Service Manual: GENERAL INFORMATION

DESCRIPTION AND OPERATION > ABOUT THIS SERVICE INFORMATION > INTRODUCTION

> *WARNING: Before beginning any service procedure in this article, refer to health and safety warnings in this article. Failure to follow this instruction may result in serious personal injury.*

For additional information, refer to: Health and Safety Precautions .

This article describes and directs repair procedures specified by Ford Motor Company for the vehicle. Critical health and safety precautions are included. Anyone who deviates from these instructions risks compromising personal safety or vehicle integrity.

ARTICLE CONTENT

This service information is divided into articles. Article contents may include:

- Specifications
  - Fluid capacities, component specifications and torque values not covered in other procedures
- Description and Operation
  - Overview of the system, component locations, and system operation
- Diagnosis and Testing
  - Symptom charts, DTC charts and diagnostic tests
  - See the Diagnosis and Testing Information in this article
- General Procedures
  - Service adjustments, electronic programming and other special procedures
- Removal and Installation
  - Component removal and installation instructions
- Removal
  - Component removal instructions
- Installation
  - Component installation instructions
- Disassembly and Assembly
  - Component disassembly and assembly instructions

- Disassembly and Assembly of Subassemblies
    - Assembly disassembly and assembly instructions

IMPORTANT INFORMATION

General Information articles contains the following important information (including this article):

- Critical Health and Safety Precautions - service safety precautions applicable to the entire article. For additional information, refer to: Health and Safety Precautions .
- A Symbols Glossary - definitions of the action directed by each symbol. For additional information, refer to: Symbols Glossary .
- Diagnostic Methods - support information for diagnostics.

DESCRIPTION AND OPERATION > ABOUT THIS SERVICE INFORMATION > WARNINGS, NOTICES AND NOTES

WARNINGS

Warnings provide information to avoid personal injury and to make sure service actions on critical safety systems are performed correctly. Warnings that apply to an entire system or service information article are located in Health and Safety Precautions .

NOTICES (in some publications, CAUTIONS)

Notices provide information to avoid damage to the vehicle or a component.

NOTES

Notes provide information critical for a complete and effective repair.

Warnings, Notices, or Notes that apply to an entire procedure will be placed at the beginning of the procedure. Warnings, Notices, or Notes that apply to a single step are placed at the beginning of the step. Those that apply to a group of steps will be placed at the first step requiring it.

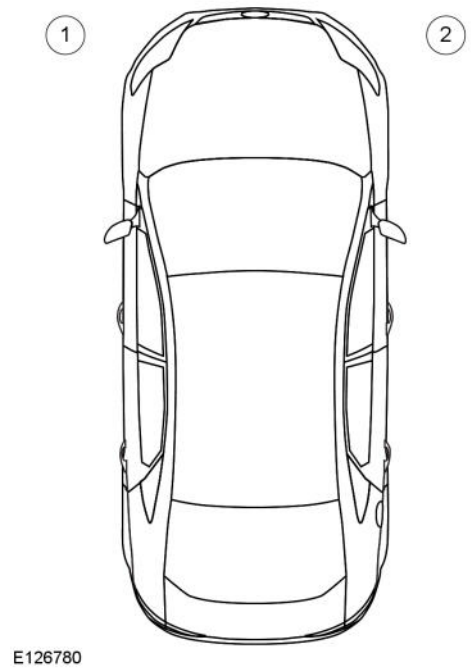
DESCRIPTION AND OPERATION > ABOUT THIS SERVICE INFORMATION > SPECIFIED CHEMICALS OR MATERIALS

Throughout this service information, chemicals or materials are specified that must be used to properly complete a service procedure or diagnostic step. In the event a specific material is not readily available, a substitute material meeting the same specification may be used. Ford has not reviewed third party products for compliance with environmental, health or safety regulations and is not responsible for their use. Use of third party products is at your own risk. Additionally, such products may cause degraded performance, premature failures, and/or vehicle component damage. All chemicals or materials used for vehicle servicing should be checked for compliance with local environmental and health and safety regulations.

DESCRIPTION AND OPERATION > ABOUT THIS SERVICE INFORMATION > LH AND RH DESIGNATIONS

All LH and RH designations are oriented from the driver's seat position looking forward.

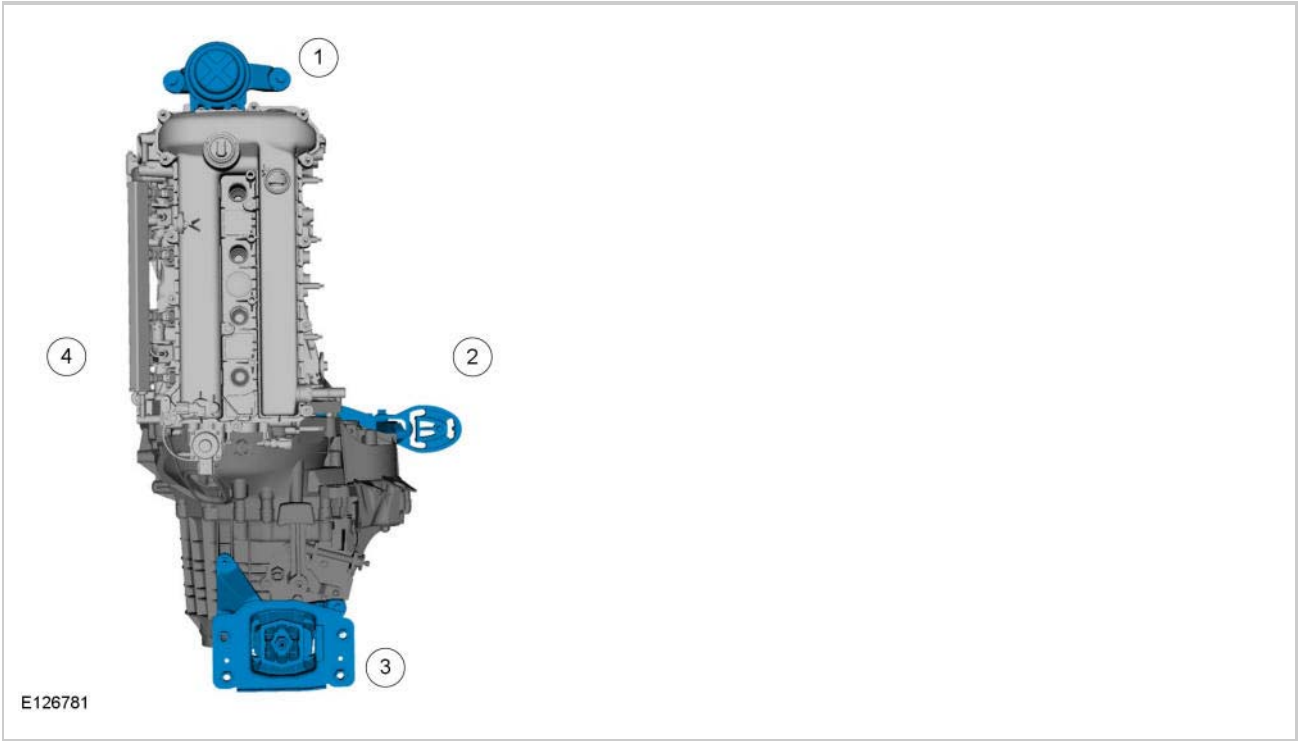
Vehicle LH and RH definition



Item	Part Number	Description
1	-	LH (left-hand)
2	-	RH (right-hand)

All LH and RH engine designations are oriented from the flywheel position looking toward the crankshaft pulley.

Powertrain LH and RH definition



Item	Part Number	Description
1	-	Front
2	-	RH (right-hand)
3	-	Rear
4	-	LH (left-hand)

DESCRIPTION AND OPERATION > ABOUT THIS SERVICE INFORMATION > STANDARD PRACTICES

The following rules apply, unless specified differently in the procedure:

FASTENERS

- Reuse standard fasteners.
- Replace fasteners with self-locking features.
    - Examples of fastener self-locking coatings or mechanical locking (with the locking features highlighted yellow) are shown in the illustration.
- Replace fasteners with torque angle specifications (those tightened a specified number of degrees).

Examples of self-locking nuts and bolts



Item	Part Number	Description
1	-	Completely coated self-locking bolt
2	-	Partially coated self-locking bolt
3	-	Self-locking bolt with a locking washer
4	-	Self-locking nut with a plastic locking insert
5	-	Self-locking nut with thread deformation (3 indentations)
6	-	Self-locking nut with thread deformation (to oval shape)
7	-	Self-locking nut with integrated locking ring

SEALS AND GASKETS

Replace seals and gaskets, unless specified differently in the procedure.

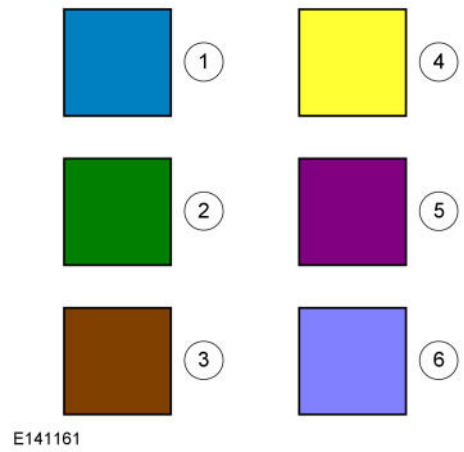
EXTERIOR TRIM PARTS

Replace exterior trim parts fastened with glue or adhesive tape, unless specified differently in the procedure.

DESCRIPTION AND OPERATION > ABOUT THIS SERVICE INFORMATION > MECHANICAL PROCEDURES

Illustrations in this service information may be used instead of written step instructions. Color-coding (see color scheme illustration) is used to communicate the required step action or actions. Service action icons may be used to add information regarding the required action. For additional information, refer to: Symbols Glossary .

Illustration Color-coding



Item	Part Number	Description
1	-	Blue - Target or primary component to be removed/installed (or disassembled/assembled).
2	-	Green - Components that need to be removed prior to or installed after the target/primary.
3	-	Brown - Components that need to be removed prior to or installed after the target/primary.
4	-	Yellow - Components to be set aside for access, but not removed. Also highlighted areas to inspect or adjust.
5	-	Magenta - Electrical connectors and fasteners such as nuts, bolts, clamps, or clips to be: detached, attached, loosened, moved, removed or installed.
6	-	Pale Blue - Special tool(s), general equipment, or common tools used in an uncommon way.

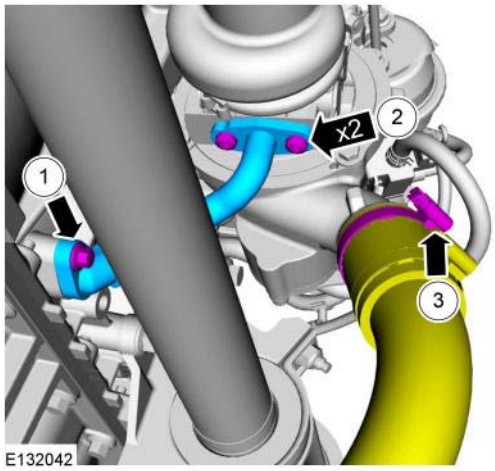
Other color coding

- Alternating Blue and White
  - Chemical, adhesive or sealer apply areas
- Red
  - Sectioned or cut-away areas
- Grey
  - Background components shown for location information

ILLUSTRATION TASK SEQUENCE

Components that must be removed or installed in a specific sequence are identified with a numbered callout. Any associated step text is numbered accordingly.

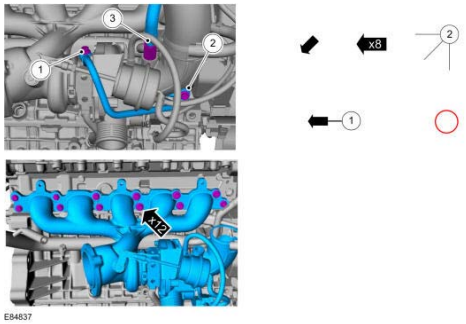
Simple procedure example showing color-coding and task sequence.



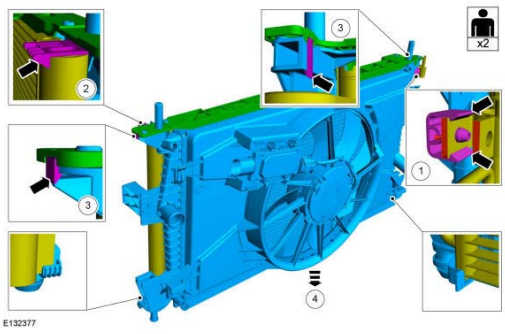
Black arrows are used to draw attention to components (usually fasteners). Arrows with multiples specified (here, x2) identify an identical number of fasteners or items. Callouts (numbers inside circles) show a required sequence or tightening torque.

In the illustration, the callouts indicate the removal sequence, **which is reversed for installation** . The yellow coloring of the hose indicates it is to be positioned aside (not removed). Two identical (magenta-colored) fasteners are indicated by the x2 arrow. The fasteners in this illustration require different torques (same torque for the x2 fasteners) so numbered callouts are used to identify them with torque values in the associated step text. The (magenta-colored) hose clamp is another fastener to be removed.

Examples of fastener removal sequence and an identical service action for 12 fasteners. Other possible symbols are shown on the right.



Example of fastener sequence information with two persons required for the service action

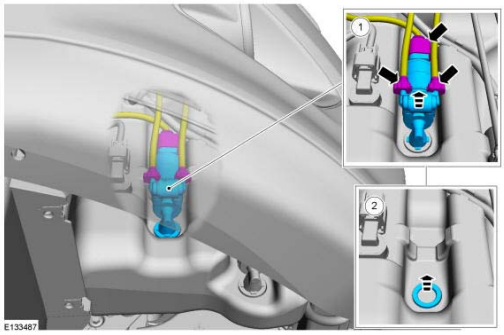


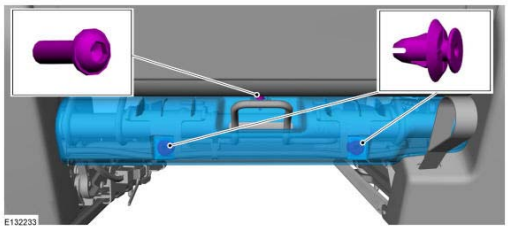
HIDDEN DETAILS

Separate detail boxes or transparent components may be used to show hidden items in an illustration.

Example of hidden fastener information



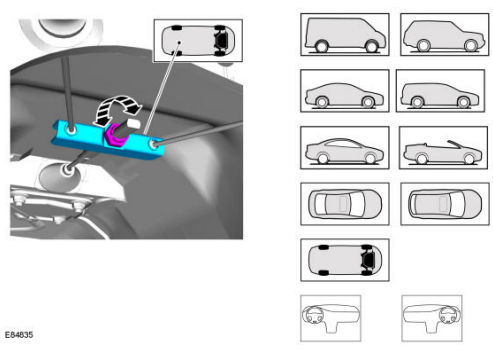




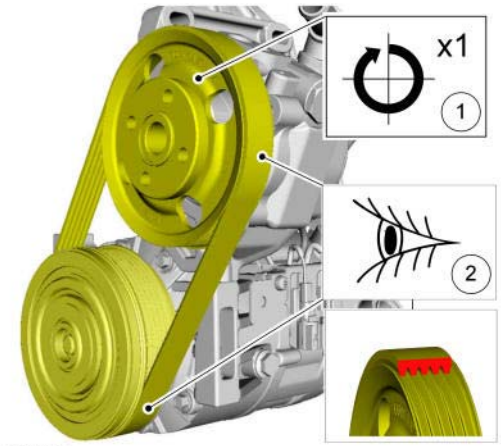
SERVICE ACTION ICONS

Service action icons may be used to add information regarding the required action. For additional information, refer to: Symbols Glossary .

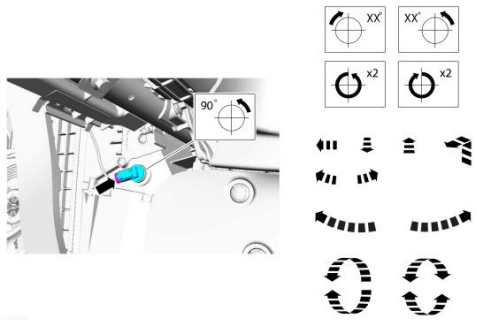
Location symbols show the location of a component or system on the vehicle.



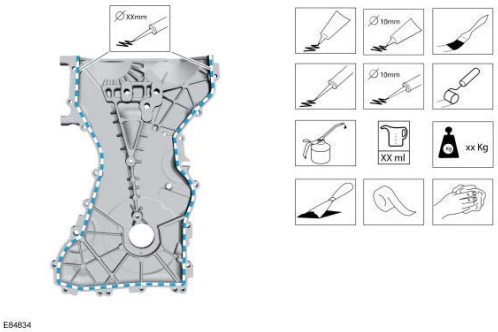
Example of service action icons pointing to highlighted components.



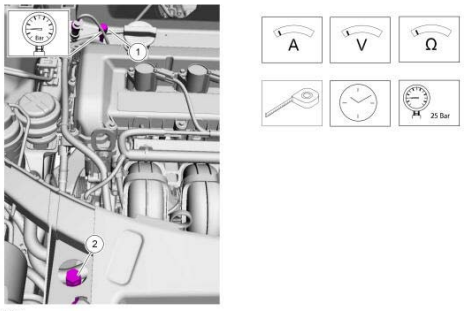
Movement arrows and service action icons show three dimensional or rotational movements.



Color-coding and service action icons show application of sealer, lubricant, weight, tape or cleaning liquid.



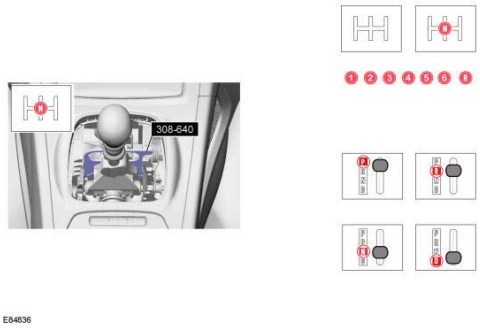
Measurement symbols provide the information required to perform a specific measurement. These symbols may include specific values.



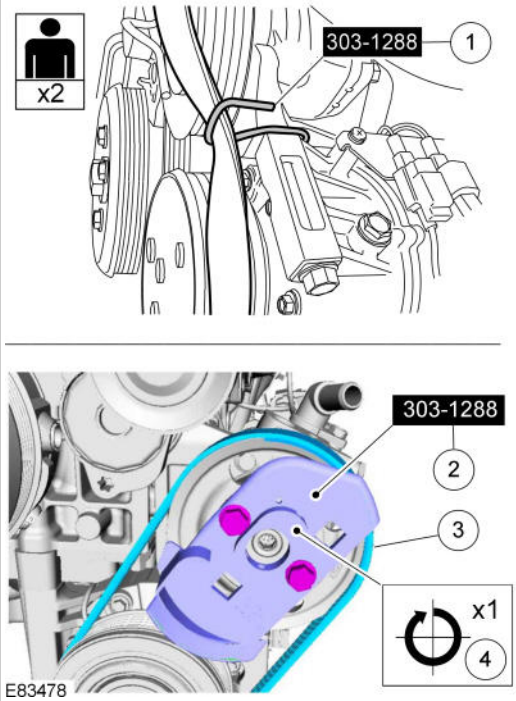
SPECIAL TOOLS, EQUIPMENT, MATERIALS AND TORQUE VALUES

When Ford special tools are required for the procedure, the tool and tool number are shown in an illustration. Special tool numbers, general equipment, materials or torque values for the procedure step are shown in the text steps.

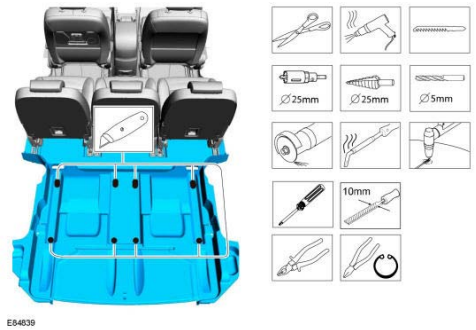
Example of special service tool and symbol used to hold the gear shift in the required gear position. Other possible symbols are shown on the right.



Example of two illustrations used together with sequence steps, service action icons and special service tools



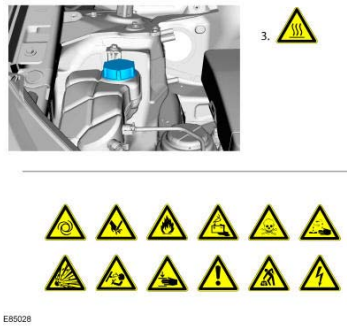
Tool symbols direct the use of standard tools. The tool size or dimension may be specified.



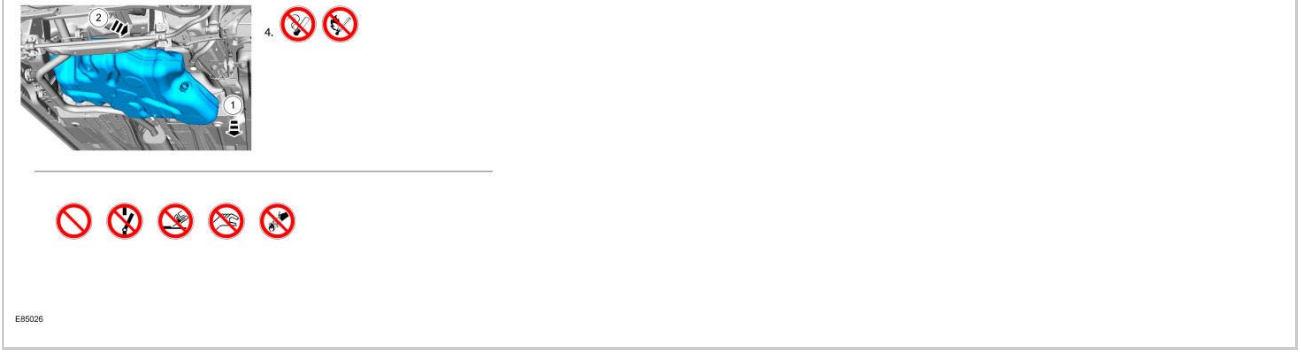
HEALTH AND SAFETY SYMBOLS

Some procedures may contain health and safety symbols that are associated with a specific service action. For additional information, refer to: Symbols Glossary . Always read and understand all health and safety precautions before beginning any procedure. For additional information, refer to: Health and Safety Precautions .

ISO warning symbols may be used to indicate potential hazards.



These symbols prohibit various hazardous actions



These symbols direct the use of personal protection equipment



DESCRIPTION AND OPERATION > ABOUT THIS SERVICE INFORMATION > DIAGNOSIS AND TESTING INFORMATION

ELEMENTS OF DIAGNOSIS AND TESTING

Diagnosis and Testing may include:

- Preliminary Inspection
    - In older service information, Inspection and Verification
- Symptom Chart
- DTC Chart
- Pinpoint Tests
- Component Tests

Some diagnostics may be contained in Symptom Based Diagnostics. Some engine performance and emission diagnostics may be placed in a separate "Engine Controls" article.

MODULE NAMES MATCH THE DIAGNOSTIC SCAN TOOL

Module names and PID names in this service information match the Ford diagnostic scan tool: IDS.

The same diagnostic scan tool module name is found in some DTC definitions (for example, U024B Lost

Communication with Seat Control Module "G").

MODULE DESCRIPTIVE NAMES

A descriptive name is sometimes added to the diagnostic scan tool name to clarify module function. The descriptive name will be followed by the diagnostic scan tool acronym in brackets.

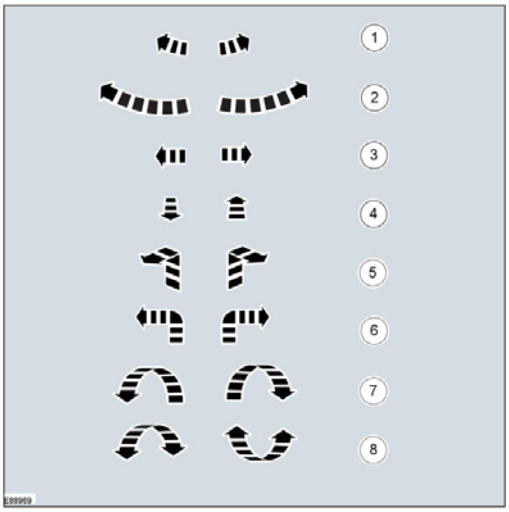
- Example: "Driver Active Motion Seat Module [SCMG]".
- Driver Active Motion Seat Module is the descriptive name added to clarify the function of the SCMG.
- The SCMG acronym is used by diagnostic scan tool, defined as "Seat Control Module G".

DESCRIPTION AND OPERATION > SYMBOLS GLOSSARY

Symbols are used inside the graphics and in the text area to enhance the information display.

Movement Symbols

Movement symbols provide detailed information to a required component movement. These component movements can be rotational or 1-3 dimensional movements.

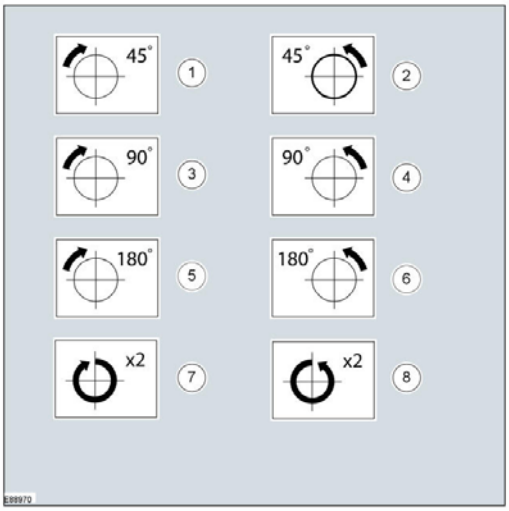


Item	Part Number	Description
1	-	Minor component movement clockwise/counterclockwise
2	-	Major component movement clockwise/counterclockwise
3	-	Component movement to the left/right/up/down
4	-	Component movement towards/away
5	-	3 dimensional component movement
6	-	2 dimensional component movement
7	-	3 dimensional component rotation

8	-	3 dimensional component cycling

Turn Symbols

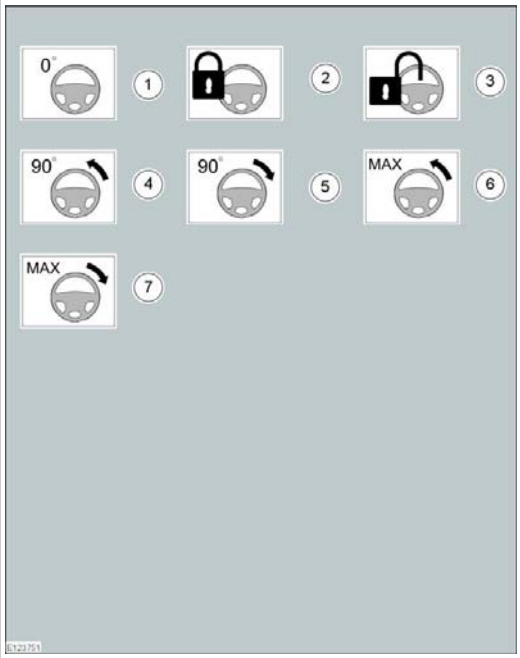
Turn symbols are used to provide further information on the direction or angle of component turns.



Item	Part Number	Description
1	-	Turn the component clockwise through 45 °
2	-	Turn the component counterclockwise through 45 °
3	-	Turn the component clockwise through 90 °
4	-	Turn the component counterclockwise through 90 °
5	-	Turn the component clockwise through 180 °
6	-	Turn the component counterclockwise through 180 °
7	-	Turn the component clockwise through 2 complete turns
8	-	Turn the component counterclockwise through 2 complete turns

Steering Wheel Symbols

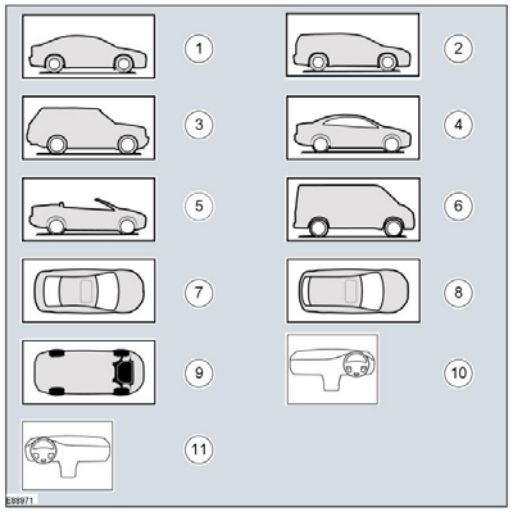
Steering wheel symbols are used to provide further information to a required steering wheel position or steering column lock status.



Item	Part Number	Description
1	-	Steering wheel in straight ahead position
2	-	Steering column lock locked
3	-	Steering column lock unlocked
4	-	Turn the steering wheel to the 90 ° left position
5	-	Turn the steering wheel to the 90 ° right position
6	-	Turn the steering wheel to the left-hand end position
7	-	Turn the steering wheel to the right-hand end position

Body Types

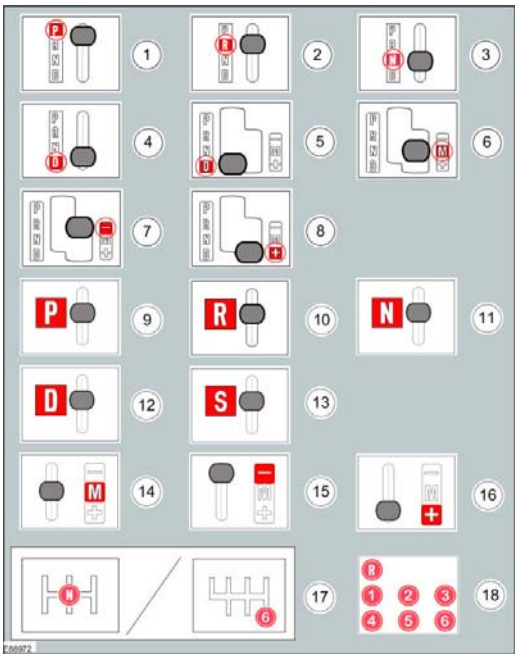
Body type symbols are used to identify different body configurations.



Item	Part Number	Description
1	-	3, 4, 5-door body style
2	-	Wagon body style
3	-	Sports utility vehicle body style
4	-	Coupe body style
5	-	Convertible body style
6	-	Van body style
7	-	3, 4, 5-door body style - Top View
8	-	Wagon body style - Top View
9	-	Underview
10	-	Right-hand drive (RHD) vehicle
11	-	Left-hand drive (LHD) vehicle

Gearshift lever and selector lever position symbols

Gearshift lever and selector lever position symbols are used to show the lever position that is required to be selected to carry out a procedure step.

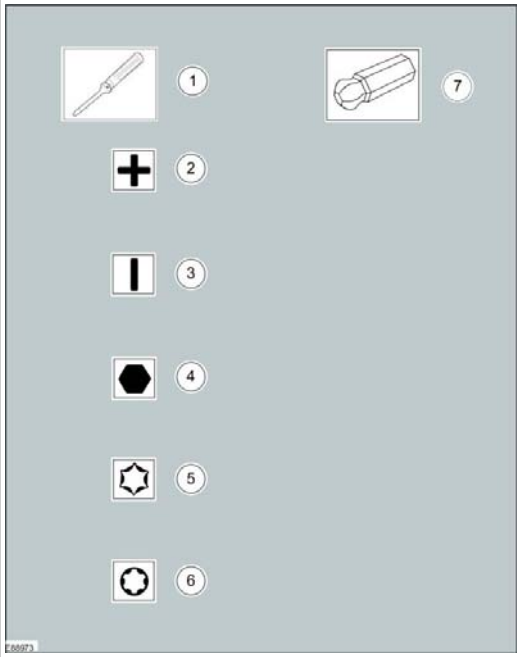


Item	Part Number	Description
1	-	Replaced by symbol 9
2	-	Replaced by symbol 10
3	-	Replaced by symbol 11
4	-	Replaced by symbol 12

5	-	Replaced by symbol 12
6	-	Replaced by symbol 14
7	-	Replaced by symbol 15
8	-	Replaced by symbol 16
9	-	Set the selector lever to the park (P) position
10	-	Set the selector lever to the reverse (R) position
11	-	Set the selector lever to the neutral (N) position
12	-	Set the selector lever to the drive (D) position
13	-	Set the selector lever to the drive (S) position
14	-	Set the selector lever to the drive (M) position
15	-	Set the selector lever to the drive (-) position
16	-	Set the selector lever to the drive (+) position
17	-	Set the gearshift lever to the neutral (N) position
18	-	Further gearshift lever positions that may appear in illustrations

Screwdriver symbols

The screwdriver symbols are used to show which screwdriver bit is recommended to carry out a procedure step.

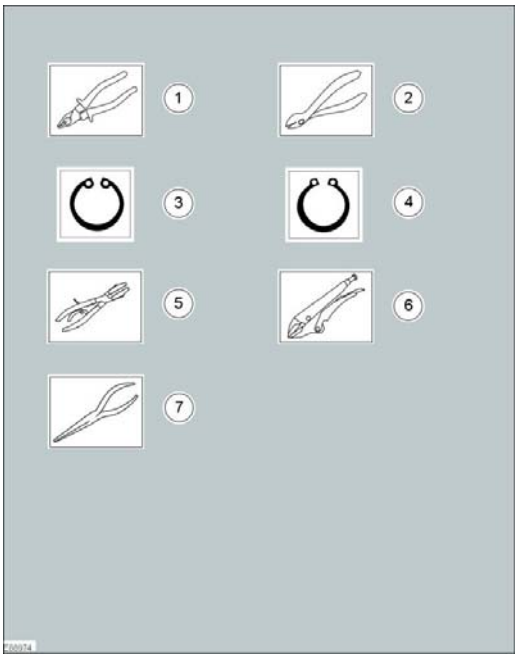


Item	Part Number	Description
1	-	Screwdriver
2	-	Cross bladed screwdriver / Cross bladed Bit Socket

3	-	Flat bladed screwdriver / Flat bladed Bit Socket
4	-	Hexagonal screwdriver / Hexagonal Bit Socket
5	-	TORX screwdriver / TORX Bit Socket
6	-	Polydrive screwdriver / Polydrive Bit Socket
7	-	Ball drive hex bit

Pliers symbols

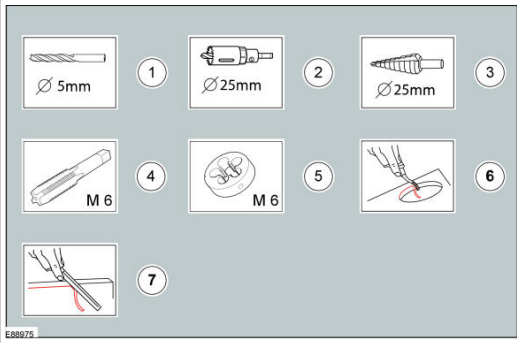
The pliers symbols are used to show which pliers is recommended to carry out a procedure step.



Item	Part Number	Description
1	-	Combination pliers
2	-	Side cutter pliers
3	-	Securing ring - inner
4	-	Securing ring - outer
5	-	Hose clamp pliers
6	-	Locking pliers
7	-	Long nose pliers

Drill symbols

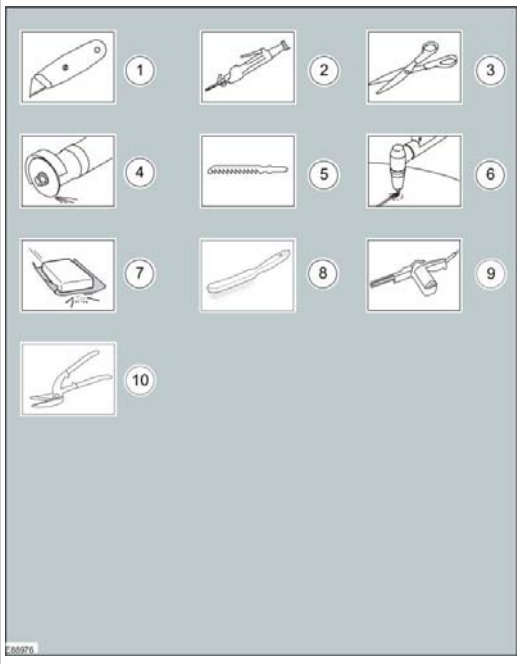
The drill symbols are used to show which type and size of drill bit is recommended to carry out a procedure step.



Item	Part Number	Description
1	-	Drill bit with a specified diameter
2	-	Hole saw with a specified diameter
3	-	Stepped drill bit with a specified diameter
4	-	Tap with a specified diameter
5	-	Die with a specified diameter
6	-	Scraper for circular holes
7	-	Scraper for straight edges

Cutting tool symbols

The cutting tool symbols are used to show which type of cutting tool is recommended to carry out a procedure step.

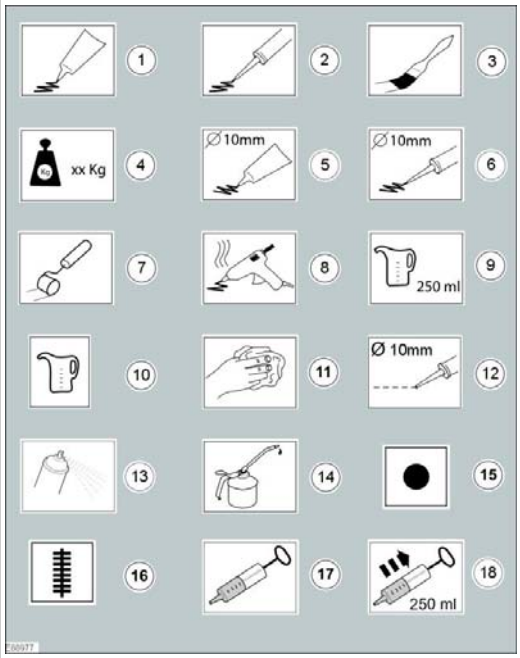


Item	Part Number	Description
1	-	Cutting knife

2	-	Air body saw
3	-	Scissors
4	-	Grinder
5	-	Jig saw
6	-	Plasma cutter
7	-	Sanding Paper
8	-	Wire brush
9	-	Belt Sander
10	-	Tin Snipes

Apply Chemical or load symbols

The apply chemical or load symbols are used to show where to apply which type of chemical or load to carry out a procedure step.

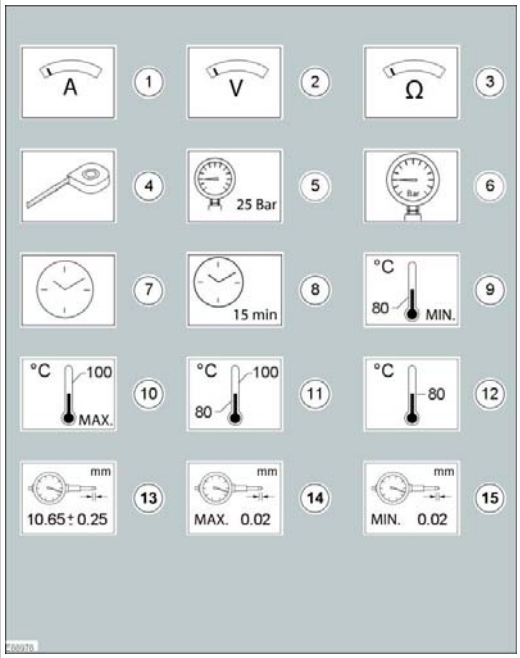


Item	Part Number	Description
1	-	Apply the substance from the specified tube
2	-	Apply the substance from the specified cartridge
3	-	Apply the specified chemical with a brush
4	-	Apply the specified load to the specified component
5	-	Apply a bead with a specific diameter from the specified tube
6	-	Apply a bead with a specific diameter from the specified cartridge
7	-	Apply the specified chemical with a roller

8	-	Apply hot glue to the specified component
9	-	Apply the specified amount of fluid from the fluid can
10	-	Apply fluid from the fluid can
11	-	Clean the specified component with the specified material
12	-	Apply a broken bead from the specified tube
13	-	Apply the specified chemical from a spray can
14	-	Apply the specified lubricant to the specified component
15	-	Apply spot welds to the specified component
16	-	Apply a continuous weld to the specified component
17	-	Handle the fluid using a syringe
18	-	Extract the specified amount of fluid using a syringe

Measurement symbols

The measurement symbols are used to show where to measure which type of measurement to carry out a procedure step.

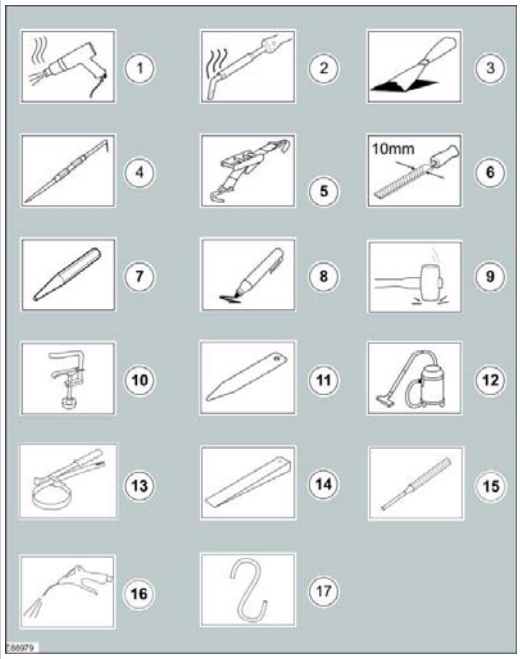


Item	Part Number	Description
1	-	Measure the current using a digital multimeter
2	-	Measure the voltage using a digital multimeter
3	-	Measure the resistance using a digital multimeter
4	-	Measure the length/distance

5	-	Check that the specified pressure is available using a suitable pressure gauge
6	-	Measure the pressure at the specified port using a suitable pressure gauge
7	-	Measure the time using a suitable stopwatch
8	-	Wait for the specified period of time
9	-	The specified task requires the specified minimum temperature
10	-	The specified task requires the specified maximum temperature not to be exceeded
11	-	The specified task requires the specified temperature range
12	-	The specified task requires the specified temperature
13	-	Measure and check for the specified value using a dial indicator gauge
14	-	Measure and check for the specified MAX value using a dial indicator gauge
15	-	Measure and check for the specified MIN value using a dial indicator gauge

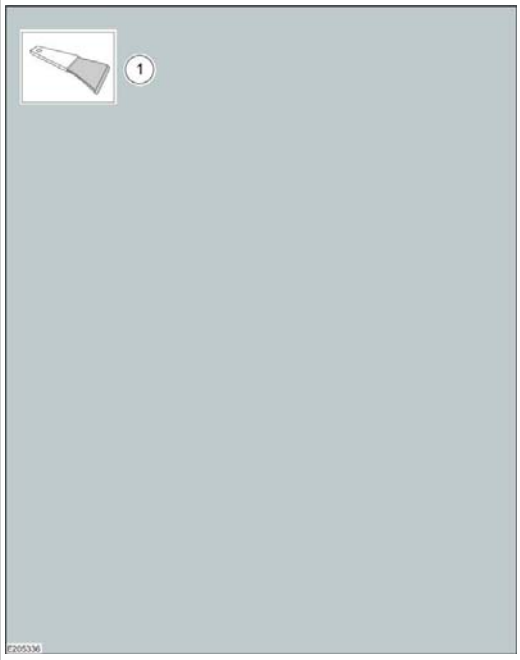
General equipment symbols

The general equipment symbols are used to show where to use which type of general equipment to carry out a procedure step.



Item	Part Number	Description
1	-	Hot air gun
2	-	Soldering iron
3	-	Scraper
4	-	Scriber

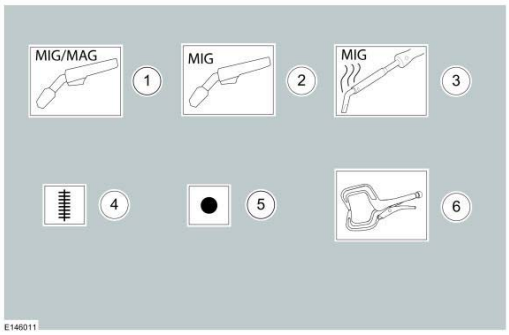
5	-	Securing strap
6	-	File with a specified size
7	-	Center punch
8	-	Marker
9	-	Mallet
10	-	Hose clamp
11	-	Interior trim remover
12	-	Vacuum cleaner
13	-	Strap wrench
14	-	Wedge
15	-	Pin Punch
16	-	Air blow gun
17	-	Relocate and support the component
18	-	C-clamp



Item	Part Number	Description
1	-	Plastic scraper

Welding symbols

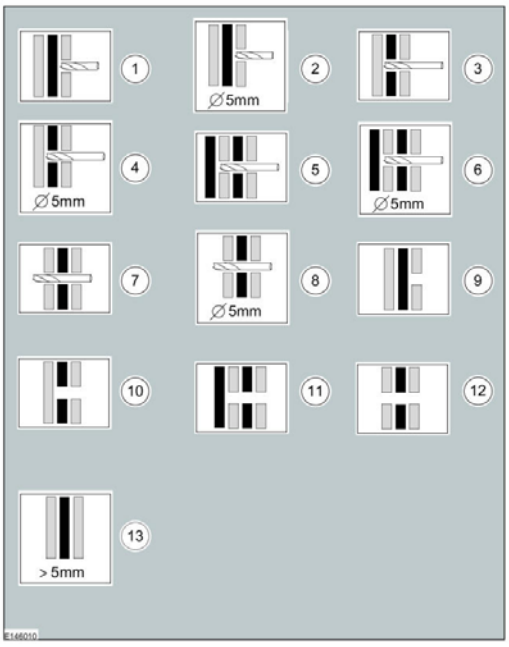
These symbols indicate the type of welding to be used.



Item	Part Number	Description
1	-	Metal inert gas (MIG) / Metal active gas (MAG) welding equipment
2	-	Metal inert gas (MIG) welding equipment
3	-	Metal inert gas (MIG) brazing equipment
4	-	Apply a continuous weld to the specified component
5	-	Apply spot welds to the specified component
6	-	C-clamp

Drilling and grinding symbols

These symbols indicate the type of drilling or grinding to be used.

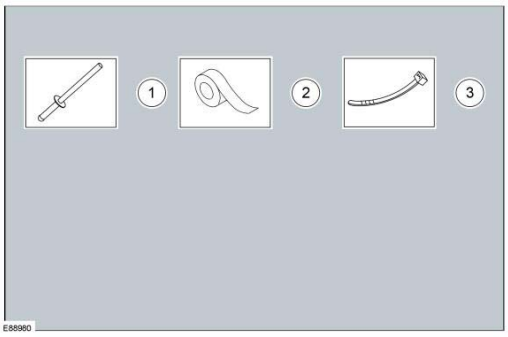


Item	Part Number	Description
1	-	Drill through first body layer with a suitable diameter
2	-	Drill through first body layer with the specified diameter
3	-	Drill through the indicated number of body layers with a suitable diameter

4	-	Drill through the indicated number of body layers with the specified diameter
5	-	Drill through the indicated number of body layers with a suitable diameter
6	-	Drill through the indicated number of body layers with the specified diameter
7	-	Drill through all body layers with a suitable diameter
8	-	Drill through all body layers with the specified diameter
9	-	Grind one layer
10	-	Grind two layers
11	-	Grind to last layer
12	-	Grind all layers
13	-	Material thickness > Xmm

Material symbols

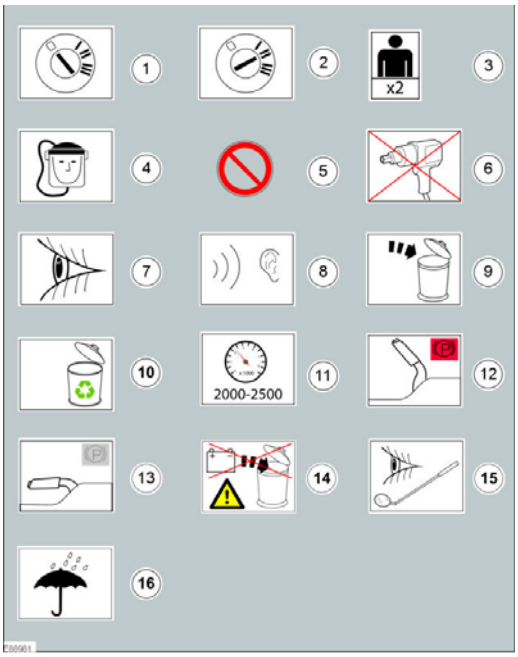
The material symbols are used to show where to use which type of material to carry out a procedure step.



Item	Part Number	Description
1	-	Remove/Install the specified blind rivet
2	-	Apply tape to the specified component/area
3	-	Remove/Install the specified cable tie

Miscellaneous symbols

These symbols provide further information that is required to carry out a procedure step.

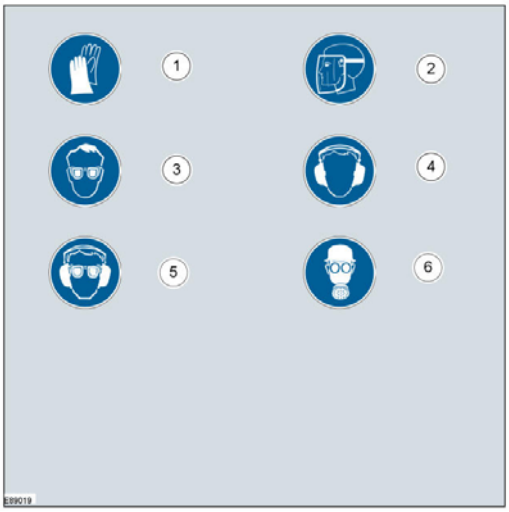


Item	Part Number	Description
1	-	Set the ignition switch to the 0 position
2	-	Set the ignition switch to the II position
3	-	The procedure step requires the aid of the specified number of supporting technicians
4	-	Self contained breathing apparatus
5	-	General prohibition used in combination with another symbol
6	-	Do not use power tools
7	-	Visual check
8	-	Noise check
9	-	Dispose the specified component
10	-	Replaced by item 9 (Dispose the specified component)
11	-	Set the engine speed to the specified value
12	-	Fully apply the parking brake lever
13	-	Fully release the parking brake lever
14	-	Do not dispose of batteries into the waste bin
15	-	Visual check using a mirror
16	-	Area/component must be dry

Mandatory Protective equipment - Health and safety symbols

The protective equipment symbols advise to use a mandatory protective equipment to avoid or at least

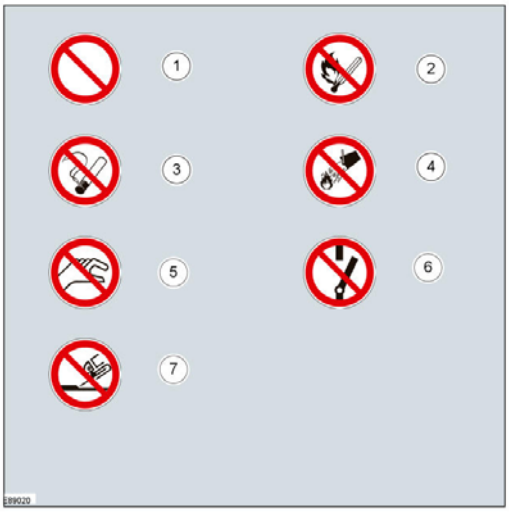
reduce possible health and safety risks.



Item	Part Number	Description
1	-	Wear protective gloves
2	-	Wear face guard
3	-	Wear safety goggles
4	-	Wear ear protectors
5	-	Wear safety goggles and ear protectors
6	-	Wear a respirator

Prohibition - Health and safety symbols and component damage

The prohibition symbols are used to prohibit the specified actions to avoid or at least reduce possible component damage and health and safety risks.

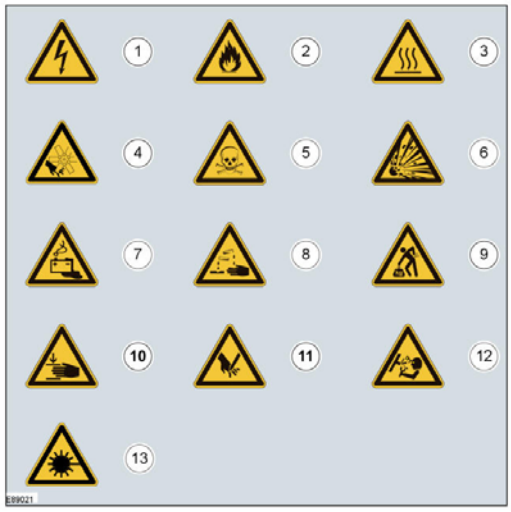


Item	Part Number	Description

1	-	General prohibition symbol
2	-	No naked flames
3	-	No smoking
4	-	No water
5	-	Do not touch
6	-	Do not switch
7	-	No grinding

Warning symbols - Health and safety and component damage

The warning symbols are used to advise on hazardous conditions to avoid or at least reduce possible component damage and health and safety risks.

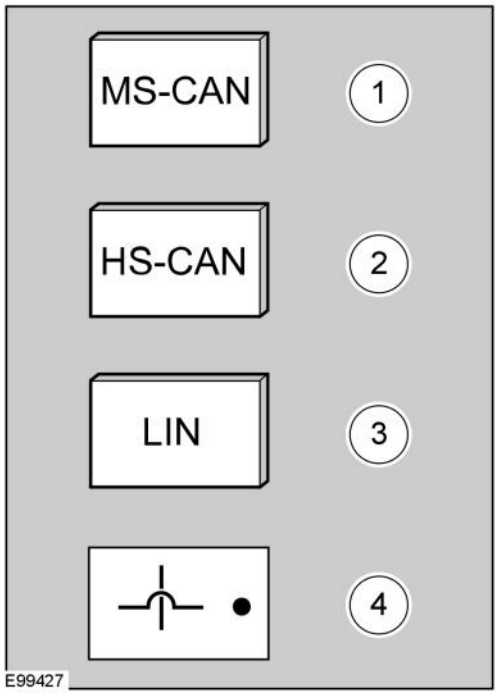


Item	Part Number	Description
1	-	Hazardous voltage/Electrical shock/Electrocution
2	-	Fire Hazard/Highly flammable
3	-	Burn hazard/Hot surface
4	-	Automatic start-up
5	-	Toxic
6	-	Explosive material
7	-	Battery hazard
8	-	Corrosive material
9	-	Lifting hazard
10	-	Hand crush/Force from above
11	-	Cutting of fingers or hand

12	-	Pressure hazard
13	-	Invisible laser radiation. Do not view directly with optical instruments (magnifiers). Class 1M laser product

Control Diagram symbols - Description and Operation procedures

These symbols provide further information on the type of connectivity, direction of flow or type of data bus of a system.



Item	Part Number	Description
1	-	Mid-speed Controller Area Network (CAN)
2	-	High-speed Controller Area Network (CAN)
3	-	Local Interconnect Network (LIN)
4	-	Wires crossing not connected

DESCRIPTION AND OPERATION > BATTERY AND BATTERY CHARGING HEALTH AND SAFETY PRECAUTIONS

WARNING: Batteries contain sulfuric acid and produce explosive gases. Work in a well-ventilated area. Do not allow the battery to come in contact with flames, sparks or burning substances. Avoid contact with skin, eyes or clothing. Shield eyes when working near the battery to protect against possible splashing of acid solution. In case of acid contact with skin or eyes, flush immediately with water for a minimum of 15 minutes, then get prompt medical attention. If acid is swallowed, call a physician immediately. Failure to follow

these instructions may result in serious personal injury.

WARNING: Always lift a plastic-cased battery with a battery carrier or with hands on opposite corners. Excessive pressure on the battery end walls may cause acid to flow through the vent caps, resulting in personal injury and/or damage to the vehicle or battery.

WARNING: Battery posts, terminals and related accessories contain lead and lead components. Wash hands after handling. Failure to follow these instructions may result in serious personal injury.

DESCRIPTION AND OPERATION > BODY REPAIR HEALTH AND SAFETY AND GENERAL PRECAUTIONS

WARNING: Always refer to Material Safety Data Sheet (MSDS) when handling chemicals and wear protective equipment as directed. Examples may include but are not limited to respirators and chemically resistant gloves. Failure to follow these instructions may result in serious personal injury.

WARNING: Always wear protective equipment including eye protection with side shields, and a dust mask when sanding or grinding. Failure to follow these instructions may result in serious personal injury.

WARNING: Do not carry out body side sectioning repairs in areas of door hinge or striker anchoring points. Welding within 50 mm (1.96 in) of door hinge or striker locations may compromise structural integrity during a collision. Failure to follow these instructions may result in serious injury to vehicle occupant(s).

WARNING: Invisible ultraviolet and infrared rays emitted in welding can injure unprotected eyes and skin. Always use protection such as a welder's helmet with dark-colored filter lenses of the correct density. Electric welding will produce intense radiation, therefore, filter plate lenses of the deepest shade providing adequate visibility are recommended. It is strongly recommended that persons working in the weld area wear flash safety goggles. Also wear protective clothing. Failure to follow these instructions may result in serious personal injury.

WARNING: All safety belt components must be inspected and corrected as part of any collision repair. Inspect all safety belt components as prescribed by SEATBELT

PROCEDURE AFTER A COLLISION . Failure to follow this instruction may result in incorrect operation of the safety belt system and increase the risk of serious personal injury or death in a crash.

WARNING: If a vehicle has been in a crash, inspect the restraints control module (RCM) and the impact sensor (if equipped) mounting areas for deformation. If damaged, restore the mounting areas to the original production configuration. A new RCM and sensors must be installed whether or not the air bags have deployed. Failure to follow these instructions may result in serious personal injury or death in a crash.

WARNING: Collision damage repair must conform to the instructions contained in this service information. Replacement components must be new, genuine Ford Motor Company parts. Recycled, salvaged, aftermarket or reconditioned parts (including body parts, wheels or safety restraint components) are not authorized by Ford.

Departure from the instructions provided in this service information, including alternate repair methods or the use of substitute components, risks compromising crash safety. Failure to follow these instructions may adversely affect structural integrity and crash safety performance, which could result in serious personal injury to vehicle occupants in a crash.

DESCRIPTION AND OPERATION > BRAKE AND CLUTCH SYSTEMS HEALTH AND SAFETY PRECAUTIONS

WARNING: Do not use any fluid other than clean brake fluid meeting manufacturer's specification. Additionally, do not use brake fluid that has been previously drained. Following these instructions will help prevent system contamination, brake component damage and the risk of serious personal injury.

WARNING: Do not breathe dust or use compressed air to blow dust from storage containers or friction components. Remove dust using government-approved techniques. Friction component dust may be a cancer and lung disease hazard. Exposure to potentially hazardous components may occur if dusts are created during repair of friction components, such as brake pads and clutch discs. Exposure may also cause irritation to skin, eyes and respiratory tract, and may cause allergic reactions and/or may lead to other chronic health effects. If irritation persists, seek medical attention or advice. Failure to follow these instructions may result in serious personal injury.

NOTE: If the brake fluid is spilled on the paintwork, the affected area must be immediately washed down with cold water.

DESCRIPTION AND OPERATION > CLIMATE CONTROL SYSTEM HEALTH AND SAFETY PRECAUTIONS

WARNING: Air conditioning R-134a liquid refrigerant is capable of harming eyes or freezing skin. Always wear safety goggles and avoid contact with liquid refrigerant. Failure to follow these instructions may result in serious personal injury.

WARNING: Air conditioning R-134a refrigerant gas is capable of displacing the air necessary for breathing in a confined space and can produce toxic gasses if burned at high temperatures. Do not release a large quantity of R-134a gas within a confined space or allow it to be exposed to a high temperature flame (such as a torch). Consult the Material Safety Data Sheet for further information. Failure to follow these instructions may result in serious personal injury or death.

WARNING: Use extreme care and observe all safety and service precautions related to the use of refrigerants as outlined on refrigerant tank and on recovery and charging equipment. Failure to follow these instructions may result in serious personal injury.

WARNING: Before disconnecting any heater water hoses, shut OFF the engine and wait until engine is fully cool. Failure to comply with this warning may result in serious injury or burns from hot liquid escaping from the engine cooling system.

WARNING: The electric booster heater may become hot during use and can burn unprotected skin. Allow enough time for the heater to cool before servicing. Failure to follow this instruction may result in serious personal injury.

DESCRIPTION AND OPERATION > DIAGNOSTIC METHODS > EFFECTIVE DIAGNOSTIC TECHNIQUES

NOTE: Do not use this document in place of Ford-prescribed Symptom Based Diagnostics or service information diagnostics. Diagnostic Methods is intended to provide Ford vehicle diagnostic information only for support of Ford-prescribed diagnostics.

The following diagnostic process is critical for consistently successful diagnoses. Random methods work inconsistently and often lead to multiple repairs and the accompanying frustration.

- Understand and verify the **symptom** .
    - Understanding a symptom requires understanding normal operation.

    - Duplicate the concern. Recreate the same conditions that demonstrated the original concern (road testing may be necessary).
- Determine the responsible **system** .
    - Gather data, such as a visual inspection and an OASIS report.
    - Perform system tests, such as pressure tests or DTC retrieval.
- Identify the responsible **component** .
    - Test the suspect component and related parts.
- Determine the root **cause**
    - Examine related components (wiring faults, misalignments, incorrect adjustments) that may be the actual cause or may have caused the component failure.
    - Repair all related faults to avoid repeat failures.
    - Verify the repair has corrected the concern (and not created any new ones) using the identical conditions that demonstrated the original concern.

DESCRIPTION AND OPERATION > DIAGNOSTIC METHODS > DIAGNOSTIC SCAN TOOL TESTING

Network Test

Performing a network test is always recommended for analysis of electronic system concerns. Always solve network issues before addressing individual symptoms or DTCs.

Recommended Practices: Refer to MODULE COMMUNICATIONS NETWORK , Diagnosis and Testing, to diagnose a network outage or no response from an individual module (or modules).

Diagnostic Trouble Code Retrieval

Generally, a good diagnostic strategy is to resolve all on-demand codes related to the system concern. Retrieving all continuous DTCs can also be beneficial to understand historic issues or issues outside of the suspect system that may be affecting your concern. On-demand testing should be done to ensure the fault represented by a continuous DTC is still present.

Continuous Memory Diagnostic Trouble Codes

Modules that produce diagnostic trouble codes have a program that evaluates system conditions, normally while the vehicle or system is in use. Module inputs can be checked for values indicating an electrical fault with the monitoring circuit or component. Module outputs can be monitored for correct function. Codes are stored when predefined limits are exceeded and retained even if the ignition is turned off (generally a DTC is retained for 40+ ignition cycles). Not all continuous codes have a matching on-demand code - and vice versa. This varies with different modules. For example, some network communication codes are continuous only. It is important to note that the presence of a continuous DTC does not guarantee that the fault currently exists.

Clearing Continuous Memory Diagnostic Trouble Codes

Continuous Memory DTCs caused by the issue being repaired or created during the diagnosis and repair must be cleared or they will confuse future diagnosis.

NOTE: Do not clear DTCs from unresolved vehicle issues.

Ford On-Demand Diagnostic Trouble Codes

Ford Motor Company modules have a unique feature that performs a special diagnostic program at the request of the technician (using a diagnostic scan tool). This "On-demand" diagnostic program can exercise system outputs not normally running when the car is parked and record observed faults. These diagnostic codes are communicated to the scan tool, but are not recorded in module memory. An on-demand test is an effective tool for evaluating real input and output conditions during module activity - activity that might not normally be occurring during service bay conditions. For example, an air suspension module on-demand test can run the compressor, vent the system, and observe the report from the height sensor even when the car is already at correct trim height and not requiring height adjustment.

Network Communication Diagnostic Trouble Codes

Network DTCs (U-prefix codes) are often a result of intermittent concerns such as damaged wiring or low battery voltage occurrences. Additionally, vehicle repair procedures (such as module reprogramming or diagnostics with modules disconnected) often set network DTCs. Replacing a module to resolve a network DTC is unlikely to resolve the concern. To prevent recurrence of intermittent network concerns, inspect all network wiring, especially in-line and module connectors. Test the vehicle battery to make sure the vehicle voltage will be stable.

Recommended practice: Clear the DTC and retest. If the DTC repeats, test the vehicle communication network.

DTC Nomenclature (SAE J2012 and ISO 14229)

Many modules use 5-character DTCs followed by a 2-character failure-type code. The failure-type (sometimes called "fault byte") codes provide information about specific fault conditions such as opens or shorts to ground. Continuous memory DTCs have an additional 2-character DTC status code suffix to assist in determining DTC history.

DESCRIPTION AND OPERATION > DIAGNOSTIC METHODS > INTEGRATED DIAGNOSTIC SYSTEM SCAN TOOL USAGE

If The Integrated Diagnostic System Scan Tool Does Not Communicate With The Vehicle Communication Module

1.

Check the Vehicle Communication Module connection and power from the DLC.

2.

Check the communication between the scan tool and the Vehicle Communication Module.

3.

Follow scan tool instructions to retry.

If The Integrated Diagnostic System Scan Tool Does Not Communicate With The Vehicle

The IDS scan tool first attempts to communicate with the PCM. After establishing communication with the PCM, the scan tool then attempts to communicate with all other modules on the vehicle.

1.

Verify the scan tool operation with a known good vehicle.

2.

Verify the ignition is ON.

3.

If an IDS session cannot be established with the vehicle, (IDS may state "No communication can be established with the PCM"):

Choose "NO" when the scan tool prompts to retry communication.

Enter a PCM engineering part number, tear tag, or calibration number to identify the vehicle and start a session. These identifying numbers may be found:

The PCM engineering part number and the 4-character tear tag are printed on the PCM label.

(PTS website users only) The PCM engineering part number can be determined from OASIS using the VIN. Choose "HVBoM" from the OASIS tab menu and search Powertrain engine modules for the PCM engineering part number (If the first character is a "P" in the part number, enter only the characters following the "P" into IDS).

Establish a session based on the PCM information (above).

4.

Using the tool box menu, run the network test.

Determine if all modules on the network are unresponsive or if only the PCM does not communicate.

Recommended practice: Refer to MODULE COMMUNICATIONS NETWORK , Diagnosis and Testing, to diagnose the network outage or no response from the PCM.

DESCRIPTION AND OPERATION > DIAGNOSTIC METHODS > MEASURING AUTOMOTIVE CIRCUITS

Wiring Pin (Terminal) Fit And The Use Of Rotunda Flex Probes

- To avoid wiring pin (terminal) damage, Rotunda Flex Probes NUD105-R025D or Terminal Probe Kit 29-011A must be used to connect test equipment or jumper wires to pins (terminals).

- Male to female pin (terminal) fit is critical for correct connection and durability.
    - Pin (terminal) fit may be checked by using the mating pin (terminal) to test for normal separation force (a damaged pin or terminal will have very low separation force from the mating pin or terminal)
    - Correctly checking the separation force of small pins (terminals) may require removal of the connector terminal guide/retainer if it adds drag to the pin (terminal) insertion or removal
- Replace damaged connectors or pins (terminals).

Checking Power-Providing Circuits

- Measuring a power wire with the intended load disconnected using a Digital Multimeter (DMM) will only find open circuits (open fuse or wire).
- **Recommended practice:** Circuits carrying approximately 200-1000 mA* may be loaded with a 250-350 mA test light. Measure circuit voltage with a Digital Multimeter (DMM) while the test light is connected and illuminated. A reduction in the voltage present during test-light-loading indicates excessive circuit resistance.
- **Recommended practice:** Circuits carrying more than one ampere* should be loaded with a device requiring similar current (e.g., a headlamp bulb may be effective). A reduction in the voltage present during loading indicates excessive resistance.
- *Circuit current is matched to wire gauge/size; Examples:
    - Conductor sizes of 24 gauge (.5 mm) or smaller are generally used to carry approximately 1 ampere (1000 mA) or less. Use of the test light to load these circuits is appropriate.
    - Conductor sizes of 20 gauge (.8 mm) or larger are generally used to carry approximately 5 amperes (5000 mA) or more. Match the substitute load (measure substitute load current first as necessary) to this current level.

Checking Ground-Providing Circuits

- The best method of checking ground circuits is to measure the circuit voltage drop during component operation (or attempted operation).
- An ohmmeter may be accurately used if the battery has been disconnected.
- **Recommended practice:** Expect less than 2 ohms for most small diameter (18 gauge and smaller) wires.
- Ohmmeter accuracy is limited to circuits carrying less than approximately 5 amperes (this is due to the fact that very small resistances, undetectable by a Digital Multimeter (DMM), cause significant voltage loss in higher current circuits).
- Digital Multimeter (DMM) ohmmeter readings are easily corrupted by the normal voltage present (battery connected) in many ground circuits.
    - **Recommended practice:** Reverse the leads and check for changes in the measurement. Reversing the Digital Multimeter (DMM) lead connections should never change the resistance measurement (unless the circuit contains a semi-conductor). Measurement (non-semi-conductor) differences when leads are interchanged at the test points indicate invalid test results. The presence of voltage corrupts the reading, and causes the meter reading to change when the leads are reversed.

Checking Circuit Continuity

- **Recommended practice:** Expect less than 2 ohms of resistance for most wires.
- Ohmmeter low-resistance resolution (approximately 0.1 ohm) limits its use to circuits carrying less than approximately 5 amperes. This is due to the fact that very small resistances, below the resolution of a Digital Multimeter (DMM), cause significant voltage loss in higher current circuits.
- The Digital Multimeter (DMM) applies a small amount of voltage to the circuit or component to calculate resistance. As a result, Digital Multimeter (DMM) ohmmeters are very sensitive to any level of voltage present. Voltage present in the circuit will corrupt the Digital Multimeter (DMM) reading.

Checking For Unintended Continuity (Shorts) To Other Circuits

- A Digital Multimeter (DMM) ohmmeter may be used to detect undesired circuit connections to:
    - Ground
    - Other unpowered circuits
- **Recommended practice:** Expect greater than 10, 000 ohms of resistance between two separate circuits; the best result is an open circuit Digital Multimeter (DMM) indication (no detected resistance).
- Shorts to voltage are checked with a voltmeter
- **Recommended practice:** Turn ignition on (with battery connected) and measure the circuit for any voltage present (none should be present)

Checking Circuits By Back-Probing A Connector

- Back-probing should be a testing method of last resort. It should only be employed where a diagnostic step requires a circuit to be tested under actual operating conditions. Back-probing is a risky testing method due to the uncertainty of the probe connection and the possibility of damaging terminals.
- Do not force test leads or other probes into connectors. Adequate care must be exercised to avoid connector terminal damage while ensuring that good electrical contact is made with the circuit or terminal. Failure to follow these instructions may cause damage to wiring, terminals, or connectors and subsequent electrical faults.
    - Use back probes specifically designed for the purpose to assist in making a good test connection and to prevent connector or terminal damage during back-probing.
- Do not test for the presence of voltage at a single point where zero volts is a possible result (you cannot tell the difference between a bad probe contact and a zero volt result).
- Do not test for continuity/opens (using an ohmmeter) between two points (you cannot tell the difference between bad probe contacts and an open circuit).
- Back-probing may be used where the circuit must be analyzed with the voltage-drop method (if the circuit carries greater than 5 amperes and no other means of testing will definitively eliminate circuit resistance as a possible fault). A zero-volt result indicates incorrect test conditions (no current flow) or bad back-probe connections.
- Occasionally, module failure mode behavior will change the operation of a circuit when it is opened

for testing. Back-probing is an acceptable remedy for these testing dilemmas.

Circuit Analysis Using Jumper Wires (Creating Substitute Circuits)

- Jumper wires may be employed for circuit analysis.
- **Cautions:**
  - Always use fused jumper wires - the recommended universal-testing jumper wire fuse is 2-5 amperes; larger fuse ratings should be used only in special circumstances.
  - Use flex probes or equivalent to prevent connector terminal damage (flex probes are not intended to carry higher currents necessary to operate motors such as a cooling fan or blower motor).
  - Follow service information testing directions when using jumper wires to avoid component or harness damage due to incorrect jumper connections.
  - Never repair a circuit by adding a new wire in parallel to the old one (overlaying the circuit) without fully understanding what caused the circuit to fail. Always find, examine, and repair the fault to correct the root cause and to repair any adjacent wiring that has been damaged.

Checking Modules

- Generally, module failure rate is very low and therefore replacement modules usually do not resolve the root cause. Incorrect replacement of a module is often the result of inadequate testing.
  - Understand the correct module function.
  - Make sure programmable parameters are set correctly for the function in question (Refer to MODULE CONFIGURATION for more information).
  - Resolve DTCs first - as directed by Diagnostic Routines.
  - Test all inputs, both hard-wired and networked.
  - Test outputs (see "Checking module switching circuits" below).
  - Check applicable TSBs for module software changes (flash programming).
- Checking module switching circuits.
  - Using the scan tool module-output command function (for example, IDS Output State Control) to activate components is a fast way to confirm an output is capable of being switched on by the module. Testing that reveals normal module-output function confirms the need to analyze the module inputs.
  - Don't apply ground or power directly to module-switched components with jumper wires (unless directed by a service information procedure), as the component could be damaged by a direct connection to ground/power.

DESCRIPTION AND OPERATION > DIESEL FUEL SYSTEM HEALTH AND SAFETY PRECAUTIONS

WARNING: Vehicles with scheduled remote start technology may start at any time. Make sure the scheduled remote start system is disabled when servicing or working in close proximity to rotating engine parts. Failure to follow this instruction may result in serious personal injury.

WARNING: Do not work on the fuel system until the pressure has been released and the engine has cooled. Fuel in the high-pressure fuel system is hot and under very high pressure. High-pressure fuel may cause cuts and contact with hot fuel may cause burns. Failure to follow these instructions may result in serious personal injury.

DESCRIPTION AND OPERATION > ENGINE COOLING SYSTEM HEALTH AND SAFETY PRECAUTIONS

WARNING: Always allow the engine to cool before opening the cooling system. Do not unscrew the coolant pressure relief cap when the engine is operating or the cooling system is hot. The cooling system is under pressure; steam and hot liquid can come out forcefully when the cap is loosened slightly. Failure to follow these instructions may result in serious personal injury.

DESCRIPTION AND OPERATION > GASOLINE AND GASOLINE-ETHANOL FUEL SYSTEMS HEALTH AND SAFETY PRECAUTIONS

WARNING: Before working on or disconnecting any of the fuel tubes or fuel system components, relieve the fuel system pressure to prevent accidental spraying of fuel. Fuel in the fuel system remains under high pressure, even when the engine is not running. Failure to follow this instruction may result in serious personal injury.

WARNING: Do not smoke, carry lighted tobacco or have an open flame of any type when working on or near any fuel-related component. Highly flammable mixtures are always present and may be ignited. Failure to follow these instructions may result in serious personal injury.

WARNING: Clean all fuel residue from the engine compartment. If not removed, fuel residue may ignite when the engine is returned to operation. Failure to follow this instruction may result in serious personal injury.

WARNING: Do not carry personal electronic devices such as cell phones, pagers or audio equipment of any type when working on or near any fuel-related component. Highly flammable mixtures are always present and may be ignited. Failure to follow these instructions may result in serious personal injury.

WARNING: Always disconnect the battery ground cable at the battery when working on an evaporative emission (EVAP) system or fuel-related component. Highly flammable mixtures are always present and may be ignited. Failure to follow these instructions may result in serious personal injury.

WARNING: When handling fuel, always observe fuel handling precautions and be prepared in the event of fuel spillage. Spilled fuel may be ignited by hot vehicle components or other ignition sources. Failure to follow these instructions may result in serious personal injury.

WARNING: Remove the fuel filler cap slowly. The fuel system may be under pressure. If the fuel filler cap is venting vapor or if you hear a hissing sound, wait until it stops before completely removing the fuel filler cap. Otherwise, fuel may spray out. Failure to follow these instructions may result in serious personal injury.

WARNING: Avoid contact with fuel during a visual inspection for fuel leaks with the engine running. Do not work on the fuel system until the pressure has been released and the engine has cooled. Fuel in the high-pressure fuel system is hot and under very high pressure. High-pressure fuel may cause cuts and contact with hot fuel may cause burns. Failure to follow these instructions may result in serious personal injury.

DESCRIPTION AND OPERATION > HEALTH AND SAFETY PRECAUTIONS > GENERAL SERVICE WARNINGS

Review carefully the information below before beginning any repair. Following these warnings is a list of specific system warnings that must be reviewed before beginning work on any listed system.

WARNING: Vehicles with scheduled remote start technology may start at any time. Make sure the scheduled remote start system is disabled when servicing or working in close proximity to rotating engine parts. Failure to follow this instruction may result in serious personal injury.

WARNING: Wear eye and ear protection when servicing a vehicle. Failure to follow this

instruction may result in serious personal injury.

WARNING: Wear protective gloves when handling components or parts that have pointed or sharp edges. Failure to follow this instruction may result in serious personal injury.

WARNING: Chemicals or materials specified in this service information, if used improperly, may present a personal health hazard. Always consult the material safety information sheet before using any material specified by this service information. Failure to follow this instruction may result in serious personal injury.

WARNING: Do not work under the hood of a vehicle with a damaged cooling fan, as it can separate during operation. With the ignition OFF, inspect all cooling fans for damage, cracks or separation and replace with a new fan as necessary. Failure to follow this instruction may result in serious personal injury.

WARNING: Cooling fans may run with the ignition off. Disable the fans before working nearby. On electric vehicles, disconnect the charging cable to prevent unexpected fan operation. Failure to follow this instruction may result in personal injury.

WARNING: Vehicles with engine auto start-stop technology may start automatically with the ignition on. Make sure the ignition is off when servicing or working in close proximity to rotating engine parts. Failure to follow this instruction may result in serious personal injury.

WARNING: Serious injury may occur if the engine is accidently started by another person during service work. Remove the key from the vehicle to prevent unauthorized starts. Failure to follow this instruction may result in serious personal injury.

WARNING: Before lifting the vehicle with a jack, make sure the jack capacity is adequate for the vehicle weight, including any vehicle cargo or modifications. Identify the correct jacking points in JACKING AND LIFTING . Position the vehicle on a hard, level surface. After jacking, always support vehicle with jack stands. Never get under a vehicle supported only by a jack. Set the parking brake and block all wheels remaining on the ground. Failure to follow these instructions may result in unintended vehicle movement and serious personal injury or death.

WARNING: Before raising the vehicle on a hoist, make sure the hoist capacity is adequate for the vehicle weight, including any vehicle cargo or modifications. Always

position the hoist lift arms as shown in JACKING AND LIFTING . Do not use the engine to power the drive wheels unless all drive wheels are elevated off the ground. Incorrect hoist arm positioning or drive wheels in contact with the ground can cause unintended vehicle movement. Failure to follow these instructions may result in serious personal injury or death.

WARNING: Removal of heavy components (such as engines, transmissions or axles) while the vehicle is lifted on a hoist may create a dangerous weight imbalance. Restrain the vehicle on the hoist with chains or straps to prevent vehicle movement. Failure to follow this instruction may result in serious personal injury or death.

WARNING: Always secure transmission, transfer case, and axle assemblies to their service jack. Avoid obstructions while lowering and raising the jack. Improperly secured assemblies or contact with obstructions may cause the assembly to fall off the jack, which could result in serious personal injury.

WARNING: Always secure engines, transmissions, or other heavy components to the support fixture with straps and wooden support blocks. Improperly secured assemblies could fall off the fixture, resulting in serious personal injury.

WARNING: Never support an engine by the intake or exhaust manifolds. The engine may drop suddenly. Failure to follow this instruction may result in serious personal injury.

WARNING: Turn off (disable) the power running boards (if equipped) before jacking, lifting or placing any object under the vehicle. Never place your hand between the power running board and the vehicle. Extended power running boards will retract when doors are closed. Failure to follow these instructions may result in serious personal injury.

WARNING: Keep solvents away from ignition sources. Solvents may be flammable and can ignite or explode if not handled correctly. Failure to follow this instruction may result in serious personal injury.

WARNING: Use tools, not fingers, to hold flagnuts. Flagnuts may slip or spin unexpectedly when removing fasteners. Failure to follow this instruction may result in injured fingers.

Carefully review the safety warnings for each system using the links below before beginning any service or repair.

For additional information, refer to: Climate Control System Health and Safety Precautions .

For additional information, refer to: Battery and Battery Charging Health and Safety Precautions .

For additional information, refer to: Brake and Clutch Systems Health and Safety Precautions .

For additional information, refer to: Body Repair Health and Safety and General Precautions .

For additional information, refer to: Engine Cooling System Health and Safety Precautions .

For additional information, refer to: Gasoline and Gasoline-Ethanol Fuel Systems Health and Safety Precautions .

For additional information, refer to: Liquefied Petroleum Gas (LPG) and Compressed Natural Gas (CNG) Fuel Systems Health and Safety Precautions .

For additional information, refer to: Pyrotechnic Device Health and Safety Precautions .

For additional information, refer to: Wheel and Tire Health and Safety Precautions .

DESCRIPTION AND OPERATION > LIQUEFIED PETROLEUM GAS (LPG) AND COMPRESSED NATURAL GAS (CNG) FUEL SYSTEMS HEALTH AND SAFETY PRECAUTIONS

WARNING: Vehicles with scheduled remote start technology may start at any time. Make sure the scheduled remote start system is disabled when servicing or working in close proximity to rotating engine parts. Failure to follow this instruction may result in serious personal injury.

WARNING: Service of Compressed Natural Gas (CNG) or Liquefied Petroleum Gas (LPG) vehicle systems is restricted to qualified personnel and authorized workshops. The required qualifications vary by region. Always observe local laws and legislative directives regarding CNG or LPG vehicle service. Failure to follow this instruction may result in serious personal injury or death.

WARNING: Compressed Natural Gas (CNG) or Liquefied Petroleum Gas (LPG) is highly flammable and toxic when contained in unventilated work areas. Work in a dedicated area with good ventilation and no sources of ignition. Failure to follow these instructions may result in serious personal injury or death.

WARNING: Liquefied Petroleum Gas (LPG) is capable of harming eyes or freezing skin. Always wear personal protection gear, including safety goggles and gloves to avoid contact with liquid gas. Failure to follow these instructions may result in serious personal injury.

WARNING: Always observe local regulations regarding storage or indoor parking of

Liquefied Petroleum Gas (LPG) vehicles. Do not park vehicles near sources of heat, ignition or unventilated open pits. Failure to follow these instructions may result in serious personal injury.

WARNING: Liquefied Petroleum Gas (LPG) is heavier than air and will collect in low points in a building, such as drains or work pits. Never discharge a tank inside a building. If possible, tanks should be discharged beforehand by running the vehicle. Any discharge of gas must be done outside in well-ventilated flat areas. Failure to follow these instructions may result in the accumulation of combustible gas, which could cause personal injury or death in a fire or explosion.

WARNING: Extreme heat such as paint drying ovens will cause an increase in Compressed Natural Gas (CNG) or Liquefied Petroleum Gas (LPG) fuel tank pressure. The fuel tank must be removed before using paint drying ovens with temperatures above 60 ° C. Failure to follow this instruction may result in a release of combustible gas, which could cause personal injury or death in a fire or explosion.

WARNING: Liquefied Petroleum Gas (LPG) may present a personal health hazard if handled improperly. Always consult the LPG material safety information sheet before servicing a LPG vehicle. Failure to follow this instruction may result in serious personal injury or death.

DESCRIPTION AND OPERATION > PYROTECHNIC DEVICE HEALTH AND SAFETY PRECAUTIONS

WARNING: Always carry a live airbag with the deployment door, trim cover or tear seam pointed away from the body. Do not place a live airbag down with the deployment door, trim cover or tear seam facing down. Failure to follow these instructions may result in serious personal injury in the event of an accidental deployment.

WARNING: Always carry or transport a live safety belt inflator with the safety belt buckle bolt installed in the inflator tube hand tight. Failure to follow this instruction may result in serious personal injury in the event of an accidental deployment.

WARNING: Deploy all supplemental restraint system (SRS) devices (air bags, pretensioners, load limiters, etc.) outdoors with all personnel at least 9 meters (30 feet) away to make sure of personal safety. Due to the loud report which occurs when an SRS device is deployed, hearing protection is required. Failure to follow these instructions may result in serious personal injury.

WARNING: Do not bleach or re-dye the safety belt webbing, as the webbing may weaken. Failure to follow this instruction may increase the risk of serious personal injury or death in a crash.

WARNING: If a vehicle has been in a crash, inspect the restraints control module (RCM) and the impact sensor (if equipped) mounting areas for deformation. If damaged, restore the mounting areas to the original production configuration. A new RCM and sensors must be installed whether or not the airbags have deployed. Failure to follow these instructions may result in serious personal injury or death in a crash.

WARNING: All safety belt components must be inspected and corrected as part of any collision repair. Inspect all safety belt components as prescribed by SEATBELT PROCEDURE AFTER A COLLISION . Failure to follow this instruction may result in incorrect operation of the safety belt system and increase the risk of serious personal injury or death in a crash.

WARNING: Anytime the Safety Canopy or side air curtain has deployed, a new headliner and new roof pillar upper trim panels with attaching hardware must be installed. Make sure the headliner includes the word AIRBAG where it meets each roof B-pillar trim panel. Remove any other damaged components or hardware and replace with new. Always use new torque-prevailing type J-nuts when installing the Safety Canopy. Failure to follow these instructions may result in the Safety Canopy or side air curtain deploying incorrectly and increases the risk of serious personal injury or death in a crash.

WARNING: Do not repair or service restraint component connector terminals. If restraint connector terminals need repair, replace with the service connector pigtails. Failure to follow this instruction may result in incorrect operation of the vehicle safety restraint, which increases the risk of serious personal injury or death in a crash.

WARNING: Never disassemble or tamper with seat belt deployable components, including pretensioners, load limiters and inflators. Never back probe deployable device electrical connectors. Tampering or back probing may cause an accidental deployment and result in personal injury or death.

WARNING: Never tamper with, repair, or modify a Restraints Control Module (RCM) or any other Supplemental Restraint System (SRS) component. Failure to follow this instruction may result in incorrect operation of the Supplemental Restraint System (SRS), which increases the risk of serious personal injury or death in a crash.

WARNING: Never probe the electrical connectors on airbag, Safety Canopy or side air curtain assemblies. Failure to follow this instruction may result in the accidental deployment of these assemblies, which increases the risk of serious personal injury or death.

WARNING: Do not handle, move or change the original horizontal mounting position of the restraints control module (RCM) while the RCM is connected and the ignition switch is ON. Failure to follow this instruction may result in the accidental deployment of the Safety Canopy and cause serious personal injury or death.

WARNING: Do not obstruct or place objects in the deployment path of the Safety Canopy or side air curtain assembly. Never insert any type of fastener or tie strap around any portion of the Safety Canopy, side air curtain assembly, or related interior trim panel. Failure to follow this instruction may result in the Safety Canopy or side airbag curtain deploying incorrectly and increases the risk of serious personal injury or death in a crash.

WARNING: Occupant Classification System (OCS) parts are calibrated as an assembly and must only be replaced in the configuration they are sold. Never separate parts of an assembly. Failure to follow this instruction may result in incorrect operation of the OCS and increases the risk of serious personal injury or death in a crash.

WARNING: Never allow oil, grease, water or foreign contaminants to get on/in the occupant classification system (OCS) components or electrical connectors. Failure to follow this instruction may result in incorrect operation of the OCS and increases the risk of serious personal injury or death in a crash.

WARNING: Always tighten the fasteners of the restraints control module (RCM) and impact sensor (if equipped) to the specified torque. Failure to do so may result in incorrect restraint system operation, which increases the risk of personal injury or death in a crash.

WARNING: Always carry a live Safety Canopy or side air curtain assembly with the tear seam pointed away from your body. Failure to follow this instruction may result in serious personal injury or death in the event of an accidental deployment.

WARNING: Do not paint any airbag trim covers or deployment doors. Paint may cause the airbag to deploy incorrectly. Failure to follow this instruction may increase the risk of serious personal injury or death in a crash.

WARNING: Always carry the live hood actuator by holding it around the cylinder with the

mounting bracket up and with the cap pointing away from the body. Always place the live hood actuator on its side with the cap pointing away from people. Never place anything in front of the cap. Failure to follow these instructions may result in serious personal injury in the event of an accidental deployment.

WARNING: If a vehicle has been in a pedestrian impact, inspect the impact sensor mounting areas for damage. If damaged, a new bumper cover must be installed. New pedestrian impact sensors must be installed. Failure to follow these instructions may result in serious personal injury or death in a pedestrian impact.

WARNING: Do not repair or service pedestrian protection system component connector terminals. If pedestrian protection system connector terminals need repair, replace with the service connector pigtails. Failure to follow this instruction may result in incorrect operation of the vehicle pedestrian protection system, which increases the risk of serious personal injury or death in a pedestrian impact.

WARNING: Never tamper with, repair, or modify a pedestrian protection system component. Failure to follow this instruction may result in incorrect operation of the pedestrian protection system, which increases the risk of serious personal injury or death in a pedestrian impact.

WARNING: Never probe the electrical connectors on pedestrian protection system pyrotechnic assemblies. Failure to follow this instruction may result in the accidental deployment of these assemblies, which increases the risk of serious personal injury or death.

WARNING: Pyrotechnic components are very hot immediately after deployment and might be covered with pyrotechnic residuals. Do not handle pyrotechnic components immediately after deployment. Always wear protective gloves, safety glasses and breathing protection to prevent skin contact and inhaling of pyrotechnic residuals. Failure to follow this instruction may result in serious personnel injury.

DESCRIPTION AND OPERATION > WHEEL AND TIRE HEALTH AND SAFETY PRECAUTIONS

WARNING: Never inflate a tire that has been run flat without first removing the tire from the wheel to inspect for damage. A damaged tire can fail during inflation. Failure to follow this instruction may result in serious personal injury.

WARNING: Do not mount tube-type tires on tubeless wheels or tubeless tires on tube-type wheels. Incorrect combinations could result in tire separation from wheel and may result in serious injury to vehicle occupant(s).

WARNING: Cracked wheels can be dangerous. Deflate tires on cracked wheels prior to removal of wheels from the vehicle. Failure to follow this instruction may result in serious personal injury.

WARNING: Retighten wheel nuts within 160 km (100 mi) after a wheel is reinstalled. For dual rear wheel (DRW) only, a second retightening is required within 800 km (500 mi). Wheels can loosen after initial tightening. Failure to follow this instruction may result in serious injury to vehicle occupant(s).

WARNING: Always match the tire size to the wheel size during assembly. Incorrect matching can result in tire bead damage or tire separation from the wheel. Failure to follow this instruction may result in serious personal injury to technician or vehicle occupant(s).

WARNING: Do not weld or peen wheels. A wheel needing such repairs must have a new wheel installed. Failure to follow these instructions may result in wheel failure and serious personal injury.

DIAGNOSIS AND TESTING > DIAGNOSTIC TROUBLE CODE CHARTS > MASTER DTC INDEX

ABS Module	REFER to: Anti-Lock Brake System (ABS) and Stability Control .
APIM	For AM/FM/CD/SYNC ®, REFER to: Information and Entertainment System . For Touchscreen display, REFER to: Information and Entertainment System .
ACM	For AM/FM/CD/SYNC ®, REFER to: Information and Entertainment System . For Touchscreen display, REFER to: Information and Entertainment System .
BCM	REFER to: Body Control Module (BCM) .
BCMB	REFER to: Body Control Module B (BCMB) .
CCM	REFER to: Cruise Control .

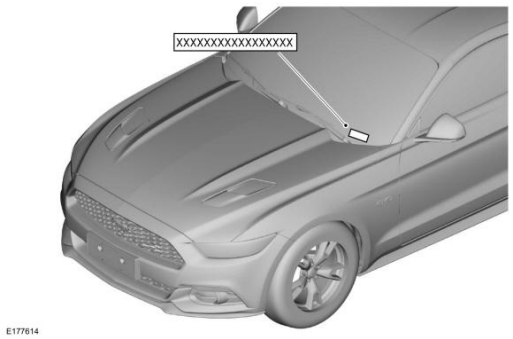
DACMC	For AM/FM/CD/SYNC ®, REFER to: Information and Entertainment System . For Touchscreen display, REFER to: Information and Entertainment System .
DDM	REFER to: Locks, Latches and Entry Systems .
DSM	REFER to: FRONT SEATS .
DSP	REFER to: Information and Entertainment System .
FCIM	For AM/FM/CD/SYNC ®, REFER to: Information and Entertainment System . For Touchscreen display, REFER to: Information and Entertainment System .
FCDIM	REFER to: Information and Entertainment System .
GWM	REFER to: MODULE COMMUNICATIONS NETWORK .
GPSM	For AM/FM/CD/SYNC ®, REFER to: Information and Entertainment System . For Touchscreen display, REFER to: Information and Entertainment System .
HUD	REFER to: Collision Warning and Collision Avoidance System .
ICM	REFER to: Instrumentation, Message Center and Warning Chimes .
IPC	REFER to: Instrumentation, Message Center and Warning Chimes .
Moveable Roof Control Module A (MRCMA)	REFER to: Convertible Top .
Moveable Roof Control Module B (MRCMB)	REFER to: Convertible Top .
OCSM	REFER to: Airbag Supplemental Restraint System (SRS) .
PAM	REFER to: Parking Aid .
PSCM	REFER to: POWER STEERING .
PCM	REFER to: Electronic Engine Controls (2.3L). REFER to: Electronic Engine Controls (3.7L). REFER to: Electronic Engine Controls (5.0L).
PDM	REFER to: Locks, Latches and Entry Systems .
RCM	REFER to: Airbag Supplemental Restraint System (SRS) .
RTM	REFER to: Locks, Latches and Entry Systems .
SCME	REFER to: FRONT SEATS .

SCCM	REFER to: Steering Wheel and Column Electrical Components .
SODL	REFER to: Blind Spot Information System .
SODR	REFER to: Blind Spot Information System .
VDM	REFER to: Vehicle Dynamic Suspension .

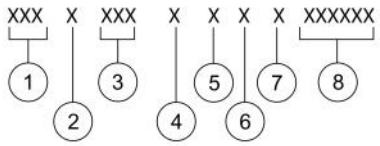
Service Manual: IDENTIFICATION_CODES

DESCRIPTION AND OPERATION > IDENTIFICATION CODES > VIN

VIN Locator



The VIN is a 17-digit combination of letters and numbers. The VIN is stamped on a metal tab riveted to the instrument panel, top upper left of the dash. The VIN is also found on the VC label. If the VIN plate requires replacement, authorized dealers must contact their respective regional office.



Item	Description
1	WMI (World Manufacturer)
2	Restraint-type code
3	Vehicle line, series, body-type code
4	Engine-type code
5	Computer-generated check digit
6	Model year code
7	Assembly plant code
8	Production sequence number

World Manufacturer Identifier

The first 3 VIN positions are the WMI (world manufacturer identifier.

- 1FA - Ford Motor Company, USA, passenger car

Restraint Type

The fourth VIN position is the vehicle restraint type code.

- 6 - Active safety belts (all positions), driver and front passenger air bags, driver and front passenger knee inflatables, side inflatables 1st and 2nd row (Coupe)
- T - Active safety belts (all positions), driver and front passenger air bags, driver and front passenger knee inflatables, side inflatables 1st and 2nd row (Convertible)

Vehicle Line, Series and Body Type

Positions 5 through 7 indicate vehicle line, series and body type.

- P8A - 2-door coupe
- P8C - 2-door coupe, GT
- P8E - 2-door convertible
- P8F - 2-door convertible, GT
- P8R - 2-door coupe, 50th Anniversary
- P8T - 2-door coupe, I4
- P8U - 2-door convertible, I4

Engine Type

The eighth VIN position identifies the engine type, displacement and number of cylinders.

- F - 5.0L, DOHC, 4-valve, sequential fuel injection, V8
- H - 2.3L Ti-VCT (twin independent variable cam timing), turbo-charged, in-line 4-cylinder
- M - 3.7L, 4-valve, port fuel injection, 6-cylinder
- Z - 5.2L, DOHC, Ti-VCT (twin independent variable cam timing), super-charged, V8

Check Digit

The ninth VIN position is a government-assigned, computer-generated check digit.

- 0-9

Model Year

The tenth VIN position is the model year code.

- F - 2015

Assembly Plant

The eleventh digit identified the assembly plant code.

- 5 - Flat Rock Assembly, Flat Rock, Michigan (USA)

Production Sequence Number

The last 6 VIN positions are a numeric code for the vehicle build sequence. This is also the vehicle serial and warranty number. The serial number can also be found on the engine block, transmission and frame.

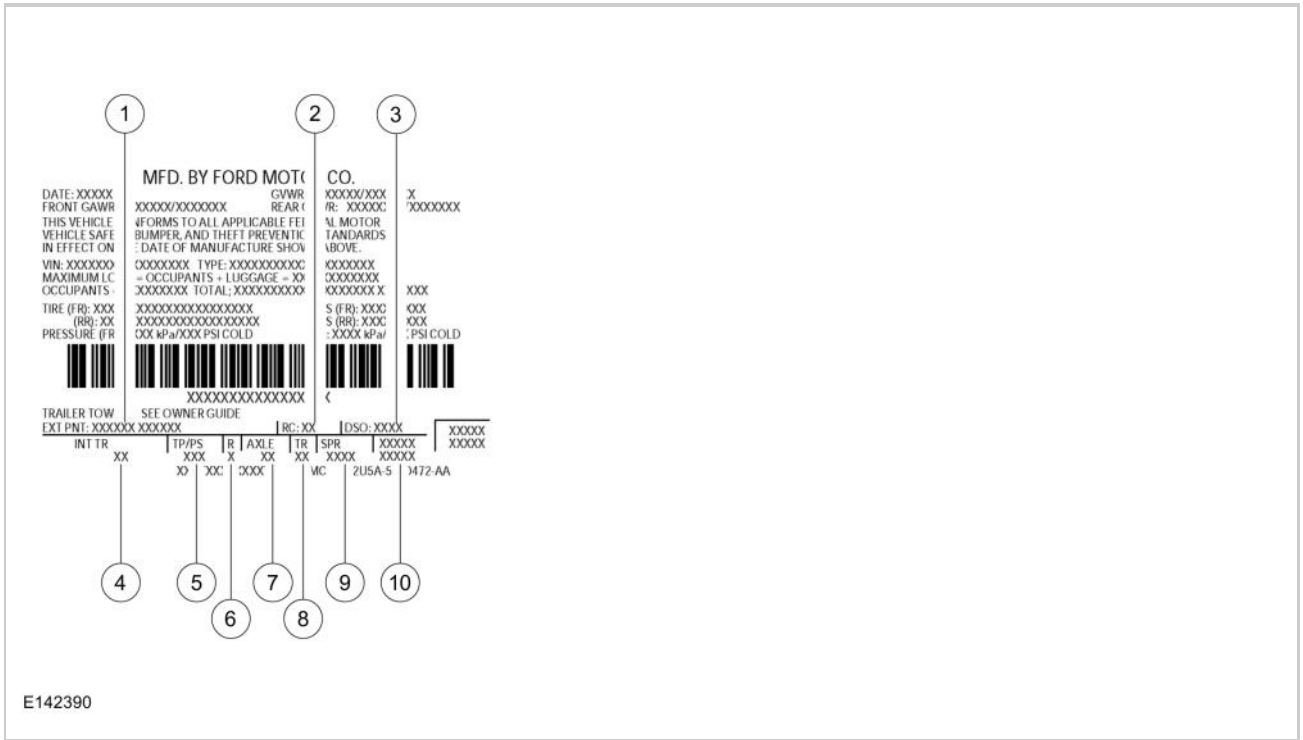
- 100001-599999

DESCRIPTION AND OPERATION > IDENTIFICATION CODES > VC CODES

VC Label Locator



The VC label contains the manufacturer name, the month and year of manufacture, the certification statement and the VIN. It also includes GVW and tire information. If a vehicle requires replacement of the VC label and is 4 years old or less, an authorized dealer must submit the VIN to their respective regional office. The regional office will submit a web form to the assembly plant for the replacement label. Once the label has been printed, a representative from the regional office will deliver the label to the dealer and witness installation on the vehicle. If a vehicle is more than 4 years old and requires a replacement label, the dealer must submit a request to the Department of Motor Vehicles.



Item	Description

1	Exterior paint code
2	Region code
3	Domestic special order code
4	Interior trim code
5	Tape/paint stripe code
6	Radio code
7	Axle code
8	Transmission code
9	Spring code
10	Powertrain calibration information

Paint Code

Paint codes are listed as a 2-part code. The first set of paint code numbers/letters indicate the vehicle primary body color. The second set of letters/numbers (if applicable) indicate a 2-tone or accent body color. All paint codes are a base coat/clear coat finish.

- CY - Competition Orange
- H3 - Triple Yellow (tri-coat)
- HN - Guard
- J4 - Deep Impact Blue
- J7 - Magnetic
- L6 - Kona Blue Metallic
- N4 - Wimbeldon White
- PQ - Race Red
- RR - Ruby Red (tri-coat)
- UA - Black
- UX - Ingot Silver Metallic
- YZ - Oxford White

Interior Trim Codes

Interior trim codes are listed as a 2-part code. The first digit listed indicates the seat and fabric style. The second digit listed indicates the interior trim color.

Trim Codes

- 1 - Chord II cloth seats
- 2 - Vinyl/cloth seats

- 3 - Recaro cloth/vinyl seats
- 4 - Trend mini-perforated milled pebble leather seats
- 5 - Natural grain leather seats
- A - Alcantra/Recaro cloth seats (SVT)
- B - Hot/Colt leather seats (SVT)
- L - Tutone natural grain leather seats (50th Anniversary)
- Q - Dash perforated leather seats
- S - Milled pebble leather seats

Interior Trim Color Codes

- 1 - Ebony
- 2 - Soft Ceramic
- 3 - Bronze Fire
- 4 - Red Line
- 5 - Ebony/Cashmere
- 6 - Cashmere

Tape/Paint Stripe Codes

Tape and paint stripe codes are:

- Blank - Less stripe
- X - Ebony

Radio Codes

The following lists available radio codes:

- 1 - AM/ FM stereo with CD player
- 2 - AM/ FM stereo, CD player and SDARS (Satellite Digital Audio Receiver System)
- 3 - AM/ FM stereo, CD player, SDARS (Satellite Digital Audio Receiver System) and HD (high-definition)
- 4 - AM/ FM stereo, CD player and dual tuner

Axle Codes

The axle codes and related gear ratios are:

- BB - 3.73 ratio with manual or automatic transmission
- DD - 3.55 ratio with manual transmission

- GG - 3.31 ratio with automatic transmission
- YY - 3.15 ratio

Transmission Codes

Available transmissions are as follows:

- 3 - 6-speed automatic (6R80)
- E - 6-speed manual (3160)
- X - 6-speed manual (MT82)

Spring Codes

Spring codes are listed as a 2-part code. The first set of characters identify the front springs. The second set of characters identify the rear springs.

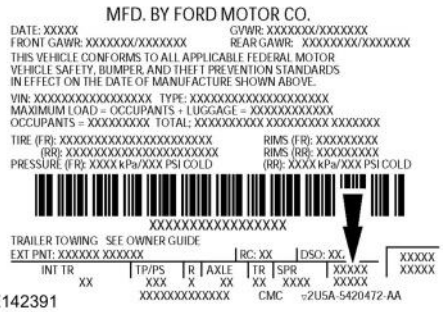
Front Springs

- AA - BR33-5310-A
- BB - BR33-5310-B
- CC - BR33-5310-C
- FF - BR33-5310-F
- GG - BR33-5310-G

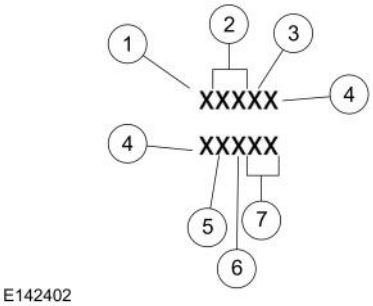
Rear Springs

- AA - BR33-5560-A
- BB - BR33-5560-B
- CC - BR33-5560-C
- DD - BR33-5560-D
- EE - BR33-5560-E
- FF - BR33-5560-F
- GG - BR33-5560-G
- JJ - BR3V-5560-J
- LL - BR3V-5560-L
- MM - AR3V-5560-M
- NN - AR33-5560-N

Powertrain Calibration Information



NOTE: Powertrain calibration information is limited to a maximum of 5 characters per line on the VC label. Because of this, calibration identification consisting of more than 5 characters will wrap to the second line on the VC label.



Item	Description
1	Model year (year in which the calibration strategy was first introduced)
2	Vehicle code
3	Transmission code
4	Unique calibrations (designates different hardware to similar vehicles), example: tires or drive ratios
5	Fleet code (describes fleet to which the vehicle belongs), example: 6 - EVAP
6	Certification region (lead region where multiple regions are included in one calibration), example: A - U.S. federal
7	Revision level (will advance as revisions occur), obtained through scan tool

Model Year

- F - 2015

Vehicle Code

- ZG - Mustang

Transmission Code

- 1 - Automatic transmission
- 2 - Manual transmission

Unique Calibration

The Emission/Corporate Average Fuel Economy/CO2 Compliance Department is responsible for assigning these calibration numbers. Unique identifications are assigned to cover similar vehicles to differentiate between tires, drive configurations, final drive ratios and other calibration-significant factors. These 2 characters are chosen by the analyst to provide identifiable information unique to each calibration. For example, using the number 2 to denote a 2- valve engine versus using the number 4 to denote a 4-valve engine provides an easily identifiable difference.

Fleet Coding

- 0 - Certification (U.S. 4K, final sale in export markets)
- 1 - Heavy duty gas engine/Dyno
- 2 - Fast Automobile Manufacturers' Association, U.S.
- 3 - Alternative durability protocol, U.S.
- 4 - Not assigned
- 5 - Not assigned
- 6 - EVAP
- 7 - Mileage accumulation aging endurance durability
- 8 - OBD
- 9 - Not assigned

Certification Region

- 5 - U.S. 50 states
- A - U.S. federal, including altitude, may include Canada and/or Mexico
- B - U.S. California standard, includes U.S. green states
- C - Canada
- D - China
- E - European Community - Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden and UK (United Kingdom)
- F - European Extended Community - E-plus Croatia, Czech Republic, Estonia, Hungary, Norway, Poland, Romania, Russian Federation, Slovakia, Slovenia, Switzerland and Yugoslavia
- G - GCC (Gulf Cooperative Council) - Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and UAE

(United Arab Emirates)

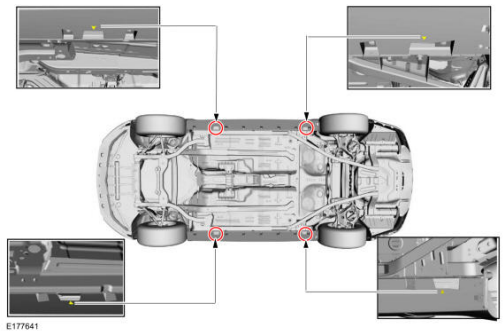
- H - Hong Kong
- J - Japan
- K - Korea
- L - Malaysia
- M - Mexico
- N - New Zealand
- P - Australia
- Q - South America - Brazil
- S - Singapore
- T - Taiwan
- U - South America - unleaded fuel regions
- V - Vietnam
- X - Rest Of World
- Y - Military
- Z - Israel

Revision Level (not printed on label)

- 91-99 - Hardware and certification levels
- 01-04 - Preliminary levels
- 00 - Job 1 production (initial certification)
- 05-09 - Pre-job 1 revisions to calibrations
- 10-89 - Post-job 1 revisions to calibrations
- 0B - Durability test level
- BD - OBD intermediate level (pre-05)

Service Manual: JACKING AND LIFTING

DESCRIPTION AND OPERATION > JACKING AND LIFTING - OVERVIEW > JACKING AND LIFTING POINTS



WARNING: Identify the correct jacking points by locating the triangle stamped into the uni-body sheet metal or vehicle frame. Raising a vehicle in any other location may result in vehicle shifting or falling. Failure to follow this instruction may result in serious personal injury.

WARNING: Never get underneath a vehicle that is supported only by a jack. The jack could unintentionally lower. Always support vehicle with floor stands. Failure to follow these instructions may result in serious personal injury.

NOTE: The jack provided with the vehicle is intended to be used in an emergency for changing a deflated tire. To avoid damage to the vehicle, never use the jack to hoist the vehicle for any other purpose.

NOTE: Do not attempt to use jack pressure on either the front bumper or the rear bumper on any vehicle. Damage to bumper covers will occur.

NOTE: Damage to the suspension, exhaust or steering linkage components may occur if care is not exercised when positioning the hoist adapters prior to lifting the vehicle.

NOTE: To prevent possible damage to the underbody, do not drive the vehicle onto the drive-on lift without first checking for possible interference.

NOTE: When raising a vehicle on a two-column hoist, use care when positioning the

vehicle so that the hoisting forks do not interfere with suspension components, mounting brackets or stabilizer mounting brackets, if equipped. In addition, use care in hoist positioning to avoid possible damage to the axle or rear cover.

Service Manual: MAINTENANCE SCHEDULES

DESCRIPTION AND OPERATION > MAINTENANCE SCHEDULES - GASOLINE ENGINES > MAINTENANCE SCHEDULES - GASOLINE ENGINES

For Maintenance Schedule Information, refer to the Scheduled Maintenance Guide chapter in the vehicle's Owner's Guide. Also available at: http://www.motorcraftservice.com and select Owner Guides.

Service Manual: NOISE, VIBRATION AND HARSHNESS

DESCRIPTION AND OPERATION > NOISE, VIBRATION AND HARSHNESS (NVH) > ACCEPTABLE NOISE, VIBRATION AND HARSHNESS (NVH)

Noise is any undesirable sound, usually unpleasant in nature. Vibration is any motion, shaking or trembling, that can be felt or seen when an object moves back and forth or up and down. Harshness is a ride quality issue where the vehicle's response to the road transmits sharply to the customer. Harshness normally describes a firmer than usual response from the suspension system. NVH is a term used to describe these conditions, which result in varying degrees of dissatisfaction. Although a certain level of NVH caused by road and environmental conditions is normal, this information is designed to aid in the diagnosis, testing and repair of NVH symptoms. All internal combustion engines and drivelines produce some noise and vibration; operating in a real world environment adds noise that is not subject to control. Vibration isolators, mufflers and dampers reduce these to acceptable levels. A driver who is unfamiliar with a vehicle can think that some sounds are abnormal when actually the sounds are normal for the vehicle type. As a technician, it is very important to be familiar with vehicle features and know how they relate to NVH symptoms and their diagnosis. For example, if the vehicle has automatic overdrive, it is important to test drive the vehicle both in and out of overdrive mode.

DESCRIPTION AND OPERATION > NOISE, VIBRATION AND HARSHNESS (NVH) > GLOSSARY OF TERMS

Amplitude:

The quantity or amount of energy produced by a vibrating component (G-force). An extreme vibration has a high amplitude. A mild vibration has a low amplitude. See Intensity.

Boom:

Low frequency or low pitched noise often accompanied by a vibration. Also refer to Drumming.

Buffet/Buffeting:

Strong noise fluctuations caused by gusting winds. An example would be wind gusts against the side glass.

Buzz:

A low-pitched sound like that from a bee. Often a metallic or hard plastic humming sound. Also describes a high-frequency vibration. Vibration feels similar to an electric razor.

Chatter:

A pronounced series of rapidly repeating rattling or clicking sounds.

Chirp:

A short-duration, high-pitched noise associated with a slipping drive belt.

Chuckle:

A repetitious, low-pitched sound. A loud chuckle is usually described as a knock.

Click:

A sharp, brief, non-resonant sound, similar to actuating a ball point pen.

Clonk:

A hydraulic knocking sound. Sound occurs with air pockets in a hydraulic system. Also described as hammering.

Clunk/Driveline Clunk:

A heavy or dull, short-duration, low-frequency sound. Occurs mostly on a vehicle that is accelerating or decelerating abruptly. Also described as a thunk.

Conductor:

The components that carry (transmit) a vibration frequency from the originator to the reactor.

Cycles Per Second:

Cycles per second. Same as Hertz (Hz).

Cracks:

A mid-frequency sound, related to squeak. Sound varies with temperature conditions.

Creak:

A metallic squeak.

Cycle:

The process of a vibrating component going through a complete range of motion and returning to the starting point.

Decibel (dB):

A unit of measurement, referring to sound pressure level, abbreviated dB.

Drone:

A low-frequency, steady sound, like a freezer compressor. Also described as a moan.

Drumming:

A cycling, low-frequency, rhythmic noise often accompanied by a sensation of pressure on the ear drums. Also described as a low rumble, boom or rolling thunder.

Flutter:

Mid to high intermittent sound due to air flow. Similar to a flag flapping in the wind.

Frequency:

The rate at which a cycle occurs within a given time.

G-force:

The additional load or weight produced in an object during acceleration. When measuring the level or

amplitude of a vibration without sound, the unit G is added to associate the force of the vibration to gravity. This is similar to measuring the weight of an object, which is also a function of gravity.

Gravelly Feel:

A grinding or growl in a component, similar to the feel experienced when driving on gravel.

Grind:

An abrasive sound, similar to using a grinding wheel, or rubbing sand paper against wood.

Hz (Hertz):

A unit of measure used to describe noise and vibration concerns expressed in cycles per second.

Hiss:

Steady, high-frequency noise. Vacuum leak sound.

Hoot:

A steady, low-frequency tone, sounds like blowing over a long neck bottle.

Howl:

A mid-range frequency noise between drumming and whine. Also described as a hum.

Hum:

Mid-frequency steady sound, like a small fan motor. Also described as a howl.

Intensity:

The physical quality of sound that relates to the strength of the vibration (measured in decibels). The higher the sound's amplitude, the higher the intensity and vice versa. See Amplitude.

Knock:

A heavy, loud, repetitious sound, similar to a knock on the door.

Moan:

A constant, low-frequency tone. Also described as a hum.

Ping:

A short-duration, high-frequency sound, which has a slight echo.

Pitch:

The physical quality of sound that relates to its frequency. Pitch increases as frequency increases and vice versa.

Pumping Feel:

A slow, pulsing movement.

Rattle:

A random and momentary or short-duration noise.

Reactor:

The component, or part, that receives a vibration from an originator and conductor and reacts to the vibration by moving.

Roughness:

A medium-frequency vibration. A slightly higher frequency than a shake. This type of vibration is usually related to drivetrain components.

Rustling:

Intermittent sound of varying frequency, sounds similar to shuffling through leaves.

Shake:

A low-frequency vibration, usually with visible component movement. Usually relates to tires, wheels, brake drums or brake discs if it is vehicle speed sensitive, or engine if it is engine speed sensitive. Also referred to as a shimmy or wobble.

Shimmy:

An abnormal vibration or wobbling, felt as a side-to-side motion of the steering wheel in the driveshaft rotation. Also described as waddle.

Shudder:

A low-frequency vibration that is felt through the steering wheel or seat during light brake application.

Slap:

A resonance from flat surfaces, such as safety belt webbing or door trim panels.

Squeak:

A high-pitched transient sound, similar to rubbing fingers against a clean window.

Squeal:

A long-duration, high-pitched noise.

Tap:

A light, rhythmic or intermittent hammering sound, similar to tapping a pencil on a table edge.

Thump:

A dull beat caused by 2 items striking together.

Tick:

A rhythmic tap, similar to a clock noise.

Tip-In-Moan:

A light moaning noise heard during light vehicle acceleration, usually between 40.2 kmh (25 mph) - 104.6 kmh (65 mph).

Transient:

A noise or vibration that is momentary, a short duration.

Vibration:

Any motion, shaking or trembling, that can be felt or seen when an object moves back and forth or up and down.

Whine:

A constant, high-pitched noise. Also described as a screech.

Whistle:

High-pitched noise with a very narrow frequency band. Examples of whistle noises are a turbocharger or air flow around an antenna.

Wind Noise:

Any noise caused by air movement in, out or around the vehicle.

DIAGNOSIS AND TESTING > NOISE, VIBRATION AND HARSHNESS (NVH)

Special Tool(s)

 ST3025-A	MASTERTECH MTS-4000 ANALYZER 257-00018
 ST2312-A	EngineEAR 107-R2100 Chassis Ears JSP97170 Squeak And Rattle Kit 164-R4900
 ST2314A	Ultrasonic Leak Detector 134-R0135

DIAGNOSIS AND TESTING > NOISE, VIBRATION AND HARSHNESS (NVH) > DIAGNOSTIC THEORY

The shortest route to an accurate diagnosis results from:

- System knowledge, including comparison with a known good system.
- System history, including repair history and usage patterns.
- Condition history, especially any relationship to repairs or sudden change.
- Knowledge of possible sources.
- Using a systematic diagnostic method that divides the system into related areas.

The diagnosis and correction of NVH symptoms requires:

- A road or system test to determine the exact nature of the symptom.
- An analysis of the possible causes.
- Testing to verify the cause.
- Repairing any symptoms found.
- A road test or system test to make sure the cause has been corrected or brought back to within acceptable range.

DIAGNOSIS AND TESTING > NOISE, VIBRATION AND HARSHNESS (NVH) > DIAGNOSTIC PROCEDURE OVERVIEW

Qualifying the symptom by the particular sensation present can help narrow down the cause. Always use the "symptom" to "system" to "component" to "cause" diagnostic technique. This diagnostic method divides the problem into related areas to correct the customer concern.

- Verify the "symptom".
- Determine which "symptoms(s)" can cause the "symptom" using the diagnostic tools described in this service information.
- After determining the possible "system(s)", refer to the appropriate information in this service information to identify the worn or damaged "components".
- After identifying the 'components", identify the "cause" of the failure.

DIAGNOSIS AND TESTING > NOISE, VIBRATION AND HARSHNESS (NVH) > TOOLS AND TECHNIQUES

The diagnostic tools allow for a systematic collection of information that is necessary to accurately diagnose and repair NVH problems. Remember that the vibrating source component (originator) may only generate a small vibration. This small vibration can in turn cause a larger vibration/noise to emanate from another receiving component (reactor), due to contact with other components (transfer path). For the best results, carry out the test as follows:

- Test drive the vehicle with the vibration sensor inside the vehicle.
- Place the sensor in the vehicle according to feel.

    - If the condition is felt through the steering wheel, the source is most likely in the front of the vehicle.
  - A vibration that is felt in the seat or floor only will most likely be found in the driveline, drive axle or rear wheels and tires.
- Record the readings. Also note when the condition begins, when it reaches maximum intensity and if it tends to diminish above/below a certain speed.
    - If a vibration symptom is vehicle speed related, the tire and wheel Revolutions Per Minute (RPM)/frequency and driveshaft frequency should be calculated.
    - Frequencies with an amplitude reading of 0.06 Gs or less are barely perceptible NVH levels. No corrective action is necessary.
- Place the vibration sensor on or near the suspect area outside the vehicle.
- Continue the road test, driving the vehicle at the speed the symptom occurs, and take another reading.
- Compare the readings.
    - A match in frequency indicates the problem component or area.

The following diagnostic tools and techniques can be used separately or in conjunction with each other to aid in the diagnosis of NVH symptoms. They are listed in order of preference for ease in their use for locating these symptoms.

Noise, Vibration and Harshness (NVH) Analyzer (Vetronix)

The MTS 4000 and the MTS 4100 NVH analyzers are tools to aid in the identification and isolation of a noise, vibration or harshness symptom in a vehicle. They measure noise and vibration data and compare it with data obtained from the vehicle's PCM as well as vehicle variants that were entered by the user such as pulley size, axle ratio and tire size in order to provide possible sources. The MTS 4000 and the MTS 4100 have the following characteristics:

- Interface with the vehicle's computer system
- Support and store vibration data input from 1 or 2 accelerometers
- Support and store noise data input from 2 microphones
- Provide a photo-tachometer for operation of the driveshaft balancing function
- Provide a strobe output capable of driving a standard timing light
- Contain a real-time clock circuit that provides time and date information which is used for tagging test data
- Have the capability to print to an external printer and interface with a personal computer
- Can be powered from a variety of power sources: cigarette lighter, AC power or the internal battery pack

The MTS 4000 and the MTS 4100 NVH analyzers have 4 main operating modes. The first is for vibration diagnosis. This mode measures data from 1 or 2 accelerometers simultaneously while obtaining data from the vehicle. Then it carries out a frequency analysis on the accelerometer information and

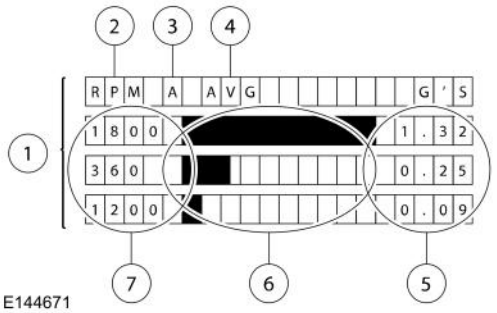
compares the vibration frequencies with the frequencies associated with various rotating components within the vehicle. The data can be presented in 4 different display modes: principle component, bar chart, frequency spectrum or waterfall. All display mode formats contain the same common elements, such as amplitude.

The second is for noise diagnosis. This mode measures noise from 1 or 2 microphones simultaneously. All noise measurements are in decibels (dB). All frequency bands used for noise measurements are the same as for the vibration measurements, up to 1, 000 Hertz (Hz).

The third is the strobe. A strobe or standard timing light can be connected to an analyzer, to provide a means for measuring rotation speed. The strobe function is used for isolating the source of a vibration.

Electronic Vibration Analyzer (EVA)

The Electronic Vibration Analyzer (EVA) is a hand-held electronic scan tool which will assist in locating the source of unacceptable vibrations. The vibration sensor can be remotely mounted anywhere in the vehicle for testing purposes. The unit displays the 3 most common vibration frequencies and their corresponding amplitudes simultaneously. A bar graph provides a visual reference of the relative signal strength (amplitude) of each vibration being displayed and its relative G-force. The keypad is arranged to make the Electronic Vibration Analyzer (EVA) simple to program and use. Some of the functions include the ability to average readings as well as record, play back and freeze readings. The Electronic Vibration Analyzer (EVA) has a strobe balancing function that can be used to detect imbalance on rotating components such as a driveshaft or engine accessories.



Item	Description
1	Electronic Vibration Analyzer (EVA) screen
2	Frequency mode displayed in Revolutions Per Minute (RPM) or Hertz (Hz)
3	Active sensor input (A or B)
4	Current active mode
5	G-force indicators or the strongest frequencies in descending strength of each vibration
6	Strength of each vibration
7	Frequency in Revolutions Per Minute (RPM)/ Hertz (Hz) of each vibration

Record the readings taken with the diagnostic tool.

- Frequencies should be read in the "average" mode.
- Frequencies have a range of plus or minus 2 Hertz (Hz). A reading of 10 Hertz (Hz) can be displayed as an 8 Hertz (Hz) through 12 Hertz (Hz).

Vibrate Software

Vibrate Software is a diagnostic aid which will assist in pinpointing the source of unacceptable vibrations. The engine's crankshaft is the point of reference for vibration diagnosis. Every rotating component will have an angular velocity that is faster, slower or the same as the engine's crankshaft. Vibrate Software® calculates the angular velocity of each component and graphically represents these velocities on a computer screen and on a printed vibration worksheet. The following steps outline how Vibrate Software® helps diagnose a vibration symptom:

- Enter the vehicle information. Vibrate will do all the calculations and display a graph showing tire and driveline vibrations.
- Print a Vibration Worksheet graph. The printed graph is to be used during the road test.
- Road test the vehicle at the speed where the vibration is most noticeable. Record the vibration frequency Revolutions Per Minute (RPM) and the engine Revolutions Per Minute (RPM) on the worksheet graph. The point on the graph where the vibration frequency Revolutions Per Minute (RPM) reading and the engine Revolutions Per Minute (RPM) reading intersect indicates the specific component group causing the symptom.
    - A frequency measurement tool capable of measuring vibration frequency and Revolutions Per Minute (RPM) will be needed.
- Provides graphics of diagnostic procedures to aid in testing components.

Reed Tachometer

The Reed tachometer is a hand-held vibration sensor which will assist in locating the source of unacceptable vibrations. The vibration sensor can be placed anywhere in the vehicle for testing purposes. The Reed tachometer contains several reeds that are tuned to vibrate or resonate at different frequencies ranging from 10 to 80 Hertz (Hz) or 600 to 4, 800 Revolutions Per Minute (RPM). Though the Reed tachometer is able to measure multiple frequencies, it does not measure amplitude.

Sirometer

The Sirometer measures frequency in Hertz (Hz) and Revolutions Per Minute (RPM). To use the Sirometer, place it on any vibrating component and slowly scroll the wire out by turning the knob. As the length of wire changes, so does its natural frequency. Find the length of wire that vibrates with the highest amplitude. This frequency will match that of the vibrating component. Read the frequency for that length of wire.

Combination EngineEAR/ChassisEAR

An electronic listening device used to quickly identify noise and the location under the chassis while the vehicle is being road tested. The ChassisEARs can identify the noise and location of damaged/worn wheel bearings, constant velocity joints, brakes, springs or axle bearings.

EngineEAR Basic Unit

An electronic listening device used to detect even the faintest noises. The EngineEARs can detect the noise of damaged/worn bearings in generators, coolant pumps, A/C compressors and power steering

pumps. They are also used to identify noisy lifters, exhaust manifold leaks, chipped gear teeth and for detecting wind noise. The EngineEAR has a sensing tip, amplifier and headphones. The directional sensing tip is used to listen to the various components. Point the sensing tip at the suspect component and adjust the volume with the amplifier. Placing the tip in direct contact with a component will reveal structure-borne noise and vibrations, generated by or passing through, the component. Various volume levels can reveal different sounds.

Mechanic's Stethoscope

A mechanics stethoscope is an inexpensive tool for locating noises in motors and other moving parts. It can be used to help diagnose worn gears, faulty valves, coolant pump failure, damaged gaskets, defective bearings and body squeaks.

Squeak and Rattle Repair Kit

The Squeak and Rattle Repair Kit contains lubricants and self-adhesive materials that can be used to eliminate interior and exterior squeaks and rattles. The kit consists of the following materials:

- PVC (soft foam) tape
- Urethane (hard foam) tape
- Flocked (black fuzzy) tape
- Ultra High Molecular Weight (UHMW) (frosted) tape
- Squeak and rattle oil tube
- Squeak and rattle grease tube

Leak Detector

The Leak Detector is used to detect wind noises caused by leaks and gaps in areas where there is weatherstripping or other sealing material. It is also used to identify A/C leaks, vacuum leaks and evaporative emission noises. The Leak Detector includes a multi-directional transmitter (operating in the ultrasonic range) and a hand-held detector. The transmitter is placed inside the vehicle. On the outside of the vehicle, the hand-held detector is used to sweep the area of the suspected leak. As the source of the leak is approached, a beeping sound is produced which increases in both speed and frequency.

DIAGNOSIS AND TESTING > NOISE, VIBRATION AND HARSHNESS (NVH) > DIAGNOSTIC GUIDE

To begin a successful diagnosis, record the reported findings, then proceed to each of the numbered process steps to complete the diagnosis.

DIAGNOSIS AND TESTING > NOISE, VIBRATION AND HARSHNESS (NVH) > 1: CUSTOMER INTERVIEW

The diagnostic process starts with the customer interview. The service advisor must obtain as much information as possible about the problem and take a test drive with the customer. There are many ways a customer will describe NVH concerns and this will help minimize confusion arising from descriptive

language differences. It is important that the concern is correctly interpreted and the customer descriptions are recorded. During the interview, ask the following questions:

- When was it first noticed?
- Did it appear suddenly or gradually?
- Did any abnormal occurrence coincide with or proceed its appearance?

Use the information gained from the customer to accurately begin the diagnostic process.

DIAGNOSIS AND TESTING > NOISE, VIBRATION AND HARSHNESS (NVH) > 2: PRE-DRIVE CHECK

It is important to do a pre-drive check before road testing the vehicle. A pre-drive check verifies that the vehicle is safe to drive and eliminates any obvious faults on the vehicle.

The pre-drive check consists of a brief visual inspection. During this brief inspection, take note of anything that will compromise safety during the road test and make those repairs/adjustments before taking the vehicle on the road.

DIAGNOSIS AND TESTING > NOISE, VIBRATION AND HARSHNESS (NVH) > 3: PREPARING FOR THE ROAD TEST

Observe the following when preparing for the road test:

- Review the information provided by the customer. It is important to know the specific concern the customer has with the vehicle.
- Do not be misled by the reported location of the noise/vibration. The cause can actually be some distance away.
- Remember that the vibrating source component (originator) may only generate a small vibration. This small vibration can in turn cause a larger vibration/noise to emanate from another receiving component (reactor) due to contact with other components (transfer path).
- Conduct the road test on a quiet street where it is safe to duplicate the vibration/noise. The ideal testing route is an open, low-traffic area where it is possible to operate the vehicle at the speed at which the condition occurs.
- If possible, lower the radio antenna in order to minimize turbulence. Identify anything that could potentially make noise or be a source of wind noise. Inspect the vehicle for add-on items that create vibration/noise. Turn off the radio and the heating and cooling system blower.

DIAGNOSIS AND TESTING > NOISE, VIBRATION AND HARSHNESS (NVH) > 4: VERIFY THE CUSTOMER CONCERN

Verify the customer concern by carrying out a road test.

A road test may be necessary if the symptom relates to the suspension system or is sensitive to torque. Remember, a condition will not always be identifiable by carrying out these tests; however, they will eliminate many possibilities if carried out correctly.

DIAGNOSIS AND TESTING > NOISE, VIBRATION AND HARSHNESS (NVH) > 5: ROAD TEST

> *NOTE: It may be necessary to have the customer ride along or drive the vehicle to point out the concern. During the road test, take into consideration the customer's driving habits and the driving conditions. The customer's concern just may be an acceptable operating condition for that vehicle.*

The following is a brief overview of each test. A review of this information helps to quickly identify the most appropriate process necessary to make a successful diagnosis. After reviewing this information, select and carry out the appropriate test(s), proceeding to the next step of this process.

- The Slow Acceleration Test is normally the first test to carry out when identifying an NVH concern, especially when a road test with the customer is not possible.
- The Heavy Acceleration Test helps to determine if the concern is torque-related.
- The Neutral Coast Down Speed Test helps to determine if the concern is vehicle speed-related.
- The Steering Input Test helps to determine how the wheel bearings and other suspension components contribute to a vehicle speed-related concern.
- The Brake Test helps to identify vibrations or noise that are brake related.
- The Road Test Over Bumps helps isolate a noise that occurs when driving over a rough or bumpy surface.
- To identify if the noise is coming from the electric motor and /or gearbox (such as for a whine issue), it can be helpful sometimes to shift into neutral while driving while the condition is present.
- The Vehicle Cold Soak Procedure helps to identify concerns occurring during initial start-up and when an extended time lapse occurs between vehicle usage.

Slow Acceleration Test

To carry out this test, proceed as follows:

- Slowly accelerate to the speed where the reported concern occurs. Note the vehicle speed, and if possible, determine the vibration frequency.
- Attempt to identify what part of the vehicle the concern is coming from.
- Attempt to identify the source of the concern.
- Proceed as necessary.

Heavy Acceleration Test

To carry out this test, proceed as follows:

- Accelerate hard from 0-64 km/h (0-40 mph).
- Decelerate in a lower gear.
- The concern is torque related if duplicated while carrying out this test.
- Proceed as necessary.

Neutral Coast Down Speed Test

To carry out this test, proceed as follows:

- Drive at a higher rate of speed than where the concern occurred when carrying out the Slow Acceleration Test.
- Place the transmission in NEUTRAL and coast down past the speed where the concern occurs.
- The concern is vehicle speed-related if duplicated while carrying out this test. This eliminates the engine or motor as a source.
- Proceed as necessary.

Steering Input Test

To carry out this test, proceed as follows:

- Drive at the speed where the concern occurs, while making sweeping turns in both directions.
- If the concern goes away or gets worse, the wheel bearings, hubs and tire tread wear are all possible sources.
- Proceed as necessary.

Brake Test

To carry out this test, proceed as follows:

- Warm the brakes by slowing the vehicle a few times from 80-32 km/h (50-20 mph) using light braking applications. At highway speeds of 89-97 km/h (50-60 mph), apply the brake using a light pedal force.
- Accelerate to 89-97 km/h (55-60 mph).
- Lightly apply the brakes and slow the vehicle to 30 km/h (20 mph).
- A brake vibration noise can be felt in the steering wheel, seat or brake pedal. A brake noise can be heard upon brake application and diminish when the brake is released.
- If the source of the symptom has been identified as a result of this test, proceed to the appropriate brake article(s) for further diagnosis and repair. If the source has not been identified, continue with the road test.

Road Test Over Bumps

To carry out this test, proceed as follows:

- Drive the vehicle over a bumpy or rough surface one wheel at a time to determine if the noise is coming from the front or the back and the left or the right side of the vehicle.
- Proceed as necessary.

Vehicle Cold Soak Procedure

To carry out this procedure, proceed as follows:

- Test preparations include matching the customer conditions (if known). If not known, document the conditions. Monitor the vibration/noise duration with a watch for up to 3 minutes.
- Park the vehicle where testing will occur. The vehicle must remain at or below the concern temperature (if known) for 6-8 hours.
- Before starting the vehicle, conduct a visual inspection under the hood.
- Listen for pumps that circulate coolant for motor, electronics, heater and battery.

> *NOTE: Never probe moving parts.*

- Isolate the vibration/noise by carefully listening. Move around the vehicle while listening to find the general location of the vibration/noise. Then, search for a more precise location by using a stethoscope or EngineEAR.
- If the source of the symptom has been identified as a result of this test, proceed to the appropriate information for further diagnosis and repair. If the source has not been identified, continue with the road test.

DIAGNOSIS AND TESTING > NOISE, VIBRATION AND HARSHNESS (NVH) > SYMPTOM CHARTS

Noise, Vibration and Harshness (NVH) Symptoms

Classify Noise, Vibration and Harshness (NVH) Symptoms

For NVH concerns, it is necessary to classify the customer's concern into one of the 3 categories: noise, vibration or harshness. The reason for this is that a customer concern may consist of a combination of symptoms involving noise and vibration, or vibration and harshness. In cases where there are combination symptoms, determine which diagnostic path to follow: noise, vibration or harshness. For example, if a customer has a concern involving a noise and a vibration, and it is determined that it is vehicle speed-related, follow the vibration diagnostic path.

Noise Symptoms

Once a symptom is classified as a noise, the particular conditions under which the noise occurs need to be identified. These conditions are identified and verified during the road test. For example, a noise may only occur while turning. The next step is to determine which systems on the vehicle are related to that condition. In this case, the steering system and wheel/tire system may be suspect. After identifying possible systems, a preliminary inspection of these systems should be done. If the source of noise is still unidentified, use a listening device (such as the ChassisEAR) to pinpoint the source. Once the source has been identified, determine if this source is related to the suspected system previously

identified. If it is related, then complete the repair to resolve the customer concern. If it is unrelated, then it is possible that the source of the noise is a reactor to a noise being transmitted through a transfer path. If this is the case, repairing the reactor will not resolve the customer concern. The transfer path must be identified and a determination made if the noise is normal, but accentuated by the transfer path (conductor), or if the originator is the fault causing excessive noise to transfer to another component through a conductor. There is a relationship between systems identified as related to conditions and the noise transfer path. In some cases, the condition under which the noise occurs has nothing to do with the identified source. This relationship is important in the diagnosis of noise concerns. It is the first clue that the identified source of noise might be a reactor and that further investigation is needed to diagnose a possible noise transfer path concern. Based on the results from the road test, make a determination of which action in the symptom chart to take first.

Vibration Symptoms

Most vibrations consist of movements back and forth or up and down that repeat. Every time the vibrating component goes through its complete range of motion and returns to the starting point is called a cycle. The rate at which these cycles occur within a given time is called the frequency. Frequency is measured in cycles per second or Hertz (Hz). One cycle per second equals one Hertz (Hz). Once the frequency of a vibration is known, calculations can be done to determine the system that is the source of the concern.

Order of Vibration

The order of a vibration refers to how often the vibration is present in one revolution of the component. For example, a vibration that is present once each revolution of a component would be a first order vibration. A vibration present twice each revolution of the component would be a second order vibration. Vibration orders do not have to be whole numbers, they can have decimal values such as 1.5 order vibration or 3.08 order vibration.

The concept of order of vibration is important to remember when the measured frequency of a vibration does not seem to match the frequency calculations of any of the likely systems or components. As the order increases, the frequency of the vibration will also increase by a multiple of that number.

For example, vibration may be present where the frequency is measured at 14 Hertz (Hz). After doing the necessary calculations it is determined the first order tire and wheel frequency is 7 Hertz (Hz) and the first order driveshaft frequency is 22 Hertz (Hz). Based on this information it can be determined the vibration is most likely a second order tire and wheel vibration: 7 Hertz (Hz) (first order tire and wheel frequency) multiplied by 2 (second order) equals 14 Hertz (Hz) (second order tire and wheel frequency).

Relationship of Vibration Frequency to Order of Vibration

After carrying out the road test as described in this service information, the vibration was determined to be either vehicle-speed related or electric motor-speed related. That determination will identify the vibration frequency calculations that should be done.

Vibration Type	Calculate
Vehicle-speed related	Tire-speed vibration frequency, Driveshaft-speed vibration frequency

In calculating and using frequency readings it is important to remember the direct relationship between Hertz (Hz) and Revolutions Per Minute (RPM). One Hertz (Hz) is equal to 60 Revolutions Per Minute (RPM). This is easy to remember. Think of Hertz (Hz) as cycles per second. There are 60 seconds in a minute, therefore multiply the Hertz (Hz) reading by 60 to get Revolutions Per Minute (RPM). Conversely,

divide Revolutions Per Minute (RPM) by 60 to get Hertz (Hz).

Use the Frequency and Revolutions Per Minute (RPM) Calculations Worksheet to calculate system/component frequencies. The worksheet provides the necessary steps to determine each system/component group frequency.

Frequency Calculations

Calculating Tire and Wheel Frequency

For a vibration concern, use the vehicle speed to determine tire/wheel frequency and Revolutions Per Minute (RPM). Calculate the tire and wheel Revolutions Per Minute (RPM) and frequency by carrying out and following:

- Measure the diameter of the tire.
- Record the speed at which the vibration occurs.
- Obtain the corresponding tire and wheel Revolutions Per Minute (RPM) and frequency from the Tire Speed and Frequency Chart.
    - If the vehicle speed is not listed, divide the vehicle speed at which the vibration occurs by 16 km/h (10 mph). Multiply that number by the 16 km/h (10 mph) tire Revolutions Per Minute (RPM) listed for that tire diameter in the chart. Then divide that number by 60. For example: a 40 MPH (Miles Per Hour) vibration with 835 mm (33 in) tires. 40 divided by 10 = 4. Multiply 4 by 105 = 420 Revolutions Per Minute (RPM). Divide 420 Revolutions Per Minute (RPM) by 60 seconds = 7 Hertz (Hz) at 40 MPH (Miles Per Hour).

Tire Speed and Frequency Chart

Tire Diameter	Tire Revolutions Per Minute (RPM)/Hertz (Hz) at value listed below	Tire Revolutions Per Minute (Revolutions Per Minute (RPM)/Hertz (Hz) at value listed below	Tire Revolutions Per Minute (RPM)/Hertz (Hz) at value listed below	Tire Revolutions Per Minute (RPM)/Hertz (Hz) at value listed below
in (mm)	9.9 mph (16 km/h)	49.7 mph (80 km/h)	60.3 mph (97 km/h)	70.2 mph (113 km/h)
19.02 in (483 mm)	182	910/15	1092/18	1274/21
20.00 in (508 mm)	173	865/14	1038/17	1211/20
20.98 in (533 mm)	165	825/14	990/16	1155/19
22.05 in (560 mm)	158	790/13	948/16	1106/18
23.03 in (585 mm)	151	755/13	906/15	1057/18
24.02 in (610 mm)	145	725/12	870/14	1015/17

25.00 in (635 mm)	139	695/12	834/14	973/16
25.98 in (660 mm)	134	670/11	804/13	938/16
26.97 in (685 mm)	129	645/11	774/13	903/15
27.95 in (710 mm)	124	620/10	744/12	868/14
28.94 in (735 mm)	119	595/10	714/12	833/14
29.92 in (760 mm)	115	575/10	690/11	805/13
30.91 in (785 mm)	111	555/9	666/11	777/13
31.89 in (810 mm)	108	540/9	648/11	756/13
32.87 in (835 mm)	105	525/9	630/10	735/12
34.02 in (864 mm)	102	510/8	612/10	714/12

Harshness Symptoms

Harshness is customer perception which gives the impression of no isolation from the tire/wheel and suspension system. Harshness may be caused by road conditions, temperature changes, component damage and/or incorrect customer modifications on original components/specifications. Customers usually experience harshness when the vehicle is driving over bumps or potholes and in cold weather conditions. Harshness can also be experienced with excessive tire pressure, sporty tires, heavy-duty springs and shocks, or other vehicle modifications. Some aftermarket tires, even with the correct size, may change vehicle behavior and produce customer concerns. The first step in diagnosing a harshness concern is to determine if the concern was experienced only in certain specific operating conditions, such as large potholes or extremely cold weather. In these cases, harshness should be considered normal. A known good vehicle can be driven under the same conditions and the rides can be compared to determine whether the concern is normal or vehicle specific. The second step is to check tire pressure and make sure it was set within vehicle specifications. The third step is to inspect for aftermarket or modified components and determine if they are the cause of the harshness complaint. If the harshness concern persists after the above steps, it is possible that some components are damaged. Based on the results from the road test, make a determination of which action in the symptom chart to take first.

Noise, Vibration and Harshness (NVH) Symptom Chart Categories

A good diagnostic process is a logical sequence of steps that lead to the identification of a causal system. Use the symptom and possible system categories as follows:

- Identify the operating condition that the vehicle is exhibiting.
- Match the operating condition to the symptom.

- Verify the symptom.
- Calculate the frequency and order of the symptom.
- Identify which category or system(s) could cause the symptom.
- The information indicated to identify and diagnose the symptom or confirm that the system is not the source of the condition.

Use the diagnostic instructions in this service information along with the necessary listed tools to identify the vibration order and to isolate the symptom and the possible systems associated with that symptom. Then based on the results from the road test, make a determination of which action in the symptom chart to take first. Since it is possible any one of multiple systems may be the cause of the symptom, it may be necessary to use a process of elimination type diagnostic approach to pinpoint the concern.

Symptom Chart: Vehicle-Speed Related Vibrations

> *NOTE: Any assembly that is out of balance will only cause a first order vibration, it will not cause a higher order vibration.*

When a vehicle-speed related vibration is present, both tire-speed related vibration and axle shaft-speed related vibration calculations should be carried out.

Symptom Chart-Tire-Speed Related Vibrations

Symptom Chart

Condition	Possible Sources	Actions
First order tire vibration	Tire or wheel	Symptom Chart: NVH REFER to: Wheels and Tires .
	Wheel bearings	Symptom Chart: NVH REFER to: Front Suspension .
	Driveshaft	Symptom Chart: NVH REFER to: Driveshaft .
	Brake disc	Symptom Chart: NVH REFER to: Front Disc Brake or REFER to: Rear Disc Brake .
Second order tire vibration	Tire or wheel	Symptom Chart: NVH REFER to: Wheels and Tires .
Third order tire vibration	Tire or wheel	Symptom Chart: NVH REFER to: Wheels and Tires .
	Driveshaft	Symptom Chart: NVH REFER to: Driveshaft .

Symptom Chart-Driveshaft-Speed Related Vibrations

Symptom Chart

Condition	Possible Sources	Actions
First order driveshaft vibration	Driveshaft	Symptom Chart: NVH REFER to: Driveshaft .
Second order driveshaft vibration	Axle shaft	Symptom Chart: NVH REFER to: Rear Drive Axle and Differential .
Third order driveshaft vibration	Drive axle	Symptom Chart: NVH REFER to: Rear Drive Axle and Differential .

Symptom Chart: Powertrain-Speed Related Vibrations

NOTE: Any assembly that is out of balance will only cause a first order vibration, it will not cause a higher order vibration.

NOTE: Some powertrain-speed related vibrations are normal though they should not be felt in the passenger compartment.

Symptom Chart

Condition	Possible Sources	Actions
First through sixth order powertrain vibration	Transmission/transaxle	Symptom Chart: NVH REFER to: Diagnosis By Symptom - 6-Speed Automatic Transmission - 6R80 or REFER to: Manual Transmission - 6-Speed Manual Transmission - MT82.
	Transmission/transaxle mounts	Symptom Chart: NVH REFER to: Diagnosis By Symptom - 6-Speed Automatic Transmission - 6R80.
Accessory speed related vibration	Coolant pump(s)	Symptom Chart: NVH REFER to: ENGINE COOLING - 2.3L EcoBoost (231kW/314PS), REFER to: ENGINE COOLING - 3.7L Duratec (227kW/301PS) or REFER to: ENGINE COOLING - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS).
	A/C compressor motor	Symptom Chart: NVH REFER to: Climate Control System - Vehicles With: Dual Automatic Temperature Control (DATC) or REFER to: Climate Control System - Vehicles With: Electronic Manual Temperature

		Control (EMTC) .

Symptom Chart: Engine-Speed Related Vibrations

NOTE: When an engine-speed related vibration is present, engine, engine accessory and engine firing calculations should be carried out.

NOTE: Any assembly that is out of balance will only cause a first order vibration, it will not cause a higher order vibration.

NOTE: Some powertrain-speed related vibrations are normal though they should not be felt in the passenger compartment.

Symptom Chart

Condition	Possible Sources	Actions
0.5 order engine vibration	Engine	Symptom Chart: NVH REFER to: ENGINE .
	Engine	Symptom Chart: NVH REFER to: ENGINE .
First through sixth order engine vibration	Engine	Symptom Chart: NVH REFER to: ENGINE .
	Engine mounts	REFER to: ENGINE .
	Transmission/transaxle	Symptom Chart: NVH REFER to: Diagnosis By Symptom - 6-Speed Automatic Transmission - 6R80.
	Exhaust system	Symptom Chart: NVH REFER to: EXHAUST SYSTEM - 2.3L EcoBoost (231kW/314PS), REFER to: EXHAUST SYSTEM - 3.7L Duratec (227kW/301PS) or REFER to: EXHAUST SYSTEM - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS).
Belt driven accessory drive vibration	Engine pulley	Symptom Chart: NVH REFER to: ENGINE SYSTEM - GENERAL INFORMATION .
	Accessory drive belt	Symptom Chart: NVH REFER to: ACCESSORY DRIVE - 2.3L EcoBoost (231kW/314PS), REFER to: ACCESSORY DRIVE

		- 3.7L Duratec (227kW/301PS) or REFER to: ACCESSORY DRIVE - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS).
	Coolant pump	Symptom Chart: NVH REFER to: ENGINE COOLING - 2.3L EcoBoost (231kW/314PS), REFER to: ENGINE COOLING - 3.7L Duratec (227kW/301PS) or REFER to: ENGINE COOLING - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS).
	Generator bearing	REFER to: Generator - 2.3L EcoBoost (201kW/273PS) , REFER to: Generator - 3.7L Duratec (227kW/301PS) or REFER to: Generator - 5.0L 32V Ti-VCT .
	A/C compressor	Symptom Chart: NVH REFER to: Climate Control System - Vehicles With: Dual Automatic Temperature Control (DATC) or REFER to: Climate Control System - Vehicles With: Electronic Manual Temperature Control (EMTC) .

Symptom Chart: Noise, Air Leaks or Water Leaks

Symptom Chart

Condition	Possible Sources	Actions
Wind noise, air or water leaks	Body	Symptom Chart: NVH REFER to: Body System .
Front end noise while driving vehicle	Front suspension	Symptom Chart: NVH REFER to: Front Suspension .
	Drive axle	Symptom Chart: NVH REFER to: Rear Drive Axle and Differential .
	Brake system	Symptom Chart: NVH REFER to: Brake System .
	Steering linkage or gear	Symptom Chart: NVH REFER to: POWER STEERING .
	Transmission/transaxle	Symptom Chart: NVH REFER to: Diagnosis By Symptom - 6-Speed Automatic

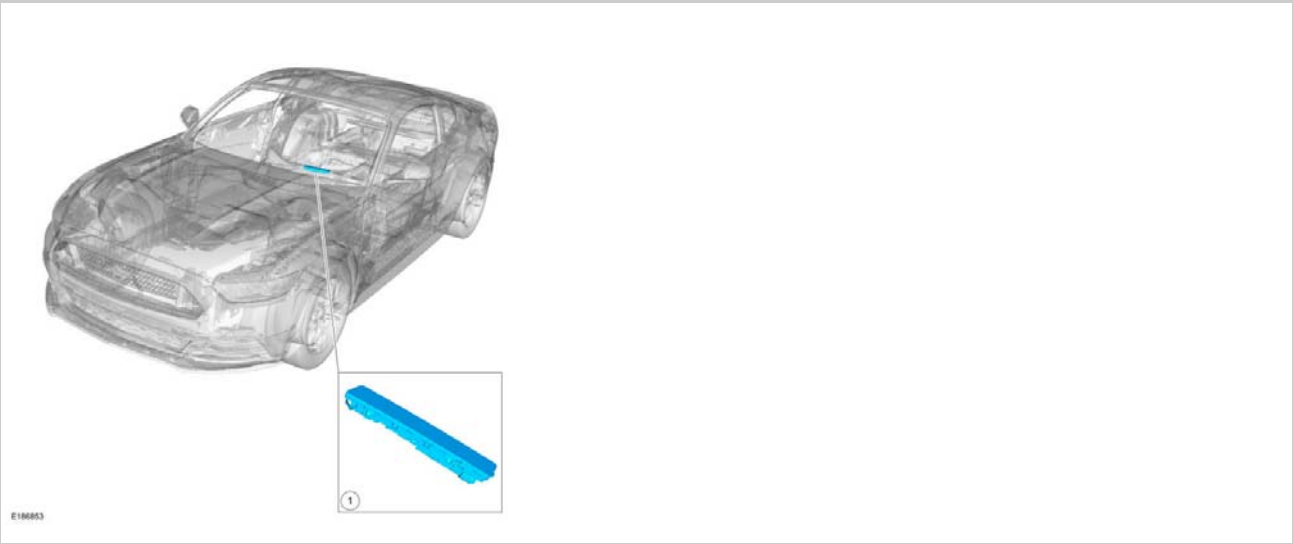
		Transmission - 6R80.
	Body	Symptom Chart: NVH REFER to: Body System .
Rear end noise while driving vehicle	Rear suspension	Symptom Chart: NVH REFER to: Rear Suspension .
	Drive axle	Symptom Chart: NVH REFER to: Rear Drive Axle and Differential .
	Brake system	Symptom Chart: NVH REFER to: Brake System .
	Transmission/transaxle	Symptom Chart: NVH REFER to: Diagnosis By Symptom - 6-Speed Automatic Transmission - 6R80.
	Body	Symptom Chart: NVH REFER to: Body System .
Noise with vehicle stopped	Transmission/transaxle	Symptom Chart: NVH REFER to: Diagnosis By Symptom - 6-Speed Automatic Transmission - 6R80.
	A/C compressor motor	Symptom Chart: NVH REFER to: Climate Control System - Vehicles With: Dual Automatic Temperature Control (DATC) or REFER to: Climate Control System - Vehicles With: Electronic Manual Temperature Control (EMTC) .
	Body	Symptom Chart: NVH REFER to: Body System .

Symptom Chart: Harshness

Symptom Chart

Condition	Possible Sources	Actions
Harsh vehicle ride	Front suspension	Symptom Chart: NVH REFER to: Suspension System .
	Rear suspension	Symptom Chart: NVH REFER to: Rear Suspension .

DESCRIPTION AND OPERATION > COLLISION WARNING AND COLLISION AVOIDANCE SYSTEM - COMPONENT LOCATION



Item	Description
1	HUD module

DESCRIPTION AND OPERATION > COLLISION WARNING AND COLLISION AVOIDANCE SYSTEM - OVERVIEW > OVERVIEW

The forward collision warning system alerts the driver of a collision risk with a red warning LED indicator bar (which is part of the HUD module) located above the instrument panel and an audible warning chime from the IPC.

DESCRIPTION AND OPERATION > COLLISION WARNING AND COLLISION AVOIDANCE SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION

System Operation

DESCRIPTION AND OPERATION > COLLISION WARNING AND COLLISION AVOIDANCE SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION > NETWORK MESSAGE CHART

Network Input Messages - ACM

Broadcast Message	Originating Module	Message Purpose
IPC chime	IPC	Data used to command a warning chime during possible collision event and audio mute so that the warning chime can be heard.

Network Input Messages - CCM

Broadcast Message	Originating Module	Message Purpose
HUD data	HUD module	Used for HUD module active, available and fault status.

Network Input Messages - HUD

Broadcast Message	Originating Module	Message Purpose
HUD flash command	CCM	Flashes the HUD module LED array when commanded.
Ignition status	BCM	Used for ignition switch position input.

Network Input Messages - IPC

Broadcast Message	Originating Module	Message Purpose
Forward collision chime request	CCM	Data used to command warning chime during possible collision event. When this message is received, the IPC sends the audio mute message to the ACM.
Forward collision warning message request	CCM	Data used to command warning chime and messages during possible collision event.

DESCRIPTION AND OPERATION > COLLISION WARNING AND COLLISION AVOIDANCE SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION > FORWARD COLLISION WARNING SYSTEM OPERATION

The forward collision warning system works in conjunction with the adaptive cruise control system. During a possible collision event, the CCM commands:

- the HUD to flash red warning Light Emitting Diodes (LEDs).
- the IPC to activate a chime and commands.
- the ACM to mute audio volume.

The forward collision warning system is activated when the vehicle is moving forward at a speed greater than 8 kmh (5 mph). The CCM determines the distance and relative speed of the vehicle that is in the path of travel, utilizing a radar sensor (integral to the CCM) to detect other vehicles that are moving in the same direction. If the CCM determines that a collision is possible, the CCM commands the HUD module Light Emitting Diodes (LEDs) to flash and the IPC to chime.

The forward collision warning system and audible warning chime can be enabled and disabled through the message center display in the IPC. The system reverts to ON each ignition cycle. The HUD module and/or chime activates briefly to confirm the last setting.

There are three levels of sensitivity detection (HIGH, NORMAL and LOW) that are changed in the message center Driver Assist menu display.

If a MyKey ® restricted key is in use, the forward collision warning defaults to the most sensitive setting at the beginning of each ignition cycle. However, the MyKey ® user is able to adjust the forward collision warning sensitivity.

When a system fault is detected with the forward collision warning system, the message COLLISION WARNING NOT AVAILABLE, COLLISION WARNING NOT AVAILABLE SENSOR BLOCKED SEE MANUAL, or COLLISION WARNING MALFUNCTION is displayed in the IPC message center.

DESCRIPTION AND OPERATION > COLLISION WARNING AND COLLISION AVOIDANCE SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION > HUD - PERFORMANCE SHIFT INDICATION (SVT ONLY)

The HUD module provides performance shift indication to the driver by flashing the Light Emitting Diodes (LEDs) at set shift points. The performance shift mode, shift points and display intensity are selected by the driver through the IPC message center. The driver can select Drag, Tach, Track or Off HUD mode. Refer to: INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES .

DESCRIPTION AND OPERATION > COLLISION WARNING AND COLLISION AVOIDANCE SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION > COMPONENT DESCRIPTION

CCM

The CCM contains a radar sensor unit that determines the distance and relative speed of the vehicle that is in the path of travel.

HUD

The HUD contains the red Light Emitting Diodes (LEDs) that warn the driver of a possible collision event when commanded by the CCM.

There are certain situations when the warning Light Emitting Diodes (LEDs) cannot be seen, such as strong sunlight or when wearing sunglasses. The HUD module has a temperature sensor circuit that is integral to the module that senses the temperature of the Light Emitting Diodes (LEDs) internal to the module. When a high passenger compartment temperature such as strong sunlight is sensed by the temperature sensor, the warning Light Emitting Diodes (LEDs) can be temporarily disengaged. If this occurs, only the audible warning chime is used.

Warnings may not appear if there is little distance to the vehicle ahead or abrupt steering wheel and pedal movements are made.

DIAGNOSIS AND TESTING > COLLISION WARNING AND COLLISION AVOIDANCE SYSTEM > DTC CHARTS

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

DIAGNOSIS AND TESTING > COLLISION WARNING AND COLLISION AVOIDANCE SYSTEM > DTC CHARTS > HUD DTC CHART

DTC	Description	Action
U0104:00	Lost Communication With Cruise Control Module: No Sub Type Information	GO to Pinpoint Test C
U0146:00	Lost Communication With Gateway "A": No Sub Type Information	GO to Pinpoint Test D
U0405:68	Invalid Data Received From Cruise Control Module: Event Information	This DTC sets when the HUD module receives invalid network data from the CCM with a faulted signal data input. RETRIEVE and REPAIR all non-network Diagnostic Trouble Codes (DTCs) in the other modules on the network.
U0447:68	Invalid Data Received From Gateway "A": Event Information	This DTC sets when the HUD module receives invalid network data from the GWM. RETRIEVE and REPAIR all non-network Diagnostic Trouble Codes (DTCs) in the other modules on the network
U210A:16	Temperature Sensor: Circuit Voltage Below Threshold	GO to Pinpoint Test F
U210A:17	Temperature Sensor: Circuit Voltage Above Threshold	GO to Pinpoint Test F
U3000:41	Control Module: General Checksum Failure	CLEAR the Diagnostic Trouble Codes (DTCs). REPEAT the self-test. If DTC U3000:41 is retrieved again, INSTALL a new HUD module. REFER to: Head Up Display (HUD) Module .

U3003:16	Battery Voltage: Circuit Voltage Below Threshold	GO to Pinpoint Test G
U3003:1C	Battery Voltage: Circuit Voltage Out of Range	GO to Pinpoint Test H

DIAGNOSIS AND TESTING > COLLISION WARNING AND COLLISION AVOIDANCE SYSTEM > DTC CHARTS > CCM DTC CHART

DTC	Description	Action
C1132:4B	Head Up Display: Over Temperature	GO to Pinpoint Test E
All other CCM Diagnostic Trouble Codes (DTCs)	-	REFER to: Cruise Control .

DIAGNOSIS AND TESTING > COLLISION WARNING AND COLLISION AVOIDANCE SYSTEM > SYMPTOM CHART

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

Symptom Chart

Condition	Possible Sources	Actions
HUD module does not respond to the diagnostic scan tool	Fuse Wiring, terminals or connectors HUD module	REFER to: MODULE COMMUNICATIONS NETWORK .
The forward collision warning system is inoperative	Refer to the Pinpoint Test	GO to Pinpoint Test A
The HUD module is inoperative	Refer to the Pinpoint Test	GO to Pinpoint Test B
COLLISION WARN NOT AVAILABLE SENSOR BLOCKED SEE MANUAL message in the IPC message center	CCM	REFER to: Cruise Control .
Too many forward collision warning events occur	A MyKey ® restricted key is in use Forward collision warning sensitivity is set to the most sensitive value	VERIFY whether a MyKey ® restricted key is in use. With an admin key, VERIFY forward collision warning system normal operation. CHECK the forward collision warning sensitivity setting in the message center menu.

DIAGNOSIS AND TESTING > COLLISION WARNING AND COLLISION AVOIDANCE SYSTEM > PINPOINT TESTS > PINPOINT TEST A : THE FORWARD COLLISION WARNING SYSTEM IS INOPERATIVE

Normal Operation and Fault Conditions

REFER to: Collision Warning and Collision Avoidance System - System Operation and Component Description .

Possible Sources

- Wiring, terminals or connectors
- CCM
- HUD module
- IPC

DIAGNOSIS AND TESTING > COLLISION WARNING AND COLLISION AVOIDANCE SYSTEM > PINPOINT TESTS > PINPOINT TEST A : THE FORWARD COLLISION WARNING SYSTEM IS INOPERATIVE > PINPOINT TEST A : THE FORWARD COLLISION WARNING SYSTEM IS INOPERATIVE

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may damage the connector.

A1 VERIFY THE CCM (CRUISE CONTROL MODULE) AND HUD (HEAD UP DISPLAY) MODULE PASS THE NETWORK TEST

Using a diagnostic scan tool, perform the network test.

Do both the CCM and the HUD module pass the network test?

Yes	GO to A2

No	REFER to: MODULE COMMUNICATIONS NETWORK .

A2 CHECK THE DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE CONTINUOUS AND ON-DEMAND HUD (HEAD UP DISPLAY) MODULE SELF-TESTS

Using a diagnostic scan tool, perform the HUD module self-test.

Are any HUD module Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to DTC Charts .

No	GO to A3

A3 CHECK THE CCM (CRUISE CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, perform the CCM self-tests.

Are any CCM Diagnostic Trouble Codes (DTCs) recorded?

Yes	If DTC C1132:4B is recorded, GO to Pinpoint Test E For all other CCM Diagnostic Trouble Codes (DTCs), REFER to: Cruise Control .

No	GO to A4

A4 CHECK THE MESSAGE CENTER FOR CORRECT OPERATION

Check the IPC message center for correct operation.

Does the message center operate correctly?

Yes	GO to A5

No	REFER to: Instrumentation, Message Center and Warning Chimes .

A5 CHECK FOR CORRECT HUD (HEAD UP DISPLAY) OPERATION

Ignition OFF.

Disconnect and inspect HUD module connector.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the HUD module connector. Make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new HUD module. REFER to: Head Up Display (HUD) Module .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > COLLISION WARNING AND COLLISION AVOIDANCE SYSTEM > PINPOINT TESTS > PINPOINT TEST B : THE HEAD UP DISPLAY (HUD) MODULE IS INOPERATIVE

Normal Operation and Fault Conditions

REFER to: Collision Warning and Collision Avoidance System - System Operation and Component Description .

Possible Sources

- CCM
- HUD module

DIAGNOSIS AND TESTING > COLLISION WARNING AND COLLISION AVOIDANCE SYSTEM > PINPOINT TESTS > PINPOINT TEST B : THE HEAD UP DISPLAY (HUD) MODULE IS INOPERATIVE > PINPOINT TEST B : THE HEAD UP DISPLAY (HUD) MODULE IS INOPERATIVE

NOTE: Remove the vehicle from any extreme heat source or sunload condition prior to testing the vehicle.

B1 CHECK FOR HUD (HEAD UP DISPLAY) MODULE LED PROVE OUT TEST

Ignition ON.

While placing the ignition switch in RUN, observe the HUD module Light Emitting Diodes (LEDs).

Do the HUD module Light Emitting Diodes (LEDs) illuminate?

Yes	The HUD module Light Emitting Diodes (LEDs) are operating correctly at this time. The concern may have been caused by extreme temperatures.

No	GO to B2

B2 CHECK THE COMMUNICATION NETWORK

Ignition ON.

Using a diagnostic scan tool, perform the network test.

Does the HUD module pass the network test?

Yes	GO to B3

No	REFER to: MODULE COMMUNICATIONS NETWORK .

B3 CHECK THE DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE HUD (HEAD UP DISPLAY) MODULE SELF-TEST

Using a diagnostic scan tool, perform a HUD module self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to DTC Charts .

No	GO to B4

B4 CHECK THE DTCS FROM THE CCM (CRUISE CONTROL MODULE) SELF-TEST

Using a diagnostic scan tool, perform a CCM self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	If DTC C1132:4B is recorded, GO to Pinpoint Test E For all other CCM Diagnostic Trouble Codes (DTCs), REFER to: Cruise Control .

No	GO to B5

B5 CHECK FOR CORRECT HUD (HEAD UP DISPLAY) OPERATION

Ignition OFF.

Disconnect and inspect HUD module connector.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the HUD module connector. Make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical

	Service Bulletins (TSBs) address this concern, INSTALL a new HUD module. REFER to: Head Up Display (HUD) Module .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > COLLISION WARNING AND COLLISION AVOIDANCE SYSTEM > PINPOINT TESTS > PINPOINT TEST C : U0104:00

Normal Operation and Fault Conditions

REFER to: Collision Warning and Collision Avoidance System - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0104:00	Lost Communication With Cruise Control Module: No Sub Type Information	Sets in the HUD module if data messages received from the CCM over the HS-CAN2 are missing.

Possible Sources

- CCM
- HUD module

DIAGNOSIS AND TESTING > COLLISION WARNING AND COLLISION AVOIDANCE SYSTEM > PINPOINT TESTS > PINPOINT TEST C : U0104:00 > PINPOINT TEST C : U0104:00

C1 VERIFY THE CUSTOMER CONCERN

Ignition ON.

Verify there is an observable symptom present.

Is an observable symptom present?

Yes	GO to C2

No	The system is operating normally at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

C2 CHECK THE COMMUNICATION NETWORK

Ignition ON.

Using a diagnostic scan tool, perform the network test.

Does the CCM pass the network test?

Yes	GO to C3

No	REFER to: MODULE COMMUNICATIONS NETWORK .

C3 RETRIEVE THE RECORDED DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE CCM (CRUISE CONTROL MODULE) SELF-TEST

Using a diagnostic scan tool, perform a CCM self-test.

Is DTC C1132:4B recorded?

Yes	If DTC C1132:4B is recorded, GO to Pinpoint Test E For any other Diagnostic Trouble Codes (DTCs), REFER to: Cruise Control .

No	GO to C4

C4 RETRIEVE THE RECORDED DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE HUD (HEAD UP DISPLAY) MODULE SELF-TEST

Using a diagnostic scan tool, perform a HUD module self-test.

Is DTC U3003:16 or U3003:1C recorded?

Yes	For DTC U3003:16, GO to Pinpoint Test G For DTC U3003:1C, GO to Pinpoint Test H

No	GO to C5

C5 RECHECK THE HUD (HEAD UP DISPLAY) MODULE DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs). Repeat the HUD module self-test.

Is DTC U0104:00 still present?

Yes	INSTALL a new CCM. REFER to: Cruise Control Module (CCM) . CLEAR the Diagnostic Trouble Codes (DTCs). REPEAT the HUD module self-test. If DTC U0104:00 is still present, INSTALL a new HUD module. REFER to: Head Up Display (HUD) Module .

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

DIAGNOSIS AND TESTING > COLLISION WARNING AND COLLISION AVOIDANCE SYSTEM > PINPOINT TESTS > PINPOINT TEST D : U0146:00

Normal Operation and Fault Conditions

REFER to: Collision Warning and Collision Avoidance System - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0146:00	Lost Communication With Gateway "A": No Sub Type Information	Sets in the HUD module if data messages received from the GWM over the HS-CAN2 are missing.

Possible Sources

- HUD module
- GWM

DIAGNOSIS AND TESTING > COLLISION WARNING AND COLLISION AVOIDANCE SYSTEM > PINPOINT TESTS > PINPOINT TEST D : U0146:00 > PINPOINT TEST D : U0146:00

D1 VERIFY THE CUSTOMER CONCERN

Ignition ON.

Verify there is an observable concern.

Is an observable symptom present?

Yes	GO to D2

No	The system is operating normally at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

D2 CHECK THE COMMUNICATION NETWORK

Using a diagnostic scan tool, perform the network test.

Does the GWM pass the network test?

Yes	GO to D3

No	REFER to: MODULE COMMUNICATIONS NETWORK .

D3 CHECK GWM (GATEWAY MODULE A) CONTINUOUS MEMORY DIAGNOSTIC TROUBLE CODES (CMDTCS)

Using a diagnostic scan tool, retrieve GWM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Are any Continuous Memory Diagnostic Trouble Codes (CMDTCs) recorded?

Yes	REFER to: MODULE COMMUNICATIONS NETWORK .

No	GO to D4

D4 PERFORM THE HUD (HEAD UP DISPLAY) MODULE SELF-TEST

Using a diagnostic scan tool, perform a HUD module self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to DTC Charts .

No	GO to D5

NOTE: If new modules were installed prior to the DTC being set, the module configuration may be incorrectly set during the Programmable Module Installation (PMI), or the Programmable Module Installation (PMI) may not have been carried out.

D5 RECHECK THE HUD (HEAD UP DISPLAY) MODULE DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs).

Wait 10 seconds.

Repeat the HUD module self-test.

Is DTC U0146:00 still present?

Yes	GO to D6

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

D6 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0146:00 SET IN OTHER MODULES

Using a diagnostic scan tool, clear all Diagnostic Trouble Codes (DTCs).

Ignition OFF.

Ignition ON.

Wait 10 seconds.

Using a diagnostic scan tool, perform the continuous memory self-test.

Retrieve the Continuous Memory Diagnostic Trouble Codes (CMDTCs) from all modules.

Is DTC U0146:00 set in other modules?

Yes	INSTALL a new GWM. REFER to: Gateway Module A (GWM) .

No	INSTALL a new HUD module. REFER to: Head Up Display (HUD) Module .

DIAGNOSIS AND TESTING > COLLISION WARNING AND COLLISION AVOIDANCE SYSTEM > PINPOINT TESTS > PINPOINT TEST E : C1132:4B

Normal Operation and Fault Conditions

The HUD module is designed with a temperature sensor internal to the module. Due to extremely hot weather conditions, the temperature sensor circuit allows the HUD module to disable under high temperature conditions, which could damage the HUD module Light Emitting Diodes (LEDs). The HUD module is designed with a LED prove-out test. Upon each ignition cycle when the ignition switch is in RUN, the Light Emitting Diodes (LEDs) illuminate for a period of time indicating the HUD module is functional.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
C1132:4B	Head Up Display: Over Temperature	Sets as a continuous memory and on-demand DTC in the CCM if the HUD module is over-temperature.

Possible Sources

- HUD module

DIAGNOSIS AND TESTING > COLLISION WARNING AND COLLISION AVOIDANCE SYSTEM > PINPOINT TESTS > PINPOINT TEST E : C1132:4B > PINPOINT TEST E : C1132:4B

E1 CHECK THE COMMUNICATION NETWORK

Ignition ON.

Using a diagnostic scan tool, perform the network test.

Does the HUD module pass the network test?

Yes	GO to E2

No	REFER to: MODULE COMMUNICATIONS NETWORK .

NOTE: Remove the vehicle from any extreme heat source or sunload condition prior to testing the vehicle.

E2 CHECK FOR HUD (HEAD UP DISPLAY) MODULE LED (LIGHT EMITTING DIODE) PROVE-OUT TEST

Ignition ON.

While placing the ignition switch in RUN, observe the HUD module Light Emitting Diodes (LEDs).

Do the HUD module light emitting diodes (LEDs) illuminate?

Yes	The HUD module Light Emitting Diodes (LEDs) are operating correctly at this time. The concern may have been caused by extreme temperatures.

No	GO to E3

E3 CHECK THE DTCS FROM THE HUD (HEAD UP DISPLAY) MODULE SELF-TEST

Using a diagnostic scan tool, perform the HUD module self-test.

Are any HUD module Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to the DTC Charts .

No	GO to E4

E4 CHECK FOR CORRECT HUD (HEAD UP DISPLAY) OPERATION

Ignition OFF.

Disconnect and inspect HUD module connector.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the HUD module connector. Make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new HUD module. REFER to: Head Up Display (HUD) Module .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > COLLISION WARNING AND COLLISION AVOIDANCE SYSTEM > PINPOINT TESTS > PINPOINT TEST F : U210A:16 OR U210A:17

Normal Operation and Fault Conditions

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U210A:16	Temperature Sensor: Circuit Voltage Below Threshold	Sets in continuous memory in the HUD module when the internal temperature sensor circuit is below the lowest valid temperature value.
U210A:17	Temperature Sensor: Circuit Voltage Above Threshold	Sets in continuous memory in the HUD module when the internal temperature sensor circuit is above the highest valid temperature value.

Possible Sources

- HUD module

DIAGNOSIS AND TESTING > COLLISION WARNING AND COLLISION AVOIDANCE SYSTEM > PINPOINT TESTS > PINPOINT TEST F : U210A:16 OR U210A:17 > PINPOINT TEST F : U210A:16 OR U210A:17

F1 CHECK FOR HUD (HEAD UP DISPLAY) MODULE DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition OFF.

Ignition ON.

Using a diagnostic scan tool, clear the HUD module Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Retrieve Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U210A:16 or U210A:17 recorded?

Yes	GO to F2

No	The system is operating normally at this time. The DTC may have been set previously due to an internal intermittent fault with the temperature sensor circuit.

F2 CHECK FOR CORRECT HUD (HEAD UP DISPLAY) OPERATION

Ignition OFF.

Disconnect and inspect HUD module connector.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the HUD module connector. Make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new HUD. REFER to: Head Up Display (HUD) Module .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > COLLISION WARNING AND COLLISION AVOIDANCE SYSTEM > PINPOINT TESTS > PINPOINT TEST G : U3003:16

Normal Operation and Fault Conditions

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U3003:16	Battery Voltage: Circuit Voltage Below Threshold	Set by the HUD module in continuous memory if the HUD module detects low battery voltage below 7 volts for more than 500 ms.

Possible Sources

- Wiring, terminals or connectors
- Battery
- Generator
- PCM
- HUD module

DIAGNOSIS AND TESTING > COLLISION WARNING AND COLLISION AVOIDANCE SYSTEM > PINPOINT TESTS > PINPOINT TEST G : U3003:16 > PINPOINT TEST G : U3003:16

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may damage the connector.

G1 CHECK THE HUD (HEAD UP DISPLAY) MODULE DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition ON.

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs). Repeat the HUD module self-test.

Is DTC U3003:16 still present?

Yes	GO to G2

No	The system is operating correctly at this time. The DTC may have been set due to a previous low battery voltage condition.

G2 CHECK FOR CHARGING SYSTEM DIAGNOSTIC TROUBLE CODES (DTCS) IN THE PCM (POWERTRAIN CONTROL MODULE)

Using a diagnostic scan tool, perform the PCM KOEO self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	For 2.3L, REFER to: Electronic Engine Controls . For 3.7L, REFER to: Electronic Engine Controls . For 5.0L, REFER to: Electronic Engine Controls .

No	GO to G3

G3 CHECK THE BATTERY CONDITION AND STATE OF CHARGE

Check the battery condition and verify the battery is fully charged. REFER to: BATTERY, MOUNTING AND CABLES .

Is the battery OK and fully charged?

Yes	GO to G4

No	REFER to: BATTERY, MOUNTING AND CABLES .

G4 CHECK THE HUD (HEAD UP DISPLAY) MODULE VOLTAGE SUPPLY

Ignition OFF.

Disconnect HUD module C2395 .

Ignition ON.

Measure and record the voltage at the battery.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2395-4		Ground

Is the voltage within 0.2 volt of the recorded battery voltage?

Yes	GO to G5

No	REPAIR the circuit.

G5 CHECK THE HUD (HEAD UP DISPLAY) MODULE GROUND CIRCUIT

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2395-4		C2395-1

Is the voltage within 0.2 volt of the recorded battery voltage?

Yes	GO to G6

No	REPAIR the circuit.

G6 CHECK FOR CORRECT HUD (HEAD UP DISPLAY) OPERATION

Ignition OFF.

Disconnect and inspect HUD module connector.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the HUD module connector. Make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new HUD module. REFER to: Head Up Display (HUD) Module .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > COLLISION WARNING AND COLLISION AVOIDANCE SYSTEM > PINPOINT TESTS > PINPOINT TEST H : U3003:1C

Normal Operation and Fault Conditions

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U3003:1C	Battery Voltage: Circuit Voltage Out of Range	Sets in continuous memory if the HUD module detects battery voltage outside the valid range.

Possible Sources

- Wiring, terminals or connectors
- Battery

- Generator
- HUD module

DIAGNOSIS AND TESTING > COLLISION WARNING AND COLLISION AVOIDANCE SYSTEM > PINPOINT TESTS > PINPOINT TEST H : U3003:1C > PINPOINT TEST H : U3003:1C

NOTE: DTC U3003:1C may be stored in the module memory due to past battery charging or vehicle jump starting events.

H1 CHECK FOR BATTERY VOLTAGE DTCS SET IN OTHER MODULES

Ignition ON.

Retrieve the Continuous Memory Diagnostic Trouble Codes (CMDTCs) from all modules.

Do any charging system Diagnostic Trouble Codes (DTCs) set in more than one module?

Yes	For 2.3L, REFER to: Charging System - 2.3L EcoBoost (201kW/273PS) . For 3.7L, REFER to: Charging System - 3.7L Duratec (227kW/301PS) . For 5.0L, REFER to: Charging System - 5.0L 32V Ti-VCT .

No	GO to H2

H2 CHECK THE BATTERY VOLTAGE

Turn off all the interior/exterior lights and accessories.

Start and run the engine at approximately 2, 000 RPM for 3 minutes while monitoring the battery voltage.

Does the battery voltage rise to 15.5 volts or higher?

Yes	For 2.3L, REFER to: Charging System - 2.3L EcoBoost (201kW/273PS) . For 3.7L, REFER to: Charging System - 3.7L Duratec (227kW/301PS) . For 5.0L, REFER to: Charging System - 5.0L 32V Ti-VCT .

No	GO to H3

H3 RECHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U3003:1C

Ignition OFF.

Ignition ON.

Clear the HUD module Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Using a diagnostic scan tool, perform the HUD module self-test.

Is DTC U3003:1C present?

Yes	GO to H4

No	The system is operating normally at this time. The DTC may have been set previously during battery charging or while jump starting the vehicle.

H4 CHECK FOR CORRECT HUD (HEAD UP DISPLAY) OPERATION

Ignition OFF.

Disconnect and inspect HUD module connector.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the HUD module connector. Make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

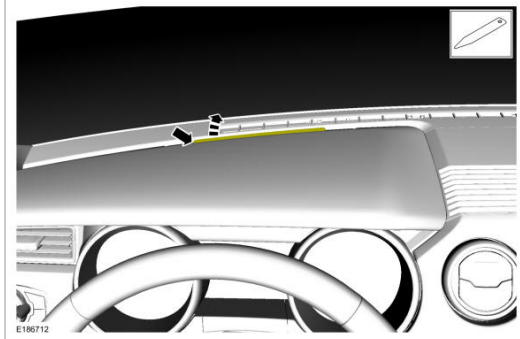
Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new HUD module. REFER to: Head Up Display (HUD) Module .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

REMOVAL AND INSTALLATION > HEAD UP DISPLAY (HUD) MODULE > REMOVAL

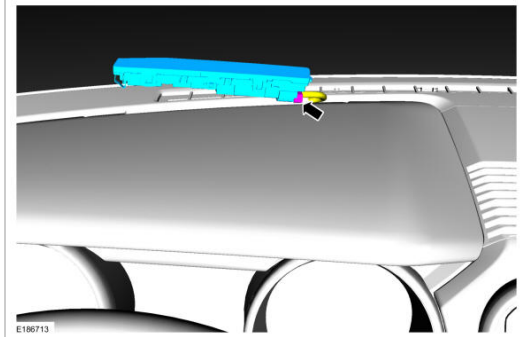
1.

Using a non-marring tool, release the tab and position the HUD up.



2.

Disconnect the electrical connector and remove the HUD.

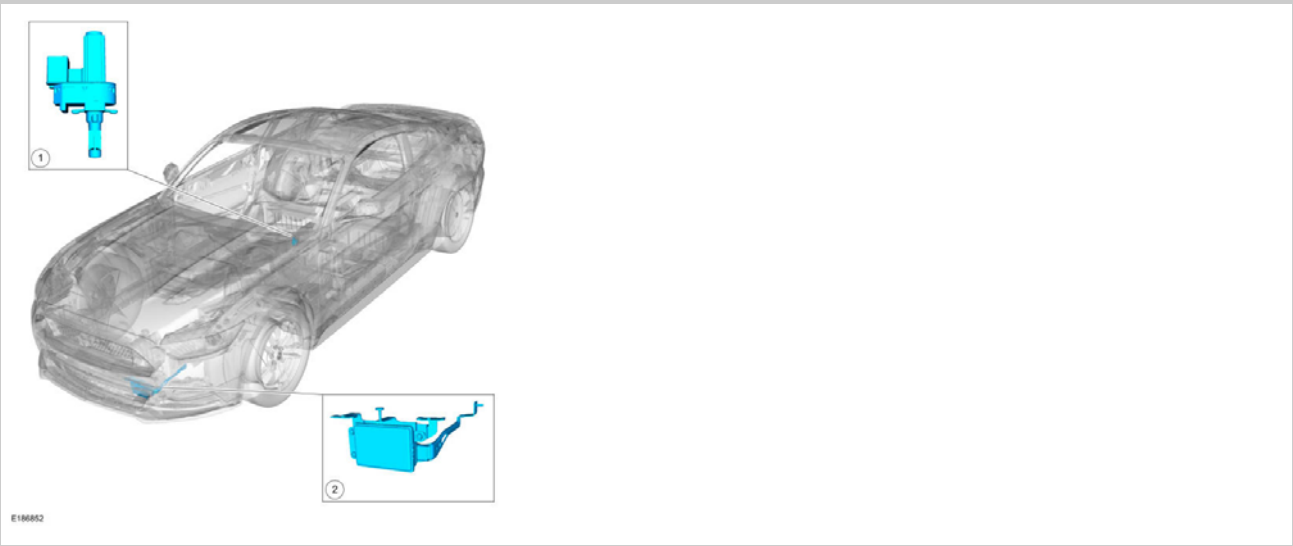


REMOVAL AND INSTALLATION > HEAD UP DISPLAY (HUD) MODULE > INSTALLATION

1.

To install, reverse the removal procedure.

DESCRIPTION AND OPERATION > CRUISE CONTROL - COMPONENT LOCATION



Item	Description
1	CPP switch
2	CCM

DESCRIPTION AND OPERATION > CRUISE CONTROL - OVERVIEW > OVERVIEW

The cruise control system is controlled by the PCM.

The cruise control mode is selected from the steering wheel mounted switches (ON/OFF, SET+, SET-, GAP+, GAP- and CAN/RES), which are integrated into the LH steering wheel switch.

The gap setting is selected from the steering wheel mounted switch (GAP), which is integrated into the LH steering wheel switch.

The cruise control system maintains a selected vehicle speed between 29 km/h (18 mph) and the maximum limited vehicle speed. When a MyKey ® restricted key is in use and max speed limiter is turned on, vehicle speed is limited to 129 km/h (80 mph).

During normal driving, the vehicle speed can vary slightly from the set speed due to road conditions. The vehicle speed can fluctuate when driving up and down a steep hill. If the vehicle speed decreases more than 16 km/h (10 mph) below the set speed, the cruise control disengages.

DESCRIPTION AND OPERATION > CRUISE CONTROL - SYSTEM OPERATION AND COMPONENT DESCRIPTION

System Operation

DESCRIPTION AND OPERATION > CRUISE CONTROL - SYSTEM OPERATION AND

COMPONENT DESCRIPTION > NETWORK MESSAGE CHART

Network Input Messages - ABS Module

Broadcast Message	Originating Module	Message Purpose
Adaptive cruise control deceleration request	CCM	Used for cruise control automatic braking.
Brake pedal applied	PCM	Used for brake switch input.
Vehicle lateral acceleration	RCM	Deactivates cruise control when requested.
Vehicle longitudinal acceleration		

Network Input Messages - CCM

Broadcast Message	Originating Module	Message Purpose
Accelerator pedal position	PCM	Used for accelerator pedal status.
Brake pedal applied	PCM	Used for brake switch input.
Cruise control override	PCM	Driver overriding cruise control with accelerator pedal.
Ignition status	BCM	Used for ignition switch position input.
Stability control event in progress	ABS module	Deactivates cruise control when requested.
Traction control event in progress		
Vehicle yaw rate		
Vehicle lateral acceleration	RCM	Deactivates cruise control when requested.
Vehicle longitudinal acceleration		
Vehicle configuration data	BCM	Used for comparison checking adaptive cruise control configuration.

Network Input Messages - IPC

Broadcast Message	Originating Module	Message Purpose
Adaptive cruise control gap distance display	CCM	Data used to generate message center display indicating adaptive cruise control gap setting.
Cruise control mode	PCM	Toggles between speed control and adaptive cruise control.
Cruise control override	PCM	Driver overriding cruise control with accelerator pedal.

Cruise control status	PCM	Data used for cruise control indicator status.

Network Input Messages - PCM

Broadcast Message	Originating Module	Message Purpose
Cruise control enable/cancel request	CCM	Disables cruise control when requested.
Steering wheel switch speed control request	SCCM	Used for cruise control enable/disable and operating mode request.
Stability control event in progress	ABS module	Deactivates cruise control when requested.
Traction control event in progress		
Vehicle lateral acceleration	RCM	Deactivates cruise control when requested.
Vehicle longitudinal acceleration		
Vehicle yaw rate		

DESCRIPTION AND OPERATION > CRUISE CONTROL - SYSTEM OPERATION AND COMPONENT DESCRIPTION > CRUISE CONTROL OPERATION

NOTE: For a complete illustration of the adaptive cruise control indicators and graphic displays, refer to the Owner's Literature.

The adaptive cruise control system functions much like a standard cruise control system. The adaptive cruise control system automatically adjusts the vehicle speed to maintain a set distance gap from the front of the vehicle and the vehicle in the same path of travel. When the adaptive cruise control system is on and is following a vehicle or a vehicle enters the same driving lane, a follow vehicle graphic is displayed in the message center.

The adaptive cruise control system does not function if the vehicle speed is below 20 km/h (12 mph). As the vehicle slows down during automatic braking, the adaptive cruise control system discontinues braking at 20 km/h (12 mph). At that speed, an audible alarm sounds and the automatic braking from the ABS module is released. The driver must take over the vehicle braking control.

The cruise control deactivator switch (which is integral to the BPP switch) is an additional safety feature. When the brake pedal is pressed, an electrical signal is sent from the BPP switch to the PCM deactivating the cruise control system. Under increased brake pedal effort, the cruise control system deactivator switch opens and removes the ground signal from the PCM input circuit, releasing the throttle and immediately deactivating the system.

For vehicles equipped with a manual transmission, the vehicle has a CPP switch. The CPP switch is a normally closed switch with the clutch pedal released. When the clutch pedal is pressed, an electrical signal from the CPP switch opens the circuit and signals the PCM to deactivate the cruise control system.

The CCM monitors the yaw rate signal from the ABS module and compares it to the wheel speed and steering wheel angle signals. If the ABS module determines the yaw rate is invalid, the CCM disables the adaptive cruise control. The message center displays the message COLLISION WARNING MALFUNCTION and/or ADAPTIVE CRUISE MALFUNCTION.

The CCM monitors the environment in front of the vehicle while active. If the radar beam is obstructed by a buildup of snow, ice, rain or other debris, or the vehicle is driven in a desert environment with no other traffic for extended periods of time, the sensor will trigger an "ADAPTIVE CRUISE NOT AVAILABLE SENSOR BLOCKED SEE MANUAL" message in the message center and will disable the adaptive cruise control. The adaptive cruise control will resume once the obstruction is cleared and the radar is able to detect targets, or upon a key cycle.

The adaptive cruise control system will not engage properly if the front radar sensor is not aligned correctly, and the message center will display FRONT SENSOR NOT ALIGNED. The adaptive cruise control will resume once the radar is aligned and is able to properly detect targets.

The ABS module estimates brake temperature by monitoring applied brake pressure over a period of time and sends a message to the CCM when the estimated temperature is above a given threshold. An alarm sounds and the adaptive cruise control system is deactivated until the estimated brake temperature returns to cooler operating conditions. This condition can happen in a hilly or mountainous driving terrain.

Cruise Control Indicator

The adaptive cruise control indicator located in the IPC illuminates a gray indicator lamp and displays the previous gap setting and SET graphic indicating the system is in standby mode. This notifies the driver the system is ready and the vehicle can be accelerated to the desired speed. A green adaptive cruise control indicator illuminates when the system is active.

Steering Wheel Switch Function

The adaptive cruise control steering wheel mounted switches are momentary contact switches that toggle up and down for the cruise control switch state. Pressing and releasing the steering wheel cruise control ON/OFF switch turns the cruise control system on. Pressing up (SET+) and releasing the SET switch sets the vehicle's speed and stores the set speed in memory. The adaptive cruise control indicator illuminates and the message center displays the set speed and gap setting graphic.

There are 2 ways to change the set speed. The first way is to accelerate or brake to the desired speed and press and release the SET cruise control switch until the desired set speed is shown on the message center. The second way is by tapping the SET+ or the SET- switch while in the set mode, increasing or decreasing the displayed set speed by 1.6 km/h (1 mph) per tap. If the respective button is pressed and held, the displayed set speed continues to increase or decrease until the button is released. The adaptive cruise control system may apply the brakes to slow the vehicle down to the new set speed. The set speed displays continuously in the message center while the adaptive cruise control system is active.

Pressing and releasing the OFF switch, or switching the ignition to OFF, turns the adaptive cruise control system off. The adaptive cruise control set speed memory is erased.

Pressing the brake pedal, pressing the clutch pedal (if equipped) or pressing the CNCL switch puts the adaptive cruise control system in standby mode and the last set speed is displayed in the message center with a strike through. Pressing the RES button when the adaptive cruise control system is in standby mode causes the vehicle to accelerate to the last set speed. The set speed continuously displays in the message center while the adaptive cruise control system is active. The RES button does not function if the OFF button is pressed, the ignition is cycled OFF, or if the current vehicle speed is

below the minimum operational speed.

The adaptive cruise control system has the capability for the driver to change from adaptive cruise control to standard cruise control. The LH 5-way steering wheel switch is used to switch from the adaptive cruise control system to standard cruise control system within the message center. For information on selecting the standard cruise control in the message center, refer to Owner's Literature. Once the driver has selected the standard cruise control in the message center, the adaptive cruise control indicator is replaced by the standard cruise control indicator. The vehicle no longer responds to lead vehicles or automatic braking. Upon the next vehicle ignition cycle, the vehicle defaults back to the adaptive cruise control system.

Gap Setting

When a vehicle ahead enters the same lane or a slower vehicle is ahead in the same lane, the vehicle speed adjusts automatically to maintain a preset distance gap. A bar graph graphic with 4 preset distance gap settings are displayed in the message center. Pressing up (decrease) or down (increase) on the steering wheel cruise control gap switch increases or decreases the distance from the vehicle ahead. If all of the bars are illuminated, this is the longest gap setting. If only one bar is illuminated, that is the shortest gap setting.

The vehicle maintains the distance gap to the vehicle ahead until:

- the vehicle ahead accelerates to a speed above the set speed.
- the vehicle ahead moves out of the lane or out of view.
- the vehicle speed falls below 20 km/h (12 mph).
- a new gap distance is set.

After each ignition cycle, the previous gap setting is remembered and the system is set to that gap setting.

The distance gap can be overridden by pressing the accelerator pedal. The follow vehicle graphic is not displayed in the message center and the green indicator illuminates. When the accelerator pedal is released, the adaptive cruise control system returns to normal operation and the vehicle speed decreases to the set speed or a lower speed if following a vehicle ahead.

Deceleration Control

The CCM commands the ABS module, which controls the brakes, to automatically apply the brakes to slow the vehicle to maintain a safe distance to the vehicle in front.

Steering Wheel Switches

The cruise control steering wheel mounted switches are momentary contact switches that toggle up and down for the switch state. The switches are an input to the SCCM.

Brake Switch

When the brake pedal is applied, an electrical signal from stoplamp circuit to the PCM deactivates the system. Under increased brake pedal effort, the cruise control deactivator switch opens and removes the ground signal from the PCM input circuit releasing the throttle, immediately deactivating the system.

Clutch Pedal Position (CPP) Switch

For vehicles with manual transmission, when the clutch pedal is applied, an electrical signal from the

CPP switch opens the circuit and signals the PCM to deactivate the cruise control system.

Cruise Control Module (C-CM)

The CCM contains a radar sensing unit which measures the relative speed and the distance between the front of the vehicle and the vehicle being followed. The CCM is responsible for requesting the PCM to increase vehicle speed and the ABS module to brake, when necessary.

DIAGNOSIS AND TESTING > CRUISE CONTROL > DTC CHARTS

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

DIAGNOSIS AND TESTING > CRUISE CONTROL > DTC CHARTS > DTC CHART: POWERTRAIN CONTROL MODULE (PCM)

PCM DTC Chart

DTC	Description	Action
P0504	Brake Switch A / B Correlation	GO to Pinpoint Test B
P0572	Brake Switch A Circuit Low	GO to Pinpoint Test B
P0573	Brake Switch A Circuit High	GO to Pinpoint Test B
P0833	Clutch Pedal Switch "B" Circuit	GO to Pinpoint Test D
P170A	Clutch Switch Out Of Self-Test Range	GO to Pinpoint Test D
P1703	Brake Switch Out Of Self-Test Range	GO to Pinpoint Test B
U0104	Lost Communication With Cruise Control Module	GO to Pinpoint Test F
U0121	Lost Communication With Anti-Lock Brake System (ABS) Module	GO to Pinpoint Test E
All other Diagnostic Trouble Codes (DTCs)	-	Refer to the appropriate article for the procedure.

DIAGNOSIS AND TESTING > CRUISE CONTROL > DTC CHARTS > DTC CHART: STEERING COLUMN CONTROL MODULE (SCCM)

SCCM DTC Chart

DTC	Description	Action

B137F:09	Steering Wheel Left Switch Pack: Component Failure	GO to Pinpoint Test A
B137F:11	Steering Wheel Left Switch Pack: Circuit Short to Ground	GO to Pinpoint Test A
B137F:17	Steering Wheel Left Switch Pack: Circuit Voltage Above Threshold	GO to Pinpoint Test A
All other Diagnostic Trouble Codes (DTCs)	-	REFER to: Steering Wheel and Column Electrical Components .

DIAGNOSIS AND TESTING > CRUISE CONTROL > DTC CHARTS > DTC CHART: CRUISE CONTROL MODULE (CCM)

Cruise Control Module (CCM) DTC Chart

DTC	Description	Action
B142E:78	Forward Looking Sensor Horizontal Alignment: Alignment or Adjustment Incorrect	GO to Pinpoint Test G
B1432:78	Forward Looking Sensor Vertical Alignment: Alignment or Adjustment Incorrect	This DTC can only be set at the assembly plant during the plant alignment process. If DTC B1432:78 sets, a reflash of the CCM and the vertical and horizontal aim procedure must be performed. REFER to: Cruise Control Radar Alignment .
B1433:54	Forward Looking Sensor Alignment: Missing Calibration	GO to Pinpoint Test G
C0072:00	Brake Temperature Too High: No Sub Type Information	REFER to: Anti-Lock Brake System (ABS) and Stability Control .
C1132:4B	Head Up Display: Over Temperature	REFER to: Collision Warning and Collision Avoidance System .
C1A67:96	Forward Looking Sensor: Component Internal Failure	GO to Pinpoint Test H
C1A67:97	Forward Looking Sensor: Component or System Operation Obstructed or Blocked	GO to Pinpoint Test I
C1A67:98	Forward Looking Sensor: Component or System Over Temperature	The CCM was over-temperature. This may occur during extended use in extremely high weather temperatures. The adaptive cruise control system operation resumes after the CCM cools.

U0001:88	High Speed CAN Communication Bus: Bus Off	This DTC sets when the CCM detects a CAN bus off fault or indicates a signal fault occurred at a point in time. The fault is not currently present since the module had to communicate with the diagnostic scan tool to report this DTC. VERIFY the integrity of the connectors and wiring. Refer to Module Communications Network for schematic and connector information. DIAGNOSE no HS-CAN communication, all modules are not responding. REFER to: MODULE COMMUNICATIONS NETWORK .
U0100:00	Lost Communication With ECM/PCM "A": No Sub Type Information	GO to Pinpoint Test J
U0121:00	Lost Communication With Anti-Lock Brake System (ABS) Control Module: No Sub Type Information	GO to Pinpoint Test E
U0140:00	Lost Communication With Body Control Module: No Sub Type Information	GO to Pinpoint Test K
U0151:00	Lost Communication With Restraints Control Module: No Sub Type Information	GO to Pinpoint Test L
U0155:00	Lost Communication With Instrument Panel Cluster (IPC) Control Module: No Sub Type Information	GO to Pinpoint Test M
U0158:00	Lost Communication With Head Up Display: No Sub Type Information	GO to Pinpoint Test N
U0212:00	Lost Communication With Steering Column Control Module: No Sub Type Information	GO to Pinpoint Test O
U0401:86	Invalid Data Received From ECM/PCM "A": Signal Invalid	RETRIEVE and FOLLOW non-network Diagnostic Trouble Codes (DTCs) from the PCM. Refer to ENGINE CONTROLS - INTRODUCTION (EXCEPT DIESEL & HYBRID) . If no Diagnostic Trouble Codes (DTCs) are present in the PCM, DIAGNOSE the observable symptom.

U0418:86	Invalid Data Received From Brake System Control Module: Signal Invalid	RETRIEVE and FOLLOW non-network Diagnostic Trouble Codes (DTCs) from the ABS module. REFER to: Anti-Lock Brake System (ABS) and Stability Control . If no Diagnostic Trouble Codes (DTCs) are present in the ABS module, DIAGNOSE the observable symptom.
U0423:82	Invalid Data Received From Instrument Panel Cluster Control Module: Alive/Sequence Counter Incorrect/ Not Updated	GO to Pinpoint Test S
U0429:86	Invalid Data Received From Steering Column Control Module: Signal Invalid	RETRIEVE and FOLLOW non-network Diagnostic Trouble Codes (DTCs) from the SCCM. REFER to: Steering Wheel and Column Electrical Components . If no Diagnostic Trouble Codes (DTCs) are present in the SCCM, DIAGNOSE the observable symptom.
U0452:86	Invalid Data Received From Restraints Control Module: Signal Invalid	RETRIEVE and FOLLOW non-network Diagnostic Trouble Codes (DTCs) from the RCM. REFER to: Airbag Supplemental Restraint System (SRS) . If no Diagnostic Trouble Codes (DTCs) are present in the RCM, DIAGNOSE the observable symptom.
U2018:51	Control Module Software #3: Not Programmed	This DTC sets when the CCM configuration has not been completed. CARRY OUT the PMI (when the original module is not available) for the module in question as directed by the diagnostic scan tool. REFER to: MODULE CONFIGURATION .
U2100:00	Initial Configuration Not Complete: No Sub Type Information	This DTC sets when the CCM configuration has not been completed. CARRY OUT the PMI (when the original module is not available) for the module in question as directed by the diagnostic scan tool. REFER to: MODULE CONFIGURATION .
U2300:55	Central Configuration: Not Configured	This DTC sets when the CCM detects the BCM is not configured correctly. CARRY OUT the PMI

		procedure (when the original module is not available) for the module in question as directed by the diagnostic scan tool. REFER to: MODULE CONFIGURATION .
U2300:64	Central Configuration: Signal Plausibility Failure	This DTC sets when the CCM detects the BCM is not configured correctly. CARRY OUT the PMI procedure (when the original module is not available) for the module in question as directed by the diagnostic scan tool. REFER to: MODULE CONFIGURATION .
U3000:41	Control Module: General Checksum Failure	CLEAR the Diagnostic Trouble Codes (DTCs). RETEST the adaptive cruise control system. REPEAT the self-test. If DTC U3000:41 is retrieved again, INSTALL a new CCM. REFER to: Cruise Control Module (CCM) .
U3000:42	Control Module: General Memory Failure	CLEAR the Diagnostic Trouble Codes (DTCs). RETEST the adaptive cruise control system. REPEAT the self-test. If DTC U3000:42 is retrieved again, INSTALL a new CCM. REFER to: Cruise Control Module (CCM) .
U3000:44	Control Module: Data Memory Failure	CLEAR the Diagnostic Trouble Codes (DTCs). RETEST the adaptive cruise control system. REPEAT the self-test. If DTC U3000:44 is retrieved again, INSTALL a new CCM. REFER to: Cruise Control Module (CCM) .
U3000:49	Control Module: Internal Electronic Failure	CLEAR the Diagnostic Trouble Codes (DTCs). RETEST the adaptive cruise control system. REPEAT the self-test. If DTC U3000:49 is retrieved again, INSTALL a new CCM. REFER to: Cruise Control Module (CCM) .
U3000:63	Control Module: Circuit/Component Protection Time-Out	GO to Pinpoint Test P
U3002:62	Vehicle Identification Number: Signal Compare Failure	This DTC sets when the stored VIN in the CCM does not match the VIN defined in the BCM. This may indicate that the original CCM is not installed in the vehicle, and has not

		been configured correctly. CARRY OUT the PMI (when the original module is not available) for the module in question as directed by the diagnostic scan tool.
U3003:16	Battery Voltage: Circuit Voltage Below Threshold	GO to Pinpoint Test Q
U3003:17	Battery Voltage: Circuit Voltage Above Threshold	GO to Pinpoint Test R

DIAGNOSIS AND TESTING > CRUISE CONTROL > DTC CHARTS > DTC CHART: ANTI-LOCK BRAKE SYSTEM (ABS) MODULE

ABS Module DTC Chart

DTC	Description	Action
U0405:41	Invalid Data Received From Cruise Control Module: General Checksum Failure	This DTC sets when the ABS module receives invalid network data from the CCM. RETRIEVE and REPAIR all non network diagnostic trouble codes (DTCs) in the CCM.
U0405:82	Invalid Data Received From Cruise Control Module: Alive/Sequence Counter Incorrect/Not Updated	This DTC sets when the ABS module receives invalid network data from the CCM. RETRIEVE and REPAIR all non-network diagnostic trouble codes (DTCs) in the CCM.
U2107:00	Collision Mitigation By Braking: No Sub Type Information	This DTC sets in the ABS module due to long and too frequent collision mitigation brake requests from the CCM RETRIEVE and REPAIR all non-network Diagnostic Trouble Codes (DTCs) in the CCM and other modules on the network.
U2107:68	Collision Mitigation By Braking: Event Information	This DTC is set in the ABS module due to a high acceleration value detected that differs from request, which can be caused by an abrupt vehicle stop or module failure. RETRIEVE and REPAIR all Diagnostic Trouble Codes (DTCs) in the CCM and ABS module.

U2108:00	Adaptive Cruised Control: No Sub Type Information	This DTC sets in the ABS module when the adaptive cruise control does not switch off while the driver is braking. RETRIEVE and REPAIR all Diagnostic Trouble Codes (DTCs) in the CCM and ABS module.
U2108:68	Adaptive Cruise Control: Event Information	This DTC is set in the ABS module when the module detects over-braking during automated vehicle deceleration. If the vehicle deceleration exceeds the 3.2 m/s threshold, the DTC is stored and the adaptive cruise control is deactivated until the next ignition cycle. RETRIEVE and REPAIR all Diagnostic Trouble Codes (DTCs) in the CCM and ABS module.
All other Diagnostic Trouble Codes (DTCs)	-	REFER to: Anti-Lock Brake System (ABS) and Stability Control .

DIAGNOSIS AND TESTING > CRUISE CONTROL > SYMPTOM CHART(S)

Symptom Chart: Adaptive Cruise Control

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

Symptom Chart

Condition	Possible Sources	Actions
A module does not communicate with the diagnostic scan tool	Fuse Wiring, terminals or connectors Communication concern Module	REFER to: MODULE COMMUNICATIONS NETWORK .
The adaptive cruise control is inoperative	Refer to the Pinpoint Test	GO to Pinpoint Test A
The cruise control switch is inoperative/does not operate correctly	Refer to the Pinpoint Test	GO to Pinpoint Test A
The adaptive cruise control does not disengage when the clutch pedal is applied	Refer to the Pinpoint Test	GO to Pinpoint Test C

The adaptive cruise control does not function in rain or snow conditions	Refer to the Pinpoint Test	GO to Pinpoint Test I
ADAPTIVE CRUISE NOT AVAILABLE SENSOR BLOCKED SEE MANUAL message in the IPC message center	Refer to the Pinpoint Test	GO to Pinpoint Test I
The adaptive cruise control indicator lamp is never/ always on	Wiring, terminals and connectors PCM IPC	REFER to: Instrumentation, Message Center and Warning Chimes .
Unexpected adaptive cruise control braking	CCM Front bumper cover	The adaptive cruise control system can occasionally detect and respond to out-of path vehicles, especially on curves, entry/exit ramps or when changing lanes. CHECK the CCM and front bumper cover for damage. RETEST the adaptive cruise control system.
Lack of adaptive cruise control braking	CCM Front bumper cover	The adaptive cruise control system may not detect and respond to vehicles carrying out close cut-ins or on tight curves (especially for vehicles on the passenger side) due to limited CCM field of view. CHECK the CCM and front bumper cover for damage. If no damage is observed, RETEST the adaptive cruise control system.
Noise during adaptive cruise control braking	Low speeds Brake concern	The driver can detect some noise at low speeds when adaptive cruise control braking occurs. If braking noise continues, REFER to: Brake System .
The cruise control cannot set above 105 kmh (65 mph), 113 kmh (70 mph), 121 kmh (75 mph), or 129 kmh (80 mph)	A MyKey ® restricted key is in use and MyKey ® max speed limiter is turned on	VERIFY whether a MyKey ® restricted key is in use. With an admin key, VERIFY if MyKey ® max speed limiter is turned on. REFER to the Owner's Literature. If necessary, VERIFY cruise control normal operation with an admin key.

DIAGNOSIS AND TESTING > CRUISE CONTROL > PINPOINT TESTS > PINPOINT TEST A : THE ADAPTIVE CRUISE CONTROL IS INOPERATIVE

Refer to Cruise Control for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Steering Wheel and Column Electrical Components - System Operation and Component Description .

REFER to: Cruise Control - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Action
B137F:09	Steering Wheel Left Switch Pack: Component Failure	A continuous and on-demand DTC that sets when one or more of the cruise control switches are stuck.
B137F:11	Steering Wheel Left Switch Pack: Circuit Short to Ground	A continuous and on-demand DTC that sets when the cruise control switch circuits are shorted to ground.
B137F:17	Steering Wheel Left Switch Pack: Circuit Voltage Above Threshold	A continuous and on-demand DTC that sets when the cruise control switch circuits are shorted to voltage.

Possible Sources

- Wiring, terminals or connectors
- Cruise control switch
- Cruise control deactivator switch
- Digital TR sensor
- Stoplamp switch
- CPP switch
- Vehicle speed signal
- PCM
- ABS module
- BCM
- CCM
- SCCM

DIAGNOSIS AND TESTING > CRUISE CONTROL > PINPOINT TESTS > PINPOINT TEST A : THE ADAPTIVE CRUISE CONTROL IS INOPERATIVE > PINPOINT TEST A :

THE ADAPTIVE CRUISE CONTROL IS INOPERATIVE

A1 CHECK FOR DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, perform PCM self-test.

Using a diagnostic scan tool, perform SCCM self-test.

Using a diagnostic scan tool, perform CCM self-test.

Using a diagnostic scan tool, perform ABS module self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	For PCM, CCM and ABS module Diagnostic Trouble Codes (DTCs), REFER to the DTC Charts . For SCCM Diagnostic Trouble Codes (DTCs) B137F:09, B137F:11 or B137F:17, GO to A6 For all other SCCM Diagnostic Trouble Codes (DTCs), REFER to: Steering Wheel and Column Electrical Components .

No	GO to A2

A2 CHECK FOR LOST COMMUNICATION DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition ON.

Clear Continuous Memory Diagnostic Trouble Codes (CMDTCs) from all modules.

Ignition OFF.

Ignition ON.

Wait at least 10 seconds. Retrieve Continuous Memory Diagnostic Trouble Codes (CMDTCs) from all modules.

Are any lost communication Diagnostic Trouble Codes (DTCs) set in the CCM?

Yes	REFER to the DTC Charts .

No	GO to A3

A3 CHECK THE STOPLAMP SWITCH (BOO1) AND CRUISE CONTROL DEACTIVATOR SWITCH (BOO2) PARAMETER IDENTIFICATIONS (PIDS)

Using a diagnostic scan tool, view PCM Parameter Identifications (PIDs).

Using the table, monitor the Parameter Identifications (PIDs) BOO1 (stoplamp switch) and BOO2 (cruise control deactivator switch) while applying and releasing the brake pedal.

Brake Pedal Position	BOO1 PID	BOO2 PID
Released	On	On

Applied lightly	On	Off
Applied firmly	Off	Off

Do the PID values agree with the brake pedal position?

Yes	For manual transmission, GO to A4 For automatic transmission, GO to A6

No	GO to Pinpoint Test B

A4 CHECK THE CLUTCH PEDAL CRUISE CONTROL DEACTIVATOR SWITCH (CPP_TOP_ PARAMETER IDENTIFICATION (PID)

Using the diagnostic scan tool, view PCM Parameter Identifications (PIDs).

Monitor the PCM PID CPP_TOP while pressing and releasing the clutch pedal.

Clutch Pedal Position	CPP_TOP PID
Released	No
Pressed	Yes

Does the PID value agree with the clutch pedal position?

Yes	GO to A5

No	If the PID value always reads YES (pressed), GO to A5 If the PID value always reads NO (released), GO to Pinpoint Test C

A5 CHECK THE CLUTCH PEDAL (CPP_TOP) PID (PARAMETER IDENTIFICATION) WITH THE CPP (CLUTCH PEDAL POSITION) SWITCH DISCONNECTED

Ignition OFF.

Disconnect CPP switch.

Ignition ON.

Using a diagnostic scan tool, view PCM Parameter Identification (PIDs).

Monitor the clutch pedal CPP_TOP PID.

Does the PID read NO?

Yes	INSTALL a new CPP switch. REFER to: Cruise Control Deactivator Switch .

No	REPAIR the circuit.

A6 CHECK THE CRUISE CONTROL SWITCH PID (PARAMETER IDENTIFICATION)

Using a diagnostic scan tool, view SCCM Parameter Identifications (PIDs).

Using the table, press each cruise control switch while monitoring the cruise control switch PID.

Cruise Control Switch	PID Value
Cruise On/Off (pressed/released)	On/Off
Cruise Cancel/Resume (pressed/released)	On/Off
SET + (pressed/released)	On/Off
SET - (pressed/released)	On/Off
GAP + (pressed/released)	On/Off
GAP - (pressed/released)	On/Off

Does the PID value agree with the switch position?

Yes	For automatic transmission, GO to A7 For manual transmission, GO to A13

No	If only one switch does not display the correct PID value, INSTALL a new LH steering wheel switch. REFER to: Steering Wheel Multifunction Switch . If multiple switches do not display the correct PID value, GO to A8

A7 MONITOR THE PCM (POWERTRAIN CONTROL MODULE) TR (TRANSMISSION RANGE) PID

Using a diagnostic scan tool, view PCM Parameter Identifications (PIDs).

Monitor the PCM TR PID.

Select DRIVE.

Does the PID value agree with the TR selector lever position?

Yes	GO to A13

No	REFER to: External Controls .

A8 CHECK FOR VOLTAGE TO THE CRUISE CONTROL SWITCHES

Ignition OFF.

Remove the driver airbag. REFER to: Driver Airbag .

Disconnect LH Steering Wheel Switch C2366 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2366-4		C2366-5
C2366-6		C2366-5
C2366-7		C2366-5

Is the voltage approximately 5 volts?

Yes	TURN the ignition off and WAIT one minute. INSTALL a new LH steering wheel switch. REFER to: Steering Wheel Multifunction Switch . INSTALL the driver airbag. REFER to: Driver Airbag .

No	GO to A9

A9 CHECK THE STEERING WHEEL SWITCH HARNESS FOR AN OPEN

Ignition OFF.

Disconnect Clockspring C218B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2366-4	Ω	C218B-15
C2366-5	Ω	C218B-8
C2366-6	Ω	C218B-6
C2366-7	Ω	C218B-7

Are the resistances less than 3 ohms?

Yes	GO to A10

No	Install a new steering wheel. REFER to: Steering Wheel .

A10 CHECK THE STEERING WHEEL SWITCH HARNESS FOR A SHORT TO GROUND

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2366-4	Ω	Ground
C2366-5	Ω	Ground

C2366-6	Ω	Ground
C2366-7	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to A11

No	Install a new steering wheel. REFER to: Steering Wheel .

A11 CHECK THE STEERING WHEEL SWITCH CIRCUITS THROUGH THE CLOCKSPRING FOR AN OPEN

Disconnect Clockspring C218C.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C218B-6 (component side)	Ω	C218C-5 (component side)
C218B-7 (component side)	Ω	C218C-7 (component side)
C218B-15 (component side)	Ω	C218C-8 (component side)

Are the resistances less than 3 ohms?

Yes	GO to A12

No	Install a new clockspring. REFER to: Clockspring .

A12 CHECK FOR CORRECT SCCM (STEERING COLUMN CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all SCCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the SCCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new SCCM. REFER to: Steering Column Control Module (SCCM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

A13 CHECK FOR CORRECT PCM (POWERTRAIN CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all PCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the PCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PCM. For 2.3L, REFER to: Powertrain Control Module (PCM) . For 3.7L, REFER to: Powertrain Control Module (PCM) . For 5.0L, REFER to: Powertrain Control Module (PCM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > CRUISE CONTROL > PINPOINT TESTS > PINPOINT TEST B : P0504, P0572, P0573 OR P1703

Refer to Cruise Control for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Cruise Control - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
P0504	Brake Switch A / B Correlation	A DTC that sets when the PCM

		does not sense the correct sequence of the brake pedal input signal from both the cruise control deactivator and stoplamp switches when the brake pedal is pressed and released.
P0572	Brake Switch A Circuit Low	A DTC that sets when the PCM detects an open in the stoplamp switch signal. The PCM monitors the vehicle speed, the engine speed, the engine torque and the stoplamp input during start and stop driving cycles. If the stoplamp switch input to the PCM is always off during start and stop driving cycles, this DTC sets in continuous memory.
P0573	Brake Switch A Circuit High	A DTC that sets when the PCM detects a short to voltage on the stoplamp switch signal. The PCM monitors the vehicle speed, the engine speed, the engine torque and the stoplamp switch input during start and stop driving cycles. If the stoplamp lamp switch input to the PCM is always on during start and stop driving cycles, this DTC sets in continuous memory.
P1703	Brake Switch Out Of Self - Test Range	A DTC that sets in the PCM during the self-test when the stoplamp switch input signal is high or does not cycle high and low.

Possible Sources

- Wiring, terminals or connectors
- Stoplamp switch
- PCM

DIAGNOSIS AND TESTING > CRUISE CONTROL > PINPOINT TESTS > PINPOINT TEST B : P0504, P0572, P0573 OR P1703 > PINPOINT TEST B : P0504, P0572, P0573 OR P1703

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the

correct probe adapter(s) may damage the connector.

B1 CHECK THE OPERATION OF THE STOPLAMPS

Ignition ON.

Operate the stoplamps.

Do the stoplamps and high mounted stoplamp operate correctly?

Yes	GO to B2

No	REFER to: Stoplamps .

B2 CHECK THE STOPLAMP SWITCH (BOO1) AND CRUISE CONTROL DEACTIVATOR SWITCH (BOO2) PARAMETER IDENTIFICATIONS (PIDS)

Using a diagnostic scan tool, view PCM Parameter Identifications (PIDs).

Using the table, monitor the Parameter Identifications (PIDs) BOO1 (stoplamp switch) and BOO2 (cruise control deactivator switch) while applying and releasing the brake pedal.

Brake Pedal Position	BOO1 PID	BOO2 PID
Released	Off	Off
Applied lightly	On	Off
Applied firmly	On	On

Do the PID values agree with the brake pedal position?

Yes	GO to B8

No	For an incorrect BOO1 PID value, GO to B3 For an incorrect BOO2 PID value, GO to B4

B3 CHECK THE STOPLAMP SWITCH CIRCUIT

Ignition OFF.

Disconnect: PCM C1551B (2.3L), C1381B (3.7L) or C175B (5.0L).

Ignition ON.

While applying and releasing the brake pedal, measure:

2.3L

Positive Lead	Measurement / Action	Negative Lead

C1551B-66		Ground

3.7L

Positive Lead	Measurement / Action	Negative Lead
C1381B-67		Ground

5.0L

Positive Lead	Measurement / Action	Negative Lead
C175B-67		Ground

Is the voltage greater than 11 volts with the brake pedal applied and no voltage with the brake pedal released?

Yes	GO to B8

No	REPAIR the circuit.

B4 CHECK THE CRUISE CONTROL DEACTIVATOR SWITCH FOR CORRECT OPERATION

Ignition OFF.

Disconnect: PCM C1551B (2.3L), C1381B (3.7L) or C175B (5.0L).

While firmly applying and releasing the brake pedal, measure:

2.3L

Positive Lead	Measurement / Action	Negative Lead
C1551B-65	Ω	Ground

3.7L

Positive Lead	Measurement / Action	Negative Lead
C1381B-66	Ω	Ground

5.0L

Positive Lead	Measurement / Action	Negative Lead
C175B-66	Ω	Ground

Is the resistance less than 3 ohms with the brake pedal released, and greater than 10, 000 ohms with the brake pedal firmly applied?

Yes	GO to B8

No	GO to B5

B5 CHECK THE CRUISE CONTROL DEACTIVATOR SWITCH GROUND CIRCUIT FOR AN OPEN

Disconnect: BPP switch C278 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C278-2	Ω	Ground

Is the resistance less than 3 ohms?

Yes	GO to B6

No	REPAIR the circuit.

B6 CHECK THE CRUISE CONTROL DEACTIVATOR SWITCH SIGNAL CIRCUIT FOR A SHORT TO GROUND

Measure:

Positive Lead	Measurement / Action	Negative Lead
C278-3	Ω	Ground

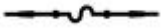
Is the resistance greater than 10, 000 ohms?

Yes	GO to B7

No	REPAIR the circuit.

B7 CHECK THE CRUISE CONTROL DEACTIVATOR SWITCH SIGNAL CIRCUIT FOR AN OPEN

Connect a fused jumper wire:

Positive Lead	Measurement / Action	Negative Lead
C278-3		C278-2

Measure:

2.3L

Positive Lead	Measurement / Action	Negative Lead
C1551B-65	Ω	Ground

3.7L

Positive Lead	Measurement / Action	Negative Lead
C1381B-66	Ω	Ground

5.0L

Positive Lead	Measurement / Action	Negative Lead
C175B-66	Ω	Ground

Is the resistance less than 3 ohms?

Yes	INSTALL a new BPP switch. REFER to: Stoplamp Switch .

No	REPAIR the signal circuit for an open.

B8 CHECK FOR CORRECT PCM (POWERTRAIN CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all PCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the PCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PCM. For 2.3L, REFER to: Powertrain Control Module (PCM) . For 3.7L, REFER to: Powertrain Control Module (PCM) . For 5.0L, REFER to: Powertrain Control Module (PCM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > CRUISE CONTROL > PINPOINT TESTS > PINPOINT TEST C : THE CRUISE CONTROL DOES NOT DISENGAGE WHEN THE CLUTCH PEDAL IS APPLIED

Refer to Cruise Control for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Cruise Control - System Operation and Component Description .

Possible Sources

- Wiring, terminals or connectors
- CPP switch
- PCM

DIAGNOSIS AND TESTING > CRUISE CONTROL > PINPOINT TESTS > PINPOINT TEST C : THE CRUISE CONTROL DOES NOT DISENGAGE WHEN THE CLUTCH PEDAL IS APPLIED > PINPOINT TEST C : THE CRUISE CONTROL DOES NOT DISENGAGE WHEN THE CLUTCH PEDAL IS APPLIED

C1 CHECK THE CPP (CLUTCH PEDAL POSITION) SENSOR (CPP_TOP) PARAMETER IDENTIFICATION (PID)

Ignition ON.

Using a diagnostic scan tool, view PCM Parameter Identifications (PIDs).

Monitor the PCM CPP_TOP PID while pressing and releasing the clutch pedal.

Does the PID value read "YES" with the clutch pedal pressed?

Yes	GO to C5
No	GO to C2

C2 CHECK THE CPP (CLUTCH PEDAL POSITION) TOP OF TRAVEL SWITCH

Ignition OFF.

Disconnect CPP top of travel switch C2354

Ignition ON.

Monitor the PCM CPP_TOP PID.

Does the PID value read YES?

Yes	INSTALL a new CPP switch. REFER to: Cruise Control Deactivator Switch .

No	GO to C3

C3 CHECK THE CPP (CLUTCH PEDAL POSITION) TOP OF TRAVEL SWITCH GROUND CIRCUIT FOR AN OPEN

Ignition OFF.

Connect:

Positive Lead	Measurement / Action	Negative Lead
C2354-2		Ground

Ignition ON.

Monitor the PCM CPP_TOP PID.

Does the PID value read YES?

Yes	REPAIR the ground circuit.

No	REMOVE the fused jumper wire. GO to C4

C4 CHECK THE CPP (CLUTCH PEDAL POSITION) TOP OF TRAVEL SWITCH SIGNAL CIRCUIT FOR AN OPEN

Ignition OFF.

Disconnect PCM C1551B (2.3L), C1381B (3.7L) or C175B (5.0L).

Measure:

2.3L

Positive Lead	Measurement / Action	Negative Lead
C2354-2	Ω	C1551B-6

3.7L

Positive Lead	Measurement / Action	Negative Lead
C2354-2	Ω	C1381B-8

5.0L

Positive Lead	Measurement / Action	Negative Lead
C2354-2	Ω	C175B-8

Is the resistance less than 3 ohms?

Yes	GO to C5

No	REPAIR the circuit.

C5 CHECK FOR CORRECT PCM (POWERTRAIN CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all PCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the PCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PCM. For 2.3L, REFER to: Powertrain Control Module (PCM) . For 3.7L, REFER to: Powertrain Control Module (PCM) . For 5.0L, REFER to: Powertrain Control Module (PCM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > CRUISE CONTROL > PINPOINT TESTS > PINPOINT TEST D : P0833 OR P170A

Refer to Cruise Control for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Cruise Control - System Operation and Component Description .

DTC Fault Trigger Condition- PCM

DTC	Description	Fault Trigger Conditions
P0833	Clutch Pedal Switch "B" Circuit	A DTC that sets when the PCM receives the vehicle speed input, indicating movement and does not detect the switching input signal from the clutch pedal speed control deactivator switch. This condition disables the cruise control.
P170A	Clutch Switch Out of Self-Test Range	A DTC that sets in the PCM during the self-test when the CPP top-of-travel switch input signal is high or does not cycle high and low.

Possible Sources

- Wiring, terminals or connectors
- CPP switch
- PCM

DIAGNOSIS AND TESTING > CRUISE CONTROL > PINPOINT TESTS > PINPOINT TEST D : P0833 OR P170A > PINPOINT TEST D : P0833 OR P170A

D1 CHECK THE CPP (CLUTCH PEDAL POSITION) SWITCH (CPP_TOP) PARAMETER IDENTIFICATION (PID)

Ignition ON.

Using a diagnostic scan tool, view PCM Parameter Identifications (PIDs).

Monitor the PCM CPP_TOP PID while pressing and releasing the clutch pedal.

Does the PID value read "YES" with the clutch pedal pressed AND "NO" with the clutch pedal released?

Yes	GO to D4

No	If PID always read "NO", GO to Pinpoint Test C If PID always reads "YES", GO to D2

D2 CHECK THE CPP (CLUTCH PEDAL POSITION) TOP OF TRAVEL SWITCH SIGNAL CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Disconnect PCM C1551B (2.3L), C1381B (3.7L) or C175B (5.0L).

Measure:

2.3L

Positive Lead	Measurement / Action	Negative Lead
C1551B-6	Ω	Ground

3.7L

Positive Lead	Measurement / Action	Negative Lead
C1381B-8	Ω	Ground

5.0L

Positive Lead	Measurement / Action	Negative Lead
C175B-8	Ω	Ground

Is the resistance less than 3 ohms?

Yes	GO to D5

No	GO to D3

D3 CHECK THE CPP (CLUTCH PEDAL POSITION) TOP OF TRAVEL SWITCH SIGNAL CIRCUIT FOR A SHORT TO GROUND WITH THE SWITCH DISCONNECTED

Disconnect CPP Top of Travel Switch C2354 .

Connect:

Positive Lead	Measurement / Action	Negative Lead
C2354-2		C2354-3

Measure:

2.3L

Positive Lead	Measurement / Action	Negative Lead
C1551B-6	Ω	Ground

3.7L

Positive Lead	Measurement / Action	Negative Lead
C1381B-8	Ω	Ground

5.0L

Positive Lead	Measurement / Action	Negative Lead
C175B-8	Ω	Ground

Is the resistance less than 3 ohms?

Yes	INSTALL a new CPP switch. REFER to: Cruise Control Deactivator Switch .

No	REPAIR the circuit.

D4 RECHECK THE PCM (POWERTRAIN CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Clear the Diagnostic Trouble Codes (DTCs). Repeat the PCM self-test.

Are any PCM Diagnostic Trouble Codes (DTCs) recorded?

Yes	If DTC P0833 or P170A is recorded, GO to D5 If any other PCM Diagnostic Trouble Codes (DTCs) are recorded, REFER to the PCM DTC Chart . For 2.3L, REFER to: Electronic Engine Controls . For 3.7L, REFER to: Electronic Engine Controls . For 5.0L, REFER to: Electronic Engine Controls .

No	GO to D5

D5 CHECK FOR CORRECT PCM (POWERTRAIN CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all PCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the PCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PCM. For 2.3L, REFER to: Powertrain Control Module (PCM) . For 3.7L, REFER to: Powertrain Control Module (PCM) . For 5.0L, REFER to: Powertrain Control Module (PCM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > CRUISE CONTROL > PINPOINT TESTS > PINPOINT TEST E : U0121:00 OR U1021

Refer to Module Communications Network for schematic and connector information.

Refer to Cruise Control for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Cruise Control - System Operation and Component Description .

DTC Fault Trigger Condition-CCM

DTC	Description	Fault Trigger Conditions
U0121:00	Lost Communication with Anti-Lock Brake System (ABS) Control Module: No Sub-Type Information	Sets in the CCM if data messages received from the ABS module over the HS-CAN2 are missing.

DTC Fault Trigger Condition-PCM

DTC	Description	Fault Trigger Conditions
U0121	Lost Communication With Anti-Lock Brake System (ABS) Control Module	Sets in the PCM if data messages received from the ABS module over the HS-CAN2 or from the GWM over the HS-CAN1 are missing.

Possible Sources

- ABS module
- CCM
- GWM
- PCM

DIAGNOSIS AND TESTING > CRUISE CONTROL > PINPOINT TESTS > PINPOINT TEST E : U0121:00 OR U1021 > PINPOINT TEST E : U0121:00 OR U1021

E1 VERIFY THE CUSTOMER CONCERN

Ignition ON.

Verify there is an observable symptom present.

Is an observable symptom present?

Yes	GO to E2

No	The system is operating normally at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

E2 CHECK THE COMMUNICATION NETWORK

Ignition ON.

Using a diagnostic scan tool, perform a network test.

Does the ABS module pass the network test?

Yes	GO to E3

No	REFER to: MODULE COMMUNICATIONS NETWORK .

E3 RETRIEVE THE RECORDED DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE CCM (CRUISE CONTROL MODULE), ABS (ANTI-LOCK BRAKE SYSTEM) MODULE AND PCM (POWERTRAIN CONTROL MODULE) SELF-TESTS

Using a diagnostic scan tool, perform a CCM self-test.

Using a diagnostic scan tool, perform a ABS module self-test

Using a diagnostic scan tool, perform a PCM self-test

Are any low or high voltage Diagnostic Trouble Codes (DTCs) recorded?

Yes	For CCM DTC U3003:16, GO to Pinpoint Test Q For CCM DTC U3003:17, GO to Pinpoint Test R For all others, REFER to the PCM DTC Chart or the ABS Module DTC Chart .

No	GO to E4

E4 CHECK THE GWM (GATEWAY MODULE A) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, retrieve the GWM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: MODULE COMMUNICATIONS NETWORK .

No	GO to E5

NOTE: If new modules were installed prior to the DTC being set, the module configuration can be incorrectly set during the Programable Module Installation (PMI) or the Programable Module Installation (PMI) may not have been carried out.

E5 RECHECK THE CCM (CRUISE CONTROL MODULE) AND PCM (POWERTRAIN CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs). Repeat the CCM and PCM self-tests.

Is CCM DTC U0121:00 or PCM DTC U0121 still present?

Yes	GO to E6

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

E6 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0121:00 OR U0121 SET IN OTHER MODULES

Using a diagnostic scan tool, clear all Diagnostic Trouble Codes (DTCs).

Ignition OFF.

Ignition ON.

Wait 10 seconds.

Using a diagnostic scan tool, perform a self-test.

Retrieve the Continuous Memory Diagnostic Trouble Codes (CMDTCs) from all modules.

Does the CCM set DTC U0121:00 and the PCM set DTC U0121?

Yes	INSTALL a new ABS module. REFER to: Anti-Lock Brake System (ABS) Module .

No	If the CCM sets DTC U0121:00, INSTALL a new CCM. REFER to: Cruise Control Module (CCM) . If the PCM sets U0121, INSTALL a new PCM. For 2.3L, REFER to: Powertrain Control Module (PCM) . For 3.7L, REFER to: Powertrain Control Module (PCM) . For 5.0L, REFER to: Powertrain Control Module (PCM) .

DIAGNOSIS AND TESTING > CRUISE CONTROL > PINPOINT TESTS > PINPOINT TEST F : U0104

Refer to Module Communications Network for schematic and connector information.

Refer to Cruise Control for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Cruise Control - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0104	Lost Communication With Cruise Control Module	Sets in the PCM if data messages received from the CCM over the HS-CAN2 or from the GWM over the HS-CAN1 are missing for greater than 5 seconds.

Possible Sources

- CCM
- PCM
- GWM

DIAGNOSIS AND TESTING > CRUISE CONTROL > PINPOINT TESTS > PINPOINT TEST F : U0104 > PINPOINT TEST F : U0104

F1 VERIFY THE CUSTOMER CONCERN

Ignition ON.

Verify there is an observable symptom present.

Is an observable symptom present?

Yes	GO to F2

No	The system is operating normally at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

F2 CHECK THE COMMUNICATION NETWORK

Ignition ON.

Using a diagnostic scan tool, perform the network test.

Does the CCM pass the network test?

Yes	GO to F3

No	REFER to: MODULE COMMUNICATIONS NETWORK .

F3 CHECK THE CCM (CRUISE CONTROL MODULE) FOR BATTERY VOLTAGE OUT-OF-RANGE DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, perform the CCM self-test.

Is DTC U3003:16 or DTC U3003:17 recorded?

Yes	For DTC U3003:16, GO to Pinpoint Test Q For DTC U3003:17, GO to Pinpoint Test R

No	GO to F4

F4 CHECK THE GWM (GATEWAY MODULE A) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, retrieve the GWM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: MODULE COMMUNICATIONS NETWORK .

No	GO to F5

F5 RECHECK THE PCM (POWERTRAIN CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Clear all Diagnostic Trouble Codes (DTCs).

Ignition OFF.

Ignition ON.

Wait 10 seconds.

Using a diagnostic scan tool, perform the PCM self-test.

Is DTC U0104 still present?

Yes	GO to F6

No	The system is operating normally at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

F6 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0104 SET IN OTHER MODULES

Clear all Diagnostic Trouble Codes (DTCs).

Ignition OFF.

Ignition ON.

Wait 10 seconds.

Using a diagnostic scan tool, retrieve the continuous memory Diagnostic Trouble Codes (DTCs) from all modules.

Does DTC U0104 set in other modules?

Yes	INSTALL a new CCM. REFER to: Cruise Control Module (CCM) .

No	INSTALL a new PCM. For 2.3L, REFER to: Powertrain Control Module (PCM) . For 3.7L, REFER to: Powertrain Control Module (PCM) . For 5.0L, REFER to: Powertrain Control Module (PCM) .

DIAGNOSIS AND TESTING > CRUISE CONTROL > PINPOINT TESTS > PINPOINT TEST G : B142E:78 OR B1433:54

Refer to Cruise Control for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Cruise Control - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B142E:78	Forward Looking Sensor Horizontal Alignment: Alignment or Adjustment Incorrect	Set by the CCM as a continuous memory and on-demand DTC if the CCM detects a misalignment of the radar due to the horizontal alignment angle being out of range.
B1433:54	Forward Looking Sensor Horizontal Alignment: Missing Calibration	Set by the CCM as a continuous memory and on-demand DTC if the CCM detects a misalignment of the radar due to the horizontal alignment angle being out of range.

Possible Sources

- CCM alignment
- CCM bracket
- CCM

DIAGNOSIS AND TESTING > CRUISE CONTROL > PINPOINT TESTS > PINPOINT TEST G : B142E:78 OR B1433:54 > PINPOINT TEST G : B142E:78 OR B1433:54

G1 INSPECT THE CCM (CRUISE CONTROL MODULE) BRACKET

With the vehicle in NEUTRAL, position it on a hoist. REFER to: Jacking and Lifting - Overview .

Remove the front lower air deflector.

Inspect for damage to the CCM bracket.

Is the CCM bracket damaged?

Yes	REPAIR or INSTALL a new CCM bracket as necessary. REFER to: Cruise Control Module (CCM) .

No	GO to G2

NOTE: Remove the front bumper cover to carry-out the vertical alignment procedure.

G2 PERFORM THE VERTICAL AND HORIZONTAL ALIGNMENT

Perform the alignment procedures for the CCM. REFER to: Cruise Control Radar Alignment .

Does the CCM align correctly?

Yes	The system is operating correctly at this time. The concern was caused by a misaligned sensor.

No	INSTALL a new CCM. REFER to: Cruise Control Module (CCM) .

DIAGNOSIS AND TESTING > CRUISE CONTROL > PINPOINT TESTS > PINPOINT TEST H : C1A67:96

Refer to Cruise Control for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Cruise Control - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions

C1A67:96	Forward Looking Sensor: Component Internal Failure	Sets when the CCM detects an internal failure or invalid radar data with the radar sensor.

Possible Sources

- CCM

DIAGNOSIS AND TESTING > CRUISE CONTROL > PINPOINT TESTS > PINPOINT TEST H : C1A67:96 > PINPOINT TEST H : C1A67:96

H1 CHECK THE DIAGNOSTIC TROUBLE CODES (DTCS) FROM BOTH THE CONTINUOUS AND ON-DEMAND CCM (CRUISE CONTROL MODULE) SELF-TESTS

Ignition ON.

Clear Continuous Memory Diagnostic Trouble Codes (CMDTCs) from all modules.

Ignition OFF.

Ignition ON.

Wait at least 10 seconds.

Using a diagnostic scan tool, perform the CCM self-test.

Check the CCM Diagnostic Trouble Codes (DTCs) from the continuous and on-demand self-tests.

Is DTC C1A67:96 recorded?

Yes	GO to H2

No	The system is operating correctly at this time. The DTC may have been set due to an intermittent fault condition. CHECK the CCM connector and the HS-CAN2 bus wire for corrosion.

H2 CHECK FOR CORRECT CCM (CRUISE CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect the CCM connector.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the CCM connector. Make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new CCM. REFER to: Cruise Control Module (CCM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > CRUISE CONTROL > PINPOINT TESTS > PINPOINT TEST I : THE ADAPTIVE CRUISE CONTROL DOES NOT FUNCTION IN RAIN OR SNOW CONDITIONS

Refer to Cruise Control for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Cruise Control - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
C1A67:97	Forward Looking Sensor: Component Or System Operation Obstructed Or Blocked	Set by the CCM as a continuous memory and on-demand DTC if the CCM detects an obstruction or if the sensor is blocked. This DTC may also set when the CCM does not see a vehicle or object on the road for an extended period.

Possible Sources

- Front bumper cover
- Blockage or obstruction
- CCM mounting bracket
- CCM alignment
- CCM

DIAGNOSIS AND TESTING > CRUISE CONTROL > PINPOINT TESTS > PINPOINT TEST I : THE ADAPTIVE CRUISE CONTROL DOES NOT FUNCTION IN RAIN OR SNOW CONDITIONS > PINPOINT TEST I : THE ADAPTIVE CRUISE CONTROL DOES NOT FUNCTION IN RAIN OR SNOW CONDITIONS

I1 INSPECT THE FRONT BUMPER COVER FOR DAMAGE

With the vehicle in NEUTRAL, position it on a hoist. REFER to: Jacking and Lifting - Overview .

Inspect for damage on the front and back of the front bumper cover.

Is the front bumper cover damaged?

Yes	REPAIR or INSTALL a new front bumper cover as necessary. If installing a new front bumper cover, REFER to: Front Bumper Cover .

No	GO to I2

I2 INSPECT THE CCM (CRUISE CONTROL MODULE) AND FRONT BUMPER COVER FOR DEBRIS, MOISTURE, SNOW OR ICE

Inspect for debris, moisture, snow or ice on the front and back of the front bumper cover and sensor.

Is the CCM obstructed or blocked?

Yes	CLEAN the front bumper cover and radar sensor portion as necessary.

No	GO to I3

I3 INSPECT THE CCM (CRUISE CONTROL MODULE) BRACKET FOR CORRECT MOUNTING

Inspect the CCM bracket for a loose connection or damage at the connection points.

Is the CCM bracket loose, bent or damaged?

Yes	Correctly INSTALL the bracket or INSTALL new grommets as necessary. ALIGN the sensor. REFER to: Cruise Control Radar Alignment .

No	GO to I4

I4 INSPECT THE CCM (CRUISE CONTROL MODULE) FOR EXTREME VERTICAL MISALIGNMENT

Visually inspect the CCM for extreme vertical misalignment. The CCM plastic face should be perpendicular to the ground.

Is the CCM visually misaligned vertically?

Yes	PERFORM vertical alignment and horizontal alignment test procedures. REFER to: Cruise Control Radar Alignment .

No	GO to I5

I5 PERFORM HORIZONTAL AIM

Using a diagnostic scan tool, perform the horizontal aim procedure.

Using a diagnostic scan tool, perform the CCM self-test.

Does horizontal aim procedure finish successfully without setting DTC C1A67:97?

Yes	The system is operating normally at this time. This condition may have been cause by previous snow or water build up or driving on very sparse rural roads.

No	INSTALL a new CCM. REFER to: Cruise Control Module (CCM) .

DIAGNOSIS AND TESTING > CRUISE CONTROL > PINPOINT TESTS > PINPOINT TEST J : U0100:00

Refer to Module Communications Network for schematic and connector information.

Refer to Cruise Control for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Cruise Control - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0100:00	Lost Communication With ECM/PCM "A": No Sub Type Information	Sets in continuous memory if data messages received from the PCM over the HS-CAN1 or from the GWM over the HS-CAN2 to the CCM are missing for more than 5 seconds.

Possible Sources

- CCM
- PCM
- GWM

DIAGNOSIS AND TESTING > CRUISE CONTROL > PINPOINT TESTS > PINPOINT TEST J : U0100:00 > PINPOINT TEST J : U0100:00

J1 VERIFY THAT THE DIAGNOSTIC SCAN TOOL COMMUNICATES WITH THE PCM (POWERTRAIN CONTROL MODULE)

Using a diagnostic scan tool, verify a vehicle session can be established.

Can a vehicle session be established?

Yes	GO to J2

No	REFER to: MODULE COMMUNICATIONS NETWORK .

J2 CHECK THE CCM (CRUISE CONTROL MODULE) CONTINUOUS MEMORY DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition ON.

Clear Continuous Memory Diagnostic Trouble Codes (CMDTCs) from all modules.

Ignition OFF.

Ignition ON.

Wait at least 10 seconds.

Using a diagnostic scan tool, perform the CCM self-test.

Retrieve the Continuous Memory Diagnostic Trouble Codes (CMDTCs) from the CCM.

Is DTC U0100:00 retrieved again?

Yes	GO to J3

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

J3 CHECK THE GWM (GATEWAY MODULE A) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, retrieve the GWM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: MODULE COMMUNICATIONS NETWORK .

No	GO to J4

J4 CHECK FOR CONTINOUS MEMORY DIAGNOSTIC TROUBLE CODES (CMDTCS) FROM THE PCM (POWERTRAIN CONTROL MODULE) KOEO (KEY ON, ENGINE OFF) SELF-TEST

Using a diagnostic scan tool, perform a PCM KOEO self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to the PCM DTC Chart .

No	GO to J5

J5 CHECK THE CCM (CRUISE CONTROL MODULE) FOR BATTERY VOLTAGE OUT-OF-RANGE DTCS

Using a diagnostic scan tool, perform a CCM self-test?

Is DTC U3003:16 or DTC U3003:17 recorded?

Yes	For DTC U3003:16, GO to Pinpoint Test Q For DTC U3003:17, GO to Pinpoint Test R

No	GO to J6

J6 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0100:00 SET IN OTHER MODULES

Ignition ON.

Using a diagnostic scan tool, retrieve the Continuous Memory Diagnostic Trouble Codes (CMDTCs) from all modules.

Is DTC U0100:00 set in multiple modules?

Yes	INSTALL a new PCM. For 2.3L, REFER to: Powertrain Control Module (PCM) . For 3.7L, REFER to: Powertrain Control Module (PCM) . For 5.0L, REFER to: Powertrain Control Module (PCM) .

No	INSTALL a new CCM. REFER to: Cruise Control Module (CCM) .

DIAGNOSIS AND TESTING > CRUISE CONTROL > PINPOINT TESTS > PINPOINT TEST K : U0140:00

Refer to Module Communications Network for schematic and connector information.

Refer to Cruise Control for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Cruise Control - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0140:00	Lost Communication With Body Control Module: No Sub Type Information	Sets in the CCM if data messages received from the BCM over the HS-CAN1 or from the GWM over the HS-CAN2 are missing.

Possible Sources

- BCM
- CCM
- GWM

DIAGNOSIS AND TESTING > CRUISE CONTROL > PINPOINT TESTS > PINPOINT TEST K : U0140:00 > PINPOINT TEST K : U0140:00

K1 VERIFY THE CUSTOMER CONCERN

Ignition ON.

Verify there is an observable symptom present.

Is an observable symptom present?

Yes	GO to K2

No	The system is operating normally at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

K2 CHECK THE COMMUNICATION NETWORK

Ignition ON.

Using a diagnostic scan tool, perform the network test.

Does the BCM pass the network test?

Yes	GO to K3

No	REFER to: MODULE COMMUNICATIONS NETWORK .

K3 CHECK THE GWM (GATEWAY MODULE A) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, retrieve the GWM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: MODULE COMMUNICATIONS NETWORK .

No	GO to K4

K4 RETRIEVE THE RECORDED DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE CCM (CRUISE CONTROL MODULE) AND BCM (BODY CONTROL MODULE) SELF-TEST

Using a diagnostic scan tool, perform the CCM and BCM self-test.

Is DTC U3003:16 or DTC U3003:17 recorded?

Yes	For CCM, DTC U3003:16: GO to Pinpoint Test Q For CCM, DTC U3003:17: GO to Pinpoint Test R For the BCM, REFER to: Body Control Module (BCM) .

No	GO to K5

NOTE: If new modules were installed prior to the DTC being set, the module configuration can be incorrectly set during the Programmable Module Installation (PMI) or the Programmable Module Installation (PMI) may not have been carried out.

K5 RECHECK THE CCM (CRUISE CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs). Repeat the CCM self-test.

Is DTC U0140:00 still present?

Yes	GO to K6

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

K6 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0140:00 SET IN OTHER MODULES

Clear all Diagnostic Trouble Codes (DTCs).

Ignition OFF.

Ignition ON.

Wait 10 seconds.

Using a diagnostic scan tool, retrieve the Continuous Memory Diagnostic Trouble Codes (CMDTCs) from all modules.

Is DTC U0140:00 set in other modules?

Yes	

No	INSTALL a new CCM. REFER to: Cruise Control Module (CCM) .

DIAGNOSIS AND TESTING > CRUISE CONTROL > PINPOINT TESTS > PINPOINT TEST L : U0151:00

Refer to Module Communications Network for schematic and connector information.

Refer to Cruise Control for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Cruise Control - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0151:00	Lost Communication With Restraints Control Module: No Sub Type Information	The yaw rate sensor is integral to the RCM. This DTC sets in the CCM if yaw rate sensor data messages received from the RCM over the HS-CAN2 are missing.

Possible Sources

- CCM
- RCM

DIAGNOSIS AND TESTING > CRUISE CONTROL > PINPOINT TESTS > PINPOINT TEST L : U0151:00 > PINPOINT TEST L : U0151:00

L1 VERIFY THE CUSTOMER CONCERN

Ignition ON.

Verify there is an observable symptom present.

Is an observable symptom present?

Yes	GO to L2

No	The system is operating normally at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

L2 CHECK THE COMMUNICATION NETWORK

Ignition ON.

Using a diagnostic scan tool, perform the network test.

Does the RCM pass the network test?

Yes	GO to L3

No	REFER to: MODULE COMMUNICATIONS NETWORK .

L3 RETRIEVE THE RECORDED DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE CCM (CRUISE CONTROL MODULE) AND THE RCM (RESTRAINTS CONTROL MODULE) SELF-TEST

Using a diagnostic scan tool, perform the CCM and RCM self-tests.

Is DTC U3003:16 or DTC U3003:17 recorded?

Yes	For CCM, DTC U3003:16: GO to Pinpoint Test Q For CCM DTC U3003:17: GO to Pinpoint Test R For the RCM, REFER to: Airbag Supplemental Restraint System (SRS) .

No	GO to L4

NOTE: If new modules were installed prior to the DTC being set, the module configuration can be incorrectly set during the Programmable Module Installation (PMI) or the Programmable Module Installation (PMI) may not have been carried out.

L4 RECHECK THE CCM (CRUISE CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs). Repeat the CCM self-test.

Is DTC U0151:00 still present?

Yes	GO to L5

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

L5 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0151:00 SET IN OTHER MODULES

Clear all Diagnostic Trouble Codes (DTCs).

Ignition OFF.

Ignition ON.

Wait 10 seconds.

Using a diagnostic scan tool, retrieve the Continuous Memory Diagnostic Trouble Codes (CMDTCs) from all modules.

Is DTC U0151:00 set in other modules?

Yes	INSTALL a new RCM. REFER to: Restraints Control Module (RCM) .

No	INSTALL a new CCM. REFER to: Cruise Control Module (CCM) .

DIAGNOSIS AND TESTING > CRUISE CONTROL > PINPOINT TESTS > PINPOINT TEST M : U0155:00

Refer to Module Communications Network for schematic and connector information.

Refer to Cruise Control for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Cruise Control - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0155:00	Lost Communication With Instrument Panel Cluster (IPC) Control Module: No Sub Type Information	Sets in the CCM if data messages received from the IPC over the HS-CAN3 or from the GWM over the HS-CAN2 are missing.

Possible Sources

- CCM
- IPC
- GWM

DIAGNOSIS AND TESTING > CRUISE CONTROL > PINPOINT TESTS > PINPOINT TEST M : U0155:00 > PINPOINT TEST M : U0155:00

M1 VERIFY THE CUSTOMER CONCERN

Ignition ON.

Verify there is an observable symptom present.

Is an observable symptom present?

Yes	GO to M2

No	The system is operating normally at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

M2 CHECK THE COMMUNICATION NETWORK

Ignition ON.

Using a diagnostic scan tool, perform the network test.

Does the IPC pass the network test?

Yes	GO to M3

No	REFER to: MODULE COMMUNICATIONS NETWORK .

M3 CHECK THE GWM (GATEWAY MODULE A) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, retrieve the GWM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: MODULE COMMUNICATIONS NETWORK .

No	GO to M4

M4 RETRIEVE THE RECORDED DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE CCM (CRUISE CONTROL MODULE) AND THE IPC (INSTRUMENT PANEL CLUSTER) SELF-TEST

Using a diagnostic scan tool, perform the CCM and IPC self-tests.

Is DTC U3003:16 or DTC U3003:17 recorded?

Yes	For CCM, DTC U3003:16: GO to Pinpoint Test Q For CCM U3003:17: GO to Pinpoint Test R For the IPC, REFER to: Instrumentation, Message Center and Warning Chimes .

No	GO to M5

NOTE: If new modules were installed prior to the DTC being set, the module configuration can be incorrectly set during the Programmable Module Installation (PMI) or the Programmable Module Installation (PMI) may not have been carried out.

M5 RECHECK THE CCM (CRUISE CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs). Repeat the CCM self-test.

Is DTC U0155:00 still present?

Yes	GO to M6

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

M6 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0155:00 SET IN OTHER MODULES

Clear all Diagnostic Trouble Codes (DTCs).

Ignition OFF.

Ignition ON.

Wait 10 seconds.

Using a diagnostic scan tool, retrieve the Continuous Memory Diagnostic Trouble Codes (CMDTCs) from all modules.

Is DTC U0155:00 set in other modules?

Yes	INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

No	INSTALL a new CCM. REFER to: Cruise Control Module (CCM) .

DIAGNOSIS AND TESTING > CRUISE CONTROL > PINPOINT TESTS > PINPOINT TEST N : U0158:00

Refer to Module Communications Network for schematic and connector information.

Refer to Cruise Control for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Cruise Control - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0158:00	Lost Communication With Head Up Display: No Sub Type Information	Sets in the CCM if data messages received from the HUD module over the HS-CAN2 are missing.

Possible Sources

- CCM
- HUD module

DIAGNOSIS AND TESTING > CRUISE CONTROL > PINPOINT TESTS > PINPOINT TEST N : U0158:00 > PINPOINT TEST N : U0158:00

N1 VERIFY THE CUSTOMER CONCERN

Ignition ON.

Verify there is an observable symptom present.

Is an observable symptom present?

Yes	GO to N2

No	The system is operating normally at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

N2 CHECK THE COMMUNICATION NETWORK

Ignition ON.

Using a diagnostic scan tool, perform the network test.

Does the HUD module pass the network test?

Yes	GO to N3

No	REFER to: MODULE COMMUNICATIONS NETWORK .

N3 RETRIEVE THE RECORDED DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE CCM (CRUISE CONTROL MODULE) AND THE HUD (HEAD UP DISPLAY) MODULE SELF-TEST

Using a diagnostic scan tool, perform the CCM and HUD module self-tests.

Is DTC U3003:16 or DTC U3003:17 recorded?

Yes	For CCM, DTC U3003:16: GO to Pinpoint Test Q For CCM DTC U3003:17: GO to Pinpoint Test R For the HUD module, REFER to: Collision Warning and Collision Avoidance System .

No	GO to N4

NOTE: If new modules were installed prior to the DTC being set, the module configuration can be incorrectly set during the Programmable Module Installation (PMI) or the Programmable Module Installation (PMI) may not have been carried out.

N4 RECHECK THE CCM (CRUISE CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs). Repeat the CCM self-test.

Is DTC U0158:00 still present?

Yes	GO to N5

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

N5 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0158:00 SET IN OTHER MODULES

Clear all Diagnostic Trouble Codes (DTCs).

Ignition OFF.

Ignition ON.

Wait 10 seconds.

Using a diagnostic scan tool, retrieve the Continuous Memory Diagnostic Trouble Codes (CMDTCs) from all modules.

Is DTC U0158:00 set in other modules?

Yes	INSTALL a new HUD module. REFER to: Head Up Display (HUD) Module .

No	INSTALL a new CCM. REFER to: Cruise Control Module (CCM) .

DIAGNOSIS AND TESTING > CRUISE CONTROL > PINPOINT TESTS > PINPOINT TEST O : U0212:00

Refer to Module Communications Network for schematic and connector information.

Refer to Cruise Control for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Cruise Control - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0212:00	Lost Communication With Steering Column Control Module: No Sub Type Information	Sets in the CCM if data messages received from the SCCM over the HS-CAN2 are missing.

Possible Sources

- CCM
- SCCM

DIAGNOSIS AND TESTING > CRUISE CONTROL > PINPOINT TESTS > PINPOINT TEST O : U0212:00 > PINPOINT TEST O : U0212:00

O1 VERIFY THE CUSTOMER CONCERN

Ignition ON.

Verify there is an observable symptom present.

Is an observable symptom present?

Yes	GO to O2

No	The system is operating normally at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

O2 CHECK THE COMMUNICATION NETWORK

Ignition ON.

Using a diagnostic scan tool, perform the network test.

Does the SCCM pass the network test?

Yes	GO to O3

No	REFER to: MODULE COMMUNICATIONS NETWORK .

O3 RETRIEVE THE RECORDED DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE CCM (CRUISE CONTROL MODULE) AND SCCM (STEERING COLUMN CONTROL MODULE) SELF-TEST

Using a diagnostic scan tool, perform the CCM and SCCM self-tests.

Is DTC U3003:16 or DTC U3003:17 recorded?

Yes	For CCM, DTC U3003:16: GO to Pinpoint Test Q For CCM DTC U3003:17: GO to Pinpoint Test R For the SCCM, REFER to: Steering Wheel and Column Electrical Components .

No	GO to O4

NOTE: If new modules were installed prior to the DTC being set, the module configuration can be incorrectly set during the PMI or the PMI may not have been carried out.

O4 RECHECK THE CCM (CRUISE CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs). Repeat the CCM self-test.

Is DTC U0212:00 still present?

Yes	GO to O5

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

O5 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0212:00 SET IN OTHER MODULES

Clear all Diagnostic Trouble Codes (DTCs).

Ignition OFF.

Ignition ON.

Wait 10 seconds.

Using a diagnostic scan tool, retrieve the Continuous Memory Diagnostic Trouble Codes (CMDTCs) from all modules.

Is DTC U0212:00 set in other modules?

Yes	INSTALL a new SCCM. REFER to: Steering Column Control Module (SCCM) .

No	INSTALL a new CCM. REFER to: Cruise Control Module (CCM) .

DIAGNOSIS AND TESTING > CRUISE CONTROL > PINPOINT TESTS > PINPOINT TEST P : U3000:63

Refer to Cruise Control for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Cruise Control - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U3000:63	Control Module: Circuit/Component Protection Time-Out	Set by the CCM as a continuous memory and on-demand DTC if the CCM detects too many collision mitigation by braking activation requests.

Possible Sources

- Front bumper cover
- CCM mounting bracket
- CCM

DIAGNOSIS AND TESTING > CRUISE CONTROL > PINPOINT TESTS > PINPOINT TEST P : U3000:63 > PINPOINT TEST P : U3000:63

P1 INSPECT THE CCM (CRUISE CONTROL MODULE), BRACKET AND FRONT BUMPER COVER

Inspect for damage to the CCM, bracket and front bumper cover.

Is the CCM, bracket or front bumper cover damaged?

Yes	REPAIR or REPLACE the CCM, bracket or front bumper cover as necessary. For the CCM or bracket, REFER to: Cruise Control Module (CCM) . For the front bumper cover, REFER to: Front Bumper Cover .

No	If a software update is available, update the CCM to the latest software level. PERFORM the module programming. REFER to direction provided by the diagnostic scan tool.If a software update is not available, INSTALL a new CCM. REFER to: Cruise Control Module (CCM) .

DIAGNOSIS AND TESTING > CRUISE CONTROL > PINPOINT TESTS > PINPOINT TEST Q : U3003:16

Refer to Cruise Control for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Cruise Control - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U3003:16	Battery Voltage: Circuit Voltage Below Threshold	Set by the CCM as a continuous memory and on-demand DTC if the CCM detects low battery voltage below 9.5 volts for more than 500 ms.

Possible Sources

- Wiring, terminals and connectors
- Battery
- Generator
- CCM
- PCM

DIAGNOSIS AND TESTING > CRUISE CONTROL > PINPOINT TESTS > PINPOINT TEST Q : U3003:16 > PINPOINT TEST Q : U3003:16

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may damage the connector.

NOTE: Failure to disconnect the battery when instructed results in false resistance readings. Refer to Cruise Control .

Q1 RECHECK THE CCM (CRUISE CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition ON.

Using a diagnostic scan tool, perform the self-test.

Is DTC U3003:16 still present?

Yes	GO to Q2

No	The system is operating correctly at this time. The DTC may have been set due to a previous low battery voltage condition.

Q2 CHECK FOR CHARGING SYSTEM DIAGNOSTIC TROUBLE CODES (DTCS) IN THE PCM (POWERTRAIN CONTROL MODULE)

Using a diagnostic scan tool, perform the PCM self-test.

Are any charging system Diagnostic Trouble Codes (DTCs) present in the PCM?

Yes	For 2.3L, REFER to: Charging System - 2.3L EcoBoost (201kW/273PS) . For 3.7L, REFER to: Charging System - 3.7L Duratec (227kW/301PS) . For 5.0L, REFER to: Charging System - 5.0L 32V Ti-VCT .

No	GO to Q3

Q3 CHECK THE BATTERY CONDITION AND STATE OF CHARGE

Check the battery condition and verify the battery is fully charged. REFER to: BATTERY, MOUNTING AND CABLES .

Is the battery OK and fully charged?

Yes	GO to Q4

No	INSTALL a new battery. REFER to: Battery .

Q4 CHECK THE CCM (CRUISE CONTROL MODULE) VOLTAGE SUPPLY

Ignition OFF.

Disconnect CCM C1582 .

Ignition ON.

Measure and record the voltage at the battery.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1582-10		Ground

Is the voltage within 0.2 volt of the recorded battery voltage?

Yes	GO to Q5

No	REPAIR the circuit for high resistance.

Q5 CHECK THE CCM (CRUISE CONTROL MODULE) GROUND CIRCUIT

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1582-4	Ω	Ground

Is the resistance less than 3 ohms?

Yes	GO to Q6

No	REPAIR the circuit for high resistance.

Q6 CHECK FOR CORRECT CCM (CRUISE CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect the CCM connector.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the CCM connector. Make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new CCM. REFER to: Cruise Control Module (CCM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > CRUISE CONTROL > PINPOINT TESTS > PINPOINT TEST R : U3003:17

Refer to Cruise Control for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Cruise Control - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U3003:17	Battery Voltage: Circuit Voltage Above Threshold	Sets as a continuous memory and on-demand DTC if the CCM detects high battery voltage above 16.5 volts for 500 ms.

Possible Sources

- Generator
- CCM
- PCM

DIAGNOSIS AND TESTING > CRUISE CONTROL > PINPOINT TESTS > PINPOINT TEST R : U3003:17 > PINPOINT TEST R : U3003:17

NOTE: DTC U3003:17 may be stored in the module memory due to past battery charging or vehicle jump starting events.

R1 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U3003:17, P0563 OR P0626 SET IN OTHER MODULES

Ignition ON.

Using a diagnostic scan tool, retrieve the Continuous Memory Diagnostic Trouble Codes (CMDTCs) from all modules.

Is DTC U3003:17, P0563 (PCM) or P0626 (PCM) set in more than one module?

Yes	For 2.3L, REFER to: Charging System - 2.3L EcoBoost (201kW/273PS) . For 3.7L, REFER to: Charging System - 3.7L Duratec (227kW/301PS) . For 5.0L, REFER to: Charging System - 5.0L 32V Ti-VCT .

No	GO to R2

R2 CHECK THE BATTERY VOLTAGE

Turn off all the interior/exterior lights and accessories.

Start and run the engine at approximately 2, 000 RPM for 3 minutes while monitoring the battery voltage.

Does the battery voltage rise to 15.5 volts or higher?

Yes	For 2.3L, REFER to: Charging System - 2.3L EcoBoost (201kW/273PS) . For 3.7L, REFER to: Charging System - 3.7L Duratec (227kW/301PS) . For 5.0L, REFER to: Charging System - 5.0L 32V Ti-VCT .

No	GO to R3

R3 RECHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U3003:17

Turn the engine off.

Ignition ON.

Using a diagnostic scan tool, clear the DTC Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Using a diagnostic scan tool, perform the CCM self-test.

Is DTC U3003:17 still present?

Yes	INSTALL a new CCM. REFER to: Cruise Control Module (CCM) .

No	The system is operating normally at this time. The DTC may have been set previously during battery charging or while jump starting the vehicle.

DIAGNOSIS AND TESTING > CRUISE CONTROL > PINPOINT TESTS > PINPOINT TEST S : U0423:82

Refer to Cruise Control for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Cruise Control - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0423:82	Invalid Data Received From Instrument Panel Cluster Control Module: Alive/Sequence Counter Incorrect/Not Updated	Sets in continuous memory in the CCM if adaptive cruise control data received from the GWM over the HS-CAN2 or from the IPC over the HS-CAN3 is missing for 5 seconds or longer.

Possible Sources

- CCM
- IPC
- GWM

DIAGNOSIS AND TESTING > CRUISE CONTROL > PINPOINT TESTS > PINPOINT TEST S : U0423:82 > PINPOINT TEST S : U0423:82

S1 VERIFY THE CUSTOMER CONCERN

Ignition ON.

Verify there is an observable symptom present.

Is an observable symptom present?

Yes	GO to S2

No	The system is operating normally at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

S2 CHECK THE COMMUNICATION NETWORK

Using a diagnostic scan tool, perform the network test.

Does the IPC pass the network test?

Yes	GO to S3

No	REFER to: MODULE COMMUNICATIONS NETWORK .

S3 CHECK THE GWM (GATEWAY MODULE A) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, retrieve the GWM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: MODULE COMMUNICATIONS NETWORK .

No	GO to S4

S4 PERFORM THE IPC (INSTRUMENT PANEL CLUSTER) SELF-TEST

Using a diagnostic scan tool, perform the IPC self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: Instrumentation, Message Center and Warning Chimes .

No	GO to S5

S5 PERFORM THE CCM (CRUISE CONTROL MODULE) SELF-TEST

Using a diagnostic scan tool, perform the CCM self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to CCM DTC Chart .

No	GO to S6

NOTE: If new modules were installed prior to the DTC being set, the module configuration may be incorrectly set during the Programmable Module Installation (PMI), or the Programmable Module Installation (PMI) may not have been carried out.

S6 RECHECK THE CCM (CRUISE CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs).

Wait 10 seconds.

Repeat the CCM self-test.

Is DTC U0423:82 still present?

Yes	INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

GENERAL PROCEDURES > CRUISE CONTROL RADAR ALIGNMENT

Activation

Vertical Alignment

NOTE: In order to align the CCM, the front bumper cover must be removed to access the

sensor and the vehicle must be in a wheel alignment bay station so that the vehicle is level.

NOTE: Damage to the CCM bracket may affect correct alignment. When aligning the CCM, inspect the CCM bracket for damage and repair as necessary before carrying out the alignment procedure.

1.

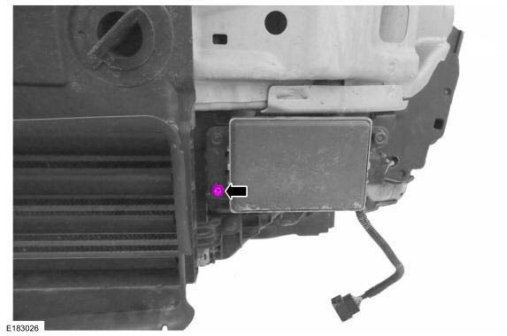
Remove the front bumper cover. Refer to: Front Bumper Cover .

2.

Place the vehicle on a wheel alignment bay station.

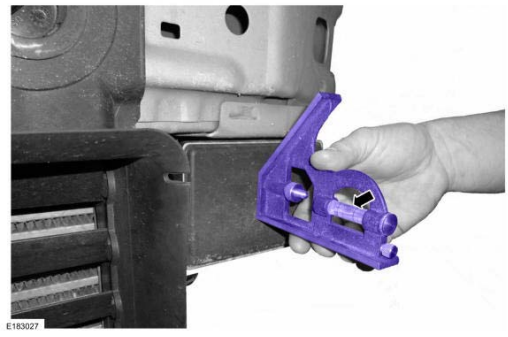
3.

Locate the CCM alignment screw.



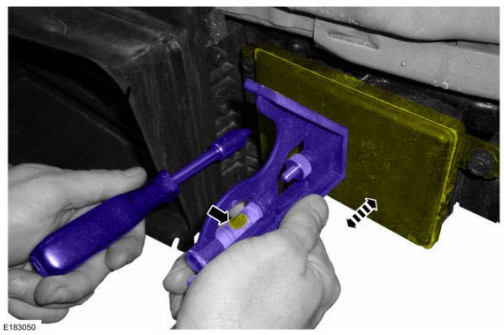
4.

Place a combination square level on the face of the CCM and check the alignment.



5.

Keeping the combination square level on the face of the CCM, adjust the pitch by using an E20 Torx ® bit to adjust the screw until the CCM is vertical and level.



NOTE: Prior to installing the front bumper cover, clean and remove any debris on the front or back of the cover.

6.
Install the front bumper cover.

Horizontal Alignment

NOTE: The horizontal alignment for the CCM is a software calibration. No manual adjustment is needed for this procedure. The scan tool calibrates the CCM through the CCM procedure in programmable parameters.

NOTE: The vehicle's engine must be running during the horizontal alignment procedure. Failure to leave the engine running throughout the entire procedure results in the cancellation of the alignment procedure and the system remains non-functional.

7.
Start the engine.

8.

Follow the scan tool on-screen instructions to carry-out the CCM calibration procedure located in IDS under Toolbox > Electrical > Cruise Control > CCM Calibration.

REMOVAL AND INSTALLATION > CRUISE CONTROL DEACTIVATOR SWITCH > REMOVAL

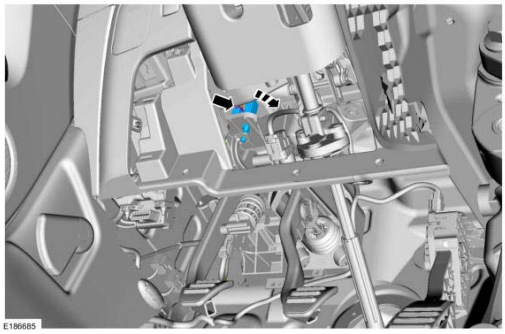
NOTE: Do not press, pull or otherwise move the clutch pedal while installing the cruise control deactivator switch. Install the switch with the clutch pedal in the at-rest position. Installing this switch with the clutch pedal in any other position results in incorrect adjustment and damages the switch.

1.

Remove the driver knee airbag. Refer to: Driver Knee Airbag .

2.

Disconnect the electrical connector and remove the cruise control deactivator switch.



REMOVAL AND INSTALLATION > CRUISE CONTROL DEACTIVATOR SWITCH > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > CRUISE CONTROL MODULE (CCM) > REMOVAL

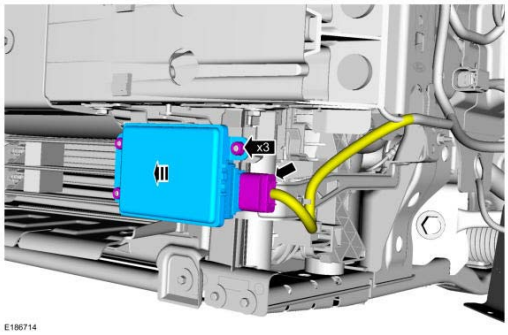
NOTE: Removal steps in this procedure may contain installation details.

1.

Remove the front bumper cover. Refer to: Front Bumper Cover .

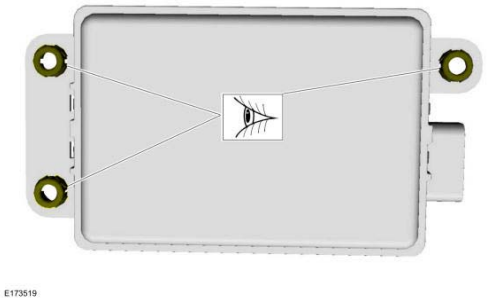
NOTE: Gently pry the CCM from the retaining studs.

2.
Disconnect the electrical connector and remove the CCM from the bracket.



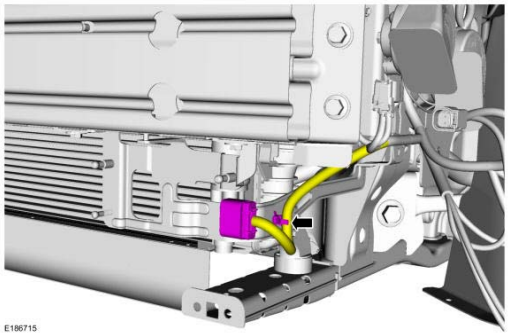
3.

Inspect the CCM grommets for damage. Replace any damaged grommets.



4.

If bracket removal is required, separate the wiring harness guide.



5.

Remove the CCM bracket.

1.

Remove the CCM bracket bolt.

Torque

: 80 lb.in (9 Nm)

2.

Remove the CCM bracket bolt.

Torque

: 80 lb.in (9 Nm)

3.

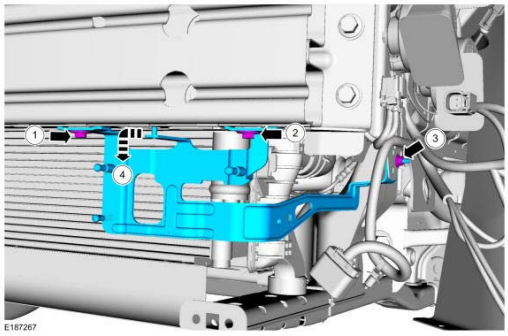
Remove the CCM bracket nut.

Torque

: 80 lb.in (9 Nm)

4.

Slide the CCM bracket left and then down.



REMOVAL AND INSTALLATION > CRUISE CONTROL MODULE (CCM) > INSTALLATION

1.

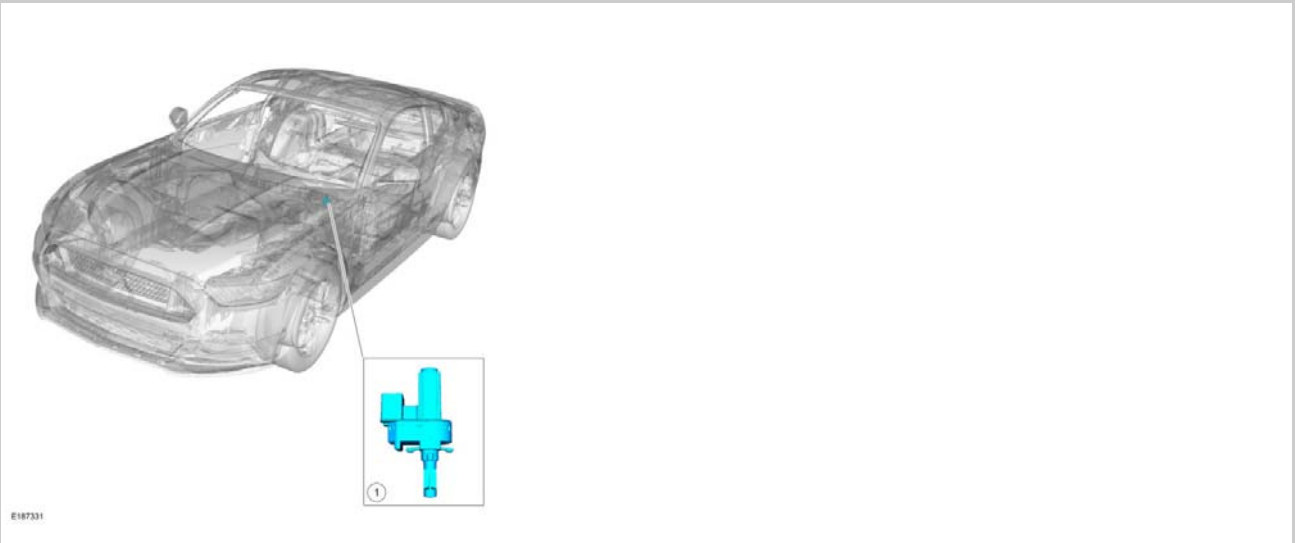
To install, reverse the removal procedure.

2.

Align the CCM. Refer to: Cruise Control Radar Alignment .

Service Manual: CRUISE CONTROL

DESCRIPTION AND OPERATION > CRUISE CONTROL - COMPONENT LOCATION



Item	Description
1	CPP switch

DESCRIPTION AND OPERATION > CRUISE CONTROL - OVERVIEW > OVERVIEW

The cruise control system is controlled by the PCM.

The cruise control mode is selected from the steering wheel mounted switches (ON/OFF, SET+, SET- and CAN/RES), which are integrated into the LH steering wheel switch.

The cruise control system maintains a selected vehicle speed between 32 km/h (20 mph), or 29 km/h (18 mph) (metric cluster), and the maximum limited vehicle speed. When a MyKey ® restricted key is in use and max speed limiter is turned on, vehicle speed is limited to 129 km/h (80 mph).

During normal driving, the vehicle speed can vary slightly from the set speed due to road conditions. The vehicle speed can fluctuate when driving up and down a steep hill. If the vehicle speed decreases more than 16 km/h (10 mph) below the set speed, the cruise control disengages.

DESCRIPTION AND OPERATION > CRUISE CONTROL - SYSTEM OPERATION AND COMPONENT DESCRIPTION > NETWORK MESSAGE CHART

Network Input Messages - IPC

Broadcast Message	Originating Module	Message Purpose
Cruise control override	PCM	Driver overriding cruise control with accelerator pedal.

Cruise control status	PCM	Data used for speed control indicator status.
Cruise control set speed display	PCM	Data used for speed control indicator display.

Network Input Messages - PCM

Broadcast Message	Originating Module	Message Purpose
Steering wheel switch speed control	SCCM	Used for cruise control enable/disable and operating mode request.
Stability control event in progress	ABS module	Deactivates speed control when requested.
Traction control event in progress		
Vehicle lateral acceleration	ABS module	Deactivates speed control when requested.
Vehicle longitudinal acceleration		
Vehicle yaw rate	RCM	

DESCRIPTION AND OPERATION > CRUISE CONTROL - SYSTEM OPERATION AND COMPONENT DESCRIPTION > CRUISE CONTROL OPERATION

The cruise control functions include:

- turning on the cruise control system.
- setting and maintaining the desired vehicle speed.
- accelerating the vehicle speed.
- coasting down to a lower speed.
- resuming the prior vehicle speed.
- turning off the cruise control system.

The cruise control system maintains a selected vehicle speed within a range between 32 km/h (20 mph), or 29 km/h (18 mph) if equipped with a metric cluster, and the maximum limited vehicle speed. When a MyKey ® restricted key is in use, the vehicle speed will not exceed the MyKey ® maximum limited speed. During normal driving conditions, the vehicle speed can fluctuate slightly from the selected set speed due to road conditions. The vehicle speed can fluctuate more noticably when driving up and down steep hills.

Certain conditions cause the cruise control system to deactivate:

- Application of the parking brake
- Transmission gear selector is placed into a position other than D or OD

- Cruise control set speed is overridden with the accelerator pedal for a period longer than 5 minutes
- Cruise control switch is pressed or stuck longer than 2 minutes
- Clutch pedal is pressed (if equipped)
- Vehicle speed decreases more than 16 km/h (10 mph) below the set speed
- ABS fault

The BPP switch assembly (contains the stoplamp switch and cruise control deactivator switch), APP sensor and CPP switch (if equipped) are hardwired inputs to the PCM.

Electronic Throttle Body (ETB) command is a hardwired output of the PCM.

The vehicle speed is controlled by the PCM through the Electronic Throttle Control (ETC) subsystem.

The cruise control system provides self-diagnostics. Cruise control is disabled anytime an error is detected in the system. No IPC indicator or message center messages are displayed when faults occur. Fault codes are logged by the PCM or SCCM.

An Electronic Throttle Control (ETC) system fault also causes the cruise control system to be disabled. In this case, an Electronic Throttle Control (ETC) system powertrain malfunction (wrench) warning indicator is displayed.

Cruise Control Indicator

The cruise control indicator, located in the IPC, illuminates to indicate the cruise control system is active.

Steering Wheel Switch Function

Cruise control switch inputs are received by the SCCM and sent to the PCM through the GWM to the high speed controller area network 1 (HS1-CAN).

Pressing and releasing the ON (ON/OFF) switch turns the cruise control system on. Pressing (SET+) or (SET-) on the SET switch while the vehicle is traveling at the desired speed activates the cruise control system.

Pressing up or down on the SET switch while in the active mode increases or decreases the maintained vehicle speed by 2 kmh per press when displayed units are "kmh" and 1 mph per press when displayed units are "mph". If the respective switch is pressed and held, the vehicle speed continues to accelerate or decelerate until the switch is released.

Pressing and releasing the OFF (ON/OFF) switch, or turning the ignition switch to the OFF position, turns the cruise control system off. While the cruise control system is active, applying the brake pedal or pressing the CNCL (CANCEL) switch puts the cruise control system into standby mode. Pressing the RES (RESUME) switch when the cruise control system is in standby mode causes the vehicle to accelerate to the last speed. Resume does not function if the OFF switch is pressed, the ignition switch is cycled OFF, the clutch pedal is pressed (if equipped) or if the current vehicle speed is below the minimum operational speed.

Steering Wheel Switches

The cruise control steering wheel mounted switches are momentary contact switches that toggle up and down for the switch state. The switches are an input to the SCCM.

Brake Switch

When the brake pedal is applied, an electrical signal from the stoplamp circuit to the PCM deactivates the system. Under increased brake pedal effort, the cruise control deactivator switch opens and removes the ground signal from the PCM input circuit releasing the throttle, immediately deactivating the system.

Clutch Pedal Position (CPP) Switch

Vehicles equipped with a manual transmission have a CPP switch. The CPP switch is a normally closed switch with the clutch pedal released. When the clutch pedal is pressed, an electrical signal from the CPP switch opens the circuit and signals the PCM to deactivate the cruise control system.

DIAGNOSIS AND TESTING > CRUISE CONTROL > DTC CHARTS

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

DIAGNOSIS AND TESTING > CRUISE CONTROL > DTC CHARTS > DTC CHART: POWERTRAIN CONTROL MODULE (PCM)

PCM DTC Chart

DTC	Description	Action
P0504	Brake Switch A / B Correlation	GO to Pinpoint Test B
P0572	Brake Switch A Circuit Low	GO to Pinpoint Test B
P0573	Brake Switch A Circuit High	GO to Pinpoint Test B
P0833	Clutch Pedal Switch "B" Circuit	GO to Pinpoint Test D
P170A	Clutch Switch Out of Self-Test Range	GO to Pinpoint Test D
P1703	Brake Switch Out Of Self-Test Range	GO to Pinpoint Test B
All other Diagnostic Trouble Codes (DTCs)	-	For 2.3L GTDI, REFER to: Electronic Engine Controls . For 3.7L, REFER to: Electronic Engine Controls . For 5.0L TiVCT, REFER to: Electronic Engine Controls .

DIAGNOSIS AND TESTING > CRUISE CONTROL > DTC CHARTS > DTC CHART: STEERING COLUMN CONTROL MODULE (SCCM)

SCCM DTC Chart

DTC	Description	Action
B137F:09	Steering Wheel Left Switch Pack: Component Failure	GO to Pinpoint Test A
B137F:11	Steering Wheel Left Switch Pack: Circuit Short to Ground	GO to Pinpoint Test A
B137F:17	Steering Wheel Left Switch Pack: Circuit Voltage Above Threshold	GO to Pinpoint Test A
All other Diagnostic Trouble Codes (DTCs)	-	REFER to: Steering Wheel and Column Electrical Components .

DIAGNOSIS AND TESTING > CRUISE CONTROL > SYMPTOM CHART(S)

Symptom Chart: Cruise Control

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

Symptom Chart

Condition	Possible Sources	Actions
A module does not respond to the diagnostic scan tool	Fuse Wiring, terminals or connectors Communication concern Module	REFER to: MODULE COMMUNICATIONS NETWORK .
The cruise control is inoperative	Refer to the Pinpoint Test	GO to Pinpoint Test A
The cruise control indicator lamp is never/always on	Wiring, terminals and connectors PCM IPC	REFER to: Instrumentation, Message Center and Warning Chimes .
The cruise control switch is inoperative/does not operate correctly	Refer to the Pinpoint Test	GO to Pinpoint Test A
The cruise control does not disengage when the clutch pedal is applied	Refer to the Pinpoint Test	GO to Pinpoint Test C
The cruise control cannot set above 105 kmh (65 mph), 113 kmh (70 mph), 121 kmh (75 mph), or 129 kmh (80 mph)	A MyKey ® restricted key is in use and MyKey ® max speed limiter is turned on	VERIFY whether a MyKey ® restricted key is in use. With an admin key, VERIFY if MyKey ® max speed limiter is turned on. REFER to the Owner's Literature. If necessary, VERIFY cruise control normal operation with an admin key.

DIAGNOSIS AND TESTING > CRUISE CONTROL > PINPOINT TESTS > PINPOINT TEST A : THE CRUISE CONTROL IS INOPERATIVE

Refer to Cruise Control for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Steering Wheel and Column Electrical Components - System Operation and Component Description .

REFER to: Cruise Control - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Action
B137F:09	Steering Wheel Left Switch Pack: Component Failure	A continuous and on-demand DTC that sets when one or more of the cruise control switches are stuck.
B137F:11	Steering Wheel Left Switch Pack: Circuit Short to Ground	A continuous and on-demand DTC that sets when the cruise control switch circuits are shorted to ground.
B137F:17	Steering Wheel Left Switch Pack: Circuit Voltage Above Threshold	A continuous and on-demand DTC that sets when the cruise control switch circuits are shorted to voltage.

Possible Sources

- Wiring, terminals or connectors
- Cruise control switch
- Digital TR sensor (if equipped)
- PCM
- SCCM
- BPP switch
- CPP switch (if equipped)

DIAGNOSIS AND TESTING > CRUISE CONTROL > PINPOINT TESTS > PINPOINT TEST A : THE CRUISE CONTROL IS INOPERATIVE > PINPOINT TEST A : THE CRUISE CONTROL IS INOPERATIVE

A1 CHECK FOR DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, perform the PCM self-test.

Using a diagnostic scan tool, perform the SCCM self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	If PCM Diagnostic Trouble Codes (DTCs) were retrieved, REFER to the PCM DTC Chart . If SCCM DTC B137F:11 or B137F:17 was retrieved, GO to A5 For all other SCCM Diagnostic Trouble Codes (DTCs), REFER to: Steering Wheel and Column Electrical Components .

No	GO to A2

A2 CHECK THE STOPLAMP SWITCH (BOO1) AND CRUISE CONTROL DEACTIVATOR SWITCH (BOO2) PARAMETER IDENTIFICATIONS (PIDS)

Using a diagnostic scan tool, view PCM Parameter Identifications (PIDs).

Using the table, monitor the Parameter Identifications (PIDs) BOO1 (stoplamp switch) and BOO2 (cruise control deactivator switch) while applying and releasing the brake pedal.

Brake Pedal Position	BOO1 PID	BOO2 PID
Released	Off	Off
Applied	On	On

Do the PID values agree with the brake pedal position?

Yes	For manual transmission, GO to A3 For automatic transmission, GO to A5

No	GO to Pinpoint Test B

A3 CHECK THE CLUTCH PEDAL CRUISE CONTROL DEACTIVATOR SWITCH (CPP_TOP_ PARAMETER IDENTIFICATION (PID)

Using the diagnostic scan tool, view PCM Parameter Identifications (PIDs).

Monitor the PCM PID CPP_TOP while pressing and releasing the clutch pedal.

Clutch Pedal Position	CPP_TOP PID
Released	No
Pressed	Yes

Does the PID value agree with the clutch pedal position?

Yes	GO to A5

No	If the PID value always reads YES (pressed), GO to A4 If the PID value always reads NO (released), GO to Pinpoint Test C

A4 CHECK THE CLUTCH PEDAL (CPP_TOP) PID (PARAMETER IDENTIFICATION) WITH THE CPP (CLUTCH PEDAL POSITION) SWITCH DISCONNECTED

Ignition OFF.

Disconnect CPP switch.

Ignition ON.

Using a diagnostic scan tool, view PCM Parameter Identification (PIDs).

Monitor the clutch pedal CPP_TOP PID.

Does the PID read NO?

Yes	INSTALL a new CPP switch. REFER to: Cruise Control Deactivator Switch .

No	REPAIR the circuit.

A5 CHECK THE CRUISE CONTROL SWITCH PID (PARAMETER IDENTIFICATION)

Using a diagnostic scan tool, view SCCM Parameter Identifications (PIDs).

Using the table, press each cruise control switch while monitoring the cruise control switch PID.

Cruise Control Switch	PID Value
Cruise On (pressed/released)	On/Off
Cruise Off (pressed/released)	On/Off
Resume (pressed/released)	On/Off
Cancel (pressed/released)	On/Off
SET + (pressed/released)	On/Off
SET - (pressed/released)	On/Off

Does the PID value agree with the switch position?

Yes	For automatic transmission, GO to A6 For manual transmission, GO to A12

No	If only one switch does not display the correct PID value, INSTALL a new LH steering wheel switch. REFER to: Steering Wheel Multifunction Switch . If multiple switches do not

	display the correct PID value, GO to A7

A6 MONITOR THE PCM (POWERTRAIN CONTROL MODULE) TR (TRANSMISSION RANGE) PID (PARAMETER IDENTIFICATION)

Using a diagnostic scan tool, view PCM Parameter Identifications (PIDs).

Monitor the PCM PID TR.

Select DRIVE.

Does the PID value agree with the TR selector lever position?

Yes	GO to A12

No	REFER to: External Controls .

A7 CHECK FOR VOLTAGE TO THE CRUISE CONTROL SWITCHES

Ignition OFF.

Remove the driver airbag. REFER to: Driver Airbag .

Disconnect LH Steering Wheel Switch C2366 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2366-4		C2366-5
C2366-6		C2366-5
C2366-7		C2366-5

Is the voltage approximately 5 volts?

Yes	TURN the ignition off and WAIT one minute. INSTALL a new LH steering wheel switch. REFER to: Steering Wheel Multifunction Switch . INSTALL the driver airbag. REFER to: Driver Airbag .

No	GO to A8

A8 CHECK THE STEERING WHEEL SWITCH HARNESS FOR AN OPEN

Ignition OFF.

Disconnect Clockspring C218B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2366-4	Ω	C218B-15
C2366-5	Ω	C218B-8
C2366-6	Ω	C218B-6
C2366-7	Ω	C218B-7

Are the resistances less than 3 ohms?

Yes	GO to A9

No	Install a new steering wheel. REFER to: Steering Wheel .

A9 CHECK THE STEERING WHEEL SWITCH HARNESS FOR A SHORT TO GROUND

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2366-4	Ω	Ground
C2366-5	Ω	Ground
C2366-6	Ω	Ground
C2366-7	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to A10

No	Install a new steering wheel. REFER to: Steering Wheel .

A10 CHECK THE STEERING WHEEL SWITCH CIRCUITS THROUGH THE CLOCKSPRING FOR AN OPEN

Disconnect Clockspring C218C.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C218B-6 (component side)	Ω	C218C-5 (component side)
C218B-7 (component side)	Ω	C218C-7 (component side)

C218B-15 (component side)	Ω	C218C-8 (component side)

Are the resistances less than 3 ohms?

Yes	GO to A11

No	Install a new clockspring. REFER to: Clockspring .

A11 CHECK FOR CORRECT SCCM (STEERING COLUMN CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all SCCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the SCCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no TSBs address this concern, INSTALL a new SCCM. REFER to: Steering Column Control Module (SCCM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

A12 CHECK FOR CORRECT PCM (POWERTRAIN CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all PCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the PCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PCM. For 2.3L, REFER to: Powertrain Control Module (PCM) . For 3.7L, REFER to: Powertrain Control Module (PCM) . For 5.0L, REFER to: Powertrain Control Module (PCM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > CRUISE CONTROL > PINPOINT TESTS > PINPOINT TEST B : P0504, P0572, P0573 OR P1703

Refer to Cruise Control for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Cruise Control - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
P0504	Brake Switch A / B Correlation	A DTC that sets when the PCM does not sense the correct sequence of the brake pedal input signal from both the cruise control deactivator and stoplamp switches when the brake pedal is pressed and released.
P0572	Brake Switch A Circuit Low	A DTC that sets when the PCM detects an open in the stoplamp switch signal. The PCM monitors the vehicle speed, the engine speed, the engine torque and the stoplamp input during start and stop driving cycles. If the stoplamp switch input to the PCM is always off during start and stop driving cycles, this DTC sets in continuous memory.
P0573	Brake Switch A Circuit High	A DTC that sets when the PCM detects a short to voltage on the stoplamp switch signal. The PCM monitors the vehicle speed, the engine speed, the engine torque and the stoplamp switch input during start and stop driving

		cycles. If the stoplamp lamp switch input to the PCM is always on during start and stop driving cycles, this DTC sets in continuous memory.
P1703	Brake Switch Out Of Self - Test Range	A DTC that sets in the PCM during the self-test when the stoplamp switch input signal is high or does not cycle high and low.

Possible Sources

- Wiring, terminals or connectors
- Stoplamp switch
- PCM

DIAGNOSIS AND TESTING > CRUISE CONTROL > PINPOINT TESTS > PINPOINT TEST B : P0504, P0572, P0573 OR P1703 > PINPOINT TEST B : P0504, P0572, P0573 OR P1703

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may damage the connector.

B1 CHECK THE OPERATION OF THE STOPLAMPS

Ignition ON.

Operate the stoplamps.

Do the stoplamps and high mounted stoplamp operate correctly?

Yes	GO to B2

No	REFER to: Stoplamps .

B2 CHECK THE STOPLAMP SWITCH (BOO1) AND CRUISE CONTROL DEACTIVATOR SWITCH (BOO2) PARAMETER IDENTIFICATIONS (PIDS)

Using a diagnostic scan tool, view PCM Parameter Identifications (PIDs).

Using the table, monitor the Parameter Identifications (PIDs) BOO1 (stoplamp switch) and BOO2 (cruise control deactivator switch) while applying and releasing the brake pedal.

Brake Pedal Position	BOO1 PID	BOO2 PID

Released	Off	Off
Applied lightly	On	Off
Applied firmly	On	On

Do the PID values agree with the brake pedal position?

Yes	GO to B8

No	For an incorrect BOO1 PID value, GO to B3 For an incorrect BOO2 PID value, GO to B4

B3 CHECK THE STOPLAMP SWITCH CIRCUIT

Ignition OFF.

Disconnect: PCM C1551B (2.3L), C1381B (3.7L) or C175B (5.0L, 5.2L).

Ignition ON.

While applying and releasing the brake pedal, measure:

2.3L

Positive Lead	Measurement / Action	Negative Lead
C1551B-66		Ground

3.7L

Positive Lead	Measurement / Action	Negative Lead
C1381B-67		Ground

5.0L, 5.2L

Positive Lead	Measurement / Action	Negative Lead
C175B-67		Ground

Is the voltage greater than 11 volts with the brake pedal applied and no voltage with the brake pedal released?

Yes	GO to B8

No	REPAIR the circuit.

B4 CHECK THE CRUISE CONTROL DEACTIVATOR SWITCH FOR CORRECT OPERATION

Ignition OFF.

Disconnect: PCM C1551B (2.3L), C1381B (3.7L) or C175B (5.0L, 5.2L).

While firmly applying and releasing the brake pedal, measure:

2.3L

Positive Lead	Measurement / Action	Negative Lead
C1551B-65	Ω	Ground

3.7L

Positive Lead	Measurement / Action	Negative Lead
C1381B-66	Ω	Ground

5.0L, 5.2L

Positive Lead	Measurement / Action	Negative Lead
C175B-66	Ω	Ground

Is the resistance less than 3 ohms with the brake pedal released, and greater than 10, 000 ohms with the brake pedal firmly applied?

Yes	GO to B8

No	GO to B5

B5 CHECK THE CRUISE CONTROL DEACTIVATOR SWITCH GROUND CIRCUIT FOR AN OPEN

Disconnect: BPP switch C278 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C278-2	Ω	Ground

Is the resistance less than 3 ohms?

Yes	GO to B6

No	REPAIR the circuit.

B6 CHECK THE CRUISE CONTROL DEACTIVATOR SWITCH SIGNAL CIRCUIT FOR A SHORT TO GROUND

Measure:

Positive Lead	Measurement / Action	Negative Lead
C278-3	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to B7

No	REPAIR the circuit.

B7 CHECK THE CRUISE CONTROL DEACTIVATOR SWITCH SIGNAL CIRCUIT FOR AN OPEN

Connect a fused jumper wire:

Positive Lead	Measurement / Action	Negative Lead
C278-3		C278-2

Measure:

2.3L

Positive Lead	Measurement / Action	Negative Lead
C1551B-65	Ω	Ground

3.7L

Positive Lead	Measurement / Action	Negative Lead
C1381B-66	Ω	Ground

5.0L, 5.2L

Positive Lead	Measurement / Action	Negative Lead
C175B-66	Ω	Ground

Is the resistance less than 3 ohms?

Yes	INSTALL a new BPP switch. REFER to: Stoplamp Switch .

No	REPAIR the signal circuit for an open.

B8 CHECK FOR CORRECT PCM (POWERTRAIN CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all PCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the PCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PCM. For 2.3L, REFER to: Powertrain Control Module (PCM) . For 3.7L, REFER to: Powertrain Control Module (PCM) . For 5.0L, REFER to: Powertrain Control Module (PCM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > CRUISE CONTROL > PINPOINT TESTS > PINPOINT TEST C : THE CRUISE CONTROL DOES NOT DISENGAGE WHEN THE CLUTCH PEDAL IS APPLIED

Refer to Cruise Control for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Cruise Control - System Operation and Component Description .

Possible Sources

- Wiring, terminals or connectors
- CPP switch
- PCM

DIAGNOSIS AND TESTING > CRUISE CONTROL > PINPOINT TESTS > PINPOINT TEST C : THE CRUISE CONTROL DOES NOT DISENGAGE WHEN THE CLUTCH PEDAL IS APPLIED > PINPOINT TEST C : THE CRUISE CONTROL DOES NOT DISENGAGE WHEN THE CLUTCH PEDAL IS APPLIED

C1 CHECK THE CPP (CLUTCH PEDAL POSITION) SENSOR (CPP_TOP) PARAMETER

IDENTIFICATION (PID)

Ignition ON.

Using a diagnostic scan tool, view PCM Parameter Identifications (PIDs).

Monitor the PCM CPP_TOP PID while pressing and releasing the clutch pedal.

Does the PID value read "YES" with the clutch pedal pressed?

Yes	GO to C5

No	GO to C2

C2 CHECK THE CPP (CLUTCH PEDAL POSITION) TOP OF TRAVEL SWITCH

Ignition OFF.

Disconnect CPP top of travel switch C2354

Ignition ON.

Monitor the PCM CPP_TOP PID.

Does the PID value read YES?

Yes	INSTALL a new CPP switch. REFER to: Cruise Control Deactivator Switch .

No	GO to C3

C3 CHECK THE CPP (CLUTCH PEDAL POSITION) TOP OF TRAVEL SWITCH GROUND CIRCUIT FOR AN OPEN

Ignition OFF.

Connect:

Positive Lead	Measurement / Action	Negative Lead
C2354-2		Ground

Ignition ON.

Monitor the PCM CPP_TOP PID.

Does the PID value read YES?

Yes	REPAIR the ground circuit.

No	GO to C4

C4 CHECK THE CPP (CLUTCH PEDAL POSITION) TOP OF TRAVEL SWITCH SIGNAL CIRCUIT FOR AN OPEN

Ignition OFF.

Disconnect PCM C1551B (2.3L), C1381B (3.7L) or C175B (5.0L, 5.2L).

Measure:

2.3L

Positive Lead	Measurement / Action	Negative Lead
C2354-2	Ω	C1551B-6

3.7L

Positive Lead	Measurement / Action	Negative Lead
C2354-2	Ω	C1381B-8

5.0L, 5.2L

Positive Lead	Measurement / Action	Negative Lead
C2354-2	Ω	C175B-8

Is the resistance less than 3 ohms?

Yes	GO to C5

No	REPAIR the circuit.

C5 CHECK FOR CORRECT PCM (POWERTRAIN CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all PCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the PCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PCM. For 2.3L, REFER to: Powertrain Control Module (PCM) . For 3.7L, REFER to: Powertrain Control Module (PCM) . For 5.0L, REFER to: Powertrain Control Module (PCM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > CRUISE CONTROL > PINPOINT TESTS > PINPOINT TEST D : P0833 OR P170A

Refer to Cruise Control for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Cruise Control - System Operation and Component Description .

DTC Fault Trigger Condition- PCM

DTC	Description	Fault Trigger Conditions
P0833	Clutch Pedal Switch "B" Circuit	A DTC that sets when the PCM receives the vehicle speed input, indicating movement and does not detect the switching input signal from the clutch pedal speed control deactivator switch. This condition disables the cruise control.
P170A	Clutch Switch Out of Self-Test Range	A DTC that sets in the PCM during the self-test when the CPP top-of-travel switch input signal is high or does not cycle high and low.

Possible Sources

- Wiring, terminals or connectors
- CPP switch
- PCM

DIAGNOSIS AND TESTING > CRUISE CONTROL > PINPOINT TESTS > PINPOINT TEST D : P0833 OR P170A > PINPOINT TEST D : P0833 OR P170A

D1 CHECK THE CPP (CLUTCH PEDAL POSITION) SWITCH (CPP_TOP) PARAMETER IDENTIFICATION (PID)

Ignition ON.

Using a diagnostic scan tool, view PCM Parameter Identifications (PIDs).

Monitor the PCM CPP_TOP PID while pressing and releasing the clutch pedal.

Does the PID value read "YES" with the clutch pedal pressed AND "NO" with the clutch pedal released?

Yes	GO to D4

No	If PID always read "NO", GO to Pinpoint Test C If PID always reads "YES", GO to D2

D2 CHECK THE CPP (CLUTCH PEDAL POSITION) TOP OF TRAVEL SWITCH SIGNAL CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Disconnect PCM C1551B (2.3L), C1381B (3.7L) or C175B (5.0L, 5.2L).

Measure:

2.3L

Positive Lead	Measurement / Action	Negative Lead
C1551B-6	Ω	Ground

3.7L

Positive Lead	Measurement / Action	Negative Lead
C1381B-8	Ω	Ground

5.0L, 5.2L

Positive Lead	Measurement / Action	Negative Lead
C175B-8	Ω	Ground

Is the resistance less than 3 ohms?

Yes	GO to D5

No	GO to D3

D3 CHECK THE CPP (CLUTCH PEDAL POSITION) TOP OF TRAVEL SWITCH SIGNAL CIRCUIT FOR A SHORT TO GROUND WITH THE SWITCH DISCONNECTED

Disconnect CPP Top of Travel Switch C2354 .

Connect:

Positive Lead	Measurement / Action	Negative Lead
C2354-2		C2354-3

Measure:

2.3L

Positive Lead	Measurement / Action	Negative Lead
C1551B-6	Ω	Ground

3.7L

Positive Lead	Measurement / Action	Negative Lead
C1381B-8	Ω	Ground

5.0L, 5.2L

Positive Lead	Measurement / Action	Negative Lead
C175B-8	Ω	Ground

Is the resistance less than 3 ohms?

Yes	INSTALL a new CPP switch. REFER to: Cruise Control Deactivator Switch .

No	REPAIR the circuit.

D4 RECHECK THE PCM (POWERTRAIN CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Clear the Diagnostic Trouble Codes (DTCs). Repeat the PCM self-test.

Are any PCM Diagnostic Trouble Codes (DTCs) recorded?

Yes	If DTC P0833 or P170A is recorded, GO to D5 If any other PCM Diagnostic Trouble Codes (DTCs) are recorded, REFER to the PCM DTC Chart . For 2.3L, REFER to: Electronic Engine Controls . For 3.7L, REFER to: Electronic Engine Controls . For 5.0L, REFER to: Electronic Engine Controls .

No	GO to D5

D5 CHECK FOR CORRECT PCM (POWERTRAIN CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all PCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the PCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PCM. For 2.3L, REFER to: Powertrain Control Module (PCM) . For 3.7L, REFER to: Powertrain Control Module (PCM) . For 5.0L, REFER to: Powertrain Control Module (PCM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

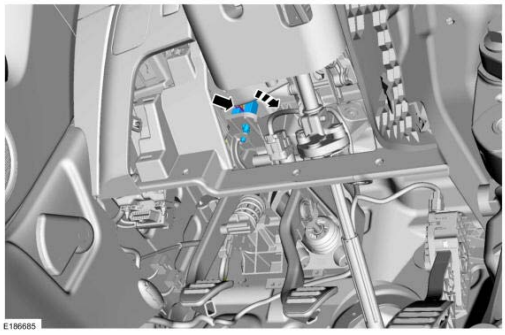
REMOVAL AND INSTALLATION > CRUISE CONTROL DEACTIVATOR SWITCH > REMOVAL

1.

Remove the driver knee airbag. Refer to: Driver Knee Airbag .

2.

Remove the cruise control deactivator switch then disconnect the electrical connector.



REMOVAL AND INSTALLATION > CRUISE CONTROL DEACTIVATOR SWITCH > INSTALLATION

1.

To install, reverse the removal procedure.

Service Manual: EXTERIOR LIGHTING

DESCRIPTION AND OPERATION > EXTERIOR LIGHTING - OVERVIEW > HEADLAMPS

The headlamp system consists of:

- Headlamp assemblies
- Ballasts
- Headlamp switch
- LH steering column multifunction switch
- BCM
- SCCM

The High Intensity Discharge (HID) headlamp system is a dual-beam pattern system. It consists of a replaceable High Intensity Discharge (HID) bulb in each headlamp assembly. Except China, the headlamp LED signature lamps are integrated into the headlamp assembly.

For China only, the headlamps are equipped with manual headlamp leveling.

DESCRIPTION AND OPERATION > EXTERIOR LIGHTING - OVERVIEW > DRL (IF EQUIPPED)

The DRL system consists of:

- Fog lamp assemblies
- BCM

The DRL system operates the fog lamp assemblies.

DESCRIPTION AND OPERATION > EXTERIOR LIGHTING - OVERVIEW > AUTOLAMPS

The autolamp system consists of:

- Light sensor
- Headlamp switch
- BCM

The autolamp system provides light sensitive automatic on/off control of the exterior lamps. The autolamp system keeps the exterior lamps on for a preselected period of time after the ignition is turned OFF (20 seconds is the factory default setting). The preselected time is adjustable up to approximately 3 minutes by using the message center controls.

DESCRIPTION AND OPERATION > EXTERIOR LIGHTING - OVERVIEW > STOPLAMPS

The stoplamp system consists of:

- Stoplamp switch
- Rear lamp assemblies
- High mounted stoplamp
- BCM
- Body Control Module B (BCMB) (except China)

The stoplamp switch is located on the brake pedal assembly. When the brake pedal is applied, voltage is supplied to the rear lamps and high mounted stoplamp.

DESCRIPTION AND OPERATION > EXTERIOR LIGHTING - OVERVIEW > TURN SIGNAL AND HAZARD LAMPS

The turn lamp system consists of:

- Front turn lamps (integrated in the front marker lamp assemblies)
- Rear lamp assemblies
- Exterior mirror assemblies (without hood turn signals)
- Hood turn signal lamps (without exterior mirror turn signals)
- LH steering column multifunction switch
- Hazard flasher lamp switch (integrated into the FCIM)
- BCM
- Body Control Module B (BCMB) (except China)
- SCCM
- DDM (if equipped with memory seat)
- PDM (if equipped with memory seat)

When the LH steering column multifunction switch is placed in the LH TURN or RH TURN position, the corresponding turn lamps flash on and off.

When the hazard function is active, all the turn lamps flash on and off.

DESCRIPTION AND OPERATION > EXTERIOR LIGHTING - OVERVIEW > PARKING, REAR AND LICENSE PLATE LAMPS

The parking, rear and license plate lamp system consists of:

- Front marker lamps
- Rear lamp assemblies
- Rear side marker lamps
- License plate lamps
- Headlamp switch
- BCM
- Body Control Module B (BCMB) (except China)

The front parking and front side marker lamps are integrated in the front marker lamp assemblies.

The rear parking lamps are integrated into the rear lamp assemblies.

DESCRIPTION AND OPERATION > EXTERIOR LIGHTING - OVERVIEW > FOG LAMP

The front fog lamp system consists of:

- Front fog lamps
- Front fog lamp switch (integrated into the headlamp switch)
- BCM

The front fog lamps can be turned on when the ignition is in RUN, the parking lamps are on, and the high beams are off.

DESCRIPTION AND OPERATION > EXTERIOR LIGHTING - OVERVIEW > FOG LAMP - REAR (CHINA ONLY)

The rear fog lamp system consists of:

- Rear fog lamp
- Rear fog lamp switch (integrated into the headlamp switch)
- BCM

The rear fog lamp can be turned on when the ignition is in RUN and the headlamps are on.

DESCRIPTION AND OPERATION > EXTERIOR LIGHTING - OVERVIEW > REVERSING LAMPS

The reverse lamp system consists of:

- Reverse lamp
- Reversing lamp switch (manual transmission)
- Transmission range sensor (automatic transmission)
- PCM
- BCM

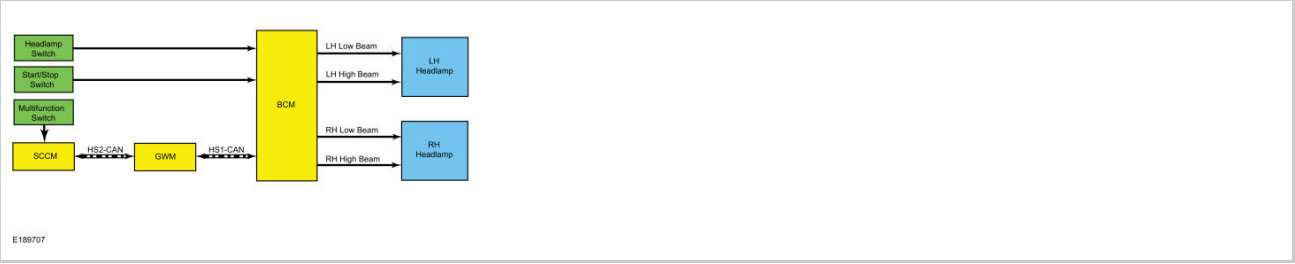
When the transmission is placed in REVERSE, the reversing lamps are illuminated. The reversing lamp are located on the bottom of the rear bumper fascia.

DESCRIPTION AND OPERATION > EXTERIOR LIGHTING - SYSTEM OPERATION AND COMPONENT DESCRIPTION

System Operation

DESCRIPTION AND OPERATION > EXTERIOR LIGHTING - SYSTEM OPERATION AND COMPONENT DESCRIPTION > HEADLAMPS - EXCEPT CHINA

System Diagram



Network Message Chart

BCM Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Headlamp flash to pass status	GWM	Indicates to the BCM a request for the high beams or flash-to-pass.

GWM Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Headlamp flash to pass status	SCCM	Indicates to the GWM a request for the high beams or flash-to-pass.

Low Beams

The BCM monitors the headlamp switch position by sending voltage signals on multiple circuits to the headlamp switch. There is one circuit for each headlamp switch position. At any given time, one of the signal circuits is switched to ground to indicate the headlamp switch position.

The BCM turns the parking lamps and headlamps on when the ignition is in RUN and the BCM detects a fault from the headlamp switch or wiring. This is normal behavior of the BCM when a fault has been detected with the inputs from the headlamp switch.

The BCM supplies a high current switched voltage to the headlamp assemblies to supply the necessary current to operate the ballast and lamps.

High Intensity Discharge (HID) headlamps utilize a ballast, mounted to each headlamp assembly, to provide the necessary voltage to illuminate the High Intensity Discharge (HID) bulbs.

The BCM also provides an Field Effect Transistor (FET) protection of the exterior lamps switched voltage and low beam output circuits. When an excessive current draw is detected, the BCM disables the affected circuit driver.

Refer to: Module Controlled Functions - System Operation and Component Description .

High Beams

The SCCM monitors the LH steering column multifunction switch for a high beam request. When the LH steering column multifunction switch is in the HIGH BEAMS position, the SCCM sends a message over the HS-CAN2 to the GWM then the GWM sends the message to the BCM over the HS-CAN1.

When the low beams are on and the BCM receives a request for high beams, the High Intensity Discharge (HID) bulbs remains powered on and the shutter within each headlamp are activated. This changes the headlamp beam pattern to illuminate a greater distance.

The BCM supplies a high current switched voltage to the headlamp assemblies to supply the necessary current to operate the high beam shutters.

The BCM also provides an Field Effect Transistor (FET) protection of the exterior lamps switched voltage and high beam output circuits. When an excessive current draw is detected, the BCM disables the affected circuit driver.

Refer to: Module Controlled Functions - System Operation and Component Description .

Flash-To-Pass

The SCCM monitors the LH steering column multifunction switch for a flash-to-pass request. When the LH steering column multifunction switch is in the FLASH-TO-PASS position, the SCCM sends a message over the HS-CAN2 to the GWM then the GWM sends the message to the BCM over the HS-CAN1.

When the ignition is in RUN and the flash-to-pass is requested, the high beams are activated as long as the LH steering column multifunction switch is held in the flash-to-pass position.

Headlamp Exit Delay

When the ignition is OFF and the LH steering column multifunction switch is placed in the FLASH-TO-PASS position and released, the parking lamps and low beams are illuminated. They remain illuminated until:

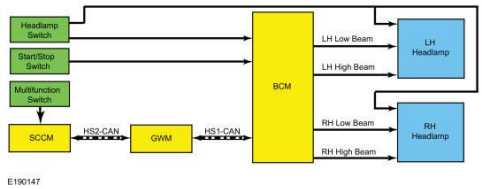
- 3 minutes have elapsed with a door open.

- 30 seconds have elapsed after all doors are closed.
- the LH steering column multifunction switch is placed in the flash-to-pass position again.
- the ignition switches to RUN.

Within the 30 second delay and all the doors closed, opening any door results in the 3 minute timer restarting.

DESCRIPTION AND OPERATION > EXTERIOR LIGHTING - SYSTEM OPERATION AND COMPONENT DESCRIPTION > HEADLAMPS - CHINA ONLY

System Diagram



Network Message Chart

BCM Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Headlamp flash to pass status	GWM	Indicates to the BCM a request for the high beams or flash-to-pass.

GWM Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Headlamp flash to pass status	SCCM	Indicates to the GWM a request for the high beams or flash-to-pass.

Low Beams

The BCM monitors the headlamp switch position by sending voltage signals on multiple circuits to the headlamp switch. There is one circuit for each headlamp switch position. At any given time, one of the signal circuits is switched to ground to indicate the headlamp switch position.

The BCM turns the parking lamps and headlamps on when the ignition is in RUN and the BCM detects a fault from the headlamp switch or wiring. This is normal behavior of the BCM when a fault has been detected with the inputs from the headlamp switch.

The BCM supplies a high current switched voltage to the headlamp assemblies to supply the necessary current to operate the ballast and lamps.

High Intensity Discharge (HID) headlamps utilize a ballast, mounted to each headlamp assembly, to provide the necessary voltage to illuminate the High Intensity Discharge (HID) bulbs.

The BCM also provides an Field Effect Transistor (FET) protection of the exterior lamps switched voltage and low beam output circuits. When an excessive current draw is detected, the BCM disables the affected circuit driver.

Refer to: Module Controlled Functions - System Operation and Component Description .

Manual Headlamp Leveling

By pressing the headlamp button and releasing it into the popped out position, the switch can be rotated into one of 4 headlamp level positions. This allows headlamp beam height to be adjusted according to vehicle load. Once the beam is adjusted, the button can be pressed again to lock in the headlamp beam height.

High Beams

The SCCM monitors the LH steering column multifunction switch for a high beam request. When the LH steering column multifunction switch is in the HIGH BEAMS position, the SCCM sends a message over the HS-CAN2 to the GWM then the GWM sends the message to the BCM over the HS-CAN1.

When the low beams are on and the BCM receives a request for high beams, the High Intensity Discharge (HID) bulbs remains powered on and the shutter within each headlamp are activated. This changes the headlamp beam pattern to illuminate a greater distance.

The BCM supplies a high current switched voltage to the headlamp assemblies to supply the necessary current to operate the high beam shutters.

The BCM also provides an Field Effect Transistor (FET) protection of the exterior lamps switched voltage and high beam output circuits. When an excessive current draw is detected, the BCM disables the affected circuit driver.

Refer to: Module Controlled Functions - System Operation and Component Description .

Flash-To-Pass

The SCCM monitors the LH steering column multifunction switch for a flash-to-pass request. When the LH steering column multifunction switch is in the FLASH-TO-PASS position, the SCCM sends a message over the HS-CAN2 to the GWM then the GWM sends the message to the BCM over the HS-CAN1.

When the ignition is in RUN and the flash-to-pass is requested, the high beams are activated as long as the LH steering column multifunction switch is held in the flash-to-pass position.

Headlamp Exit Delay

When the ignition is OFF and the LH steering column multifunction switch is placed in the FLASH-TO-PASS position and released, the parking lamps and low beams are illuminated. They remain illuminated until:

- 3 minutes have elapsed with a door open.
- 30 seconds have elapsed after all doors are closed.
- the LH steering column multifunction switch is placed in the flash-to-pass position again.
- the ignition switches to RUN.

Within the 30 second delay and all the doors closed, opening any door results in the 3 minute timer restarting.

DESCRIPTION AND OPERATION > EXTERIOR LIGHTING - SYSTEM OPERATION AND COMPONENT DESCRIPTION > DRL (IF EQUIPPED)

System Diagram



Network Message Chart

BCM Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Gear lever position	PCM	Indicates the gear selected is any position other than park, the BCM activates the DRL.

DRL

The DRL feature is not a programmable parameter for this vehicle.

The DRL system utilizes the fog lamp assemblies.

The BCM monitors the ignition status, the headlamp switch and autolamp status.

When the transmission is in not in PARK, the PCM sends a message over the HS-CAN1 to the BCM indicating the transmission is not in PARK.

Based on the input, the BCM activates the DRL.

The BCM supplies a high current switched voltage to the fog lamp assemblies to supply the necessary current to operate the lamps.

The BCM also provides an Field Effect Transistor (FET) protection of the exterior lamps switched voltage and DRL output circuits. When an excessive current draw is detected, the BCM disables the affected circuit driver.

Refer to: Module Controlled Functions - System Operation and Component Description .

Autolamps

System Diagram



DESCRIPTION AND OPERATION > EXTERIOR LIGHTING - SYSTEM OPERATION AND COMPONENT DESCRIPTION > AUTOLAMPS

System Diagram



Autolamps

The BCM monitors the light sensor with a voltage signal. The light sensor input to the BCM varies with the ambient light conditions.

The BCM monitors the headlamp switch circuits to indicate the headlamp switch position.

When the BCM receives a headlamp switch status indicating a request for the autolamps, the BCM monitors the light sensor for the ambient light condition. If the BCM determines the ambient light level is dark, the BCM supplies voltage to the exterior lamps.

Headlamps On With Wipers On Function

If the headlamp switch is in the AUTOLAMPS ON position and the front wipers are on for more than 10 seconds (except during a mist wipe or while the wipers are on to clear washer fluid during a wash condition), the exterior lamps are turned on. The exterior lamps are turned off when the ignition switch is changed to OFF, the headlamp switch is placed in the OFF position, or the front wipers are off for more than 30 seconds. The exception to this is when the exterior lights are on because of darkness determined by the light sensor.

DESCRIPTION AND OPERATION > EXTERIOR LIGHTING - SYSTEM OPERATION AND COMPONENT DESCRIPTION > STOPLAMPS - EXCEPT CHINA

System Diagram



Network Message Chart

GWM Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Stop lamp request	BCM	Indicates the BCM has received an input from the stoplamp switch indicating that the brake pedal has been pressed, and is requesting the stoplamps be illuminated.

GWM Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Body Control Module (BCMB)	GWM	Indicates the BCM has received an input from the stoplamp switch indicating that the brake pedal has been pressed, and is requesting the stoplamps be illuminated.

Stoplamps

The BCM monitors the input from the stoplamp switch. When the brake pedal is applied, voltage is routed to the BCM, indicating a request for the stoplamps. The BCM then supplies voltage to the high mounted stop lamp assembly and sends a stoplamp request over the HS-CAN1 to the GWM. The GWM then sends this stoplamp request to the Body Control Module (BCMB) over the MS-CAN. When the Body Control Module (BCMB) receives this request, it supplies voltage to the rear lamp assemblies to illuminate the stoplamps.

The BCM does not activate the stoplamps when the ignition is OFF.

The BCM Body Control Module (BCMB) and also provide an Field Effect Transistor (FET) protection of the stoplamp output circuits. When an excessive current draw is detected, the BCM or Body Control Module (BCMB) disable the affected stoplamp circuit driver.

Refer to: Module Controlled Functions - System Operation and Component Description .

DESCRIPTION AND OPERATION > EXTERIOR LIGHTING - SYSTEM OPERATION AND COMPONENT DESCRIPTION > STOPLAMPS - CHINA ONLY

System Diagram



Stoplamps

The BCM monitors the input from the stoplamp switch. When the brake pedal is applied, voltage is routed to the BCM, indicating a request for the stoplamps. The BCM then supplies voltage to the stoplamps.

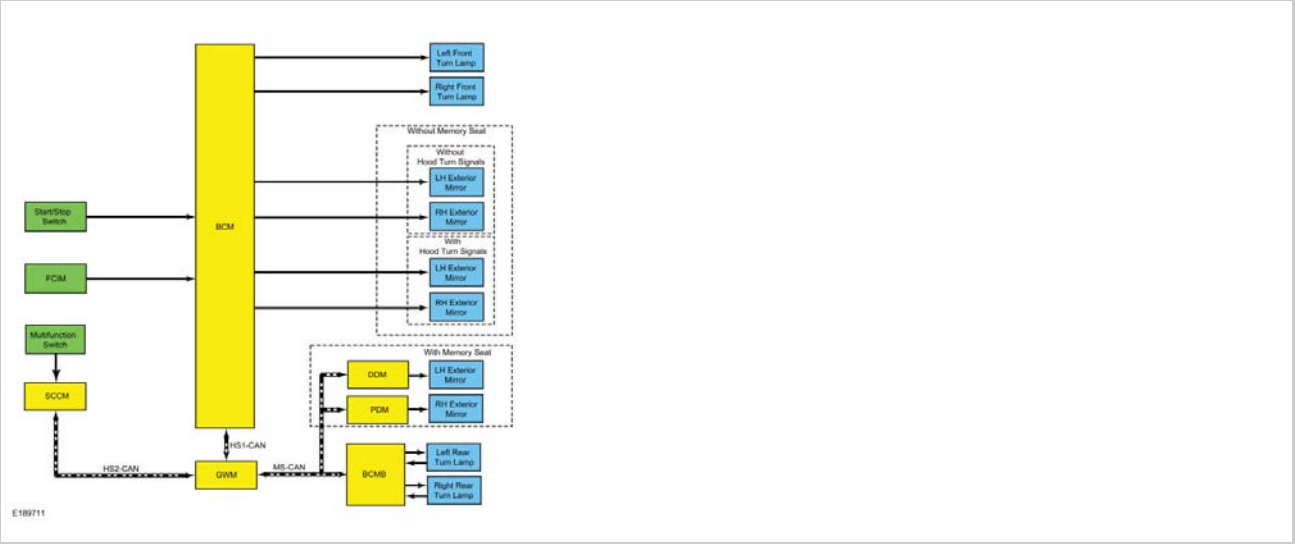
The BCM does not activate the stoplamps when the ignition is OFF.

The BCM also provides an Field Effect Transistor (FET) protection of the stoplamp output circuits. When an excessive current draw is detected, the BCM disables the affected stoplamp circuit driver.

Refer to: Module Controlled Functions - System Operation and Component Description .

DESCRIPTION AND OPERATION > EXTERIOR LIGHTING - SYSTEM OPERATION AND COMPONENT DESCRIPTION > TURN SIGNAL AND HAZARD LAMPS - EXCEPT CHINA

System Diagram



Network Message Chart

BCM Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Turn signal switch status	GWM	Indicates the turn signal stalk

		position on the LH steering column multifunction switch (left/right lane change or turn signal on or off). The BCM activates the left/right turn signals based on this input.
Turn signal lamp out status	GWM	Indicates that there is an outage of one of the rear turn signal lamps

Body Control Module (BCMB) Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Left turn lamp request	GWM	A command to activate/deactivate the LH rear turn indicator.
Right turn lamp request	GWM	A command to activate/deactivate the RH rear turn indicator.

GWM Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Turn signal switch status	SCCM	Indicates the turn signal stalk position on the LH steering column multifunction switch (left/right lane change or turn signal on or off).
Turn indication request	BCM	A command to activate/deactivate the exterior mirror turn indicator.
Turn signal lamp out status	Body Control Module (BCMB)	Indicates that there is an outage of one of the rear turn signal lamps

DDM and PDM Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Turn indication request	GWM	A command to the DDM or PDM to activate/deactivate the exterior mirror turn indicator.

Turn Signals

The SCCM monitors the LH steering column multifunction switch position. When the LH steering column multifunction switch is in the LH or RH TURN position, the SCCM sends a message over the HS-CAN2 to the GWM then the GWM sends the message to the BCM over the HS-CAN1 indicating a request for the LH or RH turn signal.

When the BCM receives a request for a turn signal, the BCM supplies on/off voltage to the front turn lamps and, if not equipped with a memory seat, the exterior mirrors or hood turn lamps, if equipped. The BCM sends the turn indicator command message over the HS-CAN1 to the GWM then the GWM sends

the message to the MS-CAN to the Body Control Module (BCMB). When the Body Control Module (BCMB) receives the message, it supplies on/off voltage to the rear turn lamps.

For vehicles equipped with a memory seat, the BCM sends a turn indicator command message over the HS-CAN1 to the GWM then the GWM sends the message to the MS-CAN to the door modules for the exterior mirror turn lamps.

The timed on/off cycle for turn lamps is determined by the BCM and is set to flash approximately 70 times per minute if both the front and rear turn signal lamps operate correctly.

The rear turn lamps are Light Emitting Diodes (LEDs) in the rear lamp assemblies and have an outage circuit that tells the Body Control Module (BCMB) when the Light Emitting Diodes (LEDs) are inoperative. During normal operation, when voltage is applied to the rear turn Light Emitting Diodes (LEDs), the feedback circuit sends the same voltage back to the Body Control Module (BCMB) through the outage circuit. If the Light Emitting Diodes (LEDs) are inoperative the Body Control Module (BCMB) will not receive this voltage feedback through the outage circuit.

If a front or rear turn signal lamp is inoperative, the BCM fast flashes the remaining turn lamp(s) approximately 150 times per minute to indicate a bulb outage to the driver.

The LH steering column multifunction switch has 2 detents for the left turn position and 2 detents for the right turn position. When placed in the first detent and released, the corresponding turn signals flash 3 times and turn off. When the LH steering column multifunction switch is moved to the second detent, the turn signal flashes until the steering wheel is turned in the opposite direction.

The BCM Body Control Module (BCMB) and also provide an Field Effect Transistor (FET) protection of the stoplamp output circuits. When an excessive current draw is detected, the BCM or Body Control Module (BCMB) disable the affected stoplamp circuit driver.

Refer to: Module Controlled Functions - System Operation and Component Description .

Hazard Lamps

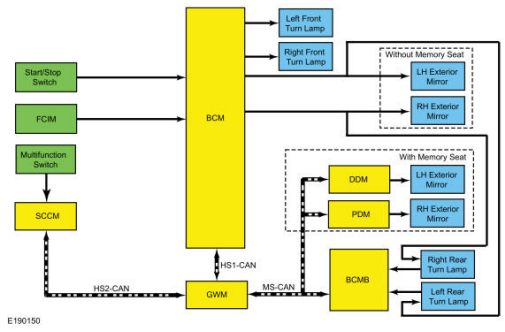
The BCM sends a voltage signal to the hazard flasher lamp switch (integrated into the FCIM) to monitor for a hazard lamp function request. When the hazard flasher lamp switch is pressed, the voltage signal is routed to ground, indicating a request to activate or deactivate the hazard lamp function.

When the BCM receives a request for the hazard lamps, it activates all the turn signal lamps.

The timed on/off cycle for the hazard lamps is approximately 70 times per minute, regardless of bulb outage.

DESCRIPTION AND OPERATION > EXTERIOR LIGHTING - SYSTEM OPERATION AND COMPONENT DESCRIPTION > TURN SIGNAL AND HAZARD LAMPS - CHINA ONLY

System Diagram



Network Message Chart

BCM Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Turn signal switch status	GWM	Indicates the turn signal stalk position on the LH steering column multifunction switch (left/right lane change or turn signal on or off). The BCM activates the left/right turn signals based on this input.
Turn signal lamp out status	GWM	Indicates that there is an outage of one of the rear turn signal lamps

GWM Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Turn signal switch status	SCCM	Indicates the turn signal stalk position on the LH steering column multifunction switch (left/right lane change or turn signal on or off).
Turn indication request	BCM	A command to activate/deactivate the exterior mirror turn indicator.
Turn signal lamp out status	Body Control Module (BCMB)	Indicates that there is an outage of one of the rear turn signal lamps

DDM and PDM Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Turn indication request	GWM	A command to the DDM or PDM to activate/deactivate the exterior mirror turn indicator.

Turn Signals

The SCCM monitors the LH steering column multifunction switch position. When the LH steering column multifunction switch is in the LH or RH TURN position, the SCCM sends a message over the HS-CAN2 to the GWM then the GWM sends the message to the BCM over the HS-CAN1 indicating a request for the LH or RH turn signal.

When the BCM receives a request for a turn signal, the BCM supplies on/off voltage to the front and rear turn lamps and, if not equipped with a memory seat, the exterior mirrors.

For vehicles equipped with a memory seat, the BCM sends a turn indicator command message over the HS-CAN1 to the GWM then the GWM sends the message to the MS-CAN to the door modules for the exterior mirror turn lamps.

The timed on/off cycle for turn lamps is determined by the BCM and is set to flash approximately 70 times per minute if both the front and rear turn signal lamps operate correctly.

The rear turn lamps are Light Emitting Diodes (LEDs) in the rear lamp assemblies and have an outage circuit that tells the Body Control Module (BCMB) when the Light Emitting Diodes (LEDs) are inoperative. During normal operation, when voltage is applied to the rear turn Light Emitting Diodes (LEDs), the feedback circuit sends the same voltage back to the Body Control Module (BCMB) through the outage circuit. If the Light Emitting Diodes (LEDs) are inoperative the Body Control Module (BCMB) will not receive this voltage feedback through the outage circuit.

If a front or rear turn signal lamp is inoperative, the BCM fast flashes the remaining turn lamp(s) approximately 150 times per minute to indicate a bulb outage to the driver.

The LH steering column multifunction switch has 2 detents for the left turn position and 2 detents for the right turn position. When placed in the first detent and released, the corresponding turn signals flash 3 times and turn off. When the LH steering column multifunction switch is moved to the second detent, the turn signal flashes until the steering wheel is turned in the opposite direction.

The BCM Body Control Module (BCMB) and also provide an Field Effect Transistor (FET) protection of the stoplamp output circuits. When an excessive current draw is detected, the BCM or Body Control Module (BCMB) disable the affected stoplamp circuit driver.

Refer to: Module Controlled Functions - System Operation and Component Description .

Hazard Lamps

The BCM sends a voltage signal to the hazard flasher lamp switch (integrated into the FCIM) to monitor for a hazard lamp function request. When the hazard flasher lamp switch is pressed, the voltage signal is routed to ground, indicating a request to activate or deactivate the hazard lamp function.

When the BCM receives a request for the hazard lamps, it activates all the turn signal lamps.

The timed on/off cycle for the hazard lamps is approximately 70 times per minute, regardless of bulb outage.

DESCRIPTION AND OPERATION > EXTERIOR LIGHTING - SYSTEM OPERATION AND COMPONENT DESCRIPTION > PARKING, REAR, AND LICENSE PLATE LAMPS

System Diagram



Parking Lamps

The BCM monitors the headlamp switch position by sending voltage signals on multiple circuits to the headlamp switch. There is one circuit for each headlamp switch position. At any given time, one of the signal circuits is switched to ground to indicate the headlamp switch position.

If the BCM detects a fault from the headlamp switch or loses communication with the headlamp switch, the BCM turns the parking and headlamps on. This is normal behavior of the BCM when a fault has been detected with the inputs from the headlamp switch.

When the BCM receives an input requesting the parking lamps on, it provides voltage to the front parking, front, rear and rear side marker and license plate lamps.

The BCM supplies a high current switched voltage to the headlamp assemblies to supply the necessary current to operate the lamps and headlamp LED park/signature lamps and to the rear lamp assemblies to operate the parking lamp Light Emitting Diodes (LEDs). The BCM provides a low current voltage signal to the headlamp assemblies to switch on the LED signature lamps and to the rear lamp assemblies to switch on the parking lamp Light Emitting Diodes (LEDs).

The BCM also provides an Field Effect Transistor (FET) protection of the parking lamps output circuits. When an excessive current draw is detected, the BCM disables the affected parking lamps circuit driver.

Refer to: Module Controlled Functions - System Operation and Component Description .

DESCRIPTION AND OPERATION > EXTERIOR LIGHTING - SYSTEM OPERATION AND COMPONENT DESCRIPTION > FOG LAMPS - EXCEPT CHINA

System Diagram



Network Message Chart

BCM Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Turn signal switch status	GWM	Indicates the turn signal stalk

		position on the LH steering column multifunction switch (left/right lane change or turn signal on or off). The BCM deactivates the LH or RH fog lamp based on this input.

GWM Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Turn signal switch status	SCCM	Indicates the turn signal stalk position on the LH steering column multifunction switch (left/right lane change or turn signal on or off).

Fog Lamps

The BCM monitors the headlamp switch position by sending voltage signals on multiple circuits to the headlamp switch. There is one circuit for each headlamp switch position. At any given time, one of the signal circuits is switched to ground to indicate the headlamp switch position.

When the BCM receives input from the headlamp switch indicating a request for the front fog lamps, the BCM provides voltage to the front fog lamps.

When the BCM receives input requesting a LH or RH turn signal, the BCM disables the corresponding front fog lamp until the turn signal request is no longer active.

The BCM also provides an Field Effect Transistor (FET) protection of the fog lamp output circuits. When an excessive current draw is detected, the BCM disables the fog lamp output circuit drivers.

Refer to: Module Controlled Functions - System Operation and Component Description .

DESCRIPTION AND OPERATION > EXTERIOR LIGHTING - SYSTEM OPERATION AND COMPONENT DESCRIPTION > FOG LAMPS - CHINA ONLY

System Diagram



Network Message Chart

BCM Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Turn signal switch status	GWM	Indicates the turn signal stalk position on the LH steering column multifunction switch (left/right lane change or turn signal on or off). The BCM deactivates the LH or RH fog lamp based on this input.

GWM Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Turn signal switch status	SCCM	Indicates the turn signal stalk position on the LH steering column multifunction switch (left/right lane change or turn signal on or off).

Fog Lamps

The BCM monitors the headlamp switch position by sending voltage signals on multiple circuits to the headlamp switch. There is one circuit for each headlamp switch position. At any given time, one of the signal circuits is switched to ground to indicate the headlamp switch position.

When the BCM receives input from the headlamp switch indicating a request for the front fog lamps, the BCM provides voltage to the front fog lamps.

When the BCM receives input requesting a LH or RH turn signal, the BCM disables the corresponding front fog lamp until the turn signal request is no longer active.

When the BCM receives input from the headlamp switch indicating a request for the rear fog lamp, the BCM provides voltage to the rear fog lamp.

The BCM also provides an Field Effect Transistor (FET) protection of the fog lamp output circuits. When an excessive current draw is detected, the BCM disables the fog lamp output circuit drivers.

Refer to: Module Controlled Functions - System Operation and Component Description .

Reversing Lamps

System Diagram



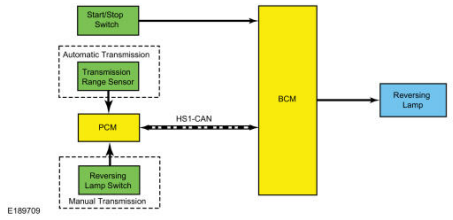
Network Message Chart

BCM Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Reverse gear state	PCM	Indicates the transmission selector is in reverse to the BCM. When the transmission selector is in REVERSE and the ignition is in RUN, the BCM provides voltage to the reversing lamps.

DESCRIPTION AND OPERATION > EXTERIOR LIGHTING - SYSTEM OPERATION AND COMPONENT DESCRIPTION > REVERSING LAMPS

System Diagram



Network Message Chart

BCM Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Reverse gear state	PCM	Indicates the transmission selector is in reverse to the BCM. When the transmission selector is in REVERSE and the ignition is in RUN, the BCM provides voltage to the reversing lamps.

Reversing Lamps

When the transmission is in REVERSE, the PCM sends a message over the HS-CAN1 to the BCM indicating the transmission is in REVERSE. The BCM provides voltage to the reversing lamps when it receives the message that the transmission is in REVERSE and the ignition is in RUN.

The BCM also provides an Field Effect Transistor (FET) protection of the reversing lamps output circuit. When an excessive current draw is detected, the BCM disables the affected reversing lamps circuit driver.

Refer to: Module Controlled Functions - System Operation and Component Description .

DESCRIPTION AND OPERATION > EXTERIOR LIGHTING - SYSTEM OPERATION AND COMPONENT DESCRIPTION > COMPONENT DESCRIPTION

Headlamp Assembly

The High Intensity Discharge (HID) headlamp assembly has an integrated solenoid activated shutter which changes the headlamp beam pattern when activated. The solenoid and shutter are not serviceable separately from the headlamp assembly. The headlamp assembly is provided power on independent circuits for the low beams and the high beams.

The High Intensity Discharge (HID) headlamp also contains LED signature lamps (except China).

For China vehicles, the headlamp assemblies contain vertical headlamp adjustment actuators for the manual headlamps leveling system.

A ballast is mounted to each headlamp assembly to power the High Intensity Discharge (HID) bulb.

Exterior lamps are vented to accommodate normal changes in pressure. Condensation can be a natural by-product of this design. When moist air enters the lamp assembly through the vents, there is a possibility that condensation can occur if the temperature is cold. When normal condensation occurs, a thin mist forms on the interior of the lens. The thin mist eventually clears and exits through the vents during normal operation. The amount of time it takes to clear the lens of acceptable mist varies with ambient humidity and lamp types. Normal condensation clears from any lamp in 48 hours under dry conditions.

Do not replace a lamp assembly with acceptable levels of condensation such as:

- presence of thin mist (no streaks, drip marks or droplets are present)
- fine mist covers less than 50% of the lens

Examples of unacceptable moisture (usually caused by a lamp housing leak):

- water puddling inside the lamp
- large water droplets, drip marks or streaks present on the interior of the lens

Headlamp Switch

The BCM monitors the headlamp switch position by sending voltage signals on multiple circuits to the headlamp switch. There is one circuit for each headlamp switch position. At any given time, one of the signal circuits is switched to ground to indicate the headlamp switch position.

Ballast

A ballast is mounted to each High Intensity Discharge (HID) headlamp assembly. The ballasts provide high voltage to the High Intensity Discharge (HID) bulbs when voltage from the BCM (low beam outputs) is detected.

Light Sensor

The BCM sends a voltage signal to the light sensor. The light sensor provides resistance between the voltage signal and ground. The resistance varies depending on the amount of ambient light detected by the light sensor. The brighter the ambient light, the lower the resistance. By varying the resistance, the BCM can determine the amount of ambient light.

Stoplamp Switch

The stoplamp switch is a normally open switch and is provided voltage at all times. When the brake pedal is applied, the switch closes and routes voltage to the BCM.

DIAGNOSIS AND TESTING > DAYTIME RUNNING LAMPS (DRL) > SYMPTOM CHART(S)

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

Symptom Chart: Daytime Running Lamps (DRL)

Symptom Chart

Condition	Possible Sources	Actions
A module does not respond to the diagnostic scan tool	Fuse Wiring, terminals or connectors Module	REFER to: MODULE COMMUNICATIONS NETWORK .
The Daytime Running Lamps (DRL) are inoperative	Refer to the Pinpoint Test	GO to Pinpoint Test A

DIAGNOSIS AND TESTING > DAYTIME RUNNING LAMPS (DRL) > PINPOINT TESTS > PINPOINT TEST A : THE DAYTIME RUNNING LAMPS (DRL) ARE INOPERATIVE

Normal Operation and Fault Conditions

REFER to: Exterior Lighting - System Operation and Component Description .

Possible Sources

- Wiring, terminals or connectors
- BCM

DIAGNOSIS AND TESTING > DAYTIME RUNNING LAMPS (DRL) > PINPOINT TESTS > PINPOINT TEST A : THE DAYTIME RUNNING LAMPS (DRL) ARE INOPERATIVE > PINPOINT TEST A : THE DAYTIME RUNNING LAMPS (DRL) ARE INOPERATIVE

A1 CHECK THE OPERATION OF THE FOG LAMPS

Ignition ON.

Place the headlamp switch in the PARKLAMPS position and activate the front fog lamps.

Do the fog lamps operate correctly?

Yes	GO to A2

No	Diagnose the fog lamps. REFER to: Fog Lamps .

A2 CHECK THE IGNITION SWITCH PID (PARAMETER IDENTIFICATION)

Using a diagnostic scan tool, view BCM Parameter Identifications (PIDs).

Monitor the BCM Ignition Switch 1 (START_STOP_1) PID while pressing and releasing the START/STOP button.

Does the PID change state when the START/STOP button is pressed and released?

Yes	GO to A3

No	Diagnose the ignition state. REFER to: Steering Wheel and Column Electrical Components .

A3 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > PARKING, REAR AND LICENSE PLATE LAMPS

Parking, Rear and License Plate Lamps

DIAGNOSIS AND TESTING > PARKING, REAR AND LICENSE PLATE LAMPS > DTC CHART: BCM

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

BCM DTC Chart

DTC	Description	Action
B10F3:11	Left Front Position Light: Circuit Short to Ground	GO to PINPOINT TEST A : ONE OR MORE PARKING, REAR OR LICENSE PLATE LAMPS ARE INOPERATIVE
B10F3:15	Left Front Position Light: Circuit Short to Battery or Open	If the lamp is inoperative, GO to PINPOINT TEST A : ONE OR MORE PARKING, REAR OR LICENSE PLATE LAMPS ARE INOPERATIVE If the lamp is always on, GO to PINPOINT TEST B : THE PARKING, REAR OR LICENSE PLATE LAMPS ARE ON CONTINUOUSLY
B10F4:11	Right Front Position Light: Circuit Short to Ground	GO to PINPOINT TEST A : ONE OR MORE PARKING, REAR OR LICENSE PLATE LAMPS ARE INOPERATIVE
B10F4:15	Right Front Position Light: Circuit Short to Battery or Open	If the lamp is inoperative, GO to PINPOINT TEST A : ONE OR MORE PARKING, REAR OR LICENSE PLATE LAMPS ARE INOPERATIVE If the lamp is always on, GO to PINPOINT TEST B : THE PARKING, REAR OR LICENSE PLATE LAMPS ARE ON CONTINUOUSLY
B1445:11	Rear Park Lamps Output: Circuit Short to Ground	GO to PINPOINT TEST A : ONE OR MORE PARKING, REAR OR LICENSE PLATE LAMPS ARE INOPERATIVE
B1445:15	Rear Park Lamps Output: Circuit Short to Battery or Open	If the lamp is inoperative, GO to PINPOINT TEST A : ONE OR MORE PARKING, REAR OR LICENSE PLATE LAMPS ARE INOPERATIVE

		If the lamp is always on, GO to PINPOINT TEST B : THE PARKING, REAR OR LICENSE PLATE LAMPS ARE ON CONTINUOUSLY
B1446:11	Front Park Lamps Output: Circuit Short To Ground	GO to PINPOINT TEST A : ONE OR MORE PARKING, REAR OR LICENSE PLATE LAMPS ARE INOPERATIVE
B1446:15	Front Park Lamps Output: Circuit Short To Battery or Open	If the lamp is inoperative, GO to PINPOINT TEST A : ONE OR MORE PARKING, REAR OR LICENSE PLATE LAMPS ARE INOPERATIVE If the lamp is always on, GO to PINPOINT TEST B : THE PARKING, REAR OR LICENSE PLATE LAMPS ARE ON CONTINUOUSLY
B1447:11	Parklamp On Switch Input: Circuit Short to Ground	REFER to: Headlamps .
B149E:11	Left Front Position/Sidemarker: Circuit Short To Ground	GO to PINPOINT TEST A : ONE OR MORE PARKING, REAR OR LICENSE PLATE LAMPS ARE INOPERATIVE
B149E:15	Left Front Position/Sidemarker: Circuit Short To Battery or Open	If the lamp is inoperative, GO to PINPOINT TEST A : ONE OR MORE PARKING, REAR OR LICENSE PLATE LAMPS ARE INOPERATIVE If the lamp is always on, GO to PINPOINT TEST B : THE PARKING, REAR OR LICENSE PLATE LAMPS ARE ON CONTINUOUSLY
B149F:11	Right Front Position/Sidemarker: Circuit Short To Ground	GO to PINPOINT TEST A : ONE OR MORE PARKING, REAR OR LICENSE PLATE LAMPS ARE INOPERATIVE
B149F:15	Right Front Position/Sidemarker: Circuit Short To Battery or Open	If the lamp is inoperative, GO to PINPOINT TEST A : ONE OR MORE PARKING, REAR OR LICENSE PLATE LAMPS ARE INOPERATIVE If the lamp is always on, GO to PINPOINT TEST B : THE PARKING, REAR OR LICENSE PLATE LAMPS ARE ON

		CONTINUOUSLY
U1000:00	Solid State Driver Protection Active -Driver Disabled: No Sub Type Information	The module has temporarily disabled an output because an excessive current draw exists (such as a short to ground). The BCM cannot enable the output until the cause of the short is corrected. ADDRESS all other Diagnostic Trouble Codes (DTCs) first. After the cause of the concern is corrected, CLEAR the Diagnostic Trouble Codes (DTCs). REPEAT the self-test.
U3000:49	Control Module: Internal Electronic Failure	The module has permanently disabled an output because an excessive current draw fault (such as a short to ground) has exceeded the limits that the BCM can withstand. The cause of the excessive current draw MUST be corrected before a new BCM is installed. ADDRESS all other Diagnostic Trouble Codes (DTCs) first. After the cause of the concern is corrected,
For other BCM Diagnostic Trouble Codes (DTCs)	-	REFER to: Body Control Module (BCM) .

DIAGNOSIS AND TESTING > PARKING, REAR AND LICENSE PLATE LAMPS > SYMPTOM CHART(S)

Symptom Chart: Parking, Rear and License Plate Lamps

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

Symptom Chart

Condition	Possible Sources	Actions
A module does not respond to the diagnostic scan tool	Fuse Wiring, terminals or connectors Module	REFER to: MODULE COMMUNICATIONS NETWORK .
One or more parking, rear or license plate lamps are inoperative	Refer to the Pinpoint Test	GO to PINPOINT TEST A : ONE OR MORE PARKING, REAR OR LICENSE PLATE LAMPS ARE INOPERATIVE

The parking, rear or license plate lamps are on continuously	Refer to the Pinpoint Test	GO to PINPOINT TEST B : THE PARKING, REAR OR LICENSE PLATE LAMPS ARE ON CONTINUOUSLY
The LED signature lamps are not the same intensity - Except China	Refer to the Pinpoint Test	GO to PINPOINT TEST C : THE LED (LIGHT EMITTING DIODE) SIGNATURE LAMPS ARE NOT THE SAME INTENSITY - EXCEPT CHINA

DIAGNOSIS AND TESTING > PARKING, REAR AND LICENSE PLATE LAMPS > PINPOINT TESTS > PINPOINT TEST A : ONE OR MORE PARKING, REAR OR LICENSE PLATE LAMPS ARE INOPERATIVE

Refer to Parking, Rear and License Lamps for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Exterior Lighting - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B10F3:11	Left Front Position Light: Circuit Short to Ground	A continuous memory and on-demand DTC that sets when the BCM detects a short to ground from the LH front parking lamp output circuit.
B10F3:15	Left Front Position Light: Circuit Short to Battery or Open	A continuous memory and on-demand DTC that sets when the BCM detects an open from the LH front parking lamp output circuit.
B10F4:11	Right Front Position Light: Circuit Short to Ground	A continuous memory and on-demand DTC that sets when the BCM detects a short to ground from the RH front parking lamp output circuit.
B10F4:15	Right Front Position Light: Circuit Short to Battery or Open	A continuous memory and on-demand DTC that sets when the BCM detects an open from the RH front parking lamp output circuit.
B1445:11	Rear Park Lamps Output: Circuit Short to Ground	A continuous memory and on-demand DTC that sets when the BCM detects a short to ground from the rear side

		marker and license plate lamp output circuit.
B1445:15	Rear Park Lamps Output: Circuit Short to Battery or Open	A continuous memory and on-demand DTC that sets when the BCM detects an open from the rear side marker and license plate lamp circuit.
B1446:11	Front Park Lamps Output: Circuit Short To Ground	A continuous memory and on-demand DTC that sets when the BCM detects a short to ground from the front sidemarker lamp output circuit.
B1446:15	Front Park Lamps Output: Circuit Short To Battery or Open	A continuous memory and on-demand DTC that sets when the BCM detects an open from the front sidemarker lamp output circuit.
B149E:11	Left Front Position/Sidemarker: Circuit Short To Ground	A continuous memory and on-demand DTC that sets when the BCM detects a short to ground from the LH front parking lamp output circuit.
B149E:15	Left Front Position/Sidemarker: Circuit Short To Battery or Open	A continuous memory and on-demand DTC that sets when the BCM detects an open from the LH front parking lamp output circuit.
B149F:11	Right Front Position/Sidemarker: Circuit Short To Ground	A continuous memory and on-demand DTC that sets when the BCM detects a short to ground from the RH front parking lamp output circuit.
B149F:15	Right Front Position/Sidemarker: Circuit Short To Battery or Open	A continuous memory and on-demand DTC that sets when the BCM detects an open from the RH front parking lamp output circuit.
U1000:00	Solid State Driver Protection Active -Driver Disabled: No Sub Type Information	This DTC sets when the BCM has temporarily shut down the output driver. The module has temporarily disabled an output because an excessive current draw exists (such as a short to ground). The BCM cannot enable the output until the cause of the short is corrected, the Diagnostic Trouble Codes

		(DTCs) have been cleared and a successful self-test is run.
U3000:49	Control Module: Internal Electronic Failure	This DTC sets when the BCM has permanently shut down the output driver. The module has permanently disabled an output because an excessive current draw fault (such as a short to ground) has exceeded the limits that the BCM can withstand. CORRECT the cause of the excessive current draw before installing a new BCM.

Possible Sources

- Bulb
- Wiring, terminals or connectors
- Rear lamp assembly
- BCM

DIAGNOSIS AND TESTING > PARKING, REAR AND LICENSE PLATE LAMPS > PINPOINT TESTS > PINPOINT TEST A : ONE OR MORE PARKING, REAR OR LICENSE PLATE LAMPS ARE INOPERATIVE > PINPOINT TEST A : ONE OR MORE PARKING, REAR OR LICENSE PLATE LAMPS ARE INOPERATIVE

A1 DETERMINE IF ALL THE PARKING LAMPS ARE INOPERATIVE

Ignition ON.

Place the headlamp switch in the PARKING LAMPS position.

Are all the parking lamps inoperative?

Yes	GO to A26

No	If both front side marker lamps are inoperative, GO to A2 If both rear side marker lamps and both license plate lamps are inoperative, GO to A6 If an individual front side marker lamp is inoperative, GO to A10 If an individual front parking lamp is inoperative, GO to A13 If an individual rear side marker or license plate lamp is inoperative, GO to A18 If all LH or all RH rear parking lamps are inoperative, GO to A21 If a single LH or single RH rear parking lamp is inoperative, INSTALL a new rear lamp assembly. REFER to: Rear Lamp Assembly .

A2 CHECK FOR VOLTAGE TO THE SIDE MARKER LAMPS

Place the headlamp switch in the OFF position.

Ignition OFF.

Disconnect: LH Front Side Marker Lamp C1127 .

Ignition ON.

Place the headlamp switch in the PARKING LAMPS position.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1127-2		Ground

Is the voltage greater than 11 volts?

Yes	REPAIR the front side marker lamps ground circuit for an open.

No	GO to A3

A3 REPEAT THE ON-DEMAND SELF-TEST AND CHECK FOR VOLTAGE TO THE SIDE MARKER LAMPS

Place the headlamp switch in the OFF position.

Using a diagnostic scan tool, perform the BCM self-test.

Clear the Diagnostic Trouble Codes (DTCs) and repeat the self-test (required to enable the lamp output driver if DTC U1000:00 is present).

Place the headlamp switch in the PARKING LAMPS position.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1127-2		Ground

Is the voltage greater than 11 volts?

Yes	INSTALL a new front parking lamp (turn signal) bulb or front side marker lamp bulb for the shorted bulb. REFER to: Front Turn Signal Lamp Bulb . REFER to: Parking Lamp Bulb .

No	GO to A4

A4 CHECK THE SIDE MARKER LAMPS SUPPLY CIRCUIT FOR AN OPEN

Place the headlamp switch in the OFF position.

Ignition OFF.

Disconnect: BCM C2280G .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1127-2	Ω	C2280G-3

Is the resistance less than 3 ohms?

Yes	GO to A5

No	REPAIR the circuit.

A5 CHECK THE SIDE MARKER LAMPS SUPPLY CIRCUIT FOR A SHORT TO GROUND

Disconnect: Except China, LH Headlamp C1021 and RH Headlamp C1041 .

Disconnect: RH Front Side Marker Lamp C1126 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1127-2	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to A26

No	REPAIR the circuit. After the repair: If no Diagnostic Trouble Codes (DTCs) are present, TEST the system for normal operation. If DTC U1000:00 is present, CLEAR the Diagnostic Trouble Codes (DTCs) and REPEAT the self-test (required to enable the lamp output driver if DTC U1000:00 is present). If DTC U3000:49 is present,

A6 CHECK FOR VOLTAGE TO THE REAR SIDE MARKER AND LICENSE PLATE LAMPS

Place the headlamp switch in the OFF position.

Ignition OFF.

Disconnect: LH Rear Side Marker Lamp C481 .

Ignition ON.

Place the headlamp switch in the PARKING LAMPS position.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C481-2		Ground

Is the voltage greater than 11 volts?

Yes	REPAIR the rear side marker and license plate lamps ground circuit for an open.

No	GO to A7

A7 REPEAT THE ON-DEMAND SELF-TEST AND CHECK FOR VOLTAGE TO THE REAR SIDE MARKER AND LICENSE PLATE LAMPS

Place the headlamp switch in the OFF position.

Using a diagnostic scan tool, perform the BCM self-test.

Clear the Diagnostic Trouble Codes (DTCs) and repeat the self-test (required to enable the lamp output driver if DTC U1000:00 is present).

Place the headlamp switch in the PARKING LAMPS position.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C481-2		Ground

Is the voltage greater than 11 volts?

Yes	INSTALL a new license plate bulb or rear side marker lamp bulb. REFER to: Side Lamp Bulb .

No	GO to A8

A8 CHECK THE REAR SIDE MARKER AND LICENSE PLATE LAMPS SUPPLY CIRCUIT FOR AN OPEN

Place the headlamp switch in the OFF position.

Ignition OFF.

Disconnect: BCM C2280C .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C481-2	Ω	C2280C-12

Is the resistance less than 3 ohms?

Yes	GO to A9

No	REPAIR the circuit.

A9 CHECK THE REAR SIDE MARKER AND LICENSE PLATE LAMPS SUPPLY CIRCUIT FOR A SHORT TO GROUND

Disconnect: RH Rear Side Marker Lamp C482 .

Disconnect: LH License Plate Lamp C4046A and RH License Plate Lamp C4046B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C481-2	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to A26

No	REPAIR the circuit. After the repair: If no Diagnostic Trouble Codes (DTCs) are present, TEST the system for normal operation. If DTC U1000:00 is present, CLEAR the Diagnostic Trouble Codes (DTCs) and REPEAT the self-test (required to enable the lamp output driver if DTC U1000:00 is present). If DTC U3000:49 is present,

A10 CHECK FOR VOLTAGE TO THE FRONT SIDE MARKER LAMP

Place the headlamp switch in the OFF position.

Ignition OFF.

Disconnect: Inoperative LH Front Side Marker Lamp C1127 or RH Front Side Marker Lamp C1126 .

Ignition ON.

Place the headlamp switch in the PARKING LAMPS position.

Measure:

LH Front Side Marker Lamp

Positive Lead	Measurement / Action	Negative Lead
C1127-2	+ V −	Ground

RH Front Side Marker Lamp

Positive Lead	Measurement / Action	Negative Lead
C1126-2		Ground

Is the voltage greater than 11 volts?

Yes	GO to A11

No	GO to A12

A11 CHECK THE FRONT SIDE MARKER LAMP GROUND CIRCUIT FOR AN OPEN

Measure:

LH Front Side Marker Lamp

Positive Lead	Measurement / Action	Negative Lead
C1127-2		C1127-1

RH Front Side Marker Lamp

Positive Lead	Measurement / Action	Negative Lead
C1126-2		C1126-1

Is the voltage greater than 11 volts?

Yes	INSTALL a new front side marker lamp bulb. REFER to: Parking Lamp Bulb .

No	REPAIR the circuit.

A12 CHECK THE FRONT SIDE MARKER LAMP SUPPLY CIRCUIT FOR AN OPEN

Place the headlamp switch in the OFF position.

Ignition OFF.

Disconnect: BCM C2280G .

Measure:

LH Front Side Marker Lamp

Positive Lead	Measurement / Action	Negative Lead
C1127-2	Ω	C2280G-3

RH Front Side Marker Lamp

Positive Lead	Measurement / Action	Negative Lead
C1126-2	Ω	C2280G-3

Is the resistance less than 3 ohms?

Yes	GO to A26

No	REPAIR the circuit.

A13 CHECK FOR VOLTAGE TO THE FRONT PARKING LAMP

Place the headlamp switch in the OFF position.

Ignition OFF.

Disconnect: Inoperative LH Side Turn Signal Lamp C156 or RH Side Turn Signal Lamp C1042 .

Ignition ON.

Place the headlamp switch in the PARKING LAMPS position.

Measure:

LH Front Parking Lamp

Positive Lead	Measurement / Action	Negative Lead
C156-2	V	Ground

RH Front Parking Lamp

Positive Lead	Measurement / Action	Negative Lead
C1042-2	V	Ground

Is the voltage greater than 11 volts?

Yes	GO to A15

No	GO to A14

A14 REPEAT THE ON-DEMAND SELF-TEST AND CHECK FOR VOLTAGE TO THE FRONT PARKING LAMP

Place the headlamp switch in the OFF position.

Using a diagnostic scan tool, perform the BCM self-test.

Clear the Diagnostic Trouble Codes (DTCs) and repeat the self-test (required to enable the lamp output driver if DTC U1000:00 is present).

Place the headlamp switch in the PARKING LAMPS position.

Measure:

LH Front Parking Lamp

Positive Lead	Measurement / Action	Negative Lead
C156-2		Ground

RH Front Parking Lamp

Positive Lead	Measurement / Action	Negative Lead
C1042-2		Ground

Is the voltage greater than 11 volts?

Yes	INSTALL a new front parking lamp (turn signal) bulb. REFER to: Front Turn Signal Lamp Bulb .

No	GO to A15

A15 CHECK THE FRONT PARKING LAMP GROUND CIRCUIT FOR AN OPEN

Measure:

LH Front Parking Lamp

Positive Lead	Measurement / Action	Negative Lead
C156-2		C156-1

RH Front Parking Lamp

Positive Lead	Measurement / Action	Negative Lead
C1042-2		C1042-1

Is the voltage greater than 11 volts?

Yes	INSTALL a new front parking lamp (turn signal) bulb. REFER to: Front Turn Signal Lamp Bulb .

No	REPAIR the circuit.

A16 CHECK THE FRONT PARKING LAMP SUPPLY CIRCUIT FOR AN OPEN

Place the headlamp switch in the OFF position.

Ignition OFF.

Disconnect: BCM C2280F .

Measure:

LH Front Parking Lamp

Positive Lead	Measurement / Action	Negative Lead
C156-2	Ω	C2280F-30

RH Front Parking Lamp

Positive Lead	Measurement / Action	Negative Lead
C1042-2	Ω	C2280F-37

Is the resistance less than 3 ohms?

Yes	GO to A17

No	REPAIR the circuit.

A17 CHECK THE FRONT PARKING LAMP SUPPLY CIRCUIT FOR A SHORT TO GROUND

Measure:

LH Front Parking Lamp

Positive Lead	Measurement / Action	Negative Lead
C156-2	Ω	Ground

RH Front Parking Lamp

Positive Lead	Measurement / Action	Negative Lead
C1042-2	Ω	Ground

Is the resistance less than 3 ohms?

Yes	GO to A26

No	REPAIR the circuit. After the repair: If no Diagnostic Trouble Codes (DTCs) are present, TEST the system for normal operation. If DTC U1000:00 is present, CLEAR the

	Diagnostic Trouble Codes (DTCs) and REPEAT the self-test (required to enable the lamp output driver if DTC U1000:00 is present). If DTC U3000:49 is present,

A18 CHECK FOR VOLTAGE TO THE LICENSE PLATE OR REAR SIDE MARKER LAMP

Place the headlamp switch in the OFF position.

Ignition OFF.

Disconnect: Inoperative LH License Plate Lamp C4046A or RH License Plate Lamp C4046B .

Disconnect: Inoperative LH Rear Side Marker Lamp C481 or RH Rear Side Marker Lamp C482 .

Ignition ON.

Place the headlamp switch in the PARKING LAMPS position.

Measure:

LH License Plate Lamp

Positive Lead	Measurement / Action	Negative Lead
C4046A-2		Ground

RH License Plate Lamp

Positive Lead	Measurement / Action	Negative Lead
C4046B-2		Ground

LH Rear Side Marker Lamp

Positive Lead	Measurement / Action	Negative Lead
C481-2		Ground

RH Rear Side Marker Lamp

Positive Lead	Measurement / Action	Negative Lead
C482-2		Ground

Is the voltage greater than 11 volts?

Yes	GO to A19

No	GO to A20

A19 CHECK THE LICENSE PLATE OR REAR SIDE MARKER LAMP GROUND CIRCUIT FOR AN OPEN

Measure:

LH License Plate Lamp

Positive Lead	Measurement / Action	Negative Lead
C4046A-2		C4046A-1

RH License Plate Lamp

Positive Lead	Measurement / Action	Negative Lead
C4046B-2		C4046B-1

LH Rear Side Marker Lamp

Positive Lead	Measurement / Action	Negative Lead
C481-2		C481-1

RH Rear Side Marker Lamp

Positive Lead	Measurement / Action	Negative Lead
C482-2		C482-1

Is the voltage greater than 11 volts?

Yes	INSTALL a new license plate bulb or rear side marker lamp bulb. REFER to: Side Lamp Bulb .

No	REPAIR the circuit.

A20 CHECK THE LICENSE PLATE OR REAR SIDE MARKER LAMP SUPPLY CIRCUIT FOR AN OPEN

Place the headlamp switch in the OFF position.

Ignition OFF.

Disconnect: BCM C2280C .

Measure:

LH License Plate Lamp

Positive Lead	Measurement / Action	Negative Lead
C4046A-2	Ω	C2280C-12

RH License Plate Lamp

Positive Lead	Measurement / Action	Negative Lead
C4046B-2	Ω	C2280C-12

LH Rear Side Marker Lamp

Positive Lead	Measurement / Action	Negative Lead
C481-2	Ω	C2280C-12

RH Rear Side Marker Lamp

Positive Lead	Measurement / Action	Negative Lead
C482-2	Ω	C2280C-12

Is the resistance less than 3 ohms?

Yes	GO to A26

No	REPAIR the circuit.

A21 CHECK THE STOPLAMP OPERATION

Apply the brake pedal and the stoplamps.

Do all the stoplamps illuminate?

Yes	GO to A22

No	REFER to: Stoplamps .

A22 CHECK FOR VOLTAGE TO THE INOPERATIVE REAR PARKING LAMP

Place the headlamp switch in the OFF position.

Ignition OFF.

Disconnect: Except China, Inoperative LH Rear Lamp C498 or RH Rear Lamp C499 .

Disconnect: China Only, Inoperative LH Rear Lamp C412 or RH Rear Lamp C415 .

Ignition ON.

Place the headlamp switch in the PARKING LAMPS position.

Except China, measure:

LH Rear Lamp (Except China)

Positive Lead	Measurement / Action	Negative Lead
C498-2		Ground

RH Rear Lamp (Except China)

Positive Lead	Measurement / Action	Negative Lead
C499-2		Ground

China only, measure:

LH Rear Lamp (China Only)

Positive Lead	Measurement / Action	Negative Lead
C412-2		Ground

RH Rear Lamp (China Only)

Positive Lead	Measurement / Action	Negative Lead
C415-2		Ground

Is the voltage greater than 11 volts?

Yes	INSTALL a new rear lamp assembly. REFER to: Rear Lamp Assembly .

No	GO to A23

A23 REPEAT THE ON-DEMAND SELF-TEST AND CHECK FOR VOLTAGE TO THE REAR PARKING LAMP

Place the headlamp switch in the OFF position.

Using a diagnostic scan tool, perform the BCM self-test.

Clear the Diagnostic Trouble Codes (DTCs) and repeat the self-test (required to enable the lamp output driver if DTC U1000:00 is present).

Place the headlamp switch in the PARKING LAMPS position.

Except China, measure:

LH Rear Lamp (Except China)

Positive Lead	Measurement / Action	Negative Lead
C498-2		Ground

RH Rear Lamp (Except China)

Positive Lead	Measurement / Action	Negative Lead
C499-2		Ground

China only, measure:

LH Rear Lamp (China Only)

Positive Lead	Measurement / Action	Negative Lead
C412-2		Ground

RH Rear Lamp (China Only)

Positive Lead	Measurement / Action	Negative Lead
C415-2		Ground

Is the voltage greater than 11 volts?

Yes	INSTALL a new rear lamp assembly. REFER to: Rear Lamp Assembly .

No	GO to A24

A24 CHECK THE INOPERATIVE PARKING LAMP SUPPLY CIRCUIT FOR AN OPEN

Place the headlamp switch in the OFF position.

Ignition OFF.

Disconnect: BCM C2280E .

Except China, measure:

LH Rear Lamp (Except China)

Positive Lead	Measurement / Action	Negative Lead
C498-2	Ω	C2280E-25

RH Rear Lamp (Except China)

Positive Lead	Measurement / Action	Negative Lead

C499-2	Ω	C2280E-51

China only, measure:

LH Rear Lamp (China Only)

Positive Lead	Measurement / Action	Negative Lead
C412-2	Ω	C2280E-25

RH Rear Lamp (China Only)

Positive Lead	Measurement / Action	Negative Lead
C415-2	Ω	C2280E-51

Is the resistance less than 3 ohms?

Yes	GO to A25

No	REPAIR the circuit in question.

A25 CHECK THE INOPERATIVE PARKING LAMP SUPPLY CIRCUIT FOR A SHORT TO GROUND

Except China, measure:

LH Rear Lamp (Except China)

Positive Lead	Measurement / Action	Negative Lead
C498-2	Ω	Ground

RH Rear Lamp (Except China)

Positive Lead	Measurement / Action	Negative Lead
C499-2	Ω	Ground

China only, measure:

LH Rear Lamp (China Only)

Positive Lead	Measurement / Action	Negative Lead
C412-2	Ω	Ground

RH Rear Lamp (China Only)

Positive Lead	Measurement / Action	Negative Lead

C415-2	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to A26

No	REPAIR the circuit. After the repair: If no Diagnostic Trouble Codes (DTCs) are present, TEST the system for normal operation. If DTC U1000:00 is present, CLEAR the Diagnostic Trouble Codes (DTCs) and REPEAT the self-test (required to enable the lamp output driver if DTC U1000:00 is present). If DTC U3000:49 is present,

A26 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > PARKING, REAR AND LICENSE PLATE LAMPS > PINPOINT TESTS > PINPOINT TEST B : THE PARKING, REAR OR LICENSE PLATE LAMPS ARE ON CONTINUOUSLY

Refer to Parking, Rear and License Lamps for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Exterior Lighting - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B10F3:15	Left Front Position Light: Circuit Short to Battery or Open	A continuous memory and on-demand DTC that sets when the BCM detects a short to voltage from the LH rear side marker lamp output circuit.
B10F4:15	Right Front Position Light: Circuit Short to Battery or Open	A continuous memory and on-demand DTC that sets when the BCM detects a short to voltage from the RH rear side marker lamp output circuit.
B1445:15	Rear Park Lamps Output: Circuit Short to Battery or Open	A continuous memory and on-demand DTC that sets when the BCM detects a short to voltage from the rear side marker and license plate lamp output circuit.
B1446:15	Front Park Lamps Output: Circuit Short to Battery or Open	A continuous memory and on-demand DTC that sets when the BCM detects a short to voltage from the front sidemarker lamps output circuit.
B149E:15	Left Front Position/Sidemarker: Circuit Short To Battery or Open	A continuous memory and on-demand DTC that sets when the BCM detects a short to voltage from the LH front parking lamp output circuit.
B149F:15	Right Front Position/Sidemarker: Circuit Short To Battery or Open	A continuous memory and on-demand DTC that sets when the BCM detects a short to voltage from the RH front parking lamp output circuit.
U1000:00	Solid State Driver Protection Active -Driver Disabled: No Sub Type Information	This DTC sets when the BCM has temporarily shut down the output driver. The module has temporarily disabled an output because an excessive current draw exists (such as a short to ground). The BCM cannot enable the output until the cause of the short is corrected, the Diagnostic Trouble Codes (DTCs) have been cleared and a successful self-test is run.
U3000:49	Control Module: Internal Electronic Failure	This DTC sets when the BCM has permanently shut down the output driver. The module has

		permanently disabled an output because an excessive current draw fault (such as a short to ground) has exceeded the limits that the BCM can withstand. CORRECT the cause of the excessive current draw before installing a new BCM.

Possible Sources

- Wiring, terminals or connectors
- Low beams concern
- BCM

DIAGNOSIS AND TESTING > PARKING, REAR AND LICENSE PLATE LAMPS > PINPOINT TESTS > PINPOINT TEST B : THE PARKING, REAR OR LICENSE PLATE LAMPS ARE ON CONTINUOUSLY > PINPOINT TEST B : THE PARKING, REAR OR LICENSE PLATE LAMPS ARE ON CONTINUOUSLY

B1 CHECK LOW BEAM HEADLAMP OPERATION

Ignition ON.

Place the headlamp switch in the OFF position.

Observe the operation of the LH and RH low beams.

Are the low beams illuminated?

Yes	REFER to: Headlamps .

No	GO to B2

B2 CHECK THE BCM (BODY CONTROL MODULE) PARKING LAMP OUTPUT CIRCUIT FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: BCM C2280C (For rear side marker or license plate lamps).

Disconnect: BCM C2280E (For rear parking lamps).

Disconnect: BCM C2280F (For front parking lamps).

Disconnect: BCM C2280G (For front side marker lamps).

Ignition ON.

Do the parking lamps continue to illuminate?

Yes	REPAIR the affected circuit.

No	GO to B3

B3 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > PARKING, REAR AND LICENSE PLATE LAMPS > PINPOINT TESTS > PINPOINT TEST C : THE LED (LIGHT EMITTING DIODE) SIGNATURE LAMPS ARE NOT THE SAME INTENSITY - EXCEPT CHINA

Refer to Headlamps/Autolamps for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Exterior Lighting - System Operation and Component Description .

Possible Sources

- Wiring, terminals or connectors

DIAGNOSIS AND TESTING > PARKING, REAR AND LICENSE PLATE LAMPS > PINPOINT TESTS > PINPOINT TEST C : THE LED (LIGHT EMITTING DIODE)

SIGNATURE LAMPS ARE NOT THE SAME INTENSITY - EXCEPT CHINA > PINPOINT TEST C : THE LED (LIGHT EMITTING DIODE) SIGNATURE LAMPS ARE NOT THE SAME INTENSITY - EXCEPT CHINA

C1 CHECK FRONT PARKING LAMP CIRCUIT FOR VOLTAGE

Ignition OFF.

Disconnect: (Dimmer LED signature lighting) LH Headlamp C1021 or RH Headlamp C1041 .

Ignition ON.

Place the headlamp switch in the PARKING LAMPS position.

Measure:

LH Headlamp

Positive Lead	Measurement / Action	Negative Lead
C1021-5	V	Ground

RH Headlamp

Positive Lead	Measurement / Action	Negative Lead
C1041-5	V	Ground

Is the voltage greater than 11 volts?

Yes	INSTALL a new headlamp assembly. REFER to: Headlamp Assembly .

No	GO to C2

C2 CHECK FRONT PARKING LAMP CIRCUIT FOR AN OPEN

Ignition OFF.

Disconnect: BCM C2280G .

Measure:

LH Headlamp

Positive Lead	Measurement / Action	Negative Lead
C1021-5	Ω	C2280G-3

RH Headlamp

Positive Lead	Measurement / Action	Negative Lead
C1041-5	Ω	C2280G-3

Is the resistance less than 3 ohms?

Yes	GO to C3

No	REPAIR the circuit.

C3 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > TURN SIGNAL AND HAZARD LAMPS > DTC CHART: BCM

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

BCM DTC Chart

DTC	Description	Action
B123A:11	Left Front Turn Indicator: Circuit Short to Ground	Except China, GO to PINPOINT TEST B : ONE TURN SIGNAL LAMP IS INOPERATIVE OR ALWAYS ON - EXCEPT CHINA

		China only, GO to PINPOINT TEST C : ONE TURN SIGNAL LAMP IS INOPERATIVE OR ALWAYS ON - CHINA ONLY
B123A:15	Left Front Turn Indicator: Circuit Short to Battery or Open	Except China, GO to PINPOINT TEST B : ONE TURN SIGNAL LAMP IS INOPERATIVE OR ALWAYS ON - EXCEPT CHINA China only, GO to PINPOINT TEST C : ONE TURN SIGNAL LAMP IS INOPERATIVE OR ALWAYS ON - CHINA ONLY
B123B:11	Right Front Turn Indicator: Circuit Short to Ground	Except China, GO to PINPOINT TEST B : ONE TURN SIGNAL LAMP IS INOPERATIVE OR ALWAYS ON - EXCEPT CHINA China only, GO to PINPOINT TEST C : ONE TURN SIGNAL LAMP IS INOPERATIVE OR ALWAYS ON - CHINA ONLY
B123B:15	Right Front Turn Indicator: Circuit Short to Battery or Open	Except China, GO to PINPOINT TEST B : ONE TURN SIGNAL LAMP IS INOPERATIVE OR ALWAYS ON - EXCEPT CHINA China only, GO to PINPOINT TEST C : ONE TURN SIGNAL LAMP IS INOPERATIVE OR ALWAYS ON - CHINA ONLY
B1247:11	Left Rear Turn Indicator: Circuit Short To Ground	GO to PINPOINT TEST C : ONE TURN SIGNAL LAMP IS INOPERATIVE OR ALWAYS ON - CHINA ONLY
B1247:15	Left Rear Turn Indicator: Circuit Short To Battery or Open	GO to PINPOINT TEST C : ONE TURN SIGNAL LAMP IS INOPERATIVE OR ALWAYS ON - CHINA ONLY
B1248:11	Right Rear Turn Indicator: Circuit Short To Ground	GO to PINPOINT TEST C : ONE TURN SIGNAL LAMP IS INOPERATIVE OR ALWAYS ON - CHINA ONLY
B1248:15	Right Rear Turn Indicator: Circuit Short To Battery or Open	GO to PINPOINT TEST C : ONE TURN SIGNAL LAMP IS INOPERATIVE OR ALWAYS ON - CHINA ONLY
B1D35:11	Hazard Switch: Circuit Short to Ground	GO to PINPOINT TEST D : THE HAZARD LAMP FUNCTION IS INOPERATIVE OR ALWAYS ON

U1000:00	Solid State Driver Protection Active -Driver Disabled: No Sub Type Information	The module has temporarily disabled an output because an excessive current draw exists (such as a short to ground). The BCM cannot enable the output until the cause of the short is corrected. ADDRESS all other Diagnostic Trouble Codes (DTCs) first. After the cause of the concern is corrected, CLEAR the Diagnostic Trouble Codes (DTCs). REPEAT the self-test.
U3000:49	Control Module: Internal Electronic Failure	The module has permanently disabled an output because an excessive current draw fault (such as a short to ground) has exceeded the limits that the BCM can withstand. The cause of the excessive current draw MUST be corrected before a new BCM is installed. ADDRESS all other Diagnostic Trouble Codes (DTCs) first. After the cause of the concern is corrected,
For other BCM Diagnostic Trouble Codes (DTCs)	-	REFER to: Body Control Module (BCM) .

DIAGNOSIS AND TESTING > TURN SIGNAL AND HAZARD LAMPS > DTC CHART: BCMB

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

BCMB DTC Chart

DTC	Description	Action
B1265:23	Left Rear Turn Lamp Feedback: Signal Stuck Low	GO to PINPOINT TEST E : DTC (DIAGNOSTIC TROUBLE CODE) B1265:23, B1265:24, B1266:23 AND B1266:24
B1265:24	Left Rear Turn Lamp Feedback: Signal Stuck High	GO to PINPOINT TEST E : DTC (DIAGNOSTIC TROUBLE CODE) B1265:23, B1265:24, B1266:23 AND B1266:24
B1266:23	Right Rear Turn Lamp Feedback: Signal Stuck Low	GO to PINPOINT TEST E : DTC (DIAGNOSTIC TROUBLE CODE) B1265:23, B1265:24, B1266:23

		AND B1266:24
B1266:24	Right Rear Turn Lamp Feedback: Signal Stuck High	GO to PINPOINT TEST E : DTC (DIAGNOSTIC TROUBLE CODE) B1265:23, B1265:24, B1266:23 AND B1266:24
B1271:11	Left Stop/Turn Inner Lamp: Circuit Short to Ground	REFER to: Stoplamps .
B1271:15	Left Stop/Turn Inner Lamp: Circuit Short to Battery or Open	REFER to: Stoplamps .
B1272:11	Right Stop/Turn Inner Lamp: Circuit Short To Ground	REFER to: Stoplamps .
B1272:15	Right Stop/Turn Inner Lamp: Circuit Short To Battery or Open	REFER to: Stoplamps .
B1273:11	Right Stop/Turn Middle Lamp: Circuit Short To Ground	REFER to: Stoplamps .
B1273:15	Right Stop/Turn Middle Lamp: Circuit Short To Battery or Open	REFER to: Stoplamps .
B1274:11	Left Stop/Turn Middle Lamp: Circuit Short To Ground	REFER to: Stoplamps .
B1274:15	Left Stop/Turn Middle Lamp: Circuit Short To Battery or Open	REFER to: Stoplamps .
B1275:11	Left Stop/Turn Outer Lamp: Circuit Short To Ground	REFER to: Stoplamps .
B1275:15	Left Stop/Turn Outer Lamp: Circuit Short To Battery or Open	REFER to: Stoplamps .
B1276:11	Right Stop/Turn Outer Lamp: Circuit Short To Ground	REFER to: Stoplamps .
B1276:15	Right Stop/Turn Outer Lamp: Circuit Short To Battery or Open	REFER to: Stoplamps .
U1000:00	Solid State Driver Protection Active -Driver Disabled: No Sub Type Information	The module has temporarily disabled an output because an excessive current draw exists (such as a short to ground). The BCMB cannot enable the output until the cause of the short is corrected. ADDRESS all other Diagnostic Trouble Codes (DTCs) first. After the cause of the concern is corrected, CLEAR the Diagnostic Trouble Codes (DTCs). REPEAT the self-test.
U3000:49	Control Module: Internal Electronic Failure	The module has permanently disabled an output because an

		excessive current draw fault (such as a short to ground) has exceeded the limits that the BCMB can withstand. The cause of the excessive current draw MUST be corrected before a new BCMB is installed. ADDRESS all other Diagnostic Trouble Codes (DTCs) first. After the cause of the concern is corrected, INSTALL a new BCMB. REFER to: Body Control Module B (BCMB) .
All other BCMB Diagnostic Trouble Codes (DTCs)	-	REFER to: Body Control Module B (BCMB) .

DIAGNOSIS AND TESTING > TURN SIGNAL AND HAZARD LAMPS > DTC CHART: DDM

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

DDM DTC Chart

DTC	Description	Action
B1D06:11	Left Turn Indicator: Circuit Short To Ground	Except China, GO to PINPOINT TEST B : ONE TURN SIGNAL LAMP IS INOPERATIVE OR ALWAYS ON - EXCEPT CHINA China only, GO to PINPOINT TEST C : ONE TURN SIGNAL LAMP IS INOPERATIVE OR ALWAYS ON - CHINA ONLY
For other DDM Diagnostic Trouble Codes (DTCs)	-	REFER to: Locks, Latches and Entry Systems .

DIAGNOSIS AND TESTING > TURN SIGNAL AND HAZARD LAMPS > DTC CHART: PDM

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

PDM DTC Chart

DTC	Description	Action
B1D07:11	Right Turn Indicator: Circuit Short	Except China, GO to PINPOINT

	To Ground	TEST B : ONE TURN SIGNAL LAMP IS INOPERATIVE OR ALWAYS ON - EXCEPT CHINA China only, GO to PINPOINT TEST C : ONE TURN SIGNAL LAMP IS INOPERATIVE OR ALWAYS ON - CHINA ONLY
For other PDM Diagnostic Trouble Codes (DTCs)	-	REFER to: Locks, Latches and Entry Systems .

DIAGNOSIS AND TESTING > TURN SIGNAL AND HAZARD LAMPS > DTC CHART: SCCM

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

SCCM DTC Chart

DTC	Description	Action
B1D36:09	Turn Indicator Switch: Component Failure	INSTALL a new LH steering column multifunction switch. REFER to: Steering Column Multifunction Switch LH . CLEAR the Diagnostic Trouble Codes (DTCs). Run the SCCM self-test. If the DTC returns, INSTALL a new SCCM. REFER to: Steering Column Control Module (SCCM) .
For other SCCM Diagnostic Trouble Codes (DTCs)	-	REFER to: Steering Wheel and Column Electrical Components .

DIAGNOSIS AND TESTING > TURN SIGNAL AND HAZARD LAMPS > SYMPTOM CHART(S)

Symptom Chart: Turn Signal and Hazard Lamps

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

Symptom Chart

Condition	Possible Sources	Actions
A module does not respond to the diagnostic scan tool	Fuse Wiring, terminals or connectors Module	REFER to: MODULE COMMUNICATIONS NETWORK .

The turn signal function is inoperative or always on	Refer to the Pinpoint Test	GO to PINPOINT TEST A : THE TURN SIGNAL FUNCTION IS INOPERATIVE OR ALWAYS ON
One turn signal lamp is inoperative or always on - except China	Refer to the Pinpoint Test	GO to PINPOINT TEST B : ONE TURN SIGNAL LAMP IS INOPERATIVE OR ALWAYS ON - EXCEPT CHINA
One turn signal lamp is inoperative or always on - China only	Refer to the Pinpoint Test	GO to PINPOINT TEST C : ONE TURN SIGNAL LAMP IS INOPERATIVE OR ALWAYS ON - CHINA ONLY
The hazard lamp function is inoperative or always on	Refer to the Pinpoint Test	GO to PINPOINT TEST D : THE HAZARD LAMP FUNCTION IS INOPERATIVE OR ALWAYS ON

DIAGNOSIS AND TESTING > TURN SIGNAL AND HAZARD LAMPS > PINPOINT TESTS > PINPOINT TEST A : THE TURN SIGNAL FUNCTION IS INOPERATIVE OR ALWAYS ON

Refer to Turn Signal/Stop/Hazard Lamps for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Exterior Lighting - System Operation and Component Description .

Possible Sources

- LH Multifunction switch
- SCCM
- BCM

DIAGNOSIS AND TESTING > TURN SIGNAL AND HAZARD LAMPS > PINPOINT TESTS > PINPOINT TEST A : THE TURN SIGNAL FUNCTION IS INOPERATIVE OR ALWAYS ON > PINPOINT TEST A : THE TURN SIGNAL FUNCTION IS INOPERATIVE OR ALWAYS ON

A1 CHECK THE SCCM (STEERING COLUMN CONTROL MODULE) TURN SIGNAL PARAMETER IDENTIFICATIONS (PIDS)

Ignition ON.

Using a diagnostic scan tool, view SCCM Parameter Identifications (PIDs).

Monitor the Turn signal Left Switch Input Status (TRN_SIG_SW_L) and Turn signal Right

Switch Input Status (TRN_SIG_SW_R) while placing the LH steering column multifunction switch in the left and right turn positions.

Do the Parameter Identifications (PIDs) match the LH steering column multifunction switch position?

Yes	GO to A2

No	INSTALL a new LH steering column multifunction switch. REFER to: Steering Column Multifunction Switch LH . TEST the system for normal operation. If the concern is still present, GO to A3

A2 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

A3 CHECK FOR CORRECT SCCM (STEERING COLUMN CONTROL MODULE) OPERATION

Disconnect and inspect all SCCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the SCCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new SCCM. REFER to: Steering Column Control Module (SCCM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > TURN SIGNAL AND HAZARD LAMPS > PINPOINT TESTS > PINPOINT TEST B : ONE TURN SIGNAL LAMP IS INOPERATIVE OR ALWAYS ON - EXCEPT CHINA

One Turn Signal Lamp Is Inoperative Or Always On - Except China

Refer to Turn Signal/Stop/Hazard Lamps for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Exterior Lighting - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B123A:11	Left Front Turn Indicator: Circuit Short To Ground	A continuous memory and on-demand DTC that sets when the BCM detects a short to ground from the LH front turn lamp voltage supply circuit.
B123A:15	Left Front Turn Indicator: Circuit Short To Battery Or Open	A continuous memory and on-demand DTC that sets when the BCM detects an open or short to voltage from the LH front turn lamp voltage supply circuit.
B123B:11	Right Front Turn Indicator: Circuit Short To Ground	A continuous memory and on-demand DTC that sets when the BCM detects a short to ground from the RH front turn lamp voltage supply circuit.
B123B:15	Right Front Turn Indicator: Circuit Short To Battery Or Open	A continuous memory and on-demand DTC that sets when the BCM detects an open or short to voltage from the RH front turn lamp voltage supply circuit.

U1000:00	Solid State Driver Protection Active -Driver Disabled: No Sub Type Information	This DTC sets when the BCM has temporarily shut down the output driver. The module has temporarily disabled an output because an excessive current draw exists (such as a short to ground). The BCM cannot enable the output until the cause of the short is corrected, the Diagnostic Trouble Codes (DTCs) have been cleared and a successful self-test is run.
U3000:49	Control Module: Internal Electronic Failure	This DTC sets when the BCM has permanently shut down the output driver. The module has permanently disabled an output because an excessive current draw fault (such as a short to ground) has exceeded the limits that the BCM can withstand. CORRECT the cause of the excessive current draw before installing a new BCM.

Possible Sources

- Bulb
- Rear lamp assembly
- Exterior mirror (without hood turn signals)
- Hood turn signal lamp (without exterior mirror turn signals)
- Wiring, terminals or connectors
- DDM
- PDM
- BCM

DIAGNOSIS AND TESTING > TURN SIGNAL AND HAZARD LAMPS > PINPOINT TESTS > PINPOINT TEST B : ONE TURN SIGNAL LAMP IS INOPERATIVE OR ALWAYS ON - EXCEPT CHINA > PINPOINT TEST B : ONE TURN SIGNAL LAMP IS INOPERATIVE OR ALWAYS ON - EXCEPT CHINA

B1 DETERMINE IF ANY TURN LAMP IS ALWAYS ON

Ignition ON.

Activate the lamp function.

Observe the front and the rear turn lamps.

Deactivate the lamp function.

Observe the front and the rear turn lamps.

Is any turn lamp continuously illuminated (not flashing) with the hazard lamp function deactivated?

Yes	For a front turn lamp, GO to B2 For a rear turn lamp, REFER to: Stoplamps . For an exterior mirror turn lamp or hood turn signal lamp (without memory seat), GO to B3 For an exterior mirror turn lamp (with memory seat), GO to B4

No	For a front turn lamp, GO to B5 For a rear turn lamp, if the stoplamps operate correctly, GO to B15For a rear turn lamp, if the stoplamps do not operate correctly, REFER to: Stoplamps . For an exterior mirror turn lamp or hood turn signal lamp, GO to B10

B2 CHECK THE FRONT TURN LAMP VOLTAGE SUPPLY CIRCUIT FOR A SHORT TO VOLTAGE

Ignition OFF.

Deactivate the hazard lamp function.

Disconnect: BCM C2280F .

Ignition ON.

Does the turn lamp in question continue to illuminate?

Yes	REPAIR the affected circuit.

No	GO to B18

B3 CHECK THE EXTERIOR MIRROR TURN LAMP OR HOOD TURN SIGNAL LAMP VOLTAGE SUPPLY CIRCUIT FOR A SHORT TO VOLTAGE (WITHOUT MEMORY SEAT)

Ignition OFF.

Deactivate the hazard lamp function.

Disconnect: BCM C2280E .

Ignition ON.

Does the turn lamp in question continue to illuminate?

Yes	REPAIR the affected circuit.

No	GO to B18

B4 CHECK THE EXTERIOR MIRROR TURN LAMP VOLTAGE SUPPLY CIRCUIT FOR A SHORT TO VOLTAGE (WITH MEMORY SEAT)

Ignition OFF.

Deactivate the hazard lamp function.

Disconnect: DDM C501A (LH exterior mirror lamp).

Disconnect: PDM C652A (RH exterior mirror lamp).

Ignition ON.

Does the turn lamp in question continue to illuminate?

Yes	REPAIR the affected circuit.

No	For the LH exterior mirror turn lamp, GO to B19 For the RH exterior mirror turn lamp, GO to B20

B5 CHECK FOR VOLTAGE TO THE FRONT TURN LAMP

Ignition OFF.

Deactivate the hazard lamp function.

Disconnect: LH Side Turn Signal Lamp C156 or RH Side Turn Signal Lamp C1042 .

Ignition ON.

Activate the hazard flasher lamp function.

Measure:

LH Turn Lamp

Positive Lead	Measurement / Action	Negative Lead
C156-3		Ground

RH Turn Lamp

Positive Lead	Measurement / Action	Negative Lead
C1042-3		Ground

Does the voltage alternate from 0 to greater than 11 volts?

Yes	GO to B7

No	GO to B6

B6 REPEAT THE ON-DEMAND SELF-TEST AND CHECK FOR VOLTAGE TO THE FRONT TURN LAMP

Deactivate the hazard lamp function.

Using a diagnostic scan tool, perform the BCM self-test.

Clear the Diagnostic Trouble Codes (DTCs) and repeat the self-test (required to enable the lamp output driver if DTC U1000:00 is present).

Activate the hazard flasher lamp function.

Measure:

LH Turn Lamp

Positive Lead	Measurement / Action	Negative Lead
C156-3		Ground

RH Turn Lamp

Positive Lead	Measurement / Action	Negative Lead
C1042-3		Ground

Does the voltage alternate from 0 to greater than 11 volts?

Yes	INSTALL a new front turn signal bulb. REFER to: Front Turn Signal Lamp Bulb .

No	GO to B8

B7 CHECK THE FRONT TURN LAMP GROUND CIRCUIT FOR AN OPEN

Measure:

LH Turn Lamp

Positive Lead	Measurement / Action	Negative Lead
C156-3		C156-1

RH Turn Lamp

Positive Lead	Measurement / Action	Negative Lead
C1042-3		C1042-1

Does the voltage alternate from 0 to greater than 11 volts?

Yes	INSTALL a new front turn signal bulb. REFER to: Front Turn Signal Lamp Bulb .

No	REPAIR the circuit.

B8 CHECK THE FRONT TURN LAMP SUPPLY CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Deactivate the hazard flasher lamp function.

Disconnect: BCM C2280F .

Measure:

LH Turn Lamp

Positive Lead	Measurement / Action	Negative Lead
C156-3	Ω	Ground

RH Turn Lamp

Positive Lead	Measurement / Action	Negative Lead
C1042-3	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to B9

No	REPAIR the circuit. After the repair: If no Diagnostic Trouble Codes (DTCs) are present, TEST the system for normal operation. If DTC U1000:00 is present, CLEAR the Diagnostic Trouble Codes (DTCs) and REPEAT the self-test (required to enable the lamp output driver if DTC U1000:00 is present). If DTC U3000:49 is present,

B9 CHECK THE FRONT TURN LAMP SUPPLY CIRCUIT FOR AN OPEN

Measure:

LH Turn Lamp

Positive Lead	Measurement / Action	Negative Lead
C156-3	Ω	C2280F-39

RH Turn Lamp

Positive Lead	Measurement / Action	Negative Lead

C1042-3	Ω	C2280F-38

Is the resistance less than 3 ohms?

Yes	GO to B18

No	REPAIR the circuit.

B10 CHECK FOR VOLTAGE TO THE EXTERIOR MIRROR OR HOOD TURN SIGNAL LAMP

Ignition OFF.

Deactivate the hazard flasher lamp function.

Disconnect: For exterior mirror turn lamp, LH Exterior Mirror C520 or RH Exterior Mirror C626 .

Disconnect: For hood turn signal lamp, LH Hood Turn Signal Lamp C1638 or RH Hood Turn Signal Lamp C1684.

Ignition ON.

Activate the hazard flasher lamp function.

For exterior mirror turn lamp, measure:

LH Exterior Mirror Turn Lamp

Positive Lead	Measurement / Action	Negative Lead
C520-3		Ground

RH Exterior Mirror Turn Lamp

Positive Lead	Measurement / Action	Negative Lead
C626-3		Ground

For hood turn signal lamp, measure:

LH Hood Turn Signal Lamp

Positive Lead	Measurement / Action	Negative Lead
C1638-1		Ground

RH Hood Turn Signal Lamp

Positive Lead	Measurement / Action	Negative Lead
C1684-1		Ground

Does the voltage alternate from 0 to greater than 11 volts?

Yes	GO to B12

No	Without memory seat, GO to B11 With memory seat, GO to B13

B11 REPEAT THE ON-DEMAND SELF-TEST AND CHECK FOR VOLTAGE TO THE EXTERIOR MIRROR OR HOOD TURN SIGNAL LAMP

Deactivate the hazard lamp function.

Using a diagnostic scan tool, perform the BCM self-test.

Clear the Diagnostic Trouble Codes (DTCs) and repeat the self-test (required to enable the lamp output driver if DTC U1000:00 is present).

Activate the hazard flasher lamp function.

For exterior mirror turn lamp, measure:

LH Exterior Mirror Turn Lamp

Positive Lead	Measurement / Action	Negative Lead
C520-3		Ground

RH Exterior Mirror Turn Lamp

Positive Lead	Measurement / Action	Negative Lead
C626-3		Ground

For hood turn signal lamp, measure:

LH Hood Turn Signal Lamp

Positive Lead	Measurement / Action	Negative Lead
C1638-1		Ground

RH Hood Turn Signal Lamp

Positive Lead	Measurement / Action	Negative Lead
C1684-1		Ground

Does the voltage alternate from 0 to greater than 11 volts?

Yes	For exterior mirror turn lamp, INSTALL a new exterior mirror turn signal lamp. REFER to: Exterior Mirror . For hood turn signal lamp, INSTALL a new hood turn signal lamp. REFER

	to: Hood Turn Signal Indicator Lamp .

No	GO to B13

B12 CHECK THE EXTERIOR MIRROR TURN LAMP OR HOOD TURN SIGNAL LAMP GROUND

For exterior mirror turn lamp, measure:

LH Exterior Mirror Turn Lamp

Positive Lead	Measurement / Action	Negative Lead
C520-3		C520-7

RH Exterior Mirror Turn Lamp

Positive Lead	Measurement / Action	Negative Lead
C626-3		C626-7

For hood turn signal lamp, measure:

LH Hood Turn Signal Lamp

Positive Lead	Measurement / Action	Negative Lead
C1638-1		C1638-2

RH Hood Turn Signal Lamp

Positive Lead	Measurement / Action	Negative Lead
C1684-1		C1684-2

Does the voltage alternate from 0 to greater than 11 volts?

Yes	For exterior mirror turn lamp, INSTALL a new exterior mirror turn signal lamp. REFER to: Exterior Mirror . For hood turn signal lamp, INSTALL a new hood turn signal lamp. REFER to: Hood Turn Signal Indicator Lamp .

No	REPAIR the circuit.

B13 CHECK THE EXTERIOR MIRROR TURN LAMP OR HOOD TURN SIGNAL LAMP SUPPLY CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Deactivate the hazard flasher lamp function.

Disconnect: Without memory seat, BCM C2280E .

Disconnect: With memory seat, DDM C501A (LH exterior mirror lamp).

Disconnect: With memory seat, PDM C652A (RH exterior mirror lamp).

For exterior mirror turn lamp, measure:

LH Exterior Mirror Turn Lamp

Positive Lead	Measurement / Action	Negative Lead
C520-3	Ω	Ground

RH Exterior Mirror Turn Lamp

Positive Lead	Measurement / Action	Negative Lead
C626-3	Ω	Ground

For hood turn signal lamp, measure:

LH Hood Turn Signal Lamp

Positive Lead	Measurement / Action	Negative Lead
C1638-1	Ω	Ground

RH Hood Turn Signal Lamp

Positive Lead	Measurement / Action	Negative Lead
C1684-1	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to B14

No	With memory seat, REPAIR the circuit. Without memory seat, REPAIR the circuit. After the repair: If no Diagnostic Trouble Codes (DTCs) are present, TEST the system for normal operation. If DTC U1000:00 is present, CLEAR the Diagnostic Trouble Codes (DTCs) and REPEAT the self-test (required to enable the lamp output driver if DTC U1000:00 is present). If DTC U3000:49 is present,

B14 CHECK THE MIRROR TURN LAMP OR HOOD TURN SIGNAL LAMP SUPPLY CIRCUIT FOR AN OPEN

For exterior mirror turn lamp, without memory seat, measure:

LH Exterior Mirror Turn Lamp

Positive Lead	Measurement / Action	Negative Lead
C520-3	Ω	C2280E-26

RH Exterior Mirror Turn Lamp

Positive Lead	Measurement / Action	Negative Lead
C626-3	Ω	C2280E-52

For exterior mirror turn lamp, with memory seat, measure:

LH Exterior Mirror Turn Lamp

Positive Lead	Measurement / Action	Negative Lead
C520-3	Ω	C501A-4

RH Exterior Mirror Turn Lamp

Positive Lead	Measurement / Action	Negative Lead
C626-3	Ω	C652A-4

For hood turn signal lamp, measure:

LH Hood Turn Signal Lamp

Positive Lead	Measurement / Action	Negative Lead
C1638-1	Ω	C2280E-26

RH Hood Turn Signal Lamp

Positive Lead	Measurement / Action	Negative Lead
C1684-1	Ω	C2280E-52

Is the resistance less than 3 ohms?

Yes	With memory seat, LH exterior mirror turn lamp, GO to B19 With memory seat, RH exterior mirror turn lamp, GO to B20 Without memory seat, GO to B18

No	REPAIR the circuit.

B15 CHECK THE REAR TURN LAMP OUTAGE CIRCUIT FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: Inoperative LH Rear Lamp C498 or RH Rear Lamp C499 .

Disconnect: BCMB C4368A .

Ignition ON.

Measure:

LH Turn Lamp

Positive Lead	Measurement / Action	Negative Lead
C498-7		Ground

RH Turn Lamp

Positive Lead	Measurement / Action	Negative Lead
C499-7		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to B16

B16 CHECK THE REAR TURN LAMP OUTAGE CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Measure:

LH Turn Lamp

Positive Lead	Measurement / Action	Negative Lead
C498-7	Ω	Ground

RH Turn Lamp

Positive Lead	Measurement / Action	Negative Lead
C499-7	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to B17

No	REPAIR the circuit.

B17 CHECK THE REAR TURN LAMP OUTAGE CIRCUIT FOR AN OPEN

Measure:

LH Turn Lamp

Positive Lead	Measurement / Action	Negative Lead
C498-7	Ω	C4368A-8

RH Turn Lamp

Positive Lead	Measurement / Action	Negative Lead
C499-7	Ω	C4368A-20

Is the resistance less than 3 ohms?

Yes	GO to B21

No	REPAIR the circuit.

B18 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

B19 CHECK FOR CORRECT DDM (DRIVER DOOR MODULE) OPERATION

Disconnect and inspect all DDM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the DDM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new DDM. REFER to: Driver Door Module (DDM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

B20 CHECK FOR CORRECT PDM (PASSENGER DOOR MODULE) OPERATION

Disconnect and inspect all PDM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the PDM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PDM. REFER to: Passenger Door Module (PDM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

B21 CHECK FOR CORRECT BCMB (BODY CONTROL MODULE B) OPERATION

Disconnect and inspect all BCMB connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCMB connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new BCMB. REFER to: Body Control Module B (BCMB) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > TURN SIGNAL AND HAZARD LAMPS > PINPOINT TESTS > PINPOINT TEST C : ONE TURN SIGNAL LAMP IS INOPERATIVE OR ALWAYS ON - CHINA ONLY

One Turn Signal Lamp Is Inoperative Or Always On - China Only

Refer to Turn Signal/Stop/Hazard Lamps for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Exterior Lighting - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B123A:11	Left Front Turn Indicator: Circuit Short To Ground	A continuous memory and on-demand DTC that sets when the BCM detects a short to ground from the LH front turn lamp voltage supply circuit.
B123A:15	Left Front Turn Indicator: Circuit Short To Battery Or Open	A continuous memory and on-demand DTC that sets when the BCM detects an open or short to voltage from the LH front turn lamp voltage supply circuit.
B123B:11	Right Front Turn Indicator: Circuit Short To Ground	A continuous memory and on-demand DTC that sets when the BCM detects a short to ground from the RH front turn lamp voltage supply circuit.

B123B:15	Right Front Turn Indicator: Circuit Short To Battery Or Open	A continuous memory and on-demand DTC that sets when the BCM detects an open or short to voltage from the RH front turn lamp voltage supply circuit.
B1247:11	Left Rear Turn Indicator: Circuit Short To Ground	A continuous memory and on-demand DTC that sets when the BCM detects a short to ground from the LH rear turn lamp voltage supply circuit.
B1247:15	Left Rear Turn Indicator: Circuit Short To Battery or Open	A continuous memory and on-demand DTC that sets when the BCM detects an open or short to voltage from the LH rear turn lamp voltage supply circuit.
B1248:11	Right Rear Turn Indicator: Circuit Short To Ground	A continuous memory and on-demand DTC that sets when the BCM detects a short to ground from the RH rear turn lamp voltage supply circuit.
B1248:15	Right Rear Turn Indicator: Circuit Short To Battery or Open	A continuous memory and on-demand DTC that sets when the BCM detects an open or short to voltage from the RH rear turn lamp voltage supply circuit.
U1000:00	Solid State Driver Protection Active -Driver Disabled: No Sub Type Information	This DTC sets when the BCM has temporarily shut down the output driver. The module has temporarily disabled an output because an excessive current draw exists (such as a short to ground). The BCM cannot enable the output until the cause of the short is corrected, the Diagnostic Trouble Codes (DTCs) have been cleared and a successful self-test is run.
U3000:49	Control Module: Internal Electronic Failure	This DTC sets when the BCM has permanently shut down the output driver. The module has permanently disabled an output because an excessive current draw fault (such as a short to ground) has exceeded the limits that the BCM can withstand. CORRECT the cause of the excessive current draw before installing a new BCM.

Possible Sources

- Bulb
- Rear lamp assembly
- Exterior mirror
- Wiring, terminals or connectors
- DDM
- PDM
- BCM

DIAGNOSIS AND TESTING > TURN SIGNAL AND HAZARD LAMPS > PINPOINT TESTS > PINPOINT TEST C : ONE TURN SIGNAL LAMP IS INOPERATIVE OR ALWAYS ON - CHINA ONLY > PINPOINT TEST C : ONE TURN SIGNAL LAMP IS INOPERATIVE OR ALWAYS ON - CHINA ONLY

C1 DETERMINE IF ANY TURN LAMP IS ALWAYS ON

Ignition ON.

Activate the lamp function.

Observe the front and the rear turn lamps.

Deactivate the lamp function.

Observe the front and the rear turn lamps.

Is any turn lamp continuously illuminated (not flashing) with the hazard lamp function deactivated?

Yes	For a front turn lamp, GO to C2 For an exterior mirror turn lamp (without memory seat) and a rear turn lamp, GO to C3 For an exterior mirror turn lamp (with memory seat), GO to C4

No	For a front turn lamp, GO to C5 For a rear turn lamp, GO to C10 For an exterior mirror turn lamp, GO to C15

C2 CHECK THE FRONT TURN LAMP VOLTAGE SUPPLY CIRCUIT FOR A SHORT TO VOLTAGE

Ignition OFF.

Deactivate the hazard lamp function.

Disconnect: BCM C2280F .

Ignition ON.

Does the turn lamp in question continue to illuminate?

Yes	REPAIR the affected circuit.

No	GO to C20

C3 CHECK THE EXTERIOR MIRROR TURN LAMP (WITHOUT MEMORY SEAT) AND REAR TURN LAMP VOLTAGE SUPPLY CIRCUIT FOR A SHORT TO VOLTAGE

Ignition OFF.

Deactivate the hazard lamp function.

Disconnect: BCM C2280E .

Ignition ON.

Does the turn lamp in question continue to illuminate?

Yes	REPAIR the affected circuit.

No	GO to C20

C4 CHECK THE EXTERIOR MIRROR TURN LAMP VOLTAGE SUPPLY CIRCUIT FOR A SHORT TO VOLTAGE (WITH MEMORY SEAT)

Ignition OFF.

Deactivate the hazard lamp function.

Disconnect: DDM C501A (LH exterior mirror lamp).

Disconnect: PDM C652A (RH exterior mirror lamp).

Ignition ON.

Does the turn lamp in question continue to illuminate?

Yes	REPAIR the affected circuit.

No	For the LH exterior mirror turn lamp, GO to C21 For the RH exterior mirror turn lamp, GO to C22

C5 CHECK FOR VOLTAGE TO THE FRONT TURN LAMP

Ignition OFF.

Deactivate the hazard lamp function.

Disconnect: LH Side Turn Signal Lamp C156 or RH Side Turn Signal Lamp C1042 .

Ignition ON.

Activate the hazard flasher lamp function.

Measure:

LH Turn Lamp

Positive Lead	Measurement / Action	Negative Lead
C156-3		Ground

RH Turn Lamp

Positive Lead	Measurement / Action	Negative Lead
C1042-3		Ground

Does the voltage alternate from 0 to greater than 11 volts?

Yes	GO to C7

No	GO to C6

C6 REPEAT THE ON-DEMAND SELF-TEST AND CHECK FOR VOLTAGE TO THE FRONT TURN LAMP

Deactivate the hazard lamp function.

Using a diagnostic scan tool, perform the BCM self-test.

Clear the Diagnostic Trouble Codes (DTCs) and repeat the self-test (required to enable the lamp output driver if DTC U1000:00 is present).

Activate the hazard flasher lamp function.

Measure:

LH Turn Lamp

Positive Lead	Measurement / Action	Negative Lead
C156-3		Ground

RH Turn Lamp

Positive Lead	Measurement / Action	Negative Lead
C1042-3		Ground

Does the voltage alternate from 0 to greater than 11 volts?

Yes	INSTALL a new front turn signal bulb. REFER to: Front Turn Signal Lamp Bulb .

No	GO to C8

C7 CHECK THE FRONT TURN LAMP GROUND CIRCUIT FOR AN OPEN

Measure:

LH Turn Lamp

Positive Lead	Measurement / Action	Negative Lead
C156-3		C156-1

RH Turn Lamp

Positive Lead	Measurement / Action	Negative Lead
C1042-3		C1042-1

Does the voltage alternate from 0 to greater than 11 volts?

Yes	INSTALL a new front turn signal bulb. REFER to: Front Turn Signal Lamp Bulb .

No	REPAIR the circuit.

C8 CHECK THE FRONT TURN LAMP SUPPLY CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Deactivate the hazard flasher lamp function.

Disconnect: BCM C2280F .

Measure:

LH Turn Lamp

Positive Lead	Measurement / Action	Negative Lead
C156-3	Ω	Ground

RH Turn Lamp

Positive Lead	Measurement / Action	Negative Lead
C1042-3	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to C9

No	REPAIR the circuit. After the repair: If no Diagnostic Trouble Codes (DTCs) are present, TEST the system for normal operation. If DTC U1000:00 is present, CLEAR the Diagnostic Trouble Codes (DTCs) and REPEAT the self-test (required to enable the lamp output driver if DTC U1000:00 is present). If DTC U3000:49 is present,

C9 CHECK THE FRONT TURN LAMP SUPPLY CIRCUIT FOR AN OPEN

Measure:

LH Turn Lamp

Positive Lead	Measurement / Action	Negative Lead
C156-3	Ω	C2280F-39

RH Turn Lamp

Positive Lead	Measurement / Action	Negative Lead
C1042-3	Ω	C2280F-38

Is the resistance less than 3 ohms?

Yes	GO to C20

No	REPAIR the circuit.

C10 CHECK FOR VOLTAGE TO THE REAR TURN LAMP

Ignition OFF.

Deactivate the hazard lamp function.

Disconnect: LH Rear Lamp Assembly C412 or RH Rear Lamp Assembly C415 .

Ignition ON.

Activate the hazard flasher lamp function.

Measure:

LH Rear Turn Lamp

Positive Lead	Measurement / Action	Negative Lead
C412-3	V	Ground

RH Rear Turn Lamp

Positive Lead	Measurement / Action	Negative Lead
C415-3		Ground

Does the voltage alternate from 0 to greater than 11 volts?

Yes	GO to C12

No	GO to C11

C11 REPEAT THE ON-DEMAND SELF-TEST AND CHECK FOR VOLTAGE TO THE REAR TURN LAMP

Deactivate the hazard lamp function.

Using a diagnostic scan tool, perform the BCM self-test.

Clear the Diagnostic Trouble Codes (DTCs) and repeat the self-test (required to enable the lamp output driver if DTC U1000:00 is present).

Activate the hazard flasher lamp function.

Measure:

LH Rear Turn Lamp

Positive Lead	Measurement / Action	Negative Lead
C412-3		Ground

RH Rear Turn Lamp

Positive Lead	Measurement / Action	Negative Lead
C415-3		Ground

Does the voltage alternate from 0 to greater than 11 volts?

Yes	INSTALL a new rear lamp assembly. REFER to: Rear Lamp Assembly .

No	GO to C13

C12 CHECK THE REAR TURN LAMP GROUND CIRCUIT FOR AN OPEN

Measure:

LH Rear Turn Lamp

Positive Lead	Measurement / Action	Negative Lead

C412-3		C412-4

RH Rear Turn Lamp

Positive Lead	Measurement / Action	Negative Lead
C415-3		C415-4

Does the voltage alternate from 0 to greater than 11 volts?

Yes	INSTALL a new rear lamp assembly. REFER to: Rear Lamp Assembly .

No	REPAIR the circuit.

C13 CHECK THE REAR TURN LAMP SUPPLY CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Deactivate the hazard flasher lamp function.

Disconnect: BCM C2280E .

Measure:

LH Rear Turn Lamp

Positive Lead	Measurement / Action	Negative Lead
C412-3	Ω	Ground

RH Rear Turn Lamp

Positive Lead	Measurement / Action	Negative Lead
C415-3	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to C14

No	REPAIR the circuit. After the repair: If no Diagnostic Trouble Codes (DTCs) are present, TEST the system for normal operation. If DTC U1000:00 is present, CLEAR the Diagnostic Trouble Codes (DTCs) and REPEAT the self-test (required to enable the lamp output driver if DTC U1000:00 is present). If DTC U3000:49 is present,

C14 CHECK THE REAR TURN LAMP SUPPLY CIRCUIT FOR AN OPEN

Measure:

LH Rear Turn Lamp

Positive Lead	Measurement / Action	Negative Lead
C412-3	Ω	C2280E-26

RH Rear Turn Lamp

Positive Lead	Measurement / Action	Negative Lead
C415-3	Ω	C2280E-52

Is the resistance less than 3 ohms?

Yes	GO to C20

No	REPAIR the circuit.

C15 CHECK FOR VOLTAGE TO THE EXTERIOR MIRROR

Ignition OFF.

Deactivate the hazard flasher lamp function.

Disconnect: LH Exterior Mirror C520 or RH Exterior Mirror C626 .

Ignition ON.

Activate the hazard flasher lamp function.

Measure:

LH Exterior Mirror Turn Lamp

Positive Lead	Measurement / Action	Negative Lead
C520-3	V	Ground

RH Exterior Mirror Turn Lamp

Positive Lead	Measurement / Action	Negative Lead
C626-3	V	Ground

Does the voltage alternate from 0 to greater than 11 volts?

Yes	GO to C17

No	GO to C16

C16 REPEAT THE ON-DEMAND SELF-TEST AND CHECK FOR VOLTAGE TO THE EXTERIOR MIRROR

Deactivate the hazard lamp function.

Using a diagnostic scan tool, perform the BCM self-test.

Clear the Diagnostic Trouble Codes (DTCs) and repeat the self-test (required to enable the lamp output driver if DTC U1000:00 is present).

Activate the hazard flasher lamp function.

Measure:

LH Exterior Mirror Turn Lamp

Positive Lead	Measurement / Action	Negative Lead
C520-3		Ground

RH Exterior Mirror Turn Lamp

Positive Lead	Measurement / Action	Negative Lead
C626-3		Ground

Does the voltage alternate from 0 to greater than 11 volts?

Yes	INSTALL a new exterior mirror turn signal lamp. REFER to: Exterior Mirror .

No	GO to C18

C17 CHECK THE EXTERIOR MIRROR TURN LAMP GROUND

Measure:

LH Exterior Mirror Turn Lamp

Positive Lead	Measurement / Action	Negative Lead
C520-3		C520-7

RH Exterior Mirror Turn Lamp

Positive Lead	Measurement / Action	Negative Lead
C626-3		C626-7

Does the voltage alternate from 0 to greater than 11 volts?

Yes	INSTALL a new exterior mirror turn signal lamp. REFER to: Exterior Mirror .

No	REPAIR the circuit.

C18 CHECK THE EXTERIOR MIRROR TURN LAMP SUPPLY CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Deactivate the hazard flasher lamp function.

Disconnect: Without memory seat, BCM C2280E .

Disconnect: With memory seat, DDM C501A (LH exterior mirror lamp).

Disconnect: With memory seat, PDM C652A (RH exterior mirror lamp).

Measure:

LH Exterior Mirror Turn Lamp

Positive Lead	Measurement / Action	Negative Lead
C520-3	Ω	Ground

RH Exterior Mirror Turn Lamp

Positive Lead	Measurement / Action	Negative Lead
C626-3	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to C19

No	With memory seat, REPAIR the circuit. Without memory seat, REPAIR the circuit. After the repair: If no Diagnostic Trouble Codes (DTCs) are present, TEST the system for normal operation.If DTC U1000:00 is present, CLEAR the Diagnostic Trouble Codes (DTCs) and REPEAT the self-test (required to enable the lamp output driver if DTC U1000:00 is present). If DTC U3000:49 is present,

C19 CHECK THE MIRROR TURN LAMP SUPPLY CIRCUIT FOR AN OPEN

Without memory seat, measure:

LH Exterior Mirror Turn Lamp

Positive Lead	Measurement / Action	Negative Lead
C520-3	Ω	C2280E-26

RH Exterior Mirror Turn Lamp

Positive Lead	Measurement / Action	Negative Lead
C626-3	Ω	C2280E-52

With memory seat, measure:

LH Exterior Mirror Turn Lamp

Positive Lead	Measurement / Action	Negative Lead
C520-3	Ω	C501A-4

RH Exterior Mirror Turn Lamp

Positive Lead	Measurement / Action	Negative Lead
C626-3	Ω	C652A-4

Is the resistance less than 3 ohms?

Yes	With memory seat, LH exterior mirror turn lamp, GO to C21 With memory seat, RH exterior mirror turn lamp, GO to C22 Without memory seat, GO to C20

No	REPAIR the circuit.

C20 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

C21 CHECK FOR CORRECT DDM (DRIVER DOOR MODULE) OPERATION

Disconnect and inspect all DDM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the DDM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new DDM. REFER to: Driver Door Module (DDM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

C22 CHECK FOR CORRECT PDM (PASSENGER DOOR MODULE) OPERATION

Disconnect and inspect all PDM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the PDM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PDM. REFER to: Passenger Door Module (PDM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > TURN SIGNAL AND HAZARD LAMPS > PINPOINT TESTS > PINPOINT TEST D : THE HAZARD LAMP FUNCTION IS INOPERATIVE OR ALWAYS ON

Refer to Turn Signal/Stop/Hazard Lamps for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Exterior Lighting - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1D35:11	Hazard Switch: Circuit Short to Ground	A continuous memory and on-demand DTC that sets when the BCM detects a short to ground from the hazard lamp function input circuit.

Possible Sources

- Wiring, terminals or connectors
- FCIM
- BCM

DIAGNOSIS AND TESTING > TURN SIGNAL AND HAZARD LAMPS > PINPOINT TESTS > PINPOINT TEST D : THE HAZARD LAMP FUNCTION IS INOPERATIVE OR ALWAYS ON > PINPOINT TEST D : THE HAZARD LAMP FUNCTION IS INOPERATIVE OR ALWAYS ON

D1 CHECK FOR BCM (BODY CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition ON.

Using a diagnostic scan tool, perform the BCM self-test.

Is DTC B1D35:11 present?

Yes	GO to D2
No	GO to D4

D2 ISOLATE THE HAZARD FLASHER SWITCH

Ignition OFF.

Disconnect: FCIM C2402B .

Ignition ON.

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs) and repeat the BCM self-test.

Is DTC B1D35:11 retrieved again?

Yes	GO to D3

No	GO to D5

D3 CHECK THE HAZARD FLASHER SWITCH INPUT CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Disconnect: BCM C2280B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2402B-20	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to D6

No	REPAIR the circuit.

D4 CHECK FOR A VOLTAGE SIGNAL TO THE HAZARD FLASHER SWITCH

Ignition OFF.

Disconnect: FCIM C2402B .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2402B-20		Ground

Is the voltage greater than 11 volts?

Yes	GO to D7

No	GO to D5

D5 CHECK THE HAZARD FLASHER SWITCH INPUT CIRCUIT FOR AN OPEN

Ignition OFF.

Disconnect: BCM C2280B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2402B-20	Ω	C2280B-19

Is the resistance less than 3 ohms?

Yes	GO to D6

No	REPAIR the circuit.

D6 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

D7 CHECK FOR CORRECT FCIM (FRONT CONTROLS INTERFACE MODULE) OPERATION

Disconnect and inspect all FCIM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the FCIM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new FCIM. Vehicles With: AM/FM/CD/SYNC REFER to: Front Controls Interface Module (FCIM) . Vehicles With: Touchscreen Display REFER to: Front Controls Interface Module (FCIM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > TURN SIGNAL AND HAZARD LAMPS > PINPOINT TESTS > PINPOINT TEST E : DTC (DIAGNOSTIC TROUBLE CODE) B1265:23, B1265:24, B1266:23 AND B1266:24

Refer to Turn Signal/Stop/Hazard Lamps for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Exterior Lighting - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1265:23	Left Rear Turn Lamp Feedback: Signal Stuck Low	A continuous memory and on-demand DTC that sets when the BCM detects a short to ground or open from the LH rear turn lamp outage input circuit.
B1265:24	Left Rear Turn Lamp Feedback: Signal Stuck High	A continuous memory and on-demand DTC that sets when the BCM detects a short to voltage from the LH rear turn lamp outage input circuit.
B1266:23	Right Rear Turn Lamp Feedback: Signal Stuck Low	A continuous memory and on-demand DTC that sets when the BCM detects a short to ground or open from the RH rear

		turn lamp outage input circuit.
B1266:24	Right Rear Turn Lamp Feedback: Signal Stuck High	A continuous memory and on-demand DTC that sets when the BCM detects a short to voltage from the RH rear turn lamp outage input circuit.

Possible Sources

- Wiring, terminals or connectors
- FCIM
- BCM

DIAGNOSIS AND TESTING > TURN SIGNAL AND HAZARD LAMPS > PINPOINT TESTS > PINPOINT TEST E : DTC (DIAGNOSTIC TROUBLE CODE) B1265:23, B1265:24, B1266:23 AND B1266:24 > PINPOINT TEST E : DTC (DIAGNOSTIC TROUBLE CODE) B1265:23, B1265:24, B1266:23 AND B1266:24

E1 CHECK THE REAR TURN LAMP OUTAGE CIRCUIT FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: Except China, LH Rear Lamp Assembly C498 or RH Rear Lamp Assembly C499 .

Disconnect: China only, LH Rear Lamp Assembly C412 or RH Rear Lamp Assembly C415 .

Disconnect: BCMB C4368A .

Ignition ON.

Except China, measure:

DTC B1265:23 or B1265:24

Positive Lead	Measurement / Action	Negative Lead
C498-7		Ground

DTC B1266:23 or B1266:24

Positive Lead	Measurement / Action	Negative Lead
C499-7		Ground

China only, measure:

DTC B1265:23 or B1265:24

Positive Lead	Measurement / Action	Negative Lead
C412-5		Ground

DTC B1266:23 or B1266:24

Positive Lead	Measurement / Action	Negative Lead
C415-5		Ground

Is voltage present?

Yes	REPAIR the circuit.

No	GO to E2

E2 CHECK THE REAR TURN LAMP OUTAGE CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Except China, measure:

DTC B1265:23 or B1265:24

Positive Lead	Measurement / Action	Negative Lead
C498-7	Ω	Ground

DTC B1266:23 or B1266:24

Positive Lead	Measurement / Action	Negative Lead
C499-7	Ω	Ground

China only, measure:

DTC B1265:23 or B1265:24

Positive Lead	Measurement / Action	Negative Lead
C412-5	Ω	Ground

DTC B1266:23 or B1266:24

Positive Lead	Measurement / Action	Negative Lead
C415-5	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to E3

No	REPAIR the circuit.

E3 CHECK THE REAR TURN LAMP OUTAGE CIRCUIT FOR AN OPEN

Ignition OFF.

Except China, measure:

DTC B1265:23 or B1265:24

Positive Lead	Measurement / Action	Negative Lead
C498-7	Ω	C4368A-8

DTC B1266:23 or B1266:24

Positive Lead	Measurement / Action	Negative Lead
C499-7	Ω	C4368A-20

China only, measure:

DTC B1265:23 or B1265:24

Positive Lead	Measurement / Action	Negative Lead
C412-5	Ω	C4368A-8

DTC B1266:23 or B1266:24

Positive Lead	Measurement / Action	Negative Lead
C415-5	Ω	C4368A-20

Is the resistance less than 3 ohms?

Yes	INSTALL a new rear lamp assembly. REFER to: Rear Lamp Assembly . CLEAR the diagnostic trouble codes (DTCs). PERFORM the BCMB self-test. If the DTC returns, GO to E4

No	REPAIR the circuit.

E4 CHECK FOR CORRECT BCMB (BODY CONTROL MODULE B) OPERATION

Disconnect and inspect all BCMB connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCMB connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new BCMB. REFER to: Body Control Module B (BCMB) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > AUTOLAMPS > DTC CHART: BCM

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

BCM DTC Chart

DTC	Description	Action
B1A85:11	Ambient Sunload Sensor: Circuit Short To Ground	GO to PINPOINT TEST B : THE AUTOLAMPS ARE ON CONTINUOUSLY
B1A85:13	Ambient Sunload Sensor: Circuit Open	GO to PINPOINT TEST B : THE AUTOLAMPS ARE ON CONTINUOUSLY
U1000:00	Solid State Driver Protection Active -Driver Disabled: No Sub Type Information	The module has temporarily disabled an output because an excessive current draw exists (such as a short to ground). The BCM cannot enable the output until the cause of the short is corrected. ADDRESS all other Diagnostic Trouble Codes (DTCs) first. After the cause of the concern is corrected, CLEAR the Diagnostic Trouble Codes (DTCs). REPEAT the self-test.
U3000:49	Control Module: Internal Electronic Failure	The module has permanently disabled an output because an excessive current draw fault (such

		as a short to ground) has exceeded the limits that the BCM can withstand. The cause of the excessive current draw MUST be corrected before a new BCM is installed. ADDRESS all other Diagnostic Trouble Codes (DTCs) first. After the cause of the concern is corrected,
For other BCM Diagnostic Trouble Codes (DTCs)	-	REFER to: Body Control Module (BCM) .

DIAGNOSIS AND TESTING > AUTOLAMPS > SYMPTOM CHART(S)

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

Symptom Chart: Autolamps

Symptom Chart

Condition	Possible Sources	Actions
A module does not respond to the diagnostic scan tool	Fuse Wiring, terminals or connectors Module	REFER to: MODULE COMMUNICATIONS NETWORK .
The autolamps are inoperative	Refer to the Pinpoint Test	GO to PINPOINT TEST A : THE AUTOLAMPS ARE INOPERATIVE
The autolamps are on continuously	Refer to the Pinpoint Test	GO to PINPOINT TEST B : THE AUTOLAMPS ARE ON CONTINUOUSLY

DIAGNOSIS AND TESTING > AUTOLAMPS > PINPOINT TESTS > PINPOINT TEST A : THE AUTOLAMPS ARE INOPERATIVE

Refer to Headlamps/Autolamps for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Exterior Lighting - System Operation and Component Description .

Possible Sources

- Headlamp concern
- Autolamp and rain sensor or sunload sensor
- BCM

DIAGNOSIS AND TESTING > AUTOLAMPS > PINPOINT TESTS > PINPOINT TEST A : THE AUTOLAMPS ARE INOPERATIVE > PINPOINT TEST A : THE AUTOLAMPS ARE INOPERATIVE

A1 CHECK THE MANUAL HEADLAMP OPERATION

Place the headlamp switch in the HEADLAMPS and then OFF positions.

Do the headlamps operate correctly?

Yes	GO to A2

No	REFER to: Headlamps .

A2 CHECK FOR VOLTAGE TO THE LIGHT SENSOR

Ignition OFF.

Disconnect: Autolamp and Rain Sensor C287 (EMTC).

Disconnect: Sunload Sensor C286 (DATC).

Ignition ON.

Place the headlamp switch in the AUTOLAMPS position.

Measure:

Vehicles With EMTC

Positive Lead	Measurement / Action	Negative Lead
C287-2		Ground

Vehicles With DATC

Positive Lead	Measurement / Action	Negative Lead
C286-2		Ground

Is the voltage approximately 5 volts?

Yes	INSTALL a new autolamp and rain sensor or sunload sensor. REFER to: Light Sensor .

No	GO to A3

A3 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > AUTOLAMPS > PINPOINT TESTS > PINPOINT TEST B : THE AUTOLAMPS ARE ON CONTINUOUSLY

Refer to Headlamps/Autolamps for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Exterior Lighting - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1A85:11	Ambient Sunload Sensor: Circuit Short To Ground	A continuous memory and on-demand DTC that sets when the BCM detects a short to ground from the light sensor input circuit.
B1A85:13	Ambient Sunload Sensor: Circuit Open	An on-demand DTC that sets when the BCM detects an open or short to voltage from the light sensor input circuit.
U1000:00	Solid State Driver Protection Active -Driver Disabled: No Sub Type Information	This DTC sets when the BCM has temporarily shut down the output driver. The module has

		temporarily disabled an output because an excessive current draw exists (such as a short to ground). The BCM cannot enable the output until the cause of the short is corrected, the Diagnostic Trouble Codes (DTCs) have been cleared and a successful self-test is run.
U3000:49	Control Module: Internal Electronic Failure	This DTC sets when the BCM has permanently shut down the output driver. The module has permanently disabled an output because an excessive current draw fault (such as a short to ground) has exceeded the limits that the BCM can withstand. CORRECT the cause of the excessive current draw before installing a new BCM.

Possible Sources

- Wiring, terminals or connectors
- Autolamp and rain sensor or sunload sensor
- BCM

Visual Inspection and Diagnostic Pre-checks

- Inspect the headlamp switch for damage.
- Inspect the light sensor for damage.

DIAGNOSIS AND TESTING > AUTOLAMPS > PINPOINT TESTS > PINPOINT TEST B : THE AUTOLAMPS ARE ON CONTINUOUSLY > PINPOINT TEST B : THE AUTOLAMPS ARE ON CONTINUOUSLY

B1 CHECK FOR BCM (BODY CONTROL MODULE) DIAGNOSTIC TROUBLE CODE (DTCS)

Ignition ON.

Using a diagnostic scan tool, perform the BCM self-test.

Are any BCM DTC present?

Yes	For DTC B1A85:11, GO to B3 For DTC B1A85:13, GO to B6

No	GO to B2

B2 CHECK FOR VOLTAGE TO THE LIGHT SENSOR (NO DTC (DIAGNOSTIC TROUBLE CODE))

Ignition OFF.

Disconnect: Autolamp and Rain Sensor C287 (EMTC).

Disconnect: Sunload Sensor C286 (DATC).

Ignition ON.

Place the headlamp switch in the AUTOLAMPS position.

Measure:

Vehicles With EMTC

Positive Lead	Measurement / Action	Negative Lead
C287-2		Ground

Vehicles With DATC

Positive Lead	Measurement / Action	Negative Lead
C286-2		Ground

Is the voltage approximately 5 volts?

Yes	INSTALL a new autolamp and rain sensor or sunload sensor. REFER to: Light Sensor .

No	GO to B11

B3 CHECK FOR VOLTAGE TO THE LIGHT SENSOR (DTC (DIAGNOSTIC TROUBLE CODE) B1A85:11)

Ignition OFF.

Disconnect: Autolamp and Rain Sensor C287 (EMTC).

Disconnect: Sunload Sensor C286 (DATC).

Ignition ON.

Measure:

Vehicles With EMTC

Positive Lead	Measurement / Action	Negative Lead

C287-2		Ground

Vehicles With DATC

Positive Lead	Measurement / Action	Negative Lead
C286-2		Ground

Is the voltage approximately 5 volts?

Yes	INSTALL a new autolamp and rain sensor or sunload sensor. REFER to: Light Sensor .

No	GO to B4

B4 REPEAT THE ON-DEMAND SELF-TEST AND CHECK FOR VOLTAGE TO THE LIGHT SENSOR (DTC (DIAGNOSTIC TROUBLE CODE) B1A85:11)

Using a diagnostic scan tool, perform the BCM self-test.

Clear the Diagnostic Trouble Codes (DTCs) and repeat the self-test (required to enable the lamp output driver if DTC U1000:00 is present).

Measure:

Vehicles With EMTC

Positive Lead	Measurement / Action	Negative Lead
C287-2		Ground

Vehicles With DATC

Positive Lead	Measurement / Action	Negative Lead
C286-2		Ground

Is the voltage approximately 5 volts?

Yes	INSTALL a new autolamp and rain sensor or sunload sensor. REFER to: Light Sensor .

No	GO to B5

B5 CHECK THE LIGHT SENSOR INPUT CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Disconnect: BCM C2280B .

Measure:

Vehicles With EMTC

Positive Lead	Measurement / Action	Negative Lead
C287-2	Ω	Ground

Vehicles With DATC

Positive Lead	Measurement / Action	Negative Lead
C286-2	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to B11

No	REPAIR the circuit. After the repair: If no Diagnostic Trouble Codes (DTCs) are present, TEST the system for normal operation. If DTC U1000:00 is present, CLEAR the Diagnostic Trouble Codes (DTCs) and REPEAT the self-test (required to enable the lamp output driver if DTC U1000:00 is present). If DTC U3000:49 is present,

B6 CHECK FOR VOLTAGE TO THE LIGHT SENSOR (DTC (DIAGNOSTIC TROUBLE CODE) B1A85:13)

Ignition OFF.

Disconnect: Autolamp and Rain Sensor C287 (EMTC).

Disconnect: Sunload Sensor C286 (DATC).

Ignition ON.

Measure:

Vehicles With EMTC

Positive Lead	Measurement / Action	Negative Lead
C287-2	+ V −	Ground

Vehicles With DATC

Positive Lead	Measurement / Action	Negative Lead
C286-2	+ V −	Ground

Is the voltage approximately 5 volts?

Yes	GO to B7

No	GO to B9

B7 CHECK THE LIGHT SENSOR FOR GROUND

Measure:

Vehicles With EMTC

Positive Lead	Measurement / Action	Negative Lead
C287-2		C287-4

Vehicles With DATC

Positive Lead	Measurement / Action	Negative Lead
C286-2		C286-4

Is the voltage approximately 5 volts?

Yes	INSTALL a new autolamp and rain sensor or sunload sensor. REFER to: Light Sensor .

No	GO to B8

B8 CHECK THE LIGHT SENSOR GROUND CIRCUIT FOR AN OPEN

Ignition OFF.

Disconnect: BCM C2280B .

Measure:

Vehicles With EMTC

Positive Lead	Measurement / Action	Negative Lead
C287-4	Ω	C2280B-22

Vehicles With DATC

Positive Lead	Measurement / Action	Negative Lead
C286-4	Ω	C2280B-22

Is the resistance less than 3 ohms?

Yes	GO to B11

No	REPAIR the circuit.

B9 CHECK THE LIGHT SENSOR INPUT CIRCUIT FOR A SHORT TO VOLTAGE

Disconnect: BCM C2280B .

Measure:

Vehicles With EMTC

Positive Lead	Measurement / Action	Negative Lead
C287-2		Ground

Vehicles With DATC

Positive Lead	Measurement / Action	Negative Lead
C286-2		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to B10

B10 CHECK THE LIGHT SENSOR INPUT CIRCUIT FOR AN OPEN

Measure:

Vehicles With EMTC

Positive Lead	Measurement / Action	Negative Lead
C287-2	Ω	C2280B-24

Vehicles With DATC

Positive Lead	Measurement / Action	Negative Lead
C286-2	Ω	C2280B-24

Is the resistance less than 3 ohms?

Yes	GO to B11

No	REPAIR the circuit.

B11 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > FOG LAMPS > DTC CHART: BCM

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

DTC	Description	Action
B1046:11	Front Fog Lamp Control Switch: Circuit Short To Ground	GO to PINPOINT TEST D : THE FRONT FOG LAMPS ARE ON CONTINUOUSLY .
B1047:11	Rear Fog Lamp Control Switch: Circuit Short To Ground	GO to PINPOINT TEST E : THE REAR FOG LAMP IS ON CONTINUOUSLY - CHINA ONLY .
B1147:11	Left Front Fog Lamps: Circuit Short To Ground	GO to PINPOINT TEST C : AN INDIVIDUAL FRONT FOG LAMP IS INOPERATIVE
B1147:15	Left Front Fog Lamps: Circuit Short To Battery or Open	If the fog lamp is inoperative, GO to PINPOINT TEST C : AN INDIVIDUAL FRONT FOG LAMP IS INOPERATIVE If the fog lamp is always on, GO to PINPOINT TEST D : THE FRONT FOG LAMPS ARE ON

		CONTINUOUSLY
B1148:11	Right Front Fog Lamps: Circuit Short To Ground	GO to PINPOINT TEST C : AN INDIVIDUAL FRONT FOG LAMP IS INOPERATIVE
B1148:15	Right Front Fog Lamps: Circuit Short To Battery or Open	If the fog lamp is inoperative, GO to PINPOINT TEST C : AN INDIVIDUAL FRONT FOG LAMP IS INOPERATIVE If the fog lamp is always on, GO to PINPOINT TEST D : THE FRONT FOG LAMPS ARE ON CONTINUOUSLY
B1A79:11	Rear Fog Lamp: Circuit Short To Ground	GO to PINPOINT TEST B : THE REAR FOG LAMP IS INOPERATIVE - CHINA ONLY
B1A79:15	Rear Fog Lamp: Circuit Short To Battery or Open	If the fog lamp is inoperative, GO to PINPOINT TEST B : THE REAR FOG LAMP IS INOPERATIVE - CHINA ONLY If the fog lamp is always on, GO to PINPOINT TEST E : THE REAR FOG LAMP IS ON CONTINUOUSLY - CHINA ONLY
U1000:00	Solid State Driver Protection Active -Driver Disabled: No Sub Type Information	The module has temporarily disabled an output because an excessive current draw exists (such as a short to ground). The BCM cannot enable the output until the cause of the short is corrected. ADDRESS all other Diagnostic Trouble Codes (DTCs) first. After the cause of the concern is corrected, CLEAR the Diagnostic Trouble Codes (DTCs). REPEAT the self-test.
U3000:49	Control Module: Internal Electronic Failure	The module has permanently disabled an output because an excessive current draw fault (such as a short to ground) has exceeded the limits that the BCM can withstand. The cause of the excessive current draw MUST be corrected before a new BCM is installed. ADDRESS all other Diagnostic Trouble Codes (DTCs) first. After the cause of the concern is corrected,
All other BCM Diagnostic Trouble Codes (DTCs)	-	REFER to: Body Control Module (BCM) .

DIAGNOSIS AND TESTING > FOG LAMPS > SYMPTOM CHART

Symptom Chart: Fog Lamps

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

Symptom Chart

Condition	Possible Sources	Actions
A module does not respond to the diagnostic scan tool	Fuse Wiring, terminals or connectors Module	REFER to: MODULE COMMUNICATIONS NETWORK .
Both front fog lamps are inoperative	Refer to the Pinpoint Test	GO to PINPOINT TEST A : BOTH FRONT FOG LAMPS ARE INOPERATIVE
The rear fog lamp is inoperative - China only	Refer to the Pinpoint Test	GO to PINPOINT TEST B : THE REAR FOG LAMP IS INOPERATIVE - CHINA ONLY
An individual front fog lamp is inoperative	Refer to the Pinpoint Test	GO to PINPOINT TEST C : AN INDIVIDUAL FRONT FOG LAMP IS INOPERATIVE
The front fog lamps are on continuously	Refer to the Pinpoint Test	GO to PINPOINT TEST D : THE FRONT FOG LAMPS ARE ON CONTINUOUSLY
The rear fog lamp is on continuously - China only	Refer to the Pinpoint Test	GO to PINPOINT TEST E : THE REAR FOG LAMP IS ON CONTINUOUSLY - CHINA ONLY

DIAGNOSIS AND TESTING > FOG LAMPS > PINPOINT TESTS > PINPOINT TEST A : BOTH FRONT FOG LAMPS ARE INOPERATIVE

Refer to Fog Lamps for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Exterior Lighting - System Operation and Component Description .

Possible Sources

- Wiring, terminals or connectors
- Headlamp switch
- Headlamps concern

- BCM

Visual Inspection and Diagnostic Pre-checks

- Inspect the headlamp switch for damage.

DIAGNOSIS AND TESTING > FOG LAMPS > PINPOINT TESTS > PINPOINT TEST A : BOTH FRONT FOG LAMPS ARE INOPERATIVE > PINPOINT TEST A : BOTH FRONT FOG LAMPS ARE INOPERATIVE

A1 CHECK THE LOW BEAM OPERATION

Ignition ON.

Place the headlamp switch in the HEADLAMPS then the OFF position.

Do the low beams operate correctly?

Yes	GO to A2

No	REFER to: Headlamps .

A2 CHECK THE HEADLAMP SWITCH

Ignition OFF.

Disconnect: Headlamp Switch C205 .

Carry out the headlamp switch component test. Refer to Component Testing for schematic and connector information.

Does the headlamp switch pass the component test?

Yes	GO to A3

No	INSTALL a new headlamp switch. REFER to: Headlamp Switch .

A3 CHECK THE BCM (BODY CONTROL MODULE) FOG LAMP SWITCH INPUT CIRCUIT FOR AN OPEN

Ignition OFF.

Disconnect: BCM C2280B .

Measure:

Positive Lead	Measurement / Action	Negative Lead

C205-14	Ω	C2280B-20

Is the resistance less than 3 ohms?

Yes	GO to A4

No	REPAIR the circuit.

A4 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > FOG LAMPS > PINPOINT TESTS > PINPOINT TEST B : THE REAR FOG LAMP IS INOPERATIVE - CHINA ONLY

Refer to Fog Lamps for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Exterior Lighting - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1A79:11	Rear Fog Lamp: Circuit Short To Ground	A continuous memory and on-demand DTC that sets when the BCM detects a short to

		ground from the rear fog lamp output circuit.
B1A79:15	Rear Fog Lamp: Circuit Short To Battery or Open	A continuous memory and on-demand DTC that sets when the BCM detects an open or short to voltage from the rear fog lamp output circuit.
U1000:00	Solid State Driver Protection Active -Driver Disabled: No Sub Type Information	This DTC sets when the BCM has temporarily shut down the output driver. The module has temporarily disabled an output because an excessive current draw exists (such as a short to ground). The BCM cannot enable the output until the cause of the short is corrected, the Diagnostic Trouble Codes (DTCs) have been cleared and a successful self-test is run.
U3000:49	Control Module: Internal Electronic Failure	This DTC sets when the BCM has permanently shut down the output driver. The module has permanently disabled an output because an excessive current draw fault (such as a short to ground) has exceeded the limits that the BCM can withstand. CORRECT the cause of the excessive current draw before installing a new BCM.

Possible Sources

- Bulb
- Wiring, terminals or connectors
- Headlamp switch
- BCM

Visual Inspection and Diagnostic Pre-checks

- Inspect the fog lamp bulb and make sure it is OK.
- Inspect the headlamp switch for damage.

DIAGNOSIS AND TESTING > FOG LAMPS > PINPOINT TESTS > PINPOINT TEST B : THE REAR FOG LAMP IS INOPERATIVE - CHINA ONLY > PINPOINT TEST B : THE

REAR FOG LAMP IS INOPERATIVE - CHINA ONLY

B1 CHECK THE HEADLAMP SWITCH

Ignition OFF.

Disconnect: Headlamp Switch C205 .

Carry out the headlamp switch component test. Refer to Component Testing for schematic and connector information.

Does the headlamp switch pass the component test?

Yes	GO to B2

No	INSTALL a new headlamp switch. REFER to: Headlamp Switch .

B2 CHECK THE HEADLAMP SWITCH REAR FOG LAMP ENABLE CIRCUIT FOR AN OPEN

Disconnect: BCM C2280B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C205-2	Ω	C2280B-8

Is the resistance less than 3 ohms?

Yes	GO to B3

No	REPAIR the circuit.

B3 CHECK FOR VOLTAGE TO THE REAR FOG LAMP

Connect: Headlamp Switch C205 .

Connect: BCM C2280B .

Disconnect: Rear Fog Lamp C436 .

Ignition ON.

Place the headlamp switch in the PARKING LAMPS position and engage the rear fog lamp switch.

Measure:

Positive Lead	Measurement / Action	Negative Lead

C436-1		Ground

Is the voltage greater than 11 volts?

Yes	GO to B5

No	GO to B4

B4 REPEAT THE ON-DEMAND SELF-TEST AND CHECK FOR VOLTAGE TO THE REAR FOG LAMP

Using a diagnostic scan tool, perform the BCM self-test.

Clear the Diagnostic Trouble Codes (DTCs) and repeat the self-test (required to enable the lamp output driver if DTC U1000:00 is present).

Measure:

Positive Lead	Measurement / Action	Negative Lead
C436-1		Ground

Is the voltage greater than 11 volts?

Yes	INSTALL a new rear fog lamp bulb.

No	GO to B6

B5 CHECK FOG LAMP GROUND CIRCUIT FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C436-1		C436-4

Is the voltage greater than 11 volts?

Yes	INSTALL a new rear fog lamp bulb.

No	REPAIR the circuit.

B6 CHECK FOG LAMP VOLTAGE SUPPLY CIRCUIT FOR A SHORT TO GROUND

Place the headlamp switch in the OFF position.

Ignition OFF.

Disconnect: BCM C2280C .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C436-1	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to B7

No	REPAIR the circuit. After the repair: If no Diagnostic Trouble Codes (DTCs) are present, TEST the system for normal operation. If DTC U1000:00 is present, CLEAR the Diagnostic Trouble Codes (DTCs) and REPEAT the self-test (required to enable the lamp output driver if DTC U1000:00 is present). If DTC U3000:49 is present,

B7 CHECK FOG LAMP VOLTAGE SUPPLY CIRCUIT FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C436-1	Ω	C2280C-25

Is the resistance less than 3 ohms?

Yes	GO to B8

No	REPAIR the circuit.

B8 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical

	Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > FOG LAMPS > PINPOINT TESTS > PINPOINT TEST C : AN INDIVIDUAL FRONT FOG LAMP IS INOPERATIVE

Refer to Fog Lamps for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Exterior Lighting - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1147:11	Left Front Fog Lamps: Circuit Short To Ground	A continuous memory and on-demand DTC that sets when the BCM detects a short to ground from the LH fog lamp output circuit.
B1147:15	Left Front Fog Lamps: Circuit Short To Battery or Open	A continuous memory and on-demand DTC that sets when the BCM detects an open from the LH fog lamp output circuit.
B1148:11	Right Front Fog Lamps: Circuit Short To Ground	A continuous memory and on-demand DTC that sets when the BCM detects a short to ground from the RH fog lamp output circuit.
B1148:15	Right Front Fog Lamps: Circuit Short To Battery or Open	A continuous memory and on-demand DTC that sets when the BCM detects an open from the RH fog lamp output circuit.
U1000:00	Solid State Driver Protection Active -Driver Disabled: No Sub Type Information	This DTC sets when the BCM has temporarily shut down the output driver. The module has temporarily disabled an output because an excessive current draw exists (such as a short to ground). The BCM cannot enable the output until the cause of the short is corrected, the Diagnostic Trouble Codes (DTCs) have been cleared and a successful self-test is run.

U3000:49	Control Module: Internal Electronic Failure	This DTC sets when the BCM has permanently shut down the output driver. The module has permanently disabled an output because an excessive current draw fault (such as a short to ground) has exceeded the limits that the BCM can withstand. CORRECT the cause of the excessive current draw before installing a new BCM.

Possible Sources

- Bulb
- Wiring, terminals or connectors
- BCM

Visual Inspection and Diagnostic Pre-checks

- Inspect the bulbs and make sure they are OK.

DIAGNOSIS AND TESTING > FOG LAMPS > PINPOINT TESTS > PINPOINT TEST C : AN INDIVIDUAL FRONT FOG LAMP IS INOPERATIVE > PINPOINT TEST C : AN INDIVIDUAL FRONT FOG LAMP IS INOPERATIVE

C1 CHECK FOR VOLTAGE TO THE INOPERATIVE FOG LAMP

Ignition OFF.

Disconnect: Inoperative LH Fog Lamp C152 or RH Fog Lamp C162 .

Ignition ON.

Place the headlamp switch in the PARKLAMPS position and engage the fog lamp switch.

Measure:

LH Fog Lamp

Positive Lead	Measurement / Action	Negative Lead
C152-1		Ground

RH Fog Lamp

Positive Lead	Measurement / Action	Negative Lead

C162-1		Ground

Is the voltage greater than 11 volts?

Yes	GO to C3

No	GO to C2

C2 REPEAT THE ON-DEMAND SELF-TEST AND CHECK FOR VOLTAGE TO THE FOG LAMP

Using a diagnostic scan tool, perform the BCM self-test.

Clear the Diagnostic Trouble Codes (DTCs) and repeat the self-test (required to enable the lamp output driver if DTC U1000:00 is present).

Measure:

LH Fog Lamp

Positive Lead	Measurement / Action	Negative Lead
C152-1		Ground

RH Fog Lamp

Positive Lead	Measurement / Action	Negative Lead
C162-1		Ground

Is the voltage greater than 11 volts?

Yes	For halogen fog lamps, INSTALL a new front fog lamp bulb. REFER to: Front Fog Lamp Bulb . For LED fog lamps, INSTALL a new front fog lamp assembly. REFER to: Front Fog Lamp .

No	GO to C4

C3 CHECK THE INOPERATIVE FOG LAMP GROUND CIRCUIT FOR AN OPEN

Measure:

LH Fog Lamp

Positive Lead	Measurement / Action	Negative Lead
C152-1		C152-2

RH Fog Lamp

Positive Lead	Measurement / Action	Negative Lead
C162-1		C162-2

Is the voltage greater than 11 volts?

Yes	For halogen fog lamps, INSTALL a new front fog lamp bulb. REFER to: Front Fog Lamp Bulb . For LED fog lamps, INSTALL a new front fog lamp assembly. REFER to: Front Fog Lamp .

No	REPAIR the circuit.

C4 CHECK FOG LAMP VOLTAGE SUPPLY CIRCUIT FOR A SHORT TO GROUND

Place the headlamp switch in the OFF position.

Ignition OFF.

Disconnect: BCM C2280G .

Measure:

LH Fog Lamp

Positive Lead	Measurement / Action	Negative Lead
C152-1	Ω	Ground

RH Fog Lamp

Positive Lead	Measurement / Action	Negative Lead
C162-1	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to C5

No	REPAIR the circuit. After the repair: If no Diagnostic Trouble Codes (DTCs) are present, TEST the system for normal operation. If DTC U1000:00 is present, CLEAR the Diagnostic Trouble Codes (DTCs) and REPEAT the self-test (required to enable the lamp output driver if DTC U1000:00 is present). If DTC U3000:49 is present,

C5 CHECK FOG LAMP VOLTAGE SUPPLY CIRCUIT FOR AN OPEN

Place the headlamp switch in the OFF position.

Ignition OFF.

Disconnect: BCM C2280G .

Measure:

LH Fog Lamp

Positive Lead	Measurement / Action	Negative Lead
C152-1	Ω	C2280G-12

RH Fog Lamp

Positive Lead	Measurement / Action	Negative Lead
C162-1	Ω	C2280G-5

Is the resistance less than 3 ohms?

Yes	GO to C6

No	REPAIR the circuit.

C6 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > FOG LAMPS > PINPOINT TESTS > PINPOINT TEST D : THE FRONT FOG LAMPS ARE ON CONTINUOUSLY

Refer to Fog Lamps for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Exterior Lighting - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1046:11	Front Fog Lamp Control Switch: Circuit Short To Ground	A continuous and on-demand DTC that sets when the BCM detects a short to ground on the headlamp switch input circuits.
B1147:15	Left Front Fog Lamps: Circuit Short To Battery or Open	A continuous memory and on-demand DTC that sets when the BCM detects an open from the LH fog lamp output circuit.
B1148:15	Right Front Fog Lamps: Circuit Short To Battery or Open	A continuous and on-demand DTC that sets when the BCM detects a short to voltage from the RH fog lamp beam output circuit.

Possible Sources

- Wiring, terminals or connectors
- Headlamp switch
- BCM

Visual Inspection and Diagnostic Pre-checks

- Inspect the headlamp switch for damage.

DIAGNOSIS AND TESTING > FOG LAMPS > PINPOINT TESTS > PINPOINT TEST D : THE FRONT FOG LAMPS ARE ON CONTINUOUSLY > PINPOINT TEST D : THE FRONT FOG LAMPS ARE ON CONTINUOUSLY

D1 CHECK THE HEADLAMP SWITCH

Ignition OFF.

Disconnect: Headlamp Switch C205 .

Carry out the headlamp switch component test. Refer to Component Testing for schematic and connector information.

Does the headlamp switch pass the component test?

Yes	GO to D2

No	INSTALL a new headlamp switch. REFER to: Headlamp Switch .

D2 CHECK THE FOG LAMP VOLTAGE SUPPLY CIRCUITS FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: BCM C2280G .

Ignition ON.

Do the fog lamps continue to illuminate?

Yes	GO to D3

No	REPAIR the circuits.

D3 CHECK THE BCM (BODY CONTROL MODULE) FOG LAMP SWITCH INPUT CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Disconnect: BCM C2280B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C205-14	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to D4

No	REPAIR the circuit.

D4 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > FOG LAMPS > PINPOINT TESTS > PINPOINT TEST E : THE REAR FOG LAMP IS ON CONTINUOUSLY - CHINA ONLY

Refer to Fog Lamps for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Exterior Lighting - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1047:11	Rear Fog Lamp Control Switch: Circuit Short To Ground	A continuous memory and on-demand DTC that sets when the BCM detects a short to ground on the rear fog lamp on input circuit.
B1A79:15	Rear Fog Lamp: Circuit Short To Battery or Open	A continuous memory and on-demand DTC that sets when the BCM detects an open or short to voltage from the rear fog lamp output circuit.

Possible Sources

- Wiring, terminals or connectors
- Headlamp switch
- BCM

Visual Inspection and Diagnostic Pre-checks

- Inspect the headlamp switch for damage.

DIAGNOSIS AND TESTING > FOG LAMPS > PINPOINT TESTS > PINPOINT TEST E : THE REAR FOG LAMP IS ON CONTINUOUSLY - CHINA ONLY > PINPOINT TEST E : THE REAR FOG LAMP IS ON CONTINUOUSLY - CHINA ONLY

E1 CHECK THE HEADLAMP SWITCH

Ignition OFF.

Disconnect: Headlamp Switch C205 .

Carry out the headlamp switch component test. Refer to Component Testing for schematic and connector information.

Does the headlamp switch pass the component test?

Yes	GO to E2

No	INSTALL a new headlamp switch. REFER to: Headlamp Switch .

E2 CHECK THE FOG LAMP SWITCH CIRCUIT FOR A SHORT TO GROUND

Disconnect: BCM C2280B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C205-2	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to E3

No	REPAIR the circuit.

E3 CHECK THE FOG LAMP VOLTAGE SUPPLY CIRCUIT FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: BCM C2280C .

Ignition ON.

Does the rear fog lamp continue to illuminate?

Yes	REPAIR the circuit.

No	GO to E4

E4 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > HEADLAMPS > DTC CHARTS

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

DIAGNOSIS AND TESTING > HEADLAMPS > DTC CHARTS > DTC CHART: BCM

BCM DTC Chart

DTC	Description	Action
B143B:11	Autolamp On Input: Circuit Short to Ground	Except China, GO to PINPOINT TEST D : ONE OR BOTH LOW BEAMS ARE ON CONTINUOUSLY - EXCEPT CHINA China only, GO to PINPOINT TEST E : ONE OR BOTH LOW BEAMS ARE ON CONTINUOUSLY - CHINA ONLY
B143C:11	Headlamp Off Input: Circuit Short to Ground	Except China, GO to PINPOINT TEST D : ONE OR BOTH LOW BEAMS ARE ON CONTINUOUSLY - EXCEPT CHINA China only, GO to PINPOINT TEST E : ONE OR BOTH LOW BEAMS ARE ON CONTINUOUSLY - CHINA ONLY

B143D:11	Headlamp On Input: Circuit Short to Ground	Except China, GO to PINPOINT TEST D : ONE OR BOTH LOW BEAMS ARE ON CONTINUOUSLY - EXCEPT CHINA China only, GO to PINPOINT TEST E : ONE OR BOTH LOW BEAMS ARE ON CONTINUOUSLY - CHINA ONLY
B143E:11	Headlamp Switch Input: Circuit Short to Ground	Except China, GO to PINPOINT TEST D : ONE OR BOTH LOW BEAMS ARE ON CONTINUOUSLY - EXCEPT CHINA China only, GO to PINPOINT TEST E : ONE OR BOTH LOW BEAMS ARE ON CONTINUOUSLY - CHINA ONLY
B1447:11	Parklamp On Switch Input: Circuit Short to Ground	Except China, GO to PINPOINT TEST D : ONE OR BOTH LOW BEAMS ARE ON CONTINUOUSLY - EXCEPT CHINA China only, GO to PINPOINT TEST E : ONE OR BOTH LOW BEAMS ARE ON CONTINUOUSLY - CHINA ONLY
B1D00:11	Left Low Beam: Circuit Short to Ground	Except China, GO to PINPOINT TEST A : ONE OR BOTH LOW BEAMS IS INOPERATIVE - EXCEPT CHINA China only, GO to PINPOINT TEST B : ONE OR BOTH LOW BEAMS IS INOPERATIVE - CHINA ONLY
B1D00:15	Left Low Beam: Circuit Short to Battery or Open	Except China, if the low beam is inoperative, GO to PINPOINT TEST A : ONE OR BOTH LOW BEAMS IS INOPERATIVE - EXCEPT CHINA Except China, if the low beam is always on, GO to PINPOINT TEST D : ONE OR BOTH LOW BEAMS ARE ON CONTINUOUSLY - EXCEPT CHINA China only, if the low beam is inoperative, GO to PINPOINT TEST B : ONE OR BOTH LOW BEAMS IS INOPERATIVE - CHINA ONLY China only, if the low beam is always on, GO to PINPOINT TEST E : ONE OR BOTH LOW BEAMS ARE ON CONTINUOUSLY - CHINA ONLY
B1D01:11	Right Low Beam: Circuit Short to Ground	Except China, GO to PINPOINT TEST A : ONE OR BOTH LOW BEAMS IS INOPERATIVE - EXCEPT CHINA

		China only, GO to PINPOINT TEST B : ONE OR BOTH LOW BEAMS IS INOPERATIVE - CHINA ONLY
B1D01:15	Right Low Beam: Circuit Short to Battery or Open	Except China, if the low beam is inoperative, GO to PINPOINT TEST A : ONE OR BOTH LOW BEAMS IS INOPERATIVE - EXCEPT CHINA Except China, if the low beam is always on, GO to PINPOINT TEST D : ONE OR BOTH LOW BEAMS ARE ON CONTINUOUSLY - EXCEPT CHINA China only, if the low beam is inoperative, GO to PINPOINT TEST B : ONE OR BOTH LOW BEAMS IS INOPERATIVE - CHINA ONLY China only, if the low beam is always on, GO to PINPOINT TEST E : ONE OR BOTH LOW BEAMS ARE ON CONTINUOUSLY - CHINA ONLY
B1D02:11	Left High Beam Circuit: Circuit Short to Ground	GO to PINPOINT TEST C : ONE OR BOTH HIGH BEAMS IS INOPERATIVE
B1D02:15	Left High Beam Circuit: Circuit Short to Battery or Open	If the high beam is inoperative, GO to PINPOINT TEST C : ONE OR BOTH HIGH BEAMS IS INOPERATIVE If the high beam is always on, GO to PINPOINT TEST F : ONE OR BOTH HIGH BEAMS ARE ON CONTINUOUSLY
B1D03:11	Right High Beam Circuit: Circuit Short to Ground	GO to PINPOINT TEST C : ONE OR BOTH HIGH BEAMS IS INOPERATIVE
B1D03:15	Right High Beam Circuit: Short to Battery or Open	If the high beam is inoperative, GO to PINPOINT TEST C : ONE OR BOTH HIGH BEAMS IS INOPERATIVE If the high beam is always on, GO to PINPOINT TEST F : ONE OR BOTH HIGH BEAMS ARE ON CONTINUOUSLY
U1000:00	Solid State Driver Protection Active -Driver Disabled: No Sub Type Information	The module has temporarily disabled an output because an excessive current draw exists (such as a short to ground). The BCM cannot enable the output until the cause of the short is corrected. ADDRESS all other Diagnostic Trouble Codes

		(DTCs) first. After the cause of the concern is corrected, CLEAR the Diagnostic Trouble Codes (DTCs). REPEAT the self-test.
U3000:49	Control Module: Internal Electronic Failure	The module has permanently disabled an output because an excessive current draw fault (such as a short to ground) has exceeded the limits that the BCM can withstand. The cause of the excessive current draw MUST be corrected before a new BCM is installed. ADDRESS all other Diagnostic Trouble Codes (DTCs) first. After the cause of the concern is corrected,
All other BCM Diagnostic Trouble Codes (DTCs)	-	REFER to: Body Control Module (BCM) .

DIAGNOSIS AND TESTING > HEADLAMPS > DTC CHARTS > DTC CHART: SCCM

SCCM DTC Chart

DTC	Description	Action
B1007:09	High-Beam Headlamp Switch: Component Failure	INSTALL a new LH steering column multifunction switch. REFER to: Steering Column Multifunction Switch LH . TEST the system for normal operation. If the concern still exists, INSTALL a new SCCM. REFER to: Steering Column Control Module (SCCM) .
B1D36:09	Turn Indicator Switch: Component Failure	INSTALL a new LH steering column multifunction switch. REFER to: Steering Column Multifunction Switch LH . TEST the system for normal operation. If the concern still exists, INSTALL a new SCCM. REFER to: Steering Column Control Module (SCCM) .
All other SCCM Diagnostic Trouble Codes (DTCs)	-	REFER to: Steering Wheel and Column Electrical Components .

DIAGNOSIS AND TESTING > HEADLAMPS > SYMPTOM CHART(S)

Symptom Chart: Headlamps

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

Symptom Chart

Condition	Possible Sources	Actions
A module does not respond to the diagnostic scan tool	Fuse Wiring, terminals or connectors Module	REFER to: MODULE COMMUNICATIONS NETWORK .
One or both low beams is inoperative - Except China	Refer to the Pinpoint Test	GO to PINPOINT TEST A : ONE OR BOTH LOW BEAMS IS INOPERATIVE - EXCEPT CHINA
One or both low beams is inoperative - China Only	Refer to the Pinpoint Test	GO to PINPOINT TEST B : ONE OR BOTH LOW BEAMS IS INOPERATIVE - CHINA ONLY
One or both high beams is inoperative	Refer to the Pinpoint Test	GO to PINPOINT TEST C : ONE OR BOTH HIGH BEAMS IS INOPERATIVE
One or both low beams are on continuously - Except China	Refer to the Pinpoint Test	GO to PINPOINT TEST D : ONE OR BOTH LOW BEAMS ARE ON CONTINUOUSLY - EXCEPT CHINA
One or both low beams are on continuously - China Only	Refer to the Pinpoint Test	GO to PINPOINT TEST E : ONE OR BOTH LOW BEAMS ARE ON CONTINUOUSLY - CHINA ONLY
One or both high beams are on continuously	Refer to the Pinpoint Test	GO to PINPOINT TEST F : ONE OR BOTH HIGH BEAMS ARE ON CONTINUOUSLY
The flash-to-pass feature is inoperative	Refer to the Pinpoint Test	GO to PINPOINT TEST G : THE FLASH-TO-PASS FEATURE IS INOPERATIVE
The manual headlamp leveling is inoperative/does not operate correctly - China Only	Refer to the Pinpoint Test	GO to PINPOINT TEST H : THE MANUAL HEADLAMP LEVELING IS INOPERATIVE/DOES NOT OPERATE CORRECTLY - CHINA ONLY

DIAGNOSIS AND TESTING > HEADLAMPS > PINPOINT TESTS > PINPOINT TEST A : ONE OR BOTH LOW BEAMS IS INOPERATIVE - EXCEPT CHINA

Refer to Headlamps/Autolamps for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Exterior Lighting - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1D00:11	Left Low Beam: Circuit Short To Ground	A continuous memory and on-demand DTC that sets when the BCM detects a short to ground from the LH low beam output circuit.
B1D00:15	Left Low Beam: Circuit Short To Battery Or Open	A continuous memory and on-demand DTC that sets when the BCM detects an open from the LH low beam output circuit.
B1D01:11	Right Low Beam: Circuit Short To Ground	A continuous memory and on-demand DTC that sets when the BCM detects a short to ground from the RH low beam output circuit.
B1D01:15	Right Low Beam: Circuit Short To Battery Or Open	A continuous memory and on-demand DTC that sets when the BCM detects an open from the RH low beam output circuit.
U1000:00	Solid State Driver Protection Active -Driver Disabled: No Sub Type Information	This DTC sets when the BCM has temporarily shut down the output driver. The module has temporarily disabled an output because an excessive current draw exists (such as a short to ground). The BCM cannot enable the output until the cause of the short is corrected, the Diagnostic Trouble Codes (DTCs) have been cleared and a successful self-test is run.
U3000:49	Control Module: Internal Electronic Failure	This DTC sets when the BCM has permanently shut down the output driver. The module has permanently disabled an output because an excessive current draw fault (such as a short to ground) has exceeded the limits that the BCM can withstand. CORRECT the cause of the excessive current draw before installing a new BCM.

Possible Sources

- Fuse(s)
- Wiring, terminals or connectors
- Bulb
- Ballast
- Headlamp assembly
- BCM

Visual Inspection and Diagnostic Pre-checks

- Inspect the headlamp assembly for damage.
- Verify BJB fuses 33 (20A) and 35 (20A) are OK

DIAGNOSIS AND TESTING > HEADLAMPS > PINPOINT TESTS > PINPOINT TEST A : ONE OR BOTH LOW BEAMS IS INOPERATIVE - EXCEPT CHINA > PINPOINT TEST A : ONE OR BOTH LOW BEAMS IS INOPERATIVE - EXCEPT CHINA

A1 DETERMINE IF ONE OR BOTH LOW BEAMS ARE INOPERATIVE

Ignition ON.

Place the headlamp switch in the HEADLAMPS ON position.

Are both low beams inoperative?

Yes	GO to A9

No	VERIFY the BJB fuse 33 (20A) (LH headlamp) or 35 (20A) (RH headlamp) is OK. If OK, GO to A2 If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short. After the repair: If no Diagnostic Trouble Codes (DTCs) are present, TEST the system for normal operation. If DTC U1000:00 is present, CLEAR the Diagnostic Trouble Codes (DTCs) and REPEAT the self-test (required to enable the lamp output driver if DTC U1000:00 is present). If DTC U3000:49 is present,

A2 CHECK FOR VOLTAGE TO THE HEADLAMP BALLAST

Ignition OFF.

Place the headlamp switch in the OFF position.

Disconnect: LH Headlamp C1021 or RH Headlamp C1041 .

Ignition ON.

Place the headlamp switch in the HEADLAMPS position.

Measure:

LH Headlamp

Positive Lead	Measurement / Action	Negative Lead
C1021-10		Ground

RH Headlamp

Positive Lead	Measurement / Action	Negative Lead
C1041-10		Ground

Is the voltage greater than 11 volts?

Yes	GO to A3

No	REPAIR the circuit.

A3 CHECK FOR VOLTAGE FROM THE HEADLAMP LOW BEAM POWER SUPPLY CIRCUIT

Measure:

LH Headlamp

Positive Lead	Measurement / Action	Negative Lead
C1021-1		Ground

RH Headlamp

Positive Lead	Measurement / Action	Negative Lead
C1041-1		Ground

Is the voltage greater than 11 volts?

Yes	GO to A7

No	GO to A4

A4 REPEAT THE ON-DEMAND SELF-TEST AND CHECK FOR VOLTAGE FROM THE HEADLAMP LOW BEAM POWER SUPPLY CIRCUIT

Using a diagnostic scan tool, perform the BCM self-test.

Clear the Diagnostic Trouble Codes (DTCs) and repeat the self-test (required to enable the lamp output driver if DTC U1000:00 is present).

Measure:

LH Headlamp

Positive Lead	Measurement / Action	Negative Lead
C1021-1		Ground

RH Headlamp

Positive Lead	Measurement / Action	Negative Lead
C1041-1		Ground

Is the voltage greater than 11 volts?

Yes	CHECK the internal headlamp harness for open or shorted circuits and damaged or pushed-out pins. If the harness is OK, INSTALL a new ballast. REFER to: Headlamp Assembly . If the harness is not OK, REPAIR the harness. If the harness cannot be repaired, INSTALL a new headlamp assembly. REFER to: Headlamp Assembly .

No	GO to A5

A5 CHECK THE LOW BEAM POWER SUPPLY CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Place the headlamp switch in the OFF position.

Disconnect: BCM C2280G .

Measure:

LH Headlamp

Positive Lead	Measurement / Action	Negative Lead
C1021-1	Ω	Ground

RH Headlamp

Positive Lead	Measurement / Action	Negative Lead
C1041-1	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to A6

No	REPAIR the circuit. After the repair: If no Diagnostic Trouble Codes (DTCs) are present,

	TEST the system for normal operation. If DTC U1000:00 is present, CLEAR the Diagnostic Trouble Codes (DTCs) and REPEAT the self-test (required to enable the lamp output driver if DTC U1000:00 is present). If DTC U3000:49 is present,

A6 CHECK THE LOW BEAM POWER SUPPLY CIRCUIT FOR AN OPEN

Measure:

LH Headlamp

Positive Lead	Measurement / Action	Negative Lead
C1021-1	Ω	C2280G-4

RH Headlamp

Positive Lead	Measurement / Action	Negative Lead
C1041-1	Ω	C2280G-2

Is the resistance less than 3 ohms?

Yes	GO to A9

No	REPAIR the circuit in question.

A7 CHECK THE HEADLAMP GROUND CIRCUITS FOR AN OPEN

Measure:

LH Headlamp

Positive Lead	Measurement / Action	Negative Lead
C1021-1	V	C1021-8
C1021-1	V	C1021-14

RH Headlamp

Positive Lead	Measurement / Action	Negative Lead
C1041-1	V	C1041-8
C1041-1	V	C1041-14

Is the voltage greater than 11 volts?

Yes	GO to A8

No	REPAIR the circuit in question.

A8 CHECK THE BULB

Substitute the known good High Intensity Discharge (HID) bulb from the same vehicle.

Ignition ON.

Place the headlamp switch in the HEADLAMPS position.

Does the inoperative headlamp illuminate?

Yes	REMOVE the known good bulb. INSTALL a new bulb. REFER to: Headlamp Bulb .

No	REMOVE the known good bulb. CHECK the internal headlamp harness for open or shorted circuits and damaged or pushed-out pins. If the harness is OK, INSTALL a new ballast. REFER to: Headlamp Assembly . If the harness is not OK, REPAIR the harness. If the harness cannot be repaired, INSTALL a new headlamp assembly. REFER to: Headlamp Assembly .

A9 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > HEADLAMPS > PINPOINT TESTS > PINPOINT TEST B : ONE OR BOTH LOW BEAMS IS INOPERATIVE - CHINA ONLY

One Or Both Low Beams is Inoperative - China Only

Refer to Headlamps/Autolamps for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Exterior Lighting - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1D00:11	Left Low Beam: Circuit Short To Ground	A continuous memory and on-demand DTC that sets when the BCM detects a short to ground from the LH low beam output circuit.
B1D00:15	Left Low Beam: Circuit Short To Battery Or Open	A continuous memory and on-demand DTC that sets when the BCM detects an open from the LH low beam output circuit.
B1D01:11	Right Low Beam: Circuit Short To Ground	A continuous memory and on-demand DTC that sets when the BCM detects a short to ground from the RH low beam output circuit.
B1D01:15	Right Low Beam: Circuit Short To Battery Or Open	A continuous memory and on-demand DTC that sets when the BCM detects an open from the RH low beam output circuit.
U1000:00	Solid State Driver Protection Active -Driver Disabled: No Sub Type Information	This DTC sets when the BCM has temporarily shut down the output driver. The module has temporarily disabled an output because an excessive current draw exists (such as a short to ground). The BCM cannot enable the output until the cause of the short is corrected, the Diagnostic Trouble Codes (DTCs) have been cleared and a successful self-test is run.
U3000:49	Control Module: Internal Electronic Failure	This DTC sets when the BCM has permanently shut down the output driver. The module has permanently disabled an output because an excessive current draw fault (such as a short to ground) has exceeded the limits that the BCM can withstand.

		CORRECT the cause of the excessive current draw before installing a new BCM.

Possible Sources

- Fuse(s)
- Wiring, terminals or connectors
- Bulb
- Ballast
- Headlamp assembly
- BCM

Visual Inspection and Diagnostic Pre-checks

- Inspect the headlamp assembly for damage.
- Verify BJB fuses 33 (20A) and 35 (20A) are OK

DIAGNOSIS AND TESTING > HEADLAMPS > PINPOINT TESTS > PINPOINT TEST B : ONE OR BOTH LOW BEAMS IS INOPERATIVE - CHINA ONLY > PINPOINT TEST B : ONE OR BOTH LOW BEAMS IS INOPERATIVE - CHINA ONLY

B1 DETERMINE IF ONE OR BOTH LOW BEAMS ARE INOPERATIVE

Ignition ON.

Place the headlamp switch in the HEADLAMPS ON position.

Are both low beams inoperative?

Yes	GO to B2

No	VERIFY the BJB fuse 33 (20A) (LH headlamp) or 35 (20A) (RH headlamp) is OK. If OK, GO to B3 If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short. After the repair: If no Diagnostic Trouble Codes (DTCs) are present, TEST the system for normal operation. If DTC U1000:00 is present, CLEAR the Diagnostic Trouble Codes (DTCs) and REPEAT the self-test (required to enable the lamp output driver if DTC U1000:00 is present). If DTC U3000:49 is present,

B2 CHECK THE HEADLAMP RELAYS GROUND CIRCUIT

Ignition OFF.

Place the headlamp switch in the OFF position.

Disconnect: LH Headlamp Relay.

Measure:

Positive Lead	Measurement / Action	Negative Lead
LH Headlamp Relay Socket Pin 3		LH Headlamp Relay Socket Pin 2

Is the voltage greater than 11 volts?

Yes	GO to B12

No	REPAIR the circuit.

B3 CHECK FOR VOLTAGE TO THE HEADLAMP RELAY

Ignition OFF.

Place the headlamp switch in the OFF position.

Disconnect: LH Headlamp Relay or RH Headlamp Relay.

Ignition ON.

Place the headlamp switch in the HEADLAMPS position.

Measure:

LH Headlamp

Positive Lead	Measurement / Action	Negative Lead
LH Headlamp Relay Socket Pin 1		Ground
LH Headlamp Relay Socket Pin 3		Ground

RH Headlamp

Positive Lead	Measurement / Action	Negative Lead
RH Headlamp Relay Socket Pin 1		Ground
RH Headlamp Relay Socket Pin 3		Ground

Is the voltage greater than 11 volts?

Yes	GO to B5

No	For LH or RH headlamp relay socket pin 1, GO to B4 For LH or RH headlamp relay socket pin 3, REPAIR the circuit.

B4 REPEAT THE ON-DEMAND SELF-TEST AND CHECK FOR VOLTAGE TO THE HEADLAMP RELAY

Using a diagnostic scan tool, perform the BCM self-test.

Clear the Diagnostic Trouble Codes (DTCs) and repeat the self-test (required to enable the lamp output driver if DTC U1000:00 is present).

Measure:

LH Headlamp

Positive Lead	Measurement / Action	Negative Lead
LH Headlamp Relay Socket Pin 1		Ground

RH Headlamp

Positive Lead	Measurement / Action	Negative Lead
RH Headlamp Relay Socket Pin 1		Ground

Is the voltage greater than 11 volts?

Yes	INSTALL a new headlamp relay.

No	GO to B10

B5 CHECK THE HEADLAMP RELAY GROUND CIRCUITS FOR AN OPEN

Measure:

LH Headlamp

Positive Lead	Measurement / Action	Negative Lead
LH Headlamp Relay Socket Pin 3		LH Headlamp Relay Socket Pin 2

RH Headlamp

Positive Lead	Measurement / Action	Negative Lead

RH Headlamp Relay Socket Pin 3		RH Headlamp Relay Socket Pin 2

Is the voltage greater than 11 volts?

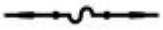
Yes	GO to B6

No	REPAIR the circuit in question.

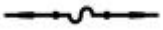
B6 CHECK THE HEADLAMP RELAY

Connect a fused jumper wire:

LH Headlamp

Positive Lead	Measurement / Action	Negative Lead
LH Headlamp Relay Socket Pin 3		LH Headlamp Relay Socket Pin 5

RH Headlamp

Positive Lead	Measurement / Action	Negative Lead
RH Headlamp Relay Socket Pin 3		RH Headlamp Relay Socket Pin 5

Is the inoperative headlamp now illuminated?

Yes	REMOVE the fuse jumper wire. INSTALL a new headlamp relay.

No	REMOVE the fuse jumper wire. GO to B7

B7 CHECK THE LOW BEAM POWER SUPPLY CIRCUITS FOR AN OPEN

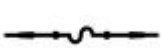
Ignition OFF.

Place the headlamp switch in the OFF position.

Disconnect: LH Headlamp C1021 or RH Headlamp C1041 .

Connect a fused jumper wire:

LH Headlamp

Positive Lead	Measurement / Action	Negative Lead
LH Headlamp Relay Socket Pin 3		LH Headlamp Relay Socket Pin 5

RH Headlamp

Positive Lead	Measurement / Action	Negative Lead
RH Headlamp Relay Socket Pin 3		RH Headlamp Relay Socket Pin 5

Measure:

LH Headlamp

Positive Lead	Measurement / Action	Negative Lead
C1021-10		Ground

RH Headlamp

Positive Lead	Measurement / Action	Negative Lead
C1041-10		Ground

Is the voltage greater than 11 volts?

Yes	GO to B8

No	REPAIR the circuit.

B8 CHECK THE HEADLAMP GROUND CIRCUITS FOR AN OPEN

Measure:

LH Headlamp

Positive Lead	Measurement / Action	Negative Lead
C1021-10		C1021-8
C1021-10		C1021-14

RH Headlamp

Positive Lead	Measurement / Action	Negative Lead
C1041-10		C1041-8
C1041-10		C1041-14

Is the voltage greater than 11 volts?

Yes	GO to B9

No	REPAIR the circuit in question.

B9 CHECK THE BULB

Substitute the known good High Intensity Discharge (HID) bulb from the same vehicle.

Ignition ON.

Place the headlamp switch in the HEADLAMPS position.

Does the inoperative headlamp illuminate?

Yes	REMOVE the known good bulb. INSTALL a new bulb. REFER to: Headlamp Bulb .

No	REMOVE the known good bulb. CHECK the internal headlamp harness for open or shorted circuits and damaged or pushed-out pins. If the harness is OK, INSTALL a new ballast. REFER to: Headlamp Assembly . If the harness is not OK, REPAIR the harness. If the harness cannot be repaired, INSTALL a new headlamp assembly. REFER to: Headlamp Assembly .

B10 CHECK THE LOW BEAM POWER BCM (BODY CONTROL MODULE) SUPPLY CIRCUITS FOR AN OPEN

Ignition OFF.

Place the headlamp switch in the OFF position.

Disconnect: BCM C2280G .

Measure:

LH Headlamp

Positive Lead	Measurement / Action	Negative Lead
LH Headlamp Relay Socket Pin 1	Ω	C2280G-4

RH Headlamp

Positive Lead	Measurement / Action	Negative Lead
RH Headlamp Relay Socket Pin 1	Ω	C2280G-2

Is the resistance less than 3 ohms?

Yes	GO to B11

No	REPAIR the circuit in question.

B11 CHECK THE LOW BEAM POWER BCM (BODY CONTROL MODULE) SUPPLY CIRCUITS FOR A SHORT TO GROUND

Measure:

LH Headlamp

Positive Lead	Measurement / Action	Negative Lead
LH Headlamp Relay Socket Pin 1	Ω	Ground

RH Headlamp

Positive Lead	Measurement / Action	Negative Lead
RH Headlamp Relay Socket Pin 1	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to B12

No	REPAIR the circuit. After the repair: If no Diagnostic Trouble Codes (DTCs) are present, TEST the system for normal operation. If DTC U1000:00 is present, CLEAR the Diagnostic Trouble Codes (DTCs) and REPEAT the self-test (required to enable the lamp output driver if DTC U1000:00 is present). If DTC U3000:49 is present,

B12 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by

	module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > HEADLAMPS > PINPOINT TESTS > PINPOINT TEST C : ONE OR BOTH HIGH BEAMS IS INOPERATIVE

One Or Both High Beams Is Inoperative

Refer to Headlamps/Autolamps for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Exterior Lighting - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1D02:11	Left High Beam Circuit: Circuit Short To Ground	A continuous memory and on-demand DTC that sets when the BCM detects a short to ground from the LH high beam output circuit.
B1D02:15	Left High Beam Circuit: Circuit Short To Battery Or Open	A continuous memory and on-demand DTC that sets when the BCM detects an open from the LH high beam output circuit.
B1D03:11	Right High Beam Circuit: Circuit Short To Ground	A continuous memory and on-demand DTC that sets when the BCM detects a short to ground from the RH high beam output circuit.
B1D03:15	Right High Beam Circuit: Circuit Short To Battery Or Open	A continuous memory and on-demand DTC that sets when the BCM detects an open from the RH high beam output circuit.
U1000:00	Solid State Driver Protection Active -Driver Disabled: No Sub Type Information	This DTC sets when the BCM has temporarily shut down the output driver. The module has temporarily disabled an output because an excessive current draw exists (such as a short to ground). The BCM cannot enable the output until the cause of the short is corrected, the Diagnostic Trouble Codes (DTCs) have been cleared and a successful self-test is run.

U3000:49	Control Module: Internal Electronic Failure	This DTC sets when the BCM has permanently shut down the output driver. The module has permanently disabled an output because an excessive current draw fault (such as a short to ground) has exceeded the limits that the BCM can withstand. CORRECT the cause of the excessive current draw before installing a new BCM.

Possible Sources

- Wiring, terminals or connectors
- LH steering column multifunction switch
- Headlamp assembly
- SCCM
- BCM

Visual Inspection and Diagnostic Pre-checks

- Inspect the headlamp assembly for damage.

DIAGNOSIS AND TESTING > HEADLAMPS > PINPOINT TESTS > PINPOINT TEST C : ONE OR BOTH HIGH BEAMS IS INOPERATIVE > PINPOINT TEST C : ONE OR BOTH HIGH BEAMS IS INOPERATIVE

C1 CHECK THE LOW BEAM OPERATION

Ignition ON.

Place the headlamp switch in the HEADLAMPS ON position.

Place the LH steering column multifunction switch in the high beam position and observe the headlamps.

Place the LH steering column multifunction switch in the low beam position and observe the headlamps.

Do the low beams illuminate?

Yes	If an individual high beam is inoperative, GO to C3 If both high beams are inoperative, GO to C2

No	Except China, GO to Pinpoint Test A China only, GO to Pinpoint Test B

C2 CHECK THE LH (LEFT-HAND) MULTIFUNCTION SWITCH INPUT

Using a diagnostic scan tool, view SCCM Parameter Identifications (PIDs).

Monitor the SCCM High Beam Switch (HIGH_BEAM_SW) PID while placing the LH steering column multifunction switch in the HIGH BEAM and LOW BEAM positions.

Do the PID values agree with the LH steering column multifunction switch position?

Yes	GO to C8

No	INSTALL a new LH steering column multifunction switch. REFER to: Steering Column Multifunction Switch LH . TEST the system for normal operation. If the concern still exists, GO to C7

C3 CHECK FOR VOLTAGE FROM THE HEADLAMP HIGH BEAM CIRCUIT

Ignition OFF.

Place the headlamp switch in the OFF position.

Disconnect: Inoperative LH Headlamp C1021 or RH Headlamp C1041 .

Ignition ON.

Place the headlamp switch in the HEADLAMPS position and the LH steering column multifunction switch in the HIGH BEAM position.

Measure:

LH Headlamp

Positive Lead	Measurement / Action	Negative Lead
C1021-12		Ground

RH Headlamp

Positive Lead	Measurement / Action	Negative Lead
C1041-12		Ground

Is the voltage greater than 11 volts?

Yes	CHECK the internal headlamp harness for open or shorted circuits and damaged or pushed-out pins. If the harness is not OK, REPAIR the harness. If the harness cannot be repaired, INSTALL a new headlamp assembly. REFER to: Headlamp Assembly .

No	GO to C4

C4 REPEAT THE ON-DEMAND SELF-TEST AND CHECK FOR VOLTAGE TO THE FRONT TURN LAMP

Using a diagnostic scan tool, perform the BCM self-test.

Clear the Diagnostic Trouble Codes (DTCs) and repeat the self-test (required to enable the output driver if DTC U1000:00 is present).

Measure:

LH Headlamp

Positive Lead	Measurement / Action	Negative Lead
C1021-12		Ground

RH Headlamp

Positive Lead	Measurement / Action	Negative Lead
C1041-12		Ground

Is the voltage greater than 11 volts?

Yes	CHECK the internal headlamp harness for open or shorted circuits and damaged or pushed-out pins. If the harness is not OK, REPAIR the harness. If the harness cannot be repaired, INSTALL a new headlamp assembly. REFER to: Headlamp Assembly .

No	GO to C5

C5 CHECK THE HIGH BEAM CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Place the headlamp switch in the OFF position.

Disconnect: BCM C2280G .

Measure:

LH Headlamp

Positive Lead	Measurement / Action	Negative Lead
C1021-12	Ω	Ground

RH Headlamp

Positive Lead	Measurement / Action	Negative Lead

C1041-12	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to C6

No	REPAIR the circuit. After the repair: If no Diagnostic Trouble Codes (DTCs) are present, TEST the system for normal operation. If DTC U1000:00 is present, CLEAR the Diagnostic Trouble Codes (DTCs) and REPEAT the self-test (required to enable the lamp output driver if DTC U1000:00 is present). If DTC U3000:49 is present,

C6 CHECK THE HIGH BEAM SUPPLY CIRCUIT FOR AN OPEN

Measure:

LH Headlamp (Except China)

Positive Lead	Measurement / Action	Negative Lead
C1021-12	Ω	C2280G-11

RH Headlamp

Positive Lead	Measurement / Action	Negative Lead
C1041-12	Ω	C2280G-6

Is the resistance less than 3 ohms?

Yes	GO to C8

No	REPAIR the circuit.

C7 CHECK FOR CORRECT SCCM (STEERING COLUMN CONTROL MODULE) OPERATION

Disconnect and inspect all SCCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the SCCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new SCCM. REFER to: Steering Column Control Module (SCCM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

C8 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > HEADLAMPS > PINPOINT TESTS > PINPOINT TEST D : ONE OR BOTH LOW BEAMS ARE ON CONTINUOUSLY - EXCEPT CHINA

One Or Both Low Beams Are On Continuously - Except China

Refer to Headlamps/Autolamps for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Exterior Lighting - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B143B:11	Autolamp On Input: Circuit Short to Ground	An on-demand DTC that sets when the BCM detects a short to

		ground on the autolamp on input circuit.
B143C:11	Headlamp Off Input: Circuit Short to Ground	An on-demand DTC that sets when the BCM detects a short to ground on the headlamp off input circuit.
B143D:11	Headlamp On Input: Circuit Short to Ground	An on-demand DTC that sets when the BCM detects a short to ground on the headlamp on input circuit.
B143E:11	Headlamp Switch Input: Circuit Short to Ground	A continuous memory DTC that sets when the BCM detects a short to ground on the headlamp switch input circuits.
B1447:11	Parklamp On Switch Input: Circuit Short to Ground	An on-demand DTC that sets when the BCM detects a short to ground on the parklamps on input circuit.
B1D00:15	Left Low Beam: Circuit Short to Battery or Open	A continuous memory and on-demand DTC that sets when the BCM detects a short to voltage from the LH low beam output circuit.
B1D01:15	Right Low Beam: Circuit Short to Battery or Open	A continuous memory and on-demand DTC that sets when the BCM detects a short to voltage from the RH low beam output circuit.

Possible Sources

- Wiring, terminals or connectors
- Headlamp switch
- BCM

Visual Inspection and Diagnostic Pre-checks

- Inspect the headlamp switch for damage.

DIAGNOSIS AND TESTING > HEADLAMPS > PINPOINT TESTS > PINPOINT TEST D : ONE OR BOTH LOW BEAMS ARE ON CONTINUOUSLY - EXCEPT CHINA > PINPOINT TEST D : ONE OR BOTH LOW BEAMS ARE ON CONTINUOUSLY - EXCEPT CHINA

D1 CHECK LOW BEAMS OPERATION

Ignition ON.

Place the headlamp switch in the OFF position.

Observe the operation of the LH and RH low beam.

Are both low beams illuminated?

Yes	GO to D2

No	GO to D7

D2 CHECK THE HEADLAMP SWITCH

Ignition OFF.

Disconnect: Headlamp Switch C205 .

Carry out the headlamp switch component test. Refer to Component Testing for schematic and connector information.

Does the headlamp switch pass the component test?

Yes	GO to D3

No	INSTALL a new headlamp switch. REFER to: Headlamp Switch .

D3 CHECK THE HEADLAMP SWITCH GROUND CIRCUIT FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C205-4	Ω	Ground

Is the resistance less than 3 ohms?

Yes	GO to D4

No	REPAIR the circuit.

D4 CHECK THE HEADLAMP SWITCH CIRCUITS FOR A SHORT TO GROUND

Disconnect: BCM C2280B .

Measure:

Positive Lead	Measurement / Action	Negative Lead

C205-10	Ω	Ground
C205-11	Ω	Ground
C205-12	Ω	Ground
C205-13	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to D5

No	REPAIR the circuit in question.

D5 CHECK THE HEADLAMP SWITCH CIRCUITS FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C205-10	Ω	C2280B-16
C205-11	Ω	C2280B-2
C205-12	Ω	C2280B-15
C205-13	Ω	C2280B-21

Are the resistances less than 3 ohms?

Yes	GO to D6

No	REPAIR the circuit in question.

D6 CHECK THE HEADLAMP SWITCH CIRCUITS FOR A SHORT TO VOLTAGE

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C205-10	V	Ground
C205-11	V	Ground
C205-12	V	Ground
C205-13	V	Ground

Is any voltage present?

Yes	REPAIR the circuit in question.

No	GO to D8

D7 CHECK THE LOW BEAM CIRCUIT FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: BCM C2280G .

Disconnect: LH Headlamp C1021 or RH Headlamp C1041 .

Ignition ON.

Measure:

LH Headlamp

Positive Lead	Measurement / Action	Negative Lead
C1021-1		Ground

RH Headlamp

Positive Lead	Measurement / Action	Negative Lead
C1041-1		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to D8

D8 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > HEADLAMPS > PINPOINT TESTS > PINPOINT TEST E : ONE OR BOTH LOW BEAMS ARE ON CONTINUOUSLY - CHINA ONLY

Refer to Headlamps/Autolamps for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Exterior Lighting - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B143B:11	Autolamp On Input: Circuit Short to Ground	An on-demand DTC that sets when the BCM detects a short to ground on the autolamp on input circuit.
B143C:11	Headlamp Off Input: Circuit Short to Ground	An on-demand DTC that sets when the BCM detects a short to ground on the headlamp off input circuit.
B143D:11	Headlamp On Input: Circuit Short to Ground	An on-demand DTC that sets when the BCM detects a short to ground on the headlamp on input circuit.
B143E:11	Headlamp Switch Input: Circuit Short to Ground	A continuous memory DTC that sets when the BCM detects a short to ground on the headlamp switch input circuits.
B1447:11	Parklamp On Switch Input: Circuit Short to Ground	An on-demand DTC that sets when the BCM detects a short to ground on the parklamps on input circuit.
B1D00:15	Left Low Beam: Circuit Short to Battery or Open	A continuous memory and on-demand DTC that sets when the BCM detects a short to voltage from the LH low beam output circuit.

B1D01:15	Right Low Beam: Circuit Short to Battery or Open	A continuous memory and on-demand DTC that sets when the BCM detects a short to voltage from the RH low beam output circuit.

Possible Sources

- Wiring, terminals or connectors
- Headlamp switch
- BCM

Visual Inspection and Diagnostic Pre-checks

- Inspect the headlamp switch for damage.

DIAGNOSIS AND TESTING > HEADLAMPS > PINPOINT TESTS > PINPOINT TEST E : ONE OR BOTH LOW BEAMS ARE ON CONTINUOUSLY - CHINA ONLY > PINPOINT TEST E : ONE OR BOTH LOW BEAMS ARE ON CONTINUOUSLY - CHINA ONLY

E1 CHECK LOW BEAMS OPERATION

Ignition ON.

Place the headlamp switch in the OFF position.

Observe the operation of the LH and RH low beam.

Are both low beams illuminated?

Yes	GO to E2

No	GO to E7

E2 CHECK THE HEADLAMP SWITCH

Ignition OFF.

Disconnect: Headlamp Switch C205 .

Carry out the headlamp switch component test. Refer to Component Testing for schematic and connector information.

Does the headlamp switch pass the component test?

Yes	GO to E3

No	INSTALL a new headlamp switch. REFER to: Headlamp Switch .

E3 CHECK THE HEADLAMP SWITCH GROUND CIRCUIT FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C205-4	Ω	Ground

Is the resistance less than 3 ohms?

Yes	GO to E4

No	REPAIR the circuit.

E4 CHECK THE HEADLAMP SWITCH CIRCUITS FOR A SHORT TO GROUND

Disconnect: BCM C2280B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C205-10	Ω	Ground
C205-11	Ω	Ground
C205-12	Ω	Ground
C205-13	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to E5

No	REPAIR the circuit in question.

E5 CHECK THE HEADLAMP SWITCH CIRCUITS FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C205-10	Ω	C2280B-16
C205-11	Ω	C2280B-2
C205-12	Ω	C2280B-15

C205-13	Ω	C2280B-21

Are the resistances less than 3 ohms?

Yes	GO to E6

No	REPAIR the circuit in question.

E6 CHECK THE HEADLAMP SWITCH CIRCUITS FOR A SHORT TO VOLTAGE

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C205-10		Ground
C205-11		Ground
C205-12		Ground
C205-13		Ground

Is any voltage present?

Yes	REPAIR the circuit in question.

No	GO to E9

E7 CHECK THE HEADLAMP RELAY

Ignition OFF.

Place the headlamp switch in the OFF position.

Disconnect: LH Headlamp Relay or RH Headlamp Relay.

Ignition ON.

Does the headlamp remain illuminated?

Yes	REPAIR the low beam voltage supply circuit between the headlamp relay and the headlamp assembly for a short to voltage.

No	GO to E8

E8 CHECK THE LOW BEAM BCM (BODY CONTROL MODULE) CIRCUIT FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: BCM C2280G .

Ignition ON.

Measure:

LH Headlamp

Positive Lead	Measurement / Action	Negative Lead
LH Headlamp Relay Socket Pin 1		Ground

RH Headlamp

Positive Lead	Measurement / Action	Negative Lead
RH Headlamp Relay Socket Pin 1		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to E9

E9 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > HEADLAMPS > PINPOINT TESTS > PINPOINT TEST F : ONE OR BOTH HIGH BEAMS ARE ON CONTINUOUSLY

Refer to Headlamps/Autolamps for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Exterior Lighting - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1D02:15	Left High Beam Circuit: Circuit Short To Battery Or Open	A continuous memory and on-demand DTC that sets when the BCM detects a short to voltage from the LH high beam output circuit.
B1D03:15	Right High Beam Circuit: Circuit Short To Battery Or Open	A continuous memory and on-demand DTC that sets when the BCM detects a short to voltage from the RH high beam output circuit.

Possible Sources

- Wiring, terminals or connectors
- Headlamp assembly
- LH steering column multifunction switch
- SCCM
- BCM

Visual Inspection and Diagnostic Pre-checks

- Inspect the LH steering column multifunction switch for damage.

DIAGNOSIS AND TESTING > HEADLAMPS > PINPOINT TESTS > PINPOINT TEST F : ONE OR BOTH HIGH BEAMS ARE ON CONTINUOUSLY > PINPOINT TEST F : ONE OR BOTH HIGH BEAMS ARE ON CONTINUOUSLY

F1 CHECK HIGH BEAMS OPERATION

Ignition ON.

Place the headlamp switch in the HEADLAMPS position.

Place the LH steering column multifunction switch in the LOW BEAM position and observe the headlamps.

Observe the operation of the LH and RH headlamps.

Are both high beams illuminated?

Yes	GO to F2

No	GO to F3

F2 CHECK THE LH (LEFT-HAND) MULTIFUNCTION SWITCH INPUT

Using a diagnostic scan tool, view SCCM Parameter Identifications (PIDs).

Monitor the SCCM High Beam Switch (HIGH_BEAM_SW) PID while placing the LH steering column multifunction switch in the HIGH BEAM and LOW BEAM positions.

Do the PID values agree with the LH steering column multifunction switch position?

Yes	GO to F6

No	INSTALL a new LH steering column multifunction switch. REFER to: Steering Column Multifunction Switch LH . TEST the system for normal operation. If the concern still exists, GO to F5

F3 CHECK HIGH BEAM VOLTAGE SUPPLY CIRCUITS FOR VOLTAGE

Ignition OFF.

Place the headlamp switch in the OFF position.

Disconnect: LH Headlamp C1021 or RH Headlamp C1041 .

Ignition ON.

Measure:

LH Headlamp

Positive Lead	Measurement / Action	Negative Lead
C1021-10		Ground

RH Headlamp

Positive Lead	Measurement / Action	Negative Lead
C1041-10		Ground

Is voltage present?

Yes	GO to F4

No	INSTALL a new headlamp assembly. REFER to: Headlamp Assembly .

F4 CHECK HIGH BEAM VOLTAGE SUPPLY CIRCUITS FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: BCM C2280G .

Ignition ON.

Measure:

LH Headlamp

Positive Lead	Measurement / Action	Negative Lead
C1021-10		Ground

RH Headlamp

Positive Lead	Measurement / Action	Negative Lead
C1041-10		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to F6

F5 CHECK FOR CORRECT SCCM (STEERING COLUMN CONTROL MODULE) OPERATION

Disconnect and inspect all SCCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the SCCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new SCCM. REFER to: Steering Column Control Module (SCCM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

F6 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > HEADLAMPS > PINPOINT TESTS > PINPOINT TEST G : THE FLASH-TO-PASS FEATURE IS INOPERATIVE

Normal Operation and Fault Conditions

REFER to: Exterior Lighting - System Operation and Component Description .

Possible Sources

- LH steering column multifunction switch
- SCCM
- BCM

Visual Inspection and Diagnostic Pre-checks

- Inspect the LH steering column multifunction switch for damage.

DIAGNOSIS AND TESTING > HEADLAMPS > PINPOINT TESTS > PINPOINT TEST G : THE FLASH-TO-PASS FEATURE IS INOPERATIVE > PINPOINT TEST G : THE FLASH-TO-PASS FEATURE IS INOPERATIVE

G1 CHECK THE HIGH BEAM OPERATION

Ignition ON.

Place the headlamp switch in the HEADLAMPS position.

Activate and deactivate the high beams using the high beam function of the LH steering column multifunction switch.

Do the high beams operate correctly?

Yes	GO to G2

No	GO to PINPOINT TEST C : ONE OR BOTH HIGH BEAMS IS INOPERATIVE

G2 CHECK THE LH (LEFT-HAND) MULTIFUNCTION SWITCH INPUT

Using a diagnostic scan tool, view SCCM Parameter Identifications (PIDs).

Monitor the SCCM Flash to Pass Switch (FLASH-to-PASS) PID while placing the LH steering column multifunction switch in the FLASH-TO-PASS position.

Does the PID value agree with the LH steering column multifunction switch position?

Yes	GO to G4

No	INSTALL a new LH steering column multifunction switch. REFER to: Steering Column Multifunction Switch LH . TEST the system for normal operation. If the concern still exists, GO to G3

G3 CHECK FOR CORRECT SCCM (STEERING COLUMN CONTROL MODULE) OPERATION

Disconnect and inspect all SCCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the SCCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new SCCM. REFER to: Steering Column Control Module (SCCM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

G4 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > HEADLAMPS > PINPOINT TESTS > PINPOINT TEST H : THE MANUAL HEADLAMP LEVELING IS INOPERATIVE/DOES NOT OPERATE CORRECTLY - CHINA ONLY

Refer to Headlamps/Autolamps for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Exterior Lighting - System Operation and Component Description .

Possible Sources

- BCM fuse 68 (10A)

- Wiring, terminals or connectors
- Headlamp assembly

DIAGNOSIS AND TESTING > HEADLAMPS > PINPOINT TESTS > PINPOINT TEST H : THE MANUAL HEADLAMP LEVELING IS INOPERATIVE/DOES NOT OPERATE CORRECTLY - CHINA ONLY > PINPOINT TEST H : THE MANUAL HEADLAMP LEVELING IS INOPERATIVE/DOES NOT OPERATE CORRECTLY - CHINA ONLY

H1 CHECK HEADLAMP LEVELING OPERATION

Ignition ON.

Place the headlamp switch in the HEADLAMPS position.

While observing both headlamps,

Press and release the headlamp leveling switch.

Adjust the headlamp leveling setting to 4.

Press the headlamp leveling switch until it locks down.

Does either headlamp change beam change?

Yes	GO to H3

No	GO to H2

H2 CHECK FOR VOLTAGE TO THE HEADLAMP SWITCH

Ignition OFF.

Place the headlamp switch in the OFF position.

Disconnect: Headlamp switch C205 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C205-9		Ground

Is the voltage greater than 11 volts?

Yes	GO to H5

No	VERIFY the BJB fuse 68 (10A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the

	OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes for the short circuit.

H3 CHECK THE INOPERATIVE HEADLAMP LEVELING MOTOR VOLTAGE SUPPLY CIRCUIT FOR AN OPEN

Ignition OFF.

Disconnect: Inoperative LH Headlamp Control Module C1024 or RH Headlamp Control Module C1044 .

Ignition ON.

Measure:

LH Headlamp

Positive Lead	Measurement / Action	Negative Lead
C1024-1		Ground

RH Headlamp

Positive Lead	Measurement / Action	Negative Lead
C1044-1		Ground

Is the voltage greater than 11 volts?

Yes	GO to H4

No	VERIFY the BJB fuse 68 (10A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes for the short circuit.

H4 CHECK THE INOPERATIVE HEADLAMP LEVELING MOTOR GROUND CIRCUIT FOR AN OPEN

Measure:

LH Headlamp

Positive Lead	Measurement / Action	Negative Lead
C1024-1		C1024-3

RH Headlamp

Positive Lead	Measurement / Action	Negative Lead

C1044-1		C1044-3

Is the voltage greater than 11 volts?

Yes	GO to H5

No	REPAIR the circuit.

H5 CHECK THE HEADLAMP LEVELING CIRCUIT TO THE HEADLAMP LEVELING MOTOR FOR AN OPEN

Disconnect: Headlamp switch C205 (if not previously disconnected).

Disconnect: LH Headlamp Control Module C1024 and RH Headlamp Control Module C1044 (both inoperative).

Disconnect: LH Headlamp Control Module C1024 (LH only inoperative).

Disconnect: RH Headlamp Control Module C1044 (RH only inoperative).

Measure:

Both or LH only inoperative

Positive Lead	Measurement / Action	Negative Lead
C1024-2	Ω	C205-1

RH only inoperative

Positive Lead	Measurement / Action	Negative Lead
C1044-2	Ω	C205-1

Is the resistance less than 3 ohms?

Yes	If the only the LH or RH is inoperative, INSTALL a new headlamp assembly. REFER to: Headlamp Assembly . If both are inoperative, GO to H6

No	REPAIR the circuit.

H6 CHECK THE HEADLAMP LEVELING CIRCUIT TO THE HEADLAMP LEVELING MOTOR FOR A SHORT TO VOLTAGE

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead

C205-1		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to H7

H7 CHECK THE HEADLAMP LEVELING CIRCUIT TO THE HEADLAMP LEVELING MOTOR FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C205-1	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	INSTALL a new headlamp switch. REFER to: Headlamp Switch .

No	REPAIR the circuit.

DIAGNOSIS AND TESTING > REVERSING LAMPS > DTC CHART: BCM

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

BCM DTC Chart

DTC	Description	Action
B1277:11	Reverse Lamp: Circuit Short To Ground	GO to PINPOINT TEST A : THE REVERSING LAMP IS INOPERATIVE
B1277:15	Reverse Lamp: Circuit Short To Battery or Open	If the reversing lamps are is inoperative, GO to PINPOINT TEST A : THE REVERSING LAMP IS INOPERATIVE If the reversing lamps are always on, GO to PINPOINT TEST B : THE REVERSING LAMP(S) ARE ON CONTINUOUSLY

U1000:00	Solid State Driver Protection Active -Driver Disabled: No Sub Type Information	The module has temporarily disabled an output because an excessive current draw exists (such as a short to ground). The BCM cannot enable the output until the cause of the short is corrected. ADDRESS all other Diagnostic Trouble Codes (DTCs) first. After the cause of the concern is corrected, CLEAR the Diagnostic Trouble Codes (DTCs). REPEAT the self-test.
U3000:49	Control Module: Internal Electronic Failure	The module has permanently disabled an output because an excessive current draw fault (such as a short to ground) has exceeded the limits that the BCM can withstand. The cause of the excessive current draw MUST be corrected before a new BCM is installed. ADDRESS all other Diagnostic Trouble Codes (DTCs) first. After the cause of the concern is corrected,
For other BCM Diagnostic Trouble Codes (DTCs)	-	REFER to: Body Control Module (BCM) .

DIAGNOSIS AND TESTING > REVERSING LAMPS > SYMPTOM CHART(S)

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

Symptom Chart: Reversing Lamps

Symptom Chart

Condition	Possible Sources	Actions
A module does not respond to the diagnostic scan tool	Fuse Wiring, terminals or connectors Module	REFER to: MODULE COMMUNICATIONS NETWORK .
The reversing lamp is inoperative - Except China	Refer to the Pinpoint Test	GO to PINPOINT TEST A : THE REVERSING LAMP IS INOPERATIVE
Both reversing lamps are inoperative - China Only	Refer to the Pinpoint Test	GO to PINPOINT TEST A : THE REVERSING LAMP IS INOPERATIVE

One reversing lamps are inoperative - China Only	Refer to the Pinpoint Test	VERIFY the reversing lamp bulb is OK. If OK, INSTALL a new reversing lamp assembly. REFER to: Reversing Lamp . If not OK, INSTALL a new reversing lamp bulb.
The reversing lamp(s) are on continuously	Refer to the Pinpoint Test	GO to PINPOINT TEST B : THE REVERSING LAMP(S) ARE ON CONTINUOUSLY

DIAGNOSIS AND TESTING > REVERSING LAMPS > PINPOINT TESTS > PINPOINT TEST A : THE REVERSING LAMP IS INOPERATIVE

Refer to Reversing Lamps for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Exterior Lighting - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1277:11	Reverse Lamp: Circuit Short To Ground	A continuous memory and on-demand DTC that sets when the BCM detects a short to ground from the reversing lamps output circuit.
B1277:15	Reverse Lamp: Circuit Short To Battery or Open	A continuous memory and on-demand DTC that sets when the BCM detects an open or short to voltage from the reversing lamps output circuit.
U1000:00	Solid State Driver Protection Active -Driver Disabled: No Sub Type Information	This DTC sets when the BCM has temporarily shut down the output driver. The module has temporarily disabled an output because an excessive current draw exists (such as a short to ground). The BCM cannot enable the output until the cause of the short is corrected, the Diagnostic Trouble Codes (DTCs) have been cleared and a successful self-test is run.
U3000:49	Control Module: Internal Electronic Failure	This DTC sets when the BCM has permanently shut down the output driver. The module has permanently disabled an output because an excessive current

		draw fault (such as a short to ground) has exceeded the limits that the BCM can withstand. CORRECT the cause of the excessive current draw before installing a new BCM.

Possible Sources

- Bulb
- Wiring, terminals or connectors
- Reversing lamp assembly (China only, integrated into the rear fog lamp assembly)
- Gear range concern
- Reversing lamps switch
- BCM
- PCM

Visual Inspection and Diagnostic Pre-checks

- Inspect the bulb and make sure it is OK.

DIAGNOSIS AND TESTING > REVERSING LAMPS > PINPOINT TESTS > PINPOINT TEST A : THE REVERSING LAMP IS INOPERATIVE > PINPOINT TEST A : THE REVERSING LAMP IS INOPERATIVE

A1 CHECK THE PCM (POWERTRAIN CONTROL MODULE) COMMANDED GEAR OR REVERSE SWITCH PID (PARAMETER IDENTIFICATION)

Apply the parking brake.

Ignition ON.

Using a diagnostic scan tool, view PCM Parameter Identifications (PIDs).

For manual transmission vehicles, monitor the Reverse Switch (REV_SW) PCM PID.

For automatic transmission vehicles, monitor the Gear Commanded (GEAR) PCM PID.

Place the gear selector in REVERSE (R).

Does the PID indicate the gear range is in reverse?

Yes	GO to A2

No	For automatic transmission vehicles, DIAGNOSE the transmission range concern. REFER

	to: External Controls . For manual transmission vehicles, GO to A7

A2 CHECK FOR VOLTAGE TO THE REVERSING LAMP

Ignition OFF.

Apply the parking brake.

Disconnect: Except China, Reversing Lamp C496 .

Disconnect: China Only, Rear Fog Lamp C436 .

Ignition ON.

Place the gear selector in REVERSE (R).

Except China, measure:

Positive Lead	Measurement / Action	Negative Lead
C496-3		Ground

China only, measure:

Positive Lead	Measurement / Action	Negative Lead
C436-2		Ground

Is the voltage greater than 11 volts?

Yes	GO to A4

No	GO to A3

A3 REPEAT THE ON-DEMAND SELF-TEST AND CHECK FOR VOLTAGE TO THE REVERSING LAMP

Using a diagnostic scan tool, perform the BCM self-test.

Clear the Diagnostic Trouble Codes (DTCs) and repeat the self-test (required to enable the lamp output driver if DTC U1000:00 is present).

Except China, measure:

Positive Lead	Measurement / Action	Negative Lead
C496-3		Ground

China only, measure:

Positive Lead	Measurement / Action	Negative Lead
C436-2		Ground

Is the voltage greater than 11 volts?

Yes	For vehicles except China, INSTALL a new reversing lamp bulb. For China vehicles only, INSTALL a new reversing lamp assembly (integrated into the rear fog lamp assembly). REFER to: Reversing Lamp .

No	GO to A5

A4 CHECK THE REVERSING LAMP GROUND CIRCUIT FOR AN OPEN

Except China, measure:

Positive Lead	Measurement / Action	Negative Lead
C496-3		C496-1

China only, measure:

Positive Lead	Measurement / Action	Negative Lead
C436-2		C436-4

Is the voltage greater than 11 volts?

Yes	For vehicles except China, INSTALL a new reversing lamp bulb. For China vehicles only, INSTALL a new reversing lamp assembly (integrated into the rear fog lamp assembly). REFER to: Reversing Lamp .

No	REPAIR the circuit.

A5 CHECK THE REVERSING LAMP VOLTAGE CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Disconnect: BCM C2280C .

Except China, measure:

Positive Lead	Measurement / Action	Negative Lead
C496-3	Ω	Ground

China only, measure:

Positive Lead	Measurement / Action	Negative Lead
C436-2	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to A6

No	REPAIR the circuit in question. After the repair: If no Diagnostic Trouble Codes (DTCs) are present, TEST the system for normal operation. If DTC U1000:00 is present, CLEAR the Diagnostic Trouble Codes (DTCs) and REPEAT the self-test (required to enable the lamp output driver if DTC U1000:00 is present). If DTC U3000:49 is present,

A6 CHECK THE REVERSING LAMP VOLTAGE CIRCUITS FOR AN OPEN

Except China, measure:

Positive Lead	Measurement / Action	Negative Lead
C496-3	Ω	C2280C-11

China only, measure:

Positive Lead	Measurement / Action	Negative Lead
C436-2	Ω	C2280C-11

Is the resistance less than 3 ohms?

Yes	GO to A11

No	REPAIR the circuit in question.

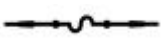
NOTE: If the fuse in the jumper wire fails, refer to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short.

A7 BYPASS THE REVERSING LAMP SWITCH

Ignition OFF.

Disconnect: Reversing Lamp Switch C169 .

Connect a fused jumper wire:

Positive Lead	Measurement / Action	Negative Lead
C169-1		Ground

Ignition ON.

Using a scan tool, monitor the Reverse Switch (REV_SW) PCM PID.

Does the PID indicate the transmission is in reverse gear?

Yes	REMOVE the jumper wire. GO to A8

No	REMOVE the jumper wire. GO to A9

A8 CHECK THE REVERSING LAMP SWITCH GROUND CIRCUIT FOR AN OPEN

Connect a fused jumper wire:

Positive Lead	Measurement / Action	Negative Lead
C169-1		C169-2

Ignition ON.

Using a scan tool, monitor the Reverse Switch (REV_SW) PCM PID.

Does the PID indicate the transmission is in reverse gear?

Yes	REMOVE the jumper wire. INSTALL a new reversing lamp switch. REFER to: Reversing Lamp Switch .

No	REMOVE the jumper wire. REPAIR the circuit.

A9 CHECK THE REVERSING LAMP SWITCH INPUT CIRCUIT FOR AN OPEN

Ignition OFF.

Disconnect: PCM C1551B (2.3L).

Disconnect: PCM C1381B (3.7L).

Disconnect: PCM C175B (5.0L).

Measure:

2.3L Vehicles

Positive Lead	Measurement / Action	Negative Lead
C169-1	Ω	C1551B-11

3.7L Vehicles

Positive Lead	Measurement / Action	Negative Lead

C169-1	Ω	C1381B-32

5.0L Vehicles

Positive Lead	Measurement / Action	Negative Lead
C169-1	Ω	C175B-32

Is the resistance less than 3 ohms?

Yes	GO to A10

No	REPAIR the circuit.

A10 CHECK FOR CORRECT PCM (POWERTRAIN CONTROL MODULE) OPERATION

Disconnect and inspect all PCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the PCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PCM. 2.3L EcoBoost REFER to: Powertrain Control Module (PCM) . 3.7L Duratec REFER to: Powertrain Control Module (PCM) . 5.0L 32V Ti-VCT REFER to: Powertrain Control Module (PCM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

A11 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > REVERSING LAMPS > PINPOINT TESTS > PINPOINT TEST B : THE REVERSING LAMP(S) ARE ON CONTINUOUSLY

Refer to Reversing Lamps for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Exterior Lighting - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1277:15	Reverse Lamp: Circuit Short To Battery or Open	A continuous memory and on-demand DTC that sets when the BCM detects an open or short to voltage from the reversing lamps output circuit.
U1000:00	Solid State Driver Protection Active -Driver Disabled: No Sub Type Information	This DTC sets when the BCM has temporarily shut down the output driver. The module has temporarily disabled an output because an excessive current draw exists (such as a short to ground). The BCM cannot enable the output until the cause of the short is corrected, the Diagnostic Trouble Codes (DTCs) have been cleared and a successful self-test is run.
U3000:49	Control Module: Internal Electronic Failure	This DTC sets when the BCM has permanently shut down the output driver. The module has permanently disabled an output because an excessive current

		draw fault (such as a short to ground) has exceeded the limits that the BCM can withstand. CORRECT the cause of the excessive current draw before installing a new BCM.

Possible Sources

- Wiring, terminals or connectors
- Gear range input
- Reversing lamps switch
- BCM
- PCM

DIAGNOSIS AND TESTING > REVERSING LAMPS > PINPOINT TESTS > PINPOINT TEST B : THE REVERSING LAMP(S) ARE ON CONTINUOUSLY > PINPOINT TEST B : THE REVERSING LAMP(S) ARE ON CONTINUOUSLY

B1 CHECK THE PCM (POWERTRAIN CONTROL MODULE) COMMANDED GEAR OR REVERSE SWITCH PID (PARAMETER IDENTIFICATION)

Apply the parking brake.

Ignition ON.

Using a diagnostic scan tool, view PCM Parameter Identifications (PIDs).

For manual transmission vehicles, monitor the Reverse Switch (REV_SW) PCM PID.

For automatic transmission vehicles, monitor the Gear Commanded (GEAR) PCM PID.

Place the gear selector lever in each position.

Does the PID indicate reverse when the gear selector is not in reverse?

Yes	For automatic transmission vehicles, DIAGNOSE the transmission range concern. REFER to: External Controls . For manual transmission vehicles, GO to B3

No	GO to B2

B2 CHECK THE REVERSING LAMPS SUPPLY CIRCUIT FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: BCM C2280C .

Ignition ON.

Does the reversing lamp continue to illuminate?

Yes	REPAIR the circuit.

No	GO to B6

B3 CHECK THE REVERSING LAMP SWITCH

Ignition OFF.

Disconnect: Reversing Lamp Switch C169 .

Ignition ON.

Using a diagnostic scan tool, view PCM Parameter Identifications (PIDs).

Monitor the Reverse Switch (REV_SW) PCM PID.

Does the PID indicate the transmission is in reverse gear?

Yes	GO to B4

No	INSTALL a new reversing lamp switch. REFER to: Reversing Lamp Switch .

B4 CHECK THE REVERSING LAMP SWITCH INPUT CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Disconnect: PCM C1551B (2.3L).

Disconnect: PCM C1381B (3.7L).

Disconnect: PCM C175B (5.0L).

Measure:

Positive Lead	Measurement / Action	Negative Lead
C169-1	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to B5

No	REPAIR the circuit.

B5 CHECK FOR CORRECT PCM (POWERTRAIN CONTROL MODULE) OPERATION

Disconnect and inspect all PCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the PCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PCM. 2.3L EcoBoost REFER to: Powertrain Control Module (PCM) . 3.7L Duratec REFER to: Powertrain Control Module (PCM) . 5.0L 32V Ti-VCT REFER to: Powertrain Control Module (PCM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

B6 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > STOPLAMPS > DTC CHART: BCM

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

BCM DTC Chart

DTC	Description	Action
B1115:11	High Mounted Stop Lamp Control: Circuit Short to Ground	Except China, GO to PINPOINT TEST B : ONE OR MORE STOPLAMPS ARE INOPERATIVE OR ALWAYS ON - EXCEPT CHINA China only, GO to PINPOINT TEST C : ONE OR MORE STOPLAMPS ARE INOPERATIVE OR ALWAYS ON - CHINA ONLY
B1115:15	High Mounted Stop Lamp Control: Circuit Short to Battery or Open	Except China, GO to PINPOINT TEST B : ONE OR MORE STOPLAMPS ARE INOPERATIVE OR ALWAYS ON - EXCEPT CHINA China only, GO to PINPOINT TEST C : ONE OR MORE STOPLAMPS ARE INOPERATIVE OR ALWAYS ON - CHINA ONLY
B1444:11	Left Rear Stop/Position Lamp Output: Circuit Short To Ground	GO to PINPOINT TEST C : ONE OR MORE STOPLAMPS ARE INOPERATIVE OR ALWAYS ON - CHINA ONLY
B1444:15	Left Rear Stop/Position Lamp Output: Circuit Short To Battery or Open	GO to PINPOINT TEST C : ONE OR MORE STOPLAMPS ARE INOPERATIVE OR ALWAYS ON - CHINA ONLY
B1448:11	Right Rear Stop/Position Lamp Output: Circuit Short To Ground	GO to PINPOINT TEST C : ONE OR MORE STOPLAMPS ARE INOPERATIVE OR ALWAYS ON - CHINA ONLY
B1448:15	Right Rear Stop/Position Lamp Output: Circuit Short To Battery or Open	GO to PINPOINT TEST C : ONE OR MORE STOPLAMPS ARE INOPERATIVE OR ALWAYS ON - CHINA ONLY
C0040:12	Brake Pedal Switch "A": Circuit Short To Battery	GO to PINPOINT TEST D : THE STOPLAMPS ARE ON CONTINUOUSLY
U1000:00	Solid State Driver Protection Active -Driver Disabled: No Sub Type Information	The module has temporarily disabled an output because an excessive current draw exists (such as a short to ground). The BCM cannot enable the output until the cause of the short is corrected. ADDRESS all

		other Diagnostic Trouble Codes (DTCs) first. After the cause of the concern is corrected, CLEAR the Diagnostic Trouble Codes (DTCs). REPEAT the self-test.
U3000:49	Control Module: Internal Electronic Failure	The module has permanently disabled an output because an excessive current draw fault (such as a short to ground) has exceeded the limits that the BCM can withstand. The cause of the excessive current draw MUST be corrected before a new BCM is installed. ADDRESS all other Diagnostic Trouble Codes (DTCs) first. After the cause of the concern is corrected,
For other BCM Diagnostic Trouble Codes (DTCs)	-	REFER to: Body Control Module (BCM) .

DIAGNOSIS AND TESTING > STOPLAMPS > DTC CHART: BCMB

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

BCMB DTC Chart

DTC	Description	Action
B1271:11	Left Stop/Turn Inner Lamp: Circuit Short to Ground	GO to PINPOINT TEST B : ONE OR MORE STOPLAMPS ARE INOPERATIVE OR ALWAYS ON - EXCEPT CHINA
B1271:15	Left Stop/Turn Inner Lamp: Circuit Short to Battery or Open	GO to PINPOINT TEST B : ONE OR MORE STOPLAMPS ARE INOPERATIVE OR ALWAYS ON - EXCEPT CHINA
B1272:11	Right Stop/Turn Inner Lamp: Circuit Short To Ground	GO to PINPOINT TEST B : ONE OR MORE STOPLAMPS ARE INOPERATIVE OR ALWAYS ON - EXCEPT CHINA
B1272:15	Right Stop/Turn Inner Lamp: Circuit Short To Battery or Open	GO to PINPOINT TEST B : ONE OR MORE STOPLAMPS ARE INOPERATIVE OR ALWAYS ON - EXCEPT CHINA

B1273:11	Right Stop/Turn Middle Lamp: Circuit Short To Ground	GO to PINPOINT TEST B : ONE OR MORE STOPLAMPS ARE INOPERATIVE OR ALWAYS ON - EXCEPT CHINA
B1273:15	Right Stop/Turn Middle Lamp: Circuit Short To Battery or Open	GO to PINPOINT TEST B : ONE OR MORE STOPLAMPS ARE INOPERATIVE OR ALWAYS ON - EXCEPT CHINA
B1274:11	Left Stop/Turn Middle Lamp: Circuit Short To Ground	GO to PINPOINT TEST B : ONE OR MORE STOPLAMPS ARE INOPERATIVE OR ALWAYS ON - EXCEPT CHINA
B1274:15	Left Stop/Turn Middle Lamp: Circuit Short To Battery or Open	GO to PINPOINT TEST B : ONE OR MORE STOPLAMPS ARE INOPERATIVE OR ALWAYS ON - EXCEPT CHINA
B1275:11	Left Stop/Turn Outer Lamp: Circuit Short To Ground	GO to PINPOINT TEST B : ONE OR MORE STOPLAMPS ARE INOPERATIVE OR ALWAYS ON - EXCEPT CHINA
B1275:15	Left Stop/Turn Outer Lamp: Circuit Short To Battery or Open	GO to PINPOINT TEST B : ONE OR MORE STOPLAMPS ARE INOPERATIVE OR ALWAYS ON - EXCEPT CHINA
B1276:11	Right Stop/Turn Outer Lamp: Circuit Short To Ground	GO to PINPOINT TEST B : ONE OR MORE STOPLAMPS ARE INOPERATIVE OR ALWAYS ON - EXCEPT CHINA
B1276:15	Right Stop/Turn Outer Lamp: Circuit Short To Battery or Open	GO to PINPOINT TEST B : ONE OR MORE STOPLAMPS ARE INOPERATIVE OR ALWAYS ON - EXCEPT CHINA
U1000:00	Solid State Driver Protection Active -Driver Disabled: No Sub Type Information	The module has temporarily disabled an output because an excessive current draw exists (such as a short to ground). The BCMB cannot enable the output until the cause of the short is corrected. ADDRESS all other Diagnostic Trouble Codes (DTCs) first. After the cause of the concern is corrected, CLEAR the Diagnostic Trouble Codes (DTCs). REPEAT the self-test.
U3000:49	Control Module: Internal Electronic Failure	The module has permanently disabled an output because an excessive current draw fault (such

		as a short to ground) has exceeded the limits that the BCMB can withstand. The cause of the excessive current draw MUST be corrected before a new BCMB is installed. ADDRESS all other Diagnostic Trouble Codes (DTCs) first. After the cause of the concern is corrected, INSTALL a new BCMB. REFER to: Body Control Module B (BCMB) .
For other BCMB Diagnostic Trouble Codes (DTCs)	-	REFER to: Body Control Module B (BCMB) .

DIAGNOSIS AND TESTING > STOPLAMPS > SYMPTOM CHART(S)

Symptom Chart: Stoplamps

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

Symptom Chart

Condition	Possible Sources	Actions
A module does not respond to the diagnostic scan tool	Fuse Wiring, terminals or connectors Module	REFER to: MODULE COMMUNICATIONS NETWORK .
All the stoplamps are inoperative	Refer to the Pinpoint Test	GO to PINPOINT TEST A : ALL THE STOPLAMPS ARE INOPERATIVE
One or more stoplamps are inoperative or always on - except China	Refer to the Pinpoint Test	GO to PINPOINT TEST B : ONE OR MORE STOPLAMPS ARE INOPERATIVE OR ALWAYS ON - EXCEPT CHINA
One or more stoplamps are inoperative or always on - China only	Refer to the Pinpoint Test	GO to PINPOINT TEST C : ONE OR MORE STOPLAMPS ARE INOPERATIVE OR ALWAYS ON - CHINA ONLY
The stoplamps are on continuously	Refer to the Pinpoint Test	GO to PINPOINT TEST D : THE STOPLAMPS ARE ON CONTINUOUSLY

DIAGNOSIS AND TESTING > STOPLAMPS > PINPOINT TESTS > PINPOINT TEST A : ALL THE STOPLAMPS ARE INOPERATIVE

Refer to Turn Signal/Stop/Hazard Lamps for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Exterior Lighting - System Operation and Component Description .

Possible Sources

- Fuse
- Wiring, terminals or connectors
- Stoplamp switch
- BCM

Visual Inspection and Diagnostic Pre-checks

- Verify BJB fuse 20 (10A) is OK.

DIAGNOSIS AND TESTING > STOPLAMPS > PINPOINT TESTS > PINPOINT TEST A : ALL THE STOPLAMPS ARE INOPERATIVE > PINPOINT TEST A : ALL THE STOPLAMPS ARE INOPERATIVE

A1 CHECK THE STOPLAMP SWITCH VOLTAGE SUPPLY CIRCUIT FOR AN OPEN

Ignition OFF.

Disconnect: Brake Pedal Position Switch C278 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C278-1		Ground

Is the voltage greater than 11 volts?

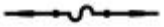
Yes	GO to A2

No	VERIFY the BJB fuse 20 (10A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short. After the repair: If no Diagnostic Trouble Codes (DTCs) are present, TEST the system for normal operation. If DTC U1000:00 is present, CLEAR the Diagnostic Trouble Codes (DTCs) and REPEAT the self-test (required to enable the lamp output driver if DTC U1000:00 is present). If DTC U3000:49 is present,

NOTE: If the fuse in the jumper wire fails, refer to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short.

A2 BYPASS THE STOPLAMP SWITCH

Connect a fused jumper:

Positive Lead	Measurement / Action	Negative Lead
C278-1		C278-4

Ignition ON.

Do the stoplamps illuminate?

Yes	REMOVE the fused jumper wire. INSTALL a new brake pedal position (stoplamp) switch. REFER to: Stoplamp Switch .

No	LEAVE the fused jumper wire connected. GO to A3

A3 CHECK THE STOPLAMP SWITCH INPUT CIRCUIT FOR AN OPEN

Ignition OFF.

Disconnect: BCM C2280A .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2280A-1		Ground

Is the voltage greater than 11 volts?

Yes	REMOVE the fused jumper wire. GO to A4

No	REMOVE the fused jumper wire. REPAIR the circuit

A4 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > STOPLAMPS > PINPOINT TESTS > PINPOINT TEST B : ONE OR MORE STOPLAMPS ARE INOPERATIVE OR ALWAYS ON - EXCEPT CHINA

Refer to Turn Signal/Stop/Hazard Lamps for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Exterior Lighting - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1115:11	High Mounted Stop Lamp Control: Circuit Short To Ground	A continuous memory and on-demand DTC that sets when the BCM detects a short to ground from the high mounted stoplamp voltage supply circuit.
B1115:15	High Mounted Stop Lamp Control: Circuit Short To Battery Or Open	A continuous memory and on-demand DTC that sets when the BCM detects an open or short to voltage from the high mounted stoplamp voltage supply circuit.
B1271:11	Left Stop/Turn Inner Lamp: Circuit Short to Ground	A continuous memory and on-demand DTC that sets when the BCMB detects a short to ground from the LH inner stop/turn lamp voltage supply circuit.
B1271:15	Left Stop/Turn Inner Lamp: Circuit Short to Battery or Open	An on-demand DTC that sets when the BCMB detects an open or short to voltage from the LH inner stop/turn lamp voltage supply circuit.
B1272:11	Right Stop/Turn Inner Lamp: Circuit Short To Ground	A continuous memory and on-demand DTC that sets when the BCMB detects a short to ground from the RH inner stop/turn lamp voltage supply circuit.

B1272:15	Right Stop/Turn Inner Lamp: Circuit Short To Battery or Open	An on-demand DTC that sets when the BCMB detects an open or short to voltage from the RH inner stop/turn lamp voltage supply circuit.
B1273:11	Right Stop/Turn Middle Lamp: Circuit Short To Ground	A continuous memory and on-demand DTC that sets when the BCMB detects a short to ground from the RH middle stop/turn lamp voltage supply circuit.
B1273:15	Right Stop/Turn Middle Lamp: Circuit Short To Battery or Open	An on-demand DTC that sets when the BCMB detects an open or short to voltage from the RH middle stop/turn lamp voltage supply circuit.
B1274:11	Left Stop/Turn Middle Lamp: Circuit Short To Ground	A continuous memory and on-demand DTC that sets when the BCMB detects a short to ground from the LH middle stop/turn lamp voltage supply circuit.
B1274:15	Left Stop/Turn Middle Lamp: Circuit Short To Battery or Open	A continuous memory and on-demand DTC that sets when the BCMB detects an open or short to voltage from the LH middle stop/turn lamp voltage supply circuit.
B1275:11	Left Stop/Turn Outer Lamp: Circuit Short To Ground	A continuous memory and on-demand DTC that sets when the BCMB detects a short to ground from the LH outer stop/turn lamp voltage supply circuit.
B1275:15	Left Stop/Turn Outer Lamp: Circuit Short To Battery or Open	An on-demand DTC that sets when the BCMB detects an open or short to voltage from the LH outer stop/turn lamp voltage supply circuit.
B1276:11	Right Stop/Turn Outer Lamp: Circuit Short To Ground	A continuous memory and on-demand DTC that sets when the BCMB detects a short to ground from the RH outer stop/turn lamp voltage supply circuit.
B1276:15	Right Stop/Turn Outer Lamp: Circuit Short To Battery or Open	An on-demand DTC that sets when the BCMB detects an open or short to voltage from the RH

		outer stop/turn lamp voltage supply circuit.
U1000:00	Solid State Driver Protection Active -Driver Disabled: No Sub Type Information	The module has temporarily disabled an output because an excessive current draw exists (such as a short to ground). The BCM or BCMB cannot enable the output until the cause of the short is corrected. ADDRESS all other Diagnostic Trouble Codes (DTCs) first. After the cause of the concern is corrected, CLEAR the Diagnostic Trouble Codes (DTCs). REPEAT the self-test.
U3000:49	Control Module: Internal Electronic Failure	The module has permanently disabled an output because an excessive current draw fault (such as a short to ground) has exceeded the limits that the BCM or BCMB can withstand. The cause of the excessive current draw MUST be corrected before a new BCM or BCMB is installed. ADDRESS all other Diagnostic Trouble Codes (DTCs) first. After the cause of the concern is corrected, or INSTALL a new BCMB. REFER to: Body Control Module B (BCMB) .

Possible Sources

- Wiring, terminals or connectors
- Rear lamp assembly
- High mounted stoplamp
- BCM
- BCMB

DIAGNOSIS AND TESTING > STOPLAMPS > PINPOINT TESTS > PINPOINT TEST B : ONE OR MORE STOPLAMPS ARE INOPERATIVE OR ALWAYS ON - EXCEPT CHINA > PINPOINT TEST B : ONE OR MORE STOPLAMPS ARE INOPERATIVE OR ALWAYS ON - EXCEPT CHINA

B1 CHECK STOPLAMPS OPERATION

Ignition ON.

Without applying the brake pedal and observe the rear and high mounted stoplamps.

Are any stoplamps illuminated?

Yes	If all the stoplamps are illuminated, GO to Pinpoint Test D For the high mounted stoplamp, GO to B8 For an individual inner, middle or outer rear stoplamp, GO to B9

No	GO to B2

B2 IDENTIFY THE INOPERATIVE STOPLAMP

Apply the brake pedal and observe the rear and high mounted stoplamps.

Is only an individual stoplamp inoperative?

Yes	For the high mounted stoplamp, GO to B3 For an individual inner, middle or outer rear stoplamp, GO to B10

No	For all LH or RH inner, middle and outer rear stoplamps, GO to B13 If all stoplamps are inoperative, GO to PINPOINT TEST A : ALL THE STOPLAMPS ARE INOPERATIVE

B3 CHECK FOR VOLTAGE TO THE HIGH MOUNTED STOPLAMP

Ignition OFF.

Disconnect: High Mounted Stoplamp C475 .

Ignition ON.

While applying the brake pedal, measure:

Positive Lead	Measurement / Action	Negative Lead
C475-1		Ground

Is the voltage greater than 11 volts?

Yes	GO to B5

No	GO to B4

B4 REPEAT THE ON-DEMAND SELF-TEST AND CHECK FOR VOLTAGE TO THE HIGH MOUNTED STOPLAMP

Using a diagnostic scan tool, perform the BCM self-test.

Clear the Diagnostic Trouble Codes (DTCs) and repeat the self-test (required to enable the

lamp output driver if DTC U1000:00 is present).

While applying the brake pedal, measure:

Positive Lead	Measurement / Action	Negative Lead
C475-1		Ground

Is the voltage greater than 11 volts?

Yes	INSTALL a new high mounted stoplamp. REFER to: High Mounted Stoplamp - Coupe .

No	GO to B6

B5 CHECK THE HIGH MOUNTED STOPLAMP GROUND CIRCUIT FOR AN OPEN

While applying the brake pedal, measure:

Positive Lead	Measurement / Action	Negative Lead
C475-1		C475-2

Is the voltage greater than 11 volts?

Yes	INSTALL a new high mounted stoplamp. REFER to: High Mounted Stoplamp - Coupe .

No	REPAIR the circuit.

B6 CHECK THE HIGH MOUNTED STOPLAMP SUPPLY CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Disconnect: BCM C2280E .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C475-1	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to B7

No	REPAIR the circuit. After the repair: If no Diagnostic Trouble Codes (DTCs) are present, TEST the system for normal operation. If DTC U1000:00 is present, CLEAR the Diagnostic Trouble Codes (DTCs) and REPEAT the self-test (required to enable the lamp output driver if DTC U1000:00 is present). If DTC U3000:49 is present,

B7 CHECK THE HIGH MOUNTED STOPLAMP SUPPLY CIRCUIT FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C475-1	Ω	C2280E-15

Is the resistance less than 3 ohms?

Yes	GO to B17

No	REPAIR the circuit.

B8 CHECK THE HIGH MOUNTED STOPLAMP SUPPLY CIRCUIT FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: High Mounted Stoplamp C475 .

Disconnect: BCM C2280E .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C475-1	V	Ground

Is voltage present?

Yes	REPAIR the circuit.

No	GO to B17

B9 CHECK THE REAR LAMP SUPPLY CIRCUIT FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: LH Rear Lamp C498 or RH Rear Lamp C499 .

Disconnect: BCMB C4368A .

Ignition ON.

Measure:

LH Rear Lamp

Positive Lead	Measurement / Action	Negative Lead
Inner Stoplamp		
C498-5		Ground
Middle Stoplamp		
C498-4		Ground
Outer Stoplamp		
C498-3		Ground

RH Rear Lamp

Positive Lead	Measurement / Action	Negative Lead
Inner Stoplamp		
C499-5		Ground
Middle Stoplamp		
C499-4		Ground
Outer Stoplamp		
C499-3		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to B16

B10 CHECK FOR VOLTAGE TO THE REAR LAMP ASSEMBLY

Ignition OFF.

Disconnect: Inoperative LH Rear Lamp C498 or RH Rear Lamp C499 .

Ignition ON.

While applying the brake pedal, measure:

LH Rear Lamp

Positive Lead	Measurement / Action	Negative Lead
Inner Stoplamp		
C498-5		Ground

Middle Stoplamp		
C498-4		Ground
Outer Stoplamp		
C498-3		Ground

RH Rear Lamp

Positive Lead	Measurement / Action	Negative Lead
Inner Stoplamp		
C499-5		Ground
Middle Stoplamp		
C499-4		Ground
Outer Stoplamp		
C499-3		Ground

Is the voltage greater than 11 volts?

Yes	INSTALL a new rear lamp assembly. REFER to: Rear Lamp Assembly .

No	GO to B11

B11 CHECK THE REAR STOPLAMP SUPPLY CIRCUITS FOR A SHORT TO GROUND

Ignition OFF.

Disconnect: BCMB C4368A .

Measure:

LH Rear Lamp

Positive Lead	Measurement / Action	Negative Lead
Inner Stoplamp		
C498-5	Ω	Ground
Middle Stoplamp		
C498-4	Ω	Ground
Outer Stoplamp		
C498-3	Ω	Ground

RH Rear Lamp

Positive Lead	Measurement / Action	Negative Lead
Inner Stoplamp		
C499-5	Ω	Ground
Middle Stoplamp		
C499-4	Ω	Ground
Outer Stoplamp		
C499-3	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to B12

No	REPAIR the circuit in question. After the repair: If no Diagnostic Trouble Codes (DTCs) are present, TEST the system for normal operation. If DTC U1000:00 is present, CLEAR the Diagnostic Trouble Codes (DTCs) and REPEAT the self-test (required to enable the lamp output driver if DTC U1000:00 is present). If DTC U3000:49 is present,

B12 CHECK THE REAR STOPLAMP SUPPLY CIRCUITS FOR AN OPEN

Measure:

LH Rear Lamp

Positive Lead	Measurement / Action	Negative Lead
Inner Stoplamp		
C498-5	Ω	C4368A-4
Middle Stoplamp		
C498-4	Ω	C4368A-3
Outer Stoplamp		
C498-3	Ω	C4368A-2

RH Rear Lamp

Positive Lead	Measurement / Action	Negative Lead
Inner Stoplamp		
C499-5	Ω	C4368A-16
Middle Stoplamp		
C499-4	Ω	C4368A-15

Outer Stoplamp		
C499-3	Ω	C4368A-14

Is the resistance less than 3 ohms?

Yes	GO to B16

No	REPAIR the circuit in question.

B13 CHECK FOR VOLTAGE TO THE REAR LAMP ASSEMBLY (ALL INOPERATIVE)

Ignition OFF.

Disconnect: Inoperative LH Rear Lamp C498 or RH Rear Lamp C499 .

Ignition ON.

While applying the brake pedal, measure:

LH Rear Lamp

Positive Lead	Measurement / Action	Negative Lead
C498-5	V	Ground

RH Rear Lamp

Positive Lead	Measurement / Action	Negative Lead
C499-5	V	Ground

Is the voltage greater than 11 volts?

Yes	GO to B15

No	GO to B14

B14 REPEAT THE ON-DEMAND SELF-TEST AND CHECK FOR VOLTAGE TO THE REAR LAMP ASSEMBLY

Using a diagnostic scan tool, perform the BCM self-test.

Clear the Diagnostic Trouble Codes (DTCs) and repeat the self-test (required to enable the lamp output driver if DTC U1000:00 is present).

While applying the brake pedal, measure:

LH Rear Lamp

Positive Lead	Measurement / Action	Negative Lead
C498-5		Ground

RH Rear Lamp

Positive Lead	Measurement / Action	Negative Lead
C499-5		Ground

Is the voltage greater than 11 volts?

Yes	INSTALL a new rear lamp assembly. REFER to: Rear Lamp Assembly .

No	GO to B16

B15 CHECK THE REAR LAMP ASSEMBLY GROUND CIRCUIT

While applying the brake pedal, measure:

LH Rear Lamp

Positive Lead	Measurement / Action	Negative Lead
C498-5		C498-6

RH Rear Lamp

Positive Lead	Measurement / Action	Negative Lead
C499-5		C499-6

Is the voltage greater than 11 volts?

Yes	INSTALL a new rear lamp assembly. REFER to: Rear Lamp Assembly .

No	REPAIR the circuit.

B16 CHECK FOR CORRECT BCMB (BODY CONTROL MODULE B) OPERATION

Disconnect and inspect all BCMB connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCMB connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new BCMB. REFER to: Body Control Module B (BCMB) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

B17 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > STOPLAMPS > PINPOINT TESTS > PINPOINT TEST C : ONE OR MORE STOPLAMPS ARE INOPERATIVE OR ALWAYS ON - CHINA ONLY

Refer to Turn Signal/Stop/Hazard Lamps for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Exterior Lighting - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1115:11	High Mounted Stop Lamp Control: Circuit Short To Ground	A continuous memory and on-demand DTC that sets when the BCM detects a short to ground from the high mounted stoplamp voltage supply circuit.
B1115:15	High Mounted Stop Lamp Control: Circuit Short To Battery Or Open	A continuous memory and on-demand DTC that sets when the BCM detects an open or short to voltage from the high mounted stoplamp voltage supply circuit.
B1444:11	Left Rear Stop/Position Lamp Output: Circuit Short To Ground	A continuous memory and on-demand DTC that sets when the BCM detects a short to ground from the LH rear stoplamp voltage supply circuit.
B1444:15	Left Rear Stop/Position Lamp Output: Circuit Short To Battery or Open	A continuous memory and on-demand DTC that sets when the BCM detects an open or short to voltage from the LH rear stoplamp voltage supply circuit.
B1448:11	Right Rear Stop/Position Lamp Output: Circuit Short To Ground	A continuous memory and on-demand DTC that sets when the BCM detects a short to ground from the right RH stoplamp voltage supply circuit.
B1448:15	Right Rear Stop/Position Lamp Output: Circuit Short To Battery or Open	A continuous memory and on-demand DTC that sets when the BCM detects an open or short to voltage from the right RH stoplamp voltage supply circuit.
U1000:00	Solid State Driver Protection Active -Driver Disabled: No Sub Type Information	The module has temporarily disabled an output because an excessive current draw exists (such as a short to ground). The BCM cannot enable the output until the cause of the short is corrected. ADDRESS all other Diagnostic Trouble Codes (DTCs) first. After the cause of the concern is corrected, CLEAR the Diagnostic Trouble Codes (DTCs). REPEAT the self-test.
U3000:49	Control Module: Internal Electronic Failure	The module has permanently disabled an output because an excessive current draw fault (such as a short to ground) has

		exceeded the limits that the BCM can withstand. The cause of the excessive current draw MUST be corrected before a new BCM is installed. ADDRESS all other Diagnostic Trouble Codes (DTCs) first. After the cause of the concern is corrected,

Possible Sources

- Wiring, terminals or connectors
- Rear lamp assembly
- High mounted stoplamp
- BCM

DIAGNOSIS AND TESTING > STOPLAMPS > PINPOINT TESTS > PINPOINT TEST C : ONE OR MORE STOPLAMPS ARE INOPERATIVE OR ALWAYS ON - CHINA ONLY > PINPOINT TEST C : ONE OR MORE STOPLAMPS ARE INOPERATIVE OR ALWAYS ON - CHINA ONLY

C1 CHECK STOPLAMPS OPERATION

Ignition ON.

Without applying the brake pedal and observe the rear and high mounted stoplamps.

Are any stoplamps illuminated?

Yes	If all the stoplamps are illuminated, GO to PINPOINT TEST D : THE STOPLAMPS ARE ON CONTINUOUSLY For the high mounted stoplamp, GO to C8 For the LH or RH inner and middle rear stoplamp, GO to C9

No	GO to C2

C2 IDENTIFY THE INOPERATIVE STOPLAMP

Apply the brake pedal and observe the rear and high mounted stoplamps.

Is only an individual stoplamp inoperative?

Yes	For the high mounted stoplamp, GO to C3 For an individual inner or middle rear stoplamp, INSTALL a new rear lamp assembly. REFER to: Rear Lamp Assembly .

No	For the LH or RH inner and middle rear stoplamp, GO to C10 If all stoplamps are

	inoperative, GO to PINPOINT TEST A : ALL THE STOPLAMPS ARE INOPERATIVE

C3 CHECK FOR VOLTAGE TO THE HIGH MOUNTED STOPLAMP

Ignition OFF.

Disconnect: High Mounted Stoplamp C475 .

Ignition ON.

While applying the brake pedal, measure:

Positive Lead	Measurement / Action	Negative Lead
C475-1		Ground

Is the voltage greater than 11 volts?

Yes	GO to C5

No	GO to C4

C4 REPEAT THE ON-DEMAND SELF-TEST AND CHECK FOR VOLTAGE TO THE HIGH MOUNTED STOPLAMP

Using a diagnostic scan tool, perform the BCM self-test.

Clear the Diagnostic Trouble Codes (DTCs) and repeat the self-test (required to enable the lamp output driver if DTC U1000:00 is present).

While applying the brake pedal, measure:

Positive Lead	Measurement / Action	Negative Lead
C475-1		Ground

Is the voltage greater than 11 volts?

Yes	INSTALL a new high mounted stoplamp. REFER to: High Mounted Stoplamp - Coupe .

No	GO to C6

C5 CHECK THE HIGH MOUNTED STOPLAMP GROUND CIRCUIT FOR AN OPEN

While applying the brake pedal, measure:

Positive Lead	Measurement / Action	Negative Lead

C475-1		C475-2

Is the voltage greater than 11 volts?

Yes	INSTALL a new high mounted stoplamp. REFER to: High Mounted Stoplamp - Coupe .

No	REPAIR the circuit.

C6 CHECK THE HIGH MOUNTED STOPLAMP SUPPLY CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Disconnect: BCM C2280E .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C475-1	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to C7

No	REPAIR the circuit. After the repair: If no Diagnostic Trouble Codes (DTCs) are present, TEST the system for normal operation. If DTC U1000:00 is present, CLEAR the Diagnostic Trouble Codes (DTCs) and REPEAT the self-test (required to enable the lamp output driver if DTC U1000:00 is present). If DTC U3000:49 is present,

C7 CHECK THE HIGH MOUNTED STOPLAMP SUPPLY CIRCUIT FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C475-1	Ω	C2280E-15

Is the resistance less than 3 ohms?

Yes	GO to C15

No	REPAIR the circuit.

C8 CHECK THE HIGH MOUNTED STOPLAMP SUPPLY CIRCUIT FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: High Mounted Stoplamp C475 .

Disconnect: BCM C2280E .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C475-1		Ground

Is voltage present?

Yes	REPAIR the circuit.

No	GO to C15

C9 CHECK THE REAR LAMP SUPPLY CIRCUIT FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: LH Rear Lamp C412 or RH Rear Lamp C415 .

Disconnect: BCM C2280E .

Ignition ON.

Measure:

LH Rear Lamp

Positive Lead	Measurement / Action	Negative Lead
C412-6		Ground

RH Rear Lamp

Positive Lead	Measurement / Action	Negative Lead
C415-6		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to C15

C10 CHECK FOR VOLTAGE TO THE REAR LAMP ASSEMBLY

Ignition OFF.

Disconnect: Inoperative LH Rear Lamp C412 or RH Rear Lamp C415 .

Ignition ON.

While applying the brake pedal, measure:

LH Rear Lamp

Positive Lead	Measurement / Action	Negative Lead
C412-6		Ground

RH Rear Lamp

Positive Lead	Measurement / Action	Negative Lead
C415-6		Ground

Is the voltage greater than 11 volts?

Yes	GO to C12

No	GO to C11

C11 REPEAT THE ON-Ddemand SELF-TEST AND CHECK FOR VOLTAGE TO THE REAR LAMP ASSEMBLY

Using a diagnostic scan tool, perform the BCM self-test.

Clear the Diagnostic Trouble Codes (DTCs) and repeat the self-test (required to enable the lamp output driver if DTC U1000:00 is present).

While applying the brake pedal, measure:

LH Rear Lamp

Positive Lead	Measurement / Action	Negative Lead
C412-6		Ground

RH Rear Lamp

Positive Lead	Measurement / Action	Negative Lead
C415-6		Ground

Is the voltage greater than 11 volts?

Yes	INSTALL a new rear lamp assembly. REFER to: Rear Lamp Assembly .

No	GO to C13

C12 CHECK THE REAR LAMP ASSEMBLY GROUND CIRCUIT

While applying the brake pedal, measure:

LH Rear Lamp

Positive Lead	Measurement / Action	Negative Lead
C412-6		C412-4

RH Rear Lamp

Positive Lead	Measurement / Action	Negative Lead
C415-6		C415-4

Is the voltage greater than 11 volts?

Yes	INSTALL a new rear lamp assembly. REFER to: Rear Lamp Assembly .

No	REPAIR the circuit.

C13 CHECK THE REAR STOPLAMP SUPPLY CIRCUITS FOR A SHORT TO GROUND

Ignition OFF.

Disconnect: BCM C2280E .

Measure:

LH Rear Lamp

Positive Lead	Measurement / Action	Negative Lead
C412-6	Ω	Ground

RH Rear Lamp

Positive Lead	Measurement / Action	Negative Lead
C415-6	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to C14

No	REPAIR the circuit in question. After the repair: If no Diagnostic Trouble Codes (DTCs) are present, TEST the system for normal operation. If DTC U1000:00 is present, CLEAR the Diagnostic Trouble Codes (DTCs) and REPEAT the self-test (required to enable the lamp output driver if DTC U1000:00 is present). If DTC U3000:49 is present,

C14 CHECK THE REAR STOPLAMP SUPPLY CIRCUITS FOR AN OPEN

Measure:

LH Rear Lamp

Positive Lead	Measurement / Action	Negative Lead
C412-6	Ω	C2280E-24

RH Rear Lamp

Positive Lead	Measurement / Action	Negative Lead
C415-6	Ω	C2280E-23

Is the resistance less than 3 ohms?

Yes	GO to C15

No	REPAIR the circuit in question.

C15 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by

	module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > STOPLAMPS > PINPOINT TESTS > PINPOINT TEST D : THE STOPLAMPS ARE ON CONTINUOUSLY

Refer to Turn Signal/Stop/Hazard Lamps for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Exterior Lighting - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
C0040:12	Brake Pedal Switch "A": Circuit Short To Battery	An on-demand DTC that sets when the BCM detects a short to voltage from the stoplamp switch input circuit during the on-demand self-test.

Possible Sources

- Wiring, terminals or connectors
- Stoplamp switch
- PCM
- BCM

DIAGNOSIS AND TESTING > STOPLAMPS > PINPOINT TESTS > PINPOINT TEST D : THE STOPLAMPS ARE ON CONTINUOUSLY > PINPOINT TEST D : THE STOPLAMPS ARE ON CONTINUOUSLY

D1 CHECK THE STOPLAMP SWITCH

Ignition OFF.

Disconnect: Stoplamp Switch C278 .

Ignition ON.

Do the stoplamps continue to illuminate?

Yes	GO to D2

No	INSTALL a new brake pedal position (stoplamp) switch. REFER to: Stoplamp Switch .

D2 CHECK THE PCM (POWERTRAIN CONTROL MODULE)

Ignition OFF.

Disconnect: PCM C1551B (2.3L).

Disconnect: PCM C1381B (3.7L).

Disconnect: PCM C175B (5.0L).

Ignition ON.

Do the stoplamps continue to illuminate?

Yes	GO to D3

No	GO to D4

D3 CHECK THE STOPLAMP SWITCH INPUT CIRCUIT FOR A SHORT TO VOLTAGE

Measure:

Positive Lead	Measurement / Action	Negative Lead
C278-4		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to D5

D4 CHECK FOR CORRECT PCM (POWERTRAIN CONTROL MODULE) OPERATION

Disconnect and inspect all PCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the PCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PCM. 2.3L EcoBoost (231kW/314PS) REFER to: Powertrain Control Module (PCM) . 3.7L Duratec (227kW/301PS) REFER to: Powertrain Control Module (PCM) . 5.0L 32V Ti-VCT REFER to: Powertrain Control Module (PCM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

D5 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

GENERAL PROCEDURES > FRONT FOG LAMP ADJUSTMENT

Activation

NOTE: Horizontal aim is not required for this vehicle and is not adjustable. Consult your state vehicle inspection center for recommended tolerance ranges for visual aiming.

1.

1.

Before starting the fog lamp assembly adjustment:

Check the tire inflation.

Make sure there are no other loads in the vehicle other than a half tank of fuel.

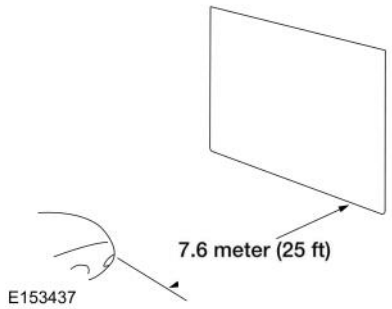
Make sure the vehicle is on level ground.

Make sure the fog lamps and headlamps are clean.

Make sure the headlamps are operating and are correctly aimed.

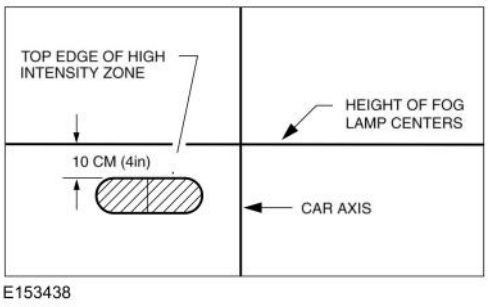
NOTE: The vertical wall screen must be a minimum of 2.4 m (7.87 ft)

2.
Park the vehicle on a level surface approximately 7.6 m (24.93 ft) from the vertical wall or screen directly in front of it.



3.

The correct visual aim for the fog lamps is with the top edge of the high-intensity zone 101.6 mm (4 in) below the horizontal center of the fog lamps.



GENERAL PROCEDURES > HEADLAMP ADJUSTMENT

Adjustment

NOTE: If the flash video link does not load or is incompatible with your browser, a.wmv version of the video can be accessed at: http://www.fordservicecontent.com /Ford_Content/videos/FusionHeadlampAdj2.wmv

1.

	A multimedia supplement to the instructions contained in this article is available. To view the multimedia example of the condition described go to; **http://www.youtube.com/user/Mitchell1Tips then type, "A00566967.vid1" into the "Search Channel" box.**

All headlamp types

NOTE: Refer to the Owner's Literature for the headlamp adjustment screw location.

NOTE: Consult your state vehicle inspection manual for recommended tolerance ranges for visual aiming.

NOTE: Horizontal aim is not adjustable.

2.

Identify the headlamp type. Vehicles are equipped with Visually Optically Aligned Left (VOL) or Visually Optically Aligned Right (VOR) headlamps. Molded in small letters on the headlamp lens is one of the following: VOL and SAE or VOR and SAE.

NOTE: Before starting headlamp adjustment, entry conditions must be met.

3.

Vehicle must be on level ground.

Tires must be correctly inflated.

Vehicle must be normally loaded.

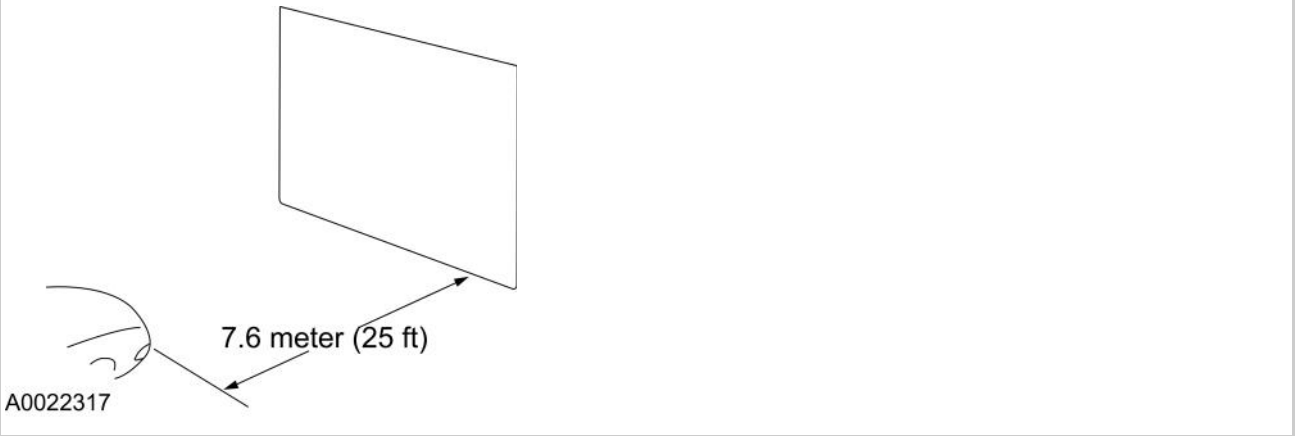
Headlamps must be clean.

Headlamps must operate correctly.

Air suspension switch must be on (if equipped).

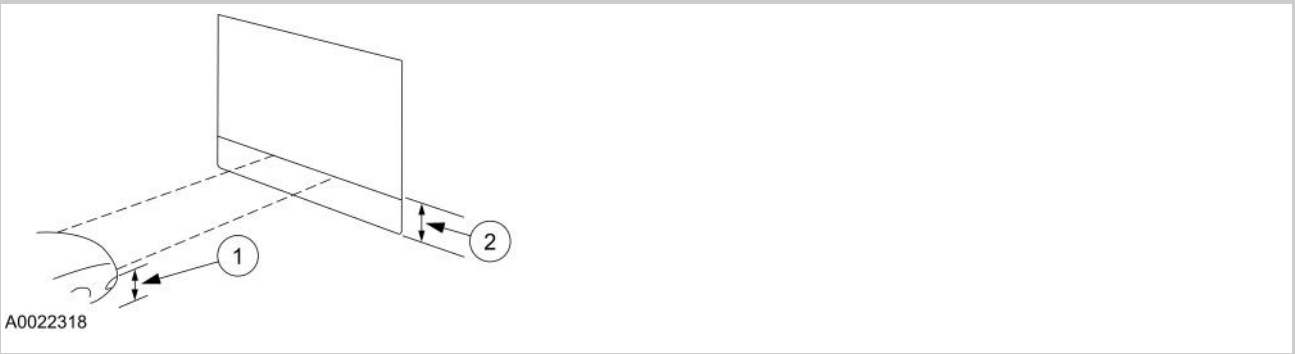
NOTE: The vertical wall or screen must be a minimum of 2.4 m (8ft) wide.

4.
Park the vehicle on a level surface approximately 7.6 m (25 ft) from the vertical wall or screen directly in front of it.



NOTE: The bulb center of the low beam bulb is sometimes marked on the lens (circle, crosshair or other mark) or is the center of the low beam reflector, bulb shield or the low beam projector inner lens.

5.
Measure the center of the headlamp height to ground and record the measurement.



NOTE: Use a 2.4 m (8 ft) section of masking tape for the horizontal reference line.

6.

For vehicles with headlamp bulb center heights below 95 cm (37.5 inches), place the horizontal reference line equal to the headlamp bulb center height.

For vehicles with headlamp bulb center heights between 95 cm - 105 cm (37.5 - 41.5 inches), place the horizontal reference line at the headlamp bulb center height minus 1.3 cm (0.5 inch).

For vehicles with headlamp bulb center heights above 105 cm (41.5 inches), place the

horizontal reference line at the headlamp bulb center height minus 2.5 cm (1.0 inch).

NOTE: Carry out this procedure in a dark environment to effectively see the headlamp beam pattern.

7.
Turn the low beam headlamps on to illuminate the wall or screen and open the hood.

NOTE: The cut off of the beam pattern is the horizontal line of the beam pattern where there is MAXIMUM change between light and dark.

8.
On the wall or screen, locate the cut off of the beam pattern.

VOR-type headlamps

NOTE: Procedure applies to both left and right headlamps with VOR molded on lens.

NOTE: The appearance of the VOR beam pattern may vary between vehicles.

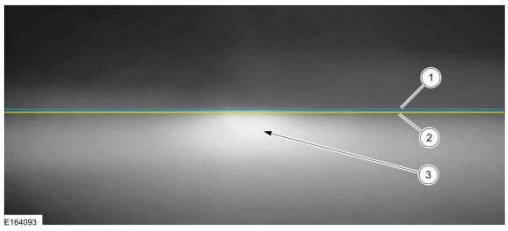
9.
There is a distinct cutoff in the right portion of the beam pattern.

10.

1 - Horizontal reference line

2 - Cut off

3 - High intensity zone



NOTE: Align one headlamp while covering the other headlamp.

11.
Align the headlamps to the horizontal reference line. Adjust the headlamp as necessary using the headlamp adjusting screw.

12.

Repeat the previous step for the remaining headlamp.

VOL-type headlamps

NOTE: Procedure applies to both left and right headlamps with VOL molded on lens.

NOTE: The appearance of the VOL beam pattern may vary between vehicles.

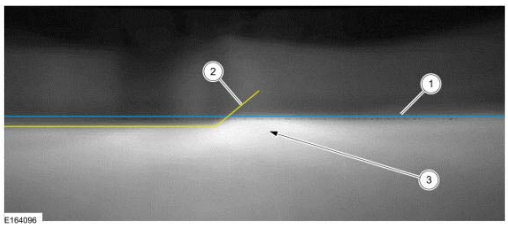
13.
For VOL-type headlamps, there is a distinct cutoff in the left portion of the beam pattern. The edge of this cutoff should be positioned 5 CM (2 in) below the horizontal reference line.

14.

1 - Horizontal reference line

2 - Cut off

3 - High intensity zone



NOTE: Align one headlamp while covering the other headlamp.

15.
Align the headlamps to the horizontal reference line. Adjust the headlamp as necessary using the headlamp adjusting screw.

16.

Repeat the previous step for the remaining headlamp.

REMOVAL AND INSTALLATION > BALLAST > REMOVAL

1.

Remove the headlamp assembly. Refer to: Headlamp Assembly .

2.

Remove the screws and position the ballast for access to the electrical connector.



3.

Disconnect the electrical connector and remove the ballast.



REMOVAL AND INSTALLATION > BALLAST > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > FRONT FOG LAMP > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

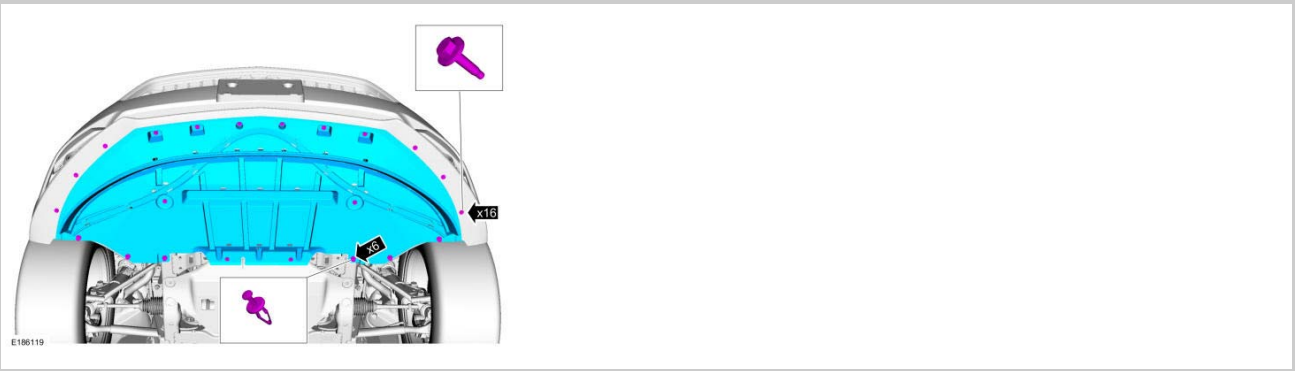
NOTE: Halogen fog lamp shown, LED fog lamp similar.

1.

Raise the vehicle on a hoist. Refer to: Jacking and Lifting - Overview .

2.

Remove the push pins, screws and the lower air deflector.



3.

Disconnect the front fog lamp electrical connector.



4.

Remove the screws and the fog lamp assembly.

Torque

: 15 lb.in (1.7 Nm)



REMOVAL AND INSTALLATION > FRONT FOG LAMP > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Adjust the fog lamps. Refer to: Front Fog Lamp Adjustment .

REMOVAL AND INSTALLATION > FRONT FOG LAMP BULB > REMOVAL

NOTE: This procedure is for halogen fog lamps bulbs only, LED fog lamp bulbs are serviced as an assembly.

NOTE: Removal steps in this procedure may contain installation details.

1.

Raise the vehicle on a hoist. Refer to: Jacking and Lifting - Overview .

2.

Remove the front wheels and tires. Refer to: Wheel and Tire .

3.

Remove the push pins and position the inner fender liner aside.



4.

Disconnect the front fog lamp electrical connector.



5.

Turn the bulb counter clock-wise and remove the front fog lamp bulb.



REMOVAL AND INSTALLATION > FRONT FOG LAMP BULB > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > FRONT MARKER LAMP > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

NOTE: Vehicles with fog lamp shown, all others are similar.

NOTE: LH shown, RH similar.

1.

Remove the front bumper cover. Refer to: Front Bumper Cover .

2.

Remove the front bumper grille cover.

1.

Remove the screws.

Torque

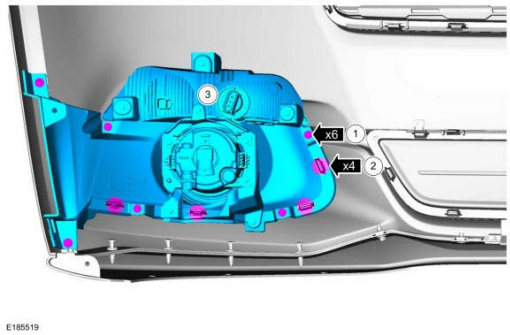
: 15 lb.in (1.7 Nm)

2.

Release the tabs.

3.

Remove the front bumper grille cover.

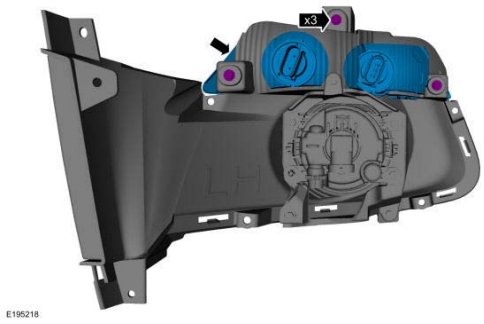


3.

Remove screws and the front marker lamp.

Torque

: 15 lb.in (1.7 Nm)



REMOVAL AND INSTALLATION > FRONT MARKER LAMP > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > FRONT TURN SIGNAL LAMP BULB > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

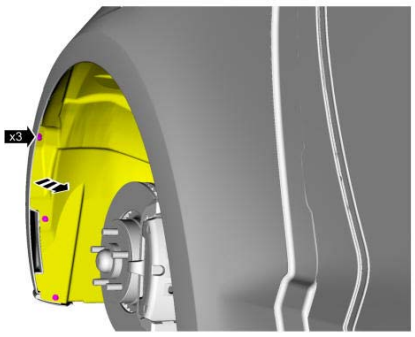
Raise the vehicle on a hoist. Refer to: Jacking and Lifting - Overview .

2.

Remove the front wheels and tire. Refer to: Wheel and Tire .

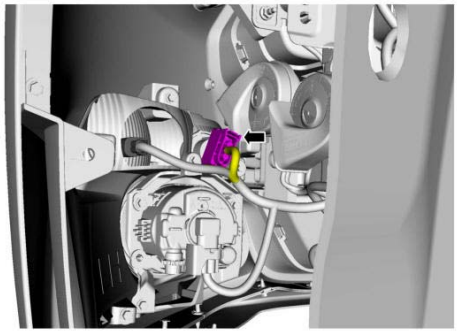
3.

Remove the push pins and position the inner fender liner aside.



4.

Disconnect the front turn signal electrical connector.



5.

Remove the turn signal bulb.

1.

Rotate the turn signal bulb holder counter clock-wise and remove the bulb holder.

2.

Separate the turn signal bulb from the bulb holder.



REMOVAL AND INSTALLATION > FRONT TURN SIGNAL LAMP BULB > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > HEADLAMP ASSEMBLY > REMOVAL

1.

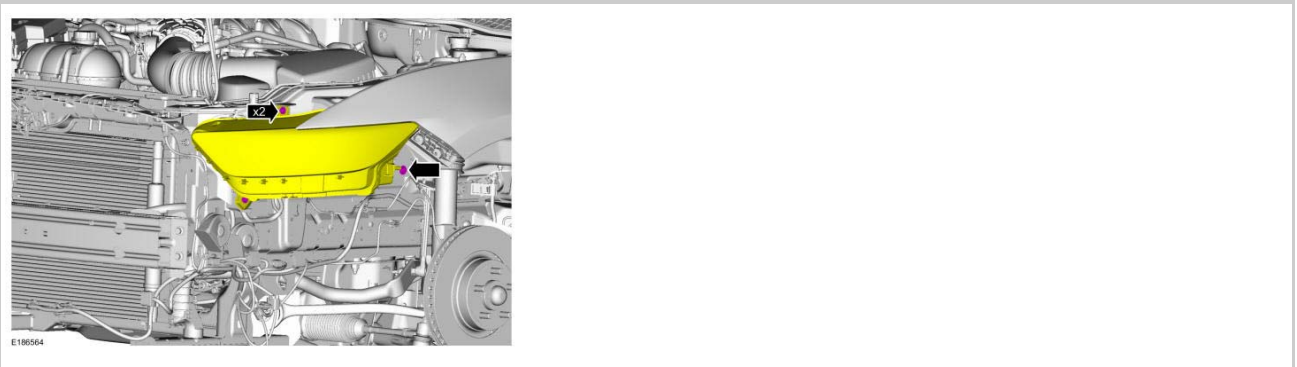
Remove the front bumper cover. Refer to: Front Bumper Cover .

2.

Remove the screws and position the headlamp assembly forward.

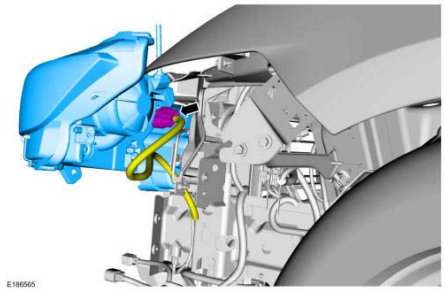
Torque

: Front mounting bolts: 74 lb.in (8.4 Nm) Side mounting bolt: 28 lb.in (3.2 Nm)



3.

Disconnect the electrical connector and remove the headlamp assembly.



REMOVAL AND INSTALLATION > HEADLAMP ASSEMBLY > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Adjust the headlamps. Refer to: Headlamp Adjustment

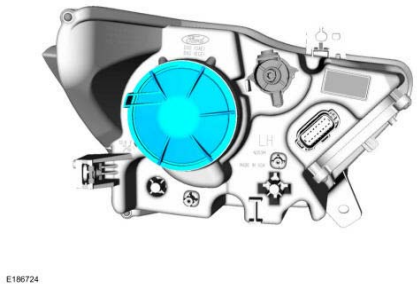
REMOVAL AND INSTALLATION > HEADLAMP BULB > REMOVAL

1.

Remove the headlamp assembly. Refer to: Headlamp Assembly .

2.

Remove the headlamp bulb cover.



3.

Disconnect the headlamp bulb connector.



4.

Remove the headlamp bulb.

1.

Release the spring tabs.

2.

Remove the headlamp bulb.



REMOVAL AND INSTALLATION > HEADLAMP BULB > INSTALLATION

1.

To install, reverse the removal procedure.

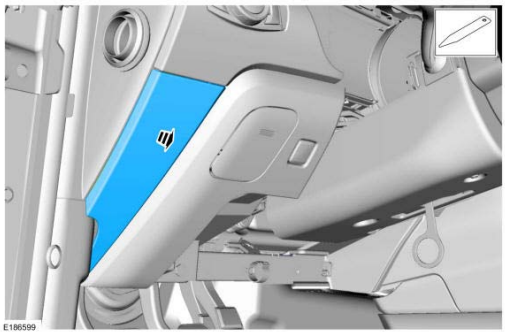
2.

Adjust the headlamps. Refer to: Headlamp Adjustment .

REMOVAL AND INSTALLATION > HEADLAMP SWITCH > REMOVAL

1.

Using a non-marring tool, remove the trim panel.



2.

Remove the screw and position the LH dash finish panel aside.



3.

Remove the headlamp switch.

1.

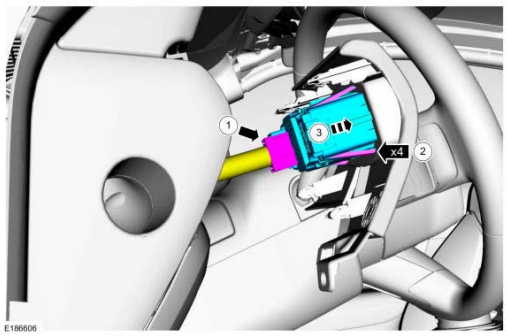
Disconnect the headlamp switch electrical connector.

2.

Release the tabs.

3.

Remove the headlamp switch.



REMOVAL AND INSTALLATION > HEADLAMP SWITCH > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > HIGH MOUNTED STOPLAMP - CONVERTIBLE > REMOVAL

1.

Remove the luggage compartment lid interior trim panel.

1.

Remove the latch cover.

2.

Remove the push pins.



2.

Remove the center high mounted stoplamp.

1.

Disconnect the electrical connector.

2.

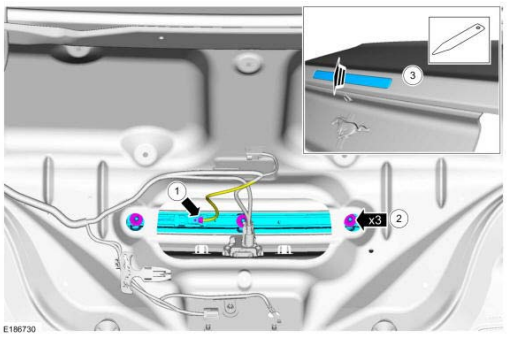
Remove the nuts.

Torque

: 13 lb.in (1.5 Nm)

3.

Release the two-sided seal tape.



REMOVAL AND INSTALLATION > HIGH MOUNTED STOPLAMP - CONVERTIBLE > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > HIGH MOUNTED STOPLAMP - COUPE > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

Lower the rear of the headliner. Refer to: Headliner - Lowering .

2.

Remove the center mounted high stoplamp.

1.

Remove the nuts.

Torque

: 36 lb.in (4.1 Nm)

2.

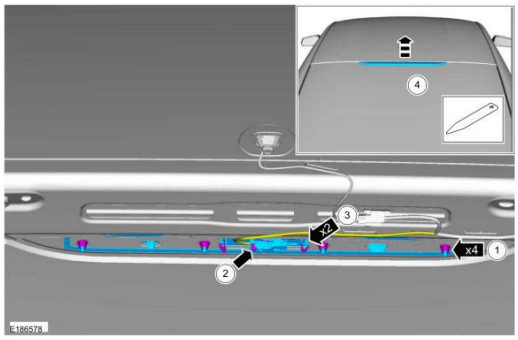
Disconnect the electrical connector.

3.

Release the tabs.

4.

Release the two-sided seal tape.



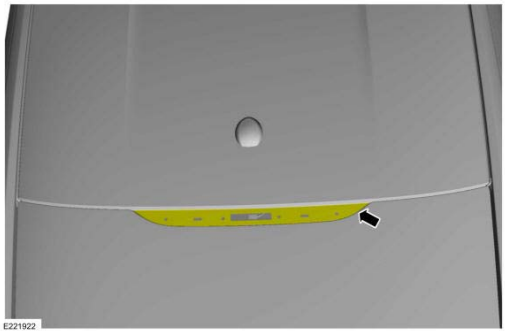
REMOVAL AND INSTALLATION > HIGH MOUNTED STOPLAMP - COUPE > INSTALLATION

1.

Clean and prepare the sealing surface.

Using 3M (TM) Specialty Adhesive Remover clean the mating surface.

Using an alcohol pad, prepare the mating surface.



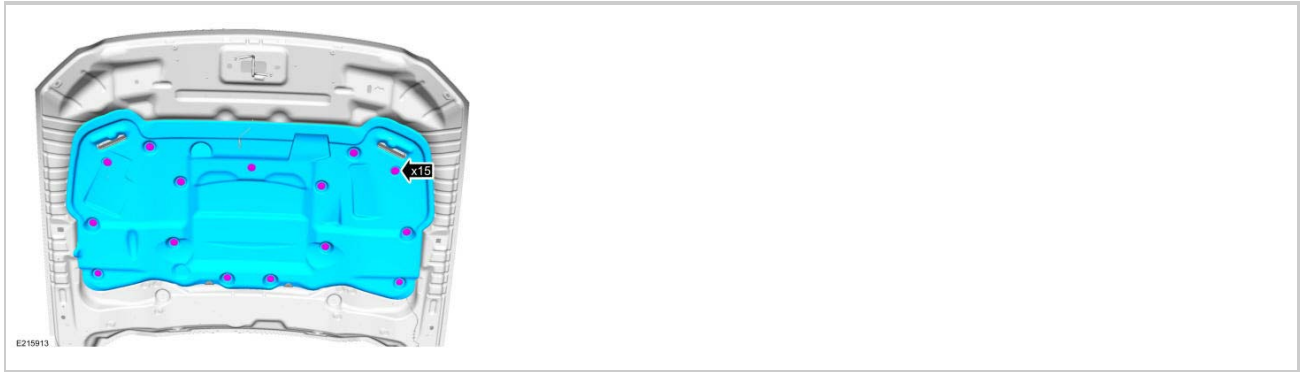
2.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > HOOD TURN SIGNAL INDICATOR LAMP > REMOVAL

1.

Remove the pushpins and the hood insulation panel.



NOTE: LH hood mounted turn signal lamp shown, RH is similar.

2.
Remove the hood mounted turn signal lamp.

1.

Disconnect the hood mounted turn signal lamp electrical connector.

2.

Remove the screws.

3.

Release the tabs.



REMOVAL AND INSTALLATION > HOOD TURN SIGNAL INDICATOR LAMP > INSTALLATION

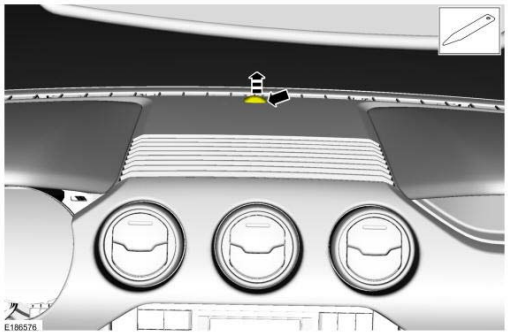
1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > LIGHT SENSOR > REMOVAL

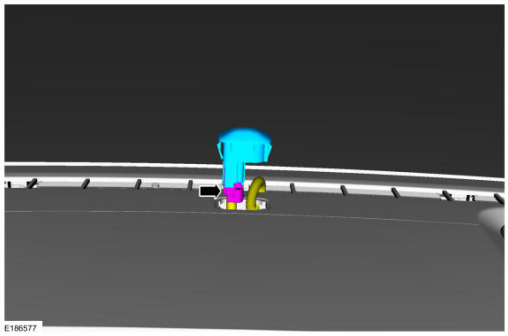
1.

Using a non-marring tool, release the light sensor and position upward.



2.

Disconnect the electrical connector and remove the light sensor.



REMOVAL AND INSTALLATION > LIGHT SENSOR > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > PARKING LAMP BULB > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

Raise the vehicle on a hoist. Refer to: Jacking and Lifting - Overview .

2.

Remove the front wheels and tires. Refer to: Wheel and Tire .

3.

Remove the push pins and position the inner fender liner aside.



4.

Disconnect the front parking lamp electrical connector.



5.

Remove the front parking lamp bulb.

1.

Rotate the front parking lamp bulb holder counter clock-wise and remove the bulb holder.

2.

Separate the front parking lamp bulb from the bulb holder.



REMOVAL AND INSTALLATION > PARKING LAMP BULB > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > REAR LAMP ASSEMBLY > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

NOTE: Coupe shown, convertible similar.

NOTE: RH rear lamp assembly shown, LH rear lamp assembly similar.

All vehicles

1.

Open the luggage compartment lid.



2.

Remove the spare tire cover.



RH rear lamp assembly

3.

If equipped, remove the subwoofer and amplifier unit. Refer to: Subwoofer and Amplifier Unit .

All vehicles

4.

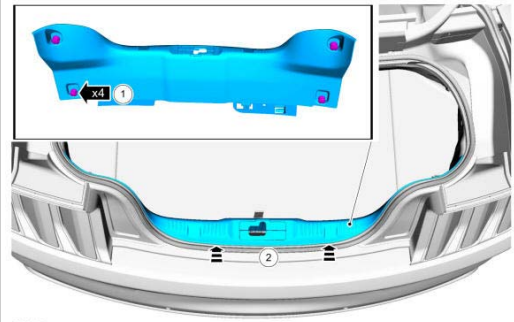
Remove the luggage compartment scuff plate.

1.

Remove the thumb nut type retainers.

2.

Remove the luggage compartment scuff plate.



5.

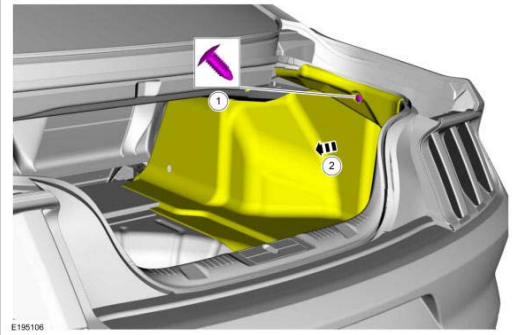
Position the luggage compartment side trim panel aside.

1.

Remove the pin-type retainer.

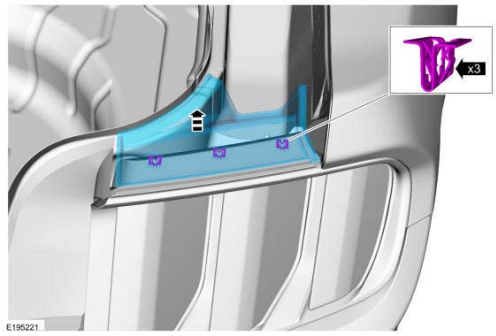
2.

Position aside the RH or LH luggage compartment side trim panel.



6.

Release the clips and remove the rear lamp assembly shield.



7.

Remove the rear lamp assembly.

1.

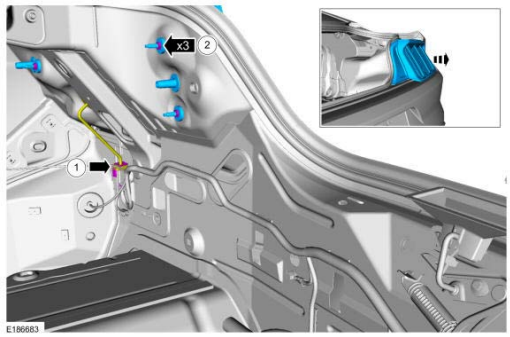
Disconnect the rear lamp assembly electrical connector.

2.

Remove the nuts.

Torque

: 55 lb.in (6.2 Nm)



REMOVAL AND INSTALLATION > REAR LAMP ASSEMBLY > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > REVERSING LAMP > REMOVAL

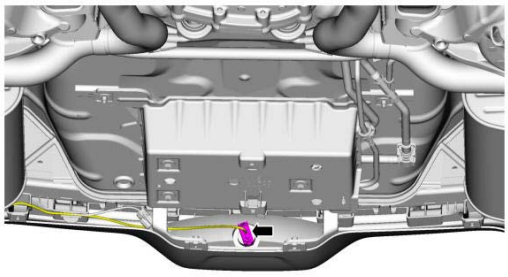
NOTE: Removal steps in this procedure may contain installation details.

1.

Raise the vehicle on a hoist. Refer to: Jacking and Lifting - Overview .

2.

Disconnect the reversing lamp electrical connector.



3.

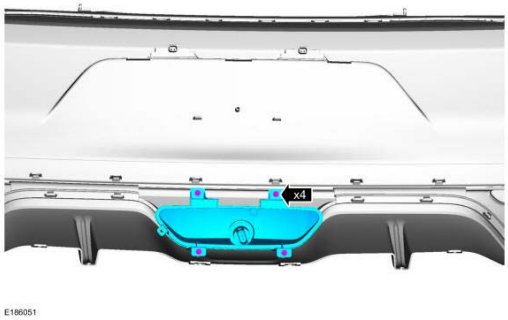
Remove the rear bumper cover. Refer to: Rear Bumper Cover .

4.

Remove the screws and the reversing lamp.

Torque

: 15 lb.in (1.7 Nm)



REMOVAL AND INSTALLATION > REVERSING LAMP > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > REVERSING LAMP SWITCH > REMOVAL

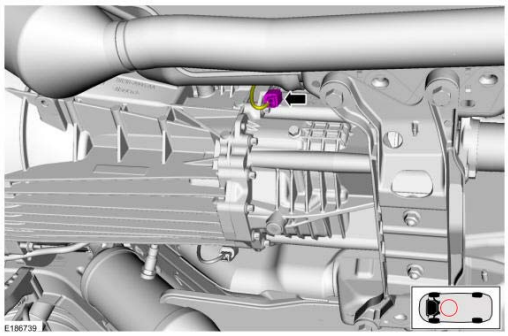
NOTE: Removal steps in this procedure may contain installation details.

1.

Raise the vehicle on a hoist. Refer to: Jacking and Lifting - Overview .

2.

Disconnect the reversing lamp switch and separate the connector retainer.

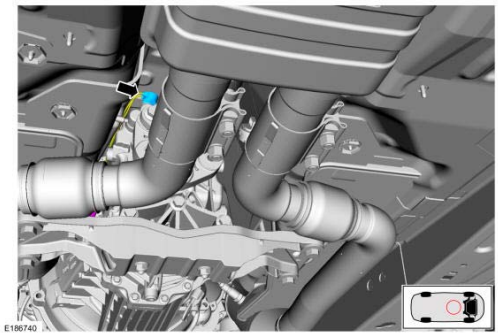


3.

Remove the reversing lamp switch.

Torque

: 177 lb.in (20 Nm)



REMOVAL AND INSTALLATION > REVERSING LAMP SWITCH > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > SIDE LAMP BULB > REMOVAL

1.

Raise the vehicle on a hoist. Refer to: Jacking and Lifting - Overview .

2.

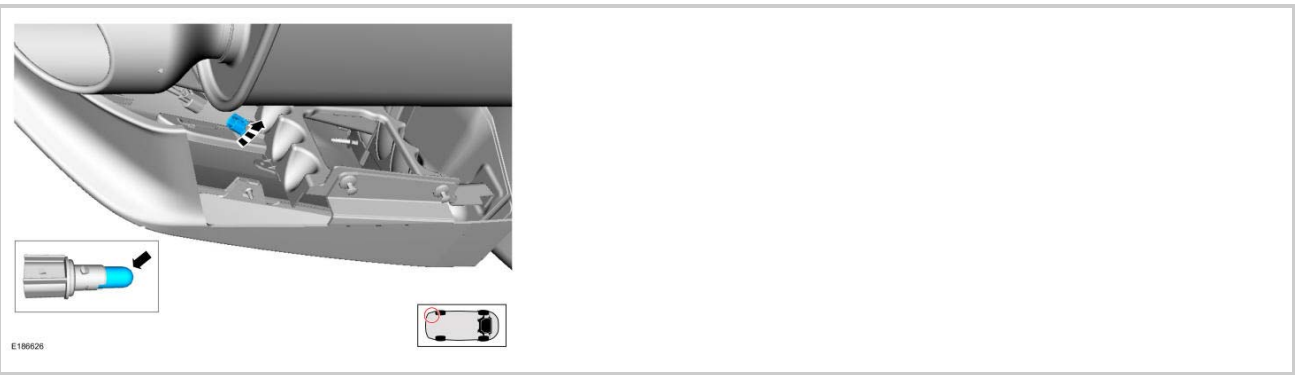
Disconnect the side lamp bulb electrical connector.



3.

Remove the bulb from the bulb holder.

Turn the bulb holder counter clockwise and remove the bulb holder.



REMOVAL AND INSTALLATION > SIDE LAMP BULB > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > SIDE TURN SIGNAL LAMP > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

NOTE: LH is shown, RH is similar.

All vehicles

1.

Raise the vehicle on a hoist. Refer to: Jacking and Lifting - Overview .

Vehicles equipped with side obstacle detection

2.

Remove the rear bumper cover. Refer to: Rear Bumper Cover .

All vehicles

3.

Remove the side turn signal.

1.

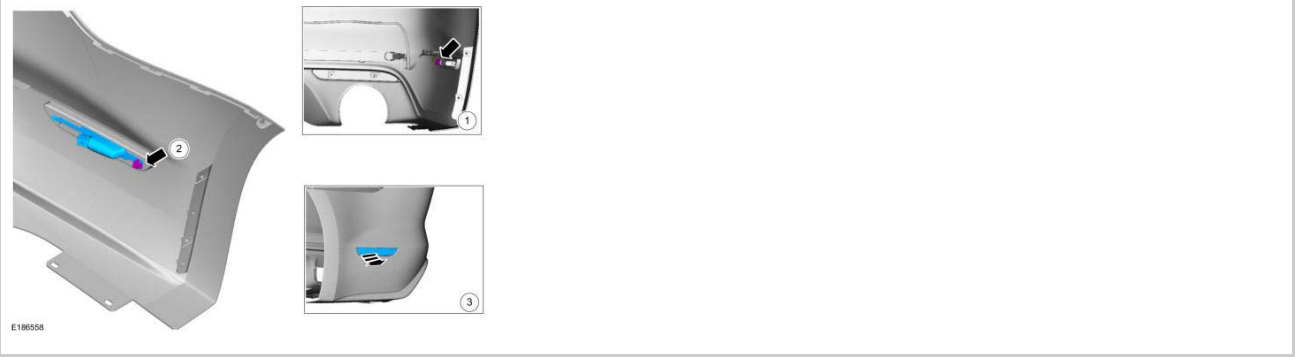
Disconnect the electrical connector.

2.

Release the tab.

3.

Remove the side turn signal.



REMOVAL AND INSTALLATION > SIDE TURN SIGNAL LAMP > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > STOPLAMP SWITCH > REMOVAL

NOTE: Do not press or pull on brake pedal when installing or removing the stoplamp switch otherwise misadjustment or damage to the stoplamp switch can occur

1.

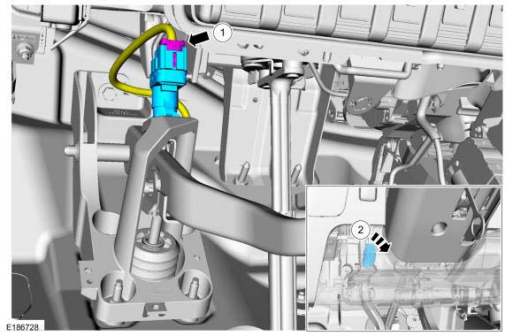
Remove the stoplamp switch.

1.

Disconnect the stoplamp switch electrical connector.

2.

Turn the stoplamp switch clockwise.

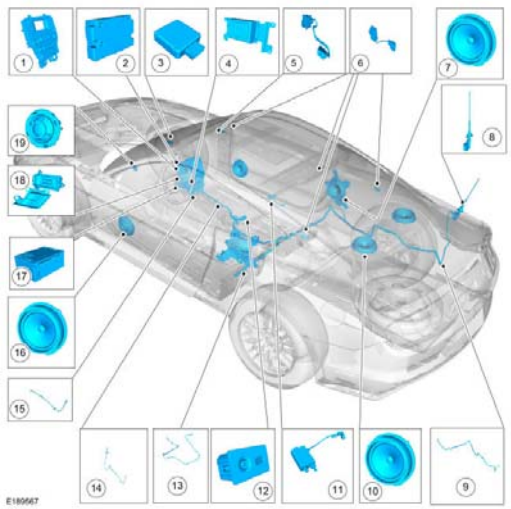


REMOVAL AND INSTALLATION > STOPLAMP SWITCH > INSTALLATION

1.

To install, reverse the removal procedure.

DESCRIPTION AND OPERATION > INFORMATION AND ENTERTAINMENT SYSTEM - COMPONENT LOCATION



Item	Description
1	FCIM
2	APIM (Located behind the FCDIM)
3	GPSM
4	4.2-inch (107 mm) FCDIM
5	SYNC ® microphone (located in the overhead console)
6	ANC microphones - 2.3L only (coupe: located in the overhead console and center rear of the headliner) / (convertible: located in the overhead console, RHR quarter panel, and LHR quarter panel)
7	RHR quarter panel full-range speaker (LHR also shown) (convertible)
8	RHR fender-mounted AM/ FM mast antenna (convertible)
9	Rear AM/ FM antenna coaxial cable for the RHR fender-mounted AM/ FM mast antenna (convertible)
-	Front AM/ FM antenna coaxial cable (Not shown)
10	Left parcel shelf full-range speaker (right also shown) (coupe)
11	AM/ FM antenna amplifier (coupe)
12	Audio input jack and rear USB port (USB2)
13	Rear AM/ FM antenna coaxial cable for the AM/ FM on-glass antenna grid (coupe)
14	Rear USB port/cable (USB2)

15	Front USB port/cable (USB1)
16	LHF door midwoofer speaker (RHF also shown)
17	ACM (contains DACMC for 2.3L and 5.2L)
18	RH upper and lower steering wheel switches
19	LHF A-pillar tweeter speaker (RHF also shown)

DESCRIPTION AND OPERATION > INFORMATION AND ENTERTAINMENT SYSTEM - OVERVIEW > OVERVIEW

The audio system consists of the following:

Main Components

- 6 speakers
- 4.2-inch (107 mm) non-touchscreen FCDIM
- ACM (contains DACMC for 2.3L and 5.2L)
- AM/ FM antenna
- APIM
- Audio input jack
- FCIM
- Front USB port/cable (USB1)
- GPSM
- Rear USB port/cable (USB2)
- RH audio steering wheel switches
- SYNC ® microphone

Main Features

- AM radio
- ANC (2.3L only)
- Battery load shed
- Compass
- ESE (2.3L and 5.2L only)
- FM radio
- MyKey ®

- Speed compensated volume
- SYNC ®
- SYNC ® AppLink™

DESCRIPTION AND OPERATION > INFORMATION AND ENTERTAINMENT SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION

System Operation

DESCRIPTION AND OPERATION > INFORMATION AND ENTERTAINMENT SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION > NETWORK MESSAGE CHART

A missing network message is indicated by a U-code DTC and can be the result of intermittent concerns such as damaged wiring or low battery voltage occurrences. Additionally, vehicle repair procedures such as module reprogramming can set these Diagnostic Trouble Codes (DTCs). When a missing message DTC (U-code) sets, it is important to look for symptoms present in the audio system and throughout the vehicle, and to review the complete message list to determine which other modules rely on the same message. Refer to: MODULE COMMUNICATIONS NETWORK . See CAN Multiplex Messages.

When the other modules have been identified, run the self-test for those modules. If the same message is missing from those modules, the identical, or similar lost communication Diagnostic Trouble Codes (DTCs) may be set in those modules. Confirmation of missing messages common to multiple modules can indicate that the originating module is the source of the concern, or that the communication network may be at fault.

It is very important to understand the following:

- Where the input originates
- All of the information necessary for a feature to operate
- Which module(s) receive(s) the input or command message
- Which module controls the output of the feature
- If the module that receives the input controls the output of the feature, or whether it outputs a message over the CAN to another module.

Module Network Input Messages - ACM

Broadcast Message	Originating Module	Message Purpose
Audio settings	IPC	Used to set the radio listening source (AM/ FM) from the steering wheel switch.

Belt-Minder ® audio mute	IPC	Used to mute speaker output so the Belt-Minder ® tone can be more easily heard. This message only applies to vehicles with a MyKey ® enabled and in use. The audio system is muted until the safety belt(s) are buckled.
Day/night status	BCM	Used for day/night illumination status for the audio system.
Ignition status	BCM	Used to indicate the ignition state (OFF, ACCESSORY, RUN, and START) required for ACM operating modes and fault reporting.
Instrument panel cluster chime	IPC	Used to request a warning chime to be played through the audio system.
MyKey ® volume limit status	IPC	Used to limit the maximum audio system volume when a MyKey ® restricted key is in use.
Power mode	IPC	Used to disable the functionality of the ACM due to the load shedding feature.
Power up chime modules	IPC	Used to initiate the audio system as the chime source.
Vehicle configuration data	BCM	Used to verify vehicle configuration data such as the VIN and system module configuration.

Module Network Input Messages - APIM

Broadcast Message	Originating Module	Message Purpose
Airbag deployment status	RCM	Used to monitor airbag deployment status for 911 Assist™.
eCall notification	RCM	Used to notify of a 911 Assist™ call being initiated due to airbag deployment.
FCIM bezel diagnostic status	GWM	Used to display the requested bezel diagnostics operations in the centerstack infotainment display.
FCIM button state	FCIM	Used to indicate when a button is pressed on the FCIM so the audio system can make the desired setting change.

Gear lever position	IPC	Used to verify the gear selector position for bezel diagnostics.
GPS data	GPSM	Used for vehicle positioning, heading, and direction for navigation and 911 Assist™.
Ignition key type	BCM	Used to determine if a MyKey ® is enabled and in use.
Ignition status	BCM	Used to indicate the ignition state (OFF, ACCESSORY, RUN, and START) required for APIM operating modes and fault reporting.
MyKey ® volume limit status	IPC	Used to limit the maximum audio system volume when a MyKey ® restricted key is in use.
Navigation rolling wheel count and direction	ABS module	Used to provide more accurate vehicle position tracking when the GPS signal is temporarily unavailable.
Steering wheel switch status	SCCM	Used to indicate the button press status of the steering wheel switches.
Vehicle configuration data	BCM	Used to verify vehicle configuration data such as the VIN and system module configuration.
Vehicle speed	PCM	Used for navigation functionality.

Module Network Input Messages - DACMC (2.3L and 5.2L Only)

Broadcast Message	Originating Module	Message Purpose
Accelerator pedal position	PCM	Used to determine the throttle position status for the ANC system operation.
Driver's door ajar status	BCM	Used to enable the ANC system if the driver's door (and all other doors and luggage compartment lid) is closed, or to disable the ANC system if the driver's door is ajar.
Engine RPM data	PCM	Used to determine the engine rotation speed for the ANC system operation.
Engine status	PCM	Used to enable the ANC system if the engine is ON, or to disable the

		ANC system if the engine is OFF or Auto-Stopped.
Engine torque	PCM	Used for ANC system operation by indicating the amount of engine torque being produced (in Nm).
Ignition status	GWM	Used to indicate the ignition state (OFF, ACCESSORY, CRANK, RUN, and START) required for DACMC operating modes and fault reporting.
Luggage compartment lid ajar status	BCM	Used to enable the ANC system if the luggage compartment lid (and all other doors) is closed, or to disable the ANC system if the luggage compartment lid is ajar.
Passenger door ajar status	BCM	Used to enable the ANC system if the front passenger door (and all other doors and luggage compartment lid) is closed, or to disable the ANC system if the front passenger door is ajar.
Power up chime modules	IPC	Used to initiate the audio system as the chime source.

Module Network Input Messages - FCDIM

Broadcast Message	Originating Module	Message Purpose
ACM CD data	ACM	Used to display CD data on the FCDIM.
ACM configuration	ACM	Used to verify that the correct configuration and modules are installed.
ACM radio functions	ACM	Used to display the ACM radio functions such as seek, tune and AM/ FM stations on the FCDIM.
ACM volume and mode status	ACM	Used to display audio volume and mode status on the FCDIM.
Audio source status	ACM	Used to display the selected audio source on the FCDIM.
CD load/eject	ACM	Used to display the loaded or ejected CD status on the FCDIM.

Date and time	IPC	Used to display the current date and time on the FCDIM.
Display language selection	IPC	Used to display information on the FCDIM in the selected language.
Door ajar status	BCM	Used to determine the door ajar status for the accessory delay feature.
Ignition status	IPC	Used to indicate the ignition state (OFF, ACCESSORY, RUN, and START) required for FCDIM operating modes and fault reporting.
Illumination dimming level	BCM	Used to control the backlight intensity of the FCDIM based on the dimmer switch input.
Phone call data	APIM	Used to send phone call data to the FCDIM.
Radio broadcast band selection	ACM	Used to display the selected radio tuner band on the FCDIM.
Transport Mode	IPC	Used to disable the functionality of the FCDIM until taken out of transport mode.
Vehicle configuration/information	IPC	Used to send vehicle configuration information to the FCDIM.
Vehicle speed	PCM	Used to determine the appropriate temperature display update rate.

Module Network Input Messages - FCIM

Broadcast Message	Originating Module	Message Purpose
Audio source selection	ACM	Used to indicate the selected audio system source.
Day/night status	BCM	Used for day/night illumination status for the FCIM.
Ignition status	BCM	Used to indicate the ignition state (OFF, ACCESSORY, RUN, and START) required for FCIM operating modes and fault reporting.

Power mode	IPC	Used to disable the functionality of the FCIM due to the load shedding feature.
Vehicle configuration data	BCM	Used to verify vehicle configuration data such as the VIN and system module configuration.

Module Network Input Messages - GPSM

Broadcast Message	Originating Module	Message Purpose
Ignition status	BCM	Used to indicate the ignition state (OFF, ACCESSORY, RUN, and START) required for GPSM operating modes and fault reporting.
Vehicle configuration data	BCM	Used to verify vehicle configuration data such as the VIN and system module configuration.
Vehicle yaw rate	RCM	Used to verify the vehicle acceleration data for navigation.
Wheel rotation count	BCM	Used to provide more accurate vehicle position tracking when the GPS signal is temporarily unavailable.
Wheel rotation direction	BCM	Used to determine wheel rotation direction for navigation.

Module Network Input Messages - IPC

Broadcast Message	Originating Module	Message Purpose
Audio source selection	ACM	Used to display the selected audio source on the IPC.
Display language request	APIM	Used to display information on the IPC in the selected language.
Multimedia player total play time status	APIM	Used to indicate the total play time of the audio track being played.

Module Network Input Messages - RCM

Broadcast Message	Originating Module	Message Purpose
eCall confirmation	APIM	Used to confirm the configuration of the 911 Assist™ feature, and to confirm the status of the 911

		Assist™ phone call.

DESCRIPTION AND OPERATION > INFORMATION AND ENTERTAINMENT SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION > ACCESSORY DELAY FEATURE

The accessory delay feature is a BCM-controlled software function that allows the audio system to be operated for a preset period of time after the ignition is turned off and a front door has not been opened.

DESCRIPTION AND OPERATION > INFORMATION AND ENTERTAINMENT SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION > AM/ FM RADIO

The AM/ FM on-glass antenna grid (coupe) or fender-mounted antenna (convertible) receives analog radio waves and sends them through the AM/ FM antenna amplifier (coupe) and AM/ FM antenna coaxial cable to the ACM. The radio waves are converted into fluctuating AC voltage and sent as left and right analog audio signals to the speakers.

DESCRIPTION AND OPERATION > INFORMATION AND ENTERTAINMENT SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION > ANC - 2.3L

ANC is an audio system feature that eliminates a certain range of low frequency engine noise within the passenger compartment typically induced under wide open throttle or heavy part-throttle conditions. The system uses two (coupe) or three (convertible) microphones, a DACMC (contained within the ACM), and the audio system speakers. The DACMC determines the noise frequency to be canceled based upon engine rotation speed data, engine torque data, and accelerator pedal position data from the PCM, as well as microphone input signals.

While the engine is running, the ANC microphones located in the overhead console and center rear of the headliner (coupe), or overhead console, RHR quarter panel, and LHR quarter panel (convertible) monitor the engine noise resonating in the passenger compartment. The microphones transmit this noise as analog signals to the DACMC (contained within the ACM), where they are converted into digital signals by the integrated analog/digital converter. The digital signals are processed and an inverted phase sound wave with the same amplitude as the original sound is created. This new sound is converted into an analog audio signal, transmitted to the DACMC internal tone generator, and output by the ACM to the LHF and RHF door midwoofer speakers, and left and right parcel shelf full-range speakers (coupe) or RHR and LHR quarter panel full-range speakers (convertible) as fluctuating AC voltage.

DESCRIPTION AND OPERATION > INFORMATION AND ENTERTAINMENT SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION > AUDIO INPUT JACK MODE

When a portable audio device, such as an iPod ® with its available cable, is connected to the vehicle audio system through the audio input jack, audio from the device can be played through the vehicle speakers. Only the volume can be controlled with the vehicle audio controls. All other functions such as

seek, fast forward, pause, etc. must be carried out on the device itself.

No metadata (information such as artist, album title, song title, and genre) is transmitted when a device is connected to the audio input jack.

DESCRIPTION AND OPERATION > INFORMATION AND ENTERTAINMENT SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION > BATTERY LOAD SHED

The BCM uses the battery current sensor to monitor the battery state of charge. The battery current sensor is attached to the battery ground cable. With the ignition in RUN, ACC, or OFF, a load shed message is sent over the CAN when the BCM determines that the battery state of charge is below 40%, 45 minutes have elapsed, or 10% of the charge has been drained. This message turns off the audio system to save the remaining battery charge. Under this condition, "Battery Saver - System Off" is displayed on the FCDIM to notify the driver that battery protection actions are active. To clear the load shed state, start the vehicle.

DESCRIPTION AND OPERATION > INFORMATION AND ENTERTAINMENT SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION > BLUETOOTH MODE

Bluetooth is a secure, short-range radio frequency that allows devices to communicate wirelessly through radio waves. The operating range of a Bluetooth signal is application specific, but will have a minimum range of 10 meters (33 feet).

The APIM Bluetooth chipset supports multiple Bluetooth profiles, allowing the SYNC ® system to interact with both Bluetooth-enabled phones and Bluetooth-enabled media devices.

Any Bluetooth-enabled device used with the SYNC ® system must first be paired with the APIM Bluetooth chipset before it can become operational. Pairing a Bluetooth-enabled device is accomplished through the "Add Device" selection of the phone menu. When pairing a device, the SYNC ® system generates a unique PIN that must be entered on the Bluetooth-enabled device in order for the pairing process to be successful. There are also some device-specific actions that must take place. For information on the pairing process, refer to the Owner's Literature.

Multiple Bluetooth-enabled phones and Bluetooth-enabled media devices can be paired to the APIM at the same time. The APIM supports an active connection with one Bluetooth-enabled phone and one Bluetooth-enabled media device at a time. If an additional device of either type is paired and made active, the APIM ends any active connection with an already-paired device, and establishes an active connection with the new device.

It is important to understand that while most Bluetooth-enabled devices can pair with the SYNC ® system, not all Bluetooth-enabled devices have the same level of available features when interacting with the SYNC ® system. To determine if a Bluetooth-enabled device or feature is supported, review the device compatibility list. Refer to owner.ford.com/how-tos/sync-technology/all/phone-setup/how-your-device-works-with-sync.html?version=sync.

For more information, refer to "Bluetooth" in the Owner's Literature.

DESCRIPTION AND OPERATION > INFORMATION AND ENTERTAINMENT SYSTEM -

SYSTEM OPERATION AND COMPONENT DESCRIPTION > CHIMES

Various vehicle systems send chime requests over the CAN to the IPC. The following are determined as the IPC processes these requests:

- Chime characteristics such as tone, tone length, number of repetitions, and time between tones
- Chime output volume
- Priority of the chime request
- Which speakers (all, front, or rear) will play the specific chime

The IPC sends the processed requests over the CAN to the ACM. The ACM outputs the left and right analog chime tones to the appropriate audio system speakers as fluctuating AC voltage.

For more information, Refer to: Warning Chimes - Overview . For even more information, Refer to: Warning Chimes - System Operation and Component Description .

DESCRIPTION AND OPERATION > INFORMATION AND ENTERTAINMENT SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION > COMPASS

The GPS antenna integral to the GPSM is used to acquire the compass heading. The compass heading is sent through the CAN to the APIM. The APIM uses this data in addition to wheel speed and wheel rotation direction CAN messages from the ABS module to calculate and provide accurate vehicle tracking. The APIM processes the data and transmits it to be displayed on the FCDIM. In the event that the GPS fix or signal is temporarily lost, the APIM will continue to use the CAN messages from the ABS module to provide accurate vehicle tracking.

DESCRIPTION AND OPERATION > INFORMATION AND ENTERTAINMENT SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION > ESE - 2.3L AND 5.2L

ESE is an audio system feature that enhances certain engine tones typically induced under wide open throttle or heavy part-throttle conditions. The system uses a DACMC (contained within the ACM) and the audio system speakers.

The DACMC determines the engine tone to enhance based upon engine rotation speed data, engine torque data, and accelerator pedal position data from the PCM. The data from the PCM is processed and converted into an analog audio signal, transmitted to the DACMC internal tone generator, and output by the ACM to the LHF and RHF door midwoofer speakers as fluctuating AC voltage.

DESCRIPTION AND OPERATION > INFORMATION AND ENTERTAINMENT SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION > MYKEY ® AUDIO OPERATION

- The following MyKey ® features are always enabled when a MyKey ® is in use, and are not configurable on/off with an administrator key:

    - Belt-Minder ®: The audio system is muted, and "MyKey Buckle Up to Unmute Audio" is displayed in the information display until the safety belts are buckled.

- The following MyKey ® features are configurable with an administrator key:
    - 911 Assist™: If the administrator has selected "Always On" in the MyKey ® menu, 911 Assist™ is enabled and cannot be disabled.
    - Do Not Disturb: If the administrator has selected "Always On" in the MyKey ® menu, the Do Not Disturb feature is enabled and cannot be disabled.
    - Speed Compensated Volume: If the administrator has enabled the Volume Limiter feature, the speed compensated volume feature will be disabled.
    - Speed Limiter: If the administrator has enabled the Speed Limiter feature, the audio volume level is temporarily reduced so the top speed alert chime can be heard when the preselected top vehicle speed is reached.
    - Speed Minder: If the administrator has enabled the Speed Minder feature, the audio volume level is temporarily reduced so the speed alert chime can be heard when the preselected Speed Minder vehicle speed is exceeded.
    - Volume Limiter: If the administrator has enabled the Volume Limiter feature, the audio system volume is limited to 45%. In an attempt to exceed the limited volume, "MyKey ® VOLUME LIMITED" is displayed on the information display.

For more information, refer to "MyKey ®" in the Owner's Literature.

DESCRIPTION AND OPERATION > INFORMATION AND ENTERTAINMENT SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION > RDS

RDS allows metadata (information such as station call letters, artist, song title, and genre) to be contained within FM radio waves. If the RDS feature is turned on, a PTY (Program Type) can be chosen. Once the customer has chosen a single PTY such as Sports, Rock, Religious Music, or Weather, the SEEK or SCAN button is pressed, and the ACM only tunes channels within the selected category. If a channel within the selected category is not found, the ACM will continually seek or scan.

DESCRIPTION AND OPERATION > INFORMATION AND ENTERTAINMENT SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION > SPEED COMPENSATED VOLUME

">Speed Compensated Volume: If the administrator has enabled the Volume Limiter feature, the speed compensated volume feature will be disabled.

- Speed Limiter: If the administrator has enabled the Speed Limiter feature, the audio volume level is temporarily reduced so the top speed alert chime can be heard when the preselected top vehicle speed is reached.
- Speed Minder: If the administrator has enabled the Speed Minder feature, the audio volume level is temporarily reduced so the speed alert chime can be heard when the preselected Speed Minder

vehicle speed is exceeded.

- Volume Limiter: If the administrator has enabled the Volume Limiter feature, the audio system volume is limited to 45%. In an attempt to exceed the limited volume, "MyKey ® VOLUME LIMITED" is displayed on the information display.

For more information, refer to "MyKey ®" in the Owner's Literature.

RDS

RDS allows metadata (information such as station call letters, artist, song title, and genre) to be contained within FM radio waves. If the RDS feature is turned on, a PTY (Program Type) can be chosen. Once the customer has chosen a single PTY such as Sports, Rock, Religious Music, or Weather, the SEEK or SCAN button is pressed, and the ACM only tunes channels within the selected category. If a channel within the selected category is not found, the ACM will continually seek or scan.

Speed Compensated Volume

The ACM compensates for wind and road noise by adjusting the audio system volume based on the VSS signal and customer-defined setting.

When a MyKey ® is in use and the MyKey ® Volume Limiter is enabled, the speed compensated volume is disabled.

DESCRIPTION AND OPERATION > INFORMATION AND ENTERTAINMENT SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION > STEERING WHEEL SWITCH FUNCTIONS

The RH steering wheel switches consist of an upper 5-way switch, and a lower 4-way switch. The upper 5-way steering wheel switch operates the volume +/-, seek +/-, and the audio mode. The lower 4-way steering wheel switch operates the voice, s end/receive call, end call, and mute functions.

DESCRIPTION AND OPERATION > INFORMATION AND ENTERTAINMENT SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION > SYNC® APPLINK™

SYNC ® AppLink™ allows Applications installed on the customer's device to be controlled using the steering wheel switches and/or FCIM.

All devices must be paired with the SYNC ® system via Bluetooth, and Apple ® devices must also be connected to a USB port.

Data is transmitted back and forth between the customer's device and the APIM through Bluetooth, or through the USB port with Apple ® devices.

For more information, refer to "AppLink" in the Owner's Literature.

DESCRIPTION AND OPERATION > INFORMATION AND ENTERTAINMENT SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION > SYNC ® SYSTEM

The SYNC ® system uses audio input jack, Bluetooth, USB, microphone, and CAN message APIM inputs to control the entertainment system and phone.

The SYNC ® system provides the following abilities:

- Send and receive phone calls via a paired Bluetooth-enabled phone
- Send and receive text messages via a paired Bluetooth-enabled phone
- Connect media devices (such as an iPod ®, USB device, or Bluetooth-enabled audio device) in order to play audio files
- Initiate an emergency assistance call (911 Assist™) when the airbags deploy (for more information, refer to "911 Assist™" in the Owner's Literature)

All SYNC ® system features are not available with every phone/device. To determine if the APIM supports a particular phone, tablet, or media player, or feature of one of those devices, review the device compatibility list. Refer to owner.ford.com/how-tos/sync-technology/all/phone-setup/how-your-device-works-with-sync.html?version=sync.

The customer can update the CIP by using a USB flash drive. For more information, refer to owner.ford.com.

For more information on the SYNC ® system, refer to "SYNC" in the Owner's Literature.

DESCRIPTION AND OPERATION > INFORMATION AND ENTERTAINMENT SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION > USB AUDIO MODE

When a portable media device, such as an iPod ® with its available cable or portable mass storage such as a USB flash drive, is connected to the vehicle audio system through the USB ports, audio from the device can be played through the vehicle speakers. Functions such as volume, seek, fast forward, pause, etc. can be controlled with the vehicle's audio controls.

When playing media files stored on a mass storage device such as a USB flash drive, the SYNC ® system only plays supported file types that do not have DRM protection, and are contained on a properly formatted device. For more information, refer to "Supported Media Players, Formats and Metadata Information" in the Owner's Literature.

In addition to audio information (track length, track number, etc.), metadata (information such as artist, album title, song title, and genre) may also be sent to the APIM from a device connected to the USB ports. The APIM uses the metadata to create indexes that can be used to sort for particular music based on the customer's preferences. Not all USB devices can send metadata to the APIM. When a new media device is connected to the SYNC ® system, the APIM automatically indexes the information. This may take several minutes depending on the amount of data on the device, and is considered normal operation. When a device that was previously connected to the SYNC ® system is reconnected, the APIM updates the index rather than creating a new one. This reduces the time needed to index the device.

DESCRIPTION AND OPERATION > INFORMATION AND ENTERTAINMENT SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION > VOICE RECOGNITION

Voice recognition allows certain phone and audio system functions to be controlled with voice commands to reduce or eliminate the need to interact with the FCIM, FCDIM, and/or device while driving.

When the voice steering wheel switch is pressed, an audible prompt originating from the APIM is heard from the speakers. Based on the customer's setting, audible prompts will either be a voice or a simple tone. When interaction mode is set to standard, detailed voice guidance is provided. When interaction mode is set to advanced, most prompts are tones only, and minimal voice guidance is provided. The microphone receives the voice commands and sends them to the APIM. For more information, refer to "voice recognition" in the Owner's Literature.

DESCRIPTION AND OPERATION > INFORMATION AND ENTERTAINMENT SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION > COMPONENT DESCRIPTION > ACM

The ACM can be operated with the ignition in RUN, ACC, or OFF.

The ACM receives radio waves containing audio from the antenna coaxial cable(s)s and converts them into fluctuating AC voltage. The ACM receives stereo and mono audio signals from the APIM in the form of fluctuating AC voltage. The ACM processes all inputs, and depending on the input received, sends stereo or mono analog audio signals to the speakers as fluctuating AC voltage.

The ACM contains the CD player.

The ACM contains the DACMC for vehicles with the 2.3L or 5.2L.

The ACM and DACMC require separate PMI procedures when the ACM is replaced.

DESCRIPTION AND OPERATION > INFORMATION AND ENTERTAINMENT SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION > COMPONENT DESCRIPTION > AM/ FM ANTENNA AMPLIFIER - COUPE

The AM/ FM antenna amplifier receives AM/ FM radio waves from the on-glass antenna grid. The AM/ FM antenna amplifier is powered by the ACM and amplifies AM audio signals to improve reception. The AM/ FM radio waves are sent through the AM/ FM antenna coaxial cable to the ACM.

DESCRIPTION AND OPERATION > INFORMATION AND ENTERTAINMENT SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION > COMPONENT DESCRIPTION > ANC MICROPHONES - 2.3L

For a coupe, two ANC microphones (overhead console-mounted and center rear headliner-mounted) measure the amplitude and phase of the engine noise inside the passenger compartment. For a convertible, three ANC microphones (overhead console-mounted, RHR quarter panel, and LHR quarter panel) measure the amplitude and phase of the engine noise inside the passenger compartment. The monitored sounds are converted into analog signals by the microphones and sent to the DACMC (contained within the ACM).

DESCRIPTION AND OPERATION > INFORMATION AND ENTERTAINMENT SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION > COMPONENT DESCRIPTION > ANTENNA

The AM/ FM radio uses the on-glass (coupe) AM/ FM antenna grid or fender-mounted (convertible) AM/ FM antenna to receive analog radio waves. The radio waves are sent through the AM/ FM antenna amplifier (coupe) or amplifier integrated into the antenna base (convertible) and AM/ FM antenna coaxial cable to the ACM, where they are further amplified.

To compensate for AM signal strength loss as the radio waves are transmitted from the antenna to the ACM, battery voltage is applied to the antenna to boost the AM radio signal. This allows the AM radio waves entering the ACM to be approximately the same strength as they were before amplification at the antenna.

DESCRIPTION AND OPERATION > INFORMATION AND ENTERTAINMENT SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION > COMPONENT DESCRIPTION > APIM

The APIM can be operated with the ignition in RUN, ACC, or OFF.

The APIM receives stereo and mono inputs. Stereo inputs include audio from the USB ports, audio input jack, connected Bluetooth media device, and outside device during a phone call. The mono input includes signals from the SYNC ® microphone.

Stereo outputs include audio from the USB ports, audio input jack, and connected Bluetooth-enabled media device. Mono outputs include audio from the TTS feature, incoming call ringtone, ringback tone, outside device during a phone call, voice or tone prompts initiated from the voice steering wheel switch and FCIM, and SYNC ® system instructions.

The TTS feature allows the customer to hear information through the audio system speakers so it does not have to be read from the FCDIM and/or device while driving. Examples include incoming text message sender information, text messages, and metadata from audio being played via USB or Bluetooth.

The APIM consists of two internal modules: the CIP and the VIP. The modules are not replaceable individually, but can be programmed independently if required.

The CIP interfaces with all of the customer inputs to the APIM. It contains an analog-to-digital-to-analog converter, as well as the Bluetooth chipset.

The VIP provides an interface between the CIP and the vehicle inputs. Its main functions are controlling the APIM power management and translating inbound and outbound CAN signals.

The APIM requires programming when it is replaced.

DESCRIPTION AND OPERATION > INFORMATION AND ENTERTAINMENT SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION > COMPONENT

DESCRIPTION > AUDIO INPUT JACK

The audio input jack can be used to play audio files from an audio device connected through the 1/8-inch (3.5 mm) audio jack.

Audio signals are sent from the audio input jack to the APIM.

There are no power or ground circuits to the audio input jack.

DESCRIPTION AND OPERATION > INFORMATION AND ENTERTAINMENT SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION > COMPONENT DESCRIPTION > DACMC - 2.3L OR 5.2L

The DACMC ANC and ESE functions only operate while the engine is running, and the luggage compartment lid and all doors are closed.

The DACMC is a digital signal processor that consists of an internal analog/digital converter and tone generator.

For ANC, the DACMC uses engine rotation speed data, engine torque data, accelerator pedal position data, and ANC microphone input signals to calculate the targeted frequency needed to cancel engine noise within the passenger compartment. For ESE, the DACMC uses engine rotation speed data, engine torque data, and accelerator pedal position data from the PCM to calculate the targeted frequency needed to enhance engine noise within the passenger compartment. The DACMC engine ANC signals are output by the ACM to the LHF and RHF door midwoofer speakers, and left and right parcel shelf full-range speakers (coupe) or RHR and LHR quarter panel full-range speakers (convertible) as fluctuating AC voltage. The DACMC ESE frequency signals are output by the ACM to the LHF and RHF door midwoofer speakers as fluctuating AC voltage.

When the engine is running and the audio system is in use, the ACM fluctuating AC voltage output signals to the LHF and RHF door midwoofer speakers, and left and right parcel shelf full-range speakers (coupe) or RHR and LHR quarter panel full-range speakers (convertible) contain a mixture of the engine ANC and ESE frequency with the audio signals.

The DACMC is contained within the ACM.

The DACMC and ACM require separate PMI procedures when the ACM is replaced.

DESCRIPTION AND OPERATION > INFORMATION AND ENTERTAINMENT SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION > COMPONENT DESCRIPTION > FCDIM

The FCDIM can be operated with the ignition in RUN, ACC, or OFF.

The FCDIM displays infotainment data received from various modules over the CAN. If the FCDIM loses the signal from any of these modules, only those specific displays will be inoperative. For more information, Refer to: Information and Entertainment System - System Operation and Component Description . See Module Network Input Messages - FCDIM.

The FCDIM requires PMI when it is replaced.

DESCRIPTION AND OPERATION > INFORMATION AND ENTERTAINMENT SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION > COMPONENT DESCRIPTION > FCIM

The FCIM audio functions can be operated with the ignition in RUN, ACC, or OFF.

The FCIM audio system buttons provide one of the methods through which the customer interacts with the infotainment system.

The FCIM is separate from the ACM.

The FCIM requires PMI when it is replaced.

DESCRIPTION AND OPERATION > INFORMATION AND ENTERTAINMENT SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION > COMPONENT DESCRIPTION > GPSM

The GPS antenna integral to the GPSM is used to acquire the compass heading. The compass heading is sent over the CAN to be displayed on the FCDIM.

The GPSM provides vehicle location information for identifying the vehicle location in the event of a collision.

The GPSM requires PMI when it is replaced.

DESCRIPTION AND OPERATION > INFORMATION AND ENTERTAINMENT SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION > COMPONENT DESCRIPTION > NOISE SUPPRESSION EQUIPMENT

The radio frequency suppression equipment reduces interference transmitted through the speakers by the engine, ignition, and electrical systems. When installing any new radio suppression equipment components, make sure that a good contact is made at all connections.

DESCRIPTION AND OPERATION > INFORMATION AND ENTERTAINMENT SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION > COMPONENT DESCRIPTION > STEERING WHEEL SWITCHES

The RH upper and lower steering wheel switches contain series of resistors. Each steering wheel switch function corresponds with a specific resistance value within the switch.

The SCCM sends a 5-volt reference voltage to the RH upper and lower steering wheel switches on the input circuit. When a switch is pressed, the voltage is routed through the corresponding resistor(s), through the return circuit, and then to ground through the SCCM. The SCCM monitors the resultant voltage drop to determine which switch was pressed. The voltage drop varies depending upon the

resistance of the specific switch pressed.

The steering wheel switch inputs are sent as network messages from the FCDIM to the APIM to control SYNC ® functions, or to the ACM to control audio functions.

The RH upper steering wheel switch inputs are sent as network messages from the SCCM to the ACM to control audio functions.

The RH lower steering wheel switch inputs are sent as network messages from the SCCM to the APIM to control SYNC ® functions, or to the ACM to control audio functions.

DESCRIPTION AND OPERATION > INFORMATION AND ENTERTAINMENT SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION > COMPONENT DESCRIPTION > SYNC® MICROPHONE

The SYNC ® microphone is powered by the APIM.

The SYNC ® microphone receives SYNC ® system voice commands and outgoing audio during a phone call. The monitored sounds are converted into analog signals by the microphone and sent to the APIM as fluctuating AC voltage.

DESCRIPTION AND OPERATION > INFORMATION AND ENTERTAINMENT SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION > COMPONENT DESCRIPTION > USB PORTS/CABLES

Data is sent from the front USB port (USB1) to the APIM (USB cable with black end) through the front USB cable. Data is sent from the rear USB port (USB2) to the APIM (USB cable with grey end) through the rear USB cable.

The USB ports are part of the USB cables, and cannot be replaced separately.

The USB ports are powered through the USB cables by the APIM and can be used to power and/or charge a device if the device supports this feature. If the device does not support this feature, an external power source is needed in order to power the device.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM

For a SYNC ®-related concern, refer to the SYNC ® System Symptom Chart before connecting the scan tool and beginning DTC-based diagnostics.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > DTC CHART: ACM

DTC	Description	Action

B1142:27	Ignition Status 1: Signal Rate of Change Above Threshold	GO to Pinpoint Test G
B1A01:01	Speaker #1: General Electrical Failure	For a LHF door speaker concern, GO to Pinpoint Test H For a LHF A-pillar tweeter speaker concern, GO to Pinpoint Test I
B1A01:11	Speaker #1: Circuit Short To Ground	For a LHF door speaker concern, GO to Pinpoint Test H For a LHF A-pillar tweeter speaker concern, GO to Pinpoint Test I
B1A01:12	Speaker #1: Circuit Short To Battery	For a LHF door speaker concern, GO to Pinpoint Test H For a LHF A-pillar tweeter speaker concern, GO to Pinpoint Test I
B1A01:13	Speaker #1: Circuit Open	For a LHF door speaker concern, GO to Pinpoint Test H For a LHF A-pillar tweeter speaker concern, GO to Pinpoint Test I
B1A02:01	Speaker #2: General Electrical Failure	For a RHF A-pillar tweeter speaker concern, GO to Pinpoint Test J For a RHF door speaker concern, GO to Pinpoint Test K
B1A02:11	Speaker #2: Circuit Short To Ground	For a RHF A-pillar tweeter speaker concern, GO to Pinpoint Test J For a RHF door speaker concern, GO to Pinpoint Test K
B1A02:12	Speaker #2: Circuit Short To Battery	For a RHF A-pillar tweeter speaker concern, GO to Pinpoint Test J For a RHF door speaker concern, GO to Pinpoint Test K
B1A02:13	Speaker #2: Circuit Open	For a RHF A-pillar tweeter speaker concern, GO to Pinpoint Test J For a RHF door speaker concern, GO to Pinpoint Test K
B1A03:01	Speaker #3: General Electrical Failure	For a RHR quarter panel speaker concern (coupe), GO to Pinpoint Test L For a right parcel shelf speaker concern (convertible), GO to Pinpoint Test M
B1A03:11	Speaker #3: Circuit Short To Ground	For a RHR quarter panel speaker concern (coupe), GO to Pinpoint Test L For a right parcel shelf speaker concern (convertible), GO to Pinpoint Test M

B1A03:12	Speaker #3: Circuit Short To Battery	For a RHR quarter panel speaker concern (coupe), GO to Pinpoint Test L For a right parcel shelf speaker concern (convertible), GO to Pinpoint Test M
B1A03:13	Speaker #3: Circuit Open	For a RHR quarter panel speaker concern (coupe), GO to Pinpoint Test L For a right parcel shelf speaker concern (convertible), GO to Pinpoint Test M
B1A04:01	Speaker #4: General Electrical Failure	For a left parcel shelf speaker concern (coupe), GO to Pinpoint Test N For a LHR quarter panel speaker concern (convertible), GO to Pinpoint Test O
B1A04:11	Speaker #4: Circuit Short To Ground	For a left parcel shelf speaker concern (coupe), GO to Pinpoint Test N For a LHR quarter panel speaker concern (convertible), GO to Pinpoint Test O
B1A04:12	Speaker #4: Circuit Short To Battery	For a left parcel shelf speaker concern (coupe), GO to Pinpoint Test N For a LHR quarter panel speaker concern (convertible), GO to Pinpoint Test O
B1A04:13	Speaker #4: Circuit Open	For a left parcel shelf speaker concern (coupe), GO to Pinpoint Test N For a LHR quarter panel speaker concern (convertible), GO to Pinpoint Test O
B1A56:21	Antenna: Signal Amplitude < Minimum	If DTC B1A56:21 sets after running the bezel diagnostic tests, DISREGARD this DTC. This test is used for end of line or repair bay testing at the Ford plant. Each plant has its own assigned frequency and signal strength requirements. The running and passing of this test depends on local radio stations. If no local station is broadcasting on the required frequency, the test will fail.

B1D19:49	Compact Disc Unit: Internal Electronic Failure	CLEAR the DTC. WAIT at least 10 seconds. REPEAT the self-test. If DTC B1D19:49 is retrieved again, INSTALL a new ACM. REFER to: Audio Front Control Module (ACM) .
B1D19:4B	Compact Disc Unit: Over Temperature	The ACM was over temperature. This may occur during extended use. Audio operation can resume after the ACM cools. CLEAR the DTC. This is normal operation.
U0100:00	Lost Communication With ECM/ PCM "A": No Sub Type Information	GO to Pinpoint Test AE
U0140:00	Lost Communication With Body Control Module: No Sub Type Information	GO to Pinpoint Test AF
U0142:00	Lost Communication With Body Control Module "B": No Sub Type Information	GO to Pinpoint Test AG
U0155:00	Lost Communication With Instrument Panel Cluster (IPC) Control Module: No Sub Type Information	GO to Pinpoint Test AI
U0237:00	Lost Communication With Digital Audio Control Module "C": No Sub Type Information	GO to Pinpoint Test AM
U0253:00	Lost Communication With Accessory Protocol Interface Module: No Sub Type Information	GO to Pinpoint Test AN
U0256:00	Lost Communication With Front Controls Interface Module "A": No Sub Type Information	GO to Pinpoint Test AO
U0257:00	Lost Communication With Front Controls / Display Interface Module: No Sub Type Information	GO to Pinpoint Test AP
U201A:51	Control Module Main Calibration Data: Not Programmed	This DTC sets due to an incorrect or incomplete ACM configuration. Using a diagnostic scan tool, PERFORM the ACM programming procedure using as-built data. For information on as-built data, REFER to: MODULE CONFIGURATION . See As-Built Data.
U2100:00	Initial Configuration Not Complete: No Sub Type Information	This DTC sets due to an incorrect or incomplete ACM configuration.

		Using a diagnostic scan tool, PERFORM the ACM programming procedure using as-built data. For information on as-built data, REFER to: MODULE CONFIGURATION . See As-Built Data.
U2101:00	Control Module Configuration Incompatible: No Sub Type Information	This DTC sets due to an incorrect or incomplete ACM configuration. Using a diagnostic scan tool, PERFORM the ACM programming procedure using as-built data. For information on as-built data, REFER to: MODULE CONFIGURATION . See As-Built Data.
U3000:41	Control Module: General Checksum Failure	CLEAR the DTC. WAIT at least 10 seconds. REPEAT the self-test. If DTC U3000:41 is retrieved again, INSTALL a new ACM. REFER to: Audio Front Control Module (ACM) .
U3000:42	Control Module: General Memory Failure	CLEAR the DTC. WAIT at least 10 seconds. REPEAT the self-test. If DTC U3000:42 is retrieved again, INSTALL a new ACM. REFER to: Audio Front Control Module (ACM) .
U3000:96	Control Module: Component Internal Failure	CLEAR the DTC. WAIT at least 10 seconds. REPEAT the self-test. If DTC U3000:96 is retrieved again, INSTALL a new ACM. REFER to: Audio Front Control Module (ACM) .
U3003:16	Battery Voltage: Circuit Voltage Below Threshold	GO to Pinpoint Test AQ
U3003:17	Battery Voltage: Circuit Voltage Above Threshold	GO to Pinpoint Test AR

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > DTC CHART: APIM

DTC	Description	Action
B1252:04	USB Port: System Internal Failure	GO to Pinpoint Test U
B1252:11	USB Port: Circuit Short To Ground	GO to Pinpoint Test U

B12B8:04	USB Port #2: System Internal Failure	GO to Pinpoint Test V
B12B8:11	USB Port #2: Circuit Short To Ground	GO to Pinpoint Test V
B1D79:01	Microphone Input: General Electrical Failure	GO to Pinpoint Test S
B1D79:11	Microphone Input: Circuit Short To Ground	GO to Pinpoint Test S
B1D79:12	Microphone Input: Circuit Short To Battery	GO to Pinpoint Test S
B1D79:13	Microphone Input: Circuit Open	GO to Pinpoint Test S
U0140:00	Lost Communication With Body Control Module: No Sub Type Information	GO to Pinpoint Test AF
U0151:00	Lost Communication With Restraints Control Module: No Sub Type Information	GO to Pinpoint Test AH
U0155:00	Lost Communication With Instrument Panel Cluster (IPC) Control Module: No Sub Type Information	GO to Pinpoint Test AI
U016A:00	Lost Communication With Global Positioning System Module: No Sub Type Information	GO to Pinpoint Test AK
U0184:00	Lost Communication With Radio: No Sub Type Information	GO to Pinpoint Test AL
U0257:00	Lost Communication With Front Controls / Display Interface Module: No Sub Type Information	GO to Pinpoint Test AP
U0422:00	Invalid Data Received From Body Control Module: No Sub Type Information	RETRIEVE and FOLLOW Diagnostic Trouble Codes (DTCs) present in the BCM. REFER to: Body Control Module (BCM) .* If no Diagnostic Trouble Codes (DTCs) are present in the BCM, DIAGNOSE the observable symptom.
U0423:00	Invalid Data Received From Instrument Panel Cluster Control Module: No Sub Type Information	RETRIEVE and FOLLOW Diagnostic Trouble Codes (DTCs) present in the IPC. REFER to: Instrumentation, Message Center and Warning Chimes .* If no Diagnostic Trouble Codes (DTCs) are present in the IPC, DIAGNOSE the observable symptom.

U0452:00	Invalid Data Received From Restraints Control Module: No Sub Type Information	RETRIEVE and FOLLOW Diagnostic Trouble Codes (DTCs) present in the RCM. REFER to: Airbag Supplemental Restraint System (SRS) .* If no Diagnostic Trouble Codes (DTCs) are present in the RCM, DIAGNOSE the observable symptom.
U2100:00	Initial Configuration Not Complete: No Sub Type Information	This DTC sets due to an incorrect or incomplete APIM programming/provisioning. Using a diagnostic scan tool, PERFORM the APIM programming procedure. REFER to: SYNC Module [APIM] Programming .
U2101:00	Control Module Configuration Incompatible: No Sub Type Information	This DTC sets due to an incorrect or incomplete APIM programming/provisioning. Using a diagnostic scan tool, PERFORM the APIM programming procedure. REFER to: SYNC Module [APIM] Programming .
U3000:04	Control Module: System Internal Failure	CLEAR the Diagnostic Trouble Codes (DTCs). WAIT at least 10 seconds. REPEAT the self-test. If DTC U3000:04 is retrieved again, PERFORM the APIM Hardware Test. Refer to APIM HARDWARE TESTING .
U3000:41	Control Module: General Checksum Failure	CLEAR the Diagnostic Trouble Codes (DTCs). WAIT at least 10 seconds. REPEAT the self-test. If DTC U3000:41 is retrieved again, PERFORM the APIM Hardware Test. Refer to APIM HARDWARE TESTING .
U3000:42	Control Module: General Memory Failure	CLEAR the Diagnostic Trouble Codes (DTCs). WAIT at least 10 seconds. REPEAT the self-test. If DTC U3000:42 is retrieved again, PERFORM the APIM Hardware Test. Refer to APIM HARDWARE TESTING .
U3000:88	Control Module: Bus Off	*NOTE: The module was unable to communicate on the network at a point in time. The fault is not currently present since the module had to communicate with the diagnostic scan tool to report this*

		DTC. **To avoid repeat network concerns:** INSPECT for damaged or corroded wiring at the APIM. Refer to Module Communications Network for schematic and connector information.CLEAR the DTC.WAIT at least 10 seconds.REPEAT the network test with the diagnostic scan tool.
U3003:16	Battery Voltage: Circuit Voltage Below Threshold	GO to Pinpoint Test AQ
U3003:17	Battery Voltage: Circuit Voltage Above Threshold	GO to Pinpoint Test AR

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > DTC CHART: DACMC - 2.3L AND 5.2L ONLY

DTC	Description	Action
B116A:01	Handset Microphone: General Electrical Failure	GO to Pinpoint Test AB
B117A:01	Backup Microphone: General Electrical Failure	GO to Pinpoint Test AC
B13F5:01	Microphone 3: General Electrical Failure	GO to Pinpoint Test AD
U0100:00	Lost Communication With ECM/ PCM "A": No Sub Type Information	GO to Pinpoint Test AE
U0140:00	Lost Communication With Body Control Module: No Sub Type Information	GO to Pinpoint Test AF
U0142:00	Lost Communication With Body Control Module "B": No Sub Type Information	GO to Pinpoint Test AG
U2024:00	Control Module Cal-Config Data: No Sub Type Information	This DTC sets due to an incorrect or incomplete DACMC configuration. Using a diagnostic scan tool, PERFORM the DACMC programming procedure using as-built data. For information on as-built data, REFER to: MODULE CONFIGURATION . See As-Built Data.

U2100:00	Initial Configuration Not Complete: No Sub Type Information	This DTC sets due to an incorrect or incomplete DACMC configuration. Using a diagnostic scan tool, PERFORM the DACMC programming procedure using as-built data. For information on as-built data, REFER to: MODULE CONFIGURATION . See As-Built Data.
U2101:00	Control Module Configuration Incompatible: No Sub Type Information	This DTC sets due to an incorrect or incomplete DACMC configuration. Using a diagnostic scan tool, PERFORM the DACMC programming procedure using as-built data. For information on as-built data, REFER to: MODULE CONFIGURATION . See As-Built Data.
U3000:41	Control Module: General Checksum Failure	CLEAR the Diagnostic Trouble Codes (DTCs). WAIT at least 10 seconds. REPEAT the self-test. If DTC U3000:41 is retrieved again, INSTALL a new ACM. REFER to: Audio Front Control Module (ACM) .
U3000:42	Control Module: General Memory Failure	CLEAR the Diagnostic Trouble Codes (DTCs). WAIT at least 10 seconds. REPEAT the self-test. If DTC U3000:42 is retrieved again, INSTALL a new ACM. REFER to: Audio Front Control Module (ACM) .
U3000:92	Control Module: Performance or Incorrect Operation	GO to Pinpoint Test E
U3000:94	Control Module: Unexpected Operation	If an observable symptom is **not** present, DISREGARD this DTC. If an observable symptom is present, GO to Pinpoint Test E
U3003:16	Battery Voltage: Circuit Voltage Below Threshold	GO to Pinpoint Test AQ
U3003:17	Battery Voltage: Circuit Voltage Above Threshold	GO to Pinpoint Test AR

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > DTC CHART: FCDIM

DTC	Description	Action
C1001:01	Vision System Camera: General Electrical Failure	REFER to: Parking Aid . See The Rear Video Is Inoperative.
U0140:00	Lost Communication With Body Control Module: No Sub Type Information	GO to Pinpoint Test AF
U0155:00	Lost Communication With Instrument Panel Cluster IPC Control Module: No Sub Type Information	GO to Pinpoint Test AI
U0159:00	Lost Communication With Parking Assist Control Module "A": No Sub Type Information	GO to Pinpoint Test AJ
U0184:00	Lost Communication With Radio: No Sub Type Information	GO to Pinpoint Test AL
U0253:00	Lost Communication With Accessory Protocol Interface Module: No Sub Type Information	GO to Pinpoint Test AN
U0256:00	Lost Communication With Front Controls Interface Module "A": No Sub Type Information	GO to Pinpoint Test AO
U201A:51	Control Module Main Calibration Data: Not Programmed	This DTC sets due to an incorrect or incomplete FCDIM configuration. Using a diagnostic scan tool, PERFORM the FCDIM programming procedure using as-built data. For information on as-built data, REFER to: MODULE CONFIGURATION . See As-Built Data.
U2100:00	Initial Configuration Not Complete: No Sub Type Information	This DTC sets due to an incorrect or incomplete FCDIM configuration. Using a diagnostic scan tool, PERFORM the FCDIM programming procedure using as-built data. For information on as-built data, REFER to: MODULE CONFIGURATION . See As-Built Data.
U2101:00	Control Module Configuration Incompatible: No Sub Type Information	This DTC sets due to an incorrect or incomplete FCDIM configuration. Using a diagnostic scan tool, PERFORM the FCDIM programming procedure using as-built data. For information on as-built data, REFER to: MODULE CONFIGURATION . See As-Built Data.

U3000:41	Control Module: General Checksum Failure	CLEAR the DTC. WAIT at least 10 seconds. REPEAT the self-test. If DTC U3000:41 is retrieved again, INSTALL a new ACM. REFER to: Audio Front Control Module (ACM) .
U3000:42	Control Module: General Memory Failure	CLEAR the DTC. WAIT at least 10 seconds. REPEAT the self-test. If DTC U3000:42 is retrieved again, INSTALL a new ACM. REFER to: Audio Front Control Module (ACM) .
U3003:16	Battery Voltage: Circuit Voltage Below Threshold	GO to Pinpoint Test AQ
U3003:17	Battery Voltage: Circuit Voltage Above Threshold	GO to Pinpoint Test AR

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > DTC CHART: FCIM

DTC	Description	Action
B00D5:01	Restraint System Passenger Disable Indicator: General Electrical Failure	CLEAR the Diagnostic Trouble Codes (DTCs). WAIT at least 10 seconds. REPEAT the self-test. If DTC B00D5:01 is retrieved again, INSTALL a new FCIM. REFER to: Front Controls Interface Module (FCIM) .
B1034:11	Left Front Seat Heater Element: Circuit Short To Ground	REFER to: FRONT SEATS . See DTC Chart: FCIM.
B1034:15	Left Front Seat Heater Element: Circuit Short To Battery or Open	REFER to: FRONT SEATS . See DTC Chart: FCIM.
B1036:11	Right Front Seat Heater Element: Circuit Short To Ground	REFER to: FRONT SEATS . See DTC Chart: FCIM.
B1036:15	Right Front Seat Heater Element: Circuit Short To Battery or Open	REFER to: FRONT SEATS . See DTC Chart: FCIM.
B1038:11	Left Front Seat Heater Sensor: Circuit Short To Ground	REFER to: FRONT SEATS . See DTC Chart: FCIM.
B1038:15	Left Front Seat Heater Sensor: Circuit Short To Battery or Open	REFER to: FRONT SEATS . See DTC Chart: FCIM.
B103A:11	Right Front Seat Heater Sensor: Circuit Short To Ground	REFER to: FRONT SEATS . See DTC Chart: FCIM.

B103A:15	Right Front Seat Heater Sensor: Circuit Short To Battery or Open	REFER to: FRONT SEATS . See DTC Chart: FCIM.
B1081:07	Left Temperature Damper Motor: Mechanical Failure	REFER to: Climate Control System - Vehicles With: Electronic Manual Temperature Control (EMTC) . See FCIM - EMTC DTC CHART
B1081:11	Left Temperature Damper Motor: Circuit Short To Ground	REFER to: Climate Control System - Vehicles With: Electronic Manual Temperature Control (EMTC) . See FCIM - EMTC DTC CHART
B1081:12	Left Temperature Damper Motor: Circuit Short To Battery	REFER to: Climate Control System - Vehicles With: Electronic Manual Temperature Control (EMTC) . See FCIM - EMTC DTC CHART
B1081:13	Left Temperature Damper Motor: Circuit Open	REFER to: Climate Control System - Vehicles With: Electronic Manual Temperature Control (EMTC) . See FCIM - EMTC DTC CHART
B1083:07	Recirculation Damper Motor: Mechanical Failure	REFER to: Climate Control System - Vehicles With: Electronic Manual Temperature Control (EMTC) . See FCIM - EMTC DTC CHART
B1083:11	Recirculation Damper Motor: Circuit Short To Ground	REFER to: Climate Control System - Vehicles With: Electronic Manual Temperature Control (EMTC) . See FCIM - EMTC DTC CHART
B1083:12	Recirculation Damper Motor: Circuit Short To Battery	REFER to: Climate Control System - Vehicles With: Electronic Manual Temperature Control (EMTC) . See FCIM - EMTC DTC CHART
B1083:13	Recirculation Damper Motor: Circuit Open	REFER to: Climate Control System - Vehicles With: Electronic Manual Temperature Control (EMTC) . See FCIM - EMTC DTC CHART
B1086:07	Air Distribution Damper Motor: Mechanical Failure	REFER to: Climate Control System - Vehicles With: Electronic Manual Temperature Control (EMTC) . See FCIM - EMTC DTC CHART
B1086:11	Air Distribution Damper Motor: Circuit Short To Ground	REFER to: Climate Control System - Vehicles With: Electronic Manual Temperature Control (EMTC) . See FCIM - EMTC DTC CHART
B1086:12	Air Distribution Damper Motor: Circuit Short To Battery	REFER to: Climate Control System - Vehicles With: Electronic Manual Temperature Control (EMTC) . See

		FCIM - EMTC DTC CHART
B1086:13	Air Distribution Damper Motor: Circuit Open	REFER to: Climate Control System - Vehicles With: Electronic Manual Temperature Control (EMTC) . See FCIM - EMTC DTC CHART
B10AF:11	Blower Fan Relay: Circuit Short To Ground	REFER to: Climate Control System - Vehicles With: Electronic Manual Temperature Control (EMTC) . See FCIM - EMTC DTC CHART
B10AF:15	Blower Fan Relay: Circuit Short To Battery or Open	REFER to: Climate Control System - Vehicles With: Electronic Manual Temperature Control (EMTC) . See FCIM - EMTC DTC CHART
B10B8:63	Push Buttons: Circuit / Component Protection Time-Out	CLEAR the Diagnostic Trouble Codes (DTCs). WAIT at least 10 seconds. REPEAT the self-test. If DTC B10B8:63 is retrieved again, INSTALL a new FCIM. REFER to: Front Controls Interface Module (FCIM) .
B10B9:12	Blower Control: Circuit Short To Battery	REFER to: Climate Control System - Vehicles With: Electronic Manual Temperature Control (EMTC) . See FCIM - EMTC DTC CHART
B10B9:14	Blower Control: Circuit Short To Ground or Open	REFER to: Climate Control System - Vehicles With: Electronic Manual Temperature Control (EMTC) . See FCIM - EMTC DTC CHART
B11E5:12	Left HVAC Damper Position Sensor: Circuit Short To Battery	REFER to: Climate Control System - Vehicles With: Electronic Manual Temperature Control (EMTC) . See FCIM - EMTC DTC CHART
B11E5:14	Left HVAC Damper Position Sensor: Circuit Short To Ground or Open	REFER to: Climate Control System - Vehicles With: Electronic Manual Temperature Control (EMTC) . See FCIM - EMTC DTC CHART
B11E7:12	Air Distribution Damper Position Sensor: Circuit Short To Battery	REFER to: Climate Control System - Vehicles With: Electronic Manual Temperature Control (EMTC) . See FCIM - EMTC DTC CHART
B11E7:14	Air Distribution Damper Position Sensor: Circuit Short To Ground or Open	REFER to: Climate Control System - Vehicles With: Electronic Manual Temperature Control (EMTC) . See FCIM - EMTC DTC CHART

B11F0:12	Air Intake Damper Position Sensor: Circuit Short To Battery	REFER to: Climate Control System - Vehicles With: Electronic Manual Temperature Control (EMTC) . See FCIM - EMTC DTC CHART
B11F0:14	Air Intake Damper Position Sensor: Circuit Short To Ground or Open	REFER to: Climate Control System - Vehicles With: Electronic Manual Temperature Control (EMTC) . See FCIM - EMTC DTC CHART
B1202:01	Restraint System Passenger Enable Indicator: General Electrical Failure	CLEAR the Diagnostic Trouble Codes (DTCs). WAIT at least 10 seconds. REPEAT the self-test. If DTC B1202:01 is retrieved again, INSTALL a new FCIM. REFER to: Front Controls Interface Module (FCIM) .
B1B71:11	Evaporator Temperature Sensor: Circuit Short To Ground	REFER to: Climate Control System - Vehicles With: Electronic Manual Temperature Control (EMTC) . See FCIM - EMTC DTC CHART
B1B71:15	Evaporator Temperature Sensor: Circuit Short To Battery or Open	REFER to: Climate Control System - Vehicles With: Electronic Manual Temperature Control (EMTC) . See FCIM - EMTC DTC CHART
B1C83:12	Rear Defog Relay: Circuit Short To Battery	REFER to: Glass, Frames and Mechanisms . See DTC Chart: FCIM.
B1C83:14	Rear Defog Relay: Circuit Short To Ground or Open	REFER to: Glass, Frames and Mechanisms . See DTC Chart: FCIM.
C1B14:11	Sensor Supply Voltage A: Circuit Short To Ground	REFER to: Climate Control System - Vehicles With: Electronic Manual Temperature Control (EMTC) . See FCIM - EMTC DTC CHART
C1B14:12	Sensor Supply Voltage A: Circuit Short To Battery	REFER to: Climate Control System - Vehicles With: Electronic Manual Temperature Control (EMTC) . See FCIM - EMTC DTC CHART
U0140:00	Lost Communication With Body Control Module: No Sub Type Information	GO to Pinpoint Test AF
U0151:00	Lost Communication With Restraints Control Module: No Sub Type Information	GO to Pinpoint Test AH

U0155:00	Lost Communication With Instrument Panel Cluster (IPC) Control Module: No Sub Type Information	GO to Pinpoint Test AI
U0253:00	Lost Communication With Accessory Protocol Interface Module: No Sub Type Information	GO to Pinpoint Test AN
U0401:00	Invalid Data Received from ECM/ PCM A: No Sub Type Information	**RETRIEVE and FOLLOW Diagnostic Trouble Codes (DTCs) present in the PCM.** For vehicles with the 2.3L EcoBoost (201kW/273PS), REFER to: Electronic Engine Controls . For vehicles with the 3.7L Duratec (227kW/301PS), REFER to: Electronic Engine Controls . For vehicles with the 5.0L 32V Ti-VCT, REFER to: Electronic Engine Controls . *NOTE: If no Diagnostic Trouble Codes (DTCs) are present in the PCM, DIAGNOSE the observable symptom.*
U0401:68	Invalid Data Received from ECM/ PCM A: Event Information	**RETRIEVE and FOLLOW Diagnostic Trouble Codes (DTCs) present in the PCM.** For vehicles with the 2.3L EcoBoost (201kW/273PS), REFER to: Electronic Engine Controls . For vehicles with the 3.7L Duratec (227kW/301PS), REFER to: Electronic Engine Controls . For vehicles with the 5.0L 32V Ti-VCT, REFER to: Electronic Engine Controls . *NOTE: If no Diagnostic Trouble Codes (DTCs) are present in the PCM, DIAGNOSE the observable symptom.*
U0401:81	Invalid Data Received from ECM/ PCM A: Invalid Serial Data Received	**RETRIEVE and FOLLOW Diagnostic Trouble Codes (DTCs) present in the PCM.** For vehicles with the 2.3L EcoBoost

		(201kW/273PS), REFER to: Electronic Engine Controls . For vehicles with the 3.7L Duratec (227kW/301PS), REFER to: Electronic Engine Controls . For vehicles with the 5.0L 32V Ti-VCT, REFER to: Electronic Engine Controls . *NOTE: If no Diagnostic Trouble Codes (DTCs) are present in the PCM, DIAGNOSE the observable symptom.*
U0401:82	Invalid Data Received from ECM/ PCM A: Alive / Sequence Counter Incorrect / Not Updated	**RETRIEVE and FOLLOW Diagnostic Trouble Codes (DTCs) present in the PCM.** For vehicles with the 2.3L EcoBoost (201kW/273PS), REFER to: Electronic Engine Controls . For vehicles with the 3.7L Duratec (227kW/301PS), REFER to: Electronic Engine Controls . For vehicles with the 5.0L 32V Ti-VCT, REFER to: Electronic Engine Controls . *NOTE: If no Diagnostic Trouble Codes (DTCs) are present in the PCM, DIAGNOSE the observable symptom.*
U0422:68	Invalid Data Received From Body Control Module: Event Information	RETRIEVE and FOLLOW Diagnostic Trouble Codes (DTCs) present in the BCM. REFER to: Body Control Module (BCM) .* If no Diagnostic Trouble Codes (DTCs) are present in the BCM, DIAGNOSE the observable symptom.
U0422:81	Invalid Data Received From Body Control Module: Invalid Serial Data Received	RETRIEVE and FOLLOW Diagnostic Trouble Codes (DTCs) present in the BCM. REFER to: Body Control Module (BCM) .* If no Diagnostic Trouble Codes (DTCs) are present in the BCM, DIAGNOSE the observable symptom.

U0452:82	Invalid Data Received From Restraints Control Module: Alive / Sequence Counter Incorrect / Not Updated	RETRIEVE and FOLLOW Diagnostic Trouble Codes (DTCs) present in the RCM. REFER to: Airbag Supplemental Restraint System (SRS) .* If no Diagnostic Trouble Codes (DTCs) are present in the RCM, DIAGNOSE the observable symptom.
U1000:00	Solid State Driver Protection Active -Driver Disabled: No Sub Type Information	*NOTE: The FCIM has temporarily disabled a HVAC control output because an excessive current draw exists (such as a short to ground). The FCIM cannot enable the output until the cause of the short is corrected.* ADDRESS all other FCIM Diagnostic Trouble Codes (DTCs) first.After the cause of the concern is corrected, CLEAR the Diagnostic Trouble Codes (DTCs).WAIT at least 10 seconds.REPEAT the self-test.If DTC U1000:00 is retrieved again, INSTALL a new FCIM. REFER to: Front Controls Interface Module (FCIM) .
U2100:00	Initial Configuration Not Complete: No Sub Type Information	This DTC sets due to an incorrect or incomplete FCIM configuration. Using a diagnostic scan tool, PERFORM the FCIM programming procedure using as-built data. For information on as-built data, REFER to: Module Configuration - System Operation and Component Description . See As-Built Data.
U3000:41	Control Module: General Checksum Failure	CLEAR the Diagnostic Trouble Codes (DTCs). WAIT at least 10 seconds. REPEAT the self-test. If DTC U3000:41 is retrieved again, INSTALL a new FCIM. REFER to: Front Controls Interface Module (FCIM) .
U3000:49	Control Module: Internal Electronic Failure	ADDRESS all other FCIM Diagnostic Trouble Codes (DTCs) first.

		After the cause of the concern is corrected, CLEAR the Diagnostic Trouble Codes (DTCs). WAIT at least 10 seconds. REPEAT the self-test. If DTC U3000:49 is retrieved again, INSTALL a new FCIM. REFER to: Front Controls Interface Module (FCIM) .
U3003:16	Battery Voltage: Circuit Voltage Below Threshold	GO to Pinpoint Test AQ
U3003:17	Battery Voltage: Circuit Voltage Above Threshold	GO to Pinpoint Test AR

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > DTC CHART: GPSM

DTC	Description	Action
U0100:00	Lost Communication with ECM/ PCM "A": No Sub Type Information	GO to Pinpoint Test AE
U0140:00	Lost Communication With Body Control Module: No Sub Type Information	GO to Pinpoint Test AF
U0155:00	Lost Communication With Instrument Panel Cluster (IPC) Control Module: No Sub Type Information	GO to Pinpoint Test AI
U0401:00	Invalid Data Received from ECM/ PCM A: No Sub Type Information	**RETRIEVE and FOLLOW Diagnostic Trouble Codes (DTCs) present in the PCM.** For vehicles with the 2.3L EcoBoost (201kW/273PS), REFER to: Electronic Engine Controls . For vehicles with the 3.7L Duratec (227kW/301PS), REFER to: Electronic Engine Controls . For vehicles with the 5.0L 32V Ti-VCT, REFER to: Electronic Engine Controls . *NOTE: If no Diagnostic Trouble Codes (DTCs) are present in the PCM, DIAGNOSE the observable symptom.*

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > DTC CHART: SCCM

DTC	Description	Action
B1380:09	Steering Wheel Right Switch Pack: Component Failure	For a RH lower steering wheel switch concern, GO to Pinpoint Test X For a RH upper steering wheel switch concern, GO to Pinpoint Test Y
B1380:11	Steering Wheel Right Switch Pack: Circuit Short To Ground	For a RH lower steering wheel switch concern, GO to Pinpoint Test X For a RH upper steering wheel switch concern, GO to Pinpoint Test Y
B1380:17	Steering Wheel Right Switch Pack: Circuit Voltage Above Threshold	For a RH lower steering wheel switch concern, GO to Pinpoint Test X For a RH upper steering wheel switch concern, GO to Pinpoint Test Y
All other Diagnostic Trouble Codes (DTCs)	-	REFER to: Steering Wheel and Column Electrical Components . See SCCM DTC Chart.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > SYMPTOM CHART: GENERAL AUDIO SYSTEM

Condition	Possible Sources	Actions
A module does not respond to the diagnostic scan tool	Fuse Wiring, terminals, or connectors Module	REFER to: MODULE COMMUNICATIONS NETWORK . See Symptom Chart.
The RH lower steering wheel switches are inoperative or do not operate correctly	Refer to the Pinpoint Test	GO to Pinpoint Test X
The RH upper steering wheel switches are inoperative or do not operate correctly	Refer to the Pinpoint Test	GO to Pinpoint Test Y
The CD player is inoperative or does not operate correctly	CD ACM	INSPECT the CD for scratches, fingerprints, a loose paper label,

		incorrect format, or damage. INSERT a known good CD and TEST the system. If the system operates correctly, the concern was caused by a damaged CD. If the system does not operate correctly, INSTALL a new ACM. REFER to: Audio Front Control Module (ACM) .
The speed compensated volume does not operate correctly	Refer to the Pinpoint Test	GO to Pinpoint Test C
The audio system does not operate correctly from the FCIM	Refer to the Pinpoint Test	GO to Pinpoint Test Z
The FCIM illumination is inoperative or does not dim	Illumination system concern FCIM	REFER to: Instrument Panel and Interior Switches Illumination .
The FCDIM is inoperative or does not operate correctly	Refer to the Pinpoint Test	GO to Pinpoint Test AA
The FCDIM illumination is inoperative or does not dim	Illumination system concern FCDIM	REFER to: Instrument Panel and Interior Switches Illumination . Symptom Chart: Instrument Cluster and Panel Illumination.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > SYMPTOM CHART: SOUND QUALITY

Symptom Chart: Sound Quality

Condition	Possible Sources	Actions
Poor reception - AM/ FM	Refer to the Pinpoint Test	For the coupe, GO to Pinpoint Test A For the convertible, GO to Pinpoint Test B
Continuous seek or scan - AM/ FM	Refer to the Pinpoint Test	For the coupe, GO to Pinpoint Test A For the convertible, GO to Pinpoint Test B
A loud popping sound is heard when cycling the ignition	Refer to the Pinpoint Test	GO to Pinpoint Test D
A low frequency noise is heard from the audio system (2.3L and 5.2L)	Refer to the Pinpoint Test	GO to Pinpoint Test E

Poor sound quality or distorted sound from one or more speakers (not all speakers)	Refer to the Pinpoint Test	GO to Pinpoint Test F
No sound from all speakers	Refer to the Pinpoint Test	GO to Pinpoint Test G
The LHF door speaker is inoperative	Refer to the Pinpoint Test	GO to Pinpoint Test H
The LHF A-pillar tweeter speaker is inoperative	Refer to the Pinpoint Test	GO to Pinpoint Test I
The RHF A-pillar tweeter speaker is inoperative	Refer to the Pinpoint Test	GO to Pinpoint Test J
The RHF door speaker is inoperative	Refer to the Pinpoint Test	GO to Pinpoint Test K
The RHR quarter panel speaker is inoperative (convertible)	Refer to the Pinpoint Test	GO to Pinpoint Test L
The right parcel shelf speaker is inoperative (coupe)	Refer to the Pinpoint Test	GO to Pinpoint Test M
The left parcel shelf speaker is inoperative (coupe)	Refer to the Pinpoint Test	GO to Pinpoint Test N
The LHR quarter panel speaker is inoperative (convertible)	Refer to the Pinpoint Test	GO to Pinpoint Test O

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > SYMPTOM CHART: SYNC® SYSTEM

Condition	Possible Sources	Actions
The SYNC ® system is inoperative (no response is received from phone, voice, and media inputs)	Refer to the Pinpoint Test	PERFORM the APIM Reset. REFER to: RESET THE SYNC MODULE [APIM] . If the concern is still present, GO to Pinpoint Test P
All APIM stereo outputs are inoperative or do not operate correctly, REFER to: Information and Entertainment System - System Operation and Component Description . See APIM for a list of stereo outputs.	Refer to the Pinpoint Test	PERFORM the APIM Reset. REFER to: RESET THE SYNC MODULE [APIM] . If the concern is still present, GO to Pinpoint Test Q
All APIM mono outputs are inoperative or do not operate correctly REFER to: Information and Entertainment System - System Operation	Refer to the Pinpoint Test	PERFORM the APIM Reset. REFER to: RESET THE SYNC MODULE [APIM] . If the concern is still present, GO to Pinpoint Test R

and Component Description . See APIM for a list of mono outputs.		
Voice recognition is inoperative or does not operate correctly	Refer to the Pinpoint Test	PERFORM the APIM Reset. REFER to: RESET THE SYNC MODULE [APIM] . If the concern is still present, GO to Pinpoint Test S
During a phone call, no outgoing audio is heard on the outside device	Refer to the Pinpoint Test	PERFORM the APIM Reset. REFER to: RESET THE SYNC MODULE [APIM] . If the concern is still present, GO to Pinpoint Test S
The SYNC ® steering wheel switches are inoperative or do not operate correctly	Refer to the Pinpoint Test	PERFORM the APIM Reset. REFER to: RESET THE SYNC MODULE [APIM] . If the concern is still present, GO to Pinpoint Test X
The audio input jack is inoperative or does not operate correctly	Refer to the Pinpoint Test	PERFORM the APIM Reset. REFER to: RESET THE SYNC MODULE [APIM] . If the concern is still present, GO to Pinpoint Test T
The front USB port (USB1) is inoperative or does not operate correctly	Refer to the Pinpoint Test	PERFORM the APIM Reset. REFER to: RESET THE SYNC MODULE [APIM] . If the concern is still present, GO to Pinpoint Test U
The rear USB port (USB2) is inoperative or does not operate correctly	Refer to the Pinpoint Test	PERFORM the APIM Reset. REFER to: RESET THE SYNC MODULE [APIM] . If the concern is still present, GO to Pinpoint Test V
Unable to pair Bluetooth device	Refer to the Pinpoint Test	PERFORM the APIM Reset. REFER to: RESET THE SYNC MODULE [APIM] . If the concern is still present, GO to Pinpoint Test W
An individual Bluetooth device feature is inoperative (text messaging, media playback or controls, phone book download, call history, or call waiting)	Customer's device compatibility	PERFORM the APIM Reset. REFER to: RESET THE SYNC MODULE [APIM] . INSTRUCT the customer to review the device compatibility list. REFER to www.syncmyride.com. It is normal operation for unsupported or incompatible Bluetooth features to` be unavailable through the SYNC ® system. If the inoperative feature is compatible, ADVISE the customer to check their device for firmware updates, and if required, reset their device following the manufacturer's instructions.
SYNC ® AppLink™ is inoperative or does not operate correctly	Refer to the Pinpoint Test	PERFORM the APIM Reset. REFER to: RESET THE SYNC MODULE [APIM] . * If the concern is still present, INSTRUCT

		the customer to review the mobile device platform, application, and application version compatibility list. REFER to owner.ford.com/how-tos/sync-technology/all/phone-setup/how-your-device-works-with-sync.html?version=sync. It is normal operation for incompatible mobile device platforms, applications, and application versions to be unavailable through SYNC ® AppLink™. * If the mobile device platform, application, and application version are compatible, and the device is connected through Bluetooth only, GO to Pinpoint Test W * If the mobile device platform, application, and application version are compatible, and the device is connected through Bluetooth and the front USB port, GO to Pinpoint Test U * If the mobile device platform, application, and application version are compatible, and the device is connected through Bluetooth and the rear USB port, GO to Pinpoint Test V

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST A : POOR RECEPTION OR CONTINUOUS SEEK OR SCAN - AM (AMPLITUDE MODULATION) / FM (FREQUENCY MODULATION) (COUPE)

Refer to Audio System/Navigation - AM/FM/CD/SYNC for schematic and connector information.

Refer to Charging System for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See AM/ FM Radio, RDS, AM/ FM Antenna Amplifier - Coupe, Antenna, and Noise Suppression Equipment.

Possible Sources

- No channel found in the selected RDS category
- Noise suppression equipment
- Charging system
- Wiring, terminals, or connectors
- Ignition system
- AM/ FM on-glass antenna grid

- AM/ FM antenna coaxial cable
- Mounting surface corrosion
- AM/ FM antenna amplifier
- ACM

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST A : POOR RECEPTION OR CONTINUOUS SEEK OR SCAN - AM (AMPLITUDE MODULATION) / FM (FREQUENCY MODULATION) (COUPE) > PINPOINT TEST A : POOR RECEPTION OR CONTINUOUS SEEK OR SCAN - AM (AMPLITUDE MODULATION) / FM (FREQUENCY MODULATION) (COUPE)

A1 CHECK THE AUDIO SYSTEM RECEPTION WITH THE ENGINE RUNNING

Operate the audio system in AM/ FM mode.

Check the reception with the engine running, and with the engine off.

Is poor reception only present with the engine running?

Yes	GO to A2
No	GO to A4

A2 CHECK THE GENERATOR

Ignition OFF.

NOTE: Do not allow the generator B+ cable terminal to make contact with a conductive surface. Failure to follow this instruction may result in personal injury or damage to the vehicle.

Disconnect: Generator B+ Cable C102C .

Start the engine.

Operate the audio system in AM/ FM mode.

Is the reception OK?

Yes	INSTALL a new generator. * For vehicles with the 2.3L EcoBoost (201kW/273PS), REFER to: Generator - 2.3L EcoBoost (201kW/273PS) .* For vehicles with the 3.7L Duratec (227kW/301PS), REFER to: Generator - 3.7L Duratec (227kW/301PS) .* For vehicles with the 5.0L 32V Ti-VCT, REFER to: Generator - 5.0L 32V Ti-VCT .

No	GO to A3

A3 CHECK THE IGNITION CIRCUITS

Ignition OFF.

Connect: Generator B+ Cable C102C .

Visually inspect the engine compartment and make sure all ignition coils are correctly and securely connected, and that there are no visible cracks in the coil housings.

Inspect all the wiring harnesses and connectors for damaged insulation and loose or broken conditions.

Are the ignition components OK?

Yes	USE a jumper cable to temporarily ground various parts of the vehicle (examples include: engine, fenders, quarter panels, body sheet metal) to the frame. When the noise is eliminated, PROVIDE a permanent ground where necessary.

No	REPAIR the ignition system as necessary.

A4 CHECK THE AUDIO SYSTEM RECEPTION WITH THE REAR WINDOW DEFROST GRID ACTIVATED

Operate the audio system in AM/ FM mode.

Check the reception with the rear window defrost grid activated and deactivated.

Is poor reception only present with the rear window defrost grid activated?

Yes	The grid line material is not embedded in the glass, but is baked onto the glass surface, and consequently can be scraped off. Carefully INSPECT and REPAIR the AM/ FM on-glass antenna grid. REFER to: Heated Window Grid Wire Repair .

No	* For a concern with only the AM radio, GO to A5* For a concern with only the FM radio, or with both the AM and FM radio, GO to A8

A5 CHECK THE AM (AMPLITUDE MODULATION) SIGNAL AMPLIFIER CIRCUIT FOR CORRECT VOLTAGE

Ignition OFF.

Disconnect: AM/ FM Antenna Amplifier C4082 .

Ignition ON.

Operate the audio system in AM mode.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4082-1		Ground

Is the voltage greater than 11 volts?

Yes	GO to A8

No	GO to A6

A6 CHECK THE AM (AMPLITUDE MODULATION) SIGNAL AMPLIFIER CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Disconnect: ACM C240A .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4082-1	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to A7

No	REPAIR the circuit.

A7 CHECK THE AM (AMPLITUDE MODULATION) SIGNAL AMPLIFIER CIRCUIT FOR AN OPEN

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4082-1	Ω	C240A-2

Is the resistance less than 3 ohms?

Yes	GO to A22

No	REPAIR the circuit.

A8 CHECK THE FRONT AM (AMPLITUDE MODULATION) / FM (FREQUENCY MODULATION) ANTENNA COAXIAL CABLE CORE AND SHIELD FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: AM/ FM antenna coaxial cable from the ACM. REFER to: Audio Front Control Module (ACM) .

Disconnect: AM/ FM antenna inline coaxial cable connection underneath the center console. REFER to: Floor Console .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
AM/ FM antenna coaxial cable core at the ACM		Ground
AM/ FM antenna coaxial cable shield at the ACM		Ground

Is any voltage present?

Yes	REPAIR or INSTALL a new front AM/ FM antenna coaxial cable. REFER to: Audio Unit Antenna Cable .

No	GO to A9

A9 CHECK THE FRONT AM (AMPLITUDE MODULATION) / FM (FREQUENCY MODULATION) ANTENNA COAXIAL CABLE CORE FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
AM/ FM antenna coaxial cable core at the ACM	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to A10

No	REPAIR or INSTALL a new front AM/ FM antenna coaxial cable. REFER to: Audio Unit Antenna Cable .

A10 CHECK THE FRONT AM (AMPLITUDE MODULATION) / FM (FREQUENCY MODULATION) ANTENNA COAXIAL CABLE CORE AND SHIELD FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
AM/ FM antenna coaxial cable core at the ACM	Ω	Front AM/ FM antenna coaxial cable core at the inline connection
AM/ FM antenna coaxial cable shield at the ACM	Ω	Front AM/ FM antenna coaxial cable shield at the inline connection

Are the resistances less than 1 ohm?

Yes	GO to A11

No	REPAIR or INSTALL a new front AM/ FM antenna coaxial cable. REFER to: Audio Unit Antenna Cable .

A11 CHECK THE FRONT AM (AMPLITUDE MODULATION) / FM (FREQUENCY MODULATION) ANTENNA COAXIAL CABLE CORE AND SHIELD FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
AM/ FM antenna coaxial cable core at the ACM	Ω	AM/ FM antenna coaxial cable shield at the ACM

Is the resistance greater than 10, 000 ohms?

Yes	GO to A12

No	REPAIR or INSTALL a new front AM/ FM antenna coaxial cable. REFER to: Audio Unit Antenna Cable .

A12 CHECK THE REAR AM (AMPLITUDE MODULATION) / FM (FREQUENCY MODULATION) ANTENNA COAXIAL CABLE CORE AND SHIELD FOR A SHORT TO VOLTAGE

Connect: AM/ FM antenna inline coaxial cable connection underneath the center console.

Disconnect: AM/ FM antenna coaxial cable from the AM/ FM Antenna Amplifier. REFER to: Audio Unit Antenna Amplifier .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
AM/ FM antenna coaxial cable core at the ACM		Ground

AM/ FM antenna coaxial cable shield at the ACM		Ground

Is any voltage present?

Yes	REPAIR or INSTALL a new rear AM/ FM antenna coaxial cable. REFER to: Audio Unit Antenna Cable .

No	GO to A13

A13 CHECK THE REAR AM (AMPLITUDE MODULATION) / FM (FREQUENCY MODULATION) ANTENNA COAXIAL CABLE CORE FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
AM/ FM antenna coaxial cable core at the ACM	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to A14

No	REPAIR or INSTALL a new rear AM/ FM antenna coaxial cable. REFER to: Audio Unit Antenna Cable .

A14 CHECK THE REAR AM (AMPLITUDE MODULATION) / FM (FREQUENCY MODULATION) ANTENNA COAXIAL CABLE CORE AND SHIELD FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
AM/ FM antenna coaxial cable core at the ACM	Ω	AM/ FM antenna coaxial cable core at the AM/ FM antenna amplifier (harness side)
AM/ FM antenna coaxial cable shield at the ACM	Ω	AM/ FM antenna coaxial cable shield at the AM/ FM antenna amplifier (harness side)

Are the resistances less than 1 ohm?

Yes	GO to A15

No	REPAIR or INSTALL a new rear AM/ FM antenna coaxial cable. REFER to: Audio Unit Antenna Cable .

A15 CHECK THE REAR AM (AMPLITUDE MODULATION) / FM (FREQUENCY MODULATION) ANTENNA COAXIAL CABLE CORE AND SHIELD FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
AM/ FM antenna coaxial cable core at the ACM	Ω	AM/ FM antenna coaxial cable shield at the ACM

Is the resistance greater than 10, 000 ohms?

Yes	GO to A16

No	REPAIR or INSTALL a new rear AM/ FM antenna coaxial cable. REFER to: Audio Unit Antenna Cable .

A16 CHECK THE AM (AMPLITUDE MODULATION) / FM (FREQUENCY MODULATION) ANTENNA AMPLIFIER CORE AND SHIELD FOR A SHORT TO VOLTAGE

Ignition OFF.

Connect: AM/ FM antenna coaxial cable to the AM/ FM Antenna Amplifier.

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
AM/ FM antenna coaxial cable core at the ACM	V	Ground
AM/ FM antenna coaxial cable shield at the ACM	V	Ground

Is any voltage present?

Yes	INSTALL a new AM/ FM antenna amplifier. REFER to: Audio Unit Antenna Amplifier .

No	GO to A17

A17 CHECK THE AM (AMPLITUDE MODULATION) / FM (FREQUENCY MODULATION) ANTENNA AMPLIFIER CORE FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
AM/ FM antenna coaxial cable core at the ACM	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to A18

No	INSTALL a new AM/ FM antenna amplifier. REFER to: Audio Unit Antenna Amplifier .

A18 CHECK THE AM (AMPLITUDE MODULATION) / FM (FREQUENCY MODULATION) ANTENNA AMPLIFIER CORE AND SHIELD FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
AM/ FM antenna coaxial cable core at the ACM	Ω	AM/ FM antenna coaxial cable shield at the ACM

Is the resistance greater than 10, 000 ohms?

Yes	GO to A19

No	INSTALL a new AM/ FM antenna amplifier. REFER to: Audio Unit Antenna Amplifier .

A19 CHECK THE AM (AMPLITUDE MODULATION) / FM (FREQUENCY MODULATION) ANTENNA AMPLIFIER SHIELD FOR CONTINUITY TO GROUND

Measure:

Positive Lead	Measurement / Action	Negative Lead
AM/ FM antenna coaxial cable shield at the ACM	Ω	Ground

Is the resistance less than 1 ohm?

Yes	GO to A21

No	GO to A20

A20 CHECK THE AM (AMPLITUDE MODULATION) / FM (FREQUENCY MODULATION) ANTENNA AMPLIFIER SHIELD FOR CONTINUITY TO ANTENNA UNIT BASE

Remove the AM/ FM antenna amplifier. REFER to: Audio Unit Antenna Amplifier .

Measure:

Positive Lead	Measurement / Action	Negative Lead
AM/ FM antenna shield at the AM/ FM antenna amplifier (component side)	Ω	AM/ FM antenna amplifier base (unpainted surface on the mounting tab)

Is the resistance less than 1 ohm?

Yes	INSPECT and REPAIR any corrosion on the AM/ FM antenna amplifier and/or vehicle mounting surface. REINSTALL the AM/ FM antenna amplifier and ensure the proper torque value is achieved. REFER to: Audio Unit Antenna Amplifier .

No	INSTALL a new AM/ FM antenna amplifier. REFER to: Audio Unit Antenna Amplifier .

A21 CHECK THE AM (AMPLITUDE MODULATION) / FM (FREQUENCY MODULATION) ANTENNA COMPONENTS

Disconnect and inspect the AM/ FM antenna amplifier connector for the AM/ FM antenna circuits coming from the AM/ FM on-glass antenna grid. REFER to: Audio Unit Antenna Amplifier .

Inspect the AM/ FM antenna circuits coming from the AM/ FM on-glass antenna grid.

Inspect the AM/ FM antenna circuit connections at the AM/ FM on-glass antenna grid.

Is any damage present on the AM/ FM antenna circuits or connections?

Yes	REPAIR or REPLACE as necessary.

No	GO to A22

A22 CHECK FOR CORRECT ACM (AUDIO FRONT CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all the ACM connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the ACM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ACM. REFER to: Audio Front Control Module (ACM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST B : POOR RECEPTION OR CONTINUOUS SEEK OR SCAN - AM (AMPLITUDE MODULATION) / FM (FREQUENCY MODULATION) (CONVERTIBLE)

Refer to Audio System/Navigation - AM/FM/CD/SYNC for schematic and connector information.

Refer to Charging System for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See AM/ FM Radio, RDS, Antenna, and Noise Suppression Equipment.

Possible Sources

- No channel found in the selected RDS category
- Charging system
- Wiring, terminals, or connectors
- Ignition system
- Noise suppression equipment
- AM/ FM antenna coaxial cable
- RHR fender-mounted AM/ FM mast antenna
- Mounting surface corrosion
- ACM

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST B : POOR RECEPTION OR CONTINUOUS SEEK OR SCAN - AM (AMPLITUDE MODULATION) / FM (FREQUENCY MODULATION) (CONVERTIBLE) > PINPOINT TEST B : POOR RECEPTION OR CONTINUOUS SEEK

OR SCAN - AM (AMPLITUDE MODULATION) / FM (FREQUENCY MODULATION) (CONVERTIBLE)

B1 CHECK THE AUDIO SYSTEM RECEPTION WITH THE ENGINE RUNNING

Operate the audio system in AM/ FM mode.

Check the reception with the engine running, and with the engine off.

Is poor reception only present with the engine running?

Yes	GO to B2

No	* For a concern with only the AM radio, GO to B4* For a concern with only the FM radio, or with both the AM and FM radio, GO to B7

B2 CHECK THE GENERATOR

Ignition OFF.

NOTE: Do not allow the generator B+ cable terminal to make contact with a conductive surface. Failure to follow this instruction may result in personal injury or damage to the vehicle.

Disconnect: Generator B+ Cable C102C .

Start the engine.

Operate the audio system in AM/ FM mode.

Is the reception OK?

Yes	INSTALL a new generator.* For vehicles with the 2.3L EcoBoost (201kW/273PS), REFER to: Generator - 2.3L EcoBoost (201kW/273PS) .* For vehicles with the 3.7L Duratec (227kW/301PS), REFER to: Generator - 3.7L Duratec (227kW/301PS) * For vehicles with the 5.0L 32V Ti-VCT, REFER to: Generator - 5.0L 32V Ti-VCT .

No	GO to B3

B3 CHECK THE IGNITION CIRCUITS

Ignition OFF.

Connect: Generator B+ Cable C102C .

Visually inspect the engine compartment and make sure all ignition coils are correctly and securely connected, and that there are no visible cracks in the coil housings.

Inspect all the wiring harnesses and connectors for damaged insulation and loose or broken

conditions.

Are the ignition components OK?

Yes	USE a jumper cable to temporarily ground various parts of the vehicle (examples include: engine, fenders, quarter panels, body sheet metal) to the frame. When the noise is eliminated, PROVIDE a permanent ground where necessary.

No	REPAIR the ignition system as necessary.

B4 CHECK THE AM (AMPLITUDE MODULATION) SIGNAL AMPLIFIER CIRCUIT FOR CORRECT VOLTAGE

Ignition OFF.

Disconnect: Antenna C4823 .

Ignition ON.

Operate the audio system in AM mode.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4823-1		Ground

Is the voltage greater than 11 volts?

Yes	GO to B7

No	GO to B5

B5 CHECK THE AM (AMPLITUDE MODULATION) SIGNAL AMPLIFIER CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Disconnect: ACM C240A .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4823-1	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to B6

No	REPAIR the circuit.

B6 CHECK THE AM (AMPLITUDE MODULATION) SIGNAL AMPLIFIER CIRCUIT FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4823-1	Ω	C240A-2

Is the resistance less than 3 ohms?

Yes	GO to B20

No	REPAIR the circuit.

B7 CHECK THE FRONT AM (AMPLITUDE MODULATION) / FM (FREQUENCY MODULATION) ANTENNA COAXIAL CABLE CORE AND SHIELD FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: AM/ FM antenna coaxial cable from the ACM. REFER to: Audio Front Control Module (ACM) .

Disconnect: AM/ FM antenna inline coaxial cable connection underneath the center console. REFER to: Floor Console .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
AM/ FM antenna coaxial cable core at the ACM	V	Ground
AM/ FM antenna coaxial cable shield at the ACM	V	Ground

Is any voltage present?

Yes	REPAIR or INSTALL a new front AM/ FM antenna coaxial cable. REFER to: Audio Unit Antenna Cable .

No	GO to B8

B8 CHECK THE FRONT AM (AMPLITUDE MODULATION) / FM (FREQUENCY MODULATION) ANTENNA COAXIAL CABLE CORE FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
AM/ FM antenna coaxial cable core at the ACM	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to B9

No	REPAIR or INSTALL a new front AM/ FM antenna coaxial cable. REFER to: Audio Unit Antenna Cable .

B9 CHECK THE FRONT AM (AMPLITUDE MODULATION) / FM (FREQUENCY MODULATION) ANTENNA COAXIAL CABLE CORE AND SHIELD FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
AM/ FM antenna coaxial cable core at the ACM	Ω	Front AM/ FM antenna coaxial cable core at the inline connection
AM/ FM antenna coaxial cable shield at the ACM	Ω	Front AM/ FM antenna coaxial cable shield at the inline connection

Are the resistances less than 1 ohm?

Yes	GO to B10

No	REPAIR or INSTALL a new front AM/ FM antenna coaxial cable. REFER to: Audio Unit Antenna Cable .

B10 CHECK THE FRONT AM (AMPLITUDE MODULATION) / FM (FREQUENCY MODULATION) ANTENNA COAXIAL CABLE CORE AND SHIELD FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
AM/ FM antenna coaxial cable core at the ACM	Ω	AM/ FM antenna coaxial cable shield at the ACM

Is the resistance greater than 10, 000 ohms?

Yes	GO to B11

No	REPAIR or INSTALL a new front AM/ FM antenna coaxial cable. REFER to: Audio Unit Antenna Cable .

B11 CHECK THE REAR AM (AMPLITUDE MODULATION) / FM (FREQUENCY MODULATION) ANTENNA COAXIAL CABLE CORE AND SHIELD FOR A SHORT TO VOLTAGE

Connect: AM/ FM antenna inline coaxial cable connection underneath the center console.

Disconnect: AM/ FM antenna coaxial cable from the antenna unit. REFER to: Audio Unit Antenna .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
AM/ FM antenna coaxial cable core at the ACM		Ground
AM/ FM antenna coaxial cable shield at the ACM		Ground

Is any voltage present?

Yes	REPAIR or INSTALL a new rear AM/ FM antenna coaxial cable. REFER to: Audio Unit Antenna Cable .

No	GO to B12

B12 CHECK THE REAR AM (AMPLITUDE MODULATION) / FM (FREQUENCY MODULATION) ANTENNA COAXIAL CABLE CORE FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
AM/ FM antenna coaxial cable core at the ACM	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to B13

No	REPAIR or INSTALL a new rear AM/ FM antenna coaxial cable. REFER to: Audio Unit

	Antenna Cable .

B13 CHECK THE REAR AM (AMPLITUDE MODULATION) / FM (FREQUENCY MODULATION) ANTENNA COAXIAL CABLE CORE AND SHIELD FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
AM/ FM antenna coaxial cable core at the ACM	Ω	AM/ FM antenna coaxial cable core at the antenna unit (harness side)
AM/ FM antenna coaxial cable shield at the ACM	Ω	AM/ FM antenna coaxial cable shield at the antenna unit (harness side)

Are the resistances less than 1 ohm?

Yes	GO to B14

No	REPAIR or INSTALL a new rear AM/ FM antenna coaxial cable. REFER to: Audio Unit Antenna Cable .

B14 CHECK THE REAR AM (AMPLITUDE MODULATION) / FM (FREQUENCY MODULATION) ANTENNA COAXIAL CABLE CORE AND SHIELD FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
AM/ FM antenna coaxial cable core at the ACM	Ω	AM/ FM antenna coaxial cable shield at the ACM

Is the resistance greater than 10, 000 ohms?

Yes	GO to B15

No	REPAIR or INSTALL a new rear AM/ FM antenna coaxial cable. REFER to: Audio Unit Antenna Cable .

B15 CHECK THE AM (AMPLITUDE MODULATION) / FM (FREQUENCY MODULATION) ANTENNA UNIT CORE AND SHIELD FOR A SHORT TO VOLTAGE

Ignition OFF.

Connect: AM/ FM antenna coaxial cable at the antenna unit.

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
AM/ FM antenna coaxial cable core at the ACM		Ground
AM/ FM antenna coaxial cable shield at the ACM		Ground

Is any voltage present?

Yes	INSTALL a new RHR fender-mounted AM/ FM mast antenna. REFER to: Audio Unit Antenna .

No	GO to B16

B16 CHECK THE AM (AMPLITUDE MODULATION) / FM (FREQUENCY MODULATION) ANTENNA UNIT CORE FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
AM/ FM antenna coaxial cable core at the ACM	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to B17

No	INSTALL a new RHR fender-mounted AM/ FM mast antenna. REFER to: Audio Unit Antenna .

B17 CHECK THE AM (AMPLITUDE MODULATION) / FM (FREQUENCY MODULATION) ANTENNA UNIT CORE AND SHIELD FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
AM/ FM antenna coaxial cable core at the ACM	Ω	AM/ FM antenna coaxial cable shield at the ACM

Is the resistance greater than 10, 000 ohms?

Yes	GO to B18

No	INSTALL a new RHR fender-mounted AM/ FM mast antenna. REFER to: Audio Unit Antenna .

B18 CHECK THE AM (AMPLITUDE MODULATION) / FM (FREQUENCY MODULATION) ANTENNA UNIT SHIELD FOR CONTINUITY TO GROUND

Measure:

Positive Lead	Measurement / Action	Negative Lead
AM/ FM antenna coaxial cable shield at the ACM	Ω	Ground

Is the resistance less than 1 ohm?

Yes	GO to B20

No	GO to B19

B19 CHECK THE AM (AMPLITUDE MODULATION) / FM (FREQUENCY MODULATION) ANTENNA UNIT SHIELD FOR CONTINUITY TO ANTENNA UNIT BASE

Remove the AM/ FM antenna. REFER to: Audio Unit Antenna .

Measure:

Positive Lead	Measurement / Action	Negative Lead
AM/ FM antenna unit shield at the antenna unit (component side)	Ω	AM/ FM antenna base (unpainted surface)

Is the resistance less than 1 ohm?

Yes	INSPECT and REPAIR any corrosion on the RHR fender-mounted AM/ FM mast antenna base and/or vehicle mounting surface. REINSTALL the antenna and ensure the proper torque value is achieved. REFER to: Audio Unit Antenna .

No	INSTALL a new RHR fender-mounted AM/ FM mast antenna. REFER to: Audio Unit Antenna .

B20 CHECK FOR CORRECT ACM (AUDIO FRONT CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all the ACM connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the ACM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ACM. REFER to: Audio Front Control Module (ACM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST C : THE SPEED COMPENSATED VOLUME DOES NOT OPERATE CORRECTLY

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See MyKey ® Audio Operation and Speed Compensated Volume.

Possible Sources

- Speed compensated volume setting
- ACM

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST C : THE SPEED COMPENSATED VOLUME DOES NOT OPERATE CORRECTLY > PINPOINT TEST C : THE SPEED COMPENSATED VOLUME DOES NOT OPERATE CORRECTLY

C1 CHECK THE SPEEDOMETER OPERATION

Drive the vehicle and observe the speedometer.

Does the speedometer operate correctly?

Yes	GO to C2

No	REFER to: Instrumentation, Message Center and Warning Chimes . See Symptom Chart: Instrument Panel Cluster (IPC): The speedometer is inoperative

C2 CHECK THE SPEED COMPENSATED VOLUME SETTING

Turn the speed compensated volume off. Refer to the Owner's Literature.

Operate the audio system in AM/ FM mode.

Drive the vehicle at various speeds and observe the speaker volume.

Set the speed compensated volume to maximum compensation. Refer to the Owner's Literature.

Operate the audio system in AM/ FM mode.

Drive the vehicle at various speeds and observe the speaker volume.

Does the volume remain constant with the speed compensated volume turned off, and increase and decrease with vehicle speed with the speed compensated volume set to maximum?

Yes	The system is operating correctly at this time. INSTRUCT the customer in the correct usage of the speed compensated volume feature.

No	GO to C3

C3 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0155:00

Using a diagnostic scan tool, retrieve all Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U0155:00 retrieved in any audio system module?

Yes	GO to Pinpoint Test AI

No	GO to C4

C4 CHECK FOR CORRECT ACM (AUDIO FRONT CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all the ACM connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the ACM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ACM. REFER to: Audio Front Control Module (ACM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST D : A LOUD POPPING SOUND IS HEARD WHEN CYCLING THE IGNITION

Refer to Audio System/Navigation - AM/FM/CD/SYNC for schematic and connector information.

Refer to Starting System for schematic and connector information.

Normal Operation and Fault Conditions

The ACM receives voltage on a start signal circuit when the ignition is in the START position, and mutes the audio signal output. This prevents voltage spikes from producing popping noises through the speakers. An open on this circuit between splice CS101 and the ACM could cause voltage spikes to produce popping noises through the speakers.

Possible Sources

- Wiring, terminals, or connectors
- ACM

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST D : A LOUD POPPING SOUND IS HEARD WHEN CYCLING THE IGNITION > PINPOINT TEST D : A LOUD POPPING SOUND IS HEARD WHEN CYCLING THE IGNITION

D1 CHECK THE START SENSE CIRCUIT FOR AN OPEN

Ignition OFF.

Disconnect: ACM C240A .

Remove: BJB Starter Relay.

Disconnect:

PCM C1551B for vehicles with the 2.3L EcoBoost (201kW/273PS).

PCM C1381B for vehicles with the 3.7L Duratec (227kW/301PS).

PCM C175B for vehicles with the 5.0L 32V Ti-VCT.

PCM C175B for vehicles with the 5.2L.

For vehicles with the 2.3L EcoBoost (201kW/273PS), measure:

Positive Lead	Measurement / Action	Negative Lead
C240A-3	Ω	BJB Starter Relay Socket 1

Positive Lead	Measurement / Action	Negative Lead
C240A-3	Ω	C1551B-62

For vehicles with the 3.7L Duratec (227kW/301PS), measure:

Positive Lead	Measurement / Action	Negative Lead
C240A-3	Ω	BJB Starter Relay Socket 1

Positive Lead	Measurement / Action	Negative Lead
C240A-3	Ω	C1381B-1

For vehicles with the 5.0L 32V Ti-VCT, measure:

Positive Lead	Measurement / Action	Negative Lead
C240A-3	Ω	BJB Starter Relay Socket 1

Positive Lead	Measurement / Action	Negative Lead
C240A-3	Ω	C175B-1

For vehicles with the 5.2L, measure:

Positive Lead	Measurement / Action	Negative Lead
C240A-3	Ω	BJB Starter Relay Socket 1

Positive Lead	Measurement / Action	Negative Lead
C240A-3	Ω	C175B-1

Are the resistances less than 3 ohms?

Yes	GO to D2

No	REPAIR the circuit.

D2 CHECK FOR CORRECT ACM (AUDIO FRONT CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all the ACM connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the ACM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ACM. REFER to: Audio Front Control Module (ACM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST E : A LOW FREQUENCY NOISE IS HEARD FROM THE AUDIO SYSTEM (2.3L AND 5.2L)

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See ANC, ANC Microphones, and DACMC.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U3000:92	Control Module: Performance or Incorrect Operation	Set by the DACMC when a fault is detected with the ANC system when running the Active Diagnostics Test.

U3000:94	Control Module: Unexpected Operation	Set by the DACMC when a fault is detected with the ANC system.

Possible Source

- Improper ANC microphone installation or damage
- Wiring, terminals, or connectors
- DACMC

Visual Inspection and Diagnostic Pre-checks

- The ANC system may not be compatible with speakers, other audio system components, and audio system architectures not approved by Ford. Ensure that no modifications have been made to the audio system.
- Inspect the LHF, RHF, RHR, and LHR door midwoofer speaker locations for items that may be blocking the speaker sound output.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST E : A LOW FREQUENCY NOISE IS HEARD FROM THE AUDIO SYSTEM (2.3L AND 5.2L) > PINPOINT TEST E : A LOW FREQUENCY NOISE IS HEARD FROM THE AUDIO SYSTEM (2.3L AND 5.2L)

E1 CHECK FOR ANC (ACTIVE NOISE CONTROL) MICROPHONE DIAGNOSTIC TROUBLE CODES (DTCS) PRESENT IN THE DACMC (DIGITAL AUDIO CONTROL MODULE C) OR SPEAKER DIAGNOSTIC TROUBLE CODES (DTCS) PRESENT IN THE ACM (AUDIO FRONT CONTROL MODULE)

Using a diagnostic scan tool, perform the self-test for the following modules:

DACMC

ACM

Are any ANC microphone Diagnostic Trouble Codes (DTCs) recorded in the DACMC or any speaker Diagnostic Trouble Codes (DTCs) recorded in the ACM?

Yes	* For DACMC ANC microphone Diagnostic Trouble Codes (DTCs), REFER to: Information and Entertainment System . See DTC Chart: DACMC.* For ACM speaker Diagnostic Trouble Codes (DTCs), REFER to: Information and Entertainment System . See DTC Chart: ACM.

No	GO to E2

E2 VERIFY IF THE CONCERN IS RELATED TO THE ANC (ACTIVE NOISE CONTROL) SYSTEM

Close the luggage compartment lid and all doors.

Ignition ON.

Turn the audio system off.

Determine if an observable symptom is present.

Enable the ANC system by starting the vehicle.

Determine if an observable symptom is present.

Is an observable symptom only present when the engine is on?

Yes	GO to E3

No	* If an observable symptom is only present when the engine is off, REFER to: Information and Entertainment System . See DTC Charts or Symptom Charts to diagnose the audio system.* If an observable symptom is present with the engine off and the ignition on **and** when the engine is on, REFER to: DIAGNOSIS AND TESTING . See DTC Charts or Symptom Charts to diagnose the audio system.

E3 VERIFY IF THE CONCERN IS RELATED TO THE ANC (ACTIVE NOISE CONTROL) SYSTEM WITH THE VEHICLE'S WHEELS STATIONARY

With the vehicle stationary, take the gasoline engine through the RPM range and verify if there is an observable symptom present.

Determine if an observable symptom is present.

Disable the ANC system by opening the driver's door.

With the vehicle stationary, take the gasoline engine through the RPM range and verify if there is an observable symptom present.

Is an observable symptom present when the driver's door is open?

Yes	REFER to: Information and Entertainment System . See DTC Charts or Symptom Charts to diagnose the audio system.

No	GO to E4

E4 VERIFY IF THE CONCERN IS RELATED TO THE ANC (ACTIVE NOISE CONTROL) SYSTEM WITH THE VEHICLE'S WHEELS IN MOTION

Place the vehicle on a hoist.

Ensure all four wheels are off the ground and not in contact with anything.

Close the luggage compartment lid and all doors.

Enable the ANC system by starting the vehicle.

Ensure the audio system is off.

Take the gasoline engine through the RPM range in various gears and verify if there is an observable symptom present.

Disable the ANC system by opening the driver's door.

Take the gasoline engine through the RPM range in various gears and verify if there is an observable symptom present.

Is an observable symptom present when the driver's door is open?

Yes	REFER to: Information and Entertainment System . See DTC Charts or Symptom Charts to diagnose the audio system.

No	GO to E5

E5 CHECK THE VEHICLE SERVICE HISTORY

Check the vehicle service history for recent service actions related to the headliner or ANC microphones.

Have there been recent service actions with the headliner or ANC microphones?

Yes	For vehicles with the 2.3L EcoBoost (201kW/273PS), GO to E6 For vehicles with the 5.0L 32V Ti-VCT, GO to E8 For vehicles with the 3.7L Duratec (227kW/301PS), GO to E6

No	GO to E14

E6 INSPECT THE OVERHEAD CONSOLE ANC (ACTIVE NOISE CONTROL) MICROPHONE INSTALLATION

Gain access to the overhead console ANC microphone. REFER to: Active Noise Control Microphone .

Inspect the microphone for correct mounting.

The microphone is snapped into the mounting bezel.

The microphone is seated properly.

Is the microphone mounted correctly?

Yes	GO to E7

No	INSTALL the ANC microphone correctly. REFER to: Active Noise Control Microphone .

E7 INSPECT THE OVERHEAD CONSOLE ANC (ACTIVE NOISE CONTROL) MICROPHONE FOR DAMAGE

Inspect the microphone and microphone mounting bezel for damage.

Is any damage present?

Yes	REPLACE the microphone or overhead console as needed. REFER to: Active Noise Control Microphone .

No	GO to E12

E8 INSPECT THE LHF (LEFT-HAND FRONT) ANC (ACTIVE NOISE CONTROL) MICROPHONE INSTALLATION

Gain access to the LHF ANC microphone. REFER to: Active Noise Control Microphone .

Inspect the microphone for correct mounting.

The microphone is snapped into the mounting bezel.

The microphone is seated properly.

The microphone mounting bezel is properly glued to the headliner with no gaps between the headliner and all four corners of the microphone mounting bezel.

Is the microphone mounted correctly?

Yes	GO to E9

No	INSTALL the ANC microphone and/or mounting bezel correctly. REFER to: Active Noise Control Microphone .

E9 INSPECT THE LHF (LEFT-HAND FRONT) ANC (ACTIVE NOISE CONTROL) MICROPHONE FOR DAMAGE

Inspect the microphone and microphone mounting bezel for damage.

Is any damage present?

Yes	REPLACE the microphone or mounting bezel as needed. REFER to: Active Noise Control Microphone .

No	GO to E10

E10 INSPECT THE RHF (RIGHT-HAND FRONT) ANC (ACTIVE NOISE CONTROL) MICROPHONE INSTALLATION

Gain access to the LHF ANC microphone. REFER to: Active Noise Control Microphone .

Inspect the microphone for correct mounting.

The microphone is snapped into the mounting bezel.

The microphone is seated properly.

The microphone mounting bezel is properly glued to the headliner with no gaps between the headliner and all four corners of the microphone mounting bezel.

Is the microphone mounted correctly?

Yes	GO to E11

No	INSTALL the ANC microphone and/or mounting bezel correctly. REFER to: Active Noise Control Microphone .

E11 INSPECT THE RHF (RIGHT-HAND FRONT) ANC (ACTIVE NOISE CONTROL) MICROPHONE FOR DAMAGE

Inspect the microphone and microphone mounting bezel for damage.

Is any damage present?

Yes	REPLACE the microphone or mounting bezel as needed. REFER to: Active Noise Control Microphone .

No	GO to E12

E12 INSPECT THE REAR ANC (ACTIVE NOISE CONTROL) MICROPHONE INSTALLATION

Gain access to the rear ANC microphone. REFER to: Active Noise Control Microphone .

Inspect the microphone for correct mounting.

The microphone is snapped into the mounting bezel.

The microphone is seated properly.

The microphone mounting bezel is properly glued to the headliner with no gaps between the headliner and all four corners of the microphone mounting bezel.

Is the microphone mounted correctly?

Yes	GO to E13

No	INSTALL the ANC microphone and/or mounting bezel correctly. REFER to: Active Noise Control Microphone .

E13 INSPECT THE REAR ANC (ACTIVE NOISE CONTROL) MICROPHONE FOR DAMAGE

Inspect the microphone and microphone mounting bezel for damage.

Is any damage present?

Yes	REPLACE the microphone or mounting bezel as needed. REFER to: Active Noise Control

	Microphone .

No	GO to E14

E14 CHECK FOR CORRECT DACMC (DIGITAL AUDIO CONTROL MODULE C) OPERATION

Ignition OFF.

Disconnect and inspect all the ACM connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the ACM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ACM. REFER to: Audio Front Control Module (ACM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST F : POOR SOUND QUALITY OR DISTORTED SOUND FROM ONE OR MORE SPEAKERS (NOT ALL SPEAKERS)

Normal Operation and Fault Conditions

The ACM sends audio signals to the speakers in the form of AC voltage, resulting in clear audio output.

Possible Sources

- Loose component fasteners
- Loose door handle, lock, and other trim panel components and fasteners
- Loose items in storage areas
- Loose speaker grilles
- Loose wire harnesses or wire harness fasteners

- Speaker(s)
- Water shield bonding and placement

Visual Inspection and Diagnostic Pre-checks

Visually inspect around the suspect area for any possible rattle conditions such as:

- Any storage compartments including cup holders (if equipped)
- Door map pockets for contents that can rattle (if equipped)
- Door pull cup attachments (if equipped)
- Door switch bezels (if equipped)
- Package tray (if equipped)
- Speaker grilles
- Trim panels and fasteners

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST F : POOR SOUND QUALITY OR DISTORTED SOUND FROM ONE OR MORE SPEAKERS (NOT ALL SPEAKERS) > PINPOINT TEST F : POOR SOUND QUALITY OR DISTORTED SOUND FROM ONE OR MORE SPEAKERS (NOT ALL SPEAKERS)

F1 ISOLATE THE ZONE

Operate the audio system using digital media such as a CD or MP3.

Using the audio system fade and balance feature, adjust the audio sound to each of the four zones (LHF, RHF, LHR, and RHR) of the vehicle to isolate the poor sound quality.

Locate and apply pressure to the trim panel(s) around the poor sound quality area in question.

Does applying pressure to a trim panel reduce or eliminate the audible noise?

Yes	REPAIR or REPLACE the trim panel as needed.

No	GO to F2

F2 REMOVE AND INSPECT BEHIND/UNDERNEATH THE SUSPECT TRIM PANEL(S)

Remove the trim panel to access the suspect speaker.

Operate the audio system using digital media such as a CD or MP3.

Validate where the poor sound quality area is located.

Check:

Trim panel for loose components (e.g. speaker grille) around the speaker area.

Trim panel joining components for missing or broken pieces.

Lock and handle mechanical parts for correct attachment.

Wire harnesses for correct routing.

Wire harness fasteners for correct attachment.

Water shield for correct placement (speaker air path not blocked).

Water shield for correct bonding to sheet metal.

Storage areas for loose items.

All child safety belt anchors (if equipped).

All safety belt retractors.

All speaker bracket fasteners and other fasteners are secured and tightened to specified torque.

Was the source of the noise located?

Yes	REPAIR or REPLACE any loose or broken component or fastener as needed.

No	GO to F3

F3 CHECK THE SUSPECT SPEAKER FOR WATER INTRUSION

Inspect for watermarks.

Check the:

Cone

Magnet

Basket

Are any watermarks present on the speaker?

Yes	VERIFY the water shield is in the correct location, REPAIR or REPLACE any trim, door, or speaker seal as required. DRY the speaker in question and TEST the system for normal operation.

No	GO to F4

F4 ISOLATE SPEAKER TO VERIFY NOISE

Remove the suspect speaker from its location and leave the speaker connected to the harness.

Hold the speaker away from any trim panel(s) and ensure the speaker is isolated from contact.

Operate the audio system using digital media such as a CD or MP3.

Is the noise still present in the suspect speaker?

Yes	INSTALL a new speaker for the one in question.

No	LOCATE the source of the noise and REPAIR as needed.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST G : NO SOUND FROM ALL SPEAKERS

Refer to Audio System/Navigation - AM/FM/CD/SYNC for schematic and connector information.

Refer to Power Distribution for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See ACM, DACMC, and Audio Unit Amplifier.

To prevent voltage spikes from producing popping noises through the speakers when the ignition is in the START position for vehicles equipped with the 3.7L Duratec (227kW/301PS) engine, the BCM provides an Ignition Status CAN message and also applies voltage on the ACM start signal circuit. When the CAN message and/or voltage is received by the ACM, the audio signal output is muted. A short to voltage on this circuit causes the ACM output to be muted continuously, and will cause the warning chimes to only sound from the IPC.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1142:27	Ignition Status 1: Signal Rate of Change Above Threshold	Set by the ACM when a short to voltage is detected on the start signal circuit.

Possible Sources

- Wiring, terminals, or connectors
- Fuse
- ACM

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM >

PINPOINT TESTS > PINPOINT TEST G : NO SOUND FROM ALL SPEAKERS > PINPOINT TEST G : NO SOUND FROM ALL SPEAKERS

G1 VERIFY THAT THE ACM (AUDIO FRONT CONTROL MODULE) PASSES THE NETWORK TEST

Using a diagnostic scan tool, perform the network test.

Did the ACM pass the network test?

Yes	GO to G2

No	REFER to: MODULE COMMUNICATIONS NETWORK . See The ACM Does Not Respond To The Diagnostic Scan Tool.

G2 CHECK THE PCM (POWERTRAIN CONTROL MODULE) FOR DTC (DIAGNOSTIC TROUBLE CODE) P0616 OR P0617

Using a diagnostic scan tool, perform the PCM self-test.

Is DTC P0616 or P0617 set in the PCM?

Yes	* For vehicles with the 2.3L EcoBoost (201kW/273PS), REFER to: Starting System . See PCM DTC Chart.* For vehicles with the 3.7L Duratec (227kW/301PS), REFER to: Starting System . See PCM DTC Chart.* For vehicles with the 5.0L 32V Ti-VCT, REFER to: Starting System . See PCM DTC Chart.

No	GO to G3

G3 CHECK THE START SENSE CIRCUIT FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: ACM C240A .

Disconnect: BJB Starter Relay.

Disconnect: PCM C175B .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C240A-3		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to G4

G4 CHECK FOR CORRECT ACM (AUDIO FRONT CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all the ACM connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the ACM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ACM. REFER to: Audio Front Control Module (ACM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST H : THE LHF (LEFT-HAND FRONT) DOOR SPEAKER IS INOPERATIVE

Refer to Audio System/Navigation - AM/FM/CD/SYNC for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See ACM.

The LHF door speaker and LHF A-pillar tweeter speaker share the same audio signal.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1A01:01	Speaker #1: General Electrical	Set by the ACM when a failure is

	Failure	detected on the LHF door or LHF A-pillar tweeter speaker circuits.
B1A01:11	Speaker #1: Circuit Short To Ground	Set by the ACM when a short to ground is detected on the LHF door or LHF A-pillar tweeter speaker circuits. When DTC B1A01:11 is set, the speaker output is disabled.
B1A01:12	Speaker #1: Circuit Short To Battery	Set by the ACM when a short to voltage is detected on the LHF door or LHF A-pillar tweeter speaker circuits. When DTC B1A01:12 is set, the speaker output is disabled.
B1A01:13	Speaker #1: Circuit Open	Set by the ACM when an open is detected on the LHF door or LHF A-pillar tweeter speaker circuits.

Possible Sources

- Speaker
- Wiring, terminals, or connectors
- ACM

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST H : THE LHF (LEFT-HAND FRONT) DOOR SPEAKER IS INOPERATIVE > PINPOINT TEST H : THE LHF (LEFT-HAND FRONT) DOOR SPEAKER IS INOPERATIVE

H1 CHECK THE AUDIO SIGNAL TO THE LHF (LEFT-HAND FRONT) DOOR SPEAKER

Ignition OFF.

Disconnect: LHF Door Speaker C523 .

Operate the audio system in AM/ FM mode.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C523-1	$\tilde{V}$	C523-4

Is a fluctuating AC voltage present?

Yes	INSTALL a new LHF door speaker. REFER to: Front Door Speaker LH .

No	GO to H2

H2 CHECK THE AUDIO CIRCUITS TO THE LHF (LEFT-HAND FRONT) DOOR SPEAKER FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: ACM C240A .

Disconnect: LHF A-pillar Tweeter Speaker C9063 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C523-1	V	Ground
C523-4	V	Ground

Is any voltage present?

Yes	REPAIR the circuit in question.

No	GO to H3

H3 CHECK THE AUDIO CIRCUITS TO THE LHF (LEFT-HAND FRONT) DOOR SPEAKER FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C523-1	Ω	Ground
C523-4	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to H4

No	REPAIR the circuit in question.

H4 CHECK THE AUDIO CIRCUITS TO THE LHF (LEFT-HAND FRONT) DOOR SPEAKER FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C523-1	Ω	C240A-22
C523-4	Ω	C240A-10

Are the resistances less than 3 ohms?

Yes	GO to H5

No	REPAIR the circuit in question.

H5 CHECK THE AUDIO CIRCUITS TO THE LHF (LEFT-HAND FRONT) DOOR SPEAKER FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C523-1	Ω	C523-4

Is the resistance greater than 10, 000 ohms?

Yes	GO to H6

No	REPAIR the circuit in question.

H6 CHECK FOR CORRECT ACM (AUDIO FRONT CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all the ACM connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the ACM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ACM. REFER to: Audio Front Control Module (ACM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST I : THE LHF (LEFT-HAND FRONT) A-PILLAR TWEETER SPEAKER IS INOPERATIVE

Refer to Audio System/Navigation - AM/FM/CD/SYNC for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See ACM.

The LHF door speaker and LHF A-pillar tweeter speaker share the same audio signal.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1A01:01	Speaker #1: General Electrical Failure	Set by the ACM when a failure is detected on the LHF door or LHF A-pillar tweeter speaker circuits.
B1A01:11	Speaker #1: Circuit Short To Ground	Set by the ACM when a short to ground is detected on the LHF door or LHF A-pillar tweeter speaker circuits. When DTC B1A01:11 is set, the speaker output is disabled.
B1A01:12	Speaker #1: Circuit Short To Battery	Set by the ACM when a short to voltage is detected on the LHF door or LHF A-pillar tweeter speaker circuits. When DTC B1A01:12 is set, the speaker output is disabled.
B1A01:13	Speaker #1: Circuit Open	Set by the ACM when an open is detected on the LHF door or LHF A-pillar tweeter speaker circuits.

Possible Sources

- Speaker

- Wiring, terminals, or connectors
- ACM

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST I : THE LHF (LEFT-HAND FRONT) A-PILLAR TWEETER SPEAKER IS INOPERATIVE > PINPOINT TEST I : THE LHF (LEFT-HAND FRONT) A-PILLAR TWEETER SPEAKER IS INOPERATIVE

I1 CHECK THE AUDIO SIGNAL TO THE LHF (LEFT-HAND FRONT) A-PILLAR TWEETER SPEAKER

Ignition OFF.

Disconnect: LHF A-pillar Tweeter Speaker C9063 .

Operate the audio system in AM/ FM mode.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C9063-1		C9063-3

Is a fluctuating AC voltage present?

Yes	INSTALL a new LHF A-pillar tweeter speaker. REFER to: A-Pillar Speaker .

No	GO to I2

I2 CHECK THE AUDIO CIRCUITS TO THE LHF (LEFT-HAND FRONT) A-PILLAR TWEETER SPEAKER FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: ACM C240A .

Disconnect: LHF Door Speaker C523 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C9063-1		Ground
C9063-3		Ground

Is any voltage present?

Yes	REPAIR the circuit in question.

No	GO to I3

I3 CHECK THE AUDIO CIRCUITS TO THE LHF (LEFT-HAND FRONT) A-PILLAR TWEETER SPEAKER FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C9063-1	Ω	Ground
C9063-3	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to I4

No	REPAIR the circuit in question.

I4 CHECK THE AUDIO CIRCUITS TO THE LHF (LEFT-HAND FRONT) A-PILLAR TWEETER SPEAKER FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C9063-1	Ω	C240A-22
C9063-3	Ω	C240A-10

Are the resistances less than 3 ohms?

Yes	GO to I5

No	REPAIR the circuit in question.

I5 CHECK THE AUDIO CIRCUITS TO THE LHF (LEFT-HAND FRONT) A-PILLAR TWEETER SPEAKER FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead

C9063-1	Ω	C9063-3

Is the resistance greater than 10, 000 ohms?

Yes	GO to I6

No	REPAIR the circuit in question.

I6 CHECK FOR CORRECT ACM (AUDIO FRONT CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all the ACM connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the ACM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ACM. REFER to: Audio Front Control Module (ACM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST J : THE RHF (RIGHT-HAND FRONT) A-PILLAR TWEETER SPEAKER IS INOPERATIVE

Refer to Audio System/Navigation - AM/FM/CD/SYNC for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See ACM.

The RHF door speaker and RHF A-pillar tweeter speaker share the same audio signal.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1A02:01	Speaker #2: General Electrical Failure	Set by the ACM when a failure is detected on the RHF door or RHF A-pillar tweeter speaker circuits.
B1A02:11	Speaker #2: Circuit Short To Ground	Set by the ACM when a short to ground is detected on the RHF door or RHF A-pillar tweeter speaker circuits. When DTC B1A02:11 is set, the speaker output is disabled.
B1A02:12	Speaker #2: Circuit Short To Battery	Set by the ACM when a short to voltage is detected on the RHF door or RHF A-pillar tweeter speaker circuits. When DTC B1A02:12 is set, the speaker output is disabled.
B1A02:13	Speaker #2: Circuit Open	Set by the ACM when an open is detected on the RHF door or RHF A-pillar tweeter speaker circuits.

Possible Sources

- Speaker
- Wiring, terminals, or connectors
- ACM

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST J : THE RHF (RIGHT-HAND FRONT) A-PILLAR TWEETER SPEAKER IS INOPERATIVE > PINPOINT TEST J : THE RHF (RIGHT-HAND FRONT) A-PILLAR TWEETER SPEAKER IS INOPERATIVE

J1 CHECK THE AUDIO SIGNAL TO THE RHF (RIGHT-HAND FRONT) A-PILLAR TWEETER SPEAKER

Ignition OFF.

Disconnect: RHF A-Pillar Tweeter Speaker C9065 .

Operate the audio system in AM/ FM mode.

Measure:

Positive Lead	Measurement / Action	Negative Lead

C9065-1		C9065-3

Is a fluctuating AC voltage present?

Yes	INSTALL a new RHF A-pillar tweeter speaker. REFER to: A-Pillar Speaker .

No	GO to J2

J2 CHECK THE AUDIO CIRCUITS TO THE RHF (RIGHT-HAND FRONT) A-PILLAR TWEETER SPEAKER FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: ACM C240A .

Disconnect: RHF Door Speaker C612 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C9065-1		Ground
C9065-3		Ground

Is any voltage present?

Yes	REPAIR the circuit in question.

No	GO to J3

J3 CHECK THE AUDIO CIRCUITS TO THE RHF (RIGHT-HAND FRONT) A-PILLAR TWEETER SPEAKER FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C9065-1	Ω	Ground
C9065-3	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to J4

No	REPAIR the circuit in question.

J4 CHECK THE AUDIO CIRCUITS TO THE RHF (RIGHT-HAND FRONT) A-PILLAR TWEETER SPEAKER FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C9065-1	Ω	C240A-23
C9065-3	Ω	C240A-11

Are the resistances less than 3 ohms?

Yes	GO to J5

No	REPAIR the circuit in question.

J5 CHECK THE AUDIO CIRCUITS TO THE RHF (RIGHT-HAND FRONT) A-PILLAR TWEETER SPEAKER FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C9065-1	Ω	C9065-3

Is the resistance greater than 10, 000 ohms?

Yes	GO to J6

No	REPAIR the circuit in question.

J6 CHECK FOR CORRECT ACM (AUDIO FRONT CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all the ACM connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the ACM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ACM. REFER to: Audio Front Control Module (ACM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST K : THE RHF (RIGHT-HAND FRONT) DOOR SPEAKER IS INOPERATIVE

Refer to Audio System/Navigation - AM/FM/CD/SYNC for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See ACM.

The RHF door speaker and RHF A-pillar tweeter speaker share the same audio signal.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1A02:01	Speaker #2: General Electrical Failure	Set by the ACM when a failure is detected on the RHF door or RHF A-pillar tweeter speaker circuits.
B1A02:11	Speaker #2: Circuit Short To Ground	Set by the ACM when a short to ground is detected on the RHF door or RHF A-pillar tweeter speaker circuits. When DTC B1A02:11 is set, the speaker output is disabled.
B1A02:12	Speaker #2: Circuit Short To Battery	Set by the ACM when a short to voltage is detected on the RHF door or RHF A-pillar tweeter speaker circuits. When DTC B1A02:12 is set, the speaker output is disabled.
B1A02:13	Speaker #2: Circuit Open	Set by the ACM when an open is detected on the RHF door or RHF A-pillar tweeter speaker circuits.

Possible Sources

- Speaker
- Wiring, terminals, or connectors
- ACM

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST K : THE RHF (RIGHT-HAND FRONT) DOOR SPEAKER IS INOPERATIVE > PINPOINT TEST K : THE RHF (RIGHT-HAND FRONT) DOOR SPEAKER IS INOPERATIVE

K1 CHECK THE AUDIO SIGNAL TO THE RHF (RIGHT-HAND FRONT) DOOR SPEAKER

Ignition OFF.

Disconnect: RHF Door Speaker C612 .

Operate the audio system in AM/ FM mode.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C612-1		C612-4

Is a fluctuating AC voltage present?

Yes	INSTALL a new RHF door speaker. REFER to: Front Door Speaker RH .

No	GO to K2

K2 CHECK THE AUDIO CIRCUITS TO THE RHF (RIGHT-HAND FRONT) DOOR SPEAKER FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: ACM C240A .

Disconnect: RHF A-Pillar Tweeter Speaker C9065 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead

C612-1		Ground
C612-4		Ground

Is any voltage present?

Yes	REPAIR the circuit in question.

No	GO to K3

K3 CHECK THE AUDIO CIRCUITS TO THE RHF (RIGHT-HAND FRONT) DOOR SPEAKER FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C612-1	Ω	Ground
C612-4	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to K4

No	REPAIR the circuit in question.

K4 CHECK THE AUDIO CIRCUITS TO THE RHF (RIGHT-HAND FRONT) DOOR SPEAKER FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C612-1	Ω	C240A-23
C612-4	Ω	C240A-11

Are the resistances less than 3 ohms?

Yes	GO to K5

No	REPAIR the circuit in question.

K5 CHECK THE AUDIO CIRCUITS TO THE RHF (RIGHT-HAND FRONT) DOOR SPEAKER FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C612-1	Ω	C612-4

Is the resistance greater than 10, 000 ohms?

Yes	GO to K6

No	REPAIR the circuit in question.

K6 CHECK FOR CORRECT ACM (AUDIO FRONT CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all the ACM connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the ACM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ACM. REFER to: Audio Front Control Module (ACM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST L : THE RHR (RIGHT-HAND REAR) QUARTER PANEL SPEAKER IS INOPERATIVE (CONVERTIBLE)

Refer to Audio System/Navigation - AM/FM/CD/SYNC for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See ACM.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1A03:01	Speaker #3: General Electrical Failure	Set by the ACM when a failure is detected on the RHR quarter panel speaker circuits.
B1A03:11	Speaker #3: Circuit Short To Ground	Set by the ACM when a short to ground is detected on the RHR quarter panel speaker circuits. When DTC B1A03:11 is set, the speaker output is disabled.
B1A03:12	Speaker #3: Circuit Short To Battery	Set by the ACM when a short to voltage is detected on the RHR quarter panel speaker circuits. When DTC B1A03:12 is set, the speaker output is disabled.
B1A03:13	Speaker #3: Circuit Open	Set by the ACM when an open is detected on the RHR quarter panel speaker circuits.

Possible Sources

- Speaker
- Wiring, terminals, or connectors
- ACM

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST L : THE RHR (RIGHT-HAND REAR) QUARTER PANEL SPEAKER IS INOPERATIVE (CONVERTIBLE) > PINPOINT TEST L : THE RHR (RIGHT-HAND REAR) QUARTER PANEL SPEAKER IS INOPERATIVE (CONVERTIBLE)

L1 CHECK THE AUDIO SIGNAL TO THE RHR (RIGHT-HAND REAR) QUARTER PANEL SPEAKER

Ignition OFF.

Disconnect: RHR Quarter Panel Speaker C396 .

Operate the audio system in AM/ FM mode.

Measure:

Positive Lead	Measurement / Action	Negative Lead

C396-1		C396-4

Is a fluctuating AC voltage present?

Yes	INSTALL a new RHR quarter panel speaker. REFER to: Rear Quarter Panel Speaker .

No	GO to L2

L2 CHECK THE AUDIO CIRCUITS TO THE RHR (RIGHT-HAND REAR) QUARTER PANEL SPEAKER FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: ACM C240A .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C396-1		Ground
C396-4		Ground

Is any voltage present?

Yes	REPAIR the circuit in question.

No	GO to L3

L3 CHECK THE AUDIO CIRCUITS TO THE RHR (RIGHT-HAND REAR) QUARTER PANEL SPEAKER FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C396-1	Ω	Ground
C396-4	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to L4

No	REPAIR the circuit in question.

L4 CHECK THE AUDIO CIRCUITS TO THE RHR (RIGHT-HAND REAR) QUARTER PANEL SPEAKER FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C396-1	Ω	C240A-24
C396-4	Ω	C240A-12

Are the resistances less than 3 ohms?

Yes	GO to L5

No	REPAIR the circuit in question.

L5 CHECK THE AUDIO CIRCUITS TO THE RHR (RIGHT-HAND REAR) QUARTER PANEL SPEAKER FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C396-1	Ω	C396-4

Is the resistance greater than 10, 000 ohms?

Yes	GO to L6

No	REPAIR the circuit in question.

L6 CHECK FOR CORRECT ACM (AUDIO FRONT CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all the ACM connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the ACM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ACM. REFER to: Audio Front Control Module (ACM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST M : THE RIGHT PARCEL SHELF SPEAKER IS INOPERATIVE (COUPE)

Refer to Audio System/Navigation - AM/FM/CD/SYNC for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See ACM.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1A03:01	Speaker #3: General Electrical Failure	Set by the ACM when a failure is detected on the right parcel shelf speaker circuits.
B1A03:11	Speaker #3: Circuit Short To Ground	Set by the ACM when a short to ground is detected on the right parcel shelf speaker circuits. When DTC B1A03:11 is set, the speaker output is disabled.
B1A03:12	Speaker #3: Circuit Short To Battery	Set by the ACM when a short to voltage is detected on the right parcel shelf speaker circuits. When DTC B1A03:12 is set, the speaker output is disabled.
B1A03:13	Speaker #3: Circuit Open	Set by the ACM when an open is detected on the right parcel shelf speaker circuits.

Possible Sources

- Speaker

- Wiring, terminals, or connectors
- ACM

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST M : THE RIGHT PARCEL SHELF SPEAKER IS INOPERATIVE (COUPE) > PINPOINT TEST M : THE RIGHT PARCEL SHELF SPEAKER IS INOPERATIVE (COUPE)

M1 CHECK THE AUDIO SIGNAL TO THE RIGHT PARCEL SHELF SPEAKER

Ignition OFF.

Disconnect: Right Parcel Shelf Speaker C485 .

Operate the audio system in AM/ FM mode.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C485-1		C485-4

Is a fluctuating AC voltage present?

Yes	INSTALL a new right parcel shelf speaker. REFER to: Parcel Shelf Speaker .

No	GO to M2

M2 CHECK THE AUDIO CIRCUITS TO THE RIGHT PARCEL SHELF SPEAKER FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: ACM C240A .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C485-1		Ground
C485-4		Ground

Is any voltage present?

Yes	REPAIR the circuit in question.

No	GO to M3

M3 CHECK THE AUDIO CIRCUITS TO THE RIGHT PARCEL SHELF SPEAKER FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C485-1	Ω	Ground
C485-4	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to M4

No	REPAIR the circuit in question.

M4 CHECK THE AUDIO CIRCUITS TO THE RIGHT PARCEL SHELF SPEAKER FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C485-1	Ω	C240A-24
C485-4	Ω	C240A-12

Are the resistances less than 3 ohms?

Yes	GO to M5

No	REPAIR the circuit in question.

M5 CHECK THE AUDIO CIRCUITS TO THE RIGHT PARCEL SHELF SPEAKER FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C485-1	Ω	C485-4

Is the resistance greater than 10, 000 ohms?

Yes	GO to M6

No	REPAIR the circuit in question.

M6 CHECK FOR CORRECT ACM (AUDIO FRONT CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all the ACM connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the ACM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ACM. REFER to: Audio Front Control Module (ACM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST N : THE LEFT PARCEL SHELF SPEAKER IS INOPERATIVE (COUPE)

Refer to Audio System/Navigation - AM/FM/CD/SYNC for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See ACM.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1A04:01	Speaker #4: General Electrical	Set by the ACM when a failure is

	Failure	detected on the left parcel shelf speaker circuits.
B1A04:11	Speaker #4: Circuit Short To Ground	Set by the ACM when a short to ground is detected on the left parcel shelf speaker circuits. When DTC B1A04:11 is set, the speaker output is disabled.
B1A04:12	Speaker #4: Circuit Short To Battery	Set by the ACM when a short to voltage is detected on the left parcel shelf speaker circuits. When DTC B1A04:12 is set, the speaker output is disabled.
B1A04:13	Speaker #4: Circuit Open	Set by the ACM when an open is detected on the left parcel shelf speaker circuits.

Possible Sources

- Speaker
- Wiring, terminals, or connectors
- ACM

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST N : THE LEFT PARCEL SHELF SPEAKER IS INOPERATIVE (COUPE) > PINPOINT TEST N : THE LEFT PARCEL SHELF SPEAKER IS INOPERATIVE (COUPE)

N1 CHECK THE AUDIO SIGNAL TO THE LEFT PARCEL SHELF SPEAKER

Ignition OFF.

Disconnect: Left Parcel Shelf Speaker C484 .

Operate the audio system in AM/ FM mode.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C484-1	$\tilde{V}$	C484-4

Is a fluctuating AC voltage present?

Yes	INSTALL a new left parcel shelf speaker. REFER to: Parcel Shelf Speaker .

No	GO to N2

N2 CHECK THE AUDIO CIRCUITS TO THE LEFT PARCEL SHELF SPEAKER FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: ACM C240A .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C484-1		Ground
C484-4		Ground

Is any voltage present?

Yes	REPAIR the circuit in question.

No	GO to N3

N3 CHECK THE AUDIO CIRCUITS TO THE LEFT PARCEL SHELF SPEAKER FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C484-1	Ω	Ground
C484-4	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to N4

No	REPAIR the circuit in question.

N4 CHECK THE AUDIO CIRCUITS TO THE LEFT PARCEL SHELF SPEAKER FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C484-1	Ω	C240A-21
C484-4	Ω	C240A-9

Are the resistances less than 3 ohms?

Yes	GO to N5

No	REPAIR the circuit in question.

N5 CHECK THE AUDIO CIRCUITS TO THE LEFT PARCEL SHELF SPEAKER FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C484-1	Ω	C484-4

Is the resistance greater than 10, 000 ohms?

Yes	GO to N6

No	REPAIR the circuit in question.

N6 CHECK FOR CORRECT ACM (AUDIO FRONT CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all the ACM connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the ACM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ACM. REFER to: Audio

	Front Control Module (ACM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST O : THE LHR (LEFT-HAND REAR) QUARTER PANEL SPEAKER IS INOPERATIVE (CONVERTIBLE)

Refer to Audio System/Navigation - AM/FM/CD/SYNC for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See ACM.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1A04:01	Speaker #4: General Electrical Failure	Set by the ACM when a failure is detected on the LHR quarter panel speaker circuits.
B1A04:11	Speaker #4: Circuit Short To Ground	Set by the ACM when a short to ground is detected on the LHR quarter panel speaker circuits. When DTC B1A04:11 is set, the speaker output is disabled.
B1A04:12	Speaker #4: Circuit Short To Battery	Set by the ACM when a short to voltage is detected on the LHR quarter panel speaker circuits. When DTC B1A04:12 is set, the speaker output is disabled.
B1A04:13	Speaker #4: Circuit Open	Set by the ACM when an open is detected on the LHR quarter panel speaker circuits.

Possible Sources

- Speaker
- Wiring, terminals, or connectors
- ACM

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM >

PINPOINT TESTS > PINPOINT TEST O : THE LHR (LEFT-HAND REAR) QUARTER PANEL SPEAKER IS INOPERATIVE (CONVERTIBLE) > PINPOINT TEST O : THE LHR (LEFT-HAND REAR) QUARTER PANEL SPEAKER IS INOPERATIVE (CONVERTIBLE)

O1 CHECK THE AUDIO SIGNAL TO THE LHR (LEFT-HAND REAR) QUARTER PANEL SPEAKER

Ignition OFF.

Disconnect: LHR Quarter Panel Speaker C395 .

Operate the audio system in AM/ FM mode.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C395-1		C395-4

Is a fluctuating AC voltage present?

Yes	INSTALL a new LHR quarter panel speaker. REFER to: Rear Quarter Panel Speaker .

No	GO to O2

O2 CHECK THE AUDIO CIRCUITS TO THE LHR (LEFT-HAND REAR) QUARTER PANEL SPEAKER FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: ACM C240A .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C395-1		Ground
C395-4		Ground

Is any voltage present?

Yes	REPAIR the circuit in question.

No	GO to O3

O3 CHECK THE AUDIO CIRCUITS TO THE LHR (LEFT-HAND REAR) QUARTER PANEL SPEAKER FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C395-1	Ω	Ground
C395-4	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to O4

No	REPAIR the circuit in question.

O4 CHECK THE AUDIO CIRCUITS TO THE LHR (LEFT-HAND REAR) QUARTER PANEL SPEAKER FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C395-1	Ω	C240A-21
C395-4	Ω	C240A-9

Are the resistances less than 3 ohms?

Yes	GO to O5

No	REPAIR the circuit in question.

O5 CHECK THE AUDIO CIRCUITS TO THE LHR (LEFT-HAND REAR) QUARTER PANEL SPEAKER FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C395-1	Ω	C395-4

Is the resistance greater than 10, 000 ohms?

Yes	GO to O6

No	REPAIR the circuit in question.

O6 CHECK FOR CORRECT ACM (AUDIO FRONT CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all the ACM connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the ACM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ACM. REFER to: Audio Front Control Module (ACM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST P : THE SYNC ® SYSTEM IS INOPERATIVE (NO RESPONSE IS RECEIVED FROM PHONE, VOICE, AND MEDIA INPUTS)

Refer to Audio System/Navigation - AM/FM/CD/SYNC for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See Audio Input Jack Mode, Bluetooth Mode, SYNC ® System, USB Audio Mode, Voice Recognition, APIM, Audio Input Jack, SYNC ® Microphone, and USB Port.

Possible Sources

- Customer's device
- APIM

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST P : THE SYNC ® SYSTEM IS INOPERATIVE (NO RESPONSE IS RECEIVED FROM PHONE, VOICE, AND MEDIA INPUTS) > PINPOINT

TEST P : THE SYNC ® SYSTEM IS INOPERATIVE (NO RESPONSE IS RECEIVED FROM PHONE, VOICE, AND MEDIA INPUTS)

P1 VERIFY THAT THE APIM (SYNC MODULE) PASSES THE NETWORK TEST

Using a diagnostic scan tool, perform the network test.

Did the APIM pass the network test?

Yes	GO to P2

No	REFER to: MODULE COMMUNICATIONS NETWORK . See The APIM Does Not Respond To The Diagnostic Scan Tool.

NOTE: Performing a Master Reset returns all preference settings to the factory defaults, erases the phone book and call histories, deletes any Bluetooth devices paired with the SYNC ® system.

P2 CHECK THE SYNC ® SYSTEM INPUTS FOR FUNCTIONALITY

Connect: MIT 105-00120.

Using the MIT 105-00120, test the audio output for the SYNC ® audio sources (Bluetooth, USB, audio input jack) using the VOICE steering wheel switch to enter each mode.

Do all of the SYNC ® inputs function correctly?

Yes	The SYNC ® system is operating correctly at this time. PERFORM a Master Reset. REFER to the Owner's Literature. REVIEW the SYNC ® system operation with the customer. If the customer's device still does not operate correctly, the fault is with the customer's device.

No	GO to P3

NOTE: Performing a Master Reset returns all preference settings to the factory defaults, erases the phone book and call histories, deletes any Bluetooth devices paired with the SYNC ® system.

P3 RESET THE APIM (SYNC MODULE) AND RECHECK SYNC ® SYSTEM OPERATION

Carry out an APIM power reset by disconnecting the battery for 1 minute, then reconnecting it.

Connect: MIT 105-00120.

Using the MIT 105-00120, test the audio output for the SYNC ® audio sources (Bluetooth, USB, audio input jack) using the VOICE steering wheel switch to enter each mode.

Do all of the SYNC ® inputs function correctly?

Yes	The SYNC ® system is operating correctly at this time. PERFORM a Master Reset. REFER to the Owner's Literature. REVIEW the SYNC ® system operation with the customer. If the customer's device still does not operate correctly, the fault is with the customer's device.

No	* If there is a concern with one or more, but not all SYNC ® audio sources, REFER to: Information and Entertainment System . See Symptom Chart: SYNC ® System.* If there is a concern with the VOICE steering wheel switch, GO to Pinpoint Test X * If all inputs are inoperative, PERFORM the APIM Hardware Test. Refer to APIM HARDWARE TESTING .

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST Q : ALL APIM (SYNC MODULE) STEREO OUTPUTS ARE INOPERATIVE OR DO NOT OPERATE CORRECTLY

Refer to Audio System/Navigation - AM/FM/CD/SYNC for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See Bluetooth Mode, Composite Audio-Video Input Mode, SD Card Mode, SYNC ® System, USB Mode, ACM, APIM, and Media Hub.

Possible Sources

- Customer's device
- Wiring, terminals, or connectors
- APIM
- ACM

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST Q : ALL APIM (SYNC MODULE) STEREO OUTPUTS ARE INOPERATIVE OR DO NOT OPERATE CORRECTLY > PINPOINT TEST Q : ALL APIM (SYNC MODULE) STEREO OUTPUTS ARE INOPERATIVE OR DO NOT OPERATE CORRECTLY

Q1 VERIFY THE OPERATION OF THE SYNC ® SYSTEM AUDIO SOURCES

Connect: MIT 105-00120.

Using the MIT 105-00120 and RCA Adapter 105-00121, test the audio output for the SYNC ® audio sources (Bluetooth, USB ports, and RCA jacks).

Is there poor quality, distorted, or no sound from all SYNC ® audio sources?

Yes	GO to Q2

No	* If there is a concern with one or more, but not all SYNC ® audio sources, REFER to: Information and Entertainment System . See Symptom Chart: SYNC ® System.* If all SYNC ® audio sources operate correctly with the MIT 105-00120 and RCA Adapter 105-00121, the concern is with the customer's device.

NOTE: This pinpoint test step directs testing circuits using a back-probe method. Use the special back-probe tool POM6411. Do not force test leads or other probes into connectors. Adequate care must be exercised to avoid connector terminal damage, while ensuring that good electrical contact is made with the circuit or terminal. Failure to follow these instructions may cause damage to wiring, terminals, or connectors, and may cause subsequent electrical faults.

Q2 CHECK FOR AN AC (ALTERNATING CURRENT) VOLTAGE SIGNAL ON THE APIM (SYNC MODULE) STEREO OUTPUT CIRCUITS TO THE ACM (AUDIO FRONT CONTROL MODULE)

Play an audio file through the audio system using a SYNC ® audio source (Bluetooth, USB ports, RCA jacks).

While back-probing ACM C240B , measure the AC voltage.

Positive Lead	Measurement / Action	Negative Lead
C240B-12	V~	C240B-25
C240B-13	V~	C240B-26

Is a fluctuating AC voltage present?

Yes	GO to Q8

No	GO to Q3

Q3 CHECK THE APIM (SYNC MODULE) STEREO OUTPUT CIRCUITS TO THE ACM (AUDIO FRONT CONTROL MODULE) FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: ACM C240B .

Disconnect: APIM C2383 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C240B-12		Ground
C240B-13		Ground
C240B-25		Ground
C240B-26		Ground

Is any voltage present?

Yes	REPAIR the circuit in question.

No	GO to Q4

Q4 CHECK THE APIM (SYNC MODULE) STEREO OUTPUT CIRCUITS TO THE ACM (AUDIO FRONT CONTROL MODULE) FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C240B-12	Ω	Ground
C240B-13	Ω	Ground
C240B-25	Ω	Ground
C240B-26	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to Q5

No	REPAIR the circuit in question.

Q5 CHECK THE APIM (SYNC MODULE) STEREO OUTPUT CIRCUITS TO THE ACM (AUDIO FRONT CONTROL MODULE) FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C240B-12	Ω	C2383-23
C240B-13	Ω	C2383-25
C240B-25	Ω	C2383-24

C240B-26	Ω	C2383-26

Are the resistances less than 3 ohms?

Yes	GO to Q6

No	REPAIR the circuit in question.

Q6 CHECK THE APIM (SYNC MODULE) STEREO OUTPUT CIRCUITS TO THE ACM (AUDIO FRONT CONTROL MODULE) FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C240B-12	Ω	C240B-13
C240B-12	Ω	C240B-25
C240B-12	Ω	C240B-26
C240B-13	Ω	C240B-25
C240B-13	Ω	C240B-26
C240B-25	Ω	C240B-26

Are the resistances greater than 10, 000 ohms?

Yes	GO to Q7

No	INSTALL a new steering wheel. REFER to: Steering Wheel .

Q7 CHECK FOR CORRECT APIM (SYNC MODULE) OPERATION

Ignition OFF.

Disconnect and inspect the APIM connector.

Repair:

- Corrosion (clean module pins or install new connectors or terminals)
- Damaged or bent pins (install new terminals or pins)
- Pushed-out pins (install new pins as necessary)

Reconnect the APIM connector. Make sure it seats and latches correctly.

Wait at least 2 minutes for the APIM to re-initialize.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, PERFORM the APIM Hardware Test. Refer to APIM HARDWARE TESTING .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

Q8 CHECK FOR CORRECT ACM (AUDIO FRONT CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all the ACM connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the ACM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ACM. REFER to: Audio Front Control Module (ACM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST R : ALL APIM (SYNC MODULE) MONO OUTPUTS ARE INOPERATIVE OR DO NOT OPERATE CORRECTLY

All APIM Mono Outputs Are Inoperative Or Do Not Operate Correctly

Refer to Audio System/Navigation - AM/FM/CD/SYNC for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See SYNC ® System, Voice Recognition, ACM, and APIM.

Possible Sources

- Customer's setting
- Wiring, terminals, or connectors
- APIM
- ACM

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST R : ALL APIM (SYNC MODULE) MONO OUTPUTS ARE INOPERATIVE OR DO NOT OPERATE CORRECTLY > PINPOINT TEST R : ALL APIM (SYNC MODULE) MONO OUTPUTS ARE INOPERATIVE OR DO NOT OPERATE CORRECTLY

R1 CHECK THE AUDIBLE PROMPT FUNCTIONALITY

Operate the audio system in AM/ FM mode.

Operate the VOICE steering wheel switch and listen for the SYNC ® audible prompt.

Does the SYNC ® system produce an audible prompt correctly; indicating voice recognition mode has been entered?

Yes	The system is operating correctly at this time. INSTRUCT the customer in the correct operation of the audible prompt feature. REFER to "SYNC ® Voice Recognition Feature" in the Owner's Literature.

No	GO to R2

R2 CHECK THE OPERATION OF THE RH (RIGHT-HAND) LOWER STEERING WHEEL SWITCHES

Operate the audio system in AM/ FM mode.

Operate the VOLUME +/-, SEEK +/END CALL, SEEK-/SEND CALL/RECEIVE CALL, VOICE, and MUTE steering wheel switches.

Do the VOLUME +/-, SEEK +/END CALL, SEEK-/SEND CALL/RECEIVE CALL, VOICE, and MUTE steering wheel switches operate correctly?

Yes	GO to R3

No	GO to Pinpoint Test X

NOTE: This pinpoint test step directs testing circuits using a back-probe method.

Use the special back-probe tool POM6411. Do not force test leads or other probes into connectors. Adequate care must be exercised to avoid connector terminal damage, while ensuring that good electrical contact is made with the circuit or terminal. Failure to follow these instructions may cause damage to wiring, terminals, or connectors, and may cause subsequent electrical faults.

R3 CHECK FOR AN AC (ALTERNATING CURRENT) VOLTAGE SIGNAL ON THE APIM (SYNC MODULE) MONO OUTPUT CIRCUITS TO THE ACM (AUDIO FRONT CONTROL MODULE)

Operate the audio system in AM/ FM mode.

While back-probing ACM C240B , measure the AC voltage while repeatedly operating the VOICE steering wheel switch.

Positive Lead	Measurement / Action	Negative Lead
C240B-8		C240B-21

Is a fluctuating AC voltage present each time the VOICE steering wheel switch is operated?

Yes	GO to R9

No	GO to R4

R4 CHECK THE APIM (SYNC MODULE) MONO OUTPUT CIRCUITS TO THE ACM (AUDIO FRONT CONTROL MODULE) FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: ACM C240B .

Disconnect: APIM C2383 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C240B-8		Ground
C240B-21		Ground

Is any voltage present?

Yes	REPAIR the circuit in question.

No	GO to R5

R5 CHECK THE APIM (SYNC MODULE) MONO OUTPUT CIRCUITS TO THE ACM (AUDIO FRONT CONTROL MODULE) FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C240B-8	Ω	Ground
C240B-21	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to R6

No	REPAIR the circuit in question.

R6 CHECK THE APIM (SYNC MODULE) MONO OUTPUT CIRCUITS TO THE ACM (AUDIO FRONT CONTROL MODULE) FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C240B-8	Ω	C2383-3
C240B-21	Ω	C2383-4

Are the resistances less than 3 ohms?

Yes	GO to R7

No	REPAIR the circuit in question.

R7 CHECK THE APIM (SYNC MODULE) MONO OUTPUT CIRCUITS TO THE ACM (AUDIO FRONT CONTROL MODULE) FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C240B-8	$\tilde{V}$	C240B-21

Is the resistance greater than 10, 000 ohms?

Yes	GO to R8

No	REPAIR the circuit in question.

R8 CHECK FOR CORRECT APIM (SYNC MODULE) OPERATION

Disconnect and inspect the APIM connector.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the APIM connector. Make sure it seats and latches correctly.

Wait at least 2 minutes for the APIM to re-initialize.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, discontinue this test and follow TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, PERFORM the APIM Hardware Test. Refer to APIM HARDWARE TESTING .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

R9 CHECK FOR CORRECT ACM (AUDIO FRONT CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all the ACM connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the ACM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, discontinue this test and follow TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ACM. REFER to: Audio Front Control Module (ACM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST S : VOICE RECOGNITION IS INOPERATIVE OR DOES NOT OPERATE CORRECTLY, OR DURING A PHONE CALL, POOR QUALITY OR NO OUTGOING AUDIO IS HEARD ON THE OUTSIDE DEVICE

Refer to Audio System/Navigation - AM/FM/CD/SYNC for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See Voice Recognition.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1D79:01	Microphone Input: General Electrical Failure	Set by the APIM when a microphone is not detected during the on-demand self-test.
B1D79:11	Microphone Input: Circuit Short To Ground	Set by the APIM when a short to ground is detected on the microphone circuits.
B1D79:12	Microphone Input: Circuit Short To Battery	Set by the APIM when a short to battery voltage is detected on the microphone circuits.
B1D79:13	Microphone Input: Circuit Open	Set by the APIM when an open is detected on the microphone circuits.

Possible Sources

- Wiring, terminals, or connectors
- Microphone
- APIM

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM >

PINPOINT TESTS > PINPOINT TEST S : VOICE RECOGNITION IS INOPERATIVE OR DOES NOT OPERATE CORRECTLY, OR DURING A PHONE CALL, POOR QUALITY OR NO OUTGOING AUDIO IS HEARD ON THE OUTSIDE DEVICE > PINPOINT TEST S : VOICE RECOGNITION IS INOPERATIVE OR DOES NOT OPERATE CORRECTLY, OR DURING A PHONE CALL, POOR QUALITY OR NO OUTGOING AUDIO IS HEARD ON THE OUTSIDE DEVICE

S1 CHECK THE AUDIBLE PROMPT FUNCTIONALITY

Operate the audio system in AM/ FM mode.

Operate the VOICE steering wheel switch and listen for the SYNC ® audible prompt.

Does the SYNC ® system produce an audible prompt correctly; indicating voice recognition mode has been entered?

Yes	GO to S3

No	GO to S2

S2 CHECK THE OPERATION OF THE RH (RIGHT-HAND) LOWER STEERING WHEEL SWITCHES

Operate the audio system in AM/ FM mode.

Operate the VOLUME +/-, SEEK +/END CALL, SEEK-/SEND CALL/RECEIVE CALL, VOICE, and MUTE steering wheel switches.

Do the VOLUME +/-, SEEK +/END CALL, SEEK-/SEND CALL/RECEIVE CALL, VOICE, and MUTE steering wheel switches operate correctly?

Yes	GO to Pinpoint Test R

No	GO to Pinpoint Test X

S3 CHECK THE MICROPHONE CIRCUITS TO THE APIM (SYNC MODULE) FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: APIM C2383 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead

C2383-5		Ground
C2383-6		Ground
C2383-29		Ground

Is any voltage present?

Yes	REPAIR the circuit in question.

No	GO to S4

S4 CHECK THE MICROPHONE CIRCUITS TO THE APIM (SYNC MODULE) FOR A SHORT TO GROUND

Ignition OFF.

Disconnect: Microphone (Overhead Console) C930 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2383-5	Ω	Ground
C2383-6	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to S5

No	REPAIR the circuit in question.

S5 CHECK THE MICROPHONE CIRCUITS TO THE APIM (SYNC MODULE) FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2383-5	Ω	C930-9
C2383-6	Ω	C930-10
C2383-29	Ω	C930-8

Are the resistances less than 3 ohms?

Yes	GO to S6

No	REPAIR the circuit in question.

S6 CHECK THE MICROPHONE CIRCUITS TO THE APIM (SYNC MODULE) FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2383-5	Ω	C2383-6
C2383-5	Ω	C2383-29
C2383-6	Ω	C2383-29

Is the resistance greater than 10, 000 ohms?

Yes	GO to S7

No	REPAIR the circuit in question.

S7 ISOLATE THE MICROPHONE

Connect: APIM C2383 .

Install a new microphone. REFER to: Microphone .

Operate the audio system in AM/ FM mode.

Operate the VOICE steering wheel switch and listen for the SYNC ® audible prompt.

Speak a command to test the voice recognition for normal operation.

Is the voice recognition functioning correctly?

Yes	The system is operating correctly at this time. The concern was caused by an inoperative microphone.

No	GO to S8

S8 CHECK FOR CORRECT APIM (SYNC MODULE) OPERATION

Ignition OFF.

Disconnect and inspect the APIM connector.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the APIM connector. Make sure they seat and latch correctly.

Wait at least 2 minutes for the APIM to re-initialize.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, PERFORM the APIM Hardware Test. Refer to APIM HARDWARE TESTING .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST T : THE AUDIO INPUT JACK IS INOPERATIVE OR DOES NOT OPERATE CORRECTLY

Refer to Audio System/Navigation - AM/FM/CD/SYNC for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See Audio Input Jack Mode and Audio Input Jack.

Possible Sources

- Customer's device
- Wiring, terminals, or connectors
- Audio input jack
- APIM

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST T : THE AUDIO INPUT JACK IS INOPERATIVE OR DOES NOT OPERATE CORRECTLY > PINPOINT TEST T : THE AUDIO INPUT JACK IS INOPERATIVE OR DOES NOT OPERATE CORRECTLY

T1 RESET THE APIM (SYNC MODULE) AND RECHECK SYNC ® SYSTEM OPERATION

Remove any devices connected to the USB port and audio input jack.

Carry out an APIM power reset by disconnecting the battery for 1 minute, then reconnecting it.

Wait at least 2 minutes for the APIM to re-initialize.

Connect: MIT 105-00120.

Using the MIT 105-00120, attempt to play an audio file using the audio input jack.

Is the audio output OK for the audio input jack?

Yes	The system is operating correctly at this time. The concern was corrected by performing the APIM power reset. If the customer's device still does not operate correctly, the fault is with the customer's device.

No	GO to T2

T2 CHECK THE AUDIO INPUT JACK CIRCUITS FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: Audio Input Jack C2362.

Disconnect: APIM C2383 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2362-1		Ground
C2362-3		Ground
C2362-4		Ground

Is any voltage present?

Yes	REPAIR the circuit in question.

No	GO to T3

T3 CHECK THE AUDIO INPUT JACK CIRCUITS FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2362-1	Ω	Ground
C2362-3	Ω	Ground
C2362-4	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to T4

No	REPAIR the circuit. TEST the system for normal operation.

T4 CHECK THE AUDIO INPUT JACK CIRCUITS FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2362-1	Ω	C2383-47
C2362-3	Ω	C2383-46
C2362-4	Ω	C2383-45

Are the resistances less than 3 ohms?

Yes	GO to T5

No	REPAIR the circuit in question. TEST the system for normal operation.

T5 ISOLATE THE AUDIO INPUT JACK

Connect: APIM C2383 .

Install a new audio input jack. REFER to: Audio Input Jack .

Connect: MIT 105-00120.

Using the MIT 105-00120, attempt to play an audio file using the audio input jack.

Is the audio output OK for the audio input jack?

Yes	The system is operating correctly at this time. The concern was caused by an inoperative audio input jack.

No	GO to T6

T6 CHECK FOR CORRECT APIM (SYNC MODULE) OPERATION

Ignition OFF.

Disconnect and inspect the APIM connector.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the APIM connector. Make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, discontinue this test and follow TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, PERFORM the APIM Hardware Test. Refer to APIM HARDWARE TESTING .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST U : THE FRONT USB (UNIVERSAL SERIAL BUS) PORT (USB1) IS INOPERATIVE OR DOES NOT OPERATE CORRECTLY

Refer to Audio System/Navigation - AM/FM/CD/SYNC for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See SYNC ® AppLink™, USB Audio Mode, and USB Port.

The MIT 105-00120 is powered by the USB port

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1252:04	USB Port: System Internal Failure	Set by the APIM when a failure is detected on the front USB port (USB1) internal APIM circuitry.
B1252:11	USB Port: Circuit Short To Ground	Set by the APIM when a short to ground or over-current (overloaded) condition is detected

		on the front USB port/cable (USB1). This can be caused by a fault in the USB port/cable or customer's USB device.

Possible Sources

- Customer's device
- Front USB port/cable
- USB port/cable connection
- APIM

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST U : THE FRONT USB (UNIVERSAL SERIAL BUS) PORT (USB1) IS INOPERATIVE OR DOES NOT OPERATE CORRECTLY > PINPOINT TEST U : THE FRONT USB (UNIVERSAL SERIAL BUS) PORT (USB1) IS INOPERATIVE OR DOES NOT OPERATE CORRECTLY

U1 CHECK THE FRONT USB (UNIVERSAL SERIAL BUS) PORT FOR POWER OUTPUT

Ignition ON.

Connect: MIT 105-00120 to the front USB port.

Does the MIT 105-00120 power on from the front USB port?

Yes	GO to U2
No	GO to U3

U2 RESET THE APIM (SYNC MODULE) AND RECHECK THE SYNC ® SYSTEM OPERATION

Remove any devices connected to the USB ports and audio input jack.

Carry out an APIM power reset by disconnecting the battery for 1 minute, then reconnecting it.

Ignition ON.

Wait at least 2 minutes for the APIM to re-initialize.

Connect: MIT 105-00120 to the front USB port.

Select USB mode on the MIT.

Operate the audio system in USB mode and observe the audio output.

Is the audio system USB output OK with the MIT 105-00120 connected to the front USB port?

Yes	The system is operating correctly at this time. The concern was corrected by performing the APIM power reset. If the customer's device still does not operate correctly, the fault is with the customer's device.

No	GO to U3

U3 CHECK THE APIM (SYNC MODULE) FOR DTC (DIAGNOSTIC TROUBLE CODE) B1252:04 OR DTC (DIAGNOSTIC TROUBLE CODE) B1252:11

Using a diagnostic scan tool, clear the APIM Diagnostic Trouble Codes (DTCs).

Perform the APIM self-test.

Is DTC B1252:04 or DTC B1252:11 present?

Yes	GO to U4

No	GO to U6

U4 INSPECT THE FRONT USB (UNIVERSAL SERIAL BUS) CABLE AND APIM (SYNC MODULE)

Ignition OFF.

Disconnect: Front USB Cable from the APIM (USB cable with black end). REFER to: SYNC Module [APIM] .

Inspect the APIM connector port and both ends of the front USB cable for damage. Remove any debris.

Is any damage present?

Yes	* For the front USB cable, INSTALL a new front USB port/cable. REFER to: SYNC Module [APIM] to Universal Serial Bus (USB) Port Cable .* For the APIM, PERFORM the APIM Hardware Test. Refer to APIM HARDWARE TESTING .

No	GO to U5

U5 CHECK THE FRONT USB (UNIVERSAL SERIAL BUS) PORT FOR FUNCTIONALITY

Connect: Front USB Cable to the APIM.

Connect: MIT 105-00120 to the front USB port.

Select USB mode on the MIT.

Operate the audio system in USB mode and observe the audio output.

Is the audio system USB output OK with the MIT 105-00120 connected to the front USB port?

Yes	The system is operating correctly at this time. The concern was caused by the USB connector not being seated correctly.

No	GO to U6

U6 ISOLATE THE FRONT USB (UNIVERSAL SERIAL BUS) PORT/CABLE

Install a new front USB port/cable. REFER to: SYNC Module [APIM] to Universal Serial Bus (USB) Port Cable .

Connect: MIT 105-00120 to the front USB port.

Select USB mode on the MIT.

Operate the audio system in USB mode and observe the audio output.

Is the audio system USB output OK with the MIT 105-00120 connected to the front USB port?

Yes	The system is operating correctly at this time. The concern was caused by an inoperative front USB cable.

No	GO to U7

U7 CHECK FOR CORRECT APIM (SYNC MODULE) OPERATION

Ignition OFF.

Disconnect and inspect the APIM connector.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the APIM connector. Make sure it seats and latches correctly.

Wait at least 2 minutes for the APIM to re-initialize.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, discontinue this test and follow TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, PERFORM the APIM Hardware Test. Refer to APIM

	HARDWARE TESTING .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST V : THE REAR USB (UNIVERSAL SERIAL BUS) PORT (USB2) IS INOPERATIVE OR DOES NOT OPERATE CORRECTLY

Refer to Audio System/Navigation - AM/FM/CD/SYNC for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See SYNC ® AppLink™, USB Audio Mode, and USB Port.

The MIT 105-00120 is powered by the USB port

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B12B8:04	USB Port #2: System Internal Failure	Set by the APIM when a failure is detected on the rear USB port (USB2) internal APIM circuitry.
B12B8:11	USB Port #2: Circuit Short To Ground	Set by the APIM when a short to ground or over-current (overloaded) condition is detected on the rear USB port/cable (USB2). This can be caused by a fault in the USB port/cable or customer's USB device.

Possible Sources

- Customer's device
- Rear USB port/cable
- USB port/cable connection
- APIM

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST V : THE REAR USB (UNIVERSAL SERIAL BUS) PORT (USB2) IS INOPERATIVE OR DOES NOT OPERATE CORRECTLY > PINPOINT TEST V : THE REAR USB (UNIVERSAL SERIAL BUS) PORT (USB2) IS INOPERATIVE

OR DOES NOT OPERATE CORRECTLY

V1 CHECK THE REAR USB (UNIVERSAL SERIAL BUS) PORT FOR POWER OUTPUT

Ignition ON.

Connect: MIT 105-00120 to the rear USB port.

Does the MIT 105-00120 power on from the rear USB port?

Yes	GO to V2

No	GO to V3

V2 RESET THE APIM (SYNC MODULE) AND RECHECK SYNC ® SYSTEM OPERATION

Remove any devices connected to the USB ports and audio input jack.

Carry out an APIM power reset by disconnecting the battery for 1 minute, then reconnecting it.

Ignition ON.

Wait at least 2 minutes for the APIM to re-initialize.

Connect: MIT 105-00120 to the rear USB port.

Select USB mode on the MIT.

Operate the audio system in USB mode and observe the audio output.

Is the audio system USB output OK with the MIT 105-00120 connected to the rear USB port?

Yes	The system is operating correctly at this time. The concern was corrected by performing the APIM power reset. If the customer's device still does not operate correctly, the fault is with the customer's device.

No	GO to V3

V3 CHECK THE APIM (SYNC MODULE) FOR DTC (DIAGNOSTIC TROUBLE CODE) B12B8:04 OR DTC (DIAGNOSTIC TROUBLE CODE) B12B8:11

Using a diagnostic scan tool, clear the APIM Diagnostic Trouble Codes (DTCs).

Perform the APIM self-test.

Is DTC B12B8:04 or DTC B12B8:11 present?

Yes	GO to V4

No	GO to V6

V4 INSPECT THE REAR USB (UNIVERSAL SERIAL BUS) CABLE AND APIM (SYNC MODULE)

Ignition OFF.

Disconnect: Rear USB Cable from the APIM (USB cable with grey end). REFER to: SYNC Module [APIM] .

Inspect the APIM connector port and both ends of the rear USB cable for damage. Remove any debris.

Is any damage present?

Yes	* For the rear USB cable, INSTALL a new rear USB port/cable. REFER to: SYNC Module [APIM] to Universal Serial Bus (USB) Port Cable .* For the APIM, PERFORM the APIM Hardware Test. Refer to APIM HARDWARE TESTING .

No	GO to V5

V5 CHECK THE REAR USB (UNIVERSAL SERIAL BUS) PORT FOR FUNCTIONALITY

Connect: USB Cable to the APIM.

Connect: MIT 105-00120 to the rear USB port.

Select USB mode on the MIT.

Operate the audio system in USB mode and observe the audio output.

Is the audio system USB output OK with the MIT 105-00120 connected to the rear USB port?

Yes	The system is operating correctly at this time. The concern was caused by the USB connector not being seated correctly.

No	GO to V6

V6 ISOLATE THE REAR USB (UNIVERSAL SERIAL BUS) PORT/CABLE

Install a new rear USB port/cable. REFER to: SYNC Module [APIM] to Universal Serial Bus (USB) Port Cable .

Connect: MIT 105-00120 to the rear USB port.

Select USB mode on the MIT.

Operate the audio system in USB mode and observe the audio output.

Is the audio system USB output OK with the MIT 105-00120 connected to the rear USB

port?

Yes	The system is operating correctly at this time. The concern was caused by an inoperative USB cable.

No	GO to V7

V7 CHECK FOR CORRECT APIM (SYNC MODULE) OPERATION

Ignition OFF.

Disconnect and inspect the APIM connector.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the APIM connector. Make sure it seats and latches correctly.

Wait at least 2 minutes for the APIM to re-initialize.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, discontinue this test and follow TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, PERFORM the APIM Hardware Test. Refer to APIM HARDWARE TESTING .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST W : UNABLE TO PAIR BLUETOOTH DEVICE

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See Bluetooth Mode and SYNC ® System.

Possible Sources

- Incompatible Bluetooth device
- APIM

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST W : UNABLE TO PAIR BLUETOOTH DEVICE > PINPOINT TEST W : UNABLE TO PAIR BLUETOOTH DEVICE

NOTE: Performing a Master Reset returns all preference settings to the factory defaults, erases the phone book and call histories, deletes any Bluetooth devices paired with the SYNC ® system.

W1 CHECK THE BLUETOOTH CONNECTION

Connect: MIT 105-00120.

Using the MIT 105-00120, connect to the SYNC ® system using Bluetooth. Follow the tool instructions.

Using a diagnostic scan tool, view the APIM Parameter Identifications (PIDs).

Monitor the Bluetooth device paired PID (BT_PAIR) and the Bluetooth device connected PID (BT_CONN).

Do the Parameter Identifications (PIDs) both read "Yes"?

Yes	The SYNC ® system is operating correctly at this time. PERFORM a Master Reset. REFER to the Owner's Literature. REVIEW the pairing process with the customer. If the customer's device still does not pair, the fault is with the customer's device.

No	GO to W2

W2 CHECK FOR CORRECT APIM (SYNC MODULE) OPERATION

Ignition OFF.

Disconnect and inspect the APIM connector.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the APIM connector. Make sure it seats and latches correctly.

Wait at least 2 minutes for the APIM to re-initialize.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, PERFORM the APIM Hardware Test. Refer to APIM HARDWARE TESTING .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST X : THE RH (RIGHT-HAND) LOWER STEERING WHEEL SWITCHES ARE INOPERATIVE OR DO NOT OPERATE CORRECTLY

Refer to Audio System/Navigation - AM/FM/CD/SYNC for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See Steering Wheel Switch Function and Steering Wheel Switches.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1380:09	Steering Wheel Right Switch Pack: Component Failure	Set by the SCCM when the RH lower or RH upper steering wheel switch is stuck for more than 2 minutes during normal operation.
B1380:11	Steering Wheel Right Switch Pack: Circuit Short To Ground	Set by the SCCM when a short to ground is detected on the RH lower or RH upper steering wheel switch circuits.
B1380:17	Steering Wheel Right Switch Pack: Circuit Voltage Above Threshold	Set by the SCCM when a short to voltage is detected on the RH lower or RH upper steering wheel switch circuits.

Possible Sources

- Steering wheel switch
- Wiring, terminals, or connectors
- Clockspring
- SCCM

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM >

PINPOINT TESTS > PINPOINT TEST X : THE RH (RIGHT-HAND) LOWER STEERING WHEEL SWITCHES ARE INOPERATIVE OR DO NOT OPERATE CORRECTLY > PINPOINT TEST X : THE RH (RIGHT-HAND) LOWER STEERING WHEEL SWITCHES ARE INOPERATIVE OR DO NOT OPERATE CORRECTLY

X1 CHECK THE RH (RIGHT-HAND) LOWER STEERING WHEEL SWITCH PARAMETER IDENTIFICATIONS (PIDS)

Ignition ON.

Using a diagnostic scan tool, view the SCCM Parameter Identifications (PIDs).

Monitor the steering wheel switch Parameter Identifications (PIDs) while pressing each RH lower steering wheel switch.

Voice (SW_VOICE)

Mute (SW_MUTE)

Volume + (SW_VOLUP)

Volume - (SW_VOLDOWN)

Seek-/Phone (SW_SEEKMINUS)/(SW_PHONE)

Seek+/End (SW_SEEKPLUS)/(SW_END)

Do the PID values agree with the switch positions?

Yes	GO to X10

No	* If one or more, but not all PID values are incorrect or always read one particular switch position, INSTALL a new RH lower steering wheel switch. REFER to: Steering Wheel Multifunction Switch .* If all PID values are incorrect or always read one particular switch position, GO to X2

X2 CHECK FOR IPC (INSTRUMENT PANEL CLUSTER) DTC (DIAGNOSTIC TROUBLE CODE) U0212:00

Ignition ON.

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs) from the IPC.

Ignition OFF.

Ignition ON.

Wait at least 10 seconds.

Using a diagnostic scan tool, perform the IPC self-test.

Is DTC U0212:00 set in the IPC?

Yes	REFER to: Instrumentation, Message Center and Warning Chimes . See DTC Chart: IPC.

No	GO to X3

X3 CHECK FOR VOLTAGE FROM THE SCCM (STEERING COLUMN CONTROL MODULE)

WARNING: Turn the ignition OFF and wait one minute to deplete the backup power supply. Failure to follow this instruction may result in serious personal injury or death in the event of an accidental deployment.

Ignition OFF.

Remove the driver airbag. REFER to: Driver Airbag .

Disconnect: RH Lower Steering Wheel Switch C2367 .

Disconnect: LH Lower Steering Wheel Switch C2366 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2367-2	V	C2367-4
C2367-3	V	C2367-4
C2367-5	V	C2367-4

Is approximately 5 volts present?

Yes	INSTALL a new RH lower steering wheel switch. REFER to: Steering Wheel Multifunction Switch .

No	GO to X4

X4 CHECK THE STEERING WHEEL HARNESS FOR A SHORT TO GROUND

Ignition OFF.

Disconnect: Clockspring C218B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2367-2	Ω	Ground

C2367-3	Ω	Ground
C2367-4	Ω	Ground
C2367-5	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to X5

No	INSTALL a new steering wheel. REFER to: Steering Wheel .

X5 CHECK THE STEERING WHEEL HARNESS FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2367-2	Ω	C218B-6
C2367-3	Ω	C218B-7
C2367-4	Ω	C218B-16
C2367-5	Ω	C218B-15

Are the resistances less than 3 ohms?

Yes	GO to X6

No	INSTALL a new steering wheel. REFER to: Steering Wheel .

X6 CHECK THE STEERING WHEEL HARNESS FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2367-2	Ω	C2367-3
C2367-2	Ω	C2367-4
C2367-2	Ω	C2367-5
C2367-3	Ω	C2367-4
C2367-3	Ω	C2367-5
C2367-4	Ω	C2367-5

Are the resistances greater than 10, 000 ohms?

Yes	GO to X7

No	INSTALL a new steering wheel. REFER to: Steering Wheel .

X7 CHECK THE CLOCKSPRING FOR A SHORT TO GROUND

Connect: Clockspring C218B .

Disconnect: Clockspring C218C.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2367-2	Ω	Ground
C2367-3	Ω	Ground
C2367-4	Ω	Ground
C2367-5	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to X8

No	INSTALL a new clockspring. REFER to: Clockspring .

X8 CHECK THE CLOCKSPRING FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2367-2	Ω	C218C-5
C2367-3	Ω	C218C-7
C2367-4	Ω	C218C-10
C2367-5	Ω	C218C-8

Are the resistances less than 3 ohms?

Yes	GO to X9

No	INSTALL a new clockspring. REFER to: Clockspring .

X9 CHECK THE CLOCKSPRING FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2367-2	Ω	C2367-3
C2367-2	Ω	C2367-4
C2367-2	Ω	C2367-5
C2367-3	Ω	C2367-4
C2367-3	Ω	C2367-5
C2367-4	Ω	C2367-5

Are the resistances greater than 10, 000 ohms?

Yes	GO to X10

No	INSTALL a new clockspring. REFER to: Clockspring .

X10 CHECK FOR CORRECT SCCM (STEERING COLUMN CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all the SCCM connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the SCCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new SCCM. REFER to: Steering Column Control Module (SCCM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM >

PINPOINT TESTS > PINPOINT TEST Y : THE RH (RIGHT-HAND) UPPER STEERING WHEEL SWITCHES ARE INOPERATIVE OR DO NOT OPERATE CORRECTLY

Refer to Audio System/Navigation - AM/FM/CD/SYNC for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See Steering Wheel Switch Function and Steering Wheel Switches.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1380:09	Steering Wheel Right Switch Pack: Component Failure	Set by the SCCM when the RH lower or RH upper steering wheel switch is stuck for more than 2 minutes during normal operation.
B1380:11	Steering Wheel Right Switch Pack: Circuit Short To Ground	Set by the SCCM when a short to ground is detected on the RH lower or RH upper steering wheel switch circuits.
B1380:17	Steering Wheel Right Switch Pack: Circuit Voltage Above Threshold	Set by the SCCM when a short to voltage is detected on the RH lower or RH upper steering wheel switch circuits.

Possible Sources

- Steering wheel switch
- Wiring, terminals, or connectors
- Clockspring
- SCCM

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST Y : THE RH (RIGHT-HAND) UPPER STEERING WHEEL SWITCHES ARE INOPERATIVE OR DO NOT OPERATE CORRECTLY > PINPOINT TEST Y : THE RH (RIGHT-HAND) UPPER STEERING WHEEL SWITCHES ARE INOPERATIVE OR DO NOT OPERATE CORRECTLY

Y1 CHECK THE RH (RIGHT-HAND) UPPER STEERING WHEEL SWITCH PARAMETER IDENTIFICATIONS (PIDS)

Ignition ON.

Using a diagnostic scan tool, view the SCCM Parameter Identifications (PIDs).

Monitor the steering wheel switch Parameter Identifications (PIDs) while pressing each RH upper steering wheel switch.

Up (R_CURS_UP)

Left (R_CURS_LFT)

Down (R_CURS_DWN)

Right (R_CURS_RGT)

Ok (R_CURS_OK)

Do the PID values agree with the switch positions?

Yes	GO to Y13

No	* If one or more, but not all PID values are incorrect or always read one particular switch position, INSTALL a new RH upper steering wheel switch. REFER to: Steering Wheel Multifunction Switch .* If all PID values are incorrect or always read one particular switch position, GO to Y2

Y2 CHECK FOR IPC (INSTRUMENT PANEL CLUSTER) DTC (DIAGNOSTIC TROUBLE CODE) U0212:00

Ignition ON.

Using a diagnostic scan tool, clear the DTCs from the IPC.

Ignition OFF.

Ignition ON.

Wait at least 10 seconds.

Using a diagnostic scan tool, perform the IPC self-test.

Is DTC U0212:00 set in the IPC?

Yes	REFER to: Instrumentation, Message Center and Warning Chimes . See DTC Chart: IPC.

No	GO to Y3

Y3 CHECK FOR VOLTAGE FROM THE SCCM (STEERING COLUMN CONTROL MODULE)

WARNING: Turn the ignition OFF and wait one minute to deplete the backup power supply. Failure to follow this instruction may result in serious personal injury or death in the event of an accidental deployment.

Ignition OFF.

Remove the driver airbag. REFER to: Driver Airbag .

Disconnect: RH Upper Steering Wheel Switch C2999 .

Disconnect: LH Upper Steering Wheel Switch C2998 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2999-2		C2999-3

Is approximately 5 volts present?

Yes	INSTALL a new RH upper steering wheel switch. REFER to: Steering Wheel Multifunction Switch .

No	GO to Y4

Y4 CHECK THE AIRBAG HARNESS FOR A SHORT TO GROUND

Disconnect: Inline C2606.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2999-2	Ω	Ground
C2999-3	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to Y5

No	INSTALL a new driver airbag. REFER to: Driver Airbag .

Y5 CHECK THE AIRBAG HARNESS FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2999-2	Ω	C2606-2
C2999-3	Ω	C2606-4

Are the resistances less than 3 ohms?

Yes	GO to Y6

No	INSTALL a new driver airbag. REFER to: Driver Airbag .

Y6 CHECK THE AIRBAG HARNESS FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2999-2	Ω	C2999-3

Is the resistance greater than 10, 000 ohms?

Yes	GO to Y7

No	INSTALL a new driver airbag. REFER to: Driver Airbag .

Y7 CHECK THE STEERING WHEEL HARNESS FOR A SHORT TO GROUND

Connect: Inline C2606.

Disconnect: Clockspring C218B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2999-2	Ω	Ground
C2999-3	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to Y8

No	INSTALL a new steering wheel. REFER to: Steering Wheel .

Y8 CHECK THE STEERING WHEEL HARNESS FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2999-2	Ω	C218B-14
C2999-3	Ω	C218B-16

Are the resistances less than 3 ohms?

Yes	GO to Y9

No	INSTALL a new steering wheel. REFER to: Steering Wheel .

Y9 CHECK THE STEERING WHEEL HARNESS FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2999-2	Ω	C2999-3

Is the resistance greater than 10, 000 ohms?

Yes	GO to Y10

No	INSTALL a new steering wheel. REFER to: Steering Wheel .

Y10 CHECK THE CLOCKSPRING FOR A SHORT TO GROUND

Connect: Clockspring C218B .

Disconnect: Clockspring C218C.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2999-2	Ω	Ground
C2999-3	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to Y11

No	INSTALL a new clockspring. REFER to: Clockspring .

Y11 CHECK THE CLOCKSPRING FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2999-2	Ω	C218C-6

C2999-3	Ω	C218C-10

Are the resistances less than 3 ohms?

Yes	GO to Y12

No	INSTALL a new clockspring. REFER to: Clockspring .

Y12 CHECK THE CLOCKSPRING FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2999-2	Ω	C2999-3

Is the resistance greater than 10, 000 ohms?

Yes	GO to Y13

No	INSTALL a new clockspring. REFER to: Clockspring .

Y13 CHECK FOR CORRECT SCCM (STEERING COLUMN CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all the SCCM connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the SCCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new SCCM. REFER to: Steering Column Control Module (SCCM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST Z : THE AUDIO SYSTEM DOES NOT OPERATE CORRECTLY FROM THE FCIM (FRONT CONTROLS INTERFACE MODULE)

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See Audio Extended Play, FCDIM, and FCIM.

Possible Sources

- Wiring, terminals, or connectors
- FCIM
- FCDIM

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST Z : THE AUDIO SYSTEM DOES NOT OPERATE CORRECTLY FROM THE FCIM (FRONT CONTROLS INTERFACE MODULE) > PINPOINT TEST Z : THE AUDIO SYSTEM DOES NOT OPERATE CORRECTLY FROM THE FCIM (FRONT CONTROLS INTERFACE MODULE)

Z1 VERIFY THAT THE ACM (AUDIO FRONT CONTROL MODULE) AND FCDIM (FRONT CONTROL/DISPLAY INTERFACE MODULE) PASS THE NETWORK TEST

Using a diagnostic scan tool, perform the network test.

Did the ACM and FCDIM pass the network test?

Yes	GO to Z2

No	* If the ACM failed the network test, REFER to: MODULE COMMUNICATIONS NETWORK . See The ACM Does Not Respond To The Diagnostic Scan Tool.* If the FCDIM failed the network test, REFER to: MODULE COMMUNICATIONS NETWORK . See The FCDIM Does Not Respond To The Diagnostic Scan Tool.

Z2 CHECK FOR LOST COMMUNICATION DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition ON.

Using a diagnostic scan tool, clear all Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Ignition OFF.

Ignition ON.

Wait at least 10 seconds.

Using a diagnostic scan tool, perform the self-test for the following modules:

ACM

FCDIM

Is DTC U0184:00 or U0257:00 present?

Yes	* For DTC U0184:00, GO to Pinpoint Test AL * For DTC U0257:00, GO to Pinpoint Test AP

No	GO to Z3

Z3 CHECK THE FCDIM (FRONT CONTROL/DISPLAY INTERFACE MODULE) PARAMETER IDENTIFICATIONS (PIDS) FOR FCIM (FRONT CONTROLS INTERFACE MODULE) BUTTON INPUTS

Ignition ON.

Using a diagnostic scan tool, view the FCDIM Parameter Identifications (PIDs).

NOTE: The button Parameter Identifications (PIDs) begin with the prefix "BTN_" and end with the indicated button. For example, PID BTN_EJECT correlates with the eject button on the FCIM.

Monitor the FCDIM Parameter Identifications (PIDs) while pressing each FCIM button.

Do the PID values agree with the button presses?

Yes	GO to Z10

No	* If one or more, but not all PID values are incorrect or always read one particular switch position, GO to Z9* If all PID values are incorrect or always read one particular switch position, GO to Z4

Z4 CHECK THE FCIM (FRONT CONTROLS INTERFACE MODULE) VOLTAGE SUPPLY

Ignition OFF.

Disconnect: FCIM C2474.

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead

C2474-1		Ground
C2474-2		Ground

Is the voltage greater than 11 volts?

Yes	GO to Z5

No	REPAIR the circuit.

Z5 CHECK THE FCIM (FRONT CONTROLS INTERFACE MODULE) GROUND CIRCUIT

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2474-1		C2474-6

Is the voltage greater than 11 volts?

Yes	GO to Z6

No	REPAIR the circuit.

Z6 CHECK THE LIN (LOCAL INTERCONNECT NETWORK) CIRCUIT FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: FCDIM C2123 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2474-5		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to Z7

Z7 CHECK THE LIN (LOCAL INTERCONNECT NETWORK) CIRCUIT FOR AN OPEN

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2474-5	Ω	C2123-8

Is the resistance less than 3 ohms?

Yes	GO to Z8

No	REPAIR the circuit.

Z8 CHECK THE LIN (LOCAL INTERCONNECT NETWORK) CIRCUIT FOR A SHORT TO GROUND

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2474-5	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to Z9

No	REPAIR the circuit.

Z9 CHECK FOR CORRECT FCIM (FRONT CONTROLS INTERFACE MODULE) OPERATION

Ignition OFF.

Disconnect and inspect the FCIM connector.

Repair:

- Corrosion (clean module pins or install new connectors or terminals)
- Damaged or bent pins (install new terminals or pins)
- Pushed-out pins (install new pins as necessary)

Reconnect the FCIM connector. Make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, discontinue this test and follow TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new FCIM. REFER to: Front Controls Interface Module (FCIM) . If the concern is still present, GO to Z10

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

Z10 CHECK FOR CORRECT FCDIM (FRONT CONTROL/DISPLAY INTERFACE MODULE) OPERATION

Ignition OFF.

Disconnect and inspect the FCDIM connector.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the FCDIM connector. Make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, discontinue this test and follow TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new FCDIM. REFER to: Front Control/Display Interface Module (FCDIM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AA : THE FCDIM (FRONT CONTROL/DISPLAY INTERFACE MODULE) IS INOPERATIVE OR DOES NOT OPERATE CORRECTLY

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See FCDIM.

Possible Source

- FCDIM

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AA : THE FCDIM (FRONT CONTROL/DISPLAY

INTERFACE MODULE) IS INOPERATIVE OR DOES NOT OPERATE CORRECTLY > PINPOINT TEST AA : THE FCDIM (FRONT CONTROL/DISPLAY INTERFACE MODULE) IS INOPERATIVE OR DOES NOT OPERATE CORRECTLY

AA1 CHECK THE FCIM (FRONT CONTROLS INTERFACE MODULE) OPERATION

Ignition ON.

Turn the audio system on.

Press each FCIM button and check for proper operation.

Does each FCIM button perform the correct operation?

Yes	GO to AA2

No	GO to Pinpoint Test Z

AA2 VERIFY THAT THE FCDIM (FRONT CONTROL/DISPLAY INTERFACE MODULE) PASSES THE NETWORK TEST

Using a diagnostic scan tool, perform the network test.

Did the FCDIM pass the network test?

Yes	GO to AA3

No	REFER to: MODULE COMMUNICATIONS NETWORK . See The FCDIM Does Not Respond To The Diagnostic Scan Tool.

AA3 OBSERVE THE FCDIM (FRONT CONTROL/DISPLAY INTERFACE MODULE) DISPLAY

Observe the FCDIM display while carrying out various operations using the FCIM controls.

Is the FCDIM screen completely inoperative or blank?

Yes	GO to AA6

No	GO to AA4

AA4 CHECK THE FCDIM (FRONT CONTROL/DISPLAY INTERFACE MODULE) DISPLAY SEGMENTS

Using a diagnostic scan tool, view the FCDIM Parameter Identifications (PIDs).

Command all of the LCD segments on using the FCDIM active command LCD_SEG (All LCD Segments).

Do all of the FCDIM segments illuminate?

Yes	GO to AA5

No	GO to AA6

AA5 CHECK FOR LOST COMMUNICATION DIAGNOSTIC TROUBLE CODES (DTCS) SET IN THE FCDIM (FRONT CONTROL/DISPLAY INTERFACE MODULE)

Ignition ON.

Using a diagnostic scan tool, retrieve all Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Are any lost communication Diagnostic Trouble Codes (DTCs) (U-codes) present in the FCDIM?

Yes	REFER to: Information and Entertainment System . See DTC Chart: FCDIM.

No	GO to AA6

AA6 CHECK FOR CORRECT FCDIM (FRONT CONTROL/DISPLAY INTERFACE MODULE) OPERATION

Ignition OFF.

Disconnect and inspect the FCDIM connector.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the FCDIM connector. Make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, discontinue this test and follow TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new FCDIM. REFER to: Front Control/Display Interface Module (FCDIM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AB : B116A:01

Refer to Audio System/Navigation - AM/FM/SYNC/Touchscreen Display for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See ANC, ANC Microphones, and DACMC.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B116A:01	Handset Microphone: General Electrical Failure	Set by the DACMC when a failure is detected on the overhead console ANC microphone circuits.

Possible Sources

- Wiring, terminals, or connectors
- Overhead console ANC microphone
- DACMC

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AB : B116A:01 > PINPOINT TEST AB : B116A:01

AB1 CHECK THE OVERHEAD CONSOLE ANC (ACTIVE NOISE CONTROL) MICROPHONE CIRCUITS FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: ACM C240B .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C240B-1		Ground
C240B-14		Ground

Is any voltage present?

Yes	REPAIR the circuit in question.

No	GO to AB2

AB2 CHECK THE OVERHEAD CONSOLE ANC (ACTIVE NOISE CONTROL) MICROPHONE CIRCUITS FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C240B-1	Ω	Ground
C240B-14	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to AB3

No	REPAIR the circuit in question.

AB3 CHECK THE OVERHEAD CONSOLE ANC (ACTIVE NOISE CONTROL) MICROPHONE CIRCUITS FOR AN OPEN

Disconnect: Overhead Console ANC Microphone C9222 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C240B-1	Ω	C9222-1
C240B-14	Ω	C9222-2

Are the resistances less than 3 ohms?

Yes	GO to AB4

No	REPAIR the circuit in question.

AB4 CHECK THE OVERHEAD CONSOLE ANC (ACTIVE NOISE CONTROL) MICROPHONE CIRCUITS FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C240B-1	Ω	C240B-14

Is the resistance greater than 10, 000 ohms?

Yes	GO to AB5

No	REPAIR the circuit in question.

AB5 ISOLATE THE OVERHEAD CONSOLE ANC (ACTIVE NOISE CONTROL) MICROPHONE

Connect: ACM C240B .

Install a new overhead console ANC microphone. REFER to: Active Noise Control Microphone .

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs) from the DACMC.

Ignition OFF.

Ignition ON.

Wait at least 5 seconds

Using a diagnostic scan tool, perform the DACMC self-test.

Is DTC B116A:01 still present in the DACMC?

Yes	GO to AB6

No	The system is operating correctly at this time. The concern was caused by an inoperative ANC microphone.

AB6 CHECK FOR CORRECT DACMC (DIGITAL AUDIO CONTROL MODULE C) OPERATION

Ignition OFF.

Disconnect and inspect all the ACM connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the ACM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical

	Service Bulletins (TSBs) address this concern, INSTALL a new ACM. REFER to: Audio Front Control Module (ACM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AC : B117A:01

Refer to Audio System/Navigation - AM/FM/SYNC/Touchscreen Display for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See ANC, ANC Microphones, and DACMC.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B117A:01	Backup Microphone: General Electrical Failure	Set by the DACMC when a failure is detected on the LHR quarter panel ANC microphone circuits (convertible only).

Possible Sources

- Wiring, terminals, or connectors
- LHR quarter panel ANC microphone
- DACMC

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AC : B117A:01 > PINPOINT TEST AC : B117A:01

AC1 CHECK THE LHR (LEFT-HAND REAR) QUARTER PANEL ANC (ACTIVE NOISE CONTROL) MICROPHONE CIRCUITS FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: ACM C240B .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C240B-2		Ground
C240B-15		Ground

Is any voltage present?

Yes	REPAIR the circuit in question.

No	GO to AC2

AC2 CHECK THE LHR (LEFT-HAND REAR) QUARTER PANEL ANC (ACTIVE NOISE CONTROL) MICROPHONE CIRCUITS FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C240B-2	Ω	Ground
C240B-15	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to AC3

No	REPAIR the circuit in question.

AC3 CHECK THE LHR (LEFT-HAND REAR) QUARTER PANEL ANC (ACTIVE NOISE CONTROL) MICROPHONE CIRCUITS FOR AN OPEN

Disconnect: LHR Quarter Panel ANC Microphone C4828 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C240B-2	Ω	C4828-1
C240B-15	Ω	C4828-2

Are the resistances less than 3 ohms?

Yes	GO to AC4

No	REPAIR the circuit in question.

AC4 CHECK THE LHR (LEFT-HAND REAR) QUARTER PANEL ANC (ACTIVE NOISE CONTROL) MICROPHONE CIRCUITS FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C240B-2	Ω	C240B-15

Is the resistance greater than 10, 000 ohms?

Yes	GO to AC5

No	REPAIR the circuit in question.

AC5 ISOLATE THE LHR (LEFT-HAND REAR) QUARTER PANEL ANC (ACTIVE NOISE CONTROL) MICROPHONE

Connect: ACM C240B .

Install a new LHR quarter panel ANC microphone. REFER to: Active Noise Control Microphone .

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs) from the DACMC.

Ignition OFF.

Ignition ON.

Wait at least 5 seconds

Using a diagnostic scan tool, perform the DACMC self-test.

Is DTC B117A:01 still present in the DACMC?

Yes	GO to AC6

No	The system is operating correctly at this time. The concern was caused by an inoperative ANC microphone.

AC6 CHECK FOR CORRECT DACMC (DIGITAL AUDIO CONTROL MODULE C) OPERATION

Ignition OFF.

Disconnect and inspect all the ACM connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the ACM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ACM. REFER to: Audio Front Control Module (ACM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AD : B13F5:01

Refer to Audio System/Navigation - AM/FM/SYNC/Touchscreen Display for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See ANC, ANC Microphones, and DACMC.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B13F5:01	Backup Microphone: General Electrical Failure	Set by the DACMC when a failure is detected on the rear center headliner (coupe) or RHR quarter panel (convertible) ANC microphone circuits.

Possible Sources

- Wiring, terminals, or connectors
- Rear center headliner (coupe) or RHR quarter panel (convertible) ANC microphone
- DACMC

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AD : B13F5:01 > PINPOINT TEST AD : B13F5:01

AD1 CHECK THE REAR CENTER HEADLINER (COUPE) OR RHR (RIGHT-HAND REAR)

QUARTER PANEL (CONVERTIBLE) ANC (ACTIVE NOISE CONTROL) MICROPHONE CIRCUITS FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: ACM C240B .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C240B-7	V	Ground
C240B-20	V	Ground

Is any voltage present?

Yes	REPAIR the circuit in question.

No	GO to AD2

AD2 CHECK THE REAR CENTER HEADLINER (COUPE) OR RHR (RIGHT-HAND REAR) QUARTER PANEL (CONVERTIBLE) ANC (ACTIVE NOISE CONTROL) MICROPHONE CIRCUITS FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C240B-7	Ω	Ground
C240B-20	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to AD3

No	REPAIR the circuit in question.

AD3 CHECK THE REAR CENTER HEADLINER (COUPE) OR RHR (RIGHT-HAND REAR) QUARTER PANEL (CONVERTIBLE) ANC (ACTIVE NOISE CONTROL) MICROPHONE CIRCUITS FOR AN OPEN

Disconnect:

Rear Center Headliner C9223 for the coupe.

RHR Quarter Panel C4829 for the convertible.

For the coupe, measure:

Positive Lead	Measurement / Action	Negative Lead
C240B-7	Ω	C9223-1
C240B-20	Ω	C9223-2

For the convertible, measure:

Positive Lead	Measurement / Action	Negative Lead
C240B-7	Ω	C4829-1
C240B-20	Ω	C4829-2

Are the resistances less than 3 ohms?

Yes	GO to AD4

No	REPAIR the circuit in question.

AD4 CHECK THE REAR CENTER HEADLINER (COUPE) OR RHR (RIGHT-HAND REAR) QUARTER PANEL (CONVERTIBLE) ANC (ACTIVE NOISE CONTROL) MICROPHONE CIRCUITS FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C240B-7	Ω	C240B-20

Is the resistance greater than 10, 000 ohms?

Yes	GO to AD5

No	REPAIR the circuit in question.

AD5 ISOLATE THE REAR CENTER HEADLINER (COUPE) OR RHR (RIGHT-HAND REAR) QUARTER PANEL (CONVERTIBLE) ANC (ACTIVE NOISE CONTROL) MICROPHONE

Connect: ACM C240B .

Install a new rear center headliner (coupe) or RHR quarter panel (convertible) ANC microphone. REFER to: Active Noise Control Microphone .

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs) from the DACMC.

Ignition OFF.

Ignition ON.

Wait at least 5 seconds

Using a diagnostic scan tool, perform the DACMC self-test.

Is DTC B13F5:01 still present in the DACMC?

Yes	GO to AD6

No	The system is operating correctly at this time. The concern was caused by an inoperative ANC microphone.

AD6 CHECK FOR CORRECT DACMC (DIGITAL AUDIO CONTROL MODULE C) OPERATION

Ignition OFF.

Disconnect and inspect all the ACM connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the ACM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ACM. REFER to: Audio Front Control Module (ACM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AE : U0100:00

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See Network Message Chart.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0100:00	Lost Communication with ECM/ PCM "A": No Sub Type Information	Set by the ACM, DACMC, and GPSM when network messages are missing from the PCM for more than 5 seconds with the ignition in RUN.

Possible Source

- PCM

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AE : U0100:00 > PINPOINT TEST AE : U0100:00

AE1 VERIFY THE CUSTOMER'S CONCERN

Ignition ON.

Verify if there is an observable symptom present.

Is an observable symptom present?

Yes	GO to AE2

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

AE2 RECHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0100:00

Ignition ON.

Using a diagnostic scan tool, clear all Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Ignition OFF.

Ignition ON.

Wait at least 10 seconds.

Using a diagnostic scan tool, retrieve all Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U0100:00 set in the ACM, DACMC, or GPSM?

Yes	GO to AE3

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

AE3 CHECK THE PCM (POWERTRAIN CONTROL MODULE) FOR BATTERY VOLTAGE OUT-OF-RANGE DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, perform the PCM self-test.

Are any low or high voltage Diagnostic Trouble Codes (DTCs) recorded in the PCM?

Yes	* For DTC P0562 or P0563 set for vehicles with the 2.3L EcoBoost (201kW/273PS), REFER to: Charging System - 2.3L EcoBoost (201kW/273PS) . See PCM DTC Chart.* For DTC P0562 or P0563 set for vehicles with the 3.7L Duratec (227kW/301PS), REFER to: Charging System - 3.7L Duratec (227kW/301PS) . See PCM DTC Chart.* For DTC P0562 or P0563 set for vehicles with the 5.0L 32V Ti-VCT, REFER to: Charging System - 5.0L 32V Ti-VCT . See PCM DTC Chart.

No	GO to AE4

AE4 CHECK FOR BATTERY VOLTAGE OUT-OF-RANGE DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, perform the self-test for the following modules:

ACM

DACMC

GPSM

Are low or high voltage Diagnostic Trouble Codes (DTCs) recorded in the APIM, DACMC, or GPSM?

Yes	* For DTC U3003:16, GO to Pinpoint Test AQ * For DTC U3003:17, GO to Pinpoint Test AR

No	GO to AE5

AE5 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0100:00 SET IN MULTIPLE MODULES

Review the recorded results from the self-test.

Is DTC U0100:00 set in more than one module?

Yes	GO to AE6

No	* If there is an observable symptom, REFER to: Information and Entertainment System . See Symptom Chart: General Audio System.* If there is no observable symptom, the

	system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

AE6 CHECK FOR CORRECT PCM (POWERTRAIN CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect the PCM connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the PCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PCM.For vehicles with the 2.3L EcoBoost (201kW/273PS), REFER to: Powertrain Control Module (PCM) . For vehicles with the 3.7L Duratec (227kW/301PS), REFER to: Powertrain Control Module (PCM) . For vehicles with the 5.0L 32V Ti-VCT, REFER to: Powertrain Control Module (PCM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AF : U0140:00

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See Network Message Chart.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0140:00	Lost Communication With Body Control Module: No Sub Type Information	Set by the ACM, APIM, DACMC, FCDIM, FCIM, and GPSM when network messages are missing from the BCM for more than 5

		seconds with the ignition in RUN.

Possible Source

- BCM

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AF : U0140:00 > PINPOINT TEST AF : U0140:00

AF1 VERIFY THE CUSTOMER'S CONCERN

Ignition ON.

Verify if there is an observable symptom present.

Is an observable symptom present?

Yes	GO to AF2

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

AF2 RECHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0140:00

Ignition ON.

Using a diagnostic scan tool, clear all Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Ignition OFF.

Ignition ON.

Wait at least 10 seconds.

Using a diagnostic scan tool, retrieve all Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U0140:00 set in the ACM, APIM, DACMC, FCIM, or GPSM?

Yes	GO to AF3

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

AF3 CHECK THE BCM (BODY CONTROL MODULE) FOR BATTERY VOLTAGE OUT-OF-RANGE DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, perform the BCM self-test.

Are any low or high voltage Diagnostic Trouble Codes (DTCs) recorded in the BCM?

Yes	* For DTC U3006:16, REFER to: Body Control Module (BCM) . See U3006:16.* For DTC U3006:17, REFER to: Body Control Module (BCM) . See U3006:17.* For DTC U3006:1C, REFER to: Body Control Module (BCM) . See U3006:1C.

No	GO to AF4

AF4 CHECK FOR BATTERY VOLTAGE OUT-OF-RANGE DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, perform the self-test for the following modules:

ACM

APIM

DACMC

FCIM

GPSM

Are any low or high voltage Diagnostic Trouble Codes (DTCs) recorded in the ACM, APIM, DACMC, FCIM, or GPSM?

Yes	* For DTC U3003:16, GO to Pinpoint Test AQ * For DTC U3003:17, GO to Pinpoint Test AR

No	GO to AF5

AF5 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0140:00 SET IN MULTIPLE MODULES

Review the recorded results from the self-test.

Is DTC U0140:00 set in more than one module?

Yes	GO to AF6

No	* If there is an observable symptom, REFER to: Information and Entertainment System . See Symptom Chart: General Audio System.* If there is no observable symptom, the system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

AF6 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all the BCM connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, PERFORM the BCM Guided Routine.

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AG : U0142:00

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See Network Message Chart.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0142:00	Lost Communication With Body Control Module "B": No Sub Type Information	Set by the ACM and DACMC when network messages are missing from the BCMB for more than 5 seconds with the ignition in RUN.

Possible Source

- BCMB

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AG : U0142:00 > PINPOINT TEST AG : U0142:00

AG1 VERIFY THE CUSTOMER'S CONCERN

Ignition ON.

Verify if there is an observable symptom present.

Is an observable symptom present?

Yes	GO to AG2

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

AG2 RECHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0140:00

Ignition ON.

Using a diagnostic scan tool, clear all Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Ignition OFF.

Ignition ON.

Wait at least 10 seconds.

Using a diagnostic scan tool, retrieve all Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U0140:00 set in the ACM, APIM, DACMC, FCIM, or GPSM?

Yes	GO to Pinpoint Test AF

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

AG3 CHECK THE BCMB (BODY CONTROL MODULE B) FOR DTC (DIAGNOSTIC TROUBLE CODE) U3003:62

Ignition ON.

Using a diagnostic scan tool, clear all Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Ignition OFF.

Ignition ON.

Wait at least 10 seconds.

Using a diagnostic scan tool, retrieve all Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U3003:62 set in the BCMB?

Yes	REFER to: Body Control Module B (BCMB) . See U3003:62.

No	GO to AG4

AG4 CHECK FOR BATTERY VOLTAGE OUT-OF-RANGE DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, perform the self-test for the following modules:

ACM

APIM

DACMC

FCIM

GPSM

Are any low or high voltage Diagnostic Trouble Codes (DTCs) recorded in the ACM, APIM, DACMC, FCIM, or GPSM?

Yes	* For DTC U3003:16, GO to Pinpoint Test AQ * For DTC U3003:17, GO to Pinpoint Test AR

No	GO to AG5

AG5 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0140:00 SET IN MULTIPLE MODULES

Review the recorded results from the self-test.

Is DTC U0140:00 set in more than one module?

Yes	GO to AG6

No	* If there is an observable symptom, REFER to: Information and Entertainment System . See Symptom Chart: General Audio System.* If there is no observable symptom, the system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

AG6 CHECK FOR CORRECT BCMB (BODY CONTROL MODULE B) OPERATION

Ignition OFF.

Disconnect and inspect all the BCMB connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the BCMB connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new BCMB. REFER to: Body Control Module B (BCMB) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AH : U0151:00

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See Network Message Chart.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0151:00	Lost Communication With Restraints Control Module: No Sub Type Information	Set by the APIM and FCIM when the airbag deployment notification message from the RCM is missing for more than 5 seconds with the ignition in RUN.

Possible Source

- RCM

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AH : U0151:00 > PINPOINT TEST AH : U0151:00

AH1 VERIFY THE CUSTOMER'S CONCERN

Ignition ON.

Verify there is an observable symptom present.

Is an observable symptom present?

Yes	GO to AH2

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

AH2 RECHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0151:00

Ignition ON.

Using a diagnostic scan tool, clear all Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Ignition OFF.

Ignition ON.

Wait at least 10 seconds.

Using a diagnostic scan tool, retrieve all Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U0151:00 set in the APIM or FCIM?

Yes	GO to AH3

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

AH3 CHECK THE RCM (RESTRAINTS CONTROL MODULE) FOR BATTERY VOLTAGE OUT-OF-RANGE DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, perform the RCM self-test.

Are any low or high voltage Diagnostic Trouble Codes (DTCs) recorded in the RCM?

Yes	* For DTC U3003:16, REFER to: Airbag Supplemental Restraint System (SRS) . See U3003:16.* For DTC U3003:17, REFER to: Airbag Supplemental Restraint System (SRS) . See U3003:17.

No	GO to AH4

AH4 CHECK FOR BATTERY VOLTAGE OUT-OF-RANGE DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, perform the self-test for the following modules:

APIM

FCIM

Are any low or high voltage Diagnostic Trouble Codes (DTCs) recorded in the APIM or FCIM?

Yes	* For DTC U3003:16, GO to Pinpoint Test AQ * For DTC U3003:17, GO to Pinpoint Test AR

No	GO to AH5

AH5 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0151:00 SET IN MULTIPLE MODULES

Review the recorded results from the self-test.

Is DTC U0151:00 set in both the APIM and FCIM?

Yes	GO to AH6

No	* If there is an observable symptom, REFER to: Information and Entertainment System . See Symptom Chart: General Audio System.* If there is no observable symptom, the system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

AH6 CHECK FOR CORRECT RCM (RESTRAINTS CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all the RCM connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the RCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new RCM. REFER to: Restraints Control Module (RCM) .

No	The system is operating correctly at this time. The concern may have been caused by

	module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AI : U0155:00

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See Network Message Chart.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0155:00	Lost Communication With IPC Control Module: No Sub Type Information	Set by the ACM, APIM, FCDIM, FCIM, and GPSM when network messages are missing from the IPC for more than 5 seconds with the ignition in RUN.

Possible Source

- IPC

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AI : U0155:00 > PINPOINT TEST AI : U0155:00

AI1 VERIFY THE CUSTOMER'S CONCERN

Ignition ON.

Verify there is an observable symptom present.

Is an observable symptom present?

Yes	GO to AI2

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

AI2 RECHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0155:00

Ignition ON.

Using a diagnostic scan tool, clear all Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Ignition OFF.

Ignition ON.

Wait at least 10 seconds.

Using a diagnostic scan tool, retrieve all Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U0155:00 set in the ACM, APIM, FCIM, or GPSM?

Yes	GO to AI3

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

AI3 CHECK THE IPC (INSTRUMENT PANEL CLUSTER) FOR BATTERY VOLTAGE OUT-OF-RANGE DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, perform the IPC self-test.

Are any low or high voltage Diagnostic Trouble Codes (DTCs) recorded in the IPC?

Yes	* For DTC U3003:16, REFER to: Instrumentation, Message Center and Warning Chimes . See U3003:16.* For DTC U3003:17, REFER to: Instrumentation, Message Center and Warning Chimes . See U3003:17.

No	GO to AI4

AI4 CHECK FOR BATTERY VOLTAGE OUT-OF-RANGE DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, perform the self-test for the following modules:

ACM

APIM

FCIM

GPSM

Are any low or high voltage Diagnostic Trouble Codes (DTCs) recorded in the ACM, APIM, FCIM, or GPSM?

Yes	* For DTC U3003:16, GO to Pinpoint Test AQ * For DTC U3003:17, GO to Pinpoint Test AR

No	GO to AI5

AI5 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0155:00 SET IN MULTIPLE MODULES

Review the recorded results from the self-test.

Is DTC U0155:00 set in more than one module?

Yes	GO to AI6

No	* If there is an observable symptom, REFER to: Information and Entertainment System . See Symptom Chart: General Audio System, to diagnose the observed symptom.* If there is no observable symptom, the system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

AI6 CHECK FOR CORRECT IPC (INSTRUMENT PANEL CLUSTER) OPERATION

Ignition OFF.

Disconnect and inspect the IPC connector.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the IPC connector. Make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, PERFORM the IPC Guided Routine.

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AJ : U0159:00

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See Network Message Chart.

The PAM is integral to the BCM.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0159:00	Lost Communication With Parking Assist Control Module "A": No Sub Type Information	Set by the FCDIM when network messages are missing from the PAM for more than 5 seconds with the ignition in RUN.

Possible Source

- PAM

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AJ : U0159:00 > PINPOINT TEST AJ : U0159:00

AJ1 VERIFY THE CUSTOMER'S CONCERN

Ignition ON.

Verify if there is an observable symptom present.

Is an observable symptom present?

Yes	GO to AJ2

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

AJ2 RECHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0159:00

Ignition ON.

Using a diagnostic scan tool, clear all Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Ignition OFF.

Ignition ON.

Wait at least 10 seconds.

Using a diagnostic scan tool, retrieve all Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U0159:00 set in the FCDIM?

Yes	GO to AJ3

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

AJ3 CHECK THE BCM (BODY CONTROL MODULE) FOR BATTERY VOLTAGE OUT-OF-RANGE DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, perform the BCM self-test.

Are any low or high voltage Diagnostic Trouble Codes (DTCs) recorded in the BCM?

Yes	* For DTC U3006:16, REFER to: Body Control Module (BCM) . See U3006:16.* For DTC U3006:17, REFER to: Body Control Module (BCM) . See U3006:17.

No	GO to AJ4

AJ4 CHECK THE APIM (SYNC MODULE) FOR BATTERY VOLTAGE OUT-OF-RANGE DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, perform the FCDIM self-test.

Are low or high voltage Diagnostic Trouble Codes (DTCs) recorded in the FCDIM?

Yes	* For DTC U3003:16, GO to Pinpoint Test AQ * For DTC U3003:17, GO to Pinpoint Test AR

No	GO to AJ5

AJ5 CHECK FOR CORRECT PAM (PARKING ASSIST CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all the BCM connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, discontinue this test and follow TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, PERFORM the BCM Guided Routine.

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AK : U016A:00

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See Network Message Chart.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U016A:00	Lost Communication With Global Positioning System Module: No Sub Type Information	Set by the APIM when it is missing network messages from the GPSM for more than 5 seconds with the ignition in RUN.

Possible Source

- GPSM

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AK : U016A:00 > PINPOINT TEST AK : U016A:00

AK1 VERIFY THE CUSTOMER'S CONCERN

Ignition ON.

Verify there is an observable symptom present.

Is an observable symptom present?

Yes	GO to AK2

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

AK2 RECHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U016A:00

Ignition ON.

Using a diagnostic scan tool, clear all Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Ignition OFF.

Ignition ON.

Wait at least 10 seconds.

Using a diagnostic scan tool, retrieve all Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U016A:00 set in the APIM?

Yes	GO to AK3

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

AK3 CHECK FOR BATTERY VOLTAGE OUT-OF-RANGE DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, perform the self-test for the following modules:

APIM

GPSM

Are any low or high voltage Diagnostic Trouble Codes (DTCs) recorded in the APIM or GPSM?

Yes	* For DTC U3003:16, GO to Pinpoint Test AQ * For DTC U3003:17, GO to Pinpoint Test AR

No	GO to AK4

AK4 CHECK FOR CORRECT GPSM (GLOBAL POSITIONING SYSTEM MODULE) OPERATION

Ignition OFF.

Disconnect and inspect the GPSM connector.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the GPSM connector. Make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new GPSM. REFER to: Global Positioning System Module (GPSM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AL : U0184:00

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See Network Message Chart.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0184:00	Lost Communication With Radio: No Sub Type Information	Set by the APIM and FCDIM when network messages are missing from the ACM for more than 5 seconds with the ignition in RUN.

Possible Source

- ACM

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AL : U0184:00 > PINPOINT TEST AL : U0184:00

AL1 VERIFY THE CUSTOMER'S CONCERN

Verify there is an observable symptom present.

Is an observable symptom present?

Yes	GO to AL2

No	The system is operating normally at this time. This DTC may have been set due to high network traffic or an intermittent fault condition.

AL2 RECHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0184:00

Ignition ON.

Using a diagnostic scan tool, clear all Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Ignition OFF.

Ignition ON.

Wait at least 10 seconds.

Using a diagnostic scan tool, retrieve all Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U0184:00 set in the APIM?

Yes	GO to AL3

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

AL3 CHECK FOR BATTERY VOLTAGE OUT-OF-RANGE DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, perform the self-test for the following modules:

ACM

APIM

Are any low or high voltage Diagnostic Trouble Codes (DTCs) recorded in the ACM or APIM?

Yes	* For DTC U3003:16, GO to Pinpoint Test AQ * For DTC U3003:17, GO to Pinpoint Test AR

No	GO to AL4

AL4 CHECK FOR CORRECT ACM (AUDIO FRONT CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all the ACM connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the ACM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ACM. REFER to: Audio Front Control Module (ACM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AM : U0237:00

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See Network Message Chart.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0237:00	Lost Communication With Digital Audio Control Module "C": No Sub Type Information	Set by the ACM when network messages are missing from the DACMC for more than 5 seconds with the ignition in RUN.

Possible Source

- DACMC

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AM : U0237:00 > PINPOINT TEST AM : U0237:00

AM1 VERIFY THE CUSTOMER'S CONCERN

Ignition ON.

Verify there is an observable symptom present.

Is an observable symptom present?

Yes	GO to AM2

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

AM2 RECHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0237:00

Ignition ON.

Using a diagnostic scan tool, clear all Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Ignition OFF.

Ignition ON.

Wait at least 10 seconds.

Using a diagnostic scan tool, retrieve all Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U0237:00 set in the ACM?

Yes	GO to AM3

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

AM3 CHECK FOR BATTERY VOLTAGE OUT-OF-RANGE DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, perform the self-test for the following modules:

ACM

DACMC

Are any low or high voltage Diagnostic Trouble Codes (DTCs) recorded in the ACM or DACMC?

Yes	* For DTC U3003:16, GO to Pinpoint Test AQ * For DTC U3003:17, GO to Pinpoint Test AR

No	GO to AM4

AM4 CHECK FOR CORRECT DACMC (DIGITAL AUDIO CONTROL MODULE C) OPERATION

Ignition OFF.

Disconnect and inspect all the ACM connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the ACM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ACM. REFER to: Audio Front Control Module (ACM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AN : U0253:00

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See Network Message Chart.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0253:00	Lost Communication With Accessory Protocol Interface Module: No Sub Type Information	Set by the ACM, FCDIM, and FCIM when network messages are missing from the APIM for more than 5 seconds with the ignition in RUN.

Possible Source

- APIM

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AN : U0253:00 > PINPOINT TEST AN : U0253:00

AN1 VERIFY THE CUSTOMER'S CONCERN

Ignition ON.

Verify there is an observable symptom present.

Is an observable symptom present?

Yes	GO to AN2

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

AN2 RECHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0253:00

Ignition ON.

Using a diagnostic scan tool, clear all Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Ignition OFF.

Ignition ON.

Wait at least 10 seconds.

Using a diagnostic scan tool, retrieve all Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U0253:00 set in the ACM or FCIM?

Yes	GO to AN3

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

AN3 CHECK FOR BATTERY VOLTAGE OUT-OF-RANGE DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, perform the self-test for the following modules:

ACM

APIM

FCIM

Are any low or high voltage Diagnostic Trouble Codes (DTCs) recorded in the ACM, APIM, or FCIM?

Yes	* For DTC U3003:16, GO to Pinpoint Test AQ * For DTC U3003:17, GO to Pinpoint Test AR

No	GO to AN4

AN4 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0253:00 SET IN MULTIPLE MODULES

Review the recorded results from the self-test.

Is DTC U0253:00 set in the both the ACM and FCIM?

Yes	GO to AN5

No	* If there is an observable symptom, REFER to: Information and Entertainment System . See Symptom Chart: General Audio System.* If there is no observable symptom, the system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

AN5 CHECK FOR CORRECT APIM (SYNC MODULE) OPERATION

Ignition OFF.

Disconnect and inspect the APIM connector.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the APIM connector. Make sure it seats and latches correctly.

Wait 2 minutes for the APIM to re-initialize.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, PERFORM the APIM Hardware Test. Refer to APIM HARDWARE TESTING .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AO : U0256:00

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See Network Message Chart.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0256:00	Lost Communication With Front Controls Interface Module "A": No Sub Type Information	Set by the ACM and FCDIM when network messages are missing from the FCIM for more than 5 seconds with the ignition in RUN.

Possible Source

- FCIM

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AO : U0256:00 > PINPOINT TEST AO : U0256:00

AO1 VERIFY THE CUSTOMER'S CONCERN

Ignition ON.

Verify there is an observable symptom present.

Is an observable symptom present?

Yes	GO to AO2

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

AO2 RECHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0256:00

Ignition ON.

Using a diagnostic scan tool, clear all Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Ignition OFF.

Ignition ON.

Wait at least 10 seconds.

Using a diagnostic scan tool, retrieve all Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U0256:00 set in the ACM or APIM?

Yes	GO to AO3

No	The system is operating correctly at this time. The DTC may have been set due to high

	network traffic or an intermittent fault condition.

AO3 CHECK FOR BATTERY VOLTAGE OUT-OF-RANGE DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, perform the self-test for the following modules:

ACM

APIM

FCIM

Are any low or high voltage Diagnostic Trouble Codes (DTCs) recorded in the ACM, APIM, or FCIM?

Yes	* For DTC U3003:16, GO to Pinpoint Test AQ * For DTC U3003:17, GO to Pinpoint Test AR

No	GO to AO4

AO4 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0256:00 SET IN MULTIPLE MODULES

Review the recorded results from the self-test.

Is DTC U0256:00 set in both the ACM and the APIM?

Yes	GO to AO5

No	* If there is an observable symptom, REFER to: Information and Entertainment System . See Symptom Chart: General Audio System, to diagnose the observed symptom.* If there is no observable symptom, the system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

AO5 CHECK FOR CORRECT FCIM (FRONT CONTROLS INTERFACE MODULE) OPERATION

Ignition OFF.

Disconnect and inspect the FCIM connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the FCIM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new FCIM. REFER to: Front Controls Interface Module (FCIM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. Address the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AP : U0257:00

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See Network Message Chart.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0257:00	Lost Communication With Front Controls / Display Interface Module: No Sub Type Information	Set by the ACM and APIM when Infotainment Controller Area Network (I-CAN) network messages are missing from the FCDIM for more than 5 seconds with the ignition in RUN.

Possible Source

- FCDIM

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AP : U0257:00 > PINPOINT TEST AP : U0257:00

AP1 VERIFY THE CUSTOMER'S CONCERN

Ignition ON.

Verify there is an observable symptom present.

Is an observable symptom present?

Yes	GO to AP2

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

AP2 RECHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0257:00

Ignition ON.

Using a diagnostic scan tool, clear all Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Ignition OFF.

Ignition ON.

Wait at least 10 seconds.

Using a diagnostic scan tool, retrieve all Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U0257:00 set in the ACM or APIM?

Yes	GO to AP3

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

AP3 CHECK FOR BATTERY VOLTAGE OUT-OF-RANGE DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, perform the self-test for the following modules:

ACM

APIM

FCDIM

Are any low or high voltage Diagnostic Trouble Codes (DTCs) recorded in the ACM, APIM, or FCDIM?

Yes	* For DTC U3003:16, GO to Pinpoint Test AQ * For DTC U3003:17, GO to Pinpoint Test AR

No	GO to AP4

AP4 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0257:00 SET IN MULTIPLE MODULES

Review the recorded results from the self-test.

Is DTC U0257:00 set in both the ACM and APIM?

Yes	GO to AP5

No	* If there is an observable symptom, REFER to: Information and Entertainment System . See Symptom Chart: General Audio System.* If there is no observable symptom, the system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

AP5 CHECK FOR CORRECT FCDIM (FRONT CONTROL/DISPLAY INTERFACE MODULE) OPERATION

Ignition OFF.

Disconnect and inspect the FCDIM connector.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the FCDIM connector. Make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, discontinue this test and follow TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new FCDIM. REFER to: Front Control/Display Interface Module (FCDIM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AQ : U3003:16

Refer to Audio System/Navigation - AM/FM/CD/SYNC for schematic and connector information.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U3003:16	Battery Voltage: Circuit Voltage Below Threshold	Set by the ACM, APIM, DACMC, FCDIM, FCIM, and GPSM when the supply voltage falls below 10 volts for at least 10 seconds

		during normal operation or for more than 250 milliseconds during the self-test.

Possible Sources

- Previous low battery voltage
- Wiring, terminals, or connectors
- ACM
- APIM
- DACMC
- FCIM
- GPSM

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AQ : U3003:16 > PINPOINT TEST AQ : U3003:16

AQ1 RECHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U3003:16

Ignition ON.

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs) for the module in question.

Wait at least 15 seconds.

Using a diagnostic scan tool, repeat the self-test for the module in question.

Is DTC U3003:16 still present?

Yes	GO to AQ2

No	The system is operating correctly at this time. The DTC may have been set due to a previous low battery voltage condition.

AQ2 CHECK FOR CHARGING SYSTEM DIAGNOSTIC TROUBLE CODES (DTCS) IN THE PCM (POWERTRAIN CONTROL MODULE)

Using a diagnostic scan tool, perform the PCM self-test

Are any voltage-related Diagnostic Trouble Codes (DTCs) set in the PCM?

Yes	* For vehicles with the 2.3L EcoBoost (201kW/273PS), REFER to: Charging System - 2.3L EcoBoost (201kW/273PS) . See PCM DTC Chart.* For vehicles with the 3.7L Duratec

	(227kW/301PS), REFER to: Charging System - 3.7L Duratec (227kW/301PS) . See PCM DTC Chart.* For vehicles with the 5.0L 32V Ti-VCT, REFER to: Charging System - 5.0L 32V Ti-VCT . See PCM DTC Chart.

No	GO to AQ3

AQ3 CHECK THE BATTERY CONDITION AND STATE OF CHARGE

Check the battery condition and verify that the battery is fully charged. REFER to: BATTERY, MOUNTING AND CABLES . See Battery Condition Test.

Is the battery OK and fully charged?

Yes	GO to AQ4

No	* For vehicles with the 2.3L EcoBoost (201kW/273PS), REFER to: Charging System - 2.3L EcoBoost (201kW/273PS) . See Symptom Chart to diagnose an under voltage condition.* For vehicles with the 3.7L Duratec (227kW/301PS), REFER to: Charging System - 3.7L Duratec (227kW/301PS) . See Symptom Chart to diagnose an under voltage condition.* For vehicles with the 5.0L 32V Ti-VCT, REFER to: Charging System - 5.0L 32V Ti-VCT . See Symptom Chart to diagnose an under voltage condition.

AQ4 CHECK THE MODULE VOLTAGE SUPPLY

Ignition OFF.

Measure and record the voltage at the battery.

Disconnect the audio system module setting DTC U3003:16.

Ignition ON.

Measure the voltage between the module setting DTC U3003:16 and ground.

For the ACM, measure:

Positive Lead	Measurement / Action	Negative Lead
C240A-1		Ground

For the APIM, measure:

Positive Lead	Measurement / Action	Negative Lead
C2383-1		Ground

For the DACMC, measure:

Positive Lead	Measurement / Action	Negative Lead

C240A-1		Ground

For the FCIM, measure:

Positive Lead	Measurement / Action	Negative Lead
C2402A-26		Ground

For the GPSM, measure:

Positive Lead	Measurement / Action	Negative Lead
C2398-1		Ground

Is the voltage within 0.2 volts of the recorded battery voltage?

Yes	GO to AQ5

No	REPAIR the circuit for high resistance.

AQ5 CHECK THE SUSPECT MODULE GROUND CIRCUIT FOR CONTINUITY

Measure the voltage at the suspect module.

For the ACM, measure:

Positive Lead	Measurement / Action	Negative Lead
C240A-1		C240A-13

For the APIM, measure:

Positive Lead	Measurement / Action	Negative Lead
C2383-1		C2383-37

For the DACMC, measure:

Positive Lead	Measurement / Action	Negative Lead
C240A-1		C240A-13

For the FCIM, measure:

Positive Lead	Measurement / Action	Negative Lead
C2402A-26		C2402A-1

For the GPSM, measure:

Positive Lead	Measurement / Action	Negative Lead
C2398-1		C2398-6

Is the suspect module voltage greater than 11 volts?

Yes	* For the ACM, GO to AQ6* For the APIM, GO to AQ7* For the DACMC, GO to AQ8* For the FCIM, GO to AQ9* For the GPSM, GO to AQ10

No	REPAIR the circuit for high resistance.

AQ6 CHECK FOR CORRECT ACM (AUDIO FRONT CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all the ACM connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the ACM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ACM. REFER to: Audio Front Control Module (ACM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

AQ7 CHECK FOR CORRECT APIM (SYNC MODULE) OPERATION

Ignition OFF.

Disconnect and inspect the APIM connector.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the APIM connector. Make sure it seats and latches correctly.

Wait at least 2 minutes for the APIM to re-initialize.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, PERFORM the APIM Hardware Test. Refer to APIM HARDWARE TESTING .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

AQ8 CHECK FOR CORRECT DACMC (DIGITAL AUDIO CONTROL MODULE C) OPERATION

Ignition OFF.

Disconnect and inspect all the ACM connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the ACM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ACM. REFER to: Audio Front Control Module (ACM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

AQ9 CHECK FOR CORRECT FCIM (FRONT CONTROLS INTERFACE MODULE) OPERATION

Ignition OFF.

Disconnect and inspect the FCIM connector.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the FCIM connector. Make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new FCIM. REFER to: Front Controls Interface Module (FCIM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

AQ10 CHECK FOR CORRECT GPSM (GLOBAL POSITIONING SYSTEM MODULE) OPERATION

Ignition OFF.

Disconnect and inspect the GPSM connector.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the GPSM connector. Make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new GPSM. REFER to: Global Positioning System Module (GPSM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AR : U3003:17

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U3003:17	Battery Voltage: Circuit Voltage Above Threshold	Set by the ACM, APIM, DACMC, FCDIM, FCIM, and GPSM when the supply voltage is more than 15.8 volts for more than 250 milliseconds during normal operation or the self-test.

Possible Sources

- ACM
- APIM
- DACMC
- FCIM
- GPSM

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AR : U3003:17 > PINPOINT TEST AR : U3003:17

AR1 RECHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U3003:17

Ignition ON.

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs) for the module in question.

Wait at least 10 seconds.

Using a diagnostic scan tool, perform the self-test for the module in question.

Is DTC U3003:17 present?

Yes	GO to AR2

No	The system is operating correctly at this time. The DTC may have been set previously during battery charging or while jump starting the vehicle.

AR2 CHECK FOR HIGH VOLTAGE DIAGNOSTIC TROUBLE CODES (DTCS) SET IN MULTIPLE MODULES

Using a diagnostic scan tool, retrieve all Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Are high voltage Diagnostic Trouble Codes (DTCs) such as B1676, P0563, or U3003:17 set in more than one module?

Yes	* For vehicles with the 2.3L EcoBoost (201kW/273PS), REFER to: Charging System - 2.3L EcoBoost (201kW/273PS) . See Symptom Chart to diagnose an overvoltage condition.* For vehicles with the 3.7L Duratec (227kW/301PS), REFER to: Charging System - 3.7L Duratec (227kW/301PS) . See Symptom Chart to diagnose an overvoltage condition.* For vehicles with the 5.0L 32V Ti-VCT, REFER to: Charging System - 5.0L 32V Ti-VCT . See Symptom Chart to diagnose an overvoltage condition.

No	GO to AR3

AR3 CHECK THE BATTERY VOLTAGE

Turn off all interior lights, exterior lights, and accessories.

Start and run the engine at approximately 2, 000 RPM for 3 minutes while monitoring the battery voltage.

Does the battery voltage rise to 15.5 volts or higher?

Yes	* For vehicles with the 2.3L EcoBoost (201kW/273PS), REFER to: Charging System - 2.3L EcoBoost (201kW/273PS) . See Symptom Chart to diagnose an overvoltage condition.* For vehicles with the 3.7L Duratec (227kW/301PS), REFER to: Charging System - 3.7L Duratec (227kW/301PS) . See Symptom Chart to diagnose an overvoltage condition.* For vehicles with the 5.0L 32V Ti-VCT, REFER to: Charging System - 5.0L 32V Ti-VCT . See Symptom Chart to diagnose an overvoltage condition.

No	* For the ACM, GO to AR4* For the APIM, GO to AR5* For the DACMC, GO to AR6* For the FCIM, GO to AR7* For the GPSM, GO to AR8

AR4 CHECK FOR CORRECT ACM (AUDIO FRONT CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all the ACM connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the ACM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ACM. REFER to: Audio

	Front Control Module (ACM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

AR5 CHECK FOR CORRECT APIM (SYNC MODULE) OPERATION

Ignition OFF.

Disconnect and inspect the APIM connector.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the APIM connector. Make sure it seats and latches correctly.

Wait at least 2 minutes for the APIM to re-initialize.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, PERFORM the APIM Hardware Test. Refer to APIM HARDWARE TESTING .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

AR6 CHECK FOR CORRECT DACMC (DIGITAL AUDIO CONTROL MODULE C) OPERATION

Ignition OFF.

Disconnect and inspect all the ACM connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the ACM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ACM. REFER to: Audio Front Control Module (ACM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

AR7 CHECK FOR CORRECT FCIM (FRONT CONTROLS INTERFACE MODULE) OPERATION

Ignition OFF.

Disconnect and inspect the FCIM connector.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the FCIM connector. Make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new FCIM. REFER to: Front Controls Interface Module (FCIM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

AR8 CHECK FOR CORRECT GPSM (GLOBAL POSITIONING SYSTEM MODULE) OPERATION

Ignition OFF.

Disconnect and inspect the GPSM connector.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the GPSM connector. Make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new GPSM. REFER to: Global Positioning System Module (GPSM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

GENERAL PROCEDURES > BEZEL DIAGNOSTICS

Check

1.

> *WARNING: Before beginning any service procedure in this article, refer to Health and Safety Precautions in GENERAL INFORMATION . Failure to follow this instruction may result in serious personal injury.*

Refer to: Health and Safety Precautions .

> *NOTE: If equipped with satellite radio, this procedure can be used to obtain the SIRIUS 12-digit ESN. If there is a concern with one of the following components and bezel diagnostics and channel 0 cannot be accessed, obtain the ESN by referencing the label attached to the ACM.*

- Inoperative (blank or does not power on) FCDIM (if equipped)
- Inoperative (blank or does not power on) FDIM (if equipped)
- Inoperative FCIM
- Inoperative steering wheel switch (if applicable)

Refer to appropriate article to diagnose the inoperative component.

> *NOTE: If there is a concern with one of the following components and Bezel Diagnostics cannot be accessed, obtain the module part number by referencing the label attached to the module.*

- Inoperative (blank or does not power on) FCDIM (if equipped)
- Inoperative (blank or does not power on) FDIM (if equipped)

- Inoperative FCIM
- Inoperative steering wheel switch (if applicable)

Refer to appropriate article to diagnose the inoperative component.

2.

Ignition ON.

3.

Operate the audio system in AM/ FM mode.

* For vehicles with a CD player, press and hold the EJECT button, and within 1 second, press and hold the SEEK UP button. If supported, the Speaker Walk-Around Test (All Speaker Test) will begin, and the display will indicate each speaker as it is tested.
* For vehicles without a CD player, simultaneously press and hold the steering wheel SEEK UP switch and FCIM TUNE UP button. If supported, the Speaker Walk-Around Test (All Speaker Test) will begin, and the display will indicate each speaker as it is tested.

4.

Once the Speaker Walk-Around Test (All Speaker Test) is complete, the following information is available:

Applicability	Menu	Submenu
Only for vehicles with a FCDIM.	AHU Diagnostics (AHU refers to the ACM)	Software Part Number
		Hardware Part Number
		Calibration Part Number
		Radio Signal Strength (may need to press OK for signal strength to display)
		SIRIUS ESN
		All Speaker Test
	EFP Diagnostics or EFP/ICP Diagnostics (EFP refers to the FCIM that communicates on the CAN; ICP refers to the FCIM that communicates on the LIN)	Software Part Number
		Hardware Part Number
		Calibration Part Number
		Exit Diagnostics
	MFD Diagnostics - if supported (MFD refers to the FCDIM)	Software Part Number
		Hardware Part Number
		Calibration Part Number
		Display Test (if supported)

Only for vehicles with FDIM touchscreen.	APIM Diagnostics	Part Numbers
		Software Versions
		Configuration Status
		GPS Information
		Tones Test
		Rear Tones Test (if equipped)
		Touch Screen Calibration
		Touch Screen Activation Test
		Display Test Pattern
		RGB Pixel Test
		Exit Diagnostics
	AHU Diagnostics (AHU refers to the ACM)	AHU Part Numbers / SIRIUS ESN or can also appear as SIRIUS ESN (also displays AHU part numbers)
		Radio Signal Strength
		Speaker Walk-Around Test (if not equipped with audio DSP module)
		Exit Diagnostics
	DSP Diagnostics (if equipped)	DSP Part Numbers
		Speaker Walk-Around Test
		Exit Diagnostics
	EFP Diagnostics - if equipped (EFP refers to the FCIM that communicates on the CAN)	EFP Part Numbers
		Exit Diagnostics

5.

To exit the bezel diagnostics, press the FCIM on/off button or select "Exit Diagnostics."

GENERAL PROCEDURES > RESET THE SYNC MODULE [APIM]

Programming

*NOTE: An APIM Reset consists of an APIM software cold boot and a SYNC ® system Master Reset. It may **not** be necessary to perform a Master Reset after performing a cold boot if the concern is resolved.*

1.

Ignition OFF.

2.

Remove any devices connected to the USB port(s), audio input jack/socket (if equipped), SD slot (if equipped), or RCA jacks (if equipped).

3.

Ignition ON.

4.

Cold boot the APIM software by simultaneously pressing and holding the FCIM power and seek up buttons for 8 seconds, and then releasing.

> *NOTE: Performing a Master Reset returns all preference settings to the factory defaults, erases the phone book and call histories, and deletes any Bluetooth devices paired with the SYNC ® system. For vehicles with navigation, the customer's saved destinations (home, favorites, and previous) are erased. For vehicles with a TCU, any devices paired with the MyFord ® Mobile or MyLincoln Mobile™ phone application will be deleted.*

5.
Perform a Master Reset. If necessary, refer to "Master Reset" in the Owner's Literature.

6.

Verify system function using the MIT 105-00120 to test the audio output for the USB port(s), audio input jack/socket (if equipped), and Bluetooth. If equipped, test the audio output for the RCA jacks using RCA Adapter 105-00121.

> *NOTE: If the concern remains after completing the APIM Reset procedure, advise the customer to power their device off and back on for a simple reboot. In some cases, if possible, the device's battery may also need to be removed and re-installed to complete a reboot. Delete SYNC ® from the device's Bluetooth menu prior to re-pairing the phone to the SYNC ® system. If necessary, the customer can also perform a Master Clear, Master Reset, or Factory Data Reset on their device following the manufacturer's instructions in the device's owner's manual and/or website. Customer devices may affect the operation of SYNC ® and this should be understood to prevent unnecessary diagnosis or repairs to the system.*

7.
If a concern is still present, return to the Symptom Charts.

GENERAL PROCEDURES > SYNC MODULE [APIM] PROGRAMMING

Special Tool(s) / General Equipment

SYNC USB 2.0 A Male to A Male Cable

Activation

1.

> *WARNING: Before beginning any service procedure in this article, refer to Health and Safety Precautions in GENERAL INFORMATION . Failure to follow this instruction may result in serious personal injury.*

Refer to: Health and Safety Precautions .

2.

If a new APIM is being installed, install the new APIM before carrying out the following procedure. Refer to: SYNC Module [APIM] .

3.

This programming procedure deletes any phones that were paired with the SYNC ® system.

To prevent timeout errors and to minimize programming time, a hardwired Internet connection is strongly recommended when programming.

A file of approximately 80 megabytes (MB) needs to be downloaded from the online database for the programming. Allow extra time for the file to download.

The diagnostic scan tool is required.

Ensure that the IDS version and patch software levels are up to date.

4.

Connect a battery charger to the vehicle and select the low charge setting. The negative battery charger lead must be connected to a clean chassis ground, not the negative battery post.

5.

Plug the diagnostic scan tool into a power supply due to the length of time the programming requires.

6.

Connect the diagnostic scan tool to the VCM, and the VCM to the DLC.

7.

Connect one end of the USB cable (male type A 4-pin to male type a 4-pin) to the diagnostic scan tool's USB port, and the other end to the vehicle's USB port. Use the General Equipment: SYNC

USB 2.0 A Male to A Male Cable

8.

Close the IDS software program.

9.

Place the ignition in the ON/RUN position. For ON/RUN position information with Push Button Start vehicles, Refer to: Steering Wheel and Column Electrical Components - Overview .

10.

Using the diagnostic scan tool, open Internet Explorer and access the technician service publication website.

Run OASIS using "Read VIN & DTCs."

If the "Read VIN & DTCs" button is green with a red VCM icon, refer to the "SYNC - Software Programming" document under the "Service Tips" tab.

If the "Read VIN & DTCs" button is red with a grey VCM icon, ensure pop-ups are enabled, follow the Internet Explorer pop-ups, and then refer to the "SYNC - Software Programming" document under the "Service Tips" tab.

If the "SYNC - Software Programming" document is not followed, the programming may stop or encounter errors due to improperly configured Internet browser settings.

11.

From the OASIS tab, select the "SYNC" button. The Last Recorded State - Software is displayed.

NOTE: There are 3 types of APIM programming available:

12.

Standard - Used to update the APIM and any currently installed Applications to the latest software levels.

Custom - Used to show all the available software options (including Applications that may not have been installed previously) that can be programmed into the APIM. Use this selection when upgrades become available or as directed by a TSB or FSA.

Module Replacement - Used when the APIM has been replaced. This type of programming performs the required provisioning (restores software for newly installed hardware).

13.

Scroll to the bottom of the screen, select 1 of the 3 options (Standard, Custom, or Module Replacement), and select the "Read SYNC" button. The current APIM assembly, Vehicle Interface Processor (VIP), and Consumer Interface Processor (CIP) software levels are compared to the last recorded state in the Ford online database, and the available software is displayed.

*NOTE: Do **not** disconnect the VCM or USB cable during APIM programming unless directed by the diagnostic scan tool on-screen prompts.*

14.
Select the "Program SYNC" button to begin the APIM programming process.

15.

Follow the diagnostic scan tool on-screen directions. After programming is complete, the diagnostic scan tool displays "Programming has been successfully completed."

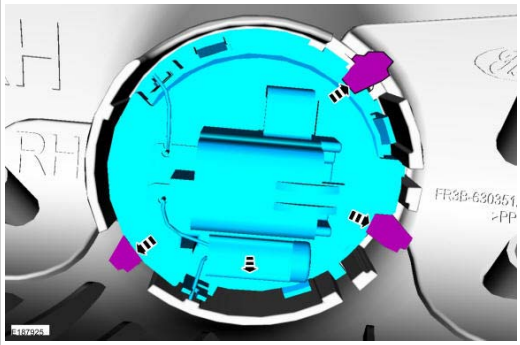
REMOVAL AND INSTALLATION > A-PILLAR SPEAKER > REMOVAL

1.

Remove the A-Pillar trim panel. Refer to: A-Pillar Trim Panel - Convertible . Refer to: A-Pillar Trim Panel - Coupe .

2.

Release the tabs and remove the A-Pillar speaker.



REMOVAL AND INSTALLATION > A-PILLAR SPEAKER > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > ACTIVE NOISE CONTROL MICROPHONE > REMOVAL

Front Microphone

1.

Remove the overhead console. Refer to: Overhead Console .

2.

Remove the ANC microphone.

1.

Release the tab.

2.

Disconnect the electrical connector.



Rear Microphone: Coupe

3.

Lower the headliner. Refer to: Headliner - Lowering .

4.

1.

Release the tabs and remove the ANC microphone.

2.

Disconnect the electrical connector.



Convertible

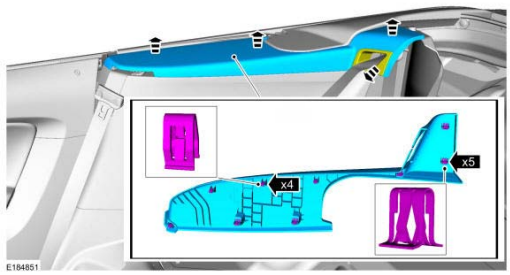
5.

Remove the rear seat backrest. Refer to: Rear Seat Backrest - Convertible .

NOTE: RH side shown LH side similar.

6.
Position the safety belt guide aside, release the clips and remove the upper loadspace trim panel.

Disconnect the electrical connector.



NOTE: RH side shown LH side similar.

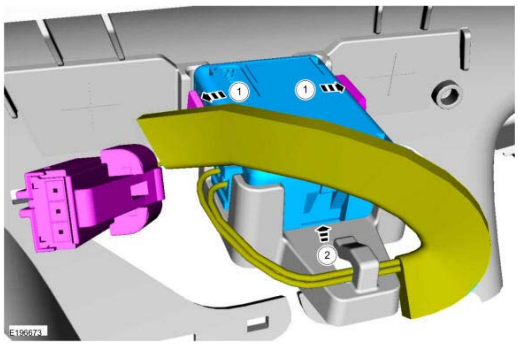
7.

1.

Release the tabs.

2.

Remove the ANC microphone.



REMOVAL AND INSTALLATION > ACTIVE NOISE CONTROL MICROPHONE > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > AUDIO FRONT CONTROL MODULE (ACM) > REMOVAL

NOTE: Eject any media from the ACM. If a disc fails to eject, do not forcibly remove the disc from the ACM.

NOTE: Removal steps in this procedure may contain installation details.

NOTE: If installing a new module, it is necessary to upload the module configuration information to the scan tool prior to removing the module. This information must be downloaded into the new module after installation.

1.
Using a diagnostic scan tool, begin the PMI process for the ACM following the on-screen instructions.

2.

Remove the FCIM. Refer to: Front Controls Interface Module (FCIM) .

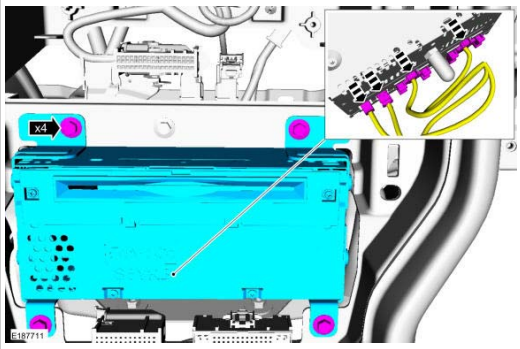
3.

Remove the bolts and the ACM.

Disconnect the electrical connectors.

Torque

: 22 lb.in (2.5 Nm)



REMOVAL AND INSTALLATION > AUDIO FRONT CONTROL MODULE (ACM) > INSTALLATION

1.

To install, reverse the removal procedure.

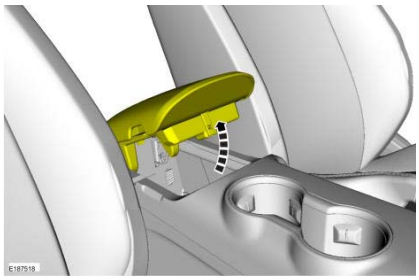
> *NOTE: This step is only necessary if replacing the component.*

2.
Using a diagnostic scan tool, complete the PMI process for the ACM following the on-screen instructions.

REMOVAL AND INSTALLATION > AUDIO INPUT JACK > REMOVAL

1.

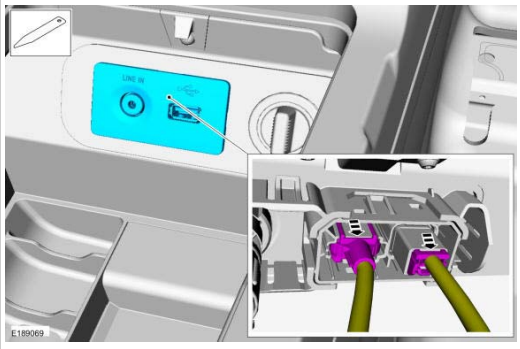
Open the floor console lid.



2.

Remove the audio input jack bezel.

Disconnect the electrical connectors.



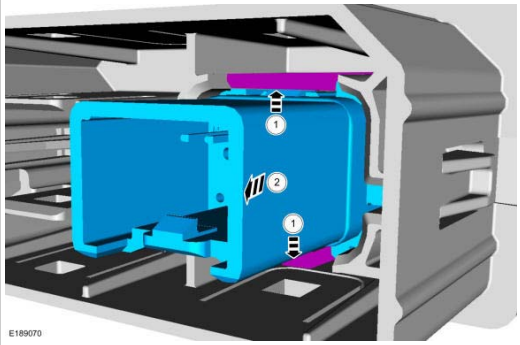
3.

1.

Release the tabs.

2.

Remove the audio input jack.



REMOVAL AND INSTALLATION > AUDIO INPUT JACK > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > AUDIO UNIT ANTENNA > REMOVAL

Coupe

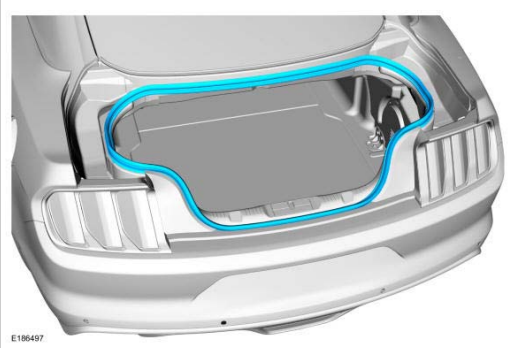
NOTE: The audio unit antenna is part of the rear window glass.

1.
Replace the rear window glass. Refer to: Fixed Glass .

Convertible

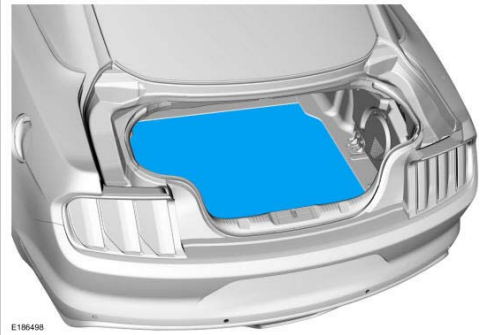
2.

Remove the luggage compartment weatherstrip.



3.

Remove the spare tire cover.



4.

If equipped, remove the subwoofer and amplifier unit. Refer to: Subwoofer and Amplifier Unit .

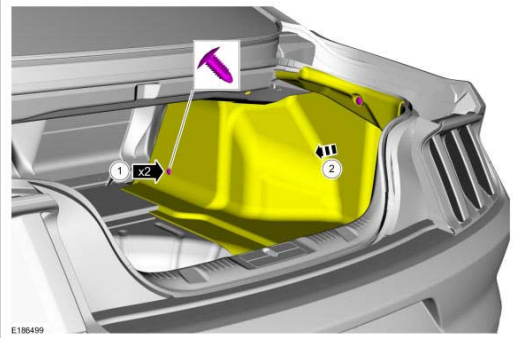
5.

1.

Remove the pin-type retainers.

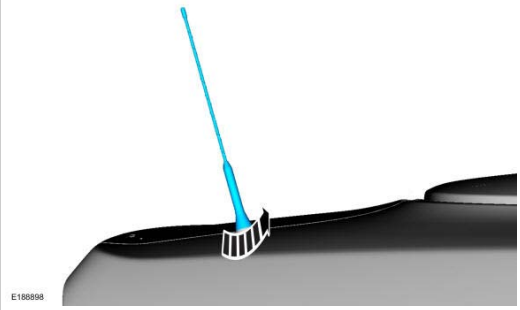
2.

Position aside the RH luggage compartment side trim panel.



6.

Remove the audio unit antenna mast.

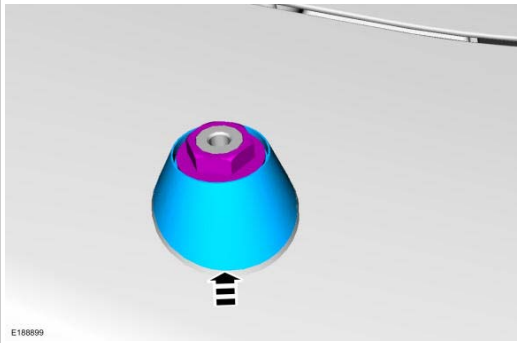


7.

Remove the audio unit antenna mounting nut and the antenna base.

Torque

: 48 lb.in (5.4 Nm)



8.

1.

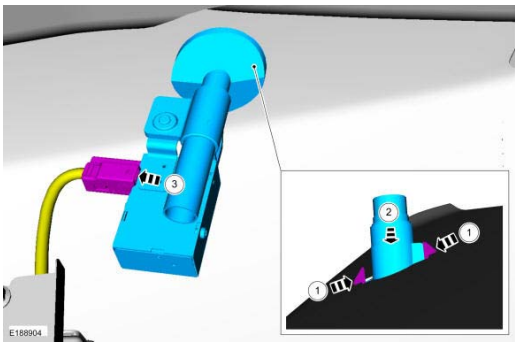
Press the tabs inward.

2.

Remove the audio unit antenna.

3.

Disconnect the electrical connector.



REMOVAL AND INSTALLATION > AUDIO UNIT ANTENNA > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > AUDIO UNIT ANTENNA AMPLIFIER > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

Lower the headliner. Refer to: Headliner - Lowering .

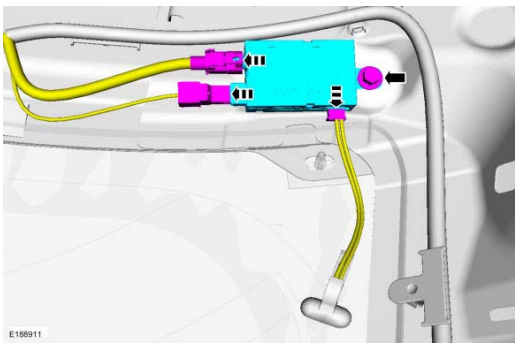
2.

Remove the bolt and the audio unit antenna amplifier.

Disconnect the electrical connectors.

Torque

: 106 lb.in (12 Nm)



REMOVAL AND INSTALLATION > AUDIO UNIT ANTENNA AMPLIFIER > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > AUDIO UNIT ANTENNA CABLE > REMOVAL

NOTE: The original equipment AM/FM antenna cable(s) are part of the wiring harness and cannot be removed. This procedure refers to replacement of the cable(s) only by overlaying the cable(s).

NOTE: The AM/FM antenna cable inline connection is located under the floor console.

Coupe: Front Cable

1.

Remove the floor console. Refer to: Floor Console .

2.

Remove the ACM. Refer to: Audio Front Control Module (ACM) .

Coupe: Rear Cable

3.

Remove the floor console. Refer to: Floor Console .

4.

Lower the headliner. Refer to: Headliner - Lowering .

Convertible

5.

Remove the floor console. Refer to: Floor Console .

6.

Remove the ACM. Refer to: Audio Front Control Module (ACM) .

Convertible: Rear Cable

7.

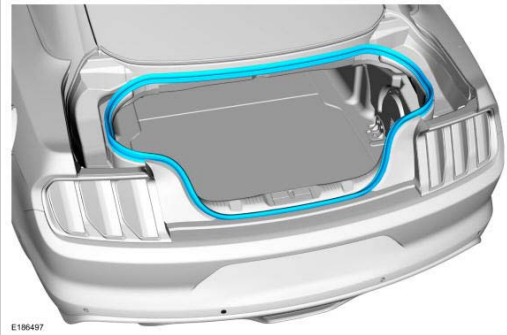
Remove the floor console. Refer to: Floor Console .

8.

Remove the loadspace trim panel. Refer to: Loadspace Trim Panel - Convertible .

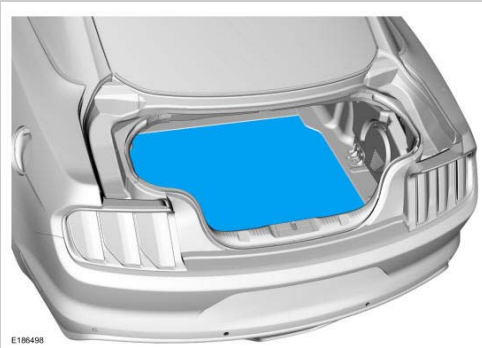
9.

Remove the luggage compartment weatherstrip.



10.

Remove the spare tire cover.



11.

If equipped, remove the subwoofer and amplifier unit. Refer to: Subwoofer and Amplifier Unit .

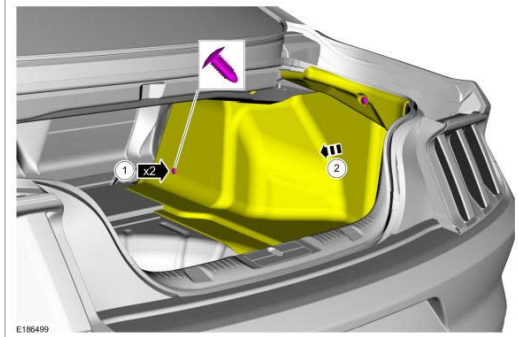
12.

1.

Remove the pin-type retainers.

2.

Position aside the RH luggage compartment side trim panel.

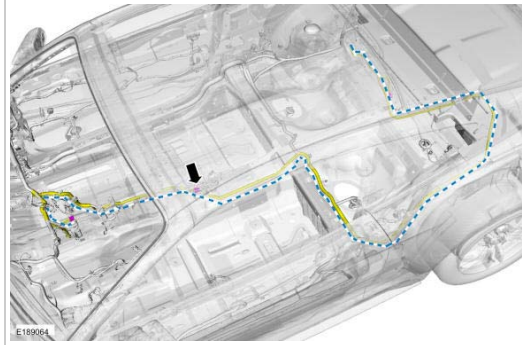


REMOVAL AND INSTALLATION > AUDIO UNIT ANTENNA CABLE > INSTALLATION

Coupe

1.

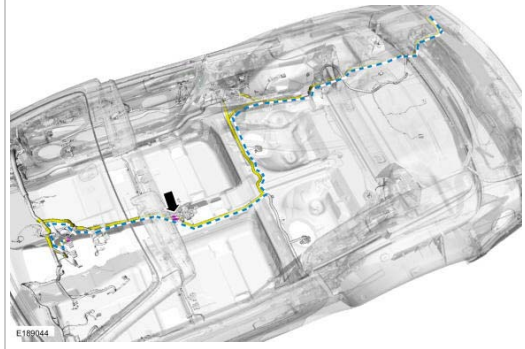
Overlay the new AM/FM antenna cable on the vehicle wiring harness following the routing shown below. Secure the new AM/FM antenna cable to the wiring harness with tape or zip ties as necessary.



Convertible

2.

Overlay the new AM/FM antenna cable on the vehicle wiring harness following the routing shown below. Secure the new AM/FM antenna cable to the wiring harness with tape or zip ties as necessary.



REMOVAL AND INSTALLATION > FRONT CONTROL DISPLAY INTERFACE MODULE (FCDIM) > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

NOTE: If installing a new module, it is necessary to upload the module configuration information to the scan tool prior to removing the module. This information must be downloaded into the new module after installation.

1.
Using a diagnostic scan tool, begin the PMI process for the FCDIM following the on-screen instructions.

2.

Remove the FCIM.

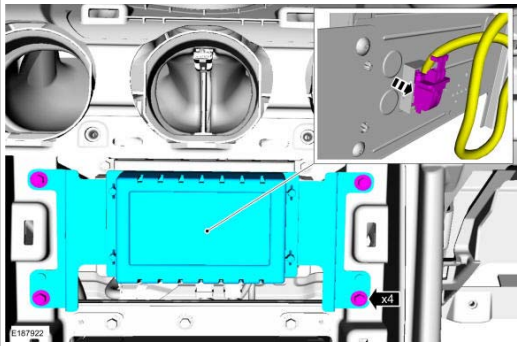
3.

Remove the bolts and the FCDIM.

Disconnect the electrical connector.

Torque

: 22 lb.in (2.5 Nm)



REMOVAL AND INSTALLATION > FRONT CONTROL DISPLAY INTERFACE MODULE (FCDIM) > INSTALLATION

1.

To install, reverse the removal procedure.

NOTE: This step is only necessary if replacing the component.

2.
Using a diagnostic scan tool, complete the PMI process for the FCDIM following the on-screen instructions.

REMOVAL AND INSTALLATION > FRONT CONTROLS INTERFACE MODULE (FCIM)

Special Tool(s) / General Equipment

Interior Trim Remover

REMOVAL AND INSTALLATION > FRONT CONTROLS INTERFACE MODULE (FCIM) > REMOVAL

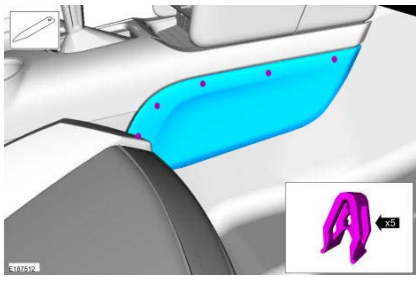
NOTE: Removal steps in this procedure may contain installation details.

NOTE: If installing a new module, it is necessary to upload the module configuration information to the scan tool prior to removing the module. This information must be downloaded into the new module after installation.

1.
Using a diagnostic scan tool, begin the PMI process for the FCIM following the on-screen instructions.

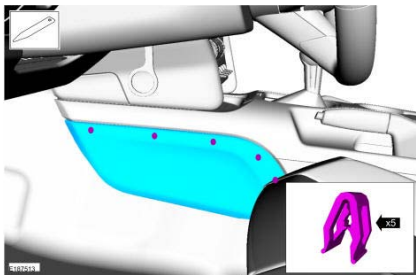
2.

Release the clips and remove the floor console RH side trim panel. Use the General Equipment: Interior Trim Remover



3.

Release the clips and the floor console LH side trim panel. Use the General Equipment: Interior Trim Remover



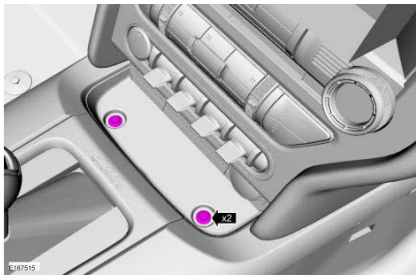
4.

Remove the stowage area mat.



5.

Remove the floor console upper bolts.



NOTE: Automatic transmission shown, manual transmission similar.

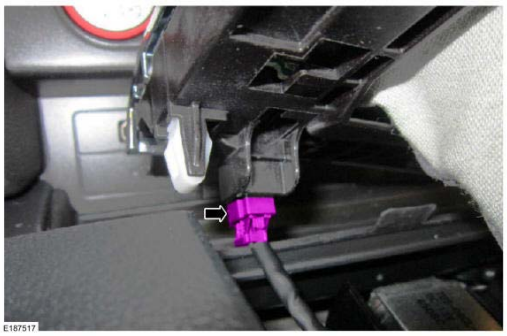
6.
Remove the selector lever bezel. Use the General Equipment: Interior Trim Remover



7.

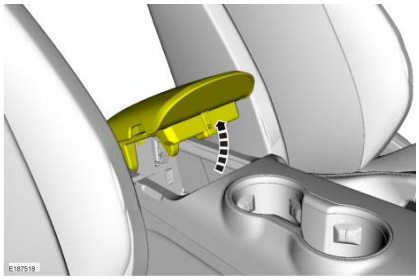
Position aside the selector lever boot.

Disconnect the electrical connector.



8.

Open the floor console lid.

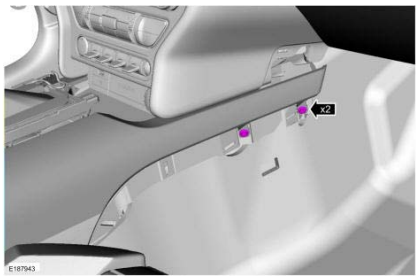


9.

Remove the RH side front retainers.

Torque

: 18 lb.in (2 Nm)

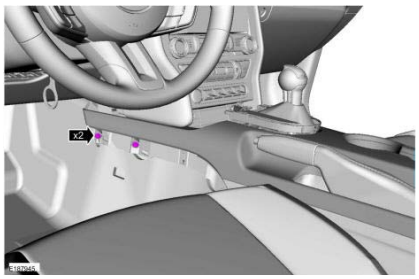


10.

Remove the LH side front retainers.

Torque

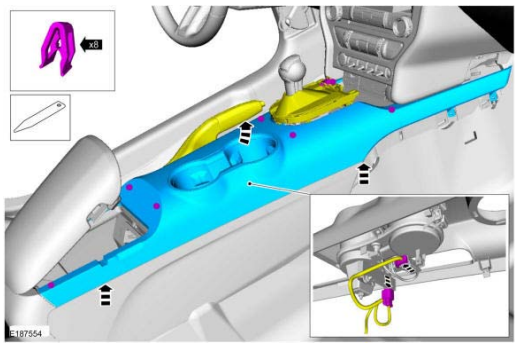
: 18 lb.in (2 Nm)



11.

Release the clips, position the gear selector cover aside and remove the floor console upper trim panel.

Disconnect the electrical connectors.



12.

Remove the stowage area tray.

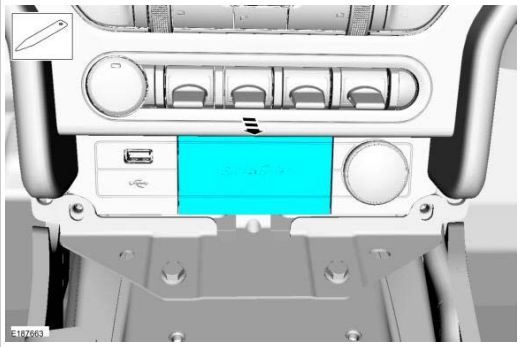


13.

Remove the instrument panel center finish panel. Refer to: Instrument Panel Center Finish Panel .

14.

Remove the trim cover. Use the General Equipment: Interior Trim Remover



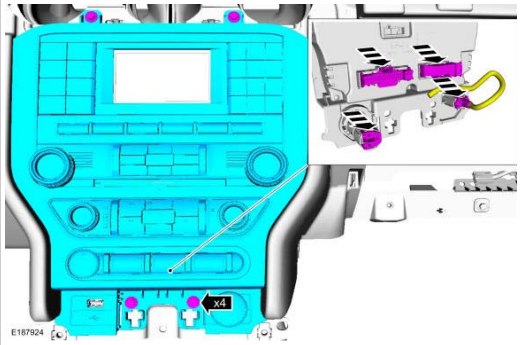
15.

Remove the bolts and the FCIM.

Disconnect the electrical connectors.

Torque

: 22 lb.in (2.5 Nm)



REMOVAL AND INSTALLATION > FRONT CONTROLS INTERFACE MODULE (FCIM) > INSTALLATION

1.

To install, reverse the removal procedure.

NOTE: This step is only necessary if replacing the component.

2.
Using a diagnostic scan tool, complete the PMI process for the FCIM following the on-screen instructions.

REMOVAL AND INSTALLATION > FRONT DOOR SPEAKER LH > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

Remove the front door trim panel. Refer to: Front Door Trim Panel .

Midwoofer speaker

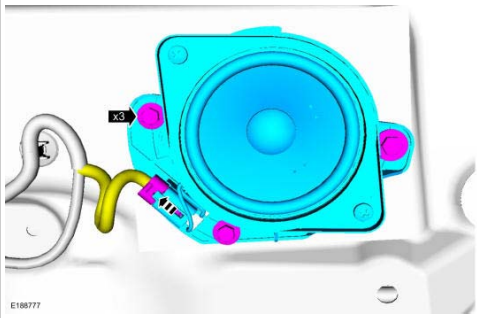
2.

Remove the bolts and the door midwoofer speaker.

Disconnect the electrical connector.

Torque

: 22 lb.in (2.5 Nm)



Woofer speaker

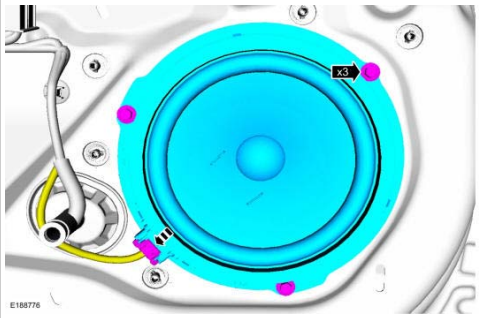
3.

Remove the bolts and the door woofer speaker.

Disconnect the electrical connector.

Torque

: 22 lb.in (2.5 Nm)



REMOVAL AND INSTALLATION > FRONT DOOR SPEAKER LH > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > FRONT DOOR SPEAKER RH > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

Remove the front door trim panel. Refer to: Front Door Trim Panel .

Midwoofer speaker

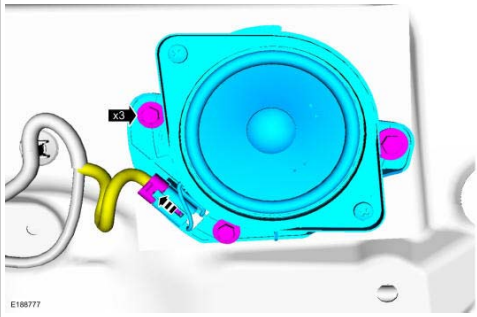
2.

Remove the bolts and the door midwoofer speaker.

Disconnect the electrical connector.

Torque

: 22 lb.in (2.5 Nm)



Woofer speaker

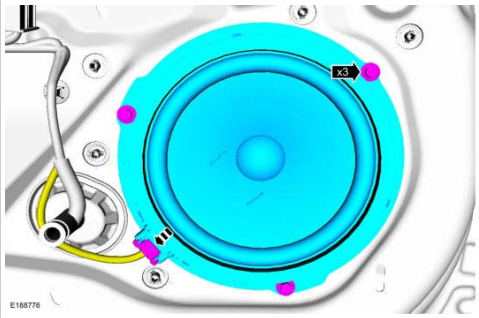
3.

Remove the bolts and the door woofer speaker.

Disconnect the electrical connector.

Torque

: 22 lb.in (2.5 Nm)



REMOVAL AND INSTALLATION > FRONT DOOR SPEAKER RH > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > GLOBAL POSITIONING SYSTEM MODULE (GPSM) > REMOVAL

NOTE: If installing a new module, it is necessary to upload the module configuration information to the scan tool prior to removing the module. This information must be downloaded into the new module after installation.

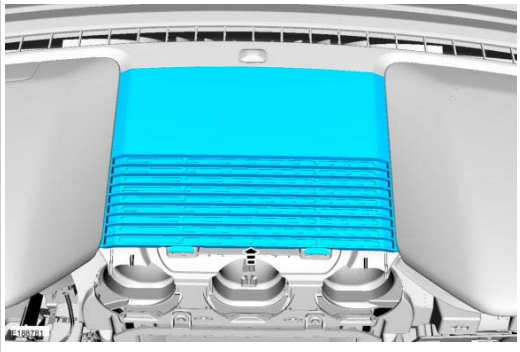
1.
Using a diagnostic scan tool, begin the PMI process for the GPSM following the on-screen instructions.

2.

Remove the instrument panel center finish panel. Refer to: Instrument Panel Center Finish Panel .

3.

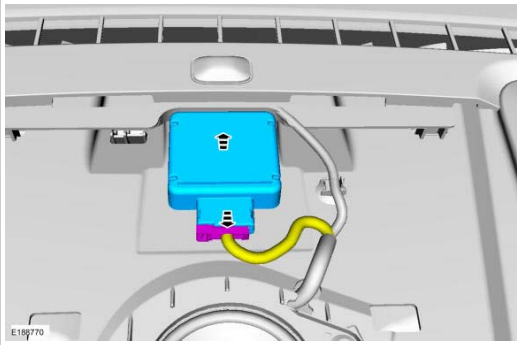
Remove the instrument panel speaker grille.



4.

Pull upwards to release the GPSM and remove.

Disconnect the electrical connector.



REMOVAL AND INSTALLATION > GLOBAL POSITIONING SYSTEM MODULE (GPSM) > INSTALLATION

1.

To install, reverse the removal procedure.

NOTE: This step is only necessary when installing a new component.

2.
Using a diagnostic scan tool, complete the PMI process for the GPSM following the on-screen instructions.

REMOVAL AND INSTALLATION > INSTRUMENT PANEL SPEAKER > REMOVAL

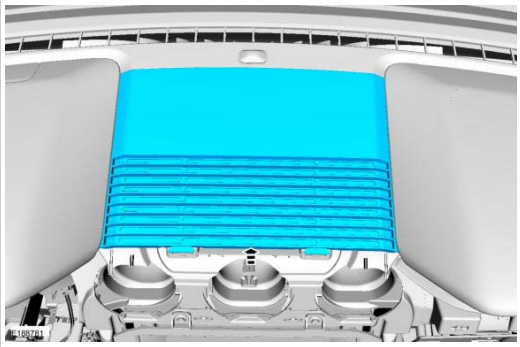
NOTE: Removal steps in this procedure may contain installation details.

1.

Remove the instrument panel center finish panel. Refer to: Instrument Panel Center Finish Panel .

2.

Remove the instrument panel speaker grille.



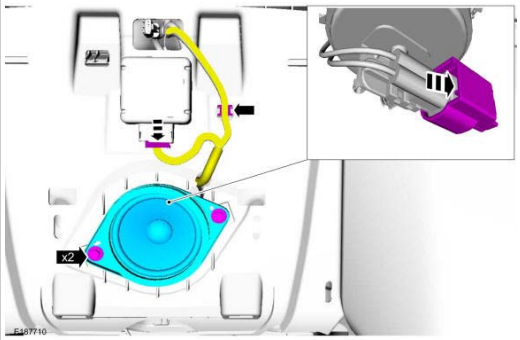
3.

Remove the bolts and the instrument panel speaker.

Disconnect the electrical connector.

Torque

: 22 lb.in (2.5 Nm)



REMOVAL AND INSTALLATION > INSTRUMENT PANEL SPEAKER > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > MICROPHONE > REMOVAL

NOTE: The SYNC ® microphone is part of the overhead console assembly and cannot be replaced separately.

1.
Replace the overhead console. Refer to: Overhead Console .

REMOVAL AND INSTALLATION > MICROPHONE > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > PARCEL SHELF SPEAKER > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

Remove the parcel shelf. Refer to: Parcel Shelf - Coupe .

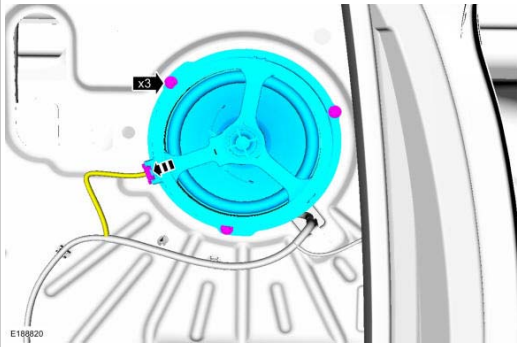
2.

Remove the bolts and the parcel shelf speaker. Remove the bolts and the parcel shelf speaker.

Disconnect the electrical connector.

Torque

: 22 lb.in (2.5 Nm)



REMOVAL AND INSTALLATION > PARCEL SHELF SPEAKER > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > REAR QUARTER PANEL SPEAKER > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

Remove the convertible loadspace trim panel. Refer to: Loadspace Trim Panel - Convertible .

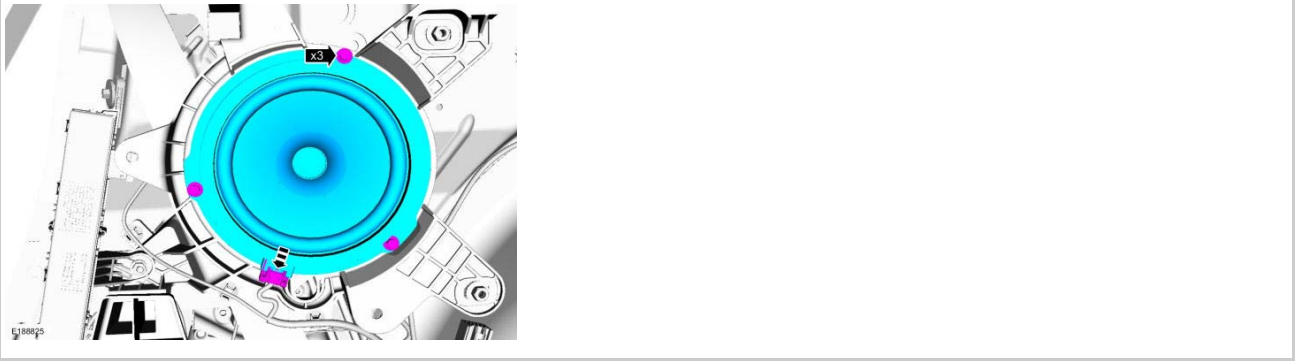
2.

Remove the bolts and the rear quarter panel speaker.

Disconnect the electrical connector.

Torque

: 22 lb.in (2.5 Nm)



REMOVAL AND INSTALLATION > REAR QUARTER PANEL SPEAKER > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > SYNC MODULE [APIM] > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

Remove the FCDIM. Refer to: Front Control/Display Interface Module (FCDIM) .

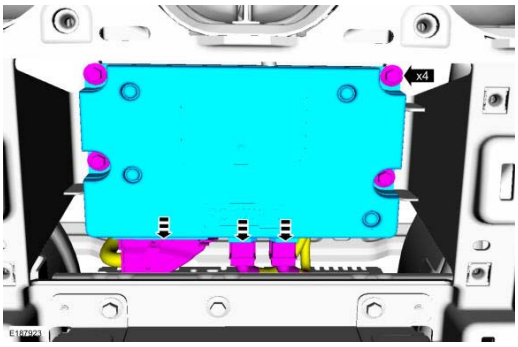
2.

Remove the bolts and APIM.

Disconnect the electrical connectors.

Torque

: 13 lb.in (1.5 Nm)



REMOVAL AND INSTALLATION > SYNC MODULE [APIM] > INSTALLATION

1.

To install, reverse the removal procedure.

2.

If a new APIM is being installed, program the APIM to the correct software level. Refer to: SYNC Module [APIM] Programming .

REMOVAL AND INSTALLATION > SYNC MODULE [APIM] TO UNIVERSAL SERIAL BUS (USB) PORT CABLE > REMOVAL

NOTE: The USB cables are taped into the wiring harness. Because the USB cables cannot be removed from the harness, this procedure applies to replacement of the USB cables only.

Vehicles With: AM/FM/CD/SYNC

1.

Remove the floor console. Refer to: Floor Console .

2.

Remove the APIM. Refer to: SYNC Module [APIM] .

Vehicles With: Touchscreen Display

3.

Remove the floor console. Refer to: Floor Console .

4.

Remove the APIM. Refer to: SYNC Module [APIM] .

REMOVAL AND INSTALLATION > SYNC MODULE [APIM] TO UNIVERSAL SERIAL BUS (USB) PORT CABLE > INSTALLATION

Vehicles With: AM/FM/CD/SYNC

> *NOTE: The rear USB port and cable located in the floor console is routed directly to the APIM.*

> *NOTE: The front USB port and cable is routed directly to the APIM.*

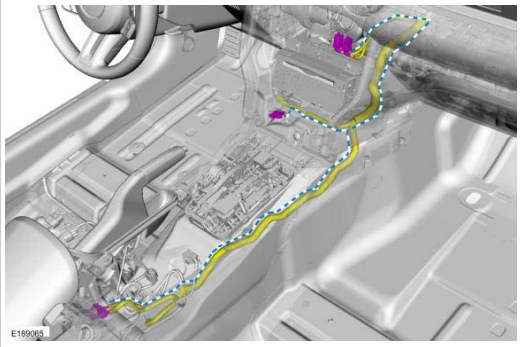
1.
Overlay the new USB cable following the routing shown below.

1.

Secure the new USB cable to the wiring harness with tape or zip ties as necessary.

2.

Cut both ends off the original USB cable.



Vehicles With: Touchscreen Display

> *NOTE: The rear USB port and cable located at the media hub in the floor console is routed directly to the APIM.*

> *NOTE: The front USB port and cable is routed directly to the media hub.*

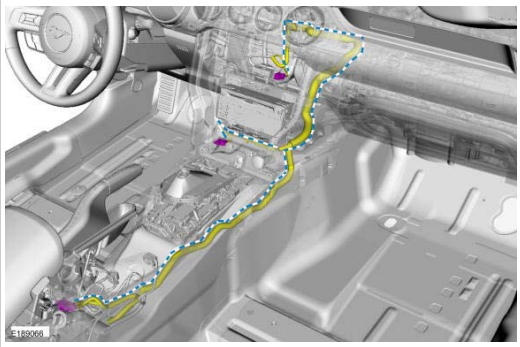
2.
Overlay the new USB cable following the routing shown below.

1.

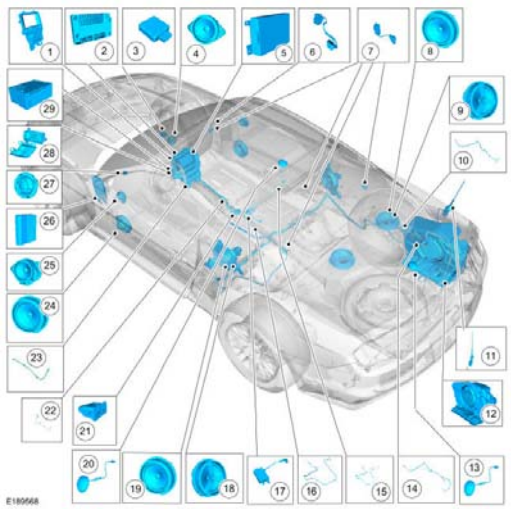
Secure the new USB cable to the wiring harness with tape or zip ties as necessary.

2.

Cut both ends off the original USB cable.



DESCRIPTION AND OPERATION > INFORMATION AND ENTERTAINMENT SYSTEM - COMPONENT LOCATION



Item	Description
1	FCIM
2	APIM
3	GPSM
4	Center instrument panel speaker
5	8-inch (203 mm) FDIM
6	SYNC ® microphone
7	ANC microphones - 2.3L only (coupe: located in the overhead console and center rear of the headliner) / (convertible: located in the overhead console, RHR quarter panel, and LHR quarter panel)
8	Right parcel shelf full-range speaker (left also shown) (coupe) (without Shaker)
9	Right parcel shelf coaxial speaker (left also shown) (coupe) (with Shaker)
10	Rear AM/ FM/(HD Radio ® with Shaker) antenna coaxial cable for the RHR fender-mounted AM/ FM/(HD Radio ® with Shaker) mast antenna (convertible)
-	Front AM/ FM/(HD Radio ® with Shaker) antenna coaxial cable (Not shown)
11	RHR fender-mounted AM/ FM/(HD Radio ® with Shaker) mast antenna (convertible)
12	Subwoofer amplifier, speaker, and enclosure assembly
13	Satellite radio (if equipped) antenna (convertible)
14	Rear satellite radio (if equipped) antenna coaxial cable (convertible)

15	Rear satellite radio (if equipped) antenna coaxial cable (coupe)
-	Front satellite radio (if equipped) antenna coaxial cable (Not shown)
16	Rear AM/ FM/(HD Radio ® with Shaker) antenna coaxial cable for the AM/ FM/(HD Radio ® with Shaker) on-glass antenna grid (coupe)
17	AM/ FM/(HD Radio ® with Shaker) antenna amplifier (coupe)
18	LHR quarter panel coaxial speaker (RHR also shown) (convertible) (with Shaker)
19	LHR quarter panel full-range speaker (RHR also shown) (convertible) (without Shaker)
20	Satellite radio (if equipped) antenna (coupe)
21	Media hub
22	Media hub to APIM USB cable
23	Remote USB port/cable
24	LHF door woofer speaker (RHF also shown)
25	LHF door midwoofer speaker (RHF also shown)
26	Audio DSP module
27	LHF A-pillar tweeter speaker (RHF also shown)
28	RH steering wheel switches
29	ACM (contains DACMC for 2.3L and 5.2L)

DESCRIPTION AND OPERATION > INFORMATION AND ENTERTAINMENT SYSTEM - OVERVIEW > OVERVIEW

The audio system consists of the following:

Main Components

- 9 speakers (without Shaker)
- 10 speakers (with Shaker)
- 8-inch (203 mm) FDIM touchscreen
- ACM (contains DACMC for 2.3L and 5.2L)
- AM/ FM/HD Radio ® (with Shaker) antenna
- APIM
- Audio DSP module
- FCIM
- GPSM
- Media hub

- Remote USB port/cable
- RH audio steering wheel switches
- Satellite radio (if equipped) antenna
- Subwoofer amplifier (with Shaker)
- SYNC ® microphone

Main Features

- AM radio
- ANC (2.3L only)
- Audio extended play
- Battery load shed
- Compass
- ESE (2.3L and 5.2L only)
- FM radio
- HD Radio ® (with Shaker)
- MyKey ®
- Navigation (if equipped)
- Satellite radio (if equipped)
- SIRIUS Data Services (if equipped)
- Speed compensated volume
- SYNC ®
- SYNC ® Services (if equipped)

DESCRIPTION AND OPERATION > INFORMATION AND ENTERTAINMENT SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION

System Operation

DESCRIPTION AND OPERATION > INFORMATION AND ENTERTAINMENT SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION > NETWORK MESSAGE CHART

A missing network message is indicated by a U-code DTC and can be the result of intermittent concerns such as damaged wiring or low battery voltage occurrences. Additionally, vehicle repair procedures such

as module reprogramming can set these Diagnostic Trouble Codes (DTCs). When a missing message DTC (U-code) sets, it is important to look for symptoms present in the audio system and throughout the vehicle, and to review the complete message list to determine which other modules rely on the same message. Refer to: MODULE COMMUNICATIONS NETWORK . See CAN Multiplex Messages.

When the other modules have been identified, run the self-test for those modules. If the same message is missing from those modules, the identical, or similar lost communication Diagnostic Trouble Codes (DTCs) may be set in those modules. Confirmation of missing messages common to multiple modules can indicate that the originating module is the source of the concern, or that the communication network may be at fault.

It is very important to understand the following:

- Where the input originates
- All of the information necessary for a feature to operate
- Which module(s) receive(s) the input or command message
- Which module controls the output of the feature
- If the module that receives the input controls the output of the feature, or whether it outputs a message over the CAN to another module.

Module Network Input Messages - ACM

Broadcast Message	Originating Module	Message Purpose
Audio settings	IPC	Used to set the radio listening source (AM/ FM, Satellite, HD Radio ®) from the steering wheel switch.
Audio source select	IPC	Used to set the audio system listening source (AM/ FM, CD, etc.) from the steering wheel switch through the IPC RH infotainment display.
Belt-Minder ® audio mute	IPC	Used to mute speaker output so the Belt-Minder ® tone can be more easily heard. This message only applies to vehicles with a MyKey ® enabled and in use. The audio system is muted until the safety belt(s) are buckled.
Day/night status	BCM	Used for day/night illumination status for the audio system.
Ignition status	BCM	Used to indicate the ignition state (OFF, ACCESSORY, RUN, and START) required for ACM operating modes and fault reporting.

Instrument panel cluster chime	IPC	Used to request a warning chime to be played through the audio system.
MyKey ® volume limit status	IPC	Used to limit the maximum audio system volume when a MyKey ® restricted key is in use.
Power mode	IPC	Used to disable the functionality of the ACM due to the load shedding feature.
Power up chime modules	IPC	Used to initiate the audio system as the chime source.
Vehicle configuration data	BCM	Used to verify vehicle configuration data such as the VIN and system module configuration.

Module Network Input Messages - APIM

Broadcast Message	Originating Module	Message Purpose
Airbag deployment status	RCM	Used to monitor airbag deployment status for 911 Assist™.
Audio settings	IPC	Used to set the radio listening source (AM/ FM, Satellite, HD Radio ®) from the steering wheel switch through the IPC RH infotainment display.
Day/night status	BCM	Used for day/night illumination status for the FDIM.
Display language selection	IPC	Used to display information on the FDIM in the selected language.
eCall notification	RCM	Used to notify of a 911 Assist™ call being initiated due to airbag deployment.
FCIM bezel diagnostic status	GWM	Used to display the requested bezel diagnostics operations in the centerstack infotainment display.
FCIM button state	FCIM	Used to indicate when a button is pressed on the FCIM so the audio system can make the desired setting change.
Gear lever position	IPC	Used to verify the gear selector position for bezel diagnostics.
GPS compass direction	GPSM	Used to display the compass direction on the FDIM.

GPS data	GPSM	Used for vehicle positioning, heading, and direction for navigation and 911 Assist™.
Ignition key type	BCM	Used to determine if a MyKey ® is enabled and in use.
Ignition status	BCM	Used to indicate the ignition state (OFF, ACCESSORY, RUN, and START) required for APIM operating modes and fault reporting.
MyKey ® volume limit status	IPC	Used to limit the maximum audio system volume when a MyKey ® restricted key is in use.
Navigation rolling wheel count and direction	ABS module	Used to provide more accurate vehicle position tracking when the GPS signal is temporarily unavailable.
Steering wheel switch status	SCCM	Used to indicate the button press status of the steering wheel switches.
Vehicle configuration data	BCM	Used to verify vehicle configuration data such as the VIN and system module configuration.
Vehicle speed	PCM	Used for navigation functionality.

Module Network Input Messages - Audio DSP Module

Broadcast Message	Originating Module	Message Purpose
Active noise audio status	DACMC	Used to indicate the operating status of the ANC system and if the audio system is in use.
Belt-Minder ® Status	IPC	Used to mute speaker output so the Belt-Minder ® tone can be more easily heard. This message only applies to vehicles with a MyKey ® enabled and in use. The audio system is muted until the safety belt(s) are buckled.
Ignition status	BCM	Used to indicate the ignition state (OFF, ACCESSORY, RUN, and START) required for audio DSP module operating modes and fault reporting.
Instrument panel cluster chime	IPC	Used to request a warning chime to be played through the audio

		system.
MyKey ® volume limit status	IPC	Used to limit the maximum audio system volume when a MyKey ® restricted key is in use.
Power up chime modules	IPC	Used to initiate the audio system as the chime source.
Set point volume	FCIM	Used to set the audio DSP module volume.
Vehicle configuration data	BCM	Used to verify vehicle configuration data such as the VIN and system module configuration.

Module Network Input Messages - DACMC (2.3L and 5.2L Only)

Broadcast Message	Originating Module	Message Purpose
Accelerator pedal position	PCM	Used to determine the throttle position status for the ANC and ESE system operation.
Driver's door ajar status	BCM	Used to enable the ANC and ESE system if the driver's door (and all other doors and luggage compartment lid) is closed, or to disable the ANC and ESE system if the driver's door is ajar.
Engine RPM data	PCM	Used to determine the engine rotation speed for the ANC and ESE system operation.
Engine status	PCM	Used to enable the ANC and ESE system if the engine is ON, or to disable the ANC and ESE system if the engine is OFF.
Engine torque	PCM	Used for ANC and ESE system operation by indicating the amount of engine torque being produced (in Nm).
Ignition status	GWM	Used to indicate the ignition state (OFF, ACCESSORY, CRANK, RUN, and START) required for DACMC operating modes and fault reporting.
Luggage compartment lid ajar status	BCM	Used to enable the ANC and ESE system if the luggage compartment lid (and all other doors) is closed, or to disable the ANC and ESE system if the luggage compartment

		lid is ajar.
Passenger door ajar status	BCM	Used to enable the ANC and ESE system if the front passenger door (and all other doors and luggage compartment lid) is closed, or to disable the ANC and ESE system if the front passenger door is ajar.
Power up chime modules	IPC	Used to initiate the audio system as the chime source.

Module Network Input Messages - FCIM

Broadcast Message	Originating Module	Message Purpose
Audio source selection	ACM	Used to indicate the selected audio system source.
Day/night status	BCM	Used for day/night illumination status for the FCIM.
Ignition status	BCM	Used to indicate the ignition state (OFF, ACCESSORY, RUN, and START) required for FCIM operating modes and fault reporting.
Power mode	IPC	Used to disable the functionality of the FCIM due to the load shedding feature.
Vehicle configuration data	BCM	Used to verify vehicle configuration data such as the VIN and system module configuration.

Module Network Input Messages - GPSM

Broadcast Message	Originating Module	Message Purpose
Ignition status	BCM	Used to indicate the ignition state (OFF, ACCESSORY, RUN, and START) required for GPSM operating modes and fault reporting.
Vehicle configuration data	BCM	Used to verify vehicle configuration data such as the VIN and system module configuration.
Vehicle yaw rate	RCM	Used to verify the vehicle acceleration data for navigation.
Wheel rotation count	BCM	Used to provide more accurate vehicle position tracking when the

		GPS signal is temporarily unavailable.
Wheel rotation direction	BCM	Used to determine wheel rotation direction for navigation.

Module Network Input Messages - IPC

Broadcast Message	Originating Module	Message Purpose
Audio source selection	ACM	Used to display the selected audio source on the IPC.
Display language request	APIM	Used to display information on the IPC in the selected language.
DSP chime status	Audio DSP module	Used to indicate the status of the warning chimes being played through the audio system.
Multimedia player total play time status	APIM	Used to indicate the total play time of the audio track being played.

Module Network Input Messages - RCM

Broadcast Message	Originating Module	Message Purpose
eCall confirmation	APIM	Used to confirm the configuration of the 911 Assist™ feature, and to confirm the status of the 911 Assist™ phone call.

DESCRIPTION AND OPERATION > INFORMATION AND ENTERTAINMENT SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION > ACCESSORY DELAY FEATURE

The accessory delay feature is a BCM-controlled software function that allows the audio system to be operated for a preset period of time after the ignition is turned off and a front door has not been opened.

DESCRIPTION AND OPERATION > INFORMATION AND ENTERTAINMENT SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION > AM/ FM RADIO

The AM/ FM on-glass antenna grid (coupe) or fender-mounted antenna (convertible) receives analog radio waves and sends them through the AM/ FM antenna amplifier (coupe) and AM/ FM antenna coaxial cable to the ACM. The radio waves are converted into fluctuating AC voltage and sent as left and right analog audio signals to the audio DSP module. For vehicles without Shaker, the audio DSP module processes the audio signals and sends them to the speakers as fluctuating AC voltage. For vehicles with Shaker, the audio DSP module processes the audio signals and sends them to the speakers and

subwoofer amplifier as fluctuating AC voltage. The subwoofer amplifier processes the audio signals and sends them to the subwoofer speaker as fluctuating AC voltage.

DESCRIPTION AND OPERATION > INFORMATION AND ENTERTAINMENT SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION > ANC - 2.3L

ANC is an audio system feature that eliminates a certain range of low frequency engine noise within the passenger compartment typically induced under wide open throttle or heavy part-throttle conditions. The system uses two (coupe) or three (convertible) microphones, a DACMC (contained within the ACM), and the audio system speakers. The DACMC determines the noise frequency to be canceled based upon engine rotation speed data, engine torque data, and accelerator pedal position data from the PCM, as well as microphone input signals.

While the engine is running, the ANC microphones located in the overhead console and center rear of the headliner (coupe), or overhead console, RHR quarter panel, and LHR quarter panel (convertible) monitor the engine noise resonating in the passenger compartment. The microphones transmit this noise as analog signals to the DACMC (contained within the ACM), where they are converted into digital signals by the integrated analog/digital converter. The digital signals are processed and an inverted phase sound wave with the same amplitude as the original sound is created. This new sound is converted into an analog audio signal, transmitted to the DACMC internal tone generator, and output by the ACM to the audio DSP module as fluctuating AC voltage. The audio DSP module sends the signal to the LHF and RHF door woofer speakers, and right and left parcel shelf full-range (without Shaker) or coaxial (with Shaker) speakers (coupe) or RHR and LHR quarter panel full-range (without Shaker) or coaxial (with Shaker) speakers (convertible) as fluctuating AC voltage.

DESCRIPTION AND OPERATION > INFORMATION AND ENTERTAINMENT SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION > APIM PROGRAMMING

The APIM requires specific programming procedures for correct operation. APIM programming is required when:

- The APIM is replaced.
- Directed by a TSB or FSA. Updates to resolve SYNC ® performance concerns should only be performed when directed by a TSB or FSA.
- Feature upgrades are requested. Occasional feature upgrades and/or new Applications can be programmed when they become available. This type of programming is available upon customer request and expense.

There are 3 types of APIM programming available:

- Module Replacement - Used when the APIM has been replaced. This type of programming performs the required provisioning (restores software for newly installed hardware).
- Standard - Used to update the APIM and any currently installed Applications to the latest software level.
- Custom - Used to show all the available software options (including Applications that may not have been installed previously) that can be programmed into the APIM. Use this selection when

upgrades become available or as directed by a TSB or FSA.

There are 3 types of software installation methods:

- Full Flash [Force CIP] - A CIP program is the entire software package for the APIM. Performing a Full Flash erases the existing APIM software and installs the complete program. A Full Flash should only be performed if a Service Pack is not available. If a Full Flash is performed, all Applications must be re-installed. Performing a Full Flash by selecting Force CIP requires additional programming time and is not necessary unless directed by a TSB or FSA.
- Service Pack - A Service Pack update only provides the necessary software to update the existing APIM program to a new level. For example, a Service Pack changes the software program from an 'AA' to an 'AB' version level. It does not delete or overwrite the existing APIM software. A Service Pack is a much smaller program than a Full Flash and requires less time to download and less time to program. A Service Pack software installation should always be performed instead of a Full Flash if possible.
- Applications - Applications are special software programs that may be installed in the APIM. Applications necessary for each vehicle are determined by the vehicle build information stored in the Ford online database. Selecting individual Applications for installation may not be necessary every time the APIM is programmed.

> *NOTE: VIP programming is not selectable because the VIP is configured automatically during programming.*

There are some general programming guidelines that are applicable to multiple types of programming:

- Full Flash/Force CIP
  - The media hub must be removed for programming.
  - A diagnostic scan tool and SYNC ® Re-Flash Kit (or equivalent), are required in order to complete the flash procedure.
  - All previously paired phones are deleted from the SYNC ® system.
  - The file needs to be downloaded from the Ford online database. Allow for extra time in order to complete the download. The compressed files are between 200 and 400 megabytes (MB), and once downloaded, are extracted to the full size of approximately 2 gigabytes (GB).
  - Once diagnostic scan tool programming is complete, Applications need to be installed with the USB flash drive. This is accomplished by reinstalling the media hub and connecting the USB flash drive to the media hub.
- Service Pack and Applications
  - A USB flash drive with a minimum 1 gigabyte (GB) storage capacity is required.
  - The file is downloaded from the Ford online database onto the flash drive. The files are then transferred via the flash drive to the APIM through the vehicle USB port.

To perform APIM replacement programming, Refer to: SYNC Module [APIM] Replacement Programming .

To perform standard programming, Refer to: SYNC Module [APIM] Standard Programming .

To perform custom programming, Refer to: SYNC Module [APIM] Custom Programming .

DESCRIPTION AND OPERATION > INFORMATION AND ENTERTAINMENT SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION > AUDIO EXTENDED PLAY

This feature allows the audio system to operate with the ignition OFF, regardless of door latch position. When the power button on the FCIM is pressed, audio system functionality is enabled and remains active for a period of 20-60 minutes, depending on configuration settings. Audio extended play will not function if the battery load shed is active. To turn the audio system off, press the FCIM power button.

DESCRIPTION AND OPERATION > INFORMATION AND ENTERTAINMENT SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION > AUDIO INPUT JACK MODE

When a portable audio device, such as an iPod ® with its available cable, is connected to the vehicle audio system through the audio input jack in the media hub, audio from the device can be played through the vehicle speakers. Only the volume can be controlled with the vehicle audio controls. All other functions such as seek, fast forward, pause, etc. must be carried out on the device itself.

No metadata (information such as artist, album title, song title, and genre) is transmitted when a device is connected to the audio input jack.

DESCRIPTION AND OPERATION > INFORMATION AND ENTERTAINMENT SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION > BATTERY LOAD SHED

The BCM uses the battery current sensor to monitor the battery state of charge. The battery current sensor is attached to the battery ground cable. With the ignition in RUN, ACC, or OFF, a load shed message is sent over the CAN when the BCM determines that the battery state of charge is below 40%, 45 minutes have elapsed, or 10% of the charge has been drained. This message turns off the audio system to save the remaining battery charge. Under this condition, "Battery Saver - System Off" is displayed on the FDIM to notify the driver that battery protection actions are active. To clear the load shed state, start the vehicle.

DESCRIPTION AND OPERATION > INFORMATION AND ENTERTAINMENT SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION > BLUETOOTH MODE

Bluetooth is a secure, short-range radio frequency that allows devices to communicate wirelessly through radio waves. The operating range of a Bluetooth signal is application specific, but will have a minimum range of 10 meters (33 feet).

The APIM Bluetooth chipset supports multiple Bluetooth profiles, allowing the SYNC ® system to interact with both Bluetooth-enabled phones and Bluetooth-enabled media devices.

Any Bluetooth-enabled device used with the SYNC ® system must first be paired with the APIM Bluetooth chipset before it can become operational. Pairing a Bluetooth-enabled device is accomplished through the "Add Device" selection of the phone menu. When pairing a device, the SYNC ® system

generates a unique PIN that must be confirmed on the Bluetooth-enabled device in order for the pairing process to be successful. There are also some device-specific actions that must take place. For information on the pairing process, refer to the Owner's Literature.

Multiple Bluetooth-enabled phones and Bluetooth-enabled media devices can be paired to the APIM at the same time. The APIM supports an active connection with one Bluetooth-enabled phone and one Bluetooth-enabled media device at a time. If an additional device of either type is paired and made active, the APIM ends any active connection with an already-paired device, and establishes an active connection with the new device.

It is important to understand that while most Bluetooth-enabled devices can pair with the SYNC ® system, not all Bluetooth-enabled devices have the same level of available features when interacting with the SYNC ® system. To determine if a Bluetooth-enabled device or feature is supported, review the device compatibility list. Refer to owner.ford.com/how-tos/sync-technology/all/phone-setup/how-your-device-works-with-sync.html?version=navigation.

For more information, refer to "Bluetooth" in the Owner's Literature.

DESCRIPTION AND OPERATION > INFORMATION AND ENTERTAINMENT SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION > CHIMES

Various vehicle systems send chime requests over the CAN to the IPC. The following are determined as the IPC processes these requests:

- Chime characteristics such as tone, tone length, number of repetitions, and time between tones
- Chime output volume
- Priority of the chime request
- Which speakers (all, front, or rear) will play the specific chime

The IPC sends the processed requests over the CAN to the ACM. The ACM outputs the left and right analog chime tones to the audio DSP module over dedicated chimes circuits as fluctuating AC voltage. The audio DSP module outputs the chime tones to the appropriate audio system speakers as fluctuating AC voltage.

For more information, Refer to: Warning Chimes - Overview . For even more information, Refer to: Warning Chimes - System Operation and Component Description .

DESCRIPTION AND OPERATION > INFORMATION AND ENTERTAINMENT SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION > COMPASS

The GPS antenna integral to the GPSM is used to acquire the compass heading. The compass heading is sent through the CAN to the APIM. The APIM uses this data in addition to wheel speed and wheel rotation direction CAN messages from the ABS module to calculate and provide accurate vehicle tracking. The APIM processes the data and transmits it to be displayed on the FDIM. In the event that the GPS fix or signal is temporarily lost, the APIM will continue to use the CAN messages from the ABS module to provide accurate vehicle tracking.

DESCRIPTION AND OPERATION > INFORMATION AND ENTERTAINMENT SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION > DSP

DSP chime status Audio DSP module Used to indicate the status of the warning chimes being played through the audio system. Multimedia player total play time status APIM Used to indicate the total play time of the audio track being played.

Module Network Input Messages - RCM

Broadcast Message	Originating Module	Message Purpose
eCall confirmation	APIM	Used to confirm the configuration of the 911 Assist™ feature, and to confirm the status of the 911 Assist™ phone call.

Accessory Delay Feature

The accessory delay feature is a BCM-controlled software function that allows the audio system to be operated for a preset period of time after the ignition is turned off and a front door has not been opened.

AM/ FM Radio

The AM/ FM on-glass antenna grid (coupe) or fender-mounted antenna (convertible) receives analog radio waves and sends them through the AM/ FM antenna amplifier (coupe) and AM/ FM antenna coaxial cable to the ACM. The radio waves are converted into fluctuating AC voltage and sent as left and right analog audio signals to the audio DSP module. For vehicles without Shaker, the audio DSP module processes the audio signals and sends them to the speakers as fluctuating AC voltage. For vehicles with Shaker, the audio DSP module processes the audio signals and sends them to the speakers and subwoofer amplifier as fluctuating AC voltage. The subwoofer amplifier processes the audio signals and sends them to the subwoofer speaker as fluctuating AC voltage.

ANC - 2.3L

ANC is an audio system feature that eliminates a certain range of low frequency engine noise within the passenger compartment typically induced under wide open throttle or heavy part-throttle conditions. The system uses two (coupe) or three (convertible) microphones, a DACMC (contained within the ACM), and the audio system speakers. The DACMC determines the noise frequency to be canceled based upon engine rotation speed data, engine torque data, and accelerator pedal position data from the PCM, as well as microphone input signals.

While the engine is running, the ANC microphones located in the overhead console and center rear of the headliner (coupe), or overhead console, RHR quarter panel, and LHR quarter panel (convertible) monitor the engine noise resonating in the passenger compartment. The microphones transmit this noise as analog signals to the DACMC (contained within the ACM), where they are converted into digital signals by the integrated analog/digital converter. The digital signals are processed and an inverted phase sound wave with the same amplitude as the original sound is created. This new sound is converted into an analog audio signal, transmitted to the DACMC internal tone generator, and output by the ACM to the audio DSP module as fluctuating AC voltage. The audio DSP module sends the signal to the LHF and RHF door woofer speakers, and right and left parcel shelf full-range (without Shaker) or coaxial (with Shaker) speakers (coupe) or RHR and LHR quarter panel full-range (without Shaker) or coaxial (with Shaker) speakers (convertible) as fluctuating AC voltage.

APIM Programming

The APIM requires specific programming procedures for correct operation. APIM programming is required when:

- The APIM is replaced.
- Directed by a TSB or FSA. Updates to resolve SYNC ® performance concerns should only be performed when directed by a TSB or FSA.
- Feature upgrades are requested. Occasional feature upgrades and/or new Applications can be programmed when they become available. This type of programming is available upon customer request and expense.

There are 3 types of APIM programming available:

- Module Replacement - Used when the APIM has been replaced. This type of programming performs the required provisioning (restores software for newly installed hardware).
- Standard - Used to update the APIM and any currently installed Applications to the latest software level.
- Custom - Used to show all the available software options (including Applications that may not have been installed previously) that can be programmed into the APIM. Use this selection when upgrades become available or as directed by a TSB or FSA.

There are 3 types of software installation methods:

- Full Flash [Force CIP] - A CIP program is the entire software package for the APIM. Performing a Full Flash erases the existing APIM software and installs the complete program. A Full Flash should only be performed if a Service Pack is not available. If a Full Flash is performed, all Applications must be re-installed. Performing a Full Flash by selecting Force CIP requires additional programming time and is not necessary unless directed by a TSB or FSA.
- Service Pack - A Service Pack update only provides the necessary software to update the existing APIM program to a new level. For example, a Service Pack changes the software program from an 'AA' to an 'AB' version level. It does not delete or overwrite the existing APIM software. A Service Pack is a much smaller program than a Full Flash and requires less time to download and less time to program. A Service Pack software installation should always be performed instead of a Full Flash if possible.
- Applications - Applications are special software programs that may be installed in the APIM. Applications necessary for each vehicle are determined by the vehicle build information stored in the Ford online database. Selecting individual Applications for installation may not be necessary every time the APIM is programmed.

> *NOTE: VIP programming is not selectable because the VIP is configured automatically during programming.*

There are some general programming guidelines that are applicable to multiple types of programming:

- Full Flash/Force CIP
    - The media hub must be removed for programming.

    - A diagnostic scan tool and SYNC ® Re-Flash Kit (or equivalent), are required in order to complete the flash procedure.
    - All previously paired phones are deleted from the SYNC ® system.
    - The file needs to be downloaded from the Ford online database. Allow for extra time in order to complete the download. The compressed files are between 200 and 400 megabytes (MB), and once downloaded, are extracted to the full size of approximately 2 gigabytes (GB).
    - Once diagnostic scan tool programming is complete, Applications need to be installed with the USB flash drive. This is accomplished by reinstalling the media hub and connecting the USB flash drive to the media hub.
- Service Pack and Applications
    - A USB flash drive with a minimum 1 gigabyte (GB) storage capacity is required.
    - The file is downloaded from the Ford online database onto the flash drive. The files are then transferred via the flash drive to the APIM through the vehicle USB port.

To perform APIM replacement programming, Refer to: SYNC Module [APIM] Replacement Programming .

To perform standard programming, Refer to: SYNC Module [APIM] Standard Programming .

To perform custom programming, Refer to: SYNC Module [APIM] Custom Programming .

Audio Extended Play

This feature allows the audio system to operate with the ignition OFF, regardless of door latch position. When the power button on the FCIM is pressed, audio system functionality is enabled and remains active for a period of 20-60 minutes, depending on configuration settings. Audio extended play will not function if the battery load shed is active. To turn the audio system off, press the FCIM power button.

Audio Input Jack Mode

When a portable audio device, such as an iPod ® with its available cable, is connected to the vehicle audio system through the audio input jack in the media hub, audio from the device can be played through the vehicle speakers. Only the volume can be controlled with the vehicle audio controls. All other functions such as seek, fast forward, pause, etc. must be carried out on the device itself.

No metadata (information such as artist, album title, song title, and genre) is transmitted when a device is connected to the audio input jack.

Battery Load Shed

The BCM uses the battery current sensor to monitor the battery state of charge. The battery current sensor is attached to the battery ground cable. With the ignition in RUN, ACC, or OFF, a load shed message is sent over the CAN when the BCM determines that the battery state of charge is below 40%, 45 minutes have elapsed, or 10% of the charge has been drained. This message turns off the audio system to save the remaining battery charge. Under this condition, "Battery Saver - System Off" is displayed on the FDIM to notify the driver that battery protection actions are active. To clear the load shed state, start the vehicle.

Bluetooth Mode

Bluetooth is a secure, short-range radio frequency that allows devices to communicate wirelessly through radio waves. The operating range of a Bluetooth signal is application specific, but will have a

minimum range of 10 meters (33 feet).

The APIM Bluetooth chipset supports multiple Bluetooth profiles, allowing the SYNC ® system to interact with both Bluetooth-enabled phones and Bluetooth-enabled media devices.

Any Bluetooth-enabled device used with the SYNC ® system must first be paired with the APIM Bluetooth chipset before it can become operational. Pairing a Bluetooth-enabled device is accomplished through the "Add Device" selection of the phone menu. When pairing a device, the SYNC ® system generates a unique PIN that must be confirmed on the Bluetooth-enabled device in order for the pairing process to be successful. There are also some device-specific actions that must take place. For information on the pairing process, refer to the Owner's Literature.

Multiple Bluetooth-enabled phones and Bluetooth-enabled media devices can be paired to the APIM at the same time. The APIM supports an active connection with one Bluetooth-enabled phone and one Bluetooth-enabled media device at a time. If an additional device of either type is paired and made active, the APIM ends any active connection with an already-paired device, and establishes an active connection with the new device.

It is important to understand that while most Bluetooth-enabled devices can pair with the SYNC ® system, not all Bluetooth-enabled devices have the same level of available features when interacting with the SYNC ® system. To determine if a Bluetooth-enabled device or feature is supported, review the device compatibility list. Refer to owner.ford.com/how-tos/sync-technology/all/phone-setup/how-your-device-works-with-sync.html?version=navigation.

For more information, refer to "Bluetooth" in the Owner's Literature.

Chimes

Various vehicle systems send chime requests over the CAN to the IPC. The following are determined as the IPC processes these requests:

- Chime characteristics such as tone, tone length, number of repetitions, and time between tones
- Chime output volume
- Priority of the chime request
- Which speakers (all, front, or rear) will play the specific chime

The IPC sends the processed requests over the CAN to the ACM. The ACM outputs the left and right analog chime tones to the audio DSP module over dedicated chimes circuits as fluctuating AC voltage. The audio DSP module outputs the chime tones to the appropriate audio system speakers as fluctuating AC voltage.

For more information, Refer to: Warning Chimes - Overview . For even more information, Refer to: Warning Chimes - System Operation and Component Description .

Compass

The GPS antenna integral to the GPSM is used to acquire the compass heading. The compass heading is sent through the CAN to the APIM. The APIM uses this data in addition to wheel speed and wheel rotation direction CAN messages from the ABS module to calculate and provide accurate vehicle tracking. The APIM processes the data and transmits it to be displayed on the FDIM. In the event that the GPS fix or signal is temporarily lost, the APIM will continue to use the CAN messages from the ABS module to provide accurate vehicle tracking.

DSP

The Shaker audio system (if equipped) provides theater quality sound in the vehicle. Audio signals are sent from the ACM and APIM to the audio DSP module. The audio DSP module processes the audio signals and sends them to the speakers.

The audio DSP module determines the correct audio environment based on the audio signals and network messages it receives from other audio system modules. These messages include information such as fade/balance and speed compensated volume settings.

DESCRIPTION AND OPERATION > INFORMATION AND ENTERTAINMENT SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION > ESE - 2.3L AND 5.2L

ESE is an audio system feature that enhances certain engine tones typically induced under wide open throttle or heavy part-throttle conditions. The system uses a DACMC (contained within the ACM) and the audio system speakers.

The DACMC determines the engine tone to enhance based upon engine rotation speed data, engine torque data, and accelerator pedal position data from the PCM. The data from the PCM is processed and converted into an analog audio signal, transmitted to the DACMC internal tone generator, and output by the ACM to the audio DSP module as fluctuating AC voltage. The audio DSP module sends the signal to the LHF and RHF door woofer, speakers as fluctuating AC voltage.

DESCRIPTION AND OPERATION > INFORMATION AND ENTERTAINMENT SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION > HD RADIO ® - WITH SHAKER

HD Radio ® is a subscription-free service.

HD Radio ® technology allows an AM or FM radio station to duplicate their traditional analog channel with a matching digital channel. Some FM radio stations subdivide the digital output signal into multiple channels that are not duplicates of the analog channel. These extra multicast channels vary in availability and are called HD2, HD3 and HD4 channels.

The AM/ FM on-glass antenna grid (coupe) or fender-mounted antenna (convertible) receives radio waves containing metadata (information such as station call letters, artist, album title, song title, and genre) and digital HD Radio ® audio. The radio waves are sent through the AM/ FM antenna amplifier (coupe) and AM/ FM antenna coaxial cable to the HD Radio ® receiver built into the ACM. The metadata is separated from the audio. The metadata is sent to be displayed on the FDIM, and the audio is converted into fluctuating AC voltage and sent as left and right analog audio signals to the audio DSP module. For vehicles without Shaker, the audio DSP module processes the audio signals and sends them to the speakers as fluctuating AC voltage. For vehicles with Shaker, the audio DSP module processes the audio signals and sends them to the speakers and subwoofer amplifier as fluctuating AC voltage. The subwoofer amplifier processes the audio signals and sends them to the subwoofer speaker as fluctuating AC voltage.

For more information, refer to "HD Radio" in the Owner's Literature.

DESCRIPTION AND OPERATION > INFORMATION AND ENTERTAINMENT SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION > MYKEY ® AUDIO OPERATION

- The following MyKey ® features are always enabled when a MyKey ® is in use, and are not configurable on/off with an administrator key:
    - Belt-Minder ®: The audio system is muted, and "MyKey Buckle Up to Unmute Audio" is displayed in the information display until the safety belts are buckled..
    - Satellite Radio (if equipped): Adult content channels are blocked by being muted.
- The following MyKey ® features are configurable with an administrator key:
    - 911 Assist™: If the administrator has selected "Always On" in the MyKey ® menu, 911 Assist™ is enabled and cannot be disabled.
    - Do Not Disturb: If the administrator has selected "Always On" in the MyKey ® menu, the Do Not Disturb feature is enabled and cannot be disabled.
    - Speed Compensated Volume: If the administrator has enabled the Volume Limiter feature, the speed compensated volume feature will be disabled.
    - Speed Limiter: If the administrator has enabled the Speed Limiter feature, the audio volume level is temporarily reduced so the top speed alert chime can be heard when the preselected top vehicle speed is reached.
    - Speed Minder: If the administrator has enabled the Speed Minder feature, the audio volume level is temporarily reduced so the speed alert chime can be heard when the preselected Speed Minder vehicle speed is exceeded.
    - Volume Limiter: If the administrator has enabled the Volume Limiter feature, the audio system volume is limited to 45%. In an attempt to exceed the limited volume, "MyKey ® VOLUME LIMITED" is displayed on the information display.

For more information, refer to "MyKey ®" in the Owner's Literature.

DESCRIPTION AND OPERATION > INFORMATION AND ENTERTAINMENT SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION > NAVIGATION - IF EQUIPPED

The navigation system guides the customer to a pre-entered destination.

The navigation display is shown on the FDIM.

Map data is transmitted from the map data SD card inserted into the media hub to the APIM through the media hub to APIM USB cable. The GPS antenna integral to the GPSM receives GPS data and sends it through the CAN to the APIM. The APIM uses this data in addition to wheel speed and wheel rotation direction CAN messages from the ABS module to calculate route information and provide accurate navigation tracking. The APIM processes the data and transmits it to be displayed on the FDIM. In the event that the GPS fix or signal is temporarily lost, the APIM will continue to use the CAN messages from the ABS module to provide accurate vehicle tracking.

The voice recognition system allows the customer to interface with the system without using the FDIM. A microphone located in the overhead console provides a direct input to the APIM.

For more information, refer to "Navigation" in the Owner's Literature.

DESCRIPTION AND OPERATION > INFORMATION AND ENTERTAINMENT SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION > RDS

RDS allows metadata (information such as station call letters, artist, song title, and genre) to be contained within FM radio waves. If the RDS feature is turned on, a PTY (Program Type) can be chosen. Once the customer has chosen a single PTY such as Sports, Rock, Religious Music, or Weather, the SEEK or SCAN button is pressed, and the ACM only tunes channels within the selected category. If a channel within the selected category is not found, the ACM will continually seek or scan.

DESCRIPTION AND OPERATION > INFORMATION AND ENTERTAINMENT SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION > SATELLITE RADIO - IF EQUIPPED

Satellite radio is a subscription-based service. When a satellite radio subscription is activated, the ESN of the satellite radio receiver built into the ACM is associated with the VIN. The SIRIUS 12-digit ESN can be obtained by tuning to channel 0, accessing "AHU Diagnostics" in Bezel Diagnostics, or by referencing the label attached to the ACM.

The roof-mounted (coupe) or luggage compartment lid-mounted (convertible) satellite radio antenna receives signals containing metadata (information such as station name, artist, album title, song title, and genre) and digital satellite radio audio. These signals are sent through the satellite radio antenna coaxial cable to the satellite radio receiver built into the ACM. The metadata is separated from the audio. The metadata is sent to be displayed on the FDIM, and the audio is converted into fluctuating AC voltage and sent as left and right analog audio signals to the audio DSP module. For vehicles without Shaker, the audio DSP module processes the audio signals and sends them to the speakers as fluctuating AC voltage. For vehicles with Shaker, the audio DSP module processes the audio signals and sends them to the speakers and subwoofer amplifier as fluctuating AC voltage. The subwoofer amplifier processes the audio signals and sends them to the subwoofer speaker as fluctuating AC voltage.

DESCRIPTION AND OPERATION > INFORMATION AND ENTERTAINMENT SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION > SD CARD MODE

When a non-navigation SD card is connected to the vehicle audio system through the SD card slot, audio from the card can be played through the vehicle speakers. Functions such as volume, seek, fast forward, pause, etc. can be controlled with the vehicle audio controls.

Image files can be saved to the APIM from a non-navigation SD card in order to be used as wallpaper backgrounds displayed on the FDIM. For more information, refer to "Edit Wallpaper" in the Owner's Literature.

DESCRIPTION AND OPERATION > INFORMATION AND ENTERTAINMENT SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION > SIRIUS DATA SERVICES - IF EQUIPPED

SIRIUS Data Services is a subscription-based service, and requires a separate subscription from the satellite radio. A map data SD card is also required.

When a SIRIUS Data Services subscription is activated, the ESN of the satellite radio receiver built into the ACM is associated with the VIN.

The satellite radio antenna receives digital signals containing data. These signals are sent through the satellite radio antenna coaxial cable to the satellite radio receiver built into the ACM. The ACM sends the data to the APIM through the SDL circuits, and then to the FDIM touchscreen to be displayed.

SIRIUS Data Services allows the customer to receive information for:

- Fuel Prices (stations, fuel type)
- Movie Listings (theaters, movie titles, ratings, start and run times)
- Ski Conditions (resorts, lodging, conditions)
- Sports (in-game and final scores, weekly schedules, headlines)
- Traffic (traffic flow, accidents, construction, road closings)
- Weather (current weather, forecasts, radar images)

DESCRIPTION AND OPERATION > INFORMATION AND ENTERTAINMENT SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION > SPEED COMPENSATED VOLUME

">Speed Compensated Volume: If the administrator has enabled the Volume Limiter feature, the speed compensated volume feature will be disabled.

- Speed Limiter: If the administrator has enabled the Speed Limiter feature, the audio volume level is temporarily reduced so the top speed alert chime can be heard when the preselected top vehicle speed is reached.
- Speed Minder: If the administrator has enabled the Speed Minder feature, the audio volume level is temporarily reduced so the speed alert chime can be heard when the preselected Speed Minder vehicle speed is exceeded.
- Volume Limiter: If the administrator has enabled the Volume Limiter feature, the audio system volume is limited to 45%. In an attempt to exceed the limited volume, "MyKey ® VOLUME LIMITED" is displayed on the information display.

For more information, refer to "MyKey ®" in the Owner's Literature.

Navigation - If Equipped

The navigation system guides the customer to a pre-entered destination.

The navigation display is shown on the FDIM.

Map data is transmitted from the map data SD card inserted into the media hub to the APIM through the media hub to APIM USB cable. The GPS antenna integral to the GPSM receives GPS data and sends it through the CAN to the APIM. The APIM uses this data in addition to wheel speed and wheel rotation direction CAN messages from the ABS module to calculate route information and provide accurate navigation tracking. The APIM processes the data and transmits it to be displayed on the FDIM. In the event that the GPS fix or signal is temporarily lost, the APIM will continue to use the CAN messages from the ABS module to provide accurate vehicle tracking.

The voice recognition system allows the customer to interface with the system without using the FDIM. A microphone located in the overhead console provides a direct input to the APIM.

For more information, refer to "Navigation" in the Owner's Literature.

RDS

RDS allows metadata (information such as station call letters, artist, song title, and genre) to be contained within FM radio waves. If the RDS feature is turned on, a PTY (Program Type) can be chosen. Once the customer has chosen a single PTY such as Sports, Rock, Religious Music, or Weather, the SEEK or SCAN button is pressed, and the ACM only tunes channels within the selected category. If a channel within the selected category is not found, the ACM will continually seek or scan.

Satellite Radio - If Equipped

Satellite radio is a subscription-based service. When a satellite radio subscription is activated, the ESN of the satellite radio receiver built into the ACM is associated with the VIN. The SIRIUS 12-digit ESN can be obtained by tuning to channel 0, accessing "AHU Diagnostics" in Bezel Diagnostics, or by referencing the label attached to the ACM.

The roof-mounted (coupe) or luggage compartment lid-mounted (convertible) satellite radio antenna receives signals containing metadata (information such as station name, artist, album title, song title, and genre) and digital satellite radio audio. These signals are sent through the satellite radio antenna coaxial cable to the satellite radio receiver built into the ACM. The metadata is separated from the audio. The metadata is sent to be displayed on the FDIM, and the audio is converted into fluctuating AC voltage and sent as left and right analog audio signals to the audio DSP module. For vehicles without Shaker, the audio DSP module processes the audio signals and sends them to the speakers as fluctuating AC voltage. For vehicles with Shaker, the audio DSP module processes the audio signals and sends them to the speakers and subwoofer amplifier as fluctuating AC voltage. The subwoofer amplifier processes the audio signals and sends them to the subwoofer speaker as fluctuating AC voltage.

SD Card Mode

When a non-navigation SD card is connected to the vehicle audio system through the SD card slot, audio from the card can be played through the vehicle speakers. Functions such as volume, seek, fast forward, pause, etc. can be controlled with the vehicle audio controls.

Image files can be saved to the APIM from a non-navigation SD card in order to be used as wallpaper backgrounds displayed on the FDIM. For more information, refer to "Edit Wallpaper" in the Owner's Literature.

SIRIUS Data Services - If Equipped

SIRIUS Data Services is a subscription-based service, and requires a separate subscription from the satellite radio. A map data SD card is also required.

When a SIRIUS Data Services subscription is activated, the ESN of the satellite radio receiver built into the ACM is associated with the VIN.

The satellite radio antenna receives digital signals containing data. These signals are sent through the satellite radio antenna coaxial cable to the satellite radio receiver built into the ACM. The ACM sends the data to the APIM through the SDL circuits, and then to the FDIM touchscreen to be displayed.

SIRIUS Data Services allows the customer to receive information for:

- Fuel Prices (stations, fuel type)
- Movie Listings (theaters, movie titles, ratings, start and run times)
- Ski Conditions (resorts, lodging, conditions)
- Sports (in-game and final scores, weekly schedules, headlines)
- Traffic (traffic flow, accidents, construction, road closings)
- Weather (current weather, forecasts, radar images)

Speed Compensated Volume

The audio DSP module compensates for wind and road noise by adjusting the audio system volume based on the VSS signal and customer-defined setting.

When a MyKey ® is in use and the MyKey ® Volume Limiter is enabled, the speed compensated volume is disabled.

DESCRIPTION AND OPERATION > INFORMATION AND ENTERTAINMENT SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION > STEERING WHEEL SWITCH FUNCTIONS

The RH steering wheel switches consist of an upper 5-way switch, and a lower 4-way switch. The upper 5-way steering wheel switch operates the volume +/-, seek +/-, and the audio mode. The lower 4-way steering wheel switch operates the voice, send/receive call, end call, and mute functions.

DESCRIPTION AND OPERATION > INFORMATION AND ENTERTAINMENT SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION > SYNC ® SERVICES - IF EQUIPPED

SYNC ® Services is a subscription-based service, and requires a non-subscription-based SYNC ® owner account in order to subscribe. The SYNC ® Services subscription is associated with a Bluetooth-enabled mobile phone number, while the SYNC ® owner account is associated with a VIN. For SYNC ® owner account enrollment or SYNC ® Services subscription information, refer to www.syncmyride.com.

SYNC Services ® allows the customer to connect to the following services:

- Traffic (incidents, traffic flow, drive time, delays, and construction and lane closures if applicable)
- Traffic alerts via text message (incidents, new construction, and/or delays for a specified route

during a specified time period)

- Directions (route can be sent to vehicle)
- Business search (business name, address, and phone number results spoken or sent to the registered mobile phone as a text, get driving directions to business, or connect to business via telephone)
- Sports (basketball, baseball, hockey, football, golf, auto racing, tennis, wrestling, soccer, boxing)
- News (top stories, business, technology, entertainment)
- Weather (current weather, forecasts)
- Stock quotes
- Travel (airlines, hotels, rental cars)
- Entertainment (movies, horoscopes)

The customer's registered mobile phone is used to access and download information from the SYNC ® Services server. The information received by the customer's registered mobile phone is sent to the APIM.

The GPS antenna, integral to the GPSM, is used to detect the location and direction of the vehicle.

Favorites allow the customer to get customized information for sports teams, weather forecasts, stocks, news reports, and horoscopes.

Live operator assistance is available for the following services: directions and business search.

For more information, refer to www.syncmyride.com or "SYNC Services" in the Owner's Literature.

DESCRIPTION AND OPERATION > INFORMATION AND ENTERTAINMENT SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION > SYNC ® SYSTEM

The SYNC ® system uses audio input jack, Bluetooth, SD card, USB, FDIM, microphone, and CAN message APIM inputs to control the entertainment system, phone, climate control system, ambient lighting system, and navigation system (if equipped).

The SYNC ® system provides the following abilities:

- Send and receive phone calls via a paired Bluetooth-enabled phone
- Send and receive text messages via a paired Bluetooth-enabled phone
- Connect media devices (such as an iPod ®, USB device, or Bluetooth-enabled audio device) in order to play audio files
- Initiate an emergency assistance call (911 Assist™) when the airbags deploy (for more information, refer to "911 Assist™" in the Owner's Literature)
- Produce Vehicle Health Reports
- Allow a single customer-supplied USB mobile broadband modem (connected to a vehicle USB port)

to provide in-vehicle Internet with the data being shared between up to eight devices. The modem can also be used in a similar fashion to a Wi-Fi or Bluetooth Hotspot (network) to allow for file sharing or playing games between connected devices. For more information, refer to "Wireless & Internet" in the Owner's Literature.

All SYNC ® system features are not available with every phone/device. To determine if the APIM supports a particular phone, tablet, or media player, or feature of one of those devices, review the device compatibility list. Refer to owner.ford.com/how-tos/sync-technology/all/phone-setup/how-your-device-works-with-sync.html?version=navigation.

The customer can update the CIP by using a USB flash drive.

For more information, refer to owner.ford.com.

For more information on the SYNC ® system, refer to "SYNC" in the Owner's Literature.

DESCRIPTION AND OPERATION > INFORMATION AND ENTERTAINMENT SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION > USB MODE

When a portable media device, such as an iPod ® with its available cable or portable mass storage such as a USB flash drive, is connected to the vehicle audio system through the USB ports, audio from the device can be played through the vehicle speakers. Functions such as volume, seek, fast forward, pause, etc. can be controlled with the vehicle's audio controls.

When playing media files stored on a mass storage device such as a USB flash drive, the SYNC ® system only plays supported file types that do not have DRM protection, and are contained on a properly formatted device. For more information, refer to "Supported Media Players, Formats and Metadata Information" in the Owner's Literature.

In addition to audio information (track length, track number, etc.), metadata (information such as artist, album title, song title, and genre) may also be sent to the APIM from a device connected to the USB ports. The APIM uses the metadata to create indexes that can be used to sort for particular music based on the customer's preferences. Not all USB devices can send metadata to the APIM. When a new media device is connected to the SYNC ® system, the APIM automatically indexes the information. This may take several minutes depending on the amount of data on the device, and is considered normal operation. When a device that was previously connected to the SYNC ® system is reconnected, the APIM updates the index rather than creating a new one. This reduces the time needed to index the device.

Image files can be saved to the APIM from a USB device in order to be used as wallpaper backgrounds displayed on the FDIM. For more information, refer to "Edit Wallpaper" in the Owner's Literature.

DESCRIPTION AND OPERATION > INFORMATION AND ENTERTAINMENT SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION > VOICE RECOGNITION

Voice recognition allows certain phone, navigation system (if equipped), audio system, and climate control system functions to be controlled with voice commands to reduce or eliminate the need to interact with the FCIM, FDIM, and/or device while driving.

When the voice steering wheel switch is pressed, an audible prompt originating from the APIM is heard

from the speakers. Based on the customer's setting, audible prompts will either be a voice or a simple tone. When interaction mode is set to standard, detailed voice guidance is provided. When interaction mode is set to advanced, most prompts are tones only, and minimal voice guidance is provided. The microphone receives the voice commands and sends them to the APIM. For more information, refer to "voice recognition" in the Owner's Literature.

DESCRIPTION AND OPERATION > INFORMATION AND ENTERTAINMENT SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION > COMPONENT DESCRIPTION

ACM

The ACM can be operated with the ignition in RUN, ACC, or OFF.

The ACM receives radio waves containing audio from the antenna coaxial cable(s) and converts them into fluctuating AC voltage. The ACM receives stereo and mono audio signals from the APIM in the form of fluctuating AC voltage. The ACM processes all inputs, and depending on the input received, sends stereo or mono analog audio signals to the audio DSP module. For vehicles without Shaker, the audio DSP module processes the audio signals and sends them to the speakers as fluctuating AC voltage. For vehicles with Shaker, the audio DSP module processes the audio signals and sends them to the speakers and subwoofer amplifier as fluctuating AC voltage. The subwoofer amplifier processes the audio signals and sends them to the subwoofer speaker as fluctuating AC voltage.

The ACM receives radio waves containing satellite radio (if equipped) and HD Radio ® (with Shaker) data through the antenna coaxial cables. The data is sent to be displayed on the FDIM.

The ACM contains the CD player.

The ACM sends data to the APIM through the SDL circuits for the SIRIUS Travel Link features.

The ACM contains the DACMC for vehicles with the 2.3L or 5.2L.

The ACM and DACMC require separate PMI procedures when the ACM is replaced.

AM/ FM Antenna Amplifier - Coupe

The AM/ FM antenna amplifier receives AM/ FM radio waves from the on-glass antenna grid. The AM/ FM antenna amplifier is powered by the ACM and amplifies AM audio signals to improve reception. The AM/ FM radio waves are sent through the AM/ FM antenna coaxial cable to the ACM.

ANC Microphones

For a coupe, two ANC microphones (overhead console-mounted and center rear headliner-mounted) measure the amplitude and phase of the engine noise inside the passenger compartment. For a convertible, three ANC microphones (overhead console-mounted, RHR quarter panel, and LHR quarter panel) measure the amplitude and phase of the engine noise inside the passenger compartment. The monitored sounds are converted into analog signals by the microphones and sent to the DACMC (contained within the ACM).

Antenna

The AM/ FM radio uses the on-glass (coupe) AM/ FM antenna grid or fender-mounted (convertible) AM/ FM antenna to receive analog radio waves. The radio waves are sent through the AM/ FM antenna

amplifier (coupe) or amplifier integrated into the antenna base (convertible) and AM/ FM antenna coaxial cable to the ACM. The ACM transmits these radio waves to the audio DSP module where they are further amplified.

To compensate for AM signal strength loss as the radio waves are transmitted from the antenna to the ACM, battery voltage is applied to the antenna to boost the AM radio signal. This allows the AM radio waves entering the ACM to be approximately the same strength as they were before amplification at the antenna.

If equipped, the HD Radio ® uses the on-glass (coupe) AM/ FM antenna grid or RHR fender-mounted (convertible) AM/ FM antenna to receive radio waves containing digital audio and data. The radio waves are sent to the AM/ FM antenna amplifier (coupe) or amplifier integrated into the antenna base (convertible) where the radio waves containing digital audio are amplified to improve reception. The amplified radio waves containing audio and the radio waves containing data are sent through the AM/ FM antenna coaxial cable to the HD Radio ® receiver built into the ACM. The ACM transmits these radio waves to the audio DSP module where the radio waves containing digital audio are further amplified, and the radio waves containing data are sent to be displayed on the FDIM.

If equipped, the satellite radio uses the roof-mounted (coupe) or luggage compartment lid-mounted (convertible) satellite radio antenna to receive signals containing digital audio and data. These signals are sent through the satellite radio antenna coaxial cable to the satellite radio receiver built into the ACM.

APIM

The APIM can be operated with the ignition in RUN, ACC, or OFF.

The APIM receives stereo and mono inputs. Stereo inputs include audio from the USB ports, SD card slot, audio input jack, connected Bluetooth-enabled media device, and outside device during a phone call. The mono input includes signals from the SYNC ® microphone.

The APIM sends stereo and mono audio signals to the ACM as fluctuating AC voltage. Stereo outputs include audio from the USB ports, SD card slot, audio input jack, connected Bluetooth-enabled media device, ringback tone, outside device during a phone call, and voice or tone prompts initiated from the voice steering wheel switch. Mono outputs include audio from the TTS feature, incoming call ringtone, voice or tone prompts initiated from the FDIM, route guidance voice or tone prompts (if equipped with navigation or SYNC ® Services), and SYNC ® system instructions.

The APIM receives data from the ACM through the SDL circuits. This data is processed and sent to be displayed on the FDIM.

The TTS feature allows the customer to hear information through the audio system speakers so it does not have to be read from the FCDIM FDIM and/or device while driving. Examples include incoming text message sender information, text messages, and metadata from audio being played via USB or Bluetooth.

The APIM consists of two internal modules: the CIP and the VIP. The modules are not replaceable individually, but can be programmed independently if required.

The CIP interfaces with all of the customer inputs to the APIM. It contains an analog-to-digital-to-analog converter, as well as the Bluetooth/Wi-Fi chipset.

The VIP provides an interface between the CIP and the vehicle inputs. Its main functions are controlling the APIM power management and translating inbound and outbound CAN signals. In addition, the VIP queries the modules on the network to retrieve any DTCs when a VHR is requested.

The APIM provides the FDIM with power and ground through the 65 pin connector.

The Touchscreen Calibration must be performed every time the APIM is separated from the FDIM.

The APIM requires programming when it is replaced.

Audio DSP Module

The audio DSP module can be operated with the ignition in RUN, ACC, or OFF.

The audio DSP module enhances the input audio signal sound quality from the ACM.

The ACM outputs voltage through the enable circuit to enable the audio DSP module amplifier. When the ACM removes voltage from this circuit, the audio will be muted. When the ACM applies the correct amount of voltage to this circuit, the audio will be unmuted. In the event of an amplifier overload, the audio DSP module reduces audio levels on the left and right audio output channels to prevent clipping and speaker damage.

The audio DSP module receives stereo and mono audio signals from the ACM in the form of fluctuating AC voltage. The audio DSP module processes and amplifies these inputs and depending on the input received, sends stereo or mono analog audio signals to the speakers and subwoofer amplifier as fluctuating AC voltage.

When the engine is running, the audio DSP module receives the engine noise cancellation frequency signal (2.3L) and ESE frequency signal (2.3L and 5.2L) from the ACM in the form of fluctuating AC voltage. The audio DSP module sends the engine noise cancellation frequency signal to the LHF and RHF door woofer speakers, and left and right parcel shelf full-range (without Shaker) or coaxial (with Shaker) speakers (coupe) or LHR and RHR quarter panel full-range (without Shaker) or coaxial (with Shaker) speakers (convertible) as fluctuating AC voltage. The ESE signal is sent to the LHF and RHF door woofer speakers as fluctuating AC voltage.

When the engine is running and the audio system is in use, the audio DSP module output to the LHF and RHF door woofer speakers contains a mixture of the engine noise cancellation and ESE frequency with the audio signals from the ACM. The output to the right and left parcel shelf full-range (without Shaker) or coaxial (with Shaker) speakers (coupe) or RHR and LHR quarter panel full-range (without Shaker) or coaxial (with Shaker) speakers (convertible) contains a mixture of the engine noise cancellation frequency with the audio signals from the APIM and ACM.

The audio DSP module requires PMI when it is replaced.

DACMC - 2.3L Or 5.2L

The DACMC ANC and ESE functions only operate while the engine is running, and the luggage compartment lid and all doors are closed.

The DACMC is a digital signal processor that consists of an internal analog/digital converter and tone generator.

For ANC, the DACMC uses engine rotation speed data, engine torque data, accelerator pedal position data, and ANC microphone input signals to calculate the targeted frequency needed to cancel engine noise within the passenger compartment. For ESE, the DACMC uses engine rotation speed data, engine torque data, and accelerator pedal position data from the PCM to calculate the targeted frequency needed to enhance engine noise within the passenger compartment. The DACMC engine noise cancellation signals are output by the ACM to the audio DSP module as fluctuating AC voltage. The audio DSP module sends the signal to the LHF and RHF door woofer speakers, and right and left parcel shelf full-range (without Shaker) or coaxial (with Shaker) speakers (coupe) or RHR and LHR quarter

panel full-range (without Shaker) or coaxial (with Shaker) speakers (convertible) as fluctuating AC voltage. The DACMC ESE frequency signals are output by the ACM to the audio DSP module as fluctuating AC voltage. The audio DSP module sends the signal to the LHF and RHF door woofer speakers as fluctuating AC voltage.

The DACMC is contained within the ACM.

The DACMC and ACM require separate PMI procedures when the ACM is replaced.

FCIM

The FCIM audio functions can be operated with the ignition in RUN, ACC, or OFF.

The FCIM audio system buttons provide one of the methods through which the customer interacts with the infotainment system.

The FCIM is separate from the ACM.

The FCIM requires PMI when it is replaced.

FDIM

The FDIM can be operated with the ignition in RUN, ACC, or OFF.

The resistive touch FDIM provides one of the methods through which the customer interacts with the infotainment system. For more information, refer to "Using the Touchscreen" in the Owner's Literature.

The FDIM is attached to the APIM.

As the FDIM does not communicate on the CAN, the APIM acts as the proxy for all FDIM inputs and outputs requiring CAN communication. Communication between the FDIM (including FDIM customer inputs) and APIM is accomplished via the 65 pin connector. The FDIM power and ground are provided by the APIM through this connector as well.

The Touchscreen Calibration must be performed every time the FDIM is separated from the APIM.

GPSM

For vehicles equipped with SYNC Services ® or SIRIUS Data Services, the GPSM provides vehicle location information for real-time traffic reports and for traffic avoidance re-routing.

The GPS antenna integral to the GPSM is used to acquire the compass heading. The compass heading is sent over the CAN to be displayed on the FDIM.

The GPSM provides vehicle location information for identifying the vehicle location in the event of a collision.

For vehicles with navigation, the GPSM acts as the antenna for the navigation system.

The GPSM requires PMI when it is replaced.

Media Hub

The media hub allows for various audio devices to play content through the vehicle speakers. The media hub is powered by circuits carrying battery voltage from the APIM. The media hub contains:

- 1 USB port

    - Data received from the remote USB port/cable or from the media hub USB port is sent to the APIM through the media hub to APIM USB cable.
    - The USB port can be used to power and/or charge a device if the device supports this feature and does not have a power consumption requirement of more than approximately 5V and.5 (about 2.5 watts).
- 1 SD card slot
    - SD card data is sent to the APIM through the USB cable.
- 1 audio input jack
    - The audio input jack can be used to play audio files from an audio device connected through the 1/8-inch (3.5 mm) audio jack. Audio signals are sent from the audio input jack to the APIM through the audio circuits.

Noise Suppression Equipment

The radio frequency suppression equipment reduces interference transmitted through the speakers by the engine, ignition, and electrical systems. When installing any new radio suppression equipment components, make sure that a good contact is made at all connections.

Remote USB Port/Cable

The remote USB port/cable sends data to the media hub.

The USB port is part of the USB cable, and cannot be replaced separately.

The remote USB port/cable is powered by the media hub (which receives power through circuits from the APIM), and can be used to power and/or charge a device if the device supports this feature and does not have a power consumption requirement of more than approximately 5V and.5A (about 2.5 watts).

Steering Wheel Switches

The RH upper and lower steering wheel switches contain series of resistors. Each steering wheel switch function corresponds with a specific resistance value within the switch.

The SCCM sends a 5-volt reference voltage to the RH upper and lower steering wheel switches on the input circuit. When a switch is pressed, the voltage is routed through the corresponding resistor(s), through the return circuit, and then to ground through the SCCM. The SCCM monitors the resultant voltage drop to determine which switch was pressed. The voltage drop varies depending upon the resistance of the specific switch pressed.

The RH upper steering wheel switch inputs are sent as network messages from the SCCM to the ACM to control audio functions.

The RH lower steering wheel switch inputs are sent as network messages from the SCCM to the APIM to control SYNC ® functions, or to the ACM to control audio functions.

Subwoofer Amplifier - With Shaker

The subwoofer amplifier can be operated with the ignition in RUN, ACC, or OFF.

The subwoofer amplifier, speaker, and enclosure are serviced as an assembly.

The audio DSP module outputs voltage through the enable circuit to enable the subwoofer amplifier. The

audio DSP module also uses this circuit to detect an amplifier overload condition. In the event of an amplifier overload, the subwoofer amplifier modifies the voltage signal from the audio DSP module to increase the voltage on the enable circuit to a higher level than provided by the audio DSP module. This higher voltage level causes the audio DSP module to momentarily reduce the audio levels on the audio output channels to the subwoofer amplifier to prevent clipping and subwoofer speaker damage.

The subwoofer amplifier receives audio signals from the audio DSP module in the form of fluctuating AC voltage. The subwoofer amplifier processes and amplifies these inputs and sends analog audio signals to the subwoofer speaker as fluctuating AC voltage.

SYNC ® Microphone

The SYNC ® microphone is powered by the APIM.

The SYNC ® microphone receives SYNC ® system voice commands and outgoing audio during a phone call. The monitored sounds are converted into analog signals by the microphone and sent to the APIM as fluctuating AC voltage.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM

For a SYNC ®-related concern, refer to the SYNC ® System Symptom Chart before connecting the scan tool and beginning DTC-based diagnostics.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > DTC CHART: ACM

DTC	Description	Action
B1142:27	Ignition Status 1: Signal Rate of Change Above Threshold	GO to Pinpoint Test I
B1A56:21	Antenna: Signal Amplitude < Minimum	If DTC B1A56:21 sets after running the bezel diagnostic tests, DISREGARD this DTC. This test is used for end of line or repair bay testing at the Ford plant. Each plant has its own assigned frequency and signal strength requirements. The running and passing of this test depends on local radio stations. If no local station is broadcasting on the required frequency, the test will fail.
B1A89:11	Satellite Antenna: Circuit Short To Ground	For a satellite radio concern, GO to Pinpoint Test C For a SIRIUS Data Services concern, GO to Pinpoint Test D

B1A89:13	Satellite Antenna: Circuit Open	For a satellite radio concern, GO to Pinpoint Test C For a SIRIUS Data Services concern, GO to Pinpoint Test D
B1D19:49	Compact Disc Unit: Internal Electronic Failure	CLEAR the DTC. WAIT at least 10 seconds. REPEAT the self-test. If DTC B1D19:49 is retrieved again, INSTALL a new ACM. REFER to: Audio Front Control Module (ACM) .
B1D19:4B	Compact Disc Unit: Over Temperature	The ACM was over temperature. This may occur during extended use. Audio operation can resume after the ACM cools. CLEAR the DTC. This is normal operation.
U0100:00	Lost Communication With ECM/ PCM "A": No Sub Type Information	GO to Pinpoint Test AO
U0140:00	Lost Communication With Body Control Module: No Sub Type Information	GO to Pinpoint Test AP
U0142:00	Lost Communication With Body Control Module "B": No Sub Type Information	GO to Pinpoint Test AQ
U0155:00	Lost Communication With Instrument Panel Cluster (IPC) Control Module: No Sub Type Information	GO to Pinpoint Test AS
U0237:00	Lost Communication With Digital Audio Control Module "C": No Sub Type Information	GO to Pinpoint Test AW
U0238:00	Lost Communication With Digital Audio Control Module "D": No Sub Type Information	GO to Pinpoint Test AX
U0253:00	Lost Communication With Accessory Protocol Interface Module: No Sub Type Information	GO to Pinpoint Test AY
U0256:00	Lost Communication With Front Controls Interface Module "A": No Sub Type Information	GO to Pinpoint Test AZ

U0257:00	Lost Communication With Front Controls / Display Interface Module: No Sub Type Information	*NOTE: Despite the description, this DTC applies to the FDIM, not the FCDIM.* GO to Pinpoint Test BA
U201A:51	Control Module Main Calibration Data: Not Programmed	This DTC sets due to an incorrect or incomplete ACM configuration. Using a diagnostic scan tool, PERFORM the ACM programming procedure using as-built data. For information on as-built data, REFER to: Module Configuration - System Operation and Component Description . See As-Built Data.
U2100:00	Initial Configuration Not Complete: No Sub Type Information	This DTC sets due to an incorrect or incomplete ACM configuration. Using a diagnostic scan tool, PERFORM the ACM programming procedure using as-built data. For information on as-built data, REFER to: Module Configuration - System Operation and Component Description . See As-Built Data.
U2101:00	Control Module Configuration Incompatible: No Sub Type Information	This DTC sets due to an incorrect or incomplete ACM configuration. Using a diagnostic scan tool, PERFORM the ACM programming procedure using as-built data. For information on as-built data, REFER to: Module Configuration - System Operation and Component Description . See As-Built Data.
U3000:41	Control Module: General Checksum Failure	CLEAR the DTC. WAIT at least 10 seconds. REPEAT the ACM self-test. If DTC U3000:41 is retrieved again, INSTALL a new ACM. REFER to: Audio Front Control Module (ACM) .
U3000:42	Control Module: General Memory Failure	CLEAR all Continuous Memory Diagnostic Trouble Codes (CMDTCs). WAIT at least 10 seconds. RETRIEVE all Continuous Memory Diagnostic Trouble Codes (CMDTCs). If DTC U3000:42 is retrieved again, INSTALL a new ACM. REFER to:

		Audio Front Control Module (ACM) .
U3000:96	Control Module: Component Internal Failure	CLEAR the DTC. WAIT at least 10 seconds. REPEAT the ACM self-test. If DTC U3000:96 is retrieved again, INSTALL a new ACM. REFER to: Audio Front Control Module (ACM) .
U3003:16	Battery Voltage: Circuit Voltage Below Threshold	GO to Pinpoint Test BB
U3003:17	Battery Voltage: Circuit Voltage Above Threshold	GO to Pinpoint Test BC

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > DTC CHART: APIM

DTC	Description	Action
B108E:01	Display: General Electrical Failure	GO to Pinpoint Test AH
B116A:01	Handset Microphone: General Electrical Failure	GO to Pinpoint Test Y
B117A:01	Backup Microphone: General Electrical Failure	GO to Pinpoint Test Y
B1215:00	External Memory Card: No Sub Type Information	GO to Pinpoint Test AI
B1252:11	USB Port: Circuit Short To Ground	For an inoperative USB port, GO to Pinpoint Test AA For an inoperative SD card slot, GO to Pinpoint Test AB
B1252:13	USB Port: Circuit Open	For an inoperative USB port, GO to Pinpoint Test AA For an inoperative SD card slot, GO to Pinpoint Test AB
B12B8:11	USB Port #2: Circuit Short To Ground	*NOTE: This DTC refers to USB port #2 on the APIM itself, which is not used.* INSPECT the APIM USB port #2 for damage and REMOVE any debris.CLEAR the Diagnostic Trouble Codes (DTCs).WAIT at least 10 seconds.REPEAT the self-test.If DTC

		B12B8:11 is retrieved again, PERFORM the APIM Hardware Test. Refer to APIM HARDWARE TESTING .
C1001:01	Vision System Camera: General Electrical Failure	REFER to: Parking Aid . See The Rear Video Is Inoperative.
U0140:00	Lost Communication With Body Control Module: No Sub Type Information	GO to Pinpoint Test AP
U0151:00	Lost Communication With Restraints Control Module: No Sub Type Information	GO to Pinpoint Test AR
U0155:00	Lost Communication With Instrument Panel Cluster (IPC) Control Module: No Sub Type Information	GO to Pinpoint Test AS
U0159:00	Lost Communication With Parking Assist Control Module "A": No Sub Type Information	GO to Pinpoint Test AT
U0162:00	Lost Communication With Navigation Display Module: No Sub Type Information	GO to Pinpoint Test AH
U016A:00	Lost Communication With Global Positioning System Module: No Sub Type Information	GO to Pinpoint Test AU
U0184:00	Lost Communication With Radio: No Sub Type Information	GO to Pinpoint Test AV
U0238:00	Lost Communication With Digital Audio Control Module "D": No Sub Type Information	GO to Pinpoint Test AX
U0256:00	Lost Communication With Front Controls Interface Module "A": No Sub Type Information	GO to Pinpoint Test AZ
U0423:00	Invalid Data Received From Instrument Panel Cluster Control Module: No Sub Type Information	RETRIEVE and FOLLOW Diagnostic Trouble Codes (DTCs) present in the IPC. REFER to: Instrumentation, Message Center and Warning Chimes .* If no Diagnostic Trouble Codes (DTCs) are present in the IPC, DIAGNOSE the observable symptom.
U0452:00	Invalid Data Received From Restraints Control Module: No Sub Type Information	RETRIEVE and FOLLOW Diagnostic Trouble Codes (DTCs) present in the RCM. REFER to: Airbag Supplemental Restraint System (SRS) .* If no Diagnostic Trouble Codes (DTCs) are

		present in the RCM, DIAGNOSE the observable symptom.
U1A00:87	Private Communication Network: Missing Message	GO to Pinpoint Test D
U2017:45	Control Module Software #2: Program Memory Failure	CLEAR all Continuous Memory Diagnostic Trouble Codes (CMDTCs). WAIT at least 10 seconds. RETRIEVE all Continuous Memory Diagnostic Trouble Codes (CMDTCs). If DTC U2017:45 is retrieved again, PERFORM the APIM Hardware Test. Refer to APIM HARDWARE TESTING .
U2017:51	Control Module Software #2: Not Programmed	This DTC sets due to an incorrect or incomplete APIM programming/provisioning. Using a diagnostic scan tool, PERFORM the APIM programming procedure. REFER to: SYNC Module [APIM] Standard Programming .
U2017:52	Control Module Software #2: Not Activated	This DTC sets due to an incorrect or incomplete APIM programming/provisioning. Using a diagnostic scan tool, PERFORM the APIM programming procedure. REFER to: SYNC Module [APIM] Standard Programming .
U2017:54	Control Module Software #2: Missing Calibration	This DTC sets due to an incorrect or incomplete APIM programming/provisioning. Using a diagnostic scan tool, PERFORM the APIM programming procedure. REFER to: SYNC Module [APIM] Standard Programming .
U2100:00	Initial Configuration Not Complete: No Sub Type Information	This DTC sets due to an incorrect or incomplete APIM programming/provisioning. Using a diagnostic scan tool, PERFORM the APIM programming procedure. REFER to: SYNC Module [APIM] Standard Programming .
U2101:00	Control Module Configuration Incompatible: No Sub Type Information	This DTC sets due to an incorrect or incomplete APIM programming/provisioning. Using a diagnostic scan tool, PERFORM the APIM programming procedure. REFER to: SYNC Module [APIM] Standard Programming .

U3000:04	Control Module: System Internal Failure	CLEAR all Continuous Memory Diagnostic Trouble Codes (CMDTCs). WAIT at least 10 seconds. RETRIEVE all Continuous Memory Diagnostic Trouble Codes (CMDTCs). If DTC U3000:04 is retrieved again, PERFORM the APIM Hardware Test. Refer to APIM HARDWARE TESTING .
U3000:41	Control Module: General Checksum Failure	CLEAR the Diagnostic Trouble Codes (DTCs). WAIT at least 10 seconds. REPEAT the APIM self-test. If DTC U3000:41 is retrieved again, PERFORM the APIM Hardware Test. Refer to APIM HARDWARE TESTING .
U3000:42	Control Module: General Memory Failure	CLEAR the Diagnostic Trouble Codes (DTCs). WAIT at least 10 seconds. REPEAT the APIM self-test. If DTC U3000:42 is retrieved again, PERFORM the APIM Hardware Test. Refer to APIM HARDWARE TESTING .
U3000:88	Control Module: Bus Off	*NOTE: The module was unable to communicate on the network at a point in time. The fault is not currently present since the module had to communicate with the diagnostic scan tool to report this DTC.* **To avoid repeat network concerns:** INSPECT for damaged or corroded wiring at the APIM. Refer to Module Communications Network for schematic and connector information.CLEAR the DTC.WAIT at least 10 seconds.REPEAT the network test with the diagnostic scan tool.
U3003:16	Battery Voltage: Circuit Voltage Below Threshold	GO to Pinpoint Test BB
U3003:17	Battery Voltage: Circuit Voltage Above Threshold	GO to Pinpoint Test BC

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > DTC

CHART: AUDIO DSP MODULE

DTC	Description	Action
B13F7:13	Audio Input 1: Circuit Open	For a RHF door woofer speaker concern, GO to Pinpoint Test P For a RHF door midwoofer speaker concern, GO to Pinpoint Test O For a RHF A-pillar tweeter speaker concern, GO to Pinpoint Test N For a RHR quarter panel speaker concern (coupe), GO to Pinpoint Test Q For a right parcel shelf speaker concern (convertible), GO to Pinpoint Test R
B13F8:13	Audio Input 2: Circuit Open	REFER to: Instrumentation, Message Center and Warning Chimes . See DTC Chart: Audio DSP Module.
B13F9:13	Audio Input 3: Circuit Open	For a LHF door woofer speaker concern, GO to Pinpoint Test J For a LHF door midwoofer speaker concern, GO to Pinpoint Test K For a LHF A-pillar tweeter speaker concern, GO to Pinpoint Test L For a left parcel shelf speaker concern (convertible), GO to Pinpoint Test T For a LHR quarter panel speaker concern (coupe), GO to Pinpoint Test U
B13FA:13	Audio Input 4: Circuit Open	REFER to: Instrumentation, Message Center and Warning Chimes . See DTC Chart: Audio DSP Module.
B13FB:11	Audio Enable Line: Circuit Short To Ground	GO to Pinpoint Test I
B1A01:01	Speaker #1: General Electrical Failure	GO to Pinpoint Test J
B1A01:11	Speaker #1: Circuit Short To Ground	GO to Pinpoint Test J
B1A01:12	Speaker #1: Circuit Short To Battery	GO to Pinpoint Test J
B1A01:13	Speaker #1: Circuit Open	GO to Pinpoint Test J

B1A02:01	Speaker #2: General Electrical Failure	For a left parcel shelf speaker concern (coupe), GO to Pinpoint Test T For a LHR quarter panel speaker concern (convertible), GO to Pinpoint Test U
B1A02:11	Speaker #2: Circuit Short To Ground	For a left parcel shelf speaker concern (coupe), GO to Pinpoint Test T For a LHR quarter panel speaker concern (convertible), GO to Pinpoint Test U
B1A02:12	Speaker #2: Circuit Short To Battery	For a left parcel shelf speaker concern (coupe), GO to Pinpoint Test T For a LHR quarter panel speaker concern (convertible), GO to Pinpoint Test U
B1A02:13	Speaker #2: Circuit Open	For a left parcel shelf speaker concern (coupe), GO to Pinpoint Test T For a LHR quarter panel speaker concern (convertible), GO to Pinpoint Test U
B1A03:01	Speaker #3: General Electrical Failure	For a LHF door midwoofer speaker concern, GO to Pinpoint Test K For a left A-pillar tweeter speaker concern, GO to Pinpoint Test L
B1A03:11	Speaker #3: Circuit Short To Ground	For a LHF door midwoofer speaker concern, GO to Pinpoint Test K For a left A-pillar tweeter speaker concern, GO to Pinpoint Test L
B1A03:12	Speaker #3: Circuit Short To Battery	For a LHF door midwoofer speaker concern, GO to Pinpoint Test K For a left A-pillar tweeter speaker concern, GO to Pinpoint Test L
B1A03:13	Speaker #3: Circuit Open	For a LHF door midwoofer speaker concern, GO to Pinpoint Test K For a left A-pillar tweeter speaker concern, GO to Pinpoint Test L
B1A05:01	Speaker #5: General Electrical Failure	GO to Pinpoint Test P
B1A05:11	Speaker #5: Circuit Short To Ground	GO to Pinpoint Test P
B1A05:12	Speaker #5: Circuit Short To Battery	GO to Pinpoint Test P

B1A05:13	Speaker #5: Circuit Open	GO to Pinpoint Test P
B1A06:01	Speaker #6: General Electrical Failure	For a right parcel shelf speaker concern (coupe), GO to Pinpoint Test R For a RHR quarter panel speaker concern (convertible), GO to Pinpoint Test Q
B1A06:11	Speaker #6: Circuit Short To Ground	For a right parcel shelf speaker concern (coupe), GO to Pinpoint Test R For a RHR quarter panel speaker concern (convertible), GO to Pinpoint Test Q
B1A06:12	Speaker #6: Circuit Short To Battery	For a right parcel shelf speaker concern (coupe), GO to Pinpoint Test R For a RHR quarter panel speaker concern (convertible), GO to Pinpoint Test Q
B1A06:13	Speaker #6: Circuit Open	For a right parcel shelf speaker concern (coupe), GO to Pinpoint Test R For a RHR quarter panel speaker concern (convertible), GO to Pinpoint Test Q
B1A07:01	Speaker #7: General Electrical Failure	For a RHF door midwoofer speaker concern, GO to Pinpoint Test O For a right A-pillar tweeter speaker concern, GO to Pinpoint Test N
B1A07:11	Speaker #7: Circuit Short To Ground	For a RHF door midwoofer speaker concern, GO to Pinpoint Test O For a right A-pillar tweeter speaker concern, GO to Pinpoint Test N
B1A07:12	Speaker #7: Circuit Short To Battery	For a RHF door midwoofer speaker concern, GO to Pinpoint Test O For a right A-pillar tweeter speaker concern, GO to Pinpoint Test N
B1A07:13	Speaker #7: Circuit Open	For a RHF door midwoofer speaker concern, GO to Pinpoint Test O For a right A-pillar tweeter speaker concern, GO to Pinpoint Test N
B1A08:01	Speaker #8: General Electrical Failure	GO to Pinpoint Test M
B1A08:11	Speaker #8: Circuit Short To Ground	GO to Pinpoint Test M

B1A08:12	Speaker #8: Circuit Short To Battery	GO to Pinpoint Test M
B1A08:13	Speaker #8: Circuit Open	GO to Pinpoint Test M
B1A09:02	Speaker #9: General Signal Failure	GO to Pinpoint Test S
U0142:00	Lost Communication With Body Control Module "B": No Sub Type Information	GO to Pinpoint Test AQ
U0155:00	Lost Communication With Instrument Panel Cluster (IPC) Control Module: No Sub Type Information	GO to Pinpoint Test AS
U0237:00	Lost Communication With Digital Audio Control Module "C": No Sub Type Information	GO to Pinpoint Test AW
U0253:00	Lost Communication With Accessory Protocol Interface Module: No Sub Type Information	GO to Pinpoint Test AY
U0257:00	Lost Communication With Front Controls / Display Interface Module: No Sub Type Information	*NOTE: Despite the description, this DTC applies to the FDIM, not the FCDIM.* GO to Pinpoint Test BA
U0423:00	Invalid Data Received from Instrument Panel Cluster Control Module: No Sub Type Information	RETRIEVE and FOLLOW Diagnostic Trouble Codes (DTCs) present in the IPC. REFER to: Instrumentation, Message Center and Warning Chimes .* If no Diagnostic Trouble Codes (DTCs) are present in the IPC, DIAGNOSE the observable symptom.
U201A:51	Control Module Main Calibration Data: Not Programmed	This DTC sets due to an incorrect or incomplete audio DSP module configuration. Using a diagnostic scan tool, PERFORM the audio DSP module programming procedure using as-built data. For information on as-built data, REFER to: Module Configuration - System Operation and Component Description . See As-Built Data.
U2100:00	Initial Configuration Not Complete: No Sub Type Information	This DTC sets due to an incorrect or incomplete audio DSP module configuration. Using a diagnostic

		scan tool, PERFORM the audio DSP module programming procedure using as-built data. For information on as-built data, REFER to: Module Configuration - System Operation and Component Description . See As-Built Data.
U2101:00	Control Module Configuration Incompatible: No Sub Type Information	This DTC sets due to an incorrect or incomplete audio DSP module configuration. Using a diagnostic scan tool, PERFORM the audio DSP module programming procedure using as-built data. For information on as-built data, REFER to: Module Configuration - System Operation and Component Description . See As-Built Data.
U3000:41	Control Module: General Checksum Failure	CLEAR the DTC. WAIT at least 10 seconds. REPEAT the audio DSP module self-test. If DTC U3000:41 is retrieved again, INSTALL a new audio DSP module. REFER to: Audio Digital Signal Processing (DSP) Module .
U3000:42	Control Module: General Memory Failure	CLEAR all Continuous Memory Diagnostic Trouble Codes (CMDTCs). WAIT at least 10 seconds. RETRIEVE all Continuous Memory Diagnostic Trouble Codes (CMDTCs). If DTC U3000:42 is retrieved again, INSTALL a new audio DSP module. REFER to: Audio Digital Signal Processing (DSP) Module .
U3003:16	Battery Voltage: Circuit Voltage Below Threshold	GO to Pinpoint Test BB
U3003:17	Battery Voltage: Circuit Voltage Above Threshold	GO to Pinpoint Test BC

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > DTC CHART: DACMC - 2.3L AND 5.2L ONLY

DTC	Description	Action
B116A:01	Handset Microphone: General	GO to Pinpoint Test AL

	Electrical Failure	
B117A:01	Backup Microphone: General Electrical Failure	GO to Pinpoint Test AM
B13F5:01	Microphone 3: General Electrical Failure	GO to Pinpoint Test AN
U0100:00	Lost Communication With ECM/ PCM "A": No Sub Type Information	GO to Pinpoint Test AO
U0140:00	Lost Communication With Body Control Module: No Sub Type Information	GO to Pinpoint Test AP
U0142:00	Lost Communication With Body Control Module "B": No Sub Type Information	GO to Pinpoint Test AQ
U2024:00	Control Module Cal-Config Data: No Sub Type Information	This DTC sets due to an incorrect or incomplete DACMC configuration. Using a diagnostic scan tool, PERFORM the DACMC programming procedure using as-built data. For information on as-built data, REFER to: Module Configuration - System Operation and Component Description . See As-Built Data.
U2100:00	Initial Configuration Not Complete: No Sub Type Information	This DTC sets due to an incorrect or incomplete DACMC configuration. Using a diagnostic scan tool, PERFORM the DACMC programming procedure using as-built data. For information on as-built data, REFER to: Module Configuration - System Operation and Component Description . See As-Built Data.
U2101:00	Control Module Configuration Incompatible: No Sub Type Information	This DTC sets due to an incorrect or incomplete DACMC configuration. Using a diagnostic scan tool, PERFORM the DACMC programming procedure using as-built data. For information on as-built data, REFER to: Module Configuration - System Operation and Component Description . See As-Built Data.
U3000:41	Control Module: General Checksum Failure	CLEAR the Diagnostic Trouble Codes (DTCs). WAIT at least 10 seconds. REPEAT the DACMC self-test.

		If DTC U3000:41 is retrieved again, INSTALL a new ACM. REFER to: Audio Front Control Module (ACM) .
U3000:42	Control Module: General Memory Failure	CLEAR all Continuous Memory Diagnostic Trouble Codes (CMDTCs). WAIT at least 10 seconds. RETRIEVE all Continuous Memory Diagnostic Trouble Codes (CMDTCs). If DTC U3000:42 is retrieved again, INSTALL a new ACM. REFER to: Audio Front Control Module (ACM) .
U3000:92	Control Module: Performance or Incorrect Operation	GO to Pinpoint Test G
U3000:94	Control Module: Unexpected Operation	If an observable symptom is **not** present, DISREGARD this DTC. If an observable symptom is present, GO to Pinpoint Test G
U3003:16	Battery Voltage: Circuit Voltage Below Threshold	GO to Pinpoint Test BB
U3003:17	Battery Voltage: Circuit Voltage Above Threshold	GO to Pinpoint Test BC

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > DTC CHART: FCIM

DTC	Description	Action
B00D5:01	Restraint System Passenger Disable Indicator: General Electrical Failure	CLEAR the Diagnostic Trouble Codes (DTCs). WAIT at least 10 seconds. REPEAT the self-test. If DTC B00D5:01 is retrieved again, INSTALL a new FCIM. REFER to: Front Controls Interface Module (FCIM) .
B1034:11	Left Front Seat Heater Element: Circuit Short To Ground	REFER to: FRONT SEATS . See DTC Chart: FCIM.
B1034:15	Left Front Seat Heater Element: Circuit Short To Battery or Open	REFER to: FRONT SEATS . See DTC Chart: FCIM.
B1036:11	Right Front Seat Heater Element: Circuit Short To Ground	REFER to: FRONT SEATS . See DTC Chart: FCIM.

B1036:15	Right Front Seat Heater Element: Circuit Short To Battery or Open	REFER to: FRONT SEATS . See DTC Chart: FCIM.
B1038:11	Left Front Seat Heater Sensor: Circuit Short To Ground	REFER to: FRONT SEATS . See DTC Chart: FCIM.
B1038:15	Left Front Seat Heater Sensor: Circuit Short To Battery or Open	REFER to: FRONT SEATS . See DTC Chart: FCIM.
B103A:11	Right Front Seat Heater Sensor: Circuit Short To Ground	REFER to: FRONT SEATS . See DTC Chart: FCIM.
B103A:15	Right Front Seat Heater Sensor: Circuit Short To Battery or Open	REFER to: FRONT SEATS . See DTC Chart: FCIM.
B105A:12	Cabin Temperature Sensor Fan: Circuit Short To Battery	REFER to: Climate Control System - Vehicles With: Dual Automatic Temperature Control (DATC) . See FCIM - DATC DTC Chart.
B105A:14	Cabin Temperature Sensor Fan: Circuit Short To Ground or Open	REFER to: Climate Control System - Vehicles With: Dual Automatic Temperature Control (DATC) . See FCIM - DATC DTC Chart.
B1081:07	Left Temperature Damper Motor: Mechanical Failure	REFER to: Climate Control System - Vehicles With: Dual Automatic Temperature Control (DATC) . See FCIM - DATC DTC Chart.
B1081:11	Left Temperature Damper Motor: Circuit Short To Ground	REFER to: Climate Control System - Vehicles With: Dual Automatic Temperature Control (DATC) . See FCIM - DATC DTC Chart.
B1081:12	Left Temperature Damper Motor: Circuit Short To Battery	REFER to: Climate Control System - Vehicles With: Dual Automatic Temperature Control (DATC) . See FCIM - DATC DTC Chart.
B1081:13	Left Temperature Damper Motor: Circuit Open	REFER to: Climate Control System - Vehicles With: Dual Automatic Temperature Control (DATC) . See FCIM - DATC DTC Chart.
B1082:07	Right Temperature Damper Motor: Mechanical Failure	REFER to: Climate Control System - Vehicles With: Dual Automatic Temperature Control (DATC) . See FCIM - DATC DTC Chart.
B1082:11	Right Temperature Damper Motor: Circuit Short To Ground	REFER to: Climate Control System - Vehicles With: Dual Automatic Temperature Control (DATC) . See FCIM - DATC DTC Chart.
B1082:12	Right Temperature Damper Motor: Circuit Short To Battery	REFER to: Climate Control System - Vehicles With: Dual Automatic

		Temperature Control (DATC) . See FCIM - DATC DTC Chart.
B1082:13	Right Temperature Damper Motor: Circuit Open	REFER to: Climate Control System - Vehicles With: Dual Automatic Temperature Control (DATC) . See FCIM - DATC DTC Chart.
B1083:07	Recirculation Damper Motor: Mechanical Failure	REFER to: Climate Control System - Vehicles With: Dual Automatic Temperature Control (DATC) . See FCIM - DATC DTC Chart.
B1083:11	Recirculation Damper Motor: Circuit Short To Ground	REFER to: Climate Control System - Vehicles With: Dual Automatic Temperature Control (DATC) . See FCIM - DATC DTC Chart.
B1083:12	Recirculation Damper Motor: Circuit Short To Battery	REFER to: Climate Control System - Vehicles With: Dual Automatic Temperature Control (DATC) . See FCIM - DATC DTC Chart.
B1083:13	Recirculation Damper Motor: Circuit Open	REFER to: Climate Control System - Vehicles With: Dual Automatic Temperature Control (DATC) . See FCIM - DATC DTC Chart.
B1086:07	Air Distribution Damper Motor: Mechanical Failure	REFER to: Climate Control System - Vehicles With: Dual Automatic Temperature Control (DATC) . See FCIM - DATC DTC Chart.
B1086:11	Air Distribution Damper Motor: Circuit Short To Ground	REFER to: Climate Control System - Vehicles With: Dual Automatic Temperature Control (DATC) . See FCIM - DATC DTC Chart.
B1086:12	Air Distribution Damper Motor: Circuit Short To Battery	REFER to: Climate Control System - Vehicles With: Dual Automatic Temperature Control (DATC) . See FCIM - DATC DTC Chart.
B1086:13	Air Distribution Damper Motor: Circuit Open	REFER to: Climate Control System - Vehicles With: Dual Automatic Temperature Control (DATC) . See FCIM - DATC DTC Chart.
B10AF:11	Blower Fan Relay: Circuit Short To Ground	REFER to: Climate Control System - Vehicles With: Dual Automatic Temperature Control (DATC) . See FCIM - DATC DTC Chart.
B10AF:15	Blower Fan Relay: Circuit Short To Battery or Open	REFER to: Climate Control System - Vehicles With: Dual Automatic Temperature Control (DATC) . See FCIM - DATC DTC Chart.

B10B5:11	Left Panel Air Discharge Temperature: Circuit Short To Ground	REFER to: Climate Control System - Vehicles With: Dual Automatic Temperature Control (DATC) . See DTC Chart: FCIM - DATC (Dual Automatic Temperature Control).
B10B5:15	Left Panel Air Discharge Temperature: Circuit Short To Battery or Open	REFER to: Climate Control System - Vehicles With: Dual Automatic Temperature Control (DATC) . See DTC Chart: FCIM - DATC (Dual Automatic Temperature Control).
B10B6:11	Left Floor Air Discharge Temperature: Circuit Short To Ground	REFER to: Climate Control System - Vehicles With: Dual Automatic Temperature Control (DATC) . See DTC Chart: FCIM - DATC (Dual Automatic Temperature Control).
B10B6:15	Left Floor Air Discharge Temperature: Circuit Short To Battery or Open	REFER to: Climate Control System - Vehicles With: Dual Automatic Temperature Control (DATC) . See DTC Chart: FCIM - DATC (Dual Automatic Temperature Control).
B10B8:63	Push Buttons: Circuit / Component Protection Time-Out	CLEAR the Diagnostic Trouble Codes (DTCs). WAIT at least 10 seconds. REPEAT the self-test. If DTC B10B8:63 is retrieved again, INSTALL a new FCIM. REFER to: Front Controls Interface Module (FCIM) .
B10B9:12	Blower Control: Circuit Short To Battery	REFER to: Climate Control System - Vehicles With: Dual Automatic Temperature Control (DATC) . See DTC Chart: FCIM - DATC (Dual Automatic Temperature Control).
B10B9:14	Blower Control: Circuit Short To Ground or Open	REFER to: Climate Control System - Vehicles With: Dual Automatic Temperature Control (DATC) . See DTC Chart: FCIM - DATC (Dual Automatic Temperature Control).
B11E5:12	Left HVAC Damper Position Sensor: Circuit Short To Battery	REFER to: Climate Control System - Vehicles With: Dual Automatic Temperature Control (DATC) . See DTC Chart: FCIM - DATC (Dual Automatic Temperature Control).
B11E5:14	Left HVAC Damper Position Sensor: Circuit Short To Ground or Open	REFER to: Climate Control System - Vehicles With: Dual Automatic Temperature Control (DATC) . See DTC Chart: FCIM - DATC (Dual

		Automatic Temperature Control).
B11E6:12	Right HVAC Damper Position Sensor: Circuit Short To Battery	REFER to: Climate Control System - Vehicles With: Dual Automatic Temperature Control (DATC) . See DTC Chart: FCIM - DATC (Dual Automatic Temperature Control).
B11E6:14	Right HVAC Damper Position Sensor: Circuit Short To Ground or Open	REFER to: Climate Control System - Vehicles With: Dual Automatic Temperature Control (DATC) . See DTC Chart: FCIM - DATC (Dual Automatic Temperature Control).
B11E7:12	Air Distribution Damper Position Sensor: Circuit Short To Battery	REFER to: Climate Control System - Vehicles With: Dual Automatic Temperature Control (DATC) . See DTC Chart: FCIM - DATC (Dual Automatic Temperature Control).
B11E7:14	Air Distribution Damper Position Sensor: Circuit Short To Ground or Open	REFER to: Climate Control System - Vehicles With: Dual Automatic Temperature Control (DATC) . See DTC Chart: FCIM - DATC (Dual Automatic Temperature Control).
B11F0:12	Air Intake Damper Position Sensor: Circuit Short To Battery	REFER to: Climate Control System - Vehicles With: Dual Automatic Temperature Control (DATC) . See DTC Chart: FCIM - DATC (Dual Automatic Temperature Control).
B11F0:14	Air Intake Damper Position Sensor: Circuit Short To Ground or Open	REFER to: Climate Control System - Vehicles With: Dual Automatic Temperature Control (DATC) . See DTC Chart: FCIM - DATC (Dual Automatic Temperature Control).
B1202:01	Restraint System Passenger Enable Indicator: General Electrical Failure	CLEAR the Diagnostic Trouble Codes (DTCs). WAIT at least 10 seconds. REPEAT the self-test. If DTC B1202:01 is retrieved again, INSTALL a new FCIM. REFER to: Front Controls Interface Module (FCIM) .
B1A61:11	Cabin Temperature Sensor: Circuit Short To Ground	REFER to: Climate Control System - Vehicles With: Dual Automatic Temperature Control (DATC) . See FCIM - DATC DTC Chart.
B1A61:15	Cabin Temperature Sensor: Circuit Short To Battery or Open	REFER to: Climate Control System - Vehicles With: Dual Automatic Temperature Control (DATC) . See FCIM - DATC DTC Chart.

B1A63:11	Right Solar Sensor: Circuit Short To Ground	REFER to: Climate Control System - Vehicles With: Dual Automatic Temperature Control (DATC) . See FCIM - DATC DTC Chart.
B1A63:15	Right Solar Sensor: Circuit Short To Battery or Open	REFER to: Climate Control System - Vehicles With: Dual Automatic Temperature Control (DATC) . See FCIM - DATC DTC Chart.
B1A64:11	Left Solar Sensor: Circuit Short To Ground	REFER to: Climate Control System - Vehicles With: Dual Automatic Temperature Control (DATC) . See FCIM - DATC DTC Chart.
B1A64:15	Left Solar Sensor: Circuit Short To Battery or Open	REFER to: Climate Control System - Vehicles With: Dual Automatic Temperature Control (DATC) . See FCIM - DATC DTC Chart.
B1A69:12	Humidity Sensor: Circuit Short To Battery	REFER to: Climate Control System - Vehicles With: Dual Automatic Temperature Control (DATC) . See FCIM - DATC DTC Chart.
B1A69:14	Humidity Sensor: Circuit Short To Ground or Open	REFER to: Climate Control System - Vehicles With: Dual Automatic Temperature Control (DATC) . See FCIM - DATC DTC Chart.
B1B71:11	Evaporator Temperature Sensor: Circuit Short To Ground	REFER to: Climate Control System - Vehicles With: Dual Automatic Temperature Control (DATC) . See FCIM - DATC DTC Chart.
B1B71:15	Evaporator Temperature Sensor: Circuit Short To Battery or Open	REFER to: Climate Control System - Vehicles With: Dual Automatic Temperature Control (DATC) . See FCIM - DATC DTC Chart.
B1C83:12	Rear Defog Relay: Circuit Short To Battery	REFER to: Glass, Frames and Mechanisms . See DTC Chart: FCIM.
B1C83:14	Rear Defog Relay: Circuit Short To Ground or Open	REFER to: Glass, Frames and Mechanisms . See DTC Chart: FCIM.
C1B14:11	Sensor Supply Voltage A: Circuit Short To Ground	REFER to: Climate Control System - Vehicles With: Dual Automatic Temperature Control (DATC) . See FCIM - DATC DTC Chart.
C1B14:12	Sensor Supply Voltage A: Circuit Short To Battery	REFER to: Climate Control System - Vehicles With: Dual Automatic Temperature Control (DATC) . See

		FCIM - DATC DTC Chart.
U0140:00	Lost Communication With Body Control Module: No Sub Type Information	GO to Pinpoint Test AP
U0151:00	Lost Communication With Restraints Control Module: No Sub Type Information	GO to Pinpoint Test AR
U0155:00	Lost Communication With Instrument Panel Cluster (IPC) Control Module: No Sub Type Information	GO to Pinpoint Test AS
U0253:00	Lost Communication With Accessory Protocol Interface Module: No Sub Type Information	GO to Pinpoint Test AY
U0401:00	Invalid Data Received from ECM/ PCM A: No Sub Type Information	**RETRIEVE and FOLLOW Diagnostic Trouble Codes (DTCs) present in the PCM.** For vehicles with the 2.3L EcoBoost (201kW/273PS), REFER to: Electronic Engine Controls . For vehicles with the 3.7L Duratec (227kW/301PS), REFER to: Electronic Engine Controls . For vehicles with the 5.0L 32V Ti-VCT, REFER to: Electronic Engine Controls . *NOTE: If no Diagnostic Trouble Codes (DTCs) are present in the PCM, DIAGNOSE the observable symptom.*
U0401:68	Invalid Data Received from ECM/ PCM A: Event Information	**RETRIEVE and FOLLOW Diagnostic Trouble Codes (DTCs) present in the PCM.** For vehicles with the 2.3L EcoBoost (201kW/273PS), REFER to: Electronic Engine Controls . For vehicles with the 3.7L Duratec (227kW/301PS), REFER to: Electronic Engine Controls . For vehicles with the 5.0L 32V Ti-VCT, REFER to: Electronic Engine Controls . *NOTE: If no Diagnostic*

		Trouble Codes (DTCs) are present in the PCM, DIAGNOSE the observable symptom.
U0401:81	Invalid Data Received from ECM/ PCM A: Invalid Serial Data Received	**RETRIEVE and FOLLOW Diagnostic Trouble Codes (DTCs) present in the PCM.** For vehicles with the 2.3L EcoBoost (201kW/273PS), REFER to: Electronic Engine Controls . For vehicles with the 3.7L Duratec (227kW/301PS), REFER to: Electronic Engine Controls . For vehicles with the 5.0L 32V Ti-VCT, REFER to: Electronic Engine Controls . *NOTE: If no Diagnostic Trouble Codes (DTCs) are present in the PCM, DIAGNOSE the observable symptom.*
U0401:82	Invalid Data Received from ECM/ PCM A: Alive / Sequence Counter Incorrect / Not Updated	**RETRIEVE and FOLLOW Diagnostic Trouble Codes (DTCs) present in the PCM.** For vehicles with the 2.3L EcoBoost (201kW/273PS), REFER to: Electronic Engine Controls . For vehicles with the 3.7L Duratec (227kW/301PS), REFER to: Electronic Engine Controls . For vehicles with the 5.0L 32V Ti-VCT, REFER to: Electronic Engine Controls . *NOTE: If no Diagnostic Trouble Codes (DTCs) are present in the PCM, DIAGNOSE the observable symptom.*
U0422:68	Invalid Data Received From Body Control Module: Event Information	RETRIEVE and FOLLOW Diagnostic Trouble Codes (DTCs) present in the BCM. REFER to: Body Control Module (BCM) .* If no Diagnostic Trouble Codes (DTCs) are present in the BCM, DIAGNOSE the observable symptom.

U0422:81	Invalid Data Received From Body Control Module: Invalid Serial Data Received	RETRIEVE and FOLLOW Diagnostic Trouble Codes (DTCs) present in the BCM. REFER to: Body Control Module (BCM) .* If no Diagnostic Trouble Codes (DTCs) are present in the BCM, DIAGNOSE the observable symptom.
U0452:82	Invalid Data Received From Restraints Control Module: Alive / Sequence Counter Incorrect / Not Updated	RETRIEVE and FOLLOW Diagnostic Trouble Codes (DTCs) present in the RCM. REFER to: Airbag Supplemental Restraint System (SRS) .* If no Diagnostic Trouble Codes (DTCs) are present in the RCM, DIAGNOSE the observable symptom.
U1000:00	Solid State Driver Protection Active -Driver Disabled: No Sub Type Information	*NOTE: The FCIM has temporarily disabled a HVAC control output because an excessive current draw exists (such as a short to ground). The FCIM cannot enable the output until the cause of the short is corrected.* ADDRESS all other FCIM Diagnostic Trouble Codes (DTCs) first.After the cause of the concern is corrected, CLEAR the Diagnostic Trouble Codes (DTCs).WAIT at least 10 seconds.REPEAT the self-test.If DTC U1000:00 is retrieved again, INSTALL a new FCIM. REFER to: Front Controls Interface Module (FCIM) .
U2100:00	Initial Configuration Not Complete: No Sub Type Information	This DTC sets due to an incorrect or incomplete FCIM configuration. Using a diagnostic scan tool, PERFORM the FCIM programming procedure using as-built data. For information on as-built data, REFER to: Module Configuration - System Operation and Component Description . See As-Built Data.
U3000:41	Control Module: General Checksum Failure	CLEAR the Diagnostic Trouble Codes (DTCs). WAIT at least 10 seconds. REPEAT the FCIM self-test.

		If DTC U3000:41 is retrieved again, INSTALL a new FCIM. REFER to: Front Controls Interface Module (FCIM) .
U3000:49	Control Module: Internal Electronic Failure	ADDRESS all other FCIM Diagnostic Trouble Codes (DTCs) first. After the cause of the concern is corrected, CLEAR all Continuous Memory Diagnostic Trouble Codes (CMDTCs). WAIT at least 10 seconds. RETRIEVE all Continuous Memory Diagnostic Trouble Codes (CMDTCs). If DTC U3000:49 is retrieved again, INSTALL a new FCIM. REFER to: Front Controls Interface Module (FCIM) .
U3003:16	Battery Voltage: Circuit Voltage Below Threshold	GO to Pinpoint Test BB
U3003:17	Battery Voltage: Circuit Voltage Above Threshold	GO to Pinpoint Test BC

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > DTC CHART: GPSM

DTC	Description	Action
U0100:00	Lost Communication with ECM/ PCM "A": No Sub Type Information	GO to Pinpoint Test AO
U0140:00	Lost Communication With Body Control Module: No Sub Type Information	GO to Pinpoint Test AP
U0155:00	Lost Communication With Instrument Panel Cluster (IPC) Control Module: No Sub Type Information	GO to Pinpoint Test AS
U0401:00	Invalid Data Received from ECM/ PCM A: No Sub Type Information	**RETRIEVE and FOLLOW Diagnostic Trouble Codes (DTCs) present in the PCM.** For vehicles with the 2.3L EcoBoost (201kW/273PS), REFER to: Electronic Engine Controls . For vehicles with the 3.7L Duratec (227kW/301PS), REFER to:

		Electronic Engine Controls . For vehicles with the 5.0L 32V Ti-VCT, REFER to: Electronic Engine Controls . *NOTE: If no Diagnostic Trouble Codes (DTCs) are present in the PCM, DIAGNOSE the observable symptom.*
U0422:00	Invalid Data Received from Body Control Module: No Sub Type Information	RETRIEVE and FOLLOW Diagnostic Trouble Codes (DTCs) present in the BCM. REFER to: Body Control Module (BCM) .* If no Diagnostic Trouble Codes (DTCs) are present in the BCM, DIAGNOSE the observable symptom.
U0423:00	Invalid Data Received from Instrument Panel Cluster Control Module: No Sub Type Information	RETRIEVE and FOLLOW Diagnostic Trouble Codes (DTCs) present in the IPC. REFER to: Instrumentation, Message Center and Warning Chimes .* If no Diagnostic Trouble Codes (DTCs) are present in the IPC, DIAGNOSE the observable symptom.
U2100:00	Initial Configuration Not Complete: No Sub Type Information	This DTC sets due to an incorrect or incomplete GPSM configuration. Using a diagnostic scan tool, PERFORM the GPSM programming procedure using as-built data. For information on as-built data, REFER to: Module Configuration - System Operation and Component Description . See As-Built Data.
U2101:00	Control Module Configuration Incompatible: No Sub Type Information	This DTC sets due to an incorrect or incomplete GPSM configuration. Using a diagnostic scan tool, PERFORM the GPSM programming procedure using as-built data. For information on as-built data, REFER to: Module Configuration - System Operation and Component Description . See As-Built Data.
U3000:09	Control Module: Component Failure	CLEAR the Diagnostic Trouble Codes (DTCs). WAIT at least 10 seconds. REPEAT the self-test.

		If DTC U3000:09 is retrieved again, DISCONNECT the battery for 1 minute, then reconnect it. CLEAR the Diagnostic Trouble Codes (DTCs). WAIT at least 10 seconds. REPEAT the self-test. If DTC U3000:09 is retrieved again, INSTALL a new GPSM. REFER to: Global Positioning System Module (GPSM) .
U3000:41	Control Module: General Checksum Failure	CLEAR the Diagnostic Trouble Codes (DTCs). WAIT at least 10 seconds. REPEAT the self-test. If DTC U3000:41 is retrieved again, INSTALL a new GPSM. REFER to: Global Positioning System Module (GPSM) .
U3000:42	Control Module: General Memory Failure	CLEAR the Diagnostic Trouble Codes (DTCs). WAIT at least 10 seconds. REPEAT the self-test. If DTC U3000:42 is retrieved again, INSTALL a new GPSM. REFER to: Global Positioning System Module (GPSM) .
U3003:16	Battery Voltage: Circuit Voltage Below Threshold	GO to Pinpoint Test BB
U3003:17	Battery Voltage: Circuit Voltage Above Threshold	GO to Pinpoint Test BC

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > DTC CHART: SCCM

DTC	Description	Action
B1380:09	Steering Wheel Right Switch Pack: Component Failure	For a RH upper steering wheel switch concern, GO to Pinpoint Test AE For a RH lower steering wheel switch concern, GO to Pinpoint Test AF
B1380:11	Steering Wheel Right Switch Pack: Circuit Short To Ground	For a RH upper steering wheel switch concern, GO to Pinpoint Test AE For a RH lower steering wheel

		switch concern, GO to Pinpoint Test AF
B1380:17	Steering Wheel Right Switch Pack: Circuit Voltage Above Threshold	For a RH upper steering wheel switch concern, GO to Pinpoint Test AE For a RH lower steering wheel switch concern, GO to Pinpoint Test AF
All other Diagnostic Trouble Codes (DTCs)	-	REFER to: Steering Wheel and Column Electrical Components . See SCCM DTC Chart.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > SYMPTOM CHARTS > SYMPTOM CHART: GENERAL AUDIO SYSTEM

Condition	Possible Sources	Actions
A module does not respond to the diagnostic scan tool	Fuse Wiring, terminals, or connectors Module	REFER to: Communications Network . See Symptom Chart.
The RH upper steering wheel switches are inoperative or do not operate correctly	Refer to the Pinpoint Test	GO to Pinpoint Test AE
The RH lower steering wheel switches are inoperative or do not operate correctly	Refer to the Pinpoint Test	GO to Pinpoint Test AF
The CD player is inoperative or does not operate correctly	CD ACM	INSPECT the CD for scratches, fingerprints, a loose paper label, incorrect format, or damage. INSERT a known good CD and TEST the system. If the system operates correctly, the concern was caused by a damaged CD. If the system does not operate correctly, INSTALL a new ACM. REFER to: Audio Front Control Module (ACM) .
The speed compensated volume does not operate correctly	Refer to the Pinpoint Test	GO to Pinpoint Test E
The compass is inoperative or does not operate correctly	Refer to the Pinpoint Test	GO to Pinpoint Test AJ
The audio system does not operate correctly from the FCIM	Refer to the Pinpoint Test	GO to Pinpoint Test AG

The FCIM illumination is inoperative or does not dim	Illumination system concern FCIM	REFER to: Instrument Panel and Interior Switches Illumination .
The FDIM touchscreen is inoperative or does not operate correctly	Refer to the Pinpoint Test	GO to Pinpoint Test AH
The SIRIUS data services are not available - if equipped	Refer to the Pinpoint Test	GO to Pinpoint Test D

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > SYMPTOM CHARTS > SYMPTOM CHART: HD RADIO ® SYSTEM

Condition	Possible Sources	Actions
Echo, stutter, skip, or repeat	Radio broadcaster time alignment error	ADVISE the customer that the HD Radio ® is functioning correctly.
FM multicast channels (HD2, HD3, HD4, etc.) are unavailable that were once available	Broadcast station not broadcasting Broadcast station maintenance Broadcast program change Broadcast station change Station unavailable for the current location Digital signal loss Poor reception	ADVISE the customer that there must be an available FM multicast channel in order to output High Definition (HD) content. The HD Radio ® is functioning correctly.
FM multicast channels (HD2, HD3, HD4, etc.) are unavailable when using the seek, tune, or scan functions	Unavailable stations Insufficient waiting time	ADVISE the customer that the scan function does not scan for multicast channels. There must be an available FM multicast channel in order to output High Definition (HD) content. If FM multicast channels are available, HD Radio ® takes time to detect and switch from analog to digital. The High Definition (HD) icon turns orange when the digital broadcast is available. The HD Radio ® is functioning correctly.
FM multicast channels (HD2, HD3, HD4, etc.) are unavailable when using a radio preset or direct tune	Station unavailable for the current location Digital signal loss Poor reception	ADVISE the customer that there must be an available FM multicast channel in order to output High Definition (HD) content. The HD Radio ® is functioning correctly.
FM multicast channels (HD2, HD3, HD4, etc.) have an audio mute delay when using a radio	Insufficient waiting time	ADVISE the customer that FM multicast channels take time to decode and make the audio

preset or direct tune		available. The HD Radio ® is functioning correctly.
High Definition (HD) not immediately available when using the seek or tune functions	Insufficient waiting time	ADVISE the customer that the HD Radio ® takes time to detect and switch from analog to digital. The High Definition (HD) icon turns orange when the digital broadcast is available. The HD Radio ® is functioning correctly.
Metadata does not match audio being played	Radio broadcaster data error	ADVISE the customer that the HD Radio ® is functioning correctly.
Metadata is not shown for the selected frequency	Radio broadcaster data error	ADVISE the customer that the HD Radio ® is functioning correctly.
Sound dropout when analog transitions to High Definition (HD)	Radio broadcaster digital encoder error	ADVISE the customer to turn HD off for this frequency to allow the analog signal to be heard. The HD Radio ® is functioning correctly.
Sound dropout while listening to FM multicast channels (HD2, HD3, HD4, etc.)	Digital signal loss	ADVISE the customer that FM multicast channels do not have analog equivalents. The HD Radio ® is functioning correctly.
Sound transitioning between High Definition (HD) and analog	Digital signal loss Poor reception	ADVISE the customer that there must be an available High Definition (HD) channel in order to output High Definition (HD) content. The HD Radio ® is functioning correctly.
Volume fluctuation	Radio broadcaster audio alignment error	ADVISE the customer that the HD Radio ® is functioning correctly.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > SYMPTOM CHARTS > SYMPTOM CHART: NAVIGATION - IF EQUIPPED

Condition	Possible Sources	Actions
Navigation application is inoperative or unresponsive	Refer to the Pinpoint Test	GO to Pinpoint Test AI
Map does not load or show what is expected	Refer to the Pinpoint Test	GO to Pinpoint Test AI
Navigation does not track vehicle correctly on map	Refer to the Pinpoint Test	GO to Pinpoint Test AI
GPS icon displayed over red X with FDIM navigation tab selected	Refer to the Pinpoint Test	GO to Pinpoint Test AI

Voice recognition does not operate correctly to voice navigate to a destination	Refer to the Pinpoint Test	GO to Pinpoint Test AK
The SIRIUS Data Services are not available - if equipped	Refer to the Pinpoint Test	GO to Pinpoint Test D

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > SYMPTOM CHARTS > SYMPTOM CHART: SATELLITE RADIO

Condition	Possible Sources	Actions
Poor reception	Refer to the Pinpoint Test	GO to Pinpoint Test C
Poor sound quality or no sound while in satellite radio mode - all other functions operate correctly	Refer to the Pinpoint Test	GO to Pinpoint Test C
The satellite radio is inoperative or does not operate correctly	Refer to the Pinpoint Test	GO to Pinpoint Test C

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > SYMPTOM CHARTS > SYMPTOM CHART: SOUND QUALITY

Condition	Possible Sources	Actions
Poor reception - AM/ FM	Refer to the Pinpoint Test	For the coupe, GO to Pinpoint Test A For the convertible, GO to Pinpoint Test B
Continuous seek or scan - AM/ FM	Refer to the Pinpoint Test	For the coupe, GO to Pinpoint Test A For the convertible, GO to Pinpoint Test B
A loud popping sound is heard when cycling the ignition	Refer to the Pinpoint Test	GO to Pinpoint Test F
A low frequency noise is heard from the audio system	Refer to the Pinpoint Test	GO to Pinpoint Test G
Poor sound quality or distorted sound from one or more speakers (not all speakers)	Refer to the Pinpoint Test	GO to Pinpoint Test H
No sound from all speakers	Refer to the Pinpoint Test	GO to Pinpoint Test I
The LHF door woofer speaker is inoperative	Refer to the Pinpoint Test	GO to Pinpoint Test J

The LHF door midwoofer speaker is inoperative	Refer to the Pinpoint Test	GO to Pinpoint Test K
The LHF A-pillar tweeter speaker is inoperative	Refer to the Pinpoint Test	GO to Pinpoint Test L
The center instrument panel speaker is inoperative	Refer to the Pinpoint Test	GO to Pinpoint Test M
The RHF A-pillar tweeter speaker is inoperative	Refer to the Pinpoint Test	GO to Pinpoint Test N
The RHF door midwoofer speaker is inoperative	Refer to the Pinpoint Test	GO to Pinpoint Test O
The RHF door woofer speaker is inoperative	Refer to the Pinpoint Test	GO to Pinpoint Test P
The RHR quarter panel speaker is inoperative (convertible)	Refer to the Pinpoint Test	GO to Pinpoint Test Q
The right parcel shelf speaker is inoperative (coupe)	Refer to the Pinpoint Test	GO to Pinpoint Test R
The subwoofer speaker is inoperative	Refer to the Pinpoint Test	GO to Pinpoint Test S
The left parcel shelf speaker is inoperative (coupe)	Refer to the Pinpoint Test	GO to Pinpoint Test T
The LHR quarter panel speaker is inoperative (convertible)	Refer to the Pinpoint Test	GO to Pinpoint Test U

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > SYMPTOM CHARTS > SYMPTOM CHART: SYNC ® SYSTEM

Condition	Possible Sources	Actions
All SYNC ® Services features are inoperative or inaccurate (traffic, directions, and information)	Refer to the Pinpoint Test	PERFORM the APIM Reset. REFER to: Reset the SYNC Module [APIM] . If the concern is still present, GO to Pinpoint Test V
All APIM stereo outputs are inoperative or do not operate correctly REFER to: Information and Entertainment System - System Operation and Component Description . See APIM for a list of stereo outputs.	Refer to the Pinpoint Test	PERFORM the APIM Reset. REFER to: Reset the SYNC Module [APIM] . If the concern is still present, GO to Pinpoint Test W
All APIM mono outputs are inoperative or do not operate	Refer to the Pinpoint Test	PERFORM the APIM Reset. REFER to: Reset the SYNC Module [APIM] .

correctly REFER to: Information and Entertainment System - System Operation and Component Description . See APIM for a list of mono outputs.		If the concern is still present, GO to Pinpoint Test X
Voice recognition is inoperative or does not operate correctly	Refer to the Pinpoint Test	PERFORM the APIM Reset. REFER to: Reset the SYNC Module [APIM] . If the concern is still present, GO to Pinpoint Test Y
During a phone call, no outgoing audio is heard on the outside device	Refer to the Pinpoint Test	PERFORM the APIM Reset. REFER to: Reset the SYNC Module [APIM] . If the concern is still present, GO to Pinpoint Test Y
The SYNC ® steering wheel switches are inoperative or do not operate correctly	Refer to the Pinpoint Test	PERFORM the APIM Reset. REFER to: Reset the SYNC Module [APIM] . If the concern is still present, GO to Pinpoint Test AF
All media hub functions are inoperative or do not operate correctly (USB ports, SD card, and audio input jack)	Refer to the Pinpoint Test	PERFORM the APIM Reset. REFER to: Reset the SYNC Module [APIM] . If the concern is still present, GO to Pinpoint Test Z
The USB port(s) is/are inoperative or does/do not operate correctly	Refer to the Pinpoint Test	PERFORM the APIM Reset. REFER to: Reset the SYNC Module [APIM] . If the concern is still present, GO to Pinpoint Test AA
The SD card slot is inoperative or does not operate correctly	Refer to the Pinpoint Test	PERFORM the APIM Reset. REFER to: Reset the SYNC Module [APIM] . If the concern is still present, GO to Pinpoint Test AB
The audio input jack is inoperative or does not operate correctly	Refer to the Pinpoint Test	PERFORM the APIM Reset. REFER to: Reset the SYNC Module [APIM] . If the concern is still present, GO to Pinpoint Test AC
Unable to pair Bluetooth device	Refer to the Pinpoint Test	PERFORM the APIM Reset. REFER to: Reset the SYNC Module [APIM] . If the concern is still present, GO to Pinpoint Test AD
An individual Bluetooth device feature is inoperative (text messaging, media playback or controls, phone book download, call history, or call waiting)	Customer's device compatibility	PERFORM the APIM Reset. REFER to: Reset the SYNC Module [APIM] . INSTRUCT the customer to review the device compatibility list. REFER to www.syncmyride.com. It is normal operation for unsupported or incompatible Bluetooth features to be unavailable through the SYNC ® system.

		If the inoperative feature is compatible, ADVISE the customer to check their device for firmware updates, and if required, reset their device following the manufacturer's instructions.
911 Assist™ or VHR is inoperative or does not operate correctly	Unregistered SYNC ® owner account RCM misconfiguration IPC misconfiguration	Verify that the customer has a SYNC ® Owner Account on www.syncmyride.com. This error message appears due to incomplete or incorrect PMI procedures. CHECK the vehicle service history for recent service actions related to the IPC or RCM. If there have been recent service actions with the IPC or RCM, REPEAT/PERFORM the PMI procedure as directed by the diagnostic scan tool. REFER to: Module Configuration - System Operation and Component Description . See PMI. If there have been no recent service actions, the APIM has failed to retain configuration data. PERFORM the APIM Hardware Test. Refer to APIM HARDWARE TESTING .

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST A : POOR RECEPTION OR CONTINUOUS SEEK OR SCAN - AM (AMPLITUDE MODULATION) / FM (FREQUENCY MODULATION) (COUPE)

Refer to Audio System/Navigation - AM/FM/CD/SYNC for schematic and connector information.

Refer to Charging System for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See AM/ FM Radio, RDS, AM/ FM Antenna Amplifier - Coupe, Antenna, and Noise Suppression Equipment.

Possible Sources

- No channel found in the selected RDS category
- Noise suppression equipment
- Charging system
- Wiring, terminals, or connectors

- Ignition system
- AM/ FM on-glass antenna grid
- AM/ FM antenna coaxial cable
- Mounting surface corrosion
- AM/ FM antenna amplifier
- ACM

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST A : POOR RECEPTION OR CONTINUOUS SEEK OR SCAN - AM (AMPLITUDE MODULATION) / FM (FREQUENCY MODULATION) (COUPE) > PINPOINT TEST A : POOR RECEPTION OR CONTINUOUS SEEK OR SCAN - AM (AMPLITUDE MODULATION) / FM (FREQUENCY MODULATION) (COUPE)

A1 CHECK THE AUDIO SYSTEM RECEPTION WITH THE ENGINE RUNNING

Operate the audio system in AM/ FM mode.

Check the reception with the engine running, and with the engine off.

Is poor reception only present with the engine running?

Yes	GO to A2

No	GO to A4

A2 CHECK THE GENERATOR

Ignition OFF.

NOTE: Do not allow the generator B+ cable terminal to make contact with a conductive surface. Failure to follow this instruction may result in personal injury or damage to the vehicle.

Disconnect: Generator B+ Cable C102C .

Start the engine.

Operate the audio system in AM/ FM mode.

Is the reception OK?

Yes	INSTALL a new generator.* For vehicles with the 2.3L EcoBoost (201kW/273PS), REFER

	to: Generator - 2.3L EcoBoost (201kW/273PS) .* For vehicles with the 3.7L Duratec (227kW/301PS), REFER to: Generator - 3.7L Duratec (227kW/301PS) .* For vehicles with the 5.0L 32V Ti-VCT, REFER to: Generator - 5.0L 32V Ti-VCT .

No	GO to A3

A3 CHECK THE IGNITION CIRCUITS

Ignition OFF.

Connect: Generator B+ Cable C102C .

Visually inspect the engine compartment and make sure all ignition coils are correctly and securely connected, and that there are no visible cracks in the coil housings.

Inspect all the wiring harnesses and connectors for damaged insulation and loose or broken conditions.

Are the ignition components OK?

Yes	USE a jumper cable to temporarily ground various parts of the vehicle (examples include: engine, fenders, quarter panels, body sheet metal) to the frame. When the noise is eliminated, PROVIDE a permanent ground where necessary.

No	REPAIR the ignition system as necessary.

A4 CHECK THE AUDIO SYSTEM RECEPTION WITH THE REAR WINDOW DEFROST GRID ACTIVATED

Operate the audio system in AM/ FM mode.

Check the reception with the rear window defrost grid activated and deactivated.

Is poor reception only present with the rear window defrost grid activated?

Yes	The grid line material is not embedded in the glass, but is baked onto the glass surface, and consequently can be scraped off. Carefully INSPECT and REPAIR the AM/ FM on-glass antenna grid. REFER to: Heated Window Grid Wire Repair .

No	* For a concern with only the AM radio, GO to A5* For a concern with only the FM radio, or with both the AM and FM radio, GO to A8

A5 CHECK THE AM (AMPLITUDE MODULATION) SIGNAL AMPLIFIER CIRCUIT FOR CORRECT VOLTAGE

Ignition OFF.

Disconnect: AM/ FM Antenna Amplifier C4082 .

Ignition ON.

Operate the audio system in AM mode.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4082-1		Ground

Is the voltage greater than 11 volts?

Yes	GO to A8

No	GO to A6

A6 CHECK THE AM (AMPLITUDE MODULATION) SIGNAL AMPLIFIER CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Disconnect: ACM C240A .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4082-1	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to A7

No	REPAIR the circuit.

A7 CHECK THE AM (AMPLITUDE MODULATION) SIGNAL AMPLIFIER CIRCUIT FOR AN OPEN

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4082-1	Ω	C240A-2

Is the resistance less than 3 ohms?

Yes	GO to A22

No	REPAIR the circuit.

A8 CHECK THE FRONT AM (AMPLITUDE MODULATION) / FM (FREQUENCY MODULATION) ANTENNA COAXIAL CABLE CORE AND SHIELD FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: AM/ FM antenna coaxial cable from the ACM. REFER to: Audio Front Control Module (ACM) .

Disconnect: AM/ FM antenna inline coaxial cable connection underneath the center console. REFER to: Floor Console .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
AM/ FM antenna coaxial cable core at the ACM		Ground
AM/ FM antenna coaxial cable shield at the ACM		Ground

Is any voltage present?

Yes	REPAIR or INSTALL a new front AM/ FM antenna coaxial cable. REFER to: Audio Unit Antenna Cable .

No	GO to A9

A9 CHECK THE FRONT AM (AMPLITUDE MODULATION) / FM (FREQUENCY MODULATION) ANTENNA COAXIAL CABLE CORE FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
AM/ FM antenna coaxial cable core at the ACM	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to A10

No	REPAIR or INSTALL a new front AM/ FM antenna coaxial cable. REFER to: Audio Unit Antenna Cable .

A10 CHECK THE FRONT AM (AMPLITUDE MODULATION) / FM (FREQUENCY MODULATION) ANTENNA COAXIAL CABLE CORE AND SHIELD FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
AM/ FM antenna coaxial cable core at the ACM	Ω	Front AM/ FM antenna coaxial cable core at the inline connection
AM/ FM antenna coaxial cable shield at the ACM	Ω	Front AM/ FM antenna coaxial cable shield at the inline connection

Are the resistances less than 1 ohm?

Yes	GO to A11

No	REPAIR or INSTALL a new front AM/ FM antenna coaxial cable. REFER to: Audio Unit Antenna Cable .

A11 CHECK THE FRONT AM (AMPLITUDE MODULATION) / FM (FREQUENCY MODULATION) ANTENNA COAXIAL CABLE CORE AND SHIELD FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
AM/ FM antenna coaxial cable core at the ACM	Ω	AM/ FM antenna coaxial cable shield at the ACM

Is the resistance greater than 10, 000 ohms?

Yes	GO to A12

No	REPAIR or INSTALL a new front AM/ FM antenna coaxial cable. REFER to: Audio Unit Antenna Cable .

A12 CHECK THE REAR AM (AMPLITUDE MODULATION) / FM (FREQUENCY MODULATION) ANTENNA COAXIAL CABLE CORE AND SHIELD FOR A SHORT TO VOLTAGE

Connect: AM/ FM antenna inline coaxial cable connection underneath the center console.

Disconnect: AM/ FM antenna coaxial cable from the AM/ FM Antenna Amplifier. REFER to: Audio Unit Antenna Amplifier .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
AM/ FM antenna coaxial cable core at the ACM		Ground
AM/ FM antenna coaxial cable shield at the ACM		Ground

Is any voltage present?

Yes	REPAIR or INSTALL a new rear AM/ FM antenna coaxial cable. REFER to: Audio Unit Antenna Cable .

No	GO to A13

A13 CHECK THE REAR AM (AMPLITUDE MODULATION) / FM (FREQUENCY MODULATION) ANTENNA COAXIAL CABLE CORE FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
AM/ FM antenna coaxial cable core at the ACM	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to A14

No	REPAIR or INSTALL a new rear AM/ FM antenna coaxial cable. REFER to: Audio Unit Antenna Cable .

A14 CHECK THE REAR AM (AMPLITUDE MODULATION) / FM (FREQUENCY MODULATION) ANTENNA COAXIAL CABLE CORE AND SHIELD FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
AM/ FM antenna coaxial cable core at the ACM	Ω	AM/ FM antenna coaxial cable core at the AM/ FM antenna amplifier (harness side)
AM/ FM antenna coaxial cable shield at the ACM	Ω	AM/ FM antenna coaxial cable shield at the AM/ FM antenna amplifier (harness side)

Are the resistances less than 1 ohm?

Yes	GO to A15

No	REPAIR or INSTALL a new rear AM/ FM antenna coaxial cable. REFER to: Audio Unit Antenna Cable .

A15 CHECK THE REAR AM (AMPLITUDE MODULATION) / FM (FREQUENCY MODULATION) ANTENNA COAXIAL CABLE CORE AND SHIELD FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
AM/ FM antenna coaxial cable core at the ACM	Ω	AM/ FM antenna coaxial cable shield at the ACM

Is the resistance greater than 10, 000 ohms?

Yes	GO to A16

No	REPAIR or INSTALL a new rear AM/ FM antenna coaxial cable. REFER to: Audio Unit Antenna Cable .

A16 CHECK THE AM (AMPLITUDE MODULATION) / FM (FREQUENCY MODULATION) ANTENNA AMPLIFIER CORE AND SHIELD FOR A SHORT TO VOLTAGE

Ignition OFF.

Connect: AM/ FM antenna coaxial cable to the AM/ FM Antenna Amplifier.

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
AM/ FM antenna coaxial cable core at the ACM		Ground
AM/ FM antenna coaxial cable shield at the ACM		Ground

Is any voltage present?

Yes	INSTALL a new AM/ FM antenna amplifier. REFER to: Audio Unit Antenna Amplifier .

No	GO to A17

A17 CHECK THE AM (AMPLITUDE MODULATION) / FM (FREQUENCY MODULATION) ANTENNA

AMPLIFIER CORE FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
AM/ FM antenna coaxial cable core at the ACM	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to A18

No	INSTALL a new AM/ FM antenna amplifier. REFER to: Audio Unit Antenna Amplifier .

A18 CHECK THE AM (AMPLITUDE MODULATION) / FM (FREQUENCY MODULATION) ANTENNA AMPLIFIER CORE AND SHIELD FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
AM/ FM antenna coaxial cable core at the ACM	Ω	AM/ FM antenna coaxial cable shield at the ACM

Is the resistance greater than 10, 000 ohms?

Yes	GO to A19

No	INSTALL a new AM/ FM antenna amplifier. REFER to: Audio Unit Antenna Amplifier .

A19 CHECK THE AM (AMPLITUDE MODULATION) / FM (FREQUENCY MODULATION) ANTENNA AMPLIFIER SHIELD FOR CONTINUITY TO GROUND

Measure:

Positive Lead	Measurement / Action	Negative Lead
AM/ FM antenna coaxial cable shield at the ACM	Ω	Ground

Is the resistance less than 1 ohm?

Yes	GO to A21

No	GO to A20

A20 CHECK THE AM (AMPLITUDE MODULATION) / FM (FREQUENCY MODULATION) ANTENNA AMPLIFIER SHIELD FOR CONTINUITY TO ANTENNA UNIT BASE

Remove the AM/ FM antenna amplifier. REFER to: Audio Unit Antenna Amplifier .

Measure:

Positive Lead	Measurement / Action	Negative Lead
AM/ FM antenna shield at the AM/ FM antenna amplifier (component side)	Ω	AM/ FM antenna amplifier base (unpainted surface on the mounting tab)

Is the resistance less than 1 ohm?

Yes	INSPECT and REPAIR any corrosion on the AM/ FM antenna amplifier and/or vehicle mounting surface. REINSTALL the AM/ FM antenna amplifier and ensure the proper torque value is achieved. REFER to: Audio Unit Antenna Amplifier .

No	INSTALL a new AM/ FM antenna amplifier. REFER to: Audio Unit Antenna Amplifier .

A21 CHECK THE AM (AMPLITUDE MODULATION) / FM (FREQUENCY MODULATION) ANTENNA COMPONENTS

Disconnect and inspect the AM/ FM antenna amplifier connector for the AM/ FM antenna circuits coming from the AM/ FM on-glass antenna grid. REFER to: Audio Unit Antenna Amplifier .

Inspect the AM/ FM antenna circuits coming from the AM/ FM on-glass antenna grid.

Inspect the AM/ FM antenna circuit connections at the AM/ FM on-glass antenna grid.

Is any damage present on the AM/ FM antenna circuits or connections?

Yes	REPAIR or REPLACE as necessary.

No	GO to A22

A22 CHECK FOR CORRECT ACM (AUDIO FRONT CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all the ACM connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the ACM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ACM. REFER to: Audio Front Control Module (ACM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST B : POOR RECEPTION OR CONTINUOUS SEEK OR SCAN - AM (AMPLITUDE MODULATION) / FM (FREQUENCY MODULATION) (CONVERTIBLE)

Refer to Audio System/Navigation - AM/FM/CD/SYNC for schematic and connector information.

Refer to Charging System for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See AM/ FM Radio, RDS, Antenna, and Noise Suppression Equipment.

Possible Sources

- No channel found in the selected RDS VHR category
- Charging system
- Wiring, terminals, or connectors
- Ignition system
- Noise suppression equipment
- AM/ FM antenna coaxial cable
- RHR fender-mounted AM/ FM mast antenna
- Mounting surface corrosion
- ACM

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST B : POOR RECEPTION OR CONTINUOUS SEEK

OR SCAN - AM (AMPLITUDE MODULATION) / FM (FREQUENCY MODULATION) (CONVERTIBLE) > PINPOINT TEST B : POOR RECEPTION OR CONTINUOUS SEEK OR SCAN - AM (AMPLITUDE MODULATION) / FM (FREQUENCY MODULATION) (CONVERTIBLE)

B1 CHECK THE AUDIO SYSTEM RECEPTION WITH THE ENGINE RUNNING

Operate the audio system in AM/ FM mode.

Check the reception with the engine running, and with the engine off.

Is poor reception only present with the engine running?

Yes	GO to B2

No	* For a concern with only the AM radio, GO to B4* For a concern with only the FM radio, or with both the AM and FM radio, GO to B7

B2 CHECK THE GENERATOR

Ignition OFF.

NOTE: Do not allow the generator B+ cable terminal to make contact with a conductive surface. Failure to follow this instruction may result in personal injury or damage to the vehicle.

Disconnect: Generator B+ Cable C102C .

Start the engine.

Operate the audio system in AM/ FM mode.

Is the reception OK?

Yes	INSTALL a new generator.* For vehicles with the 2.3L EcoBoost (201kW/273PS), REFER to: Generator - 2.3L EcoBoost (201kW/273PS) .* For vehicles with the 3.7L Duratec (227kW/301PS), REFER to: Generator - 3.7L Duratec (227kW/301PS) .* For vehicles with the 5.0L 32V Ti-VCT, REFER to: Generator - 5.0L 32V Ti-VCT .

No	GO to B3

B3 CHECK THE IGNITION CIRCUITS

Ignition OFF.

Connect: Generator B+ Cable C102C .

Visually inspect the engine compartment and make sure all ignition coils are correctly and

securely connected, and that there are no visible cracks in the coil housings.

Inspect all the wiring harnesses and connectors for damaged insulation and loose or broken conditions.

Are the ignition components OK?

Yes	USE a jumper cable to temporarily ground various parts of the vehicle (examples include: engine, fenders, quarter panels, body sheet metal) to the frame. When the noise is eliminated, PROVIDE a permanent ground where necessary.

No	REPAIR the ignition system as necessary.

B4 CHECK THE AM (AMPLITUDE MODULATION) SIGNAL AMPLIFIER CIRCUIT FOR CORRECT VOLTAGE

Ignition OFF.

Disconnect: Antenna C4823 .

Ignition ON.

Operate the audio system in AM mode.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4823-1		Ground

Is the voltage greater than 11 volts?

Yes	GO to B7

No	GO to B5

B5 CHECK THE AM (AMPLITUDE MODULATION) SIGNAL AMPLIFIER CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Disconnect: ACM C240A .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4823-1	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to B6

No	REPAIR the circuit.

B6 CHECK THE AM (AMPLITUDE MODULATION) SIGNAL AMPLIFIER CIRCUIT FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4823-1	Ω	C240A-2

Is the resistance less than 3 ohms?

Yes	GO to B20

No	REPAIR the circuit.

B7 CHECK THE FRONT AM (AMPLITUDE MODULATION) / FM (FREQUENCY MODULATION) ANTENNA COAXIAL CABLE CORE AND SHIELD FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: AM/ FM antenna coaxial cable from the ACM. REFER to: Audio Front Control Module (ACM) .

Disconnect: AM/ FM antenna inline coaxial cable connection underneath the center console. REFER to: Floor Console .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
AM/ FM antenna coaxial cable core at the ACM	V	Ground
AM/ FM antenna coaxial cable shield at the ACM	V	Ground

Is any voltage present?

Yes	REPAIR or INSTALL a new front AM/ FM antenna coaxial cable. REFER to: Audio Unit Antenna Cable .

No	GO to B8

B8 CHECK THE FRONT AM (AMPLITUDE MODULATION) / FM (FREQUENCY MODULATION) ANTENNA COAXIAL CABLE CORE FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
AM/ FM antenna coaxial cable core at the ACM	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to B9

No	REPAIR or INSTALL a new front AM/ FM antenna coaxial cable. REFER to: Audio Unit Antenna Cable .

B9 CHECK THE FRONT AM (AMPLITUDE MODULATION) / FM (FREQUENCY MODULATION) ANTENNA COAXIAL CABLE CORE AND SHIELD FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
AM/ FM antenna coaxial cable core at the ACM	Ω	Front AM/ FM antenna coaxial cable core at the inline connection
AM/ FM antenna coaxial cable shield at the ACM	Ω	Front AM/ FM antenna coaxial cable shield at the inline connection

Are the resistances less than 1 ohm?

Yes	GO to B10

No	REPAIR or INSTALL a new front AM/ FM antenna coaxial cable. REFER to: Audio Unit Antenna Cable .

B10 CHECK THE FRONT AM (AMPLITUDE MODULATION) / FM (FREQUENCY MODULATION) ANTENNA COAXIAL CABLE CORE AND SHIELD FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
AM/ FM antenna coaxial cable core at the ACM	Ω	AM/ FM antenna coaxial cable shield at the ACM

Is the resistance greater than 10, 000 ohms?

Yes	GO to B11

No	REPAIR or INSTALL a new front AM/ FM antenna coaxial cable. REFER to: Audio Unit Antenna Cable .

B11 CHECK THE REAR AM (AMPLITUDE MODULATION) / FM (FREQUENCY MODULATION) ANTENNA COAXIAL CABLE CORE AND SHIELD FOR A SHORT TO VOLTAGE

Connect: AM/ FM antenna inline coaxial cable connection underneath the center console.

Disconnect: AM/ FM antenna coaxial cable from the antenna unit. REFER to: Audio Unit Antenna .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
AM/ FM antenna coaxial cable core at the ACM		Ground
AM/ FM antenna coaxial cable shield at the ACM		Ground

Is any voltage present?

Yes	REPAIR or INSTALL a new rear AM/ FM antenna coaxial cable. REFER to: Audio Unit Antenna Cable .

No	GO to B12

B12 CHECK THE REAR AM (AMPLITUDE MODULATION) / FM (FREQUENCY MODULATION) ANTENNA COAXIAL CABLE CORE FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
AM/ FM antenna coaxial cable core at the ACM	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to B13

No	REPAIR or INSTALL a new rear AM/ FM antenna coaxial cable. REFER to: Audio Unit Antenna Cable .

B13 CHECK THE REAR AM (AMPLITUDE MODULATION) / FM (FREQUENCY MODULATION) ANTENNA COAXIAL CABLE CORE AND SHIELD FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
AM/ FM antenna coaxial cable core at the ACM	Ω	AM/ FM antenna coaxial cable core at the antenna unit (harness side)
AM/ FM antenna coaxial cable shield at the ACM	Ω	AM/ FM antenna coaxial cable shield at the antenna unit (harness side)

Are the resistances less than 1 ohm?

Yes	GO to B14

No	REPAIR or INSTALL a new rear AM/ FM antenna coaxial cable. REFER to: Audio Unit Antenna Cable .

B14 CHECK THE REAR AM (AMPLITUDE MODULATION) / FM (FREQUENCY MODULATION) ANTENNA COAXIAL CABLE CORE AND SHIELD FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
AM/ FM antenna coaxial cable core at the ACM	Ω	AM/ FM antenna coaxial cable shield at the ACM

Is the resistance greater than 10, 000 ohms?

Yes	GO to B15

No	REPAIR or INSTALL a new rear AM/ FM antenna coaxial cable. REFER to: Audio Unit Antenna Cable .

B15 CHECK THE AM (AMPLITUDE MODULATION) / FM (FREQUENCY MODULATION) ANTENNA UNIT CORE AND SHIELD FOR A SHORT TO VOLTAGE

Ignition OFF.

Connect: AM/ FM antenna coaxial cable at the antenna unit.

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
AM/ FM antenna coaxial cable core at the ACM		Ground
AM/ FM antenna coaxial cable shield at the ACM		Ground

Is any voltage present?

Yes	INSTALL a new RHR fender-mounted AM/ FM mast antenna. REFER to: Audio Unit Antenna .

No	GO to B16

B16 CHECK THE AM (AMPLITUDE MODULATION) / FM (FREQUENCY MODULATION) ANTENNA UNIT CORE FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
AM/ FM antenna coaxial cable core at the ACM	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to B17

No	INSTALL a new RHR fender-mounted AM/ FM mast antenna. REFER to: Audio Unit Antenna .

B17 CHECK THE AM (AMPLITUDE MODULATION) / FM (FREQUENCY MODULATION) ANTENNA UNIT CORE AND SHIELD FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
AM/ FM antenna coaxial cable core at the ACM	Ω	AM/ FM antenna coaxial cable shield at the ACM

Is the resistance greater than 10, 000 ohms?

Yes	GO to B18

No	INSTALL a new RHR fender-mounted AM/ FM mast antenna. REFER to: Audio Unit Antenna .

B18 CHECK THE AM (AMPLITUDE MODULATION) / FM (FREQUENCY MODULATION) ANTENNA UNIT SHIELD FOR CONTINUITY TO GROUND

Measure:

Positive Lead	Measurement / Action	Negative Lead
AM/ FM antenna coaxial cable shield at the ACM	Ω	Ground

Is the resistance less than 1 ohm?

Yes	GO to B20

No	GO to B19

B19 CHECK THE AM (AMPLITUDE MODULATION) / FM (FREQUENCY MODULATION) ANTENNA UNIT SHIELD FOR CONTINUITY TO ANTENNA UNIT BASE

Remove the AM/ FM antenna. REFER to: Audio Unit Antenna .

Measure:

Positive Lead	Measurement / Action	Negative Lead
AM/ FM antenna unit shield at the antenna unit (component side)	Ω	AM/ FM antenna base (unpainted surface)

Is the resistance less than 1 ohm?

Yes	INSPECT and REPAIR any corrosion on the RHR fender-mounted AM/ FM mast antenna base and/or vehicle mounting surface. REINSTALL the antenna and ensure the proper torque value is achieved. REFER to: Audio Unit Antenna .

No	INSTALL a new RHR fender-mounted AM/ FM mast antenna. REFER to: Audio Unit Antenna .

B20 CHECK FOR CORRECT ACM (AUDIO FRONT CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all the ACM connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the ACM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ACM. REFER to: Audio Front Control Module (ACM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST C : THE SATELLITE RADIO IS INOPERATIVE, HAS POOR RECEPTION OR SOUND QUALITY, OR HAS NO SOUND

Refer to Audio System/Navigation - AM/FM/SYNC/Touchscreen Display for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See MyKey ®, Satellite Radio, and Antenna.

When a satellite radio subscription is activated, the ESN of the satellite radio receiver built into the ACM is associated with the VIN.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1A89:11	Satellite Antenna: Circuit Short To Ground	Set by the ACM when a short to ground is detected on the satellite radio coaxial cable for more than 1 second. This DTC can be either continuous or on-demand.
B1A89:13	Satellite Antenna: Circuit Open	Set by the ACM when an open is detected on the satellite radio coaxial cable for more than 250 milliseconds. This DTC can be

		either continuous or on-demand.

Possible Sources

- Expired subscription
- Obstructions in the antenna's line of sight
- Incorrectly matched ESN
- Satellite radio antenna coaxial cable
- Satellite radio antenna
- ACM

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST C : THE SATELLITE RADIO IS INOPERATIVE, HAS POOR RECEPTION OR SOUND QUALITY, OR HAS NO SOUND > PINPOINT TEST C : THE SATELLITE RADIO IS INOPERATIVE, HAS POOR RECEPTION OR SOUND QUALITY, OR HAS NO SOUND

C1 VERIFY AN ACTIVE SUBSCRIPTION

Operate the audio system in satellite radio mode and observe the infotainment display.

Does the display indicate that the subscription has expired?

Yes	The subscription has expired. INSTRUCT the customer to contact SIRIUS to reactivate the subscription.

No	GO to C2

C2 CHECK THE RECEPTION

Drive the vehicle to an open location that is free from obstacles such as tall buildings or large trees.

Using a diagnostic scan tool, view the ACM Parameter Identifications (PIDs).

Monitor the satellite signal strength (SAT_SIG_STR) PID.

If the PID reads "No Signal" or "Poor," move the vehicle to another area and retest until "Good," "Very Good," or "Excellent" PID values are obtained.

Can a "Good," "Very Good," or "Excellent" PID value be obtained?

Yes	GO to C3

No	GO to C6

C3 CHECK THE SATELLITE RADIO SYSTEM FOR CORRECT OPERATION

Operate multiple channels with the audio system in satellite radio mode.

Does the satellite radio system receive multiple channels with normal sound quality?

Yes	The system is operating correctly at this time. The concern was a result of obstructions in the antenna's line of sight.

No	GO to C4

C4 CHECK FOR PROMOTIONAL CHANNEL 184

Select channel 184.

Does the satellite radio system receive channel 184 with normal sound quality?

Yes	GO to C5

No	GO to C6

C5 VERIFY THAT THE VIN (VEHICLE IDENTIFICATION NUMBER) AND ESN (ELECTRONIC SERIAL NUMBER) ON FILE MATCH THE VIN (VEHICLE IDENTIFICATION NUMBER) AND ESN (ELECTRONIC SERIAL NUMBER) FROM THE VEHICLE

Retrieve the satellite radio ESN by tuning to channel 0.

Contact the SIRIUS Dealer Support Line (888-465-8528).

Ensure that the VIN and ESN SIRIUS has on the customer's file match the VIN and ESN retrieved from the vehicle.

Follow the actions from step 2 to obtain "Good," "Very Good," or "Excellent" reception.

Operate the audio system in satellite radio mode.

NOTE: It may take up to 30 minutes for the activation signal to be received and satellite radio functions to operate.

Request for SIRIUS to send the activation signal to the vehicle 2-3 times.

Operate multiple channels with the audio system in satellite radio mode.

Does the satellite radio system receive multiple channels with normal sound quality?

Yes	The system is operating correctly at this time. The concern was a result of the activation

	signal needing to be resent or the VIN and ESN SIRIUS had on file not matching the VIN and ESN from the vehicle.

No	GO to C6

C6 CHECK FOR ACM (AUDIO FRONT CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition ON.

Using a diagnostic scan tool, clear the ACM Diagnostic Trouble Codes (DTCs).

Using a diagnostic scan tool, perform the ACM self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded in the ACM?

Yes	* For DTC B1A89:11 or DTC B1A89:13, GO to C7* For all other Diagnostic Trouble Codes (DTCs), REFER to: Information and Entertainment System . See DTC REFER to: Satellite Radio Antenna . Chart: ACM.

No	GO to C20

C7 CHECK THE FRONT SATELLITE ANTENNA COAXIAL CABLE CORE AND SHIELD FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: Satellite antenna coaxial cable from the ACM. REFER to: Audio Front Control Module (ACM) .

Disconnect: Satellite antenna inline coaxial cable connection underneath the center console. REFER to: Floor Console .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
Satellite antenna coaxial cable core at the ACM		Ground
Satellite antenna coaxial cable shield at the ACM		Ground

Is any voltage present?

Yes	REPAIR or INSTALL a new front satellite antenna coaxial cable. REFER to: Satellite Radio Antenna Cable .

No	GO to C8

C8 CHECK THE FRONT SATELLITE ANTENNA COAXIAL CABLE CORE FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
Satellite antenna coaxial cable core at the ACM	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to C9

No	REPAIR or INSTALL a new front satellite antenna coaxial cable. REFER to: Satellite Radio Antenna Cable .

C9 CHECK THE FRONT SATELLITE ANTENNA COAXIAL CABLE CORE AND SHIELD FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
Satellite antenna coaxial cable core at the ACM	Ω	Front satellite antenna coaxial cable core at the inline connection
Satellite antenna coaxial cable shield at the ACM	Ω	Front satellite antenna coaxial cable shield at the inline connection

Are the resistances less than 1 ohm?

Yes	GO to C10

No	REPAIR or INSTALL a new front satellite antenna coaxial cable. REFER to: Satellite Radio Antenna Cable .

C10 CHECK THE FRONT SATELLITE ANTENNA COAXIAL CABLE CORE AND SHIELD FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
Satellite antenna coaxial cable core at the ACM	Ω	Satellite antenna coaxial cable shield at the ACM

Is the resistance greater than 10, 000 ohms?

Yes	GO to C11

No	REPAIR or INSTALL a new front satellite antenna coaxial cable. REFER to: Satellite Radio Antenna Cable .

C11 CHECK THE REAR SATELLITE ANTENNA COAXIAL CABLE CORE AND SHIELD FOR A SHORT TO VOLTAGE

Connect: Satellite antenna inline coaxial cable connection underneath the center console.

Disconnect: Satellite antenna coaxial cable from the satellite radio antenna unit. REFER to: Satellite Radio Antenna .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
Satellite antenna coaxial cable core at the ACM		Ground
Satellite antenna coaxial cable shield at the ACM		Ground

Is any voltage present?

Yes	REPAIR or INSTALL a new rear satellite antenna coaxial cable. REFER to: Satellite Radio Antenna Cable .

No	GO to C12

C12 CHECK THE REAR SATELLITE ANTENNA COAXIAL CABLE CORE FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
Satellite antenna coaxial cable core at the ACM	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to C13

No	REPAIR or INSTALL a new rear satellite antenna coaxial cable. REFER to: Satellite Radio Antenna Cable .

C13 CHECK THE REAR SATELLITE ANTENNA COAXIAL CABLE CORE AND SHIELD FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
Satellite antenna coaxial cable core at the ACM	Ω	Satellite antenna coaxial cable core at the antenna unit (harness side)
Satellite antenna coaxial cable shield at the ACM	Ω	Satellite antenna coaxial cable shield at the antenna unit (harness side)

Are the resistances less than 1 ohm?

Yes	GO to C14

No	REPAIR or INSTALL a new rear satellite antenna coaxial cable. REFER to: Satellite Radio Antenna Cable .

C14 CHECK THE REAR SATELLITE ANTENNA COAXIAL CABLE CORE AND SHIELD FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
Satellite antenna coaxial cable core at the ACM	Ω	Satellite antenna coaxial cable shield at the ACM

Is the resistance greater than 10, 000 ohms?

Yes	GO to C15

No	REPAIR or INSTALL a new rear satellite antenna coaxial cable. REFER to: Satellite Radio Antenna Cable .

C15 CHECK THE SATELLITE ANTENNA UNIT CORE AND SHIELD FOR A SHORT TO VOLTAGE

Ignition OFF.

Connect: Satellite antenna coaxial cable at the satellite radio antenna unit.

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
Satellite antenna coaxial cable core at the ACM		Ground
Satellite antenna coaxial cable shield at the ACM		Ground

Is any voltage present?

Yes	INSTALL a new satellite radio antenna. REFER to: Satellite Radio Antenna .

No	GO to C16

C16 CHECK THE SATELLITE ANTENNA UNIT CORE FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
Satellite antenna coaxial cable core at the ACM	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to C17

No	INSTALL a new satellite radio antenna. REFER to: Satellite Radio Antenna .

C17 CHECK THE SATELLITE ANTENNA UNIT CORE AND SHIELD FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
Satellite antenna coaxial cable core at the ACM	Ω	Satellite antenna coaxial cable shield at the ACM

Is the resistance greater than 10, 000 ohms?

Yes	GO to C18

No	INSTALL a new satellite radio antenna. REFER to: Satellite Radio Antenna .

C18 CHECK THE SATELLITE ANTENNA UNIT SHIELD FOR CONTINUITY TO GROUND

Measure:

Positive Lead	Measurement / Action	Negative Lead
Satellite antenna coaxial cable shield at the ACM	Ω	Ground

Is the resistance less than 1 ohm?

Yes	GO to C20

No	GO to C19

C19 CHECK THE SATELLITE ANTENNA UNIT SHIELD FOR CONTINUITY TO ANTENNA UNIT BASE

Remove the satellite antenna. REFER to: Satellite Radio Antenna .

Measure:

Positive Lead	Measurement / Action	Negative Lead
Satellite antenna unit shield at the antenna unit (component side)	Ω	Satellite antenna base (unpainted surface)

Is the resistance less than 1 ohm?

Yes	INSPECT and REPAIR any corrosion on the satellite radio antenna base and/or vehicle mounting surface. REINSTALL the antenna and ensure the proper torque value is achieved. REFER to: Satellite Radio Antenna .

No	INSTALL a new satellite radio antenna. REFER to: Satellite Radio Antenna .

C20 CHECK FOR CORRECT ACM (AUDIO FRONT CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all the ACM connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the ACM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ACM. REFER to: Audio Front Control Module (ACM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST D : THE SIRIUS DATA SERVICES ARE NOT AVAILABLE - IF EQUIPPED

Refer to Audio System/Navigation - AM/FM/SYNC/Touchscreen Display for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See SIRIUS Data Services and Media Hub.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1A89:11	Satellite Antenna: Circuit Short To Ground	Set by the ACM when a short to ground is detected on the satellite radio coaxial cable for more than 1 second. This DTC can be either continuous or on-demand.
B1A89:13	Satellite Antenna: Circuit Open	Set by the ACM when an open is detected on the satellite radio coaxial cable for more than 250 milliseconds. This DTC can be either continuous or on-demand.
U1A00:87	Private Communication Network: Missing Message	Set by the APIM when messages are missing from the ACM on the SDL circuits.

Removal of the map data SD card results in the loss of SIRIUS Data Services while the card is

removed. This is normal operation.

Possible Sources

- Map data SD card not present, not fully seated, or damaged
- Media hub
- Expired subscription
- Obstructions in the antenna's line of sight
- Incorrectly matched ESN
- Satellite radio antenna coaxial cable
- Satellite radio antenna
- Wiring, terminals, or connectors
- ACM
- APIM

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST D : THE SIRIUS DATA SERVICES ARE NOT AVAILABLE - IF EQUIPPED > PINPOINT TEST D : THE SIRIUS DATA SERVICES ARE NOT AVAILABLE - IF EQUIPPED

NOTE: Ford Motor Company does not support the addition of SIRIUS Data Services to vehicles not equipped with a factory-installed navigation system.

D1 VERIFY THE MAP DATA SD (SECURE DIGITAL) CARD IS PRESENT

Check for the presence of a map data SD card in the media hub SD card slot.

Is the map data SD card present and fully seated?

Yes	GO to D2

No	INSTALL the map data SD card. TEST the system for normal operation.

D2 INSPECT THE MAP DATA SD (SECURE DIGITAL) CARD

Remove the map data SD card.

Inspect the map data SD card case and pins for damage.

Is any damage present?

Yes	INSTALL a new map data SD card.

No	GO to D3

D3 CHECK THE USB (UNIVERSAL SERIAL BUS) PORTS FOR POWER OUTPUT

Connect: MIT 105-00120.

Does the MIT 105-00120 power on from both USB ports?

Yes	GO to D4

No	* If the MIT 105-00120 powers on from only one USB port, INSTALL a new media hub. REFER to: Media Hub .* If the MIT 105-00120 does not power on from either USB port, GO to Pinpoint Test Z

D4 RESET THE APIM (SYNC MODULE) AND VERIFY THE OPERATION OF THE USB (UNIVERSAL SERIAL BUS) CABLE

Remove any devices connected to the media hub.

Carry out an APIM power reset by disconnecting the battery for 1 minute, then reconnecting it.

Wait at least 2 minutes for the APIM to re-initialize.

Connect: MIT 105-00120.

Using the MIT 105-00120, attempt to play an audio file using each USB port.

Is the audio output OK for each USB port?

Yes	GO to D5

No	* If the audio output is not OK from one USB port, INSTALL a new media hub. REFER to: Media Hub .* If the audio output is not OK from both USB ports, GO to Pinpoint Test AA

NOTE: The status of the satellite radio subscription should be disregarded in this step since SIRIUS Data Services does not require a satellite radio subscription to operate.

D5 VERIFY AN ACTIVE SUBSCRIPTION

Access the Subscription Info selection in the touchscreen Travel Link menu.

Does the display indicate the subscription has expired for traffic, weather, fuel prices, movie times, sports, weather map, or ski conditions?

Yes	* If the subscription has expired for one or more, but not all categories mentioned above, GO to D30 * If the subscription has expired for all categories mentioned above, INSTRUCT the customer to contact SIRIUS to reactivate the subscription.

No	GO to D6

D6 CHECK THE RECEPTION

Drive the vehicle to an open location that is free from obstacles such as tall buildings or large trees.

Using a diagnostic scan tool, view the ACM Parameter Identifications (PIDs).

Monitor the satellite signal strength (SAT_SIG_STR) PID.

If the PID reads "No Signal" or "Poor," move the vehicle to another area and retest until "Good," "Very Good," or "Excellent" PID values are obtained.

Can a "Good," "Very Good," or "Excellent" PID value be obtained?

Yes	GO to D7

No	GO to D10

D7 CHECK THE SIRIUS DATA SERVICES FOR CORRECT OPERATION

Operate the audio system in SIRIUS Data Services mode and observe the infotainment display.

Do SIRIUS Data Services operate correctly?

Yes	The system is operating correctly at this time. The concern was a result of obstructions in the antenna's line of sight.

No	GO to D8

D8 CHECK FOR PROMOTIONAL CHANNEL 184

Operate the audio system in satellite radio mode.

Select channel 184.

Does the satellite radio system receive promotional channel 184 with normal sound quality?

Yes	GO to D9

No	GO to D10

D9 VERIFY THAT THE VIN (VEHICLE IDENTIFICATION NUMBER) AND ESN (ELECTRONIC SERIAL NUMBER) ON FILE MATCH THE VIN (VEHICLE IDENTIFICATION NUMBER) AND ESN (ELECTRONIC SERIAL NUMBER) FROM THE VEHICLE

Retrieve the satellite radio ESN by tuning to channel 0.

Contact the SIRIUS Dealer Support Line (888-465-8528).

Ensure that the VIN and ESN SIRIUS has on the customer's file match the VIN and ESN retrieved from the vehicle.

Follow the actions from step 4 to obtain "Good," "Very Good," or "Excellent" reception.

Operate the audio system in SIRIUS Data Services mode.

NOTE: It may take up to 30 minutes for the activation signal to be received and satellite radio functions to operate.

Request for SIRIUS to send the activation signal to the vehicle 2-3 times.

Operate the audio system in SIRIUS Data Services mode and observe the infotainment display.

Do SIRIUS Data Services operate correctly?

Yes	The system is operating correctly at this time. The concern was a result of the activation signal needing to be resent or the VIN and ESN SIRIUS had on file not matching the VIN and ESN from the vehicle.

No	GO to D10

D10 CHECK FOR ACM (AUDIO FRONT CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition ON.

Using a diagnostic scan tool, clear the ACM Diagnostic Trouble Codes (DTCs).

Using a diagnostic scan tool, perform the ACM self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded in the ACM?

Yes	* For DTC B1A89:11 or DTC B1A89:13, GO to D12* For all other ACM Diagnostic Trouble Codes (DTCs), REFER to: Information and Entertainment System . See DTC Chart: ACM.

No	GO to D11

D11 CHECK FOR APIM (SYNC MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition ON.

Using a diagnostic scan tool, clear the APIM Diagnostic Trouble Codes (DTCs).

Using a diagnostic scan tool, perform the APIM self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded in the APIM?

Yes	* For DTC U1A00:87, GO to D25* For all other APIM Diagnostic Trouble Codes (DTCs), REFER to: Information and Entertainment System . See DTC Chart: APIM.

No	GO to D29

D12 CHECK THE FRONT SATELLITE ANTENNA COAXIAL CABLE CORE AND SHIELD FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: Satellite antenna coaxial cable from the ACM. REFER to: Audio Front Control Module (ACM) .

Disconnect: Satellite antenna inline coaxial cable connection underneath the center console. REFER to: Floor Console .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
Satellite antenna coaxial cable core at the ACM		Ground
Satellite antenna coaxial cable shield at the ACM		Ground

Is any voltage present?

Yes	REPAIR or INSTALL a new front satellite antenna coaxial cable. REFER to: Satellite Radio Antenna Cable .

No	GO to D13

D13 CHECK THE FRONT SATELLITE ANTENNA COAXIAL CABLE CORE FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
Satellite antenna coaxial cable core at the ACM	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to D14

No	REPAIR or INSTALL a new front satellite antenna coaxial cable. REFER to: Satellite Radio Antenna Cable .

D14 CHECK THE FRONT SATELLITE ANTENNA COAXIAL CABLE CORE AND SHIELD FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
Satellite antenna coaxial cable core at the ACM	Ω	Front satellite antenna coaxial cable core at the inline connection
Satellite antenna coaxial cable shield at the ACM	Ω	Front satellite antenna coaxial cable shield at the inline connection

Are the resistances less than 1 ohm?

Yes	GO to D15

No	REPAIR or INSTALL a new front satellite antenna coaxial cable. REFER to: Satellite Radio Antenna Cable .

D15 CHECK THE FRONT SATELLITE ANTENNA COAXIAL CABLE CORE AND SHIELD FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
Satellite antenna coaxial cable core at the ACM	Ω	Satellite antenna coaxial cable shield at the ACM

Is the resistance greater than 10, 000 ohms?

Yes	GO to D16

No	REPAIR or INSTALL a new front satellite antenna coaxial cable. REFER to: Satellite Radio Antenna Cable .

D16 CHECK THE REAR SATELLITE ANTENNA COAXIAL CABLE CORE AND SHIELD FOR A SHORT TO VOLTAGE

Ignition OFF.

Connect: Satellite antenna inline coaxial cable connection underneath the center console.

Disconnect: Satellite antenna coaxial cable from the satellite radio antenna unit. REFER to: Satellite Radio Antenna .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
Satellite antenna coaxial cable core at the ACM		Ground
Satellite antenna coaxial cable shield at the ACM		Ground

Is any voltage present?

Yes	REPAIR or INSTALL a new rear satellite antenna coaxial cable. REFER to: Satellite Radio Antenna Cable .

No	GO to D17

D17 CHECK THE REAR SATELLITE ANTENNA COAXIAL CABLE CORE FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
Satellite antenna coaxial cable core at the ACM		Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to D18

No	REPAIR or INSTALL a new rear satellite antenna coaxial cable. REFER to: Satellite Radio Antenna Cable .

D18 CHECK THE REAR SATELLITE ANTENNA COAXIAL CABLE CORE AND SHIELD FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
Satellite antenna coaxial cable core at the ACM	Ω	Satellite antenna coaxial cable core at the antenna unit (harness side)
Satellite antenna coaxial cable shield at the ACM	Ω	Satellite antenna coaxial cable shield at the antenna unit (harness side)

Are the resistances less than 1 ohm?

Yes	GO to D19

No	REPAIR or INSTALL a new rear satellite antenna coaxial cable. REFER to: Satellite Radio Antenna Cable .

D19 CHECK THE REAR SATELLITE ANTENNA COAXIAL CABLE CORE AND SHIELD FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
Satellite antenna coaxial cable core at the ACM	Ω	Satellite antenna coaxial cable shield at the ACM

Is the resistance greater than 10, 000 ohms?

Yes	GO to D20

No	REPAIR or INSTALL a new rear satellite antenna coaxial cable. REFER to: Satellite Radio Antenna Cable .

D20 CHECK THE SATELLITE ANTENNA UNIT CORE AND SHIELD FOR A SHORT TO VOLTAGE

Ignition OFF.

Connect: Satellite antenna coaxial cable at the satellite radio antenna unit.

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
Satellite antenna coaxial cable core at the ACM		Ground
Satellite antenna coaxial cable shield at the ACM		Ground

Is any voltage present?

Yes	INSTALL a new satellite radio antenna. REFER to: Satellite Radio Antenna .

No	GO to D21

D21 CHECK THE SATELLITE ANTENNA UNIT CORE FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
Satellite antenna coaxial cable core at the ACM	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to D22

No	INSTALL a new satellite radio antenna. REFER to: Satellite Radio Antenna .

D22 CHECK THE SATELLITE ANTENNA UNIT CORE AND SHIELD FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
Satellite antenna coaxial cable core at the ACM	Ω	Satellite antenna coaxial cable shield at the ACM

Is the resistance greater than 10, 000 ohms?

Yes	GO to D23

No	INSTALL a new satellite radio antenna. REFER to: Satellite Radio Antenna .

D23 CHECK THE SATELLITE ANTENNA UNIT SHIELD FOR CONTINUITY TO GROUND

Measure:

Positive Lead	Measurement / Action	Negative Lead
Satellite antenna coaxial cable shield at the ACM	Ω	Ground

Is the resistance less than 1 ohm?

Yes	GO to D29

No	GO to D24

D24 CHECK THE SATELLITE ANTENNA UNIT SHIELD FOR CONTINUITY TO ANTENNA UNIT BASE

Remove the satellite antenna. REFER to: Satellite Radio Antenna .

Measure:

Positive Lead	Measurement / Action	Negative Lead
Satellite antenna unit shield at the antenna unit (component side)	Ω	Satellite antenna base (unpainted surface)

Is the resistance less than 1 ohm?

Yes	INSPECT and REPAIR any corrosion on the satellite radio antenna base and/or vehicle mounting surface. REINSTALL the antenna and ensure the proper torque value is achieved. REFER to: Satellite Radio Antenna .

No	INSTALL a new satellite radio antenna. REFER to: Satellite Radio Antenna .

D25 CHECK THE SDL (SIRIUS DATA LINK) FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: ACM C240B .

Disconnect: APIM C2383 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C240B-6	V	Ground

C240B-19		Ground

Is any voltage present?

Yes	REPAIR the circuit in question.

No	GO to D26

D26 CHECK THE SDL (SIRIUS DATA LINK) FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C240B-6	Ω	Ground
C240B-19	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to D27

No	REPAIR the circuit in question.

D27 CHECK THE SDL (SIRIUS DATA LINK) FOR AN OPEN

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C240B-6	Ω	C2383-51
C240B-19	Ω	C2383-52

Are the resistances less than 3 ohms?

Yes	GO to D28

No	REPAIR the circuit in question.

D28 CHECK THE SDL (SIRIUS DATA LINK) FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C240B-6	Ω	C240B-19

Is the resistance greater than 10, 000 ohms?

Yes	GO to D30

No	REPAIR the circuit in question.

D29 CHECK FOR CORRECT ACM (AUDIO FRONT CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all the ACM connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the ACM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ACM. REFER to: Audio Front Control Module (ACM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

D30 CHECK FOR CORRECT APIM (SYNC MODULE) OPERATION

Ignition OFF.

Disconnect and inspect the APIM connector.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the APIM connector. Make sure it seats and latches correctly.

Wait at least 2 minutes for the APIM to re-initialize.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, PERFORM the APIM Hardware Test. Refer to APIM HARDWARE TESTING .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST E : THE SPEED COMPENSATED VOLUME DOES NOT OPERATE CORRECTLY

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See DSP, MyKey ® Audio Operation, and Speed Compensated Volume.

Possible Sources

- Speed compensated volume setting
- Audio DSP module

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST E : THE SPEED COMPENSATED VOLUME DOES NOT OPERATE CORRECTLY > PINPOINT TEST E : THE SPEED COMPENSATED VOLUME DOES NOT OPERATE CORRECTLY

E1 CHECK THE SPEEDOMETER OPERATION

Drive the vehicle and observe the speedometer.

Does the speedometer operate correctly?

Yes	GO to E2

No	REFER to: Instrumentation, Message Center and Warning Chimes . See A virtual Gauge (Accessory Power, AWD, Brake Coach, High Voltage Battery, Integrated Power,

	Speedometer, Split Power, Tachometer Or Temperature), Is Inoperative

E2 CHECK THE SPEED COMPENSATED VOLUME SETTING

Turn the speed compensated volume off. Refer to the Owner's Literature.

Operate the audio system in AM/ FM mode.

Drive the vehicle at various speeds and observe the speaker volume.

Set the speed compensated volume to maximum compensation. Refer to the Owner's Literature.

Operate the audio system in AM/ FM mode.

Drive the vehicle at various speeds and observe the speaker volume.

Does the volume remain constant with the speed compensated volume turned off, and increase and decrease with vehicle speed with the speed compensated volume set to maximum?

Yes	The system is operating correctly at this time. INSTRUCT the customer in the correct usage of the speed compensated volume feature.

No	GO to E3

E3 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0155:00

Using a diagnostic scan tool, retrieve all Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U0155:00 retrieved in any audio system module?

Yes	GO to Pinpoint Test AS

No	GO to E4

E4 CHECK FOR CORRECT AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE OPERATION

Ignition OFF.

Disconnect and inspect all the audio DSP module connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the audio DSP module connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, discontinue this test and follow TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new audio DSP module. REFER to: Audio Digital Signal Processing (DSP) Module .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST F : A LOUD POPPING SOUND IS HEARD WHEN CYCLING THE IGNITION

Refer to Audio System/Navigation - AM/FM/SYNC/Touchscreen Display for schematic and connector information.

Refer to Starting System for schematic and connector information.

Normal Operation and Fault Conditions

The ACM receives voltage on a start signal circuit when the ignition is in the START position, and mutes the audio signal output. This prevents voltage spikes from producing popping noises through the speakers. An open on this circuit between splice CS101 and the ACM could cause voltage spikes to produce popping noises through the speakers.

Possible Sources

- Wiring, terminals, or connectors
- ACM

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST F : A LOUD POPPING SOUND IS HEARD WHEN CYCLING THE IGNITION > PINPOINT TEST F : A LOUD POPPING SOUND IS HEARD WHEN CYCLING THE IGNITION

F1 CHECK THE START SENSE CIRCUIT FOR AN OPEN

Ignition OFF.

Disconnect: ACM C240A .

Remove: BJB Starter Relay.

Disconnect:

PCM C1551B for vehicles with the 2.3L EcoBoost (201kW/273PS).

PCM C1381B for vehicles with the 3.7L Duratec (227kW/301PS).

PCM C175B for vehicles with the 5.0L 32V Ti-VCT.

PCM C175B for vehicles with the 5.2L.

For vehicles with the 2.3L EcoBoost (201kW/273PS), measure:

Positive Lead	Measurement / Action	Negative Lead
C240A-3	Ω	BJB Starter Relay Socket 1

Positive Lead	Measurement / Action	Negative Lead
C240A-3	Ω	C1551B-62

For vehicles with the 3.7L Duratec (227kW/301PS), measure:

Positive Lead	Measurement / Action	Negative Lead
C240A-3	Ω	BJB Starter Relay Socket 1

Positive Lead	Measurement / Action	Negative Lead
C240A-3	Ω	C1381B-1

For vehicles with the 5.0L 32V Ti-VCT, measure:

Positive Lead	Measurement / Action	Negative Lead
C240A-3	Ω	BJB Starter Relay Socket 1

Positive Lead	Measurement / Action	Negative Lead
C240A-3	Ω	C175B-1

For vehicles with the 5.2L, measure:

Positive Lead	Measurement / Action	Negative Lead
C240A-3	Ω	BJB Starter Relay Socket 1

Positive Lead	Measurement / Action	Negative Lead
C240A-3	Ω	C175B-1

Are the resistances less than 3 ohms?

Yes	GO to F2

No	REPAIR the circuit.

F2 CHECK FOR CORRECT ACM (AUDIO FRONT CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all the ACM connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the ACM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ACM. REFER to: Audio Front Control Module (ACM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST G : A LOW FREQUENCY NOISE IS HEARD FROM THE AUDIO SYSTEM

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See ANC, ANC Microphones, Audio DSP Module, and DACMC.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U3000:92	Control Module: Performance or Incorrect Operation	Set by the DACMC when a fault is detected with the ANC system when running the Active Diagnostics Test.

U3000:94	Control Module: Unexpected Operation	Set by the DACMC when a fault is detected with the ANC system.

Possible Source

- Improper ANC microphone installation or damage
- Wiring, terminals, or connectors
- DACMC
- Audio DSP module

Visual Inspection and Diagnostic Pre-checks

- The ANC system may not be compatible with speakers, other audio system components, and audio system architectures not approved by Ford. Ensure that no modifications have been made to the audio system.
- Inspect the LHF, RHF, RHR, and LHR door midwoofer speaker locations for items that may be blocking the speaker sound output.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST G : A LOW FREQUENCY NOISE IS HEARD FROM THE AUDIO SYSTEM > PINPOINT TEST G : A LOW FREQUENCY NOISE IS HEARD FROM THE AUDIO SYSTEM

G1 CHECK FOR ANC (ACTIVE NOISE CONTROL) MICROPHONE DIAGNOSTIC TROUBLE CODES (DTCS) PRESENT IN THE DACMC (DIGITAL AUDIO CONTROL MODULE C) OR SPEAKER DIAGNOSTIC TROUBLE CODES (DTCS) PRESENT IN THE AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE

Using a diagnostic scan tool, perform the self-test for the following modules:

DACMC

Audio DSP module

Are any ANC microphone Diagnostic Trouble Codes (DTCs) recorded in the DACMC or any speaker Diagnostic Trouble Codes (DTCs) recorded in the audio DSP module?

Yes	* For DACMC Diagnostic Trouble Codes (DTCs), REFER to: Information and Entertainment System . See DTC Chart: DACMC.* For audio DSP module Diagnostic Trouble Codes (DTCs), REFER to: Information and Entertainment System . See DTC Chart: Audio DSP Module.

No	GO to G2

G2 VERIFY IF THE CONCERN IS RELATED TO THE ANC (ACTIVE NOISE CONTROL) SYSTEM

Close the luggage compartment lid and all doors.

Ignition ON.

Turn the audio system off.

Determine if an observable symptom is present.

Enable the ANC system by starting the vehicle.

Determine if an observable symptom is present.

Is an observable symptom only present when the engine is on?

Yes	GO to G3

No	* If an observable symptom is only present when the engine is off, REFER to: Information and Entertainment System . See DTC Charts or Symptom Charts to diagnose the audio system.* If an observable symptom is present with the engine off and the ignition on **and** when the engine is on, REFER to: DTC Charts or Symptom Charts to diagnose the audio system.

G3 VERIFY IF THE CONCERN IS RELATED TO THE ANC (ACTIVE NOISE CONTROL) SYSTEM WITH THE VEHICLE'S WHEELS STATIONARY

With the vehicle stationary, take the gasoline engine through the RPM range and verify if there is an observable symptom present.

Determine if an observable symptom is present.

Disable the ANC system by opening the driver's door.

With the vehicle stationary, take the gasoline engine through the RPM range and verify if there is an observable symptom present.

Is an observable symptom present when the driver's door is open?

Yes	REFER to: Information and Entertainment System . See DTC Charts or Symptom Charts to diagnose the audio system.

No	GO to G4

G4 VERIFY IF THE CONCERN IS RELATED TO THE ANC (ACTIVE NOISE CONTROL) SYSTEM WITH THE VEHICLE'S WHEELS IN MOTION

Place the vehicle on a hoist.

Ensure all four wheels are off the ground and not in contact with anything.

Close the luggage compartment lid and all doors.

Enable the ANC system by starting the vehicle.

Ensure the audio system is off.

Take the gasoline engine through the RPM range in various gears and verify if there is an observable symptom present.

Disable the ANC system by opening the driver's door.

Take the gasoline engine through the RPM range in various gears and verify if there is an observable symptom present.

Is an observable symptom present when the driver's door is open?

Yes	REFER to: Information and Entertainment System . See DTC Charts or Symptom Charts to diagnose the audio system.

No	GO to G5

G5 CHECK THE VEHICLE SERVICE HISTORY

Check the vehicle service history for recent service actions related to the overhead console, headliner, or ANC microphones.

Have there been recent service actions with the overhead console, headliner, or ANC microphones?

Yes	GO to G6

No	GO to G14

G6 INSPECT THE OVERHEAD CONSOLE ANC (ACTIVE NOISE CONTROL) MICROPHONE INSTALLATION

Gain access to the overhead console ANC microphone. REFER to: Active Noise Control Microphone .

Inspect the microphone for correct mounting.

The microphone is snapped into the mounting bezel.

The microphone is seated properly.

Is the microphone mounted correctly?

Yes	GO to G7

No	INSTALL the ANC microphone correctly. REFER to: Active Noise Control Microphone .

G7 INSPECT THE OVERHEAD CONSOLE ANC (ACTIVE NOISE CONTROL) MICROPHONE FOR DAMAGE

Inspect the microphone and microphone mounting bezel for damage.

Is any damage present?

Yes	REPLACE the microphone or overhead console as needed. REFER to: Active Noise Control Microphone .

No	* For coupes, GO to G12* For convertibles, GO to G8

G8 INSPECT THE LHF (LEFT-HAND FRONT) ANC (ACTIVE NOISE CONTROL) MICROPHONE INSTALLATION

Gain access to the LHF ANC microphone. REFER to: Active Noise Control Microphone .

Inspect the microphone for correct mounting.

The microphone is snapped into the mounting bezel.

The microphone is seated properly.

The microphone mounting bezel is properly glued to the headliner with no gaps between the headliner and all four corners of the microphone mounting bezel.

Is the microphone mounted correctly?

Yes	GO to G9

No	INSTALL the ANC microphone and/or mounting bezel correctly. REFER to: Active Noise Control Microphone .

G9 INSPECT THE LHF (LEFT-HAND FRONT) ANC (ACTIVE NOISE CONTROL) MICROPHONE FOR DAMAGE

Inspect the microphone and microphone mounting bezel for damage.

Is any damage present?

Yes	REPLACE the microphone or mounting bezel as needed. REFER to: Active Noise Control Microphone .

No	GO to G10

G10 INSPECT THE RHF (RIGHT-HAND FRONT) ANC (ACTIVE NOISE CONTROL) MICROPHONE INSTALLATION

Gain access to the LHF ANC microphone. REFER to: Active Noise Control Microphone .

Inspect the microphone for correct mounting.

The microphone is snapped into the mounting bezel.

The microphone is seated properly.

The microphone mounting bezel is properly glued to the headliner with no gaps between the headliner and all four corners of the microphone mounting bezel.

Is the microphone mounted correctly?

Yes	GO to G11

No	INSTALL the ANC microphone and/or mounting bezel correctly. REFER to: Active Noise Control Microphone .

G11 INSPECT THE RHF (RIGHT-HAND FRONT) ANC (ACTIVE NOISE CONTROL) MICROPHONE FOR DAMAGE

Inspect the microphone and microphone mounting bezel for damage.

Is any damage present?

Yes	REPLACE the microphone or mounting bezel as needed. REFER to: Active Noise Control Microphone .

No	GO to G14

G12 INSPECT THE REAR ANC (ACTIVE NOISE CONTROL) MICROPHONE INSTALLATION

Gain access to the rear ANC microphone. REFER to: Active Noise Control Microphone .

Inspect the microphone for correct mounting.

The microphone is snapped into the mounting bezel.

The microphone is seated properly.

The microphone mounting bezel is properly glued to the headliner with no gaps between the headliner and all four corners of the microphone mounting bezel.

Is the microphone mounted correctly?

Yes	GO to G13

No	INSTALL the ANC microphone and/or mounting bezel correctly. REFER to: Active Noise Control Microphone .

G13 INSPECT THE REAR ANC (ACTIVE NOISE CONTROL) MICROPHONE FOR DAMAGE

Inspect the microphone and microphone mounting bezel for damage.

Is any damage present?

Yes	REPLACE the microphone or mounting bezel as needed. REFER to: Active Noise Control Microphone .

No	GO to G14

NOTE: This pinpoint test step directs testing circuits using a back-probe method. Use the special back-probe tool POM6411. Do not force test leads or other probes into connectors. Adequate care must be exercised to avoid connector terminal damage, while ensuring that good electrical contact is made with the circuit or terminal. Failure to follow these instructions may cause damage to wiring, terminals, or connectors, and may cause subsequent electrical faults.

G14 CHECK THE ANC (ACTIVE NOISE CONTROL) AUDIO SIGNALS FROM THE ACM (AUDIO FRONT CONTROL MODULE) TO THE AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE

Place the vehicle on a hoist.

Ensure all four wheels are off the ground and not in contact with anything.

Close the luggage compartment lid and all doors.

Enable the ANC system by starting the vehicle.

Ensure the audio system is off.

While taking the gasoline engine through the RPM range in various gears and back-probing ACM C240A and C240B , measure the AC voltage.

LHF ANC Signal

Positive Lead	Measurement / Action	Negative Lead
C240B-4		Ground
C240B-17		Ground

RHF ANC Signal

Positive Lead	Measurement / Action	Negative Lead
C240A-8		Ground
C240A-20		Ground

Rear ANC Signal

Positive Lead	Measurement / Action	Negative Lead
C240B-9		Ground

C240B-22		Ground

Is a fluctuating AC voltage present?

Yes	GO to G15

No	GO to G19

G15 CHECK THE ANC (ACTIVE NOISE CONTROL) CIRCUITS FROM THE ACM (AUDIO FRONT CONTROL MODULE) TO THE AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: Audio DSP Module C2385A .

Disconnect: ACM C240A .

Disconnect: ACM C240B .

Ignition ON.

Measure:

LHF ANC Signal

Positive Lead	Measurement / Action	Negative Lead
C240B-4		Ground
C240B-17		Ground

RHF ANC Signal

Positive Lead	Measurement / Action	Negative Lead
C240A-8		Ground
C240A-20		Ground

Rear ANC Signal

Positive Lead	Measurement / Action	Negative Lead
C240B-9		Ground
C240B-22		Ground

Shield

Positive Lead	Measurement / Action	Negative Lead
C240B-16		Ground

Is any voltage present?

Yes	REPAIR the circuit in question.

No	GO to G16

G16 CHECK THE ANC (ACTIVE NOISE CONTROL) CIRCUITS FROM THE ACM (AUDIO FRONT CONTROL MODULE) TO THE AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE FOR A SHORT TO GROUND

Ignition OFF.

Measure:

LHF ANC Signal

Positive Lead	Measurement / Action	Negative Lead
C240B-4	Ω	Ground
C240B-17	Ω	Ground

RHF ANC Signal

Positive Lead	Measurement / Action	Negative Lead
C240A-8	Ω	Ground
C240A-20	Ω	Ground

Rear ANC Signal

Positive Lead	Measurement / Action	Negative Lead
C240B-9	Ω	Ground
C240B-22	Ω	Ground

Shield

Positive Lead	Measurement / Action	Negative Lead
C240B-16	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to G17

No	REPAIR the circuit in question.

G17 CHECK THE ANC (ACTIVE NOISE CONTROL) CIRCUITS FROM THE ACM (AUDIO FRONT CONTROL MODULE) TO THE AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE FOR AN OPEN

Measure:

LHF ANC Signal

Positive Lead	Measurement / Action	Negative Lead
C240B-4	Ω	C2385A-11
C240B-17	Ω	C2385A-12

RHF ANC Signal

Positive Lead	Measurement / Action	Negative Lead
C240A-8	Ω	C2385A-10
C240A-20	Ω	C2385A-9

Rear Signal

Positive Lead	Measurement / Action	Negative Lead
C240B-9	Ω	C2385A-13
C240B-22	Ω	C2385A-14

Are the resistances less than 3 ohms?

Yes	GO to G18

No	REPAIR the circuit in question.

G18 CHECK THE ANC (ACTIVE NOISE CONTROL) CIRCUITS FROM THE ACM (AUDIO FRONT CONTROL MODULE) TO THE AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C240B-4	Ω	C240A-8

C240B-4	Ω	C240B-9
C240B-4	Ω	C240B-16
C240B-4	Ω	C240B-17
C240B-4	Ω	C240A-20
C240B-4	Ω	C240B-22
C240A-8	Ω	C240B-9
C240A-8	Ω	C240B-16
C240A-8	Ω	C240B-17
C240A-8	Ω	C240A-20
C240A-8	Ω	C240B-22
C240B-9	Ω	C240B-16
C240B-9	Ω	C240B-17
C240B-9	Ω	C240A-20
C240B-9	Ω	C240B-22
C240B-16	Ω	C240B-17
C240B-16	Ω	C240A-20
C240B-16	Ω	C240B-22
C240B-17	Ω	C240A-20
C240B-17	Ω	C240B-22
C240A-20	Ω	C240B-22

Are the resistances greater than 10, 000 ohms?

Yes	GO to G20

No	REPAIR the circuit in question.

G19 CHECK FOR CORRECT DACMC (DIGITAL AUDIO CONTROL MODULE C) OPERATION

Ignition OFF.

Disconnect and inspect all the ACM connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the ACM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, discontinue this test and follow TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ACM. REFER to: Audio Front Control Module (ACM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

G20 CHECK FOR CORRECT AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE OPERATION

Ignition OFF.

Disconnect and inspect all the audio DSP module connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the audio DSP module connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, discontinue this test and follow TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new audio DSP module. REFER to: Audio Digital Signal Processing (DSP) Module .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST H : POOR SOUND QUALITY OR DISTORTED SOUND FROM ONE OR MORE SPEAKERS (NOT ALL SPEAKERS)

Normal Operation and Fault Conditions

The ACM sends audio signals to the speakers in the form of AC voltage, resulting in clear audio output.

Possible Sources

- Loose component fasteners
- Loose door handle, lock, and other trim panel components and fasteners
- Loose items in storage areas
- Loose speaker grilles
- Loose wire harnesses or wire harness fasteners
- Speaker(s)
- Water shield bonding and placement

Visual Inspection and Diagnostic Pre-checks

Visually inspect around the suspect area for any possible rattle conditions such as:

- Any storage compartments including cup holders (if equipped)
- Door map pockets for contents that can rattle (if equipped)
- Door pull cup attachments (if equipped)
- Door switch bezels (if equipped)
- Package tray (if equipped)
- Speaker grilles
- Trim panels and fasteners

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST H : POOR SOUND QUALITY OR DISTORTED SOUND FROM ONE OR MORE SPEAKERS (NOT ALL SPEAKERS) > PINPOINT TEST H : POOR SOUND QUALITY OR DISTORTED SOUND FROM ONE OR MORE SPEAKERS (NOT ALL SPEAKERS)

H1 ISOLATE THE ZONE

Operate the audio system using digital media such as a CD or MP3.

Using the audio system fade and balance feature, adjust the audio sound to each of the four zones (LHF, RHF, LHR and RHR) of the vehicle to isolate the poor sound quality.

Locate and apply pressure to the trim panel(s) around the poor sound quality area in question.

Does applying pressure to a trim panel reduce or eliminate the audible noise?

Yes	REPAIR or REPLACE the trim panel as needed.

No	GO to H2

H2 REMOVE AND INSPECT BEHIND/UNDERNEATH THE SUSPECT TRIM PANEL(S)

Remove the trim panel to access the suspect speaker.

Operate the audio system using digital media such as a CD or MP3.

Validate where the poor sound quality area is located.

Check:

- Trim panel for loose components around the speaker area such as the speaker grille
- Trim panel joining components for missing or broken pieces
- Lock and handle mechanical parts for correct attachment
- Wire harnesses for correct routing
- Wire harness fasteners for correct attachment
- Water shield for correct placement (speaker air path not blocked)
- Water shield for correct bonding to sheet metal
- Storage areas for loose items
- All child safety belt anchors (if equipped)
- All safety belt retractors
- All speaker bracket fasteners and other fasteners are secured and tightened to specified torque

Was the source of the noise located?

Yes	REPAIR or REPLACE any loose or broken component or fastener as needed.

No	GO to H3

H3 CHECK THE SUSPECT SPEAKER FOR WATER INTRUSION

Inspect for watermarks.

Check the:

- Cone
- Magnet

Basket

Are any watermarks present on the speaker?

Yes	VERIFY the water shield is in the correct location, REPAIR or REPLACE any trim, door, or speaker seal as required. DRY the speaker in question and TEST the system for normal operation.

No	GO to H4

H4 ISOLATE SPEAKER TO VERIFY NOISE

Remove the suspect speaker from its location and leave the speaker connected to the harness.

Hold the speaker away from any trim panel(s) and ensure the speaker is isolated from contact.

Operate the audio system using digital media such as a CD or MP3.

Is the noise still present in the suspect speaker?

Yes	INSTALL a new speaker for the one in question.

No	LOCATE the source of the noise and REPAIR as needed.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST I : NO SOUND FROM ALL SPEAKERS

Refer to Audio System/Navigation - AM/FM/SYNC/Touchscreen Display for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See Network Message Chart, Chimes, ACM, and Audio DSP Module.

If the audio DSP module detects an open, short to ground, or less than 3.5 volts on the enable circuit, the speaker output will be muted for all of the speakers.

A short to ground or short to voltage in the circuitry to one of the speakers may cause multiple speakers to lose sound due to the built-in overload protection feature of the audio DSP module. In this case, a speaker fault DTC sets.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1142:27	Ignition Status 1: Signal Rate of	Set by the ACM when a short to

	Change Above Threshold	voltage is detected on the start signal circuit.
B13FB:11	Audio Enable Line: Circuit Short To Ground	Set by the audio DSP module when a short to ground is detected on the enable circuit.

Possible Sources

- Wiring, terminals, or connectors
- Fuse
- ACM
- Audio DSP module

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST I : NO SOUND FROM ALL SPEAKERS > PINPOINT TEST I : NO SOUND FROM ALL SPEAKERS

I1 VERIFY THAT THE ACM (AUDIO FRONT CONTROL MODULE) AND AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE PASS THE NETWORK TEST

Using a diagnostic scan tool, perform the network test.

Did the ACM and audio DSP module pass the network test?

Yes	GO to I2

No	* If the ACM failed the network test, REFER to: Communications Network . See The ACM Does Not Respond To The Diagnostic Scan Tool.* If the audio DSP module failed the network test, REFER to: Communications Network . See The Audio DSP Module Does Not Respond To The Diagnostic Scan Tool.

I2 CHECK FOR SPEAKER DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, perform the audio DSP module self-test.

Are any speaker fault Diagnostic Trouble Codes (DTCs) present?

Yes	REFER to: Information and Entertainment System . See DTC Chart: Audio DSP Module.

No	GO to I3

I3 CHECK THE ENABLE CIRCUIT FUNCTIONALITY BY CHECKING THE AUDIBLE PROMPT FUNCTIONALITY

Operate the audio system in AM/ FM mode.

Operate the VOICE steering wheel switch and listen for the SYNC ® audible prompt.

Does the SYNC ® system produce an audible prompt correctly; indicating voice recognition mode has been entered?

Yes	GO to I4

No	GO to I5

NOTE: This pinpoint test step directs testing circuits using a back-probe method. Use the special back-probe tool POM6411. Do not force test leads or other probes into connectors. Adequate care must be exercised to avoid connector terminal damage, while ensuring that good electrical contact is made with the circuit or terminal. Failure to follow these instructions may cause damage to wiring, terminals, or connectors, and may cause subsequent electrical faults.

I4 CHECK FOR AN AUDIO SIGNAL TO THE AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE

Ignition ON.

Operate the audio system in AM/ FM mode.

While back-probing audio DSP module C2385A , measure the AC voltage.

Positive Lead	Measurement / Action	Negative Lead
C2385A-7	$\tilde{V}$	C2385A-17

Is a fluctuating AC voltage present?

Yes	GO to I10

No	GO to I9

NOTE: This pinpoint test step directs testing circuits using a back-probe method. Use the special back-probe tool POM6411. Do not force test leads or other probes into connectors. Adequate care must be exercised to avoid connector terminal damage, while ensuring that good electrical contact is made with the circuit or terminal. Failure to follow these instructions may cause damage to wiring, terminals, or connectors, and may cause subsequent electrical faults.

I5 CHECK THE AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE ENABLE CIRCUIT FOR CORRECT VOLTAGE

While back-probing audio DSP module C2385A , measure the AC voltage.

Positive Lead	Measurement / Action	Negative Lead
C2385A-3		Ground

Is the voltage between 3.5 and 8.5 volts?

Yes	GO to I10

No	GO to I6

I6 CHECK THE AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE ENABLE CIRCUIT FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: Audio DSP Module C2385A .

Disconnect: ACM C240A .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2385A-3		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to I7

I7 CHECK THE AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE ENABLE CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2385A-3	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to I8

No	REPAIR the circuit.

I8 CHECK THE AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE ENABLE CIRCUIT FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2385A-3	Ω	C240A-7

Is the resistance less than 3 ohms?

Yes	GO to I9

No	REPAIR the circuit.

I9 CHECK FOR CORRECT ACM (AUDIO FRONT CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all the ACM connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the ACM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ACM. REFER to: Audio Front Control Module (ACM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

I10 CHECK FOR CORRECT AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE OPERATION

Ignition OFF.

Disconnect and inspect all the audio DSP module connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the audio DSP module connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, discontinue this test and follow TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new audio DSP module. REFER to: Audio Digital Signal Processing (DSP) Module .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST J : THE LHF (LEFT-HAND FRONT) DOOR WOOFER SPEAKER IS INOPERATIVE

Refer to Audio System/Navigation - AM/FM/SYNC/Touchscreen Display for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See Audio DSP Module.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B13F9:13	Audio Input 3: Circuit Open	Set by the audio DSP module when an open is detected on the LH audio signal circuits from the ACM to the audio DSP module.
B1A01:01	Speaker #1: General Electrical Failure	Set by the audio DSP module when a failure is detected on the LHF door woofer speaker circuits.
B1A01:11	Speaker #1: Circuit Short To Ground	Set by the audio DSP module when a short to ground is detected on the LHF door woofer speaker circuits. When DTC B1A01:11 is set, the speaker output is disabled.

B1A01:12	Speaker #1: Circuit Short To Battery	Set by the audio DSP module when a short to voltage is detected on the LHF door woofer speaker circuits. When DTC B1A01:12 is set, the speaker output is disabled.
B1A01:13	Speaker #1: Circuit Open	Set by the audio DSP module when an open is detected on the LHF door woofer speaker circuits.

Possible Sources

- Speaker
- Wiring, terminals, or connectors
- ACM
- Audio DSP module

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST J : THE LHF (LEFT-HAND FRONT) DOOR WOOFER SPEAKER IS INOPERATIVE > PINPOINT TEST J : THE LHF (LEFT-HAND FRONT) DOOR WOOFER SPEAKER IS INOPERATIVE

J1 CHECK THE AUDIO SIGNAL TO THE LHF (LEFT-HAND FRONT) DOOR WOOFER SPEAKER

Ignition OFF.

Disconnect: LHF Door Woofer Speaker C523 .

Operate the audio system in AM/ FM mode.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C523-1	$\tilde{V}$	C523-4

Is a fluctuating AC voltage present?

Yes	INSTALL a new LHF door woofer speaker. REFER to: Front Door Speaker LH .

No	GO to J2

J2 CHECK THE AUDIO CIRCUITS TO THE LHF (LEFT-HAND FRONT) DOOR WOOFER SPEAKER FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: Audio DSP Module C2385B .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C523-1		Ground
C523-4		Ground

Is any voltage present?

Yes	REPAIR the circuit in question.

No	GO to J3

J3 CHECK THE AUDIO CIRCUITS TO THE LHF (LEFT-HAND FRONT) DOOR WOOFER SPEAKER FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C523-1	Ω	Ground
C523-4	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to J4

No	REPAIR the circuit in question.

J4 CHECK THE AUDIO CIRCUITS TO THE LHF (LEFT-HAND FRONT) DOOR WOOFER SPEAKER FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C523-1	Ω	C2385B-14
C523-4	Ω	C2385B-13

Are the resistances less than 3 ohms?

Yes	GO to J5

No	REPAIR the circuit in question.

J5 CHECK THE AUDIO CIRCUITS TO THE LHF (LEFT-HAND FRONT) DOOR WOOFER SPEAKER FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C523-1	Ω	C523-4

Is the resistance greater than 10, 000 ohms?

Yes	GO to J6

No	REPAIR the circuit in question.

J6 CHECK THE LH (LEFT-HAND) AUDIO SIGNAL FROM THE ACM (AUDIO FRONT CONTROL MODULE) TO THE AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE

Ignition OFF.

Connect: Audio DSP Module C2385B .

Disconnect: Audio DSP Module C2385A .

Ignition ON.

Operate the audio system in AM/ FM mode.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2385A-7	V~	C2385A-8

Is a fluctuating AC voltage present?

Yes	GO to J12

No	GO to J7

J7 CHECK THE LH (LEFT-HAND) AUDIO SIGNAL FROM THE ACM (AUDIO FRONT CONTROL MODULE) TO THE AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: ACM C240A .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2385A-7		Ground
C2385A-8		Ground

Is any voltage present?

Yes	REPAIR the circuit in question.

No	GO to J8

J8 CHECK THE LH (LEFT-HAND) AUDIO SIGNAL FROM THE ACM (AUDIO FRONT CONTROL MODULE) TO THE AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2385A-7	Ω	Ground
C2385A-8	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to J9

No	REPAIR the circuit in question.

J9 CHECK THE LH (LEFT-HAND) AUDIO SIGNAL FROM THE ACM (AUDIO FRONT CONTROL MODULE) TO THE AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2385A-7	Ω	C240A-10

C2385A-8	Ω	C240A-22

Are the resistances less than 3 ohms?

Yes	GO to J10

No	REPAIR the circuit in question.

J10 CHECK THE LH (LEFT-HAND) AUDIO SIGNAL FROM THE ACM (AUDIO FRONT CONTROL MODULE) TO THE AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2385A-7	Ω	C2385A-8

Is the resistance greater than 10, 000 ohms?

Yes	GO to J11

No	REPAIR the circuit in question.

J11 CHECK FOR CORRECT ACM (AUDIO FRONT CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all the ACM connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the ACM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ACM. REFER to: Audio Front Control Module (ACM) .

No	The system is operating correctly at this time. The concern may have been caused by

	module connections. ADDRESS the root cause of any connector or pin issues.

J12 CHECK FOR CORRECT AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE OPERATION

Ignition OFF.

Disconnect and inspect all the audio DSP module connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the audio DSP module connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, discontinue this test and follow TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new audio DSP module. REFER to: Audio Digital Signal Processing (DSP) Module .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST K : THE LHF (LEFT-HAND FRONT) DOOR MIDWOOFER SPEAKER IS INOPERATIVE

Refer to Audio System/Navigation - AM/FM/SYNC/Touchscreen Display for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See Audio DSP Module.

The LHF door midwoofer speaker and LHF A-pillar tweeter speaker share the same audio signal.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B13F9:13	Audio Input 3: Circuit Open	Set by the audio DSP module

		when an open is detected on the LH audio signal circuits from the ACM to the audio DSP module.
B1A03:01	Speaker #3: General Electrical Failure	Set by the audio DSP module when a failure is detected on the LHF door midwoofer or LHF A-pillar tweeter speaker circuits.
B1A03:11	Speaker #3: Circuit Short To Ground	Set by the audio DSP module when a short to ground is detected on the LHF door midwoofer or LHF A-pillar tweeter speaker circuits. When DTC B1A03:11 is set, the speaker output is disabled.
B1A03:12	Speaker #3: Circuit Short To Battery	Set by the audio DSP module when a short to voltage is detected on the LHF door midwoofer or LHF A-pillar tweeter speaker circuits. When DTC B1A03:12 is set, the speaker output is disabled.
B1A03:13	Speaker #3: Circuit Open	Set by the audio DSP module when an open is detected on the LHF door midwoofer or LHF A-pillar tweeter speaker circuits.

Possible Sources

- Speaker
- Wiring, terminals, or connectors
- ACM
- Audio DSP module

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST K : THE LHF (LEFT-HAND FRONT) DOOR MIDWOOFER SPEAKER IS INOPERATIVE > PINPOINT TEST K : THE LHF (LEFT-HAND FRONT) DOOR MIDWOOFER SPEAKER IS INOPERATIVE

K1 CHECK THE AUDIO SIGNAL TO THE LHF (LEFT-HAND FRONT) DOOR MIDWOOFER SPEAKER

Ignition OFF.

Disconnect: LHF Door Midwoofer Speaker C513 .

Operate the audio system in AM/ FM mode.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C513-1		C513-3

Is a fluctuating AC voltage present?

Yes	INSTALL a new LHF door midwoofer speaker. REFER to: Front Door Speaker LH .

No	GO to K2

K2 CHECK THE AUDIO CIRCUITS TO THE LHF (LEFT-HAND FRONT) DOOR MIDWOOFER SPEAKER FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: Audio DSP Module C2385C .

Disconnect: LHF A-pillar Tweeter Speaker C9063 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C513-1		Ground
C513-3		Ground

Is any voltage present?

Yes	REPAIR the circuit in question.

No	GO to K3

K3 CHECK THE AUDIO CIRCUITS TO THE LHF (LEFT-HAND FRONT) DOOR MIDWOOFER SPEAKER FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C513-1		Ground

C513-3	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to K4

No	REPAIR the circuit in question.

K4 CHECK THE AUDIO CIRCUITS TO THE LHF (LEFT-HAND FRONT) DOOR MIDWOOFER SPEAKER FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C513-1	Ω	C2385C-8
C513-3	Ω	C2385C-9

Are the resistances less than 3 ohms?

Yes	GO to K5

No	REPAIR the circuit in question.

K5 CHECK THE AUDIO CIRCUITS TO THE LHF (LEFT-HAND FRONT) DOOR MIDWOOFER SPEAKER FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C513-1	Ω	C513-3

Is the resistance greater than 10, 000 ohms?

Yes	GO to K6

No	REPAIR the circuit in question.

K6 CHECK THE LH (LEFT-HAND) AUDIO SIGNAL FROM THE ACM (AUDIO FRONT CONTROL MODULE) TO THE AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE

Ignition OFF.

Connect: Audio DSP Module C2385C .

Disconnect: Audio DSP Module C2385A .

Ignition ON.

Operate the audio system in AM/ FM mode.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2385A-7		C2385A-8

Is a fluctuating AC voltage present?

Yes	GO to K12

No	GO to K7

K7 CHECK THE LH (LEFT-HAND) AUDIO SIGNAL FROM THE ACM (AUDIO FRONT CONTROL MODULE) TO THE AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: ACM C240A .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2385A-7		Ground
C2385A-8		Ground

Is any voltage present?

Yes	REPAIR the circuit in question.

No	GO to K8

K8 CHECK THE LH (LEFT-HAND) AUDIO SIGNAL FROM THE ACM (AUDIO FRONT CONTROL MODULE) TO THE AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead

C2385A-7	Ω	Ground
C2385A-8	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to K9

No	REPAIR the circuit in question.

K9 CHECK THE LH (LEFT-HAND) AUDIO SIGNAL FROM THE ACM (AUDIO FRONT CONTROL MODULE) TO THE AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2385A-7	Ω	C240A-10
C2385A-8	Ω	C240A-22

Are the resistances less than 3 ohms?

Yes	GO to K10

No	REPAIR the circuit in question.

K10 CHECK THE LH (LEFT-HAND) AUDIO SIGNAL FROM THE ACM (AUDIO FRONT CONTROL MODULE) TO THE AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2385A-7	Ω	C2385A-8

Is the resistance greater than 10, 000 ohms?

Yes	GO to K11

No	REPAIR the circuit in question.

K11 CHECK FOR CORRECT ACM (AUDIO FRONT CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all the ACM connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the ACM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ACM. REFER to: Audio Front Control Module (ACM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

K12 CHECK FOR CORRECT AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE OPERATION

Ignition OFF.

Disconnect and inspect all the audio DSP module connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the audio DSP module connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, discontinue this test and follow TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new audio DSP module. REFER to: Audio Digital Signal Processing (DSP) Module .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST L : THE LHF (LEFT-HAND FRONT) A-PILLAR TWEETER SPEAKER IS INOPERATIVE

Refer to Audio System/Navigation - AM/FM/SYNC/Touchscreen Display for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See Audio DSP Module.

The LHF door midwoofer speaker and LHF A-pillar tweeter speaker share the same audio signal.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B13F9:13	Audio Input 3: Circuit Open	Set by the audio DSP module when an open is detected on the LH audio signal circuits from the ACM to the audio DSP module.
B1A03:01	Speaker #3: General Electrical Failure	Set by the audio DSP module when a failure is detected on the LHF door midwoofer or LHF A-pillar tweeter speaker circuits.
B1A03:11	Speaker #3: Circuit Short To Ground	Set by the audio DSP module when a short to ground is detected on the LHF door midwoofer or LHF A-pillar tweeter speaker circuits. When DTC B1A03:11 is set, the speaker output is disabled.
B1A03:12	Speaker #3: Circuit Short To Battery	Set by the audio DSP module when a short to voltage is detected on the LHF door midwoofer or LHF A-pillar tweeter speaker circuits. When DTC B1A03:12 is set, the speaker output is disabled.
B1A03:13	Speaker #3: Circuit Open	Set by the audio DSP module when an open is detected on the LHF door midwoofer or LHF A-pillar tweeter speaker circuits.

Possible Sources

- Speaker
- Wiring, terminals, or connectors

- ACM
- Audio DSP module

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST L : THE LHF (LEFT-HAND FRONT) A-PILLAR TWEETER SPEAKER IS INOPERATIVE > PINPOINT TEST L : THE LHF (LEFT-HAND FRONT) A-PILLAR TWEETER SPEAKER IS INOPERATIVE

L1 CHECK THE AUDIO SIGNAL TO THE LHF (LEFT-HAND FRONT) A-PILLAR TWEETER SPEAKER

Ignition OFF.

Disconnect: LHF A-Pillar Tweeter Speaker C9063 .

Operate the audio system in AM/ FM mode.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C9063-1		C9063-3

Is a fluctuating AC voltage present?

Yes	INSTALL a new LHF A-pillar tweeter speaker. REFER to: A-Pillar Speaker .

No	GO to L2

L2 CHECK THE AUDIO CIRCUITS TO THE LHF (LEFT-HAND FRONT) A-PILLAR TWEETER SPEAKER FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: Audio DSP Module C2385C .

Disconnect: LHF Door Midwoofer Speaker C513 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C9063-1		Ground
C9063-3		Ground

Is any voltage present?

Yes	REPAIR the circuit in question.

No	GO to L3

L3 CHECK THE AUDIO CIRCUITS TO THE LHF (LEFT-HAND FRONT) A-PILLAR TWEETER SPEAKER FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C9063-1	Ω	Ground
C9063-3	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to L4

No	REPAIR the circuit in question.

L4 CHECK THE AUDIO CIRCUITS TO THE LHF (LEFT-HAND FRONT) A-PILLAR TWEETER SPEAKER FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C9063-1	Ω	C2385C-8
C9063-3	Ω	C2385C-9

Are the resistances less than 3 ohms?

Yes	GO to L5

No	REPAIR the circuit in question.

L5 CHECK THE AUDIO CIRCUITS TO THE LHF (LEFT-HAND FRONT) A-PILLAR TWEETER SPEAKER FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead

C9063-1	Ω	C9063-3

Is the resistance greater than 10, 000 ohms?

Yes	GO to L6

No	REPAIR the circuit in question.

L6 CHECK THE LH (LEFT-HAND) AUDIO SIGNAL FROM THE ACM (AUDIO FRONT CONTROL MODULE) TO THE AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE

Ignition OFF.

Connect: Audio DSP Module C2385C .

Disconnect: Audio DSP Module C2385A .

Ignition ON.

Operate the audio system in AM/ FM mode.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2385A-7	V~	C2385A-8

Is a fluctuating AC voltage present?

Yes	GO to L12

No	GO to L7

L7 CHECK THE LH (LEFT-HAND) AUDIO SIGNAL FROM THE ACM (AUDIO FRONT CONTROL MODULE) TO THE AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: ACM C240A .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2385A-7	+ V~ −	Ground

C2385A-8		Ground

Is any voltage present?

Yes	REPAIR the circuit in question.

No	GO to L8

L8 CHECK THE LH (LEFT-HAND) AUDIO SIGNAL FROM THE ACM (AUDIO FRONT CONTROL MODULE) TO THE AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2385A-7	Ω	Ground
C2385A-8	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to L9

No	REPAIR the circuit in question.

L9 CHECK THE LH (LEFT-HAND) AUDIO SIGNAL FROM THE ACM (AUDIO FRONT CONTROL MODULE) TO THE AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2385A-7	Ω	C240A-10
C2385A-8	Ω	C240A-22

Are the resistances less than 3 ohms?

Yes	GO to L10

No	REPAIR the circuit in question.

L10 CHECK THE LH (LEFT-HAND) AUDIO SIGNAL FROM THE ACM (AUDIO FRONT CONTROL MODULE) TO THE AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2385A-7	Ω	C2385A-8

Is the resistance greater than 10, 000 ohms?

Yes	GO to L11

No	REPAIR the circuit in question.

L11 CHECK FOR CORRECT ACM (AUDIO FRONT CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all the ACM connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the ACM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ACM. REFER to: Audio Front Control Module (ACM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

L12 CHECK FOR CORRECT AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE OPERATION

Ignition OFF.

Disconnect and inspect all the audio DSP module connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the audio DSP module connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, discontinue this test and follow TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new audio DSP module. REFER to: Audio Digital Signal Processing (DSP) Module .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST M : THE CENTER INSTRUMENT PANEL SPEAKER IS INOPERATIVE

Refer to Audio System/Navigation - AM/FM/SYNC/Touchscreen Display for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See Audio DSP Module.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1A08:01	Speaker #8: General Electrical Failure	Set by the audio DSP module when a failure is detected on the center instrument panel speaker circuits.
B1A08:11	Speaker #8: Circuit Short To Ground	Set by the audio DSP module when a short to ground is detected on the center instrument panel speaker circuits. When DTC B1A08:11 is set, the speaker output is disabled.
B1A08:12	Speaker #8: Circuit Short To Battery	Set by the audio DSP module when a short to voltage is detected on the center instrument panel speaker circuits. When DTC B1A08:12 is set, the

		speaker output is disabled.
B1A08:13	Speaker #8: Circuit Open	Set by the audio DSP module when an open is detected on the center instrument panel speaker circuits.

Possible Sources

- Speakers
- Wiring, terminals, or connectors
- Audio DSP module

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST M : THE CENTER INSTRUMENT PANEL SPEAKER IS INOPERATIVE > PINPOINT TEST M : THE CENTER INSTRUMENT PANEL SPEAKER IS INOPERATIVE

M1 CHECK THE AUDIO SIGNAL TO THE CENTER INSTRUMENT PANEL SPEAKER

Ignition OFF.

Disconnect: Center Instrument Panel Speaker C2359 .

Operate the audio system in AM/ FM mode.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2359-1		C2359-2

Is a fluctuating AC voltage present?

Yes	INSTALL a new center instrument panel speaker. REFER to: Instrument Panel Speaker .

No	GO to M2

M2 CHECK THE AUDIO CIRCUITS TO THE CENTER INSTRUMENT PANEL SPEAKER FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: Audio DSP Module C2385C .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2359-1		Ground
C2359-2		Ground

Is any voltage present?

Yes	REPAIR the circuit in question.

No	GO to M3

M3 CHECK THE AUDIO CIRCUITS TO THE CENTER INSTRUMENT PANEL SPEAKER FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2359-1	Ω	Ground
C2359-2	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to M4

No	REPAIR the circuit in question.

M4 CHECK THE AUDIO CIRCUITS TO THE CENTER INSTRUMENT PANEL SPEAKER FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2359-1	Ω	C2385C-2
C2359-2	Ω	C2385C-3

Are the resistances less than 3 ohms?

Yes	GO to M5

No	REPAIR the circuit in question.

M5 CHECK THE AUDIO CIRCUITS TO THE CENTER INSTRUMENT PANEL SPEAKER FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2359-1	Ω	C2359-2

Is the resistance greater than 10, 000 ohms?

Yes	GO to M6

No	REPAIR the circuit in question.

M6 CHECK FOR CORRECT AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE OPERATION

Ignition OFF.

Disconnect and inspect all the audio DSP module connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the audio DSP module connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, discontinue this test and follow TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new audio DSP module. REFER to: Audio Digital Signal Processing (DSP) Module .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST N : THE RHF (RIGHT-HAND FRONT) A-PILLAR TWEETER SPEAKER IS INOPERATIVE

Refer to Audio System/Navigation - AM/FM/SYNC/Touchscreen Display for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See Audio DSP Module.

The RHF door midwoofer speaker and RHF A-pillar tweeter speaker share the same audio signal.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B13F7:13	Audio Input 1: Circuit Open	Set by the audio DSP module when an open is detected on the RH audio signal circuits from the ACM to the audio DSP module.
B1A07:01	Speaker #7: General Electrical Failure	Set by the audio DSP module when a failure is detected on the RHF door midwoofer or RHF A-pillar tweeter speaker circuits.
B1A07:11	Speaker #7: Circuit Short To Ground	Set by the audio DSP module when a short to ground is detected on the RHF door midwoofer or RHF A-pillar tweeter speaker circuits. When DTC B1A07:11 is set, the speaker output is disabled.
B1A07:12	Speaker #7: Circuit Short To Battery	Set by the audio DSP module when a short to voltage is detected on the RHF door midwoofer or RHF A-pillar tweeter speaker circuits. When DTC B1A07:12 is set, the speaker output is disabled.
B1A07:13	Speaker #7: Circuit Open	Set by the audio DSP module when an open is detected on the RHF door midwoofer or RHF A-pillar tweeter speaker circuits.

Possible Sources

- Speaker
- Wiring, terminals, or connectors
- ACM
- Audio DSP module

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST N : THE RHF (RIGHT-HAND FRONT) A-PILLAR TWEETER SPEAKER IS INOPERATIVE > PINPOINT TEST N : THE RHF (RIGHT-HAND FRONT) A-PILLAR TWEETER SPEAKER IS INOPERATIVE

N1 CHECK THE AUDIO SIGNAL TO THE RHF (RIGHT-HAND FRONT) A-PILLAR TWEETER SPEAKER

Ignition OFF.

Disconnect: RHF A-Pillar Tweeter Speaker C9065 .

Operate the audio system in AM/ FM mode.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C9065-1		C9065-3

Is a fluctuating AC voltage present?

Yes	INSTALL a new RHF A-pillar tweeter speaker. REFER to: A-Pillar Speaker .

No	GO to N2

N2 CHECK THE AUDIO CIRCUITS TO THE RHF (RIGHT-HAND FRONT) A-PILLAR TWEETER SPEAKER FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: Audio DSP Module C2385C .

Disconnect: RHF Door Midwoofer Speaker C613 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C9065-1		Ground
C9065-3		Ground

Is any voltage present?

Yes	REPAIR the circuit in question.

No	GO to N3

N3 CHECK THE AUDIO CIRCUITS TO THE RHF (RIGHT-HAND FRONT) A-PILLAR TWEETER SPEAKER FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C9065-1	Ω	Ground
C9065-3	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to N4

No	REPAIR the circuit in question.

N4 CHECK THE AUDIO CIRCUITS TO THE RHF (RIGHT-HAND FRONT) A-PILLAR TWEETER SPEAKER FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C9065-1	Ω	C2385C-4
C9065-3	Ω	C2385C-5

Are the resistances less than 3 ohms?

Yes	GO to N5

No	REPAIR the circuit in question.

N5 CHECK THE AUDIO CIRCUITS TO THE RHF (RIGHT-HAND FRONT) A-PILLAR TWEETER SPEAKER FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C9065-1	Ω	C9065-3

Is the resistance greater than 10, 000 ohms?

Yes	GO to N6

No	REPAIR the circuit in question.

N6 CHECK THE RH (RIGHT-HAND) AUDIO SIGNAL FROM THE ACM (AUDIO FRONT CONTROL MODULE) TO THE AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE

Ignition OFF.

Connect: Audio DSP Module C2385C .

Disconnect: Audio DSP Module C2385A .

Ignition ON.

Operate the audio system in AM/ FM mode.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2385A-3		C2385A-4

Is a fluctuating AC voltage present?

Yes	GO to N12

No	GO to N7

N7 CHECK THE RH (RIGHT-HAND) AUDIO SIGNAL FROM THE ACM (AUDIO FRONT CONTROL MODULE) TO THE AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: ACM C240A .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2385A-3		Ground
C2385A-4		Ground

Is any voltage present?

Yes	REPAIR the circuit in question.

No	GO to N8

N8 CHECK THE RH (RIGHT-HAND) AUDIO SIGNAL FROM THE ACM (AUDIO FRONT CONTROL MODULE) TO THE AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2385A-3	Ω	Ground
C2385A-4	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to N9

No	REPAIR the circuit in question.

N9 CHECK THE RH (RIGHT-HAND) AUDIO SIGNAL FROM THE ACM (AUDIO FRONT CONTROL MODULE) TO THE AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2385A-3	Ω	C240A-11
C2385A-4	Ω	C240A-23

Are the resistances less than 3 ohms?

Yes	GO to N10

No	REPAIR the circuit in question.

N10 CHECK THE RH (RIGHT-HAND) AUDIO SIGNAL FROM THE ACM (AUDIO FRONT CONTROL MODULE) TO THE AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2385A-3	Ω	C2385A-4

Is the resistance greater than 10, 000 ohms?

Yes	GO to N11

No	REPAIR the circuit in question.

N11 CHECK FOR CORRECT ACM (AUDIO FRONT CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all the ACM connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the ACM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ACM. REFER to: Audio Front Control Module (ACM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

N12 CHECK FOR CORRECT AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE OPERATION

Ignition OFF.

Disconnect and inspect all the audio DSP module connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the audio DSP module connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, discontinue this test and follow TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new audio DSP module. REFER to: Audio Digital Signal Processing (DSP) Module .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST O : THE RHF (RIGHT-HAND FRONT) DOOR MIDWOOFER SPEAKER IS INOPERATIVE

Refer to Audio System/Navigation - AM/FM/SYNC/Touchscreen Display for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See Audio DSP Module.

The RHF door midwoofer speaker and RHF A-pillar tweeter speaker share the same audio signal.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B13F7:13	Audio Input 1: Circuit Open	Set by the audio DSP module when an open is detected on the RH audio signal circuits from the ACM to the audio DSP module.
B1A07:01	Speaker #7: General Electrical Failure	Set by the audio DSP module when a failure is detected on the RHF door midwoofer or RHF A-pillar tweeter speaker circuits.
B1A07:11	Speaker #7: Circuit Short To Ground	Set by the audio DSP module when a short to ground is detected on the RHF door midwoofer or RHF A-pillar tweeter speaker circuits. When DTC B1A07:11 is set, the speaker output is disabled.

B1A07:12	Speaker #7: Circuit Short To Battery	Set by the audio DSP module when a short to voltage is detected on the RHF door midwoofer or RHF A-pillar tweeter speaker circuits. When DTC B1A07:12 is set, the speaker output is disabled.
B1A07:13	Speaker #7: Circuit Open	Set by the audio DSP module when an open is detected on the RHF door midwoofer or RHF A-pillar tweeter speaker circuits.

Possible Sources

- Speaker
- Wiring, terminals, or connectors
- ACM
- Audio DSP module

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST O : THE RHF (RIGHT-HAND FRONT) DOOR MIDWOOFER SPEAKER IS INOPERATIVE > PINPOINT TEST O : THE RHF (RIGHT-HAND FRONT) DOOR MIDWOOFER SPEAKER IS INOPERATIVE

O1 CHECK THE AUDIO SIGNAL TO THE RHF (RIGHT-HAND FRONT) DOOR MIDWOOFER SPEAKER

Ignition OFF.

Disconnect: RHF Door Midwoofer Speaker C613 .

Operate the audio system in AM/ FM mode.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C613-1	$\tilde{V}$	C613-3

Is a fluctuating AC voltage present?

Yes	INSTALL a new RHF door midwoofer speaker. REFER to: Front Door Speaker RH .

No	GO to O2

O2 CHECK THE AUDIO CIRCUITS TO THE RHF (RIGHT-HAND FRONT) DOOR MIDWOOFER SPEAKER FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: Audio DSP Module C2385C .

Disconnect: RHF A-Pillar Tweeter Speaker C9065 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C613-1	V	Ground
C613-3	V	Ground

Is any voltage present?

Yes	REPAIR the circuit in question.

No	GO to O3

O3 CHECK THE AUDIO CIRCUITS TO THE RHF (RIGHT-HAND FRONT) DOOR MIDWOOFER SPEAKER FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C613-1	Ω	Ground
C613-3	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to O4

No	REPAIR the circuit in question.

O4 CHECK THE AUDIO CIRCUITS TO THE RHF (RIGHT-HAND FRONT) DOOR MIDWOOFER SPEAKER FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C613-1	Ω	C2385C-4
C613-3	Ω	C2385C-5

Are the resistances less than 3 ohms?

Yes	GO to O5

No	REPAIR the circuit in question.

O5 CHECK THE AUDIO CIRCUITS TO THE RHF (RIGHT-HAND FRONT) DOOR MIDWOOFER SPEAKER FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C613-1	Ω	C613-3

Is the resistance greater than 10, 000 ohms?

Yes	GO to O6

No	REPAIR the circuit in question.

O6 CHECK THE RH (RIGHT-HAND) AUDIO SIGNAL FROM THE ACM (AUDIO FRONT CONTROL MODULE) TO THE AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE

Ignition OFF.

Connect: Audio DSP Module C2385C .

Disconnect: Audio DSP Module C2385A .

Ignition ON.

Operate the audio system in AM/ FM mode.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2385A-3	$\tilde{V}$	C2385A-4

Is a fluctuating AC voltage present?

Yes	GO to O12

No	GO to O7

O7 CHECK THE RH (RIGHT-HAND) AUDIO SIGNAL FROM THE ACM (AUDIO FRONT CONTROL MODULE) TO THE AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: ACM C240A .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2385A-3		Ground
C2385A-4		Ground

Is any voltage present?

Yes	REPAIR the circuit in question.

No	GO to O8

O8 CHECK THE RH (RIGHT-HAND) AUDIO SIGNAL FROM THE ACM (AUDIO FRONT CONTROL MODULE) TO THE AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2385A-3	Ω	Ground
C2385A-4	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to O9

No	REPAIR the circuit in question.

O9 CHECK THE RH (RIGHT-HAND) AUDIO SIGNAL FROM THE ACM (AUDIO FRONT CONTROL

MODULE) TO THE AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2385A-3	Ω	C240A-11
C2385A-4	Ω	C240A-23

Are the resistances less than 3 ohms?

Yes	GO to O10

No	REPAIR the circuit in question.

O10 CHECK THE RH (RIGHT-HAND) AUDIO SIGNAL FROM THE ACM (AUDIO FRONT CONTROL MODULE) TO THE AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2385A-3	Ω	C2385A-4

Is the resistance greater than 10, 000 ohms?

Yes	GO to O11

No	REPAIR the circuit in question.

O11 CHECK FOR CORRECT ACM (AUDIO FRONT CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all the ACM connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the ACM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ACM. REFER to: Audio Front Control Module (ACM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

O12 CHECK FOR CORRECT AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE OPERATION

Ignition OFF.

Disconnect and inspect all the audio DSP module connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the audio DSP module connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, discontinue this test and follow TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new audio DSP module. REFER to: Audio Digital Signal Processing (DSP) Module .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST P : THE RHF (RIGHT-HAND FRONT) DOOR WOOFER SPEAKER IS INOPERATIVE

Refer to Audio System/Navigation - AM/FM/SYNC/Touchscreen Display for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See Audio DSP Module.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B13F7:13	Audio Input 1: Circuit Open	Set by the audio DSP module when an open is detected on the RH audio signal circuits from the ACM to the audio DSP module.
B1A05:01	Speaker #5: General Electrical Failure	Set by the audio DSP module when a failure is detected on the RHF door woofer speaker circuits.
B1A05:11	Speaker #5: Circuit Short To Ground	Set by the audio DSP module when a short to ground is detected on the RHF door woofer speaker circuits. When DTC B1A05:11 is set, the speaker output is disabled.
B1A05:12	Speaker #5: Circuit Short To Battery	Set by the audio DSP module when a short to voltage is detected on the RHF door woofer speaker circuits. When DTC B1A05:12 is set, the speaker output is disabled.
B1A05:13	Speaker #5: Circuit Open	Set by the audio DSP module when an open is detected on the RHF door woofer speaker circuits.

Possible Sources

- Speaker
- Wiring, terminals, or connectors
- ACM
- Audio DSP module

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST P : THE RHF (RIGHT-HAND FRONT) DOOR WOOFER SPEAKER IS INOPERATIVE > PINPOINT TEST P : THE RHF (RIGHT-HAND FRONT) DOOR WOOFER SPEAKER IS INOPERATIVE

P1 CHECK THE AUDIO SIGNAL TO THE RHF (RIGHT-HAND FRONT) DOOR WOOFER SPEAKER

Ignition OFF.

Disconnect: RHF Door Woofer Speaker C612 .

Operate the audio system in AM/ FM mode.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C612-1		C612-4

Is a fluctuating AC voltage present?

Yes	INSTALL a new RHF door woofer speaker. REFER to: Front Door Speaker RH .

No	GO to P2

P2 CHECK THE AUDIO CIRCUITS TO THE RHF (RIGHT-HAND FRONT) DOOR WOOFER SPEAKER FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: Audio DSP Module C2385B .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C612-1		Ground
C612-4		Ground

Is any voltage present?

Yes	REPAIR the circuit in question.

No	GO to P3

P3 CHECK THE AUDIO CIRCUITS TO THE RHF (RIGHT-HAND FRONT) DOOR WOOFER SPEAKER FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead

C612-1	Ω	Ground
C612-4	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to P4

No	REPAIR the circuit in question.

P4 CHECK THE AUDIO CIRCUITS TO THE RHF (RIGHT-HAND FRONT) DOOR WOOFER SPEAKER FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C612-1	Ω	C2385B-6
C612-4	Ω	C2385B-5

Are the resistances less than 3 ohms?

Yes	GO to P5

No	REPAIR the circuit in question.

P5 CHECK THE AUDIO CIRCUITS TO THE RHF (RIGHT-HAND FRONT) DOOR WOOFER SPEAKER FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C612-1	Ω	C612-4

Is the resistance greater than 10, 000 ohms?

Yes	GO to P6

No	REPAIR the circuit in question.

P6 CHECK THE RH (RIGHT-HAND) AUDIO SIGNAL FROM THE ACM (AUDIO FRONT CONTROL MODULE) TO THE AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE

Ignition OFF.

Connect: Audio DSP Module C2385B .

Disconnect: Audio DSP Module C2385A .

Ignition ON.

Operate the audio system in AM/ FM mode.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2385A-3		C2385A-4

Is a fluctuating AC voltage present?

Yes	GO to P12

No	GO to P7

P7 CHECK THE RH (RIGHT-HAND) AUDIO SIGNAL FROM THE ACM (AUDIO FRONT CONTROL MODULE) TO THE AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: ACM C240A .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2385A-3		Ground
C2385A-4		Ground

Is any voltage present?

Yes	REPAIR the circuit in question.

No	GO to P8

P8 CHECK THE RH (RIGHT-HAND) AUDIO SIGNAL FROM THE ACM (AUDIO FRONT CONTROL MODULE) TO THE AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2385A-3	Ω	Ground
C2385A-4	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to P9

No	REPAIR the circuit in question.

P9 CHECK THE RH (RIGHT-HAND) AUDIO SIGNAL FROM THE ACM (AUDIO FRONT CONTROL MODULE) TO THE AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2385A-3	Ω	C240A-11
C2385A-4	Ω	C240A-23

Are the resistances less than 3 ohms?

Yes	GO to P10

No	REPAIR the circuit in question.

P10 CHECK THE RH (RIGHT-HAND) AUDIO SIGNAL FROM THE ACM (AUDIO FRONT CONTROL MODULE) TO THE AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2385A-3	Ω	C2385A-4

Is the resistance greater than 10, 000 ohms?

Yes	GO to P11

No	REPAIR the circuit in question.

P11 CHECK FOR CORRECT ACM (AUDIO FRONT CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all the ACM connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the ACM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ACM. REFER to: Audio Front Control Module (ACM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

P12 CHECK FOR CORRECT AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE OPERATION

Ignition OFF.

Disconnect and inspect all the audio DSP module connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the audio DSP module connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, discontinue this test and follow TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new audio DSP module. REFER to: Audio Digital Signal Processing (DSP) Module .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST Q : THE RHR (RIGHT-HAND REAR) QUARTER PANEL SPEAKER IS INOPERATIVE (CONVERTIBLE)

Refer to Audio System/Navigation - AM/FM/SYNC/Touchscreen Display for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See Audio DSP Module.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B13F7:13	Audio Input 1: Circuit Open	Set by the audio DSP module when an open is detected on the RH audio signal circuits from the ACM to the audio DSP module.
B1A06:01	Speaker #6: General Electrical Failure	Set by the audio DSP module when a failure is detected on the RHR quarter panel (convertible) or right parcel shelf (coupe) speaker circuits.
B1A06:11	Speaker #6: Circuit Short To Ground	Set by the audio DSP module when a short to ground is detected on the RHR quarter panel (convertible) or right parcel shelf (coupe) speaker circuits. When DTC B1A06:11 is set, the speaker output is disabled.
B1A06:12	Speaker #6: Circuit Short To Battery	Set by the audio DSP module when a short to voltage is detected on the RHR quarter panel (convertible) or right parcel shelf (coupe) speaker circuits. When DTC B1A06:12 is set, the speaker output is disabled.
B1A06:13	Speaker #6: Circuit Open	Set by the audio DSP module when an open is detected on the RHR quarter panel (convertible) or right parcel shelf (coupe) speaker circuits.

Possible Sources

- Speaker

- Wiring, terminals, or connectors
- ACM
- Audio DSP module

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST Q : THE RHR (RIGHT-HAND REAR) QUARTER PANEL SPEAKER IS INOPERATIVE (CONVERTIBLE) > PINPOINT TEST Q : THE RHR (RIGHT-HAND REAR) QUARTER PANEL SPEAKER IS INOPERATIVE (CONVERTIBLE)

Q1 CHECK THE AUDIO SIGNAL TO THE RHR (RIGHT-HAND REAR) QUARTER PANEL SPEAKER

Ignition OFF.

Disconnect: RHR Quarter Panel Speaker C396 .

Operate the audio system in AM/ FM mode.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C396-1		C396-4

Is a fluctuating AC voltage present?

Yes	INSTALL a new RHR quarter panel speaker. REFER to: Rear Quarter Panel Speaker .

No	GO to Q2

Q2 CHECK THE AUDIO CIRCUITS TO THE RHR (RIGHT-HAND REAR) QUARTER PANEL SPEAKER FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: Audio DSP Module C2385B .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C396-1		Ground
C396-4		Ground

Is any voltage present?

Yes	REPAIR the circuit in question.

No	GO to Q3

Q3 CHECK THE AUDIO CIRCUITS TO THE RHR (RIGHT-HAND REAR) QUARTER PANEL SPEAKER FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C396-1	Ω	Ground
C396-4	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to Q4

No	REPAIR the circuit in question.

Q4 CHECK THE AUDIO CIRCUITS TO THE RHR (RIGHT-HAND REAR) QUARTER PANEL SPEAKER FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C396-1	Ω	C2385C-15
C396-4	Ω	C2385C-3

Are the resistances less than 3 ohms?

Yes	GO to Q5

No	REPAIR the circuit in question.

Q5 CHECK THE AUDIO CIRCUITS TO THE RHR (RIGHT-HAND REAR) QUARTER PANEL SPEAKER FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead

C396-1	Ω	C396-4

Is the resistance greater than 10, 000 ohms?

Yes	GO to Q6

No	REPAIR the circuit in question.

Q6 CHECK THE RH (RIGHT-HAND) AUDIO SIGNAL FROM THE ACM (AUDIO FRONT CONTROL MODULE) TO THE AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE

Ignition OFF.

Connect: Audio DSP Module C2385B .

Disconnect: Audio DSP Module C2385A .

Ignition ON.

Operate the audio system in AM/ FM mode.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2385A-3	V~	C2385A-4

Is a fluctuating AC voltage present?

Yes	GO to Q12

No	GO to Q7

Q7 CHECK THE RH (RIGHT-HAND) AUDIO SIGNAL FROM THE ACM (AUDIO FRONT CONTROL MODULE) TO THE AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: ACM C240A .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2385A-3		Ground

C2385A-4	V	Ground

Is any voltage present?

Yes	REPAIR the circuit in question.

No	GO to Q8

Q8 CHECK THE RH (RIGHT-HAND) AUDIO SIGNAL FROM THE ACM (AUDIO FRONT CONTROL MODULE) TO THE AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2385A-3	Ω	Ground
C2385A-4	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to Q9

No	REPAIR the circuit in question.

Q9 CHECK THE RH (RIGHT-HAND) AUDIO SIGNAL FROM THE ACM (AUDIO FRONT CONTROL MODULE) TO THE AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2385A-3	Ω	C240A-11
C2385A-4	Ω	C240A-23

Are the resistances less than 3 ohms?

Yes	GO to Q10

No	REPAIR the circuit in question.

Q10 CHECK THE RH (RIGHT-HAND) AUDIO SIGNAL FROM THE ACM (AUDIO FRONT CONTROL MODULE) TO THE AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2385A-3	Ω	C2385A-4

Is the resistance greater than 10, 000 ohms?

Yes	GO to Q11

No	REPAIR the circuit in question.

Q11 CHECK FOR CORRECT ACM (AUDIO FRONT CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all the ACM connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the ACM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ACM. REFER to: Audio Front Control Module (ACM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

Q12 CHECK FOR CORRECT AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE OPERATION

Ignition OFF.

Disconnect and inspect all the audio DSP module connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the audio DSP module connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, discontinue this test and follow TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new audio DSP module. REFER to: Audio Digital Signal Processing (DSP) Module .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST R : THE RIGHT PARCEL SHELF SPEAKER IS INOPERATIVE (COUPE)

Refer to Audio System/Navigation - AM/FM/SYNC/Touchscreen Display for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See Audio DSP Module.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B13F7:13	Audio Input 1: Circuit Open	Set by the audio DSP module when an open is detected on the RH audio signal circuits from the ACM to the audio DSP module.
B1A06:01	Speaker #6: General Electrical Failure	Set by the audio DSP module when a failure is detected on the RHR quarter panel (convertible) or right parcel shelf (coupe) speaker circuits.
B1A06:11	Speaker #6: Circuit Short To Ground	Set by the audio DSP module when a short to ground is detected on the RHR quarter panel (convertible) or right parcel shelf (coupe) speaker circuits. When DTC B1A06:11 is set, the speaker

		output is disabled.
B1A06:12	Speaker #6: Circuit Short To Battery	Set by the audio DSP module when a short to voltage is detected on the RHR quarter panel (convertible) or right parcel shelf (coupe) speaker circuits. When DTCB1A06:12 is set, the speaker output is disabled.
B1A06:13	Speaker #6: Circuit Open	Set by the audio DSP module when an open is detected on the RHR quarter panel (convertible) or right parcel shelf (coupe) speaker circuits.

Possible Sources

- Speaker
- Wiring, terminals, or connectors
- ACM
- Audio DSP module

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST R : THE RIGHT PARCEL SHELF SPEAKER IS INOPERATIVE (COUPE) > PINPOINT TEST R : THE RIGHT PARCEL SHELF SPEAKER IS INOPERATIVE (COUPE)

R1 CHECK THE AUDIO SIGNAL TO THE RIGHT PARCEL SHELF SPEAKER

Ignition OFF.

Disconnect: Right Parcel Shelf Speaker C485 .

Operate the audio system in AM/ FM mode.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C485-1	$\tilde{V}$	C485-4

Is a fluctuating AC voltage present?

Yes	INSTALL a new right parcel shelf speaker. REFER to: Parcel Shelf Speaker .

No	GO to R2

R2 CHECK THE AUDIO CIRCUITS TO THE RIGHT PARCEL SHELF SPEAKER FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: Audio DSP Module C2385B .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C485-1		Ground
C485-4		Ground

Is any voltage present?

Yes	REPAIR the circuit in question.

No	GO to R3

R3 CHECK THE AUDIO CIRCUITS TO THE RIGHT PARCEL SHELF SPEAKER FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C485-1	Ω	Ground
C485-4	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to R4

No	REPAIR the circuit in question.

R4 CHECK THE AUDIO CIRCUITS TO THE RIGHT PARCEL SHELF SPEAKER FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C485-1	Ω	C2385C-15
C485-4	Ω	C2385C-3

Are the resistances less than 3 ohms?

Yes	GO to R5

No	REPAIR the circuit in question.

R5 CHECK THE AUDIO CIRCUITS TO THE RIGHT PARCEL SHELF SPEAKER FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C485-1	Ω	C485-4

Is the resistance greater than 10, 000 ohms?

Yes	GO to R6

No	REPAIR the circuit in question.

R6 CHECK THE RH (RIGHT-HAND) AUDIO SIGNAL FROM THE ACM (AUDIO FRONT CONTROL MODULE) TO THE AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE

Ignition OFF.

Connect: Audio DSP Module C2385B .

Disconnect: Audio DSP Module C2385A .

Ignition ON.

Operate the audio system in AM/ FM mode.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2385A-3	$\tilde{V}$	C2385A-4

Is a fluctuating AC voltage present?

Yes	GO to R12

No	GO to R7

R7 CHECK THE RH (RIGHT-HAND) AUDIO SIGNAL FROM THE ACM (AUDIO FRONT CONTROL MODULE) TO THE AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: ACM C240A .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2385A-3	V	Ground
C2385A-4	V	Ground

Is any voltage present?

Yes	REPAIR the circuit in question.

No	GO to R8

R8 CHECK THE RH (RIGHT-HAND) AUDIO SIGNAL FROM THE ACM (AUDIO FRONT CONTROL MODULE) TO THE AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2385A-3	Ω	Ground
C2385A-4	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to R9

No	REPAIR the circuit in question.

R9 CHECK THE RH (RIGHT-HAND) AUDIO SIGNAL FROM THE ACM (AUDIO FRONT CONTROL

MODULE) TO THE AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2385A-3	Ω	C240A-11
C2385A-4	Ω	C240A-23

Are the resistances less than 3 ohms?

Yes	GO to R10

No	REPAIR the circuit in question.

R10 CHECK THE RH (RIGHT-HAND) AUDIO SIGNAL FROM THE ACM (AUDIO FRONT CONTROL MODULE) TO THE AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2385A-3	Ω	C2385A-4

Is the resistance greater than 10, 000 ohms?

Yes	GO to R11

No	REPAIR the circuit in question.

R11 CHECK FOR CORRECT ACM (AUDIO FRONT CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all the ACM connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the ACM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ACM. REFER to: Audio Front Control Module (ACM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

R12 CHECK FOR CORRECT AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE OPERATION

Ignition OFF.

Disconnect and inspect all the audio DSP module connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the audio DSP module connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, discontinue this test and follow TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new audio DSP module. REFER to: Audio Digital Signal Processing (DSP) Module .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST S : THE SUBWOOFER SPEAKER IS INOPERATIVE

Refer to Audio System/Navigation - AM/FM/SYNC/Touchscreen Display for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See Audio DSP Module and Subwoofer Amplifier.

If the subwoofer amplifier detects an open, short to ground, or less than 4.5 volts on the enable circuit, the speaker output will be muted for the subwoofer speaker.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1A09:02	Speaker #9: General Signal Failure	Set by the audio DSP module when a failure is detected on the audio signal circuits to the subwoofer amplifier.

Possible Sources

- Fuse
- Wiring, terminals, or connectors
- Audio DSP module
- Subwoofer amplifier, speaker, and enclosure assembly

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST S : THE SUBWOOFER SPEAKER IS INOPERATIVE > PINPOINT TEST S : THE SUBWOOFER SPEAKER IS INOPERATIVE

S1 CHECK THE SUBWOOFER AMPLIFIER VOLTAGE SUPPLY

Ignition OFF.

Disconnect: Subwoofer Amplifier C4109A .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4109A-5		Ground

Is the voltage greater than 11 volts?

Yes	GO to S2

No	VERIFY the BCM fuse 5 (20A) is OK. If OK, REPAIR the circuit.

S2 CHECK THE SUBWOOFER AMPLIFIER GROUND CIRCUIT

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4109A-5		C4109A-2

Is the voltage greater than 11 volts?

Yes	GO to S3

No	REPAIR the circuit.

NOTE: This pinpoint test step directs testing circuits using a back-probe method. Use the special back-probe tool POM6411. Do not force test leads or other probes into connectors. Adequate care must be exercised to avoid connector terminal damage, while ensuring that good electrical contact is made with the circuit or terminal. Failure to follow these instructions may cause damage to wiring, terminals, or connectors, and may cause subsequent electrical faults.

S3 CHECK THE SUBWOOFER AMPLIFIER ENABLE CIRCUIT FOR CORRECT VOLTAGE

Ignition OFF.

Connect: Subwoofer Amplifier C4109A .

Ignition ON.

Operate the audio system in AM/ FM mode.

Measure the voltage by back-probing subwoofer amplifier C4109A :

Positive Lead	Measurement / Action	Negative Lead
C4109A-1		Ground

Is the voltage between 3.5 and 5 volts?

Yes	GO to S7

No	GO to S4

S4 CHECK THE SUBWOOFER AMPLIFIER ENABLE CIRCUIT FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: Subwoofer Amplifier C4109A .

Disconnect: Audio DSP Module C2385B .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4109A-1		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to S5

S5 CHECK THE SUBWOOFER AMPLIFIER ENABLE CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4109A-1	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to S6

No	REPAIR the circuit.

S6 CHECK THE SUBWOOFER AMPLIFIER ENABLE CIRCUIT FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4109A-1	Ω	C2385B-9

Is the resistance less than 3 ohms?

Yes	GO to S7

No	REPAIR the circuit.

NOTE: This pinpoint test step directs testing circuits using a back-probe method. Use the special back-probe tool POM6411. Do not force test leads or other probes into connectors. Adequate care must be exercised to avoid connector terminal damage, while ensuring that good electrical contact is made with the circuit or terminal. Failure to follow these instructions may cause damage to wiring, terminals, or connectors, and may cause subsequent electrical faults.

S7 CHECK THE AUDIO SIGNAL TO THE SUBWOOFER AMPLIFIER

Ignition OFF.

Connect: Subwoofer Amplifier C4109A .

Connect: Audio DSP Module C2385B if necessary.

Ignition ON.

Operate the audio system in AM/ FM mode.

Measure the voltage by back-probing Subwoofer Amplifier C4109A :

Positive Lead	Measurement / Action	Negative Lead
C4109A-7		C4109A-8

Is a fluctuating AC voltage present?

Yes	GO to S13

No	GO to S8

S8 CHECK THE AUDIO CIRCUITS TO THE SUBWOOFER AMPLIFIER FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: Subwoofer Amplifier C4109A .

Disconnect: Audio DSP Module C2385B .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4109A-7		Ground
C4109A-8		Ground

Is any voltage present?

Yes	REPAIR the circuit in question.

No	GO to S9

S9 CHECK THE AUDIO CIRCUITS TO THE SUBWOOFER AMPLIFIER FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4109A-7	Ω	Ground
C4109A-8	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to S10

No	REPAIR the circuit in question.

S10 CHECK THE AUDIO CIRCUITS TO THE SUBWOOFER AMPLIFIER FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4109A-7	Ω	C2385B-1
C4109A-8	Ω	C2385B-2

Are the resistances less than 3 ohms?

Yes	GO to S11

No	REPAIR the circuit in question.

S11 CHECK THE AUDIO CIRCUITS TO THE SUBWOOFER AMPLIFIER FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4109A-7	Ω	C4109A-8

Is the resistance greater than 10, 000 ohms?

Yes	GO to S12

No	REPAIR the circuit in question.

S12 CHECK FOR CORRECT AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE OPERATION

Ignition OFF.

Disconnect and inspect all the audio DSP module connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the audio DSP module connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, discontinue this test and follow TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new audio DSP module. REFER to: Audio Digital Signal Processing (DSP) Module .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

S13 CHECK FOR CORRECT SUBWOOFER AMPLIFIER OPERATION

Ignition OFF.

Disconnect and inspect all the subwoofer amplifier connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the subwoofer amplifier connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new subwoofer amplifier, speaker, and enclosure assembly. REFER to: Subwoofer and Amplifier Unit .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST T : THE LEFT PARCEL SHELF SPEAKER IS INOPERATIVE (COUPE)

Refer to Audio System/Navigation - AM/FM/SYNC/Touchscreen Display for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See Audio DSP Module.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B13F9:13	Audio Input 3: Circuit Open	Set by the audio DSP module when an open is detected on the LH audio signal circuits from the ACM to the audio DSP module.
B1A02:01	Speaker #2: General Electrical Failure	Set by the audio DSP module when a failure is detected on the LHR quarter panel (convertible) or left parcel shelf (coupe) speaker circuits.
B1A02:11	Speaker #2: Circuit Short To Ground	Set by the audio DSP module when a short to ground is detected on the LHR quarter panel (convertible) or left parcel shelf (coupe) speaker circuits. When DTC B1A02:11 is set, the speaker output is disabled.
B1A02:12	Speaker #2: Circuit Short To Battery	Set by the audio DSP module when a short to voltage is detected on the LHR quarter panel (convertible) or left parcel shelf (coupe) speaker circuits. When DTC B1A02:12 is set, the speaker output is disabled.
B1A02:13	Speaker #2: Circuit Open	Set by the audio DSP module when an open is detected on the LHR quarter panel (convertible) or left parcel shelf (coupe) speaker circuits.

Possible Sources

- Speaker
- Wiring, terminals, or connectors
- ACM
- Audio DSP module

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST T : THE LEFT PARCEL SHELF SPEAKER IS INOPERATIVE (COUPE) > PINPOINT TEST T : THE LEFT PARCEL SHELF SPEAKER IS INOPERATIVE (COUPE)

T1 CHECK THE AUDIO SIGNAL TO THE LEFT PARCEL SHELF SPEAKER

Ignition OFF.

Disconnect: Left Parcel Shelf Speaker C484 .

Operate the audio system in AM/ FM mode.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C484-1		C484-4

Is a fluctuating AC voltage present?

Yes	INSTALL a new left parcel shelf speaker. REFER to: Parcel Shelf Speaker .

No	GO to T2

T2 CHECK THE AUDIO CIRCUITS TO THE LEFT PARCEL SHELF SPEAKER FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: Audio DSP Module C2385B .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead

C484-1		Ground
C484-4		Ground

Is any voltage present?

Yes	REPAIR the circuit in question.

No	GO to T3

T3 CHECK THE AUDIO CIRCUITS TO THE LEFT PARCEL SHELF SPEAKER FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C484-1	Ω	Ground
C484-4	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to T4

No	REPAIR the circuit in question.

T4 CHECK THE AUDIO CIRCUITS TO THE LEFT PARCEL SHELF SPEAKER FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C484-1	Ω	C2385B-16
C484-4	Ω	C2385B-15

Are the resistances less than 3 ohms?

Yes	GO to T5

No	REPAIR the circuit in question.

T5 CHECK THE AUDIO CIRCUITS TO THE LEFT PARCEL SHELF SPEAKER FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C484-1	Ω	C484-4

Is the resistance greater than 10, 000 ohms?

Yes	GO to T6

No	REPAIR the circuit in question.

T6 CHECK THE LH (LEFT-HAND) AUDIO SIGNAL FROM THE ACM (AUDIO FRONT CONTROL MODULE) TO THE AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE

Ignition OFF.

Connect: Audio DSP Module C2385B .

Disconnect: Audio DSP Module C2385A .

Ignition ON.

Operate the audio system in AM/ FM mode.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2385A-7	$\tilde{V}$	C2385A-8

Is a fluctuating AC voltage present?

Yes	GO to T12

No	GO to T7

T7 CHECK THE LH (LEFT-HAND) AUDIO SIGNAL FROM THE ACM (AUDIO FRONT CONTROL MODULE) TO THE AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: ACM C240A .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2385A-7		Ground
C2385A-8		Ground

Is any voltage present?

Yes	REPAIR the circuit in question.

No	GO to T8

T8 CHECK THE LH (LEFT-HAND) AUDIO SIGNAL FROM THE ACM (AUDIO FRONT CONTROL MODULE) TO THE AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2385A-7	Ω	Ground
C2385A-8	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to T9

No	REPAIR the circuit in question.

T9 CHECK THE LH (LEFT-HAND) AUDIO SIGNAL FROM THE ACM (AUDIO FRONT CONTROL MODULE) TO THE AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2385A-7	Ω	C240A-10
C2385A-8	Ω	C240A-22

Are the resistances less than 3 ohms?

Yes	GO to T10

No	REPAIR the circuit in question.

T10 CHECK THE LH (LEFT-HAND) AUDIO SIGNAL FROM THE ACM (AUDIO FRONT CONTROL MODULE) TO THE AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2385A-7	Ω	C2385A-8

Is the resistance greater than 10, 000 ohms?

Yes	GO to T11

No	REPAIR the circuit in question.

T11 CHECK FOR CORRECT ACM (AUDIO FRONT CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all the ACM connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the ACM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ACM. REFER to: Audio Front Control Module (ACM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

T12 CHECK FOR CORRECT AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE OPERATION

Ignition OFF.

Disconnect and inspect all the audio DSP module connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the audio DSP module connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, discontinue this test and follow TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new audio DSP module. REFER to: Audio Digital Signal Processing (DSP) Module .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST U : THE LHR (LEFT-HAND REAR) QUARTER PANEL SPEAKER IS INOPERATIVE (CONVERTIBLE)

Refer to Audio System/Navigation - AM/FM/SYNC/Touchscreen Display for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See Audio DSP Module.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B13F9:13	Audio Input 3: Circuit Open	Set by the audio DSP module when an open is detected on the LH audio signal circuits from the ACM to the audio DSP module.
B1A02:01	Speaker #2: General Electrical Failure	Set by the audio DSP module when a failure is detected on the LHR quarter panel (convertible) or left parcel shelf (coupe) speaker circuits.

B1A02:11	Speaker #2: Circuit Short To Ground	Set by the audio DSP module when a short to ground is detected on the LHR quarter panel (convertible) or left parcel shelf (coupe) speaker circuits. When DTC B1A02:11 is set, the speaker output is disabled.
B1A02:12	Speaker #2: Circuit Short To Battery	Set by the audio DSP module when a short to voltage is detected on the LHR quarter panel (convertible) or left parcel shelf (coupe) speaker circuits. When DTC B1A02:12 is set, the speaker output is disabled.
B1A02:13	Speaker #2: Circuit Open	Set by the audio DSP module when an open is detected on the LHR quarter panel (convertible) or left parcel shelf (coupe) speaker circuits.

Possible Sources

- Speaker
- Wiring, terminals, or connectors
- ACM
- Audio DSP module

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST U : THE LHR (LEFT-HAND REAR) QUARTER PANEL SPEAKER IS INOPERATIVE (CONVERTIBLE) > PINPOINT TEST U : THE LHR (LEFT-HAND REAR) QUARTER PANEL SPEAKER IS INOPERATIVE (CONVERTIBLE)

U1 CHECK THE AUDIO SIGNAL TO THE LHR (LEFT-HAND REAR) QUARTER PANEL SPEAKER

Ignition OFF.

Disconnect: LHR Quarter Panel Speaker C395 .

Operate the audio system in AM/ FM mode.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C395-1		C395-4

Is a fluctuating AC voltage present?

Yes	INSTALL a new LHR quarter panel speaker. REFER to: Rear Quarter Panel Speaker .

No	GO to U2

U2 CHECK THE AUDIO CIRCUITS TO THE LHR (LEFT-HAND REAR) QUARTER PANEL SPEAKER FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: Audio DSP Module C2385B .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C395-1		Ground
C395-4		Ground

Is any voltage present?

Yes	REPAIR the circuit in question.

No	GO to U3

U3 CHECK THE AUDIO CIRCUITS TO THE LHR (LEFT-HAND REAR) QUARTER PANEL SPEAKER FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C395-1	Ω	Ground
C395-4	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to U4

No	REPAIR the circuit in question.

U4 CHECK THE AUDIO CIRCUITS TO THE LHR (LEFT-HAND REAR) QUARTER PANEL SPEAKER FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C395-1	Ω	C2385B-16
C395-4	Ω	C2385B-15

Are the resistances less than 3 ohms?

Yes	GO to U5

No	REPAIR the circuit in question.

U5 CHECK THE AUDIO CIRCUITS TO THE LHR (LEFT-HAND REAR) QUARTER PANEL SPEAKER FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C395-1	Ω	C395-4

Is the resistance greater than 10, 000 ohms?

Yes	GO to U6

No	REPAIR the circuit in question.

U6 CHECK THE LH (LEFT-HAND) AUDIO SIGNAL FROM THE ACM (AUDIO FRONT CONTROL MODULE) TO THE AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE

Ignition OFF.

Connect: Audio DSP Module C2385B .

Disconnect: Audio DSP Module C2385A .

Ignition ON.

Operate the audio system in AM/ FM mode.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2385A-7	$\tilde{V}$	C2385A-8

Is a fluctuating AC voltage present?

Yes	GO to U12

No	GO to U7

U7 CHECK THE LH (LEFT-HAND) AUDIO SIGNAL FROM THE ACM (AUDIO FRONT CONTROL MODULE) TO THE AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: ACM C240A .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2385A-7	V	Ground
C2385A-8	V	Ground

Is any voltage present?

Yes	REPAIR the circuit in question.

No	GO to U8

U8 CHECK THE LH (LEFT-HAND) AUDIO SIGNAL FROM THE ACM (AUDIO FRONT CONTROL MODULE) TO THE AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2385A-7	Ω	Ground
C2385A-8	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to U9

No	REPAIR the circuit in question.

U9 CHECK THE LH (LEFT-HAND) AUDIO SIGNAL FROM THE ACM (AUDIO FRONT CONTROL MODULE) TO THE AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2385A-7	Ω	C240A-10
C2385A-8	Ω	C240A-22

Are the resistances less than 3 ohms?

Yes	GO to U10

No	REPAIR the circuit in question.

U10 CHECK THE LH (LEFT-HAND) AUDIO SIGNAL FROM THE ACM (AUDIO FRONT CONTROL MODULE) TO THE AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2385A-7	Ω	C2385A-8

Is the resistance greater than 10, 000 ohms?

Yes	GO to U11

No	REPAIR the circuit in question.

U11 CHECK FOR CORRECT ACM (AUDIO FRONT CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all the ACM connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the ACM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ACM. REFER to: Audio Front Control Module (ACM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

U12 CHECK FOR CORRECT AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE OPERATION

Ignition OFF.

Disconnect and inspect all the audio DSP module connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the audio DSP module connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, discontinue this test and follow TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new audio DSP module. REFER to: Audio Digital Signal Processing (DSP) Module .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST V : ALL SYNC ® SERVICES FEATURES ARE INOPERATIVE OR INACCURATE (TRAFFIC, DIRECTIONS, AND INFORMATION)

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See SYNC ® Services.

Possible Sources

- Unregistered SYNC ® Owner Account
- Unregistered, inactive, or expired SYNC ® Services subscription
- Unregistered mobile phone number
- Mobile phone being used not selected as "Active"
- SYNC ® Services server
- Inadequate phone reception
- Obstructions in the GPS antenna's line of sight
- APIM
- GPSM

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST V : ALL SYNC ® SERVICES FEATURES ARE INOPERATIVE OR INACCURATE (TRAFFIC, DIRECTIONS, AND INFORMATION) > PINPOINT TEST V : ALL SYNC ® SERVICES FEATURES ARE INOPERATIVE OR INACCURATE (TRAFFIC, DIRECTIONS, AND INFORMATION)

> *NOTE: Caller ID blocking must be disabled on the customer's mobile phone so the SYNC ® Services server can recognize the registered and "Active" phone number.*

V1 VERIFY THE CUSTOMER'S PHONE CONNECTION TO SYNC ® SERVICES WHILE AWAY FROM THE VEHICLE

Advise the customer to call SYNC ® Services (888-240-4529) from their mobile phone.

Verify that the phone call is placed and that the phone connects to SYNC ® Services.

Observe whether the SYNC ® Services subscription commercial plays, or if the system asks which Service is wanted.

Does the SYNC ® Services subscription commercial play?

Yes	GO to V2

No	GO to V4

V2 VERIFY THE CUSTOMER'S SYNC ® OWNER ACCOUNT AND SYNC ® SERVICES REGISTRATION AND SUBSCRIPTION

Verify that the customer has a SYNC ® Owner Account on www.syncmyride.com.

Verify that the customer has registered for SYNC ® Services and has an active subscription.

Does the customer have a SYNC ® Owner Account and an active SYNC ® Services subscription?

Yes	GO to V3

No	* If the customer does not have a SYNC ® Owner Account, INFORM the customer that an account must be created in order to sign up for SYNC ® Services. REFER to www.syncmyride.com.* If the customer does not have an active SYNC ® Services subscription, INFORM the customer that in order for SYNC ® Services to function, the subscription needs to be activated. REFER to www.syncmyride.com.

NOTE: Only one mobile phone number can be selected as "Active" at a time, and only the "Active" mobile phone number has access to SYNC ® Services.

V3 VERIFY THE CUSTOMER'S REGISTERED PHONE NUMBER AND STATUS

Verify that the mobile phone being used has the correct mobile phone number registered with the SYNC ® Owner Account on www.syncmyride.com.

Verify that the mobile phone being used is selected as "Active" on www.syncmyride.com.

Is the customer using the registered and active mobile phone associated with the SYNC ® Services account?

Yes	GO to V5

No	INFORM the customer that the correct mobile phone number must be registered on the SYNC ® website and selected as "Active." REFER to www.syncmyride.com.

V4 VERIFY THE CUSTOMER'S PHONE CONNECTION TO SYNC ® SERVICES FROM INSIDE THE VEHICLE

Ensure the registered and "Active" mobile phone is paired with the SYNC ® system. For information on the pairing process, refer to the Owner's Literature. If necessary, review the device compatibility list found on support.ford.com/sync-technology/device-compatibility-sync.

Ensure that the customer's mobile phone has adequate reception.

Ensure that the vehicle is in an open location that is free from obstacles such as tall buildings or large trees.

Start the vehicle.

Connect to SYNC ® Services from the vehicle controls.

Verify that the phone call is placed and that the phone is connected to SYNC ® Services.

When prompted, select "Directions," and follow the audible prompts to get directions to an address or Saved Point.

Did SYNC ® Services indicate that the vehicle location was being obtained, the route was being sent, and that the route download from the server to the vehicle was complete?

Yes	SYNC ® Services is operating correctly at this time.

No	* If SYNC ® Services indicated that the vehicle location was **not** able to be obtained, GO to * If SYNC ® Services did **not** indicate that the vehicle location was being obtained, the route was being sent, and that the route download from the server to the vehicle was complete, there is a potential SYNC ® Services server issue. The problem does not reside in the vehicle's audio system. CONTACT the Ford Technical Hotline for assistance.

V5 CHECK FOR APIM (SYNC MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition ON.

Using a diagnostic scan tool, perform the APIM self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded in the APIM?

Yes	REFER to: Information and Entertainment System . See DTC Chart: APIM.

No	GO to V6

V6 CHECK FOR GPSM (GLOBAL POSITIONING SYSTEM MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, perform the GPSM self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded in the GPSM?

Yes	REFER to: Information and Entertainment System . See DTC Chart: GPSM.

No	GO to V7

V7 CHECK FOR CORRECT APIM (SYNC MODULE) OPERATION

Ignition OFF.

Disconnect and inspect the APIM connector.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the APIM connector. Make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, PERFORM the APIM Hardware Test. Refer to APIM HARDWARE TESTING . If the concern is still present, GO to V8

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

V8 CHECK FOR CORRECT GPSM (GLOBAL POSITIONING SYSTEM MODULE) OPERATION

Ignition OFF.

Disconnect and inspect the GPSM connector.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the GPSM connector. Make sure it seats and latches correctly.

NOTE: Before operating the system to determine if the concern is still present, ensure that the vehicle is in an open location that is free from obstacles such as tall buildings or large trees so an adequate GPS signal can be obtained.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new GPSM. REFER to: Global Positioning System Module (GPSM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

PINPOINT TESTS > PINPOINT TEST W : ALL APIM (SYNC MODULE) STEREO OUTPUTS ARE INOPERATIVE OR DO NOT OPERATE CORRECTLY

Refer to Audio System/Navigation - AM/FM/SYNC/Touchscreen Display for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See Bluetooth Mode, Composite Audio-Video Input Mode, SD Card Mode, SYNC ® System, USB Mode, ACM, APIM, and Media Hub.

Possible Sources

- Customer's device
- Wiring, terminals, or connectors
- APIM
- ACM

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST W : ALL APIM (SYNC MODULE) STEREO OUTPUTS ARE INOPERATIVE OR DO NOT OPERATE CORRECTLY > PINPOINT TEST W : ALL APIM (SYNC MODULE) STEREO OUTPUTS ARE INOPERATIVE OR DO NOT OPERATE CORRECTLY

W1 VERIFY THE OPERATION OF THE SYNC ® SYSTEM AUDIO SOURCES

Connect: MIT 105-00120.

Using the MIT 105-00120 and RCA Adapter 105-00121, test the audio output for the SYNC ® audio sources (Bluetooth, USB ports, and RCA jacks).

Is there poor quality, distorted, or no sound from all SYNC ® audio sources?

Yes	GO to W2

No	* If there is a concern with one or more, but not all SYNC ® audio sources, REFER to: Information and Entertainment System . See Symptom Chart: SYNC ® System.* If all SYNC ® audio sources operate correctly with the MIT 105-00120 and RCA Adapter 105-00121, the concern is with the customer's device.

NOTE: This pinpoint test step directs testing circuits using a back-probe method. Use the special back-probe tool POM6411. Do not force test leads or other probes into connectors. Adequate care must be exercised to avoid connector terminal damage, while ensuring that good electrical contact is made with the circuit or terminal. Failure

to follow these instructions may cause damage to wiring, terminals, or connectors, and may cause subsequent electrical faults.

W2 CHECK FOR AN AC (ALTERNATING CURRENT) VOLTAGE SIGNAL ON THE APIM (SYNC MODULE) STEREO OUTPUT CIRCUITS TO THE ACM (AUDIO FRONT CONTROL MODULE)

Play an audio file through the audio system using a SYNC ® audio source (Bluetooth, USB ports, RCA jacks).

While back-probing ACM C240B , measure the AC voltage.

Positive Lead	Measurement / Action	Negative Lead
C240B-12	V~	C240B-25
C240B-13	V~	C240B-26

Is a fluctuating AC voltage present?

Yes	GO to W8

No	GO to W3

W3 CHECK THE APIM (SYNC MODULE) STEREO OUTPUT CIRCUITS TO THE ACM (AUDIO FRONT CONTROL MODULE) FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: ACM C240B .

Disconnect: APIM C2383 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C240B-12	+ V⎓ −	Ground
C240B-13	+ V⎓ −	Ground
C240B-25	+ V⎓ −	Ground
C240B-26	+ V⎓ −	Ground

Is any voltage present?

Yes	REPAIR the circuit in question.

No	GO to W4

W4 CHECK THE APIM (SYNC MODULE) STEREO OUTPUT CIRCUITS TO THE ACM (AUDIO FRONT CONTROL MODULE) FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C240B-12	Ω	Ground
C240B-13	Ω	Ground
C240B-25	Ω	Ground
C240B-26	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to W5

No	REPAIR the circuit in question.

W5 CHECK THE APIM (SYNC MODULE) STEREO OUTPUT CIRCUITS TO THE ACM (AUDIO FRONT CONTROL MODULE) FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C240B-12	Ω	C2383-23
C240B-13	Ω	C2383-25
C240B-25	Ω	C2383-24
C240B-26	Ω	C2383-26

Are the resistances less than 3 ohms?

Yes	GO to W6

No	REPAIR the circuit in question.

W6 CHECK THE APIM (SYNC MODULE) STEREO OUTPUT CIRCUITS TO THE ACM (AUDIO FRONT CONTROL MODULE) FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C240B-12	Ω	C240B-13
C240B-12	Ω	C240B-25
C240B-12	Ω	C240B-26
C240B-13	Ω	C240B-25
C240B-13	Ω	C240B-26
C240B-25	Ω	C240B-26

Are the resistances greater than 10, 000 ohms?

Yes	GO to W7

No	INSTALL a new steering wheel. REFER to: Steering Wheel .

W7 CHECK FOR CORRECT APIM (SYNC MODULE) OPERATION

Ignition OFF.

Disconnect and inspect the APIM connector.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the APIM connector. Make sure it seats and latches correctly.

Wait at least 2 minutes for the APIM to re-initialize.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, PERFORM the APIM Hardware Test. Refer to APIM HARDWARE TESTING .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

W8 CHECK FOR CORRECT ACM (AUDIO FRONT CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all the ACM connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the ACM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ACM. REFER to: Audio Front Control Module (ACM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST X : ALL APIM (SYNC MODULE) MONO OUTPUTS ARE INOPERATIVE OR DO NOT OPERATE CORRECTLY

Refer to Audio System/Navigation - AM/FM/SYNC/Touchscreen Display for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See SYNC ® System, Voice Recognition, ACM, and APIM.

Possible Sources

- Customer's setting
- Wiring, terminals, or connectors
- APIM
- ACM

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM >

PINPOINT TESTS > PINPOINT TEST X : ALL APIM (SYNC MODULE) MONO OUTPUTS ARE INOPERATIVE OR DO NOT OPERATE CORRECTLY > PINPOINT TEST X : ALL APIM (SYNC MODULE) MONO OUTPUTS ARE INOPERATIVE OR DO NOT OPERATE CORRECTLY

X1 CHECK THE AUDIBLE PROMPT FUNCTIONALITY

Operate the audio system in AM/ FM mode.

Operate the VOICE steering wheel switch and listen for the SYNC ® audible prompt.

Does the SYNC ® system produce an audible prompt correctly; indicating voice recognition mode has been entered?

Yes	The system is operating correctly at this time. INSTRUCT the customer in the correct operation of the audible prompt feature. REFER to "SYNC ® Voice Recognition Feature" in the Owner's Literature.

No	GO to X2

X2 CHECK THE OPERATION OF THE RH (RIGHT-HAND) LOWER STEERING WHEEL SWITCHES

Operate the audio system in AM/ FM mode.

Operate the VOLUME +/-, SEEK +/END CALL, SEEK-/SEND CALL/RECEIVE CALL, VOICE, and MUTE steering wheel switches.

Do the VOLUME +/-, SEEK +/END CALL, SEEK-/SEND CALL/RECEIVE CALL, VOICE, and MUTE steering wheel switches operate correctly?

Yes	GO to X3

No	GO to Pinpoint Test AF

NOTE: This pinpoint test step directs testing circuits using a back-probe method. Use the special back-probe tool POM6411. Do not force test leads or other probes into connectors. Adequate care must be exercised to avoid connector terminal damage, while ensuring that good electrical contact is made with the circuit or terminal. Failure to follow these instructions may cause damage to wiring, terminals, or connectors, and may cause subsequent electrical faults.

X3 CHECK FOR AN AC (ALTERNATING CURRENT) VOLTAGE SIGNAL ON THE APIM (SYNC MODULE) MONO OUTPUT CIRCUITS TO THE ACM (AUDIO FRONT CONTROL MODULE)

Operate the audio system in AM/ FM mode.

While back-probing audio ACM C240B , measure the AC voltage while repeatedly operating

the VOICE steering wheel switch.

Positive Lead	Measurement / Action	Negative Lead
C240B-8		C240B-21

Is a fluctuating AC voltage present each time the VOICE steering wheel switch is operated?

Yes	GO to X9

No	GO to X4

X4 CHECK THE APIM (SYNC MODULE) MONO OUTPUT CIRCUITS TO THE ACM (AUDIO FRONT CONTROL MODULE) FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: ACM C240B .

Disconnect: APIM C2383 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C240B-8		Ground
C240B-21		Ground

Is any voltage present?

Yes	REPAIR the circuit in question.

No	GO to X5

X5 CHECK THE APIM (SYNC MODULE) MONO OUTPUT CIRCUITS TO THE ACM (AUDIO FRONT CONTROL MODULE) FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C240B-8		Ground

C240B-21	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to X6

No	REPAIR the circuit in question.

X6 CHECK THE APIM (SYNC MODULE) MONO OUTPUT CIRCUITS TO THE ACM (AUDIO FRONT CONTROL MODULE) FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C240B-8	Ω	C2383-3
C240B-21	Ω	C2383-4

Are the resistances less than 3 ohms?

Yes	GO to X7

No	REPAIR the circuit in question.

X7 CHECK THE APIM (SYNC MODULE) MONO OUTPUT CIRCUITS TO THE ACM (AUDIO FRONT CONTROL MODULE) FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C240B-8	$\tilde{V}$	C240B-21

Is the resistance greater than 10, 000 ohms?

Yes	GO to X8

No	REPAIR the circuit in question.

X8 CHECK FOR CORRECT APIM (SYNC MODULE) OPERATION

Disconnect and inspect the APIM connector.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the APIM connector. Make sure it seats and latches correctly.

Wait at least 2 minutes for the APIM to re-initialize.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, PERFORM the APIM Hardware Test. Refer to APIM HARDWARE TESTING .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

X9 CHECK FOR CORRECT ACM (AUDIO FRONT CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all the ACM connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the ACM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ACM. REFER to: Audio Front Control Module (ACM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST Y : VOICE RECOGNITION IS INOPERATIVE OR

DOES NOT OPERATE CORRECTLY, OR DURING A PHONE CALL, POOR QUALITY OR NO OUTGOING AUDIO IS HEARD ON THE OUTSIDE DEVICE

Refer to Audio System/Navigation - AM/FM/SYNC/Touchscreen Display for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See Voice Recognition.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B116A:01	Handset Microphone: General Electrical Failure	Set by the APIM when a short to voltage, short to ground, or open is detected on the microphone circuits.
B117A:01	Backup Microphone: General Electrical Failure	Set by the APIM when a short to voltage or open is detected on the microphone shield.

Possible Sources

- Wiring, terminals, or connectors
- Microphone
- APIM

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST Y : VOICE RECOGNITION IS INOPERATIVE OR DOES NOT OPERATE CORRECTLY, OR DURING A PHONE CALL, POOR QUALITY OR NO OUTGOING AUDIO IS HEARD ON THE OUTSIDE DEVICE > PINPOINT TEST Y : VOICE RECOGNITION IS INOPERATIVE OR DOES NOT OPERATE CORRECTLY, OR DURING A PHONE CALL, POOR QUALITY OR NO OUTGOING AUDIO IS HEARD ON THE OUTSIDE DEVICE

Y1 CHECK THE AUDIBLE PROMPT FUNCTIONALITY

Operate the audio system in AM/ FM mode.

Operate the VOICE steering wheel switch and listen for the SYNC ® audible prompt.

Does the SYNC ® system produce an audible prompt correctly; indicating voice recognition mode has been entered?

Yes	GO to Y3

No	GO to Y2

Y2 CHECK THE OPERATION OF THE LOWER STEERING WHEEL SWITCHES

Operate the audio system in AM/ FM mode.

Operate the VOLUME +/-, SEEK +/END CALL, SEEK-/SEND CALL/RECEIVE CALL, VOICE, and MUTE steering wheel switches.

Do the VOLUME +/-, SEEK +/END CALL, SEEK-/SEND CALL/RECEIVE CALL, VOICE, and MUTE steering wheel switches operate correctly?

Yes	GO to Pinpoint Test X

No	GO to Pinpoint Test AF

Y3 CHECK THE MICROPHONE CIRCUITS TO THE APIM (SYNC MODULE) FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: APIM C2383 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2383-12		Ground
C2383-13		Ground
C2383-31		Ground

Is any voltage present?

Yes	REPAIR the circuit in question.

No	GO to Y4

Y4 CHECK THE MICROPHONE CIRCUITS TO THE APIM (SYNC MODULE) FOR A SHORT TO GROUND

Ignition OFF.

Disconnect: Microphone (Overhead Console) C930 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2383-12	Ω	Ground
C2383-13	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to Y5

No	REPAIR the circuit in question.

Y5 CHECK THE MICROPHONE CIRCUITS TO THE APIM (SYNC MODULE) FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2383-12	Ω	C930-9
C2383-13	Ω	C930-10
C2383-31	Ω	C930-8

Are the resistances less than 3 ohms?

Yes	GO to Y6

No	REPAIR the circuit in question.

Y6 CHECK THE MICROPHONE CIRCUITS TO THE APIM (SYNC MODULE) FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2383-12	Ω	C2383-13
C2383-12	Ω	C2383-31
C2383-13	Ω	C2383-31

Is the resistance greater than 10, 000 ohms?

Yes	GO to Y7

No	REPAIR the circuit in question.

Y7 ISOLATE THE MICROPHONE

Connect: APIM C2383 .

Install a new microphone. REFER to: Microphone .

Operate the audio system in AM/ FM mode.

Operate the VOICE steering wheel switch and listen for the SYNC ® audible prompt.

Speak a command to test the voice recognition for normal operation.

Is the voice recognition functioning correctly?

Yes	The system is operating correctly at this time. The concern was caused by an inoperative microphone.

No	GO to Y8

Y8 CHECK FOR CORRECT APIM (SYNC MODULE) OPERATION

Ignition OFF.

Disconnect and inspect the APIM connector.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the APIM connector. Make sure they seat and latch correctly.

Wait at least 2 minutes for the APIM to re-initialize.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, PERFORM the APIM Hardware Test. Refer to APIM HARDWARE TESTING .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST Z : ALL MEDIA HUB FUNCTIONS ARE INOPERATIVE OR DO NOT OPERATE CORRECTLY (USB (UNIVERSAL SERIAL BUS) PORTS, SD (SECURE DIGITAL) CARD, AND RCA JACKS)

Refer to Audio System/Navigation - AM/FM/SYNC/Touchscreen Display for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See Composite Audio-Video Input Mode, SD Card Mode, USB Mode, and Media Hub.

The media hub requires a power and ground circuit from the APIM to operate. Loss of power or ground disables all media hub functionality.

Possible Sources

- Customer's device
- Media hub
- Wiring, terminals, or connectors
- APIM

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST Z : ALL MEDIA HUB FUNCTIONS ARE INOPERATIVE OR DO NOT OPERATE CORRECTLY (USB (UNIVERSAL SERIAL BUS) PORTS, SD (SECURE DIGITAL) CARD, AND RCA JACKS) > PINPOINT TEST Z : ALL MEDIA HUB FUNCTIONS ARE INOPERATIVE OR DO NOT OPERATE CORRECTLY (USB (UNIVERSAL SERIAL BUS) PORTS, SD (SECURE DIGITAL) CARD, AND RCA JACKS)

Z1 CHECK FOR APIM (SYNC MODULE) BATTERY VOLTAGE OUT-OF-RANGE DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, perform the APIM self-test.

Are any low or high voltage Diagnostic Trouble Codes (DTCs) recorded in the APIM?

Yes	* For DTC U3003:16, GO to Pinpoint Test BB * For DTC U3003:17, GO to Pinpoint Test BC

No	GO to Z2

Z2 RESET THE APIM (SYNC MODULE)

Remove any devices connected to the media hub.

Carry out an APIM power reset by disconnecting the battery for 1 minute, then reconnecting it.

Wait at least 2 minutes for the APIM to re-initialize.

Test the system for normal operation.

Does the system operate correctly?

Yes	The system is operating correctly at this time. The concern was corrected by performing the APIM power reset. If the customer's device still does not operate correctly, the fault is with the customer's device.

No	GO to Z3

Z3 CHECK THE MEDIA HUB VOLTAGE SUPPLY CIRCUIT

Ignition OFF.

Disconnect: Media Hub C3618 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3618-1		Ground

Is the voltage greater than 11 volts?

Yes	GO to Z4

No	GO to Z5

Z4 CHECK THE MEDIA HUB GROUND CIRCUIT

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3618-1		C3618-8

Is the voltage greater than 11 volts?

Yes	INSTALL a new media hub. REFER to: Media Hub .

No	GO to Z5

Z5 CHECK THE MEDIA HUB VOLTAGE SUPPLY CIRCUIT AND GROUND CIRCUIT FOR A SHORT TOGETHER

Ignition OFF.

Disconnect: APIM C2383 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3618-1	Ω	C3618-8

Is the resistance greater than 10, 000 ohms?

Yes	GO to Z6

No	Repair the circuit in question.

Z6 CHECK THE MEDIA HUB VOLTAGE SUPPLY CIRCUIT AND GROUND CIRCUIT FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3618-1	Ω	C2383-8
C3618-8	Ω	C2383-38

Are the resistances less than 3 ohms?

Yes	GO to Z7

No	Repair the circuit in question.

Z7 CHECK THE MEDIA HUB VOLTAGE SUPPLY CIRCUIT FOR A SHORT TO GROUND

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3618-1	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to Z8

No	REPAIR the circuit.

Z8 CHECK THE MEDIA HUB GROUND CIRCUIT FOR A SHORT TO VOLTAGE

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3618-8		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to Z9

Z9 CHECK FOR CORRECT APIM (SYNC MODULE) OPERATION

Ignition OFF.

Disconnect and inspect the APIM connector.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the APIM connector. Make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, PERFORM the APIM Hardware Test. Refer to APIM HARDWARE TESTING .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AA : THE USB (UNIVERSAL SERIAL BUS)

PORT(S) IS/ARE INOPERATIVE OR DOES/DO NOT OPERATE CORRECTLY

Refer to Audio System/Navigation - AM/FM/SYNC/Touchscreen Display for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See USB Mode, APIM, and Media Hub.

The MIT 105-00120 is powered by the USB port.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1252:11	USB Port: Circuit Short to Ground	Set by the APIM when a short to ground or over-current condition is detected on the USB cable. This can be caused by a fault on the USB cable, USB port, or by the customer's USB or SD card device.
B1252:13	USB Port: Circuit Open	Set by the APIM when an open is detected on the USB cable.

Possible Sources

- Media hub
- Customer's device
- USB cable
- USB cable connection
- APIM

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AA : THE USB (UNIVERSAL SERIAL BUS) PORT(S) IS/ARE INOPERATIVE OR DOES/DO NOT OPERATE CORRECTLY > PINPOINT TEST AA : THE USB (UNIVERSAL SERIAL BUS) PORT(S) IS/ARE INOPERATIVE OR DOES/DO NOT OPERATE CORRECTLY

AA1 CHECK THE USB (UNIVERSAL SERIAL BUS) PORTS FOR POWER OUTPUT

Connect: MIT 105-00120.

Does the MIT 105-00120 power on from both USB ports?

Yes	GO to AA2

No	* If the MIT 105-00120 powers on from only one USB port, INSTALL a new media hub. REFER to: Media Hub .* If the MIT 105-00120 does not power on from either USB port, GO to Pinpoint Test Z

AA2 RESET THE APIM (SYNC MODULE)

Remove any devices connected to the media hub.

Carry out an APIM power reset by disconnecting the battery for 1 minute, then reconnecting it.

Wait at least 2 minutes for the APIM to re-initialize.

Connect: MIT 105-00120.

Using the MIT 105-00120, attempt to play an audio file using each USB port.

Is the audio output OK for each USB port?

Yes	The system is operating correctly at this time. The concern was corrected by performing the APIM power reset. If the customer's device still does not operate correctly, the fault is with the customer's device.

No	* If the audio output is not OK from one USB port, INSTALL a new media hub. REFER to: Media Hub .* If the audio output is not OK from both USB ports, GO to AA3

AA3 VERIFY THE OPERATION OF THE USB (UNIVERSAL SERIAL BUS) CABLE

Insert a known good non-navigation SD card containing music files.

Operate the audio system in SD card mode and attempt to play an audio file.

Is the audio output OK for the SD card slot?

Yes	INSTALL a new media hub. REFER to: Media Hub .

No	GO to AA4

AA4 CHECK THE APIM (SYNC MODULE) FOR DTC (DIAGNOSTIC TROUBLE CODE) B1252:11 OR DTC (DIAGNOSTIC TROUBLE CODE) B1252:13

Using a diagnostic scan tool, clear the APIM Diagnostic Trouble Codes (DTCs).

Perform the APIM self-test.

Is DTC B1252:11 or DTC B1252:13 present?

Yes	GO to AA5

No	GO to AA7

AA5 INSPECT THE USB (UNIVERSAL SERIAL BUS) CABLE, MEDIA HUB, AND APIM (SYNC MODULE)

Ignition OFF.

Disconnect: USB cable at the media hub. REFER to: Media Hub .

Disconnect: USB cable at the APIM. REFER to: SYNC Module [APIM] .

Inspect the USB cable, USB cable ends, media hub USB connector port, and APIM USB connector port for damage. Remove any debris.

Is any damage present?

Yes	* For the USB cable, INSTALL a new USB cable. REFER to: SYNC Module [APIM] to Universal Serial Bus (USB) Port Cable .* For the media hub, INSTALL a new media hub. REFER to: Media Hub .* For the APIM, PERFORM the APIM Hardware Test. Refer to APIM HARDWARE TESTING .

No	GO to AA6

AA6 CHECK EACH USB (UNIVERSAL SERIAL BUS) PORT FOR FUNCTIONALITY

Connect: USB cable at the media hub.

Connect: USB cable at the APIM.

Connect: MIT 105-00120.

Using the MIT 105-00120, attempt to play an audio file using each USB port.

Is the audio output OK for each USB port?

Yes	The system is operating correctly at this time. The concern was caused by the USB connector not being seated correctly.

No	GO to AA7

AA7 ISOLATE THE USB (UNIVERSAL SERIAL BUS) CABLE

Install a new USB cable. REFER to: SYNC Module [APIM] to Universal Serial Bus (USB) Port Cable .

Connect: MIT 105-00120.

Using the MIT 105-00120, attempt to play an audio file using each USB port.

Is the audio output OK for each USB port?

Yes	The system is operating correctly at this time. The concern was caused by an inoperative USB cable.

No	GO to AA8

AA8 CHECK FOR CORRECT APIM (SYNC MODULE) OPERATION

Ignition OFF.

Disconnect and inspect the APIM connector.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the APIM connector. Make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, PERFORM the APIM Hardware Test. Refer to APIM HARDWARE TESTING .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AB : THE SD (SECURE DIGITAL) CARD SLOT IS INOPERATIVE OR DOES NOT OPERATE CORRECTLY

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See SD Card Mode, APIM, and Media Hub.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1252:11	USB Port: Circuit Short to Ground	Set by the APIM when a short to

		ground or over-current condition is detected on the USB cable. This can be caused by a fault in the USB cable, USB port, or by the customer's USB or SD card device.
B1252:13	USB Port: Circuit Open	Set by the APIM when an open is detected on the USB cable.

Possible Sources

- Customer's device
- Media hub
- USB cable
- APIM

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AB : THE SD (SECURE DIGITAL) CARD SLOT IS INOPERATIVE OR DOES NOT OPERATE CORRECTLY > PINPOINT TEST AB : THE SD (SECURE DIGITAL) CARD SLOT IS INOPERATIVE OR DOES NOT OPERATE CORRECTLY

AB1 RESET THE APIM (SYNC MODULE)

Remove any devices connected to the media hub.

Carry out an APIM power reset by disconnecting the battery for 1 minute, then reconnecting it.

Wait at least 2 minutes for the APIM to re-initialize.

Insert a known good non-navigation SD card containing music files.

Operate the audio system in SD card mode and attempt to play an audio file.

Is the audio output OK for the SD card slot?

Yes	The system is operating correctly at this time. The concern was corrected by performing the APIM power reset. If the customer's device still does not operate correctly, the fault is with the customer's device.

No	GO to AB2

AB2 VERIFY THE OPERATION OF THE USB (UNIVERSAL SERIAL BUS) CABLE

Using the MIT 105-00120, attempt to play an audio file using each USB port.

Is the audio output OK for each USB port?

Yes	INSTALL a new media hub. REFER to: Media Hub .

No	* If the audio output is not OK from one USB port, INSTALL a new media hub. REFER to: Media Hub .* If the audio output is not OK from both USB ports, GO to AB3

AB3 CHECK THE APIM (SYNC MODULE) FOR DTC (DIAGNOSTIC TROUBLE CODE) B1252:11 OR DTC (DIAGNOSTIC TROUBLE CODE) B1252:13

Using a diagnostic scan tool, clear the APIM Diagnostic Trouble Codes (DTCs).

Perform the APIM self-test.

Is DTC B1252:11 or DTC B1252:13 present?

Yes	GO to AB4

No	GO to AB6

AB4 INSPECT THE USB (UNIVERSAL SERIAL BUS) CABLE, MEDIA HUB, AND APIM (SYNC MODULE)

Ignition OFF.

Disconnect: USB cable at the media hub. REFER to: Media Hub .

Disconnect: USB cable at the APIM. REFER to: SYNC Module [APIM] .

Inspect the USB cable, USB cable ends, media hub USB connector port, and APIM USB connector port for damage and remove any debris.

Is any damage present?

Yes	* For the USB cable, INSTALL a new USB cable. REFER to: SYNC Module [APIM] to Universal Serial Bus (USB) Port Cable .* For the media hub, INSTALL a new media hub. REFER to: Media Hub .* For the APIM, PERFORM the APIM Hardware Test. Refer to APIM HARDWARE TESTING .

No	GO to AB5

AB5 RECHECK FOR APIM (SYNC MODULE) DTC (DIAGNOSTIC TROUBLE CODE) B1252:11 OR DTC (DIAGNOSTIC TROUBLE CODE) B1252:13

Using a diagnostic scan tool, clear the APIM Diagnostic Trouble Codes (DTCs).

Perform the APIM self-test.

Is DTC B1252:11 or DTC B1252:13 present?

Yes	GO to AB7

No	GO to AB6

AB6 ISOLATE THE USB (UNIVERSAL SERIAL BUS) CABLE

Install a new USB cable. REFER to: SYNC Module [APIM] to Universal Serial Bus (USB) Port Cable .

Insert a known good non-navigation SD card containing music files.

Operate the audio system in SD card mode and attempt to play an audio file.

Is the audio output OK for the SD card slot?

Yes	The system is operating correctly at this time. The concern was caused by an inoperative USB cable.

No	GO to AB7

AB7 CHECK FOR CORRECT APIM (SYNC MODULE) OPERATION

Ignition OFF.

Disconnect and inspect the APIM connector.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the APIM connector. Make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, PERFORM the APIM Hardware Test. Refer to APIM HARDWARE TESTING .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AC : THE AUDIO INPUT JACK IS INOPERATIVE OR DOES NOT OPERATE CORRECTLY

Refer to Audio System/Navigation - AM/FM/SYNC/Touchscreen Display for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See Audio Input Jack Mode, SYNC ® System, APIM, and Media Hub.

Possible Sources

- Customer's device
- Wiring, terminals, or connectors
- Media hub
- APIM

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AC : THE AUDIO INPUT JACK IS INOPERATIVE OR DOES NOT OPERATE CORRECTLY > PINPOINT TEST AC : THE AUDIO INPUT JACK IS INOPERATIVE OR DOES NOT OPERATE CORRECTLY

AC1 RESET THE APIM (SYNC MODULE)

Remove any devices connected to the media hub.

Carry out an APIM power reset by disconnecting the battery for 1 minute, then reconnecting it.

Wait at least 2 minutes for the APIM to re-initialize.

Connect: MIT 105-00120 and RCA Adapter 105-00121.

Using the MIT 105-00120 and RCA Adapter 105-00121, attempt to play audio content using the RCA jacks.

Is the audio output OK for the RCA jacks?

Yes	The system is operating correctly at this time. The concern was corrected by performing the APIM power reset.

No	GO to AC2

AC2 CHECK THE RCA CIRCUITS FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: Media Hub C3618 .

Disconnect: APIM C2383 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3618-2	V	Ground
C3618-3	V	Ground
C3618-4	V	Ground
C3618-5	V	Ground
C3618-6	V	Ground
C3618-9	V	Ground
C3618-11	V	Ground
C3618-12	V	Ground

Is any voltage present?

Yes	REPAIR the circuit in question.

No	GO to AC3

AC3 CHECK THE RCA CIRCUITS FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3618-2	Ω	Ground
C3618-3	Ω	Ground
C3618-4	Ω	Ground
C3618-5	Ω	Ground
C3618-6	Ω	Ground
C3618-9	Ω	Ground

C3618-11	Ω	Ground
C3618-12	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to AC4

No	REPAIR the circuit in question.

AC4 CHECK THE RCA CIRCUITS FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3618-2	Ω	C2383-36
C3618-3	Ω	C2383-34
C3618-4	Ω	C2383-9
C3618-5	Ω	C2383-10
C3618-6	Ω	C2383-11
C3618-9	Ω	C2383-35
C3618-11	Ω	C2383-28
C3618-12	Ω	C2383-29

Are the resistances less than 3 ohms?

Yes	INSTALL a new media hub. REFER to: Media Hub . RETEST the system for normal operation. If the concern is still present, GO to AC5

No	REPAIR the circuit in question.

AC5 CHECK FOR CORRECT APIM (SYNC MODULE) OPERATION

Ignition OFF.

Disconnect and inspect the APIM connector.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the APIM connector. Make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, PERFORM the APIM Hardware Test. Refer to APIM HARDWARE TESTING .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AD : UNABLE TO PAIR BLUETOOTH DEVICE

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See Bluetooth Mode and SYNC ® System.

Possible Sources

- Incompatible Bluetooth device
- APIM

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AD : UNABLE TO PAIR BLUETOOTH DEVICE > PINPOINT TEST AD : UNABLE TO PAIR BLUETOOTH DEVICE

NOTE: Performing a Master Reset returns all preference settings to the factory defaults, erases the phone book and call histories, deletes any Bluetooth devices paired with the SYNC ® system, and removes any Wi-Fi network connections (cancelling any system update download or installation in progress). For vehicles with navigation, the customer's saved destinations (home, favorites, and previous) are erased.

AD1 CHECK THE BLUETOOTH CONNECTION

Connect: MIT 105-00120.

Using the MIT 105-00120, connect to the SYNC ® system using Bluetooth. Follow the tool instructions.

Using a diagnostic scan tool, view the APIM Parameter Identifications (PIDs).

Monitor the Bluetooth device paired PID (BT_PAIR) and the Bluetooth device connected PID (BT_CONN).

Do the Parameter Identifications (PIDs) both read "Yes"?

Yes	The SYNC ® system is operating correctly at this time. PERFORM a Master Reset. REFER to the Owner's Literature. REVIEW the pairing process with the customer. If the customer's device still does not pair, the fault is with the customer's device.

No	GO to AD2

AD2 CHECK FOR CORRECT APIM (SYNC MODULE) OPERATION

Ignition OFF.

Disconnect and inspect the APIM connector.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the APIM connector. Make sure it seats and latches correctly.

Wait at least 2 minutes for the APIM to re-initialize.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, discontinue this test and follow TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, PERFORM the APIM Hardware Test. Refer to APIM HARDWARE TESTING .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AE : THE RH (RIGHT-HAND) UPPER STEERING WHEEL SWITCHES ARE INOPERATIVE OR DO NOT OPERATE CORRECTLY

Refer to Audio System/Navigation - AM/FM/SYNC/Touchscreen Display for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See Steering Wheel Switch Function and Steering Wheel Switches.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1380:09	Steering Wheel Right Switch Pack: Component Failure	Set by the SCCM when the RH lower or RH upper steering wheel switch is stuck for more than 2 minutes during normal operation.
B1380:11	Steering Wheel Right Switch Pack: Circuit Short To Ground	Set by the SCCM when a short to ground is detected on the RH lower or RH upper steering wheel switch circuits.
B1380:17	Steering Wheel Right Switch Pack: Circuit Voltage Above Threshold	Set by the SCCM when a short to voltage is detected on the RH lower or RH upper steering wheel switch circuits.

Possible Sources

- Steering wheel switch
- Wiring, terminals, or connectors
- Clockspring
- SCCM

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AE : THE RH (RIGHT-HAND) UPPER STEERING WHEEL SWITCHES ARE INOPERATIVE OR DO NOT OPERATE CORRECTLY > PINPOINT TEST AE : THE RH (RIGHT-HAND) UPPER STEERING WHEEL SWITCHES ARE INOPERATIVE OR DO NOT OPERATE CORRECTLY

AE1 CHECK THE RH (RIGHT-HAND) UPPER STEERING WHEEL SWITCH PARAMETER IDENTIFICATIONS (PIDS)

Ignition ON.

Using a diagnostic scan tool, view the SCCM Parameter Identifications (PIDs).

Monitor the steering wheel switch Parameter Identifications (PIDs) while pressing each RH upper steering wheel switch.

Up (R_CURS_UP)

Left (R_CURS_LFT)

Down (R_CURS_DWN)

Right (R_CURS_RGT)

Ok (R_CURS_OK)

Do the PID values agree with the switch positions?

Yes	GO to AE13

No	* If one or more, but not all PID values are incorrect or always read one particular switch position, INSTALL a new RH upper steering wheel switch. REFER to: Steering Column Multifunction Switch RH .* If all PID values are incorrect or always read one particular switch position, GO to AE2

AE2 CHECK FOR IPC (INSTRUMENT PANEL CLUSTER) DTC (DIAGNOSTIC TROUBLE CODE) U0212:00

Ignition ON.

Using a diagnostic scan tool, clear the DTCs from the IPC.

Ignition OFF.

Ignition ON.

Wait at least 10 seconds.

Using a diagnostic scan tool, perform the IPC self-test.

Is DTC U0212:00 set in the IPC?

Yes	REFER to: Instrumentation, Message Center and Warning Chimes . See DTC Chart: IPC.

No	GO to AE3

AE3 CHECK FOR VOLTAGE FROM THE SCCM (STEERING COLUMN CONTROL MODULE)

WARNING: Turn the ignition OFF and wait one minute to deplete the backup power supply. Failure to follow this instruction may result in serious personal injury or death in the event of an accidental deployment.

Ignition OFF.

Remove the driver airbag. REFER to: Driver Airbag .

Disconnect: RH Upper Steering Wheel Switch C2999 .

Disconnect: LH Upper Steering Wheel Switch C2998 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2999-2		C2999-3

Is approximately 5 volts present?

Yes	INSTALL a new RH upper steering wheel switch. REFER to: Steering Column Multifunction Switch RH .

No	GO to AE4

AE4 CHECK THE AIRBAG HARNESS FOR A SHORT TO GROUND

Disconnect: Inline C2606.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2999-2	Ω	Ground
C2999-3	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to AE5

No	INSTALL a new driver airbag. REFER to: Driver Airbag .

AE5 CHECK THE AIRBAG HARNESS FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2999-2	Ω	C2606-2
C2999-3	Ω	C2606-4

Are the resistances less than 3 ohms?

Yes	GO to AE6

No	INSTALL a new driver airbag. REFER to: Driver Airbag .

AE6 CHECK THE AIRBAG HARNESS FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2999-2	Ω	C2999-3

Is the resistance greater than 10, 000 ohms?

Yes	GO to AE7

No	INSTALL a new driver airbag. REFER to: Driver Airbag .

AE7 CHECK THE STEERING WHEEL HARNESS FOR A SHORT TO GROUND

Connect: Inline C2606.

Disconnect: Clockspring C218B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2999-2	Ω	Ground
C2999-3	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to AE8

No	INSTALL a new steering wheel. REFER to: Steering Wheel .

AE8 CHECK THE STEERING WHEEL HARNESS FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2999-2	Ω	C218B-14
C2999-3	Ω	C218B-16

Are the resistances less than 3 ohms?

Yes	GO to AE9

No	INSTALL a new steering wheel. REFER to: Steering Wheel .

AE9 CHECK THE STEERING WHEEL HARNESS FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2999-2	Ω	C2999-3

Is the resistance greater than 10, 000 ohms?

Yes	GO to AE10

No	INSTALL a new steering wheel. REFER to: Steering Wheel .

AE10 CHECK THE CLOCKSPRING FOR A SHORT TO GROUND

Connect: Clockspring C218B .

Disconnect: Clockspring C218C.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2999-2	Ω	Ground
C2999-3	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to AE11

No	INSTALL a new clockspring. REFER to: Clockspring .

AE11 CHECK THE CLOCKSPRING FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2999-2	Ω	C218C-6
C2999-3	Ω	C218C-10

Are the resistances less than 3 ohms?

Yes	GO to AE12

No	INSTALL a new clockspring. REFER to: Clockspring .

AE12 CHECK THE CLOCKSPRING FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2999-2	Ω	C2999-3

Is the resistance greater than 10, 000 ohms?

Yes	GO to AE13

No	INSTALL a new clockspring. REFER to: Clockspring .

AE13 CHECK FOR CORRECT SCCM (STEERING COLUMN CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all the SCCM connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the SCCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new SCCM. REFER to: Steering Column Control Module (SCCM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AF : THE RH (RIGHT-HAND) LOWER STEERING WHEEL SWITCHES ARE INOPERATIVE OR DO NOT OPERATE CORRECTLY

Refer to Audio System/Navigation - AM/FM/SYNC/Touchscreen Display for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See Steering Wheel Switch Function and Steering Wheel Switches.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1380:09	Steering Wheel Right Switch Pack: Component Failure	Set by the SCCM when the RH lower or RH upper steering wheel switch is stuck for more than 2 minutes during normal operation.
B1380:11	Steering Wheel Right Switch Pack: Circuit Short To Ground	Set by the SCCM when a short to ground is detected on the RH lower or RH upper steering wheel switch circuits.
B1380:17	Steering Wheel Right Switch Pack: Circuit Voltage Above Threshold	Set by the SCCM when a short to voltage is detected on the RH lower or RH upper steering wheel switch circuits.

Possible Sources

- Steering wheel switch
- Wiring, terminals, or connectors
- Clockspring
- SCCM

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AF : THE RH (RIGHT-HAND) LOWER STEERING WHEEL SWITCHES ARE INOPERATIVE OR DO NOT OPERATE CORRECTLY > PINPOINT TEST AF : THE RH (RIGHT-HAND) LOWER STEERING WHEEL SWITCHES ARE INOPERATIVE OR DO NOT OPERATE CORRECTLY

AF1 CHECK THE RH (RIGHT-HAND) LOWER STEERING WHEEL SWITCH PARAMETER IDENTIFICATIONS (PIDS)

Ignition ON.

Using a diagnostic scan tool, view the SCCM Parameter Identifications (PIDs).

Monitor the steering wheel switch Parameter Identifications (PIDs) while pressing each RH lower steering wheel switch.

Voice (SW_VOICE)

Mute (SW_MUTE)

Volume + (SW_VOLUP)

Volume - (SW_VOLDOWN)

Seek-/Phone (SW_SEEKMINUS)/(SW_PHONE)

Seek+/End (SW_SEEKPLUS)/(SW_END)

Do the PID values agree with the switch positions?

Yes	GO to AF10

No	* If one or more, but not all PID values are incorrect or always read one particular switch position, INSTALL a new RH lower steering wheel switch. REFER to: Steering Column Multifunction Switch RH .* If all PID values are incorrect or always read one particular switch position, GO to AF2

AF2 CHECK FOR IPC (INSTRUMENT PANEL CLUSTER) DTC (DIAGNOSTIC TROUBLE CODE) U0212:00

Ignition ON.

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs) from the IPC.

Ignition OFF.

Ignition ON.

Wait at least 10 seconds.

Using a diagnostic scan tool, perform the IPC self-test.

Is DTC U0212:00 set in the IPC?

Yes	REFER to: Instrumentation, Message Center and Warning Chimes . See DTC Chart: IPC.

No	GO to AF3

AF3 CHECK FOR VOLTAGE FROM THE SCCM (STEERING COLUMN CONTROL MODULE)

WARNING: Turn the ignition OFF and wait one minute to deplete the backup power supply. Failure to follow this instruction may result in serious personal injury or death in the event of an accidental deployment.

Ignition OFF.

Remove the driver airbag. REFER to: Driver Airbag .

Disconnect: RH Lower Steering Wheel Switch C2367 .

Disconnect: LH Lower Steering Wheel Switch C2366 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2367-2	V	C2367-4
C2367-3	V	C2367-4
C2367-5	V	C2367-4

Is approximately 5 volts present?

Yes	INSTALL a new RH lower steering wheel switch. REFER to: Steering Column Multifunction Switch RH .

No	GO to AF4

AF4 CHECK THE STEERING WHEEL HARNESS FOR A SHORT TO GROUND

Ignition OFF.

Disconnect: Clockspring C218B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2367-2	Ω	Ground
C2367-3	Ω	Ground
C2367-4	Ω	Ground
C2367-5	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to AF5

No	INSTALL a new steering wheel. REFER to: Steering Wheel .

AF5 CHECK THE STEERING WHEEL HARNESS FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead

C2367-2	Ω	C218B-6
C2367-3	Ω	C218B-7
C2367-4	Ω	C218B-16
C2367-5	Ω	C218B-15

Are the resistances less than 3 ohms?

Yes	GO to AF6

No	INSTALL a new steering wheel. REFER to: Steering Wheel .

AF6 CHECK THE STEERING WHEEL HARNESS FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2367-2	Ω	C2367-3
C2367-2	Ω	C2367-4
C2367-2	Ω	C2367-5
C2367-3	Ω	C2367-4
C2367-3	Ω	C2367-5
C2367-4	Ω	C2367-5

Are the resistances greater than 10, 000 ohms?

Yes	GO to AF7

No	INSTALL a new steering wheel. REFER to: Steering Wheel .

AF7 CHECK THE CLOCKSPRING FOR A SHORT TO GROUND

Connect: Clockspring C218B .

Disconnect: Clockspring C218C.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2367-2	Ω	Ground
C2367-3	Ω	Ground

C2367-4	Ω	Ground
C2367-5	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to AF8

No	INSTALL a new clockspring. REFER to: Clockspring .

AF8 CHECK THE CLOCKSPRING FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2367-2	Ω	C218C-5
C2367-3	Ω	C218C-7
C2367-4	Ω	C218C-10
C2367-5	Ω	C218C-8

Are the resistances less than 3 ohms?

Yes	GO to AF9

No	INSTALL a new clockspring. REFER to: Clockspring .

AF9 CHECK THE CLOCKSPRING FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2367-2	Ω	C2367-3
C2367-2	Ω	C2367-4
C2367-2	Ω	C2367-5
C2367-3	Ω	C2367-4
C2367-3	Ω	C2367-5
C2367-4	Ω	C2367-5

Are the resistances greater than 10, 000 ohms?

Yes	GO to AF10

No	INSTALL a new clockspring. REFER to: Clockspring .

AF10 CHECK FOR CORRECT SCCM (STEERING COLUMN CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all the SCCM connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the SCCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new SCCM. REFER to: Steering Column Control Module (SCCM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AG : THE AUDIO SYSTEM DOES NOT OPERATE CORRECTLY FROM THE FCIM (FRONT CONTROLS INTERFACE MODULE)

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See Accessory Delay Feature, Audio Extended Play, and FCIM.

Possible Source

- FCIM

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AG : THE AUDIO SYSTEM DOES NOT OPERATE CORRECTLY FROM THE FCIM (FRONT CONTROLS INTERFACE MODULE) > PINPOINT TEST AG : THE AUDIO SYSTEM DOES NOT OPERATE CORRECTLY FROM

THE FCIM (FRONT CONTROLS INTERFACE MODULE)

AG1 CHECK THE FDIM (FRONT DISPLAY INTERFACE MODULE) OPERATION

Verify the FDIM screen operation.

Does the FDIM operate correctly?

Yes	GO to AG2

No	GO to Pinpoint Test AH

AG2 VERIFY THAT THE ACM (AUDIO FRONT CONTROL MODULE), APIM (SYNC MODULE), AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE, AND FCIM (FRONT CONTROLS INTERFACE MODULE) PASS THE NETWORK TEST

Using a diagnostic scan tool, perform the network test.

Did the ACM, APIM, audio DSP module, and FCIM pass the network test?

Yes	GO to AG3

No	* If the ACM failed the network test, REFER to: Communications Network . See The ACM Does Not Respond To The Diagnostic Scan Tool.* If the APIM failed the network test, REFER to: Communications Network . See The APIM Does Not Respond To The Diagnostic Scan Tool.* If the audio DSP module failed the network test, REFER to: Communications Network . See The Audio DSP Module Does Not Respond To The Diagnostic Scan Tool.* If the FCIM failed the network test, REFER to: Communications Network . See The FCIM Does Not Respond To The Diagnostic Scan Tool.

AG3 RESET THE AUDIO SYSTEM MODULES AND RECHECK THE FCIM (FRONT CONTROLS INTERFACE MODULE) OPERATION

Disconnect the battery for 1 minute, then reconnect it.

Turn the infotainment system on.

Test the FCIM for normal operation.

Does the FCIM operate correctly?

Yes	The FCIM is operating correctly at this time. The concern was corrected by resetting the audio system modules.

No	GO to AG4

AG4 RETRIEVE THE ACM (AUDIO FRONT CONTROL MODULE), APIM (SYNC MODULE), AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE, AND FCIM (FRONT CONTROLS INTERFACE MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, perform the self-test for the following modules:

ACM

APIM

Audio DSP module

FCIM

Are any Diagnostic Trouble Codes (DTCs) present in the ACM, APIM, audio DSP module, or FCIM?

Yes	* For ACM Diagnostic Trouble Codes (DTCs), REFER to: Information and Entertainment System . See DTC Chart: ACM.* For APIM Diagnostic Trouble Codes (DTCs), REFER to: Information and Entertainment System . See DTC Chart: APIM.* For audio DSP module Diagnostic Trouble Codes (DTCs), REFER to: Information and Entertainment System . See DTC Chart: Audio DSP Module. For FCIM Diagnostic Trouble Codes (DTCs), REFER to: Information and Entertainment System . See DTC Chart: FCIM.

No	GO to AG5

AG5 CHECK FOR CORRECT FCIM (FRONT CONTROLS INTERFACE MODULE) OPERATION

Ignition OFF.

Disconnect and inspect the FCIM connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the FCIM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new FCIM. REFER to: Front Controls Interface Module (FCIM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. Address the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AH : THE FDIM (FRONT DISPLAY INTERFACE MODULE) TOUCHSCREEN IS INOPERATIVE OR DOES NOT OPERATE CORRECTLY

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See FDIM.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B108E:01	Display: General Electrical Failure	Set by the APIM when an error is detected in the touch sensing ability of the FDIM.
U0162:00	Lost Communication With Navigation Display Module: No Sub Type Information	Set by the APIM when communication is missing from the FDIM for more than 1 second with the ignition in RUN.

Possible Sources

- Object pressed against the touchscreen
- FDIM
- Uncalibrated touchscreen
- APIM

NOTE: The FDIM touchscreen can only sense one touch command at a time. If any objects are pressed against the touchscreen (including wiring or components behind the trim panel surrounding the touchscreen), the FDIM can appear to be inoperative.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AH : THE FDIM (FRONT DISPLAY INTERFACE MODULE) TOUCHSCREEN IS INOPERATIVE OR DOES NOT OPERATE CORRECTLY > PINPOINT TEST AH : THE FDIM (FRONT DISPLAY INTERFACE MODULE) TOUCHSCREEN IS INOPERATIVE OR DOES NOT OPERATE CORRECTLY

AH1 VERIFY THE TOUCHSCREEN RESPONSE TO TOUCH COMMANDS

Ignition ON.

Press each tab of the 4 corners on the FDIM and observe the touchscreen operation.

Does the FDIM touchscreen respond correctly when each tab is pressed?

Yes	VERIFY the customer's specific concern by duplicating the steps that were taken when the original concern was generated. If the concern is not duplicated, the system is operating correctly at this time. INSTRUCT the customer in the correct operation of the FDIM touchscreen.

No	* If the FDIM **is not** completely inoperative or blank, GO to AH2. * If the FDIM **is** completely inoperative or blank, GO to AH3.

AH2 ENSURE THE TOUCHSCREEN IS CALIBRATED

Calibrate the touchscreen. REFER to: Touchscreen Calibration .

Verify the touchscreen operation.

Does the FDIM touchscreen respond correctly?

Yes	The system is operating correctly at this time. The concern was a result of the touchscreen not being calibrated.

No	GO to AH5

AH3 VERIFY THAT THE APIM (SYNC MODULE) PASSES THE NETWORK TEST

Using a diagnostic scan tool, perform the network test.

Did the APIM pass the network test?

Yes	GO to AH4

No	REFER to: Communications Network . See The APIM Does Not Respond To The Diagnostic Scan Tool.

AH4 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0162:00 SET IN THE APIM (SYNC MODULE)

Using a diagnostic scan tool, perform the APIM self-test.

Is DTC U0162:00 set in the APIM?

Yes	INSTALL a new FDIM. REFER to: Front Display Interface Module (FDIM) .

No	GO to AH5

AH5 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) B108E:01 SET IN THE APIM (SYNC MODULE)

Using a diagnostic scan tool, perform the APIM self-test.

Is DTC B108E:01 set in the APIM?

Yes	INSTALL a new FDIM. REFER to: Front Display Interface Module (FDIM) .

No	GO to AH6

NOTE: Performing a Master Reset returns all preference settings to the factory defaults, erases the phone book and call histories, deletes any Bluetooth devices paired with the SYNC ® system, and removes any Wi-Fi network connections (cancelling any system update download or installation in progress). For vehicles with navigation, the customer's saved destinations (home, favorites, and previous) are erased.

AH6 RESET THE APIM (SYNC MODULE) AND RECHECK THE SYSTEM OPERATION

Carry out an APIM power reset by disconnecting the battery for 1 minute, then reconnecting it.

Wait at least 2 minutes for the APIM to re-initialize.

Turn the infotainment system on.

While pressing each tab of the 4 corners on the FDIM, observe the touchscreen operation.

Does the touchscreen operate correctly?

Yes	The FDIM is operating correctly at this time. PERFORM a Master Reset. REFER to the Owner's Literature.

No	GO to AH7

AH7 CHECK FOR CORRECT APIM (SYNC MODULE) OPERATION

Ignition OFF.

Disconnect and inspect the APIM connector.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the APIM connector. Make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, PERFORM the APIM Hardware Test. Refer to APIM HARDWARE TESTING .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AI : NAVIGATION IS INOPERATIVE OR DOES NOT OPERATE CORRECTLY

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See Navigation and GPSM.

Removal of the map data SD card results in loss of navigation while the card is removed. This is normal operation.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1215:00	External Memory Card: No Sub Type Information	Set by the APIM when the map data SD card is missing.

Possible Sources

- Media hub
- Map data SD card not present, not fully seated, or damaged
- GPSM
- APIM

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AI : NAVIGATION IS INOPERATIVE OR DOES NOT OPERATE CORRECTLY > PINPOINT TEST AI : NAVIGATION IS INOPERATIVE OR DOES NOT OPERATE CORRECTLY

AI1 DETERMINE IF THE VEHICLE IS EQUIPPED WITH A FACTORY-INSTALLED NAVIGATION SYSTEM

Ensure that the correct VIN was entered on the technician service publication website.

Hover the mouse cursor over or click on the OASIS tab toward the top left of the screen.

Select "HVBoM (Historical Vehicle Bill of Material)."

Locate the

Limit to Base: text entry box toward the center of the screen.

Enter the map data SD card base part number "19H449" (do not include quotation marks).

Press Enter on the keyboard or click on "View BoM (Build of Material)."

If the vehicle is equipped with a factory-installed navigation system, a row will appear indicating "CARD - MEMORY" in the DESCRIPTION column.

If the vehicle is **not** equipped with a factory-installed navigation system, a row will **not** appear and the DESCRIPTION column will be blank.

Does the technician service publication website indicate the vehicle is equipped with a factory-installed navigation system?

Yes	GO to AI2

No	Ford Motor Company does not support the addition of a navigation system to vehicles not equipped with a factory-installed navigation system.

AI2 VERIFY THAT THE APIM (SYNC MODULE) PASSES THE NETWORK TEST

Using a diagnostic scan tool, perform the network test.

Did the APIM pass the network test?

Yes	GO to AI3

No	REFER to: Communications Network . See The APIM Does Not Respond To The Diagnostic Scan Tool.

AI3 CHECK THE USB (UNIVERSAL SERIAL BUS) PORTS FOR POWER OUTPUT

Connect: MIT 105-00120.

Does the MIT 105-00120 power on from both USB ports?

Yes	GO to AI4

No	* If the MIT 105-00120 powers on from only one USB port, INSTALL a new media hub. REFER to: Media Hub .* If the MIT 105-00120 does not power on from either USB port, GO to Pinpoint Test Z

AI4 RESET THE APIM (SYNC MODULE) AND VERIFY THE OPERATION OF THE USB (UNIVERSAL SERIAL BUS) CABLE

Remove any devices connected to the media hub.

Carry out an APIM power reset by disconnecting the battery for 1 minute, then reconnecting it.

Wait at least 2 minutes for the APIM to re-initialize.

Connect: MIT 105-00120.

Using the MIT 105-00120, attempt to play an audio file using each USB port.

Is the audio output OK for each USB port?

Yes	GO to AI5

No	* If the audio output is not OK from one USB port, INSTALL a new media hub. REFER to: Media Hub .* If the audio output is not OK from both USB ports, GO to Pinpoint Test AA

AI5 CHECK FOR A MAP DATA SD (SECURE DIGITAL) CARD FAULT MESSAGE

Ignition ON.

Observe the FDIM display.

Does the FDIM display "Insert Nav SD Card" or "Navigation SD Card Fault?"

Yes	GO to AI6

No	GO to AI9

AI6 VERIFY THE MAP DATA SD (SECURE DIGITAL) CARD IS PRESENT

Check for the presence of a map data SD card in the media hub SD card slot.

Is the map data SD card present and fully seated?

Yes	GO to AI7

No	INSTALL the map data SD card. TEST the system for normal operation.

AI7 INSPECT THE MAP DATA SD (SECURE DIGITAL) CARD

NOTE: The media hub SD card slot is spring loaded. The SD card is removed by pushing the card inward until a faint click is heard and the card is released outward. Attempting to remove the card without properly releasing it may cause damage to the SD card pins.

Remove the map data SD card.

Inspect the map data SD card case and pins for damage.

Is any damage present?

Yes	INSTALL a new map data SD card.

No	If a known good map data SD card is available, GO to AI8 If a known good map data SD card is **not** available, GO to AI9

AI8 VERIFY NAVIGATION SYSTEM OPERATION WITH KNOWN GOOD MAP DATA SD (SECURE DIGITAL) CARD

Insert a known good map data SD card with the correct software version level.

Confirm that the navigation system operates correctly.

Does the navigation system operate correctly with the known good map data SD card?

Yes	INSTALL a new map data SD card.

No	GO to AI9

AI9 VERIFY THAT THE GPSM (GLOBAL POSITIONING SYSTEM MODULE) PASSES THE NETWORK TEST

Using a diagnostic scan tool, perform the network test.

Did the GPSM pass the network test?

Yes	GO to AI10

No	REFER to: Communications Network . See The GPSM Does Not Respond To The Diagnostic Scan Tool.

AI10 RETRIEVE THE DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE APIM (SYNC MODULE) AND GPSM (GLOBAL POSITIONING SYSTEM MODULE)

Using a diagnostic scan tool, perform the self-test for the following modules:

APIM

GPSM

Are any Diagnostic Trouble Codes (DTCs) present in the APIM or GPSM?

Yes	* For APIM Diagnostic Trouble Codes (DTCs), REFER to: Information and Entertainment System . See DTC Chart: APIM.* For GPSM Diagnostic Trouble Codes (DTCs), REFER to:

	Information and Entertainment System . See DTC Chart: GPSM.

No	GO to AI11

AI11 REPROGRAM THE APIM (SYNC MODULE)

Perform the APIM Standard Programming. REFER to: SYNC Module [APIM] Standard Programming .

Override the Service Pack installation and perform a Full Flash/Force CIP.

Once the APIM programming is complete and the system has re-initialized, confirm that the navigation system operates correctly.

Does the navigation system operate correctly?

Yes	The navigation system is operating correctly at this time. The concern was resolved by reprogramming the APIM.

No	GO to AI12

AI12 CHECK FOR CORRECT GPSM (GLOBAL POSITIONING SYSTEM MODULE) OPERATION

Ignition OFF.

Disconnect and inspect the GPSM connector.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the GPSM connector. Make sure it seats and latches correctly.

NOTE: Before operating the system to determine if the concern is still present, ensure that the vehicle is in an open location that is free from obstacles such as tall buildings or large trees so an adequate GPS signal can be obtained.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new GPSM. REFER to: Global Positioning System Module (GPSM) . RETEST the system for normal operation. If the concern is still present, GO to AI13

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

AI13 CHECK FOR CORRECT APIM (SYNC MODULE) OPERATION

Ignition OFF.

Disconnect and inspect the APIM connector.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the APIM connector. Make sure it seats and latches correctly.

Wait at least 2 minutes for the APIM to re-initialize.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, PERFORM the APIM Hardware Test. Refer to APIM HARDWARE TESTING .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AJ : THE COMPASS IS INOPERATIVE OR DOES NOT OPERATE CORRECTLY

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See Compass.

Possible Source

- GPSM

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AJ : THE COMPASS IS INOPERATIVE OR DOES

NOT OPERATE CORRECTLY > PINPOINT TEST AJ : THE COMPASS IS INOPERATIVE OR DOES NOT OPERATE CORRECTLY

AJ1 VERIFY THAT THE APIM (SYNC MODULE) AND GPSM (GLOBAL POSITIONING SYSTEM MODULE) PASS THE NETWORK TEST

Using a diagnostic scan tool, perform the network test.

Did the APIM and GPSM pass the network test?

Yes	GO to AJ2

No	* If the APIM failed the network test, REFER to: Communications Network . See The APIM Does Not Respond To The Diagnostic Scan Tool.* If the GPSM failed the network test, REFER to: Communications Network . See The GPSM Does Not Respond To The Diagnostic Scan Tool.

AJ2 RETRIEVE THE APIM (SYNC MODULE) AND GPSM (GLOBAL POSITIONING SYSTEM MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, perform the self-test for the following modules:

APIM

GPSM

Are any Diagnostic Trouble Codes (DTCs) present in the APIM or GPSM?

Yes	* For APIM Diagnostic Trouble Codes (DTCs), REFER to: Information and Entertainment System . See DTC Chart: APIM.* For GPSM Diagnostic Trouble Codes (DTCs), REFER to: Information and Entertainment System . See DTC Chart: GPSM.

No	GO to AJ3

AJ3 CHECK FOR CORRECT GPSM (GLOBAL POSITIONING SYSTEM MODULE) OPERATION

Ignition OFF.

Disconnect and inspect the GPSM connector.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the GPSM connector. Make sure it seats and latches correctly.

NOTE: Before operating the system to determine if the concern is still present, ensure that the vehicle is in an open location that is free from obstacles such as tall buildings or large trees so an adequate GPS signal can be obtained.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new GPSM. REFER to: Global Positioning System Module (GPSM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AK : VOICE RECOGNITION DOES NOT OPERATE CORRECTLY TO VOICE NAVIGATE TO A DESTINATION

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See Navigation, Voice Recognition, and APIM.

Visual Inspection and Diagnostic Pre-checks

- Verify the key is in the ON position (navigation function may be limited in accessory mode on some vehicles).
- Verify the vehicle is located in a clear, open area to ensure the satellite information can be received by the vehicle.
- Verify the navigation SD card is present and fully seated in the SD card slot.
- Run the vehicle for at least one minute before testing the system in order for the navigation and voice recognition application to load properly.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AK : VOICE RECOGNITION DOES NOT OPERATE CORRECTLY TO VOICE NAVIGATE TO A DESTINATION > PINPOINT TEST AK : VOICE RECOGNITION DOES NOT OPERATE CORRECTLY TO VOICE NAVIGATE TO A DESTINATION

AK1 DETERMINE IF THE VEHICLE IS EQUIPPED WITH A FACTORY-INSTALLED NAVIGATION SYSTEM

Ensure that the correct VIN was entered on the technician service publication website.

Hover the mouse cursor over or click on the OASIS tab toward the top left of the screen.

Select "HVBoM (Historical Vehicle Bill of Material)."

Locate the

Limit to Base: text entry box toward the center of the screen.

Enter the map data SD card base part number "19H449" (do not include quotation marks).

Press Enter on the keyboard or click on "View BoM (Build of Material)."

If the vehicle is equipped with a factory-installed navigation system, a row will appear indicating "CARD - MEMORY" in the DESCRIPTION column.

If the vehicle is **not** equipped with a factory-installed navigation system, a row will **not** appear and the DESCRIPTION column will be blank.

Does the technician service publication website indicate the vehicle is equipped with a factory-installed navigation system?

Yes	GO to AK2

No	Ford Motor Company does not support the addition of a navigation system to vehicles not equipped with a factory-installed navigation system.

AK2 REPROGRAM THE APIM (SYNC MODULE)

Perform the APIM Standard Programming. REFER to: SYNC Module [APIM] Standard Programming .

Override the Service Pack installation and perform a Full Flash/Force CIP.

Once the APIM programming is complete and the system has re-initialized, confirm that the navigation system operates correctly.

Does the navigation system operate correctly?

Yes	The navigation system is operating correctly at this time. The concern was resolved by reprogramming the APIM.

No	GO to AK3

AK3 VERIFY THAT NO ROUTE PREFERENCE, NAVIGATION, TRAFFIC, OR AVOID AREA RESTRICTIONS ARE SELECTED

Verify that the Navigation Route Preferences are not set to avoid freeways, toll roads, ferries, and car trains. Refer to the Owner's Literature.

Verify that Traffic Preferences are set properly. Refer to the Owner's Literature.

Verify that the destination being entered is not located within the boundaries of a "to avoid" area. Refer to the Owner's Literature.

Change preferences as necessary, and operate the Voice Navigation system.

Does the Voice Navigation system operate as expected?

Yes	If the concern is not duplicated, the system is operating correctly at this time. INSTRUCT the customer in the correct operation of the route preference, navigation, traffic, and avoid area restrictions.

No	GO to AK4

AK4 CHECK THE AUDIBLE PROMPT FUNCTIONALITY

Operate the audio system in AM/ FM mode.

Operate the VOICE steering wheel switch and listen for the SYNC ® audible prompt.

Does the SYNC ® system produce an audible prompt correctly; indicating voice recognition mode has been entered?

Yes	GO to AK5

No	GO to Pinpoint Test X

AK5 CHECK THE VOICE RECOGNITION OPERATION

Operate the VOICE steering wheel switch and listen for the SYNC ® audible prompt.

NOTE: Make sure the interior of the vehicle is as quiet as possible. Excessive noise may prevent the system from correctly recognizing spoken commands.

Clearly speak the word "help."

Does the SYNC ® system respond correctly to the "help" voice command?

Yes	The voice recognition of the navigation destination concern may have been caused by an insufficiently quiet vehicle or a destination not being present in the map database. GO to AK6

No	GO to Pinpoint Test Y

NOTE: Dragging your finger and pinching two fingers will not scroll to a location or

zoom in or out as in other devices on the market. Holding your finger on a location off-center will cause the map to scroll to that location. Refer to the Owner Guide for more information about navigating the map screen.

AK6 CHECK OPERATION OF NAVIGATION SYSTEM WITH MANUAL DESTINATION ENTRY

Using the map feature, touch the screen at the requested destination.

Verify there is a road present on the map at the requested location and verify the address of the destination is correct.

Does the navigation system properly navigate to the destination requested?

Yes	The information on the navigation SD card may not include the correct map data, or is in a different format than what was expected. The system is operating correctly at this time. NOTIFY the customer that there may be an updated map upgrade available for purchase.

No	GO to Pinpoint Test AI

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AL : B116A:01

Refer to Audio System/Navigation - AM/FM/SYNC/Touchscreen Display for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See ANC, ANC Microphones, and DACMC.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B116A:01	Handset Microphone: General Electrical Failure	Set by the DACMC when a failure is detected on the overhead console ANC microphone circuits.

Possible Sources

- Wiring, terminals, or connectors
- Overhead console ANC microphone
- DACMC

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AL : B116A:01 > PINPOINT TEST AL : B116A:01

AL1 CHECK THE OVERHEAD CONSOLE ANC (ACTIVE NOISE CONTROL) MICROPHONE CIRCUITS FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: ACM C240B .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C240B-1		Ground
C240B-14		Ground

Is any voltage present?

Yes	REPAIR the circuit in question.

No	GO to AL2

AL2 CHECK THE OVERHEAD CONSOLE ANC (ACTIVE NOISE CONTROL) MICROPHONE CIRCUITS FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C240B-1	Ω	Ground
C240B-14	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to AL3

No	REPAIR the circuit in question.

AL3 CHECK THE OVERHEAD CONSOLE ANC (ACTIVE NOISE CONTROL) MICROPHONE CIRCUITS FOR AN OPEN

Disconnect: Overhead Console ANC Microphone C9222 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C240B-1	Ω	C9222-1
C240B-14	Ω	C9222-2

Are the resistances less than 3 ohms?

Yes	GO to AL4

No	REPAIR the circuit in question.

AL4 CHECK THE OVERHEAD CONSOLE ANC (ACTIVE NOISE CONTROL) MICROPHONE CIRCUITS FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C240B-1	Ω	C240B-14

Is the resistance greater than 10, 000 ohms?

Yes	GO to AL5

No	REPAIR the circuit in question.

AL5 ISOLATE THE OVERHEAD CONSOLE ANC (ACTIVE NOISE CONTROL) MICROPHONE

Connect: ACM C240B .

Install a new overhead console ANC microphone. REFER to: Active Noise Control Microphone .

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs) from the DACMC.

Ignition OFF.

Ignition ON.

Wait at least 5 seconds

Using a diagnostic scan tool, perform the DACMC self-test.

Is DTC B116A:01 still present in the DACMC?

Yes	GO to AL6

No	The system is operating correctly at this time. The concern was caused by an inoperative ANC microphone.

AL6 CHECK FOR CORRECT DACMC (DIGITAL AUDIO CONTROL MODULE C) OPERATION

Ignition OFF.

Disconnect and inspect all the ACM connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the ACM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ACM. REFER to: Audio Front Control Module (ACM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AM : B117A:01

Refer to Audio System/Navigation - AM/FM/SYNC/Touchscreen Display for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See ANC, ANC Microphones, and DACMC.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B117A:01	Backup Microphone: General Electrical Failure	Set by the DACMC when a failure is detected on the LHR quarter panel ANC microphone circuits (convertible only).

Possible Sources

- Wiring, terminals, or connectors

- LHR quarter panel ANC microphone
- DACMC

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AM : B117A:01 > PINPOINT TEST AM : B117A:01

AM1 CHECK THE LHR (LEFT-HAND REAR) QUARTER PANEL ANC (ACTIVE NOISE CONTROL) MICROPHONE CIRCUITS FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: ACM C240B .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C240B-2	V	Ground
C240B-15	V	Ground

Is any voltage present?

Yes	REPAIR the circuit in question.

No	GO to AM2

AM2 CHECK THE LHR (LEFT-HAND REAR) QUARTER PANEL ANC (ACTIVE NOISE CONTROL) MICROPHONE CIRCUITS FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C240B-2	Ω	Ground
C240B-15	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to AM3

No	REPAIR the circuit in question.

AM3 CHECK THE LHR (LEFT-HAND REAR) QUARTER PANEL ANC (ACTIVE NOISE CONTROL) MICROPHONE CIRCUITS FOR AN OPEN

Disconnect: LHR Quarter Panel ANC Microphone C4828 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C240B-2	Ω	C4828-1
C240B-15	Ω	C4828-2

Are the resistances less than 3 ohms?

Yes	GO to AM4

No	REPAIR the circuit in question.

AM4 CHECK THE LHR (LEFT-HAND REAR) QUARTER PANEL ANC (ACTIVE NOISE CONTROL) MICROPHONE CIRCUITS FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C240B-2	Ω	C240B-15

Is the resistance greater than 10, 000 ohms?

Yes	GO to AM5

No	REPAIR the circuit in question.

AM5 ISOLATE THE LHR (LEFT-HAND REAR) QUARTER PANEL ANC (ACTIVE NOISE CONTROL) MICROPHONE

Connect: ACM C240B .

Install a new LHR quarter panel ANC microphone. REFER to: Active Noise Control Microphone .

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs) from the DACMC.

Ignition OFF.

Ignition ON.

Wait at least 5 seconds

Using a diagnostic scan tool, perform the DACMC self-test.

Is DTC B117A:01 still present in the DACMC?

Yes	GO to AM6

No	The system is operating correctly at this time. The concern was caused by an inoperative ANC microphone.

AM6 CHECK FOR CORRECT DACMC (DIGITAL AUDIO CONTROL MODULE C) OPERATION

Ignition OFF.

Disconnect and inspect all the ACM connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the ACM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ACM. REFER to: Audio Front Control Module (ACM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AN : B13F5:01

Refer to Audio System/Navigation - AM/FM/SYNC/Touchscreen Display for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See ANC, ANC Microphones, and DACMC.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B13F5:01	Backup Microphone: General Electrical Failure	Set by the DACMC when a failure is detected on the rear center headliner (coupe) or RHR quarter panel (convertible) ANC microphone circuits.

Possible Sources

- Wiring, terminals, or connectors
- Rear center headliner (coupe) or RHR quarter panel (convertible) ANC microphone
- DACMC

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AN : B13F5:01 > PINPOINT TEST AN : B13F5:01

AN1 CHECK THE REAR CENTER HEADLINER (COUPE) OR RHR (RIGHT-HAND REAR) QUARTER PANEL (CONVERTIBLE) ANC (ACTIVE NOISE CONTROL) MICROPHONE CIRCUITS FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: ACM C240B .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C240B-7		Ground
C240B-20		Ground

Is any voltage present?

Yes	REPAIR the circuit in question.

No	GO to AN2

AN2 CHECK THE REAR CENTER HEADLINER (COUPE) OR RHR (RIGHT-HAND REAR) QUARTER PANEL (CONVERTIBLE) ANC (ACTIVE NOISE CONTROL) MICROPHONE CIRCUITS FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C240B-7	Ω	Ground
C240B-20	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to AN3

No	REPAIR the circuit in question.

AN3 CHECK THE REAR CENTER HEADLINER (COUPE) OR RHR (RIGHT-HAND REAR) QUARTER PANEL (CONVERTIBLE) ANC (ACTIVE NOISE CONTROL) MICROPHONE CIRCUITS FOR AN OPEN

Disconnect:

Rear Center Headliner C9223 for the coupe.

RHR Quarter Panel C4829 for the convertible.

For the coupe, measure:

Positive Lead	Measurement / Action	Negative Lead
C240B-7	Ω	C9223-1
C240B-20	Ω	C9223-2

For the convertible, measure:

Positive Lead	Measurement / Action	Negative Lead
C240B-7	Ω	C4829-1
C240B-20	Ω	C4829-2

Are the resistances less than 3 ohms?

Yes	GO to AN4

No	REPAIR the circuit in question.

AN4 CHECK THE REAR CENTER HEADLINER (COUPE) OR RHR (RIGHT-HAND REAR) QUARTER PANEL (CONVERTIBLE) ANC (ACTIVE NOISE CONTROL) MICROPHONE CIRCUITS FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C240B-7	Ω	C240B-20

Is the resistance greater than 10, 000 ohms?

Yes	GO to AN5

No	REPAIR the circuit in question.

AN5 ISOLATE THE REAR CENTER HEADLINER (COUPE) OR RHR (RIGHT-HAND REAR) QUARTER PANEL (CONVERTIBLE) ANC (ACTIVE NOISE CONTROL) MICROPHONE

Connect: ACM C240B .

Install a new rear center headliner (coupe) or RHR quarter panel (convertible) ANC microphone. REFER to: Active Noise Control Microphone .

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs) from the DACMC.

Ignition OFF.

Ignition ON.

Wait at least 5 seconds

Using a diagnostic scan tool, perform the DACMC self-test.

Is DTC B13F5:01 still present in the DACMC?

Yes	GO to AN6

No	The system is operating correctly at this time. The concern was caused by an inoperative ANC microphone.

AN6 CHECK FOR CORRECT DACMC (DIGITAL AUDIO CONTROL MODULE C) OPERATION

Ignition OFF.

Disconnect and inspect all the ACM connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the ACM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ACM. REFER to: Audio Front Control Module (ACM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AO : U0100:00

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See Network Message Chart.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0100:00	Lost Communication with ECM/ PCM "A": No Sub Type Information	Set by the ACM, DACMC, and GPSM when network messages are missing from the PCM for more than 5 seconds with the ignition in RUN.

Possible Source

- PCM

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AO : U0100:00 > PINPOINT TEST AO : U0100:00

AO1 VERIFY THE CUSTOMER'S CONCERN

Ignition ON.

Verify if there is an observable symptom present.

Is an observable symptom present?

Yes	GO to AO2

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

AO2 RECHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0100:00

Ignition ON.

Using a diagnostic scan tool, clear all Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Ignition OFF.

Ignition ON.

Wait at least 10 seconds.

Using a diagnostic scan tool, retrieve all Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U0100:00 set in the ACM, DACMC, or GPSM?

Yes	GO to AO3

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

AO3 CHECK THE PCM (POWERTRAIN CONTROL MODULE) FOR BATTERY VOLTAGE OUT-OF-RANGE DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, perform the PCM self-test.

Are any low or high voltage Diagnostic Trouble Codes (DTCs) recorded in the PCM?

Yes	* For DTC P0562 or P0563 set for vehicles with the 2.3L EcoBoost (201kW/273PS), REFER to: Charging System - 2.3L EcoBoost (201kW/273PS) . See PCM DTC Chart.* For DTC P0562 or P0563 set for vehicles with the 3.7L Duratec (227kW/301PS), REFER to: Charging System - 3.7L Duratec (227kW/301PS) . See PCM DTC Chart.* For DTC P0562 or P0563 set for vehicles with the 5.0L 32V Ti-VCT, REFER to: Charging System - 5.0L 32V Ti-VCT . See PCM DTC Chart.

No	GO to AO4

AO4 CHECK FOR BATTERY VOLTAGE OUT-OF-RANGE DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, perform the self-test for the following modules:

ACM

DACMC

GPSM

Are low or high voltage Diagnostic Trouble Codes (DTCs) recorded in the ACM, DACMC, or GPSM?

Yes	* For DTC U3003:16, GO to Pinpoint Test BB * For DTC U3003:17, GO to Pinpoint Test BC

No	GO to AO5

AO5 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0100:00 SET IN MULTIPLE MODULES

Review the recorded results from the self-test.

Is DTC U0100:00 set in more than one module?

Yes	GO to AO6

No	* If there is an observable symptom, REFER to: Information and Entertainment System . See Symptom Chart: General Audio System.* If there is no observable symptom, the system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

AO6 CHECK FOR CORRECT PCM (POWERTRAIN CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect the PCM connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the PCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PCM. For vehicles with the 2.3L EcoBoost (201kW/273PS), REFER to: Powertrain Control Module (PCM) . For vehicles with the 3.7L Duratec (227kW/301PS), REFER to: Powertrain Control Module (PCM) . For vehicles with the 5.0L 32V Ti-VCT, REFER to: Powertrain Control Module (PCM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AP : U0140:00

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See Network Message Chart.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0140:00	Lost Communication With Body Control Module: No Sub Type Information	Set by the ACM, APIM, DACMC, FCIM, and GPSM when network messages are missing from the BCM for more than 5 seconds with the ignition in RUN.

Possible Source

- BCM

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AP : U0140:00 > PINPOINT TEST AP : U0140:00

AP1 VERIFY THE CUSTOMER'S CONCERN

Ignition ON.

Verify if there is an observable symptom present.

Is an observable symptom present?

Yes	GO to AP2

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

AP2 RECHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0140:00

Ignition ON.

Using a diagnostic scan tool, clear all Continuous Memory Diagnostic Trouble Codes

(CMDTCs).

Ignition OFF.

Ignition ON.

Wait at least 10 seconds.

Using a diagnostic scan tool, retrieve all Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U0140:00 set in the ACM, APIM, DACMC, FCIM, or GPSM?

Yes	GO to AP3

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

AP3 CHECK THE BCM (BODY CONTROL MODULE) FOR BATTERY VOLTAGE OUT-OF-RANGE DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, perform the BCM self-test.

Are any low or high voltage Diagnostic Trouble Codes (DTCs) recorded in the BCM?

Yes	* For DTC U3006:16, REFER to: Body Control Module (BCM) . See U3006:16.* For DTC U3006:17, REFER to: Body Control Module (BCM) . See U3006:17.* For DTC U3006:1C, REFER to: Body Control Module (BCM) . See U3006:1C.

No	GO to AP4

AP4 CHECK FOR BATTERY VOLTAGE OUT-OF-RANGE DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, perform the self-test for the following modules:

ACM

APIM

DACMC

FCIM

GPSM

Are any low or high voltage Diagnostic Trouble Codes (DTCs) recorded in the ACM, APIM, DACMC, FCIM, or GPSM?

Yes	* For DTC U3003:16, GO to Pinpoint Test BB * For DTC U3003:17, GO to Pinpoint Test BC

No	GO to AP5

AP5 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0140:00 SET IN MULTIPLE MODULES

Review the recorded results from the self-test.

Is DTC U0140:00 set in more than one module?

Yes	GO to AP6

No	* If there is an observable symptom, REFER to: Information and Entertainment System . See Symptom Chart: General Audio System.* If there is no observable symptom, the system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

AP6 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all the BCM connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, PERFORM the BCM Guided Routine.

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AQ : U0142:00

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See Network Message Chart.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0142:00	Lost Communication With Body Control Module "B": No Sub Type Information	Set by the ACM, audio DSP module, and DACMC when network messages are missing from the BCMB for more than 5 seconds with the ignition in RUN.

Possible Source

- BCMB

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AQ : U0142:00 > PINPOINT TEST AQ : U0142:00

AQ1 VERIFY THE CUSTOMER'S CONCERN

Ignition ON.

Verify if there is an observable symptom present.

Is an observable symptom present?

Yes	GO to AQ2

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

AQ2 RECHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0142:00

Ignition ON.

Using a diagnostic scan tool, clear all Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Ignition OFF.

Ignition ON.

Wait at least 10 seconds.

Using a diagnostic scan tool, retrieve all Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U0142:00 set in the ACM, audio DSP module, or DACMC?

Yes	GO to AQ3

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

AQ3 CHECK THE BCMB (BODY CONTROL MODULE B) FOR DTC (DIAGNOSTIC TROUBLE CODE) U3003:62

Ignition ON.

Using a diagnostic scan tool, clear all Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Ignition OFF.

Ignition ON.

Wait at least 10 seconds.

Using a diagnostic scan tool, retrieve all Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U3003:62 set in the BCMB?

Yes	REFER to: Body Control Module B (BCMB) . See U3003:62.

No	GO to AQ4

AQ4 CHECK FOR BATTERY VOLTAGE OUT-OF-RANGE DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, perform the self-test for the following modules:

ACM

audio DSP module

DACMC

Are any low or high voltage Diagnostic Trouble Codes (DTCs) recorded in the ACM, audio DSP module, or, DACMC?

Yes	* For DTC U3003:16, GO to Pinpoint Test BB * For DTC U3003:17, GO to Pinpoint Test BC

No	GO to AQ5

AQ5 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0142:00 SET IN MULTIPLE MODULES

Review the recorded results from the self-test.

Is DTC U0142:00 set in more than one module?

Yes	GO to AQ6

No	* If there is an observable symptom, REFER to: Information and Entertainment System . See Symptom Chart: General Audio System.* If there is no observable symptom, the system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

AQ6 CHECK FOR CORRECT BCMB (BODY CONTROL MODULE B) OPERATION

Ignition OFF.

Disconnect and inspect all the BCMB connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the BCMB connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new BCMB. REFER to: Body Control Module B (BCMB) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AR : U0151:00

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See Network Message Chart.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0151:00	Lost Communication With	Set by the APIM and FCIM when

	Restraints Control Module: No Sub Type Information	the airbag deployment notification message from the RCM is missing for more than 5 seconds with the ignition in RUN.

Possible Source

- RCM

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AR : U0151:00 > PINPOINT TEST AR : U0151:00

AR1 VERIFY THE CUSTOMER'S CONCERN

Ignition ON.

Verify there is an observable symptom present.

Is an observable symptom present?

Yes	GO to AR2

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

AR2 RECHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0151:00

Ignition ON.

Using a diagnostic scan tool, clear all Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Ignition OFF.

Ignition ON.

Wait at least 10 seconds.

Using a diagnostic scan tool, retrieve all Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U0151:00 set in the APIM or FCIM?

Yes	GO to AR3

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

AR3 CHECK THE RCM (RESTRAINTS CONTROL MODULE) FOR BATTERY VOLTAGE

OUT-OF-RANGE DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, perform the RCM self-test.

Are any low or high voltage Diagnostic Trouble Codes (DTCs) recorded in the RCM?

Yes	* For DTC U3003:16, REFER to: Airbag Supplemental Restraint System (SRS) . See U3003:16.* For DTC U3003:17, REFER to: Airbag Supplemental Restraint System (SRS) . See U3003:17.

No	GO to AR4

AR4 CHECK FOR BATTERY VOLTAGE OUT-OF-RANGE DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, perform the self-test for the following modules:

APIM

FCIM

Are any low or high voltage Diagnostic Trouble Codes (DTCs) recorded in the APIM or FCIM?

Yes	* For DTC U3003:16, GO to Pinpoint Test BB * For DTC U3003:17, GO to Pinpoint Test BC

No	GO to AR5

AR5 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0151:00 SET IN MULTIPLE MODULES

Review the recorded results from the self-test.

Is DTC U0151:00 set in both the APIM and FCIM?

Yes	GO to AR6

No	* If there is an observable symptom, REFER to: Information and Entertainment System . See Symptom Chart: General Audio System.* If there is no observable symptom, the system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

AR6 CHECK FOR CORRECT RCM (RESTRAINTS CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all the RCM connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the RCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new RCM. REFER to: Restraints Control Module (RCM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AS : U0155:00

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See Network Message Chart.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0155:00	Lost Communication With IPC Control Module: No Sub Type Information	Set by the ACM, APIM, audio DSP module, FCIM, and GPSM when network messages are missing from the IPC for more than 5 seconds with the ignition in RUN.

Possible Source

- IPC

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AS : U0155:00 > PINPOINT TEST AS : U0155:00

AS1 VERIFY THE CUSTOMER'S CONCERN

Ignition ON.

Verify there is an observable symptom present.

Is an observable symptom present?

Yes	GO to AS2

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

AS2 RECHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0155:00

Ignition ON.

Using a diagnostic scan tool, clear all Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Ignition OFF.

Ignition ON.

Wait at least 10 seconds.

Using a diagnostic scan tool, retrieve all Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U0155:00 set in the ACM, APIM, audio DSP module, FCIM, or GPSM?

Yes	GO to AS3

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

AS3 CHECK THE IPC (INSTRUMENT PANEL CLUSTER) FOR BATTERY VOLTAGE OUT-OF-RANGE DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, perform the IPC self-test.

Are any low or high voltage Diagnostic Trouble Codes (DTCs) recorded in the IPC?

Yes	* For DTC U3003:16, REFER to: Instrumentation, Message Center and Warning Chimes . See U3003:16.* For DTC U3003:17, REFER to: Instrumentation, Message Center and Warning Chimes . See U3003:17.

No	GO to AS4

AS4 CHECK FOR BATTERY VOLTAGE OUT-OF-RANGE DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, perform the self-test for the following modules:

ACM

APIM

Audio DSP module

FCIM

GPSM

Are any low or high voltage Diagnostic Trouble Codes (DTCs) recorded in the ACM, APIM, audio DSP module, FCIM, or GPSM?

Yes	* For DTC U3003:16, GO to Pinpoint Test BB * For DTC U3003:17, GO to Pinpoint Test BC

No	GO to AS5

AS5 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0155:00 SET IN MULTIPLE MODULES

Review the recorded results from the self-test.

Is DTC U0155:00 set in more than one module?

Yes	GO to AS6

No	If there is an observable symptom, REFER to: Information and Entertainment System . See Symptom Chart: General Audio System, to diagnose the observed symptom. If there is no observable symptom, the system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

AS6 CHECK FOR CORRECT IPC (INSTRUMENT PANEL CLUSTER) OPERATION

Ignition OFF.

Disconnect and inspect the IPC connector.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the IPC connector. Make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, PERFORM the IPC Guided Routine.

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AT : U0159:00

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See Network Message Chart.

The PAM is integral to the BCM.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0159:00	Lost Communication With Parking Assist Control Module "A": No Sub Type Information	Set by the APIM when network messages are missing from the PAM for more than 5 seconds with the ignition in RUN.

Possible Source

- PAM

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AT : U0159:00 > PINPOINT TEST AT : U0159:00

AT1 VERIFY THE CUSTOMER'S CONCERN

Ignition ON.

Verify if there is an observable symptom present.

Is an observable symptom present?

Yes	GO to AT2

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

AT2 RECHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0159:00

Ignition ON.

Using a diagnostic scan tool, clear all Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Ignition OFF.

Ignition ON.

Wait at least 10 seconds.

Using a diagnostic scan tool, retrieve all Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U0159:00 set in the APIM?

Yes	GO to AT3

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

AT3 CHECK THE BCM (BODY CONTROL MODULE) FOR BATTERY VOLTAGE OUT-OF-RANGE DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, perform the BCM self-test.

Are any low or high voltage Diagnostic Trouble Codes (DTCs) recorded in the BCM?

Yes	* For DTC U3006:16, REFER to: Body Control Module (BCM) . See U3006:16.* For DTC U3006:17, REFER to: Body Control Module (BCM) . See U3006:17.

No	GO to AT4

AT4 CHECK THE APIM (SYNC MODULE) FOR BATTERY VOLTAGE OUT-OF-RANGE DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, perform the APIM self-test.

Are low or high voltage Diagnostic Trouble Codes (DTCs) recorded in the APIM?

Yes	* For DTC U3003:16, GO to Pinpoint Test BB * For DTC U3003:17, GO to Pinpoint Test BC

No	GO to AT5

AT5 CHECK FOR CORRECT PAM (PARKING ASSIST CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all the BCM connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, discontinue this test and follow TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, PERFORM the BCM Guided Routine.

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AU : U016A:00

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See Network Message Chart.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U016A:00	Lost Communication With Global Positioning System Module: No Sub Type Information	Set by the APIM when it is missing network messages from the GPSM for more than 5 seconds with the ignition in RUN.

Possible Source

- GPSM

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AU : U016A:00 > PINPOINT TEST AU : U016A:00

AU1 VERIFY THE CUSTOMER'S CONCERN

Ignition ON.

Verify there is an observable symptom present.

Is an observable symptom present?

Yes	GO to AU2

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

AU2 RECHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U016A:00

Ignition ON.

Using a diagnostic scan tool, clear all Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Ignition OFF.

Ignition ON.

Wait at least 10 seconds.

Using a diagnostic scan tool, retrieve all Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U016A:00 set in the APIM?

Yes	GO to AU3

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

AU3 CHECK FOR BATTERY VOLTAGE OUT-OF-RANGE DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, perform the self-test for the following modules:

APIM

GPSM

Are any low or high voltage Diagnostic Trouble Codes (DTCs) recorded in the APIM or GPSM?

Yes	* For DTC U3003:16, GO to Pinpoint Test BB * For DTC U3003:17, GO to Pinpoint Test BC

No	GO to AU4

AU4 CHECK FOR CORRECT GPSM (GLOBAL POSITIONING SYSTEM MODULE) OPERATION

Ignition OFF.

Disconnect and inspect the GPSM connector.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the GPSM connector. Make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new GPSM. REFER to: Global Positioning System Module (GPSM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AV : U0184:00

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See Network Message Chart.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0184:00	Lost Communication With Radio: No Sub Type Information	Set by the APIM when network messages are missing from the ACM for more than 5 seconds with the ignition in RUN.

Possible Source

- ACM

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM >

PINPOINT TESTS > PINPOINT TEST AV : U0184:00 > PINPOINT TEST AV : U0184:00

AV1 VERIFY THE CUSTOMER'S CONCERN

Verify there is an observable symptom present.

Is an observable symptom present?

Yes	GO to AV2

No	The system is operating normally at this time. This DTC may have been set due to high network traffic or an intermittent fault condition.

AV2 RECHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0184:00

Ignition ON.

Using a diagnostic scan tool, clear all Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Ignition OFF.

Ignition ON.

Wait at least 10 seconds.

Using a diagnostic scan tool, retrieve all Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U0184:00 set in the APIM?

Yes	GO to AV3

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

AV3 CHECK FOR BATTERY VOLTAGE OUT-OF-RANGE DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, perform the self-test for the following modules:

ACM

APIM

Are any low or high voltage Diagnostic Trouble Codes (DTCs) recorded in the ACM or APIM?

Yes	* For DTC U3003:16, GO to Pinpoint Test BB * For DTC U3003:17, GO to Pinpoint Test BC

No	GO to AV4

AV4 CHECK FOR CORRECT ACM (AUDIO FRONT CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all the ACM connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the ACM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ACM. REFER to: Audio Front Control Module (ACM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AW : U0237:00

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See Network Message Chart.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0237:00	Lost Communication With Digital Audio Control Module "C": No Sub Type Information	Set by the ACM and audio DSP module when network messages are missing from the DACMC for more than 5 seconds with the ignition in RUN.

Possible Source

- DACMC

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AW : U0237:00 > PINPOINT TEST AW : U0237:00

AW1 VERIFY THE CUSTOMER'S CONCERN

Ignition ON.

Verify there is an observable symptom present.

Is an observable symptom present?

Yes	GO to AW2

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

AW2 RECHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0237:00

Ignition ON.

Using a diagnostic scan tool, clear all Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Ignition OFF.

Ignition ON.

Wait at least 10 seconds.

Using a diagnostic scan tool, retrieve all Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U0237:00 set in the ACM or audio DSP module?

Yes	GO to AW3

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

AW3 CHECK FOR BATTERY VOLTAGE OUT-OF-RANGE DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, perform the self-test for the following modules:

ACM

Audio DSP module

DACMC

Are any low or high voltage Diagnostic Trouble Codes (DTCs) recorded in the ACM, audio DSP module, or DACMC?

Yes	* For DTC U3003:16, GO to Pinpoint Test BB * For DTC U3003:17, GO to Pinpoint Test BC

No	GO to AW4

AW4 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0237:00 SET IN MULTIPLE MODULES

Review the recorded results from the self-test.

Is DTC U0237:00 set in both the ACM and audio DSP module?

Yes	GO to AW5

No	* If there is an observable symptom, REFER to: Information and Entertainment System . See Symptom Chart: General Audio System.* If there is no observable symptom, the system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

AW5 CHECK FOR CORRECT DACMC (DIGITAL AUDIO CONTROL MODULE C) OPERATION

Ignition OFF.

Disconnect and inspect all the ACM connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the ACM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ACM. REFER to: Audio Front Control Module (ACM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AX : U0238:00

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See Network Message Chart.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0238:00	Lost Communication With Digital Audio Control Module "D": No Sub Type Information	Set by the ACM and APIM when network messages are missing from the audio DSP module for more than 5 seconds with the ignition in RUN.

Possible Source

- Audio DSP module

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AX : U0238:00 > PINPOINT TEST AX : U0238:00

AX1 VERIFY THE CUSTOMER'S CONCERN

Ignition ON.

Verify there is an observable symptom present.

Is an observable symptom present?

Yes	GO to AX2

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

AX2 RECHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0238:00

Ignition ON.

Using a diagnostic scan tool, clear all Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Ignition OFF.

Ignition ON.

Wait at least 10 seconds.

Using a diagnostic scan tool, retrieve all Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U0238:00 set in the ACM or APIM?

Yes	GO to AX3

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

AX3 CHECK FOR BATTERY VOLTAGE OUT-OF-RANGE DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, perform the self-test for the following modules:

ACM

APIM

Audio DSP module

Are any low or high voltage Diagnostic Trouble Codes (DTCs) recorded in the ACM, APIM, or audio DSP module?

Yes	* For DTC U3003:16, GO to Pinpoint Test BB * For DTC U3003:17, GO to Pinpoint Test BC

No	GO to AX4

AX4 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0238:00 SET IN MULTIPLE MODULES

Review the recorded results from the self-test.

Is DTC U0238:00 set in both the ACM and APIM?

Yes	GO to AX5

No	* If there is an observable symptom, REFER to: Information and Entertainment System . See Symptom Chart: General Audio System.* If there is no observable symptom, the system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

AX5 CHECK FOR CORRECT AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE OPERATION

Ignition OFF.

Disconnect and inspect all the audio DSP module connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the audio DSP module connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, discontinue this test and follow TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new audio DSP module. REFER to: Audio Digital Signal Processing (DSP) Module .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AY : U0253:00

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See Network Message Chart.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0253:00	Lost Communication With Accessory Protocol Interface Module: No Sub Type Information	Set by the ACM, audio DSP module, and FCIM when network messages are missing from the APIM for more than 5 seconds with the ignition in RUN.

Possible Source

- APIM

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AY : U0253:00 > PINPOINT TEST AY : U0253:00

AY1 VERIFY THE CUSTOMER'S CONCERN

Ignition ON.

Verify there is an observable symptom present.

Is an observable symptom present?

Yes	GO to AY2

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

AY2 RECHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0253:00

Ignition ON.

Using a diagnostic scan tool, clear all Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Ignition OFF.

Ignition ON.

Wait at least 10 seconds.

Using a diagnostic scan tool, retrieve all Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U0253:00 set in the ACM, audio DSP module, or FCIM?

Yes	GO to AY3

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

AY3 CHECK FOR BATTERY VOLTAGE OUT-OF-RANGE DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, perform the self-test for the following modules:

ACM

APIM

Audio DSP module

FCIM

Are any low or high voltage Diagnostic Trouble Codes (DTCs) recorded in the ACM, APIM, audio DSP module, or FCIM?

Yes	* For DTC U3003:16, GO to Pinpoint Test BB * For DTC U3003:17, GO to Pinpoint Test BC

No	GO to AY4

AY4 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0253:00 SET IN MULTIPLE MODULES

Review the recorded results from the self-test.

Is DTC U0253:00 set in more than one module?

Yes	GO to AY5

No	If there is an observable symptom, REFER to: Information and Entertainment System . See Symptom Chart: General Audio System. If there is no observable symptom, the system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

AY5 CHECK FOR CORRECT APIM (SYNC MODULE) OPERATION

Ignition OFF.

Disconnect and inspect the APIM connector.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the APIM connector. Make sure it seats and latches correctly.

Wait 2 minutes for the APIM to re-initialize.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, PERFORM the APIM Hardware Test. Refer to APIM HARDWARE TESTING .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AZ : U0256:00

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See Network Message Chart.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0256:00	Lost Communication With Front Controls Interface Module "A": No Sub Type Information	Set by the ACM, and APIM when network messages are missing from the FCIM for more than 5 seconds with the ignition in RUN.

Possible Source

- FCIM

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST AZ : U0256:00 > PINPOINT TEST AZ : U0256:00

AZ1 VERIFY THE CUSTOMER'S CONCERN

Ignition ON.

Verify there is an observable symptom present.

Is an observable symptom present?

Yes	GO to AZ2

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

AZ2 RECHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0256:00

Ignition ON.

Using a diagnostic scan tool, clear all Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Ignition OFF.

Ignition ON.

Wait at least 10 seconds.

Using a diagnostic scan tool, retrieve all Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U0256:00 set in the ACM or APIM?

Yes	GO to AZ3

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

AZ3 CHECK FOR BATTERY VOLTAGE OUT-OF-RANGE DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, perform the self-test for the following modules:

ACM

APIM

FCIM

Are any low or high voltage Diagnostic Trouble Codes (DTCs) recorded in the ACM, APIM, or FCIM?

Yes	* For DTC U3003:16, GO to Pinpoint Test BB * For DTC U3003:17, GO to Pinpoint Test BC

No	GO to AZ4

AZ4 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0256:00 SET IN MULTIPLE MODULES

Review the recorded results from the self-test.

Is DTC U0256:00 set in set in both the ACM and APIM?

Yes	GO to AZ5

No	* If there is an observable symptom, REFER to: Information and Entertainment System . See Symptom Chart: General Audio System, to diagnose the observed symptom.* If there is no observable symptom, the system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

AZ5 CHECK FOR CORRECT FCIM (FRONT CONTROLS INTERFACE MODULE) OPERATION

Ignition OFF.

Disconnect and inspect the FCIM connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the FCIM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new FCIM. REFER to: Front Controls Interface Module (FCIM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. Address the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST BA : U0257:00

Normal Operation and Fault Conditions

REFER to: Information and Entertainment System - System Operation and Component Description . See Network Message Chart.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0257:00	Lost Communication With Front Controls / Display Interface Module: No Sub Type Information	*NOTE: The FDIM is a non-networked module attached to the APIM. The APIM acts as the gateway module for messages sent over the Infotainment Controller Area Network (I-CAN) between the FDIM, ACM, and FCIM.* Set by the ACM and audio DSP module when network messages are missing from the APIM for more than 5 seconds with the ignition in RUN. This DTC may be set in conjunction with DTC U0253:00.

Possible Source

- APIM

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST BA : U0257:00 > PINPOINT TEST BA : U0257:00

BA1 VERIFY THE CUSTOMER'S CONCERN

Ignition ON.

Verify there is an observable symptom present.

Is an observable symptom present?

Yes	GO to BA2

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

BA2 RECHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0257:00

Ignition ON.

Using a diagnostic scan tool, clear all Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Ignition OFF.

Ignition ON.

Wait at least 10 seconds.

Using a diagnostic scan tool, retrieve all Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U0257:00 set in the ACM or audio DSP module?

Yes	GO to BA3

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

BA3 CHECK FOR BATTERY VOLTAGE OUT-OF-RANGE DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, perform the self-test for the following modules:

ACM

APIM

Audio DSP module

Are any low or high voltage Diagnostic Trouble Codes (DTCs) recorded in the ACM, APIM, or audio DSP module?

Yes	* For DTC U3003:16, GO to Pinpoint Test BB * For DTC U3003:17, GO to Pinpoint Test BC

No	GO to BA4

BA4 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0257:00 SET IN MULTIPLE MODULES

Review the recorded results from the self-test.

Is DTC U0257:00 set in both the ACM and audio DSP module?

Yes	INSTALL a new FDIM. CLEAR the DTCs. Using a diagnostic scan tool, retrieve all Continuous Memory Diagnostic Trouble Codes (CMDTCs). If DTC U0257:00 is still present, GO to BA5

No	* If there is an observable symptom, REFER to: Information and Entertainment System . See Symptom Chart: General Audio System, to diagnose the observed symptom.* If there is no observable symptom, the system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

BA5 CHECK FOR CORRECT APIM (SYNC MODULE) OPERATION

Ignition OFF.

Disconnect and inspect the APIM connector.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the APIM connector. Make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, PERFORM the APIM Hardware Test. Refer to APIM HARDWARE TESTING .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST BB : U3003:16

Refer to Audio System/Navigation - AM/FM/SYNC/Touchscreen Display for schematic and connector information.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U3003:16	Battery Voltage: Circuit Voltage Below Threshold	Set by the ACM, APIM, audio DSP module, DACMC, FCIM, and GPSM when the supply voltage falls below 10 volts for at least 10 seconds during normal operation or for more than 250 milliseconds during the self-test.

Possible Sources

- Previous low battery voltage
- Wiring, terminals, or connectors
- ACM
- APIM
- Audio DSP module
- DACMC
- FCIM
- GPSM

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST BB : U3003:16 > PINPOINT TEST BB : U3003:16

BB1 RECHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U3003:16

Ignition ON.

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs) for the module in question.

Wait at least 15 seconds.

Using a diagnostic scan tool, repeat the self-test for the module in question.

Is DTC U3003:16 still present?

Yes	GO to BB2

No	The system is operating correctly at this time. The DTC may have been set due to a previous low battery voltage condition.

BB2 CHECK FOR CHARGING SYSTEM DIAGNOSTIC TROUBLE CODES (DTCS) IN THE PCM (POWERTRAIN CONTROL MODULE)

Using a diagnostic scan tool, perform the PCM self-test

Are any voltage-related Diagnostic Trouble Codes (DTCs) set in the PCM?

Yes	* For vehicles with the 2.3L EcoBoost (201kW/273PS), REFER to: Charging System - 2.3L EcoBoost (201kW/273PS) . See PCM DTC Chart.* For vehicles with the 3.7L Duratec (227kW/301PS), REFER to: Charging System - 3.7L Duratec (227kW/301PS) . See PCM DTC Chart.* For vehicles with the 5.0L 32V Ti-VCT, REFER to: Charging System - 5.0L 32V Ti-VCT . See PCM DTC Chart.

No	GO to BB3

BB3 CHECK THE BATTERY CONDITION AND STATE OF CHARGE

Check the battery condition and verify that the battery is fully charged. REFER to: Battery . See Battery Condition Test.

Is the battery OK and fully charged?

Yes	GO to BB4

No	* For vehicles with the 2.3L EcoBoost (201kW/273PS), REFER to: Charging System - 2.3L EcoBoost (201kW/273PS) . See Symptom Chart to diagnose an under voltage condition.* For vehicles with the 3.7L Duratec (227kW/301PS), REFER to: Charging System - 3.7L Duratec (227kW/301PS) . See Symptom Chart to diagnose an under voltage condition.* For vehicles with the 5.0L 32V Ti-VCT, REFER to: Charging System - 5.0L 32V Ti-VCT . See Symptom Chart to diagnose an under voltage condition.

BB4 CHECK THE MODULE VOLTAGE SUPPLY

Ignition OFF.

Measure and record the voltage at the battery.

Disconnect the audio system module setting DTC U3003:16.

Ignition ON.

Measure the voltage between the module setting DTC U3003:16 and ground.

For the ACM, measure:

Positive Lead	Measurement / Action	Negative Lead
C240A-1		Ground

For the APIM, measure:

Positive Lead	Measurement / Action	Negative Lead
C2383-1		Ground

For the audio DSP module, measure:

Positive Lead	Measurement / Action	Negative Lead
C2385B-14		Ground

For the DACMC, measure:

Positive Lead	Measurement / Action	Negative Lead
C240A-1		Ground

For the FCIM, measure:

Positive Lead	Measurement / Action	Negative Lead
C2402A-7		Ground

For the GPSM, measure:

Positive Lead	Measurement / Action	Negative Lead
C2398-1		Ground

Is the voltage within 0.2 volts of the recorded battery voltage?

Yes	GO to BB5

No	REPAIR the circuit for high resistance.

BB5 CHECK THE SUSPECT MODULE GROUND CIRCUIT FOR CONTINUITY

Measure the voltage at the suspect module.

For the ACM, measure:

Positive Lead	Measurement / Action	Negative Lead
C240A-1		C240A-13

For the APIM, measure:

Positive Lead	Measurement / Action	Negative Lead
C2383-1		C2383-37

For the audio DSP module, measure:

Positive Lead	Measurement / Action	Negative Lead
C2385B-14		C2385B-11

For the DACMC, measure:

Positive Lead	Measurement / Action	Negative Lead
C240A-1		C240A-13

For the FCIM, measure:

Positive Lead	Measurement / Action	Negative Lead
C2402A-7		C2402A-1

For the GPSM, measure:

Positive Lead	Measurement / Action	Negative Lead
C2398-1		C2398-6

Is the suspect module voltage greater than 11 volts?

Yes	* For the ACM, GO to BB6* For the APIM, GO to BB7* For the audio DSP module, GO to BB8* For the DACMC, GO to BB9* For the FCIM, GO to BB10* For the GPSM, GO to BB11

No	REPAIR the circuit for high resistance.

BB6 CHECK FOR CORRECT ACM (AUDIO FRONT CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all the ACM connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the ACM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ACM. REFER to: Audio Front Control Module (ACM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

BB7 CHECK FOR CORRECT APIM (SYNC MODULE) OPERATION

Ignition OFF.

Disconnect and inspect the APIM connector.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the APIM connector. Make sure it seats and latches correctly.

Wait at least 2 minutes for the APIM to re-initialize.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, PERFORM the APIM Hardware Test. Refer to APIM HARDWARE TESTING .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

BB8 CHECK FOR CORRECT AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE OPERATION

Ignition OFF.

Disconnect and inspect all the audio DSP module connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the audio DSP module connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, discontinue this test and follow TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new audio DSP module. REFER to: Audio Digital Signal Processing (DSP) Module .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

BB9 CHECK FOR CORRECT DACMC (DIGITAL AUDIO CONTROL MODULE C) OPERATION

Ignition OFF.

Disconnect and inspect all the ACM connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the ACM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ACM. REFER to: Audio Front Control Module (ACM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

BB10 CHECK FOR CORRECT FCIM (FRONT CONTROLS INTERFACE MODULE) OPERATION

Ignition OFF.

Disconnect and inspect the FCIM connector.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the FCIM connector. Make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new FCIM. REFER to: Front Controls Interface Module (FCIM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

BB11 CHECK FOR CORRECT GPSM (GLOBAL POSITIONING SYSTEM MODULE) OPERATION

Ignition OFF.

Disconnect and inspect the GPSM connector.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the GPSM connector. Make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new GPSM. REFER to: Global Positioning System Module (GPSM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST BC : U3003:17

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U3003:17	Battery Voltage: Circuit Voltage Above Threshold	Set by the ACM, APIM, audio DSP module, DACMC, FCIM, and GPSM when the supply voltage is more than 15.8 volts for more than 250 milliseconds during normal operation or the self-test.

Possible Sources

- ACM
- APIM
- Audio DSP module
- DACMC
- FCIM
- GPSM

DIAGNOSIS AND TESTING > INFORMATION AND ENTERTAINMENT SYSTEM > PINPOINT TESTS > PINPOINT TEST BC : U3003:17 > PINPOINT TEST BC : U3003:17

BC1 RECHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U3003:17

Ignition ON.

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs) for the module in question.

Wait at least 10 seconds.

Using a diagnostic scan tool, perform the self-test for the module in question.

Is DTC U3003:17 present?

Yes	GO to BC2

No	The system is operating correctly at this time. The DTC may have been set previously during battery charging or while jump starting the vehicle.

BC2 CHECK FOR HIGH VOLTAGE DIAGNOSTIC TROUBLE CODES (DTCS) SET IN MULTIPLE MODULES

Using a diagnostic scan tool, retrieve all Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Are high voltage Diagnostic Trouble Codes (DTCs) such as B1676, P0563, or U3003:17 set in more than one module?

Yes	* For vehicles with the 2.3L EcoBoost (201kW/273PS), REFER to: Charging System - 2.3L EcoBoost (201kW/273PS) . See Symptom Chart to diagnose an overvoltage condition.* For vehicles with the 3.7L Duratec (227kW/301PS), REFER to: Charging System - 3.7L Duratec (227kW/301PS) . See Symptom Chart to diagnose an overvoltage condition.* For vehicles with the 5.0L 32V Ti-VCT, REFER to: Charging System - 5.0L 32V Ti-VCT . See Symptom Chart to diagnose an overvoltage condition.

No	GO to BC3

BC3 CHECK THE BATTERY VOLTAGE

Turn off all interior lights, exterior lights, and accessories.

Start and run the engine at approximately 2, 000 RPM for 3 minutes while monitoring the battery voltage.

Does the battery voltage rise to 15.5 volts or higher?

Yes	* For vehicles with the 2.3L EcoBoost (201kW/273PS), REFER to: Charging System - 2.3L EcoBoost (201kW/273PS) . See Symptom Chart to diagnose an overvoltage condition.* For vehicles with the 3.7L Duratec (227kW/301PS), REFER to: Charging System - 3.7L Duratec (227kW/301PS) . See Symptom Chart to diagnose an overvoltage condition.* For vehicles with the 5.0L 32V Ti-VCT, REFER to: Charging System - 5.0L 32V Ti-VCT . See Symptom Chart to diagnose an overvoltage condition.

No	* For the ACM, GO to BC4* For the APIM, GO to BC5* For the audio DSP module, GO to BC6* For the DACMC, GO to BC7* For the FCIM, GO to BC8* For the GPSM, GO to BC9

BC4 CHECK FOR CORRECT ACM (AUDIO FRONT CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all the ACM connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the ACM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ACM. REFER to: Audio Front Control Module (ACM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

BC5 CHECK FOR CORRECT APIM (SYNC MODULE) OPERATION

Ignition OFF.

Disconnect and inspect the APIM connector.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the APIM connector. Make sure it seats and latches correctly.

Wait at least 2 minutes for the APIM to re-initialize.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, PERFORM the APIM Hardware Test. Refer to APIM HARDWARE TESTING .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

BC6 CHECK FOR CORRECT AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE OPERATION

Ignition OFF.

Disconnect and inspect all the audio DSP module connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the audio DSP module connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, discontinue this test and follow TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new audio DSP module. REFER to: Audio Digital Signal Processing (DSP) Module .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

BC7 CHECK FOR CORRECT DACMC (DIGITAL AUDIO CONTROL MODULE C) OPERATION

Ignition OFF.

Disconnect and inspect all the ACM connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the ACM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ACM. REFER to: Audio Front Control Module (ACM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

BC8 CHECK FOR CORRECT FCIM (FRONT CONTROLS INTERFACE MODULE) OPERATION

Ignition OFF.

Disconnect and inspect the FCIM connector.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the FCIM connector. Make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new FCIM. REFER to: Front Controls Interface Module (FCIM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

BC9 CHECK FOR CORRECT GPSM (GLOBAL POSITIONING SYSTEM MODULE) OPERATION

Ignition OFF.

Disconnect and inspect the GPSM connector.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the GPSM connector. Make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new GPSM. REFER to: Global Positioning System Module (GPSM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

GENERAL PROCEDURES > BEZEL DIAGNOSTICS

Check

1.

WARNING: Before beginning any service procedure in this article, refer to Health and Safety Precautions in GENERAL INFORMATION . Failure to follow this instruction may result in serious personal injury.

Refer to: Health and Safety Precautions .

NOTE: If there is a concern with one of the following components and Bezel Diagnostics cannot be accessed, obtain the module part number by referencing the label attached to the module.

- Inoperative (blank or does not power on) FDIM
- Inoperative FCIM
- Inoperative steering wheel switch (for vehicles without a CD player)

Refer to appropriate article to diagnose the inoperative component.

2.

Ignition ON.

3.

Operate the audio system in AM/ FM mode.

* For vehicles **with** a CD player, press and hold the EJECT button, and within 1 second, press and hold the SEEK UP button. If supported, the Speaker Walk-Around Test will begin, and the display will indicate each speaker as it is tested.
* For vehicles **without** a CD player, simultaneously press and hold the steering wheel SEEK UP switch and FCIM TUNE UP button. If supported, the Speaker Walk-Around Test will begin, and the display will indicate each speaker as it is tested.

4.

Once the Speaker Walk-Around Test (All Speaker Test) is complete, the following information is available:

Menu	Submenu
APIM Diagnostics	Part Numbers
	Software Versions
	Configuration Status
	Location Information
	Tones Test
	Touchscreen Activation Test
	Display Test Pattern
	RGB Pixel Test
	IVSU Versions
	Exit Diagnostics
AHU Diagnostics (AHU refers to the ACM)	AHU Part Numbers (also displays SIRIUS ESN)
	Radio Signal Strength
	Speaker Walk-Around Test Active (if **not** equipped with audio DSP module)
	Exit Diagnostics
DSP Diagnostics (if equipped)	DSP Part Numbers
	Speaker Walk-Around Test Active
	Exit Diagnostics
EFP Diagnostics - if equipped (EFP refers to the FCIM that communicates on the CAN)	EFP Part Numbers
	Exit Diagnostics

5.

To exit the bezel diagnostics, press the FCIM on/off button or select "Exit Diagnostics."

GENERAL PROCEDURES > RESET THE SYNC MODULE [APIM]

Programming

*NOTE: An APIM Reset consists of an APIM software cold boot and a SYNC ® system Master Reset. It may **not** be necessary to perform a Master Reset after performing a cold boot if the concern is resolved.*

1.

Ignition OFF.

2.

Remove any devices connected to the USB port(s), audio input jack/socket (if equipped), SD slot (if equipped), or RCA jacks (if equipped).

3.

Ignition ON.

4.

Cold boot the APIM software by simultaneously pressing and holding the FCIM power and seek up buttons for 8 seconds, and then releasing.

> *NOTE: Performing a Master Reset returns all preference settings to the factory defaults, erases the phone book and call histories, and deletes any Bluetooth devices paired with the SYNC ® system. For vehicles with navigation, the customer's saved destinations (home, favorites, and previous) are erased. For vehicles with a TCU, any devices paired with the MyFord ® Mobile or MyLincoln Mobile™ phone application will be deleted.*

5.
Perform a Master Reset. If necessary, refer to "Master Reset" in the Owner's Literature.

6.

Verify system function using the MIT 105-00120 to test the audio output for the USB port(s), audio input jack/socket (if equipped), and Bluetooth. If equipped, test the audio output for the RCA jacks using RCA Adapter 105-00121.

> *NOTE: If the concern remains after completing the APIM Reset procedure, advise the customer to power their device off and back on for a simple reboot. In some cases, if possible, the device's battery may also need to be removed and re-installed to complete a reboot. Delete SYNC ® from the device's Bluetooth menu prior to re-pairing the phone to the SYNC ® system. If necessary, the customer can also perform a Master Clear, Master Reset, or Factory Data Reset on their device following the manufacturer's instructions in the device's owner's manual and/or website. Customer devices may affect the operation of SYNC ® and this should be understood to prevent unnecessary diagnosis or repairs to the system.*

7.
If a concern is still present, return to the Symptom Charts.

GENERAL PROCEDURES > SYNC MODULE [APIM] CUSTOM PROGRAMMING

Special Tool(s) / General Equipment

SYNC USB 2.0 A Male to A Male Cable

SYNC USB 2.0 A Female to Mini B Female 5-Pin Adapter

Activation

1.

WARNING: Before beginning any service procedure in this article, refer to Health and Safety Precautions in GENERAL INFORMATION . Failure to follow this instruction may result in serious personal injury.

Refer to: Health and Safety Precautions .

NOTE: Use this procedure to show all available software options, including Applications, that can be programmed into the APIM when upgrades become available, or as directed by a TSB or FSA. For additional information about choosing the correct APIM programming procedure, see Accessory Protocol Interface Module (APIM) Programming.

2.
Refer to: Information and Entertainment System - Overview .

3.

To prevent timeout errors and to minimize programming time, a hardwired Internet connection is strongly recommended when programming.

A USB flash drive with a minimum storage size of 1 gigabyte (GB) may be required for this procedure.

Some programming files are large (greater than 2GB). It is important that the diagnostic scan tool has enough available hard drive space to accommodate the programming file download.

If a "Disk Space Error" is received, create additional free space on the hard drive.

The diagnostic scan tool is required.

Ensure that the IDS version and patch software levels are up to date.

During programming, the vehicle display may momentarily go blank.

4.

Connect a battery charger to the vehicle and select the low charge setting. The negative battery charger lead must be connected to a clean chassis ground, not the negative battery post.

5.

Plug the diagnostic scan tool into a power supply due to the length of time the programming requires.

6.

Connect the diagnostic scan tool to the VCM, and the VCM to the DLC.

7.

Close the IDS software program.

8.

Place the ignition in the ON/RUN position. For ON/RUN position information with Push Button Start vehicles, Refer to: Steering Wheel and Column Electrical Components - Overview .

9.

Using the diagnostic scan tool, open Internet Explorer and access the technician service publication website.

Run OASIS using "Read VIN & DTCs."

If the "Read VIN & DTCs" button is green with a red VCM icon, refer to the "SYNC - Software Programming" document under the "Service Tips" tab.

If the "Read VIN & DTCs" button is red with a grey VCM icon, ensure pop-ups are enabled, follow the Internet Explorer pop-ups, and then refer to the "SYNC - Software Programming" document under the "Service Tips" tab.

If the "SYNC - Software Programming" document is not followed, the programming may stop or encounter errors due to improperly configured Internet browser settings.

NOTE: This procedure clears all Continuous Memory Diagnostic Trouble Codes (CMDTCs). The Diagnostic Trouble Codes (DTCs) must be recorded now if other diagnoses are to be performed after this procedure.

10.
Select "Toolbox" from the technician service publications website to retrieve and record all Continuous Memory Diagnostic Trouble Codes (CMDTCs).

11.

From the OASIS tab, select the "SYNC" button. The Last Recorded State - Software is displayed.

12.

Scroll to the bottom of the screen, select "Custom," and select the "Read SYNC" button. The current APIM assembly, Vehicle Interface Processor (VIP), Consumer Interface Processor (CIP), and Application software levels are compared to the last recorded state in the Ford online database, and the available software is displayed.

Select the software level needed as indicated by the TSB or FSA. If the software level is not known, stop this procedure and perform standard programming, which automatically selects the latest software levels. Refer to: SYNC Module [APIM] Standard Programming .

Applications may require selection for installation. Applications with a green check mark next to them indicates the APIM already has the latest level installed (no reinstallation is required).

Depending on the software level required, the diagnostic scan tool automatically selects either the Service Pack or Full Flash programming method.

Although there may be an option available to override the Service Pack installation and perform a Full Flash/Force Consumer Interface Processor (CIP), choosing this option requires additional programming time and is not recommended unless directed by a TSB or FSA.

Select the customer-requested upgrade or the Application directed by the TSB or FSA.

NOTE: If not performing a Full Flash/Force Consumer Interface Processor (CIP), go to step 16.

NOTE: Only Applications on a flash drive may be loaded into the APIM through the media hub.

13.

Disconnect the vehicle's USB cable by removing the media hub. Refer to: Media Hub .

If the USB cable cannot be accessed by removing the media hub, access and disconnect the USB inline connector. Refer to: SYNC Module [APIM] to Universal Serial Bus (USB) Port Cable .

14.

Connect the USB adaptor (female type A 4-pin to female type Mini-B 5-pin) to the vehicle's USB cable.Use the General Equipment: SYNC USB 2.0 A Female to Mini B Female 5-Pin Adapter

Connect one end of the USB cable (male type A 4-pin to male type a 4-pin) to the diagnostic scan tool's USB port, and the other end to the USB adaptor. Use the General Equipment: SYNC USB 2.0 A Male to A Male Cable

*NOTE: Do **not** disconnect the VCM or USB cable during APIM programming unless directed by the diagnostic scan tool on-screen prompts.*

15.

NOTE: This step may take 20 minutes or longer.

NOTE: Diagnostic scan tools that have never been used to program SYNC ® may

encounter a Hardware Wizard pop-up requesting a "WMA SBOOT" driver installation. If this request is encountered, install the driver and select the diagnostic scan tool "Retry" button to continue programming.

16.

Select the "Program SYNC" button to begin the APIM programming process.

When prompted by the diagnostic scan tool, disconnect the battery charger, start the engine, and select "OK." Once "OK" is selected, do not interrupt this step, which may take 20 minutes or longer.

NOTE: This step may take 20 minutes or longer.

17.
Connect the USB flash drive to the diagnostic scan tool and follow the on-screen instructions to download Service Pack and Application files onto the USB flash drive. (If the diagnostic scan tool does not have an available USB port, the USB cable that is connected to the vehicle's USB cable can be unplugged at this time to make room for the USB flash drive. Do **not** disconnect the VCM from the diagnostic scan tool).

18.

Install the media hub if it was removed. Refer to: Media Hub .

Reconnect the USB inline connector if it was accessed and disconnected. Refer to: SYNC Module [APIM] to Universal Serial Bus (USB) Port Cable .

NOTE: This step may take 20 minutes or longer.

19.

When prompted by the diagnostic scan tool, remove the USB flash drive from the diagnostic scan tool and connect it to the media hub to install the Applications into the APIM.

The update should start automatically, and may take 20 minutes or longer.

It is normal for the APIM to reset during this step.

20.

Once the diagnostic scan tool programming and USB flash drive programming are complete, reinstall the flash drive into the diagnostic scan tool and select "OK." This initiates the remaining automated configuration steps and reports the software installation to the Ford online database. Failure to do so results in the loss of features such as navigation (if equipped) and SYNC ® Services.

NOTE: Calibrate the touchscreen.

21.
Refer to: Touchscreen Calibration

GENERAL PROCEDURES > SYNC MODULE [APIM] REPLACEMENT PROGRAMMING

Special Tool(s) / General Equipment

SYNC USB 2.0 A Male to A Male Cable
SYNC USB 2.0 A Female to Mini B Female 5-Pin Adapter

Activation

1.

> *WARNING: Before beginning any service procedure in this article, refer to Health and Safety Precautions in GENERAL INFORMATION . Failure to follow this instruction may result in serious personal injury.*

Refer to: Health and Safety Precautions .

> *NOTE: Use this procedure to program and provision the module when a new APIM is being installed. For additional information about choosing the correct APIM programming procedure, see Accessory Protocol Interface Module (APIM) Programming.*

2.
Refer to: Information and Entertainment System - Overview .

3.

Install the new APIM before performing this procedure. Refer to: SYNC Module [APIM] .

4.

To prevent timeout errors and to minimize programming time, a hardwired Internet connection is strongly recommended when programming.

A USB flash drive with a minimum storage size of 1 gigabyte (GB) may be required for this procedure.

Some programming files are large (greater than 2GB). It is important that the diagnostic scan tool has enough available hard drive space to accommodate the programming file download.

If a "Disk Space Error" is received, create additional free space on the hard drive.

The diagnostic scan tool is required.

Ensure that the IDS version and patch software levels are up to date.

During programming, the vehicle display may momentarily go blank.

5.

Connect a battery charger to the vehicle and select the low charge setting. The negative battery charger lead must be connected to a clean chassis ground, not the negative battery post.

6.

Plug the diagnostic scan tool into a power supply due to the length of time the programming requires.

7.

Connect the diagnostic scan tool to the VCM, and the VCM to the DLC.

8.

Close the IDS software program.

9.

Place the ignition in the ON/RUN position. For ON/RUN position information with Push Button Start vehicles, Refer to: Steering Wheel and Column Electrical Components - Overview .

10.

Using the diagnostic scan tool, open Internet Explorer and access the technician service publication website.

Run OASIS using "Read VIN & DTCs."

If the "Read VIN & DTCs" button is green with a red VCM icon, refer to the "SYNC - Software Programming" document under the "Service Tips" tab.

If the "Read VIN & DTCs" button is red with a grey VCM icon, ensure pop-ups are enabled, follow the Internet Explorer pop-ups, and then refer to the "SYNC - Software Programming" document under the "Service Tips" tab.

If the "SYNC - Software Programming" document is not followed, the programming may stop or encounter errors due to improperly configured Internet browser settings.

NOTE: This procedure clears all Continuous Memory Diagnostic Trouble Codes (CMDTCs). The Diagnostic Trouble Codes (DTCs) must be recorded now if other diagnoses are to be performed after this procedure.

11.
Select "Toolbox" from the technician service publications website to retrieve and record all Continuous Memory Diagnostic Trouble Codes (CMDTCs).

12.

From the OASIS tab, select the "SYNC" button. The Last Recorded State - Software is displayed.

13.

Scroll to the bottom of the screen, select "Module Replacement," and select the "Read SYNC" button. The current APIM assembly, Vehicle Interface Processor (VIP), Consumer Interface Processor (CIP), and Application software levels are compared to the last recorded state in the Ford online database, and the diagnostic scan tool automatically selects the latest software for programming.

Applications may require selection for installation. Applications with a green check mark next to them indicates the APIM already has the latest level installed (no reinstallation is required).

Depending on the software level required, the diagnostic scan tool automatically selects either the Service Pack or Full Flash programming method.

Although there may be an option available to override the Service Pack installation and perform a Full Flash/Force Consumer Interface Processor (CIP), choosing this option requires additional programming time and is not recommended unless directed by a TSB or FSA.

NOTE: If not performing a Full Flash/Force Consumer Interface Processor (CIP), go to step 17.

NOTE: Only Applications on a flash drive may be loaded into the APIM through the media hub.

14.

Disconnect the vehicle's USB cable by removing the media hub. Refer to: Media Hub .

If the USB cable cannot be accessed by removing the media hub, access and disconnect the USB inline connector. Refer to: SYNC Module [APIM] to Universal Serial Bus (USB) Port Cable .

15.

Connect the USB adaptor (female type A 4-pin to female type Mini-B 5-pin) to the vehicle's USB cable. Use the General Equipment: SYNC USB 2.0 A Female to Mini B Female 5-Pin Adapter

Connect one end of the USB cable (male type A 4-pin to male type a 4-pin) to the diagnostic scan tool's USB port, and the other end to the USB adaptor. Use the General Equipment: SYNC USB 2.0 A Male to A Male Cable

*NOTE: Do **not** disconnect the VCM or USB cable during APIM programming*

unless directed by the diagnostic scan tool on-screen prompts.

16.

NOTE: This step may take 20 minutes or longer.

NOTE: Diagnostic scan tools that have never been used to program SYNC ® may encounter a Hardware Wizard pop-up requesting a "WMA SBOOT" driver installation. If this request is encountered, install the driver and select the diagnostic scan tool "Retry" button to continue programming.

17.

Select the "Program SYNC" button to begin the APIM programming process.

When prompted by the diagnostic scan tool, disconnect the battery charger, start the engine, and select "OK." Once "OK" is selected, do not interrupt this step, which may take 20 minutes or longer.

NOTE: This step may take 20 minutes or longer.

18.
Connect the USB flash drive to the diagnostic scan tool and follow the on-screen instructions to download Service Pack and Application files onto the USB flash drive. (If the diagnostic scan tool does not have an available USB port, the USB cable that is connected to the vehicle's USB cable can be unplugged at this time to make room for the USB flash drive. Do **not** disconnect the VCM from the diagnostic scan tool).

19.

Install the media hub if it was removed. Refer to: Media Hub .

Reconnect the USB inline connector if it was accessed and disconnected. Refer to: SYNC Module [APIM] to Universal Serial Bus (USB) Port Cable .

NOTE: This step may take 20 minutes or longer.

20.

When prompted by the diagnostic scan tool, remove the USB flash drive from the diagnostic scan tool and connect it to the media hub to install the Applications into the APIM.

The update should start automatically, and may take 20 minutes or longer.

It is normal for the APIM to reset during this step.

NOTE: Reinstalling the USB flash drive into the diagnostic scan tool initiates the remaining automated configuration steps. Failure to do so results in the loss of feature functionality such as navigation and SYNC ® traffic, directions, and information services.

21.
Once diagnostic scan tool programming and USB flash drive programming are complete, reinstall the flash drive into the diagnostic scan tool and select "OK" to report software installation to the Ford online database.

NOTE: Calibrate the touchscreen.

22.
Refer to: Touchscreen Calibration .

GENERAL PROCEDURES > SYNC MODULE [APIM] STANDARD PROGRAMMING

Special Tool(s) / General Equipment

SYNC USB 2.0 A Male to A Male Cable
SYNC USB 2.0 A Female to Mini B Female 5-Pin Adapter

Activation

1.

WARNING: Before beginning any service procedure in this article, refer to Health and Safety Precautions in GENERAL INFORMATION . Failure to follow this instruction may result in serious personal injury.

Refer to: Health and Safety Precautions .

NOTE: Use this procedure to update the APIM and any installed Applications to the latest level. For additional information about choosing the correct APIM programming procedure, see Accessory Protocol Interface Module (APIM) Programming.

2.
Refer to: Information and Entertainment System - Overview .

3.

To prevent timeout errors and to minimize programming time, a hardwired Internet connection is strongly recommended when programming.

A USB flash drive with a minimum storage size of 1 gigabyte (GB) may be required for this procedure.

Some programming files are large (greater than 2GB). It is important that the diagnostic scan tool has enough available hard drive space to accommodate the programming file download.

If a "Disk Space Error" is received, create additional free space on the hard drive.

The diagnostic scan tool is required.

Ensure that the IDS version and patch software levels are up to date.

During programming, the vehicle display may momentarily go blank.

4.

Connect a battery charger to the vehicle and select the low charge setting. The negative battery charger lead must be connected to a clean chassis ground, not the negative battery post.

5.

Plug the diagnostic scan tool into a power supply due to the length of time the programming requires.

6.

Connect the diagnostic scan tool to the VCM, and the VCM to the DLC.

7.

Close the IDS software program.

8.

Place the ignition in the ON/RUN position. For ON/RUN position information with Push Button Start vehicles, Refer to: Steering Wheel and Column Electrical Components - Overview .

9.

Using the diagnostic scan tool, open Internet Explorer and access the technician service publication website.

Run OASIS using "Read VIN & DTCs."

If the "Read VIN & DTCs" button is green with a red VCM icon, refer to the "SYNC - Software Programming" document under the "Service Tips" tab.

If the "Read VIN & DTCs" button is red with a grey VCM icon, ensure pop-ups are enabled, follow the Internet Explorer pop-ups, and then refer to the "SYNC - Software Programming" document under the "Service Tips" tab.

If the "SYNC - Software Programming" document is not followed, the programming may stop

or encounter errors due to improperly configured Internet browser settings.

NOTE: This procedure clears all Continuous Memory Diagnostic Trouble Codes (CMDTCs). The Diagnostic Trouble Codes (DTCs) must be recorded now if other diagnoses are to be performed after this procedure.

10.
Select "Toolbox" from the technician service publications website to retrieve and record all Continuous Memory Diagnostic Trouble Codes (CMDTCs).

11.

From the OASIS tab, select the "SYNC" button. The Last Recorded State - Software is displayed.

12.

Scroll to the bottom of the screen, select "Standard," and select the "Read SYNC" button. The current APIM assembly, Vehicle Interface Processor (VIP), Consumer Interface Processor (CIP), and Application software levels are compared to the last recorded state in the Ford online database, and the diagnostic scan tool automatically selects the latest software for programming.

Applications may require selection for installation. Applications with a green check mark next to them indicates the APIM already has the latest level installed (no reinstallation is required).

Depending on the software level required, the diagnostic scan tool automatically selects either the Service Pack or Full Flash programming method.

Although there may be an option available to override the Service Pack installation and perform a Full Flash/Force Consumer Interface Processor (CIP), choosing this option requires additional programming time and is not recommended unless directed by a TSB, FSA or specific pinpoint test.

NOTE: If not performing a Full Flash/Force Consumer Interface Processor (CIP), go to step 16.

NOTE: Only Applications on a flash drive may be loaded into the APIM through the media hub.

13.

Disconnect the vehicle's USB cable by removing the media hub. Refer to: Media Hub .

If the USB cable cannot be accessed by removing the media hub, access and disconnect the USB inline connector. Refer to: SYNC Module [APIM] to Universal Serial Bus (USB) Port Cable .

14.

Connect the USB adaptor (female type A 4-pin to female type Mini-B 5-pin) to the vehicle's USB cable. Use the General Equipment: SYNC USB 2.0 A Female to Mini B Female 5-Pin Adapter

Connect one end of the USB cable (male type A 4-pin to male type a 4-pin) to the diagnostic scan tool's USB port, and the other end to the USB adaptor. Use the General Equipment: SYNC USB 2.0 A Male to A Male Cable

*NOTE: Do **not** disconnect the VCM or USB cable during APIM programming unless directed by the diagnostic scan tool on-screen prompts.*

15.

NOTE: This step may take 20 minutes or longer.

NOTE: Diagnostic scan tools that have never been used to program SYNC ® may encounter a Hardware Wizard pop-up requesting a "WMA SBOOT" driver installation. If this request is encountered, install the driver and select the diagnostic scan tool "Retry" button to continue programming.

16.

Select the "Program SYNC" button to begin the APIM programming process.

When prompted by the diagnostic scan tool, disconnect the battery charger, start the engine, and select "OK." Once "OK" is selected, do not interrupt this step, which may take 20 minutes or longer.

NOTE: This step may take 20 minutes or longer.

17.
Connect the USB flash drive to the diagnostic scan tool and follow the on-screen instructions to download Service Pack and Application files onto the USB flash drive. (If the diagnostic scan tool does not have an available USB port, the USB cable that is connected to the vehicle's USB cable can be unplugged at this time to make room for the USB flash drive. Do **not** disconnect the VCM from the diagnostic scan tool).

18.

Install the media hub if it was removed. Refer to: Media Hub .

Reconnect the USB inline connector if it was accessed and disconnected. Refer to: SYNC Module [APIM] to Universal Serial Bus (USB) Port Cable .

NOTE: This step may take 20 minutes or longer.

19.

When prompted by the diagnostic scan tool, remove the USB flash drive from the diagnostic scan tool and connect it to the media hub to install the Applications into the APIM.

The update should start automatically, and may take 20 minutes or longer.

It is normal for the APIM to reset during this step.

20.

Once the diagnostic scan tool programming and USB flash drive programming are complete, reinstall the flash drive into the diagnostic scan tool and select "OK." This initiates the remaining automated configuration steps and reports the software installation to the Ford online database. Failure to do so results in the loss of features such as navigation (if equipped) and SYNC ® Services.

NOTE: Calibrate the touchscreen.

21.
Refer to: Touchscreen Calibration .

GENERAL PROCEDURES > TOUCHSCREEN CALIBRATION

Activation

1.

WARNING: Before beginning any service procedure in this article, refer to Health and Safety Precautions in GENERAL INFORMATION . Failure to follow this instruction may result in serious personal injury.

Refer to: Health and Safety Precautions .

NOTE: Calibrate the touchscreen by following the diagnostic scan tool prompts, or the steps below.

2.

Make sure the vehicle battery is fully charged in order to avoid an inoperative touchscreen.

3.

Turn the ACM on.

4.

Operate the audio system in radio tuner AM/ FM mode.

5.

Press and hold the eject button, and within 1 second, press and hold the seek up button until the speaker walk around test begins.

6.

Press and hold the seek down button to enter the touchscreen calibration.

7.

Touch and hold the touch points as they appear on the touchscreen (a stylus is not required).

8.

When "New calibration settings have been measured. Press the Enter key to accept the new settings." is displayed, touch anywhere on the screen to accept the new settings.

9.

Clear all Continuous Memory Diagnostic Trouble Codes (CMDTCs).

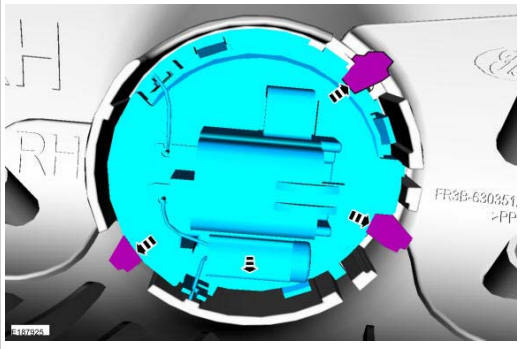
REMOVAL AND INSTALLATION > A-PILLAR SPEAKER > REMOVAL

1.

Remove the A-Pillar trim panel. Refer to: A-Pillar Trim Panel - Convertible . Refer to: A-Pillar Trim Panel - Coupe .

2.

Release the tabs and remove the A-Pillar speaker.



REMOVAL AND INSTALLATION > A-PILLAR SPEAKER > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > ACTIVE NOISE CONTROL MICROPHONE > REMOVAL

Front Microphone

1.

Remove the overhead console. Refer to: Overhead Console .

2.

Remove the ANC microphone.

1.

Release the tab.

2.

Disconnect the electrical connector.



Rear Microphone: Coupe

3.

Lower the headliner. Refer to: Headliner - Lowering .

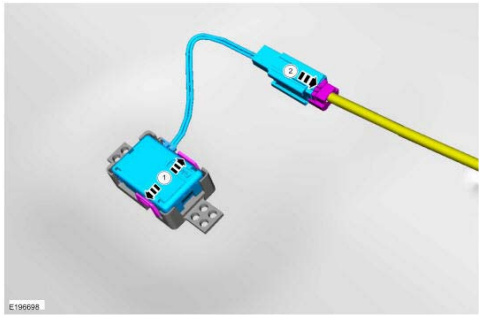
4.

1.

Release the tabs and remove the ANC microphone.

2.

Disconnect the electrical connector.



Convertible

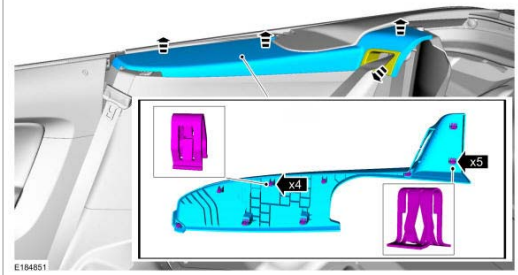
5.

Remove the rear seat backrest. Refer to: Rear Seat Backrest - Convertible .

NOTE: RH side shown LH side similar.

6.
Position the safety belt guide aside, release the clips and remove the upper loadspace trim panel.

Disconnect the electrical connector.



NOTE: RH side shown LH side similar.

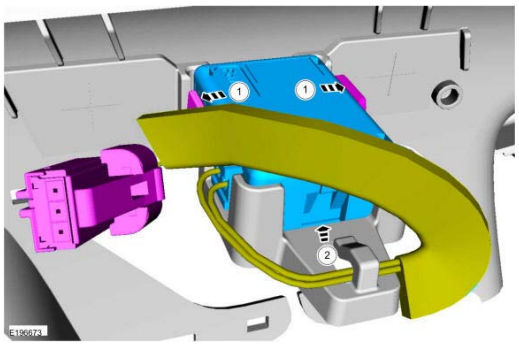
7.

1.

Release the tabs.

2.

Remove the ANC microphone



REMOVAL AND INSTALLATION > ACTIVE NOISE CONTROL MICROPHONE > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > AUDIO DIGITAL SIGNAL PROCESSING (DSP) MODULE

Special Tool(s) / General Equipment

Interior Trim Remover

REMOVAL AND INSTALLATION > AUDIO DIGITAL SIGNAL PROCESSING (DSP) MODULE > REMOVAL

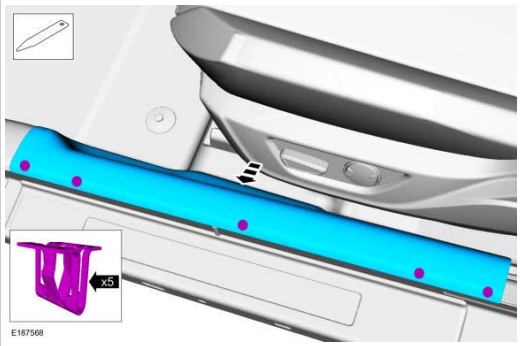
NOTE: Removal steps in this procedure may contain installation details.

NOTE: If installing a new module, it is necessary to upload the module configuration information to the scan tool prior to removing the module. This information must be downloaded into the new module after installation.

1.
Using a diagnostic scan tool, begin the PMI process for the ACM following the on-screen instructions.

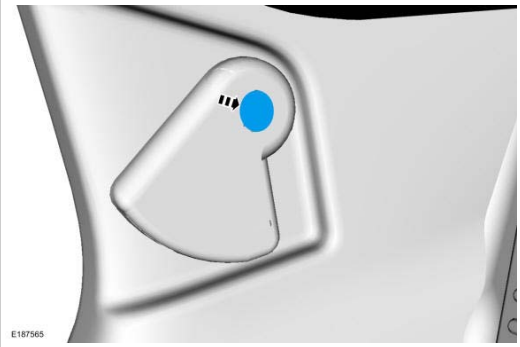
2.

Release the clips and remove the LH scuff plate. Use the General Equipment: Interior Trim Remover



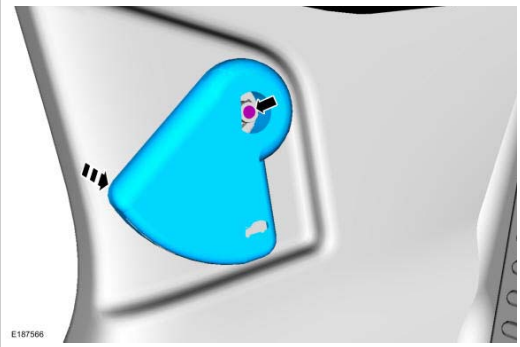
3.

Remove the hood release handle bolt cover.



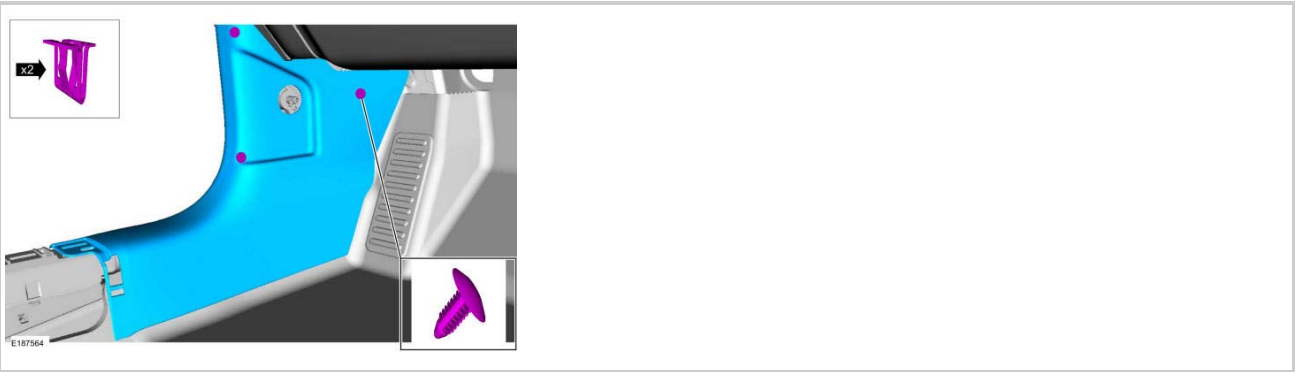
4.

Remove the hood release handle screw and the hood release handle.



5.

Release the clips and remove the LH cowl trim panel.



6.

Remove the bolts, disconnect the electrical connectors and remove the DSP.

1.

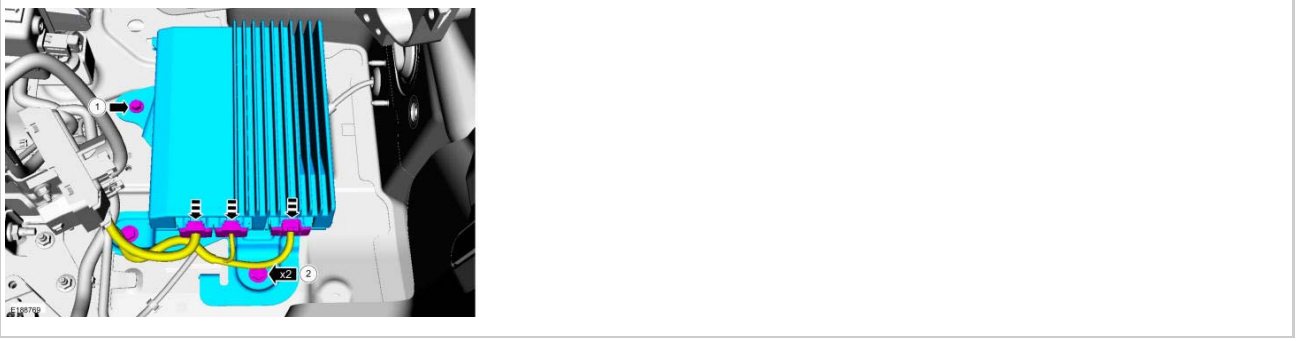
Torque

: 106 lb.in (12 Nm)

2.

Torque

: 62 lb.in (7 Nm)



REMOVAL AND INSTALLATION > AUDIO DIGITAL SIGNAL PROCESSING (DSP) MODULE > INSTALLATION

1.

To install, reverse the removal procedure.

NOTE: This step is only required if the component is being replaced.

2.
Using a diagnostic scan tool, complete the PMI process for the DSP following the on-screen instructions.

REMOVAL AND INSTALLATION > AUDIO FRONT CONTROL MODULE (ACM) > REMOVAL

NOTE: Eject any media from the ACM. If a disc fails to eject, do not forceably remove the disc from the ACM.

NOTE: Removal steps in this procedure may contain installation details.

NOTE: If installing a new module, it is necessary to upload the module configuration information to the scan tool prior to removing the module. This information must be downloaded into the new module after installation.

1.
Using a diagnostic scan tool, begin the PMI process for the ACM following the on-screen instructions.

2.

Remove the FCIM. Refer to: Front Controls Interface Module (FCIM) .

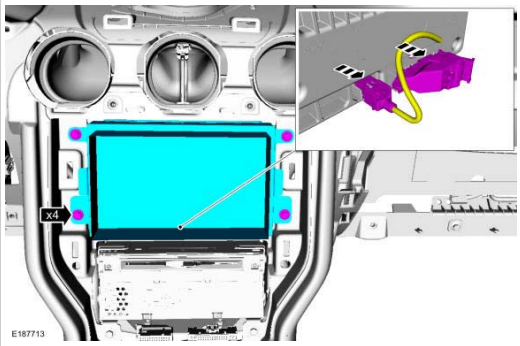
3.

Remove the bolts and the FDIM.

Disconnect the electrical connectors.

Torque

: 22 lb.in (2.5 Nm)



4.

Remove the bolts and the ACM.

Disconnect the electrical connectors.

Torque

: 22 lb.in (2.5 Nm)



REMOVAL AND INSTALLATION > AUDIO FRONT CONTROL MODULE (ACM) > INSTALLATION

1.

To install, reverse the removal procedure.

NOTE: This step is only necessary if replacing the component.

2.
Using a diagnostic scan tool, complete the PMI process for the ACM following the on-screen instructions.

REMOVAL AND INSTALLATION > AUDIO UNIT ANTENNA > REMOVAL

Coupe

NOTE: The audio unit antenna is part of the rear window glass.

1.
Replace the rear window glass. Refer to: Fixed Glass .

Convertible

2.

Remove the luggage compartment weatherstrip.



3.

Remove the spare tire cover.



4.

If equipped, remove the subwoofer and amplifier unit. Refer to: Subwoofer and Amplifier Unit .

5.

1.

Remove the pin-type retainers.

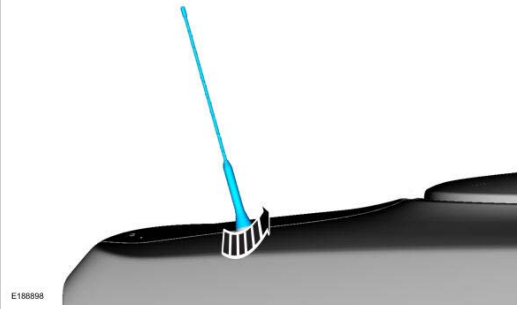
2.

Position aside the RH luggage compartment side trim panel.



6.

Remove the audio unit antenna mast.

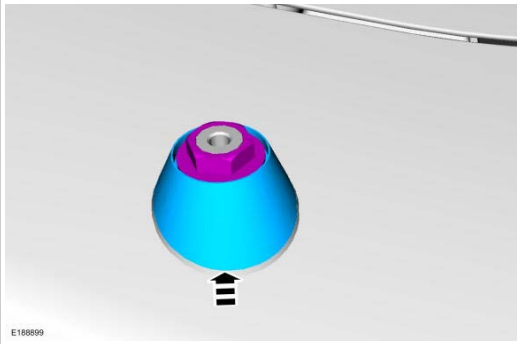


7.

Remove the audio unit antenna mounting nut and the antenna base.

Torque

: 48 lb.in (5.4 Nm)



8.

1.

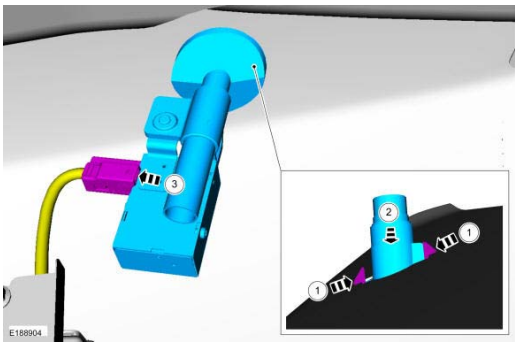
Press the tabs inward.

2.

Remove the audio unit antenna.

3.

Disconnect the electrical connector.



REMOVAL AND INSTALLATION > AUDIO UNIT ANTENNA > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > AUDIO UNIT ANTENNA AMPLIFIER > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

Lower the headliner. Refer to: Headliner - Lowering

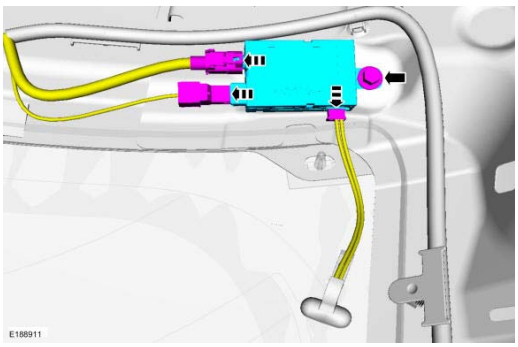
2.

Remove the bolt and the audio unit antenna amplifier.

Disconnect the electrical connectors.

Torque

: 106 lb.in (12 Nm)



REMOVAL AND INSTALLATION > AUDIO UNIT ANTENNA AMPLIFIER > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > AUDIO UNIT ANTENNA CABLE > REMOVAL

NOTE: The original equipment AM/FM antenna cable(s) are part of the wiring harness and cannot be removed. This procedure refers to replacement of the cable(s) only by overlaying the cable(s).

NOTE: The AM/FM antenna cable inline connection is located under the floor console.

Coupe: Front Cable

1.

Remove the floor console. Refer to: Floor Console .

2.

Remove the ACM. Refer to: Audio Front Control Module (ACM) .

Coupe: Rear Cable

3.

Remove the floor console. Refer to: Floor Console .

4.

Lower the headliner. Refer to: Headliner - Lowering .

Convertible

5.

Remove the floor console. Refer to: Floor Console .

6.

Remove the ACM. Refer to: Audio Front Control Module (ACM) .

Convertible: Rear Cable

7.

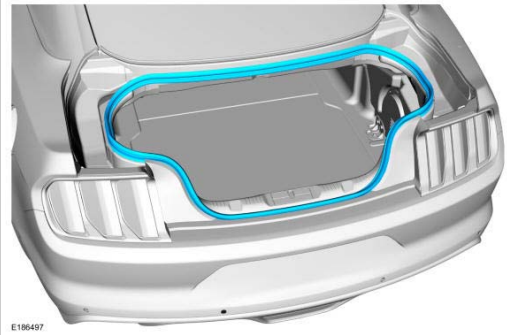
Remove the floor console. Refer to: Floor Console .

8.

Remove the loadspace trim panel. Refer to: Loadspace Trim Panel - Convertible .

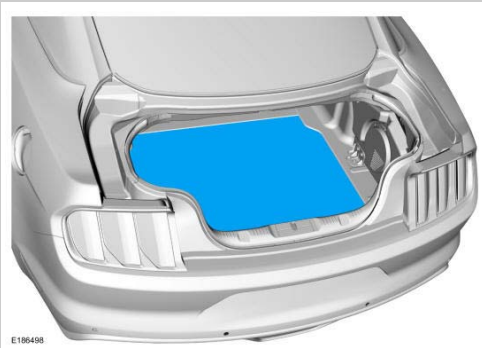
9.

Remove the luggage compartment weatherstrip.



10.

Remove the spare tire cover.



11.

If equipped, remove the subwoofer and amplifier unit. Refer to: Subwoofer and Amplifier Unit .

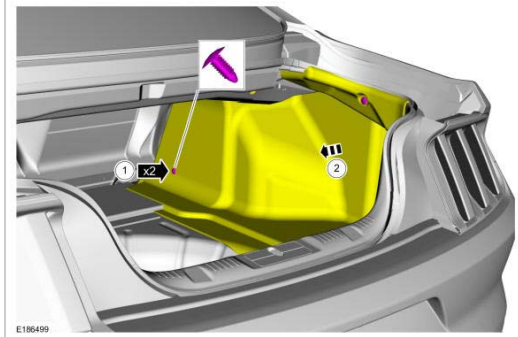
12.

1.

Remove the pin-type retainers.

2.

Position aside the RH luggage compartment side trim panel.

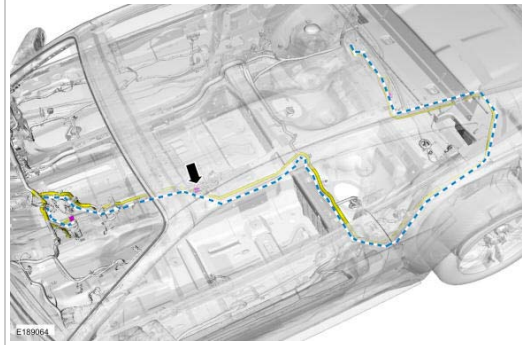


REMOVAL AND INSTALLATION > AUDIO UNIT ANTENNA CABLE > INSTALLATION

Coupe

1.

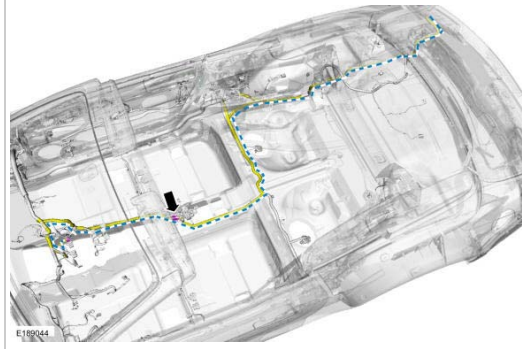
Overlay the new AM/FM antenna cable on the vehicle wiring harness following the routing shown below. Secure the new AM/FM antenna cable to the wiring harness with tape or zip ties as necessary.



Convertible

2.

Overlay the new AM/FM antenna cable on the vehicle wiring harness following the routing shown below. Secure the new AM/FM antenna cable to the wiring harness with tape or zip ties as necessary.



REMOVAL AND INSTALLATION > FRONT CONTROLS INTERFACE MODULE (FCIM)

Special Tool(s) / General Equipment

Interior Trim Remover

REMOVAL AND INSTALLATION > FRONT CONTROLS INTERFACE MODULE (FCIM) > REMOVAL

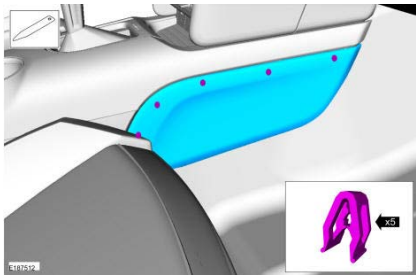
NOTE: Removal steps in this procedure may contain installation details.

NOTE: If installing a new module, it is necessary to upload the module configuration information to the scan tool prior to removing the module. This information must be downloaded into the new module after installation.

1.
Using a diagnostic scan tool, begin the PMI process for the FCIM following the on-screen instructions.

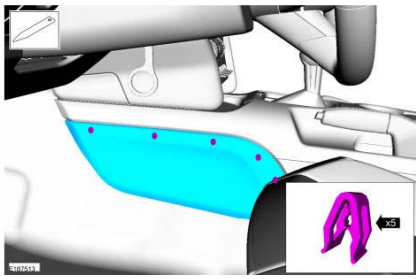
2.

Release the clips and remove the floor console RH side trim panel. Use the General Equipment: Interior Trim Remover



3.

Release the clips and the floor console LH side trim panel. Use the General Equipment: Interior Trim Remover



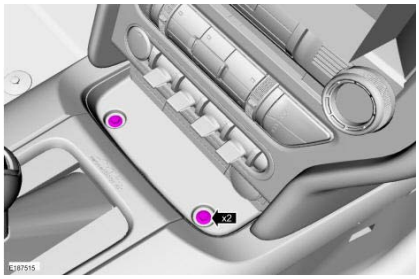
4.

Remove the stowage area mat.



5.

Remove the floor console upper bolts.



NOTE: Automatic transmission shown, manual transmission similar.

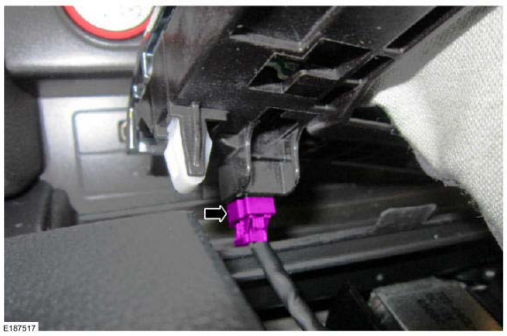
6.
Remove the selector lever bezel. Use the General Equipment: Interior Trim Remover



7.

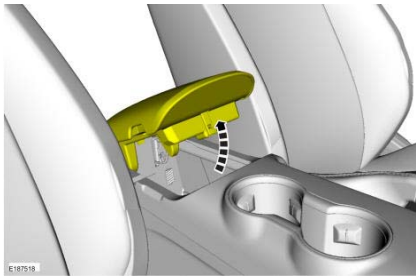
Position aside the selector lever boot.

Disconnect the electrical connector.



8.

Open the floor console lid.

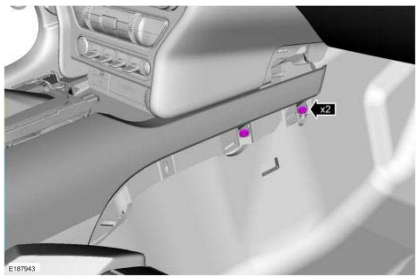


9.

Remove the RH side front retainers.

Torque

: 18 lb.in (2 Nm)

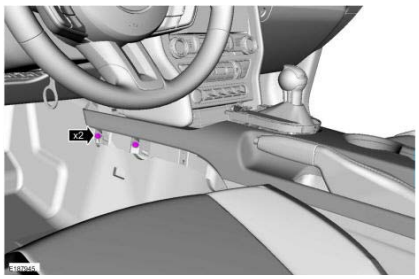


10.

Remove the LH side front retainers.

Torque

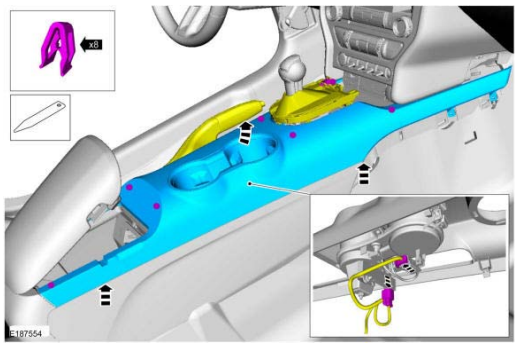
: 18 lb.in (2 Nm)



11.

Release the clips, position the gear selector cover aside and remove the floor console upper trim panel.

Disconnect the electrical connectors.



12.

Remove the stowage area tray.

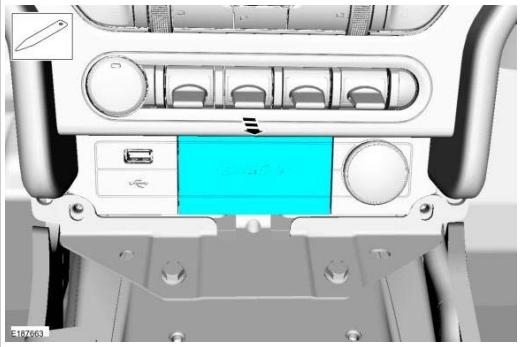


13.

Remove the instrument panel center finish panel. Refer to: Instrument Panel Center Finish Panel .

14.

Remove the trim cover. Use the General Equipment: Interior Trim Remover



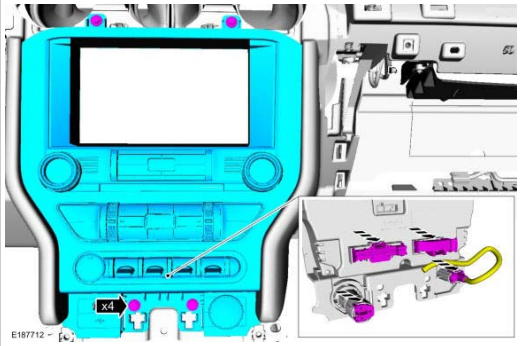
15.

Remove the bolts and the FCIM.

Disconnect the electrical connectors.

Torque

: 22 lb.in (2.5 Nm)



REMOVAL AND INSTALLATION > FRONT CONTROLS INTERFACE MODULE (FCIM) > INSTALLATION

1.

To install, reverse the removal procedure.

NOTE: This step is only necessary if replacing the component.

2.
Using a diagnostic scan tool, complete the PMI process for the FCIM following the on-screen instructions.

REMOVAL AND INSTALLATION > FRONT DISPLAY INTERFACE MODULE (FDIM) > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

Remove the FCIM. Refer to: Front Control/Display Interface Module (FCDIM) .

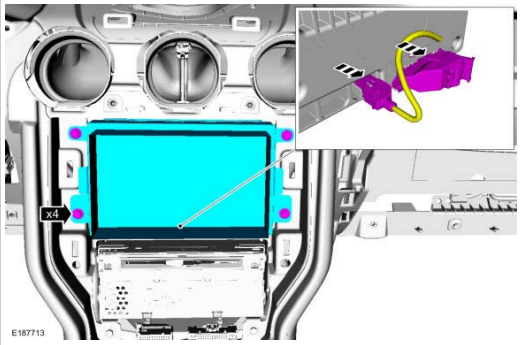
2.

Remove the bolts and the FDIM.

Disconnect the electrical connectors.

Torque

: 22 lb.in (2.5 Nm)

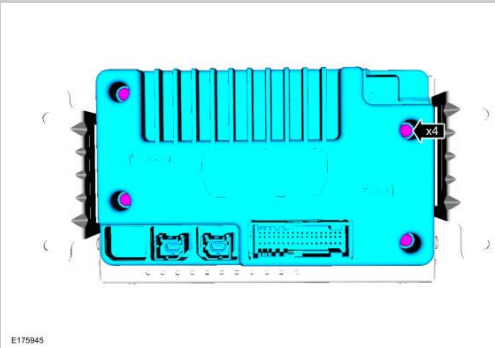


3.

Remove the screws and separate the APIM from the FDIM.

Torque

: 9 lb.in (1 Nm)



REMOVAL AND INSTALLATION > FRONT DISPLAY INTERFACE MODULE (FDIM) > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Calibrate the touchscreen. Refer to: Touchscreen Calibration .

REMOVAL AND INSTALLATION > FRONT DOOR SPEAKER LH > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

Remove the front door trim panel. Refer to: Front Door Trim Panel .

Midwoofer speaker

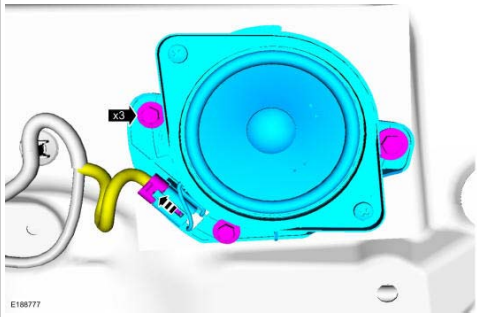
2.

Remove the bolts and the door midwoofer speaker.

Disconnect the electrical connector.

Torque

: 22 lb.in (2.5 Nm)



Woofer speaker

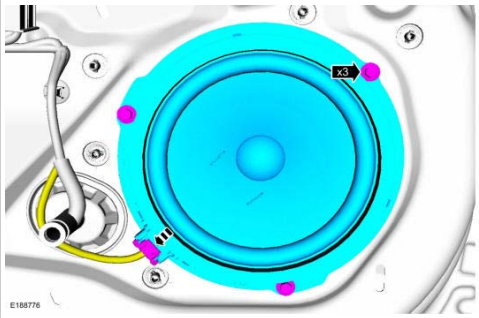
3.

Remove the bolts and the door woofer speaker.

Disconnect the electrical connector.

Torque

: 22 lb.in (2.5 Nm)



REMOVAL AND INSTALLATION > FRONT DOOR SPEAKER LH > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > FRONT DOOR SPEAKER RH > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

Remove the front door trim panel. Refer to: Front Door Trim Panel .

Midwoofer speaker

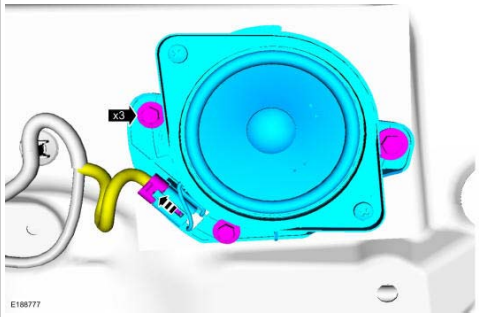
2.

Remove the bolts and the door midwoofer speaker.

Disconnect the electrical connector.

Torque

: 22 lb.in (2.5 Nm)



Woofer speaker

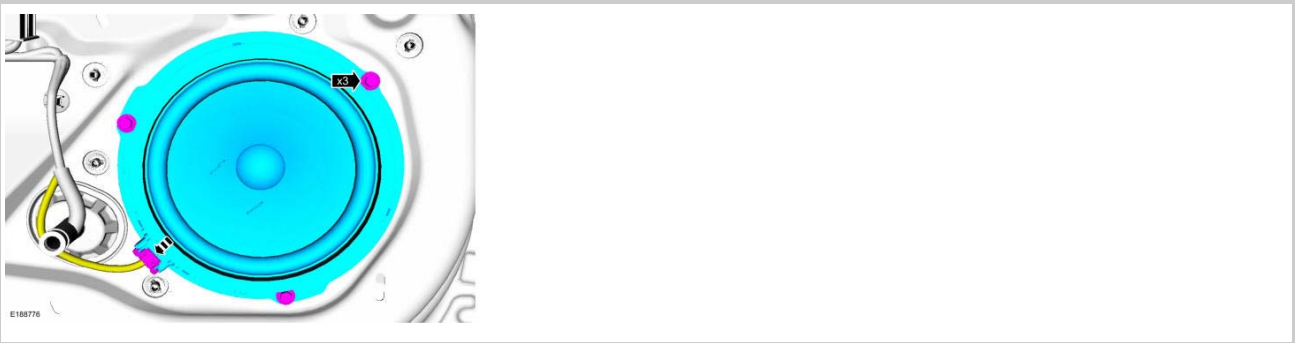
3.

Remove the bolts and the door woofer speaker.

Disconnect the electrical connector.

Torque

: 22 lb.in (2.5 Nm)



REMOVAL AND INSTALLATION > FRONT DOOR SPEAKER RH > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > GLOBAL POSITIONING SYSTEM MODULE (GPSM) > REMOVAL

NOTE: If installing a new module, it is necessary to upload the module configuration information to the scan tool prior to removing the module. This information must be downloaded into the new module after installation.

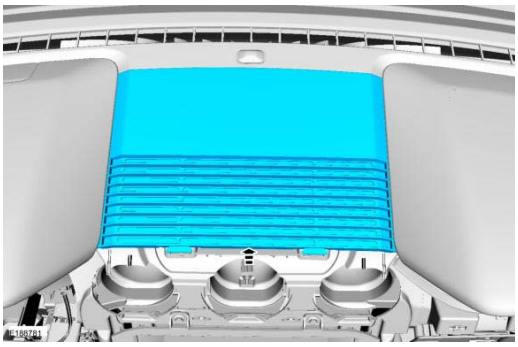
1.
Using a diagnostic scan tool, begin the PMI process for the GPSM following the on-screen instructions.

2.

Remove the instrument panel center finish panel. Refer to: Instrument Panel Center Finish Panel .

3.

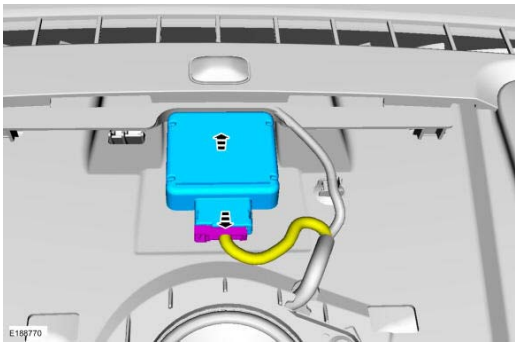
Remove the instrument panel speaker grille.



4.

Pull upwards to release the GPSM and remove.

Disconnect the electrical connector.



REMOVAL AND INSTALLATION > GLOBAL POSITIONING SYSTEM MODULE (GPSM) > INSTALLATION

1.

To install, reverse the removal procedure.

NOTE: This step is only necessary when installing a new component.

2.
Using a diagnostic scan tool, complete the PMI process for the GPSM following the on-screen instructions.

REMOVAL AND INSTALLATION > INSTRUMENT PANEL SPEAKER > REMOVAL

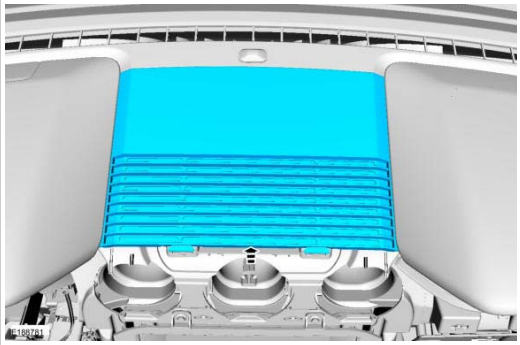
NOTE: Removal steps in this procedure may contain installation details.

1.

Remove the instrument panel center finish panel. Refer to: Instrument Panel Center Finish Panel .

2.

Remove the instrument panel speaker grille.



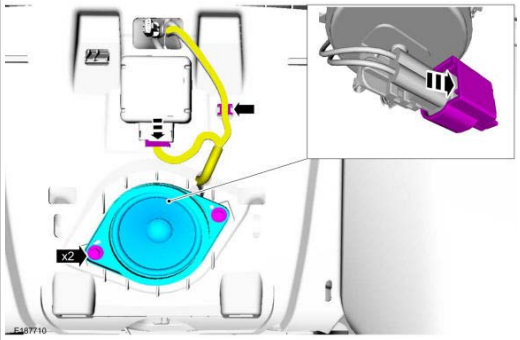
3.

Remove the bolts and the instrument panel speaker.

Disconnect the electrical connector.

Torque

: 22 lb.in (2.5 Nm)



REMOVAL AND INSTALLATION > INSTRUMENT PANEL SPEAKER > INSTALLATION

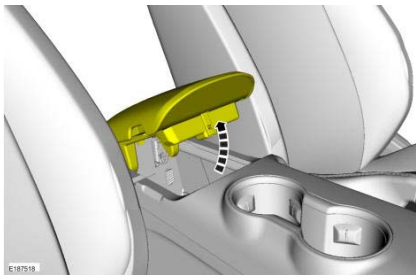
1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > MEDIA HUB > REMOVAL

1.

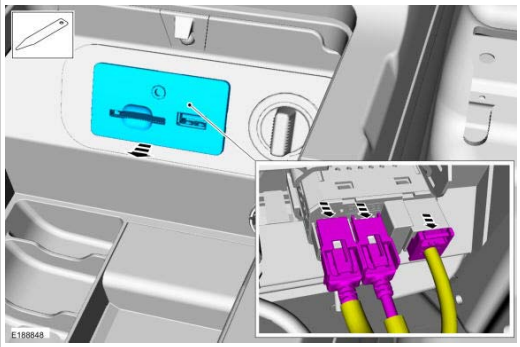
Open the floor console lid.



2.

Remove the media hub.

Disconnect the electrical connectors.



REMOVAL AND INSTALLATION > MEDIA HUB > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > MICROPHONE > REMOVAL

NOTE: The SYNC ® microphone is part of the overhead console assembly and cannot be replaced separately.

1.
Replace the overhead console. Refer to: Overhead Console .

REMOVAL AND INSTALLATION > MICROPHONE > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > PARCEL SHELF SPEAKER > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

Remove the parcel shelf. Refer to: Parcel Shelf - Coupe .

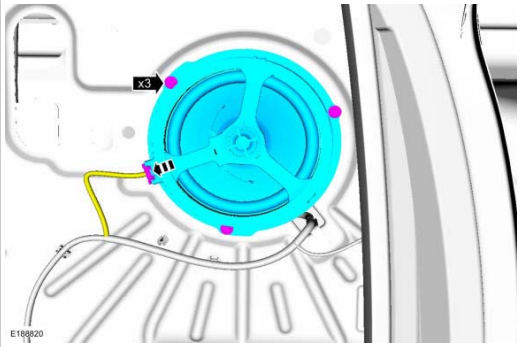
2.

Remove the bolts and the parcel shelf speaker. Remove the bolts and the parcel shelf speaker.

Disconnect the electrical connector.

Torque

: 22 lb.in (2.5 Nm)



REMOVAL AND INSTALLATION > PARCEL SHELF SPEAKER > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > REAR QUARTER PANEL SPEAKER > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

Remove the convertible loadspace trim panel. Refer to: Loadspace Trim Panel - Convertible .

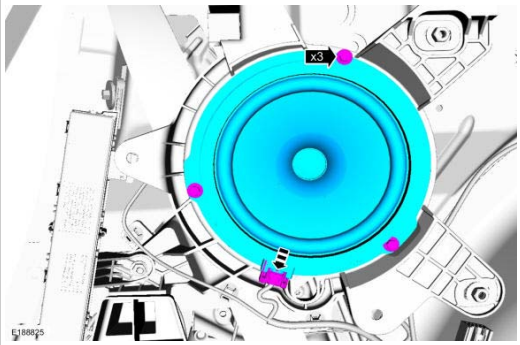
2.

Remove the bolts and the rear quarter panel speaker.

Disconnect the electrical connector.

Torque

: 22 lb.in (2.5 Nm)



REMOVAL AND INSTALLATION > REAR QUARTER PANEL SPEAKER > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > SATELLITE RADIO ANTENNA > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

Coupe

1.

Lower the headliner. Refer to: Headliner - Lowering .

2.

1.

Remove the satellite radio antenna retaining bolt.

Torque

: 62 lb.in (7 Nm)

2.

Remove the satellite radio antenna retainer.

3.

Disconnect the electrical connector.

4.

Remove the satellite radio antenna.



Convertible

3.

Remove the luggage compartment lid interior trim panel.

1.

Remove the latch cover.

2.

Remove the push pins.



4.

1.

Remove the satellite radio antenna retaining bolt.

Torque

: 62 lb.in (7 Nm)

2.

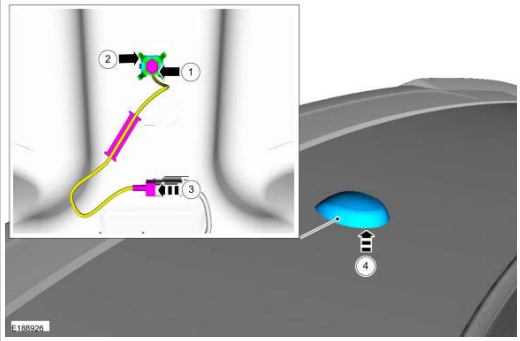
Remove the satellite radio antenna retainer.

3.

Disconnect the electrical connector.

4.

Remove the satellite radio antenna.



REMOVAL AND INSTALLATION > SATELLITE RADIO ANTENNA > INSTALLATION

NOTE: If installing a new satellite radio antenna it is not necessary to remove the bolt from the satellite radio antenna base.

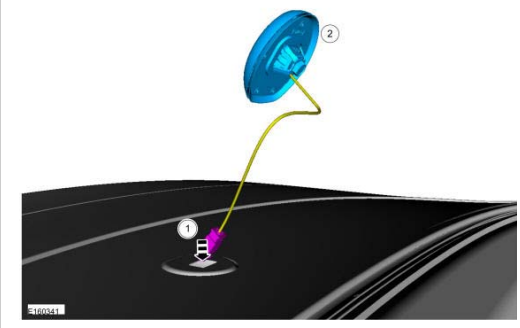
1.

1.

Install harness through the opening.

2.

Install base until seated.



REMOVAL AND INSTALLATION > SATELLITE RADIO ANTENNA CABLE > REMOVAL

NOTE: The original equipment Satellite radio cable(s) are part of the wiring harness and cannot be removed. This procedure refers to replacement of the cable(s) only by overlaying the cable(s).

NOTE: The Satellite radio cable(s) inline connection is located under the floor console.

Coupe: Front Cable

1.

Remove the floor console. Refer to: Floor Console .

2.

Remove the ACM. Refer to: Audio Front Control Module (ACM) .

Coupe: Rear Cable

3.

Remove the floor console. Refer to: Floor Console .

4.

Lower the headliner. Refer to: Headliner - Lowering .

Convertible

5.

Remove the floor console. Refer to: Floor Console .

6.

Remove the ACM. Refer to: Audio Front Control Module (ACM) .

Convertible: Rear Cable

7.

Remove the floor console. Refer to: Floor Console .

8.

Remove the loadspace trim panel. Refer to: Loadspace Trim Panel - Convertible .

9.

Remove the luggage compartment lid interior trim panel.

1.

Remove the latch cover.

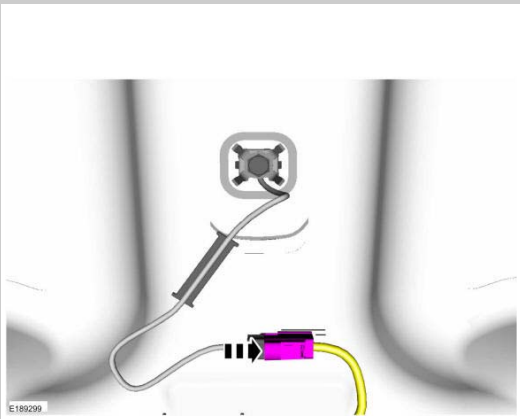
2.

Remove the push pins.



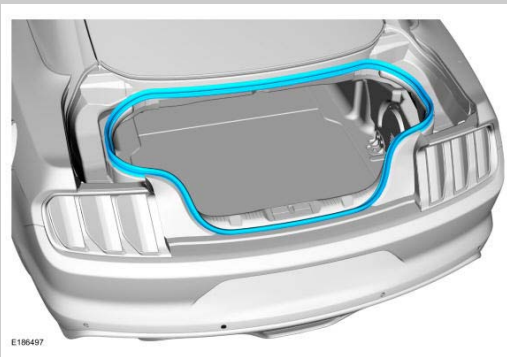
10.

Disconnect the electrical connector.



11.

Remove the luggage compartment weatherstrip.



12.

Remove the spare tire cover.



13.

If equipped, remove the subwoofer and amplifier unit. Refer to: Subwoofer and Amplifier Unit .

14.

1.

Remove the pin-type retainers.

2.

Position aside the RH luggage compartment side trim panel.

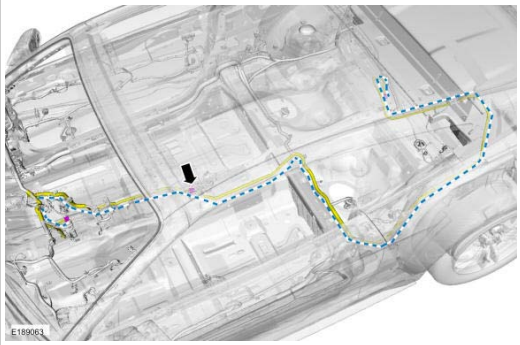


REMOVAL AND INSTALLATION > SATELLITE RADIO ANTENNA CABLE > INSTALLATION

Coupe

1.

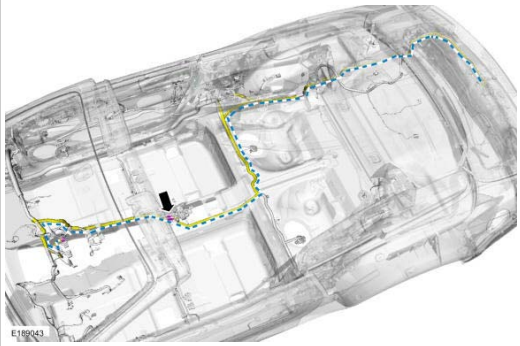
Overlay the new Satellite radio antenna cable on the vehicle wiring harness following the routing shown below. Secure the new Satellite radio antenna cable to the wiring harness with tape or zip ties as necessary.



Convertible

2.

Overlay the new Satellite radio antenna cable on the vehicle wiring harness following the routing shown below. Secure the new Satellite radio antenna cable to the wiring harness with tape or zip ties as necessary.



REMOVAL AND INSTALLATION > SUBWOOFER AND AMPLIFIER UNIT > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

Remove the bolts and the subwoofer speaker cover.

Torque

: 21 lb.in (2.4 Nm)



2.

Remove the bolts, disconnect the electrical connector and remove the subwoofer speaker.

1.

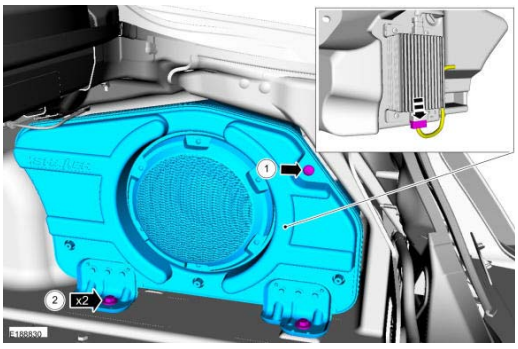
Torque

: 93 lb.in (10.5 Nm)

2.

Torque

: 93 lb.in (10.5 Nm)



REMOVAL AND INSTALLATION > SUBWOOFER AND AMPLIFIER UNIT > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > SYNC MODULE [APIM] > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

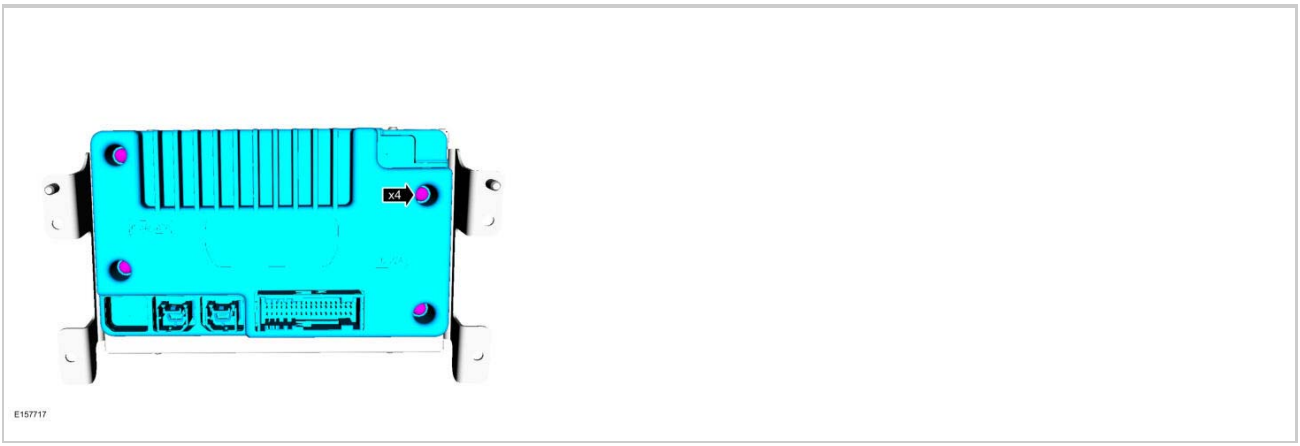
Remove the FDIM. Refer to: SYNC Module [APIM] .

2.

Remove the screws and separate the APIM from the FDIM.

Torque

: 9 lb.in (1 Nm)



REMOVAL AND INSTALLATION > SYNC MODULE [APIM] > INSTALLATION

1.

To install, reverse the removal procedure

2.

If a new APIM is being installed, program the APIM to the correct software level Refer to: SYNC Module [APIM] Replacement Programming .

REMOVAL AND INSTALLATION > SYNC MODULE [APIM] TO UNIVERSAL SERIAL BUS (USB) PORT CABLE > REMOVAL

NOTE: The USB cables are taped into the wiring harness. Because the USB cables cannot be removed from the harness, this procedure applies to replacement of the USB cables only.

Vehicles With: AM/FM/CD/SYNC

1.

Remove the floor console. Refer to: Floor Console .

2.

Remove the APIM. Refer to: SYNC Module [APIM] .

Vehicles With: Touchscreen Display

3.

Remove the floor console. Refer to: Floor Console .

4.

Remove the APIM. Refer to: SYNC Module [APIM] .

REMOVAL AND INSTALLATION > SYNC MODULE [APIM] TO UNIVERSAL SERIAL BUS (USB) PORT CABLE > INSTALLATION

Vehicles With: AM/FM/CD/SYNC

NOTE: The rear USB port and cable located in the floor console is routed directly to the APIM.

NOTE: The front USB port and cable is routed directly to the APIM.

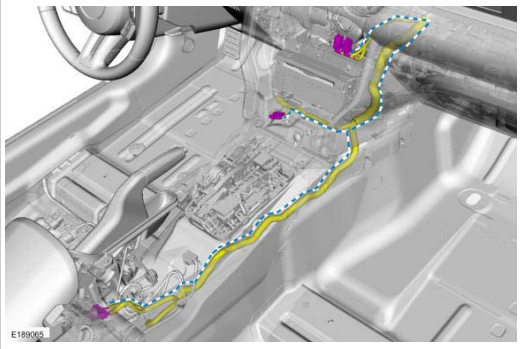
1.
Overlay the new USB cable following the routing shown below.

1.

Secure the new USB cable to the wiring harness with tape or zip ties as necessary.

2.

Cut both ends off the original USB cable.



Vehicles With: Touchscreen Display

NOTE: The rear USB port and cable located at the media hub in the floor console is routed directly to the APIM.

NOTE: The front USB port and cable is routed directly to the media hub.

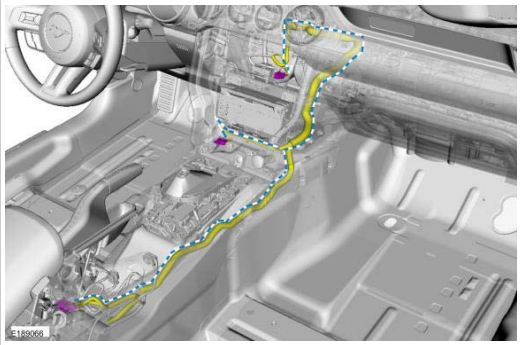
2.
Overlay the new USB cable following the routing shown below.

1.

Secure the new USB cable to the wiring harness with tape or zip ties as necessary.

2.

Cut both ends off the original USB cable.



Service Manual: INTERIOR LIGHTING

DESCRIPTION AND OPERATION > INTERIOR LIGHTING - OVERVIEW > OVERVIEW

The interior lighting system consists of:

- Courtesy lamps
- Demand lamps
- Ambient lighting (if equipped)

The courtesy lamps subsystem consists of:

- Interior lamps (roof mounted)
- Pony projection lamps (part of the exterior mirror assemblies)
- Door ajar switches (integrated into the door latches)
- BCM

The courtesy lamps provide illumination to the interior of the vehicle when entering or exiting the vehicle.

The demand lamps subsystem consists of:

- Interior lamps (map lamps)
- Luggage compartment lid ajar switch (integrated into the luggage compartment lid latch)
- Luggage compartment lamp
- Vanity mirror lamps
- Floor console bin
- BCM

The demand lamps provide illumination to specific areas within the vehicle when needed.

The BCM energizes the battery saver output supply voltage to the demand lamps when the battery saver feature is not active.

The ambient lighting subsystem consists of:

- Ambient lighting Light Emitting Diodes (LEDs)
- IPC
- Body Control Module B (BCMB)

The ambient lighting is controlled through the IPC message center. The ambient lighting provides aesthetically colored illumination to the following locations for illuminated entry or when the ignition is ON or the parking lamps are on:

- Floor console cup holders

- Interior door release handles
- Scuff plate trim panels
- Front footwells

DESCRIPTION AND OPERATION > INTERIOR LIGHTING - SYSTEM OPERATION AND COMPONENT DESCRIPTION

System Operation

DESCRIPTION AND OPERATION > INTERIOR LIGHTING - SYSTEM OPERATION AND COMPONENT DESCRIPTION > NETWORK MESSAGE CHART

GWM Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Ambient light color/intensity request	IPC	Indicates the color and brightness setting selected from the display interface. This commands the ambient color and brightness setting as requested by the operator.
Headlamp switch status	BCM	Indicates the headlamp switch position to enable or disable the ambient lighting.
Illuminated entry status	BCM	Indicates the status of the illuminated entry lighting to enable or disable the ambient lighting.

Body Control Module (BCMB) Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Ambient light color/intensity request	GWM	Indicates the color and brightness setting selected from the display interface. This commands the ambient color and brightness setting as requested by the operator.
Headlamp switch status	GWM	Indicates the headlamp switch position to enable or disable the ambient lighting.

Illuminated entry status	GWM	Indicates the status of the illuminated entry lighting to enable or disable the ambient lighting.

DESCRIPTION AND OPERATION > INTERIOR LIGHTING - SYSTEM OPERATION AND COMPONENT DESCRIPTION > BATTERY SAVER

NOTE: Time-out is 10 seconds if the vehicle is in factory mode or 1 minute if the vehicle is in transport mode.

The BCM provides automatic shut-off of the courtesy and demand lamps after a time-out period when the ignition is OFF. A timer in the BCM starts when:

- the ignition transitions to OFF.
- the front or rear interior lamp was switched ON.
- any door or the luggage compartment lid becomes ajar.
- any button of a RKE transmitter is pressed.
- a door is unlocked using the passive entry feature.
- a valid code was entered on the keyless entry keypad.

When 10 minutes (30 minutes for demand lamps) have elapsed, the BCM automatically shuts off voltage to the lamps. The timer restarts (voltage is restored if the BCM is in battery saver mode) when:

- the ignition transitions out of OFF.
- the front or rear interior lamp was switched ON.
- any door or the luggage compartment lid becomes ajar.
- any button of a RKE transmitter is pressed.
- a door is unlocked using the passive entry feature.
- a valid code was entered on the keyless entry keypad.

DESCRIPTION AND OPERATION > INTERIOR LIGHTING - SYSTEM OPERATION AND COMPONENT DESCRIPTION > COURTESY LAMPS

The BCM controls the courtesy lighting functions and timing by monitoring inputs from the following:

- Ignition state
- Door ajar switches

- RKE system

The BCM sends a voltage signal to each door ajar switch. When the doors are closed, the circuit is switched to ground and the voltage is pulled low, indicating closed doors.

For vehicles with a memory seat, the DDM and the PDM provide ground for the door ajar switch.

The BCM monitors the ignition state and inputs from the RKE system to determine when to energize the interior lighting output. When the interior lighting output is energized, voltage is provided to the interior overhead lamps.

DESCRIPTION AND OPERATION > INTERIOR LIGHTING - SYSTEM OPERATION AND COMPONENT DESCRIPTION > ILLUMINATED ENTRY AND EXIT

The illuminated entry and exit features provide temporary illumination of the parking lamps, the dimmable backlighting, the ambient backlighting and the courtesy lamps. Refer to the table for additional information.

> *NOTE: An arbitrator (software programming) within the BCM determines which actions take precedence over others (for example, an open door keeps the courtesy lamps on even when a command to lock the doors is received).*

Action	Parking Lamps	Courtesy Lamps	Dimmable Backlighting	Ambient Lighting
RKE transmitter or mechanical unlocking of the doors	On for 25 seconds	On for 25 seconds	On for 25 seconds	Off
RKE transmitter or mechanical locking of the doors	Off	Off	Off	Off 3 seconds after courtesy lamps turned off
Open a closed door after previously unlocking (no ignition state change since unlock)	Off (on for remaining time if unlocked from transmitter or mechanical unlocking of the doors)	On	Off	On
Close all doors	Off	On for 25 seconds	On for 25 seconds	On for 25 seconds
Ignition changed to ON	Off	On for 25 seconds	Off	On
Ignition changed out of ON	Off	On for 25 seconds	On for 25 seconds	On for 25 seconds

Open a door after the ignition is changed to OFF	Off	On	Off	On
Ignition is OFF and doors are unlocked from the door lock switch	Off	On for 25 seconds	Off	Off
Ignition is OFF and doors are locked from the door lock switch	Off	Off	Off	Off

DESCRIPTION AND OPERATION > INTERIOR LIGHTING - SYSTEM OPERATION AND COMPONENT DESCRIPTION > DEMAND LAMPS

When the BCM is in not in battery saver mode, the interior light output is energized to provide voltage to the demand lamps.

DESCRIPTION AND OPERATION > INTERIOR LIGHTING - SYSTEM OPERATION AND COMPONENT DESCRIPTION > AMBIENT LIGHTING

The ambient lighting subsystem consists of the Body Control Module B (BCMB), and the Light Emitting Diodes (LEDs) located within the floor console (cup holders), front door panels (interior door release handles), front footwell areas and the scuff plate trim panels. The message center switch is used to cycle the Light Emitting Diodes (LEDs) through 132 different color combinations (7 preset colors or 125 colors created through the MyColor™ feature) or to turn the ambient lighting off. The Body Control Module B (BCMB) provides the necessary voltage to all the Light Emitting Diodes (LEDs) to illuminate the 2 different zones.

Based on the ambient lighting system selections made using the IPC message center, the IPC sends ambient light color request and ambient light intensity request messages over the HS-CAN3 to the GWM, then to the Body Control Module B (BCMB) through the MS-CAN for color and brightness settings.

The ambient lighting is split up into 2 separate zones, zone 1 and zone 3. Zone 2 is not used. Zone 1 consists of the front footwells, interior door release handles and the cup holders. Zone 3 consists of the scuff plate trim panels. Both zones share an ambient lighting LED ground circuit. Ground is provided by the Body Control Module B (BCMB).

When a door is opened, the Body Control Module B (BCMB) turns on both zones of the ambient lighting system. Zone 3 (door scuff plate Light Emitting Diodes (LEDs)) are turned off when any door is closed, or the illuminated entry request is detected by the Body Control Module B (BCMB). The zone is turned off at the same time as the courtesy lighting by the Body Control Module B (BCMB) if the key is not activated in the ignition switch. The ambient lighting is reactivated when until the parking lamps are turned on or the ignition is in ON.

DESCRIPTION AND OPERATION > INTERIOR LIGHTING - SYSTEM OPERATION AND COMPONENT DESCRIPTION > FIELD EFFECT TRANSISTOR (FET) PROTECTION

A Field Effect Transistor (FET) is a type of transistor that, when used with module software, monitors and controls current flow on module outputs. The Field Effect Transistor (FET) protection strategy prevents module damage in the event of excessive current flow.

The BCM utilizes a Field Effect Transistor (FET) protective circuit strategy for many of its outputs (for example, a headlamp output circuit). Output loads (current level) are monitored for excessive current (typically short circuits) and are shut down (turns off the voltage or ground provided by the module) when a fault event is detected. A short circuit DTC is stored at the fault event and a cumulative counter is started.

When the demand for the output is no longer present, the module resets the Field Effect Transistor (FET) circuit protection to allow the circuit to function. The next time the driver requests a circuit to activate that has been shut down by a previous short (Field Effect Transistor (FET) protection) and the circuit is still shorted, the Field Effect Transistor (FET) protection shuts off the circuit again and the cumulative counter advances.

When the excessive circuit load occurs often enough, the module shuts down the output until a repair procedure is carried out. Each Field Effect Transistor (FET) protected circuit has 3 predefined levels of short circuit tolerance based on the harmful effect of each circuit fault on the Field Effect Transistor (FET) and the ability of the Field Effect Transistor (FET) to withstand it. A module lifetime level of fault events is established based upon the durability of the Field Effect Transistor (FET). If the total tolerance level is determined to be 600 fault events, the 3 predefined levels would be 200, 400 and 600 fault events.

When each tolerance level is reached, DTC U1000:00 sets along with the short circuit DTC that was stored on the first failure. These Diagnostic Trouble Codes (DTCs) cannot be cleared until the vehicle is repaired.

After the repair, it is necessary to clear the Diagnostic Trouble Codes (DTCs). Use the clear DTC operation on the scan tool, cycle the ignition, and run the BCM on-demand self-test.

The module never resets the fault event counter to zero and continues to advance the fault event counter as short circuit fault events occur. If the number of short circuit fault events reach the third level, DTC U3000:49 sets along with the associated short circuit DTC. DTC U3000:49 cannot be cleared and the module must be replaced after the initial fault is repaired.

DESCRIPTION AND OPERATION > INTERIOR LIGHTING - SYSTEM OPERATION AND COMPONENT DESCRIPTION > COMPONENT DESCRIPTION

Door Ajar Switch

The door ajar switches (ground switches) each receive a voltage signal from the BCM on independent circuits. When the door is closed, the ajar switch is closed, routing the signal to ground. When the door is opened, the ajar switch opens.

Luggage Compartment Lid Ajar Switch

The luggage compartment lid ajar switch receives a voltage signal from the BCM through the cargo area lamp. The luggage compartment lid ajar switch is grounded to the vehicle. When the luggage

compartment lid is closed, the ajar switch is closed, providing ground to the luggage compartment lamp.

DIAGNOSIS AND TESTING > INTERIOR LIGHTING > DTC CHART: BCM

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

BCM DTC Chart

DTC	Description	Action
B1175:01	Driver Door Ajar Switch: General Electrical Failure	If the courtesy lamps are always on, GO to Pinpoint Test D If the courtesy lamps are inoperative, GO to Pinpoint Test A
B1176:01	Passenger Door Ajar Switch: General Electrical Failure	If the courtesy lamps are always on, GO to Pinpoint Test D If the courtesy lamps are inoperative, GO to Pinpoint Test A
B12C2:11	Puddle Lamp: Circuit Short To Ground	GO to Pinpoint Test C
B12C2:15	Puddle Lamp: Circuit Short To Battery or Open	GO to Pinpoint Test C
B1313:11	Interior Lighting Output: Circuit Short To Ground	GO to Pinpoint Test B
B1313:15	Interior Lighting Output: Circuit Short To Battery or Open	GO to Pinpoint Test B
U1000:00	Solid State Driver Protection Active -Driver Disabled: No Sub Type Information	The module has temporarily disabled an output because an excessive current draw exists (such as a short to ground). The BCM cannot enable the output until the cause of the short is corrected. ADDRESS all other Diagnostic Trouble Codes (DTCs) first. After the cause of the concern is corrected, CLEAR the Diagnostic Trouble Codes (DTCs). REPEAT the self-test.
U3000:49	Control Module: Internal Electronic Failure	The module has permanently disabled an output because an excessive current draw fault (such as a short to ground) has exceeded the limits that the BCM

		can withstand. The cause of the excessive current draw MUST be corrected before a new BCM is installed. ADDRESS all other Diagnostic Trouble Codes (DTCs) first. After the cause of the concern is corrected,
All other BCM Diagnostic Trouble Codes (DTCs)	-	REFER to: Body Control Module (BCM) .

DIAGNOSIS AND TESTING > INTERIOR LIGHTING > DTC CHART: BODY CONTROL MODULE B (BCMB)

Body Control Module B (BCMB) DTC Chart

DTC	Description	Action
B127B:11	Ambient Lighting Zone 1 Output Red LED: Circuit Short To Ground	GO to Pinpoint Test I
B127B:15	Ambient Lighting Zone 1 Output Red LED: Circuit Short To Battery or Open	GO to Pinpoint Test I
B127D:11	Ambient Lighting Zone 3 Output Red LED: Circuit Short To Ground	GO to Pinpoint Test I
B127D:15	Ambient Lighting Zone 3 Output Red LED: Circuit Short To Battery or Open	GO to Pinpoint Test I
B127E:11	Ambient Lighting Zone 1 Output Green LED: Circuit Short To Ground	GO to Pinpoint Test I
B127E:15	Ambient Lighting Zone 1 Output Green LED: Circuit Short To Battery or Open	GO to Pinpoint Test I
B1280:11	Ambient Lighting Zone 3 Output Green LED: Circuit Short To Ground	GO to Pinpoint Test I
B1280:15	Ambient Lighting Zone 3 Output Green LED: Circuit Short To Battery or Open	GO to Pinpoint Test I
B1281:11	Ambient Lighting Zone 1 Output Blue LED: Circuit Short To Ground	GO to Pinpoint Test I
B1281:15	Ambient Lighting Zone 1 Output Blue LED: Circuit Short To Battery or Open	GO to Pinpoint Test I

B1283:11	Ambient Lighting Zone 3 Output Blue LED: Circuit Short To Ground	GO to Pinpoint Test I
B1283:15	Ambient Lighting Zone 3 Output Blue LED: Circuit Short To Battery or Open	GO to Pinpoint Test I
U1000:00	Solid State Driver Protection Active -Driver Disabled: No Sub Type Information	The module has temporarily disabled an output because an excessive current draw exists (such as a short to ground). The Body Control Module B (BCMB) cannot enable the output until the cause of the short is corrected. ADDRESS all other Diagnostic Trouble Codes (DTCs) first. After the cause of the concern is corrected, CLEAR the Diagnostic Trouble Codes (DTCs). REPEAT the self-test.
U3000:49	Control Module: Internal Electronic Failure	The module has permanently disabled an output because an excessive current draw fault (such as a short to ground) has exceeded the limits that the Body Control Module B (BCMB) can withstand. The cause of the excessive current draw MUST be corrected before a new Body Control Module B (BCMB) is installed. ADDRESS all other Diagnostic Trouble Codes (DTCs) first. After the cause of the concern is corrected, INSTALL a new Body Control Module B (BCMB). REFER to: Body Control Module B (BCMB) .
All other Body Control Module B (BCMB) Diagnostic Trouble Codes (DTCs)	-	REFER to: Body Control Module B (BCMB) .

DIAGNOSIS AND TESTING > INTERIOR LIGHTING > SYMPTOM CHART(S)

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

Symptom Chart: Interior Lighting

Symptom Chart

Condition	Possible Sources	Actions
A module does not respond to the scan tool	Fuse Wiring, terminals or connectors Module	REFER to: MODULE COMMUNICATIONS NETWORK .
The courtesy lamps do not illuminate with a door open	Refer to the Pinpoint Test	GO to Pinpoint Test A
One or both interior overhead courtesy lamps are inoperative or the interior courtesy lamps stay on continuously	Refer to the Pinpoint Test	If one or both map lamps are also inoperative, GO to Pinpoint Test E If the map lamps operate correctly, GO to Pinpoint Test B
One or both pony projection lamps are inoperative or always on	Refer to the Pinpoint Test	GO to Pinpoint Test C
All the courtesy lamps stay on continuously	Refer to the Pinpoint Test	GO to Pinpoint Test D
One or more demand lamps are inoperative	Refer to the Pinpoint Test	GO to Pinpoint Test E
The luggage compartment lamp is inoperative or on continuously	Refer to the Pinpoint Test	GO to Pinpoint Test F
The battery saver does not deactivate after time-out	Refer to the Pinpoint Test	GO to Pinpoint Test G
The ambient lighting is inoperative	Refer to the Pinpoint Test	GO to Pinpoint Test H
The ambient lighting does not cycle through all color combinations	Refer to the Pinpoint Test	GO to Pinpoint Test I
An individual ambient lighting LED is inoperative/does not cycle through all color combinations	Refer to the Pinpoint Test	GO to Pinpoint Test J

DIAGNOSIS AND TESTING > INTERIOR LIGHTING > PINPOINT TESTS > PINPOINT TEST A : THE COURTESY LAMPS DO NOT ILLUMINATE WITH A DOOR OPEN

Refer to Remote Keyless Entry and Alarm for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Interior Lighting - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1175:01	Driver Door Ajar Switch: General	An on-demand DTC that sets

	Electrical Failure	when the BCM detects a fault on the LH front door ajar circuit.
B1176:01	Passenger Door Ajar Switch: General Electrical Failure	An on-demand DTC that sets when the BCM detects a fault on the RH front door ajar circuit.

Possible Sources

- Wiring, terminals or connectors
- Door latch
- BCM

DIAGNOSIS AND TESTING > INTERIOR LIGHTING > PINPOINT TESTS > PINPOINT TEST A : THE COURTESY LAMPS DO NOT ILLUMINATE WITH A DOOR OPEN > PINPOINT TEST A : THE COURTESY LAMPS DO NOT ILLUMINATE WITH A DOOR OPEN

A1 CHECK THE DOOR AJAR SWITCH OPERATION

Disconnect: suspect door latch.

Do the courtesy lamps illuminate?

Yes	INSTALL a new front door latch. REFER to: Front Door Latch .

No	GO to A2

A2 CHECK THE DOOR AJAR SWITCH INPUT CIRCUIT FOR A SHORT TO GROUND

Disconnect: BCM C2280E .

Measure:

LH Front Door Ajar Switch

Positive Lead	Measurement / Action	Negative Lead
C525-3	Ω	Ground

RH Front Door Ajar Switch

Positive Lead	Measurement / Action	Negative Lead
C609-6	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to A3

No	REPAIR the circuit.

A3 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues. CLEAR the Diagnostic Trouble Codes (DTCs).

DIAGNOSIS AND TESTING > INTERIOR LIGHTING > PINPOINT TESTS > PINPOINT TEST B : ONE OR BOTH INTERIOR OVERHEAD COURTESY LAMPS ARE INOPERATIVE OR THE INTERIOR COURTESY LAMPS STAY ON CONTINUOUSLY

Refer to Interior Lamps for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Interior Lighting - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1313:11	Interior Lighting Output: Circuit Short To Ground	A continuous memory and on-demand DTC that sets when the BCM detects a short to

		ground from the interior lighting output circuit.
B1313:15	Interior Lighting Output: Circuit Short To Battery or Open	A continuous memory and on-demand DTC that sets when the BCM detects an open or short to voltage from the interior lighting output circuit.
U1000:00	Solid State Driver Protection Active -Driver Disabled: No Sub Type Information	This DTC sets when the BCM has temporarily shut down the output driver. The module has temporarily disabled an output because an excessive current draw exists (such as a short to ground). The BCM cannot enable the output until the cause of the short is corrected, the Diagnostic Trouble Codes (DTCs) have been cleared and a successful self-test is run.
U3000:49	Control Module: Internal Electronic Failure	This DTC sets when the BCM has permanently shut down the output driver. The module has permanently disabled an output because an excessive current draw fault (such as a short to ground) has exceeded the limits that the BCM can withstand. CORRECT the cause of the excessive current draw before installing a new BCM.

Possible Sources

- Wiring, terminals or connectors
- Bulb
- Interior lamp
- BCM

DIAGNOSIS AND TESTING > INTERIOR LIGHTING > PINPOINT TESTS > PINPOINT TEST B : ONE OR BOTH INTERIOR OVERHEAD COURTESY LAMPS ARE INOPERATIVE OR THE INTERIOR COURTESY LAMPS STAY ON CONTINUOUSLY > PINPOINT TEST B : ONE OR BOTH INTERIOR OVERHEAD COURTESY LAMPS ARE INOPERATIVE OR THE INTERIOR COURTESY LAMPS STAY ON CONTINUOUSLY

B1 CHECK THE COURTESY LAMP OPERATION WITH THE DOORS CLOSED

Close the doors.

Press the RKE LOCK button.

Do the interior courtesy lamps turn off?

Yes	If one interior overhead courtesy lamp is inoperative, INSTALL a new courtesy lamp bulb. If the lamp is still inoperative, INSTALL a new overhead console. REFER to: Overhead Console . If both interior overhead courtesy lamps are inoperative, GO to B2

No	GO to B5

B2 CHECK FOR VOLTAGE TO THE INTERIOR OVERHEAD COURTESY LAMPS

Disconnect: Dome Lamp.

Open a door.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C901-4		Ground

Is the voltage greater than 11 volts?

Yes	GO to B3

No	GO to B4

B3 CHECK THE INTERIOR OVERHEAD COURTESY LAMPS GROUND CIRCUIT

Measure:

Positive Lead	Measurement / Action	Negative Lead
C901-4		C901-5

Is the voltage greater than 11 volts?

Yes	INSTALL a new overhead console. REFER to: Overhead Console .

No	REPAIR the circuit

B4 CHECK THE INTERIOR OVERHEAD COURTESY LAMPS VOLTAGE CIRCUIT FOR AN OPEN

Disconnect: BCM C2280C .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C901-4	Ω	C2280C-13

Is the resistance less than 3 ohms?

Yes	GO to B6

No	REPAIR the circuit.

B5 CHECK THE INTERIOR OVERHEAD COURTESY LAMPS VOLTAGE CIRCUIT FOR A SHORT TO VOLTAGE

Disconnect: BCM C2280C .

Disconnect: Dome Lamp.

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C901-4	V	Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to B6

B6 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for

	this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues. CLEAR the Diagnostic Trouble Codes (DTCs).

DIAGNOSIS AND TESTING > INTERIOR LIGHTING > PINPOINT TESTS > PINPOINT TEST C : ONE OR BOTH PONY PROJECTION LAMPS ARE INOPERATIVE OR ALWAYS ON

Refer to Interior Lamps for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Interior Lighting - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B12C2:11	Puddle Lamp: Circuit Short To Ground	A continuous memory and on-demand DTC that sets when the BCM detects a short to ground from the puddle lamp (pony projection lamp) output circuit.
B12C2:15	Puddle Lamp: Circuit Short To Battery or Open	A continuous memory and on-demand DTC that sets when the BCM detects an open or a short to voltage from the exterior door handle puddle lamp (pony projection lamp) output circuit.
U1000:00	Solid State Driver Protection Active -Driver Disabled: No Sub Type Information	This DTC sets when the BCM has temporarily shut down the output driver. The module has temporarily disabled an output because an excessive current draw exists (such as a short to ground). The BCM cannot enable the output until the cause of the short is corrected, the Diagnostic Trouble Codes (DTCs) have been cleared and a successful self-test is run.
U3000:49	Control Module: Internal Electronic Failure	This DTC sets when the BCM has permanently shut down the output driver. The module has permanently disabled an output

		because an excessive current draw fault (such as a short to ground) has exceeded the limits that the BCM can withstand. CORRECT the cause of the excessive current draw before installing a new BCM.

Possible Sources

- Wiring, terminals or connectors
- Exterior mirror assembly
- Pony projection lamp
- BCM

Visual Inspection and Diagnostic Pre-checks

- Inspect the exterior mirror assembly for damage.

DIAGNOSIS AND TESTING > INTERIOR LIGHTING > PINPOINT TESTS > PINPOINT TEST C : ONE OR BOTH PONY PROJECTION LAMPS ARE INOPERATIVE OR ALWAYS ON > PINPOINT TEST C : ONE OR BOTH PONY PROJECTION LAMPS ARE INOPERATIVE OR ALWAYS ON

C1 CHECK THE PONY PROJECTION LAMP OPERATION WITH THE DOORS CLOSED

Close the doors.

Press the RKE LOCK button.

Do the pony projection lamps turn off?

Yes	If one pony projection lamp is inoperative, GO to C2 If both pony projection lamps are inoperative, GO to C5

No	GO to C7

C2 CHECK THE PONY PROJECTION LAMP VOLTAGE SUPPLY CIRCUIT FOR VOLTAGE

Disconnect: LH exterior mirror C520 or RH exterior mirror C626 .

Ignition ON.

Using a diagnostic scan tool, select the BCM Courtesy Puddle Step Lamps (PUDDLE_LMPS) active command.

Command the pony projection lamps (Courtesy Puddle Step Lamps) ON.

Measure:

LH Pony Projection Lamp

Positive Lead	Measurement / Action	Negative Lead
C520-5		Ground

RH Pony Projection Lamp

Positive Lead	Measurement / Action	Negative Lead
C626-5		Ground

Is the voltage greater than 11 volts?

Yes	GO to C3

No	GO to C4

C3 CHECK THE PONY PROJECTION LAMP GROUND CIRCUIT

Measure:

LH Pony Projection Lamp

Positive Lead	Measurement / Action	Negative Lead
C520-5		C520-7

RH Pony Projection Lamp

Positive Lead	Measurement / Action	Negative Lead
C626-5		C626-7

Is the voltage greater than 11 volts?

Yes	INSTALL a new pony projection lamp. REFER to: Exterior Mirror .

No	REPAIR the circuit.

C4 CHECK THE PONY PROJECTION LAMP CIRCUIT FOR AN OPEN TO THE LAMP

Ignition OFF.

Disconnect: BCM C2280C .

Measure:

LH Pony Projection Lamp

Positive Lead	Measurement / Action	Negative Lead
C520-5	Ω	C2280C-26

RH Pony Projection Lamp

Positive Lead	Measurement / Action	Negative Lead
C626-5	Ω	C2280C-26

Is the resistance less than 3 ohms?

Yes	GO to C8

No	REPAIR the circuit.

C5 CHECK THE PONY PROJECTION LAMP CIRCUIT FOR AN OPEN

Disconnect: LH exterior mirror C520 .

Disconnect: BCM C2280C .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C520-5	Ω	C2280C-26

Is the resistance less than 3 ohms?

Yes	GO to C6

No	REPAIR the circuit.

C6 CHECK THE PONY PROJECTION LAMP CIRCUIT FOR A SHORT TO GROUND

Disconnect: RH exterior mirror C626 .

Measure:

LH Pony Projection Lamp

Positive Lead	Measurement / Action	Negative Lead
C520-5	Ω	Ground

RH Pony Projection Lamp

Positive Lead	Measurement / Action	Negative Lead
C626-5	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to C8

No	REPAIR the circuit.

C7 CHECK THE PONY PROJECTION LAMP CIRCUIT FOR A SHORT TO VOLTAGE

Disconnect: BCM C2280C .

Observe the pony projection lamps.

Are the pony projection lamps illuminated?

Yes	REPAIR the circuit.

No	GO to C8

C8 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues. CLEAR the Diagnostic Trouble Codes (DTCs).

DIAGNOSIS AND TESTING > INTERIOR LIGHTING > PINPOINT TESTS > PINPOINT TEST D : ALL THE COURTESY LAMPS STAY ON CONTINUOUSLY

Refer to Remote Keyless Entry and Alarm for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Interior Lighting - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1175:01	Driver Door Ajar Switch: General Electrical Failure	An on-demand DTC that sets when the BCM detects a fault on the LH front door ajar circuit.
B1176:01	Passenger Door Ajar Switch: General Electrical Failure	An on-demand DTC that sets when the BCM detects a fault on the RH front door ajar circuit.

Possible Sources

- Wiring, terminals or connectors
- Ajar switch
- BCM

DIAGNOSIS AND TESTING > INTERIOR LIGHTING > PINPOINT TESTS > PINPOINT TEST D : ALL THE COURTESY LAMPS STAY ON CONTINUOUSLY > PINPOINT TEST D : ALL THE COURTESY LAMPS STAY ON CONTINUOUSLY

D1 CHECK THE DOOR AJAR SWITCH PARAMETER IDENTIFICATIONS (PIDS)

Ignition ON.

Using a diagnostic scan tool, view BCM Parameter Identifications (PIDs).

Monitor the BCM DOOR_SW_DRVR and DOOR_SW_PSGR Parameter Identifications (PIDs) while opening and closing the doors.

Do all the door ajar switch PID values agree with the door positions?

Yes	For the interior courtesy lamps, GO to Pinpoint Test B For the pony projection lamps, GO to Pinpoint Test C

No	GO to D2

D2 BYPASS THE SUSPECT DOOR LATCH

Disconnect: suspect door latch.

Connect a fused jumper wire:

LH Front Door Ajar Switch

Positive Lead	Measurement / Action	Negative Lead
C525-3		C525-5

RH Front Door Ajar Switch

Positive Lead	Measurement / Action	Negative Lead
C609-6		C609-4

Using a diagnostic scan tool, view BCM Parameter Identifications (PIDs).

Monitor the BCM DOOR_SW_DRVR and DOOR_SW_PSGR Parameter Identifications (PIDs).

Does the PID indicate the door in question is closed?

Yes	REMOVE the fused jumper wire. INSTALL a new front door latch. REFER to: Front Door Latch .

No	REMOVE the fused jumper wire. GO to D3

D3 BYPASS THE DOOR LATCH GROUND CIRCUIT

Connect a fused jumper wire:

LH Front Door Ajar Switch

Positive Lead	Measurement / Action	Negative Lead
C525-3		Ground

RH Front Door Ajar Switch

Positive Lead	Measurement / Action	Negative Lead
C609-6		Ground

Monitor the BCM DOOR_SW_DRVR and DOOR_SW_PSGR Parameter Identifications (PIDs).

Does the PID indicate the door in question is closed?

Yes	REMOVE the fused jumper wire. For vehicles without a memory seat, REPAIR the circuit. For vehicles with a memory seat, GO to D5

No	REMOVE the fused jumper wire. GO to D4

D4 CHECK THE SUSPECT DOOR AJAR SWITCH INPUT CIRCUIT FOR AN OPEN

Disconnect: BCM C2280E .

Measure:

LH Front Door Ajar Switch

Positive Lead	Measurement / Action	Negative Lead
C525-3	Ω	C2280E-33

RH Front Door Ajar Switch

Positive Lead	Measurement / Action	Negative Lead
C609-6	Ω	C2280E-21

Is the resistance less than 3 ohms?

Yes	GO to D6

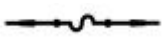
No	REPAIR the door ajar input circuit in question.

D5 CHECK THE DOOR LATCH RETURN CIRCUIT TO THE DOOR MODULE FOR AN OPEN

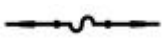
Disconnect: suspect door module.

Connect a fused jumper wire:

LH Front Door Ajar Switch

Positive Lead	Measurement / Action	Negative Lead
C501B-12		Ground

RH Front Door Ajar Switch

Positive Lead	Measurement / Action	Negative Lead
C652B-12		Ground

Close the door.

Monitor the BCM DOOR_SW_DRVR and DOOR_SW_PSGR Parameter Identifications (PIDs).

Does the PID indicate the door is closed?

Yes	REMOVE the fused jumper wire. For LH door, GO to D7 For RH door, GO to D8

No	REMOVE the fused jumper wire. REPAIR the door latch return circuit in question.

D6 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues. CLEAR the Diagnostic Trouble Codes (DTCs).

D7 CHECK FOR CORRECT DDM (DRIVER DOOR MODULE) OPERATION

Disconnect and inspect all DDM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the DDM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new DDM. REFER to: Driver Door Module (DDM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues. CLEAR the Diagnostic Trouble Codes (DTCs).

D8 CHECK FOR CORRECT PDM (PASSENGER DOOR MODULE) OPERATION

Disconnect and inspect all PDM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the PDM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PDM. REFER to: Passenger Door Module (PDM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues. CLEAR the Diagnostic Trouble Codes (DTCs).

DIAGNOSIS AND TESTING > INTERIOR LIGHTING > PINPOINT TESTS > PINPOINT TEST E : ONE OR MORE DEMAND LAMPS ARE INOPERATIVE

Refer to Interior Lamps for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Interior Lighting - System Operation and Component Description .

Possible Sources

- Wiring, terminals or connectors
- Demand lamp

- BCM

Visual Inspection and Diagnostic Pre-checks

- Inspect the bulbs and make sure they are OK.
- Inspect the interior lamps for damage.

DIAGNOSIS AND TESTING > INTERIOR LIGHTING > PINPOINT TESTS > PINPOINT TEST E : ONE OR MORE DEMAND LAMPS ARE INOPERATIVE > PINPOINT TEST E : ONE OR MORE DEMAND LAMPS ARE INOPERATIVE

E1 CHECK THE DEMAND LAMP OPERATION

Ignition ON.

Check the operation of the LH vanity mirror, RH vanity mirror, overhead map, center console bin and glove box lamps.

Do any of the LH vanity mirror, RH vanity mirror, overhead map, center console bin or glove box lamps illuminate?

Yes	If a vanity mirror lamp is inoperative, GO to E3 If the glove compartment lamp is inoperative, GO to E5 If both overhead map lamps are inoperative, GO to E7 If a single overhead map lamp is inoperative, INSTALL a new map lamp bulb. If the lamp is still inoperative, INSTALL a new overhead console. REFER to: Overhead Console . If the center console bin lamp is inoperative, GO to E9

No	GO to E2

E2 CHECK THE DEMAND LAMP VOLTAGE SUPPLY CIRCUIT FOR AN OPEN

Ignition OFF.

Disconnect: Glove Compartment Lamp C254 .

Disconnect: BCM C2280C .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C254-1	Ω	C2280C-14

Is the resistance less than 3 ohms?

Yes	GO to E11

No	REPAIR the circuit.

E3 CHECK THE VANITY MIRROR VOLTAGE SUPPLY CIRCUIT FOR AN OPEN

Ignition OFF.

Disconnect: Inoperative LH Vanity Mirror Lamp C907 or RH Vanity Mirror Lamp C906 .

Ignition ON.

Measure:

LH Vanity Mirror Lamp

Positive Lead	Measurement / Action	Negative Lead
C907-1		Ground

RH Vanity Mirror Lamp

Positive Lead	Measurement / Action	Negative Lead
C906-1		Ground

Is the voltage greater than 11 volts?

Yes	GO to E4

No	REPAIR the circuit.

E4 CHECK THE VANITY MIRROR GROUND CIRCUIT FOR AN OPEN

Measure:

LH Vanity Mirror Lamp

Positive Lead	Measurement / Action	Negative Lead
C907-1		C907-2

RH Vanity Mirror Lamp

Positive Lead	Measurement / Action	Negative Lead
C906-1		C906-2

Is the voltage greater than 11 volts?

Yes	INSTALL a new sun visor for the lamp in question.

No	REPAIR the circuit.

E5 CHECK THE GLOVE COMPARTMENT LAMP VOLTAGE SUPPLY CIRCUIT FOR AN OPEN

Ignition OFF.

Disconnect: Glove Compartment Lamp C254 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C254-1		Ground

Is the voltage greater than 11 volts?

Yes	GO to E6

No	REPAIR the circuit.

E6 CHECK THE GLOVE COMPARTMENT LAMP GROUND CIRCUIT FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C254-1		C254-2

Is the voltage greater than 11 volts?

Yes	INSTALL a new glove compartment lamp.

No	REPAIR the circuit.

E7 CHECK THE OVERHEAD INTERIOR LAMP VOLTAGE SUPPLY CIRCUIT FOR AN OPEN

Ignition OFF.

Disconnect: Dome Lamp.

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead

C901-4		Ground

Is the voltage greater than 11 volts?

Yes	GO to E8

No	REPAIR the circuit.

E8 CHECK THE OVERHEAD INTERIOR LAMP GROUND CIRCUIT FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C901-4		C901-5

Is the voltage greater than 11 volts?

Yes	INSTALL a new overhead console. REFER to: Overhead Console .

No	REPAIR the circuit.

E9 CHECK THE CENTER CONSOLE BIN LAMP VOLTAGE SUPPLY CIRCUIT FOR AN OPEN

Ignition OFF.

Disconnect: Center Console Lock Assembly C3463 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3463-2		Ground

Is the voltage greater than 11 volts?

Yes	GO to E10

No	REPAIR the circuit.

E10 CHECK THE CENTER CONSOLE BIN LAMP GROUND CIRCUIT FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead

C3463-2		C3463-3

Is the voltage greater than 11 volts?

Yes	INSTALL a new center console bin lamp.

No	REPAIR the circuit.

E11 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues. CLEAR the Diagnostic Trouble Codes (DTCs).

DIAGNOSIS AND TESTING > INTERIOR LIGHTING > PINPOINT TESTS > PINPOINT TEST F : THE LUGGAGE COMPARTMENT LAMP IS INOPERATIVE OR ON CONTINUOUSLY

Refer to Interior Lamps for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Interior Lighting - System Operation and Component Description .

Possible Sources

- Wiring, terminals or connectors
- Luggage compartment lid latch

- Luggage compartment lamp bulb

DIAGNOSIS AND TESTING > INTERIOR LIGHTING > PINPOINT TESTS > PINPOINT TEST F : THE LUGGAGE COMPARTMENT LAMP IS INOPERATIVE OR ON CONTINUOUSLY > PINPOINT TEST F : THE LUGGAGE COMPARTMENT LAMP IS INOPERATIVE OR ON CONTINUOUSLY

F1 DETERMINE IF THE LAMP IS ON WITH THE LUGGAGE COMPARTMENT LID OPEN

Ignition ON.

Make sure the luggage compartment lid is fully open and observe the luggage compartment lamp.

Is the luggage compartment lamp illuminated?

Yes	GO to F2

No	GO to F3

F2 CHECK THE LUGGAGE COMPARTMENT LAMP GROUND CIRCUIT FOR A SHORT TO GROUND

Disconnect: Luggage Compartment Lid Latch C4339 .

Does the luggage compartment lamp continue to illuminate?

Yes	REPAIR the circuit.

No	INSTALL a new luggage compartment lid latch. REFER to: Luggage Compartment Lid Latch - Coupe . REFER to: Luggage Compartment Lid Latch - Convertible .

F3 CHECK THE OPERATION OF THE DEMAND LAMPS

Ignition ON.

Check the operation of the LH vanity mirror, RH vanity mirror, overhead map, center console bin and glove box lamps.

Does the interior demand lamps illuminate?

Yes	GO to F4

No	GO to Pinpoint Test E

F4 CHECK FOR VOLTAGE TO THE LUGGAGE COMPARTMENT LAMP

Disconnect: Luggage Compartment Lamp C428 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C428-1		Ground

Is the voltage greater than 11 volts?

Yes	GO to F5

No	REPAIR the luggage compartment lamp voltage supply circuit for an open.

F5 ISOLATE THE LUGGAGE COMPARTMENT LAMP BULB SOCKET

Measure:

Positive Lead	Measurement / Action	Negative Lead
C428-1		C428-3

Is the voltage greater than 11 volts?

Yes	INSTALL a new luggage compartment lamp bulb socket.

No	GO to F6

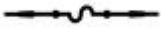
F6 CHECK THE LUGGAGE COMPARTMENT LAMP GROUND CIRCUIT FOR AN OPEN

Ignition OFF.

Connect: Luggage Compartment Lamp C428 .

Disconnect: Luggage Compartment Lid Latch C4339 .

Connect a fused jumper:

Positive Lead	Measurement / Action	Negative Lead
C4339-2		Ground

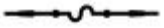
Does the luggage compartment lamp illuminate?

Yes	REMOVE the fused jumper wire. GO to F7

No	REMOVE the fused jumper wire. REPAIR the circuit.

F7 CHECK THE LUGGAGE COMPARTMENT LID LATCH GROUND CIRCUIT FOR AN OPEN

Connect:

Positive Lead	Measurement / Action	Negative Lead
C4339-2		C4339-4

Does the luggage compartment lamp illuminate?

Yes	REMOVE the fused jumper wire. INSTALL a new luggage compartment lid latch. REFER to: Luggage Compartment Lid Latch - Coupe . REFER to: Luggage Compartment Lid Latch - Convertible .

No	REMOVE the fused jumper wire. REPAIR the circuit.

DIAGNOSIS AND TESTING > INTERIOR LIGHTING > PINPOINT TESTS > PINPOINT TEST G : THE BATTERY SAVER DOES NOT DEACTIVATE AFTER TIME-OUT

Refer to Interior Lamps for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Interior Lighting - System Operation and Component Description .

Possible Sources

- Wiring, terminals or connectors
- BCM

DIAGNOSIS AND TESTING > INTERIOR LIGHTING > PINPOINT TESTS > PINPOINT TEST G : THE BATTERY SAVER DOES NOT DEACTIVATE AFTER TIME-OUT > PINPOINT TEST G : THE BATTERY SAVER DOES NOT DEACTIVATE AFTER TIME-OUT

G1 CHECK THE DEMAND LAMP VOLTAGE SUPPLY CIRCUIT FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: BCM C2280C .

Turn any demand lamp (map or vanity mirror) on.

Does the demand lamp turn on?

Yes	REPAIR the circuit.

No	GO to G2

G2 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues. CLEAR the Diagnostic Trouble Codes (DTCs).

DIAGNOSIS AND TESTING > INTERIOR LIGHTING > PINPOINT TESTS > PINPOINT TEST H : THE AMBIENT LIGHTING IS INOPERATIVE

Refer to Interior Lamps for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Interior Lighting - System Operation and Component Description .

Possible Sources

- Wiring, terminals or connectors
- IPC
- Body Control Module B (BCMB)

DIAGNOSIS AND TESTING > INTERIOR LIGHTING > PINPOINT TESTS > PINPOINT

TEST H : THE AMBIENT LIGHTING IS INOPERATIVE > PINPOINT TEST H : THE AMBIENT LIGHTING IS INOPERATIVE

H1 CHECK THE IPC (INSTRUMENT PANEL CLUSTER) MESSAGE CENTER OPERATION

Ignition ON.

Check the operation of other IPC message center settings.

Can other IPC message center settings be changed and saved?

Yes	GO to H2

No	REFER to: Instrumentation, Message Center and Warning Chimes .

H2 CHECK THE AMBIENT LIGHTING LED (LIGHT EMITTING DIODE) RETURN CIRCUIT FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: Body Control Module B (BCMB) C4368A .

Disconnect: Body Control Module B (BCMB) C4368B .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4368A-24		Ground

Is voltage present?

Yes	GO to H3

No	REPAIR the circuit.

H3 CHECK THE AMBIENT LIGHTING LED (LIGHT EMITTING DIODE) RETURN CIRCUIT FOR AN OPEN

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4368B-9		C4368A-24

Does the meter indicate the circuit is good?

Yes	GO to H4

No	REPAIR the circuit.

H4 CHECK FOR CORRECT BODY CONTROL MODULE B (BCMB) OPERATION

Disconnect and inspect all Body Control Module B (BCMB) connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the Body Control Module B (BCMB) connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new Body Control Module B (BCMB). REFER to: Body Control Module B (BCMB) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues. CLEAR the Diagnostic Trouble Codes (DTCs).

DIAGNOSIS AND TESTING > INTERIOR LIGHTING > PINPOINT TESTS > PINPOINT TEST I : THE AMBIENT LIGHTING DOES NOT CYCLE THROUGH ALL COLOR COMBINATIONS

Refer to Interior Lamps for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Interior Lighting - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B127B:11	Ambient Lighting Zone 1 Output	A continuous memory and

	Red LED: Circuit Short To Ground	on-demand DTC that sets when the Body Control Module B (BCMB) module detects a short to ground from the zone 1 red ambient lighting output circuit
B127B:15	Ambient Lighting Zone 1 Output Red LED: Circuit Short To Battery or Open	An on-demand DTC that sets when the Body Control Module B (BCMB) module detects an open or a short to voltage from the zone 1 red ambient lighting output circuit.
B127D:11	Ambient Lighting Zone 3 Output Red LED: Circuit Short To Ground	A continuous memory and on-demand DTC that sets when the Body Control Module B (BCMB) module detects a short to ground from the zone 3 red ambient lighting output circuit
B127D:15	Ambient Lighting Zone 3 Output Red LED: Circuit Short To Battery or Open	An on-demand DTC that sets when the Body Control Module B (BCMB) module detects an open or a short to voltage from the zone 3 red ambient lighting output circuit.
B127E:11	Ambient Lighting Zone 1 Output Green LED: Circuit Short To Ground	A continuous memory and on-demand DTC that sets when the Body Control Module B (BCMB) module detects a short to ground from the zone 1 green ambient lighting output circuit
B127E:15	Ambient Lighting Zone 1 Output Green LED: Circuit Short To Battery or Open	An on-demand DTC that sets when the Body Control Module B (BCMB) module detects an open or a short to voltage from the zone 1 green ambient lighting output circuit.
B1280:11	Ambient Lighting Zone 3 Output Green LED: Circuit Short To Ground	A continuous memory and on-demand DTC that sets when the Body Control Module B (BCMB) module detects a short to ground from the zone 3 green ambient lighting output circuit
B1280:15	Ambient Lighting Zone 3 Output Green LED: Circuit Short To Battery or Open	An on-demand DTC that sets when the Body Control Module B (BCMB) module detects an open or a short to voltage from the zone 3 green ambient lighting output circuit.

B1281:11	Ambient Lighting Zone 1 Output Blue LED: Circuit Short To Ground	A continuous memory and on-demand DTC that sets when the Body Control Module B (BCMB) module detects a short to ground from the zone 1 blue ambient lighting output circuit
B1281:15	Ambient Lighting Zone 1 Output Blue LED: Circuit Short To Battery or Open	An on-demand DTC that sets when the Body Control Module B (BCMB) module detects an open or a short to voltage from the zone 1 blue ambient lighting output circuit.
B1283:11	Ambient Lighting Zone 3 Output Blue LED: Circuit Short To Ground	A continuous memory and on-demand DTC that sets when the Body Control Module B (BCMB) module detects a short to ground from the zone 3 blue ambient lighting output circuit
B1283:15	Ambient Lighting Zone 3 Output Blue LED: Circuit Short To Battery or Open	An on-demand DTC that sets when the Body Control Module B (BCMB) module detects an open or a short to voltage from the zone 3 blue ambient lighting output circuit.
U1000:00	Solid State Driver Protection Active -Driver Disabled: No Sub Type Information	This DTC sets when the Body Control Module B (BCMB) has temporarily shut down the output driver. The module has temporarily disabled an output because an excessive current draw exists (such as a short to ground). The Body Control Module B (BCMB) cannot enable the output until the cause of the short is corrected, the Diagnostic Trouble Codes (DTCs) have been cleared and a successful self-test is run.
U3000:49	Control Module: Internal Electronic Failure	This DTC sets when the Body Control Module B (BCMB) has permanently shut down the output driver. The module has permanently disabled an output because an excessive current draw fault (such as a short to ground) has exceeded the limits that the Body Control Module B (BCMB) can withstand. CORRECT the cause of the

		excessive current draw before installing a new Body Control Module B (BCMB).

Possible Sources

- Wiring, terminals or connectors
- Ambient lighting LED
- Body Control Module B (BCMB)

DIAGNOSIS AND TESTING > INTERIOR LIGHTING > PINPOINT TESTS > PINPOINT TEST I : THE AMBIENT LIGHTING DOES NOT CYCLE THROUGH ALL COLOR COMBINATIONS > PINPOINT TEST I : THE AMBIENT LIGHTING DOES NOT CYCLE THROUGH ALL COLOR COMBINATIONS

I1 CHECK THE AMBIENT LIGHTING

Ignition ON.

Place the headlamp switch in the PARKING LAMPS ON position.

Observe the operation of all the ambient lighting Light Emitting Diodes (LEDs).

Are all ambient lighting Light Emitting Diodes (LEDs) effected?

Yes	GO to I3

No	GO to I2

I2 CHECK THE AMBIENT LIGHTING COLOR OUTPUT CIRCUITS

Ignition OFF.

Disconnect: Body Control Module B (BCMB) C4368A .

Disconnect: Body Control Module B (BCMB) C4368B .

For front footwell, interior door release handle and cup holder Light Emitting Diodes (LEDs), measure:

Positive Lead	Measurement / Action	Negative Lead
C4368B-11	⊣⊢	C4368A-24
C4368B-12	⊣⊢	C4368A-24
C4368B-13	⊣⊢	C4368A-24

For scuff plate trim panel Light Emitting Diodes (LEDs), measure:

Positive Lead	Measurement / Action	Negative Lead
C4368B-9	⇥⊢	C4368A-24
C4368B-10	⇥⊢	C4368A-24
C4368B-23	⇥⊢	C4368A-24

Does the meter indicate the circuit is good?

Yes	GO to I3

No	REPAIR the LED voltage supply circuit in question.

I3 CHECK FOR CORRECT BODY CONTROL MODULE B (BCMB) OPERATION

Disconnect and inspect all Body Control Module B (BCMB) connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the Body Control Module B (BCMB) connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new Body Control Module B (BCMB). REFER to: Body Control Module B (BCMB) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues. CLEAR the Diagnostic Trouble Codes (DTCs).

DIAGNOSIS AND TESTING > INTERIOR LIGHTING > PINPOINT TESTS > PINPOINT TEST J : AN INDIVIDUAL AMBIENT LIGHTING LED (LIGHT EMITTING DIODE) IS INOPERATIVE/DOES NOT CYCLE THROUGH ALL COLOR COMBINATIONS

Refer to Interior Lamps for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Interior Lighting - System Operation and Component Description .

Possible Sources

- Wiring, terminals or connectors
- Ambient lighting LED
- Body Control Module B (BCMB)

DIAGNOSIS AND TESTING > INTERIOR LIGHTING > PINPOINT TESTS > PINPOINT TEST J : AN INDIVIDUAL AMBIENT LIGHTING LED (LIGHT EMITTING DIODE) IS INOPERATIVE/DOES NOT CYCLE THROUGH ALL COLOR COMBINATIONS > PINPOINT TEST J : AN INDIVIDUAL AMBIENT LIGHTING LED (LIGHT EMITTING DIODE) IS INOPERATIVE/DOES NOT CYCLE THROUGH ALL COLOR COMBINATIONS

J1 CHECK THE AMBIENT LIGHTING

Ignition ON.

Place the headlamp switch in the PARKING LAMPS ON position.

Observe the operation of all the ambient lighting Light Emitting Diodes (LEDs).

Is only a scuff plate trim panel ambient lighting LED effected?

Yes	GO to J2

No	For an interior door release handle ambient lighting LED, GO to J3 For a footwell ambient lighting LED, GO to J4 For the center console cup holder ambient lighting LED, GO to J5

J2 CHECK THE SCUFF PLATE TRIM PANEL LIGHTING COLOR SUPPLY CIRCUITS

Ignition OFF.

Disconnect: LH Scuff Plate Lamp C3369 or RH Scuff Plate Lamp C3370 .

Disconnect: Body Control Module B (BCMB) C4368A .

Disconnect: Body Control Module B (BCMB) C4368B .

For the LH scuff plate lamp, measure:

Positive Lead	Measurement / Action	Negative Lead
C3369-3	Ω	C4368B-9
C3369-2	Ω	C4368B-10

C3369-1	Ω	C4368B-23
C3369-4	Ω	C4368A-24

For the RH scuff plate lamp, measure:

Positive Lead	Measurement / Action	Negative Lead
C3370-3	Ω	C4368B-9
C3370-2	Ω	C4368B-10
C3370-1	Ω	C4368B-23
C3370-4	Ω	C4368A-24

Is the resistance less than 3 ohms?

Yes	INSTALL a new ambient lighting LED.

No	REPAIR the LED voltage supply circuit in question.

J3 CHECK THE INTERIOR DOOR RELEASE HANDLE LIGHTING COLOR SUPPLY CIRCUITS

Ignition OFF.

Disconnect: LH Interior Door Release Handle Ambient Lighting Lamp C573 or RH Interior Door Release Handle Ambient Lighting Lamp C649 .

Disconnect: Body Control Module B (BCMB) C4368A .

Disconnect: Body Control Module B (BCMB) C4368B .

For the LH interior door release handle ambient lighting lamp, measure:

Positive Lead	Measurement / Action	Negative Lead
C573-1	Ω	C4368B-11
C573-3	Ω	C4368B-12
C573-5	Ω	C4368B-13
C573-4	Ω	C4368A-24

For the RH interior door release handle ambient lighting lamp, measure:

Positive Lead	Measurement / Action	Negative Lead
C649-1	Ω	C4368B-11
C649-3	Ω	C4368B-12

C649-5	Ω	C4368B-13
C649-4	Ω	C4368A-24

Is the resistance less than 3 ohms?

Yes	INSTALL a new ambient lighting LED.

No	REPAIR the LED voltage supply circuit in question.

J4 CHECK THE FOOTWELL LIGHTING COLOR SUPPLY CIRCUITS

Ignition OFF.

Disconnect: LH Footwell Lamp C209 or RH Footwell Lamp C266 .

Disconnect: Body Control Module B (BCMB) C4368A .

Disconnect: Body Control Module B (BCMB) C4368B .

For the LH interior door release handle ambient lighting lamp, measure:

Positive Lead	Measurement / Action	Negative Lead
C209-1	Ω	C4368B-11
C209-2	Ω	C4368B-12
C209-3	Ω	C4368B-13
C209-4	Ω	C4368A-24

For the RH interior door release handle ambient lighting lamp, measure:

Positive Lead	Measurement / Action	Negative Lead
C266-1	Ω	C4368B-11
C266-2	Ω	C4368B-12
C266-3	Ω	C4368B-13
C266-4	Ω	C4368A-24

Is the resistance less than 3 ohms?

Yes	INSTALL a new ambient lighting LED.

No	REPAIR the LED voltage supply circuit in question.

J5 CHECK THE CENTER CONSOLE CUP HOLDER LIGHTING COLOR SUPPLY CIRCUITS

Ignition OFF.

Disconnect: Center Console Cup Holder Ambient Lighting Lamp C3349 .

Disconnect: Body Control Module B (BCMB) C4368A .

Disconnect: Body Control Module B (BCMB) C4368B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3349-1	Ω	C4368B-11
C3349-2	Ω	C4368B-12
C3349-3	Ω	C4368B-13
C3349-4	Ω	C4368A-24

Is the resistance less than 3 ohms?

Yes	INSTALL a new ambient lighting LED.

No	REPAIR the LED voltage supply circuit in question.

Service Manual: MODULE COMMUNICATIONS NETWORK

DESCRIPTION AND OPERATION > COMMUNICATIONS NETWORK - OVERVIEW > OVERVIEW

Multiplexing is a method of sending 2 or more signals simultaneously over a single circuit. Multiplexing allows 2 or more electronic modules (nodes) to communicate over a twisted wire pair [data (+) and data (-)] network. The information or messages that can be communicated on these wires consists of commands, status or data. Multiplexing reduces the weight of the vehicle by reducing the number of redundant components and electrical wiring.

The vehicle has 2 module communication networks connected to the DLC, located under the instrument panel. The communication networks are:

- HS-CAN1
- HS-CAN2

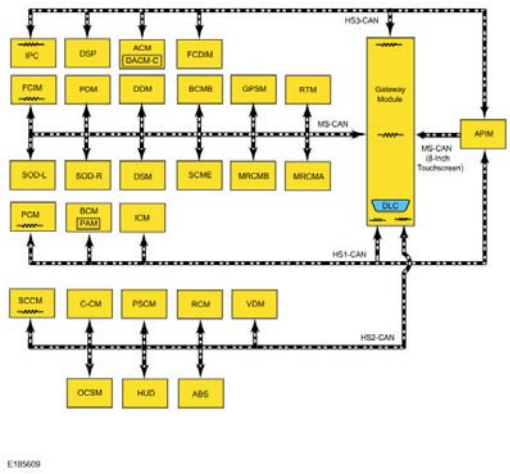
The vehicle has 2 module communication networks that communicate on the network, but do not communicate directly with the diagnostic scan tool. The GWM translates the messages on these 2 networks, and transfers the signals to the HS-CAN2 to communicate with the diagnostic scan tool. The communication networks are:

- HS-CAN3
- MS-CAN)

DESCRIPTION AND OPERATION > COMMUNICATIONS NETWORK - SYSTEM OPERATION AND COMPONENT DESCRIPTION

System Operation

DESCRIPTION AND OPERATION > COMMUNICATIONS NETWORK - SYSTEM OPERATION AND COMPONENT DESCRIPTION > MODULE NETWORK CHART



Module Network Chart

Module Name	Network Type	Terminating Module
APIM (if equipped)	HS-CAN1	No
	HS-CAN3	No
	MS-CAN	No
ABS module	HS-CAN2	No
ACM	HS-CAN3	No
DSP (if equipped)	HS-CAN3	No
BCM	HS-CAN1	No
Body Control Module B (BCMB)	MS-CAN	No
CCM (if equipped)	HS-CAN2	No
DACMC (integral with the ACM)	HS-CAN3	No
DDM (if equipped)	MS-CAN	No
DSM (if equipped)	MS-CAN	No
FCIM	MS-CAN	Yes
FCDIM (if equipped)	HS-CAN3	No
GWM	HS-CAN1	Yes
	HS-CAN2	Yes
	HS-CAN3	Yes
	MS-CAN	Yes
GPSM	MS-CAN	No
HUD module (if equipped)	HS-CAN2	No

ICM (if equipped)	HS-CAN1	No
IPC	HS-CAN3	Yes
Moveable Roof Control Module A (MRCMA) (if equipped)	MS-CAN	No
Moveable Roof Control Module B (MRCMB) (if equipped)	MS-CAN	No
OCSM	HS-CAN2	No
PAM (integral with BCM)	HS-CAN1	No
PSCM	HS-CAN2	No
PCM	HS-CAN1	Yes
PDM (if equipped)	MS-CAN	No
RTM	MS-CAN	No
RCM	HS-CAN2	No
SCME (if equipped)	MS-CAN	No
SODL (if equipped)	MS-CAN	No
SODR (if equipped)	MS-CAN	No
SCCM	HS-CAN2	Yes
VDM (if equipped)	HS-CAN2	No

DESCRIPTION AND OPERATION > COMMUNICATIONS NETWORK - SYSTEM OPERATION AND COMPONENT DESCRIPTION > NETWORK TERMINATION

The CAN uses network termination to improve communication reliability. Termination modules are located at both ends of the network. As network messages are broadcast in the form of voltage signals, the network voltage signals are stabilized by the termination resistors.

Each termination module has an internal 120 ohm resistor that bridges across the positive and negative bus connection. With two 120 ohm resistors located in a parallel circuit configuration, the total network impedance, or total resistance, is 60 ohms.

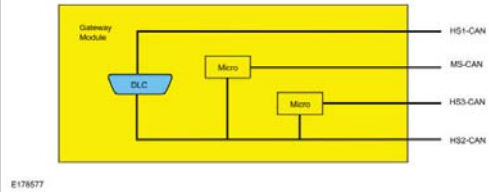
Network termination improves bus message reliability by stabilizing bus voltage and eliminating electrical interference.

DESCRIPTION AND OPERATION > COMMUNICATIONS NETWORK - SYSTEM OPERATION AND COMPONENT DESCRIPTION > GATEWAY MODULE

The GWM is mounted under the driver side instrument panel. The DLC connector is fitted to the GWM. The GWM acts as a central gateway to translate messages across all 4 vehicle controller area networks (CANs), and vice versa. The GWM is the only module on this vehicle with this ability. The GWM also

serves as a termination module for each of the networks to which it is connected.

The 2 module communication networks connected to the DLC are HS-CAN1 and HS-CAN2. These 2 networks communicate directly with the diagnostic scan tool. The other 2 communication networks, HS-CAN3 and MS-CAN, communicate on the network, but do not communicate directly with the diagnostic scan tool. The GWM translates the messages from these 2 networks to the HS-CAN2, which transfers the signals to the diagnostic scan tool.



DESCRIPTION AND OPERATION > COMMUNICATIONS NETWORK - SYSTEM OPERATION AND COMPONENT DESCRIPTION > HIGH SPEED CONTROLLER AREA NETWORK 1 AND 2 (HS-CAN1, HS-CAN2)

The HS-CAN1 and HS-CAN2 operate at a maximum data transfer speed of 500 Kbps and are designed for real time powertrain and driver feature information transfer and control. Modules on the HS-CAN1 and HS-CAN2 communicate using bussed messages. The HS-CAN uses an unshielded twisted pair cable, data bus (+) and data bus (-) circuits. In addition to scan tool communication, the HS-CAN allows sharing of information between all modules on each HS-CAN.

With the addition of more modules, network traffic has increased. This has created the need for an additional HS-CAN to manage the increased bus data carried on each network.

The GWM is used as a gateway for the messages to transfer between the scan tool and the modules on the HS-CAN1 and the modules on the HS-CAN2.

The scan tool communicates with the vehicle communication networks directly through the HS-CAN1 and HS-CAN2.

DESCRIPTION AND OPERATION > COMMUNICATIONS NETWORK - SYSTEM OPERATION AND COMPONENT DESCRIPTION > HIGH SPEED CONTROLLER AREA NETWORK 3 (HS-CAN3)

The HS-CAN3, or the Infotainment Controller Area Network (I-CAN), operates at a maximum data transfer speed of 500 Kbps and is designed for real time audio, multimedia and driver information transfer and control. Modules on the HS-CAN3 communicate using bussed messages. HS-CAN3 uses an unshielded twisted pair cable, data bus (+) and data bus (-) circuits, and allows sharing of information between all modules on the network.

The GWM is used as a gateway for the messages to transfer between the scan tool and the modules on the HS-CAN3.

The GWM translates the diagnostic messages from the HS-CAN2 to the HS-CAN3 and vice versa,

allowing communication between the modules on the HS-CAN3 and the scan tool.

DESCRIPTION AND OPERATION > COMMUNICATIONS NETWORK - SYSTEM OPERATION AND COMPONENT DESCRIPTION > MEDIUM SPEED CONTROLLER AREA NETWORK (MS-CAN)

The MS-CAN operates at a maximum data transfer speed of 125 Kbps and is designed for general information transfer. Modules on the MS-CAN communicate using bussed messages. The MS-CAN uses an unshielded twisted pair cable, data bus (+) and data bus (-) circuits. In addition to scan tool communication, the MS-CAN allows sharing of information between all modules on the network.

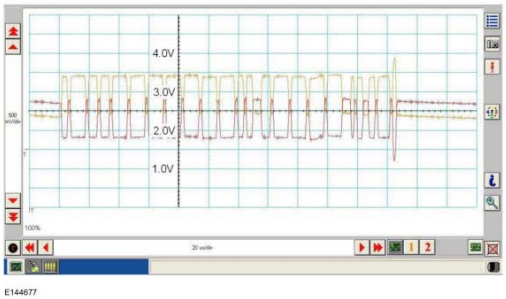
The GWM is used as a gateway for the messages to transfer between the scan tool and the modules on the MS-CAN.

The GWM translates the diagnostic messages from the HS-CAN2 to the MS-CAN and vice versa, allowing communication between the modules on the MS-CAN and the scan tool.

DESCRIPTION AND OPERATION > COMMUNICATIONS NETWORK - SYSTEM OPERATION AND COMPONENT DESCRIPTION > CONTROLLER AREA NETWORK (CAN) FAULT TOLERANCE

NOTE: The oscilloscope traces shown are from the IDS oscilloscope taken using the IDS pre-configured CAN settings. The traces are for both data (+) and data (-) taken simultaneously (2-channel) at a sample rate of 1 mega-sample per second (1MS/s) or greater.

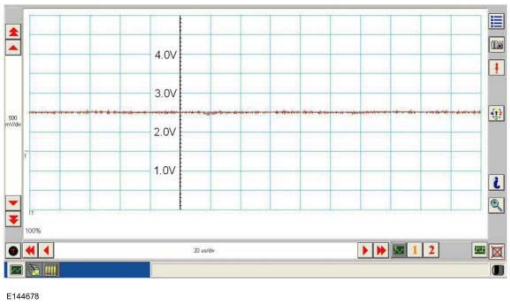
Fault Tolerance Normal Operation



The data (+) and data (-) circuits are each regulated to approximately 2.5 volts during neutral or rested network traffic. As messages are sent on the data (+) circuit, voltage is increased by approximately 1.0 volt. Inversely, the data (-) circuit is reduced by approximately 1.0 volt when a message is sent.

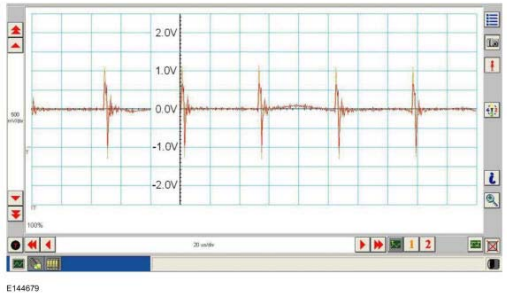
Successful communication of a message can usually be identified by the slight spike at the end of a message transmission. Any signals that are significantly different than the normal CAN waveform may cause network Diagnostic Trouble Codes (DTCs) (U-codes) to set or may cause a complete network outage.

CAN Circuits Shorted Together



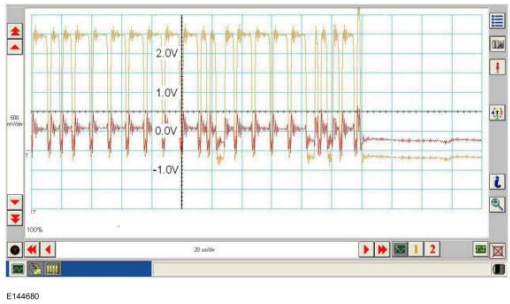
In the event the data (+) and data (-) circuits become shorted together, the signal stays at base voltage (2.5V) continuously and all communication capabilities are lost.

CAN (+) Circuit Shorted to Ground



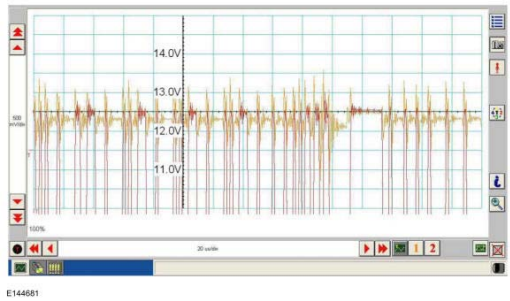
In the event the data (+) circuit becomes shorted to ground, both the data (+) and data (-) circuits are pulled low (0V) and all communication capabilities are lost.

CAN (-) Circuit Shorted to Ground



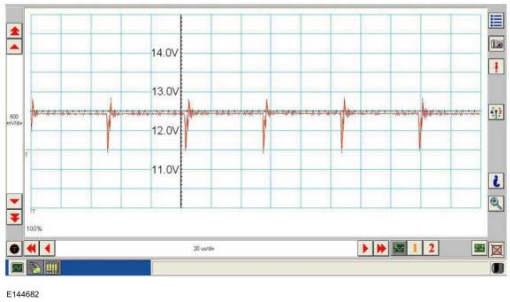
In the event the data (-) circuit becomes shorted to ground, the data (-) circuit is pulled low (0V) and the data (+) circuit reaches near-normal peak voltage (3.0V) during communication but falls to 0V instead of normal base voltage (2.5V). Communication may continue but at a degraded level.

CAN (+) Circuit Shorted to Battery Voltage



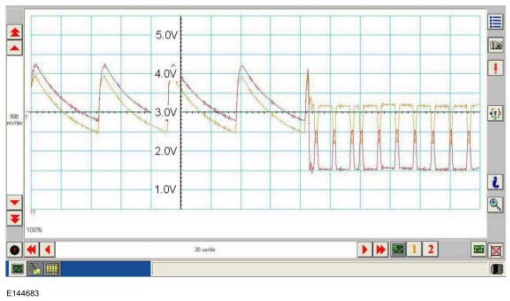
In the event the data (+) circuit becomes shorted to battery voltage, the data (+) circuit is pulled high (12V) and the data (-) circuit falls to abnormally high voltage (above 5V) during communication and reaches battery voltage (12V) for peak voltage. Communication may continue but at a degraded level.

CAN (-) Circuit Shorted to Battery Voltage



In the event the data (-) circuit becomes shorted to battery voltage, both the data (+) and data (-) circuits are pulled high (12V) and all communication capabilities are lost.

CAN Circuit Signal Corruption



Rhythmic oscillations, inductive spikes or random interference can corrupt the network communications. The corruption signal source may be outside electrical interference such as motors or solenoids or internal interference generated from a module on the network. In some cases, an open in either the data (+) or data (-) circuit to a network module may cause the module to emit interference on the one circuit which is still connected. The trace shown is an example of a "sawtooth" pattern transmitted from a module with one open network circuit.

Other corruptions may be present when a module is intermittently powered up and down. The module on power up may initiate communication out of sync with other modules on the network causing momentary communication outages.

DESCRIPTION AND OPERATION > COMMUNICATIONS NETWORK - SYSTEM OPERATION AND COMPONENT DESCRIPTION > CONTROLLER AREA NETWORK (CAN) MULTIPLEX MESSAGES

Network Message	Originating Module	Network Type	Receiving Module(s)
911 Assist ® override status	IPC	HS-CAN3	APIM
A/C clutch status	PCM	HS-CAN1	GWM
A/C clutch status	GWM	HS-CAN3	IPC
A/C clutch status	GWM	MS-CAN	FCIM
ABS active	ABS module	HS-CAN2	RCM CCM VDM GWM
ABS active	GWM	HS-CAN1	PCM
ABS fault	ABS module	HS-CAN2	GWM
ABS fault	GWM	HS-CAN1	PCM
ABS fault	GWM	HS-CAN3	IPC
ABS warning indicator request	ABS module	HS-CAN2	GWM RCM
ABS warning indicator request	GWM	HS-CAN3	IPC
Accelerator pedal position	PCM	HS-CAN1	GWM BCM
Accelerator pedal position	GWM	HS-CAN2	ABS module RCM CCM OCSM VDM
Accelerator pedal position	GWM	HS-CAN3	ACM APIM DACMC
Accelerator pedal position	GWM	MS-CAN	FCIM
Accessory delay	BCM	HS-CAN1	GWM
Accessory delay	GWM	MS-CAN	BCMB DDM MRCMA MRCMB PDM

ACM track information	ACM	HS-CAN3	APIM IPC
Active noise audio status	DACMC	HS-CAN3	DSP ACM
Adaptive cruise control cancel request	CCM	HS-CAN2	ABS module GWM
Adaptive cruise control cancel request	GWM	HS-CAN1	PCM
Adaptive cruise control commands	SCCM	HS-CAN2	GWM CCM
Adaptive cruise control commands	GWM	HS-CAN1	PCM
Adaptive cruise control deceleration request	CCM	HS-CAN2	ABS module RCM
Adaptive cruise control enable request	IPC	HS-CAN3	GWM
Adaptive cruise control enable request	GWM	HS-CAN2	CCM
Adaptive cruise control engine status	PCM	HS-CAN1	GWM
Adaptive cruise control engine status	GWM	HS-CAN2	CCM
Adaptive cruise control follow mode display	CCM	HS-CAN2	GWM
Adaptive cruise control follow mode display	GWM	HS-CAN3	IPC
Adaptive cruise control gap distance display	CCM	HS-CAN2	GWM
Adaptive cruise control gap distance display	GWM	HS-CAN3	IPC
Adaptive cruise control gap select	SCCM	HS-CAN2	CCM GWM
Adaptive cruise control gap select	GWM	HS-CAN1	PCM
Adaptive cruise control service required	CCM	HS-CAN2	GWM
Adaptive cruise control service required	GWM	HS-CAN3	IPC
Adaptive cruise control set speed request	PCM	HS-CAN1	GWM

Adaptive cruise control set speed request	GWM	HS-CAN2	CCM
Adaptive cruise control warning request	CCM	HS-CAN2	GWM
Adaptive cruise control warning request	GWM	HS-CAN3	IPC
Airbag deployment status	RCM	HS-CAN2	GWM
Airbag deployment status	GWM	HS-CAN1	APIM
Airbag indicator status	IPC	HS-CAN3	GWM
Airbag indicator status	GWM	HS-CAN2	RCM
Airbag warning indicator request	RCM	HS-CAN2	GWM
Airbag warning indicator request	GWM	HS-CAN3	IPC
Air fuel ratio display	PCM	HS-CAN1	GWM
Air fuel ratio display	GWM	HS-CAN3	IPC
Ambient air temperature	PCM	HS-CAN1	BCM GWM
Ambient air temperature	GWM	MS-CAN	FCIM
Ambient air temperature	GWM	HS-CAN3	IPC
Ambient air temperature	GWM	HS-CAN2	ABS module SCCM VDM
Ambient air temperature filtered	PCM	HS-CAN1	BCM GWM
Ambient air temperature filtered	GWM	MS-CAN	FCIM
Ambient air temperature filtered	GWM	HS-CAN3	IPC
Ambient light color/intensity	BCM	HS-CAN1	APIM GWM
Ambient light color/intensity	GWM	HS-CAN3	APIM
Ambient light color/intensity request	APIM	HS-CAN3	GWM
Ambient light color/intensity request	GWM	HS-CAN1	BCM
Audio front control module alert	ACM	HS-CAN3	IPC DSP

Audio settings	IPC	HS-CAN3	ACM APIM
Audio source select	IPC	HS-CAN3	ACM
Audio source status	ACM	HS-CAN3	IPC APIM DSP GWM
Audio source status	GWM	MS-CAN	FCIM
Audio system response status	ACM	HS-CAN3	IPC APIM DSP GWM
Audio system response status	GWM	MS-CAN	FCIM
Auto seat movement cancel	DSM	MS-CAN	DDM PDM
Backlit LED status	BCM	HS-CAN1	GWM
Backlit LED status	GWM	HS-CAN3	FCDIM
Backlit LED status	GWM	MS-CAN	DDM PDM FCIM
Battery low state of charge	BCM	HS-CAN1	GWM
Battery low state of charge	GWM	MS-CAN	FCIM
Battery low state of charge	GWM	HS-CAN3	IPC
Beltminder audio mute	ACM	HS-CAN3	APIM
BLIS/CTA enable request	IPC	HS-CAN3	GWM
BLIS/CTA enable request	GWM	MS-CAN	SODL SODR
BLIS/CTA LED command - left	SODL	MS-CAN	DDM PDM GWM
BLIS/CTA LED command - right	SODR	MS-CAN	DDM PDM GWM
Bluetooth call request	IPC	HS-CAN3	APIM
Body service required request	BCM	HS-CAN1	GWM
Body service required request	GWM	HS-CAN3	IPC

Brake (red) warning indicator request	ABS module	HS-CAN2	GWM RCM
Brake (red) warning indicator request	GWM	HS-CAN3	IPC
Brake fluid level low message request	BCM	HS-CAN1	GWM
Brake fluid level low message request	GWM	HS-CAN3	IPC
Brake On/Off switch	PCM	HS-CAN1	GWM
Brake On/Off switch	GWM	HS-CAN2	OCSM
Brake On/Off switch	GWM	HS-CAN3	APIM
Brake pedal applied	PCM	HS-CAN1	GWM
Brake pedal applied	GWM	HS-CAN2	ABS module CCM RCM VDM
Brake pedal applied	GWM	HS-CAN3	IPC APIM
Brake pedal movement	ABS module	HS-CAN2	GWM
Brake pedal movement	GWM	HS-CAN1	PCM
Brake wear message request	VDM	HS-CAN2	GWM
Brake wear message request	GWM	HS-CAN3	IPC
Call options	IPC	HS-CAN3	APIM
Camera settings	BCM	HS-CAN1	GWM
Camera settings	GWM	HS-CAN3	APIM
Camera settings request	APIM	HS-CAN3	GWM
Camera settings request	GWM	HS-CAN1	BCM
Camera settings status	BCM	HS-CAN1	GWM
Camera settings status	GWM	HS-CAN3	IPC
CD load/eject	ACM	HS-CAN3	APIM
Center stack display configuration	FCDIM	HS-CAN3	GWM
Center stack display configuration	APIM	HS-CAN1	BCM GWM
Center stack display configuration	GWM	HS-CAN2	CCM SCCM

Center stack display configuration	GWM	MS-CAN	DDM DSM FCIM
Child lock request	DDM	MS-CAN	GWM
Child lock request	GWM	HS-CAN1	BCM
Chime source	IPC	HS-CAN3	ACM DACMC DSP
Climate control button status	FCIM	MS-CAN	GWM
Climate control button status	GWM	HS-CAN3	APIM IPC
Climate control seat settings request	FCIM	MS-CAN	SCME
Climate control seat settings status	SCME	MS-CAN	FCIM
Climate control temperature	FCIM	MS-CAN	GWM
Climate control temperature	GWM	HS-CAN1	PCM
Cluster blended lighting	IPC	HS-CAN3	GWM
Cluster blended lighting	GWM	HS-CAN1	ICM
Cluster blended lighting	GWM	MS-CAN	BCMB
Clutch pedal position	PCM	HS-CAN1	GWM
Clutch pedal position	GWM	HS-CAN2	ABS module
Clutch pedal position	GWM	HS-CAN3	IPC
Collision mitigation by braking event status display	CCM	HS-CAN2	GWM
Collision mitigation by braking event status display	GWM	HS-CAN3	IPC
Collision mitigation by braking request	CCM	HS-CAN2	GWM RCM
Collision mitigation by braking request	GWM	HS-CAN1	PCM
Convertible top position status	MRCMA	MS-CAN	BCMB GWM

Convertible top position status	GWM	HS-CAN3	DACMC
Convertible top position status	GWM	HS-CAN1	BCM
Convertible top request	MRCMA	MS-CAN	MRCMB
Convertible top message request	MRCMA	MS-CAN	BCMB MRCMB GWM
Convertible top message request	GWM	HS-CAN3	IPC
Convertible top status	MRCMB	MS-CAN	MRCMA
Convertible top window drop command	MRCMA	MS-CAN	BCMB
Courtesy delay status	BCM	HS-CAN1	GWM
Courtesy delay status	GWM	MS-CAN	BCMB
Crash event status	BCM	HS-CAN1	GWM
Crash event status	GWM	MS-CAN	FCIM
Cross traffic alert chime request	IPC	HS-CAN3	ACM DSP
Cross traffic alert left status	SODL	MS-CAN	DDM PDM GWM
Cross traffic alert left status	GWM	HS-CAN3	IPC
Cross traffic alert right status	SODR	MS-CAN	DDM PDM GWM
Cross traffic alert right status	GWM	HS-CAN3	IPC
Cruise control mode	PCM	HS-CAN1	GWM
Cruise control mode	GWM	HS-CAN2	ABS module
Cruise control override	PCM	HS-CAN1	GWM
Cruise control override	GWM	HS-CAN2	ABS module CCM RCM
Cruise control override	GWM	HS-CAN3	IPC
Cruise control set speed display	PCM	HS-CAN1	GWM

Cruise control set speed display	GWM	HS-CAN3	IPC
Cruise control status	PCM	HS-CAN1	GWM
Cruise control status	GWM	HS-CAN2	ABS module CCM OCSM RCM
Cruise control status	GWM	HS-CAN3	IPC
Cruise control switch commands	SCCM	HS-CAN2	GWM
Cruise control switch commands	GWM	HS-CAN1	PCM
Cylinder head temperature data	PCM	HS-CAN1	GWM
Cylinder head temperature data	GWM	HS-CAN3	IPC
Date/time adjustment	APIM	HS-CAN3	IPC
Date/time settings	APIM	HS-CAN3	IPC DSP
Day/night status	BCM	HS-CAN1	GWM PAM ICM
Day/night status	GWM	HS-CAN3	IPC ACM APIM
Day/night status	GWM	MS-CAN	DDM PDM FCIM
Day/night status	GWM	HS-CAN2	CCM RCM HUD module
Daytime running lamps status	BCM	HS-CAN1	GWM
Daytime running lamps status	GWM	HS-CAN3	IPC
Display language request	APIM	HS-CAN3	IPC
Display speed offset data	IPC	HS-CAN3	GWM
Display speed offset data	GWM	HS-CAN1	PCM
Do not disturb override status	IPC	HS-CAN3	APIM

Door ajar status	BCM	HS-CAN1	GWM ICM
Door ajar status	GWM	HS-CAN3	IPC DACMC APIM FCDIM
Door ajar status	GWM	HS-CAN2	ABS module
Driver door ajar status	BCM	HS-CAN1	GWM ICM
Driver door ajar status	GWM	HS-CAN3	IPC DACMC APIM FCDIM
Driver door ajar status	GWM	HS-CAN2	ABS module CCM
Driver door lock switch status	DDM	MS-CAN	GWM
Driver door lock switch status	GWM	HS-CAN1	BCM
Driver performance mode request	IPC	HS-CAN3	GWM
Driver performance mode request	GWM	HS-CAN1	PCM
Driver safety belt buckle status	RCM	HS-CAN2	ABS module CCM GWM
Driver safety belt buckle status	GWM	HS-CAN3	IPC
Driver safety belt buckle status	GWM	HS-CAN1	BCM
Driver set temperature	APIM	HS-CAN3	GWM
Driver set temperature	GWM	MS-CAN	FCIM
DSP chime request	DSP	HS-CAN3	IPC APIM ACM
DSP volume status	DSP	HS-CAN3	APIM
eCall confirmation	APIM	HS-CAN1	BCM GWM
eCall confirmation	GWM	HS-CAN2	RCM
eCall notification	RCM	HS-CAN2	GWM

eCall notification	GWM	HS-CAN1	APIM
Emergency brake lamp request	ABS module	HS-CAN2	GWM
Emergency brake lamp request	GWM	HS-CAN1	BCM
Engine air inlet temperature data	PCM	HS-CAN1	GWM
Engine air inlet temperature data	GWM	HS-CAN3	IPC
Engine coolant temperature	PCM	HS-CAN1	BCM GWM
Engine coolant temperature	GWM	MS-CAN	FCIM
Engine coolant temperature	GWM	HS-CAN2	VDM
Engine coolant temperature data	PCM	HS-CAN1	BCM GWM
Engine coolant temperature data	GWM	HS-CAN3	IPC
Engine idle shutdown request	IPC	HS-CAN3	GWM
Engine idle shutdown request	GWM	HS-CAN1	PCM
Engine idle shutdown status	PCM	HS-CAN1	BCM GWM
Engine idle shutdown status	GWM	HS-CAN3	IPC
Engine oil life	PCM	HS-CAN1	GWM
Engine oil life	GWM	HS-CAN3	IPC
Engine oil life data reset	IPC	HS-CAN3	GWM
Engine oil life data reset	GWM	HS-CAN1	PCM
Engine oil temperature	PCM	HS-CAN1	ICM GWM
Engine oil temperature	GWM	HS-CAN3	IPC
Engine overheat indication request	PCM	HS-CAN1	GWM
Engine overheat indication request	GWM	HS-CAN3	IPC

Engine RPM data	PCM	HS-CAN1	BCM GWM
Engine RPM data	GWM	HS-CAN2	ABS module HUD module RCM
Engine RPM data	GWM	HS-CAN3	DACMC IPC
Engine RPM data	GWM	MS-CAN	FCIM
Engine service required request	PCM	HS-CAN1	GWM
Engine service required request	GWM	HS-CAN3	IPC
Engine service required request	GWM	HS-CAN2	RCM
Engine status	PCM	HS-CAN1	BCM GWM
Engine status	GWM	HS-CAN3	ACM APIM DACMC DSP IPC
Engine status	GWM	HS-CAN2	ABS module VDM
Engine status	GWM	MS-CAN	FCIM
English/metric mode	IPC	HS-CAN3	GWM
English/metric mode	GWM	MS-CAN	FCIM
English/metric mode	GWM	HS-CAN1	PCM
EPAS failure	PSCM	HS-CAN2	GWM
EPAS failure	GWM	HS-CAN3	IPC
ePRNDL mode	IPC	HS-CAN3	GWM
ePRNDL mode	GWM	HS-CAN1	BCM PCM
Evaporator temperature	FCIM	MS-CAN	GWM
Evaporator temperature	GWM	HS-CAN1	PCM
Factory mode	BCM	HS-CAN1	PAM PCM GWM
Factory mode	GWM	HS-CAN2	ABS module CCM

Factory mode	GWM	MS-CAN	DDM PDM FCIM RTM
Factory mode	GWM	HS-CAN3	IPC ACM APIM DSP
FCIM bezel diagnostic status	FCIM	MS-CAN	GWM
FCIM bezel diagnostic status	GWM	HS-CAN3	APIM
FCIM button state	FCIM	MS-CAN	GWM
FCIM button state	GWM	HS-CAN3	APIM DSP
Folder/track information request	IPC	HS-CAN3	ACM
Forward collision chime request	CCM	HS-CAN2	GWM
Forward collision chime request	GWM	HS-CAN3	IPC
Forward collision warning message request	CCM	HS-CAN2	GWM
Forward collision warning message request	GWM	HS-CAN3	IPC
Front blower speed	APIM	HS-CAN3	GWM
Front blower speed	GWM	MS-CAN	FCIM
Front fog lamp indicator request	BCM	HS-CAN1	GWM
Front fog lamp indicator request	GWM	HS-CAN3	IPC
Front fog lamp status	BCM	HS-CAN1	GWM
Front fog lamp status	GWM	HS-CAN3	IPC
Front passenger detect status	RCM	HS-CAN2	GWM
Front passenger detect status	GWM	HS-CAN3	IPC
Front wiper status	SCCM	HS-CAN2	CCM GWM
Front wiper status	GWM	HS-CAN3	APIM

Front wiper status	GWM	MS-CAN	FCIM SODL SODR
Front wiper status	GWM	HS-CAN1	BCM PCM
Fuel fill inlet message display	PCM	HS-CAN1	GWM
Fuel fill inlet message display	GWM	HS-CAN3	IPC
Fuel flow volume display	PCM	HS-CAN1	GWM
Fuel flow volume display	GWM	HS-CAN3	IPC
Gear lever position	PCM	HS-CAN1	GWM BCM PAM
Gear lever position	GWM	HS-CAN2	ABS module CCM RCM SCCM
Gear lever position	GWM	HS-CAN3	IPC APIM ACM DACMC DSP
Gear lever position	GWM	MS-CAN	DDM DSM FCIM GPSM PDM SODL SODR
Global window open command	BCM	HS-CAN1	GWM
Global window open command	GWM	MS-CAN	DDM PDM
GPS compass direction	GPSM	MS-CAN	APIM GWM
GPS compass direction	GWM	HS-CAN3	IPC APIM
GPS data	GPSM	MS-CAN	APIM GWM
GPS data	GWM	HS-CAN3	APIM

Grill shutter position command	PCM	HS-CAN1	BCM GWM
Grill shutter position command	GWM	HS-CAN3	IPC
Head up display active	HUD module	HS-CAN2	CCM
Head up display flash command	HUD module	HS-CAN2	CCM
Head up display flash rate	CCM	HS-CAN2	HUD module
Head up display LED status	HUD module	HS-CAN2	GWM
Head up display LED status	GWM	HS-CAN3	IPC
Headlamp flash to pass status	SCCM	HS-CAN2	GWM
Headlamp flash to pass status	GWM	HS-CAN1	BCM
Headlamp high/low status	BCM	HS-CAN1	GWM
Headlamp high/low status	GWM	HS-CAN2	SCCM
Headlamp high/low status	GWM	HS-CAN3	IPC
Headlamp low beam out	BCM	HS-CAN1	GWM
Headlamp low beam out	GWM	HS-CAN3	IPC
Headlamp on warning chime	BCM	HS-CAN1	GWM
Headlamp on warning chime	GWM	HS-CAN3	IPC
Heated steering wheel command status	FCIM	MS-CAN	GWM
Heated steering wheel command status	GWM	HS-CAN3	IPC
Hill start assist display	ABS module	HS-CAN2	GWM
Hill start assist display	GWM	HS-CAN3	IPC
Hill start assist mode request	IPC	HS-CAN3	GWM
Hill start assist mode request	GWM	HS-CAN2	ABS module
Hill start assist status	ABS module	HS-CAN2	GWM
Hill start assist status	GWM	HS-CAN3	IPC

Home safe lamp indicator request	BCM	HS-CAN1	GWM
Home safe lamp indicator request	GWM	HS-CAN3	IPC
Hood ajar status	BCM	HS-CAN1	GWM
Hood ajar status	GWM	HS-CAN3	DACMC IPC
HUD bulb check status	IPC	HS-CAN3	GWM
HUD bulb check status	GWM	HS-CAN2	HUD module
HVAC A/C request	FCIM	MS-CAN	GWM
HVAC A/C request	GWM	HS-CAN1	PCM
HVAC front blower indicator	IPC	HS-CAN3	APIM GWM
HVAC front blower indicator	GWM	MS-CAN	FCIM
HVAC front blower speed	APIM	HS-CAN3	GWM
HVAC front blower speed	GWM	MS-CAN	FCIM
HVAC front/rear blower status	FCIM	MS-CAN	GWM
HVAC front/rear blower status	GWM	HS-CAN1	BCM
HVAC evap temperature request	FCIM	MS-CAN	GWM
HVAC evap temperature request	GWM	HS-CAN1	PCM
Ignition key type	BCM	HS-CAN1	PCM PAM GWM
Ignition key type	GWM	HS-CAN3	IPC APIM ACM DSP
Ignition key type	GWM	MS-CAN	SODL SODR
Ignition key type	GWM	HS-CAN2	CCM ABS module
Ignition status	BCM	HS-CAN1	PCM PAM ICM GWM

Ignition status	GWM	MS-CAN	BCMB DDM DSM FCIM GPSM MRCMA MRCMB PDM RTM SODL SODR
Ignition status	GWM	HS-CAN2	ABS module CCM HUD module OCSM PSCM RCM SCCM VDM
Ignition status	GWM	HS-CAN3	ACM APIM DSP DACMC IPC
Illuminated entry status	BCM	HS-CAN1	GWM
Illuminated entry status	GWM	MS-CAN	BCMB
Illumination dimming level	BCM	HS-CAN1	GWM ICM
Illumination dimming level	GWM	MS-CAN	DDM PDM FCIM BCMB
Illumination dimming level	GWM	HS-CAN3	IPC ACM APIM
Immobilizer message display	BCM	HS-CAN1	GWM
Immobilizer message display	GWM	HS-CAN3	IPC
Input controller interface button data	SCCM	HS-CAN2	GWM
Input controller interface button data	GWM	HS-CAN3	IPC APIM
IPC chime request	IPC	HS-CAN3	ACM DSP

Key in ignition status	BCM	HS-CAN1	GWM ICM
Key in ignition status	GWM	MS-CAN	DSM RTM
Key in ignition status	GWM	HS-CAN3	IPC
Key in ignition status	GWM	HS-CAN2	ABS module
Key-in-ignition indicator status	BCM	HS-CAN1	GWM
Key-in-ignition indicator status	GWM	HS-CAN3	IPC
Keyless remote start request status	BCM	HS-CAN1	GWM
Keyless remote start request status	GWM	MS-CAN	RTM
Language selection	IPC	HS-CAN3	APIM
Language update status	IPC	HS-CAN3	APIM
Launch control status	PCM	HS-CAN1	GWM
Launch control status	GWM	HS-CAN3	IPC
Left turn lamp on request	BCM	HS-CAN1	GWM
Left turn lamp on request	GWM	HS-CAN3	IPC ACM DSP
Left turn lamp request	BCM	HS-CAN1	GWM
Left turn lamp request	GWM	MS-CAN	BCMB DDM PDM
Left turn lamp request	GWM	HS-CAN2	SCCM
LED low beam malfunction	BCM	HS-CAN1	GWM
LED low beam malfunction	GWM	HS-CAN3	IPC
Lock system message request	BCM	HS-CAN1	GWM
Lock system message request	GWM	HS-CAN3	IPC
Luggage compartment lid ajar	BCM	HS-CAN1	GWM
Luggage compartment lid ajar	GWM	HS-CAN3	IPC
Manual mirror override	DDM	MS-CAN	DSM

Manual upshift indicator	PCM	HS-CAN1	GWM
Manual upshift indicator	GWM	HS-CAN3	IPC
Memory feedback request	DSM	MS-CAN	GWM
Memory feedback request	GWM	HS-CAN3	IPC
Memory seat switch request	DSM	MS-CAN	GWM
Memory seat switch request	GWM	HS-CAN1	BCM
Memory seat switch status	DDM	MS-CAN	DSM
Message center display	IPC	HS-CAN3	GWM
Message center display	GWM	HS-CAN2	SCCM CCM
Message center display	GWM	HS-CAN1	BCM
Message center display	GWM	MS-CAN	DDM FCIM DSM
Message center feature configuration	IPC	HS-CAN3	GWM
Message center feature configuration	GWM	HS-CAN2	SCCM CCM
Message center feature configuration	GWM	HS-CAN1	BCM
Message center feature configuration	GWM	MS-CAN	DDM FCIM DSM
MIL request	PCM	HS-CAN1	BCM GWM
MIL request	GWM	HS-CAN3	IPC
MIL request	GWM	HS-CAN2	RCM
Mirror heat on request	FCIM	MS-CAN	DDM PDM
MyKey ® Beltminder audio mute	IPC	HS-CAN3	ACM DSP APIM
MyKey ® change key type request	IPC	HS-CAN3	GWM
MyKey ® change key type request	GWM	HS-CAN1	BCM
MyKey ® code status	BCM	HS-CAN1	GWM

MyKey ® code status	GWM	HS-CAN3	IPC
MyKey ® DSP volume limit status	DSP	HS-CAN3	APIM
MyKey ® IPC volume limit status	IPC	HS-CAN3	ACM APIM DSP
MyKey ® volume limit	ACM	HS-CAN3	APIM
Navigation information	APIM	HS-CAN3	IPC
OCS fault status	OCSM	HS-CAN2	RCM
OCS sensor data	OCSM	HS-CAN2	RCM GWM
OCS sensor data	GWM	MS-CAN	FCIM
OCS serial number	OCSM	HS-CAN2	RCM
OCS vehicle calibration data	OCSM	HS-CAN2	RCM
Odometer count	PCM	HS-CAN1	GWM
Odometer count	GWM	HS-CAN3	IPC APIM
Odometer master value	IPC	HS-CAN3	GWM
Odometer master value	GWM	HS-CAN2	ABS module PSCM VDM
Odometer master value	GWM	HS-CAN1	BCM PCM
Odometer trip programming data	IPC	HS-CAN3	GWM
Odometer trip programming data	GWM	HS-CAN1	PCM
Oil pressure warning indicator request	PCM	HS-CAN1	GWM ICM
Oil pressure warning indicator request	GWM	HS-CAN3	IPC
Outside air temperature	FCIM	MS-CAN	DDM PDM GWM
Outside air temperature	GWM	HS-CAN3	APIM IPC DSP

Outside air temperature	GWM	HS-CAN1	PAM PCM
Outside air temperature	GWM	HS-CAN2	CCM
Park brake active	BCM	HS-CAN1	PAM PCM GWM
Park brake active	GWM	HS-CAN3	APIM IPC
Park brake active	GWM	HS-CAN2	ABS module
Park detect status	IPC	HS-CAN3	GWM
Park detect status	GWM	HS-CAN1	BCM
Parking aid audio mute request	PAM	HS-CAN1	GWM
Parking aid audio mute request	GWM	HS-CAN3	IPC APIM DSP
Parking aid chime request	PAM	HS-CAN1	GWM
Parking aid chime request	GWM	HS-CAN3	IPC APIM FCDIM
Parking aid chime status	PAM	HS-CAN1	GWM
Parking aid chime status	GWM	HS-CAN3	APIM FCDIM IPC
Parking aid enable status	PAM	HS-CAN1	GWM
Parking aid enable status	GWM	HS-CAN3	IPC
Parking aid fault status	PAM	HS-CAN1	BCM GWM
Parking aid fault status	GWM	HS-CAN3	IPC APIM FCDIM
Parking aid message center data	PAM	HS-CAN1	GWM
Parking aid message center data	GWM	HS-CAN3	IPC FCDIM APIM
Parking aid rear status	PAM	HS-CAN1	GWM
Parking aid rear status	GWM	HS-CAN3	IPC FCDIM APIM

Parking aid sensor data	PAM	HS-CAN1	GWM
Parking aid sensor data	GWM	HS-CAN3	IPC FCDIM APIM
Parking brake chime request	BCM	HS-CAN1	GWM
Parking brake chime request	GWM	HS-CAN3	IPC
Parking brake status	BCM	HS-CAN1	PCM ICM PAM GWM
Parking brake status	GWM	HS-CAN3	IPC
Park lamp chime request	BCM	HS-CAN1	GWM
Park lamp chime request	GWM	HS-CAN3	IPC
Park lamp status	BCM	HS-CAN1	GWM
Park lamp status	GWM	MS-CAN	DDM FCIM PDM SODL SODR
Park lamp status	GWM	HS-CAN3	IPC ACM APIM
Passenger door ajar status	BCM	HS-CAN1	ICM GWM
Passenger door ajar status	GWM	HS-CAN3	IPC DACMC APIM FCDIM
Passenger door ajar status	GWM	HS-CAN2	ABS module
Passenger door ajar status	GWM	MS-CAN	DSM
Passenger door lock switch status	PDM	MS-CAN	GWM
Passenger door lock switch status	GWM	HS-CAN1	BCM
Passenger mirror command	DDM	MS-CAN	PDM
Passenger safety belt buckle status	RCM	HS-CAN2	GWM OCSM

Passenger safety belt buckle status	GWM	HS-CAN3	IPC
Passenger window command	DDM	MS-CAN	PDM
PATS control command	BCM	HS-CAN1	PCM
PATS start request target command	PCM	HS-CAN1	BCM GWM
PATS start request target command	GWM	HS-CAN2	ABS module
Perimeter alarm chime request	BCM	HS-CAN1	GWM
Perimeter alarm chime request	GWM	HS-CAN3	IPC
Power shed level request	BCM	HS-CAN1	PCM GWM
Power shed level request	GWM	HS-CAN2	SCCM
Power shed level request	GWM	MS-CAN	DDM PDM FCIM
Power shed level request	GWM	HS-CAN3	IPC
Powertrain drive mode	PCM	HS-CAN1	GWM
Powertrain drive mode	GWM	HS-CAN3	IPC
Power up chime modules	IPC	HS-CAN3	ACM DACMC DSP
Puddle lamp activation	BCM	HS-CAN1	GWM
Puddle lamp activation	GWM	MS-CAN	DDM PDM
Rear fog lamp indicator request	BCM	HS-CAN1	GWM
Rear fog lamp indicator request	GWM	HS-CAN3	IPC
RCM serial number	RCM	HS-CAN2	ABS module OCSM
Rear parking aid enable request	IPC	HS-CAN3	GWM
Rear parking aid enable request	GWM	HS-CAN1	PAM

Red brake warning indicator request	BCM	HS-CAN1	GWM
Red brake warning indicator request	GWM	HS-CAN3	IPC
Remote start status	BCM	HS-CAN1	GWM
Remote start status	GWM	HS-CAN2	RCM
Remote start status	GWM	MS-CAN	FCIM
Remote start status	GWM	HS-CAN3	APIM IPC
Restraint impact event status	RCM	HS-CAN2	OCSM CCM GWM
Restraint impact event status	GWM	MS-CAN	FCIM
Restraint impact event status	GWM	HS-CAN1	BCM PCM
Restraint impact event status	GWM	HS-CAN3	IPC
Restraint indicator lamp status	IPC	HS-CAN3	GWM
Restraint indicator lamp status	GWM	HS-CAN2	RCM
Reverse gear state	PCM	HS-CAN1	BCM PAM GWM
Reverse gear state	GWM	HS-CAN2	ABS module CCM OCSM RCM SCCM
Reverse gear state	GWM	HS-CAN3	IPC
Reverse gear state	GWM	MS-CAN	SODL SODR
Reverse mirrior chime	GWM	HS-CAN3	IPC
Reverse mirror chime request	DDM	MS-CAN	DSM GWM
Reverse mirror chime request	GWM	HS-CAN3	IPC
Right turn lamp request	BCM	HS-CAN1	GWM

Right turn lamp request	GWM	MS-CAN	BCMB DDM PDM
Right turn lamp request	GWM	HS-CAN3	ACM DSP IPC
RKE data	BCM	HS-CAN1	GWM
RKE data	GWM	MS-CAN	RTM
Satellite radio alert status	APIM	HS-CAN3	ACM
Satellite radio status	ACM	HS-CAN3	APIM IPC
Seat memory command	DSM	MS-CAN	DDM PDM GWM
Seat memory command	GWM	HS-CAN3	IPC
Set point volume	FCIM	MS-CAN	GWM
Set point volume	GWM	HS-CAN3	APIM DSP
Side obstacle detect status-left	SODL	MS-CAN	GWM
Side obstacle detect status-left	GWM	HS-CAN3	IPC
Side obstacle detect status-right	SODR	MS-CAN	GWM
Side obstacle detect status-right	GWM	HS-CAN3	IPC
Side obstacle sensor status-left	SODL	MS-CAN	SODR DDM PDM GWM
Side obstacle sensor status-left	GWM	HS-CAN3	IPC
Side obstacle sensor status-right	SODR	MS-CAN	SODL DDM PDM GWM
Side obstacle sensor status-right	GWM	HS-CAN3	IPC
Stability-traction control event in progress	ABS module	HS-CAN2	CCM RCM VDM

			GWM
Stability-traction control event in progress	GWM	HS-CAN1	PCM
Stability-traction control indicator request	ABS module	HS-CAN2	GWM RCM
Stability-traction control indicator request	GWM	HS-CAN1	PCM
Stability-traction control indicator request	GWM	HS-CAN3	IPC
Stability-traction control mode indicator	ABS module	HS-CAN2	CCM RCM GWM
Stability-traction control mode indicator	GWM	HS-CAN1	PCM
Stability-traction control mode indicator	GWM	HS-CAN3	IPC
Stability-traction control mode request	FCIM	MS-CAN	GWM
Stability-traction control mode request	GWM	HS-CAN2	ABS module
Starting system fault message request	PCM	HS-CAN1	GWM
Starting system fault message request	GWM	HS-CAN3	IPC
Steering column position switch status	SCCM	HS-CAN2	GWM
Steering column position switch status	GWM	MS-CAN	DSM
Steering effort status	PSCM	HS-CAN2	GWM
Steering effort status	GWM	HS-CAN3	IPC
Steering wheel angle	ABS module	HS-CAN2	CCM PSCM RCM VDM GWM
Steering wheel angle	GWM	HS-CAN1	BCM PAM PCM
Steering wheel angle	GWM	HS-CAN3	APIM IPC

Steering wheel angle sensor data	PSCM	HS-CAN2	ABS module CCM VDM SCCM GWM
Steering wheel angle sensor data	GWM	HS-CAN1	PCM
Steering wheel lock message request	BCM	HS-CAN1	GWM
Steering wheel lock message request	GWM	HS-CAN3	IPC
Steering wheel message center switch data	SCCM	HS-CAN2	GWM
Steering wheel message center switch data	GWM	HS-CAN3	IPC
Stop lamp brake request	ABS module	HS-CAN2	GWM
Stop lamp brake request	GWM	HS-CAN1	BCM
Stop lamp request	BCM	HS-CAN1	GWM
Stop lamp request	GWM	MS-CAN	BCMB
Suspension driver mode request	IPC	HS-CAN3	GWM
Suspension driver mode request	GWM	HS-CAN2	VDM
Suspension driver mode status	VDM	HS-CAN2	GWM
Suspension driver mode status	GWM	HS-CAN3	IPC
SYNC ® alerts	APIM	HS-CAN3	ACM DSP
Tire pressure data	BCM	HS-CAN1	GWM
Tire pressure data	GWM	HS-CAN3	IPC
Tire pressure information	BCM	HS-CAN1	GWM
Tire pressure information	GWM	MS-CAN	RTM
Tire pressure reset request	IPC	HS-CAN3	GWM
Tire pressure reset request	GWM	HS-CAN1	BCM
Tire pressure status	BCM	HS-CAN1	GWM
Tire pressure status	GWM	MS-CAN	RTM

Tire pressure system status	BCM	HS-CAN1	GWM
Tire pressure system status	GWM	MS-CAN	RTM
Tire pressure system status	GWM	HS-CAN3	IPC APIM
Tire pressure warning indicator	BCM	HS-CAN1	GWM
Tire pressure warning indicator	GWM	MS-CAN	RTM
Tire pressure warning indicator	GWM	HS-CAN3	IPC APIM
Traction control mode	ABS module	HS-CAN2	CCM GWM RCM VDM
Traction control mode	GWM	HS-CAN1	PCM
Transmission fluid temperature data	PCM	HS-CAN1	GWM
Transmission fluid temperature data	GWM	HS-CAN3	IPC
Transmission gear display	PCM	HS-CAN1	GWM
Transmission gear display	GWM	HS-CAN3	IPC
Transmission gear display mode	PCM	HS-CAN1	GWM
Transmission gear display mode	GWM	HS-CAN3	IPC
Transmission not in park indicator request	BCM	HS-CAN1	GWM
Transmission not in park indicator request	GWM	HS-CAN3	IPC
Transmission service required	PCM	HS-CAN1	GWM
Transmission service required	GWM	HS-CAN3	IPC
Transmission service required	GWM	HS-CAN2	RCM
Transport mode	BCM	HS-CAN1	PAM PCM GWM

Transport mode	GWM	HS-CAN2	ABS module CCM
Transport mode	GWM	MS-CAN	DDM PDM FCIM RTM
Transport mode	GWM	HS-CAN3	IPC ACM APIM DSP
Trip odometer verify	PCM	HS-CAN1	GWM
Trip odometer verify	GWM	HS-CAN3	IPC
Turn signal lamp out status	BCMB	MS-CAN	GWM
Turn signal lamp out status	GWM	HS-CAN1	BCM
Turn signal lamp out status	GWM	HS-CAN3	IPC
Turn signal status	SCCM	HS-CAN2	CCM GWM
Turn signal status	GWM	HS-CAN3	IPC
Turn signal status	GWM	MS-CAN	SODL SODR
Turn signal status	GWM	HS-CAN1	BCM
Turn signal switch status	SCCM	HS-CAN2	CCM GWM
Turn signal switch status	GWM	HS-CAN1	BCM
Vacuum/boost display	PCM	HS-CAN1	GWM
Vacuum/boost display	GWM	HS-CAN3	IPC
Valet mode status	APIM	HS-CAN3	GWM
Valet mode status	GWM	HS-CAN1	BCM
Vehicle configuration data	BCM	HS-CAN1	PCM GWM
Vehicle configuration data	GWM	HS-CAN2	ABS module CCM HUD module OCSM PSCM RCM SCCM VDM
Vehicle configuration data	GWM	MS-CAN	DDM FCIM

			GPSM PDM RTM SODL SODR
Vehicle configuration data	GWM	HS-CAN3	ACM APIM IPC
Vehicle dynamics SOS	ABS module	HS-CAN2	GWM
Vehicle dynamics SOS	GWM	HS-CAN3	IPC
Vehicle dynamics SOS	GWM	HS-CAN1	BCM
Vehicle lateral acceleration	ABS module	HS-CAN2	PSCM GWM
Vehicle lateral acceleration	GWM	HS-CAN1	PCM
Vehicle lateral acceleration	GWM	HS-CAN3	IPC
Vehicle lock requestor	BCM	HS-CAN1	GWM
Vehicle lock requestor	GWM	MS-CAN	DDM PDM
Vehicle lock status	BCM	HS-CAN1	GWM
Vehicle lock status	GWM	MS-CAN	DDM PDM
Vehicle lock status	GWM	HS-CAN3	APIM
Vehicle longitudinal acceleration	ABS module	HS-CAN2	PSCM GWM
Vehicle longitudinal acceleration	GWM	HS-CAN1	PCM
Vehicle longitudinal acceleration	GWM	HS-CAN3	IPC
Vehicle speed	PCM	HS-CAN1	BCM PAM GWM
Vehicle speed	GWM	HS-CAN3	IPC APIM
Vehicle speed	GWM	MS-CAN	BCMB DDM DSM FCIM GPSM MRCMA MRCMB PDM

			RTM SODL SODR
Vehicle speed	GWM	HS-CAN2	CCM HUD module OCSM PSCM RCM SCCM VDM
Vehicle temperature display units	APIM	HS-CAN3	IPC
Vehicle trip display units	APIM	HS-CAN3	IPC
Vehicle yaw rate	ABS module	HS-CAN2	GWM PSCM CCM
Vehicle yaw rate	GWM	HS-CAN1	PCM
Vehicle yaw rate	GWM	HS-CAN3	IPC
Vehicle yaw rate	RCM	HS-CAN2	ABS module CCM VDM GWM
Vehicle yaw rate	GWM	MS-CAN	GPSM SODL SODR
Voice recognition audio source request	APIM	HS-CAN3	ACM
Voice recognition bluetooth response data	APIM	HS-CAN3	IPC
Voice recognition status	APIM	HS-CAN3	IPC
Wheel rotation count	ABS module	HS-CAN2	GWM
Wheel rotation count	GWM	HS-CAN1	BCM
Wheel rotation count	GWM	MS-CAN	GPSM
Wheel rotation count	GWM	HS-CAN3	APIM
Wheel rotation direction	ABS module	HS-CAN2	GWM
Wheel rotation direction	GWM	MS-CAN	GPSM
Wheel rotation direction	GWM	HS-CAN3	APIM
Wheel speed data	ABS module	HS-CAN2	CCM PSCM GWM

Wheel speed data	GWM	HS-CAN1	BCM PCM
Window lockout status	BCM	HS-CAN1	GWM
Window lockout status	GWM	MS-CAN	DDM

DIAGNOSIS AND TESTING > COMMUNICATIONS NETWORK > DTC CHART: GATEWAY MODULE (GWM)

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

DTC	Description	Action
U2100:00	Initial Configuration Not Complete: No Sub Type Information	CHECK the vehicle service history for recent service actions related to this module. This DTC sets due to incomplete or incorrect PMI procedures. INSTALL As-Built data from Professional Technician Society (PTS) following diagnostic scan tool instructions under Module Programming>As-Built.
U3000:44	Control Module: Data Memory Failure	RETRIEVE all Continuous Memory Diagnostic Trouble Codes (CMDTCs). If DTC U3000:44 is retrieved, INSTALL a new GWM. REFER to: Gateway Module A (GWM) . If DTC U3000:44 is not retrieved, the module is operating correctly at this time. The concern may have been caused by an intermittent concern.
U3000:45	Control Module: Program Memory Failure	RETRIEVE all Continuous Memory Diagnostic Trouble Codes (CMDTCs). If DTC U3000:45 is retrieved, INSTALL a new GWM. REFER to: Gateway Module A (GWM) . If DTC U3000:45 is not retrieved, the module is operating correctly at this time. The concern may have been caused by an intermittent concern.
U3000:49	Control Module: Internal Electronic Failure	RETRIEVE all Continuous Memory Diagnostic Trouble Codes (CMDTCs). If DTC U3000:49 is retrieved, INSTALL a new GWM. REFER to: Gateway Module A

		(GWM) . If DTC U3000:49 is not retrieved, the module is operating correctly at this time. The concern may have been caused by an intermittent concern.

DIAGNOSIS AND TESTING > COMMUNICATIONS NETWORK > SYMPTOM CHART(S)

Symptom Chart: Communication Network

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

Symptom Chart

Condition	Possible Sources	Actions
The vehicle does not start with the diagnostic scan tool connected to the DLC and/or multiple malfunction indicators are only on when the diagnostic scan tool is connected to the DLC	Refer to the Pinpoint Test	GO to Pinpoint Test AH
No HS-CAN1 communication, all modules are not responding	Refer to the Pinpoint Test	GO to Pinpoint Test AD
No HS-CAN2 communication, all modules are not responding	Refer to the Pinpoint Test	GO to Pinpoint Test AE
No HS-CAN3 communication, all modules are not responding	Refer to the Pinpoint Test	GO to Pinpoint Test AF
No MS-CAN communication, all modules are not responding	Refer to the Pinpoint Test	GO to Pinpoint Test AG
The PCM does not respond to the diagnostic scan tool	Refer to the Pinpoint Test	GO to Pinpoint Test A
The ABS module does not respond to the diagnostic scan tool	Refer to the Pinpoint Test	GO to Pinpoint Test B
The VDM does not respond to the scan tool	Refer to the Pinpoint Test	GO to Pinpoint Test C
The RCM does not respond to the diagnostic scan tool	Refer to the Pinpoint Test	GO to Pinpoint Test D
The OCSM does not respond to the diagnostic scan tool	Refer to the Pinpoint Test	GO to Pinpoint Test E
The SCCM does not respond to the diagnostic scan tool	Refer to the Pinpoint Test	GO to Pinpoint Test F

The IPC does not respond to the diagnostic scan tool	Refer to the Pinpoint Test	GO to Pinpoint Test G
The ICM does not respond to the diagnostic scan tool	Refer to the Pinpoint Test	GO to Pinpoint Test H
The BCM does not respond to the diagnostic scan tool	Refer to the Pinpoint Test	GO to Pinpoint Test I
The BCMB does not respond to the diagnostic scan tool	Refer to the Pinpoint Test	GO to Pinpoint Test J
The FCIM module does not respond to the diagnostic scan tool	Refer to the Pinpoint Test	GO to Pinpoint Test K
The FCDIM module does not respond to the diagnostic scan tool	Refer to the Pinpoint Test	GO to Pinpoint Test L
The ACM does not respond to the diagnostic scan tool	Refer to the Pinpoint Test	GO to Pinpoint Test M
The GPSM does not respond to the diagnostic scan tool	Refer to the Pinpoint Test	GO to Pinpoint Test N
The APIM does not respond to the diagnostic scan tool	Refer to the Pinpoint Test	GO to Pinpoint Test O
The audio DSP does not respond to the diagnostic scan tool	Refer to the Pinpoint Test	GO to Pinpoint Test P
The DACMC does not respond to the diagnostic scan tool (integrated with the ACM)	Refer to the Pinpoint Test	GO to Pinpoint Test M
The RTM does not respond to the diagnostic scan tool	Refer to the Pinpoint Test	GO to Pinpoint Test Q
The PSCM does not respond to the diagnostic scan tool	Refer to the Pinpoint Test	GO to Pinpoint Test R
The DSM does not respond to the diagnostic scan tool	Refer to the Pinpoint Test	GO to Pinpoint Test S
The SCME does not respond to the diagnostic scan tool	Refer to the Pinpoint Test	GO to Pinpoint Test T
The DDM does not respond to the diagnostic scan tool	Refer to the Pinpoint Test	GO to Pinpoint Test U
The PDM does not respond to the diagnostic scan tool	Refer to the Pinpoint Test	GO to Pinpoint Test V
The SODL does not respond to the diagnostic scan tool	Refer to the Pinpoint Test	GO to Pinpoint Test W
The SODR does not respond to the diagnostic scan tool	Refer to the Pinpoint Test	GO to Pinpoint Test X
The CCM does not respond to the diagnostic scan tool	Refer to the Pinpoint Test	GO to Pinpoint Test Y

The HUD module does not respond to the diagnostic scan tool	Refer to the Pinpoint Test	GO to Pinpoint Test Z
The PAM does not respond to the diagnostic scan tool (integrated with the BCM)	Refer to the Pinpoint Test	GO to Pinpoint Test I
The Moveable Roof Control Module A (MRCMA) does not respond to the diagnostic scan tool	Refer to the Pinpoint Test	GO to Pinpoint Test AA
The Moveable Roof Control Module B (MRCMB) does not respond to the diagnostic scan tool	Refer to the Pinpoint Test	GO to Pinpoint Test AB
The GWM does not respond to the diagnostic scan tool	Refer to the Pinpoint Test	GO to Pinpoint Test AC
No power to the DLC	Refer to the Pinpoint Test	GO to Pinpoint Test AH

DIAGNOSIS AND TESTING > COMMUNICATIONS NETWORK > PINPOINT TESTS > PINPOINT TEST A : THE POWERTRAIN CONTROL MODULE (PCM) DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL

Refer to Module Communications Network for schematic and connector information.

Refer to Electronic Engine Controls - 5.0L for schematic and connector information.

Refer to Electronic Engine Controls - 2.3L for schematic and connector information.

Refer to Electronic Engine Controls - 3.7L for schematic and connector information.

Normal Operation and Fault Conditions

The PCM communicates with the diagnostic scan tool through the HS-CAN1. An IDS session cannot be established if the PCM communication fails when attempting to identify the vehicle.

Possible Sources

- Fuse
- Wiring, terminals and connectors
- PCM

DIAGNOSIS AND TESTING > COMMUNICATIONS NETWORK > PINPOINT TESTS > PINPOINT TEST A : THE POWERTRAIN CONTROL MODULE (PCM) DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL > PINPOINT TEST A : THE POWERTRAIN CONTROL MODULE (PCM) DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL

A1 VERIFY WHETHER OTHER HS-CAN1 (HIGH SPEED-CONTROLLER AREA NETWORK 1) MODULES PASS THE NETWORK TEST

Using a diagnostic scan tool, perform the network test.

Is the text "pass" or a DTC listed next to any of the following modules (if equipped): APIM, BCM, ICM or PCM?

Yes	If "pass" or a DTC was listed next to the PCM, a network fault is not currently present. If "pass" or a DTC was listed next to one or more modules other than the PCM, GO to A2

No	No modules are currently communicating on the HS-CAN1. GO to Pinpoint Test AD

A2 ENGINE CONTROLS ARTICLE PINPOINT TEST QA VERIFICATION CHECK

Verify Engine Controls article pinpoint test QA has been performed.

Has pinpoint test QA been performed?

Yes	GO to A3

No	Refer to ENGINE CONTROLS - INTRODUCTION (EXCEPT DIESEL & HYBRID) .

A3 CHECK THE HS-CAN1 (HIGH SPEED-CONTROLLER AREA NETWORK 1) TERMINATION RESISTANCE

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C251-6	Ω	C251-14

Is the resistance between 54 and 66 ohms?

Yes	GO to A5

No	GO to A4

A4 CHECK THE HS-CAN1 (HIGH SPEED-CONTROLLER AREA NETWORK 1) CIRCUITS BETWEEN THE PCM (POWERTRAIN CONTROL MODULE) AND THE DLC (DATA LINK CONNECTOR) FOR AN OPEN

Disconnect PCM C1551B (2.3L), C1381B (3.7L) or C175B (5.0L, 5.2L).

Measure:

2.3L

Positive Lead	Measurement / Action	Negative Lead
C1551B-69	Ω	C251-6
C1551B-68	Ω	C251-14

3.7L

Positive Lead	Measurement / Action	Negative Lead
C1381B-75	Ω	C251-6
C1381B-76	Ω	C251-14

5.0L or 5.2L

Positive Lead	Measurement / Action	Negative Lead
C175B-75	Ω	C251-6
C175B-76	Ω	C251-14

Are the resistances less than 3 ohms?

Yes	GO to A5

No	REPAIR the circuit in question.

A5 CHECK FOR CORRECT PCM (POWERTRAIN CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all the PCM connectors and related in-line connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the PCM connectors and related in-line connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for

	this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PCM. For 2.3L, REFER to: Powertrain Control Module (PCM) . For 3.7L, REFER to: Powertrain Control Module (PCM) . For 5.0L, REFER to: Powertrain Control Module (PCM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > COMMUNICATIONS NETWORK > PINPOINT TESTS > PINPOINT TEST B : THE ANTI-LOCK BRAKE SYSTEM (ABS) MODULE DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL

Refer to Module Communications Network for schematic and connector information.

Refer to Vehicle Dynamic Systems for schematic and connector information.

Normal Operation and Fault Conditions

The ABS module communicates with the diagnostic scan tool through the HS-CAN2.

Possible Sources

- Fuse
- Wiring, terminals and connectors
- ABS module

Visual Inspection and Diagnostic Pre-checks

Verify BJB fuses 5 (50A), 28 (30A) and 62 (5A) are OK.

DIAGNOSIS AND TESTING > COMMUNICATIONS NETWORK > PINPOINT TESTS > PINPOINT TEST B : THE ANTI-LOCK BRAKE SYSTEM (ABS) MODULE DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL > PINPOINT TEST B : THE ANTI-LOCK BRAKE SYSTEM (ABS) MODULE DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL

B1 CHECK THE ABS (ANTI-LOCK BRAKE SYSTEM) MODULE VOLTAGE SUPPLY CIRCUITS FOR AN OPEN

Ignition OFF.

Disconnect: ABS module C135

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C135-1		Ground
C135-30		Ground
C135-35		Ground

Are the voltages greater than 11 volts?

Yes	GO to B2

No	VERIFY the BJB fuses 5 (50A), 28 (30A) and 62 (5A) are OK. If OK, REPAIR the circuit in question. If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short.

B2 CHECK THE ABS (ANTI-LOCK BRAKE SYSTEM) MODULE GROUND CIRCUIT FOR AN OPEN

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C135-14	Ω	Ground

Is the resistance less than 3 ohms?

Yes	GO to B3

No	REPAIR the circuit.

B3 CHECK THE HS-CAN2 (HIGH SPEED-CONTROLLER AREA NETWORK 2) CIRCUITS BETWEEN THE ABS (ANTI-LOCK BRAKE SYSTEM) MODULE AND THE DLC (DATA LINK CONNECTOR) FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C135-42	Ω	C251-3
C135-43	Ω	C251-11

Are the resistances less than 3 ohms?

Yes	GO to B4

No	REPAIR the circuit in question.

B4 CHECK FOR CORRECT ABS (ANTI-LOCK BRAKE SYSTEM) MODULE OPERATION

Ignition OFF.

Disconnect and inspect the ABS module connector and related in-line connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the ABS module connector and related in-line connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ABS module. REFER to: Anti-Lock Brake System (ABS) Module .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > COMMUNICATIONS NETWORK > PINPOINT TESTS > PINPOINT TEST C : THE VEHICLE DYNAMICS CONTROL MODULE (VDM) DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL

Refer to Module Communications Network for schematic and connector information.

Refer to Vehicle Dynamic Suspension for schematic and connector information.

Normal Operation and Fault Conditions

The VDM communicates with the diagnostic scan tool through the HS-CAN2.

Possible Sources

- Fuse
- Wiring, terminals and connectors
- VDM

Visual Inspection and Diagnostic Pre-checks

Verify BJB fuse 66 (5A) and BCM fuse 25 (30A) are OK.

DIAGNOSIS AND TESTING > COMMUNICATIONS NETWORK > PINPOINT TESTS > PINPOINT TEST C : THE VEHICLE DYNAMICS CONTROL MODULE (VDM) DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL > PINPOINT TEST C : THE VEHICLE DYNAMICS CONTROL MODULE (VDM) DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL

C1 CHECK THE VDM (VEHICLE DYNAMICS CONTROL MODULE) VOLTAGE SUPPLY CIRCUITS FOR AN OPEN

Ignition OFF.

Disconnect:VDM C4396

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4396-16	V	Ground
C4396-32	V	Ground

Are the voltages greater than 11 volts?

Yes	GO to C2

No	VERIFY the BJB fuse 66 (5A) or BCM fuse 25 (30A) is OK. If OK, REPAIR the circuit in question. If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short.

C2 CHECK THE VDM (VEHICLE DYNAMICS CONTROL MODULE) GROUND CIRCUIT FOR AN OPEN

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4396-47	Ω	Ground

Is the resistance less than 3 ohms?

Yes	GO to C3

No	REPAIR the circuit.

C3 CHECK THE HS-CAN2 (HIGH SPEED-CONTROLLER AREA NETWORK 2) CIRCUITS BETWEEN THE VDM (VEHICLE DYNAMICS CONTROL MODULE) AND THE DLC (DATA LINK CONNECTOR) FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4396-39	Ω	C251-3
C4396-24	Ω	C251-11

Are the resistances less than 3 ohms?

Yes	GO to C4

No	REPAIR the circuit in question.

C4 CHECK FOR CORRECT VDM (VEHICLE DYNAMICS CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect the VDM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the VDM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new VDM.

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > COMMUNICATIONS NETWORK > PINPOINT TESTS > PINPOINT TEST D : THE RESTRAINTS CONTROL MODULE (RCM) DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL

Refer to Module Communications Network for schematic and connector information.

Refer to Supplemental Restraint System for schematic and connector information.

Normal Operation and Fault Conditions

The RCM communicates with the diagnostic scan tool through the HS-CAN2.

Possible Causes

- Fuse
- Wiring, terminals and connectors
- RCM

Visual Inspection and Diagnostic Pre-checks

Verify BCM fuse 35 (5A) is OK.

DIAGNOSIS AND TESTING > COMMUNICATIONS NETWORK > PINPOINT TESTS > PINPOINT TEST D : THE RESTRAINTS CONTROL MODULE (RCM) DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL > PINPOINT TEST D : THE RESTRAINTS CONTROL MODULE (RCM) DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL

WARNING: Never probe the electrical connectors on airbag, Safety Canopy ® or side air curtain assemblies. Failure to follow this instruction may result in the accidental deployment of these assemblies, which increases the risk of serious personal injury or death.

WARNING: Never disassemble or tamper with seat belt deployable components, including pretensioners, load limiters and inflators. Never back probe deployable device electrical connectors. Tampering or back probing may cause an accidental deployment and result in personal injury or death.

NOTE: The Supplemental Restraint System (SRS) must be fully operational and free of faults before releasing the vehicle to the customer.

D1 CHECK THE RCM (RESTRAINTS CONTROL MODULE) CONNECTION

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect: RCM C310A and C310B .

Are RCM C310A pin 19 and C310B pins 47 and 48 OK?

Yes	GO to D2

No	INSTALL a new wiring harness. REPOWER the Supplemental Restraint System (SRS). REFER to: Supplemental Restraint System (SRS) Repowering .

D2 CHECK THE RCM (RESTRAINTS CONTROL MODULE) VOLTAGE SUPPLY CIRCUIT FOR AN OPEN

Repower the SRS. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C310A-19		Ground

Is the voltage greater than 11 volts?

Yes	GO to D3

No	VERIFY the BCM fuse 35 (5A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short.

D3 CHECK THE RCM (RESTRAINTS CONTROL MODULE) CASE GROUND

Ignition OFF.

Measure the resistance between the RCM case and a good chassis ground.

Is the resistance less than 3 ohms?

Yes	GO to D4

No	REPAIR the RCM case ground as necessary.

D4 CHECK THE HS-CAN2 (HIGH SPEED-CONTROLLER AREA NETWORK 2) CIRCUITS BETWEEN THE RCM (RESTRAINTS CONTROL MODULE) AND THE DLC (DATA LINK CONNECTOR) FOR AN OPEN

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C310B-48	Ω	C251-3
C310B-47	Ω	C251-11

Are the resistances less than 3 ohms?

Yes	GO to D5

No	REPAIR the circuit in question.

D5 CHECK FOR CORRECT RCM (RESTRAINTS CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all the RCM connectors and related in-line connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the RCM connector and related in-line connectors. Make sure they seat and latch correctly.

Repower the Supplemental Restraint System (SRS). REFER to: Supplemental Restraint System (SRS) Repowering .

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new RCM. REFER to: Restraints Control Module (RCM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > COMMUNICATIONS NETWORK > PINPOINT TESTS > PINPOINT TEST E : THE OCCUPANT CLASSIFICATION SYSTEM MODULE (OCSM)

DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL

Refer to Module Communications Network for schematic and connector information.

Refer to Supplemental Restraint System for schematic and connector information.

Normal Operation and Fault Conditions

The OCSM communicates with the diagnostic scan tool through the HS-CAN2.

Possible Sources

- Fuse
- Wiring, terminals and connector
- OCSM

Visual Inspection and Diagnostic Pre-checks

Verify BCM fuse 22 (5A) is OK.

DIAGNOSIS AND TESTING > COMMUNICATIONS NETWORK > PINPOINT TESTS > PINPOINT TEST E : THE OCCUPANT CLASSIFICATION SYSTEM MODULE (OCSM) DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL > PINPOINT TEST E : THE OCCUPANT CLASSIFICATION SYSTEM MODULE (OCSM) DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL

E1 CHECK THE OCSM (OCCUPANT CLASSIFICATION SYSTEM MODULE) VOLTAGE SUPPLY CIRCUIT FOR AN OPEN

Ignition OFF.

Wait one minute.

Disconnect: OCSM C3043

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3043-1		Ground

Is the voltage greater than 11 volts?

Yes	GO to E2

No	VERIFY the BCM fuse 22 (5A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the

	OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short.

E2 CHECK THE OCSM (OCCUPANT CLASSIFICATION SYSTEM MODULE) GROUND CIRCUIT FOR AN OPEN

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3043-4	Ω	Ground

Is the resistance less than 3 ohms?

Yes	GO to E3

No	REPAIR the circuit.

E3 CHECK THE HS-CAN2 (HIGH SPEED-CONTROLLER AREA NETWORK 2) CIRCUITS BETWEEN THE OCSM (OCCUPANT CLASSIFICATION SYSTEM MODULE) AND THE DLC (DATA LINK CONNECTOR) FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3043-2	Ω	C251-3
C3043-3	Ω	C251-11

Are the resistances less than 3 ohms?

Yes	GO to E4

No	REPAIR the circuit in question.

E4 CHECK FOR CORRECT OCSM (OCCUPANT CLASSIFICATION SYSTEM MODULE) OPERATION

Ignition OFF.

Disconnect and inspect the OCSM connector and related in-line connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the OCSM connector and related in-line connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new OCSM. REFER to: Occupant Classification System (OCS) Sensor .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > COMMUNICATIONS NETWORK > PINPOINT TESTS > PINPOINT TEST F : THE STEERING COLUMN CONTROL MODULE (SCCM) DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL

Refer to Module Communications Network for schematic and connector information.

Refer to Cruise Control for schematic and connector information.

Normal Operation and Fault Conditions

The SCCM communicates with the diagnostic scan tool through the HS-CAN2.

Possible Causes

- Fuse
- Wiring, terminals and connector
- SCCM

Visual Inspection and Diagnostic Pre-checks

Verify BCM fuse 13 (7.5A) is OK.

DIAGNOSIS AND TESTING > COMMUNICATIONS NETWORK > PINPOINT TESTS > PINPOINT TEST F : THE STEERING COLUMN CONTROL MODULE (SCCM) DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL > PINPOINT TEST F : THE STEERING COLUMN CONTROL MODULE (SCCM) DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL

F1 CHECK THE HS-CAN2 (HIGH SPEED-CONTROLLER AREA NETWORK 2) TERMINATION RESISTANCE

Ignition OFF.

Disconnect the diagnostic scan tool cable from the DLC.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C251-3	Ω	C251-11

Is the resistance between 54 and 66 ohms?

Yes	GO to F3

No	GO to F2

F2 CHECK THE HS-CAN2 (HIGH SPEED-CONTROLLER AREA NETWORK 2) CIRCUITS BETWEEN THE SCCM (STEERING COLUMN CONTROL MODULE) AND THE DLC (DATA LINK CONNECTOR) FOR AN OPEN

Disconnect SCCM C226A

Measure:

Positive Lead	Measurement / Action	Negative Lead
C226A-3	Ω	C251-3
C226A-4	Ω	C251-11

Are the resistances less than 3 ohms?

Yes	GO to F5

No	REPAIR the circuit in question.

F3 CHECK THE SCCM (STEERING COLUMN CONTROL MODULE) VOLTAGE SUPPLY CIRCUIT FOR AN OPEN

Disconnect SCCM C226A

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead

C226A-7		Ground

Is the voltage greater than 11 volts?

Yes	GO to F4

No	VERIFY the BCM fuse 13 (7.5A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short.

F4 CHECK THE SCCM (STEERING COLUMN CONTROL MODULE) GROUND CIRCUIT FOR AN OPEN

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C226A-5	Ω	Ground

Is the resistance less than 3 ohms?

Yes	GO to F5

No	REPAIR the circuit.

F5 CHECK FOR CORRECT SCCM (STEERING COLUMN CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all the SCCM connectors and related in-line connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the SCCM connectors and related in-line connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical

	Service Bulletins (TSBs) address this concern, INSTALL a new SCCM. REFER to: Steering Column Control Module (SCCM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > COMMUNICATIONS NETWORK > PINPOINT TESTS > PINPOINT TEST G : THE INSTRUMENT PANEL CLUSTER (IPC) DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL

Refer to Module Communications Network for schematic and connector information.

Refer to Instrument Cluster for schematic and connector information.

Normal Operation and Fault Conditions

The IPC communicates on the HS-CAN3, and communicates with the diagnostic scan tool through the HS-CAN2. Diagnostic messages are sent/received through the HS-CAN2 circuits at the DLC, and translated through the GWM to the HS-CAN3.

Possible Sources

- Fuse
- Wiring, terminals and connector
- IPC

Visual Inspection and Diagnostic Pre-checks

Verify BCM fuse 13 (7.5A) is OK.

DIAGNOSIS AND TESTING > COMMUNICATIONS NETWORK > PINPOINT TESTS > PINPOINT TEST G : THE INSTRUMENT PANEL CLUSTER (IPC) DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL > PINPOINT TEST G : THE INSTRUMENT PANEL CLUSTER (IPC) DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL

G1 CHECK THE HS-CAN3 (HIGH SPEED-CONTROLLER AREA NETWORK 3) TERMINATION RESISTANCE

Ignition OFF.

Disconnect negative battery cable.

Disconnect the diagnostic scan tool cable from the DLC.

Disconnect GWM C2431

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2431-16	Ω	C2431-15

Is the resistance between 108 and 132 ohms?

Yes	GO to G3

No	GO to G2

G2 CHECK THE HS-CAN3 (HIGH SPEED-CONTROLLER AREA NETWORK 3) CIRCUITS BETWEEN THE IPC (INSTRUMENT PANEL CLUSTER) AND THE GWM (GATEWAY MODULE A) FOR AN OPEN

Disconnect IPC C220

Measure:

Positive Lead	Measurement / Action	Negative Lead
C220-12	Ω	C2431-16
C220-13	Ω	C2431-15

Are the resistances less than 3 ohms?

Yes	GO to G5

No	REPAIR the circuit in question.

G3 CHECK THE IPC (INSTRUMENT PANEL CLUSTER) VOLTAGE SUPPLY CIRCUIT

Disconnect: IPC C220 .

Connect negative battery cable.

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C220-8	V	Ground

Is the voltage greater than 11 volts?

Yes	GO to G4

No	VERIFY the BCM fuse 13 (7.5A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short.

G4 CHECK THE IPC (INSTRUMENT PANEL CLUSTER) GROUND CIRCUIT

Ignition OFF.

Disconnect negative battery cable.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C220-3	Ω	Ground

Is the resistance less than 3 ohms?

Yes	CONNECT negative battery cable. GO to G5

No	REPAIR the circuit.

G5 CHECK FOR CORRECT IPC (INSTRUMENT PANEL CLUSTER) OPERATION

Ignition OFF.

Disconnect and inspect the IPC connector and related in-line connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the IPC connector and related in-line connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > COMMUNICATIONS NETWORK > PINPOINT TESTS > PINPOINT TEST H : THE INSTRUMENT CENTER MODULE (ICM) DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL

Refer to Module Communications Network for schematic and connector information.

Refer to Instrument Cluster for schematic and connector information.

Normal Operation and Fault Conditions

The ICM communicates on the HS-CAN1.

Possible Sources

- Fuse
- Wiring, terminals and connector
- ICM

Visual Inspection and Diagnostic Pre-checks

Verify BCM fuse 32 (10A) is OK.

DIAGNOSIS AND TESTING > COMMUNICATIONS NETWORK > PINPOINT TESTS > PINPOINT TEST H : THE INSTRUMENT CENTER MODULE (ICM) DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL > PINPOINT TEST H : THE INSTRUMENT CENTER MODULE (ICM) DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL

H1 CHECK THE ICM (INFORMATION CENTER MODULE) VOLTAGE SUPPLY CIRCUIT

Disconnect: ICM C2114 .

Connect negative battery cable.

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2114-1		Ground

Is the voltage greater than 11 volts?

Yes	GO to H2

No	VERIFY the BCM fuse 32 (10A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short.

H2 CHECK THE ICM (INFORMATION CENTER MODULE) GROUND CIRCUIT

Ignition OFF.

Disconnect negative battery cable.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2114-4	Ω	Ground

Is the resistance less than 3 ohms?

Yes	CONNECT negative battery cable. GO to H3

No	REPAIR the circuit.

H3 CHECK THE HS-CAN1 (HIGH SPEED-CONTROLLER AREA NETWORK 1) CIRCUITS BETWEEN THE ICM (INFORMATION CENTER MODULE) AND THE DLC (DATA LINK CONNECTOR) FOR AN OPEN

Disconnect ICM C2114

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2114-2	Ω	C251-6
C2114-3	Ω	C251-14

Are the resistances less than 3 ohms?

Yes	GO to H4

No	REPAIR the circuit in question.

H4 CHECK FOR CORRECT ICM (INFORMATION CENTER MODULE) OPERATION

Ignition OFF.

Disconnect and inspect the ICM connector and related in-line connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the ICM connector and related in-line connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ICM. REFER to: Information Center Module (ICM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > COMMUNICATIONS NETWORK > PINPOINT TESTS > PINPOINT TEST I : THE BODY CONTROL MODULE (BCM) DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL

Refer to Power Distribution for schematic and connector information.

Refer to Module Communications Network for schematic and connector information.

Normal Operation and Fault Conditions

The BCM communicates with the diagnostic scan tool through the HS-CAN1.

Possible Causes

- Fuse
- Wiring, terminals and connector
- BCM

Visual Inspection and Diagnostic Pre-checks

Verify BJB fuse 7 (60A) is OK.

DIAGNOSIS AND TESTING > COMMUNICATIONS NETWORK > PINPOINT TESTS > PINPOINT TEST I : THE BODY CONTROL MODULE (BCM) DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL > PINPOINT TEST I : THE BODY CONTROL MODULE (BCM) DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL

I1 CHECK THE BCM (BODY CONTROL MODULE) VOLTAGE SUPPLY CIRCUIT FOR AN OPEN

Ignition OFF.

Disconnect BCM C2280H .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2280H-1		Ground

Is the voltage greater than 11 volts?

Yes	Connect BCM C2280H . GO to I2

No	VERIFY the BJB fuse 7 (60A) is OK. If OK, repair the circuit in question. If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short.

I2 CHECK THE BCM (BODY CONTROL MODULE) GROUND CIRCUITS FOR AN OPEN

Ignition OFF.

Disconnect BCM C2280C .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2280C-6	Ω	Ground
C2280C-7	Ω	Ground
C2280C-10	Ω	Ground

Are the resistances less than 3 ohms?

Yes	GO to I3

No	REPAIR the circuit in question.

I3 CHECK THE HS-CAN1 (HIGH SPEED-CONTROLLER AREA NETWORK 1) CIRCUITS BETWEEN THE BCM (BODY CONTROL MODULE) AND THE DLC (DATA LINK CONNECTOR) FOR AN OPEN

Disconnect: BCM C2280G .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2280G-10	Ω	C251-6
C2280G-9	Ω	C251-14

Are the resistances less than 3 ohms?

Yes	GO to I4

No	REPAIR the circuit in question.

I4 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect the BCM connectors and related in-line connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors and related in-line connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > COMMUNICATIONS NETWORK > PINPOINT TESTS > PINPOINT TEST J : THE BODY CONTROL MODULE B (BCMB) DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL

Refer to Module Communications Network for schematic and connector information.

Refer to Power Windows for schematic and connector information.

Normal Operation and Fault Conditions

The Body Control Module B (BCMB) communicates on the MS-CAN, and communicates with the diagnostic scan tool through the HS-CAN2. Diagnostic messages are sent/received through the HS-CAN2 circuits at the DLC, and translated through the GWM to the MS-CAN.

Visual Inspection and Diagnostic Pre-checks

Verify BCM fuses 28 (20A) and 36 (15A) are OK.

DIAGNOSIS AND TESTING > COMMUNICATIONS NETWORK > PINPOINT TESTS > PINPOINT TEST J : THE BODY CONTROL MODULE B (BCMB) DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL > PINPOINT TEST J : THE BODY CONTROL MODULE B (BCMB) DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL

J1 CHECK THE BODY CONTROL MODULE B (BCMB) VOLTAGE SUPPLY CIRCUIT FOR AN OPEN

Ignition OFF.

Disconnect: Body Control Module B (BCMB) C4368A .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4368A-1	V	Ground
C4368A-7	V	Ground

Is the voltage greater than 11 volts?

Yes	GO to J2

No	VERIFY BCM fuse 28 (20A) or fuse 36 (15A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short.

J2 CHECK THE BODY CONTROL MODULE B (BCMB) GROUND CIRCUIT FOR AN OPEN

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4368A-13	Ω	Ground

Is the resistance less than 3 ohms?

Yes	GO to J3

No	REPAIR the circuit.

J3 CHECK THE MS-CAN (MEDIUM SPEED-CONTROLLER AREA NETWORK) CIRCUITS BETWEEN THE BODY CONTROL MODULE B (BCMB) AND THE GWM (GATEWAY MODULE A) FOR AN OPEN

Disconnect: GWM C2431 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4368A-11	Ω	C2431-23
C4368A-23	Ω	C2431-22

Are the resistances less than 3 ohms?

Yes	GO to J4

No	REPAIR the circuit in question.

J4 CHECK FOR CORRECT BODY CONTROL MODULE B (BCMB) OPERATION

Ignition OFF.

Disconnect and inspect the Body Control Module B (BCMB) connector and related in-line connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the Body Control Module B (BCMB) connector and related in-line connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new Body Control Module B (BCMB). REFER to: Body Control Module B (BCMB) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > COMMUNICATIONS NETWORK > PINPOINT TESTS > PINPOINT TEST K : THE FRONT CONTROLS INTERFACE MODULE (FCIM) DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL

Refer to Module Communications Network for schematic and connector information.

Refer to Automatic Climate Control System for schematic and connector information.

Normal Operation and Fault Conditions

The FCIM communicates on the MS-CAN, and communicates with the diagnostic scan tool through the HS-CAN2. Diagnostic messages are sent/received through the HS-CAN2 circuits at the DLC, and translated through the GWM to the MS-CAN.

Possible Sources

- Fuse
- Wiring, terminals and connector
- FCIM

Visual Inspection and Diagnostic Pre-checks

Verify BCM fuse 12 (7.5A) is OK.

DIAGNOSIS AND TESTING > COMMUNICATIONS NETWORK > PINPOINT TESTS > PINPOINT TEST K : THE FRONT CONTROLS INTERFACE MODULE (FCIM) DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL > PINPOINT TEST K : THE FRONT CONTROLS INTERFACE MODULE (FCIM) DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL

K1 CHECK THE MS-CAN (MEDIUM SPEED-CONTROLLER AREA NETWORK) TERMINATION RESISTANCE

Ignition OFF.

Disconnect negative battery cable.

Disconnect the diagnostic scan tool cable from the DLC.

Disconnect: GWM C2431 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2431-23	Ω	C2431-22

Is the resistance between 108 and 132 ohms?

Yes	GO to K3

No	GO to K2

K2 CHECK THE MS-CAN (MEDIUM SPEED-CONTROLLER AREA NETWORK) CIRCUITS BETWEEN THE FCIM (FRONT CONTROLS INTERFACE MODULE) AND THE GWM (GATEWAY MODULE A) FOR AN OPEN

Disconnect FCIM C2402A .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2402A-17	Ω	C2431-23
C2402A-18	Ω	C2431-22

Are the resistances less than 3 ohms?

Yes	GO to K5

No	REPAIR the circuit in question.

K3 CHECK THE FCIM (FRONT CONTROLS INTERFACE MODULE) VOLTAGE SUPPLY CIRCUIT FOR AN OPEN

Connect negative battery cable.

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2402A-26	V	Ground

Is the voltage greater than 11 volts?

Yes	GO to K4

No	VERIFY the BCM fuse 12 (7.5A) is OK. If OK, REPAIR the circuit. If not OK, REFER to

	the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short.

K4 CHECK THE FCIM (FRONT CONTROLS INTERFACE MODULE) GROUND CIRCUIT FOR AN OPEN

Ignition OFF.

Disconnect negative battery cable.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2402A-1	Ω	Ground

Is the resistance less than 3 ohms?

Yes	CONNECT negative battery cable. GO to K5

No	REPAIR the circuit.

K5 CHECK FOR CORRECT FCIM (FRONT CONTROLS INTERFACE MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all the FCIM connectors and related in-line connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the FCIM connectors and related in-line connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new FCIM. For AM/FM/CD /SYNC, REFER to: Front Controls Interface Module (FCIM) . For touchscreen display, REFER to: Front Controls Interface Module (FCIM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > COMMUNICATIONS NETWORK > PINPOINT TESTS > PINPOINT TEST L : THE FRONT CONTROL/DISPLAY INTERFACE MODULE (FCDIM) DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL

Refer to Module Communications Network for schematic and connector information.

Refer to Audio System/Navigation - Am/Fm/Sync/Touchscreen Display for schematic and connector information.

Refer to Audio System/Navigation - AM/FM/CD/SYNC for schematic and connector information.

Normal Operation and Fault Conditions

The FCDIM communicates on the HS-CAN3, and communicates with the diagnostic scan tool through the HS-CAN2. Diagnostic messages are sent/received through the HS-CAN2 circuits at the DLC, and translated through the GWM to the HS-CAN3.

Possible Sources

- Fuse
- Wiring, terminals and connector
- FCDIM

Visual Inspection and Diagnostic Pre-checks

Verify BCM fuse 32 (10A) is OK.

DIAGNOSIS AND TESTING > COMMUNICATIONS NETWORK > PINPOINT TESTS > PINPOINT TEST L : THE FRONT CONTROL/DISPLAY INTERFACE MODULE (FCDIM) DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL > PINPOINT TEST L : THE FRONT CONTROL/DISPLAY INTERFACE MODULE (FCDIM) DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL

L1 CHECK THE FCDIM (FRONT CONTROL/DISPLAY INTERFACE MODULE) VOLTAGE SUPPLY CIRCUIT FOR AN OPEN

Ignition OFF.

Disconnect: FCDIM C2123 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2123-1		Ground

Is the voltage greater than 11 volts?

Yes	GO to L2

No	VERIFY the BCM fuse 32 (10A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short.

L2 CHECK THE FCDIM (FRONT CONTROL/DISPLAY INTERFACE MODULE) GROUND CIRCUIT FOR AN OPEN

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2123-9	Ω	Ground

Is the resistance less than 3 ohms?

Yes	GO to L3

No	REPAIR the circuit.

L3 CHECK THE HS-CAN3 (HIGH SPEED-CONTROLLER AREA NETWORK 3) CIRCUITS BETWEEN THE FCDIM (FRONT CONTROL/DISPLAY INTERFACE MODULE) AND THE GWM (GATEWAY MODULE A) FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2123-4	Ω	C2431-16
C2123-5	Ω	C2431-15

Are the resistances less than 3 ohms?

Yes	GO to L4

No	REPAIR the circuit in question.

L4 CHECK FOR CORRECT FCDIM (FRONT CONTROL/DISPLAY INTERFACE MODULE) OPERATION

Ignition OFF.

Disconnect and inspect the FCDIM connector and related in-line connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the FCDIM connector and related in-line connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new FCDIM. REFER to: INFORMATION AND ENTERTAINMENT SYSTEM - GENERAL INFORMATION - VEHICLES WITH TOUCHSCREEN DISPLAY .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > COMMUNICATIONS NETWORK > PINPOINT TESTS > PINPOINT TEST M : THE AUDIO CONTROL MODULE (ACM) DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL

Refer to Module Communications Network for schematic and connector information.

Refer to Audio System/Navigation - AM/FM/CD/SYNC for schematic and connector information.

Refer to Audio System/Navigation - AM/FM/SYNC/Touchscreen Display for schematic and connector information.

Normal Operation and Fault Conditions

The ACM communicates on the HS-CAN3, and communicates with the diagnostic scan tool through the HS-CAN2. Diagnostic messages are sent/received through the HS-CAN2 circuits at the DLC, and translated through the GWM to the HS-CAN3.

Possible Sources

- Fuse
- Wiring, terminals and connector
- ACM

Visual Inspection and Diagnostic Pre-checks

Verify BCM fuse 33 (20A) is OK.

DIAGNOSIS AND TESTING > COMMUNICATIONS NETWORK > PINPOINT TESTS > PINPOINT TEST M : THE AUDIO CONTROL MODULE (ACM) DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL > PINPOINT TEST M : THE AUDIO CONTROL MODULE (ACM) DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL

M1 CHECK THE ACM (AUDIO FRONT CONTROL MODULE) VOLTAGE SUPPLY CIRCUIT FOR AN OPEN

Ignition OFF.

Disconnect: ACM C240A .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C240A-1		Ground

Is the voltage greater than 11 volts?

Yes	GO to M2

No	VERIFY the BCM fuse 33 (20A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short.

M2 CHECK THE ACM (AUDIO FRONT CONTROL MODULE) GROUND CIRCUIT FOR AN OPEN

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C240A-13	Ω	Ground

Is the resistance less than 3 ohms?

Yes	GO to M3

No	REPAIR the circuit.

M3 CHECK THE HS-CAN3 (HIGH SPEED-CONTROLLER AREA NETWORK 3) CIRCUITS

BETWEEN THE ACM (AUDIO FRONT CONTROL MODULE) AND THE GWM (GATEWAY MODULE A) FOR AN OPEN

Disconnect GWM C2431 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C240A-14	Ω	C2431-16
C240A-15	Ω	C2431-15

Are the resistances less than 3 ohms?

Yes	GO to M4

No	REPAIR the circuit in question.

M4 CHECK FOR CORRECT ACM (AUDIO FRONT CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all the ACM connectors and related in-line connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the ACM connectors and related in-line connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ACM. For AM/FM/CD /SYNC, REFER to: Audio Front Control Module (ACM) . For touchscreen display, REFER to: Audio Front Control Module (ACM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > COMMUNICATIONS NETWORK > PINPOINT TESTS > PINPOINT TEST N : THE GLOBAL POSITIONING SYSTEM MODULE (GPSM) DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL

Refer to Module Communications Network for schematic and connector information.

Refer to Audio System/Navigation - AM/FM/CD/SYNC for schematic and connector information.

Refer to Audio System/Navigation - AM/FM/SYNC/Touchscreen Display for schematic and connector information.

Normal Operation and Fault Conditions

The GPSM communicates on the MS-CAN, and communicates with the diagnostic scan tool through the HS-CAN2. Diagnostic messages are sent/received through the HS-CAN2 circuits at the DLC, and translated through the GWM to the MS-CAN.

Visual Inspection and Diagnostic Pre-checks

Verify BCM fuse 32 (10A) is OK.

DIAGNOSIS AND TESTING > COMMUNICATIONS NETWORK > PINPOINT TESTS > PINPOINT TEST N : THE GLOBAL POSITIONING SYSTEM MODULE (GPSM) DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL > PINPOINT TEST N : THE GLOBAL POSITIONING SYSTEM MODULE (GPSM) DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL

N1 CHECK THE GPSM (GLOBAL POSITIONING SYSTEM MODULE) VOLTAGE SUPPLY CIRCUIT FOR AN OPEN

Ignition OFF.

Disconnect: GPSM C2398 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2398-1		Ground

Is the voltage greater than 11 volts?

Yes	GO to N2

No	VERIFY BCM fuse 32 (10A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short.

N2 CHECK THE GPSM (GLOBAL POSITIONING SYSTEM MODULE) GROUND CIRCUIT FOR AN OPEN

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2398-6	Ω	Ground

Is the resistance less than 3 ohms?

Yes	GO to N3

No	REPAIR the circuit.

N3 CHECK THE MS-CAN (MEDIUM SPEED-CONTROLLER AREA NETWORK) CIRCUITS BETWEEN THE GPSM (GLOBAL POSITIONING SYSTEM MODULE) AND THE GWM (GATEWAY MODULE A) FOR AN OPEN

Disconnect: GWM C2431 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2398-2	Ω	C2431-23
C2398-3	Ω	C2431-22

Are the resistances less than 3 ohms?

Yes	GO to N4

No	REPAIR the circuit in question.

N4 CHECK FOR CORRECT GPSM (GLOBAL POSITIONING SYSTEM MODULE) OPERATION

Ignition OFF.

Disconnect and inspect the GPSM connector and related in-line connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the GPSM connector and related in-line connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new GPSM. For AM/FM/CD /SYNC, REFER to: Global Positioning System Module (GPSM) . For touchscreen display, REFER to: Global Positioning System Module (GPSM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > COMMUNICATIONS NETWORK > PINPOINT TESTS > PINPOINT TEST O : THE ACCESSORY PROTOCOL INTERFACE MODULE (APIM) DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL

Refer to Module Communications Network for schematic and connector information.

Refer to Audio System/Navigation - AM/FM/CD/SYNC for schematic and connector information.

Refer to Audio System/Navigation - AM/FM/SYNC/Touchscreen Display for schematic and connector information.

Normal Operation and Fault Conditions

The APIM communicates with the diagnostic scan tool through the HS-CAN1 and communicates with other modules through the HS-CAN3 and the MS-CAN (touchscreen only). Diagnostic messages to modules on the HS-CAN3 and MS-CAN are sent/received between the DLC and the diagnostic scan tool through the HS-CAN2 circuits at the DLC, and translated through the GWM.

Possible Sources

- Fuse
- Wiring, terminals and connector
- APIM

Visual Inspection and Diagnostic Pre-checks

Verify BCM fuse 32 (10A) is OK.

DIAGNOSIS AND TESTING > COMMUNICATIONS NETWORK > PINPOINT TESTS > PINPOINT TEST O : THE ACCESSORY PROTOCOL INTERFACE MODULE (APIM) DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL > PINPOINT TEST O : THE

ACCESSORY PROTOCOL INTERFACE MODULE (APIM) DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL

O1 CHECK THE APIM (SYNC MODULE) VOLTAGE SUPPLY CIRCUIT FOR AN OPEN

Ignition OFF.

Disconnect: APIM C2383 or C2342 (touchscreen display).

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2383-1		Ground

Touchscreen display

Positive Lead	Measurement / Action	Negative Lead
C2342-1		Ground

Is the voltage greater than 11 volts?

Yes	GO to O2

No	VERIFY the BCM fuse 32 (10A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short.

O2 CHECK THE APIM (SYNC MODULE) GROUND CIRCUITS FOR AN OPEN

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2383-37	Ω	Ground
C2383-38	Ω	Ground

Touchscreen display

Positive Lead	Measurement / Action	Negative Lead
C2342-37	Ω	Ground

Is the resistance less than 3 ohms?

Yes	GO to O3

No	REPAIR the circuit.

O3 CHECK THE HS-CAN1 (HIGH SPEED-CONTROLLER AREA NETWORK 1) CIRCUITS BETWEEN THE APIM (SYNC MODULE) AND THE DLC (DATA LINK CONNECTOR) FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2383-53	Ω	C251-6
C2383-54	Ω	C251-14

Touchscreen display

Positive Lead	Measurement / Action	Negative Lead
C2342-53	Ω	C251-6
C2342-54	Ω	C251-14

Are the resistances less than 3 ohms?

Yes	GO to O4

No	REPAIR the circuit in question.

O4 CHECK THE HS-CAN3 (HIGH SPEED-CONTROLLER AREA NETWORK 3) CIRCUITS BETWEEN THE APIM (SYNC MODULE) AND THE GWM (GATEWAY MODULE A) FOR AN OPEN

Disconnect GWM C2431

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2383-16	Ω	C2431-16
C2383-17	Ω	C2431-15

Touchscreen display

Positive Lead	Measurement / Action	Negative Lead
C2342-19	Ω	C2431-16

C2342-20	Ω	C2431-15

Are the resistances less than 3 ohms?

Yes	If equipped with touchscreen display, GO to O5 If not equipped with touchscreen display, GO to O6

No	REPAIR the circuit in question.

O5 CHECK THE MS-CAN (MEDIUM SPEED-CONTROLLER AREA NETWORK) CIRCUITS BETWEEN THE APIM (SYNC MODULE) AND THE GWM (GATEWAY MODULE A) FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2342-16	Ω	C2431-23
C2342-17	Ω	C2431-22

Are the resistances less than 3 ohms?

Yes	GO to O6

No	REPAIR the circuit in question.

O6 CHECK FOR CORRECT APIM (SYNC MODULE) OPERATION

Ignition OFF.

Disconnect and inspect the APIM connector and related in-line connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the APIM connector and related in-line connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, Refer to APIM HARDWARE TESTING .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > COMMUNICATIONS NETWORK > PINPOINT TESTS > PINPOINT TEST P : THE DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL

Refer to Module Communications Network for schematic and connector information.

Refer to Audio System/Navigation - AM/FM/CD/SYNC for schematic and connector information.

Refer to Audio System/Navigation - AM/FM/SYNC/Touchscreen Display for schematic and connector information.

Normal Operation and Fault Conditions

The DSP communicates on the HS-CAN3 and communicates with the diagnostic scan tool through the HS-CAN2. Diagnostic messages are sent/received through the HS-CAN2 circuits at the DLC, and are translated through the GWM to the HS-CAN3.

Possible Sources

- Fuse
- Wiring, terminals and connector
- DSP

Visual Inspection and Diagnostic Pre-checks

Verify BCM fuse 27 (30A) is OK.

DIAGNOSIS AND TESTING > COMMUNICATIONS NETWORK > PINPOINT TESTS > PINPOINT TEST P : THE DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL > PINPOINT TEST P : THE DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL

P1 CHECK THE DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) VOLTAGE SUPPLY CIRCUIT FOR AN OPEN

Ignition OFF.

Disconnect: DSP C2385B .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2385B-14		Ground

Are the voltages greater than 11 volts?

Yes	GO to P2

No	VERIFY the BCM fuse 27 (30A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short.

P2 CHECK THE DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) GROUND CIRCUIT FOR AN OPEN

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2385B-11	Ω	Ground

Are the resistances less than 3 ohms?

Yes	GO to P3

No	REPAIR the circuit.

P3 CHECK THE HS-CAN3 (HIGH SPEED-CONTROLLER AREA NETWORK 3) CIRCUITS BETWEEN THE DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) AND THE GWM (GATEWAY MODULE A) FOR AN OPEN

Disconnect: DSP C2470 .

Disconnect: GWM C2431 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2470-15	Ω	C2431-16
C2470-16	Ω	C2431-15

Are the resistances less than 3 ohms?

Yes	GO to P4

No	REPAIR the circuit in question.

P4 CHECK FOR CORRECT DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) OPERATION

Ignition OFF.

Disconnect and inspect the DSP connector and related in-line connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the DSP connector and related in-line connectors. Make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new DSP. REFER to: Audio Digital Signal Processing (DSP) Module .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > COMMUNICATIONS NETWORK > PINPOINT TESTS > PINPOINT TEST Q : THE RADIO TRANSCEIVER MODULE (RTM) DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL

Refer to Module Communications Network for schematic and connector information.

Refer to Remote Keyless Entry and Alarm for schematic and connector information.

Normal Operation and Fault Conditions

The RTM communicates on the MS-CAN and communicates with the diagnostic scan tool through the HS-CAN2. Diagnostic messages are sent/received through the HS-CAN2 circuits at the DLC, and are translated through the GWM to the MS-CAN.

Possible Sources

- Fuse
- Wiring, terminals and connector

- RTM

Visual Inspection and Diagnostic Pre-checks

Verify BCM fuse 32 (10A) is OK.

DIAGNOSIS AND TESTING > COMMUNICATIONS NETWORK > PINPOINT TESTS > PINPOINT TEST Q : THE RADIO TRANSCEIVER MODULE (RTM) DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL > PINPOINT TEST Q : THE RADIO TRANSCEIVER MODULE (RTM) DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL

Q1 CHECK THE RTM (RADIO TRANSCEIVER MODULE) VOLTAGE SUPPLY CIRCUIT FOR AN OPEN

Ignition OFF.

Disconnect: RTM C4458 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4458-6	V	Ground

Is the voltage greater than 11 volts?

Yes	GO to Q2

No	VERIFY the BCM fuse 32 (10A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short.

Q2 CHECK THE RTM (RADIO TRANSCEIVER MODULE) GROUND CIRCUIT FOR AN OPEN

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4458-1	Ω	Ground

Is the resistance less than 3 ohms?

Yes	GO to Q3

No	REPAIR the circuit.

Q3 CHECK THE MS-CAN (MEDIUM SPEED-CONTROLLER AREA NETWORK) CIRCUITS BETWEEN THE RTM (RADIO TRANSCEIVER MODULE) AND THE GWM (GATEWAY MODULE A) FOR AN OPEN

Disconnect: GWM C2431 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4458-4	Ω	C2431-23
C4458-3	Ω	C2431-22

Are the resistances less than 3 ohms?

Yes	GO to Q4

No	REPAIR the circuit in question.

Q4 CHECK FOR CORRECT RTM (RADIO TRANSCEIVER MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all the RTM connectors and related in-line connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the RTM connectors and related in-line connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new RTM. REFER to: Radio Transceiver Module (RTM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > COMMUNICATIONS NETWORK > PINPOINT TESTS > PINPOINT TEST R : THE POWER STEERING CONTROL MODULE (PSCM) DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL

Refer to Module Communications Network for schematic and connector information.

Refer to Power Steering Controls for schematic and connector information.

Normal Operation and Fault Conditions

The PSCM communicates with the diagnostic scan tool through the HS-CAN2.

Possible Sources

- Fuse
- Wiring, terminals and connector
- PSCM

Visual Inspection and Diagnostic Pre-checks

Verify high current BJB MEGA fuse 1 (125A) and BJB fuse 64 (5A) are OK.

DIAGNOSIS AND TESTING > COMMUNICATIONS NETWORK > PINPOINT TESTS > PINPOINT TEST R : THE POWER STEERING CONTROL MODULE (PSCM) DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL > PINPOINT TEST R : THE POWER STEERING CONTROL MODULE (PSCM) DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL

R1 CHECK THE PSCM (POWER STEERING CONTROL MODULE) VOLTAGE SUPPLY CIRCUITS FOR AN OPEN

Ignition OFF.

Disconnect: PSCM C1463A and C1463B .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1463A-1		Ground

Positive Lead	Measurement / Action	Negative Lead
C1463B-2		Ground

Is the voltage greater than 11 volts?

Yes	GO to R2

No	VERIFY the high current BJB MEGA fuse 1 (125A) or BJB fuse 64 (5A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short.

R2 CHECK THE PSCM (POWER STEERING CONTROL MODULE) GROUND CIRCUIT FOR AN OPEN

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1463B-1	Ω	Ground

Is the resistance less than 3 ohms?

Yes	GO to R3

No	REPAIR the circuit.

R3 CHECK THE HS-CAN2 (HIGH SPEED-CONTROLLER AREA NETWORK 2) CIRCUITS BETWEEN THE PSCM (POWER STEERING CONTROL MODULE) AND THE DLC (DATA LINK CONNECTOR) FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1463A-2	Ω	C251-3
C1463A-3	Ω	C251-11

Are the resistances less than 3 ohms?

Yes	GO to R4

No	REPAIR the circuit in question.

R4 CHECK FOR CORRECT PSCM (POWER STEERING CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all the PSCM connectors and related in-line connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the PSCM connectors and related in-line connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, REFER to the EPAS Symptom Chart.

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > COMMUNICATIONS NETWORK > PINPOINT TESTS > PINPOINT TEST S : THE DRIVER SEAT MODULE (DSM) DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL

Refer to Module Communications Network for schematic and connector information.

Refer to Memory Seats for schematic and connector information.

Normal Operation and Fault Conditions

The DSM communicates on the MS-CAN and communicates with the diagnostic scan tool through the HS-CAN2. Diagnostic messages are sent/received through the HS-CAN2 circuits at the DLC, and are translated through the GWM to the MS-CAN.

Possible Sources

- Fuse
- Wiring, terminals and connector
- DSM

Visual Inspection and Diagnostic Pre-checks

Verify BJB fuse 12 (30A) and BCM fuse 2 (7.5A) are OK.

DIAGNOSIS AND TESTING > COMMUNICATIONS NETWORK > PINPOINT TESTS > PINPOINT TEST S : THE DRIVER SEAT MODULE (DSM) DOES NOT RESPOND TO

THE DIAGNOSTIC SCAN TOOL > PINPOINT TEST S : THE DRIVER SEAT MODULE (DSM) DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL

S1 CHECK THE DSM (DRIVER FRONT SEAT MODULE) VOLTAGE SUPPLY CIRCUITS FOR AN OPEN

Ignition OFF.

Disconnect: DSM C341A and C341B .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C341A-1		Ground

Positive Lead	Measurement / Action	Negative Lead
C341B-1		Ground

Are the voltages greater than 11 volts?

Yes	GO to S2

No	VERIFY the BJB fuse 12 (30A) or BCM fuse 2 (7.5A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short.

S2 CHECK THE DSM (DRIVER FRONT SEAT MODULE) GROUND CIRCUIT FOR AN OPEN

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C341A-2	Ω	Ground

Positive Lead	Measurement / Action	Negative Lead
C341B-24	Ω	Ground

Is the resistance less than 3 ohms?

Yes	GO to S3

No	REPAIR the circuit.

S3 CHECK THE MS-CAN (MEDIUM SPEED-CONTROLLER AREA NETWORK) CIRCUITS BETWEEN THE DSM (DRIVER FRONT SEAT MODULE) AND THE GWM (GATEWAY MODULE A) FOR AN OPEN

Disconnect DSM C341D .

Disconnect GWM C2431 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C341D-10	Ω	C2431-23
C341D-9	Ω	C2431-22

Are the resistances less than 3 ohms?

Yes	GO to S4

No	REPAIR the circuit in question.

S4 CHECK FOR CORRECT DSM (DRIVER FRONT SEAT MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all the DSM connectors and related in-line connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the DSM connectors and related in-line connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new DSM. REFER to: Driver Front Seat Module (DSM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > COMMUNICATIONS NETWORK > PINPOINT TESTS > PINPOINT TEST T : THE SCME (FRONT SEAT CLIMATE CONTROL MODULE) DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL

Refer to Module Communications Network for schematic and connector information.

Refer to Climate Controlled Seats for schematic and connector information.

Normal Operation and Fault Conditions

The SCME communicates on the MS-CAN and communicates with the diagnostic scan tool through the HS-CAN2. Diagnostic messages are sent/received through the HS-CAN2 circuits at the DLC, and are translated through the GWM to the MS-CAN.

Possible Sources

- Fuse
- Wiring, terminals and connector
- SCME

Visual Inspection and Diagnostic Pre-checks

Verify BJB fuse 14 (30A) is OK.

DIAGNOSIS AND TESTING > COMMUNICATIONS NETWORK > PINPOINT TESTS > PINPOINT TEST T : THE SCME (FRONT SEAT CLIMATE CONTROL MODULE) DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL > PINPOINT TEST T : THE SCME (FRONT SEAT CLIMATE CONTROL MODULE) DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL

T1 CHECK THE SCME (FRONT SEAT CLIMATE CONTROL MODULE) VOLTAGE SUPPLY CIRCUITS FOR AN OPEN

Ignition OFF.

Disconnect: SCME C3265A .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265A-E		Ground
C3265A-F		Ground

Are the voltages greater than 11 volts?

Yes	GO to T2

No	VERIFY the BJB fuse 14 (30A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short.

T2 CHECK THE SCME (FRONT SEAT CLIMATE CONTROL MODULE) GROUND CIRCUIT FOR AN OPEN

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265A-M	Ω	Ground

Is the resistance less than 3 ohms?

Yes	GO to T3

No	REPAIR the circuit.

T3 CHECK THE MS-CAN (MEDIUM SPEED-CONTROLLER AREA NETWORK) CIRCUITS BETWEEN THE SCME (FRONT SEAT CLIMATE CONTROL MODULE) AND THE GWM (GATEWAY MODULE A) FOR AN OPEN

Disconnect: SCME C3265C

Disconnect: GWM C2431 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265C-1	Ω	C2431-23
C3265C-2	Ω	C2431-22

Are the resistances less than 3 ohms?

Yes	GO to T4

No	REPAIR the circuit in question.

T4 CHECK FOR CORRECT SCME (FRONT SEAT CLIMATE CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all the SCME connectors and related in-line connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the SCME connectors and related in-line connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new SCME. REFER to: Front Seat Climate Control Module [SCME] .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > COMMUNICATIONS NETWORK > PINPOINT TESTS > PINPOINT TEST U : THE DRIVER DOOR MODULE (DDM) DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL

Refer to Module Communications Network for schematic and connector information.

Refer to Power Mirrors for schematic and connector information.

Normal Operation and Fault Conditions

The DDM communicates on the MS-CAN and communicates with the diagnostic scan tool through the HS-CAN2. Diagnostic messages are sent/received through the HS-CAN2 circuits at the DLC, and are translated through the GWM to the MS-CAN.

Possible Sources

- Fuse
- Wiring, terminals and connector
- DDM

Visual Inspection and Diagnostic Pre-checks

Verify BJB fuse 11 (30A) is OK.

DIAGNOSIS AND TESTING > COMMUNICATIONS NETWORK > PINPOINT TESTS > PINPOINT TEST U : THE DRIVER DOOR MODULE (DDM) DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL > PINPOINT TEST U : THE DRIVER DOOR MODULE (DDM) DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL

U1 CHECK THE DDM (DRIVER DOOR MODULE) VOLTAGE SUPPLY CIRCUITS FOR AN OPEN

Ignition OFF.

Disconnect: DDM C501A .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C501A-1		Ground

Is the voltage greater than 11 volts?

Yes	GO to U2

No	VERIFY the BJB fuse 11 (30A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short.

U2 CHECK THE DDM (DRIVER DOOR MODULE) GROUND CIRCUIT FOR AN OPEN

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C501A-2		Ground

Is the resistance less than 3 ohms?

Yes	GO to U3

No	REPAIR the circuit.

U3 CHECK THE MS-CAN (MEDIUM SPEED-CONTROLLER AREA NETWORK) CIRCUITS BETWEEN THE DDM (DRIVER DOOR MODULE) AND THE GWM (GATEWAY MODULE A) FOR AN OPEN

Disconnect: GWM C2431 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C501A-7	Ω	C2431-23
C501A-6	Ω	C2431-22

Are the resistances less than 3 ohms?

Yes	GO to U4

No	REPAIR the circuit in question.

U4 CHECK FOR CORRECT DDM (DRIVER DOOR MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all the DDM connectors and related in-line connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the DDM connectors and related in-line connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new DDM. REFER to: Driver Door Module (DDM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > COMMUNICATIONS NETWORK > PINPOINT TESTS > PINPOINT TEST V : THE PASSENGER DOOR MODULE (PDM) DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL

Refer to Module Communications Network for schematic and connector information.

Refer to Power Mirrors for schematic and connector information.

Normal Operation and Fault Conditions

The PDM communicates on the MS-CAN and communicates with the diagnostic scan tool through the HS-CAN2. Diagnostic messages are sent/received through the HS-CAN2 circuits at the DLC, and are translated through the GWM to the MS-CAN.

Possible Sources

- Fuse
- Wiring, terminals and connector
- PDM

Visual Inspection and Diagnostic Pre-checks

Verify BCM fuse 26 (30A) is OK.

DIAGNOSIS AND TESTING > COMMUNICATIONS NETWORK > PINPOINT TESTS > PINPOINT TEST V : THE PASSENGER DOOR MODULE (PDM) DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL > PINPOINT TEST V : THE PASSENGER DOOR MODULE (PDM) DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL

V1 CHECK THE PDM (PASSENGER DOOR MODULE) VOLTAGE SUPPLY CIRCUITS FOR AN OPEN

Ignition OFF.

Disconnect: PDM C652A .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C652A-1		Ground

Is the voltage greater than 11 volts?

Yes	GO to V2

No	VERIFY the BCM fuse 26 (30A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short.

V2 CHECK THE PDM (PASSENGER DOOR MODULE) GROUND CIRCUIT FOR AN OPEN

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C652A-2	Ω	Ground

Is the resistance less than 3 ohms?

Yes	GO to V3

No	REPAIR the circuit.

V3 CHECK THE MS-CAN (MEDIUM SPEED-CONTROLLER AREA NETWORK) CIRCUITS BETWEEN THE PDM (PASSENGER DOOR MODULE) AND THE GWM (GATEWAY MODULE A) FOR AN OPEN

Disconnect: GWM C2431 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C652A-7	Ω	C2431-23
C652A-6	Ω	C2431-22

Are the resistances less than 3 ohms?

Yes	GO to V4

No	REPAIR the circuit in question.

V4 CHECK FOR CORRECT PDM (PASSENGER DOOR MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all the PDM connectors and related in-line connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the PDM connectors and related in-line connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PDM. REFER to: Passenger Door Module (PDM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > COMMUNICATIONS NETWORK > PINPOINT TESTS > PINPOINT TEST W : THE SIDE OBSTACLE DETECTION CONTROL MODULE LH (SOD-L) DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL

Refer to Module Communications Network for schematic and connector information.

Normal Operation and Fault Conditions

The SODL communicates on the MS-CAN and communicates with the diagnostic scan tool through the HS-CAN2. Diagnostic messages are sent/received through the HS-CAN2 circuits at the DLC, and are translated through the GWM to the MS-CAN.

Possible Sources

- Fuse
- Wiring, terminals and connector
- SODL

Visual Inspection and Diagnostic Pre-checks

Verify BJB fuse 66 (5A) is OK.

DIAGNOSIS AND TESTING > COMMUNICATIONS NETWORK > PINPOINT TESTS > PINPOINT TEST W : THE SIDE OBSTACLE DETECTION CONTROL MODULE LH (SOD-L) DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL > PINPOINT TEST W : THE SIDE OBSTACLE DETECTION CONTROL MODULE LH (SOD-L) DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL

W1 CHECK THE SODL (SIDE OBSTACLE DETECTION CONTROL MODULE LH) VOLTAGE SUPPLY CIRCUITS FOR AN OPEN

Ignition OFF.

Disconnect: SODL C4369 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4369-5		Ground

Is the voltage greater than 11 volts?

Yes	GO to W2

No	VERIFY the BJB fuse 66 (5A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short.

W2 CHECK THE SODL (SIDE OBSTACLE DETECTION CONTROL MODULE LH) GROUND CIRCUIT FOR AN OPEN

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4369-8	Ω	Ground

Is the resistance less than 3 ohms?

Yes	GO to W3

No	REPAIR the circuit.

W3 CHECK THE MS-CAN (MEDIUM SPEED-CONTROLLER AREA NETWORK) CIRCUITS BETWEEN THE SODL (SIDE OBSTACLE DETECTION CONTROL MODULE LH) AND THE GWM (GATEWAY MODULE A) FOR AN OPEN

Disconnect: GWM C2431 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4369-6	Ω	C2431-23
C4369-7	Ω	C2431-22

Are the resistances less than 3 ohms?

Yes	GO to W4

No	REPAIR the circuit in question.

W4 CHECK FOR CORRECT SODL (SIDE OBSTACLE DETECTION CONTROL MODULE LH) OPERATION

Ignition OFF.

Disconnect and inspect the SODL connector and related in-line connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the SODL connector and related in-line connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new SODL. REFER to: Side Obstacle Detection Control Module .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > COMMUNICATIONS NETWORK > PINPOINT TESTS > PINPOINT TEST X : THE SIDE OBSTACLE DETECTION CONTROL MODULE RH (SOD-R) DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL

Refer to Module Communications Network for schematic and connector information.

Normal Operation and Fault Conditions

The SODR communicates on the MS-CAN and communicates with the diagnostic scan tool through the HS-CAN2. Diagnostic messages are sent/received through the HS-CAN2 circuits at the DLC, and are translated through the GWM to the MS-CAN.

Possible Sources

- Fuse
- Wiring, terminals and connector
- SODR

Visual Inspection and Diagnostic Pre-checks

Verify BJB fuse 66 (5A) is OK.

DIAGNOSIS AND TESTING > COMMUNICATIONS NETWORK > PINPOINT TESTS > PINPOINT TEST X : THE SIDE OBSTACLE DETECTION CONTROL MODULE RH (SOD-R) DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL > PINPOINT TEST X : THE SIDE OBSTACLE DETECTION CONTROL MODULE RH (SOD-R) DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL

X1 CHECK THE SODR (SIDE OBSTACLE DETECTION CONTROL MODULE RH) VOLTAGE SUPPLY CIRCUITS FOR AN OPEN

Ignition OFF.

Disconnect: SODR C4370 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4370-5	V	Ground

Is the voltage greater than 11 volts?

Yes	GO to X2

No	VERIFY the BJB fuse 66 (5A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short.

X2 CHECK THE SODR (SIDE OBSTACLE DETECTION CONTROL MODULE RH) GROUND CIRCUIT FOR AN OPEN

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4370-3	Ω	Ground
C4370-8	Ω	Ground

Are the resistances less than 3 ohms?

Yes	GO to X3

No	REPAIR the circuit.

X3 CHECK THE MS-CAN (MEDIUM SPEED-CONTROLLER AREA NETWORK) CIRCUITS BETWEEN THE SODR (SIDE OBSTACLE DETECTION CONTROL MODULE RH) AND THE GWM (GATEWAY MODULE A) FOR AN OPEN

Disconnect: GWM C2431 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4370-6	Ω	C2431-23
C4370-7	Ω	C2431-22

Are the resistances less than 3 ohms?

Yes	GO to X4

No	REPAIR the circuit in question.

X4 CHECK FOR CORRECT SODR (SIDE OBSTACLE DETECTION CONTROL MODULE RH) OPERATION

Ignition OFF.

Disconnect and inspect all the SODR connectors and related in-line connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the SODR connectors and related in-line connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new SODR. REFER to: Side Obstacle Detection Control Module .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > COMMUNICATIONS NETWORK > PINPOINT TESTS > PINPOINT TEST Y : THE CRUISE CONTROL MODULE (CCM) DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL

Refer to Module Communications Network for schematic and connector information.

Refer to Cruise Control for schematic and connector information.

Normal Operation and Fault Conditions

The CCM communicates with the diagnostic scan tool through the HS-CAN2.

Possible Sources

- Fuse
- Wiring, terminals and connector
- CCM

Visual Inspection and Diagnostic Pre-checks

Verify BJB fuse 66 (5A) is OK.

DIAGNOSIS AND TESTING > COMMUNICATIONS NETWORK > PINPOINT TESTS > PINPOINT TEST Y : THE CRUISE CONTROL MODULE (CCM) DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL > PINPOINT TEST Y : THE CRUISE CONTROL MODULE (CCM) DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL

Y1 CHECK THE CCM (CRUISE CONTROL MODULE) VOLTAGE SUPPLY CIRCUITS FOR AN OPEN

Ignition OFF.

Disconnect: CCM C1582 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1582-10		Ground

Is the voltage greater than 11 volts?

Yes	GO to Y2

No	VERIFY the BJB fuse 66 (5A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short.

Y2 CHECK THE CCM (CRUISE CONTROL MODULE) GROUND CIRCUIT FOR AN OPEN

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1582-4	Ω	Ground

Is the resistance less than 3 ohms?

Yes	GO to Y3

No	REPAIR the circuit.

Y3 CHECK THE HS-CAN2 (HIGH SPEED-CONTROLLER AREA NETWORK 2) CIRCUITS BETWEEN THE CCM (CRUISE CONTROL MODULE) AND THE DLC (DATA LINK CONNECTOR) FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1582-8	Ω	C251-3
C1582-7	Ω	C251-11

Are the resistances less than 3 ohms?

Yes	GO to Y4

No	REPAIR the circuit in question.

Y4 CHECK FOR CORRECT CCM (CRUISE CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect the CCM connector and related in-line connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the CCM connector and related in-line connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new CCM. REFER to: Cruise Control Module (CCM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > COMMUNICATIONS NETWORK > PINPOINT TESTS > PINPOINT TEST Z : THE HEAD UP DISPLAY (HUD) MODULE DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL

Refer to Module Communications Network for schematic and connector information.

Normal Operation and Fault Conditions

The HUD module communicates with the diagnostic scan tool through the HS-CAN2.

Possible Sources

- Fuse
- Wiring, terminals and connector
- HUD module

Visual Inspection and Diagnostic Pre-checks

Verify BJB fuse 66 (5A) is OK.

DIAGNOSIS AND TESTING > COMMUNICATIONS NETWORK > PINPOINT TESTS > PINPOINT TEST Z : THE HEAD UP DISPLAY (HUD) MODULE DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL > PINPOINT TEST Z : THE HEAD UP DISPLAY (HUD) MODULE DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL

Z1 CHECK THE HUD (HEAD UP DISPLAY) MODULE VOLTAGE SUPPLY CIRCUITS FOR AN OPEN

Ignition OFF.

Disconnect: HUD Module C2395 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2395-4		Ground

Is the voltage greater than 11 volts?

Yes	GO to Z2

No	VERIFY the BJB fuse 66 (5A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short.

Z2 CHECK THE HUD (HEAD UP DISPLAY) MODULE GROUND CIRCUIT FOR AN OPEN

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2395-1	Ω	Ground

Is the resistance less than 3 ohms?

Yes	GO to Z3

No	REPAIR the circuit.

Z3 CHECK THE HS-CAN2 (HIGH SPEED-CONTROLLER AREA NETWORK 2) CIRCUITS BETWEEN THE HUD (HEAD UP DISPLAY) MODULE AND THE DLC (DATA LINK CONNECTOR) FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2395-3	Ω	C251-3
C2395-2	Ω	C251-11

Are the resistances less than 3 ohms?

Yes	GO to Z4

No	REPAIR the circuit in question.

Z4 CHECK FOR CORRECT HUD (HEAD UP DISPLAY) MODULE OPERATION

Ignition OFF.

Disconnect and inspect the HUD module connector and related in-line connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the HUD module connector and related in-line connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new HUD module. REFER to: Head Up Display (HUD) Module .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > COMMUNICATIONS NETWORK > PINPOINT TESTS > PINPOINT TEST AA : THE MOVEABLE ROOF CONTROL MODULE A (MRCMA) DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL

Refer to Module Communications Network for schematic and connector information.

Refer to Convertible Top for schematic and connector information.

Normal Operation and Fault Conditions

The Moveable Roof Control Module A (MRCMA) communicates on the MS-CAN and communicates with the diagnostic scan tool through the HS-CAN2. Diagnostic messages are sent/received through the HS-CAN2 circuits at the DLC, and translated through the GWM to the MS-CAN.

Visual Inspection and Diagnostic Pre-checks

Verify BJB fuse 17 (20A) is OK.

DIAGNOSIS AND TESTING > COMMUNICATIONS NETWORK > PINPOINT TESTS > PINPOINT TEST AA : THE MOVEABLE ROOF CONTROL MODULE A (MRCMA) DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL > PINPOINT TEST AA : THE MOVEABLE ROOF CONTROL MODULE A (MRCMA) DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL

AA1 CHECK THE MOVEABLE ROOF CONTROL MODULE A (MRCMA) VOLTAGE SUPPLY CIRCUIT FOR AN OPEN

Ignition OFF.

Disconnect: Moveable Roof Control Module A (MRCMA) C4830 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4830-6		Ground

Is the voltage greater than 11 volts?

Yes	GO to AA2

No	VERIFY BJB fuse 17 (20A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short.

AA2 CHECK THE MOVEABLE ROOF CONTROL MODULE A (MRCMA) GROUND CIRCUIT FOR AN OPEN

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4830-5	Ω	Ground

Is the resistance less than 3 ohms?

Yes	GO to AA3

No	REPAIR the circuit.

AA3 CHECK THE MS-CAN (MEDIUM SPEED-CONTROLLER AREA NETWORK) CIRCUITS

BETWEEN THE MOVEABLE ROOF CONTROL MODULE A (MRCMA) AND THE GWM (GATEWAY MODULE A) FOR AN OPEN

Disconnect: GWM C2431 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4830-9	Ω	C2431-23
C4830-10	Ω	C2431-22

Are the resistances less than 3 ohms?

Yes	GO to AA4

No	REPAIR the circuit in question.

AA4 CHECK FOR CORRECT MOVEABLE ROOF CONTROL MODULE A (MRCMA) OPERATION

Ignition OFF.

Disconnect and inspect the Moveable Roof Control Module A (MRCMA) connectors and related in-line connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the Moveable Roof Control Module A (MRCMA) connectors and related in-line connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new Moveable Roof Control Module A (MRCMA).

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > COMMUNICATIONS NETWORK > PINPOINT TESTS > PINPOINT TEST AB : THE MOVEABLE ROOF CONTROL MODULE B (MRCMB) DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL

Refer to Module Communications Network for schematic and connector information.

Refer to Convertible Top for schematic and connector information.

Normal Operation and Fault Conditions

The Moveable Roof Control Module B (MRCMB) communicates on the MS-CAN and communicates with the diagnostic scan tool through the HS-CAN2. Diagnostic messages are sent/received through the HS-CAN2 circuits at the DLC, and translated through the GWM to the MS-CAN.

Visual Inspection and Diagnostic Pre-checks

Verify BJB fuse 15 (20A) is OK.

DIAGNOSIS AND TESTING > COMMUNICATIONS NETWORK > PINPOINT TESTS > PINPOINT TEST AB : THE MOVEABLE ROOF CONTROL MODULE B (MRCMB) DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL > PINPOINT TEST AB : THE MOVEABLE ROOF CONTROL MODULE B (MRCMB) DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL

AB1 CHECK THE MOVEABLE ROOF CONTROL MODULE B (MRCMB) VOLTAGE SUPPLY CIRCUIT FOR AN OPEN

Ignition OFF.

Disconnect: Moveable Roof Control Module B (MRCMB) C4831 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4831-6		Ground

Is the voltage greater than 11 volts?

Yes	GO to AB2

No	VERIFY BJB fuse 15 (20A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short.

AB2 CHECK THE MOVEABLE ROOF CONTROL MODULE B (MRCMB) GROUND CIRCUIT FOR AN OPEN

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4831-3	Ω	Ground
C4831-5	Ω	Ground

Is the resistance less than 3 ohms?

Yes	GO to AB3

No	REPAIR the circuit.

AB3 CHECK THE MS-CAN (MEDIUM SPEED-CONTROLLER AREA NETWORK) CIRCUITS BETWEEN THE MOVEABLE ROOF CONTROL MODULE B (MRCMB) AND THE GWM (GATEWAY MODULE A) FOR AN OPEN

Disconnect: GWM C2431 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4831-9	Ω	C2431-23
C4831-10	Ω	C2431-22

Are the resistances less than 3 ohms?

Yes	GO to AB4

No	REPAIR the circuit in question.

AB4 CHECK FOR CORRECT MOVEABLE ROOF CONTROL MODULE B (MRCMB) OPERATION

Ignition OFF.

Disconnect and inspect the Moveable Roof Control Module B (MRCMB) connectors and related in-line connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the Moveable Roof Control Module B (MRCMB) connectors and related in-line connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new Moveable Roof Control Module B (MRCMB).

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > COMMUNICATIONS NETWORK > PINPOINT TESTS > PINPOINT TEST AC : THE GATEWAY MODULE (GWM) DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL

Refer to Module Communications Network for schematic and connector information.

Normal Operation and Fault Conditions

The GWM communicates with the diagnostic scan tool through the HS-CAN1 and HS-CAN2. The GWM operates as a gateway for communication between the modules on HS-CAN1, HS-CAN2, HS-CAN3 and MS-CAN.

Visual Inspection and Diagnostic Pre-checks

Verify BCM fuses 13 (7.5A) and 15 (10A) are OK.

DIAGNOSIS AND TESTING > COMMUNICATIONS NETWORK > PINPOINT TESTS > PINPOINT TEST AC : THE GATEWAY MODULE (GWM) DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL > PINPOINT TEST AC : THE GATEWAY MODULE (GWM) DOES NOT RESPOND TO THE DIAGNOSTIC SCAN TOOL

AC1 CHECK THE HS-CAN1 (HIGH SPEED-CONTROLLER AREA NETWORK 1) TERMINATION RESISTANCE

Ignition OFF.

Disconnect negative battery cable.

Disconnect the diagnostic scan tool cable from the DLC.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C251-6	Ω	C251-14

Is the resistance between 54 and 66 ohms?

Yes	GO to AC3

No	GO to AC2

AC2 CHECK THE HS-CAN1 (HIGH SPEED-CONTROLLER AREA NETWORK 1) CIRCUITS BETWEEN THE GWM (GATEWAY MODULE A) AND THE DLC (DATA LINK CONNECTOR) FOR AN OPEN

Disconnect GWM C2431 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2431-20 (component side)	Ω	C251-6
C2431-19 (component side)	Ω	C251-14

Are the resistances less than 3 ohms?

Yes	GO to AC3

No	GO to AC9

AC3 CHECK THE HS-CAN2 (HIGH SPEED-CONTROLLER AREA NETWORK 2) TERMINATION RESISTANCE

Connect: GWM C2431 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C251-3	Ω	C251-11

Is the resistance between 54 and 66 ohms?

Yes	GO to AC5

No	GO to AC4

AC4 CHECK THE HS-CAN2 (HIGH SPEED-CONTROLLER AREA NETWORK 2) CIRCUITS

BETWEEN THE GWM (GATEWAY MODULE A) AND THE DLC (DATA LINK CONNECTOR) FOR AN OPEN

Disconnect: GWM C2431 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2431-18 (component side)	Ω	C251-3
C2431-17 (component side)	Ω	C251-11

Are the resistances less than 3 ohms?

Yes	GO to AC5

No	GO to AC9

AC5 CHECK THE MS-CAN (MEDIUM SPEED-CONTROLLER AREA NETWORK) TERMINATION RESISTANCE, COMPONENT SIDE

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2431-23 (component side)	Ω	C2431-22 (component side)

Is the resistance between 108 and 132 ohms?

Yes	GO to AC6

No	GO to AC9

AC6 CHECK THE HS-CAN3 (HIGH SPEED-CONTROLLER AREA NETWORK 3) TERMINATION RESISTANCE, COMPONENT SIDE

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2431-16 (component side)	Ω	C2431-15 (component side)

Is the resistance between 108 and 132 ohms?

Yes	GO to AC7

No	GO to AC9

AC7 CHECK THE GWM (GATEWAY MODULE A) VOLTAGE SUPPLY CIRCUITS FOR AN OPEN

Connect negative battery cable.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2431-13		Ground
C2431-24		Ground

Is the voltage greater than 11 volts?

Yes	GO to AC8

No	VERIFY the BCM fuse 13 (7.5A) or fuse 15 (10A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short.

AC8 CHECK THE GWM (GATEWAY MODULE A) GROUND CIRCUITS FOR AN OPEN

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2431-1	Ω	Ground
C2431-14	Ω	Ground

Are the resistances less than 3 ohms?

Yes	GO to AC9

No	REPAIR the circuit in question.

AC9 CHECK FOR CORRECT GWM (GATEWAY MODULE A) OPERATION

Ignition OFF.

Disconnect and inspect all GWM connectors and related in-line connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the GWM connector and related in-line connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new GWM. REFER to: Gateway Module A (GWM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > COMMUNICATIONS NETWORK > PINPOINT TESTS > PINPOINT TEST AD : NO HIGH SPEED CONTROLLER AREA NETWORK 1 (HS-CAN1) COMMUNICATION, ALL MODULES ARE NOT RESPONDING

Refer to Module Communications Network for schematic and connector information.

Normal Operation and Fault Conditions

The HS-CAN1 modules communicate with the diagnostic scan tool directly through the DLC circuits.

Possible Sources

- Fuse
- Wiring, terminals or connectors
- APIM (if equipped)
- BCM
- GWM
- ICM (if equipped)
- PCM

DIAGNOSIS AND TESTING > COMMUNICATIONS NETWORK > PINPOINT TESTS > PINPOINT TEST AD : NO HIGH SPEED CONTROLLER AREA NETWORK 1 (HS-CAN1) COMMUNICATION, ALL MODULES ARE NOT RESPONDING > PINPOINT TEST AD : NO HIGH SPEED CONTROLLER AREA NETWORK 1 (HS-CAN1) COMMUNICATION, ALL MODULES ARE NOT RESPONDING

NOTE: Various modules set network DTCs during this test procedure. Clear DTCs from all modules after completing the diagnostic procedure.

AD1 CHECK THE DLC (DATA LINK CONNECTOR) PINS FOR DAMAGE

Ignition OFF.

Disconnect the diagnostic scan tool cable from the DLC.

Inspect the DLC pins 6 and 14 for damage.

Are DLC pins 6 and 14 OK?

Yes	GO to AD2

No	REPAIR the DLC as necessary.

AD2 CHECK THE HS-CAN1 (HIGH SPEED-CONTROLLER AREA NETWORK 1) TERMINATION RESISTANCE

Disconnect the negative battery cable.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C251-6	Ω	C251-14

Is the resistance between 54 and 66 ohms?

Yes	GO to AD3

No	GO to AD5

AD3 CHECK THE HS-CAN1 (HIGH SPEED-CONTROLLER AREA NETWORK 1) (+) AND HS-CAN1 (HIGH SPEED-CONTROLLER AREA NETWORK 1) (-) CIRCUITS FOR A SHORT TO GROUND

Measure:

Positive Lead	Measurement / Action	Negative Lead
C251-6	Ω	Ground
C251-14	Ω	Ground

Are the resistances greater than 1, 000 ohms?

Yes	GO to AD4

No	GO to AD11

AD4 CHECK THE HS-CAN1 (HIGH SPEED-CONTROLLER AREA NETWORK 1) (+) AND HS-CAN1 (HIGH SPEED-CONTROLLER AREA NETWORK 1) (-) CIRCUITS FOR A SHORT TO VOLTAGE

Connect the negative battery cable.

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C251-6		Ground
C251-14		Ground

Is the voltage greater than 6 volts on either circuit?

Yes	REPAIR the circuit in question.

No	GO to AD12

AD5 CHECK THE HS-CAN1 (HIGH SPEED-CONTROLLER AREA NETWORK 1) TERMINATION RESISTOR

Measure:

Positive Lead	Measurement / Action	Negative Lead
C251-6	Ω	C251-14

Is the resistance between 108 and 132 ohms?

Yes	GO to AD6

No	GO to AD8

AD6 CHECK THE HS-CAN1 (HIGH SPEED-CONTROLLER AREA NETWORK 1) TERMINATION RESISTOR WITH THE PCM (POWERTRAIN CONTROL MODULE) DISCONNECTED

Disconnect: PCM C1551B (2.3L), C1381B (3.7L) or C175B (5.0L, 5.2L).

Measure:

Positive Lead	Measurement / Action	Negative Lead
C251-6	Ω	C251-14

Is the resistance between 108 and 132 ohms?

Yes	GO to AD7

No	GO to AD18

AD7 CHECK THE HS-CAN1 (HIGH SPEED-CONTROLLER AREA NETWORK 1) CIRCUITS BETWEEN THE PCM (POWERTRAIN CONTROL MODULE) AND THE DLC (DATA LINK CONNECTOR) FOR AN OPEN

Measure:

2.3L

Positive Lead	Measurement / Action	Negative Lead
C1551B-69	Ω	C251-6
C1551B-68	Ω	C251-14

3.7L

Positive Lead	Measurement / Action	Negative Lead
C1381B-75	Ω	C251-6
C1381B-76	Ω	C251-14

5.0L or 5.2L

Positive Lead	Measurement / Action	Negative Lead
C175B-75	Ω	C251-6
C175B-76	Ω	C251-14

Are the resistances less than 3 ohms?

Yes	GO to AD12

No	REPAIR the circuit in question.

AD8 CHECK THE HS-CAN1 (HIGH SPEED-CONTROLLER AREA NETWORK 1) (+) AND HS-CAN1 (HIGH SPEED-CONTROLLER AREA NETWORK 1) (-) CIRCUITS FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C251-6	Ω	C251-14

Is the resistance less than 3 ohms?

Yes	GO to AD10

No	GO to AD9

AD9 CHECK THE HS-CAN1 (HIGH SPEED-CONTROLLER AREA NETWORK 1) (+) AND HS-CAN1 (HIGH SPEED-CONTROLLER AREA NETWORK 1) (-) CIRCUITS FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C251-6	Ω	C251-14

Is the resistance greater than 10, 000 ohms?

Yes	REPAIR the DLC or REPAIR the circuit in question.

No	A capacitor internal to a module can still be draining, causing irregular resistance readings. WAIT 5 minutes. REPEAT the pinpoint test. If the concern is still present, REPAIR the circuit.

AD10 CHECK THE HS-CAN1 (HIGH SPEED-CONTROLLER AREA NETWORK 1) (+) AND HS-CAN1 (HIGH SPEED-CONTROLLER AREA NETWORK 1) (-) CIRCUITS FOR A SHORT TOGETHER WITH THE MODULES DISCONNECTED

Measure:

Positive Lead	Measurement / Action	Negative Lead
C251-6	Ω	C251-14

Disconnect modules one at a time until the resistance is greater than 3 ohms.

APIM (if equipped) C2383 or C2342 (touchscreen display)

BCM C2280G

ICM C2114 (if equipped)

PCM C1551B (2.3L), C1381B (3.7L) or C175B (5.0L, 5.2L)

Did the resistance change to greater than 3 ohms with one of the modules disconnected?

Yes	For the APIM, GO to AD21 For the BCM, GO to AD20 For the ICM, GO to AD22 For the PCM, GO to AD19

No	REPAIR the circuit in question. CONNECT all modules.

AD11 CHECK THE HS-CAN1 (HIGH SPEED-CONTROLLER AREA NETWORK 1) (+) AND HS-CAN1 (HIGH SPEED-CONTROLLER AREA NETWORK 1) (-) CIRCUITS FOR A SHORT TO GROUND WITH THE MODULES DISCONNECTED

Measure:

Positive Lead	Measurement / Action	Negative Lead
C251-6	Ω	Ground
C251-14	Ω	Ground

Disconnect modules one at a time until the resistance to ground is greater than 1, 000 ohms.

APIM (if equipped) C2383 or C2342 (touchscreen display)

BCM C2280G

ICM C2114 (if equipped)

PCM C1551B (2.3L), C1381B (3.7L) or C175B (5.0L, 5.2L)

Did the resistance change to greater than 1, 000 ohms with one of the modules disconnected?

Yes	For the APIM, GO to AD21 For the BCM, GO to AD20 For the ICM, GO to AD22 For the PCM, GO to AD19

No	REPAIR the circuit in question. CONNECT all modules.

AD12 CHECK FOR RESTORED COMMUNICATION WITH THE PCM (POWERTRAIN CONTROL MODULE) DISABLED

NOTE: Establish an IDS session prior to disabling the PCM in this test step. If the PCM has failed communication during multiple attempts to identify the vehicle, first identify the vehicle manually by entering a PCM part number, calibration number or tear tag when prompted by IDS. When a vehicle is manually identified by a PCM part number, calibration number or tear tag, the IDS does not automatically run a network test. Manually select and run the network test. When re-running the network test, close the network test application first or the screen display reverts back to the prior network test results.

Disconnect: BJB fuse 83 (20A).

Using a diagnostic scan tool, perform the network test.

Do all other modules pass the network test?

Yes	INSTALL the removed fuses. GO to Pinpoint Test A

No	INSTALL the removed fuses. GO to AD13

AD13 CHECK FOR RESTORED COMMUNICATION WITH THE GWM (GATEWAY MODULE A) DISABLED

NOTE: When re-running the network test, close the network test application first or the screen display reverts back to the prior network test results.

Disconnect: BCM fuse 13 (7.5A) and fuse 15 (10A).

Using a diagnostic scan tool, perform the network test.

Do all other modules pass the network test?

Yes	INSTALL the removed fuses. GO to Pinpoint Test AC

No	INSTALL the removed fuses. GO to AD14

AD14 CHECK FOR RESTORED NETWORK COMMUNICATION WITH THE BCM (BODY CONTROL MODULE) DISABLED

NOTE: When re-running the network test, close the network test application first or the screen display reverts back to the prior network test results.

Disconnect: BCM fuse 18 (5A) to disable the BCM.

Using a diagnostic scan tool, perform the network test.

Do all other HS-CAN1 modules pass the network test?

Yes	INSTALL the removed fuse. GO to Pinpoint Test I

No	INSTALL the removed fuse. GO to AD15

AD15 VERIFY VEHICLE EQUIPMENT - APIM (SYNC MODULE) OR ICM (INFORMATION CENTER MODULE)

Inspect the vehicle for an APIM or ICM.

Is the vehicle equipped with an APIM or ICM?

Yes	GO to AD16

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

AD16 CHECK FOR RESTORED NETWORK COMMUNICATION WITH THE APIM (SYNC MODULE) AND ICM (INFORMATION CENTER MODULE) (IF EQUIPPED) DISABLED

NOTE: When re-running the network test, close the network test application first or the screen display reverts back to the prior network test results.

Disconnect: BCM fuse 32 (10A).

Using a diagnostic scan tool, perform the network test.

Do all other HS-CAN1 modules pass the network test?

Yes	INSTALL the removed fuse. If equipped with an ICM, GO to AD17 If not equipped with an ICM, GO to Pinpoint Test O

No	INSTALL the removed fuse. The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

AD17 CHECK FOR RESTORED NETWORK COMMUNICATION WITH THE ICM (INFORMATION CENTER MODULE) DISCONNECTED

NOTE: When re-running the network test, close the network test application first or the screen display reverts back to the prior network test results.

Disconnect: ICM C2114 .

Using a diagnostic scan tool, perform the network test.

Do all other HS-CAN1 modules pass the network test?

Yes	INSTALL the removed fuse. GO to Pinpoint Test H

No	INSTALL the removed fuse. The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

AD18 CHECK FOR CORRECT GWM (GATEWAY MODULE A) OPERATION

Ignition OFF.

Disconnect and inspect the GWM connector and related in-line connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the GWM connector and related in-line connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new GWM. REFER to: Gateway Module A (GWM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

AD19 CHECK FOR CORRECT PCM (POWERTRAIN CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all the PCM connectors and related in-line connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the PCM connectors and related in-line connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PCM. For 2.3L, REFER to: Powertrain Control Module (PCM) . For 3.7L, REFER to: Powertrain Control Module (PCM) . For 5.0L, REFER to: Powertrain Control Module (PCM) .

No	The system is operating correctly at this time. The concern may have been caused by

	module connections. ADDRESS the root cause of any connector or pin issues.

AD20 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect the BCM connectors and related in-line connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors and related in-line connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

AD21 CHECK FOR CORRECT APIM (SYNC MODULE) OPERATION

Ignition OFF.

Disconnect and inspect the APIM connector and related in-line connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the APIM connector and related in-line connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical

	Service Bulletins (TSBs) address this concern, Refer to APIM HARDWARE TESTING .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

AD22 CHECK FOR CORRECT ICM (INFORMATION CENTER MODULE) OPERATION

Ignition OFF.

Disconnect and inspect the ICM connector and related in-line connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the ICM connector and related in-line connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ICM. REFER to: Information Center Module (ICM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > COMMUNICATIONS NETWORK > PINPOINT TESTS > PINPOINT TEST AE : NO HIGH SPEED CONTROLLER AREA NETWORK 2 (HS-CAN2) COMMUNICATION, ALL MODULES ARE NOT RESPONDING

Refer to Module Communications Network for schematic and connector information.

Normal Operation and Fault Conditions

The HS-CAN2 modules communicate with the diagnostic scan tool directly through the DLC circuits.

Possible Sources

- Fuse
- Wiring, terminals or connectors
- ABS module

- CCM (if equipped)
- GWM
- HUD module (if equipped)
- OCSM
- PSCM
- SCCM
- RCM
- VDM (if equipped)

DIAGNOSIS AND TESTING > COMMUNICATIONS NETWORK > PINPOINT TESTS > PINPOINT TEST AE : NO HIGH SPEED CONTROLLER AREA NETWORK 2 (HS-CAN2) COMMUNICATION, ALL MODULES ARE NOT RESPONDING > PINPOINT TEST AE : NO HIGH SPEED CONTROLLER AREA NETWORK 2 (HS-CAN2) COMMUNICATION, ALL MODULES ARE NOT RESPONDING

NOTE: Various modules set network DTCs during this test procedure. Clear DTCs from all modules after completing the diagnostic procedure.

AE1 CHECK THE DLC (DATA LINK CONNECTOR) PINS FOR DAMAGE

Ignition OFF.

Disconnect the diagnostic scan tool cable from the DLC.

Inspect the DLC pins 3 and 11 for damage.

Are DLC pins 3 and 11 OK?

Yes	GO to AE2

No	REPAIR the DLC as necessary.

AE2 CHECK THE HS-CAN2 (HIGH SPEED-CONTROLLER AREA NETWORK 2) TERMINATION RESISTANCE

Disconnect negative battery cable.

Measure:

Positive Lead	Measurement / Action	Negative Lead

C251-3	Ω	C251-11

Is the resistance between 54 and 66 ohms?

Yes	GO to AE3

No	GO to AE5

AE3 CHECK THE HS-CAN2 (HIGH SPEED-CONTROLLER AREA NETWORK 2) (+) AND HS-CAN2 (HIGH SPEED-CONTROLLER AREA NETWORK 2) (-) CIRCUITS FOR A SHORT TO GROUND

Measure:

Positive Lead	Measurement / Action	Negative Lead
C251-3	Ω	Ground
C251-11	Ω	Ground

Are the resistances greater than 1, 000 ohms?

Yes	GO to AE4

No	GO to AE11

AE4 CHECK THE HS-CAN2 (HIGH SPEED-CONTROLLER AREA NETWORK 2) (+) AND HS-CAN2 (HIGH SPEED-CONTROLLER AREA NETWORK 2) (-) CIRCUITS FOR A SHORT TO VOLTAGE

Connect negative battery cable.

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C251-3		Ground
C251-11		Ground

Is the voltage greater than 6 volts on either circuit?

Yes	REPAIR the circuit in question.

No	GO to AE12

AE5 CHECK THE HS-CAN2 (HIGH SPEED-CONTROLLER AREA NETWORK 2) TERMINATION

RESISTOR

Measure:

Positive Lead	Measurement / Action	Negative Lead
C251-3	Ω	C251-11

Is the resistance between 108 and 132 ohms?

Yes	GO to AE6

No	GO to AE8

AE6 CHECK THE HS-CAN2 (HIGH SPEED-CONTROLLER AREA NETWORK 2) TERMINATION RESISTOR WITH THE GWM (GATEWAY MODULE A) DISCONNECTED

Disconnect: GWM C2431 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C251-3	Ω	C251-11

Is the resistance between 108 and 132 ohms?

Yes	GO to AE7

No	GO to AE22

AE7 CHECK THE HS-CAN2 (HIGH SPEED-CONTROLLER AREA NETWORK 2) CIRCUITS BETWEEN THE SCCM (STEERING COLUMN CONTROL MODULE) AND THE DLC (DATA LINK CONNECTOR) FOR AN OPEN

Disconnect: SCCM C226A .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C226A-3	Ω	C251-3
C226A-4	Ω	C251-11

Are the resistances less than 3 ohms?

Yes	GO to AE28

No	REPAIR the circuit in question.

AE8 CHECK THE HS-CAN2 (HIGH SPEED-CONTROLLER AREA NETWORK 2) (+) AND HS-CAN2 (HIGH SPEED-CONTROLLER AREA NETWORK 2) (-) CIRCUITS FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C251-3	Ω	C251-11

Is the resistance less than 3 ohms?

Yes	GO to AE10

No	GO to AE9

AE9 CHECK THE HS-CAN2 (HIGH SPEED-CONTROLLER AREA NETWORK 2) (+) AND HS-CAN2 (HIGH SPEED-CONTROLLER AREA NETWORK 2) (-) CIRCUITS FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C251-3	Ω	C251-11

Is the resistance greater than 10, 000 ohms?

Yes	REPAIR the DLC or REPAIR the circuit in question.

No	A capacitor internal to a module can still be draining, causing irregular resistance readings. WAIT 5 minutes. REPEAT the pinpoint test. If the concern is still present, REPAIR the circuit.

AE10 CHECK THE HS-CAN2 (HIGH SPEED-CONTROLLER AREA NETWORK 2) (+) AND HS-CAN2 (HIGH SPEED-CONTROLLER AREA NETWORK 2) (-) CIRCUITS FOR A SHORT TOGETHER WITH THE MODULES DISCONNECTED

Measure:

Positive Lead	Measurement / Action	Negative Lead
C251-3	Ω	C251-11

Disconnect modules one at a time until the resistance is greater than 3 ohms.

ABS module C135

CCM C1582

HUD module C2395

OCSM C3043

PSCM C1463A

RCM C310B

SCCM C226A

VDM C4396

Did the resistance change to greater than 3 ohms with one of the modules disconnected?

Yes	For the ABS module, GO to AE21 For the CCM, GO to AE23 For the HUD module, GO to AE24 For the OCSM, GO to AE26 For the PSCM, GO to AE25 For the RCM, GO to AE27 For the SCCM, GO to AE28 For the VDM, GO to AE29

No	REPAIR the circuits.

AE11 CHECK THE HS-CAN2 (HIGH SPEED-CONTROLLER AREA NETWORK 2) (+) AND HS-CAN2 (HIGH SPEED-CONTROLLER AREA NETWORK 2) (-) CIRCUITS FOR A SHORT TO GROUND WITH THE MODULES DISCONNECTED

Measure:

Positive Lead	Measurement / Action	Negative Lead
C251-3	Ω	Ground
C251-11	Ω	Ground

Disconnect modules one at a time until the resistance to ground is greater than 1, 000 ohms.

ABS module C135

CCM C1582

HUD module C2395

OCSM C3043

PSCM C1463A

RCM C310B

SCCM C226A

VDM C4396

Did the resistance change to greater than 1, 000 ohms with one of the modules disconnected?

Yes	For the ABS module, GO to AE21 For the CCM, GO to AE23 For the HUD module, GO to AE24 For the OCSM, GO to AE26 For the PSCM, GO to AE25 For the RCM, GO to AE27 For the SCCM, GO to AE28 For the VDM, GO to AE29

No	REPAIR the circuit in question. CONNECT all modules.

AE12 CHECK FOR RESTORED COMMUNICATION WITH THE GWM (GATEWAY MODULE A) AND THE SCCM (STEERING COLUMN CONTROL MODULE) DISABLED

NOTE: When re-running the network test, close the network test application first or the screen display reverts back to the prior network test results.

Disconnect: BCM fuse 13 (7.5A).

Using a diagnostic scan tool, perform the network test.

Do all other modules pass the network test?

Yes	INSTALL the removed fuse. GO to AE13

No	INSTALL the removed fuse. GO to AE14

AE13 CHECK FOR RESTORED COMMUNICATION WITH THE SCCM (STEERING COLUMN CONTROL MODULE) DISCONNECTED

NOTE: When re-running the network test, close the network test application first or the screen display reverts back to the prior network test results.

Disconnect: SCCM C226A .

Using a diagnostic scan tool, perform the network test.

Do all other modules pass the network test?

Yes	CONNECT the SCCM. GO to Pinpoint Test F

No	GO to Pinpoint Test AC

AE14 CHECK FOR RESTORED COMMUNICATION WITH THE ABS (ANTI-LOCK BRAKE SYSTEM) MODULE DISABLED

NOTE: When re-running the network test, close the network test application first or the screen display reverts back to the prior network test results.

Disconnect: BJB fuses 5 (20A), 28 (30A) and 62 (5A).

Using a diagnostic scan tool, perform the network test.

Do all other modules pass the network test?

Yes	INSTALL the removed fuses. GO to Pinpoint Test B

No	INSTALL the removed fuses. GO to AE15

AE15 VERIFY VEHICLE EQUIPMENT - ADAPTIVE CRUISE CONTROL OR VEHICLE DYNAMICS SYSTEM

Inspect the vehicle for an adaptive cruise control system or a vehicle dynamics system.

Is the vehicle equipped with adaptive cruise control or vehicle dynamics?

Yes	GO to AE16

No	GO to AE18

AE16 CHECK FOR RESTORED NETWORK COMMUNICATION WITH THE CCM (CRUISE CONTROL MODULE), HUD (HEAD UP DISPLAY) MODULE OR VDM (VEHICLE DYNAMICS CONTROL MODULE) DISABLED

NOTE: When re-running the network test, close the network test application first or the screen display reverts back to the prior network test results.

Disconnect: BJB fuse 66 (5A) to disable the HUD module and CCM (if equipped).

Disconnect: BJB fuse 66 (5A) and BCM fuse 25 (30A) to disable the VDM (if equipped).

Using a diagnostic scan tool, perform the network test.

Do all other HS-CAN2 modules pass the network test?

Yes	INSTALL the removed fuse. GO to AE17

No	INSTALL the removed fuse. GO to AE18

AE17 CHECK FOR RESTORED NETWORK COMMUNICATION WITH THE HEAD UP DISPLAY (HUD) MODULE AND VEHICLE DYNAMICS MODULE (VDM) DISCONNECTED

NOTE: When re-running the network test, close the network test application first or the screen display reverts back to the prior network test results.

Disconnect: HUD module C2395 (if equipped).

Using a diagnostic scan tool, perform the network test.

Disconnect: VDM C4396 (if equipped).

Using a diagnostic scan tool, perform the network test.

Do all other HS-CAN2 modules pass the network test?

Yes	If communication was restored with the HUD disconnected, CONNECT the HUD module. GO to Pinpoint Test Z If communication was restored with the VDM disconnected, GO to Pinpoint Test C

No	CONNECT the modules. GO to Pinpoint Test Y

AE18 CHECK FOR RESTORED NETWORK COMMUNICATION WITH THE PSCM (POWER STEERING CONTROL MODULE) DISABLED

NOTE: When re-running the network test, close the network test application first or the screen display reverts back to the prior network test results.

Disconnect: High Current BJB MEGA fuse 1 (125A) and BJB fuse 64 (5A) to disable the PSCM.

Using a diagnostic scan tool, perform the network test.

Do all other HS-CAN2 modules pass the network test?

Yes	INSTALL the removed fuses. GO to Pinpoint Test R

No	INSTALL the removed fuses. GO to AE19

AE19 CHECK FOR RESTORED NETWORK COMMUNICATION WITH THE RCM (RESTRAINTS CONTROL MODULE) AND THE OCSM (OCCUPANT CLASSIFICATION SYSTEM MODULE) DISABLED

NOTE: When re-running the network test, close the network test application first or the screen display reverts back to the prior network test results.

Disconnect: BCM fuse 35 (5A) to disable the RCM and fuse 22 (5A) to disable the OCSM.

Using a diagnostic scan tool, perform the network test.

Do all other modules pass the network test?

Yes	INSTALL the removed fuses. GO to AE20

No	INSTALL the removed fuses. The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

AE20 CHECK FOR RESTORED NETWORK COMMUNICATION WITH THE RCM (RESTRAINTS CONTROL MODULE) DISCONNECTED

NOTE: When re-running the network test, close the network test application first or the screen display reverts back to the prior network test results.

Disconnect: RCM C310B

Using a diagnostic scan tool, perform the network test.

Do all other modules pass the network test?

Yes	CONNECT RCM C310B. GO to Pinpoint Test D

No	CONNECT RCM C310B. GO to Pinpoint Test E

AE21 CHECK FOR CORRECT ABS (ANTI-LOCK BRAKE SYSTEM) MODULE OPERATION

Ignition OFF.

Disconnect and inspect the ABS module connector and related in-line connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the ABS module connector and related in-line connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ABS module. REFER to: Anti-Lock Brake System (ABS) Module .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

AE22 CHECK FOR CORRECT GWM (GATEWAY MODULE A) OPERATION

Ignition OFF.

Disconnect and inspect the GWM connector and related in-line connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the GWM connector and related in-line connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new GWM. REFER to: Gateway Module A (GWM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

AE23 CHECK FOR CORRECT CCM (CRUISE CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect the CCM connector and related in-line connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the CCM connector and related in-line connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new CCM. REFER to: Cruise

	Control Module (CCM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

AE24 CHECK FOR CORRECT HUD (HEAD UP DISPLAY) MODULE OPERATION

Ignition OFF.

Disconnect and inspect the HUD module connector and related in-line connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the HUD module connector and related in-line connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new HUD module. REFER to: Head Up Display (HUD) Module .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

AE25 CHECK FOR CORRECT PSCM (POWER STEERING CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all the PSCM connectors and related in-line connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the PSCM connectors and related in-line connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, REFER to the EPAS Symptom Chart.

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

AE26 CHECK FOR CORRECT OCSM (OCCUPANT CLASSIFICATION SYSTEM MODULE) OPERATION

Ignition OFF.

Disconnect and inspect the OCSM connector and related in-line connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the OCSM connector and related in-line connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new OCSM. REFER to: Occupant Classification System (OCS) Sensor .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

AE27 CHECK FOR CORRECT RCM (RESTRAINTS CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all the RCM connectors and related in-line connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the RCM connectors and related in-line connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new RCM. REFER to: Restraints Control Module (RCM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

AE28 CHECK FOR CORRECT SCCM (STEERING COLUMN CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all the SCCM connectors and related in-line connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the SCCM connectors and related in-line connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new SCCM. REFER to: Steering Column Control Module (SCCM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

AE29 CHECK FOR CORRECT VDM (VEHICLE DYNAMICS CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all the VDM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the VDM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new VDM.

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > COMMUNICATIONS NETWORK > PINPOINT TESTS > PINPOINT TEST AF : NO HIGH SPEED CONTROLLER AREA NETWORK 3 (HS-CAN3) COMMUNICATION, ALL MODULES ARE NOT RESPONDING

Refer to Module Communications Network for schematic and connector information.

Normal Operation and Fault Conditions

Diagnostic messages sent/received between the diagnostic scan tool and the HS-CAN3 modules are accessed through the HS-CAN2 circuits on the DLC.

Possible Sources

- Fuse
- Wiring, terminals or connectors
- ACM
- APIM (if equipped)
- DSP (if equipped)
- FCDIM (if equipped)
- IPC
- GWM

DIAGNOSIS AND TESTING > COMMUNICATIONS NETWORK > PINPOINT TESTS > PINPOINT TEST AF : NO HIGH SPEED CONTROLLER AREA NETWORK 3 (HS-CAN3)

COMMUNICATION, ALL MODULES ARE NOT RESPONDING > PINPOINT TEST AF : NO HIGH SPEED CONTROLLER AREA NETWORK 3 (HS-CAN3) COMMUNICATION, ALL MODULES ARE NOT RESPONDING

NOTE: Various modules set network DTCs during this test procedure. Clear DTCs from all modules after completing the diagnostic procedure.

AF1 CHECK THE DLC (DATA LINK CONNECTOR) PINS FOR DAMAGE

Ignition OFF.

Disconnect the diagnostic scan tool cable from the DLC.

Inspect the DLC pins 3 and 11 for damage.

Are DLC pins 3 and 11 OK?

Yes	GO to AF2

No	REPAIR the DLC as necessary.

AF2 CHECK FOR HS-CAN2 (HIGH SPEED-CONTROLLER AREA NETWORK 2) COMMUNICATION

Using a diagnostic scan tool, perform a network test.

Does the RCM pass the network test?

Yes	GO to AF3

No	GO to Pinpoint Test AE

AF3 CHECK THE HS-CAN3 (HIGH SPEED-CONTROLLER AREA NETWORK 3) TERMINATION RESISTANCE

Disconnect: GWM C2431 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2431-16	Ω	C2431-15

Is the resistance between 108 and 132 ohms?

Yes	GO to AF4

No	GO to AF6

AF4 CHECK THE HS-CAN3 (HIGH SPEED-CONTROLLER AREA NETWORK 3) (+) AND HS-CAN3 (HIGH SPEED-CONTROLLER AREA NETWORK 3) (-) CIRCUITS FOR A SHORT TO GROUND

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2431-16	Ω	Ground
C2431-15	Ω	Ground

Are the resistances greater than 1, 000 ohms?

Yes	GO to AF5

No	GO to AF11

AF5 CHECK THE HS-CAN3 (HIGH SPEED-CONTROLLER AREA NETWORK 3) (+) AND HS-CAN3 (HIGH SPEED-CONTROLLER AREA NETWORK 3) (-) CIRCUITS FOR A SHORT TO VOLTAGE

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2431-16	V	Ground
C2431-15	V	Ground

Are the voltages greater than 6 volts?

Yes	REPAIR the circuit in question.

No	GO to AF12

AF6 CHECK THE HS-CAN3 (HIGH SPEED-CONTROLLER AREA NETWORK 3) TERMINATION RESISTOR, COMPONENT SIDE

Disconnect: GWM C2431 .

Measure:

Positive Lead	Measurement / Action	Negative Lead

C2431-16 (component side)	Ω	C2431-15 (component side)

Is the resistance between 108 and 132 ohms?

Yes	GO to AF8

No	GO to AF7

AF7 CHECK THE HS-CAN3 (HIGH SPEED-CONTROLLER AREA NETWORK 3) TERMINATION RESISTOR, HARNESS SIDE

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2431-16	Ω	C2431-15

Is the resistance between 108 and 132 ohms?

Yes	GO to AF9

No	GO to AF25

AF8 CHECK THE HS-CAN3 (HIGH SPEED-CONTROLLER AREA NETWORK 3) CIRCUITS BETWEEN THE IPC (INSTRUMENT PANEL CLUSTER) AND THE GWM (GATEWAY MODULE A) FOR AN OPEN

Disconnect: IPC C220 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C220-12	Ω	C2431-16
C220-13	Ω	C2431-15

Are the resistances less than 3 ohms?

Yes	GO to AF23

No	REPAIR the circuit in question.

AF9 CHECK THE HS-CAN3 (HIGH SPEED-CONTROLLER AREA NETWORK 3) (+) AND HS-CAN3 (HIGH SPEED-CONTROLLER AREA NETWORK 3) (-) CIRCUITS FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2431-16	Ω	C2431-15

Is the resistance less than 3 ohms?

Yes	GO to AF10

No	GO to AF12

AF10 CHECK THE HS-CAN3 (HIGH SPEED-CONTROLLER AREA NETWORK 3) (+) AND HS-CAN3 (HIGH SPEED-CONTROLLER AREA NETWORK 3) (-) CIRCUITS FOR A SHORT TOGETHER WITH THE MODULES DISCONNECTED

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2431-16	Ω	C2431-15

Disconnect modules one at a time until the resistance is greater than 3 ohms.

APIM (if equipped) C2383 or C2342 (touchscreen display)

ACM C240A

DSP C2470 (if equipped)

FCDIM C2123 (if equipped)

IPC C220

Did the resistance change to greater than 3 ohms with one of the modules disconnected?

Yes	For the APIM, GO to AF20 For the ACM, GO to AF21 For the DSP, GO to AF22 For the FCDIM, GO to AF24 For the IPC, GO to AF23

No	REPAIR the circuits in question.

AF11 CHECK THE HS-CAN3 (HIGH SPEED-CONTROLLER AREA NETWORK 3) (+) AND HS-CAN3 (HIGH SPEED-CONTROLLER AREA NETWORK 3) (-) CIRCUITS FOR A SHORT TO GROUND WITH THE MODULES DISCONNECTED

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2431-16	Ω	Ground
C2431-15	Ω	Ground

Disconnect modules one at a time until the resistance to ground is greater than 1, 000 ohms.

APIM (if equipped) C2383 or C2342 (touchscreen display)

ACM C240A

DSP C2470 (if equipped)

FCDIM C2123 (if equipped)

IPC C220

Are the resistances greater than 1, 000 ohms?

Yes	For the APIM, GO to AF20 For the ACM, GO to AF21 For the DSP, GO to AF22 For the FCDIM, GO to AF24 For the IPC, GO to AF23

No	REPAIR the circuit in question. CONNECT all modules.

AF12 CHECK FOR RESTORED COMMUNICATION WITH THE GWM (GATEWAY MODULE A) AND IPC (INSTRUMENT PANEL CLUSTER) DISABLED

NOTE: When re-running the network test, close the network test application first or the screen display reverts back to the prior network test results.

Disconnect: BCM fuse 13 (7.5A).

Using a diagnostic scan tool, perform the network test.

Do all other HS-CAN3 modules pass the network test?

Yes	INSTALL the fuse. GO to AF13

No	INSTALL the fuse. GO to AF14

AF13 CHECK FOR RESTORED COMMUNICATION WITH THE IPC (INSTRUMENT PANEL CLUSTER) DISCONNECTED

NOTE: When re-running the network test, close the network test application first or the screen display reverts back to the prior network test results.

Disconnect: IPC C220 .

Using a diagnostic scan tool, perform the network test.

Do all other HS-CAN3 modules pass the network test?

Yes	CONNECT the IPC. GO to Pinpoint Test G

No	CONNECT the IPC. GO to Pinpoint Test AC

AF14 VERIFY VEHICLE EQUIPMENT - APIM (SYNC MODULE) OR FCDIM (FRONT CONTROL/DISPLAY INTERFACE MODULE)

Inspect the vehicle for an APIM or a FCDIM.

Is the vehicle equipped with an APIM or a FCDIM?

Yes	GO to AF15

No	GO to AF17

AF15 CHECK FOR RESTORED COMMUNICATION WITH THE APIM (SYNC MODULE) AND FCDIM (FRONT CONTROL/DISPLAY INTERFACE MODULE) DISABLED

NOTE: When re-running the network test, close the network test application first or the screen display reverts back to the prior network test results.

Disconnect: BCM fuse 32 (10A) to disable the APIM (if equipped) and FCDIM (if equipped).

Using a diagnostic scan tool, perform the network test.

Do all other HS-CAN3 modules pass the network test?

Yes	INSTALL the removed fuse. If equipped with a 4.2-inch display and SYNC ®, GO to AF16 If equipped with a touchscreen display, GO to Pinpoint Test O If not equipped with a SYNC ® system, GO to Pinpoint Test L

No	INSTALL the removed fuse. GO to AF17

AF16 CHECK FOR RESTORED COMMUNICATION WITH THE APIM (SYNC MODULE) DISCONNECTED

NOTE: When re-running the network test, close the network test application first or the screen display reverts back to the prior network test results.

Disconnect: BCM fuse 32 (10A).

Using a diagnostic scan tool, perform the network test.

Do all other HS-CAN3 modules pass the network test?

Yes	INSTALL the removed fuse. GO to Pinpoint Test O

No	INSTALL the removed fuse. GO to AF17

AF17 CHECK FOR RESTORED COMMUNICATION WITH THE ACM (AUDIO FRONT CONTROL MODULE) DISABLED

NOTE: When re-running the network test, close the network test application first or the screen display reverts back to the prior network test results.

Disconnect: BCM fuse 33 (20A).

Using a diagnostic scan tool, perform the network test.

Do all other HS-CAN3 modules pass the network test?

Yes	INSTALL the removed fuse. GO to Pinpoint Test M

No	INSTALL the removed fuse. GO to AF18

AF18 VERIFY VEHICLE EQUIPMENT - DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE)

Inspect the vehicle for a DSP.

Is the vehicle equipped with a DSP?

Yes	GO to AF19

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

AF19 CHECK FOR RESTORED COMMUNICATION WITH THE DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) DISABLED

NOTE: When re-running the network test, close the network test application first or the screen display reverts back to the prior network test results.

Disconnect: BCM fuse 27 (30A).

Using a diagnostic scan tool, perform the network test.

Do all other HS-CAN3 modules pass the network test?

Yes	INSTALL removed fuses. GO to Pinpoint Test P

No	INSTALL removed fuses. The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

AF20 CHECK THE APIM (SYNC MODULE) FOR CORRECT OPERATION

Ignition OFF.

Disconnect and inspect the APIM connector and related in-line connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the APIM connector and related in-line connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, Refer to APIM HARDWARE TESTING .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

AF21 CHECK THE ACM (AUDIO FRONT CONTROL MODULE) FOR CORRECT OPERATION

Ignition OFF.

Disconnect and inspect all the ACM connectors and related in-line connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the ACM connector and related in-line connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ACM. For AM/FM/CD /SYNC, REFER to: Audio Front Control Module (ACM) . For touchscreen display, REFER to: Audio Front Control Module (ACM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

AF22 CHECK THE DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) FOR CORRECT OPERATION

Ignition OFF.

Disconnect and inspect all the DSP connectors and related in-line connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the DSP connectors and related in-line connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new DSP. REFER to: Audio Digital Signal Processing (DSP) Module .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

AF23 CHECK THE IPC (INSTRUMENT PANEL CLUSTER) FOR CORRECT OPERATION

Ignition OFF.

Disconnect and inspect the IPC connector and related in-line connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the IPC connector and related in-line connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

AF24 CHECK THE FCDIM (FRONT CONTROL/DISPLAY INTERFACE MODULE) FOR CORRECT OPERATION

Ignition OFF.

Disconnect and inspect the FCDIM connector and related in-line connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the FCDIM connector and related in-line connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new FCDIM. REFER to: INFORMATION AND ENTERTAINMENT SYSTEM - GENERAL INFORMATION - VEHICLES WITH TOUCHSCREEN DISPLAY .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

AF25 CHECK THE GWM (GATEWAY MODULE A) FOR CORRECT OPERATION

Ignition OFF.

Disconnect and inspect the GWM connector and related in-line connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the GWM connector and related in-line connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new GWM. REFER to: Gateway Module A (GWM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > COMMUNICATIONS NETWORK > PINPOINT TESTS > PINPOINT TEST AG : NO MEDIUM SPEED CONTROLLER AREA NETWORK (MS-CAN) COMMUNICATION, ALL MODULES ARE NOT RESPONDING

Refer to Module Communications Network for schematic and connector information.

Normal Operation and Fault Conditions

Diagnostic messages sent/received between the diagnostic scan tool and the MS-CAN modules are accessed through the HS-CAN2 circuits on the DLC.

Possible Sources

- Fuse
- Wiring, terminals or connectors
- APIM (if equipped)
- Body Control Module B (BCMB)
- DDM
- DSM
- FCIM
- GPSM
- GWM

- Moveable Roof Control Module A (MRCMA) (if equipped)
- Moveable Roof Control Module B (MRCMB) (if equipped)
- PDM
- RTM
- SCME (if equipped)
- SODL (if equipped)
- SODR (if equipped)

DIAGNOSIS AND TESTING > COMMUNICATIONS NETWORK > PINPOINT TESTS > PINPOINT TEST AG : NO MEDIUM SPEED CONTROLLER AREA NETWORK (MS-CAN) COMMUNICATION, ALL MODULES ARE NOT RESPONDING > PINPOINT TEST AG : NO MEDIUM SPEED CONTROLLER AREA NETWORK (MS-CAN) COMMUNICATION, ALL MODULES ARE NOT RESPONDING

NOTE: Various modules set network DTCs during this test procedure. Clear DTCs from all modules after completing the diagnostic procedure.

AG1 CHECK THE DLC (DATA LINK CONNECTOR) PINS FOR DAMAGE

Ignition OFF.

Disconnect the diagnostic scan tool cable from the DLC.

Inspect the DLC pins 3 and 11 for damage.

Are DLC pins 3 and 11 OK?

Yes	GO to AG2

No	REPAIR the DLC as necessary.

AG2 CHECK FOR HS-CAN2 (HIGH SPEED-CONTROLLER AREA NETWORK 2) COMMUNICATION

Using a diagnostic scan tool, perform a network test.

Does the RCM pass the network test?

Yes	GO to AG3

No	GO to Pinpoint Test AE

AG3 CHECK THE MS-CAN (MEDIUM SPEED-CONTROLLER AREA NETWORK) TERMINATION RESISTANCE

Disconnect: GWM C2431 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2431-23	Ω	C2431-22

Is the resistance between 108 and 132 ohms?

Yes	GO to AG4

No	GO to AG6

AG4 CHECK THE MS-CAN (MEDIUM SPEED-CONTROLLER AREA NETWORK) (+) AND MS-CAN (MEDIUM SPEED-CONTROLLER AREA NETWORK) (-) CIRCUITS FOR A SHORT TO GROUND

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2431-23	Ω	Ground
C2431-22	Ω	Ground

Are the resistances greater than 1, 000 ohms?

Yes	GO to AG5

No	GO to AG11

AG5 CHECK THE MS-CAN (MEDIUM SPEED-CONTROLLER AREA NETWORK) (+) AND MS-CAN (MEDIUM SPEED-CONTROLLER AREA NETWORK) (-) CIRCUITS FOR A SHORT TO VOLTAGE

Connect the negative battery cable.

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2431-23	V	Ground

C2431-22		Ground

Are the voltages greater than 6 volts?

Yes	REPAIR the circuit in question.

No	GO to AG12

AG6 CHECK THE MS-CAN (MEDIUM SPEED-CONTROLLER AREA NETWORK) TERMINATION RESISTOR, COMPONENT SIDE

Disconnect: GWM C2431 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2431-23 (component side)	Ω	C2431-22 (component side)

Is the resistance between 108 and 132 ohms?

Yes	GO to AG8

No	GO to AG7

AG7 CHECK THE MS-CAN (MEDIUM SPEED-CONTROLLER AREA NETWORK) TERMINATION RESISTOR, HARNESS SIDE

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2431-23	Ω	C2431-22

Is the resistance between 108 and 132 ohms?

Yes	GO to AG9

No	GO to AG31

AG8 CHECK THE MS-CAN (MEDIUM SPEED-CONTROLLER AREA NETWORK) CIRCUITS BETWEEN THE FCIM AND THE GWM (GATEWAY MODULE A) FOR AN OPEN

Disconnect: FCIM C2402A

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2402A-17	Ω	C2431-23
C2402A-18	Ω	C2431-22

Are the resistances less than 3 ohms?

Yes	GO to AG30

No	REPAIR the circuit in question.

AG9 CHECK THE MS-CAN (MEDIUM SPEED-CONTROLLER AREA NETWORK) (+) AND MS-CAN (MEDIUM SPEED-CONTROLLER AREA NETWORK) (-) CIRCUITS FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2431-23	Ω	C2431-22

Is the resistance less than 3 ohms?

Yes	GO to AG10

No	GO to AG12

AG10 CHECK THE MS-CAN (MEDIUM SPEED-CONTROLLER AREA NETWORK) (+) AND MS-CAN (MEDIUM SPEED-CONTROLLER AREA NETWORK) (-) CIRCUITS FOR A SHORT TOGETHER WITH MODULES DISCONNECTED

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2431-23	Ω	C2431-22

Disconnect modules one at a time until the resistance is greater than 3 ohms.

APIM (if equipped) C2383 or C2342 (touchscreen display)

Body Control Module B (BCMB) C4368A

DDM C501A

DSM C341D

FCIM C2402A

GPSM C2398

Moveable Roof Control Module A (MRCMA) C4830 (if equipped)

Moveable Roof Control Module B (MRCMB) C4831 (if equipped)

PDM C652A

RTM C4458

SCME C3265C (if equipped)

SODL C4369 (if equipped)

SODR C4370 (if equipped)

Did the resistance change to greater than 3 ohms with one of the modules disconnected?

Yes	For the APIM, GO to AG28 For the Body Control Module (BCMB), GO to AG29 For the DDM, GO to AG32 For the DSM, GO to AG34 For the FCIM, GO to AG30 For the GPSM, GO to AG33 For the Moveable Roof Control Module A (MRCMA), GO to AG35 For the Moveable Roof Control Module B (MRCMB), GO to AG36 For the PDM, GO to AG37 For the RTM, GO to AG38 For the SCME, GO to AG39 For the SODL, GO to AG40 For the SODR, GO to AG41

No	REPAIR the circuits.

AG11 CHECK THE MS-CAN (MEDIUM SPEED-CONTROLLER AREA NETWORK) (+) AND MS-CAN (MEDIUM SPEED-CONTROLLER AREA NETWORK) (-) CIRCUITS FOR A SHORT TO GROUND WITH THE MODULES DISCONNECTED

Measure

Positive Lead	Measurement / Action	Negative Lead
C2431-23	Ω	Ground
C2431-22	Ω	Ground

Disconnect modules one at a time until the resistance to ground is greater than 1, 000 ohms.

APIM (if equipped) C2383 or C2342 (touchscreen display)

Body Control Module B (BCMB) C4368A

DDM C501A

DSM C341D

FCIM C2402A

GPSM C2398

Moveable Roof Control Module A (MRCMA) C4830 (if equipped)

Moveable Roof Control Module B (MRCMB) C4831 (if equipped)

PDM C652A

RTM C4458

SCME C3265C (if equipped)

SODL C4369 (if equipped)

SODR C4370 (if equipped)

Did the resistance change to greater than 1, 000 ohms with one of the modules disconnected?

Yes	For the APIM, GO to AG28 For the Body Control Module (BCMB), GO to AG29 For the DDM, GO to AG32 For the DSM, GO to AG34 For the FCIM, GO to AG30 For the GPSM, GO to AG33 For the Moveable Roof Control Module A (MRCMA), GO to AG35 For the Moveable Roof Control Module B (MRCMB), GO to AG36 For the PDM, GO to AG37 For the RTM, GO to AG38 For the SCME, GO to AG39 For the SODL, GO to AG40 For the SODR, GO to AG41

No	REPAIR the circuit in question.

AG12 CHECK FOR RESTORED COMMUNICATION WITH THE GWM (GATEWAY MODULE A) DISABLED

NOTE: When re-running the network test, close the Network Test application first or the screen display reverts back to the prior run Network Test results.

Disconnect BCM fuse 13 (7.5A).

Using a diagnostic scan tool, perform the network test.

Do all other MS-CAN modules pass the network test?

Yes	INSTALL the removed fuse. GO to Pinpoint Test AC

No	INSTALL the removed fuse. GO to AG13

AG13 CHECK FOR RESTORED NETWORK COMMUNICATION WITH THE FCIM (FRONT CONTROLS INTERFACE MODULE) DISABLED

Disconnect: BCM fuse 12 (7.5A) to disable the FCIM.

Using a diagnostic scan tool, perform the network test.

Do all other MS-CAN modules pass the network test?

Yes	INSTALL the removed fuse. GO to Pinpoint Test K

No	INSTALL the removed fuse. GO to AG14

AG14 CHECK FOR RESTORED NETWORK COMMUNICATION WITH THE BODY CONTROL MODULE B (BCMB) DISABLED

Disconnect: BCM fuses 28 (20A) and 36 (15A) to disable the Body Control Module B (BCMB).

Using a diagnostic scan tool, perform the network test.

Do all other MS-CAN modules pass the network test?

Yes	INSTALL the removed fuse. GO to Pinpoint Test J

No	INSTALL the removed fuse. GO to AG15

AG15 CHECK FOR RESTORED NETWORK COMMUNICATION WITH THE DDM (DRIVER DOOR MODULE) AND PDM (PASSENGER DOOR MODULE) DISABLED

NOTE: When re-running the network test, close the network test application first or the screen display reverts back to the prior network test results.

Disable modules one at a time until other MS-CAN modules pass the network test. Skip to the end once network operation is restored.

Disconnect: BJB fuse 11 (30A) to disable the DDM.

Using a diagnostic scan tool, perform a network test.

Disconnect:BCM fuse 26 (30A) to disable the PDM.

Using a diagnostic scan tool, perform a network test.

Do all other MS-CAN modules pass the network test?

Yes	INSTALL the removed fuses. For restored communication with the DDM disabled, GO to Pinpoint Test U For restored communication with the PDM disabled, GO to Pinpoint Test V

No	INSTALL the removed fuses. GO to AG16

AG16 VERIFY VEHICLE EQUIPMENT - APIM (SYNC MODULE) AND GPSM (GLOBAL POSITIONING SYSTEM MODULE)

Inspect the vehicle for an APIM or GPSM.

Is the vehicle equipped with an APIM or GPSM?

Yes	GO to AG17

No	GO to AG19

AG17 CHECK FOR RESTORED COMMUNICATION WITH THE GPSM (GLOBAL POSITIONING SYSTEM MODULE), APIM (SYNC MODULE) AND RTM (RADIO TRANSCEIVER MODULE) DISABLED

NOTE: When re-running the network test, close the network test application first or the screen display reverts back to the prior network test results.

Disconnect: BCM fuse 32 (10A) to disable the GPSM, APIM and RTM (if equipped).

Using a diagnostic scan tool, perform the network test.

Do all other MS-CAN modules pass the network test?

Yes	INSTALL the removed fuse. GO to AG18

No	INSTALL the removed fuse. GO to AG19

AG18 CHECK FOR RESTORED COMMUNICATION WITH THE GPSM (GLOBAL POSITIONING SYSTEM MODULE) AND RTM (RADIO TRANSCEIVER MODULE) DISCONNECTED

NOTE: When re-running the network test, close the network test application first or the screen display reverts back to the prior network test results.

Disconnect: GPSM C2398 (if equipped).

Using a diagnostic scan tool, perform the network test.

Disconnect: RTM C4458 (if equipped).

Using a diagnostic scan tool, perform the network test.

Do all other MS-CAN modules pass the network test?

Yes	CONNECT the module. For restored communication with the GPSM disabled, GO to Pinpoint Test N For restored communication with the RTM disabled, GO to Pinpoint Test Q

No	CONNECT the module. GO to Pinpoint Test O

AG19 VERIFY VEHICLE EQUIPMENT - DSM (DRIVER FRONT SEAT MODULE)

Inspect the vehicle for an DSM.

Is the vehicle equipped with a DSM?

Yes	GO to AG20

No	GO to AG21

AG20 CHECK FOR RESTORED NETWORK COMMUNICATION WITH THE DSM (DRIVER FRONT SEAT MODULE) DISABLED

NOTE: When re-running the network test, close the network test application first or the screen display reverts back to the prior network test results.

Disconnect: BJB fuse 12 (30A) and BCM fuse 2 (7.5A) to disable the DSM (if equipped).

Using a diagnostic scan tool, perform the network test.

Do all other MS-CAN modules pass the network test?

Yes	INSTALL the removed fuse. GO to Pinpoint Test S

No	GO to AG21

AG21 VERIFY VEHICLE EQUIPMENT - SCME (FRONT SEAT CLIMATE CONTROL MODULE)

Inspect the vehicle for a SCME.

Is the vehicle equipped with a SCME?

Yes	GO to AG22

No	GO to AG23

AG22 CHECK FOR RESTORED NETWORK COMMUNICATION WITH THE SCME (FRONT SEAT CLIMATE CONTROL MODULE) DISABLED

NOTE: When re-running the network test, close the network test application first or the screen display reverts back to the prior network test results.

Disconnect: BJB fuse 14 (30A) to disable the SCME (if equipped).

Using a diagnostic scan tool, perform the network test.

Do all other MS-CAN modules pass the network test?

Yes	INSTALL the removed fuse. GO to Pinpoint Test T

No	GO to AG23

AG23 VERIFY VEHICLE EQUIPMENT - CONVERTIBLE TOP

Inspect the vehicle for a convertible top.

Is the vehicle equipped with a convertible top?

Yes	GO to AG24

No	GO to AG25

AG24 CHECK FOR RESTORED NETWORK COMMUNICATION WITH THE MOVEABLE ROOF CONTROL MODULE A (MRCMA) AND MOVEABLE ROOF CONTROL MODULE B (MRCMB) DISABLED

NOTE: When re-running the network test, close the network test application first or the screen display reverts back to the prior network test results.

Disconnect: BCM fuse 17 (20A) to disable the Moveable Roof Control Module A (MRCMA) (if equipped).

Using a diagnostic scan tool, perform the network test.

Disconnect: BCM fuse 15 (20A) to disable the Moveable Roof Control Module B (MRCMB) (if equipped).

Using a diagnostic scan tool, perform the network test.

Do all other MS-CAN modules pass the network test?

Yes	INSTALL the removed fuse.For restored communication with the Moveable Roof Control Module A (MRCMA) disabled, GO to Pinpoint Test AA For restored communication with the Moveable Roof Control Module B (MRCMB) disabled, GO to Pinpoint Test AB

No	GO to AG25

AG25 VERIFY VEHICLE EQUIPMENT - SODL (SIDE OBSTACLE DETECTION CONTROL MODULE LH) AND SODR (SIDE OBSTACLE DETECTION CONTROL MODULE RH)

Inspect the vehicle for a SODL and SODR.

Is the vehicle equipped with a SODL and SODR?

Yes	GO to AG26

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

AG26 CHECK FOR RESTORED NETWORK COMMUNICATION WITH THE SODL (SIDE OBSTACLE DETECTION CONTROL MODULE LH) AND SODR (SIDE OBSTACLE DETECTION CONTROL MODULE RH) DISABLED

NOTE: When re-running the network test, close the network test application first or the screen display reverts back to the prior network test results.

Disconnect: BJB fuse 66 (5A) to disable the SODL and SODR (if equipped).

Using a diagnostic scan tool, perform the network test.

Do all other modules pass the network test?

Yes	INSTALL the removed fuse. GO to AG27

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

AG27 CHECK FOR RESTORED NETWORK COMMUNICATION WITH THE SODR (SIDE OBSTACLE DETECTION CONTROL MODULE RH) DISCONNECTED

NOTE: When re-running the network test, close the network test application first or the screen display reverts back to the prior network test results.

Disconnect: SODR C4370 (if equipped).

Using a diagnostic scan tool, perform the network test.

Do all other modules pass the network test?

Yes	CONNECT the SODR. GO to Pinpoint Test X

No	CONNECT the SODR. GO to Pinpoint Test W

AG28 CHECK THE APIM (SYNC MODULE) FOR CORRECT OPERATION

Ignition OFF.

Disconnect and inspect the APIM connector and related in-line connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the APIM connector and related in-line connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, Refer to APIM HARDWARE TESTING .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

AG29 CHECK THE BODY CONTROL MODULE B (BCMB) FOR CORRECT OPERATION

Ignition OFF.

Disconnect and inspect the Body Control Module B (BCMB) connectors and related in-line connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the Body Control Module B (BCMB) connectors and related in-line connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new Body Control Module B (BCMB). REFER to: Body Control Module B (BCMB) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

AG30 CHECK THE FCIM (FRONT CONTROLS INTERFACE MODULE) FOR CORRECT OPERATION

Ignition OFF.

Disconnect and inspect all the FCIM connectors and related in-line connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the FCIM connectors and related in-line connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS or any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new FCIM. For AM/FM/CD/SYNC, REFER to: Front Controls Interface Module (FCIM) . For touchscreen display, REFER to: Front Controls Interface Module (FCIM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

AG31 CHECK THE GWM (GATEWAY MODULE A) FOR CORRECT OPERATION

Ignition OFF.

Disconnect and inspect the GWM connector and related in-line connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the GWM connector and related in-line connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new GWM. REFER to: Gateway Module A (GWM) .

No	The system is operating correctly at this time. The concern may have been caused by

	module connections. ADDRESS the root cause of any connector or pin issues.

AG32 CHECK THE DDM (DRIVER DOOR MODULE) FOR CORRECT OPERATION

Ignition OFF.

Disconnect and inspect all the DDM connectors and related in-line connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the DDM connectors and related in-line connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new DDM. REFER to: Driver Door Module (DDM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

AG33 CHECK THE GPSM (GLOBAL POSITIONING SYSTEM MODULE) FOR CORRECT OPERATION

Ignition OFF.

Disconnect and inspect the GPSM connector and related in-line connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the GPSM connector and related in-line connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new GPSM. For AM/FM/CD /SYNC, REFER to: Global Positioning System Module (GPSM) . For touchscreen display, REFER to: Global Positioning System Module (GPSM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

AG34 CHECK THE DSM (DRIVER FRONT SEAT MODULE) FOR CORRECT OPERATION

Ignition OFF.

Disconnect and inspect all the DSM module connectors and related in-line connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the DSM connectors and related in-line connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new DSM. REFER to: Driver Front Seat Module (DSM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

AG35 CHECK THE MOVEABLE ROOF CONTROL MODULE A (MRCMA) FOR CORRECT OPERATION

Ignition OFF.

Disconnect and inspect all Moveable Roof Control Module A (MRCMA) connector and related in-line connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the Moveable Roof Control Module A (MRCMA) connector and related in-line connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new Moveable Roof Control Module A (MRCMA).

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

AG36 CHECK THE MOVEABLE ROOF CONTROL MODULE B (MRCMB) FOR CORRECT OPERATION

Ignition OFF.

Disconnect and inspect all Moveable Roof Control Module B (MRCMB) connector and related in-line connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the Moveable Roof Control Module B (MRCMB) connector and related in-line connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new Moveable Roof Control Module B (MRCMB).

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

AG37 CHECK THE PDM (PASSENGER DOOR MODULE) FOR CORRECT OPERATION

Ignition OFF.

Disconnect and inspect the PDM connectors and related in-line connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the PDM connectors and related in-line connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PDM. REFER to: Passenger Door Module (PDM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

AG38 CHECK THE RTM (RADIO TRANSCEIVER MODULE) FOR CORRECT OPERATION

Ignition OFF.

Disconnect and inspect the RTM connector and related in-line connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the RTM connector and related in-line connectors. Make sure they seats and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new RTM. REFER to: Radio Transceiver Module (RTM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

AG39 CHECK THE SCME (FRONT SEAT CLIMATE CONTROL MODULE) FOR CORRECT OPERATION

Ignition OFF.

Disconnect and inspect the SCME connectors and related in-line connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the SCME connectors and related in-line connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new SCME. REFER to: Front Seat Climate Control Module [SCME] .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

AG40 CHECK THE SODL (SIDE OBSTACLE DETECTION CONTROL MODULE LH) FOR CORRECT OPERATION

Ignition OFF.

Disconnect and inspect the SODL connector and related in-line connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the SODL connector and related in-line connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for

	this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new SODL. REFER to: Side Obstacle Detection Control Module .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

AG41 CHECK THE SODR (SIDE OBSTACLE DETECTION CONTROL MODULE RH) FOR CORRECT OPERATION

Ignition OFF.

Disconnect and inspect the SODR connector and related in-line connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the SODR connector and related in-line connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new SODR. REFER to: Side Obstacle Detection Control Module .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > COMMUNICATIONS NETWORK > PINPOINT TESTS > PINPOINT TEST AH : NO POWER TO THE DATA LINK CONNECTOR (DLC)

Normal Operation and Fault Conditions

The diagnostic scan tool is connected to the DLC to communicate with the HS-CAN1 and HS-CAN2. The GWM translates diagnostic messages for the HS-CAN3 and the MS-CAN from the HS-CAN2. A loss of ground or poor ground at the DLC can result in network faults while the diagnostic scan tool is connected.

Possible Sources

- Fuse

- Wiring, terminals or connector
- DLC
- Diagnostic scan tool

Visual Inspection and Diagnostic Pre-checks

Verify BCM fuse 13 (7.5A) and fuse 15 (10A) are OK.

DIAGNOSIS AND TESTING > COMMUNICATIONS NETWORK > PINPOINT TESTS > PINPOINT TEST AH : NO POWER TO THE DATA LINK CONNECTOR (DLC) > PINPOINT TEST AH : NO POWER TO THE DATA LINK CONNECTOR (DLC)

AH1 CHECK THE DLC (DATA LINK CONNECTOR) PINS FOR DAMAGE

Ignition OFF.

Disconnect the diagnostic scan tool cable from the DLC.

Inspect DLC pins 4, 5 and 16 for damage.

Are DLC pins 4, 5 and 16 OK?

Yes	GO to AH2

No	REPAIR the DLC as necessary.

AH2 CHECK THE DLC (DATA LINK CONNECTOR) VOLTAGE SUPPLY FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C251-16		Ground

Is the voltage greater than 11 volts?

Yes	GO to AH4

No	GO to AH3

AH3 CHECK THE GWM (GATEWAY MODULE A) VOLTAGE SUPPLY FOR AN OPEN

Disconnect GWM C2431 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2431-13		Ground
C2431-24		Ground

Is the voltage greater than 11 volts?

Yes	GO to AH5

No	VERIFY the BCM fuse 13 (7.5A) or fuse 15 (10A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short.

AH4 CHECK THE DLC (DATA LINK CONNECTOR) GROUND CIRCUITS FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C251-4	Ω	Ground
C251-5	Ω	Ground

Are the resistances less than 3 ohms?

Yes	REPAIR the diagnostic scan tool.

No	GO to AH5

AH5 CHECK THE GWM (GATEWAY MODULE A) GROUND CIRCUITS FOR AN OPEN

Disconnect GWM C2431 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2431-1	Ω	Ground
C2431-14	Ω	Ground

Are the resistances less than 3 ohms?

Yes	REPAIR the diagnostic scan tool.

No	GO to AH6

AH6 CHECK FOR CORRECT GWM (GATEWAY MODULE A) OPERATION

Ignition OFF.

Disconnect and inspect the GWM connector and related in-line connectors

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the GWM connector and related in-line connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new GWM. REFER to: Gateway Module A (GWM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

GENERAL PROCEDURES > NO COMMUNICATION BETWEEN THE INTEGRATED DIAGNOSTIC SYSTEM (IDS) AND THE VEHICLE

Configuration

1.

WARNING: Before beginning any service procedure in this article, REFER to Safety Warnings in GENERAL INFORMATION . Failure to follow this instruction may result in serious personal injury.

Refer to: Health and Safety Precautions .

2.

Establish a diagnostic scan tool session.

3.

NOTE: For vehicles with push-button start, refer to Push Button Ignition Switch in STEERING WHEEL AND COLUMN ELECTRICAL COMPONENTS .

Turn ignition to RUN.

4.

The diagnostic scan tool first attempts to communicate with the PCM. After establishing communication with the PCM, the diagnostic scan tool then attempts to communicate with all other modules on the vehicle.

5.

If an IDS session cannot be established with the vehicle, IDS may state "No communication can be established with the Powertrain Control Module (PCM)."

6.

Choose "NO" when the scan tool prompts whether or not to retry communication.

7.

Enter a PCM part number, tear tag or calibration number to identify the vehicle and start a session. The PCM part number and 4-character tear tag number are printed on the PCM label. If the PCM part number or tear tag number cannot be found, double-click on the Vehicle Identification Number (VIN) in the top LH corner of the PTS screen. The tear tag number is listed on the Detailed Vehicle Specification.

8.

If the diagnostic scan tool cannot communicate with the vehicle after manually entering the PCM part number, diagnose the PCM does not respond to the scan tool.

REMOVAL AND INSTALLATION > GATEWAY MODULE A (GWM) > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

NOTE: If installing a new module, it is necessary to upload the module configuration information to the scan tool prior to removing the module. This information must be downloaded into the new module after installation.

Using a diagnostic scan tool, begin the PMI process for the GWM following the on-screen instructions.

2.

Remove the nuts and the GWM.

Disconnect the electrical connector.

Torque

: 89 lb.in (10 Nm)



REMOVAL AND INSTALLATION > GATEWAY MODULE A (GWM) > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Using a diagnostic scan tool, complete the PMI process for the GWM following the on-screen instructions.

Service Manual: MODULE CONFIGURATION

DESCRIPTION AND OPERATION > MODULE CONFIGURATION - SYSTEM OPERATION AND COMPONENT DESCRIPTION

System Operation

DESCRIPTION AND OPERATION > MODULE CONFIGURATION - SYSTEM OPERATION AND COMPONENT DESCRIPTION > PROGRAMMABLE MODULE INSTALLATION (PMI)

Programmable Module Installation (PMI) is a diagnostic scan tool process which configures settings in a new module. Data used for the Programmable Module Installation (PMI) process is automatically downloaded from the original module and stored when a diagnostic scan tool session is started. If this data cannot be retrieved from the module being replaced, the diagnostic scan tool may prompt for As-Built data entry or display a list of parameter values that need to be manually selected. Some modules are reprogrammed during Programmable Module Installation (PMI) when a strategy/calibration update is available.

It is important that the diagnostic scan tool identifies the vehicle and obtains configuration data prior to removing any modules. The new module must be able to communicate with the diagnostic scan tool in order to carry out Programmable Module Installation (PMI).

DESCRIPTION AND OPERATION > MODULE CONFIGURATION - SYSTEM OPERATION AND COMPONENT DESCRIPTION > MODULE PROGRAMMING

Module reprogramming (also referred to as "flashing") is a diagnostic scan tool process which updates the strategy/calibration in a module. Reprogramming a module with the same level of software does not improve module operation or repair a hardware failure. Module reprogramming is automatically carried out during Programmable Module Installation (PMI) when a later strategy/calibration is available.

Limit module reprogramming to circumstances where a published TSB procedure recommends doing so.

A module cannot communicate with other modules on the communication network while being reprogrammed. After the reprogramming process, clear any network communication Diagnostic Trouble Codes (DTCs) which may have been set in other modules.

Some modules are reprogrammed in coordination with other modules. Follow the IDS key cycling instructions carefully to avoid reprogramming errors, including failure of programming one or more of the modules.

DESCRIPTION AND OPERATION > MODULE CONFIGURATION - SYSTEM OPERATION AND COMPONENT DESCRIPTION > PROGRAMMABLE PARAMETERS

Programmable parameters are customer preference items that may be modified by the dealer via the

diagnostic scan tool or in some cases, modified by the customer following a procedure listed in the Owner's Literature. While many configuration options may exist for a module, only a few of these options are programmable parameters.

DESCRIPTION AND OPERATION > MODULE CONFIGURATION - SYSTEM OPERATION AND COMPONENT DESCRIPTION > ADAPTIVE LEARNING AND CALIBRATION

Some modules require a separate learning procedure be carried out if replaced as part of a repair procedure. For adaptive learning and calibration instructions, refer to the appropriate specific module removal and installation procedures.

DESCRIPTION AND OPERATION > MODULE CONFIGURATION - SYSTEM OPERATION AND COMPONENT DESCRIPTION > VEHICLE IDENTIFICATION (VID) BLOCK

Vehicle identification block commonly stores powertrain configuration items such as VIN, tire size, axle ratio, and whether or not the vehicle is equipped with cruise control.

DESCRIPTION AND OPERATION > MODULE CONFIGURATION - SYSTEM OPERATION AND COMPONENT DESCRIPTION > TRANSMISSION IDENTIFICATION

The solenoid body has a unique strategy data file that must be downloaded to the PCM. There is a 12-digit solenoid body identification and a 13-digit solenoid body strategy for each solenoid body. When a new solenoid body or transmission is installed, the diagnostic scan tool must be used to retrieve the solenoid body strategy data file and download it into the PCM. If the PCM is replaced and the PCM data cannot be inhaled or exhaled, the solenoid body identification and solenoid body strategy must be downloaded into the PCM

DESCRIPTION AND OPERATION > MODULE CONFIGURATION - SYSTEM OPERATION AND COMPONENT DESCRIPTION > AS-BUILT DATA

As-Built data is a VIN-specific module configuration record. During vehicle build, the configuration from all modules is downloaded and stored in the As-Built database. As-Built data does not reflect customer preference items that have been changed from the default state. These items need to be changed using programmable parameters after the module is configured.

It is not necessary to obtain As-Built data unless directed to do so by the diagnostic scan tool. This data may be accessed from the technician service publication web site.

DESCRIPTION AND OPERATION > MODULE CONFIGURATION - SYSTEM

OPERATION AND COMPONENT DESCRIPTION > MODULE CONFIGURATION AND PARAMETER CHART

The chart describes specific module configuration information:

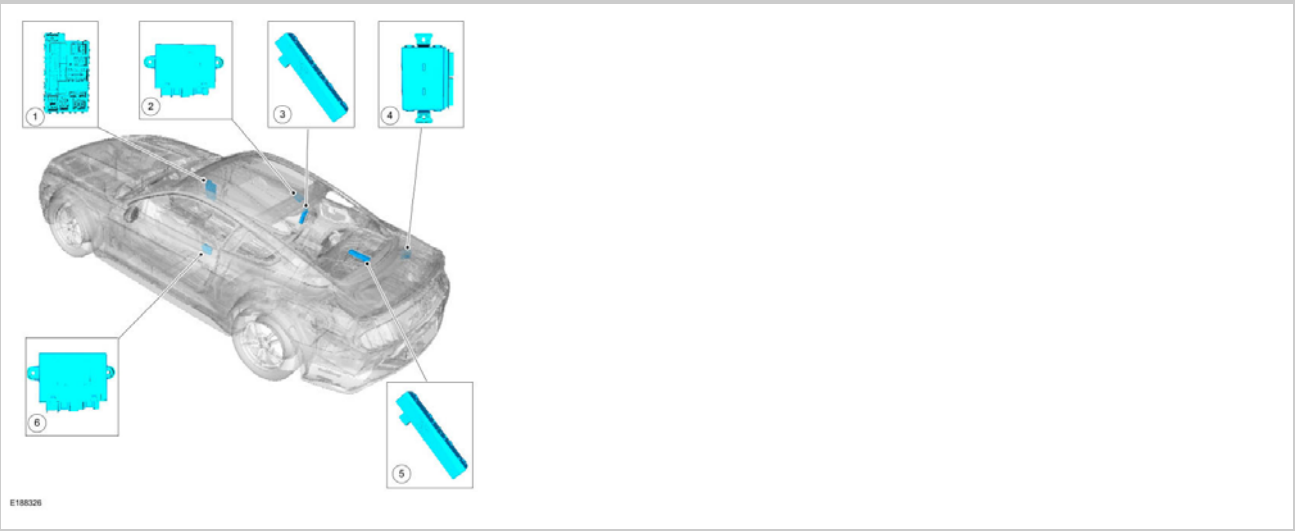
Module Name	Module Address	Programmable Module Installation (PMI) Available	Reprogram/Flash Capable	Requires Adaptive Learning or Calibration	Available Progammable Parameters
APIM	7D0	Yes	Yes	No	None
ABS module	760	Yes	Yes	IVD initialization	Line Lock feature enabled
ACM	727	Yes	Yes	No	None
BCM	726	Yes	Yes	Ambient lighting calibration Rear view camera calibration	Auto unlock enable/disable Trim switch inhibit enable/disable DRL configuration Remote start enable Front/rear placard configuration
BCMB	7B7	Yes	Yes	No	Entry lighting Blue Red Green
CCM	764	Yes	Yes	Radar horizontal and vertical alignment calibration	None
DSP	783	Yes	Yes	No	None
DACMC (integrated with ACM)	7D5	Yes	Yes	No	None
DDM	740	Yes	Yes	Windows initialization	None
DSM	744	Yes	Yes	No	None
SCME	776	Yes	Yes	No	None
FCIM	7A7	Yes	Yes	No	None
FCDIM	7A5	Yes	Yes	No	None

GWM	716	Yes	Yes	No	None
GPSM	701	Yes	Yes	No	None
HUD module	7B2	No	No	No	None
ICM	784	Yes	Yes	No	None
IPC	720	Yes	Yes	No	AEIS with override Auto unlock control function DRL control function Remote start Climate settings Driver seat Passenger seat Rear defrost Steering wheel Line lock feature enabled
Moveable Roof Control Module A (MRCMA)	790	No	No	No	None
Moveable Roof Control Module B (MRCMB)	7B0	No	No	No	None
OCSM	765	No	No	OCSM re-zero	None
PAM (integrated with BCM)	736	Yes	Yes	No	None
PSCM	730	Yes	Yes	No	None
PCM	7E0	Yes	Yes	Misfire Monitor Neutral Profile Correction procedure	None
PDM	741	Yes	Yes	Windows initialization	None
RTM	751	Yes	Yes	No	None
RCM	737	Yes	Yes	No	Driver Beltminder enable/disable Passenger Beltminder enable/disable

SODL	7C4	Yes	Yes	No	BLIS/CTA enable/disable Blockage enabled
SODR	7C6	Yes	Yes	No	BLIS/CTA enable/disable Blockage enabled
SCCM	724	Yes	Yes	No	Courtesy wipe enable/disable
VDM	721	Yes	Yes	Suspension height sensor calibration	None

Service Manual: MULTIFUNCTION ELECTRONIC MODULES

DESCRIPTION AND OPERATION > MODULE CONTROLLED FUNCTIONS - COMPONENT LOCATION



Item	Description
1	BCM
2	PDM
3	RTM (Convertible)
4	Body Control Module B (BCM-B)
5	RTM (Coupe)
6	DDM

DESCRIPTION AND OPERATION > MODULE CONTROLLED FUNCTIONS - OVERVIEW > BODY CONTROL MODULE (BCM)

The BCM controls the following:

- Battery saver function
- Brake shift interlock
- Delayed accessory function
- Dimmable backlighting
- Exterior lighting
- Heated rear windows
- Heated exterior mirrors
- Horn

- Ignition state messaging
- Interior lighting
- PATS
- Perimeter alarm
- Post crash alert function
- Power door locks
- RKE system
- TPMS
- Transport mode function
- Wipers and washers

DESCRIPTION AND OPERATION > MODULE CONTROLLED FUNCTIONS - OVERVIEW > BODY CONTROL MODULE B (BCM-B)

The Body Control Module B (BCM-B) controls the following:

- Ambient lighting
- Convertible top
- Window function inhibit (convertible)
- Luggage compartment lid release inhibit (convertible)
- Reverse lamps
- Rear stop/turn lamps

DESCRIPTION AND OPERATION > MODULE CONTROLLED FUNCTIONS - SYSTEM OPERATION AND COMPONENT DESCRIPTION

System Operation

DESCRIPTION AND OPERATION > MODULE CONTROLLED FUNCTIONS - SYSTEM OPERATION AND COMPONENT DESCRIPTION > FIELD EFFECT TRANSISTOR (FET) PROTECTION

The BCM and BCMB utilize an Field Effect Transistor (FET) protective circuit strategy for many of its outputs, for example, lamp output circuits. Output loads (current level) are monitored for excessive current (typically short circuits) and are shut down (turns off the voltage or ground provided by the module) when a fault event is detected.

A Field Effect Transistor (FET) is a type of transistor that the control module software uses to control and monitor current flow on module outputs. The Field Effect Transistor (FET) protection strategy prevents module damage in the event of excessive current flow.

Output loads (current level) are monitored for excessive current draw (typically short circuits). When a fault event is detected the Field Effect Transistor (FET) turns off and a short circuit DTC sets. The module resets the Field Effect Transistor (FET) protection and allows the circuit to function when the fault is corrected or the ignition state is cycled off and then back on.

When the excessive circuit load occurs often enough, the module shuts down the output until a repair procedure is carried out. Each Field Effect Transistor (FET) protected circuit has 3 predefined levels of short circuit tolerance based on a module lifetime level of fault events based upon the durability of the Field Effect Transistor (FET). If the total tolerance level is determined to be 600 fault events, the 3 predefined levels would be 200, 400 and 600 fault events.

When each level is reached, the DTC associated with the short circuit sets along with DTC U1000:00. These Diagnostic Trouble Codes (DTCs) can be cleared using the module on-demand self-test, then the Clear DTC operation on the scan tool (if the on-demand test shows the fault corrected). The module never resets the fault event counter to zero and continues to advance the fault event counter as short circuit fault events occur.

If the number of short circuit fault events reach the third level, then Diagnostic Trouble Codes (DTCs) U1000:00 and U3000:49 set along with the associated short circuit DTC. DTC **U3000:49 cannot be cleared** and the module **must** be replaced after the repair.

DESCRIPTION AND OPERATION > MODULE CONTROLLED FUNCTIONS - SYSTEM OPERATION AND COMPONENT DESCRIPTION > BODY CONTROL MODULE (BCM)

The BCM controls various systems by monitoring inputs from switches, sensors and messages sent from other modules on the Medium Speed Controller Area Network (MS-CAN). Based on the inputs received, the BCM activates outputs. For example, the BCM monitors the headlamp switch position. Based on this input, the BCM may provide voltage to the exterior lamps. For a list of BCM controlled functions, Refer to: Module Controlled Functions - Overview .

Battery Saver

The battery saver feature is used to conserve battery voltage. The BCM provides automatic shut-off of the interior lamps after a time-out period when the ignition is off.

Refer to: Interior Lighting - System Operation and Component Description .

Battery Load Shed

The BCM monitors the battery state of charge in order to save the remaining battery charge when necessary. For more information, Refer to: Charging System - System Operation and Component Description .

Post Crash Alert Function

The post crash alert is a function controlled by the BCM. If the RCM determines an impact of enough severity has occurred (the airbags may or may not be deployed), the post crash alert function activates.

The post crash alert function:

- sounds the horn.

- turns on the hazard lights.
- turns on the interior lights.
- unlocks the doors.

The post crash alert function can be turned off by:

- pressing the hazard flasher lamp switch (which may need to be pressed twice).
- pressing the transmitter unlock button.
- pressing the RKE transmitter PANIC button.
- cycling the ignition switch (RUN-OFF-RUN-OFF-RUN).
- opening the driver door.

Factory-Transport Mode

During vehicle build, some modules (such as the IPC and the BCM) are set to factory mode. When the vehicle build is complete, the vehicle is set to transport mode.

Transport mode is used to reduce the drain on the battery during longer periods when the vehicle is not used. Various system functions can be altered or disabled when in the transport mode. While in transport mode, the IPC displays TRANSPORT MODE in the message center. Transport mode can be disabled and placed into normal operation mode. Refer to: Transport and Factory Mode Deactivation.

Car Configuration Parameters

The parameters are set in the BCM. The parameters are also set in the IPC as backup data for service, in case online As-Built data is not available. For more information, Refer to: MODULE CONFIGURATION .

Steering Column Lock Module

The steering column lock module locks and unlocks the steering column based on commands received from the BCM. For more information, Refer to: Passive Anti-Theft System (PATS) - System Operation and Component Description .

When the steering column lock module is replaced, the BCM **must** be configured/trained to the new steering column lock module for the steering column lock module to operate correctly. Refer to: Anti-Theft Security Access .

BCMB

The BCMB controls various systems by monitoring inputs from switches, sensors and messages sent from other modules on the MS-CAN. Based on the inputs received, the BCMB activates outputs. For example, the BCM-B monitors the stoplamp switch and messages received from the BCM regarding ignition state and door ajar status. Based on this input, the BCMB may provide voltage to the stoplamps or activate the ambient lighting. For a list of BCMB controlled functions, Refer to: Module Controlled Functions - Overview .

Component Description

BCM

The BCM is a multifunction module that requires a PMI when replaced.

Refer to: MODULE CONFIGURATION .

DESCRIPTION AND OPERATION > MODULE CONTROLLED FUNCTIONS - SYSTEM OPERATION AND COMPONENT DESCRIPTION > BCMB

The BCMB controls various systems by monitoring inputs from switches, sensors and messages sent from other modules on the MS-CAN. Based on the inputs received, the BCMB activates outputs. For example, the BCM-B monitors the stoplamp switch and messages received from the BCM regarding ignition state and door ajar status. Based on this input, the BCMB may provide voltage to the stoplamps or activate the ambient lighting. For a list of BCMB controlled functions, Refer to: Module Controlled Functions - Overview .

Component Description

BCM

The BCM is a multifunction module that requires a PMI when replaced.

Refer to: MODULE CONFIGURATION .

BCMB

The BCMB is a multifunction module that requires a PMI when replaced.

Refer to: MODULE CONFIGURATION .

DIAGNOSIS AND TESTING > BODY CONTROL MODULE (BCM) > DTC CHART: BODY CONTROL MODULE (BCM)

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

> *NOTE: Diagnostic Trouble Codes (DTCs) which are not listed in the DTC charts are often retrieved as a result of incorrect repair procedures. Before attempting any repairs for unlisted Diagnostic Trouble Codes (DTCs):*

- repair all other Diagnostic Trouble Codes (DTCs).
- if no other Diagnostic Trouble Codes (DTCs) are retrieved, CLEAR the Diagnostic Trouble Codes (DTCs) and REPEAT the self-test.
- if the unlisted Diagnostic Trouble Codes (DTCs) return, VERIFY that the correct part number module is installed for the vehicle and if correct, install As-Built data from PTS following the diagnostic scan tool instructions under Module Programming > As-Built.

BCM DTC Chart

DTC	Description	Action
B1026:04	Steering Column Lock: System Internal Failure	REFER to: Steering Wheel and Column Electrical Components .
B1026:05	Steering Column Lock: System Programming Failure	REFER to: Steering Wheel and Column Electrical Components .

B1026:09	Steering Column Lock: Component Failure	REFER to: Steering Wheel and Column Electrical Components .
B1026:49	Steering Column Lock: Internal Electronic Failure	REFER to: Steering Wheel and Column Electrical Components .
B1026:51	Steering Column Lock: Not Programmed	REFER to: Steering Wheel and Column Electrical Components .
B1026:56	Steering Column Lock: Invalid / Incompatible Configuration	REFER to: Steering Wheel and Column Electrical Components .
B1026:77	Steering Column Lock: Commanded Position Not Reachable	REFER to: Steering Wheel and Column Electrical Components .
B1026:87	Steering Column Lock: Missing Message	REFER to: Steering Wheel and Column Electrical Components .
B1026:92	Steering Column Lock: Performance or Incorrect Operation	REFER to: Steering Wheel and Column Electrical Components .
B1026:93	Steering Column Lock: No Operation	REFER to: Steering Wheel and Column Electrical Components .
B1026:96	Steering Column Lock: Component Internal Failure	REFER to: Steering Wheel and Column Electrical Components .
B1046:11	Front Fog Lamp Control Switch: Circuit Short To Ground	REFER to: Fog Lamps .
B1047:11	Rear Fog Lamp Control Switch: Circuit Short To Ground	REFER to: Fog Lamps .
B1048:13	Brake Fluid Level Switch: Circuit Open	REFER to: Instrumentation, Message Center and Warning Chimes .
B1048:7B	Brake Fluid Level Switch: Low Fluid Level	REFER to: Instrumentation, Message Center and Warning Chimes .
B1048:01	Brake Fluid Level Switch: General Electrical Failure	REFER to: Steering Wheel and Column Electrical Components .
B108A:01	Start Button: General Electrical Failure	REFER to: Steering Wheel and Column Electrical Components .
B108A:24	Start Button: Signal Stuck High	REFER to: Steering Wheel and Column Electrical Components .
B109F:01	Intrusion Sensor Module: General Electrical Failure	REFER to: Perimeter Anti-Theft Alarm .
B109F:02	Intrusion Sensor Module: General Signal Failure	REFER to: Perimeter Anti-Theft Alarm .
B109F:08	Intrusion Sensor Module: Bus Signal / Message Failure	REFER to: Perimeter Anti-Theft Alarm .
B109F:49	Intrusion Sensor Module: Internal Electronic Failure	REFER to: Perimeter Anti-Theft Alarm .

B109F:55	Intrusion Sensor Module: Not Configured	REFER to: Perimeter Anti-Theft Alarm .
B109F:97	Intrusion Sensor Module: Component or System Operation Obstructed or Blocked	REFER to: Perimeter Anti-Theft Alarm .
B109F:9A	Intrusion Sensor Module: Component or System Operating Conditions	REFER to: Perimeter Anti-Theft Alarm .
B10AB:00	Remote Keyless Entry Synchronization: No Sub Type Information	REFER to: Locks, Latches and Entry Systems .
B10C7:01	Interior Trunk Antenna: General Electrical Failure	For a starting concern, REFER to: Passive Anti-Theft System (PATS) . For a luggage compartment lid passive entry feature concern, REFER to: Locks, Latches and Entry Systems .
B10C9:01	Interior Front Antenna: General Electrical Failure	REFER to: Passive Anti-Theft System (PATS) .
B10D7:05	PATS Key: System Programming Failure	REFER to: Passive Anti-Theft System (PATS) .
B10D7:55	PATS Key: Not Configured	REFER to: Passive Anti-Theft System (PATS) .
B10D8:00	PATS Key Less Than Minimum Programmed: No Sub Type Information	REFER to: Passive Anti-Theft System (PATS) .
B10DA:51	PATS Target Identifier: Not Programmed	REFER to: Passive Anti-Theft System (PATS) .
B10F3:11	Left front position light: Circuit Short To Ground	REFER to: Parking, Rear and License Plate Lamps .
B10F3:15	Left front position light: Circuit Short To Battery or Open	REFER to: Parking, Rear and License Plate Lamps .
B10F4:11	Right front position light: Circuit Short To Ground	REFER to: Parking, Rear and License Plate Lamps .
B10F4:15	Right front position light: Circuit Short To Battery or Open	REFER to: Parking, Rear and License Plate Lamps .
B1115:11	High Mounted Stop Lamp control: Circuit Short To Ground	REFER to: Stoplamps .
B1115:15	High Mounted Stop Lamp control: Circuit Short To Battery or Open	REFER to: Stoplamps .
B1142:29	Ignition Status 1: Signal Invalid	REFER to: Steering Wheel and Column Electrical Components .
B1147:11	Left Front Fog Lamps: Circuit Short To Ground	REFER to: Fog Lamps .

B1147:15	Left Front Fog Lamps: Circuit Short To Battery or Open	REFER to: Fog Lamps .
B1148:11	Right Front Fog Lamps: Circuit Short To Ground	REFER to: Fog Lamps .
B1148:15	Right Front Fog Lamps: Circuit Short To Battery or Open	REFER to: Fog Lamps .
B115E:01	Camera Module: General Electrical Failure	REFER to: Parking Aid .
B115E:02	Camera Module: General Signal Failure	REFER to: Parking Aid .
B115E:08	Camera Module: Bus Signal / Message Failure	REFER to: Parking Aid .
B115E:49	Camera Module: Internal Electronic Failure	REFER to: Parking Aid .
B115E:55	Camera Module: Not Configured	REFER to: Parking Aid .
B115E:9A	Camera Module: Component or System Operating Conditions	REFER to: Parking Aid .
B1175:01	Drivers Door Ajar Switch: General Electrical Failure	REFER to: Interior Lighting .
B1176:01	Passenger Door Ajar Switch: General Electrical Failure	REFER to: Interior Lighting .
B1178:01	Boot/Trunk Ajar Switch: General Electrical Failure	REFER to: Instrumentation, Message Center and Warning Chimes .
B1182:00	Tire Pressure Monitoring System: No Sub Type Information	REFER to: Tire Pressure Monitoring System (TPMS) .
B1182:55	Tire Pressure Monitoring System: Not Configured	REFER to: Tire Pressure Monitoring System (TPMS) .
B1184:11	Steering Column Lock Output: Circuit Short To Ground	REFER to: Steering Wheel and Column Electrical Components .
B1184:15	Steering Column Lock Output: Circuit Short To Battery or Open	REFER to: Steering Wheel and Column Electrical Components .
B11C6:01	Passenger Door External Antenna: General Electrical Failure	For a starting concern, REFER to: Passive Anti-Theft System (PATS) . For a door passive entry feature concern, REFER to: Locks, Latches and Entry Systems .
B11CA:01	Driver Door External Antenna: General Electrical Failure	For a starting concern, REFER to: Passive Anti-Theft System (PATS) . For a door passive entry feature concern, REFER to: Locks, Latches and Entry Systems .

B11D8:01	Restraint Event Notification: General Electrical Failure	REFER to: Airbag Supplemental Restraint System (SRS) .
B1218:00	Transmitter Identification Code: No Sub Type Information	REFER to: Locks, Latches and Entry Systems .
B1219:11	Interior Boot/Trunk Release Switch: Circuit Short To Ground	REFER to: Locks, Latches and Entry Systems .
B123A:11	Left Front Turn Indicator: Circuit Short To Ground	REFER to: Turn Signal and Hazard Lamps .
B123A:15	Left Front Turn Indicator: Circuit Short To Battery or Open	REFER to: Turn Signal and Hazard Lamps .
B123B:11	Right Front Turn Indicator: Circuit Short To Ground	REFER to: Turn Signal and Hazard Lamps .
B123B:15	Right Front Turn Indicator: Circuit Short To Battery or Open	REFER to: Turn Signal and Hazard Lamps .
B1240:11	Start Button Mode Indicator: Circuit Short To Ground	REFER to: Steering Wheel and Column Electrical Components .
B1240:15	Start Button Mode Indicator: Circuit Short To Battery or Open	REFER to: Steering Wheel and Column Electrical Components .
B1247:11	Left Rear Turn Indicator: Circuit Short To Ground	REFER to: Turn Signal and Hazard Lamps .
B1247:15	Left Rear Turn Indicator: Circuit Short To Battery or Open	REFER to: Turn Signal and Hazard Lamps .
B1248:11	Right Rear Turn Indicator: Circuit Short To Ground	REFER to: Turn Signal and Hazard Lamps .
B1248:15	Right Rear Turn Indicator: Circuit Short To Battery or Open	REFER to: Turn Signal and Hazard Lamps .
B124D:02	Tire Pressure Sensor: General Signal Failure	REFER to: Tire Pressure Monitoring System (TPMS) .
B1251:00	Tire Pressure Sensor Low Battery: No Sub Type Information	REFER to: Tire Pressure Monitoring System (TPMS) .
B1254:51	Right Rear (Outside on Dual Wheel) Tire Pressure Sensor and Transmitter Assembly: Not Programmed	REFER to: Tire Pressure Monitoring System (TPMS) .
B1255:51	Left Rear (Outside On Dual Wheel) Tire Pressure Sensor and Transmitter Assembly: Not Programmed	REFER to: Tire Pressure Monitoring System (TPMS) .
B126A:01	Drivers Door Interior Lock Switch: General Electrical Failure	REFER to: Locks, Latches and Entry Systems .
B1277:11	Reverse Lamp: Circuit Short To Ground	REFER to: Reversing Lamps .
B1277:15	Reverse Lamp: Circuit Short To Battery or Open	REFER to: Reversing Lamps .

B12C2:11	Puddle Lamp: Circuit Short To Ground	REFER to: Interior Lighting .
B12C2:15	Puddle Lamp: Circuit Short To Battery or Open	REFER to: Interior Lighting .
B1305:01	Hood Switch: General Electrical Failure	REFER to: Passive Anti-Theft System (PATS) .
B130F:12	Run Accessory Control: Circuit Short To Battery	REFER to: Wipers and Washers .
B130F:14	Run Accessory Control: Circuit Short To Ground or Open	REFER to: Wipers and Washers .
B1313:11	Interior Lighting Output: Circuit Short To Ground	REFER to: Interior Lighting .
B1313:15	Interior Lighting Output: Circuit Short To Battery or Open	REFER to: Interior Lighting .
B1315:11	Backlighting (Non Reflective Controls) Illumination Output: Circuit Short To Ground	REFER to: Instrumentation, Message Center and Warning Chimes .
B1315:15	Backlighting (Non Reflective Controls) Illumination Output: Circuit Short To Battery or Open	REFER to: Instrumentation, Message Center and Warning Chimes .
B1319:11	Shift Interlock (BSI) Output Circuit: Circuit Short To Ground	REFER to: External Controls .
B1319:15	Shift Interlock (BSI) Output Circuit: Circuit Short To Battery or Open	REFER to: External Controls .
B1323:11	Horn Switch: Circuit Short To Ground	REFER to: Horn .
B1381:11	Left Front Door Handle Proximity Sensor: Circuit Short To Ground	REFER to: Locks, Latches and Entry Systems .
B1381:15	Left Front Door Handle Proximity Sensor: Circuit Short To Battery or Open	REFER to: Locks, Latches and Entry Systems .
B1381:29	Left Front Door Handle Proximity Sensor: Signal Invalid	REFER to: Locks, Latches and Entry Systems .
B1382:11	Right Front Door Handle Proximity Sensor: Circuit Short To Ground	REFER to: Locks, Latches and Entry Systems .
B1382:15	Right Front Door Handle Proximity Sensor: Circuit Short To Battery or Open	REFER to: Locks, Latches and Entry Systems .
B1382:29	Right Front Door Handle Proximity Sensor: Signal Invalid	REFER to: Locks, Latches and Entry Systems .
B1436:01	Digital Dimmer Switch Input: General Electrical Failure	REFER to: Instrumentation, Message Center and Warning Chimes .

B143A:11	Crash Event Detection Output : Circuit Short To Ground	GO to Pinpoint Test N
B143B:11	Autolamp On Input: Circuit Short To Ground	REFER to: Autolamps .
B143C:11	Headlamp Off Input: Circuit Short To Ground	REFER to: Headlamps .
B143D:11	Headlamp On Input: Circuit Short To Ground	REFER to: Headlamps .
B143E:11	Headlamp Switch Input: Circuit Short To Ground	REFER to: Headlamps .
B1445:11	Rear Park Lamps Output: Circuit Short To Ground	REFER to: Parking, Rear and License Plate Lamps .
B1445:15	Rear Park Lamps Output: Circuit Short To Battery or Open	REFER to: Parking, Rear and License Plate Lamps .
B1446:11	Front Park Lamps Output: Circuit Short To Ground	REFER to: Parking, Rear and License Plate Lamps .
B1446:15	Front Park Lamps Output: Circuit Short To Battery or Open	REFER to: Parking, Rear and License Plate Lamps .
B1447:11	Parklamp On Switch Input: Circuit Short To Ground	REFER to: Parking, Rear and License Plate Lamps .
B1448:11	Right Rear Stop/Position Lamp Output: Circuit Short To Ground	REFER to: Parking, Rear and License Plate Lamps .
B1448:15	Right Rear Stop/Position Lamp Output: Circuit Short To Battery or Open	REFER to: Parking, Rear and License Plate Lamps .
B1490:11	Lock Indicator LED Status Output: Circuit Short To Ground	REFER to: Locks, Latches and Entry Systems .
B1490:15	Lock Indicator LED Status Output: Circuit Short To Battery or Open	REFER to: Locks, Latches and Entry Systems .
B149E:11	Left Front Position/Sidemarker: Circuit Short To Ground	REFER to: Parking, Rear and License Plate Lamps .
B149E:15	Left Front Position/Sidemarker: Circuit Short To Battery or Open	REFER to: Parking, Rear and License Plate Lamps .
B149F:11	Right Front Position/Sidemarker: Circuit Short To Ground	REFER to: Parking, Rear and License Plate Lamps .
B149F:15	Right Front Position/Sidemarker: Circuit Short To Battery or Open	REFER to: Parking, Rear and License Plate Lamps .
B1A79:11	Rear Fog Lamp: Circuit Short To Ground	REFER to: Fog Lamps .
B1A79:15	Rear Fog Lamp: Circuit Short To Battery or Open	REFER to: Fog Lamps .

B1A85:11	Ambient Light Sensor: Circuit Short To Ground	REFER to: Autolamps .
B1A85:13	Ambient Light Sensor: Circuit Open	REFER to: Autolamps .
B1C55:12	Horn Relay: Circuit Short To Battery	REFER to: Horn .
B1C55:14	Horn Relay: Circuit Short To Ground or Open	REFER to: Horn .
B1D00:11	Left Low Beam: Circuit Short To Ground	REFER to: Headlamps .
B1D00:15	Left Low Beam: Circuit Short To Battery or Open	REFER to: Headlamps .
B1D01:11	Right Low Beam: Circuit Short To Ground	REFER to: Headlamps .
B1D01:15	Right Low Beam: Circuit Short To Battery or Open	REFER to: Headlamps .
B1D02:11	Left High Beam Circuit: Circuit Short To Ground	REFER to: Headlamps .
B1D02:15	Left High Beam Circuit: Circuit Short To Battery or Open	REFER to: Headlamps .
B1D03:11	Right High Beam Circuit: Circuit Short To Ground	REFER to: Headlamps .
B1D03:15	Right High Beam Circuit: Circuit Short To Battery or Open	REFER to: Headlamps .
B1D35:11	Hazard Switch: Circuit Short To Ground	REFER to: Turn Signal and Hazard Lamps .
B1D35:23	Hazard Switch: Signal Stuck Low	REFER to: Turn Signal and Hazard Lamps .
C0040:12	Brake Pedal Switch "A": Circuit Short To Battery	REFER to: Stoplamps .
C1017:11	Boot/Trunk Primary Switch: Circuit Short To Ground	REFER to: Locks, Latches and Entry Systems .
C113A:11	Wakeup Control: Circuit Short To Ground	2.3L REFER to: Starting System . 3.7L REFER to: Starting System . 5.0L REFER to: Starting System .
C113A:15	Wakeup Control: Circuit Short To Battery or Open	2.3L REFER to: Starting System . 3.7L REFER to: Starting System . 5.0L REFER to: Starting System .
C1A56:51	Left Front Tire Pressure Sensor and Transmitter Assembly: Not Programmed	REFER to: Tire Pressure Monitoring System (TPMS) .
C1A58:51	Right Front Tire Pressure Sensor and Transmitter Assembly: Not Programmed	REFER to: Tire Pressure Monitoring System (TPMS) .

C1D00:11	Park Brake Apply Switch : Circuit Short To Ground	REFER to: Instrumentation, Message Center and Warning Chimes .
P0230:12	Fuel Pump Primary Circuit: Circuit Short To Battery	Refer to ENGINE CONTROLS - PINPOINT TESTS (EXCEPT DIESEL & HYBRID) and PERFORM pinpoint test KC for DTC P025A.
P0230:14	Fuel Pump Primary Circuit: Circuit Short To Ground or Open	GO to Pinpoint Test J
P0830:11	Clutch Pedal Switch "A" Circuit: Circuit Short To Ground	2.3L EcoBoost REFER to: Starting System . 3.7L REFER to: Starting System . 5.0L REFER to: Starting System .
U0100:87	Lost Communication With ECM/PCM "A": Missing Message	GO to Pinpoint Test A
U0121:87	Lost Communication With Anti:Lock Brake System (ABS) Control Module: Missing Message	GO to Pinpoint Test C
U0131:87	Lost Communication With Power Steering Control Module: Missing Message	GO to Pinpoint Test D
U0142:87	Lost Communication With Body Control Module "B": Missing Message	GO to Pinpoint Test B
U0151:87	Lost Communication With Restraints Control Module: Missing Message	GO to Pinpoint Test E
U0155:87	Lost Communication With Instrument Panel Cluster (IPC) Control Module: Missing Message	GO to Pinpoint Test F
U0184:87	Lost Communication With Radio: Missing Message	GO to Pinpoint Test G
U0199:87	Lost Communication With "Door Control Module A": Missing Message	GO to Pinpoint Test H
U0200:87	Lost Communication With "Door Control Module B": Missing Message	GO to Pinpoint Test I
U0208:87	Lost Communication With "Seat Control Module A": Missing Message	GO to Pinpoint Test M
U0212:87	Lost Communication With Steering Column Control Module: Missing Message	GO to Pinpoint Test O
U0253:87	Lost Communication With Accessory Protocol Interface Module: Missing Message	GO to Pinpoint Test P
U0256:87	Lost Communication With Front Controls Interface Module "A" :	GO to Pinpoint Test Q

	Missing Message	
U0258:87	Lost Communication With Radio Transceiver: Missing Message	REFER to: Locks, Latches and Entry Systems .
U0559:56	Invalid Data Received From Radio Transceiver: Invalid / Incompatible Configuration	REFER to: Tire Pressure Monitoring System (TPMS) .
U1000:00	Solid State Driver Protection Active: Driver Disabled: No Sub Type Information	GO to Pinpoint Test R
U1A4C:55	Build / End of Line mode Active: Not Configured	If the IPC message center indicates the vehicle has entered factory mode, REFER to: Transport and Factory Mode Deactivation. If the IPC message center does not indicate the vehicle has entered factory mode, CLEAR the Diagnostic Trouble Codes (DTCs) and REPEAT the self-test. If the DTC is retrieved again,
U2005:85	Vehicle Speed: Signal Above Allowable Range	Make sure the vehicle is stationary and the BCM entry level requirements (found on the diagnostic scan tool self-test screen) are met prior to performing the self-test. A speed signal is detected during the self-test. DIAGNOSE any observable symptoms that are present. CLEAR the Diagnostic Trouble Codes (DTCs). REPEAT the BCM self-test. If the DTC returns, diagnose any PCM or ABS Diagnostic Trouble Codes (DTCs) causing a false vehicle speed signal.
U2100:00	Initial Configuration Not Complete: No Sub Type Information	CHECK the vehicle service history for recent service actions related to this module. This DTC sets due to incomplete or incorrect PMI procedures. INSTALL As-Built data from Professional Technician Society (PTS) following diagnostic scan tool instructions under Module Programming>As-Built.
U2200:00	Control Module Configuration Memory Corrupt: No Sub Type Information	INSTALL As-Built data from Professional Technician Society (PTS) following diagnostic scan tool instructions under Module Programming>As-Built. CLEAR the Diagnostic Trouble Codes (DTCs). REPEAT the self-test. If BCM

		U2200:00 is retrieved again,
U3000:49	Control Module: Internal Electronic Failure	ADDRESS all other Diagnostic Trouble Codes (DTCs) first. CLEAR the Diagnostic Trouble Codes (DTCs). REPEAT the self-test. If DTC U3000:49 is retrieved again,
U3006:16	Control Module Input Power "A": Circuit Voltage Below Threshold	GO to Pinpoint Test K
U3006:17	Control Module Input Power "A": Circuit Voltage Above Threshold	GO to Pinpoint Test L
U3006:1C	Control Module Input Power "A": Circuit Voltage Out of Range	GO to Pinpoint Test S
U3007:16	Control Module Input Power "B": Circuit Voltage Below Threshold	GO to Pinpoint Test K
U3007:17	Control Module Input Power "B": Circuit Voltage Above Threshold	GO to Pinpoint Test L
U3013:16	Control Module Input Power "C": Circuit Voltage Below Threshold	GO to Pinpoint Test K
U3013:17	Control Module Input Power "C": Circuit Voltage Above Threshold	GO to Pinpoint Test L
U3014:16	Control Module Input Power "D": Circuit Voltage Below Threshold	GO to Pinpoint Test K
U3014:17	Control Module Input Power "D": Circuit Voltage Above Threshold	GO to Pinpoint Test L

DIAGNOSIS AND TESTING > BODY CONTROL MODULE (BCM) > SYMPTOM CHART

Symptom Chart: Multifunction Electronic Modules

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

Condition	Possible Sources	Action
A module does not respond to the diagnostic scan tool	Fuse Wiring, terminals or connectors Module	REFER to: MODULE COMMUNICATIONS NETWORK .

DIAGNOSIS AND TESTING > BODY CONTROL MODULE (BCM) > PINPOINT TESTS > PINPOINT TEST A : U0100:87

Normal Operation and Fault Conditions

The BCM communicates with the PCM over the HS-CAN. REFER to: MODULE COMMUNICATIONS

NETWORK .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0100:87	Lost Communication With ECM/PCM "A": Missing Message	A continuous memory DTC that sets in the BCM if powertrain data messages received from the PCM over the HS-CAN are missing.

Possible Sources

- Communication network concern
- Charging system concern
- PCM
- BCM

DIAGNOSIS AND TESTING > BODY CONTROL MODULE (BCM) > PINPOINT TESTS > PINPOINT TEST A : U0100:87 > PINPOINT TEST A : U0100:87

NOTE: If new modules were installed prior to the DTC being set, the module configuration may be incorrectly set during the PMI or the PMI may not have been carried out.

A1 VERIFY THE DIAGNOSTIC SCAN TOOL COMMUNICATES WITH THE PCM (POWERTRAIN CONTROL MODULE)

Ignition ON.

Connect the diagnostic scan tool.

Check that a vehicle session can be established using the diagnostic scan tool.

Can a vehicle session be established?

Yes	GO to A2

No	DIAGNOSE the PCM not communicating with the diagnostic scan tool. REFER to: MODULE COMMUNICATIONS NETWORK .

A2 RECHECK THE BCM (BODY CONTROL MODULE) CONTINUOUS MEMORY DIAGNOSTIC TROUBLE CODES (CMDTCS)

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs).

Wait 10 seconds.

Using a diagnostic scan tool, check the BCM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U0100:87 retrieved again?

Yes	GO to A3

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

A3 RETRIEVE THE RECORDED DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE PCM (POWERTRAIN CONTROL MODULE) KOEO (KEY ON, ENGINE OFF) SELF-TEST

Using a diagnostic scan tool, perform the PCM KOEO self-test.

Are any voltage system related Diagnostic Trouble Codes (DTCs) present?

Yes	2.3L REFER to: Electronic Engine Controls . 3.7L REFER to: Electronic Engine Controls . 5.0L REFER to: Electronic Engine Controls .

No	GO to A4

A4 RETRIEVE THE RECORDED DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE BCM (BODY CONTROL MODULE) SELF-TEST

Using a diagnostic scan tool, perform the BCM self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to the BCM DTC Chart .

No	GO to A5

A5 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0100 SET IN OTHER MODULES

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs).

Ignition OFF.

Ignition ON.

Wait 10 seconds.

Using a diagnostic scan tool, retrieve **all** Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U0100 set in any other module?

Yes	GO to A6

No	GO to A7

A6 CHECK FOR CORRECT PCM (POWERTRAIN CONTROL MODULE) OPERATION

Disconnect and inspect all PCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the PCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PCM. 2.3L REFER to: Powertrain Control Module (PCM) . 3.7L REFER to: Powertrain Control Module (PCM) . 5.0L REFER to: Powertrain Control Module (PCM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

A7 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > BODY CONTROL MODULE (BCM) > PINPOINT TESTS > PINPOINT TEST B : U0142:87

Normal Operation and Fault Conditions

The BCM communicates with the BCMB through the GWM. REFER to: MODULE COMMUNICATIONS NETWORK .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0142:87	Lost Communication With Body Control Module "B": Missing Message	A continuous memory DTC that sets in the BCM if data messages received from the BCMB through the GWM are missing.

Possible Sources

- Communication network concern
- Battery voltage concern
- BCMB
- BCM

DIAGNOSIS AND TESTING > BODY CONTROL MODULE (BCM) > PINPOINT TESTS > PINPOINT TEST B : U0142:87 > PINPOINT TEST B : U0142:87

NOTE: If new modules were installed prior to the DTC being set, the module configuration may be incorrectly set during the PMI or the PMI may not have been carried out.

B1 VERIFY THE CUSTOMER CONCERN

Ignition ON.

Verify there is an observable symptom present.

Is an observable symptom present?

Yes	GO to B2

No	The system is operating normally at this time. The DTC may have been set due to high network traffic or an intermittent fault condition. CLEAR the DTC.

B2 CHECK THE COMMUNICATION NETWORK

Using a diagnostic scan tool, perform a network test.

Does the BCMB pass the network test?

Yes	GO to B3

No	DIAGNOSE no communication with the TCM. REFER to: MODULE COMMUNICATIONS NETWORK .

B3 CHECK THE BCM (BODY CONTROL MODULE) CONTINUOUS MEMORY DIAGNOSTIC TROUBLE CODES (CMDTCS)

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs).

Wait 10 seconds.

Using a diagnostic scan tool, check the BCM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U3006:16, U3006:17, U3007:16, U3007:17, U3013:16, U3013:17, U3014:16 or U3014:17 recorded?

Yes	For DTC U3006:16, U3007:16, U3013:16 or U3014:16, GO to Pinpoint Test K For DTC U3006:17, U3007:17, U3013:17 or U3014:17, GO to Pinpoint Test L

No	GO to B4

B4 RETRIEVE THE RECORDED DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE BCMB (BODY CONTROL MODULE B) SELF-TEST

Using a diagnostic scan tool, perform the BCMB self-test.

Is there any DTC recorded?

Yes	REFER to: Body Control Module B (BCMB) .

No	GO to B5

B5 RECHECK THE BCM (BODY CONTROL MODULE) CONTINUOUS MEMORY DIAGNOSTIC TROUBLE CODES (CMDTCS)

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs).

Wait 10 seconds.

Using a diagnostic scan tool, check the BCM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U0142:87 still present?

Yes	GO to B6

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

B6 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0142 SET IN OTHER MODULES

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs).

Ignition OFF.

Ignition ON.

Wait 10 seconds.

Using a diagnostic scan tool, retrieve **all** Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U0142 set in any other module?

Yes	GO to B7

No	GO to B8

B7 CHECK FOR CORRECT BCMB (BODY CONTROL MODULE B) OPERATION

Disconnect and inspect the BCMB connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCMB connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new BCMB. REFER to: Body Control Module B (BCMB) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

B8 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Connect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > BODY CONTROL MODULE (BCM) > PINPOINT TESTS > PINPOINT TEST C : U0121:87

Normal Operation and Fault Conditions

The BCM communicates with the ABS module through the GWM. REFER to: MODULE COMMUNICATIONS NETWORK .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0121:87	Lost Communication With Anti Lock Brake System (ABS) Control Module: Missing Message	A continuous memory DTC that sets in the BCM if ABS messages received from the ABS module through the GWM are missing.

Possible Sources

- Communication network concern
- Battery voltage concern
- ABS module
- BCM

DIAGNOSIS AND TESTING > BODY CONTROL MODULE (BCM) > PINPOINT TESTS > PINPOINT TEST C : U0121:87 > PINPOINT TEST C : U0121:87

NOTE: If new modules were installed prior to the DTC being set, the module configuration may be incorrectly set during the PMI or the PMI may not have been carried out.

C1 VERIFY THE CUSTOMER CONCERN

Ignition ON.

Verify there is an observable symptom present.

Is an observable symptom present?

Yes	GO to C2

No	The system is operating normally at this time. The DTC may have been set due to high network traffic or an intermittent fault condition. CLEAR the DTC.

C2 CHECK THE COMMUNICATION NETWORK

Using a diagnostic scan tool, perform a network test.

Does the ABS module pass the network test?

Yes	GO to C3

No	DIAGNOSE no communication with the ABS module. DIAGNOSE the PCM not communicating with the diagnostic scan tool. REFER to: MODULE COMMUNICATIONS NETWORK .

C3 CHECK THE BCM (BODY CONTROL MODULE) CONTINUOUS MEMORY DIAGNOSTIC TROUBLE CODES (CMDTCS)

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs).

Wait 10 seconds.

Using a diagnostic scan tool, check the BCM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U3006:16, U3006:17, U3007:16, U3007:17, U3013:16, U3013:17, U3014:16 or U3014:17 recorded?

Yes	For DTC U3006:16, U3007:16, U3013:16 or U3014:16, GO to Pinpoint Test K For DTC U3006:17, U3007:17, U3013:17 or U3014:17, GO to Pinpoint Test L

No	GO to C4

C4 RETRIEVE THE RECORDED DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE ABS (ANTI-LOCK BRAKE SYSTEM) MODULE SELF-TEST

Using a diagnostic scan tool, perform the ABS module self-test.

Are any voltage system related Diagnostic Trouble Codes (DTCs) present?

Yes	REFER to: Anti-Lock Brake System (ABS) and Stability Control .

No	GO to C5

C5 RECHECK THE BCM (BODY CONTROL MODULE) CONTINUOUS MEMORY DIAGNOSTIC TROUBLE CODES (CMDTCS)

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs).

Wait 10 seconds.

Using a diagnostic scan tool, check the BCM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U0121:87 still present?

Yes	GO to C6

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

C6 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0121 SET IN OTHER MODULES

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs).

Ignition OFF.

Ignition ON.

Wait 10 seconds.

Using a diagnostic scan tool, retrieve **all** Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U0121 set in any other module?

Yes	GO to C7

No	GO to C8

C7 CHECK FOR CORRECT ABS (ANTI-LOCK BRAKE SYSTEM) MODULE OPERATION

Disconnect and inspect the ABS module connector.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the ABS module connector. Make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ABS module. REFER to: Anti-Lock Brake System (ABS) Module .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

C8 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > BODY CONTROL MODULE (BCM) > PINPOINT TESTS > PINPOINT TEST D : U0131:87

Normal Operation and Fault Conditions

The BCM communicates with the PSCM through the GWM. REFER to: MODULE COMMUNICATIONS NETWORK .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0131:87	Lost Communication With Power Steering Control Module: Missing Message	A continuous memory DTC that sets in the BCM if messages received from the PSCM through the GWM are missing.

Possible Sources

- Communication network concern
- Battery voltage concern
- PSCM
- BCM

DIAGNOSIS AND TESTING > BODY CONTROL MODULE (BCM) > PINPOINT TESTS > PINPOINT TEST D : U0131:87 > PINPOINT TEST D : U0131:87

NOTE: If new modules were installed prior to the DTC being set, the module configuration may be incorrectly set during the PMI or the PMI may not have been carried out.

D1 VERIFY THE CUSTOMER CONCERN

Ignition ON.

Verify there is an observable symptom present.

Is an observable symptom present?

Yes	GO to D2

No	The system is operating normally at this time. The DTC may have been set due to high network traffic or an intermittent fault condition. CLEAR the DTC.

D2 CHECK THE COMMUNICATION NETWORK

Using a diagnostic scan tool, perform a network test.

Does the TBM pass the network test?

Yes	GO to D3

No	DIAGNOSE no communication with the PSCM. REFER to: MODULE COMMUNICATIONS NETWORK .

D3 CHECK THE BCM (BODY CONTROL MODULE) CONTINUOUS MEMORY DIAGNOSTIC

TROUBLE CODES (CMDTCS)

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs).

Wait 10 seconds.

Using a diagnostic scan tool, check the BCM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U3006:16, U3006:17, U3007:16, U3007:17, U3013:16, U3013:17, U3014:16 or U3014:17 recorded?

Yes	For DTC U3006:16, U3007:16, U3013:16 or U3014:16, GO to Pinpoint Test K For DTC U3006:17, U3007:17, U3013:17 or U3014:17, GO to Pinpoint Test L

No	GO to D4

D4 RETRIEVE THE RECORDED DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE PSCM (POWER STEERING CONTROL MODULE) SELF-TEST

Using a diagnostic scan tool, perform the PSCM self-test.

Is there any DTC recorded?

Yes	REFER to: POWER STEERING .

No	GO to D5

D5 RECHECK THE BCM (BODY CONTROL MODULE) CONTINUOUS MEMORY DIAGNOSTIC TROUBLE CODES (CMDTCS)

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs).

Wait 10 seconds.

Using a diagnostic scan tool, check the BCM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U0131:87 still present?

Yes	GO to D6

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

D6 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0131 SET IN OTHER MODULES

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs).

Ignition OFF.

Ignition ON.

Wait 10 seconds.

Using a diagnostic scan tool, retrieve **all** Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U0131 set in any other module?

Yes	GO to D7

No	GO to D8

D7 CHECK FOR CORRECT PSCM (POWER STEERING CONTROL MODULE) OPERATION

Disconnect and inspect the PSCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the PSCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

D8 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > BODY CONTROL MODULE (BCM) > PINPOINT TESTS > PINPOINT TEST E : U0151:87

Normal Operation and Fault Conditions

The BCM communicates with the RCM through the GWM. REFER to: MODULE COMMUNICATIONS NETWORK .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0151:87	Lost Communication With Restraints Control Module: Missing Message	A continuous memory DTC that sets in the BCM if SRS messages received from the RCM through the GWM are missing.

Possible Sources

- Communication network concern
- Battery voltage concern
- RCM
- BCM

DIAGNOSIS AND TESTING > BODY CONTROL MODULE (BCM) > PINPOINT TESTS > PINPOINT TEST E : U0151:87 > PINPOINT TEST E : U0151:87

NOTE: If new modules were installed prior to the DTC being set, the module configuration may be incorrectly set during the PMI or the PMI may not have been carried out.

E1 VERIFY THE CUSTOMER CONCERN

Ignition ON.

Verify there is an observable symptom present.

Is an observable symptom present?

Yes	GO to E2

No	The system is operating normally at this time. The DTC may have been set due to high network traffic or an intermittent fault condition. CLEAR the DTC.

E2 CHECK THE COMMUNICATION NETWORK

Using a diagnostic scan tool, perform a network test.

Does the RCM pass the network test?

Yes	GO to E3

No	DIAGNOSE no communication with the RCM. REFER to: MODULE COMMUNICATIONS NETWORK .

E3 CHECK THE BCM (BODY CONTROL MODULE) CONTINUOUS MEMORY DIAGNOSTIC TROUBLE CODES (CMDTCS)

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs).

Wait 10 seconds.

Using a diagnostic scan tool, check the BCM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U3006:16, U3006:17, U3007:16, U3007:17, U3013:16, U3013:17, U3014:16 or U3014:17 recorded?

Yes	For DTC U3006:16, U3007:16, U3013:16 or U3014:16, GO to Pinpoint Test K For DTC U3006:17, U3007:17, U3013:17 or U3014:17, GO to Pinpoint Test L

No	GO to E4

E4 RETRIEVE THE RECORDED DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE RCM (RESTRAINTS CONTROL MODULE) SELF-TEST

Using a diagnostic scan tool, perform the RCM self-test.

Are any voltage system related Diagnostic Trouble Codes (DTCs) present?

Yes	REFER to: Airbag Supplemental Restraint System (SRS) .

No	GO to E5

E5 RECHECK THE BCM (BODY CONTROL MODULE) CONTINUOUS MEMORY DIAGNOSTIC TROUBLE CODES (CMDTCS)

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs).

Wait 10 seconds.

Using a diagnostic scan tool, check the BCM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U0151:87 still present?

Yes	GO to E6

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

E6 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0151 SET IN OTHER MODULES

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs).

Ignition OFF.

Ignition ON.

Wait 10 seconds.

Using a diagnostic scan tool, retrieve **all** Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U0151 set in any other module?

Yes	GO to E7

No	GO to E8

E7 CHECK FOR CORRECT RCM (RESTRAINTS CONTROL MODULE) OPERATION

Disconnect and inspect the RCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the RCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new RCM. REFER to: Restraints Control Module (RCM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

E8 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > BODY CONTROL MODULE (BCM) > PINPOINT TESTS > PINPOINT TEST F : U0155:87

Normal Operation and Fault Conditions

The BCM communicates with the IPC over the MS-CAN through the GWM. REFER to: MODULE COMMUNICATIONS NETWORK .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0155:87	Lost Communication With Instrument Panel Cluster (IPC) Control Module: Missing Message	A continuous memory DTC that sets in the BCM if messages received from the IPC through the GWM are missing.

Possible Sources

- Communication network concern
- Battery voltage concern
- IPC

- BCM

DIAGNOSIS AND TESTING > BODY CONTROL MODULE (BCM) > PINPOINT TESTS > PINPOINT TEST F : U0155:87 > PINPOINT TEST F : U0155:87

NOTE: If new modules were installed prior to the DTC being set, the module configuration may be incorrectly set during the PMI or the PMI may not have been carried out.

F1 VERIFY THE CUSTOMER CONCERN

Ignition ON.

Verify there is an observable symptom present.

Is an observable symptom present?

Yes	GO to F2

No	The system is operating normally at this time. The DTC may have been set due to high network traffic or an intermittent fault condition. CLEAR the DTC.

F2 CHECK THE COMMUNICATION NETWORK

Using a diagnostic scan tool, perform a network test.

Does the IPC pass the network test?

Yes	GO to F3

No	DIAGNOSE no communication with the IPC. REFER to: MODULE COMMUNICATIONS NETWORK .

F3 CHECK THE BCM (BODY CONTROL MODULE) CONTINUOUS MEMORY DIAGNOSTIC TROUBLE CODES (CMDTCS)

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs).

Wait 10 seconds.

Using a diagnostic scan tool, check the BCM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U3006:16, U3006:17, U3007:16, U3007:17, U3013:16, U3013:17, U3014:16 or U3014:17 recorded?

Yes	For DTC U3006:16, U3007:16, U3013:16 or U3014:16, GO to Pinpoint Test K For DTC U3006:17, U3007:17, U3013:17 or U3014:17, GO to Pinpoint Test L

No	GO to F4

F4 RETRIEVE THE RECORDED DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE IPC (INSTRUMENT PANEL CLUSTER) SELF-TEST

Using a diagnostic scan tool, perform the IPC self-test.

Are any voltage system related Diagnostic Trouble Codes (DTCs) present?

Yes	REFER to: Instrumentation, Message Center and Warning Chimes .

No	GO to F5

F5 RECHECK THE BCM (BODY CONTROL MODULE) CONTINUOUS MEMORY DIAGNOSTIC TROUBLE CODES (CMDTCS)

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs).

Wait 10 seconds.

Using a diagnostic scan tool, check the BCM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U0155:87 still present?

Yes	GO to F6

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

F6 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0155 SET IN OTHER MODULES

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs).

Ignition OFF.

Ignition ON.

Wait 10 seconds.

Using a diagnostic scan tool, retrieve **all** Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U0155 set in any other module?

Yes	GO to F7

No	GO to F8

F7 CHECK FOR CORRECT IPC (INSTRUMENT PANEL CLUSTER) OPERATION

Disconnect and inspect the IPC connector.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the IPC connector. Make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

F8 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > BODY CONTROL MODULE (BCM) > PINPOINT TESTS > PINPOINT TEST G : U0184:87

Normal Operation and Fault Conditions

The BCM communicates with the ACM through the GWM. REFER to: MODULE COMMUNICATIONS NETWORK .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0184:87	Lost Communication With Radio: Missing Message	A continuous memory DTC that sets in the BCM if messages received from the ACM through the GWM are missing.

Possible Sources

- Communication network concern
- Battery voltage concern
- GWM concern
- ACM
- BCM

DIAGNOSIS AND TESTING > BODY CONTROL MODULE (BCM) > PINPOINT TESTS > PINPOINT TEST G : U0184:87 > PINPOINT TEST G : U0184:87

NOTE: If new modules were installed prior to the DTC being set, the module configuration may be incorrectly set during the PMI or the PMI may not have been carried out.

G1 VERIFY THE CUSTOMER CONCERN

Ignition ON.

Verify there is an observable symptom present.

Is an observable symptom present?

Yes	GO to G2

No	The system is operating normally at this time. The DTC may have been set due to high network traffic or an intermittent fault condition. CLEAR the DTC.

G2 CHECK THE COMMUNICATION NETWORK

Using a diagnostic scan tool, perform a network test.

Does the ACM pass the network test?

Yes	GO to G3

No	DIAGNOSE no communication with the ACM. REFER to: MODULE COMMUNICATIONS NETWORK .

G3 CHECK THE BCM (BODY CONTROL MODULE) CONTINUOUS MEMORY DIAGNOSTIC TROUBLE CODES (CMDTCS)

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs).

Wait 10 seconds.

Using a diagnostic scan tool, check the BCM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U3006:16, U3006:17, U3007:16, U3007:17, U3013:16, U3013:17, U3014:16 or U3014:17 recorded?

Yes	For DTC U3006:16, U3007:16, U3013:16 or U3014:16, GO to Pinpoint Test K For DTC U3006:17, U3007:17, U3013:17 or U3014:17, GO to Pinpoint Test L

No	GO to G4

G4 RETRIEVE THE RECORDED DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE ACM (AUDIO FRONT CONTROL MODULE) SELF-TEST

Using a diagnostic scan tool, perform the ACM self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	Vehicles With: AM/FM/CD/SYNC REFER to: Information and Entertainment System . Vehicles With: Touchscreen Display, REFER to: Information and Entertainment System .

No	GO to G5

G5 RECHECK THE BCM (BODY CONTROL MODULE) CONTINUOUS MEMORY DIAGNOSTIC TROUBLE CODES (CMDTCS)

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs).

Wait 10 seconds.

Using a diagnostic scan tool, check the BCM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U0184:87 still present?

Yes	GO to G6

No	The system is operating correctly at this time. The DTC may have been set due to high

	network traffic or an intermittent fault condition.

G6 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0184 SET IN OTHER MODULES

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs).

Ignition OFF.

Ignition ON.

Wait 10 seconds.

Using a diagnostic scan tool, retrieve **all** Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U0184 set in any other module?

Yes	GO to G7

No	GO to G8

G7 CHECK FOR CORRECT ACM (AUDIO FRONT CONTROL MODULE) OPERATION

Disconnect and inspect the ACM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the ACM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ACM. Vehicles With: AM/FM/CD/SYNC, REFER to: Audio Front Control Module (ACM) . Vehicles With: Touchscreen Display, REFER to: Audio Front Control Module (ACM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

G8 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > BODY CONTROL MODULE (BCM) > PINPOINT TESTS > PINPOINT TEST H : U0199:87

Normal Operation and Fault Conditions

The BCM communicates with the DDM through the GWM. REFER to: MODULE COMMUNICATIONS NETWORK .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0199:87	Lost Communication With "Door Control Module A": Missing Message	A continuous memory DTC that sets in the BCM if messages received from the DDM over the MS-CAN through the GWM are missing.

Possible Sources

- Communication network concern
- Battery voltage concern
- GWM concern
- DDM
- BCM

DIAGNOSIS AND TESTING > BODY CONTROL MODULE (BCM) > PINPOINT TESTS > PINPOINT TEST H : U0199:87 > PINPOINT TEST H : U0199:87

NOTE: If new modules were installed prior to the DTC being set, the module configuration may be incorrectly set during the PMI or the PMI may not have been carried out.

H1 VERIFY THE CUSTOMER CONCERN

Ignition ON.

Verify there is an observable symptom present.

Is an observable symptom present?

Yes	GO to H2

No	The system is operating normally at this time. The DTC may have been set due to high network traffic or an intermittent fault condition. CLEAR the DTC.

H2 CHECK THE COMMUNICATION NETWORK

Using a diagnostic scan tool, perform a network test.

Does the DDM pass the network test?

Yes	GO to H3

No	DIAGNOSE no communication with the DDM. REFER to: MODULE COMMUNICATIONS NETWORK .

H3 CHECK THE BCM (BODY CONTROL MODULE) CONTINUOUS MEMORY DIAGNOSTIC TROUBLE CODES (CMDTCS)

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs).

Wait 10 seconds.

Using a diagnostic scan tool, check the BCM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U3006:16, U3006:17, U3007:16, U3007:17, U3013:16, U3013:17, U3014:16 or U3014:17 recorded?

Yes	For DTC U3006:16, U3007:16, U3013:16 or U3014:16, GO to Pinpoint Test K For DTC U3006:17, U3007:17, U3013:17 or U3014:17, GO to Pinpoint Test L

No	GO to H4

H4 RETRIEVE THE RECORDED DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE TRM (TRAILER MODULE) SELF-TEST

Using a diagnostic scan tool, perform the DDM self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: Locks, Latches and Entry Systems .

No	GO to H5

H5 RECHECK THE BCM (BODY CONTROL MODULE) CONTINUOUS MEMORY DIAGNOSTIC TROUBLE CODES (CMDTCS)

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs).

Wait 10 seconds.

Using a diagnostic scan tool, check the BCM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U0199:87 still present?

Yes	GO to H6

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

H6 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0199 SET IN OTHER MODULES

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs).

Ignition OFF.

Ignition ON.

Wait 10 seconds.

Using a diagnostic scan tool, retrieve **all** Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U0199 set in any other module?

Yes	GO to H7

No	GO to H8

H7 CHECK FOR CORRECT DDM (DRIVER DOOR MODULE) OPERATION

Disconnect and inspect the DDM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the DDM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new DDM. REFER to: Driver Door Module (DDM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

H8 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > BODY CONTROL MODULE (BCM) > PINPOINT TESTS > PINPOINT TEST I : U0200:87

Normal Operation and Fault Conditions

The BCM communicates with the PDM through the GWM. REFER to: MODULE COMMUNICATIONS NETWORK .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0200:87	Lost Communication With "Door Control Module B": Missing Message	A continuous memory DTC that sets in the BCM if messages received from the PDM through the GWM are missing.

Possible Sources

- Communication network concern
- Battery voltage concern
- GWM concern
- PDM
- BCM

DIAGNOSIS AND TESTING > BODY CONTROL MODULE (BCM) > PINPOINT TESTS > PINPOINT TEST I : U0200:87 > PINPOINT TEST I : U0200:87

NOTE: If new modules were installed prior to the DTC being set, the module configuration may be incorrectly set during the PMI or the PMI may not have been carried out.

I1 VERIFY THE CUSTOMER CONCERN

Ignition ON.

Verify there is an observable symptom present.

Is an observable symptom present?

Yes	GO to I2

No	The system is operating normally at this time. The DTC may have been set due to high network traffic or an intermittent fault condition. CLEAR the DTC.

I2 CHECK THE COMMUNICATION NETWORK

Using a diagnostic scan tool, perform a network test.

Does the PDM pass the network test?

Yes	GO to I3

No	DIAGNOSE no communication with the PDM. REFER to: MODULE COMMUNICATIONS NETWORK .

I3 CHECK THE BCM (BODY CONTROL MODULE) CONTINUOUS MEMORY DIAGNOSTIC TROUBLE CODES (CMDTCS)

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs).

Wait 10 seconds.

Using a diagnostic scan tool, check the BCM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U3006:16, U3006:17, U3007:16, U3007:17, U3013:16, U3013:17, U3014:16 or U3014:17 recorded?

Yes	For DTC U3006:16, U3007:16, U3013:16 or U3014:16, GO to Pinpoint Test K For DTC U3006:17, U3007:17, U3013:17 or U3014:17, GO to Pinpoint Test L

No	GO to I4

I4 RETRIEVE THE RECORDED DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE PDM (PASSENGER DOOR MODULE) SELF-TEST

Using a diagnostic scan tool, perform the PDM self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: Locks, Latches and Entry Systems .

No	GO to I5

I5 RECHECK THE BCM (BODY CONTROL MODULE) CONTINUOUS MEMORY DIAGNOSTIC TROUBLE CODES (CMDTCS)

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs).

Wait 10 seconds.

Using a diagnostic scan tool, check the BCM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U0200:87 still present?

Yes	GO to I6

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

I6 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0200 SET IN OTHER MODULES

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs).

Ignition OFF.

Ignition ON.

Wait 10 seconds.

Using a diagnostic scan tool, retrieve **all** Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U0200 set in any other module?

Yes	GO to I7

No	GO to I8

I7 CHECK FOR CORRECT PDM (PASSENGER DOOR MODULE) OPERATION

Disconnect and inspect the PDM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the PDM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PDM. REFER to: Passenger Door Module (PDM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

I8 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > BODY CONTROL MODULE (BCM) > PINPOINT TESTS > PINPOINT TEST J : P0230:14

Refer to Electronic Engine Controls - 2.3L for schematic and connector information.

Normal Operation and Fault Conditions

The BCM provides a ground to the coil side of the BJB fuel pump relay.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
P0230:14	Fuel Pump Primary Circuit: Circuit Short To Ground or Open	A continuous and on-demand DTC that sets when the BCM detects a short to ground or open from the fuel pump relay coil circuit.

Possible Sources

- Fuse
- Wiring, terminals or connectors
- Fuel pump relay
- BCM

Visual Inspection and Diagnostic Pre-Checks

Inspect BJB fuse 49 (30A).

DIAGNOSIS AND TESTING > BODY CONTROL MODULE (BCM) > PINPOINT TESTS > PINPOINT TEST J : P0230:14 > PINPOINT TEST J : P0230:14

J1 CHECK THE FUEL PUMP RELAY

Ignition OFF.

Swap the fuel pump relay with a known good relay.

Ignition ON.

Using a diagnostic scan tool, clear the BCM Diagnostic Trouble Codes (DTCs).

Perform the BCM self-test.

Is DTC P0230:14 still present?

Yes	GO to J2

No	INSTALL a new the fuel pump relay.

J2 CHECK FOR VOLTAGE AT THE BCM (BODY CONTROL MODULE)

Ignition OFF.

Disconnect: BCM C2280C .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2280C-12		Ground

Is the voltage greater than 11 volts?

Yes	GO to J3

No	VERIFY BJB fuse 49 (30A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes for the short circuit.

J3 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > BODY CONTROL MODULE (BCM) > PINPOINT TESTS > PINPOINT TEST K : BCM (BODY CONTROL MODULE) INPUT POWER VOLTAGE BELOW THRESHOLD

Vehicle Ground Information

Refer to OEM GROUND DISTRIBUTION for schematic and connector information.

Vehicle Power Information

Refer to Power Distribution for schematic and connector information.

Normal Operation and Fault Conditions

The BCM receives voltage at all times from the BJB.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U3006:16	Control Module Input Power "A": Circuit Voltage Below Threshold	A continuous and on-demand DTC that sets in the BCM if the BCM detects lower than expected battery voltage on the voltage supply input circuit.
U3007:16	Control Module Input Power "B": Circuit Voltage Below Threshold	A continuous DTC that sets in the BCM if the BCM detects lower than expected battery voltage on the voltage supply input circuit.
U3013:16	Control Module Input Power "C": Circuit Voltage Below Threshold	A continuous DTC that sets in the BCM if the BCM detects lower than expected battery voltage on the voltage supply input circuit.
U3014:16	Control Module Input Power "D": Circuit Voltage Below Threshold	A continuous DTC that sets in the BCM if the BCM detects lower than expected battery voltage on the voltage supply input circuit.

Possible Sources

- Wiring, terminals or connectors
- Charging system concern

- Battery concern
- BJB
- BCM

DIAGNOSIS AND TESTING > BODY CONTROL MODULE (BCM) > PINPOINT TESTS > PINPOINT TEST K : BCM (BODY CONTROL MODULE) INPUT POWER VOLTAGE BELOW THRESHOLD > PINPOINT TEST K : BCM (BODY CONTROL MODULE) INPUT POWER VOLTAGE BELOW THRESHOLD

K1 RECHECK THE BCM (BODY CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition ON.

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs).

Wait 10 seconds.

Using a diagnostic scan tool, perform the BCM self-test.

Is DTC U3006:16, U3007:16, U3013:16 or U3014:16 still present?

Yes	GO to K2

No	The system is operating correctly at this time. The DTC may have been set due to a previous low battery voltage condition. CLEAR the DTC.

K2 CHECK FOR CHARGING SYSTEM DIAGNOSTIC TROUBLE CODES (DTCS) SET IN OTHER MODULES

Using a diagnostic scan tool, retrieve all Diagnostic Trouble Codes (DTCs).

Are any charging system Diagnostic Trouble Codes (DTCs) recorded?

Yes	DIAGNOSE the charging system concern. REFER to: Charging System - 2.3L EcoBoost (201kW/273PS) . REFER to: Charging System - 3.7L Duratec (227kW/301PS) . REFER to: Charging System - 5.0L 32V Ti-VCT .

No	GO to K3

K3 CHECK THE BATTERY CONDITION AND STATE OF CHARGE

Check the battery condition and verify the battery is fully charged. REFER to: BATTERY, MOUNTING AND CABLES .

Is the battery OK and fully charged?

Yes	GO to K4

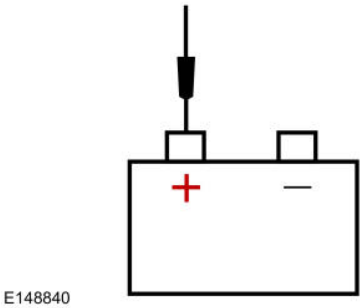
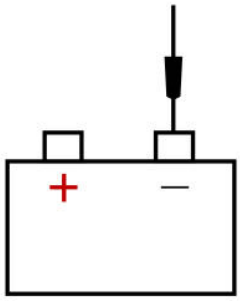
No	If the battery is discharged, DIAGNOSE the cause of the low battery condition. REFER to: Charging System - 2.3L EcoBoost (201kW/273PS) . REFER to: Charging System - 3.7L Duratec (227kW/301PS) . REFER to: Charging System - 5.0L 32V Ti-VCT . If the battery condition fails, INSTALL a new battery. REFER to: Battery .

K4 COMPARE THE BCM (BODY CONTROL MODULE) BATTERY VOLTAGE (V_BATT_BCM) PID (PARAMETER IDENTIFICATION) WITH THE ACTUAL BATTERY VOLTAGE

Start the engine.

Turn on accessories (climate control blower on high speed, exterior lights).

With the engine running at idle, measure and record battery voltage:

Positive Lead	Measurement / Action	Negative Lead
 E148840		 E148841

Using a diagnostic scan tool, view the BCM PID V_BATT_BCM.

Is the recorded battery voltage within 0.2 volt of the PID?

Yes	TURN the engine off, GO to K7

No	GO to K5

K5 CHECK THE BCM (BODY CONTROL MODULE) VOLTAGE SUPPLY CIRCUITS

Ignition OFF.

Disconnect BCM C2280G .

Disconnect BCM C2280H .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2280G-17		Ground
C2280G-21		Ground

C2280G-22		Ground

Positive Lead	Measurement / Action	Negative Lead
C2280H-1		Ground

Are the voltages within 0.2 volt of the recorded battery voltage?

Yes	GO to K6

No	REPAIR the circuit in question for high resistance.

K6 CHECK THE BCM (BODY CONTROL MODULE) PROCESSOR GROUNDS

Ignition OFF.

Disconnect BCM C2280C .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2280C-6	Ω	Ground
C2280C-7	Ω	Ground
C2280C-10	Ω	Ground

Are the resistances less than 3 ohms?

Yes	GO to K7

No	REPAIR the circuit in question for high resistance.

K7 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect all BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > BODY CONTROL MODULE (BCM) > PINPOINT TESTS > PINPOINT TEST L : BCM (BODY CONTROL MODULE) INPUT POWER VOLTAGE ABOVE THRESHOLD

Vehicle Ground Information

Refer to OEM GROUND DISTRIBUTION for schematic and connector information.

Vehicle Power Information

Refer to Power Distribution for schematic and connector information.

Normal Operation and Fault Conditions

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U3006:17	Control Module Input Power "A": Circuit Voltage Above Threshold	A continuous and on-demand DTC that sets in the BCM if the BCM detects higher than expected battery voltage on the voltage supply input circuit.
U3007:17	Control Module Input Power "B": Circuit Voltage Above Threshold	A continuous DTC that sets in the BCM if the BCM detects higher than expected battery voltage on the voltage supply input circuit.
U3013:17	Control Module Input Power "C": Circuit Voltage Above Threshold	A continuous DTC that sets in the BCM if the BCM detects higher than expected battery voltage on the voltage supply input circuit.
U3014:17	Control Module Input Power "D": Circuit Voltage Above Threshold	A continuous DTC that sets in the BCM if the BCM detects higher than expected battery voltage on the voltage supply input circuit.

Possible Sources

- Charging system concern
- BCM

DIAGNOSIS AND TESTING > BODY CONTROL MODULE (BCM) > PINPOINT TESTS > PINPOINT TEST L : BCM (BODY CONTROL MODULE) INPUT POWER VOLTAGE ABOVE THRESHOLD > PINPOINT TEST L : BCM (BODY CONTROL MODULE) INPUT POWER VOLTAGE ABOVE THRESHOLD

NOTE: U3006:17, U3007:17, U3013:17 or U3014:17 may be stored in the module memory due to previous battery charging or vehicle jump starting events.

L1 CHECK FOR OVERCHARGING DIAGNOSTIC TROUBLE CODES (DTCS) SET IN OTHER MODULES

Ignition ON.

Using a diagnostic scan tool, retrieve **all** Diagnostic Trouble Codes (DTCs).

Are any charging system Diagnostic Trouble Codes (DTCs) recorded?

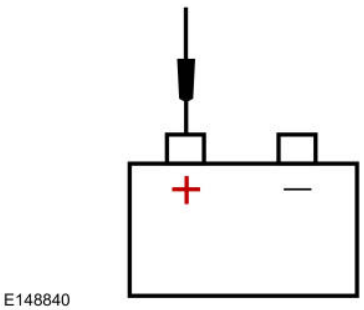
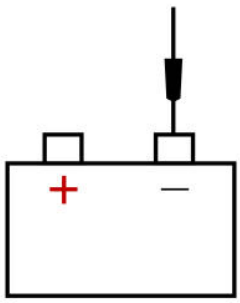
Yes	DIAGNOSE the charging system concern. REFER to: Charging System - 2.3L EcoBoost (201kW/273PS) . REFER to: Charging System - 3.7L Duratec (227kW/301PS) . REFER to: Charging System - 5.0L 32V Ti-VCT .

No	GO to L2

L2 CHECK THE BATTERY VOLTAGE

Turn off all interior/exterior lights and accessories.

Start and run the engine at approximately 2, 000 RPM for 3 minutes while monitoring the battery voltage.

Positive Lead	Measurement / Action	Negative Lead
 E148840		 E148841

Does the battery voltage rise to 16 volts or higher?

Yes	DIAGNOSE the over-charging system concern. REFER to: Charging System - 2.3L EcoBoost (201kW/273PS) . REFER to: Charging System - 3.7L Duratec (227kW/301PS) . REFER to: Charging System - 5.0L 32V Ti-VCT .

No	GO to L3

L3 RECHECK THE BCM (BODY CONTROL MODULE) CONTINUOUS MEMORY DIAGNOSTIC TROUBLE CODES (CMDTCS)

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs).

Wait 10 seconds.

Using a diagnostic scan tool, check the BCM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U3006:17, U3007:17, U3013:17 or U3014:17 present?

Yes	GO to L4

No	The system is operating correctly at this time. The DTC may have been caused by module connections or may have been set previously during battery charging or while jump starting the vehicle. ADDRESS the root cause of any connector or pin issues.

L4 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > BODY CONTROL MODULE (BCM) > PINPOINT TESTS > PINPOINT TEST M : U0208:87

Refer to Power Seats for schematic and connector information.

Normal Operation and Fault Conditions

The BCM communicates with the DSM through the GWM. REFER to: MODULE COMMUNICATIONS NETWORK .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0208:87	Lost Communication With "Seat Control Module A": Missing Message	A continuous memory DTC that sets in the BCM if messages received from the DSM through the GWM are missing.

Possible Sources

- Communication network concern
- Battery voltage concern
- GWM concern
- DSM
- BCM

DIAGNOSIS AND TESTING > BODY CONTROL MODULE (BCM) > PINPOINT TESTS > PINPOINT TEST M : U0208:87 > PINPOINT TEST M : U0208:87

NOTE: If new modules were installed prior to the DTC being set, the module configuration may be incorrectly set during the PMI or the PMI may not have been carried out.

M1 VERIFY THE CUSTOMER CONCERN

Ignition ON.

Verify there is an observable symptom present.

Is an observable symptom present?

Yes	GO to M2

No	The system is operating normally at this time. The DTC may have been set due to high network traffic or an intermittent fault condition. CLEAR the DTC.

M2 CHECK THE COMMUNICATION NETWORK

Using a diagnostic scan tool, perform a network test.

Does the PDM pass the network test?

Yes	GO to M3

No	DIAGNOSE no communication with the DSM. REFER to: MODULE COMMUNICATIONS NETWORK .

M3 CHECK THE BCM (BODY CONTROL MODULE) CONTINUOUS MEMORY DIAGNOSTIC TROUBLE CODES (CMDTCS)

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs).

Wait 10 seconds.

Using a diagnostic scan tool, check the BCM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U3006:16, U3006:17, U3007:16, U3007:17, U3013:16, U3013:17, U3014:16 or U3014:17 recorded?

Yes	For DTC U3006:16, U3007:16, U3013:16 or U3014:16, GO to Pinpoint Test K For DTC U3006:17, U3007:17, U3013:17 or U3014:17, GO to Pinpoint Test L

No	GO to M4

M4 RETRIEVE THE RECORDED DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE DSM (DRIVER FRONT SEAT MODULE) SELF-TEST

Using a diagnostic scan tool, perform the PDM self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: FRONT SEATS .

No	GO to M5

M5 RECHECK THE BCM (BODY CONTROL MODULE) CONTINUOUS MEMORY DIAGNOSTIC TROUBLE CODES (CMDTCS)

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs).

Wait 10 seconds.

Using a diagnostic scan tool, check the BCM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U0208:87 still present?

Yes	GO to M6

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

M6 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0208 SET IN OTHER MODULES

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs).

Ignition OFF.

Ignition ON.

Wait 10 seconds.

Using a diagnostic scan tool, retrieve **all** Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U0208 set in any other module?

Yes	GO to M7

No	GO to M8

M7 CHECK FOR CORRECT DSM (DRIVER FRONT SEAT MODULE) OPERATION

Disconnect and inspect the DSM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the DSM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new DSM. REFER to: Driver Front Seat Module (DSM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

M8 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > BODY CONTROL MODULE (BCM) > PINPOINT TESTS > PINPOINT TEST N : B143A:11

Refer to Power Distribution for schematic and connector information.

Normal Operation and Fault Conditions

The BCM transmits an event notification signal which communicates crash status and SRS deployment status to the PCM. When the PCM receives an event notification signal which indicates a crash, it initiates fuel cut-off.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B143A:11	Crash Event Detection Output: Circuit Short To Ground	A continuous memory and on-demand DTC that sets in the BCM if the BCM senses a short to ground on the event notification signal circuit to the PCM.

Possible Sources

- Wiring, terminals or connectors
- PCM
- BCM

DIAGNOSIS AND TESTING > BODY CONTROL MODULE (BCM) > PINPOINT TESTS > PINPOINT TEST N : B143A:11 > PINPOINT TEST N : B143A:11

N1 CONFIRM THAT THE DTC (DIAGNOSTIC TROUBLE CODE) RESETS

Ignition ON.

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs).

Wait 10 seconds.

Using a diagnostic scan tool, perform the BCM self-test.

Is DTC B143A:11 still present?

Yes	GO to N2

No	The system is operating correctly at this time. The DTC may have been falsely set by a BCM self-test, causing the signal to momentarily stop and set the DTC.

N2 CHECK THE PCM (POWERTRAIN CONTROL MODULE) FOR A SHORT TO GROUND

Ignition OFF.

Disconnect PCM C1551B (2.3L EcoBoost).

Disconnect PCM C1381B (3.7L Duratec).

Disconnect PCM C175B (5.0L or 5.2L).

Ignition ON.

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs).

Wait 10 seconds.

Using a diagnostic scan tool, perform the BCM self-test.

Is DTC B143A:11 still present?

Yes	GO to N3

No	GO to N4

N3 CHECK THE EVENT NOTIFICATION SIGNAL CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Disconnect: BCM C2280F

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2280F-29	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to N5

No	REPAIR the circuit.

N4 CHECK FOR CORRECT PCM (POWERTRAIN CONTROL MODULE) OPERATION

Disconnect and inspect all PCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the PCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PCM. 2.3L REFER to: Powertrain Control Module (PCM) . 3.7L REFER to: Powertrain Control Module (PCM) . 5.0L REFER to: Powertrain Control Module (PCM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

N5 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > BODY CONTROL MODULE (BCM) > PINPOINT TESTS > PINPOINT TEST O : U0212:87

Refer to Module Communications Network for schematic and connector information.

Normal Operation and Fault Conditions

The BCM communicates with the SCCM through the GWM. REFER to: MODULE COMMUNICATIONS NETWORK .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0212:87	Lost Communication With Steering Column Control Module: Missing Message	A continuous memory DTC that sets in the BCM if messages received from the SCCM through the GWM are missing.

Possible Sources

- Communication network concern
- Battery voltage concern
- GWM concern
- SCCM
- BCM

DIAGNOSIS AND TESTING > BODY CONTROL MODULE (BCM) > PINPOINT TESTS > PINPOINT TEST O : U0212:87 > PINPOINT TEST O : U0212:87

O1 VERIFY THE CUSTOMER CONCERN

Ignition ON.

Verify there is an observable symptom present.

Is an observable symptom present?

Yes	GO to O2

No	The system is operating normally at this time. The DTC may have been set due to high network traffic or an intermittent fault condition. CLEAR the DTC.

O2 CHECK THE COMMUNICATION NETWORK

Using a diagnostic scan tool, perform a network test.

Does the SCCM pass the network test?

Yes	GO to O3

No	DIAGNOSE no communication with the SCCM. REFER to: MODULE COMMUNICATIONS NETWORK .

O3 CHECK THE BCM (BODY CONTROL MODULE) CONTINUOUS MEMORY DIAGNOSTIC TROUBLE CODES (CMDTCS)

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs).

Wait 10 seconds.

Using a diagnostic scan tool, check the BCM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U3006:16, U3006:17, U3007:16, U3007:17, U3013:16, U3013:17, U3014:16 or U3014:17 recorded?

Yes	For DTC U3006:16, U3007:16, U3013:16 or U3014:16, GO to Pinpoint Test K For DTC U3006:17, U3007:17, U3013:17 or U3014:17, GO to Pinpoint Test L

No	GO to O4

O4 RETRIEVE THE RECORDED DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE SCCM (STEERING COLUMN CONTROL MODULE) SELF-TEST

Using a diagnostic scan tool, perform the SCCM self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: Steering Wheel and Column Electrical Components .

No	GO to O5

O5 RECHECK THE BCM (BODY CONTROL MODULE) CONTINUOUS MEMORY DIAGNOSTIC TROUBLE CODES (CMDTCS)

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs).

Wait 10 seconds.

Using a diagnostic scan tool, check the BCM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U0212:87 still present?

Yes	GO to O6

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

O6 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0212 SET IN OTHER MODULES

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs).

Ignition OFF.

Ignition ON.

Wait 10 seconds.

Using a diagnostic scan tool, retrieve **all** Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U0212 set in any other module?

Yes	GO to O7

No	GO to O8

O7 CHECK FOR CORRECT SCCM (STEERING COLUMN CONTROL MODULE) OPERATION

Disconnect and inspect the SCCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the SCCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new SCCM. REFER to: Steering Column Control Module (SCCM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

O8 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > BODY CONTROL MODULE (BCM) > PINPOINT TESTS > PINPOINT TEST P : U0253:87

Refer to Module Communications Network for schematic and connector information.

Normal Operation and Fault Conditions

The BCM communicates with the APIM through the GWM. REFER to: MODULE COMMUNICATIONS NETWORK .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0253:87	Lost Communication With Accessory Protocol Interface Module: Missing Message	A continuous memory DTC that sets in the BCM if messages received from the APIM through the GWM are missing.

Possible Sources

- Communication network concern
- Battery voltage concern
- GWM concern
- APIM
- BCM

DIAGNOSIS AND TESTING > BODY CONTROL MODULE (BCM) > PINPOINT TESTS > PINPOINT TEST P : U0253:87 > PINPOINT TEST P : U0253:87

P1 VERIFY THE CUSTOMER CONCERN

Ignition ON.

Verify there is an observable symptom present.

Is an observable symptom present?

Yes	GO to P2

No	The system is operating normally at this time. The DTC may have been set due to high network traffic or an intermittent fault condition. CLEAR the DTC.

P2 CHECK THE COMMUNICATION NETWORK

Using a diagnostic scan tool, perform a network test.

Does the APIM pass the network test?

Yes	GO to P3

No	DIAGNOSE no communication with the APIM. REFER to: MODULE COMMUNICATIONS NETWORK .

P3 CHECK THE BCM (BODY CONTROL MODULE) CONTINUOUS MEMORY DIAGNOSTIC TROUBLE CODES (CMDTCS)

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs).

Wait 10 seconds.

Using a diagnostic scan tool, check the BCM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U3006:16, U3006:17, U3007:16, U3007:17, U3013:16, U3013:17, U3014:16 or U3014:17 recorded?

Yes	For DTC U3006:16, U3007:16, U3013:16 or U3014:16, GO to Pinpoint Test K For DTC U3006:17, U3007:17, U3013:17 or U3014:17, GO to Pinpoint Test L

No	GO to P4

P4 RETRIEVE THE RECORDED DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE APIM (SYNC MODULE) SELF-TEST

Using a diagnostic scan tool, perform the APIM self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	Vehicles With: AM/FM/CD/SYNC, REFER to: Information and Entertainment System . Vehicles With: Touchscreen Display, REFER to: Information and Entertainment System .

No	GO to P5

P5 RECHECK THE BCM (BODY CONTROL MODULE) CONTINUOUS MEMORY DIAGNOSTIC TROUBLE CODES (CMDTCS)

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs).

Wait 10 seconds.

Using a diagnostic scan tool, check the BCM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U0253:87 still present?

Yes	GO to P6

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

P6 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0253 SET IN OTHER MODULES

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs).

Ignition OFF.

Ignition ON.

Wait 10 seconds.

Using a diagnostic scan tool, retrieve **all** Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U0253 set in any other module?

Yes	GO to P7

No	GO to P8

P7 CHECK FOR CORRECT APIM (SYNC MODULE) OPERATION

Disconnect and inspect the APIM connector.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the APIM connector. Make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new APIM. Without touchscreen, REFER to: SYNC Module [APIM] . With touchscreen, REFER to: SYNC Module [APIM] .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

P8 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > BODY CONTROL MODULE (BCM) > PINPOINT TESTS > PINPOINT TEST Q : U0256:87

Refer to Module Communications Network for schematic and connector information.

Normal Operation and Fault Conditions

The BCM communicates with the APIM through the GWM. REFER to: MODULE COMMUNICATIONS NETWORK .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0256:87	Lost Communication With Front Controls Interface Module "A" : Missing Message	A continuous memory DTC that sets in the BCM if messages received from the FCIM through the GWM are missing.

Possible Sources

- Communication network concern
- Battery voltage concern
- GWM concern
- FCIM
- BCM

DIAGNOSIS AND TESTING > BODY CONTROL MODULE (BCM) > PINPOINT TESTS > PINPOINT TEST Q : U0256:87 > PINPOINT TEST Q : U0256:87

Q1 VERIFY THE CUSTOMER CONCERN

Ignition ON.

Verify there is an observable symptom present.

Is an observable symptom present?

Yes	GO to Q2

No	The system is operating normally at this time. The DTC may have been set due to high network traffic or an intermittent fault condition. CLEAR the DTC.

Q2 CHECK THE COMMUNICATION NETWORK

Using a diagnostic scan tool, perform a network test.

Does the FCIM pass the network test?

Yes	GO to Q3

No	DIAGNOSE no communication with the FCIM. REFER to: MODULE COMMUNICATIONS NETWORK .

Q3 CHECK THE BCM (BODY CONTROL MODULE) CONTINUOUS MEMORY DIAGNOSTIC TROUBLE CODES (CMDTCS)

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs).

Wait 10 seconds.

Using a diagnostic scan tool, check the BCM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U3006:16, U3006:17, U3007:16, U3007:17, U3013:16, U3013:17, U3014:16 or U3014:17 recorded?

Yes	For DTC U3006:16, U3007:16, U3013:16 or U3014:16, GO to Pinpoint Test K For DTC U3006:17, U3007:17, U3013:17 or U3014:17, GO to Pinpoint Test L

No	GO to Q4

Q4 RETRIEVE THE RECORDED DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE FCIM (FRONT CONTROLS INTERFACE MODULE) SELF-TEST

Using a diagnostic scan tool, perform the FCIM self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	Vehicles With: AM/FM/CD/SYNC, REFER to: Information and Entertainment System . Vehicles With: Touchscreen Display, REFER to: Information and Entertainment System .

No	GO to Q5

Q5 RECHECK THE BCM (BODY CONTROL MODULE) CONTINUOUS MEMORY DIAGNOSTIC TROUBLE CODES (CMDTCS)

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs).

Wait 10 seconds.

Using a diagnostic scan tool, check the BCM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U0256:87 still present?

Yes	GO to Q6

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

Q6 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0256 SET IN OTHER MODULES

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs).

Ignition OFF.

Ignition ON.

Wait 10 seconds.

Using a diagnostic scan tool, retrieve **all** Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U0256 set in any other module?

Yes	GO to Q7

No	GO to Q8

Q7 CHECK FOR CORRECT FCIM (FRONT CONTROLS INTERFACE MODULE) OPERATION

Disconnect and inspect the FCIM connector.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the FCIM connector. Make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new FCIM.Without touchscreen, REFER to: Front Controls Interface Module (FCIM) . With touchscreen, REFER to: Front Controls Interface Module (FCIM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

Q8 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > BODY CONTROL MODULE (BCM) > PINPOINT TESTS > PINPOINT TEST R : U1000:00

Normal Operation and Fault Conditions

The BCM uses solid state drivers to control the output of several vehicle systems. When an overload occurs on any of these drivers, the BCM disables the output and tracks the number of repetitive faults on each of these circuits. The module compares this number of overloads to 3 progressive thresholds established for each circuit. At each threshold, DTC U1000:00 sets along with the DTC associated with the affected circuit. REFER to: Module Controlled Functions - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U1000:00	Solid State Driver Protection Active: Driver Disabled: No Sub Type Information	A continuous memory DTC that sets when the BCM has disabled a circuit due to a repetitive circuit overload and a progressive threshold is met.

Possible Sources

- BCM output circuit short
- BCM

DIAGNOSIS AND TESTING > BODY CONTROL MODULE (BCM) > PINPOINT TESTS > PINPOINT TEST R : U1000:00 > PINPOINT TEST R : U1000:00

R1 REVIEW THE DIAGNOSTIC TROUBLE CODES (DTCS)

Review the Diagnostic Trouble Codes (DTCs) from the BCM self-test.

Are any Diagnostic Trouble Codes (DTCs) present besides U1000:00?

Yes	CORRECT the Diagnostic Trouble Codes (DTCs). REFER to the BCM DTC Chart .

No	GO to R2

R2 REPEAT THE BCM (BODY CONTROL MODULE) SELF-TEST

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs).

Wait 10 seconds.

Repeat the BCM self-test.

Is DTC U1000:00 still present?

Yes	

No	The system is operating correctly at this time. The circuit short has been repaired.

DIAGNOSIS AND TESTING > BODY CONTROL MODULE (BCM) > PINPOINT TESTS > PINPOINT TEST S : U3006:1C

Vehicle Ground Information

Refer to OEM GROUND DISTRIBUTION for schematic and connector information.

Vehicle Power Information

Refer to Power Distribution for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Charging System - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U3006:1C	Control Module Input Power "A": Circuit Voltage Out of Range	A continuous memory DTC that sets in the BCM if the BCM detects out of range voltage on the voltage supply input circuits.

Possible Sources

- Wiring, terminals or connectors
- Charging system concern
- Battery concern
- BJB
- BCM

DIAGNOSIS AND TESTING > BODY CONTROL MODULE (BCM) > PINPOINT TESTS > PINPOINT TEST S : U3006:1C > PINPOINT TEST S : U3006:1C

S1 CHECK FOR CHARGING SYSTEM DIAGNOSTIC TROUBLE CODES (DTCS) IN THE BCM (BODY CONTROL MODULE)

Using a diagnostic scan tool, perform the BCM self-test.

Are any charging system Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to the BCM DTC Chart .

No	GO to S2

S2 CHECK FOR CHARGING SYSTEM DIAGNOSTIC TROUBLE CODES (DTCS) SET IN OTHER MODULES

Ignition ON.

Using a diagnostic scan tool, retrieve all Diagnostic Trouble Codes (DTCs).

Are any charging system Diagnostic Trouble Codes (DTCs) recorded?

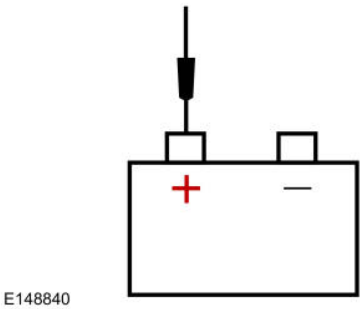
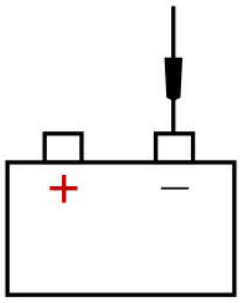
Yes	DIAGNOSE the charging system concern. REFER to: Charging System - 2.3L EcoBoost (201kW/273PS) . REFER to: Charging System - 3.7L Duratec (227kW/301PS) . REFER to: Charging System - 5.0L 32V Ti-VCT .

No	GO to S3

S3 CHECK THE BATTERY VOLTAGE

Turn off all interior/exterior lights and accessories.

Start and run the engine at approximately 2, 000 RPM for 3 minutes while monitoring the battery voltage.

Positive Lead	Measurement / Action	Negative Lead
 E148840		 E148841

Does the battery voltage rise to 16 volts or higher?

Yes	DIAGNOSE the over-charging system concern. REFER to: Charging System - 2.3L EcoBoost (201kW/273PS) . REFER to: Charging System - 3.7L Duratec (227kW/301PS) . REFER to:

	Charging System - 5.0L 32V Ti-VCT .

No	GO to S4

S4 RECHECK THE BCM (BODY CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition OFF.

Ignition ON.

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs).

Wait 10 seconds.

Using a diagnostic scan tool, check the BCM Diagnostic Trouble Codes (DTCs).

Is DTC U3006:1C present?

Yes	GO to S5

No	The system is operating correctly at this time. The DTC may have been caused by module connections or may have been set previously during battery charging or while jump starting the vehicle. ADDRESS the root cause of any connector or pin issues.

S5 CHECK THE BATTERY CONDITION AND STATE OF CHARGE

Check the battery condition and verify the battery is fully charged. REFER to: BATTERY, MOUNTING AND CABLES .

Is the battery OK and fully charged?

Yes	GO to S6

No	If the battery is discharged, DIAGNOSE the cause of the low battery condition. REFER to: Charging System - 2.3L EcoBoost (201kW/273PS) . REFER to: Charging System - 3.7L Duratec (227kW/301PS) . REFER to: Charging System - 5.0L 32V Ti-VCT . If the battery condition fails, INSTALL a new battery. REFER to: Battery .

S6 COMPARE THE BCM (BODY CONTROL MODULE) BATTERY VOLTAGE (V_BATT_BCM) PID (PARAMETER IDENTIFICATION) WITH THE ACTUAL BATTERY VOLTAGE

Start the engine.

Turn on accessories (climate control blower on high speed, exterior lights).

With the engine running at idle, measure and record battery voltage:

Positive Lead	Measurement / Action	Negative Lead
		

Using a diagnostic scan tool, view the BCM PID V_BATT_BCM.

Is the recorded battery voltage within 0.2 volt of the PID?

Yes	TURN the engine off, GO to S9

No	GO to S7

S7 CHECK THE BCM (BODY CONTROL MODULE) VOLTAGE SUPPLY CIRCUIT

Ignition OFF.

Disconnect BCM C2280G .

Disconnect BCM C2280H .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2280G-17	V	Ground
C2280G-21	V	Ground
C2280G-22	V	Ground

Positive Lead	Measurement / Action	Negative Lead
C2280H-1	V	Ground

Is the voltage within 0.2 volt of the recorded battery voltage?

Yes	GO to S8

No	REPAIR the circuit for high resistance.

S8 CHECK THE BCM (BODY CONTROL MODULE) PROCESSOR GROUNDS

Ignition OFF.

Disconnect BCM C2280C .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2280C-6	Ω	Ground
C2280C-7	Ω	Ground
C2280C-10	Ω	Ground

Are the resistances less than 3 ohms?

Yes	GO to S9

No	REPAIR the circuit in question for high resistance.

S9 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > BODY CONTROL MODULE B (BCMB) > DTC CHARTS

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

NOTE: Diagnostic Trouble Codes (DTCs) which are not listed in the DTC charts are often retrieved as a result of incorrect repair procedures. Before attempting any repairs for unlisted Diagnostic Trouble Codes (DTCs):

- repair all other Diagnostic Trouble Codes (DTCs).
- if no other Diagnostic Trouble Codes (DTCs) are retrieved, CLEAR the Diagnostic Trouble Codes (DTCs) and REPEAT the self-test.
- if the unlisted Diagnostic Trouble Codes (DTCs) return, VERIFY that the correct part number module is installed for the vehicle and if correct, install As-Built data from PTS following the diagnostic scan tool instructions under Module Programming > As-Built.

BCMB DTC Chart

DTC	Description	Action
B1265:23	Left Rear Turn Lamp Feedback: Signal Stuck Low	REFER to: Turn Signal and Hazard Lamps .
B1265:24	Left Rear Turn Lamp Feedback: Signal Stuck High	REFER to: Turn Signal and Hazard Lamps .
B1266:23	Right Rear Turn Lamp Feedback: Signal Stuck Low	REFER to: Turn Signal and Hazard Lamps .
B1266:24	Right Rear Turn Lamp Feedback: Signal Stuck High	REFER to: Turn Signal and Hazard Lamps .
B126E:23	Right Rear Window Fully Down Feedback: Signal Stuck Low	REFER to: Convertible Top .
B126E:24	Right Rear Window Fully Down Feedback: Signal Stuck High	REFER to: Convertible Top .
B126F:23	Left Rear Window Fully Down Feedback: Signal Stuck Low	REFER to: Convertible Top .
B126F:24	Left Rear Window Fully Down Feedback: Signal Stuck High	REFER to: Convertible Top .
B1271:11	Left Stop/Turn Inner Lamp: Circuit Short To Ground	REFER to: Stoplamps .
B1271:15	Left Stop/Turn Inner Lamp: Circuit Short To Battery or Open	REFER to: Stoplamps .
B1272:11	Right Stop/Turn Inner Lamp: Circuit Short To Ground	REFER to: Stoplamps .
B1272:15	Right Stop/Turn Inner Lamp: Circuit Short To Battery or Open	REFER to: Stoplamps .
B1273:11	Right Stop/Turn Middle Lamp: Circuit Short To Ground	REFER to: Stoplamps .
B1273:15	Right Stop/Turn Middle Lamp: Circuit Short To Battery or Open	REFER to: Stoplamps .
B1274:11	Left Stop/Turn Middle Lamp: Circuit Short To Ground	REFER to: Stoplamps .
B1274:15	Left Stop/Turn Middle Lamp: Circuit Short To Battery or Open	REFER to: Stoplamps .
B1275:11	Left Stop/Turn Outer Lamp: Circuit Short To Ground	REFER to: Stoplamps .
B1275:15	Left Stop/Turn Outer Lamp: Circuit Short To Battery or Open	REFER to: Stoplamps .
B1276:11	Right Stop/Turn Outer Lamp: Circuit Short To Ground	REFER to: Stoplamps .
B1276:15	Right Stop/Turn Outer Lamp: Circuit Short To Battery or Open	REFER to: Stoplamps .

B127A:12	Global Window Control: Circuit Short To Battery	REFER to: Glass, Frames and Mechanisms .
B127A:14	Global Window Control: Circuit Short To Ground or Open	REFER to: Glass, Frames and Mechanisms .
B127B:11	Ambient Lighting Zone 1 Output Red LED: Circuit Short To Ground	REFER to: Interior Lighting .
B127B:15	Ambient Lighting Zone 1 Output Red LED: Circuit Short To Battery or Open	REFER to: Interior Lighting .
B127D:11	Ambient Lighting Zone 3 Output Red LED: Circuit Short To Ground	REFER to: Interior Lighting .
B127D:15	Ambient Lighting Zone 3 Output Red LED: Circuit Short To Battery or Open	REFER to: Interior Lighting .
B127E:11	Ambient Lighting Zone 1 Output Green LED: Circuit Short To Ground	REFER to: Interior Lighting .
B127E:15	Ambient Lighting Zone 1 Output Green LED: Circuit Short To Battery or Open	REFER to: Interior Lighting .
B1280:11	Ambient Lighting Zone 3 Output Green LED: Circuit Short To Ground	REFER to: Interior Lighting .
B1280:15	Ambient Lighting Zone 3 Output Green LED: Circuit Short To Battery or Open	REFER to: Interior Lighting .
B1281:11	Ambient Lighting Zone 1 Output Blue LED: Circuit Short To Ground	REFER to: Interior Lighting .
B1281:15	Ambient Lighting Zone 1 Output Blue LED: Circuit Short To Battery or Open	REFER to: Interior Lighting .
B1283:11	Ambient Lighting Zone 3 Output Blue LED: Circuit Short To Ground	REFER to: Interior Lighting .
B1283:15	Ambient Lighting Zone 3 Output Blue LED: Circuit Short To Battery or Open	REFER to: Interior Lighting .
P2533:14	Ignition Switch Run/Start Position Circuit: Circuit Short To Ground or Open	REFER to: Steering Wheel and Column Electrical Components .
U0140:87	Lost Communication With Body Control Module: Missing Message	GO to PINPOINT TEST A : U0140:87
U0155:87	Lost Communication With Instrument Panel Cluster (IPC) Control Module: Missing Message	GO to PINPOINT TEST B : U0155:87

U0422:68	Invalid Data Received From Body Control Module: Event Information	This DTC is set when the BCMB receives invalid data from the BCM. RETRIEVE and REPAIR all non-network DTCs in the BCM. REFER to: Body Control Module (BCM) .
U1000:00	Solid State Driver Protection Active -Driver Disabled: No Sub Type Information	GO to PINPOINT TEST D : U1000:00
U2100:00	Initial Configuration Not Complete: No Sub Type Information	CARRY OUT Programmable Module Installation (PMI) on the BCMB. REFER to: MODULE CONFIGURATION .
U3000:49	Control Module: Internal Electronic Failure	ADDRESS all other DTCs first. CLEAR the DTCs. REPEAT the self-test. If DTC U3000:49 is retrieved again, INSTALL a new BCMB. REFER to: Body Control Module B (BCMB) .
U3003:62	Battery Voltage: Signal Compare Failure	GO to PINPOINT TEST C : U3003:62

DIAGNOSIS AND TESTING > BODY CONTROL MODULE B (BCMB) > PINPOINT TESTS > PINPOINT TEST A : U0140:87

Normal Operation and Fault Conditions

The BCM communicates with the PCM through the GWM. REFER to: MODULE COMMUNICATIONS NETWORK .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0140:87	Lost Communication With Body Control Module: Missing Message	A continuous memory DTC that sets in the BCMB if data messages received from the BCM through the GWM are missing.

Possible Sources

- Communication network concern
- Charging system concern
- BCM
- BCMB

DIAGNOSIS AND TESTING > BODY CONTROL MODULE B (BCMB) > PINPOINT TESTS > PINPOINT TEST A : U0140:87 > PINPOINT TEST A : U0140:87

NOTE: If new modules were installed prior to the DTC being set, the module configuration may be incorrectly set during the PMI or the PMI may not have been carried out.

A1 VERIFY THE CUSTOMER CONCERN

Ignition ON.

Verify there is an observable symptom present.

Is an observable symptom present?

Yes	GO to A2

No	The system is operating normally at this time. The DTC may have been set due to high network traffic or an intermittent fault condition. CLEAR the DTC.

A2 CHECK THE COMMUNICATION NETWORK

Ignition ON.

Using a diagnostic scan tool, perform a network test.

Does the BCM pass the network test?

Yes	GO to A3

No	DIAGNOSE no communication with the BCM. REFER to: MODULE COMMUNICATIONS NETWORK .

A3 CHECK THE BCMB (BODY CONTROL MODULE B) CONTINUOUS MEMORY DIAGNOSTIC TROUBLE CODES (CMDTCS)

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs).

Wait 10 seconds.

Using a diagnostic scan tool, check the BCMB Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U3003:62 recorded?

Yes	GO to PINPOINT TEST C : U3003:62

No	GO to A4

A4 RETRIEVE THE RECORDED DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE BCM (BODY

CONTROL MODULE) SELF-TEST

Using a diagnostic scan tool, perform the BCM self-test.

Is there any DTC recorded?

Yes	REFER to: Body Control Module (BCM) .

No	GO to A5

A5 RECHECK THE BCMB (BODY CONTROL MODULE B) CONTINUOUS MEMORY DIAGNOSTIC TROUBLE CODES (CMDTCS)

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs).

Wait 10 seconds.

Using a diagnostic scan tool, check the BCM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U0140:87 still present?

Yes	GO to A6

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

A6 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0140 SET IN OTHER MODULES

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs).

Ignition OFF.

Ignition ON.

Wait 10 seconds.

Using a diagnostic scan tool, retrieve **all** Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U0140 set in any other module?

Yes	GO to A7

No	GO to A8

A7 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect the BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCMB connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

A8 CHECK FOR CORRECT BCMB (BODY CONTROL MODULE B) OPERATION

Disconnect and inspect all BCMB connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Connect the BCMB connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new BCMB. REFER to: Body Control Module B (BCMB) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > BODY CONTROL MODULE B (BCMB) > PINPOINT TESTS > PINPOINT TEST B : U0155:87

Normal Operation and Fault Conditions

The BCM communicates with the PCM through the GWM. REFER to: MODULE COMMUNICATIONS NETWORK .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0155:87	Lost Communication With Instrument Panel Cluster (IPC) Control Module: Missing Message	A continuous memory DTC that sets in the BCMB if data messages received from the IPC through the GWM are missing.

Possible Sources

- Communication network concern
- Charging system concern
- IPC
- BCMB

DIAGNOSIS AND TESTING > BODY CONTROL MODULE B (BCMB) > PINPOINT TESTS > PINPOINT TEST B : U0155:87 > PINPOINT TEST B : U0155:87

B1 VERIFY THE CUSTOMER CONCERN

Ignition ON.

Verify there is an observable symptom present.

Is an observable symptom present?

Yes	GO to B2

No	The system is operating normally at this time. The DTC may have been set due to high network traffic or an intermittent fault condition. CLEAR the DTC.

B2 CHECK THE COMMUNICATION NETWORK

Ignition ON.

Using a diagnostic scan tool, perform a network test.

Does the IPC pass the network test?

Yes	GO to B3

No	DIAGNOSE no communication with the IPC. REFER to: MODULE COMMUNICATIONS NETWORK .

B3 CHECK THE BCMB (BODY CONTROL MODULE B) CONTINUOUS MEMORY DIAGNOSTIC TROUBLE CODES (CMDTCS)

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs).

Wait 10 seconds.

Using a diagnostic scan tool, check the BCMB Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U3003:62 recorded?

Yes	GO to PINPOINT TEST C : U3003:62

No	GO to B4

B4 RETRIEVE THE RECORDED DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE BCM (BODY CONTROL MODULE) SELF-TEST

Using a diagnostic scan tool, perform the IPC self-test.

Is there any DTC recorded?

Yes	REFER to: Instrumentation, Message Center and Warning Chimes .

No	GO to B5

B5 RECHECK THE BCMB (BODY CONTROL MODULE B) CONTINUOUS MEMORY DIAGNOSTIC TROUBLE CODES (CMDTCS)

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs).

Wait 10 seconds.

Using a diagnostic scan tool, check the BCM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U0155:87 still present?

Yes	GO to B6

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

B6 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0155 SET IN OTHER MODULES

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs).

Ignition OFF.

Ignition ON.

Wait 10 seconds.

Using a diagnostic scan tool, retrieve **all** Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U0155 set in any other module?

Yes	GO to B7

No	GO to B8

B7 CHECK FOR CORRECT IPC (INSTRUMENT PANEL CLUSTER) OPERATION

Disconnect and inspect the IPC connector.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the IPC connector. Make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

B8 CHECK FOR CORRECT BCMB (BODY CONTROL MODULE B) OPERATION

Disconnect and inspect all BCMB connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Connect the BCMB connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this

	concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new BCMB. REFER to: Body Control Module B (BCMB) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > BODY CONTROL MODULE B (BCMB) > PINPOINT TESTS > PINPOINT TEST C : U3003:62

Vehicle Ground Information

Refer to OEM GROUND DISTRIBUTION for schematic and connector information.

Vehicle Power Information

Refer to Power Distribution for schematic and connector information.

Normal Operation and Fault Conditions

The BCMB receives hot at all times voltage from the BJB.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U3003:62	Battery Voltage: Signal Compare Failure	A continuous memory DTC that sets in the BCMB when the BCMB detects battery voltage 1.5 volts above or below specific thresholds.

Possible Sources

- Wiring, terminals or connectors
- Charging system concern
- Battery concern
- BJB
- BCM

DIAGNOSIS AND TESTING > BODY CONTROL MODULE B (BCMB) > PINPOINT TESTS > PINPOINT TEST C : U3003:62 > PINPOINT TEST C : U3003:62

C1 CHECK FOR CHARGING SYSTEM DIAGNOSTIC TROUBLE CODES (DTCS) IN THE BCM (BODY CONTROL MODULE)

Using a diagnostic scan tool, perform the BCM self-test.

Are any charging system Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: Body Control Module (BCM) .

No	GO to C2

C2 CHECK FOR CHARGING SYSTEM DIAGNOSTIC TROUBLE CODES (DTCS) SET IN OTHER MODULES

Ignition ON.

Using a diagnostic scan tool, retrieve all Diagnostic Trouble Codes (DTCs).

Are any charging system Diagnostic Trouble Codes (DTCs) recorded?

Yes	DIAGNOSE the charging system concern. REFER to: Charging System - 2.3L EcoBoost (201kW/273PS) . REFER to: Charging System - 3.7L Duratec (227kW/301PS) . REFER to: Charging System - 5.0L 32V Ti-VCT .

No	GO to C3

C3 RECHECK THE BCMB (BODY CONTROL MODULE B) DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition OFF.

Ignition ON.

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs).

Wait 10 seconds.

Using a diagnostic scan tool, check the BCMB Diagnostic Trouble Codes (DTCs).

Is DTC U3003:62 present?

Yes	GO to C4

No	The system is operating correctly at this time. The DTC may have been caused by module connections or may have been set previously during battery charging or while jump starting the vehicle. ADDRESS the root cause of any connector or pin issues.

C4 CHECK THE BATTERY CONDITION AND STATE OF CHARGE

Check the battery condition and verify the battery is fully charged. REFER to: BATTERY, MOUNTING AND CABLES .

Is the battery OK and fully charged?

Yes	GO to C5

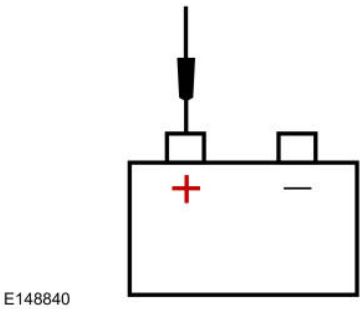
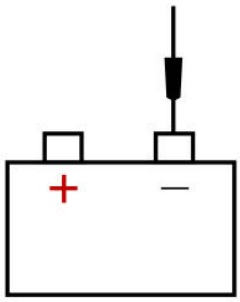
No	If the battery is discharged, DIAGNOSE the cause of the low battery condition. REFER to: Charging System - 2.3L EcoBoost (201kW/273PS) . REFER to: Charging System - 3.7L Duratec (227kW/301PS) . REFER to: Charging System - 5.0L 32V Ti-VCT . If the battery condition fails, INSTALL a new battery. REFER to: Battery .

C5 CHECK THE BATTERY VOLTAGE

Turn off all interior/exterior lights and accessories.

Start the engine.

Run the engine at approximately 2, 000 RPM for 3 minutes while monitoring the battery voltage.

Positive Lead	Measurement / Action	Negative Lead
 E148840		 E148841

Does the battery voltage rise to 15 volts or higher?

Yes	DIAGNOSE the over-charging system concern. REFER to: Charging System - 2.3L EcoBoost (201kW/273PS) . REFER to: Charging System - 3.7L Duratec (227kW/301PS) . REFER to: Charging System - 5.0L 32V Ti-VCT .

No	GO to C6

C6 CHECK THE BCMB (BODY CONTROL MODULE B) VOLTAGE PID (PARAMETER IDENTIFICATION)

Ignition OFF.

Ignition ON.

Measure and record battery voltage:

Positive Lead	Measurement / Action	Negative Lead
		

Using a diagnostic scan tool, view the BCMB PID VPWR_BCMB.

Is the recorded battery voltage within 0.2 volt of the PID?

Yes	GO to C9

No	GO to C7

C7 CHECK THE BCMB (BODY CONTROL MODULE B) VOLTAGE SUPPLY CIRCUIT

Ignition OFF.

Disconnect BCM C2280C .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2280C-1		Ground

Is the voltage within 0.2 volt of the recorded battery voltage?

Yes	GO to C8

No	REPAIR the circuit for high resistance.

C8 CHECK THE BCMB (BODY CONTROL MODULE B) GROUND

Ignition OFF.

Disconnect BCM C2280A .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2280A-13	Ω	Ground

Is the resistance less than 3 ohms?

Yes	GO to C9

No	REPAIR the circuit for high resistance.

C9 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > BODY CONTROL MODULE B (BCMB) > PINPOINT TESTS > PINPOINT TEST D : U1000:00

Normal Operation and Fault Conditions

The BCMB uses solid state drivers to control the output of several vehicle systems. When an overload occurs on any of these drivers, the BCMB disables the output and tracks the number of repetitive faults on each of these circuits. The module compares this number of overloads to 3 progressive thresholds established for each circuit. At each threshold, DTC U1000:00 sets along with the DTC associated with the affected circuit. REFER to: Module Controlled Functions - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U1000:00	Solid State Driver Protection Active: Driver Disabled: No Sub Type Information	A continuous memory DTC that sets when the BCMB has disabled a circuit due to a repetitive circuit overload and a progressive threshold is met.

Possible Sources

- BCMB output circuit short
- BCMB

DIAGNOSIS AND TESTING > BODY CONTROL MODULE B (BCMB) > PINPOINT TESTS > PINPOINT TEST D : U1000:00 > PINPOINT TEST D : U1000:00

D1 REVIEW THE DIAGNOSTIC TROUBLE CODES (DTCS)

Review the Diagnostic Trouble Codes (DTCs) from the BCMB self-test.

Are any Diagnostic Trouble Codes (DTCs) present besides U1000:00?

Yes	CORRECT the Diagnostic Trouble Codes (DTCs). REFER to the BCMB DTC Chart .

No	GO to D2

D2 REPEAT THE BCM (BODY CONTROL MODULE) SELF-TEST

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs).

Wait 10 seconds.

Repeat the BCMB self-test.

Is DTC U1000:00 still present?

Yes	INSTALL a new BCMB. REFER to: Body Control Module B (BCMB) .

No	The system is operating correctly at this time. The circuit short has been repaired.

GENERAL PROCEDURES > FACTORY MODE DEACTIVATION

Deactivation

*NOTE: During vehicle build, some modules, such as the IPC and BCM module are set in **factory mode** . Factory mode reduces the drain on the battery during longer periods where the vehicle is not used. While in the factory mode, various systems may be altered or disabled and the IPC displays FACTORY MODE CONTACT DEALER in the message center. If the vehicle is in factory mode, the system automatically reverts to Transport mode after 60 ignition cycles. If the IPC displays **TRANSPORT MODE CONTACT DEALER** , refer to the Transport Mode Deactivation procedure.*

1.

Place the ignition in the OFF position.

2.

Verify the battery is fully charged. Refer to: BATTERY, MOUNTING AND CABLES .

3.

Without push button start, cycle the ignition from off to on 60 times.

*NOTE: One IKT **must** be in the vehicle.*

4.
With push button start, press the Engine Start/Stop button 120 times.

5.

Refer to the

Transport Mode Deactivation procedure.

GENERAL PROCEDURES > TRANSPORT MODE DEACTIVATION

Deactivation

> *NOTE: After vehicle build, some vehicle modules are set in Transport mode including the IPC and the BCM. Transport mode reduces battery drain during longer periods where the vehicle is not used. While in transport mode, the IPC displays TRANSPORT MODE CONTACT DEALER in the message center. Various systems may be altered or are disabled when in the transport mode. The vehicle automatically reverts to normal operation mode after being driven 80 km (50 mi). The vehicle can be manually taken out of Transport mode using this procedure.*

If the IPC displays FACTORY MODE CONTACT DEALER in the message center the vehicle is set in factory mode. The system **does not** automatically revert to another mode and must be manually set to either the transport or normal operation mode. Refer to the **Factory Mode Deactivation** procedure.

1.

> *WARNING: Before beginning any service procedure in this article, refer to Safety Warnings in GENERAL INFORMATION . Failure to follow this instruction may result in serious personal injury.*

Place the ignition in the OFF position.

2.

Verify the battery is fully charged. Refer to: Battery Charging .

3.

Place the ignition in the ON position.

> *NOTE: Steps 4 and 5 must be carried out within 10 seconds.*

4.
Press and release the brake pedal 5 times.

> *NOTE: The IPC message center indicates NORMAL MODE when the procedure has been successfully completed.*

5.
Press and release the hazard switch 2 times.

6.

Start the engine.

7.

Place the ignition in the OFF position.

8.

Verify the RKE works correctly.

REMOVAL AND INSTALLATION > BODY CONTROL MODULE (BCM)

Special Tool(s) / General Equipment

Interior Trim Remover

REMOVAL AND INSTALLATION > BODY CONTROL MODULE (BCM) > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

NOTE: If the BCM did not respond to the diagnostic scan tool, As-Built Data may need to be entered as part of the repair. This step is only necessary if the BCM is being replaced

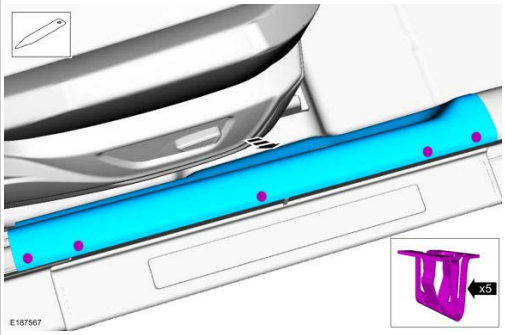
1.
Using a diagnostic scan tool, begin the PMI process for the BCM following the on-screen instructions.

NOTE: The PAM is integral to the BCM. This step is only necessary if the BCM is being replaced.

2.
Using a diagnostic scan tool, begin the PMI process for the PAM following the on-screen instructions.

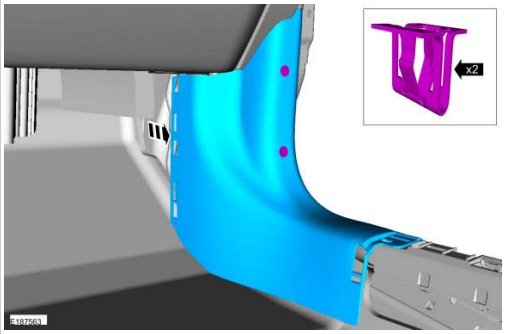
3.

Release the clips and remove the RH scuff plate. Use the General Equipment: Interior Trim Remover



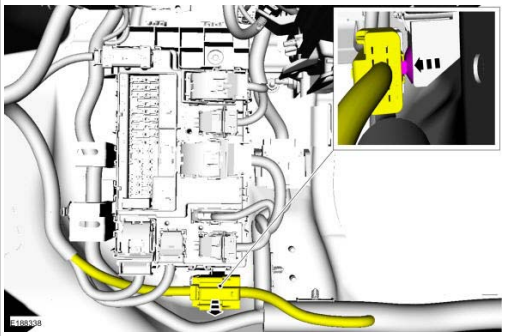
4.

Release the clips and remove the lower RH cowl trim panel.



5.

Release the harness retainer and position the harness aside.



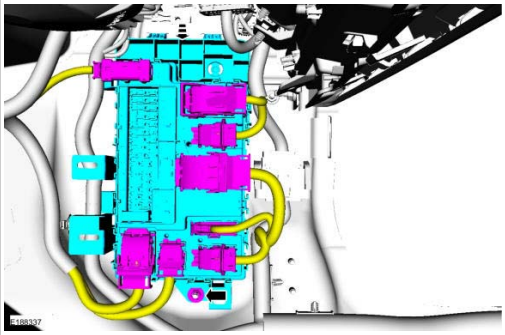
6.

Remove the nut and the BCM.

Disconnect the electrical connectors.

Torque

: 71 lb.in (8 Nm)



REMOVAL AND INSTALLATION > BODY CONTROL MODULE (BCM) > INSTALLATION

NOTE: If installing a new BCM, the ignition cannot be turned on until a parameter reset is performed and 2 keys are programmed to the vehicle. The BCM still communicates with the diagnostic scan tool with the ignition off. Use the previous diagnostic scan tool session or start a diagnostic scan tool session using the PCM part number or tear tag number located on the PCM.

1.
To install, reverse the removal procedure.

NOTE: Carry out the remaining steps only if installing a new BCM.

*NOTE: A diagnostic scan tool should **not** be used to program keys for this specific step.*

2.
Program the keys.

Place the first key in the backup starting location. Refer to: Passive Anti-Theft System (PATS) - Component Location .

Press the START/STOP button and wait approximately 6 seconds.

Press the START/STOP button and remove the first key.

Place the second key in the backup starting location.

Press the START/STOP button.

3.

Carry out the parameter reset. Refer to: Anti-Theft Security Access .

4.

Using a diagnostic scan tool, complete the PMI process for the BCM following the on-screen instructions.

5.

Using a diagnostic scan tool, carry out the Configuration Engine Immobilizer (CEI) configuration following the on-screen instructions (Toolbox > Body > Service Functions > CEI Lock Configuration).

6.

Using a diagnostic scan tool, carry out the battery monitor sensor reset following the on-screen instructions (Toolbox > Body > BMS Reset).

7.

If equipped with video rear parking aid, using a diagnostic scan tool, carry out the new module initialization following the on-screen instructions (Toolbox > Electrical > Service Functions > LIN New Module Initialization).

NOTE: This step is only necessary if equipped with Electronic Steering Column Lock (ESCL).

8.
Carry out the BCM to Electronic Steering Column Lock (ESCL) configuration/training procedure. Refer to: Anti-Theft Security Access .

9.

Configure the customer preference programmable parameters. Refer to: MODULE CONFIGURATION .

10.

Train the tire pressure sensors. Refer to: Tire Pressure Monitoring System (TPMS) Sensor Location Calibration .

11.

Carry out the BCM self-test (must include an on-demand self-test) and then repeat the self-test to confirm all Diagnostic Trouble Codes (DTCs) have been cleared.

12.

Using a diagnostic scan tool, complete the PMI process for the PAM following the on-screen instructions.

REMOVAL AND INSTALLATION > BODY CONTROL MODULE B (BCMB) > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

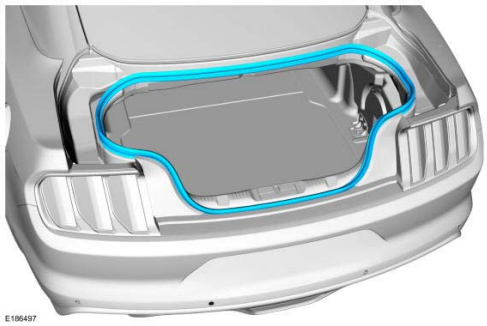
NOTE: If installing a new module, it is necessary to upload the module configuration information to the scan tool prior to removing the module. This information must be

downloaded into the new module after installation.

1.
Using a diagnostic scan tool, begin the PMI process for the BCM-B (Body Control Module-B) following the on-screen instructions.

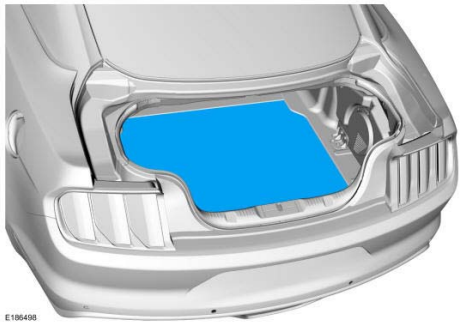
2.

Remove the luggage compartment weatherstrip.



3.

Remove the spare tire cover.



4.

If equipped, remove the subwoofer and amplifier unit. Refer to: Subwoofer and Amplifier Unit .

5.

1.

Remove the pin-type retainers.

2.

Position aside the RH luggage compartment side trim panel.



6.

Remove the nuts and the BCM-B (Body Control Module-B).

Disconnect the electrical connectors.

Torque

: 22 lb.in (2.5 Nm)



REMOVAL AND INSTALLATION > BODY CONTROL MODULE B (BCMB) > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Using a diagnostic scan tool, complete the PMI process for the BCM-B (Body Control Module-B) following the on-screen instructions.

3.

Carry out the BCM-B (Body Control Module-B) self-test (must include an on-demand self-test) and then repeat the self-test to confirm all BCM-B (Body Control Module-B) DTCs have been cleared.

REMOVAL AND INSTALLATION > DRIVER DOOR MODULE (DDM) > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

NOTE: If installing a new module, it is necessary to upload the module configuration information to the diagnostic scan tool prior to removing the module. This information must be downloaded into the new module after installation.

1.
Using a diagnostic scan tool, begin the PMI process for the DDM following the on-screen instructions.

2.

Remove the Front door trim panel. Refer to: Front Door Trim Panel .

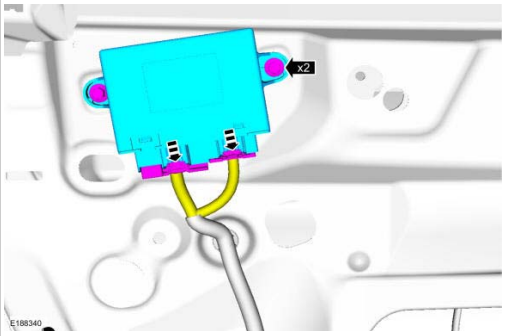
3.

Remove the bolts and the DDM.

Disconnect the electrical connectors.

Torque

: 44 lb.in (5 Nm)



REMOVAL AND INSTALLATION > DRIVER DOOR MODULE (DDM) > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Using a diagnostic scan tool, complete the PMI process for the DDM following the on-screen instructions.

REMOVAL AND INSTALLATION > PASSENGER DOOR MODULE (PDM) > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

NOTE: If installing a new module, it is necessary to upload the module configuration information to the diagnostic scan tool prior to removing the module. This information must be downloaded into the new module after installation.

1.
Using a diagnostic scan tool, begin the PMI process for the PDM following the on-screen instructions.

2.

Remove the Front door trim panel. Refer to: Front Door Trim Panel .

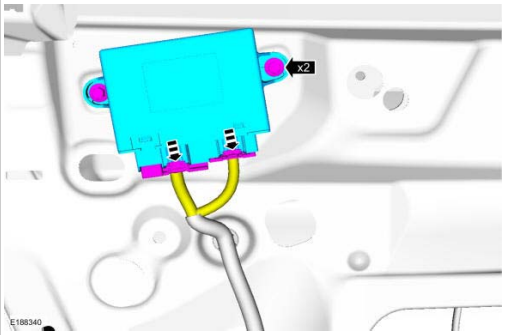
3.

Remove the bolts and the PDM.

Disconnect the electrical connectors.

Torque

: 44 lb.in (5 Nm)



REMOVAL AND INSTALLATION > PASSENGER DOOR MODULE (PDM) > INSTALLATION

1.

To install, reverse the removal procedure

2.

Using a diagnostic scan tool, complete the PMI process for the PDM following the on-screen instructions.

REMOVAL AND INSTALLATION > RADIO TRANSCEIVER MODULE (RTM) > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

All vehicles

NOTE: If installing a new module, it is necessary to upload the module configuration information to the diagnostic scan tool prior to removing the module. This information must be downloaded into the new module after installation.

1.
Using a diagnostic scan tool, begin the PMI process for the RTM following the on-screen instructions.

Coupe

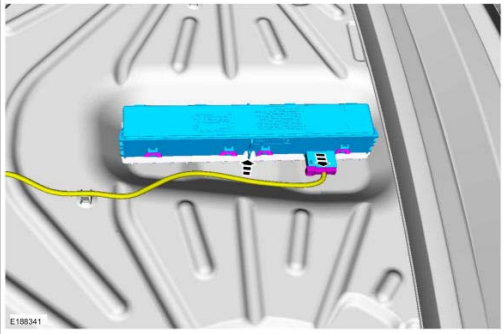
2.

Remove the parcel shelf. Refer to: Parcel Shelf - Coupe .

3.

Release the tabs and remove the RTM.

Disconnect the electrical connectors.



Convertible

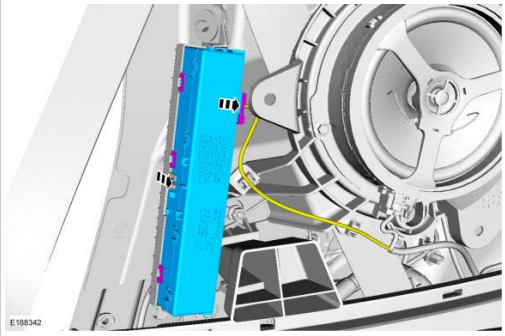
4.

Remove the loadspace trim panel. Refer to: Loadspace Trim Panel - Convertible .

5.

Release the tabs and remove the RTM.

Disconnect the electrical connectors.



REMOVAL AND INSTALLATION > RADIO TRANSCEIVER MODULE (RTM) > INSTALLATION

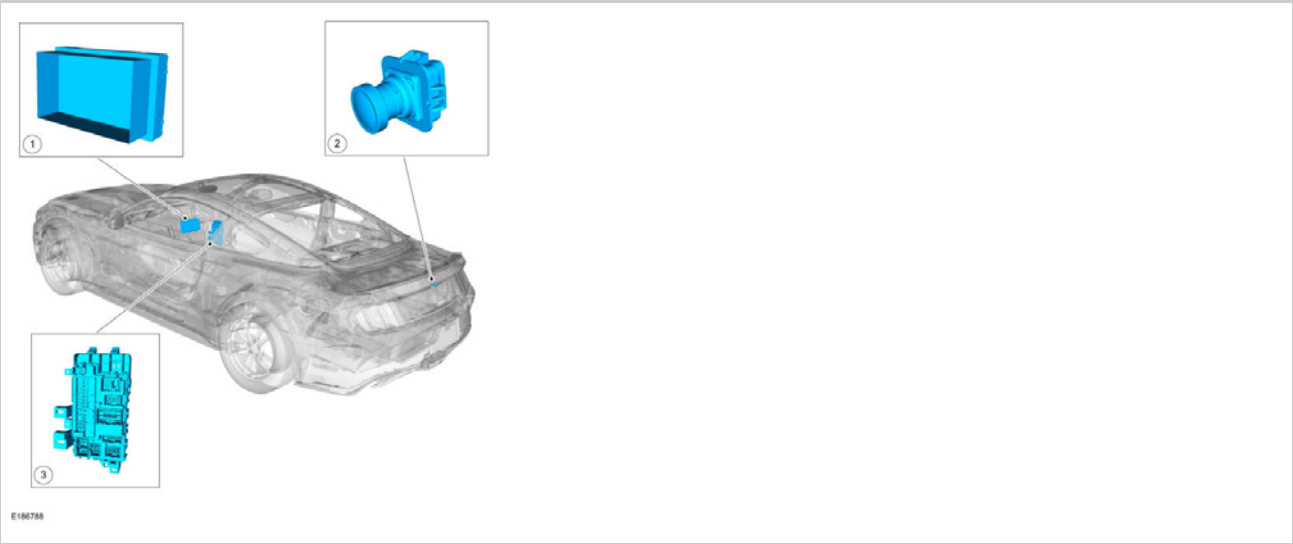
1.

To install, reverse the removal procedure.

2.

Using a diagnostic scan tool, complete the PMI process for the RTM following the on-screen instructions.

DESCRIPTION AND OPERATION > PARKING AID - COMPONENT LOCATION > REAR VIDEO CAMERA



Item	Description
1	Centerstack infotainment display (FDIM shown FCDIM similar)
2	Rear parking aid camera
3	BCM

DESCRIPTION AND OPERATION > PARKING AID - OVERVIEW > OVERVIEW

The rear parking aid camera system visually aids the driver while reversing or reverse parking the vehicle. When reverse gear is selected, the rear video camera image can be displayed on the 8 in (203 mm) touchscreen or 4.2 in (107 mm) centerstack infotainment display depending on vehicle equipment. This camera system has features that provide fixed and active guideline overlays on the video image to assist the driver in aligning the vehicle, a manual zoom and a visual alert function that works with the rear audible parking aid system to visually highlight a zone in the video image where an object has been detected. The rear parking aid camera communicates with the BCM through a LIN circuit.

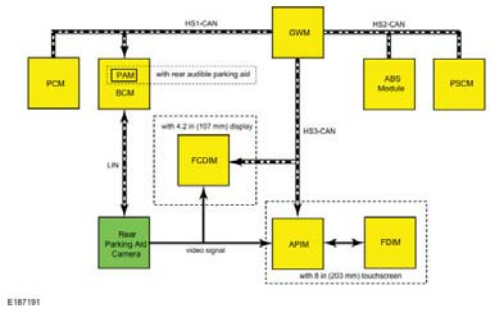
DESCRIPTION AND OPERATION > PARKING AID - SYSTEM OPERATION AND COMPONENT DESCRIPTION

System Operation

DESCRIPTION AND OPERATION > PARKING AID - SYSTEM OPERATION AND

COMPONENT DESCRIPTION > PARKING AID CAMERA

System Diagram



Network Message Chart

BCM Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Rear park aid camera commands	APIM	Used to command the visual park aid alert and zoom level on and off based on driver inputs through the FDIM.
Parking aid range to object	PAM	Used to generate the visual highlights in the zone where an object is detected by the parking aid system.
Steering angle	ABS Module	Used to generate the intended vehicle path for the active guideline feature.
Reverse gear state	PCM	Used to enable the active guidelines and visual park aid features when reverse gear is selected.
Vehicle speed	PCM	Used to support the rear parking aid camera stand by mode by enabling and disabeling the rear parking aid camera. Turns off the camera display when the vehicle speed is 10 mph (16 km/h) or greater or turn on the camera display when the vehicle speed is 8 mph (13 km/h) or lower.

ABS Module Network Input Messages

Broadcast Message	Originating Module	Message Purpose

Steering angle sensor data	PSCM	The ABS module uses the steering angle sensor data to generate the steering angle message that is sent to the BCM to support the active guideline feature.

APIM Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Rear park aid camera status	BCM	Used to display the current settings for the visual park aid alert and zoom level.
Parking aid range to object	PAM	Used to generate the visual highlights in the zone where an object is detected by the parking aid system.
Gear position	PCM	Used to enable and disable the video display when reverse gear is selected.
Vehicle speed	PCM	When the video delay feature is turned on, this message is used to turn the camera display off after the vehicle speed exceeds a preset threshold.

FCDIM Module Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Gear position	PCM	Used to enable and disable the video display when reverse gear is selected.
Parking aid range to object	PAM	Used to generate the visual highlights in the zone where an object is detected by the parking aid system.

Image Display - Vehicles Equipped With An 8 in (203 mm) Touchscreen

NOTE: The luggage compartment lid must remain closed for correct operation of the parking aid camera system.

The rear park aid camera image is displayed by the FDIM when the reverse gear is selected. To determine the selector lever (automatic transmission) or gearshift lever (manual transmission) position and enable the rear park aid camera display, the PCM sends the gear position message over the HS-CAN1 to the GWM. The GWM then sends the message to the APIM on the HS-CAN3.

The BCM provides power to the rear view camera when the ignition is in the ON position. The BCM rear parking aid camera stand by mode is used to turn off the camera video signal when the vehicle speed is 10 mph (16 km/h) or greater or turn on the camera video signal when the vehicle speed is 8 mph (13 km/h) or lower. The camera generates a video signal any time it's on regardless of the current configuration. If the camera is not configured properly, some features may be inoperative. When the rear parking aid camera is on, the image signal is sent from the camera on shielded twisted pair wires to the APIM, which displays the image on the FDIM.

The following parking aid camera system features are configured by the driver using the FDIM:

- Visual park aid alert - assists the driver to visually see the object causing the parking aid system to sound.
- Manual zoom - allows the driver to manually zoom the image.
- Video delay - allows the driver to see the image behind the vehicle after the vehicle is shifted out of reverse. The image is not displayed if the vehicle is shifted into park.

The following camera system feature are not driver selectable and always on:

- Fixed guidelines - assists the driver with aligning the vehicle with an object.
- Active guidelines - displays the intended path of the vehicle based upon steering angle input.

The FDIM settings menu is used to turn the visual park aid alert feature on and off. The visual park aid feature is initialized on and remains in the last mode based on the driver's setting. To turn the manual zoom feature on and off, the driver uses an on screen button located on the FDIM display while in reverse. The driver generated commands originate at the FDIM, which is hardwired to the APIM. The APIM sends the driver generated commands over the HS-CAN3 to the GWM. The GWM then sends the commands to the BCM on the HS-CAN1. The BCM then sends the command to the rear parking aid camera via the LIN circuit. The visual park aid alert feature is generated by the APIM and the manual zoom is generated by the rear parking aid camera.

The video delay feature is generated by the APIM and displayed on the FDIM. The FDIM settings menu is used to turn the video delay feature on and off. The video delay feature is initialized off and remains in the last mode based on the driver's setting.

The fixed and active guidelines are generated by the rear parking aid camera and are not selectable by the driver.

Image Display - Vehicles Equipped With An 4.2 in (107 mm) Display

> *NOTE: The luggage compartment lid must remain closed for correct operation of the rear parking aid camera system.*

The rear park aid camera image is displayed by the FCDIM when the reverse gear is selected. To determine the selector lever (automatic transmission) or gearshift lever (manual transmission) position and enable the rear park aid camera display, the PCM sends the gear position message over the HS-CAN1 to the GWM. The GWM then sends the message to the FCDIM on the HS-CAN3.

The BCM provides power to the rear parking aid camera when the ignition is in the ON position. The BCM rear parking aid camera stand by mode is used to turn off the camera video signal when the vehicle speed is 10 mph (16 km/h) or greater or turn on the camera video signal when the vehicle speed is 8 mph (13 km/h) or lower. The camera generates a video signal any time it's on regardless of the

current configuration. If the video camera is not configured properly, some features may be inoperative. When the rear parking aid camera is on, the image signal is sent from the camera on shielded twisted pair wires to the FCDIM.

The following parking aid camera system features are configured by the driver using the FCDIM:

- Visual park aid alert - assists the driver to visually see the object causing the parking aid system to sound.
- Manual zoom - allows the driver to manually zoom the image.
- Video delay - allows the driver to see the image behind the vehicle after the vehicle is shifted out of reverse. The image will not be displayed if the vehicle is shifted into park.

The following camera system feature are not driver selectable and always on:

- Fixed guidelines - assists the driver with aligning the vehicle with an object.
- Active guidelines - displays the intended path of the vehicle based upon steering angle input.

To turn the visual park aid alert and manual zoom features on and off, the driver generated commands originate from two different buttons on the FCDIM. The commands are sent by the FCDIM over the HS-CAN3 to the GWM. The GWM then sends the commands to the BCM on the HS-CAN1. The BCM sends the command to the rear parking aid camera via the LIN circuit. The visual park aid alert feature is generated by a combination of either the rear park aid camera or the FCDIM and the manual zoom is generated by the rear parking aid camera.

The video delay feature is generated by the FCDIM. The FCDIM settings menu is used to turn the video delay feature on and off. The video delay feature is initialized off and remains in the last mode based on the driver's setting.

The fixed and active guidelines are generated by the rear parking aid camera and are not selectable by the driver.

LIN Communication

The BCM and the rear parking aid camera communicate via a LIN circuit which is a dedicated single wire communication network.

The messages sent from the BCM to the rear parking aid camera are:

- Luggage compartment lid ajar status
- Camera configuration data
- Display manual zoom request
- Parking aid sensor distance to object data
- Steering angle

The messages sent from the rear parking aid camera to the BCM are:

- Camera status
- Display zoom status
- Camera part number data

- Visual park aid alert status
- Fixed guideline status
- Active guideline status

Visual Park Aid Alert

> *NOTE: The on-screen alert color transitions may not match changes in the audible parking aid alert tone frequency.*

The visual park aid alert feature displays red, yellow or green visual alerts that appear as highlights over the video image in the zone where an object has been detected by the rear parking aid system. This feature utilizes the parking aid sensor data from the PAM to generate the visual highlights over the video image. When the reverse gear is selected and an object is detected by a parking aid sensor, the parking aid sensor data message is sent from the PAM through the HS-CAN1 to the BCM, which sends the message to the rear parking aid camera via the LIN circuit.

Visual highlights color chart

> *NOTE: The on-screen alert color transitions may not match changes in the audible parking aid alert tone frequency.*

Distance Zone	Color
0 - 17 in (0 - 45 cm)	Red
18 - 41 in (46 - 105 cm)	Yellow
42 - 71 in (106 - 180 cm)	Green
72 + in (181 + cm)	No highlight

If the visual park aid alert feature is enabled, the feature is still operational even if the audible rear parking aid system has been disabled by the driver.

Fixed Guidelines

> *NOTE: The color-coded lines cannot indicate accurate or consistent distances between the rear of the vehicle and objects shown in the video image. This normal condition is due to variances in vehicle ride height, including, but not limited to, vehicle loading.*

The rear parking aid camera fixed guidelines feature displays guidelines on top of the video image as projection of the wheel tracks or vehicle corners to assist the driver with alignment of the vehicle. A black dashed line on the displayed image represents the center of the vehicle and 3 color-coded lines (red, yellow, green) identify different zones between the rear of the vehicle and objects. The color-coded lines match the distances with the visual park aid alert highlights.

The fixed guidelines are shown even when the vehicle is not in reverse (delay mode selected).

If the luggage compartment lid is open, the fixed guidelines are not shown.

Active Guidelines

> *NOTE: If the battery has been disconnected or discharged, or a module is disconnected or replaced, the active guidelines may be inoperative until the vehicle is driven on a flat and smooth road at 32 km/h (20 mph) or more, with hands placed loosely on the steering wheel and minimal steering correction for approximately 30 seconds.*

If the guidelines are remain inoperative, it may be necessary to disconnect the battery for 5 minutes with the driver's door open, then drive the vehicle for 5 miles in normal city driving before performing the procedure described above.

The rear parking aid camera active guidelines feature displays dynamic guidelines that correspond to the projected path of the vehicle travel based on the current steering angle. Several modules are involved in generating the steering angle data used to support the active guidelines. The PSCM monitors the current steering angle and sends the steering angle data message to the ABS module via the HS-CAN2. The ABS module uses this message from the PSCM to generate the steering angle message that is sent to the BCM via the HS-CAN1 and HS-CAN2, with the GWM acting as the gateway. The BCM then sends the steering angle data to the rear parking aid camera via the LIN circuit. The camera uses this data to generate the active guidelines over the video image.

If the luggage compartment lid is open or the steering wheel is in the straight-ahead position, the active guidelines are not shown.

Manual Zoom

The manual zoom feature is controlled by the rear parking aid video camera and has one level of zoom. If the manual zoom feature is on and the vehicle is shifted out of reverse gear, the manual zoom feature is disabled. The manual zoom feature must be re-enabled the next time reverse gear is selected.

When the manual zoom feature is turned on, only the centerline is present with no other guidelines even if the fixed and/or active guidelines are selected on.

When the driver turns the zoom on or off at the FDIM, the command is sent by the APIM over the HS-CAN3 to the GWM. The GWM then sends the command to the BCM on the HS-CAN1. The BCM sends the manual zoom request message to the parking aid camera via the LIN circuit. The camera then turns the zoom on or off.

When the driver turns the zoom on or off at the FCDIM, the command is sent by the FCDIM over the HS-CAN3 to the GWM. The GWM then sends the command to the BCM on the HS-CAN1. The BCM sends the manual zoom request message to the parking aid camera via the LIN circuit. The camera then turns the zoom on or off.

Video Delay

When the video delay is turned on, the APIM (vehicles with 8 in (203 mm) touchscreen display) or the FCDIM (vehicle with 4.2 in (107 mm) display) keeps the video display enabled after the transmission is shifted out of reverse gear, into any gear other than park, until the vehicle speed reaches 5 mph (8 km/h). With the delay off (default), the image displays until the transmission is shifted out of reverse gear.

Component Description

Rear Parking Aid Video Camera

The rear parking aid video camera is located on the luggage compartment lid. The camera provides a video signal any time it receives voltage and ground, regardless of configuration, but it must be configured using a diagnostic scan tool after replacement in order for all features to operate properly.

BCM

> *NOTE: The BCM settings and configuration have no influence over the video signal from the camera. The camera provides a video signal any time it receives voltage and ground.*

The BCM serves as a gateway module between the video camera and other modules on the HS-CAN1. It communicates with the video camera via the LIN and stores Diagnostic Trouble Codes (DTCs) for the camera and the LIN in the event of a concern.

Refer to: Module Controlled Functions - System Operation and Component Description .

Video Display

The rear park aid video camera image can be displayed on the 8 in (203 mm) touchscreen or 4.2 in (107 mm) display depending on vehicle equipment.

Vehicles With: AM/FM/CD/SYNC Refer to: Information and Entertainment System - System Operation and Component Description .

Vehicles With: Touchscreen Display Refer to: Information and Entertainment System - System Operation and Component Description .

DIAGNOSIS AND TESTING > PARKING AID > DTC CHART(S) > DTC CHART: BCM

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

DTC	Description	Action
B115E:01	Camera Module: General Electrical Failure	GO to Pinpoint Test A
B115E:02	Camera Module: General Signal Failure	GO to Pinpoint Test A
B115E:08	Camera Module: Bus Signal/Message Failure	GO to Pinpoint Test A
B115E:49	Camera Module: Internal Electronic Failure	Sets in continuous memory and on-demand in the BCM when an internal fault in the video camera is detected. CLEAR the Diagnostic Trouble Codes (DTCs) and REPEAT the self-test. If DTC B115E:49 returns, INSTALL a new rear video camera. REFER

		to: Rear Parking Aid Camera .
B115E:55	Camera Module: Not Configured	Sets in continuous memory and on-demand in the BCM when the video camera is not configured. Using a diagnostic scan tool, PERFORM the video camera configuration.
B115E:9A	Camera Module: Component or System Operating Conditions	Sets as an on-demand DTC in the BCM when the prerequisite conditions are not met for the on-demand self test. INSPECT the luggage compartment lid to make sure it is fully closed and DIAGNOSE any other Diagnostic Trouble Codes (DTCs) present in the BCM. REFER to: Body Control Module (BCM) .
All other Diagnostic Trouble Codes (DTCs)	-	REFER to: Body Control Module (BCM) .

DIAGNOSIS AND TESTING > PARKING AID > DTC CHART(S) > DTC CHART: APIM

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

DTC	Description	Action
C1001:01	Vision System Camera: General Electrical Failure	GO to Pinpoint Test A
All other Diagnostic Trouble Codes (DTCs)	-	Vehicles With: AM/FM/CD/SYNC REFER to: Information and Entertainment System . Vehicles With: Touchscreen Display REFER to: Information and Entertainment System .

DIAGNOSIS AND TESTING > PARKING AID > DTC CHART(S) > DTC CHART: FCDIM

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

DTC	Description	Action
C1001:01	Vision System Camera: General Electrical Failure	GO to Pinpoint Test A

All other Diagnostic Trouble Codes (DTCs)	-	REFER to: Information and Entertainment System .

DIAGNOSIS AND TESTING > PARKING AID > SYMPTOM CHART(S)

Parking Aid Camera

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

Condition	Possible Sources	Actions
The rear video is inoperative	Refer to the Pinpoint Test	GO to Pinpoint Test A
The video display shows "REAR VIDEO CAMERA IS UNAVAILABLE" or "CAMERA IS UNAVAILABLE PLEASE CONTACT YOUR DEALERSHIP" and a black screen/no image	Refer to the Pinpoint Test	GO to Pinpoint Test A
Static/flashing/blinking/flickering /scrolling or rolling image/screen /scrolling horizontal lines	Refer to the Pinpoint Test	If the vehicle is equipped with an 8 in (203 mm) touchscreen display, PERFORM an APIM reset. REFER to: RESET THE SYNC MODULE [APIM] . If the concern is still present after the APIM reset, GO to Pinpoint Test B If the vehicle is equipped with a 4.2 in (107 mm) display, GO to Pinpoint Test B
Poor image quality (foggy/cloudy /fuzzy/blurry/hazy image or moisture/water in lens or black spots)	Refer to the Pinpoint Test	If the vehicle is equipped with an 8 in (203 mm) touchscreen display, PERFORM an APIM reset. REFER to: RESET THE SYNC MODULE [APIM] . If the concern is still present after the APIM reset, GO to Pinpoint Test B If the vehicle is equipped with a 4.2 in (107 mm) display, GO to Pinpoint Test B
Frozen screen or slow screen transitions (vehicles with 8 in [203 mm] touchscreen display)	APIM FDIM	PERFORM an APIM reset. REFER to: RESET THE SYNC MODULE [APIM] . If the concern is still present after the APIM reset, DIAGNOSE the APIM and the FDIM. REFER to: Information and Entertainment System .

Frozen screen or slow screen transitions (vehicles with 4.2 in [107 mm] display)	FCDIM	DIAGNOSE the FCDIM. REFER to: Information and Entertainment System .
Manual zoom function is inoperative	Refer to the Pinpoint Test	If the vehicle is equipped with an 8 in (203 mm) touchscreen display, PERFORM an APIM reset. REFER to: RESET THE SYNC MODULE [APIM] . If the concern is still present after the APIM reset, GO to Pinpoint Test F If the vehicle is equipped with a 4.2 in (107 mm) display, GO to Pinpoint Test F
Visual park aid alert is inoperative	Refer to the Pinpoint Test	If the vehicle is equipped with an 8 in (203 mm) touchscreen display, PERFORM an APIM reset. REFER to: RESET THE SYNC MODULE [APIM] . If the concern is still present after the APIM reset, GO to Pinpoint Test C If the vehicle is equipped with a 4.2 in (107 mm) display, GO to Pinpoint Test C
Active guidelines are not displayed on the rear video camera image	Refer to the Pinpoint Test	If the vehicle is equipped with an 8 in (203 mm) touchscreen display, PERFORM an APIM reset. REFER to: RESET THE SYNC MODULE [APIM] . If the concern is still present after the APIM reset, GO to Pinpoint Test D If the vehicle is equipped with a 4.2 in (107 mm) display, GO to Pinpoint Test D
Fixed guidelines are not displayed on the video image	Refer to the Pinpoint Test	If the vehicle is equipped with an 8 in (203 mm) touchscreen display, PERFORM an APIM reset. REFER to: RESET THE SYNC MODULE [APIM] . If the concern is still present after the APIM reset, GO to Pinpoint Test D If the vehicle is equipped with a 4.2 in (107 mm) display, GO to Pinpoint Test D
The video delay feature is inoperative (vehicles with 8 in [203 mm] touchscreen display)	Refer to the Pinpoint Test	PERFORM an APIM reset. REFER to: RESET THE SYNC MODULE [APIM] . If the concern is still present after the APIM reset, GO to Pinpoint Test E

The video delay feature is inoperative (vehicles with 4.2 in [107 mm] display)	Refer to the Pinpoint Test	GO to Pinpoint Test E
Video image is upside down	Internal parking aid camera failure Incorrect parking aid camera installed on vehicle	INSTALL a new rear parking aid camera. REFER to: Rear Parking Aid Camera .
All other image concerns	Refer to the Pinpoint Test	GO to Pinpoint Test A

DIAGNOSIS AND TESTING > PARKING AID > PINPOINT TEST(S) > PINPOINT TEST A : THE REAR VIDEO IS INOPERATIVE

Refer to PARKING AID for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Parking Aid - System Operation and Component Description .

BCM DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B115E:01	Camera Module: General Electrical Failure	A continuous and on-demand DTC that sets in the BCM when an internal electrical failure is detected from the video camera.
B115E:02	Camera Module: General Signal Failure	A continuous and on-demand DTC that sets in the BCM when invalid LIN data is received from the video camera.
B115E:08	Camera Module: Bus Signal/Message Failure	A continuous and on-demand DTC that sets in the BCM when there is a LIN communication fault from the video camera.

APIM DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
C1001:01	Vision System Camera: General Electrical Failure	A continuous and on-demand DTC that sets in the APIM if no video signal is detected from the video camera when the vehicle is in REVERSE.

FCDIM DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
C1001:01	Vision System Camera: General Electrical Failure	A continuous and on-demand DTC that sets in the FCDIM if no video signal is detected from the video camera when the vehicle is in REVERSE.

Possible Sources

- Wiring, terminals or connectors
- Fuse
- Rear parking aid camera
- TR input concern
- LIN concern
- FCDIM
- APIM (8 in [203 mm] touchscreen display)
- BCM

Visual Inspection and Diagnostic Pre-Checks

- BJB Fuse 66 (5A).
- Verify the luggage compartment lid is fully closed.
- If the rear video camera is not configured after replacement, some video functions will be inoperative. Verify the rear video camera configuration using the diagnostic scan tool.

NOTE: Before disconnecting the camera, verify the connector is properly seated and latched.

DIAGNOSIS AND TESTING > PARKING AID > PINPOINT TEST(S) > PINPOINT TEST A : THE REAR VIDEO IS INOPERATIVE > PINPOINT TEST A : THE REAR VIDEO IS INOPERATIVE

A1 CHECK AND CLEAN THE REAR VIDEO CAMERA LENS

Clean and make sure the rear video camera lens is clear of any debris.

Ignition ON.

Test the video camera system and check the video camera image.

Is the video camera concern still present?

Yes	GO to A2

No	The system is operating correctly at this time. The concern was caused by a dirty video camera lens.

A2 CHECK FOR CORRECT GEAR INPUT

Apply the parking brake.

While monitoring the reversing lamps, move the selector lever (automatic transmission) or gearshift lever (manual Transmission) through the entire range.

Do the reversing lamps illuminate only in reverse?

Yes	GO to A3

No	REFER to: Reversing Lamps .

A3 PERFORM A NETWORK TEST

Using a diagnostic scan tool, perform a network test.

Do all modules pass the network test?

Yes	GO to A4

No	REFER to: MODULE COMMUNICATIONS NETWORK .

A4 CHECK FOR DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE BCM (BODY CONTROL MODULE) SELF-TEST

Using the diagnostic scan tool, perform the BCM self-test.

Are any Diagnostic Trouble Codes (DTCs) retrieved?

Yes	For BCM Diagnostic Trouble Codes (DTCs) B115E:01, B115E:02 or B115E:08, GO to A9 For all other Diagnostic Trouble Codes (DTCs), REFER to the DTC chart .

No	For vehicles equipped with an 8 in (203 mm) touchscreen display, GO to A5 For vehicles equipped with a 4.2 in (107 mm) display, GO to A7

A5 PERFORM THE APIM (SYNC MODULE) RESET

Perform the APIM reset. REFER to: RESET THE SYNC MODULE [APIM] .

Test the system to determine if the concern is still present.

Is the concern still present?

Yes	GO to A6

No	The system is operating correctly at this time. The concern may have been caused by an intermittent APIM concern.

A6 CHECK FOR DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE APIM (SYNC MODULE) SELF-TEST

Using a diagnostic scan tool, perform the APIM self-test.

Are any Diagnostic Trouble Codes (DTCs) retrieved?

Yes	For DTC C1001:01, GO to A9 For all other Diagnostic Trouble Codes (DTCs), REFER to: Information and Entertainment System .

No	GO to A8

A7 CHECK FOR DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE FCDIM (FRONT CONTROL/DISPLAY INTERFACE MODULE) SELF-TEST

Using a diagnostic scan tool, perform the FCDIM self-test.

Are any Diagnostic Trouble Codes (DTCs) retrieved?

Yes	For DTC C1001:01, GO to A9 For all other Diagnostic Trouble Codes (DTCs), REFER to: Information and Entertainment System .

No	GO to A8

A8 CHECK THE VIDEO DISPLAY

Observe the FDIM (if equipped) or FCDIM (if equipped) while placing the vehicle in reverse.

Wait 30 seconds.

Does the display switch to video camera mode and display REAR VIDEO CAMERA IS UNAVAILABLE PLEASE CONTACT YOUR DEALERSHIP?

Yes	GO to A9

No	For vehicles equipped with an 8 in (203 mm) touchscreen display, DIAGNOSE the APIM. REFER to: Information and Entertainment System . For vehicles equipped with a 4.2 in (107 mm) display, DIAGNOSE the FCDIM. REFER to: Information and Entertainment System .

A9 CHECK THE VOLTAGE TO THE CAMERA

Ignition OFF.

Disconnect: Rear Parking Aid Camera C4357 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4357-1		Ground

Is the voltage greater than 11 volts?

Yes	GO to A10

No	INSPECT BJB fuse 66 (5A). If the fuse is OK, repair the circuit for high resistance. If the fuse is not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the short circuit.

A10 CHECK FOR GROUND TO THE CAMERA

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4357-1		C4357-5

Is the voltage greater than 11 volts?

Yes	GO to A11

No	REPAIR the circuit.

A11 CHECK THE VIDEO SIGNAL CIRCUITS FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: APIM C2342 (with 8 in (203 mm) touchscreen display).

Disconnect: FCDIM C2123 (with 4.2 in (107 mm) display).

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4357-3		Ground

C4357-4		Ground

Is any voltage present?

Yes	REPAIR the circuit in question.

No	GO to A12

A12 CHECK THE VIDEO SIGNAL CIRCUITS FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4357-3	Ω	Ground
C4357-4	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to A13

No	REPAIR the circuit in question.

A13 CHECK THE VIDEO SIGNAL CIRCUITS FOR A SHORT TO VIDEO SHIELD

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4357-3	Ω	C4357-5
C4357-4	Ω	C4357-5

Are the resistances greater than 10, 000 ohms?

Yes	GO to A14

No	REPAIR the circuits in question.

A14 CHECK VIDEO SIGNAL CIRCUITS FOR AN OPEN

Measure:**with 8 in (203 mm) touchscreen display**

Positive Lead	Measurement / Action	Negative Lead

C4357-3	Ω	C2342-15
C4357-4	Ω	C2342-14

with 4.2 in (107 mm) display

Positive Lead	Measurement / Action	Negative Lead
C4357-3	Ω	C2123-12
C4357-4	Ω	C2123-6

Are the resistances less than 3 ohms?

Yes	GO to A15

No	REPAIR the circuit in question.

A15 CHECK THE LIN (LOCAL INTERCONNECT NETWORK) CIRCUIT FOR A SHORT TO VOLTAGE

Disconnect: BCM C2280E .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4357-2		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to A16

A16 CHECK THE LIN (LOCAL INTERCONNECT NETWORK) CIRCUIT FOR AN OPEN

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4357-2	Ω	C2280E-37

Is the resistance less than 3 ohms ?

Yes	GO to A17

No	REPAIR the circuit.

A17 CHECK THE LIN (LOCAL INTERCONNECT NETWORK) CIRCUIT FOR A SHORT TO GROUND

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4357-2	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to A18

No	REPAIR the circuit.

A18 CHECK FOR CORRECT PARKING AID CAMERA OPERATION

Ignition OFF.

Disconnect and inspect the rear parking aid camera connector.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the rear parking aid camera connector. Make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new rear parking aid camera. REFER to: Rear Parking Aid Camera . TEST the system for normal operation. If the concern is still present, for vehicles equipped with a 4.2 in (107 mm) display, GO to A19 For vehicles equipped with an 8 in (203mm) touchscreen display, GO to A20

No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

A19 CHECK FOR CORRECT FCDIM (FRONT CONTROL/DISPLAY INTERFACE MODULE)

OPERATION

Ignition OFF.

Disconnect and inspect the FCDIM connector.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the FCDIM connector. Make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new FCDIM. REFER to: Front Control/Display Interface Module (FCDIM) .

No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

A20 CHECK FOR CORRECT APIM (SYNC MODULE) OPERATION

Ignition OFF.

Disconnect and inspect the APIM connector.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the APIM connector. Make sure it seats and latches correctly.

Wait at least 2 minutes for the APIM to re-initialize.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, PERFORM the APIM Hardware Test. Refer to APIM HARDWARE TESTING .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > PARKING AID > PINPOINT TEST(S) > PINPOINT TEST B : POOR IMAGE QUALITY

Refer to PARKING AID for schematic and connector information.

Normal Operation and Fault Conditions

The video signal is transmitted from the camera to the APIM or FCDIM on shielded, twisted pair circuits. REFER to: Parking Aid - System Operation and Component Description .

Possible Sources

- Dirty or scratched camera lens
- Wiring, terminals or connectors
- Rear parking aid camera
- FCDIM
- APIM
- Interference from other sources

Visual Inspection and Diagnostic Pre-Checks

- Make sure the rear video camera lens is clear of any debris.
- If the vehicle is equipped with an 8 in (203 mm) touchscreen display, PERFORM an APIM reset and reevaluate the concern prior to following this pinpoint test. REFER to: RESET THE SYNC MODULE [APIM] .

NOTE: Before disconnecting the camera, verify the connector is properly seated and latched.

DIAGNOSIS AND TESTING > PARKING AID > PINPOINT TEST(S) > PINPOINT TEST B : POOR IMAGE QUALITY > PINPOINT TEST B : POOR IMAGE QUALITY

B1 CHECK AND CLEAN THE CAMERA LENS

Clean and make sure the rear video camera lens is clear of any debris and scratches.

Test the rear video camera system while observing the video camera image.

Is the concern still present?

Yes	GO to B2

No	The system is operating correctly at this time. The concern may have been caused by dirt or debris on the camera lens or intermittent electromagnetic interference from an outside source.

B2 CHECK THE VOLTAGE TO THE CAMERA

Ignition OFF.

Disconnect: Rear Parking Aid Camera C4357 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4357-1		Ground

Is the voltage greater than 11 volts?

Yes	GO to B3

No	INSPECT BJB fuse 66 (5A). If the fuse is OK, repair the circuit for high resistence. If the fuse is not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the short circuit.

B3 CHECK THE CAMERA GROUND CIRCUIT

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4357-1		C4357-5

Is the voltage greater than 11 volts?

Yes	For vehicles equipped with an 8 in (203mm) touchscreen display, GO to B4 For vehicles equipped with a 4.2 in (107 mm) display, GO to B8

No	REPAIR the camera shield ground circuit.

B4 CHECK THE VIDEO SIGNAL CIRCUITS FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: APIM C2342 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4357-3		Ground
C4357-4		Ground

Is any voltage present?

Yes	REPAIR the circuit in question.

No	GO to B5

B5 CHECK THE VIDEO SIGNAL CIRCUITS FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4357-3	Ω	Ground
C4357-4	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to B6

No	REPAIR the circuit in question.

B6 CHECK THE VIDEO SIGNAL CIRCUITS FOR A SHORT TO VIDEO SHIELD

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4357-3	Ω	C4357-5
C4357-4	Ω	C4357-5

Are the resistances greater than 10, 000 ohms?

Yes	GO to B7

No	REPAIR the circuits in question.

B7 CHECK VIDEO SIGNAL CIRCUITS FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4357-3	Ω	C2342-15
C4357-4	Ω	C2342-14

Are the resistances less than 3 ohms?

Yes	GO to B12

No	REPAIR the circuit in question.

B8 CHECK THE VIDEO SIGNAL CIRCUITS FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: FCDIM C2123 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4357-3	V	Ground
C4357-4	V	Ground

Is any voltage present?

Yes	REPAIR the circuit in question.

No	GO to B9

B9 CHECK THE VIDEO SIGNAL CIRCUITS FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4357-3	Ω	Ground
C4357-4	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to B10

No	REPAIR the circuit in question.

B10 CHECK THE VIDEO SIGNAL CIRCUITS FOR A SHORT TO VIDEO SHIELD

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4357-3	Ω	C4357-5
C4357-4	Ω	C4357-5

Are the resistances greater than 10, 000 ohms?

Yes	GO to B11

No	REPAIR the circuit in question.

B11 CHECK VIDEO SIGNAL CIRCUITS FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4357-3	Ω	C2123-12
C4357-4	Ω	C2123-6

Are the resistances less than 3 ohms?

Yes	GO to B12

No	REPAIR the circuit in question.

B12 CHECK FOR CORRECT PARKING AID CAMERA OPERATION

Ignition OFF.

Disconnect and inspect the rear parking aid camera connector.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the rear parking aid camera connector. Make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new rear parking aid camera. REFER to: Rear Parking Aid Camera . TEST the system for normal operation. If the concern is still present, for vehicles equipped with a 4.2 in (107 mm) display, GO to B13 For vehicles equipped with an 8 in (203mm) touchscreen display, GO to B14

No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

B13 CHECK FOR CORRECT FCDIM (FRONT CONTROL/DISPLAY INTERFACE MODULE) OPERATION

Ignition OFF.

Disconnect and inspect the FCDIM connector.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the FCDIM connector. Make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new FCDIM. REFER to: Front Control/Display Interface Module (FCDIM) .

No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

B14 CHECK FOR CORRECT APIM (SYNC MODULE) OPERATION

Ignition OFF.

Disconnect and inspect the APIM connector.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the APIM connector. Make sure it seats and latches correctly.

Wait at least 2 minutes for the APIM to re-initialize.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, PERFORM the APIM Hardware Test. Refer to APIM HARDWARE TESTING .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > PARKING AID > PINPOINT TEST(S) > PINPOINT TEST C : THE VISUAL PARK AID ALERT IS INOPERATIVE

Normal Operation and Fault Conditions

REFER to: Parking Aid - System Operation and Component Description .

Possible Sources

- The feature is disable
- Audible parking aid system concern
- Rear parking aid camera (4.2 in [107 mm] display)
- BCM concern
- FCDIM
- APIM (8 in [203 mm] touchscreen display)

Visual Inspection and Diagnostic Pre-Checks

- If the rear video camera is not configured after replacement, some video functions will be inoperative. Verify the rear video camera configuration using the diagnostic scan tool.
- Verify that the visual parking aid alert is enabled in the FCDIM (4.2 in [107 mm] display) using the display button or using the FDIM (8 in [203 mm] display) settings menu.

DIAGNOSIS AND TESTING > PARKING AID > PINPOINT TEST(S) > PINPOINT TEST C : THE VISUAL PARK AID ALERT IS INOPERATIVE > PINPOINT TEST C : THE VISUAL PARK AID ALERT IS INOPERATIVE

C1 VERIFY THE VISUAL PART AID ALERT IS ENABLED

Ignition ON.

Verify the visual park aid alert is enabled. Refer to the Owner's Literature.

Is the visual park aid alert enabled?

Yes	GO to C2

No	ENABLE the visual park aid alert.

C2 CHECK THE DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE PAM (PARKING ASSIST CONTROL MODULE) SELF-TEST

Using a diagnostic scan tool, perform the PAM self-test.

Are any PAM Diagnostic Trouble Codes (DTCs) recorded?

Yes	REPAIR all PAM Diagnostic Trouble Codes (DTCs) before continuing this test. REFER to: Parking Aid .

No	GO to C3

C3 CHECK THE DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE BCM (BODY CONTROL MODULE) SELF-TEST

Using a diagnostic scan tool, perform the BCM self-test.

Are any BCM Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to BCM DTC Chart .

No	For vehicles with 8 in (203 mm) touchscreen display, GO to C7 For vehicles with 4.2 in (107 mm) display, GO to C4

C4 CHECK THE DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE FCDIM (FRONT CONTROL/DISPLAY INTERFACE MODULE) SELF-TEST

Using a diagnostic scan tool, perform the FCDIM self-test.

Are any FCDIM Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: Information and Entertainment System .

No	GO to C5

C5 CHECK FOR CORRECT VIDEO CAMERA OPERATION

Ignition OFF.

Disconnect and inspect the rear video camera connector.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the rear video camera connector. Make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new rear parking aid camera. REFER to: Rear Parking Aid Camera . If the concern is still present after the rear parking aid camera replacement, GO to C6

No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

C6 CHECK FOR CORRECT FCDIM (FRONT CONTROL/DISPLAY INTERFACE MODULE) OPERATION

Ignition OFF.

Disconnect and inspect the FCDIM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the FCDIM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new FCDIM. REFER to: Front Control/Display Interface Module (FCDIM) .

No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

C7 CHECK THE DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE APIM (SYNC MODULE) SELF-TEST

Using a diagnostic scan tool, perform the APIM self-test.

Are any APIM Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: Information and Entertainment System .

No	GO to C8

C8 CHECK FOR CORRECT APIM (SYNC MODULE) OPERATION

Ignition OFF.

Disconnect and inspect the APIM connector.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the APIM connector. Make sure it seats and latches correctly.

Wait at least 2 minutes for the APIM to re-initialize.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, PERFORM the APIM Hardware Test. Refer to APIM HARDWARE TESTING .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > PARKING AID > PINPOINT TEST(S) > PINPOINT TEST D : THE FIXED OR ACTIVE GUIDELINES ARE INOPERATIVE

Normal Operation and Fault Conditions

REFER to: Parking Aid - System Operation and Component Description .

Possible Sources

- Rear parking aid camera
- Luggage compartment lid position data concern
- LIN concern
- BCM
- ABS module concern
- PSCM concern (active guidelines only)

Visual Inspection and Diagnostic Pre-Checks

- Verify the luggage compartment lid is fully closed.
- Verify the inoperative feature is enabled in the settings menu. Refer to the Owner's Literature.
- For active guideline concerns, verify the concern was not caused by the steering wheel being in the straight ahead position. Active guidelines are not displayed unless the steering wheel is rotated.
- If the rear video camera is not configured after replacement, some video functions will be inoperative. Verify the rear video camera configuration using the diagnostic scan tool.

NOTE: If the battery has been disconnected or discharged, or a module is disconnected or replaced, the active guidelines may be inoperative until the vehicle is driven on a flat and smooth road at 32 km/h (20 mph) or more, with hands placed loosely on the steering wheel and minimal steering correction for approximately 30 seconds.

If the guidelines are remain inoperative, it may be necessary to disconnect the battery for 5 minutes with the driver's door open, then drive the vehicle for 5 miles in normal city driving before performing the procedure described above.

DIAGNOSIS AND TESTING > PARKING AID > PINPOINT TEST(S) > PINPOINT TEST D : THE FIXED OR ACTIVE GUIDELINES ARE INOPERATIVE > PINPOINT TEST D : THE FIXED OR ACTIVE GUIDELINES ARE INOPERATIVE

D1 PERFORM A NETWORK TEST

Ignition ON.

Using a diagnostic scan tool, perform a network test.

Do all modules pass the network test?

Yes	GO to D2

No	REFER to: MODULE COMMUNICATIONS NETWORK .

D2 CHECK THE DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE BCM (BODY CONTROL MODULE) SELF-TEST

Using a scan tool, perform the BCM self-test.

Are any BCM Diagnostic Trouble Codes (DTCs) retrieved?

Yes	REFER to the BCM DTC Chart .

No	For vehicles equipped with a 4.2 in (107 mm) display, GO to D3 For vehicles equipped with a 8 in (203 mm) touchscreen display, GO to D4

D3 CHECK THE DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE FCDIM (FRONT CONTROL/DISPLAY INTERFACE MODULE) SELF-TEST

Using a diagnostic scan tool, perform the FCDIM self-test.

Are any FCDIM Diagnostic Trouble Codes (DTCs) retrieved?

Yes	REFER to: Information and Entertainment System .

No	For an active guideline concern, GO to D5 For a fixed guideline concern, GO to D7

D4 CHECK FOR DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE APIM (SYNC MODULE) SELF-TEST

Using a diagnostic scan tool, perform the APIM self-test.

Are any Diagnostic Trouble Codes (DTCs) retrieved?

Yes	For DTC C1001:01, GO to Pinpoint Test A For all other Diagnostic Trouble Codes (DTCs), REFER to: Information and Entertainment System .

No	For an active guideline concern, GO to D5 For a fixed guideline concern, GO to D7

D5 CHECK THE DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE ABS (ANTI-LOCK BRAKE SYSTEM) MODULE SELF-TEST

Using a diagnostic scan tool, perform the ABS module self-test.

Are any ABS module Diagnostic Trouble Codes (DTCs) retrieved?

Yes	REFER to: Anti-Lock Brake System (ABS) and Stability Control .

No	GO to D6

D6 CHECK THE DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE PSCM (POWER STEERING CONTROL MODULE) SELF-TEST

Using a diagnostic scan tool, perform the PSCM self-test.

Are any PSCM Diagnostic Trouble Codes (DTCs) retrieved?

Yes	REFER to: POWER STEERING .

No	GO to D7

D7 CHECK THE LUGGAGE COMPARTMENT LID AJAR PID (PARAMETER IDENTIFICATION)

Using a diagnostic scan tool, view the BCM Parameter Identifications (PIDs).

Monitor the DOOR_SW_LUGG PID while opening and closing the luggage compartment lid.

Does the PID consistently agree with the luggage compartment lid position?

Yes	GO to D8

No	REFER to: Locks, Latches and Entry Systems .

D8 CHECK FOR CORRECT PARKING AID CAMERA OPERATION

Ignition OFF.

Disconnect and inspect the rear parking aid camera connector.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the rear parking aid camera connector. Make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for

	this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new rear parking aid camera. REFER to: Rear Parking Aid Camera . TEST the system for normal operation. If the concern is still present, GO to D9

No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

D9 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect all BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > PARKING AID > PINPOINT TEST(S) > PINPOINT TEST E : THE VIDEO DELAY IS INOPERATIVE

Normal Operation and Fault Conditions

REFER to: Parking Aid - System Operation and Component Description .

Possible Sources

- Communication network concern
- Gear input concern
- FCDIM concern (vehicles with 4.2 in (107 mm) display)
- APIM concern (vehicles with 8 in (203 mm) touchscreen display)

Visual Inspection and Diagnostic Pre-Checks

- Verify the video delay feature is enabled in the settings menu. Refer to the Owner's Literature.

DIAGNOSIS AND TESTING > PARKING AID > PINPOINT TEST(S) > PINPOINT TEST E : THE VIDEO DELAY IS INOPERATIVE > PINPOINT TEST E : THE VIDEO DELAY IS INOPERATIVE

E1 PERFORM A NETWORK TEST

Ignition ON.

Using a diagnostic scan tool, perform a network test.

Do all modules pass the network test?

Yes	GO to E2

No	REFER to: MODULE COMMUNICATIONS NETWORK .

E2 CHECK FOR CORRECT GEAR INPUT

Apply the parking brake.

While monitoring the reversing lamps, move the selector lever (automatic transmission) or gearshift lever (manual Transmission) through the entire range.

Do the reversing lamps illuminate only in reverse?

Yes	For vehicles equipped with 4.2 in (107 mm) display, GO to E3 For vehicles equipped with 8 in (203 mm) touchscreen display, GO to E4

No	REFER to: Reversing Lamps .

E3 CHECK THE DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE FCDIM (FRONT CONTROL/DISPLAY INTERFACE MODULE) SELF-TEST

Using a diagnostic scan tool, perform the FCDIM self-test.

Are any FCDIM Diagnostic Trouble Codes (DTCs) retrieved?

Yes	REFER to: Information and Entertainment System .

No	GO to E5

E4 CHECK FOR DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE APIM (SYNC MODULE) SELF-TEST

Using a diagnostic scan tool, perform the APIM self-test.

Are any Diagnostic Trouble Codes (DTCs) retrieved?

Yes	REFER to: Information and Entertainment System .

No	GO to E6

E5 CHECK FOR CORRECT FCDIM (FRONT CONTROL/DISPLAY INTERFACE MODULE) OPERATION

Ignition OFF.

Disconnect and inspect the FCDIM connector.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the FCDIM connector. Make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new FCDIM. REFER to: Front Control/Display Interface Module (FCDIM) .

No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

E6 CHECK FOR CORRECT APIM (SYNC MODULE) OPERATION

Ignition OFF.

Disconnect and inspect the APIM connector.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the APIM connector. Make sure it seats and latches correctly.

Wait at least 2 minutes for the APIM to re-initialize.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, PERFORM the APIM Hardware Test. Refer to APIM HARDWARE TESTING .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > PARKING AID > PINPOINT TEST(S) > PINPOINT TEST F : THE MANUAL ZOOM IS INOPERATIVE

Normal Operation and Fault Conditions

REFER to: Parking Aid - System Operation and Component Description .

Possible Sources

- Network communication concern
- Rear parking aid camera
- LIN concern
- APIM concern (vehicles equipped 8 in (203 mm) touchscreen display)
- FCDIM concern (vehicles equipped with 4.2 in (107 mm) display)

Visual Inspection and Diagnostic Pre-Checks

- If the rear video camera is not configured after replacement, some video functions will be inoperative. Verify the rear video camera configuration using the diagnostic scan tool.

DIAGNOSIS AND TESTING > PARKING AID > PINPOINT TEST(S) > PINPOINT TEST F : THE MANUAL ZOOM IS INOPERATIVE > PINPOINT TEST F : THE MANUAL ZOOM IS INOPERATIVE

F1 PERFORM A NETWORK TEST

Ignition ON.

Using a diagnostic scan tool, perform a network test.

Do all modules pass the network test?

Yes	GO to F2

No	REFER to: MODULE COMMUNICATIONS NETWORK .

F2 CHECK FOR RECORDED DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE BCM (BODY CONTROL MODULE) SELF-TEST

Using a diagnostic scan tool, perform the BCM self-test.

Are any Diagnostic Trouble Codes (DTCs) present?

Yes	REFER to the BCM DTC Chart .

No	For vehicles equipped with 8 in (203 mm) touchscreen display, GO to F3 For vehicles equipped with 4.2 in (107 mm) display, GO to F4

F3 CHECK FOR RECORDED DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE APIM (SYNC MODULE) SELF-TEST

Using a diagnostic scan tool, perform the APIM self-test.

Are any Diagnostic Trouble Codes present?

Yes	For DTC C1001:01, GO to Pinpoint Test A For all other Diagnostic Trouble Codes (DTCs), REFER to: Information and Entertainment System .

No	GO to F5

F4 CHECK FOR RECORDED DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE FCDIM (FRONT CONTROL/DISPLAY INTERFACE MODULE) SELF-TEST

Using a diagnostic scan tool, perform the FCDIM self-test.

Are any Diagnostic Trouble Codes present?

Yes	For DTC C1001:01, GO to Pinpoint Test A For all other Diagnostic Trouble Codes (DTCs), REFER to: Information and Entertainment System .

No	GO to F5

F5 CHECK FOR CORRECT VIDEO CAMERA OPERATION

Ignition OFF.

Disconnect and inspect the rear video camera connector.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the rear video camera connector. Make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a Technical Service Bulletin (TSB) exists for this concern, DISCONTINUE this test and FOLLOW the Technical Service Bulletin (TSB) instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new rear parking aid camera. REFER to: Rear Parking Aid Camera .

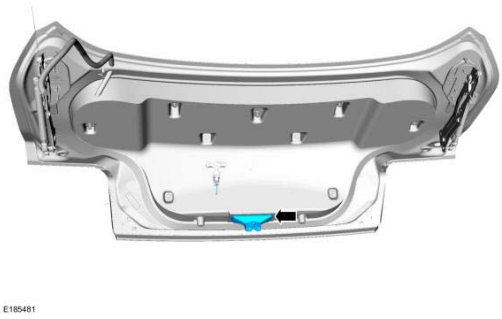
No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

REMOVAL AND INSTALLATION > REAR PARKING AID CAMERA > REMOVAL

NOTE: Coupe shown, convertible similar.

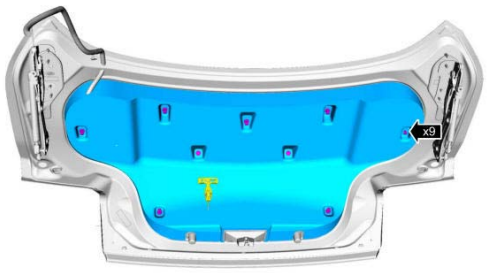
1.

Remove the luggage compartment latch cover.



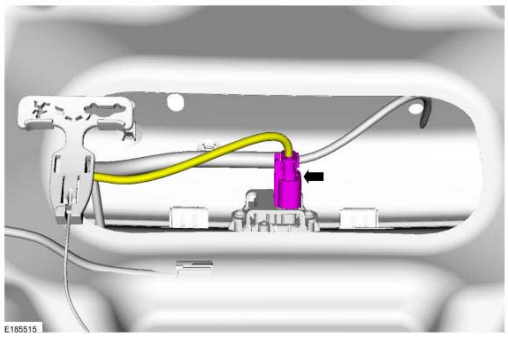
2.

Remove the push pins and remove the luggage compartment lid interior trim panel.



3.

Disconnect the rear view camera electrical connector.



4.

Remove the rear view camera.

1.

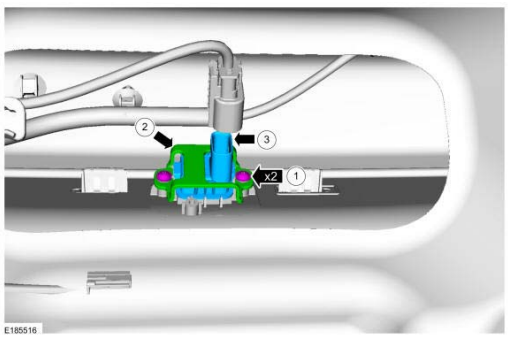
Remove the screws.

2.

Remove the rear view camera bracket.

3.

Remove the rear view camera.



REMOVAL AND INSTALLATION > REAR PARKING AID CAMERA > INSTALLATION

1.

To install, reverse the removal procedure.

2.

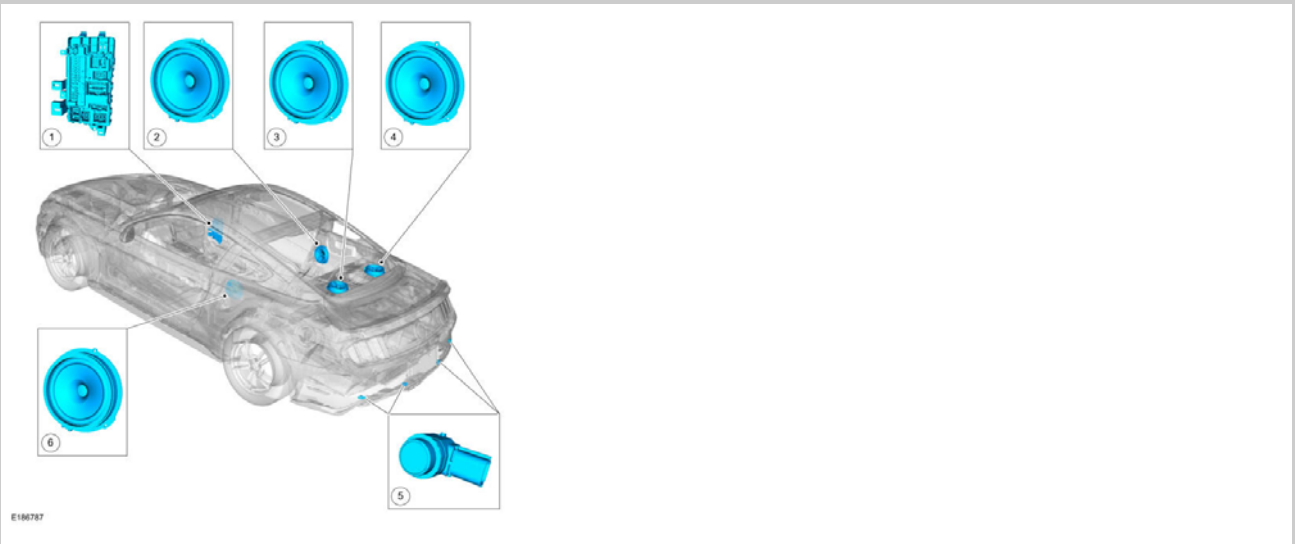
Configure the rear video camera following the instructions on the scan tool located using the following path: Electrical> Service Functions>LIN New Module Initialization.

SPECIFICATIONS > SPECIFICATIONS

General Specifications - Rear Parking Aid

Item	Specification
Test object position 1 (P1) and position 5 (P5), distance from rear bumper	25 cm (10 in)
Test object position 2 (P2) and position 4 (P4), distance from rear bumper	50 cm (20 in)
Test object position 3 (P3), distance from rear bumper	150 cm (59 in)

DESCRIPTION AND OPERATION > PARKING AID - COMPONENT LOCATION > COMPONENT LOCATION, PARKING AID - AUDIBLE



Item	Description
1	PAM (integral to the BCM)
2	RH rear convertible speaker (part of audio system)
3	LH rear sedan speaker (part of audio system)
4	RH rear sedan speaker (part of audio system)
5	Rear parking aid sensors
6	LH rear convertible speaker (part of audio system)

DESCRIPTION AND OPERATION > PARKING AID - OVERVIEW > PARKING AID - AUDIBLE

The rear parking aid system sounds a warning tone through the rear audio speakers to alert the driver of objects near the rear bumper while the transmission is in reverse. The rear parking aid system assists the driver in detecting certain objects while the vehicle is stationary or moves slowly. The rear parking aid system may not detect moving objects.

The rear parking aid system is disabled if a fault is detected in a parking aid sensor, the communications network or the PAM. This is indicated by a parking aid disabled warning message displayed in the message center.

The rear parking aid system is enabled and disabled through the message center, located in the IPC. Disabling lasts one key cycle.

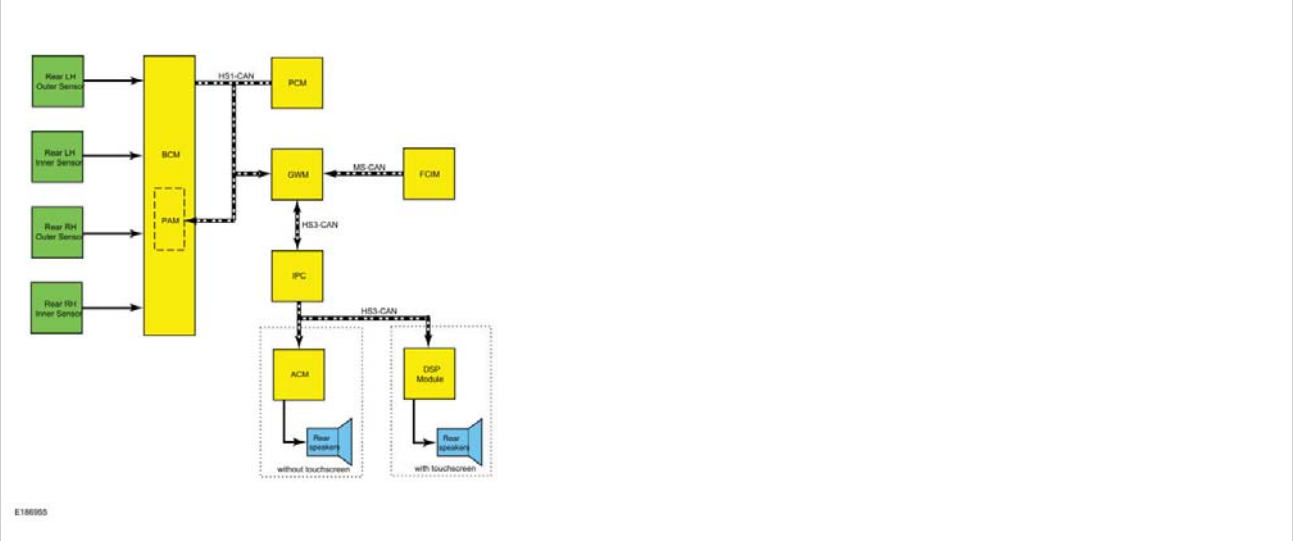
If a MyKey ® restricted key is in use, the parking aid menu is not available in the message center and cannot be deactivated.

DESCRIPTION AND OPERATION > PARKING AID - SYSTEM OPERATION AND COMPONENT DESCRIPTION

System Operation

DESCRIPTION AND OPERATION > PARKING AID - SYSTEM OPERATION AND COMPONENT DESCRIPTION > PARKING AID - AUDIBLE

System Diagram



Network Message Chart

PAM Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Ignition key type	BCM	Used to disable the parking aid menus if a MyKey ® is in use.
Ignition status	BCM	Used to communicate the ignition switch state.
Outside air temperature	FCIM	Used to temperature compensate the parking aid sensor data.
Parking aid enable/disable request	IPC	Used to enable or disable the parking aid based on driver input.
Gear position (automatic transmission)	PCM	Used to enable or disable the parking aid depending on the selector lever position.
Reverse gear (manual transmission)	PCM	Used to enable or disable the parking aid depending on the gearshift lever position.
Vehicle speed	PCM	Used to disable and enable the parking aid based on vehicle speed.

IPC Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Parking aid chime request	PAM	Used to command parking aid warning tones through the audio system speakers.
Parking aid fault status	PAM	Used to generate the parking aid warning message and chime in the event of a parking aid system concern.

ACM and DSP Network Input Messages

Broadcast Message	Originating Module	Message Purpose
IPC chime request	IPC	Input used to control the audio chime output. This message contains the parking aid chime request data.

Audible Parking Aid System Operation

The PAM calculates the distance to an object within a 170 degree semicircular area (azimuth) around the rear of the vehicle when the selector lever (automatic transmission) or gearshift lever (manual transmission) is in reverse. When the system is active and an object is detected within the rear parking aid azimuth around the rear of the vehicle, a variable rate warning tone is sounded through the rear audio system speakers.

The rear parking aid system calculates the distance to an object around the rear of the vehicle using 4 ultrasonic sensors. The rear outer parking aid sensors can detect objects approximately 24 in (60 cm) from the rear of the vehicle. The rear inner parking aid sensors can detect objects approximately 70 in (177 cm) from the rear of the vehicle. Objects that are approximately 14 in (35 cm) to the side of the rear bumper can also be detected by these sensors. Objects must be 12 in (30 cm) above the ground to be detected by the rear parking aid system. The PAM supplies voltage and ground to the rear ultrasonic sensors while monitoring a signal return circuit from each sensor. The 4 sensors share common voltage and ground circuits.

Only objects that reflect a sufficient amount of sound waves are detected by the rear parking aid sensors. The surface properties, size and composition of an object can affect the ability of the parking aid system to detect the object. Incorrect sensor alignment or installation, dirt or ice covered sensors, heavy rain and snow can also cause objects not to be detected.

The rear parking aid system can be disabled through the message center. The system remains disabled until enable through the message center or the ignition is turned off and back on. When a MyKey ® restricted key is in use, the rear parking aid can not be disabled.

Parking Aid Audible Alert

When the selector lever (automatic transmission) or gearshift lever (manual transmission) is in reverse and an object has been detected by the rear parking aid system, the IPC performs an arbitration function to prioritize the chime. The IPC built in logic determines when to mute the audio then sends a chime request message to the ACM (with 4.2 in (107 mm) display) or DSP (with 8 in (203 mm) touchscreen) to reduce the current audio volume and sound the parking aid chime through the rear audio system speakers. The alert tone frequency increases as the vehicle gets closer to an obstacle. When an object is detected within 12 in (30 cm) of the sensors, the alert tone becomes continuous. Objects detected outside the continuous tone area to the side of the vehicle generate a warning tone for 3 seconds. The warning tones are prioritized to the closest object.

The rear parking aid system standstill strategy provides audio warnings when the vehicle is stationary, with the transmission in reverse, and the detected obstacle is less than 12 in (30 cm) away from the rear bumper.

> *NOTE: Certain add-on devices can block the normal detection zone of the system and may create false audible alerts.*

Component Description

Parking Aid Sensors

The parking aid sensors are wide beam ultrasonic sensors. When the ignition is on, the sensors continuously send out ultrasonic signals to detect objects and communicate the information back to the PAM.

PAM

The PAM supplies voltage and ground to the rear ultrasonic sensors while monitoring a signal return circuit from each sensor. When an object is detected by the sensors and the rear parking aid system is active, the PAM calculates and reports, via audio system tones, the distance between the rear bumper of the vehicle and an object.

The PAM is integral to the BCM but communicates as a separate node on the HS-CAN1.

The BCM requires PMI when replaced.

DIAGNOSIS AND TESTING > PARKING AID > DTC CHART: PARKING AID MODULE (PAM)

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

PAM DTC Chart

DTC	Description	Action
B1B44:12	Right Rear Outer Sensor: Circuit Short To Battery	GO to Pinpoint Test D
B1B44:14	Right Rear Outer Sensor: Circuit Short To Ground or Open	GO to Pinpoint Test C
B1B44:96	Right Rear Outer Sensor: Component Internal Failure	GO to Pinpoint Test E
B1B46:12	Right Rear Inner Sensor: Circuit Short To Battery	GO to Pinpoint Test D
B1B46:14	Right Rear Inner Sensor: Circuit Short To Ground or Open	GO to Pinpoint Test C
B1B46:96	Right Rear Inner Sensor: Component Internal Failure	GO to Pinpoint Test E
B1B48:12	Left Rear Outer Sensor: Circuit Short To Battery	GO to Pinpoint Test D
B1B48:14	Left Rear Outer Sensor: Circuit Short To Ground or Open	GO to Pinpoint Test C
B1B48:96	Left Rear Outer Sensor: Component Internal Failure	GO to Pinpoint Test E
B1B50:12	Left Rear Inner Sensor: Circuit Short To Battery	GO to Pinpoint Test D
B1B50:14	Left Rear Inner Sensor: Circuit Short To Ground or Open	GO to Pinpoint Test C
B1B50:96	Left Rear Inner Sensor: Component Internal Failure	GO to Pinpoint Test E
B1B58:11	Rear Sensors Power Circuit: Circuit Short To Ground	GO to Pinpoint Test B
U0100:00	Lost Communication With ECM/PCM "A": No Sub Type Information	GO to Pinpoint Test F
U0101:00	Lost Communication with TCM: No Sub Type Information	GO to Pinpoint Test F

U0121:00	Lost Communication With Anti-Lock Brake System (ABS) Control Module: No Sub Type Information	GO to Pinpoint Test G
U0131:00	Lost Communication With Power Steering Control Module: No Sub Type Information	GO to Pinpoint Test H
U0140:00	Lost Communication With Body Control Module: No Sub Type Information	GO to Pinpoint Test I
U0146:00	Lost Communication With Gateway "A": No Sub Type Information	GO to Pinpoint Test J
U0155:00	Lost Communication With Instrument Panel Cluster (IPC) Control Module: No Sub Type Information	GO to Pinpoint Test K
U0212:00	Lost Communication With Steering Column Control Module: No Sub Type Information	GO to Pinpoint Test L
U0253:00	Lost Communication With Accessory Protocol Interface Module: No Sub Type Information	GO to Pinpoint Test M
U0256:00	Lost Communication With Front Controls Interface Module "A"	GO to Pinpoint Test N
U0257:00	Lost Communication With Front Controls/Display Interface Module: No Sub Type Information	GO to Pinpoint Test O
U0401:00	Invalid Data Received From ECM/PCM A: No Sub Type Information	This DTC sets in continuous memory when the PAM receives invalid network data from the PCM with a faulted signal data input. RETRIEVE and REPAIR all non-network Diagnostic Trouble Codes (DTCs) in the other modules on the network. If no PCM Diagnostic Trouble Codes (DTCs) are present, DIAGNOSE the observable symptom.
U0402:00	Invalid Data Received From TCM: No Sub Type Information	This DTC sets in continuous memory when the PAM receives invalid network data from the PCM with a faulted signal data input. RETRIEVE and REPAIR all non-network Diagnostic Trouble Codes (DTCs) in the other modules on the network. If no PCM Diagnostic Trouble Codes (DTCs) are present, DIAGNOSE the

		observable symptom.
U0415:00	Invalid Data Received From Anti-Lock Brake System (ABS) Control Module: No Sub Type Information	This DTC sets in continuous memory when the PAM receives invalid network data from the ABS module with a faulted signal data input. RETRIEVE and REPAIR all non-network Diagnostic Trouble Codes (DTCs) in the other modules on the network. If no ABS Diagnostic Trouble Codes (DTCs) are present, DIAGNOSE the observable symptom.
U0420:00	Invalid Data Received From Power Steering Control Module: No Sub Type Information	This DTC sets in continuous memory when the PAM receives invalid network data from the PSCM with a faulted signal data input. RETRIEVE and REPAIR all non-network Diagnostic Trouble Codes (DTCs) in the other modules on the network. If no PSCM Diagnostic Trouble Codes (DTCs) are present, DIAGNOSE the observable symptom.
U0422:00	Invalid Data Received From Body Control Module: No Sub Type Information	This DTC sets in continuous memory when the PAM receives invalid network data from the BCM with a faulted signal data input. RETRIEVE and REPAIR all non-network Diagnostic Trouble Codes (DTCs) in the other modules on the network. If no BCM Diagnostic Trouble Codes (DTCs) are present, DIAGNOSE the observable symptom.
U0423:00	Invalid Data Received from Instrument Panel Cluster Control Module: No Sub Type Information	This DTC sets in continuous memory when the PAM receives invalid network data from the IPC with a faulted signal data input. RETRIEVE and REPAIR all non-network Diagnostic Trouble Codes (DTCs) in the other modules on the network. If no IPC Diagnostic Trouble Codes (DTCs) are present, DIAGNOSE the observable symptom.
U0429:00	Invalid Data Received From Steering Column Control Module: No Sub Type Information	This DTC sets in continuous memory when the PAM receives invalid network data from the SCCM with a faulted signal data input.

		RETRIEVE and REPAIR all non-network Diagnostic Trouble Codes (DTCs) in the other modules on the network. If no SCCM Diagnostic Trouble Codes (DTCs) are present, DIAGNOSE the observable symptom.
U0554:00	Invalid Data Received From Accessory Protocol Interface Module: No Sub Type Information	This DTC sets in continuous memory when the PAM receives invalid network data from the APIM with a faulted signal data input. RETRIEVE and REPAIR all non-network Diagnostic Trouble Codes (DTCs) in the other modules on the network. If no APIM Diagnostic Trouble Codes (DTCs) are present, DIAGNOSE the observable symptom.
U0557:00	Invalid Data Received From Front Controls Interface Module "A": No Sub Type Information	This DTC sets in continuous memory when the PAM receives invalid network data from the FCIM with a faulted signal data input. RETRIEVE and REPAIR all non-network Diagnostic Trouble Codes (DTCs) in the other modules on the network. If no FCIM Diagnostic Trouble Codes (DTCs) are present, DIAGNOSE the observable symptom.
U0558:00	Invalid Data Received From Front Controls/Display Interface Module: No Sub Type Information	This DTC sets in continuous memory when the PAM receives invalid network data from the FCDIM with a faulted signal data input. RETRIEVE and REPAIR all non-network Diagnostic Trouble Codes (DTCs) in the other modules on the network. If no FCDIM Diagnostic Trouble Codes (DTCs) are present, DIAGNOSE the observable symptom.
U2024:41	Control Module Cal-Config Data: General Checksum Failure	CLEAR the Diagnostic Trouble Codes (DTCs) and REPEAT the PAM self-test. If DTC U2024:41 is retrieved again, INSTALL As-Built data from Professional Technician Society (PTS), following the diagnostic scan tool instructions under Module Programming>As-Built. REFER to: MODULE COMMUNICATIONS NETWORK .

		REPEAT the self-test. If DTC U2024:41 is retrieved again, .
U2100:00	Initial Configuration Not Complete: No Sub Type Information	CHECK the vehicle service history for recent service actions related to this module. This DTC can set due to incomplete or incorrect PMI procedures. If there have been recent service actions with this module, INSTALL As-Built data from Professional Technician Society (PTS), following the diagnostic scan tool instructions under Module Programming>As-Built. REFER to: MODULE COMMUNICATIONS NETWORK . If there have been no recent service actions, .
U2101:00	Control Module Configuration Incompatible: No Sub Type Information	CHECK the vehicle service history for recent service actions related to this module. This DTC can set due to incomplete or incorrect PMI procedures. If there have been recent service actions with this module, INSTALL As-Built data from Professional Technician Society (PTS), following the diagnostic scan tool instructions under Module Programming>As-Built. REFER to: MODULE COMMUNICATIONS NETWORK . If there have been no recent service actions, .
U3000:44	Control Module: Data Memory Failure	CLEAR the PAM Diagnostic Trouble Codes (DTCs) and PERFORM the PAM self-test. If DTC U3000:44 is retrieved again, .
U3000:45	Control Module: Program Memory Failure	CLEAR the PAM Diagnostic Trouble Codes (DTCs) and PERFORM the PAM self-test. If DTC U3000:45 is retrieved again, .
U3000:46	Control Module: Calibration/Parameter Memory Failure	CLEAR the PAM Diagnostic Trouble Codes (DTCs) and PERFORM the PAM self-test. If DTC U3000:46 is retrieved again, .
U3000:49	Control Module: Internal Electronic Failure	ADDRESS all other Diagnostic Trouble Codes (DTCs) first. CLEAR the Diagnostic Trouble Codes (DTCs). REPEAT the self-test. If DTC U3000:49 is retrieved again, .

DIAGNOSIS AND TESTING > PARKING AID > SYMPTOM CHART(S)

Symptom Chart: Parking Aid - Audible

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

Symptom Chart: Parking Aid - Audible

Condition	Possible Sources	Actions
A module does not communicate with the diagnostic scan tool	Fuse Wiring, terminals or connectors Module	REFER to: MODULE COMMUNICATIONS NETWORK .
The audible parking aid is inoperative	Refer to the Pinpoint Test	GO to Pinpoint Test A
Continuous or intermittent tone when no obstacles or fault codes are present	Dirty or iced over parking aid sensor(s)	CLEAN the rear bumper and sensors with high-pressure water.
	Ice between parking aid sensor(s) and bezel(s)	ALLOW time for the ice between the parking aid sensor(s) and bezel(s) to melt.
	Parking aid sensor(s) locked into the rear bumper incorrectly	INSTALL the parking aid sensor(s) into the parking aid sensor bezel(s) correctly.
	Parking aid sensor(s) are not aligned correctly	CARRY OUT the elevation system check. REFER to: Elevation System Check .
	Parking aid sensor(s) isolator ring missing, damaged or misaligned	INSTALL a new parking aid sensor. REFER to: Rear Parking Aid Sensor .
The parking aid audio tones are inoperative	Refer to the Pinpoint Test	GO to Pinpoint Test A
The parking aid menu is not available in the message center and cannot be deactivated	A MyKey ® restricted key is in use	Normal operation.

DIAGNOSIS AND TESTING > PARKING AID > PINPOINT TEST(S) > PINPOINT TEST A : THE AUDIBLE PARKING AID IS INOPERATIVE

Refer to PARKING AID for schematic and connector information.

Refer to Module Communications Network for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Parking Aid - System Operation and Component Description .

NOTE: If a MyKey ® restricted key is in use, the parking aid menu is not available in the message center and cannot be deactivated.

NOTE: Before disconnecting the PAM or any of the parking aid sensors, verify the connectors are properly seated and latched.

Possible Sources

- Parking aid system disabled
- Communication network concern
- IPC concern
- TR input concern
- PAM (integral to the BCM)

DIAGNOSIS AND TESTING > PARKING AID > PINPOINT TEST(S) > PINPOINT TEST A : THE AUDIBLE PARKING AID IS INOPERATIVE > PINPOINT TEST A : THE AUDIBLE PARKING AID IS INOPERATIVE

A1 PERFORM A NETWORK TEST

Ignition ON.

Using a diagnostic scan tool, perform a network test.

Do all modules pass the network test?

Yes	GO to A2

No	REFER to: MODULE COMMUNICATIONS NETWORK .

A2 CHECK THE DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE PAM (PARKING ASSIST CONTROL MODULE) SELF-TEST

Using the diagnostic scan tool, perform the PAM self-test.

Are any PAM Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to the PAM DTC Chart .

No	GO to A3

A3 CHECK FOR DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE IPC (INSTRUMENT PANEL CLUSTER) SELF-TEST

Using the diagnostic scan tool, perform the IPC self-test.

Are any IPC Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: Instrumentation, Message Center and Warning Chimes .

No	GO to A4

NOTE: If a MyKey ® restricted key is in use, the rear parking aid can not be enable/disabled.

A4 VERIFY THE PARKING AID IS ENABLED

Verify the parking system is enabled in the IPC message center. For additional information, refer to the Owner's Literature.

Is the parking aid system enabled?

Yes	GO to A5

No	ENABLE the parking aid system.

A5 CHECK FOR CORRECT GEAR INPUT

Apply the parking brake.

Select REVERSE.

Enter the following diagnostic mode on the diagnostic scan tool: PAM DataLogger.

Monitor the PAM transmission range PID (TRANSGR).

Does the PID indicate YES (transmission in reverse)?

Yes	GO to A6

No	For automatic transmission, REFER to: Diagnosis By Symptom . For manual transmission, REFER to: Manual Transmission .

A6 CHECK THE AUDIO CHIMES

Ignition OFF.

Open the driver door.

Place the headlamp switch in the ON position.

Does the warning chime operate through the audio system?

Yes	GO to A7

No	REFER to: Instrumentation, Message Center and Warning Chimes .

A7 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all BCM connectors and related in line connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors and related in line connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new BCM. REFER to: Body Control Module (BCM) .

No	The system is operating correctly at this time. Concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > PARKING AID > PINPOINT TEST(S) > PINPOINT TEST B : DTC (DIAGNOSTIC TROUBLE CODE) B1B58:11

Refer to PARKING AID for schematic and connector information.

Normal Operation and Fault Conditions

The PAM supplies voltage to the parking aid sensors via a common circuit.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1B58:11	Rear Sensors Power Circuit: Circuit Short To Ground	A continuous and on-demand DTC that sets when the rear sensor voltage supply circuit is shorted to ground or to the signal return circuit.

Possible Sources

- Wiring, terminals or connectors
- Parking aid sensor
- PAM (integral to the BCM)

NOTE: Before disconnecting the PAM or any of the parking aid sensors, verify the connectors are properly seated and latched.

DIAGNOSIS AND TESTING > PARKING AID > PINPOINT TEST(S) > PINPOINT TEST B : DTC (DIAGNOSTIC TROUBLE CODE) B1B58:11 > PINPOINT TEST B : DTC (DIAGNOSTIC TROUBLE CODE) B1B58:11

B1 CHECK THE BUMPER WIRING HARNESS

Ignition OFF.

Inspect the bumper wiring harness for opens, shorts, grounds, or corrosion.

Is the bumper wiring harness OK?

Yes	GO to B2

No	REPAIR or INSTALL a new bumper wiring harness.

B2 CHECK THE LH (LEFT-HAND) REAR OUTER PARKING AID SENSOR FOR AN INTERNAL SHORT

Disconnect: LH Rear Outer Parking Aid Sensor C4009 .

Ignition ON.

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs) and repeat the PAM self-test.

Is DTC B1B58:11 still present?

Yes	GO to B3

No	INSTALL a new LH rear outer parking aid sensor. REFER to: Rear Parking Aid Sensor .

B3 CHECK THE LH (LEFT-HAND) REAR INNER PARKING AID SENSOR FOR AN INTERNAL SHORT

Ignition OFF.

Disconnect: LH Rear Inner Parking Aid Sensor C4010 .

Ignition ON.

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs) and repeat the PAM self-test.

Is DTC B1B58:11 still present?

Yes	GO to B4

No	INSTALL a new LH rear inner parking aid sensor. REFER to: Rear Parking Aid Sensor .

B4 CHECK THE RH (RIGHT-HAND) REAR INNER PARKING AID SENSOR FOR AN INTERNAL SHORT

Ignition OFF.

Disconnect: RH Rear Inner Parking Aid Sensor C4012 .

Ignition ON.

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs) and repeat the PAM self-test.

Is DTC B1B58:11 still present?

Yes	GO to B5

No	INSTALL a new RH rear inner parking aid sensor. REFER to: Rear Parking Aid Sensor .

B5 CHECK THE RH (RIGHT-HAND) REAR OUTER PARKING AID SENSOR FOR AN INTERNAL SHORT

Ignition OFF.

Disconnect: RH Rear Outer Parking Aid Sensor C4011 .

Ignition ON.

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs) and repeat the

PAM self-test.

Is DTC B1B58:11 still present?

Yes	GO to B6

No	INSTALL a new RH rear outer parking aid sensor. REFER to: Rear Parking Aid Sensor .

B6 CHECK THE PARKING AID SENSOR VOLTAGE SUPPLY CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Disconnect: BCM C2280D .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2280D-26	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to B7

No	REPAIR the circuit.

B7 CHECK THE PARKING AID SENSOR VOLTAGE SUPPLY CIRCUIT AND GROUND CIRCUIT FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2280D-26	Ω	C2280D-27

Is the resistance greater than 10, 000 ohms?

Yes	GO to B8

No	REPAIR the circuits.

B8 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all BCM connectors and related inline connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors and related inline connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, .

No	The system is operating correctly at this time. Concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > PARKING AID > PINPOINT TEST(S) > PINPOINT TEST C : DTC (DIAGNOSTIC TROUBLE CODE) B1B44:14, B1B46:14, B1B48:14, B1B50:14

Refer to PARKING AID for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Parking Aid - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1B44:14	Right Rear Outer Sensor: Circuit Short To Ground Or Open	A continuous and on-demand DTC that sets when any of the right rear outer parking aid sensor circuits are open or the sensor signal line is shorted to ground.
B1B46:14	Right Rear Inner Sensor: Circuit Short To Ground Or Open	A continuous and on-demand DTC that sets when any of the right rear inner parking aid sensor circuits are open or the sensor signal line is shorted to ground.
B1B48:14	Left Rear Outer Sensor: Circuit Short To Ground Or Open	A continuous and on-demand DTC that sets when any of the left rear outer parking aid sensor circuits are open or the sensor signal line is shorted to ground.
B1B50:14	Left Rear Inner Sensor: Circuit Short To Ground Or Open	A continuous and on-demand DTC that sets when any of the left rear inner parking aid sensor circuits

		are open or the sensor signal line is shorted to ground.

Possible Sources

- Wiring, terminals or connectors
- Parking aid sensor
- PAM (integral to the BCM)

NOTE: Before disconnecting the PAM or any of the parking aid sensors, verify the connectors are properly seated and latched.

DIAGNOSIS AND TESTING > PARKING AID > PINPOINT TEST(S) > PINPOINT TEST C : DTC (DIAGNOSTIC TROUBLE CODE) B1B44:14, B1B46:14, B1B48:14, B1B50:14 > PINPOINT TEST C : DTC (DIAGNOSTIC TROUBLE CODE) B1B44:14, B1B46:14, B1B48:14, B1B50:14

C1 RETRIEVE THE DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE PAM (PARKING ASSIST CONTROL MODULE) SELF-TEST

Ignition ON.

Using a diagnostic scan tool, perform the PAM self-test.

Check the PAM Diagnostic Trouble Codes (DTCs).

Are multiple parking aid sensor Diagnostic Trouble Codes (DTCs) recorded?

Yes	GO to C2

No	For DTC B1B44:14, B1B46:14, B1B48:14 or B1B50:14, GO to C3 For all other Diagnostic Trouble Codes (DTCs), REFER to the PAM DTC Chart .

C2 CHECK THE REAR BUMPER WIRING HARNESS

Ignition OFF.

Inspect the rear bumper wiring harness for opens, shorts, grounds, or corrosion.

Is the rear bumper wiring harness OK?

Yes	GO to C3

No	REPAIR or INSTALL a new rear bumper wiring harness.

C3 CHECK THE PARKING AID SENSOR CIRCUITRY FOR OPENS

Ignition OFF.

Disconnect: suspect parking aid sensor(s).

Disconnect: BCM C2280D .

Measure:

DTC B1B44:14

Positive Lead	Measurement / Action	Negative Lead
C2280D-26	Ω	C4011-1
C2280D-7	Ω	C4011-2
C2280D-27	Ω	C4011-3

DTC B1B46:14

Positive Lead	Measurement / Action	Negative Lead
C2280D-26	Ω	C4012-1
C2280D-8	Ω	C4012-2
C2280D-27	Ω	C4012-3

DTC B1B48:14

Positive Lead	Measurement / Action	Negative Lead
C2280D-26	Ω	C4009-1
C2280D-23	Ω	C4009-2
C2280D-27	Ω	C4009-3

DTC B1B50:14

Positive Lead	Measurement / Action	Negative Lead
C2280D-26	Ω	C4010-1
C2280D-24	Ω	C4010-2
C2280D-27	Ω	C4010-3

Are the resistances of the suspect sensor(s) circuits less than 3 ohms?

Yes	GO to C4

No	REPAIR the circuit in question.

C4 CHECK THE PARKING AID SENSOR CIRCUITRY FOR SHORTS TO GROUND

Measure:

DTC B1B44:14

Positive Lead	Measurement / Action	Negative Lead
C4011-2	Ω	Ground

DTC B1B46:14,

Positive Lead	Measurement / Action	Negative Lead
C4012-2	Ω	Ground

DTC B1B48:14,

Positive Lead	Measurement / Action	Negative Lead
C4009-2	Ω	Ground

DTC B1B50:14,

Positive Lead	Measurement / Action	Negative Lead
C4010-2	Ω	Ground

Is the resistance greater than 10, 000 ohms for the sensor circuit in question?

Yes	If all of the parking aid sensors recorded Diagnostic Trouble Codes (DTCs), GO to C5 If one or more (but not all) parking aid sensor(s) recorded Diagnostic Trouble Codes (DTCs), INSTALL a new sensor(s) for the one(s) in question. REFER to: Rear Parking Aid Sensor .

No	REPAIR the circuit in question.

C5 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all BCM connectors and related inline connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors and related inline connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, .

No	The system is operating correctly at this time. Concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > PARKING AID > PINPOINT TEST(S) > PINPOINT TEST D : DTC (DIAGNOSTIC TROUBLE CODE) B1B44:12, B1B46:12, B1B48:12, B1B50:12

Refer to PARKING AID for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Parking Aid - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1B44:12	Right Rear Outer Sensor: Circuit Short To Battery	A continuous and on-demand DTC that sets when the right rear outer parking aid sensor signal circuit is shorted to battery voltage.
B1B46:12	Right Rear Inner Sensor: Circuit Short To Battery	A continuous and on-demand DTC that sets when the right rear inner parking aid sensor signal circuit is shorted to battery voltage.
B1B48:12	Left Rear Outer Sensor: Circuit Short To Battery	A continuous and on-demand DTC that sets when the left rear outer parking aid sensor signal circuit is shorted to battery voltage.
B1B50:12	Left Rear Inner Sensor: Circuit Short To Battery	A continuous and on-demand DTC that sets when the left rear inner parking aid sensor signal circuit is shorted to battery voltage.

Possible Sources

- Wiring, terminals or connectors
- Parking aid sensor

- PAM (integral to the BCM)

NOTE: Before disconnecting the PAM or any of the parking aid sensors, verify the connectors are properly seated and latched.

DIAGNOSIS AND TESTING > PARKING AID > PINPOINT TEST(S) > PINPOINT TEST D : DTC (DIAGNOSTIC TROUBLE CODE) B1B44:12, B1B46:12, B1B48:12, B1B50:12 > PINPOINT TEST D : DTC (DIAGNOSTIC TROUBLE CODE) B1B44:12, B1B46:12, B1B48:12, B1B50:12

D1 RETRIEVE THE DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE PAM (PARKING ASSIST CONTROL MODULE) SELF-TEST

Ignition ON.

Using a diagnostic scan tool, perform the PAM self-test.

Check the PAM Diagnostic Trouble Codes (DTCs) from the self-test.

Are multiple parking aid sensor Diagnostic Trouble Codes (DTCs) recorded?

Yes	GO to D2

No	For Diagnostic Trouble Codes (DTCs) B1B44:12, B1B46:12, B1B48:12 or B1B50:12, GO to D3 For all other Diagnostic Trouble Codes (DTCs), REFER to the PAM DTC Chart .

D2 CHECK THE REAR BUMPER WIRING HARNESS

Ignition OFF.

Inspect the rear bumper wiring harness for opens, shorts, grounds, or corrosion.

Is the rear bumper wiring harness OK?

Yes	GO to D3

No	REPAIR or INSTALL a new rear bumper wiring harness.

D3 CHECK THE PARKING AID SENSOR CIRCUITRY FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: Suspect Parking Aid Sensor(s).

Disconnect: BCM C2280D .

Ignition ON.

Measure:

DTC B1B44:12

Positive Lead	Measurement / Action	Negative Lead
C4011-2		Ground

DTC B1B46:12

Positive Lead	Measurement / Action	Negative Lead
C4012-2		Ground

DTC B1B48:12

Positive Lead	Measurement / Action	Negative Lead
C4009-2		Ground

DTC B1B50:12

Positive Lead	Measurement / Action	Negative Lead
C4010-2		Ground

Is any voltage present?

Yes	REPAIR the circuit in question.

No	GO to D4

D4 CHECK THE PARKING AID SENSOR CIRCUITRY FOR A SHORT TOGETHER

Measure:

DTC B1B44:12

Positive Lead	Measurement / Action	Negative Lead
C4011-2	Ω	C4011-1

DTC B1B46:12

Positive Lead	Measurement / Action	Negative Lead
C4012-2	Ω	C4012-1

DTC B1B48:12

Positive Lead	Measurement / Action	Negative Lead
C4009-2	Ω	C4009-1

DTC B1B50:12

Positive Lead	Measurement / Action	Negative Lead
C4010-2	Ω	C4010-1

Is the resistance greater than 10, 000 ohms?

Yes	If all the sensor Diagnostic Trouble Codes (DTCs) are set, GO to D5 If one or more (but not all) parking aid sensor(s) recorded Diagnostic Trouble Codes (DTCs), INSTALL a new sensor(s) for the one in question. REFER to: Rear Parking Aid Sensor .

No	REPAIR the circuit in question.

D5 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all BCM connectors and related inline connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors and related inline connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, .

No	The system is operating correctly at this time. Concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > PARKING AID > PINPOINT TEST(S) > PINPOINT TEST E

: DTC (DIAGNOSTIC TROUBLE CODE) B1B44:96, B1B46:96, B1B48:96, B1B50:96

Refer to PARKING AID for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Parking Aid - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1B44:96	Right Rear Outer Sensor: Component Internal Failure	A continuous and on-demand DTC that sets when the right rear outer parking aid sensor has internally failed or has an incorrect attenuation time.
B1B46:96	Right Rear Inner Sensor: Component Internal Failure	A continuous and on-demand DTC that sets when the right rear inner parking aid sensor has internally failed or has an incorrect attenuation time.
B1B48:96	Left Rear Outer Sensor: Component Internal Failure	A continuous and on-demand DTC that sets when the left rear outer parking aid sensor has internally failed or has an incorrect attenuation time.
B1B50:96	Left Rear Inner Sensor: Component Internal Failure	A continuous and on-demand DTC that sets when the left rear inner parking aid sensor has internally failed or has an incorrect attenuation time.

Possible Sources

- Wiring, terminals or connectors
- Parking aid sensor
- PAM (integral to the BCM)

NOTE: Before disconnecting the PAM or any of the parking aid sensors, verify the connectors are properly seated and latched.

DIAGNOSIS AND TESTING > PARKING AID > PINPOINT TEST(S) > PINPOINT TEST E : DTC (DIAGNOSTIC TROUBLE CODE) B1B44:96, B1B46:96, B1B48:96, B1B50:96 > PINPOINT TEST E : DTC (DIAGNOSTIC TROUBLE CODE) B1B44:96, B1B46:96,

B1B48:96, B1B50:96

E1 CHECK THE DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE PAM (PARKING ASSIST CONTROL MODULE) SELF-TEST

Using a diagnostic scan tool, perform the PAM self-test.

Check the PAM Diagnostic Trouble Codes (DTCs) from the self-test.

Are parking aid Diagnostic Trouble Codes (DTCs) other than B1B44:96, B1B46:96, B1B48:96 or B1B50:96 recorded?

Yes	For all other Diagnostic Trouble Codes (DTCs) REFER to the PAM DTC Chart .

No	GO to E2

NOTE: Make sure the area around the vehicle is clear of anything that can activate the parking aid system.

E2 CHECK THE PARKING AID SENSOR DISTANCE PARAMETER IDENTIFICATIONS (PIDS) WITH NO OBJECTS BEHIND THE VEHICLE

Clean the rear bumper and sensors with high-pressure water.

Make sure the suspect parking aid sensor(s) is flush-mounted in the bezel.

Ignition ON.

Using a diagnostic scan tool, monitor the PAM parking aid sensor distance Parameter Identifications (PIDs) (LRI_DIST, LRO_DIST, RRI_DIST, RRO_DIST). The PID reads 2, 540 mm (100 in) on a correctly functioning sensor.

Does the PID read 2, 540 mm (100 in)?

Yes	GO to E3

No	GO to E4

NOTE: Make sure the area around the vehicle is clear of anything that can activate the parking aid system.

E3 CHECK THE PARKING AID SENSOR DISTANCE PARAMETER IDENTIFICATIONS (PIDS) WITH A TEST OBJECT BEHIND THE VEHICLE

Using a diagnostic scan tool, monitor the PAM parking aid sensor distance Parameter Identifications (PIDs) (LRI_DIST, LRO_DIST, RRI_DIST, RRO_DIST).

While monitoring the Parameter Identifications (PIDs), move a test object into and out of the detection zone behind each sensor. For an example of a test object, REFER to: Azimuth

System Check .

Does the PID approximately match the distance from the test object to the rear bumper of the vehicle?

Yes	GO to E5

No	GO to E4

E4 CHECK THE PARKING AID SENSORS

Ignition OFF.

Install a known good sensor for the suspect parking aid sensor. REFER to: Rear Parking Aid Sensor .

Ignition ON.

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs) and repeat the PAM self-test.

Check the PAM Diagnostic Trouble Codes (DTCs).

Is the concern still present?

Yes	GO to E5

No	INSTALL a new rear parking aid sensor. REFER to: Rear Parking Aid Sensor .

E5 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all BCM connectors and related inline connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors and related inline connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical

	Service Bulletins (TSBs) address this concern, .

No	The system is operating correctly at this time. Concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > PARKING AID > PINPOINT TEST(S) > PINPOINT TEST F : DTC (DIAGNOSTIC TROUBLE CODE) U0100:00 OR DTC (DIAGNOSTIC TROUBLE CODE) U0101:00

Refer to Module Communications Network for schematic and connector information.

Normal Operation and Fault Conditions

The PAM communicates with the PCM on the HS-CAN1.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0100:00	Lost Communication With ECM/PCM "A": No Sub Type Information	A continuous memory DTC that sets in the PAM if messages received from the PCM are missing for 5 seconds or more.
U0101:00	Lost Communication with TCM: No Sub Type Information	A continuous memory DTC that sets in the PAM if messages received from the PCM are missing for 5 seconds or more.

Possible Sources

- Communication network concern
- PCM
- TCM (integral to the PCM)
- PAM (integral to the BCM)

DIAGNOSIS AND TESTING > PARKING AID > PINPOINT TEST(S) > PINPOINT TEST F : DTC (DIAGNOSTIC TROUBLE CODE) U0100:00 OR DTC (DIAGNOSTIC TROUBLE CODE) U0101:00 > PINPOINT TEST F : DTC (DIAGNOSTIC TROUBLE CODE) U0100:00 OR DTC (DIAGNOSTIC TROUBLE CODE) U0101:00

F1 VERIFY THAT A VEHICLE SESSION CAN BE ESTABLISHED USING THE DIAGNOSTIC SCAN TOOL

Ignition ON.

Verify that a vehicle session can be established using a diagnostic scan tool.

Can a vehicle session be established?

Yes	GO to F2

No	REFER to: MODULE COMMUNICATIONS NETWORK .

F2 RECHECK THE PAM (PARKING ASSIST CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition ON.

Using a diagnostic scan tool, clear the PAM Diagnostic Trouble Codes (DTCs).

Operate the system and test for normal operation.

Check the PAM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U0100:00 still present?

Yes	GO to F3

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

F3 RETRIEVE THE RECORDED DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE PCM (POWERTRAIN CONTROL MODULE) KOEO (KEY ON, ENGINE OFF) SELF-TEST

Using a diagnostic scan tool, perform the PCM KOEO self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	Refer to the appropriate article for the procedure.

No	GO to F4

F4 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0100 OR DTC (DIAGNOSTIC TROUBLE CODE) U0101 SET IN OTHER MODULES

Using a diagnostic scan tool, clear all Diagnostic Trouble Codes (DTCs).

Ignition OFF.

Ignition ON.

Wait 10 seconds.

Using a diagnostic scan tool, retrieve the Continuous Memory Diagnostic Trouble Codes (CMDTCs) from all modules.

Is DTC U0100 or DTC U0101 set in any other module?

Yes	GO to F5

No	GO to F6

F5 CHECK FOR CORRECT PCM (POWERTRAIN CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all PCM connectors and related inline connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the PCM connectors and related inline connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PCM. Refer to the appropriate article for the procedure.

No	The system is operating correctly at this time. Concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

F6 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all BCM connectors and related inline connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors and related inline connectors. Make sure they seat and

latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, .

No	The system is operating correctly at this time. Concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > PARKING AID > PINPOINT TEST(S) > PINPOINT TEST G : DTC (DIAGNOSTIC TROUBLE CODE) U0121:00

Refer to Module Communications Network for schematic and connector information.

Normal Operation and Fault Conditions

The PAM communicates with the ABS module through the HS-CAN1, HS-CAN2 and the GWM.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0121:00	Lost Communication With Anti-Lock Brake System (ABS) Control Module: No Sub Type Information	A continuous memory DTC that sets in the PAM if messages received from the ABS module are missing for 5 seconds or more.

Possible Sources

- Communication network concern
- ABS module
- GWM concern
- PAM (integral to the BCM)

DIAGNOSIS AND TESTING > PARKING AID > PINPOINT TEST(S) > PINPOINT TEST G : DTC (DIAGNOSTIC TROUBLE CODE) U0121:00 > PINPOINT TEST G : DTC (DIAGNOSTIC TROUBLE CODE) U0121:00

G1 VERIFY THE CUSTOMER CONCERN

Ignition ON.

Verify there is an observable symptom present.

Is an observable symptom present?

Yes	GO to G2

No	The system is operating normally at this time. The DTC may have been set due to high network traffic or an intermittent fault condition. CLEAR the DTC.

G2 CHECK THE COMMUNICATION NETWORK

Using a diagnostic scan tool, perform the network test.

Do the ABS module and the GWM pass the network test?

Yes	GO to G3

No	REFER to: MODULE COMMUNICATIONS NETWORK .

G3 PERFORM THE ABS (ANTI-LOCK BRAKE SYSTEM) MODULE SELF-TEST

Using a diagnostic scan tool, perform the ABS module self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: Anti-Lock Brake System (ABS) and Stability Control .

No	GO to G4

G4 CHECK THE GWM (GATEWAY MODULE A) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, check the GWM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: MODULE COMMUNICATIONS NETWORK .

No	GO to G5

G5 RECHECK THE PAM (PARKING ASSIST CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs).

Operate the system and test for normal operation.

Check the PAM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U0121:00 still present?

Yes	GO to G6

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

G6 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0121 SET IN OTHER MODULES

Using a diagnostic scan tool, clear all Diagnostic Trouble Codes (DTCs).

Ignition OFF.

Ignition ON.

Wait 10 seconds.

Using a diagnostic scan tool, retrieve the Continuous Memory Diagnostic Trouble Codes (CMDTCs) from all modules.

Is DTC U0121 set in any other module?

Yes	GO to G7

No	GO to G8

G7 CHECK FOR CORRECT ABS (ANTI-LOCK BRAKE SYSTEM) MODULE OPERATION

Ignition OFF.

Disconnect and inspect all ABS module connectors and related inline connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the ABS module connectors and related inline connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ABS module. REFER to:

	Anti-Lock Brake System (ABS) Module .

No	The system is operating correctly at this time. Concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

G8 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all BCM connectors and related inline connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors and related inline connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, .

No	The system is operating correctly at this time. Concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > PARKING AID > PINPOINT TEST(S) > PINPOINT TEST H : DTC (DIAGNOSTIC TROUBLE CODE) U0131:00

Refer to Module Communications Network for schematic and connector information.

Normal Operation and Fault Conditions

The PAM communicates with the PSCM through the HS-CAN1, HS-CAN2 and GWM.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0131:00	Lost Communication with Power Steering Control Module: No Sub Type Information	A continuous memory DTC that sets in the PAM if messages received from the PSCM are missing for 5 seconds or more.

Possible Sources

- Communication network concern
- PSCM (integral to the steering gear)
- GWM concern
- PAM (integral to the BCM)

DIAGNOSIS AND TESTING > PARKING AID > PINPOINT TEST(S) > PINPOINT TEST H : DTC (DIAGNOSTIC TROUBLE CODE) U0131:00 > PINPOINT TEST H : DTC (DIAGNOSTIC TROUBLE CODE) U0131:00

H1 VERIFY THE CUSTOMER CONCERN

Ignition ON.

Verify there is an observable symptom present.

Is an observable symptom present?

Yes	GO to H2

No	The system is operating normally at this time. The DTC may have been set due to high network traffic or an intermittent fault condition. CLEAR the DTC.

H2 CHECK THE COMMUNICATION NETWORK

Using a diagnostic scan tool, perform the network test.

Do the PSCM and the GWM pass the network test?

Yes	GO to H3

No	REFER to: MODULE COMMUNICATIONS NETWORK .

H3 PERFORM THE PSCM (POWER STEERING CONTROL MODULE) SELF-TEST

Using a diagnostic scan tool, perform the PSCM self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: POWER STEERING .

No	GO to H4

H4 CHECK THE GWM (GATEWAY MODULE A) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, check the GWM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: MODULE COMMUNICATIONS NETWORK .

No	GO to H5

H5 RECHECK THE PAM (PARKING ASSIST CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs).

Operate the system and test for normal operation.

Check the PAM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U0131:00 still present?

Yes	GO to H6

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

H6 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0131 SET IN OTHER MODULES

Using a diagnostic scan tool, clear all Diagnostic Trouble Codes (DTCs).

Ignition OFF.

Ignition ON.

Wait 10 seconds.

Using a diagnostic scan tool, retrieve the Continuous Memory Diagnostic Trouble Codes (CMDTCs) from all modules.

Is DTC U0131 set in any other module?

Yes	GO to H7

No	GO to H8

H7 CHECK FOR CORRECT PSCM (POWER STEERING CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all PSCM connectors and related inline connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the PSCM connectors and related inline connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, REFER to the EPAS symptom chart.

No	The system is operating correctly at this time. Concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

H8 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all BCM connectors and related inline connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors and related inline connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new BCM. REFER to: Body Control Module (BCM) .

No	The system is operating correctly at this time. Concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > PARKING AID > PINPOINT TEST(S) > PINPOINT TEST I : DTC (DIAGNOSTIC TROUBLE CODE) U0140:00

Refer to Module Communications Network for schematic and connector information.

Normal Operation and Fault Conditions

The PAM is integral to the BCM, but the modules communicate as separate nodes on the HS-CAN1.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0140:00	Lost Communication With Body Control Module: No Sub Type Information	A continuous memory DTC that sets in the PAM when the PAM is unable to communicate with the BCM for 5 seconds or more.

Possible Sources

- Communication network concern
- BCM
- PAM (integral to the BCM)

DIAGNOSIS AND TESTING > PARKING AID > PINPOINT TEST(S) > PINPOINT TEST I : DTC (DIAGNOSTIC TROUBLE CODE) U0140:00 > PINPOINT TEST I : DTC (DIAGNOSTIC TROUBLE CODE) U0140:00

I1 VERIFY THE CUSTOMER CONCERN

Ignition ON.

Verify there is an observable symptom present.

Is an observable symptom present?

Yes	GO to I2

No	The system is operating normally at this time. The DTC may have been set due to high network traffic or an intermittent fault condition. CLEAR the DTC.

I2 CHECK THE COMMUNICATION NETWORK

Using a diagnostic scan tool, perform the network test.

Does the BCM pass the network test?

Yes	GO to I3

No	REFER to: MODULE COMMUNICATIONS NETWORK .

I3 PERFORM THE BCM (BODY CONTROL MODULE) SELF-TEST

Using a diagnostic scan tool, perform the BCM self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: Body Control Module (BCM) .

No	GO to I4

I4 RECHECK THE PAM (PARKING ASSIST CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs).

Operate the system and test the system for normal operation.

Check the PAM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U0140:00 still present?

Yes	GO to I5

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

I5 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all BCM connectors and related inline connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors and related inline connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, .

No	The system is operating correctly at this time. Concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > PARKING AID > PINPOINT TEST(S) > PINPOINT TEST J : DTC (DIAGNOSTIC TROUBLE CODE) U0146:00

Refer to Module Communications Network for schematic and connector information.

Normal Operation and Fault Conditions

The PAM communicates with the GWM through the HS-CAN1.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0146:00	Lost Communication With Gateway "A": No Sub Type Information	A continuous memory DTC that sets in the PAM if expected messages received trough the GWM are missing for 5 seconds or more.

Possible Sources

- Communication network concern
- GWM
- PAM (integral to the BCM)

DIAGNOSIS AND TESTING > PARKING AID > PINPOINT TEST(S) > PINPOINT TEST J : DTC (DIAGNOSTIC TROUBLE CODE) U0146:00 > PINPOINT TEST J : DTC (DIAGNOSTIC TROUBLE CODE) U0146:00

J1 VERIFY THE CUSTOMER CONCERN

Ignition ON.

Verify there is an observable symptom present.

Is an observable symptom present?

Yes	GO to J2

No	The system is operating normally at this time. The DTC may have been set due to high network traffic or an intermittent fault condition. CLEAR the DTC.

J2 CHECK THE COMMUNICATION NETWORK

Using a diagnostic scan tool, perform the network test.

Does the GWM pass the network test?

Yes	GO to J3

No	REFER to: MODULE COMMUNICATIONS NETWORK .

J3 CHECK THE GWM (GATEWAY MODULE A) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, check the GWM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: MODULE COMMUNICATIONS NETWORK .

No	GO to J4

J4 RECHECK THE PAM (PARKING ASSIST CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs).

Operate the system and test for normal operation.

Check the PAM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U0146:00 still present?

Yes	GO to J5

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

J5 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0146 SET IN OTHER MODULES

Using a diagnostic scan tool, clear all Diagnostic Trouble Codes (DTCs).

Ignition OFF.

Ignition ON.

Wait 10 seconds.

Using a diagnostic scan tool, retrieve the Continuous Memory Diagnostic Trouble Codes (CMDTCs) from all modules.

Is DTC U0146 set in any other module?

Yes	GO to J6

No	GO to J7

J6 CHECK FOR CORRECT GWM (GATEWAY MODULE A) OPERATION

Ignition OFF.

Disconnect and inspect all GWM connectors and related inline connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the GWM connectors and related inline connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new GWM. REFER to: Gateway Module A (GWM) .

No	The system is operating correctly at this time. Concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

J7 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all BCM connectors and related inline connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors and related inline connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, .

No	The system is operating correctly at this time. Concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > PARKING AID > PINPOINT TEST(S) > PINPOINT TEST K : DTC (DIAGNOSTIC TROUBLE CODE) U0155:00

Refer to Module Communications Network for schematic and connector information.

Normal Operation and Fault Conditions

The PAM communicates with the IPC through the HS-CAN1, HS-CAN3, and GWM.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0155:00	Lost Communication With Instrument Panel Cluster (IPC) Control Module: No Sub Type Information	A continuous memory DTC that sets in the PAM if messages received from the IPC are missing for 5 seconds or more.

Possible Sources

- Communication network concern
- GWM concern
- IPC
- PAM (integral to the BCM)

DIAGNOSIS AND TESTING > PARKING AID > PINPOINT TEST(S) > PINPOINT TEST K : DTC (DIAGNOSTIC TROUBLE CODE) U0155:00 > PINPOINT TEST K : DTC (DIAGNOSTIC TROUBLE CODE) U0155:00

K1 VERIFY THE CUSTOMER CONCERN

Ignition ON.

Verify there is an observable symptom present.

Is an observable symptom present?

Yes	GO to K2

No	The system is operating normally at this time. The DTC may have been set due to high network traffic or an intermittent fault condition. CLEAR the DTC.

K2 CHECK THE COMMUNICATION NETWORK

Using a diagnostic scan tool, perform the network test.

Do the IPC and the GWM pass the network test?

Yes	GO to K3

No	REFER to: MODULE COMMUNICATIONS NETWORK .

K3 PERFORM THE IPC (INSTRUMENT PANEL CLUSTER) SELF-TEST

Using a diagnostic scan tool, perform the IPC self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: Instrumentation, Message Center and Warning Chimes .

No	GO to K4

K4 CHECK THE GWM (GATEWAY MODULE A) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, check the GWM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: MODULE COMMUNICATIONS NETWORK .

No	GO to K5

K5 RECHECK THE PAM (PARKING ASSIST CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs).

Operate the system and test for normal operation.

Check the PAM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U0155:00 still present?

Yes	GO to K6

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

K6 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0155 SET IN OTHER MODULES

Using a diagnostic scan tool, clear all Diagnostic Trouble Codes (DTCs).

Ignition OFF.

Ignition ON.

Wait 10 seconds.

Using a diagnostic scan tool, retrieve the Continuous Memory Diagnostic Trouble Codes (CMDTCs) from all modules.

Is DTC U0155 set in any other module?

Yes	GO to K7

No	GO to K8

K7 CHECK FOR CORRECT IPC (INSTRUMENT PANEL CLUSTER) OPERATION

Ignition OFF.

Disconnect and inspect the IPC connector and related inline connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the IPC connector and related inline connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new IPC. REFER to: Instrument

	Panel Cluster (IPC) .

No	The system is operating correctly at this time. Concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

K8 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all BCM connectors and related inline connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors and related inline connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, .

No	The system is operating correctly at this time. Concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > PARKING AID > PINPOINT TEST(S) > PINPOINT TEST L : DTC (DIAGNOSTIC TROUBLE CODE) U0212:00

Refer to Module Communications Network for schematic and connector information.

Normal Operation and Fault Conditions

The PAM communicates with the SCCM through the HS-CAN1, HS-CAN2 and GWM.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0212:00	Lost Communication With Steering Column Control Module: No Sub Type Information	A continuous memory DTC that sets in the PAM if messages received from the SCCM are missing for 5 seconds or more.

Possible Sources

- Communication network concern
- GWM concern
- SCCM
- PAM (integral to the BCM)

DIAGNOSIS AND TESTING > PARKING AID > PINPOINT TEST(S) > PINPOINT TEST L : DTC (DIAGNOSTIC TROUBLE CODE) U0212:00 > PINPOINT TEST L : DTC (DIAGNOSTIC TROUBLE CODE) U0212:00

L1 VERIFY THE CUSTOMER CONCERN

Ignition ON.

Verify there is an observable symptom present.

Is an observable symptom present?

Yes	GO to L2

No	The system is operating normally at this time. The DTC may have been set due to high network traffic or an intermittent fault condition. CLEAR the DTC.

L2 CHECK THE COMMUNICATION NETWORK

Using a diagnostic scan tool, perform the network test.

Do the SCCM and the GWM pass the network test?

Yes	GO to L3

No	REFER to: MODULE COMMUNICATIONS NETWORK .

L3 PERFORM THE SCCM (STEERING COLUMN CONTROL MODULE) SELF-TEST

Using a diagnostic scan tool, perform the SCCM self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: Steering Wheel and Column Electrical Components .

No	GO to L4

L4 CHECK THE GWM (GATEWAY MODULE A) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, check the GWM Continuous Memory Diagnostic Trouble Codes (CMDTCs)

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: MODULE COMMUNICATIONS NETWORK .

No	GO to L5

L5 RECHECK THE PAM (PARKING ASSIST CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs).

Operate the system and test for normal operation.

Check the PAM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U0212:00 still present?

Yes	GO to L6

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

L6 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0212 SET IN OTHER MODULES

Using a diagnostic scan tool, clear all Diagnostic Trouble Codes (DTCs).

Ignition OFF.

Ignition ON.

Wait 10 seconds.

Using a diagnostic scan tool, retrieve the Continuous Memory Diagnostic Trouble Codes (CMDTCs) from all modules.

Is DTC U0212 set in any other module?

Yes	GO to L7

No	GO to L8

L7 CHECK FOR CORRECT SCCM (STEERING COLUMN CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all SCCM connectors and related inline connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the SCCM connectors and related inline connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new SCCM. REFER to: Steering Column Control Module (SCCM) .

No	The system is operating correctly at this time. Concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

L8 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all BCM connectors and related inline connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors and related inline connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, .

No	The system is operating correctly at this time. Concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > PARKING AID > PINPOINT TEST(S) > PINPOINT TEST M : DTC (DIAGNOSTIC TROUBLE CODE) U0253:00

Refer to Module Communications Network for schematic and connector information.

Normal Operation and Fault Conditions

The PAM communicates with the APIM through the HS-CAN1, HS-CAN3 and GWM.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0253:00	Lost Communication With Accessory Protocol Interface Module: No Sub Type Information	A continuous memory DTC that sets in the PAM if messages received from the APIM are missing for 5 seconds or more.

Possible Sources

- Communication network concern
- GWM concern
- APIM
- PAM (integral to the BCM)

DIAGNOSIS AND TESTING > PARKING AID > PINPOINT TEST(S) > PINPOINT TEST M : DTC (DIAGNOSTIC TROUBLE CODE) U0253:00 > PINPOINT TEST M : DTC (DIAGNOSTIC TROUBLE CODE) U0253:00

M1 VERIFY THE CUSTOMER CONCERN

Ignition ON.

Verify there is an observable symptom present.

Is an observable symptom present?

Yes	GO to M2

No	The system is operating normally at this time. The DTC may have been set due to high network traffic or an intermittent fault condition. CLEAR the DTC.

M2 CHECK THE COMMUNICATION NETWORK

Using a diagnostic scan tool, perform the network test.

Does the APIM and the GWM pass the network test?

Yes	GO to M3

No	REFER to: MODULE COMMUNICATIONS NETWORK .

M3 PERFORM THE APIM (SYNC MODULE) SELF-TEST

Using a diagnostic scan tool, perform the APIM self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	For vehicles with the touchscreen display, REFER to: Information and Entertainment System . For vehicles without the touchscreen display, REFER to: Information and Entertainment System .

No	GO to M4

M4 CHECK THE GWM (GATEWAY MODULE A) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, check the GWM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: MODULE COMMUNICATIONS NETWORK .

No	GO to M5

M5 RECHECK THE PAM (PARKING ASSIST CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs).

Operate the system and test for normal operation.

Check the PAM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U0253:00 still present?

Yes	GO to M6

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

M6 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0253 IN OTHER MODULES

Using a diagnostic scan tool, clear all Diagnostic Trouble Codes (DTCs).

Ignition OFF.

Ignition ON.

Wait 10 seconds.

Using a diagnostic scan tool, retrieve the Continuous Memory Diagnostic Trouble Codes (CMDTCs) from all modules.

Is DTC U0253 set in any other module?

Yes	GO to M7

No	GO to M8

M7 CHECK FOR CORRECT APIM (SYNC MODULE) OPERATION

Ignition OFF.

Disconnect and inspect the APIM connectors and related inline connectors.

Repair:

Corrosion (clean module pins or install new connectors or terminals)

Damaged or bent pins (install new terminals or pins)

Pushed-out pins (install new pins as necessary)

Reconnect the APIM connectors and related inline connectors. Make sure they seat and latch correctly.

Wait at least 2 minutes for the APIM to re-initialize.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, PERFORM the APIM Hardware Test. Refer to APIM HARDWARE TESTING .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

M8 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all BCM connectors and related inline connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors and related inline connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, .

No	The system is operating correctly at this time. Concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > PARKING AID > PINPOINT TEST(S) > PINPOINT TEST N : DTC (DIAGNOSTIC TROUBLE CODE) U0256:00

Refer to Module Communications Network for schematic and connector information.

Normal Operation and Fault Conditions

The PAM communicates with the FCIM through the HS-CAN1, MS-CAN and GWM.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0256:00	Lost Communication With Front Controls Interface Module: No Sub Type Information	A continuous memory DTC that sets in the PAM if messages received from the FCIM are missing for 5 seconds or more.

Possible Sources

- Communication network concern
- GWM concern
- FCIM
- PAM (integral to the BCM)

DIAGNOSIS AND TESTING > PARKING AID > PINPOINT TEST(S) > PINPOINT TEST N : DTC (DIAGNOSTIC TROUBLE CODE) U0256:00 > PINPOINT TEST N : DTC (DIAGNOSTIC TROUBLE CODE) U0256:00

N1 VERIFY THE CUSTOMER CONCERN

Ignition ON.

Verify there is an observable symptom present.

Is an observable symptom present?

Yes	GO to N2

No	The system is operating normally at this time. The DTC may have been set due to high network traffic or an intermittent fault condition. CLEAR the DTC.

N2 CHECK THE COMMUNICATION NETWORK

Using a diagnostic scan tool, perform the network test.

Do the FCIM and the GWM pass the network test?

Yes	GO to N3

No	REFER to: MODULE COMMUNICATIONS NETWORK .

N3 PERFORM THE FCIM (FRONT CONTROLS INTERFACE MODULE) SELF-TEST

Using a diagnostic scan tool, perform the FCIM self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	For vehicles with the touchscreen display, REFER to: Information and Entertainment System . For vehicles without the touchscreen display, REFER to: Information and Entertainment System .

No	GO to N4

N4 CHECK THE GWM (GATEWAY MODULE A) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, check the GWM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: MODULE COMMUNICATIONS NETWORK .

No	GO to N5

N5 RECHECK THE PAM (PARKING ASSIST CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs).

Operate the system and test for normal operation.

Check the PAM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U0256:00 still present?

Yes	GO to N6

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

N6 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0256 SET IN OTHER MODULES

Using a diagnostic scan tool, clear all Diagnostic Trouble Codes (DTCs).

Ignition OFF.

Ignition ON.

Wait 10 seconds.

Using a diagnostic scan tool, retrieve the Continuous Memory Diagnostic Trouble Codes (CMDTCs) from all modules.

Is DTC U0256 set in any other module?

Yes	GO to N7

No	GO to N8

N7 CHECK FOR CORRECT FCIM (FRONT CONTROLS INTERFACE MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all FCIM connectors and related inline connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the FCIM connectors and related inline connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new FCIM. For vehicles with the touchscreen display, REFER to: Front Controls Interface Module (FCIM) . For vehicles without the touchscreen display, REFER to: Front Controls Interface Module (FCIM) .

No	The system is operating correctly at this time. Concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

N8 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all BCM connectors and related inline connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors and related inline connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, .

No	The system is operating correctly at this time. Concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > PARKING AID > PINPOINT TEST(S) > PINPOINT TEST O : DTC (DIAGNOSTIC TROUBLE CODE) U0257:00

Refer to Module Communications Network for schematic and connector information.

Normal Operation and Fault Conditions

The PAM communicates with the FCDIM through the HS-CAN1, HS-CAN3 and GWM.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0257:00	Lost Communication With Front Controls/Display Interface Module: No Sub Type Information	A continuous memory DTC that sets in the PAM if messages received from the FCDIM are missing for 5 seconds or more.

Possible Sources

- Communication network concern
- GWM concern
- FCDIM
- PAM (integral to the BCM)

DIAGNOSIS AND TESTING > PARKING AID > PINPOINT TEST(S) > PINPOINT TEST O : DTC (DIAGNOSTIC TROUBLE CODE) U0257:00 > PINPOINT TEST O : DTC (DIAGNOSTIC TROUBLE CODE) U0257:00

O1 VERIFY THE CUSTOMER CONCERN

Ignition ON.

Verify there is an observable symptom present.

Is an observable symptom present?

Yes	GO to O2

No	The system is operating normally at this time. The DTC may have been set due to high network traffic or an intermittent fault condition. CLEAR the DTC.

O2 CHECK THE COMMUNICATION NETWORK

Using a diagnostic scan tool, perform the network test.

Do the FCDIM and the GWM pass the network test?

Yes	GO to O3

No	REFER to: MODULE COMMUNICATIONS NETWORK .

O3 PERFORM THE FCDIM (FRONT CONTROL/DISPLAY INTERFACE MODULE) SELF-TEST

Using a diagnostic scan tool, perform the FCIM self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: Information and Entertainment System .

No	GO to O4

O4 CHECK THE GWM (GATEWAY MODULE A) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, check the GWM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: MODULE COMMUNICATIONS NETWORK .

No	GO to O5

O5 RECHECK THE PAM (PARKING ASSIST CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs).

Operate the system and test for normal operation.

Check the PAM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U0257:00 still present?

Yes	GO to O6

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

O6 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0257 SET IN OTHER MODULES

Using a diagnostic scan tool, clear all Diagnostic Trouble Codes (DTCs).

Ignition OFF.

Ignition ON.

Wait 10 seconds.

Using a diagnostic scan tool, retrieve the Continuous Memory Diagnostic Trouble Codes (CMDTCs) from all modules.

Is DTC U0257 set in any other module?

Yes	GO to O7

No	GO to O8

O7 CHECK FOR CORRECT FCDIM (FRONT CONTROL/DISPLAY INTERFACE MODULE) OPERATION

Ignition OFF.

Disconnect and inspect the FCDIM connectors and related inline connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the FCDIM connectors and related inline connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new FCDIM. REFER to: Front Control/Display Interface Module (FCDIM) .

No	The system is operating correctly at this time. Concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

O8 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all BCM connectors and related inline connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors and related inline connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, .

No	The system is operating correctly at this time. Concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

GENERAL PROCEDURES > AZIMUTH SYSTEM CHECK

Check

NOTE: Actual sensor arrangement may differ from the configuration shown.

NOTE: The following system check should be carried out with the vehicle on a level surface.

NOTE: The object used in this system check can be fabricated using a 9 cm diameter (3 in I.D.) pipe, 100 cm (39 in) in length (available as Polyvinyl Chloride (PVC) pipe, or similar from a hardware or plumbing supply.

1.
Distribute the test objects evenly across the bumper as shown below. Refer to the specifications in this article.



2.

Turn the ignition switch to the ON position, engine off.

3.

Apply the parking brake.

4.

Select REVERSE (R) for rear parking aid.

5.

Select DRIVE (D) for front parking aid.

> *NOTE: If the PAM does not detect the object above, refer to Diagnosis and Testing .*

> *NOTE: The system provides audio warnings only when the vehicle is moving or when the vehicle is stationary and the detected obstacle is less than 12 in (30 cm) away from the bumper.*

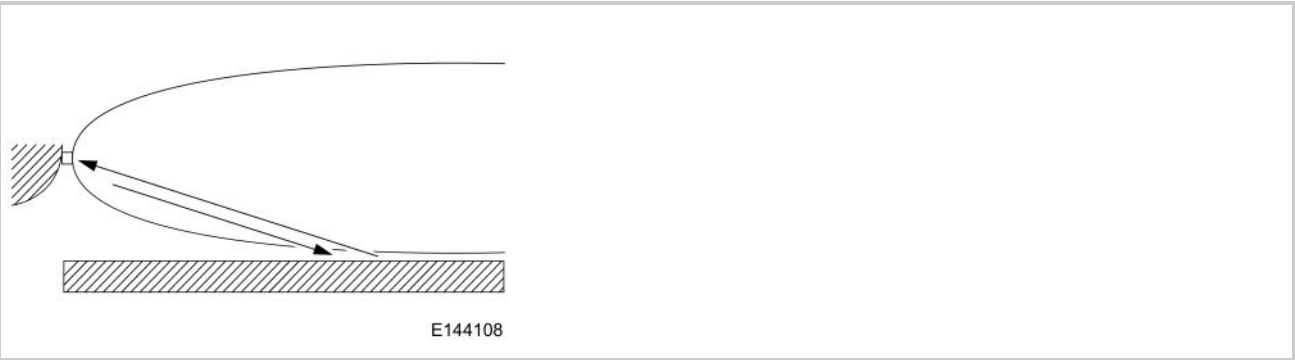
6.
Using a diagnostic scan tool, monitor the PAM parking aid sensor distance Parameter Identifications (PIDs) to verify the PAM detects the objects when placed in the specified locations (P1, P2, P3, P4 and P5).

GENERAL PROCEDURES > ELEVATION SYSTEM CHECK

Check

1.

Turn the ignition ON, engine OFF.



2.

Set the parking brake.

3.

Place the gearshift in REVERSE (R) for rear parking aid sensors.

4.

Place the gearshift in DRIVE (D) for front parking aid sensors.

5.

Using a diagnostic scan tool, monitor the PAM parking aid sensor distance Parameter Identifications (PIDs) to verify the PAM detects no objects.

6.

If the audible warning is heard or if the Parameter Identifications (PIDs) indicate an object is detected, check to make sure the bumper is correctly installed and is not tilted downward so the sensor is pointing at the ground. Refer to Diagnosis and Testing .

REMOVAL AND INSTALLATION > REAR PARKING AID SENSOR > REMOVAL

1.

Remove the rear bumper cover. Refer to: Rear Bumper Cover .

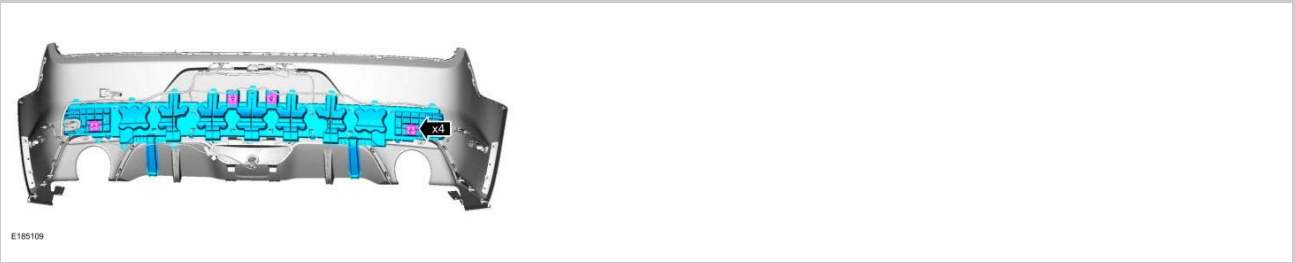
2.

Separate the wiring harness guides and position the harness aside.



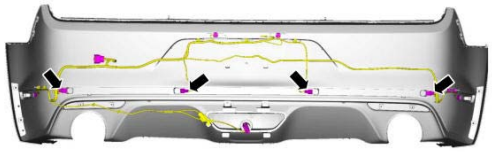
3.

Release the clips and remove the rear bumper cover reinforcement.



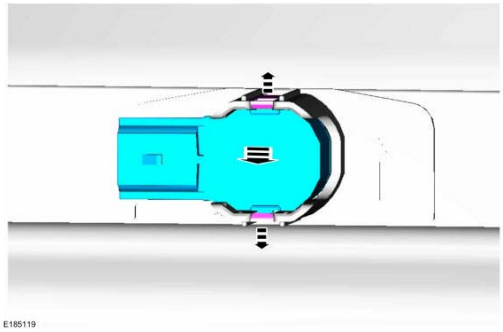
4.

Disconnect the appropriate sensor electrical connector.



5.

Release the retaining clips and remove the park aid sensor.



REMOVAL AND INSTALLATION > REAR PARKING AID SENSOR > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Check the alignment of the park aid sensors. Refer to: Azimuth System Check . Refer to: Elevation System Check .

Service Manual: REMOTE CONVENIENCE

DESCRIPTION AND OPERATION > UNIVERSAL TRANSMITTER - OVERVIEW > OVERVIEW

The universal transmitter operates garage doors, gates and home or office lighting and security systems.

DESCRIPTION AND OPERATION > UNIVERSAL TRANSMITTER - SYSTEM OPERATION AND COMPONENT DESCRIPTION

System Operation

DESCRIPTION AND OPERATION > UNIVERSAL TRANSMITTER - SYSTEM OPERATION AND COMPONENT DESCRIPTION > UNIVERSAL TRANSMITTER

The universal transmitter learns a hand-held transmitter radio frequency code and stores the code in memory. It consists of 3 buttons with an indicator lamp. Once the universal transmitter code is stored, the universal transmitter emits the radio frequency of the hand-held transmitter when the corresponding button is pressed. The universal transmitter can store 3 unique transmitter codes at a time. The universal transmitter and LH vanity mirror lamp are part of the LH sun visor and share the same power and ground circuits.

DIAGNOSIS AND TESTING > UNIVERSAL TRANSMITTER > SYMPTOM CHART(S)

Symptom Chart: Universal Home Transmitter

Diagnostics in this service information assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

Symptom Chart

Condition	Possible Sources	Actions
The universal transmitter is inoperative	Interior lamps concern Universal transmitter (part of the LH sun visor)	GO to Pinpoint Test A

DIAGNOSIS AND TESTING > UNIVERSAL TRANSMITTER > PINPOINT TESTS

Universal Transmitter Is Inoperative

Normal Operation and Fault Conditions

REFER to: Universal Transmitter - Overview .

Visual Inspection and Diagnostic Pre-checks

- Inspect BCM Fuse 41 (10A).
- Inspect battery saver relay.

DIAGNOSIS AND TESTING > UNIVERSAL TRANSMITTER > PINPOINT TESTS > PINPOINT TEST A : UNIVERSAL TRANSMITTER IS INOPERATIVE > PINPOINT TEST A : UNIVERSAL TRANSMITTER IS INOPERATIVE

A1 CHECK FOR VOLTAGE TO THE UNIVERSAL TRANSMITTER

Check the illumination of the universal transmitter by pressing one of the buttons.

Does the indicator on the universal transmitter illuminate?

Yes	GO to A2

No	GO to A3

A2 PROGRAM A HAND-HELD TRANSMITTER TO THE UNIVERSAL TRANSMITTER

NOTE: The customer's hand-held transmitter is required when programming the universal transmitter.

Program the universal transmitter. Refer to the Owner's Literature.

Does the universal transmitter program successfully?

Yes	The universal transmitter is OK. VERIFY the receiver unit operates correctly.

No	INSTALL a new LH sun visor.

A3 CHECK THE OPERATION OF THE LH (LEFT-HAND) VANITY MIRROR LAMP

Verify the operation of the LH vanity mirror lamp. REFER to: Interior Lighting .

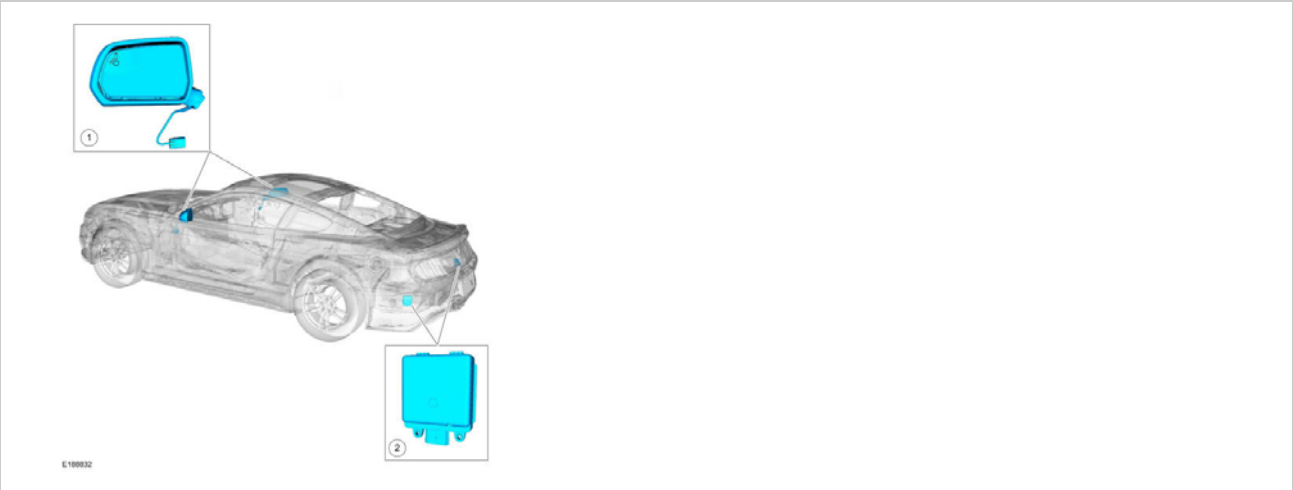
Does the LH vanity mirror lamp operate correctly?

Yes	INSTALL a new LH sun visor.

No	Diagnose the lighting concern. REFER to: Interior Lighting .

Service Manual: SIDE AND REAR VISION

DESCRIPTION AND OPERATION > BLIND SPOT INFORMATION SYSTEM - COMPONENT LOCATION > COMPONENT LOCATION - BLIND SPOT MONITORING SYSTEM



Item	Description
1	Exterior Mirrors
2	SODL and SODR

DESCRIPTION AND OPERATION > BLIND SPOT INFORMATION SYSTEM - OVERVIEW > BLIND SPOT MONITORING

The BLIS ® aids the driver in assessing whether another vehicle is present within a specific area (blind spot) to either side of the vehicle, extending rearward approximately 6 m (20 ft) beyond the rear bumper while driving on roads and highways. The system is not designed to prevent contact with other vehicles or objects. The BLIS ® uses the exterior mirror BLIS ® Light Emitting Diodes (LEDs) to alert the driver that a vehicle has been detected. The BLIS ® provides alerts when the vehicle is in forward gear and the vehicle speeds is greater than 10 km/h (6 mph).

DESCRIPTION AND OPERATION > BLIND SPOT INFORMATION SYSTEM - OVERVIEW > CTA

When the vehicle is in REVERSE (R), the CTA system alerts the driver of vehicles that are approaching from the side when backing out of a front-in parking space or backing towards the road. The system can detect a vehicle approaching from 14 m (45 ft) away at a speed up to 64 km/h (40 mph) from the left or right side of the vehicle. The CTA system uses the exterior mirror BLIS ® Light Emitting Diodes (LEDs), a warning chime from the audio speakers and a message in the IPC message center to notify the driver of approaching vehicles.

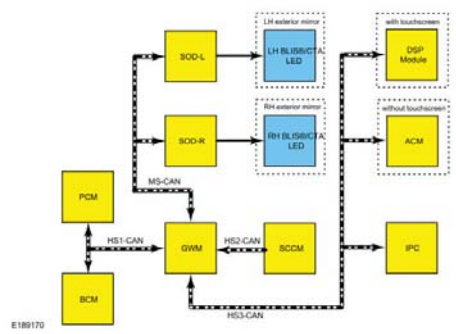
NOTE: If a MyKey ® restricted key is in use, the BLIS ® and CTA system cannot be turned off in the IPC.

DESCRIPTION AND OPERATION > BLIND SPOT INFORMATION SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION

System Operation

DESCRIPTION AND OPERATION > BLIND SPOT INFORMATION SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION > BLIND SPOT INFORMATION SYSTEM (BLIS ®) AND CROSS TRAFFIC ALERT (CTA)

System Diagram



Network Message Chart

IPC Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Side obstacle sensor status - left	SODL	Used to communicate the operating status of the SODL and to command the Cross Traffic Alert (CTA) message center displays.
Side obstacle sensor status - right	SODR	Used to communicate the operating status of the SODR and to command the Cross Traffic Alert (CTA) message center displays.
Cross traffic alert left status	SODL	Used to command the Cross Traffic Alert (CTA) audio chime and the BLIS ® RTT.
Cross traffic alert right status	SODR	

ACM Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Chime mode	IPC	Used to command the Cross Traffic Alert (CTA) audio chimes on without touchscreen.

DSP Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Chime mode	IPC	Used to command the Cross Traffic Alert (CTA) audio chimes on vehicles with touchscreen.

SODL Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Blind Spot Information System (BLIS ®)/Cross Traffic Alert (CTA) enable command	IPC	Used to enable/disable the Blind Spot Information System (BLIS ®) or Cross Traffic Alert (CTA) based on driver input.
Ignition key type	BCM	Used to disable the ability to turn OFF the Blind Spot Information System (BLIS ®) and Cross Traffic Alert (CTA) when a MyKey restricted key is in use.
Gear lever position (automatic transmission vehicles only)	PCM	Used to turn the Blind Spot Information System (BLIS ®) and Cross Traffic Alert (CTA) system on and off depending the gear lever position.
Reverse gear (manual transmission vehicles only)	PCM	Used to turn the Cross Traffic Alert (CTA) system on and off when the transmission is shifted in to and out of REVERSE (R).
Vehicle speed	PCM	Used to activate the Blind Spot Information System (BLIS ®) after an ignition cycle and deactivate the Cross Traffic Alert (CTA) system when the vehicle speed exceeds preset thresholds.
Wiper status	SCCM	Used to determine ambient weather conditions for correct system operation.
Turn signal status	SCCM	Used to generate the secondary alert when a turn signal is activated.

VIN information	BCM	Contains VIN information.

SODR Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Blind Spot Information System (BLIS ®)/Cross Traffic Alert (CTA) enable command	IPC	Used to enable/disable the Blind Spot Information System (BLIS ®) or Cross Traffic Alert (CTA) based on driver input.
Gear lever position (automatic transmission vehicles only)	PCM	Used to turn the Blind Spot Information System (BLIS ®) and Cross Traffic Alert (CTA) system on and off depending the gear lever position.
Reverse gear (manual transmission vehicles only)	PCM	Used to turn the Cross Traffic Alert (CTA) system on and off when the transmission is shifted in to and out of REVERSE (R).
Ignition key type	BCM	Used to disable the ability to turn OFF the Blind Spot Information System (BLIS ®) and Cross Traffic Alert (CTA) when a MyKey ® restricted key is in use.
Vehicle speed	PCM	Used to activate the Blind Spot Information System (BLIS ®) after an ignition cycle and deactivate the Cross Traffic Alert (CTA) system when the vehicle speed exceeds preset thresholds.
Wiper status	SCCM	Used to determine ambient weather conditions for correct system operation.
Turn signal status	SCCM	Used to generate the secondary alert when a turn signal is activated.
VIN information	BCM	Contains VIN information.

Blind Spot Information System (BLIS ®)

The Blind Spot Information System (BLIS ®) provides alerts to the driver when the vehicle is in a forward gear and the vehicle speeds is greater than 6 mph (10 km/h).

The Blind Spot Information System (BLIS ®) can trigger an alert for vehicles that enter the blind zone from the rear, front, or merge into the blind zone from the side. The exterior mirror Blind Spot Information System (BLIS ®)/Cross Traffic Alert (CTA) LED illuminates in the right and/or left exterior mirror when a target is present. For vehicles that pass through the blind zone quickly, typically less than 2 seconds, the Blind Spot Information System (BLIS ®) may not trigger an alert.

If a turn signal is active while Blind Spot Information System (BLIS ®) has detected a target in the blind zone, the Blind Spot Information System (BLIS ®)/Cross Traffic Alert (CTA) LED will flash rapidly. When the turn signal is off, the Blind Spot Information System (BLIS ®) target warnings will be a constant LED illumination.

> *NOTE: There should be no bumper stickers or body filler material used on the rear side bumper cover in the vicinity of the SODL or SODR.*

> *NOTE: The Blind Spot Information System (BLIS ®) is not intended to detect parked vehicles, pedestrians, or objects such as fences, guard rails or trees.*

Due to the nature of radar technology, false alerts may occur under certain circumstances. False alerts occur when the LED illuminates with no target present. False alerts up to 3% (3 out of 100 targets) is considered normal operation. False alerts are temporary and self-correcting. False alerts may be caused by sharp turns around a pole or building, jogging pedestrians or fast moving shopping carts.

Missed targets occur when a target is present and the LED does not illuminate. Missed targets up to 1% (1 out of 100 targets) is considered normal operation.

Circumstances that cause missed alerts are:

- Debris build-up or bumper stickers on the rear bumper sides
- Certain maneuvering of the vehicles entering and exiting the blind zone
- Vehicles passing through the blind zone at high rates of speed
- When several vehicles forming a convoy pass through the blind zone

The Blind Spot Information System (BLIS ®) may not detect an adjacent target immediately when the vehicle accelerates from a standing start with another vehicle alongside.

Cross Traffic Alert (CTA) System

> *NOTE: The Cross Traffic Alert (CTA) system is only active when reverse gear is selected.*

When the transmission is in reverse, the Cross Traffic Alert (CTA) system can detect a vehicle or a bicycle that is approaching at a speed between 5 mph and 40 mph (8 km/h and 64 km/h) and time to impact is between 1 and 2.5 seconds. The distance at which an alert is generated varies depending on the speed of the approaching vehicles or bicycles. The Cross Traffic Alert (CTA) system response time and performance can degrade if vehicles are approaching at speeds greater than 40 mph (64 km/h).

An adjacent parked vehicle or object can affect the systems ability to detect approaching vehicles or bicycles (refer to figure 1). Parking in at extreme angles can further affect the systems ability to detect approaching vehicles or bicycles (refer to figure 2).

Backing towards a curve road can also affect systems ability to detect approaching vehicles or bicycles (refer to figure 3).

Cross Traffic Alert (CTA) detection zones:







The Cross Traffic Alert (CTA) system is designed to detect any objects approaching the vehicle at a speed equal to or greater than 5 mph (8 km/h). This includes vehicles and bicycles. The Cross Traffic Alert (CTA) system has some detection limitations due to the nature of the radar technology used by the SODL and SODR. The system cannot normally detect stationary vehicles, humans, animals or objects such as fences, guard rails or trees.

Circumstances that may cause non-detection are:

- Debris build-up or bumper stickers on the rear bumper sides
- The rear quarter panel of the vehicle is obstructed or partially obstructed by an adjacently parked vehicle or object
- Vehicle approaching at speeds greater than 40 mph (64 km/h)
- Driving in reverse faster than 7.5 mph (12 km/h)
- Damage to sensor and/or sensor area

Due to the nature of radar technology, there may be certain instances when the Cross Traffic Alert (CTA) system alerts the operator, when no object or vehicle is present while backing up. This is known as a false alert. False alerts up to 3% of the time (3 times out of 100 reversals) are considered normal. A false alert may occur when backing out of a garage or backing into a parking space and objects or vehicles are very close to the radar sensors. False alerts are temporary and self-correcting.

Missed targets occur when a target is present and the LED does not illuminate. Missed targets up to 1% (1 out of 100 targets) is considered normal operation.

Circumstances that cause missed alerts are:

- Debris build-up or bumper stickers on the rear bumper sides
- Certain maneuvering of the vehicles entering and exiting the detection zone
- Vehicles passing through the detection zone at high rates of speed
- When several vehicles forming a convoy pass through the detection zone

Exterior Mirror Indication

When the Blind Spot Information System (BLIS ®) or Cross Traffic Alert (CTA) system is active and an object is detected by the SODL and/or SODR, the SODL and/or SODR supplies voltage to illuminate their respective exterior mirror Blind Spot Information System (BLIS ®)/Cross Traffic Alert (CTA) LED. The exterior mirrors provide ground to the Blind Spot Information System (BLIS ®)/Cross Traffic Alert (CTA) Light Emitting Diodes (LEDs).

Each time the vehicle is started, the SODL and SODR command the exterior mirror Blind Spot Information System (BLIS ®)/Cross Traffic Alert (CTA) Light Emitting Diodes (LEDs) to illuminate for approximately 3 seconds, indicating the Blind Spot Information System (BLIS ®) and Cross Traffic Alert (CTA) system is operational.

If a Blind Spot Information System (BLIS ®) or Cross Traffic Alert (CTA) system fault is present, the exterior mirror Blind Spot Information System (BLIS ®)/Cross Traffic Alert (CTA) Light Emitting Diodes (LEDs) remains off, the IPC Blind Spot Information System (BLIS ®) RTT illuminates and a message center warning displays BLIND SPOT SYSTEM FAULT.

Blind Spot Information System (BLIS ®) and Cross Traffic Alert (CTA) Message Center Function

> *NOTE: Cross Traffic Alert (CTA) system faults may not be detected until the transmission is placed in reverse.*

> *NOTE: The BLIS ® and Cross Traffic Alert (CTA) system menus in the message center are not available when a MyKey ® restricted key is in use.*

The Blind Spot Information System (BLIS ®) can be turned off by using the blind spot on/off function in the message center. When the Blind Spot Information System (BLIS ®) has been turned off by the driver or if a system fault is present, the Blind Spot Information System (BLIS ®) RTT in the message center remains on. When turning the system on or off, the exterior mirror Light Emitting Diodes (LEDs) flash 2 times. When the Blind Spot Information System (BLIS ®) is turned off, the driver cannot receive any alerts. The system remains off until turned back on by the driver.

The Cross Traffic Alert (CTA) system can be turned off by selecting the Cross Traffic Alert (CTA) system on/off function in the message center. The system defaults to on with each ignition cycle.

There are some system faults that set Diagnostic Trouble Codes (DTCs) in the SODL or SODR. These Diagnostic Trouble Codes (DTCs) can set a message in the IPC message center that displays BLIND SPOT SYSTEM FAULT and/or CROSS TRAFFIC SYSTEM FAULT. There are also symptom based faults

that do not set a DTC.

Blocked Sensor

NOTE: Blockage sensing becomes active after the wipers are activated.

NOTE: A blocked state is not a system fault. A blocked state is a normal mode of operation under blocked conditions.

An excessive build-up of materials on the rear bumper sides, such as mud or snow, can cause the Blind Spot Information System (BLIS ®) or Cross Traffic Alert (CTA) system functionality to degrade. Heavy rain can have the same affect on the system. If a blocked state is detected, the SODL and SODR blockage sensing senses the performance degradation and enters the SODL and SODR into a blocked state. The performance degradation means alerting late on targets or additional missed targets. Upon entering a blocked state, the SODL and/or SODR send a status message over the MS-CAN to the GWM. The GWM then sends the message to the IPC on the HS-CAN3. The message center displays BLIND SPOT NOT AVAILABLE SENSOR BLOCKED or CROSS TRAFFIC NOT AVAILABLE SENSOR BLOCKED and the LH and RH exterior mirror Blind Spot Information System (BLIS ®)/ Cross Traffic Alert (CTA) Light Emitting Diodes (LEDs) illuminate.

The message center warning can be cleared by the driver, but the amber Blind Spot Information System (BLIS ®) RTT in the IPC remains illuminated. A blocked state will self clear when blockage sensing senses performance has returned to normal operation. The ignition can also be cycled off to clear the blocked state. However, if the blockage is still present after the ignition cycle, after some drive time the system detects again that it is blocked. The blocked sensor message is displayed again in the message center and the amber Blind Spot Information System (BLIS ®) RTT in the IPC is illuminated again.

Due to the nature of radar technology, it is possible to get a blocked sensor warning without the radar sensor being blocked. This is rare and is known as a false blockage warning. A false blocked condition either self-clears or clears after an ignition cycle.

Component Description

SODL / SODR

The SODL and SODR are radar based sensors that are located rearward of the rear wheel under the bumper cover. These sensors detect targets for the Blind Spot Information System (BLIS ®) and Cross Traffic Alert (CTA) system. The modules are capable of storing Diagnostic Trouble Codes (DTCs) for the Blind Spot Information System (BLIS ®) or Cross Traffic Alert (CTA) system when a concern exists. The SODL and SODR communicate through the MS-CAN.

Blind Spot Information System (BLIS ®)/Cross Traffic Alert (CTA) LED

The Blind Spot Information System (BLIS ®)/Cross Traffic Alert (CTA) LED is integral to the LH and RH exterior mirror glass.

DIAGNOSIS AND TESTING > BLIND SPOT INFORMATION SYSTEM > DTC CHART(S)

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic

practices. REFER to: Diagnostic Methods .

SODL and SODR DTC Chart

DTC	Description	Action
B11D6:11	Driver Display Alert LED: Circuit Short To Ground	GO to Pinpoint Test D
B11D6:15	Driver Display Alert LED: Circuit Short To Battery or Open	If the LH or RH Blind Spot Information System (BLIS ®)/Cross Traffic Alert (CTA) LED is inoperative, GO to Pinpoint Test D If the LH or RH Blind Spot Information System (BLIS ®)/Cross Traffic Alert (CTA) LED is always on, GO to Pinpoint Test C
U0100:00	Lost Communication With ECM/PCM "A": No Sub Type Information	GO to Pinpoint Test G
U0101:00	Lost Communication with TCM: No Sub Type Information	GO to Pinpoint Test H
U0146:00	Lost Communication with Gateway "A": No Sub Type Information	GO to Pinpoint Test I
U0401:86	Invalid Data Received from ECM/PCM A: Signal Invalid	This DTC sets when the SODL or SODR receives invalid network data from the PCM. RETRIEVE and REPAIR all non-network Diagnostic Trouble Codes (DTCs) in the other modules on the network. If no PCM Diagnostic Trouble Codes (DTCs) exist, DIAGNOSE the observable symptom.
U0402:86	Invalid Data Received from TCM: Signal Invalid	This DTC sets when the SODL or SODR receives invalid network data from the PCM. RETRIEVE and REPAIR all non-network Diagnostic Trouble Codes (DTCs) in the other modules on the network. If no PCM Diagnostic Trouble Codes (DTCs) exist, DIAGNOSE the observable symptom.
U2100:00	Initial Configuration Not Complete: No Sub Type Information	This DTC sets due to incomplete or incorrect PMI procedures. CHECK the vehicle service history for recent service actions related to this module. If there have been recent service

		actions with this module, INSTALL as-built data from Professional Technician Society (PTS) following diagnostic scan tool instructions under Module Programming>As-Built. REFER to: MODULE CONFIGURATION If there have been no recent service actions, INSTALL a new module to correct the failure to retain configuration data. REFER to: Side Obstacle Detection Control Module .
U2300:55	Central Configuration: Not Configured	This DTC sets when the SODL or SODR do not detect the VIN information on the MS-CAN. RETRIEVE and REPAIR all non-network Diagnostic Trouble Codes (DTCs) in all other modules.
U3000:44	Control Module: Data Memory Failure	CLEAR the SODL or SODR Diagnostic Trouble Codes (DTCs) and REPEAT the self-test. If DTC U3000:44 returns, INSTALL a new SODL or SODR. REFER to: Side Obstacle Detection Control Module .
U3000:45	Control Module: Program Memory Failure	CLEAR the SODL or SODR Diagnostic Trouble Codes (DTCs) and REPEAT the self-test. If DTC U3000:45 returns, INSTALL a new SODL or SODR. REFER to: Side Obstacle Detection Control Module .
U3000:46	Control Module: Calibration/Parameter Memory Failure	CLEAR the SODL or SODR Diagnostic Trouble Codes (DTCs) and REPEAT the self-test. If DTC U3000:46 returns, INSTALL a new SODL or SODR. REFER to: Side Obstacle Detection Control Module .
U3000:49	Control Module: Internal Electronic Failure	CLEAR the SODL or SODR Diagnostic Trouble Codes (DTCs) and REPEAT the self-test. If DTC U3000:49 returns, INSTALL a new SODL or SODR. REFER to: Side Obstacle Detection Control Module .

U3002:62	Vehicle Identification Number: Signal Compare Failure	This DTC sets when the VIN stored in the SODL or SODR does not match the VIN that is broadcast on the network. CHECK the vehicle service history for recent service actions related to this module. If there have been recent service actions with this module, REPEAT the PMI procedure as directed by the diagnostic scan tool. REFER to: MODULE CONFIGURATION . If there have been no recent service actions, INSTALL a new module to correct the failure to retain configuration data. REFER to: Side Obstacle Detection Control Module .

DIAGNOSIS AND TESTING > BLIND SPOT INFORMATION SYSTEM > SYMPTOM CHART(S)

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

Symptom Chart - Blind Spot Information System (BLIS ®)

Condition	Possible Sources	Action
A module does not respond to the diagnostic scan tool	Fuse Communication concern Wiring, terminals or connectors Module	REFER to: MODULE COMMUNICATIONS NETWORK .
The Blind Spot Information System (BLIS ®) is inoperative or does not function correctly	Refer to the Pinpoint Test	GO to Pinpoint Test A
The Blind Spot Information System (BLIS ®) has poor or inconsistent performance	Refer to the Pinpoint Test	GO to Pinpoint Test A
The Blind Spot Information System (BLIS ®) message center warnings are not displayed and the exterior mirror Blind Spot Information System (BLIS ®)/Cross Traffic Alert (CTA) LED does not illuminate	Refer to the Pinpoint Test	GO to Pinpoint Test A

An exterior mirror Blind Spot Information System (BLIS ®)/Cross Traffic Alert (CTA) LED is always on	Refer to the Pinpoint Test	GO to Pinpoint Test C
An exterior mirror Blind Spot Information System (BLIS ®)/Cross Traffic Alert (CTA) LED does not illuminate	Refer to the Pinpoint Test	GO to Pinpoint Test D
The IPC message center displays a blocked sensor message	Refer to the Pinpoint Test	GO to Pinpoint Test E
The Blind Spot Information System (BLIS ®) cannot be turned off in the message center	Refer to the Pinpoint Test	GO to Pinpoint Test F

Symptom Chart - Cross Traffic Alert (CTA)

Condition	Possible Sources	Action
A module does not respond to the diagnostic scan tool	Fuse Communication concern Wiring, terminals or connectors Module	REFER to: MODULE COMMUNICATIONS NETWORK .
The Cross Traffic Alert (CTA) system is inoperative or does not function correctly	Refer to the Pinpoint Test	GO to Pinpoint Test B
The Cross Traffic Alert (CTA) system has poor or inconsistent performance	Refer to the Pinpoint Test	GO to Pinpoint Test B
The Cross Traffic Alert (CTA) system message center warnings are not displayed and the exterior mirror Blind Spot Information System (BLIS ®)/Cross Traffic Alert (CTA) LED does not illuminate	Refer to the Pinpoint Test	GO to Pinpoint Test B
An exterior mirror Blind Spot Information System (BLIS ®)/Cross Traffic Alert (CTA) LED does not illuminate when the audio tone sounds for the Cross Traffic Alert (CTA) system	Refer to the Pinpoint Test	GO to Pinpoint Test B
An exterior mirror Blind Spot Information System (BLIS ®)/Cross Traffic Alert (CTA)	Refer to the Pinpoint Test	GO to Pinpoint Test C

LED is always on		
An exterior mirror Blind Spot Information System (BLIS ®)/Cross Traffic Alert (CTA) LED does not illuminate	Refer to the Pinpoint Test	GO to Pinpoint Test D
The IPC message center displays a blocked sensor message	Refer to the Pinpoint Test	GO to Pinpoint Test E
The Cross Traffic Alert (CTA) system cannot be turned off in the message center	Refer to the Pinpoint Test	GO to Pinpoint Test F

DIAGNOSIS AND TESTING > BLIND SPOT INFORMATION SYSTEM > PINPOINT TESTS > PINPOINT TEST A : BLIND SPOT INFORMATION SYSTEM (BLIS ®) IS INOPERATIVE OR DOES NOT FUNCTION CORRECTLY

Refer to Vehicle Emergency Messaging System for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Blind Spot Information System - System Operation and Component Description .

Possible Sources

- Communication network concern
- Obstruction or damage to the rear bumper cover sides
- Configuration concern
- SODL
- SODR
- IPC concern
- PCM concern
- GWM concern

DIAGNOSIS AND TESTING > BLIND SPOT INFORMATION SYSTEM > PINPOINT TESTS > PINPOINT TEST A : BLIND SPOT INFORMATION SYSTEM (BLIS ®) IS INOPERATIVE OR DOES NOT FUNCTION CORRECTLY > PINPOINT TEST A : BLIND SPOT INFORMATION SYSTEM (BLIS ®) IS INOPERATIVE OR DOES NOT FUNCTION CORRECTLY

A1 VERIFY THE LH (LEFT-HAND) AND RH (RIGHT-HAND) EXTERIOR MIRROR BLIND SPOT

INFORMATION SYSTEM (BLIS ®)/CROSS TRAFFIC ALERT (CTA) LED (LIGHT EMITTING DIODE) OPERATION

Ignition OFF.

Observe the LH and RH exterior mirror Blind Spot Information System (BLIS ®)/Cross Traffic Alert (CTA) Light Emitting Diodes (LEDs).

Start the engine.

Do the LH and RH exterior mirror Blind Spot Information System (BLIS ®)/Cross Traffic Alert (CTA) Light Emitting Diodes (LEDs) illuminate and turn off after approximately 3 seconds?

Yes	GO to A2

No	If either LED is inoperative, GO to Pinpoint Test D If either LED is always on, GO to Pinpoint Test C

A2 VERIFY THE BLIND SPOT INFORMATION SYSTEM (BLIS ®) OPERATION

Verify the operation of the Blind Spot Information System (BLIS ®).

Does the Blind Spot Information System (BLIS ®) operate correctly?

Yes	The concern may have been caused by an intermittent condition such as poor weather conditions or the customer's perception of proper Blind Spot Information System (BLIS ®) operation. REVIEW the normal system operation with the customer. REFER to the Owner's Literature.

No	GO to A3

A3 CHECK FOR SODL (SIDE OBSTACLE DETECTION CONTROL MODULE LH) AND SODR (SIDE OBSTACLE DETECTION CONTROL MODULE RH) OBSTRUCTIONS

Ignition OFF.

Check the lower rear side bumper cover for a build up of mud, bumper stickers or any obstruction.

Are any obstructions present?

Yes	CLEAN and REMOVE all obstructions from the lower rear side bumper cover.

No	GO to A4

A4 INSPECT THE REAR BUMPER COVER, SODL (SIDE OBSTACLE DETECTION CONTROL MODULE LH) AND SODR (SIDE OBSTACLE DETECTION CONTROL MODULE RH) FOR DAMAGE

Inspect the lower rear side bumper cover and the SODL and SODR mounting brackets for damage.

Is any damage present?

Yes	REPAIR or INSTALL new parts as necessary. REFER to: Rear Bumper Cover . REFER to: Side Obstacle Detection Control Module .

No	GO to A5

A5 VERIFY THE SODL (SIDE OBSTACLE DETECTION CONTROL MODULE LH) AND SODR (SIDE OBSTACLE DETECTION CONTROL MODULE RH) PASS THE NETWORK TEST

Ignition ON.

Using a diagnostic scan tool, perform the network test.

Do the SODL and SODR pass the network test?

Yes	GO to A6

No	REFER to: MODULE COMMUNICATIONS NETWORK .

A6 CHECK THE SODL (SIDE OBSTACLE DETECTION CONTROL MODULE LH) AND SODR (SIDE OBSTACLE DETECTION CONTROL MODULE RH) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, retrieve the Diagnostic Trouble Codes (DTCs) from the SODL and SODR.

Are any Diagnostic Trouble Codes (DTCs) present?

Yes	REFER to the SODL and SODR DTC chart .

No	GO to A7

A7 VERIFY THE MESSAGE CENTER FUNCTIONALITY

Verify the message center functions correctly.

Does the message center function correctly?

Yes	GO to A8

No	REFER to: Instrumentation, Message Center and Warning Chimes .

A8 VERIFY THE BLIND SPOT INFORMATION SYSTEM (BLIS ®) IS ENABLED IN THE MESSAGE CENTER

NOTE: Verify a MyKey ® is NOT in use.

Navigate to the Blind Spot Information System (BLIS ®) menu in the message center and verify the Blind Spot Information System (BLIS ®) is ON.

Is the Blind Spot Information System (BLIS ®) ON?

Yes	GO to A9

No	ACTIVATE the Blind Spot Information System (BLIS ®). If the system cannot be activated, GO to A10

A9 CHECK FOR CORRECT GEAR INPUT

Apply the parking brake.

While monitoring the reversing lamps, move the selector lever (automatic transmission) or gearshift lever (manual transmission) through the entire range.

Do the reversing lamps illuminate only in reverse?

Yes	GO to A10

No	REFER to: Reversing Lamps .

A10 PERFORM THE PCM (POWERTRAIN CONTROL MODULE) KOEO (KEY ON, ENGINE OFF) SELF-TEST

Using a diagnostic scan tool, perform the PCM KOEO self-test.

Are any Diagnostic Trouble Codes (DTCs) present?

Yes	Refer to the appropriate article for the procedure.

No	GO to A11

A11 CHECK THE GWM (GATEWAY MODULE A) CONTINUOUS MEMORY DIAGNOSTIC TROUBLE CODES (CMDTCS)

Using a diagnostic scan tool, check the GWM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Are any Diagnostic Trouble Codes (DTCs) present?

Yes	REFER to: MODULE COMMUNICATIONS NETWORK .

No	GO to A12

A12 VERIFY THE SODL (SIDE OBSTACLE DETECTION CONTROL MODULE LH) AND SODR (SIDE OBSTACLE DETECTION CONTROL MODULE RH) CONFIGURATION

Check the vehicle service history for recent service action related to the SODL and SODR.

Have there been any recent service actions related to the SODL or SODR?

Yes	INSTALL As-Built data into the SODL **and** SODR from Professional Technician Society (PTS) following diagnostic scan tool instructions under Module Programming>As-Built.

No	For a SODL concern, GO to A13 For a SODR concern, GO to A14

A13 CHECK FOR CORRECT SODL (SIDE OBSTACLE DETECTION CONTROL MODULE LH) OPERATION

Ignition OFF.

Disconnect and inspect the SODL connector and related in-line connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the SODL connector and related in-line connectors. Make sure the connectors seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new SODL. REFER to: Side Obstacle Detection Control Module .

No	The system is operating correctly at this time. Concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

A14 CHECK FOR CORRECT SODR (SIDE OBSTACLE DETECTION CONTROL MODULE RH) OPERATION

Ignition OFF.

Disconnect and inspect the SODR connector and related in-line connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the SODR connector and related in-line connectors. Make sure the connectors seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new SODR. REFER to: Side Obstacle Detection Control Module .

No	The system is operating correctly at this time. Concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > BLIND SPOT INFORMATION SYSTEM > PINPOINT TESTS > PINPOINT TEST B : THE CROSS TRAFFIC ALERT (CTA) SYSTEM IS INOPERATIVE OR DOES NOT FUNCTION CORRECTLY

Refer to Vehicle Emergency Messaging System for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Blind Spot Information System - System Operation and Component Description .

Possible Sources

- Communication network concern
- Obstruction or damage to the rear bumper cover sides
- Configuration concern
- SODL
- SODR
- IPC concern
- PCM concern
- GWM concern

DIAGNOSIS AND TESTING > BLIND SPOT INFORMATION SYSTEM > PINPOINT TESTS > PINPOINT TEST B : THE CROSS TRAFFIC ALERT (CTA) SYSTEM IS INOPERATIVE OR DOES NOT FUNCTION CORRECTLY > PINPOINT TEST B : THE CROSS TRAFFIC ALERT (CTA) SYSTEM IS INOPERATIVE OR DOES NOT FUNCTION CORRECTLY

B1 VERIFY THE LH (LEFT-HAND) AND RH (RIGHT-HAND) EXTERIOR MIRROR BLIND SPOT INFORMATION SYSTEM (BLIS ®)/CROSS TRAFFIC ALERT (CTA) LED (LIGHT EMITTING DIODE) OPERATION

Ignition OFF.

Observe the LH and RH exterior mirror Blind Spot Information System (BLIS ®)/Cross Traffic Alert (CTA) Light Emitting Diodes (LEDs).

Start the engine.

Do the LH and RH exterior mirror Blind Spot Information System (BLIS ®)/Cross Traffic Alert (CTA) Light Emitting Diodes (LEDs) illuminate and turn off after approximately 3 seconds?

Yes	GO to B2

No	If either LED is inoperative, GO to Pinpoint Test D If either LED is always on, GO to Pinpoint Test C

B2 VERIFY THE CROSS TRAFFIC ALERT (CTA) SYSTEM OPERATION

Verify the operation of the Cross Traffic Alert (CTA) system.

Does the Cross Traffic Alert (CTA) operate correctly?

Yes	The concern may have been caused by an intermittent condition such as poor weather conditions or the customer's perception of proper Cross Traffic Alert (CTA) system operation. REVIEW proper system operation with the customer. REFER to the Owner's Literature.

No	GO to B3

B3 VERIFY THE SODL (SIDE OBSTACLE DETECTION CONTROL MODULE LH) AND SODR (SIDE OBSTACLE DETECTION CONTROL MODULE RH) PASS THE NETWORK TEST

Ignition OFF.

Ignition ON.

Using a diagnostic scan tool, perform the network test.

Do the SODL and SODR pass the network test?

Yes	GO to B4

No	REFER to: MODULE COMMUNICATIONS NETWORK .

B4 CHECK THE SODL (SIDE OBSTACLE DETECTION CONTROL MODULE LH) AND SODR (SIDE OBSTACLE DETECTION CONTROL MODULE RH) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, retrieve all Diagnostic Trouble Codes (DTCs) from the SODL and SODR.

Are any Diagnostic Trouble Codes (DTCs) present?

Yes	REFER to the SODL and SODR DTC chart .

No	GO to B5

B5 VERIFY THE MESSAGE CENTER FUNCTIONALITY

Verify the message center functions correctly.

Does the message center function correctly?

Yes	GO to B6

No	REFER to: Instrumentation, Message Center and Warning Chimes .

B6 VERIFY THE CROSS TRAFFIC ALERT (CTA) IS ENABLED IN THE MESSAGE CENTER

NOTE: Verify a MyKey ® is NOT in use.

Navigate to the Cross Traffic Alert (CTA) menu in the message center and verify the Cross Traffic Alert (CTA) system is ON.

Is the Cross Traffic Alert (CTA) system ON?

Yes	GO to B7

No	ACTIVATE the Cross Traffic Alert (CTA) system. If the system cannot be activated, GO to B8

B7 CHECK FOR CORRECT GEAR INPUT

Apply the parking brake.

While monitoring the reversing lamps, move the selector lever (automatic transmission) or gearshift lever (manual transmission) through the entire range.

Do the reversing lamps illuminate only in reverse?

Yes	GO to B8

No	REFER to: Reversing Lamps .

B8 PERFORM THE PCM (POWERTRAIN CONTROL MODULE) KOEO (KEY ON, ENGINE OFF) SELF-TEST

Using a diagnostic scan tool, perform the PCM KOEO self-test.

Are any Diagnostic Trouble Codes (DTCs) present?

Yes	Refer to the appropriate article for the procedure.

No	GO to B9

B9 CHECK THE GWM (GATEWAY MODULE A) CONTINUOUS MEMORY DIAGNOSTIC TROUBLE CODES (CMDTCS)

Using a diagnostic scan tool, check the GWM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Are any Diagnostic Trouble Codes (DTCs) present?

Yes	REFER to: MODULE COMMUNICATIONS NETWORK .

No	GO to B10

B10 CHECK FOR SODL (SIDE OBSTACLE DETECTION CONTROL MODULE LH) AND SODR (SIDE OBSTACLE DETECTION CONTROL MODULE RH) OBSTRUCTIONS

Ignition OFF.

Inspect the lower rear side bumper cover for a build up of dirt, debris, bumper stickers or other obstructions.

Are any obstructions present?

Yes	CLEAN and REMOVE all obstructions from the lower rear side bumper cover.

No	GO to B11

B11 INSPECT THE REAR BUMPER COVER, SODL (SIDE OBSTACLE DETECTION CONTROL MODULE LH) AND SODR (SIDE OBSTACLE DETECTION CONTROL MODULE RH) FOR DAMAGE

Inspect the lower rear side bumper cover and the SODL and SODR mounting brackets for damage.

Is any damage present?

Yes	REPAIR or INSTALL new components as necessary. REFER to: Side Obstacle Detection Control Module . REFER to: Rear Bumper Cover .

No	GO to B12

B12 VERIFY THE SODL (SIDE OBSTACLE DETECTION CONTROL MODULE LH) AND SODR (SIDE OBSTACLE DETECTION CONTROL MODULE RH) CONFIGURATION

Check the vehicle service history for recent service action related to the SODL and SODR.

Have there been any recent service actions related to the SODL or SODR?

Yes	INSTALL As-Built data into the SODL **and** SODR from Professional Technician Society (PTS) following diagnostic scan tool instructions under Module Programming>As-Built.

No	For a SODL concern, GO to B13 For a SODR concern, GO to B14

B13 CHECK FOR CORRECT SODL (SIDE OBSTACLE DETECTION CONTROL MODULE LH) OPERATION

Ignition OFF.

Disconnect and inspect the SODL connector and related in-line connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the SODL connector and related in-line connectors. Make sure the connectors seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical

	Service Bulletins (TSBs) address this concern, INSTALL a new SODL. REFER to: Side Obstacle Detection Control Module .

No	The system is operating correctly at this time. Concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

B14 CHECK FOR CORRECT SODR (SIDE OBSTACLE DETECTION CONTROL MODULE RH) OPERATION

Ignition OFF.

Disconnect and inspect the SODR connector and related in-line connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the SODR connector and related in-line connectors. Make sure the connectors seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new SODR. REFER to: Side Obstacle Detection Control Module .

No	The system is operating correctly at this time. Concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > BLIND SPOT INFORMATION SYSTEM > PINPOINT TESTS > PINPOINT TEST C : AN EXTERIOR MIRROR BLIND SPOT INFORMATION SYSTEM (BLIS ®)/CROSS TRAFFIC ALERT (CTA) LED (LIGHT EMITTING DIODE) IS ALWAYS ON

Refer to Vehicle Emergency Messaging System for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Blind Spot Information System - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B11D6:15	Driver Display Alert LED: Circuit Short To Battery or Open	This DTC sets in continuous memory and on-demand in the SODL or SODR when a lower than expected current draw (such as a short to voltage) is detected on the LH or RH exterior mirror Blind Spot Information System (BLIS ®)/Cross Traffic Alert (CTA) LED output circuit for 500 mili-seconds.

Possible Sources

- Wiring, terminals or connectors
- Exterior mirror
- Exterior mirror Blind Spot Information System (BLIS ®)/Cross Traffic Alert (CTA) LED (integral to the exterior mirror glass)
- SODL
- SODR

DIAGNOSIS AND TESTING > BLIND SPOT INFORMATION SYSTEM > PINPOINT TESTS > PINPOINT TEST C : AN EXTERIOR MIRROR BLIND SPOT INFORMATION SYSTEM (BLIS ®)/CROSS TRAFFIC ALERT (CTA) LED (LIGHT EMITTING DIODE) IS ALWAYS ON > PINPOINT TEST C : AN EXTERIOR MIRROR BLIND SPOT INFORMATION SYSTEM (BLIS ®)/CROSS TRAFFIC ALERT (CTA) LED (LIGHT EMITTING DIODE) IS ALWAYS ON

C1 VERIFY THE EXTERIOR MIRROR BLIND SPOT INFORMATION SYSTEM (BLIS ®)/CROSS TRAFFIC ALERT (CTA) LED (LIGHT EMITTING DIODE) OPERATION

Start the engine.

Observe the exterior mirror Blind Spot Information System (BLIS ®)/Cross Traffic Alert (CTA) Light Emitting Diodes (LEDs) for 10 seconds.

Is the always on condition still present?

Yes	GO to C2

No	The system is operating correctly at this time. The concern may have been caused by an intermittent condition.

C2 CHECK THE EXTERIOR MIRROR BLIS ®/CROSS TRAFFIC ALERT (CTA) LED (LIGHT EMITTING DIODE) SUPPLY CIRCUITS FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: SODL C4369 . (LH LED concern).

Disconnect: SODR C4370 . (RH LED concern).

Ignition ON.

Measure:

SODL

Positive Lead	Measurement / Action	Negative Lead
C4369-4		Ground

SODR

Positive Lead	Measurement / Action	Negative Lead
C4370-4		Ground

Is any voltage present?

Yes	GO to C3

No	For a LH LED concern, GO to C5 For a RH LED concern, GO to C6

C3 CHECK THE EXTERIOR MIRROR FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: LH Exterior Mirror C520 . (LH LED concern).

Disconnect: RH Exterior Mirror C626 . (RH LED concern).

Ignition ON.

Measure:

SODL

Positive Lead	Measurement / Action	Negative Lead
C4369-4		Ground

SODR

Positive Lead	Measurement / Action	Negative Lead

C4370-4		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to C4

C4 CHECK THE EXTERIOR MIRROR JUMPER HARNESS

Inspect the exterior mirror jumper harness between the vehicle harness and the mirror motors for:

Open or short circuits

Damaged or pushed out pins

Corrosion

Is the harness OK?

Yes	INSTALL a new exterior mirror glass. REFER to: Exterior Mirror .

No	REPAIR the harness as necessary. If the harness cannot be repaired, INSTALL a new exterior mirror. REFER to: Exterior Mirror .

C5 CHECK FOR CORRECT SODL (SIDE OBSTACLE DETECTION CONTROL MODULE LH) OPERATION

Ignition OFF.

Disconnect and inspect the SODL connector and related in-line connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the SODL connector and related in-line connectors. Make sure the connectors seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new SODL. REFER to: Side

	Obstacle Detection Control Module .

No	The system is operating correctly at this time. Concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

C6 CHECK FOR CORRECT SODR (SIDE OBSTACLE DETECTION CONTROL MODULE RH) OPERATION

Ignition OFF.

Disconnect and inspect the SODR connector and related in-line connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the SODR connector and related in-line connectors. Make sure the connectors seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new SODR. REFER to: Side Obstacle Detection Control Module .

No	The system is operating correctly at this time. Concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > BLIND SPOT INFORMATION SYSTEM > PINPOINT TESTS > PINPOINT TEST D : AN EXTERIOR MIRROR BLIND SPOT INFORMATION SYSTEM (BLIS ®)/CROSS TRAFFIC ALERT (CTA) LED (LIGHT EMITTING DIODE) IS INOPERATIVE

Refer to Vehicle Emergency Messaging System for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Blind Spot Information System - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions

B11D6:11	Driver Display Alert LED: Circuit Short To Ground	This DTC sets in continuous memory and on-demand in the SODL or SODR when a higher than expected current draw (such as a short to ground) is detected on the LH or RH exterior mirror Blind Spot Information System (BLIS ®)/Cross Traffic Alert (CTA) LED output circuit for 2.5 seconds.
B11D6:15	Driver Display Alert LED: Circuit Short To Battery or Open	This DTC sets in continuous memory and on-demand in the SODL or SODR when an open circuit is detected on the LH or RH exterior mirror Blind Spot Information System (BLIS ®)/Cross Traffic Alert (CTA) LED output circuit for 2.5 seconds.

Possible Sources

- Wiring, terminals or connectors
- Communication network concern
- Exterior mirror
- SODL
- SODR
- Exterior mirror Blind Spot Information System (BLIS ®)/Cross Traffic Alert (CTA) LED (integral to the exterior mirror glass)

DIAGNOSIS AND TESTING > BLIND SPOT INFORMATION SYSTEM > PINPOINT TESTS > PINPOINT TEST D : AN EXTERIOR MIRROR BLIND SPOT INFORMATION SYSTEM (BLIS ®)/CROSS TRAFFIC ALERT (CTA) LED (LIGHT EMITTING DIODE) IS INOPERATIVE > PINPOINT TEST D : AN EXTERIOR MIRROR BLIND SPOT INFORMATION SYSTEM (BLIS ®)/CROSS TRAFFIC ALERT (CTA) LED (LIGHT EMITTING DIODE) IS INOPERATIVE

D1 CHECK THE BLIND SPOT INFORMATION SYSTEM (BLIS ®)/CROSS TRAFFIC ALERT (CTA) OPERATION

Start the engine.

Observe the left and right exterior mirror Blind Spot Information System (BLIS ®)/Cross Traffic Alert (CTA) Light Emitting Diodes (LEDs).

Do the left and right Blind Spot Information System (BLIS ®)/Cross Traffic Alert (CTA) Light Emitting Diodes (LEDs) illuminate and turn off after 3 seconds?

Yes	The system is operating correctly at this time. The concern may have been caused by an intermittent fault condition. VERIFY the operation of the Blind Spot Information System (BLIS ®) and Cross Traffic Alert (CTA) system.

No	GO to D2

D2 VERIFY THE SODL (SIDE OBSTACLE DETECTION CONTROL MODULE LH) AND SODR (SIDE OBSTACLE DETECTION CONTROL MODULE RH) PASS THE NETWORK TEST

Ignition OFF.

Ignition ON.

Using a diagnostic scan tool, perform a network test.

Do the SODL and SODR pass the network test?

Yes	GO to D3

No	REFER to: MODULE COMMUNICATIONS NETWORK .

D3 CHECK THE DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE SODL (SIDE OBSTACLE DETECTION CONTROL MODULE LH) AND SODR (SIDE OBSTACLE DETECTION CONTROL MODULE RH) SELF-TESTS

Using a diagnostic scan tool, perform the SODL and SODR self-tests.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	For DTC B11D6:11 or DTC B11D6:15, GO to D4 For all other Diagnostic Trouble Codes (DTCs), REFER to the DTC chart .

No	GO to D5

D4 CHECK THE EXTERIOR MIRROR BLIND SPOT INFORMATION SYSTEM (BLIS ®)/CROSS TRAFFIC ALERT (CTA) LED (LIGHT EMITTING DIODE) SUPPLY CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Disconnect: SODL C4369 (LH LED concern).

Disconnect: SODR C4370 (RH LED concern).

Measure:

SODL

Positive Lead	Measurement / Action	Negative Lead
C4369-4	Ω	Ground

SODR

Positive Lead	Measurement / Action	Negative Lead
C4370-4	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to D5

No	REPAIR the circuit.

D5 CHECK THE SUSPECTED EXTERIOR MIRROR BLIND SPOT INFORMATION SYSTEM (BLIS ®)/CROSS TRAFFIC ALERT (CTA) LED (LIGHT EMITTING DIODE) FOR ILLUMINATION

Connect a fused jumper wire:

LH Exterior Mirror LED

Positive Lead	Measurement / Action	Negative Lead
C4369-5		C4369-4

RH Exterior Mirror LED

Positive Lead	Measurement / Action	Negative Lead
C4370-5		C4370-4

Ignition ON.

Does the LED in question illuminate?

Yes	REMOVE the fused jumper wire. For the LH LED, GO to D11 REMOVE the fused jumper wire. For the RH LED, GO to D12

No	REMOVE the fused jumper wire, GO to D6

D6 CHECK THE EXTERIOR MIRROR GLASS BLIND SPOT INFORMATION SYSTEM (BLIS ®)/CROSS TRAFFIC ALERT (CTA) LED (LIGHT EMITTING DIODE) FOR AN OPEN

Ignition OFF.

Disconnect: LH Blind Spot Information System (BLIS ®)/Cross Traffic Alert (CTA) LED C576

(LH LED concern).

Disconnect: RH Blind Spot Information System (BLIS ®)/Cross Traffic Alert (CTA) LED C676 (RH LED concern).

Measure:

LH Exterior Mirror LED

Positive Lead	Measurement / Action	Negative Lead
C576-1	Ω	C576-2

RH Exterior Mirror LED

Positive Lead	Measurement / Action	Negative Lead
C676-1	Ω	C676-2

Is the resistance less than 2000 ohms?

Yes	GO to D7

No	INSTALL a new exterior mirror glass for the mirror in question. REFER to: Exterior Mirror .

D7 CHECK THE EXTERIOR MIRROR BLIND SPOT INFORMATION SYSTEM (BLIS ®)/CROSS TRAFFIC ALERT (CTA) LED (LIGHT EMITTING DIODE) SUPPLY CIRCUIT FOR AN OPEN

Measure:

LH Exterior Mirror LED

Positive Lead	Measurement / Action	Negative Lead
C4369-4	Ω	C576-1

RH Exterior Mirror LED

Positive Lead	Measurement / Action	Negative Lead
C4370-4	Ω	C676-1

Is the resistance less than 3 ohms?

Yes	GO to D9

No	GO to D8

D8 CHECK THE EXTERIOR MIRROR FOR AN OPEN

Disconnect: LH Exterior Mirror C520 (LH LED concern).

Disconnect: RH Exterior Mirror C626 (RH LED concern).

Measure:

LH Exterior Mirror LED

Positive Lead	Measurement / Action	Negative Lead
C4369-4	Ω	C520-11

RH Exterior Mirror LED

Positive Lead	Measurement / Action	Negative Lead
C4370-4	Ω	C626-11

Is the resistance less than 3 ohms?

Yes	GO to D13

No	REPAIR the circuit.

D9 CHECK THE EXTERIOR MIRROR BLIND SPOT INFORMATION SYSTEM (BLIS ®)/CROSS TRAFFIC ALERT (CTA) LED (LIGHT EMITTING DIODE) GROUND CIRCUIT FOR AN OPEN

Measure:

LH Exterior Mirror LED

Positive Lead	Measurement / Action	Negative Lead
C576-2	Ω	Ground

RH Exterior Mirror LED

Positive Lead	Measurement / Action	Negative Lead
C676-2	Ω	Ground

Is the resistance less than 3 ohms?

Yes	For the LH LED, GO to D11 For the RH LED, GO to D12

No	GO to D10

D10 CHECK THE EXTERIOR MIRROR GROUND CIRCUIT FOR AN OPEN

Disconnect: LH Exterior Mirror C520 (LH LED concern).

Disconnect: RH Exterior Mirror C626 (RH LED concern).

Measure:

LH Exterior Mirror LED

Positive Lead	Measurement / Action	Negative Lead
C520-7	Ω	Ground

RH Exterior Mirror LED

Positive Lead	Measurement / Action	Negative Lead
C626-7	Ω	Ground

Is the resistance less than 3 ohms?

Yes	GO to D13

No	REPAIR the circuit.

D11 CHECK FOR CORRECT SODL (SIDE OBSTACLE DETECTION CONTROL MODULE LH) OPERATION

Ignition OFF.

Disconnect and inspect all SODL connector and related in-line connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the SODL connector and related in-line connectors. Make sure all connectors seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new SODL. REFER to: Side Obstacle Detection Control Module .

No	The system is operating correctly at this time. Concern may have been caused by a loose

	or corroded connector. ADDRESS the root cause of any connector or pin issues.

D12 CHECK FOR CORRECT SODR (SIDE OBSTACLE DETECTION CONTROL MODULE RH) OPERATION

Ignition OFF.

Disconnect and inspect all SODR connector and related in-line connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the SODR connector and related in-line connectors. Make sure all connectors seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new SODR. REFER to: Side Obstacle Detection Control Module .

No	The system is operating correctly at this time. Concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

D13 CHECK THE EXTERIOR MIRROR JUMPER HARNESS

Inspect the exterior mirror jumper harness between the vehicle harness and the mirror motors for:

Open or short circuits

Damaged or pushed out pins

Corrosion

Is the harness OK?

Yes	INSTALL a new exterior mirror. REFER to: Exterior Mirror .

No	REPAIR the harness as necessary. If the harness cannot be repaired, INSTALL a new exterior mirror. REFER to: Exterior Mirror .

DIAGNOSIS AND TESTING > BLIND SPOT INFORMATION SYSTEM > PINPOINT TESTS > PINPOINT TEST E : THE IPC (INSTRUMENT PANEL CLUSTER) MESSAGE CENTER DISPLAYS A BLOCKED SENSOR MESSAGE

Normal Operation and Fault Conditions

The blocked sensor message indicates that there is an obstruction on the rear bumper cover near the SODL or SODR that is obscuring the radar used by the SODL and SODR.

Possible Sources

- Build-up of dirt or debris on the rear bumper cover sides
- Damaged rear bumper cover
- SODL
- SODR

DIAGNOSIS AND TESTING > BLIND SPOT INFORMATION SYSTEM > PINPOINT TESTS > PINPOINT TEST E : THE IPC (INSTRUMENT PANEL CLUSTER) MESSAGE CENTER DISPLAYS A BLOCKED SENSOR MESSAGE > PINPOINT TEST E : THE IPC (INSTRUMENT PANEL CLUSTER) MESSAGE CENTER DISPLAYS A BLOCKED SENSOR MESSAGE

E1 INSPECT THE SODL (SIDE OBSTACLE DETECTION CONTROL MODULE LH) AND SODR (SIDE OBSTACLE DETECTION CONTROL MODULE RH) FOR DEBRIS, MUD, SNOW OR ICE

Inspect the rear bumper cover, SODL and SODR for any debris, mud, snow or ice that may be present.

Is the rear bumper cover, SODL or SODR blocked due to debris, mud, snow or ice?

Yes	REMOVE and CLEAN the affected component(s). Once the repair is complete, PERFORM one key cycle and DRIVE the vehicle. The SODL and SODR needs to detect 2 good targets while the vehicle is being driven to clear the blocked condition.

No	GO to E2

E2 INSPECT THE REAR BUMPER COVER, SODL (SIDE OBSTACLE DETECTION CONTROL MODULE LH) AND SODR (SIDE OBSTACLE DETECTION CONTROL MODULE RH) FOR DAMAGE

Thoroughly inspect the rear bumper cover, SODL, SODR and the SODL and SODR mounting brackets for damage.

Is any damage present?

Yes	REPAIR or INSTALL new parts as necessary. REFER to: Rear Bumper Cover . REFER to: Side Obstacle Detection Control Module .

No	For a SODL concern, GO to E3 For a SODR concern, GO to E4

E3 CHECK FOR CORRECT SODL (SIDE OBSTACLE DETECTION CONTROL MODULE LH) OPERATION

Ignition OFF.

Disconnect and inspect all SODL connector and related in-line connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the SODL connector and related in-line connectors. Make sure all connectors seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new SODL. REFER to: Side Obstacle Detection Control Module .

No	The system is operating correctly at this time. Concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

E4 CHECK FOR CORRECT SODR (SIDE OBSTACLE DETECTION CONTROL MODULE RH) OPERATION

Ignition OFF.

Disconnect and inspect all SODR connector and related in-line connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the SODR connector and related in-line connectors. Make sure all connectors seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new SODR. REFER to: Side Obstacle Detection Control Module .

No	The system is operating correctly at this time. Concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > BLIND SPOT INFORMATION SYSTEM > PINPOINT TESTS > PINPOINT TEST F : THE BLIND SPOT INFORMATION SYSTEM (BLIS ®) AND CROSS TRAFFIC ALERT (CTA) SYSTEM CANNOT BE TURNED OFF IN THE MESSAGE CENTER

Normal Operation and Fault Conditions

The Cross Traffic Alert (CTA) is turned off for one key cycle after being disabled in the IPC message center. When the Blind Spot Information System (BLIS ®) is turned off using the message center, it remains off until manually turned back on in the message center. The Blind Spot Information System (BLIS ®) and Cross Traffic Alert (CTA) system menus in the message center are not available when a MyKey ® restricted key is in use.

Possible Sources

- MyKey ® in use
- Communication network concern
- Message center concern
- IPC concern
- SODR concern
- SODL concern

Visual Inspection and Diagnostic Pre-Checks

Verify if a MyKey ® restricted key is in use. If a restricted key is in use, the Blind Spot Information System (BLIS ®) or the Cross Traffic Alert (CTA) system cannot be turned off in the message center.

DIAGNOSIS AND TESTING > BLIND SPOT INFORMATION SYSTEM > PINPOINT TESTS > PINPOINT TEST F : THE BLIND SPOT INFORMATION SYSTEM (BLIS ®) AND CROSS TRAFFIC ALERT (CTA) SYSTEM CANNOT BE TURNED OFF IN THE MESSAGE CENTER > PINPOINT TEST F : THE BLIND SPOT INFORMATION SYSTEM

(BLIS ®) AND CROSS TRAFFIC ALERT (CTA) SYSTEM CANNOT BE TURNED OFF IN THE MESSAGE CENTER

F1 VERIFY WHETHER A MYKEY ® RESTRICTED KEY IS IN USE

Verify whether a MyKey ® restricted key is in use.

Is a MyKey ® restricted key in use?

Yes	The system is operating correctly at this time. INFORM the customer of normal operation. REFER to the Owner's Literature.

No	GO to F2

F2 PERFORM A NETWORK TEST

Ignition ON.

Using a diagnostic scan tool, perform a network test.

Do the IPC, SODL and SODR pass the network test?

Yes	GO to F3

No	REFER to: MODULE COMMUNICATIONS NETWORK .

F3 CHECK FOR DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE SODL (SIDE OBSTACLE DETECTION CONTROL MODULE LH) AND SODR (SIDE OBSTACLE DETECTION CONTROL MODULE RH) SELF-TESTS

Using a diagnostic scan tool, perform the SODL and SODR self-tests.

Are any Diagnostic Trouble Codes (DTCs) present?

Yes	REFER to the DTC chart .

No	GO to F4

F4 CHECK THE MESSAGE CENTER FOR CORRECT OPERATION

Check the message center for correct operation while turning the Blind Spot Information System (BLIS ®) and Cross Traffic Alert (CTA) system on and off.

Does the message center function correctly?

Yes	The system is operating correctly at this time. The concern may have been caused by an intermittent fault condition.

No	REFER to: Instrumentation, Message Center and Warning Chimes .

DIAGNOSIS AND TESTING > BLIND SPOT INFORMATION SYSTEM > PINPOINT TESTS > PINPOINT TEST G : DTC (DIAGNOSTIC TROUBLE CODE) U0100:00

Refer to Module Communications Network for schematic and connector information.

Normal Operation and Fault Conditions

The SODL and SODR communicate with the PCM through the GWM.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0100:00	Lost Communication with ECM/PCM "A": No Sub Type Information	A continuous memory DTC that sets in the SODL and SODR when messages received from the PCM over the HS-CAN1 through the GWM are missing for 2 seconds or more.

Possible Sources

- Communication network concern
- PCM
- GWM concern

DIAGNOSIS AND TESTING > BLIND SPOT INFORMATION SYSTEM > PINPOINT TESTS > PINPOINT TEST G : DTC (DIAGNOSTIC TROUBLE CODE) U0100:00 > PINPOINT TEST G : DTC (DIAGNOSTIC TROUBLE CODE) U0100:00

G1 VERIFY THE CUSTOMER'S CONCERN

Ignition ON.

Verify if there is an observable symptom present.

Is an observable symptom present?

Yes	GO to G2

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition. CLEAR the DTC.

G2 VERIFY THAT THE DIAGNOSTIC SCAN TOOL CAN COMMUNICATE WITH THE PCM (POWERTRAIN CONTROL MODULE)

Connect a diagnostic scan tool.

Check that a vehicle session can be established using the diagnostic scan tool.

Can a vehicle session be established?

Yes	GO to G3

No	REFER to: MODULE COMMUNICATIONS NETWORK .

G3 CHECK THE SODL (SIDE OBSTACLE DETECTION CONTROL MODULE LH) AND SODR (SIDE OBSTACLE DETECTION CONTROL MODULE RH) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, clear the SODL and SODR Diagnostic Trouble Codes (DTCs).

Ignition OFF.

Ignition ON.

Wait 10 seconds.

Check the SODL and SODR Diagnostic Trouble Codes (DTCs).

Is DTC U0100:00 retrieved again?

Yes	GO to G4

No	The system is operating correctly at this time. The DTC may have set due to high network traffic or an intermittent fault condition.

G4 RETRIEVE THE RECORDED DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE PCM (POWERTRAIN CONTROL MODULE) KOEO (KEY ON, ENGINE OFF) SELF-TEST

Using a diagnostic scan tool, perform the PCM KOEO self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	Refer to the appropriate article for the procedure. REFER to the ENGINE CONTROLS - INTRODUCTION (EXCEPT DIESEL & HYBRID) .

No	GO to G5

G5 PERFORM THE SODL (SIDE OBSTACLE DETECTION CONTROL MODULE LH) AND SODR (SIDE OBSTACLE DETECTION CONTROL MODULE RH) SELF-TEST

Using a diagnostic scan tool, perform the SODL and SODR self-tests.

Are any non-network Diagnostic Trouble Codes (DTCs) present?

Yes	DIAGNOSE all non-network Diagnostic Trouble Codes (DTCs). REFER to the DTC chart .

No	GO to G6

G6 CHECK THE GWM (GATEWAY MODULE A) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, check the GWM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: MODULE COMMUNICATIONS NETWORK .

No	GO to G7

G7 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0100 SET IN OTHER MODULES

Using a diagnostic scan tool, clear all Diagnostic Trouble Codes (DTCs) from all modules.

Ignition OFF.

Wait 10 seconds.

Ignition ON.

Wait 10 seconds.

Retrieve the Continuous Memory Diagnostic Trouble Codes (CMDTCs) from all modules.

Is DTC U0100 set in any other module?

Yes	GO to G8

No	If there is an observable symptom, DIAGNOSE the observable symptom. If there is no observable symptom, the system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

G8 CHECK FOR CORRECT PCM (POWERTRAIN CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all PCM connectors and related in-line connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the PCM connectors and related in-line connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PCM. Refer to the appropriate article for the procedure.

No	The system is operating correctly at this time. Concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > BLIND SPOT INFORMATION SYSTEM > PINPOINT TESTS > PINPOINT TEST H : DTC (DIAGNOSTIC TROUBLE CODE) U0101:00

Refer to Module Communications Network for schematic and connector information.

Normal Operation and Fault Conditions

The SODL and SODR communicate with the PCM through the GWM. The TCM is contained inside the PCM and cannot be serviced separately.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0101:00	Lost Communication with TCM: No Sub Type Information	A continuous memory DTC that sets in the SODL and SODR when messages received from the PCM over the HS-CAN1 through the GWM are missing for 2 seconds or more.

Possible Sources

- Communication network concern
- PCM
- GWM concern

DIAGNOSIS AND TESTING > BLIND SPOT INFORMATION SYSTEM > PINPOINT

TESTS > PINPOINT TEST H : DTC (DIAGNOSTIC TROUBLE CODE) U0101:00 > PINPOINT TEST H : DTC (DIAGNOSTIC TROUBLE CODE) U0101:00

H1 VERIFY THE CUSTOMER CONCERN

Ignition ON.

Verify there is an observable symptom present.

Is an observable symptom present?

Yes	GO to H2

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition. CLEAR the DTC.

H2 CHECK THE COMMUNICATION NETWORK

Using a diagnostic scan tool, perform a network test.

Does the PCM pass the network test?

Yes	GO to H3

No	REFER to: MODULE COMMUNICATIONS NETWORK .

H3 PERFORM THE SODL (SIDE OBSTACLE DETECTION CONTROL MODULE LH) AND SODR (SIDE OBSTACLE DETECTION CONTROL MODULE RH) SELF-TEST

Using a diagnostic scan tool, perform the SODL and SODR self-tests.

Are any non-network Diagnostic Trouble Codes (DTCs) present?

Yes	DIAGNOSE all non-network Diagnostic Trouble Codes (DTCs). REFER to the DTC chart .

No	GO to H4

H4 CHECK THE GWM (GATEWAY MODULE A) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, check the GWM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: MODULE COMMUNICATIONS NETWORK .

No	GO to H5

H5 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0101 SET IN OTHER MODULES

Using a diagnostic scan tool, clear all Diagnostic Trouble Codes (DTCs) from all modules.

Ignition OFF.

Wait 10 seconds.

Ignition ON.

Wait 10 seconds.

Retrieve the Continuous Memory Diagnostic Trouble Codes (CMDTCs) from all modules.

Is DTC U0101 set in any other module?

Yes	GO to H6

No	If there is an observable symptom, DIAGNOSE the observable symptom. If there is no observable symptom, the system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

H6 CHECK FOR CORRECT PCM (POWERTRAIN CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all PCM connectors and related in-line connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the PCM connectors and related in-line connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PCM. Refer to the appropriate article for the procedure.

No	The system is operating correctly at this time. Concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > BLIND SPOT INFORMATION SYSTEM > PINPOINT TESTS > PINPOINT TEST I : DTC (DIAGNOSTIC TROUBLE CODE) U0146:00

Refer to Module Communications Network for schematic and connector information.

Normal Operation and Fault Conditions

The SODL and SODR communicate with the GWM through the MS-CAN.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0146:00	Lost Communication with Gateway "A": No Sub Type Information	A continuous memory DTC that sets in the SODL and SODR when messages received through the GWM are missing for 2 seconds or more.

Possible Sources

- Communication network concern
- GWM

DIAGNOSIS AND TESTING > BLIND SPOT INFORMATION SYSTEM > PINPOINT TESTS > PINPOINT TEST I : DTC (DIAGNOSTIC TROUBLE CODE) U0146:00 > PINPOINT TEST I : DTC (DIAGNOSTIC TROUBLE CODE) U0146:00

I1 VERIFY THE CUSTOMER CONCERN

Ignition ON.

Verify there is an observable symptom present.

Is an observable symptom present?

Yes	GO to I2

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition. CLEAR the DTC.

I2 CHECK THE COMMUNICATION NETWORK

Using a diagnostic scan tool, perform a network test.

Does the GWM pass the network test?

Yes	GO to I3

No	REFER to: MODULE COMMUNICATIONS NETWORK .

I3 CHECK THE GWM (GATEWAY MODULE A) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, check the GWM CONTINUOUS MEMORY DIAGNOSTIC TROUBLE CODES (CMDTCS).

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: MODULE COMMUNICATIONS NETWORK .

No	GO to I4

I4 PERFORM THE SODL (SIDE OBSTACLE DETECTION CONTROL MODULE LH) AND SODR (SIDE OBSTACLE DETECTION CONTROL MODULE RH) SELF-TEST

Using a diagnostic scan tool, perform the SODL and SODR self-tests.

Are any non-network Diagnostic Trouble Codes (DTCs) present?

Yes	DIAGNOSE all non-network Diagnostic Trouble Codes (DTCs). REFER to the DTC chart .

No	GO to I5

I5 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0146 SET IN OTHER MODULES

Using a diagnostic scan tool, clear all Diagnostic Trouble Codes (DTCs) from all modules.

Ignition OFF.

Wait 10 seconds.

Ignition ON.

Wait 10 seconds.

Retrieve the Continuous Memory Diagnostic Trouble Codes (CMDTCs) from all modules.

Is DTC U0146 set in any other module?

Yes	GO to I6

No	If there is an observable symptom, DIAGNOSE the observable symptom. If there is no observable symptom, the system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

I6 CHECK FOR CORRECT GWM (GATEWAY MODULE A) OPERATION

Ignition OFF.

Disconnect and inspect the GWM connector and related in-line connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the GWM connector and related in-line connectors. Make sure the connectors seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new GWM. REFER to: Gateway Module A (GWM) .

No	The system is operating correctly at this time. Concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

REMOVAL AND INSTALLATION > SIDE OBSTACLE DETECTION CONTROL MODULE > REMOVAL

Side obstacle detection control module

NOTE: This step is only necessary if the SODL or SODR is being replaced.

1.

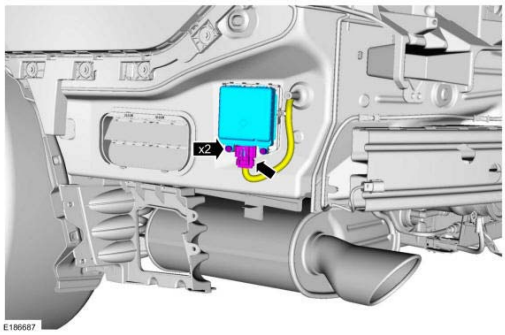
Using a diagnostic scan tool, begin the PMI process for the SODL or SODR following the on-screen instructions.

2.

Remove the rear bumper cover. Refer to: Rear Bumper Cover .

3.

Disconnect the electrical connector, remove the screws and the SODL or SODR.



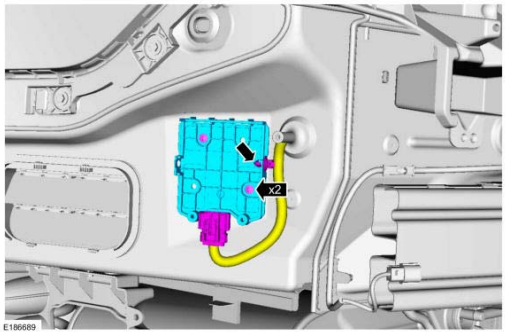
Side obstacle detection control module bracket

4.

Remove the SODL or SODR.

5.

Disconnect the wiring harness guide, remove the screws and the side obstacle control module bracket.



REMOVAL AND INSTALLATION > SIDE OBSTACLE DETECTION CONTROL MODULE > INSTALLATION

1.

To install, reverse the removal procedure.

> *NOTE: Carry out this step only if a SODL or SODR is being replaced.*

2.
Using a diagnostic scan tool, complete the PMI process for the SODL or SODR following the on-screen instructions.

DESCRIPTION AND OPERATION > STEERING WHEEL AND COLUMN ELECTRICAL COMPONENTS - OVERVIEW > STEERING COLUMN SWITCHES OVERVIEW

The steering column switches are located on and around the steering column. They enable the driver to control various vehicle functions while remaining focused on driving. The steering column switches consist of:

- Left multifunction switch - mounted on the left side of the SCCM and is used to control the turn signals, low/high beam selection and the flash-to-pass feature. Refer to: Exterior Lighting - System Operation and Component Description .
- Right multifunction switch - mounted on the right side of the SCCM and is used to control the windshield wipers and washer. Refer to: Wipers and Washers - System Operation and Component Description .
- Steering wheel switches - mounted on the front of the steering wheel and can be serviced separately from the steering wheel. These are used to access settings and controls displayed in the message center or for control of the cruise control system, the audio system and the SYNC ® system.
    - For the message center (left upper switch), Refer to: Message Center - System Operation and Component Description .
    - For the cruise control system (left lower switch), Refer to: Cruise Control - System Operation and Component Description . Refer to: Cruise Control - System Operation and Component Description .
    - For the audio system (right upper switch), Refer to the appropriate article for the procedure.
    - For the SYNC ® system (right lower switch), Refer to the appropriate article for the procedure.
- Paddle shifter switches - mounted on rear of the steering wheel and are used to control the transmission up and down shifts. Refer to: External Controls - System Operation and Component Description .

The steering column and steering wheel switches interface with other modules and components on the vehicle through the SCCM, which communicates on the High Speed Controller Area Network 2 (HS2-CAN).

DESCRIPTION AND OPERATION > STEERING WHEEL AND COLUMN ELECTRICAL COMPONENTS - OVERVIEW > PUSH BUTTON START IGNITION SYSTEM OVERVIEW

The push button start ignition system is used to place the ignition in the ON or OFF mode and to start or shut off the vehicle powertrain. The push button ignition switch is integrated into the FCIM.

DESCRIPTION AND OPERATION > STEERING WHEEL AND COLUMN ELECTRICAL COMPONENTS - OVERVIEW > STEERING COLUMN LOCK SYSTEM OVERVIEW

The steering column lock deters vehicle theft by locking the steering column and preventing the steering wheel from being used to turn the front wheels.

DESCRIPTION AND OPERATION > STEERING WHEEL AND COLUMN ELECTRICAL COMPONENTS - SYSTEM OPERATION AND COMPONENT DESCRIPTION

System Operation

DESCRIPTION AND OPERATION > STEERING WHEEL AND COLUMN ELECTRICAL COMPONENTS - SYSTEM OPERATION AND COMPONENT DESCRIPTION > NETWORK MESSAGE CHART - PUSH BUTTON IGNITION SWITCH

GWM Module Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Ignition status	BCM	This message informs the GWM of the current ignition status; off, run, start, unknown or invalid.

PCM Module Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Ignition status	BCM	This message informs the PCM of the current ignition status; off, run, start, unknown or invalid.

Push Button Ignition Switch

The push button ignition switch is used to control the ignition mode.

There are 2 circuits the BCM monitors from the ignition switch to change the ignition mode. One circuit is monitored for voltage and the other for a ground signal. When the START/STOP button is pressed, one circuit routes battery voltage to the BCM while a voltage signal from the BCM on the second circuit is routed to ground, indicating a request to change the ignition state. Changing the ignition state from the OFF mode works in conjunction with the PATS. The BCM must recognize a valid programmed key before it changes the ignition mode out of OFF. Refer to: Passive Anti-Theft System (PATS) - System Operation and Component Description .

Refer to the following table for information about achieving the various ignition states.

Ignition Entry Condition	Desired Ignition Mode	Action To Take
Off	ON (engine off)	Press the START/STOP button without applying the brake pedal.
Off or on	START	Apply and the brake pedal (automatic transmission) or fully apply the clutch (manual transmission) and then press the START/STOP button.
On (engine off)	OFF	Press the START/STOP button.

On (engine running)	OFF	Press and hold the START/STOP button.

Ignition Mode LED Indicator

The ignition mode LED indicates the ignition mode of the vehicle. The BCM controls the voltage to the ignition mode LED indicator. Refer to the following table.

Ignition Mode	Ignition Mode LED Indicator
Off	Off
On (engine off)	Flashing
On (engine running)	On

OFF

The BCM controls the relays providing voltage to the vehicle electrical systems. When the ignition is in the ON mode, a single press and release of the START/STOP button changes the ignition to the OFF mode. No programmed key is required to change the ignition to the OFF mode when the vehicle is running.

If the vehicle is in motion, a momentary press of the START/STOP button does not shut the vehicle off. If the vehicle is moving at a speed greater than 15 km/h (9 mph), the START/STOP button must be pressed and held for longer than one second (or pressed 3 times within 2 seconds) to turn the ignition off.

When the BCM changes the ignition state to OFF, it communicates the ignition mode to the other modules by sending an ignition status message over the CAN.

ON

The BCM must recognize a programmed key before it changes the ignition mode out of OFF. When the START/STOP button is pressed when the ignition is off, the BCM checks the vehicle for a valid programmed key as part of the PATS function. If no valid programmed key is detected, the ignition remains off. Refer to: Passive Anti-Theft System (PATS) - System Operation and Component Description .

When the ignition is in the ON mode, the BCM activates the run/start relay to provide voltage to the vehicle electrical systems and communicates the ignition mode to the other modules by sending an ignition status message over the CAN.

When the vehicle enters ON mode, multiple indicators in the IPC prove out and the IPC displays the gear selection and the vehicle mileage.

START

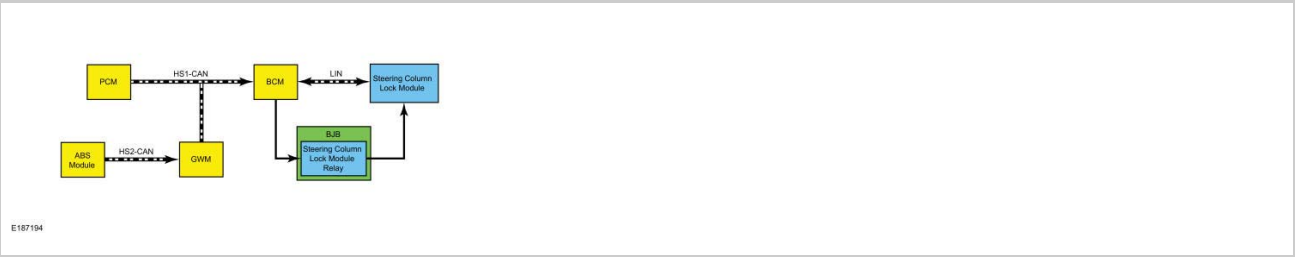
If the brake pedal is applied when the START/STOP button is pressed with the ignition in the off mode, the vehicle temporarily goes into the START mode so long as a valid programmed key is detected within the vehicle.

In addition to activating the run/start relay, the BCM communicates the ignition mode to the other modules by sending an ignition status message over the CAN.

Once the ignition has entered START mode, the ignition mode indicator in the ignition switch illuminates.

The engine can be started from any ignition mode.

System Diagram - Steering Column Lock



Network Message Chart - Steering Column Lock

BCM Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Engine RPM data	PCM	Provides the BCM with the engine speed to indicate if it is running or not.
Wheel rotation count	ABS module	Provides the BCM with the vehicle speed to indicate if it is moving or stationary.

Steering Column Lock

The steering column lock is used to deter vehicle theft by electronically locking the steering column. This prevents the steering wheel from being rotated to turn the front wheels.

The steering column unlocks when:

- the passive entry feature is used to open the driver door.
- the driver door is opened after unlocking the vehicle with a RKE transmitter.
- the START/STOP button is pressed and a valid programmed passive key is detected.
- the remote start feature is activated.

The steering column locks after:

- the ignition is turned off and 45 seconds have elapsed since the delayed accessory feature has turned off.
- 45 seconds have elapsed since the remote feature turns off the vehicle.

The BCM controls the voltage provided to the steering column lock module using a relay (located in the BJB) and communicates with it over a LIN. The BCM monitors input from various systems to determine when to send a command to lock or unlock the steering column. The steering column lock module locks and unlocks the steering column as directed by commands received from the BCM.

If the BCM detects a fault from the steering column lock module or the LIN, the BCM prevents the vehicle from starting.

The BCM does not provide power to the steering column lock module when the vehicle is moving or the engine is running.

Steering Column Lock Messages

The message center displays a message when the BCM detects a fault from the steering column lock

module.

The Steering Malfunction message displays when a fault with the electronic steering column lock system is present and must be diagnosed.

The Turn the wheel while starting message displays when the steering column lock module is unable to unlock the steering column because of a high amount of torque against the lock (such as when the wheels are against a curb when the vehicle is shut off). The torque against the steering column lock must be relieved for the steering column to unlock.

Turn the vehicle off, rotate and hold the steering wheel in one direction while turning the vehicle on. If the message displays again, turn the vehicle off, rotate and hold the steering wheel in the other direction while turning the vehicle on.

DESCRIPTION AND OPERATION > STEERING WHEEL AND COLUMN ELECTRICAL COMPONENTS - SYSTEM OPERATION AND COMPONENT DESCRIPTION > COMPONENT DESCRIPTION > PUSH BUTTON IGNITION SWITCH

The push button ignition switch is used to control the ignition mode.

There are 2 circuits the BCM monitors from the ignition switch to change the ignition mode. One circuit is monitored for voltage and the other for a ground signal. When the START/STOP button is pressed, one circuit routes battery voltage to the BCM while a voltage signal from the BCM on the second circuit is routed to ground, indicating a request to change the ignition state. Changing the ignition state from the OFF mode works in conjunction with the PATS. The BCM must recognize a valid programmed key before it changes the ignition mode out of OFF. Refer to: Passive Anti-Theft System (PATS) - System Operation and Component Description .

Refer to the following table for information about achieving the various ignition states.

Ignition Entry Condition	Desired Ignition Mode	Action To Take
Off	ON (engine off)	Press the START/STOP button without applying the brake pedal.
Off or on	START	Apply and the brake pedal (automatic transmission) or fully apply the clutch (manual transmission) and then press the START/STOP button.
On (engine off)	OFF	Press the START/STOP button.
On (engine running)	OFF	Press and hold the START/STOP button.

Ignition Mode LED Indicator

The ignition mode LED indicates the ignition mode of the vehicle. The BCM controls the voltage to the ignition mode LED indicator. Refer to the following table.

Ignition Mode	Ignition Mode LED Indicator
Off	Off

On (engine off)	Flashing
On (engine running)	On

OFF

The BCM controls the relays providing voltage to the vehicle electrical systems. When the ignition is in the ON mode, a single press and release of the START/STOP button changes the ignition to the OFF mode. No programmed key is required to change the ignition to the OFF mode when the vehicle is running.

If the vehicle is in motion, a momentary press of the START/STOP button does not shut the vehicle off. If the vehicle is moving at a speed greater than 15 km/h (9 mph), the START/STOP button must be pressed and held for longer than one second (or pressed 3 times within 2 seconds) to turn the ignition off.

When the BCM changes the ignition state to OFF, it communicates the ignition mode to the other modules by sending an ignition status message over the CAN.

ON

The BCM must recognize a programmed key before it changes the ignition mode out of OFF. When the START/STOP button is pressed when the ignition is off, the BCM checks the vehicle for a valid programmed key as part of the PATS function. If no valid programmed key is detected, the ignition remains off. Refer to: Passive Anti-Theft System (PATS) - System Operation and Component Description .

When the ignition is in the ON mode, the BCM activates the run/start relay to provide voltage to the vehicle electrical systems and communicates the ignition mode to the other modules by sending an ignition status message over the CAN.

When the vehicle enters ON mode, multiple indicators in the IPC prove out and the IPC displays the gear selection and the vehicle mileage.

START

If the brake pedal is applied when the START/STOP button is pressed with the ignition in the off mode, the vehicle temporarily goes into the START mode so long as a valid programmed key is detected within the vehicle.

In addition to activating the run/start relay, the BCM communicates the ignition mode to the other modules by sending an ignition status message over the CAN.

Once the ignition has entered START mode, the ignition mode indicator in the ignition switch illuminates.

The engine can be started from any ignition mode.

DESCRIPTION AND OPERATION > STEERING WHEEL AND COLUMN ELECTRICAL COMPONENTS - SYSTEM OPERATION AND COMPONENT DESCRIPTION > COMPONENT DESCRIPTION > NETWORK MESSAGE CHART - STEERING COLUMN LOCK

BCM Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Engine RPM data	PCM	Provides the BCM with the engine

		speed to indicate if it is running or not.
Wheel rotation count	ABS module	Provides the BCM with the vehicle speed to indicate if it is moving or stationary.

DESCRIPTION AND OPERATION > STEERING WHEEL AND COLUMN ELECTRICAL COMPONENTS - SYSTEM OPERATION AND COMPONENT DESCRIPTION > COMPONENT DESCRIPTION > STEERING COLUMN LOCK

The steering column lock is used to deter vehicle theft by electronically locking the steering column. This prevents the steering wheel from being rotated to turn the front wheels.

The steering column unlocks when:

- the passive entry feature is used to open the driver door.
- the driver door is opened after unlocking the vehicle with a RKE transmitter.
- the START/STOP button is pressed and a valid programmed passive key is detected.
- the remote start feature is activated.

The steering column locks after:

- the ignition is turned off and 45 seconds have elapsed since the delayed accessory feature has turned off.
- 45 seconds have elapsed since the remote feature turns off the vehicle.

The BCM controls the voltage provided to the steering column lock module using a relay (located in the BJB) and communicates with it over a LIN. The BCM monitors input from various systems to determine when to send a command to lock or unlock the steering column. The steering column lock module locks and unlocks the steering column as directed by commands received from the BCM.

If the BCM detects a fault from the steering column lock module or the LIN, the BCM prevents the vehicle from starting.

The BCM does not provide power to the steering column lock module when the vehicle is moving or the engine is running.

Steering Column Lock Messages

The message center displays a message when the BCM detects a fault from the steering column lock module.

The Steering Malfunction message displays when a fault with the electronic steering column lock system is present and must be diagnosed.

The Turn the wheel while starting message displays when the steering column lock module is unable to unlock the steering column because of a high amount of torque against the lock (such as when the wheels are against a curb when the vehicle is shut off). The torque against the steering column lock must be relieved for the steering column to unlock.

Turn the vehicle off, rotate and hold the steering wheel in one direction while turning the vehicle on. If the

message displays again, turn the vehicle off, rotate and hold the steering wheel in the other direction while turning the vehicle on.

Component Description

Push Button Ignition Switch

The push button ignition switch is a momentary dual contact switch that provides direct input to the BCM and PCM. Both sets of contacts are normally open. When the START/STOP button is pressed, one set of contacts provides a ground signal to the BCM and the other set of contacts supplies voltage to the BCM and the PCM.

The ignition mode LED indicator is located near the top of the START/STOP button and is controlled by the BCM.

The ignition switch is part of the FCIM and cannot be serviced separately.

Steering Column Lock Module

The steering column lock module locks and unlocks the steering column based on commands received from the BCM. The steering column lock module monitors the position of the steering column lock and, if a fault is detected, reports the failure to the BCM.

When the steering column lock module is replaced, the BCM must configured/trained to the new steering column lock module for the steering column lock module to operate correctly.

The BCM sets a DTC if a fault is detected with the steering column lock module. Additionally, if the BCM is not configured to the steering column lock module, the steering column module keeps the column locked, a programming and/or configuration DTC sets and the vehicle does not start. To configure the BCM to the steering column lock module, Refer to: Anti-Theft Security Access .

BCM

The BCM controls the run/start relays and sets the vehicle ignition mode based on inputs and communicates the ignition mode to other modules over the CAN. If a fault is detected in the ignition switch system, Diagnostic Trouble Codes (DTCs) are set in the BCM.

The BCM requires at least 2 keys to be programmed, and the PMI and parameter reset procedures carried out when replaced. Additionally, if equipped with a steering column lock module, the BCM to Electronic Steering Column Lock (ESCL) configuration must be carried out.

DIAGNOSIS AND TESTING > STEERING WHEEL AND COLUMN ELECTRICAL COMPONENTS > DTC CHARTS > BCM DTC CHART

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

DTC	Description	Action
B1026:04	Steering Column Lock: System Internal Failure	DIAGNOSE all other Diagnostic Trouble Codes (DTCs) present. If no other Diagnostic Trouble Codes (DTCs) are present, INSTALL a new steering column lock module.

B1026:05	Steering Column Lock: System Programming Failure	CARRY OUT the BCM to Electronic Steering Column Lock (ESCL) configuration/training procedure. REFER to: Anti-Theft Security Access .
B1026:09	Steering Column Lock: Component Failure	INSTALL a new steering column lock module.
B1026:49	Steering Column Lock: Internal Electronic Failure	INSTALL a new steering column lock module.
B1026:51	Steering Column Lock: Not Programmed	CARRY OUT the BCM to Electronic Steering Column Lock (ESCL) configuration/training procedure. REFER to: Anti-Theft Security Access .
B1026:56	Steering Column Lock: Invalid / Incompatible Configuration	CARRY OUT the BCM to Electronic Steering Column Lock (ESCL) configuration/training procedure. REFER to: Anti-Theft Security Access .
B1026:77	Steering Column Lock: Commanded Position Not Reachable	INSTALL a new steering column lock module.
B1026:87	Steering Column Lock: Missing Message	GO to Pinpoint Test D
B1026:92	Steering Column Lock: Performance or Incorrect Operation	GO to Pinpoint Test D
B1026:93	Steering Column Lock: No Operation	DIAGNOSE all other Diagnostic Trouble Codes (DTCs) present. If no other Diagnostic Trouble Codes (DTCs) are present, INSTALL a new steering column lock module.
B1026:96	Steering Column Lock: Component Internal Failure	INSTALL a new steering column lock module.
B108A:01	Start Button: General Electrical Failure	GO to Pinpoint Test A
B108A:24	Start Button: Signal Stuck High	GO to Pinpoint Test A
B1142:29	Ignition Status 1: Signal Invalid	GO to Pinpoint Test A
B1184:11	Steering Column Lock Output: Circuit Short To Ground	GO to Pinpoint Test D
B1184:15	Steering Column Lock Output: Circuit Short To Battery or Open	GO to Pinpoint Test D
B1240:11	Start Button Mode Indicator: Circuit Short to Ground	GO to Pinpoint Test B
B1240:15	Start Button Mode Indicator: Circuit Short to Battery or Open	If the ignition mode indicator is inoperative, GO to Pinpoint Test B If the ignition mode indicator is always

		on, GO to Pinpoint Test C
B130F:12	Run Accessory Control: Circuit Short to Battery	REFER to: Wipers and Washers .
B130F:14	Run Accessory Control: Circuit Short to Ground or Open	REFER to: Wipers and Washers .
All other Diagnostic Trouble Codes (DTCs)	-	REFER to: Body Control Module (BCM) .

DIAGNOSIS AND TESTING > STEERING WHEEL AND COLUMN ELECTRICAL COMPONENTS > DTC CHARTS > SCCM DTC CHART

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

DTC	Description	Action
B1007:09	High-Beam Headlamp Switch: Component Failure	REFER to: Headlamps .
B1008:09	Wiper Mode Switch: Component Failure	REFER to: Wipers and Washers .
B1051:09	Front Washer Switch: Component Failure	REFER to: Wipers and Washers .
B10AD:02	Rain Sensor: General Signal Failure	REFER to: Wipers and Washers .
B10AD:08	Rain Sensor: Bus Signal/Message Failure	REFER to: Wipers and Washers .
B10AD:49	Rain Sensor: Internal Electronic Failure	REFER to: Wipers and Washers .
B10AD:55	Rain Sensor: Not Configured	REFER to: Wipers and Washers .
B1131:02	Wiper motor module: General Signal Failure	REFER to: Wipers and Washers .
B1131:08	Wiper motor module: Bus Signal/Message Failure	REFER to: Wipers and Washers .
B1131:11	Wiper motor module: Circuit Short To Ground	REFER to: Wipers and Washers .
B1131:49	Wiper motor module: Internal Electronic Failure	REFER to: Wipers and Washers .
B1131:55	Wiper motor module: Not Configured	REFER to: Wipers and Washers .
B1131:9A	Wiper motor module: Component or System Operating Conditions	REFER to: Wipers and Washers .
B11D9:16	Vehicle Battery: Circuit Voltage Below Threshold	GO to Pinpoint Test E

B11D9:17	Vehicle Battery: Circuit Voltage Above Threshold	GO to Pinpoint Test F
B12F7:09	Single Wipe Switch: Component Failure	REFER to: Wipers and Washers .
B137F:09	Steering Wheel Left Switch Pack: Component Failure	For a cruise control system concern, REFER to: Cruise Control . For a message center concern, REFER to: Instrumentation, Message Center and Warning Chimes .
B137F:11	Steering Wheel Left Switch Pack: Circuit Short to Ground	For a cruise control system concern, REFER to: Cruise Control . Vehicles With: Adaptive Cruise Control REFER to: Cruise Control . For a message center concern, REFER to: Instrumentation, Message Center and Warning Chimes .
B137F:17	Steering Wheel Left Switch Pack: Circuit Voltage Above Threshold	For a cruise control system concern, REFER to: Cruise Control . Vehicles With: Adaptive Cruise Control REFER to: Cruise Control . For a message center concern, REFER to: Instrumentation, Message Center and Warning Chimes .
B1380:09	Steering Wheel Right Switch Pack: Component Failure	Refer to the appropriate article for the procedure.
B1380:11	Steering Wheel Right Switch Pack: Circuit Short to Ground	Refer to the appropriate article for the procedure.
B1380:17	Steering Wheel Right Switch Pack: Circuit Voltage Above Threshold	Refer to the appropriate article for the procedure.
B1D36:09	Turn Indicator Switch: Component Failure	REFER to: Turn Signal and Hazard Lamps .
U2100:00	Initial Configuration Not Complete: No Sub Type Information	CHECK vehicle service history for recent service actions related to this module. This DTC sets due to incomplete or improper PMI procedures. If there have been recent service actions with this module, REPEAT/CARRY OUT the PMI procedure as directed by the diagnostic scan tool. If there have been no recent service actions, INSTALL a new SCCM to correct the failure to retain configuration data. REFER to: Steering Column Control Module (SCCM) .

U2101:00	Control Module Configuration Incompatible: No Sub Type Information	This DTC sets if the steering wheel switches do not match the switch function configuration data in the SCCM. CHECK the parts catalog and CONFIRM that the correct SCCM and steering wheel control switches are installed in the vehicle. INSTALL the correct components, as necessary.

DIAGNOSIS AND TESTING > STEERING WHEEL AND COLUMN ELECTRICAL COMPONENTS > DTC CHARTS > BCMB DTC CHART

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

DTC	Description	Action
P2533:14	Ignition Switch Run/Start Position Circuit: Circuit Short to Ground or Open	GO to Pinpoint Test G
All other Diagnostic Trouble Codes (DTCs)	-	REFER to: Body Control Module B (BCMB) .

DIAGNOSIS AND TESTING > STEERING WHEEL AND COLUMN ELECTRICAL COMPONENTS > SYMPTOM CHART

Symptom Chart: Steering Column Switches

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

Symptom Chart

Condition	Possible Causes	Actions
No power in ON	Refer to the Pinpoint Test	GO to Pinpoint Test A
Key not detected displays in the message center	Refer to the Pinpoint Test	REFER to: Passive Anti-Theft System (PATS) .
The ignition mode indicator is inoperative	Refer to the Pinpoint Test	GO to Pinpoint Test B
The ignition mode indicator is always on	Refer to the Pinpoint Test	GO to Pinpoint Test C
The steering column is always or never locked	Refer to the Pinpoint Test	GO to Pinpoint Test D

DIAGNOSIS AND TESTING > STEERING WHEEL AND COLUMN ELECTRICAL COMPONENTS > PINPOINT TESTS > PINPOINT TEST A : NO POWER IN ON

Refer to Power Distribution for schematic and connector information.

Refer to Starting System for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Steering Wheel and Column Electrical Components - System Operation and Component Description .

When in ON mode, the BCM activates the integral run/start relay which distributes fused voltage to various components.

The integral run/start relay in the BCM receives voltage from the BCM fuse 34 (30A).

BCM DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B108A:01	Start Button: General Electrical Failure	Sets continuous when the BCM detects a fault from one of the ignition switch input circuits.
B108A:24	Start Button: Signal Stuck High	Sets continuous when the BCM detects a short to voltage from one of the ignition switch input circuits.
B1142:29	Ignition Status 1: Signal Invalid	Sets during the on-demand self-test when the BCM detects a fault from one of the ignition switch input circuits.

Possible Causes

- Battery voltage concern
- Fuse
- Wiring, terminals or connectors
- PATS concern
- FCIM (includes the ignition switch)
- BCM

Visual Inspection and Diagnostic Pre-checks

- Inspect the battery and battery cables.
- Inspect BCM fuse 34 (30A).

DIAGNOSIS AND TESTING > STEERING WHEEL AND COLUMN ELECTRICAL

COMPONENTS > PINPOINT TESTS > PINPOINT TEST A : NO POWER IN ON > PINPOINT TEST A : NO POWER IN ON

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may damage the connector.

NOTE: Make sure there are no charging system concerns or low voltage Diagnostic Trouble Codes (DTCs) before diagnosing the ignition switch or ignition mode concern.

A1 CHECK VEHICLE BATTERY

Carry out the Battery Condition Test. REFER to: BATTERY, MOUNTING AND CABLES .

Is the battery OK?

Yes	GO to A2

No	CORRECT the battery condition and VERIFY correct charging operation. Refer to the appropriate article for the procedure.

NOTE: If DTC B108A:01, B108A:24 or B1142:29 is present, go to step A4.

A2 CHECK FOR IGNITION ON MODE

Press and release the START/STOP button while monitoring the ignition mode indicator at the top of the button.

Does the ignition mode indicator flash on and off continuously?

Yes	GO to A16

No	GO to A3

A3 CHECK FOR A PATS (PASSIVE ANTI-THEFT SYSTEM) CONCERN

Press the START/STOP button while monitoring the message center.

Does No key detected display in the message center?

Yes	REFER to: Passive Anti-Theft System (PATS) .

No	GO to A4

A4 CHECK THE IGNITION SWITCH 1 (START_STOP_1) PID (PARAMETER IDENTIFICATION)

Using a diagnostic scan tool, view the BCM Parameter Identification (PIDs).

Monitor the BCM PID START_STOP_1 while pressing and releasing the START/STOP button.

Does the PID change state when the START/STOP button is pressed and released?

Yes	GO to A11

No	GO to A5

A5 CHECK THE START/STOP 1 INPUT CIRCUIT FOR A SHORT TO VOLTAGE

Disconnect BCM C2280B .

Disconnect FCIM C2402A .

Disconnect PCM C175B , C1551B or C1381B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2402A-12		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to A6

A6 CHECK THE START/STOP 1 INPUT CIRCUIT FOR A SHORT TO GROUND

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2402A-12	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to A7

No	REPAIR the circuit.

A7 BYPASS THE FCIM (FRONT CONTROLS INTERFACE MODULE) WHILE MONITORING THE IGNITION SWITCH 1 (START_STOP_1) PID (PARAMETER IDENTIFICATION)

Connect BCM C2280B .

Using a diagnostic scan tool, view the BCM Parameter Identification (PIDs).

Monitor the BCM PID START_STOP_1.

Connect:

Positive Lead	Measurement / Action	Negative Lead
C2402A-12		C2402A-26

Remove the fused jumper wire.

Does the PID indicate the START/STOP button is pressed with the jumper wire connected?

Yes	GO to A18

No	GO to A8

A8 CHECK FOR VOLTAGE TO THE IGNITION SWITCH

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2402A-26		Ground

Is the voltage greater than 11 volts?

Yes	GO to A10

No	VERIFY BCM fuse 12 (7.5A) is OK. If OK, GO to A9 If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible cause of the circuit short.

A9 CHECK THE IGNITION SWITCH VOLTAGE SUPPLY CIRCUIT FOR AN OPEN

Disconnect BCM C2280A .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2402A-26	Ω	C2280A-10

Is the resistance less than 3 ohms?

Yes	GO to A19

No	REPAIR the circuit.

A10 CHECK THE BCM (BODY CONTROL MODULE) START/STOP 1 INPUT CIRCUIT FOR AN OPEN

Disconnect BCM C2280B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2402A-12	Ω	C2280B-51

Is the resistance less than 3 ohms?

Yes	GO to A19

No	REPAIR the circuit.

A11 CHECK THE IGNITION SWITCH 2 (START_STOP_2) PID (PARAMETER IDENTIFICATION)

Using a diagnostic scan tool, view the BCM Parameter Identification (PIDs).

Monitor the BCM PID START_STOP_2 while pressing the START/STOP button.

Does the PID change state when the START/STOP button is pressed and released?

Yes	GO to A19

No	GO to A12

A12 CHECK THE BCM (BODY CONTROL MODULE) START/STOP 2 INPUT CIRCUIT FOR A SHORT TO GROUND

Disconnect FCIM C2402A .

Disconnect BCM C2280B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2402A-13	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to A13

No	REPAIR the circuit.

A13 BYPASS THE FCIM (FRONT CONTROLS INTERFACE MODULE) WHILE MONITORING THE IGNITION SWITCH 2 (START_STOP_2) PID (PARAMETER IDENTIFICATION)

Connect BCM C2280B .

Using a diagnostic scan tool, view the BCM Parameter Identification (PIDs).

Monitor the BCM PID START_STOP_2.

Connect:

Positive Lead	Measurement / Action	Negative Lead
C2402A-13		Ground

Remove the fused jumper wire.

Does the PID indicate the START/STOP button is pressed with the jumper wire connected?

Yes	GO to A14

No	GO to A15

A14 CHECK THE IGNITION SWITCH GROUND CIRCUIT FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2402A-26		C2402A-1

Is the voltage greater than 11 volts?

Yes	GO to A18

No	REPAIR the circuit.

A15 CHECK THE BCM (BODY CONTROL MODULE) START/STOP 2 INPUT CIRCUIT FOR AN OPEN

Disconnect BCM C2280B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2402A-13	Ω	C2280B-5

Is the resistance less than 3 ohms?

Yes	GO to A19

No	REPAIR the circuit.

A16 CARRY OUT A NETWORK TEST

Using a diagnostic scan tool, carry out the network test.

Do the IPC and the BCM pass the network test?

Yes	VERIFY the BCM fuse 34 (30A) is OK. If OK, GO to A17 If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short.

No	REFER to: MODULE COMMUNICATIONS NETWORK .

A17 CHECK FOR AN INTERMITTENT COMMUNICATION CONCERN

Using a diagnostic scan tool, retrieve the Continuous Mode Diagnostic Trouble Codes (CMDTCs) from all modules.

Are multiple communication Diagnostic Trouble Codes (DTCs) set in multiple modules?

Yes	DIAGNOSE an intermittent network concern. REFER to: MODULE COMMUNICATIONS NETWORK .

No	GO to A19

A18 CHECK FOR CORRECT FCIM (FRONT CONTROLS INTERFACE MODULE) OPERATION

Disconnect and inspect all FCIM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the FCIM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new FCIM. Refer to the appropriate article for the procedure.

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

A19 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > STEERING WHEEL AND COLUMN ELECTRICAL COMPONENTS > PINPOINT TESTS > PINPOINT TEST B : THE IGNITION MODE INDICATOR IS INOPERATIVE

The Ignition Mode Indicator Is Inoperative

Refer to Starting System for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Steering Wheel and Column Electrical Components - System Operation and Component Description .

BCM DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1240:11	Start Button Mode Indicator: Circuit Short to Ground	Sets when the BCM detects a short to ground from the ignition mode status indicator circuit.
B1240:15	Start Button Mode Indicator: Circuit Short to Battery or Open	Sets when the BCM detects an open from the ignition mode status indicator circuit.

Possible Causes

- Wiring, terminals or connectors
- FCIM (includes the ignition switch)
- BCM

DIAGNOSIS AND TESTING > STEERING WHEEL AND COLUMN ELECTRICAL COMPONENTS > PINPOINT TESTS > PINPOINT TEST B : THE IGNITION MODE INDICATOR IS INOPERATIVE > PINPOINT TEST B : THE IGNITION MODE INDICATOR IS INOPERATIVE

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may damage the connector.

B1 CHECK FOR VOLTAGE TO THE IGNITION MODE INDICATOR

Start the engine.

Disconnect FCIM C2402A .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2402A-5	V	Ground

Is the voltage greater than 11 volts?

Yes	GO to B4

No	GO to B2

B2 CHECK THE IGNITION MODE INDICATOR CIRCUIT FOR A SHORT TO GROUND

Connect FCIM C2402A .

Ignition OFF.

Disconnect FCIM C2402A .

Disconnect BCM C2280B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2402A-5	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to B3

No	REPAIR the circuit.

B3 CHECK THE IGNITION MODE INDICATOR CIRCUIT FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2402A-5	Ω	C2280B-39

Is the resistance less than 3 ohms?

Yes	GO to B5

No	REPAIR the circuit.

B4 CHECK FOR CORRECT FCIM (FRONT CONTROLS INTERFACE MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all FCIM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the FCIM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new FCIM. Refer to the appropriate article for the procedure.

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

B5 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors and all other previously disconnected connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > STEERING WHEEL AND COLUMN ELECTRICAL COMPONENTS > PINPOINT TESTS > PINPOINT TEST C : THE IGNITION MODE INDICATOR IS ALWAYS ON

Refer to Starting System for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Steering Wheel and Column Electrical Components - System Operation and Component Description .

BCM DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1240:15	Start Button Mode Indicator: Circuit Short to Battery or Open	Sets when the BCM detects a short to voltage from the ignition mode status indicator circuit.

Possible Causes

- Wiring, terminals or connectors
- FCIM (includes the ignition switch)
- BCM

DIAGNOSIS AND TESTING > STEERING WHEEL AND COLUMN ELECTRICAL COMPONENTS > PINPOINT TESTS > PINPOINT TEST C : THE IGNITION MODE INDICATOR IS ALWAYS ON > PINPOINT TEST C : THE IGNITION MODE INDICATOR IS ALWAYS ON

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the

correct probe adapter(s) may damage the connector.

C1 ISOLATE THE BCM (BODY CONTROL MODULE)

Ignition ON.

Disconnect BCM C2280B .

Observe the ignition mode indicator.

Does the ignition mode indicator continue to illuminate?

Yes	GO to C2

No	GO to C4

C2 CHECK THE IGNITION MODE INDICATOR CIRCUIT FOR A SHORT TO VOLTAGE

Disconnect FCIM C2402A .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2402A-5		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to C3

C3 CHECK FOR CORRECT FCIM (FRONT CONTROLS INTERFACE MODULE) OPERATION

Disconnect and inspect all FCIM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the FCIM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service

	Bulletins (TSBs) address this concern, INSTALL a new FCIM. Refer to the appropriate article for the procedure.

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

C4 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > STEERING WHEEL AND COLUMN ELECTRICAL COMPONENTS > PINPOINT TESTS > PINPOINT TEST D : THE STEERING COLUMN IS ALWAYS OR NEVER LOCKED

Refer to Passive Anti-Theft System for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Steering Wheel and Column Electrical Components - System Operation and Component Description .

BCM DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1026:87	Steering Column Lock: Missing Message	Sets when the BCM detects no messages from the steering column lock module.

B1026:92	Steering Column Lock: Performance or Incorrect Operation	Sets when the BCM detects messages from the steering column lock module when the BCM has not activated the steering column lock module relay.
B1184:11	Steering Column Lock Output: Circuit Short To Ground	Sets when the BCM detects a short to ground from the steering column lock module relay control circuit.
B1184:15	Steering Column Lock Output: Circuit Short To Battery or Open	Sets when the BCM detects a short to voltage or an open from the steering column lock module relay control circuit.

Possible Causes

- Fuse
- Wiring, terminals or connectors
- Steering column lock module relay
- Steering column lock module
- BCM

Visual Inspection and Diagnostic Pre-checks

- Inspect BJB fuse 19 (20A).

DIAGNOSIS AND TESTING > STEERING WHEEL AND COLUMN ELECTRICAL COMPONENTS > PINPOINT TESTS > PINPOINT TEST D : THE STEERING COLUMN IS ALWAYS OR NEVER LOCKED > PINPOINT TEST D : THE STEERING COLUMN IS ALWAYS OR NEVER LOCKED

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may damage the connector.

D1 CHECK FOR BCM (BODY CONTROL MODULE) DTC (DIAGNOSTIC TROUBLE CODE) B1184:11 OR B1184:14

Ignition ON.

Using a diagnostic scan tool, carry out the BCM self-test.

Is DTC B1184:11 or B1184:14 present?

Yes	GO to D2

No	GO to D7

D2 CHECK THE STEERING COLUMN LOCK MODULE RELAY (DTC (DIAGNOSTIC TROUBLE CODE) B1184:11 OR B1184:14

Ignition OFF.

Disconnect Steering Column Lock Module Relay.

Substitute a known good relay.

Ignition ON.

Using a diagnostic scan tool, clear the BCM Diagnostic Trouble Codes (DTCs).

Using a diagnostic scan tool, carry out the BCM self-test.

Is DTC B1184:11 or B1184:14 still present?

Yes	REMOVE the known good relay. GO to D3

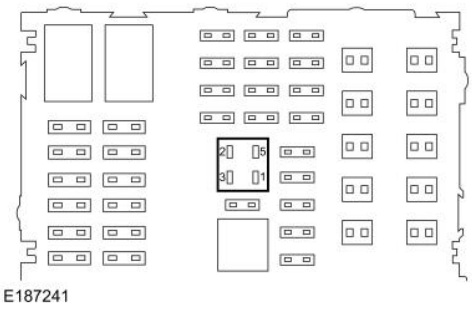
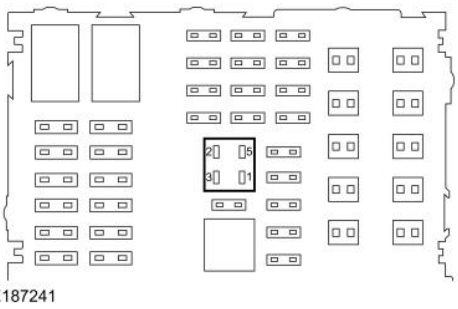
No	REMOVE the known good relay. INSTALL a new steering column lock module relay.

D3 CHECK THE STEERING COLUMN LOCK MODULE RELAY COIL GROUND CIRCUIT FOR AN OPEN

Ignition OFF.

Disconnect Steering Column Lock Module Relay.

Connect:

Positive Lead	Measurement / Action	Negative Lead
 Steering column lock module relay, cavity 3		 Steering column lock module relay, cavity 2

Does the test lamp illuminate?

Yes	GO to D4

No	REPAIR the circuit.

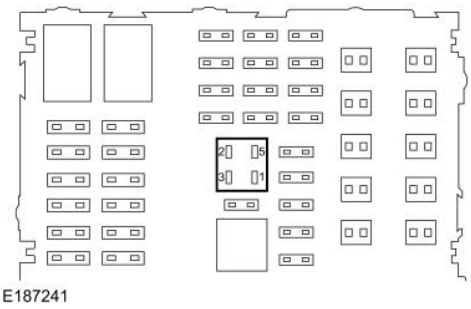
D4 CHECK THE STEERING COLUMN LOCK MODULE RELAY COIL CONTROL CIRCUIT FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect BCM C2280F .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
 Steering column lock module relay, cavity 1	V	Ground

Is any voltage present?

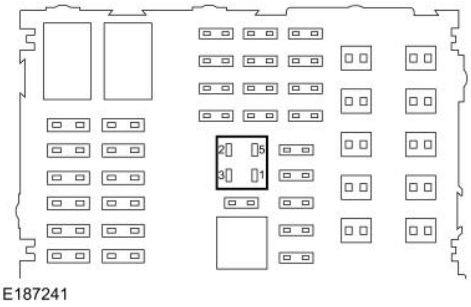
Yes	REPAIR the circuit.

No	GO to D5

D5 CHECK THE STEERING COLUMN LOCK MODULE RELAY COIL CONTROL CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
 Steering column lock module relay, cavity 1	Ω	Ground

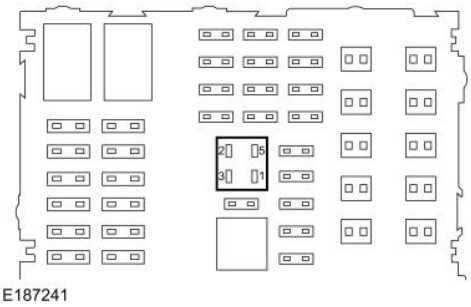
Is the resistance greater than 10, 000 ohms?

Yes	GO to D6

No	REPAIR the circuit.

D6 CHECK THE STEERING COLUMN LOCK MODULE RELAY COIL CONTROL CIRCUIT FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
 Steering column lock module relay, cavity 1	Ω	C2280F-9

Is the resistance less than 3 ohms?

Yes	GO to D15

No	REPAIR the circuit.

D7 CHECK THE STEERING COLUMN LOCK MODULE RELAY

Ignition OFF.

Disconnect Steering Column Lock Module Relay.

Substitute a known good relay.

Check the operation of the electric steering column lock system. REFER to: Steering Wheel and Column Electrical Components - System Operation and Component Description .

Does the steering column lock and unlock correctly?

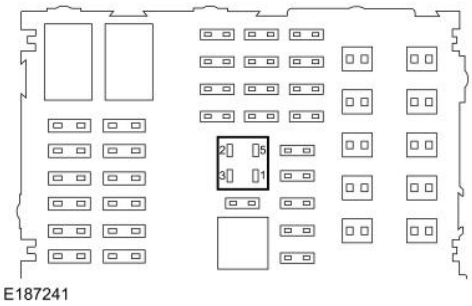
Yes	REMOVE the known good relay. INSTALL a new steering column lock module relay.

No	REMOVE the known good relay. GO to D8

D8 CHECK THE STEERING COLUMN LOCK MODULE RELAY VOLTAGE SUPPLY CIRCUIT FOR AN OPEN

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
 Steering column lock module relay, cavity 3		Ground

Is the voltage greater than 11 volts?

Yes	GO to D9

No	VERIFY the BJB fuse 19 (20A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible cause of the circuit short.

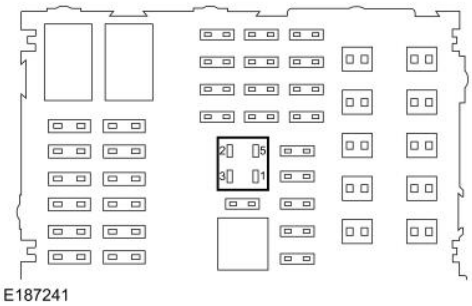
D9 CHECK THE STEERING COLUMN LOCK MODULE VOLTAGE SUPPLY CIRCUIT FOR A SHORT TO VOLTAGE

Disconnect BCM C2280G .

Disconnect Steering Column Lock Module C2434 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
 Steering column lock module relay, cavity 5		Ground

Is any voltage present?

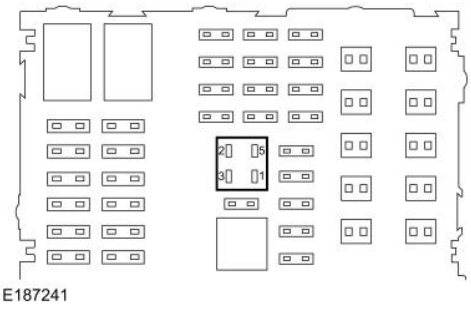
Yes	REPAIR the circuit.

No	GO to D10

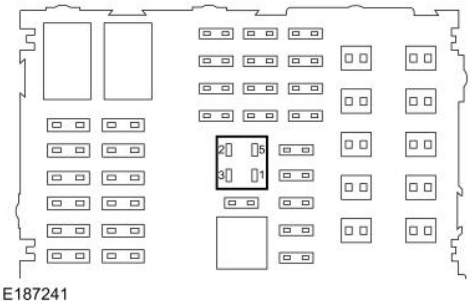
D10 CHECK THE STEERING COLUMN LOCK MODULE VOLTAGE SUPPLY CIRCUIT FOR AN OPEN

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
 E187241 Steering column lock module relay, cavity 5	Ω	C2280G-8

Measure:

Positive Lead	Measurement / Action	Negative Lead
 E187241 Steering column lock module relay, cavity 5	Ω	C2434-2

Are the resistances less than 3 ohms?

Yes	GO to D11

No	REPAIR the circuit in question.

D11 CHECK THE STEERING COLUMN LOCK MODULE GROUND CIRCUIT FOR AN OPEN

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead

C2434-3	Ω	Ground

Is the resistance less than 3 ohms?

Yes	GO to D12

No	REPAIR the circuit.

D12 CHECK THE STEERING COLUMN LOCK MODULE LIN (LOCAL INTERCONNECT NETWORK) CIRCUIT FOR A SHORT TO VOLTAGE

Connect BCM C2280G .

Ignition ON.

Disconnect BCM C2280B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2434-4	V	Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to D13

D13 CHECK THE STEERING COLUMN LOCK MODULE LIN (LOCAL INTERCONNECT NETWORK) CIRCUIT FOR A SHORT TO GROUND

Connect BCM C2280B .

Ignition OFF.

Disconnect BCM C2280B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2434-4	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to D14

No	REPAIR the circuit.

D14 CHECK THE STEERING COLUMN LOCK MODULE LIN (LOCAL INTERCONNECT NETWORK)

CIRCUIT FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2434-4	Ω	C2280B-25

Is the resistance less than 3 ohms?

Yes	INSTALL a new steering column lock module. TEST the system for normal operation. If the concern is still present, GO to D15

No	REPAIR the circuit.

D15 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > STEERING WHEEL AND COLUMN ELECTRICAL COMPONENTS > PINPOINT TESTS > PINPOINT TEST E : B11D9:16

Refer to Power Distribution for schematic and connector information.

Normal Operation and Fault Conditions

The SCCM continuously monitors its voltage supply circuit. If voltage decreases below a predefined limit, the SCCM ceases functions. DTC B11D9:16 can set if the vehicle battery has been discharged. The vehicle battery may become discharged due to excessive load on the charging system from aftermarket accessories or if the vehicle has been left unattended with the accessories on.

SCCM DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B11D9:16	Vehicle Battery: Circuit Below Threshold	This DTC sets in continuous memory if the SCCM detects battery voltage below 8 volts from the battery voltage supply circuit.

Possible Causes

- Wiring, terminals or connectors
- Charging system concern
- High circuit resistance
- SCCM

DIAGNOSIS AND TESTING > STEERING WHEEL AND COLUMN ELECTRICAL COMPONENTS > PINPOINT TESTS > PINPOINT TEST E : B11D9:16 > PINPOINT TEST E : B11D9:16

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may damage the connector.

NOTE: Failure to disconnect the battery when instructed may result in false resistance readings.

E1 RECHECK THE SCCM (STEERING COLUMN CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition ON.

Using the diagnostic scan tool, clear the SCCM Diagnostic Trouble Codes (DTCs).

Using the diagnostic scan tool, carry out the SCCM self-test.

Is DTC B11D9:16 still present?

Yes	GO to E2

No	The system is operating normally at this time. The DTC may have been set due to a previous low battery voltage condition.

E2 CHECK FOR CHARGING SYSTEM DIAGNOSTIC TROUBLE CODES (DTCS) IN THE PCM (POWERTRAIN CONTROL MODULE)

Using the diagnostic scan tool, carry out the PCM KOEO self-test.

Using the diagnostic scan tool, retrieve the Continuous Memory Diagnostic Trouble Codes (CMDTCs) from the PCM.

Are any charging system Diagnostic Trouble Codes (DTCs) present in the PCM?

Yes	Refer to the appropriate article for the procedure.

No	GO to E3

E3 CHECK THE BATTERY CONDITION AND STATE OF CHARGE

Ignition OFF.

Carry out the battery condition test. REFER to: BATTERY, MOUNTING AND CABLES .

Is the battery OK and fully charged?

Yes	GO to E4

No	Refer to the appropriate article for the procedure.

E4 CHECK THE SCCM (STEERING COLUMN CONTROL MODULE) VOLTAGE SUPPLY USING THE SYSTEM BATTERY VOLTAGE (VBAT_SCCM) PID (PARAMETER IDENTIFICATION)

Ignition ON.

Measure and record:

Positive Lead	Measurement / Action	Negative Lead
		

Using a diagnostic scan tool, view the SCCM Parameter Identifications (PIDs).

Using a diagnostic scan tool, monitor the SCCM PID VBAT_SCCM.

Is the voltage within 0.2 volt of the recorded battery voltage?

Yes	GO to E7

No	GO to E5

E5 CHECK THE SCCM (STEERING COLUMN CONTROL MODULE) VOLTAGE SUPPLY FOR HIGH RESISTANCE

Ignition OFF.

Disconnect SCCM C226A .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C226A-7		Ground

Is the voltage within 0.2 volt of the recorded battery voltage?

Yes	GO to E6

No	REPAIR the SCCM voltage supply circuit for high resistance.

E6 CHECK THE SCCM (STEERING COLUMN CONTROL MODULE) GROUND CIRCUIT FOR HIGH RESISTANCE

Ignition OFF.

Disconnect the negative battery cable. REFER to: Battery Disconnect and Connect .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C226A-5	Ω	Ground

Is the resistance less than 3 ohms?

Yes	CONNECT the negative battery cable. GO to E7

No	REPAIR the SCCM ground circuit for high resistance.

E7 CHECK FOR CORRECT SCCM (STEERING COLUMN CONTROL MODULE) OPERATION

Disconnect and inspect all of the SCCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the SCCM connectors and make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service

	Bulletins (TSBs) address this concern, INSTALL a new SCCM. REFER to: Steering Column Control Module (SCCM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > STEERING WHEEL AND COLUMN ELECTRICAL COMPONENTS > PINPOINT TESTS > PINPOINT TEST F : B11D9:17

Normal Operation and Fault Conditions

The SCCM continuously monitors the voltage supply circuit. If voltage increases above a predefined limit, the SCCM ceases functions. DTC B11D9:17 can set if the vehicle has been recently jump started or the vehicle battery has been recently charged.

SCCM DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B11D9:17	Vehicle Battery: Circuit Above Threshold	This DTC sets in continuous memory if the SCCM detects battery voltage above 19 volts from the battery voltage supply circuit.

Possible Causes

- Charging system
- SCCM

DIAGNOSIS AND TESTING > STEERING WHEEL AND COLUMN ELECTRICAL COMPONENTS > PINPOINT TESTS > PINPOINT TEST F : B11D9:17 > PINPOINT TEST F : B11D9:17

F1 CHECK FOR CHARGING SYSTEM DIAGNOSTIC TROUBLE CODES (DTCS) SET IN OTHER MODULES

Ignition ON.

Using the diagnostic scan tool, retrieve the Continuous Memory Diagnostic Trouble Codes (CMDTCs) from all modules.

Are any high battery voltage and/or charging system Diagnostic Trouble Codes (DTCs) present in other modules?

Yes	Refer to the appropriate article for the procedure.

No	GO to F2

F2 CHECK THE BATTERY VOLTAGE

Turn off all interior/exterior lights and accessories.

Start and run the engine at approximately 2, 000 RPM for 3 minutes while monitoring the battery voltage.

Does the battery voltage rise to 16.5 volts or higher?

Yes	DIAGNOSE the overcharging condition. Refer to the appropriate article for the procedure.

No	GO to F3

F3 RECHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) B11D9:17

Ignition OFF.

Ignition ON.

Using a diagnostic scan tool, clear the SCCM Diagnostic Trouble Codes (DTCs) and repeat the self-test.

Using a diagnostic scan tool, carry out the SCCM self-test.

Is DTC B11D9:17 present?

Yes	INSTALL a new SCCM. REFER to: Steering Column Control Module (SCCM) .

No	The system is operating normally at this time. The DTC may have been set previously during battery charging or while jump starting the vehicle.

DIAGNOSIS AND TESTING > STEERING WHEEL AND COLUMN ELECTRICAL COMPONENTS > PINPOINT TESTS > PINPOINT TEST G : P2533:14

Refer to Power Distribution for schematic and connector information.

Normal Operation and Fault Conditions

The BCMB check for voltage from the RUN/START circuit when the self-test is commanded. If no voltage is detected, DTC P2533:14 sets.

BCMB DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
P2533:14	Ignition Switch Run/Start Position Circuit: Circuit Short To Ground or	Sets during the on-demand self-test when the BCMB detects

	Open	no voltage from the RUN/START input circuit.

Possible Causes

- Fuse
- Wiring, terminals or connectors
- BCM
- BCMB

DIAGNOSIS AND TESTING > STEERING WHEEL AND COLUMN ELECTRICAL COMPONENTS > PINPOINT TESTS > PINPOINT TEST G : P2533:14 > PINPOINT TEST G : P2533:14

G1 CHECK FOR VOLTAGE TO THE BCMB (BODY CONTROL MODULE B)

Ignition OFF.

Disconnect BCMB C4368A .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4368A-7	V	Ground

Is the voltage greater than 11 volts?

Yes	GO to G3

No	GO to G2

G2 CHECK THE BCMB (BODY CONTROL MODULE B) RUN/START INPUT CIRCUIT FOR AN OPEN

Ignition OFF.

Disconnect BCM C2280C .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4368A-7	Ω	C2280C-8

Is the resistance less than 3 ohms?

Yes	GO to G4

No	REPAIR the circuit.

G3 CHECK FOR CORRECT BCMB (BODY CONTROL MODULE B) BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all BCMB connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCMB connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new BCMB. REFER to: Body Control Module B (BCMB) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

G4 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

REMOVAL AND INSTALLATION > STEERING COLUMN CONTROL MODULE (SCCM) > REMOVAL

NOTE: LHD shown, RHD similar.

NOTE: Removal steps in this procedure may contain installation details.

NOTE: The PMI process must begin with the current SCCM installed. If the current SCCM does not respond to the diagnostic scan tool, the tool may prompt for As-Built Data as part of the repair.

NOTE: This step is only necessary when installing a new component.

1.
Using a diagnostic scan tool, begin the PMI process for the SCCM following the on-screen instructions.

2.

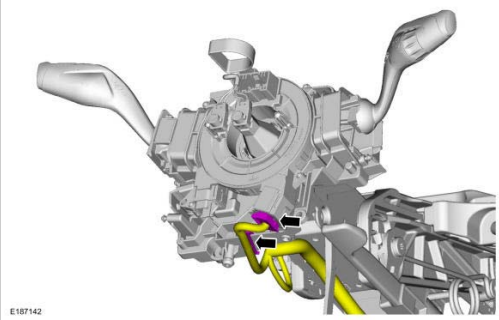
Remove the steering wheel. Refer to: Steering Wheel .

3.

Remove the steering column shrouds. Refer to: Steering Column Shrouds .

4.

Detach the retainer and disconnect the clockspring electrical connector.



5.

1.

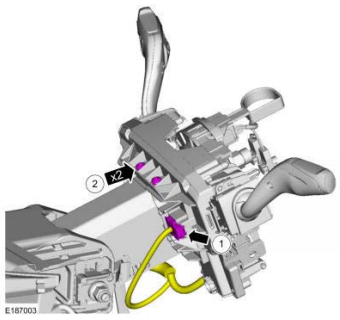
Disconnect the SCCM electrical connector.

2.

Remove the retainers.

Torque

: 27 lb.in (3 Nm)



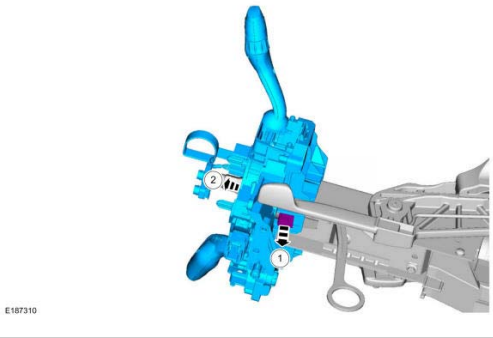
6.

1.

Pull the SCCM retaining clip.

2.

Remove the SCCM from steering column.



REMOVAL AND INSTALLATION > STEERING COLUMN CONTROL MODULE (SCCM) > INSTALLATION

1.

To install, reverse the removal procedure.

NOTE: This step is only necessary when installing a new component.

2.
Using a diagnostic scan tool, complete the PMI process for the SCCM following the on-screen instructions.

REMOVAL AND INSTALLATION > STEERING COLUMN LOCK MODULE

Special Tool(s) / General Equipment

Center Punch

REMOVAL AND INSTALLATION > STEERING COLUMN LOCK MODULE > REMOVAL

NOTE: LHD shown, RHD similar.

NOTE: Prior to the removal of the steering column lock module, it is necessary to upload the BCM configuration information to the scan tool. This information must be downloaded back into the same BCM after installation of a new steering column lock module in order to establish the correct configuration of the BCM into the new steering column lock module.

NOTE: This step is only necessary when installing a new component.

1.
Using a diagnostic scan tool, begin the PMI process for the BCM following the on-screen instructions.

2.

Remove the driver knee airbag. Refer to: Driver Knee Airbag .

3.

Remove the steering column shrouds. Refer to: Steering Column Shrouds .

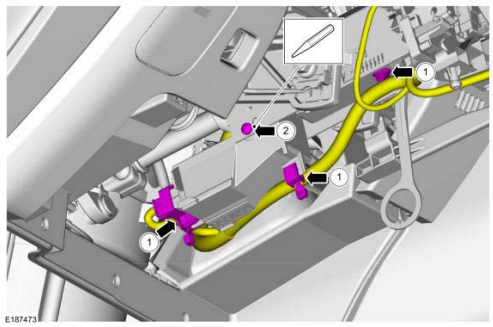
4.

1.

Release the retainers and detach the steering column lock module electrical connectors.

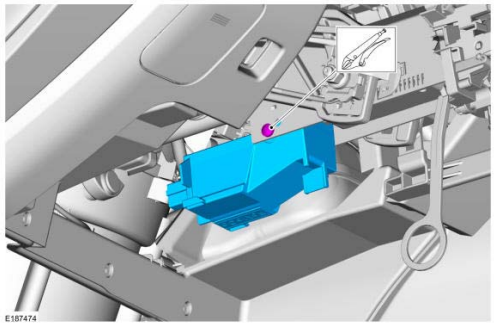
2.

Using a center punch, partially push out the retainers on both sides. Use the General Equipment: Center Punch



5.

Remove the retainers from the both sides and the steering column lock module.



REMOVAL AND INSTALLATION > STEERING COLUMN LOCK MODULE > INSTALLATION

1.

To install, reverse the removal procedure.

NOTE: This step is only necessary when installing a new component.

2.
Using a diagnostic scan tool, complete the PMI process for the BCM following the on-screen instructions.

NOTE: This step is only necessary when installing a new component.

3.
Carry out the BCM to steering column lock module training procedure.

NOTE: This step is only necessary when installing a new component.

4.
Carry out the BCM self-test. Clear the Diagnostic Trouble Codes (DTCs) and then retrieve the Diagnostic Trouble Codes (DTCs) from the BCM to confirm all Diagnostic Trouble Codes (DTCs) have been cleared.

REMOVAL AND INSTALLATION > STEERING COLUMN MULTIFUNCTION SWITCH LH > REMOVAL

NOTE: LHD shown, RHD similar.

NOTE: Removal steps in this procedure may contain installation details.

1.

Remove the steering column shrouds. Refer to: Steering Column Shrouds .

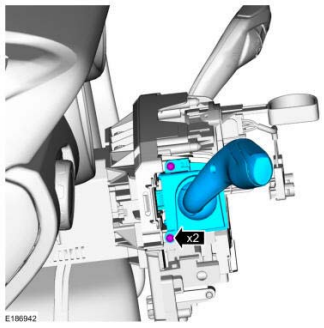
NOTE: Make sure the component terminals are not bent or damaged.

NOTE: The steering wheel is removed for clarity.

2.
Remove the retainers and the LH steering column multifunction switch.

Torque

: 9 lb.in (1 Nm)



REMOVAL AND INSTALLATION > STEERING COLUMN MULTIFUNCTION SWITCH LH > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > STEERING COLUMN MULTIFUNCTION SWITCH RH > REMOVAL

NOTE: LHD shown, RHD similar.

NOTE: Removal steps in this procedure may contain installation details.

1.

Remove the steering column shrouds. Refer to: Steering Column Shrouds .

NOTE: Make sure the component terminals are not bent or damaged.

NOTE: The steering wheel is removed for clarity.

2.
Remove the retainers and the RH steering column multifunction switch.

Torque

: 9 lb.in (1 Nm)



REMOVAL AND INSTALLATION > STEERING COLUMN MULTIFUNCTION SWITCH RH > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > STEERING WHEEL MULTIFUNCTION SWITCH >

REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

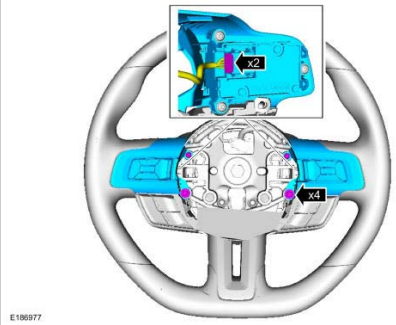
Remove the driver airbag. Refer to: Driver Airbag .

2.

Remove the retainers, disconnect the electrical connectors and remove the switch and bezel assemblies.

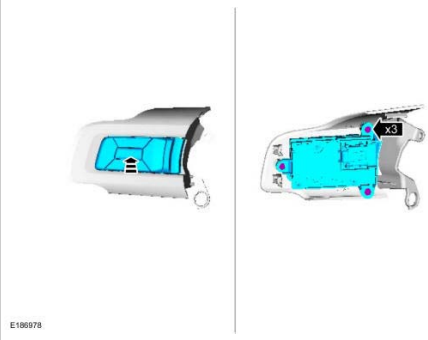
Torque

: 44 lb.in (5 Nm)



NOTE: This step is only necessary when installing new upper steering wheel switches.

3.
On both sides. Remove the retainers and the upper steering wheel switch.



Lower steering wheel switch

4.

1.

Remove the retainers.

Torque

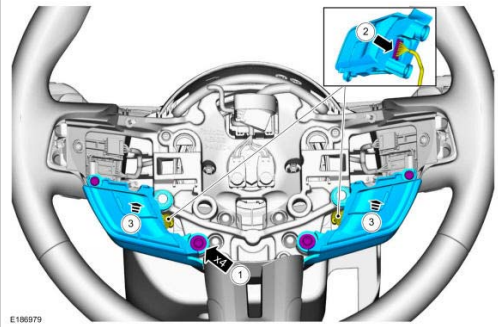
: 44 lb.in (5 Nm)

2.

Disconnect the electrical connectors.

3.

Remove the lower steering wheel switches.



REMOVAL AND INSTALLATION > STEERING WHEEL MULTIFUNCTION SWITCH > INSTALLATION

1.

To install, reverse the removal procedure.

Service Manual: WIPERS AND WASHERS

DESCRIPTION AND OPERATION > WIPERS AND WASHERS - OVERVIEW > OVERVIEW

The windshield wiper/washer system is activated by the wiper/washer switch. The following functions/features of the windshield wiper/washer system are:

- Mist wipe
- Windshield wash
- Courtesy wipe
- Windshield wipers (low/high speed)
- Intermittent wipers
- Speed dependent wipers
- Wiper activated exterior lamps
- Rain sensitive wipers (if equipped)

There are 6 intermittent/sensitivity settings to choose from for the intermittent/rain sensitive wipers.

DESCRIPTION AND OPERATION > WIPERS AND WASHERS - SYSTEM OPERATION AND COMPONENT DESCRIPTION

System Operation

DESCRIPTION AND OPERATION > WIPERS AND WASHERS - SYSTEM OPERATION AND COMPONENT DESCRIPTION > NETWORK MESSAGE CHART

SCCM Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Vehicle speed	PCM	The SCCM uses vehicle speed information for the operation of the speed sensitive wiper function.
Message center feature configuration	IPC	The SCCM uses the message center feature configuration to enable/disable the courtesy wipe and the rain sensitive wiper features.

BCM Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Front wiper status	SCCM	The BCM uses the wiper status information for the operation of the wiper activated headlamps feature.

DESCRIPTION AND OPERATION > WIPERS AND WASHERS - SYSTEM OPERATION AND COMPONENT DESCRIPTION > WINDSHIELD WIPERS

The wiper relay is energized when the ignition is on and provides voltage to the windshield wiper motor and the rain sensor.

The SCCM monitors the wiper/washer switch inputs and sends the wiper/washer switch data to the windshield wiper motor through a LIN circuit.

Based on the input, the windshield wiper motor activates the appropriate wash, low, high and intermittent or rain sense modes. The logic of the wiper operation is contained within the windshield wiper motor.

When the wiper/washer switch is in the high speed setting, the windshield wiper motor also receives a ground signal directly from the SCCM, bypassing the logic within the windshield wiper motor module. This fail-safe circuit makes sure the windshield wipers function in high speed mode in the event of a LIN communication failure.

Mist Wipe

When the mist wipe function is activated, the SCCM sends the request to the windshield wiper motor over the LIN to perform a single wipe of the windshield. The windshield wipers operate for as long as the mist wipe function is active.

Windshield Washer

When the windshield washer switch is activated, the SCCM sends the washer request to the windshield wiper motor over the LIN. The windshield wash relay is internal to the windshield wiper motor. When the windshield wiper motor activates the windshield wash relay, voltage is provided to the washer pump, directing washer solvent to the windshield. When the switch is released, the windshield wiper motor continues to activate for 3 additional wipes and then turn off.

Courtesy Wipe

When the windshield washer is requested, a few seconds after the windshield wash cycle has completed, an additional wipe of the windshield occurs to clear any washer solvent remaining on the windshield.

The courtesy wipe feature can be configured on/off using the message center.

Intermittent Wipers

When the wiper/washer switch is in an intermittent setting, the windshield wiper motor activates at timed intervals. The lower the setting, the longer the interval between wipes.

Speed Dependent Wipers

When the wiper/washer switch is in an intermittent setting, the speed dependent feature increases the frequency of wiping as the vehicle speed increases to compensate for the extra moisture that accumulates on the windshield.

The SCCM receives the vehicle speed from the PCM. The SCCM then sends the vehicle speed data to the windshield wiper motor through the LIN.

Rain Sensitive Wipers (if equipped)

When equipped, the rain sensitive wiper feature replaces the intermittent wiper feature. The rain sensitive feature is active when the wiper/washer switch is in any of the 6 auto/intermittent sensitivity settings. The setting closest to OFF is the least sensitive to moisture, the highest setting being the most sensitive to moisture.

The rain sensor sends data through the LIN to the windshield wiper motor. Based on the data received from the rain sensor and the auto/intermittent setting from the wiper/washer switch, the system automatically activates and adjusts the wiper speed and frequency when moisture is detected on the windshield.

If a fault is detected with the rain sensitive feature, the windshield wipers change to a default intermittent mode. The timing of the wipers correspond to a standard intermittent setting based on the auto/intermittent sensitivity setting on the wiper/washer switch.

Wiper Activated Exterior Lamps

When the headlamp switch is set to AUTO, the BCM turns the exterior lamps on within 10 seconds of the windshield wipers being activated by the wiper/washer switch. Approximately 60 seconds after the windshield wipers turn off, the BCM turns the exterior lamps off.

If the rain sensitive wipers are activated by moisture detected on the windshield when the headlamp switch is in the AUTO position, the BCM turns the exterior lamps on after a time delay. Shortly after the rain sensitive wipers are deactivated (moisture no longer detected on the windshield), the BCM turns the exterior lamps off after a time delay.

Component Description

Wiper/Washer Switch

The wiper/washer switch is mounted directly to the SCCM. The windshield wiper/washer inputs to the SCCM are:

- Mist wipe
- Windshield wash
- Off
- AUTO 1/INT 1
- AUTO 2/INT 2
- AUTO 3/INT 3
- AUTO 4/INT 4
- AUTO 5/INT 5

- AUTO 6/INT 6
- Low
- High

Windshield Wiper Motor

The windshield wiper motor contains a logic module, internal sensors to monitor the wiper arm position, and a multi-speed motor. The logic module from the windshield wiper motor continuously monitors the wiper/washer switch inputs from the SCCM and the rain sensor when the ignition is on. Depending on the input, the wiper motor activates to achieve the desired request.

The windshield wiper motor is mounted to the wiper and linkage assembly.

Washer Pump

The washer pump is controlled by the windshield wiper motor. The washer pump delivers washer solvent to the windshield when the windshield wiper motor activates the windshield washer relay (internal to the windshield wiper motor), which provides voltage to the washer pump. When activated, the washer pump delivers washer solvent to the windshield.

Rain Sensor

The rain sensor uses an infrared beam to optically sense moisture on the windshield. The intensity of the reflected beam is measured and compared to the intensity of the transmitted beam. If there is water on the surface of the windshield the beam distorts, reducing the intensity of the beam. If the beam is not reflected completely, it is interpreted as rain on the windshield and the windshield wipers are activated.

A gel-type lens is used as the interface between the rain sensor and the windshield. If the lens is missing or damaged, the rain sensing wipers can be inoperative. The rain sensor gel-type lens cannot be replaced separately on a rain sensor of this type.

DIAGNOSIS AND TESTING > WIPERS AND WASHERS > DTC CHART: BCM

Diagnostics in this service information assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

BCM DTC Chart

DTC	Description	Action
B130F:12	Run Accessory Control: Circuit Short To Battery	GO to Pinpoint Test A
B130F:14	Run Accessory Control: Circuit Short To Ground or Open	If the windshield wipers are inoperative, GO to Pinpoint Test A If the windshield wipers operate with the ignition off, GO to Pinpoint Test D
All other Diagnostic Trouble Codes (DTCs)	-	REFER to: Body Control Module (BCM) .

DIAGNOSIS AND TESTING > WIPERS AND WASHERS > DTC CHART: SCCM

Diagnostics in this service information assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

SCCM DTC Chart

DTC	Description	Action
B1008:09	Wiper Mode Switch: Component Failure	INSTALL a new wiper/washer switch. REFER to: Steering Column Multifunction Switch RH . CLEAR the DTC and repeat the self-test. If DTC B1008:09 is retrieved again, INSTALL a new SCCM. REFER to: Steering Column Control Module (SCCM) .
B1051:09	Front Washer Switch: Component Failure	INSTALL a new wiper/washer switch. REFER to: Steering Column Multifunction Switch RH . CLEAR the DTC and repeat the self-test. If DTC B1008:09 is retrieved again, INSTALL a new SCCM. REFER to: Steering Column Control Module (SCCM) .
B10AD:02	Rain Sensor: General Signal Failure	GO to Pinpoint Test F
B10AD:08	Rain Sensor: Bus Signal / Message Failure	GO to Pinpoint Test F
B10AD:49	Rain Sensor: Internal Electronic Failure	INSTALL a new rain sensor. REFER to: Rain Sensor .
B10AD:55	Rain Sensor: Not Configured	CARRY OUT the PMI for the SCCM using As-Built data.
B1131:02	Wiper motor module: General Signal Failure	If the wipers are inoperative, or no symptom is present, GO to Pinpoint Test A If the wipers are always on, GO to Pinpoint Test D
B1131:08	Wiper motor module: Bus Signal / Message Failure	GO to Pinpoint Test B
B1131:11	Wiper motor module: Circuit Short To Ground	GO to Pinpoint Test B
B1131:49	Wiper motor module: Internal Electronic Failure	INSTALL a new windshield wiper motor. REFER to: Windshield Wiper Motor .

B1131:55	Wiper motor module: Not Configured	CARRY OUT the PMI for the SCCM using As-Built data.
B1131:9A	Wiper motor module: Component or System Operating Conditions	DIAGNOSE the symptom present with the wiper/washer system. REFER to the Symptom Chart below.
B12F7:09	Single Wipe Switch: Component Failure	INSTALL a new wiper/washer switch. REFER to: Steering Column Multifunction Switch RH . CLEAR the DTC and repeat the self-test. If DTC B1008:09 is retrieved again, INSTALL a new SCCM. REFER to: Steering Column Control Module (SCCM) .
All other Diagnostic Trouble Codes (DTCs)	-	REFER to: Steering Wheel and Column Electrical Components .

Symptom Chart

Symptom Chart: Wiper and Washer

Diagnostics in this service information assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

DIAGNOSIS AND TESTING > WIPERS AND WASHERS > SYMPTOM CHART

Symptom Chart: Wiper and Washer

Diagnostics in this service information assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

Symptom Chart

Condition	Possible Sources	Actions
All windshield wiper modes are inoperative	Refer to the Pinpoint Test	GO to Pinpoint Test A
The intermittent and/or low speed windshield wipers are inoperative	Refer to the Pinpoint Test	GO to Pinpoint Test B
The high speed windshield wipers are inoperative	Refer to the Pinpoint Test	GO to Pinpoint Test C
The windshield wipers stay on continuously	Refer to the Pinpoint Test	GO to Pinpoint Test D
The windshield wipers do not operate correctly in the intermittent mode	Refer to the Pinpoint Test	GO to Pinpoint Test E

The rain sensitive wiper feature is inoperative	Refer to the Pinpoint Test	GO to Pinpoint Test F
The rain sensitive wipers have erratic/inconsistent operation	Refer to the Pinpoint Test	GO to Pinpoint Test F
The rain sensitive wipers are too sensitive/not sensitive enough to moisture	Refer to the Pinpoint Test	GO to Pinpoint Test F
The windshield wipers do not park at the correct position	Refer to the Pinpoint Test	GO to Pinpoint Test G
The windshield washer is inoperative	Refer to the Pinpoint Test	GO to Pinpoint Test H
The windshield washer is always on	Refer to the Pinpoint Test	GO to Pinpoint Test I

DIAGNOSIS AND TESTING > WIPERS AND WASHERS > PINPOINT TESTS

All Windshield Wiper Modes Are Inoperative

Refer to Wipers and Washers for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Wipers and Washers - System Operation and Component Description .

BCM DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B130F:12	Run Accessory Control: Circuit Short To Battery	Sets when the BCM detects a short to voltage from the wiper relay control circuit.
B130F:14	Run Accessory Control: Circuit Short To Ground or Open	Sets when the BCM detects an open from the wiper relay control circuit.

SCCM DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1131:02	Wiper motor module: General Signal Failure	Sets when the input to the windshield wiper motor from the fail-safe circuit does not match the requested input from the SCCM.

Possible Causes

- Fuse
- Wiring, terminals or connectors

- Wiper relay
- Windshield wiper motor
- SCCM
- BCM

Visual Inspection and Diagnostic Pre-checks

- Inspect BJB fuse 26 (25A)

DIAGNOSIS AND TESTING > WIPERS AND WASHERS > PINPOINT TESTS > PINPOINT TEST A : ALL WINDSHIELD WIPER MODES ARE INOPERATIVE > PINPOINT TEST A : ALL WINDSHIELD WIPER MODES ARE INOPERATIVE

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may damage the connector.

A1 CHECK FOR BCM (BODY CONTROL MODULE) DTC (DIAGNOSTIC TROUBLE CODE) B130F:12, B130F:14 OR SCCM (STEERING COLUMN CONTROL MODULE) DTC (DIAGNOSTIC TROUBLE CODE) B1131:02

Ignition ON.

Using a diagnostic scan tool, carry out the BCM self-test.

Using a diagnostic scan tool, carry out the SCCM self-test.

Is DTC B130F:12, B130F:14 or B1131:02 present?

Yes	For DTC B130F:12, GO to A2For DTC B130F:14, GO to A4For DTC B1131:02, GO to A12

No	GO to A7

A2 CHECK THE WIPER RELAY (DTC (DIAGNOSTIC TROUBLE CODE) B130F:12)

Ignition OFF.

Disconnect Wiper Relay.

Substitute a known good relay.

Ignition ON.

Using a diagnostic scan tool, clear the DTC and repeat the BCM self-test.

Is DTC B130F:12 still present?

Yes	REMOVE the known good relay. GO to A3

No	REMOVE the known good relay. INSTALL a new windshield wiper relay.

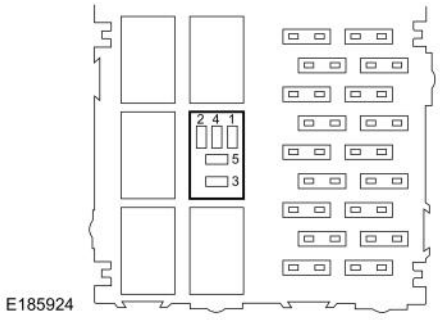
A3 CHECK THE WIPER RELAY CONTROL CIRCUIT FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect BCM C2280F .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
 Wiper relay, cavity 2		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to A16

A4 CHECK THE WIPER RELAY (DTC (DIAGNOSTIC TROUBLE CODE) B130F:14)

Ignition OFF.

Disconnect Wiper Relay.

Substitute a known good relay.

Ignition ON.

Using a diagnostic scan tool, clear the DTC and repeat the BCM self-test.

Is DTC B130F:14 still present?

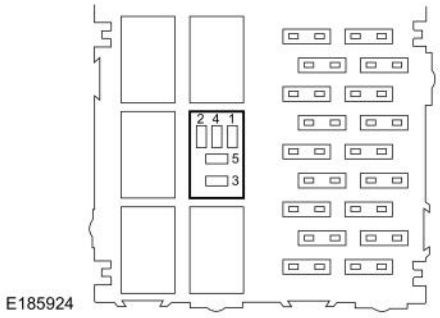
Yes	REMOVE the known good relay. GO to A5

No	REMOVE the known good relay. INSTALL a new windshield wiper relay.

A5 CHECK THE WINDSHIELD WIPER RELAY COIL VOLTAGE SUPPLY CIRCUIT FOR AN OPEN

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
 Wiper relay, cavity 1	V	Ground

Is the voltage greater than 11 volts?

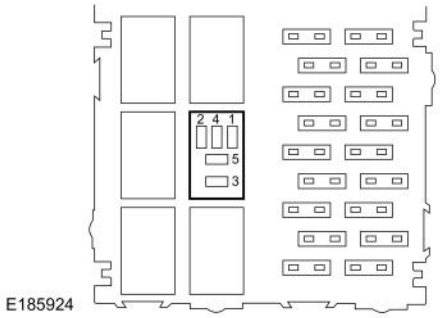
Yes	GO to A6

No	VERIFY the BJB fuse 26 (25A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the SYSTEM WIRING DIAGRAMS article to identify the possible cause of the circuit short.

A6 CHECK THE WIPER RELAY CONTROL CIRCUIT FOR AN OPEN

Disconnect BCM C2280F .

Measure:

Positive Lead	Measurement / Action	Negative Lead
 Wiper relay, cavity 2	Ω	C2280F-24

Is the resistance less than 3 ohms?

Yes	GO to A16

No	REPAIR the circuit.

A7 CHECK THE INPUT TO THE SCCM (STEERING COLUMN CONTROL MODULE)

Using a diagnostic scan tool, view the SCCM Parameter Identifications (PIDs).

Using a diagnostic scan tool, view the following SCCM wiper/washer switch Parameter Identifications (PIDs):

WIPE_SINGLE

F_WASH_SW

F_WIP_INT_D1

F_WIP_INT_D2

F_WIP_INT_D3

F_WIP_INT_D4

F_WIP_INT_D5

F_WIP_INT_D6

F_WIP_SLO_SW

F_WIPE_FAST_SW

Cycle the wiper/washer switch from off to the high speed setting and then back to off.

Do the Parameter Identifications (PIDs) correspond correctly with each setting selection?

Yes	GO to A8

No	INSTALL a new wiper/washer switch. REFER to: Steering Column Multifunction Switch RH . TEST the system for normal operation. If the concern is still present, INSTALL a new SCCM. REFER to: Steering Column Control Module (SCCM) .

A8 CHECK FOR VOLTAGE TO THE WINDSHIELD WIPER MOTOR

Ignition OFF.

Disconnect Windshield Wiper Motor C1656 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead

C1656-8		Ground

Is the voltage greater than 11 volts?

Yes	GO to A11

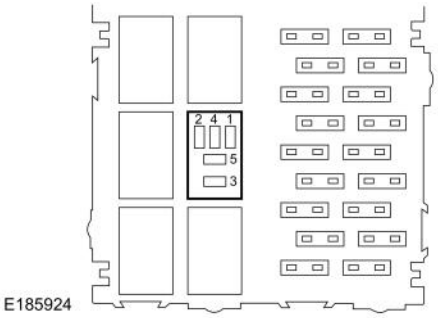
No	GO to A9

A9 CHECK THE WIPER RELAY VOLTAGE SUPPLY CIRCUIT FOR AN OPEN

Ignition OFF.

Disconnect Wiper Relay.

Measure:

Positive Lead	Measurement / Action	Negative Lead
 Wiper relay, cavity 3		Ground

Is the voltage greater than 11 volts?

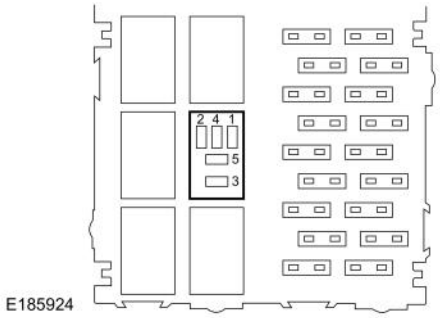
Yes	GO to A10

No	REPAIR the circuit.

A10 CHECK FOR THE WINDSHIELD WIPER MOTOR VOLTAGE SUPPLY CIRCUIT FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead

 Wiper relay, cavity 5	Ω	C1656-8

Is the resistance less than 3 ohms?

Yes	INSTALL a new wiper relay.

No	REPAIR the circuit.

A11 CHECK THE WINDSHIELD WIPER MOTOR GROUND CIRCUIT FOR AN OPEN

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1656-8	V	C1656-6

Is the voltage greater than 11 volts?

Yes	GO to A12

No	REPAIR the circuit.

NOTE: This pinpoint test step uses a test lamp to simulate normal circuit loads. Use only a Rotunda Test Lamp (SGT27000) or 250-300mA incandescent bulb test lamp. To avoid connector terminal damage, use the Rotunda Flex Probe kit for the test lamp probe connection to the vehicle. Do not use the test lamp probe directly on any connector.

A12 CHECK THE FAIL-SAFE HIGH SPEED WIPER GROUND CIRCUIT CONTROL

Ignition OFF.

Disconnect Windshield Wiper Motor C1656 (if not previously disconnected).

Connect:

Positive Lead	Measurement / Action	Negative Lead

C1656-8		C1656-1

Ignition ON.

Place the wiper/washer switch to the high speed setting and then off.

Ignition OFF.

Does the test lamp illuminate when the wiper washer switch is in the high speed setting?

Yes	GO to A14

No	GO to A13

NOTE: If steps A2-A12 did not identify the cause of the concern, a double fault may be present. After the fail-safe ground is diagnosed and repaired, it is necessary to check all operation modes and diagnose any symptom still present.

A13 CHECK THE FAIL-SAFE HIGH SPEED WIPER GROUND CIRCUIT FOR AN OPEN

Disconnect SCCM C226A .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1656-1	Ω	C226A-2

Is the resistance less than 3 ohms?

Yes	INSTALL a new wiper/washer switch. REFER to: Steering Column Multifunction Switch RH . TEST the system for normal operation. If the concern is still present, GO to A15

No	REPAIR the circuit.

A14 CHECK FOR CORRECT WINDSHIELD WIPER MOTOR OPERATION

Disconnect and inspect the windshield wiper motor connector.

Repair:

corrosion (install new connector or terminal - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the windshield wiper motor connector. Make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new windshield wiper motor. REFER to: Windshield Wiper Motor (501-16 Wipers and Washers, Removal and Installation).

No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

A15 CHECK FOR CORRECT SCCM (STEERING COLUMN CONTROL MODULE) OPERATION

Disconnect and inspect all the SCCM connectors:

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the SCCM connectors. Make sure they seat and latch correctly.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new SCCM. REFER to: Steering Column Control Module (SCCM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

A16 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all the BCM connectors:

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Is the concern still present?

Yes	

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > WIPERS AND WASHERS > PINPOINT TESTS > PINPOINT TEST B : THE INTERMITTENT AND/OR LOW SPEED WINDSHIELD WIPERS ARE INOPERATIVE

The Intermittent And/Or Low Speed Windshield Wipers Are Inoperative

Refer to Wipers and Washers for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Wipers and Washers - System Operation and Component Description .

SCCM DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1131:08	Wiper motor module: Bus Signal / Message Failure	Sets when the SCCM detects a communication fault with the windshield wiper motor over the LIN.
B1131:11	Wiper motor module: Circuit Short to Ground	Sets when the SCCM detects a short to ground from the windshield wiper motor LIN circuit.

Possible Causes

- Wiring, terminals or connectors
- Wiper/washer switch
- Windshield wiper motor
- Rain sensor
- SCCM

Visual Inspection and Diagnostic Pre-checks

- Inspect the wiper/washer switch for damage

DIAGNOSIS AND TESTING > WIPERS AND WASHERS > PINPOINT TESTS > PINPOINT TEST B : THE INTERMITTENT AND/OR LOW SPEED WINDSHIELD WIPERS ARE INOPERATIVE > PINPOINT TEST B : THE INTERMITTENT AND/OR LOW SPEED WINDSHIELD WIPERS ARE INOPERATIVE

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may damage the connector.

NOTE: It may be necessary to disconnect and then reconnect the battery after the repair to enable the wiper operation.

B1 CHECK THE HIGH SPEED WIPER OPERATION

Ignition ON.

Place the wiper/washer switch to the high speed setting and observe the windshield wipers. Place the wiper/washer switch to the off setting.

Do the windshield wipers operate with the wiper/washer switch in the high speed setting?

Yes	GO to B2

No	GO to Pinpoint Test A

B2 CHECK THE LOW SPEED WIPER OPERATION

Place the wiper/washer switch to the low speed setting and observe the windshield wipers. Place the wiper/washer switch to the off setting.

Do the windshield wipers operate with the wiper/washer switch in the low speed setting?

Yes	If not equipped with a rain sensor, GO to Pinpoint Test E . If equipped with a rain sensor, GO to Pinpoint Test F

No	GO to B3

B3 CHECK THE INPUT TO THE SCCM (STEERING COLUMN CONTROL MODULE)

Using a diagnostic scan tool, view the SCCM Parameter Identifications (PIDs).

Using a diagnostic scan tool, view the SCCM F_WIP_SLO_SW PID.

Place the wiper/washer switch to the low speed setting.

Does the PID indicate the wiper/washer switch is in the low speed setting?

Yes	If equipped with a rain sensor, GO to B4. If not equipped with a rain sensor, GO to B5

No	INSTALL a new wiper/washer switch. REFER to: Steering Column Multifunction Switch RH . TEST the system for normal operation. If the concern is still present, INSTALL a new

	SCCM. REFER to: Steering Column Control Module (SCCM) .

B4 ISOLATE THE RAIN SENSOR

Ignition OFF.

Disconnect Rain Sensor C914 .

Ignition ON.

Place the wiper/washer switch to the low speed setting and observe the windshield wipers. Place the wiper/washer switch to the off setting.

Do the windshield wipers operate with the wiper/washer switch in the low speed setting?

Yes	INSTALL a new rain sensor. REFER to: Rain Sensor .

No	GO to B5

B5 CHECK THE LIN (LOCAL INTERCONNECT NETWORK) CIRCUIT FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect Windshield Wiper Motor C1656 .

Disconnect SCCM C226A .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1656-4		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to B6

B6 CHECK THE LIN (LOCAL INTERCONNECT NETWORK) CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1656-4	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to B7

No	REPAIR the circuit.

B7 CHECK THE LIN (LOCAL INTERCONNECT NETWORK) CIRCUIT FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1656-4	Ω	C226A-8

Is the resistance less than 3 ohms?

Yes	GO to B8

No	REPAIR the circuit.

B8 CHECK FOR CORRECT WINDSHIELD WIPER MOTOR OPERATION

Disconnect and inspect the windshield wiper motor connector.

Repair:

corrosion (install new connector or terminal - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the windshield wiper motor connector. Make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new windshield wiper motor. REFER to: Windshield Wiper Motor . TEST the system for normal operation. If the concern is still present, GO to B9

No	The system is operating correctly at this time. The concern may have been caused by a

	loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

B9 CHECK FOR CORRECT SCCM (STEERING COLUMN CONTROL MODULE) OPERATION

Disconnect and inspect all the SCCM connectors.

Repair:

corrosion (install new connector or terminal - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the SCCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new SCCM. REFER to: Steering Column Control Module (SCCM) .

No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > WIPERS AND WASHERS > PINPOINT TESTS > PINPOINT TEST C : THE HIGH SPEED WINDSHIELD WIPERS ARE INOPERATIVE

Normal Operation and Fault Conditions

REFER to: Wipers and Washers - System Operation and Component Description .

Possible Causes

- Windshield wiper motor
- Wiper/washer switch
- SCCM

DIAGNOSIS AND TESTING > WIPERS AND WASHERS > PINPOINT TESTS > PINPOINT TEST C : THE HIGH SPEED WINDSHIELD WIPERS ARE INOPERATIVE > PINPOINT TEST C : THE HIGH SPEED WINDSHIELD WIPERS ARE INOPERATIVE

C1 CHECK THE INPUT TO THE SCCM (STEERING COLUMN CONTROL MODULE)

Ignition ON.

Using a diagnostic scan tool, view the SCCM Parameter Identifications (PIDs).

Using a diagnostic scan tool, view the SCCM F_WIPE_FAST_SW PID.

Place the wiper/washer switch to the high speed setting.

Does the PID indicate the wiper/washer switch is in the high speed setting?

Yes	INSTALL a new windshield wiper motor. REFER to: Windshield Wiper Motor .

No	INSTALL a new wiper/washer switch. REFER to: Steering Column Multifunction Switch RH . TEST the system for normal operation. If the concern is still present, INSTALL a new SCCM. REFER to: Steering Column Control Module (SCCM) .

DIAGNOSIS AND TESTING > WIPERS AND WASHERS > PINPOINT TESTS > PINPOINT TEST D : THE WINDSHIELD WIPERS STAY ON CONTINUOUSLY

Refer to Wipers and Washers for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Wipers and Washers - System Operation and Component Description .

BCM DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B130F:14	Run Accessory Control: Circuit Short To Ground or Open	Sets when the BCM detects a short to ground from the wiper relay control circuit.

SCCM DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1131:02	Wiper Motor Module: General Signal Failure	Sets when the input to the windshield wiper motor from the fail-safe circuit does not match the requested input from the SCCM.

Possible Causes

- Wiring, terminals or connectors
- Wiper/washer switch
- Wiper relay

- Windshield wiper motor
- SCCM
- BCM

Visual Inspection and Diagnostic Pre-checks

- Inspect the wiper/washer switch for damage

DIAGNOSIS AND TESTING > WIPERS AND WASHERS > PINPOINT TESTS > PINPOINT TEST D : THE WINDSHIELD WIPERS STAY ON CONTINUOUSLY > PINPOINT TEST D : THE WINDSHIELD WIPERS STAY ON CONTINUOUSLY

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may damage the connector.

D1 CHECK THE WINDSHIELD WIPER OPERATION WITH THE IGNITION OFF

Ignition OFF.

Observe the windshield wiper operation.

Do the windshield wipers operate with the ignition off?

Yes	GO to D5
No	GO to D2

D2 CHECK THE WIPER/WASHER SWITCH INPUT

Ignition ON.

Make sure the wiper/washer switch is in the off setting.

Using a diagnostic scan tool, view the following SCCM wiper/washer switch Parameter Identifications (PIDs):

WIPE_SINGLE

F_WASH_SW

F_WIP_INT_D1

F_WIP_INT_D2

F_WIP_INT_D3

F_WIP_INT_D4

F_WIP_INT_D5

F_WIP_INT_D6

F_WIP_SLO_SW

F_WIPE_FAST_SW

Do all of the Parameter Identifications (PIDs) indicate the wipers should be off?

Yes	GO to D3

No	INSTALL a new wiper/washer switch. REFER to: Steering Column Multifunction Switch RH . TEST the system for normal operation. If the concern is still present, INSTALL a new SCCM. REFER to: Steering Column Control Module (SCCM) .

D3 CHECK THE WINDSHIELD WIPER OPERATION WITH THE SCCM (STEERING COLUMN CONTROL MODULE) DISCONNECTED

Ignition OFF.

Disconnect SCCM C226A .

Ignition ON.

Observe the windshield wiper operation.

Do the windshield wipers continue to operate?

Yes	GO to D4

No	INSTALL a new wiper/washer switch. REFER to: Steering Column Multifunction Switch RH . TEST the system for normal operation. If the concern is still present, GO to D9

D4 CHECK THE HIGH SPEED FAIL-SAFE CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Disconnect Windshield Wiper Motor C1656 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1656-1	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to D8

No	REPAIR the circuit.

D5 CHECK FOR BCM (BODY CONTROL MODULE) DTC (DIAGNOSTIC TROUBLE CODE) B130F:14

Ignition ON.

Using a diagnostic scan tool, carry out the BCM self-test.

Is DTC B130F:14 present?

Yes	GO to D6

No	GO to D7

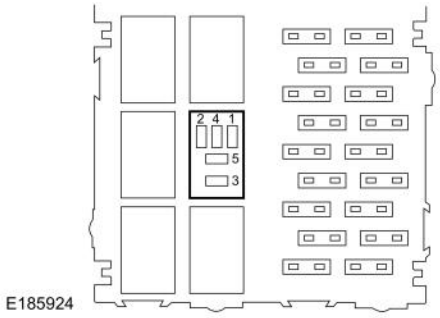
D6 CHECK THE WIPER RELAY CONTROL CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Disconnect BCM C2280F .

Disconnect Wiper Relay.

Measure:

Positive Lead	Measurement / Action	Negative Lead
 Wiper relay, cavity 2	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to D10

No	REPAIR the circuit.

D7 CHECK THE WINDSHIELD WIPER MOTOR VOLTAGE SUPPLY CIRCUIT FOR A SHORT TO VOLTAGE

Disconnect Wiper Relay.

Observe the windshield wiper operation.

Does the windshield wiper motor continue to operate?

Yes	REPAIR the circuit.

No	INSTALL a new wiper relay.

D8 CHECK FOR CORRECT WINDSHIELD WIPER MOTOR OPERATION

Disconnect and inspect the windshield wiper motor connector.

Repair:

corrosion (install new connector or terminal - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the windshield wiper motor connector. Make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new windshield wiper motor. REFER to: Windshield Wiper Motor .

No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

D9 CHECK FOR CORRECT SCCM (STEERING COLUMN CONTROL MODULE) OPERATION

Disconnect and inspect all the SCCM connectors.

Repair:

corrosion (install new connector or terminal - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the SCCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new SCCM. REFER to: Steering Column Control Module (SCCM) .

No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

D10 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all the BCM connectors.

Repair:

corrosion (install new connector or terminal - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	

No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > WIPERS AND WASHERS > PINPOINT TESTS > PINPOINT TEST E : THE WINDSHIELD WIPERS DO NOT OPERATE CORRECTLY IN THE INTERMITTENT MODE

Normal Operation and Fault Conditions

REFER to: Wipers and Washers - System Operation and Component Description (501-16 Wipers and Washers, Description and Operation).

Possible Causes

- Wiper/washer switch
- Windshield wiper motor
- SCCM

Visual Inspection and Diagnostic Pre-checks

- Inspect the wiper/washer switch for damage

DIAGNOSIS AND TESTING > WIPERS AND WASHERS > PINPOINT TESTS > PINPOINT TEST E : THE WINDSHIELD WIPERS DO NOT OPERATE CORRECTLY IN THE INTERMITTENT MODE > PINPOINT TEST E : THE WINDSHIELD WIPERS DO NOT OPERATE CORRECTLY IN THE INTERMITTENT MODE

E1 VERIFY IF THE VEHICLE IS EQUIPPED WITH A RAIN SENSOR

Inspect the vehicle for a rain sensor.

Is the vehicle equipped with a rain sensor?

Yes	GO to E2

No	GO to E3

E2 VERIFY THE RAIN SENSITIVE WIPER FEATURE IS DISABLED IN THE VEHICLE MESSAGE CENTER

Ignition ON.

Access the vehicle settings in the message center using the steering wheel controls and check the rain sensitive feature setting.

Is the rain sensitive feature enabled?

Yes	DISABLE the rain sensitive feature. INFORM the customer how to disable the rain sensitive feature, activating the intermittent setting.

No	GO to E3

E3 CHECK THE LOW SPEED WIPER OPERATION

Ignition ON.

Place the wiper/washer switch to the low speed setting and observe the windshield wipers. Place the wiper/washer switch to the off setting.

Do the low speed wipers operate when the low speed setting is selected?

Yes	GO to E4

No	GO to Pinpoint Test B

E4 CHECK THE INPUT FROM THE WIPER/WASHER SWITCH

Using a diagnostic scan tool, view the SCCM Parameter Identifications (PIDs).

Using a diagnostic scan tool, view the following SCCM wiper/washer switch Parameter Identifications (PIDs):

F_WIP_INT_D1

F_WIP_INT_D2

F_WIP_INT_D3

F_WIP_INT_D4

F_WIP_INT_D5

F_WIP_INT_D6

Cycle the wiper/washer switch from off through each of the intermittent settings.

Do the Parameter Identifications (PIDs) correspond correctly with each setting selection?

Yes	INSTALL a new windshield wiper motor. REFER to: Windshield Wiper Motor .

No	INSTALL a new wiper/washer switch. REFER to: Steering Column Multifunction Switch RH . TEST the system for normal operation. If the concern is still present, INSTALL a new SCCM. REFER to: Steering Column Control Module (SCCM) .

DIAGNOSIS AND TESTING > WIPERS AND WASHERS > PINPOINT TESTS > PINPOINT TEST F : THE RAIN SENSITIVE WIPER FEATURE IS INOPERATIVE OR DOES NOT OPERATE CORRECTLY

The Rain Sensitive Wiper Feature Is Inoperative Or Does Not Operate Correctly

Refer to Wipers and Washers for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Wipers and Washers - System Operation and Component Description (501-16 Wipers and Washers, Description and Operation).

SCCM DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B10AD:02	Rain Sensor: General Signal Failure	Sets when the SCCM detects a communication fault with the rain sensor.
B10AD:08	Rain Sensor: Bus Signal / Message Failure	Sets when the SCCM detects a communication fault with the rain

		sensor.

Possible Causes

- Fuse
- Wiring, terminals or connectors
- Rain sensitive feature not enabled
- Foreign material on windshield, such as dirt, dust or bugs
- Wiper blades
- Windshield glass
- Wiper/washer switch
- Windshield wiper motor
- Rain sensor
- SCCM

Visual Inspection and Diagnostic Pre-checks

- Inspect the windshield for damage
- Inspect the rain sensor mounting for damage
- Inspect BJB fuse 72 (5A)

DIAGNOSIS AND TESTING > WIPERS AND WASHERS > PINPOINT TESTS > PINPOINT TEST F : THE RAIN SENSITIVE WIPER FEATURE IS INOPERATIVE OR DOES NOT OPERATE CORRECTLY > PINPOINT TEST F : THE RAIN SENSITIVE WIPER FEATURE IS INOPERATIVE OR DOES NOT OPERATE CORRECTLY

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may damage the connector.

F1 CHECK THE LOW SPEED WIPER OPERATION

Place the wiper/washer switch to the low speed setting and observe the windshield wipers. Place the wiper/washer switch to the off setting.

Do the low speed wipers operate when the low speed setting is selected?

Yes	GO to F2

No	GO to Pinpoint Test B

F2 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) B10AD:02 OR B10AD:08

Using a diagnostic scan tool, carry out the SCCM self-test.

Are any Diagnostic Trouble Codes (DTCs) present?

Yes	For DTC B10AD:02 or B10AD:08, GO to F11 For all other Diagnostic Trouble Codes (DTCs), REFER to the DTC Chart: SCCM .

No	GO to F3

F3 VERIFY THE RAIN SENSITIVE WIPER FEATURE IS ENABLED IN THE VEHICLE MESSAGE CENTER

Access the vehicle settings in the message center using the steering wheel controls. Check the rain sensitive feature setting.

Is the rain sensitive feature enabled?

Yes	GO to F4

No	ENABLE the rain sensitive feature. INFORM the customer how to enable/disable the rain sensitive feature.

F4 CHECK THE INPUT FROM THE WIPER/WASHER SWITCH

Using a diagnostic scan tool, monitor the following SCCM wiper/washer switch Parameter Identifications (PIDs):

F_WIP_INT_D1

F_WIP_INT_D2

F_WIP_INT_D3

F_WIP_INT_D4

F_WIP_INT_D5

F_WIP_INT_D6

Cycle the wiper/washer switch from off through each of the auto/intermittent sensitivity settings.

Do the Parameter Identifications (PIDs) correspond correctly with each setting selection?

Yes	GO to F5

No	INSTALL a new wiper/washer switch. REFER to: Steering Column Multifunction Switch RH . TEST the system for normal operation. If the concern is still present, INSTALL a new SCCM. REFER to: Steering Column Control Module (SCCM) .

F5 CHECK THE WINDSHIELD FOR DAMAGE

Ignition OFF.

Inspect the windshield glass for any cracks, pits or other visible damage around the area of the rain sensor.

Is any windshield damage present near the area of the rain sensor?

Yes	INSTALL a new windshield. REFER to: Fixed Glass .

No	GO to F6

F6 CHECK THE WINDSHIELD GLASS FOR STREAKING

Ignition ON.

Turn the wiper/washer switch to the low speed wiper setting and while applying water to the windshield surface. Observe the wipe quality, especially around the area of the rain sensor.

Is any streaking present on the windshield around the area of the rain sensor?

Yes	GO to F7

No	GO to F9

F7 CHECK THE WINDSHIELD WIPER BLADES FOR STREAKING

Ignition OFF.

Clean the windshield glass with glass cleaner.

Clean the wiper blades with isopropyl alcohol swabs. Wipe the entire length of the wiper blades.

Ignition ON.

Place the wiper/washer switch to the low speed wiper setting and while applying water to the windshield surface. Observe the wipe quality, especially around the area of the rain sensor.

Was there noticeable improvement in the wipe quality after cleaning the glass and the wiper blades?

Yes	GO to F8

No	INSTALL new wiper blades. GO to F8

F8 RECHECK THE RAIN SENSITIVE WIPERS OPERATION

Place the wiper/washer switch to the auto/intermittent 5 setting (most sensitive to moisture) while applying water on the windshield above the rain sensor.

Do the wipers operate when water is applied to the windshield surface?

Yes	The system is operating correctly at this time. The concern may have been caused by poor wipe quality on the windshield around the rain sensor.

No	GO to F9

F9 CHECK FOR THE PRESENCE OF THE LENS GEL

Ignition OFF.

Lightly press the rain sensor against the windshield and release the rain sensor clips.

Does the rain sensor remain adhered to the windshield?

Yes	ATTACH the retaining clips. GO to F10

No	The sensor gel-type lens is missing or damaged. INSTALL a new rain sensor. REFER to: Rain Sensor .

NOTE: The rain sensor gel-type lens can be damaged or contaminated during rain sensor removal, rain sensor bracket separation or incorrect installation.

F10 INSPECT THE RAIN SENSOR MOUNTING AREA

From the outside of the vehicle, inspect the area of the windshield glass where the rain sensor is mounted. The rain sensor contact area should appear black, with no bubbles, air pockets or contaminants between the windshield glass and the rain sensor.

Does the rain sensor contact area appear black, with no bubbles, air pockets or contaminants between the windshield glass and the rain sensor?

Yes	GO to F11

No	REMOVE the rain sensor. REFER to: Rain Sensor . CLEAN the mating surfaces between the windshield glass and the rain sensor. INSTALL the rain sensor correctly. TEST the system for normal operation. If the concern is still present, INSTALL a new windshield wiper motor. REFER to: Windshield Wiper Motor .

F11 CHECK THE RAIN SENSOR VOLTAGE SUPPLY CIRCUIT FOR AN OPEN

Ignition OFF.

Disconnect Rain Sensor C914 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C914-1		Ground

Is the voltage greater than 11 volts?

Yes	GO to F12

No	VERIFY the BJB fuse 72 (5A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the SYSTEM WIRING DIAGRAMS article to identify the possible cause of the circuit short.

F12 CHECK THE RAIN SENSOR GROUND CIRCUIT FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C914-1		C914-3

Is the voltage greater than 11 volts?

Yes	GO to F13

No	REPAIR the circuit.

F13 CHECK THE LIN (LOCAL INTERCONNECT NETWORK) CIRCUIT FOR AN OPEN

Ignition OFF.

Disconnect SCCM C226A .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C914-2	Ω	C226A-8

Is the resistance less than 3 ohms?

Yes	GO to F14

No	REPAIR the circuit.

F14 CHECK FOR CORRECT SCCM (STEERING COLUMN CONTROL MODULE) OPERATION

Disconnect and inspect all the SCCM connectors.

Repair:

corrosion (install new connector or terminal - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect all the SCCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new SCCM. REFER to: Steering Column Control Module (SCCM) .

No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > WIPERS AND WASHERS > PINPOINT TESTS > PINPOINT TEST G : THE WINDSHIELD WIPERS DO NOT PARK AT THE CORRECT POSITION

Normal Operation and Fault Conditions

REFER to: Wipers and Washers - System Operation and Component Description .

Possible Causes

- Wiper mounting arm and pivot shaft
- Windshield wiper motor

Visual Inspection and Diagnostic Pre-checks

- Inspect the mounting arm and pivot shaft for damage

DIAGNOSIS AND TESTING > WIPERS AND WASHERS > PINPOINT TESTS > PINPOINT TEST G : THE WINDSHIELD WIPERS DO NOT PARK AT THE CORRECT

POSITION > PINPOINT TEST G : THE WINDSHIELD WIPERS DO NOT PARK AT THE CORRECT POSITION

G1 CHECK THE WIPER MOUNTING ARM AND PIVOT SHAFT FOR DAMAGE

Ignition OFF.

Inspect the wiper mounting arm and pivot shaft for damage.

Is the wiper mounting arm and pivot shaft OK?

Yes	GO to G2

No	INSTALL a new wiper mounting arm and pivot shaft. REFER to: Windshield Wiper Pivot Arm .

G2 CHECK THE WINDSHIELD WIPER PARK RELAY OPERATION

Ignition ON.

Place the wiper/washer switch to the low speed setting. When the wiper blades are in the middle of a wipe, place the wiper/washer switch off.

Do the windshield wipers immediately stop when the wiper/washer switch is turned off?

Yes	INSTALL a new windshield wiper motor. REFER to: Windshield Wiper Motor .

No	ADJUST the pivot arms as necessary.

DIAGNOSIS AND TESTING > WIPERS AND WASHERS > PINPOINT TESTS > PINPOINT TEST H : THE WINDSHIELD WASHER IS INOPERATIVE

Refer to Wipers and Washers for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Wipers and Washers - System Operation and Component Description .

Possible Causes

- Wiring, terminals or connectors
- Windshield washer hose
- Windshield washer jet
- Washer pump
- Wiper/washer switch

- Windshield wiper motor
- SCCM

Visual Inspection and Diagnostic Pre-checks

- Inspect the wiper/washer switch for damage

DIAGNOSIS AND TESTING > WIPERS AND WASHERS > PINPOINT TESTS > PINPOINT TEST H : THE WINDSHIELD WASHER IS INOPERATIVE > PINPOINT TEST H : THE WINDSHIELD WASHER IS INOPERATIVE

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may damage the connector.

NOTE: This Pinpoint Test uses a test lamp to simulate normal circuit loads. Use only a Rotunda Test Lamp (SGT27000) or 250-300mA incandescent bulb test lamp. To avoid connector terminal damage, use the Rotunda Flex Probe kit for the test lamp probe connection to the vehicle. Do not use the test lamp probe directly on any connector.

H1 CHECK THE AMBIENT AIR TEMPERATURE

Check the ambient air temperature.

Is the ambient air temperature below freezing?

Yes	GO to H2
No	GO to H4

H2 CHECK THE WASHER SOLVENT

Check the washer solvent and make sure it is of the correct type to use for the temperature conditions present.

Is the correct type of washer solvent present?

Yes	GO to H3
No	ALLOW the vehicle to warm to room temperature. DRAIN and REFILL the windshield washer reservoir with the correct washer solvent type. INFORM the customer of the correct type of washer solvent to use for the temperature conditions present.

H3 CHECK FOR WASHER SOLVENT TO THE WASHER JETS

Disconnect the washer hoses from the windshield washer jets and place them in a container to capture fluid.

Ignition ON.

Momentarily activate the windshield washer function.

Is washer fluid emitted at the washer hoses?

Yes	INSTALL a new washer jet in question.

No	GO to H4

H4 CHECK FOR WASHER PUMP ACTIVATION

Ignition ON.

While listening for washer pump activation near the right front of the vehicle, have an assistant activate the windshield washer function.

Does the washer pump activate?

Yes	GO to H5

No	GO to H6

H5 CHECK FOR DAMAGED WASHER HOSES

Inspect the washer hoses for kinks or damage.

Are the washer hoses OK?

Yes	Install a new washer pump. REFER to: Windshield Washer Pump .

No	REPAIR the washer hoses as necessary.

H6 CHECK THE WIPER/WASHER SWITCH INPUT USING THE WASHER SWITCH (FRONT) (F_WASH_SW) PID (PARAMETER IDENTIFICATION)

Ignition ON.

Using a diagnostic scan tool, view the SCCM Parameter Identifications (PIDs).

Using a diagnostic scan tool, view the SCCM F_WASH_SW PID.

Activate and release the wash function on the wiper/washer switch.

Does the PID indicate correctly when the switch is activated?

Yes	GO to H7

No	INSTALL a new wiper/washer switch. REFER to: Steering Column Multifunction Switch RH . TEST the system for normal operation. If the concern is still present, INSTALL a new SCCM. REFER to: Steering Column Control Module (SCCM) .

H7 CHECK FOR VOLTAGE TO THE WASHER PUMP

Ignition OFF.

Disconnect Washer Pump C137 .

Connect:

Positive Lead	Measurement / Action	Negative Lead
C137-1		Ground

Ignition ON.

Use the wiper/washer switch to activate the windshield washer function.

Does the test lamp illuminate when the washer is activated?

Yes	GO to H8

No	GO to H9

H8 CHECK THE WASHER PUMP GROUND CIRCUIT FOR AN OPEN

Connect:

Positive Lead	Measurement / Action	Negative Lead
C137-1		C137-2

Use the wiper/washer switch to activate the windshield washer function.

Does the test lamp illuminate when the washer is activated?

Yes	INSTALL a new washer pump. REFER to: Windshield Washer Pump .

No	REPAIR the circuit.

H9 CHECK THE WASHER PUMP VOLTAGE SUPPLY CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Disconnect Windshield Wiper Motor C1656 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1656-7	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to H10

No	REPAIR the circuit.

H10 CHECK THE WASHER PUMP VOLTAGE SUPPLY CIRCUIT FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1656-7	Ω	C137-1

Is the resistance less than 3 ohms?

Yes	GO to H11

No	REPAIR the circuit.

H11 CHECK FOR CORRECT WINDSHIELD WIPER MOTOR OPERATION

Disconnect and inspect the windshield wiper motor connector.

Repair:

corrosion (install new connector or terminal - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the windshield wiper motor connector. Make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new windshield wiper motor. REFER to: Windshield Wiper Motor .

No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > WIPERS AND WASHERS > PINPOINT TESTS > PINPOINT TEST I : THE WINDSHIELD WASHER IS ALWAYS ON

Refer to Wipers and Washers for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Wipers and Washers - System Operation and Component Description .

Possible Causes

- Wiring, terminals or connectors
- Washer pump
- Wiper/washer switch
- Windshield wiper motor
- SCCM

Visual Inspection and Diagnostic Pre-checks

- Inspect the wiper/washer switch for damage

DIAGNOSIS AND TESTING > WIPERS AND WASHERS > PINPOINT TESTS > PINPOINT TEST I : THE WINDSHIELD WASHER IS ALWAYS ON > PINPOINT TEST I : THE WINDSHIELD WASHER IS ALWAYS ON

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may damage the connector.

I1 CHECK THE WIPER/WASHER SWITCH INPUT USING THE WASHER SWITCH (FRONT) (F_WASH_SW) PID (PARAMETER IDENTIFICATION)

Ignition ON.

Using a diagnostic scan tool, view the SCCM Parameter Identifications (PIDs).

Using a diagnostic scan tool, view the SCCM F_WASH_SW PID.

Does the PID indicate the switch is activated?

Yes	INSTALL a new wiper/washer switch. REFER to: Steering Column Multifunction Switch RH . TEST the system for normal operation. If the concern is still present, INSTALL a new SCCM. REFER to: Steering Column Control Module (SCCM)

No	GO to I2

I2 CHECK THE WASHER PUMP VOLTAGE SUPPLY CIRCUIT FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect Windshield Wiper Motor C1656 .

Ignition ON.

Does the washer pump continue to operate?

Yes	REPAIR the circuit.

No	INSTALL a new windshield wiper motor. REFER to: Windshield Wiper Motor .

GENERAL PROCEDURES > WASHER HOSE COUPLING

Disconnect

1.

WARNING: Before beginning any service procedure in this service information, refer to Safety Warnings in GENERAL INFORMATION . Failure to follow this instruction may result in serious personal injury.

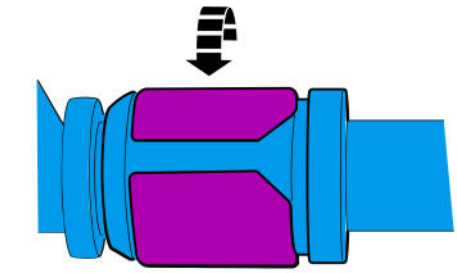
Refer to: Health and Safety Precautions .

NOTE: To prevent damage to the coupler, do not use hand tools to disconnect /connect the C-lock.

NOTE: Do not remove the lock ring from the C-lock coupler.

NOTE: Hold the female side of the coupler at the hose connection to prevent the coupler from rotating internally.

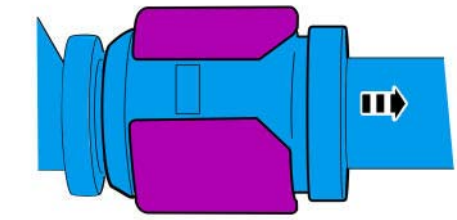
2.
Gently twist the lock ring until it has rotated approximately 90 degrees.



E143253

NOTE: The female side of the C-lock coupler contains an o-ring seal. Use care not to lose the o-ring.

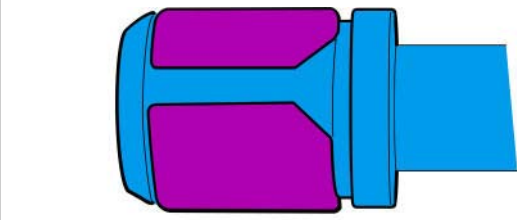
3.
Slide the C-lock coupler apart from the component fitting.



E143271

NOTE: Do not leave the lock ring in the unlocked position. This will weaken the lock ring and prevent it from correctly locking in place when reassembled, resulting in a leak.

4.
Rotate the lock ring back to the original locked position.



E143255

5.

To connect, verify the C-lock coupler lock ring is in the locked position.

NOTE: The lock ring flexes open slightly to allow the male fitting to enter the

C-lock coupler.

NOTE: The lock ring can be heard as it snaps into the lock position.

6.
Insert the male fitting into the C-lock coupler.

7.

Gently pull on the C-lock coupler to verify it is seated correctly.

GENERAL PROCEDURES > WASHER HOSE REPAIR

Repair

NOTE: This procedure may be carried out on rubber hoses only. If a plastic washer hose is damaged, a new washer hose must be installed.

1.

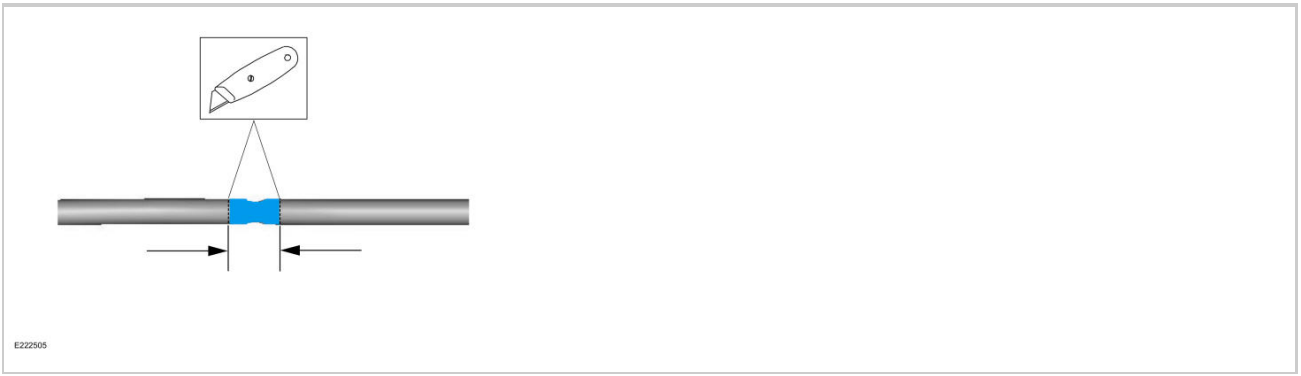
Locate and verify the damaged washer hose.

2.

Cut the hose cleanly and remove the damaged portion of the washer hose.

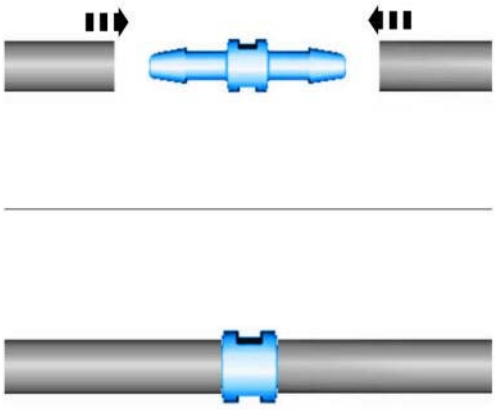
Dimension

: 0.5000 in (12.7 mm)



3.

Install a windshield washer hose adapter between the cut ends of the hose.



NOTE: In difficult cases, clamping may be required.

4.
If necessary, install a segment of 6.4 mm (0.25 in) ID black rubber hose over the ends of the washer hose and clamp both ends of the rubber hose using spring clamps.

REMOVAL AND INSTALLATION > RAIN SENSOR

Materials

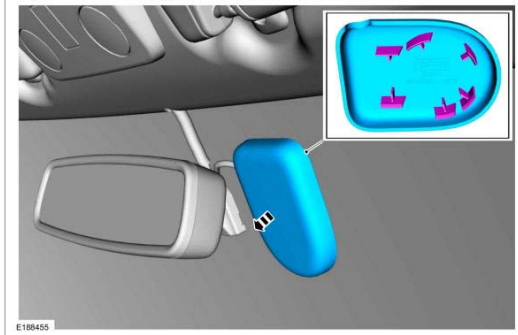
Name	Specification
Motorcraft® Ultra-Clear Spray Glass Cleaner (U.S.) ZC-23 (U.S.)	ESR-M14P5-A

REMOVAL AND INSTALLATION > RAIN SENSOR > REMOVAL

NOTE: LHD shown in illustration, RHD similar.

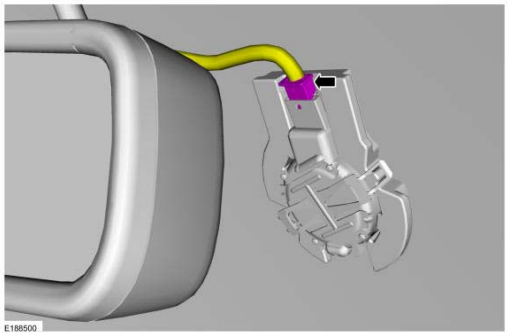
1.

Remove the rain sensor cover.



2.

Disconnect the rain sensor electrical connector.



3.

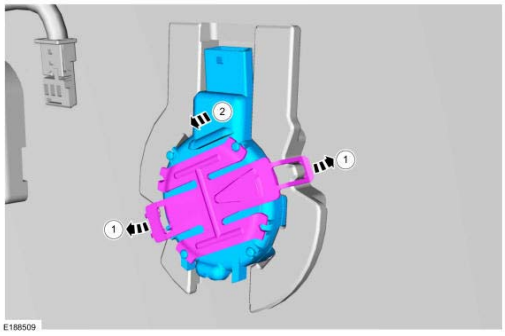
Remove the rain sensor.

1.

Release the rain sensor retaining clip tabs.

2.

Remove the rain sensor from the mounting bracket.



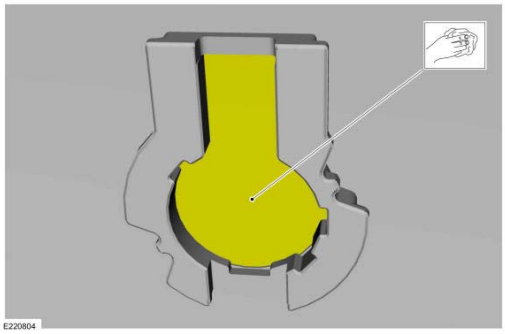
REMOVAL AND INSTALLATION > RAIN SENSOR > INSTALLATION

1.

Clean the windshield glass area of foreign materials.

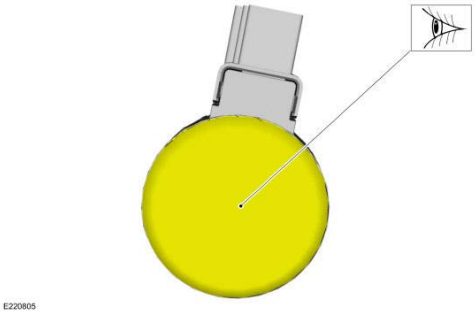
Material

: Motorcraft® Ultra-Clear Spray Glass Cleaner (U.S.) / ZC-23 (U.S.) (ESR-M14P5-A)



NOTE: If the rain sensor gel pack is damaged, install a new rain sensor.

2.
Inspect the rain sensor gel pack for damage.



3.

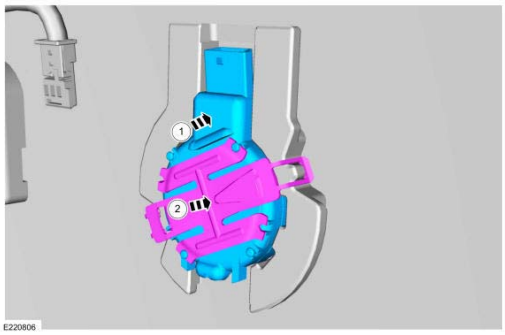
Install the rain sensor.

1.

Place the rain sensor in the mounting bracket.

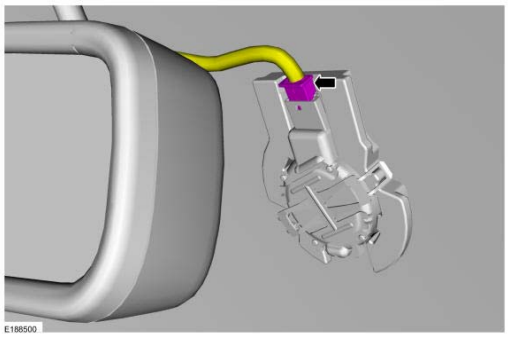
2.

Install the rain sensor retaining clip.



4.

Connect the rain sensor electrical connector.



REMOVAL AND INSTALLATION > WINDSHIELD WASHER PUMP

Special Tool(s) / General Equipment

Fluid Suction Gun

Materials

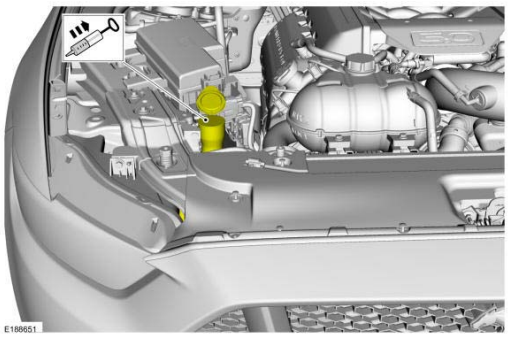
Name	Specification
Motorcraft® Premium Windshield Wash Concentrate with Bitterant (U.S.) ZC-32-B2 (U.S.)	WSS-M14P19-A

REMOVAL AND INSTALLATION > WINDSHIELD WASHER PUMP > REMOVAL

1.

Siphon out the windshield washer fluid.

Use the General Equipment: Fluid Suction Gun



2.

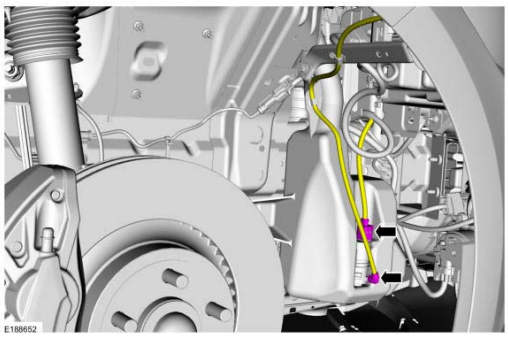
Remove the RH fender splash shield. Refer to: Fender Splash Shield .

NOTE: Be prepared to collect escaping fluid.

3.

Disconnect the windshield washer pump electrical connector.

Disconnect the washer hose coupling. Refer to: Washer Hose Coupling .



4.

Remove the windshield washer pump.



REMOVAL AND INSTALLATION > WINDSHIELD WASHER PUMP > INSTALLATION

NOTE: Do not operate the washer pump prior to filling the windshield washer reservoir. Failure to follow this instruction may result in premature pump failure.

1.

To install, reverse the removal procedure.

Material

: Motorcraft® Premium Windshield Wash Concentrate with Bitterant (U.S.) / ZC-32-B2 (U.S.) (WSS-M14P19-A)

REMOVAL AND INSTALLATION > WINDSHIELD WASHER RESERVOIR

Special Tool(s) / General Equipment

Fluid Suction Gun

Materials

Name	Specification
Motorcraft® Premium Windshield Wash Concentrate with Bitterant (U.S.) ZC-32-B2 (U.S.)	WSS-M14P19-A

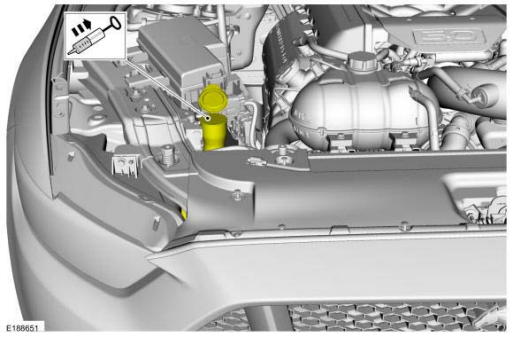
REMOVAL AND INSTALLATION > WINDSHIELD WASHER RESERVOIR > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

Siphon out the windshield washer fluid.

Use the General Equipment: Fluid Suction Gun



2.

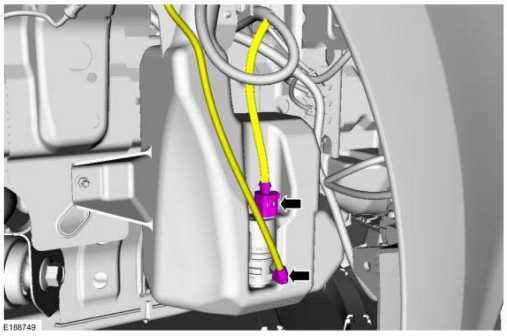
Remove the RH fender splash shield. Refer to: Fender Splash Shield .

NOTE: Be prepared to collect escaping fluid.

3.

Disconnect the windshield washer pump electrical connector.

Disconnect the washer hose coupling. Refer to: Washer Hose Coupling .



4.

Remove the windshield washer reservoir.

1.

Release the hose routing clips.

2.

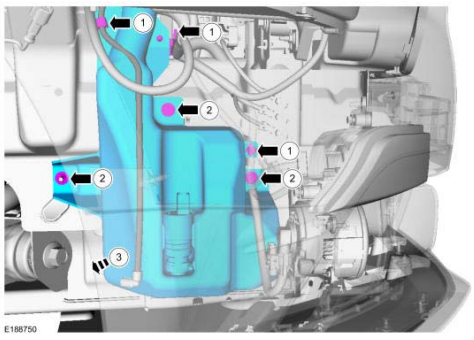
Remove the mounting bolts and nut.

Torque

: 52 lb.in (5.9 Nm)

3.

Remove the windshield washer reservoir.



REMOVAL AND INSTALLATION > WINDSHIELD WASHER RESERVOIR > INSTALLATION

NOTE: Do not operate the washer pump prior to filling the windshield washer reservoir. Failure to follow this instruction may result in premature failure.

1.
To install, reverse the removal procedure.

Material

: Motorcraft® Premium Windshield Wash Concentrate with Bitterant (U.S.) / ZC-32-B2 (U.S.) (WSS-M14P19-A)

REMOVAL AND INSTALLATION > WINDSHIELD WIPER PIVOT ARM

Special Tool(s) / General Equipment

Tow Leg Puller

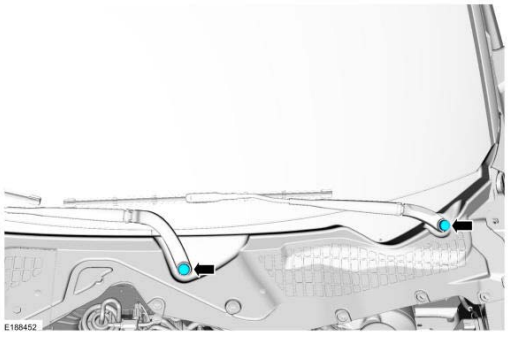
REMOVAL AND INSTALLATION > WINDSHIELD WIPER PIVOT ARM > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

NOTE: The hood is removed in this procedure for clarity.

1.

Remove the windshield wiper pivot arm nut covers.

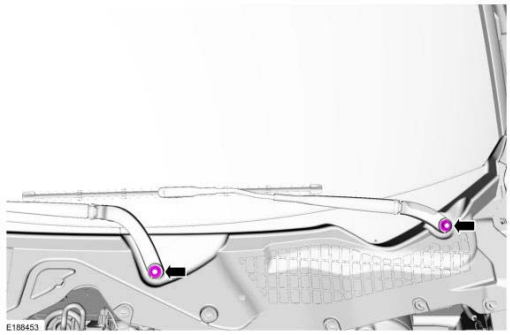


2.

Remove the windshield wiper pivot arm nuts.

Torque

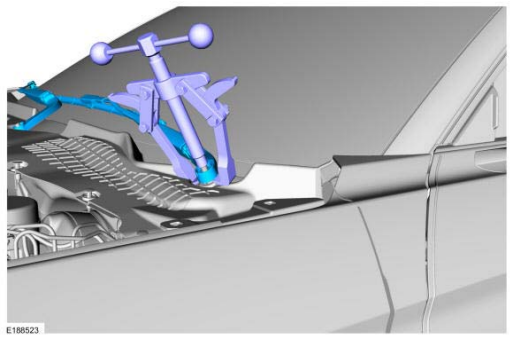
: 26 lb.ft (35 Nm)



3.

Remove the windshield wiper pivot arms.

Use the General Equipment: Two Leg Puller



REMOVAL AND INSTALLATION > WINDSHIELD WIPER PIVOT ARM > INSTALLATION

1.

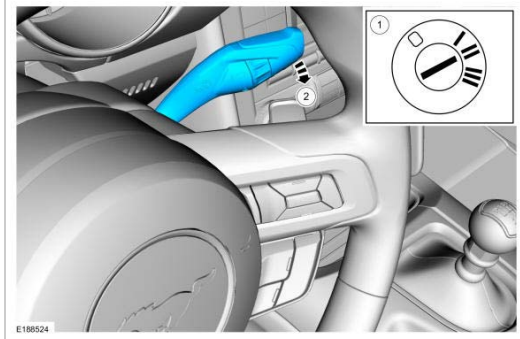
Verify the windshield wiper motor is in the PARK position.

1.

Set the ignition switch to the ON position.

2.

Set the windshield wiper switch to run the wipers one complete cycle.



2.

Install the windshield wiper pivot arms.

1.

Align the windshield wiper blades inside the marks on the windshield.

2.

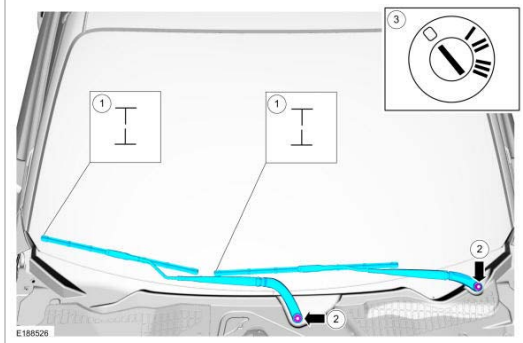
Install the windshield wiper pivot arm nuts.

Torque

: 26 lb.ft (35 Nm)

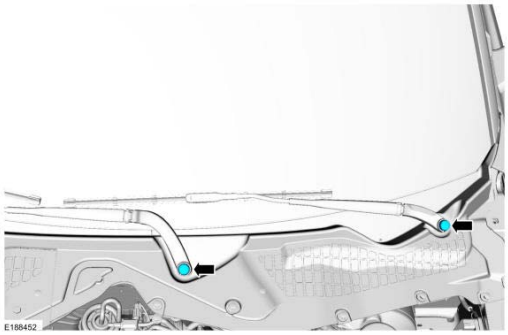
3.

Turn the ignition switch off.



3.

Install the windshield wiper pivot arm nut covers.



REMOVAL AND INSTALLATION > WIPER LINKAGE ASSEMBLY > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

NOTE: The hood is removed in this procedure for clarity.

1.

Remove the cowl panel grille. Refer to: Cowl Panel Grille .

2.

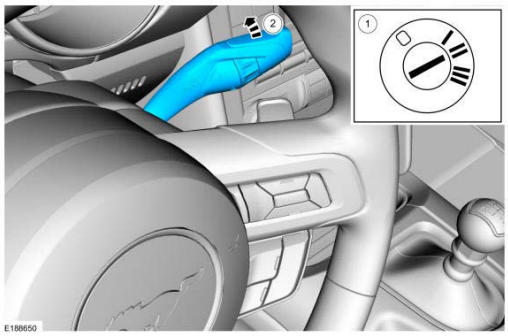
Activate the windshield wipers.

1.

Set the ignition switch to the ON position.

2.

Set the windshield wiper switch to run the wipers continuously.



NOTE: The wiper motor crank must be positioned to the 270 degree down position.

NOTE: This step is necessary to access all the mounting bolts and remove the wiper linkage assembly from the wiper motor.

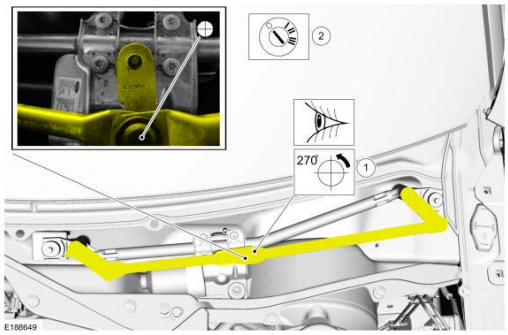
3.
Position the motor crank.

1.

Rotate the wiper motor crank 270 degrees.

2.

Set the ignition switch to the OFF position.

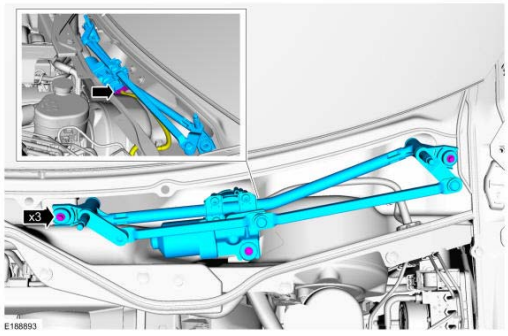


NOTE: Follow the unique instructions or graphic for this step in the installation.

4.
Remove the wiper linkage assembly mounting bolts, disconnect the windshield wiper motor electrical connector and remove the wiper linkage assembly.

Torque

: 80 lb.in (9 Nm)



NOTE: This step is only necessary when installing a new component.

5.

Remove the wiper linkage assembly links from the motor crank.

1.

Remove the left hand link.

2.

Remove the right hand link.



NOTE: This step is only necessary when installing a new component.

6.
Remove the windshield wiper motor bracket.

1.

Remove the mounting bolts.

Torque

: 115 lb.in (13 Nm)

2.

Slide the bracket out.



NOTE: This step is only necessary when installing a new component.

7.
Remove the wiper linkage assembly from the windshield wiper motor.



REMOVAL AND INSTALLATION > WIPER LINKAGE ASSEMBLY > INSTALLATION

NOTE: The windshield wiper motor must be returned to the PARK position before the wiper pivot arms can be installed. Failure to follow this instruction may result in wiper pivot arm damage.

1.

To install, reverse the removal procedure.

NOTE: Install all the bolts finger tight before final tightening.

2.
Install the wiper linkage assembly.

1.

Connect the windshield wiper motor electrical connector.

2.

Install the wiper linkage assembly mounting bolt.

Torque

: 80 lb.in (9 Nm)

3.

Install the wiper linkage assembly mounting bolt.

Torque

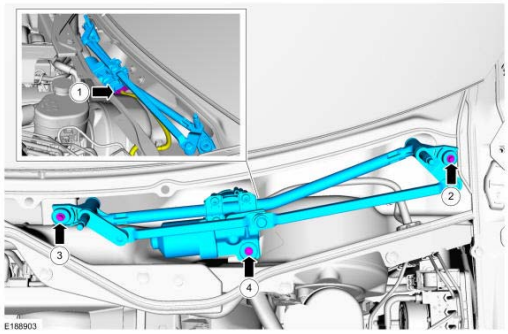
: 80 lb.in (9 Nm)

4.

Install the wiper linkage assembly mounting bolt.

Torque

: 80 lb.in (9 Nm)



REMOVAL AND INSTALLATION > WINDSHIELD WIPER MOTOR > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

Remove the wiper linkage assembly. Refer to: Wiper Linkage Assembly .

NOTE: Be careful not to damage the link seals during removal. Failure to follow this instruction may result in poor windshield wiper performance.

2.
Remove the wiper linkage assembly links from the motor crank.

1.

Remove the LH link.

2.

Remove the RH link.



3.

Remove the windshield wiper motor bracket.

1.

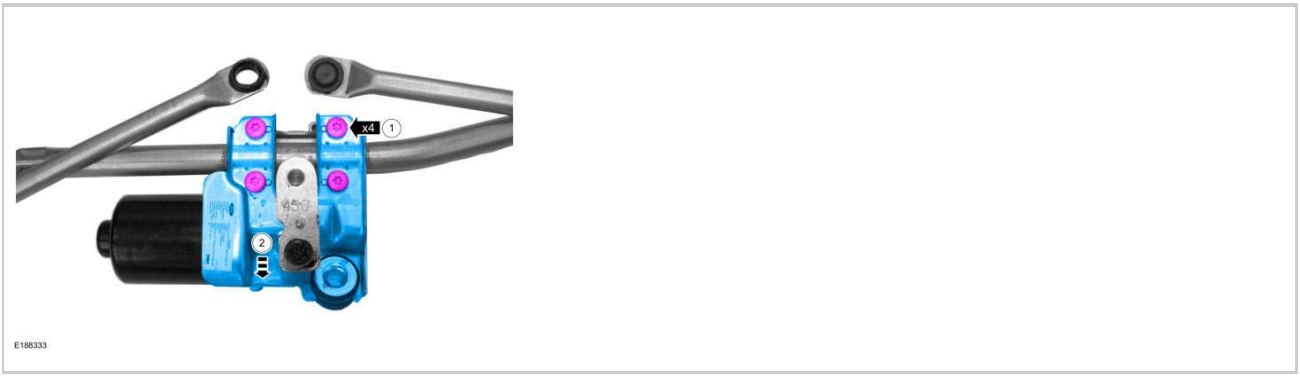
Remove the mounting bolts.

Torque

: 115 lb.in (13 Nm)

2.

Slide the bracket out.



4.

Remove the windshield wiper motor from the wiper linkage assembly.



REMOVAL AND INSTALLATION > WINDSHIELD WIPER MOTOR > INSTALLATION

1.

To install, reverse the removal procedure.

Service Manual: BODY CLOSURES

GENERAL PROCEDURES > FRONT DOOR ALIGNMENT

Inspection

NOTE: Coupe shown, convertible similar.

1.

Check front door to body dimensions. Refer to: Body and Frame .

Adjustment

All alignments

NOTE: Removal steps in this procedure may contain installation details.

NOTE: LH side shown, RH side similar.

1.

Remove the bolts and the striker assembly.

Torque

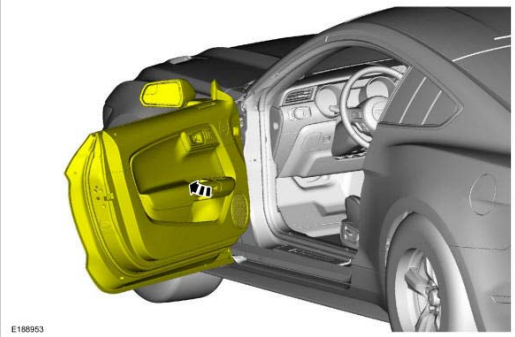
: 18 lb.ft (25 Nm)



Front door in and out, up and down alignment

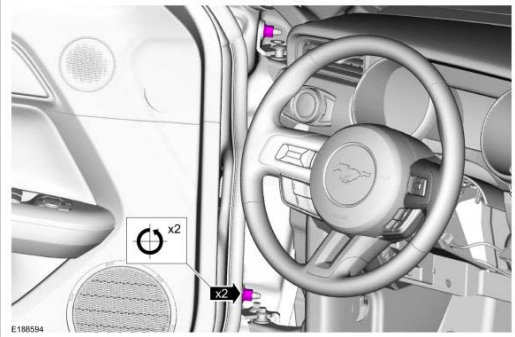
2.

Open the door.



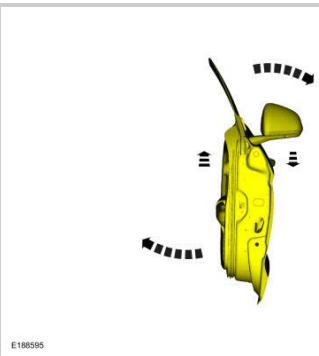
3.

Loosen the nuts to permit movement of the door. Loosen:: 2 turn(s)



4.

Adjust the door to specification. Refer to: Body and Frame .

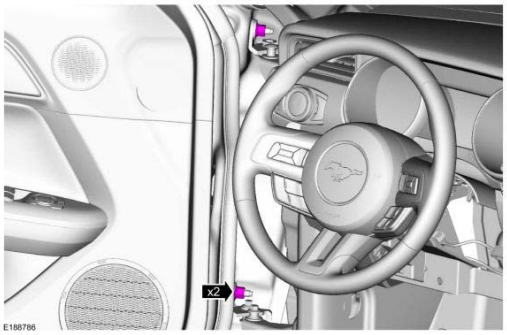


5.

Tighten the nuts.

Torque

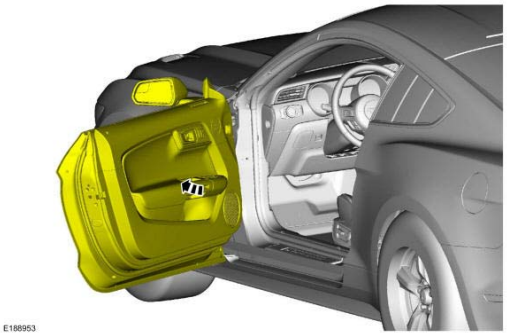
: 22 lb.ft (30 Nm)



Front door fore, aft and tilt alignment

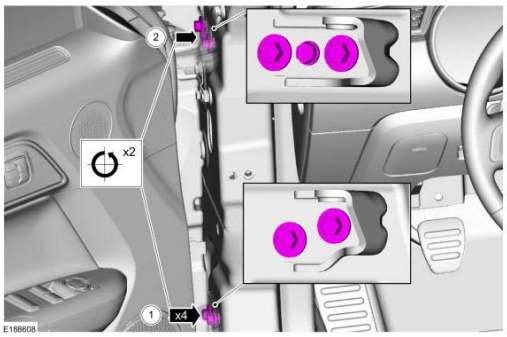
6.

Open the door.



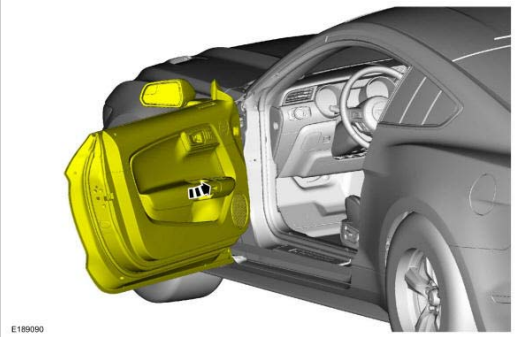
7.

Loosen the bolts to permit movement of the door. Loosen : 2 turn(s)



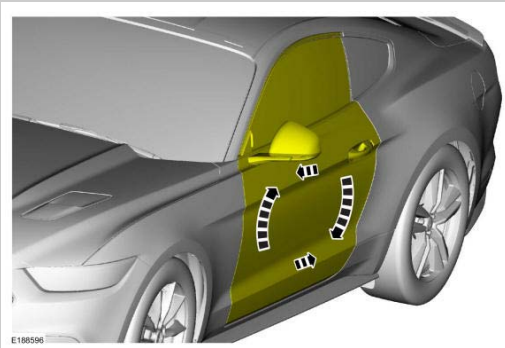
8.

Carefully close the door.



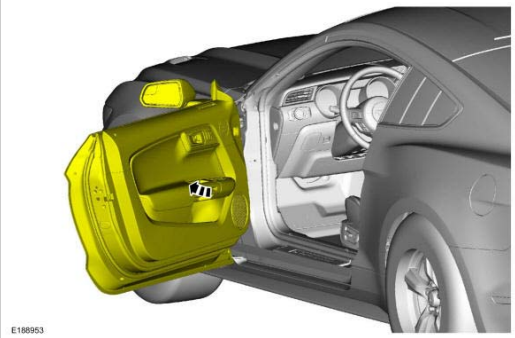
9.

Adjust the door to specification. Refer to: Body and Frame .



10.

Carefully open the door.

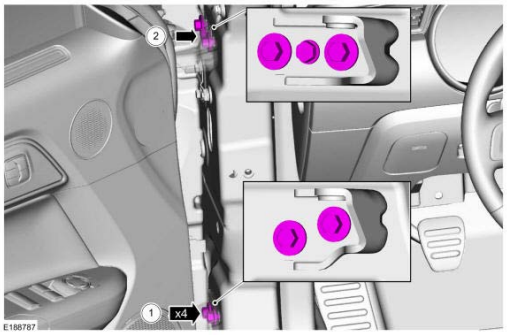


11.

Tighten the bolts.

Torque

: 1.: 22 lb.ft (30 Nm) 2.: 89 lb.in (10 Nm)



All alignments

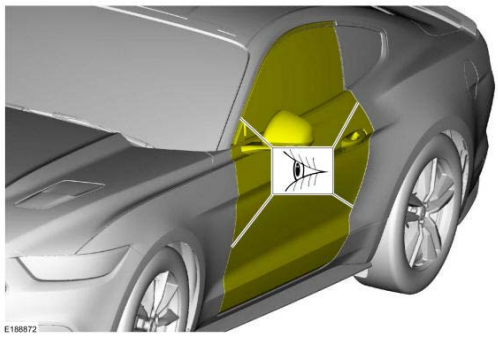
12.

Loosen the bolts to permit movement of the striker assembly. Loosen: : 2 turn(s)



13.

Check body to front door dimensions. Refer to: Body and Frame .



14.

Check the front door glass alignment. Refer to: Door Window Glass Adjustment - Convertible . Refer to: Door Window Glass Adjustment - Coupe .

15.

Install the removed components.

GENERAL PROCEDURES > HOOD ALIGNMENT

Inspection

NOTE: Coupe shown, convertible similar.

1.

Check hood to body dimensions. Refer to: Body and Frame .

All alignments

NOTE: Removal steps in this procedure may contain installation details.

2.

Remove the hood latch. Refer to: Hood Latch .

Hood fore and aft, left and right alignments

3.

Loosen the bolts to permit movement of the hood and adjust to specification. Refer to: Body and Frame . Loosen : 2 turn(s)

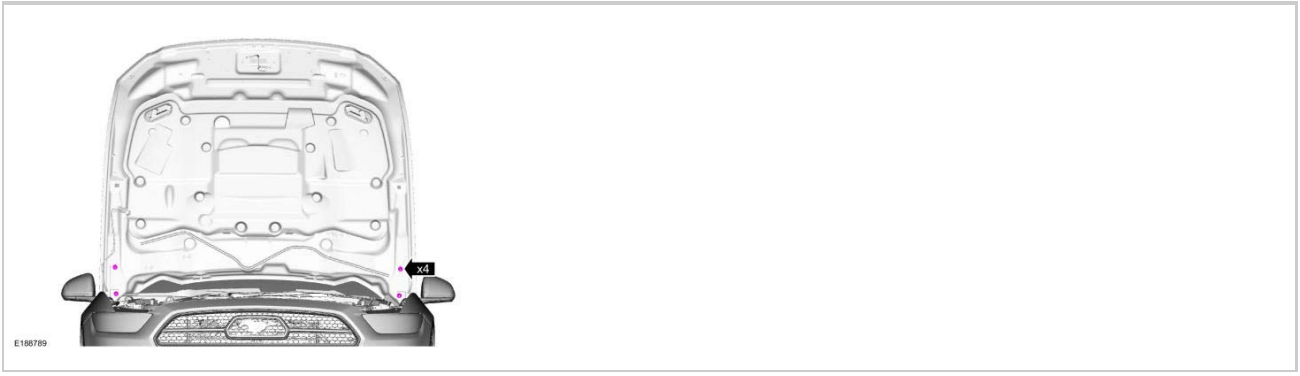


4.

Tighten the nuts.

Torque

: 17 lb.ft (23 Nm)



Hood front up and down alignments

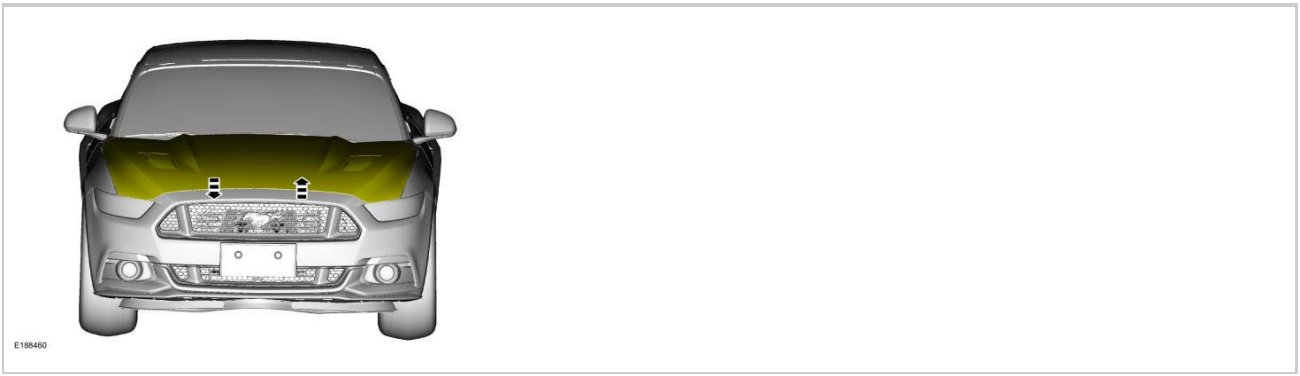
5.

Adjust the bump stop rubbers.



6.

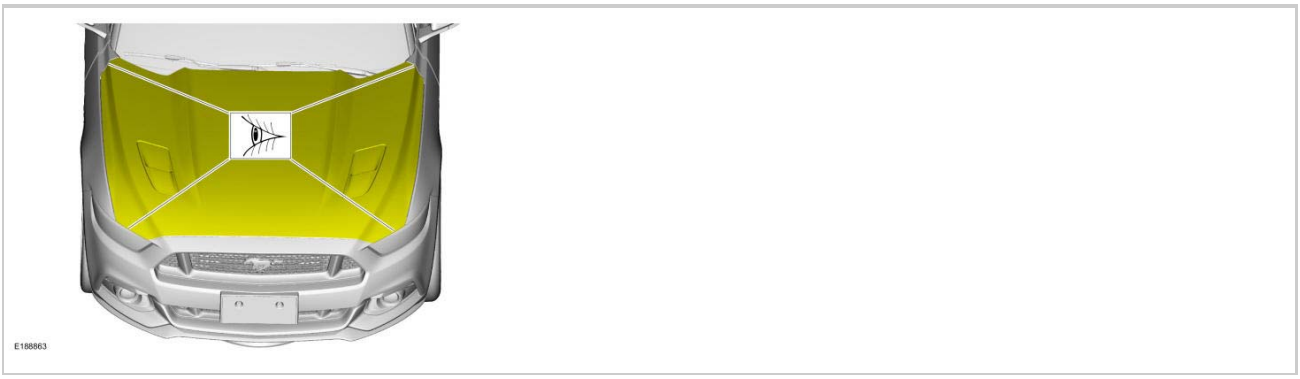
Adjust the hood to specification. Refer to: Body and Frame .



All alignments

7.

Check the body to hood dimensions. Refer to: Body and Frame .



8.

Install the removed components.

GENERAL PROCEDURES > LUGGAGE COMPARTMENT LID ALIGNMENT

Inspection

NOTE: Coupe shown, convertible similar.

1.

Check luggage compartment lid to body dimensions. Refer to: Body and Frame .

All alignments

NOTE: Removal steps in this procedure may contain installation details.

2.

Remove the luggage compartment lid latch. Refer to: Luggage Compartment Lid Latch - Coupe .

Luggage compartment lid fore and aft, left and right alignments

3.

Loosen the bolts to permit movement of the luggage compartment lid. Loosen: : 2 turn(s)



4.

Adjust the luggage compartment lid to specifications. Refer to: Body and Frame .



5.

Carefully open luggage compartment lid.

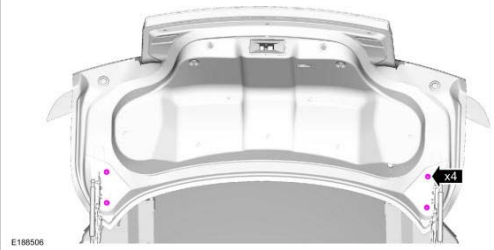


6.

Tighten the nuts.

Torque

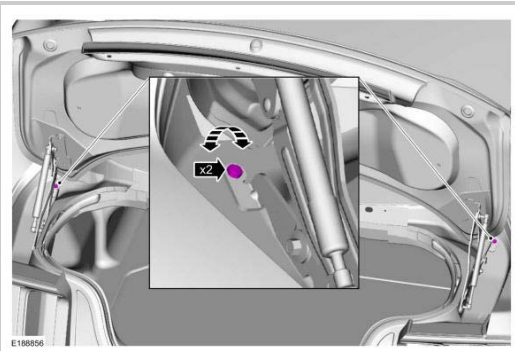
: 106 lb.in (12 Nm)



Luggage compartment lid up and down alignments

7.

Adjust the adjusting screws.



8.

Adjust the luggage compartment lid to specifications. Refer to: Body and Frame .



9.

Open the luggage compartment lid.



10.

Adjust the luggage compartment lid bump stop rubbers.



11.

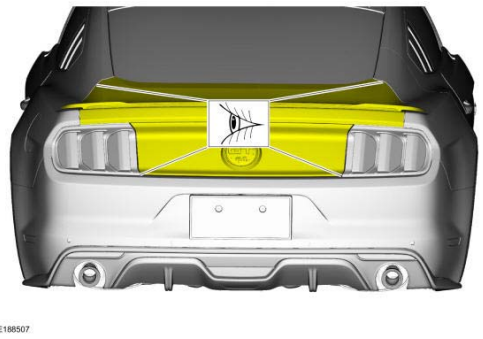
Adjust the luggage compartment lid to specifications. Refer to: Body and Frame .



All alignments

12.

Check the body to luggage compartment lid dimensions. Refer to: Body and Frame .



13.

Install the removed components.

REMOVAL AND INSTALLATION > FRONT DOOR > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

NOTE: LH side shown, RH side similar.

1.

Disconnect the front door electrical connector.

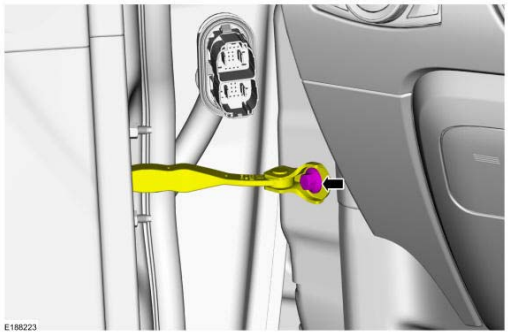


2.

Remove the check arm bolt.

Torque

: 18 lb.ft (25 Nm)

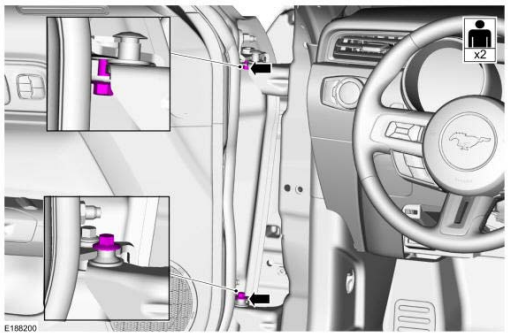


NOTE: This step requires the aid of another technician.

3.
Remove the door hinge pivot bolts.

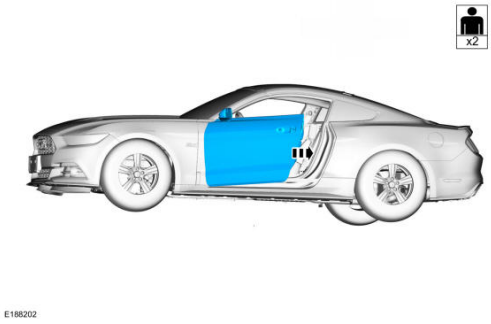
Torque

: 150 lb.in (17 Nm)



NOTE: This step requires the aid of another technician.

4.
Remove the door.



REMOVAL AND INSTALLATION > FRONT DOOR > INSTALLATION

1.

To install, reverse the removal procedure.

> *NOTE: This step is only necessary when installing a new component.*

2.
Check the door to body alignment. Align the door as necessary. Refer to: Front Door Alignment .

REMOVAL AND INSTALLATION > FRONT DOOR CHECK ARM > REMOVAL

> *NOTE: Removal steps in this procedure may contain installation details.*

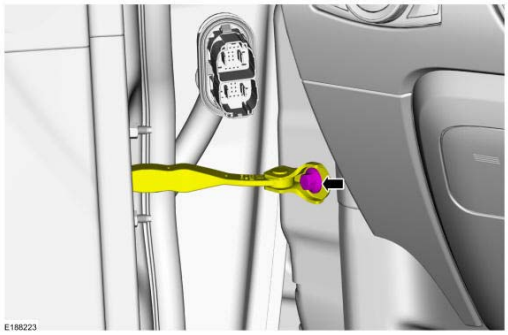
> *NOTE: LH side shown, RH side similar.*

1.

Remove the check arm bolt.

Torque

: 18 lb.ft (25 Nm)



2.

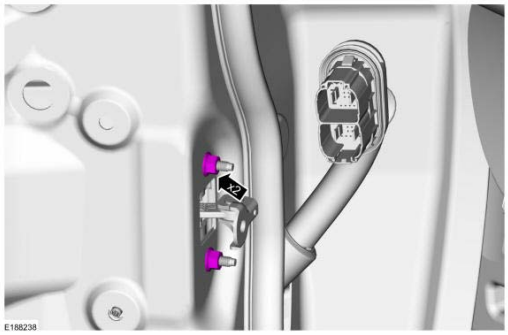
Remove the front door trim panel. Refer to: Front Door Trim Panel .

3.

Remove the nuts.

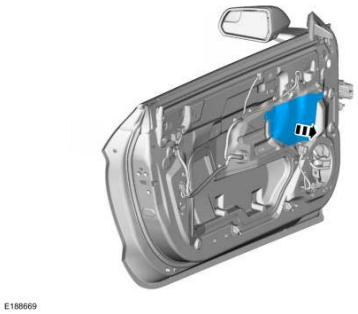
Torque

: 106 lb.in (12 Nm)



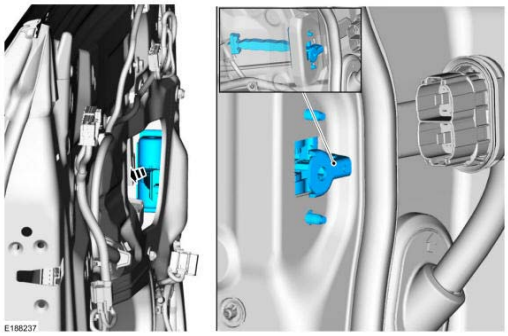
4.

Remove the front watershield.



5.

Remove the check arm assembly.



REMOVAL AND INSTALLATION > FRONT DOOR CHECK ARM > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > FUEL FILLER DOOR > REMOVAL

1.

Open the fuel filler door.



2.

Using a screwdriver, pry the retaining tab back and slide the fuel filler door from the fuel filler door hinge.



REMOVAL AND INSTALLATION > FUEL FILLER DOOR > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > FUEL FILLER DOOR ASSEMBLY > REMOVAL

NOTE: The fuel filler door assembly is damaged during the removal process and requires a new fuel filler door assembly installed.

1.

Open the fuel filler door.



2.

Remove the fuel tank filler pipe. 2.3L Refer to: Fuel Tank Filler Pipe . 3.7L Refer to: Fuel Tank Filler Pipe . 5.0L Refer to: Fuel Tank Filler Pipe .

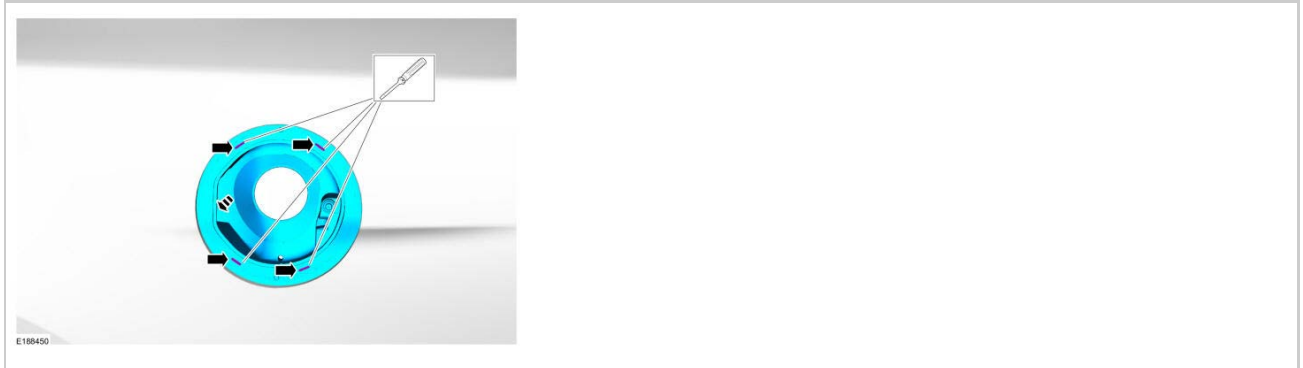
3.

Unseat the fuel filler door assembly boot from inside the wheel opening.



NOTE: Clearance is limited. When all four clips release you can rotate the housing out of the vehicle.

4.
Using a screwdriver, punch 4 holes at the indicated areas. Insert the screwdriver and release the clips while pulling the housing away from the vehicle.



REMOVAL AND INSTALLATION > FUEL FILLER DOOR ASSEMBLY > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > FUEL FILLER DOOR SPRING > REMOVAL

1.

Open the fuel filler door.



2.

Using a screwdriver, press the tab to release the fuel filler door spring from the fuel filler door assembly.



REMOVAL AND INSTALLATION > FUEL FILLER DOOR SPRING > INSTALLATION

1.

To install, reverse the removal procedure.

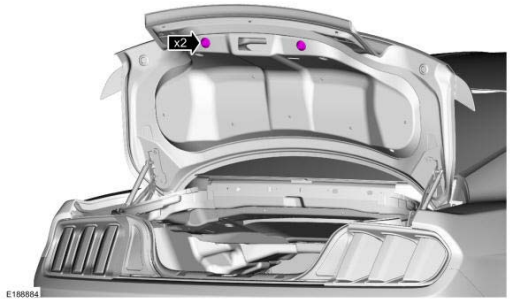
REMOVAL AND INSTALLATION > LUGGAGE COMPARTMENT LID > REMOVAL

All vehicles

NOTE: Removal steps in this procedure may contain installation details.

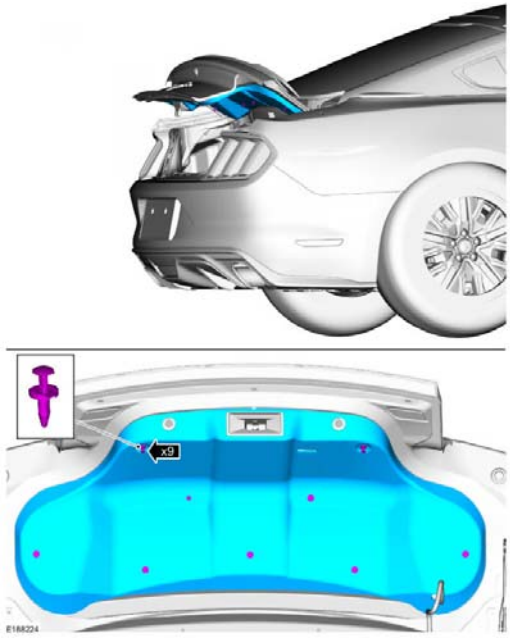
1.

Remove the bump stops.



2.

Remove the retainers and the luggage compartment lid trim panel.



NOTE: This step is only necessary when installing a new component.

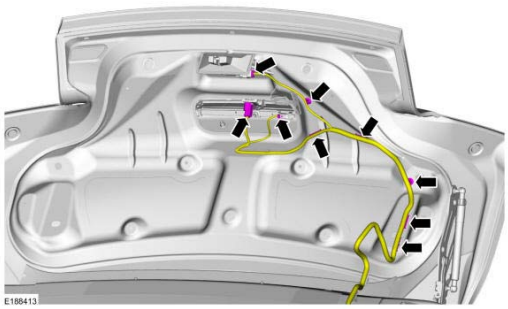
3.
Remove the luggage compartment lid moulding. Refer to: Luggage Compartment Lid Moulding .

NOTE: This step is only necessary when installing a new component.

4.
If equipped, remove the rear spoiler. Refer to: Rear Spoiler .

5.

Detach the wiring harness retainers and disconnect the luggage compartment lid electrical connectors.



Convertible

6.

1.

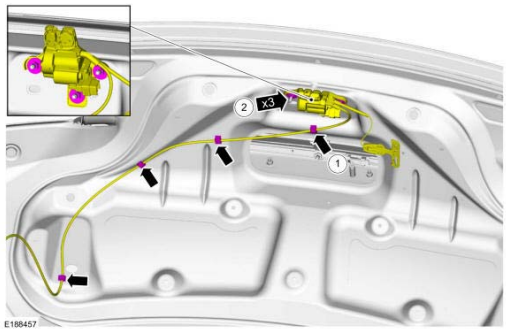
Detach the latch lock cable retainers.

2.

Remove the bolts and position aside the latch lock cable.

Torque

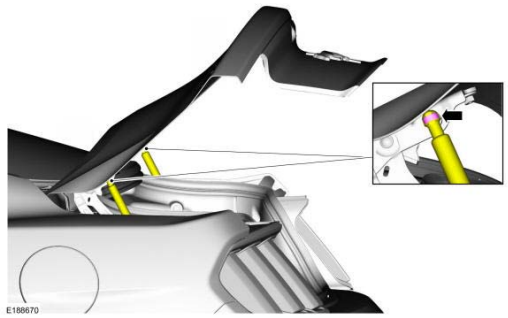
: 80 lb.in (9 Nm)



All vehicles

7.

On both sides, remove the strut.

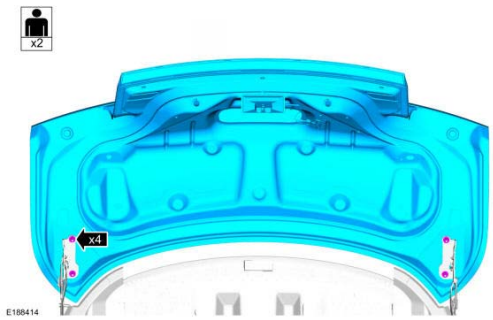


NOTE: This step requires the aid of another technician.

8.
Remove the nuts and the luggage compartment lid.

Torque

: 106 lb.in (12 Nm)



REMOVAL AND INSTALLATION > LUGGAGE COMPARTMENT LID > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Check the luggage compartment lid alignment. Align the luggage compartment lid as necessary.
Refer to: Luggage Compartment Lid Alignment .

Service Manual: BODY REPAIRS - GENERAL INFORMATION

SPECIFICATIONS > SPECIFICATIONS > GENERAL SPECIFICATIONS

Item	Specification
Plug Weld hole	8 mm (0.315 in)
Weld Wire ER70S-3	0.9 mm (0.0354 in) - 1.1 mm (0.0433 in)
Weld Wire ER70S-6	0.9 mm (0.0354 in) - 1.1 mm (0.0433 in)

SPECIFICATIONS > SPECIFICATIONS > WELD NUGGET CHART

Test Thickness of Metal	Nugget Size
0.7 mm (0.0276 in) + 0.7 mm (0.0276 in)	4.3 mm (0.1693 in)
0.7 mm (0.0276 in) + 0.7 mm (0.0276 in) + 0.7 mm (0.0276 in)	4.3 mm (0.1693 in)
0.9 mm (0.0354 in) + 0.9 mm (0.0354 in)	4.7 mm (0.185 in)
0.9 mm (0.0354 in) + 0.9 mm (0.0354 in) + 0.9 mm (0.0354 in)	4.7 mm (0.185 in)
1 mm (0.0394 in) + 1 mm (0.0394 in)	5.2 mm (0.2047 in)
1 mm (0.0394 in) + 1 mm (0.0394 in) + 1 mm (0.0394 in)	5.2 mm (0.2047 in)
2 mm (0.0787 in) + 2 mm (0.0787 in)	7.1 mm (0.2795 in)
2 mm (0.0787 in) + 2 mm (0.0787 in) + 2 mm (0.0787 in)	7.1 mm (0.2795 in)
3 mm (0.1181 in) + 3 mm (0.1181 in)	8.7 mm (0.3425 in)
3 mm (0.1181 in) + 3 mm (0.1181 in) + 3 mm (0.1181 in)	8.7 mm (0.3425 in)
3 mm (0.1181 in) + 0.7 mm (0.0276 in)	4.3 mm (0.1693 in)
0.7 mm (0.0276 in) + 3 mm (0.1181 in) + 1 mm (0.0394 in)	5.2 mm (0.2047 in)
2 mm (0.0787 in) + 2 mm (0.0787 in) + 0.7 mm (0.0276 in)	4.3 mm (0.1693 in)
0.9 mm (0.0354 in) + 0.9 mm (0.0354 in) + 2 mm (0.0787 in)	4.7 mm (0.185 in)
2 mm (0.0787 in) + 0.9 mm (0.0354 in) + 1 mm (0.0394 in)	5.2 mm (0.2047 in)

1 mm (0.0394 in) + 3 mm (0.1181 in) + 1 mm (0.0394 in)	5.2 mm (0.2047 in)
3 mm (0.1181 in) + 1 mm (0.0394 in) + 2 mm (0.0787 in)	7.1 mm (0.2795 in)
0.9 mm (0.0354 in) + 0.7 mm (0.0276 in) + 0.9 mm (0.0354 in)	4.3 mm (0.1693 in)

SPECIFICATIONS > SPECIFICATIONS > FORD RECOMMENDED STEEL REPAIRABILITY MATRIX

Grade	Trade Descriptions	Welding Method	Cold Repairs	Use of Heat for Repair	Temperature Range	Maximum Heat		
MIG	Squeeze-Type Resistance Spot Welding (STRW)	MIG Braze						
Mild Steel	Mild	Yes	Yes	N/A	Yes **FOOTNOTE (a)**	Yes	Up to 650 ° C (1, 200 ° F)	90 seconds x 2
Laminate Steel	Quiet Steel	No	Yes	No	Yes **FOOTNOTE (a)**	NA	NA	NA
Bake Hardened Steel (BH)	Bake Hardened Steel (BH) 180, 200, 210, 220, 250, 280	Yes	Yes	Yes **FOOTNOTE (b)**	Yes **FOOTNOTE (a)**	Yes	Up to 650 ° C (1, 200 ° F)	90 seconds x 2
Solid Solution Strengthened	-	Yes	Yes	Yes **FOOTNOTE (b)**	Yes **FOOTNOTE (a)**	Yes	Up to 650 ° C (1, 200° F)	90 seconds x 2
High-Strength Low Alloy (HSLA)	High-Strength Low Alloy (HSLA) 200,	Yes	Yes	Yes **FOOTNOTE (b)**	Yes **FOOTNOTE (a)**	Yes	Up to 650	90 seconds x 2

	High-Strength Low Alloy (HSLA 250, High-Strength Low Alloy (HSLA 260, High-Strength Low Alloy (HSLA 300, High-Strength Low Alloy (HSLA 340, High-Strength Low Alloy (HSLA 350, High-Strength Low Alloy (HSLA 500, High-Strength Low Alloy (HSLA) 550						° C (1, 200 ° F)	
Dual Phase Steel (DP)	Dual Phase Steel (DP) 500, Dual Phase Steel (DP) 600	Yes	Yes	Yes **FOOTNOTE (b)**	Yes **FOOTNOTE (a)**	No	NA	NA
Dual Phase Steel (DP) **FOOTNOTE (c)**	Dual Phase Steel (DP) 700, Dual Phase Steel (DP) 900 and Dual Phase Steel (DP) 1, 000	Yes **FOOTNOTE (d)**	Yes	Yes **FOOTNOTE (b)**	No	No	NA	NA
Ultra High Strength Steel (UHSS) (Martensitic, Boron) **FOOTNOTE (e)**	Boron, Martensitic	Yes **FOOTNOTE (a)**	Yes	Yes **FOOTNOTE (b)**	No	No	NA	NA
Transformation Induced Plasticity Steel (TRIP)	Transformation Induced Plasticity Steel (TRIP) 590, Transformation Induced Plasticity Steel (TRIP) 780, Transformation	NA	NA	NA	NA	NA	NA	NA

	Induced Plasticity Steel (TRIP) 980							

FOOTNOTE (a) Cold repairs can be performed if damage excludes kinks. May section only if approved procedure in service information. **FOOTNOTE (b)** Metal Inert Gas (MIG) braze allowed for non-structural applications only. **FOOTNOTE (c)** Dual phase steels DP 700 class, DP 900 class and DP 1, 000 class must be replaced at factory joints, no sectioning unless approved procedure in service information. **FOOTNOTE (d)** For DP 900, 1, 000 and Boron use Metal Inert Gas (MIG) plug welding only, no stitch welding. **FOOTNOTE (e)** Boron and Ultra High Strength Steel (UHSS)-Mortensite components must be replaced at factory joints, no sectioning allowed.

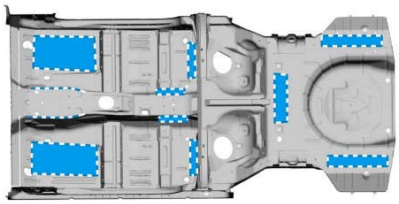
DESCRIPTION AND OPERATION > NOISE, VIBRATION AND HARSHNESS > SOUND DEADENERS AND INSULATORS

NOTE: Mastic is made of a combustible material and should be removed prior to carrying out welding procedures to the area. Heat zones from welding near mastic may cause the mastic material to burn.

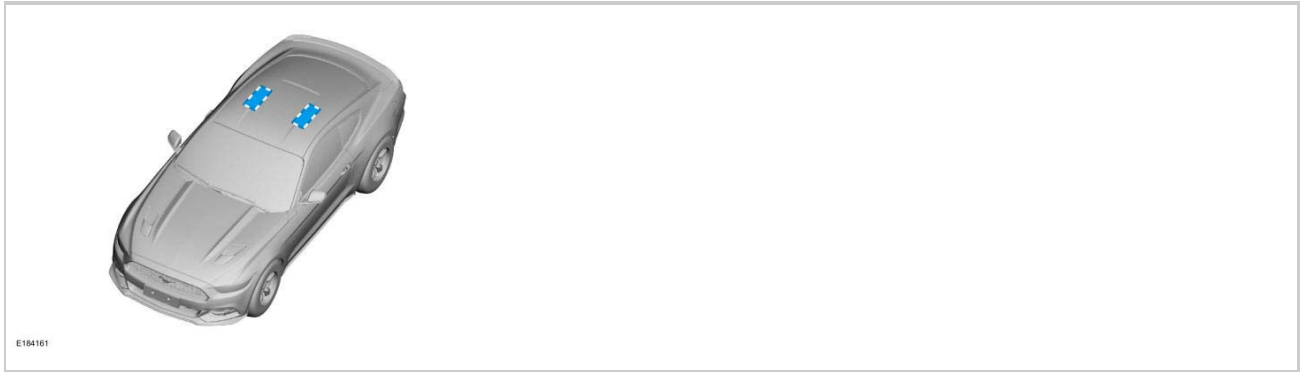
NOTE: Corrosion protection must be restored to the area after the mastic material is applied. Corrosion protection products may be wax based and loss of adhesion may occur if applied prior to mastic installation.

The following serve as a reference to indicate mastic patch (butyl) locations. Additional insulators and sound deadeners are used beyond those indicated in the illustrations.

Floor Pan

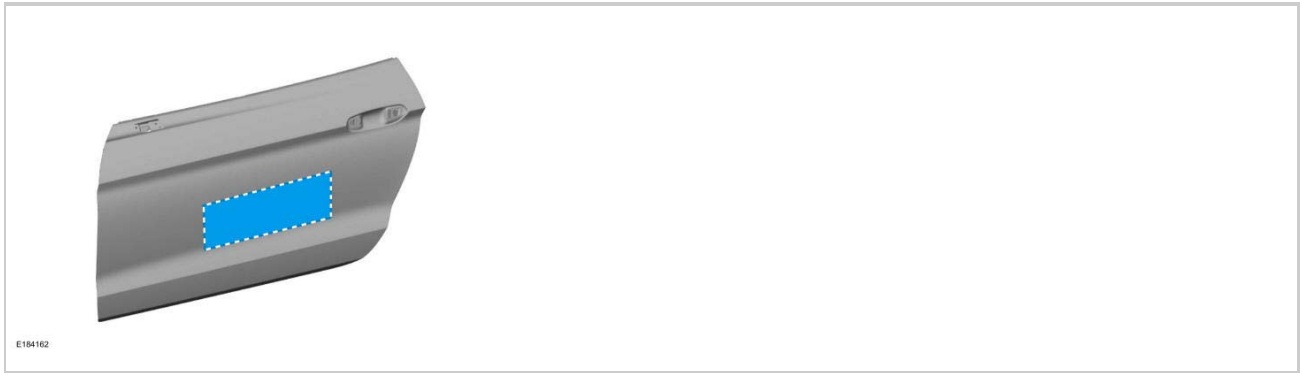


Roof Panel



Front Door

NOTE: LH side shown, RH side similar.



DESCRIPTION AND OPERATION > PLASTIC REPAIRS > PLASTIC COMPONENTS

The following illustration(s) are not all-inclusive of trim levels available. The actual trim level of the vehicle will determine the viability of carrying out a plastics repair. Typically components with moulded-in color or a textured finish are not considered repairable components.

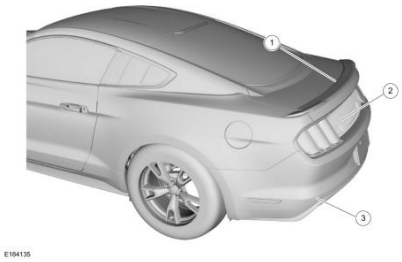
Front Exterior Plastic Components



Item	Description	Material
1	Front bumper cover lower	Thermoplastic olefin (TPO)

2	Hood scoop insert	Acrylonitrile butadiene styrene (ABS)
3	Rocker panel moulding	Thermoplastic olefin (TPO)

Rear Exterior Plastic Components



Item	Description	Material
1	Rear spoiler	Polypropelyne (PP)
2	Luggage compartment lid moulding	Polypropelyne (PP)
3	Rear bumper cover	Thermoplastic olefin (TPO)

Repair Considerations

Several considerations will determine viability of plastic repair procedure(s):

- Is the damage cosmetic or structural?
- Can the repair be carried out on the vehicle?
- Is the part readily available?
- Is component repair the most cost effective method?
- Will the repair provide for the fastest, highest quality repair?

Several types of plastic are in use for automotive application. However, all plastics will fall into 2 primary categories of thermoplastic or thermosetting plastic.

Thermosetting Plastic

Generally, thermosetting plastics are made with 2-part thermosetting resins. When mixed together, heat is generated, producing a cure that is irreversible. Because of this, thermosetting plastics will require the use of a 2-part adhesive for repair.

Sheet-Molded Composite (SMC):

- Sheet-Molded Composite (SMC) is a type of thermosetting plastic that uses glass fibers or nylon fibers in combination with thermosetting polyester resins. When fully cured, Sheet-Molded Composite (SMC) is strong and rigid.
- Sheet-Molded Composite (SMC) is similar to, but not identical to fiberglass. Ford Motor Company uses Sheet-Molded Composite (SMC) in components such as fenders, hoods and liftgates.

Thermoplastic Compounds

Thermoplastic compounds are manufactured by a process that is reversible. Thermoplastics can be remolded repeatedly by reheating. This characteristic of thermoplastics makes plastic welding a possible repair alternative. A repair of thermoplastic compounds is still possible through the use of a 2-part adhesive and filler repair materials and reinforcements as needed. Thermoplastics are widely used in interior trim components, wheel flares, body side cladding and bumper covers.

Polyolefin

Polyolefins fall into the family of thermoplastics with one unique characteristic: an oily or waxy feel to the material when sanded or ground. Polyolefin lends itself very well to remolding through the use of heat. Because of this, components made of this material lend themselves well to the possibility of plastic welding. Most adhesive repair materials and paint will not bond to the surface of a polyolefin unless an adhesion promoter specially formulated for plastic is first applied to the exposed raw surface. Otherwise, polyolefins are repaired like most other thermoplastics. Polyolefins are used in bumper covers, fan shrouds and wheel housings.

Proper identification of the various types of plastic is necessary to select the appropriate repair method(s) to carry out high quality plastic repairs. For additional information, refer to: Plastic Repairs .

DESCRIPTION AND OPERATION > SEALER, UNDERBODY PROTECTION MATERIAL AND ADHESIVES > ADHESIVES

NOTE: The following illustrations are examples of structural adhesive application and are not all inclusive.

The correct adhesive bonding is essential to repairing the vehicle correctly. Adhesives are used in many areas of the body structure in place of welding. In addition to providing a structural bond between component, adhesives can also help prevent wind noise, water leaks, exhaust fumes and dust from entering the vehicle. They also provide anti-corrosion barriers.

Hood

NOTE: Adhesive applied between inner and outer panels prior to assembly.



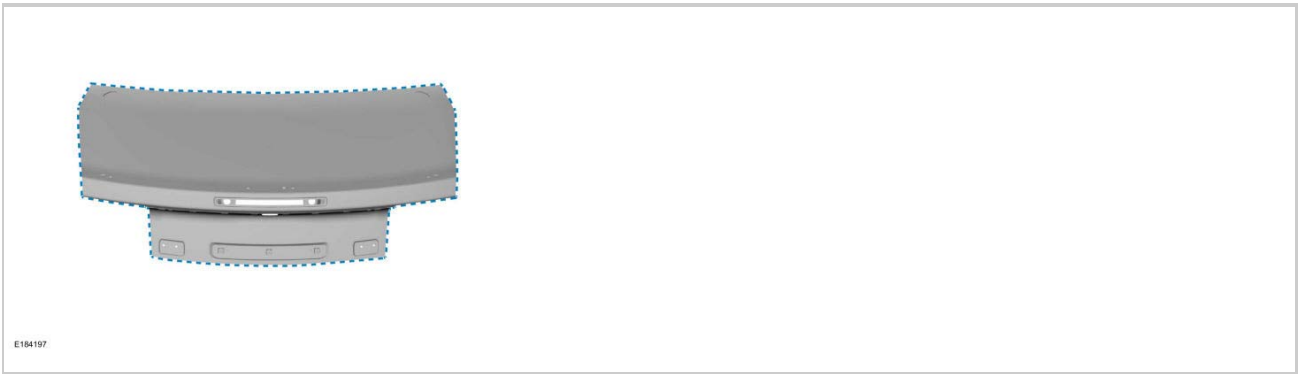
Front Door

NOTE: Adhesive applied between inner and outer panels prior to assembly.



Luggage Compartment Lid

NOTE: Adhesive applied between inner and outer panels prior to assembly.



Bodyside



DESCRIPTION AND OPERATION > SEALER, UNDERBODY PROTECTION MATERIAL AND ADHESIVES > SEALERS

The correct sealing of joints is essential to repairing the vehicle correctly. Sealers are used to prevent wind noise, water leaks, exhaust fumes and dust from entering the vehicle. They also provide anti-corrosion barriers. Sealers are applied to areas such as door and rear compartment hem flanges,

wheelhouse, quarter outer, floor, cowl, roof and other panel-to-panel attaching points. The following joint sealers are recommended for use depending upon the application:

- Seam Sealer - Heavy-bodied, non-sag adhesive/sealer for use on standing cosmetic seams, truck bed seams, tooled door skin seams and floor pans.

Sealers should remain flexible after curing and must be paintable. Follow the manufacturer's directions for correct application of these materials.

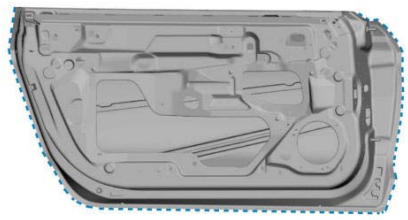
Any damage to originally sealed joints should be repaired by resealing. Along with attaching points of new panels, open joints that require bridging of sealer to close a gap should be sealed using a heavy-bodied sealer.

NOTE: The following illustrations are examples of sealer application and are not all inclusive.

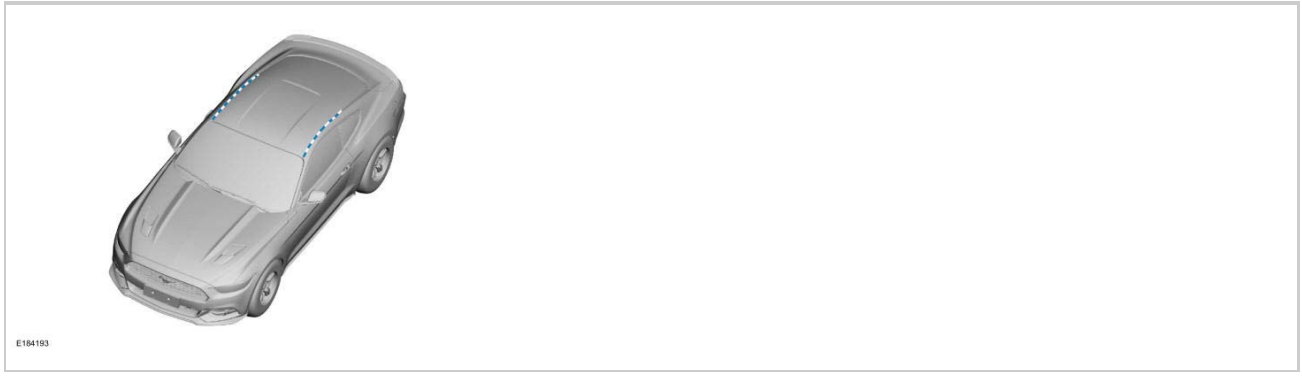
Hood



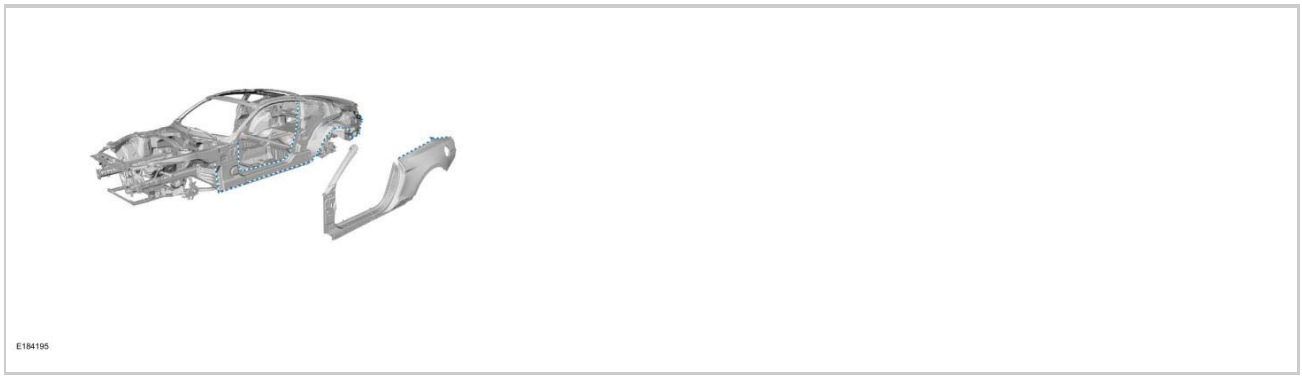
Front Door



Roof Panel



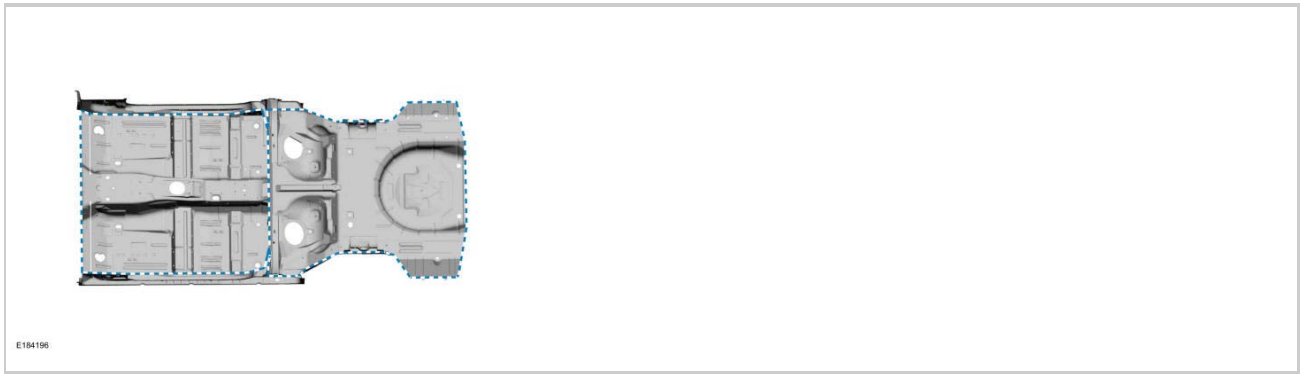
Bodyside



Luggage Compartment Lid



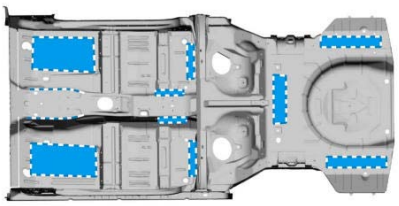
Underbody



DESCRIPTION AND OPERATION > SEALER, UNDERBODY PROTECTION MATERIAL

AND ADHESIVES > UNDERBODY PROTECTION MATERIAL

Underbody protection is necessary for permanent, elastic corrosion protection of vehicle underbodies. It is paintable, very durable and has good resistance to abrasion. This material may be applied in many manners. It may be sprayed, rolled or brushed on (obtain locally).



GENERAL PROCEDURES > CORROSION PREVENTION

Special Tool(s) / General Equipment

 ST3277-A	300-SAT12740 UBE Gun
 ST3278-A	300-SAT9795 HRS Rust Gun

Materials

Name	Specification
Motorcraft ® Metal Surface Prep ZC-31-A	-
ValuGard™ Premium Undercoating VG101, VG101A	-
ValuGard™ Rust InhibitorVG104, VG104A	-

Repair

NOTE: Undercoating

NOTE: The following illustrations are not vehicle specific and are intended for reference only.

1.

WARNING: Before beginning any service procedure in this article, REFER to Safety Warnings in GENERAL INFORMATION . Failure to follow this instruction may result in serious personal injury.

Refer to: Body Repair Health and Safety and General Precautions .

2.

Wire brush the area and make sure the surfaces are free of oil, dirt and other foreign material. Carry out the undercoating process in the following sequence.

3.

Thoroughly clean and degrease metal surfaces to remove wax and grease.

Material

: Motorcraft ® Metal Surface Prep / ZC-31-A

4.

For best results, the vehicle should be at room temperature.

5.

Canister attaches directly to the dispensing gun. Attach the undercoating canister to the special tool. Use Special Service Tool: 300-SAT12740 UBE Gun.

Material

: ValuGard™ Premium Undercoating / VG101, VG101A

6.

Undercoating should be applied after the welding and refinishing process. Product cannot be welded through.

7.

Air pressure setting for applicator gun is 552 kPa (80.06 psi) - 621 kPa (90.07 psi).

8.

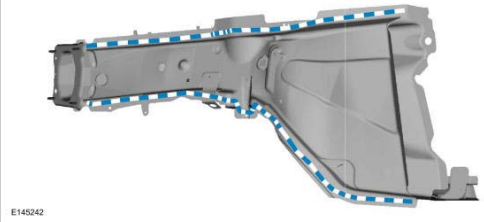
Apply light mist coats, applicator sprays in fogging pattern. Material displaces moisture.

9.

Clean up any overspray with a mild solvent such as mineral spirits or bug and tar remover.

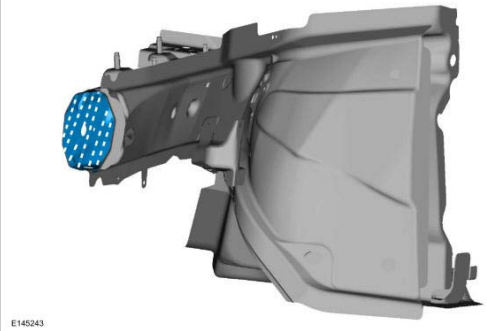
NOTE: Frame rail exterior spot-weld flange view.

10.
Apply Premium Undercoating material to the exterior exposed edges after carrying out the welding and refinishing process.



NOTE: Cross section view of typical unibody frame rail shown.

11.
Apply Rust Inhibitor to the inner surfaces of the rail after carrying out welding process. Depress trigger and wait 2-3 seconds and slowly pull the wand to make sure the area is completely fogged.



NOTE: Full frame vehicle, front rail-to-mid rail section repair shown.

12.
Apply Premium Undercoating to the exposed surfaces after carrying out the welding process. Make sure to completely cover any bare metal areas.



Repair

NOTE: Rust Inhibitor

1.

The surfaces must be free of oil, dirt and other foreign material. Carry out the process in the following sequence.

2.

Thoroughly clean and degrease metal surfaces to remove wax and grease.

Material

: Motorcraft ® Metal Surface Prep / ZC-31-A

3.

For best results, the vehicle should be at room temperature. Attach the rust inhibitor canister to the special tool. Use Special Service Tool: 300-SAT9795 HRS Rust Gun.

Material

: ValuGard™ Rust Inhibitor / VG104, VG104A

4.

Rust inhibitor should be applied after the welding and refinishing process. Product cannot be welded through.

5.

Air pressure setting for applicator gun is 448 kPa (64.97 psi) - 517 kPa (74.98 psi).

6.

Use the appropriate length wand when spraying enclosed areas. Insert the wand as far as possible into the access hole, pull the trigger and wait 2-3 seconds and slowly pull the wand out of the access hole. Apply the material in light mist coats. Material displaces moisture.

7.

Clean up any overspray with a mild solvent such as mineral spirits or bug and tar remover.

NOTE: Door assembly lower view.

8.
Apply as shown to the inside of the door shell on all the interior metal surfaces using the most suitable applicator wand. Apply material to the exposed edges after carrying out the welding process. Make sure horizontal surfaces are well protected as they are more susceptible to corrosion. Keep door drain holes clear to prevent moisture buildup.

Material

: ValuGard™ Rust Inhibitor / VG104, VG104A

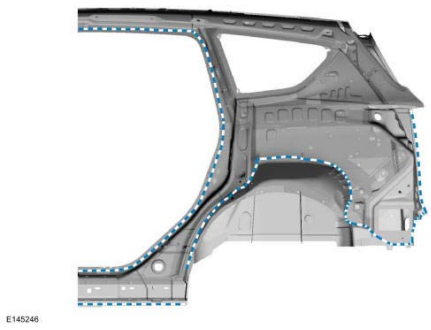


NOTE: Quarter panel inner view.

9.
Apply to the closed channel portion of the spot weld flange areas. Apply to the exposed edges after carrying out the welding process. Make sure horizontal surfaces are well protected as they are more susceptible to corrosion.

Material

: ValuGard™ Rust Inhibitor / VG104, VG104A

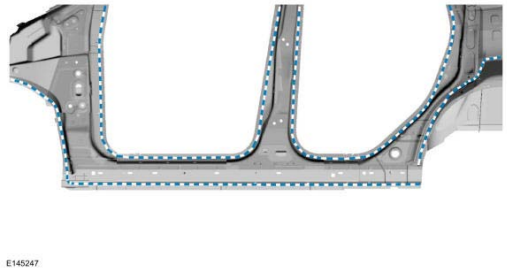


NOTE: Door frame opening view.

10.
Apply to the closed channel portion of the spot weld flange areas. Make sure horizontal surfaces are well protected as they are more susceptible to corrosion.

Material

: ValuGard™ Rust Inhibitor / VG104, VG104A



GENERAL PROCEDURES > JOINING TECHNIQUES

Special Tool(s) / General Equipment

Resistance Spotwelding Equipment
Grinder
Plasma Cutter
Air Body Saw
8 mm Drill Bit
MIG/MAG Welding Equipment
Spot Weld Drill Bit

Materials

Name	Specification
Metal Bonding Adhesive TA-1, 3M™ 08115, Fusor ® 108B	-
Seam Sealer TA-2-B	-
Motorcraft ® Metal Surface Prep ZC-31-A	-
ValuGard™ Premium Undercoating VG101, VG101A	-
ValuGard™ Rust Inhibitor VG104, VG104A	-

Repair

NOTE: Weld Bonding - Squeeze-Type Resistance Spot Welding (STRW) Method

1.

WARNING: Before beginning any service procedure in this article, REFER to Safety Warnings in GENERAL INFORMATION . Failure to follow this instruction may result in serious personal injury.

Refer to: Body Repair Health and Safety and General Precautions .

2.

Verify the vehicle is dimensionally correct on a frame machine. Straighten if necessary.

3.

Remove damaged panels. Remove only large portions of the damaged panel. Avoid cutting into mating flanges or adjacent parts. Use the General Equipment: Air Body Saw Use the General Equipment: Plasma Cutter

4.

Drill out the spot welds and remove the remaining portions of the panel to be replaced. Use the General Equipment: Spot Weld Drill Bit

5.

Prepare any damaged flanges on the vehicle using hammer and dolly.

6.

Grind the mating surface of the original flanges no greater than 25 mm (0.9843 in) where the metal bonding adhesive will be applied.

7.

Be sure to remove galvanizing on metal. Metal should have a shiny appearance. Be careful not to damage the corners or thin the metal. The E-coat should also be removed on the opposite side of the flange only where the spot welds are to be placed. Clean surfaces with surface prep.

Material

: Motorcraft ® Metal Surface Prep / ZC-31-A

8.

Dry-fit and clamp the replacement service parts to verify a correct fit.

9.

Remove the service part after verifying correct fit and alignment.

10.

Prepare the adhesive. Dispense a small amount of adhesive from the cartridge to make sure of an even flow of both components. Attach the mixing tip and dispense a mixing tip length of adhesive to make sure of a correct mix ratio.

Material

: Metal Bonding Adhesive / TA-1, 3M™ 08115, Fusor ® 108B

> *NOTE: Refer to the product label for handling and preparation instructions.*

> *NOTE: Welding can be carried out anytime during the adhesive curing process, or after the adhesive is fully cured. Welder settings will vary when welding through wet adhesive versus welding through fully cured adhesive. Refer to welder manufacturer's recommended settings for welding through fully cured adhesive. It is recommended to place a shunt weld in an area with no adhesive to make sure of conductivity, particularly when welding through fully cured adhesive.*

11.
Create a test sample.

12.

Prepare the metal and adhesive as described. Apply a 6 mm (0.2362 in) - 9 mm (0.3543 in) bead of adhesive and weld the sample. Use the General Equipment: Resistance Spotwelding Equipment

13.

Place the welded sample in a vice and carry out destructive weld tests by peeling the scrap metal apart using large lock-type pliers. Measure the weld nugget to determine that the nugget meets Ford weld nugget requirements. If the weld nugget does not meet required size, adjust welder settings until the correct weld nugget size is achieved. Refer to: Specifications .

14.

Apply a 6 mm (0.2362 in) - 9 mm (0.3543 in) bead of adhesive to the vehicle prepared flange surface.

15.

Place the service part(s) in the correct position on the vehicle.

16.

When positioned, do not pull the component away from the vehicle. If repositioning is necessary, slide the service part(s). This will make sure of correct contact between the components and adhesive.

17.

Clamp evenly and tightly. The adhesive contains glass beads which will prevent over-clamping the component.

> *NOTE: Refer to the product label for cure times and handling instructions. Clamps may be removed immediately after the component is welded.*

18.
Wipe excess adhesive from the panel before it cures.

> *NOTE: The ends of welding clamps should be insulated on the ends using tape or similar material when welding is carried out.*

19.
Complete the spot welding process following Ford recommendations and welder manufacturer procedures and settings. Refer to: Specifications . Use the General Equipment: Resistance Spotwelding Equipment

20.

Finish any cosmetic section seams with fiber-filled body filler. Rough sand the filler, apply conventional body filler after the adhesive cures and block-sand the area.

21.

Mix and apply primer surfacer per Ford-approved paint recommendations.

22.

Seal wherever a cosmetic seam sealer is required.

Material

: Seam Sealer / TA-2-B

23.

Refinish using a Ford approved paint system.

24.

Refer to: Corrosion Prevention .

Material

: ValuGard™ Premium Undercoating / VG101, VG101A

Material

: ValuGard™ Rust Inhibitor / VG104, VG104A

Repair

NOTE: Weld Bonding - Metal Inert Gas (MIG) Welding Method

1.

WARNING: Before beginning any service procedure in this article, REFER to Safety Warnings in GENERAL INFORMATION . Failure to follow this instruction may result in serious personal injury.

Refer to: Body Repair Health and Safety and General Precautions .

2.

Verify the vehicle is dimensionally correct on a frame machine. Straighten if necessary.

3.

Remove damaged panels. Remove only large portions of the damaged panel. Avoid cutting into mating flanges or adjacent parts. Use the General Equipment: Air Body Saw Use the General Equipment: Plasma Cutter

4.

Drill out the spot welds and remove the remaining portions of the panel to be replaced. Use the General Equipment: Spot Weld Drill Bit

5.

After removing the damaged sheet metal panel(s), repair any damaged flanges on the vehicle using a hammer and dolly.

6.

Using an appropriate grinder, carefully grind around the entire receiving flange area following the original welds. Be sure to remove all E-coat, paint or galvanized coating from the mating surfaces of the joint. Use the General Equipment: Grinder

7.

Be sure to remove galvanizing on metal. Metal should have a shiny appearance. Be careful not to damage the corners or thin the metal. The E-coat should also be removed on the opposite side of the flange only where the spot welds are to be placed. Clean the surface.

8.

Repeat the procedure on the mating surface of the replacement service part(s). Use the General Equipment: Grinder

9.

Prepare the new service panel for plug welds.

10.

Using the original panel as a reference, drill or punch holes in the exact number as the original spot welds. The holes should be positioned as close as possible to the original spot weld locations, without lining up exactly on top of an original spot weld site. To make sure of correct weld performance, grind the immediate perimeter of the plug weld hole. Grind only in the area of the plug weld; this will keep the potential of corrosion to a minimum. Use the General Equipment: 8 mm Drill Bit

11.

Clean all mating surfaces on both the vehicle and replacement panel.

Material

: Motorcraft ® Metal Surface Prep / ZC-31-A

12.

Dry-fit and clamp the replacement service parts to verify a correct fit and alignment.

13.

Remove the service part after verifying correct fit and alignment.

14.

The vehicle prepared flange areas where plug welds will be located must be kept free of adhesive. Apply 25 mm (0.9843 in) tape to the plug weld areas to prevent contamination from the adhesive.

15.

Prepare the adhesive. Dispense a small amount of adhesive from the cartridge to make sure of an even flow of both components. Attach the mixing tip and dispense a mixing tip length of adhesive to make sure of correct mix ratio.

Material

: Metal Bonding Adhesive / TA-1, 3M™ 08115, Fusor ® 108B

NOTE: Refer to the product label for cure times and handling instructions.

16.
Apply a 6 mm (0.2362 in)-9 mm (0.3543 in) wide bead of adhesive to the vehicle prepared flange surface. Remove the tape from the plug weld areas.

Material

: Metal Bonding Adhesive / TA-1, 3M™ 08115, Fusor ® 108B

17.

Place the service part(s) in the correct position on the vehicle.

18.

When positioned, do not pull the component away from the vehicle. If repositioning is necessary, slide the service part(s). This will make sure of correct contact between the components and adhesive.

19.

Clamp evenly and tightly. The adhesive contains glass beads which will prevent over-clamping the component.

> *NOTE: If welding will not be carried out immediately, refer to product label for cure times and handling instructions. Clamps may be removed immediately after the component is welded.*

> *NOTE: Welding can be carried out anytime during the adhesive curing process or after the adhesive is fully cured.*

20.
Wipe excess adhesive from the panel before it cures.

21.

Complete the plug-welding process following Ford recommendations. Refer to: Specifications .
Use the General Equipment: MIG/MAG Welding Equipment

22.

Finish any cosmetic section seams with fiber-filled body filler. Rough sand the filler, apply conventional body filler after the adhesive cures and block-sand the area.

23.

Mix and apply primer surfacer per Ford-approved paint recommendations.

24.

Seal wherever a cosmetic seam sealer is required.

Material

: Seam Sealer / TA-2-B

25.

Refinish using a Ford approved paint system.

26.

Refer to: Corrosion Prevention .

Material

: ValuGard™ Premium Undercoating / VG101, VG101A

Material

: ValuGard™ Rust Inhibitor / VG104, VG104A

GENERAL PROCEDURES > PLASTIC REPAIRS

Special Tool(s) / General Equipment

ALCV-200

Materials

Name	Specification
Plastic Bonding Adhesive TA-9	-

Inspection

NOTE: Plastics Identification

1.

WARNING: Before beginning any service procedure in this article, REFER to Safety Warnings in GENERAL INFORMATION . Failure to follow this instruction may result in serious personal injury.

Refer to: Health and Safety Precautions .

NOTE: In some instances, a code or material designation is moulded or stamped on the component indicating the plastic type.

2.
Thermoplastics are solvent reactive. Types of thermoplastics include Thermoplastic Olefin (TPO), Polyvinyl Chloride (PVC), Sheet-Molded Composite (SMC) and Acrylonitrile Butadiene Styrene (ABS). Polyolefins have an oily or waxy appearance. Examples include some bumper covers, stone shields, fender aprons and fan shrouds. Polyolefins require an adhesion promoter prior to carrying out any refinish procedure.

3.

To determine if the part is a polyolefin, grind the damaged area in an out-of-sight area. Grinding a polyolefin will melt and smear the plastic and leave a ragged edge. If the part is non-polyolefin, the area will grind or sand smoothly, producing a powdery dust.

4.

Polyolefin plastic can also be identified by placing a small sliver in a container of water, if the sample floats, it is a polyolefin plastic. A non-polyolefin will sink when placed in a container of water.

5.

Generally, thermosetting plastics are rigid or semi-rigid. Sheet-Molded Composite (SMC) is reinforced with glass and other fibers and are strong and rigid. Sheet-Molded Composite (SMC) is used for large panels such as hoods, liftgates, fenders and quarter panels.

6.

A burn test can be a reliable method to determine if a plastic is a thermosetting plastic. Extreme care must be exercised when using this method. Apply an open flame to the corner of the damaged component. If the material crystallizes and becomes hard, it is a thermosetting plastic.

7.

In deciding whether to repair or install a new component, follow these guidelines.

8.

Is a part readily available ? Can the damaged part be economically returned to its original strength and appearance, or will the labor cost exceed the cost of a new component? Will repair provide for the fastest, highest quality repair ?

NOTE: The following procedure applies to repair of structural cracks and large gouges. If damage is cosmetic, use of reinforcing cloth may not be necessary.

NOTE: Always refer to the manufacturer's label directions for the type of repair materials, fillers and bonding agents being used as they are material specific.

NOTE: When possible, it is recommended to carry out as much of the plastic repair as possible on the vehicle. Parts mounted on the vehicle are held in correct alignment throughout the repair. Attempting to repair the part off the vehicle may cause misalignment. This could lead to failure of the repair.

NOTE: During the repair of many plastics and particularly polyolefin plastics, an adhesion promoter must be applied to the substrate to allow repair materials and paint to bond correctly. Reapplication is required when grinding or sanding through the sealer or primered layers.

NOTE: Never apply solvents such as lacquer thinner or reducer at any stage of

plastic repair. Solvents, cleaners and water are absorbed by many types of plastics and by the glass fibers used for reinforcements. If this occurs, the plastic may swell in the area of repair and cause the repair to fail. Remove cleaners and water quickly and use air and heat to speed up drying.

9.
Panels to be repaired should be dry and at room temperature 18 C (64.4 F) to 24 C (75.2 F) prior to carrying out any repairs. Both sides of the panel must be thoroughly cleaned before sanding or grinding.

Repair

NOTE: Sheet-Molded Composite (SMC) Panel Repair

1.

Cover the break in the Sheet-Molded Composite (SMC) (front and back) with masking tape. This protects the damaged area from absorbing the prep cleaner and eliminates wicking of the cleaner through the fibers into the Sheet-Molded Composite (SMC).

2.

Remove all waxes, silicones, dirt and road oils from the area surrounding both sides of the damaged area with a plastics wax and grease remover.

3.

Remove the tape and sand the back of the repair area with an angle grinder, Dual Action (D/A) sander or by hand using 80-grit sandpaper. Remove all dust with a vacuum and tack cloth.Use Special Service Tool: ALCV-200.

4.

Create a reinforcing patch using a piece of scrap Sheet-Molded Composite (SMC) that conforms well to the back of the damaged area or form a patch from fiberglass cloth.

5.

Cut a section of cloth large enough to cover the repair, plus around the repair area. Cut a section of plastic film backing approximately larger than the cloth. Lay the plastic on a smooth, flat surface where it will be used to create a pyramid patch.

6.

Follow manufacturer's directions and apply adhesive to the plastic film backing and smooth with plastic spreader to recommended thickness. Place the pre-cut fiberglass cloth on the adhesive-coated plastic film. Cover the cloth with a coat of repair adhesive and spread to the recommended thickness.

Material

: Plastic Bonding Adhesive / TA-9

7.

Apply the prepared patch to the backside of the panel and compress. Follow manufacturer's instructions for adhesive cure. Remove plastic film after adhesive cures and sand as necessary to remove roughness.

8.

Remove masking tape from the front side of damaged area and grind down to the backing patch. Use an angle grinder with a 30 to 40-grit wheel. Make a gradual taper in the area, this will prevent bull's-eyes or read-through in the finished repair. Sand prepared area with a Dual Action (D/A) sander or hand-sand with 80-grit sandpaper. Use Special Service Tool: ALCV-200.

9.

Build a pyramid patch using fiberglass cloth or equivalent and adhesive. Following manufacturer's directions, apply patch to damaged area.

Material

: Plastic Bonding Adhesive / TA-9

10.

Rough-grind area to remove excess adhesive. Sand repair area with 80-grit sandpaper, making sure to cut slightly below the Sheet-Molded Composite (SMC) finished surface. This will allow for a finish coat of plastic repair filler material.

11.

Apply a finish coat of plastic repair filler material per manufacturer's directions.

12.

Finish-sand, prime and topcoat using Ford-approved paint systems.

Repair

NOTE: Thermoplastic Compounds Repair

1.

Select the correct repair method by identifying the type of plastic being repaired.

NOTE: Always refer to the manufacturer's label directions for the type of repair materials, fillers and bonding agents being used as they are material specific.

2.
Determine whether a reinforcement piece is needed as a backer on large repairs.

3.

Construct a reinforcement piece from a scrap piece of the type of plastic being repaired and follow manufacturer's label directions for the type of system being used.

> *NOTE: The following steps are to be used as a guideline. Depending on what brand of adhesives or patch materials are used, procedures may vary slightly.*

4.
Thoroughly clean the damaged area with wax and grease remover formulated for use with plastics.

5.

Hand sand the repair area with 80-grit sandpaper and remove any foreign material with compressed air.

6.

Apply a plastics adhesion promoter per label directions to the repair area.

7.

For small repairs, a adhesive filler can be applied to the damaged area. Follow manufacturer's directions and build layers to form a thickness above the damaged area. This will allow the area to be sanded smooth.

Material

: Plastic Bonding Adhesive / TA-9

8.

To repair large holes or cracks, measure and cut a piece of fiberglass cloth or equivalent 25.4 mm (1 in) larger than the crack or hole.

9.

Apply adhesive to the damaged area and immediately apply fiberglass cloth into plastic adhesive for reinforcement. Apply additional plastic repair adhesive for strength and shape as required.

Material

: Plastic Bonding Adhesive / TA-9

10.

Contour and sand to shape the repair as necessary. Avoid sanding through the repair. Use Special Service Tool: ALCV-200.

11.

Finish-sand the area and carry out any required paint operations using Ford-approved paint systems.

Repair

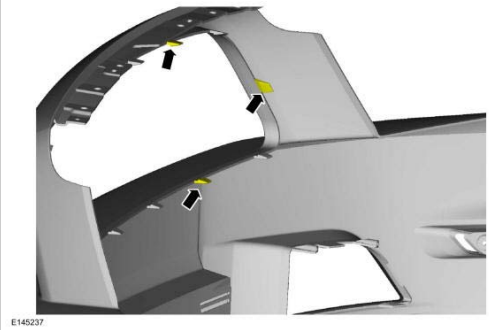
NOTE: Tab Repair

NOTE: The following steps are to be used as a guideline. Depending on what brand of adhesives or patch materials are used, procedures may vary slightly.

NOTE: Inspect the component to determine if part of it can be repaired to an acceptable level of quality of appearance, fit and durability. Will labor and material cost of the repair meet or exceed the cost of a new replacement bumper cover? If the bumper cover is determined to be repairable, proceed to the following steps.

NOTE: Illustration is not vehicle specific.

1.
Clean the broken tab(s) with a plastics wax and grease remover.



2.

Hand sand the repair area with 80-grit sandpaper and remove any foreign material with compressed air.

3.

Apply a plastics adhesion promoter per label directions to the repair area.

4.

Measure and cut a patch of fiberglass cloth or equivalent large enough to form the front of the tab, then slope back in a wedge shape approximately 51 mm (2 in) from original tab.

5.

Prepare the repair adhesive cloth patch per manufacturer's instructions and apply to the affected area.

6.

Immediately position the plastic repair material patch to form the tab shape.

7.

Allow appropriate cure time and shape the repair tab using a small angle sander. Use extreme care to not sand through the exterior surface.

8.

Carry out any required paint repair operations to the bumper cover using Ford-approved paint systems.

Repair

NOTE: Plastics Refinishing

NOTE: Care must be used if applying heat to parts. Thermoplastics soften and tend to lose their shape when heated.

1.
The first step for any repair or refinish procedure is to identify the type of plastic. Is it thermosetting or thermoplastic, grained or smooth? This will determine how it should be cleaned and prepared for refinishing.

2.

It is essential that the correct cleaner is used, depending on which painting system is employed, solvent-based or water-based. Clean part with warm water/mild detergent, then with plastic cleaner to remove wax, silicone and other contaminants. Do not allow parts to remain wet for extended periods. As a general rule, if water beads on the part, it requires additional cleaning as all the manufacturing release agents have not been removed.

3.

New parts may require baking in a spray booth or heating with heat lamps to release trapped solvents or mold release agents used in the manufacturing processes.

NOTE: Grained components may only be lightly sanded through use of a gray scuff pad. Failure to follow this direction may result in graining being flattened.

4.
After cleaning, lightly sand with 600-grit or finer sandpaper. Remove sanding residue with plastic cleaner and wipe dry.

5.

Apply a plastics adhesion promoter to any bare plastic part following manufacturer's recommendation. Throughout the refinish procedure, any time bare plastic is exposed for any reason, it is essential that adhesion promoter be reapplied to that area.

6.

A sealer may be required to prevent wrinkling and lifting of the topcoat prior to carrying out the refinish procedure.

7.

Flexible and non-flexible components should be refinished separately as a flex additive may be required when refinishing flexible parts (refer to the paint manufacturer's recommendation).

8.

It is recommended to carry out refinishing of exterior components on-vehicle (after cut-in) to control color match and blending to adjacent panels.

9.

Interior trim components may be refinished using Motorcraft ® Interior Spray Paint or any Ford-approved paint system procedures. Steps may vary between paint manufacturers.

10.

Proceed with the refinish process and follow the Ford-approved paint system procedures. Steps may vary between paint manufacturers.

GENERAL PROCEDURES > WELDING PRECAUTIONS

Check

WARNING: Invisible ultraviolet and infrared rays emitted in welding can injure unprotected eyes and skin. Always use protection such as a welder's helmet with dark-colored filter lenses of the correct density. Electric welding will produce intense radiation, therefore, filter plate lenses of the deepest shade providing adequate visibility are recommended. It is strongly recommended that persons working in the weld area wear flash safety goggles. Also wear protective clothing. Failure to follow these instructions may result in serious personal injury.

WARNING: Always wear protective equipment including eye protection with side shields, and a dust mask when sanding or grinding. Failure to follow these instructions may result in serious personal injury.

NOTE: SRS components should always be depowered and disconnected before beginning any welding procedure.

NOTE: Electronic modules and related wiring can be damaged when exposed to heat

from welding procedures. Carefully disconnect and remove, or position away from heat affected areas.

1.

A test weld should always be carried out on a test sample.

2.

The correct protective clothing should always be worn.

3.

Always work in a well ventilated area to avoid accumulation of noxious and oxygen displacing gases.

4.

Place protective covers around components and wiring harnesses to protect from welding spatter.

5.

Use grinding discs and wire brushes dedicated to the type of material being welded.

6.

Follow equipment manufacturer's prescribed procedures and equipment settings for the type of weld being used. ER70S-3 or ER70S-6 wire is typically used for MIG welding on steel.

7.

Disconnect and isolate battery ground cable.

8.

Components made of Boron, Martensitic, HSS (high-strength steel) and UHSS (ultra high-strength) steel should not be heated to straighten or repair. Severely bent or kinked components should be replaced with new ones.

9.

Factory welds may be substituted with either STRW (squeeze-type resistance welding) spot welds or MIG plug welds.

10.

MIG plug welds must equal factory welds in both location and quantity.

11.

MIG plug weld holes should equal 8 mm (0.31 in) diameter.

12.

Resistance spot welds must equal factory welds in quantity and be placed adjacent to original

weld location.

13.

Disconnect on-vehicle modules and protect them from possible heat damage and electrical currents when welding.

14.

Use of a weld-through primer is recommended where applicable.

15.

When welding, always place the ground clamp as close as possible to the weld area.

16.

Never connect the welder ground clamp to the vehicle subframe.

17.

Never weld a vehicle subframe, steering or suspension component. Service is through replacement only.

DESCRIPTION AND OPERATION > BODY AND FRAME > BODY

The body consists of the following:

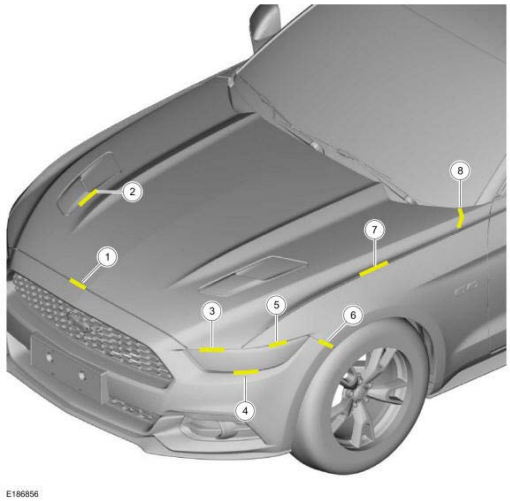
- High-Strength Low Alloy (HSLA), dual-phase (DP), Boron and mild steels
- Coupe and convertible body styles
- Aluminum hood
- Steel luggage compartment lid
- Body side outer panels constructed of mild steel
- Dual-phase steel (DP) in select body structure components
- Bolted, removable front fenders, hinged doors and hood
- Aluminum front fenders
- Ultra high-strength steel (UHSS) front and rear bumper beam
- Underbody components constructed of mild, boron and high-strength steels
- Mastic pads used on floor pan for sound deadening

Body Dimensions

Body Margins - Front Panels

NOTE: Unless otherwise indicated, margin dimensions apply to RH and LH side of vehicle.

NOTE: Dimensions apply to coupe and convertible.

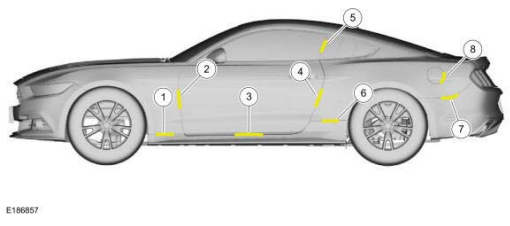


Item	Description	Margin Specification	Flushness Specification
1	Hood-to-fascia	4.0 mm ± 2.3 mm	-0.75 mm ± 2.3 mm
2	Hood scoop-to-hood	2.0 mm ± 1.0 mm	-0.5 mm ± 0.75 mm
3	Headlamp-to-hood	-	-
4	Headlamp-to-fascia	2.0 mm ± 1.5 mm	-
5	Headlamp-to-fender	2.0 mm ± 1.5 mm	-
6	Fascia-to-fender	0.0 mm ± 0.5 mm	0.75 mm ± 1.5 mm
7	Hood-to-fender	3.5 mm ± 1.7 mm	± 1.5 mm
8	Hood-to-cowl filler	3.5 mm ± 1.7 mm	0.0 mm ± 1.7 mm

Body Margins - Side Panels

NOTE: Unless otherwise indicated, margin dimensions apply to RH and LH side of vehicle.

NOTE: Dimensions apply to coupe and convertible.

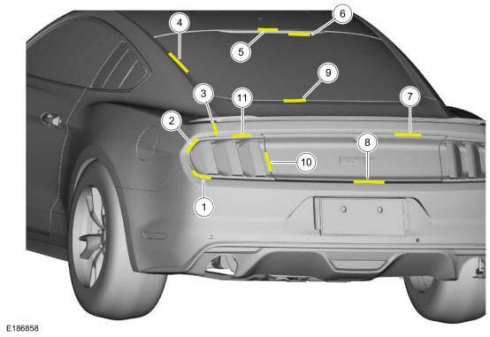


Item	Description	Margin Specification	Flushness

			Specification
1	Fender-to-rocker moulding	0.0 mm ± 1.1 mm	0.75 mm ± 1.1 mm
2	Door-to-fender	3.4 mm ± 1.5 mm	-0.75 mm ± 1.1 mm
3	Door-to-rocker moulding	5.0 mm ± 2.0 mm	-
4	Door-to-body side	3.4 mm ± 1.5 mm	0.0 mm ± 2.0 mm
5	Door glass-to-quarter glass	10.0 mm ± 1.5 mm	0.0 mm ± 2.0 mm
6	Body side-to-rocker moulding	0.0 mm ± 1.1 mm	0.75 mm ± 1.2 mm
7	Rear fascia-to-body side	0.0 mm + 0.5 mm ± 0.0 mm	-0.75 mm ± 1.7 mm
8	Fuel door-to-body side	2.2 mm ± 1.2 mm	-1.0 mm ± 1.2 mm

Body Margins - Rear Panels

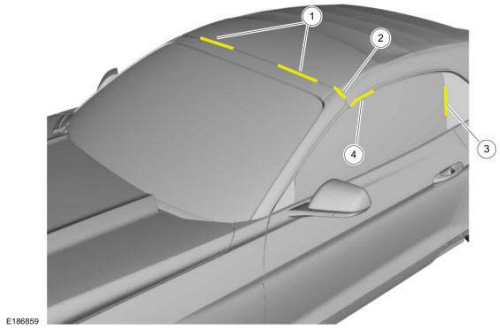
NOTE: Unless otherwise indicated, margin dimensions apply to RH and LH side of vehicle.



Item	Description	Margin Specification	Flushness Specification
1	Tail lamp-to-fascia	2.0 mm ± 2.0 mm	-
2	Tail lamp-to-body side	2.0 mm ± 1.5 mm	1.5 mm ± 1.7 mm
3	Luggage compartment lid-to-body side	3.0 mm ± 1.5 mm	0.0 mm ± 2.0 mm
4	Rear window-to-body side	3.0 mm ± 1.7 mm	-3.0 mm ± 1.5 mm
5	CHMSL-to-roof	3.0 ± 1.0 mm	-1.5 mm ± 1.5 mm
6	CHMSL-to-rear window	2.5 mm ± 2.2 mm	-
7	Luggage compartment lid moulding-to-Luggage compartment lid	-	-2.0 mm + 1.4 mm ± 0.0 mm

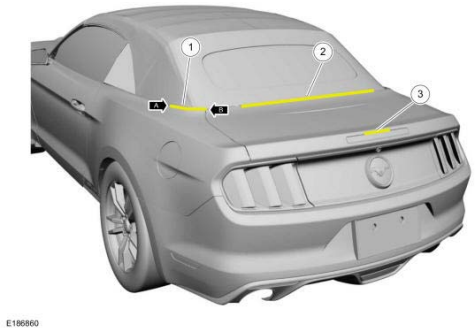
8	Luggage compartment lid moulding-to-fascia	6.0 mm ± 3.4 mm	-
9	Rear window-to-luggage compartment lid	3.0 mm ± 1.5 mm	-
10	Tail lamp-to-luggage compartment lid moulding	4.8 mm ± 3.0 mm	0.0 mm ± 3.0 mm
11	Luggage compartment lid-to-tail lamp	-	-

Body Margins - Convertible Front



Item	Description	Margin Specification	Flushness Specification
1	Convertible top-to-roof	9.25 mm ± 2.0 mm	1.5 mm ± 1.9 mm
2	Convertible top-to-A-pillar	8.8 mm ± 2.4 mm	1.5 mm ± 2.7 mm
3	Door glass-to-quarter window glass	8.0 mm ± 1.5 mm	0.0 mm ± 1.5 mm
4	Convertible top-to-seal retainer	8.5 mm ± 2.7 mm	1.5 mm ± 2.5 mm

Body Margins - Convertible Rear

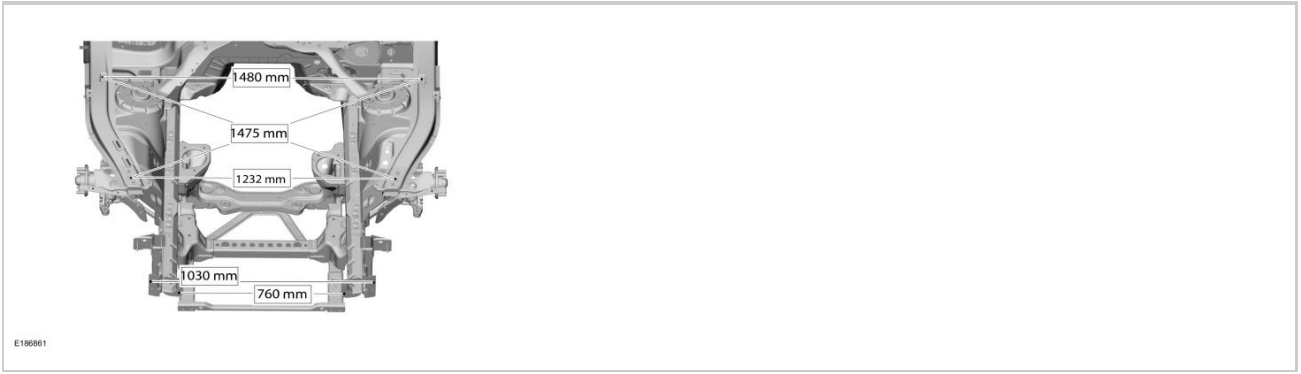


Item	Description	Margin Specification	Flushness Specification

1	Convertible top moulding-to-body side	0.0 mm at point A to 5.0 mm at point B	-
2	Convertible top-to-luggage compartment lid	5.0 mm ± 4.7 mm (margin parallelism within 3.7 mm)	-
3	Luggage compartment lid-to-CHMSL	1.0 mm ± 0.8 mm	0.5 mm ± 0.8 mm

Under Hood Dimensions

NOTE: All measurements are on center unless otherwise indicated.



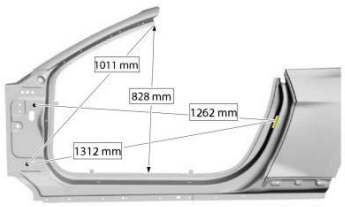
Front Door Opening Dimensions - Coupe

NOTE: All measurements are on center unless otherwise indicated.



Front Door Opening Dimensions - Convertible

NOTE: All measurements are on center unless otherwise indicated.

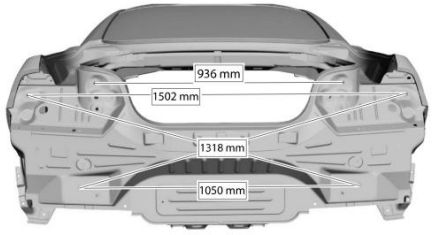


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Rear Body Dimensions

NOTE: All measurements are on center unless otherwise indicated.

Dimensions apply to coupe and convertible.

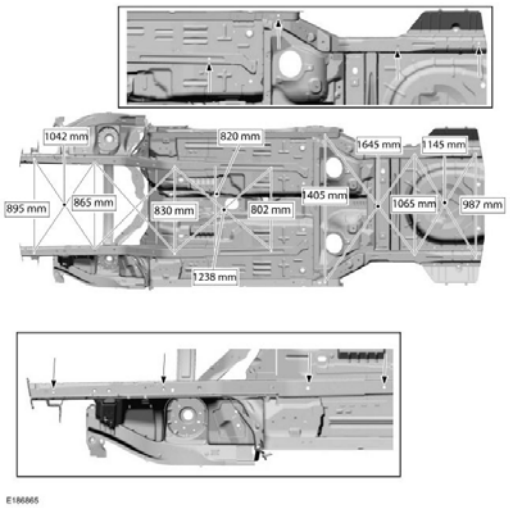


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Under Body Measurements

NOTE: All measurements are on center unless otherwise indicated.

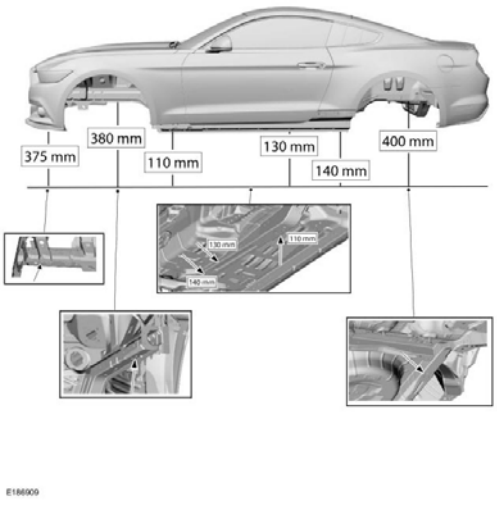
Dimensions apply to coupe and convertible.



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Datum Height Dimensions

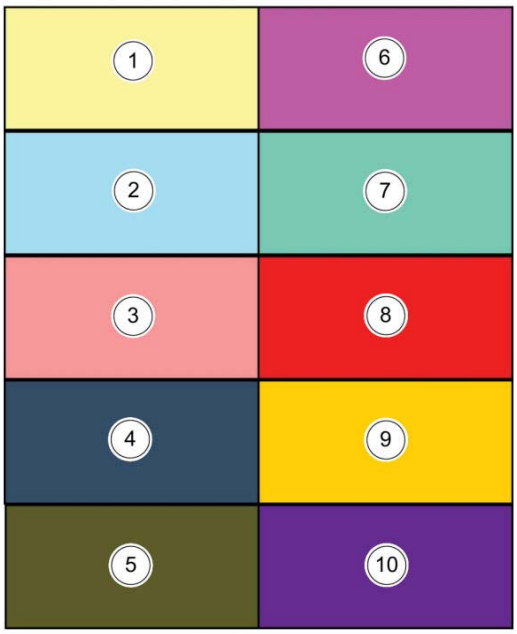
NOTE: Dimensions apply to coupe and convertible.



DESCRIPTION AND OPERATION > VEHICLE SPECIFIC BODY CONSTRUCTION

For recommended metal repair guidelines and recommendations, refer to the following illustrations and: For additional information, refer to: Specifications .

Steel Type Legend

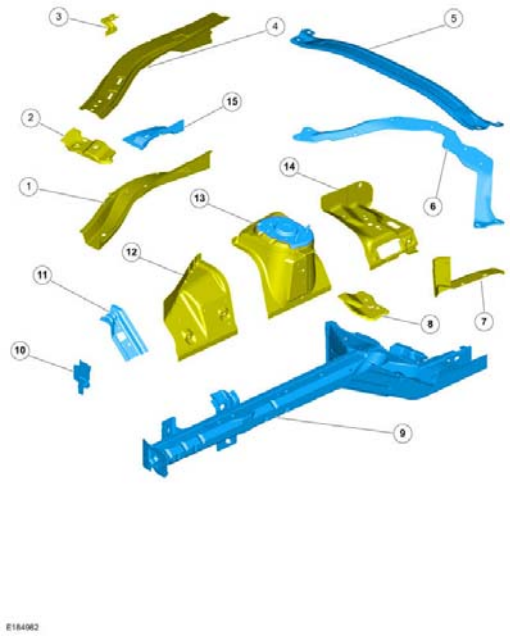


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Item	Steel Type	Color
1	Mild Steel	Yellow
2	Bake Hardened Steel (BH)	Light Blue
3	Solid Solution Strength	Pink
4	High Strength Low Alloy (HSLA)	Dark Blue
5	Dual Phase (DP) 500, 600 Class Steel	Green
6	Dual Phase (DP) 700, 800, 900, 1000 Class Steel	Fuchsia
7	Laminate Steel	Teal
8	Ultra High Strength Steel (UHSS) Martensitic, Boron	Red
9	Transformation Induced Plasticity Steel (TRIP)	Gold
10	Aluminum	Purple

Front Structure Components

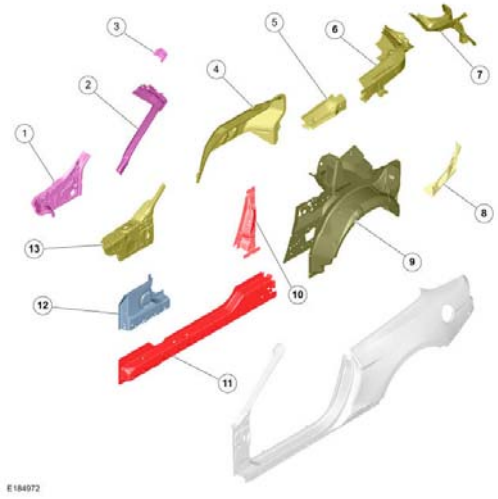
NOTE: RH side shown, LH side similar.



Item	Description	Steel Type
1	Fender reinforcement	Mild steel
2	Fender mounting bracket	Mild steel
3	Fender mounting bracket	Mild steel
4	Fender apron assembly	Mild steel
5	Fender mounting bracket	High-Strength Low Alloy (HSLA) 350 steel
6	Fender apron reinforcement	Bake Hardened Steel (BH)
7	Reinforcement	Mild steel
8	Battery tray RH side only	Mild steel
9	Front floor side member	High-Strength Low Alloy (HSLA) 350 steel
10	Radiator support	High-Strength Low Alloy (HSLA) 350 steel
11	Reinforcement	High-Strength Low Alloy (HSLA) 350 steel
12	Fender apron assembly	Mild steel
13	Housing	Mild and High-Strength Low Alloy (HSLA) 350 steel
14	Reinforcement (part of fender apron assembly)	Mild steel
15	Fender bracket	High-Strength Low Alloy (HSLA) 350 steel

Body Side Inner Panels-Convertible

NOTE: LH side shown, RH side similar.



Item	Description	Steel Type
1	A-pillar inner reinforcement	Dual Phase Steel (DP) 1000 steel
2	A-pillar bracket	Dual Phase Steel (DP) 1000 steel
3	Bracket	Dual Phase Steel (DP) 1000 steel
4	Inner wheelhouse panel	Mild steel
5	Quarter panel outer	Mild steel
6	C-pillar reinforcement	Mild steel
7	Filler panel	Mild steel
8	Quarter panel extension	Mild steel
9	Inner quarter panel and wheelhouse	Dual Phase Steel (DP) 500 steel
10	B-pillar inner assembly	Boron steel
11	Rocker panel reinforcement	Martensite 1100
12	A-pillar assembly	High-Strength Low Alloy (HSLA) 350 steel
13	Reinforcement	Mild steel

Body Side Outer Panels-Convertible

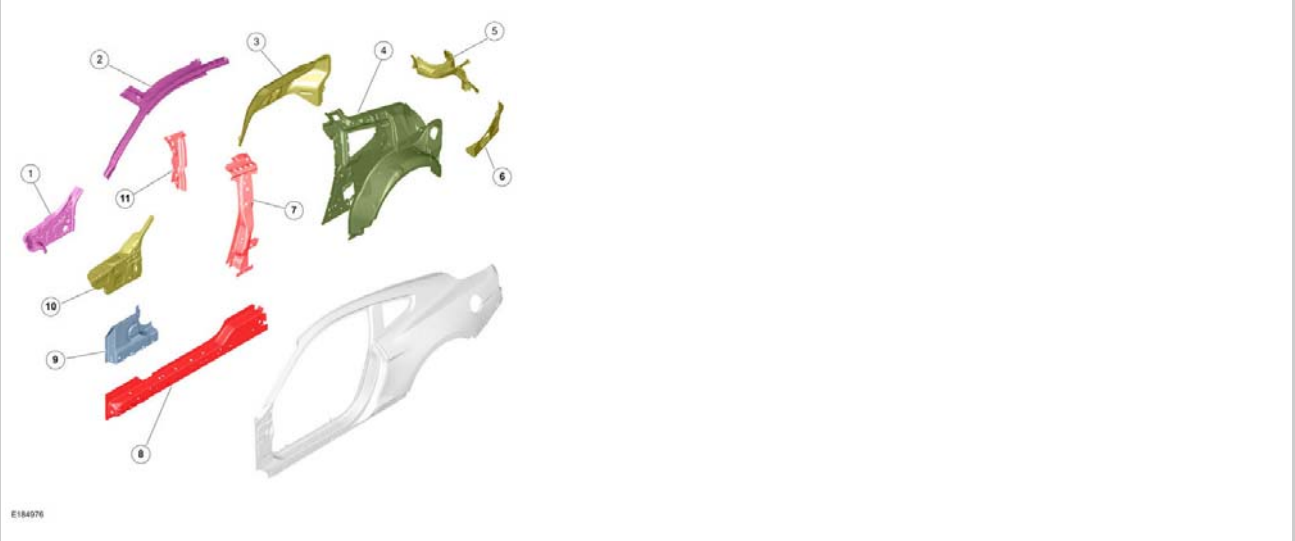
NOTE: LH side shown, RH side similar.



Item	Description	Steel Type
1	Door frame panel	Mild steel
2	Body side panel	Mild steel

Body Side Inner Panels-Coupe

NOTE: LH side shown, RH side similar.

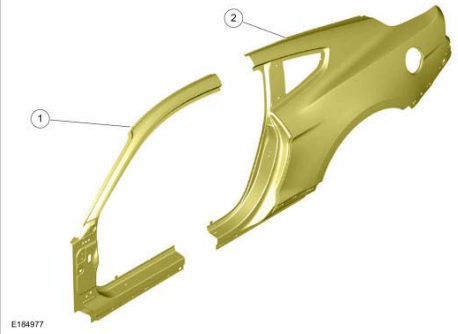


Item	Description	Steel Type
1	A-pillar inner reinforcement	Dual Phase Steel (DP) 1000 steel
2	A-pillar bracket	Dual Phase Steel (DP) 1000 steel
3	Inner wheelhouse panel	Mild steel
4	Inner quarter panel and wheelhouse	Dual Phase Steel (DP) 500 steel
5	Filler panel	Mild steel
6	Quarter panel extension	Mild steel
7	B-pillar inner assembly	Boron steel
8	Rocker panel reinforcement	Martensite 1100 steel

9	A-pillar assembly	High-Strength Low Alloy (HSLA) 350 steel
10	A-pillar reinforcement	Mild steel
11	B-pillar inner reinforcement	Boron steel

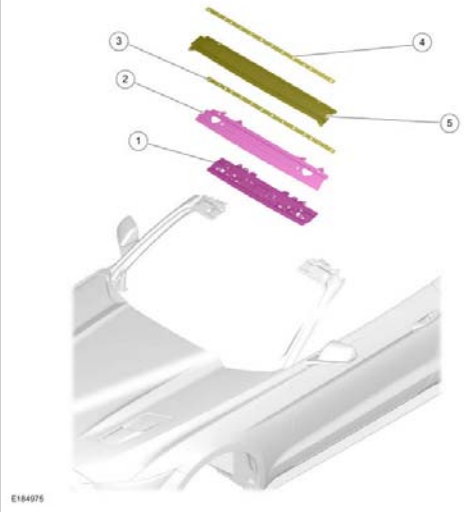
Body Side Outer Panels-Convertible

NOTE: LH side shown, RH side similar.



Item	Description	Steel Type
1	Door frame panel	Mild steel
2	Body side panel	Mild steel

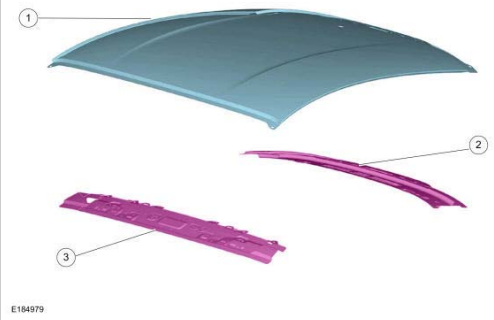
Roof Panel-Convertible



Item	Description	Steel Type
1	Windshield header	Dual Phase Steel (DP) 1000 steel

2	Windshield header reinforcement	Dual Phase Steel (DP) 1000 steel
3	Windshield reinforcement	Mild steel
4	Roof panel brace	Mild steel
5	Roof panel assembly	Mild steel

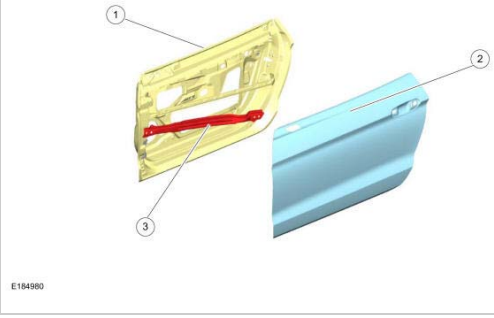
Roof Panel-Coupe



Item	Description	Steel Type
1	Roof panel	Bake Hardened (BH) 180 steel
2	Rear window frame	Dual Phase Steel (DP) 1000 steel
3	Windshield header reinforcement	Dual Phase Steel (DP) 1000 steel

Front Door

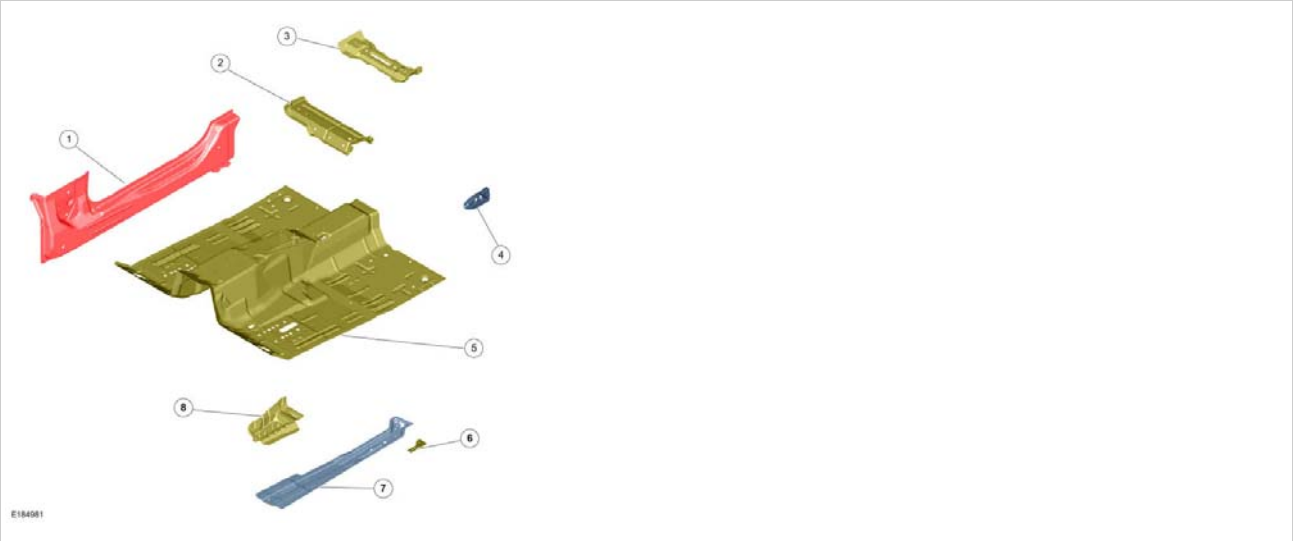
NOTE: LH side shown, RH side similar.



Item	Description	Steel Type
1	Door shell assembly	Mild steel
2	Door outer panel	Bake hardened (BH) 180 steel

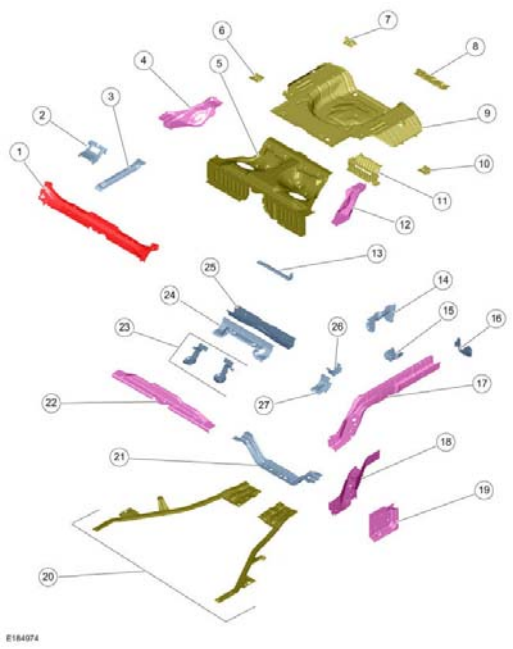
3	Door intrusion beam	Boron steel

Front Floor Pan



Item	Description	Steel Type
1	Floor side member	Boron steel
2	Crossmember	Mild steel
3	Crossmember	Mild steel
4	Support	High-Strength Low Alloy (HSLA) 350 steel
5	Floor panel	Mild steel
6	Bracket	Mild steel
7	Floor side member	High-Strength Low Alloy (HSLA) 350 steel
8	Reinforcement	Mild steel

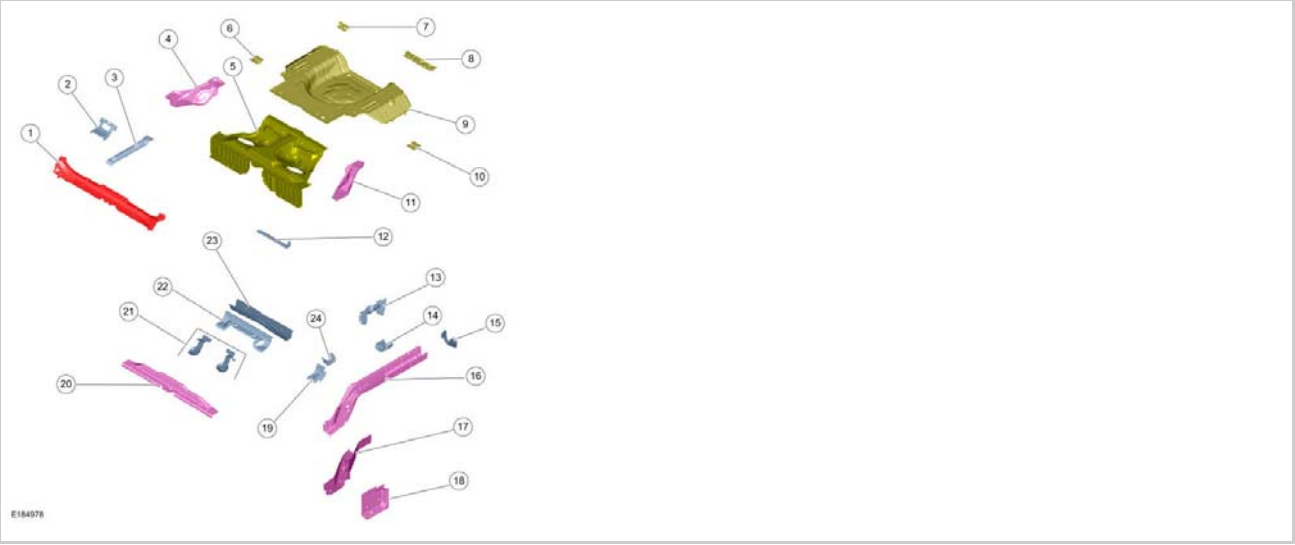
Center and Rear Floor Pan-Convertible



Item	Description	Steel Type
1	Crossmember	Boron steel
2	Reinforcement	High-Strength Low Alloy (HSLA) 350 steel
3	Reinforcement	High-Strength Low Alloy (HSLA) 350 steel
4	Reinforcement	Dual Phase Steel (DP) 800 steel
5	Center floor pan	Mild steel
6	Bracket	Mild steel
7	Bracket	Mild steel
8	Bracket	Mild steel
9	Rear floor pan	Mild steel
10	Bracket	Mild steel
11	Support	Mild steel
12	Reinforcement	Dual Phase Steel (DP) 800 steel
13	Bracket	High-Strength Low Alloy (HSLA) 350 steel
14	Floor side member reinforcement	High-Strength Low Alloy (HSLA) 350 steel
15	Reinforcement	High-Strength Low Alloy (HSLA) 350 steel
16	Bumper mounting bracket	High-Strength Low Alloy (HSLA) 350 steel

17	Floor side member	Dual Phase Steel (DP) 800 steel
18	Floor side member	Dual Phase Steel (DP) 800 steel
19	Reinforcement	Dual Phase Steel (DP) 800 steel
20	Brace	Mild steel
21	Brace	High-Strength Low Alloy (HSLA) 350 steel
22	Crossmember	High-Strength Low Alloy (HSLA) 350 steel
23	Reinforcement	High-Strength Low Alloy (HSLA) 350 steel
24	Crossmember	High-Strength Low Alloy (HSLA) 350 steel
25	Crossmember	High-Strength Low Alloy (HSLA) 350 steel
26	Bracket	High-Strength Low Alloy (HSLA) 350 steel
27	Bracket	High-Strength Low Alloy (HSLA) 350 steel

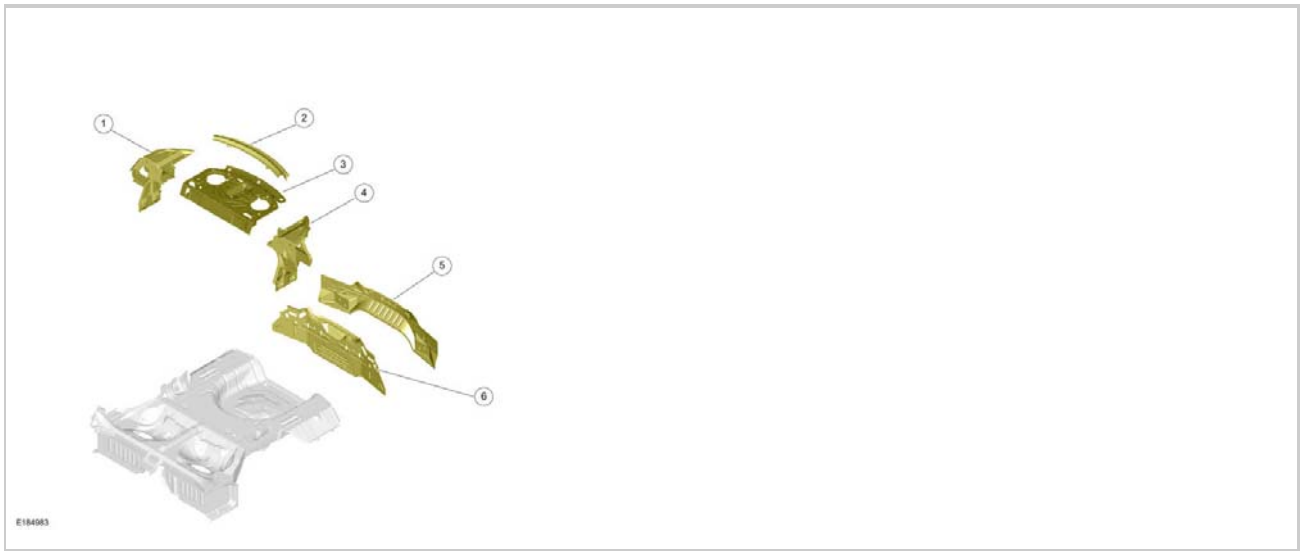
Center and Rear Floor Pan-Coupe



Item	Description	Steel Type
1	Crossmember	Boron steel
2	Reinforcement	High-Strength Low Alloy (HSLA) 350 steel
3	Reinforcement	High-Strength Low Alloy (HSLA) 350 steel

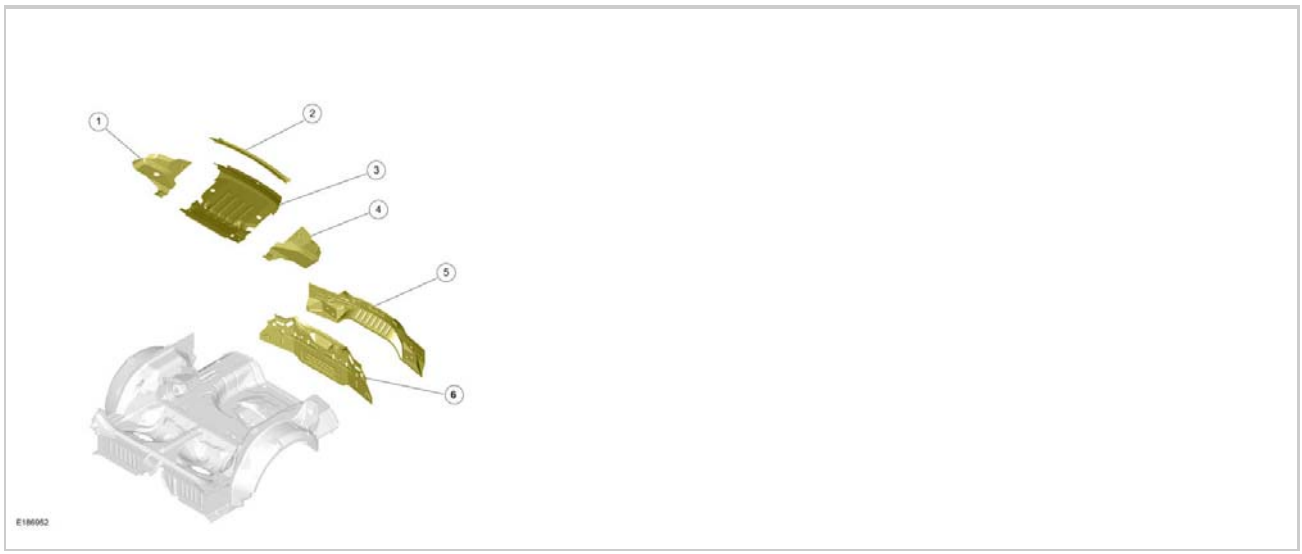
4	Reinforcement	Dual Phase Steel (DP) 800 steel
5	Center floor pan	Mild steel
6	Bracket	Mild steel
7	Bracket	Mild steel
8	Bracket	Mild steel
9	Rear floor pan	Mild steel
10	Bracket	Mild steel
11	Reinforcement	Dual Phase Steel (DP) 800 steel
12	Reinforcement	High-Strength Low Alloy (HSLA) 350 steel
13	Bracket	High-Strength Low Alloy (HSLA) 350 steel
14	Floor side member reinforcement	High-Strength Low Alloy (HSLA) 350 steel
15	Bumper mounting bracket	High-Strength Low Alloy (HSLA) 350 steel
16	Floor side member	Dual Phase Steel (DP) 800 steel
17	Floor side member	Dual Phase Steel (DP) 800 steel
18	Floor side member	Dual Phase Steel (DP) 800 steel
19	Brace	High-Strength Low Alloy (HSLA) 350 steel
20	Crossmember	Dual Phase Steel (DP) 800 steel
21	Reinforcement	High-Strength Low Alloy (HSLA) 350 steel
22	Crossmember	High-Strength Low Alloy (HSLA) 350 steel
23	Crossmember	High-Strength Low Alloy (HSLA) 350 steel
24	Bracket	High-Strength Low Alloy (HSLA) 350 steel

Rear Panels and Package Tray- Coupe



Item	Description	Steel Type
1	Strainer	Mild steel
2	Back panel	Mild steel
3	Package tray panel	Mild steel
4	Strainer	Mild steel
5	Back panel assembly	Mild steel
6	Back panel inner assembly	Mild steel

Rear Panels and Package Tray- Convertible



Item	Description	Steel Type
1	Quarter panel wheelhouse support	Mild steel
2	Back panel	Mild steel
3	Package tray panel	Mild steel

4	Quarter panel wheelhouse support	Mild steel
5	Back panel assembly	Mild steel
6	Back panel inner assembly	Mild steel

GENERAL PROCEDURES > BODY PANEL SECTIONING

Special Tool(s) / General Equipment

Resistance Spotwelding Equipment
Spherical Cutter
Plasma Cutter
Air Body Saw
MIG/MAG Welding Equipment
Spot Weld Drill Bit

Materials

Name	Specification
Seam Sealer TA-2-B	-

Repair

NOTE: Do not begin removal of the vehicle body side until the replacement panel is available for reference.

NOTE: Do not carry out body side sectioning repairs in areas of door hinge, safety belt or striker anchoring points. Welding within 50 mm (1.96 in) of door hinge or striker locations may compromise structural integrity during a collision.

NOTE: Sectioning within the door hinge portion of the A-pillar, B-pillar or dog leg portion of the quarter panel is not approved by Ford Motor Company.

NOTE: LH side shown, RH side similar.

1.

Only remove as much of the **outer** body side panel material as necessary using available tools.

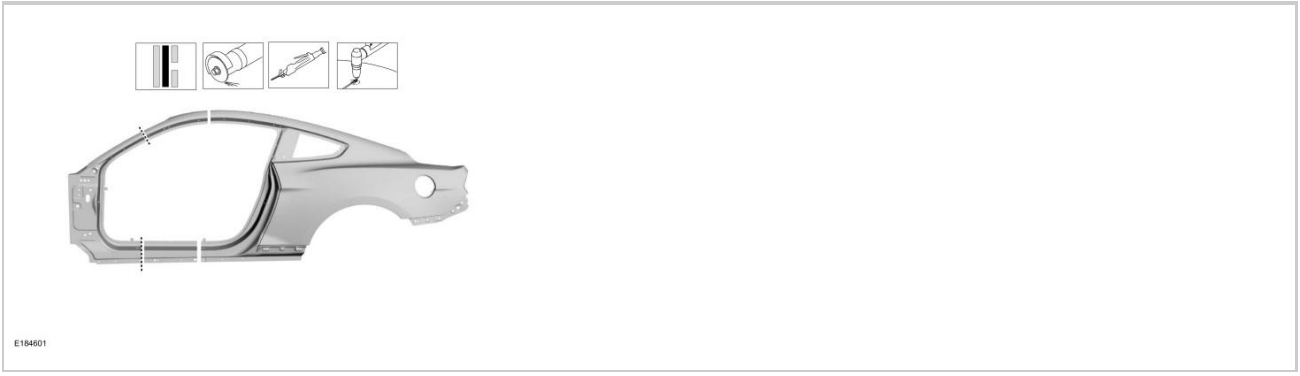
2.

Body side replacement panels are released as 2-part panels.



3.

As a general rule, sectioning cut points should be chosen to result in the smallest repair area possible. Use the General Equipment: Air Body Saw Use the General Equipment: Plasma Cutter Use the General Equipment: Spherical Cutter



4.

Detrim the vehicle as necessary and remove spot welds from the damaged area. Use the General Equipment: Spot Weld Drill Bit

NOTE: When welding overlapping surfaces or substrates, apply a high quality weld-through primer between the surfaces prior to welding.

NOTE: Use resistance spotwelding equipment where possible. This will produce a higher quality repair.

5.
Where possible, create a lap-joint backer plate using a portion of the old panel. This will create a stronger joint. Use the General Equipment: Resistance Spotwelding Equipment Use the General Equipment: MIG/MAG Welding Equipment

6.

Rough finish all sectioning joints with a fibre-based body filler, final finish sectioning joints and plug welds with a conventional body filler.

7.

Properly seal all horizontal joints to prevent moisture intrusion. Water and moisture migrate toward horizontal joints and corrosion tends to occur more rapidly in these areas.

Material

: Seam Sealer / TA-2-B

8.

Proceed with the refinishing process using a Ford approved paint system and manufacturers recommendations.

9.

Refer to: Corrosion Prevention .

10.

Reinstall vehicle trim as necessary.

Service Manual: BODY SYSTEM - GENERAL INFORMATION

SPECIFICATIONS > SPECIFICATIONS

Materials

Name	Specification
Seam Sealer TA-2-B	-
Silicone Spray Lubricant XL-6	ESR-M13P4-A
Permatex® Trim and Weatherstrip Adhesive 81850	-
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4

DESCRIPTION AND OPERATION > BODY - OVERVIEW > INSULATION

Insulation is used as a sound-deadener to reduce exterior road and powertrain noises from the interior of the vehicle. Mastic insulators are also used as insulation. Insulation is installed:

- under the roof.
- above and below the instrument panel.
- at the cowl side panels.
- over the front and rear floorpans.
- inside the B-, C- and D-pillar sections.
- on the wheelhouse/quarter panel.
- behind the rear quarter trim panel.

Other forms of insulation include:

- front tunnel stiffening pad.
- dash panel stiffener.
- rear wheelhouse mastic pads.

It has heat-bonded mastic deadeners for improved NVH characteristics.

It also has sound dampeners located inside the D-pillar and plug holes in the inner rear quarter.

DESCRIPTION AND OPERATION > BODY - OVERVIEW > BODY SEALER TYPES AND APPLICATIONS

Seam Sealer

- heavy-bodied, non-sag adhesive/sealer used on standing cosmetic seams, truck bed seams, tooled door skin seams and floorpans.
- can be used on water leaks and noise concerns.

Silicone Gasket and Sealant

- form-in-place gasket and multi-purpose adhesive/sealant.
- room temperature curing silicone rubber.

Silicone Spray Lubricant

- keeps the door and window weatherstrip pliable and soft.
- makes the door easier to close.
- retards weatherstrip squeaks.
- retards weatherstrip wear.
- helps retain door window alignment by reducing friction between the glass frame and the rubber weatherstrip.
- should not be used prior to painting.

Trim and Weatherstrip Adhesive

- quick drying, strong adhesive designed to hold weatherstripping onto all body panels and surrounding metal.

DIAGNOSIS AND TESTING > BODY SYSTEM > SYMPTOM CHART(S)

Diagnostics in this service information assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

Dust and Water Leaks

Most dust and water leaks occur due to missing or incorrectly installed body sealer or components. The source of the leak is detected by:

- pressurizing the vehicle and testing with soapy water.
    - Locate and tape off the body vents.
    - Turn the blower motor to HI.
    - Turn the air recirculation OFF.
    - Close the windows and doors.
    - Open the hood and spray soapy water along body seams and grommets. Make sure to test the areas around the A-pillar at the fender and the hood hinge area.
    - Check for bubbles.

- inspecting for a dust pattern or water path near and above the area in question.
- removing any trim or carpet in the general area of the leak.
- road testing or water-hose testing the vehicle.
- placing a bright light under the vehicle, removing any necessary trim or carpet and inspecting the interior of the body at joints and weld lines.

Wind noise

Most wind noise leaks occur at the corners of the windows or in the doors. Wind noise is detected by driving the vehicle at highway speeds or at speeds as specified by the customer. The vehicle should be driven in 4 different directions, with all the windows closed, the radio off and the A/C blower motor off.

Squeak and Rattle

Squeak and rattle noises are generally caused by loose parts, contact or relative movement between 2 surfaces or loose wires and connectors. The source of the noise can be detected by stopping movement of the suspect part by hand or by using dampening or low friction materials.

Symptom Chart: Body System - General Information

Condition	Possible Sources	Actions
Draft/wind noise and water leak around door perimeter	Loose fit seal	PINCH seal carrier to improve retention on seal flange.
	Seal installed incorrectly	REINSTALL the seal.
	Door misaligned	REALIGN the door. CHECK door gaps and fit in door opening and ADJUST as necessary. For door alignment, REFER to: Front Door Alignment .
	Scuff plate installed incorrectly	REINSTALL the scuff plate.
	Seal or seal pushpins damaged	INSTALL a new seal/pushpins.
	Sheet metal joints in door or door opening	SEAL leaks with seam sealer.
Draft/wind noise and water leak around glass run	Door glass misaligned	ADJUST door glass.
	Glass run installed incorrectly or not fully seated	REINSTALL glass run. To reinstall the glass run, REFER to: Front Door Glass Run and Bracket .
	Leak path behind glass run	INSTALL foam rope behind glass run.
	Glass run channel spread wide	PINCH glass run channel to reduce size of opening.
	Glass run damaged	INSTALL a new glass run. To install the glass run, REFER to: Front Door Glass Run and

		Bracket .
	Glass run overstuffed in corners creating pucker	REINSTALL glass run. INSTALL new part as necessary. To reinstall the glass run, REFER to: Front Door Glass Run and Bracket .
	Inner glass run reveal lip not contacting sheet metal	REINSTALL glass run. INSTALL new part as necessary. To reinstall the glass run, REFER to: Front Door Glass Run and Bracket .
	Inner belt overstuffed creating gap between glass and glass run	REINSTALL inner belt and INSTALL foam rope behind inner lip of glass run at belt. INSTALL new glass run as necessary.
Draft/wind noise and water leak at inner belt line	Belt line seal installed incorrectly on flange	ADJUST seal (do not bend the flange).
	No contact with side glass	ADJUST door glass.
	No contact with glass runs at both ends of belt line seal	ADJUST belt line seal or ADD foam at seal ends.
	Belt line seal damaged	INSTALL a new seal.
Draft/wind noise and water leak at outer belt line	Belt line seal installed incorrectly on flange (no glass contact)	ADJUST seal.
	Belt line seal does not contact the glass	ADJUST door glass.
	No contact with glass runs at both ends of belt line seal	ADJUST belt line seal or ADD foam at seal ends.
	Belt line seal damaged	INSTALL a new seal.
Draft/wind noise at inner door handle/speaker opening	Hole in weathershield	SEAL hole with suitable tape.
	Weathershield misaligned	REALIGN weathershield. INSTALL a new weathershield if pressure sensitive adhesive fails.
	Exterior door handle seal misaligned/damaged	REALIGN or INSTALL a new seal as necessary.
	Speaker or speaker seal missing or damaged	REPAIR speaker seal or INSTALL a new door speaker.
Draft/wind noise and water leaks at floor pan and grommets	Missing or damaged plugs/grommets	CHECK plugs/grommets for correct installation or damage. INSTALL new plugs/grommets if necessary.
Road noise	Missing mastic insulators	CHECK for missing mastic insulators.

	Missing body insulators	CHECK for missing body insulators.
Rattles in body/doors and instrument panel	Loose wires/cables	CHECK that all wires/cables are correctly routed and inserted in correct retainers.
	Loose objects/components in door wells, pillars quarter trim panels	CHECK doors by carefully striking underside of doors with a rubber mallet while listening for rattles in doors and pillars. REMOVE or TIGHTEN loose objects/components.
	Buzz from instrument panel components	IDENTIFY which components of the instrument panel are buzzing. SECURE/FASTEN components as necessary, ADD foam or felt as needed if rattle persists.
Door drain holes collecting water	Holes clogged with mud or road tar	CLEAN drain holes of foreign material with a punch or screwdriver. CHECK drain holes regularly.
Wind noise from exterior rear view mirror	Exterior mirror housing misaligned	REALIGN with edges shingled to airflow, with no gaps.
	Mirror sail gasket folded/misaligned	REINSTALL with gasket unfolded and aligned correctly.
	Mirror housing trim cap installed incorrectly	REINSTALL with edges shingled to airflow.
	Inner sail trim installed incorrectly	REINSTALL sail trim. ADJUST door trim.
	Inner sail gasket/barrier installed incorrectly	REINSTALL trim cover with gasket/barrier aligned correctly.
	Air path through wiring bundle/fastener access holes	BLOCK air path(s) with foam/tape.
	Exposed fastener access hole on mirror housing/sail	INSTALL a new cap if missing.
	Mirror housing trim cap under-flush to housing causing whistle	INSTALL a new exterior mirror. To install new mirror, REFER to: Exterior Mirror .
Rattle/vibration from exterior rear view mirror	Mirror mounting nuts loose	TIGHTEN mirror mounting nuts. REFER to: Exterior Mirror .
	Aftermarket air deflector/stone shields	If possible, REMOVE aftermarket air deflector/stone shield, then ROAD TEST vehicle. If concern is no longer present, ADVISE the customer the aftermarket

		component was causing concern.
Draft/wind noise and water leak around perimeter of all fixed glass	Air traveling up windshield molding along A-pillar	INSTALL foam rope full length of the A-pillar.
	Gaps in sealant bead of windshield/rear glass	Install new windshield/rear glass. To install new windshield/rear glass, REFER to: Fixed Glass .
	Windshield/rear glass misaligned or not installed correctly	Install new windshield/rear glass. To install new windshield/rear glass, REFER to: Fixed Glass .
	Rear hood seal at base of windshield misaligned/damaged	REALIGN or INSTALL a new seal as necessary.
	High mounted stoplamp	CHECK high mounted stoplamp seal. REPAIR or INSTALL as necessary.
	A-pillar applique along windshield lifting	INSPECT attachment clips for damage and REINSTALL part. INSTALL new part as necessary.
Draft/wind noise and water leak around liftgate/luggage compartment perimeter	Loose fit seal	PINCH seal carrier to improve retention on seal flange or INSERT foam in carrier.
	Seal misaligned or installed incorrectly	REINSTALL seal.
	Liftgate/luggage compartment misaligned	REALIGN luggage compartment lid. CHECK luggage compartment lid fit in body opening and ADJUST as necessary. To realign luggage compartment lid, REFER to: Luggage Compartment Lid Alignment .
	Scuff plate misaligned	REINSTALL scuff plate.
	Seal or seal pushpins damaged	INSTALL a new seal or pushpins.
Wind noise created by airflow over or behind body panels	Fender splash shield misaligned	REALIGN fender splash shield.
	Body panel misaligned (exposed edge)	REALIGN appropriate body panel.
	Hood misaligned (front margin)	CHECK hood gaps and fit. ADJUST hood as necessary. To align hood, REFER to: Hood Alignment .
	Front grille edge noise	APPLY foam in hollow areas behind louvers.
Wind noise created by grille opening panel	Grille fit to leading edge on hood	If possible, ADJUST grille opening panel forward to eliminate wind

		noise.
	Sharp edges due to material imperfections	REMOVE sharp edges (no visible surface damage).
Wind noise from air extractor (body vent)	Air extractor housing seated incorrectly	REINSTALL air extractor housing.
	Air extractor housing or flaps damaged	INSTALL a new air extractor.
Wind noise from bug shield/exterior windshield sun visor	Turbulence created by location and shape	DETERMINE if the component is an Original Equipment Manufacturer (OEM) part or aftermarket. If aftermarket, ADVISE customer accordingly. If Original Equipment Manufacturer (OEM), VERIFY correctly installed. If noise is abnormal REPAIR or INSTALL new as required.
Wind noise from cowl panel (leaf screen)	Leaf screen rubber lip not touching windshield	REINSTALL part. If part still does not fit, CHECK for damaged attachment clips. INSTALL new part as necessary.

Service Manual: BUMPERS

REMOVAL AND INSTALLATION > FRONT BUMPER > REMOVAL

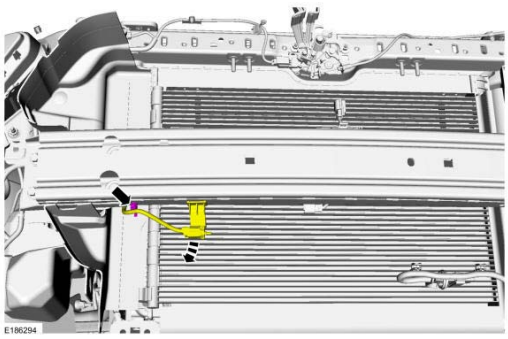
NOTE: Removal steps in this procedure may contain installation details.

1.

Remove the front bumper cover. Refer to: Front Bumper Cover .

2.

Position aside the ambient air temperature sensor bracket and wiring harness guide.



3.

If equipped, remove the active grille shutter assembly. Refer to: Active Grille Shutter .

4.

If equipped, remove the CCM and bracket. Refer to: Cruise Control Module (CCM) - Vehicles With: Adaptive Cruise Control.

5.

Separate the wiring harness guides.

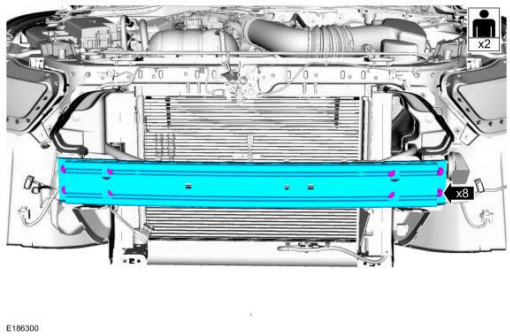


6.

Remove the bolts and the front bumper.

Torque

: 18 lb.ft (25 Nm)



REMOVAL AND INSTALLATION > FRONT BUMPER > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > FRONT BUMPER COVER > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

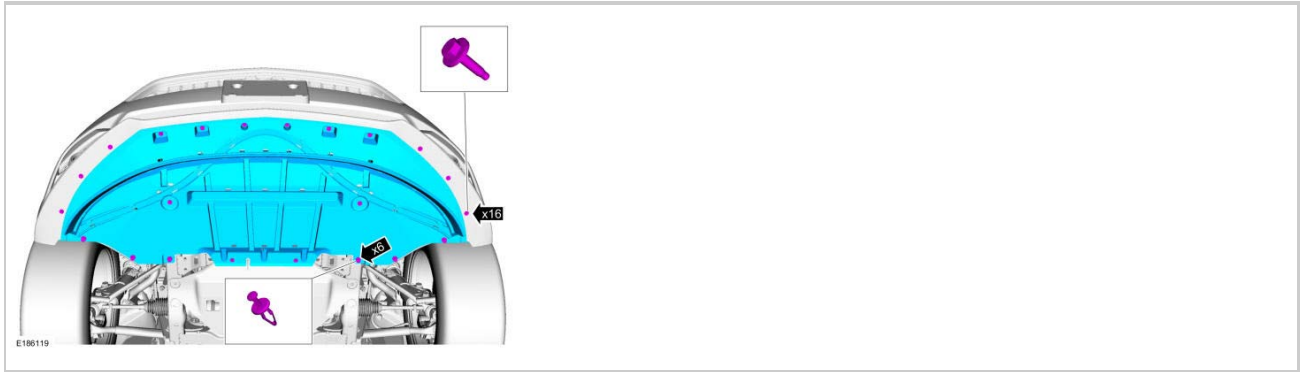
Raise the vehicle on a hoist. Refer to: Jacking and Lifting - Overview .

2.

Remove the front wheels and tires. Refer to: Wheel and Tire .

3.

Remove the push pins, screws and the lower air deflector.



NOTE: On both sides.

4.
Remove the push pins.



NOTE: On both sides.

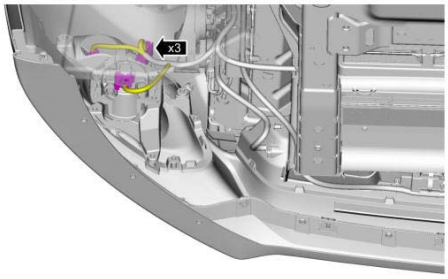
5.
Remove the push pins and position the inner fender liner aside.



NOTE: Halogen fog lamp shown in illustration, LED fog lamp is similar.

NOTE: On both sides.

6.
Disconnect the electrical connectors.



NOTE: On both sides.

7.
Remove the bolt and separate the front bumper cover from the fender bracket.

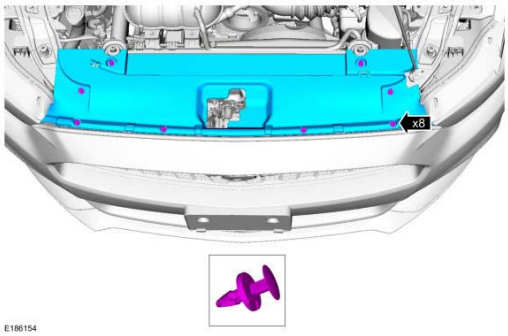
Torque

: 15 lb.in (1.7 Nm)



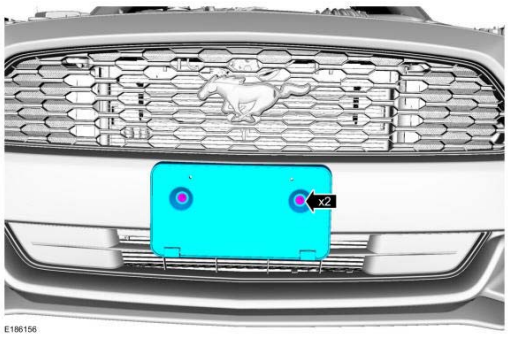
8.

Remove the push pins and the radiator sight shield.



9.

If equipped, remove the screws and the license plate bracket.

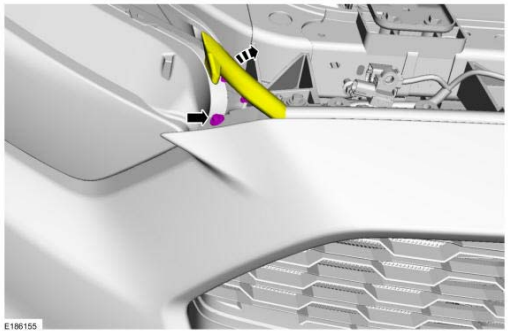


NOTE: On both sides.

10.
Position aside the outer edge of the hood seal and remove the bolt.

Torque

: 15 lb.in (1.7 Nm)



11.

Remove the front bumper cover.

1.

Remove the screws.

Torque

: 48 lb.in (5.4 Nm)

2.

Lift the front bumper cover up and off the alignment pins.

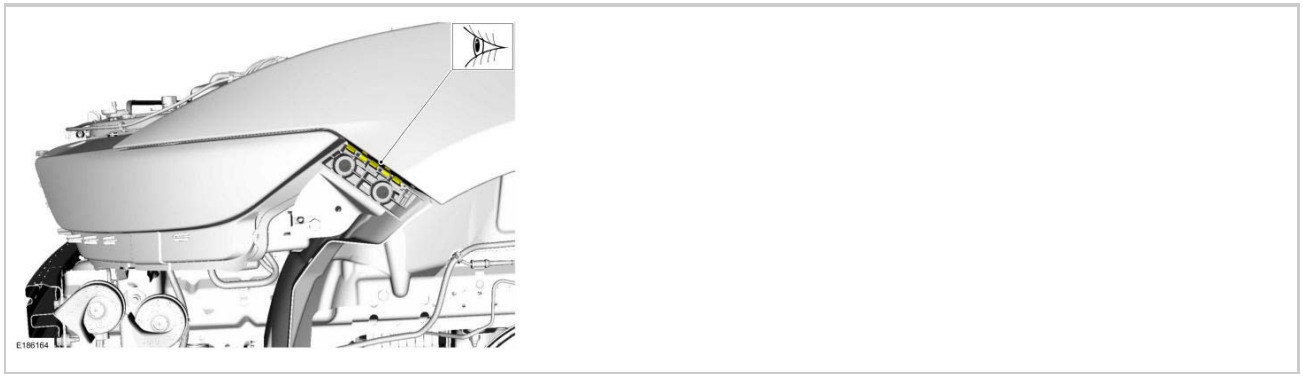
3.

Pull the front bumper cover forward and off the vehicle.



12.

Inspect the fender bracket teeth for damage.

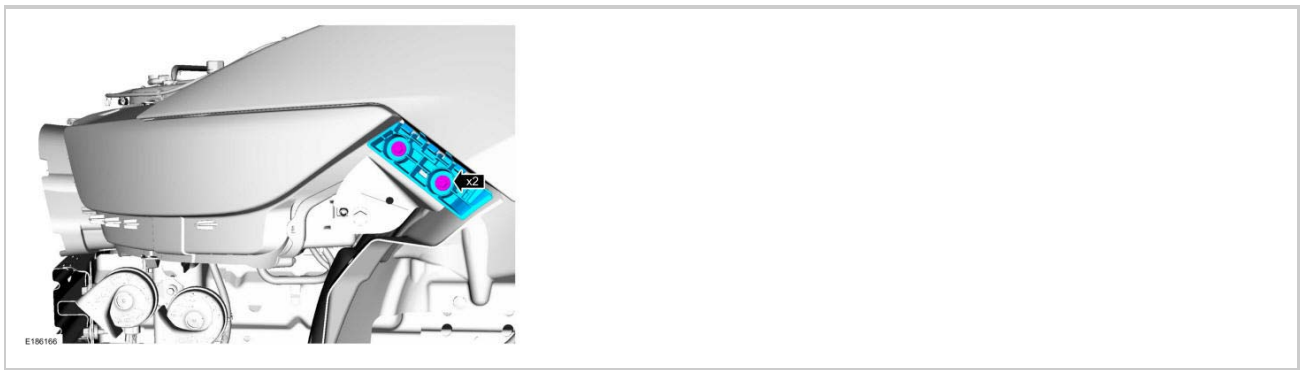


13.

If required. Remove the bolts and the fender bracket.

Torque

: 13 lb.in (1.5 Nm)



REMOVAL AND INSTALLATION > FRONT BUMPER COVER > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > REAR BUMPER > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

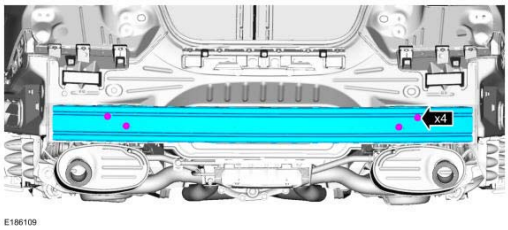
Remove the rear bumper cover. Refer to: Rear Bumper Cover .

2.

Remove the bolts and the rear bumper.

Torque

: 18 lb.ft (25 Nm)



REMOVAL AND INSTALLATION > REAR BUMPER > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > REAR BUMPER COVER > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

Raise the vehicle on a hoist. Refer to: Jacking and Lifting - Overview .

2.

1.

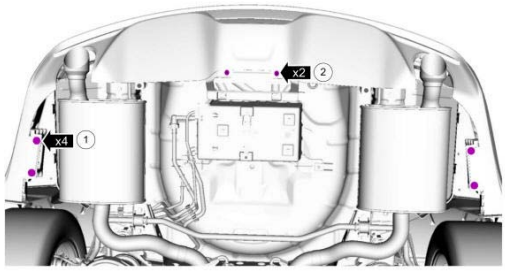
Remove the push pins.

2.

Remove the screws.

Torque

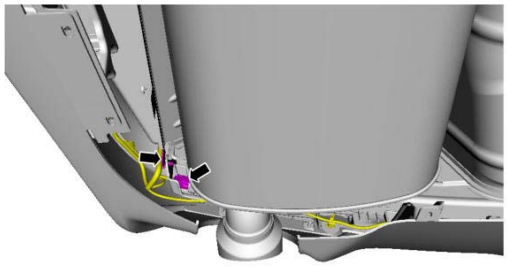
: 13 lb.in (1.5 Nm)



E186168

NOTE: On both sides.

3.
Disconnect the rear bumper harness electrical connector and separate the wiring harness guide.


E186182

4.

Remove the rear wheels and tires. Refer to: Wheel and Tire .

NOTE: On both sides.

5.
Remove the screw and the pushpins.

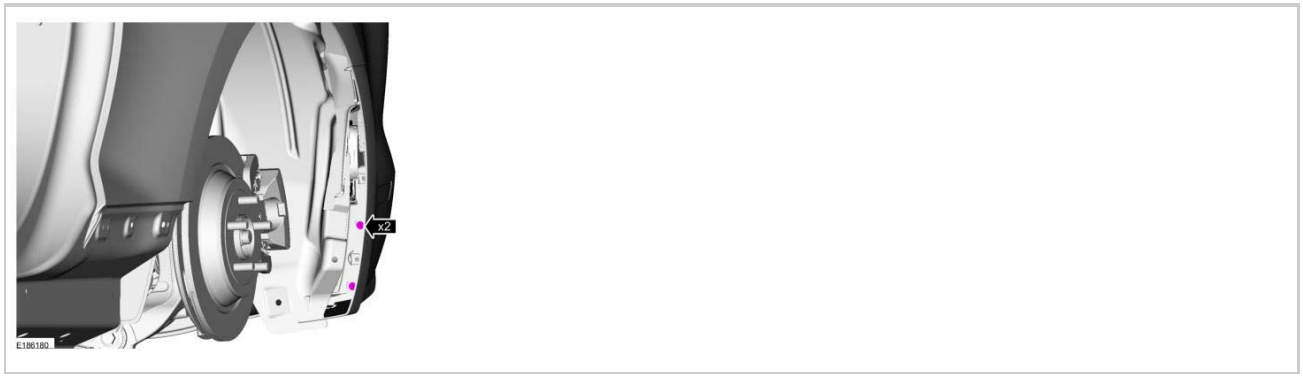


6.

Remove the bumper cover to bracket screws.

Torque

: 13 lb.in (1.5 Nm)



7.

Remove the rear lamp assemblies. Refer to: Rear Lamp Assembly .

8.

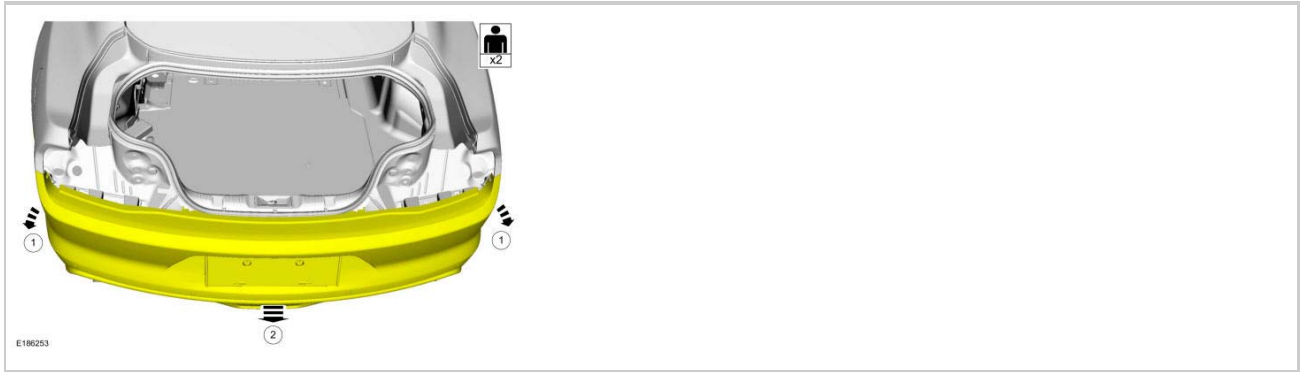
Position the rear bumper cover aside for access to electrical connector.

1.

Release the sides of the rear bumper cover from the brackets.

2.

Release the center of the rear bumper cover from the rear brackets and position aside.



9.

Disconnect the rear bumper wiring harness electrical connector.



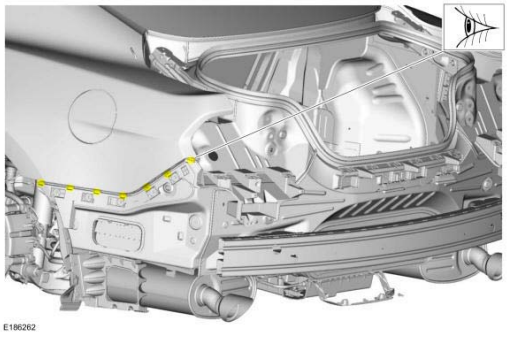
10.

Remove the rear bumper cover.



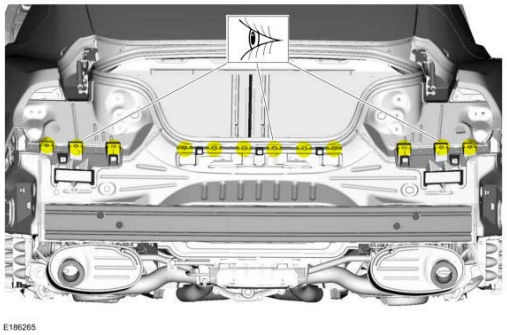
NOTE: On both sides.

11.
Inspect the side bracket for damage.



12.

Inspect the rear brackets for damage.

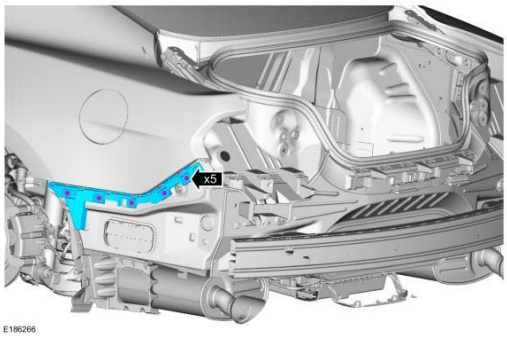


13.

If required, remove the screws and the side bracket.

Torque

: 13 lb.in (1.5 Nm)

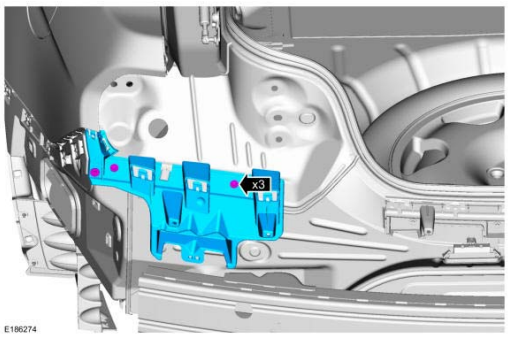


14.

If required, remove the screws and the outer rear bracket.

Torque

: 13 lb.in (1.5 Nm)

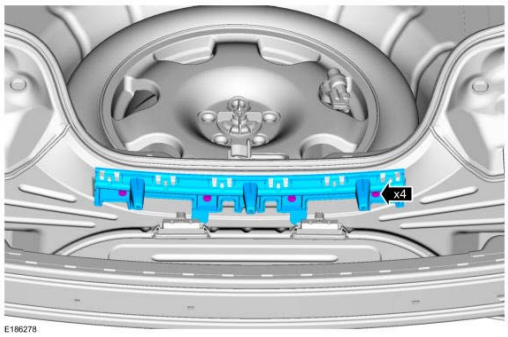


15.

If required, remove the screws and the center rear bracket.

Torque

: 13 lb.in (1.5 Nm)



REMOVAL AND INSTALLATION > REAR BUMPER COVER > INSTALLATION

1.

To install, reverse the removal procedure.

DISASSEMBLY AND ASSEMBLY > FRONT BUMPER COVER > DISASSEMBLY

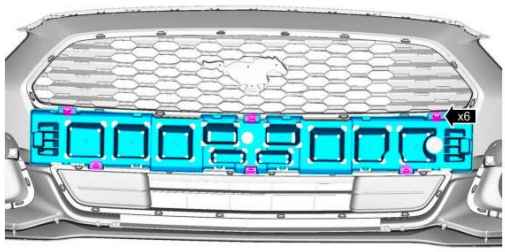
All vehicles

1.

Remove the front bumper cover. Refer to: Front Bumper Cover .

2.

Release the clips and remove the front bumper cover reinforcement.



NOTE: LH shown in illustration, RH similar.

3.
Remove the fog lamp brackets.

1.

Remove the screws.

Torque

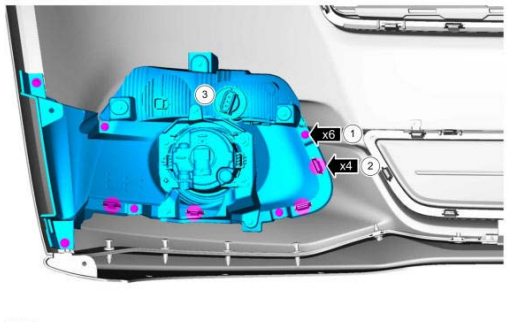
: 15 lb.in (1.7 Nm)

2.

Release the tabs.

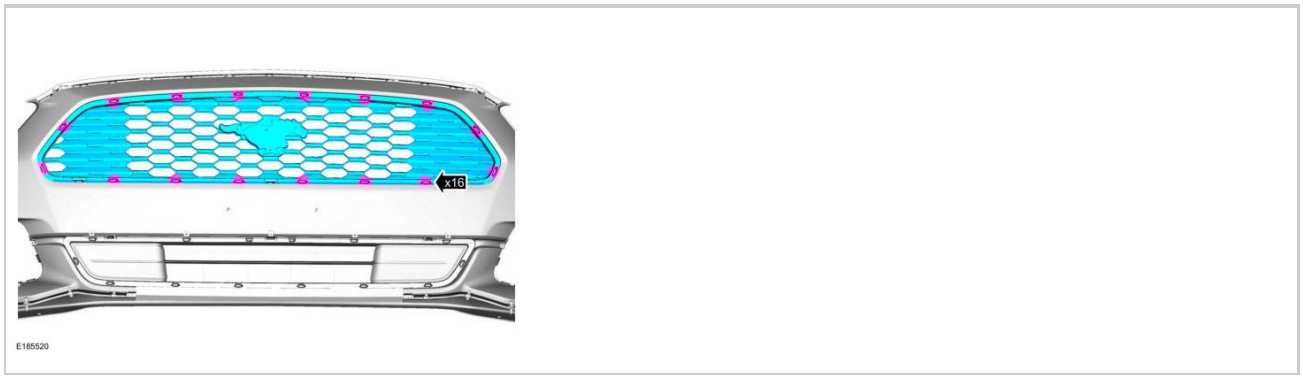
3.

Remove the fog lamp bracket.



4.

Release the tabs and remove the upper radiator grille.



5.

Release the tabs and remove the lower radiator grill.



6.

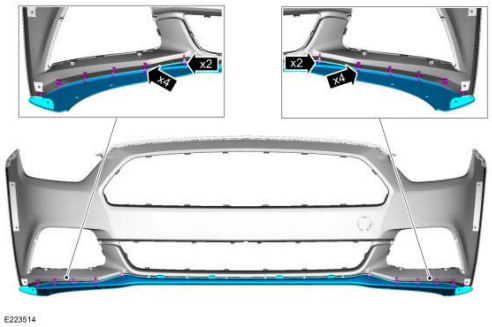
Remove the hood seal.



Vehicles equipped with base spoiler

7.

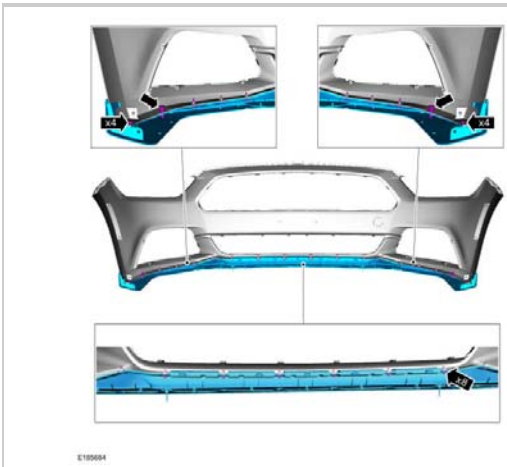
Remove the bolts, push pins and the lower spoiler.



Vehicles equipped with performance spoiler

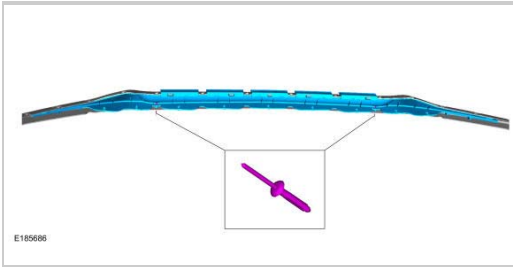
8.

Remove the bolts, push pins and the lower spoiler.



9.

Remove the rivets and the spoiler reinforcement.



DISASSEMBLY AND ASSEMBLY > FRONT BUMPER COVER > ASSEMBLY

1.

To assemble, reverse the disassembly procedure.

DISASSEMBLY AND ASSEMBLY > REAR BUMPER COVER > DISASSEMBLY

All vehicles

1.

Remove the rear bumper cover. Refer to: Rear Bumper Cover .

2.

Separate the wiring harness guides from the rear bumper cover reinforcement.



3.

Release the tabs and remove the rear bumper cover reinforcement.



4.

Remove the rear bumper wiring harness.

1.

Disconnect the electrical connectors.

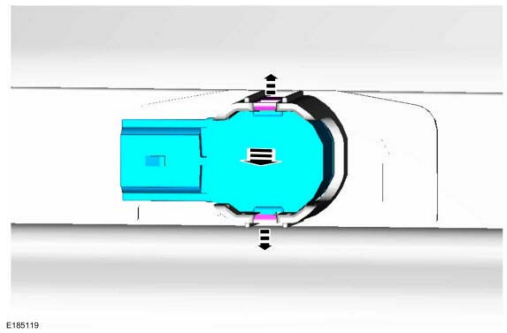
2.

Disconnect the wiring guides.



5.

Remove the rear park aid sensors.

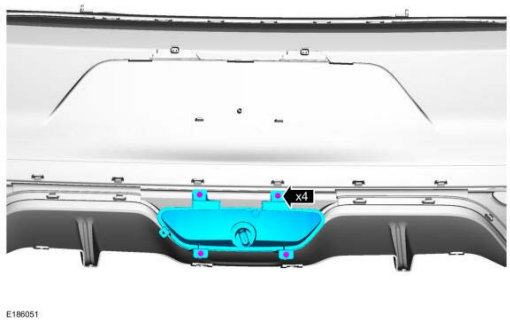


6.

Remove the screws and the reversing lamp.

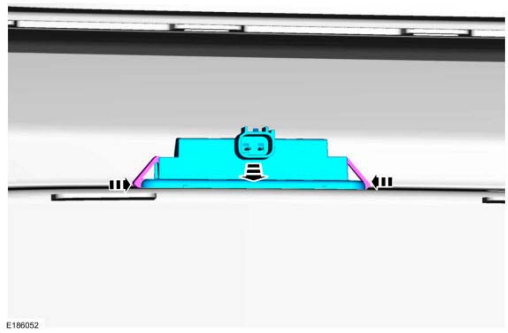
Torque

: 15 lb.in (1.7 Nm)



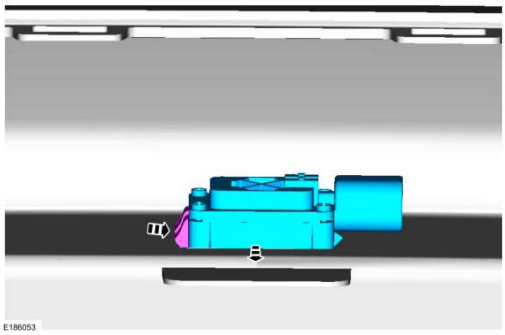
NOTE: On both sides.

7.
Press the tabs and remove the license plate lamp.



8.

Press the tabs and remove the deck lid release switch.

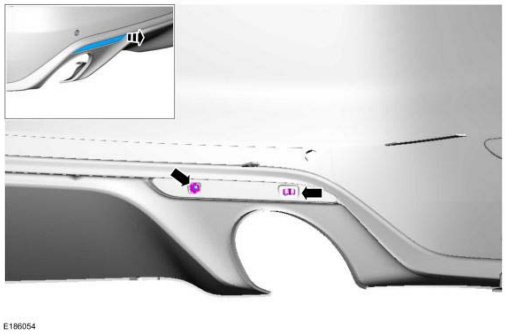


NOTE: On both sides.

9.
Remove the nut, release the tabs and remove the rear reflector.

Torque

: 13 lb.in (1.5 Nm)



NOTE: On both sides.

10.
Release the tab and remove the side marker lamp.



GT vehicles

11.

Remove the lower bumper cover.

1.

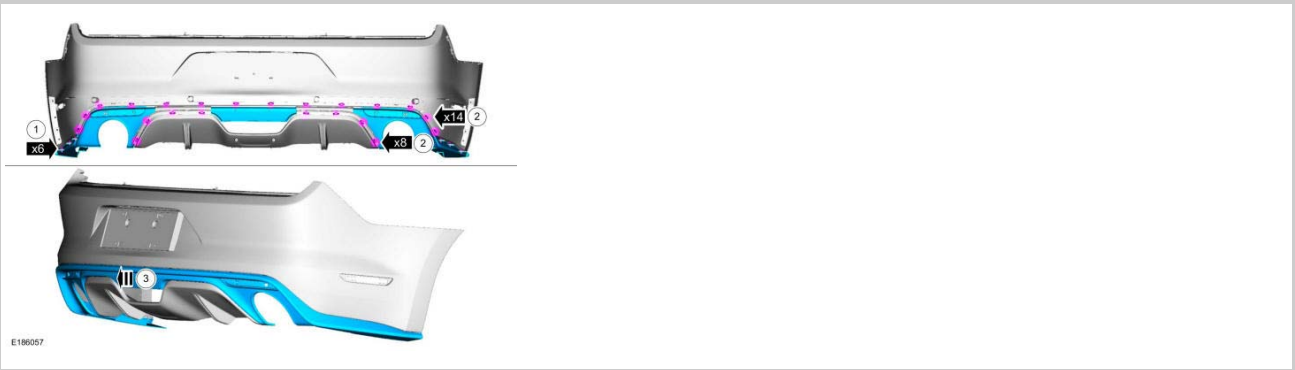
Remove the screws.

2.

Release the tabs.

3.

Remove the lower bumper cover.



DISASSEMBLY AND ASSEMBLY > REAR BUMPER COVER > ASSEMBLY

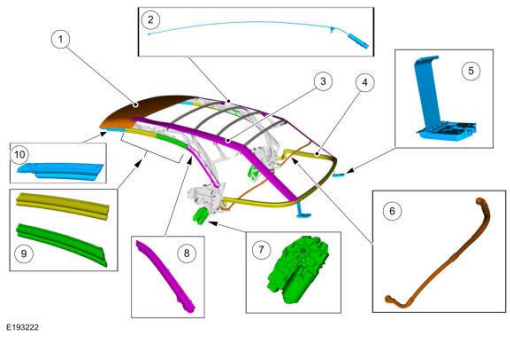
1.

To assemble, reverse the disassembly procedure.

Service Manual: CONVERTIBLE TOP

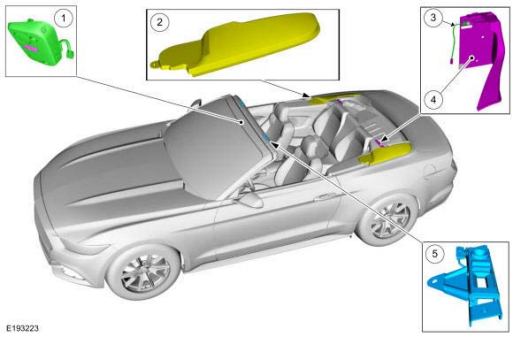
DESCRIPTION AND OPERATION > CONVERTIBLE TOP - COMPONENT LOCATION

Frame Related Components



Item	Description
1	Convertible top front panel
2	Convertible top tension cable (routed through convertible top material)
3	Stay pad
4	Floating bow
5	Convertible top tension belt (located in the luggage compartment)
6	Rear glass tension rod
7	Convertible top motor (Moveable Roof Control Module (MRCM))
8	Convertible top rear panel lower seal
9	Convertible top center panel side weatherstrip (forward/rear)
10	Convertible top front panel side weatherstrip

Sensors And Switches



Item	Description
1	Overhead console (contains convertible top open/close switch)

2	Tonneau cover (includes magnet for tonneau cover sensor operation)
3	Tonneau cover sensor (PIA to D-tower cover)
4	D-tower cover
5	Convertible top front striker (LH side convertible top striker contains convertible top latch switch)

DESCRIPTION AND OPERATION > CONVERTIBLE TOP - OVERVIEW > OVERVIEW

The convertible top system is controlled by 2 smart electric motors called the Moveable Roof Control Module A (MRCMA) and the Moveable Roof Control Module B (MRCMB). The Moveable Roof Control Module A (MRCMA) is the primary module for the system and communicates with other modules and the Moveable Roof Control Module B (MRCMB) over the MS-CAN. The convertible top is raised and lowered using the convertible top switch, the switch must be held in position (up or down) while the roof is raised or lowered. The convertible top can only be operated when the following conditions are met:

Convertible Top Opening Conditions

- Accessory delay relay is active.
- Vehicle speed is less than 5 km/h (3 mph).
- Convertible top latch switch is open.

Convertible Top Closing Conditions

- Accessory delay relay is active.
- Vehicle speed is less than 5 km/h (3 mph).
- Tonneau covers (if equipped) are **not** in place.

DESCRIPTION AND OPERATION > CONVERTIBLE TOP - SYSTEM OPERATION AND COMPONENT DESCRIPTION

System Operation

DESCRIPTION AND OPERATION > CONVERTIBLE TOP - SYSTEM OPERATION AND COMPONENT DESCRIPTION > NETWORK MESSAGE CHARTS

Moveable Roof Control Module A (MRCMA) Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Accessory delay status	BCM	This message is sent to the GWM and then to the Moveable Roof Control Module A (MRCMA). This message informs the Moveable

		Roof Control Module A (MRCMA) of the current accessory delay relay status; active or not active.
Convertible Top Request	Moveable Roof Control Module B (MRCMB)	This message informs the Moveable Roof Control Module A (MRCMA) the vehicle occupant has requested the convertible top to be raised.
Convertible Top Status	Moveable Roof Control Module B (MRCMB)	This message informs the Moveable Roof Control Module A (MRCMA) of the current Moveable Roof Control Module B (MRCMB) convertible top status; opened, closed, moving, stalled or faulted.
Ignition Status	BCM	This message is sent to the GWM and then to the Moveable Roof Control Module A (MRCMA). This message informs the Moveable Roof Control Module A (MRCMA) of the current ignition status; OFF, ACC, RUN, START or UNKNOWN.
LH rear window down status	BCMB	This message informs the Moveable Roof Control Module A (MRCMA) the LH rear window is in the full down position.
RH rear window down status	BCMB	This message informs the Moveable Roof Control Module A (MRCMA) the RH rear window is in the full down position.
Tonneau Cover Status	Moveable Roof Control Module B (MRCMB)	This message informs the Moveable Roof Control Module A (MRCMA) of the current Moveable Roof Control Module B (MRCMB) tonneau cover status; installed, not installed, not used or faulted.
Vehicle speed	PCM	This message is sent to the GWM and then to the Moveable Roof Control Module A (MRCMA). This message informs the Moveable Roof Control Module A (MRCMA) of the current vehicle speed.

Moveable Roof Control Module B (MRCMB) Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Accessory delay status	BCM	This message is sent to the GWM and then to the Moveable Roof Control Module B (MRCMB). This message informs the Moveable Roof Control Module B (MRCMB) of the current accessory delay relay status; active or not active.
Convertible Top Request	Moveable Roof Control Module A (MRCMA)	This message informs the Moveable Roof Control Module B (MRCMB) the vehicle occupant has requested the convertible top to be lowered.
Convertible Top Status	Moveable Roof Control Module A (MRCMA)	This message informs the Moveable Roof Control Module B (MRCMB) of the current Moveable Roof Control Module A (MRCMA) convertible top status; opened, closed, moving, stalled or faulted.
Ignition Status	BCM	This message is sent to the GWM and then to the Moveable Roof Control Module B (MRCMB). This message informs the Moveable Roof Control Module B (MRCMB) of the current ignition status; OFF, ACC, RUN, START or UNKNOWN.
Tonneau Cover Status	Moveable Roof Control Module A (MRCMA)	This message informs the Moveable Roof Control Module B (MRCMB) of the current Moveable Roof Control Module A (MRCMA) tonneau cover status; installed, not installed, not used or faulted.

DESCRIPTION AND OPERATION > CONVERTIBLE TOP - SYSTEM OPERATION AND COMPONENT DESCRIPTION > CONVERTIBLE TOP FUNCTION

The convertible top UP switch position is hard-wired to the Moveable Roof Control Module A (MRCMA) and the convertible top switch DOWN position is hard-wired to the Moveable Roof Control Module B (MRCMB). When the convertible top down function requirements have been met (accessory delay relay is active, vehicle speed is less than 5 km/h (3 mph) and the convertible top latch is released) and the convertible top DOWN switch is activated, a ground signal is sent to the Moveable Roof Control Module B (MRCMB). The Moveable Roof Control Module B (MRCMB) sends a convertible top down message over the MS-CAN to the Moveable Roof Control Module A (MRCMA). The Moveable Roof Control Module A (MRCMA) verifies all down function requirements have been met and then sends a window

down message over the MS-CAN to the BCMB to lower all 4 windows. The BCMB sends a signal on the global open circuit to the 4 window motors to activate a full down operation of all 4 windows. Once the windows are fully lowered, the full down sensor in each rear quarter window motor sends a signal to the BCMB indicating the windows are in the full DOWN position. The BCMB sends the rear window status message to the Moveable Roof Control Module A (MRCMA) over the MS-CAN. After receiving the rear window status message from the BCMB, the Moveable Roof Control Module A (MRCMA) sends a convertible top down message to the Moveable Roof Control Module B (MRCMB) and the convertible top is lowered.

When the convertible top up function requirements have been met (accessory delay relay is active, vehicle speed is less than 5 km/h (3 mph) and the 2 tonneau covers (if equipped) are not in place) and the convertible top switch UP is activated, a ground signal is sent to the Moveable Roof Control Module A (MRCMA). The Moveable Roof Control Module A (MRCMA) verifies all up function requirements have been met and then sends a window down message over the MS-CAN to the BCMB to lower all 4 windows. The BCMB sends a signal on the global open circuit to the 4 window motors to activate a full down operation of all 4 windows. Once the windows are fully lowered, the full down sensor in each rear quarter window motor sends a signal to the BCMB indicating the windows are in the full DOWN position. The BCMB sends the rear window status message to the Moveable Roof Control Module A (MRCMA) over the MS-CAN. After receiving the rear window status message from the BCMB, the Moveable Roof Control Module A (MRCMA) sends a convertible top up message to the Moveable Roof Control Module B (MRCMB) and the convertible top is raised.

If the convertible top cannot be raised or lowered, the Moveable Roof Control Module A (MRCMA), Moveable Roof Control Module B (MRCMB) or BCMB sets a DTC. There are no warning indicators associated with the convertible top system, but messages may be displayed in the message center.

Convertible Top Drop Window Function

When the convertible top switch is operated (to raise or lower the convertible top), the BCMB sends a signal on the global open circuit to the 4 window motors to activate a full down operation of all 4 windows. When the rear quarter windows reach the full DOWN position, the full down sensor in each rear quarter window motor sends a signal to the BCMB indicating the windows are in the full DOWN position. If the BCMB does not see the full down signal from both rear quarter window motors, the convertible top does not operate. The BCMB also disables the rear quarter window control switch from operating the rear quarter windows when the convertible top is not in the full UP or full DOWN position by sending a message (pulses) on the global open circuit (the front door window motors ignore this message). This function prevents an accidental opening of the convertible top with the windows in the UP position causing contact between the windows and convertible top which may result in damage to the convertible top or windows. For additional information on window operation, Refer to: Glass, Frames and Mechanisms - System Operation and Component Description .

Moveable Roof Control Module A (MRCMA) Message Center Messages

The Moveable Roof Control Module A (MRCMA) continually monitors the convertible top system operation and status using Hall-effect switches. The convertible top latch contains a magnet which activates a Hall-effect switch. The Hall-effect switch is hard-wired to the Moveable Roof Control Module A (MRCMA) so the module knows the roof is secured. The optional tonneau covers also each contain a magnet which activates a Hall-effect switch. One Hall-effect switch is hard-wired to the Moveable Roof Control Module A (MRCMA) and the other is hard-wired to the Moveable Roof Control Module B (MRCMB). When one or both tonneau covers are installed, the magnet activates the Hall-effect switch and prevents the convertible top from being raised. The Moveable Roof Control Module A (MRCMA) receives vehicle speed from the PCM over the HS-CAN1. If the vehicle speed exceeds 5 km/h (3 mph), the Hall-effect switches indicates one or more of the tonneau covers are installed or the convertible top latch is not fully engaged the Moveable Roof Control Module A (MRCMA) sends a message to the IPC

over the MS-CAN.

When the IPC receives a convertible top status message from the Moveable Roof Control Module A (MRCMA), one or more of the following messages is displayed in the message center:

- **TOP DISABLED - REMOVE COVERS** - Displays when the vehicle occupants attempt to raise the convertible top with the optional tonneau covers installed.
- **TOP DISABLED - REDUCE SPEED** - Displays when the vehicle occupants attempt to lower or raise the convertible top and vehicle speed is greater than 5 km/h (3 mph).
- **TOP NOT SECURE** - Displays when the vehicle occupants have raised convertible top, vehicle speed exceeds 5 km/h (3 mph) and the convertible top latch has not been fully engaged.

For additional information on the message center, Refer to: Message Center - System Operation and Component Description .

DESCRIPTION AND OPERATION > CONVERTIBLE TOP - SYSTEM OPERATION AND COMPONENT DESCRIPTION > COMPONENT DESCRIPTION

Convertible Top Latch Switch

The convertible top latch switch is a Hall-effect style switch, the switch is activated by a magnet in the convertible top. When the convertible top is closed and fully latched, the Hall-effect switch closes and sends a signal to the Moveable Roof Control Module A (MRCMA).

Convertible Top Switch

The convertible top switch is a 3-position (UP, DOWN, NEUTRAL), momentary contact, rocker style switch.

Moveable Roof Control Module A (MRCMA)

The Moveable Roof Control Module A (MRCMA) is the primary electronic control unit for the convertible top system and communicates with the Moveable Roof Control Module B (MRCMB) and other modules over the MS-CAN or HS-CAN1 through the GWM. The Moveable Roof Control Module A (MRCMA) monitors all sensor inputs and all CAN messages relating to the convertible top and directly controls the convertible top using a motor. The Moveable Roof Control Module A (MRCMA) also contains a Hall-effect switch to detect convertible top movement and position (open, closed, moving).

The Moveable Roof Control Module A (MRCMA) and Moveable Roof Control Module B (MRCMB) use their internal Hall-effect switches and the MS-CAN to synchronize motor speed and direction.

Moveable Roof Control Module B (MRCMB)

The Moveable Roof Control Module B (MRCMB) is the secondary electronic control unit for the convertible top system and communicates with the Moveable Roof Control Module A (MRCMA) over the MS-CAN and the BCM over the HS-CAN1 through the GWM. The Moveable Roof Control Module B (MRCMB) monitors one of the tonneau cover Hall-effect switches and MS-CAN messages from the Moveable Roof Control Module A (MRCMA) and directly controls the convertible top using a motor. The Moveable Roof Control Module B (MRCMB) also contains a Hall-effect switch to detect convertible top movement and position (open, closed, moving).

Tonneau Cover Switches

The tonneau cover switches are Hall-effect style switches, the switches are activated by a magnet located in each tonneau cover (1 magnet per cover). When the tonneau covers are installed, the Hall-effect switches close and send a signal to the Moveable Roof Control Module A (MRCMA) and the Moveable Roof Control Module B (MRCMB). One switch is hard-wired to each module.

DIAGNOSIS AND TESTING > CONVERTIBLE TOP > DIAGNOSTIC TROUBLE CODE (DTC) CHARTS > MOVEABLE ROOF CONTROL MODULE A (MRCMA) DTC CHART

Diagnostic Trouble Code (DTC) Chart: Moveable Roof Control Module A (MRCMA)

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

DTC	Description	Action
B1070:12	Tonneau Lid Piston Out Sensor: Circuit Short to Battery	GO to Pinpoint Test B
B1070:14	Tonneau Lid Piston Out Sensor: Circuit Short to Ground or Open	GO to Pinpoint Test B
B1070:29	Tonneau Lid Piston Out Sensor: Signal Invalid	GO to Pinpoint Test B
B1078:12	Convertible Top Latched Sensor: Circuit Short to Battery	GO to Pinpoint Test C
B1078:14	Convertible Top Latched Sensor: Circuit Short to Ground or Open	GO to Pinpoint Test C
B1078:29	Convertible Top Latched Sensor: Signal Invalid	GO to Pinpoint Test C
B1267:24	Convertible / Folding Top Activation Up Switch: Signal Stuck High	GO to Pinpoint Test E
P0604:44	Internal Control Module Random Access Memory (RAM) Error: Data Memory Failure	Using a diagnostic scan tool, CLEAR the DTC. CYCLE the ignition from ON to OFF and back to ON. CARRY OUT the Moveable Roof Control Module A (MRCMA) self-test. If the DTC returns, INSTALL a new Moveable Roof Control Module A (MRCMA). REFER to: Convertible Top Motor .
P0605:45	Internal Control Module Read Only Memory (ROM) Error: Program Memory Failure	Using a diagnostic scan tool, CLEAR the DTC. CYCLE the ignition from ON to OFF and back to ON. CARRY OUT the Moveable Roof Control Module A (MRCMA) self-test. If the DTC returns, INSTALL a

		new Moveable Roof Control Module A (MRCMA). REFER to: Convertible Top Motor .
P062F:46	Internal Control Module EEPROM Error: Calibration / Parameter Memory Failure	Using a diagnostic scan tool, CLEAR the DTC. SET the ignition to OFF and wait 20 seconds. SET the ignition to ON. CARRY OUT the Moveable Roof Control Module A (MRCMA) self-test. If the DTC returns, INSTALL a new Moveable Roof Control Module A (MRCMA). REFER to: Convertible Top Motor .
P1240:1C	Sensor Power Supply - Circuit Voltage Out of Range	GO to Pinpoint Test D
U0140:00	Lost Communication With Body Control Module: No Sub Type Information	GO to Pinpoint Test F
U0142:00	Lost Communication With Body Control Module "B": No Sub Type Information	GO to Pinpoint Test G
U020A:00	Lost Communication With Moveable Roof Control Module "B" (MRCMB): No Sub Type Information	GO to Pinpoint Test I
U0294:00	Lost Communication With Powertrain Control Monitor Module: No Sub Type Information	GO to Pinpoint Test H
U2011:64	Motor: Signal Plausibility Failure	Using a diagnostic scan tool, CLEAR the DTC. SET the ignition to ON. Using the convertible top switch, OPEN or CLOSE the convertible top. If the convertible top does not operate, INSTALL a new Moveable Roof Control Module A (MRCMA). REFER to: Convertible Top Motor .
U2011:98	Motor: Component or System Over Temperature	WAIT a minimum of 2 minutes to allow the motor time to cool. Using a diagnostic scan tool, CLEAR the DTC. SET the ignition to ON. Using the convertible top switch, OPEN or CLOSE the convertible top. If the convertible top does not operate, CARRY OUT the

		Moveable Roof Control Module A (MRCMA) self-test. If the DTC does not return, DIAGNOSE any other Moveable Roof Control Module A (MRCMA) Diagnostic Trouble Codes (DTCs), verify all convertible roof operation entry conditions have been met. REFER to: Convertible Top - Overview . If the DTC returns, the system has not had sufficient time to cool. SET the ignition to OFF and WAIT another 2 minutes, CLEAR the DTC and REPEAT the self-test.
U2013:64	Switch Pack: Signal Plausibility Failure	GO to Pinpoint Test E
U3000:49	Control Module: Internal Electronic Failure	Using a diagnostic scan tool, CLEAR the DTC. SET the ignition to ON. Using the convertible top switch, OPEN or CLOSE the convertible top. Using a diagnostic scan tool, CARRY OUT the Moveable Roof Control Module A (MRCMA) self-test. If the DTC returns, INSTALL a new Moveable Roof Control Module A (MRCMA). REFER to: Convertible Top Motor .

DIAGNOSIS AND TESTING > CONVERTIBLE TOP > DIAGNOSTIC TROUBLE CODE (DTC) CHARTS > MOVEABLE ROOF CONTROL MODULE B (MRCMB) DTC CHART

Diagnostic Trouble Code (DTC) Chart: Moveable Roof Control Module B (MRCMB)

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

DTC	Description	Action
B1070:12	Tonneau Lid Piston Out Sensor: Circuit Short to Battery	GO to Pinpoint Test B
B1070:14	Tonneau Lid Piston Out Sensor: Circuit Short to Ground or Open	GO to Pinpoint Test B
B1070:29	Tonneau Lid Piston Out Sensor: Signal Invalid	GO to Pinpoint Test B

B1268:24	Convertible / Folding Top Activation Down Switch: Signal Stuck High	GO to Pinpoint Test E
P0604:44	Internal Control Module Random Access Memory (RAM) Error: Data Memory Failure	Using a diagnostic scan tool, CLEAR the DTC. CYCLE the ignition from ON to OFF and back to ON. CARRY OUT the Moveable Roof Control Module B (MRCMB) self-test. If the DTC returns, INSTALL a new Moveable Roof Control Module B (MRCMB). REFER to: Convertible Top Motor .
P0605:45	Internal Control Module Read Only Memory (ROM) Error: Program Memory Failure	Using a diagnostic scan tool, CLEAR the DTC. CYCLE the ignition from ON to OFF and back to ON. CARRY OUT the Moveable Roof Control Module B (MRCMB) self-test. If the DTC returns, INSTALL a new Moveable Roof Control Module B (MRCMB). REFER to: Convertible Top Motor .
P062F:46	Internal Control Module EEPROM Error: Calibration / Parameter Memory Failure	Using a diagnostic scan tool, CLEAR the DTC. SET the ignition to OFF and wait 20 seconds. SET the ignition to ON. CARRY OUT the Moveable Roof Control Module B (MRCMB) self-test. If the DTC returns, INSTALL a new Moveable Roof Control Module B (MRCMB). REFER to: Convertible Top Motor .
U0140:00	Lost Communication With Body Control Module: No Sub Type Information	GO to Pinpoint Test F
U0207:00	Lost Communication With Moveable Roof Control Module "A" (MRCMA): No Sub Type Information	GO to Pinpoint Test J
U2011:64	Motor: Signal Plausibility Failure	Using a diagnostic scan tool, CLEAR the DTC. SET the ignition to ON. Using the convertible top switch, OPEN or CLOSE the convertible top. If the convertible top does not operate, INSTALL a new Moveable Roof Control Module B (MRCMB). REFER to: Convertible Top Motor .

U2011:98	Motor: Component or System Over Temperature	WAIT a minimum of 2 minutes to allow the motor time to cool. Using a diagnostic scan tool, CLEAR the DTC. SET the ignition to ON. Using the convertible top switch, OPEN or CLOSE the convertible top. If the convertible top does not operate, CARRY OUT the Moveable Roof Control Module B (MRCMB) self-test. If the DTC does not return, DIAGNOSE any other Moveable Roof Control Module B (MRCMB) Diagnostic Trouble Codes (DTCs), verify all convertible roof operation entry conditions have been met. REFER to: Convertible Top - Overview . If the DTC returns, the system has not had sufficient time to cool. SET the ignition to OFF and WAIT another 2 minutes, CLEAR the DTC and REPEAT the self-test.
U2013:64	Switch Pack: Signal Plausibility Failure	GO to Pinpoint Test E
U3000:49	Control Module: Internal Electronic Failure	Using a diagnostic scan tool, CLEAR the DTC. SET the ignition to ON. Using the convertible top switch, OPEN or CLOSE the convertible top. Using a diagnostic scan tool, CARRY OUT the Moveable Roof Control Module B (MRCMB) self-test. If the DTC returns, INSTALL a new Moveable Roof Control Module B (MRCMB). REFER to: Convertible Top Motor .

DIAGNOSIS AND TESTING > CONVERTIBLE TOP > DIAGNOSTIC TROUBLE CODE (DTC) CHARTS > BCMB DTC CHART

Diagnostic Trouble Code (DTC) Chart: Body Control Module B (BCMB)

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

DTC	Description	Action
B126E:23	Right Rear Window Fully Down Feedback: Signal Stuck Low	GO to Pinpoint Test K
B126E:24	Right Rear Window Fully Down Feedback: Signal Stuck High	GO to Pinpoint Test K
B126F:23	Left Rear Window Fully Down Feedback: Signal Stuck Low	GO to Pinpoint Test K
B126f:24	Left Rear Window Fully Down Feedback: Signal Stuck High	GO to Pinpoint Test K
-	All Other BCMB Diagnostic Trouble Codes (DTCs)	REFER to: Body Control Module B (BCMB) .

DIAGNOSIS AND TESTING > CONVERTIBLE TOP > SYMPTOM CHART

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

Symptom	Possible Sources	Action
A module does not respond to the diagnostic scan tool	Fuse Wiring, terminals or connectors Moveable Roof Control Module A (MRCMA) concern Moveable Roof Control Module B (MRCMB) concern BCMB concern	REFER to: MODULE COMMUNICATIONS NETWORK .
The convertible top is inoperative	Refer to the Pinpoint Test	GO to Pinpoint Test A
The convertible top is difficult to latch	Convertible top latch front striker incorrectly installed Convertible top latch incorrectly installed Convertible top incorrectly installed	CHECK the convertible top latch installation. REFER to: Convertible Top Front Panel . REINSTALL as necessary. CHECK the convertible top latch front striker installation. REFER to: Convertible Top Front Striker . REINSTALL as necessary. CHECK the convertible top installation. REFER to: Convertible Top Assembly . REINSTALL as necessary.
The windows do not lower when the convertible top is opened or closed	Wiring, terminals or connectors Network communication concern Window motor BCMB concern Moveable Roof Control Module A	RETRIEVE and RECORD all BCMB and Moveable Roof Control Module A (MRCMA) Diagnostic Trouble Codes (DTCs). DIAGNOSE all retrieved Diagnostic

	(MRCMA) concern	Trouble Codes (DTCs). GO to the DTC Chart: BCMB or DTC Chart: Moveable Roof Control Module A (MRCMA).
The message center displays Top Not Secured	Convertible top incorrect installed Convertible top not latched correctly Latch sensor concern	CLOSE the convertible top without latching and VERIFY the top is correctly installed / aligned. REINSTALL the convertible top as necessary. LATCH the convertible top and TEST DRIVE the vehicle above 5 km/h (3 mph). If the message does not return, INFORM the customer of the correct latching procedure. RETRIEVE and RECORD all Moveable Roof Control Module A (MRCMA) Diagnostic Trouble Codes (DTCs). GO to the DTC Chart: Moveable Roof Control Module A (MRCMA).
The message center displays Top Disabled - Remove Covers	Tonneau covers are installed Tonneau cover sensor concern	VERIFY the covers **are not** installed. REMOVE the covers and CLOSE the convertible roof. INFORM the customer the tonneau covers must be removed before closing the convertible roof. RETRIEVE and RECORD all Moveable Roof Control Module A (MRCMA) and Moveable Roof Control Module B (MRCMB) Diagnostic Trouble Codes (DTCs). GO to the DTC Chart: Moveable Roof Control Module A (MRCMA) or the DTC Chart: Moveable Roof Control Module B (MRCMB).
The message center displays Top Disabled - Reduce Speed	Vehicle speed concern Network communication concern	RETRIEVE and RECORD all PCM Diagnostic Trouble Codes (DTCs). DIAGNOSE all vehicle speed related Diagnostic Trouble Codes (DTCs). 2.3L REFER to: Electronic Engine Controls . 3.7L REFER to: Electronic Engine Controls . 5.0L REFER to: Electronic Engine Controls . RETRIEVE and RECORD all Moveable Roof Control Module A (MRCMA), Moveable Roof Control Module B (MRCMB) and GWM Diagnostic Trouble Codes (DTCs). GO to the DTC Chart: Moveable Roof Control Module A (MRCMA),

		the DTC Chart: Moveable Roof Control Module B (MRCMB) or REFER to: MODULE COMMUNICATIONS NETWORK .

DIAGNOSIS AND TESTING > CONVERTIBLE TOP > PINPOINT TESTS > PINPOINT TEST A : THE CONVERTIBLE TOP IS INOPERATIVE

Refer to Convertible Top for schematic and connector information.

Normal Operation and Fault Conditions

The convertible top is controlled through the use of a switch, the switch must be held in place during convertible top operation. Voltage for convertible top operation is supplied to the Moveable Roof Control Module A (MRCMA) and Moveable Roof Control Module B (MRCMB) from the BJB. There are several requirements which must be met before the convertible top can be opened or closed, REFER to: Convertible Top - Overview . For additional convertible

Circuit faults, a convertible top switch failure, network communication errors, invalid network data or an internal failure of one or more modules listed below prevents the convertible top from operating.

Possible Sources

- Fuses
- Wiring, terminals or connectors
- Convertible top switch
- Tonneau covers installed
- Vehicle speed concern
- Network communication concern
- Rear window concern
- Moveable Roof Control Module A (MRCMA)
- Moveable Roof Control Module B (MRCMB)
- BCMB concern
- GWM concern
- BCM concern
- PCM concern

Visual Inspection and Diagnostic Pre-checks

- Make sure the tonneau covers are not installed.
- Make sure BJB fuses 15 (20A) and 17 (20A) are OK.

DIAGNOSIS AND TESTING > CONVERTIBLE TOP > PINPOINT TESTS > PINPOINT TEST A : THE CONVERTIBLE TOP IS INOPERATIVE > PINPOINT TEST A : THE CONVERTIBLE TOP IS INOPERATIVE

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may cause damage to the connector.

A1 VERIFY THE COMMUNICATION NETWORK

Ignition ON.

Using a diagnostic scan tool, carry out the Network Test.

Do the Moveable Roof Control Module A (MRCMA), Moveable Roof Control Module B (MRCMB), BCMB, GWM, BCM and PCM all pass the Network Test?

Yes	GO to A2

No	DIAGNOSE no communication with the unresponsive module. REFER to: MODULE COMMUNICATIONS NETWORK .

A2 RETRIEVE ANY DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, carry out the self test for the following modules:

Moveable Roof Control Module A (MRCMA)

Moveable Roof Control Module B (MRCMB)

BCMB

GWM

BCM

PCM, KOEO

Are any Diagnostic Trouble Codes (DTCs) present in any of the modules listed above?

Yes	DIAGNOSE all Diagnostic Trouble Codes (DTCs) before continuing with this test. For Moveable Roof Control Module A (MRCMA) Diagnostic Trouble Codes (DTCs), GO to the DTC Chart: Moveable Roof Control Module A (MRCMA). For Moveable Roof Control Module B (MRCMB) Diagnostic Trouble Codes (DTCs), GO to the DTC Chart: Moveable Roof Control Module B . For BCMB Diagnostic Trouble Codes (DTCs), REFER to: Body Control Module B (BCMB) . For GWM Diagnostic Trouble Codes (DTCs), REFER to: MODULE COMMUNICATIONS NETWORK . For BCM Diagnostic Trouble Codes (DTCs), REFER to: Body Control Module (BCM) For PCM Diagnostic Trouble Codes (DTCs), 2.3L

	REFER to: Electronic Engine Controls . 3.7L REFER to: Electronic Engine Controls . 5.0L REFER to: Electronic Engine Controls .

No	GO to A3

A3 CHECK THE BCM (BODY CONTROL MODULE) DELAYED ACCESSORY POWER (ACC_DELAY) PID (PARAMETER IDENTIFICATION)

Using a diagnostic scan tool, view the BCM ACC_DELAY PID.

Does the PID display Active?

Yes	GO to A5

No	DIAGNOSE the accessory delay relay. REFER to: Body Control Module (BCM) .

A4 CHECK THE CONVERTIBLE TOP ACTIVATION UP (TOP_UP_SW) AND DOWN (TOP_DWN_SW) SWITCH PARAMETER IDENTIFICATIONS (PIDS)

Using a diagnostic scan tool, view the Moveable Roof Control Module A (MRCMA) TOP_UP_SW PID while pressing the convertible top UP switch.

Using a diagnostic scan tool, view the Moveable Roof Control Module B (MRCMB) TOP_DWN_SW PID while pressing the convertible top DOWN switch.

Does the PID display Active when the switch is pressed and Inactive when the switch is released?

Yes	GO to A5

No	If the PID displays Active all the time, GO to Pinpoint Test E If the PID displays Inactive all the time, GO to A9

A5 CHECK THE MOVEABLE ROOF CONTROL MODULE A (MRCMA) VEHICLE SPEED (VSS) PID (PARAMETER IDENTIFICATION)

Using a diagnostic scan tool, view the Moveable Roof Control Module A (MRCMA) VSS PID.

Does the PID display less than 5 km/h (3 mph) ?

Yes	GO to A6

No	DIAGNOSE the vehicle speed concern. 2.3L REFER to: Electronic Engine Controls . 3.7L REFER to: Electronic Engine Controls . 5.0L REFER to: Electronic Engine Controls .

A6 CHECK THE MOVEABLE ROOF CONTROL MODULE A (MRCMA) FRONT LATCH SENSOR (FRNT_LATCH_S) PID (PARAMETER IDENTIFICATION)

Using a diagnostic scan tool, view the Moveable Roof Control Module A (MRCMA) FRNT_LATCH_S PID.

Does the PID display Inactive with the top open and Active with the top closed?

Yes	GO to A7

No	GO to Pinpoint Test C

A7 CHECK THE MOVEABLE ROOF CONTROL MODULE A (MRCMA) CONVERTIBLE TOP LATCH SENSOR VOLTAGE (LTCH_SNSR_V) PID (PARAMETER IDENTIFICATION)

Using a diagnostic scan tool, view the Moveable Roof Control Module A (MRCMA) LTCH_SNSR_V PID.

Is the PID display equal to battery voltage?

Yes	If the vehicle is equipped with convertible top tonneau covers, GO to A8 If the vehicle is not equipped with convertible top tonneau covers, the system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. DISCONNECT and INSPECT Moveable Roof Control Module A (MRCMA) C4830 , Moveable Roof Control Module B (MRCMB) C4831 , convertible top switch C9013 and convertible top latch switch C9111 for corrosion, damaged pins, bent pins, pushed-out pins and spread terminals. REPAIR or INSTALL NEW as necessary.

No	GO to Pinpoint Test D

A8 CHECK THE CONVERTIBLE TOP TONNEAU COVER SENSOR PARAMETER IDENTIFICATIONS (PIDS)

Using a diagnostic scan tool, view the Moveable Roof Control Module A (MRCMA) tonneau cover sensor PID with the tonneau covers installed and removed.

Using a diagnostic scan tool, view the Moveable Roof Control Module B (MRCMB) tonneau cover sensor PID with the tonneau covers installed and removed.

Do the Parameter Identifications (PIDs) display Active with the covers installed and Inactive with the covers removed?

Yes	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. DISCONNECT and INSPECT Moveable Roof Control Module A (MRCMA) C4830 , Moveable Roof Control Module B (MRCMB) C4831 , convertible top switch C9013 , convertible top latch switch C9111 , LH tonneau cover sensor C4525 and RH tonneau cover sensor C4526 for corrosion, damaged pins, bent pins, pushed-out pins and spread terminals. REPAIR or INSTALL NEW as necessary.

No	GO to Pinpoint Test B

A9 CHECK THE CONVERTIBLE TOP ACTIVATION SWITCH CIRCUITS FOR AN OPEN

Ignition OFF.

Disconnect Moveable Roof Control Module A (MRCMA) C4830 .

Disconnect Moveable Roof Control Module B (MRCMB) C4831 .

Disconnect convertible top switch C9013 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4830-8	Ω	C9013-4

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4831-8	Ω	C9013-3

Is the resistance less than 3 ohms?

Yes	GO to A10

No	REPAIR the circuit.

A10 CHECK THE CONVERTIBLE TOP ACTIVATION SWITCH GROUND CIRCUIT FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C9013-5	Ω	Ground

Is the resistance less than 3 ohms?

Yes	INSTALL a new convertible top switch. REFER to: Convertible Top Switch .

No	REPAIR the circuit.

DIAGNOSIS AND TESTING > CONVERTIBLE TOP > PINPOINT TESTS > PINPOINT TEST B : TONNEAU COVER SENSOR FAULTS

Refer to Convertible Top for schematic and connector information.

Normal Operation and Fault Conditions

A tonneau cover sensor is hardwired to the Moveable Roof Control Module A (MRCMA) and a separate tonneau cover sensor is hardwired to the Moveable Roof Control Module B (MRCMB). Each module

sends out a 5 volt reference signal to the respective Hall-effect switch and receives a voltage signal input from the switch when the tonneau cover is installed. When a tonneau cover sensor or circuit is faulted, the convertible top may open, but does not close. Also, depending on the nature of the fault, the message center may display the TOP DISABLED - REMOVE COVERS.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1070:12	Tonneau Lid Piston Out Sensor: Circuit Short To Battery	This DTC sets if the tonneau cover sensor voltage signal sent to the Moveable Roof Control Module A (MRCMA) or Moveable Roof Control Module B (MRCMB) is shorted to battery voltage.
B1070:14	Tonneau Lid Piston Out Sensor: Circuit Short To Ground or Open	This DTC sets if the tonneau cover sensor voltage signal sent to the Moveable Roof Control Module A (MRCMA) or Moveable Roof Control Module B (MRCMB) is shorted to ground or open.
B1070:29	Tonneau Lid Piston Out Sensor: Signal Invalid	This DTC sets if the Moveable Roof Control Module A (MRCMA) or Moveable Roof Control Module B (MRCMB) or receives an implausible signal from the tonneau cover sensor.

Possible Sources

- Wiring, terminals or connectors
- LH tonneau cover sensor
- RH tonneau cover sensor
- Moveable Roof Control Module A (MRCMA)
- Moveable Roof Control Module B (MRCMB)

DIAGNOSIS AND TESTING > CONVERTIBLE TOP > PINPOINT TESTS > PINPOINT TEST B : TONNEAU COVER SENSOR FAULTS > PINPOINT TEST B : TONNEAU COVER SENSOR FAULTS

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may cause damage to the connector.

B1 CHECK FOR RETURNING DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, clear the Moveable Roof Control Module A (MRCMA) or Moveable Roof Control Module B (MRCMB) Diagnostic Trouble Codes (DTCs).

Ignition OFF.

Ignition ON.

With the convertible top in the open position, press and hold the convertible top UP switch for 2 seconds.

Using a diagnostic scan tool, carry out the Moveable Roof Control Module A (MRCMA) and Moveable Roof Control Module B (MRCMB) self-tests.

Does the DTC return?

Yes	If DTC B1070:12 or B1070:29 is present, GO to B2 If DTC B1070:14 is present, GO to B3

No	The condition that caused the DTC to set is not present at this time. The concern may have been caused by a loose or corroded electrical connector or an intermittent concern. DISCONNECT and INSPECT the suspect tonneau cover sensor C4525 or C4526, and Moveable Roof Control Module A (MRCMA) C4830 or Moveable Roof Control Module B (MRCMB) C4831 for corrosion, bent pins, pushed-out pins and spread terminals. REPAIR or INSTALL new components as necessary. For all other Moveable Roof Control Module A (MRCMA) and Moveable Roof Control Module B (MRCMB) Diagnostic Trouble Codes (DTCs), GO to the DTC Chart: Moveable Roof Control Module A (MRCMA) or DTC Chart: Moveable Roof Control Module B (MRCMB).

B2 CHECK THE TONNEAU COVER SENSOR SIGNAL CIRCUIT FOR A SHORT TO BATTERY VOLTAGE

Ignition OFF.

If Moveable Roof Control Module A (MRCMA) set the DTC:

Disconnect Moveable Roof Control Module A (MRCMA) C4830 .

Disconnect LH tonneau cover sensor C4525.

If Moveable Roof Control Module B (MRCMB) set the DTC:

Moveable Roof Control Module B (MRCMB) C4831 .

Disconnect RH tonneau cover sensor C4526.

Ignition ON.

For Moveable Roof Control Module A (MRCMA) measure:

Positive Lead	Measurement / Action	Negative Lead
C4830-2		Ground

For Moveable Roof Control Module B (MRCMB) measure:

Positive Lead	Measurement / Action	Negative Lead
C4831-2		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	If DTC B1070:29 **is not** present, INSTALL a new tonneau cover sensor. REFER to: Tonneau Cover Sensor . If DTC B1070:29 **is** present, GO to B3

B3 CHECK THE TONNEAU COVER SENSOR SIGNAL CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

If Moveable Roof Control Module A (MRCMA) set the DTC:

Disconnect Moveable Roof Control Module A (MRCMA) C4830 (if not previously disconnected).

Disconnect the LH tonneau cover sensor C4525 (if not previously disconnected).

If Moveable Roof Control Module B (MRCMB) set the DTC:

Moveable Roof Control Module B (MRCMB) C4831 (if not previously disconnected).

Disconnect the RH tonneau cover sensor C4526 (if not previously disconnected).

For Moveable Roof Control Module A (MRCMA) measure:

Positive Lead	Measurement / Action	Negative Lead
C4830-2	Ω	Ground

For Moveable Roof Control Module B (MRCMB) measure:

Positive Lead	Measurement / Action	Negative Lead
C4831-2	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	If DTC B1070:29 **is not** present, INSTALL a new tonneau cover sensor. REFER to: Tonneau Cover Sensor . If DTC B1070:29 **is** present, GO to B4

No	REPAIR the circuit.

B4 CHECK THE TONNEAU COVER SENSOR SIGNAL CIRCUIT FOR AN OPEN

For Moveable Roof Control Module A (MRCMA) measure:

Positive Lead	Measurement / Action	Negative Lead
C4830-2	Ω	C4525-1

For Moveable Roof Control Module B (MRCMB) measure:

Positive Lead	Measurement / Action	Negative Lead
C4831-2	Ω	C4526-1

Is the resistance less than 3 ohms?

Yes	GO to B5

No	REPAIR the circuit.

B5 CHECK THE TONNEAU COVER SENSOR SIGNAL CIRCUIT FOR A SHORT TOGETHER

For Moveable Roof Control Module A (MRCMA) measure:

Positive Lead	Measurement / Action	Negative Lead
C4830-2	Ω	C4830-1

For Moveable Roof Control Module B (MRCMB) measure:

Positive Lead	Measurement / Action	Negative Lead
C4831-2	Ω	C4831-1

Is the resistance greater than 10, 000 ohms?

Yes	INSTALL a new tonneau cover sensor. REFER to: Tonneau Cover Sensor .

No	REPAIR the circuit.

DIAGNOSIS AND TESTING > CONVERTIBLE TOP > PINPOINT TESTS > PINPOINT TEST C : B1078:12, B1078:14, B1078:29

Refer to Convertible Top for schematic and connector information.

Normal Operation and Fault Conditions

The convertible top latch switch is hardwired to the Moveable Roof Control Module A (MRCMA). The Moveable Roof Control Module A (MRCMA) sends out a 5 volt reference signal to the Hall-effect switch and receives a voltage signal input back from the switch when the latch is open. When the latch switch

or circuit is faulted, the convertible top may close, but does not open. Also, depending on the nature of the fault, the message center may display the TOP NOT SECURE. The convertible top latch switch is part of the convertible roof latch and striker assembly.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1078:12	Convertible Top Latched Sensor: Circuit Short To Battery	This DTC sets if the convertible top latch switch voltage signal sent to the Moveable Roof Control Module A (MRCMA) is shorted to battery voltage.
B1078:14	Convertible Top Latched Sensor: Circuit Short To Ground or Open	This DTC sets if the convertible top latch switch voltage signal sent to the Moveable Roof Control Module A (MRCMA) is shorted to ground or open.
B1078:29	Convertible Top Latched Sensor: Signal Invalid	This DTC sets if the Moveable Roof Control Module A (MRCMA) receives an implausible signal from the convertible top latch switch.

Possible Sources

- Wiring, terminals or connectors
- Convertible top latch assembly
- Moveable Roof Control Module A (MRCMA)

DIAGNOSIS AND TESTING > CONVERTIBLE TOP > PINPOINT TESTS > PINPOINT TEST C : B1078:12, B1078:14, B1078:29 > PINPOINT TEST C : B1078:12, B1078:14, B1078:29

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may cause damage to the connector.

C1 CHECK FOR RETURNING DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, clear the Moveable Roof Control Module A (MRCMA) Diagnostic Trouble Codes (DTCs).

Ignition OFF.

Ignition ON.

With the convertible top in the closed position, press and hold the convertible top DOWN switch for 2 seconds.

Using a diagnostic scan tool, carry out the Moveable Roof Control Module A (MRCMA) self-test.

Does the DTC return?

Yes	If DTC B1078:12 or B1078:29 is present, GO to C2 If DTC B1078:14 is present, GO to C3

No	The condition that caused the DTC to set is not present at this time. The concern may have been caused by a loose or corroded electrical connector or an intermittent concern. DISCONNECT and INSPECT convertible top latch switch C9111 and Moveable Roof Control Module A (MRCMA) C4830 for corrosion, bent pins, pushed-out pins and spread terminals. REPAIR or INSTALL new components as necessary. For all other Moveable Roof Control Module A (MRCMA) Diagnostic Trouble Codes (DTCs), GO to the DTC Chart: Moveable Roof Control Module A (MRCMA).

C2 CHECK THE CONVERTIBLE LATCH SWITCH SIGNAL CIRCUIT FOR A SHORT TO BATTERY VOLTAGE

Ignition OFF.

Disconnect Moveable Roof Control Module A (MRCMA) C4830 .

Disconnect convertible top latch switch C9111 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4830-7		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	If DTC B1078:29 **is not** present, INSTALL a new convertible top latch switch. REFER to: Convertible Top Front Striker . If DTC B1078:29 **is** present, GO to C3

C3 CHECK THE CONVERTIBLE LATCH SWITCH SIGNAL CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Disconnect Moveable Roof Control Module A (MRCMA) C4830 (if not previously disconnected).

Disconnect convertible top latch switch C9111 (if not previously disconnected).

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4830-7	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	If DTC B1078:29 **is not** present, INSTALL a new convertible top latch switch. REFER to: Convertible Top Front Striker . DTC B1078:29 **is** present, GO to C4

No	REPAIR the circuit.

C4 CHECK THE CONVERTIBLE LATCH SWITCH SIGNAL CIRCUIT FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4830-7	Ω	C9111-1

Is the resistance less than 3 ohms?

Yes	GO to C5

No	REPAIR the circuit.

C5 CHECK THE CONVERTIBLE LATCH SWITCH SIGNAL CIRCUIT FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4830-7	Ω	C4830-1

Is the resistance greater than 10, 000 ohms?

Yes	INSTALL a new convertible top latch switch. REFER to: Convertible Top Front Striker .

No	REPAIR the circuit.

DIAGNOSIS AND TESTING > CONVERTIBLE TOP > PINPOINT TESTS > PINPOINT TEST D : P1240:1C

Refer to Convertible Top for schematic and connector information.

Normal Operation and Fault Conditions

The convertible top latch switch and the LH tonneau cover switch are hardwired to the Moveable Roof Control Module A (MRCMA). The Moveable Roof Control Module A (MRCMA) sends battery voltage to both Hall-effect switches and back to the Moveable Roof Control Module A (MRCMA) for fault detection purposes. When one of the switches or the volt reference circuit is faulted, the convertible top does not operate.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
P1240:1C	Sensor Power Supply: Circuit Voltage Out of Range	This DTC sets if the convertible top latch switch voltage signal sent to the Moveable Roof Control Module A (MRCMA) is below a predetermined limit.

Possible Sources

- Wiring, terminals or connectors
- Moveable Roof Control Module A (MRCMA)

DIAGNOSIS AND TESTING > CONVERTIBLE TOP > PINPOINT TESTS > PINPOINT TEST D : P1240:1C > PINPOINT TEST D : P1240:1C

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may cause damage to the connector.

D1 CHECK FOR RETURNING DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, clear the Moveable Roof Control Module A (MRCMA) Diagnostic Trouble Codes (DTCs).

Ignition OFF.

Ignition ON.

Using a diagnostic scan tool, carry out the Moveable Roof Control Module A (MRCMA) self-test.

Does DTC P1240:1C return?

Yes	GO to D1

No	The condition that caused the DTC to set is not present at this time. The concern may have been caused by a loose or corroded electrical connector or an intermittent concern. DISCONNECT and INSPECT LH tonneau cover sensor C4525, convertible top latch

	switch C9111 and Moveable Roof Control Module A (MRCMA) C4830 for corrosion, bent pins, pushed-out pins and spread terminals. REPAIR or INSTALL new components as necessary. For all other Moveable Roof Control Module A (MRCMA) Diagnostic Trouble Codes (DTCs), GO to the DTC Chart: Moveable Roof Control Module A (MRCMA).

D2 CHECK THE SENSOR VOLTAGE SUPPLY CIRCUIT FOR AN OPEN

Ignition OFF.

Disconnect Moveable Roof Control Module A (MRCMA) C4830 .

Disconnect convertible top latch switch C9111 .

Disconnect LH tonneau cover sensor C4525.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4830-1	Ω	C9111-2

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4830-1	Ω	LH Tonneau Cover Connector Pin-2

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4830-1	Ω	C4830-3

Are the resistances less than 3 ohms?

Yes	GO to D3

No	REPAIR the circuit.

D3 CHECK THE SENSOR VOLTAGE SUPPLY CIRCUIT FOR A SHORT TO GROUND

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4830-1	Ω	Ground
C4830-3	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to D4

No	REPAIR the circuit.

D4 VERIFY ALL WIRING CONNECTIONS

Disconnect all Moveable Roof Control Module A (MRCMA) related in-line connectors. Refer to Convertible Top for schematic and connector information.

Using a good light source, inspect Moveable Roof Control Module A (MRCMA) C4830 and related in-line connectors for the following:

corrosion - install new connector or terminal and clean the module pins

damaged or bent pins - install new terminals or pins

pushed-out pins - install new pins as necessary

spread terminals - install new terminals as necessary

Are the connectors free of corrosion, damaged pins, bent pins, pushed-out pins and spread terminals?

Yes	GO to D5

No	REPAIR the affected connectors or terminals. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

D5 VERIFY SENSOR VOLTAGE SUPPLY

Connect Moveable Roof Control Module A (MRCMA) C4830 .

Connect convertible top latch switch C9111 .

Connect LH tonneau cover sensor C4525.

Connect all disconnected in-line connectors.

Make sure all connectors fully seat and latch correctly.

Ignition ON.

Measure and record the battery

Using a diagnostic scan tool, view the Moveable Roof Control Module A (MRCMA) convertible top latch sensor voltage (LTCH_SNSR_V) PID and the module supply voltage (VOLT_SUPPLY) PID.

Do both Parameter Identifications (PIDs) display greater than 9 volts?

Yes	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

No	If **both** Parameter Identifications (PIDs) display 9 volts or less, or **only** the VOLT_SUPPLY PID displays 9 volts or less, GO to D6 If the VOLT_SUPPLY PID displays **greater than** 9 volts and the LTCH_SNSR_V PID displays **9 volts or less** , CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new Moveable Roof Control Module A (MRCMA). REFER to: Convertible Top Motor .

D6 CHECK THE MODULE VOLTAGE SUPPLY CIRCUIT FOR AN OPEN OR EXCESSIVE RESISTANCE

Ignition OFF.

Disconnect Moveable Roof Control Module A (MRCMA) C4830 .

Remove BJB fuse 17 (20A).

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4830-6	Ω	BJB Fuse 17 (20A) Output Socket

Is the resistance less than 3 ohms?

Yes	DIAGNOSE the battery and charging system. REFER to: Charging System - 2.3L EcoBoost (201kW/273PS) . REFER to: Charging System - 3.7L Duratec (227kW/301PS) . REFER to: Charging System - 5.0L 32V Ti-VCT .

No	REPAIR the circuit.

DIAGNOSIS AND TESTING > CONVERTIBLE TOP > PINPOINT TESTS > PINPOINT TEST E : B1267:24, B1268:24, U2013:64

Refer to Convertible Top for schematic and connector information.

Normal Operation and Fault Conditions

The convertible top switch is a 3-position rocker switch, the UP circuit is hardwired to the Moveable Roof Control Module A (MRCMA) and the DOWN circuit is hardwired to the Moveable Roof Control Module B (MRCMB). When the switch is pressed, the applicable module receives a ground signal and roof operation is initiated. The switch is designed so that both circuits (UP and DOWN) cannot be activated at the same time. The modules share the convertible top switch status on the MS-CAN. When the switch or one of the circuits is faulted, the convertible top does not operate. The convertible top

switch is located in the overhead console and is serviced with the console assembly.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1267:24	Convertible / Folding Top Activation Up Switch: Circuit Stuck High	This DTC sets if the Moveable Roof Control Module A (MRCMA) detects a ground signal on the convertible roof switch for longer than 30 seconds.
B1268:24	Convertible / Folding Top Activation Down Switch: Circuit Stuck High	This DTC sets if the Moveable Roof Control Module B (MRCMB) detects a ground signal on the convertible roof switch for longer than 30 seconds.
U2013:64	Switch Pack: Signal Plausibility Failure	This DTC sets if both control modules detect a ground signal at the same time.

Possible Sources

- Wiring, terminals or connectors
- Convertible top switch

DIAGNOSIS AND TESTING > CONVERTIBLE TOP > PINPOINT TESTS > PINPOINT TEST E : B1267:24, B1268:24, U2013:64 > PINPOINT TEST E : B1267:24, B1268:24, U2013:64

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may cause damage to the connector.

E1 CHECK FOR RETURNING DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, clear the Moveable Roof Control Module A (MRCMA) and Moveable Roof Control Module B (MRCMB) Diagnostic Trouble Codes (DTCs).

Ignition OFF.

Ignition ON.

Attempt to open and close the convertible top using the convertible top switch.

Using a diagnostic scan tool, carry out the Moveable Roof Control Module A (MRCMA) and Moveable Roof Control Module B (MRCMB) self-tests.

Does DTC B1267:24, B1268:24 or U2013:64 return?

Yes	If DTC B1267:24 or U2013:64 is present, GO to E2 If DTC B1268:24 is present, GO to E3

No	The condition that caused the DTC to set is not present at this time. The concern may have been caused by a loose or corroded electrical connector or an intermittent concern. DISCONNECT and INSPECT convertible top switch C9013 , Moveable Roof Control Module A (MRCMA) C4830 and Moveable Roof Control Module B (MRCMB) C4831 for corrosion, bent pins, pushed-out pins and spread terminals. REPAIR or INSTALL new components as necessary. For all other Moveable Roof Control Module A (MRCMA) and Moveable Roof Control Module B (MRCMB) Diagnostic Trouble Codes (DTCs), GO to the DTC Chart: Moveable Roof Control Module A (MRCMA) or DTC Chart: Moveable Roof Control Module B (MRCMB).

E2 CHECK THE CONVERTIBLE TOP SWITCH UP CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Disconnect Moveable Roof Control Module A (MRCMA) C4830 .

Disconnect convertible top switch C9013 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4830-8	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	If DTC U2013:64 **is not** present, INSTALL a new convertible top switch. REFER to: OVERHEAD CONSOLE . If DTC U2013:64 **is** present, GO to E3

No	REPAIR the circuit.

E3 CHECK THE CONVERTIBLE TOP SWITCH DOWN CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Disconnect Moveable Roof Control Module B (MRCMB) C4831 .

Disconnect convertible top switch C9013 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4831-8	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	INSTALL a new convertible top switch. REFER to: Overhead Console .

No	REPAIR the circuit.

DIAGNOSIS AND TESTING > CONVERTIBLE TOP > PINPOINT TESTS > PINPOINT TEST F : U0140:00

Refer to Convertible Top for schematic and connector information.

Normal Operation and Fault Conditions

With the ignition ON, the BCM sends messages to the Moveable Roof Control Module A (MRCMA) and Moveable Roof Control Module B (MRCMB) through the GWM over the HS-CAN1. If the Moveable Roof Control Module A (MRCMA) or Moveable Roof Control Module B (MRCMB) does not receive these messages within a certain time frame, the module sets a DTC. For information on the messages sent to the Moveable Roof Control Module A (MRCMA) and Moveable Roof Control Module B (MRCMB) by the BCM, refer to the Network Message Chart. REFER to: Convertible Top - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0140:00	Lost Communication With Body Control Module: No Sub Type Information	This DTC sets in the Moveable Roof Control Module A (MRCMA) and Moveable Roof Control Module B (MRCMB) if the accessory delay status or ignition status message is missing from the BCM.

Possible Sources

- Wiring, terminals or connectors
- Network communication concern
- GWM
- BCM

DIAGNOSIS AND TESTING > CONVERTIBLE TOP > PINPOINT TESTS > PINPOINT TEST F : U0140:00 > PINPOINT TEST F : U0140:00

F1 CHECK THE COMMUNICATION NETWORK

Ignition ON.

Using a diagnostic scan tool, carry out the Network Test.

Do both the BCM and the GWM pass the Network Test?

Yes	GO to F2

No	DIAGNOSE the no communication with the BCM or GWM. REFER to: MODULE COMMUNICATIONS NETWORK .

F2 CHECK THE MOVEABLE ROOF CONTROL MODULE A (MRCMA) AND MOVEABLE ROOF CONTROL MODULE B (MRCMB) CONTINUOUS MEMORY DIAGNOSTIC TROUBLE CODES (CMDTCS)

Using a diagnostic scan tool, carry out the Moveable Roof Control Module A (MRCMA) and Moveable Roof Control Module B (MRCMB) self-tests.

Retrieve and record all Diagnostic Trouble Codes (DTCs) from both modules.

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs) from both modules.

Ignition OFF.

Ignition ON.

Using a diagnostic scan tool, carry out the Moveable Roof Control Module A (MRCMA) and Moveable Roof Control Module B (MRCMB) self-tests.

Is DTC U0140:00 retrieved again?

Yes	GO to F3

No	GO to F6

F3 RETRIEVE ANY DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE GWM (GATEWAY MODULE A) SELF-TEST

Using a diagnostic scan tool, carry out the GWM self-test.

Are any Diagnostic Trouble Codes (DTCs) present in the GWM?

Yes	DIAGNOSE all GWM Diagnostic Trouble Codes (DTCs). REFER to: MODULE COMMUNICATIONS NETWORK .

No	GO to F4

F4 RETRIEVE ANY DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE BCM (BODY CONTROL MODULE) SELF-TEST

Using a diagnostic scan tool, carry out the BCM self-test.

Are any Diagnostic Trouble Codes (DTCs) present in the BCM?

Yes	DIAGNOSE all BCM Diagnostic Trouble Codes (DTCs). REFER to: Body Control Module (BCM) .

No	GO to F5

F5 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0140:XX SET IN OTHER MODULES

Using the diagnostic scan tool, carry out the self-test for all modules.

Retrieve and record the Continuous Memory Diagnostic Trouble Codes (CMDTCs) from all modules.

Is DTC U0140:xx set in 1 or more modules in addition to the Moveable Roof Control Module A (MRCMA) or Moveable Roof Control Module B (MRCMB)?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	GO to F6

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may cause damage to the connector.

F6 CHECK THE ELECTRICAL CONNECTORS

Ignition OFF.

Disconnect Moveable Roof Control Module A (MRCMA) C4830 .

Disconnect Moveable Roof Control Module B (MRCMB) C4831 .

Disconnect GWM C2431 .

Disconnect BCM C2280G .

Using a good light source, inspect each connector for the following:

corrosion - install new connector or terminal and clean the module pins

damaged or bent pins - install new terminals or pins

pushed-out pins - install new pins as necessary

Using a suitable mating terminal, check the following connector terminals for deformed or enlarged contacts:

C4830-9

C4830-10

C4831-9

C4831-10

C2431-19

C2431-20

C2431-22

C2431-23

C2280G-9

C2280G-10

Are all the connectors free of corrosion, pushed-out pins and deformed or enlarged contacts?

Yes	The system is operating correctly at this time. The DTC may have been set due to high network traffic, a loose connector, a corroded connector or an intermittent fault condition. ADDRESS the root cause of any connector or pin issues.

No	REPAIR the affected connector. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

DIAGNOSIS AND TESTING > CONVERTIBLE TOP > PINPOINT TESTS > PINPOINT TEST G : U0142:00

Refer to Convertible Top for schematic and connector information.

Normal Operation and Fault Conditions

When the convertible top is opened, the BCMB sends an "open" request to the rear window smart motors. Once the windows are open, the smart motors send a reply to the BCMB. The BCMB then sends a message to the Moveable Roof Control Module A (MRCMA) over the MS-CAN. If the Moveable Roof Control Module A (MRCMA) does not receive this message within a certain time frame, the module sets a DTC. For information on the messages sent to the Moveable Roof Control Module A (MRCMA) by the BCMB, refer to the Network Message Chart. REFER to: Convertible Top - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0142:00	Lost Communication With Body Control Module "B": No Sub Type Information	This DTC sets in the Moveable Roof Control Module A (MRCMA) if the rear window down status message is missing from the BCMB.

Possible Sources

- Wiring, terminals or connectors

- Network communication concern
- BCMB

DIAGNOSIS AND TESTING > CONVERTIBLE TOP > PINPOINT TESTS > PINPOINT TEST G : U0142:00 > PINPOINT TEST G : U0142:00

G1 CHECK THE COMMUNICATION NETWORK

Ignition ON.

Using a diagnostic scan tool, carry out the Network Test.

Does the BCMB pass the Network Test?

Yes	GO to G2

No	DIAGNOSE the no communication with the BCMB. REFER to: MODULE COMMUNICATIONS NETWORK .

G2 CHECK THE MOVEABLE ROOF CONTROL MODULE A (MRCMA) CONTINUOUS MEMORY DIAGNOSTIC TROUBLE CODES (CMDTCS)

Using a diagnostic scan tool, carry out the Moveable Roof Control Module A (MRCMA) self-test.

Retrieve and record all Diagnostic Trouble Codes (DTCs) from the Moveable Roof Control Module A (MRCMA).

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs) from the Moveable Roof Control Module A (MRCMA).

Ignition OFF.

Ignition ON.

Using a diagnostic scan tool, carry out the Moveable Roof Control Module A (MRCMA) self-test.

Is DTC U0142:00 retrieved again?

Yes	GO to G3

No	GO to G5

G3 RETRIEVE ANY DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE BCMB (BODY CONTROL MODULE B) SELF-TEST

Using a diagnostic scan tool, carry out the BCMB self-test.

Are any Diagnostic Trouble Codes (DTCs) present in the BCMB?

Yes	DIAGNOSE all BCMB Diagnostic Trouble Codes (DTCs). REFER to: Body Control Module B (BCMB) .

No	GO to G4

G4 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0142:XX SET IN OTHER MODULES

Using the diagnostic scan tool, carry out the self-test for all modules.

Retrieve and record the Continuous Memory Diagnostic Trouble Codes (CMDTCs) from all modules.

Is DTC U0142:xx set in 1 or more modules in addition to the Moveable Roof Control Module A (MRCMA)?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new BCMB. REFER to: Body Control Module B (BCMB) .

No	GO to G5

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may cause damage to the connector.

G5 CHECK THE ELECTRICAL CONNECTORS

Ignition OFF.

Disconnect Moveable Roof Control Module A (MRCMA) C4830 .

Disconnect BCMB C4368A .

Using a good light source, inspect each connector for the following:

corrosion - install new connector or terminal and clean the module pins

damaged or bent pins - install new terminals or pins

pushed-out pins - install new pins as necessary

Using a suitable mating terminal, check the following connector terminals for deformed or enlarged contacts:

C4830-9

C4830-10

C4368A-11

C4368A-23

Are both connectors free of corrosion, pushed-out pins and deformed or enlarged contacts?

Yes	The system is operating correctly at this time. The DTC may have been set due to high network traffic, a loose connector, a corroded connector or an intermittent fault condition. ADDRESS the root cause of any connector or pin issues.

No	REPAIR the affected connector. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

DIAGNOSIS AND TESTING > CONVERTIBLE TOP > PINPOINT TESTS > PINPOINT TEST H : U0294:00

Refer to Convertible Top for schematic and connector information.

Normal Operation and Fault Conditions

With the ignition ON, the PCM sends messages to the Moveable Roof Control Module A (MRCMA) through the GWM over the HS-CAN1. If the Moveable Roof Control Module A (MRCMA) does not receive these messages within a certain time frame, the module sets a DTC. For information on the messages sent to the Moveable Roof Control Module A (MRCMA) by the PCM, refer to the Network Message Chart. REFER to: Convertible Top - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0294:00	Lost Communication With Powertrain Control Monitor Module: No Sub Type Information	This DTC sets in the Moveable Roof Control Module A (MRCMA) if the vehicle speed message is missing from the PCM.

Possible Sources

- Wiring, terminals or connectors
- Network communication concern
- PCM

DIAGNOSIS AND TESTING > CONVERTIBLE TOP > PINPOINT TESTS > PINPOINT TEST H : U0294:00 > PINPOINT TEST H : U0294:00

H1 CHECK THE COMMUNICATION NETWORK

Ignition ON.

Using a diagnostic scan tool, carry out the Network Test.

Do both the PCM and the GWM pass the Network Test?

Yes	GO to H2

No	DIAGNOSE the no communication with the PCM or GWM. REFER to: MODULE COMMUNICATIONS NETWORK .

H2 CHECK THE MOVEABLE ROOF CONTROL MODULE A (MRCMA) CONTINUOUS MEMORY DIAGNOSTIC TROUBLE CODES (CMDTCS)

Using a diagnostic scan tool, carry out the Moveable Roof Control Module A (MRCMA) self-test.

Retrieve and record all Diagnostic Trouble Codes (DTCs) from the Moveable Roof Control Module A (MRCMA).

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs) from the Moveable Roof Control Module A (MRCMA).

Ignition OFF.

Ignition ON.

Using a diagnostic scan tool, carry out the Moveable Roof Control Module A (MRCMA) self-test.

Is DTC U0140:00 retrieved again?

Yes	GO to H3

No	GO to H6

H3 RETRIEVE ANY DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE GWM (GATEWAY MODULE A) SELF-TEST

Using a diagnostic scan tool, carry out the GWM self-test.

Are any Diagnostic Trouble Codes (DTCs) present in the GWM?

Yes	DIAGNOSE all GWM Diagnostic Trouble Codes (DTCs). REFER to: MODULE COMMUNICATIONS NETWORK .

No	GO to H4

H4 RETRIEVE ANY DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE PCM (POWERTRAIN CONTROL MODULE) SELF-TEST

Using a diagnostic scan tool, carry out the PCM self-test.

Are any Diagnostic Trouble Codes (DTCs) present in the PCM?

Yes	DIAGNOSE all PCM Diagnostic Trouble Codes (DTCs). 2.3L REFER to: Electronic Engine Controls . 3.7L REFER to: Electronic Engine Controls . 5.0L REFER to: Electronic Engine Controls .

No	GO to H5

H5 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0294:XX SET IN OTHER MODULES

Using the diagnostic scan tool, carry out the self-test for all modules.

Retrieve and record the Continuous Memory Diagnostic Trouble Codes (CMDTCs) from all modules.

Is DTC U0294:xx set in 1 or more modules in addition to the Moveable Roof Control Module A (MRCMA)?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PCM. 2.3L REFER to: Powertrain Control Module (PCM) . 3.7L REFER to: Powertrain Control Module (PCM) . 5.0L REFER to: Powertrain Control Module (PCM) .

No	GO to H6

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may cause damage to the connector.

H6 CHECK THE ELECTRICAL CONNECTORS

Ignition OFF.

Disconnect Moveable Roof Control Module A (MRCMA) C4830 .

Disconnect GWM C2431 .

For 2.3L engine equipped vehicles, disconnect PCM C1551B .

For 3.7L engine equipped vehicles, disconnect PCM C1381B .

For 5.0L engine equipped vehicles, disconnect PCM C175B .

Using a good light source, inspect each connector for the following:

corrosion - install new connector or terminal and clean the module pins

damaged or bent pins - install new terminals or pins

pushed-out pins - install new pins as necessary

Using a suitable mating terminal, check the following connector terminals for deformed or enlarged contacts:

C4830-9

C4830-10

C2431-19

C2431-20

C2431-22

C2431-23

C1551B-75 ,

C1551B-76 ,

Are all the connectors free of corrosion, pushed-out pins and deformed or enlarged contacts?

Yes	The system is operating correctly at this time. The DTC may have been set due to high network traffic, a loose connector, a corroded connector or an intermittent fault condition. ADDRESS the root cause of any connector or pin issues.

No	REPAIR the affected connector. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

DIAGNOSIS AND TESTING > CONVERTIBLE TOP > PINPOINT TESTS > PINPOINT TEST I : U020A:00

Refer to Convertible Top for schematic and connector information.

Normal Operation and Fault Conditions

With the ignition ON, the Moveable Roof Control Module B (MRCMB) sends messages to the Moveable Roof Control Module A (MRCMA) over the MS-CAN. If the Moveable Roof Control Module A (MRCMA) does not receive these messages within a certain time frame, the module sets a DTC. For information on the messages sent to the Moveable Roof Control Module A (MRCMA) by the Moveable Roof Control Module B (MRCMB), refer to the Network Message Chart. REFER to: Convertible Top - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U020A:00	Lost Communication With Moveable Roof Control Module "B" (MRCMB): No Sub Type Information	This DTC sets in the Moveable Roof Control Module A (MRCMA) if the convertible top status messages are missing from the Moveable Roof Control Module B

		(MRCMB).

Possible Sources

- Wiring, terminals or connectors
- Network communication concern
- Moveable Roof Control Module B (MRCMB)

DIAGNOSIS AND TESTING > CONVERTIBLE TOP > PINPOINT TESTS > PINPOINT TEST I : U020A:00 > PINPOINT TEST I : U020A:00

I1 CHECK THE COMMUNICATION NETWORK

Ignition ON.

Using a diagnostic scan tool, carry out the Network Test.

Does the Moveable Roof Control Module B (MRCMB) pass the Network Test?

Yes	GO to I2

No	DIAGNOSE the no communication with the Moveable Roof Control Module B (MRCMB). REFER to: MODULE COMMUNICATIONS NETWORK .

I2 CHECK THE MOVEABLE ROOF CONTROL MODULE A (MRCMA) CONTINUOUS MEMORY DIAGNOSTIC TROUBLE CODES (CMDTCS)

Using a diagnostic scan tool, carry out the Moveable Roof Control Module A (MRCMA) self-test.

Retrieve and record all Diagnostic Trouble Codes (DTCs) from the Moveable Roof Control Module A (MRCMA).

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs) from the Moveable Roof Control Module A (MRCMA).

Ignition OFF.

Ignition ON.

Using a diagnostic scan tool, carry out the Moveable Roof Control Module A (MRCMA) self-test.

Is DTC U020A:00 retrieved again?

Yes	GO to I3

No	GO to I5

I3 RETRIEVE ANY DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE MOVEABLE ROOF CONTROL MODULE B (MRCMB) SELF-TEST

Using a diagnostic scan tool, carry out the Moveable Roof Control Module B (MRCMB) self-test.

Are any Diagnostic Trouble Codes (DTCs) present in the Moveable Roof Control Module B (MRCMB)?

Yes	DIAGNOSE all Moveable Roof Control Module B (MRCMB) Diagnostic Trouble Codes (DTCs). GO to the DTC Chart: Moveable Roof Control Module B (MRCMB).

No	GO to I4

I4 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U020A:XX SET IN OTHER MODULES

Using the diagnostic scan tool, carry out the self-test for all modules.

Retrieve and record the Continuous Memory Diagnostic Trouble Codes (CMDTCs) from all modules.

Is DTC U020A:xx set in 1 or more modules in addition to the Moveable Roof Control Module A (MRCMA)?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new Moveable Roof Control Module B (MRCMB). REFER to: Convertible Top Motor .

No	GO to I5

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may cause damage to the connector.

I5 CHECK THE ELECTRICAL CONNECTORS

Ignition OFF.

Disconnect Moveable Roof Control Module A (MRCMA) C4830 .

Disconnect Moveable Roof Control Module B (MRCMB) C4831 .

Using a good light source, inspect each connector for the following:

corrosion - install new connector or terminal and clean the module pins

damaged or bent pins - install new terminals or pins

pushed-out pins - install new pins as necessary

Using a suitable mating terminal, check the following connector terminals for deformed or enlarged contacts:

C4830-9

C4830-10

C4831-9

C4831-10

Are both connectors free of corrosion, pushed-out pins and deformed or enlarged contacts?

Yes	The system is operating correctly at this time. The DTC may have been set due to high network traffic, a loose connector, a corroded connector or an intermittent fault condition. ADDRESS the root cause of any connector or pin issues.

No	REPAIR the affected connector. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

DIAGNOSIS AND TESTING > CONVERTIBLE TOP > PINPOINT TESTS > PINPOINT TEST J : U0207:00

Refer to Convertible Top for schematic and connector information.

Normal Operation and Fault Conditions

With the ignition ON, the Moveable Roof Control Module A (MRCMA) sends messages to the Moveable Roof Control Module B (MRCMB) over the MS-CAN. If the Moveable Roof Control Module B (MRCMB) does not receive these messages within a certain time frame, the module sets a DTC. For information on the messages sent to the Moveable Roof Control Module B (MRCMB) by the Moveable Roof Control Module A (MRCMA), refer to the Network Message Chart. REFER to: Convertible Top - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0207:00	Lost Communication With Moveable Roof Control Module "A" (MRCMB): No Sub Type Information	This DTC sets in the Moveable Roof Control Module B (MRCMB) if the convertible top status messages are missing from the Moveable Roof Control Module A (MRCMA).

Possible Sources

- Wiring, terminals or connectors

- Network communication concern
- Moveable Roof Control Module A (MRCMA)

DIAGNOSIS AND TESTING > CONVERTIBLE TOP > PINPOINT TESTS > PINPOINT TEST J : U0207:00 > PINPOINT TEST J : U0207:00

J1 CHECK THE COMMUNICATION NETWORK

Ignition ON.

Using a diagnostic scan tool, carry out the Network Test.

Does the Moveable Roof Control Module A (MRCMA) pass the Network Test?

Yes	GO to J2

No	DIAGNOSE the no communication with the Moveable Roof Control Module A (MRCMA). REFER to: MODULE COMMUNICATIONS NETWORK .

J2 CHECK THE MOVEABLE ROOF CONTROL MODULE B (MRCMB) CONTINUOUS MEMORY DIAGNOSTIC TROUBLE CODES (CMDTCS)

Using a diagnostic scan tool, carry out the Moveable Roof Control Module B (MRCMB) self-test.

Retrieve and record all Diagnostic Trouble Codes (DTCs) from the Moveable Roof Control Module B (MRCMB).

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs) from the Moveable Roof Control Module B (MRCMB).

Ignition OFF.

Ignition ON.

Using a diagnostic scan tool, carry out the Moveable Roof Control Module B (MRCMB) self-test.

Is DTC U0207:00 retrieved again?

Yes	GO to J3

No	GO to J5

J3 RETRIEVE ANY DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE MOVEABLE ROOF CONTROL MODULE A (MRCMA) SELF-TEST

Using a diagnostic scan tool, carry out the Moveable Roof Control Module A (MRCMA)

self-test.

Are any Diagnostic Trouble Codes (DTCs) present in the Moveable Roof Control Module A (MRCMA)?

Yes	DIAGNOSE all Moveable Roof Control Module A (MRCMA) Diagnostic Trouble Codes (DTCs). GO to the DTC Chart: Moveable Roof Control Module A (MRCMA).

No	GO to J4

J4 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0207:XX SET IN OTHER MODULES

Using the diagnostic scan tool, carry out the self-test for all modules.

Retrieve and record the Continuous Memory Diagnostic Trouble Codes (CMDTCs) from all modules.

Is DTC U0207:xx set in 1 or more modules in addition to the Moveable Roof Control Module B (MRCMB)?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new Moveable Roof Control Module A (MRCMA). REFER to: Convertible Top Motor .

No	GO to J5

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may cause damage to the connector.

J5 CHECK THE ELECTRICAL CONNECTORS

Ignition OFF.

Disconnect Moveable Roof Control Module A (MRCMA) C4830 .

Disconnect Moveable Roof Control Module B (MRCMB) C4831 .

Using a good light source, inspect each connector for the following:

corrosion - install new connector or terminal and clean the module pins

damaged or bent pins - install new terminals or pins

pushed-out pins - install new pins as necessary

Using a suitable mating terminal, check the following connector terminals for deformed or enlarged contacts:

C4830-9

C4830-10

C4831-9

C4831-10

Are both connectors free of corrosion, pushed-out pins and deformed or enlarged contacts?

Yes	The system is operating correctly at this time. The DTC may have been set due to high network traffic, a loose connector, a corroded connector or an intermittent fault condition. ADDRESS the root cause of any connector or pin issues.

No	REPAIR the affected connector. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

DIAGNOSIS AND TESTING > CONVERTIBLE TOP > PINPOINT TESTS > PINPOINT TEST K : REAR WINDOW DOWN FEEDBACK SIGNAL FAULTS

Refer to Power Windows for schematic and connector information.

Normal Operation and Fault Conditions

After receiving a "window drop" message from the Moveable Roof Control Module A (MRCMA), the BCMB sends a global open request to the 4 window smart motors. Once the windows have fully lowered, the rear window smart motors send a ground signal to the BCMB indicating they are in the full down position. The BCMB then sends a "window down" message to the Moveable Roof Control Module A (MRCMA) and convertible top operation continues. When there is a fault on the circuit between the BCMB and the smart motors or when there is a failure of the BCMB or smart motors, the rear windows do not operate when the convertible top is open or closed which prevents convertible top operation. For additional information on window operation, REFER to: Glass, Frames and Mechanisms - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B126E:23	Right Rear Window Fully Down Feedback: Signal Stuck Low	This DTC sets in the BCMB when the accessory delay relay is OFF and the right rear window fully down feedback signal is active (low, indicating a possible short to ground).
B126E:24	Right Rear Window Fully Down Feedback: Signal Stuck High	This DTC sets in the BCMB when the right rear window fully down feedback signal does not indicate "fully down" within 10 seconds of a "window drop" message from the Moveable Roof Control Module A (MRCMA) (indicating a

		possible open circuit).
B126F:23	Left Rear Window Fully Down Feedback: Signal Stuck Low	This DTC sets in the BCMB when the accessory delay relay is OFF and the left rear window fully down feedback signal is active (low, indicating a possible short to ground).
B126F:24	Left Rear Window Fully Down Feedback: Signal Stuck High	This DTC sets in the BCMB when the left rear window fully down feedback signal does not indicate "fully down" within 10 seconds of a "window drop" message from the Moveable Roof Control Module A (MRCMA) (indicating a possible open circuit).

Possible Sources

- Wiring, terminals or connectors
- LH rear window motor
- RH rear window motor
- BCMB

DIAGNOSIS AND TESTING > CONVERTIBLE TOP > PINPOINT TESTS > PINPOINT TEST K : REAR WINDOW DOWN FEEDBACK SIGNAL FAULTS > PINPOINT TEST K : REAR WINDOW DOWN FEEDBACK SIGNAL FAULTS

K1 CHECK FOR MOVEABLE ROOF CONTROL MODULE A (MRCMA) AND MOVEABLE ROOF CONTROL MODULE B (MRCMB) DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition ON.

Using a diagnostic scan tool, carry out the Moveable Roof Control Module A (MRCMA) and Moveable Roof Control Module B (MRCMB) self-tests.

Are any Diagnostic Trouble Codes (DTCs) present in the Moveable Roof Control Module A (MRCMA) or Moveable Roof Control Module B (MRCMB)?

Yes	DIAGNOSE any Moveable Roof Control Module A (MRCMA) and Moveable Roof Control Module B (MRCMB) Diagnostic Trouble Codes (DTCs), before diagnosing any BCMB Diagnostic Trouble Codes (DTCs). GO to DTC Chart: Moveable Roof Control Module A (MRCMA) or DTC Chart: Moveable Roof Control Module B (MRCMB).

No	GO to K2

K2 CHECK FOR RETURNING BCMB (BODY CONTROL MODULE B) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, clear the BCMB Diagnostic Trouble Codes (DTCs).

Ignition OFF.

Ignition ON.

Using the convertible top switch, attempt to operate the convertible roof for a minimum of 10 seconds.

Using a diagnostic scan tool, carry out the BCMB self-test.

Does DTC B126E:23, B126E:24, B126F:23 or B126F:24 return?

Yes	GO to K3

No	The concern may have been caused by a loose or corroded connector causing an intermittent fault condition. DISCONNECT BCMB C4368B , LH rear power window motor C3118 and RH rear power window motor C3119 . INSPECT all 3 connectors for; corrosion, bent pins, pushed-out pins and spread terminals. REPAIR or INSTALL new as necessary. For all other BCMB Diagnostic Trouble Codes (DTCs), REFER to: Body Control Module B (BCMB) .

K3 VERIFY REAR WINDOW OPERATION

Using the master window control switch, operate the rear windows.

Do the rear windows operate correctly from the master window control switch?

Yes	For DTC B126E:23 or B126F:23, GO to K4 For DTC B126E:24 or B126F:24, GO to K5

No	DIAGNOSE the inoperative rear windows. REFER to: Glass, Frames and Mechanisms .

K4 CHECK THE REAR WINDOW DOWN FEEDBACK CIRCUITS FOR A SHORT TO GROUND

Ignition OFF.

Disconnect BCMB C4368B .

If DTC B126E:23 is present, disconnect power window motor right rear C3119 .

If DTC B126F:23 is present, disconnect power window motor left rear C3118 .

If DTC B126E:23 is present, measure:

Positive Lead	Measurement / Action	Negative Lead
C4368B-16	Ω	Ground

If DTC B126F:23 is present, measure:

Positive Lead	Measurement / Action	Negative Lead
C4368B-3	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to K6

No	REPAIR the circuit.

K5 CHECK THE REAR WINDOW DOWN FEEDBACK CIRCUITS FOR AN OPEN

Ignition OFF.

Disconnect BCMB C4368B .

If DTC B126E:24 is present, disconnect power window motor right rear C3119 .

If DTC B126F:24 is present, disconnect power window motor left rear C3118 .

If DTC B126E:24 is present, measure:

Positive Lead	Measurement / Action	Negative Lead
C4368B-16	Ω	C3119-7

If DTC B126F:24 is present, measure:

Positive Lead	Measurement / Action	Negative Lead
C4368B-3	Ω	C3118-7

Is the resistance less than 3 ohms?

Yes	GO to K6

No	REPAIR the circuit.

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may cause damage to the connector.

K6 CHECK THE ELECTRICAL CONNECTORS

Ignition OFF.

Disconnect BCMB C4368B .

If DTC B126E:23 or B126E:24 is present, disconnect power window motor right rear C3119

.

If DTC B126F:23 or B126F:24 is present, disconnect power window motor left rear C3118 .

Using a good light source, inspect each connector for the following:

corrosion - install new connector or terminal and clean the module pins

damaged or bent pins - install new terminals or pins

pushed-out pins - install new pins as necessary

Using a suitable mating terminal, check the following connector terminals for deformed or enlarged contacts:

C4368B-3

C4368B-16

C3119-7

C3118-7

Are all connectors free of corrosion, pushed-out pins and deformed or enlarged contacts?

Yes	INSTALL a new right rear or left rear power window motor. REFER to: Rear Quarter Window Regulator Motor - Convertible .

No	REPAIR the affected connector. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

REMOVAL AND INSTALLATION > CONVERTIBLE TOP ASSEMBLY > REMOVAL

NOTE: Make sure the body of the vehicle is fully covered with fender blankets or equivalent or damage to the finish may result.

NOTE: Removal steps in this procedure may contain installation details.

Many procedure views are with the convertible top in the fully closed position showing tension on the convertible top material.

1.

Open the convertible top approximately 50 percent.



NOTE: RH side shown, LH side similar.

2.
From the luggage compartment on both sides, disconnect the convertible top tension belt adjuster bracket from body.

1.

Push in on the rear of the convertible top tension belt adjuster to release the locking tabs.

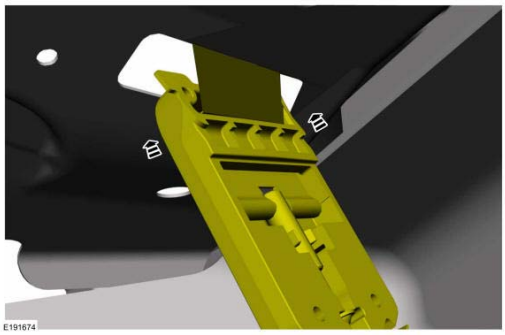
2.

Pull the rear of the convertible top tension belt adjuster down.



NOTE: RH side shown, LH side similar.

3.
On both sides, push convertible top tension belt adjuster bracket through body to interior.



4.

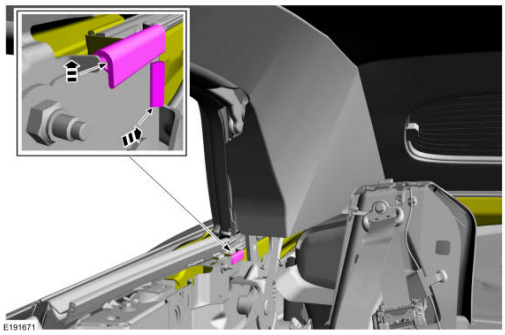
On both sides, remove the rear quarter panel speakers. Vehicles With: Touchscreen Display Refer to: Rear Quarter Panel Speaker . Vehicles With: AM/FM/CD/SYNC Refer to: Rear Quarter Panel Speaker .

5.

Remove the parcel shelf. Refer to: Parcel Shelf - Convertible .

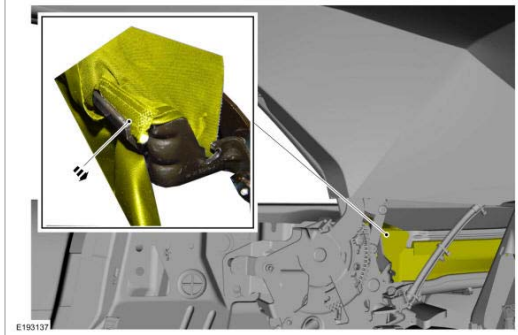
NOTE: RH side shown, LH side similar.

6.
During installation, make sure to position all trough assembly flexible material and convertible top material in the exact location it was removed from. On both sides, disconnect both trough hanging retainers (near the rear window belt moulding) from the body.



NOTE: RH side shown, LH side similar.

7.
During installation, make sure to position all trough assembly flexible material and convertible top material in the exact location it was removed from. On both sides, slide the water bag portion of the trough assembly out of the bracket and position aside.



8.

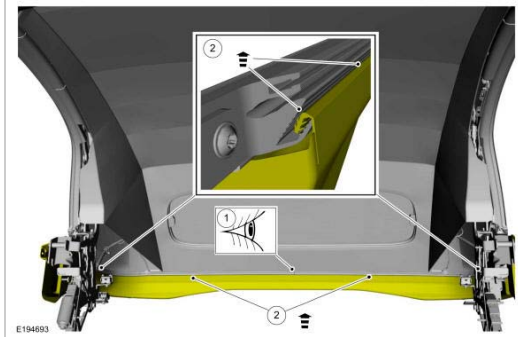
From inside the vehicle, disconnect the trough assembly from the convertible top assembly.

1.

Locate the position of the notch on the floating bow and on the convertible top trough assembly for alignment reference during installation.

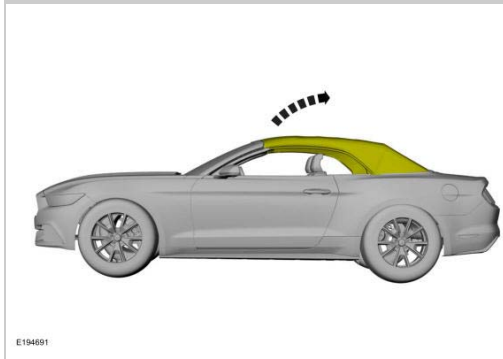
2.

Pull the convertible top trough assembly up and out of the floating bow track along the back and the sides.



9.

Fully open the convertible top.



10.

On the RH side only, position aside the RTM and bracket assembly.

1.

Disconnect the RTM wiring harness clips from the speaker bracket.

Torque

: 93 lb.in (10.5 Nm)

2.

Remove the RTM bracket nut.

Torque

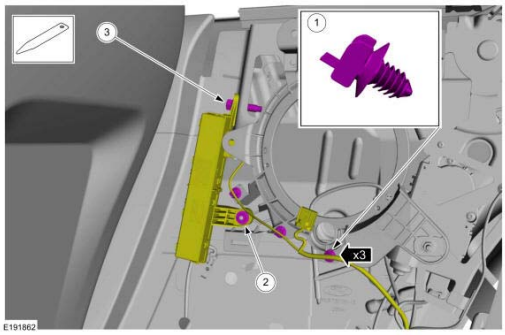
: 71 lb.in (8 Nm)

3.

Remove the RTM bracket bolt and position the RTM and bracket assembly aside.

Torque

: 17 lb.in (1.9 Nm)



NOTE: RH side shown, LH side similar.

11.
On both sides, remove the rear quarter panel speaker brackets.

1.

On both sides, remove the speaker bracket stud.

Torque

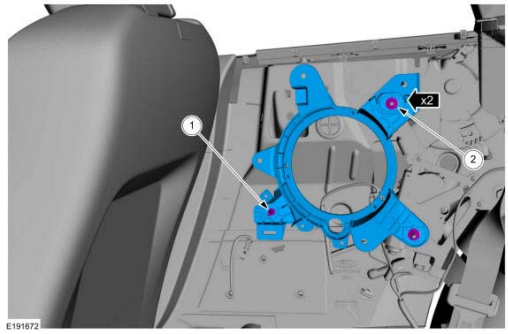
: 93 lb.in (10.5 Nm)

2.

On both sides, remove the speaker bracket nuts and the speaker bracket.

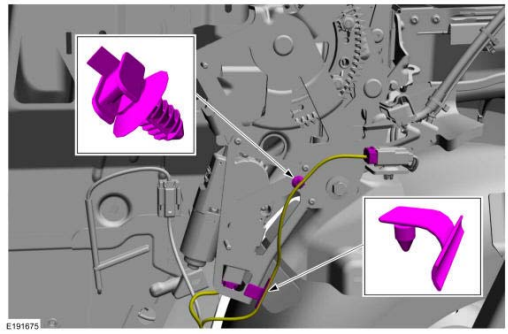
Torque

: 71 lb.in (8 Nm)



NOTE: RH side shown, LH side similar.

12.
On both sides, disconnect the convertible top harness routing clip retainers and connectors and position aside.

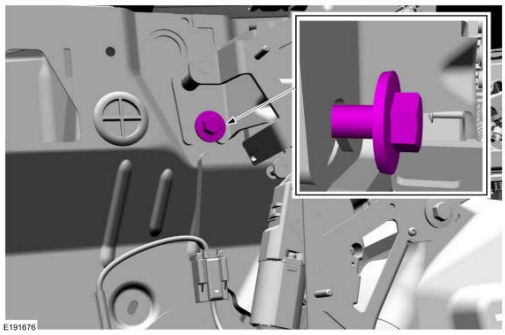


NOTE: RH side shown, LH side similar.

13.
Loosen the bolts approximately 13 mm (1/2 in.) for clearance of the guide pins when removing the convertible top assembly. On both sides, loosen the convertible top forward mounting bracket bolts.

Torque

: 35 lb.ft (48 Nm)



NOTE: LH side shown, RH side similar.

14.
Remove the remaining convertible top assembly bolts.

1.

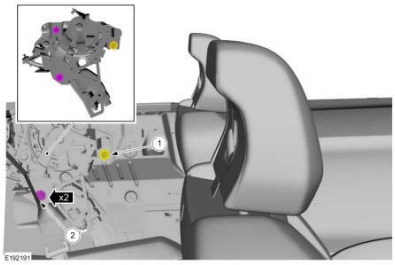
NOTE: This bolt remains to assist positioning the convertible top assembly during installation.

2.

On both sides, remove the remaining convertible top retaining bolts.

Torque

: 35 lb.ft (48 Nm)



NOTE: Make sure the body of the vehicle is fully covered with fender blankets or equivalent or damage to the finish may result.

15.
Position the convertible top assembly for removal.

1.

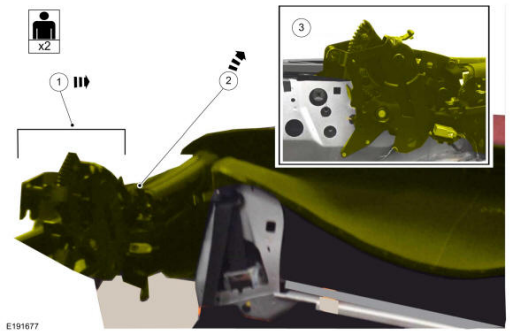
Grasping the assembly on both sides in the area of the gears/motors pull the sides together, releasing the guide pins from the body interior sheet metal.

2.

With the help of an assistant, lift/tilt the gears/motors area of the assembly up and rearward, resting the gears/motors area on top of the body interior sheet metal.

3.

Inset is the position off the convertible top gear assembly area after positioning in sub step 2.



16.

Measure the distance between the RH and LH sides of the frame assembly.



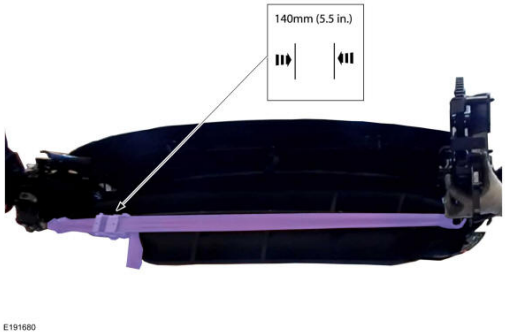
NOTE: LH side shown, RH side similar.

17.
On both sides, attach a retaining strap to the bottom of both floating bowl brackets as shown below.



NOTE: Reducing the distance between the floating bow brackets by more than 165 mm (6.5 in.) may cause damage to the assembly.

18.
Tighten the retaining strap so the measurement between the floating bow brackets is reduced by a maximum of 140 mm (5.5 in.).



NOTE: The sub steps should be performed together as a single step.

19.
With the help of an assistant, lift the RH side of the convertible top assembly above the vehicle body.

1.

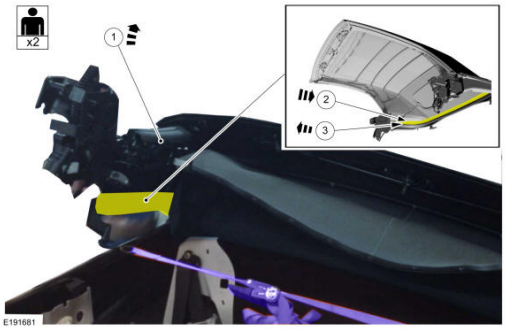
Lift the RH side of the convertible top assembly.

2.

While the convertible top assembly is being raised, push the floating bow area of the convertible top assembly inward until the RH side of the convertible top assembly including the floating bow is fully above the vehicle body.

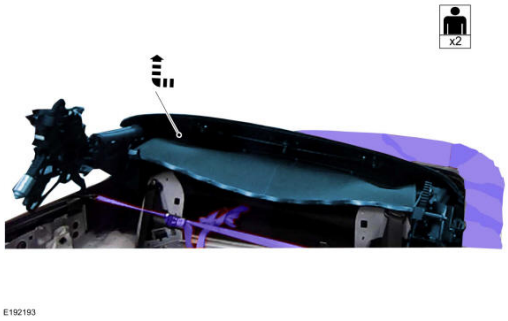
3.

Pull the floating bow part of the convertible top assembly outward for clearance to lift out the convertible top assembly in the next step.



NOTE: This step and the next step should be performed together as a single step.

20.
With the help of an assistant, move the convertible top assembly toward the RH side of the vehicle and lift the LH side above the vehicle body.



21.

With the help of an assistant, carefully remove the convertible top assembly the rear of the vehicle to a suitable workbench.



NOTE: If the convertible top assembly is being removed to service other convertible top components (not replacing the complete assembly) the motors must be removed to allow free convertible top position changes for access to remove components.

22.

Skip this step if the complete convertible top assembly is being replaced. If the convertible top assembly needs to be repositioned for access to other components when on the workbench, remove both convertible top motors. Refer to: Convertible Top Motor .

REMOVAL AND INSTALLATION > CONVERTIBLE TOP ASSEMBLY > INSTALLATION

1.

Transfer parts as necessary.

2.

To install, reverse the removal procedure.

3.

If the complete convertible top assembly was replaced, fully close and latch the convertible top and reopen to initialize the motors.

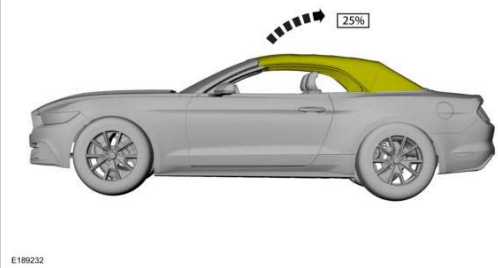
REMOVAL AND INSTALLATION > CONVERTIBLE TOP CENTER PANEL SIDE WEATHERSTRIP > REMOVAL

NOTE: Procedure views are with the convertible top in the fully closed position showing tension on the convertible top material, actual position should be approximately 25-50 percent open allowing slack in the convertible top material and other components for serviceability.

This procedure can be used for any of the 4 convertible top center panel side weatherstrips.

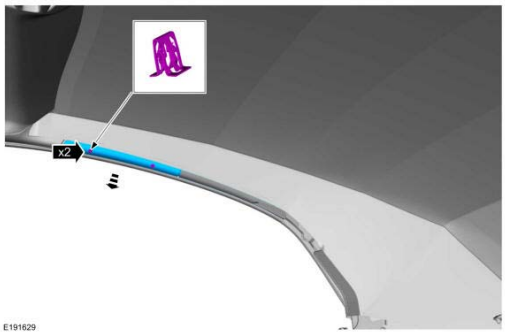
1.

Open the convertible top approximately 25 percent.



NOTE: RH side shown, LH side similar.

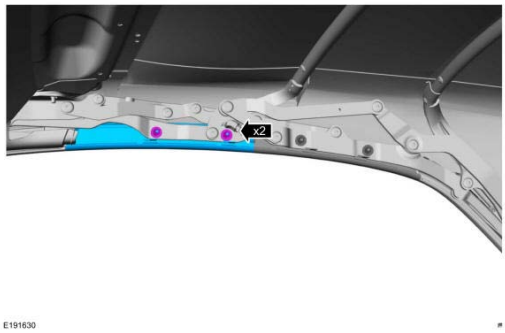
2.
Pull down to remove the convertible top center panel side weatherstrip trim.



NOTE: RH side shown, LH side similar.

3.
Convertible top headliner removed for clarity.

If any shims are present, note the position for installation. Remove the convertible top center panel side weatherstrip nuts and the convertible top center panel side weatherstrip.

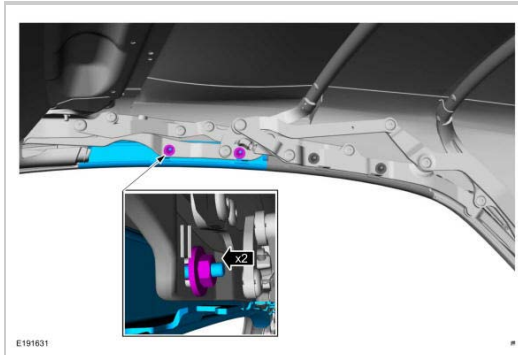


REMOVAL AND INSTALLATION > CONVERTIBLE TOP CENTER PANEL SIDE WEATHERSTRIP > INSTALLATION

NOTE: RH side shown, LH side similar.

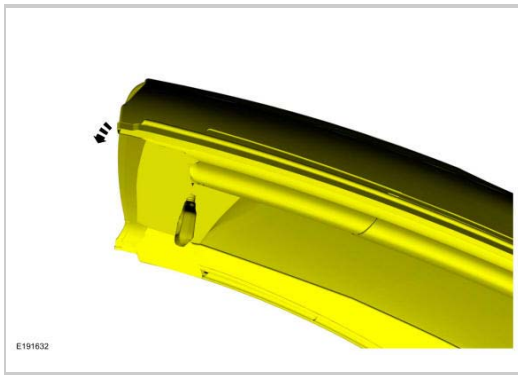
1.
Convertible top headliner removed for clarity.

Install with shim if removed with shim. Loose install the convertible top center panel side weatherstrip.



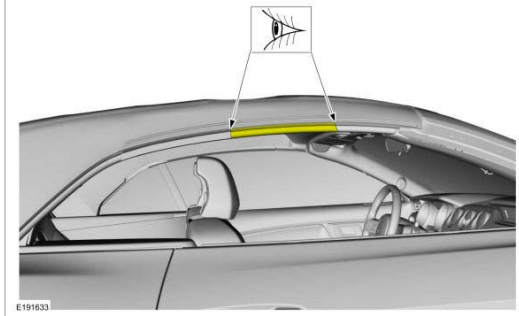
2.

Close the convertible top.



NOTE: RH side shown, LH side similar.

3.
Check for correct alignment of the convertible top center panel side weatherstrip and wiggle to seat properly if needed.

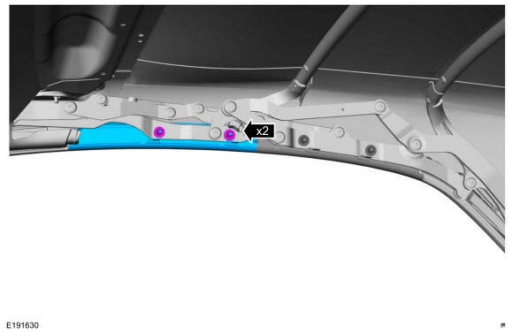


NOTE: Water test the convertible top to verify no water leak exists after repair.

4.
Tighten the convertible top center panel side weatherstrip nuts.

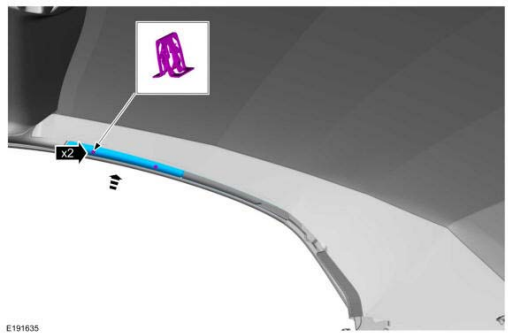
Torque

: 62 lb.in (7 Nm)



NOTE: RH side shown, LH side similar.

5.
Install the convertible top center panel side weatherstrip trim.



REMOVAL AND INSTALLATION > CONVERTIBLE TOP FRONT PANEL

Special Tool(s) / General Equipment

Rivet Gun
Electric Drill

REMOVAL AND INSTALLATION > CONVERTIBLE TOP FRONT PANEL > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

Procedure views are with the convertible top in the fully closed position showing tension on the convertible top material, actual position should be approximately 25-50 percent open allowing slack in the convertible top material and other components for serviceability.

1.

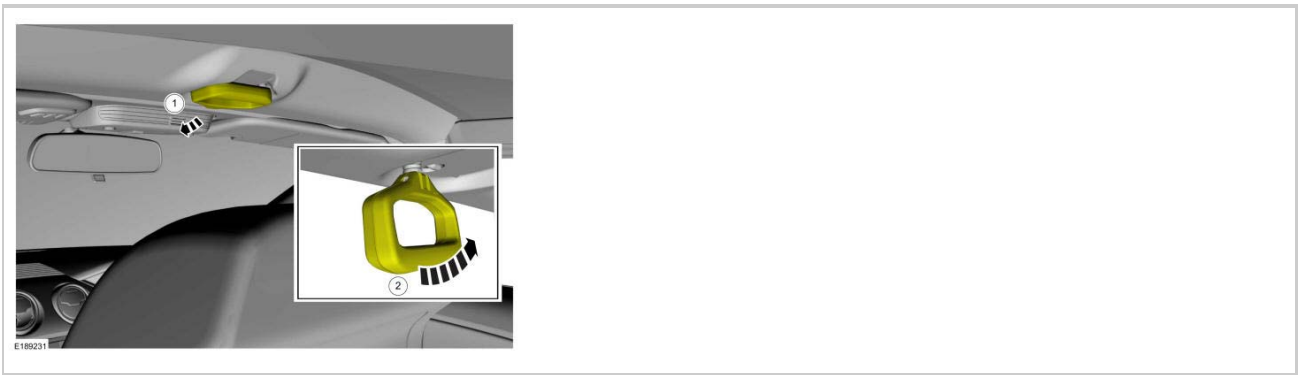
Release the convertible top.

1.

Lower the convertible top latch handle.

2.

Twist the convertible top latch handle clockwise to release the convertible top.



2.

Open the convertible top approximately 25 percent.



3.

Remove the convertible top latch handle.



4.

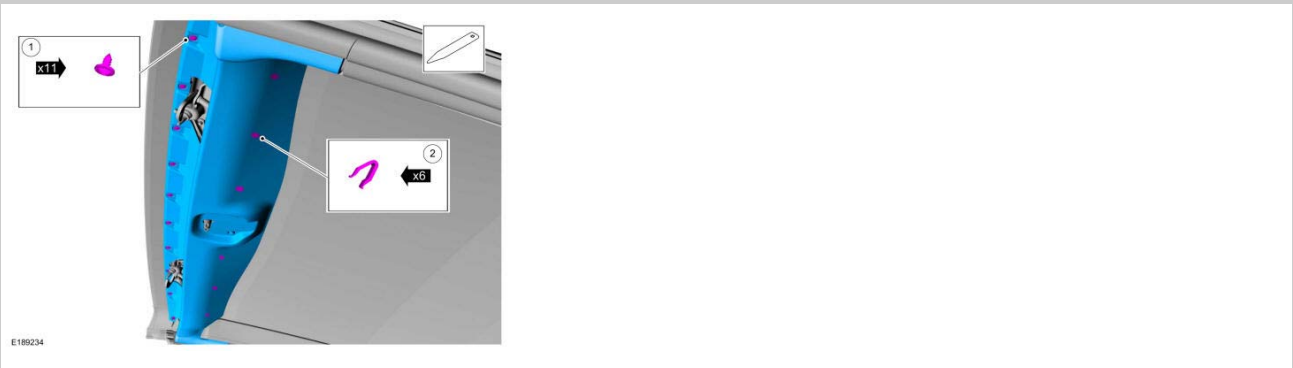
Remove the convertible top front panel trim.

1.

Remove the convertible top front panel trim retainers on the front of the trim.

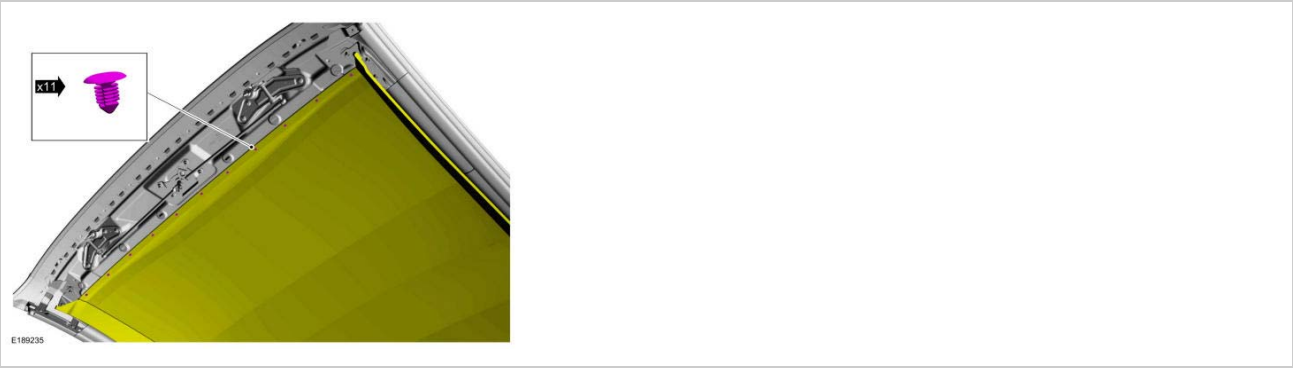
2.

Release the clips under the back of the convertible top front panel trim and remove the trim.



5.

Remove the headliner push pin retainers along the back of the convertible top front panel.



NOTE: LH side shown, RH side similar.

6.
The headliner tension brackets can remain on the convertible top headliner. On both sides.
Remove the headliner tension bracket retainers and brackets from the convertible top front panel.



NOTE: RH side shown, LH side similar.

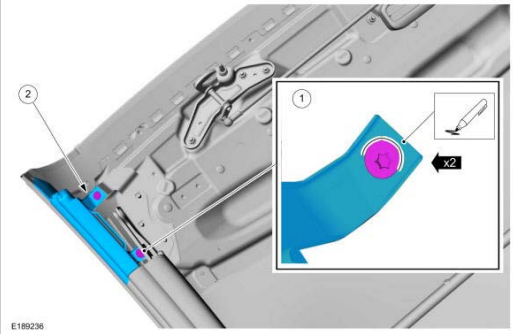
7.
If any shims are present, note the position for installation. On both sides. Remove the convertible top front panel side weatherstrip and bracket assembly.

1.

Mark the convertible top front panel side weatherstrip bracket assembly at the retainers for installation reference.

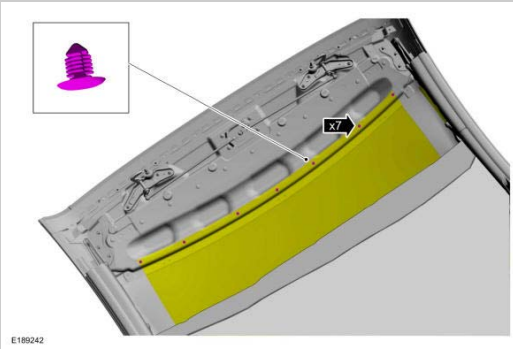
2.

Remove the convertible top front panel side weatherstrip and bracket assembly retainers and remove the weatherstrip/bracket assembly.



8.

Remove the convertible top material push pin retainers at the back of the convertible top front panel.



9.

Disconnect the convertible top material from the front underside of the convertible top front panel.

1.

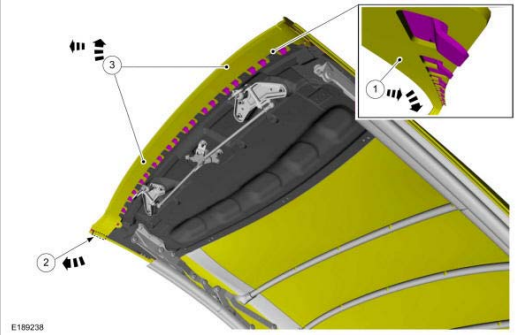
Across the front, pull the convertible top material backward and down to release from the convertible top front panel clips.

NOTE: RH side shown, LH side similar.

2.
On both sides, pull the convertible top material from the double sided tape securing the material to the convertible top front panel.

3.

Roll the convertible top material forward and up over the convertible top front panel.



10.

Fold the front of the convertible top material back to the first crossbow to expose the convertible top tension cable end and stay pad rivets.



NOTE: RH side shown, LH side similar.

11.
On both sides.Disconnect the convertible top tension cable from the convertible top front panel.



NOTE: RH side shown, LH side similar.

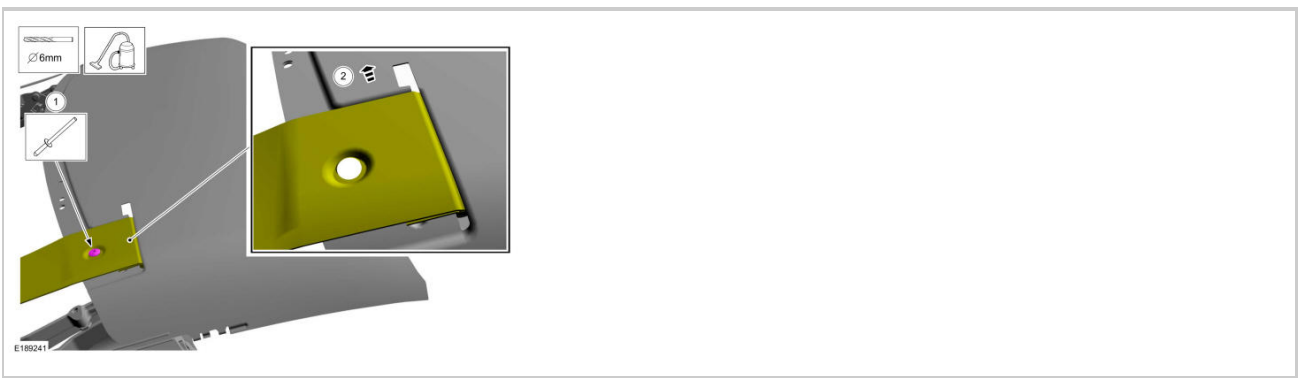
12.
On both sides. Disconnect the stay pad from the convertible top front panel.

NOTE: All rivet shavings must be removed from the vehicle and convertible top assembly.

1.
Drill the stay pad rivets from the convertible top front panel. Use the General Equipment: Electric Drill

2.

Slide the stay pad to the center of the convertible top front panel to disconnect the stay pad.



NOTE: LH side shown, RH side similar.

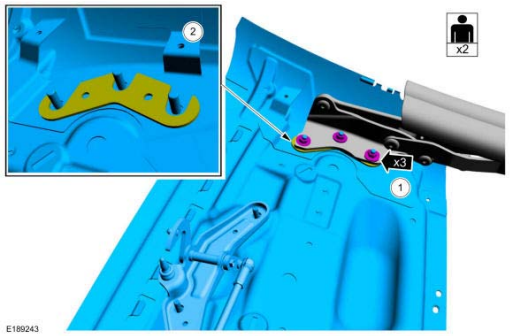
13.
On both sides. Remove the convertible top front panel.

1.

With the help of an assistant.Remove the frame to convertible top front panel retainers.

NOTE: If equipped, retain the shims for installation on both sides.

2.



REMOVAL AND INSTALLATION > CONVERTIBLE TOP FRONT PANEL > INSTALLATION

NOTE: LH side shown, RH side similar.

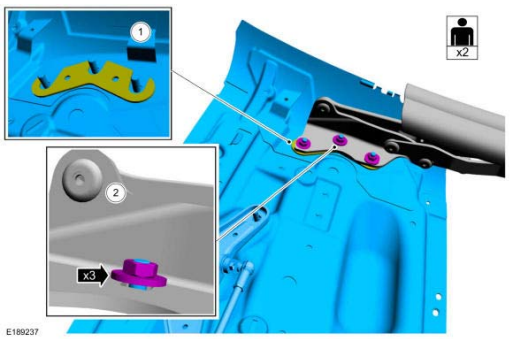
1.
On both sides with the help of an assistant, loose install the convertible top front panel.

1.

Position the shims as removed.

NOTE: The convertible top front panel retainers are loose installed at this point so the alignment of the panel to frame can be set later in the procedure by closing and latching the convertible top.

2.
Position the convertible top front panel and loose install the retainers.



NOTE: RH side shown, LH side similar.

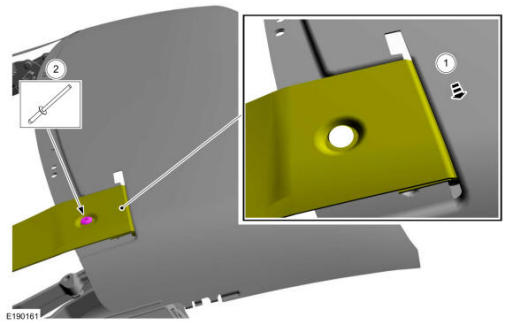
2.
On both sides. Attach the stay pad to the convertible top front panel.

1.

Position the stay pad and slide outward to proper position for installing the rivet.

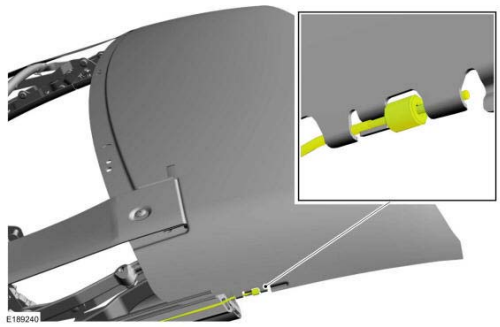
2.

Install the stay pad rivets attaching the stay pad to the convertible top front panel. Use the General Equipment: Rivet Gun



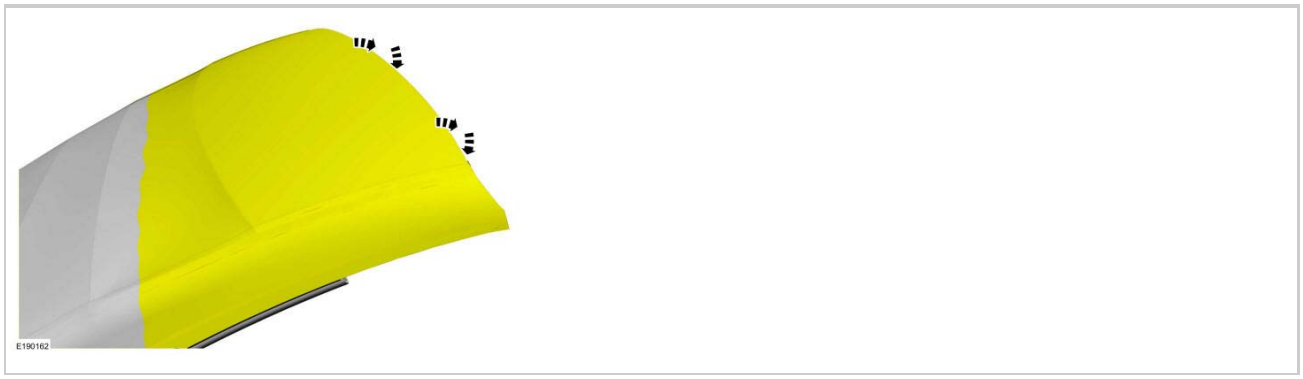
NOTE: RH side shown, LH side similar.

3.
On both sides. Connect the convertible top tension cable to the convertible top front panel.



4.

Fold the front of the convertible top material over the front of the convertible top front panel.



5.

Connect the convertible top material to the front underside of the convertible top front panel.

> *NOTE: RH side shown, LH side similar.*

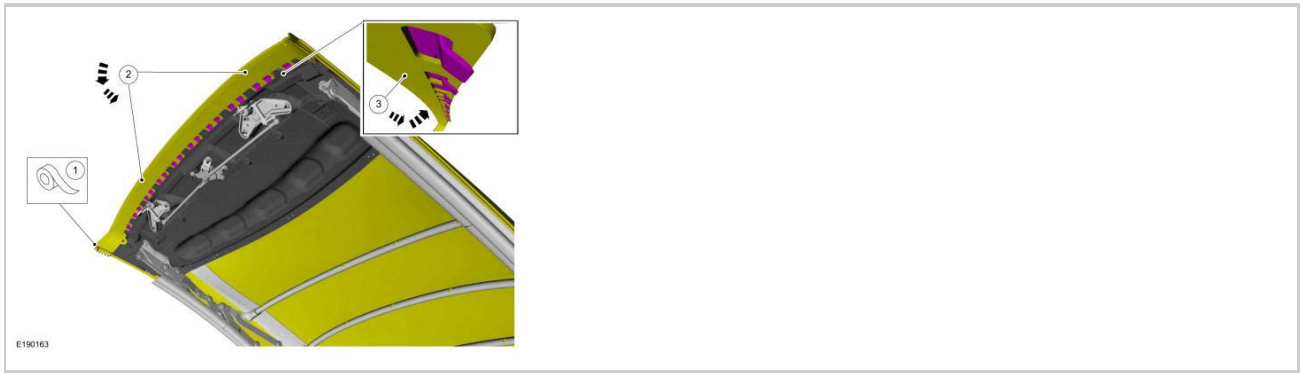
1.
On both sides, apply double sided tape to the convertible top front panel as positioned when removed.

> *NOTE: Sub steps 2 and 3 can be performed together along the front of the convertible top front panel.*

2.
Roll the convertible top material down and rearward over the convertible top front panel.

3.

Across the front, attach the convertible top material over the convertible top front panel clips.



6.

Position the convertible top material and install the push pin retainers along the back of the convertible top front panel.



NOTE: RH side shown, LH side similar.

7.
On both sides. Install the front panel side weatherstrip and bracket assembly.

1.

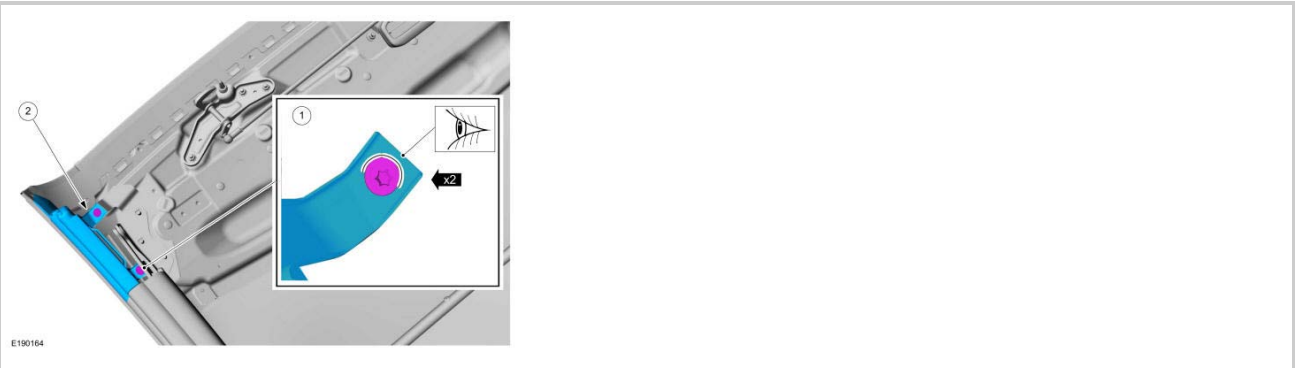
Align the front panel side weatherstrip and bracket assembly using the marks applied during removal.

2.

Tighten the front panel side weatherstrip and bracket assembly retainers.

Torque

: 62 lb.in (7 Nm)



NOTE: Before tightening, make sure to properly align the bracket so that the headliner to back of front panel retainers are also aligned for the next step.

8.
RH side shown, LH side similar. On both sides. Install the headliner tension bracket to the convertible top front panel.

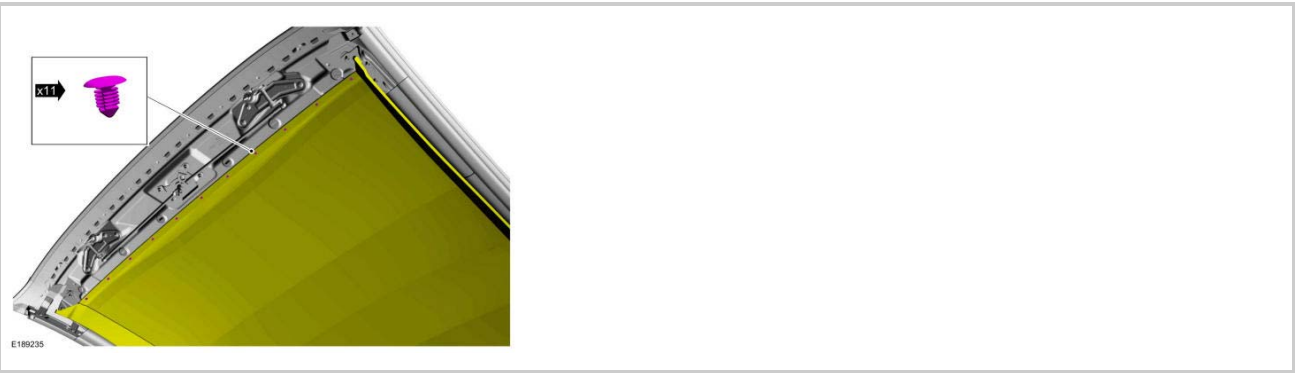
Torque

: 18 lb.in (2 Nm)



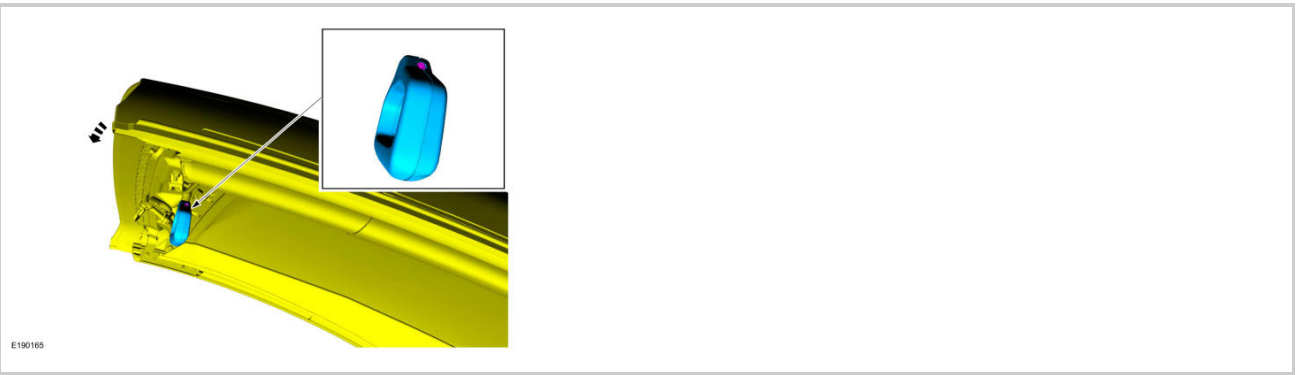
9.

Position the headliner and install the headliner push pin retainers along the back of the convertible top front panel.



NOTE: The retainer does not need to be tightened at this time.

10.
Close the convertible top and install the convertible top latch handle and retainer.



11.

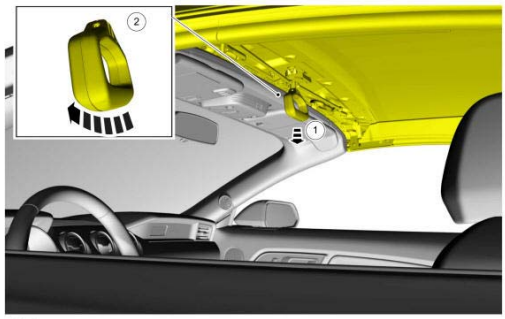
Secure the convertible top in the closed position.

1.

Pull down on the convertible top to position the latching mechanism properly.

2.

Twist the latch handle counter clockwise to fully secure the convertible top.

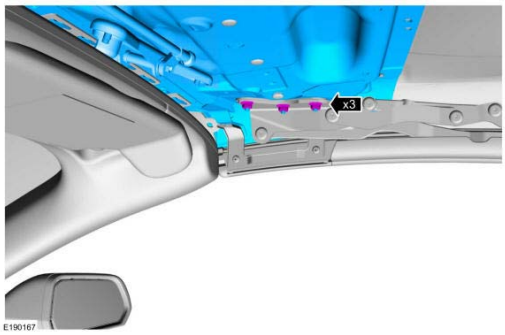


NOTE: RH side shown, LH side similar.

12.
On both sides. Tighten the convertible top front panel to frame bracket nuts.

Torque

: 106 lb.in (12 Nm)



13.

Twist the convertible top latch handle clockwise to release the convertible top.



14.

Open the convertible top approximately 25%.



15.

Remove the convertible top latch handle.



16.

Install the convertible top front panel trim.

1.

Position the convertible top front panel trim and attach the clips under the back of the convertible top front panel trim.

2.

Install the convertible top front panel trim retainers on the front of the trim.

Torque

: 25 lb.in (2.8 Nm)

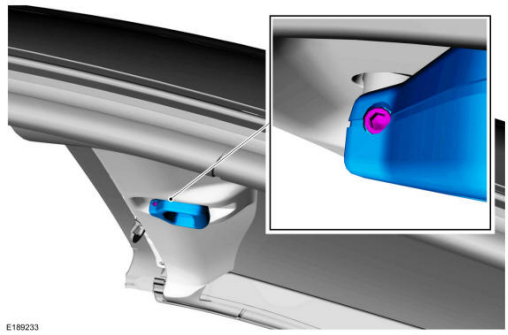


17.

Install the convertible top latch handle.

Torque

: 31 lb.in (3.5 Nm)



REMOVAL AND INSTALLATION > CONVERTIBLE TOP FRONT PANEL SIDE WEATHERSTRIP

Special Tool(s) / General Equipment

Rivet Gun
Electric Drill
Vise

REMOVAL AND INSTALLATION > CONVERTIBLE TOP FRONT PANEL SIDE WEATHERSTRIP > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

Procedure views are with the convertible top in the fully closed position showing tension on the convertible top material, actual position should be approximately 25-50 percent open allowing slack in the convertible top material and other components for serviceability.

1.

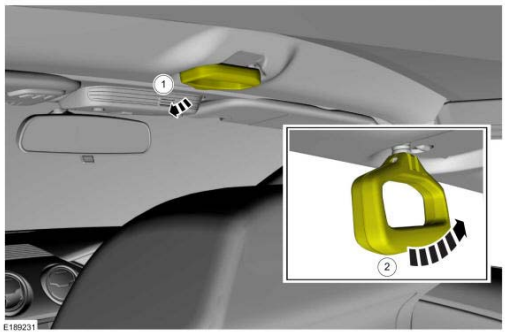
Release the convertible top.

1.

Lower the convertible top latch handle.

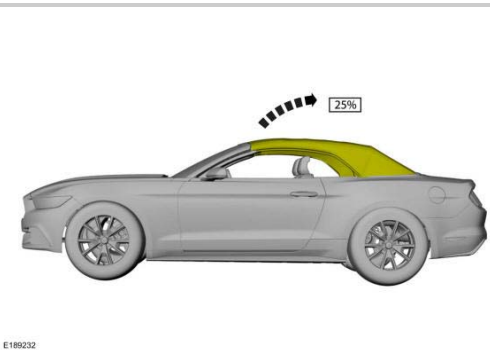
2.

Twist the convertible top latch handle clockwise to release the convertible top.



2.

Open the convertible top approximately 25%.

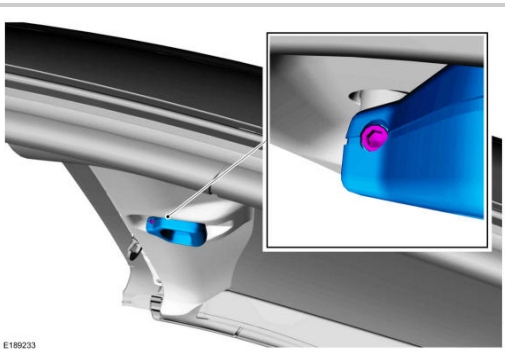


3.

Remove the convertible top latch handle.

Torque

: 31 lb.in (3.5 Nm)



4.

Remove the convertible top front panel trim.

1.

Remove the convertible top front panel trim retainers on the front of the trim.

Torque

: 25 lb.in (2.8 Nm)

2.

Release the clips under the back of the convertible top front panel trim and remove the trim.

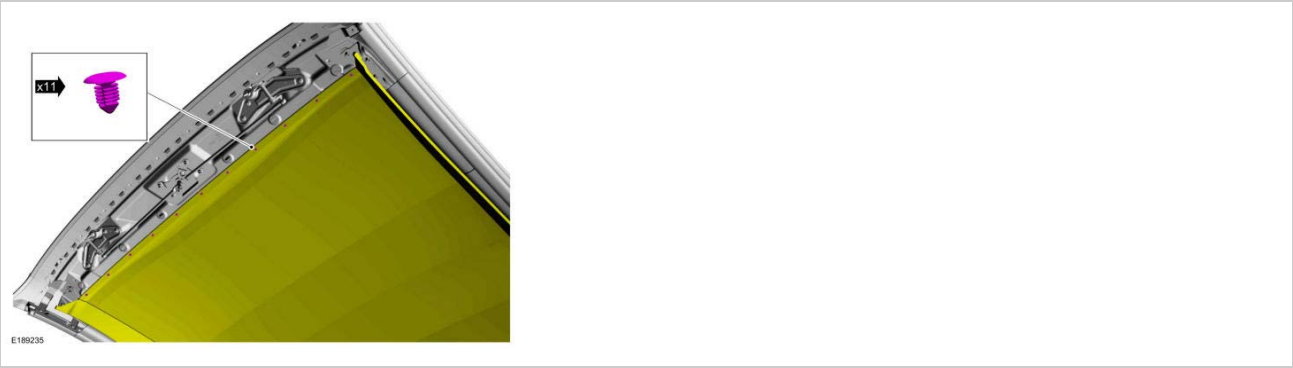


5.

Remove the headliner push pin retainers along the back of the convertible top front panel.

Torque

: 25 lb.in (2.8 Nm)



NOTE: LH side shown, RH similar.

6.
Remove the headliner tension bracket retainers and bracket from the convertible top front panel.

Torque

: 25 lb.in (2.8 Nm)



NOTE: Headliner removed for clarity.

7.
RH side shown, LH similar.

Remove the convertible top front panel side weatherstrip and bracket assembly.

NOTE: The reference marks must be used during installation because there is no adjustment for the convertible top front panel side weatherstrip.

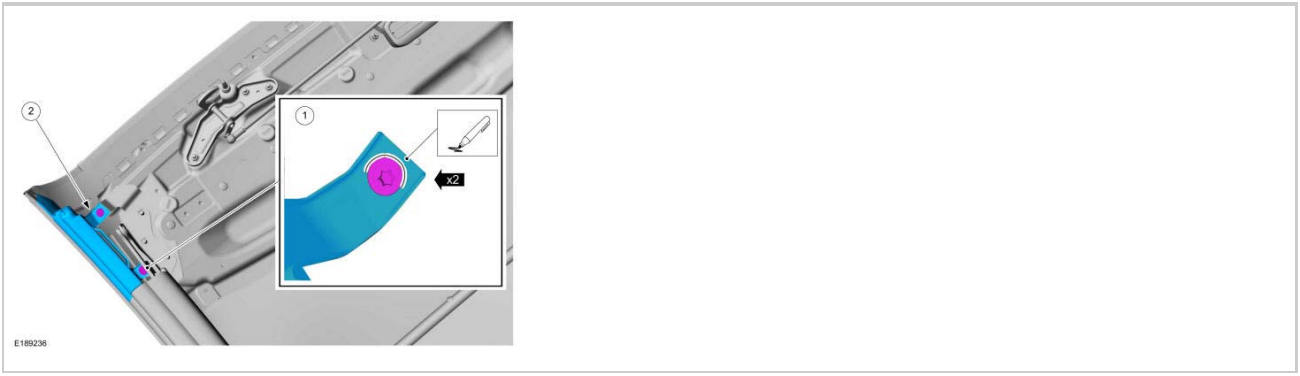
1.
Mark the convertible top front panel side weatherstrip bracket assembly at the retainers for installation reference.

2.

Remove the convertible top front panel side weatherstrip and bracket assembly retainers and remove the weatherstrip/bracket assembly.

Torque

: 62 lb.in (7 Nm)



NOTE: All rivet shavings must be removed from the vehicle and convertible top assembly.

8.

Make sure that the bracket does not bend when positioning in the bench vise or when drilling out the rivets. With the convertible top front panel side weatherstrip and bracket assembly secured in a bench vise. Drill out the retaining rivets. Use the General Equipment: ViseUse the General Equipment: Electric Drill Use the General Equipment: Rivet Gun



REMOVAL AND INSTALLATION > CONVERTIBLE TOP FRONT PANEL SIDE WEATHERSTRIP > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > CONVERTIBLE TOP FRONT STRIKER > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

Open the convertible top approximately 50 percent.



2.

On both sides, remove the A-pillar trim panels. Refer to: A-Pillar Trim Panel - Convertible .

NOTE: RH side shown, LH side similar.

3.
On both sides. Remove the sun visors.

1.

Remove the sun visor cap.

2.

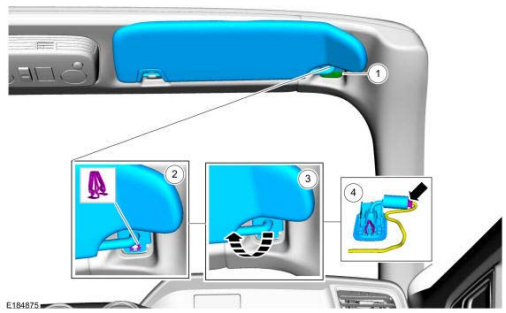
Release the clip.

3.

Remove the sun visor.

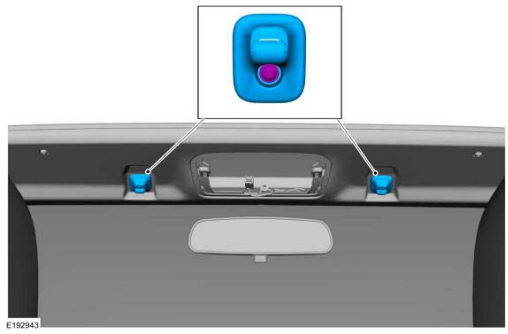
4.

If equipped. Disconnect the electrical connector.



4.

Remove the sun visor latch clips.



5.

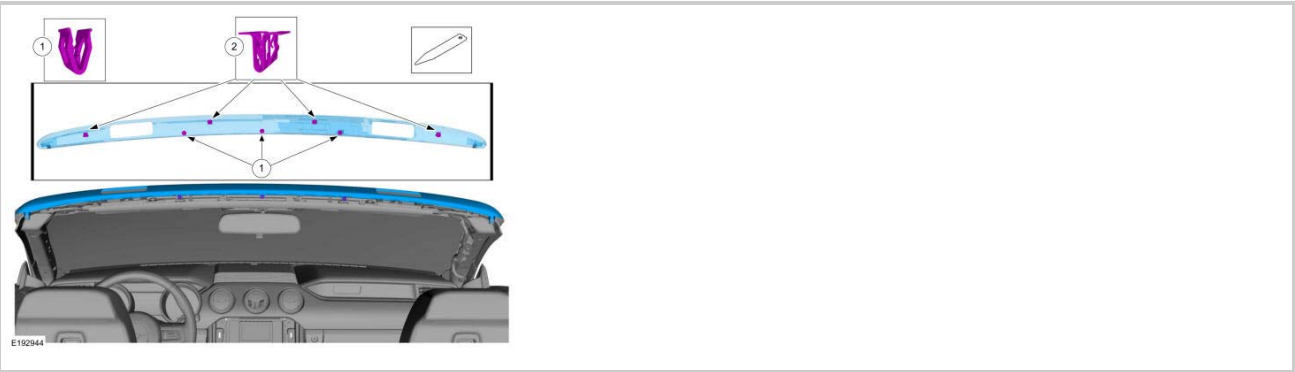
Remove the windshield header upper trim panel.

1.

Release the 3 windshield header upper trim panel clips from the lower trim panel.

2.

Release the 4 windshield header upper trim panel clips from the windshield header and remove the upper header trim panel.



NOTE: Wiring harness and overhead console removed for clarity.

6.
Move the windshield header lower trim panel for access to the convertible top striker lower bolt.

1.

Release the 6 windshield header lower trim panel clips from the windshield header.

NOTE: Disconnect the wiring harness as necessary for clearance.

2.
Release the 2 windshield header lower trim panel clips (sun visor clips) from the windshield header and lower the windshield header lower trim panel.



NOTE: side shown, RH side similar.

7.
Remove the convertible top front striker lower bolt and on the LH side, disconnect the harness

connector.

1.

On the LH side only. Disconnect the convertible top latch switch harness connector.

> *NOTE: The convertible top front striker reference marks must be used during installation for proper alignment.*

2.
Mark the convertible top front striker to header panel for installation reference.

3.

Remove the convertible top front striker lower bolt.

Torque

: 133 lb.in (15 Nm)



> *NOTE: LH side shown, RH side similar.*

8.
Remove the convertible top front striker.

> *NOTE: The convertible top front striker retainer reference marks must be used during installation.*

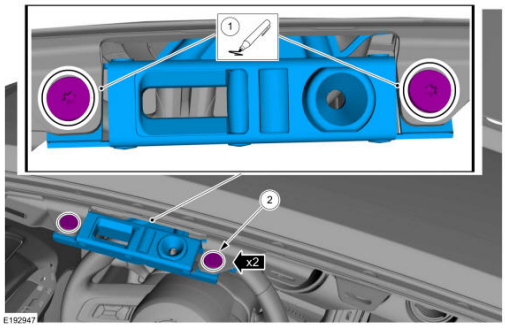
1.
Mark the convertible top header panel around the retainers for installation reference.

2.

Remove the convertible top front striker upper retainers and the striker.

Torque

: 93 lb.in (10.5 Nm)



REMOVAL AND INSTALLATION > CONVERTIBLE TOP FRONT STRIKER > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > CONVERTIBLE TOP HEADLINER

Special Tool(s) / General Equipment

Rivet Gun
Electric Drill

REMOVAL AND INSTALLATION > CONVERTIBLE TOP HEADLINER > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

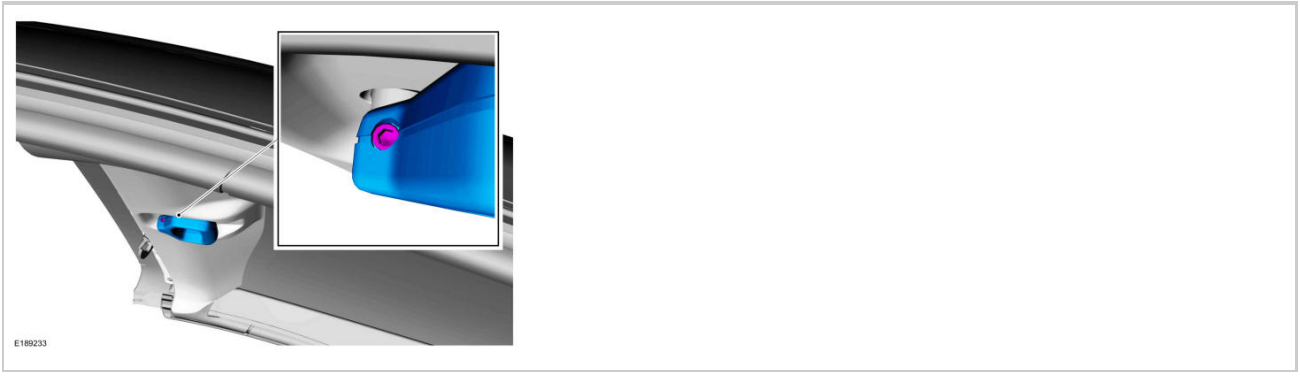
Procedure views are with the convertible top in the fully closed position showing tension on the convertible top material, actual position should be approximately 25-50 percent open allowing slack in the convertible top material and other components for serviceability.

1.

Remove the convertible top latch handle.

Torque

: 31 lb.in (3.5 Nm)



2.

Remove the convertible top front panel trim.

1.

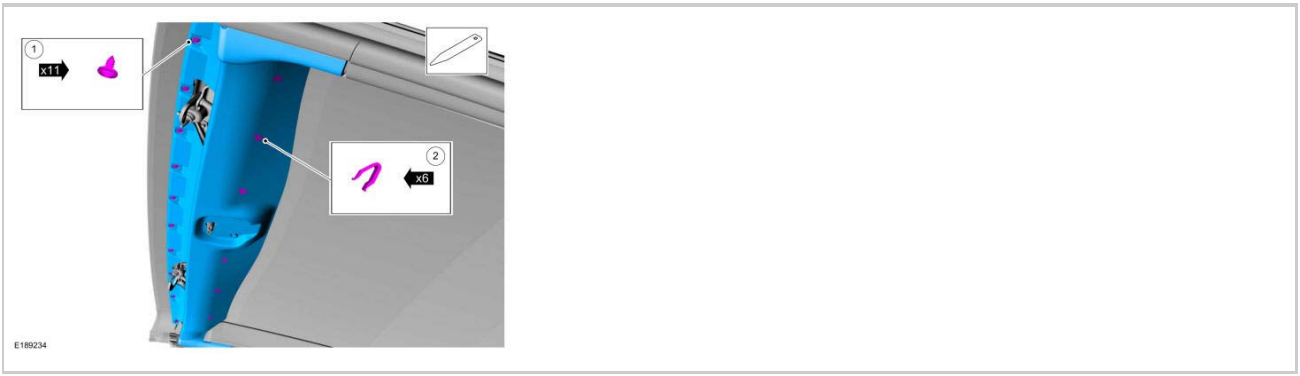
Remove the convertible top front panel trim retainers on the front of the trim.

Torque

: 18 lb.in (2 Nm)

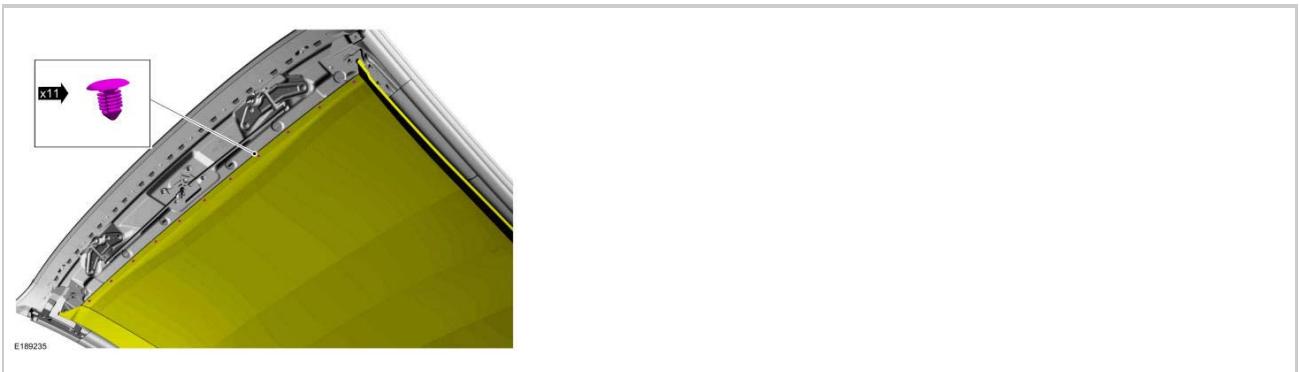
2.

Release the clips under the back of the convertible top front panel trim and remove the trim.



3.

Remove the convertible top headliner push pin type retainers along the back of the convertible top front panel.

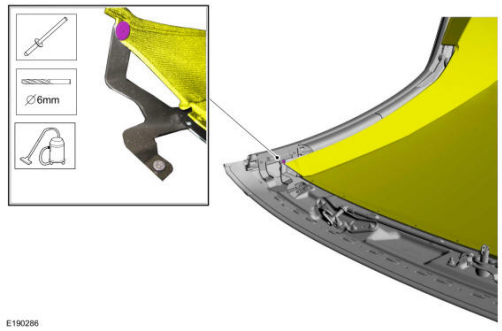


NOTE: All rivet shavings must be removed from the vehicle and convertible top assembly.

4.
LH side shown, RH side similar. On both sides, drill out the rivet to disconnect the convertible top headliner from the convertible top headliner tension bracket. Use the General Equipment: Electric Drill Use the General Equipment: Rivet Gun

Torque

: 25 lb.in (2.8 Nm)



5.

Remove the convertible top headliner nylon fabric strap from the floating bow.

1.

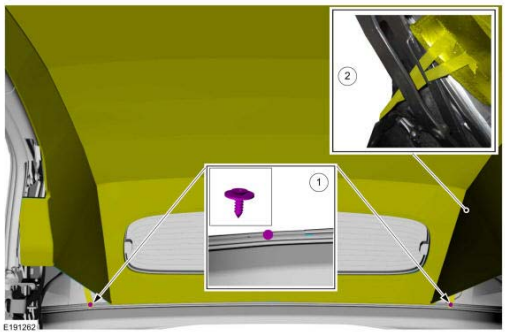
Remove the convertible top headliner nylon fabric strap retainers from the floating bow.

Torque

: 62 lb.in (7 Nm)

NOTE: During installation, route the nylon fabric strap through the frame as it was removed.

2.
LH side shown, RH side similar. On both sides, route the nylon fabric strap through the frame.



NOTE: Fold the convertible top headliner down between each cross bow after rivet removal to expose the next cross bow.

6.
All rivet shavings must be removed from the vehicle and convertible top assembly. Drill out the cross bow retaining rivets.

NOTE: Inset view is from above with convertible top material removed for clarity.

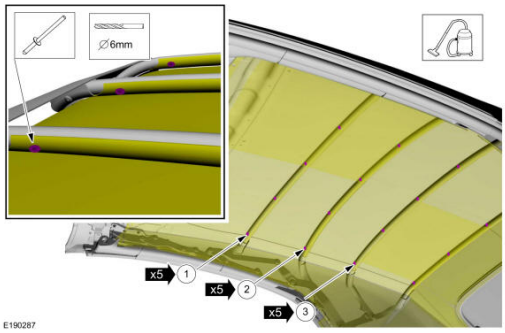
1.
Remove the rivets from cross bow 1. Use the General Equipment: Electric Drill Use the General Equipment: Rivet Gun

2.

Remove the rivets from cross bow 2.

3.

Remove the rivets from cross bow 3.



7.

Remove the headliner from cross bow 4.

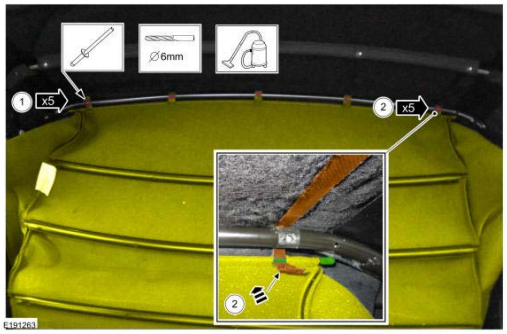
NOTE: All rivet shavings must be removed from the vehicle and convertible

top assembly.

1.
Drill out the rivets from cross bow 4. Use the General Equipment: Electric Drill Use the General Equipment: Rivet Gun

NOTE: The nylon fabric strap has 2 sided tape holding it to cross bow 4 to aid in positioning during installation.

2.
The nylon fabric strap can remain routed over cross bow 4 after pushing through the convertible top headliner. Pull the end of the nylon fabric strap from the cross bar and push through the convertible top headliner to release the convertible top headliner from cross bow 4.



NOTE: All rivet, shavings or pieces must be removed from all cross bows and the vehicle interior. Rivet ends left in any cross bow may result in a rattle condition.

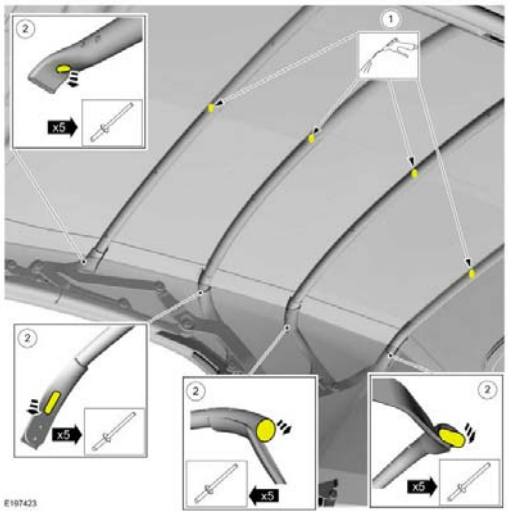
8.
Remove all rivet pieces from inside all of the cross bows.

NOTE: It may be necessary to force compressed air into multiple rivet holes in the cross bows to get all rivet pieces out of the cross bows.

1.
Using an air nozzle and compressed air, blow into each cross bow to force the rivet pieces to the outer ends of the cross bows for removal.

NOTE: Check both ends of each cross bow to make sure all rivet pieces are removed from the vehicle

2.
At the ends of the cross bows, collect all rivet pieces and verify that all rivet ends are accounted for.

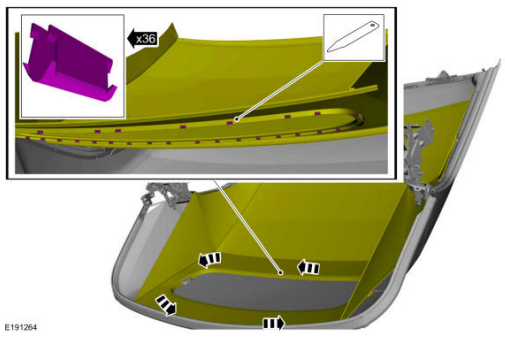


NOTE: The convertible top headliner trim ring is permanently attached to the convertible top headliner, and the rear window glass frame is permanently attached to the convertible top material.

9.
Some retaining clips may stay on the rear window glass frame. Remove from the rear window glass frame and position all retaining clips on the convertible top headliner trim ring at the location where they were removed.

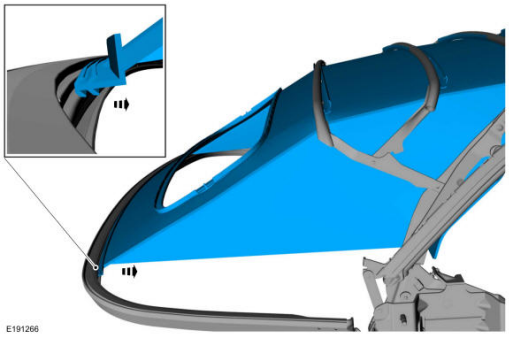
For installation, begin with the top 2 corners when attaching the convertible top headliner trim ring to the rear window glass frame. This ensures proper alignment as the convertible top headliner trim ring is attached around the rear window glass frame.

View shown is with the convertible top off vehicle for clarity. Carefully pry the convertible top headliner trim ring from the rear window glass frame.



NOTE: View is from outside the vehicle with the convertible top material removed for clarity.

10.
From inside the vehicle, pull the headliner straight out of the floating bow to remove.



REMOVAL AND INSTALLATION > CONVERTIBLE TOP HEADLINER > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > CONVERTIBLE TOP MATERIAL

Special Tool(s) / General Equipment

Rivet Gun
Electric Drill
Flat-Bladed Screwdriver

REMOVAL AND INSTALLATION > CONVERTIBLE TOP MATERIAL > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

Procedure views are with the convertible top in the fully closed position showing tension on the convertible top material, actual position should be approximately 25-50 percent open allowing slack in the convertible top material and other components for serviceability.

1.

Refer to: Convertible Top Trough Assembly .

2.

Remove the convertible top latch handle.



3.

Remove the convertible top front panel trim.

1.

Remove the convertible top front panel trim retainers on the front of the trim.

Torque

: 18 lb.in (2 Nm)

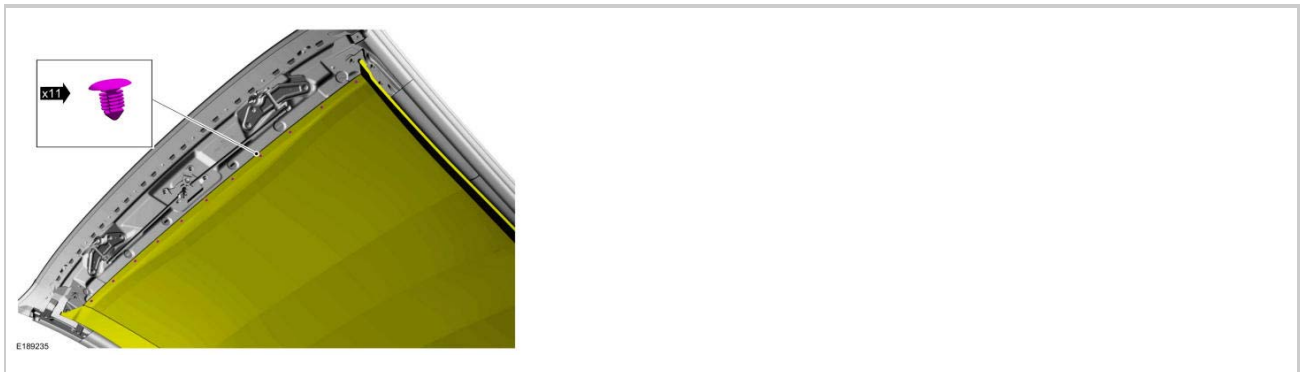
2.

Release the clips under the back of the convertible top front panel trim and remove the trim.



4.

Remove the convertible top headliner push pin retainers along the back of the convertible top front panel.

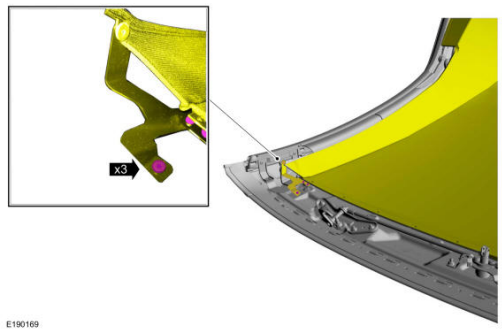


NOTE: The headliner tension bracket will still be attached to the headliner.

5.
LH side shown, RH side similar. On both sides, remove the headliner tension bracket retainers and bracket from the convertible top front panel.

Torque

: 18 lb.in (2 Nm)



NOTE: RH side shown, LH side similar.

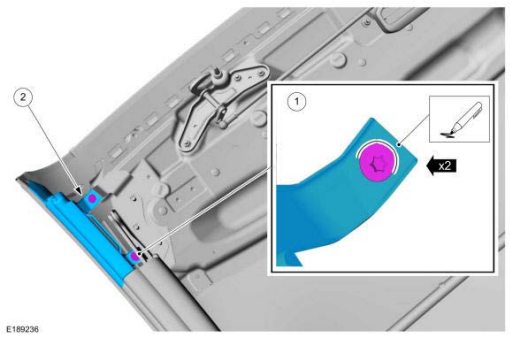
6.
If any shims are present, note the position for installation. On both sides, remove the convertible top front panel side weatherstrip and bracket assembly.

1.

Mark the convertible top front panel side weatherstrip bracket assembly at the retainers for installation reference.

2.

Remove the convertible top front panel side weatherstrip and bracket assembly retainers and remove the weatherstrip/bracket assembly.



NOTE: Fold the convertible top headliner down between each cross bow after rivet

removal to expose the next cross bow.

7.
All rivet shavings must be removed from the vehicle and convertible top assembly. Drill out the cross bow retaining rivets.

NOTE: Inset view is from above with convertible top material removed for clarity.

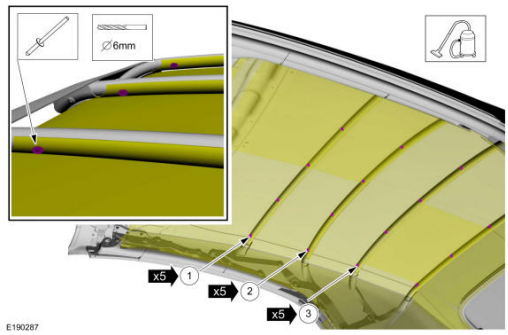
1.
Remove the rivets from cross bow 1. Use the General Equipment: Electric Drill Use the General Equipment: Rivet Gun

2.

Remove the rivets from cross bow 2.

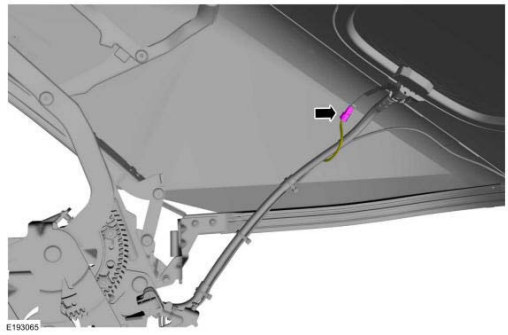
3.

Remove the rivets from cross bow 3.



NOTE: RH side shown, LH side similar.

8.
On both sides, disconnect the rear window defrost harness.



NOTE: RH side shown, LH side similar.

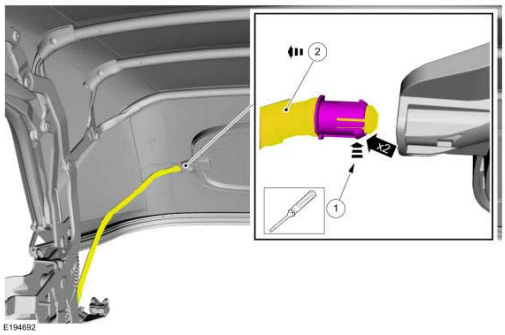
9.
Remove the rear glass tension rod.

1.

Using a small flat-bladed screwdriver, press in on the retainer tabs to release the rear glass tension rod. Use the General Equipment: Flat-Bladed Screwdriver

2.

Pull out on the rear glass tension rod to remove from the rear glass frame.



10.

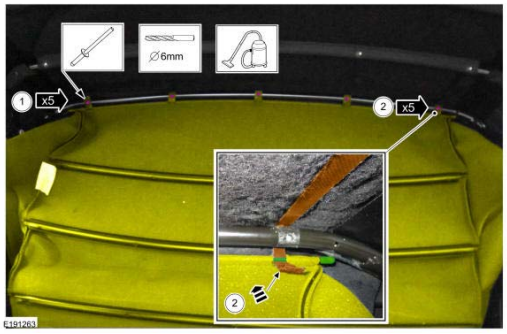
Remove the headliner from cross bow 4.

NOTE: All rivet shavings must be removed from the vehicle and convertible top assembly.

1.
Drill out the rivets from cross bow 4. Use the General Equipment: Electric Drill Use the General Equipment: Rivet Gun

NOTE: The nylon fabric strap has 2 sided tape holding it to cross bow 4 to aid in positioning during installation.

2.
The nylon fabric strap can remain routed over cross bow 4 after pushing through the convertible top headliner. Pull the end of the nylon fabric strap from the cross bar and push through the convertible top headliner to release the convertible top headliner from cross bow 4.



NOTE: All rivet, shavings or pieces must be removed from all cross bows and the vehicle interior. Rivet ends left in any cross bow may result in a rattle condition.

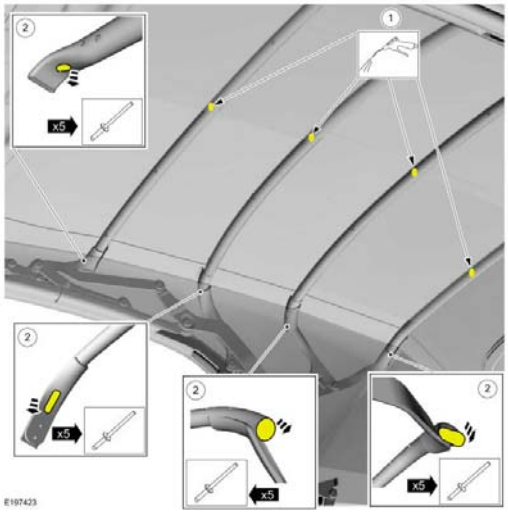
11.
Remove all rivet pieces from inside all of the cross bows.

NOTE: It may be necessary to force compressed air into multiple rivet holes in the cross bows to get all rivet pieces out of the cross bows.

1.
Using an air nozzle and compressed air, blow into each cross bow to force the rivet pieces to the outer ends of the cross bows for removal.

NOTE: Check both ends of each cross bow to make sure all rivet pieces are removed from the vehicle

2.
At the ends of the cross bows, collect all rivet pieces and verify that all rivet ends are accounted for.



NOTE: The convertible top headliner trim ring is permanently attached to the convertible top headliner, and the rear window glass frame is permanently attached to the convertible top material.

12.
Some retaining clips may stay on the rear window glass frame. Remove from the rear window glass frame and position all retaining clips on the convertible top headliner trim ring at the location where they were removed.

For installation, begin with the top 2 corners when attaching the convertible top headliner trim ring to the rear window glass frame. This ensures proper alignment as the convertible top headliner trim ring is attached around the rear window glass frame.

View shown is with the convertible top off vehicle for clarity. Beginning on the top corners of the rear window glass frame, carefully pry the convertible top headliner trim ring from the rear window glass frame.



13.

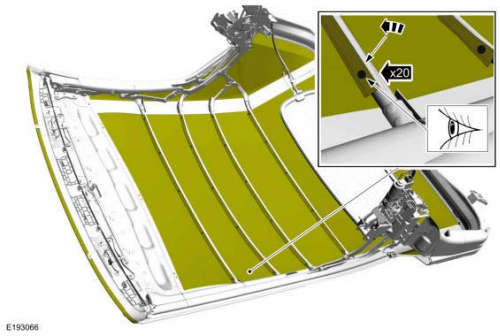
Remove the convertible top material push pins at the back of the convertible top front panel.



NOTE: The convertible top material to crossbow retaining flaps are attached to the crossbows with 2 sided tape to align the holes for the same rivets that were removed for the headliner. During installation, make sure to line up the holes. A standard 2 sided tape can be used to ease alignment retention during installation.

14.
Pull the convertible top material to crossbow retaining flap from the 2 sided tape at each

crossbow.



NOTE: During installation, route the convertible top tension cords and nylon fabric straps through the frame exactly as they were removed.

15.
All rivet shavings must be removed from the vehicle and convertible top assembly.

RH side shown, LH side similar. On both sides, disconnect the convertible top tension cords and nylon fabric straps from the frame assembly.

1.

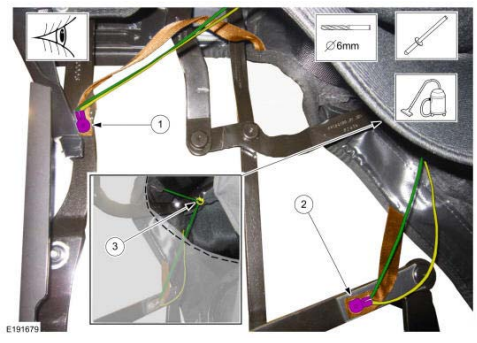
Drill out the rivets to the front set of tension cords at the front side of the frame. Use the General Equipment: Electric Drill Use the General Equipment: Rivet Gun

2.

Drill out the rivets to the second set of tension cords at the center side of the frame.

NOTE: Do not drill out the D-ring retaining rivet.

3.
Route the tension cord through the D-ring.



16.

Disconnect the convertible top material from the front underside of the convertible top front panel.

1.

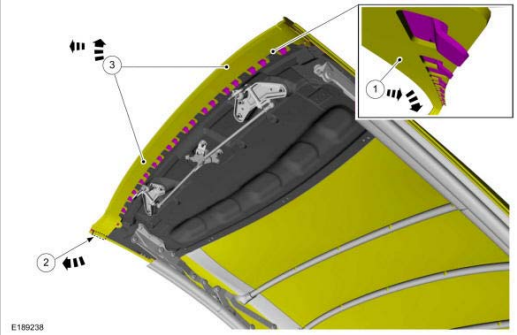
Pull the convertible top material backward and down to release from the convertible top front panel clips.

2.

On both sides, pull the convertible top material from the double sided tape securing the material to the convertible top front panel.

3.

Roll the convertible top material forward and up over the convertible top front panel.



17.

Fold the front of the convertible top material back to the first crossbow to expose the convertible top tension cable ends at the convertible top front panel.



NOTE: RH side shown, LH side similar.

18.
If the convertible top material is to be reinstalled a draw string can be attached to the convertible top tension cable and left in the convertible top material for pulling the convertible top tension cable back into the convertible top material during installation. On both sides, disconnect the convertible top tension cable from the convertible top front panel.



19.

On both sides. Refer to: Convertible Top Rear Panel Lower Weatherstrip .

NOTE: RH side shown, LH side similar.

20.
On both sides, release the convertible top material from the frame under the removed convertible top rear panel lower weatherstrip.

1.

Release the convertible top material edge trim from the frame as indicated in all 5 locations under the removed convertible top rear panel lower weatherstrip.

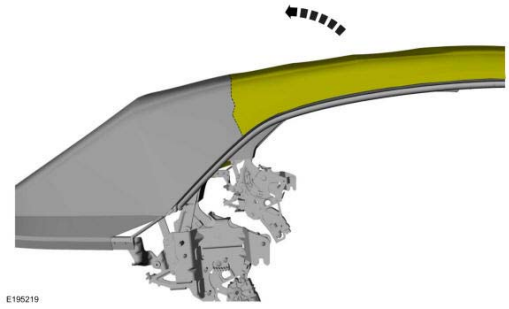
2.

Pull the convertible top material out to fully release from the frame.



NOTE: RH side shown, LH side similar.

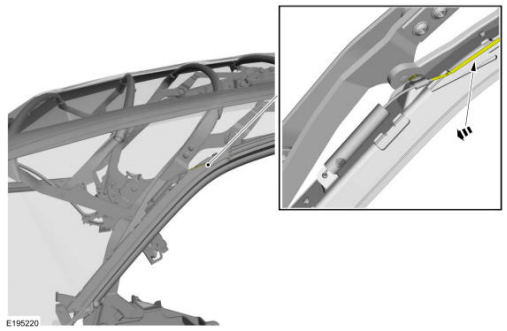
21.
On both sides, pull the convertible top material back to access the back of the convertible top tension cable.



NOTE: Make sure to note the routing of the tension cable through the convertible top material for installation.

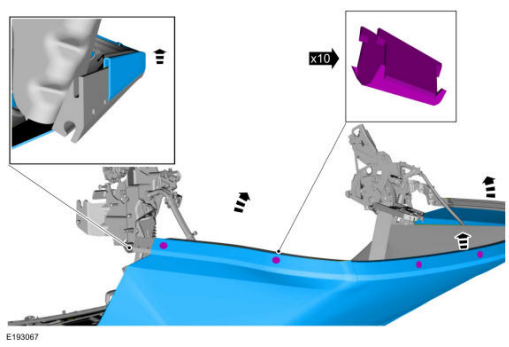
NOTE: RH side shown, LH side similar.

22.
On both sides, leaving the convertible top tension cable attached to the frame, pull the front of the convertible top tension cable out of the convertible top material.



NOTE: Make sure to remove the convertible top material retaining clips from the floating bow. The convertible top material retaining clips must be placed on the convertible top material in the proper locations when installing.

23.
RH side shown, LH side similar. Pull the convertible top material out of the floating bow to remove.



REMOVAL AND INSTALLATION > CONVERTIBLE TOP MATERIAL > INSTALLATION

1.

Transfer parts as necessary.

2.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > CONVERTIBLE TOP MOTOR > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

On both sides, remove the rear quarter panel speakers. Vehicles With: Touchscreen Display Refer to: Rear Quarter Panel Speaker . Vehicles With: AM/FM/CD/SYNC Refer to: Rear Quarter Panel Speaker .

2.

On the RH side only. Position aside the RTM and bracket assembly.

1.

Disconnect the RTM wiring harness clips from the speaker bracket.

Torque

: 93 lb.in (10.5 Nm)

2.

Remove the RTM bracket nut.

Torque

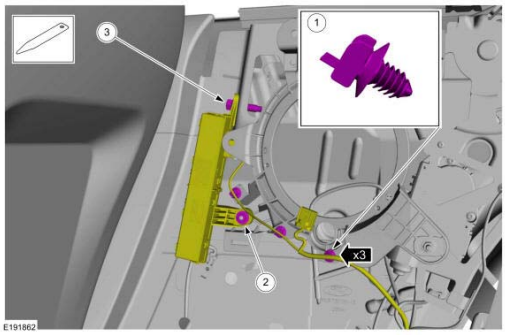
: 71 lb.in (8 Nm)

3.

Remove the RTM bracket bolt and position the RTM and bracket assembly aside.

Torque

: 17 lb.in (1.9 Nm)



NOTE: RH side shown, LH side similar.

3.
On both sides. Remove the rear quarter panel speaker brackets.

1.

Remove the speaker bracket stud.

Torque

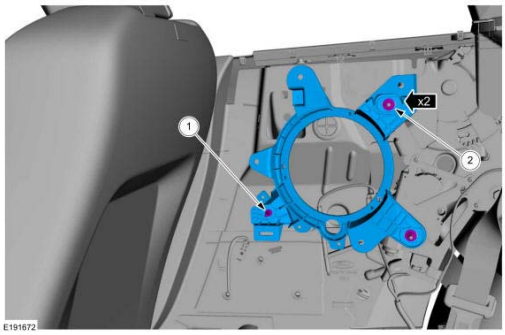
: 93 lb.in (10.5 Nm)

2.

Remove the speaker bracket nuts and the speaker bracket.

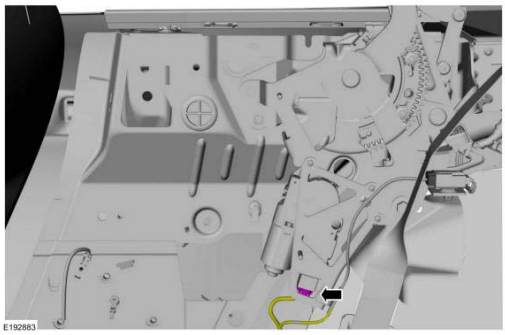
Torque

: 71 lb.in (8 Nm)



NOTE: RH side shown, LH side similar.

4.
Disconnect the harness connectors and position harness aside.

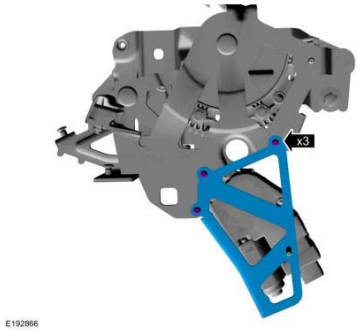


NOTE: LH side shown, RH side similar.

5.
Remove the motor guard bracket retainers and position aside.

Torque

: 25 lb.in (2.8 Nm)

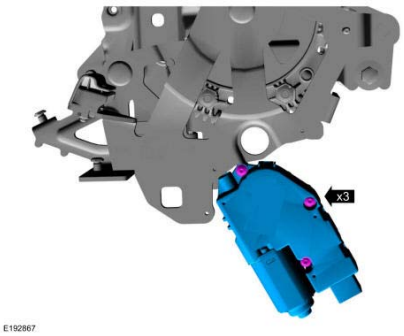


NOTE: LH side shown, RH side similar.

6.
Remove the convertible top motor.

Torque

: 106 lb.in (12 Nm)



REMOVAL AND INSTALLATION > CONVERTIBLE TOP MOTOR > INSTALLATION

1.

To install, reverse the removal procedure.

2.

To initialize the motors, fully close and latch the convertible top and reopen fully.

REMOVAL AND INSTALLATION > CONVERTIBLE TOP REAR PANEL LOWER WEATHERSTRIP

Special Tool(s) / General Equipment

Electric Drill

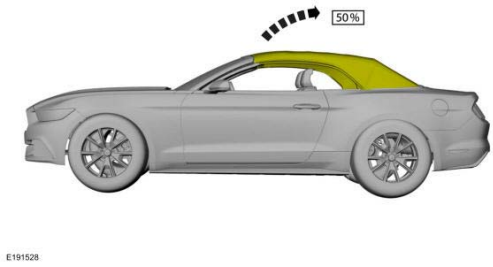
REMOVAL AND INSTALLATION > CONVERTIBLE TOP REAR PANEL LOWER WEATHERSTRIP > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

Procedure views are with the convertible top in the fully closed position showing tension on the convertible top material, actual position should be approximately 25-50 percent open allowing slack in the convertible top material and other components for serviceability.

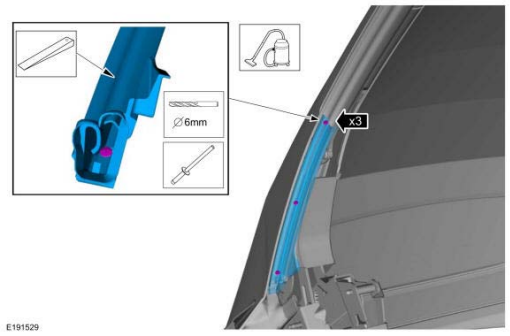
1.

Open the convertible top approximately 50 percent.



NOTE: RH side shown, LH side similar.

2.
All rivet shavings must be removed from the vehicle and convertible top assembly. Drill the rivets from the convertible top rear panel lower weatherstrip. Use the General Equipment: Electric Drill



REMOVAL AND INSTALLATION > CONVERTIBLE TOP REAR PANEL LOWER WEATHERSTRIP > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > CONVERTIBLE TOP SWITCH > REMOVAL

1.

The roof opening panel switch is replaced as an assembly with the overhead console. Refer to: Overhead Console .

REMOVAL AND INSTALLATION > CONVERTIBLE TOP SWITCH > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > CONVERTIBLE TOP TENSION BELT > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

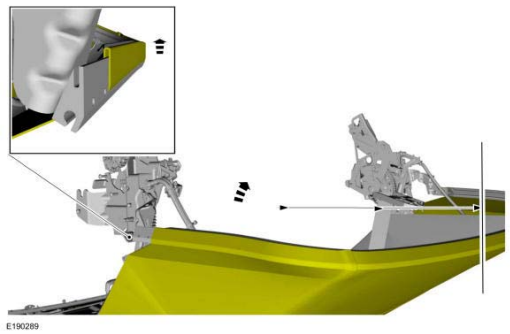
Procedure views are with the convertible top in the fully closed position showing tension on the convertible top material, actual position should be approximately 25-50 percent open allowing slack in the convertible top material and other components for serviceability.

1.

Remove the convertible top assembly. Refer to: Convertible Top Assembly .

> *NOTE: Make sure to remove the convertible top material retaining clips from the floating bow. The convertible top material retaining clips must be placed on the convertible top material in the proper locations when installing.*

2.
RH side shown, LH side similar. Partially disconnect the convertible top material from the floating bow.



> *NOTE: RH side shown, LH side similar.*

3.
Remove the tension belt.

1.

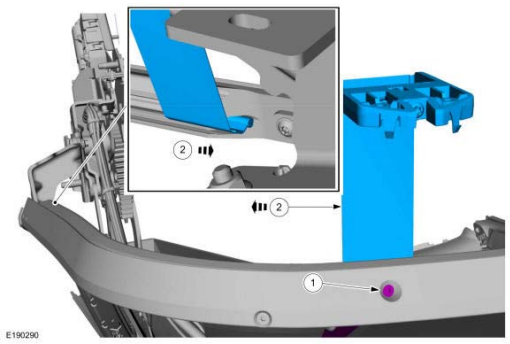
Remove the tension belt retaining screw.

Torque

: 62 lb.in (7 Nm)

2.

Slide the tension belt out of the floating bow.



REMOVAL AND INSTALLATION > CONVERTIBLE TOP TENSION BELT > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > CONVERTIBLE TOP TENSION CABLE

Special Tool(s) / General Equipment

Rivet Gun
Electric Drill
Draw Cord

REMOVAL AND INSTALLATION > CONVERTIBLE TOP TENSION CABLE > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

Procedure views are with the convertible top in the fully closed position showing tension on the convertible top material, actual position should be approximately 25-50 percent open allowing slack in the convertible top material and other components for serviceability.

1.

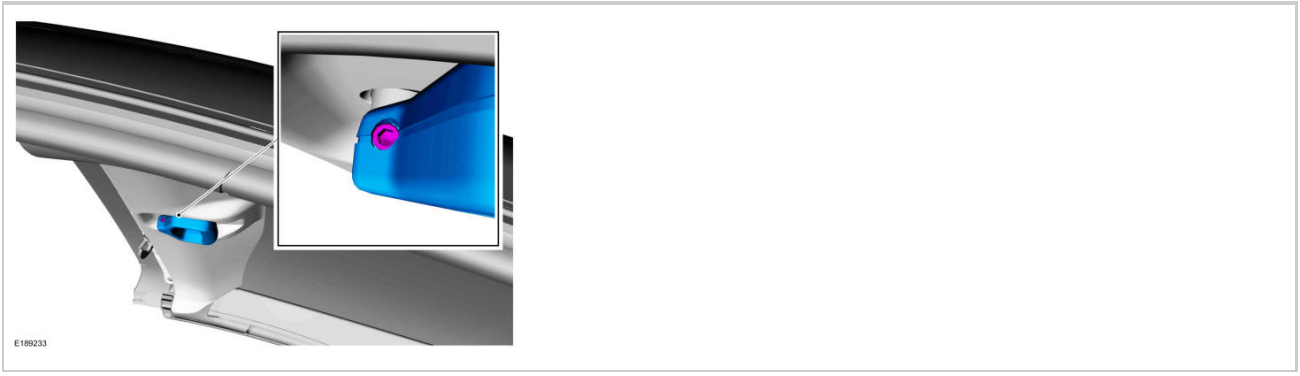
On the side needing convertible top tension cable serviced. Refer to: Convertible Top Rear Panel Lower Weatherstrip .

2.

Remove the convertible top latch handle.

Torque

: 31 lb.in (3.5 Nm)



3.

Remove the convertible top front panel trim.

1.

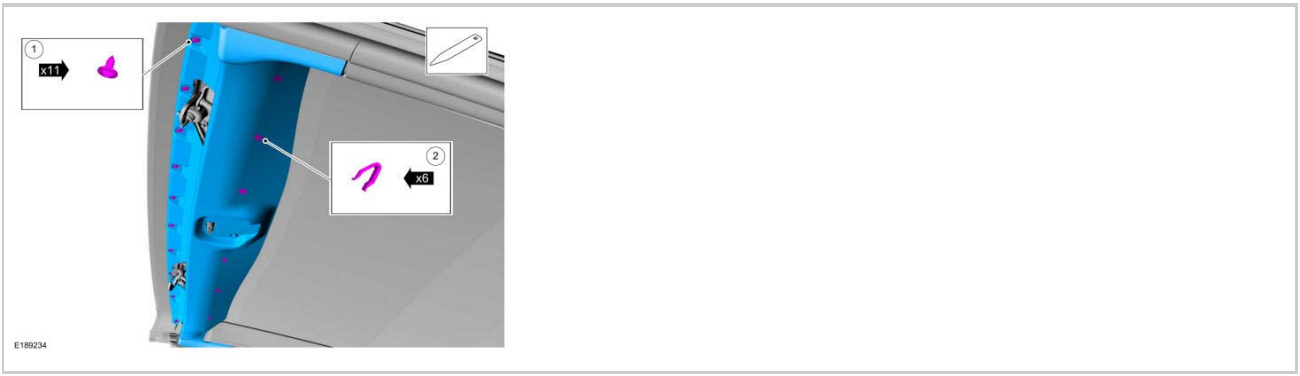
Remove the convertible top front panel trim retainers on the front of the trim.

Torque

: 18 lb.in (2 Nm)

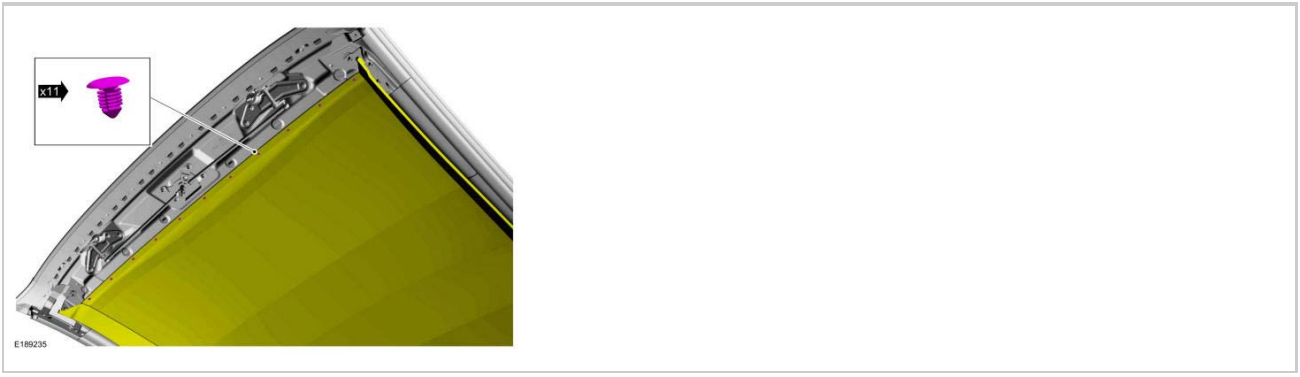
2.

Release the clips under the back of the convertible top front panel trim and remove the trim.



4.

Remove the headliner push pin retainers along the back of the convertible top front panel.

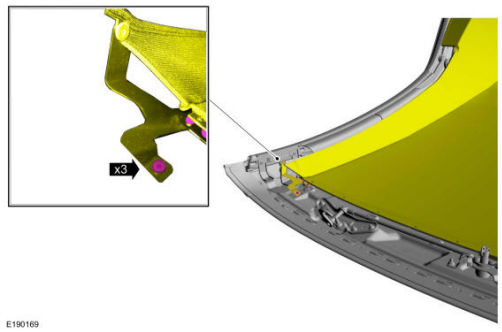


NOTE: LH side shown, RH side similar.

5.
On both sides, remove the headliner tension bracket retainers and bracket from the convertible top front panel.

Torque

: 25 lb.in (2.8 Nm)



NOTE: RH side shown, LH side similar.

6.
If any shims are present, note the position for installation. On both sides, remove the convertible top front panel side weatherstrip and bracket assembly.

1.

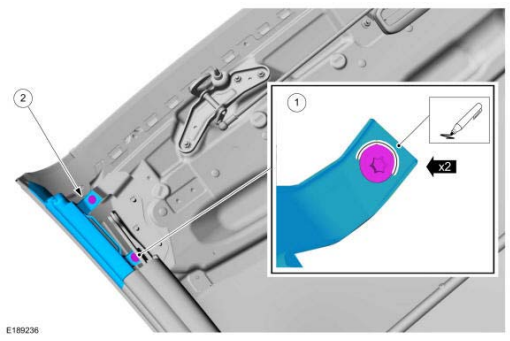
Mark the convertible top front panel side weatherstrip bracket assembly at the retainers for installation reference.

Torque

: 62 lb.in (7 Nm)

2.

Remove the convertible top front panel side weatherstrip and bracket assembly retainers and remove the weatherstrip/bracket assembly.



7.

Remove the convertible top material push pins at the back of the convertible top front panel.



8.

On both sides, disconnect the convertible top material from the front underside of the convertible top front panel.

1.

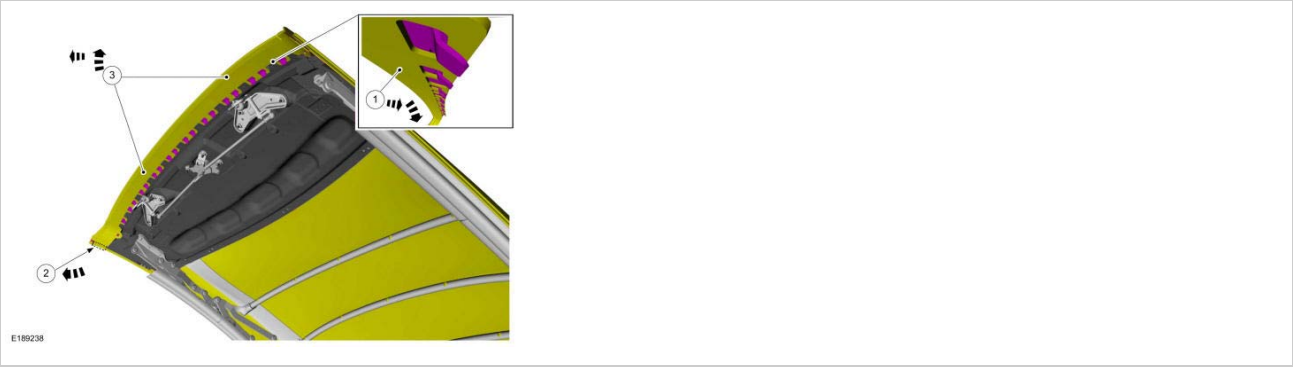
Pull the convertible top material backward and down to release from the convertible top front panel clips.

2.

Pull the convertible top material from the double sided tape securing the material to the convertible top front panel.

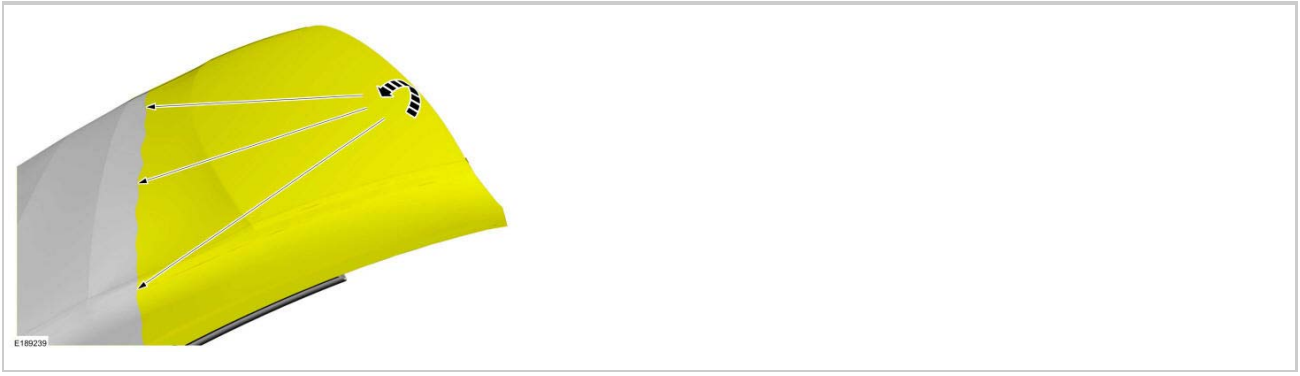
3.

Roll the convertible top material forward and up over the convertible top front panel.



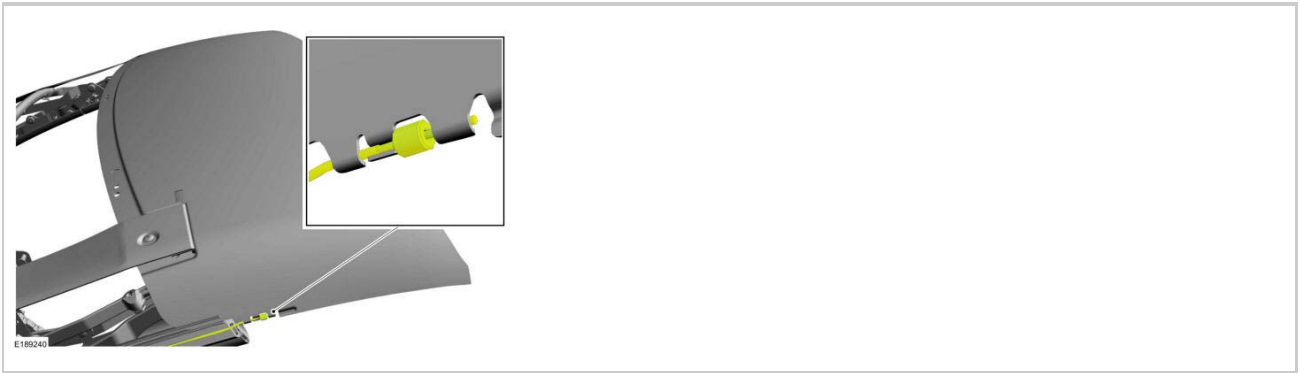
9.

Fold the front of the convertible top material back to the first crossbow to expose the tension cable end and stay pad rivets.



NOTE: RH side shown, LH side similar.

10.
Disconnect the convertible top tension cable from the convertible top front panel.



NOTE: RH side shown, LH side similar.

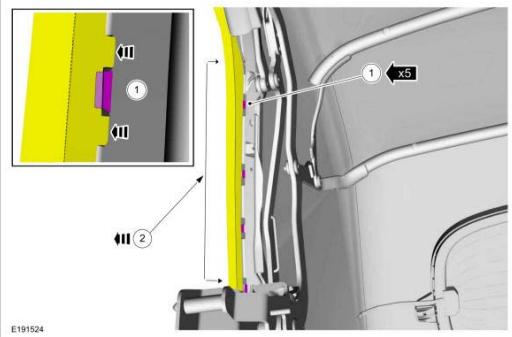
11.
Release the convertible top material from the frame under the removed convertible top rear panel lower weatherstrip.

1.

Release the convertible top material edge trim from the frame as indicated in all 5 locations under the removed convertible top rear panel lower weatherstrip.

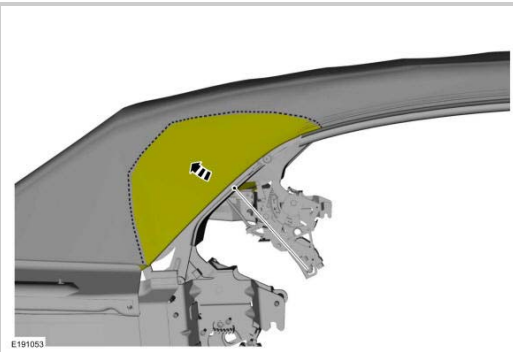
2.

Pull the convertible top material out to fully release from the frame.



NOTE: RH side shown, LH side similar.

12.
Position the convertible top material up in the area shown for access to remove the convertible top tension cable.



NOTE: RH side shown, LH side similar.

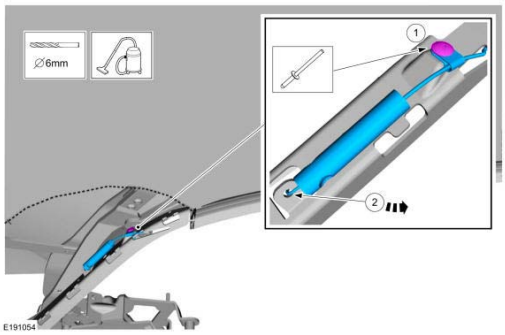
13.
Disconnect the convertible top tension cable from the convertible top frame.

NOTE: All rivet shavings must be removed from the vehicle and convertible top assembly.

1.
Drill out the convertible top tension cable rivet. Use the General Equipment: Electric Drill Use the General Equipment: Rivet Gun

2.

Disconnect the spring end of the convertible top tension cable from the frame.



NOTE: RH side shown, LH side similar.

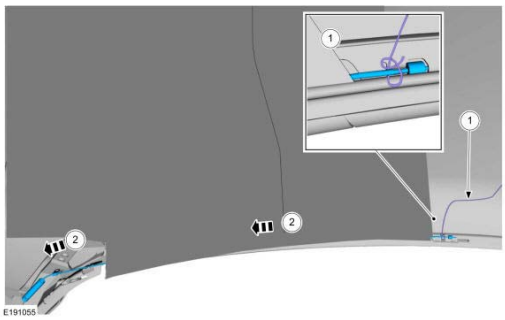
14.
Remove the convertible top tension cable.

NOTE: The draw cord is attached to the wiring harness so the harness can be easily routed through the convertible top material during installation.

1.
Attach a draw cord to the convertible top tension cable. Use the General Equipment: Draw Cord

2.

Pull the convertible top tension cable from the convertible top material leaving the draw cord exposed on both sides of the convertible top material for installation.



REMOVAL AND INSTALLATION > CONVERTIBLE TOP TENSION CABLE > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > CONVERTIBLE TOP TROUGH ASSEMBLY > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

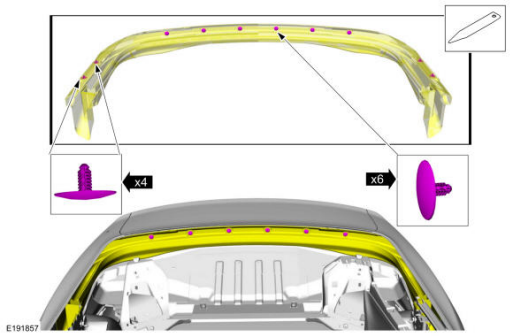
Many procedure views are with the convertible top in the fully closed position showing tension on the convertible top material. Actual position should be approximately 25-50 percent open allowing slack in the convertible top material and other components for serviceability.

1.

Remove the convertible top assembly. Refer to: Convertible Top Assembly .

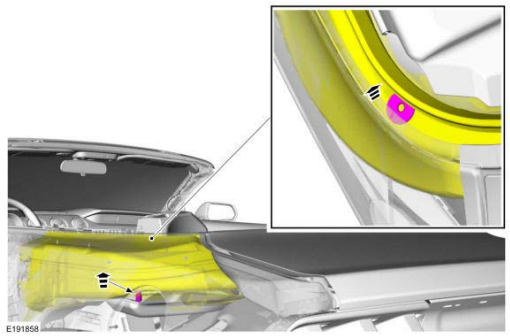
2.

Remove the convertible top trough assembly to inner body panel push pin retainers.



NOTE: LH shown, RH side similar.

3.
The water drain fitting should not be removed from the flexible water bag portion of the convertible top trough assembly. On both sides, from inside the convertible top trough assembly.Carefully pull up on the flexible water bag portion of the convertible top trough assembly and the water drain fitting to release the water drain fitting from the inner body panel grommet/drain hose.



NOTE: Make sure the body of the vehicle is fully covered with fender blankets or

equivalent or damage to the finish may result.

4.
Remove the trough assembly from the vehicle.

NOTE: Sub steps 1, 2 and 3 should be performed together as a single step.

1.
Pull the RH side of the convertible top trough assembly inward for clearance of the body side panels.

2.

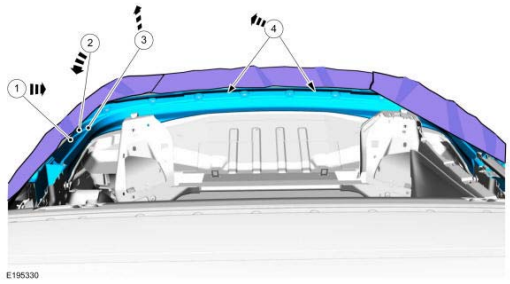
Roll the RH side of the convertible top trough assembly forward and slightly down for clearance of the rear body panels.

3.

Lift the RH rear of the convertible top trough assembly above the body panels.

4.

Remove the convertible top trough assembly toward the RH side of the vehicle.



REMOVAL AND INSTALLATION > CONVERTIBLE TOP TROUGH ASSEMBLY > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > STAY PAD

Special Tool(s) / General Equipment

Rivet Gun

Electric Drill

REMOVAL AND INSTALLATION > STAY PAD > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

Procedure views are with the convertible top in the fully closed position showing tension on the convertible top material, actual position should be approximately 25-50 percent open allowing slack in the convertible top material and other components for serviceability.

1.

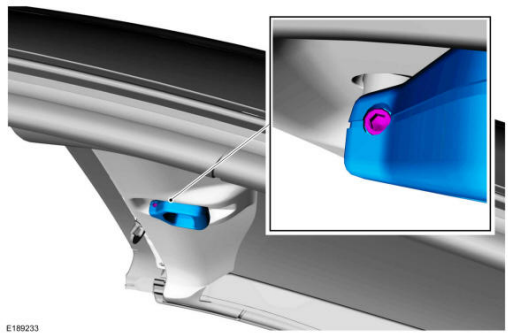
Refer to: Convertible Top Assembly .

2.

Remove the convertible top latch handle.

Torque

: 31 lb.in (3.5 Nm)



3.

Remove the convertible top front panel trim.

1.

Remove the convertible top front panel trim retainers on the front of the trim.

Torque

: 18 lb.in (2 Nm)

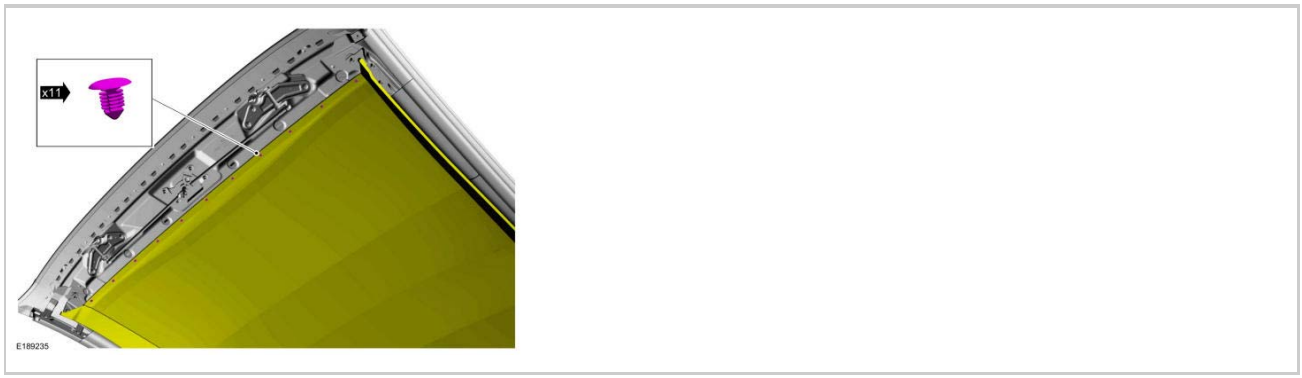
2.

Release the clips under the back of the convertible top front panel trim and remove the trim.



4.

Remove the headliner push pin retainers along the back of the convertible top front panel.



NOTE: LH side shown, RH side similar.

5.
On both sides, remove the headliner tension bracket retainers and bracket from the convertible top front panel.

Torque

: 25 lb.in (2.8 Nm)



NOTE: RH side shown, LH side similar.

6.

If any shims are present, note the position for installation. On both sides, remove the convertible top front panel side weatherstrip and bracket assembly.

1.

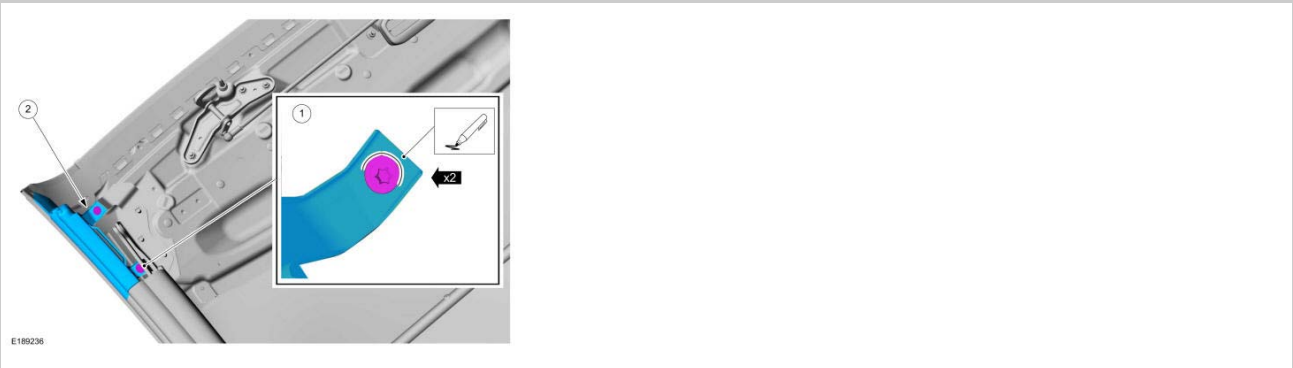
Mark the convertible top front panel side weatherstrip bracket assembly at the retainers for installation reference.

Torque

: 62 lb.in (7 Nm)

2.

Remove the convertible top front panel side weatherstrip and bracket assembly retainers and remove the weatherstrip/bracket assembly.



7.

Remove the convertible top material push pins at the back of the convertible top front panel.



8.

On both sides, disconnect the convertible top material from the front underside of the convertible top front panel.

1.

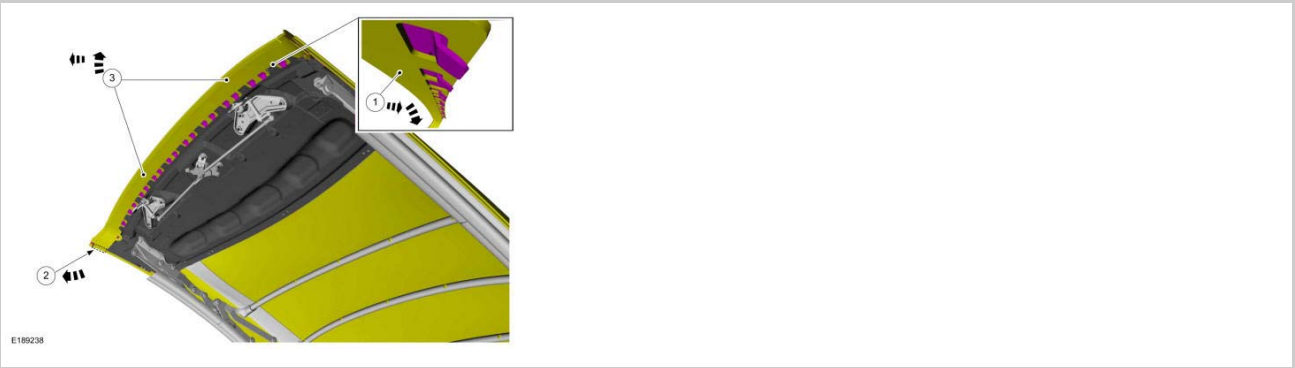
Pull the convertible top material backward and down to release from the convertible top front panel clips.

2.

Pull the convertible top material from the double sided tape securing the material to the convertible top front panel.

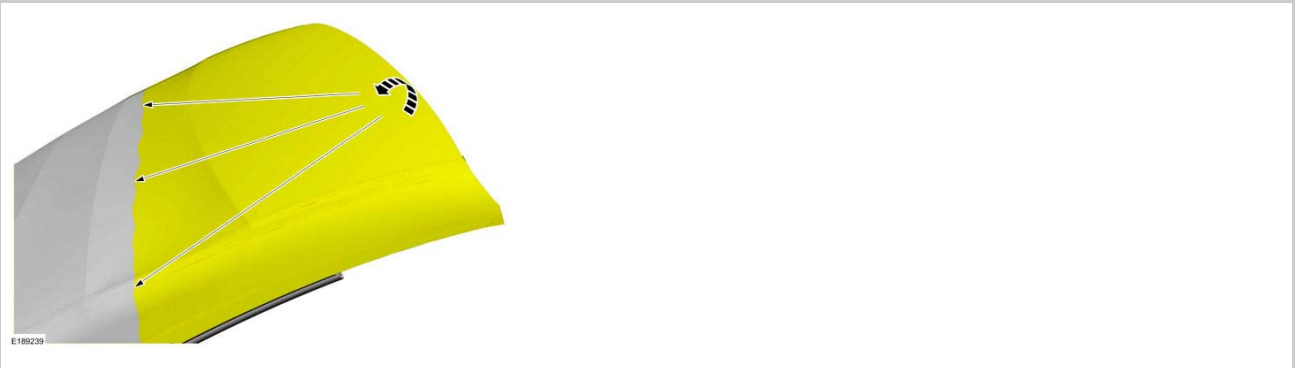
3.

Roll the convertible top material forward and up over the convertible top front panel.



9.

Fold the front of the convertible top material back to the first crossbow to expose the tension cable end and stay pad rivets.



NOTE: RH side shown, LH side similar.

10.
Disconnect the stay pad from the convertible top front panel.

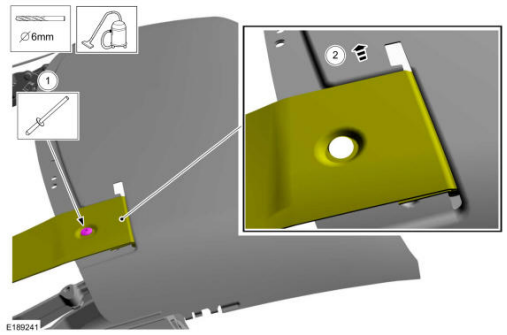
NOTE: All rivet shavings must be removed from the vehicle and convertible top assembly.

1.
Drill the stay pad rivets from the convertible top front panel. Use the General Equipment: Electric Drill Use the General Equipment: Rivet Gun

2.

Slide the stay pad to the center of the convertible top front panel to disconnect the stay

pad.



NOTE: Clean all rivet shavings from the vehicle after removing the rivets.

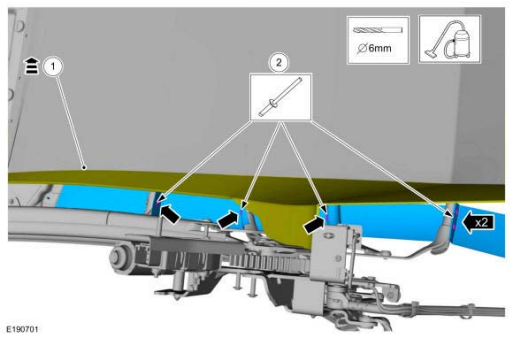
11.
RH side shown, LH side similar. Remove the stay pad to cross bow rivets.

1.

Pull the edge of the headliner inward to access the stay pad rivets.

NOTE: All rivet shavings must be removed from the vehicle and convertible top assembly.

2.
Drill out the stay pad rivets. Use the General Equipment: Electric Drill Use the General Equipment: Rivet Gun



NOTE: All rivet, shavings or pieces must be removed from all cross bows and the vehicle interior. Rivet ends left in any cross bow may result in a rattle condition.

12.
RH side shown, LH side similar. Remove all rivet pieces from inside two center cross bows.

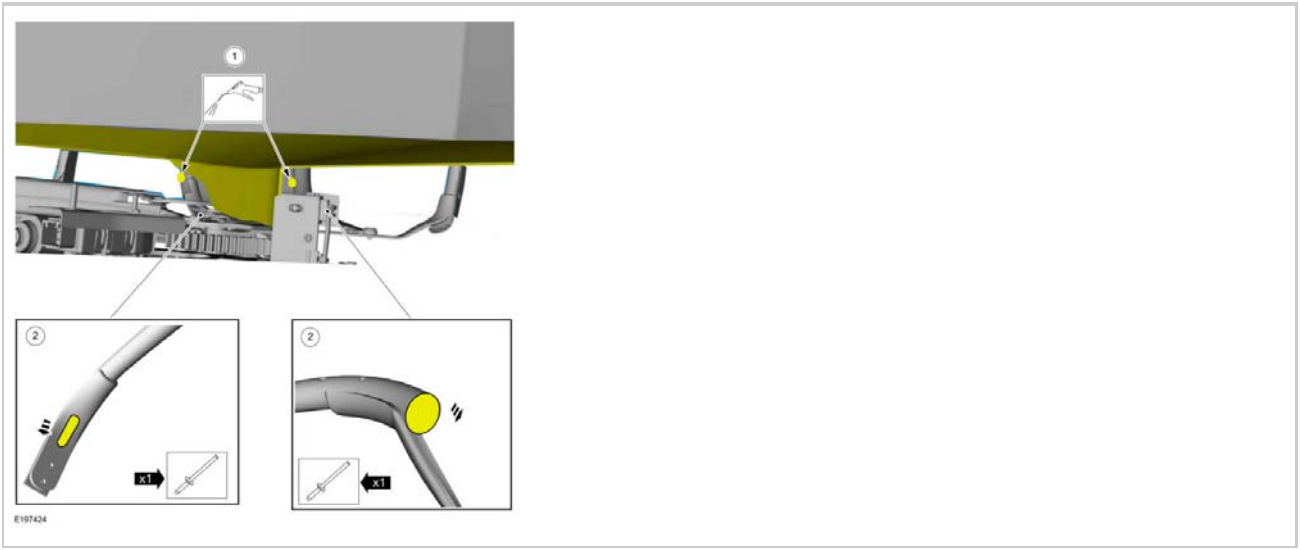
NOTE: It may be necessary to force compressed air into multiple rivet holes

in the cross bows to get all rivet pieces out of the cross bows.

1.
Using an air nozzle and compressed air, blow the two center cross bow to force the rivet pieces to the outer ends of the cross bows for removal.

NOTE: Check both ends of each cross bow to make sure all rivet pieces are removed from the vehicle

2.
At the ends of the cross bows, collect all rivet pieces and verify that all rivet ends are accounted for.



NOTE: All rivet, shavings or pieces must be removed from the front and rear cross bows and the vehicle interior. Rivet ends left in any cross bow may result in a rattle condition.

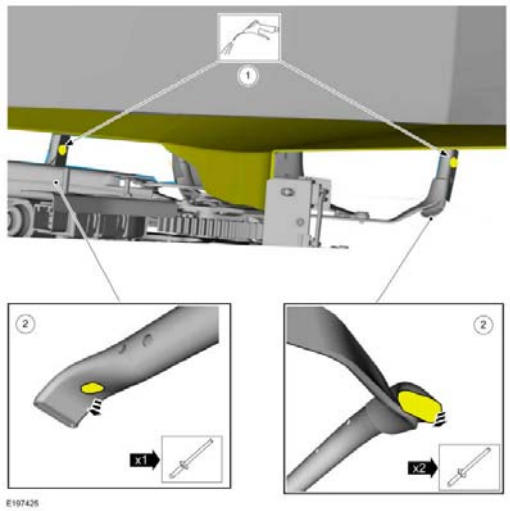
13.
RH side shown, LH side similar. Remove all rivet pieces from inside the front and rear cross bows.

NOTE: It may be necessary to force compressed air into multiple rivet holes in the cross bows to get all rivet pieces out of the cross bows.

1.
Using an air nozzle and compressed air, blow into the front and rear cross bows to force the rivet pieces to the outer ends of the cross bows for removal.

NOTE: Check both ends of each cross bow to make sure all rivet pieces are removed from the vehicle

2.
At the ends of the cross bows, collect all rivet pieces and verify that all rivet ends are accounted for.



NOTE: RH side shown, LH side similar.

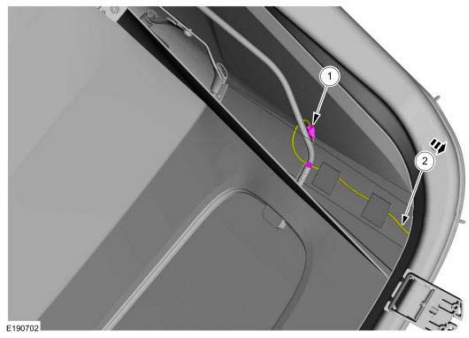
14.
Remove the wiring harness from the LH stay pad webbing.

1.

Disconnect the rear window wiring harness connector and routing connector, if equipped.

2.

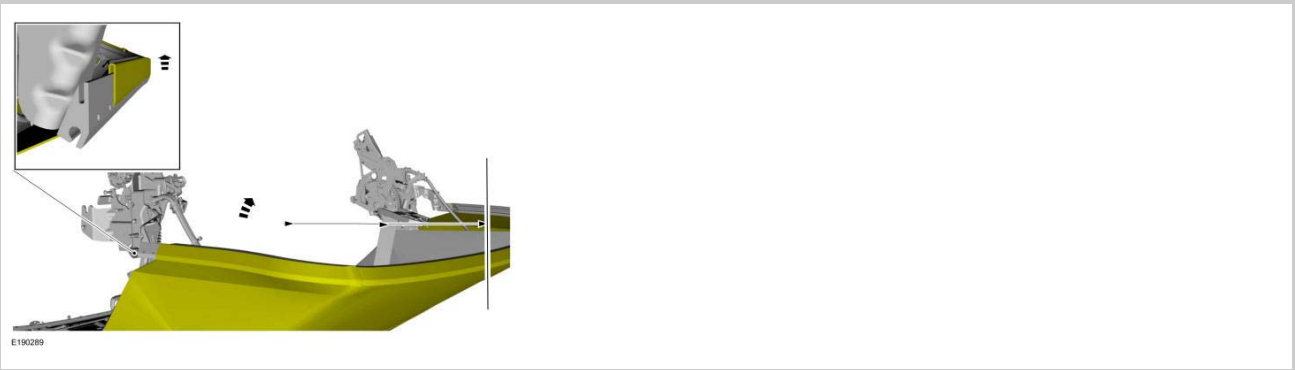
Route the wiring harness through the stay pad webbing.



NOTE: Make sure to remove the convertible top material retaining clips from the floating bow. The convertible top material retaining clips must be placed on the convertible top material in the proper locations when installing.

15.
RH side shown, LH side similar. Partially disconnect the convertible top material from the floating

bow.



NOTE: RH side shown, LH side similar.

16.
Remove the stay pad.

1.

Remove the stay pad retaining screw.

Torque

: 62 lb.in (7 Nm)

2.

Slide the tension belt out of the floating bow.



REMOVAL AND INSTALLATION > STAY PAD > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > TONNEAU COVER SENSOR > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

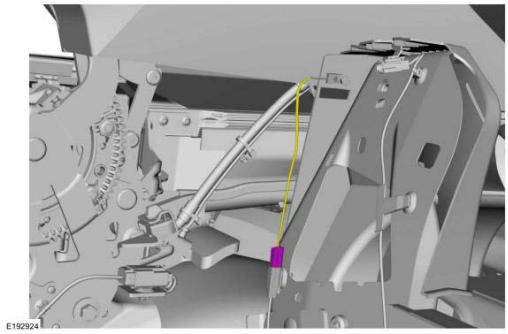
The tonneau cover sensor is part of the D-tower cover and must be replaced as an assembly.

1.

Remove the load space trim panel as necessary. Refer to: Loadspace Trim Panel - Convertible .

NOTE: RH side shown, LH side similar.

2.
Disconnect the harness connector.



NOTE: LH side shown, RH side similar.

3.
Remove the necessary D-tower cover.

1.

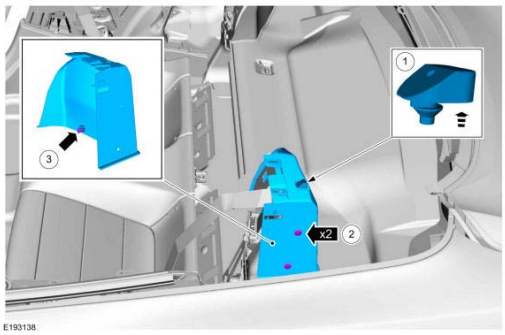
Remove the bumper stop.

2.

Remove the 2 pin-type retainers.

3.

Release the clip and remove the cover.



REMOVAL AND INSTALLATION > TONNEAU COVER SENSOR > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > LUGGAGE COMPARTMENT LID MOULDING > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

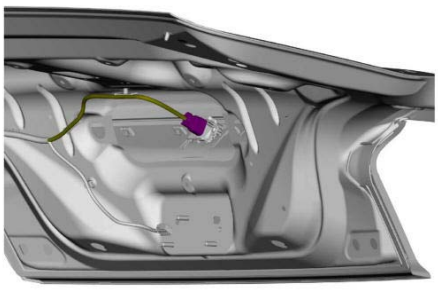
Remove the luggage compartment lid trim panel.



E184653

2.

Disconnect the rear parking aid camera electrical connector.



E184403

3.

Remove the screw covers.



4.

Remove the screws.

Torque

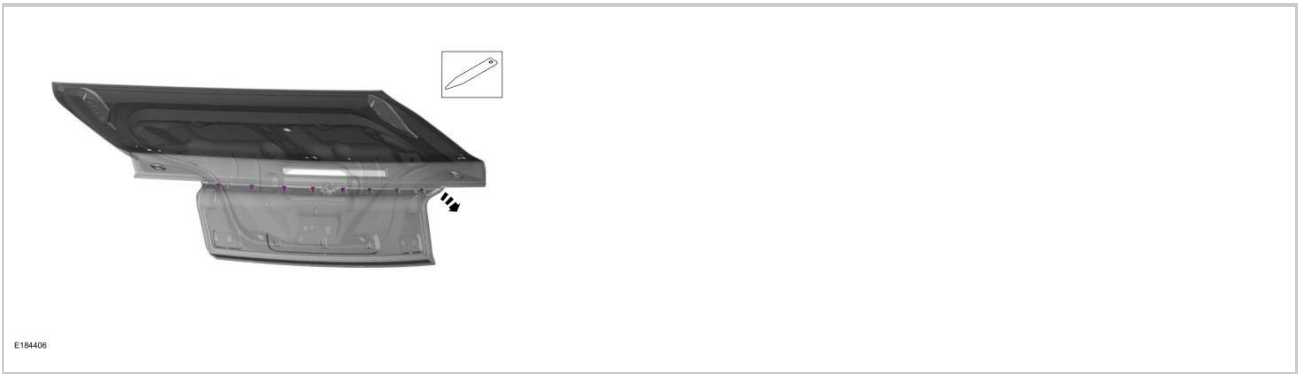
: 13 lb.in (1.5 Nm)



5.

Disengage the W-clips from the luggage compartment lid moulding using a non-marring trim removal tool.

Depress molded clips to disengage.



6.

Remove the luggage compartment lid moulding.



NOTE: If required, remove the attachment bracket.

7.
Remove the screws.

Torque

: 28 lb.in (3.2 Nm)



8.

Remove the luggage compartment lid moulding bracket.



REMOVAL AND INSTALLATION > LUGGAGE COMPARTMENT LID MOULDING > INSTALLATION

NOTE: Ensure the moulding engages luggage compartment lid bracket before the w-clips engage.

1.
To install, reverse the removal procedure.

2.

If installing a new moulding, configure the rear video camera following the instructions on the scan tool located using the following path: Electrical> Service Functions>LIN New Module Initialization.

REMOVAL AND INSTALLATION > REAR SPOILER > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

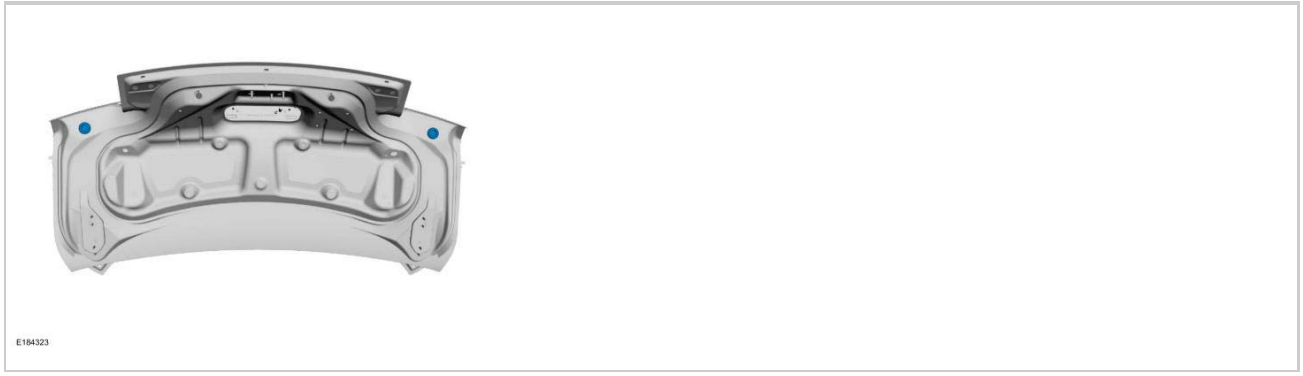
1.

Remove the luggage compartment lid trim panel.



2.

Remover the rubber grommets.

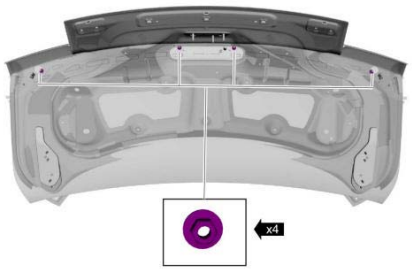


3.

Remove the nuts.

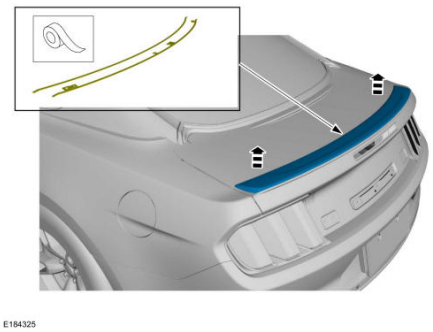
Torque

: 48 lb.in (5.4 Nm)



NOTE: The rear spoiler uses two-side adhesive tape to fasten the spoiler to the luggage compartment lid.

4.
Lift the rear spoiler to detach from the luggage compartment lid.



5.

Clean any residual adhesive and dirt from the luggage compartment lid surface.



REMOVAL AND INSTALLATION > REAR SPOILER > INSTALLATION

NOTE: When installing the spoiler, apply approximately 15 lbs. of pressure along the length of the spoiler to ensure adhesion of the two-side tape.

1.
To install, reverse the removal procedure.

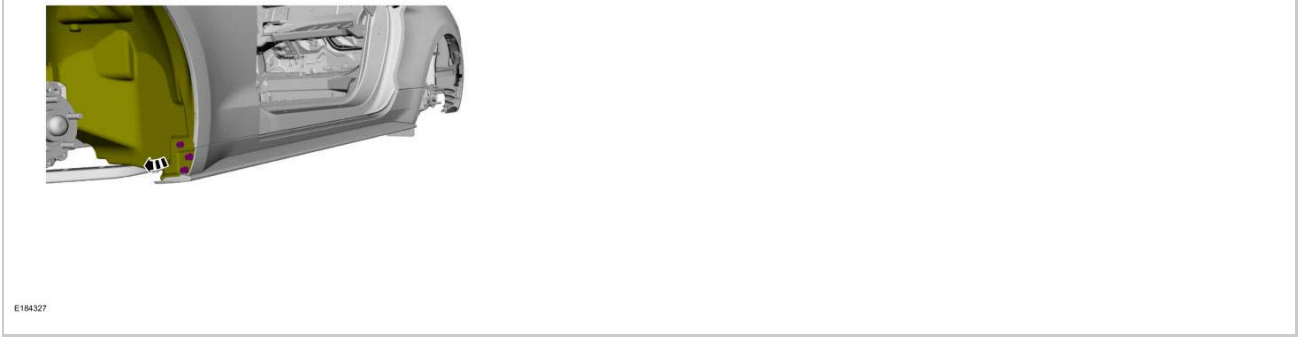
REMOVAL AND INSTALLATION > ROCKER PANEL MOULDING > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

NOTE: LH side shown in illustration below, RH side similar.

1.

Remove the 3 pushpin type retainers and partially position aside the splash shield.



2.

Remove the pushpin type retainers from the underside of the rocker panel moulding.



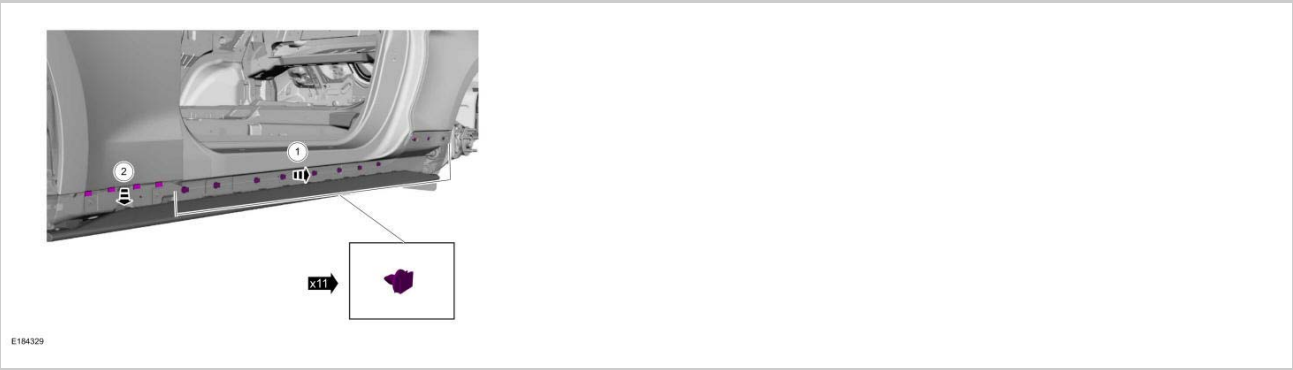
3.

1.

Starting at the rear of the rocker panel moulding, detach the retainers from the rocker panel.

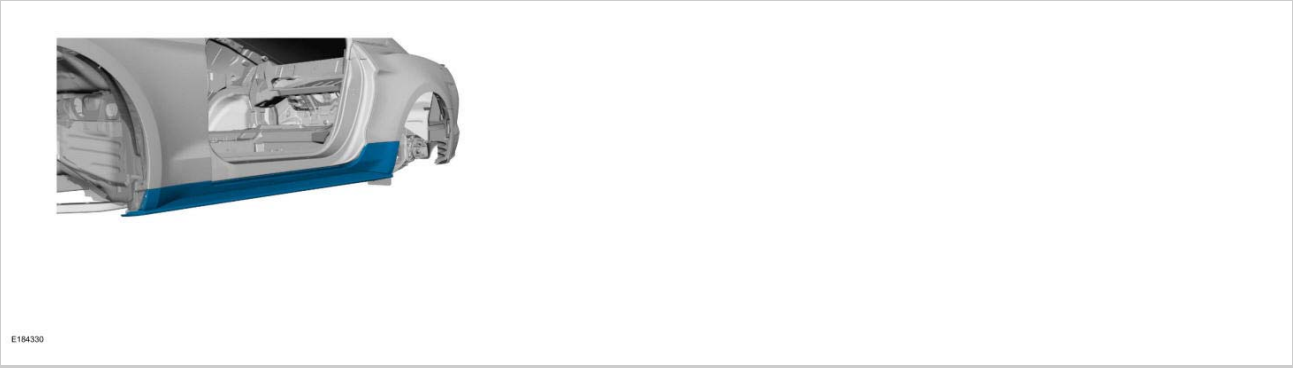
2.

Disengage the four tab retainers at the fender.



4.

Remove the rocker panel moulding.



REMOVAL AND INSTALLATION > ROCKER PANEL MOULDING > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > FRONT DOOR UPPER MOULDING > REMOVAL

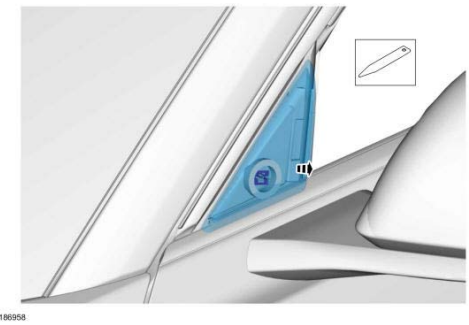
NOTE: Removal steps in this procedure may contain installation details.

LH side shown in illustration below, RH side similar.

Door glass must be in down position.

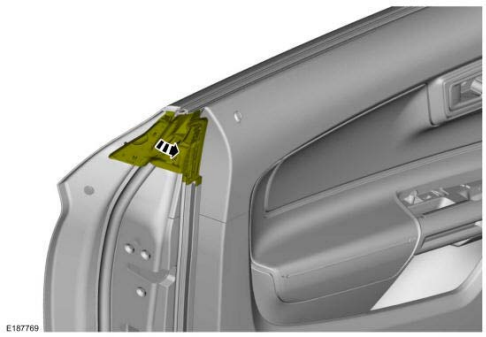
1.

Remove the door sail panel.



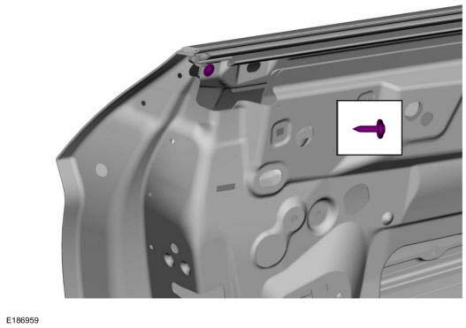
NOTE: Rear weatherstrip shown in illustration below, front is similar.

2.
Position aside the weatherstrip at the front and rear of door to access the fasteners.



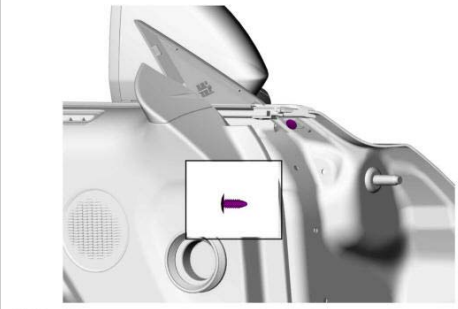
3.

Remove the screw at the rear of the upper door moulding.



4.

Remove the pin type retainer from the upper door moulding.



NOTE: Use care when disengaging the retainer tabs on the upper door moulding to avoid damage to the moulding.

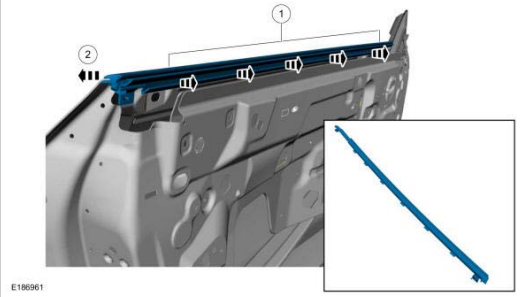
5.

1.

Disengage the tabs on the upper door moulding from the door, along the length of the moulding.

2.

Slide the upper door moulding rearward past the door sail panel and remove the moulding.



REMOVAL AND INSTALLATION > FRONT DOOR UPPER MOULDING > INSTALLATION

1.

To install, reverse the removal procedure.

Service Manual: FRONT END BODY PANELS

DESCRIPTION AND OPERATION > ACTIVE GRILLE SHUTTER - OVERVIEW > OVERVIEW

The active grille shutter system (when equipped) is comprised of the grille shutter assembly and the grille shutter actuator. The active grille shutter system is primarily used to maximize fuel economy by reducing aerodynamic drag on the vehicle. The active grille shutter system is also used to shorten engine warm-up time, increasing engine efficiency and providing heat to the vehicle occupants in a timely manner. The grille shutter actuator receives position commands from the PCM. The active grille shutter system carries out a calibration sequence whenever the engine is started, fully opening and closing the shutters before being positioned in the programmed position as requested by the PCM.

PCM inputs/outputs that may be used for controlling of grille shutters are the:

- ECT sensor
- IAT sensor
- A/C pressure transducer
- APP sensor
- ABS module (through the HS-CAN)
- AAT (ambient air temperature) sensor
- TCT (turbo charge temperature) sensor
- MCT (manifold charge temperature) sensor
- TOT (transmission oil temperature) sensor
- Engine cooling fan motor
- Engine oil temperature

DESCRIPTION AND OPERATION > ACTIVE GRILLE SHUTTER - SYSTEM OPERATION AND COMPONENT DESCRIPTION

System Operation

DESCRIPTION AND OPERATION > ACTIVE GRILLE SHUTTER - SYSTEM OPERATION AND COMPONENT DESCRIPTION > NETWORK MESSAGE CHART

PCM Network Input Messages

Broadcast Message	Originating Module	Message Purpose

Vehicle speed	ABS module	Vehicle speed is used to determine positioning of the grille shutters.

DESCRIPTION AND OPERATION > ACTIVE GRILLE SHUTTER - SYSTEM OPERATION AND COMPONENT DESCRIPTION > ACTIVE GRILLE SHUTTER

The grille shutter actuator positions the grille shutters based on commands from the PCM. The grille shutter moves 90 degrees from fully closed to fully open and, based on the position commanded by the PCM, is set in 1 of 16 positions (approximately 6 degrees between positions).

During normal operation, the grille shutter may be partially to fully open when the engine is off, depending on the ambient temperature. After an engine starting event, a calibration of the grille shutter system occurs, which typically takes 15-20 seconds. The grille shutter system performs the calibration sequence by detecting the end positions, open and closed. The calibration sequence can begin in either direction, open or closed, and continues until it is successful or a fault is sensed. A long pause may occur between the 2 portions (open/close) of the calibration sequence. If certain faults are present (shutter blocked or actuator error), a recalibration is initiated in an attempt to resolve the problem. If the problem is not resolved after a calibrated number of attempts (usually 3 or 4), a timer starts and sets a DTC when the timer reaches a predetermined limit. Other faults also trigger a recalibration request, but not until a grille shutter DTC is set in the PCM.

The PCM communicates the desired position (open or closed) of the grille shutter based on various PCM inputs (vehicle speed, coolant temperature, ambient temperature, A/C system pressure, etc.). The PCM communicates to the grille shutter actuator via a LIN. The LIN supports bi-directional communication between the grille shutter actuator and PCM, allowing the grille shutter actuator to communicate position and fault information to the PCM.

The PCM sets grille shutter Diagnostic Trouble Codes (DTCs) when the fault information is communicated by the grille shutter actuator for a predetermined amount of time. Any failures of the LIN for over 10 seconds continuously results in the grille shutter actuator positioning the grille shutter fully open. There is no indication to the driver of the vehicle when a fault with the grille shutter system is present or a grille shutter DTC is set in the PCM.

Component Description

Grille Shutter Actuator

The grille shutter actuator is a smart motor which receives position requests from the PCM via the LIN. One of the grille shutter blinds connects to the grille shutter actuator using a retainer. The grille shutter actuator can be serviced individually or as an entire assembly, which includes the grille shutter, grille shutter actuator, retainer, housing and jumper harness.

Grille Shutter

The grille shutter is comprised of shutter blinds which are linked to each other. One of the individual shutter blinds is fixed to the grille shutter actuator. When the grille shutter actuator moves, it moves the attached shutter which causes the other linked shutters to move. The grille shutter is serviced as an assembly (individual shutter blinds are not serviceable) or as an entire assembly, which includes the grille shutter, grille shutter actuator, retainer, housing and jumper harness.

DIAGNOSIS AND TESTING > ACTIVE GRILLE SHUTTER > DTC CHART: POWERTRAIN CONTROL MODULE (PCM)

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

Powertrain Control Module (PCM) DTC Chart

DTC	Description	Action
P059F	Active Grille Air Shutter "A" Performance / Stuck Off	GO to Pinpoint Test A
P05A1	Active Grille Air Shutter "A" Position Sensor Minimum / Maximum Stop Performance	GO to Pinpoint Test A
P05A2	Active Grille Air Shutter "A" Control Circuit / Open	INSTALL a new grille shutter actuator. REFER to: Active Grille Shutter Actuator .
P05A7	Active Grille Air Shutter Control Module "A" Supply Voltage Circuit Low	GO to Pinpoint Test A
P05C0	Active Grille Air Shutter Module "A" Over Temperature	INSTALL a new grille shutter actuator. REFER to: Active Grille Shutter Actuator .
U0046	Vehicle Communication Bus C	GO to Pinpoint Test A
U0284	Lost Communication With Active Grille Air Shutter Module "A"	GO to Pinpoint Test A
All other Diagnostic Trouble Codes (DTCs)	-	Refer to the appropriate article for the procedure.

DIAGNOSIS AND TESTING > ACTIVE GRILLE SHUTTER > SYMPTOM CHART(S)

Symptom Chart: Active Grille Shutter

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

Symptom Chart

Condition	Possible Sources	Actions
The active grille shutter is inoperative or does not operate correctly	Refer to the Pinpoint Test	GO to Pinpoint Test A

DIAGNOSIS AND TESTING > ACTIVE GRILLE SHUTTER > PINPOINT TEST(S) > PINPOINT TEST A : THE ACTIVE GRILLE SHUTTER IS INOPERATIVE OR DOES NOT OPERATE CORRECTLY

Refer to Cooling Fan for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Active Grille Shutter - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
P059F	Active Grille Air Shutter "A" Performance / Stuck Off	When the grille shutter actuator senses it is unable to move the grille shutter, it sends a message to the PCM via the LIN. The PCM sets this DTC when the fault is communicated for a predetermined amount of time.
P05A1	Active Grille Air Shutter "A" Position Sensor Minimum / Maximum Stop Performance	When the grille shutter actuator senses it is unable to obtain a fully open or closed position of the grille shutter, it sends a message to the PCM via the LIN. The PCM then sets the DTC when the fault is communicated for a predetermined amount of time.
P05A7	Active Grille Air Shutter Control Module "A" Supply Voltage Circuit Low	When the grille shutter actuator senses low voltage, it sends a message to the PCM via the LIN. The PCM sets this DTC when the fault is communicated for a predetermined amount of time.
U0046	Vehicle Communication Bus C	This DTC sets when the PCM detects a short to voltage, ground or open in the LIN.
U0284	Lost Communication With Active Grille Air Shutter Module "A"	When the PCM does not receive communication from the grille shutter actuator for a predetermined amount of time, the PCM sets this DTC.

Possible Causes

- Fuse
- Wiring, terminals or connectors

- Grille shutter actuator
- Active grille shutter
- PCM

Visual Inspection and Diagnostic Pre-checks

- Verify BJB fuse 85 (15A) is OK.
- Make sure the grille opening does not have any debris or other obstructions that inhibit operation of the grille shutter.
- Make sure the grille shutter actuator electrical connector is not disconnected.

DIAGNOSIS AND TESTING > ACTIVE GRILLE SHUTTER > PINPOINT TEST(S) > PINPOINT TEST A : THE ACTIVE GRILLE SHUTTER IS INOPERATIVE OR DOES NOT OPERATE CORRECTLY > PINPOINT TEST A : THE ACTIVE GRILLE SHUTTER IS INOPERATIVE OR DOES NOT OPERATE CORRECTLY

A1 RETRIEVE THE PCM (POWERTRAIN CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition ON.

Using a diagnostic scan tool, perform PCM self-test.

Is DTC DTC P05A7, U0046 or U0284 present?

Yes	GO to A2

No	For DTC P059F or P05A1, GO to A7 For all other PCM Diagnostic Trouble Codes (DTCs), Refer to the appropriate article for the procedure.

A2 CHECK THE VOLTAGE SUPPLY TO THE GRILLE SHUTTER ACTUATOR

Ignition OFF.

Disconnect: Grille Shutter Actuator C1651 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1651-3		Ground

Is the voltage greater than 11 volts?

Yes	GO to A3

No	VERIFY BJB fuse 85 (15A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the cause of the circuit short.

A3 CHECK THE GRILLE SHUTTER ACTUATOR GROUND CIRCUIT FOR AN OPEN

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1651-1	Ω	Ground

Is the resistance less than 3 ohms?

Yes	For DTC U0046 or U0284, GO to A4 For DTC P05A7, GO to A9

No	REPAIR the circuit.

A4 CHECK THE LIN (LOCAL INTERCONNECT NETWORK) CIRCUIT FOR AN OPEN

Ignition OFF.

Disconnect: PCM C1551B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1651-2	Ω	C1551B-50

Is the resistance less than 3 ohms?

Yes	GO to A5

No	REPAIR the circuit.

A5 CHECK THE LIN (LOCAL INTERCONNECT NETWORK) CIRCUIT FOR A SHORT TO VOLTAGE

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead

C1651-2		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to A6

A6 CHECK THE LIN (LOCAL INTERCONNECT NETWORK) CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1651-2	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	For DTC U0046 or U0248, GO to A10 For all other Diagnostic Trouble Codes (DTCs), GO to A9

No	REPAIR the circuit.

A7 VERIFY THE GRILLE SHUTTER OPERATION USING THE GRILLE SHUTTER A POSITION - COMMANDED (GRILL_A_CMD) PARAMETER IDENTIFICATION (PID)

Start the engine and allow it to idle for at least 30 seconds to allow for the grille shutter calibration to complete.

Using a diagnostic scan tool, view PCM Parameter Identifications (PIDs).

Using a diagnostic scan tool, select the PCM GRILL_A_CMD Parameter Identification (PID) and active command the grille shutter from 100% (open) to 0% (closed) while observing the grille shutter operation from the front of the vehicle.

Does the grille shutter fully open and close when commanded by the diagnostic scan tool?

Yes	The grille shutter system is operating correctly at this time. The concern may have been caused by debris/obstruction or the grille shutter actuator electrical connector. INSPECT the electrical connector and REPAIR or REPLACE as necessary.

No	GO to A8

A8 CHECK THE GRILLE SHUTTER FOR OBSTRUCTIONS AND/OR MECHANICAL BINDING CONCERNS

Ignition OFF.

Remove the grille shutter actuator.

Manually open and close the grille shutter, removing any obstructions which can inhibit operation of the grille shutter or linkage. The grille shutter should open and close easily with no binding.

Does the grille shutter operate freely with no binding or obstruction?

Yes	GO to A9

No	REPAIR the binding/obstruction, or if necessary, INSTALL a new grille shutter assembly. REFER to: Active Grille Shutter .

A9 CHECK FOR CORRECT GRILLE SHUTTER ACTUATOR OPERATION

Ignition OFF.

Disconnect: Grille Shutter Actuator C1651 (if not previously disconnected).

Inspect the grille shutter actuator electrical connector and jumper harness.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins as necessary

pushed-out pins - install new pins as necessary

Reconnect the grille shutter actuator connector, jumper harness and all previously disconnected system connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new grille shutter actuator. REFER to: Active Grille Shutter Actuator .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

A10 CHECK FOR THE CORRECT GRILLE SHUTTER ACTUATOR OPERATION

Inspect the grille shutter actuator and PCM electrical connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins as necessary

pushed-out pins - install new pins as necessary

Reconnect the grille shutter actuator connector, jumper harness and all previously disconnected system connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new grille shutter actuator. REFER to: Active Grille Shutter Actuator . CLEAR the Diagnostic Trouble Codes (DTCs). REPEAT the self-test. If the concern is still present, INSTALL a new PCM. Refer to the appropriate article for the procedure.

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

REMOVAL AND INSTALLATION > ACTIVE GRILLE SHUTTER > REMOVAL

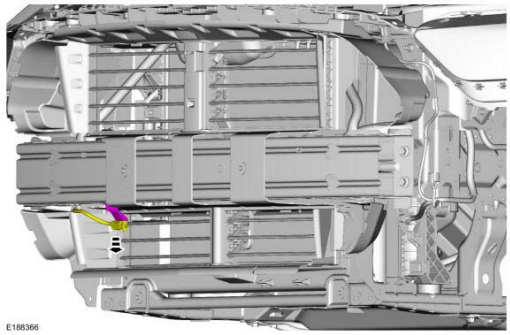
NOTE: Removal steps in this procedure may contain installation details.

1.

Refer to: Front Bumper Cover .

2.

Detach the ambient air temperature sensor.

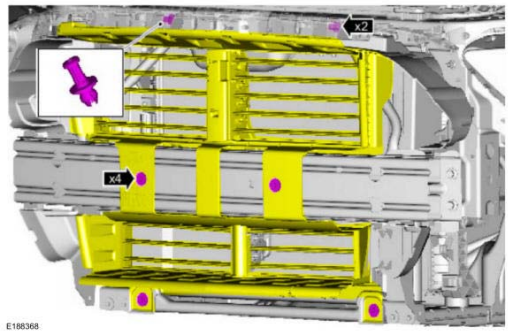


3.

Remove the retainers and bolts and position the active grille shutter forward.

Torque

: 71 lb.in (8 Nm)



NOTE: Radiator and condenser removed for clarity.

4.

1.

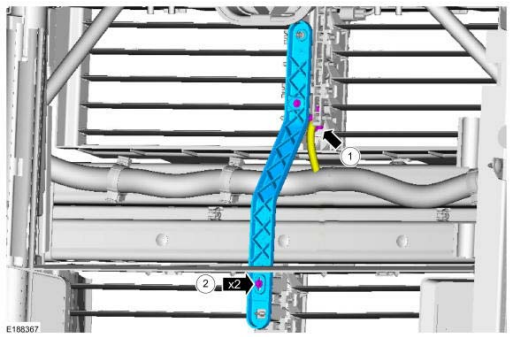
Disconnect the active grille shutter actuator electrical connector.

2.

Remove the retainers and the bridge link.

Torque

: 27 lb.in (3 Nm)



5.

Remove the active grille shutter.



REMOVAL AND INSTALLATION > ACTIVE GRILLE SHUTTER > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > ACTIVE GRILLE SHUTTER ACTUATOR > REMOVAL

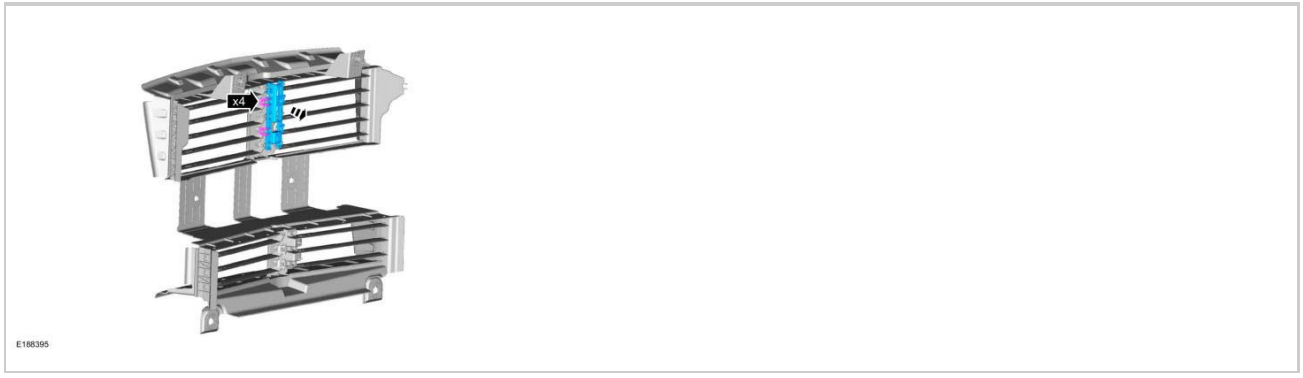
NOTE: Removal steps in this procedure may contain installation details.

1.

Remove the active grille shutter assembly. Refer to: Active Grille Shutter .

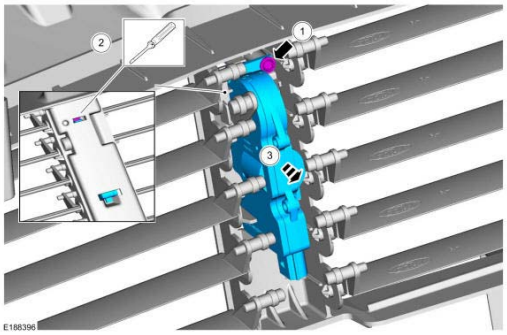
2.

Remove the upper linkage.



3.

Remove the retainer. Using a screwdriver, push up on the clip and remove the active grille shutter actuator.



REMOVAL AND INSTALLATION > ACTIVE GRILLE SHUTTER ACTUATOR > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > COWL PANEL GRILLE > REMOVAL

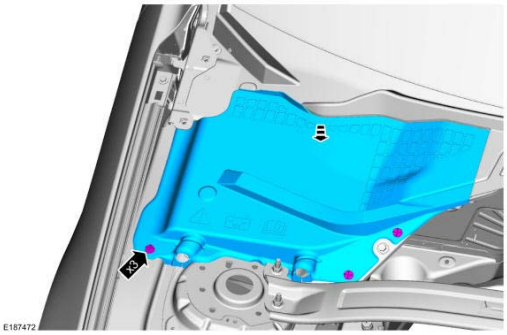
NOTE: LHD shown, RHD similar.

1.

Remove the wiper pivot arms. Refer to: Windshield Wiper Pivot Arm .

2.

Remove the retainers and the battery cover.



3.

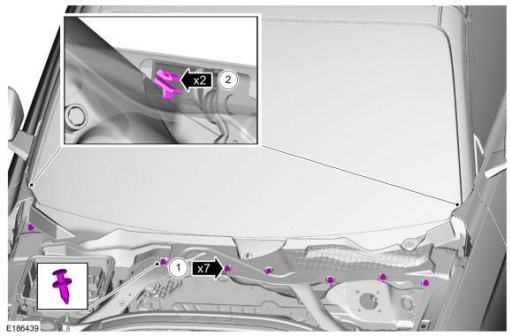
Remove the retainers and the clips.

1.

Remove the retainers.

2.

Depress and remove the clips.



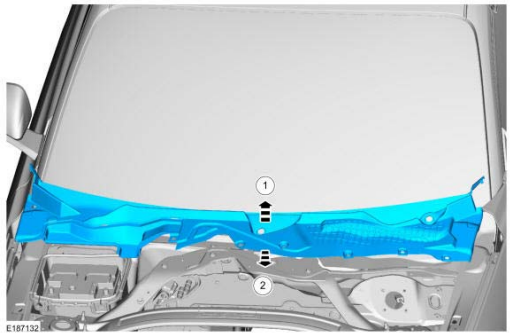
4.

1.

Lift the cowl panel grille up.

2.

Pull the cowl panel grille out and remove.



REMOVAL AND INSTALLATION > COWL PANEL GRILLE > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > FENDER SPLASH SHIELD > REMOVAL

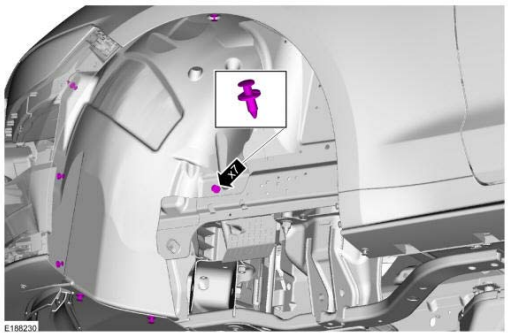
NOTE: LH side shown, RH side similar.

1.

Remove the wheel and tire. Refer to: Wheel and Tire .

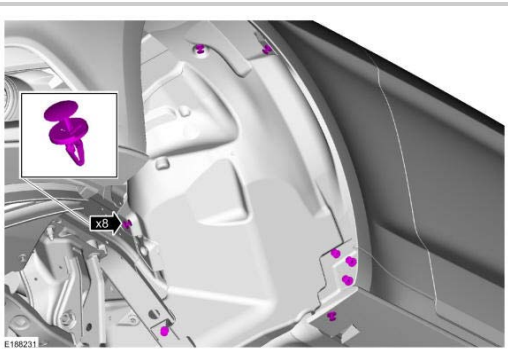
2.

Remove the retainers.



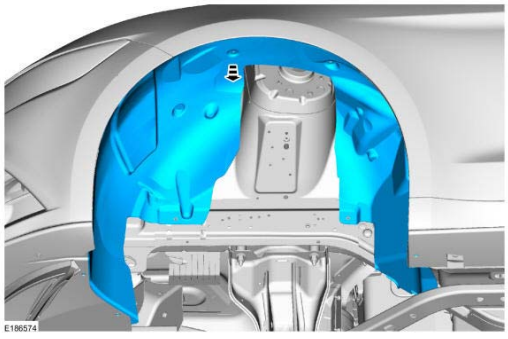
3.

Remove the retainers.



4.

Remove the fender splash shield.



REMOVAL AND INSTALLATION > FENDER SPLASH SHIELD > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > FENDER > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

NOTE: LH side shown, RH side similar.

1.

Remove the fender splash shield. Refer to: Fender Splash Shield .

2.

Remove the rocker panel moulding. Refer to: Rocker Panel Moulding .

3.

Remove the bolts.

Torque

: 106 lb.in (12 Nm)

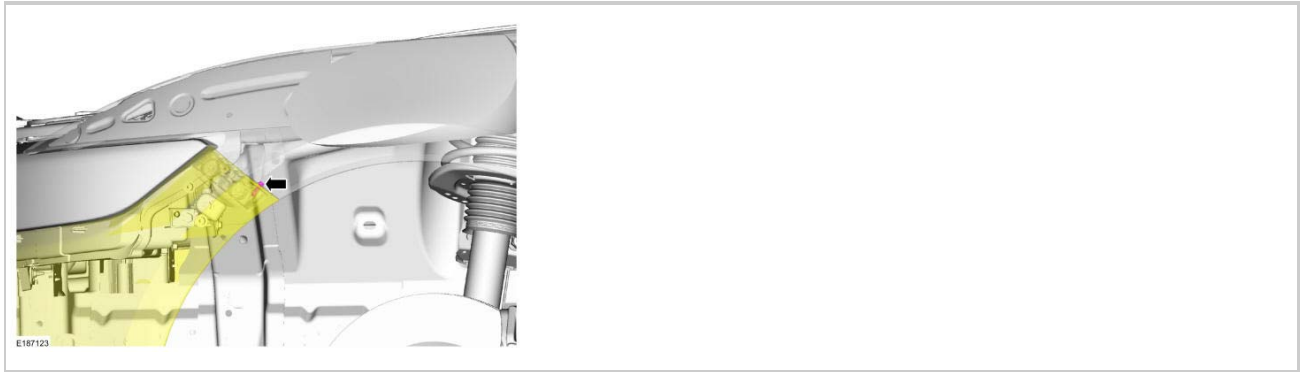


4.

Remove the bolt and separate the front bumper cover from the fender bracket.

Torque

: 18 lb.in (2 Nm)



5.

1.

Remove the headlamp assembly bolt.

Torque

: 27 lb.in (3 Nm)

2.

Remove the fender bolt.

Torque

: 106 lb.in (12 Nm)



6.

Remove the cowl panel grille to fender clip.



7.

Remove the bolt.

Torque

: 80 lb.in (9 Nm)



8.

1.

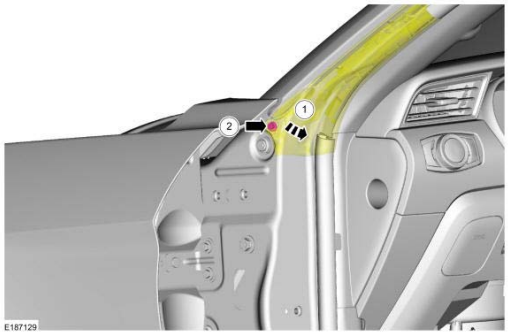
Position aside the door weatherstrip.

2.

Remove the bolt.

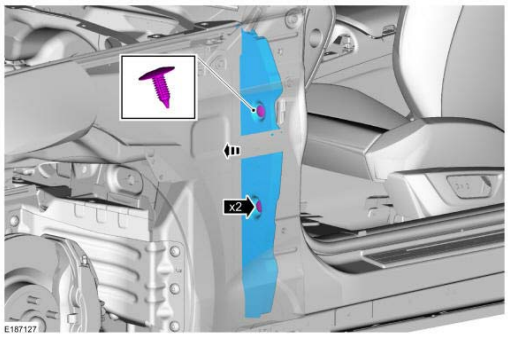
Torque

: 80 lb.in (9 Nm)



9.

Remove the retainers and sound insulation.

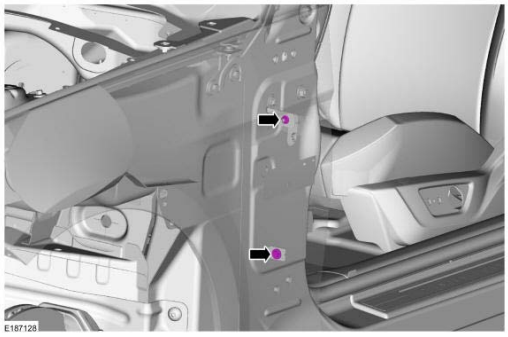


10.

Remove the bolt and nut.

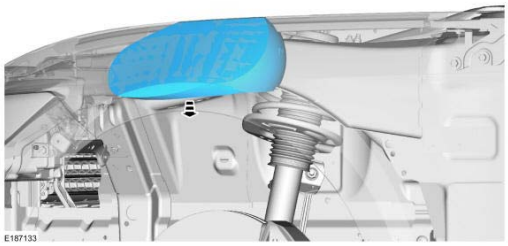
Torque

: 106 lb.in (12 Nm)



11.

Remove the sound insulation.



12.

Remove the bolts and the fender.

Torque

: 106 lb.in (12 Nm)



REMOVAL AND INSTALLATION > FENDER > INSTALLATION

1.

To install, reverse the removal procedure.

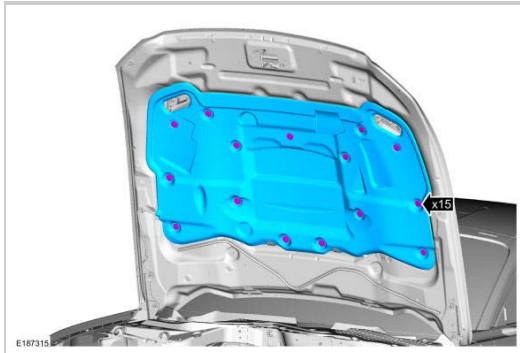
REMOVAL AND INSTALLATION > HOOD > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

All vehicles

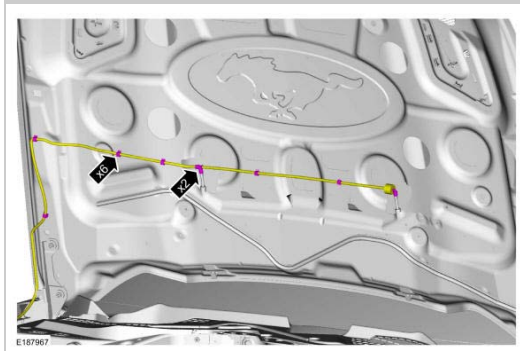
1.

Remove the retainers and hood insulation.



2.

Detach the windshield washer hose retainers and couplings.



Vehicles equipped with hood scoop

NOTE: This step is only necessary when installing a new component.

3.
Remove the nuts and the brackets.

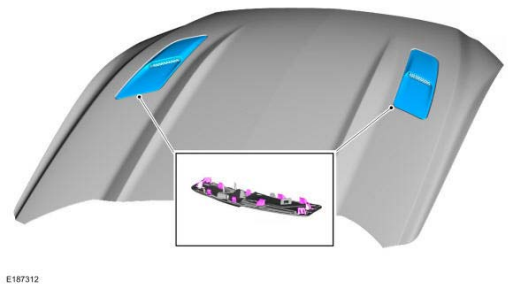
Torque

: 27 lb.in (3 Nm)



NOTE: This step is only necessary when installing a new component.

4.
Remove the scoop assembly.



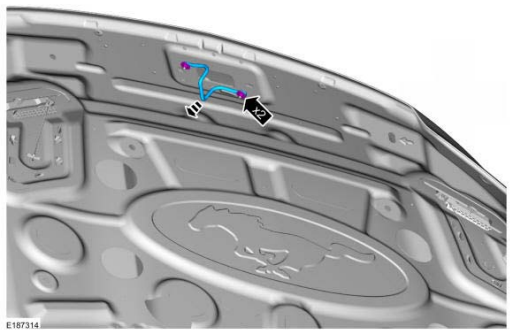
All vehicles

NOTE: This step is only necessary when installing a new component.

5.
Remove the striker latch to hood bolts and the striker latch.

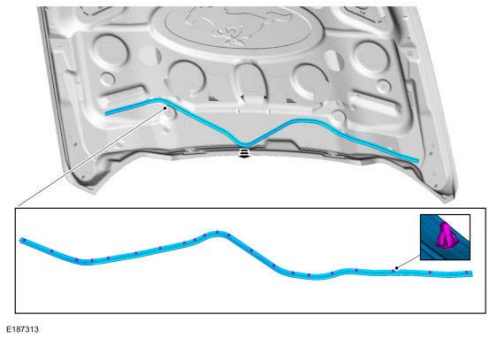
Torque

: 106 lb.in (12 Nm)



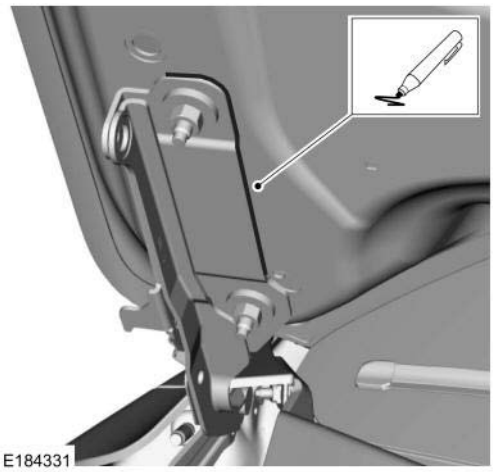
NOTE: This step is only necessary when installing a new component.

6.
Remove the retainers and the hood pad assembly.



NOTE: RH side shown, LH side similar.

7.
Index-mark the hood hinge location to aid in hood installation.

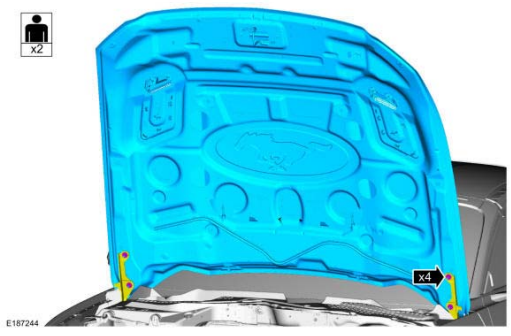


NOTE: An assistant is necessary for the removal of the hood.

8.
Remove the nuts and the hood.

Torque

: 17 lb.ft (23 Nm)



REMOVAL AND INSTALLATION > HOOD > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Check the hood alignment. Align the hood as necessary. Refer to: Hood Alignment .

Service Manual: FRONT END SHEET METAL REPAIRS

REMOVAL AND INSTALLATION > FENDER APRON PANEL REINFORCEMENT

Special Tool(s) / General Equipment

Resistance Spotwelding Equipment
Grinder
MIG/MAG Welding Equipment
Spot Weld Drill Bit
Locking Pliers

Materials

Name	Specification
Seam Sealer TA-2-B	-

REMOVAL AND INSTALLATION > FENDER APRON PANEL REINFORCEMENT > REMOVAL

1.

Remove the following items:

Refer to: Hood .

Refer to: Fender .

Refer to: Headlamp Assembly .

2.

RH side. Refer to: Battery .

3.

If required, dimensionally restore vehicle to pre-accident condition. Refer to: Body and Frame .

NOTE: LH side shown, RH similar.

4.
Drill out the spot welds from upper fender apron reinforcement. Use the General Equipment: Spot Weld Drill Bit Use the General Equipment: Grinder



5.

Grind welds at rear flange of the reinforcement. Use the General Equipment: Grinder



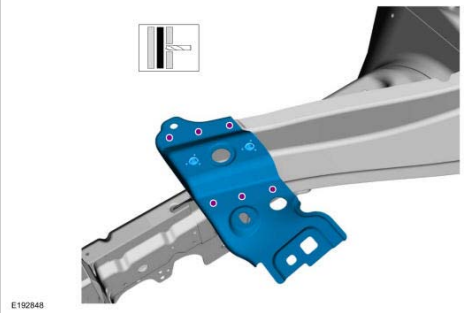
6.

Remove the upper fender apron reinforcement.



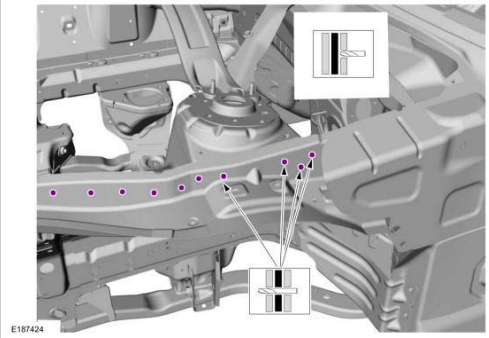
7.

Drill out the welds from upper fender apron reinforcement bracket and remove. Use the General Equipment: Spot Weld Drill Bit



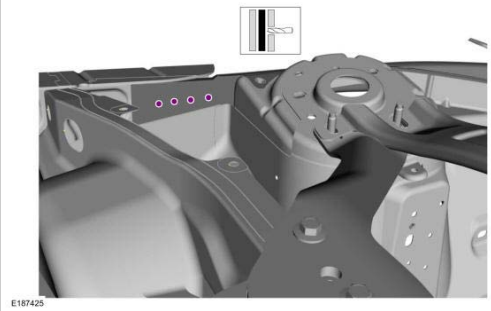
8.

Drill out the welds on the lower fender apron reinforcement as indicated. Use the General Equipment: Spot Weld Drill Bit



9.

Remove the welds at the rear inner flange of the reinforcement. Use the General Equipment: Spot Weld Drill Bit



10.

Drill out the welds at the reinforcement bracket.



11.

Remove the lower fender apron reinforcement.



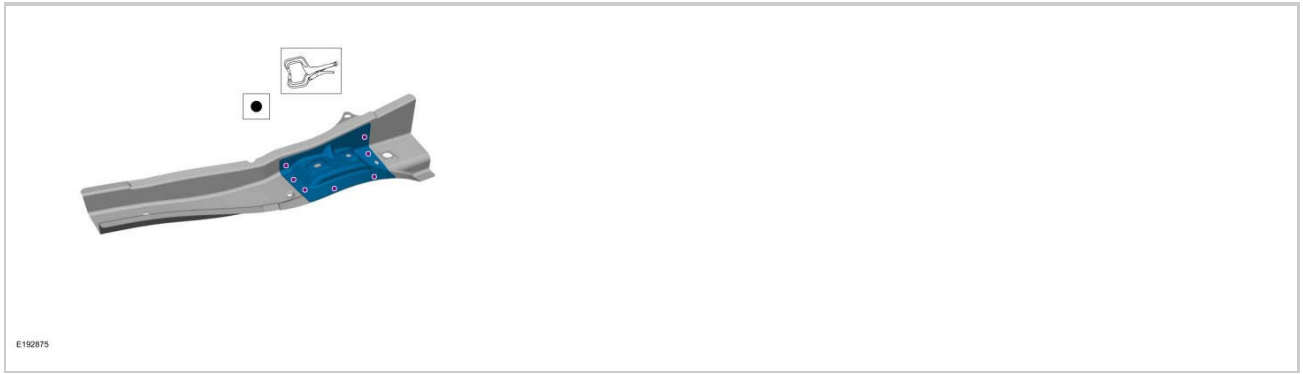
REMOVAL AND INSTALLATION > FENDER APRON PANEL REINFORCEMENT > INSTALLATION

1.

Refer to: Joining Techniques .

2.

Install the apron panel reinforcement to the lower apron panel reinforcement and spot weld. Use the General Equipment: Locking Pliers Use the General Equipment: Resistance Spotwelding Equipment



3.

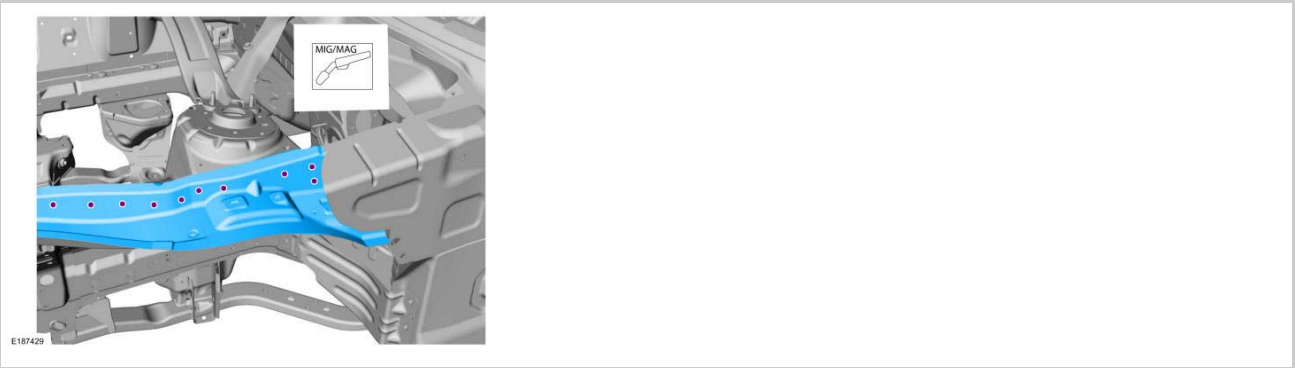
1.

Drill plug weld holes in the replacement panel.



4.

Install the lower fender apron panel reinforcement and plug weld. Use the General Equipment: MIG/MAG Welding Equipment



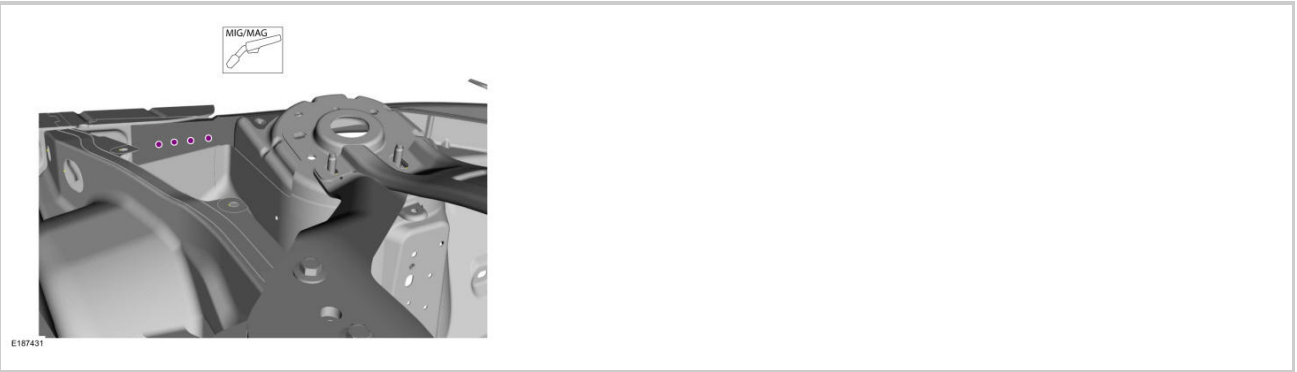
5.

Weld the bracket reinforcement to the fender apron panel. Use the General Equipment: Resistance Spotwelding Equipment



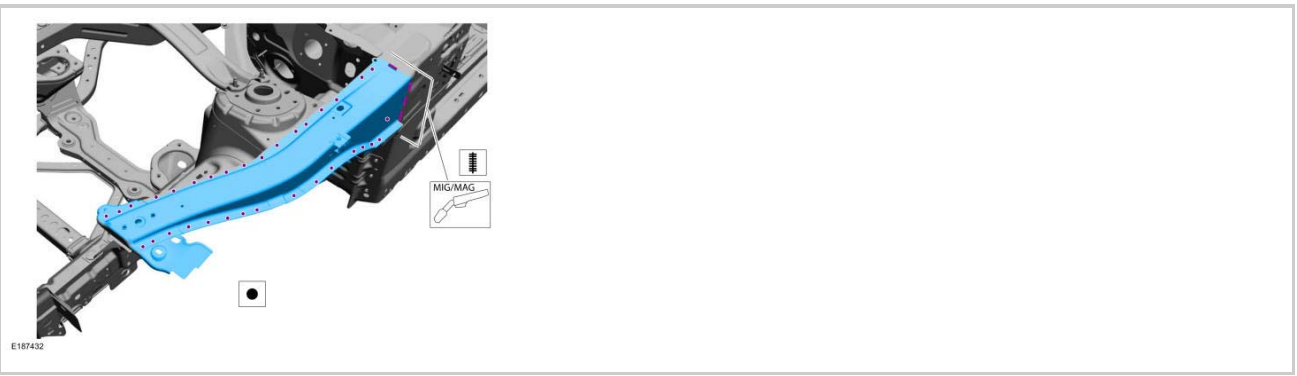
6.

Plug weld the rear inner flange of the lower fender apron panel. Use the General Equipment: MIG/MAG Welding Equipment



7.

Install the upper fender apron reinforcement and bracket weld. Use the General Equipment: MIG/MAG Welding Equipment Use the General Equipment: Resistance Spotwelding Equipment



8.

Finish the repair area using typical metal finishing techniques.

9.

Sealing work: All areas must be sealed to production level.

Material

: Seam Sealer / TA-2-B

10.

Refinish using a Ford approved paint system.

11.

Restore corrosion protection. Refer to: Corrosion Prevention .

12.

Install the following items:

Refer to: Hood .

Refer to: Fender .

Refer to: Headlamp Assembly .

13.

RH side. Refer to: Battery .

REMOVAL AND INSTALLATION > FRONT SIDE MEMBER AND FENDER APRON PANEL LH

Special Tool(s) / General Equipment

Resistance Spotwelding Equipment
Air Body Saw
8 mm Drill Bit
MIG/MAG Welding Equipment
Spot Weld Drill Bit
Locking Pliers

Materials

Name	Specification
Seam Sealer TA-2-B	-

REMOVAL AND INSTALLATION > FRONT SIDE MEMBER AND FENDER APRON PANEL LH > REMOVAL

1.

If required, dimensionally restore vehicle to pre-accident condition. Refer to: Body and Frame .

2.

Refer to: Fender Apron Panel Reinforcement .

3.

Remove the following items:

Refer to: Front Bumper .

Refer to: Front Subframe - 2.3L EcoBoost (201kW/273PS) .

Refer to: Front Subframe - 3.7L Duratec (227kW/301PS)/5.0L 32V Ti-VCT/5.2L 32V Ti-VCT .

2.3L Refer to: Radiator .

3.7L Refer to: Radiator .

5.0L Refer to: Radiator .

2.3L Refer to: Engine .

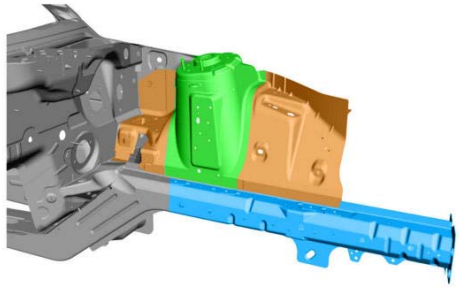
3.7L Refer to: Engine .

5.0L Refer to: Engine .

NOTE: Individual apron panels can be serviced as required.

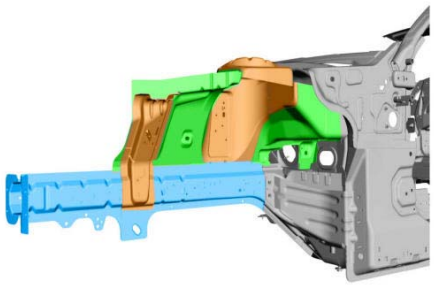
NOTE: LH side shown, RH similar.

4.
Overview



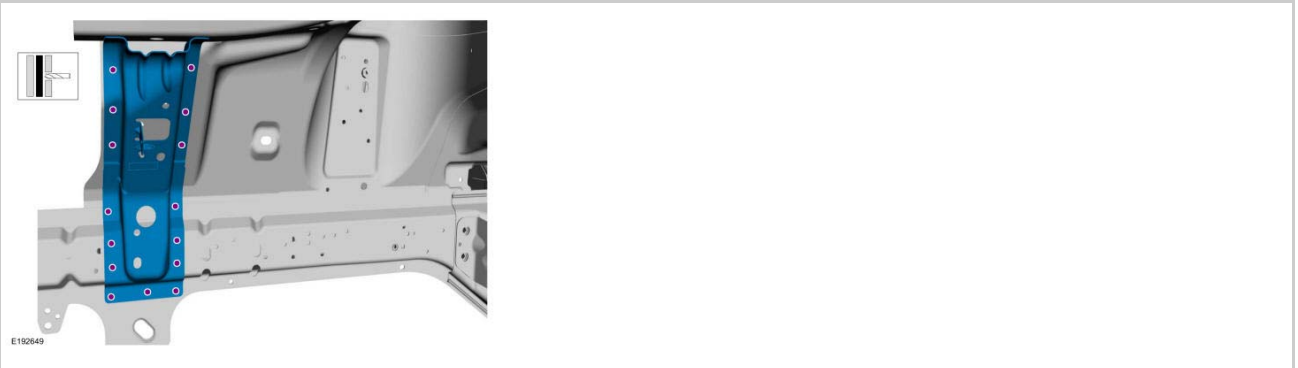
5.

Overview



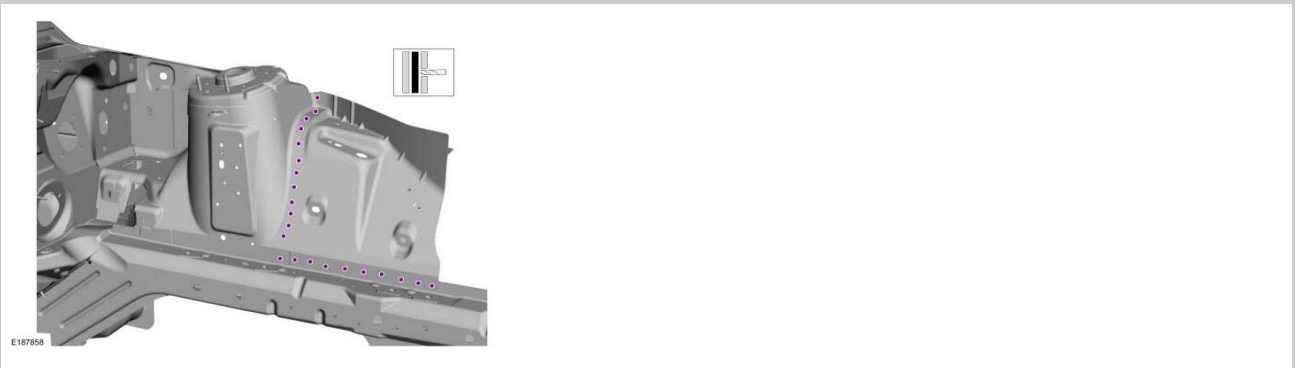
6.

Drill out the spot welds in the fender apron bracket and remove the bracket.



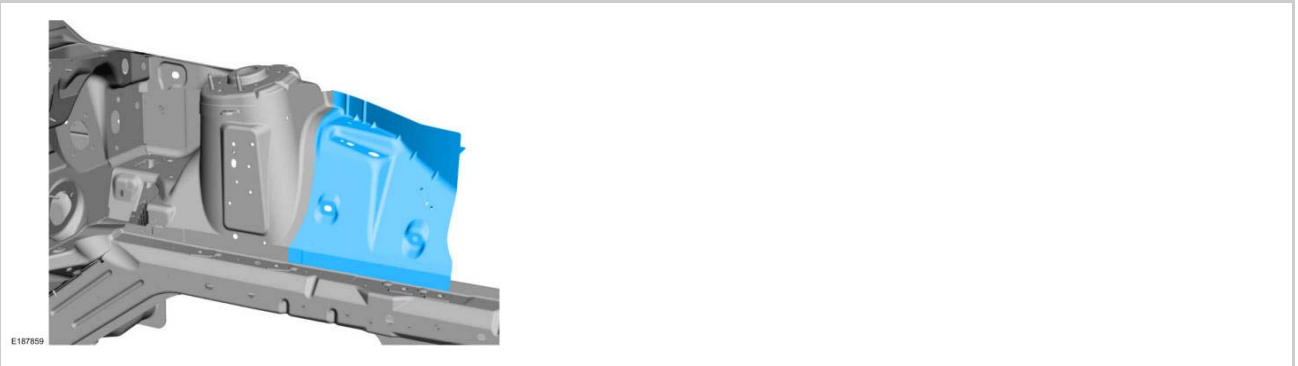
7.

Drill out the spot welds. Use the General Equipment: Spot Weld Drill Bit



8.

Remove the panel.



9.

Drill out the spot welds. Use the General Equipment: Spot Weld Drill Bit



10.

Remove the panel.



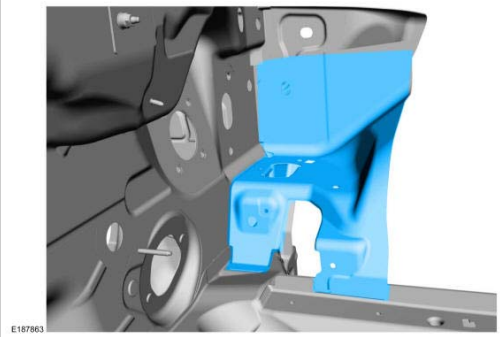
11.

Drill out the spot welds. Use the General Equipment: Spot Weld Drill Bit



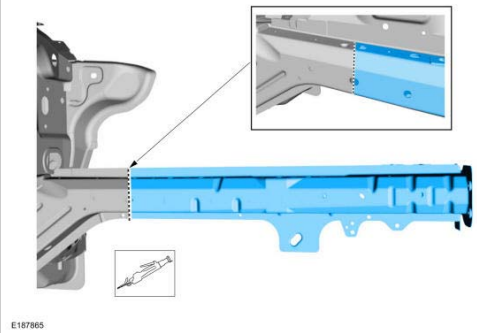
12.

Remove the panel.



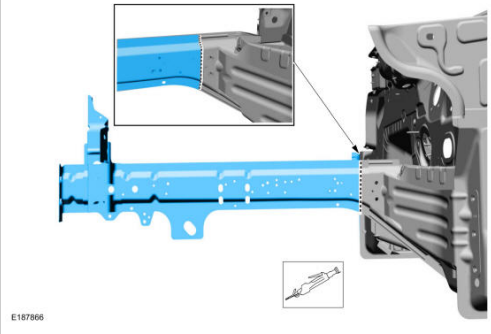
NOTE: Cutline option depending on extent of damage.

13.
Mark cutline and cut through **inner** frame rail. Use the General Equipment: Air Body Saw



NOTE: Cutline option depending on extent of damage.

14.
Mark cutline and cut through **outer** frame rail. Use the General Equipment: Spot Weld Drill Bit Use the General Equipment: Air Body Saw



REMOVAL AND INSTALLATION > FRONT SIDE MEMBER AND FENDER APRON PANEL LH > INSTALLATION

1.

Refer to: Joining Techniques .

> *NOTE: Frame member portion of service assembly shown for clarity.*

2.
Mark and cut outer frame member from the replacement part.



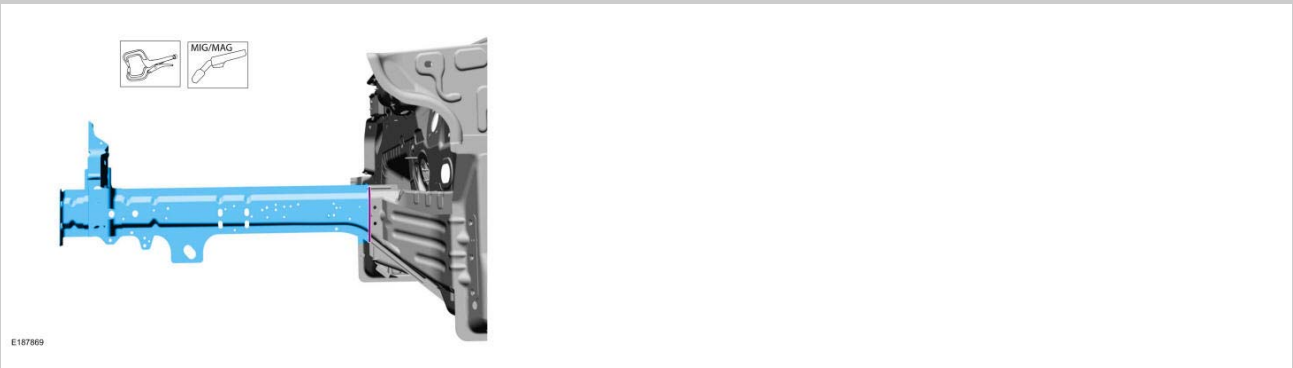
> *NOTE: Frame member portion of service assembly shown for clarity.*

3.
Mark and cut inner frame member from the replacement part. Use the General Equipment: Air Body Saw



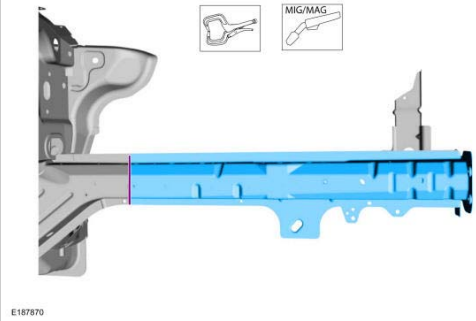
> *NOTE: Check for dimensional accuracy **before** welding.*

4.
Install and weld the outer frame member. Refer to: Body and Frame . Use the General Equipment: MIG/MAG Welding Equipment Use the General Equipment: Locking Pliers



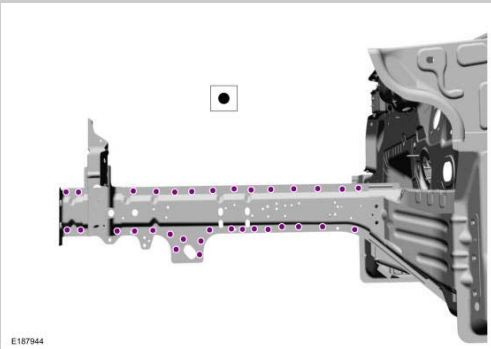
5.

Install and weld the inner frame member. Use the General Equipment: MIG/MAG Welding Equipment Use the General Equipment: Locking Pliers



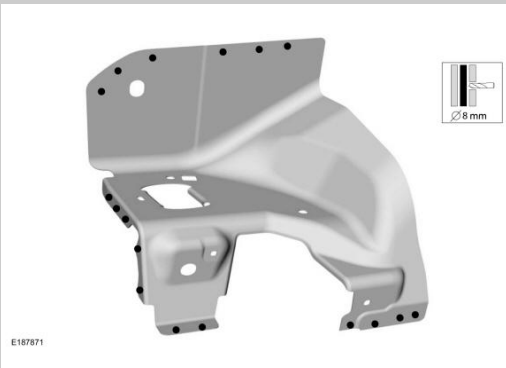
6.

Spot weld the frame member assembly. Use the General Equipment: Resistance Spotwelding Equipment



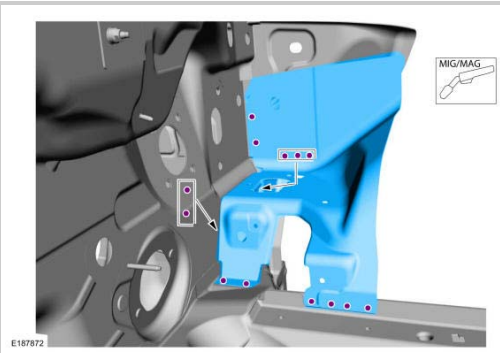
7.

Drill plug weld holes in the replacement panel. Use the General Equipment: 8 mm Drill Bit



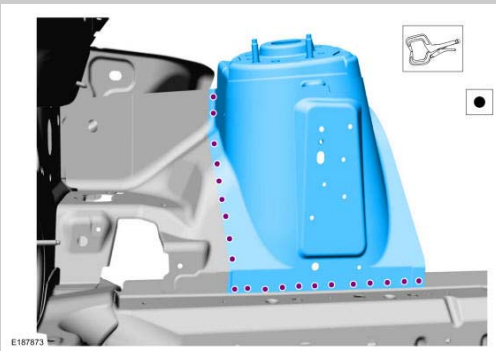
8.

Install the apron reinforcement panel and weld. Use the General Equipment: MIG/MAG Welding Equipment



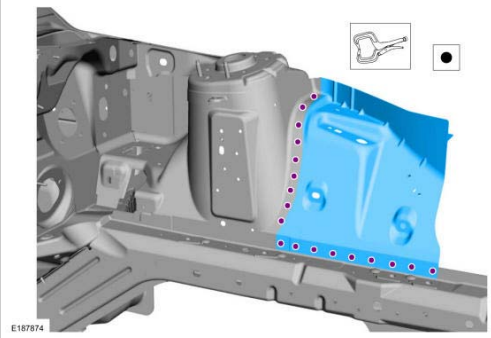
9.

Install the apron reinforcement panel and weld. Use the General Equipment: Locking Pliers Use the General Equipment: Locking Pliers



10.

Install the apron reinforcement panel and weld. Use the General Equipment: Resistance Spotwelding Equipment Use the General Equipment: Locking Pliers



11.

Install the fender apron bracket and weld. Use the General Equipment: Resistance Spotwelding Equipment



12.

Complete all sectioning seams using typical metal finishing techniques.

13.

Sealing work: All areas must be sealed to production level.

Material

: Seam Sealer / TA-2-B

14.

Refer to: Corrosion Prevention .

15.

Refinish using a Ford approved paint system.

16.

Refer to: Fender Apron Panel Reinforcement .

17.

Install the following items:

Refer to: Front Bumper .

Refer to: Front Subframe - 2.3L EcoBoost (201kW/273PS) .

Refer to: Front Subframe - 3.7L Duratec (227kW/301PS)/5.0L 32V Ti-VCT/5.2L 32V Ti-VCT .

2.3L Refer to: Radiator .

3.7L Refer to: Radiator .

5.0L Refer to: Radiator .

2.3L Refer to: Engine .

3.7L Refer to: Engine .

5.0L Refer to: Engine .

REMOVAL AND INSTALLATION > FRONT SIDE MEMBER SECTION

Special Tool(s) / General Equipment

Air Body Saw
8 mm Drill Bit
MIG/MAG Welding Equipment
Locking Pliers

Materials

Name	Specification
Seam Sealer TA-2-B	-

REMOVAL AND INSTALLATION > FRONT SIDE MEMBER SECTION > REMOVAL

1.

Remove the following items:

Refer to: Fender .

Refer to: Front Bumper .

Refer to: Headlamp Assembly .

2.3L Refer to: Radiator .

3.7L Refer to: Radiator .

5.0L Refer to: Radiator .

2.3L Refer to: Engine .

3.7L Refer to: Engine .

5.0L Refer to: Engine .

Refer to: Front Subframe - 2.3L EcoBoost (201kW/273PS) .

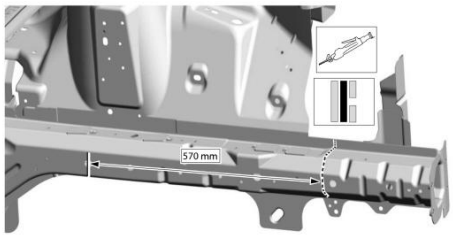
Refer to: Front Subframe - 3.7L Duratec (227kW/301PS)/5.0L 32V Ti-VCT/5.2L 32V Ti-VCT .

2.

If required, dimensionally restore vehicle to pre-accident condition. Refer to: Body and Frame .

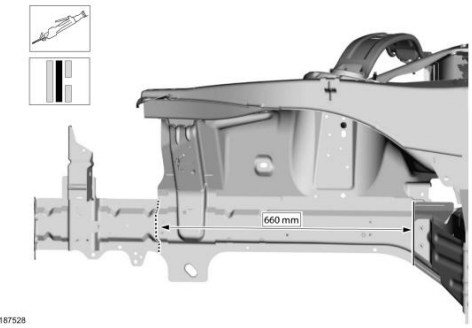
NOTE: LH side shown, RH similar.

3.
Mark a cutline and cut through the **inner** frame rail as indicated. Use the General Equipment: Air Body Saw



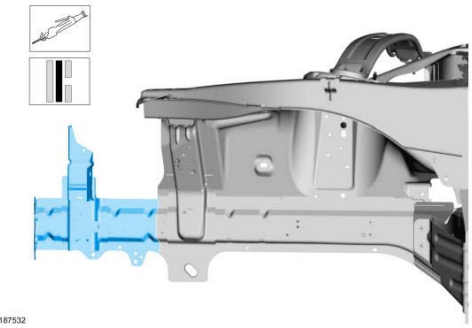
4.

Mark a cutline and cut through the **outer** frame rail as indicated. Use the General Equipment: Air Body Saw



5.

Remove the sectioned portion of the frame rail.



REMOVAL AND INSTALLATION > FRONT SIDE MEMBER SECTION > INSTALLATION

1.

Refer to: Joining Techniques .

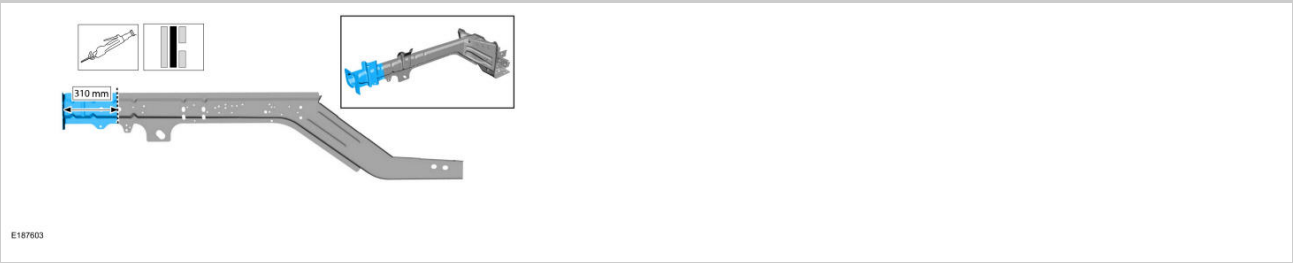
> *NOTE: Inner frame rail portion of the service assembly shown for clarity.*

2.
Mark and cut replacement portion of the inner frame rail from the service replacement assembly.
Use the General Equipment: Air Body Saw



> *NOTE: Outer frame rail portion of the service assembly shown for clarity.*

3.
Mark and cut replacement portion of the outer frame rail from the service replacement assembly.
Use the General Equipment: 8 mm Drill Bit

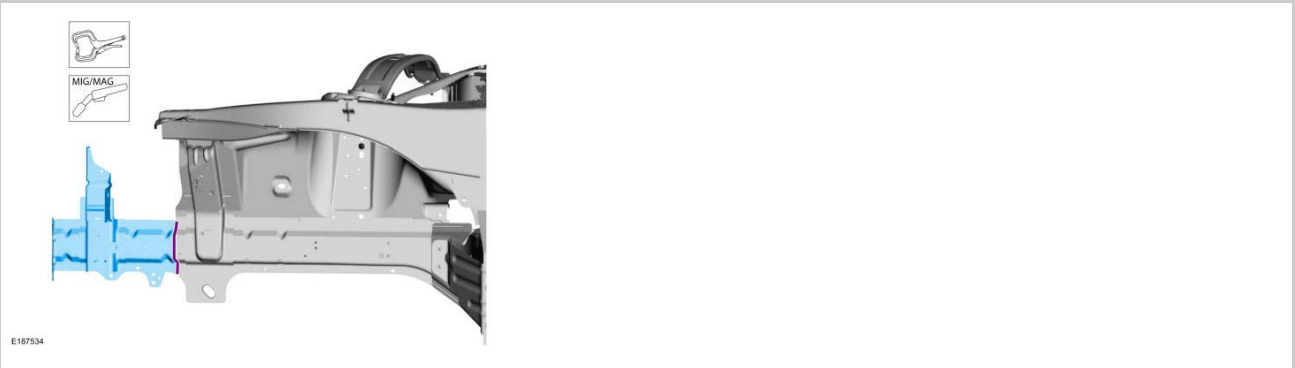


4.

Check for dimensional accuracy **before** welding. Refer to: DESCRIPTION AND OPERATION .

> *NOTE: Create a backer from a piece of the frame rail. This will create a strong joint.*

5.
Install the frame rail replacement section and seam weld the outer frame rail. Use the General Equipment: MIG/MAG Welding Equipment Use the General Equipment: Locking Pliers



6.

Seam weld along the joint on the inner frame rail. Use the General Equipment: MIG/MAG Welding Equipment



7.

Metal finish the repair area using typical metal finishing techniques.

8.

Sealing work: All areas must be sealed to production level.

Material

: Seam Sealer / TA-2-B

9.

Refinish using a Ford approved paint system.

10.

Restore corrosion protection. Refer to: Corrosion Prevention .

11.

Install the following items:

Refer to: Fender .

Refer to: Front Bumper .

Refer to: Headlamp Assembly .

2.3L Refer to: Radiator .

3.7L Refer to: Radiator .

5.0L Refer to: Radiator .

2.3L Refer to: Engine .

3.7L Refer to: Engine .

5.0L Refer to: Engine .

Refer to: Front Subframe - 2.3L EcoBoost (201kW/273PS) .

Refer to: Front Subframe - 3.7L Duratec (227kW/301PS)/5.0L 32V Ti-VCT/5.2L 32V Ti-VCT .

Service Manual: FRONT SEATS

DESCRIPTION AND OPERATION > FRONT SEATS - OVERVIEW > OVERVIEW

Driver Power Seat - Without Memory

The seat control switch contains normally closed contacts which are grounded. An individual circuit is switched to voltage when a specific adjustment position is selected. The seat control switch is hard-wired directly to the applicable seat motors. The motor direction is determined by the polarity of voltage supplied from the seat control switch.

The driver power seat is equipped with the following motors:

- Front height motor (serviced with seat track assembly)
- Rear height motor (serviced with seat track assembly)
- Horizontal motor (serviced separately from the seat track assembly)
- Lumbar motor (serviced with power lumbar assembly)

Driver Power Seat - With Memory

The seat control switch provides a voltage signal to the DSM when a specific adjustment position is selected. The power driver seat is controlled by the DSM. The DSM is located on the driver seat track. PMI is required when a new DSM is installed. The DSM hard stop/soft stops must be set/reset any time a new DSM, driver seat track or horizontal motor is installed. This system allows automatic positioning of the driver seat to 1 of 3 programmable positions. For information on programming memory positions or recalling a stored memory position, refer to the Owner's Literature.

The driver power seat is equipped with the following motors:

- Front height motor (serviced with seat track assembly)
- Rear height motor (serviced with seat track assembly)
- Horizontal motor (serviced separately from the seat track assembly)
- Lumbar motor (serviced with power lumbar assembly)

Passenger Power Seat

The seat control switch contains normally closed contacts which are grounded. An individual circuit is switched to voltage when a specific adjustment position is selected. The seat control switch is hard-wired directly to the applicable seat motors. The motor direction is determined by the polarity of voltage supplied from the seat control switch.

The passenger power seat is equipped with the following motors:

- Front height motor (serviced with seat track assembly)
- Rear height motor (serviced with seat track assembly)
- Horizontal motor (serviced separately from the seat track assembly)
- Lumbar motor (serviced with power lumbar assembly)

Climate Controlled Seats

This system allows on-demand, independent, electrical heating/cooling of each front seat.

The climate controlled seat system consists of the following components:

- Blower motor, located within each front seat cushion and backrest
- Air filter integrated to each blower motor assembly (not serviceable)
- Climate controlled seat buttons, located on the FDIM (touchscreen)
- Climate controlled seat buttons, located on the FCIM
- SCME, mounted to the bottom of the front passenger seat
- Cushion and backrest manifolds
- Cushion and backrest foam pads
- Cushion and backrest trim covers

Remote Start Climate Operation

Different climate control modes/preferences can be selected when the vehicle is started using the remote start feature. This can be accessed through the message center. For additional information on how to set the remote start preferences, refer to the Owner's Literature. When the driver seat and/or passenger seat is set to AUTO mode, the driver/passenger heated/climate controlled seat activates in full heat mode when the outside temperature is less than 0 ° C (32 ° F) and full cool mode (climate controlled seats only) when outside temperature is greater than 27 ° C (80 ° F) any time the vehicle is started using the remote start feature. No heated/climate controlled seat adjustments are recognized during remote start operation. Once the ignition is cycled ON, the heated/climate controlled seat returns to the previous settings (last ignition ON cycle) and adjustments can be made normally. If the previous setting was off, the heated/climate controlled seat turns off.

DESCRIPTION AND OPERATION > FRONT SEATS - SYSTEM OPERATION AND COMPONENT DESCRIPTION

System Operation

DESCRIPTION AND OPERATION > FRONT SEATS - SYSTEM OPERATION AND COMPONENT DESCRIPTION > NETWORK MESSAGE CHART - MEMORY SEAT

DSM Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Ignition status	BCM	Provides the ignition status. This input is used for the easy entry/exit feature.
Gear lever position	PCM	Provides the gear selector lever status. This input is used for the easy entry/exit and memory recall

		feature.
Personality recall	BCM	When the personality recall command is received from the BCM, the DSM stores or recalls the associated memory seat position (1, 2 or 3). If a RKE transmitter has been programmed to a memory position, this input is used to recall the associated memory seat position.
Memory seat switch status	DDM	When the memory set switch (1, 2 or 3) is activated, the DDM sends this message to the DSM, which then stores or recalls the associated memory seat position.

DESCRIPTION AND OPERATION > FRONT SEATS - SYSTEM OPERATION AND COMPONENT DESCRIPTION > NETWORK MESSAGE CHART - CLIMATE CONTROLLED SEATS

SCME Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Climate control seat settings request	FDIM	The climate control seat settings request message contains the climate controlled seat request information.
Climate control seat settings request	FCIM	The climate control seat settings request message contains the climate controlled seat request information.

FDIM Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Climate control seat settings status	SCME	The SCME provides this message to the FDIM for the purpose of updating the displayed status of the climate controlled seat buttons on the FDIM (touchscreen).

FCIM Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Climate control seat settings status	SCME	The SCME provides this message to the FCIM for the purpose of

		updating the displayed status of the climate controlled seat buttons on the FCIM.

DESCRIPTION AND OPERATION > FRONT SEATS - SYSTEM OPERATION AND COMPONENT DESCRIPTION > MEMORY SEAT OPERATION

The driver seat control switch provides a voltage signal to the DSM only when activated. This voltage signal causes the DSM to power the appropriate motor until the input is removed. The motor circuits are normally grounded through the DSM. The DSM internally switches the appropriate circuit from ground to voltage to operate the motors.

As the seat is adjusted, the DSM monitors the motor position sensors to record the current seat position. The DSM removes voltage from the motor upon termination of the seat control switch input or if the DSM does not detect movement from the motor while monitoring the position sensor during a memory recall operation.

If the DSM loses the signal from any of motor position sensors, the affected seat motor operates in jog mode. Jog mode allows limited operation of the affected seat motor using only the seat control switch. When the seat control switch is operated in jog mode, the seat moves in the desired direction for one second, then stops. The seat control switch must be released, then pressed again in order to move the seat for an additional second. Jog mode is an indication that there is a seat motor sensor fault. If the memory seat is operating in jog mode, a DTC sets in the DSM.

DSM Hard Stop/Soft Stop

The DSM has the ability for soft stops both at the upper and lower limits on all axes of the driver seat. When an axis reaches the hard stop and the switch is held for approximately one second, it then reverses direction 180 ms and establishes the soft stop for that axis in that direction. The DSM uses this back up strategy to check sensor integrity any time movement has stopped prematurely due to a sensor failure or obstruction.

A hard stop occurs when one of the memory seat track axes or backrest recline physically reach the end of travel and can go no further. A soft stop occurs when the seat stops before physically reaching the end of travel. The hard stop is set by seat design and cannot be changed or adjusted. The soft stop is set by the DSM. To prevent unnecessary stress on the seat and motors, the DSM sets soft stop positions, 2 for each moving axis. The DSM uses a preset distance from the hard stop to determine where the soft stop occurs. When an axis reaches the hard stop and the switch is held for approximately one second, the DSM establishes the soft stop for that axis in that direction.

Easy Entry/Exit

The easy entry/exit feature is a function of the DSM that moves the driver seat back approximately 50.8 mm (2 in) (unless seat is already positioned at or near the end of travel) when the ignition is turned off. The DSM receives ignition status over the MS-CAN and operates the driver seat rearward. The DSM cancels this operation if a valid input command is received from the driver seat control switch, memory set switch, exterior mirror control switch or if the function has been disabled.

The DSM records the current seat positions before operating the seat for an easy exit operation. During easy entry operation (when the ignition is turned on), the seat is returned to the recorded seat position previous to the easy exit operation. Easy entry operation is cancelled if a valid input command is received by the DSM. A memory position recall using the memory set switch also overrides the easy exit operation.

The easy entry/exit feature can be enabled/disabled on the message center. For information on

programming vehicle settings in the message center, refer to the Owner's Literature.

DESCRIPTION AND OPERATION > FRONT SEATS - SYSTEM OPERATION AND COMPONENT DESCRIPTION > CLIMATE CONTROLLED SEAT OPERATION

The driver and passenger climate controlled seat buttons are selected from the FCIM or FDIM (touchscreen). The FDIM is mounted directly to the APIM. The climate controlled seat system functions independently of the vehicle's climate control system. When the climate controlled seat buttons are pressed on the touchscreen, the APIM sends the request to the GWM using the HS-CAN3. The GWM sends the message to the SCME over the MS-CAN.

When the climate controlled seat buttons are pressed on FCIM, the FCIM sends the request to the SCME using the MS-CAN.

The seat cushion and backrest are each equipped with a blower motor assembly. As cabin air is drawn through each blower motor, the blower motors heat or cool the air, which is then directed into the foam pad where it is distributed along the surface of the cushion and backrest of the seat. Once the system is activated, the SCME uses a set of flexible algorithms to control the heating/cooling modes and the blower speed dependant on the commanded climate controlled seat settings.

The SCME monitors seat cushion temperature while it supplies voltage and ground to both blower motors. The SCME also supplies a variable voltage signal to control the blower speed. Cabin air enters the blower through a filter attached to the blower motor housing. Heated or cooled air exits the blower motor and flows through the foam pad.

DESCRIPTION AND OPERATION > FRONT SEATS - SYSTEM OPERATION AND COMPONENT DESCRIPTION > CLIMATE CONTROLLED SEAT HEATING CHARACTERISTICS

- In heat mode, the blower motor can add up to 40-60 ° C (72-108 ° F) to the ambient inlet air temperature.
- The system control settings are indicated next to each climate controlled seat heat button on the touchscreen. The first setting is HIGH (3 indicators), the second setting is MED (2 indicators) and the third is LOW (1 indicator), then OFF (no indicators).
- When heating, the SCME varies the speed of the blower motors and the duty cycle of the integral Thermo-Electric Device (TED) in order to reach and maintain the desired temperature determined by the system control settings.

DESCRIPTION AND OPERATION > FRONT SEATS - SYSTEM OPERATION AND COMPONENT DESCRIPTION > CLIMATE CONTROLLED SEAT COOLING CHARACTERISTICS

- In cool mode, the blower motors can remove up to 8 ° C (14 ° F) from the ambient air temperature entering the system.
- The system control settings are based on the 3 indicators next to each climate controlled seat cool

button on the touchscreen. The first setting is HIGH (3 indicators), the second setting is MED (2 indicators) and the third is LOW (1 indicator), then OFF (no indicators).

- The SCME maintains a constant blower motor speed and a constant Thermo-Electric Device (TED) supply voltage (duty cycle is determined by the switch setting) in COOL mode.

DESCRIPTION AND OPERATION > FRONT SEATS - SYSTEM OPERATION AND COMPONENT DESCRIPTION > CLIMATE CONTROLLED SEAT RECOVERY MODE

NOTE: The presence of overtemperature faults (Diagnostic Trouble Codes (DTCs) B2729, B2730, B272A and B272B) can be induced by incorrectly operating the climate controlled seat system after an initial heat setting has been attained. If a heat setting is repeatedly turned off and on in an attempt to increase the seat temperature or repeatedly toggled between heat and cool modes, an overtemperature condition can result and the Diagnostic Trouble Codes (DTCs) may be set.

If the temperature of one of the blower motors rises above 110 ° C (229.8 ° F) in the heat mode or 65 ° C (148.9 ° F) in the cool mode for more than 4 seconds, the SCME records an overtemperature DTC, removes voltage from the Thermo-Electric Devices (TEDs) (part of the blower motor assembly) and goes into recovery mode (blower only) for 30 seconds to cool down the blower motor. The same occurs if a temperature difference of 60 ° C (108 ° F) or greater is detected between the backrest and cushion blower motors on either front seat. The SCME continues to monitor the blower motors while in recovery mode. If the temperature of the Thermo-Electric Devices (TEDs) do not drop to 105 ° C (220.8 ° F) in the heat mode or 60 ° C (139.9 ° F) in the cool mode after 30 seconds, the system continues to cool the blower motors in recovery mode for up to 5 minutes. If the Thermo-Electric Devices (TEDs) cool down after 30 seconds, but before 5 minutes (checked at 4 second intervals), the system is operating normally. An overtemperature DTC is still recorded even if the system recovers and is operating normally. This is more likely to occur during extreme cabin temperatures with significant seat back sun load. If the system does not recover within 30 seconds in heat mode or within 5 minutes in cool mode, the SCME disables that seat (fault mode) and remains off until the ignition is cycled. Also, if the SCME detects a temperature differential fault twice during the same ignition cycle, the SCME disables the seat. When a fault causes a shutdown, the climate controlled seat indicators turn off and that seat is not operational until the next ignition cycle.

DESCRIPTION AND OPERATION > FRONT SEATS - SYSTEM OPERATION AND COMPONENT DESCRIPTION > COMPONENT DESCRIPTION

Driver Seat Control Switch - With Memory

The seat control switch is hard-wired to the DSM, which controls seat operation. When a specific seat adjustment position is selected, an individual circuit is switched to voltage.

Seat Control Switch - Without Memory

The seat control switch contains normally closed contacts (which are grounded). When a specific adjustment position is selected, an individual circuit is switched to voltage.

DSM

The driver seat control switch and power memory seat motors are hard-wired to the DSM. The DSM controls the operation of the power memory seat. The DSM communicates on the Medium Speed Controller

Area Network (MS-CAN). PMI is required when a new DSM is installed. The DSM hard stop/soft stops must be set/reset any time a new DSM, driver seat track or horizontal motor is installed.

Memory Set Switch

The memory set switch contains 3 momentary contact switches. It is hard-wired to the DDM and is used to recall each memory position stored in the DSM.

Driver Seat Track - With Memory

There are 3 front seat track bi-directional motors present on power seat tracks. The horizontal (fore/aft) front seat track motor is the only seat track motor which can be serviced separately from the seat track assembly. All other seat track motors (front height, rear height) are serviced as part of the seat track assembly. Each seat track motor contains a Hall-effect sensor which provides seat track position information to the DSM for setting/obtaining desired preset seat memory positions. The seat track motors move the power seat forward/backward and up/down depending on the polarity of voltage supplied from the DSM.

Seat Track - Without Memory

There are 3 front seat track bi-directional motors present on power seat tracks. The horizontal (fore/aft) front seat track motor is the only seat track motor which can be serviced separately from the seat track assembly. All other seat track motors (front height, rear height) are serviced as part of the seat track assembly. The seat track motors move the power seat forward/backward and up/down depending on the polarity of voltage supplied from the seat control switch.

FDIM

If equipped with climate controlled seats, the FDIM (touchscreen) contains climate controlled seat control buttons.

FCIM

If equipped with climate controlled seats, the FCIM contains climate controlled seat buttons. PMI is required when a new FCIM is installed.

SCME

If equipped with climate controlled seats, The SCME controls the operation of the climate controlled seat system. PMI is required when a new SCME is installed.

Blower Motor

If equipped with climate controlled seats, the seat cushion and backrest are each equipped with a blower motor assembly that includes a seat blower (Thermo-Electric Device (TED) and fan motor, serviced as an assembly). There is also a temperature sensor (thermistor) in each blower motor which provides feedback to the SCME. The blower motor assembly is controlled by the SCME.

Front Seat Power Lumbar Assembly

The front seat power lumbar assembly is mounted to the backrest (serviced as an assembly).

DIAGNOSIS AND TESTING > FRONT SEATS

Base Part Number: 63100 Base Part Number: 63100

DIAGNOSIS AND TESTING > FRONT SEATS > DTC CHART: DDM

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: GENERAL INFORMATION .

DDM DTC Chart

DTC	Description	Action
B1C03:23	Memory #1 Switch: Signal Stuck Low	GO to Pinpoint Test D
B1C04:23	Memory #2 Switch: Signal Stuck Low	GO to Pinpoint Test D
B1C05:23	Memory #3 Switch: Signal Stuck Low	GO to Pinpoint Test D
All other Diagnostic Trouble Codes (DTCs)	-	REFER to: HANDLES, LOCKS, LATCHES AND ENTRY SYSTEMS .

DIAGNOSIS AND TESTING > FRONT SEATS > DTC CHART: SCME

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: GENERAL INFORMATION .

SCME DTC Chart

DTC	Description	Action
B103B	Thermoelectric Driver Overcurrent Low	GO to Pinpoint Test L
B103C	Thermoelectric Driver Open Load	GO to Pinpoint Test M
B103D	Blower Driver Overtemperature	GO to Pinpoint Test N
B1111	Driver Thermal Electric Device Control Overtemperature Fault	GO to Pinpoint Test L
B1113	Passenger Thermal Electric Device Control Overtemperature Fault	GO to Pinpoint Test O
B111B	Passenger Thermoelectric Driver Overcurrent Low	GO to Pinpoint Test O
B111C	Passenger Thermoelectric Driver Open Load	GO to Pinpoint Test P
B111D	Passenger Blower Driver Overtemperature	GO to Pinpoint Test Q

B1342	ECU is Faulted	INSTALL a new SCME. REFER to: Front Seat Climate Control Module [SCME].
B19A1	Passenger Seat Cushion Blower Speed Short to Battery	GO to Pinpoint Test R
B19A2	Passenger Seat Back Blower Speed Short to Battery	GO to Pinpoint Test S
B19A3	Driver Seat Cushion Blower Speed Short to Battery	GO to Pinpoint Test T
B19A4	Driver Seat Back Blower Speed Short to Battery	GO to Pinpoint Test U
B19A5	Passenger Seat Cushion Blower Speed Short to Ground	GO to Pinpoint Test V
B19A6	Passenger Seat Back Blower Speed Short to Ground	GO to Pinpoint Test W
B19A7	Driver Seat Cushion Blower Speed Short to Ground	GO to Pinpoint Test X
B19A8	Driver Seat Back Blower Speed Short to Ground	GO to Pinpoint Test Y
B2477	Module Configuration Failure	*NOTE: This DTC indicates PMI has not been done to a newly installed module or configuration data has been lost.* Using a diagnostic scan tool, CARRY OUT PMI on the SCME. REPEAT the self-test. If PMI is successful, the DTC will not be present.
B2486	Climate Control Seat Module Voltage Out of Range	GO to Pinpoint Test K
B2729	Cushion Over-Temp Detected	GO to Pinpoint Test AF
B272A	Passenger Cushion Over-Temp Detected	GO to Pinpoint Test Z
B272B	Passenger Back Over-Temp Detected	GO to Pinpoint Test AA
B272C	Driver Differential Temperature Fault	GO to Pinpoint Test AB
B272D	Passenger Differential Temperature Fault	GO to Pinpoint Test AC
B272E	Driver Ignition Run/Blower Circuit Short to Ground	GO to Pinpoint Test AD

B272F	Passenger Ignition Run/Blower Circuit Short to Ground	GO to Pinpoint Test AE
B2730	Back Over-Temp Detected	GO to Pinpoint Test AG
U2050	No Application Present	INSTALL a new SCME. REFER to: Front Seat Climate Control Module .

DIAGNOSIS AND TESTING > FRONT SEATS > DTC CHART: DSM

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: GENERAL INFORMATION .

DSM DTC Chart

DTC	Description	Action
B1317	Battery Voltage High	GO to Pinpoint Test G
B1318	Battery Voltage Low	GO to Pinpoint Test H
B1663	Seat Driver Front Up/Down Motor Stalled	If the motor does not operate, GO to Pinpoint Test C If the motor operates in one second intervals, GO to Pinpoint Test D
B1664	Seat Driver Rear Up/Down Motor Stalled	If the motor does not operate, GO to Pinpoint Test C If the motor operates in one second intervals, GO to Pinpoint Test D
B1665	Seat Driver Forward/Backward Motor Stalled	If the motor does not operate, GO to Pinpoint Test C If the motor operates in one second intervals, GO to Pinpoint Test D
B1711	Seat Driver Front Up Switch Circuit Short To Battery	GO to Pinpoint Test C
B1715	Seat Driver Front Down Switch Circuit Short To Battery	GO to Pinpoint Test C
B1719	Seat Driver Forward Switch Circuit Short To Battery	GO to Pinpoint Test C
B1723	Seat Driver Rearward Switch Circuit Short To Battery	GO to Pinpoint Test C
B1727	Seat Driver Rear Up Switch Circuit Short To Battery	GO to Pinpoint Test C
B1731	Seat Driver Rear Down Switch Circuit Short To Battery	GO to Pinpoint Test C
B1952	Seat Rear Up/Down Position Feedback Circuit Short To Battery	GO to Pinpoint Test D

B1953	Seat Rear Up/Down Position Feedback Circuit Short To Ground	GO to Pinpoint Test D
B1956	Seat Front Up/Down Position Feedback Circuit Short To Battery	GO to Pinpoint Test D
B1957	Seat Front Up/Down Position Feedback Circuit Short To Ground	GO to Pinpoint Test D
B1964	Seat Horizontal Forward/Rearward Position Feedback Circuit Short To Battery	GO to Pinpoint Test D
B1965	Seat Horizontal Forward/Rearward Position Feedback Circuit Short To Ground	GO to Pinpoint Test D
B2477	Module Configuration Failure	*NOTE: This DTC indicates PMI has not been carried out on a newly installed module or configuration data has been lost. Presence of this DTC alone does not prevent basic seat operation from the seat control switch.* Using a diagnostic scan tool, CARRY OUT PMI on the DSM. REPEAT the self-test and VERIFY successful PMI. CLEAR the Diagnostic Trouble Codes (DTCs).
U0140	Lost Communication With Body Control Module (GEM)	GO to Pinpoint Test I
U2050	No Application Present	INSTALL a new DSM. REFER to: Driver Front Seat Module .

DIAGNOSIS AND TESTING > FRONT SEATS > SYMPTOM CHART(S)

Symptom Chart: Front Seats

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: GENERAL INFORMATION .

Symptom Chart

Condition	Possible Sources	Actions
No communication with the DSM	Refer to the Pinpoint Test	REFER to: MODULE COMMUNICATIONS NETWORK .

No communication with the DDM	Refer to the Pinpoint Test	REFER to: MODULE COMMUNICATIONS NETWORK .
No communication with the FCIM	Refer to the Pinpoint Test	REFER to: MODULE COMMUNICATIONS NETWORK .
No communication with the SCME	Refer to the Pinpoint Test	REFER to: MODULE COMMUNICATIONS NETWORK .
The power seat is inoperative or does not operate correctly - driver, without memory	Refer to the Pinpoint Test	GO to Pinpoint Test F
The power seat is inoperative or does not operate correctly - passenger	Refer to the Pinpoint Test	GO to Pinpoint Test A
The power lumbar is inoperative - driver	Refer to the Pinpoint Test	GO to Pinpoint Test B
The memory seat does not operate horizontally/vertically using the seat control switch	Refer to the Pinpoint Test	GO to Pinpoint Test C
The memory seat does not operate using the memory SET switch	Refer to the Pinpoint Test	GO to Pinpoint Test D
The memory seat moves in one-second intervals	Refer to the Pinpoint Test	CARRY OUT the DSM self-test and RETRIEVE the Diagnostic Trouble Codes (DTCs). REFER to the DSM DTC Chart .
The memory seat does not move to the correct memory position	Refer to the Pinpoint Test	CARRY OUT the DSM self-test and RETRIEVE the Diagnostic Trouble Codes (DTCs). REFER to the DSM DTC Chart .
The memory seat does not operate when using the RKE transmitter	Refer to the Pinpoint Test	VERIFY the RKE transmitter is operating correctly and is associated to a memory position. REFER to the Owner's Literature for information on associating a RKE transmitter. CARRY OUT the DSM self-test and REFER to the DSM DTC Chart to diagnose any Diagnostic Trouble Codes (DTCs) retrieved.
Easy entry/easy exit is inoperative/does not operate correctly	Refer to the Pinpoint Test	GO to Pinpoint Test E
One or both climate controlled seats are inoperative	Refer to the Pinpoint Test	GO to Pinpoint Test J
A single climate controlled seat does not operate correctly - exhibits poor airflow or performance	Excessive sunload or extreme cabin temperatures Incorrectly installed backrest or cushion blower motor	CARRY OUT the SCME self-test and retrieve any Diagnostic Trouble Codes (DTCs). If any Diagnostic Trouble Codes

	Airflow blockage Disconnected air duct	(DTCs) are present, REFER to the SCME DTC Chart . If no Diagnostic Trouble Codes (DTCs) are present, CHECK the affected seat cushion or backrest for correct installation of the climate controlled seat components (backrest or cushion blower motor, air duct and foam pad) and CHECK for airflow restrictions (backrest or cushion blower motor inlets and outlets, filters and ducts) and REPAIR as needed. RETEST the system for normal operation.

DIAGNOSIS AND TESTING > FRONT SEATS > PINPOINT TEST(S) > PINPOINT TEST A : THE POWER SEAT IS INOPERATIVE OR DOES NOT OPERATE CORRECTLY - PASSENGER

Refer to Power Seats for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Front Seats .

Possible Causes

- Fuse
- Wiring, terminals or connectors
- Seat control switch
- Horizontal motor
- Seat track

Visual Inspection and Diagnostic Pre-checks

- Verify BJB fuse 13 (30A) is OK.

DIAGNOSIS AND TESTING > FRONT SEATS > PINPOINT TEST(S) > PINPOINT TEST A : THE POWER SEAT IS INOPERATIVE OR DOES NOT OPERATE CORRECTLY - PASSENGER > PINPOINT TEST A : THE POWER SEAT IS INOPERATIVE OR DOES NOT OPERATE CORRECTLY - PASSENGER

WARNING: Incorrect repair techniques or actions can cause an accidental Supplemental Restraint System (SRS) deployment. Never compromise or depart from these instructions. Failure to precisely follow all instructions could result in serious

personal injury from an accidental deployment.

A1 CHECK THE SEAT OPERATION

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING .

Disconnect: Passenger Side Airbag In-line C219 .

Attempt to operate the seat in all directions.

Is the seat inoperative in all directions?

Yes	GO to A2

No	If only the horizontal motor is inoperative, GO to A4If only the front height motor is inoperative, GO to A6If only the rear height motor is inoperative, GO to A8

A2 CHECK FOR VOLTAGE TO THE SEAT CONTROL SWITCH

Disconnect: Passenger Seat Control Switch C3190 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3190-8	V	Ground

Is the voltage greater than 11 volts?

Yes	GO to A3

No	VERIFY BJB fuse 13 (30A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short. GO to A10

A3 CHECK THE SEAT CONTROL SWITCH GROUND CIRCUIT

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3190-10	Ω	Ground

Is the resistance less than 3 ohms?

Yes	INSTALL a new passenger seat control switch. REFER to: Front Seat Control Switch . GO to A10

No	REPAIR the circuit. GO to A10

A4 CHECK FOR VOLTAGE TO THE SEAT HORIZONTAL MOTOR

Disconnect: Passenger Seat Horizontal Motor C332 .

> *NOTE: The voltage being measured changes polarity depending upon which direction the seat control switch is activated.*

While pushing the horizontal switch forward and rearward, measure:

Positive Lead	Measurement / Action	Negative Lead
C332-1	V	C332-3

Is the voltage greater than 11 volts when the seat control switch is operated in both directions?

Yes	INSTALL a new horizontal motor. REFER to: Front Seat Track Motor . GO to A10

No	GO to A5

A5 CHECK THE SEAT HORIZONTAL MOTOR CIRCUIT FOR AN OPEN

Disconnect: Passenger Seat Control Switch C3190 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3190-1	Ω	C332-3
C3190-2	Ω	C332-1

Are the resistances less than 3 ohms?

Yes	INSTALL a new passenger seat control switch. REFER to: Front Seat Control Switch . GO to A10

No	REPAIR the circuit in question. GO to A10

A6 CHECK FOR VOLTAGE TO THE SEAT FRONT HEIGHT MOTOR

Disconnect: Passenger Seat Front Height Motor C3074 .

> *NOTE: The voltage being measured changes polarity depending upon which direction the seat control switch is activated.*

While pushing the front height switch upward and downward, measure:

Positive Lead	Measurement / Action	Negative Lead
C3074-1		C3074-3

Is the voltage greater than 11 volts when the seat control switch is operated in both directions?

Yes	INSTALL a new passenger seat track. REFER to: Front Seat Track . GO to A10

No	GO to A7

A7 CHECK THE SEAT FRONT HEIGHT MOTOR CIRCUIT FOR AN OPEN

Disconnect: Passenger Seat Control Switch C3190 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3190-6	Ω	C3074-3
C3190-5	Ω	C3074-1

Are the resistances less than 3 ohms?

Yes	INSTALL a new passenger seat control switch. REFER to: Front Seat Control Switch . GO to A10

No	REPAIR the circuit in question. GO to A10

A8 CHECK FOR VOLTAGE TO THE SEAT REAR HEIGHT MOTOR

Disconnect: Passenger Seat Rear Height Motor C3075 .

NOTE: The voltage being measured changes polarity depending upon which direction the seat control switch is activated.

While pushing the rear height switch upward and downward, measure:

Positive Lead	Measurement / Action	Negative Lead
C3075-1		C3075-3

Is the voltage greater than 11 volts when the seat control switch is operated in both directions?

Yes	INSTALL a new passenger seat track. REFER to: Front Seat Track . GO to A10

No	GO to A9

A9 CHECK THE SEAT REAR HEIGHT MOTOR CIRCUIT FOR AN OPEN

Disconnect: Passenger Seat Control Switch C3190 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3190-9	Ω	C3075-3
C3190-7	Ω	C3075-1

Are the resistances less than 3 ohms?

Yes	INSTALL a new passenger seat control switch. REFER to: Front Seat Control Switch . GO to A10

No	REPAIR the circuit in question. GO to A10

A10 VERIFY THE SUPPLEMENTAL RESTRAINT SYSTEM (SRS) PROVES OUT SUCCESSFULLY

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING .

Connect: Passenger Side Airbag In-line C219 .

Connect all previously disconnected connectors.

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) REPOWERING .

Did the SRS prove out successfully?

Yes	Repair is complete. RETURN the vehicle to the customer.

No	REFER to: SUPPLEMENTAL RESTRAINT SYSTEM .

DIAGNOSIS AND TESTING > FRONT SEATS > PINPOINT TEST(S) > PINPOINT TEST B : THE POWER LUMBAR IS INOPERATIVE - DRIVER

Refer to Power Seats for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Front Seats .

Possible Causes

- Wiring, terminals or connectors

- Seat control switch
- Front seat power lumbar assembly

DIAGNOSIS AND TESTING > FRONT SEATS > PINPOINT TEST(S) > PINPOINT TEST B : THE POWER LUMBAR IS INOPERATIVE - DRIVER > PINPOINT TEST B : THE POWER LUMBAR IS INOPERATIVE - DRIVER

WARNING: Incorrect repair techniques or actions can cause an accidental Supplemental Restraint System (SRS) deployment. Never compromise or depart from these instructions. Failure to precisely follow all instructions could result in serious personal injury from an accidental deployment.

B1 CHECK FOR VOLTAGE TO THE SEAT LUMBAR MOTOR

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING .

Disconnect: Driver Side Airbag In-line C345.

Disconnect: Driver Seat Lumbar Motor C3215 .

NOTE: The voltage being measured changes polarity depending upon which direction the seat control switch is activated.

While pushing the lumbar switch in both directions, measure:

Positive Lead	Measurement / Action	Negative Lead
C3215-A	V	C3215-B

Is the voltage greater than 11 volts when the seat control switch is operated in both directions?

Yes	INSTALL a new driver seat power lumbar assembly. REFER to: Front Seat Power Lumbar Assembly . GO to B3

No	GO to B2

B2 CHECK THE SEAT LUMBAR MOTOR CIRCUITS FOR AN OPEN

Disconnect: Driver Seat Control Switch C352 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C352-4	Ω	C3215-B

C352-3	Ω	C3215-A

Are the resistances less than 3 ohms?

Yes	INSTALL a new driver seat control switch. REFER to: Front Seat Control Switch . GO to B3

No	REPAIR the circuit in question. GO to B3

B3 VERIFY THE SUPPLEMENTAL RESTRAINT SYSTEM (SRS) PROVES OUT SUCCESSFULLY

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING .

Connect: Driver Side Airbag In-line C345.

Connect all previously disconnected connectors.

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) REPOWERING .

Did the SRS prove out successfully?

Yes	Repair is complete. RETURN the vehicle to the customer.

No	REFER to: SUPPLEMENTAL RESTRAINT SYSTEM .

DIAGNOSIS AND TESTING > FRONT SEATS > PINPOINT TEST(S) > PINPOINT TEST C : THE MEMORY SEAT DOES NOT OPERATE HORIZONTALLY/VERTICALLY USING THE SEAT CONTROL SWITCH

Refer to Memory Seats for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Front Seats .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1663	Seat Driver Front Up/Down Motor Stalled	During self-test, the DSM attempts to operate the appropriate seat track motor and uses the motor's position sensor to monitor movement. If no motor movement is sensed, the DTC is set. The DSM will retry motor operation on the next activation of the seat control switch. If no movement continues to be monitored after 250 milliseconds, the DSM disables the output.

B1664	Seat Driver Rear Up/Down Motor Stalled	During self-test, the DSM attempts to operate the appropriate seat track motor and uses the motor's position sensor to monitor movement. If no motor movement is sensed, the DTC is set. The DSM will retry motor operation on the next activation of the seat control switch. If no movement continues to be monitored after 250 milliseconds, the DSM disables the output.
B1665	Seat Driver Forward/Backward Motor Stalled	During self-test, the DSM attempts to operate the appropriate seat track motor and uses the motor's position sensor to monitor movement. If no motor movement is sensed, the DTC is set. The DSM will retry motor operation on the next activation of the seat control switch. If no movement continues to be monitored after 250 milliseconds, the DSM disables the output.
B1711	Seat Driver Front Up Switch Circuit Short to Battery	If voltage is sensed on the switch input circuit during the DSM self-test, the DTC is set. If voltage is sensed on the input circuit for greater than 2 minutes, the DTC is set as continuous. With the DTC set, any input signal on the circuit is ignored.
B1715	Seat Driver Front Down Switch Circuit Short to Battery	If voltage is sensed on the switch input circuit during the DSM self-test, the DTC is set. If voltage is sensed on the input circuit for greater than 2 minutes, the DTC is set as continuous. With the DTC set, any input signal on the circuit is ignored.
B1719	Seat Driver Forward Switch Circuit Short to Battery	If voltage is sensed on the switch input circuit during the DSM self-test, the DTC is set. If voltage is sensed on the input circuit for greater than 2 minutes, the DTC is set as continuous. With the DTC set, any input signal on the circuit is ignored.
B1723	Seat Driver Rearward Switch Circuit Short to Battery	If voltage is sensed on the switch input circuit during the DSM self-test, the DTC is set. If voltage

		is sensed on the input circuit for greater than 2 minutes, the DTC is set as continuous. With the DTC set, any input signal on the circuit is ignored.
B1727	Seat Driver Rear Up Switch Circuit Short to Battery	If voltage is sensed on the switch input circuit during the DSM self-test, the DTC is set. If voltage is sensed on the input circuit for greater than 2 minutes, the DTC is set as continuous. With the DTC set, any input signal on the circuit is ignored.
B1731	Seat Driver Rear Down Switch Circuit Short to Battery	If voltage is sensed on the switch input circuit during the DSM self-test, the DTC is set. If voltage is sensed on the input circuit for greater than 2 minutes, the DTC is set as continuous. With the DTC set, any input signal on the circuit is ignored.

Possible Causes

- Fuse
- Wiring, terminals or connectors
- Seat control switch
- Horizontal motor
- Seat track
- DSM

Visual Inspection and Diagnostic Pre-checks

- Verify BCM fuse 2 (7.5A) is OK.
- Verify BJB fuse 12 (30A) is OK.

DIAGNOSIS AND TESTING > FRONT SEATS > PINPOINT TEST(S) > PINPOINT TEST C : THE MEMORY SEAT DOES NOT OPERATE HORIZONTALLY/VERTICALLY USING THE SEAT CONTROL SWITCH > PINPOINT TEST C : THE MEMORY SEAT DOES NOT OPERATE HORIZONTALLY/VERTICALLY USING THE SEAT CONTROL SWITCH

WARNING: Incorrect repair techniques or actions can cause an accidental Supplemental Restraint System (SRS) deployment. Never compromise or depart from these instructions. Failure to precisely follow all instructions could result in serious

personal injury from an accidental deployment.

C1 RETRIEVE THE DSM (DRIVER FRONT SEAT MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING .

Disconnect: Driver Side Airbag In-line C345.

Ignition ON.

Activate the seat control switch in all directions.

Using a diagnostic scan tool, perform DSM self-test. If the diagnostic scan tool does not communicate with the DSM, REFER to: MODULE COMMUNICATIONS NETWORK .

Are any DSM Diagnostic Trouble Codes (DTCs) present?

Yes	If Diagnostic Trouble Codes (DTCs) B1663, B1664, and B1665 are all retrieved, GO to C10For DTC B1711, B1715, B1719, B1723, B1727 or B1731, GO to C3 For DTC B1663, GO to C18 For DTC B1664, GO to C21 For DTC B1665, GO to C24 For all other Diagnostic Trouble Codes (DTCs), REFER to the DSM DTC Chart . GO to C28

No	GO to C2

C2 CHECK THE DSM (DRIVER FRONT SEAT MODULE) SEAT CONTROL SWITCH PARAMETER IDENTIFICATIONS (PIDS)

While operating the seat control switch in all positions, monitor the following DSM seat control switch Parameter Identifications (PIDs) using a diagnostic scan tool:

Driver Power Seat Front Up/Down Switch (SFNT_SW)

Driver Power Seat Forward/Backward Switch (SFWD_SW)

Driver Power Seat Rear Up/Down Switch (SREARSW)

Do the PID states agree with the switch positions?

Yes	GO to C9

No	VERIFY BJB fuse 12 (30A) is OK. If OK, GO to C3 If not OK or fails while operating the seat control switch, DISCONNECT the seat control switch C3387 and GO to C7

C3 CHECK THE SEAT CONTROL SWITCH

Ignition OFF.

Remove the driver seat control switch. REFER to: Front Seat Control Switch .

Carry out the seat control switch component test. Refer to Component Testing for schematic and connector information.

Is the seat control switch OK?

Yes	GO to C4

No	INSTALL a new driver seat control switch. REFER to: Front Seat Control Switch . GO to C28

C4 CHECK FOR VOLTAGE TO THE SEAT CONTROL SWITCH

Measure:

Positive Lead	Measurement / Action	Negative Lead
C352-9	V	Ground

Is the voltage greater than 11 volts?

Yes	GO to C5

No	REPAIR the circuit. GO to C28

C5 CHECK THE SEAT CONTROL SWITCH GROUND CIRCUIT FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C352-7	Ω	Ground

Is the resistance less than 3 ohms?

Yes	GO to C6

No	REPAIR the circuit. GO to C28

C6 CHECK THE CIRCUITS BETWEEN THE SEAT CONTROL SWITCH AND DSM (DRIVER FRONT SEAT MODULE) FOR A SHORT TO VOLTAGE

Disconnect: DSM C341B .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C352-8	V	Ground
C352-1	V	Ground
C352-5	V	Ground

C352-2		Ground
C352-6		Ground
C352-10		Ground

Is any voltage present?

Yes	REPAIR the circuit in question. GO to C28

No	GO to C7

C7 CHECK THE CIRCUITS BETWEEN THE SEAT CONTROL SWITCH AND DSM (DRIVER FRONT SEAT MODULE) FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C352-8	Ω	Ground
C352-1	Ω	Ground
C352-5	Ω	Ground
C352-2	Ω	Ground
C352-6	Ω	Ground
C352-10	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to C8

No	REPAIR the circuit in question. GO to C28

C8 CHECK THE CIRCUITS BETWEEN THE SEAT CONTROL SWITCH AND DSM (DRIVER FRONT SEAT MODULE) FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C352-8	Ω	C341B-17
C352-1	Ω	C341B-18
C352-5	Ω	C341B-16
C352-2	Ω	C341B-6

C352-6	Ω	C341B-15
C352-10	Ω	C341B-5

Are the resistances less than 3 ohms?

Yes	GO to C27

No	REPAIR the circuit in question. GO to C28

C9 CHECK THE SEAT TRACK OPERATION USING DSM (DRIVER FRONT SEAT MODULE) ACTIVE COMMANDS AND PARAMETER IDENTIFICATIONS (PIDS)

Toggle the following DSM active commands ON and OFF using a diagnostic scan tool while monitoring the seat movement:

Front Motor Up (FRONT_UP)

Front Motor Down (FRONT_DWN)

Rear Motor Up (REAR_UP)

Rear motor down (REAR_DWN)

Horizontal Motor Forward (HORZ_FWD)

Horizontal Motor Backward (HORZ_BWD)

Does the driver seat operate correctly?

Yes	The condition may be intermittent. CHECK for causes of an intermittent concern, particularly the pins and terminals of electrical connectors that were disconnected. **Do not install any new components at this time. Components should only be installed when directed to do so in the pinpoint test.** REPAIR any intermittent wiring, terminal or connector concerns found. GO to

No	If no seat movement, GO to C10If no front vertical seat movement, GO to C18If no rear vertical seat movement, GO to C21If no horizontal seat movement, GO to C24

C10 CHECK FOR VOLTAGE TO THE DSM (DRIVER FRONT SEAT MODULE)

Ignition OFF.

Disconnect: DSM C341A and C341B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C341A-1		Ground

Measure:

Positive Lead	Measurement / Action	Negative Lead
C341B-1		Ground

Are the voltages greater than 11 volts?

Yes	GO to C11

No	VERIFY BJB fuse 12 (30A) and BCM fuse 2 (7.5A) are OK. If OK, REPAIR the circuit. If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short. GO to C28

C11 CHECK THE DSM (DRIVER FRONT SEAT MODULE) GROUND CIRCUITS FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C341A-2	Ω	Ground

Measure:

Positive Lead	Measurement / Action	Negative Lead
C341B-24	Ω	Ground

Are the resistances less than 3 ohms?

Yes	GO to C12

No	REPAIR the circuit in question. GO to C28

C12 CHECK THE FRONT HEIGHT MOTOR CIRCUITS FOR A SHORT TO GROUND

Measure:

Positive Lead	Measurement / Action	Negative Lead
C341B-23	Ω	Ground
C341B-11	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to C14

No	GO to C13

C13 CHECK THE FRONT HEIGHT MOTOR CIRCUITS FOR A SHORT TO GROUND WITH THE

MOTOR DISCONNECTED

Disconnect: Driver Seat Front Height Motor C382 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C341B-23	Ω	Ground
C341B-11	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	INSTALL a new driver seat track. REFER to: Front Seat Track . GO to C28

No	REPAIR the circuit in question. GO to C28

C14 CHECK THE REAR HEIGHT MOTOR CIRCUITS FOR A SHORT TO GROUND

Measure:

Positive Lead	Measurement / Action	Negative Lead
C341B-22	Ω	Ground
C341B-10	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to C16

No	GO to C15

C15 CHECK THE REAR HEIGHT MOTOR CIRCUITS FOR A SHORT TO GROUND WITH THE MOTOR DISCONNECTED

Disconnect: Driver Seat Rear Height Motor C363 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C341B-22	Ω	Ground
C341B-10	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	INSTALL a new driver seat track. REFER to: Front Seat Track . GO to C28

No	REPAIR the circuit in question. GO to C28

C16 CHECK THE HORIZONTAL MOTOR CIRCUITS FOR A SHORT TO GROUND

Measure:

Positive Lead	Measurement / Action	Negative Lead
C341B-9	Ω	Ground
C341B-12	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to C27

No	GO to C17

C17 CHECK THE HORIZONTAL MOTOR CIRCUITS FOR A SHORT TO GROUND WITH THE MOTOR DISCONNECTED

Disconnect: Driver Seat Horizontal Motor C362 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C341B-9	Ω	Ground
C341B-12	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	INSTALL a new horizontal motor. REFER to: Front Seat Track Motor . GO to C28

No	REPAIR the circuit in question. GO to C28

C18 CHECK THE FRONT HEIGHT MOTOR FOR CORRECT OPERATION USING ACTIVE COMMANDS

Ignition OFF.

Disconnect: Driver Seat Front Height Motor C382 .

Ignition ON.

Using a diagnostic scan tool, view the following DSM active command Parameter Identifications (PIDs):

Front Motor Up (FRONT_UP)

Front Motor Down (FRONT_DWN)

> *NOTE: During the following step, the voltage being measured changes polarity dependent upon which direction the seat control is activated.*

Using a diagnostic scan tool, toggle the active commands FRONT_UP and FRONT_DOWN on and off and measure:

Positive Lead	Measurement / Action	Negative Lead
C382-1	V	C382-3

Is the voltage greater than 11 volts when commanded ON in both directions and 0 volt when commanded OFF?

Yes	INSTALL a new driver seat track. REFER to: Front Seat Track . GO to C28

No	GO to C19

C19 CHECK THE FRONT HEIGHT MOTOR CIRCUITS FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: DSM C341B .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C341B-23	V	Ground
C341B-11	V	Ground

Is any voltage present?

Yes	REPAIR the circuit in question. GO to C28

No	GO to C20

C20 CHECK THE FRONT HEIGHT MOTOR CIRCUITS FOR AN OPEN

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C341B-23	Ω	C382-3

C341B-11	Ω	C382-1

Are the resistances less than 3 ohms?

Yes	GO to C27

No	REPAIR the circuit in question. GO to C28

C21 CHECK THE REAR HEIGHT MOTOR FOR CORRECT OPERATION USING ACTIVE COMMANDS

Ignition OFF.

Disconnect: Driver Seat Rear Height Motor C363 .

Ignition ON.

Using a diagnostic scan tool, view the following DSM active command Parameter Identifications (PIDs):

Rear Motor Up (REAR_UP)

Rear motor down (REAR_DWN)

NOTE: During the following step, the voltage being measured changes polarity dependent upon which direction the seat control is activated.

Using a diagnostic scan tool, toggle the active commands REAR_UP and REAR_DOWN on and off and measure:

Positive Lead	Measurement / Action	Negative Lead
C363-1	V	C363-3

Is the voltage greater than 11 volts when commanded ON in both directions and 0 volt when commanded OFF?

Yes	INSTALL a new driver seat track. REFER to: Front Seat Track . GO to C28

No	GO to C22

C22 CHECK THE REAR HEIGHT MOTOR CIRCUITS FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: DSM C341B .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C341B-22	V	Ground
C341B-10	V	Ground

Is any voltage present?

Yes	REPAIR the circuit in question. GO to C28

No	GO to C23

C23 CHECK THE REAR HEIGHT MOTOR CIRCUITS FOR AN OPEN

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C341B-22	Ω	C363-3
C341B-10	Ω	C363-1

Are the resistances less than 3 ohms?

Yes	GO to C27

No	REPAIR the circuit in question. GO to C28

C24 CHECK THE HORIZONTAL MOTOR FOR CORRECT OPERATION USING ACTIVE COMMANDS

Ignition OFF.

Disconnect: Driver Seat Horizontal Motor C362 .

Ignition ON.

Using a diagnostic scan tool, view the following DSM active command Parameter Identifications (PIDs):

Horizontal Motor Forward (HORZ_FWD)

Horizontal Motor Backward (HORZ_BWD)

> *NOTE: During the following step, the voltage being measured changes polarity dependent upon which direction the seat control is activated.*

Using a diagnostic scan tool, toggle the active commands HORZ_FWD and HORZ_BWD on and off and measure:

Positive Lead	Measurement / Action	Negative Lead
C362-1		C362-3

Is the voltage greater than 11 volts when commanded ON in both directions and 0 volt when commanded OFF?

Yes	INSTALL a new horizontal motor. REFER to: Front Seat Track Motor . GO to C28

No	GO to C25

C25 CHECK THE HORIZONTAL MOTOR CIRCUITS FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: DSM C341B .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C341B-9		Ground
C341B-12		Ground

Is any voltage present?

Yes	REPAIR the circuit in question. GO to C28

No	GO to C26

C26 CHECK THE HORIZONTAL MOTOR CIRCUITS FOR AN OPEN

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C341B-9	Ω	C362-3
C341B-12	Ω	C362-1

Are the resistances less than 3 ohms?

Yes	GO to C27

No	REPAIR the circuit in question. GO to C28

C27 CHECK THE DSM (DRIVER FRONT SEAT MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all of the DSM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins as necessary

pushed-out pins - install new pins as necessary

Reconnect the DSM connectors. Make sure they seat and latch correctly.

> *NOTE: Do not reconnect Driver Side Airbag In-line C345 at this time.*

Reconnect all previously disconnected connectors.

Ignition ON.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new DSM. REFER to: Driver Front Seat Module . GO to C28

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues. GO to C28

C28 VERIFY THE SUPPLEMENTAL RESTRAINT SYSTEM (SRS) PROVES OUT SUCCESSFULLY

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING .

Connect: Driver Side Airbag In-line C345.

Connect all previously disconnected connectors.

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) REPOWERING .

Did the SRS prove out successfully?

Yes	Repair is complete. RETURN the vehicle to the customer.

No	REFER to: SUPPLEMENTAL RESTRAINT SYSTEM .

DIAGNOSIS AND TESTING > FRONT SEATS > PINPOINT TEST(S) > PINPOINT TEST D : THE MEMORY SEAT DOES NOT OPERATE USING THE MEMORY SET SWITCH

Refer to Memory Seats for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Front Seats

DSM DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1663	Seat Driver Front Up/Down Motor Stalled	During self-test, the DSM attempts to operate the appropriate seat track motor and uses the motor's position sensor to monitor movement. If no motor movement is sensed, the DTC is set. The DSM will retry motor operation on the next activation of the seat control switch. If no movement continues to be monitored after 250 milliseconds, the DSM disables the output.
B1664	Seat Driver Rear Up/Down Motor Stalled	During self-test, the DSM attempts to operate the appropriate seat track motor and uses the motor's position sensor to monitor movement. If no motor movement is sensed, the DTC is set. The DSM will retry motor operation on the next activation of the seat control switch. If no movement continues to be monitored after 250 milliseconds, the DSM disables the output.
B1665	Seat Driver Forward/Backward Motor Stalled	During self-test, the DSM attempts to operate the appropriate seat track motor and uses the motor's position sensor to monitor movement. If no motor movement is sensed, the DTC is set. The DSM will retry motor operation on the next activation of the seat control switch. If no movement continues to be monitored after 250 milliseconds, the DSM disables the output.
B1952	Seat Rear Up/Down Position Feedback Circuit Short to Battery	If a short to voltage or an open condition is present on the affected motor's position sensor

		(Hall-effect) feedback circuit, the DTC is set. After a DTC is set, a memory recall is not possible but the seat control switch can operate the associated motor in one-second increments.
B1953	Seat Rear Up/Down Position Feedback Circuit Short to Ground	If a short to ground condition is present on the affected motor's position sensor (Hall-effect) feedback circuit, the DTC is set. After a DTC is set, a memory recall is not possible but the seat control switch can operate the associated motor in one-second increments.
B1956	Seat Front Up/Down Position Feedback Circuit Short to Battery	If a short to voltage or an open condition is present on the affected motor's position sensor (Hall-effect) feedback circuit, the DTC is set. After a DTC is set, a memory recall is not possible but the seat control switch can operate the associated motor in one-second increments.
B1957	Seat Front Up/Down Position Feedback Circuit Short to Ground	If a short to ground condition is present on the affected motor's position sensor (Hall-effect) feedback circuit, the DTC is set. After a DTC is set, a memory recall is not possible but the seat control switch can operate the associated motor in one-second increments.
B1964	Seat Horizontal Forward/Rearward Position Feedback Circuit Short to Battery	If a short to voltage or an open condition is present on the affected motor's position sensor (Hall-effect) feedback circuit, the DTC is set. After a DTC is set, a memory recall is not possible but the seat control switch can operate the associated motor in one-second increments.
B1965	Seat Horizontal Forward/Rearward Position Feedback Circuit Short to Ground	If a short to ground condition is present on the affected motor's position sensor (Hall-effect) feedback circuit, the DTC is set. After a DTC is set, a memory recall is not possible but the seat control switch can operate the associated motor in one-second increments.

DDM DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1C03:23	Memory #1 Switch: Signal Stuck Low	If a short to ground is sensed on the switch input circuit during the DDM self-test, the DTC is set. If activity is sensed on the input circuit for greater than 2 minutes, the DTC is set as continuous. With the DTC set, any input signal on the circuit is ignored.
B1C04:23	Memory #2 Switch: Signal Stuck Low	If a short to ground is sensed on the switch input circuit during the DDM self-test, the DTC is set. If activity is sensed on the input circuit for greater than 2 minutes, the DTC is set as continuous. With the DTC set, any input signal on the circuit is ignored.
B1C05:23	Memory #3 Switch: Signal Stuck Low	If a short to ground is sensed on the switch input circuit during the DDM self-test, the DTC is set. If activity is sensed on the input circuit for greater than 2 minutes, the DTC is set as continuous. With the DTC set, any input signal on the circuit is ignored.

Possible Causes

- Wiring, terminals or connectors
- Memory SET switch
- Missing ignition status information
- Horizontal motor
- Seat track
- DSM

DIAGNOSIS AND TESTING > FRONT SEATS > PINPOINT TEST(S) > PINPOINT TEST D : THE MEMORY SEAT DOES NOT OPERATE USING THE MEMORY SET SWITCH > PINPOINT TEST D : THE MEMORY SEAT DOES NOT OPERATE USING THE MEMORY SET SWITCH

WARNING: Incorrect repair techniques or actions can cause an accidental

Supplemental Restraint System (SRS) deployment. Never compromise or depart from these instructions. Failure to precisely follow all instructions could result in serious personal injury from an accidental deployment.

D1 CHECK THE DSM (DRIVER FRONT SEAT MODULE) IGNITION SWITCH STATUS PID (PARAMETER IDENTIFICATION) STATES

Ignition ON.

Using a diagnostic scan tool, monitor the DSM IGN_SW PID while operating the ignition.

Do the PID states agree?

Yes	GO to D2

No	To diagnose no power in run, REFER to: STEERING WHEEL AND COLUMN ELECTRICAL COMPONENTS .

D2 CHECK FOR DIAGNOSTIC TROUBLE CODES (DTCS)

Operate the memory seat in all directions through the full range of travel.

Place the memory seat in the middle of each range of travel.

Using a diagnostic scan tool, perform self-test on the DSM and DDM. If the diagnostic scan tool does not communicate to the DSM and/or DDM, REFER to: MODULE COMMUNICATIONS NETWORK .

Are any Diagnostic Trouble Codes (DTCs) present?

Yes	For DTC B1C03:23, B1C04:23 or B1C05:23, GO to D4 If Diagnostic Trouble Codes (DTCs) B1952, B1956 and B1964 are all retrieved, GO to D9 If Diagnostic Trouble Codes (DTCs) B1953, B1957 and B1965 are all retrieved, GO to D9 For DTC B1663 or B1956, GO to D10 For DTC B1957, GO to D11 For DTC B1664 or B1952, GO to D13 For DTC B1953, GO to D14 For DTC B1665 or B1964, GO to D16 For DTC B1965, GO to D17 For all other Diagnostic Trouble Codes (DTCs), REFER to the DSM DTC Chart or DDM DTC Chart (s).

No	GO to D3

D3 MONITOR DSM (DRIVER FRONT SEAT MODULE) PARAMETER IDENTIFICATIONS (PIDS) AND CHECK FOR CORRECT MEMORY SET SWITCH INPUTS

While activating the memory recall 1, 2 and 3 buttons, monitor the following DSM memory recall switch status Parameter Identifications (PIDs) using a diagnostic scan tool:

Memory 1 recall switch status (MEM_1).

Memory 2 recall switch status (MEM_2).

Memory 3 recall switch status (MEM_3).

Do the PID values agree with the switch button positions?

Yes	GO to D9

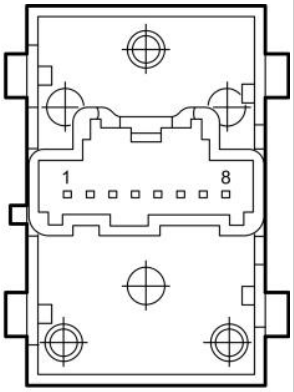
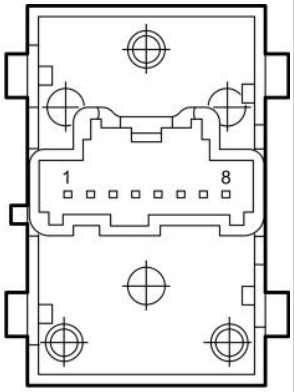
No	GO to D4

D4 CHECK THE MEMORY SET SWITCH

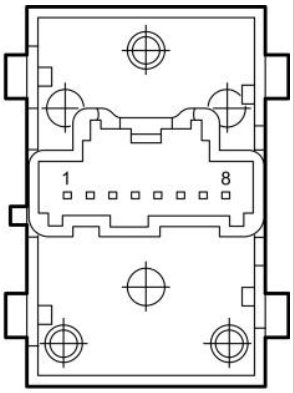
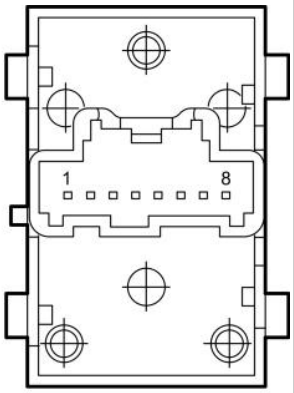
Ignition OFF.

Disconnect: Driver Door Lock Control Switch C541 .

While pressing and releasing the indicated memory recall button 1, measure the **component side resistance** of the driver door lock control switch using the following table:

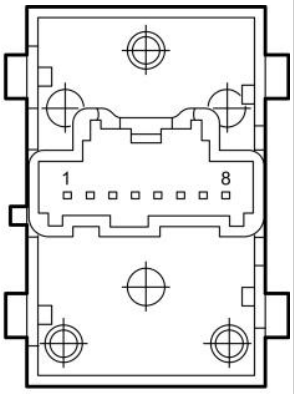
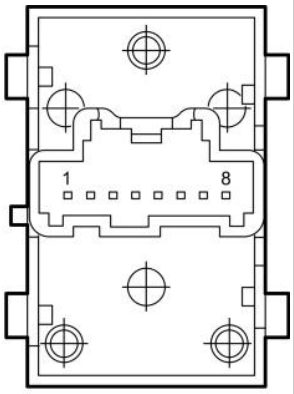
Positive Lead	Measurement / Action	Negative Lead
 A0074536 C541, pin 5, Component Side	Ω	 A0074536 C541, pin 3, Component Side

While pressing and releasing the indicated memory recall button 2, measure the **component side resistance** of the driver door lock control switch using the following table:

Positive Lead	Measurement / Action	Negative Lead
 A0074536 C541, pin 6, Component Side	Ω	 A0074536 C541, pin 3, Component Side

While pressing and releasing the indicated memory recall button 3, measure the **component**

side resistance of the driver door lock control switch using the following table:

Positive Lead	Measurement / Action	Negative Lead
 A0074536 C541, pin 7, Component Side	Ω	 A0074536 C541, pin 3, Component Side

Are the resistances less than 20 ohms with the switch buttons pressed and greater than 10, 000 ohms with the switch buttons released?

Yes	GO to D5

No	INSTALL a new door lock control switch. REFER to: DOOR LOCK CONTROL SWITCH .

D5 CHECK THE MEMORY SET SWITCH GROUND CIRCUIT FOR AN OPEN

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C541-3	Ω	Ground

Is the resistance less than 3 ohms?

Yes	GO to D6

No	REPAIR the circuit.

D6 CHECK THE MEMORY SET CIRCUITS FOR A SHORT TO VOLTAGE

Disconnect: DDM C501B .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead

C541-5		Ground
C541-6		Ground
C541-7		Ground

Is any voltage present?

Yes	REPAIR the circuit in question.

No	GO to D7

D7 CHECK THE MEMORY SET SWITCH CIRCUITS FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C541-5	Ω	Ground
C541-6	Ω	Ground
C541-7	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to D8

No	REPAIR the circuit in question.

D8 CHECK THE MEMORY SET SWITCH CIRCUITS FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C541-5	Ω	C501B-1
C541-6	Ω	C501B-3
C541-7	Ω	C501B-2

Are the resistances less than 3 ohms?

Yes	GO to D20

No	REPAIR the circuit in question.

D9 CHECK THE DSM (DRIVER FRONT SEAT MODULE) SENSOR PARAMETER IDENTIFICATIONS

(PIDS)

While operating the seat control switch in all positions, monitor the following DSM seat control switch Parameter Identifications (PIDs) using a diagnostic scan tool:

Driver Power Seat Front Up/Down Switch (SFNT_MT)

Driver Power Seat Forward/Backward Switch (SFWD_MT)

Driver Power Seat Rear Up/Down Switch (SREARMT)

Does each PID indicate the sensor is operational throughout each motor's full range of travel?

Yes	GO to D19

No	If the PID indicates driver seat front vertical position sensor is not present, GO to D10 If the PID indicates driver seat rear vertical position sensor is not present, GO to D13 If the PID indicates driver seat horizontal position sensor is not present, GO to D16

D10 CHECK THE FRONT HEIGHT SENSOR CIRCUITS FOR A SHORT TO VOLTAGE

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING .

Disconnect: Driver Side Airbag In-line C345.

Disconnect: DSM C341B .

Disconnect: Driver Seat Front Height Motor C382 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C382-2		Ground
C382-4		Ground

Is any voltage present?

Yes	REPAIR the circuit in question. GO to D21

No	GO to D11

D11 CHECK THE FRONT HEIGHT SENSOR CIRCUITS FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead

C382-2	Ω	Ground
C382-4	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to D12

No	REPAIR the circuit in question. GO to D21

D12 CHECK THE FRONT HEIGHT SENSOR CIRCUITS FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C382-2	Ω	C341B-8
C382-4	Ω	C341B-4

Are the resistances less than 3 ohms?

Yes	INSTALL a new driver seat track. REFER to: Front Seat Track . GO to D21

No	REPAIR the circuit in question. GO to D21

D13 CHECK THE REAR HEIGHT SENSOR CIRCUITS FOR A SHORT TO VOLTAGE

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING .

Disconnect: Driver Side Airbag In-line C345.

Disconnect: DSM C341B .

Disconnect: Driver Seat Rear Height Motor C363 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C363-2	V	Ground
C363-4	V	Ground

Is any voltage present on any circuits?

Yes	REPAIR the circuit in question. GO to D21

No	GO to D14

D14 CHECK THE REAR HEIGHT SENSOR CIRCUITS FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C363-2	Ω	Ground
C363-4	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to D15

No	REPAIR the circuit in question. GO to D21

D15 CHECK THE REAR HEIGHT SENSOR CIRCUITS FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C363-2	Ω	C341B-3
C363-4	Ω	C341B-8

Are the resistances less than 3 ohms?

Yes	INSTALL a new driver seat track. REFER to: Front Seat Track . GO to D21

No	REPAIR the circuit in question. GO to D21

D16 CHECK THE HORIZONTAL SENSOR CIRCUITS FOR A SHORT TO VOLTAGE

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING .

Disconnect: Driver Side Airbag In-line C345.

Disconnect: DSM C341B .

Disconnect: Driver Seat Horizontal Motor C362 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C362-2	V	Ground

C362-4		Ground

Is any voltage present on any circuits?

Yes	REPAIR the circuit in question. GO to D21

No	GO to D17

D17 CHECK THE HORIZONTAL SENSOR CIRCUITS FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C362-2	Ω	Ground
C362-4	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to D18

No	REPAIR the circuit in question. GO to D21

D18 CHECK THE HORIZONTAL SENSOR CIRCUITS FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C362-2	Ω	C341B-8
C362-4	Ω	C341B-14

Are the resistances less than 3 ohms?

Yes	INSTALL a new horizontal motor. REFER to: Front Seat Track Motor . GO to D21

No	REPAIR the circuit in question. GO to D21

D19 CHECK THE DSM (DRIVER FRONT SEAT MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all of the DSM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins as necessary

pushed-out pins - install new pins as necessary

Reconnect the DSM connectors. Make sure they seat and latch correctly.

> *NOTE: Do not reconnect Driver Side Airbag In-line C345 at this time.*

Reconnect all previously disconnected connectors.

Ignition ON.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new DSM. REFER to: Driver Front Seat Module . GO to D21

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues. GO to D21

D20 CHECK THE DDM (DRIVER DOOR MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all of the DDM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins as necessary

pushed-out pins - install new pins as necessary

Reconnect the DDM connectors. Make sure they seat and latch correctly.

Connect: Driver Door Lock Control Switch C541 .

Ignition ON.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new DDM. REFER to: DRIVER DOOR MODULE (DDM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

D21 VERIFY THE SUPPLEMENTAL RESTRAINT SYSTEM (SRS) PROVES OUT SUCCESSFULLY

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING .

Connect: Driver Side Airbag In-line C345.

Connect all previously disconnected connectors.

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) REPOWERING .

Did the SRS prove out successfully?

Yes	Repair is complete. RETURN the vehicle to the customer.

No	REFER to: SUPPLEMENTAL RESTRAINT SYSTEM .

DIAGNOSIS AND TESTING > FRONT SEATS > PINPOINT TEST(S) > PINPOINT TEST E : EASY ENTRY/EASY EXIT IS INOPERATIVE/DOES NOT OPERATE CORRECTLY

Normal Operation and Fault Conditions

REFER to: Front Seats .

Possible Causes

- Easy entry/exit feature is not enabled
- Missing ignition status information - communication bus message
- DSM

DIAGNOSIS AND TESTING > FRONT SEATS > PINPOINT TEST(S) > PINPOINT TEST E : EASY ENTRY/EASY EXIT IS INOPERATIVE/DOES NOT OPERATE CORRECTLY > PINPOINT TEST E : EASY ENTRY/EASY EXIT IS INOPERATIVE/DOES NOT OPERATE CORRECTLY

E1 CHECK THE DRIVER POWER SEAT OPERATION

Ignition ON.

Check the message center to verify the easy entry/exit feature is turned on.

Using the seat control switch, verify the driver power seat operates fully forward and backward.

Using a diagnostic scan tool, perform the DSM self-test.

Are any Diagnostic Trouble Codes (DTCs) received?

Yes	REFER to the DSM DTC Chart .

No	If disabled, ENABLE the easy entry/exit feature through the message center. REFER to the Owner's Literature. TEST the system for normal operation. If OK, INSTRUCT the customer on correct system operation. Otherwise, GO to E2

E2 CHECK THE DSM (DRIVER FRONT SEAT MODULE) IGNITION SWITCH STATUS PID (PARAMETER IDENTIFICATION) STATES

Ignition ON.

Using a diagnostic scan tool, monitor the DSM IGN_SW PID while operating the ignition.

Do the PID states agree with ignition mode?

Yes	INSTALL a new DSM. REFER to: Driver Front Seat Module .

No	DIAGNOSE the ignition status concern. REFER to: STEERING WHEEL AND COLUMN ELECTRICAL COMPONENTS .

DIAGNOSIS AND TESTING > FRONT SEATS > PINPOINT TEST(S) > PINPOINT TEST F : THE POWER SEAT IS INOPERATIVE OR DOES NOT OPERATE CORRECTLY - DRIVER, WITHOUT MEMORY

Refer to Power Seats for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Front Seats .

Possible Causes

- Fuse
- Wiring, terminals or connectors
- Seat control switch
- Horizontal motor
- Seat track

Visual Inspection and Diagnostic Pre-checks

- Verify BJB fuse 12 (30A) is OK.

DIAGNOSIS AND TESTING > FRONT SEATS > PINPOINT TEST(S) > PINPOINT TEST F :

THE POWER SEAT IS INOPERATIVE OR DOES NOT OPERATE CORRECTLY - DRIVER, WITHOUT MEMORY > PINPOINT TEST F : THE POWER SEAT IS INOPERATIVE OR DOES NOT OPERATE CORRECTLY - DRIVER, WITHOUT MEMORY

> *WARNING: Incorrect repair techniques or actions can cause an accidental Supplemental Restraint System (SRS) deployment. Never compromise or depart from these instructions. Failure to precisely follow all instructions could result in serious personal injury from an accidental deployment.*

F1 CHECK THE SEAT OPERATION

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING .

Disconnect: Driver Side Airbag In-line C345.

Attempt to operate the seat in all directions.

Is the seat inoperative in all directions?

Yes	GO to F2

No	If only the horizontal motor is inoperative, GO to F4 If only the front height motor is inoperative, GO to F6 If only the rear height motor is inoperative, GO to F8

F2 CHECK FOR VOLTAGE TO THE SEAT CONTROL SWITCH

Disconnect: Driver Seat Control Switch C352 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C352-9		Ground

Is the voltage greater than 11 volts?

Yes	GO to F3

No	VERIFY BJB fuse 12 (30A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short. GO to F10

F3 CHECK THE SEAT CONTROL SWITCH GROUND CIRCUIT

Measure:

Positive Lead	Measurement / Action	Negative Lead

C352-7	Ω	Ground

Is the resistance less than 3 ohms?

Yes	INSTALL a new driver seat control switch. REFER to: Front Seat Control Switch . GO to F10

No	REPAIR the circuit. GO to F10

F4 CHECK FOR VOLTAGE TO THE SEAT HORIZONTAL MOTOR

Disconnect: Driver Seat Horizontal Motor C362 .

NOTE: The voltage being measured changes polarity depending upon which direction the seat control switch is activated.

While pushing the horizontal switch forward and rearward, measure:

Positive Lead	Measurement / Action	Negative Lead
C362-1	V	C362-3

Is the voltage greater than 11 volts when the seat control switch is operated in both directions?

Yes	INSTALL a new horizontal motor. REFER to: Front Seat Track Motor . GO to F10

No	GO to F5

F5 CHECK THE SEAT HORIZONTAL MOTOR CIRCUIT FOR AN OPEN

Disconnect: Driver Seat Control Switch C352 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C352-6	Ω	C362-3
C352-5	Ω	C362-1

Are the resistances less than 3 ohms?

Yes	INSTALL a new driver seat control switch. REFER to: Front Seat Control Switch . GO to F10

No	REPAIR the circuit in question. GO to F10

F6 CHECK FOR VOLTAGE TO THE SEAT FRONT HEIGHT MOTOR

Disconnect: Driver Seat Front Height Motor C382 .

> *NOTE: The voltage being measured changes polarity depending upon which direction the seat control switch is activated.*

While pushing the front height switch upward and downward, measure:

Positive Lead	Measurement / Action	Negative Lead
C382-1	V	C382-3

Is the voltage greater than 11 volts when the seat control switch is operated in both directions?

Yes	INSTALL a new driver seat track. REFER to: Front Seat Track . GO to F10

No	GO to F7

F7 CHECK THE SEAT FRONT HEIGHT MOTOR CIRCUIT FOR AN OPEN

Disconnect: Driver Seat Control Switch C352 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C352-1	Ω	C382-3
C352-2	Ω	C382-1

Are the resistances less than 3 ohms?

Yes	INSTALL a new driver seat control switch. REFER to: Front Seat Control Switch . GO to F10

No	REPAIR the circuit in question. GO to F10

F8 CHECK FOR VOLTAGE TO THE SEAT REAR HEIGHT MOTOR

Disconnect: Driver Seat Rear Height Motor C363 .

> *NOTE: The voltage being measured changes polarity depending upon which direction the seat control switch is activated.*

While pushing the rear height switch upward and downward, measure:

Positive Lead	Measurement / Action	Negative Lead
C363-1	V	C363-3

Is the voltage greater than 11 volts when the seat control switch is operated in both directions?

Yes	INSTALL a new driver seat track. REFER to: Front Seat Track . GO to F10

No	GO to F9

F9 CHECK THE SEAT REAR HEIGHT MOTOR CIRCUIT FOR AN OPEN

Disconnect: Passenger Seat Control Switch C352 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C352-8	Ω	C363-3
C352-10	Ω	C363-1

Are the resistances less than 3 ohms?

Yes	INSTALL a new driver seat control switch. REFER to: Front Seat Control Switch . GO to F10

No	REPAIR the circuit in question. GO to F10

F10 VERIFY THE SUPPLEMENTAL RESTRAINT SYSTEM (SRS) PROVES OUT SUCCESSFULLY

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING .

Connect: Driver Side Airbag In-line C345.

Connect all previously disconnected connectors.

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) REPOWERING .

Did the SRS prove out successfully?

Yes	Repair is complete. RETURN the vehicle to the customer.

No	REFER to: SUPPLEMENTAL RESTRAINT SYSTEM .

DIAGNOSIS AND TESTING > FRONT SEATS > PINPOINT TEST(S) > PINPOINT TEST G : DTC: B1317

Refer to Memory Seats for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Front Seats .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1317	Battery Voltage High	*NOTE: DTC B1317 may be stored in the module memory due to previous battery charging or vehicle jump starting events.* The DSM continuously monitors the input voltage for correct operation. If the DSM detects input voltage above 15 volts, it stores DTC B1317 in memory. If DTC B1317 is set, the DSM disables the memory system outputs for the driver seat memory operation.

Possible Causes

- Wiring, terminals or connectors
- DSM

DIAGNOSIS AND TESTING > FRONT SEATS > PINPOINT TEST(S) > PINPOINT TEST G : DTC: B1317 > PINPOINT TEST G : DTC: B1317

G1 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) B1317, B1676 OR P0563 SET IN OTHER MODULES

Ignition ON.

Using a diagnostic scan tool, retrieve the Continuous Memory Diagnostic Trouble Codes (CMDTCs) from all modules.

Is DTC B1317, B1676 or P0563 set in more than one module?

Yes	DIAGNOSE the charging system concern. Refer to the appropriate article for the procedure.

No	GO to G2

G2 CHECK THE BATTERY VOLTAGE

Turn off all interior/exterior lights and accessories.

Start and run the engine at approximately 2, 000 RPM for 3 minutes while monitoring the battery voltage

Does the battery voltage rise to 15 volts or higher?

Yes	DIAGNOSE the charging system concern. Refer to the appropriate article for the procedure.

No	GO to G3

G3 RECHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) B1317

Ignition OFF.

Ignition ON.

Using a diagnostic scan tool, clear the Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Using a diagnostic scan tool, perform the DSM self-test.

Is DTC B1317 present?

Yes	INSTALL a new DSM. REFER to: Driver Front Seat Module .

No	The system is operating normally at this time. The DTC may have been set previously during battery charging or while jump starting the vehicle.

DIAGNOSIS AND TESTING > FRONT SEATS > PINPOINT TEST(S) > PINPOINT TEST H : DTC: B1318

Refer to Memory Seats for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Front Seats .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1318	Battery Voltage Low	The DSM continuously monitors the input voltage for correct operation. If the DSM detects input voltage below 10 volts, it stores DTC B1318 in memory. If DTC B1318 is set, the DSM disables the memory system outputs for the driver seat memory operation.

Possible Causes

- Wiring, terminals or connectors
- DSM

DIAGNOSIS AND TESTING > FRONT SEATS > PINPOINT TEST(S) > PINPOINT TEST H : DTC: B1318 > PINPOINT TEST H : DTC: B1318

WARNING: Incorrect repair techniques or actions can cause an accidental Supplemental Restraint System (SRS) deployment. Never compromise or depart from these instructions. Failure to precisely follow all instructions could result in serious personal injury from an accidental deployment.

H1 RECHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) B1318

Ignition ON.

Using a diagnostic scan tool, clear the Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Using a diagnostic scan tool, repeat the DSM self-test.

Is DTC B1318 still present?

Yes	GO to H2

No	The system is operating normally at this time. The DTC may have been set previously due to a discharged battery condition.

H2 CHECK FOR CHARGING SYSTEM DIAGNOSTIC TROUBLE CODES (DTCS) IN THE PCM (POWERTRAIN CONTROL MODULE)

Using a diagnostic scan tool, retrieve the Continuous Memory Diagnostic Trouble Codes (CMDTCs) from the PCM.

Are any charging system Diagnostic Trouble Codes (DTCs) present?

Yes	DIAGNOSE the charging system concern. Refer to the appropriate article for the procedure.

No	GO to H3

H3 CHECK THE BATTERY CONDITION AND STATE OF CHARGE

Ignition OFF.

Check the battery condition and verify the battery is fully charged. REFER to: BATTERY, MOUNTING AND CABLES .

Is the battery OK and fully charged?

Yes	GO to H4

No	DIAGNOSE the charging system concern. Refer to the appropriate article for the procedure.

H4 CHECK THE DSM (DRIVER FRONT SEAT MODULE) VOLTAGE SUPPLY

Measure and record the voltage at the battery.

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING .

Disconnect: Driver Side Airbag In-line C345.

Disconnect: DSM C341A and C341B .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C341A-1	V	Ground

Positive Lead	Measurement / Action	Negative Lead
C341B-1	V	Ground

Are the voltages greater than 11 volts?

Yes	GO to H5

No	REPAIR the circuit. CLEAR the DTC. GO to H7

H5 CHECK THE DSM (DRIVER FRONT SEAT MODULE) GROUND CIRCUIT

Ignition OFF.

Disconnect: Negative Battery Cable.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C341A-2	Ω	Ground

Positive Lead	Measurement / Action	Negative Lead
C341B-24	Ω	Ground

Are the resistances less than 3 ohms?

Yes	CONNECT the negative battery cable. GO to H6

No	REPAIR the circuit. CONNECT the negative battery cable. GO to H7

H6 CHECK THE DSM (DRIVER FRONT SEAT MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all of the DSM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins as necessary

pushed-out pins - install new pins as necessary

Reconnect the DSM connectors. Make sure they seat and latch correctly.

> *NOTE: Do not reconnect Driver Side Airbag In-line C345 at this time.*

Reconnect all previously disconnected connectors.

Ignition ON.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new DSM. REFER to: Driver Front Seat Module . GO to H7

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues. GO to H7

H7 VERIFY THE SUPPLEMENTAL RESTRAINT SYSTEM (SRS) PROVES OUT SUCCESSFULLY

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING .

Connect: Driver Side Airbag In-line C345.

Connect all previously disconnected connectors.

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) REPOWERING .

Did the SRS prove out successfully?

Yes	Repair is complete. RETURN the vehicle to the customer.

No	REFER to: SUPPLEMENTAL RESTRAINT SYSTEM .

DIAGNOSIS AND TESTING > FRONT SEATS > PINPOINT TEST(S) > PINPOINT TEST I : DTC: U0140

Refer to Module Communications Network for schematic and connector information.

Normal Operation and Fault Conditions

The DSM and the BCM communicate using the MS-CAN.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0140	Lost Communication With Body Control Module (GEM)	Set by the DSM whenever it has lost communication to the BCM for 15 seconds or longer while DSM input is between 10 and 15 volts.

Possible Causes

- Module communication
- DSM
- BCM

DIAGNOSIS AND TESTING > FRONT SEATS > PINPOINT TEST(S) > PINPOINT TEST I : DTC: U0140 > PINPOINT TEST I : DTC: U0140

I1 VERIFY CUSTOMER CONCERN

Ignition ON.

Verify there is an observable symptom present.

Is an observable symptom present?

Yes	GO to I2

No	The system is operating normally at this time. The DTC may have been set due to high network traffic or intermittent fault condition.

I2 CHECK THE COMMUNICATION NETWORK

Ignition ON.

Using a diagnostic scan tool, perform the network test.

Does the DSM pass the network test?

Yes	GO to I3

No	REFER to: MODULE COMMUNICATIONS NETWORK .

I3 RETRIEVE THE RECORDED DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE SELF-TEST

Check for recorded DSM Diagnostic Trouble Codes (DTCs) from the self-test.

Is DTC B1317 or B1318 recorded?

Yes	For DTC B1317, GO to Pinpoint Test G For DTC B1318, GO to Pinpoint Test H

No	GO to I4

I4 RECHECK THE DSM (DRIVER FRONT SEAT MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

NOTE: If new modules were installed prior to the DTC being set, the module configuration may be incorrectly set during PMI or the PMI may not have been carried out.

Using a diagnostic scan tool, clear the Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Using a diagnostic scan tool, repeat the DSM self-test.

Is DTC U0140 still present?

Yes	GO to I5

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or intermittent fault condition.

I5 CHECK FOR DTC U0140/U0140:00 IN OTHER MODULES

NOTE: If new modules were installed prior to the DTC being set, the module configuration may be incorrectly set during PMI or the PMI may not have been carried out.

Using a diagnostic scan tool, clear the Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Ignition OFF.

Ignition ON.

Wait 10 seconds.

Using a diagnostic scan tool, retrieve the Continuous Memory Diagnostic Trouble Codes (CMDTCs) from all modules.

Is DTC U0140/U0140:00 set in other modules?

Yes	

No	INSTALL a new DSM. REFER to: Driver Front Seat Module .

DIAGNOSIS AND TESTING > FRONT SEATS > PINPOINT TEST(S) > PINPOINT TEST J : ONE OR BOTH CLIMATE CONTROLLED SEATS ARE INOPERATIVE

Refer to Climate Controlled Seats for schematic and connector information.

Normal Operation and Fault Conditions

The SCME is supplied voltage at all times, but the climate controlled seat system only operates with the engine running. The system can be operated with the ignition ON engine OFF by using a diagnostic scan tool to bypass the climate controlled seat buttons on the touchscreen and FCIM. When commanding a heat or cool mode operation in this manner, it only operates in 15 second intervals.

Both voltage supply circuits are spliced together internal to the SCME, so if one circuit becomes open, both seats can still be operated. However, if a fault occurs setting a DTC specific to either climate controlled seat, only the affected seat is disabled by the SCME.

Possible Causes

- Wiring, terminals or connectors
- FDIM
- FCIM
- SCME

Visual Inspection and Diagnostic Pre-checks

- Verify BJB fuse 14 (30A) is OK.

DIAGNOSIS AND TESTING > FRONT SEATS > PINPOINT TEST(S) > PINPOINT TEST J : ONE OR BOTH CLIMATE CONTROLLED SEATS ARE INOPERATIVE > PINPOINT TEST J : ONE OR BOTH CLIMATE CONTROLLED SEATS ARE INOPERATIVE

J1 CHECK FOR SCME (FRONT SEAT CLIMATE CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, perform the SCME self-test.

Were any Diagnostic Trouble Codes (DTCs) retrieved?

Yes	GO to the SCME DTC Chart .

No	If the diagnostic scan tool did not communicate to the SCME, REFER to: MODULE COMMUNICATIONS NETWORK . Otherwise, GO to J2

J2 CHECK OPERATION OF THE SCME (FRONT SEAT CLIMATE CONTROL MODULE) USING PARAMETER IDENTIFICATIONS (PIDS)

NOTE: This step verifies the SCME is able to receive and process inbound command messages from the network and demonstrates if the SCME is operational. If the SCME is functioning correctly, this indicates the FDIM or FCIM may not be sending the commands correctly.

Using a diagnostic scan tool, view the SCME Parameter Identifications (PIDs):

Driver Seat

Seat cushion thermal electric device temperature (CSHTEMP)

Seat back thermal electric device temperature (BKTMP)

Climate-controlled seat heat command (TED_HEAT_D)

Front Passenger Seat

Passenger Cushion Thermal Electric Device (TED) Temperature (PCSHTMP)

Passenger Back (TED) Temperature (PBKTMP)

Passenger (TED) Heat Mode (TED_HEAT_P)

NOTE: The SCME active commands TED_HEAT_D (driver seat) and TED_HEAT_P (passenger seat) are limited to 15 seconds in the ON state.

Operate the affected climate controlled seat using the active command while monitoring the appropriate Parameter Identifications (PIDs) for that seat.

When the command is in process, the blower motor temperature Parameter Identifications (PIDs) on the affected seat should momentarily increase. If no temperature increase is noted, remove the cushion blower filter and repeat the active command while physically monitoring the cushion blower for fan movement.

Do the PID states or cushion blower movement indicate climate controlled seat operation when using the active command?

Yes	GO to J3

No	INSTALL a new SCME. REFER to: Front Seat Climate Control Module .

J3 USE THE FCIM (FRONT CONTROLS INTERFACE MODULE) BUTTONS AND MONITOR THE SCME (FRONT SEAT CLIMATE CONTROL MODULE) PID (PARAMETER IDENTIFICATION) FOR A RESPONSE

Using a diagnostic scan tool, view the SCME Parameter Identifications (PIDs):

Driver State Seat Mode (DCCSMOD) (driver seat)

Passenger State Seat Mode (PCCSMOD) (passenger seat)

Start the engine.

NOTE: Operation of the climate controlled seats repeatedly on and off or repeatedly switching between heat and cool modes may cause SCME Diagnostic Trouble Codes (DTCs) to set, disabling one or both seat system and may require Diagnostic Trouble Codes (DTCs) to be cleared before seat operation may continue. It is recommended to allow time between modes for seat temperatures to return toward ambient temperatures before continuing.

Attempt to operate the affected climate controlled seat in all modes using the appropriate buttons on the FCIM while monitoring the SCME PID DCCSMOD (driver seat) or PCCSMOD (passenger seat).

Do all the PID states match the climate controlled seat settings selected on the FCIM?

Yes	To diagnose the inoperative touchscreen button(s), REFER to: INFORMATION AND ENTERTAINMENT SYSTEM - GENERAL INFORMATION - VEHICLES WITH TOUCHSCREEN DISPLAY .

No	If only the climate seat functionality is inoperative, INSTALL a new FCIM. REFER to: FRONT CONTROLS INTERFACE MODULE (FCIM) . If other features of the FCIM are also inoperative, DIAGNOSE the FCIM concern. REFER to: CLIMATE CONTROL SYSTEM - GENERAL INFORMATION .

DIAGNOSIS AND TESTING > FRONT SEATS > PINPOINT TEST(S) > PINPOINT TEST K : DTC B2486

Refer to Climate Controlled Seats for schematic and connector information.

Refer to Memory Seats for schematic and connector information.

Normal Operation and Fault Conditions

The SCME monitors the input voltage for correct operation. If the SCME detects input voltage below 10 volts or above 15 volts, it stores DTC B2486 in memory. If DTC B2486 is set, the SCME enters a standby mode and suspends operation of both seats until system voltage between 10 and 15 volts is restored and a climate controlled seat switch button is selected on.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B2486	Climate Control Seat Module Voltage Out of Range	*NOTE: DTC B2486 can be*

		set if the vehicle has been recently jump started, the battery has been recently charged or the battery has been discharged. The battery may become discharged due to excessive load(s) on the charging system from aftermarket accessories or if the battery has been left unattended with the accessories on. If the SCME detects voltage below 10 volts or greater than 15 volts, the DTC is set.

Possible Causes

- Wiring, terminals or connectors
- SCME

DIAGNOSIS AND TESTING > FRONT SEATS > PINPOINT TEST(S) > PINPOINT TEST K : DTC B2486 > PINPOINT TEST K : DTC B2486

WARNING: Incorrect repair techniques or actions can cause an accidental Supplemental Restraint System (SRS) deployment. Never compromise or depart from these instructions. Failure to precisely follow all instructions could result in serious personal injury from an accidental deployment.

K1 RETRIEVE ALL CONTINUOUS MEMORY DIAGNOSTIC TROUBLE CODES (CMDTCS) IN ALL MODULES

Ignition ON.

Using a diagnostic scan tool, retrieve all Continuous Memory Diagnostic Trouble Codes (CMDTCs) from all modules.

Are any charging system related Diagnostic Trouble Codes (DTCs) retrieved from the PCM?

Yes	DIAGNOSE the charging system concern. Refer to the appropriate article for the procedure.

No	GO to K2

K2 CHECK BATTERY CONDITION

Ignition OFF.

Carry out the Battery Condition Test. REFER to: BATTERY, MOUNTING AND CABLES .

Did the battery pass the condition test?

Yes	If the battery passed the condition test but required a recharge, DIAGNOSE the charging system concern. Refer to the appropriate article for the procedure. CLEAR all Diagnostic Trouble Codes (DTCs). TEST the system for normal operation. If the battery passed the condition test and did not require a recharge, GO to K3

No	INSTALL a new battery. REFER to: BATTERY, MOUNTING AND CABLES .

K3 CHECK CHARGING SYSTEM VOLTAGE

NOTE: Do not allow the engine speed to increase above 2, 000 RPM while performing this step or the generator may self-excite and result in default charging system output voltage. If engine speed goes above 2, 000 RPM, shut the vehicle OFF and restart the engine before performing this step.

Start the engine.

Measure the voltage of the battery with and without a load on the charging system as follows:

Turn off all accessories and run the engine at 1, 500 RPM for a minimum of 2 minutes while measuring battery voltage.

Turn on headlights and HVAC fan on high and run engine at 1, 500 RPM for a minimum of 2 minutes while measuring battery voltage.

Was the battery voltage between 13 and 15.2 volts?

Yes	GO to K4

No	DIAGNOSE the charging system concern. Refer to the appropriate article for the procedure.

K4 CHECK VOLTAGE AT THE SCME (FRONT SEAT CLIMATE CONTROL MODULE)

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING .

Disconnect: Passenger Side Airbag In-line C219 .

Disconnect: SCME C3265A .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265A-E		Ground
C3265A-F		Ground

Are the voltages greater than 11 volts?

Yes	GO to K5

No	REPAIR the circuit in question. GO to K7

K5 CHECK SCME (FRONT SEAT CLIMATE CONTROL MODULE) GROUND CIRCUIT FOR AN OPEN

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265A-M	Ω	Ground

Repeat this measurement while wiggling the harness.

Is the resistance less than 3 ohms?

Yes	GO to K6

No	REPAIR the circuit. GO to K7

K6 CHECK THE SCME (FRONT SEAT CLIMATE CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all of the SCME connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins as necessary

pushed-out pins - install new pins as necessary

Reconnect the SCME connectors. Make sure they seat and latch correctly.

NOTE: Do not reconnect Passenger Side Airbag In-line C219 at this time.

Reconnect all previously disconnected connectors.

Ignition ON.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service

	Bulletins (TSBs) address this concern, INSTALL a new SCME. REFER to: Front Seat Climate Control Module . GO to K7

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues. GO to K7

K7 VERIFY THE SUPPLEMENTAL RESTRAINT SYSTEM (SRS) PROVES OUT SUCCESSFULLY

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING .

Connect: Passenger Side Airbag In-line C219 .

Connect all previously disconnected connectors.

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) REPOWERING .

Did the SRS prove out successfully?

Yes	Repair is complete. RETURN the vehicle to the customer.

No	REFER to: SUPPLEMENTAL RESTRAINT SYSTEM .

DIAGNOSIS AND TESTING > FRONT SEATS > PINPOINT TEST(S) > PINPOINT TEST L : DTCS B103B AND B1111

Refer to Climate Controlled Seats for schematic and connector information.

Normal Operation and Fault Conditions

The SCME monitors the backrest and cushion blower motor circuits. If a short to ground or voltage on any of these circuits is detected, the Diagnostic Trouble Codes (DTCs) will be set.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B103B	Thermoelectric Driver Overcurrent Low	If SCME outputs to the driver seat backrest or cushion blower motor (circuit pins G, H, J or K at the SCME connector) or any components within these circuit loops are shorted to ground or a blower motor resistance of less than 0.9 ohm is sensed, the SCME shuts down the driver seat system and sets this DTC.
B1111	Driver Thermal Electric Device Control Overtemperature Fault	If the SCME blower motor driver integrated circuit temperature exceeds 175 ° C (347 ° F), the SCME shuts down the driver seat

		system and sets this DTC.

Possible Causes

- Wiring, terminals or connectors
- Backrest blower motor
- Cushion blower motor
- SCME

DIAGNOSIS AND TESTING > FRONT SEATS > PINPOINT TEST(S) > PINPOINT TEST L : DTCS B103B AND B1111 > PINPOINT TEST L : DTCS B103B AND B1111

> *WARNING: Incorrect repair techniques or actions can cause an accidental Supplemental Restraint System (SRS) deployment. Never compromise or depart from these instructions. Failure to precisely follow all instructions could result in serious personal injury from an accidental deployment.*

L1 CHECK BLOWER MOTOR CIRCUITS FOR A SHORT TO GROUND

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING .

Disconnect: Driver Side Airbag In-line C345.

Disconnect: Passenger Side Airbag In-line C219 .

Disconnect: SCME C3265A .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265A-G	Ω	Ground
C3265A-H	Ω	Ground
C3265A-J	Ω	Ground
C3265A-K	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to L2

No	If the resistance of C3265A-G and C3265A-H to ground is **not** greater than 10, 000 ohms to ground, GO to L6. If the resistance of C3265A-J and C3265A-K to ground is not greater than 10, 000 ohms to ground, GO to L7.

L2 CHECK BLOWER MOTOR CIRCUITS FOR A SHORT TO VOLTAGE

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265A-G		Ground
C3265A-H		Ground
C3265A-J		Ground
C3265A-K		Ground

Is any voltage present?

Yes	If voltage is present at C3265A-G and/or C3265A-H , GO to L8 If voltage is present at C3265A-J and/or C3265A-K , GO to L9

No	GO to L3

L3 CHECK THE RESISTANCE OF THE BLOWER MOTOR AND WIRING

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265A-G	Ω	C3265A-H
C3265A-J	Ω	C3265A-K

Are the resistances between 0.9 and 10 ohms?

Yes	GO to L10

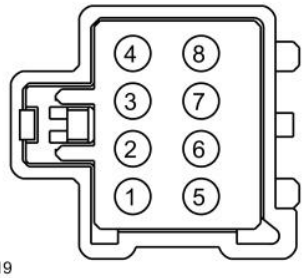
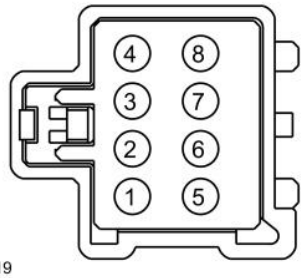
No	If the resistance between C3265A-G and C3265A-H is **not** between 0.9 and 10 ohms, GO to is **not** between 0.9 and 10 ohms, GO to L5. If the resistance between C3265A-J and C3265A-K is not between 0.9 and 10 ohms, GO to L4

L4 CHECK BACKREST BLOWER MOTOR THERMO ELECTRIC DEVICE RESISTANCE

Disconnect: Driver Seat Backrest Blower Motor C3034 .

Measure the **component side resistance** between:

Positive Lead	Measurement / Action	Negative Lead

 E160219 C3034-1, Component Side	Ω	 E160219 C3034-2, Component Side

Is the resistance between 0.9 and 10 ohms?

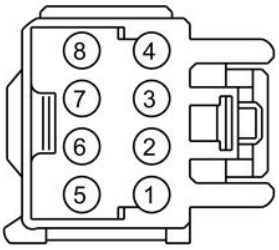
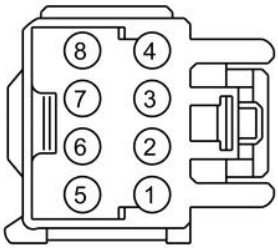
Yes	REPAIR the circuit(s) in question. GO to L11

No	INSTALL a new backrest blower motor. REFER to: Front Seat Backrest Blower Motor . GO to L11

L5 CHECK CUSHION BLOWER MOTOR RESISTANCE

Disconnect: Driver Seat Cushion Blower Motor C3035 .

Measure the **component side resistance** between:

Positive Lead	Measurement / Action	Negative Lead
 E160218 C3035-1, Component Side	Ω	 E160218 C3035-2, Component Side

Is the resistance between 0.9 and 10 ohms?

Yes	REPAIR the circuit(s) in question. GO to L11

No	INSTALL a new cushion blower motor. REFER to: Front Seat Cushion Blower Motor . GO to L11

L6 CHECK THE CUSHION BLOWER MOTOR CIRCUITS FOR A SHORT TO GROUND

Disconnect: Driver Seat Cushion Blower Motor C3035 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265A-G	Ω	Ground
C3265A-H	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	INSTALL a new cushion blower motor. REFER to: Front Seat Cushion Blower Motor . GO to L11

No	REPAIR the circuit in question. GO to L11

L7 CHECK THE BACKREST BLOWER MOTOR CIRCUITS FOR A SHORT TO GROUND

Disconnect: Driver Seat Backrest Blower Motor C3034 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265A-J	Ω	Ground
C3265A-K	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	INSTALL a new backrest blower motor. REFER to: Front Seat Backrest Blower Motor . GO to L11

No	REPAIR the circuit in question. GO to L11

L8 CHECK THE CUSHION BLOWER MOTOR CIRCUITS FOR A SHORT TO VOLTAGE

Disconnect: Driver Seat Cushion Blower Motor C3035 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265A-G	V	Ground
C3265A-H	V	Ground

Is any voltage present?

Yes	REPAIR the circuit in question. GO to L11

No	INSTALL a new cushion blower motor. REFER to: Front Seat Cushion Blower Motor . GO to

	L11

L9 CHECK THE BACKREST BLOWER MOTOR CIRCUITS FOR A SHORT TO VOLTAGE

Disconnect: Driver Seat Backrest Blower Motor C3034 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265A-J		Ground
C3265A-K		Ground

Is any voltage present?

Yes	REPAIR the circuit in question. GO to L11

No	INSTALL a new backrest blower motor. REFER to: Front Seat Backrest Blower Motor . GO to L11

L10 CHECK THE SCME (FRONT SEAT CLIMATE CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all of the SCME connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins as necessary

pushed-out pins - install new pins as necessary

Reconnect the SCME connectors. Make sure they seat and latch correctly.

NOTE: Do not reconnect Driver Side Airbag In-line C345 or Passenger Side Airbag In-line C219 at this time.

Reconnect all previously disconnected connectors.

Ignition ON.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service

	Bulletins (TSBs) address this concern, INSTALL a new SCME. REFER to: Front Seat Climate Control Module . GO to L11

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues. GO to L11

L11 VERIFY THE SUPPLEMENTAL RESTRAINT SYSTEM (SRS) PROVES OUT SUCCESSFULLY

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING .

Connect: Driver Side Airbag In-line C345.

Connect: Passenger Side Airbag In-line C219 .

Connect all previously disconnected connectors.

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) REPOWERING .

Did the SRS prove out successfully?

Yes	Repair is complete. RETURN the vehicle to the customer.

No	REFER to: SUPPLEMENTAL RESTRAINT SYSTEM .

DIAGNOSIS AND TESTING > FRONT SEATS > PINPOINT TEST(S) > PINPOINT TEST M : DTC B103C

Refer to Climate Controlled Seats for schematic and connector information.

Normal Operation and Fault Conditions

The SCME monitors the backrest and cushion blower motor circuits. If an open on any of these circuits is detected, the DTC will be set.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B103C	Thermoelectric Driver Open Load	If SCME outputs to the driver seat backrest or cushion blower motor (circuit pins G, H, J or K at the SCME connector) or any components within these circuit loops are open, disconnected or a blower motor resistance greater than 90, 000 ohms is sensed, the SCME continues normal operation and sets this DTC.

Possible Causes

- Wiring, terminals or connectors
- Backrest blower motor
- Cushion blower motor
- SCME

DIAGNOSIS AND TESTING > FRONT SEATS > PINPOINT TEST(S) > PINPOINT TEST M : DTC B103C > PINPOINT TEST M : DTC B103C

> *WARNING: Incorrect repair techniques or actions can cause an accidental Supplemental Restraint System (SRS) deployment. Never compromise or depart from these instructions. Failure to precisely follow all instructions could result in serious personal injury from an accidental deployment.*

M1 CHECK BLOWER MOTOR CIRCUITS FOR AN OPEN

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING .

Disconnect: Driver Side Airbag In-line C345.

Disconnect: Passenger Side Airbag In-line C219 .

Disconnect: Driver Seat Backrest Blower Motor C3034 .

Disconnect: Driver Seat Cushion Blower Motor C3035 .

Disconnect: SCME C3265A .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265A-G	Ω	C3035-1
C3265A-H	Ω	C3035-2

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265A-J	Ω	C3034-1
C3265A-K	Ω	C3034-2

Are the resistances less than 3 ohms?

Yes	GO to M2

No	REPAIR the circuit(s) in question. GO to M5

M2 CHECK BLOWER MOTOR CIRCUITS FOR A SHORT TO VOLTAGE

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265A-G	V	Ground
C3265A-H	V	Ground
C3265A-J	V	Ground
C3265A-K	V	Ground

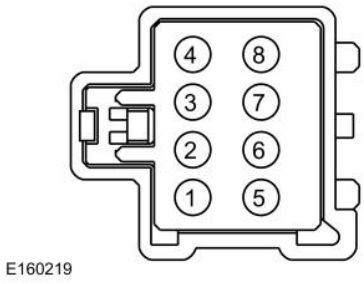
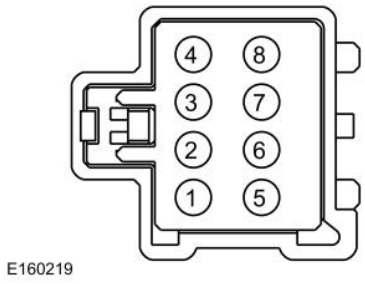
Is any voltage present?

Yes	REPAIR the circuit(s) in question. GO to M5

No	GO to M3

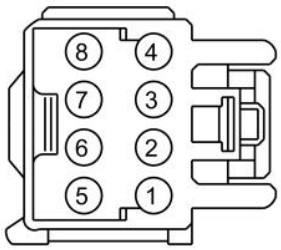
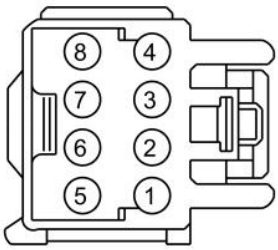
M3 CHECK BACKREST AND CUSHION BLOWER MOTOR RESISTANCES

Measure the **component side resistance** between:

Positive Lead	Measurement / Action	Negative Lead
 C3034-1, Component Side	Ω	 C3034-2, Component Side

Measure the **component side resistance** between:

Positive Lead	Measurement / Action	Negative Lead

 E160218 C3035-1, Component Side	Ω	 E160218 C3035-2, Component Side

Are the resistances between 0.9 and 10 ohms?

Yes	GO to M4

No	If the backrest blower motor resistance measurement failed, INSTALL a new backrest blower motor. REFER to: Front Seat Backrest Blower Motor . GO to M5 If the cushion blower motor resistance measurement failed, INSTALL a new cushion blower motor. REFER to: Front Seat Cushion Blower Motor . GO to M5

M4 CHECK THE SCME (FRONT SEAT CLIMATE CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all of the SCME connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins as necessary

pushed-out pins - install new pins as necessary

Reconnect the SCME connectors. Make sure they seat and latch correctly.

NOTE: Do not reconnect Driver Side Airbag In-line C345 or Passenger Side Airbag In-line C219 at this time.

Reconnect all previously disconnected connectors.

Ignition ON.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new SCME. REFER to: Front Seat Climate Control Module . GO to M5

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues. GO to M5

M5 VERIFY THE SUPPLEMENTAL RESTRAINT SYSTEM (SRS) PROVES OUT SUCCESSFULLY

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING .

Connect: Driver Side Airbag In-line C345.

Connect: Passenger Side Airbag In-line C219 .

Connect all previously disconnected connectors.

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) REPOWERING .

Did the SRS prove out successfully?

Yes	Repair is complete. RETURN the vehicle to the customer.

No	REFER to: SUPPLEMENTAL RESTRAINT SYSTEM .

DIAGNOSIS AND TESTING > FRONT SEATS > PINPOINT TEST(S) > PINPOINT TEST N : DTC B103D

Refer to Climate Controlled Seats for schematic and connector information.

Normal Operation and Fault Conditions

The SCME is supplied voltage at all times, but the climate controlled seat system only operates with the engine running. The system can be operated with the ignition ON engine OFF by using a diagnostic scan tool to bypass the climate controlled seat switches on the touchscreen and FCIM. When commanding a heat or cool mode operation in this manner, the climate controlled seat system only operates in 15 second intervals.

Both voltage supply circuits are spliced together internal to the SCME, so if one circuit becomes open, both seats can still be operated. However, if a fault occurs setting a DTC specific to either climate controlled seat, only the affected seat is disabled by the SCME.

Cabin air is drawn through and distributed to each of the blower motors located in the seat cushion and backrest. The blower motors then heat or cool the air. The air is then directed into the foam pad where it is distributed along the surface of the cushion and backrest of the seat. Once the system is activated, the SCME uses a set of flexible algorithms to control the heating/cooling modes and the blower speed dependant on the commanded climate controlled seat settings.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B103D	Blower Driver Overtemperature	If the SCME outputs to the driver seat blower or any components within these circuit loops are

		shorted to ground or cause an excessive current draw, the SCME overheats, shuts down the driver seat system and sets this DTC.

Possible Causes

- Wiring, terminals or connectors
- Backrest blower motor
- Cushion blower motor
- SCME

DIAGNOSIS AND TESTING > FRONT SEATS > PINPOINT TEST(S) > PINPOINT TEST N : DTC B103D > PINPOINT TEST N : DTC B103D

WARNING: Incorrect repair techniques or actions can cause an accidental Supplemental Restraint System (SRS) deployment. Never compromise or depart from these instructions. Failure to precisely follow all instructions could result in serious personal injury from an accidental deployment.

N1 CHECK THE BLOWER MOTOR FEED CIRCUIT FOR A SHORT TO GROUND

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING .

Disconnect: Driver Side Airbag In-line C345.

Disconnect: Passenger Side Airbag In-line C219 .

Disconnect: Driver Seat Backrest Blower Motor C3034 .

Disconnect: Driver Seat Cushion Blower Motor C3035 .

Disconnect: SCME C3265C .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265C-16	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to N2

No	REPAIR the circuit. GO to N5

N2 CHECK THE BLOWER MOTOR FEED CIRCUITS FOR A SHORT TOGETHER

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265C-16	Ω	C3265C-15

Is the resistance greater than 10, 000 ohms?

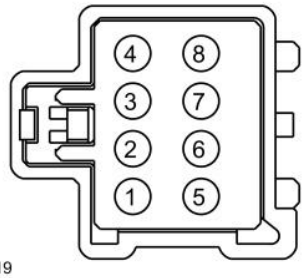
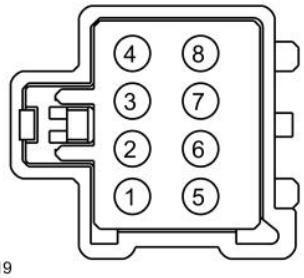
Yes	GO to N3

No	REPAIR the circuits. GO to N5

N3 CHECK THE BACKREST BLOWER AND CUSHION BLOWER RESISTANCES

NOTE: The ohmmeter must be connected with the positive lead to pin 3 and the negative lead to pin 4 when measuring. Ohmmeter leads incorrectly connected will result in false readings and lead to incorrect identification of components that are not faulty.

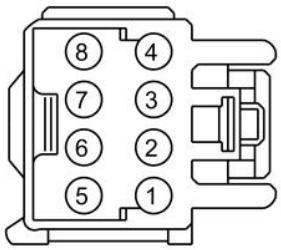
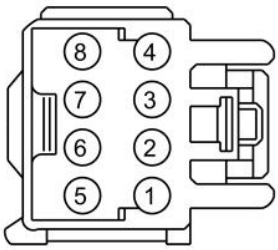
Measure the **component side resistance** between:

Positive Lead	Measurement / Action	Negative Lead
 E160219 C3034-3, Component Side	Ω	 E160219 C3034-4, Component Side

NOTE: The ohmmeter must be connected with the positive lead to pin 3 and the negative lead to pin 4 when measuring. Ohmmeter leads incorrectly connected will result in false readings and lead to incorrect identification of components that are not faulty.

Measure the **component side resistance** between:

Positive Lead	Measurement / Action	Negative Lead

 E160218 C3035-3, Component Side	Ω	 E160218 C3035-4, Component Side

Are the resistances between 4000 and 10, 000 ohms?

Yes	GO to N4

No	If the backrest blower motor resistance measurement failed, INSTALL a new backrest blower motor. REFER to: Front Seat Backrest Blower Motor . GO to N5 If the cushion blower motor resistance measurement failed, INSTALL a new cushion blower motor. REFER to: Front Seat Cushion Blower Motor . GO to N5

N4 CHECK THE SCME (FRONT SEAT CLIMATE CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all of the SCME connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins as necessary

pushed-out pins - install new pins as necessary

Reconnect the SCME connectors. Make sure they seat and latch correctly.

NOTE: Do not reconnect Driver Side Airbag In-line C345 or Passenger Side Airbag In-line C219 at this time.

Reconnect all previously disconnected connectors.

Ignition ON.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new SCME. REFER to: Front Seat Climate Control Module . GO to N5

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues. GO to N5

N5 VERIFY THE SUPPLEMENTAL RESTRAINT SYSTEM (SRS) PROVES OUT SUCCESSFULLY

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING .

Connect: Driver Side Airbag In-line C345.

Connect: Passenger Side Airbag In-line C219 .

Connect all previously disconnected connectors.

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) REPOWERING .

Did the SRS prove out successfully?

Yes	Repair is complete. RETURN the vehicle to the customer.

No	REFER to: SUPPLEMENTAL RESTRAINT SYSTEM .

DIAGNOSIS AND TESTING > FRONT SEATS > PINPOINT TEST(S) > PINPOINT TEST O : DTC B1113 AND B111B

Refer to Climate Controlled Seats for schematic and connector information.

Normal Operation and Fault Conditions

The SCME monitors the backrest and cushion blower motor circuits. If a short to ground or voltage on any of these circuits is detected, the Diagnostic Trouble Codes (DTCs) will be set.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1113	Passenger Thermal Electric Device Control Overtemperature Fault	If the SCME blower motor driver integrated circuit temperature exceeds 175 ° C (347 ° F), the SCME shuts down the driver seat system and sets this DTC.
B111B	Passenger Thermo-Electric Driver Overcurrent Low	If SCME outputs to the driver seat backrest or cushion blower motor (circuit pins A, B, C or D at the SCME connector) or any components within these circuit loops are shorted to ground or a blower motor resistance of less than 0.9 ohm is sensed, the SCME shuts down the driver seat system and sets this DTC.

Possible Causes

- Wiring, terminals or connectors
- Backrest blower motor
- Cushion blower motor
- SCME

DIAGNOSIS AND TESTING > FRONT SEATS > PINPOINT TEST(S) > PINPOINT TEST O : DTC B1113 AND B111B > PINPOINT TEST O : DTC B1113 AND B111B

> *WARNING: Incorrect repair techniques or actions can cause an accidental Supplemental Restraint System (SRS) deployment. Never compromise or depart from these instructions. Failure to precisely follow all instructions could result in serious personal injury from an accidental deployment.*

O1 CHECK BLOWER MOTOR CIRCUITS FOR A SHORT TO GROUND

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING .

Disconnect: Passenger Side Airbag In-line C219 .

Disconnect: SCME C3265A .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265A-A	Ω	Ground
C3265A-B	Ω	Ground
C3265A-C	Ω	Ground
C3265A-D	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to O2

No	If the resistance of C3265A-A and C3265A-B to ground is **not** greater than 10, 000 ohms to ground, GO to O6. If the resistance of C3265A-C and C3265A-D to ground is not greater than 10, 000 ohms to ground, GO to O7.

O2 CHECK BLOWER MOTOR CIRCUITS FOR A SHORT TO VOLTAGE

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265A-A		Ground
C3265A-B		Ground
C3265A-C		Ground
C3265A-D		Ground

Is any voltage present?

Yes	If voltage is present at C3265A-A and/or C3265A-B , GO to O8 If voltage is present at C3265A-C and/or C3265A-D , GO to O9

No	GO to O3

O3 CHECK THE RESISTANCE OF THE BLOWER MOTOR AND WIRING

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265A-A	Ω	C3265A-B
C3265A-C	Ω	C3265A-D

Are the resistances between 0.9 and 10 ohms?

Yes	GO to O10

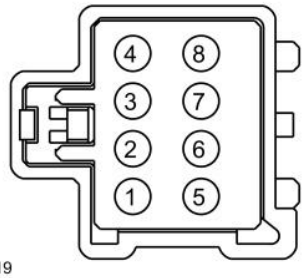
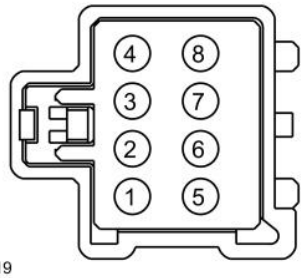
No	If the resistance between C3265A-A and C3265A-B is **not** between 0.9 and 10 ohms, GO to O5. If the resistance between C3265A-C and C3265A-D is not between 0.9 and 10 ohms, GO to O4

O4 CHECK BACKREST BLOWER MOTOR THERMO ELECTRIC DEVICE RESISTANCE

Disconnect: Passenger Seat Backrest Blower Motor C3039 .

Measure the **component side resistance** between:

Positive Lead	Measurement / Action	Negative Lead

 E160219 C3039-1, Component Side	Ω	 E160219 C3039-2, Component Side

Is the resistance between 0.9 and 10 ohms?

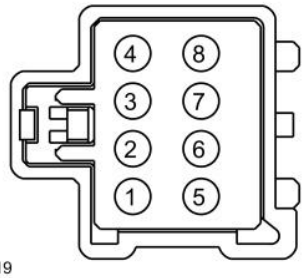
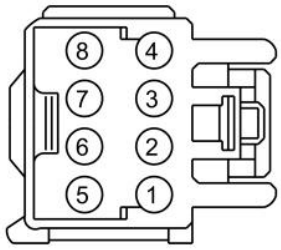
Yes	REPAIR the circuit(s) in question. GO to O11

No	INSTALL a new backrest blower motor. REFER to: Front Seat Backrest Blower Motor . GO to O11

O5 CHECK CUSHION BLOWER MOTOR RESISTANCE

Disconnect: Passenger Seat Cushion Blower Motor C3040 .

Measure the **component side resistance** between:

Positive Lead	Measurement / Action	Negative Lead
 E160219 C3040-1, Component Side	Ω	 E160218 C3040-2, Component Side

Is the resistance between 0.9 and 10 ohms?

Yes	REPAIR the circuit(s) in question. GO to O11

No	INSTALL a new cushion blower motor. REFER to: Front Seat Cushion Blower Motor . GO to O11

O6 CHECK THE CUSHION BLOWER MOTOR CIRCUITS FOR A SHORT TO GROUND

Disconnect: Passenger Seat Cushion Blower Motor C3040 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265A-A	Ω	Ground
C3265A-B	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	INSTALL a new cushion blower motor. REFER to: Front Seat Cushion Blower Motor . GO to O11

No	REPAIR the circuit in question. GO to O11

O7 CHECK THE BACKREST BLOWER MOTOR CIRCUITS FOR A SHORT TO GROUND

Disconnect: Passenger Seat Backrest Blower Motor C3039 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265A-C	Ω	Ground
C3265A-D	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	INSTALL a new backrest blower motor. REFER to: Front Seat Backrest Blower Motor . GO to O11

No	REPAIR the circuit in question. GO to O11

O8 CHECK THE CUSHION BLOWER MOTOR CIRCUITS FOR A SHORT TO VOLTAGE

Disconnect: Passenger Seat Cushion Blower Motor C3040 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265A-A	V	Ground
C3265A-B	V	Ground

Is any voltage present?

Yes	REPAIR the circuit in question. GO to O11

No	INSTALL a new cushion blower motor. REFER to: Front Seat Cushion Blower Motor . GO to

	O11

O9 CHECK THE BACKREST BLOWER MOTOR CIRCUITS FOR A SHORT TO VOLTAGE

Disconnect: Passenger Seat Backrest Blower Motor C3039 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265A-C		Ground
C3265A-D		Ground

Is any voltage present?

Yes	REPAIR the circuit in question. GO to O11

No	INSTALL a new backrest blower motor. REFER to: Front Seat Backrest Blower Motor . GO to O11

O10 CHECK THE SCME (FRONT SEAT CLIMATE CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all of the SCME connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins as necessary

pushed-out pins - install new pins as necessary

Reconnect the SCME connectors. Make sure they seat and latch correctly.

NOTE: Do not reconnect Passenger Side Airbag In-line C219 at this time.

Reconnect all previously disconnected connectors.

Ignition ON.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new SCME. REFER to: Front Seat Climate

	Control Module . GO to O11

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues. GO to O11

O11 VERIFY THE SUPPLEMENTAL RESTRAINT SYSTEM (SRS) PROVES OUT SUCCESSFULLY

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING .

Connect: Passenger Side Airbag In-line C219 .

Connect all previously disconnected connectors.

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) REPOWERING .

Did the SRS prove out successfully?

Yes	Repair is complete. RETURN the vehicle to the customer.

No	REFER to: SUPPLEMENTAL RESTRAINT SYSTEM .

DIAGNOSIS AND TESTING > FRONT SEATS > PINPOINT TEST(S) > PINPOINT TEST P : DTC B111C

Refer to Climate Controlled Seats for schematic and connector information.

Normal Operation and Fault Conditions

The SCME monitors the backrest and cushion blower motor circuits. If an open on any of these circuits is detected, the DTC will be set.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B111C	Passenger Thermoelectric Driver Open Load	If SCME outputs to the passenger seat backrest or cushion blower motor (circuit pins A, B, C or D at the SCME connector) or any components within these circuit loops are open, disconnected or a blower motor resistance greater than 90, 000 ohms is sensed, the SCME continues normal operation and sets this DTC.

Possible Causes

- Wiring, terminals or connectors
- Backrest blower motor

- Cushion blower motor
- SCME

DIAGNOSIS AND TESTING > FRONT SEATS > PINPOINT TEST(S) > PINPOINT TEST P : DTC B111C > PINPOINT TEST P : DTC B111C

> *WARNING: Incorrect repair techniques or actions can cause an accidental Supplemental Restraint System (SRS) deployment. Never compromise or depart from these instructions. Failure to precisely follow all instructions could result in serious personal injury from an accidental deployment.*

P1 CHECK BLOWER MOTOR CIRCUITS FOR AN OPEN

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING .

Disconnect: Passenger Side Airbag In-line C219 .

Disconnect: Passenger Side Backrest Blower Motor C3039 .

Disconnect: Passenger Seat Cushion Blower Motor C3040 .

Disconnect: SCME C3265A .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265A-A	Ω	C3040-1
C3265A-B	Ω	C3040-2

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265A-C	Ω	C3039-1
C3265A-D	Ω	C3039-2

Are the resistances less than 3 ohms?

Yes	GO to P2

No	REPAIR the circuit(s) in question. GO to P5

P2 CHECK BLOWER MOTOR CIRCUITS FOR A SHORT TO VOLTAGE

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265A-A	V	Ground
C3265A-B	V	Ground
C3265A-C	V	Ground
C3265A-D	V	Ground

Is any voltage present?

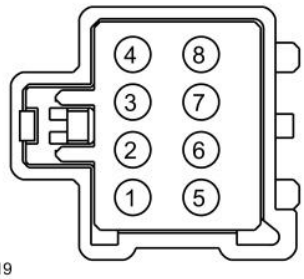
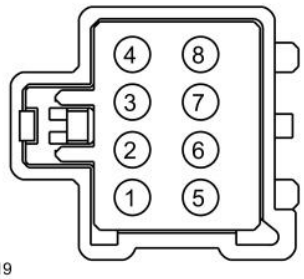
Yes	REPAIR the circuit(s) in question. GO to P5

No	GO to P3

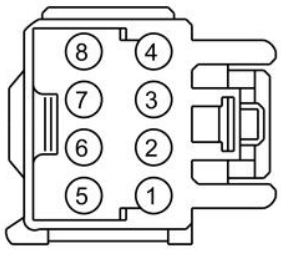
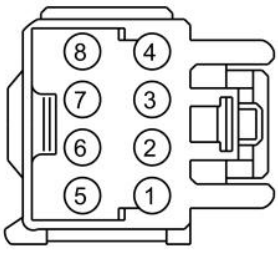
P3 CHECK BACKREST AND CUSHION BLOWER MOTOR RESISTANCES

Disconnect: Passenger Seat Backrest Blower Motor C3039 .

Measure the **component side resistance** between:

Positive Lead	Measurement / Action	Negative Lead
 E160219 C3039-1, Component Side	Ω	 E160219 C3039-2, Component Side

Measure the **component side resistance** between:

Positive Lead	Measurement / Action	Negative Lead
 E160218	Ω	 E160218

C3040-1, Component Side		C3040-2, Component Side

Are the resistances between 0.9 and 10 ohms?

Yes	GO to P4

No	If the backrest blower motor resistance measurement failed, INSTALL a new backrest blower motor. REFER to: Front Seat Backrest Blower Motor . GO to P5 If the cushion blower motor resistance measurement failed, INSTALL a new cushion blower motor. REFER to: Front Seat Cushion Blower Motor . GO to P5

P4 CHECK THE SCME (FRONT SEAT CLIMATE CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all of the SCME connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins as necessary

pushed-out pins - install new pins as necessary

Reconnect the SCME connectors. Make sure they seat and latch correctly.

NOTE: Do not reconnect Passenger Side Airbag In-line C219 at this time.

Reconnect all previously disconnected connectors.

Ignition ON.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, SCME. REFER to: Front Seat Climate Control Module . GO to P5

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues. GO to P5

P5 VERIFY THE SUPPLEMENTAL RESTRAINT SYSTEM (SRS) PROVES OUT SUCCESSFULLY

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING .

Connect: Passenger Side Airbag In-line C219 .

Connect all previously disconnected connectors.

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) REPOWERING .

Did the SRS prove out successfully?

Yes	Repair is complete. RETURN the vehicle to the customer.

No	REFER to: SUPPLEMENTAL RESTRAINT SYSTEM .

DIAGNOSIS AND TESTING > FRONT SEATS > PINPOINT TEST(S) > PINPOINT TEST Q : DTC B111D

Refer to Climate Controlled Seats for schematic and connector information.

Normal Operation and Fault Conditions

The SCME is supplied voltage at all times, but the climate controlled seat system only operates with the engine running. The system can be operated with the ignition ON engine OFF by using a diagnostic scan tool to bypass the climate controlled seat switches on the touchscreen and FCIM. When commanding a heat or cool mode operation in this manner, the climate controlled seat system only operates in 15 second intervals. Both voltage supply circuits are spliced together internal to the SCME, so if one circuit becomes open, both seats can still be operated. However, if a fault occurs setting a DTC specific to either climate controlled seat, only the affected seat is disabled by the SCME.

Cabin air is drawn through and distributed to each of the blower motors located in the seat cushion and backrest. The blower motors then heat or cool the air. The air is then directed into the foam pad where it is distributed along the surface of the cushion and backrest of the seat. Once the system is activated, the SCME uses a set of flexible algorithms to control the heating/cooling modes and the blower speed dependant on the commanded climate controlled seat settings.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B111D	Passenger Blower Driver Overtemperature	If the SCME outputs to the passenger seat blower or any components within these circuit loops are shorted to ground or cause an excessive current draw, the SCME overheats, shuts down the passenger seat system and sets this DTC.

Possible Causes

- Wiring, terminals or connectors
- Backrest blower motor
- Cushion blower motor
- SCME

DIAGNOSIS AND TESTING > FRONT SEATS > PINPOINT TEST(S) > PINPOINT TEST Q : DTC B111D > PINPOINT TEST Q : DTC B111D

WARNING: Incorrect repair techniques or actions can cause an accidental Supplemental Restraint System (SRS) deployment. Never compromise or depart from these instructions. Failure to precisely follow all instructions could result in serious personal injury from an accidental deployment.

Q1 CHECK THE BLOWER MOTOR FEED CIRCUIT FOR A SHORT TO GROUND

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING .

Disconnect: Passenger Side Airbag In-line C219 .

Disconnect: Passenger Seat Backrest Blower Motor C3039 .

Disconnect: Passenger Seat Cushion Blower Motor C3040 .

Disconnect: SCME C3265C .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265C-8	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to Q2

No	REPAIR the circuit. GO to Q5

Q2 CHECK THE BLOWER MOTOR FEED CIRCUITS FOR A SHORT TOGETHER

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265C-7	Ω	C3265C-8

Is the resistance greater than 10, 000 ohms?

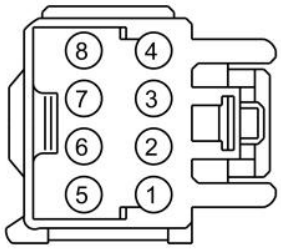
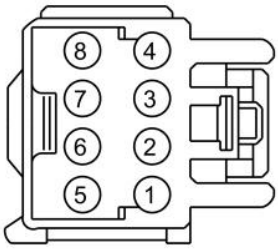
Yes	GO to Q3

No	REPAIR the circuits. GO to Q5

Q3 CHECK THE BACKREST BLOWER AND CUSHION BLOWER RESISTANCES

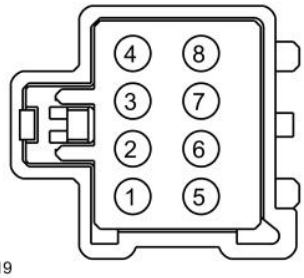
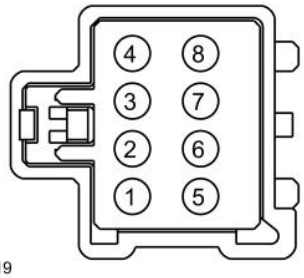
NOTE: The ohmmeter must be connected with the positive lead to pin 3 and the negative lead to pin 4 when measuring. Ohmmeter leads incorrectly connected will result in false readings and lead to incorrect identification of components that are not faulty.

Measure the **component side resistance** between:

Positive Lead	Measurement / Action	Negative Lead
 E160218 C3040-3, Component Side	Ω	 E160218 C3040-4, Component Side

NOTE: The ohmmeter must be connected with the positive lead to pin 3 and the negative lead to pin 4 when measuring. Ohmmeter leads incorrectly connected will result in false readings and lead to incorrect identification of components that are not faulty.

Measure the **component side resistance** between:

Positive Lead	Measurement / Action	Negative Lead
 E160219 C3039-3, Component Side	Ω	 E160219 C3039-4, Component Side

Are the resistances between 4000 and 10, 000 ohms?

Yes	GO to Q4
No	If the backrest blower motor resistance measurement failed, INSTALL a new backrest blower

	motor. REFER to: Front Seat Backrest Blower Motor . GO to Q5 If the cushion blower motor resistance measurement failed, INSTALL a new cushion blower motor. REFER to: Front Seat Cushion Blower Motor . GO to Q5

Q4 CHECK THE SCME (FRONT SEAT CLIMATE CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all of the SCME connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins as necessary

pushed-out pins - install new pins as necessary

Reconnect the SCME connectors. Make sure they seat and latch correctly.

NOTE: Do not reconnect Passenger Side Airbag In-line C219 at this time.

Reconnect all previously disconnected connectors.

Ignition ON.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new SCME. REFER to: Front Seat Climate Control Module . GO to Q5

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues. GO to Q5

Q5 VERIFY THE SUPPLEMENTAL RESTRAINT SYSTEM (SRS) PROVES OUT SUCCESSFULLY

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING .

Connect: Passenger Side Airbag In-line C219 .

Connect all previously disconnected connectors.

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) REPOWERING .

Did the SRS prove out successfully?

Yes	Repair is complete. RETURN the vehicle to the customer.

No	REFER to: SUPPLEMENTAL RESTRAINT SYSTEM .

DIAGNOSIS AND TESTING > FRONT SEATS > PINPOINT TEST(S) > PINPOINT TEST R : DTC B19A1

Refer to Climate Controlled Seats for schematic and connector information.

Normal Operation and Fault Conditions

The SCME supplies voltage and ground to the passenger seat cushion backrest and cushion blower motors. The SCME also sends a speed control voltage signal to the blower motor to control blower speed.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B19A1	Passenger Seat Cushion Blower Speed Short to Battery	If the passenger seat cushion blower speed circuit is shorted to voltage, the SCME shuts down the passenger seat system and sets this DTC.

Possible Causes

- Wiring, terminals or connectors
- Cushion blower motor
- SCME

DIAGNOSIS AND TESTING > FRONT SEATS > PINPOINT TEST(S) > PINPOINT TEST R : DTC B19A1 > PINPOINT TEST R : DTC B19A1

WARNING: Incorrect repair techniques or actions can cause an accidental Supplemental Restraint System (SRS) deployment. Never compromise or depart from these instructions. Failure to precisely follow all instructions could result in serious personal injury from an accidental deployment.

R1 CHECK CUSHION BLOWER MOTOR BLOWER SPEED CONTROL CIRCUIT FOR A SHORT TO VOLTAGE

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING .

Disconnect: Passenger Side Airbag In-line C219 .

Disconnect: SCME C3265C .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265C-3		Ground

Is any voltage present?

Yes	GO to R2

No	GO to R3

R2 CHECK CUSHION BLOWER MOTOR SPEED CONTROL CIRCUIT FOR A SHORT TO VOLTAGE WITH THE CIRCUIT ISOLATED

Ignition OFF.

Disconnect: Passenger Seat Cushion Blower Motor C3040 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265C-3		Ground

Is any voltage present?

Yes	REPAIR the circuit. GO to R6

No	GO to R3

R3 CHECK CUSHION BLOWER MOTOR SPEED CONTROL AND BLOWER OUTPUT CIRCUITS FOR A SHORT TOGETHER

Ignition OFF.

Disconnect: Passenger Seat Cushion Blower Motor C3040 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265C-3	Ω	C3265C-8

Is the resistance greater than 10, 000 ohms?

Yes	GO to R4

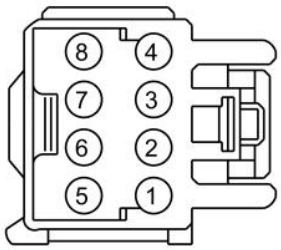
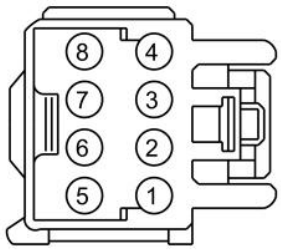
No	REPAIR the circuits. GO to R6

R4 CHECK CUSHION BLOWER MOTOR SPEED CONTROL AND BLOWER OUTPUT CIRCUITS FOR AN INTERNAL SHORT TOGETHER

Ignition OFF.

Disconnect: Passenger Seat Cushion Blower Motor C3040 .

Measure the **component side resistance** between:

Positive Lead	Measurement / Action	Negative Lead
 E160218 C3040-3, Component Side	Ω	 E160218 C3040-7, Component Side

Is the resistance greater than 2M ohms?

Yes	GO to R5

No	INSTALL a new cushion blower motor. REFER to: Front Seat Cushion Blower Motor . GO to R6

R5 CHECK THE SCME (FRONT SEAT CLIMATE CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all of the SCME connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins as necessary

pushed-out pins - install new pins as necessary

Reconnect the SCME connectors. Make sure they seat and latch correctly.

NOTE: Do not reconnect Passenger Side Airbag In-line C219 at this time.

Reconnect all previously disconnected connectors.

Ignition ON.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new SCME. REFER to: Front Seat Climate Control Module . GO to R6

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues. GO to R6

R6 VERIFY THE SUPPLEMENTAL RESTRAINT SYSTEM (SRS) PROVES OUT SUCCESSFULLY

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING .

Connect: Passenger Side Airbag In-line C219 .

Connect all previously disconnected connectors.

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) REPOWERING .

Did the SRS prove out successfully?

Yes	Repair is complete. RETURN the vehicle to the customer.

No	REFER to: SUPPLEMENTAL RESTRAINT SYSTEM .

DIAGNOSIS AND TESTING > FRONT SEATS > PINPOINT TEST(S) > PINPOINT TEST S : DTC B19A2

Refer to Climate Controlled Seats for schematic and connector information.

Normal Operation and Fault Conditions

The SCME supplies voltage and ground to the passenger seat backrest blower motor. The SCME also sends a speed control voltage signal to the blower motor to control blower speed.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B19A2	Passenger Seat Back Blower Speed Short to Battery	If the passenger seat backrest blower speed circuit is shorted to voltage, the SCME shuts down the passenger seat system and sets this DTC.

Possible Causes

- Wiring, terminals or connectors

- Backrest blower motor
- SCME

DIAGNOSIS AND TESTING > FRONT SEATS > PINPOINT TEST(S) > PINPOINT TEST S : DTC B19A2 > PINPOINT TEST S : DTC B19A2

> *WARNING: Incorrect repair techniques or actions can cause an accidental Supplemental Restraint System (SRS) deployment. Never compromise or depart from these instructions. Failure to precisely follow all instructions could result in serious personal injury from an accidental deployment.*

S1 CHECK BACKREST BLOWER MOTOR SPEED CONTROL CIRCUIT FOR A SHORT TO VOLTAGE

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING .

Disconnect: Passenger Side Airbag In-line C219 .

Disconnect: SCME C3265C .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265C-4	V	Ground

Is any voltage present?

Yes	GO to S2

No	GO to S3

S2 CHECK BACKREST BLOWER MOTOR SPEED CONTROL CIRCUIT FOR A SHORT TO VOLTAGE WITH THE CIRCUIT ISOLATED

Ignition OFF.

Disconnect: Passenger Seat Backrest Blower Motor C3039 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265C-4	V	Ground

Is any voltage present?

Yes	REPAIR the circuit. GO to S6

No	GO to S3

S3 CHECK BACKREST BLOWER MOTOR SPEED CONTROL AND BLOWER OUTPUT CIRCUITS FOR A SHORT TOGETHER

Ignition OFF.

Disconnect: Passenger Seat Backrest Blower Motor C3039 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265C-4	Ω	C3265C-8

Is the resistance greater than 10, 000 ohms?

Yes	GO to S4

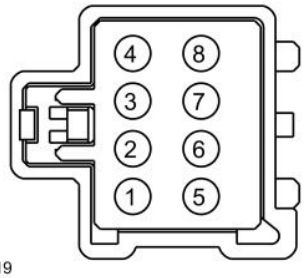
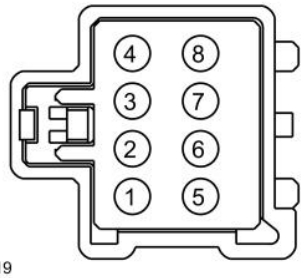
No	REPAIR the circuits. GO to S6

S4 CHECK BACKREST BLOWER MOTOR SPEED CONTROL AND BLOWER OUTPUT CIRCUITS FOR AN INTERNAL SHORT TOGETHER

Ignition OFF.

Disconnect: Passenger Seat Backrest Blower Motor C3039 .

Measure the **component side resistance** between:

Positive Lead	Measurement / Action	Negative Lead
 E160219 C3039-3, Component Side	Ω	 E160219 C3039-7, Component Side

Is the resistance greater than 2M ohms?

Yes	GO to S5

No	INSTALL a new backrest blower motor. REFER to: Front Seat Backrest Blower Motor . GO to S6

S5 CHECK THE SCME (FRONT SEAT CLIMATE CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all of the SCME connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins as necessary

pushed-out pins - install new pins as necessary

Reconnect the SCME connectors. Make sure they seat and latch correctly.

NOTE: Do not reconnect Passenger Side Airbag In-line C219 at this time.

Reconnect all previously disconnected connectors.

Ignition ON.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new SCME. REFER to: Front Seat Climate Control Module . GO to S6

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues. GO to S6

S6 VERIFY THE SUPPLEMENTAL RESTRAINT SYSTEM (SRS) PROVES OUT SUCCESSFULLY

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING .

Connect: Passenger Side Airbag In-line C219 .

Connect all previously disconnected connectors.

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) REPOWERING .

Did the SRS prove out successfully?

Yes	Repair is complete. RETURN the vehicle to the customer.

No	REFER to: SUPPLEMENTAL RESTRAINT SYSTEM .

DIAGNOSIS AND TESTING > FRONT SEATS > PINPOINT TEST(S) > PINPOINT TEST T : DTC B19A3

Refer to Climate Controlled Seats for schematic and connector information.

Normal Operation and Fault Conditions

The SCME supplies voltage and ground to the driver seat cushion blower motor. The SCME also sends a speed control voltage signal to the blower motor to control blower speed.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B19A3	Driver Seat Cushion Blower Speed Short to Battery	If the driver seat cushion blower speed circuit is shorted to voltage, the SCME shuts down the driver seat system and sets this DTC.

Possible Causes

- Wiring, terminals or connectors
- Cushion blower motor
- SCME

DIAGNOSIS AND TESTING > FRONT SEATS > PINPOINT TEST(S) > PINPOINT TEST T : DTC B19A3 > PINPOINT TEST T : DTC B19A3

WARNING: Incorrect repair techniques or actions can cause an accidental Supplemental Restraint System (SRS) deployment. Never compromise or depart from these instructions. Failure to precisely follow all instructions could result in serious personal injury from an accidental deployment.

T1 CHECK CUSHION BLOWER MOTOR SPEED CONTROL CIRCUIT FOR A SHORT TO VOLTAGE

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING .

Disconnect: Driver Side Airbag In-line C345.

Disconnect: Passenger Side Airbag In-line C219 .

Disconnect: SCME C3265C .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265C-11		Ground

Is any voltage present?

Yes	GO to T2

No	GO to T3

T2 CHECK CUSHION BLOWER MOTOR SPEED CONTROL CIRCUIT FOR A SHORT TO VOLTAGE WITH THE CIRCUIT ISOLATED

Ignition OFF.

Disconnect: Driver Seat Cushion Blower Motor C3035 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265C-11		Ground

Is any voltage present?

Yes	REPAIR the circuit. GO to T6

No	GO to T3

T3 CHECK CUSHION BLOWER MOTOR SPEED CONTROL AND BLOWER OUTPUT CIRCUITS FOR A SHORT TOGETHER

Ignition OFF.

Disconnect: Driver Seat Cushion Blower Motor C3035 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265C-11	Ω	C3265C-16

Is the resistance greater than 10, 000 ohms?

Yes	GO to T4

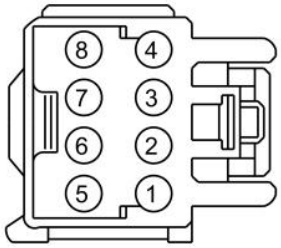
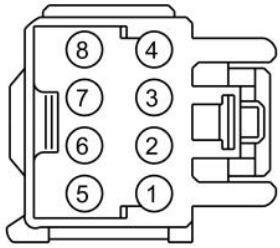
No	REPAIR the circuits. GO to T6

T4 CHECK CUSHION BLOWER MOTOR SPEED CONTROL AND BLOWER OUTPUT CIRCUITS FOR AN INTERNAL SHORT TOGETHER

Ignition OFF.

Disconnect: Driver Seat Cushion Blower Motor C3035 .

Measure the **component side resistance** between:

Positive Lead	Measurement / Action	Negative Lead
 E160218 C3035-3, Component Side	Ω	 E160218 C3035-7, Component side

Is the resistance greater than 2M ohms?

Yes	GO to T5

No	INSTALL a new cushion blower motor. REFER to: Front Seat Cushion Blower Motor . GO to T6

T5 CHECK THE SCME (FRONT SEAT CLIMATE CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all of the SCME connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins as necessary

pushed-out pins - install new pins as necessary

Reconnect the SCME connectors. Make sure they seat and latch correctly.

NOTE: Do not reconnect Driver Side Airbag In-line C345 or Passenger Side Airbag In-line C219 at this time.

Reconnect all previously disconnected connectors.

Ignition ON.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new SCME. REFER to: Front Seat Climate Control Module . GO to T6

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues. GO to T6

T6 VERIFY THE SUPPLEMENTAL RESTRAINT SYSTEM (SRS) PROVES OUT SUCCESSFULLY

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING .

Connect: Driver Side Airbag In-line C345.

Connect: Passenger Side Airbag In-line C219 .

Connect all previously disconnected connectors.

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) REPOWERING .

Did the SRS prove out successfully?

Yes	Repair is complete. RETURN the vehicle to the customer.

No	REFER to: SUPPLEMENTAL RESTRAINT SYSTEM .

DIAGNOSIS AND TESTING > FRONT SEATS > PINPOINT TEST(S) > PINPOINT TEST U : DTC B19A4

Refer to Climate Controlled Seats for schematic and connector information.

Normal Operation and Fault Conditions

The SCME supplies voltage and ground to the driver seat backrest blower motor. The SCME also sends a speed control voltage signal to the blower motor to control blower speed.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B19A4	Driver Seat Back Blower Speed Short to Battery	If the driver seat backrest blower speed circuit is shorted to voltage, the SCME shuts down the driver seat system and sets this DTC.

Possible Causes

- Wiring, terminals or connectors
- Backrest blower motor
- SCME

DIAGNOSIS AND TESTING > FRONT SEATS > PINPOINT TEST(S) > PINPOINT TEST U : DTC B19A4 > PINPOINT TEST U : DTC B19A4

> *WARNING: Incorrect repair techniques or actions can cause an accidental Supplemental Restraint System (SRS) deployment. Never compromise or depart from these instructions. Failure to precisely follow all instructions could result in serious personal injury from an accidental deployment.*

U1 CHECK BACKREST BLOWER MOTOR SPEED CONTROL CIRCUIT FOR A SHORT TO VOLTAGE

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING .

Disconnect: Driver Side Airbag In-line C345.

Disconnect: Passenger Side Airbag In-line C219 .

Disconnect: SCME C3265C .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265C-12		Ground

Is any voltage present?

Yes	GO to U2

No	GO to U3

U2 CHECK BACKREST BLOWER MOTOR BLOWER SPEED CONTROL CIRCUIT FOR A SHORT TO VOLTAGE WITH THE CIRCUIT ISOLATED

Ignition OFF.

Disconnect: Driver Seat Backrest Blower Motor C3034 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265C-12	V	Ground

Is any voltage present?

Yes	REPAIR the circuit. GO to U6

No	GO to U3

U3 CHECK BACKREST BLOWER MOTOR BLOWER SPEED CONTROL AND BLOWER OUTPUT CIRCUITS FOR A SHORT TOGETHER

Ignition OFF.

Disconnect: Driver Seat Backrest Blower Motor C3034 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265C-12	Ω	C3265C-16

Is the resistance greater than 10, 000 ohms?

Yes	GO to U4

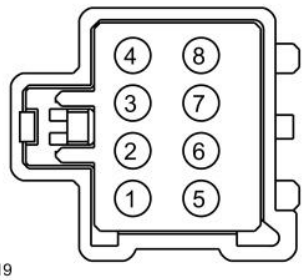
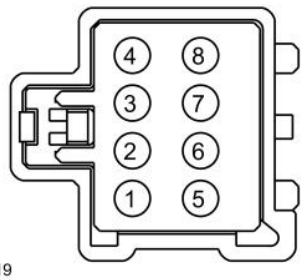
No	REPAIR the circuits. GO to U6

U4 CHECK BACKREST BLOWER MOTOR SPEED CONTROL AND BLOWER OUTPUT CIRCUITS FOR AN INTERNAL SHORT TOGETHER

Ignition OFF.

Disconnect: Driver Seat Backrest Blower Motor C3034 .

Measure the **component side resistance** between:

Positive Lead	Measurement / Action	Negative Lead
 E160219 C3034-3, Component Side	Ω	 E160219 C3034-7, Component Side

Is the resistance greater than 2M ohms?

Yes	GO to U5

No	INSTALL a new backrest blower motor. REFER to: Front Seat Backrest Blower Motor . GO to U6

U5 CHECK THE SCME (FRONT SEAT CLIMATE CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all of the SCME connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins as necessary

pushed-out pins - install new pins as necessary

Reconnect the SCME connectors. Make sure they seat and latch correctly.

NOTE: Do not reconnect Driver Side Airbag In-line C345 or Passenger Side Airbag In-line C219 at this time.

Reconnect all previously disconnected connectors.

Ignition ON.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new SCME. REFER to: Front Seat Climate Control Module . GO to U6

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues. GO to U6

U6 VERIFY THE SUPPLEMENTAL RESTRAINT SYSTEM (SRS) PROVES OUT SUCCESSFULLY

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING .

Connect: Driver Side Airbag In-line C345.

Connect: Passenger Side Airbag In-line C219 .

Connect all previously disconnected connectors.

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) REPOWERING .

Did the SRS prove out successfully?

Yes	Repair is complete. RETURN the vehicle to the customer.

No	REFER to: SUPPLEMENTAL RESTRAINT SYSTEM .

DIAGNOSIS AND TESTING > FRONT SEATS > PINPOINT TEST(S) > PINPOINT TEST V : DTC B19A5

Refer to Climate Controlled Seats for schematic and connector information.

Normal Operation and Fault Conditions

The SCME supplies voltage and ground to the passenger seat cushion blower motor. The SCME also sends a speed control voltage signal to the blower motor to control blower speed.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B19A5	Passenger Seat Cushion Blower Speed Short to Ground	If the passenger seat cushion blower speed circuit is shorted to ground, the SCME shuts down the passenger seat system and sets this DTC.

Possible Causes

- Wiring, terminals or connectors
- Cushion blower motor
- SCME

DIAGNOSIS AND TESTING > FRONT SEATS > PINPOINT TEST(S) > PINPOINT TEST V : DTC B19A5 > PINPOINT TEST V : DTC B19A5

WARNING: Incorrect repair techniques or actions can cause an accidental Supplemental Restraint System (SRS) deployment. Never compromise or depart from these instructions. Failure to precisely follow all instructions could result in serious personal injury from an accidental deployment.

V1 CHECK CUSHION BLOWER MOTOR SPEED CONTROL CIRCUIT FOR A SHORT TO GROUND

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING .

Disconnect: Passenger Side Airbag In-line C219 .

Disconnect: Passenger Seat Cushion Blower Motor C3040 .

Disconnect: SCME C3265C .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265C-3	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to V2

No	REPAIR the circuit. GO to V5

V2 CHECK CUSHION BLOWER MOTOR SPEED CONTROL CIRCUIT AND BLOWER GROUND CIRCUIT FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265C-3	Ω	C3265C-7

Is the resistance greater than 10, 000 ohms?

Yes	GO to V3

No	REPAIR the circuits. GO to V5

V3 DETERMINE CUSHION BLOWER MOTOR OR SCME (FRONT SEAT CLIMATE CONTROL MODULE) FAILURE

Remove the cushion blower motor from the passenger seat. REFER to: Front Seat Cushion Blower Motor .

Remove the cushion blower motor from the driver seat and install it on the passenger seat.

Connect: Passenger Seat Cushion Blower Motor C3040 .

Connect: SCME C3265C .

Start the engine and check operation of the passenger seat climate controlled seat system.

Does the seat operate with the cushion blower motor from the other seat installed?

Yes	INSTALL a new seat cushion blower motor. REFER to: Front Seat Cushion Blower Motor . GO to V5

No	GO to V4

V4 CHECK THE SCME (FRONT SEAT CLIMATE CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all of the SCME connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins as necessary

pushed-out pins - install new pins as necessary

Reconnect the SCME connectors. Make sure they seat and latch correctly.

NOTE: Do not reconnect Passenger Side Airbag In-line C219 at this time.

Reconnect all previously disconnected connectors.

Ignition ON.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new SCME. REFER to: Front Seat Climate Control Module . GO to V5

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues. GO to V5

V5 VERIFY THE SUPPLEMENTAL RESTRAINT SYSTEM (SRS) PROVES OUT SUCCESSFULLY

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING .

Connect: Passenger Side Airbag In-line C219 .

Connect all previously disconnected connectors.

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) REPOWERING .

Did the SRS prove out successfully?

Yes	Repair is complete. RETURN the vehicle to the customer.

No	REFER to: SUPPLEMENTAL RESTRAINT SYSTEM .

DIAGNOSIS AND TESTING > FRONT SEATS > PINPOINT TEST(S) > PINPOINT TEST W : DTC B19A6

Refer to Climate Controlled Seats for schematic and connector information.

Normal Operation and Fault Conditions

The SCME supplies voltage and ground to the passenger seat backrest blower motor. The SCME also sends a speed control voltage signal to the blower motor to control blower speed.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B19A6	Passenger Seat Back Blower Speed Short to Ground	If the passenger seat backrest blower speed circuit is shorted to ground, the SCME shuts down the passenger seat system and sets this DTC.

Possible Causes

- Wiring, terminals or connectors
- Backrest blower motor
- SCME

DIAGNOSIS AND TESTING > FRONT SEATS > PINPOINT TEST(S) > PINPOINT TEST W : DTC B19A6 > PINPOINT TEST W : DTC B19A6

WARNING: Incorrect repair techniques or actions can cause an accidental Supplemental Restraint System (SRS) deployment. Never compromise or depart from these instructions. Failure to precisely follow all instructions could result in serious personal injury from an accidental deployment.

W1 CHECK BACKREST BLOWER MOTOR SPEED CONTROL CIRCUIT FOR A SHORT TO GROUND

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING .

Disconnect: Passenger Side Airbag In-line C219 .

Disconnect: Passenger Seat Backrest Blower Motor C3039 .

Disconnect: SCME C3265C .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265C-4	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to W2

No	REPAIR the circuit. GO to W5

W2 CHECK BACKREST BLOWER MOTOR SPEED CONTROL CIRCUIT AND BLOWER GROUND CIRCUIT FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265C-4	Ω	C3265C-7

Is the resistance greater than 10, 000 ohms?

Yes	GO to W3

No	REPAIR the circuits. GO to W5

W3 DETERMINE BACKREST BLOWER MOTOR OR SCME (FRONT SEAT CLIMATE CONTROL MODULE) FAILURE

Remove the backrest blower motor from the passenger seat. REFER to: Front Seat Backrest Blower Motor .

Remove the backrest blower motor from the driver seat and install it on the passenger seat.

Connect: Passenger Seat Backrest Blower Motor C3039 .

Connect: SCME C3265C .

Start the engine and check operation of the passenger seat climate controlled seat system.

Does the seat operate with the backrest blower motor from the other seat installed?

Yes	INSTALL a new seat backrest blower motor. REFER to: Front Seat Backrest Blower Motor . GO to W5

No	GO to W4

W4 CHECK THE SCME (FRONT SEAT CLIMATE CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all of the SCME connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins as necessary

pushed-out pins - install new pins as necessary

Reconnect the SCME connectors. Make sure they seat and latch correctly.

NOTE: Do not reconnect Passenger Side Airbag In-line C219 at this time.

Reconnect all previously disconnected connectors.

Ignition ON.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new SCME. REFER to: Front Seat Climate Control Module . GO to W5

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues. GO to W5

W5 VERIFY THE SUPPLEMENTAL RESTRAINT SYSTEM (SRS) PROVES OUT SUCCESSFULLY

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING .

Connect: Passenger Side Airbag In-line C219 .

Connect all previously disconnected connectors.

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) REPOWERING .

Did the SRS prove out successfully?

Yes	Repair is complete. RETURN the vehicle to the customer.

No	REFER to: SUPPLEMENTAL RESTRAINT SYSTEM .

DIAGNOSIS AND TESTING > FRONT SEATS > PINPOINT TEST(S) > PINPOINT TEST X : DTC B19A7

Refer to Climate Controlled Seats for schematic and connector information.

Normal Operation and Fault Conditions

The SCME supplies voltage and ground to the driver seat cushion blower motor. The SCME also sends a speed control voltage signal to the blower motor to control blower speed.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B19A7	Driver Seat Cushion Blower Speed Short to Ground	If the driver seat cushion blower speed circuit is shorted to ground, the SCME shuts down the driver seat system and sets this DTC.

Possible Causes

- Wiring, terminals or connectors
- Cushion blower motor
- SCME

DIAGNOSIS AND TESTING > FRONT SEATS > PINPOINT TEST(S) > PINPOINT TEST X : DTC B19A7 > PINPOINT TEST X : DTC B19A7

> *WARNING: Incorrect repair techniques or actions can cause an accidental Supplemental Restraint System (SRS) deployment. Never compromise or depart from these instructions. Failure to precisely follow all instructions could result in serious personal injury from an accidental deployment.*

X1 CHECK CUSHION BLOWER MOTOR BLOWER SPEED CONTROL CIRCUIT FOR A SHORT TO GROUND

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING .

Disconnect: Driver Side Airbag In-line C345.

Disconnect: Passenger Side Airbag In-line C219 .

Disconnect: Driver Seat Cushion Blower Motor C3035 .

Disconnect: SCME C3265C .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265C-11	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to X2

No	REPAIR the circuit. GO to X5

X2 CHECK CUSHION BLOWER MOTOR SPEED CONTROL CIRCUIT AND BLOWER GROUND CIRCUIT FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265C-11	Ω	C3265C-15

Is the resistance greater than 10, 000 ohms?

Yes	GO to X3

No	REPAIR the circuits. GO to X5

X3 DETERMINE CUSHION BLOWER MOTOR OR SCME (FRONT SEAT CLIMATE CONTROL MODULE) FAILURE

Remove the cushion blower motor from the passenger seat. REFER to: Front Seat Cushion Blower Motor .

Remove the cushion blower motor from the passenger seat and install it on the driver seat.

Connect: Driver Seat Cushion Blower Motor C3035 .

Connect: SCME C3265C .

Start the engine and check operation of the driver seat climate controlled seat system.

Does the seat operate with the cushion blower motor from the other seat installed?

Yes	INSTALL a new seat cushion blower motor. REFER to: Front Seat Cushion Blower Motor . GO to X5

No	GO to X4

X4 CHECK THE SCME (FRONT SEAT CLIMATE CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all of the SCME connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins as necessary

pushed-out pins - install new pins as necessary

Reconnect the SCME connectors. Make sure they seat and latch correctly.

> *NOTE: Do not reconnect Driver Side Airbag In-line C345 or Passenger Side Airbag In-line C219 at this time.*

Reconnect all previously disconnected connectors.

Ignition ON.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new SCME. REFER to: Front Seat Climate Control Module . GO to X5

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues. GO to X5

X5 VERIFY THE SUPPLEMENTAL RESTRAINT SYSTEM (SRS) PROVES OUT SUCCESSFULLY

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING .

Connect: Driver Side Airbag In-line C345.

Connect: Passenger Side Airbag In-line C219 .

Connect all previously disconnected connectors.

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) REPOWERING .

Did the SRS prove out successfully?

Yes	Repair is complete. RETURN the vehicle to the customer.

No	REFER to: SUPPLEMENTAL RESTRAINT SYSTEM .

DIAGNOSIS AND TESTING > FRONT SEATS > PINPOINT TEST(S) > PINPOINT TEST Y : DTC B19A8

Refer to Climate Controlled Seats for schematic and connector information.

Normal Operation and Fault Conditions

The SCME supplies voltage and ground to the driver seat backrest blower motor. The SCME also sends a speed control voltage signal to the blower motor to control blower speed.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B19A8	Driver Seat Back Blower Speed Short to Ground	If the driver seat backrest blower speed circuit is shorted to ground, the SCME shuts down the driver seat system and sets this DTC.

Possible Causes

- Wiring, terminals or connectors
- Backrest blower motor
- SCME

DIAGNOSIS AND TESTING > FRONT SEATS > PINPOINT TEST(S) > PINPOINT TEST Y : DTC B19A8 > PINPOINT TEST Y : DTC B19A8

> *WARNING: Incorrect repair techniques or actions can cause an accidental Supplemental Restraint System (SRS) deployment. Never compromise or depart from these instructions. Failure to precisely follow all instructions could result in serious personal injury from an accidental deployment.*

Y1 CHECK BACKREST BLOWER MOTOR SPEED CONTROL CIRCUIT FOR A SHORT TO GROUND

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING .

Disconnect: Driver Side Airbag In-line C345.

Disconnect: Passenger Side Airbag In-line C219 .

Disconnect: Driver Seat Backrest Blower Motor C3034 .

Disconnect: SCME C3265C .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265C-12	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to Y2

No	REPAIR the circuit. GO to Y5

Y2 CHECK BACKREST BLOWER MOTOR SPEED CONTROL CIRCUIT AND BLOWER GROUND CIRCUIT FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265C-12	Ω	C3265C-15

Is the resistance greater than 10, 000 ohms?

Yes	GO to Y3

No	REPAIR the circuits. GO to Y5

Y3 DETERMINE BACKREST BLOWER MOTOR OR SCME (FRONT SEAT CLIMATE CONTROL MODULE) FAILURE

Remove the backrest blower motor from the driver seat. REFER to: Front Seat Backrest Blower Motor .

Remove the backrest blower motor from the passenger seat and install it on the driver seat.

Connect: Driver Seat Backrest Blower Motor C3034 .

Connect: SCME C3265C .

Start the engine and check operation of the driver seat climate controlled seat system.

Does the seat operate with the backrest blower motor from the other seat installed?

Yes	INSTALL a new seat backrest blower motor. REFER to: Front Seat Backrest Blower Motor . GO to Y5

No	GO to Y4

Y4 CHECK THE SCME (FRONT SEAT CLIMATE CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all of the SCME connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins as necessary

pushed-out pins - install new pins as necessary

Reconnect the SCME connectors. Make sure they seat and latch correctly.

NOTE: Do not reconnect Driver Side Airbag In-line C345 or Passenger Side Airbag In-line C219 at this time.

Reconnect all previously disconnected connectors.

Ignition ON.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new SCME. REFER to: Front Seat Climate Control Module . GO to Y5

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues. GO to Y5

Y5 VERIFY THE SUPPLEMENTAL RESTRAINT SYSTEM (SRS) PROVES OUT SUCCESSFULLY

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING .

Connect: Driver Side Airbag In-line C345.

Connect: Passenger Side Airbag In-line C219 .

Connect all previously disconnected connectors.

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) REPOWERING .

Did the SRS prove out successfully?

Yes	Repair is complete. RETURN the vehicle to the customer.

No	REFER to: SUPPLEMENTAL RESTRAINT SYSTEM .

DIAGNOSIS AND TESTING > FRONT SEATS > PINPOINT TEST(S) > PINPOINT TEST Z : DTC B272A

Refer to Climate Controlled Seats for schematic and connector information.

Normal Operation and Fault Conditions

The SCME monitors seat cushion temperature while it supplies voltage and ground to both blower motors. The SCME also supplies a variable voltage signal to control the blower speed. Cabin air enters the blower through a filter attached to the blower motor housing. Heated or cooled air exits the blower motor and flows through a duct to the foam pad.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B272A	Passenger Cushion Over-Temp Detected	If the passenger seat cushion blower motor temperature exceeds 70 ° C (158 ° F) in cool mode or 85 ° C (185 ° F) in heat mode for more than 4 seconds, the SCME shuts down the passenger seat system and sets this DTC.

Possible Causes

- Wiring, terminals or connectors
- Restricted blower motor filter
- Crushed or restricted cushion foam pad
- Cushion blower motor
- SCME

DIAGNOSIS AND TESTING > FRONT SEATS > PINPOINT TEST(S) > PINPOINT TEST Z : DTC B272A > PINPOINT TEST Z : DTC B272A

WARNING: Incorrect repair techniques or actions can cause an accidental Supplemental Restraint System (SRS) deployment. Never compromise or depart from these instructions. Failure to precisely follow all instructions could result in serious personal injury from an accidental deployment.

Z1 CHECK THE SCME (FRONT SEAT CLIMATE CONTROL MODULE) FOR ON-DEMAND DIAGNOSTIC TROUBLE CODES (DTCS)

Start the vehicle and set the passenger seat to HIGH heat.

Using a diagnostic scan tool, perform the SCME self-test.

Was DTC B272A retrieved on-demand during the self-test?

Yes	GO to Z2
No	GO to Z5

Z2 CHECK THE PASSENGER SEAT CUSHION BLOWER MOTOR THERMISTOR CIRCUITS FOR A SHORT TO GROUND

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING .

Disconnect: Passenger Side Airbag In-line C219 .

Disconnect: SCME C3265B .

Disconnect: Passenger Seat Cushion Blower Motor C3040 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265B-2	Ω	Ground
C3265B-3	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to Z3

No	REPAIR the circuit in question. GO to Z22

Z3 CHECK THE PASSENGER SEAT CUSHION BLOWER MOTOR THERMISTOR AND WIRING

Connect: Passenger Seat Cushion Blower Motor C3040 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265B-2	Ω	C3265B-3

Compare the measured resistance value with the following table:

Ambient Temperature	Resistance
0-10 ° C (32-50 ° F)	2, 782-1, 663 ohms
10-20 ° C (50-68 ° F)	1, 837-1, 140 ohms
20-30 ° C (68-86 ° F)	1, 260-806 ohms
30-40 ° C (86-104 ° F)	893-570 ohms
40-50 ° C (104-122 ° F)	630-428 ohms

Is the resistance within the limits indicated?

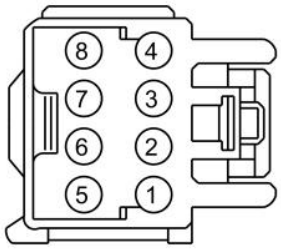
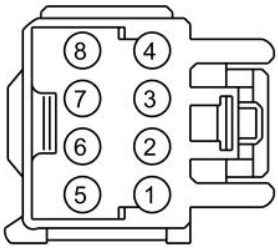
Yes	GO to Z18

No	GO to Z4

Z4 CHECK THE PASSENGER SEAT CUSHION BLOWER MOTOR THERMISTOR

Disconnect: Passenger Seat Cushion Blower Motor C3040 .

Measure the **component side resistance** between:

Positive Lead	Measurement / Action	Negative Lead
 E160218 C3040-5, Component Side	Ω	 E160218 C3040-8, Component Side

Compare the measured resistance value with the following table:

Ambient Temperature	Resistance
0-10 ° C (32-50 ° F)	2, 782-1, 663 ohms
10-20 ° C (50-68 ° F)	1, 837-1, 140 ohms
20-30 ° C (68-86 ° F)	1, 260-806 ohms
30-40 ° C (86-104 ° F)	893-570 ohms
40-50 ° C (104-122 ° F)	630-428 ohms

Is the resistance within the limits indicated?

Yes	REPAIR circuit VHS27 (WH/OG) or RHS10 (BU/OG) for an open or high resistance. GO to Z22

No	INSTALL a new passenger seat cushion blower motor. REFER to: Front Seat Cushion Blower Motor . GO to Z22

Z5 CONFIRM THE FAULT WHILE MONITORING THE SCME (FRONT SEAT CLIMATE CONTROL MODULE) SEAT BACK THERMO-ELECTRIC DEVICE TEMPERATURE (PBKTEMP) AND SEAT CUSHION THERMO-ELECTRIC DEVICE TEMPERATURE (PCSHTEMP) PARAMETER IDENTIFICATIONS (PIDS)

Set the passenger seat to OFF.

Using a diagnostic scan tool, clear the SCME Diagnostic Trouble Codes (DTCs).

Using a diagnostic scan tool, monitor the SCME PBKTEMP and PCSHTEMP Parameter Identifications (PIDs).

NOTE: A crushed seat cushion foam pad may be the cause of the fault, making it necessary to occupy the seat to recreate and identify the fault.

Attempt to recreate the fault. Start the vehicle and set the passenger seat to HIGH heat for at

least 15 minutes while occupying the seat.

Do the Parameter Identifications (PIDs) increase incrementally (gradually) and stay within 15 ° C (27 ° F) of each other?

Yes	Fault not present at this time. Fault may have been set due to a past failure, incorrect use of the climate controlled seat system by repeated switching between heat and cool modes or due to excessive passenger compartment temperature.

No	If the PCSHTEMP PID increases incrementally and is greater than 15 ° C (27 ° F) of the PBKTEMP PID, GO to Z6If the PCSHTEMP PID increases quickly (temperature "jumps" and does not increase incrementally) and is greater than 15 ° C (27 ° F) of the PBKTEMP PID, GO to Z16

Z6 COMPARE OPERATION OF THE DRIVER AND PASSENGER SEATS

With the engine running, set both front seats to HIGH cool.

Note the airflow exhausting from the passenger seat cushion blower motor and compare it to the airflow exhausting from the driver seat cushion blower motor.

Carry out a wiggle test of the wire harnesses between the SCME and the passenger seat cushion blower motor while monitoring blower operation. The blower should operate consistently and not change speeds.

Is the airflow exhausting from the passenger seat cushion blower motor comparable to the airflow exhausting from the driver seat cushion blower motor with no change in operation when carrying out the wiggle test?

Yes	GO to Z7

No	If the airflow exhausting from the passenger seat cushion blower motor is not comparable to the airflow exhausting from the driver seat cushion blower motor, GO to Z8 If the passenger seat cushion blower motor operation changed while carrying out the wiggle test, IDENTIFY and REPAIR the wiring fault.

Z7 COMPARE OPERATION OF THE DRIVER AND PASSENGER SEATS WHILE OCCUPIED

Note the airflow exhausting from the passenger seat cushion blower motor with the passenger seat occupied and compare it to the airflow exhausting from the driver seat cushion blower motor with the driver seat occupied.

Is the airflow exhausting from the passenger seat cushion blower motor comparable to the airflow exhausting from the driver seat cushion blower motor?

Yes	GO to Z16

No	INSTALL a new passenger seat cushion foam pad.

Z8 CHECK THE PASSENGER SEAT CUSHION BLOWER FOR AN OBSTRUCTION OR RESTRICTED FILTER

Ignition OFF.

Inspect the blower of the passenger seat cushion blower motor assembly for an obstruction or for a restricted filter.

Is the blower obstructed or the filter restricted?

Yes	REMOVE the obstruction or INSTALL a passenger seat cushion blower motor. REFER to: Front Seat Cushion Blower Motor .

No	GO to Z9

Z9 CHECK THE PASSENGER SEAT CUSHION BLOWER SPEED CONTROL CIRCUIT FOR AN OPEN

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING .

Disconnect: Passenger Side Airbag In-line C219 .

Disconnect: SCME C3265C .

Disconnect: Passenger Seat Cushion Blower Motor C3040 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265C-3	Ω	C3040-7

Is the resistance less than 3 ohms?

Yes	GO to Z10

No	REPAIR the circuit. GO to Z22

Z10 CHECK THE PASSENGER SEAT CUSHION BLOWER CIRCUIT FOR A SHORT TO VOLTAGE

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265C-7	V	Ground

Is any voltage present?

Yes	REPAIR the circuit. GO to Z22

No	GO to Z11

Z11 CHECK THE PASSENGER SEAT CUSHION BLOWER CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265C-8	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to Z12

No	REPAIR the circuit. GO to Z22

Z12 CHECK THE PASSENGER SEAT CUSHION BLOWER CIRCUITS FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265C-8	Ω	C3040-3
C3265C-7	Ω	C3040-4

Are the resistances less than 3 ohms?

Yes	GO to Z13

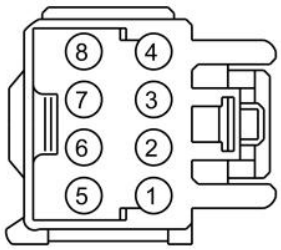
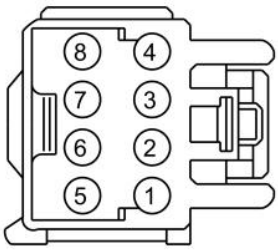
No	REPAIR the circuit in question. GO to Z22

Z13 CHECK THE PASSENGER SEAT CUSHION BLOWER RESISTANCE

NOTE: The ohmmeter must be connected with the positive lead to pin 3 and the negative lead to pin 4 when measuring. Ohmmeter leads incorrectly connected results in false readings and leads to incorrect identification of components that are not damaged.

Measure the **component side resistance** between:

Positive Lead	Measurement / Action	Negative Lead

 E160218 C3040-3, Component Side	Ω	 E160218 C3040-4, Component Side

Is the resistance between 4, 000 and 10, 000 ohms?

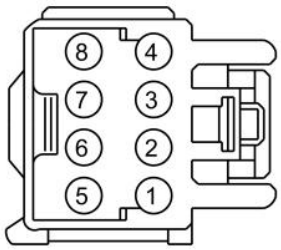
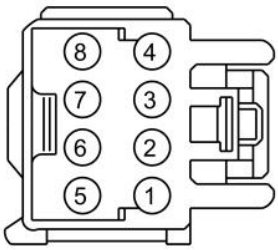
Yes	GO to Z14

No	INSTALL a new passenger seat cushion blower motor. REFER to: Front Seat Cushion Blower Motor . GO to Z22

Z14 CHECK THE PASSENGER SEAT CUSHION BLOWER SPEED CONTROL RESISTANCE

NOTE: The ohmmeter must be connected with the positive lead to pin 7 and the negative lead to pin 4 when measuring. Ohmmeter leads incorrectly connected results in false readings and leads to incorrect identification of components that are not damaged.

Measure the **component side resistance** between:

Positive Lead	Measurement / Action	Negative Lead
 E160218 C3040-7, Component Side	Ω	 E160218 C3040-4, Component Side

Is the resistance between 240K and 400K ohms?

Yes	GO to Z15

No	INSTALL a new passenger seat cushion blower motor. REFER to: Front Seat Cushion Blower Motor . GO to Z22

Z15 CHECK THE PASSENGER SEAT CUSHION BLOWER MOTOR INSTALLATION AND FOR

CRUSHED SEAT CUSHION

Ignition OFF.

Remove the passenger seat. REFER to: Front Seat .

Remove the passenger seat cushion cover. REFER to: Front Seat Cushion Cover .

Inspect the passenger seat cushion for the following:

Blower motor correctly installed

Cushion foam pad crushed or restricted

Is the passenger seat cushion blower motor correctly installed and are there no signs of damage to the foam pad?

Yes	INSTALL the passenger seat cushion cover and seat. GO to Z18

No	CORRECTLY install the passenger seat cushion blower motor or INSTALL a new passenger seat cushion foam pad. GO to Z22

Z16 CHECK THE PASSENGER SEAT CUSHION BLOWER MOTOR THERMISTOR AND WIRING

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING .

Disconnect: Passenger Side Airbag In-line C219 .

Disconnect: SCME C3265B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265B-2	Ω	C3265B-3

Compare the measured resistance value with the following table:

Ambient Temperature	Resistance
0-10 ° C (32-50 ° F)	2, 782-1, 663 ohms
10-20 ° C (50-68 ° F)	1, 837-1, 140 ohms
20-30 ° C (68-86 ° F)	1, 260-806 ohms
30-40 ° C (86-104 ° F)	893-570 ohms
40-50 ° C (104-122 ° F)	630-428 ohms

Is the resistance within the limits indicated?

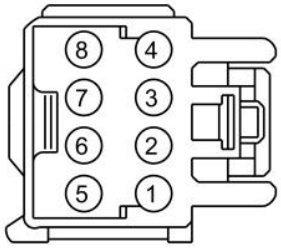
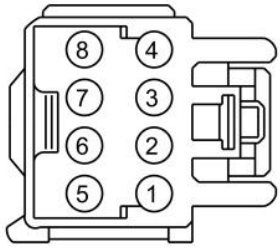
Yes	GO to Z18

No	GO to Z17

Z17 CHECK THE PASSENGER SEAT CUSHION BLOWER MOTOR THERMISTOR

Disconnect: Passenger Seat Cushion Blower Motor C3040 .

Measure the **component side resistance** between:

Positive Lead	Measurement / Action	Negative Lead
 E160218 C3040-5, Component Side	Ω	 E160218 C3040-8, Component Side

Compare the measured resistance value with the following table:

Ambient Temperature	Resistance
0-10 ° C (32-50 ° F)	2, 782-1, 663 ohms
10-20 ° C (50-68 ° F)	1, 837-1, 140 ohms
20-30 ° C (68-86 ° F)	1, 260-806 ohms
30-40 ° C (86-104 ° F)	893-570 ohms
40-50 ° C (104-122 ° F)	630-428 ohms

Is the resistance within the limits indicated?

Yes	REPAIR circuit VHS27 (WH/OG) or RHS10 (BU/OG) for an open or high resistance. GO to Z22

No	INSTALL a new cushion blower motor. REFER to: Front Seat Cushion Blower Motor . GO to Z22

Z18 CHECK THE PASSENGER SEAT CUSHION BLOWER MOTOR HEATING/COOLING CIRCUITRY CURRENT DRAW

Connect all SCME, blower motor and Body Harness-to-Seat Harness Connectors.

NOTE: It may be necessary to open the seat wire harness conduit to allow placing the inductive current probe around the circuit as described in the following step. Care

must be taken when opening up the wire harness so as not to damage any wiring or connectors. Do not damage any wiring or induce stress on any wiring or connectors. Close up the wire harness once repairs to the seat are complete.

NOTE: Use a commercially available inductive current probe (such as Electronic Specialties Current Probe/Multimeter 685 or a Fluke I410 [used with a digital multimeter]) or the low current probe from the VMM available for use with IDS. If these are unavailable, the inductive current probe feature from a battery tester may be substituted.

Place an inductive current probe around circuit CHS07 (GY/BU) near SCME C3265A-A and monitor the current draw.

Start the engine and set the passenger seat to HIGH heat.

Is the current draw less than 11 amps?

Yes	GO to Z19

No	INSTALL a new cushion blower motor. REFER to: Front Seat Cushion Blower Motor . GO to Z22

Z19 CHECK RESISTANCE OF THE PASSENGER SEAT CUSHION BLOWER MOTOR AND WIRING

Ignition OFF.

Disconnect: SCME C3265A .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265A-A	Ω	Ground
C3265A-B	Ω	Ground

Are the resistances between 0.9 and 10 ohms?

Yes	GO to Z21

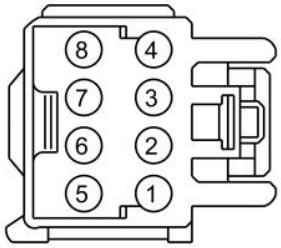
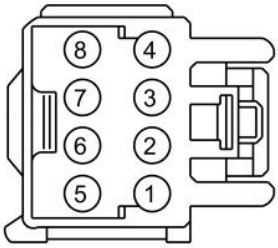
No	GO to Z20

Z20 CHECK THE RESISTANCE OF THE PASSENGER SEAT CUSHION BLOWER MOTOR

Disconnect: Passenger Seat Cushion Blower Motor C3040 .

Measure the **component side resistance** between:

Positive Lead	Measurement	Negative Lead

	/ Action	
 E160218 C3040-1, Component Side	Ω	 E160218 C3040-2, Component Side

Is the resistance between 0.9 and 10 ohms?

Yes	REPAIR circuit CHS07 (GY/BU) or RHS07 (BU) for an open or high resistance. GO to Z22

No	INSTALL a new cushion blower motor. REFER to: Front Seat Cushion Blower Motor . GO to Z22

Z21 CHECK THE SCME (FRONT SEAT CLIMATE CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all of the SCME connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins as necessary

pushed-out pins - install new pins as necessary

Reconnect the SCME connectors. Make sure they seat and latch correctly.

NOTE: Do not reconnect Passenger Side Airbag In-line C219 at this time.

Reconnect all previously disconnected connectors.

Ignition ON.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new SCME. REFER to: Front Seat Climate Control Module . GO to Z22

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues. GO to Z22

Z22 VERIFY THE SUPPLEMENTAL RESTRAINT SYSTEM (SRS) PROVES OUT SUCCESSFULLY

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING .

Connect: Passenger Side Airbag In-line C219 .

Connect all previously disconnected connectors.

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) REPOWERING .

Did the SRS prove out successfully?

Yes	Repair is complete. RETURN the vehicle to the customer.

No	REFER to: SUPPLEMENTAL RESTRAINT SYSTEM .

DIAGNOSIS AND TESTING > FRONT SEATS > PINPOINT TEST(S) > PINPOINT TEST AA : DTC B272B

Refer to Climate Controlled Seats for schematic and connector information.

Normal Operation and Fault Conditions

The SCME monitors seat backrest temperature while it supplies voltage and ground to both blower motors. The SCME also supplies a variable voltage signal to control the blower speed. Cabin air enters the blower through a filter attached to the blower motor housing. Heated or cooled air exits the blower motor and flows through the foam pad.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B272B	Passenger Back Over-Temp Detected	If the passenger seat backrest blower motor temperature exceeds 70 ° C (158 ° F) in cool mode or 85 ° C (185 ° F) in heat mode for more than 4 seconds, the SCME shuts down the passenger seat system and sets this DTC.

Possible Causes

- Wiring, terminals or connectors
- Restricted blower motor filter
- Crushed or restricted backrest foam pad
- Backrest blower motor

- SCME

DIAGNOSIS AND TESTING > FRONT SEATS > PINPOINT TEST(S) > PINPOINT TEST AA : DTC B272B > PINPOINT TEST AA : DTC B272B

> *WARNING: Incorrect repair techniques or actions can cause an accidental Supplemental Restraint System (SRS) deployment. Never compromise or depart from these instructions. Failure to precisely follow all instructions could result in serious personal injury from an accidental deployment.*

AA1 CHECK THE SCME (FRONT SEAT CLIMATE CONTROL MODULE) FOR ON-DEMAND DIAGNOSTIC TROUBLE CODES (DTCS)

Start the vehicle and set the passenger seat to HIGH heat.

Using a diagnostic scan tool, perform the SCME self-test.

Was DTC B272B retrieved on-demand during the self-test?

Yes	GO to AA2

No	GO to AA5

AA2 CHECK THE PASSENGER SEAT BACKREST BLOWER MOTOR THERMISTOR CIRCUITS FOR A SHORT TO GROUND

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING .

Disconnect: Passenger Side Airbag In-line C219 .

Disconnect: SCME C3265B .

Disconnect: Passenger Seat Backrest Blower Motor C3039 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265B-4	Ω	Ground
C3265B-5	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to AA3

No	REPAIR the circuit in question. GO to AA22

AA3 CHECK THE PASSENGER SEAT BACKREST BLOWER MOTOR THERMISTOR AND WIRING

Connect: Passenger Seat Backrest Blower Motor C3039 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265B-4	Ω	C3265B-5

Compare the measured resistance value with the following table:

Ambient Temperature	Resistance
0-10 ° C (32-50 ° F)	2, 782-1, 663 ohms
10-20 ° C (50-68 ° F)	1, 837-1, 140 ohms
20-30 ° C (68-86 ° F)	1, 260-806 ohms
30-40 ° C (86-104 ° F)	893-570 ohms
40-50 ° C (104-122 ° F)	630-428 ohms

Is the resistance within the limits indicated?

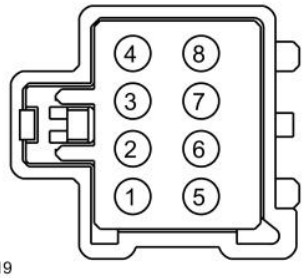
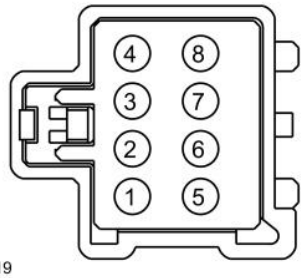
Yes	GO to AA18

No	GO to AA4

AA4 CHECK THE PASSENGER SEAT BACKREST BLOWER MOTOR THERMISTOR

Disconnect: Passenger Seat Backrest Blower Motor C3039 .

Measure the **component side resistance** between:

Positive Lead	Measurement / Action	Negative Lead
 E160219 C3039-5, Component Side	Ω	 E160219 C3039-8, Component Side

Compare the measured resistance value with the following table:

Ambient Temperature	Resistance

0-10 ° C (32-50 ° F)	2, 782-1, 663 ohms
10-20 ° C (50-68 ° F)	1, 837-1, 140 ohms
20-30 ° C (68-86 ° F)	1, 260-806 ohms
30-40 ° C (86-104 ° F)	893-570 ohms
40-50 ° C (104-122 ° F)	630-428 ohms

Is the resistance within the limits indicated?

Yes	REPAIR circuit VHS36 (YE/BU) or RHS20 (GN/BU) for an open or high resistance. GO to AA22

No	INSTALL a new passenger seat backrest blower motor. REFER to: Front Seat Backrest Blower Motor . GO to AA22

AA5 CONFIRM THE FAULT WHILE MONITORING THE SCME (FRONT SEAT CLIMATE CONTROL MODULE) SEAT BACK THERMO-ELECTRIC DEVICE TEMPERATURE (PBKTEMP) AND SEAT CUSHION THERMO-ELECTRIC DEVICE TEMPERATURE (PCSHTEMP) PARAMETER IDENTIFICATIONS (PIDS)

Set the passenger seat to OFF.

Using a diagnostic scan tool, clear the SCME Diagnostic Trouble Codes (DTCs).

Using a diagnostic scan tool, monitor the SCME PBKTEMP and PCSHTEMP Parameter Identifications (PIDs).

NOTE: A crushed seat backrest foam pad may be the cause of the fault, making it necessary to occupy the seat to recreate and identify the fault.

Attempt to recreate the fault. Start the vehicle and set the passenger seat to HIGH heat for at least 15 minutes while occupying the seat.

Do the Parameter Identifications (PIDs) increase incrementally (gradually) and stay within 15 ° C (27 ° F) of each other?

Yes	Fault not present at this time. Fault may have been set due to a past failure, incorrect use of the climate controlled seat system by repeated switching between heat and cool modes or due to excessive passenger compartment temperature.

No	If the PBKTEMP PID increases incrementally and is greater than 15 ° C (27 ° F) of the PCSHTEMP PID, GO to AA6 If the PBKTEMP PID increases quickly (temperature "jumps" and does not increase incrementally) and is greater than 15 ° C (27 ° F) of the PCSHTEMP PID, GO to AA16

AA6 COMPARE OPERATION OF THE DRIVER AND PASSENGER SEATS

With the engine running, set both front seats to HIGH cool.

Note the airflow exhausting from the passenger seat backrest blower motor and compare it to the airflow exhausting from the driver seat backrest blower motor.

Carry out a wiggle test of the wire harnesses between the SCME and the passenger seat backrest blower motor while monitoring blower operation. The blower should operate consistently and not change speeds.

Is the airflow exhausting from the passenger seat backrest blower motor comparable to the airflow exhausting from the driver seat backrest blower motor with no change in operation when carrying out the wiggle test?

Yes	GO to AA7

No	If the airflow exhausting from the passenger seat backrest blower motor is not comparable to the airflow exhausting from the driver seat backrest blower motor, GO to AA8 If the passenger seat backrest blower motor blower operation changed while carrying out the wiggle test, IDENTIFY and REPAIR the wiring fault.

AA7 COMPARE OPERATION OF THE DRIVER AND PASSENGER SEATS WHILE OCCUPIED

Note the airflow exhausting from the passenger seat backrest blower motor with the passenger seat occupied and compare it to the airflow exhausting from the driver seat backrest blower motor with the driver seat occupied.

Is the airflow exhausting from the passenger seat backrest blower motor comparable to the airflow exhausting from the driver seat backrest blower motor?

Yes	GO to AA16

No	INSTALL a new passenger seat backrest foam pad.

AA8 CHECK THE PASSENGER SEAT BACKREST BLOWER FOR AN OBSTRUCTION OR RESTRICTED FILTER

Ignition OFF.

Inspect the blower of the passenger seat backrest blower motor assembly for an obstruction or for a restricted filter.

Is the blower obstructed or the filter restricted?

Yes	REMOVE the obstruction or INSTALL a new passenger seat backrest blower motor. REFER to: Front Seat Backrest Blower Motor .

No	GO to AA9

AA9 CHECK THE PASSENGER SEAT BACKREST BLOWER SPEED CONTROL CIRCUIT FOR AN OPEN

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING .

Disconnect: Passenger Side Airbag In-line C219 .

Disconnect: SCME C3265C .

Disconnect: Passenger Seat Backrest Blower Motor C3039 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265C-4	Ω	C3039-7

Is the resistance less than 3 ohms?

Yes	GO to AA10

No	REPAIR the circuit. GO to AA22

AA10 CHECK THE PASSENGER SEAT BACKREST BLOWER CIRCUIT FOR A SHORT TO VOLTAGE

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265C-7	V	Ground

Is any voltage present?

Yes	REPAIR the circuit. GO to AA22

No	GO to AA11

AA11 CHECK THE PASSENGER SEAT BACKREST BLOWER CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265C-8	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to AA12

No	REPAIR the circuit. GO to AA22

AA12 CHECK THE PASSENGER SEAT BACKREST BLOWER CIRCUITS FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265C-8	Ω	C3039-3
C3265C-7	Ω	C3039-4

Are the resistances less than 3 ohms?

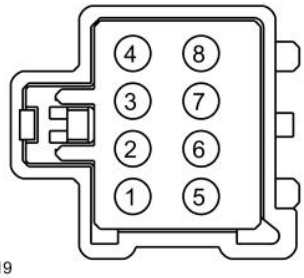
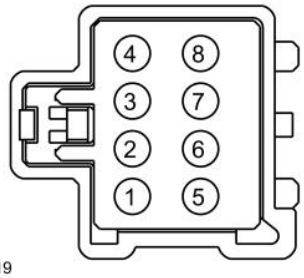
Yes	GO to AA13

No	REPAIR the circuit in question. GO to AA22

AA13 CHECK THE PASSENGER SEAT BACKREST BLOWER RESISTANCE

NOTE: The ohmmeter must be connected with the positive lead to pin 3 and the negative lead to pin 4 when measuring. Ohmmeter leads incorrectly connected results in false readings and leads to incorrect identification of components that are not damaged.

Measure the **component side resistance** between:

Positive Lead	Measurement / Action	Negative Lead
 E160219 C3039-3, Component Side	Ω	 E160219 C3039-4, Component Side

Is the resistance between 4, 000 and 10, 000 ohms?

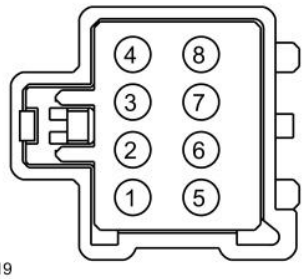
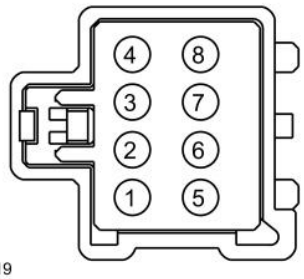
Yes	GO to AA14

No	INSTALL a new passenger seat backrest blower motor. REFER to: Front Seat Backrest Blower Motor . GO to AA22

AA14 CHECK THE PASSENGER SEAT BACKREST BLOWER SPEED CONTROL RESISTANCE

NOTE: The ohmmeter must be connected with the positive lead to pin 7 and the negative lead to pin 4 when measuring. Ohmmeter leads incorrectly connected results in false readings and leads to incorrect identification of components that are not damaged.

Measure the **component side resistance** between:

Positive Lead	Measurement / Action	Negative Lead
 E160219 C3039-7, Component Side	Ω	 E160219 C3039-4, Component Side

Is the resistance between 240K and 400K ohms?

Yes	GO to AA15

No	INSTALL a new passenger seat backrest blower motor. REFER to: Front Seat Backrest Blower Motor . GO to AA22

AA15 CHECK THE PASSENGER SEAT BACKREST BLOWER MOTOR INSTALLATION AND FOR CRUSHED SEAT BACKREST

Ignition OFF.

Remove the passenger seat. REFER to: Front Seat .

Remove the passenger seat backrest cover. REFER to: Front Seat Backrest Cover .

Inspect the passenger seat backrest for the following:

- Blower motor correctly installed
- Backrest foam pad crushed or restricted

Is the passenger seat backrest blower motor correctly installed and are there no signs of damage to the foam pad?

Yes	INSTALL the passenger seat backrest cover and seat. GO to AA18

No	CORRECTLY install the passenger seat backrest blower motor or INSTALL a new passenger seat backrest foam pad. GO to AA22

AA16 CHECK THE PASSENGER SEAT BACKREST BLOWER MOTOR THERMISTOR AND WIRING

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING .

Disconnect: Passenger Side Airbag In-line C219 .

Disconnect: SCME C3265B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265B-4	Ω	C3265B-5

Compare the measured resistance value with the following table:

Ambient Temperature	Resistance
0-10 ° C (32-50 ° F)	2, 782-1, 663 ohms
10-20 ° C (50-68 ° F)	1, 837-1, 140 ohms
20-30 ° C (68-86 ° F)	1, 260-806 ohms
30-40 ° C (86-104 ° F)	893-570 ohms
40-50 ° C (104-122 ° F)	630-428 ohms

Is the resistance within the limits indicated?

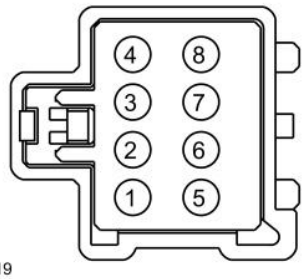
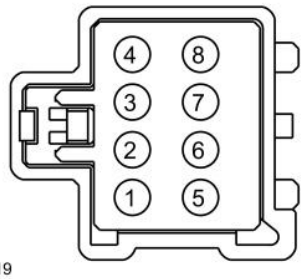
Yes	GO to AA18

No	GO to AA17

AA17 CHECK THE PASSENGER SEAT BACKREST BLOWER MOTOR THERMISTOR

Disconnect: Passenger Seat Backrest Blower Motor C3039 .

Measure the **component side resistance** between:

Positive Lead	Measurement / Action	Negative Lead
 E160219 C3039-5, Component Side	Ω	 E160219 C3039-8, Component Side

Compare the measured resistance value with the following table:

Ambient Temperature	Resistance
0-10 ° C (32-50 ° F)	2, 782-1, 663 ohms
10-20 ° C (50-68 ° F)	1, 837-1, 140 ohms
20-30 ° C (68-86 ° F)	1, 260-806 ohms
30-40 ° C (86-104 ° F)	893-570 ohms
40-50 ° C (104-122 ° F)	630-428 ohms

Is the resistance within the limits indicated?

Yes	REPAIR circuit VHS35 (VT/OG) or RHS15 (GY/BN) for an open or high resistance. GO to AA22

No	INSTALL a new backrest blower motor. REFER to: Front Seat Backrest Blower Motor . GO to AA22

AA18 CHECK THE PASSENGER SEAT BACKREST BLOWER MOTOR HEATING/COOLING CIRCUITRY CURRENT DRAW

Connect all SCME, blower motor and Body Harness-to-Seat Harness Connectors.

NOTE: It may be necessary to open the seat wire harness conduit to allow placing the inductive current probe around the circuit as described in the following step. Care must be taken when opening up the wire harness so as not to damage any wiring or connectors. Do not damage any wiring or induce stress on any wiring or connectors. Close up the wire harness once repairs to the seat are complete.

NOTE: Use a commercially available inductive current probe (such as Electronic Specialties Current Probe/Multimeter 685 or a Fluke I410 [used with a digital multimeter]) or the low current probe from the VMM available for use with IDS. If these are unavailable, the inductive current probe feature from a battery tester may be substituted.

Place an inductive current probe around circuit CHS06 (BU/BN) near SCME C3265A-C and monitor the current draw.

Start the engine and set the passenger seat to HIGH heat.

Is the current draw less than 11 amps?

Yes	GO to AA19

No	INSTALL a new backrest blower motor. REFER to: Front Seat Backrest Blower Motor . GO to AA22

AA19 CHECK RESISTANCE OF THE PASSENGER SEAT BACKREST BLOWER MOTOR AND WIRING

Ignition OFF.

Disconnect: SCME C3265A .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265A-C	Ω	Ground
C3265A-D	Ω	Ground

Are the resistances between 0.9 and 10 ohms?

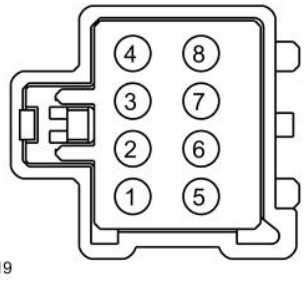
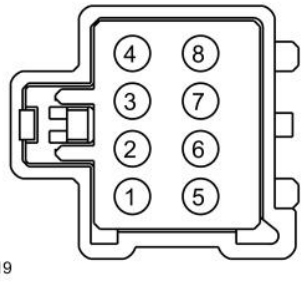
Yes	GO to AA21

No	GO to AA20

AA20 CHECK THE RESISTANCE OF THE PASSENGER SEAT BACKREST BLOWER MOTOR

Disconnect: Passenger Seat Backrest Blower Motor C3039 .

Measure the **component side resistance** between:

Positive Lead	Measurement / Action	Negative Lead
 E160219 C3039-1, Component Side	Ω	 E160219 C3039-2, Component Side

Is the resistance between 0.9 and 10 ohms?

Yes	REPAIR circuit CHS01 (GY/VT) or RHS01 (WH/VT) for an open or high resistance. GO to AA22

No	INSTALL a new backrest blower motor. REFER to: Front Seat Backrest Blower Motor . GO to AA22

AA21 CHECK THE SCME (FRONT SEAT CLIMATE CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all of the SCME connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins as necessary

pushed-out pins - install new pins as necessary

Reconnect the SCME connectors. Make sure they seat and latch correctly.

> *NOTE: Do not reconnect Passenger Side Airbag In-line C219 at this time.*

Reconnect all previously disconnected connectors.

Ignition ON.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new SCME. REFER to: Front Seat Climate Control Module . GO to AA22

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues. GO to AA22

AA22 VERIFY THE SUPPLEMENTAL RESTRAINT SYSTEM (SRS) PROVES OUT SUCCESSFULLY

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING .

Connect: Passenger Side Airbag In-line C219 .

Connect all previously disconnected connectors.

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) REPOWERING .

Did the SRS prove out successfully?

Yes	Repair is complete. RETURN the vehicle to the customer.

No	REFER to: SUPPLEMENTAL RESTRAINT SYSTEM .

DIAGNOSIS AND TESTING > FRONT SEATS > PINPOINT TEST(S) > PINPOINT TEST AB : DTC B272C

Refer to Climate Controlled Seats for schematic and connector information.

Normal Operation and Fault Conditions

The SCME is supplied voltage at all times, but the climate controlled seat system only operates with the engine running. The system can be operated with the ignition ON engine OFF by using a diagnostic scan tool to bypass the climate controlled seat buttons on the touchscreen and FCIM. When commanding a heat or cool mode operation in this manner, the climate controlled seat system only operates in 15 second intervals.

Both voltage supply circuits are spliced together internal to the SCME, so if one circuit becomes open, both seats can still be operated. However, if a fault occurs setting a DTC specific to either climate controlled seat, only the affected seat is disabled by the SCME.

Cabin air is drawn through and distributed to each of the blower motors located in the seat cushion and backrest. The blower motors then heat or cool the air. The air is then directed into the foam pad where it is distributed along the surface of the cushion and backrest of the seat. Once the system is activated, the SCME uses a set of flexible algorithms to control the heating/cooling modes and the blower speed dependant on the commanded climate controlled seat settings.

A differential fault occurs when the cushion and backrest blower motors on an affected seat are reporting very different temperatures to the SCME. This may result from an airflow restriction or a circuit fault of either blower motor area. If a blower motor is clear of obstruction and is operational, check the other blower motor and circuitry on the seat. It is important to note that a blower motor with a higher temperature may be operating correctly and not the area of concern. The other blower motor may be indicating a much lower temperature, causing the DTC to set.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B272C	Driver Differential Temperature Fault	If there is a temperature differential between the driver backrest and cushion blower motor of 60 ° C (108 ° F) or more for more than 4 seconds, or if the blower motor is disconnected or the duct is blocked, this DTC sets. When this happens for the first time in a key cycle, the SCME puts the driver seat system into recovery mode (see principles of operation). If the system is able to recover, it returns to normal function. If the system is able to recover and it occurs a second time in the same key cycle, the SCME shuts down the driver seat system.

Possible Causes

- Wiring, terminals or connectors
- Restricted blower motor filter
- Crushed or restricted backrest foam pad

- Cushion or backrest blower motor
- SCME

DIAGNOSIS AND TESTING > FRONT SEATS > PINPOINT TEST(S) > PINPOINT TEST AB : DTC B272C > PINPOINT TEST AB : DTC B272C

WARNING: Incorrect repair techniques or actions can cause an accidental Supplemental Restraint System (SRS) deployment. Never compromise or depart from these instructions. Failure to precisely follow all instructions could result in serious personal injury from an accidental deployment.

AB1 CHECK THE SCME (FRONT SEAT CLIMATE CONTROL MODULE) FOR ON-DEMAND DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, perform the SCME self-test.

Was DTC B2729 or B2730, retrieved on-demand during the self-test?

Yes	For DTC B2729, GO to Pinpoint Test AF For DTC B2730, GO to Pinpoint Test AG

No	GO to AB2

AB2 MONITOR SCME (FRONT SEAT CLIMATE CONTROL MODULE) BLOWER MOTOR TEMPERATURE PARAMETER IDENTIFICATIONS (PIDS)

Using a diagnostic scan tool, monitor the following SCME Parameter Identifications (PIDs):

Passenger Cushion Thermal Electric Device (TED) Temperature (PCSHTMP)

Passenger Back (TED) Temperature (PBKTMP)

Seat cushion thermal electric device temperature (CSHTEMP)

Seat back thermal electric device temperature (BKTMP)

NOTE: Make sure the temperature of the climate controlled seats has stabilized before monitoring the Parameter Identifications (PIDs). Not allowing stabilization can cause incorrect readings and lead to incorrect identification of components that are not faulty.

Monitor blower motor temperature Parameter Identifications (PIDs) with the climate controlled seats OFF. Compare the PID values of the driver seat to those of the front passenger seat, this can help identify if there is a concern with the driver seat cushion or backrest PID value readings.

Are both driver seat blower motor temperature Parameter Identifications (PIDs) within 10 ° C (18 ° F) of the ambient temperature?

Yes	GO to AB3

No	If the driver seat cushion PID varies 10 ° C (18 ° F) or more from ambient temperature, GO to AB16 If the driver seat backrest PID varies 10 ° C (18 ° F) or more from ambient temperature, GO to AB32

AB3 CONFIRM THE FAULT IS IN THE SEAT CUSHION OR THE BACKREST

Ignition OFF.

Start the engine.

NOTE: A crushed seat cushion foam pad may be the cause of the fault. It may be necessary to sit on the seat or place something of reasonable size and weight on the seat to recreate the fault.

After cycling the ignition and with the engine running, set the driver seat to high heat. Allow the seat to heat for at least 15 minutes while monitoring the blower motor temperature Parameter Identifications (PIDs) of the driver seat.

Do the driver seat cushion blower motor and backrest blower motor Parameter Identifications (PIDs) vary more than 60 ° C (108 ° F) from each other?

Yes	If the driver seat cushion PID is 60 ° C (108 ° F) hotter than the backrest PID, GO to AB5 If the driver seat backrest PID is 60 ° C (108 ° F) hotter than the cushion PID, GO to AB20

No	GO to AB4

AB4 CHECK THE BLOWER MOTOR COOLING PERFORMANCE

Check the blower motors cooling performance on the affected seat. Refer to Component Test - Blower Motor Cooling Performance.

Did the blower motors pass the component test?

Yes	The DTC may have been set by extreme cabin temperatures or excessive sunload on the seat causing the system to enter recovery mode. Occupant size and weight characteristics can also be a factor. CLEAR the Diagnostic Trouble Codes (DTCs). REPEAT the self-test. TEST the system for normal operation. If a concern cannot be found or duplicated, RETURN the vehicle to the customer.

No	CHECK the affected seat cushion or backrest for correct installation of the climate controlled seat components (blower motor, air ducts and foam pad). CHECK for airflow restrictions (blower motor inlets and outlets, filters and ducts) and REPAIR as needed. CHECK for an intermittent wiring fault. REPAIR as needed. CLEAR the Diagnostic Trouble Codes (DTCs). REPEAT the self-test.

AB5 CHECK FOR CORRECT BLOWER MOTOR INSTALLATION AND FOR CRUSHED FOAM

Ignition OFF.

Remove the seat. REFER to: Front Seat .

Remove the seat cushion trim cover. REFER to: Front Seat Cushion Cover .

Inspect the driver seat cushion for the following:

Cushion blower obstructed

Blower filter restricted or plugged

Blower motor correctly installed

Seat cushion foam pad crushed or restricted

Is the blower motor correctly installed and the foam pad OK?

Yes	GO to AB6

No	Correctly INSTALL the cushion blower motor or INSTALL a new seat cushion foam pad.

AB6 CHECK BACKREST BLOWER MOTOR THERMO ELECTRIC DEVICE CIRCUIT FOR A SHORT TO VOLTAGE

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING .

Position the driver seat in the vehicle and connect the seat-to-floor connectors.

Disconnect: Driver Side Airbag In-line C345.

Disconnect: Passenger Side Airbag In-line C219 .

Disconnect: SCME C3265A .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265A-K		Ground

Is any voltage present?

Yes	REPAIR the circuit. GO to AB36

No	GO to AB7

AB7 CHECK BACKREST BLOWER MOTOR THERMO ELECTRIC DEVICE CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265A-J	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to AB8

No	REPAIR the circuit. GO to AB36

AB8 CHECK THE RESISTANCE OF THE BACKREST BLOWER MOTOR THERMO ELECTRIC DEVICE AND WIRING

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265A-J	Ω	Ground
C3265A-K	Ω	Ground

Are the resistances between 0.9 and 10 ohms?

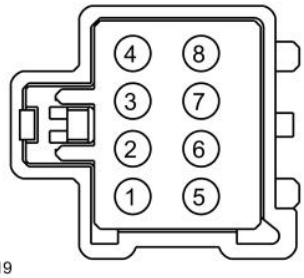
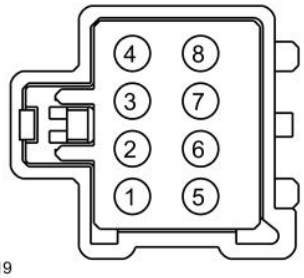
Yes	GO to AB10

No	GO to AB9

AB9 CHECK THE RESISTANCE OF THE BACKREST BLOWER MOTOR THERMO ELECTRIC DEVICE

Disconnect: Driver Seat Backrest Blower Motor C3034 .

Measure the **component side resistance** between:

Positive Lead	Measurement / Action	Negative Lead
 E160219 C3034-1, Component Side	Ω	 E160219 C3034-2, Component Side

Is the resistance less than 3 ohms?

Yes	REPAIR circuit CHS01 (GY/VT) or RHS01 (WH/VT) for an open or high resistance. GO to AB36

No	INSTALL a new backrest blower motor. REFER to: Front Seat Backrest Blower Motor . GO to AB36

AB10 CHECK BLOWER CIRCUIT AND SPEED CONTROL CIRCUIT FOR A SHORT TO VOLTAGE

Disconnect: SCME C3265C .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265C-16	V	Ground
C3265C-11	V	Ground

Is any voltage present?

Yes	REPAIR the circuit in question. GO to AB36

No	GO to AB11

AB11 CHECK BLOWER AND SPEED CONTROL CIRCUITS FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265C-16	Ω	Ground
C3265C-11	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to AB12

No	REPAIR the circuit in question. GO to AB36

AB12 CHECK THE BLOWER AND WIRING

NOTE: The ohmmeter must be connected with the positive lead to pin 16 and the negative lead to pin 15 when measuring. Ohmmeter leads incorrectly connected will

result in false readings and lead to incorrect identification of components that are not faulty.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265C-16	Ω	C3265C-15

Is the resistance between 4, 000 and 10, 000 ohms?

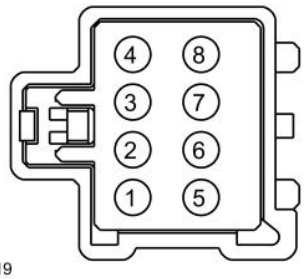
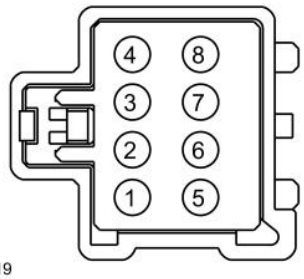
Yes	GO to AB14
No	GO to AB13

AB13 CHECK THE BLOWER RESISTANCE

Disconnect: Driver Seat Cushion Blower Motor C3035 .

NOTE: The ohmmeter must be connected with the positive lead to pin 3 and the negative lead to pin 4 when measuring. Ohmmeter leads incorrectly connected results in false readings and leads to incorrect identification of components that are not damaged.

Measure the **component side resistance** between:

Positive Lead	Measurement / Action	Negative Lead
 E160219 C3035-3, Component Side	Ω	 E160219 C3035-4, Component Side

Is the resistance between 4, 000 and 10, 000 ohms?

Yes	REPAIR the circuit in question. GO to AB36
No	INSTALL a new driver seat cushion blower motor. REFER to: Front Seat Cushion Blower Motor . GO to AB36

AB14 CHECK THE BLOWER SPEED CONTROL AND CIRCUIT RESISTANCE

NOTE: The ohmmeter must be connected with the positive lead to pin 11 and the negative lead to pin 15 when measuring. Ohmmeter leads incorrectly connected results in false readings and leads to incorrect identification of components that are not damaged.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265C-11	Ω	C3265C-15

Is the resistance between 240K and 400K ohms?

Yes	GO to AB16

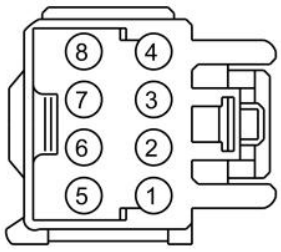
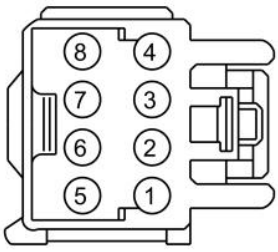
No	GO to AB15

AB15 CHECK THE BLOWER SPEED CONTROL RESISTANCE

Disconnect: Driver Seat Cushion Blower Motor C3035 .

NOTE: The ohmmeter must be connected with the positive lead to pin 7 and the negative lead to pin 4 when measuring. Ohmmeter leads incorrectly connected results in false readings and leads to incorrect identification of components that are not damaged.

Measure the **component side resistance** between:

Positive Lead	Measurement / Action	Negative Lead
 E160218 C3035-7, Component Side	Ω	 E160218 C3035-4, Component Side

Is the resistance between 240K and 400K ohms?

Yes	REPAIR the circuit in question. GO to AB36

No	INSTALL a new driver seat cushion blower motor. REFER to: Front Seat Cushion Blower Motor . GO to AB36

AB16 CHECK THERMISTOR CIRCUIT FOR A SHORT TO VOLTAGE

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING .

Disconnect: Driver Side Airbag In-line C345.

Disconnect: Passenger Side Airbag In-line C219 .

Disconnect: SCME C3265B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265B-7		Ground

Is any voltage present?

Yes	REPAIR the circuit. GO to AB36

No	GO to AB17

AB17 CHECK THERMISTOR CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265B-7	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to AB18

No	REPAIR the circuit. GO to AB36

AB18 CHECK THE BLOWER MOTOR THERMISTOR AND WIRING RESISTANCE AT THE SCME (FRONT SEAT CLIMATE CONTROL MODULE)

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265B-7	Ω	C3265B-8

Compare the measured resistance value with the following table:

Ambient Temperature	Resistance

0-10 ° C (32-50 ° F)	2, 782-1, 663 ohms
10-20 ° C (50-68 ° F)	1, 837-1, 140 ohms
20-30 ° C (68-86 ° F)	1, 260-806 ohms
30-40 ° C (86-104 ° F)	893-570 ohms
40-50 ° C (104-122 ° F)	630-428 ohms

Is the resistance within the limits indicated?

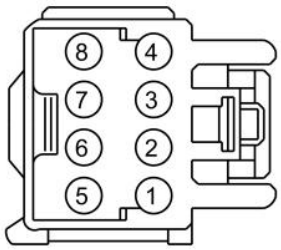
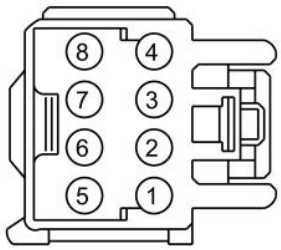
Yes	GO to AB35

No	GO to AB19

AB19 CHECK THE BLOWER MOTOR THERMISTOR RESISTANCE

Disconnect: Driver Seat Cushion Blower Motor C3035 .

Measure the **component side resistance** between:

Positive Lead	Measurement / Action	Negative Lead
 E160218 C3035-5, Component Side	Ω	 E160218 C3035-8, Component Side

Compare the measured resistance value with the following table:

Ambient Temperature	Resistance
0-10 ° C (32-50 ° F)	2, 782-1, 663 ohms
10-20 ° C (50-68 ° F)	1, 837-1, 140 ohms
20-30 ° C (68-86 ° F)	1, 260-806 ohms
30-40 ° C (86-104 ° F)	893-570 ohms
40-50 ° C (104-122 ° F)	630-428 ohms

Is the resistance within the limits indicated?

Yes	REPAIR the circuit(s) in question. GO to AB36

No	INSTALL a new driver seat cushion blower motor. REFER to: Front Seat Cushion Blower Motor . GO to AB36

AB20 CHECK FOR CORRECT BLOWER MOTOR INSTALLATION AND FOR CRUSHED FOAM

Ignition OFF.

Remove the driver seat. REFER to: Front Seat .

Remove the driver seat backrest cover. REFER to: Front Seat Backrest Cover .

Inspect the driver seat backrest for the following:

Backrest blower obstructed

Blower filter restricted or plugged

Blower motor correctly installed

Seat backrest foam pad crushed or restricted

Is the blower motor correctly installed and the foam pad OK?

Yes	GO to AB21

No	Correctly INSTALL the backrest blower motor or INSTALL a new seat backrest foam pad. INSTALL the seat. GO to AB36

AB21 CHECK CUSHION BLOWER MOTOR CIRCUIT FOR A SHORT TO VOLTAGE

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING .

Position the driver seat in the vehicle and connect the seat-to-floor connectors.

Disconnect: Driver Side Airbag In-line C345.

Disconnect: Passenger Side Airbag In-line C219 .

Disconnect: SCME C3265A .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265A-H		Ground

Is any voltage present?

Yes	REPAIR the circuit. GO to AB36

No	GO to AB22

AB22 CHECK CUSHION BLOWER MOTOR + CIRCUIT FOR A SHORT TO GROUND

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265A-G	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to AB23

No	REPAIR the circuit. GO to AB36

AB23 CHECK THE RESISTANCE OF THE CUSHION BLOWER MOTOR AND WIRING

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265A-G	Ω	C3265A-H

Is the resistance between 0.9 and 10 ohms?

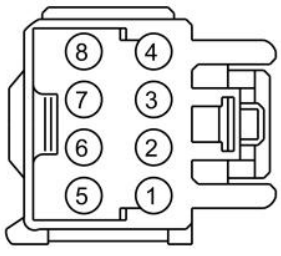
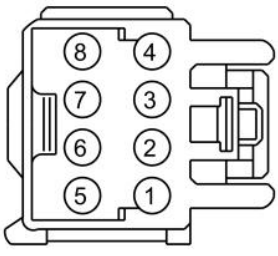
Yes	GO to AB25

No	GO to AB24

AB24 CHECK THE CUSHION BLOWER MOTOR RESISTANCE

Disconnect: Driver Seat Cushion Blower Motor C3035 .

Measure the **component side resistance** between:

Positive Lead	Measurement / Action	Negative Lead
 E160218 C3035-1, Component Side	Ω	 E160218 C3035-2, Component Side

Is the resistance between 0.9 and 10 ohms?

Yes	REPAIR the circuit(s) in question. GO to AB36

No	INSTALL a new driver seat cushion blower motor. REFER to: Front Seat Cushion Blower Motor . GO to AB36

AB25 CHECK BLOWER CIRCUIT AND SPEED CONTROL CIRCUIT FOR A SHORT TO VOLTAGE

Disconnect: SCME C3265C .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265C-16	V	Ground
C3265C-12	V	Ground

Is any voltage present?

Yes	REPAIR the circuit in question. GO to AB36

No	GO to AB26

AB26 CHECK BLOWER AND SPEED CONTROL CIRCUITS FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265C-16	Ω	Ground
C3265C-12	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to AB27

No	REPAIR the circuit in question. GO to AB36

AB27 CHECK THE BLOWER AND WIRING RESISTANCE

NOTE: The ohmmeter must be connected with the positive lead to pin 16 and the

negative lead to pin 15 when measuring. Ohmmeter leads incorrectly connected will result in false readings and lead to incorrect identification of components that are not faulty.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265C-16	Ω	C3265C-15

Is the resistance between 4, 000 and 10, 000 ohms?

Yes	GO to AB29

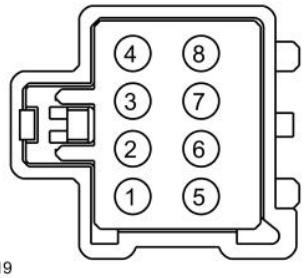
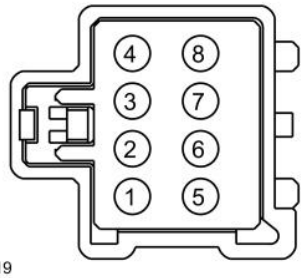
No	GO to AB28

AB28 CHECK THE BLOWER RESISTANCE

Disconnect: Driver Seat Backrest Blower Motor C3034 .

NOTE: The ohmmeter must be connected with the positive lead to pin 3 and the negative lead to pin 4 when measuring. Ohmmeter leads incorrectly connected results in false readings and leads to incorrect identification of components that are not damaged.

Measure the **component side resistance** between:

Positive Lead	Measurement / Action	Negative Lead
 E160219 C3034-3, Component Side	Ω	 E160219 C3034-4, Component Side

Is the resistance between 4, 000 and 10, 000 ohms?

Yes	REPAIR the circuit(s) in question. GO to AB36

No	INSTALL a new backrest blower motor. REFER to: Front Seat Backrest Blower Motor . GO to AB36

AB29 CHECK THE BLOWER SPEED CONTROL AND CIRCUIT RESISTANCE

NOTE: The ohmmeter must be connected with the positive lead to pin 12 and the negative lead to pin 15 when measuring. Ohmmeter leads incorrectly connected results in false readings and leads to incorrect identification of components that are not damaged.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265C-12	Ω	C3265C-15

Is the resistance between 240K and 400K ohms?

Yes	GO to AB31

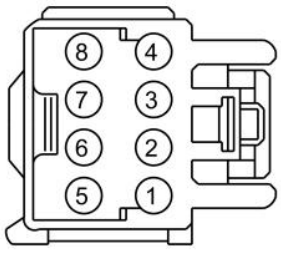
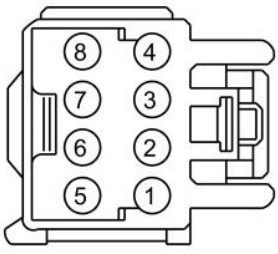
No	GO to AB30

AB30 CHECK THE BLOWER SPEED CONTROL RESISTANCE

Disconnect: Driver Seat Backrest Blower Motor C3034 .

NOTE: The ohmmeter must be connected with the positive lead to pin 7 and the negative lead to pin 4 when measuring. Ohmmeter leads incorrectly connected results in false readings and leads to incorrect identification of components that are not damaged.

Measure the **component side resistance** between:

Positive Lead	Measurement / Action	Negative Lead
 E160218 C3034-7, Component Side	Ω	 E160218 C3034-4, Component Side

Is the resistance between 240K and 400K ohms?

Yes	REPAIR the circuit(s) in question. GO to AB36

No	INSTALL a new backrest blower motor. REFER to: Front Seat Backrest Blower Motor . GO to AB36

AB31 CHECK THERMISTOR CIRCUIT FOR A SHORT TO VOLTAGE

Disconnect: SCME C3265B .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265B-9		Ground

Is any voltage present?

Yes	REPAIR the circuit. GO to AB36

No	GO to AB32

AB32 CHECK THERMISTOR CIRCUIT FOR A SHORT TO GROUND

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING .

Disconnect: Driver Side Airbag In-line C345.

Disconnect: Passenger Side Airbag In-line C219 .

Disconnect: SCME C3265B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265B-9	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to AB33

No	REPAIR the circuit. GO to AB36

AB33 CHECK THE BLOWER MOTOR THERMISTOR AND WIRING RESISTANCE

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265B-9	Ω	C3265B-10

Compare the measured resistance value with the following table:

Ambient Temperature	Resistance
0-10 ° C (32-50 ° F)	2, 782-1, 663 ohms
10-20 ° C (50-68 ° F)	1, 837-1, 140 ohms
20-30 ° C (68-86 ° F)	1, 260-806 ohms
30-40 ° C (86-104 ° F)	893-570 ohms
40-50 ° C (104-122 ° F)	630-428 ohms

Is the resistance within the limits indicated?

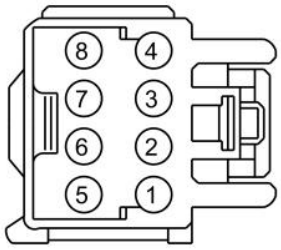
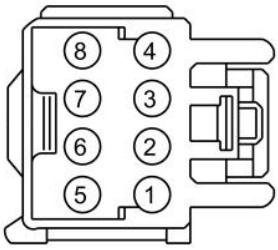
Yes	GO to AB35

No	GO to AB34

AB34 CHECK THE BLOWER MOTOR THERMISTOR RESISTANCE

Disconnect: Driver Seat Backrest Blower Motor C3034 .

Measure the **component side resistance** between:

Positive Lead	Measurement / Action	Negative Lead
 E160218 C3034-5, Component Side	Ω	 E160218 C3034-8, Component Side

Compare the measured resistance value with the following table:

Ambient Temperature	Resistance
0-10 ° C (32-50 ° F)	2, 782-1, 663 ohms
10-20 ° C (50-68 ° F)	1, 837-1, 140 ohms
20-30 ° C (68-86 ° F)	1, 260-806 ohms
30-40 ° C (86-104 ° F)	893-570 ohms
40-50 ° C (104-122 ° F)	630-428 ohms

Is the resistance within the limits indicated?

Yes	REPAIR the circuit(s) in question. GO to AB36

No	INSTALL a new backrest blower motor. REFER to: Front Seat Backrest Blower Motor . GO to AB36

AB35 CHECK THE SCME (FRONT SEAT CLIMATE CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all of the SCME connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins as necessary

pushed-out pins - install new pins as necessary

Reconnect the SCME connectors. Make sure they seat and latch correctly.

NOTE: Do not reconnect Driver Side Airbag In-line C345 or Passenger Side Airbag In-line C219 at this time.

Reconnect all previously disconnected connectors.

Ignition ON.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new SCME. REFER to: Front Seat Climate Control Module . GO to AB36

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues. GO to AB36

AB36 VERIFY THE SUPPLEMENTAL RESTRAINT SYSTEM (SRS) PROVES OUT SUCCESSFULLY

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING .

Connect: Driver Side Airbag In-line C345.

Connect: Passenger Side Airbag In-line C219 .

Connect all previously disconnected connectors.

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) REPOWERING .

Did the SRS prove out successfully?

Yes	Repair is complete. RETURN the vehicle to the customer.

No	REFER to: SUPPLEMENTAL RESTRAINT SYSTEM .

DIAGNOSIS AND TESTING > FRONT SEATS > PINPOINT TEST(S) > PINPOINT TEST AC : DTC B272D

Refer to Climate Controlled Seats for schematic and connector information.

Normal Operation and Fault Conditions

The SCME is supplied voltage at all times, but the climate controlled seat system only operates with the engine running. The system can be operated with the ignition ON engine OFF by using a diagnostic scan tool to bypass the climate controlled seat buttons on the touchscreen and FCIM. When commanding a heat or cool mode operation in this manner, the climate controlled seat system only operates in 15 second intervals.

Both voltage supply circuits are spliced together internal to the SCME, so if one circuit becomes open, both seats can still be operated. However, if a fault occurs setting a DTC specific to either climate controlled seat, only the affected seat is disabled by the SCME.

Cabin air is drawn through and distributed to each of the blower motors located in the seat cushion and backrest. The blower motors then heat or cool the air. The air is then directed into the foam pad where it is distributed along the surface of the cushion and backrest of the seat. Once the system is activated, the SCME uses a set of flexible algorithms to control the heating/cooling modes and the blower speed dependant on the commanded climate controlled seat settings.

A differential fault occurs when the cushion and backrest blower motors on an affected seat are reporting very different temperatures to the SCME. This may result from an airflow restriction or a circuit fault of either blower motor area. If a blower motor is clear of obstruction and is operational, check the other blower motor and circuitry on the seat. It is important to note that a blower motor with a higher temperature may be operating correctly and not the area of concern. The other blower motor may be indicating a much lower temperature, causing the DTC to set.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B272D	Passenger Differential Temperature Fault	If there is a temperature differential between the passenger backrest and cushion blower motor of 60 ° C (108 ° F) or more for more than 4 seconds, or if the blower motor is disconnected or the duct is blocked, this DTC sets. When this happens for the first time in a key cycle, the SCME puts the passenger seat system into recovery mode (see principles of operation). If the system is able to recover, it returns

		to normal function. If the system is able to recover and it occurs a second time in the same key cycle, the SCME shuts down the passenger seat system.

Possible Causes

- Wiring, terminals or connectors
- Restricted blower motor filter
- Crushed or restricted backrest foam pad
- Cushion or backrest blower motor
- SCME

DIAGNOSIS AND TESTING > FRONT SEATS > PINPOINT TEST(S) > PINPOINT TEST AC : DTC B272D > PINPOINT TEST AC : DTC B272D

> *WARNING: Incorrect repair techniques or actions can cause an accidental Supplemental Restraint System (SRS) deployment. Never compromise or depart from these instructions. Failure to precisely follow all instructions could result in serious personal injury from an accidental deployment.*

AC1 CHECK THE SCME (FRONT SEAT CLIMATE CONTROL MODULE) FOR ON-DEMAND DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, perform the SCME self-test.

Was DTC B272A or B272B, retrieved on-demand during the self-test?

Yes	For DTC B272A, GO to Pinpoint Test Z . For DTC B272B, GO to Pinpoint Test AA

No	GO to AC2

AC2 MONITOR SCME (FRONT SEAT CLIMATE CONTROL MODULE) BLOWER MOTOR TEMPERATURE PARAMETER IDENTIFICATIONS (PIDS)

Using a diagnostic scan tool, monitor the following SCME Parameter Identifications (PIDs):

Passenger Cushion Thermal Electric Device (TED) Temperature (PCSHTMP)

Passenger Back (TED) Temperature (PBKTMP)

Seat cushion thermal electric device temperature (CSHTEMP)

Seat back thermal electric device temperature (BKTMP)

NOTE: Make sure the temperature of the climate controlled seats has stabilized before monitoring the Parameter Identifications (PIDs). Not allowing stabilization can cause incorrect readings and lead to incorrect identification of components that are not faulty.

Monitor blower motor temperature Parameter Identifications (PIDs) with the climate controlled seats OFF. Compare the PID values of the driver seat to those of the front passenger seat, this can help identify if there is a concern with the passenger seat cushion or backrest PID value readings.

Are both passenger seat blower motor temperature Parameter Identifications (PIDs) within 10 ° C (18 ° F) of the ambient temperature?

Yes	GO to AC3

No	If the passenger seat cushion PID varies 10 ° C (18 ° F) or more from ambient temperature, GO to AC16 If the passenger seat backrest PID varies 10 ° C (18 ° F) or more from ambient temperature, GO to AC32

AC3 CONFIRM THE FAULT IS IN THE SEAT CUSHION OR THE BACKREST

Ignition OFF.

Start the engine.

NOTE: A crushed seat cushion foam pad may be the cause of the fault. It may be necessary to sit on the seat or place something of reasonable size and weight on the seat to recreate the fault.

After cycling the ignition and with the engine running, set the passenger seat to high heat. Allow the seat to heat for at least 15 minutes while monitoring the blower motor temperature Parameter Identifications (PIDs) of the passenger seat.

Do the passenger seat cushion blower motor and backrest blower motor Parameter Identifications (PIDs) vary more than 60 ° C (108 ° F) from each other?

Yes	If the passenger seat cushion PID is 60 ° C (108 ° F) hotter than the backrest PID, GO to AC5 If the passenger seat backrest PID is 60 ° C (108 ° F) hotter than the cushion PID, GO to AC20

No	GO to AC4

AC4 CHECK THE BLOWER MOTOR COOLING PERFORMANCE

Check the blower motor cooling performance on the affected seat. Refer to Component Test - Blower Motor Cooling Performance.

Did the blower motors pass the component test?

Yes	The DTC may have been set by extreme cabin temperatures or excessive sunload on the seat causing the system to enter recovery mode. Occupant size and weight characteristics can also be a factor. CLEAR the Diagnostic Trouble Codes (DTCs). REPEAT the self-test. TEST the system for normal operation. If a concern cannot be found or duplicated, RETURN the vehicle to the customer.

No	CHECK the affected seat cushion or backrest for correct installation of the climate controlled seat components (blower motor, air ducts and foam pad). CHECK for airflow restrictions (blower motor inlets and outlets, filters and ducts) and REPAIR as needed. CHECK for an intermittent wiring fault. REPAIR as needed. CLEAR the Diagnostic Trouble Codes (DTCs). REPEAT the self-test.

AC5 CHECK FOR CORRECT BLOWER MOTOR INSTALLATION AND FOR CRUSHED FOAM

Ignition OFF.

Remove the seat. REFER to: Front Seat .

Remove the seat cushion trim cover. REFER to: Front Seat Cushion Cover .

Inspect the seat cushion for the following:

Cushion blower obstructed

Blower filter restricted or plugged

Blower motor correctly installed

Seat cushion foam pad crushed or restricted

Is the blower motor correctly installed and the foam pad OK?

Yes	GO to AC6

No	Correctly INSTALL the cushion blower motor or INSTALL a new seat cushion foam pad.

AC6 CHECK BACKREST BLOWER MOTOR THERMO ELECTRIC DEVICE CIRCUIT FOR A SHORT TO VOLTAGE

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING .

Position the passenger seat in the vehicle and connect the seat-to-floor connectors.

Disconnect: Passenger Side Airbag In-line C219 .

Disconnect: SCME C3265A .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead

C3265A-D		Ground

Is any voltage present?

Yes	REPAIR the circuit. GO to AC36

No	GO to AC7

AC7 CHECK BACKREST BLOWER MOTOR THERMO ELECTRIC DEVICE CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265A-C	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to AC8

No	REPAIR the circuit. GO to AC36

AC8 CHECK THE RESISTANCE OF THE BACKREST BLOWER MOTOR THERMO ELECTRIC DEVICE AND WIRING

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265A-C	Ω	Ground
C3265A-D	Ω	Ground

Are the resistances between 0.9 and 10 ohms?

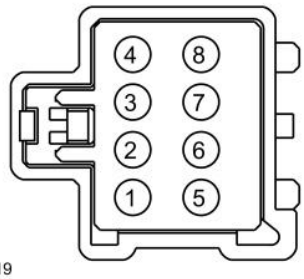
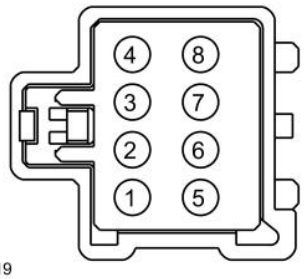
Yes	GO to AC10

No	GO to AC9

AC9 CHECK THE RESISTANCE OF THE BACKREST BLOWER MOTOR THERMO ELECTRIC DEVICE

Disconnect: Passenger Seat Backrest Blower Motor C3039 .

Measure the **component side resistance** between:

Positive Lead	Measurement / Action	Negative Lead
 E160219 C3039-1, Component Side	Ω	 E160219 C3039-2, Component Side

Is the resistance less than 3 ohms?

Yes	REPAIR circuit CHS06 (BU/BN) or RHS06 (WH) for an open or high resistance. GO to AC36

No	INSTALL a new backrest blower motor. REFER to: Front Seat Backrest Blower Motor . GO to AC36

AC10 CHECK BLOWER CIRCUIT AND SPEED CONTROL CIRCUIT FOR A SHORT TO VOLTAGE

Disconnect: SCME C3265C .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265C-8	V	Ground
C3265C-3	V	Ground

Is any voltage present?

Yes	REPAIR the circuit in question. GO to AC36

No	GO to AC11

AC11 CHECK BLOWER AND SPEED CONTROL CIRCUITS FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265C-8	Ω	Ground

C3265C-3	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to AC12

No	REPAIR the circuit in question. GO to AC36

AC12 CHECK THE BLOWER AND WIRING

> *NOTE: The ohmmeter must be connected with the positive lead to pin 8 and the negative lead to pin 7 when measuring. Ohmmeter leads incorrectly connected will result in false readings and lead to incorrect identification of components that are not faulty.*

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265C-8	Ω	C3265C-7

Is the resistance between 4, 000 and 10, 000 ohms?

Yes	GO to AC14

No	GO to AC13

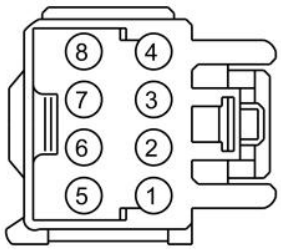
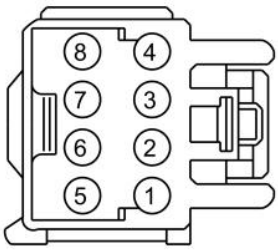
AC13 CHECK THE BLOWER RESISTANCE

Disconnect: Passenger Seat Cushion Blower Motor C3040 .

> *NOTE: The ohmmeter must be connected with the positive lead to pin 3 and the negative lead to pin 4 when measuring. Ohmmeter leads incorrectly connected results in false readings and leads to incorrect identification of components that are not damaged.*

Measure the **component side resistance** between:

Positive Lead	Measurement / Action	Negative Lead

 E160218 C3040-3, Component Side	Ω	 E160218 C3040-4, Component Side

Is the resistance between 4, 000 and 10, 000 ohms?

Yes	REPAIR the circuit in question. GO to AC36

No	INSTALL a new passenger seat cushion blower motor. REFER to: Front Seat Cushion Blower Motor . GO to AC36

AC14 CHECK THE BLOWER SPEED CONTROL AND CIRCUIT RESISTANCE

NOTE: The ohmmeter must be connected with the positive lead to pin 3 and the negative lead to pin 7 when measuring. Ohmmeter leads incorrectly connected results in false readings and leads to incorrect identification of components that are not damaged.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265C-3	Ω	C3265C-7

Is the resistance between 240K and 400K ohms?

Yes	GO to AC16

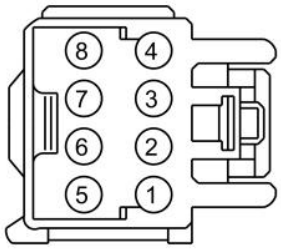
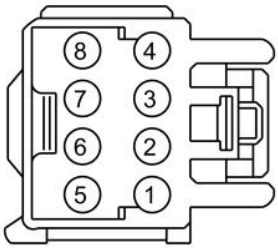
No	GO to AC15

AC15 CHECK THE BLOWER SPEED CONTROL RESISTANCE

Disconnect: Passenger Seat Cushion Blower Motor C3040 .

NOTE: The ohmmeter must be connected with the positive lead to pin 7 and the negative lead to pin 4 when measuring. Ohmmeter leads incorrectly connected results in false readings and leads to incorrect identification of components that are not damaged.

Measure the **component side resistance** between:

Positive Lead	Measurement / Action	Negative Lead
 E160218 C3040-7, Component Side	Ω	 E160218 C3040-4, Component Side

Is the resistance between 240K and 400K ohms?

Yes	REPAIR the circuit in question. GO to AC36

No	INSTALL a new passenger seat cushion blower motor. REFER to: Front Seat Cushion Blower Motor . GO to AC36

AC16 CHECK THERMISTOR CIRCUIT FOR A SHORT TO VOLTAGE

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING .

Disconnect: Passenger Side Airbag In-line C219 .

Disconnect: SCME C3265B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265B-2	V	Ground

Is any voltage present?

Yes	REPAIR the circuit. GO to AC36

No	GO to AC17

AC17 CHECK THERMISTOR CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265B-2	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to AC18

No	REPAIR the circuit. GO to AC36

AC18 CHECK THE BLOWER MOTOR THERMISTOR AND WIRING RESISTANCE AT THE SCME (FRONT SEAT CLIMATE CONTROL MODULE)

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265B-2	Ω	C3265B-3

Compare the measured resistance value with the following table:

Ambient Temperature	Resistance
0-10 ° C (32-50 ° F)	2, 782-1, 663 ohms
10-20 ° C (50-68 ° F)	1, 837-1, 140 ohms
20-30 ° C (68-86 ° F)	1, 260-806 ohms
30-40 ° C (86-104 ° F)	893-570 ohms
40-50 ° C (104-122 ° F)	630-428 ohms

Is the resistance within the limits indicated?

Yes	GO to AC35

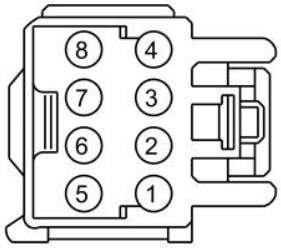
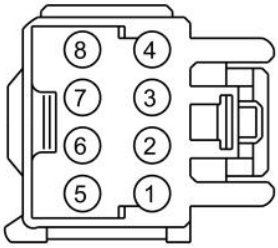
No	GO to AC19

AC19 CHECK THE BLOWER MOTOR THERMISTOR RESISTANCE

Disconnect: Passenger Seat Cushion Blower Motor C3040 .

Measure the **component side resistance** between:

Positive Lead	Measurement / Action	Negative Lead

 E160218 C3040-5, Component Side	Ω	 E160218 C3040-8, Component Side

Compare the measured resistance value with the following table:

Ambient Temperature	Resistance
0-10 ° C (32-50 ° F)	2, 782-1, 663 ohms
10-20 ° C (50-68 ° F)	1, 837-1, 140 ohms
20-30 ° C (68-86 ° F)	1, 260-806 ohms
30-40 ° C (86-104 ° F)	893-570 ohms
40-50 ° C (104-122 ° F)	630-428 ohms

Is the resistance within the limits indicated?

Yes	REPAIR the circuit(s) in question. GO to AC36

No	INSTALL a new passenger seat cushion blower motor. REFER to: Front Seat Cushion Blower Motor . GO to AC36

AC20 CHECK FOR CORRECT BLOWER MOTOR INSTALLATION AND FOR CRUSHED FOAM

Ignition OFF.

Remove the passenger seat. REFER to: Front Seat .

Remove the passenger seat backrest cover. REFER to: Front Seat Backrest Cover .

Inspect the passenger seat backrest for the following:

- Backrest blower obstructed
- Blower filter restricted or plugged
- Blower motor correctly installed
- Seat backrest foam pad crushed or restricted

Is the blower motor correctly installed and the foam pad OK?

Yes	GO to AC21

No	Correctly INSTALL the backrest blower motor or INSTALL a new seat backrest foam pad. INSTALL the seat. GO to AC36

AC21 CHECK CUSHION BLOWER MOTOR CIRCUIT FOR A SHORT TO VOLTAGE

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING .

Position the passenger seat in the vehicle and connect the seat-to-floor connectors.

Disconnect: Passenger Side Airbag In-line C219 .

Disconnect: SCME C3265A .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265A-B		Ground

Is any voltage present?

Yes	REPAIR the circuit. GO to AC36

No	GO to AC22

AC22 CHECK CUSHION BLOWER MOTOR + CIRCUIT FOR A SHORT TO GROUND

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265A-A	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to AC23

No	REPAIR the circuit. GO to AC36

AC23 CHECK THE RESISTANCE OF THE CUSHION BLOWER MOTOR AND WIRING

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265A-A	Ω	C3265A-B

Is the resistance between 0.9 and 10 ohms?

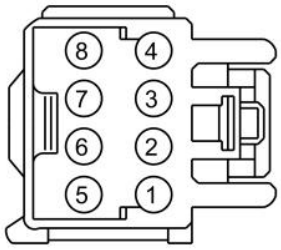
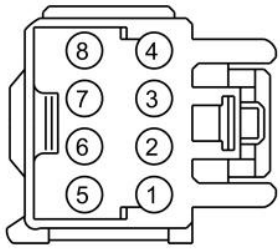
Yes	GO to AC25

No	GO to AC24

AC24 CHECK THE CUSHION BLOWER MOTOR RESISTANCE

Disconnect: Passenger Seat Cushion Blower Motor C3040 .

Measure the **component side resistance** between:

Positive Lead	Measurement / Action	Negative Lead
 E160218 C3040-1, Component Side	Ω	 E160218 C3040-2, Component Side

Is the resistance between 0.9 and 10 ohms?

Yes	REPAIR the circuit(s) in question. GO to AC36

No	INSTALL a new passenger seat cushion blower motor. REFER to: Front Seat Cushion Blower Motor . GO to AC36

AC25 CHECK BLOWER CIRCUIT AND SPEED CONTROL CIRCUIT FOR A SHORT TO VOLTAGE

Disconnect: SCME C3265C .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265C-8	V	Ground
C3265C-4	V	Ground

Is any voltage present?

Yes	REPAIR the circuit in question. GO to AC36

No	GO to AC26

AC26 CHECK BLOWER AND SPEED CONTROL CIRCUITS FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265C-8	Ω	Ground
C3265C-4	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to AC27

No	REPAIR the circuit in question. GO to AC36

AC27 CHECK THE BLOWER AND WIRING RESISTANCE

NOTE: The ohmmeter must be connected with the positive lead to pin 8 and the negative lead to pin 7 when measuring. Ohmmeter leads incorrectly connected will result in false readings and lead to incorrect identification of components that are not faulty.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265C-8	Ω	C3265C-7

Is the resistance between 4, 000 and 10, 000 ohms?

Yes	GO to AC29

No	GO to AC28

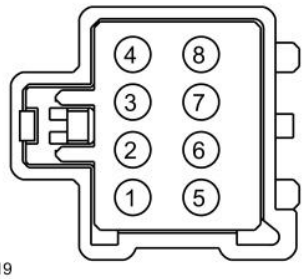
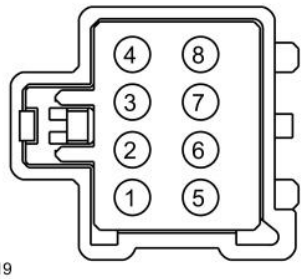
AC28 CHECK THE BLOWER RESISTANCE

Disconnect: Passenger Seat Backrest Blower Motor C3039 .

NOTE: The ohmmeter must be connected with the positive lead to pin 3 and the negative lead to pin 4 when measuring. Ohmmeter leads incorrectly connected results in false readings and leads to incorrect identification of components that are not

damaged.

Measure the **component side resistance** between:

Positive Lead	Measurement / Action	Negative Lead
 E160219 C3039-3, Component Side	Ω	 E160219 C3039-4, Component Side

Is the resistance between 4, 000 and 10, 000 ohms?

Yes	REPAIR the circuit(s) in question. GO to AC36

No	INSTALL a new backrest blower motor. REFER to: Front Seat Backrest Blower Motor . GO to AC36

AC29 CHECK THE BLOWER SPEED CONTROL AND CIRCUIT RESISTANCE

NOTE: The ohmmeter must be connected with the positive lead to pin 4 and the negative lead to pin 7 when measuring. Ohmmeter leads incorrectly connected results in false readings and leads to incorrect identification of components that are not damaged.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265C-4	Ω	C3265C-7

Is the resistance between 240K and 400K ohms?

Yes	GO to AC31

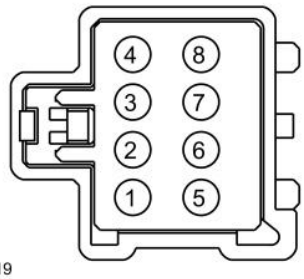
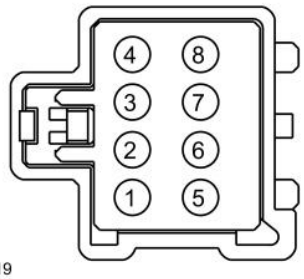
No	GO to AC30

AC30 CHECK THE BLOWER SPEED CONTROL RESISTANCE

Disconnect: Passenger Seat Backrest Blower Motor C3039 .

NOTE: The ohmmeter must be connected with the positive lead to pin 7 and the negative lead to pin 4 when measuring. Ohmmeter leads incorrectly connected results in false readings and leads to incorrect identification of components that are not damaged.

Measure the **component side resistance** between:

Positive Lead	Measurement / Action	Negative Lead
 E160219 C3039-7, Component Side	Ω	 E160219 C3039-4, Component Side

Is the resistance between 240K and 400K ohms?

Yes	REPAIR the circuit(s) in question. GO to AC36

No	INSTALL a new backrest blower motor. REFER to: Front Seat Backrest Blower Motor . GO to AC36

AC31 CHECK THERMISTOR CIRCUIT FOR A SHORT TO VOLTAGE

Disconnect: SCME C3265B .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265B-4	V	Ground

Is any voltage present?

Yes	REPAIR the circuit. GO to AC36

No	GO to AC32

AC32 CHECK THERMISTOR CIRCUIT FOR A SHORT TO GROUND

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING .

Disconnect: Passenger Side Airbag In-line C219 .

Disconnect: SCME C3265B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265B-4	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to AC33

No	REPAIR the circuit. GO to AC36

AC33 CHECK THE BLOWER MOTOR THERMISTOR AND WIRING RESISTANCE

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265B-4	Ω	C3265B-5

Compare the measured resistance value with the following table:

Ambient Temperature	Resistance
0-10 ° C (32-50 ° F)	2, 782-1, 663 ohms
10-20 ° C (50-68 ° F)	1, 837-1, 140 ohms
20-30 ° C (68-86 ° F)	1, 260-806 ohms
30-40 ° C (86-104 ° F)	893-570 ohms
40-50 ° C (104-122 ° F)	630-428 ohms

Is the resistance within the limits indicated?

Yes	GO to AC35

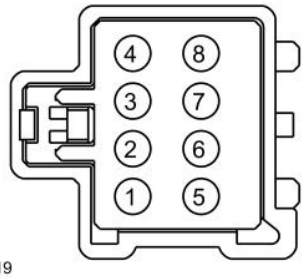
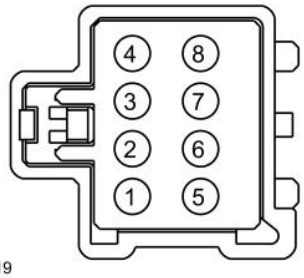
No	GO to AC34

AC34 CHECK THE BLOWER MOTOR THERMISTOR RESISTANCE

Disconnect: Passenger Seat Backrest Blower Motor C3039 .

Measure the **component side resistance** between:

Positive Lead	Measurement / Action	Negative Lead

 E160219 C3039-5, Component Side	Ω	 E160219 C3039-8, Component Side

Compare the measured resistance value with the following table:

Ambient Temperature	Resistance
0-10 ° C (32-50 ° F)	2, 782-1, 663 ohms
10-20 ° C (50-68 ° F)	1, 837-1, 140 ohms
20-30 ° C (68-86 ° F)	1, 260-806 ohms
30-40 ° C (86-104 ° F)	893-570 ohms
40-50 ° C (104-122 ° F)	630-428 ohms

Is the resistance within the limits indicated?

Yes	REPAIR the circuit(s) in question. GO to AC36

No	INSTALL a new backrest blower motor. REFER to: Front Seat Backrest Blower Motor . GO to AC36

AC35 CHECK THE SCME (FRONT SEAT CLIMATE CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all of the SCME connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins as necessary

pushed-out pins - install new pins as necessary

Reconnect the SCME connectors. Make sure they seat and latch correctly.

NOTE: Do not reconnect Passenger Side Airbag In-line C219 at this time.

Reconnect all previously disconnected connectors.

Ignition ON.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new SCME. REFER to: Front Seat Climate Control Module . GO to AC36

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues. GO to AC36

AC36 VERIFY THE SUPPLEMENTAL RESTRAINT SYSTEM (SRS) PROVES OUT SUCCESSFULLY

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING .

Connect: Passenger Side Airbag In-line C219 .

Connect all previously disconnected connectors.

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) REPOWERING .

Did the SRS prove out successfully?

Yes	Repair is complete. RETURN the vehicle to the customer.

No	REFER to: SUPPLEMENTAL RESTRAINT SYSTEM .

DIAGNOSIS AND TESTING > FRONT SEATS > PINPOINT TEST(S) > PINPOINT TEST AD : DTC B272E

Refer to Climate Controlled Seats for schematic and connector information.

Normal Operation and Fault Conditions

The SCME supplies voltage and ground to the backrest and cushion blower motors. The blower motors are independently controlled by separate speed control circuits from the SCME.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B272E	Driver Ignition Run/Blower Circuit Short to Ground	If either the blower voltage supply or return circuits are open (to both cushion or backrest blowers) or shorted to voltage, the DTC is set and after 4-6 seconds the SCME disables outputs to the driver seat. The DTC also sets if the blower voltage supply or return circuit is open to only one blower when

		SCME supply voltage is less than 12 volts.

Possible Causes

- Wiring, terminals or connectors
- Cushion or backrest blower motor
- SCME

DIAGNOSIS AND TESTING > FRONT SEATS > PINPOINT TEST(S) > PINPOINT TEST AD : DTC B272E > PINPOINT TEST AD : DTC B272E

WARNING: Incorrect repair techniques or actions can cause an accidental Supplemental Restraint System (SRS) deployment. Never compromise or depart from these instructions. Failure to precisely follow all instructions could result in serious personal injury from an accidental deployment.

AD1 CHECK THE BLOWER MOTOR CIRCUITS FOR A SHORT TO VOLTAGE

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING .

Disconnect: Driver Side Airbag In-line C345.

Disconnect: Passenger Side Airbag In-line C219 .

Disconnect: SCME C3265C .

Disconnect: Driver Seat Cushion Blower Motor C3035 .

Disconnect: Driver Seat Backrest Blower Motor C3034 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265C-16	V	Ground
C3265C-15	V	Ground

Is any voltage present?

Yes	REPAIR the circuit in question. GO to AD5

No	GO to AD2

AD2 CHECK THE BLOWER MOTOR CIRCUITS FOR AN OPEN

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265C-16	Ω	C3035-3
C3265C-15	Ω	C3035-4

Are the resistances less than 3 ohms?

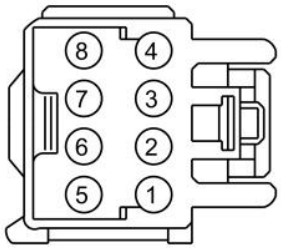
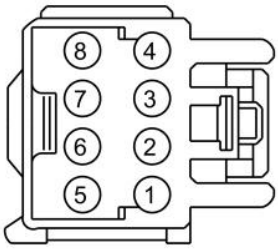
Yes	GO to AD3

No	REPAIR the circuit in question. GO to AD5

AD3 CHECK THE RESISTANCE OF THE CUSHION AND BACKREST BLOWER MOTORS

NOTE: The ohmmeter must be connected with the positive lead to pin 3 and the negative lead to pin 4 when measuring. Ohmmeter leads incorrectly connected results in false readings and leads to incorrect identification of components that are not damaged.

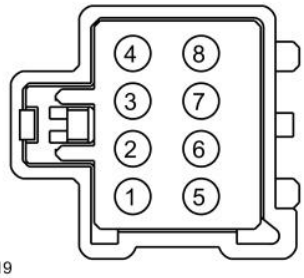
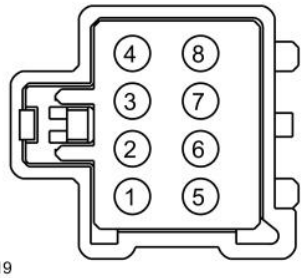
Measure the **component side resistance** between:

Positive Lead	Measurement / Action	Negative Lead
 E160218 C3035-3, Component Side	Ω	 E160218 C3035-4, Component Side

NOTE: The ohmmeter must be connected with the positive lead to pin 3 and the negative lead to pin 4 when measuring. Ohmmeter leads incorrectly connected results in false readings and leads to incorrect identification of components that are not damaged.

Measure the **component side resistance** between:

Positive Lead	Measurement / Action	Negative Lead

 C3034-3, Component Side	Ω	 C3034-4, Component Side

Are the resistances between 4, 000 and 10, 000 ohms?

Yes	GO to AD4

No	If the backrest blower motor resistance measurement failed, INSTALL a new backrest blower motor. REFER to: Front Seat Backrest Blower Motor . GO to AD5 If the cushion blower motor resistance measurement failed, INSTALL a new cushion blower motor. REFER to: Front Seat Cushion Blower Motor . GO to AD5

AD4 CHECK THE SCME (FRONT SEAT CLIMATE CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all of the SCME connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins as necessary

pushed-out pins - install new pins as necessary

Reconnect the SCME connectors. Make sure they seat and latch correctly.

NOTE: Do not reconnect Driver Side Airbag In-line C345 or Passenger Side Airbag In-line C219 at this time.

Reconnect all previously disconnected connectors.

Ignition ON.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new SCME. REFER to: Front Seat Climate Control Module . GO to AD5

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues. GO to AD5

AD5 VERIFY THE SUPPLEMENTAL RESTRAINT SYSTEM (SRS) PROVES OUT SUCCESSFULLY

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING .

Connect: Driver Side Airbag In-line C345.

Connect: Passenger Side Airbag In-line C219 .

Connect all previously disconnected connectors.

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) REPOWERING .

Did the SRS prove out successfully?

Yes	Repair is complete. RETURN the vehicle to the customer.

No	REFER to: SUPPLEMENTAL RESTRAINT SYSTEM .

DIAGNOSIS AND TESTING > FRONT SEATS > PINPOINT TEST(S) > PINPOINT TEST AE : DTC B272F

Refer to Climate Controlled Seats for schematic and connector information.

Normal Operation and Fault Conditions

The SCME supplies voltage and ground to the backrest and cushion blower motors. The blower motors are independently controlled by separate speed control circuits from the SCME.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B272F	Passenger Ignition Run/Blower Circuit Short to Ground	If either the blower voltage supply or return circuits are open (to both cushion or backrest blowers) or shorted to voltage, the DTC is set and after 4-6 seconds the SCME disables outputs to the passenger seat. The DTC also sets if the blower voltage supply or return circuit is open to only one blower when SCME supply voltage is less than 12 volts.

Possible Causes

- Wiring, terminals or connectors
- Cushion or backrest blower motor

- SCME

DIAGNOSIS AND TESTING > FRONT SEATS > PINPOINT TEST(S) > PINPOINT TEST AE : DTC B272F > PINPOINT TEST AE : DTC B272F

> *WARNING: Incorrect repair techniques or actions can cause an accidental Supplemental Restraint System (SRS) deployment. Never compromise or depart from these instructions. Failure to precisely follow all instructions could result in serious personal injury from an accidental deployment.*

AE1 CHECK THE BLOWER MOTOR CIRCUITS FOR A SHORT TO VOLTAGE

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING .

Disconnect: Passenger Side Airbag In-line C219 .

Disconnect: SCME C3265C .

Disconnect: Passenger Seat Cushion Blower Motor C3040 .

Disconnect: Passenger Seat Backrest Blower Motor C3039 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265C-8	V	Ground
C3265C-7	V	Ground

Is any voltage present?

Yes	REPAIR the circuit in question. GO to AE5

No	GO to AE2

AE2 CHECK THE BLOWER MOTOR CIRCUITS FOR AN OPEN

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265C-8	Ω	C3040-3
C3265C-7	Ω	C3040-4

Are the resistances less than 3 ohms?

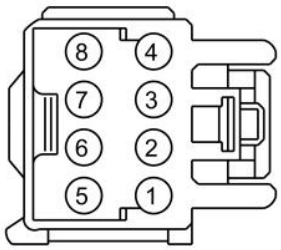
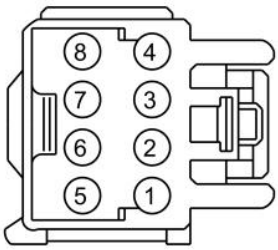
Yes	GO to AE3

No	REPAIR the circuit in question. GO to AE5

AE3 CHECK THE RESISTANCE OF THE CUSHION AND BACKREST BLOWER MOTORS

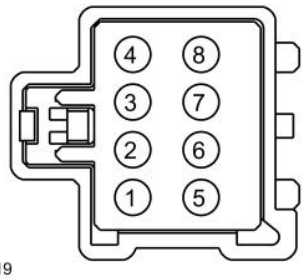
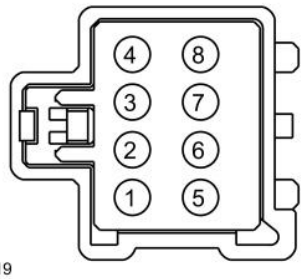
NOTE: The ohmmeter must be connected with the positive lead to pin 3 and the negative lead to pin 4 when measuring. Ohmmeter leads incorrectly connected results in false readings and leads to incorrect identification of components that are not damaged.

Measure the **component side resistance** between:

Positive Lead	Measurement / Action	Negative Lead
 E160218 C3040-3, Component Side	Ω	 E160218 C3040-4, Component Side

NOTE: The ohmmeter must be connected with the positive lead to pin 3 and the negative lead to pin 4 when measuring. Ohmmeter leads incorrectly connected results in false readings and leads to incorrect identification of components that are not damaged.

Measure the **component side resistance** between:

Positive Lead	Measurement / Action	Negative Lead
 E160219	Ω	 E160219

C3039-3, Component Side		C3039-4, Component Side

Are the resistances between 4, 000 and 10, 000 ohms?

Yes	GO to AE4

No	If the backrest blower motor resistance measurement failed, INSTALL a new backrest blower motor. REFER to: Front Seat Backrest Blower Motor . GO to AE5 If the cushion blower motor resistance measurement failed, INSTALL a new cushion blower motor. REFER to: Front Seat Cushion Blower Motor . GO to AE5

AE4 CHECK THE SCME (FRONT SEAT CLIMATE CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all of the SCME connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins as necessary

pushed-out pins - install new pins as necessary

Reconnect the SCME connectors. Make sure they seat and latch correctly.

NOTE: Do not reconnect Passenger Side Airbag In-line C219 at this time.

Reconnect all previously disconnected connectors.

Ignition ON.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new SCME. REFER to: Front Seat Climate Control Module . GO to AE5

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues. GO to AE5

AE5 VERIFY THE SUPPLEMENTAL RESTRAINT SYSTEM (SRS) PROVES OUT SUCCESSFULLY

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING .

Connect: Passenger Side Airbag In-line C219 .

Connect all previously disconnected connectors.

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) REPOWERING .

Did the SRS prove out successfully?

Yes	Repair is complete. RETURN the vehicle to the customer.

No	REFER to: SUPPLEMENTAL RESTRAINT SYSTEM .

DIAGNOSIS AND TESTING > FRONT SEATS > PINPOINT TEST(S) > PINPOINT TEST AF : DTC B2729

Refer to Climate Controlled Seats for schematic and connector information.

Normal Operation and Fault Conditions

The SCME monitors seat cushion temperature while it supplies voltage and ground to both blower motors. The SCME also supplies a variable voltage signal to control the blower speed. Cabin air enters the blower through a filter attached to the blower motor housing. Heated or cooled air exits the blower motor and flows through a duct to the foam pad.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B2729	Cushion Over-Temp Detected	If the driver seat cushion blower motor temperature exceeds 70 ° C (158 ° F) in cool mode or 85 ° C (185 ° F) in heat mode for more than 4 seconds, the SCME shuts down the driver seat system and sets this DTC.

Possible Causes

- Wiring, terminals or connectors
- Restricted blower motor filter
- Crushed or restricted cushion foam pad
- Cushion blower motor
- SCME

DIAGNOSIS AND TESTING > FRONT SEATS > PINPOINT TEST(S) > PINPOINT TEST AF : DTC B2729 > PINPOINT TEST AF : DTC B2729

WARNING: Incorrect repair techniques or actions can cause an accidental Supplemental Restraint System (SRS) deployment. Never compromise or depart from

these instructions. Failure to precisely follow all instructions could result in serious personal injury from an accidental deployment.

AF1 CHECK THE SCME (FRONT SEAT CLIMATE CONTROL MODULE) FOR ON-DEMAND DIAGNOSTIC TROUBLE CODES (DTCS)

Start the vehicle and set the driver seat to HIGH heat.

Using a diagnostic scan tool, perform the SCME self-test.

Was DTC B2729 retrieved on-demand during the self-test?

Yes	GO to AF2

No	GO to AF5

AF2 CHECK THE DRIVER SEAT CUSHION BLOWER MOTOR THERMISTOR CIRCUITS FOR A SHORT TO GROUND

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING .

Disconnect: Driver Side Airbag In-line C345.

Disconnect: Passenger Side Airbag In-line C219 .

Disconnect: SCME C3265B .

Disconnect: Driver Seat Cushion Blower Motor C3035 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265B-7	Ω	Ground
C3265B-8	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to AF3

No	REPAIR the circuit in question. GO to AF22

AF3 CHECK THE DRIVER SEAT CUSHION BLOWER MOTOR THERMISTOR AND WIRING

Connect: Driver Seat Cushion Blower Motor C3035 .

Measure:

Positive Lead	Measurement / Action	Negative Lead

C3265B-7	Ω	C3265B-8

Compare the measured resistance value with the following table:

Ambient Temperature	Resistance
0-10 ° C (32-50 ° F)	2, 782-1, 663 ohms
10-20 ° C (50-68 ° F)	1, 837-1, 140 ohms
20-30 ° C (68-86 ° F)	1, 260-806 ohms
30-40 ° C (86-104 ° F)	893-570 ohms
40-50 ° C (104-122 ° F)	630-428 ohms

Is the resistance within the limits indicated?

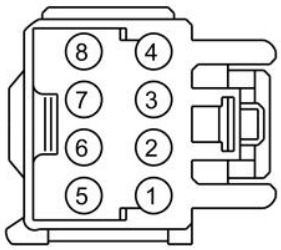
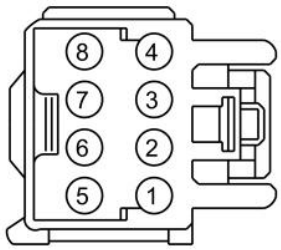
Yes	GO to AF18

No	GO to AF4

AF4 CHECK THE DRIVER SEAT CUSHION BLOWER MOTOR THERMISTOR

Disconnect: Driver Seat Cushion Blower Motor C3035 .

Measure the **component side resistance** between:

Positive Lead	Measurement / Action	Negative Lead
 E160218 C3035-5, Component Side	Ω	 E160218 C3035-8, Component Side

Compare the measured resistance value with the following table:

Ambient Temperature	Resistance
0-10 ° C (32-50 ° F)	2, 782-1, 663 ohms
10-20 ° C (50-68 ° F)	1, 837-1, 140 ohms
20-30 ° C (68-86 ° F)	1, 260-806 ohms
30-40 ° C (86-104 ° F)	893-570 ohms
40-50 ° C (104-122 ° F)	630-428 ohms

Is the resistance within the limits indicated?

Yes	REPAIR circuit VHS26 (VT) or RHS05 (YE/VT) for an open or high resistance. GO to AF22

No	INSTALL a new driver seat cushion blower motor. REFER to: Front Seat Cushion Blower Motor . GO to AF22

AF5 CONFIRM THE FAULT WHILE MONITORING THE SCME (FRONT SEAT CLIMATE CONTROL MODULE) SEAT BACK THERMAL ELECTRIC DEVICE TEMPERATURE (BKTMP) AND SEAT CUSHION THERMAL ELECTRIC DEVICE TEMPERATURE (CSHTEMP) PARAMETER IDENTIFICATIONS (PIDS)

Set the driver seat to OFF.

Using a diagnostic scan tool, clear the SCME Diagnostic Trouble Codes (DTCs).

Using a diagnostic scan tool, monitor the SCME BKTMP and CSHTEMP Parameter Identifications (PIDs).

NOTE: A crushed seat cushion foam pad may be the cause of the fault, making it necessary to occupy the seat to recreate and identify the fault.

Attempt to recreate the fault. Start the vehicle and set the driver seat to HIGH heat for at least 15 minutes while occupying the seat.

Do the Parameter Identifications (PIDs) increase incrementally (gradually) and stay within 15 ° C (27 ° F) of each other?

Yes	Fault not present at this time. Fault may have been set due to a past failure, incorrect use of the climate controlled seat system by repeated switching between heat and cool modes or due to excessive passenger compartment temperature.

No	If the CSHTEMP PID increases incrementally and is greater than 15 ° C (27 ° F) of the BKTMP PID, GO to AF6 If the CSHTEMP PID increases quickly (temperature "jumps" and does not increase incrementally) and is greater than 15 ° C (27 ° F) of the BKTMP PID, GO to AF16

AF6 COMPARE OPERATION OF THE DRIVER AND PASSENGER SEATS

With the engine running, set both front seats to HIGH cool.

Note the airflow exhausting from the driver seat cushion blower motor and compare it to the airflow exhausting from the driver seat cushion blower motor.

Carry out a wiggle test of the wire harnesses between the SCME and the driver seat cushion blower motor while monitoring blower operation. The blower should operate consistently and not change speeds.

Is the airflow exhausting from the driver seat cushion blower motor comparable to the airflow exhausting from the driver seat cushion blower motor with no change in operation when carrying out the wiggle test?

Yes	GO to AF7

No	If the airflow exhausting from the driver seat cushion blower motor is not comparable to the airflow exhausting from the passenger seat cushion blower motor, GO to AF8 If the driver seat cushion blower motor blower operation changed while carrying out the wiggle test, IDENTIFY and REPAIR the wiring fault.

AF7 COMPARE OPERATION OF THE DRIVER AND DRIVER SEATS WHILE OCCUPIED

Note the airflow exhausting from the driver seat cushion blower motor with the driver seat occupied and compare it to the airflow exhausting from the passenger seat cushion blower motor with the passenger seat occupied.

Is the airflow exhausting from the driver seat cushion blower motor comparable to the airflow exhausting from the passenger seat cushion blower motor?

Yes	GO to AF16

No	INSTALL a new driver seat cushion foam pad.

AF8 CHECK THE DRIVER SEAT CUSHION BLOWER FOR AN OBSTRUCTION OR RESTRICTED FILTER

Ignition OFF.

Inspect the driver seat cushion blower motor assembly for an obstruction or for a restricted filter.

Is the blower motor obstructed or the filter restricted?

Yes	REMOVE the obstruction or INSTALL a new driver seat cushion blower motor. REFER to: Front Seat Cushion Blower Motor .

No	GO to AF9

AF9 CHECK THE DRIVER SEAT CUSHION BLOWER SPEED CONTROL CIRCUIT FOR AN OPEN

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING .

Disconnect: Driver Side Airbag In-line C345.

Disconnect: Passenger Side Airbag In-line C219 .

Disconnect: SCME C3265C .

Disconnect: Driver Seat Cushion Blower Motor C3035 .

Measure:

Positive Lead	Measurement / Action	Negative Lead

C3265C-11	Ω	C3035-7

Is the resistance less than 3 ohms?

Yes	GO to AF10

No	REPAIR the circuit. GO to AF22

AF10 CHECK THE DRIVER SEAT CUSHION BLOWER CIRCUIT FOR A SHORT TO VOLTAGE

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265C-15		Ground

Is any voltage present?

Yes	REPAIR the circuit. GO to AF22

No	GO to AF11

AF11 CHECK THE DRIVER SEAT CUSHION BLOWER CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265C-16	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to AF12

No	REPAIR the circuit. GO to AF22

AF12 CHECK THE DRIVER SEAT CUSHION BLOWER CIRCUITS FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265C-16	Ω	C3035-3
C3265C-15	Ω	C3035-4

Are the resistances less than 3 ohms?

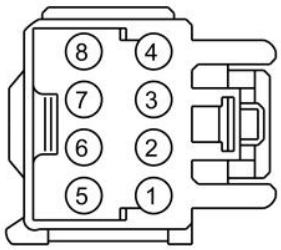
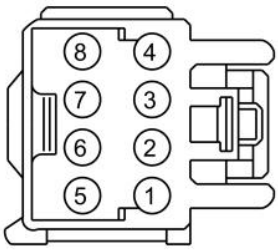
Yes	GO to AF13

No	REPAIR the circuit in question. GO to AF22

AF13 CHECK THE DRIVER SEAT CUSHION BLOWER RESISTANCE

NOTE: The ohmmeter must be connected with the positive lead to pin 3 and the negative lead to pin 4 when measuring. Ohmmeter leads incorrectly connected results in false readings and leads to incorrect identification of components that are not damaged.

Measure the **component side resistance** between:

Positive Lead	Measurement / Action	Negative Lead
 E160218 C3035-3, Component Side	Ω	 E160218 C3035-4, Component Side

Is the resistance between 4, 000 and 10, 000 ohms?

Yes	GO to AF14

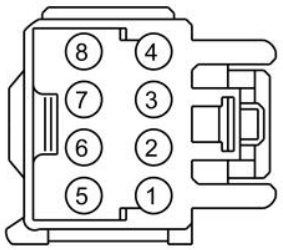
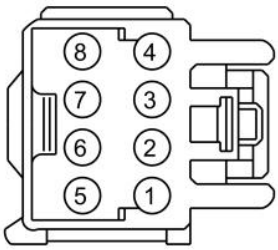
No	INSTALL a new driver seat cushion blower motor. REFER to: Front Seat Cushion Blower Motor . GO to AF22

AF14 CHECK THE DRIVER SEAT CUSHION BLOWER SPEED CONTROL RESISTANCE

NOTE: The ohmmeter must be connected with the positive lead to pin 7 and the negative lead to pin 4 when measuring. Ohmmeter leads incorrectly connected results in false readings and leads to incorrect identification of components that are not damaged.

Measure the **component side resistance** between:

Positive Lead	Measurement / Action	Negative Lead

 E160218 C3035-7, Component Side	Ω	 E160218 C3035-4, Component Side

Is the resistance between 240K and 400K ohms?

Yes	GO to AF15

No	INSTALL a new driver seat cushion blower motor. REFER to: Front Seat Cushion Blower Motor . GO to AF22

AF15 CHECK THE DRIVER SEAT CUSHION BLOWER MOTOR INSTALLATION AND FOR CRUSHED SEAT CUSHION

Ignition OFF.

Remove the driver seat. REFER to: Front Seat .

Remove the driver seat cushion cover. REFER to: Front Seat Cushion Cover .

Inspect the driver seat cushion for the following:

Blower motor correctly installed

Seat cushion foam pad crushed or restricted

Is the driver seat cushion blower motor correctly installed and are there no signs of damage to the foam pad?

Yes	INSTALL the driver seat cushion cover and seat. GO to AF18

No	CORRECTLY install the driver seat cushion blower motor or INSTALL a new driver seat cushion foam pad. GO to AF22

AF16 CHECK THE DRIVER SEAT CUSHION BLOWER MOTOR THERMISTOR AND WIRING

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING .

Disconnect: Driver Side Airbag In-line C345.

Disconnect: Passenger Side Airbag In-line C219 .

Disconnect: SCME C3265B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265B-7	Ω	C3265B-8

Compare the measured resistance value with the following table:

Ambient Temperature	Resistance
0-10 ° C (32-50 ° F)	2, 782-1, 663 ohms
10-20 ° C (50-68 ° F)	1, 837-1, 140 ohms
20-30 ° C (68-86 ° F)	1, 260-806 ohms
30-40 ° C (86-104 ° F)	893-570 ohms
40-50 ° C (104-122 ° F)	630-428 ohms

Is the resistance within the limits indicated?

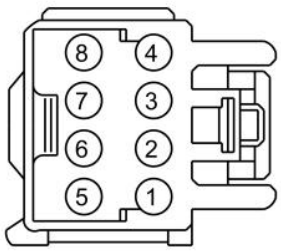
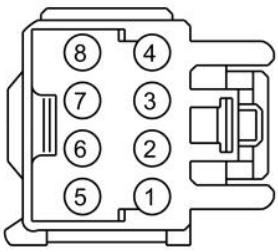
Yes	GO to AF18

No	GO to AF17

AF17 CHECK THE DRIVER SEAT CUSHION BLOWER MOTOR THERMISTOR

Disconnect: Driver Seat Cushion Blower Motor C3035 .

Measure the **component side resistance** between:

Positive Lead	Measurement / Action	Negative Lead
 E160218 C3035-5, Component Side	Ω	 E160218 C3035-8, Component Side

Compare the measured resistance value with the following table:

Ambient Temperature	Resistance
0-10 ° C (32-50 ° F)	2, 782-1, 663 ohms
10-20 ° C (50-68 ° F)	1, 837-1, 140 ohms
20-30 ° C (68-86 ° F)	1, 260-806 ohms

30-40 ° C (86-104 ° F)	893-570 ohms
40-50 ° C (104-122 ° F)	630-428 ohms

Is the resistance within the limits indicated?

Yes	REPAIR circuit VHS26 (VT) or RHS05 (YE/VT) for an open or high resistance. GO to AF22

No	INSTALL a new cushion blower motor. REFER to: Front Seat Cushion Blower Motor . GO to AF22

AF18 CHECK THE DRIVER SEAT CUSHION BLOWER MOTOR HEATING/COOLING CIRCUITRY CURRENT DRAW

Connect all SCME, blower motor and Body Harness-to-Seat Harness Connectors.

NOTE: It may be necessary to open the seat wire harness conduit to allow placing the inductive current probe around the circuit as described in the following step. Care must be taken when opening up the wire harness so as not to damage any wiring or connectors. Do not damage any wiring or induce stress on any wiring or connectors. Close up the wire harness once repairs to the seat are complete.

NOTE: Use a commercially available inductive current probe (such as Electronic Specialties Current Probe/Multimeter 685 or a Fluke I410 [used with a digital multimeter]) or the low current probe from the VMM available for use with IDS. If these are unavailable, the inductive current probe feature from a battery tester may be substituted.

Place an inductive current probe around circuit CHS02 (YE/BU) near SCME C3265A-G and monitor the current draw.

Start the engine and set the driver seat to HIGH heat.

Is the current draw less than 11 amps?

Yes	GO to AF19

No	INSTALL a new cushion blower motor. REFER to: Front Seat Cushion Blower Motor . GO to AF22

AF19 CHECK RESISTANCE OF THE DRIVER SEAT CUSHION BLOWER MOTOR AND WIRING

Ignition OFF.

Disconnect: SCME C3265A .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265A-G	Ω	Ground
C3265A-H	Ω	Ground

Are the resistances between 0.9 and 10 ohms?

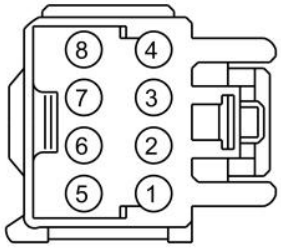
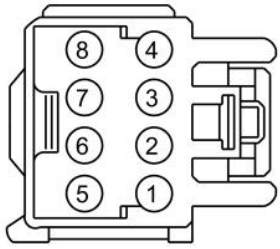
Yes	GO to AF21

No	GO to AF20

AF20 CHECK THE RESISTANCE OF THE DRIVER SEAT CUSHION BLOWER MOTOR

Disconnect: Driver Seat Cushion Blower Motor C3035 .

Measure the **component side resistance** between:

Positive Lead	Measurement / Action	Negative Lead
 E160218 C3035-1, Component Side	Ω	 E160218 C3035-2, Component Side

Is the resistance between 0.9 and 10 ohms?

Yes	REPAIR circuit CHS02 (YE/BU) or RHS02 (BU/OG) for an open or high resistance. GO to AF22

No	INSTALL a new cushion blower motor. REFER to: Front Seat Cushion Blower Motor . GO to AF22

AF21 CHECK THE SCME (FRONT SEAT CLIMATE CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all of the SCME connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins as necessary

pushed-out pins - install new pins as necessary

Reconnect the SCME connectors. Make sure they seat and latch correctly.

> *NOTE: Do not reconnect Driver Side Airbag In-line C345 or Passenger Side Airbag In-line C219 at this time.*

Reconnect all previously disconnected connectors.

Ignition ON.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new SCME. REFER to: Front Seat Climate Control Module . GO to AF22

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues. GO to AF22

AF22 VERIFY THE SUPPLEMENTAL RESTRAINT SYSTEM (SRS) PROVES OUT SUCCESSFULLY

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING .

Connect: Driver Side Airbag In-line C345.

Connect: Passenger Side Airbag In-line C219 .

Connect all previously disconnected connectors.

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) REPOWERING .

Did the SRS prove out successfully?

Yes	Repair is complete. RETURN the vehicle to the customer.

No	REFER to: SUPPLEMENTAL RESTRAINT SYSTEM .

DIAGNOSIS AND TESTING > FRONT SEATS > PINPOINT TEST(S) > PINPOINT TEST AG : DTC B2730

Refer to Climate Controlled Seats for schematic and connector information.

Normal Operation and Fault Conditions

The SCME monitors seat backrest temperature while it supplies voltage and ground to both blower motors. The SCME also supplies a variable voltage signal to control the blower speed. Cabin air enters the blower

through a filter attached to the blower motor housing. Heated or cooled air exits the blower motor and flows through the foam pad.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B2730	Back Over-Temp Detected	If the driver seat backrest blower motor temperature exceeds 70 ° C (158 ° F) in cool mode or 85 ° C (185 ° F) in heat mode for more than 4 seconds the SCME shuts down the driver seat system and sets this DTC.

Possible Causes

- Wiring, terminals or connectors
- Restricted blower motor filter
- Crushed or restricted backrest foam pad
- Backrest blower motor
- SCME

DIAGNOSIS AND TESTING > FRONT SEATS > PINPOINT TEST(S) > PINPOINT TEST AG : DTC B2730 > PINPOINT TEST AG : DTC B2730

WARNING: Incorrect repair techniques or actions can cause an accidental Supplemental Restraint System (SRS) deployment. Never compromise or depart from these instructions. Failure to precisely follow all instructions could result in serious personal injury from an accidental deployment.

AG1 CHECK THE SCME (FRONT SEAT CLIMATE CONTROL MODULE) FOR ON-DEMAND DIAGNOSTIC TROUBLE CODES (DTCS)

Start the vehicle and set the driver seat to HIGH heat.

Using a diagnostic scan tool, perform the SCME self-test.

Was DTC B2730 retrieved on-demand during the self-test?

Yes	GO to AG2

No	GO to AG5

AG2 CHECK THE DRIVER SEAT BACKREST BLOWER MOTOR THERMISTOR CIRCUITS FOR A SHORT TO GROUND

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING .

Disconnect: Driver Side Airbag In-line C345.

Disconnect: Passenger Side Airbag In-line C219 .

Disconnect: SCME C3265B .

Disconnect: Driver Seat Backrest Blower Motor C3034 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265B-9	Ω	Ground
C3265B-10	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to AG3

No	REPAIR the circuit in question. GO to AG22

AG3 CHECK THE DRIVER SEAT BACKREST BLOWER MOTOR THERMISTOR AND WIRING

Connect: Driver Seat Backrest Blower Motor C3034 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265B-9	Ω	C3265B-10

Compare the measured resistance value with the following table:

Ambient Temperature	Resistance
0-10 ° C (32-50 ° F)	2, 782-1, 663 ohms
10-20 ° C (50-68 ° F)	1, 837-1, 140 ohms
20-30 ° C (68-86 ° F)	1, 260-806 ohms
30-40 ° C (86-104 ° F)	893-570 ohms
40-50 ° C (104-122 ° F)	630-428 ohms

Is the resistance within the limits indicated?

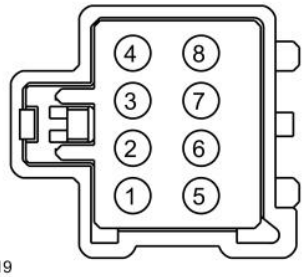
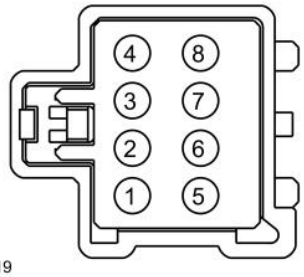
Yes	GO to AG18

No	GO to AG4

AG4 CHECK THE PASSENGER SEAT BACKREST BLOWER MOTOR THERMISTOR

Disconnect: Driver Seat Backrest Blower Motor C3034 .

Measure the **component side resistance** between:

Positive Lead	Measurement / Action	Negative Lead
 E160219 C3034-5, Component Side	Ω	 E160219 C3034-8, Component Side

Compare the measured resistance value with the following table:

Ambient Temperature	Resistance
0-10 ° C (32-50 ° F)	2, 782-1, 663 ohms
10-20 ° C (50-68 ° F)	1, 837-1, 140 ohms
20-30 ° C (68-86 ° F)	1, 260-806 ohms
30-40 ° C (86-104 ° F)	893-570 ohms
40-50 ° C (104-122 ° F)	630-428 ohms

Is the resistance within the limits indicated?

Yes	REPAIR circuit VHS35 (VT/OG) or RHS15 (GY/BN) for an open or high resistance. GO to AG22

No	INSTALL a new driver seat backrest blower motor. REFER to: Front Seat Backrest Blower Motor . GO to AG22

AG5 CONFIRM THE FAULT WHILE MONITORING THE SCME (FRONT SEAT CLIMATE CONTROL MODULE) SEAT BACK THERMAL ELECTRIC DEVICE TEMPERATURE (BKTMP) AND SEAT CUSHION THERMAL ELECTRIC DEVICE TEMPERATURE (CSHTEMP) PARAMETER IDENTIFICATIONS (PIDS)

Set the passenger seat to OFF.

Using a diagnostic scan tool, clear the SCME Diagnostic Trouble Codes (DTCs).

Using a diagnostic scan tool, monitor the SCME BKTMP and CSHTEMP Parameter Identifications (PIDs).

NOTE: A crushed seat backrest foam pad may be the cause of the fault, making it necessary to occupy the seat to recreate and identify the fault.

Attempt to recreate the fault. Start the vehicle and set the driver seat to HIGH heat for at least 15 minutes while occupying the seat.

Do the Parameter Identifications (PIDs) increase incrementally (gradually) and stay within 15 ° C (27 ° F) of each other?

Yes	Fault not present at this time. Fault may have been set due to a past failure, incorrect use of the climate controlled seat system by repeated switching between heat and cool modes or due to excessive passenger compartment temperature.

No	If the BKTMP PID increases incrementally and is greater than 15 ° C (27 ° F) of the CSHTEMP PID, GO to AG6If the BKTMP PID increases quickly (temperature "jumps" and does not increase incrementally) and is greater than 15 ° C (27 ° F) of the CSHTEMP PID, GO to AG16

AG6 COMPARE OPERATION OF THE DRIVER AND PASSENGER SEATS

With the engine running, set both front seats to HIGH cool.

Note the airflow exhausting from the driver seat backrest blower motor and compare it to the airflow exhausting from the passenger seat backrest blower motor.

Carry out a wiggle test of the wire harnesses between the SCME and the driver seat backrest blower motor while monitoring blower operation. The blower should operate consistently and not change speeds.

Is the airflow exhausting from the driver seat backrest blower motor comparable to the airflow exhausting from the passenger seat backrest blower motor with no change in operation when carrying out the wiggle test?

Yes	GO to AG7

No	If the airflow exhausting from the driver seat backrest blower motor is not comparable to the airflow exhausting from the passenger seat backrest blower motor, GO to AG8 If the driver seat backrest blower motor operation changed while carrying out the wiggle test, IDENTIFY and REPAIR the wiring fault.

AG7 COMPARE OPERATION OF THE DRIVER AND PASSENGER SEATS WHILE OCCUPIED

Note the airflow exhausting from the driver seat backrest blower motor with the driver seat occupied and compare it to the airflow exhausting from the passenger seat backrest blower motor with the passenger seat occupied.

Is the airflow exhausting from the driver seat backrest blower motor comparable to the airflow exhausting from the passenger seat backrest blower motor?

Yes	GO to AG16

No	INSTALL a new driver seat backrest foam pad.

AG8 CHECK THE DRIVER SEAT BACKREST BLOWER FOR AN OBSTRUCTION OR RESTRICTED FILTER

Ignition OFF.

Inspect the blower of the driver seat backrest blower motor assembly for an obstruction or for a restricted filter.

Is the blower obstructed or the filter restricted?

Yes	REMOVE the obstruction or INSTALL a new driver seat cushion blower motor. REFER to: Front Seat Cushion Blower Motor .

No	GO to AG9

AG9 CHECK THE DRIVER SEAT BACKREST BLOWER SPEED CONTROL CIRCUIT FOR AN OPEN

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING .

Disconnect: Driver Side Airbag In-line C345.

Disconnect: Passenger Side Airbag In-line C219 .

Disconnect: SCME C3265C .

Disconnect: Driver Seat Backrest Blower Motor C3034 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265C-12	Ω	C3034-7

Is the resistance less than 3 ohms?

Yes	GO to AG10

No	REPAIR the circuit. GO to AG22

AG10 CHECK THE DRIVER SEAT BACKREST BLOWER CIRCUIT FOR A SHORT TO VOLTAGE

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265C-15	V	Ground

Is any voltage present?

Yes	REPAIR the circuit. GO to AG22

No	GO to AG11

AG11 CHECK THE DRIVER SEAT BACKREST BLOWER CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265C-16	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to AG12

No	REPAIR the circuit. GO to AG22

AG12 CHECK THE DRIVER SEAT BACKREST BLOWER CIRCUITS FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265C-16	Ω	C3034-3
C3265C-15	Ω	C3034-4

Are the resistances less than 3 ohms?

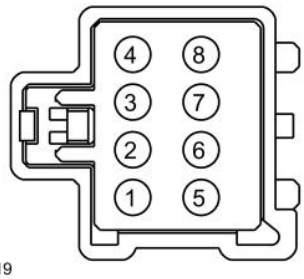
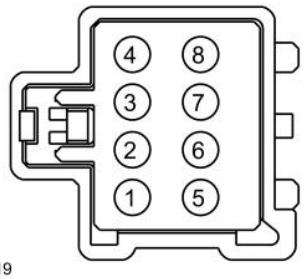
Yes	GO to AG13

No	REPAIR the circuit in question. GO to AG22

AG13 CHECK THE DRIVER SEAT BACKREST BLOWER RESISTANCE

> *NOTE: The ohmmeter must be connected with the positive lead to pin 3 and the negative lead to pin 4 when measuring. Ohmmeter leads incorrectly connected results in false readings and leads to incorrect identification of components that are not damaged.*

Measure the **component side resistance** between:

Positive Lead	Measurement / Action	Negative Lead
 E160219 C3034-3, Component Side	Ω	 E160219 C3034-4, Component Side

Is the resistance between 4, 000 and 10, 000 ohms?

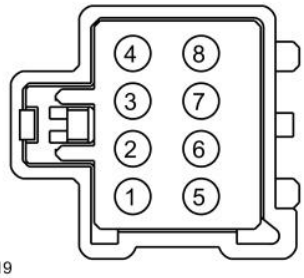
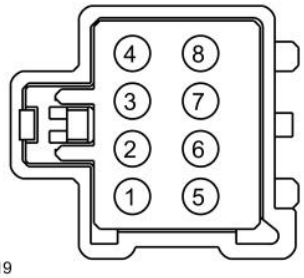
Yes	GO to AG14

No	INSTALL a new driver seat backrest blower motor. REFER to: Front Seat Backrest Blower Motor . GO to AG22

AG14 CHECK THE DRIVER SEAT BACKREST BLOWER SPEED CONTROL RESISTANCE

NOTE: The ohmmeter must be connected with the positive lead to pin 7 and the negative lead to pin 4 when measuring. Ohmmeter leads incorrectly connected results in false readings and leads to incorrect identification of components that are not damaged.

Measure the **component side resistance** between:

Positive Lead	Measurement / Action	Negative Lead
 E160219 C3034-7, Component Side	Ω	 E160219 C3040-4, Component Side

Is the resistance between 240K and 400K ohms?

Yes	GO to AG15

No	INSTALL a new driver seat backrest blower motor. REFER to: Front Seat Backrest Blower Motor . GO to AG22

AG15 CHECK THE DRIVER SEAT BACKREST BLOWER MOTOR INSTALLATION AND FOR CRUSHED SEAT BACKREST

Ignition OFF.

Remove the driver seat. REFER to: Front Seat .

Remove the driver seat backrest cover. REFER to: Front Seat Backrest Cover .

Inspect the driver seat backrest for the following:

Blower motor correctly installed

Backrest foam pad crushed or restricted

Is the driver seat backrest blower motor correctly installed and are there no signs of damage to the foam pad?

Yes	INSTALL the driver seat backrest cover and seat. GO to AG18

No	CORRECTLY install the driver seat backrest blower motor or INSTALL a new driver seat backrest foam pad. GO to AG22

AG16 CHECK THE DRIVER SEAT BACKREST BLOWER MOTOR THERMISTOR AND WIRING

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING .

Disconnect: Driver Side Airbag In-line C345.

Disconnect: Passenger Side Airbag In-line C219 .

Disconnect: SCME C3265B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265B-9	Ω	C3265B-10

Compare the measured resistance value with the following table:

Ambient Temperature	Resistance
0-10 ° C (32-50 ° F)	2, 782-1, 663 ohms
10-20 ° C (50-68 ° F)	1, 837-1, 140 ohms
20-30 ° C (68-86 ° F)	1, 260-806 ohms
30-40 ° C (86-104 ° F)	893-570 ohms
40-50 ° C (104-122 ° F)	630-428 ohms

Is the resistance within the limits indicated?

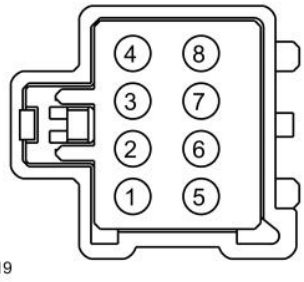
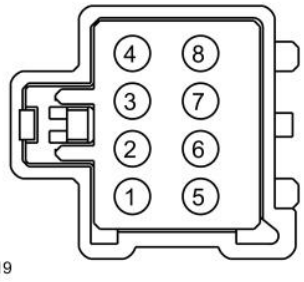
Yes	GO to AG18

No	GO to AG17

AG17 CHECK THE DRIVER SEAT BACKREST BLOWER MOTOR THERMISTOR

Disconnect: Driver Seat Backrest Blower Motor C3034 .

Measure the **component side resistance** between:

Positive Lead	Measurement / Action	Negative Lead
 E160219 C3034-5, Component Side	Ω	 E160219 C3034-8, Component Side

Compare the measured resistance value with the following table:

Ambient Temperature	Resistance
0-10 ° C (32-50 ° F)	2, 782-1, 663 ohms
10-20 ° C (50-68 ° F)	1, 837-1, 140 ohms
20-30 ° C (68-86 ° F)	1, 260-806 ohms
30-40 ° C (86-104 ° F)	893-570 ohms
40-50 ° C (104-122 ° F)	630-428 ohms

Is the resistance within the limits indicated?

Yes	REPAIR circuit VHS35 (VT/OG) or RHS15 (GY/BN) for an open or high resistance. GO to AG22

No	INSTALL a new backrest blower motor. REFER to: Front Seat Backrest Blower Motor . GO to AG22

AG18 CHECK THE DRIVER SEAT BACKREST BLOWER MOTOR HEATING/COOLING CIRCUITRY CURRENT DRAW

Connect all SCME, blower motor and Body Harness-to-Seat Harness Connectors.

NOTE: It may be necessary to open the seat wire harness conduit to allow placing the inductive current probe around the circuit as described in the following step. Care must be taken when opening up the wire harness so as not to damage any wiring or connectors. Do not damage any wiring or induce stress on any wiring or connectors. Close up the wire harness once repairs to the seat are complete.

NOTE: Use a commercially available inductive current probe (such as Electronic Specialties Current Probe/Multimeter 685 or a Fluke I410 [used with a digital multimeter]) or the low current probe from the VMM available for use with IDS. If these are unavailable, the inductive current probe feature from a battery tester may be substituted.

Place an inductive current probe around circuit CHS01 (GY/VT) near SCME C3265A-J and monitor the current draw.

Start the engine and set the driver seat to HIGH heat.

Is the current draw less than 11 amps?

Yes	GO to AG19

No	INSTALL a new backrest blower motor. REFER to: Front Seat Backrest Blower Motor . GO to AG22

AG19 CHECK RESISTANCE OF THE DRIVER SEAT BACKREST BLOWER MOTOR AND WIRING

Ignition OFF.

Disconnect: SCME C3265A .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3265A-J	Ω	Ground
C3265A-K	Ω	Ground

Are the resistances between 0.9 and 10 ohms?

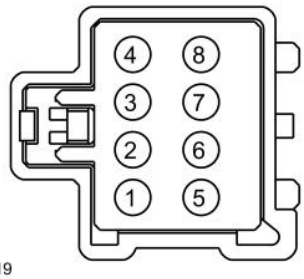
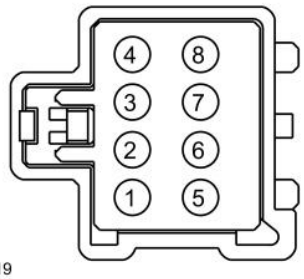
Yes	GO to AG21

No	GO to AG20

AG20 CHECK THE RESISTANCE OF THE DRIVER SEAT BACKREST BLOWER MOTOR

Disconnect: Driver Seat Backrest Blower Motor C3034 .

Measure the **component side resistance** between:

Positive Lead	Measurement / Action	Negative Lead
 E160219 C3034-1, Component Side	Ω	 E160219 C3034-2, Component Side

Is the resistance between 0.9 and 10 ohms?

Yes	REPAIR circuit CHS01 (GY/VT) or RHS01 (WH/VT) for an open or high resistance. GO to AG22

No	INSTALL a new backrest blower motor. REFER to: Front Seat Backrest Blower Motor . GO to AG22

AG21 CHECK THE SCME (FRONT SEAT CLIMATE CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all of the SCME connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins as necessary

pushed-out pins - install new pins as necessary

Reconnect the SCME connectors. Make sure they seat and latch correctly.

> *NOTE: Do not reconnect Driver Side Airbag In-line C345 or Passenger Side Airbag In-line C219 at this time.*

Reconnect all previously disconnected connectors.

Ignition ON.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new SCME. REFER to: Front Seat Climate

	Control Module . GO to AG22

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues. GO to AG22

AG22 VERIFY THE SUPPLEMENTAL RESTRAINT SYSTEM (SRS) PROVES OUT SUCCESSFULLY

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING .

Connect: Driver Side Airbag In-line C345.

Connect: Passenger Side Airbag In-line C219 .

Connect all previously disconnected connectors.

REFER to: SUPPLEMENTAL RESTRAINT SYSTEM (SRS) REPOWERING .

Did the SRS prove out successfully?

Yes	Repair is complete. RETURN the vehicle to the customer.

No	REFER to: SUPPLEMENTAL RESTRAINT SYSTEM .

DIAGNOSIS AND TESTING > FRONT SEATS > COMPONENT TEST(S)

Blower Motor Cooling Performance

NOTE: This test is intended to check the cooling mode performance of an operational climate controlled seat backrest or cushion blower motor and verify it is cooling inlet air at the blower motor (ambient cabin air) between 6-8 ° C (10-14 ° F).

NOTE: Make sure the vehicle is out of direct sunlight and is in an area with a stable air temperature when testing the climate controlled seat system.

NOTE: For correct temperature measurements, the seat being tested should be occupied.

1.

Using a diagnostic scan tool, monitor the following SCME Parameter Identifications (PIDs):

Seat cushion thermal electric device temperature (CSHTEMP)

Seat back thermal electric device temperature (BKTMP)

Passenger Cushion Thermal Electric Device (TED) Temperature (PCSHTMP)

Passenger Back (TED) Temperature (PBKTMP)

Driver State Seat Mode (DCCSMOD)

Passenger State Seat Mode (PCCSMOD)

2.

Any initial PID value of greater than 205 ° C (401 ° F) or less than 2 ° C (36 ° F) indicates a system hardware failure. Do not proceed with this test. GO to Symptom Chart or SCME DTC Chart for diagnostic direction.

3.

Gain access to the seat cushion and backrest blower motors and use a suitable thermocouple temperature measuring device to monitor the air inlet temperature.

Place the temperature probe near each blower motor air filter.

4.

NOTE: The engine must be running to operate the climate controlled seat system and carry out this test.

Operate system in high cool mode and measure the temperature at the cushion blower motor filter using the thermocouple device.

Secure the temperature probe at the cushion blower motor and record the air inlet temperature.

5.

Use a diagnostic scan tool to measure the cushion blower motor PID temperature and record the value.

Monitor the MODE PID and verify the system is operating. If during testing, the PID value changes to Blower Only state, the system has entered into recovery mode and voltage to the blower motors are disabled. If this occurs, the seat has failed the test. Do not continue. Return to the diagnostic routine.

6.

Subtract the cushion blower motor PID temperature from the cushion air inlet temperature and record the temperature difference value.

7.

Continue to operate the system in high cool mode and use the thermocouple device to measure the temperature at the backrest blower motor filter.

Secure the temperature probe at the backrest blower motor and close the backrest trim cover before measuring and recording the air inlet temperature.

8.

Use a diagnostic scan tool to measure the backrest blower motor PID temperature and record the value.

Monitor the MODE PID and verify the system is operating. If during testing, the PID value changes to Blower Only state, the system has entered into recovery mode and voltage to the blower motors is disabled. If this occurs, the seat has failed the test. Do not continue. Return to the diagnostic routine.

9.

Subtract the backrest blower motor PID temperature from the backrest air inlet temperature and record the value.

10.

Compare the cushion and backrest calculated temperature values. The temperature difference should be between 6-8 ° C (10-14 ° F).

11.

If the calculated temperature values are not within these specifications, check the climate controlled seat components for air duct or filter restrictions, blockages, duct or electrical disconnections and for incorrect assembly. Repair as needed. If OK, carry out the SCME self-test and if any Diagnostic Trouble Codes (DTCs) are retrieved, go to SCME DTC Chart for diagnostic direction. Return to the diagnostic routine.

REMOVAL AND INSTALLATION > DRIVER FRONT SEAT MODULE (DSM) > REMOVAL

NOTE: LHD driver seat shown, RHD driver seat similar.

NOTE: Removal steps in this procedure may contain installation details.

1.

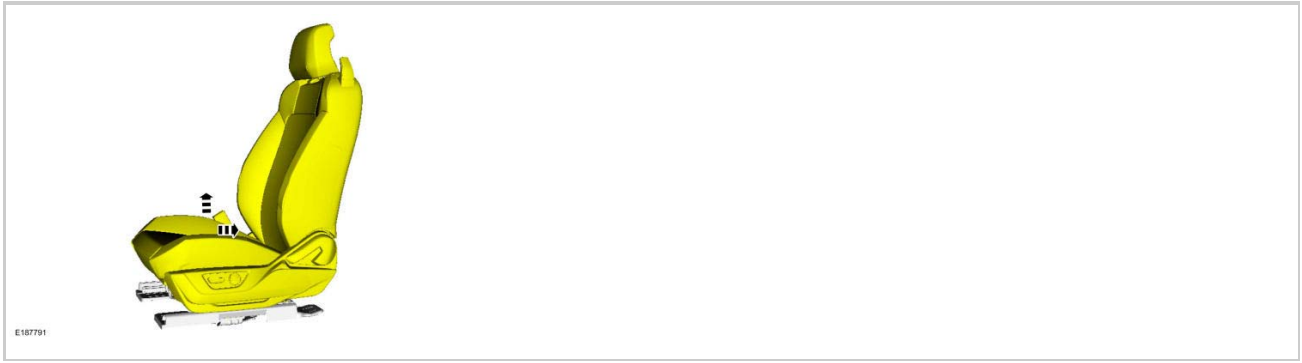
NOTE: This step is only necessary when installing a new component.

NOTE: The PMI process must begin with the current DSM installed. If the current DSM does not respond to the diagnostic scan tool, the tool may prompt for As-Built Data as part of the repair.

Using a diagnostic scan tool, begin the PMI process for the DSM following the on-screen instructions.

2.

Position the driver front seat to the full rearward and full upward position.



3.

Disconnect the DSM electrical connectors.



4.

Remove the screws and the DSM.

Torque

: 18 lb.in (2 Nm)



REMOVAL AND INSTALLATION > DRIVER FRONT SEAT MODULE (DSM) > INSTALLATION

1.

To install, reverse the removal procedure.

2.

NOTE: This step is only necessary when installing a new component.

Using a diagnostic scan tool, complete the PMI process for the DSM following the on-screen instructions.

3.

NOTE: This step is only necessary when installing a new component.

Operate the seat in all directions through the full range of travel to set soft stops and avoid a premature stopping point occurrence after the vehicle is returned to the customer.

REMOVAL AND INSTALLATION > FRONT HEAD RESTRAINT GUIDE SLEEVE

Special Tool(s) / General Equipment

Flat Headed Screw Driver

REMOVAL AND INSTALLATION > FRONT HEAD RESTRAINT GUIDE SLEEVE > REMOVAL

NOTE: Typical head restraint guide sleeve shown, others similar.

1.

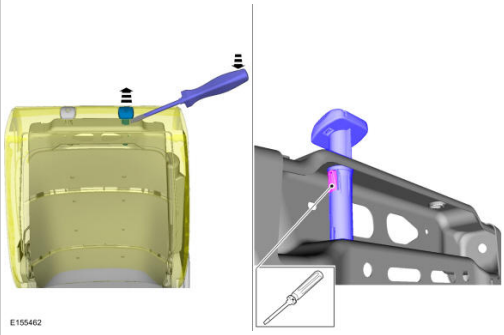
Depress the locking tabs and remove the head restraint.



2.

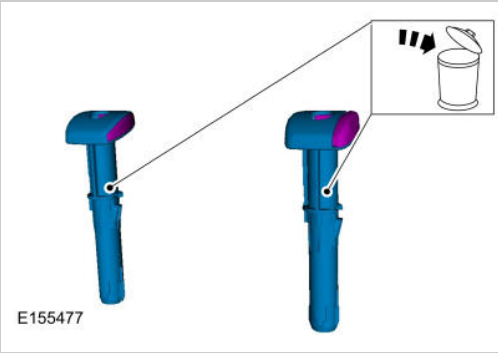
NOTE: Seat backrest cushion removed for clarity.

Remove the headrest restraint guide sleeves. Use the General Equipment: Flat Headed Screw Driver



3.

Discard the head restraint guide sleeves.



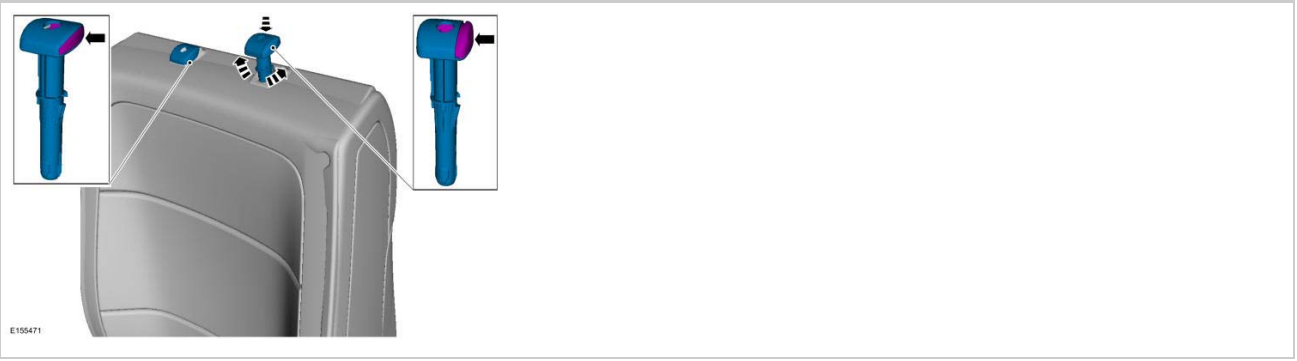
REMOVAL AND INSTALLATION > FRONT HEAD RESTRAINT GUIDE SLEEVE > INSTALLATION

NOTE: Always install new head restraint guide sleeves. Difficult adjustment of the head restraint may occur. Failure to follow these instructions may result in component failure.

NOTE: The head restraint guide sleeves are not interchangeable. Failure to install the correct head restraint guide sleeve at the correct position may result in component failure.

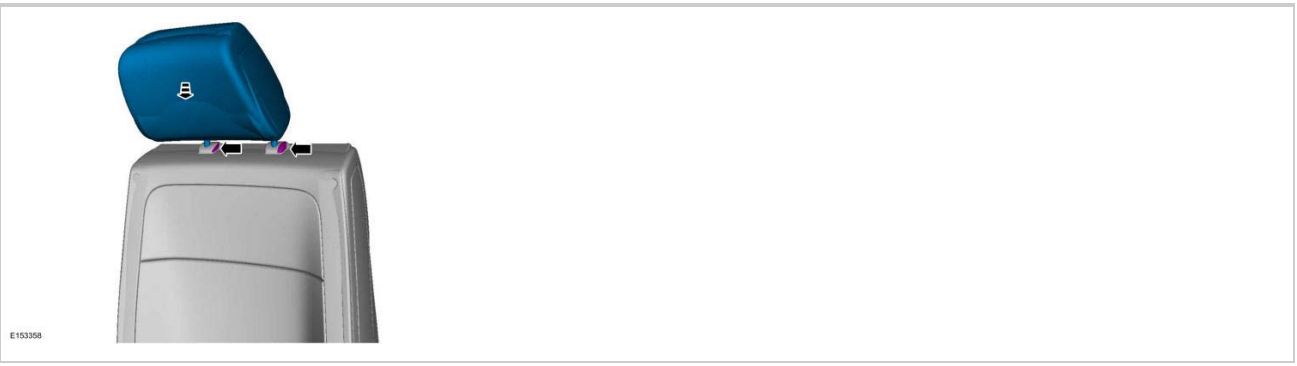
1.

Install the new head restraint guide sleeves.



2.

Depress the locking tabs and install the head restraint.



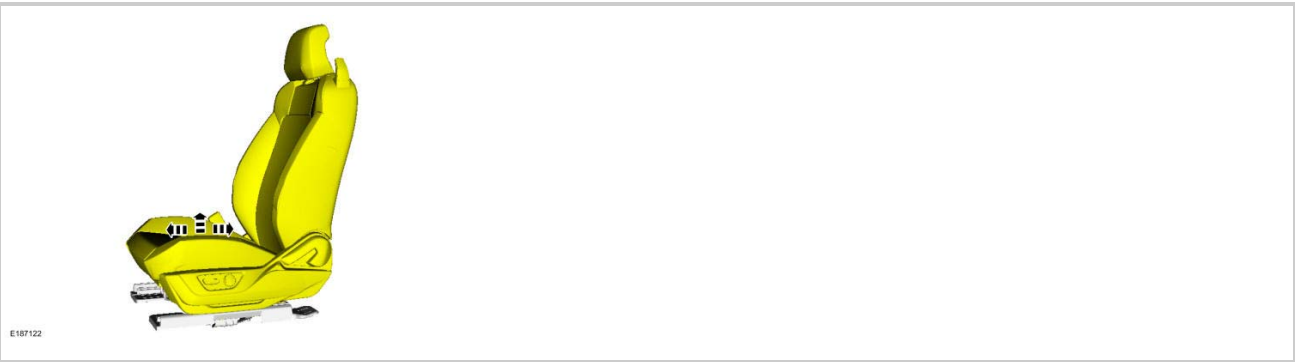
REMOVAL AND INSTALLATION > FRONT SEAT > REMOVAL

NOTE: LHD driver seat shown, all others similar.

1.

Position the seat to access the front seat bolts.

If a power seat cannot be positioned horizontally to access the front seat bolts, diagnose the inoperative horizontal seat track motor. Refer to: Front Seats .

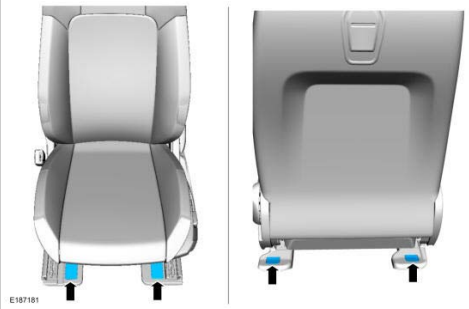


2.

Depower the SRS. Refer to: Supplemental Restraint System (SRS) Depowering .

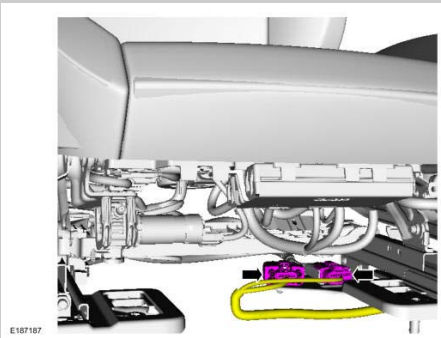
3.

Remove the front seat shield bolt caps.



4.

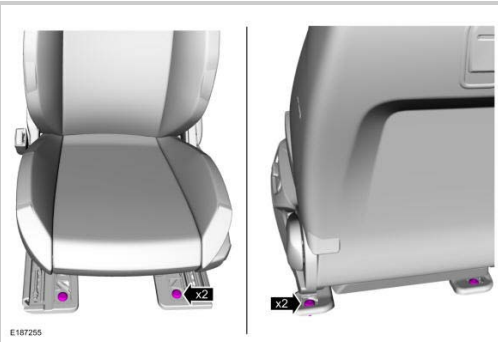
Disconnect the front seat electrical connector(s) and position the wire harness aside.



5.

NOTE: Follow the unique instructions or graphic for this step in the installation.

Remove the bolts and the front seat.



REMOVAL AND INSTALLATION > FRONT SEAT > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Install the front seat bolts in the following sequence.

1.

Install the front inboard bolt.

Torque

: 35 lb.ft (47 Nm)

2.

Install the front outboard bolt.

Torque

: 35 lb.ft (47 Nm)

3.

Install the rear inboard bolt.

Torque

: 35 lb.ft (47 Nm)

4.

Install the rear outboard bolt.

Torque

: 35 lb.ft (47 Nm)



3.

Repower the SRS. Refer to: Supplemental Restraint System (SRS) Repowering .

REMOVAL AND INSTALLATION > FRONT SEAT BACKREST > REMOVAL

NOTE: LHD driver seat shown, all others similar.

NOTE: Removal steps in this procedure may contain installation details.

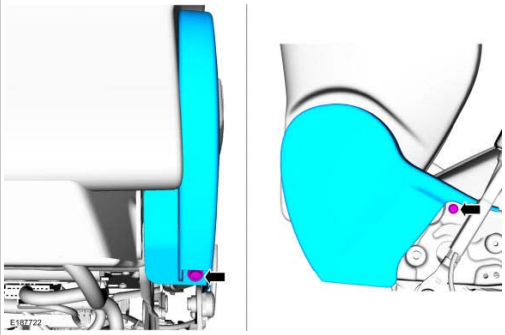
All seats

1.

Remove the front seat. Refer to: Front Seat .

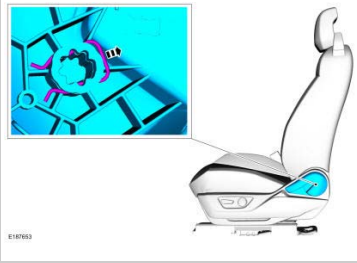
2.

Remove the screws and the recline cover.



3.

Release the retaining clip and remove the front seat recline handle.



Manual driver seat

4.

If equipped, remove the height adjusting handle.

1.

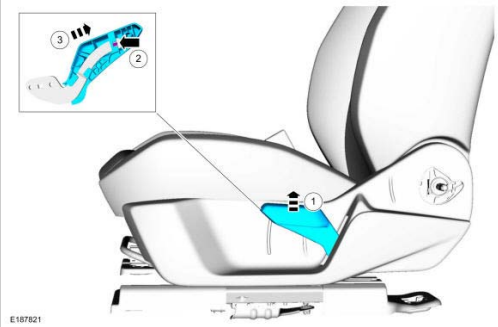
Raise the height adjusting handle.

2.

Release the locking tab.

3.

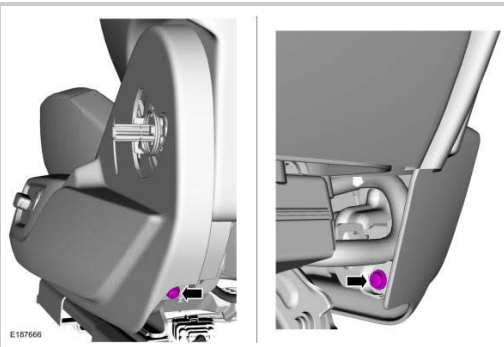
Slide the height adjusting handle forward.



Power seats and manual driver seat

5.

Remove the side shield screws.



6.

Remove the side shield.

1.

Lift up on the rear of the side shield and pull outward.

2.

Push the side shield forward.

3.

If equipped, disconnect the electrical connector.



Passenger manual seat

7.

Remove the side shield screws.



8.

Remove the side shield.

1.

Pull the rear of the side shield out.

2.

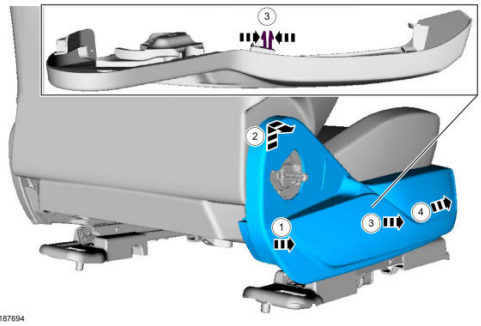
Firmly grasp the side shield, lift up and out, separating the side shield from the recliner bracket.

3.

From underneath, squeeze the retainers together and pull out on the side shield.

4.

Slide the side shield forward.



All seats

9.

Position the front seat backrest cover.

1.

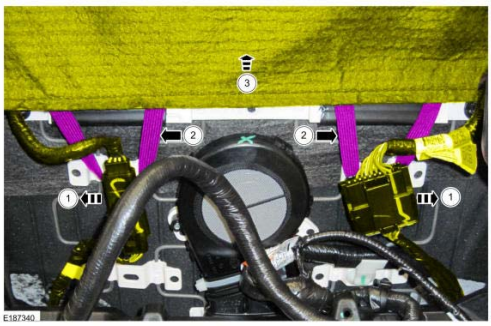
Release the wire harness electrical connector retainer(s).

2.

Detach the front seat backrest cover straps from the seat cushion frame.

3.

Position the front seat backrest cover aside.

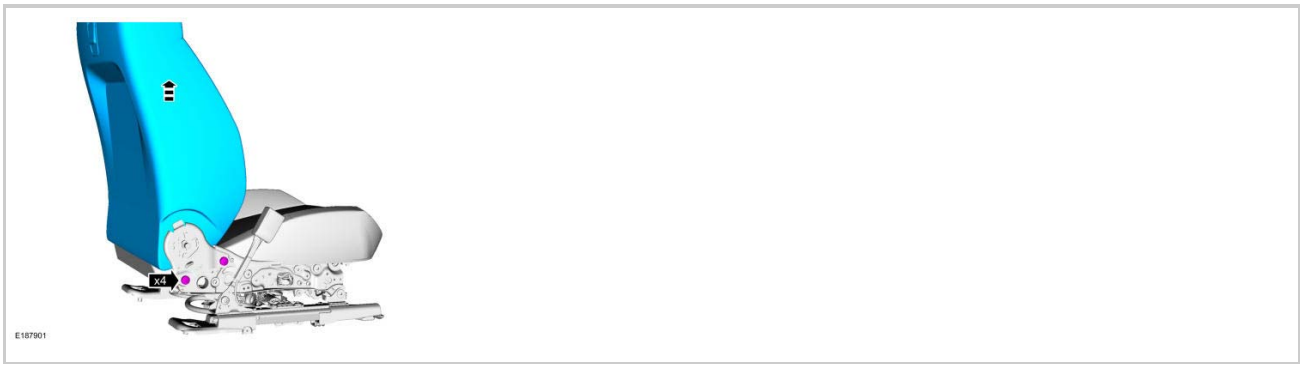


10.

Remove the bolts and backrest.

Torque

: 33 lb.ft (45 Nm)



REMOVAL AND INSTALLATION > FRONT SEAT BACKREST > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > FRONT SEAT BACKREST BLOWER MOTOR > REMOVAL

NOTE: LHD driver seat shown, all others similar.

NOTE: Seat backrest blower motor without snorkel shown, unless otherwise called out.

NOTE: Removal steps in this procedure may contain installation details.

NOTE: Methods are common among all options unless otherwise specified.

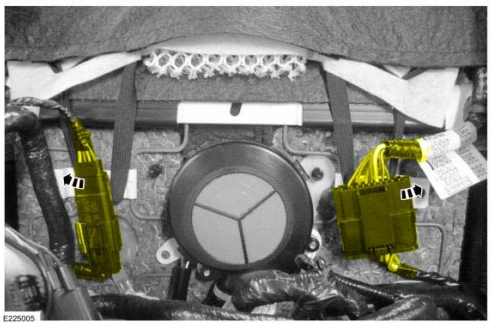
1.

Remove the front seat. Refer to: Front Seat .

2.

NOTE: Seat backrest blower motor with snorkel shown.

Release the electrical connector retainers and position the wire harnesses aside.



3.

NOTE: Seat backrest blower motor with snorkel shown.

Position the backrest cover.

1.

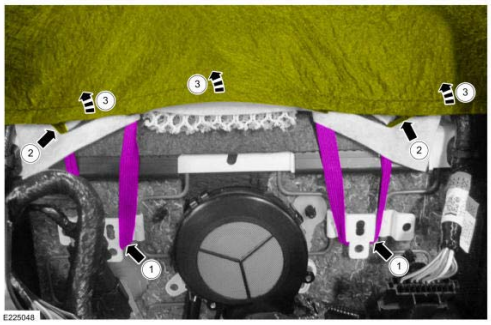
Detach the backrest cover straps.

2.

If equipped, route the backrest cover straps out through the backrest blower motor snorkel.

3.

Position the backrest cover aside.



4.

Remove the backrest cover insert.

1.

Release the pin-type retainers.

2.

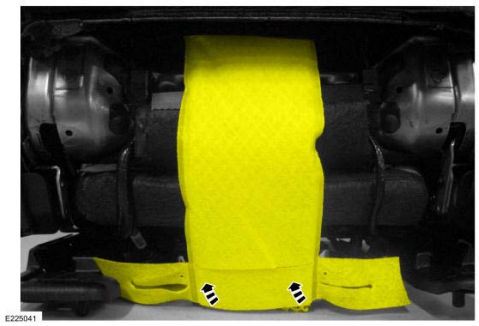
Position the backrest cover upwards.



5.

NOTE: Seat backrest blower motor with snorkel shown.

If equipped, position the backrest blower motor snorkel aside.



6.

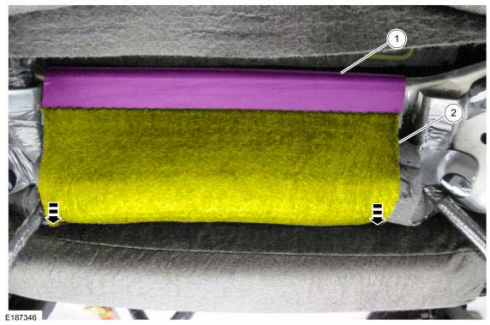
Position the backrest cover.

1.

Release the J-clip.

2.

Position the backrest cover from between the seat cushion and backrest cushion.



7.

NOTE: Use care when separating the seat backrest trim cover from the hook-and-loop strips or the hook-and-loop strips may be torn from the seat backrest foam pad.

Release the hook-and-loop strips and position the backrest cover upward.



8.

NOTE: Seat backrest blower motor with snorkel shown.

NOTE: New tie strap location should be used during all installations.

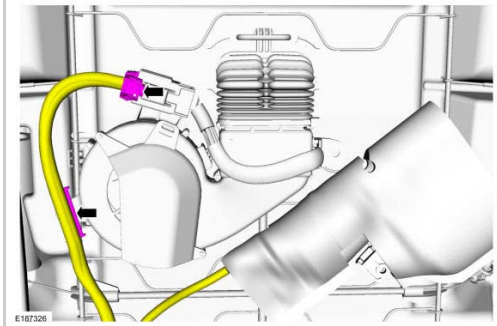
NOTE: Follow the unique instructions or graphics for this step in the installation.

Remove the tie strap.



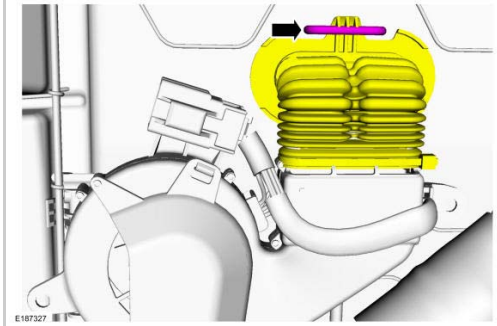
9.

Release the wire harness retainer and disconnect the blower motor electrical connector.



10.

Disconnect the blower motor manifold from the backrest cushion.



11.

NOTE: The backrest foam has been removed for clarity.

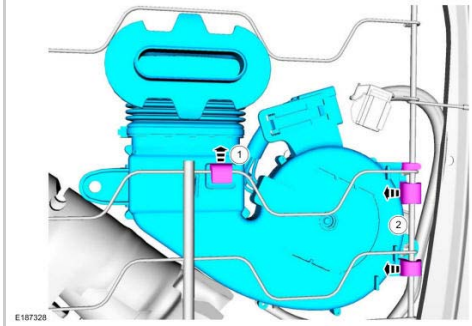
Remove the blower motor.

1.

Release the blower motor horizontal retainer.

2.

Release the blower motor vertical retainers.



REMOVAL AND INSTALLATION > FRONT SEAT BACKREST BLOWER MOTOR > INSTALLATION

1.

To install, reverse the removal procedure.

2.

NOTE: Seat backrest blower motor with snorkel shown.

1.

Install the tie strap.

2.

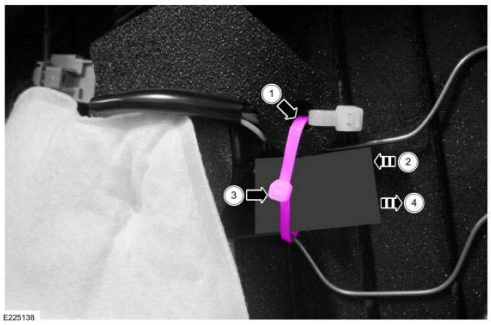
Insert a 1 in x 1/8 in section of flat metal stock in the tie strap opening.

3.

Tighten the tie strap

4.

Remove the flat stock.



REMOVAL AND INSTALLATION > FRONT SEAT BACKREST COVER

Special Tool(s) / General Equipment

Hog Ring Plier

REMOVAL AND INSTALLATION > FRONT SEAT BACKREST COVER > REMOVAL

WARNING: Front seat backrest trim covers installed on seats equipped with seat side

airbags cannot be repaired. A new trim cover must be installed. Cleaning is permissible. Failure to follow these instructions may result in the seat side airbag deploying incorrectly and increase the risk of serious personal injury or death in a crash.

NOTE: Removal steps in this procedure may contain installation details.

NOTE: LHD drive seat shown, all others similar.

1.

Remove the front seat. Refer to: Front Seat .

2.

Remove the front head restraint guide sleeves. Refer to: Front Head Restraint Guide Sleeve .

3.

If equipped, remove the inner safety belt guide.



4.

If equipped, remove the outer safety belt guide.

1.

Remove the cover.

2.

Remove the front bolt.

Torque

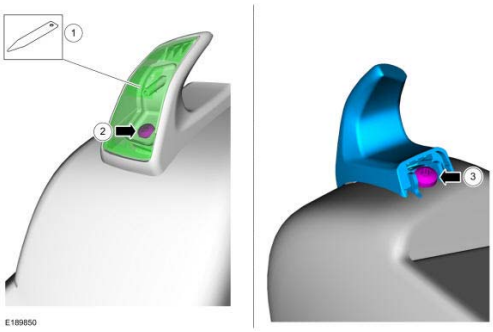
: 106 lb.in (12 Nm)

3.

Remove the rear bolt.

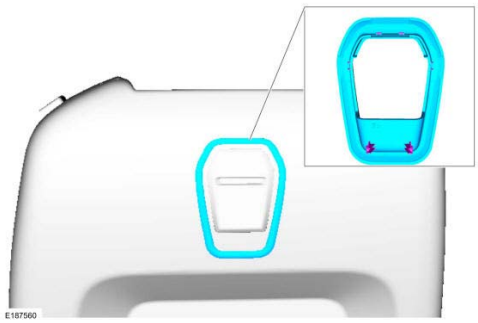
Torque

: 106 lb.in (12 Nm)



5.

Remove the seat release handle bezel.



6.

Position the front seat backrest cover.

1.

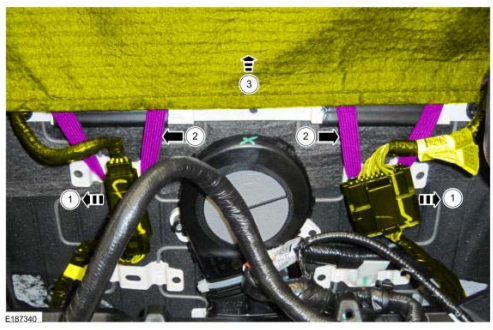
Releases the wire harness electrical connector retainer(s).

2.

Detach the front seat backrest cover straps.

3.

Position the front seat backrest cover aside.



7.

Remove the backrest cover insert.

1.

Release the pin-type retainers.

2.

Position the backrest cover upwards.



8.

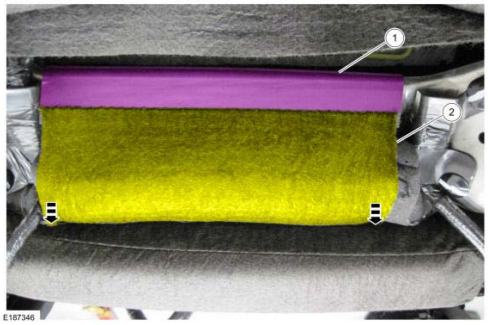
Position the front seat backrest cover.

1.

Release the J-clip.

2.

Position the backrest cover from between the seat cushion and backrest cushion.



9.

NOTE: Use care when separating the seat backrest trim cover from the hook-and-loop strips or the hook-and-loop strips may be torn from the seat backrest foam pad.

Release the hook-and-loop strips and position the backrest cover upward.



10.

Detach the side airbag deployment chute retainers and position aside.



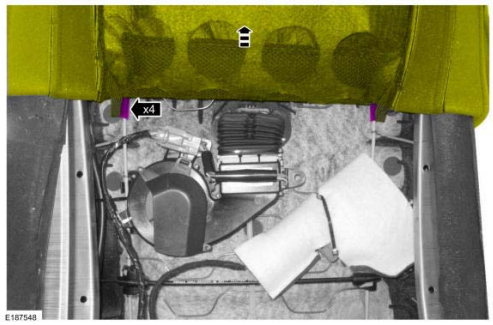
11.

Pull the side airbag deployment chute through the backrest foam.



12.

Release the backrest cover J-clips and position the backrest cover upward.



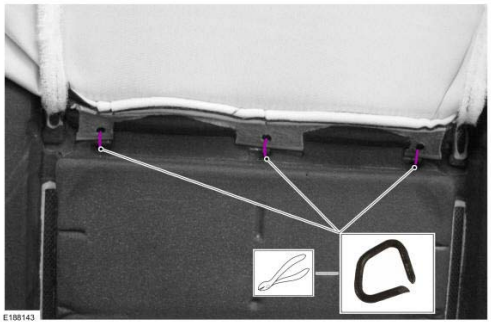
13.

Release the J-clip from the backrest frame.



14.

Remove the hog rings.



15.

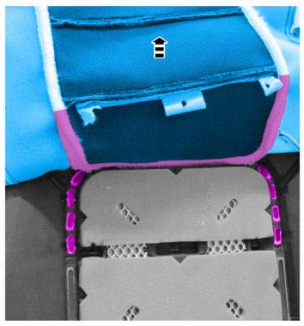
If equipped, position the safety belt strap as needed.



16.

NOTE: Use care when separating the seat backrest trim cover from the hook-and-loop strips or the hook-and-loop strips may be torn from the seat backrest foam pad.

Release the hook-and-loop and remove the backrest cover.



REMOVAL AND INSTALLATION > FRONT SEAT BACKREST COVER > INSTALLATION

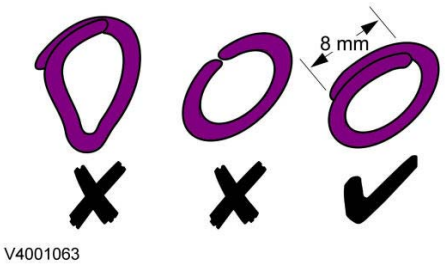
WARNING: Inspect the seat side airbag, airbag cavity, mounting surface and deployment chute for damage or the presence of foreign material. Remove all foreign material. Install a new side airbag if it is damaged. Install a new deployment chute if the deployment chute is damaged. Failure to follow these instructions may result in the seat side airbag deploying incorrectly and increase the risk of serious personal injury or death in a crash.

1.

To install, reverse the procedure.

2.

Use the General Equipment: Hog Ring Plier



REMOVAL AND INSTALLATION > FRONT SEAT BACKREST COVER - VEHICLES WITH: RECARO SEATS > REMOVAL

WARNING: Front seat backrest trim covers installed on seats equipped with seat side airbags cannot be repaired. A new trim cover must be installed. Cleaning is permissible. Failure to follow these instructions may result in the seat side airbag deploying incorrectly and increase the risk of serious personal injury or death in a crash.

NOTE: Removal steps in this procedure may contain installation details.

NOTE: LHD driver seat shown, all others similar.

NOTE: Recaro seat shown, GT 350 Recaro seat similar.

All

1.

Remove the front seat. Refer to: Front Seat .

2.

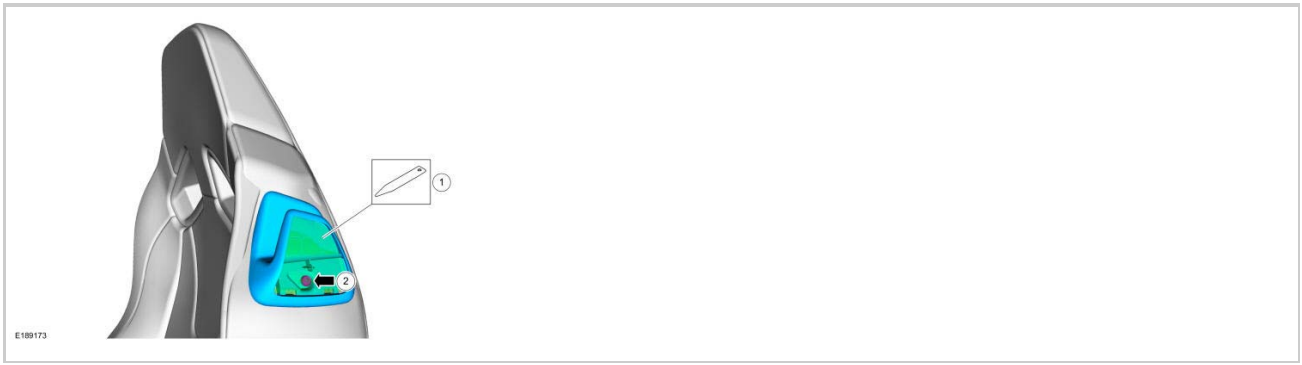
If equipped. Remove the safety belt guide.

1.

Remove the cover.

2.

Remove the bolt.



3.

NOTE: Inspect the pass-thru bezels for damage, replace as necessary.

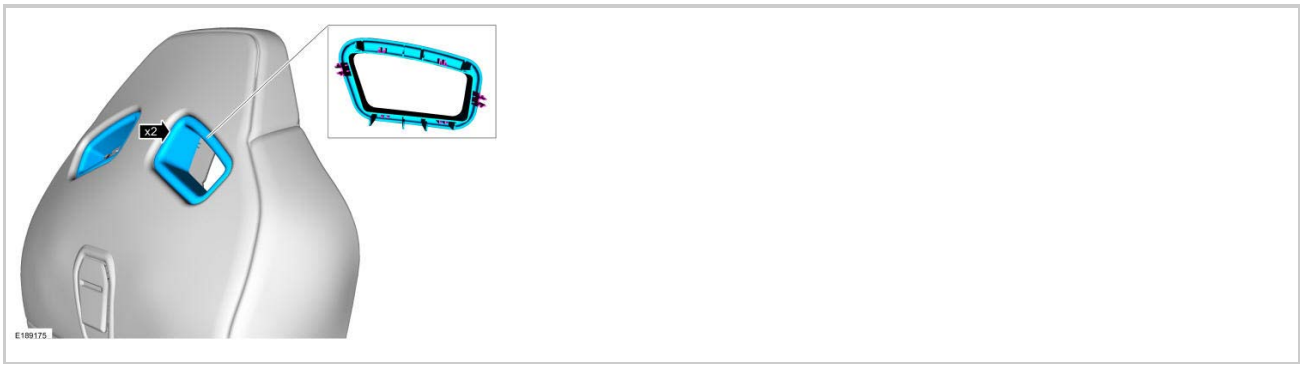
Remove the front pass-thru bezels.



4.

NOTE: Inspect the pass-thru bezels for damage, replace as necessary.

Remove the rear pass-thru bezels.



5.

Remove the backrest release handle bezel.



6.

Remove the side airbag. Refer to: Side Airbag .

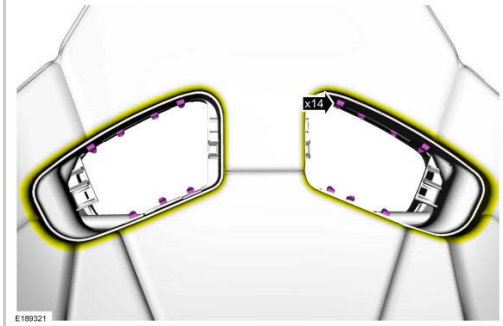
7.

Detach the J-clip from the backrest frame.



8.

Release the backrest cover from the backrest carrier hooks.



9.

NOTE: Use care when separating the backrest cover from the hook-and-loop strip, or the hook-and-loop strip can be torn from the backrest foam pad.

NOTE: Use care when separating the backrest cover from the hook-and-arrows, or the hooks can be torn from the backrest foam pad.

Release the hook-and-loop strips, the hook-and-arrows and position the backrest cover up.

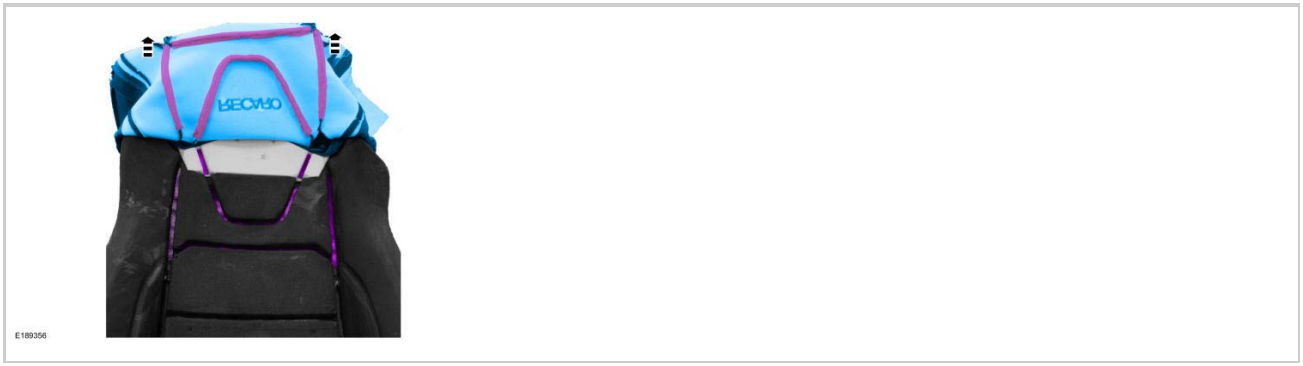


Recaro seat

10.

NOTE: Use care when separating the seat backrest trim cover from the hook-and-loop strips or the hook-and-loop strips may be torn from the seat backrest foam pad.

Release the hook-and-loop strips and remove the backrest cover.

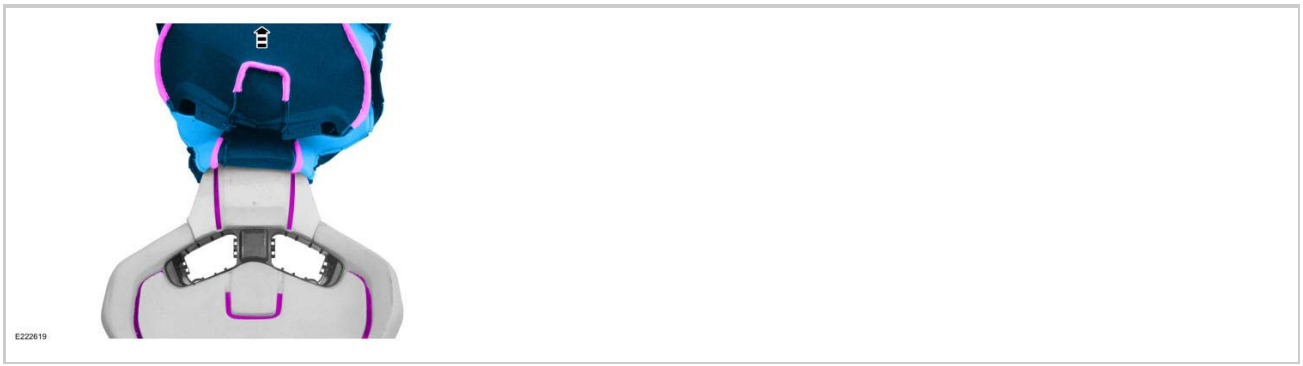


GT 350 Recaro seat

11.

NOTE: Use care when separating the seat backrest trim cover from the hook-and-loop strips or the hook-and-loop strips may be torn from the seat backrest foam pad.

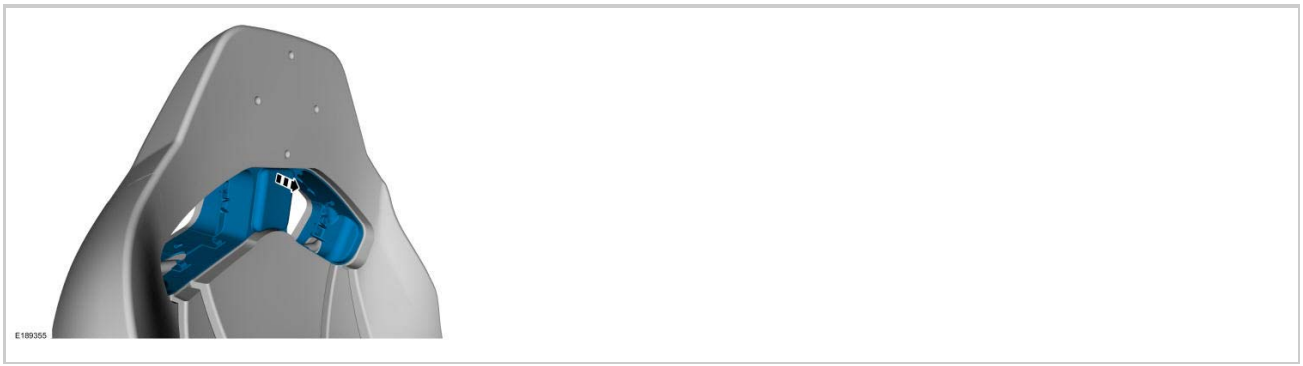
Release the hook-and-loop strips and remove the backrest cover.



All

12.

If required. Remove the backrest carrier.



REMOVAL AND INSTALLATION > FRONT SEAT BACKREST COVER - VEHICLES WITH: RECARO SEATS > INSTALLATION

WARNING: Inspect the seat side airbag, airbag cavity, mounting surface and deployment chute for damage or the presence of foreign material. Remove all foreign material. Install a new side airbag if it is damaged. Install a new deployment chute if the deployment chute is damaged. Failure to follow these instructions may result in the seat side airbag deploying incorrectly and increase the risk of serious personal injury or death in a crash.

1.

To install, reverse the procedure.

REMOVAL AND INSTALLATION > FRONT SEAT BACKREST RELEASE HANDLE > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

NOTE: LHD driver seat shown, all others similar.

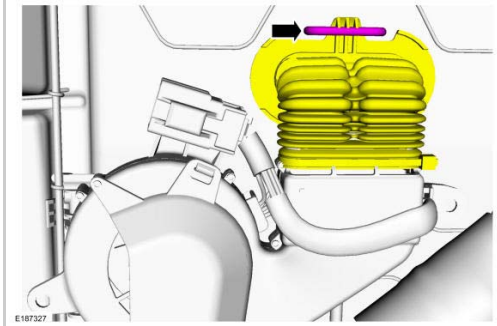
NOTE: Power seat shown, all others similar.

1.

Remove the front seat backrest cover. Refer to: Front Seat Backrest Cover . Refer to: Front Seat Backrest Cover - Vehicles With: Recaro Seats .

2.

If equipped. Disconnect the backrest blower motor manifold from the backrest cushion.



3.

If equipped with a Recaro seat. Remove the upper backrest foam.



4.

If equipped with a GT 350 Recaro seat. Remove the upper backrest foam.

1.

Pull the upper backrest foam away from the release handle.

2.

Remove the upper backrest foam.



5.

NOTE: If equipped, make sure that the safety belt guide strap is in the same position

during installation.

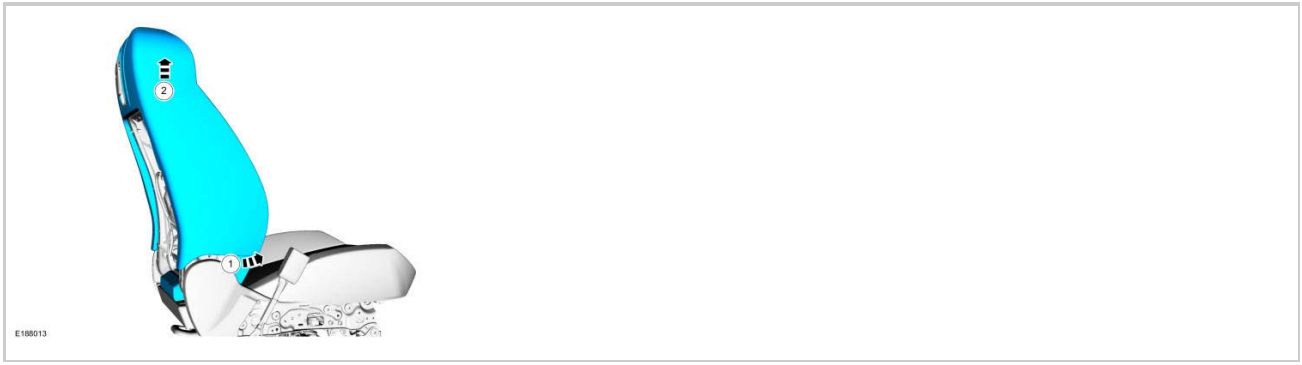
Remove the seat backrest foam.

1.

Pull the backrest foam from the backrest.

2.

Lift the backrest foam from the backrest.



6.

Position the release handle cable.

1.

Detach the cable conduit.

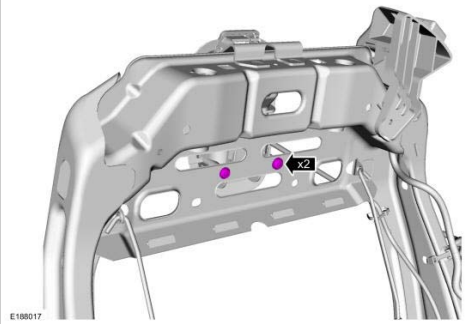
2.

Disconnect the cable from the recline mechanism.



7.

Remove the release handle front bolts.



8.

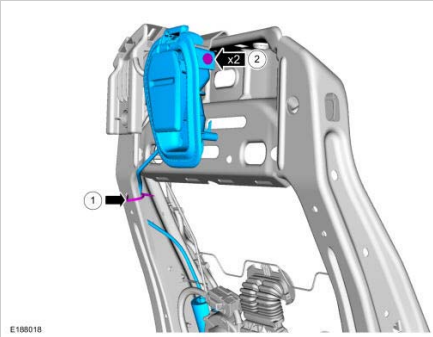
Remove the backrest release handle.

1.

Remove the cable mount tie strap.

2.

Remove the release handle side bolts.



REMOVAL AND INSTALLATION > FRONT SEAT BACKREST RELEASE HANDLE > INSTALLATION

1.

To install, reverse removal procedure.

REMOVAL AND INSTALLATION > FRONT SEAT CLIMATE CONTROL MODULE [SCME] > REMOVAL

NOTE: LHD passenger seat shown, RHD passenger seat similar.

NOTE: Removal steps in this procedure may contain installation details.

1.

NOTE: This step is only necessary when installing a new component.

NOTE: The PMI process must begin with the current SCME installed. If the current SCME does not respond to the diagnostic scan tool, the tool may prompt for As-Built Data as part of the repair.

Using a diagnostic scan tool, begin the PMI process for the SCME following the on-screen instructions.

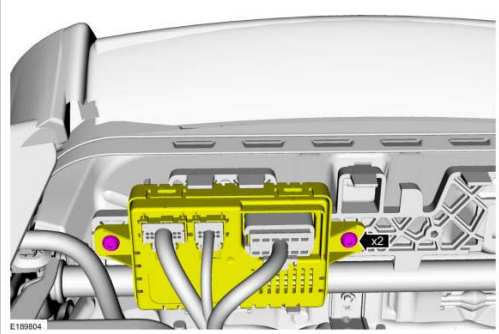
2.

Position the front passenger seat to the full upward and full rearward positions.



3.

Remove the screws and position the SCME aside.



4.

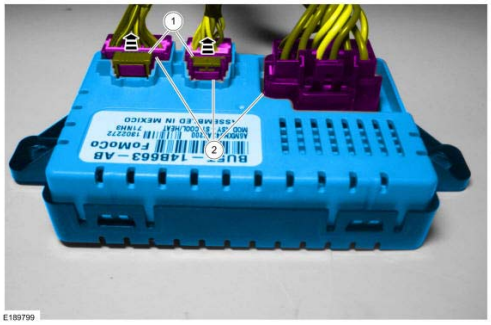
Remove the SCME.

1.

Release the locking wedges.

2.

Disconnect the electrical connectors.



REMOVAL AND INSTALLATION > FRONT SEAT CLIMATE CONTROL MODULE [SCME] > INSTALLATION

1.

To install, reverse the removal procedure.

2.

NOTE: This step is only necessary when installing a new component.

Using a diagnostic scan tool, complete the PMI process for the SCME following the on-screen instructions.

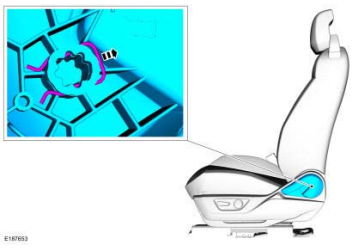
REMOVAL AND INSTALLATION > FRONT SEAT CONTROL SWITCH > REMOVAL

NOTE: LHD driver seat shown, all others similar.

NOTE: Removal steps in this procedure may contain installation details.

1.

Release the retaining clip and remove the front seat recline handle.



2.

Remove the side shield screws.



3.

Remove the side shield.

1.

Lift up on the rear of the side shield and pull outward.

2.

Push the side shield forward.

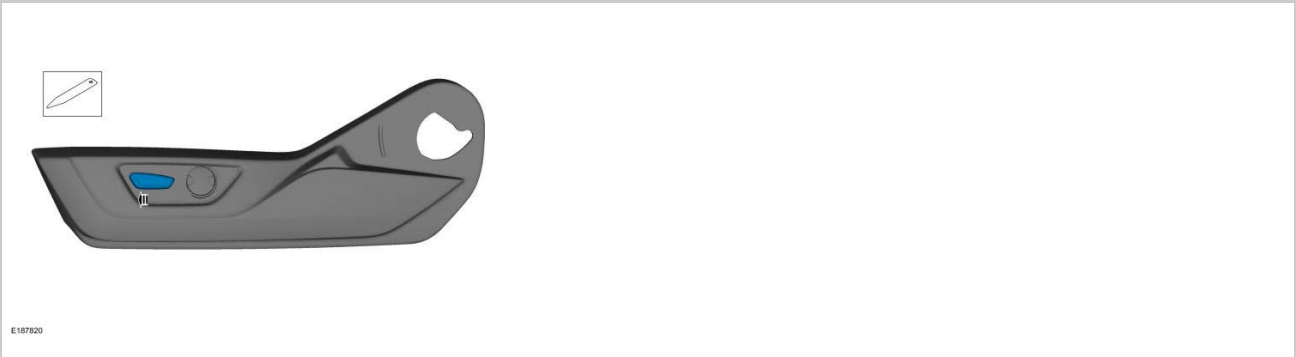
3.

Disconnect the electrical connector.



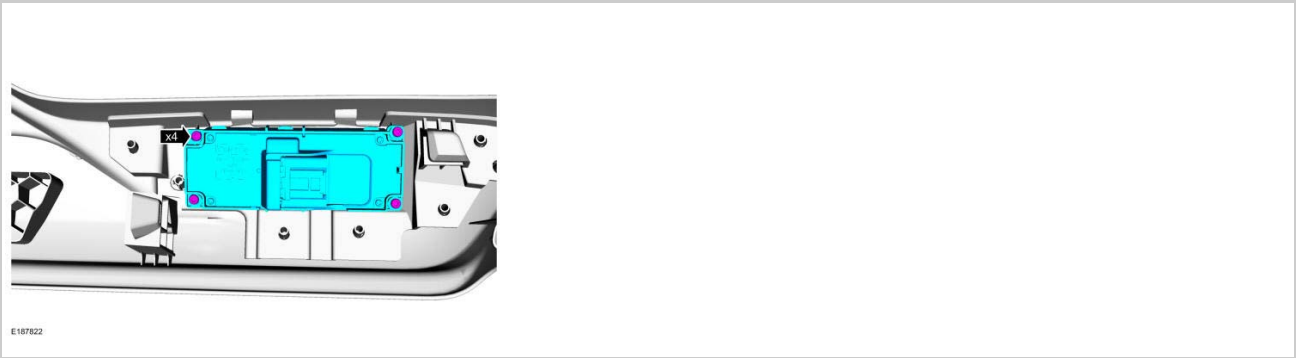
4.

Remove the seat control switch knob.



5.

Remove the screws and the seat control switch.



REMOVAL AND INSTALLATION > FRONT SEAT CONTROL SWITCH > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > FRONT SEAT CUSHION BLOWER MOTOR > REMOVAL

NOTE: LHD driver seat shown, all others similar.

NOTE: Removal steps in this procedure may contain installation details.

All seats

1.

Remove the front seat. Refer to: Front Seat .

2.

Release the retaining clip and remove the front seat recline handle.



3.

Remove the side shield screws.



4.

Remove the side shield.

1.

Lift up on the rear of the side shield and pull outward.

2.

Push the side shield forward.

3.

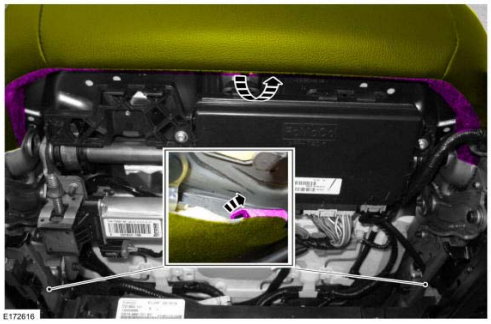
Disconnect the electrical connector.



5.

NOTE: For passenger seats equipped with an OCS service kit, the OCS will be adhered to the bottom of the seat cushion foam.

Release the J-clips and position the front of the seat cushion cover and foam assembly upwards.



Passenger seat

6.

NOTE: Original equipment (OE) OCS shown, service kit similar.

NOTE: If equipped with an OCS service kit, the OCS will be adhered to the bottom of the front seat cushion.

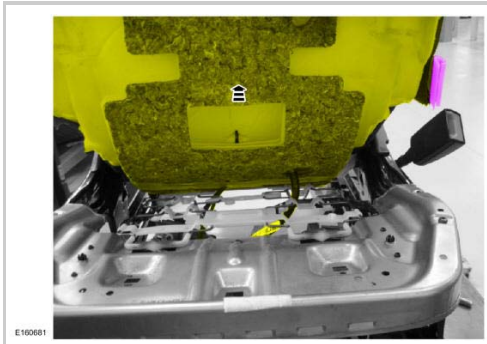
Remove the OCS pin-type retainers.



7.

NOTE: If equipped with an OCS service kit, the OCS is adhered to the bottom of the front seat cushion foam. This requires the cushion cover, foam and OCS to be positioned aside as an assembly.

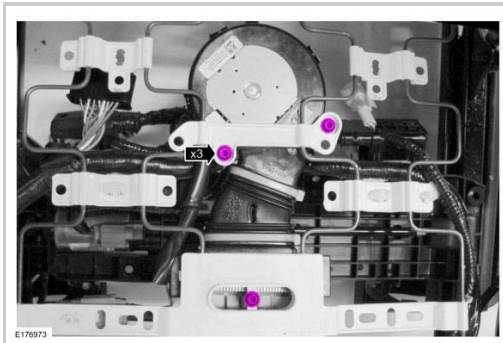
Position the front of the seat cushion cover, foam and OCS assembly upward.



All seats

8.

Remove the seat cushion blower motor screws.



9.

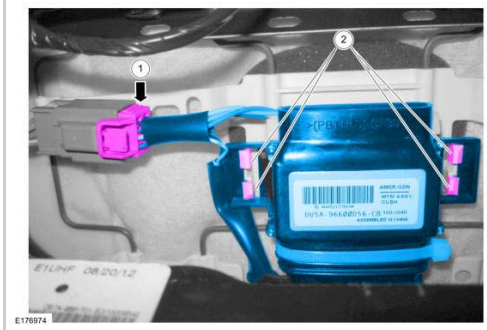
Remove the seat cushion blower motor.

1.

Disconnect the seat cushion blower motor electrical connector.

2.

Release the locking tabs.



REMOVAL AND INSTALLATION > FRONT SEAT CUSHION BLOWER MOTOR > INSTALLATION

All Seats

1.

To install, reverse the removal procedure.

2.

Install the seat.

If the passenger seat has been serviced, do not prove out the

SRS **at this time.**

Refer to: Front Seat .

Passenger seat

3.

WARNING: Occupant Classification System (OCS) parts are calibrated as an assembly and must only be replaced in the configuration they are sold. Never separate parts of an assembly. Failure to follow this instruction may result in incorrect operation of the OCS and increases the risk of serious personal injury or death in a crash.

WARNING: Make sure the front passenger seat repair is complete, the seat and all attached components (head restraint, seat side shield, etc.) are correctly assembled, and the seat is correctly installed to the vehicle before using System Reset to rezero the seat weight. Failure to follow these instructions may result in incorrect operation of the occupant classification system (OCS) and increases the risk of serious personal injury or death in a crash.

NOTE: To prevent system failure, take the following precautions before carrying out the OCS reset.

Make sure the voltage to the OCSM is greater than 8 volts and less than 18 volts.

Make sure the OCS is not below 6 ° C (42.8 ° F) or above 36 ° C (96.7 ° F) when initiating the OCS reset process. If the vehicle has been exposed to extreme cold or hot temperatures, the vehicle must be exposed and kept at a temperature between 6 ° C (42.8 ° F) to 36 ° C (96.7 ° F) for a minimum of 30 minutes.

Make sure nothing is present on the passenger seat before and during the OCS reset process.

Prior to carrying out the OCS reset, make sure a minimum of 8 seconds has elapsed after cycling the ignition switch on.

Using a diagnostic scan tool, carry out the OCS reset. Cycle the ignition switch after the OCS reset.

4.

If the first system reset attempt was successful, proceed to prove out the SRS.

5.

If the first system reset attempt was not successful, carry out a thorough visual inspection of the OCS connector and wiring for damage, pressure sensor hose for kinks and or damage, and seat-related wiring harness and body wiring harness terminals and connectors for damage. Repair any concerns found and proceed to the next step.

6.

Carry out a second OCS reset. Cycle the ignition switch after the OCS reset. If the second attempt is unsuccessful, install a new OCS service kit. Refer to: Occupant Classification System (OCS) Sensor .

7.

Prove out the SRS. Verify all airbags are installed and connected and the ignition is OFF. Wait 10 seconds then turn the ignition ON and monitor the airbag warning indicator. The airbag warning indicator illuminates continuously for approximately 6 seconds and turns off. Continue to monitor the airbag warning indicator for approximately 30 seconds, as this is the time required for the RCM to complete testing of the SRS.

If a SRS fault is present, the airbag warning indicator either fails to light, remains lit continuously or flashes. The flashing may not occur until approximately 30 seconds after the ignition has been turned from OFF to ON. If this occurs, diagnose and repair any SRS faults before proceeding with other repairs.

If, after the ignition has been turned on for 30 seconds, the airbag warning indicator remains unlit with no chime or SRS message displayed in the message center, no SRS fault is present.

If the airbag warning indicator is inoperative and a SRS fault exists, a chime sounds in a pattern of 5 sets of 5 beeps or a message displays in the message center. If this occurs, diagnose and repair the airbag warning indicator and any SRS faults before proceeding with other repairs.

8.

Using a scan tool, clear all Continuous Memory Diagnostic Trouble Codes (CMDTCs) from all modules.

REMOVAL AND INSTALLATION > FRONT SEAT CUSHION COVER > REMOVAL

NOTE: LHD driver seat shown, all others similar.

NOTE: Removal steps in this procedure may contain installation details.

All seats

1.

Remove the front seat. Refer to: Front Seat .

2.

Release the retaining clip and remove the seat recline handle.



Manual driver seat

3.

Remove the height adjusting handle.

1.

Raise the height adjusting handle.

2.

Release the locking tab.

3.

Slide the height adjusting handle forward.



Power seats and manual driver seat

4.

Remove the side shield screws.



5.

Remove the side shield.

1.

Lift up on the rear of the side shield and pull outward.

2.

Push the side shield forward.

3.

If equipped, disconnect the electrical connector.



Passenger manual seat

6.

Remove the side shield screws.



7.

Remove the side shield.

1.

Pull the rear of the side shield out.

2.

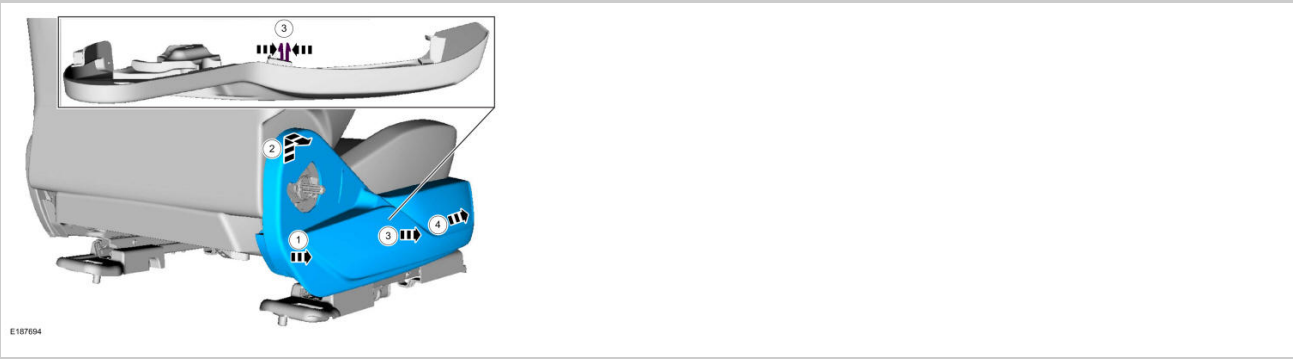
Firmly grasp the side shield, lift up and out, separating the side shield from the recliner bracket.

3.

From underneath, squeeze the retainers together and pull out on the side shield.

4.

Slide the side shield forward.



All seats

8.

If equipped, position the front seat backrest cover.

1.

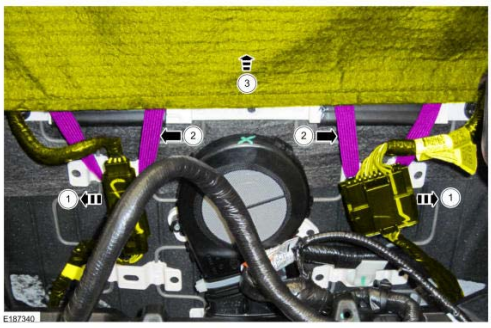
Release the wire harness electrical connector retainer(s).

2.

Detach the front seat backrest cover straps from the seat cushion frame.

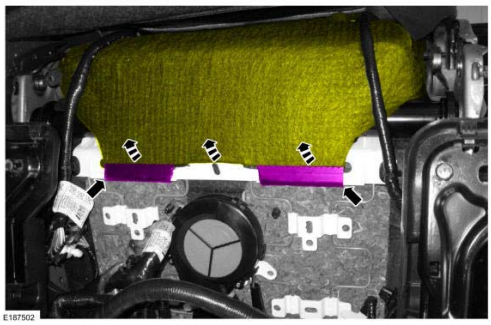
3.

Position the front seat backrest cover aside.



9.

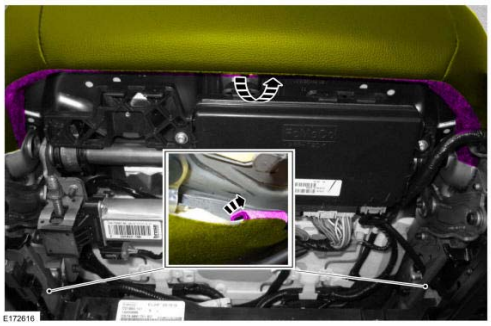
Detach the J-clips and position the cushion cover aside.



10.

> *NOTE: For passenger seats equipped with an OCS service kit, the OCS will be adhered to the bottom of the seat cushion foam.*

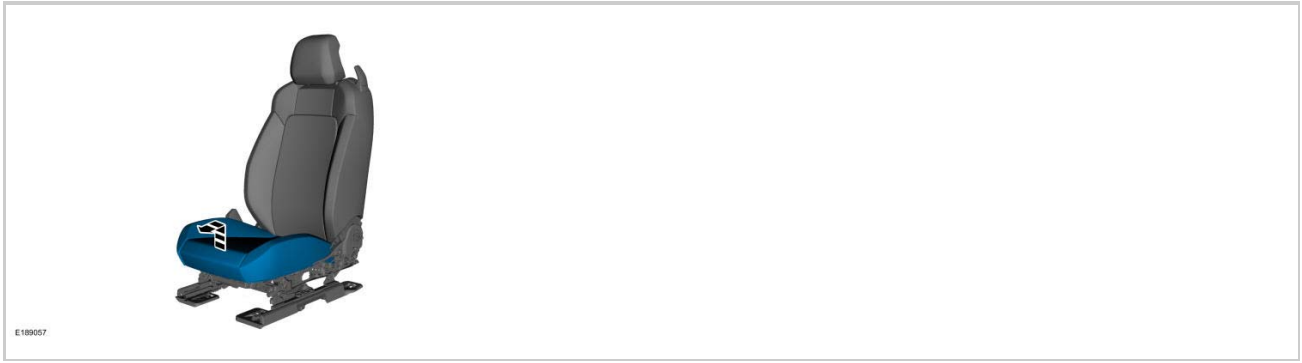
Release the J-clips and position the front of the seat cushion cover and foam assembly upwards.



Driver seat and passenger seat with OEM (Original Equipment Manufacturer)

11.

Remove the front seat cushion cover and foam as an assembly.



Passenger seat with service kit

12.

> *NOTE: When equipped with an OCS service kit, the OCS is adhered to the bottom of the front seat cushion foam. This requires the cushion cover, foam and OCS to be positioned aside as an assembly.*

With the seat cushion cover, foam and OCS assembly positioned upward, remove the pin-type retainers.

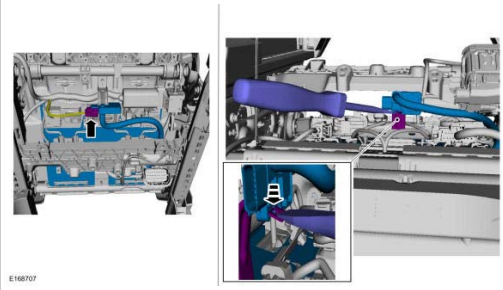


13.

> *NOTE: Using excessive force when bending the bracket tab can damage the OCS sensor housing.*

> *NOTE: Follow the unique instructions or graphic for this step in the installation.*

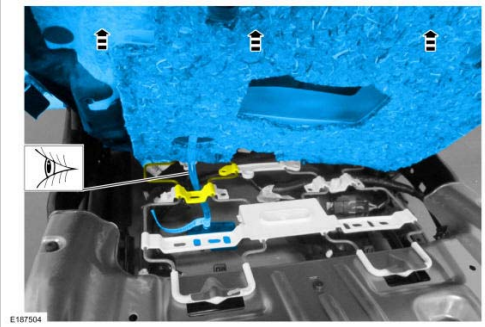
Disconnect the electrical connector, bend the bracket tab away and slide the OCS sensor off the bracket.



14.

> *NOTE: Note the location of the OCS hose as it passes through the seat springs for proper installation.*

Route out the OCS hose and sensor from between the seat cushion support wires and remove the seat cushion cover, foam and OCS sensor as an assembly.



All seats

15.

> *NOTE: This step is only necessary when installing a new component.*

Position the rear portion of the seat cushion cover from the foam.



16.

NOTE: Use care when separating the seat cushion from the hook-and-arrow or the hook may be torn from the seat cushion foam pad.

NOTE: Use care when separating the seat cushion trim cover from the hook-and-loop strips or the hook-and-loop strips may be torn from the seat cushion foam pad.

NOTE: This step is only necessary when installing a new component.

Remove the seat cushion cover.

1.

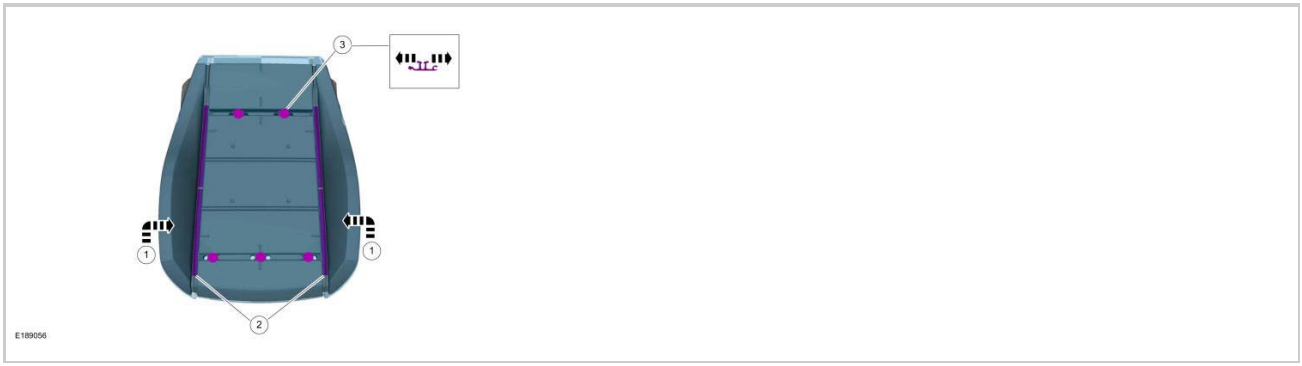
Position the seat cushion cover.

2.

Release hook-and-loop strips.

3.

Release the hook-and-arrows.



REMOVAL AND INSTALLATION > FRONT SEAT CUSHION COVER > INSTALLATION

All Seats

1.

To install, reverse the removal procedure.

2.

Install the seat.

If the passenger seat has been serviced, do not prove out the

SRS **at this time.**

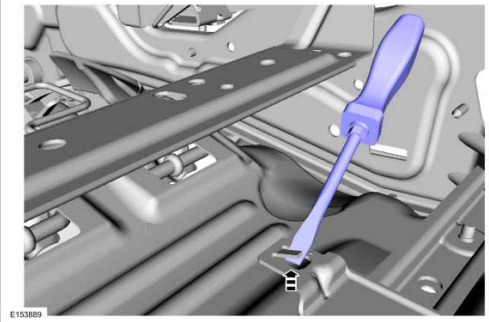
Refer to: Front Seat .

Passenger seat

3.

NOTE: This step is only necessary when an OCS service kit is installed

Bend the OCS sensor bracket tab back.



4.

WARNING: Occupant Classification System (OCS) parts are calibrated as an assembly and must only be replaced in the configuration they are sold. Never separate parts of an assembly. Failure to follow this instruction may result in incorrect operation of the OCS and increases the risk of serious personal injury or death in a crash.

WARNING: Make sure the front passenger seat repair is complete, the seat and all attached components (head restraint, seat side shield, etc.) are correctly assembled, and the seat is correctly installed to the vehicle before using System Reset to rezero the seat weight. Failure to follow these instructions may result in incorrect operation of the occupant classification system (OCS) and increases the risk of serious personal injury or death in a crash.

NOTE: To prevent system failure, take the following precautions before carrying out the OCS reset.

Make sure the voltage to the OCSM is greater than 8 volts and less than 18 volts.

Make sure the OCS is not below 6 ° C (42.8 ° F) or above 36 ° C (96.7 ° F) when initiating the OCS reset process. If the vehicle has been exposed to extreme cold or hot temperatures, the vehicle must be exposed and kept at a temperature between 6 ° C (42.8 ° F) to 36 ° C (96.7 ° F) for a minimum of 30 minutes.

Make sure nothing is present on the passenger seat before and during the OCS reset process.

Prior to carrying out the OCS reset, make sure a minimum of 8 seconds has elapsed after cycling the ignition switch on.

Using a diagnostic scan tool, carry out the OCS reset. Cycle the ignition switch after the OCS reset.

5.

If the first system reset attempt was successful, proceed to prove out the SRS.

6.

If the first system reset attempt was not successful, carry out a thorough visual inspection of the OCS connector and wiring for damage, pressure sensor hose for kinks and or damage, and seat-related wiring harness and body wiring harness terminals and connectors for damage. Repair any concerns found and proceed to the next step.

7.

Carry out a second OCS reset. Cycle the ignition switch after the OCS reset. If the second attempt is unsuccessful, install a new OCS service kit. Refer to: Occupant Classification System (OCS) Sensor .

8.

Prove out the SRS. Verify all airbags are installed and connected and the ignition is OFF. Wait 10 seconds then turn the ignition ON and monitor the airbag warning indicator. The airbag warning indicator illuminates continuously for approximately 6 seconds and turns off. Continue to monitor the airbag warning indicator for approximately 30 seconds, as this is the time required for the RCM to complete testing of the SRS.

If a SRS fault is present, the airbag warning indicator either fails to light, remains lit continuously or flashes. The flashing may not occur until approximately 30 seconds after the ignition has been turned from OFF to ON. If this occurs, diagnose and repair any SRS faults before proceeding with other repairs.

If, after the ignition has been turned on for 30 seconds, the airbag warning indicator remains unlit with no chime or SRS message displayed in the message center, no SRS fault is present.

If the airbag warning indicator is inoperative and a SRS fault exists, a chime sounds in a pattern of 5 sets of 5 beeps or a message displays in the message center. If this occurs, diagnose and repair the airbag warning indicator and any SRS faults before proceeding with other repairs.

9.

Using a scan tool, clear all Continuous Memory Diagnostic Trouble Codes (CMDTCs) from all modules.

REMOVAL AND INSTALLATION > FRONT SEAT POWER LUMBAR ASSEMBLY > REMOVAL

NOTE: LHD driver seat shown, all others similar.

1.

Remove the front seat. Refer to: Front Seat .

2.

Position the front seat backrest cover.

1.

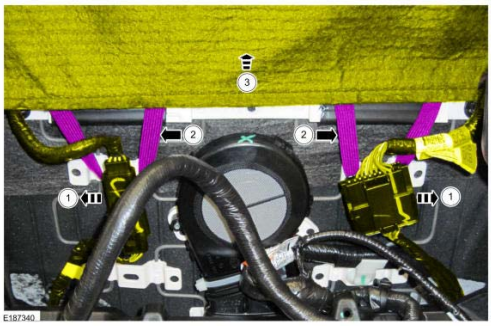
Release the wire harness electrical connector retainers.

2.

Detach the front seat backrest cove straps.

3.

Position the front seat backrest cover aside.



3.

Remove the backrest cover insert.

1.

Release the pin-type retainers.

2.

Position the backrest cover upwards.



4.

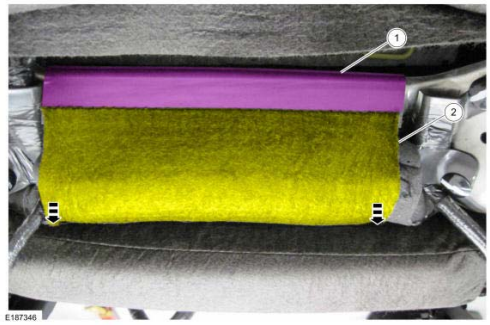
Position the front seat backrest cover.

1.

Release the J-clip.

2.

Position the backrest cover from between the seat cushion and backrest cushion.



5.

NOTE: Use care when separating the seat backrest trim cover from the hook-and-loop strips or the hook-and-loop strips may be torn from the seat backrest foam pad.

Release the hook-and-loop strips and position the backrest cover upward.



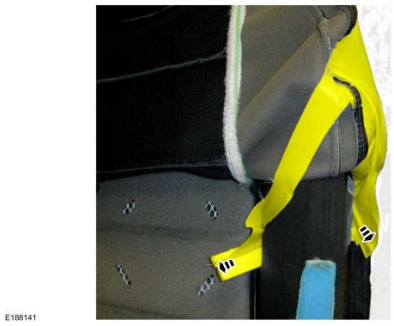
6.

Detach the side airbag deployment chute retainers and position aside.



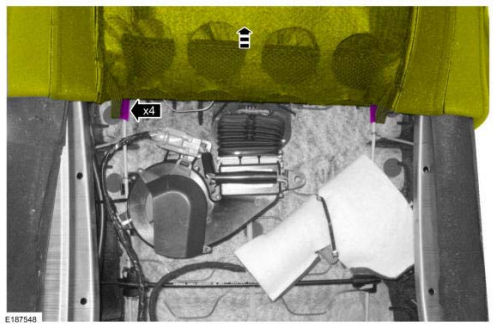
7.

Pull the side airbag deployment chute through the backrest foam.



8.

Release the backrest cover J-clips and position the backrest cover upward.

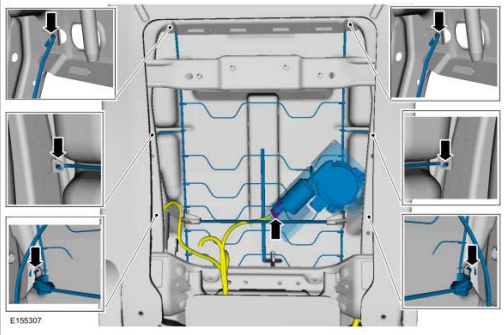


9.

If equipped, remove the backrest blower motor. Refer to: Front Seat Backrest Blower Motor .

10.

Disconnect the electrical connector, release the J-hooks and remove the lumbar assembly.



REMOVAL AND INSTALLATION > FRONT SEAT POWER LUMBAR ASSEMBLY > INSTALLATION

1.

WARNING: Inspect the seat side airbag, airbag cavity, mounting surface and deployment chute for damage or the presence of foreign material. Remove all foreign material. Install a new side airbag if it is damaged. Install a new deployment chute if the deployment chute is damaged. Failure to follow these instructions may result in the seat side airbag deploying incorrectly and increase the risk of serious personal injury or death in a crash.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > FRONT SEAT TRACK > REMOVAL

1.

Remove the front seat backrest. Refer to: Front Seat Backrest .

2.

Remove the front seat cushion cover and foam as an assembly. Refer to: Front Seat Cushion Cover .

3.

NOTE: This step is only necessary when the passenger seat is equipped with an original equipment (OE) OCS.

Remove the OCS. Refer to: Occupant Classification System (OCS) Sensor .

REMOVAL AND INSTALLATION > FRONT SEAT TRACK > INSTALLATION

1.

NOTE: Transfer components to the new seat track as necessary.

To install, reverse the removal procedure.

2.

NOTE: This step is only necessary when installing a new driver memory seat track.

Operate the seat in all directions through the full range of travel to set soft stops and avoid a

premature stopping point occurrence after the vehicle is returned to the customer.

REMOVAL AND INSTALLATION > FRONT SEAT TRACK MOTOR

Special Tool(s) / General Equipment

Electric Drill

REMOVAL AND INSTALLATION > FRONT SEAT TRACK MOTOR > REMOVAL

NOTE: LHD driver seat shown, all others similar.

1.

NOTE: Positioning the seat fully upward provides access to service the seat track motor with the seat in the vehicle.

Position the front seat to the full upward position.

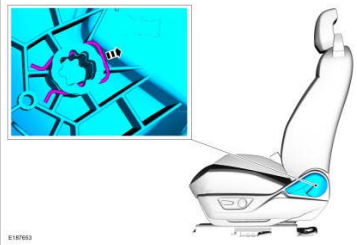


2.

Depower the SRS. Refer to: Supplemental Restraint System (SRS) Depowering .

3.

Release the retaining clip and remove the front seat recline handle.



4.

Remove the side shield screws.



5.

Remove the side shield.

1.

Lift up on the rear of the side shield and pull outward.

2.

Push the side shield forward.

3.

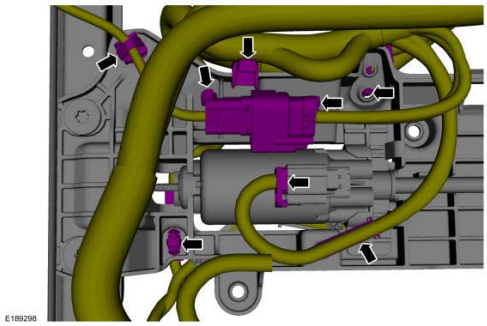
Disconnect the electrical connector.



6.

NOTE: Seat track components are removed for clarity.

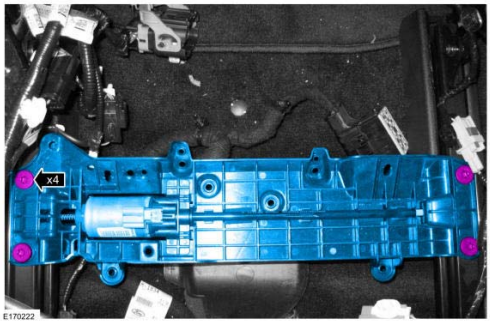
Disconnect the seat track motor electrical connector, release the wire harness retainers and position the wire harness aside.



7.

> *NOTE: Seat track components and wiring harness are removed for clarity.*

Remove the bolts and the seat track motor.



REMOVAL AND INSTALLATION > FRONT SEAT TRACK MOTOR > INSTALLATION

1.

> *NOTE: Use the bolts from the old seat track motor.*

Install the seat track motor bolts.

Torque

: 21 lb.ft (28 Nm)



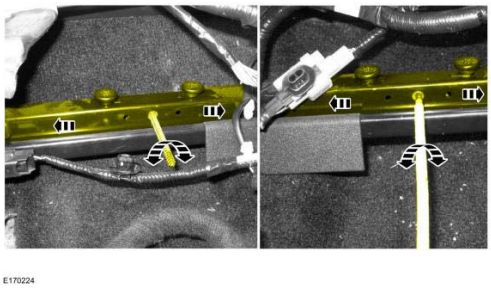
2.

NOTE: When using a drill to move the seat track, do not move the seat track to its forward or rearward end of travel stops, otherwise a new seat track must be installed.

NOTE: Be sure to drive the seat track evenly or the track will bind during movement.

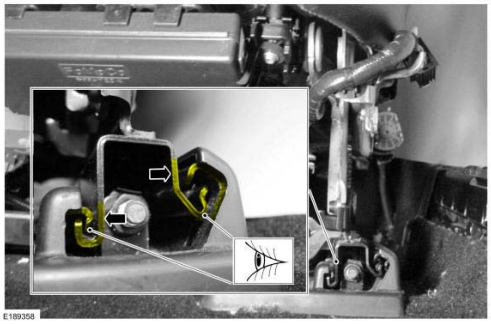
NOTE: Rotate the cables using 2 drills operating at similar speeds to most efficiently position the seat track.

Insert the original seat track motor drive cables and drive the gearbox and seat track uniformly until the front edge of the upper and lower seat tracks are flush. Use the General Equipment: Electric Drill



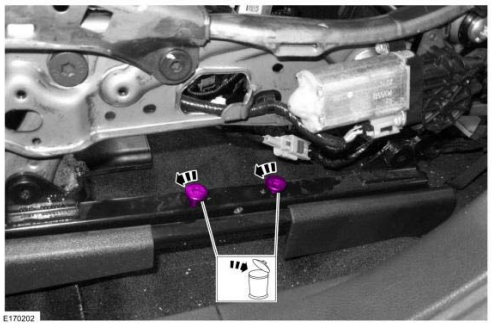
3.

The front edges of the upper and lower seat track rails must align with each other **on both sides of the seat** .



4.

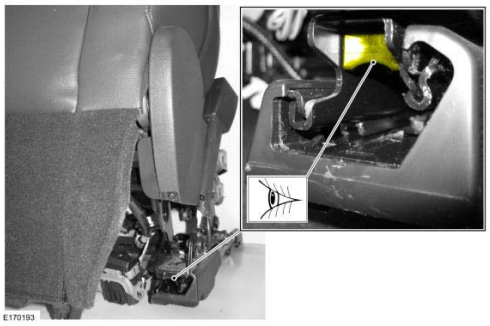
On both sides, remove the seat track motor bolts.



5.

> *NOTE: Install a new seat track if the block is not in place.*

Verify the block is in place at the rear of the inboard seat track rail.



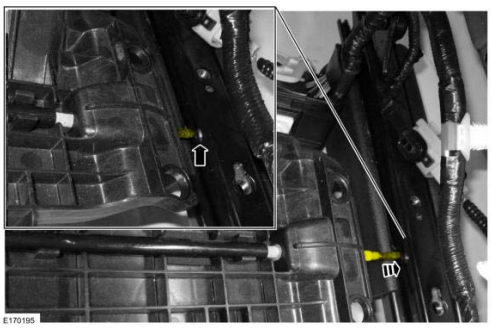
6.

To aid installation. Pull the long drive cable on the new motor assembly out of the sheathing.



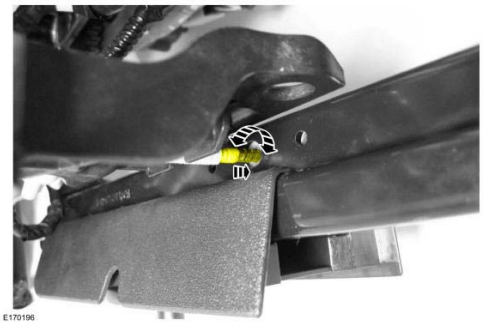
7.

Insert the long drive cable into the seat track gearbox.



8.

Rotate the long drive cable to verify engagement to seat track gearbox.



9.

NOTE: Do not severely bend the short drive cable during installation or damage to the cable will occur.

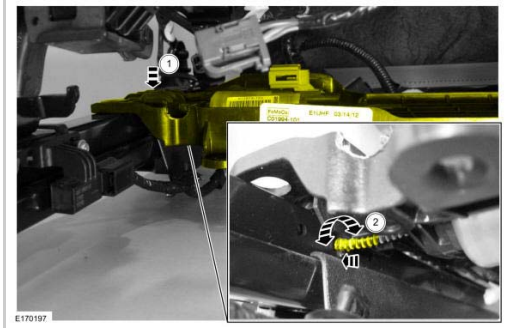
Insert the short drive cable into the seat track gearbox.

1.

Position the seat track motor while inserting the short cable into the seat track gearbox.

2.

Rotate the short drive cable to verify engagement to seat track gearbox.



10.

NOTE: Do not cross-thread the bolts as they are load bearing. If the bolts are cross-threaded, a new seat track must be installed.

NOTE: Seat track components and wiring harness are removed for clarity.

Install the seat track motor and install the new bolts in the sequence shown below.

1.

Install the rear inboard bolt.

Torque

: 21 lb.ft (28 Nm)

2.

Install the front inboard bolt.

Torque

: 21 lb.ft (28 Nm)

3.

Install the rear outboard bolt.

Torque

: 21 lb.ft (28 Nm)

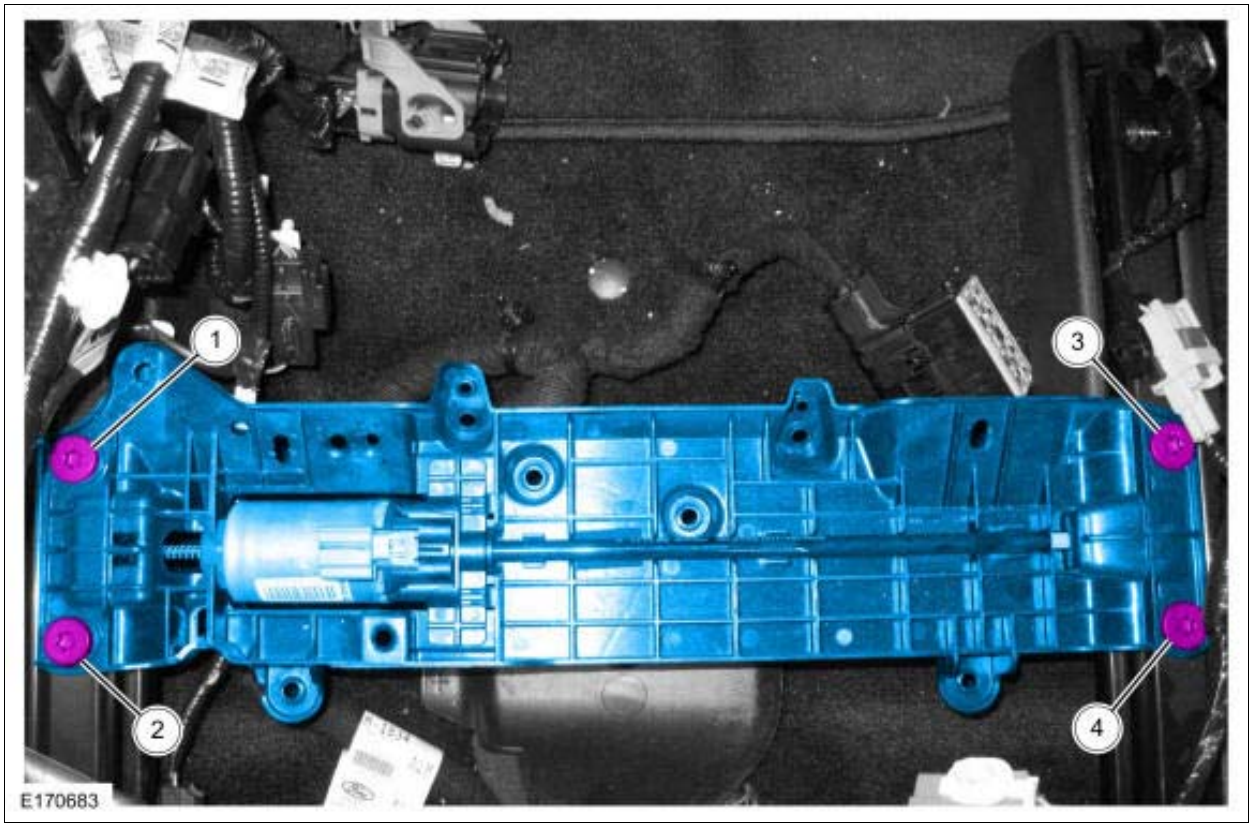
4.

Install the front outboard bolt.

Torque

: 21 lb.ft (28 Nm)

Fig 1: Front Seat Track Motor Bolts Tightening Sequence



Courtesy of FORD MOTOR CO.

11.

NOTE: Seat track components are removed for clarity.

Connect the seat track motor electrical connector and engage the wire harness retainers.



12.

Install the side shield.

1.

Connect the electrical connector.

2.

Position the side shield and push it rearward.

3.

Push the rear of the side shield inward.

4.

Push the rear of the side shield downward.



13.

Install the side shield screws.



14.

Install the retaining clip and the front seat recline handle.



15.

Repower the SRS. Refer to: Supplemental Restraint System (SRS) Repowering .

16.

On a driver seat with memory, operate the seat track horizontal motor in all directions through the full range of travel to set the soft stops and avoid a premature stopping point occurrence after the vehicle is returned to the customer.

DESCRIPTION AND OPERATION > GLASS, FRAMES AND MECHANISMS - OVERVIEW > OVERVIEW

Power Windows

Standard power window features include one-touch up/down operation (door windows only) when the master window control switch (or passenger door window control switch) is momentarily pressed to the second detent and released.

The master window control switch may be used to raise or lower the driver or passenger door windows. The passenger door window can also be operated from the passenger door window control switch.

For convertible, the rear quarter windows can be raised or lowered from the master window control switch.

Rear Window Defrost

When the rear window defrost is activated, the rear window defrost grid is energized, warming/heating the glass to improve rearward visibility.

DESCRIPTION AND OPERATION > GLASS, FRAMES AND MECHANISMS - SYSTEM OPERATION AND COMPONENT DESCRIPTION

System Operation

DESCRIPTION AND OPERATION > GLASS, FRAMES AND MECHANISMS - SYSTEM OPERATION AND COMPONENT DESCRIPTION > NETWORK MESSAGE CHART - POWER WINDOWS (WITH MEMORY DRIVER SEAT)

Passenger Door Module (PDM) Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Passenger window command	DDM	When activating the front passenger window from the master window control switch, the passenger window command is sent from the DDM to the PDM.

Body Control Module B (BCM-B) Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Convertible top window drop command	Movable Roof Control Module A (MRCMA)	When the convertible top switch is activated, the Movable Roof Control Module A (MRCMA) sends a message to the Body Control Module B (BCM-B), which then sends a

		global open signal/command to fully open all windows.
Global open command	BCM	When the RKE transmitter is used to initiate a global open command, the BCM sends the message to the Body Control Module B (BCM-B) which then sends a global open signal/command to fully open all windows.

DESCRIPTION AND OPERATION > GLASS, FRAMES AND MECHANISMS - SYSTEM OPERATION AND COMPONENT DESCRIPTION > NETWORK MESSAGE CHART - POWER WINDOWS (WITHOUT MEMORY DRIVER SEAT)

Body Control Module B (BCM-B) Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Convertible top window drop command	Movable Roof Control Module A (MRCMA)	When the convertible top switch is activated, the Movable Roof Control Module A (MRCMA) sends a message to the Body Control Module B (BCM-B), which then sends a global open signal/command to fully open all windows.
Global open command	BCM	When the RKE transmitter is used to initiate a global open command, the BCM sends the message to the Body Control Module B (BCM-B) which then sends a global open signal/command to fully open all windows.

DESCRIPTION AND OPERATION > GLASS, FRAMES AND MECHANISMS - SYSTEM OPERATION AND COMPONENT DESCRIPTION > NETWORK MESSAGE CHART - REAR WINDOW DEFROST

Front Controls Interface Module (FCIM) Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Climate control requests	APIM (if equipped with touchscreen)	The climate control requests message contains the rear window defrost request information. When the rear window defrost function is requested using voice command or the button is selected on the

		touchscreen, this input activates the rear window defrost system.

DESCRIPTION AND OPERATION > GLASS, FRAMES AND MECHANISMS - SYSTEM OPERATION AND COMPONENT DESCRIPTION > POWER WINDOW OPERATION

NOTE: If the vehicle battery is disconnected while the door window is moving, the one-touch up feature (and obstacle detection) is disabled. The convertible rear window motors do NOT need to be initialized as they do not have one-touch up or one-touch down functions.

Refer to: Power Door Window Initialization .

The power windows operate when the delayed accessory relay is active. The delayed accessory relay (non-serviceable) is located in the BCM. Both door windows are equipped with obstacle detection and one-touch up and one-touch down functionality. If an obstacle is detected as the window glass is moving upward, the window motor automatically reverses direction and moves the glass downward.

The window one-touch up/down feature is activated by pulling/pressing the window control switch to the up/down position (second detent). This allows the front door window glass to move upward/downward until it is fully closed/open. A momentary activation of the window control switch, while the window glass is moving upward or downward, stops the front door window glass.

If equipped with a memory driver seat, the master window control switch communicates to the DDM through a LIN. To operate the driver door window, the DDM supplies the applicable voltage signals to the driver door window regulator motor to operate the window in the desired direction. To operate the passenger door window from the master window control switch, the DDM communicates to the PDM through the Medium Speed Controller Area Network (MS-CAN), which then supplies the applicable voltage signals to the passenger door window regulator motor to operate the window in the desired direction. The passenger door window control switch provides ground input signals to the PDM, which then supplies the applicable voltage signals to the passenger door window regulator motor to operate the window in the desired direction.

DESCRIPTION AND OPERATION > GLASS, FRAMES AND MECHANISMS - SYSTEM OPERATION AND COMPONENT DESCRIPTION > GLOBAL OPEN

NOTE: The global open feature may be enabled/disabled by the customer following a procedure listed in the Owner's Literature. For a complete list of available programmable parameters, refer to MODULE CONFIGURATION .

The global open feature can automatically open both door windows and rear quarter windows (convertible) using the RKE transmitter. The global open feature only activates when the ignition is off and the delayed accessory relay is not active. After unlocking the vehicle, pressing and holding the unlock button on the RKE transmitter causes the Body Control Module B (BCM-B) to send a global open signal to each power window regulator motor. When this signal is sent the windows begin to open. If the lock or unlock button on the RKE is pressed while the windows are moving, the window operations will stop.

DESCRIPTION AND OPERATION > GLASS, FRAMES AND MECHANISMS - SYSTEM OPERATION AND COMPONENT DESCRIPTION > SHORT DROP WINDOWS

When the window motor senses a door has been opened (by monitoring its door ajar switch), the window motor opens the window slightly to clear the grooved channel weatherstrip. After the door is closed, the window motor senses the closed door, and the window motor fully closes and seats the window glass into the grooved channel weatherstrip. This function is on both the coupe and the convertible.

DESCRIPTION AND OPERATION > GLASS, FRAMES AND MECHANISMS - SYSTEM OPERATION AND COMPONENT DESCRIPTION > REAR QUARTER WINDOW OPERATION - CONVERTIBLE

NOTE: The convertible rear window motors do NOT need to be initialized as they do not have one-touch up or one-touch down functions.

Both rear quarter windows operate at the same time when activated by the master window control switch.

DESCRIPTION AND OPERATION > GLASS, FRAMES AND MECHANISMS - SYSTEM OPERATION AND COMPONENT DESCRIPTION > CONVERTIBLE TOP DROP WINDOW FUNCTION

When the convertible top switch is operated (to raise or lower the convertible top), the Body Control Module B (BCM-B) sends a signal on the global open circuit to the 4 window motors to activate a full down operation of all 4 windows. When the rear quarter windows reach the full DOWN position, the full down sensor in each rear quarter window motor sends a signal to the BCM-B that the windows are in the full DOWN position. At this time, the BCM-B allows the convertible top to operate (up or down). If the BCM-B does not see the full down signal from both rear quarter window motors, the convertible top does not operate. The BCM-B also disables/inhibits the rear quarter window control switch from operating the rear quarter windows when the convertible top is not in the full UP or full DOWN position by sending a message (pulses) on the global open circuit (the front door window motors ignore this message). This function is to prevent an accidental opening of the convertible top with the windows in the UP position causing contact between the windows and convertible top which may result in damage to the convertible top or windows.

DESCRIPTION AND OPERATION > GLASS, FRAMES AND MECHANISMS - SYSTEM OPERATION AND COMPONENT DESCRIPTION > REAR WINDOW DEFROST

When the rear window defrost switch (integral to the FCIM) is activated, the FCIM activates the rear window defrost relay located in the BJB. When activated, the rear window defrost relay supplies voltage to the rear window defrost grid.

If equipped, the rear window defrost can also be commanded on and off using voice commands or by touching the rear window defrost button located on the touchscreen (FDIM). For additional information on voice or touchscreen commanded features, refer to the Owner's Literature.

The FCIM deactivates the rear window defrost relay when one of these conditions is met:

- The rear window defrost switch is pressed when the feature is active.
- If equipped, the rear window defrost is commanded off using voice command or the touchscreen interface when the feature is active.
- Ignition state is changed from ON to OFF.
- A predetermined timer completes.
- Battery voltage has dropped below a specified threshold (load management strategy).

DESCRIPTION AND OPERATION > GLASS, FRAMES AND MECHANISMS - SYSTEM OPERATION AND COMPONENT DESCRIPTION > REMOTE START - REAR WINDOW DEFROST OPERATION

The customer can select different climate control modes/preferences when the vehicle is started using the remote start feature. This can be accessed through the message center. For additional information on setting the remote start preferences, refer to the Owner's Literature. When the rear defrost is set to AUTO mode, the rear window defrost activates when the outside temperature is less than 0 °C (32 °F) and the vehicle is started using the remote start feature. No climate control adjustments are recognized during remote start operation. Once the ignition is cycled to the ON mode, the climate control system returns to the previous settings (last ignition ON cycle) and adjustments can be made normally. If the previous setting was off, the climate control system turns off.

DESCRIPTION AND OPERATION > GLASS, FRAMES AND MECHANISMS - SYSTEM OPERATION AND COMPONENT DESCRIPTION > COMPONENT DESCRIPTION

Window Control Switches - Without Memory Driver Seat

The master window control switch (and passenger window control switch) sends 2 separate signals to the window motor: up and down. When the window control switch is pressed to the first detent position, a 12-volt signal is sent to the window motor to request an up or down operation. When auto up or auto down is requested (switch activated to the second detent position), the window control switch provides a 12-volt signal on both the up and down line simultaneously. During an auto up or auto down request, the window motor determines intended window direction by the signal first received. If the window control switch is activated too quickly to the second detent position (less than 5 milliseconds of time between first detent signal and second detent signal), the window motor is not able to determine the intended direction request and does not operate until the window control switch is released and activated again. The up and down contacts are floating within the window control switch when the switch is in the neutral position. The up and down feeds to the window motor are all low current.

For convertible, the master window control switch also operates the rear quarter windows. When the switch is activated, a 12-volt signal is sent to both rear quarter window motors to request an up or down operation.

Master Window Control Switch - With Memory Driver Seat

The master window control switch receives voltage whenever the delayed accessory relay is active. The master window control switch is grounded through the DDM. The master window control switch communicates to the DDM through a LIN.

Passenger Window Control Switch - With Memory Driver Seat

The PDM provides a return (ground) for the passenger door window control switch. The passenger window control switch sends 2 separate signals to the PDM: up and down. When the window control switch is pressed to the first detent position, a ground signal is sent to the PDM to request an up or down operation. When auto up or auto down is requested (switch activated to the second detent position), the window control switch provides a ground signal on both the up and down line simultaneously. During an auto up or auto down request, the PDM determines intended window direction by the signal first received

Door Window Regulator Motor

The door window regulator motor(s) are bi-directional. Window direction is determined by the low current voltage signal(s) being supplied to the motor from the window control switch or associated door module (if equipped with memory driver seat). The door window regulator motor contains integral electronics which control the one-touch up/down movements as well as the short drop window feature.

Rear Quarter Window Regulator Motor

The rear quarter window regulator motor(s) are bi-directional. Window direction is determined by the low current voltage signal(s) being supplied to the motor from the master window control switch or a command over the global open circuit.

Front Controls Interface Module (FCIM)

The FCIM contains the rear window defrost button and also controls the rear window defrost relay. PMI is required if installing a new module.

Front Display Interface Module (FDIM)

The FDIM contains a redundant rear window defrost button on the touchscreen display. The FDIM plugs directly into the APIM, and does not communicate directly on any network.

Driver Door Module (DDM)

For vehicles equipped with memory driver seat, the DDM receives power window commands from the master window control switch through a LIN. The DDM supplies the applicable voltage signals to the driver door window regulator motor to operate the window in the desired direction.

The DDM also communicates master window control switch requests to the PDM through the Medium Speed Controller Area Network (MS-CAN) to operate the passenger door window from the master window control switch. PMI is required if installing a new module.

Passenger Door Module (PDM)

The PDM receives power window commands from the passenger door window control switch or from the DDM through the Medium Speed Controller Area Network (MS-CAN). The PDM supplies the applicable voltage signals to the passenger door window regulator motor to operate the window in the desired direction. PMI is required if installing a new module.

Body Control Module B (BCM-B)

During a global open command or whenever the convertible top switch is operated (to raise or lower the convertible top if equipped), the Body Control Module B (BCM-B) sends a signal on a shared circuit to the window motors to activate a full down operation of all windows. PMI is required if installing a new module.

DIAGNOSIS AND TESTING > GLASS, FRAMES AND MECHANISMS > DTC CHART: BODY CONTROL MODULE B (BCM-B)

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

PDM DTC Chart

DTC	Description	Action
B127A:12	Global Window Control: Circuit Short To Battery	GO to Pinpoint Test I
B127A:14	Global Window Control: Circuit Short To Ground or Open	GO to Pinpoint Test I
All other Diagnostic Trouble Codes (DTCs)	-	REFER to: Body Control Module (BCM) .

DIAGNOSIS AND TESTING > GLASS, FRAMES AND MECHANISMS > DTC CHART: DRIVER DOOR MODULE (DDM)

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

DDM DTC Chart

DTC	Description	Action
B1088:83	LIN Bus "B": Value of Signal Protection Calculation Incorrect	GO to Pinpoint Test B
B1088:87	LIN Bus "B": Missing Message	GO to Pinpoint Test B
U2013:24	Switch Pack: Signal Stuck High	CLEAR the DTC. TEST the system for normal operation from the master window control switch. If any individual switches within the master window control switch are inoperative or the DTC returns, INSTALL a new master window control switch. REFER to: Front Door Window Control Switch .
All other Diagnostic Trouble Codes (DTCs)	-	REFER to: Locks, Latches and Entry Systems .

DIAGNOSIS AND TESTING > GLASS, FRAMES AND MECHANISMS > DTC CHART: FRONT CONTROLS INTERFACE MODULE (FCIM)

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

FCIM DTC Chart

DTC	Description	Action
B1C83:12	Rear Defog Relay: Circuit Short to Battery	GO to Pinpoint Test K
B1C83:14	Rear Defog Relay: Circuit Short To Ground or Open	If the defrost is inoperative, GO to Pinpoint Test K If the defrost does not shut off, GO to Pinpoint Test L
All other Diagnostic Trouble Codes (DTCs)	-	REFER to: Climate Control System - Vehicles With: Electronic Manual Temperature Control (EMTC) . REFER to: Climate Control System - Vehicles With: Dual Automatic Temperature Control (DATC) .

DIAGNOSIS AND TESTING > GLASS, FRAMES AND MECHANISMS > DTC CHART: PASSENGER DOOR MODULE (PDM)

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

PDM DTC Chart

DTC	Description	Action
U2002:24	Switch: Signal Stuck High	GO to Pinpoint Test D
All other Diagnostic Trouble Codes (DTCs)	-	REFER to: Locks, Latches and Entry Systems .

DIAGNOSIS AND TESTING > GLASS, FRAMES AND MECHANISMS > SYMPTOM CHART(S)

Symptom Chart: Glass, Frames and Mechanisms

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

Symptom Chart

Condition	Possible Sources	Actions
Both front door power windows are inoperative from the master window control switch only - with memory driver seat	Wiring, terminals or connectors Master window control switch DDM	DIAGNOSE any related DDM Diagnostic Trouble Codes (DTCs) first. REFER to the DDM DTC Chart . If there are no related Diagnostic Trouble Codes (DTCs) present, INSTALL a new master window control switch. REFER to: Front

		Door Window Control Switch .
Both front door power windows are inoperative - without memory driver seat	Fuse Wiring, terminals or connectors	VERIFY the BCM fuse 23 (10A) is OK. If OK, REPAIR circuit CBP23 (BN/YE) for an open. If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short.
The LH front power window is inoperative/does not operate correctly - without memory driver seat	Refer to the Pinpoint Test	GO to Pinpoint Test A
The LH front power window is inoperative/does not operate correctly - with memory driver seat	Refer to the Pinpoint Test	GO to Pinpoint Test B
The RH front power window is inoperative/does not operate correctly - without memory driver seat	Refer to the Pinpoint Test	GO to Pinpoint Test C
The RH front power window is inoperative/does not operate correctly - with memory driver seat	Refer to the Pinpoint Test	GO to Pinpoint Test D
Both rear quarter windows are inoperative from the window control switch	Refer to the Pinpoint Test	GO to Pinpoint Test E
The LH rear quarter window is inoperative/does not operate correctly	Refer to the Pinpoint Test	GO to Pinpoint Test F
The RH rear quarter window is inoperative/does not operate correctly	Refer to the Pinpoint Test	GO to Pinpoint Test G
The one-touch up/down feature is inoperative	Refer to the Pinpoint Test	GO to Pinpoint Test H
The global open function is inoperative	Refer to the Pinpoint Test	GO to Pinpoint Test I
The short drop window feature does not operate correctly	Refer to the Pinpoint Test	GO to Pinpoint Test J
The defrost system is inoperative	Refer to the Pinpoint Test	GO to Pinpoint Test K
The defrost system does not shut off automatically	Refer to the Pinpoint Test	GO to Pinpoint Test L
The defrost system does not respond to voice command only	Refer to the Pinpoint Test	VERIFY the rear window defrost operation using the instrument panel rear window defrost switch. If the rear window defrost is still inoperative, GO to Pinpoint Test K

		If the rear window defrost operates, Refer to the appropriate article for the procedure.
The defrost system does not respond to touchscreen command only	Refer to the Pinpoint Test	VERIFY the rear window defrost operation using the instrument panel rear window defrost switch. If the rear window defrost is still inoperative, GO to Pinpoint Test K If the rear window defrost operates, Refer to the appropriate article for the procedure.

DIAGNOSIS AND TESTING > GLASS, FRAMES AND MECHANISMS > PINPOINT TEST(S) > PINPOINT TEST A : THE LH (LEFT-HAND) FRONT POWER WINDOW IS INOPERATIVE/DOES NOT OPERATE CORRECTLY - WITHOUT MEMORY DRIVER SEAT

Refer to Power Windows for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Glass, Frames and Mechanisms - System Operation and Component Description .

Possible Causes

- Fuse
- Wiring, terminals or connectors
- Master window control switch
- Window regulator motor

Visual Inspection and Diagnostic Pre-checks

- Verify BJB fuse 11 (30A) is OK.

DIAGNOSIS AND TESTING > GLASS, FRAMES AND MECHANISMS > PINPOINT TEST(S) > PINPOINT TEST A : THE LH (LEFT-HAND) FRONT POWER WINDOW IS INOPERATIVE/DOES NOT OPERATE CORRECTLY - WITHOUT MEMORY DRIVER SEAT > PINPOINT TEST A : THE LH (LEFT-HAND) FRONT POWER WINDOW IS INOPERATIVE/DOES NOT OPERATE CORRECTLY - WITHOUT MEMORY DRIVER SEAT

A1 CHECK THE POWER TO THE WINDOW MOTOR

Ignition OFF.

Disconnect: Driver Door Window Regulator Motor C518 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C518-1		Ground

Is the voltage greater than 11 volts?

Yes	GO to A2

No	VERIFY BJB fuse 11 (30A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short. DE-INITIALIZE then INITIALIZE the window regulator motor. REFER to: Power Door Window Initialization .

A2 CHECK THE WINDOW MOTOR DELAYED ACCESSORY FEED

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C518-3		Ground

Is the voltage greater than 11 volts?

Yes	GO to A3

No	REPAIR the circuit. DE-INITIALIZE then INITIALIZE the window regulator motor. REFER to: Power Door Window Initialization .

A3 CHECK THE WINDOW MOTOR GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C518-2	Ω	Ground

Is the resistance less than 3 ohms?

Yes	GO to A4

No	REPAIR the circuit. DE-INITIALIZE then INITIALIZE the window regulator motor. REFER to: Power Door Window Initialization .

A4 CHECK FOR A SHORT TO VOLTAGE IN THE WINDOW UP/DOWN CIRCUITS

Disconnect: Master Window Control Switch C504 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C518-5		Ground
C518-4		Ground

Is any voltage present?

Yes	REPAIR the circuit in question. DE-INITIALIZE then INITIALIZE the window regulator motor. REFER to: Power Door Window Initialization .

No	GO to A5

A5 CHECK THE WINDOW UP/DOWN CIRCUITS FOR AN OPEN

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C518-5	Ω	C504-20
C518-4	Ω	C504-19

Are the resistances less than 3 ohms?

Yes	GO to A6

No	REPAIR the circuit in question. DE-INITIALIZE then INITIALIZE the window regulator motor. REFER to: Power Door Window Initialization .

A6 CHECK THE MASTER WINDOW CONTROL SWITCH

Carry out the master window control switch component test. Refer to Component Testing for schematic and connector information.

Did the master window control switch pass the component test?

Yes	INSTALL a new window regulator motor. REFER to: Front Door Window Regulator Motor .

No	INSTALL a new master window control switch. REFER to: Front Door Window Control Switch . DE-INITIALIZE then INITIALIZE the window regulator motor. REFER to: Power Door Window Initialization .

DIAGNOSIS AND TESTING > GLASS, FRAMES AND MECHANISMS > PINPOINT TEST(S) > PINPOINT TEST B : THE LH (LEFT-HAND) FRONT POWER WINDOW IS INOPERATIVE/DOES NOT OPERATE CORRECTLY - WITH MEMORY DRIVER SEAT

Refer to Power Windows for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Glass, Frames and Mechanisms - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1088:83	LIN Bus "B": Value of Signal Protection Calculation Incorrect	This DTC sets when the DDM has received invalid data from the master window control switch.
B1088:87	LIN Bus "B": Missing Message	This DTC sets when the DDM has lost communication from the master window control switch.

Possible Causes

- Wiring, terminals or connectors
- Master window control switch
- Driver door window regulator motor
- DDM

DIAGNOSIS AND TESTING > GLASS, FRAMES AND MECHANISMS > PINPOINT TEST(S) > PINPOINT TEST B : THE LH (LEFT-HAND) FRONT POWER WINDOW IS INOPERATIVE/DOES NOT OPERATE CORRECTLY - WITH MEMORY DRIVER SEAT > PINPOINT TEST B : THE LH (LEFT-HAND) FRONT POWER WINDOW IS INOPERATIVE/DOES NOT OPERATE CORRECTLY - WITH MEMORY DRIVER SEAT

B1 CHECK FOR DDM (DRIVER DOOR MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition ON.

Using a diagnostic scan tool, perform DDM self-test.

Are any DDM Diagnostic Trouble Codes (DTCs) present?

Yes	For DTC B1088:83 and B1088:87, GO to B2 For all other Diagnostic Trouble Codes (DTCs), REFER to the DDM DTC Chart .

No	GO to B8

B2 CHECK FOR VOLTAGE TO THE MASTER WINDOW CONTROL SWITCH

Ignition OFF.

Disconnect: Master Window Control Switch C535 (coupe) or C504 (convertible).

Ignition ON.

For coupe, measure:

Positive Lead	Measurement / Action	Negative Lead
C535-1		Ground

For convertible, measure:

Positive Lead	Measurement / Action	Negative Lead
C504-10		Ground

Is the voltage greater than 11 volts?

Yes	GO to B3

No	REPAIR the circuit.

B3 CHECK THE MASTER WINDOW CONTROL SWITCH GROUND CIRCUIT

Ignition OFF.

For coupe, measure:

Positive Lead	Measurement / Action	Negative Lead
C535-4	Ω	Ground

For convertible, measure:

Positive Lead	Measurement / Action	Negative Lead
C504-11	Ω	Ground

Is the resistance less than 3 ohms?

Yes	GO to B5

No	GO to B4

B4 CHECK THE MASTER WINDOW CONTROL SWITCH GROUND CIRCUIT FOR AN OPEN

Disconnect: DDM C501A .

For coupe, measure:

Positive Lead	Measurement / Action	Negative Lead
C535-4	Ω	C501A-17

For convertible, measure:

Positive Lead	Measurement / Action	Negative Lead
C504-11	Ω	C501A-17

Is the resistance less than 3 ohms?

Yes	GO to B16

No	REPAIR the circuit.

B5 CHECK THE MASTER WINDOW CONTROL SWITCH LIN (LOCAL INTERCONNECT NETWORK) CIRCUIT FOR A SHORT TO VOLTAGE

Disconnect: DDM C501A .

Ignition ON.

For coupe, measure:

Positive Lead	Measurement / Action	Negative Lead
C535-3	V	Ground

For convertible, measure:

Positive Lead	Measurement / Action	Negative Lead
C504-1	V	Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to B6

B6 CHECK THE MASTER WINDOW CONTROL SWITCH LIN (LOCAL INTERCONNECT NETWORK) CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

For coupe, measure:

Positive Lead	Measurement / Action	Negative Lead
C535-3	Ω	Ground

For convertible, measure:

Positive Lead	Measurement / Action	Negative Lead
C504-1	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to B7

No	REPAIR the circuit.

B7 CHECK THE MASTER WINDOW CONTROL SWITCH LIN (LOCAL INTERCONNECT NETWORK) CIRCUIT FOR AN OPEN

For coupe, measure:

Positive Lead	Measurement / Action	Negative Lead
C535-3	Ω	C501A-5

For convertible, measure:

Positive Lead	Measurement / Action	Negative Lead
C504-1	Ω	C501A-5

Is the resistance less than 3 ohms?

Yes	INSTALL a new master window control switch. REFER to: Front Door Window Control Switch . RETEST the system. If the concern is still present, GO to B16

No	REPAIR the circuit.

B8 CHECK THE DRIVER'S FRONT WINDOW SWITCH - DRIVER'S DOOR (DF_WINDSW_DD) PID (PARAMETER IDENTIFICATION)

Using a diagnostic scan tool, view DDM Parameter Identifications (PIDs).

Monitor the DDM PID DF_WINDSW_DD while pressing and releasing the master window control switch in the up and down positions.

Does the PID status agree with the master window control switch as it is pressed and released?

Yes	GO to B9

No	INSTALL a new master window control switch. REFER to: Front Door Window Control Switch .

B9 CHECK THE BATTERY VOLTAGE TO THE WINDOW MOTOR

Ignition OFF.

Disconnect: Driver Door Window Regulator Motor C518 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C518-1		Ground

Is the voltage greater than 11 volts?

Yes	GO to B10

No	REPAIR the circuit. DE-INITIALIZE then INITIALIZE the window regulator motor. REFER to: Power Door Window Initialization .

B10 CHECK THE WINDOW MOTOR DELAYED ACCESSORY FEED

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C518-3		Ground

Is the voltage greater than 11 volts?

Yes	GO to B11

No	REPAIR the circuit. DE-INITIALIZE then INITIALIZE the window regulator motor. REFER to: Power Door Window Initialization .

B11 CHECK THE WINDOW MOTOR GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead

C518-2	Ω	Ground

Is the resistance less than 3 ohms?

Yes	GO to B12

No	REPAIR the circuit. DE-INITIALIZE then INITIALIZE the window regulator motor. REFER to: Power Door Window Initialization .

B12 CHECK FOR A SHORT TO VOLTAGE IN THE WINDOW UP/DOWN CIRCUITS

Disconnect: DDM C501B .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C518-5	V	Ground
C518-4	V	Ground

Is any voltage present?

Yes	REPAIR the circuit in question. DE-INITIALIZE then INITIALIZE the window regulator motor. REFER to: Power Door Window Initialization .

No	GO to B13

B13 CHECK FOR A SHORT TO GROUND IN THE WINDOW UP/DOWN CIRCUITS

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C518-5	Ω	Ground
C518-4	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to B14

No	REPAIR the circuit in question. DE-INITIALIZE then INITIALIZE the window regulator motor. REFER to: Power Door Window Initialization .

B14 CHECK FOR AN OPEN IN THE WINDOW UP/DOWN CIRCUITS

Measure:

Positive Lead	Measurement / Action	Negative Lead
C518-5	Ω	C501B-10
C518-4	Ω	C501B-19

Are the resistances less than 3 ohms?

Yes	GO to B15

No	REPAIR the circuit in question. DE-INITIALIZE then INITIALIZE the window regulator motor. REFER to: Power Door Window Initialization .

B15 CHECK THE DDM (DRIVER DOOR MODULE) OUTPUT

Connect: DDM C501B .

Ignition ON.

While pressing and holding the master window control switch in the UP position, measure:

Positive Lead	Measurement / Action	Negative Lead
C518-4		Ground

While pressing and holding the master window control switch in the DOWN position, measure:

Positive Lead	Measurement / Action	Negative Lead
C518-5		Ground

Are the voltages greater than 11 volts when the master window control switch is activated in both up and down positions?

Yes	INSTALL a new driver door window regulator motor. REFER to: Front Door Window Regulator Motor .

No	GO to B16

B16 CHECK FOR CORRECT DDM (DRIVER DOOR MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all the DDM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins as necessary

pushed-out pins - install new pins as necessary

Reconnect the DDM connectors. Make sure they seat and latch correctly.

Reconnect all previously disconnected connectors.

Ignition ON.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new DDM. REFER to: Driver Door Module (DDM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > GLASS, FRAMES AND MECHANISMS > PINPOINT TEST(S) > PINPOINT TEST C : THE RH (RIGHT-HAND) FRONT POWER WINDOW IS INOPERATIVE/DOES NOT OPERATE CORRECTLY - WITHOUT MEMORY DRIVER SEAT

Refer to Power Windows for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Glass, Frames and Mechanisms - System Operation and Component Description .

Possible Causes

- Fuse
- Wiring, terminals or connectors
- Window control switch
- Window regulator motor

Visual Inspection and Diagnostic Pre-checks

- Verify BCM fuse 26 (30A) is OK.

DIAGNOSIS AND TESTING > GLASS, FRAMES AND MECHANISMS > PINPOINT TEST(S) > PINPOINT TEST C : THE RH (RIGHT-HAND) FRONT POWER WINDOW IS INOPERATIVE/DOES NOT OPERATE CORRECTLY - WITHOUT MEMORY DRIVER SEAT > PINPOINT TEST C : THE RH (RIGHT-HAND) FRONT POWER WINDOW IS INOPERATIVE/DOES NOT OPERATE CORRECTLY - WITHOUT MEMORY DRIVER SEAT

C1 CHECK THE WINDOW OPERATION FROM BOTH WINDOW CONTROL SWITCHES

Ignition ON.

Attempt to operate the RH door window from the master window control switch and also the passenger door window control switch.

Does the RH door window operate from at least one window control switch?

Yes	If the RH door window operates only from the passenger door window control switch, GO to C2 If the RH door window operates only from the master window control switch, GO to C3

No	GO to C5

C2 CHECK THE WINDOW CONTROL SWITCH UP/DOWN CIRCUITS FOR AN OPEN

Ignition OFF.

Disconnect: Master Window Control Switch C504 and Passenger Door Window Control Switch C624 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C624-3	Ω	C504-15
C624-2	Ω	C504-16

Are the resistances less than 3 ohms?

Yes	INSTALL a new master window control switch. REFER to: Front Door Window Control Switch .

No	REPAIR the circuit in question.

C3 CHECK FOR VOLTAGE TO THE PASSENGER WINDOW CONTROL SWITCH

Ignition OFF.

Disconnect: Passenger Door Window Control Switch C624 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C624-1		Ground

Is the voltage greater than 11 volts?

Yes	GO to C4

No	REPAIR the circuit.

C4 CHECK THE WINDOW CONTROL SWITCH CIRCUITS FOR AN OPEN

Ignition OFF.

Disconnect: Master Window Control Switch C504 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C624-3	Ω	C504-15
C624-2	Ω	C504-16

Are the resistances less than 3 ohms?

Yes	INSTALL a new passenger door window control switch. REFER to: Front Door Window Control Switch .

No	REPAIR the circuit in question.

C5 CHECK FOR BATTERY VOLTAGE TO THE WINDOW MOTOR

Ignition OFF.

Disconnect: Passenger Door Window Regulator Motor C608 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C608-1	V	Ground

Is the voltage greater than 11 volts?

Yes	GO to C6

No	VERIFY BCM fuse 26 (30A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short. DE-INITIALIZE then INITIALIZE the window regulator motor. REFER to: Power Door Window Initialization .

C6 CHECK THE WINDOW MOTOR DELAYED ACCESSORY FEED

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C608-3	V	Ground

Is the voltage greater than 11 volts?

Yes	GO to C7

No	REPAIR the circuit. DE-INITIALIZE then INITIALIZE the window regulator motor. REFER to: Power Door Window Initialization .

C7 CHECK THE WINDOW MOTOR GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C608-2	Ω	Ground

Is the resistance less than 3 ohms?

Yes	GO to C8

No	REPAIR the circuit. DE-INITIALIZE then INITIALIZE the window regulator motor. REFER to: Power Door Window Initialization .

C8 CHECK FOR A SHORT TO VOLTAGE IN THE WINDOW UP/DOWN CIRCUITS

Disconnect: Master Window Control Switch C504 and Passenger Door Window Control Switch C624 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C608-5	V	Ground
C608-4	V	Ground

Is any voltage present?

Yes	REPAIR the circuit in question. DE-INITIALIZE then INITIALIZE the window regulator motor. REFER to: Power Door Window Initialization .

No	GO to C9

C9 CHECK THE WINDOW UP/DOWN CIRCUITS FOR AN OPEN

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C608-5	Ω	C624-3
C608-4	Ω	C624-2

Are the resistances less than 3 ohms?

Yes	INSTALL a new window regulator motor. REFER to: Front Door Window Regulator Motor .

No	REPAIR the circuit in question. DE-INITIALIZE then INITIALIZE the window regulator motor. REFER to: Power Door Window Initialization .

DIAGNOSIS AND TESTING > GLASS, FRAMES AND MECHANISMS > PINPOINT TEST(S) > PINPOINT TEST D : THE RH (RIGHT-HAND) FRONT POWER WINDOW IS INOPERATIVE/DOES NOT OPERATE CORRECTLY - WITH MEMORY DRIVER SEAT

Refer to Power Windows for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Glass, Frames and Mechanisms - System Operation and Component Description .

Possible Causes

- Wiring, terminals or connectors
- Master window control switch
- Passenger door window control switch
- Passenger door window regulator motor
- PDM

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U2002:24	Switch: Signal Stuck High	This DTC sets when the PDM detects the window control switch is stuck in the UP or DOWN position or a short to ground is present on the input circuit for greater than 10 seconds.

DIAGNOSIS AND TESTING > GLASS, FRAMES AND MECHANISMS > PINPOINT TEST(S) > PINPOINT TEST D : THE RH (RIGHT-HAND) FRONT POWER WINDOW IS INOPERATIVE/DOES NOT OPERATE CORRECTLY - WITH MEMORY DRIVER SEAT > PINPOINT TEST D : THE RH (RIGHT-HAND) FRONT POWER WINDOW IS INOPERATIVE/DOES NOT OPERATE CORRECTLY - WITH MEMORY DRIVER SEAT

D1 CHECK FOR PDM (PASSENGER DOOR MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition ON.

Using a diagnostic scan tool, perform PDM self-test.

Are any PDM Diagnostic Trouble Codes (DTCs) present?

Yes	For DTC U2002:24, GO to D2 For all other Diagnostic Trouble Codes (DTCs), REFER to: Locks, Latches and Entry Systems .

No	GO to D4

D2 CHECK THE WINDOW CONTROL SWITCH CIRCUITS FOR A SHORT TO GROUND

Ignition OFF.

Disconnect: PDM C652A .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C652A-8	Ω	Ground
C652A-9	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to D16

No	GO to D3

D3 CHECK THE WINDOW CONTROL SWITCH CIRCUITS FOR A SHORT TO GROUND WITH THE WINDOW CONTROL SWITCH DISCONNECTED

Disconnect: Passenger Door Window Control Switch C624 .

Measure:

Positive Lead	Measurement / Action	Negative Lead

C652A-8	Ω	Ground
C652A-9	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	INSTALL a new passenger door window control switch. REFER to: Front Door Window Control Switch .

No	REPAIR the circuit in question.

D4 CHECK THE WINDOW OPERATION FROM BOTH WINDOW CONTROL SWITCHES

Ignition ON.

Attempt to operate the RH door window from the master window control switch and also the passenger door window control switch.

Does the RH door window operate from at least one window control switch?

Yes	If the RH door window operates only from the passenger door window control switch, INSTALL a new master window control switch. REFER to: Front Door Window Control Switch . If the RH door window operates only from the master window control switch, GO to D5

No	GO to D9

D5 CHECK THE PASSENGER DOOR WINDOW CONTROL SWITCH RETURN CIRCUIT

Ignition OFF.

Disconnect: Passenger Door Window Control Switch C624 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C624-1	Ω	Ground

Is the resistance less than 3 ohms?

Yes	GO to D7

No	GO to D6

D6 CHECK THE PASSENGER DOOR WINDOW CONTROL SWITCH RETURN CIRCUIT FOR AN OPEN

Disconnect: PDM C652A .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C624-1	Ω	C652A-17

Is the resistance less than 3 ohms?

Yes	GO to D16

No	REPAIR the circuit.

D7 CHECK THE WINDOW CONTROL SWITCH UP/DOWN CIRCUITS

Disconnect: PDM C652A .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C624-3	Ω	C652A-9
C624-2	Ω	C652A-8

Are the resistances less than 3 ohms?

Yes	GO to D8

No	REPAIR the circuit in question.

D8 CHECK THE PASSENGER DOOR WINDOW CONTROL SWITCH

Carry out the passenger door window control switch component test. Refer to Component Testing for schematic and connector information.

Did the passenger door window control switch pass the component test?

Yes	GO to D16

No	INSTALL a new passenger door window control switch. REFER to: Front Door Window Control Switch .

D9 CHECK FOR BATTERY VOLTAGE TO THE WINDOW MOTOR

Ignition OFF.

Disconnect: Passenger Door Window Regulator Motor C608 .

Measure:

Positive Lead	Measurement / Action	Negative Lead

C608-1		Ground

Is the voltage greater than 11 volts?

Yes	GO to D10

No	REPAIR the circuit. DE-INITIALIZE then INITIALIZE the window regulator motor. REFER to: Power Door Window Initialization .

D10 CHECK THE WINDOW MOTOR DELAYED ACCESSORY FEED

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C608-3		Ground

Is the voltage greater than 11 volts?

Yes	GO to D11

No	REPAIR the circuit. DE-INITIALIZE then INITIALIZE the window regulator motor. REFER to: Power Door Window Initialization .

D11 CHECK THE WINDOW MOTOR GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C608-2	Ω	Ground

Is the resistance less than 3 ohms?

Yes	GO to D12

No	REPAIR the circuit. DE-INITIALIZE then INITIALIZE the window regulator motor. REFER to: Power Door Window Initialization .

D12 CHECK FOR A SHORT TO VOLTAGE IN THE WINDOW UP/DOWN CIRCUITS

Disconnect: PDM C652B .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C608-5		Ground
C608-4		Ground

Is any voltage present?

Yes	REPAIR the circuit in question. DE-INITIALIZE then INITIALIZE the window regulator motor. REFER to: Power Door Window Initialization .

No	GO to D13

D13 CHECK FOR A SHORT TO GROUND IN THE WINDOW UP/DOWN CIRCUITS

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C608-5	Ω	Ground
C608-4	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to D14

No	REPAIR the circuit in question. DE-INITIALIZE then INITIALIZE the window regulator motor. REFER to: Power Door Window Initialization .

D14 CHECK THE WINDOW UP/DOWN CIRCUITS FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C608-5	Ω	C652B-10
C608-4	Ω	C652B-19

Are the resistances less than 3 ohms?

Yes	GO to D15

No	REPAIR the circuit in question. DE-INITIALIZE then INITIALIZE the window regulator motor. REFER to: Power Door Window Initialization .

D15 CHECK THE PDM (PASSENGER DOOR MODULE) OUTPUT

Connect: PDM C652B .

Ignition ON.

While pressing and holding the window control switch in the UP position, measure:

Positive Lead	Measurement / Action	Negative Lead
C608-4		Ground

While pressing and holding the window control switch in the DOWN position, measure:

Positive Lead	Measurement / Action	Negative Lead
C608-5		Ground

Are the voltages greater than 11 volts when the door window control switch is activated in both up and down positions?

Yes	INSTALL a new passenger door window regulator motor. REFER to: Front Door Window Regulator Motor .

No	GO to D16

D16 CHECK FOR CORRECT PDM (PASSENGER DOOR MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all the PDM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins as necessary

pushed-out pins - install new pins as necessary

Reconnect the PDM connectors. Make sure they seat and latch correctly.

Reconnect all previously disconnected connectors.

Ignition ON.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PDM. REFER to: Passenger Door Module (PDM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > GLASS, FRAMES AND MECHANISMS > PINPOINT TEST(S) > PINPOINT TEST E : BOTH REAR QUARTER WINDOWS ARE INOPERATIVE FROM THE WINDOW CONTROL SWITCH

Refer to Power Windows for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Glass, Frames and Mechanisms - System Operation and Component Description .

Possible Causes

- Convertible top not in fully closed/latched or open position
- Wiring, terminals or connectors
- Master window control switch

Visual Inspection and Diagnostic Pre-checks

- The rear window operation from the switch is disabled when the convertible top is not fully open or fully closed. Verify the convertible top is in the fully open, or fully closed and latched position before carrying out this pinpoint test.

DIAGNOSIS AND TESTING > GLASS, FRAMES AND MECHANISMS > PINPOINT TEST(S) > PINPOINT TEST E : BOTH REAR QUARTER WINDOWS ARE INOPERATIVE FROM THE WINDOW CONTROL SWITCH > PINPOINT TEST E : BOTH REAR QUARTER WINDOWS ARE INOPERATIVE FROM THE WINDOW CONTROL SWITCH

E1 CHECK FOR MRCMA (MOVABLE ROOF CONTROL MODULE A) DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition ON.

Using a diagnostic scan tool, perform MRCMA (Movable Roof Control Module A) self-test.

Are any MRCMA (Movable Roof Control Module A) Diagnostic Trouble Codes (DTCs) present?

Yes	DIAGNOSE any convertible top related Diagnostic Trouble Codes (DTCs) first. Refer to the appropriate article for the procedure.

No	GO to E2

E2 CHECK THE WINDOW UP/DOWN CIRCUITS FOR AN OPEN

Ignition OFF.

Disconnect: Master Window Control Switch C504 .

Disconnect: Left Rear Power Window Motor C3118 .

If equipped with memory driver seat, measure:

Positive Lead	Measurement / Action	Negative Lead
C504-13	Ω	C3118-4
C504-14	Ω	C3118-5

If not equipped with memory driver seat, measure:

Positive Lead	Measurement / Action	Negative Lead
C504-17	Ω	C3118-4
C504-18	Ω	C3118-5

Are the resistances less than 3 ohms?

Yes	INSTALL a new master window control switch. REFER to: Front Door Window Control Switch .

No	REPAIR the circuit.

DIAGNOSIS AND TESTING > GLASS, FRAMES AND MECHANISMS > PINPOINT TEST(S) > PINPOINT TEST F : THE LH (LEFT-HAND) REAR QUARTER WINDOW IS INOPERATIVE/DOES NOT OPERATE CORRECTLY

Refer to Power Windows for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Glass, Frames and Mechanisms - System Operation and Component Description .

Possible Causes

- Fuse
- Wiring, terminals or connectors
- Master window control switch
- Rear window regulator motor

Visual Inspection and Diagnostic Pre-checks

- Verify BCM fuse 29 (30A) is OK.

DIAGNOSIS AND TESTING > GLASS, FRAMES AND MECHANISMS > PINPOINT TEST(S) > PINPOINT TEST F : THE LH (LEFT-HAND) REAR QUARTER WINDOW IS INOPERATIVE/DOES NOT OPERATE CORRECTLY > PINPOINT TEST F : THE LH (LEFT-HAND) REAR QUARTER WINDOW IS INOPERATIVE/DOES NOT OPERATE CORRECTLY

F1 CHECK THE WINDOW UP/DOWN CIRCUITS FOR AN OPEN

Ignition OFF.

Disconnect: Master Window Control Switch C504 .

Disconnect: Left Rear Power Window Motor C3118 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C504-17	Ω	C3118-4
C504-18	Ω	C3118-5

Are the resistances less than 3 ohms?

Yes	GO to F2

No	REPAIR the circuit.

F2 CHECK THE POWER TO THE WINDOW MOTOR

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3118-1	V	Ground

Is the voltage greater than 11 volts?

Yes	GO to F3

No	VERIFY BCM fuse 29 (30A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short.

F3 CHECK THE WINDOW MOTOR DELAYED ACCESSORY FEED

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3118-3		Ground

Is the voltage greater than 11 volts?

Yes	GO to F4

No	REPAIR the circuit.

F4 CHECK THE WINDOW MOTOR GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3118-2	Ω	Ground

Is the resistance less than 3 ohms?

Yes	INSTALL a new window regulator motor. REFER to: Rear Quarter Window Regulator Motor - Convertible .

No	REPAIR the circuit.

DIAGNOSIS AND TESTING > GLASS, FRAMES AND MECHANISMS > PINPOINT TEST(S) > PINPOINT TEST G : THE RH (RIGHT-HAND) REAR QUARTER WINDOW IS INOPERATIVE/DOES NOT OPERATE CORRECTLY

The RH Rear Quarter Window is Inoperative/Does Not Operate Correctly

Refer to Power Windows for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Glass, Frames and Mechanisms - System Operation and Component Description .

Possible Causes

- Fuse
- Wiring, terminals or connectors
- Master window control switch
- Rear window regulator motor

Visual Inspection and Diagnostic Pre-checks

- Verify BCM fuse 30 (30A) is OK.

DIAGNOSIS AND TESTING > GLASS, FRAMES AND MECHANISMS > PINPOINT TEST(S) > PINPOINT TEST G : THE RH (RIGHT-HAND) REAR QUARTER WINDOW IS INOPERATIVE/DOES NOT OPERATE CORRECTLY > PINPOINT TEST G : THE RH (RIGHT-HAND) REAR QUARTER WINDOW IS INOPERATIVE/DOES NOT OPERATE CORRECTLY

G1 CHECK THE WINDOW UP/DOWN CIRCUITS FOR AN OPEN

Ignition OFF.

Disconnect: Master Window Control Switch C504 .

Disconnect: Left Rear Power Window Motor C3119 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C504-17	Ω	C3119-4
C504-18	Ω	C3119-5

Are the resistances less than 3 ohms?

Yes	GO to G2

No	REPAIR the circuit.

G2 CHECK THE POWER TO THE WINDOW MOTOR

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3119-1	V	Ground

Is the voltage greater than 11 volts?

Yes	GO to G3

No	VERIFY BCM fuse 30 (30A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short.

G3 CHECK THE WINDOW MOTOR DELAYED ACCESSORY FEED

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3119-3		Ground

Is the voltage greater than 11 volts?

Yes	GO to G4

No	REPAIR the circuit.

G4 CHECK THE WINDOW MOTOR GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3119-2	Ω	Ground

Is the resistance less than 3 ohms?

Yes	INSTALL a new window regulator motor. REFER to: Rear Quarter Window Regulator Motor - Convertible .

No	REPAIR the circuit.

DIAGNOSIS AND TESTING > GLASS, FRAMES AND MECHANISMS > PINPOINT TEST(S) > PINPOINT TEST H : THE ONE-TOUCH UP/DOWN FEATURE IS INOPERATIVE

Refer to Power Windows for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Glass, Frames and Mechanisms - System Operation and Component Description .

Possible Causes

- Window regulator motor not initialized
- Window control switch

DIAGNOSIS AND TESTING > GLASS, FRAMES AND MECHANISMS > PINPOINT TEST(S) > PINPOINT TEST H : THE ONE-TOUCH UP/DOWN FEATURE IS INOPERATIVE

> PINPOINT TEST H : THE ONE-TOUCH UP/DOWN FEATURE IS INOPERATIVE

H1 INITIALIZE THE SUSPECT POWER WINDOW

Carry out the initialization procedure on the suspect power window. REFER to: Power Door Window Initialization .

Is the one-touch up feature operating correctly?

Yes	The system is operating normally at this time. The window lost initialization.

No	If the LH front window one-touch up/down feature is inoperative, INSTALL a new master window control switch. REFER to: Front Door Window Control Switch . If the concern is still present, INSTALL a new window regulator motor. REFER to: Front Door Window Regulator Motor . If the RH front window one-touch up/down feature is inoperative from the passenger window control switch, INSTALL a new passenger window control switch. REFER to: Front Door Window Control Switch . If the concern is still present, INSTALL a new window regulator motor. REFER to: Front Door Window Regulator Motor . If the RH front window one-touch up/down feature is inoperative from the master window control switch, INSTALL a new master window control switch. REFER to: Front Door Window Control Switch . If the concern is still present, INSTALL a new window regulator motor. REFER to: Front Door Window Regulator Motor .

DIAGNOSIS AND TESTING > GLASS, FRAMES AND MECHANISMS > PINPOINT TEST(S) > PINPOINT TEST I : THE GLOBAL OPEN FUNCTION IS INOPERATIVE

Refer to Power Windows for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Glass, Frames and Mechanisms - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B127A:12	Global Window Control: Circuit Short To Battery	This DTC sets when the Body Control Module B (BCM-B) detects a short to voltage on the global open circuit.
B127A:14	Global Window Control: Circuit Short To Ground or Open	This DTC sets when the Body Control Module B (BCM-B) detects an open or short to ground on the global open circuit.

Possible Causes

- Global open not enabled in the message center
- RKE transmitter

- Door window regulator motor not initialized
- Wiring, terminals or connectors
- Body Control Module B (BCM-B)

DIAGNOSIS AND TESTING > GLASS, FRAMES AND MECHANISMS > PINPOINT TEST(S) > PINPOINT TEST I : THE GLOBAL OPEN FUNCTION IS INOPERATIVE > PINPOINT TEST I : THE GLOBAL OPEN FUNCTION IS INOPERATIVE

I1 CHECK FOR BODY CONTROL MODULE B (BCM-B) DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition ON.

Using a diagnostic scan tool, perform Body Control Module B (BCM-B) self-test.

Is Body Control Module B (BCM-B) DTC B127A:12 or B127A:14 present?

Yes	For B127A:12, GO to I2 For B127A:14, GO to I7

No	GO to I13

I2 CHECK THE GLOBAL OPEN CIRCUIT FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: Body Control Module B (BCM-B) C4368A .

Ignition ON.

> *NOTE: The LH and RH side window(s) each have their own global open circuits, however both of these circuits are tied together within the Body Control Module B (BCM-B).*

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4368A-10 (LH window(s))		Ground
C4368A-22 (RH window(s))		Ground

Is any voltage present?

Yes	If voltage was present on the LH window circuit, GO to I3 If voltage was present on the RH window circuit, GO to I4

No	GO to I17

I3 CHECK THE GLOBAL OPEN CIRCUIT FOR A SHORT TO VOLTAGE WITH THE LH (LEFT-HAND) FRONT WINDOW MOTOR DISCONNECTED

Ignition OFF.

Disconnect: Driver Door Window Regulator Motor C518 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4368A-10		Ground

Is any voltage present?

Yes	For coupe, REPAIR the circuit. For convertible, GO to I5

No	INSTALL a new driver door window regulator motor. REFER to: Front Door Window Regulator Motor .

I4 CHECK THE GLOBAL OPEN CIRCUIT FOR A SHORT TO VOLTAGE WITH THE RH (RIGHT-HAND) FRONT WINDOW MOTOR DISCONNECTED

Ignition OFF.

Disconnect: Passenger Door Window Regulator Motor C608 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4368A-22		Ground

Is any voltage present?

Yes	For coupe, REPAIR the circuit. For convertible, GO to I6

No	INSTALL a new passenger door window regulator motor. REFER to: Front Door Window Regulator Motor .

I5 CHECK THE GLOBAL OPEN CIRCUIT FOR A SHORT TO VOLTAGE WITH THE LH (LEFT-HAND) REAR WINDOW MOTOR DISCONNECTED

Ignition OFF.

Disconnect: Left Rear Power Window Motor C3118 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4368A-10		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	INSTALL a new left rear quarter window regulator motor. REFER to: Rear Quarter Window Regulator Motor - Convertible .

I6 CHECK THE GLOBAL OPEN CIRCUIT FOR A SHORT TO VOLTAGE WITH THE RH (RIGHT-HAND) REAR WINDOW MOTOR DISCONNECTED

Ignition OFF.

Disconnect: Right Rear Power Window Motor C3119 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4368A-22		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	INSTALL a new right rear quarter window regulator motor. REFER to: Rear Quarter Window Regulator Motor - Convertible .

I7 CHECK THE GLOBAL OPEN CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Disconnect: Body Control Module B (BCM-B) C4368A .

NOTE: The LH and RH side window(s) each have their own global open circuits, however both of these circuits are tied together within the Body Control Module B (BCM-B).

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4368A-10 (LH window(s))	Ω	Ground

C4368A-22 (RH window(s))	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to I12

No	If the LH window circuit resistance measurement was less than 10, 000 ohms, GO to I8 If the RH window circuit resistance measurement was less than 10, 000 ohms, GO to I9

I8 CHECK THE GLOBAL OPEN CIRCUIT FOR A SHORT TO GROUND WITH THE LH (LEFT-HAND) FRONT WINDOW MOTOR DISCONNECTED

Disconnect: Driver Door Window Regulator Motor C518 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4368A-10	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	INSTALL a new driver door window regulator motor. REFER to: Front Door Window Regulator Motor .

No	For coupe, REPAIR the circuit. For convertible, GO to I10

I9 CHECK THE GLOBAL OPEN CIRCUIT FOR A SHORT TO GROUND WITH THE RH (RIGHT-HAND) FRONT WINDOW MOTOR DISCONNECTED

Disconnect: Passenger Door Window Regulator Motor C608 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4368A-22	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	INSTALL a new passenger door window regulator motor. REFER to: Front Door Window Regulator Motor .

No	For coupe, REPAIR the circuit. For convertible, GO to I11

I10 CHECK THE GLOBAL OPEN CIRCUIT FOR A SHORT TO GROUND WITH THE LH (LEFT-HAND) REAR WINDOW MOTOR DISCONNECTED

Disconnect: Left Rear Power Window Motor C3118 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4368A-10	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	INSTALL a new left rear quarter window regulator motor. REFER to: Rear Quarter Window Regulator Motor - Convertible .

No	REPAIR the circuit.

I11 CHECK THE GLOBAL OPEN CIRCUIT FOR A SHORT TO GROUND WITH THE RH (RIGHT-HAND) REAR WINDOW MOTOR DISCONNECTED

Disconnect: Right Rear Power Window Motor C3119 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4368A-22	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	INSTALL a new right rear quarter window regulator motor. REFER to: Rear Quarter Window Regulator Motor - Convertible .

No	REPAIR the circuit.

I12 CHECK THE GLOBAL OPEN CIRCUIT FOR AN OPEN

Ignition OFF.

Disconnect: Body Control Module B (BCM-B) C4368A .

Disconnect: Driver Door Window Regulator Motor C518 .

Disconnect: Passenger Door Window Regulator Motor C608 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4368A-10	Ω	C518-6
C4368A-22	Ω	C608-6

Are the resistances less than 3 ohms?

Yes	GO to I17

No	REPAIR the circuit in question.

I13 CHECK THE GLOBAL OPEN OPERATION

Ignition OFF.

Open and close the driver door.

Attempt to carry out a global open operation using the RKE transmitter.

Does the global open function operate correctly with at least one window?

Yes	GO to I14

No	GO to I15

I14 CHECK FOR AN OPEN IN THE GLOBAL OPEN CIRCUIT TO THE SUSPECT WINDOW MOTOR

Disconnect: Body Control Module B (BCM-B) C4368A .

Disconnect the suspect window motor: Driver Door Window Regulator Motor C518 , Passenger Door Window Regulator Motor C608 , Left Rear Power Window Motor C3118 or Right Rear Power Window Motor C3119 .

For an inoperative LH door window, measure:

Positive Lead	Measurement / Action	Negative Lead
C4368A-10	Ω	C518-6

For an inoperative RH door window, measure:

Positive Lead	Measurement / Action	Negative Lead
C4368A-22	Ω	C608-6

For an inoperative left rear window, measure:

Positive Lead	Measurement / Action	Negative Lead
C4368A-10	Ω	C3118-6

For an inoperative right rear window, measure:

Positive Lead	Measurement / Action	Negative Lead
C4368A-22	Ω	C3119-6

Is the resistance less than 3 ohms?

Yes	For an inoperative LH or RH door window, INSTALL a new window regulator motor. REFER to:

	Front Door Window Regulator Motor . For an inoperative left or right rear window, INSTALL a new window regulator motor. REFER to: Rear Quarter Window Regulator Motor - Convertible .

No	REPAIR the circuit.

I15 VERIFY GLOBAL OPEN FEATURE IS ENABLED IN MESSAGE CENTER

Ignition ON.

Verify the global open feature (Remote Open) is enabled in the message center. REFER to the Owner's Literature.

Is the global open feature enabled in the message center?

Yes	GO to I16

No	The system is operating correctly at this time. INFORM the customer how to enable/disable the global open feature in the message center. REFER to the Owner's Literature.

I16 CHECK THE RKE (REMOTE KEYLESS ENTRY) TRANSMITTER OPERATION

Operate the RKE lock/unlock function using all of the RKE transmitters.

Does the RKE lock/unlock function operate correctly with at least one of the RKE transmitters?

Yes	GO to I17

No	To diagnose the RKE system, REFER to: Locks, Latches and Entry Systems .

I17 CHECK FOR CORRECT BODY CONTROL MODULE B (BCM-B) OPERATION

Ignition OFF.

Disconnect and inspect all the Body Control Module B (BCM-B) connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins as necessary

pushed-out pins - install new pins as necessary

Reconnect the Body Control Module B (BCM-B) connectors and all previously disconnected window system connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new Body Control Module B (BCM-B). REFER to: Body Control Module B (BCMB) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > GLASS, FRAMES AND MECHANISMS > PINPOINT TEST(S) > PINPOINT TEST J : THE SHORT DROP WINDOW FEATURE DOES NOT OPERATE CORRECTLY

Refer to Power Windows for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Glass, Frames and Mechanisms - System Operation and Component Description .

Possible Causes

- Door window regulator motor not initialized
- Wiring, terminals or connectors
- Door ajar switch
- Door window regulator motor

DIAGNOSIS AND TESTING > GLASS, FRAMES AND MECHANISMS > PINPOINT TEST(S) > PINPOINT TEST J : THE SHORT DROP WINDOW FEATURE DOES NOT OPERATE CORRECTLY > PINPOINT TEST J : THE SHORT DROP WINDOW FEATURE DOES NOT OPERATE CORRECTLY

J1 VERIFY THE DOOR AJAR SWITCH OPERATION

Open and close the driver door and view the interior lamps operation.

Open and close the passenger door and view the interior lamps operation.

Do the interior lamps operate correctly?

Yes	GO to J2

No	DIAGNOSE the interior lamps, REFER to: Interior Lighting .

J2 CARRY OUT THE WINDOW MOTOR INITIALIZATION

Ignition ON.

Carry out the initialization procedure on the suspect power window. REFER to: Power Door Window Initialization .

Open and close the suspect door to verify the short drop function operates.

Does the short drop window feature operate correctly?

Yes	The system is operating correctly at this time. The window lost initialization.

No	GO to J3

J3 CHECK THE DRIVER WINDOW MOTOR AJAR SWITCH INPUT CIRCUIT

Ignition OFF.

Disconnect: Inoperative Driver Door Window Regulator Motor C518 or Passenger Door Window Regulator Motor C608 .

Disconnect: Inoperative LH Front Door Latch C525 or RH Front Door Latch C609 .

For driver door, measure:

Positive Lead	Measurement / Action	Negative Lead
C518-7	Ω	C525-3

For passenger door, measure:

Positive Lead	Measurement / Action	Negative Lead
C608-7	Ω	C609-6

Is the resistance less than 3 ohms?

Yes	INSTALL a new window regulator motor. REFER to: Front Door Window Regulator Motor .

No	REPAIR the circuit.

DIAGNOSIS AND TESTING > GLASS, FRAMES AND MECHANISMS > PINPOINT TEST(S) > PINPOINT TEST K : THE DEFROST SYSTEM IS INOPERATIVE

Refer to Heated Window for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Glass, Frames and Mechanisms - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1C83:12	Rear Defog Relay: Circuit Short to Battery	This DTC sets when the FCIM detects a short to voltage on the rear window defrost relay control circuit.
B1C83:14	Rear Defog Relay: Circuit Short To Ground or Open	This DTC sets when the FCIM detects an open or short to ground on the rear window defrost relay control circuit.

Possible Causes

- Fuse
- Rear window defrost relay
- Wiring, terminals or connectors
- Rear window defrost grid
- FCIM

Visual Inspection and Diagnostic Pre-checks

- Verify BJB fuses 9 (40A) and 66 (5A) are OK.
- Inspect the rear window defrost grid and electrical connectors for damage.

DIAGNOSIS AND TESTING > GLASS, FRAMES AND MECHANISMS > PINPOINT TEST(S) > PINPOINT TEST K : THE DEFROST SYSTEM IS INOPERATIVE > PINPOINT TEST K : THE DEFROST SYSTEM IS INOPERATIVE

K1 CHECK THE REAR WINDOW DEFROST GRID VOLTAGE

Ignition OFF.

Disconnect: Heated Rear Window Element C402A (coupe) or C402 (convertible).

Ignition ON.

Activate the rear window defrost switch.

For coupe, measure:

Positive Lead	Measurement / Action	Negative Lead
C402A-1		Ground

For convertible, measure:

Positive Lead	Measurement / Action	Negative Lead

C402-1		Ground

Is the voltage greater than 11 volts?

Yes	GO to K2

No	GO to K3

K2 CHECK THE REAR WINDOW DEFROST GRID GROUND

Ignition OFF.

Disconnect: For coupe, heated Rear Window Element C402B.

For coupe, measure:

Positive Lead	Measurement / Action	Negative Lead
C402B-1	Ω	Ground

For convertible, measure:

Positive Lead	Measurement / Action	Negative Lead
C402-2	Ω	Ground

Is the resistance less than 3 ohms?

Yes	CARRY OUT the Grid Wire Test. REFER to Grid Wire Test . REPAIR the rear window defrost grid or INSTALL a new rear window glass. REFER to: Fixed Glass .

No	REPAIR the circuit.

K3 CHECK THE REAR WINDOW DEFROST RELAY CONTROL CIRCUIT FOR VOLTAGE

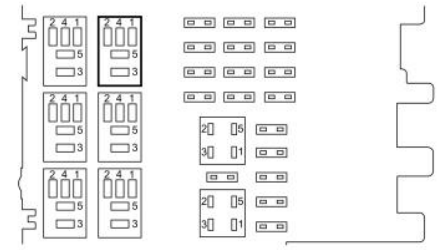
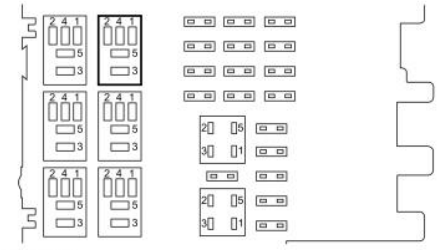
Ignition OFF.

Disconnect: Rear Window Defrost Relay.

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead

 E188113 Rear Window Defrost Relay, socket pin 1		Ground
 E188113 Rear Window Defrost Relay, socket pin 3		Ground

Are the voltages greater than 11 volts?

Yes	GO to K4

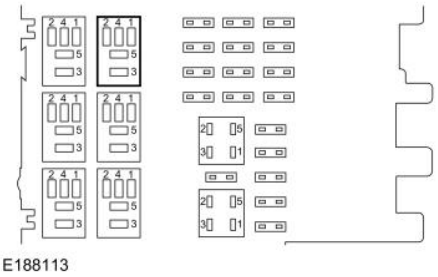
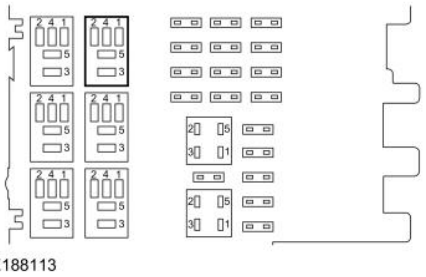
No	VERIFY the BJB fuses 9 (40A) and 66 (5A) are OK. If OK, REPAIR the circuit in question. If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short.

NOTE: The following step uses a test lamp to simulate normal circuit loads. Use only a Rotunda Test Lamp (SGT27000) or 250- 300mA incandescent bulb test lamp. To avoid connector terminal damage, use the Rotunda Flex Probe kit for the test lamp probe connection to the vehicle. Do not use the test lamp probe directly on any connector.

K4 CHECK THE FCIM (FRONT CONTROLS INTERFACE MODULE) OUTPUT

Connect:

Positive Lead	Measurement / Action	Negative Lead

 E188113 Rear Window Defrost Relay, socket pin 1		 E188113 Rear Window Defrost Relay, socket pin 2

Activate the rear window defrost switch.

Does the test light illuminate?

Yes	GO to K5

No	GO to K6

K5 CHECK THE REAR WINDOW DEFROST RELAY

Ignition OFF.

Carry out the rear window defrost relay component test. Refer to Component Testing for schematic and connector information.

Did the rear window defrost relay pass the component test?

Yes	REPAIR the open in the rear window defrost relay output circuit.

No	INSTALL a new rear window defrost relay.

K6 CHECK THE REAR WINDOW DEFROST RELAY CONTROL CIRCUIT FOR A SHORT TO VOLTAGE

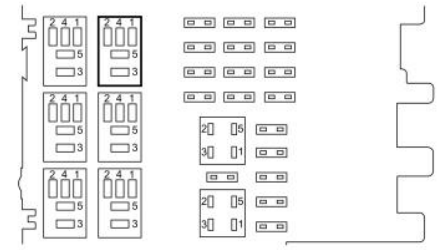
Ignition OFF.

Disconnect: FCIM C2402A .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead

 E188113 Rear Window Defrost Relay, socket pin 2		Ground

Is any voltage present?

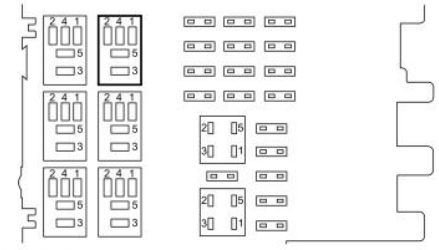
Yes	REPAIR the circuit.

No	GO to K7

K7 CHECK THE REAR WINDOW DEFROST RELAY CONTROL CIRCUIT FOR AN OPEN

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
 E188113 Rear Window Defrost Relay, socket pin 2	Ω	C2402A-7

Is the resistance less than 3 ohms?

Yes	GO to K8

No	REPAIR the circuit.

K8 CHECK FOR CORRECT FCIM (FRONT CONTROLS INTERFACE MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all the FCIM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins as necessary

pushed-out pins - install new pins as necessary

Reconnect the FCIM connectors and all previously disconnected rear window defrost system connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new FCIM. Refer to the appropriate article for the procedure.

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > GLASS, FRAMES AND MECHANISMS > PINPOINT TEST(S) > PINPOINT TEST L : THE DEFROST SYSTEM DOES NOT SHUT OFF AUTOMATICALLY

Refer to Heated Window for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Glass, Frames and Mechanisms - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1C83:14	Rear Defog Relay: Circuit Short To Ground or Open	This DTC sets when the FCIM detects an open or short to ground on the rear window defrost relay control circuit.

Possible Causes

- Wiring, terminals or connectors
- Rear window defrost relay
- FCIM

DIAGNOSIS AND TESTING > GLASS, FRAMES AND MECHANISMS > PINPOINT TEST(S) > PINPOINT TEST L : THE DEFROST SYSTEM DOES NOT SHUT OFF AUTOMATICALLY > PINPOINT TEST L : THE DEFROST SYSTEM DOES NOT SHUT OFF AUTOMATICALLY

L1 CHECK THE REAR WINDOW DEFROST GRID VOLTAGE

Ignition OFF.

Disconnect: Rear Window Defrost Relay.

Disconnect: Heated Rear Window Element C402A (coupe) or C402 (convertible).

Ignition ON.

For coupe, measure:

Positive Lead	Measurement / Action	Negative Lead
C402A-1		Ground

For convertible, measure:

Positive Lead	Measurement / Action	Negative Lead
C402-1		Ground

Is any voltage present?

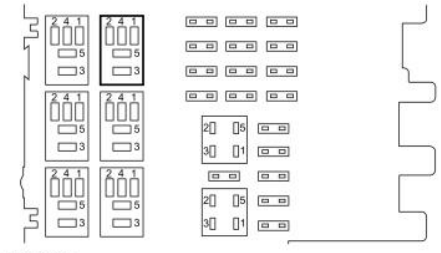
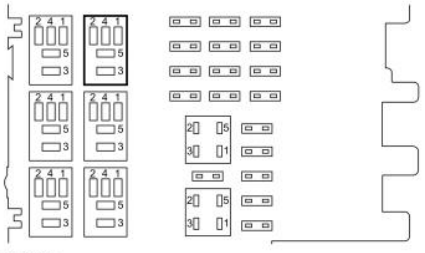
Yes	REPAIR the circuit.

No	GO to L2

NOTE: The following step uses a test lamp to simulate normal circuit loads. Use only a Rotunda Test Lamp (SGT27000) or 250- 300mA incandescent bulb test lamp. To avoid connector terminal damage, use the Rotunda Flex Probe kit for the test lamp probe connection to the vehicle. Do not use the test lamp probe directly on any connector.

L2 CHECK THE FCIM (FRONT CONTROLS INTERFACE MODULE) OUTPUT

Connect:

Positive Lead	Measurement / Action	Negative Lead
 E188113 Rear Window Defrost Relay, socket pin 1		 E188113 Rear Window Defrost Relay, socket pin 2

Does the test light illuminate?

Yes	GO to L3

No	INSTALL a new rear window defrost relay.

L3 CHECK THE REAR WINDOW DEFROST RELAY CONTROL CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Disconnect: FCIM C2402A .

Measure:

Positive Lead	Measurement / Action	Negative Lead
Rear Window Defrost Relay, socket pin 2	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to L4

No	REPAIR the circuit.

L4 CHECK FOR CORRECT FCIM (FRONT CONTROLS INTERFACE MODULE) OPERATION

Disconnect and inspect all the FCIM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins as necessary

pushed-out pins - install new pins as necessary

Reconnect the FCIM connectors and all previously disconnected rear window defrost system connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new FCIM. Refer to the appropriate article for the procedure.

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > GLASS, FRAMES AND MECHANISMS > COMPONENT TEST- GRID WIRE TEST

1.

Using a bright lamp in the vehicle, inspect the grid wire from the exterior. A broken grid wire will appear as a brown spot.

2.

Run the engine at idle. Activate the rear window defrost switch. The indicator light should come on.

3.

Working in the vehicle with a voltmeter, contact the broad red-brown stripes of the rear glass window (positive lead to B+ side and the negative lead to ground side). The meter should read 10-13 volts. A lower voltage reading indicates a loose ground connection.

4.

Contact a good ground point with the negative lead of the meter. The voltage reading should not change.

5.

With the negative lead of the meter grounded, touch each grid line of the heated rear window glass at its midpoint with the positive lead. A reading of approximately 6 volts indicates the line is good. A reading of 0 volt indicates the line is broken between the midpoint and the B+ side of the grid line. A reading of 12 volts indicates the circuit is broken between the midpoint of the grid line and ground.

6.

Pinpointing the exact position of the break can be accomplished (if the voltmeter reads 0 volt when the midpoint of the grid line is touched with the positive lead of the voltmeter) by moving the positive lead of the voltmeter toward the B+ side of the grid line and touching the grid line until the voltmeter reads 12 volts. If the voltmeter reads 12 volts when the midpoint of the grid line is touched with the positive lead of the voltmeter, simply move the positive lead of the voltmeter toward the ground connection of the grid line and touch the grid line until the voltmeter reads 0 volt.

GENERAL PROCEDURES > HEATED WINDOW GRID WIRE REPAIR

Materials

Name	Specification
Motorcraft ® Ultra-Clear Spray Glass Cleaner (U.S.) ZC-23 (U.S.)	ESR-M14P5-A
Rear Window Defroster Repair PM-11	-
Motorcraft ® Lacquer Touch-Up Paint PMPC-19500-XXXXX, PMPM-19500-XXXXX, PMPP-19500-XXXXX	ESR-M2P100-C

Repair

> *NOTE: The antenna and heated window grid line material is not embedded into the glass, but is baked to the glass surface and consequently can be scraped off. An undamaged grid line has small ridges that project above the surface of the glass and can easily be felt when running a fingernail across them. Antenna and heated window grid lines that have been razor bladed will feel smooth when a fingernail is dragged across the affected area. Inoperative heated window grid lines may appear to the eye to be undamaged due to residue remaining on the glass and require diagnosis with a voltmeter or 12V test lamp.*

> *WARNING: Before beginning any service procedure in this article, refer to Safety Warnings in GENERAL INFORMATION . Failure to follow this instruction may result in serious personal injury.*

1.

Refer to: Health and Safety Precautions .

2.

Bring the vehicle up to a room temperature of at least 16 °C (60.8 °F) or above.

> *NOTE: Do not use scrapers, sharp instruments or abrasive window cleaners on the interior surface of the rear window glass as this may cause damage to the antenna and heated window grid lines.*

3.
Clean the entire antenna and heated window grid line repair area with glass cleaner and 0000 steel wool to remove all dirt, wax, grease, oil or other foreign material.

Material

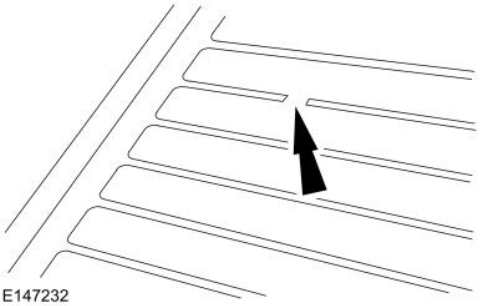
: Motorcraft ® Ultra-Clear Spray Glass Cleaner (U.S.) / ZC-23 (U.S.) (ESR-M14P5-A)

4.

Mark the location of the antenna or heated window grid break on the exterior of the rear window glass.

5.

Using a polypropylene film fine line tape, mask the area directly above and below the antenna or heated window grid break extending the tape 26 mm (1.0236 in) beyond the concern area in both directions. The break area should be at the center of the mask. Polypropylene Film Fine Line Tape (commercially available).


E147232

NOTE: Allow at least 5 minutes of drying time between applications for the touch-up paint or the silver repair coating. Applying fewer coats or not allowing adequate drying time between coats produces repaired resistance that is greater than Original Equipment Manufacturer (OEM) resistance, resulting in poor defrost performance and excessive localized heating.

NOTE: If the brown layer is not broken or missing, apply only the silver grid repair compound to the break. If both the brown and silver layers of the antenna or heated window grid are broken or missing, apply a coating of the lacquer touch-up paint across the break in the grid line prior to applying the rear window defroster repair compound. Do not overlap the silver grid line with the paint. Several applications may be necessary to achieve a color match.

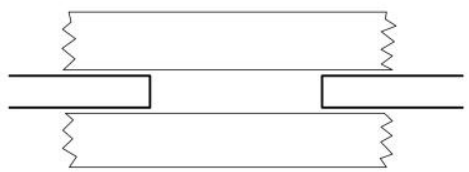
6.
Apply the repair coating to the antenna or heated window grid break area in several smooth, continuous strokes. Extend the silver repair coating at least 6.35 mm (0.25 in) on both sides of the break area. Apply a minimum of 6 applications of the grid repair compound. Polypropylene Film Fine Line Tape (commercially available)

Material

: Rear Window Defroster Repair / PM-11

Material

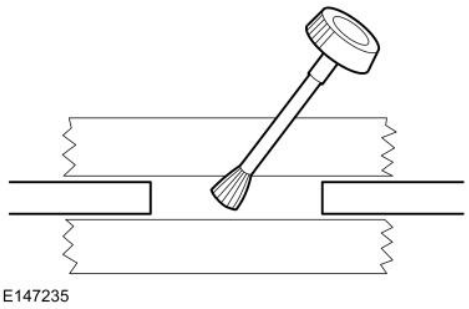
: Motorcraft ® Lacquer Touch-Up Paint / PMPC-19500-XXXXX, PMPM-19500-XXXXX, PMPP-19500-XXXXX (ESR-M2P100-C)


E147233

NOTE: The repair coating air dries in approximately one minute and can be

energized after 5 minutes. Optimum adhesion occurs after approximately 24 hours.

7.
Allow the repair area to dry completely and remove the mask.



NOTE: Be careful not to damage the antenna or heated window grid line with the razor blade. If this occurs, additional repair may be necessary.

8.
Remove any excess repair compound above or below the antenna or heated window grid line with a razor blade.

NOTE: The interior side of the antenna or heated grid lines are not painted, but due to the silver tarnishing tend to change the grid to a gold or brown color. The repair area will be bright silver and also tarnish over time to match the rest of the antenna or heated window grid.

9.
Test the system for normal operation.

GENERAL PROCEDURES > LEAD TERMINAL REPAIR

Materials

Name	Specification
Motorcraft ® Ultra-Clear Spray Glass Cleaner (U.S.) ZC-23 (U.S.)	ESR-M14P5-A

Repair

1.

Bring the vehicle up to at least the specified room temperature or above.

Temperature

: 60.8 °F (16 °C)

NOTE: The new terminal covers the original terminal location, but it must be placed so the terminal conductive areas will be placed on a good conductive base.

2.

Terminal Kit - Back Glass 4F1Z-14421-AA

Clean the bus bar in the area to be repaired with steel wool (000 to 0000 grade), and then with glass cleaner to remove all dirt, wax, grease, oil or other foreign material.

Material

: Motorcraft ® Ultra-Clear Spray Glass Cleaner (U.S.) / ZC-23 (U.S.) (ESR-M14P5-A)

NOTE: Depending on the original terminal location, and whether the terminal is covered by pillar trim, determines where to locate the new terminal. Some grid line bus bars may only allow the placement of the terminal above or below the original tab location due to space limitations. For most vehicle applications, the replacement tab location covers the original tab location, but still allows the replacement tab to attach to the bus bar on good conductive material.

NOTE: Do not use any type of flame torch or flame-heated soldering gun for this procedure. Use of these tools provide inadequate heat generation at the tip and the exhaust heat can cause damage to plastic trim parts in the area. Use only an electric soldering gun with 100 watts or more of power. Before using the soldering gun, be sure to melt a small amount of rosin core solder to the tip. The solder will assist in achieving better heat transfer from the soldering gun tip to the new terminal.

3.
Place the replacement terminal type A over the original tab location, making sure the conductive areas of the terminal will be on a good conductive area. Do not place the terminal tab foot on the original location, which does not have conductive material.

4.

Hold the terminal in place with an item such as a regular lead pencil at a 90 degree angle from the terminal (Holding at other than a 90 degree angle may allow the terminal to slip when the solder liquefies).

NOTE: The new terminal has pre-applied solder, flux and temperature-sensitive paint. The paint provides a visual indication when the terminal has reached the correct temperature to melt solder on the terminal. When the correct temperature is achieved, the temperature paint liquefies and changes color.

5.
Place the soldering gun tip on the top of the terminal, but not on the painted areas of the tab. Energize the soldering gun and watch for the painted area of the terminal to liquefy and change color. The paint should liquefy in approximately 25-45 seconds after heating. As soon as the paint color completely changes on either side of the terminal, de-energize the soldering gun and continue to hold

the terminal in place with the soldering gun and pencil for an additional 30 seconds.

6.

Remove the soldering gun and pencil from the terminal. Allow the terminal to cool for another 2 minutes before attaching the wiring lead to the terminal.

7.

Attach the electrical lead connection to this terminal, turn on the heated rear window and verify the operation.

GENERAL PROCEDURES > POWER DOOR WINDOW INITIALIZATION

Initialization

> *NOTE: This step is only necessary for an existing window regulator motor. If installing a new window regulator motor, proceed to Step 2.*

> *WARNING: Before beginning any service procedure in this article, refer to health and safety warnings in GENERAL INFORMATION . Failure to follow this instruction may result in serious personal injury.*

1.

To initialize an existing window regulator motor, the motor must first be de-initialized. This can be accomplished by disconnecting the battery cable or window motor fuse while the window is operating. After the motor has been de-initialized, reconnect the battery cable or fuse before proceeding to the following step.

> *NOTE: The door MUST be closed during this procedure (for convertibles, the top and quarter glass must be in the CLOSED and UP position) in order for the door window motor to initialize.*

> *WARNING: Keep objects and body parts clear of the glass panel when carrying out the initialization procedure. During the initialization procedure, the glass panel closes with high force and cannot detect objects in its path. Failure to follow this instruction may result in serious personal injury.*

2.

With the door window in the fully OPEN position, press and hold the window control switch in the UP position at the second detent until the window glass stalls into the glass top run for at least 2 seconds. Release the switch.

3.

Press and hold the window control switch in the DOWN position at the second detent until the window glass stalls at the bottom of its travel for at least 2 seconds.

4.

Cycle the window glass up and down once more to set the window soft stop for the DOWN position.

5.

Test for correct window operation by carrying out the one-touch up and one-touch down features.

GENERAL PROCEDURES > FIXED GLASS

Special Tool(s) / General Equipment

Glass Cut-Out Wire
Power Caulk Gun
Power Fixed Glass Removal Tool
Cold Knife
Knife
Vacuum Cleaner

Materials

Name	Specification
Betaseal™ Express Dow Urethane Adhesive	-
Sika Tack ASAP Urethane Adhesive	-
Dow Urethane One Step Glass Primer Betaprime™ 5500/5500A/5500SA	-
Sika Urethane Metal and Glass Primer Sika 206 G+P	-
Motorcraft ® Ultra-Clear Spray Glass Cleaner (U.S.) ZC-23 (U.S.)	ESR-M14P5-A
Bare Metal Etch Primer BETAPRIME 5201	-
Body Primer BETASEAL™ 43538	-

Repair

NOTE: In some instances repair methods may be combined to achieve the best results.

NOTE: Some interior trim, exterior trim and/or components may require removal based on the tools and removal method used.

1.
Choose the best repair method for the type of glass being replaced.

1.

Cold knife method - uses the cold knife to cut the urethane from the outside of a vehicle provided the blade can reach the bead. Use the General Equipment: Cold Knife

2.

Power tool method - uses various power tools from inside the vehicle using a cutting or paddle type blade. Use the General Equipment: Power Fixed Glass Removal Tool

3.

Piano wire method - uses the piano wire to cut the urethane from inside and outside of a vehicle using an assistant. Use the General Equipment: Glass Cut-Out Wire

2.

When using the cold knife method, apply tape to protect the perimeter of the window opening from paint damage. Multiple layers of tape may be required.

NOTE: Fixed glass may have locating pins that vary in location. It may be necessary to cut these pins with a utility knife.

NOTE: Fixed glass must be discarded once removed. A new fixed glass is required.

NOTE: Take precautions to prevent damage to other components when cutting urethane.

NOTE: To avoid rust formation, use extreme care not to scratch the paint or primer or damage the pinch weld during glass removal.

NOTE: New fixed glass must be installed within 2 hours of cutting the urethane adhesive. Cut or scraped urethane becomes oxidized and inactive beyond 2 hours, reducing the effectiveness of the repair bond.

3.





Remove the fixed glass and discard. Use the General Equipment: Power Fixed Glass Removal Tool. Use the General Equipment: Cold Knife. Use the General Equipment: Knife

NOTE: Make sure the mating surfaces are clean and free of foreign material.

NOTE: Touching the adhesive surface impairs the rebonding.

NOTE: Avoid scratching the pinch weld. Repair all minor scratches or exposed metal on the pinch weld following manufacturer's instructions for the product being used. Use the same brand pinch weld primer, glass primer and urethane adhesive.

WARNING: Repair any corrosion found on the pinch weld. The pinch weld is a structural component of the vehicle. Corrosion left unrepaired may reduce the structural integrity of the vehicle. Failure to follow this instruction may result in serious injury to vehicle occupant(s).

4.





Prep the pinch weld area to install the new fixed glass.

1.

Trim the original urethane adhesive using a utility knife, leaving a 1 mm to 2 mm (0.04 in to 0.08 in) base on the pinch weld.

2.

Remove any foreign material or dirt from the pinch weld using a soft brush or vacuum. Use the General Equipment: Vacuum Cleaner

NOTE: Minimize applying bare metal primer over areas with remaining urethane adhesive and observe a minimum flash time of 30 minutes.

5.

If the paint layer was damaged on the pinch weld extending into bare metal, apply bare metal primer to those areas only.

Material

: Bare Metal Etch Primer / BETAPRIME 5201

NOTE: Minimize applying body primer over areas with remaining urethane adhesive and observe a minimum flash time of 30 minutes.

6.
Apply body primer as necessary.

1.

Apply body primer to those areas only previously primed with bare metal primer.

Material

: Bare Metal Etch Primer / BETAPRIME 5201

2.

If the clearcoat layer was damaged on the pinch weld but not extending into bare metal, apply body primer to those areas only.

Material

: Body Primer / BETASEAL™ 43538

7.

Clean the inside of the new fixed glass with glass cleaner.

Material

: Motorcraft ® Ultra-Clear Spray Glass Cleaner (U.S.) / ZC-23 (U.S.) (ESR-M14P5-A)

8.





Apply glass primer according to the manufacturer's instructions to the new fixed glass. Allow at least 6 minutes to dry.

Material

: Dow Urethane One Step Glass Primer / Betaprime™ 5500/5500A/5500SA

Material

: Sika Urethane Metal and Glass Primer / Sika 206 G+P

9.





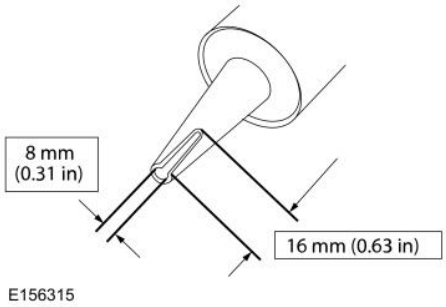
Cut the urethane adhesive applicator tip to specification.

Material

: Betaseal™ Express Dow Urethane Adhesive

Material

: Sika Tack ASAP Urethane Adhesive



NOTE: Use a power caulk gun that applies the urethane adhesive with less effort and a continuous bead.

NOTE: The fixed glass must be installed within 10 minutes of applying the urethane adhesive.

NOTE: Make sure the urethane bead is uniform to prevent air and water leaks.

10.



Apply a urethane adhesive bead.

1.

Start and end at the original overlap points to prevent air and water leaks.

NOTE: Take care in applying urethane on vehicles without peripheral moldings as urethane expulsion could become an appearance issue.

2.
Apply a urethane adhesive bead 14 mm (0.551 in) high and 8 mm (0.314 in) wide on top of the existing trimmed urethane adhesive bead on the pinch weld. Use the General Equipment: Power Caulk Gun

Material

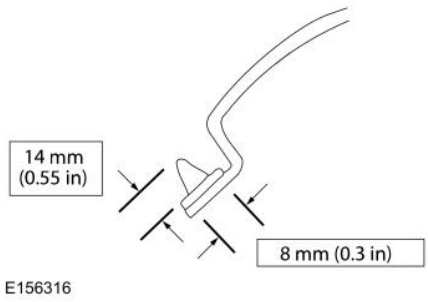
: Betaseal™ Express Dow Urethane Adhesive

Material

: Sika Tack ASAP Urethane Adhesive

3.

Make sure there are no gaps in the bead.



NOTE: The door windows must be left open during the adhesive curing time.

11.
Open the vehicle windows to prevent the air pressure of closing doors from compromising the urethane adhesive bond.

NOTE: If equipped, the adhesive strip backings must be removed from the A-pillar mouldings before installing the fixed glass.

WARNING: Do not drive vehicle until the urethane adhesive seal has cured. Follow urethane adhesive manufacturer's curing directions. Inadequate or incorrect curing of the urethane adhesive seal will adversely affect glass retention. Failure to follow these instructions may result in serious injury to vehicle occupant(s).

12.





Install the fixed glass to the vehicle.

1.

Install the fixed glass, pressing firmly by hand to ensure a good bond.

2.

Secure the fixed glass in the correct position with tape until the urethane adhesive has cured.

13.

If necessary, remove excess uncured urethane adhesive from the interior and exterior surface of the fixed glass.

Material

: Motorcraft ® Ultra-Clear Spray Glass Cleaner (U.S.) / ZC-23 (U.S.) (ESR-M14P5-A)

14.

Install any removed components as needed.

15.

If equipped, carry out the IPMA camera alignment.

GENERAL PROCEDURES > DOOR WINDOW GLASS ADJUSTMENT - COUPE

Adjustment

NOTE: LH side shown, RH side similar.

NOTE: Removal steps in this procedure may contain installation details.

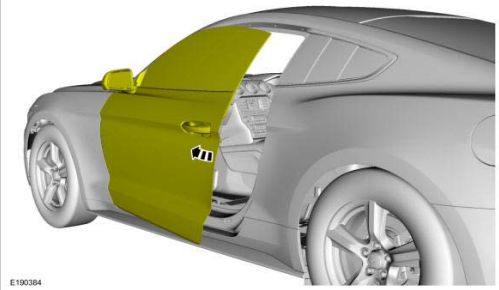
All adjustments

NOTE: The front door must be aligned correctly before adjusting the front door window glass.

1.
Check the front door alignment. Refer to: Front Door Alignment .

2.

Open the door.

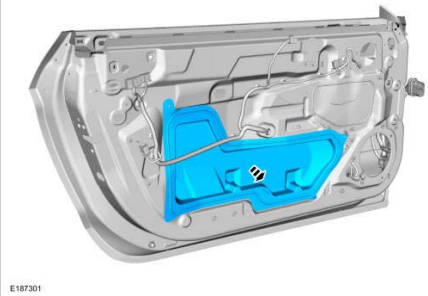


3.

Remove the front door speaker. Refer to: Front Door Speaker RH . Refer to: Front Door Speaker LH .

4.

Remove the front door lower watershield.



5.

Remove the grommets and the adhesive tapes.



6.

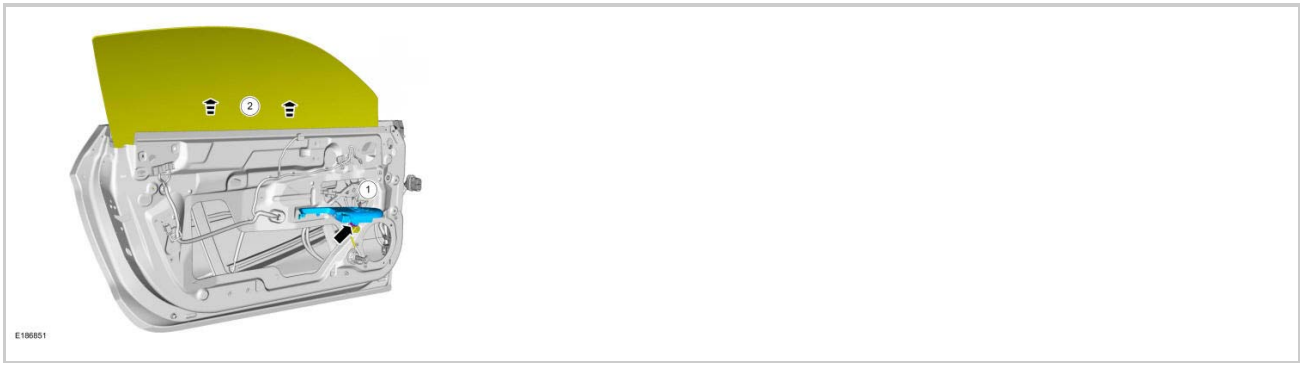
Raise the front door window glass to the full up position.

1.

Install the front door window control switch.

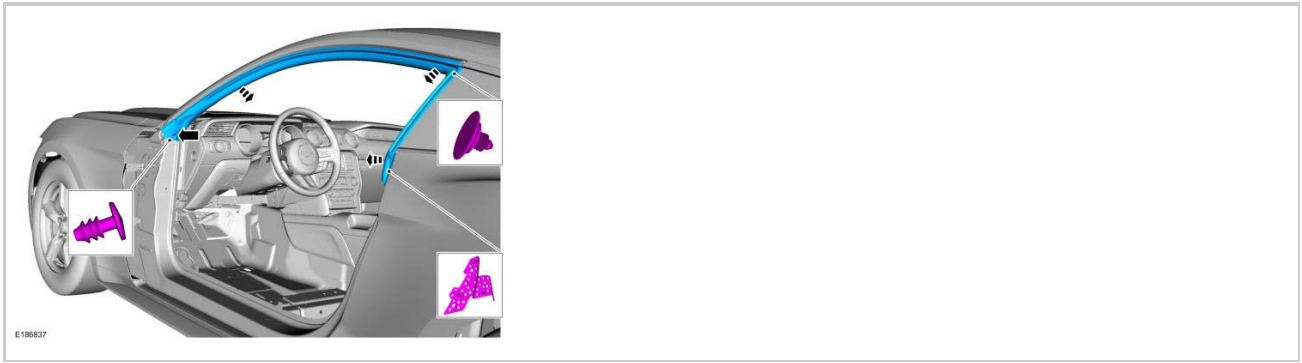
2.

Raise the front door window glass to the full up position.



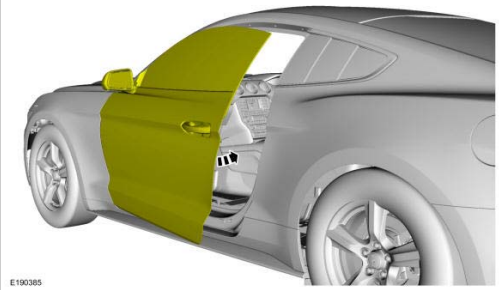
7.

On coupe vehicles, remove the pin-type retainer and the door weatherstrip.



8.

Close the door.



Up/Down, Fore/Aft adjustment

9.

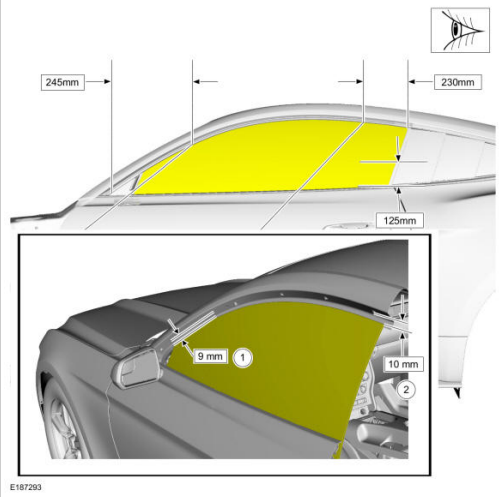
Measure the gap between the top of the front door glass and the body at the specified locations.

1.

Measurement at A-pillar 9mm.

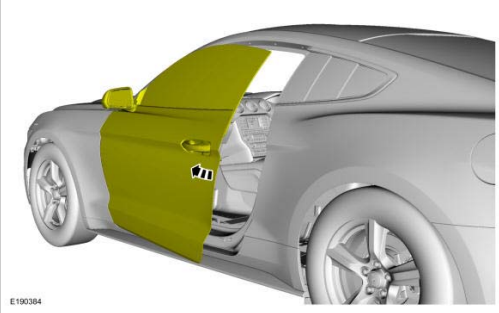
2.

Measurement at B-pillar 10mm.



10.

Open the door.

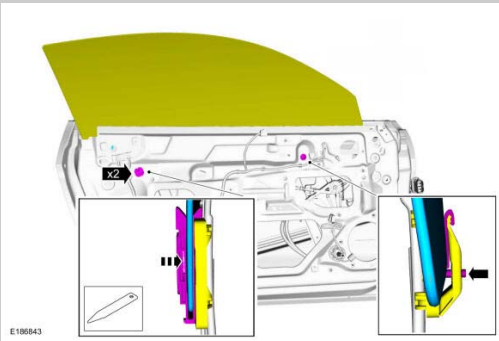


11.

Loosen both glass clamps, adjust the front door window glass as necessary and tighten the glass clamps.

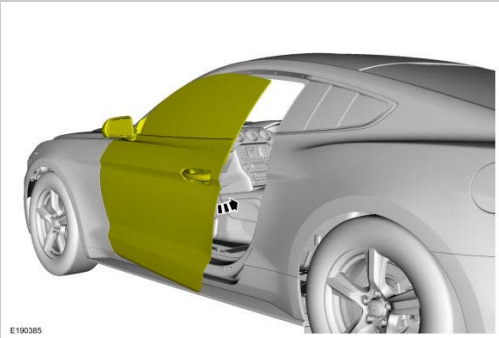
Torque

: 80 lb.in (9 Nm)



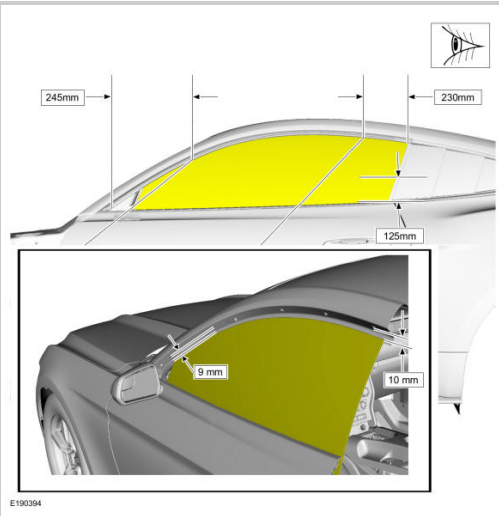
12.

Close the door.



13.

Check the door glass up/down, fore/aft to body dimensions.



In/Out adjustment

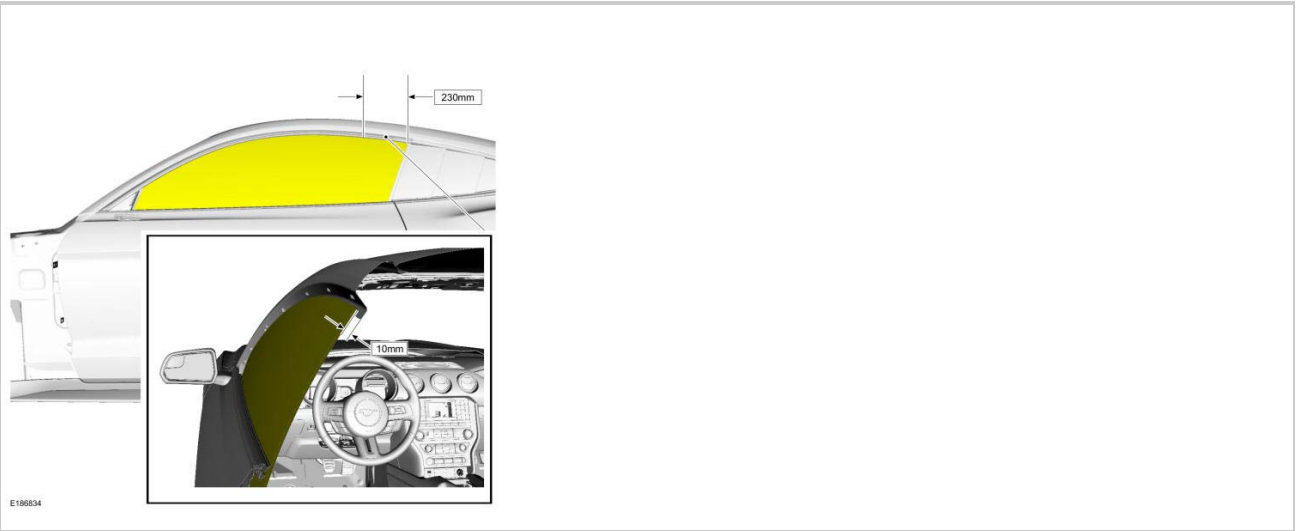
14.

Close the door.



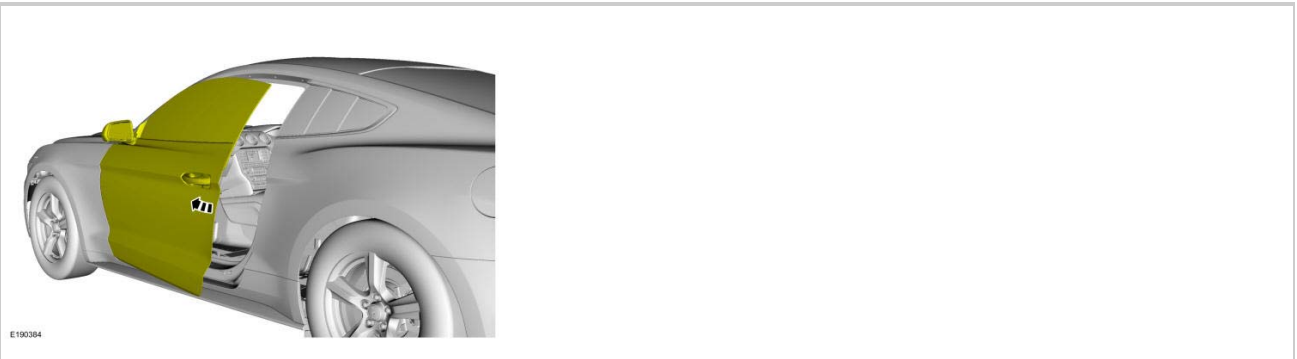
15.

Measure the gap between the top of the front door glass and the body at the specified locations.



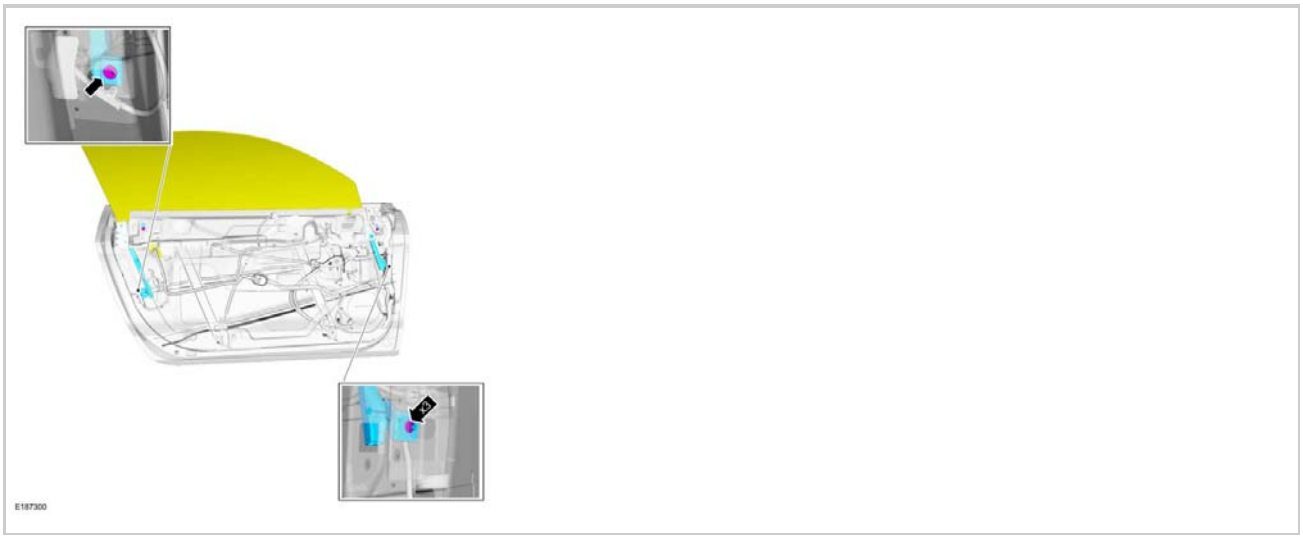
16.

Open the door.



17.

Loosen the nuts on the fore and aft front door glass runs.



18.

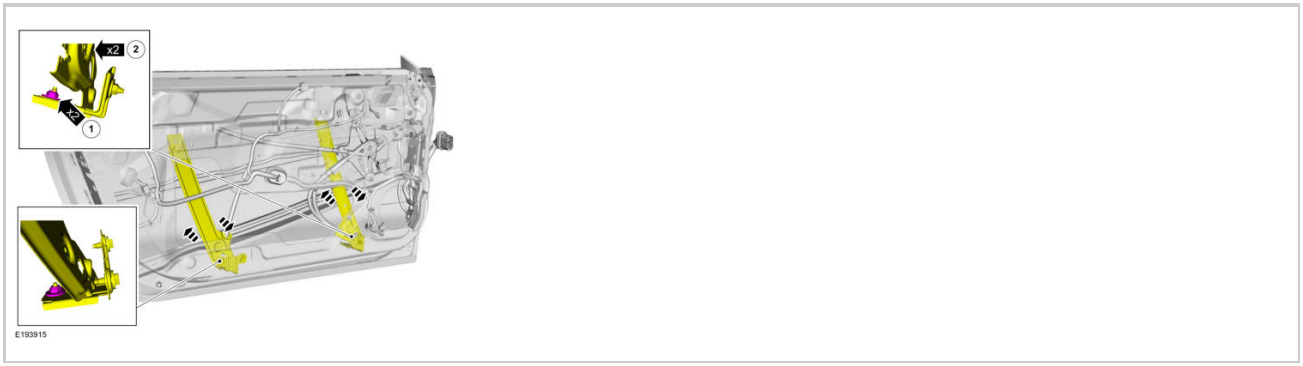
Adjust the regulator rails equally in and out to avoid binding.

1.

Loosen the lower window regulator nuts.

2.

Adjust the regulator rails equally in and out to avoid binding.



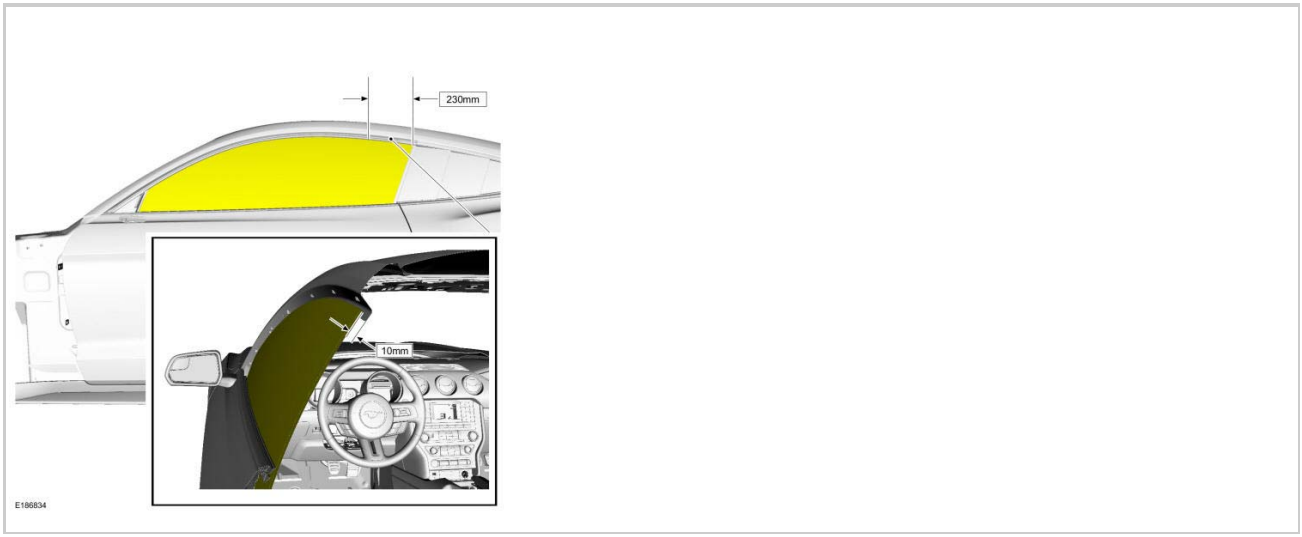
19.

Close the door.



20.

Check the door glass in/out to body dimensions and adjust the door glass runs and regulator rails relative to the door as necessary.



21.

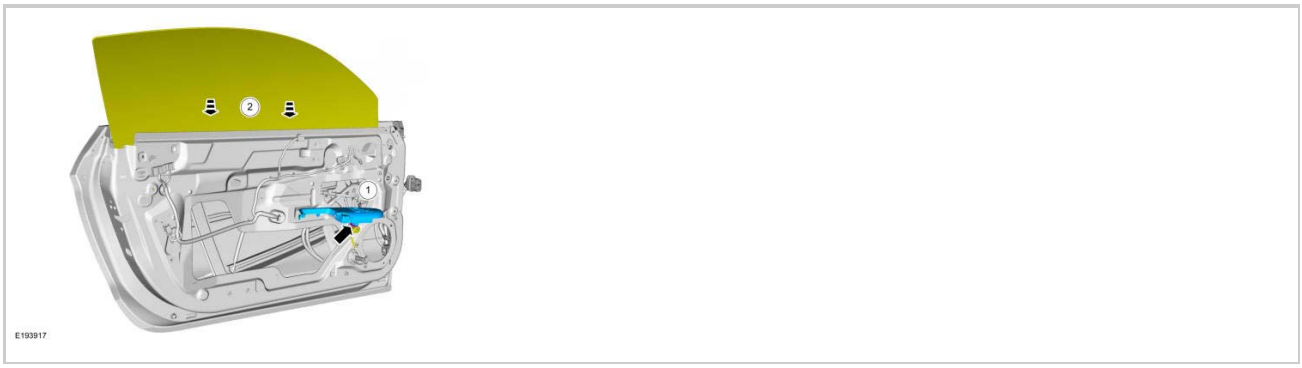
Lower the front door window glass.

1.

Install the front door window control switch.

2.

Lower the front door window glass.

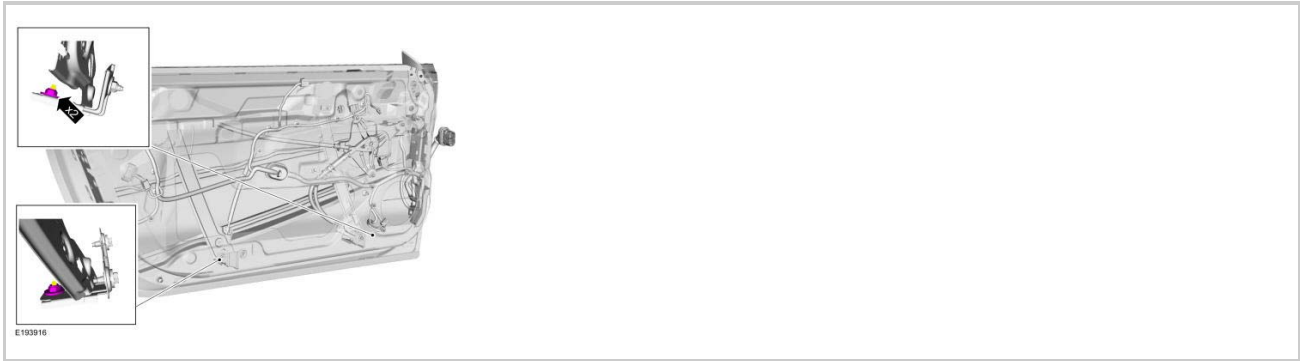


22.

Tighten the front door glass regulator rail nuts.

Torque

: 97 lb.in (11 Nm)



NOTE: Take care not to influence the position of the front door glass runs when tightening the nuts.

23.
Tighten the nuts on the fore and aft front door glass runs.

1.

Tighten the lower bolt and nuts on the fore and aft front door glass runs.

Torque

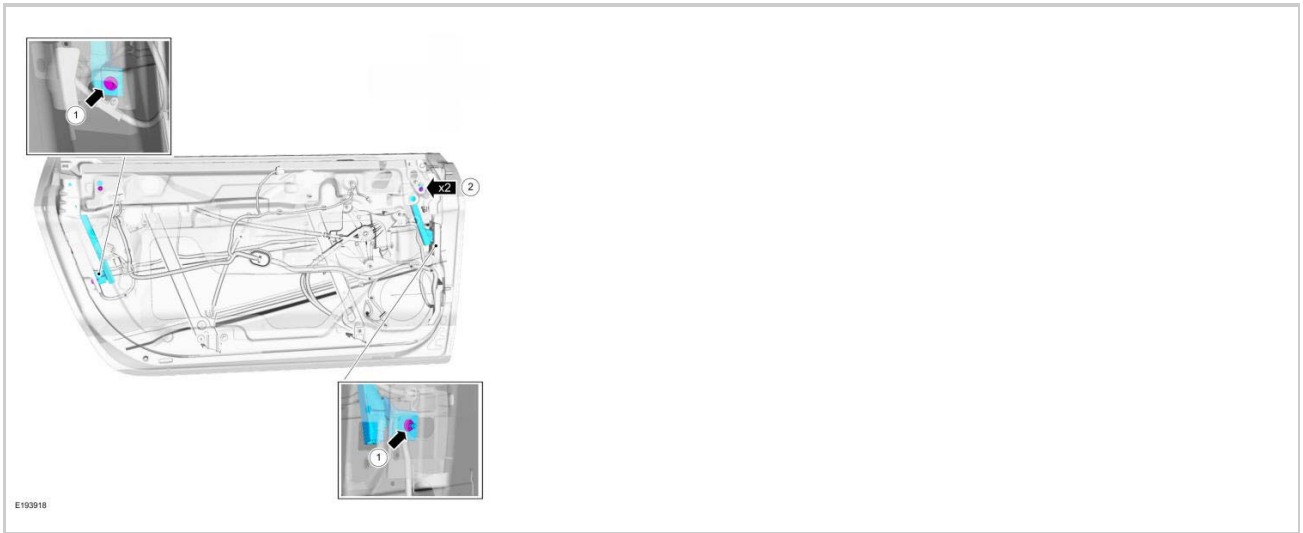
: 97 lb.in (11 Nm)

2.

Tighten the upper nuts on the fore and aft front door glass runs.

Torque

: 97 lb.in (11 Nm)



24.

Raise the front door window glass to the full up position.

1.

Install the front door window control switch.

2.

Raise the front door window glass to the full up position.



25.

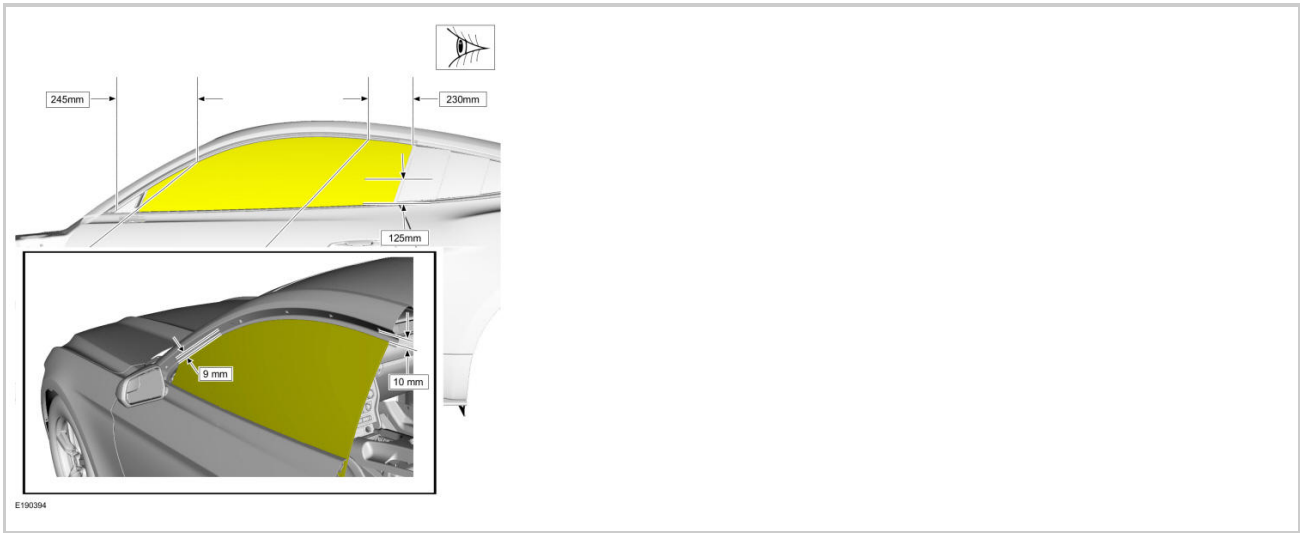
Close the door.



All adjustments

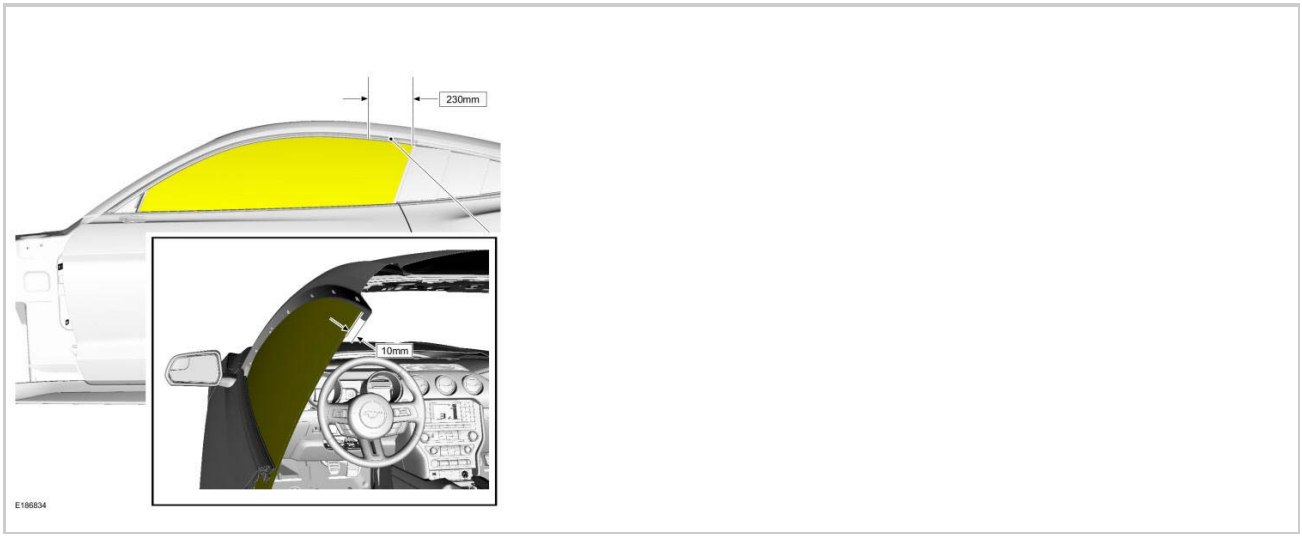
26.

Recheck the front door glass up/down, fore/aft to body dimensions at the specified locations.



27.

Recheck the front door glass in/out to body dimensions at the specified locations.



28.

Install the removed components.

29.

Carry out the power door window initialization. Refer to: Power Door Window Initialization .

GENERAL PROCEDURES > DOOR WINDOW GLASS ADJUSTMENT - CONVERTIBLE

Adjustment

NOTE: RH side shown, LH side similar.

NOTE: Removal steps in this procedure may contain installation details.

NOTE: The rear quarter window glass must be aligned correctly before adjusting the front door window glass.

All adjustments

1.

Check the rear quarter window glass adjustment. Refer to: Rear Quarter Window Glass Adjustment - Convertible .

NOTE: The front door must be aligned correctly before adjusting the front door

window glass.

2.
Check the front door alignment. Refer to: Front Door Alignment .

3.

Open the door.

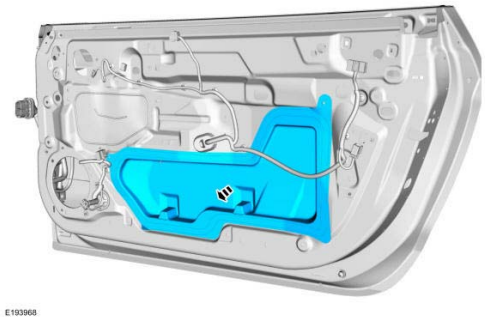


4.

Remove the front door speaker. Refer to: Front Door Speaker RH . Refer to: Front Door Speaker LH .

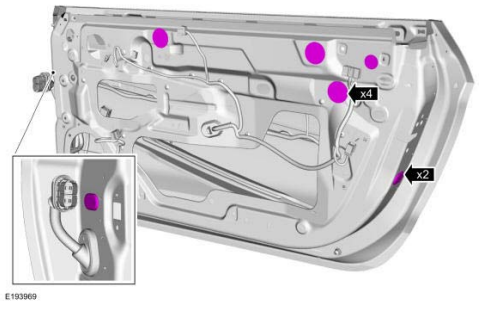
5.

Remove the front door lower watershield.



6.

Remove the grommets and the adhesive tapes.



7.

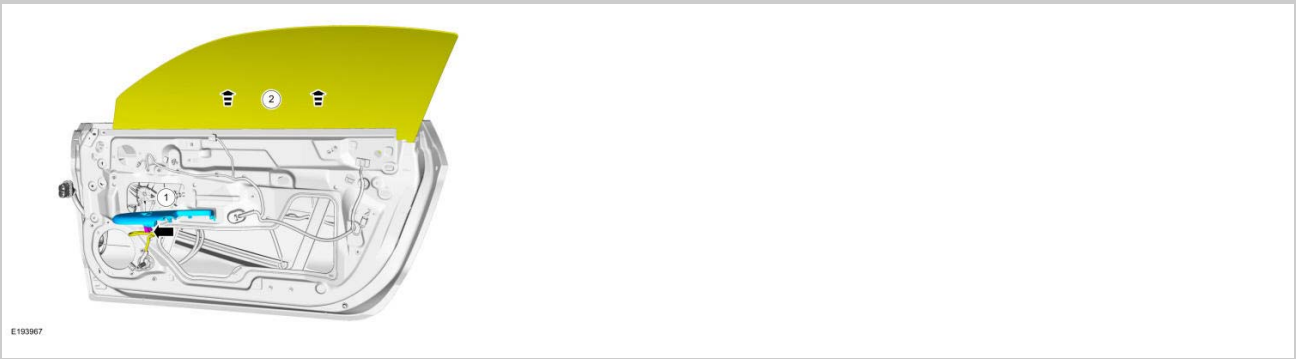
Raise the front door window glass to the full up position.

1.

Install the front door window control switch.

2.

Raise the front door window glass to the full up position.



8.

Close the door.



Up/Down, Fore/Aft adjustment

9.

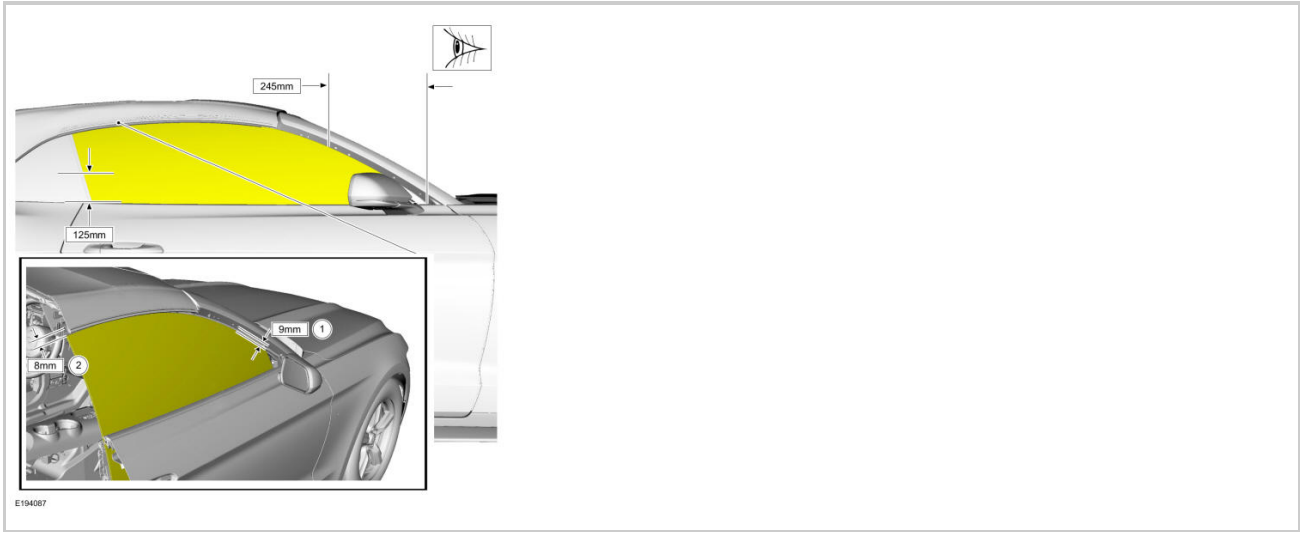
Measure the gap between the top of the front door glass and the body at the specified locations.

1.

Measurement at A-pillar 9mm.

2.

Measurement at B-pillar 8mm.



10.

Open the door.



11.

Loosen both glass clamps, adjust the front door window glass as necessary and tighten the glass clamps.

Torque

: 80 lb.in (9 Nm)



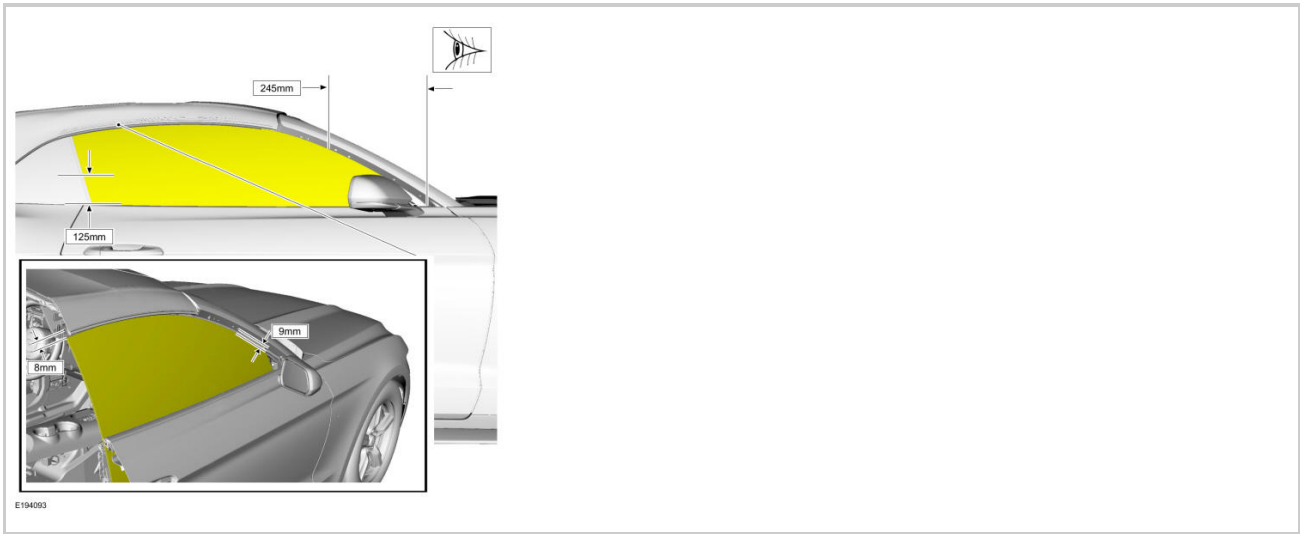
12.

Close the door.



13.

Check the door glass up/down, fore/aft to body dimensions.



In/Out adjustment

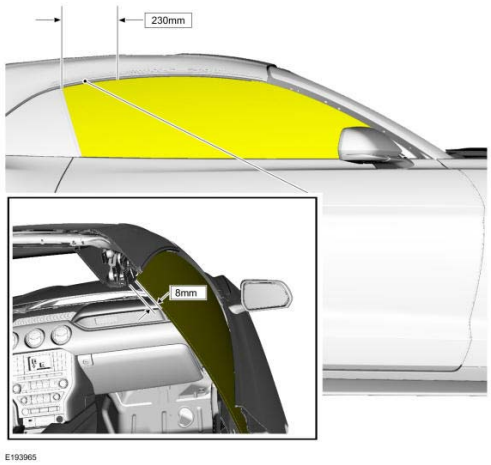
14.

Close the door.



15.

Measure the gap between the top of the front door glass and the body at the specified locations.



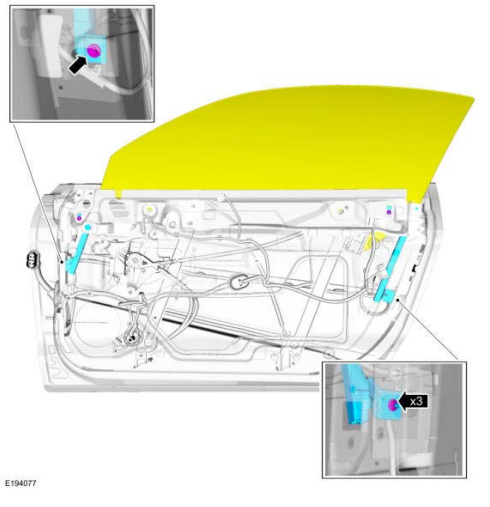
16.

Open the door.



17.

Loosen the nuts on the fore and aft front door glass runs.



18.

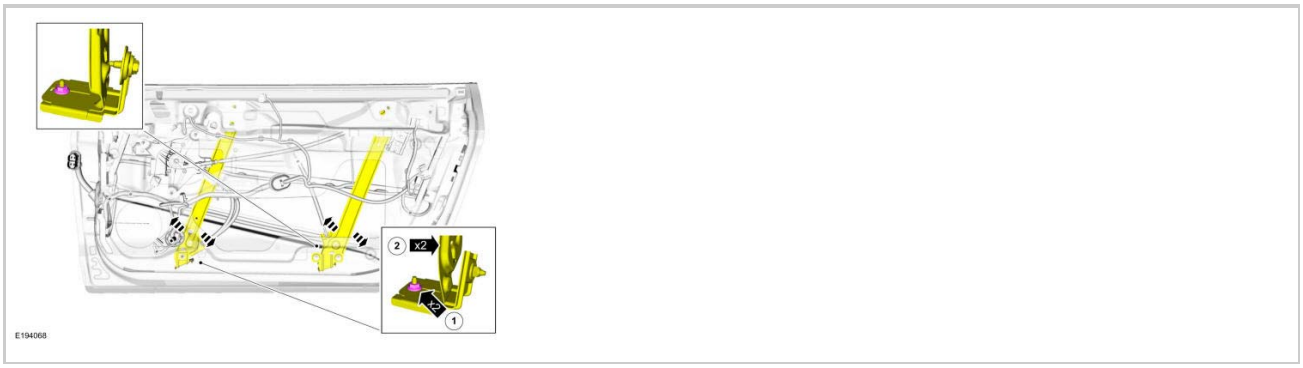
Adjust the regulator rails equally in and out to avoid binding.

1.

Loosen the lower window regulator nuts.

2.

Adjust the regulator rails equally in and out to avoid binding.



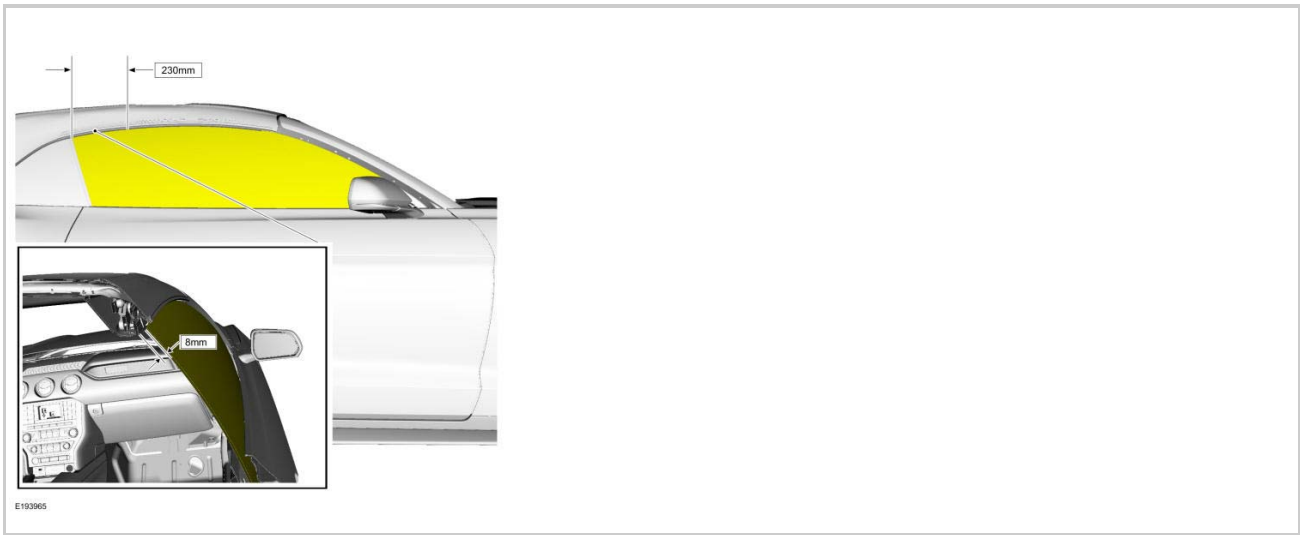
19.

Close the door.



20.

Check the door glass in/out to body dimensions and adjust the door glass runs and regulator rails relative to the door as necessary.



21.

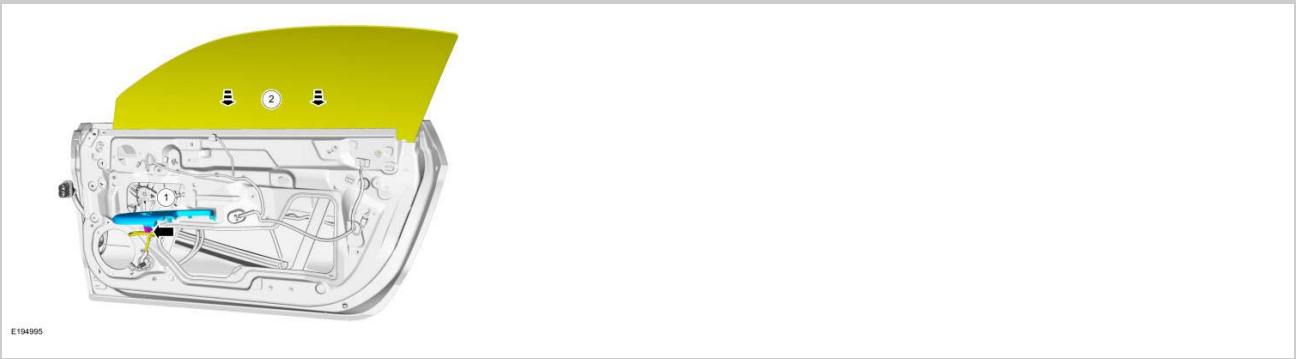
Lower the front door window glass.

1.

Install the front door window control switch.

2.

Lower the front door window glass.

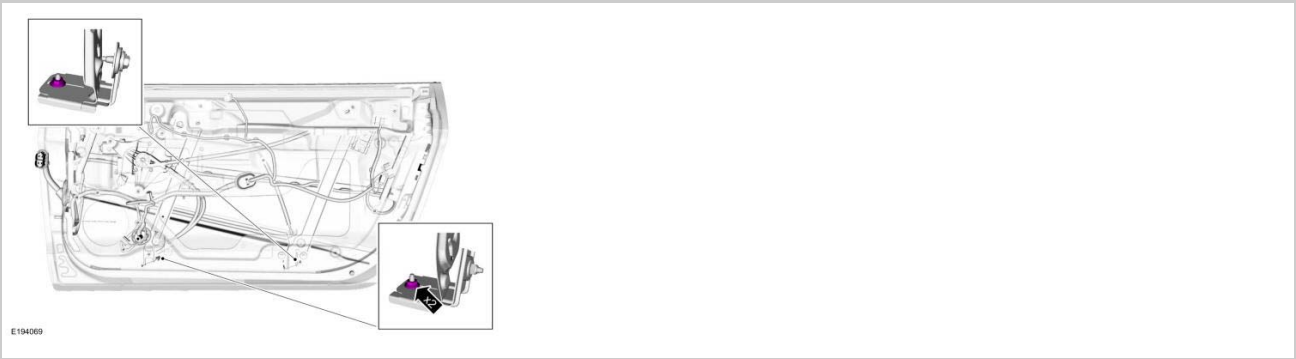


22.

Tighten the front door glass regulator rail nuts.

Torque

: 97 lb.in (11 Nm)



NOTE: Take care not to influence the position of the front door glass runs when tightening the nuts.

23.
Tighten the nuts on the fore and aft front door glass runs.

1.

Tighten the lower bolt and nuts on the fore and aft front door glass runs.

Torque

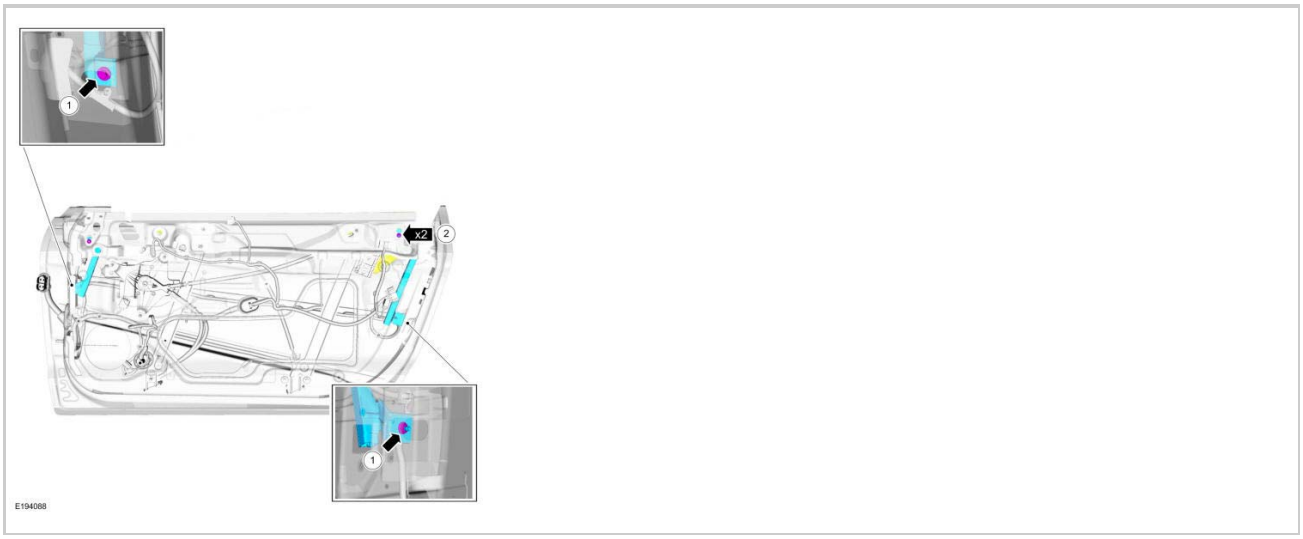
: 97 lb.in (11 Nm)

2.

Tighten the upper nuts on the fore and aft front door glass runs.

Torque

: 97 lb.in (11 Nm)



24.

Raise the front door window glass to the full up position.

1.

Install the front door window control switch.

2.

Raise the front door window glass to the full up position.



25.

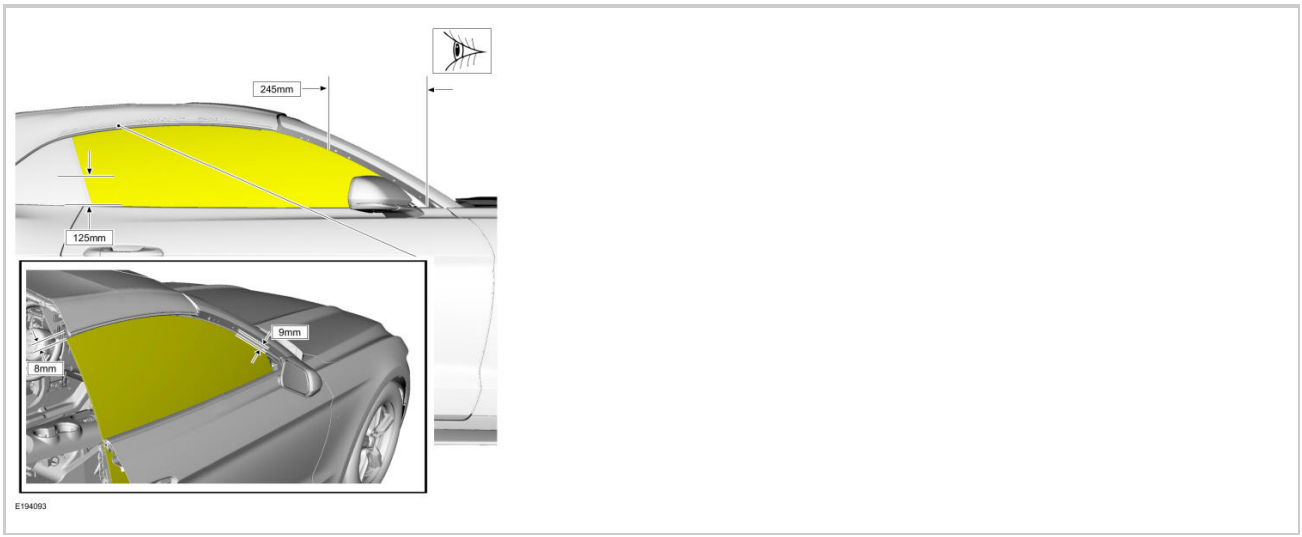
Close the door.



All adjustments

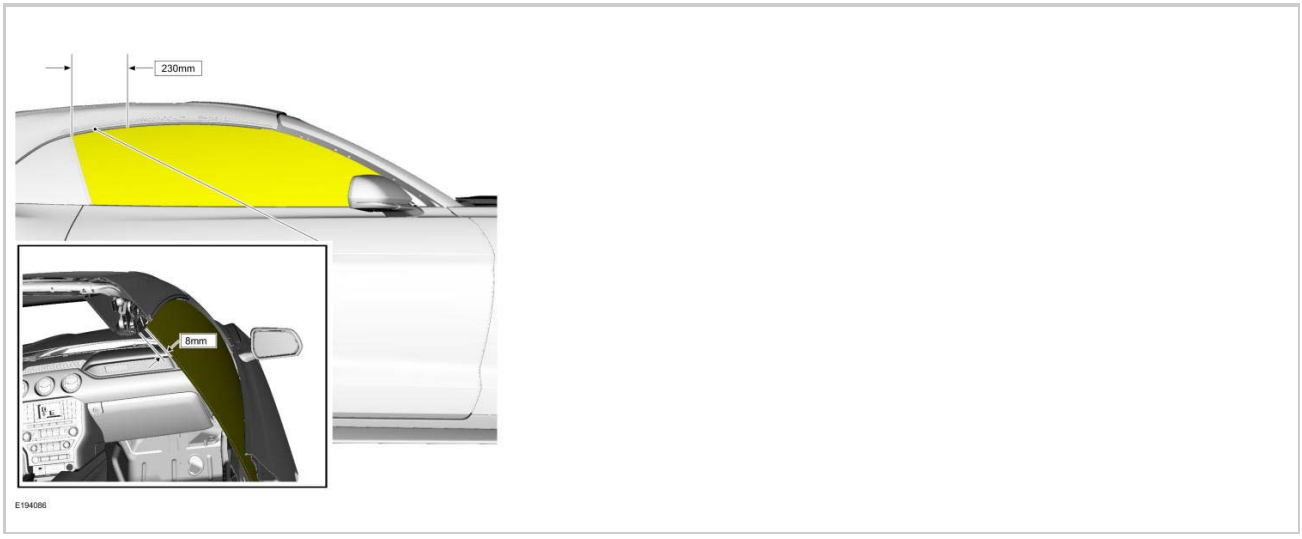
26.

Recheck the front door glass up/down, fore/aft to body dimensions at the specified locations.



27.

Recheck the front door glass in/out to body dimensions at the specified locations.



28.

Install the removed components.

29.

Carry out the power door window initialization. Refer to: Power Door Window Initialization .

GENERAL PROCEDURES > REAR QUARTER WINDOW GLASS ADJUSTMENT - CONVERTIBLE

Adjustment

All adjustments

NOTE: RH side shown, LH side similar.

NOTE: Removal steps in this procedure may contain installation details.

1.

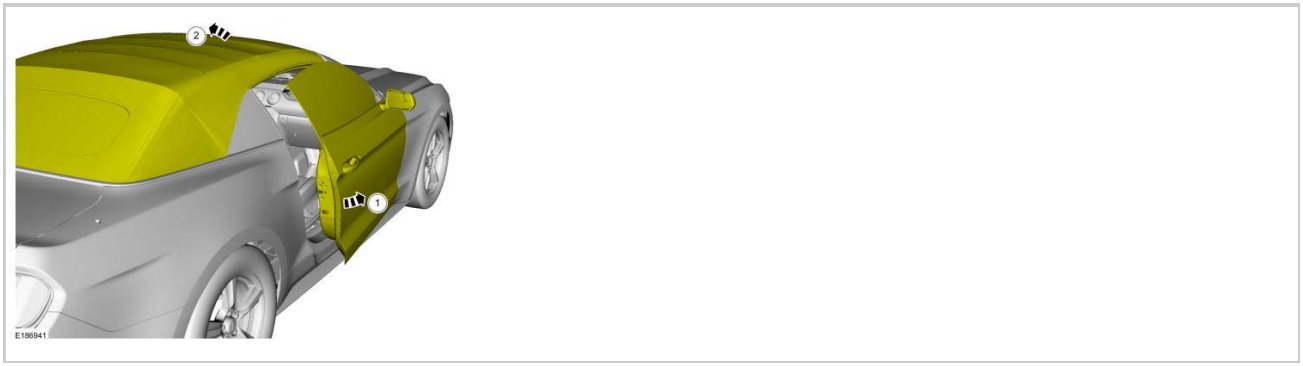
Open the door and lower the convertible top.

1.

Open the door.

2.

Lower the convertible top.



2.

If equipped, remove the RTM. Refer to: Radio Transceiver Module (RTM) .

3.

Remove the rear quarter panel speaker. Refer to: Rear Quarter Panel Speaker .

4.

Remove the rear quarter panel speaker bracket.

1.

Remove the nuts.

Torque

: 71 lb.in (8 Nm)

2.

Remove the stud bolt.

Torque

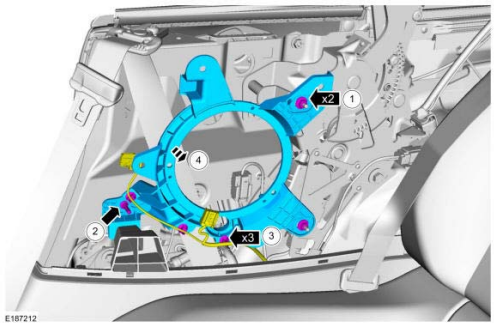
: 97 lb.in (11 Nm)

3.

Detach the retainers and position aside the wiring harness.

4.

Remove the rear quarter panel speaker bracket.



5.

Remove the watershield.

1.

Disconnect the rear quarter window regulator motor electrical connector and position aside the wiring harness.

2.

Detach the retainer and position aside the watershield.

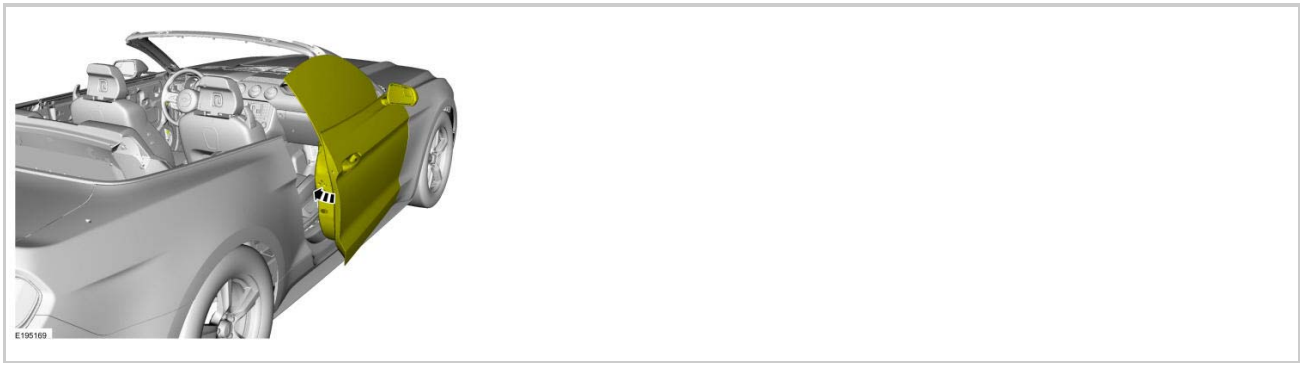
3.

Detach the wiring harness retainer and remove the watershield.



6.

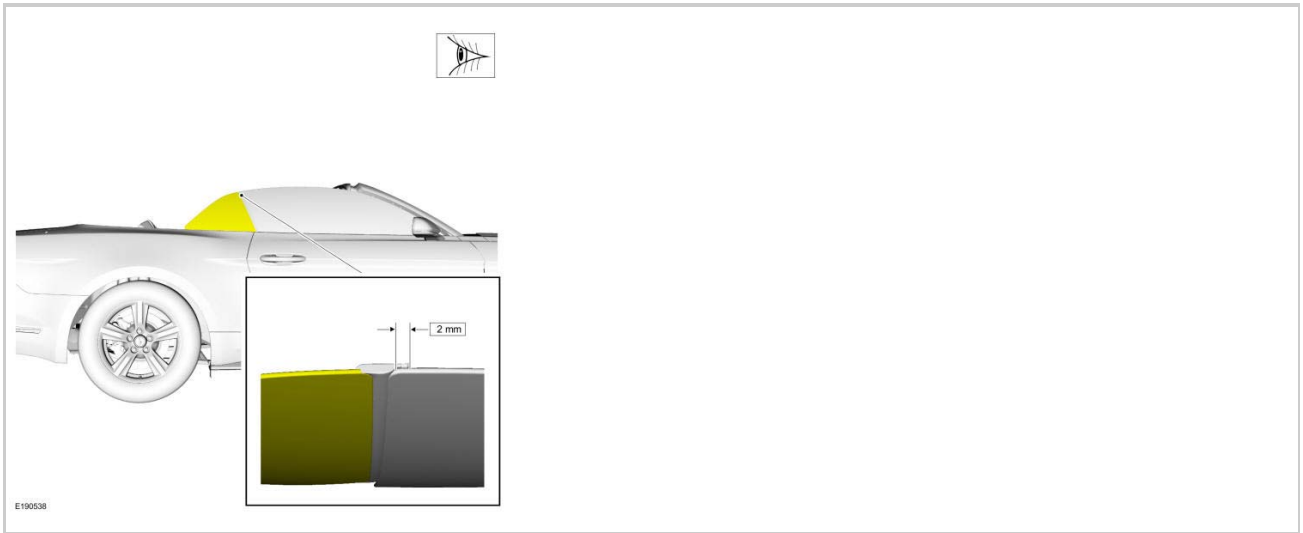
Close the door.



Up/Down, Fore/Aft adjustment

7.

Check the relative position of the rear quarter window glass to the body seals.



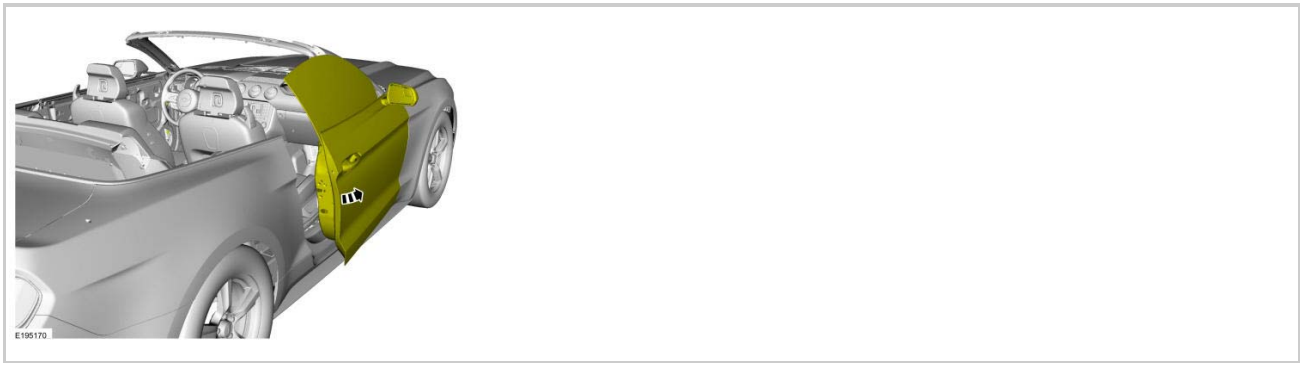
8.

Check the relative position of the rear quarter window glass to the door window glass.



9.

Open the door.



10.

Adjust the rear quarter window glass as necessary.

1.

Loosen the rear quarter window glass bolts.

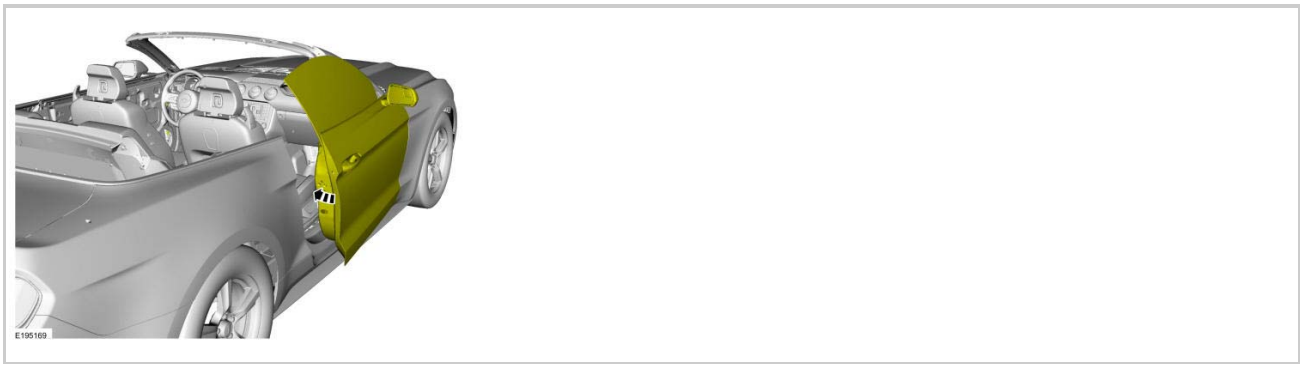
2.

Adjust the rear quarter window glass as necessary.



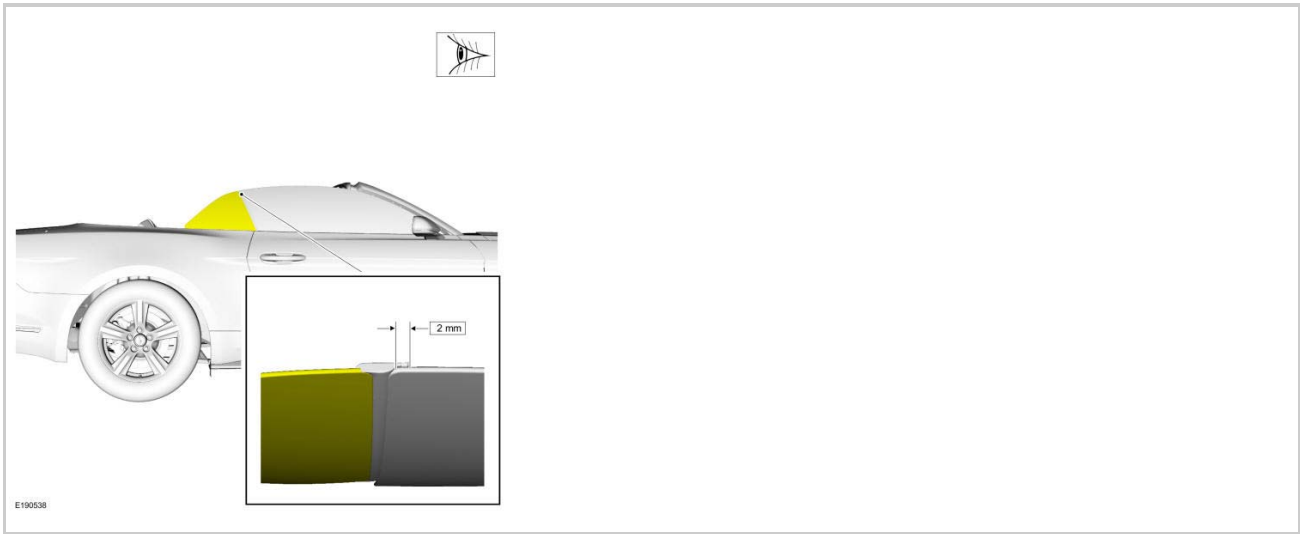
11.

Close the door.



12.

Check the quarter glass up/down, fore/aft to body dimensions.

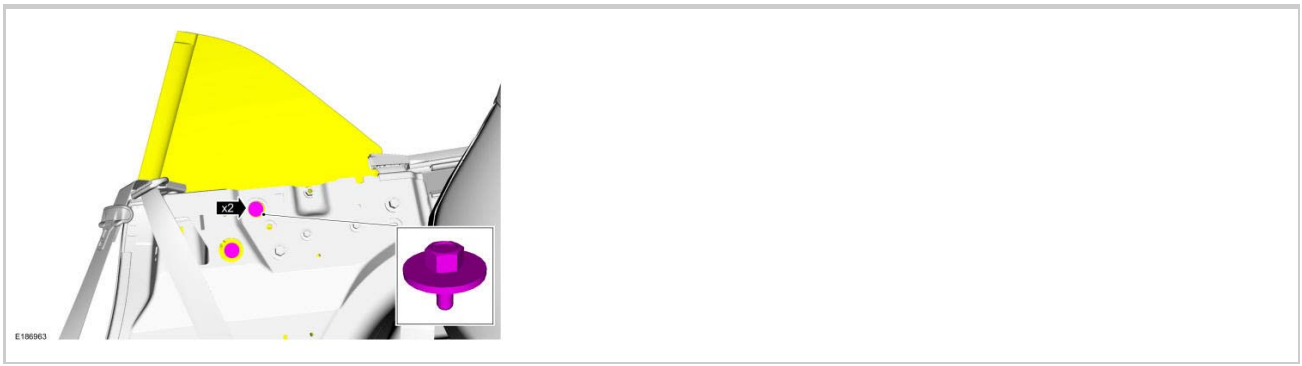


13.

Tighten the rear quarter window glass bolts.

Torque

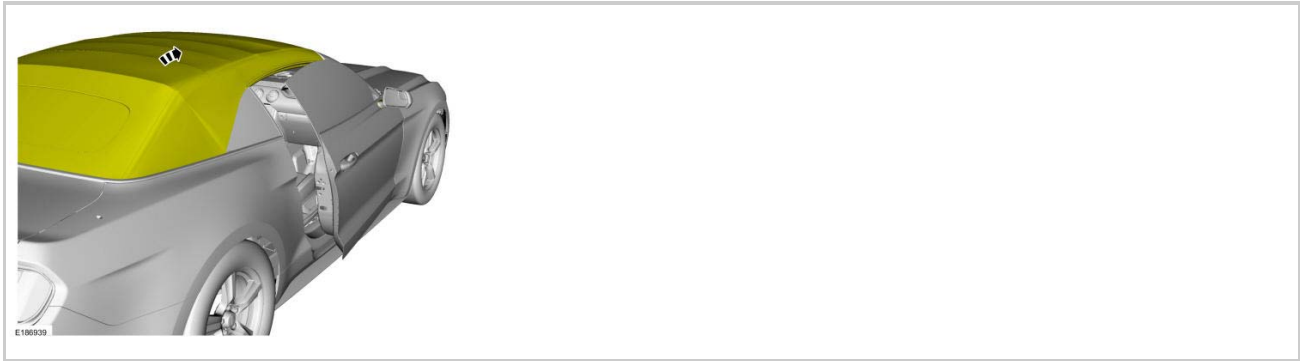
: 97 lb.in (11 Nm)



In/Out adjustment

14.

Close the convertible top.



15.

Close the door.



16.

Check the relative position of the rear quarter window glass to the body seals.



17.

Check the relative position of the rear quarter window glass to the door window glass. Make sure the division bar seal enters the convertible top seals completely when the quarter window glass is raised to full up position and engages the door glass without clipping.



18.

Open the door.



19.

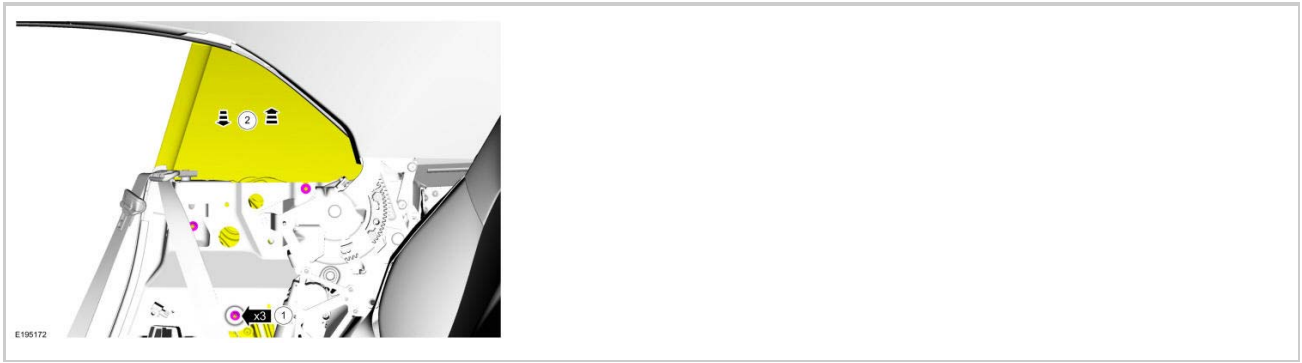
Adjust the rear quarter window glass/regulator assembly as necessary.

1.

Loosen the rear quarter window glass/regulator assembly nuts.

2.

Adjust the rear quarter window glass/regulator assembly as necessary.



20.

Close the door.



21.

Check the rear quarter window glass in/out to seals and door glass.

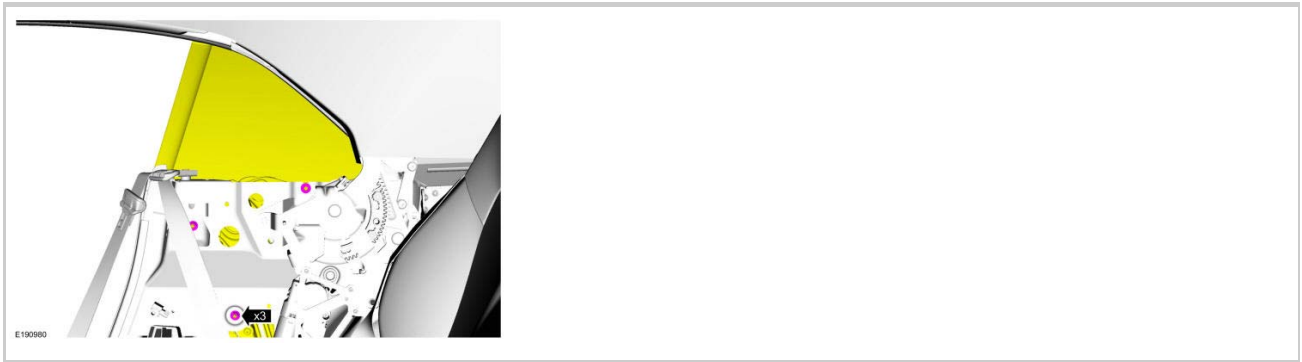


22.

Tighten the rear quarter window glass/regulator assembly nuts.

Torque

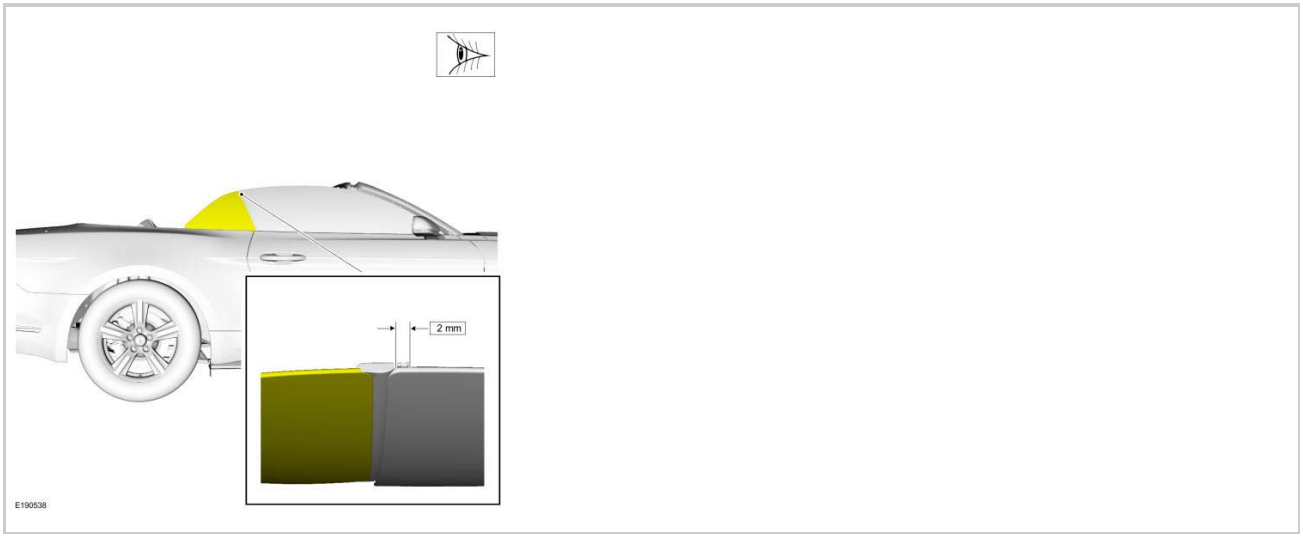
: 177 lb.in (20 Nm)



All adjustments

NOTE: Convertible top removed for clarity.

23.
Check the relative position of the rear quarter window glass to the body seals and door glass.



24.

Check the relative position of the rear quarter window glass to the body seals.



25.

Check the relative position of the rear quarter window glass to the door window glass.



26.

Install the removed components.

REMOVAL AND INSTALLATION > REAR QUARTER WINDOW GLASS - CONVERTIBLE > REMOVAL

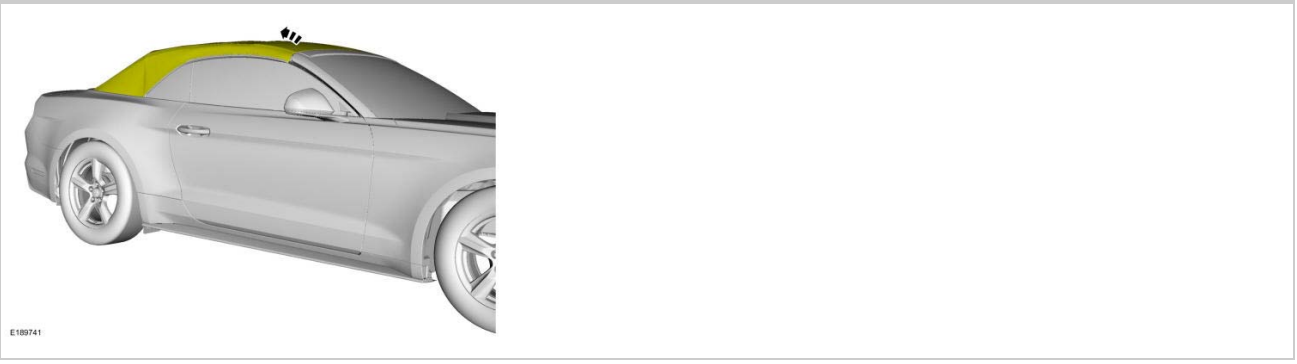
NOTE: RH side shown, LH side similar.

NOTE: Removal steps in this procedure may contain installation details.

All vehicles

1.

Lower the convertible top.



Right hand side

2.

Remove the RTM. Refer to: Radio Transceiver Module (RTM) .

All vehicles

NOTE: The convertible top assembly removed for clarity.

3.

Remove the rear quarter panel speaker. Refer to: Rear Quarter Panel Speaker .

4.

Remove the rear quarter window glass interior belt moulding.

1.

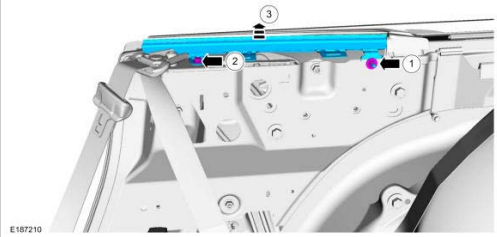
Remove the nut.

2.

Remove the bolt.

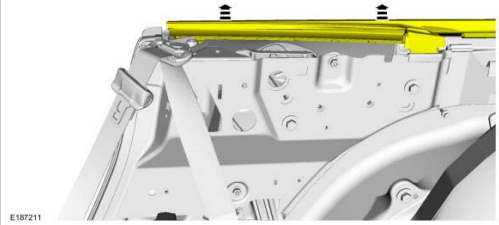
3.

Remove the rear quarter window glass interior belt moulding.



5.

Position aside the rear quarter window glass exterior moulding.



NOTE: If the rear quarter window glass is inoperative the rear quarter window regulator motor will have to be removed to allow movement of the glass to gain access to the bolts.

NOTE: If the rear quarter window glass is not in full up position, the rear quarter window glass and rear quarter window regulator cannot be separated.

6.
Raise the rear quarter window glass to full up position.



7.

Remove the rear quarter panel speaker bracket.

1.

Remove the nuts.

Torque

: 71 lb.in (8 Nm)

2.

Remove the stud bolt.

Torque

: 97 lb.in (11 Nm)

3.

Detach the retainer and position aside the wiring harness.

4.

Remove the rear quarter panel speaker bracket.



8.

Remove the watershield.

1.

Disconnect the rear quarter window regulator motor electrical connector and position aside the

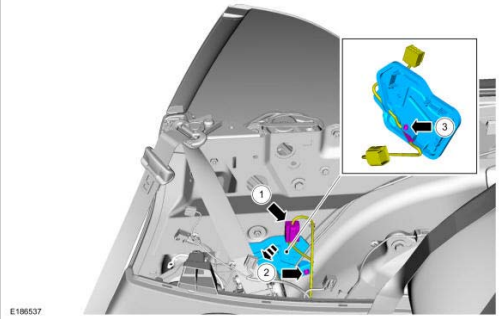
wiring harness.

2.

Detach the retainer and position aside the watershield.

3.

Detach the wiring harness retainer and the watershield.



9.

Remove the rear quarter window glass/regulator assembly.

1.

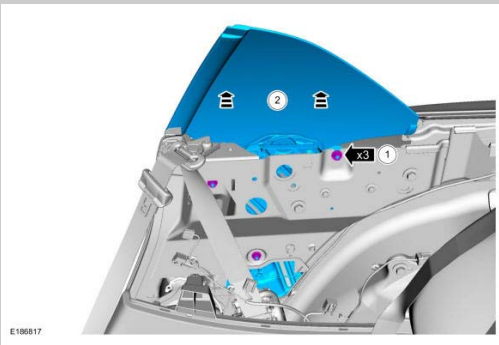
Remove the nuts.

Torque

: 177 lb.in (20 Nm)

2.

Remove the rear quarter window glass/regulator assembly.



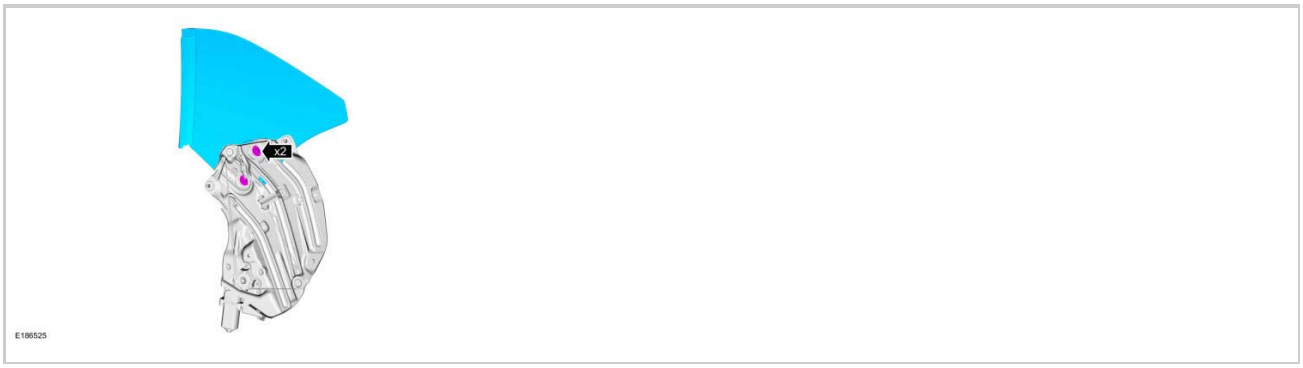
NOTE: If the rear quarter window glass is inoperative the rear quarter window regulator motor will have to be removed to allow movement of the glass to gain access to the bolts.

NOTE: This step only necessary when installing a new rear quarter window glass.

10.
Remove the bolts and the rear quarter window glass.

Torque

: 97 lb.in (11 Nm)



REMOVAL AND INSTALLATION > REAR QUARTER WINDOW GLASS - CONVERTIBLE > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Carry out the rear quarter window glass adjustment. Refer to: Rear Quarter Window Glass Adjustment - Convertible .

REMOVAL AND INSTALLATION > REAR QUARTER WINDOW REGULATOR - CONVERTIBLE > REMOVAL

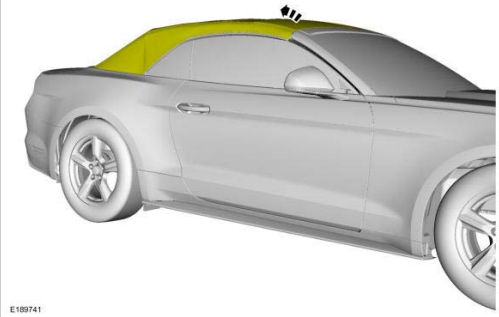
NOTE: RH side shown, LH side similar.

NOTE: Removal steps in this procedure may contain installation details.

All vehicles

1.

Lower the convertible top.



Right hand side

2.

Remove RTM. Refer to: Radio Transceiver Module (RTM) .

All vehicles

NOTE: The convertible top assembly removed for clarity.

3.

Remove the rear quarter panel speaker. Refer to: Rear Quarter Panel Speaker .

4.

Remove the rear quarter window glass interior belt moulding.

1.

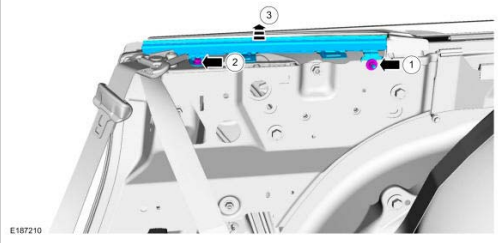
Remove the nut.

2.

Remove the bolt.

3.

Remove the rear quarter window glass interior belt moulding.



5.

Position aside the rear quarter window glass exterior moulding.



NOTE: If the rear quarter window glass is inoperative the rear quarter window regulator motor will have to be removed to allow movement of the glass to gain access to the bolts.

NOTE: If the rear quarter window glass is not in full up position, the rear quarter window glass and rear quarter window regulator cannot be separated.

6.
Raise the rear quarter window glass to full up position.



7.

Remove the rear quarter panel speaker bracket.

1.

Remove the nuts.

Torque

: 71 lb.in (8 Nm)

2.

Remove the stud bolt.

Torque

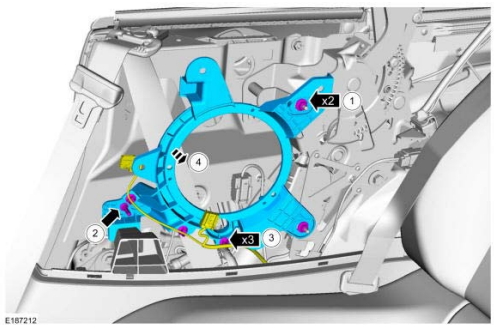
: 97 lb.in (11 Nm)

3.

Detach the retainer and position aside the wiring harness.

4.

Remove the rear quarter panel speaker bracket.



8.

Remove the watershield.

1.

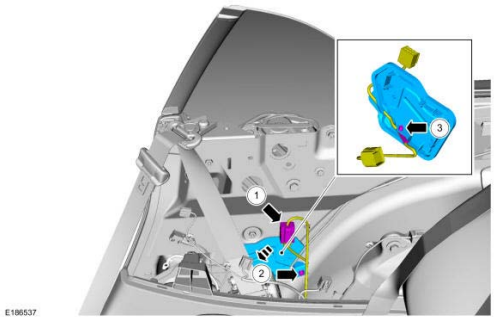
Disconnect the rear quarter window regulator motor electrical connector and position aside the wiring harness.

2.

Detach the retainer and position aside the watershield.

3.

Detach the wiring harness retainer and the watershield.



9.

Remove the rear quarter window glass/regulator assembly.

1.

Remove the nuts.

Torque

: 177 lb.in (20 Nm)

2.

Remove the rear quarter window glass/regulator assembly.



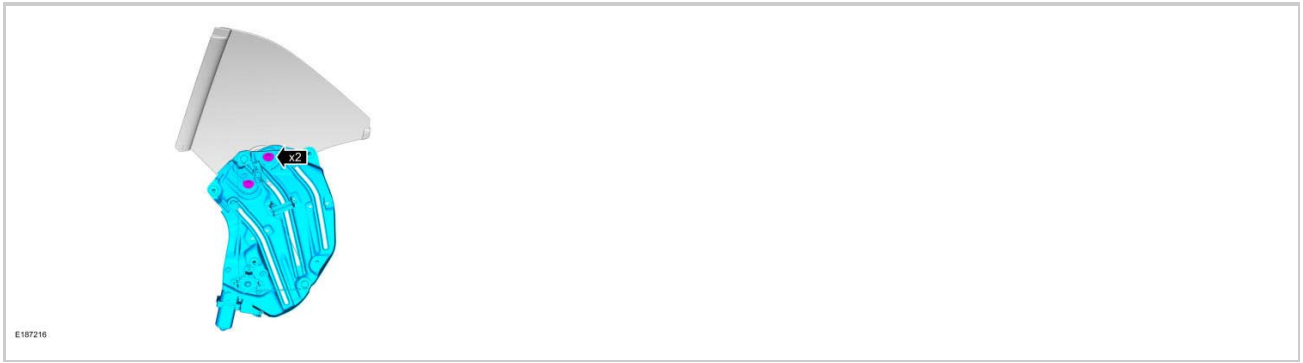
NOTE: If the rear quarter window glass is inoperative the rear quarter window regulator motor will have to be removed to allow movement of the glass to gain access to the bolts.

NOTE: This step only necessary when installing a new rear quarter window regulator.

10.
Remove the bolts and the rear quarter window regulator.

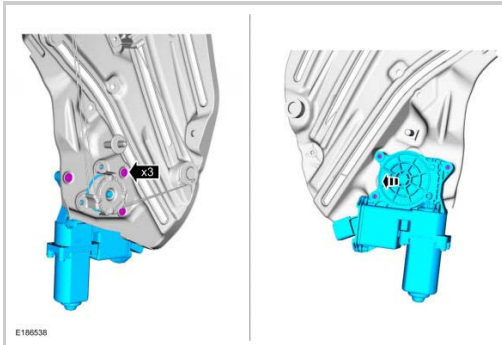
Torque

: 97 lb.in (11 Nm)



NOTE: This step is only necessary when installing a new component.

11.
Remove the bolts and the rear quarter window regulator motor.



REMOVAL AND INSTALLATION > REAR QUARTER WINDOW REGULATOR - CONVERTIBLE > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Carry out the rear quarter window glass adjustment. Refer to: Rear Quarter Window Glass Adjustment - Convertible .

REMOVAL AND INSTALLATION > REAR QUARTER WINDOW REGULATOR MOTOR - CONVERTIBLE > REMOVAL

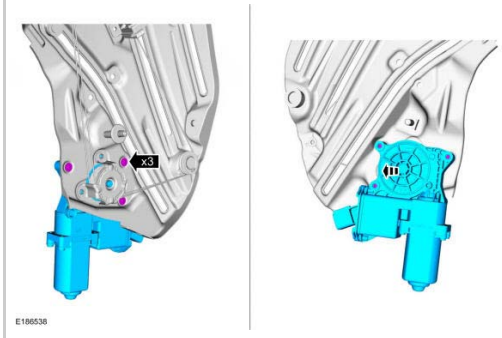
NOTE: RH side shown, LH side similar.

1.

Remove the rear quarter window regulator. Refer to: Rear Quarter Window Regulator - Convertible .

2.

Remove the bolts and the rear quarter window regulator motor.



REMOVAL AND INSTALLATION > REAR QUARTER WINDOW REGULATOR MOTOR - CONVERTIBLE > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Carry out the rear quarter window glass adjustment. Refer to: Rear Quarter Window Glass Adjustment - Convertible .

REMOVAL AND INSTALLATION > FRONT DOOR WINDOW CONTROL SWITCH > REMOVAL

NOTE: LHD shown, RHD similar.

Both doors

NOTE: LH side shown, RH side similar.

1.
Remove the front door window control switch.

1.

Remove the front door window control switch and the bezel assembly.

2.

Disconnect the front door window control switch electrical connector.



Driver side

NOTE: This step is only necessary when installing a new component.

2.

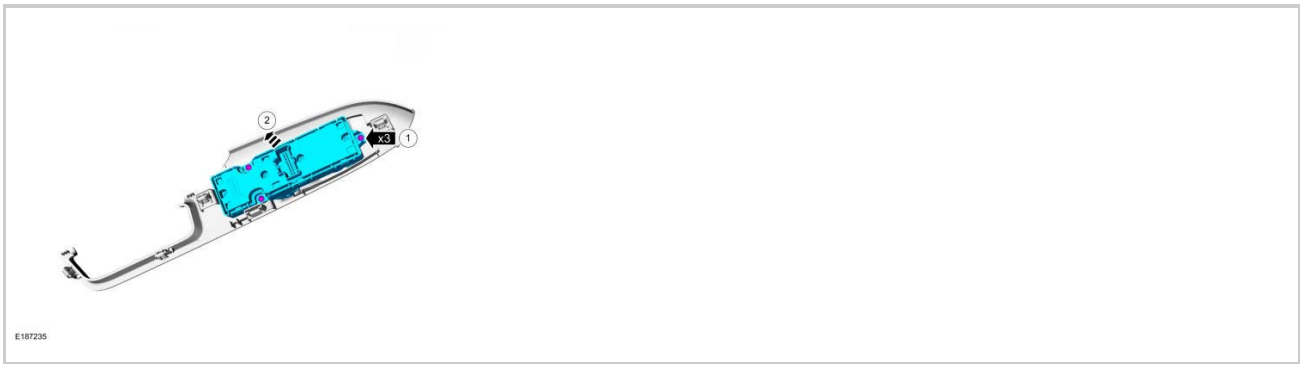
Remove the front door window control switch.

1.

Remove the retainers.

2.

Remove the front door window control switch from the bezel.



Passenger side

> *NOTE: This step is only necessary when installing a new component.*

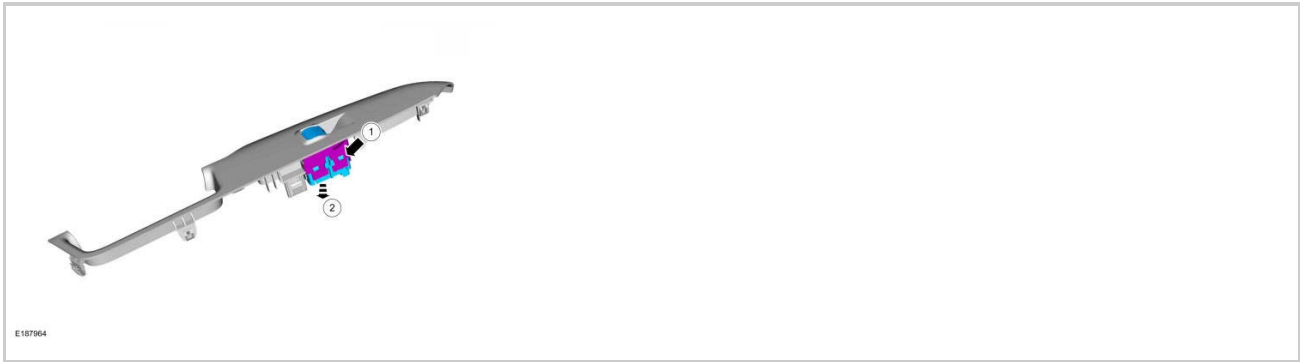
3.
Remove the front door window control switch.

1.

Release the retaining tab from the front door window control switch.

2.

Remove the front door window control switch from the bezel.



REMOVAL AND INSTALLATION > FRONT DOOR WINDOW CONTROL SWITCH > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > FRONT DOOR WINDOW GLASS > REMOVAL

NOTE: LH side shown, RH side similar.

NOTE: Removal steps in this procedure may contain installation details.

1.

Remove the front door speaker. Refer to: Front Door Speaker LH . Refer to: Front Door Speaker RH .

2.

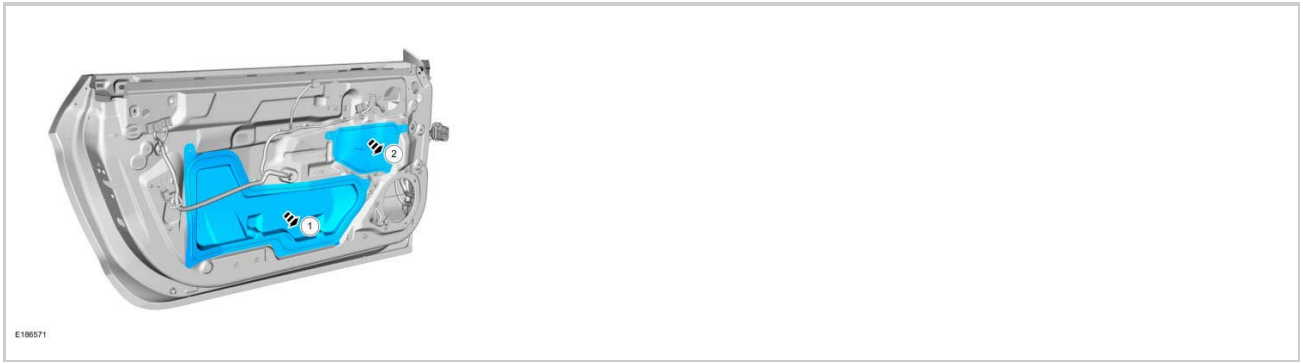
Remove the front door upper and the lower watershield.

1.

Remove the front door lower watershield.

2.

Remove the front door upper watershield.



3.

Raise the front door window glass to full up position.

1.

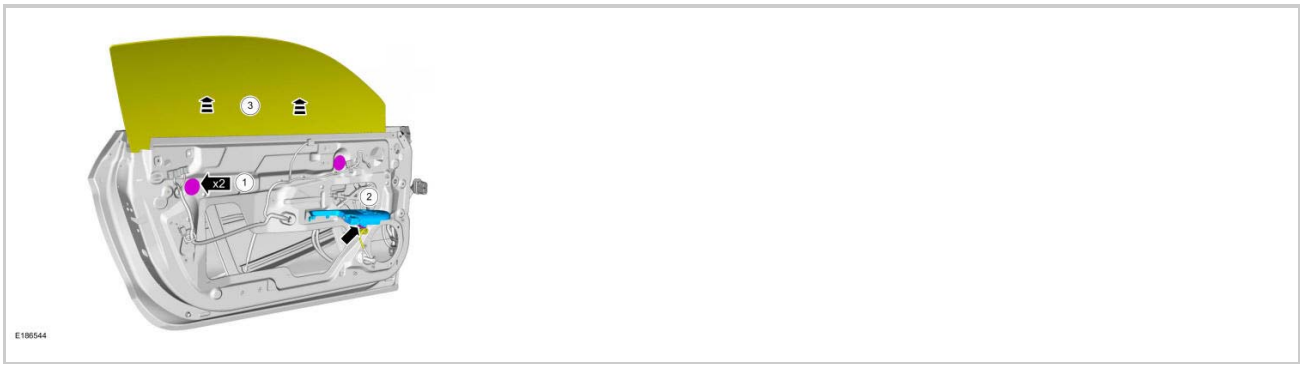
Remove the adhesive covers.

2.

Install the front door window control switch.

3.

Raise the front door window glass to full up position.



4.

Remove the front door window glass.

1.

Remove the bolts.

Torque

: 80 lb.in (9 Nm)

2.

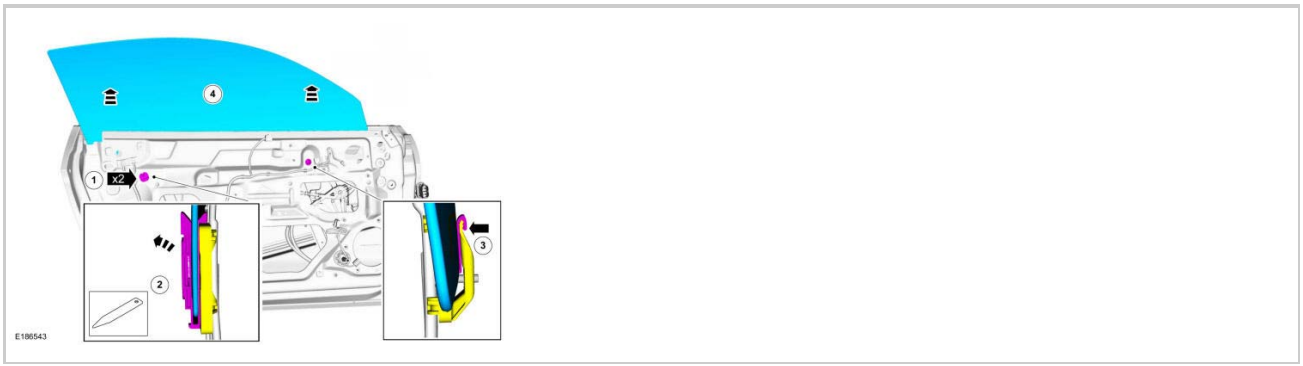
Using a non-marring trim tool from the outboard side of the glass, pry the tang on each clip back, releasing the window glass.

3.

Release the clip.

4.

Remove the front window glass.



REMOVAL AND INSTALLATION > FRONT DOOR WINDOW GLASS > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Carry out the door window glass adjustment. Refer to: Door Window Glass Adjustment - Coupe . Refer to: Door Window Glass Adjustment - Convertible .

3.

If the door is equipped with one-touch up the power window motor must be initialized. Carry out the power door window initialization. Refer to: Power Door Window Initialization .

REMOVAL AND INSTALLATION > FRONT DOOR WINDOW REGULATOR > REMOVAL

NOTE: LH side shown, RH side similar.

NOTE: Removal steps in this procedure may contain installation details.

1.

Remove the front door window glass. Refer to: Front Door Window Glass .

2.

Mark the location and remove the front door window regulator nuts.

1.

Remove the adhesive tapes.

2.

Disconnect the front door window regulator electrical connector and position aside the wiring harness.

Torque

: 97 lb.in (11 Nm)

3.

Mark the location of the nuts for installation.

4.

Remove the nuts.



3.

Remove the front door window regulator.

1.

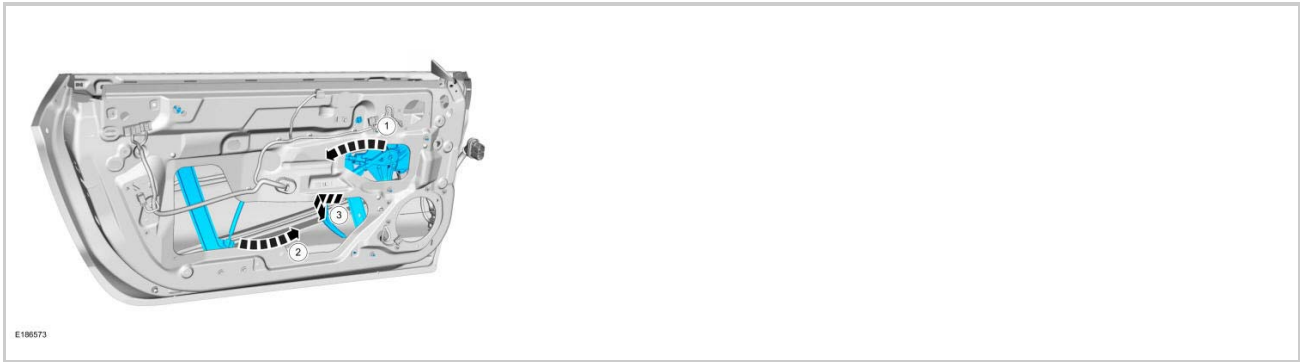
Rotate the front half of the window regulator rearward.

2.

Rotate the rear half of the window regulator forward.

3.

Remove the front door window regulator.



NOTE: This step is only necessary when installing a new component.

4.
Remove the front door window regulator motor. Refer to: Front Door Window Regulator Motor .

REMOVAL AND INSTALLATION > FRONT DOOR WINDOW REGULATOR > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Align the front door window regulator to the marks made previous during removal.

3.

Carry out the door window glass adjustment. Refer to: Door Window Glass Adjustment - Coupe . Refer to: Door Window Glass Adjustment - Convertible .

4.

If the door is equipped with one-touch up the power window motor must be initialized. Carry out the power door window initialization. Refer to: Power Door Window Initialization .

REMOVAL AND INSTALLATION > FRONT DOOR WINDOW REGULATOR MOTOR > REMOVAL

NOTE: LH side shown, RH side similar.

1.

Remove the front door window regulator. Refer to: Front Door Window Regulator .

2.

Remove the retainers and the front door window regulator motor.



REMOVAL AND INSTALLATION > FRONT DOOR WINDOW REGULATOR MOTOR > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Carry out the door window glass adjustment. Refer to: Door Window Glass Adjustment - Coupe . Refer to: Door Window Glass Adjustment - Convertible .

3.

If the door is equipped with one-touch up the power window motor must be initialized. Carry out the power door window initialization. Refer to: Power Door Window Initialization .

REMOVAL AND INSTALLATION > FRONT DOOR GLASS RUN AND BRACKET > REMOVAL

NOTE: LH side shown, RH side similar.

NOTE: Removal steps in this procedure may contain installation details.

Fore front door glass run

1.

Raise the front door window glass to full up position.

1.

Install the front door window control switch.

2.

Raise the front door window glass to full up position.



2.

Remove the front door speaker. Refer to: Front Door Speaker LH . Refer to: Front Door Speaker RH .

3.

Mark the location and remove the fore front door glass run.

1.

Mark the location of the retainers for installation.

2.

Loosen the top nut.

Torque

: 97 lb.in (11 Nm)

3.

Remove the lower nut and the fore front door glass run.

Torque

: 97 lb.in (11 Nm)



Aft front door glass run

4.

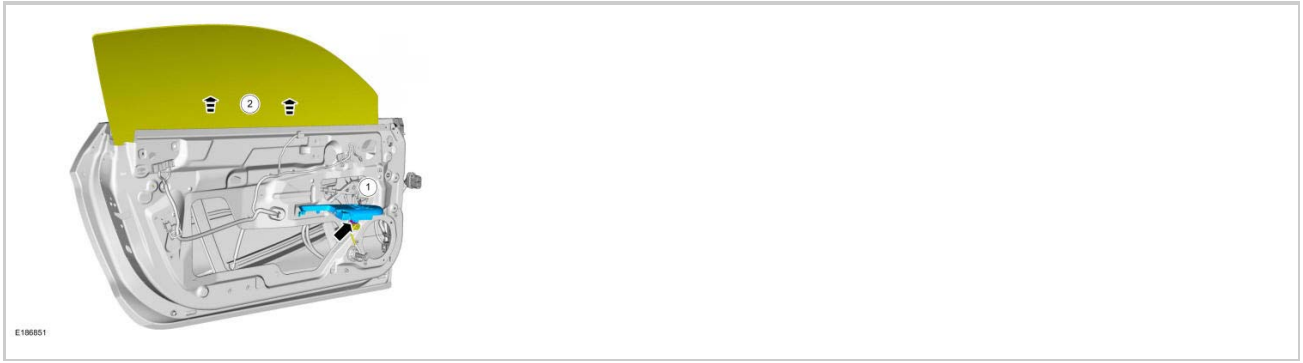
Raise the front door window glass to full up position.

1.

Install the front door window control switch.

2.

Raise the front door window glass to full up position.

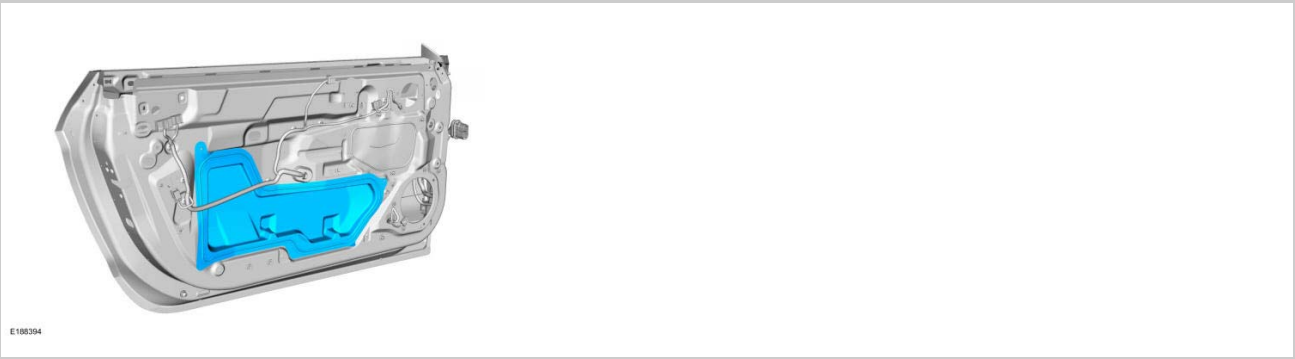


5.

Remove the front door trim panel. Refer to: Front Door Trim Panel .

6.

Remove the front door lower watershield.



7.

Mark the location and remove the aft front door glass run.

1.

Mark the location of the retainers for installation.

2.

Loosen the top nut.

Torque

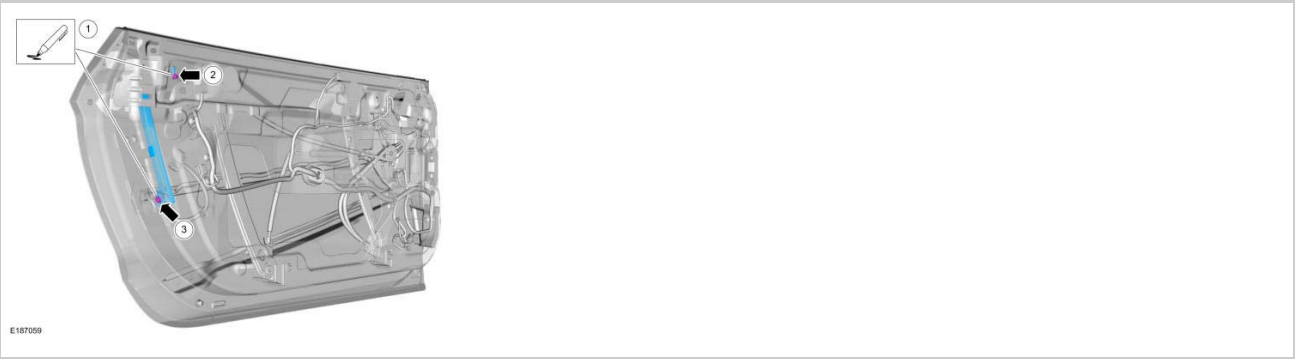
: 97 lb.in (11 Nm)

3.

Remove the lower bolt and the aft front door glass run.

Torque

: 97 lb.in (11 Nm)



REMOVAL AND INSTALLATION > FRONT DOOR GLASS RUN AND BRACKET > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Carry out the door window glass adjustment. Refer to: Door Window Glass Adjustment - Coupe . Refer to: Door Window Glass Adjustment - Convertible .

3.

If the door is equipped with one-touch up the power window motor must be initialized. Carry out the power door window initialization. Refer to: Power Door Window Initialization .

DESCRIPTION AND OPERATION > HANDLES, LOCKS, LATCHES AND ENTRY SYSTEMS - OVERVIEW > OVERVIEW

The power lock/unlock feature locks or unlocks the doors upon a customer request from a door lock control switch, the passive entry system or a RKE transmitter. The doors can also be locked by using a mechanical key in the driver door lock cylinder.

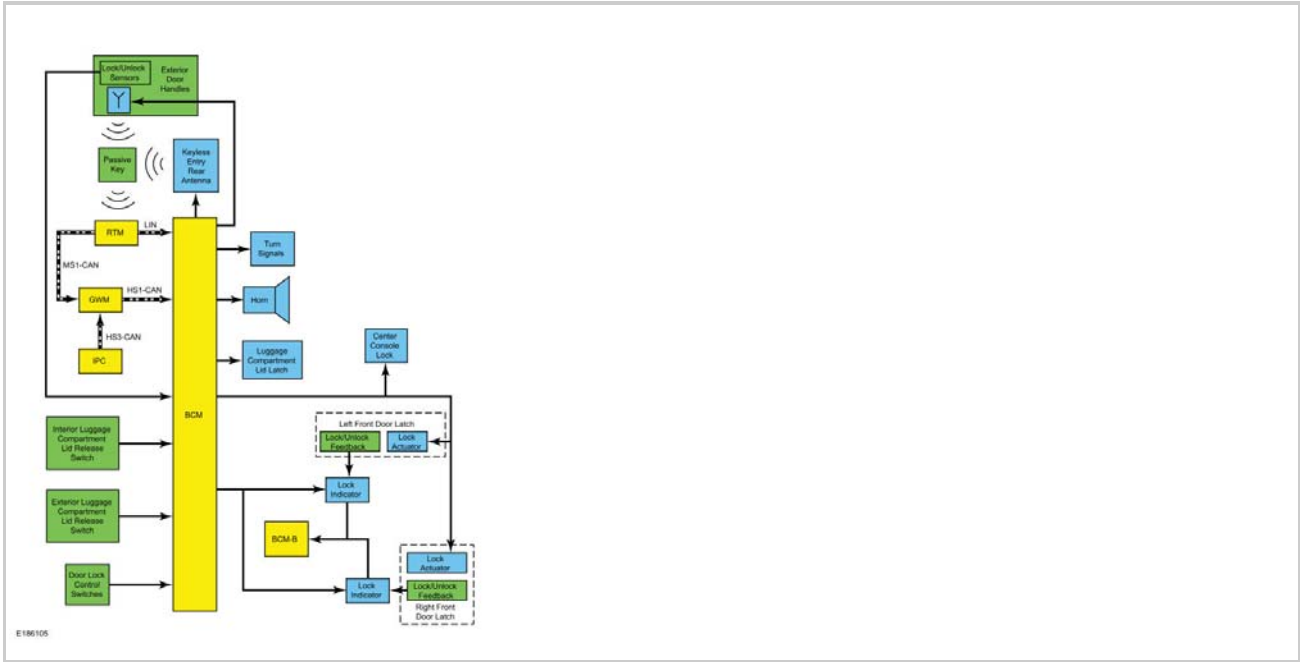
The passive entry feature automatically locks or unlocks the doors, or releases the luggage compartment lid latch.

DESCRIPTION AND OPERATION > HANDLES, LOCKS, LATCHES AND ENTRY SYSTEMS - SYSTEM OPERATION AND COMPONENT DESCRIPTION

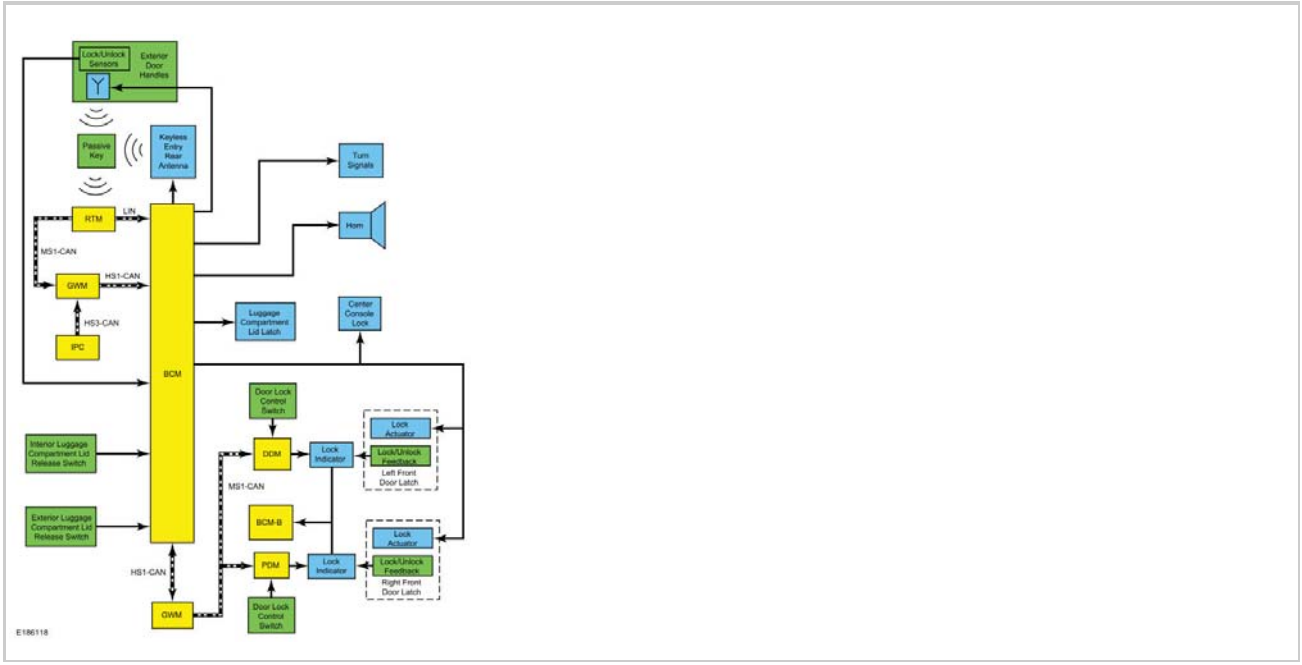
System Operation

DESCRIPTION AND OPERATION > HANDLES, LOCKS, LATCHES AND ENTRY SYSTEMS - SYSTEM OPERATION AND COMPONENT DESCRIPTION > SYSTEM DIAGRAM

Without Memory Seat



With Memory Seat



DESCRIPTION AND OPERATION > HANDLES, LOCKS, LATCHES AND ENTRY SYSTEMS - SYSTEM OPERATION AND COMPONENT DESCRIPTION > NETWORK MESSAGE CHART

BCM Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Vehicle speed	PCM	The BCM uses the vehicle speed data for the autolock and auto-unlock features.
RKE data	RTM	Provides the BCM with the lock/unlock status of the driver door latch. The lock/unlock status is used for the illumination of the door lock status indicator.
Door lock switch status	DDM	Provides the BCM with lock/unlock requests based on the input from the door lock control switch.

IPC Module Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Message center feature configuration	IPC	Provides the BCM configuration settings selected by the driver of the vehicle, such as autolock and auto-unlock settings.

Power Door Locks

The BCM controls the door locks using a series of integrated relays (driver door unlock/passenger doors unlock/all doors lock). When the relays are not energized, ground is provided on both circuits to the lock motors within the latches. When an unlock relay energizes, voltage is provided to one side of the lock motor to unlock the door(s). When the lock relay energizes, the polarity is reversed and the motors lock the doors.

For vehicles not equipped with a memory seat, the BCM sends voltage signals to the door lock control switches. When a door lock control switch is pressed, the voltage signal is routed to ground, indicating a request to lock/unlock the doors. When the BCM detects a lock or unlock request, the BCM energizes the appropriate relays to lock or unlock the doors.

For vehicles equipped with a memory seat, the DDM and PDM send voltage signals to the door lock control switches. When a door lock control switch is pressed, the voltage signal is routed to ground, indicating a request to lock/unlock the doors. When the DDM or PDM detects a lock or unlock request, a message is sent over the CAN to the BCM to lock or unlock the doors.

In the event of a power door lock failure, the doors can be individually locked using the manual door lock. The manual door lock is located on the rear edge of the door just above the door latch opening. For the left door, insert a key and turn clockwise to lock. For the right door, insert a key and turn counterclockwise to lock.

Based on input from the door lock control switches, the passive entry system and the RKE transmitter, the BCM unlocks the driver door, unlocks all the doors or locks all the doors.

LED Door Lock Indicators

Each door panel has a door lock indicator located on the window sill to indicate the lock or unlock status of that individual door. The door lock indicators are controlled by the lock/unlock feedback switch located within each door latch. When powered, they illuminate to indicate a door is locked and are off when a door is unlocked.

The Light Emitting Diodes (LEDs) are powered continuously if the ignition is on, or for 5 minutes after a lock request if the ignition is off.

The LED door lock indicators brightness level works in conjunction with the backlighting brightness level setting.

For vehicles not equipped with a memory seat, the BCM provides voltage to the door lock indicators.

For vehicles equipped with a memory seat, the DDM and PDM provide voltage to their respective door lock indicator.

The lock/unlock feedback switch provides a ground path to bypass the indicator. The switch is closed when the door is unlocked (indicator not illuminated) and open when locked (indicator illuminated). The Body Control Module B (BCM-B) provides ground for the door lock indicators to illuminate.

The LED door lock indicators are part of the electrical harness and cannot be replaced independently.

Switch Inhibit Feature

The switch inhibit feature prevents unauthorized access to the vehicle from the door lock control switches or the interior luggage compartment lid release switch. The BCM disables the function of both door lock control switches and the interior luggage compartment lid release switch 20 seconds after the vehicle is electronically locked. If any of these switches are activated while they are inhibited, a chime sounds and a message is displayed in the message center to indicate the switches are inhibited. The BCM enables the function of these switches when the vehicle is electronically unlocked.

This feature can be configured on/off using the message center.

Power Door Locking Feedback

The exterior lamps and horn provide visual and audible feedback when unlocking and locking the doors under certain circumstances. Refer to the following chart:

Action	Status of Door(s)	Status of Luggage Compartment Lid	Status of Hood	Visual/Audible Feedback
Press the lock button on the door lock control switch	Open	Closed	Closed	A short flash of the turn signals after all the doors are closed.
Press the unlock button on a RKE transmitter	Closed	Closed	Closed	A long flash of the turn signals.
Press the lock button on a RKE transmitter	Closed	Closed	Closed	A short flash of the turn signals.
Press the lock button on a RKE transmitter	Open	Closed	Closed	A short flash of the turn signals after all the doors are closed.
Press the lock button on a RKE transmitter	Closed	Open	Closed	A short flash of the turn signals after the luggage compartment lid is closed.
Press the lock button on a RKE transmitter	Closed	Closed	Open	A short flash of the turn signals after the hood is closed.
Press the lock button on a RKE transmitter twice within 3 seconds	Closed	Closed	Closed	The horn chirps twice and the turn signals flash twice.
Press the lock button on a RKE transmitter twice within 3 seconds	Open	Closed	Closed	The horn immediately chirps twice and the turn signals flash twice after all the doors are closed.
Press the lock button on a RKE transmitter twice within 3 seconds	Closed	Open	Closed	The horn immediately chirps twice and the turn signals flash twice after the luggage compartment lid is closed.
Press the lock button on a RKE transmitter twice within 3 seconds	Closed	Closed	Open	The horn immediately chirps twice and the turn signals flash twice after the hood is closed.

There is also feedback provided by the vehicle to the key for the remote start feature. For additional

information regarding the remote start feedback, refer to the Owner's Literature.

Center Console Storage Compartment Lock (if equipped)

The BCM controls the center console storage compartment solenoid. The center console storage compartment solenoid locks the storage compartment when the doors are electronically locked and unlocks when the driver door is electronically locked.

Luggage Compartment Lid Latch Release

The luggage compartment lid latch can be released using:

- the interior luggage compartment lid release switch.
- the exterior luggage compartment lid release switch.
- a valid programmed passive key.

The BCM sends voltage signals to the interior and exterior luggage compartment lid release switches. When a luggage compartment lid release switch is pressed, the voltage signal is routed to ground, indicating a request to release the luggage compartment lid latch. The BCM momentarily provides voltage to the luggage compartment lid latch to actuate the release motor.

When using the luggage compartment lid release switches, the BCM releases the luggage compartment lid only when the doors are electronically unlocked and the vehicle is in PARK.

When using a programmed RKE transmitter, press the luggage compartment lid release button twice within 3 seconds to release the luggage compartment lid latch. The luggage compartment lid latch releases if the vehicle speed is 5 km/h (3.1 mph) or less.

The luggage compartment lid latch can also be released using a programmed passive key. Refer to Luggage Compartment Lid Passive Entry in this information.

RKE

The RKE feature is controlled by the BCM. When a button is pressed, the Transmitter Identification Code (TIC) and RKE command is received by the RTM. The RTM interprets the information and sends a message to the BCM over a LIN circuit, and when the network is awake over the CAN. If the BCM detects a programmed key, it carries out the command by controlling the door locks, releasing the luggage compartment lid latch or activating the horn or turn signals as required.

The RKE system can be used to:

- unlock the driver door.
- unlock all doors.
- lock all doors.
- release the luggage compartment lid latch (luggage compartment lid release button must be pressed twice within 3 seconds).
- arm/disarm the perimeter alarm.
- activate/deactivate the panic alarm.
- global open the windows (press the unlock button and then within 10 seconds press and hold the unlock button for 3 seconds) (if equipped).

- global close the windows (press and hold the lock button for 2 seconds) (if equipped).
- remotely start the vehicle.
- configure the staged lock programming (2-stage unlock or global unlock).

The RKE transmitters have a normal operating range of 30 m (98 ft) in an open air, no obstruction environment.

The RKE transmitters and the BCM also utilize a rolling code to prevent the code from being captured by a code grabber. The system advances the counter in the RKE transmitter and the BCM every time a RKE transmitter button is pressed.

The message center displays Key Battery Low Replace Soon when the battery in the key needs to be replaced.

RKE Transmitter Unlock

The RKE feature provides a staged process for unlocking the doors. Upon receipt of the first request for unlocking the doors, the RKE feature unlocks only the driver door. If another unlock request is received within 3 seconds of the first, all the doors are unlocked. This feature can be disabled so that all the doors unlock on the first press of the unlock button (global unlock) using the message center settings.

Vehicles come from the factory set with the 2-stage unlock feature disabled (single press unlocks all doors).

RKE Transmitter Lock

The RKE feature requests all of the doors lock when the lock button is pressed.

RKE Transmitter Luggage Compartment Lid Latch Release

The RKE transmitter provides a luggage compartment lid release/power open function. The luggage compartment lid release button must be pressed twice within 3 seconds for the luggage compartment lid latch to release.

Global Open/Close (if equipped)

The global open feature is used to open all the windows using the RKE transmitter.

To global open the windows, press the unlock button and then within 10 seconds press and hold the unlock button for 3 seconds. The windows stop movement if the lock or unlock button is pressed on the RKE.

To global close the windows, press and hold the lock button for 2 seconds.

Panic Alarm (if equipped)

The panic alarm feature provides audible and visual alarms which are evident from the exterior of the vehicle. When the panic alarm button is initially pressed, the panic alarm feature requests the turn signals flash and the horn sounds for up to 3 minutes or until deactivation. The flashing of the outputs occurs simultaneously.

The panic alarm can only be activated when the ignition is off. This feature is disabled at all other times. Deactivation of an active panic alarm is accomplished when:

- a second press of the RKE transmitter panic button is detected.
- the ignition status changes from off.
- a period of 2 minutes and 45 seconds have elapsed since the initial activation.

Remote Start

> *NOTE: The remote start feature is not available for vehicles equipped with a manual transmission.*

The factory-installed remote start allows the vehicle to be remotely started from outside the vehicle. There is a 2- way communication between the passive key and the vehicle to provide the remote start status of the vehicle. The passive key contains a green and a red LED to indicate the remote start status.

LED	Status
Blinking green	Waiting for status update from vehicle
Blinking red	Remote start/stop failed
Solid green	Remote start or extension successful
Solid red	Remote stop successful (engine off)

To remotely start the vehicle, the buttons on the passive key must be pressed within 3 seconds of each other. Press the lock button once and then the remote start button twice. The vehicle should remotely start and the LED on the passive key should be lit solid green.

The vehicle does not remote start if any of the following conditions are present:

- The feature is disabled using the message center settings
- The hood is not closed
- The vehicle is not in PARK
- A powertrain system DTC is present, illuminating the service engine soon indicator
- The ignition is on
- The alarm system is triggered
- The vehicle battery voltage is low

For additional information regarding the remote start system, refer to the Owner's Literature.

Autolock

The autolock feature locks all of the doors after all of the following have occurred:

- All the doors are closed
- The ignition is on
- The vehicle is shifted into any gear to put the vehicle in motion
- The vehicle attains a speed greater than 20 km/h (12.4 mph)

The autolock feature activates again during the same ignition cycle when all of the following have occurred:

- The vehicle speed is reduced to less than 15 km/h (9.3 mph)
- A door is opened and then closed

- The vehicle attains a speed greater than 20 km/h (12.4 mph)

Auto-Unlock

> *NOTE: The doors do not auto-unlock if the vehicle has been electronically locked before the driver door is unlocked.*

The auto-unlock feature unlocks all of the doors when all of the following conditions have been met:

- All the doors are closed and locked
- The ignition was on
- The vehicle was shifted out of park and a speed greater than 20 km/h (12.4 mph) was achieved
- The vehicle has come to a stop
- The ignition transitions to accessory or off and, within 10 minutes, the driver door is opened

The auto-unlock feature can be enabled/disabled using the message center.

Smart Unlock

The smart unlock feature prevents the vehicle from electronically locking when a passive key is left inside the vehicle. When the doors are electronically locked while a door is ajar and then closed, the interior of the vehicle is scanned for a passive key. If a valid programmed passive key is detected inside the vehicle, the BCM unlocks the doors and chirps the horn twice.

The smart unlock feature also operates to prevent locking a passive key inside the luggage compartment area. When the luggage compartment lid is closed, the interior of the vehicle is scanned for a passive key. If a passive key is detected inside the luggage compartment area when the luggage compartment lid is closed, the BCM releases the luggage compartment lid latch and chirps the horn twice.

To override the smart unlock feature, lock the doors using the keyless entry keypad, the door lock cylinder or another programmed passive key.

Passive Entry

The passive entry feature unlocks or locks the doors or opens the luggage compartment lid without having to use a mechanical key blade or the RKE transmitter feature.

When the BCM detects a lock or unlock sensor is touched on an exterior door handle, or the exterior luggage compartment lid release button is pressed, it activates the low frequency antenna in the corresponding exterior door handle or inside the luggage compartment area. The low frequency antenna sends out a signal to activate the passive key. The passive key then responds by sending a high frequency signal back to the RTM. The RTM interprets the high frequency signal from the passive key and sends the information to the BCM. If the BCM detects a valid programmed passive key, the BCM either unlocks the driver door, unlocks or locks both doors, or releases the luggage compartment lid latch.

Door Passive Entry

With a programmed passive key within 1 m (3.28 ft) outside a door, touch the lock or unlock sensor on the exterior door handle. The doors lock or unlock depending upon which sensor was touched on the handle. The unlock sensor is located on the inside of the handle and the lock sensor is located on the outside face of the handle.

The driver front door passive entry feature either unlocks the driver door (if 2-stage unlock is enabled) or

both doors (if 2-staged unlock is disabled). The passive entry feature always locks both doors when the lock button is touched.

The passenger door passive entry feature always locks or unlocks both doors.

Luggage Compartment Lid Passive Entry

With a programmed passive key within 1 m (3.28 ft) outside the luggage compartment lid, press the exterior luggage compartment lid release button (above the license plate) at the rear of the vehicle to open the luggage compartment lid.

DESCRIPTION AND OPERATION > HANDLES, LOCKS, LATCHES AND ENTRY SYSTEMS - SYSTEM OPERATION AND COMPONENT DESCRIPTION > COMPONENT DESCRIPTION

Door Lock Control Switches

The door lock control switches are dual pole, single throw momentary contact switches. The BCM (vehicles without memory seat) or the DDM and PDM (vehicles with memory seat) provide the voltage signals to the door lock control switches for the lock and unlock requests. When a switch is pressed to lock or unlock, the corresponding input circuit is routed to ground, indicating a request to lock or unlock the doors.

Door Latches

The door latches are sealed units and contain the door lock actuator, lock/unlock feedback switch, and the door ajar switch. The door lock actuators operate in 2 directions, depending on the polarity of the voltage. The door latches can be lubricated, if needed.

Interior Luggage Compartment Lid Release Switch

The interior luggage compartment lid release switch is a momentary contact switch that supplies a ground signal to the BCM. When the interior luggage compartment lid release switch is pressed, the signal is routed to ground indicating a request to the BCM to release the luggage compartment lid latch.

Exterior Luggage Compartment Lid Release Switch

The exterior luggage compartment lid release switch is a momentary contact switch that supplies a ground signal to the BCM. When the exterior luggage compartment lid release switch is pressed, the signal is routed to ground indicating a request to the BCM to release the luggage compartment lid latch.

Luggage Compartment Lid Latch

The luggage compartment lid latch contains the luggage compartment lid latch release motor and the luggage compartment lid ajar switch. The luggage compartment lid latch release motor is momentarily supplied voltage by the BCM when a valid request to open the luggage compartment lid is detected.

DDM or PDM

When equipped with a memory seat, the DDM and the PDM monitor the door lock control switches and control the operation of the power windows and the power mirrors. They communicate with each other and the BCM over the CAN.

The DDM and PDM require PMI when replaced.

Passive Key

The passive key incorporates both the PATS and RKE transmitter functions in a single device.

During key programming procedures, the PATS and RKE transmitter Identification (ID) of a passive key are both programmed. A maximum of 4 passive keys can be programmed.

The passive key also contains a removable key blade that unlocks the driver door in the event of an electrical failure (such as a drained battery). The passive key requires 2 batteries. They should always be replaced as a set. For battery replacement instructions, refer to the Owner's Manual.

To start the vehicle in the event of a passive key battery failure, place the passive key in the backup starting location. Refer to: Passive Anti-Theft System (PATS) - System Operation and Component Description .

Exterior Door Handles

The exterior door handles contain a keyless entry antenna and capacitive touch sensor(s). The antennas and lock/unlock sensors are wired to the BCM. When activated, the antenna transmits a low frequency signal to activate a passive key.

Keyless Entry Rear Antenna

The keyless entry rear antenna is monitored and activated by the BCM. When activated, it transmits a low frequency signal to activate a passive key.

RTM

The RTM communicates all RKE and passive key information to the BCM over a LIN-based circuit whether or not the CAN is active. The RTM is a receiving antenna that receives the high frequency signals from passive keys.

The RTM requires PMI when replaced.

BCM

The BCM is the master module in control of the power door lock system. It is responsible for locking/unlocking the doors. The BCM receives inputs for the door lock control switches, passive keys and RKE commands over the CAN.

The BCM requires PMI when replaced. Additionally, at least 2 keys must be programmed and the parameter reset procedure carried out.

DIAGNOSIS AND TESTING > LOCKS, LATCHES AND ENTRY SYSTEMS > DTC CHART: BCM

Diagnostics in this service information assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

BCM DTC Chart

DTC	Description	Action
B10AB:00	Remote Keyless Entry Synchronization: No Sub Type Information	GO to Pinpoint Test O

B10C7:01	Interior Trunk Antenna: General Electrical Failure	GO to Pinpoint Test T
B11C6:01	Passenger Door External Antenna: General Electrical Failure	GO to Pinpoint Test S
B11CA:01	Driver Door External Antenna: General Electrical Failure	GO to Pinpoint Test S
B1218:00	Transmitter Identification Code: No Sub Type Information	GO to Pinpoint Test O
B1219:11	Interior Boot/Trunk Release Switch: Circuit Short To Ground	GO to Pinpoint Test N
B126A:01	Drivers Door Interior Lock Switch: General Electrical Failure	GO to Pinpoint Test J
B1381:11	Left Front Door Handle Proximity Sensor: Circuit Short To Ground	GO to Pinpoint Test S
B1381:15	Left Front Door Handle Proximity Sensor: Circuit Short To Battery or Open	GO to Pinpoint Test S
B1381:29	Left Front Door Handle Proximity Sensor: Signal Invalid	GO to Pinpoint Test S
B1382:11	Right Front Door Handle Proximity Sensor: Circuit Short To Ground	GO to Pinpoint Test S
B1382:15	Right Front Door Handle Proximity Sensor: Circuit Short To Battery or Open	GO to Pinpoint Test S
B1382:29	Right Front Door Handle Proximity Sensor: Signal Invalid	GO to Pinpoint Test S
B1490:11	Lock Indicator LED Status Output: Circuit Short To Ground	GO to Pinpoint Test L
B1490:15	Lock Indicator LED Status Output: Circuit Short To Battery or Open	If the door lock indicator is inoperative, GO to Pinpoint Test L If the door lock indicator is always on, GO to Pinpoint Test M
C1017:11	Boot/Trunk Primary Switch: Circuit Short To Ground	GO to Pinpoint Test N
U0258:87	Lost Communication With Radio Transceiver: Missing Message	GO to Pinpoint Test V
All other Diagnostic Trouble Codes (DTCs)	-	REFER to: Body Control Module (BCM) .

DIAGNOSIS AND TESTING > LOCKS, LATCHES AND ENTRY SYSTEMS > DTC CHART: RTM

Diagnostics in this service information assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

RTM DTC Chart

DTC	Description	Action
U0146:00	Lost Communication With Gateway "A": No Sub Type Information	GO to Pinpoint Test U
U0401:00	Invalid Data Received from ECM/PCM A: No Sub Type Information	DIAGNOSE all non-network Diagnostic Trouble Codes (DTCs) from the PCM. Refer to the appropriate Engine article for the procedure.
U0401:82	Invalid Data Received from ECM/PCM A: Alive / Sequence Counter Incorrect / Not Updated	DIAGNOSE all non-network Diagnostic Trouble Codes (DTCs) from the PCM. Refer to the appropriate Engine article for the procedure.
U1A00:00	Private Communication Network: No Sub Type Information	GO to Pinpoint Test V
U2100:00	Initial Configuration Not Complete: No Sub Type Information	PERFORM the PMI using as-built data. CLEAR the Diagnostic Trouble Codes (DTCs) and REPEAT the self-test. If the DTC returns, INSTALL a new RTM. REFER to: Radio Transceiver Module (RTM) .
U3000:04	Control Module: System Internal Failure	INSTALL a new RTM. REFER to: Radio Transceiver Module (RTM) .

DIAGNOSIS AND TESTING > LOCKS, LATCHES AND ENTRY SYSTEMS > DTC CHART: DDM

Diagnostics in this service information assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

DDM DTC Chart

DTC	Description	Action
B1088:83	LIN Bus "B": Value of Signal Protection Calculation Incorrect	REFER to: Glass, Frames and Mechanisms .
B1088:87	LIN Bus "B": Missing Message	REFER to: Glass, Frames and Mechanisms .
B108F:23	Cabin Lock/Unlock Switch: Signal Stuck Low	GO to Pinpoint Test J

B1163:11	Left Mirror Heater Output: Circuit Short To Ground	REFER to: Rear View Mirrors .
B1163:15	Left Mirror Heater Output: Circuit Short To Battery or Open	REFER to: Rear View Mirrors .
B1C03:23	Memory #1 Switch: Signal Stuck Low	REFER to: FRONT SEATS .
B1C04:23	Memory #2 Switch: Signal Stuck Low	REFER to: FRONT SEATS .
B1C05:23	Memory #3 Switch: Signal Stuck Low	REFER to: FRONT SEATS .
B1C09:11	Driver Left/Right Mirror Motor: Circuit Short To Ground	REFER to: Rear View Mirrors .
B1C09:15	Driver Left/Right Mirror Motor: Circuit Short To Battery or Open	REFER to: Rear View Mirrors .
B1C10:11	Driver Up/Down Mirror Motor: Circuit Short To Ground	REFER to: Rear View Mirrors .
B1C10:15	Driver Up/Down Mirror Motor: Circuit Short To Battery or Open	REFER to: Rear View Mirrors .
B1C13:11	Driver Up/Down Mirror Motor Feedback: Circuit Short To Ground	REFER to: Rear View Mirrors .
B1C13:15	Driver Up/Down Mirror Motor Feedback: Circuit Short To Battery or Open	REFER to: Rear View Mirrors .
B1C14:11	Driver Left/Right Mirror Motor Feedback: Circuit Short To Ground	REFER to: Rear View Mirrors .
B1C14:15	Driver Left/Right Mirror Motor Feedback: Circuit Short To Battery or Open	REFER to: Rear View Mirrors .
B1D06:11	Left Turn Indicator: Circuit Short To Ground	REFER to: Turn Signal and Hazard Lamps .
C1B15:11	Sensor Supply Voltage B: Circuit Short To Ground	REFER to: Rear View Mirrors .
C1B15:15	Sensor Supply Voltage B: Circuit Short To Battery or Open	REFER to: Rear View Mirrors .
U0010:00	Medium Speed CAN Communication Bus: No Sub Type Information	The module was unable to communicate on the network at a point in time. The fault is not currently present (the module had to communicate with the scan tool to report this DTC). VERIFY the continuity of the connectors and wiring. Refer to MODULE COMMUNICATIONS NETWORK for schematic and connector information.

U0140:00	Lost Communication With Body Control Module: No Sub Type Information	GO to Pinpoint Test W
U0208:00	Lost Communication With "Seat Control Module A": No Sub Type Information	GO to Pinpoint Test X
U0300:00	Internal Control Module Software Incompatibility: No Sub Type Information	CLEAR the Diagnostic Trouble Codes (DTCs) and REPEAT the self-test. If the DTC is retrieved again, INSTALL a new DDM. REFER to: Driver Door Module (DDM) .
U0300:4A	Internal Control Module Software Incompatibility: Incorrect Component Installed	PERFORM the PMI using as-built data. CLEAR the Diagnostic Trouble Codes (DTCs) and REPEAT the self-test. If the DTC returns, INSTALL a new DDM. REFER to: Driver Door Module (DDM) .
U0422:00	Invalid Data Received From Body Control Module: No Sub Type Information	RETRIEVE and REPAIR all non-network Diagnostic Trouble Codes (DTCs) from the BCM. REFER to: Body Control Module (BCM) .
U0509:00	Invalid Data Received From "Seat Control Module A": No Sub Type Information	RETRIEVE and REPAIR all non-network Diagnostic Trouble Codes (DTCs) from the DSM. REFER to: FRONT SEATS .
U2010:00	Switch Illumination: No Sub Type Information	REFER to: Instrument Panel and Interior Switches Illumination .
U2013:24	Switch Pack: Signal Stuck High	REFER to: Glass, Frames and Mechanisms .
U2014:00	Control Module Hardware: No Sub Type Information	INSTALL a new DDM. REFER to: Driver Door Module (DDM) .
U2100:00	Initial Configuration Not Complete: No Sub Type Information	PERFORM the PMI using as-built data. CLEAR the Diagnostic Trouble Codes (DTCs) and REPEAT the self-test. If the DTC returns, INSTALL a new DDM. REFER to: Driver Door Module (DDM) .
U3000:04	Control Module: System Internal Failure	INSTALL a new DDM. REFER to: Driver Door Module (DDM) .

DIAGNOSIS AND TESTING > LOCKS, LATCHES AND ENTRY SYSTEMS > DTC CHART: PDM

Diagnostics in this service information assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

PDM DTC Chart

DTC	Description	Action
B108F:23	Cabin Lock/Unlock Switch: Signal Stuck Low	GO to Pinpoint Test J
B1164:11	Right Mirror Heater Output: Circuit Short To Ground	REFER to: Rear View Mirrors .
B1164:15	Right Mirror Heater Output: Circuit Short To Battery or Open	REFER to: Rear View Mirrors .
B1C11:11	Passenger Left/Right Mirror Motor: Circuit Short To Ground	REFER to: Rear View Mirrors .
B1C11:15	Passenger Left/Right Mirror Motor: Circuit Short To Battery or Open	REFER to: Rear View Mirrors .
B1C12:11	Passenger Up/Down Mirror Motor: Circuit Short To Ground	REFER to: Rear View Mirrors .
B1C12:15	Passenger Up/Down Mirror Motor: Circuit Short To Battery or Open	REFER to: Rear View Mirrors .
B1C15:11	Passenger Up/Down Mirror Motor Feedback: Circuit Short To Ground	REFER to: Rear View Mirrors .
B1C15:15	Passenger Up/Down Mirror Motor Feedback: Circuit Short To Battery or Open	REFER to: Rear View Mirrors .
B1C16:11	Passenger Left/Right Mirror Motor Feedback: Circuit Short To Ground	REFER to: Rear View Mirrors .
B1C16:15	Passenger Left/Right Mirror Motor Feedback: Circuit Short To Battery or Open	REFER to: Rear View Mirrors .
B1D07:11	Right Turn Indicator: Circuit Short To Ground	REFER to: Turn Signal and Hazard Lamps .
C1B15:11	Sensor Supply Voltage B: Circuit Short To Ground	REFER to: Rear View Mirrors .
C1B15:15	Sensor Supply Voltage B: Circuit Short To Battery or Open	REFER to: Rear View Mirrors .
U0010:00	Medium Speed CAN Communication Bus: No Sub Type Information	The module was unable to communicate on the network at a point in time. The fault is not currently present (the module had to communicate with the scan tool to report this DTC). VERIFY the continuity of the connectors and wiring. Refer to MODULE COMMUNICATIONS NETWORK for schematic and connector information.

U0140:00	Lost Communication With Body Control Module: No Sub Type Information	GO to Pinpoint Test W
U0208:00	Lost Communication With "Seat Control Module A": No Sub Type Information	GO to Pinpoint Test X
U0300:00	Internal Control Module Software Incompatibility: No Sub Type Information	CLEAR the Diagnostic Trouble Codes (DTCs) and REPEAT the self-test. If the DTC is retrieved again, INSTALL a new PDM. REFER to: Passenger Door Module (PDM) .
U0300:4A	Internal Control Module Software Incompatibility: Incorrect Component Installed	PERFORM the PMI using as-built data. CLEAR the Diagnostic Trouble Codes (DTCs) and REPEAT the self-test. If the DTC returns, INSTALL a new PDM. REFER to: Passenger Door Module (PDM) .
U0422:00	Invalid Data Received From Body Control Module: No Sub Type Information	RETRIEVE and REPAIR all non-network Diagnostic Trouble Codes (DTCs) from the BCM. REFER to: Body Control Module (BCM) .
U0509:00	Invalid Data Received From "Seat Control Module A": No Sub Type Information	RETRIEVE and REPAIR all non-network Diagnostic Trouble Codes (DTCs) from the DSM. REFER to: FRONT SEATS .
U2002:24	Switch: Signal Stuck High	REFER to: Glass, Frames and Mechanisms .
U2010:00	Switch Illumination: No Sub Type Information	REFER to: Instrument Panel and Interior Switches Illumination .
U2014:00	Control Module Hardware: No Sub Type Information	CLEAR the Diagnostic Trouble Codes (DTCs) and REPEAT the self-test. If the DTC returns, INSTALL a new PDM. REFER to: Passenger Door Module (PDM) .
U2100:00	Initial Configuration Not Complete: No Sub Type Information	PERFORM the PMI using as-built data. CLEAR the Diagnostic Trouble Codes (DTCs) and REPEAT the self-test. If the DTC returns, INSTALL a new PDM. REFER to: Passenger Door Module (PDM) .
U3000:04	Control Module: System Internal Failure	CLEAR the Diagnostic Trouble Codes (DTCs) and REPEAT the self-test. If the DTC returns, INSTALL a new PDM. REFER to: Passenger Door Module (PDM) .

DIAGNOSIS AND TESTING > LOCKS, LATCHES AND ENTRY SYSTEMS > DTC CHART: PCM

Diagnostics in this service information assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

PCM DTC Chart

DTC	Description	Action
P1594	Forced Engine Shutdown - Remote Start System Fault, No Unattended Vehicle Timeout	GO to Pinpoint Test Y
P1595	Forced Engine Shutdown - Remote Start System Fault, Transmission Range Not In Park Position	GO to Pinpoint Test Y
All other Diagnostic Trouble Codes (DTCs)	-	REFER to the appropriate Electronic Engine Controls article.

DIAGNOSIS AND TESTING > LOCKS, LATCHES AND ENTRY SYSTEMS > SYMPTOM CHARTS

Symptom Chart: Handles, Locks, Latches and Entry Systems - Mechanical

Diagnostics in this service information assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

Condition	Possible Sources	Actions
Hard to open or close a door from either door handle	Refer to the Pinpoint Test	GO to Pinpoint Test A
A door is difficult or does not open from the exterior door handle	Refer to the Pinpoint Test	GO to Pinpoint Test B
A door is difficult or does not open from the interior door handle	Refer to the Pinpoint Test	GO to Pinpoint Test C
The exterior door release handle sticks	Refer to the Pinpoint Test	GO to Pinpoint Test D
The interior door release handle sticks	Refer to the Pinpoint Test	GO to Pinpoint Test E
Squeak-rattle-chucking noise from door	Refer to the Pinpoint Test	GO to Pinpoint Test F
The manual door lock cylinder is inoperative	Refer to the Pinpoint Test	GO to Pinpoint Test G

Symptom Chart: Handles, Locks, Latches and Entry Systems - Electrical

Diagnostics in this service information assume a certain skill level and knowledge of Ford-specific

diagnostic practices. REFER to: Diagnostic Methods .

Condition	Possible Sources	Actions
All door locks are inoperative	Refer to the Pinpoint Test	GO to Pinpoint Test H
A single or more than one door lock is inoperative	Refer to the Pinpoint Test	GO to Pinpoint Test I
The door locks operate only one way	Refer to the Pinpoint Test	GO to Pinpoint Test J
All door locks are inoperative from one door lock control switch	Refer to the Pinpoint Test	GO to Pinpoint Test K
A door lock indicator is inoperative	Refer to the Pinpoint Test	GO to Pinpoint Test L
A door lock indicator is always on	Refer to the Pinpoint Test	GO to Pinpoint Test M
The luggage compartment lid latch release is inoperative	Refer to the Pinpoint Test	GO to Pinpoint Test N
The luggage compartment lid does not latch	Refer to the Pinpoint Test	DISCONNECT the luggage compartment lid latch electrical connector and CHECK the operation of the latch using a screwdriver. If the latch does not fully latch (2 clicks), INSTALL a new luggage compartment lid latch. If the latch fully latches (2 clicks), REFER to the OEM WIRING DIAGRAMS article to identify the possible cause of the circuit short in the luggage compartment lid latch release circuit.
The RKE transmitter is inoperative	Refer to the Pinpoint Test	GO to Pinpoint Test O
An individual button/feature is inoperative from the RKE transmitter	Refer to the Pinpoint Test	GO to Pinpoint Test P
The RKE transmitter has poor range performance	Refer to the Pinpoint Test	GO to Pinpoint Test Q
The remote start feature is inoperative	Refer to the Pinpoint Test	GO to Pinpoint Test R
The smart unlock is inoperative	Refer to the Pinpoint Test	DIAGNOSE the passive key not starting the vehicle from various areas within the interior of the vehicle. REFER to: Passive Anti-Theft System (PATS) .
The 2-stage door unlocking does not operate correctly	The 2-stage door unlocking is not programmed	PROGRAM the 2-step door unlocking. REFER to: Staged Unlock Programming .

A door passive entry feature is inoperative	Refer to the Pinpoint Test	GO to Pinpoint Test S
The luggage compartment lid passive entry feature is inoperative	Refer to the Pinpoint Test	GO to Pinpoint Test T

DIAGNOSIS AND TESTING > LOCKS, LATCHES AND ENTRY SYSTEMS > PINPOINT TESTS

Hard To Open Or Close a Door From Either Door Handle

Normal Operations and Fault Conditions

The door latch can be actuated from the interior or exterior door handle. When actuated, the door latch releases and allows the door to open. If the door latch or the door hinges have insufficient lubrication or if the striker or door are misaligned, it causes extra force to be used when opening or closing the door.

Possible Cause

- Door alignment
- Door hinges
- Striker adjustment
- Door latch

DIAGNOSIS AND TESTING > LOCKS, LATCHES AND ENTRY SYSTEMS > PINPOINT TESTS > PINPOINT TEST A : HARD TO OPEN OR CLOSE A DOOR FROM EITHER DOOR HANDLE > PINPOINT TEST A : HARD TO OPEN OR CLOSE A DOOR FROM EITHER DOOR HANDLE

A1 CHECK THE LATCH OPERATION FROM BOTH DOOR HANDLES

Open the door using both the interior and exterior door handles.

Does the door open normally from one of the door handles?

Yes	If the door is difficult/does not open from the exterior door handle, GO to Pinpoint Test B . If the door is difficult/does not open from the interior door handle, GO to Pinpoint Test C

No	GO to A2

A2 CHECK THE LATCH OPERATION

Open the door.

Using a screwdriver, fully close the latch (2 clicks).

Verify the latch releases easily while pulling on the interior/exterior door handle.

Does the latch release easily?

Yes	GO to A4

No	GO to A3

A3 CHECK THE LATCH OPERATION AFTER LUBRICATION

Lubricate the door latch. REFER to: Door Latch Lubrication .

Using a screwdriver, fully close the latch (2 clicks).

Verify the latch releases easily while pulling on the interior/exterior door handle.

Does the latch release easily?

Yes	The concern was caused by an insufficiently lubricated door latch.

No	INSTALL a new door latch. REFER to: Front Door Latch .

A4 CHECK THE STRIKER ADJUSTMENT

Check the adjustment of the striker.

Is the striker adjusted correctly?

Yes	GO to A5

No	ADJUST the striker as necessary.

A5 CHECK THE DOOR ALIGNMENT

Check the alignment of the door.

Is the door aligned correctly?

Yes	LUBRICATE the door hinges.

No	ADJUST the door as necessary. REFER to: Front Door Alignment .

DIAGNOSIS AND TESTING > LOCKS, LATCHES AND ENTRY SYSTEMS > PINPOINT TESTS > PINPOINT TEST B : A DOOR IS DIFFICULT OR DOES NOT OPEN FROM THE EXTERIOR DOOR HANDLE

Normal Operations and Fault Conditions

The exterior door handle is connected to the door latch with an actuating cable. When the exterior door handle is pulled, the actuating cable pulls on the latch lever. When the latch lever moves, the door latch releases, allowing the door to open.

Possible Cause

- Broken or binding linkage
- Exterior door handle reinforcement
- Door latch

DIAGNOSIS AND TESTING > LOCKS, LATCHES AND ENTRY SYSTEMS > PINPOINT TESTS > PINPOINT TEST B : A DOOR IS DIFFICULT OR DOES NOT OPEN FROM THE EXTERIOR DOOR HANDLE > PINPOINT TEST B : A DOOR IS DIFFICULT OR DOES NOT OPEN FROM THE EXTERIOR DOOR HANDLE

B1 CHECK THE LATCH OPERATION FROM BOTH DOOR HANDLES

Open and close the door using both the interior and exterior door handles.

Does the door open normally from one of the door handles?

Yes	If the door is difficult/does not open from only the exterior door handle, GO to B2 If the door is difficult/does not open from only the interior door handle, GO to Pinpoint Test C

No	GO to Pinpoint Test A

B2 CHECK THE EXTERIOR DOOR HANDLE AND CABLE OPERATION

Disconnect the exterior door handle actuating cable from the door latch.

Operate the exterior door handle while observing the linkage and cable.

Are any of the exterior door handle components or linkages binding or broken?

Yes	GO to B3

No	INSTALL a new door latch. REFER to: Front Door Latch .

B3 CHECK THE EXTERIOR DOOR HANDLE REINFORCEMENT

Disconnect the exterior door handle actuating cable from the exterior door handle reinforcement.

Pull and release the exterior door handle.

Does the exterior door handle operate correctly?

Yes	INSTALL a new exterior door handle cable.

No	INSTALL a new exterior door handle reinforcement. REFER to: Exterior Front Door Handle Reinforcement .

DIAGNOSIS AND TESTING > LOCKS, LATCHES AND ENTRY SYSTEMS > PINPOINT TESTS > PINPOINT TEST C : A DOOR IS DIFFICULT OR DOES NOT OPEN FROM THE INTERIOR DOOR HANDLE

Normal Operations and Fault Conditions

The interior door handle is connected to the door latch by an actuating cable. When the interior door handle is pulled, the cable pulls on the latch lever. When the latch lever moves, the door latch releases, allowing the door to open.

Possible Cause

- Broken or binding cable/linkage
- Door latch

DIAGNOSIS AND TESTING > LOCKS, LATCHES AND ENTRY SYSTEMS > PINPOINT TESTS > PINPOINT TEST C : A DOOR IS DIFFICULT OR DOES NOT OPEN FROM THE INTERIOR DOOR HANDLE > PINPOINT TEST C : A DOOR IS DIFFICULT OR DOES NOT OPEN FROM THE INTERIOR DOOR HANDLE

C1 CHECK THE LATCH OPERATION FROM BOTH DOOR HANDLES

Open the door using both the interior and exterior door handles.

Does the door open normally from one of the door handles?

Yes	If the door is difficult/does not open from only the interior door handle, GO to C2 If the door is difficult/does not open from only the exterior door handle, GO to Pinpoint Test B

No	GO to Pinpoint Test A

C2 CHECK THE INTERIOR DOOR HANDLE AND CABLE/LINKAGE OPERATION

Remove the door trim panel.

Install the interior door handle back onto the release cable.

Operate the interior door handle while observing the cable/linkage.

Are any of the interior door handle components or cable/linkages binding or broken?

Yes	REPAIR as necessary.

No	INSTALL a new door latch. REFER to: Front Door Latch .

DIAGNOSIS AND TESTING > LOCKS, LATCHES AND ENTRY SYSTEMS > PINPOINT TESTS > PINPOINT TEST D : THE EXTERIOR DOOR RELEASE HANDLE STICKS

Normal Operations and Fault Conditions

The exterior door handle is connected to the door latch with an actuating cable. When the exterior door handle is pulled, the actuating cable pulls on the latch lever. When the latch lever moves, the door latch releases, allowing the door to open. The handle has a return spring to make sure the handle returns to a closed position.

Possible Cause

- Binding linkage
- Broken handle return spring
- Door latch

DIAGNOSIS AND TESTING > LOCKS, LATCHES AND ENTRY SYSTEMS > PINPOINT TESTS > PINPOINT TEST D : THE EXTERIOR DOOR RELEASE HANDLE STICKS > PINPOINT TEST D : THE EXTERIOR DOOR RELEASE HANDLE STICKS

D1 CHECK FOR A BROKEN RETURN SPRING

Remove the window regulator. REFER to: Front Door Window Regulator .

Install the exterior door handle strap back onto the exterior door handle reinforcement.

Disconnect the exterior door handle actuating rod from the door latch.

Pull and release the exterior door handle

Does the exterior door handle return to a closed position once released?

Yes	GO to D2

No	INSTALL a new exterior door handle reinforcement. REFER to: Exterior Front Door Handle Reinforcement .

D2 CHECK THE EXTERIOR DOOR HANDLE AND LINKAGE OPERATION

Operate the exterior door handle while observing the linkage.

Are any of the exterior door handle components or linkages binding?

Yes	REPAIR as necessary.

No	INSTALL a new door latch. REFER to: Front Door Latch .

DIAGNOSIS AND TESTING > LOCKS, LATCHES AND ENTRY SYSTEMS > PINPOINT TESTS > PINPOINT TEST E : THE INTERIOR DOOR RELEASE HANDLE STICKS

Normal Operations and Fault Conditions

The interior door handle is connected to the door latch by an actuating cable. When the interior door handle is pulled, the cable pulls on the latch lever. When the latch lever is moved, the door latch releases, allowing the door to open. The handle has a return spring to make sure the handle returns to a closed position.

Possible Cause

- Binding cable
- Broken handle return spring
- Door latch

DIAGNOSIS AND TESTING > LOCKS, LATCHES AND ENTRY SYSTEMS > PINPOINT TESTS > PINPOINT TEST E : THE INTERIOR DOOR RELEASE HANDLE STICKS > PINPOINT TEST E : THE INTERIOR DOOR RELEASE HANDLE STICKS

E1 CHECK FOR A BROKEN RETURN SPRING

Remove the interior door handle. REFER to: Interior Front Door Handle .

Pull and release the interior door handle.

Does the interior door handle return to a closed position once released?

Yes	GO to E2

No	INSTALL a new interior door handle. REFER to: Interior Front Door Handle .

E2 CHECK THE INTERIOR DOOR HANDLE CABLE OPERATION

Remove the interior door latch release cable.

Observe the door latch release cable for any damage or binding.

Is the door latch release cable OK?

Yes	INSTALL a new door latch. REFER to: Front Door Latch .

No	INSTALL a new interior door handle cable.

DIAGNOSIS AND TESTING > LOCKS, LATCHES AND ENTRY SYSTEMS > PINPOINT TESTS > PINPOINT TEST F : SQUEAK-RATTLE-CHUCKING NOISE FROM DOOR

Possible Cause

- Door alignment
- Striker adjustment
- Door latch

DIAGNOSIS AND TESTING > LOCKS, LATCHES AND ENTRY SYSTEMS > PINPOINT TESTS > PINPOINT TEST F : SQUEAK-RATTLE-CHUCKING NOISE FROM DOOR > PINPOINT TEST F : SQUEAK-RATTLE-CHUCKING NOISE FROM DOOR

F1 CHECK FOR ANY LOOSE COMPONENTS

Remove the door trim panel.

Inspect inside the door for any loose components.

Are there any loose components inside the door?

Yes	REPAIR as necessary.

No	GO to F2

F2 CHECK THE STRIKER ADJUSTMENT

Check the adjustment of the striker.

Is the striker adjusted correctly?

Yes	GO to F3

No	ADJUST the striker as necessary.

F3 CHECK THE DOOR ALIGNMENT

Check the alignment of the door.

Is the door aligned correctly?

Yes	GO to F4

No	ADJUST the door as necessary. REFER to: Front Door Alignment .

F4 CHECK THE LATCH OPERATION AFTER LUBRICATION

Lubricate the door latch. REFER to: Door Latch Lubrication .

Using a screwdriver, fully close the latch (2 clicks).

Operate the door latch and listen for the noise.

Is the original noise still present after the latch is lubricated?

Yes	INSTALL a new door latch. REFER to: Front Door Latch .

No	The concern was caused by an insufficiently lubricated door latch.

DIAGNOSIS AND TESTING > LOCKS, LATCHES AND ENTRY SYSTEMS > PINPOINT TESTS > PINPOINT TEST G : THE MANUAL DOOR LOCK CYLINDER IS INOPERATIVE

Normal Operations and Fault Conditions

The door lock cylinder is connected to the door latch via a lock rod and can be used to manually lock/unlock the door.

Possible Cause

- Bent or binding lock rod and lever
- Door lock cylinder-to-latch rod disconnected
- Door lock cylinder
- Door latch

DIAGNOSIS AND TESTING > LOCKS, LATCHES AND ENTRY SYSTEMS > PINPOINT TESTS > PINPOINT TEST G : THE MANUAL DOOR LOCK CYLINDER IS INOPERATIVE > PINPOINT TEST G : THE MANUAL DOOR LOCK CYLINDER IS INOPERATIVE

G1 CHECK THE LOCK AND UNLOCK OPERATION

Insert a key into the lock cylinder and rotate the lock cylinder to the lock and unlock positions.

Does the door lock cylinder freely rotate without locking and unlocking the door?

Yes	GO to G2

No	GO to G5

G2 CHECK THE DOOR LOCK CYLINDER-TO-LATCH ROD CONNECTION

Remove the door trim panel.

Inspect the door lock cylinder-to-latch rod connections and make sure it is connected correctly.

Is the door lock cylinder-to-latch rod connected correctly?

Yes	GO to G3

No	CONNECT the cylinder-to-latch rod correctly to the door latch and the door lock cylinder

G3 CHECK THE DOOR LOCK CYLINDER (FREE-SPIN)

Remove the door lock cylinder. REFER to: Door Lock Cylinder .

Operate the door lock cylinder with the key while holding the lever on the lock cylinder.

Does the key in the door lock cylinder rotate freely while the lever is stationary?

Yes	INSTALL a new door lock cylinder. REFER to: Door Lock Cylinder .

No	GO to G4

G4 CHECK THE DOOR LOCK CYLINDER LINKAGE CONNECTION

Inspect the door lock cylinder linkage.

Is the door lock cylinder rod and lever disconnected?

Yes	CONNECT the door lock cylinder rod and lever.

No	INSTALL a new door latch. REFER to: Front Door Latch .

G5 CHECK THE LOCK CYLINDER OPERATION AFTER LUBRICATION

Spray a lock lubricant (such as Motorcraft® XL-1) into the lock cylinder opening for a couple of seconds.

Operate the door lock cylinder with the key.

Does the door lock and unlock using the door lock cylinder?

Yes	The concern was caused by an insufficiently lubricated lock cylinder. SPRAY a multi-purpose grease (such as Motorcraft® XL-5) into the lock cylinder for a couple seconds to provide long term lubrication.

No	GO to G6

G6 CHECK THE DOOR LOCK CYLINDER FOR BINDING

Remove the door lock cylinder. REFER to: Door Lock Cylinder .

Operate the door lock cylinder with the key.

Does the door lock cylinder rotate freely?

Yes	GO to G7

No	INSTALL a new door lock cylinder. REFER to: Door Lock Cylinder .

G7 CHECK THE DOOR LOCK CYLINDER LINKAGE

Operate the door lock using the door lock cylinder linkage.

Operate the door lock cylinder with the key.

Is the door lock cylinder rod and lever binding, damaged or disconnected?

Yes	REPAIR as necessary.

No	INSTALL a new door latch. REFER to: Front Door Latch .

DIAGNOSIS AND TESTING > LOCKS, LATCHES AND ENTRY SYSTEMS > PINPOINT TESTS > PINPOINT TEST H : ALL DOOR LOCKS ARE INOPERATIVE

Refer to Remote Keyless Entry and Alarm for schematic and connector information.

Normal Operations and Fault Conditions

REFER to: Handles, Locks, Latches and Entry Systems - System Operation and Component Description .

Possible Cause

- Wiring, terminals or connectors
- BCM

DIAGNOSIS AND TESTING > LOCKS, LATCHES AND ENTRY SYSTEMS > PINPOINT TESTS > PINPOINT TEST H : ALL DOOR LOCKS ARE INOPERATIVE > PINPOINT TEST H : ALL DOOR LOCKS ARE INOPERATIVE

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may damage the connector.

H1 CHECK FOR BCM (BODY CONTROL MODULE), DDM (DRIVER DOOR MODULE) AND PDM (PASSENGER DOOR MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition ON.

Using a diagnostic scan tool, perform the BCM self-test.

Using a diagnostic scan tool, perform the DDM self-test.

Using a diagnostic scan tool, perform the PDM self-test.

Are any Diagnostic Trouble Codes (DTCs) present?

Yes	REFER to the DTC Chart: BCM , the DTC Chart: DDM or DTC Chart: PDM chart(s).

No	GO to H2

H2 VERIFY THE OPERATION OF BOTH DOOR LOCK CONTROL SWITCHES

Press the lock and unlock buttons on both door lock control switches while observing the door lock operation.

Does any door lock operate?

Yes	GO to H3

No	GO to H4

H3 CHECK IF THE LOCKS OPERATE IN ONLY ONE DIRECTION

Press the lock and unlock buttons from the driver door lock control switch and then the passenger door lock control switch while observing the door locks.

Are all the door locks inoperative from both switch positions (lock and unlock) of either door lock control switch?

Yes	GO to Pinpoint Test K

No	GO to Pinpoint Test J

H4 CHECK THE BCM (BODY CONTROL MODULE) DOOR LOCK GROUND CIRCUIT FOR AN OPEN

Ignition OFF.

Disconnect BCM C2280C .

Measure

Positive Lead	Measurement / Action	Negative Lead

C2280C-10	Ω	Ground

Is the resistance less than 3 ohms?

Yes	GO to H5

No	REPAIR the circuit.

H5 CHECK THE ALL DOOR LOCK CIRCUIT FOR AN OPEN

Disconnect Left Front Door Latch C525 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2280C-35	Ω	C525-7

Is the resistance less than 3 ohms?

Yes	GO to H6

No	REPAIR the circuit.

H6 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all the BCM connectors.

Repair:

corrosion (install new connectors or terminals - clean module pins)

damaged or bent pins - install new terminals pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors and make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > LOCKS, LATCHES AND ENTRY SYSTEMS > PINPOINT TESTS > PINPOINT TEST I : A SINGLE OR MORE THAN ONE DOOR LOCK IS INOPERATIVE

Refer to Remote Keyless Entry and Alarm for schematic and connector information.

Normal Operations and Fault Conditions

REFER to: Handles, Locks, Latches and Entry Systems - System Operation and Component Description .

Possible Cause

- Fuse
- Wiring, terminals or connectors
- Door latch
- BCM

Visual Inspection and Diagnostic Pre-checks

- Check the BCM fuse 24 (30A)

DIAGNOSIS AND TESTING > LOCKS, LATCHES AND ENTRY SYSTEMS > PINPOINT TESTS > PINPOINT TEST I : A SINGLE OR MORE THAN ONE DOOR LOCK IS INOPERATIVE > PINPOINT TEST I : A SINGLE OR MORE THAN ONE DOOR LOCK IS INOPERATIVE

I1 CHECK THE DOOR LATCH FOR BINDING

Lock and unlock the inoperative door lock using the manual door lock located just above the door latch opening.

Does the door lock and unlock?

Yes	VERIFY the BCM fuse 24 (30A) is OK. If OK, GO to I2 If not OK, REFER to the OEM WIRING DIAGRAMS article to identify the possible causes of the circuit short.

No	INSTALL a new door latch. REFER to: Front Door Latch .

NOTE: The following step uses a test lamp to simulate normal circuit loads. Use only a Rotunda Test Lamp (SGT27000) or 250-300mA incandescent bulb test lamp. To avoid connector terminal damage, use the Rotunda Flex Probe kit for the test lamp probe connection to the vehicle. Do not use the test lamp probe directly on any connector.

I2 CHECK THE BCM (BODY CONTROL MODULE) ALL LOCK OUTPUT CIRCUIT FOR AN OPEN

Ignition OFF.

Disconnect suspect door latch.

For the suspect door latch, connect:

Left Front Door Latch

Positive Lead	Measurement / Action	Negative Lead
C525-7		Ground

Right Front Door Latch

Positive Lead	Measurement / Action	Negative Lead
C609-2		Ground

NOTE: The BCM only supplies voltage to the actuator momentarily. It is important to monitor the test lamp while pressing the door lock control switch.

While pressing the door lock control switch in the lock position, monitor the test lamp.

Does the test lamp momentarily illuminate?

Yes	GO to I3

No	REPAIR the circuit.

NOTE: The following step uses a test lamp to simulate normal circuit loads. Use only a Rotunda Test Lamp (SGT27000) or 250-300mA incandescent bulb test lamp. To avoid connector terminal damage, use the Rotunda Flex Probe kit for the test lamp probe connection to the vehicle. Do not use the test lamp probe directly on any connector.

I3 CHECK THE BCM (BODY CONTROL MODULE) UNLOCK OUTPUT

For the suspect door latch, connect:

Left Front Door Latch

Positive Lead	Measurement / Action	Negative Lead
C525-8		Ground

Right Front Door Latch

Positive Lead	Measurement / Action	Negative Lead
C609-1		Ground

NOTE: The BCM only supplies voltage to the actuator momentarily. It is important to monitor the test lamp while pressing the door lock control switch.

While pressing the door lock control switch in the unlock position, monitor the test lamp.

Does the test lamp momentarily illuminate?

Yes	INSTALL a new door latch. REFER to: Front Door Latch .

No	GO to I4

I4 CHECK THE BCM (BODY CONTROL MODULE) UNLOCK OUTPUT CIRCUIT FOR AN OPEN

Disconnect BCM C2280C .

For the suspect door latch, connect:

Left Front Door Latch

Positive Lead	Measurement / Action	Negative Lead
C525-8	Ω	C2280C-27

Right Front Door Latch

Positive Lead	Measurement / Action	Negative Lead
C609-1	Ω	C2280C-32

Is the resistance less than 3 ohms?

Yes	GO to I5

No	REPAIR the circuit.

I5 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all the BCM connectors.

Repair:

corrosion (install new connectors or terminals - clean module pins)

damaged or bent pins - install new terminals pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors and make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > LOCKS, LATCHES AND ENTRY SYSTEMS > PINPOINT TESTS > PINPOINT TEST J : THE DOOR LOCKS OPERATE ONLY ONE WAY

Refer to Remote Keyless Entry and Alarm for schematic and connector information.

Normal Operations and Fault Conditions

REFER to: Handles, Locks, Latches and Entry Systems - System Operation and Component Description .

BCM DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B126A:01	Drivers Door Interior Lock Switch: General Electrical Failure	Sets during an on-demand self-test if the BCM detects a short to ground from one of the door lock control switch input circuits.

DDM/ PDM DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B108F:23	Cabin Lock/Unlock Switch: Signal Stuck Low	Sets when the DDM/ PDM detects a short to ground from one of the door lock control switch input circuits.

Possible Cause

- Fuse
- Wiring, terminals or connectors
- Door lock control switch
- PDM
- DDM
- BCM

Visual Inspection and Diagnostic Pre-checks

- Check the BCM fuse 3 (20A)

DIAGNOSIS AND TESTING > LOCKS, LATCHES AND ENTRY SYSTEMS > PINPOINT TESTS > PINPOINT TEST J : THE DOOR LOCKS OPERATE ONLY ONE WAY > PINPOINT TEST J : THE DOOR LOCKS OPERATE ONLY ONE WAY

J1 CHECK FOR AN INOPERATIVE DOOR LOCK

Operate the power door locks using both door lock control switches.

Is any door lock inoperative for both directions?

Yes	GO to Pinpoint Test I

No	GO to J2

J2 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) B108F:23 OR B126A:01

Ignition ON.

For vehicles not equipped with a memory seat, using a diagnostic scan tool, perform the BCM self-test.

For vehicles equipped with a memory seat, using a diagnostic scan tool, perform the DDM and the PDM self-tests.

Is DTC B108F:23 or B126A:01 present?

Yes	For vehicles not equipped with a memory seat, GO to J3 For vehicles equipped with a memory seat, GO to J5

No	VERIFY the BCM fuse 3 (20A) is OK. If OK, GO to J7 If not OK, REFER to the OEM WIRING DIAGRAMS article to identify the possible causes of the circuit short.

J3 ISOLATE THE DRIVER DOOR LOCK CONTROL SWITCH

Ignition OFF.

Disconnect Driver Door Lock Control Switch C505 .

Ignition ON.

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs) and repeat the BCM self-test.

Is DTC B126A:01 still present?

Yes	GO to J4

No	INSTALL a new driver door lock control switch. REFER to: Door Lock Control Switch .

J4 ISOLATE THE PASSENGER DOOR LOCK CONTROL SWITCH

Ignition OFF.

Disconnect Passenger Door Lock Control Switch C605 .

Ignition ON.

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs) and repeat the BCM self-test.

Is DTC B126A:01 still present?

Yes	GO to J6

No	INSTALL a new passenger door lock control switch. REFER to: Door Lock Control Switch .

J5 ISOLATE THE DOOR LOCK CONTROL SWITCH

Ignition OFF.

Disconnect Driver Door Lock Control Switch C541 (DTC set in DDM).

Disconnect Passenger Door Lock Control Switch C605 (DTC set in PDM).

Ignition ON.

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs) and repeat the DDM or the PDM self-test.

Is DTC B108F:23 still present?

Yes	GO to J6

No	INSTALL a new door lock control switch. REFER to: Door Lock Control Switch .

J6 CHECK THE DOOR LOCK CONTROL SWITCH INPUT CIRCUITS FOR A SHORT TO GROUND

Ignition OFF.

Disconnect BCM C2280E (DTC set in BCM).

Disconnect DDM C501A (DTC set in DDM).

Disconnect PDM C652A (DTC set in PDM).

If the DTC set in the BCM, measure:

Positive Lead	Measurement / Action	Negative Lead

C2280E-4	Ω	Ground
C2280E-17	Ω	Ground

If the DTC set in the DDM, measure:

Positive Lead	Measurement / Action	Negative Lead
C501A-10	Ω	Ground
C501A-20	Ω	Ground

If the DTC set in the PDM, measure:

Positive Lead	Measurement / Action	Negative Lead
C652A-10	Ω	Ground
C652A-20	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	For the PDM, GO to J13 For the DDM, GO to J14 For the BCM, GO to J15

No	REPAIR the circuit in question.

J7 CHECK THE LOCK REQUEST INPUT CIRCUIT

Ignition OFF.

Disconnect suspect door lock control switch.

Connect:

Driver Door Lock Control Switch (without memory)

Positive Lead	Measurement / Action	Negative Lead
C505-4		C505-3

Driver Door Lock Control Switch (with memory)

Positive Lead	Measurement / Action	Negative Lead
C541-2		C541-3

Passenger Door Lock Control Switch

Positive Lead	Measurement / Action	Negative Lead

C605-1		C605-2

Remove the fused jumper wire.

Do the doors lock?

Yes	GO to J10

No	For vehicles not equipped with a memory seat, GO to J8 For vehicles equipped with a memory seat, GO to J9

J8 CHECK THE LOCK REQUEST INPUT CIRCUIT FOR AN OPEN (WITHOUT MEMORY SEAT)

Disconnect BCM C2280E .

Measure:

Driver Door Lock Control Switch

Positive Lead	Measurement / Action	Negative Lead
C505-4	Ω	C2280E-17

Passenger Door Lock Control Switch

Positive Lead	Measurement / Action	Negative Lead
C605-1	Ω	C2280E-17

Is the resistance less than 3 ohms?

Yes	GO to J15

No	REPAIR the circuit.

J9 CHECK THE LOCK REQUEST INPUT CIRCUIT FOR AN OPEN (WITH MEMORY SEAT)

Disconnect DDM C501A (driver door lock control switch with memory).

Disconnect PDM C652A (passenger door lock control switch).

Measure:

Driver Door Lock Control Switch

Positive Lead	Measurement / Action	Negative Lead
C541-2	Ω	C501A-20

Passenger Door Lock Control Switch

Positive Lead	Measurement / Action	Negative Lead
C605-1	Ω	C652A-20

Is the resistance less than 3 ohms?

Yes	For the concern with the passenger door lock control switch, GO to J13 For the concern with the driver door lock control switch, GO to J14

No	REPAIR the circuit.

J10 CHECK THE UNLOCK REQUEST INPUT CIRCUIT

Connect:

Driver Door Lock Control Switch (without memory)

Positive Lead	Measurement / Action	Negative Lead
C505-2		C505-3

Driver Door Lock Control Switch (with memory)

Positive Lead	Measurement / Action	Negative Lead
C541-1		C541-3

Passenger Door Lock Control Switch

Positive Lead	Measurement / Action	Negative Lead
C605-1		C605-2

For the passenger door lock control switch, momentarily connect:

Do the doors unlock?

Yes	INSTALL a new door lock control switch. REFER to: Door Lock Control Switch .

No	For vehicles not equipped with a memory seat, GO to J11 For vehicles equipped with a memory seat, GO to J12

J11 CHECK THE UNLOCK REQUEST INPUT CIRCUIT FOR AN OPEN (WITHOUT MEMORY SEAT)

Disconnect BCM C23280E.

Measure:

Driver Door Lock Control Switch

Positive Lead	Measurement / Action	Negative Lead
C505-2	Ω	C2280E-4

Passenger Door Lock Control Switch

Positive Lead	Measurement / Action	Negative Lead
C605-3	Ω	C2280E-4

Is the resistance less than 3 ohms?

Yes	GO to J15

No	REPAIR the circuit.

J12 CHECK THE UNLOCK REQUEST INPUT CIRCUIT FOR AN OPEN (WITH MEMORY SEAT)

Disconnect DDM C501A (driver door lock control switch).

Disconnect PDM C652A (passenger door lock control switch).

For the driver door lock control switch, measure:

Driver Door Lock Control Switch

Positive Lead	Measurement / Action	Negative Lead
C541-1	Ω	C501A-10

Passenger Door Lock Control Switch

Positive Lead	Measurement / Action	Negative Lead
C605-3	Ω	C652A-10

Is the resistance less than 3 ohms?

Yes	For the concern with the passenger door lock control switch, GO to J13 For the concern with the driver door lock control switch, GO to J14

No	REPAIR the circuit.

J13 CHECK FOR CORRECT PDM (PASSENGER DOOR MODULE) OPERATION

Disconnect and inspect all the PDM connectors.

Repair:

corrosion (install new connectors or terminals - clean module pins)

damaged or bent pins - install new terminals pins

pushed-out pins - install new pins as necessary

Reconnect the PDM connectors and make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PDM. REFER to: Passenger Door Module (PDM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

J14 CHECK FOR CORRECT DDM (DRIVER DOOR MODULE) OPERATION

Disconnect and inspect all the DDM connectors.

Repair:

corrosion (install new connectors or terminals - clean module pins)

damaged or bent pins - install new terminals pins

pushed-out pins - install new pins as necessary

Reconnect the DDM connectors and make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new DDM. REFER to: Driver Door Module (DDM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

J15 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all the BCM connectors.

Repair:

corrosion (install new connectors or terminals - clean module pins)

damaged or bent pins - install new terminals pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors and make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > LOCKS, LATCHES AND ENTRY SYSTEMS > PINPOINT TESTS > PINPOINT TEST K : ALL DOOR LOCKS ARE INOPERATIVE FROM ONE DOOR LOCK CONTROL SWITCH

Refer to Remote Keyless Entry and Alarm for schematic and connector information.

Normal Operations and Fault Conditions

REFER to: Handles, Locks, Latches and Entry Systems - System Operation and Component Description .

Possible Cause

- Wiring, terminals or connectors
- Door lock control switch

Visual Inspection and Diagnostic Pre-checks

- Check the door lock control switch for damage

DIAGNOSIS AND TESTING > LOCKS, LATCHES AND ENTRY SYSTEMS > PINPOINT TESTS > PINPOINT TEST K : ALL DOOR LOCKS ARE INOPERATIVE FROM ONE DOOR LOCK CONTROL SWITCH > PINPOINT TEST K : ALL DOOR LOCKS ARE INOPERATIVE FROM ONE DOOR LOCK CONTROL SWITCH

NOTE: If the vehicle is not equipped with a memory seat, proceed to K2.

K1 CHECK FOR COMMUNICATION TO THE DDM (DRIVER DOOR MODULE) AND PDM (PASSENGER DOOR MODULE)

Ignition ON.

Using a diagnostic scan tool, perform the network test.

Do the DDM and PDM pass the network test?

Yes	GO to K2

No	REFER to: MODULE COMMUNICATIONS NETWORK .

K2 CHECK THE DOOR LOCK CONTROL SWITCH GROUND CIRCUIT FOR AN OPEN

Ignition OFF.

Disconnect suspect door lock control switch.

Measure:

Driver Door Lock Control Switch (without memory)

Positive Lead	Measurement / Action	Negative Lead
C505-3	Ω	Ground

Driver Door Lock Control Switch (with memory)

Positive Lead	Measurement / Action	Negative Lead
C541-3	Ω	Ground

Passenger Door Lock Control Switch

Positive Lead	Measurement / Action	Negative Lead
C605-2	Ω	Ground

Is the resistance less than 3 ohms?

Yes	INSTALL a new door lock control switch in question. REFER to: Door Lock Control Switch .

No	REPAIR the circuit.

DIAGNOSIS AND TESTING > LOCKS, LATCHES AND ENTRY SYSTEMS > PINPOINT TESTS > PINPOINT TEST L : A DOOR LOCK INDICATOR IS INOPERATIVE

Refer to Remote Keyless Entry and Alarm for schematic and connector information.

Refer to Interior Lamps for schematic and connector information.

Normal Operations and Fault Conditions

REFER to: Handles, Locks, Latches and Entry Systems - System Operation and Component Description .

BCM DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1490:11	Lock Indicator LED Status Output: Circuit Short To Ground	Sets when the BCM detects a short to ground from the door lock indicator voltage supply circuit.
B1490:15	Lock Indicator LED Status Output: Circuit Short To Battery or Open	Sets when the BCM detects an open from the door lock indicator voltage supply circuit.

Possible Cause

- Wiring, terminals or connectors
- PDM
- DDM
- Body Control Module B (BCM-B)
- BCM

DIAGNOSIS AND TESTING > LOCKS, LATCHES AND ENTRY SYSTEMS > PINPOINT TESTS > PINPOINT TEST L : A DOOR LOCK INDICATOR IS INOPERATIVE > PINPOINT TEST L : A DOOR LOCK INDICATOR IS INOPERATIVE

L1 CHECK THE DOOR LOCK OPERATION

Ignition OFF.

Check the operation of the door locks using the door lock control switches.

Do the door locks operate correctly?

Yes	GO to L2

No	REFER to the Symptom Chart: Handles, Locks, Latches and Entry Systems - Electrical in Symptom Charts .

L2 CHECK THE UNLOCK FEEDBACK CIRCUIT INPUT

Ignition OFF.

Disconnect suspect door lock indicator harness connector.

Lock the doors using a door lock control switch.

Measure:

Left Front Door

Positive Lead	Measurement / Action	Negative Lead
C573-2	Ω	Ground

Right Front Door

Positive Lead	Measurement / Action	Negative Lead
C649-2	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to L4

No	GO to L3

L3 CHECK THE UNLOCK FEEDBACK CIRCUIT FOR A SHORT TO GROUND

Disconnect corresponding door latch.

Measure:

Left Front Door

Positive Lead	Measurement / Action	Negative Lead
C573-2	Ω	Ground

Right Front Door

Positive Lead	Measurement / Action	Negative Lead
C649-2	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	INSTALL a new door latch. REFER to: Front Door Latch .

No	REPAIR the circuit.

L4 CHECK FOR VOLTAGE TO THE DOOR LOCK INDICATOR

Ignition ON.

Measure:

Left Front Door

Positive Lead	Measurement / Action	Negative Lead
C573-6		Ground

Right Front Door

Positive Lead	Measurement / Action	Negative Lead
C649-6		Ground

Is the voltage greater than 11 volts?

Yes	GO to L5

No	For vehicles without a memory seat, GO to L7 For vehicles with a memory seat, GO to L12

L5 CHECK THE DOOR LOCK INDICATOR GROUND CIRCUIT

Measure:

Left Front Door

Positive Lead	Measurement / Action	Negative Lead
C573-6		C573-4

Right Front Door

Positive Lead	Measurement / Action	Negative Lead
C649-6		C649-4

Is the voltage greater than 11 volts?

Yes	INSTALL a new door lock indicator harness.

No	GO to L6

L6 CHECK THE DOOR LOCK INDICATOR GROUND CIRCUIT FOR AN OPEN

Ignition OFF.

Disconnect Body Control Module B (BCM-B) C4368A .

Measure:

Left Front Door

Positive Lead	Measurement / Action	Negative Lead

C573-4	Ω	C4368A-24

Right Front Door

Positive Lead	Measurement / Action	Negative Lead
C649-4	Ω	C4368A-24

Is the resistance less than 3 ohms?

Yes	GO to L16

No	REPAIR the circuit.

L7 CHECK FOR BCM (BODY CONTROL MODULE) DTC (DIAGNOSTIC TROUBLE CODE) B1490:11

Ignition OFF.

Connect suspect door lock indicator harness connector.

Ignition ON.

Using a diagnostic scan tool, carry out the BCM self-test.

Is DTC B1490:11 present?

Yes	GO to L8

No	GO to L11

L8 CHECK THE LEFT DOOR LOCK INDICATOR FOR A SHORT TO GROUND

Ignition OFF.

Disconnect Left Door Lock Indicator Harness C573 .

Ignition ON.

Using a diagnostic scan tool, clear the BCM Diagnostic Trouble Codes (DTCs).

Using a diagnostic scan tool, carry out the BCM self-test.

Is DTC B1490:11 still present?

Yes	GO to L9

No	REPAIR or REPLACE the door lock indicator harness.

L9 CHECK THE RIGHT DOOR LOCK INDICATOR FOR A SHORT TO GROUND

Ignition OFF.

Disconnect Right Door Lock Indicator Harness C649 .

Ignition ON.

Using a diagnostic scan tool, clear the BCM Diagnostic Trouble Codes (DTCs).

Using a diagnostic scan tool, carry out the BCM self-test.

Is DTC B1490:11 still present?

Yes	GO to L10

No	REPAIR or REPLACE the door lock indicator harness.

L10 CHECK THE DOOR LOCK INDICATOR VOLTAGE SUPPLY CIRCUIT FOR A SHORT TO GROUND (WITHOUT MEMORY)

Ignition OFF.

Disconnect BCM C2280E .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2280E-39	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to L17

No	REPAIR the circuit.

L11 CHECK THE DOOR LOCK INDICATOR VOLTAGE SUPPLY CIRCUIT FOR AN OPEN (WITHOUT MEMORY)

Ignition OFF.

Disconnect suspect door lock indicator harness connector.

Disconnect BCM C2280E .

Measure:

Left Front Door

Positive Lead	Measurement / Action	Negative Lead
C573-6	Ω	C2280E-39

Right Front Door

Positive Lead	Measurement / Action	Negative Lead
C649-6	Ω	C2280E-39

Is the resistance less than 3 ohms?

Yes	GO to L17

No	REPAIR the circuit.

L12 CHECK THE DOOR LOCK INDICATOR VOLTAGE SUPPLY CIRCUIT FOR A SHORT TO GROUND (WITH MEMORY)

Ignition OFF.

Disconnect DDM C501A (left front door indicator).

Disconnect PDM C652A (right front door indicator).

Measure:

Left Front Door

Positive Lead	Measurement / Action	Negative Lead
C501A-3	Ω	Ground

Right Front Door

Positive Lead	Measurement / Action	Negative Lead
C652A-3	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to L13

No	REPAIR the circuit.

L13 CHECK THE DOOR LOCK INDICATOR VOLTAGE SUPPLY CIRCUIT FOR AN OPEN

Measure:

Left Front Door

Positive Lead	Measurement / Action	Negative Lead
C501A-3	Ω	C573-6

Right Front Door

Positive Lead	Measurement / Action	Negative Lead
C652A-3	Ω	C649-6

Is the resistance less than 3 ohms?

Yes	For a left front door indicator, GO to L15 For a right front door indicator, GO to L14

No	REPAIR the circuit.

L14 CHECK FOR CORRECT PDM (PASSENGER DOOR MODULE) OPERATION

Disconnect and inspect all the PDM connectors.

Repair:

corrosion (install new connectors or terminals - clean module pins)

damaged or bent pins - install new terminals pins

pushed-out pins - install new pins as necessary

Reconnect the PDM connectors and make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PDM. REFER to: Passenger Door Module (PDM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

L15 CHECK FOR CORRECT DDM (DRIVER DOOR MODULE) OPERATION

Disconnect and inspect all the DDM connectors.

Repair:

corrosion (install new connectors or terminals - clean module pins)

damaged or bent pins - install new terminals pins

pushed-out pins - install new pins as necessary

Reconnect the DDM connectors and make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new DDM. REFER to: Driver Door Module (DDM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

L16 CHECK FOR CORRECT BODY CONTROL MODULE B (BCM-B) OPERATION

Disconnect and inspect the Body Control Module B (BCM-B) connector.

Repair:

corrosion (install new connectors or terminals - clean module pins)

damaged or bent pins - install new terminals pins

pushed-out pins - install new pins as necessary

Reconnect the Body Control Module B (BCM-B) connectors and make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new Body Control Module B (BCM-B). REFER to: Body Control Module B (BCMB) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

L17 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all the BCM connectors.

Repair:

corrosion (install new connectors or terminals - clean module pins)

damaged or bent pins - install new terminals pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors and make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this

	concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > LOCKS, LATCHES AND ENTRY SYSTEMS > PINPOINT TESTS > PINPOINT TEST M : A DOOR LOCK INDICATOR IS ALWAYS ON

Refer to Remote Keyless Entry and Alarm for schematic and connector information.

Refer to Interior Lamps for schematic and connector information.

Normal Operations and Fault Conditions

REFER to: Handles, Locks, Latches and Entry Systems - System Operation and Component Description .

BCM DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1490:15	Lock Indicator LED Status Output: Circuit Short To Battery or Open	Sets when the BCM detects a short to voltage from the door lock indicator voltage supply circuit.

Possible Cause

- Wiring, terminals or connectors
- PDM
- DDM
- BCM

DIAGNOSIS AND TESTING > LOCKS, LATCHES AND ENTRY SYSTEMS > PINPOINT TESTS > PINPOINT TEST M : A DOOR LOCK INDICATOR IS ALWAYS ON > PINPOINT TEST M : A DOOR LOCK INDICATOR IS ALWAYS ON

M1 CHECK THE COURTESY LAMP OPERATION

Check the operation of the courtesy lamps from each door.

Do the courtesy lamps operate correctly?

Yes	GO to M2

No	REFER to: Interior Lighting .

M2 CHECK THE UNLOCK FEEDBACK FOR CORRECT OPERATION

Ignition OFF.

Disconnect suspect door lock indicator harness connector.

Ignition ON.

Unlock the doors using the door lock control switch.

Measure:

Left Front Door

Positive Lead	Measurement / Action	Negative Lead
C573-6		C573-2

Right Front

Positive Lead	Measurement / Action	Negative Lead
C649-6		C649-2

Is the voltage greater than 11 volts?

Yes	For vehicles not equipped with a memory seat, GO to M4 For vehicles equipped with a memory seat, GO to M5

No	GO to M3

M3 CHECK THE UNLOCK FEEDBACK CIRCUIT FOR AN OPEN

Ignition OFF.

Disconnect suspect door latch.

Measure:

Left Front Door

Positive Lead	Measurement / Action	Negative Lead
C573-2	Ω	C525-4

Right Front

Positive Lead	Measurement / Action	Negative Lead
C649-2	Ω	C609-5

Is the resistance less than 3 ohms?

Yes	INSTALL a new door latch. REFER to: Front Door Latch .

No	REPAIR the circuit.

M4 CHECK THE DOOR LOCK INDICATOR VOLTAGE SUPPLY CIRCUIT FOR A SHORT TO VOLTAGE (WITHOUT MEMORY)

Ignition OFF.

Connect suspect door lock indicator harness connector.

Disconnect BCM C2280E .

Lock the doors using the RKE transmitter.

Observe the door lock indicators.

Do the door lock indicators continue to illuminate?

Yes	REPAIR the circuit.

No	GO to M8

M5 CHECK THE DOOR LOCK INDICATOR VOLTAGE SUPPLY CIRCUIT FOR A SHORT TO VOLTAGE (WITH MEMORY)

Ignition OFF.

Connect suspect door lock indicator harness connector.

Disconnect DDM C501A (driver door indicator).

Disconnect PDM C652A (passenger door indicator).

Lock the doors using the RKE transmitter.

Observe the door lock indicator in question.

Does the door lock indicator continue to illuminate?

Yes	REPAIR the circuit.

No	For the passenger door lock indicator, GO to M6 For the driver door lock indicator, GO to M7

M6 CHECK FOR CORRECT PDM (PASSENGER DOOR MODULE) OPERATION

Disconnect and inspect all the PDM connectors.

Repair:

corrosion (install new connectors or terminals - clean module pins)

damaged or bent pins - install new terminals pins

pushed-out pins - install new pins as necessary

Reconnect the PDM connectors and make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PDM. REFER to: Passenger Door Module (PDM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

M7 CHECK FOR CORRECT DDM (DRIVER DOOR MODULE) OPERATION

Disconnect and inspect all the DDM connectors.

Repair:

corrosion (install new connectors or terminals - clean module pins)

damaged or bent pins - install new terminals pins

pushed-out pins - install new pins as necessary

Reconnect the DDM connectors and make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new DDM. REFER to: Driver Door Module (DDM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

M8 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all the BCM connectors.

Repair:

corrosion (install new connectors or terminals - clean module pins)

damaged or bent pins - install new terminals pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors and make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > LOCKS, LATCHES AND ENTRY SYSTEMS > PINPOINT TESTS > PINPOINT TEST N : THE LUGGAGE COMPARTMENT LID LATCH RELEASE IS INOPERATIVE

Refer to Remote Keyless Entry and Alarm for schematic and connector information.

Normal Operations and Fault Conditions

REFER to: Handles, Locks, Latches and Entry Systems - System Operation and Component Description .

BCM DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1219:11	Interior Boot/Trunk Release Switch: Circuit Short To Ground	Sets when the BCM detects a short to ground from the interior luggage compartment lid release switch input circuit.
C1017:11	Boot/Trunk Primary Switch: Circuit Short To Ground	Sets when the BCM detects a short to ground from the exterior luggage compartment lid release switch input circuit.

Possible Cause

- Fuse
- Wiring, terminals or connectors
- Luggage compartment lid release switch
- Luggage compartment lid latch
- BCM

Visual Inspection and Diagnostic Pre-checks

- Check the BCM fuse 16 (15A)
- Inspect the luggage compartment lid release switches for damage

DIAGNOSIS AND TESTING > LOCKS, LATCHES AND ENTRY SYSTEMS > PINPOINT TESTS > PINPOINT TEST N : THE LUGGAGE COMPARTMENT LID LATCH RELEASE IS INOPERATIVE > PINPOINT TEST N : THE LUGGAGE COMPARTMENT LID LATCH RELEASE IS INOPERATIVE

N1 CHECK FOR BCM (BODY CONTROL MODULE) DTC (DIAGNOSTIC TROUBLE CODE) B1219:11 AND C1017:11

Ignition ON.

Using a diagnostic scan tool, carry out the BCM self-test.

Is DTC B1219:11 or C1017:11 present?

Yes	GO to N2

No	GO to N4

N2 CHECK THE LUGGAGE COMPARTMENT LID RELEASE SWITCH

Ignition OFF.

Disconnect Interior Luggage Compartment Lid Release Switch C2610 (DTC B1219:11).

Disconnect Exterior Luggage Compartment Lid Release Switch C4333 (DTC C1017:11).

Ignition ON.

Using a diagnostic scan tool, clear the BCM Diagnostic Trouble Codes (DTCs).

Using a diagnostic scan tool, carry out the BCM self-test.

Is DTC B1219:11 or C1017:11 still present?

Yes	GO to N3

No	INSTALL a new luggage compartment lid release switch in question.

N3 CHECK THE LUGGAGE COMPARTMENT LID RELEASE SWITCH INPUT CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Disconnect BCM C2280B (DTC B1219:11).

Disconnect BCM C2280E (DTC C1017:11).

Measure:

DTC B1219:11

Positive Lead	Measurement / Action	Negative Lead
C2280B-1	Ω	Ground

DTC C1017:11

Positive Lead	Measurement / Action	Negative Lead
C2280E-14	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to N11

No	REPAIR the circuit.

N4 CHECK THE LUGGAGE COMPARTMENT LID RELEASE OUTPUT USING THE DECKLID / LIFTGLASS RELEASE OUTPUT STATUS (DL_LFTGLS_RLS) PID (PARAMETER IDENTIFICATION)

Using a diagnostic scan tool, view the BCM Parameter Identifications (PIDs).

Command the BCM PID DL_LFTGLS_RLS on and then off.

Does the luggage compartment lid latch release?

Yes	GO to N5

No	VERIFY the BCM fuse 16 (15A) is OK. If OK, GO to N8 If not OK, REFER to the OEM WIRING DIAGRAMS article to identify the possible cause of the circuit short.

N5 CHECK THE SUSPECT LUGGAGE COMPARTMENT LID RELEASE SWITCH

Ignition OFF.

Disconnect Suspect luggage compartment lid release switch.

Unlock the doors using a door lock control switch.

Connect:

Interior Luggage Compartment Lid Release Switch

Positive Lead	Measurement / Action	Negative Lead
C2610-6		C2610-2

Exterior Luggage Compartment Lid Release Switch

Positive Lead	Measurement / Action	Negative Lead
C4333-1		C4333-2

Remove the fused jumper wire.

Does the luggage compartment lid latch release?

Yes	INSTALL a new luggage compartment lid release switch in question.

No	GO to N6

N6 CHECK THE SUSPECT LUGGAGE COMPARTMENT LID RELEASE SWITCH GROUND CIRCUIT FOR AN OPEN

Unlock the doors using a door lock control switch.

Connect:

Interior Luggage Compartment Lid Release Switch

Positive Lead	Measurement / Action	Negative Lead
C2610-6		Ground

Exterior Luggage Compartment Lid Release Switch

Positive Lead	Measurement / Action	Negative Lead
C4333-1		Ground

Remove the fused jumper wire.

Does the luggage compartment lid latch release?

Yes	REPAIR the circuit.

No	GO to N7

N7 CHECK THE SUSPECT LUGGAGE COMPARTMENT LID RELEASE SWITCH INPUT CIRCUIT FOR AN OPEN

Disconnect BCM C2280B (interior luggage compartment lid release switch).

Disconnect BCM C2280E (exterior luggage compartment lid release switch).

Measure:

Interior Luggage Compartment Lid Release Switch

Positive Lead	Measurement / Action	Negative Lead
C2610-6	Ω	C2280B-1

Exterior Luggage Compartment Lid Release Switch

Positive Lead	Measurement / Action	Negative Lead
C4333-1	Ω	C2280E-14

Is the resistance less than 3 ohms?

Yes	GO to N11

No	REPAIR the circuit.

NOTE: The following step uses a test lamp to simulate normal circuit loads. Use only a Rotunda Test Lamp (SGT27000) or 250-300mA incandescent bulb test lamp. To avoid connector terminal damage, use the Rotunda Flex Probe kit for the test lamp probe connection to the vehicle. Do not use the test lamp probe directly on any connector.

N8 CHECK THE LUGGAGE COMPARTMENT LID LATCH

Ignition OFF.

Disconnect Luggage Compartment Lid Latch C4339 .

Connect:

Positive Lead	Measurement / Action	Negative Lead
C4339-3		C4339-4

Ignition ON.

Unlock the doors using a door lock control switch.

NOTE: The BCM only supplies voltage to the latch momentarily. It is important to monitor the test lamp while pressing the luggage compartment lid release switch.

Press and release the exterior luggage compartment lid release switch while observing the test lamp.

Does the test lamp momentarily illuminate?

Yes	INSTALL a new luggage compartment lid latch.

No	GO to N9

N9 CHECK THE LUGGAGE COMPARTMENT LID LATCH GROUND CIRCUIT FOR AN OPEN

Connect:

Positive Lead	Measurement / Action	Negative Lead
C4339-3		Ground

NOTE: The BCM only supplies voltage to the latch momentarily. It is important to monitor the test lamp while pressing the luggage compartment lid release switch.

Press and release the exterior luggage compartment lid release switch while observing the test lamp.

Does the test lamp momentarily illuminate?

Yes	REPAIR the circuit.

No	GO to N10

N10 CHECK THE BCM (BODY CONTROL MODULE) LUGGAGE COMPARTMENT LID LATCH OUTPUT CIRCUIT FOR AN OPEN

Ignition OFF.

Disconnect BCM C2280C .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4339-3	Ω	C2280C-33

Is the resistance less than 3 ohms?

Yes	GO to N11

No	REPAIR the circuit.

N11 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all the BCM connectors.

Repair:

corrosion (install new connectors or terminals - clean module pins)

damaged or bent pins - install new terminals pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors and make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > LOCKS, LATCHES AND ENTRY SYSTEMS > PINPOINT TESTS > PINPOINT TEST O : THE RKE (REMOTE KEYLESS ENTRY) TRANSMITTER IS INOPERATIVE

Normal Operations and Fault Conditions

REFER to: Handles, Locks, Latches and Entry Systems - System Operation and Component Description .

A loss of synchronization of a RKE transmitter is caused when the button(s) on that RKE transmitter is pressed repeatedly on a continuous basis when the RKE transmitter is out of range from the vehicle it is programmed to. If a RKE transmitter becomes out of sync, the BCM ignores commands from that RKE transmitter.

BCM DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B10AB:00	Remote Keyless Entry Synchronization: No Sub Type Information	Sets when the BCM detects the rolling counter received from a RKE transmitter is out of synchronization with the rolling counter stored in the module.
B1218:00	Transmitter Identification Code: No Sub Type Information	Sets when the BCM detects and invalid Transmitter Identification Code (TIC).

Possible Cause

- Key battery
- Key
- Key button pressed a substantial amount of times while outside the range of the vehicle
- Key programming
- Network concern

Visual Inspection and Diagnostic Pre-checks

- Inspect the key for damage.
- Check for aftermarket keys.

DIAGNOSIS AND TESTING > LOCKS, LATCHES AND ENTRY SYSTEMS > PINPOINT TESTS > PINPOINT TEST O : THE RKE (REMOTE KEYLESS ENTRY) TRANSMITTER IS INOPERATIVE > PINPOINT TEST O : THE RKE (REMOTE KEYLESS ENTRY) TRANSMITTER IS INOPERATIVE

NOTE: All customer keys need to be present when diagnosing the RKE system.

O1 CHECK FOR THE CORRECT KEYS

Verify all keys present are the correct type for the vehicle.

Are the correct keys present?

Yes	GO to O2

No	The system cannot be tested without the correct keys. INFORM the customer that all of the correct keys must be present to proceed with diagnosis of the system.

NOTE: Make sure the vehicle is in an open area with no other large metal objects near, such as other vehicles or steel buildings.

O2 CHECK FOR REDUCED RANGE

Check all keys for normal range performance (approximately 50m (165 ft)).

Do the keys experience poor range?

Yes	GO to Pinpoint Test Q

No	GO to O3

O3 CHECK THE RKE (REMOTE KEYLESS ENTRY) FUNCTIONALITY OF THE KEYS

Press each RKE button on a key. Repeat this step on a second key.

Are all the RKE functions inoperative from both keys?

Yes	GO to O11

No	GO to O4

O4 CHECK THE RKE (REMOTE KEYLESS ENTRY) FUNCTIONALITY OF THE SUSPECT KEY

Press each RKE button (twice for the luggage compartment lid latch release) on the suspect key.

Does any RKE function operate?

Yes	GO to Pinpoint Test P

No	GO to O5

O5 CHECK THE NO (TIC) OUT OF SYNC (TIC-NONE_OOS) PID (PARAMETER IDENTIFICATION)

Ignition ON.

Using a diagnostic scan tool, view the BCM Parameter Identifications (PIDs).

Using a diagnostic scan tool, monitor the BCM PID TIC-NONE_OOS.

Does the PID indicate On?

Yes	GO to O8

No	GO to O6

O6 RESYNCHRONIZE THE INOPERATIVE PASSIVE KEY

Ignition OFF.

Place the suspect key in the backup starting location. REFER to: Passive Anti-Theft System (PATS) - System Operation and Component Description .

Ignition ON.

Wait 10 seconds.

Ignition OFF.

Within 30 seconds, press any button on the suspect key.

Does the suspect key operate correctly now?

Yes	The system is OK. The concern was caused by a key out of synchronization.

No	GO to O7

O7 RESYNCHRONIZE THE INOPERATIVE KEY USING THE SECOND KEY

Press any button on the operational key.

Within 30 seconds, press any button on the suspect key.

Check the suspect key for correct operation.

Does the suspect key operate correctly now?

Yes	The system is OK. The concern was caused by a key out of synchronization.

No	GO to O10

O8 CHECK THE (RKE) REMOTE BATTERY LOW (RKE_BATT_LOW) PID (PARAMETER IDENTIFICATION)

Using a diagnostic scan tool, view the BCM Parameter Identifications (PIDs).

Using a diagnostic scan tool, monitor the BCM PID RKE_BATT_LOW.

Does the PID indicate Off?

Yes	GO to O10

No	GO to O9

NOTE: Do not clean off any grease from the battery terminals on the back surface of the circuit board.

O9 CHECK THE KEY BATTERIES

Remove the passive key batteries. Refer to the Owner Guide for battery removal instructions.

Verify the correct batteries are used (CR2025).

Remove both key batteries and measure the voltage.

Are the voltages greater than 2.5 volts?

Yes	GO to O10

No	REPLACE both key batteries (make sure the batteries are seated correctly). DO NOT reprogram the key (damaged or dead batteries do not erase keys from memory).

O10 PROGRAM THE SUSPECT KEY

Program the suspect key. REFER to: Anti-Theft Security Access .

Check the RKE functionality of the suspect key.

Does the RKE functionality operate?

Yes	The system is OK. The concern was caused by an unprogrammed key.

No	REPLACE the suspect key. PROGRAM the new key. REFER to: Anti-Theft Security Access .

O11 CHECK FOR COMMUNICATION WITH THE BCM (BODY CONTROL MODULE) AND THE RTM (RADIO TRANSCEIVER MODULE)

Ignition ON.

Using a diagnostic scan tool, perform a network test.

Does the BCM and the RTM pass the network test?

Yes	GO to O12

No	REFER to: MODULE COMMUNICATIONS NETWORK .

O12 CHECK FOR LOW VOLTAGE AND CHARGING SYSTEM-RELATED DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, retrieve the Continuous Memory Diagnostic Trouble Codes (CMDTCs) from all modules.

Are any low voltage or charging system-related Diagnostic Trouble Codes (DTCs) present?

Yes	DIAGNOSE the low voltage or charging system as necessary. Refer to the appropriate Battery and Charging System article for the procedure.

No	GO to O13

O13 CHECK FOR A NETWORK CONCERN

Using a diagnostic scan tool, retrieve the Continuous Memory Diagnostic Trouble Codes (CMDTCs) from all modules.

Are multiple lost communication Diagnostic Trouble Codes (DTCs) for multiple modules present in more than one module?

Yes	DIAGNOSE a network concern. REFER to: MODULE COMMUNICATIONS NETWORK .

No	GO to O14

O14 CHECK FOR RTM (RADIO TRANSCEIVER MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, perform a RTM module self-test.

Are any Diagnostic Trouble Codes (DTCs) present?

Yes	REFER to the DTC Chart: RTM .

No	GO to O15

O15 CHECK FOR BCM (BODY CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, perform a BCM module self-test.

Are any Diagnostic Trouble Codes (DTCs) present?

Yes	REFER to the DTC Chart: BCM .

No	GO to Pinpoint Test V

DIAGNOSIS AND TESTING > LOCKS, LATCHES AND ENTRY SYSTEMS > PINPOINT TESTS > PINPOINT TEST P : AN INDIVIDUAL BUTTON/FEATURE IS INOPERATIVE FROM THE RKE (REMOTE KEYLESS ENTRY) TRANSMITTER

Normal Operations and Fault Conditions

REFER to: Handles, Locks, Latches and Entry Systems - System Operation and Component Description .

Possible Cause

- Door lock system concern
- Luggage compartment lid latch release system concern
- Horn system concern
- Turn signal system concern
- Remote start system concern
- Key

Visual Inspection and Diagnostic Pre-checks

- Inspect the key for damage

DIAGNOSIS AND TESTING > LOCKS, LATCHES AND ENTRY SYSTEMS > PINPOINT TESTS > PINPOINT TEST P : AN INDIVIDUAL BUTTON/FEATURE IS INOPERATIVE FROM THE RKE (REMOTE KEYLESS ENTRY) TRANSMITTER > PINPOINT TEST P : AN INDIVIDUAL BUTTON/FEATURE IS INOPERATIVE FROM THE RKE (REMOTE KEYLESS ENTRY) TRANSMITTER

P1 VERIFY THE DOOR LOCK OPERATION

Press the lock and unlock button on the door lock control switch while observing the door lock operation.

Do the door locks operate?

Yes	GO to P2

No	GO to Pinpoint Test H

P2 VERIFY THE HORN OPERATION USING THE BCM (BODY CONTROL MODULE) PID (PARAMETER IDENTIFICATION) (HORN_RELAY)

Ignition ON.

Using a diagnostic scan tool, view the BCM Parameter Identifications (PIDs).

Select the BCM horn PID (HORN_RELAY) and active command the horn on then off.

Does the horn sound when commanded on?

Yes	GO to P3

No	REFER to: Horn .

P3 VERIFY THE HAZARD LAMP OPERATION

Activate the hazard lamp function.

Do the hazard lamps operate correctly?

Yes	GO to P4

No	REFER to: Turn Signal and Hazard Lamps .

P4 VERIFY THE LUGGAGE COMPARTMENT LID LATCH RELEASE OPERATION

Ignition OFF.

Unlock the doors using the door lock control switch.

Press the luggage compartment lid release switch.

Does the luggage compartment lid latch release?

Yes	GO to P5

No	GO to Pinpoint Test N

P5 CHECK THE LOCK AND UNLOCK BUTTONS

Press the lock and then unlock button on the suspect passive key.

Do the doors lock and unlock?

Yes	GO to P6

No	REPLACE the suspect key. PROGRAM the new key. REFER to: Anti-Theft Security Access .

P6 CHECK THE LUGGAGE COMPARTMENT LID RELEASE BUTTON

Press the luggage compartment lid release button twice on the suspect passive key.

Does the luggage compartment lid latch release?

Yes	GO to P7

No	REPLACE the suspect key. PROGRAM the new key. REFER to: Anti-Theft Security Access .

P7 VERIFY THE REMOTE START OPERATION

Close all the doors, the hood and the luggage compartment lid.

NOTE: Each button press must be done within 3 seconds of each other.

From outside the vehicle using a passive key:

Press the door lock button.

Press the remote start button twice.

Does the vehicle remotely start?

Yes	The RKE transmitter is operating correctly. INFORM the customer of the RKE transmitter operation.

No	REPLACE the suspect key. PROGRAM the new key. REFER to: Anti-Theft Security Access .

DIAGNOSIS AND TESTING > LOCKS, LATCHES AND ENTRY SYSTEMS > PINPOINT TESTS > PINPOINT TEST Q : THE RKE (REMOTE KEYLESS ENTRY) TRANSMITTER HAS POOR RANGE PERFORMANCE

Normal Operations and Fault Conditions

REFER to: Handles, Locks, Latches and Entry Systems - System Operation and Component Description .

Possible Cause

- Key
- Key batteries
- Aftermarket system

- Consumer electronic device
- High power devices
- TV/radio transmission towers
- RTM

Visual Inspection and Diagnostic Pre-checks

- Inspect the key for damage
- Inspect the key batteries
- Inspect for aftermarket RKE systems

DIAGNOSIS AND TESTING > LOCKS, LATCHES AND ENTRY SYSTEMS > PINPOINT TESTS > PINPOINT TEST Q : THE RKE (REMOTE KEYLESS ENTRY) TRANSMITTER HAS POOR RANGE PERFORMANCE > PINPOINT TEST Q : THE RKE (REMOTE KEYLESS ENTRY) TRANSMITTER HAS POOR RANGE PERFORMANCE

NOTE: At least 2 programmed keys must be present to begin diagnosis of the RKE system.

Q1 CHECK FOR THE CORRECT KEYS

Check that the correct keys are used with the vehicle.

Are the correct keys present?

Yes	GO to Q2

No	The system cannot be tested without the correct keys. INFORM the customer the correct keys must be present to proceed with diagnosis of the system.

NOTE: Make sure the vehicle is in an open area with no other large metal objects near, such as other vehicles or steel buildings.

Q2 CHECK ALL KEYS FOR POOR RANGE PERFORMANCE

Check all keys for normal range performance (approximately 50m (165 ft.).

Do all keys experience poor range?

Yes	GO to Q4

No	GO to Q3

NOTE: Do not clean off any grease from the battery terminals on the back surface of the circuit board.

Q3 CHECK THE KEY BATTERIES

Remove the passive key batteries. Refer to the Owner Guide for battery removal instructions.

Verify the correct batteries are used (CR2025).

Measure the key batteries voltage.

Are the voltages greater than 2.5 volts?

Yes	REPLACE the suspect key. PROGRAM the new key. REFER to: Anti-Theft Security Access .

No	REPLACE both key batteries (make sure the batteries are seated correctly). DO NOT reprogram the key (weak or dead batteries do not erase keys from memory).

Q4 CHECK THE LOCATION OF THE VEHICLE AND THE APPROACH ANGLES AROUND THE VEHICLE

Make sure the poor performance is consistent in nature and is not from one approaching angle.

The RKE transmitter range performance may be degraded in certain locations. For example, if the vehicle or RKE transmitter is within range of high-power devices, radio/TV towers, 2-way radios, cell phone charger or other radio communication device, the operating distance of the keys may be reduced.

Is the poor range performance consistent around the vehicle?

Yes	INSTALL a new RTM. REFER to: Radio Transceiver Module (RTM) .

No	The system is operating correctly at this time. The range may have been affected by environmental interference such as high-power devices or other radio communication device.

DIAGNOSIS AND TESTING > LOCKS, LATCHES AND ENTRY SYSTEMS > PINPOINT TESTS > PINPOINT TEST R : THE REMOTE START FEATURE IS INOPERATIVE

Refer to Power Distribution for schematic and connector information.

Normal Operations and Fault Conditions

REFER to: Handles, Locks, Latches and Entry Systems - System Operation and Component Description .

Possible Cause

- Wiring, terminals or connectors
- Remote start feature not enabled

- Passive key
- Hood ajar switch input concern
- Door ajar switch input concern
- TR input concern
- Powertrain concern
- BCM

Visual Inspection and Diagnostic Pre-checks

- Inspect the passive key for damage

DIAGNOSIS AND TESTING > LOCKS, LATCHES AND ENTRY SYSTEMS > PINPOINT TESTS > PINPOINT TEST R : THE REMOTE START FEATURE IS INOPERATIVE > PINPOINT TEST R : THE REMOTE START FEATURE IS INOPERATIVE

NOTE: This pinpoint test does not diagnose dealer installed remote start systems.

R1 CHECK THE REMOTE START FEATURE ENABLE/DISABLE SETTING

Ignition ON.

Using the steering wheel control switch, check the remote start feature setting in the message center.

Is the remote start feature enabled?

Yes	GO to R2

No	ENABLE the remote start feature.

R2 CHECK THE PARK DETECT SWITCH INPUT

Ignition ON.

Verify the PRNDL displays correctly in the IPC. When the vehicle is in PARK, the P should be highlighted or displayed prominently.

Does the PRNDL display correctly?

Yes	GO to R3

No	DIAGNOSE the PRNDL display. REFER to: Instrumentation, Message Center and Warning Chimes .

R3 CHECK FOR POWERTRAIN DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, perform the PCM KOEO and KOER self-tests.

Are any PCM Diagnostic Trouble Codes (DTCs) present?

Yes	REFER to the DTC Chart: PCM .

No	GO to R4

R4 CHECK FOR BCM (BODY CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, perform the BCM self-test.

Are any BCM Diagnostic Trouble Codes (DTCs) present?

Yes	REFER to the DTC Chart: BCM .

No	GO to R5

R5 CHECK THE RKE (REMOTE KEYLESS ENTRY) FUNCTIONALITY

Ignition OFF.

Using the RKE function of the passive key, press the luggage compartment lid release button twice, the lock button and then the unlock button.

Do all the functions tested of the RKE transmitter operate (lock, unlock and luggage compartment lid latch release)?

Yes	GO to R6

No	If all of the functions are inoperative, GO to Pinpoint Test O If an individual function is inoperative, GO to Pinpoint Test P

R6 CHECK THE WAKE-UP CIRCUIT FOR VOLTAGE AT THE PCM (POWERTRAIN CONTROL MODULE) USING THE BCM (BODY CONTROL MODULE) PID (PARAMETER IDENTIFICATION) (PCM) WAKE-UP OUTPUT CONTROL (PCM_WKUP_CTRL)

Disconnect PCM B connector.

Ignition ON.

Using a diagnostic scan tool, command the BCM PID PCM_WKUP_CTRL on.

Measure:

2.3L GTDI

Positive Lead	Measurement / Action	Negative Lead
C1551B-28		Ground

3.7L Duratec

Positive Lead	Measurement / Action	Negative Lead
C1381B-65		Ground

5.0L TIVCT

Positive Lead	Measurement / Action	Negative Lead
C175B-65		Ground

Is the voltage greater than 11 volts?

Yes	GO to R8

No	GO to R7

R7 CHECK THE WAKE-UP CIRCUIT FOR AN OPEN

Ignition OFF.

Disconnect BCM C2280F .

Measure:

2.3L GTDI

Positive Lead	Measurement / Action	Negative Lead
C1551B-28	Ω	C2280F-18

3.7L Duratec

Positive Lead	Measurement / Action	Negative Lead
C1381B-65	Ω	C2280F-18

5.0L TIVCT

Positive Lead	Measurement / Action	Negative Lead
C175B-65	Ω	C2280F-18

Is the resistance less than 3 ohms?

Yes	GO to R9

No	REPAIR the circuit.

R8 VERIFY THE REMOTE START FUNCTION IS INOPERATIVE

Ignition OFF.

Connect PCM B connector.

Close all the doors, the hood and the liftgate.

NOTE: Each button press must be done within three seconds of each other.

Using the key:

Press the door lock button.

Press the remote start button twice.

Does the vehicle remotely start?

Yes	The system is operating correctly. INFORM the customer of the correct vehicle remote start operation.

No	REPLACE the passive key in question. PROGRAM the new passive key. REFER to: Anti-Theft Security Access .

R9 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all the BCM connectors.

Repair:

corrosion (install new connectors or terminals - clean module pins)

damaged or bent pins - install new terminals pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors and make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by

	module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > LOCKS, LATCHES AND ENTRY SYSTEMS > PINPOINT TESTS > PINPOINT TEST S : A DOOR PASSIVE ENTRY FEATURE IS INOPERATIVE

Refer to Remote Keyless Entry and Alarm for schematic and connector information.

Normal Operations and Fault Conditions

REFER to: Handles, Locks, Latches and Entry Systems - System Operation and Component Description .

BCM DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B11C6:01	Passenger Door External Antenna: General Electrical Failure	Sets when the BCM detects a fault from one of the circuits to the passenger side keyless entry antenna (internal to the front passenger exterior door handle).
B11CA:01	Driver Door External Antenna: General Electrical Failure	Sets when the BCM detects a fault from one of the circuits to the driver side keyless entry antenna (internal to the front driver exterior door handle).
B1381:11	Left Front Door Handle Proximity Sensor: Circuit Short To Ground	Sets when the BCM detects a fault from one of the circuits to the left front exterior door handle.
B1381:15	Left Front Door Handle Proximity Sensor: Circuit Short To Battery or Open	Sets when the BCM detects a fault from one of the circuits to the left front exterior door handle.
B1381:29	Left Front Door Handle Proximity Sensor: Signal Invalid	Set when the BCM detects an activated touch sensor for more than 5 minutes.
B1382:11	Right Front Door Handle Proximity Sensor: Circuit Short To Ground	Sets when the BCM detects a fault from one of the circuits to the right exterior door handle.
B1382:15	Right Front Door Handle Proximity Sensor: Circuit Short To Battery or Open	Sets when the BCM detects a fault from one of the circuits to the right exterior door handle.
B1382:29	Right Front Door Handle Proximity Sensor: Signal Invalid	Set when the BCM detects an activated touch sensor for more than 5 minutes.

Possible Cause

- Wiring, terminals or connectors

- Door lock system concern
- RKE system concern
- Exterior door handle
- BCM

Visual Inspection and Diagnostic Pre-checks

- Inspect the exterior door handles for damage

DIAGNOSIS AND TESTING > LOCKS, LATCHES AND ENTRY SYSTEMS > PINPOINT TESTS > PINPOINT TEST S : A DOOR PASSIVE ENTRY FEATURE IS INOPERATIVE > PINPOINT TEST S : A DOOR PASSIVE ENTRY FEATURE IS INOPERATIVE

S1 CHECK THE DOOR LOCK OPERATION

Lock and unlock the doors using a door lock control switch.

Do the doors lock and unlock?

Yes	GO to S2

No	GO to Pinpoint Test H

S2 CHECK THE RKE (REMOTE KEYLESS ENTRY) OPERATION

Press the lock and unlock buttons on a key.

Do the doors lock and unlock?

Yes	GO to S3

No	GO to Pinpoint Test O

S3 CHECK THE PASSIVE ENTRY OPERATION FROM ALL DOORS

Operate the passive entry feature from the left door.

Operate the passive entry feature from the right door.

Is the passive entry feature inoperative from all the doors?

Yes	GO to S4

No	GO to S7

S4 CHECK THE EXTERIOR DOOR HANDLE GROUND CIRCUIT FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect BCM C2280D .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2280D-20		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to S5

S5 CHECK THE EXTERIOR DOOR HANDLE GROUND CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2280D-20	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to S6

No	REPAIR the circuit.

S6 CHECK THE EXTERIOR DOOR HANDLE GROUND CIRCUIT FOR AN OPEN (ALL DOORS PASSIVE ENTRY INOPERATIVE)

Disconnect Left Front Exterior Door Handle C543 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C543-4	Ω	C2280D-20

Is the resistance less than 3 ohms?

Yes	GO to S16

No	REPAIR the circuit.

S7 CHECK FOR VOLTAGE TO THE EXTERIOR DOOR HANDLE

Ignition OFF.

Disconnect suspect exterior door handle.

Measure:

Left Front

Positive Lead	Measurement / Action	Negative Lead
C543-1		Ground

Right Front

Positive Lead	Measurement / Action	Negative Lead
C634-1		Ground

Is the voltage greater than 11 volts?

Yes	GO to S10

No	GO to S8

S8 CHECK THE EXTERIOR DOOR HANDLE VOLTAGE SUPPLY CIRCUIT FOR A SHORT TO GROUND

Disconnect BCM C2280D .

Measure:

Left Front

Positive Lead	Measurement / Action	Negative Lead
C543-1	Ω	Ground

Right Front

Positive Lead	Measurement / Action	Negative Lead
C634-1	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to S9

No	REPAIR the circuit.

S9 CHECK THE EXTERIOR DOOR HANDLE VOLTAGE SUPPLY CIRCUIT FOR AN OPEN

Measure:

Left Front

Positive Lead	Measurement / Action	Negative Lead
C543-1	Ω	C2280D-21

Right Front

Positive Lead	Measurement / Action	Negative Lead
C634-1	Ω	C2280D-5

Is the resistance less than 3 ohms?

Yes	GO to S16

No	REPAIR the circuit.

S10 CHECK THE EXTERIOR DOOR HANDLE GROUND CIRCUIT FOR AN OPEN

Disconnect BCM C2280D .

Measure:

Left Front

Positive Lead	Measurement / Action	Negative Lead
C543-4	Ω	C2280D-20

Right Front

Positive Lead	Measurement / Action	Negative Lead
C634-4	Ω	C2280D-20

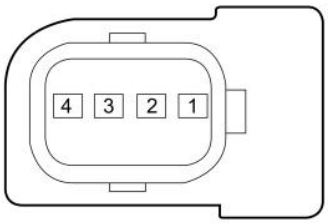
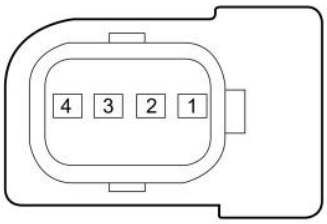
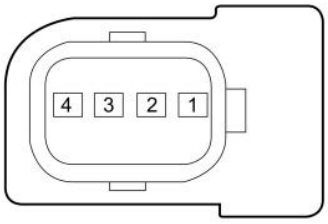
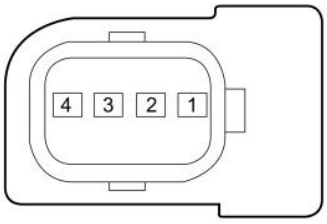
Is the resistance less than 3 ohms?

Yes	GO to S11

No	REPAIR the circuit.

S11 CHECK THE EXTERIOR DOOR HANDLE INTERNAL ANTENNA

Measure:

Positive Lead	Measurement / Action	Negative Lead
 E158730 C543, pin 2, component side	Ω	 E158730 C543, pin 3, component side
 E158730 C634, pin 2, component side	Ω	 E158730 C634, pin 3, component side

Is the resistance between 1 and 3 ohms?

Yes	GO to S12

No	INSTALL a new front exterior handle. REFER to: Exterior Front Door Handle .

S12 CHECK THE EXTERIOR DOOR HANDLE

Remove the opposite side exterior door handle. REFER to: Exterior Front Door Handle .

Transfer the exterior door handle from the opposite side of the vehicle to the suspect exterior door. For example, if the left front exterior door handle is suspect, transfer the right front exterior door handle to the left front door.

Connect BCM C2280D .

Operate the keyless entry feature from the suspect door.

Does the keyless entry feature operate from the suspect door?

Yes	INSTALL a new exterior handle. REFER to: Exterior Front Door Handle .

No	GO to S13

S13 CHECK THE EXTERIOR DOOR HANDLE ANTENNA CIRCUITS FOR A SHORT TO VOLTAGE

Disconnect BCM C2280D .

Ignition ON.

Measure:

Left Front

Positive Lead	Measurement / Action	Negative Lead
C543-2	V	Ground
C543-3	V	Ground

Right Front

Positive Lead	Measurement / Action	Negative Lead
C634-2	V	Ground
C634-3	V	Ground

Is any voltage present?

Yes	REPAIR the circuit in question.

No	GO to S14

S14 CHECK THE EXTERIOR DOOR HANDLE ANTENNA CIRCUITS FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Left Front

Positive Lead	Measurement / Action	Negative Lead
C543-2	Ω	Ground
C543-3	Ω	Ground

Right Front

Positive Lead	Measurement / Action	Negative Lead
C634-2	Ω	Ground
C634-3	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to S15

No	REPAIR the circuit in question.

S15 CHECK THE EXTERIOR DOOR HANDLE ANTENNA CIRCUITS FOR AN OPEN

Measure:

Left Front

Positive Lead	Measurement / Action	Negative Lead
C543-2	Ω	C2280D-13
C543-3	Ω	C2280D-28

Right Front

Positive Lead	Measurement / Action	Negative Lead
C634-2	Ω	C2280D-12
C634-3	Ω	C2280D-29

Are the resistances less than 3 ohms?

Yes	GO to S16

No	REPAIR the circuit in question.

S16 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all the BCM connectors.

Repair:

corrosion (install new connectors or terminals - clean module pins)

damaged or bent pins - install new terminals pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors and make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > LOCKS, LATCHES AND ENTRY SYSTEMS > PINPOINT TESTS > PINPOINT TEST T : THE LUGGAGE COMPARTMENT LID PASSIVE ENTRY FEATURE IS INOPERATIVE

The Luggage Compartment Lid Passive Entry Feature Is Inoperative

Refer to Remote Keyless Entry and Alarm for schematic and connector information.

Normal Operations and Fault Conditions

REFER to: Handles, Locks, Latches and Entry Systems - System Operation and Component Description .

BCM DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B10C7:01	Interior Trunk Antenna: General Electrical Failure	Sets when the BCM detects a fault from the keyless entry rear antenna input.

Possible Cause

- Wiring, terminals or connectors
- Keyless entry rear antenna
- BCM

DIAGNOSIS AND TESTING > LOCKS, LATCHES AND ENTRY SYSTEMS > PINPOINT TESTS > PINPOINT TEST T : THE LUGGAGE COMPARTMENT LID PASSIVE ENTRY FEATURE IS INOPERATIVE > PINPOINT TEST T : THE LUGGAGE COMPARTMENT LID PASSIVE ENTRY FEATURE IS INOPERATIVE

T1 CHECK THE LUGGAGE COMPARTMENT LID RELEASE SWITCH INPUT

Close the luggage compartment lid.

Ignition ON.

Unlock the doors using the door lock control switch.

Press the luggage compartment lid release button.

Does the luggage compartment lid latch release?

Yes	GO to T2

No	GO to Pinpoint Test N

T2 CHECK THE RKE (REMOTE KEYLESS ENTRY) OPERATION

Ignition OFF.

Close the luggage compartment lid.

Press the luggage compartment lid release button twice on a valid programmed key.

Does the luggage compartment lid latch release?

Yes	GO to T3

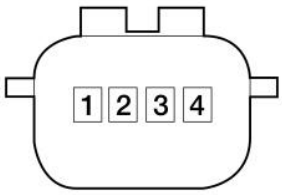
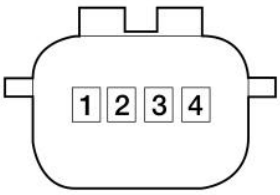
No	GO to Pinpoint Test O

T3 CHECK THE KEYLESS ENTRY REAR ANTENNA

Ignition OFF.

Disconnect Keyless Entry Rear Antenna C4378 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
 E157911 C4378, pin 1, component side	Ω	 E157911 C4378, pin 2, component side

Is the resistance between 1 and 3 ohms?

Yes	GO to T4

No	INSTALL a new keyless entry rear antenna. REFER to: Keyless Entry Rear Antenna .

T4 CHECK THE KEYLESS ENTRY REAR ANTENNA CIRCUITS FOR A SHORT TO VOLTAGE

Disconnect BCM C2280D .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4378-1		Ground
C4378-2		Ground

Is any voltage present?

Yes	REPAIR the circuit in question.

No	GO to T5

T5 CHECK THE KEYLESS ENTRY REAR ANTENNA CIRCUITS FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4378-1	Ω	Ground
C4378-2	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to T6

No	REPAIR the circuit in question.

T6 CHECK THE KEYLESS ENTRY REAR ANTENNA CIRCUITS FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4378-1	Ω	C2280E-16
C4378-2	Ω	C2280E-15

Are the resistances less than 3 ohms?

Yes	GO to T7

No	REPAIR the circuit in question.

T7 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all the BCM connectors.

Repair:

corrosion (install new connectors or terminals - clean module pins)

damaged or bent pins - install new terminals pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors and make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > LOCKS, LATCHES AND ENTRY SYSTEMS > PINPOINT TESTS > PINPOINT TEST U : U0146:00

Normal Operations and Fault Conditions

The RTM communicates with the GWM over the CAN. If the RTM does not receive messages from the GWM, features such as the keyless entry can be inoperative.

RTM DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0146:00	Lost Communication With Gateway "A": No Sub Type Information	Sets when the RTM detects data messages are missing from the GWM over the CAN.

Possible Cause

- Network communication concern
- RTM
- GWM

DIAGNOSIS AND TESTING > LOCKS, LATCHES AND ENTRY SYSTEMS > PINPOINT TESTS > PINPOINT TEST U : U0146:00 > PINPOINT TEST U : U0146:00

U1 VERIFY THE CUSTOMER CONCERN

Ignition ON.

Verify there is an observable symptom present.

Is an observable symptom present?

Yes	GO to U2

No	The system is operating normally at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

U2 CHECK THE COMMUNICATION NETWORK

Using a diagnostic scan tool, perform a network test.

Does the GWM pass the network test?

Yes	GO to U3

No	REFER to: MODULE COMMUNICATIONS NETWORK .

U3 CHECK FOR CHARGING SYSTEM RELATED DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, retrieve all Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Are any battery voltage or charging system related Diagnostic Trouble Codes (DTCs) retrieved?

Yes	DIAGNOSE the charging system. Refer to the appropriate Battery and Charging System article.

No	GO to U4

NOTE: If new modules were installed prior to the DTC being set, the module configuration may be incorrectly set during PMI or the PMI may not have been performed.

U4 RECHECK THE RTM (RADIO TRANSCEIVER MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs) and repeat the RTM self-test.

Is DTC U0146:00 still present?

Yes	GO to U5

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

U5 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0146 SET IN OTHER MODULES

Using a diagnostic scan tool, clear all Diagnostic Trouble Codes (DTCs).

Ignition OFF.

Ignition ON.

Wait 30 seconds.

Using a diagnostic scan tool, retrieve the Continuous Memory Diagnostic Trouble Codes (CMDTCs) from all modules.

Is DTC U0146 set in other modules?

Yes	INSTALL a new GWM. REFER to: Gateway Module A (GWM) .

No	INSTALL a new RTM. REFER to: Radio Transceiver Module (RTM) .

DIAGNOSIS AND TESTING > LOCKS, LATCHES AND ENTRY SYSTEMS > PINPOINT TESTS > PINPOINT TEST V : U0258:87 OR U1A00:00

Refer to Remote Keyless Entry and Alarm for schematic and connector information.

Normal Operation and Fault Conditions

The RTM communicates with the BCM over a LIN circuit and, when the network is awake, over the CAN.

RTM DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U1A00:00	Private Communication Network: No Sub Type Information	Sets when the RTM detects a fault with the LIN circuit to the BCM.

BCM DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0258:87	Lost Communication With Radio Transceiver: Missing Message	Sets when the BCM detects a communication fault with the RTM over the LIN circuit.

Possible Cause

- Wiring, terminals or connectors
- RTM
- BCM

DIAGNOSIS AND TESTING > LOCKS, LATCHES AND ENTRY SYSTEMS > PINPOINT TESTS > PINPOINT TEST V : U0258:87 OR U1A00:00 > PINPOINT TEST V : U0258:87 OR U1A00:00

V1 CHECK IF THE RTM (RADIO TRANSCEIVER MODULE) AND THE BCM (BODY CONTROL MODULE) PASS THE NETWORK TEST

Ignition ON.

Using a diagnostic tool, perform the network test.

Does the RTM and the BCM pass the network test?

Yes	GO to V2

No	REFER to: MODULE COMMUNICATIONS NETWORK .

V2 CHECK THE LIN (LOCAL INTERCONNECT NETWORK) CIRCUIT FOR A SHORT TO VOLTAGE

Disconnect RTM C4458 .

Disconnect BCM C2280B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4458-2		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to V3

V3 CHECK THE LIN (LOCAL INTERCONNECT NETWORK) CIRCUIT FOR A SHORT TO GROUND

Connect BCM C2280B .

Ignition OFF.

Disconnect BCM C2280B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4458-2	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to V4

No	REPAIR the circuit.

V4 CHECK THE LIN (LOCAL INTERCONNECT NETWORK) CIRCUIT FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4458-2	Ω	C2280B-26

Is the resistance less than 3 ohms?

Yes	GO to V5

No	REPAIR the circuit.

V5 CHECK FOR CORRECT RTM (RADIO TRANSCEIVER MODULE) OPERATION

Disconnect and inspect the RTM connector.

Repair:

corrosion (install new connectors or terminals - clean module pins)

damaged or bent pins - install new terminals pins

pushed-out pins - install new pins as necessary

Reconnect the RTM connector and make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new RTM.REFER to: Radio Transceiver Module (RTM) . TEST the system for normal operation. If the concern is still present, GO to V6

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

V6 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all the BCM connectors.

Repair:

corrosion (install new connectors or terminals - clean module pins)

damaged or bent pins - install new terminals pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors and make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > LOCKS, LATCHES AND ENTRY SYSTEMS > PINPOINT TESTS > PINPOINT TEST W : U0140:00

Normal Operation and Fault Conditions

The DDM/ PDM communicates with the BCM over the CAN. If the DDM/ PDM does not receive messages from the BCM, features such as the puddle lamps, exterior mirror turn signal and door switch illumination can be inoperative.

DDM/ PDM DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0140:00	Lost Communication With Body Control Module: No Sub-Type Information	Sets when the DDM/ PDM detects data messages are missing from the BCM.

Possible Cause

- Network communication concern
- DDM/ PDM
- BCM

DIAGNOSIS AND TESTING > LOCKS, LATCHES AND ENTRY SYSTEMS > PINPOINT TESTS > PINPOINT TEST W : U0140:00 > PINPOINT TEST W : U0140:00

W1 VERIFY THE CUSTOMER CONCERN

Ignition ON.

Verify there is an observable symptom present.

Is an observable symptom present?

Yes	GO to W2

No	The system is operating normally at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

W2 CHECK THE COMMUNICATION NETWORK

Using a diagnostic scan tool, perform a network test.

Does the BCM pass the network test?

Yes	GO to W3

No	REFER to: MODULE COMMUNICATIONS NETWORK .

W3 CHECK FOR BCM (BODY CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, perform the BCM self-test.

Are any voltage related Diagnostic Trouble Codes (DTCs) present?

Yes	REFER to: Body Control Module (BCM) .

No	GO to W4

NOTE: If new modules were installed prior to the DTC being set, the module configuration may be incorrectly set during PMI or the PMI may not have been performed.

W4 RECHECK THE DDM (DRIVER DOOR MODULE) OR PDM (PASSENGER DOOR MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs) and repeat the DDM/ PDM self-test.

Is DTC U0140:00 still present?

Yes	GO to W5

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

W5 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0140 SET IN OTHER MODULES

Using a diagnostic scan tool, clear all Diagnostic Trouble Codes (DTCs).

Ignition OFF.

Ignition ON.

Wait 30 seconds.

Using a diagnostic scan tool, retrieve the Continuous Memory Diagnostic Trouble Codes (CMDTCs) from all modules.

Is DTC U0140 set in other modules?

Yes	

No	INSTALL a new DDM or PDM. REFER to: Driver Door Module (DDM) . REFER to: Passenger Door Module (PDM) .

DIAGNOSIS AND TESTING > LOCKS, LATCHES AND ENTRY SYSTEMS > PINPOINT TESTS > PINPOINT TEST X : U0208:00

Normal Operation and Fault Conditions

The DDM/ PDM communicate with the DSM over the CAN. If the DDM/ PDM does not receive messages from the DSM, features such as the memory mirror position can be inoperative.

DDM/ PDM DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0208:00	Lost Communication With "Seat Control Module A": No Sub-Type Information	Sets when the DDM/ PDM detects data messages are missing from the DSM.

Possible Cause

- Network communication concern
- DDM/ PDM
- DSM

DIAGNOSIS AND TESTING > LOCKS, LATCHES AND ENTRY SYSTEMS > PINPOINT TESTS > PINPOINT TEST X : U0208:00 > PINPOINT TEST X : U0208:00

X1 VERIFY THE CUSTOMER CONCERN

Ignition ON.

Verify there is an observable symptom present.

Is an observable symptom present?

Yes	GO to X2

No	The system is operating normally at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

X2 CHECK THE COMMUNICATION NETWORK

Using a diagnostic scan tool, perform a network test.

Does the DSM pass the network test?

Yes	GO to X3

No	REFER to: MODULE COMMUNICATIONS NETWORK .

X3 CHECK FOR DSM (DRIVER FRONT SEAT MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, perform the DSM self-test.

Are any voltage related Diagnostic Trouble Codes (DTCs) present?

Yes	REFER to: FRONT SEATS .

No	GO to X4

NOTE: If new modules were installed prior to the DTC being set, the module configuration may be incorrectly set during PMI or the PMI may not have been performed.

X4 RECHECK THE DDM (DRIVER DOOR MODULE) OR PDM (PASSENGER DOOR MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs) and repeat the DDM/ PDM self-test.

Is DTC U0208:00 still present?

Yes	GO to X5

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

X5 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0208 SET IN OTHER MODULES

Using a diagnostic scan tool, clear all Diagnostic Trouble Codes (DTCs).

Ignition OFF.

Ignition ON.

Wait 30 seconds.

Using a diagnostic scan tool, retrieve the Continuous Memory Diagnostic Trouble Codes (CMDTCs) from all modules.

Is DTC U0208 set in other modules?

Yes	INSTALL a new DSM. REFER to: Driver Front Seat Module (DSM) .

No	INSTALL a new DDM or PDM. REFER to: Driver Door Module (DDM) . REFER to: Passenger Door Module (PDM) .

DIAGNOSIS AND TESTING > LOCKS, LATCHES AND ENTRY SYSTEMS > PINPOINT TESTS > PINPOINT TEST Y : P1594 OR P1595

Normal Operation and Fault Conditions

When the BCM receives a request to remote start the vehicle, it first checks to make sure conditions exist to allow it to start (for example, the hood and doors closed, vehicle in PARK, no powertrain concerns). If the required conditions are correct, the BCM starts the vehicle and allows it to run for a predetermined amount of time, determined by the setting selected from the message center.

PCM DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
P1594	Forced Engine Shutdown - Remote Start System Fault, No Unattended Vehicle Timeout	Sets when the PCM detects the remote start has been active for more than 30 minutes continuously.
P1595	Forced Engine Shutdown - Remote Start System Fault, Transmission Range Not In Park Position	Sets when the PCM detects the remote start is active with the transmission not in PARK.

Possible Cause

- Network communication concern
- Powertrain concern
- BCM

DIAGNOSIS AND TESTING > LOCKS, LATCHES AND ENTRY SYSTEMS > PINPOINT TESTS > PINPOINT TEST Y : P1594 OR P1595 > PINPOINT TEST Y : P1594 OR P1595

Y1 CHECK FOR OTHER PCM (POWERTRAIN CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Review the results from the PCM self-test.

Are any other PCM Diagnostic Trouble Codes (DTCs) present?

Yes	DIAGNOSE all other PCM Diagnostic Trouble Codes (DTCs) first. Refer to the appropriate Engine article for the procedure.

No	GO to Y2

Y2 CHECK FOR BCM (BODY CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition ON.

Using a diagnostic scan tool, perform the BCM self-test.

Are any BCM Diagnostic Trouble Codes (DTCs) present?

Yes	REFER to the DTC Chart: BCM .

No	GO to Y3

Y3 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all the BCM connectors.

Repair:

corrosion (install new connectors or terminals - clean module pins)

damaged or bent pins - install new terminals pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors and make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

GENERAL PROCEDURES > DOOR LATCH LUBRICATION

Special Tool(s) / General Equipment

Flat-Bladed Screwdriver

Materials

Name	Specification
Motorcraft® Multi-Purpose Grease SprayXL-5-A	ESB-M1C93-B

Activation

NOTE: Typical left front door shown in illustration, others similar.

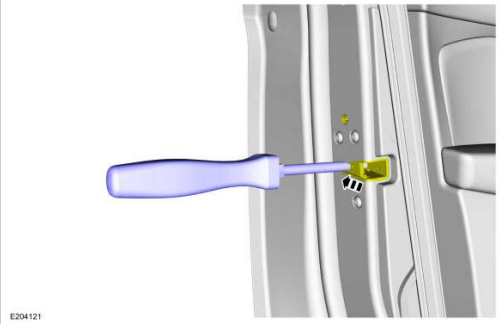
1.

Open the door.



2.

Using a flat blade screwdriver, fully close the latch (2 clicks). Use the General Equipment: Flat-Bladed Screwdriver

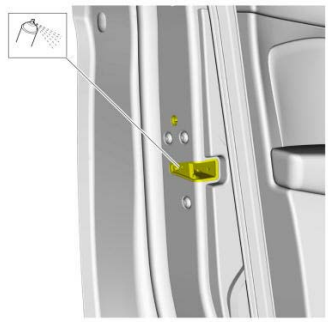


NOTE: Do not over-lubricate the latch. Using excessive grease may damage the internal lock motor.

3.
Spray the multi-purpose grease into the opening on the door latch for approximately 5 seconds.

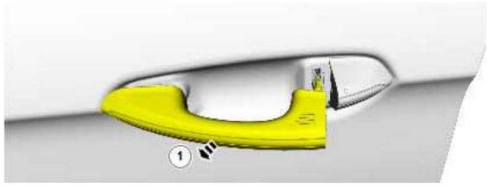
Material

: Motorcraft® Multi-Purpose Grease Spray / XL-5-A (ESB-M1C93-B)



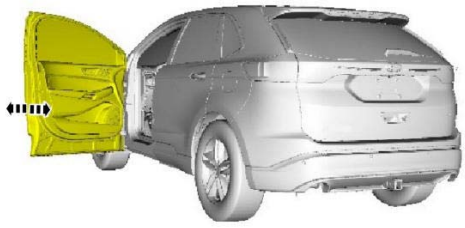
4.

Open the latch using the exterior door handle.



5.

Open and close the door several times to circulate the lubricant inside the latch.



6.

Open the door.



7.

Wipe off any excess grease.



GENERAL PROCEDURES > STAGED UNLOCK PROGRAMMING

Programming

1.

> *WARNING: Before beginning any service procedure in this service information, refer to Safety Warnings in GENERAL INFORMATION . Failure to follow this instruction may result in serious personal injury.*

Refer to: Health and Safety Precautions .

2.

With the ignition in OFF, press the lock and unlock buttons on the RKE transmitter simultaneously for 4 seconds.

3.

The turn signals flash twice to indicate the mode change.

4.

Repeat Step 2 to enable/disable the staged unlocking feature.

REMOVAL AND INSTALLATION > LUGGAGE COMPARTMENT LID LOCK CYLINDER - CONVERTIBLE > REMOVAL

1.

Remove the rear seat backrest. Refer to: Rear Seat Backrest - Convertible .

2.

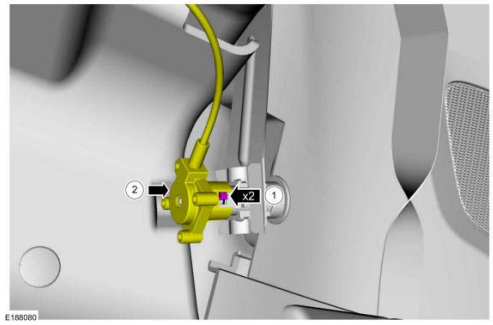
Detach the luggage compartment lid latch cable.

1.

Release the luggage compartment lid lock cylinder retaining tabs.

2.

Detach the luggage compartment lid latch cable.



3.

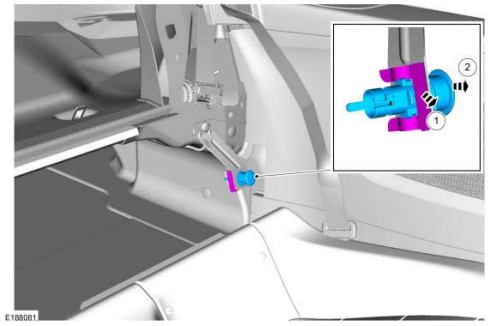
Remove the luggage compartment lid lock cylinder.

1.

Remove the luggage compartment lid lock cylinder retaining clip.

2.

Remove the luggage compartment lid lock cylinder.



REMOVAL AND INSTALLATION > LUGGAGE COMPARTMENT LID LOCK CYLINDER - CONVERTIBLE > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > LUGGAGE COMPARTMENT LID RELEASE SWITCH > REMOVAL

1.

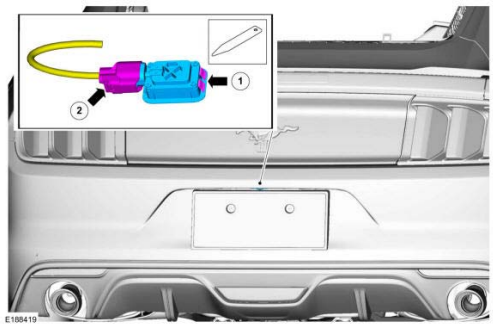
Remove the luggage compartment lid release switch.

1.

Release the luggage compartment lid release switch from the bumper cover.

2.

Disconnect the electrical connector and remove the luggage compartment lid release switch.



REMOVAL AND INSTALLATION > LUGGAGE COMPARTMENT LID RELEASE SWITCH > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > DOOR LOCK CONTROL SWITCH > REMOVAL

NOTE: LHD shown in illustration, RHD similar.

NOTE: LH side shown in illustration, RH side similar.

1.

Remove the front door trim panel. Refer to: Front Door Trim Panel .

2.

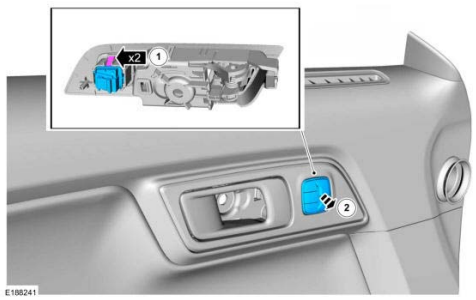
Remove the door lock control switch.

1.

Release the retaining clips.

2.

Remove the door lock control switch.



REMOVAL AND INSTALLATION > DOOR LOCK CONTROL SWITCH > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > DOOR LOCK CYLINDER > REMOVAL

NOTE: LHD shown in illustration, RHD similar.

NOTE: Removal steps in this procedure may contain installation details.

1.

Remove the grommet.



2.

Remove the lock cylinder door handle cover.

1.

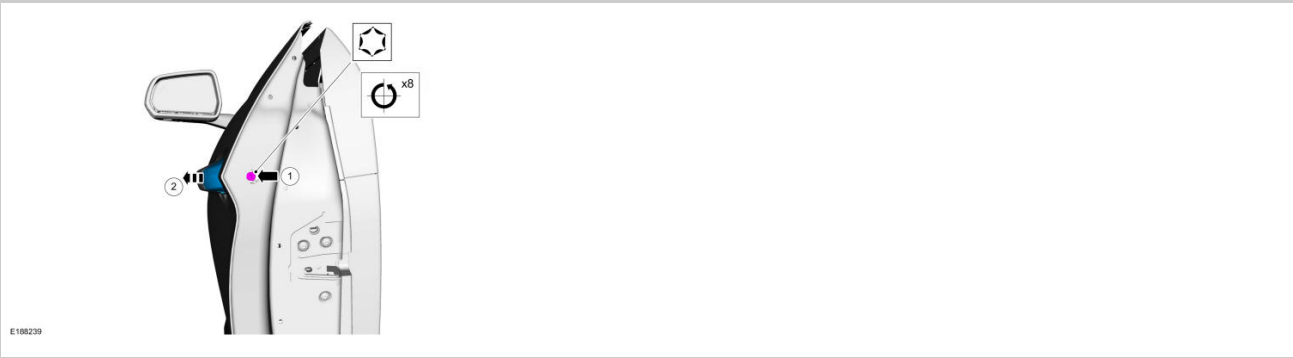
Turn the release screw 8 turns. The handle will release around 6 to 6.5 turns. You must continue to the full 8 revolutions for installation.

Torque

: 62 lb.in (7 Nm)

2.

Remove the lock cylinder and the door handle cover assembly from the front door.



3.

Remove the door lock cylinder.



REMOVAL AND INSTALLATION > DOOR LOCK CYLINDER > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > EXTERIOR FRONT DOOR HANDLE > REMOVAL

NOTE: LHD shown in illustration, RHD similar.

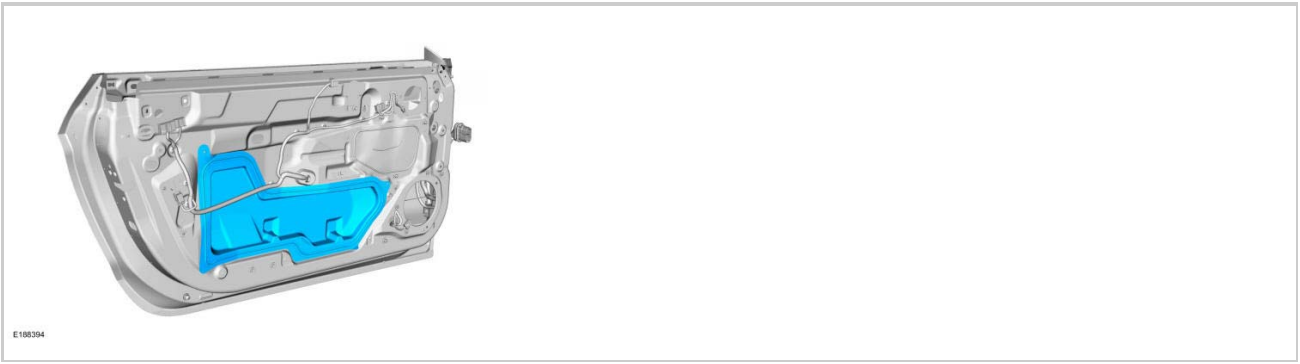
NOTE: LH side shown in illustration, RH side similar.

1.

Remove the front door trim panel. Refer to: Front Door Trim Panel .

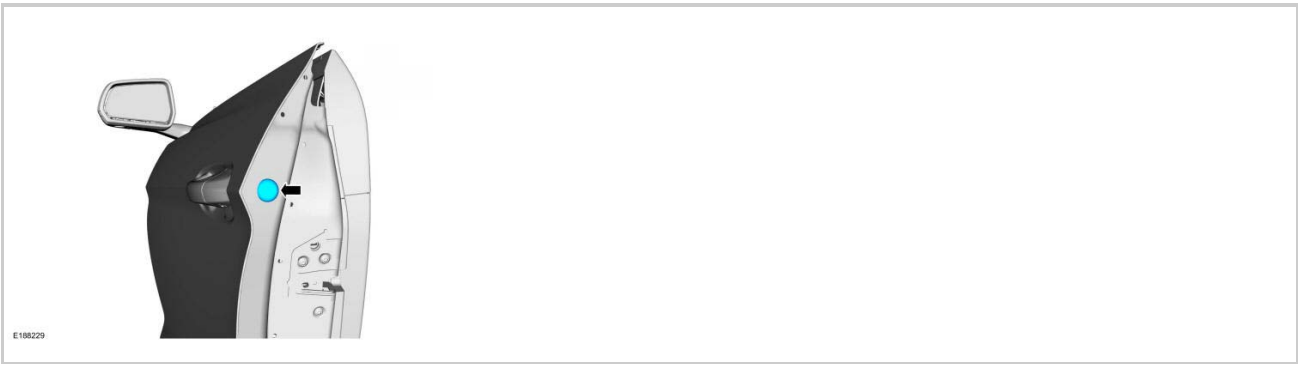
2.

Remove the front door lower watershield.



3.

Remove the grommet.



4.

Remove the lock cylinder door handle cover.

1.

Hold the front door handle open.

2.

Turn the release screw 8 turns. The handle will release around 6 to 6.5 turns. You must continue to the full 8 revolutions for installation.

3.

Remove the lock cylinder and door handle cover assembly from front door.



NOTE: Do not pull the door handle out of the door too far without disconnecting the handle from the connector. Damage to the harness will occur.

5.
Disconnect the exterior front door handle connector from the handle from inside the door and remove the exterior front door handle.



REMOVAL AND INSTALLATION > EXTERIOR FRONT DOOR HANDLE > INSTALLATION

1.

Connect the exterior front door handle connector to the handle from inside the door and partially install the front door handle in the front door opening.



2.

Install the lock cylinder door handle cover.

1.

Install the lock cylinder and door handle cover assembly to the front door.

2.

Release the front door handle.

3.

Apply light pressure to the front door handle while turning the release screw 8 turns. The handle will engage and go in around 6 to 6.5 turns. You must continue to the full 8 revolutions for installation then torque to the specified value.

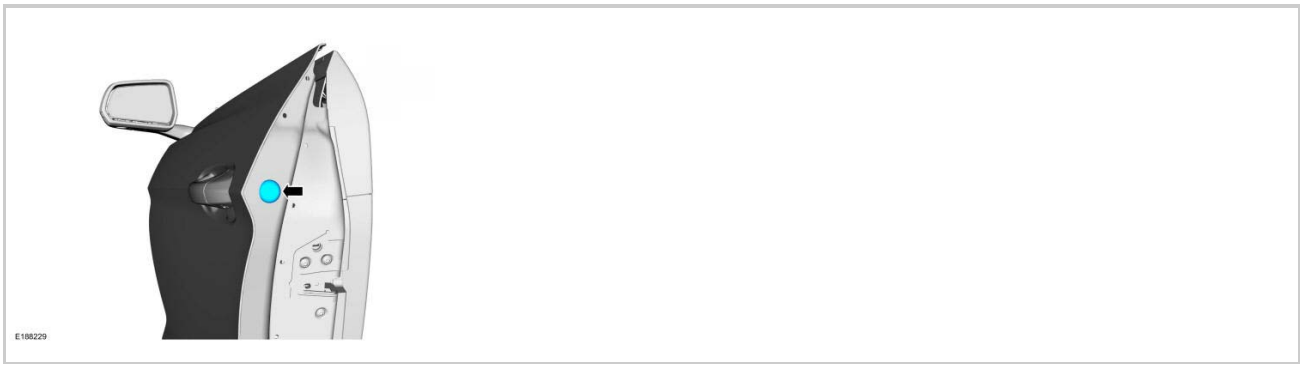
Torque

: 62 lb.in (7 Nm)



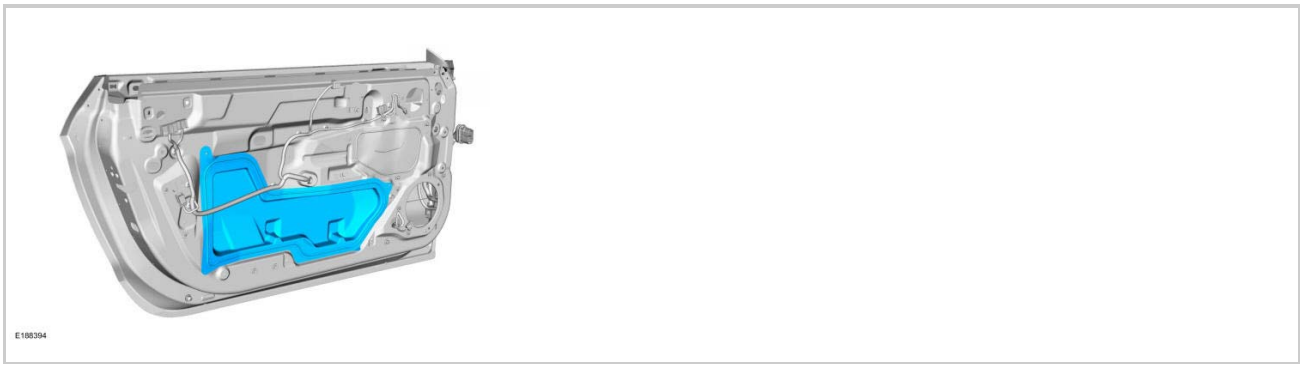
3.

Install the grommet.



4.

Install the front door lower watershield.



5.

Install the front door trim panel. Refer to: Front Door Trim Panel .

REMOVAL AND INSTALLATION > EXTERIOR FRONT DOOR HANDLE REINFORCEMENT > REMOVAL

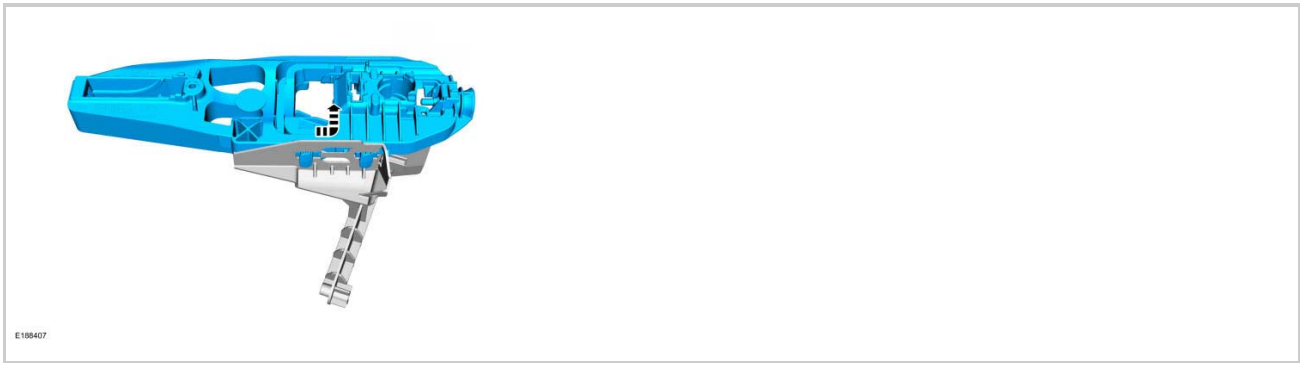
NOTE: LH side shown in illustration, RH side similar.

1.

Remove the front door latch. Refer to: Front Door Latch .

NOTE: This step only necessary when installing a new component.

2.
Remove the exterior front door handle reinforcement.



REMOVAL AND INSTALLATION > EXTERIOR FRONT DOOR HANDLE REINFORCEMENT > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > FRONT DOOR LATCH > REMOVAL

NOTE: LH side shown in illustration, RH side similar.

NOTE: Removal steps in this procedure may contain installation details.

1.

Remove the front door window glass. Refer to: Front Door Window Glass .

2.

Remove the exterior front door handle. Refer to: Exterior Front Door Handle .

3.

Remove the aft front door glass run. Refer to: Front Door Glass Run and Bracket (501-11 Glass, Frames and Mechanisms, Removal and Installation).

4.

Position aside the front door window regulator.

1.

Remove the retainers.

2.

Position aside the rear portion of the front door window regulator.



5.

Remove the exterior door handle reinforcement screw.

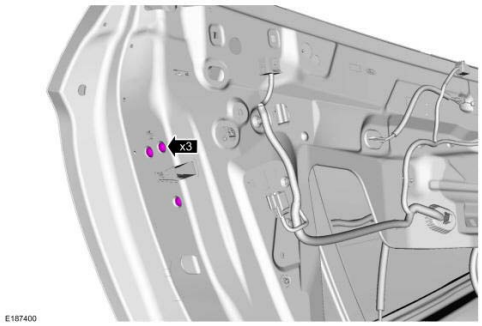


6.

Remove the front door latch bolts.

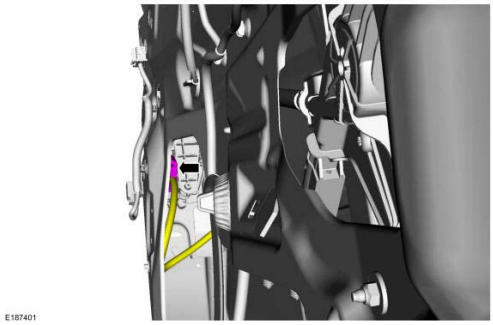
Torque

: 71 lb.in (8 Nm)



7.

Disconnect the electrical connector.



8.

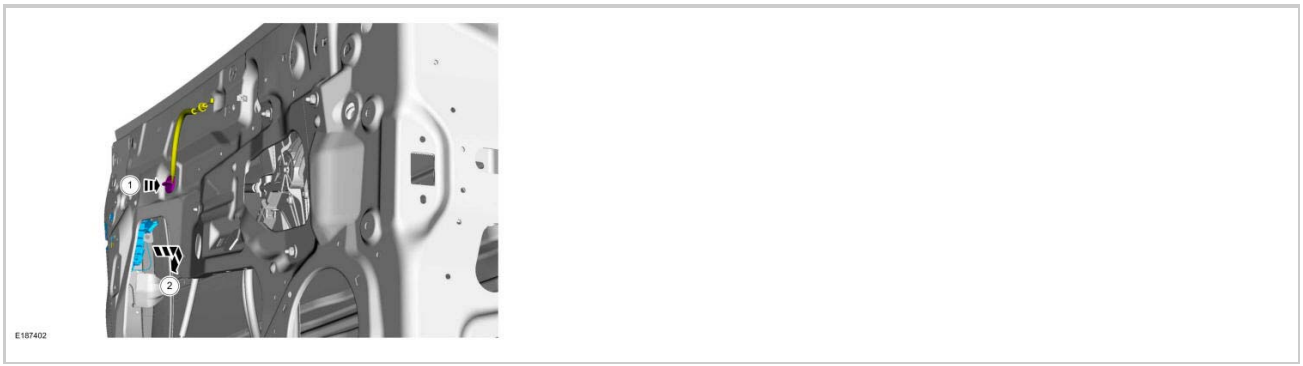
Remove the front door latch.

1.

Route the interior front door handle cable through the door.

2.

Remove the front door latch.



NOTE: This step is only necessary when installing a new component.

9.
Remove the interior front door handle cable from the front door latch.



NOTE: This step is only necessary when installing a new component.

10.
Remove the exterior front door handle reinforcement.

1.

Tighten the screw releasing the tension on the cable.

2.

Detach and position aside the cable from the exterior front door handle reinforcement.



NOTE: This step is only necessary when installing a new component.

11.
Remove the front door latch.

1.

Remove the screws.

2.

Detach and position aside the cable from the front door latch.

3.

Detach the rod and remove the front door latch.



REMOVAL AND INSTALLATION > FRONT DOOR LATCH > INSTALLATION

1.

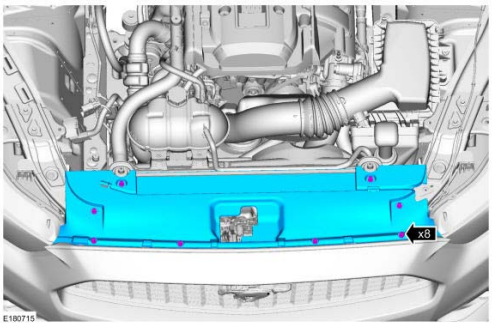
To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > HOOD LATCH > REMOVAL

NOTE: LHD shown in illustration, RHD similar.

1.

Remove the retainers and the radiator sight shield.



2.

Remove the hood latch.

1.

Mark the hood latch nuts for reference.

2.

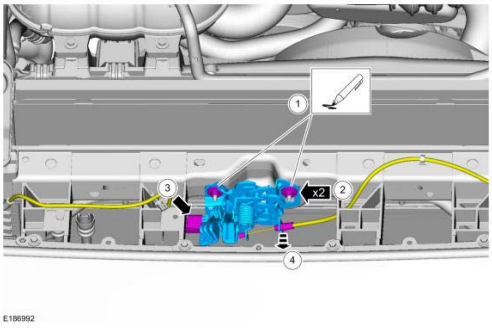
Remove the hood latch nuts.

3.

Disconnect the hood ajar switch electrical connector.

4.

Disconnect the hood latch release cable from the hood latch and remove the hood latch.



REMOVAL AND INSTALLATION > HOOD LATCH > INSTALLATION

1.

Install the hood latch.

1.

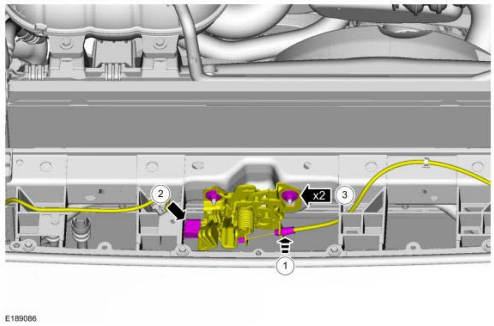
Install the hood latch and connect the hood latch release cable.

2.

Connect the hood ajar switch electrical connector.

3.

Finger tighten the nuts at this stage.

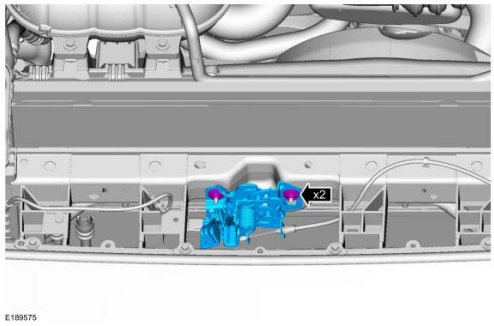


2.

Position the hood latch to the marked reference points and tighten the hood latch nuts.

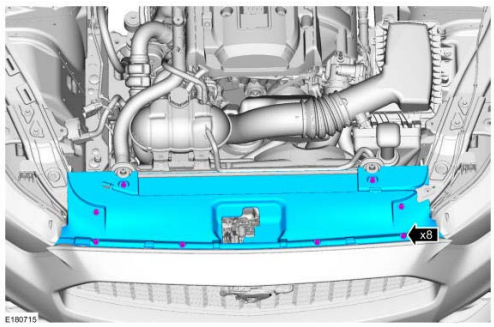
Torque

: 80 lb.in (9 Nm)



3.

Install the radiator sight shield and the retainers.



REMOVAL AND INSTALLATION > HOOD LATCH RELEASE CABLE

Special Tool(s) / General Equipment

Interior Trim Remover

REMOVAL AND INSTALLATION > HOOD LATCH RELEASE CABLE > REMOVAL

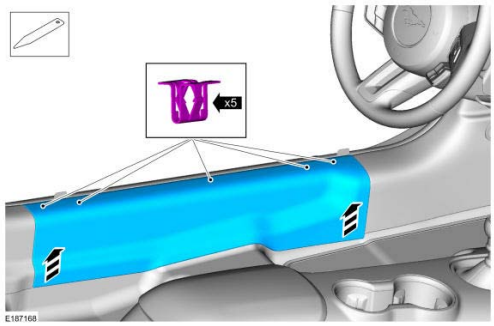
NOTE: LHD shown in illustration, RHD similar.

1.

If equipped, remove DSP. Refer to: Audio Digital Signal Processing (DSP) Module .

2.

Remove the driver door scuff plate. Use the General Equipment: Interior Trim Remover



NOTE: Insert a 10mm 1/4 inch drive socket to release the clips.

3.
Remove the hood latch release handle.

1.

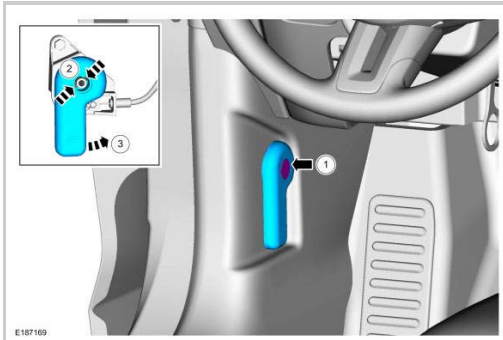
Remove the hood latch release handle access cover.

2.

Release the clips releasing the hood latch release handle.

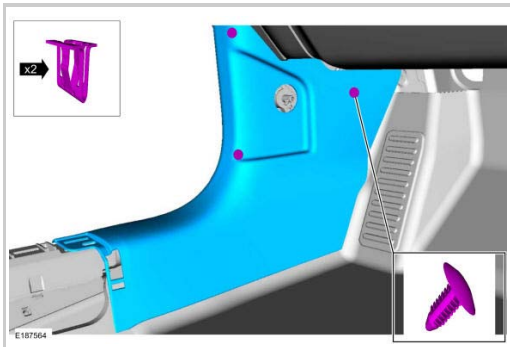
3.

Remove the hood latch release handle.



4.

Release the clips and remove the LH cowl trim panel.



5.

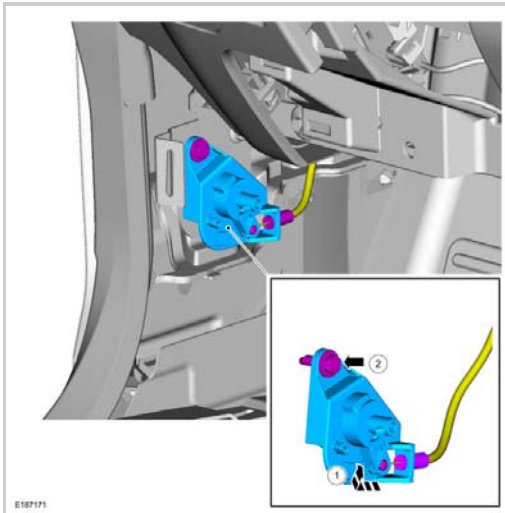
Remove the hood latch release.

1.

Disconnect the hood latch release cable.

2.

Remove the bolts and the hood latch release.



6.

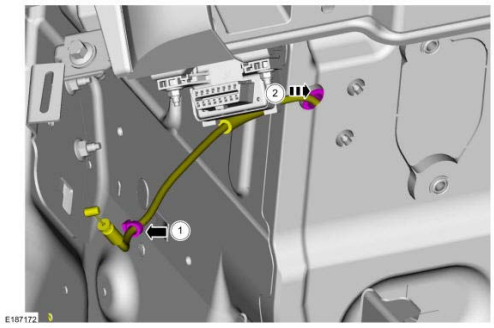
Route the hood latch release cable through the cowl.

1.

Release the routing cable clips.

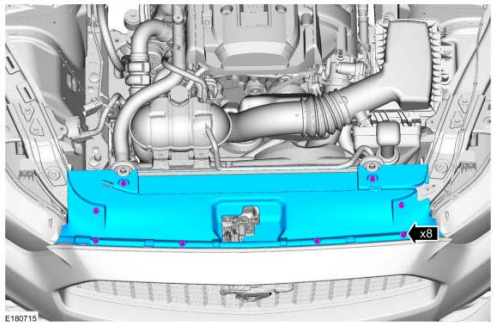
2.

Route the hood latch release cable through the cowl.



7.

Remove the retainers and the radiator sight shield.



8.

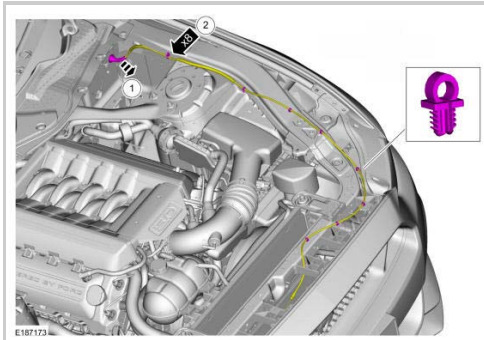
Remove the hood latch release cable.

1.

Remove the grommet.

2.

Remove the clips and position aside the hood latch release cable.



9.

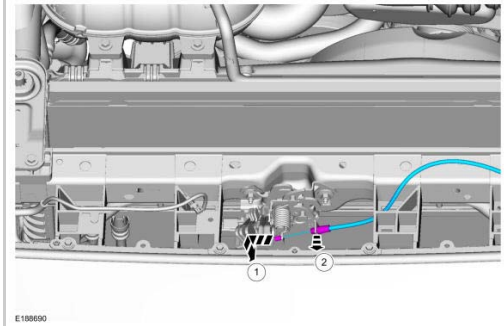
Remove the hood latch release cable.

1.

Release the hood latch release cable from the routing bracket.

2.

Disconnect the cable end and remove the hood latch release cable.



REMOVAL AND INSTALLATION > HOOD LATCH RELEASE CABLE > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > HOOD LATCH RELEASE HANDLE > REMOVAL

NOTE: LHD shown in illustration, RHD similar.

NOTE: Insert a 10 mm 1/4 inch drive socket to release the clips.

1.
Remove the hood latch release handle.

1.

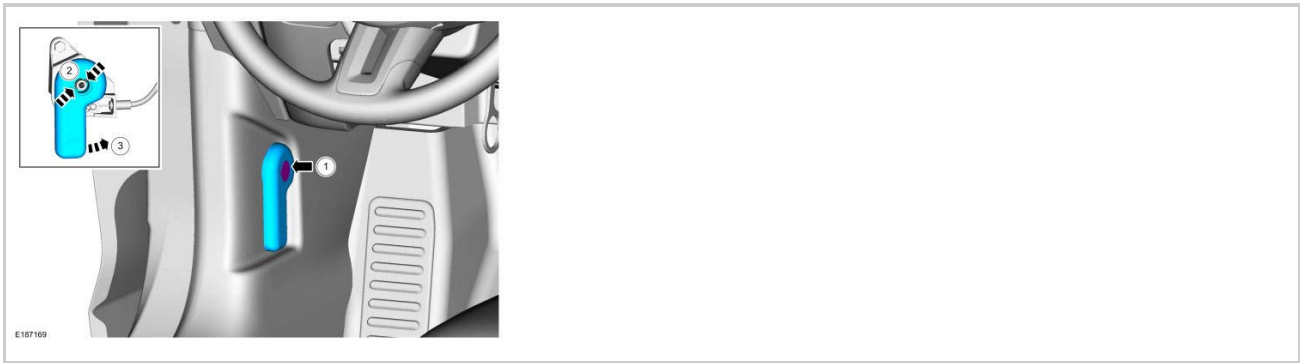
Remove the hood latch release handle access cover.

2.

Release the clips releasing the hood latch release handle.

3.

Remove the hood latch release handle.



REMOVAL AND INSTALLATION > HOOD LATCH RELEASE HANDLE > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > INTERIOR FRONT DOOR HANDLE > REMOVAL

NOTE: LHD shown in illustration, RHD similar.

NOTE: LH side shown in illustration, RH side similar.

1.

Remove the front door trim panel. Refer to: Front Door Trim Panel .

2.

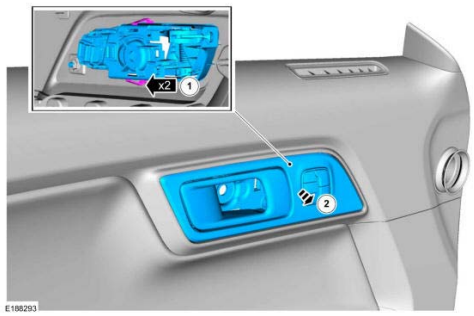
Remove the interior front door handle.

1.

Release the retaining clips.

2.

Remove the interior front door handle.



NOTE: This step is only necessary when installing a new component.

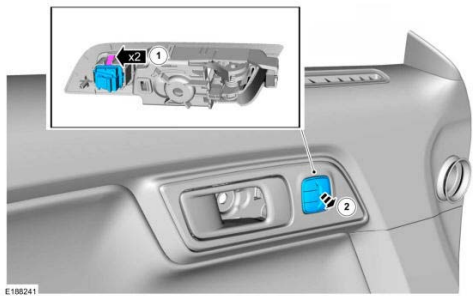
3.
Remove the door lock control switch.

1.

Release the retaining clips.

2.

Remove the door lock control switch.



REMOVAL AND INSTALLATION > INTERIOR FRONT DOOR HANDLE > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > KEYLESS ENTRY REAR ANTENNA > REMOVAL

NOTE: Coupe shown in illustration, convertible similar.

1.

Open the luggage compartment lid.



2.

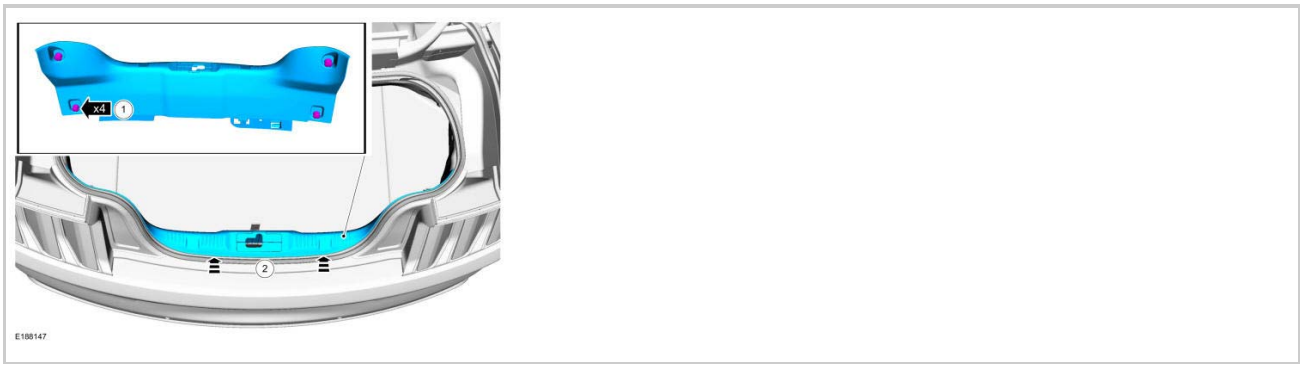
Remove the luggage compartment scuff plate.

1.

Remove the thumb nut type retainers.

2.

Remove the luggage compartment scuff plate.



NOTE: Luggage compartment lid removed for clarity.

3.
Remove the keyless entry rear antenna.

1.

Disconnect the keyless entry rear antenna electrical connector.

2.

Remove the retainers and the keyless entry rear antenna.



REMOVAL AND INSTALLATION > KEYLESS ENTRY REAR ANTENNA > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > LUGGAGE COMPARTMENT LID LATCH - COUPE > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

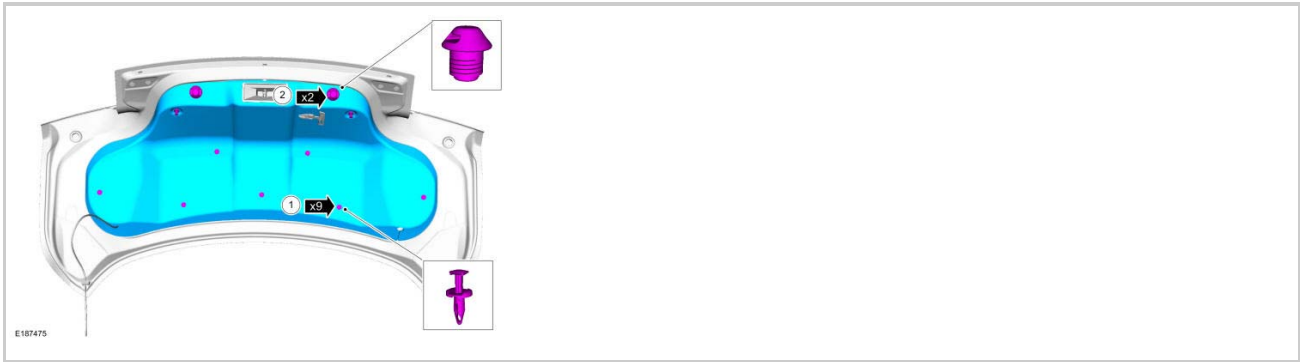
Remove the luggage compartment lid trim panel.

1.

Remove the retainers.

2.

Remove the bump stops and the luggage compartment lid trim panel.



2.

Remove the luggage compartment lid latch.

1.

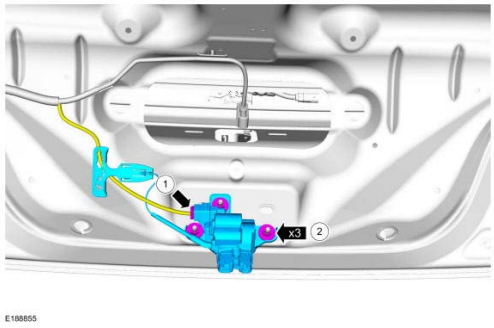
Disconnect the electrical connector and position aside the wiring harness.

2.

Remove the nuts and the luggage compartment lid latch.

Torque

: 62 lb.in (7 Nm)



REMOVAL AND INSTALLATION > LUGGAGE COMPARTMENT LID LATCH - COUPE > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > LUGGAGE COMPARTMENT LID LATCH - CONVERTIBLE > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

Remove the luggage compartment lid lock cylinder. Refer to: Luggage Compartment Lid Lock Cylinder - Convertible .

2.

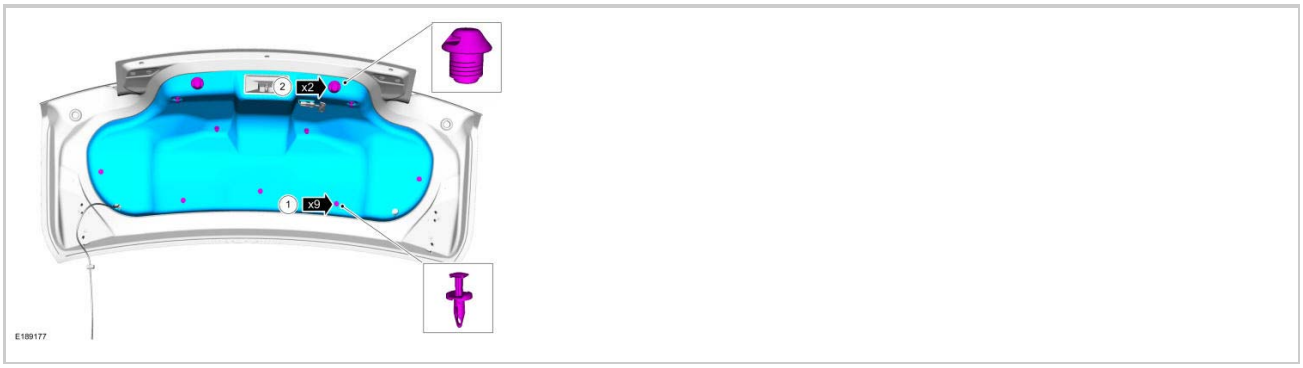
Remove the luggage compartment lid trim panel.

1.

Remove the retainers.

2.

Remove the bump stops and the luggage compartment lid trim panel.



3.

Route the luggage compartment lid latch cable.

1.

Remove the retainer.

2.

Position aside the load compartment trim panel.

3.

Remove the retainers.

4.

Route the luggage compartment lid latch cable through the load compartment trim panel.



4.

Remove the luggage compartment lid latch.

1.

Disconnect the electrical connector and position aside the wiring harness.

2.

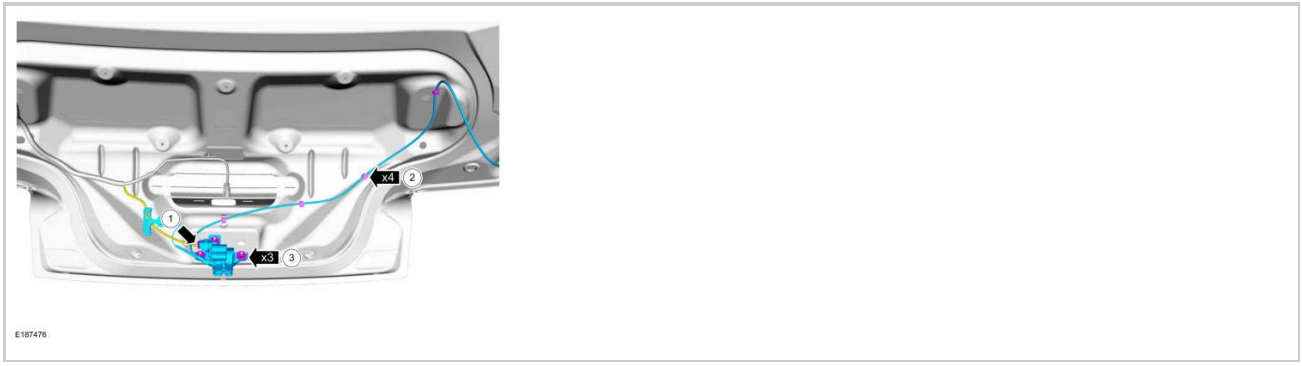
Unlock the luggage compartment lid latch cable from the clips.

3.

Remove the nuts and the luggage compartment lid latch.

Torque

: 62 lb.in (7 Nm)



REMOVAL AND INSTALLATION > LUGGAGE COMPARTMENT LID LATCH - CONVERTIBLE > INSTALLATION

1.

To install, reverse the removal procedure.

Service Manual: INTERIOR TRIM AND ORNAMENTATION

REMOVAL AND INSTALLATION > A-PILLAR TRIM PANEL - CONVERTIBLE > REMOVAL

NOTE: LHD shown, RHD similar.

NOTE: RH side shown, LH side similar.

1.

Remove the sun visor.

1.

Remove the sun visor cap.

2.

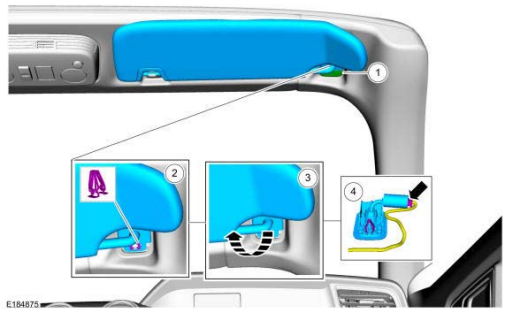
Release the clip.

3.

Remove the sun visor.

4.

If equipped. Disconnect the electrical connector.



2.

Remove the A-pillar trim panel.

1.

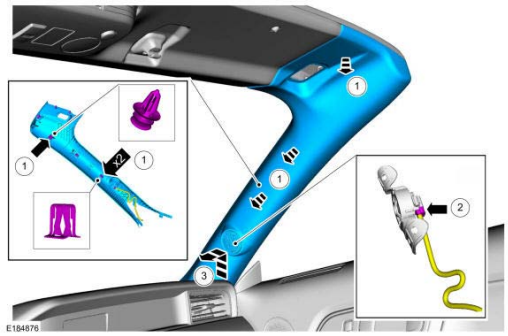
Release the retainers.

2.

If equipped. Disconnect the speaker electrical connector.

3.

Release the clips and remove the A-pillar trim panel.



REMOVAL AND INSTALLATION > A-PILLAR TRIM PANEL - CONVERTIBLE > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > A-PILLAR TRIM PANEL - COUPE > REMOVAL

NOTE: LHD shown, RHD similar.

NOTE: RH side shown, LH side similar.

1.

Remove the pin-type retainer and position aside the door weatherstrip.



2.

Remove the A-pillar trim panel.

1.

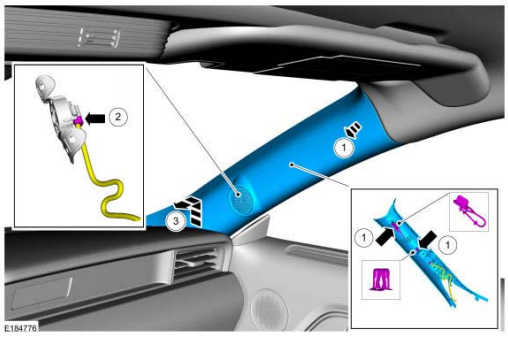
Release the clips and disconnect the tether anchor.

2.

If equipped Disconnect the speaker electrical connector.

3.

Release the clips and remove the A-pillar trim panel.



REMOVAL AND INSTALLATION > A-PILLAR TRIM PANEL - COUPE > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > FRONT DOOR TRIM PANEL > REMOVAL

NOTE: LHD shown, RHD similar.

NOTE: Removal steps in this procedure may contain installation details.

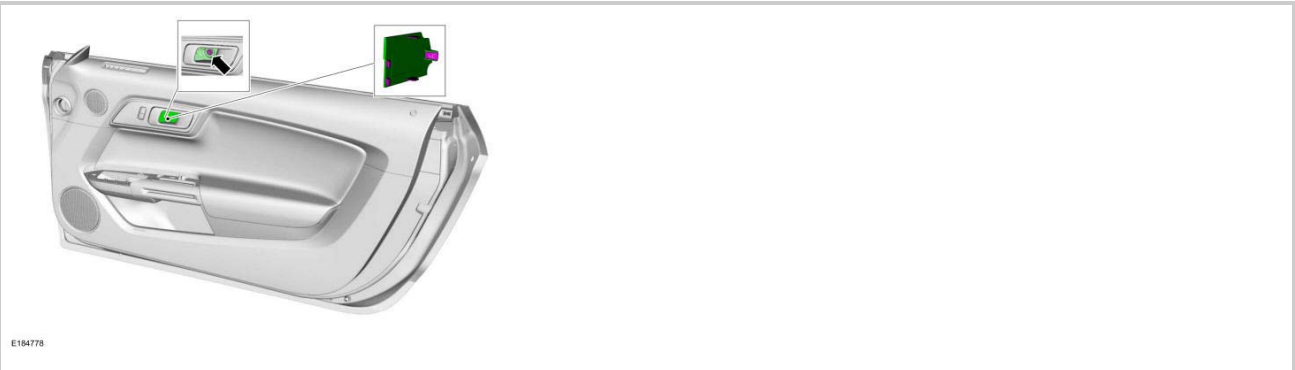
NOTE: RH side shown, LH side similar.

1.

Remove the cover and the upper trim panel bolt.

Torque

: 48 lb.in (5.4 Nm)



2.

Remove the front door window control switch. Refer to: Front Door Window Control Switch .

3.

Remove the front door trim panel center bolt.

Torque

: 48 lb.in (5.4 Nm)



4.

Remove the front door trim panel lower retainers.

Torque

: 13 lb.in (1.5 Nm)



5.

Remove the front door trim panel.

1.

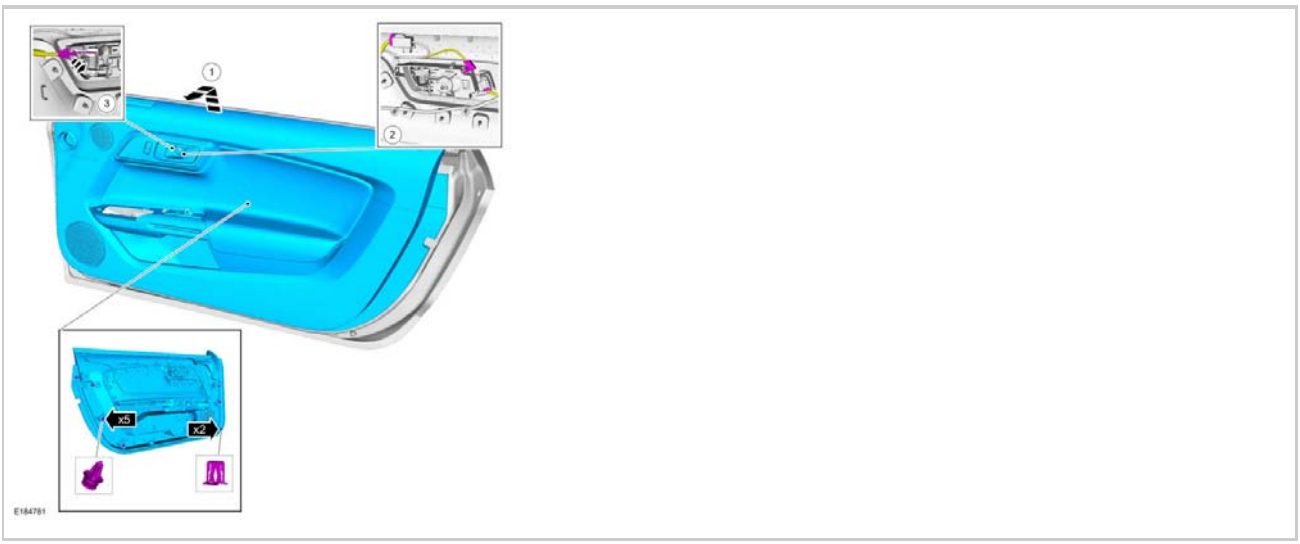
Release the clips.

2.

If equipped. Disconnect the electrical connectors.

3.

Release the latch cable and remove the front door trim panel.



REMOVAL AND INSTALLATION > FRONT DOOR TRIM PANEL > INSTALLATION

NOTE: Transfer parts as necessary.

1.
To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > HEADLINER

Materials

Name	Specification
3M™ Super-Fast Repair Adhesive 04747	-

REMOVAL AND INSTALLATION > HEADLINER > REMOVAL

NOTE: LHD shown, RHD similar.

NOTE: RH side shown, LH side similar.

1.
On both sides. Remove the sun visors.

1.

Remove the retainer cap.

2.

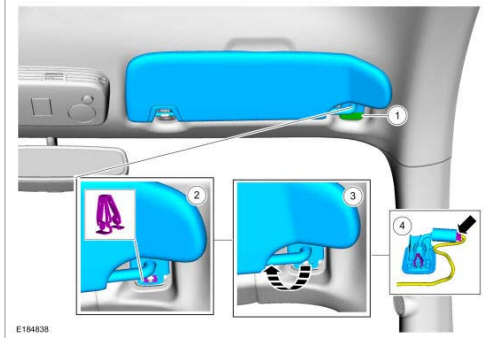
Release the retainer.

3.

Remove the sun visor.

4.

If equipped.Disconnect the electrical connector.

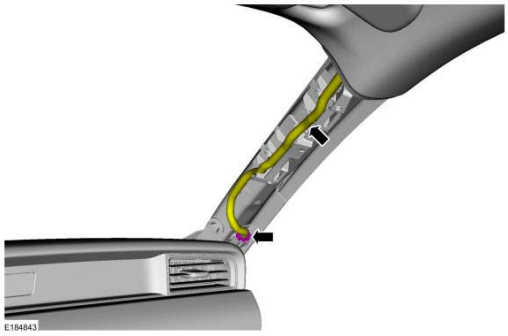


2.

On both sides, remove the A-pillar trim panels. Refer to: A-Pillar Trim Panel - Coupe .

3.

Detach the wire harness and electrical connector retainers and disconnect the electrical connector.



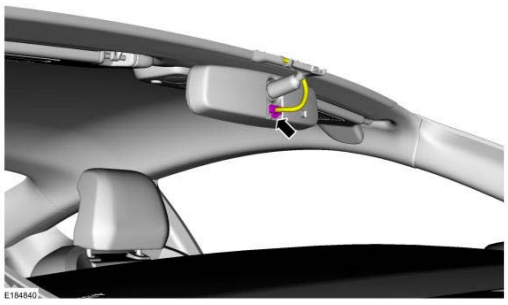
NOTE: RH side shown, LH side similar.

4.
On both sides. Remove the retainer and the sun visor clip.



5.

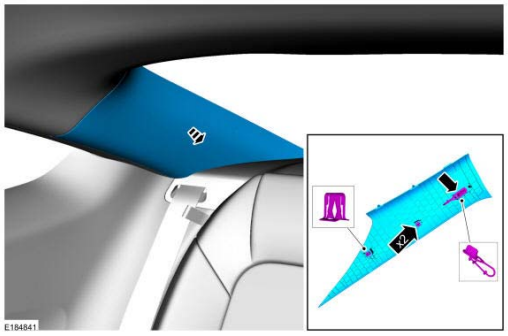
If equipped. Disconnect the rear view mirror electrical connector.



NOTE: RH side shown, LH side similar.

6.

On both sides. Release the clips, disconnect the tether clip and remove the D-pillar trim panel.



7.

On both sides, remove the rear quarter trim panels. Refer to: Rear Quarter Trim Panel .

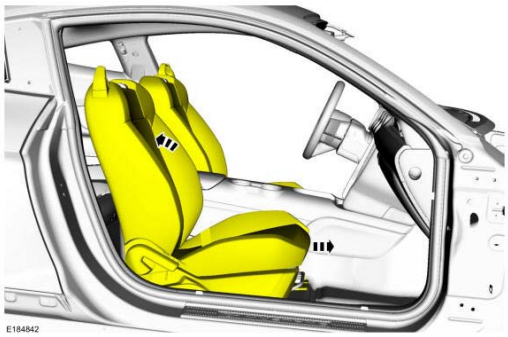
8.

On both sides. Remove the head restraints.



9.

Position both front seats in the full forward and full reclined position.



10.

Remove the headliner.



REMOVAL AND INSTALLATION > HEADLINER > INSTALLATION

NOTE: Obtain the specified adhesive commercially. Depending on the headliner and optional wire harness(es), the purchase of multiple tubes is suggested.

NOTE: These steps are only necessary when installing a new component.

1.

1.

Using tape, mark the wire at the exit points for proper length from headliner-to-body/ roof connectors.

2.

Carefully remove the wire harness from the original headliner.

3.

Using a marking tool, mark the new headliner with the routing and exit points of the wire harness from the original headliner.

NOTE: Make sure not to damage the wire harness when cutting the excess adhesive from the wire harness.

4.
Cut and remove any excess adhesive from the wire harness.

5.

Position the wire harness onto the new headliner, making sure the harness has enough length to be connected to the body/roof connectors at the tape location(s) applied earlier. Apply tape to temporarily hold the wire harness in position on the headliner.

6.

Apply the adhesive in the same location as the factory installed adhesive along the full length of the wire harness-to-headliner to avoid any NVH concern(s).

Material

: 3M™ Super-Fast Repair Adhesive / 04747

NOTE: Transfer parts as necessary.

2.
To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > HEADLINER - LOWERING

NOTE: RH side shown, LH side similar.

1.
On both sides. Remove the sun visors.

1.

Remove the retainer cap.

2.

Release the retainer.

3.

Remove the sun visor.

4.

If equipped. Disconnect the electrical connector.

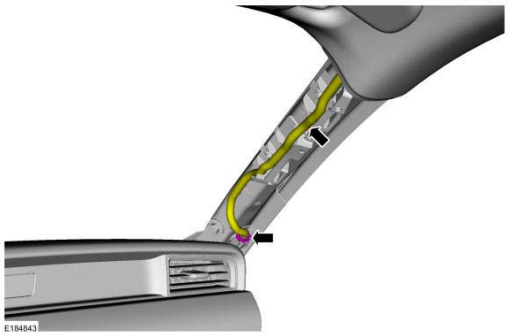


2.

On both sides, remove the A-pillar trim panels. Refer to: A-Pillar Trim Panel - Coupe .

3.

Detach the wire harness and electrical connector retainers and disconnect the electrical connector.



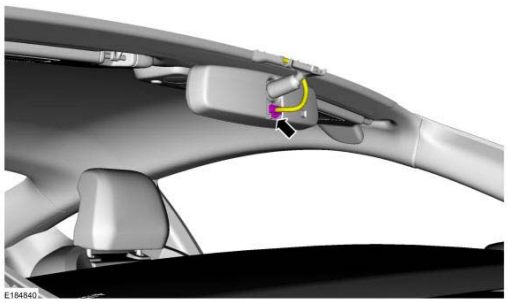
NOTE: RH side shown, LH side similar.

4.
On both sides. Remove the retainer and the sun visor clip.



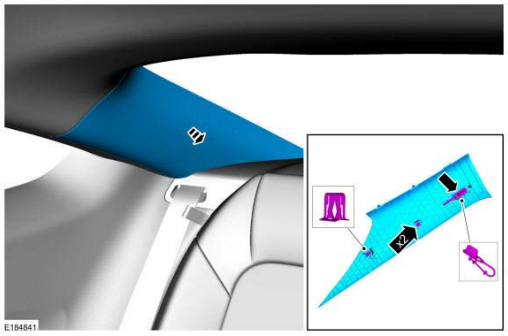
5.

If equipped. Disconnect the rear view mirror electrical connector.



NOTE: RH side shown, LH side similar.

6.
On both sides. Release the clips, disconnect the tether clip and remove the D-pillar trim panel.

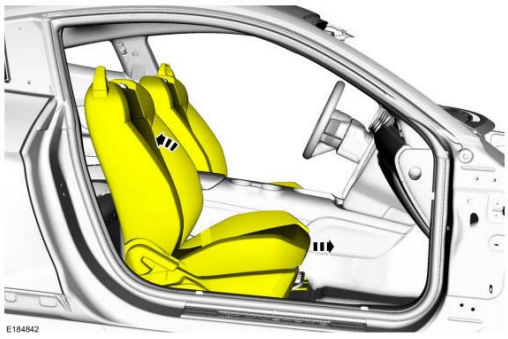


7.

On both sides, remove the rear quarter trim panels. Refer to: Rear Quarter Trim Panel .

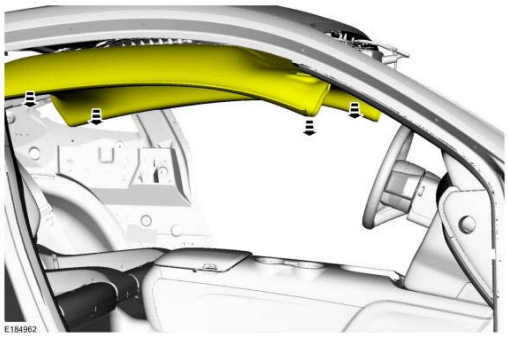
8.

Position both front seats in the full forward and full reclined position.



9.

Lower the headliner.



REMOVAL AND INSTALLATION > LOADSPACE TRIM PANEL - CONVERTIBLE > REMOVAL

NOTE: LHD shown, RHD similar.

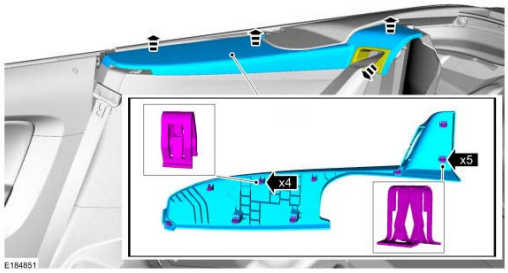
NOTE: RH side shown, LH side similar.

1.

Remove the rear seat backrest. Refer to: Rear Seat Backrest - Convertible .

2.

Position the safety belt guide aside, release the clips and remove the upper loadspace trim panel.



3.

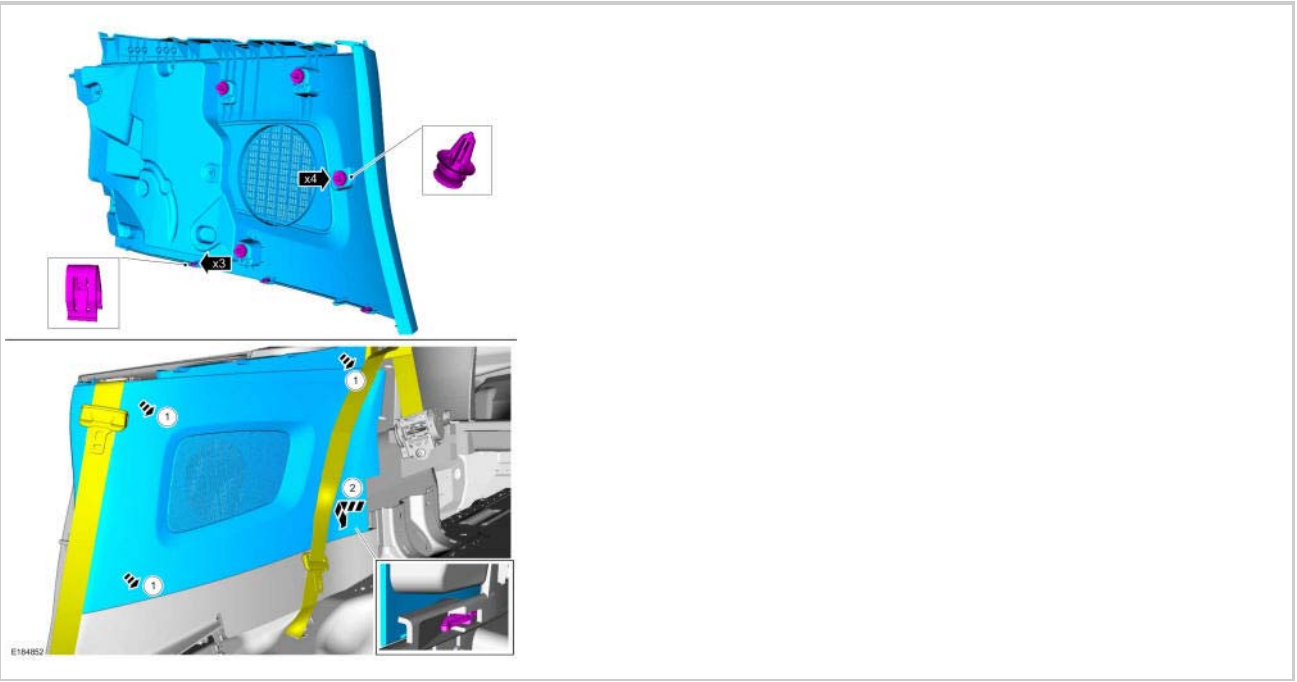
Remove the middle loadspace trim panel.

1.

Release the clips.

2.

Pull forward and outward to release the rear tab, position the front and rear safety belts aside and remove the middle loadspace trim panel.



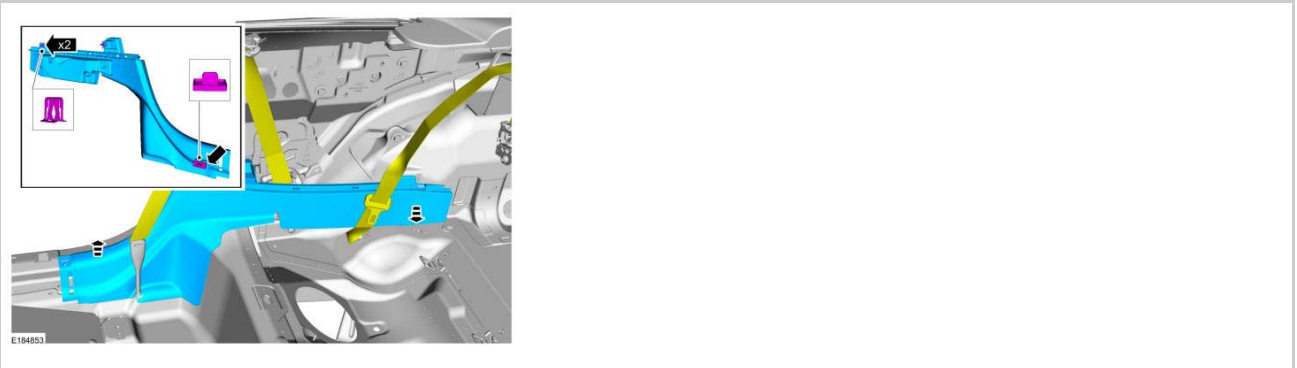
4.

Release the clips and remove the scuff plate trim panel.



5.

Release the clips and remove the lower loadspace trim panel.



REMOVAL AND INSTALLATION > LOADSPACE TRIM PANEL - CONVERTIBLE >

INSTALLATION

NOTE: During installation, make sure the safety belt webbing is not twisted and the safety belts and buckles are accessible to the occupants.

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > LOADSPACE TRIM PANEL - COUPE > REMOVAL

NOTE: LHD shown, RHD similar.

NOTE: RH side shown, LH side similar.

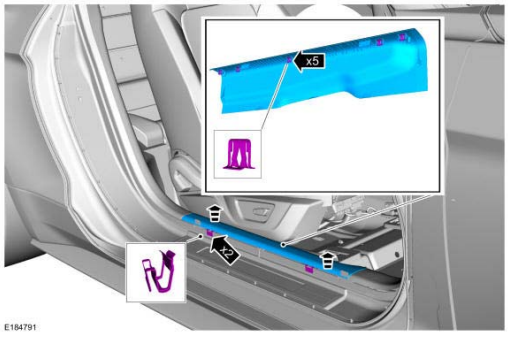
1.

Position aside the door weatherstrip.



2.

Release the clips and remove the scuff plate trim panel.



3.

Remove the rear seat cushion. Refer to: Rear Seat Cushion .

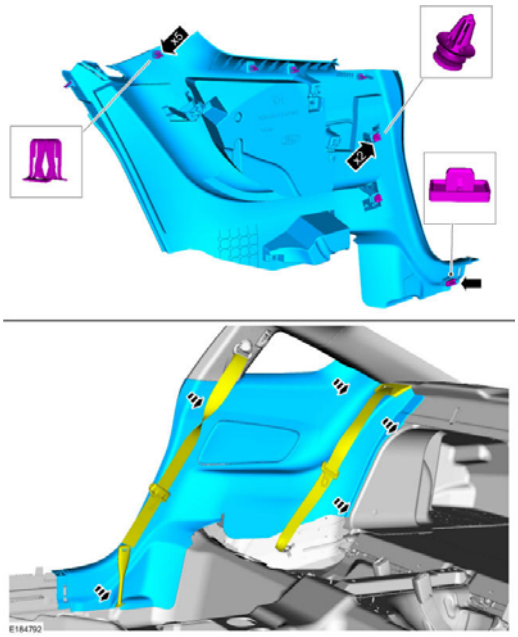
4.

Release the latch and position the seat backrest down.



5.

Position aside the safety belt guide, release the clips and remove the loadspace trim panel.



REMOVAL AND INSTALLATION > LOADSPACE TRIM PANEL - COUPE > INSTALLATION

NOTE: During installation, make sure the safety belt webbing is not twisted and the safety belts and buckles are accessible to the occupants.

1.

To install, reverse the removal procedure.

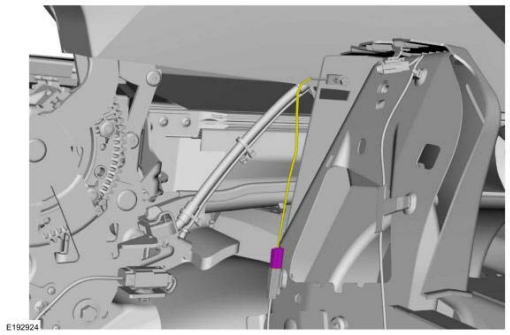
REMOVAL AND INSTALLATION > PARCEL SHELF - CONVERTIBLE > REMOVAL

1.

On both sides, remove the loadspace trim panels. Refer to: Loadspace Trim Panel - Convertible .

> *NOTE: LH side shown, RH side similar.*

2.
On both sides. Disconnect the tonneau cover sensor electrical connectors.



> *NOTE: LH side shown, RH side similar.*

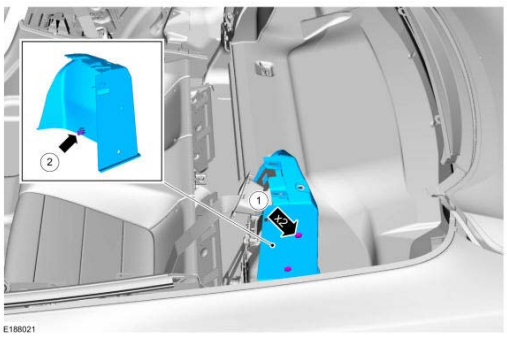
3.
On both sides. Remove the D-tower covers.

1.

Remove the pin-type retainers.

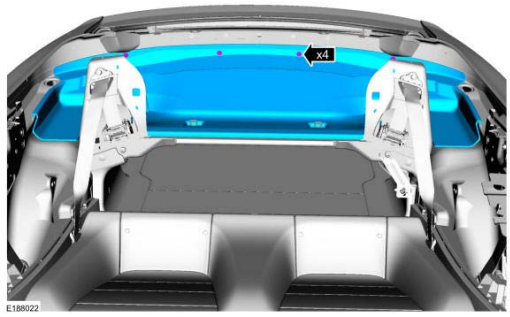
2.

Release the clip and remove the cover.



4.

Remove the pin-type retainers and the parcel shelf.



REMOVAL AND INSTALLATION > PARCEL SHELF - CONVERTIBLE > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > PARCEL SHELF - COUPE > REMOVAL

1.

Release the second row seat base floor backrest latch and position the seat backrest in the full flat position.

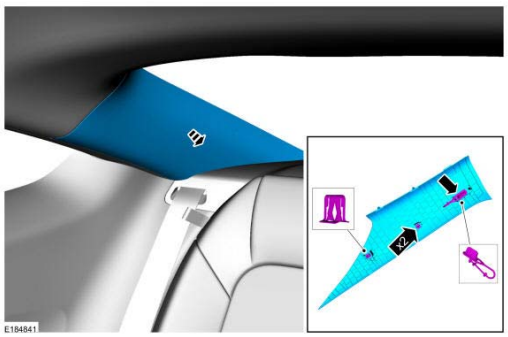


2.

On both sides, remove the loadspace trim panels. Refer to: Loadspace Trim Panel - Coupe .

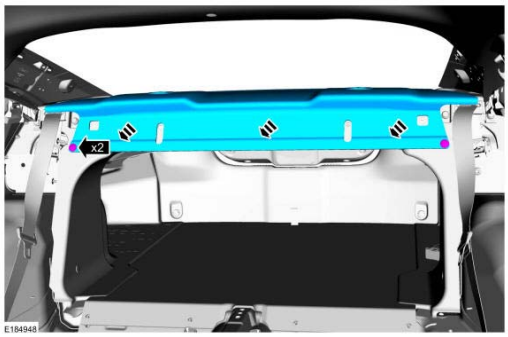
NOTE: RH side shown, LH side similar.

3.
On both sides. Release the clips, disconnect the tether clip and remove the D-pillar trim panel.



4.

Remove the pin-type retainers and the parcel shelf.



REMOVAL AND INSTALLATION > PARCEL SHELF - COUPE > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > REAR QUARTER TRIM PANEL > REMOVAL

NOTE: LHD shown, RHD similar.

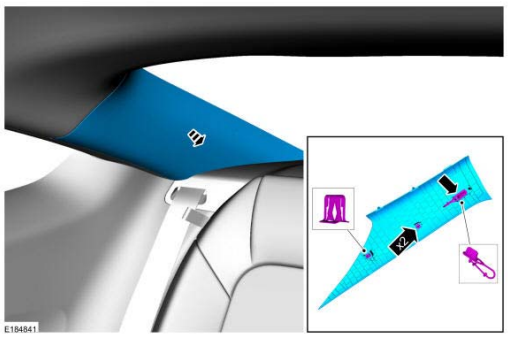
NOTE: RH side shown, LH side similar.

1.

Remove the load space trim panel. Refer to: Loadspace Trim Panel - Coupe .

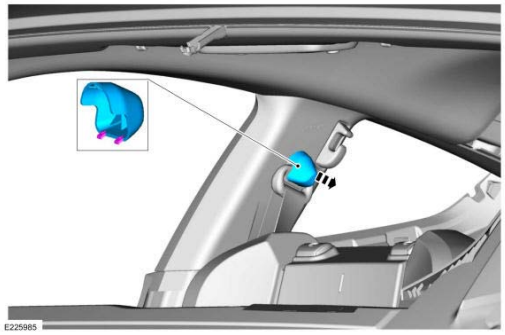
2.

Release the clips, disconnect the tether clip and remove the C-pillar trim panel.



3.

Release the tabs and remove the D-ring retainer cover.



4.

Remove the D-ring bolt and position aside the seatbelt.

Torque

: 30 lb.ft (40 Nm)



5.

Remove the rear quarter trim panel.

1.

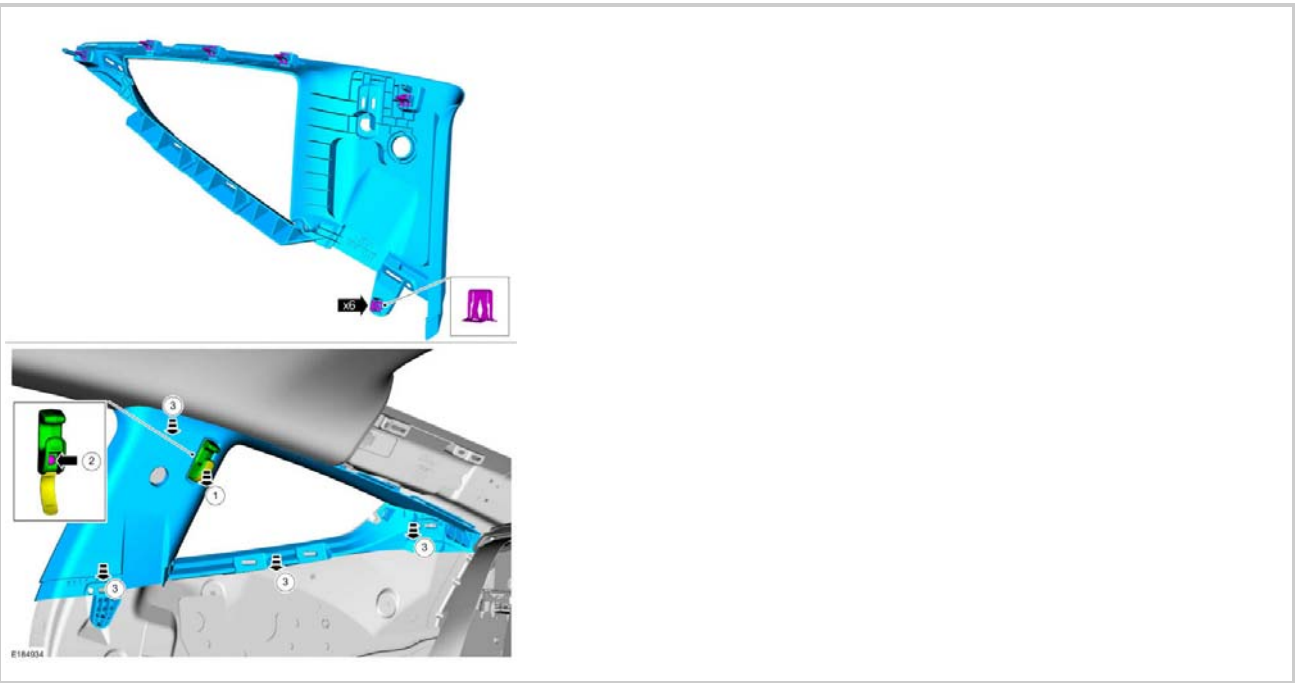
Open the garment hook retainer cover.

2.

Remove the retainer and the garment hook.

3.

Release the clips and remove the rear quarter trim panel.



REMOVAL AND INSTALLATION > REAR QUARTER TRIM PANEL > INSTALLATION

NOTE: During installation, make sure the seatbelt webbing is not twisted and the seatbelts and buckles are accessible to the occupants.

1.
To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > STEERING COLUMN SHROUDS

Special Tool(s) / General Equipment

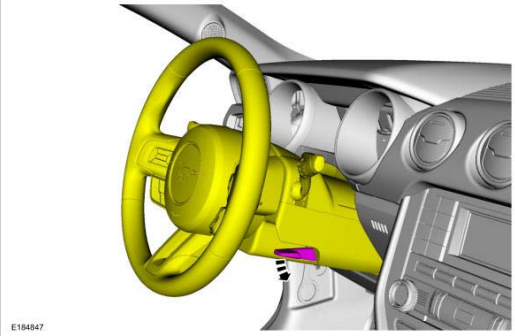
Flat Headed Screw Driver

REMOVAL AND INSTALLATION > STEERING COLUMN SHROUDS > REMOVAL

NOTE: LHD shown, RHD similar.

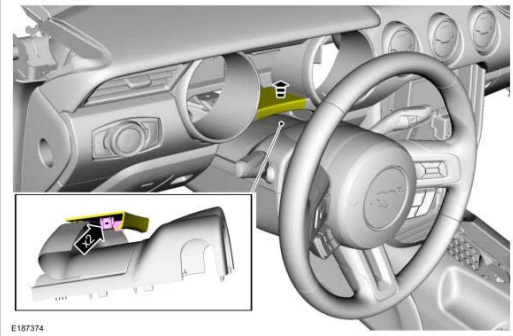
1.

Fully extend and lower the steering column.



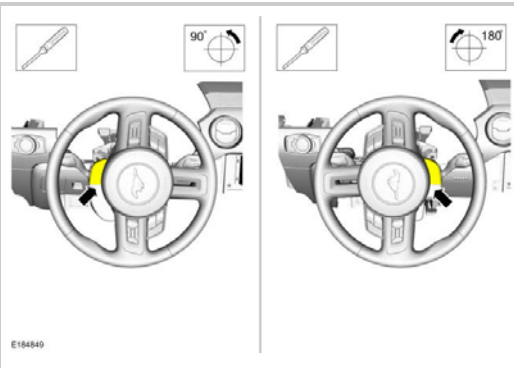
2.

Release the upper gap hider from the IPC and position aside.



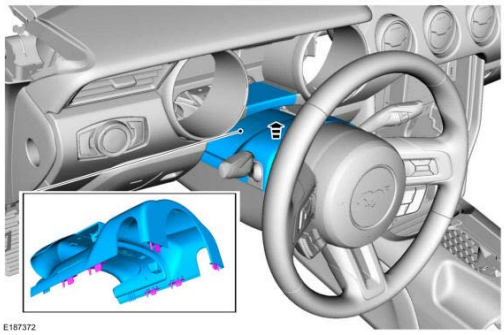
3.

Rotate the steering wheel 90 degrees to the left and release the LH retainer, rotate the steering wheel 180 degrees right and release the RH retainer. Use the General Equipment: Flat Headed Screw Driver



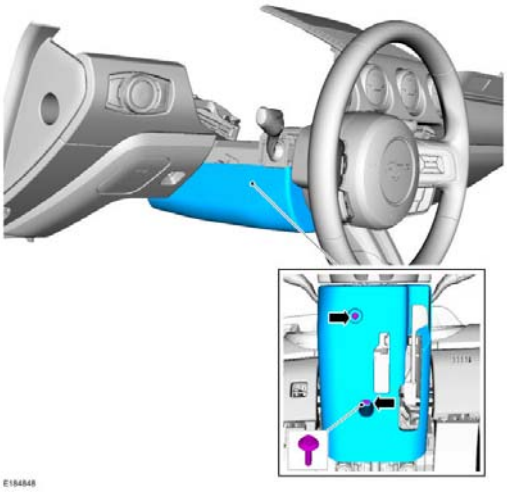
4.

Release the outer clips on each side and remove the upper steering column shroud.



5.

Remove the lower steering column shroud screws and the lower steering column shroud.



REMOVAL AND INSTALLATION > STEERING COLUMN SHROUDS > INSTALLATION

1.

To install, reverse the removal procedure.

Service Manual: PAINT - GENERAL INFORMATION

GENERAL PROCEDURES > PAINTWORK DEFECTS AND DAMAGE

Materials

Name	Specification
Motorcraft® Acid Neutralizer ZC-1-A	-
Motorcraft® Alkaline Neutralizer ZC-2-A	-

Repair

NOTE: Refinishing - Environmental Damage

1.

WARNING: Before beginning any service procedure in this service information, refer to health and safety warnings in GENERAL INFORMATION . Failure to follow this instruction may result in serious personal injury.

Refer to: Body Repair Health and Safety and General Precautions .

NOTE: Never paint over iron particles as rust spots will reoccur. Use only the recommended decontamination procedure detailed below.

2.
Rinse any dust, dirt and foreign material from the vehicle body with cold water. Flush liberally.

3.

Prepare the acid neutralizer by mixing 8 parts of water to 1 part neutralizer in a bucket.

Material

: Motorcraft® Acid Neutralizer / ZC-1-A

NOTE: Use a separate clean twisted lambs wool wash mitt for each product applied to the vehicle. Rinse frequently to remove any particles trapped in the fibers.

NOTE: To avoid paint failure, do not allow the product to dry on the vehicle.

4.

Working quickly and beginning at the top of the vehicle and working to the sides, apply the neutralizer mix to the entire vehicle. Keep the vehicle wet with the solution and lightly agitate for 5 to 7 minutes. Continue around the vehicle 4 to 5 times. For severe conditions, work the product for up to 8 minutes.

5.

Rinse the vehicle completely with cold water to remove the product.

6.

Dry only the horizontal surfaces of the vehicle, do not dry the glass at this time.

> *NOTE: Alkaline neutralizer is a ready-to-use product. Do not mix with water.*

> *NOTE: Use a separate clean twisted lambs wool wash mitt for each product applied to the vehicle. Rinse frequently to remove any particles trapped in the fibers.*

> *NOTE: To avoid damage to the paint surface, do not apply the alkaline neutralizer directly to the vehicle plastic trim.*

7.
Pour the alkaline neutralizer into a squirt bottle and apply the solution to a clean closed-loop wash mitt.

Material

: Motorcraft® Alkaline Neutralizer / ZC-2-A

> *NOTE: To avoid paint failure, do not allow the alkaline neutralizer to dry on the vehicle.*

8.
Apply the product to the vehicle keeping the solution wet and lightly agitate for 5 to 7 minutes. For severe conditions, work the product for up to 8 minutes.

9.

Rinse the vehicle completely with cold water to remove the product.

10.

Using a clean closed-loop wash mitt and locally available car wash soap, shampoo the entire vehicle exterior and rinse with cold water. Dry the vehicle completely.

11.

Visually inspect the paint surface for any remaining evidence of ferrous metal particles. Repeat

procedure as necessary.

NOTE: Always follow the manufacturer's product usage sequence. Use the appropriate buffing or polishing pad at the recommended buffing speed as specified by the product manufacturer.

NOTE: Do not intermix buffing products. Use only one manufacturer's product.

NOTE: Acid rain discoloring or etching may require color sanding in addition to buffing and polishing. In extreme cases, refinishing may be required if the following procedure does not restore the vehicle finish.

NOTE: When attempting to affect a repair by buffing, polishing or color sanding, do not remove an excess of 0.3 mil of paint film or refinishing will be required.

12.
Apply rubbing compound to the vehicle surface as recommended by the product manufacturer.

13.

Apply machine glaze to the vehicle surface as recommended by the product manufacturer.

14.

Use an alcohol and water mixture (1 to 1) to clean the buffed and polished areas. Verify removal of scratches and swirls before the application of the final polish.

15.

Apply a final polish material by hand, with a dual-action sander and foam pad, or with an orbital polisher and appropriate polishing bonnet.

16.

Using a locally available car wash soap, wash and dry the vehicle.

Repair

NOTE: Refinishing - Manufacturing Damage

1.

WARNING: Before beginning any service procedure in this service information,

refer to health and safety warnings in GENERAL INFORMATION . Failure to follow this instruction may result in serious personal injury.

Refer to: Body Repair Health and Safety and General Precautions .

2.

Wash the repair area with pH-neutral soap and water.

3.

Remove any trim, emblems and hardware from the area to be repaired.

NOTE: All delamination must be removed.

4.
Sand or media blast the damaged surface, keeping the repair area as minimal as possible.

5.

Treat any bare metal surface to prevent flash corrosion, and prime and block sand as necessary prior to refinishing.

6.

Mask the adjacent panels to protect from overspray.

7.

Spot repair the base coat as necessary, following the paint manufacturer's prescribed procedures.

8.

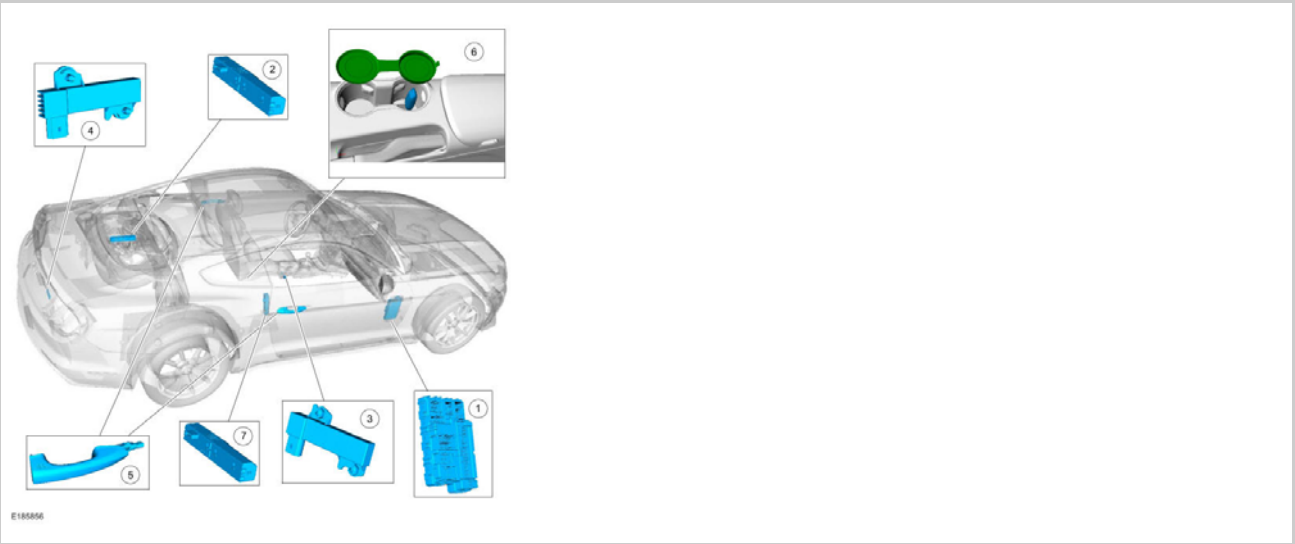
Following the paint manufacturer's prescribed procedure, apply clear coat to the entire panel.

9.

Reapply any trim, emblems and hardware previously removed from the repair area.

Service Manual: PASSIVE ANTI-THEFT SYSTEM (PATS)

DESCRIPTION AND OPERATION > PASSIVE ANTI-THEFT SYSTEM (PATS) - COMPONENT LOCATION



Item	Description
1	BCM
2	RTM (coupe)
3	PATS front antenna
4	Keyless entry rear antenna
5	Door handle antennas (exterior front door handles)
6	Passive key backup starting location
7	RTM (convertible)

DESCRIPTION AND OPERATION > PASSIVE ANTI-THEFT SYSTEM (PATS) - OVERVIEW > OVERVIEW

The PATS deters the vehicle from theft by preventing the vehicle from starting unless a valid programmed key is detected inside the vehicle when the START/STOP button is pressed.

The PATS does not disable an already running vehicle.

DESCRIPTION AND OPERATION > PASSIVE ANTI-THEFT SYSTEM (PATS) - SYSTEM OPERATION AND COMPONENT DESCRIPTION

System Operation

DESCRIPTION AND OPERATION > PASSIVE ANTI-THEFT SYSTEM (PATS) - SYSTEM OPERATION AND COMPONENT DESCRIPTION > NETWORK MESSAGE CHART

BCM Network Input Messages

Broadcast Message	Originating Module	Message Purpose
RKE data	RTM	The RTM sends the BCM programmed passive key information.
PATS start request target command	PCM	The PCM sends the BCM a challenge request for a valid ID.

IPC Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Vehicle mode	BCM	Used by the IPC to display No Key Detected when the START/STOP button is pressed and no programmed key is detected within the vehicle.
Ignition status	BCM	Used by the IPC to power up when the START/STOP button is pressed and a programmed key is detected within the vehicle or to power down when the request is to turn the vehicle off.

PCM Network Input Messages

Broadcast Message	Originating Module	Message Purpose
PATS control command	BCM	The response from the BCM supplying the PCM challenge ID. If the BCM ID response is incorrect, then PATS prevents the vehicle from starting.

PATS

The PATS function is controlled by the BCM and the PCM.

When the START/STOP button is pressed, a voltage signal is sent to the BCM. When the BCM detects the START/STOP button is pressed, it begins the key initialization sequence by activating the PATS front antenna, the keyless entry rear antenna and both exterior door handle keyless entry antennas. Each antenna transmits a low frequency signal with an approximate range of 1 m (3 ft). The passive key activates if it is within range of the antennas. The BCM is able to determine the passive key location (inside or outside the vehicle) based on the input from the antennas.

When the passive key activates, it sends the PATS identification code to the RTM via a high frequency signal. The RTM interprets the high frequency signal from the passive key and sends the information to the BCM over the LIN-based circuit.

If a valid programmed passive key is detected inside the vehicle, the BCM transitions the ignition out of off.

When the ignition transitions out of off and the modules initialize, the PCM sends a challenge request to the BCM. The BCM replies and if the correct identification is received, the PATS disables and allows the vehicle to start. If the PATS prevents the vehicle from starting, a DTC sets in one of the modules.

The PATS and the RKE system share operation of several components including the passive keys, the BCM and the RTM.

If there is a concern with any of these components, the PATS and the RKE system are both affected.

In the event of a no start, place a programmed passive key in the backup location to allow the vehicle to start. The PATS front antenna activates the passive key when the START/STOP button is pressed in the event the batteries are depleted within the passive key.

> *NOTE: The passive start feature is a programmable parameter and can be enabled/disabled with a scan tool. If the feature is disabled, the features to passively enter and start the vehicle are inoperative. To start the vehicle, the passive key must be placed in the backup starting location.*

The BCM controls the ignition modes and, in conjunction with the PCM, control the PATS.

For information on ignition states, Refer to: Steering Wheel and Column Electrical Components - System Operation and Component Description .

PATS Parameter Identifications (PIDs)

In conjunction with Diagnostic Trouble Codes (DTCs), the PATS Parameter Identifications (PIDs) are a useful tool when diagnosing PATS concerns.

BCM PID Chart

Acronym	Name	Description
KEYS_PROGMD	Number of ignition key codes supported	Displays the number of keys currently programmed into the BCM.
MIN_KEYS_RQD	Minimum number of keys required	Minimum number of programmed keys required. This PID always reads 2.

PCM PID Chart

Acronym	Name	Description
PATSENABL	Vehicle enable status	Indicates if PATS allows the vehicle to be driven. Must read

		enabled for the vehicle to be driven.

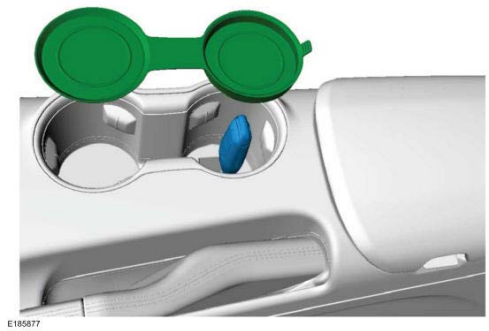
Backup Starting

> *NOTE: There are certain areas within the vehicle where the passive key may not be detected and the message center displays No Key Detected. If the passive key is in the far outside edges of the interior (such as in a door map pocket or above a sun visor), it may not be detected. Move the passive key to a different location and try to turn the ignition on.*

When the vehicle experiences a PATS condition, the No Key Detected message displays in the message center when the START/STOP button is pressed.

In the event of one of these failures, place a programmed passive key in the backup location to allow the vehicle to start. When the START/STOP button is pressed, the PATS front antenna activates the passive key and the identification code is sent to the BCM. The passive key must be oriented correctly in the backup starting location.

Passive Key Backup Starting Location (floor console rear cup holder)



No Key Detected Message

> *NOTE: Some brands/types of mobile phone or laptop computer chargers may cause interference that could lead to a PATS concern if the passive key is within close proximity of the charger. If a concern is observed, move the passive key away from the charger and attempt to turn the ignition on.*

There are 2 scenarios in which the No Key Detected message displays in the message center.

The first is when the ignition is off, the START/STOP button is pressed and a programmed passive key is not detected inside the vehicle. If a component failure (such as a dead passive key battery) is causing the No Key Detected message to display, the backup starting method can be used.

The second scenario is when the vehicle ignition is on, the driver exits the vehicle with the programmed passive key and closes the door.

The BCM activates the PATS front antenna, the keyless entry rear antenna and both exterior door handle keyless entry antennas to search the inside of the vehicle for a passive key any time a door is opened and then closed with the ignition on and the first time each drive cycle the vehicle speed exceeds 15 km/h (9 mph). The No Key Detected message displays in the message center and the horn

chirps twice when the ignition is on and a passive key is no longer detected inside the vehicle.

This strategy deters the passive key from being separated from an already running vehicle. If a passive key is no longer in the vehicle, the ignition remains on and the vehicle continues to operate. When the START/STOP button is pressed to turn the ignition off, the ignition can be restarted without a passive key present inside the vehicle for approximately 20 seconds. After 20 seconds have elapsed, a passive key must be present to transition the ignition out of off.

Component Description

Passive Key

The passive key incorporates both the PATS and the RKE transmitter functions in a single device. The passive key must be located inside the vehicle for the ignition to transition out of off and on the outside for keyless entry features. During key programming procedures, the PATS and the RKE transmitter of the passive key are both programmed into the BCM. Passive keys are programmed into the BCM using the passive key backup starting location. The vehicle accepts programming of up to 4 passive keys.

The passive key receives the low frequency signals from the PATS front antenna and the keyless entry rear antenna. When the passive key is activated by one of the low frequency signals, it sends out a high frequency signal that is received by the RTM. The passive key also contains a removable key blade that unlocks the driver door in the event of an electrical failure (such as a drained battery).

PATS Front Antenna

> *NOTE: Some brands/types of mobile phone or laptop computer chargers may cause interference that could lead to a PATS concern if the passive key is within a few inches of the charger and the No Key Detected message displays in the message center. If a concern is observed, move the passive key away from the charger and attempt to transition the ignition on.*

The PATS front antenna is wired to the BCM. When activated by the BCM, it transmits a low frequency signal that activates a passive key. This antenna serves a dual purpose in that it can detect a passive key in the backup starting location. The backup starting location is used to program passive keys and to detect a programmed passive key in the event the battery in the programmed passive key has failed.

When activated, the PATS front antenna sends out a low frequency signal with an approximate range of 1 m (3 ft). A valid programmed passive key must be within range for the PATS to recognize the key and allow the ignition to transition out of off.

If a passive key is placed in the far outside edges of the interior, such as above a sun visor or in a door map pocket, the vehicle can experience a PATS concern. If the passive key is located in one of these areas and there is a PATS concern, move the passive key out of the area and attempt to transition the ignition on. If the key is outside the range of the PATS front antenna and the keyless entry rear antenna when the START/STOP button is pressed, the No Key Detected message displays in the message center.

Keyless Entry Rear Antenna

> *NOTE: Some brands/types of mobile phone or laptop computer chargers may cause interference that could lead to a PATS concern if the passive key is within a few inches of the charger and the No Key Detected message displays in the message center. If a concern*

is observed, move the passive key away from the charger and attempt to transition the ignition on.

The keyless entry rear antenna is wired to the BCM. When activated by the BCM, it transmits a low frequency signal that activates a passive key.

When activated, the keyless entry rear antenna sends out a low frequency signal with an approximate range of 1 m (3 ft). A programmed passive key must be within range for the PATS to recognize the key and allow the ignition to transition out of off.

If a passive key is placed in the far outside edges of the interior, such as the far corners of the luggage compartment area, the vehicle can experience a PATS concern. If the passive key is located in one of these areas and there is a PATS concern, move the passive key out of the area and attempt to transition the ignition on. If the key is outside the range of the keyless entry rear antenna and the PATS front antenna when the START/STOP button is pressed, the No Key Detected message displays in the message center.

Exterior Front Door Handles

Each of the exterior front door handles contain a keyless entry antenna. The antennas are wired to the BCM. When activated by the BCM, the antenna transmits a low frequency signal with an approximate range of 1 m (3 ft) to activate a passive key.

If a passive key is placed in the far outside edges of the interior, such as the far corners of the luggage compartment area, the vehicle can experience a PATS concern. If the passive key is located in one of these areas and there is a PATS concern, move the passive key out of the area and attempt to transition the ignition on. If the key is determined by the BCM to be outside the vehicle or is outside the range of the antennas within the exterior front door handles, the keyless entry rear antenna and the PATS front antenna when the START/STOP button is pressed, the No Key Detected message displays in the message center.

BCM

If the BCM is replaced, program at least 2 keys and perform the parameter reset procedure.

PMI is required when the BCM is replaced.

PCM

When the PCM is replaced, perform the parameter reset procedure. There is no need to program keys if the PCM is replaced.

PMI is required when the PCM is replaced.

DIAGNOSIS AND TESTING > PASSIVE ANTI-THEFT SYSTEM (PATS) > BCM DTC CHART

Diagnostics in this service information assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

DTC	Description	Action

B10C7:01	Interior Trunk Antenna: General Electrical Failure	GO to Pinpoint Test A
B10C9:01	Interior Front Antenna: General Electrical Failure	GO to Pinpoint Test A
B10D7:05	PATS Key: System Programming Failure	DIAGNOSE all other Diagnostic Trouble codes (DTCs) first. If no other Diagnostic Trouble codes (DTCs) are present, PROGRAM the suspect passive key again. If key programming fails, REPLACE the suspect passive key. PROGRAM the new passive key. REFER to: Anti-Theft Security Access .
B10D7:55	PATS Key: Not Configured	The Configurable Engine Immobilizer (CEI) was not completed during the PMI procedure. CARRY OUT the Configurable Engine Immobilizer (CEI) as part of the PMI procedure.
B10D8:00	PATS Key Less Than Minimum Programmed: No Sub Type Information	Less than 2 keys are programmed (minimum of 2 keys must be programmed). PROGRAM the customer's second key. REFER to: Anti-Theft Security Access .
B10DA:51	PATS Target Identifier: Not Programmed	There is no PCM ID stored in the BCM memory. PERFORM a parameter reset. REFER to: Anti-Theft Security Access .
B11C6:01	Passenger Door External Antenna: General Electrical Failure	GO to Pinpoint Test A
B11CA:01	Driver Door External Antenna: General Electrical Failure	GO to Pinpoint Test A
All other Diagnostic Trouble Codes (DTCs)	-	REFER to: Body Control Module (BCM) .

DIAGNOSIS AND TESTING > PASSIVE ANTI-THEFT SYSTEM (PATS) > PCM DTC CHART

Diagnostics in this service information assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

DTC	Description	Action

P161A	Incorrect Response from Immobilizer Control Module	The BCM ID received by the PCM does not match the ID stored in the PCM memory. PERFORM a parameter reset. REFER to: Anti-Theft Security Access .
All other Diagnostic Trouble Codes (DTCs)	-	REFER to the appropriate Electronic Engine Controls article.

DIAGNOSIS AND TESTING > PASSIVE ANTI-THEFT SYSTEM (PATS) > SYMPTOM CHART

Symptom Chart: PATS

Diagnostics in this service information assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

Condition	Possible Sources	Actions
The vehicle does not start with the passive key in certain areas within the vehicle but starts using the passive key backup location	Refer to the Pinpoint Test	GO to Pinpoint Test A
Unable to turn the ignition on	Refer to the Pinpoint Test	GO to Pinpoint Test B
No Key Detected displays in the message center	Refer to the Pinpoint Test	GO to Pinpoint Test C
Unable to program keys	Refer to the Pinpoint Test	GO to Pinpoint Test D

DIAGNOSIS AND TESTING > PASSIVE ANTI-THEFT SYSTEM (PATS) > PINPOINT TESTS

The Vehicle Does Not Start With The Passive Key In Certain Areas Within The Vehicle But Starts Using The Passive Key Backup Location

Refer to Passive Anti-Theft System for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Passive Anti-Theft System (PATS) - System Operation and Component Description .

The PATS does not disable an already running vehicle.

BCM DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions

B10C7:01	Interior Trunk Antenna: General Electrical Failure	Sets when the BCM detects a fault with the keyless entry rear antenna or associated circuitry.
B10C9:01	Interior Front Antenna: General Electrical Failure	Sets when the BCM detects a fault with the PATS front antenna or associated circuitry.
B11C6:01	Passenger Door External Antenna: General Electrical Failure	Sets when the BCM detects a fault with the passenger door keyless entry antenna or associated circuitry.
B11CA:01	Driver Door External Antenna: General Electrical Failure	Sets when the BCM detects a fault with the driver door keyless entry antenna or associated circuitry.

Possible Causes

- Environmental interference
- Wiring, terminals or connectors
- PATS front antenna
- Keyless entry rear antenna
- Driver exterior door handle
- Passenger exterior door handle
- BCM

DIAGNOSIS AND TESTING > PASSIVE ANTI-THEFT SYSTEM (PATS) > PINPOINT TESTS > PINPOINT TEST A : THE VEHICLE DOES NOT START WITH THE PASSIVE KEY IN CERTAIN AREAS WITHIN THE VEHICLE BUT STARTS USING THE PASSIVE KEY BACKUP LOCATION > PINPOINT TEST A : THE VEHICLE DOES NOT START WITH THE PASSIVE KEY IN CERTAIN AREAS WITHIN THE VEHICLE BUT STARTS USING THE PASSIVE KEY BACKUP LOCATION

A1 CHECK FOR BCM (BODY CONTROL MODULE) ANTENNA DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition ON.

Using a diagnostic scan tool, perform the BCM self-test. Record the DTC.

Ignition OFF.

Is BCM DTC B10C7:01, B10C9:01, B11C6:01 or B11CA:01 present?

Yes	GO to A6

No	GO to A2

A2 CHECK THE RKE (REMOTE KEYLESS ENTRY) TRANSMITTER OPERATION

Press the lock and unlock RKE transmitter buttons on the suspect passive key.

Do the doors lock and unlock?

Yes	GO to A3

No	REFER to: Locks, Latches and Entry Systems .

A3 CHECK THE PASSIVE KEY LOCATION

Check the location of the passive key. If it is placed in the far corners of the interior of the vehicle, move the passive key out of these areas and attempt to start the vehicle.

Does the vehicle start?

Yes	The system is OK. INFORM the customer of the normal vehicle operation.

No	GO to A4

A4 CHECK FOR ENVIRONMENTAL INTERFERENCE

Check for the use of a charger or other wireless device that can cause interference with the passive key. If any device is found, remove the device and attempt to start the vehicle.

Does the vehicle start?

Yes	INFORM the customer of the cause of the concern and the normal operation of the vehicle.

No	GO to A5

A5 CHECK WITH THE SUSPECT PASSIVE KEY IN THE BACKUP STARTING LOCATION

Place the passive key in the backup location. REFER to: Passive Anti-Theft System (PATS) - Component Location .

Press the START/STOP button.

Does the ignition turn on?

Yes	GO to A6

No	GO to Pinpoint Test D

NOTE: If no Diagnostic Trouble Codes (DTCs) are present, follow the diagnostics for the PATS front antenna.

A6 CHECK THE SUSPECT ANTENNA

Disconnect suspect antenna.

Measure:

PATS Front Antenna

Positive Lead	Measurement / Action	Negative Lead
C3513, pin 1, component side	Ω	C3513, pin 2, component side

Keyless Entry Rear Antenna

Positive Lead	Measurement / Action	Negative Lead
C4378, pin 1, component side	Ω	C4378, pin 2, component side

Driver Exterior Front Door Handle

Positive Lead	Measurement / Action	Negative Lead
C543, pin 2, component side	Ω	C543, pin 3, component side

Passenger Exterior Front Door Handle

Positive Lead	Measurement / Action	Negative Lead
C634, pin 2, component side	Ω	C634, pin 3, component side

Is the resistance between 1 and 3 ohms?

Yes	GO to A7

No	INSTALL a new antenna in question. REFER to: Passive Anti-Theft System (PATS) Front Antenna . REFER to: Exterior Front Door Handle . REFER to: Keyless Entry Rear Antenna .

A7 CHECK THE SUSPECT ANTENNA CIRCUITS FOR A SHORT TO VOLTAGE

Disconnect BCM C2280D .

Measure:

PATS Front Antenna

Positive Lead	Measurement / Action	Negative Lead
C3513-1		Ground
C3513-2		Ground

Keyless Entry Rear Antenna

Positive Lead	Measurement / Action	Negative Lead
C4378-1		Ground
C4378-2		Ground

Driver Exterior Front Door Handle

Positive Lead	Measurement / Action	Negative Lead
C543-2		Ground
C543-3		Ground

Passenger Exterior Front Door Handle

Positive Lead	Measurement / Action	Negative Lead
C634-2		Ground
C634-3		Ground

Is any voltage present?

Yes	REPAIR the circuit in question.

No	GO to A8

A8 CHECK THE SUSPECT ANTENNA CIRCUITS FOR A SHORT TO GROUND

Measure:

PATS Front Antenna

Positive Lead	Measurement / Action	Negative Lead

C3513-1	Ω	Ground
C3513-2	Ω	Ground

Keyless Entry Rear Antenna

Positive Lead	Measurement / Action	Negative Lead
C4378-1	Ω	Ground
C4378-2	Ω	Ground

Driver Exterior Front Door Handle

Positive Lead	Measurement / Action	Negative Lead
C543-2	Ω	Ground
C543-3	Ω	Ground

Passenger Exterior Front Door Handle

Positive Lead	Measurement / Action	Negative Lead
C634-2	Ω	Ground
C634-3	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to A9

No	REPAIR the circuit in question.

A9 CHECK THE SUSPECT ANTENNA CIRCUITS FOR AN OPEN

Measure:

PATS Front Antenna

Positive Lead	Measurement / Action	Negative Lead
C3513-1	Ω	C2280D-31
C3513-2	Ω	C2280D-14

Keyless Entry Rear Antenna

Positive Lead	Measurement / Action	Negative Lead

C4378-1	Ω	C2280D-16
C4378-2	Ω	C2280D-15

Driver Exterior Front Door Handle

Positive Lead	Measurement / Action	Negative Lead
C543-2	Ω	C2280D-13
C543-3	Ω	C2280D-28

Passenger Exterior Front Door Handle

Positive Lead	Measurement / Action	Negative Lead
C634-2	Ω	C2280D-12
C634-3	Ω	C2280D-29

Are the resistances less than 3 ohms?

Yes	INSTALL a new antenna in question. REFER to: Passive Anti-Theft System (PATS) Front Antenna . REFER to: Exterior Front Door Handle . REFER to: Keyless Entry Rear Antenna . TEST the system for normal operation. If the concern is still present, GO to A10

No	REPAIR the circuit in question.

A10 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all of the BCM connectors.

Repair:

corrosion (install new connectors or terminals, clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect all the BCM connectors and make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by

	module connections. Address the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > PASSIVE ANTI-THEFT SYSTEM (PATS) > PINPOINT TESTS > PINPOINT TEST B : UNABLE TO TURN THE IGNITION ON

Normal Operation and Fault Conditions

REFER to: Passive Anti-Theft System (PATS) - System Operation and Component Description .

Possible Causes

- Battery voltage concern
- Driveability system concern
- Starting system concern
- PATS concern

DIAGNOSIS AND TESTING > PASSIVE ANTI-THEFT SYSTEM (PATS) > PINPOINT TESTS > PINPOINT TEST B : UNABLE TO TURN THE IGNITION ON > PINPOINT TEST B : UNABLE TO TURN THE IGNITION ON

B1 CHECK VEHICLE BATTERY

Carry out the Battery Condition Test. REFER to: BATTERY .

Is the battery OK?

Yes	GO to B2

No	CORRECT the battery condition and VERIFY correct charging operation. REFER to: Charging System - 2.3L EcoBoost (201kW/273PS) . REFER to: Charging System - 3.7L Duratec (227kW/301PS) . REFER to: Charging System - 5.0L 32V Ti-VCT .

B2 CHECK FOR THE NO KEY DETECTED MESSAGE

Press and release the START/STOP button while monitoring the message center.

Is the No Key Detected message displayed in the message center?

Yes	GO to Pinpoint Test C

No	GO to B3

B3 CHECK FOR IGNITION ON MODE

Press and release the START/STOP button while monitoring the ignition mode indicator at the top of the button.

Does the ignition mode indicator flash on and off continuously?

Yes	The condition is not PATS-related. DIAGNOSE no power in ON. REFER to: Steering Wheel and Column Electrical Components .

No	GO to B4

B4 CHECK FOR BCM (BODY CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Follow the procedure to establish a diagnostic scan tool session with the vehicle. REFER to: Diagnostic Methods .

Using a diagnostic scan tool, perform the BCM self-test.

Are any BCM Diagnostic Trouble Codes (DTCs) present?

Yes	REFER to the BCM DTC Chart .

No	The condition is not PATS-related. DIAGNOSE no power in ON. REFER to: Steering Wheel and Column Electrical Components .

DIAGNOSIS AND TESTING > PASSIVE ANTI-THEFT SYSTEM (PATS) > PINPOINT TESTS > PINPOINT TEST C : NO KEY DETECTED DISPLAYS IN THE MESSAGE CENTER

Normal Operation and Fault Conditions

REFER to: Passive Anti-Theft System (PATS) - System Operation and Component Description .

Possible Causes

- Environmental interference
- Passive key

Visual Inspection and Diagnostic Pre-Checks

- Inspect the passive key for damage.

DIAGNOSIS AND TESTING > PASSIVE ANTI-THEFT SYSTEM (PATS) > PINPOINT TESTS > PINPOINT TEST C : NO KEY DETECTED DISPLAYS IN THE MESSAGE CENTER > PINPOINT TEST C : NO KEY DETECTED DISPLAYS IN THE MESSAGE

CENTER

C1 CHECK THE RKE (REMOTE KEYLESS ENTRY) TRANSMITTER OPERATION

Press the lock and unlock RKE transmitter buttons on the suspect passive key.

Do the doors lock and unlock?

Yes	GO to C2

No	REFER to: Locks, Latches and Entry Systems .

C2 CHECK FOR ENVIRONMENTAL INTERFERENCE

Check for the use of a charger or other wireless device that can cause interference with the passive key. If any device is found, remove the device and attempt to start the vehicle.

Does the vehicle start?

Yes	INFORM the customer of the cause of the concern and the normal operation of the vehicle.

No	GO to C3

C3 CHECK THE PASSIVE KEY OPERATION FROM MULTIPLE AREAS

Place the passive key in several locations within the vehicle and press the START/STOP button each time.

Does the ignition turn on with the passive key in certain areas only?

Yes	GO to Pinpoint Test A

No	GO to C4

C4 VERIFY THE PASSIVE FEATURE IS ENABLED

Using a diagnostic scan tool, check the BCM passive start programmable parameter.

Is the BCM passive start programmable parameter enabled?

Yes	GO to C5

No	ENABLE the passive start programmable parameter.

C5 CHECK THE PASSIVE KEY OPERATION FROM THE BACKUP STARTING LOCATION

Place the passive key in the backup location. REFER to: Passive Anti-Theft System (PATS) - Component Location .

Press the START/STOP button.

Does the ignition turn on?

Yes	GO to Pinpoint Test A
No	GO to Pinpoint Test D

DIAGNOSIS AND TESTING > PASSIVE ANTI-THEFT SYSTEM (PATS) > PINPOINT TESTS > PINPOINT TEST D : UNABLE TO PROGRAM KEYS

Refer to Passive Anti-Theft System for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Passive Anti-Theft System (PATS) - System Operation and Component Description .

When programming keys or using a key in the backup starting location, the PATS front antenna operates similar to a standard PATS transceiver.

The PATS sends a signal to the PATS front antenna to read the key transponder ID. The PATS front antenna sends the key ID to the BCM.

The BCM either compares the key ID against what is already programmed (backup starting) or programs that key ID into memory (key programming). A maximum of 4 passive keys can be programmed into the BCM memory.

Possible Causes

- Wiring, terminals or connectors
- Passive key
- PATS front antenna
- BCM

DIAGNOSIS AND TESTING > PASSIVE ANTI-THEFT SYSTEM (PATS) > PINPOINT TESTS > PINPOINT TEST D : UNABLE TO PROGRAM KEYS > PINPOINT TEST D : UNABLE TO PROGRAM KEYS

D1 CHECK FOR THE CORRECT KEYS

Verify the keys present are the correct type for the vehicle.

Are the correct keys present?

Yes	GO to D2

No	The system cannot be tested without the correct keys. INFORM the customer the correct keys must be present to proceed with diagnosis of the system.

D2 CHECK FOR OTHER VALID PROGRAMMED KEYS

Check for other valid programmed keys.

Is a valid programmed key present?

Yes	GO to D4

No	GO to D3

NOTE: This step requires 2 passive keys to be programmed into the BCM. Any previous programmed passive keys are erased from memory.

D3 VERIFY THE KEY PLACEMENT FOR KEY PROGRAMMING

Verify the key is correctly placed in the backup starting location. REFER to: Passive Anti-Theft System (PATS) - System Operation and Component Description .

Using a diagnostic scan tool, erase and program the new passive keys. REFER to: Anti-Theft Security Access .

Do the keys program to the vehicle?

Yes	The vehicle is operating correctly. The concern was caused by an improperly placed passive key.

No	GO to D6

D4 HECK THE BACKUP STARTING METHOD USING THE VALID PROGRAMMED KEY

Ignition OFF.

Disconnect BCM Fuse 32 (10A).

Place the **valid** programmed key in the backup starting location. REFER to: DESCRIPTION AND OPERATION .

Press the START/STOP button.

Does the ignition transition out of OFF?

Yes	INSTALL the BCM fuse 32 (10A). REMOVE the valid key from the backup starting location. Place the **suspect** in the backup starting location and PROGRAM the key again. REFER

	to: GENERAL PROCEDURES . If the key does not program, DISCARD the suspect key and PROGRAM a new key.

No	INSTALL the BCM fuse 32 (10A). GO to D5

D5 VERIFY THE KEY PLACEMENT

Verify the key is correctly placed in the backup starting location. REFER to: Passive Anti-Theft System (PATS) - System Operation and Component Description .

Press the START/STOP button.

Does the ignition transition out of OFF?

Yes	The vehicle is operating correctly. The concern was caused by an improperly placed passive key.

No	GO to D6

NOTE: For a concern with key programming or if unable to start the vehicle with the passive key in the backup starting location, follow the diagnostics for the PATS front antenna.

D6 CHECK THE PATS (PASSIVE ANTI-THEFT SYSTEM) FRONT ANTENNA

Disconnect PATS Front Antenna.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3513, pin 1, component side	Ω	C3513, pin 2, component side

Is the resistance between 1 and 3 ohms?

Yes	GO to D7

No	INSTALL a new PATS front antenna. REFER to: Passive Anti-Theft System (PATS) Front Antenna .

D7 CHECK THE PATS (PASSIVE ANTI-THEFT SYSTEM) FRONT ANTENNA CIRCUITS FOR A SHORT TO VOLTAGE

Disconnect BCM C2280D .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3513-1		Ground
C3513-2		Ground

Is any voltage present?

Yes	REPAIR the circuit in question.

No	GO to D8

D8 CHECK THE PATS (PASSIVE ANTI-THEFT SYSTEM) FRONT ANTENNA CIRCUITS FOR A SHORT TO GROUND

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3513-1	Ω	Ground
C3513-2	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to D9

No	REPAIR the circuit in question.

D9 CHECK THE PATS (PASSIVE ANTI-THEFT SYSTEM) FRONT ANTENNA CIRCUITS FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3513-1	Ω	C2280D-31
C3513-2	Ω	C2280D-14

Are the resistances less than 3 ohms?

Yes	INSTALL a new PATS front antenna. REFER to: Passive Anti-Theft System (PATS) Front Antenna . TEST the system for normal operation. If the concern is still present, GO to D10

No	REPAIR the circuit in question.

D10 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all of the BCM connectors.

Repair:

corrosion (install new connectors or terminals, clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect all the BCM connectors and make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. Address the root cause of any connector or pin issues.

GENERAL PROCEDURES > ANTI-THEFT SECURITY ACCESS

Programming

*NOTE: In order to gain module security access, the diagnostic scan tool **must** have an active connection to the internet. A hardwired internet connection is strongly recommended.*

NOTE: When programming keys, the RKE transmitter and the PATS portion of the key are programmed at the same time.

NOTE: Common anti-theft security access choices are:

- **Program Additional Key**
- **Erase and Program Keys**
- **Parameter Reset**
- **Customer Spare Key Programming Enable/Disable**
- **Unlimited Key Mode ON/OFF (vehicles with Integrated Keyhead Transmitter (IKT) only)**
- **Program Unlimited Key Code (vehicles with Integrated Keyhead Transmitter (IKT) only)**

NOTE: If no valid programmed keys are available and the perimeter alarm activates when the scan tool is connected, carry out the following steps.

1.

A. Wait 10 minutes after triggering the alarm. A single horn chirp sounds to indicate a 1 minute data link access time period begins.

B. Connect the scan tool to the DLC and begin a scan tool session.

C. Access the PATS Functions to gain security access. Once security access is obtained, the 1 minute data link access time period extends indefinitely.

D. Follow the procedure to erase and program keys.

Follow the procedure to establish a session with the vehicle. Refer to: Diagnostic Methods .

2.

From the diagnostic scan tool, enter TOOLBOX. Select Body>Security> PATS Functions.

3.

Select Yes when Gaining Security Access displays.

4.

Select either Dealer or Aftermarket and enter a valid username and password when prompted.

5.

Return to the diagnostic scan tool window.

NOTE: If programming a passive key, refer to the Owner's Literature for the backup starting passive key location. The passive key must be placed in this location for the passive key to successfully program.

6.
Select the appropriate procedure and follow the on-screen instructions.

GENERAL PROCEDURES > KEY PROGRAMMING USING TWO PROGRAMMED KEYS

Programming

NOTE: This procedure works only if the spare key programming is enabled.

NOTE: Two previously programmed keys are required to perform this procedure. All the

steps must be completed within 30 seconds.

NOTE: Make sure all the doors are closed prior to beginning this procedure and that they remain closed until the procedure is complete.

1.

Locate the passive key backup starting location. Refer to: Passive Anti-Theft System (PATS) - System Operation and Component Description .

2.

Place the first programmed passive key in the backup starting location. Press the START/STOP button.

3.

Wait 5 seconds and then press the START/STOP button.

4.

Remove the first programmed passive key.

5.

Within 10 seconds, place the second programmed passive key in the backup starting location and press the START/STOP button.

6.

Wait 5 seconds and press the START/STOP button.

7.

Remove the second programmed passive key.

NOTE: A maximum of 4 keys can be programmed into the vehicle.

8.
Wait 5 seconds and then place the unprogrammed passive key in the backup starting location and press the START/STOP button.

NOTE: If the key does not successfully program, wait at least 10 seconds before attempting to repeat the procedure.

9.
Verify the RKE transmitter operates and the vehicle starts using the new passive key.

REMOVAL AND INSTALLATION > PASSIVE ANTI-THEFT SYSTEM (PATS) FRONT ANTENNA

Special Tool(s) / General Equipment

Interior Trim Remover

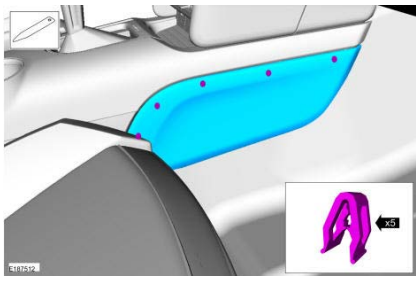
REMOVAL AND INSTALLATION > PASSIVE ANTI-THEFT SYSTEM (PATS) FRONT ANTENNA > REMOVAL

NOTE: Automatic transmission shown in illustration, manual transmission similar.

NOTE: Removal steps in this procedure may contain installation details.

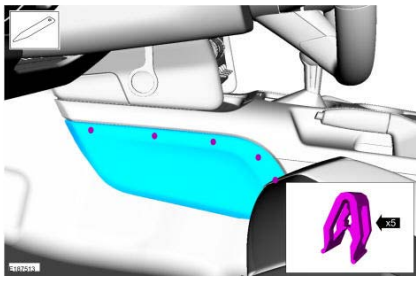
1.

Release the clips and remove the floor console RH side trim panel. Use the General Equipment: Interior Trim Remover



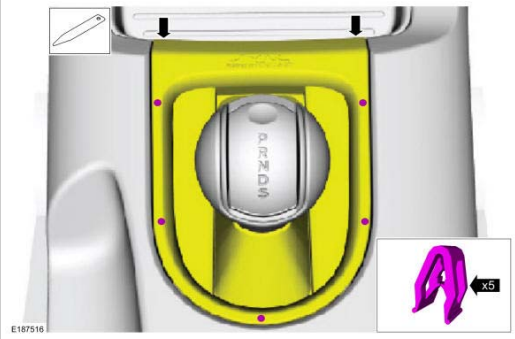
2.

Release the clips and the floor console LH side trim panel. Use the General Equipment: Interior Trim Remover



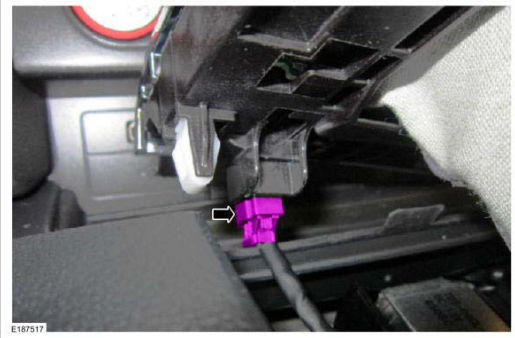
3.

Remove the selector lever bezel. Use the General Equipment: Interior Trim Remover



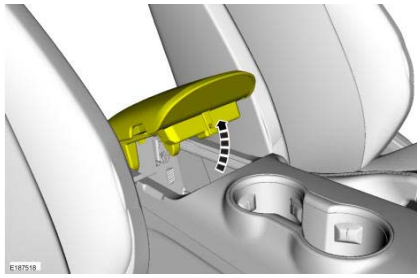
4.

Disconnect the electrical connector and position aside the selector lever boot.



5.

Open the floor console lid.

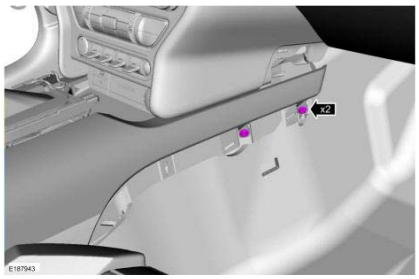


6.

Remove the RH side front retainers.

Torque

: 18 lb.in (2 Nm)

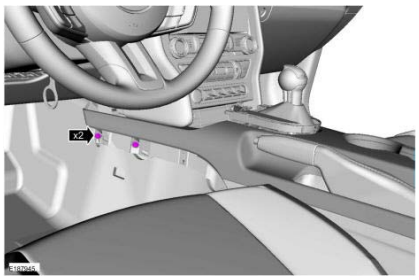


7.

Remove the LH side front retainers.

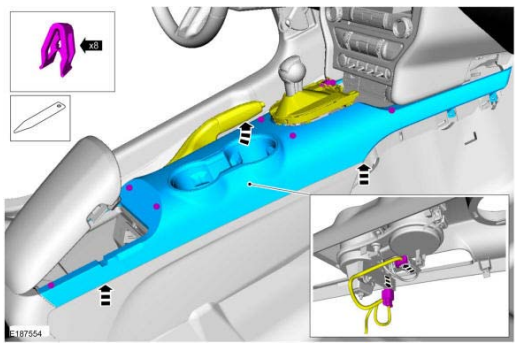
Torque

: 18 lb.in (2 Nm)



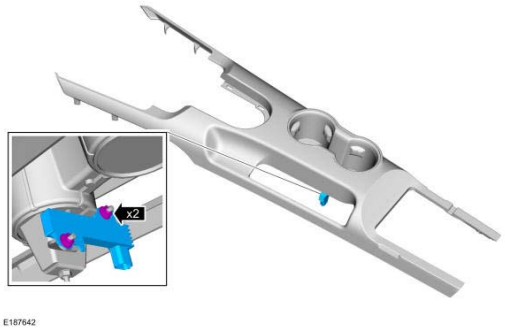
8.

Release the clips, position the selector lever boot, disconnect the electrical connectors and remove the floor console upper trim panel. Use the General Equipment: Interior Trim Remover



9.

Remove the retainers and the PATS front antenna.



REMOVAL AND INSTALLATION > PASSIVE ANTI-THEFT SYSTEM (PATS) FRONT ANTENNA > INSTALLATION

1.

To install, reverse the removal procedure.

Service Manual: PERIMETER ANTI-THEFT ALARM

DESCRIPTION AND OPERATION > PERIMETER ANTI-THEFT ALARM - OVERVIEW > OVERVIEW

The perimeter alarm system deters unauthorized entry into the vehicle by sounding the traffic horn and/or the anti-theft alarm horn and flashing all the turn signals and interior courtesy lamps. When an unauthorized entry occurs or the intrusion sensor detects motion inside the vehicle when the alarm is armed, the horn(s) and lamps activate for 30 seconds. After 30 seconds, the horn(s) stops sounding, but the lamps continue to flash for up to 5 minutes.

The panic alarm operates similar to the perimeter alarm, but only activates using the panic button on the RKE transmitter.

DESCRIPTION AND OPERATION > PERIMETER ANTI-THEFT ALARM - SYSTEM OPERATION AND COMPONENT DESCRIPTION

System Operation

DESCRIPTION AND OPERATION > PERIMETER ANTI-THEFT ALARM - SYSTEM OPERATION AND COMPONENT DESCRIPTION > NETWORK MESSAGE CHART

IPC Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Perimeter alarm chime request	BCM	Used by the IPC to sound the perimeter alarm chime during the 12-second delay.

BCM Network Input Messages

Broadcast Message	Originating Module	Message Purpose
RKE data	RTM	Used by the BCM to arm/disarm the perimeter alarm or to activate/deactivate the panic alarm.
Driver door lock switch status	DDM	Used by the BCM to arm the perimeter alarm (vehicles with memory seats).
Passenger door lock switch status	PDM	Used by the BCM to arm the perimeter alarm (vehicles with memory seats).

Perimeter Alarm

The BCM controls the operation of the perimeter alarm. It monitors inputs from the RKE system, the passive entry system, the power door lock system, the PATS and the ignition status to determine when to arm the perimeter alarm.

The BCM monitors all of the door ajar switches, the luggage compartment lid ajar input, the hood ajar switch, the intrusion sensor, the CAN and the ignition status to determine when to activate the perimeter alarm. When the BCM detects an input indicating an unauthorized entry into the vehicle, the BCM activates the perimeter alarm by sounding the traffic horn and/or the anti-theft alarm horn and flashing all the turn signals and interior courtesy lamps at regular intervals.

The BCM monitors the RKE system, the passive entry system, and the PATS to determine when to disarm the perimeter alarm.

A switch inhibit feature temporarily disables the door lock control switches and the interior luggage compartment lid release switch 20 seconds after the vehicle is electronically locked. For detailed information of the switch inhibit feature, Refer to: Handles, Locks, Latches and Entry Systems - Overview .

Additionally, there is a door lock LED indicator located on each door window sill. The indicators provide lock/unlock indication for each door. They illuminate when the door is locked and are off when the door is unlocked. For detailed information of the door lock LED indicators, Refer to: Handles, Locks, Latches and Entry Systems - Overview .

Visual and audible feedback is also provided when locking or unlocking the vehicle. For detailed information of the vehicle locking and unlocking feedback, Refer to: Handles, Locks, Latches and Entry Systems - Overview .

Arming The Perimeter Alarm

The perimeter alarm is ready to arm any time the ignition is off. The perimeter alarm pre-arms when any of the following occur:

- Pressing the lock button on a RKE transmitter
- Pressing the door lock control switch to the lock position with a front door open, and then closing the door
- Locking the vehicle with the passive entry feature

Once the system is pre-armed, there is a 20-second countdown before the perimeter alarm is armed. Each entry point to the vehicle (hood, door and luggage compartment lid) is armed separately and must be closed before that entry point begins the 20-second countdown to become armed. If all entry points are closed, the turn signals flash upon locking indicating that all entry points are entering the 20-second countdown.

Perimeter Alarm Activation

The perimeter alarm has a 12-second delay when the driver front door is opened without using a valid programmed RKE transmitter or a passive key to unlock the vehicle. During the delay, a chime sounds. If the perimeter alarm is not disarmed within the 12-second delay, the alarm activates.

The perimeter alarm activates when:

- the driver front door is opened without first receiving an unlock command from the passive entry feature or a valid programmed RKE transmitter, and the 12-second delay has expired.

- any other door, the luggage compartment lid or the hood is opened without first receiving an electronic unlock command from the passive entry feature or a valid programmed RKE transmitter.
- the ignition transitions to RUN without a valid PATS key read received.
- the BCM detects an attempt by a diagnostic scan tool to establish communication on the CAN.

The perimeter alarm only activates 10 times per arming cycle. After that, the alarm does not activate. To enable the perimeter alarm again, disarm the perimeter alarm and then arm it again.

Disarming The Perimeter Alarm

The perimeter alarm disarms when:

- pressing the unlock button on a door lock control switch within the 20-second pre-arm.
- the smart unlock feature activates within the initial 20-second pre-arm.
- pressing the unlock button on a valid programmed RKE transmitter.
- pressing the luggage compartment lid release button on a programmed RKE transmitter (this only disarms the luggage compartment lid entry point with the rest of the vehicle remaining armed).
- using a valid programmed key to change the ignition to RUN.
- unlocking a front door or opening the luggage compartment lid using the passive entry feature.

CAN Protection Strategy

When the perimeter alarm is armed, the BCM monitors the CAN. If a scan tool is connected to the DLC, and an attempt is made to establish a session with the BCM, it activates the perimeter alarm.

Every time the BCM detects an unauthorized access (alarm activates), all BCM programming, PID monitoring and self-test sessions are blocked for 10 minutes. At the end of the 10 minute time period, the traffic horn chirps to indicate the 1 minute of opportunity to communicate with the BCM and program keys if none are available.

Refer to: Anti-Theft Security Access .

Component Description

Door Latch

The door ajar switch, the lock/unlock solenoid and the lock/unlock status input switch are part of the door latch and not serviceable separately.

The door ajar switch is monitored by the BCM and the primary function is for the courtesy lamps system. Refer to: Interior Lighting - System Operation and Component Description .

The lock/unlock solenoid is controlled by the BCM for locking and unlocking the door. Refer to: Handles, Locks, Latches and Entry Systems - Overview .

The lock/unlock status input switch is used to illuminate the door lock status indicator. Refer to: Handles, Locks, Latches and Entry Systems - Overview .

Hood Ajar Switch

The hood ajar switch is a single pole switch (integrated into the hood latch) that is normally closed when

the hood is closed. When the hood is opened, the hood ajar switch opens to indicate an open hood.

The BCM sends a signal to the hood ajar switch, and based on the input, the BCM determines if the hood is open or closed.

Intrusion Sensor

The intrusion sensor is powered at all times and is monitored by the BCM. When the perimeter alarm is armed, the intrusion sensor monitors the passenger compartment for movement and, if movement is detected, it sends a signal to the BCM.

When the intrusion sensor is replaced, the BCM configuration must first be uploaded into a diagnostic scan tool, a new intrusion sensor installed, and then the BCM configuration downloaded back into the BCM for the new intrusion sensor to operate correctly.

Anti-Theft Alarm Horn

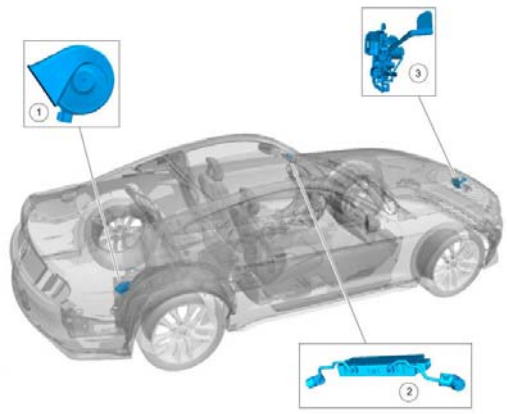
The anti-theft alarm horn is located behind the right rear quarter trim panel and is controlled by the BCM. When the perimeter alarm activates, the BCM energizes an internal relay to provide voltage to the anti-theft alarm horn. The anti-theft alarm horn is similar in design to a traffic horn.

BCM

The BCM controls the operation of the perimeter alarm. Based on input, the BCM arms, disarms, activates or deactivates the perimeter alarm.

The BCM requires PMI when replaced. Additionally, at least 2 keys must be programmed and the parameter reset procedure carried out.

DESCRIPTION AND OPERATION > PERIMETER ANTI-THEFT ALARM - COMPONENT LOCATION



Item	Description
1	Anti-theft alarm horn
2	Intrusion sensor

3	Hood latch (with integrated hood ajar switch)

DIAGNOSIS AND TESTING > PERIMETER ANTI-THEFT ALARM > BCM DTC CHART

Diagnostics in this service information assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

BCM DTC Chart

DTC	Description	Action
B109F:01	Intrusion Sensor Module: General Electrical Failure	GO to Pinpoint Test B
B109F:02	Intrusion Sensor Module: General Signal Failure	GO to Pinpoint Test B
B109F:08	Intrusion Sensor Module: Bus Signal / Message Failure	GO to Pinpoint Test B
B109F:49	Intrusion Sensor Module: Internal Electronic Failure	INSTALL a new intrusion sensor.
B109F:55	Intrusion Sensor Module: Not Configured	Using a diagnostic scan tool, CARRY OUT the LIN New Module Initialization procedure (Toolbox>Electrical>Service Functions>LIN New Module Initialization).
B109F:97	Intrusion Sensor Module: Component or System Operation Obstructed or Blocked	GO to Pinpoint Test B
B109F:9A	Intrusion Sensor Module: Component or System Operating Conditions	GO to Pinpoint Test B
B1305:01	Hood Switch: General Electrical Failure	GO to Pinpoint Test F
All other Diagnostic Trouble Codes (DTCs)	-	REFER to: Body Control Module (BCM) .

Symptom Chart

Symptom Chart: Anti-Theft - Perimeter

Diagnostics in this service information assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

DIAGNOSIS AND TESTING > PERIMETER ANTI-THEFT ALARM > SYMPTOM CHART

Symptom Chart: Anti-Theft - Perimeter

Diagnostics in this service information assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

Symptom Chart

Condition	Possible Sources	Actions
The alarm system does not activate from an unauthorized entry at the hood	Refer to the Pinpoint Test	GO to Pinpoint Test A
The alarm system does not activate from an unauthorized entry at a door	Door ajar input	DIAGNOSE the courtesy lamps not illuminating when a door is open. REFER to: Interior Lighting .
The alarm system does not activate from an unauthorized entry at the luggage compartment lid	Luggage compartment lid ajar input	DIAGNOSE the incorrect luggage compartment lid ajar indication. REFER to: Instrumentation, Message Center and Warning Chimes .
The alarm system does not activate from the intrusion sensor	Refer to the Pinpoint Test	GO to Pinpoint Test B
The alarm system does not arm or no turn signals flash confirmation	Refer to the Pinpoint Test	GO to Pinpoint Test C
No traffic horn output during alarm activation	Horn output concern	REFER to: Horn .
No anti-theft alarm horn output during alarm activation	Refer to the Pinpoint Test	GO to Pinpoint Test D
The anti-theft alarm horn sounds continuously	Refer to the Pinpoint Test	GO to Pinpoint Test E
False alarm activation	Intrusion sensor input Door ajar input Hood switch input Liftgate ajar input Panic button pressed on a RKE transmitter A valid PATS key read was NOT received when the ignition transitioned to RUN	An intermittent fault exists. MONITOR the BCM alarm event Parameter Identifications (PIDs) to identify and isolate the cause of the last alarm activation. Most Recent Alarm Trigger Event (ALARM_EVT_1) 2nd Most Recent Alarm Trigger Event (ALARM_EVT_2) 3rd Most Recent Alarm Trigger Event (ALARM_EVT_3) 4th Most Recent Alarm Trigger Event (ALARM_EVT_4)

DIAGNOSIS AND TESTING > PERIMETER ANTI-THEFT ALARM > PINPOINT TESTS

The Alarm System Does Not Activate from an Unauthorized Entry at the Hood

Refer to Remote Keyless Entry and Alarm for schematic and connector information.

Normal Operations and Fault Conditions

REFER to: Perimeter Anti-Theft Alarm - System Operation and Component Description .

Possible Causes

- Wiring, terminals or connectors
- Hood latch
- BCM

Visual Inspection and Diagnostic Pre-checks

- Inspect the hood latch for damage.

DIAGNOSIS AND TESTING > PERIMETER ANTI-THEFT ALARM > PINPOINT TESTS > PINPOINT TEST A : THE ALARM SYSTEM DOES NOT ACTIVATE FROM AN UNAUTHORIZED ENTRY AT THE HOOD > PINPOINT TEST A : THE ALARM SYSTEM DOES NOT ACTIVATE FROM AN UNAUTHORIZED ENTRY AT THE HOOD

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may damage the connector.

A1 MONITOR THE BCM (BODY CONTROL MODULE) HOOD AJAR SWITCH (HOOD_SW) PID (PARAMETER IDENTIFICATION)

Ignition ON.

Using a diagnostic scan tool, view the BCM Parameter Identifications (PIDs).

Using a diagnostic scan tool, monitor the BCM HOOD_SW PID.

Disconnect Hood Ajar Switch C127 .

Does the PID read AJAR when the switch is disconnected?

Yes	INSTALL a new hood latch. REFER to: Hood Latch .

No	GO to A2

A2 CHECK THE HOOD AJAR SWITCH INPUT CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Disconnect BCM C2280F .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C127-2	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to A3

No	REPAIR the circuit.

A3 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect all BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > PERIMETER ANTI-THEFT ALARM > PINPOINT TESTS > PINPOINT TEST B : THE ALARM SYSTEM DOES NOT ACTIVATE FROM THE INTRUSION SENSOR

Refer to Remote Keyless Entry and Alarm for schematic and connector information.

Normal Operations and Fault Conditions

REFER to: Perimeter Anti-Theft Alarm - System Operation and Component Description .

BCM DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B109F:01	Intrusion Sensor Module: General Electrical Failure	Sets when the BCM detects a short to ground from the intrusion sensor LIN circuit.
B109F:02	Intrusion Sensor Module: General Signal Failure	Sets when the BCM detects a communication fault with the intrusion sensor.
B109F:08	Intrusion Sensor Module: Bus Signal / Message Failure	Sets when the BCM detects a communication fault with the intrusion sensor.
B109F:97	Intrusion Sensor Module: Component or System Operation Obstructed or Blocked	Sets when the intrusion sensor communicates to the BCM that it detects the motion sensor is blocked.
B109F:9A	Intrusion Sensor Module: Component or System Operating Conditions	Sets when the BCM detects a communication fault with the intrusion sensor.

Possible Causes

- Fuse
- Wiring, terminals or connectors
- Intrusion sensor
- BCM

Visual Inspection and Diagnostic Pre-checks

- Inspect the BCM fuse 18 (5A)

DIAGNOSIS AND TESTING > PERIMETER ANTI-THEFT ALARM > PINPOINT TESTS > PINPOINT TEST B : THE ALARM SYSTEM DOES NOT ACTIVATE FROM THE INTRUSION SENSOR > PINPOINT TEST B : THE ALARM SYSTEM DOES NOT ACTIVATE FROM THE INTRUSION SENSOR

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may damage the connector.

B1 CHECK FOR VOLTAGE TO THE INTRUSION SENSOR

Ignition OFF.

Disconnect Overhead Console C930 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C930-1		Ground

Is the voltage greater than 11 volts?

Yes	GO to B3

No	VERIFY the BCM fuse 18 (5A) is OK. If OK, GO to B2 If not OK, REFER to the OEM WIRING DIAGRAMS article to identify the possible cause of the circuit short.

B2 CHECK THE INTRUSION SENSOR VOLTAGE SUPPLY CIRCUIT FOR A OPEN

Disconnect BCM C2280A .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C930-1	Ω	C2280A-12

Is the resistance less than 3 ohms?

Yes	GO to B8

No	REPAIR the circuit.

B3 CHECK THE INTRUSION SENSOR GROUND CIRCUIT FOR A OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C930-1		C930-5

Is the voltage greater than 11 volts?

Yes	GO to B4

No	REPAIR the circuit.

B4 CHECK THE INTRUSION SENSOR LIN (LOCAL INTERCONNECT NETWORK) CIRCUIT FOR A SHORT TO VOLTAGE

Disconnect BCM C2280E .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C930-2		C930-5

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to B5

B5 CHECK THE INTRUSION SENSOR LIN (LOCAL INTERCONNECT NETWORK) CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C930-2	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to B6

No	REPAIR the circuit.

B6 CHECK THE INTRUSION SENSOR LIN (LOCAL INTERCONNECT NETWORK) CIRCUIT FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C930-2	Ω	C2280E-36

Is the resistance less than 3 ohms?

Yes	GO to B7

No	REPAIR the circuit.

B7 CHECK THE OVERHEAD CONSOLE HARNESS

Inspect the overhead console harness for opens and shorts.

Is the overhead console harness OK?

Yes	INSTALL a new intrusion sensor. TEST the system for normal operation. If the concern is still present, GO to B8

No	REPAIR the overhead console harness or INSTALL a new overhead console as necessary. REFER to: Overhead Console .

B8 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect all BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > PERIMETER ANTI-THEFT ALARM > PINPOINT TESTS > PINPOINT TEST C : THE ALARM SYSTEM DOES NOT ARM OR NO TURN SIGNALS FLASH CONFIRMATION

Normal Operations and Fault Conditions

REFER to: Perimeter Anti-Theft Alarm - System Operation and Component Description .

Possible Causes

- Door ajar input
- Hood switch input

- Luggage compartment lid ajar input
- Turn signal output
- Keyless entry keypad concern
- RKE transmitter concern
- BCM

DIAGNOSIS AND TESTING > PERIMETER ANTI-THEFT ALARM > PINPOINT TESTS > PINPOINT TEST C : THE ALARM SYSTEM DOES NOT ARM OR NO TURN SIGNALS FLASH CONFIRMATION > PINPOINT TEST C : THE ALARM SYSTEM DOES NOT ARM OR NO TURN SIGNALS FLASH CONFIRMATION

NOTE: DTC B1305:01 sets if the hood is open. Make sure the hood is closed prior to running the self-test.

C1 RETRIEVE THE RECORDED DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE BCM (BODY CONTROL MODULE) SELF-TEST

Ignition ON.

Using a diagnostic scan tool, perform the BCM self-test.

Are any Diagnostic Trouble Codes (DTCs) present?

Yes	REFER to the BCM DTC Chart .

No	GO to C2

C2 CHECK THE DOOR AJAR SWITCH INPUT

Close all the doors.

Observe the IPC.

Does the IPC indicate a door is ajar?

Yes	DIAGNOSE the courtesy lamps staying on continuously. REFER to: Interior Lighting .

No	GO to C3

C3 MONITOR THE LUGGAGE COMPARTMENT LID AJAR SWITCH INPUT

Close the luggage compartment lid.

Observe the IPC.

Does the IPC indicate the luggage compartment lid is ajar?

Yes	DIAGNOSE the incorrect luggage compartment lid ajar indication. REFER to: Instrumentation, Message Center and Warning Chimes .

No	GO to C4

C4 VERIFY THE HAZARD FLASHER LAMP OPERATION

Ignition OFF.

Activate the hazard flasher lamp function and observe the turn signals.

Do all the turn signals flash on and off?

Yes	GO to C5

No	DIAGNOSE the inoperative turn signals. REFER to: Turn Signal and Hazard Lamps .

C5 CHECK THE RKE (REMOTE KEYLESS ENTRY) TRANSMITTER FUNCTION

Using the RKE transmitter, lock and unlock the doors.

Do the doors lock and unlock?

Yes	GO to C6

No	DIAGNOSE the inoperative RKE transmitter. REFER to: Locks, Latches and Entry Systems .

C6 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all the BCM connectors.

Repair:

- corrosion (install new connector or terminals - clean module pins)
- damaged or bent pins - install new terminals/pins
- pushed-out pins - install new pins as necessary

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > PERIMETER ANTI-THEFT ALARM > PINPOINT TESTS > PINPOINT TEST D : NO ANTI-THEFT ALARM HORN OUTPUT DURING ALARM ACTIVATION

Refer to Remote Keyless Entry and Alarm for schematic and connector information.

Normal Operations and Fault Conditions

REFER to: Perimeter Anti-Theft Alarm - System Operation and Component Description .

Possible Causes

- Fuse
- Wiring, terminals or connectors
- Anti-theft alarm horn
- BCM

Visual Inspection and Diagnostic Pre-checks

- Inspect the BCM fuse 8 (10A)

DIAGNOSIS AND TESTING > PERIMETER ANTI-THEFT ALARM > PINPOINT TESTS > PINPOINT TEST D : NO ANTI-THEFT ALARM HORN OUTPUT DURING ALARM ACTIVATION > PINPOINT TEST D : NO ANTI-THEFT ALARM HORN OUTPUT DURING ALARM ACTIVATION

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may damage the connector.

NOTE: The following step uses a test lamp to simulate normal circuit loads. Use only a Rotunda Test Lamp (SGT27000) or 250- 300mA incandescent bulb test lamp. To avoid connector terminal damage, use the Rotunda Flex Probe kit for the test lamp probe connection to the vehicle. Do not use the test lamp probe directly on any connector.

D1 CHECK FOR VOLTAGE TO THE ANTI-THEFT SECURITY HORN USING THE BCM (BODY CONTROL MODULE) PID (PARAMETER IDENTIFICATION)

Ignition OFF.

Disconnect Anti-Theft Security Horn C4380.

Connect:

Positive Lead	Measurement / Action	Negative Lead
C4380-2		Ground

Ignition ON.

Using a diagnostic scan tool, monitor the BCM Parameter Identifications (PIDs).

Using a diagnostic scan tool, command the BCM anti-theft alarm horn PID on and then off.

Does the test lamp illuminate when the PID is commanded on?

Yes	GO to D2

No	VERIFY the BCM fuse 8 (10A) is OK. If OK, GO to D3 If not OK, REFER to the OEM WIRING DIAGRAMS article to identify the possible cause of the circuit short.

NOTE: The following step uses a test lamp to simulate normal circuit loads. Use only a Rotunda Test Lamp (SGT27000) or 250- 300mA incandescent bulb test lamp. To avoid connector terminal damage, use the Rotunda Flex Probe kit for the test lamp probe connection to the vehicle. Do not use the test lamp probe directly on any connector.

D2 CHECK THE ANTI-THEFT SECURITY HORN GROUND CIRCUIT FOR AN OPEN USING THE BCM (BODY CONTROL MODULE) PID (PARAMETER IDENTIFICATION)

Connect:

Positive Lead	Measurement / Action	Negative Lead
C4380-2		Ground

Using a diagnostic scan tool, monitor the BCM Parameter Identifications (PIDs).

Using a diagnostic scan tool, command the BCM anti-theft alarm horn PID on and then off.

Does the test lamp illuminate when the PID is commanded on?

Yes	INSTALL a new anti-theft alarm horn. REFER to: Anti-Theft Alarm Horn .

No	REPAIR the circuit.

D3 CHECK THE ANTI-THEFT SECURITY HORN VOLTAGE SUPPLY CIRCUIT FOR AN OPEN

Ignition OFF.

Disconnect BCM C2280C .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4380-2	Ω	C2280C-34

Is the resistance less than 3 ohms?

Yes	GO to D4

No	REPAIR the circuit.

D4 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all the BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > PERIMETER ANTI-THEFT ALARM > PINPOINT TESTS > PINPOINT TEST E : THE ANTI-THEFT ALARM HORN SOUNDS CONTINUOUSLY

Refer to Remote Keyless Entry and Alarm for schematic and connector information.

Normal Operations and Fault Conditions

REFER to: Perimeter Anti-Theft Alarm - System Operation and Component Description .

Possible Causes

- Wiring, terminals or connectors
- BCM

DIAGNOSIS AND TESTING > PERIMETER ANTI-THEFT ALARM > PINPOINT TESTS > PINPOINT TEST E : THE ANTI-THEFT ALARM HORN SOUNDS CONTINUOUSLY > PINPOINT TEST E : THE ANTI-THEFT ALARM HORN SOUNDS CONTINUOUSLY

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may damage the connector.

E1 CHECK THE ANTI-THEFT SECURITY HORN VOLTAGE SUPPLY CIRCUIT FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect BCM C2280C .

Ignition ON.

Does the anti-theft alarm horn continue to sound?

Yes	REPAIR the circuit.

No	GO to E2

E2 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all the BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > PERIMETER ANTI-THEFT ALARM > PINPOINT TESTS > PINPOINT TEST F : B1305:01

Refer to Remote Keyless Entry and Alarm for schematic and connector information.

Normal Operations and Fault Conditions

REFER to: Perimeter Anti-Theft Alarm - System Operation and Component Description .

BCM DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1305:01	Hood Switch: General Electrical Failure	Sets when the BCM detects an open from the hood ajar switch input during a self-test.

Possible Causes

- Wiring, terminals or connectors
- Hood latch
- BCM

Visual Inspection and Diagnostic Pre-checks

- Inspect the hood latch for damage

DIAGNOSIS AND TESTING > PERIMETER ANTI-THEFT ALARM > PINPOINT TESTS > PINPOINT TEST F : B1305:01 > PINPOINT TEST F : B1305:01

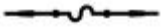
NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may damage the connector.

F1 CHECK THE HOOD AJAR SWITCH

Disconnect Hood Ajar Switch C127 .

Ignition ON.

Connect:

Positive Lead	Measurement / Action	Negative Lead
C127-2		C127-1

Using a diagnostic scan tool, perform the BCM self-test.

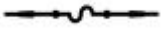
Is DTC B1305:01 still present?

Yes	REMOVE the fused jumper wire. GO to F2

No	REMOVE the fused jumper wire. INSTALL a new hood latch. REFER to: Hood Latch .

F2 CHECK THE HOOD AJAR SWITCH GROUND CIRCUIT FOR AN OPEN

Connect:

Positive Lead	Measurement / Action	Negative Lead
C127-2		Ground

Using a diagnostic scan tool, perform the BCM self-test.

Is DTC B1305:01 still present?

Yes	REMOVE the fused jumper wire. GO to F3

No	REMOVE the fused jumper wire. REPAIR the circuit.

F3 CHECK THE HOOD AJAR SWITCH INPUT CIRCUIT FOR AN OPEN

Ignition OFF.

Disconnect BCM C2280F .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C127-2	Ω	C2280F-14

Is the resistance less than 3 ohms?

Yes	GO to F4

No	REPAIR the circuit.

F4 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all the BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

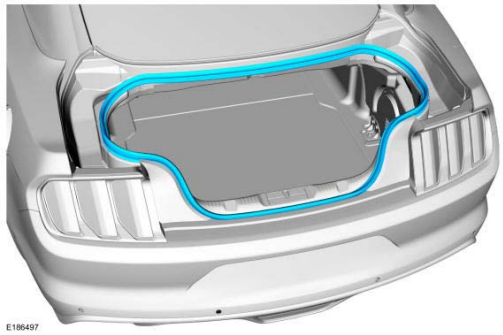
Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

REMOVAL AND INSTALLATION > ANTI-THEFT ALARM HORN > REMOVAL

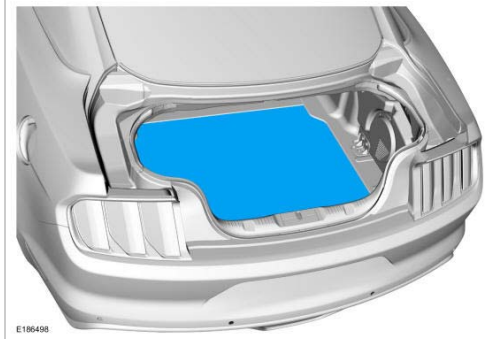
1.

Remove the luggage compartment weatherstrip.



2.

Remove the spare tire cover.



3.

If equipped, remove the subwoofer and amplifier unit. Refer to: Subwoofer and Amplifier Unit .

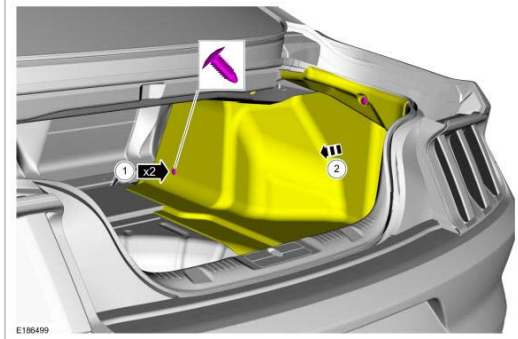
4.

1.

Remove the pin-type retainers.

2.

Position aside the RH luggage compartment side trim panel.



5.

Remove the anti-theft horn bolt.



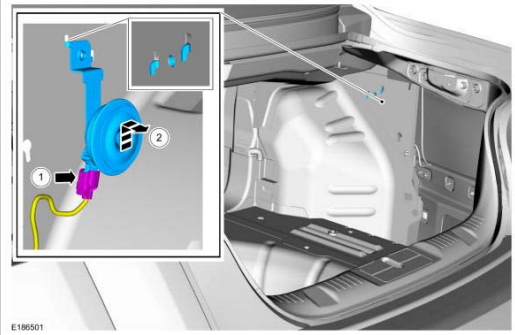
6.

1.

Disconnect the electrical connector.

2.

Remove the anti-theft horn.



REMOVAL AND INSTALLATION > ANTI-THEFT ALARM HORN > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > INTRUSION SENSOR > REMOVAL

1.

Remove the overhead console. Refer to: Overhead Console .

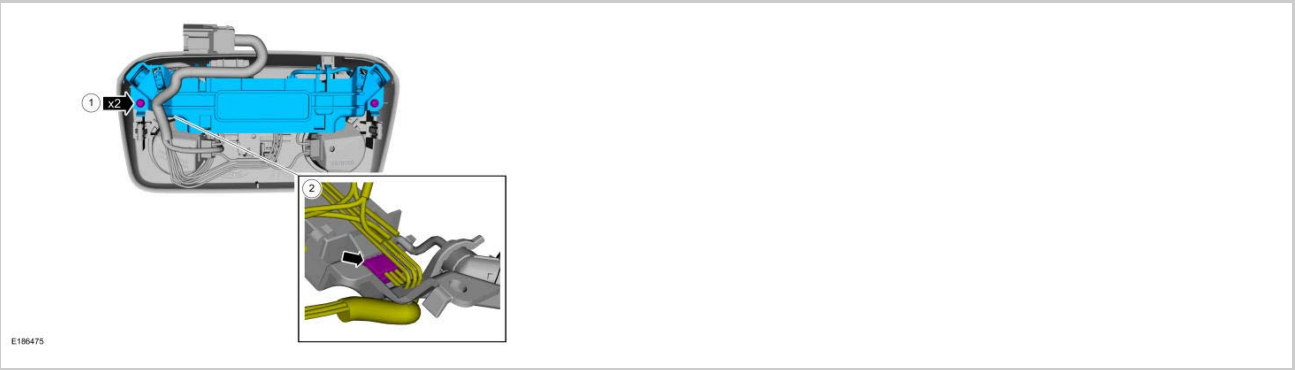
2.

1.

Remove the screws.

2.

Disconnect the electrical connector and remove the bracket and sensor assembly.



3.

1.

Release the clips and position the sensors aside.

2.

Release the clips.

3.

Remove the intrusion sensor.



REMOVAL AND INSTALLATION > INTRUSION SENSOR > INSTALLATION

1.

To install, reverse the removal procedure.

> *NOTE: This step is only necessary when installing a new component.*

2.
Using a diagnostic scan tool, carry out the LIN New Module Initialization procedure (Toolbox>Electrical>Service Functions>LIN New Module Initialization).

NOTE: This step is only necessary when installing a new component.

3.
Carry out the BCM self-test. Clear the Diagnostic Trouble Codes (DTCs) and then retrieve the Diagnostic Trouble Codes (DTCs) from the BCM to confirm all Diagnostic Trouble Codes (DTCs) have been cleared.

Service Manual: REAR END SHEET METAL REPAIRS

REMOVAL AND INSTALLATION > BACK PANEL AND REINFORCEMENT

Special Tool(s) / General Equipment

Resistance Spotwelding Equipment
Hot Air Gun
8 mm Drill Bit
MIG/MAG Welding Equipment
Spot Weld Drill Bit
Locking Pliers

Materials

Name	Specification
Metal Bonding Adhesive TA-1, 3M™ 08115, Fusor ® 108B	-
Seam Sealer TA-2-B	-

REMOVAL AND INSTALLATION > BACK PANEL AND REINFORCEMENT > REMOVAL

1.

If required, dimensionally restore the vehicle to pre-accident condition. Refer to: Body and Frame .

2.

Remove the following items:

Refer to: Rear Bumper .

Refer to: Rear Lamp Assembly .

3.

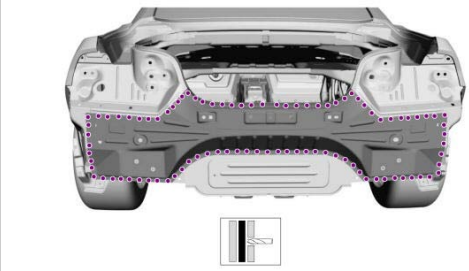
Reposition the carpeting and the wiring harness away from the working area.

4.

Refer to: Joining Techniques .

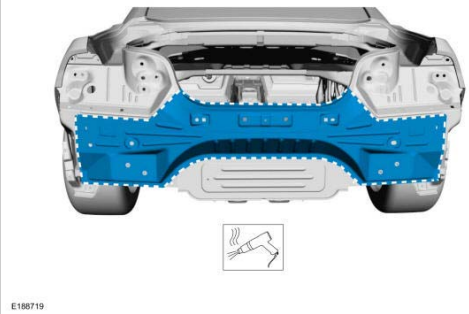
5.

Drill out the spot welds from the back panel. Use the General Equipment: Spot Weld Drill Bit



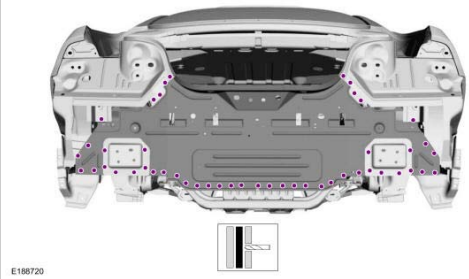
NOTE: Heat may be applied, not to exceed 170 °C to aid in softening the adhesive.

6.
Remove the back panel assembly. Use the General Equipment: Hot Air Gun



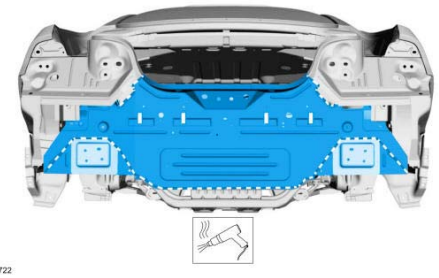
7.

Drill out the spot welds from the back panel reinforcement. Use the General Equipment: Spot Weld Drill Bit



NOTE: Heat may be applied, not to exceed 170 °C to aid in softening the adhesive.

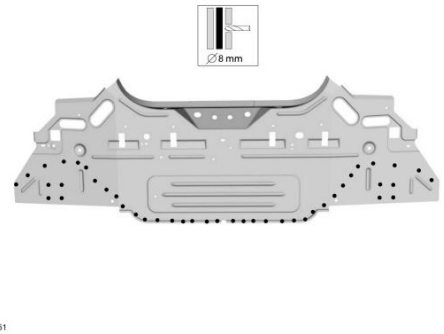
8.
Remove the back panel reinforcement. Use the General Equipment: Hot Air Gun



REMOVAL AND INSTALLATION > BACK PANEL AND REINFORCEMENT > INSTALLATION

1.

Drill holes in the replacement back panel reinforcement for plug welding. Use the General Equipment: 8 mm Drill Bit

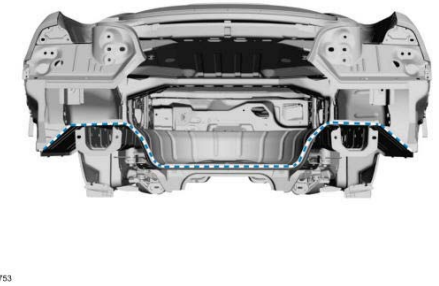


NOTE: Make sure the surface is clean and free of foreign material.

2.
Apply metal bonding adhesive to the floor pan flange.

Material

: Metal Bonding Adhesive / TA-1, 3M™ 08115, Fusor ® 108B



NOTE: Make sure that the component is clean and free of foreign material and lubricant.

3.
Apply metal bonding adhesive to the back panel reinforcement upper flanges.

Material

: Metal Bonding Adhesive / TA-1, 3M™ 08115, Fusor ® 108B



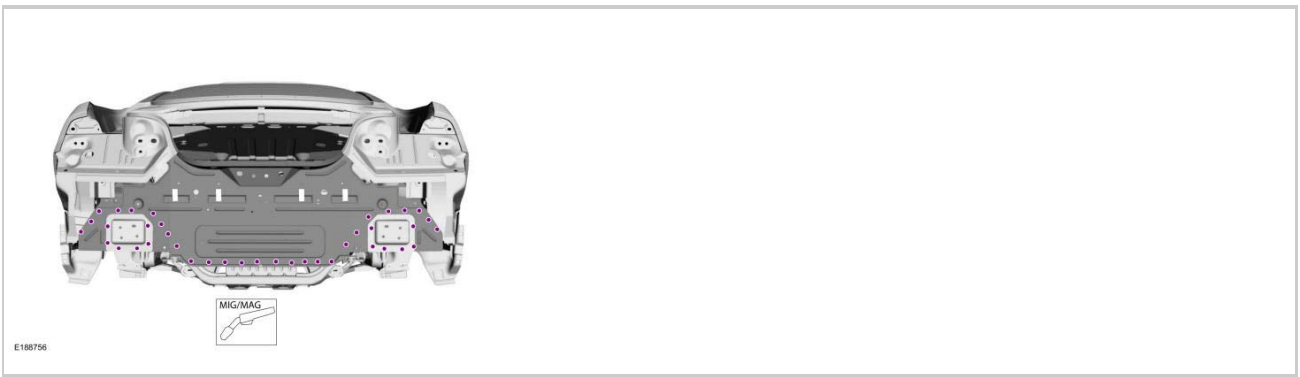
4.

Install the back panel reinforcement and spot weld. Use the General Equipment: Locking Pliers
Use the General Equipment: Resistance Spotwelding Equipment



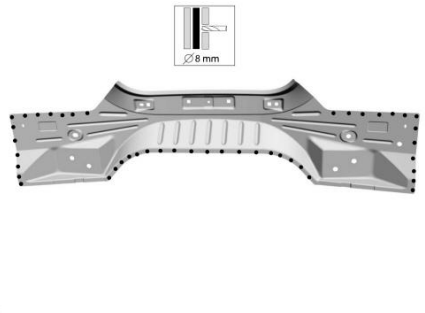
5.

MIG weld the panel. Use the General Equipment: MIG/MAG Welding Equipment



6.

Drill holes in the back panel for plug welding. Use the General Equipment: 8 mm Drill Bit

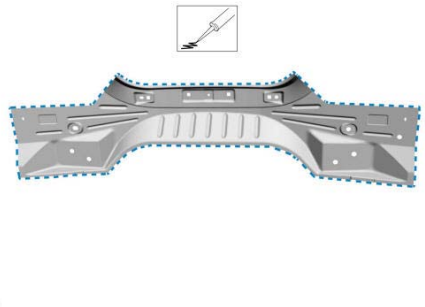


NOTE: Make sure that the component is clean, free of foreign material and lubricant.

7.
Apply metal bonding adhesive to the back panel.

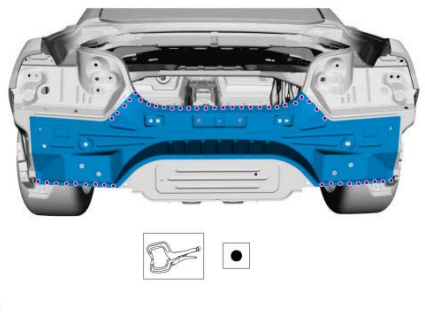
Material

: Metal Bonding Adhesive / TA-1, 3M™ 08115, Fusor ® 108B



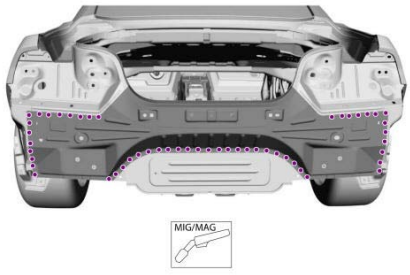
8.

Install the back panel and spot weld. Use the General Equipment: Locking Pliers Use the General Equipment: Resistance Spotwelding Equipment



9.

MIG weld the panel. Use the General Equipment: MIG/MAG Welding Equipment



10.

Metal finish the repair area using typical metal finishing procedures.

11.

Sealing work: All areas must be sealed to production level.

Material

: Seam Sealer / TA-2-B

12.

Refer to: Corrosion Prevention .

13.

Refinish using a Ford approved paint system.

14.

Reposition the wiring harness and carpet.

15.

Install the following items:

Refer to: Rear Bumper .

Refer to: Rear Lamp Assembly .

REMOVAL AND INSTALLATION > QUARTER PANEL - COUPE

Special Tool(s) / General Equipment

Resistance Spotwelding Equipment

Hot Air Gun
Air Body Saw
8 mm Drill Bit
MIG/MAG Welding Equipment
Spot Weld Drill Bit
Locking Pliers

Materials

Name	Specification
Metal Bonding Adhesive TA-1, 3M™ 08115, Fusor ® 108B	-
Seam Sealer TA-2-B	-
Fusor ® Flexible Foam Repair 3M™ 08463, Fusor ® 121	-

REMOVAL AND INSTALLATION > QUARTER PANEL - COUPE > REMOVAL

1.

If required, dimensionally restore vehicle to pre-accident condition. Refer to: Body and Frame .

2.

Remove the following items:

Refer to: Roof Panel .

Refer to: FRONT DOOR .

Refer to: Luggage Compartment Lid .

LH side Refer to: Fuel Filler Door Assembly .

LH side as equipped. 2.3L Refer to: Fuel Tank Filler Pipe . 3.7L Refer to: Fuel Tank Filler Pipe . 5.0L Refer to: Fuel Tank Filler Pipe .

Refer to: Rocker Panel Moulding .

Refer to: Fixed Glass .

Refer to: Loadspace Trim Panel - Coupe .

Refer to: Rear Quarter Trim Panel .

Refer to: Rear Bumper .

Refer to: Rear Lamp Assembly .

3.

Remove the door striker from the affected side.

4.

Position aside the carpet and wiring harness.

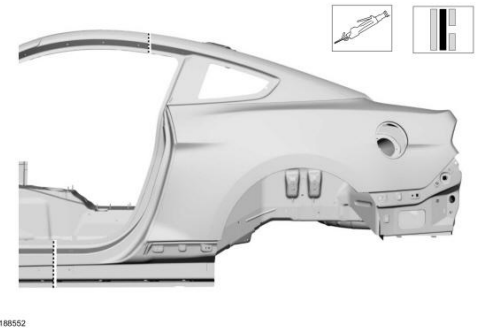
5.

Available service part.



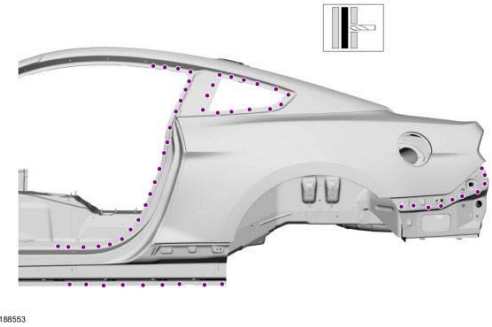
NOTE: Cut through outer panel only.

6.
Cut the quarter panel flange at the rocker and roof rail. Use the General Equipment: Air Body Saw



7.

Drill out the spot welds. Use the General Equipment: Spot Weld Drill Bit



8.

Drill out the spot welds. Use the General Equipment: Spot Weld Drill Bit



9.

Drill out the spot welds. Use the General Equipment: Spot Weld Drill Bit



NOTE: Heat may be applied, not to exceed 170 °C to aid in softening the adhesive and NVH foam.

10.
Remove the quarter panel assembly. Use the General Equipment: Hot Air Gun



REMOVAL AND INSTALLATION > QUARTER PANEL - COUPE > INSTALLATION

1.

Drill holes in the replacement panel for plug welding. Use the General Equipment: 8 mm Drill Bit



2.

Apply NVH expanding foam and metal bonding adhesive to indicated areas.

Material

: Fusor ® Flexible Foam Repair / 3M™ 08463, Fusor ® 121

Material

: Metal Bonding Adhesive / TA-1, 3M™ 08115, Fusor ® 108B



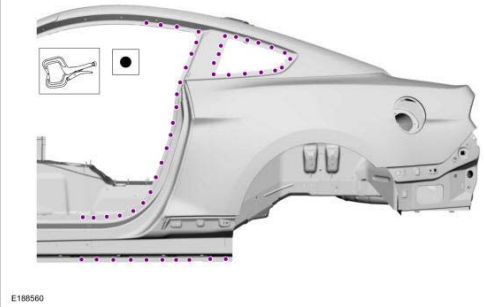
3.

Install the quarter panel and seam weld. Use the General Equipment: Locking Pliers Use the General Equipment: MIG/MAG Welding Equipment



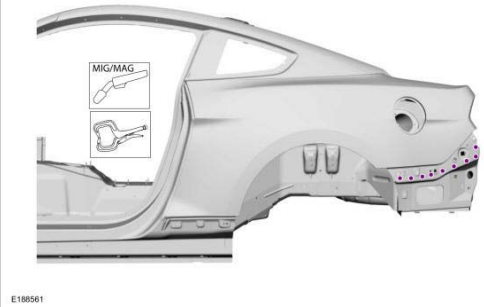
4.

Resistance spot weld the panel. Use the General Equipment: Resistance Spotwelding Equipment Use the General Equipment: Locking Pliers



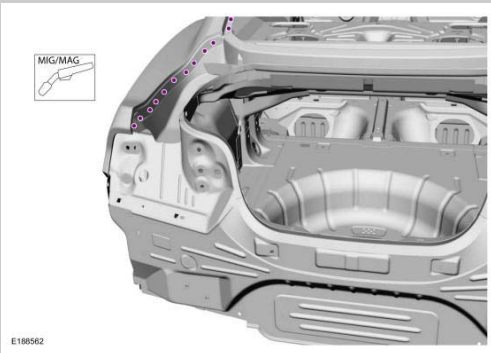
5.

MIG weld the panel. Use the General Equipment: MIG/MAG Welding Equipment Use the General Equipment: Locking Pliers



6.

MIG weld the panel. Use the General Equipment: MIG/MAG Welding Equipment



7.

Resistance spot weld the panel along the roof rail. Use the General Equipment: Resistance Spotwelding Equipment Use the General Equipment: Locking Pliers



8.

Metal finish the repair area(s) using typical metal finishing techniques.

9.

Sealing work: All areas must be sealed to production level.

Material

: Seam Sealer / TA-2-B

10.

Refinish using a Ford approved paint system.

11.

Restore corrosion protection. Refer to: Corrosion Prevention .

12.

Reposition the carpet and wiring harness.

13.

Install the door striker.

14.

Install the following items:

Refer to: Roof Panel .

Refer to: FRONT DOOR .

Refer to: Luggage Compartment Lid .

LH side Refer to: Fuel Filler Door Assembly .

LH side as equipped. 2.3L Refer to: Fuel Tank Filler Pipe . 3.7L Refer to: Fuel Tank Filler Pipe . 5.0L Refer to: Fuel Tank Filler Pipe .

Refer to: Rocker Panel Moulding .

Refer to: Fixed Glass .

Refer to: Loadspace Trim Panel - Coupe .

Refer to: Rear Quarter Trim Panel .

Refer to: Rear Bumper .

Refer to: Rear Lamp Assembly .

REMOVAL AND INSTALLATION > QUARTER PANEL - CONVERTIBLE

Special Tool(s) / General Equipment

Resistance Spotwelding Equipment
Hot Air Gun
Knife
Air Body Saw
8 mm Drill Bit
MIG/MAG Welding Equipment
Spot Weld Drill Bit
Locking Pliers

Materials

Name	Specification
Metal Bonding Adhesive TA-1, 3M™ 08115, Fusor ® 108B	-
Seam Sealer TA-2-B	-
Fusor ® Flexible Foam Repair 3M™ 08463, Fusor ® 121	-

REMOVAL AND INSTALLATION > QUARTER PANEL - CONVERTIBLE > REMOVAL

1.

If required, dimensionally restore vehicle to pre-accident condition. Refer to: Body and Frame .

2.

Remove the following items:

Refer to: Convertible Top Assembly .

Refer to: FRONT DOOR .

Refer to: Luggage Compartment Lid .

LH side Refer to: Fuel Filler Door Assembly .

LH side as equipped. 2.3L Refer to: Fuel Tank Filler Pipe . 3.7L Refer to: Fuel Tank Filler Pipe . 5.0L Refer to: Fuel Tank Filler Pipe .

Refer to: Rocker Panel Moulding .

Refer to: Loadspace Trim Panel - Convertible .

Refer to: Rear Quarter Trim Panel .

Refer to: Rear Bumper .

Refer to: Rear Lamp Assembly .

3.

Remove the door striker from the affected side.

4.

Position aside the carpet and wiring harness.

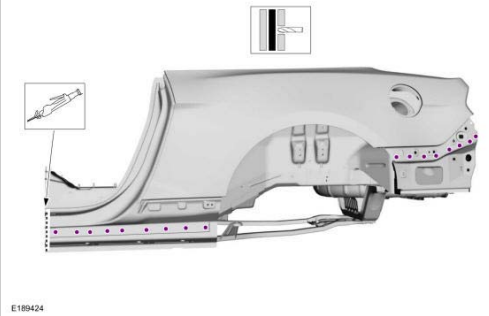
5.

Available service part.



NOTE: Cut through outer panel only.

6.
Cut the quarter panel flange and drill out the spot welds. Use the General Equipment: Spot Weld Drill Bit Use the General Equipment: Air Body Saw



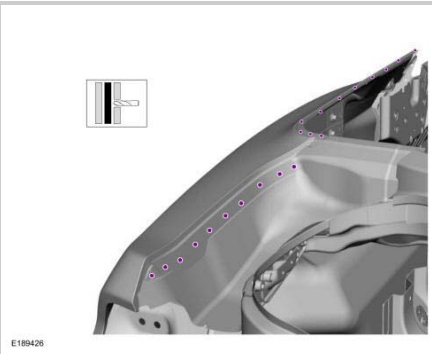
7.

Drill out the spot welds. Use the General Equipment: Spot Weld Drill Bit



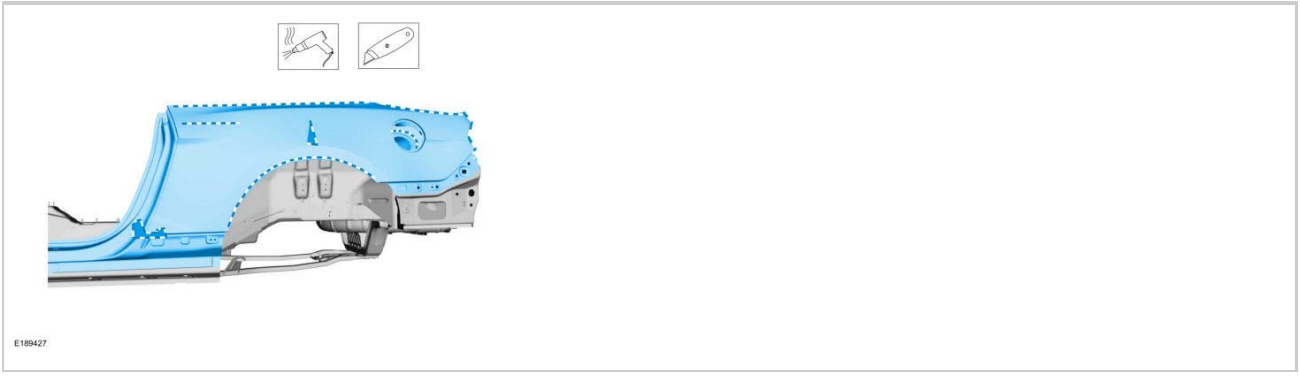
8.

Drill out the spot welds. Use the General Equipment: Spot Weld Drill Bit



NOTE: Heat may be applied, not to exceed 170 °C to aid in softening the adhesive and NVH foam.

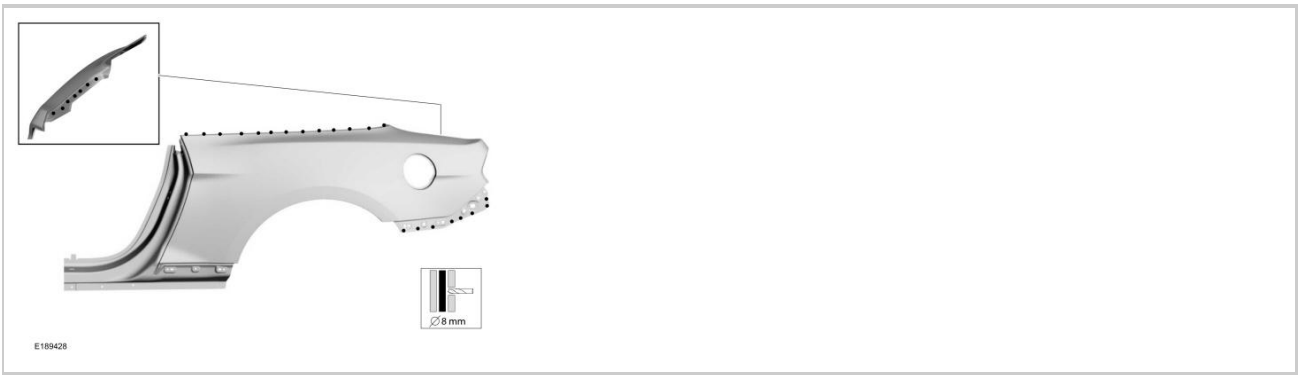
9.
Remove the quarter panel assembly. Use the General Equipment: Knife Use the General Equipment: Hot Air Gun



REMOVAL AND INSTALLATION > QUARTER PANEL - CONVERTIBLE > INSTALLATION

1.

Drill holes in the replacement panel for plug welding. Use the General Equipment: 8 mm Drill Bit



2.

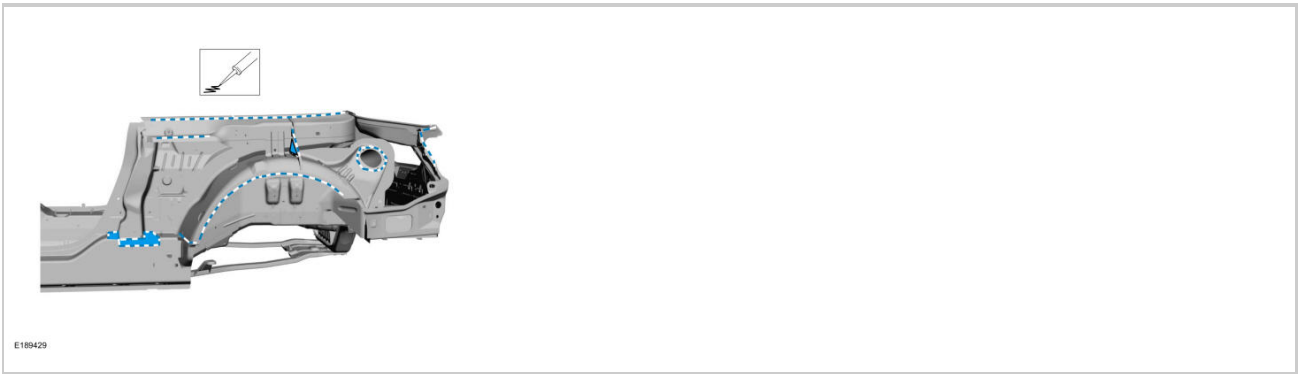
Apply NVH expanding foam and metal bonding adhesive to indicated areas.

Material

: Metal Bonding Adhesive / TA-1, 3M™ 08115, Fusor ® 108B

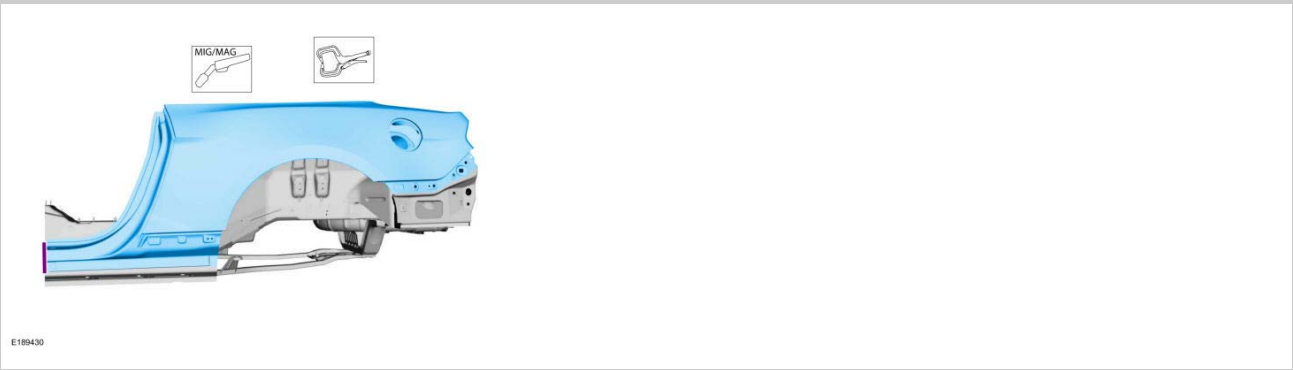
Material

: Fusor ® Flexible Foam Repair / 3M™ 08463, Fusor ® 121



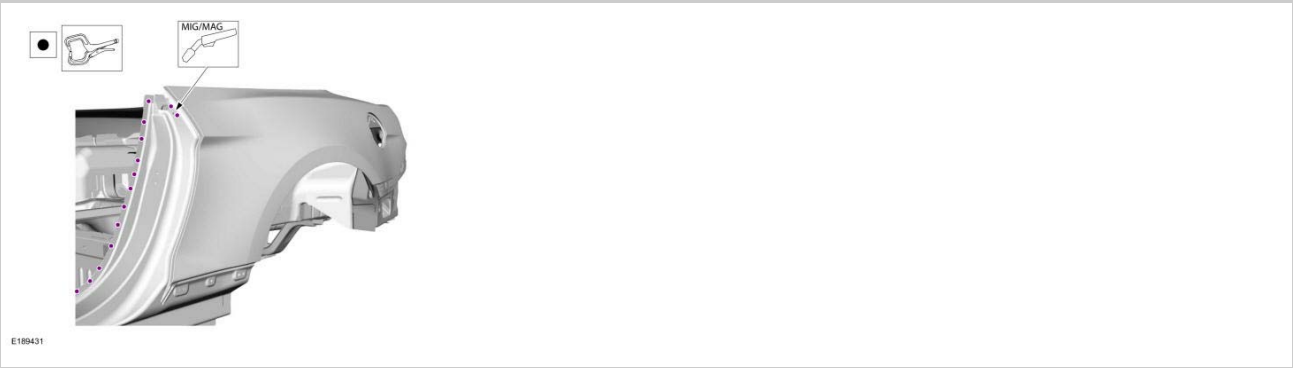
3.

Install the quarter panel and seam weld. Use the General Equipment: Locking Pliers Use the General Equipment: MIG/MAG Welding Equipment



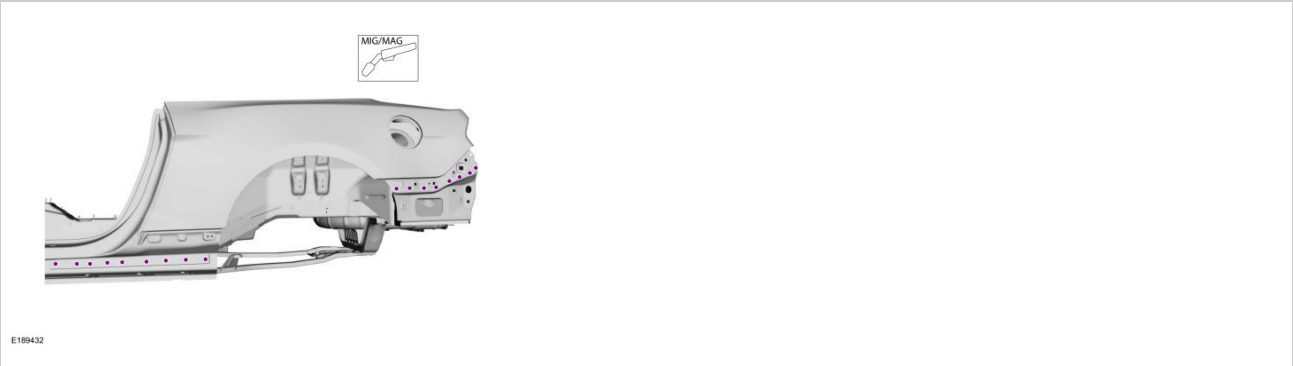
4.

Weld the panel at the door opening. Use the General Equipment: Locking Pliers Use the General Equipment: MIG/MAG Welding Equipment Use the General Equipment: Resistance Spotwelding Equipment



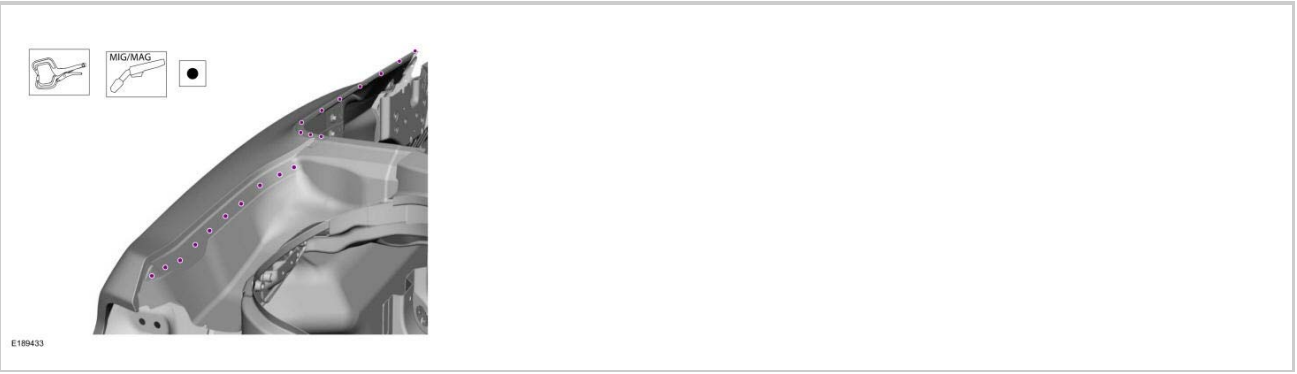
5.

MIG weld the panel along flange areas. Use the General Equipment: MIG/MAG Welding Equipment



6.

Weld the panel along upper flange areas. Use the General Equipment: Locking Pliers Use the General Equipment: MIG/MAG Welding Equipment Use the General Equipment: Resistance Spotwelding Equipment



7.

Metal finish the repair area(s) using typical metal finishing techniques.

8.

Sealing work: All areas must be sealed to production level

Material

: Seam Sealer / TA-2-B

9.

Refinish using a Ford approved paint system.

10.

Restore corrosion protection. Refer to: Corrosion Prevention .

11.

Reposition the carpet and wiring harness.

12.

Install the door striker.

13.

Install the following items:

Refer to: Convertible Top Assembly .

Refer to: FRONT DOOR .

Refer to: Luggage Compartment Lid .

LH side Refer to: Fuel Filler Door Assembly .

LH side as equipped. 2.3L Refer to: Fuel Tank Filler Pipe . 3.7L Refer to: Fuel Tank Filler Pipe . 5.0L Refer to: Fuel Tank Filler Pipe .

Refer to: Rocker Panel Moulding .

Refer to: Loadspace Trim Panel - Convertible .

Refer to: Rear Quarter Trim Panel .

Refer to: Rear Bumper .

Refer to: Rear Lamp Assembly .

REMOVAL AND INSTALLATION > REAR FLOOR PANEL

Rear Floor Panel

Special Tool(s) / General Equipment

Resistance Spotwelding Equipment
Scraper for Straight Edges
Hot Air Gun
Knife
8 mm Drill Bit
MIG/MAG Welding Equipment
Spot Weld Drill Bit
Locking Pliers

Materials

Name	Specification
Metal Bonding Adhesive TA-1, 3M™ 08115, Fusor ® 108B	-
Seam Sealer TA-2-B	-
Fusor ® Flexible Foam Repair 3M™ 08463, Fusor ® 121	-

REMOVAL AND INSTALLATION > REAR FLOOR PANEL > REMOVAL

1.

If required, dimensionally restore vehicle to pre-accident condition. Refer to: DESCRIPTION AND OPERATION .

2.

Position the carpeting and the wiring harness away from the working area.

3.

Remove the following items:

As equipped 2.3L Refer to: EVAPORATIVE EMISSION CANISTER . 3.7L Refer to: EVAPORATIVE EMISSION CANISTER . 5.0L Refer to: EVAPORATIVE EMISSION CANISTER .

As equipped 2.3L Refer to: FUEL TANK . 3.7L Refer to: FUEL TANK . 5.0L Refer to: FUEL TANK .

Refer to: REAR SUBFRAME .

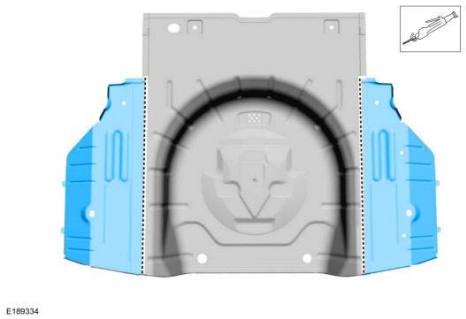
As equipped 2.3L Refer to: MUFFLER AND TAILPIPE . 3.7L Refer to: MUFFLER AND TAILPIPE . 5.0L Refer to: MUFFLER AND TAILPIPE .

Refer to: Back Panel and Reinforcement .

Refer to: WHEEL AND TIRE .

4.

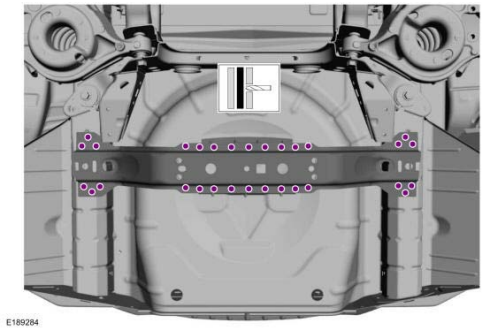
Possible **sectioning** cut points depending on extent of damage.



NOTE: ***Convertible only.***

5.

Drill out the spot welds on the crossmember. Use the General Equipment: Spot Weld Drill Bit



NOTE: ***Convertible only.***

6.

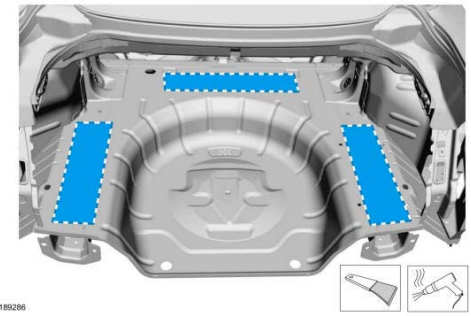
Remove the crossmember.



NOTE: Heat may be applied, not to exceed 170 °C to aid in softening the NVH (noise, vibration and harshness) mastic material.

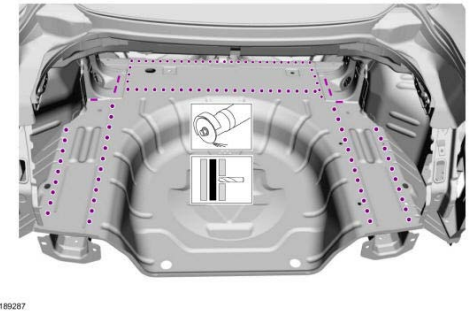
7.

Remove the NVH mastic material. Use the General Equipment: Hot Air Gun Use the General Equipment: Scraper for Straight Edges



8.

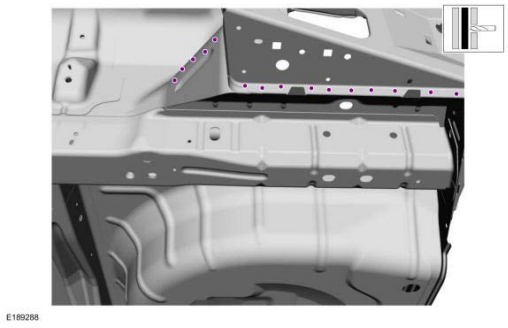
Drill out the spot welds and grind off the brazed material at the floor panel seams. Use the General Equipment: Spot Weld Drill Bit



NOTE: On both sides.

9.

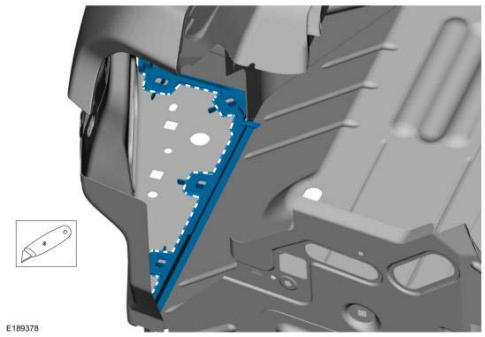
Drill out the spot welds on the lower extension of the quarter panel. Use the General Equipment: Spot Weld Drill Bit



NOTE: On both sides.

10.

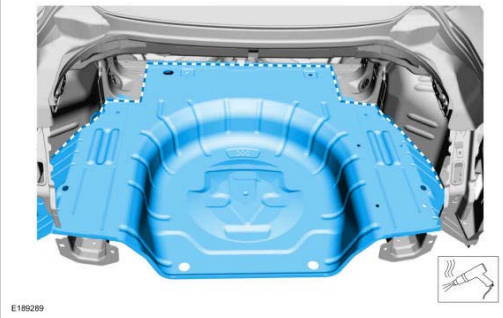
Remove the foam carrier strip between the floor panel and quarter panel extension. Use the General Equipment: Knife



NOTE: Heat may be applied, not to exceed 170 °C to aid in softening the adhesive.

11.

Remove the floor pan assembly. Use the General Equipment: Hot Air Gun



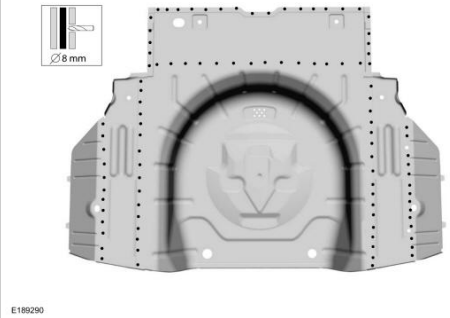
REMOVAL AND INSTALLATION > REAR FLOOR PANEL > INSTALLATION

1.

Refer to: JOINING TECHNIQUES .

2.

Drill holes in the replacement panel for plug welding. Use the General Equipment: 8 mm Drill Bit

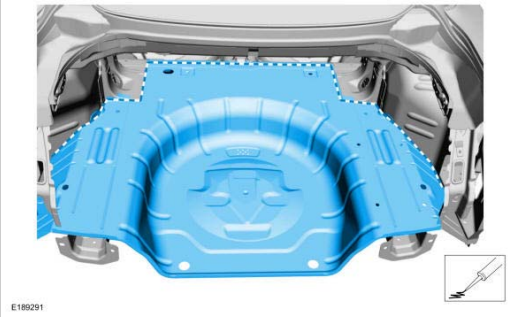


3.

Apply adhesive to the floor panel seams and flanges and install the floor panel assembly.

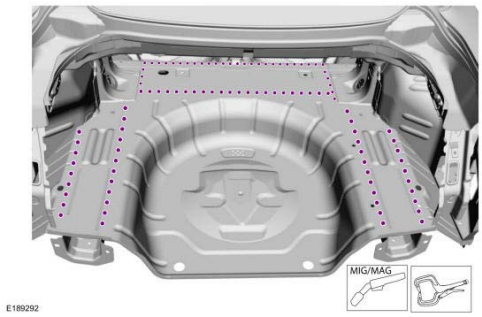
Material

: Metal Bonding Adhesive / TA-1, 3M™ 08115, Fusor ® 108B



4.

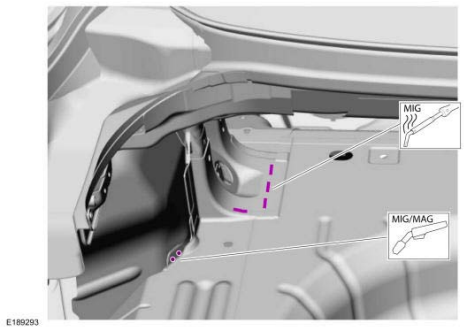
MIG weld the floor panel to the reinforcements. Use the General Equipment: Locking Pliers Use the General Equipment: MIG/MAG Welding Equipment



NOTE: On both sides.

5.

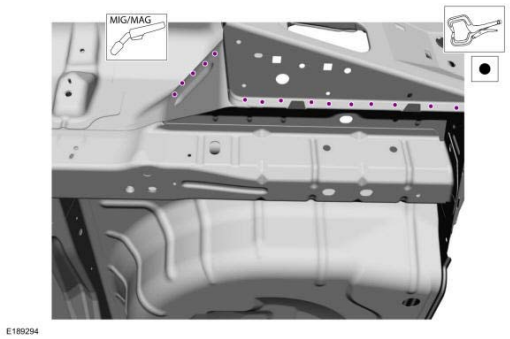
MIG braze the floor panel seams and plug weld the floor panel extension. Use the General Equipment: MIG/MAG Welding Equipment



NOTE: On both sides.

6.

Weld the floor panel to the quarter panel extension. Use the General Equipment: MIG/MAG Welding Equipment Use the General Equipment: Locking Pliers Use the General Equipment: Resistance Spotwelding Equipment



NOTE: Convertible only.

7.

Install and weld the underbody crossmember. Use the General Equipment: MIG/MAG Welding Equipment



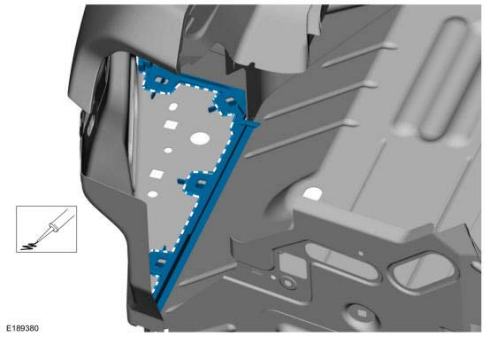
NOTE: On both sides.

8.

Apply NVH expanding foam to the foam carrier strip and install.

Material

: Fusor ® Flexible Foam Repair / 3M™ 08463, Fusor ® 121



9.

Finish the repair area using typical metal finishing techniques.

10.

Sealing work: All areas must be sealed to production level.

Material

: Seam Sealer / TA-2-B

11.

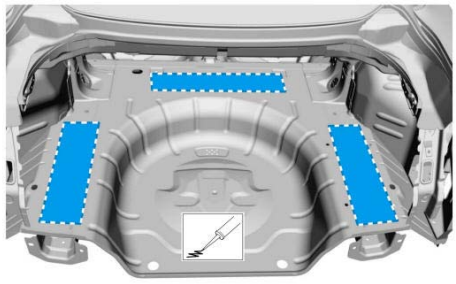
Refinish using a Ford approved paint system.

12.

Refer to: CORROSION PREVENTION .

13.

Apply NVH material (obtain locally) in original locations.



14.

Install the following items:

As equipped 2.3L Refer to: EVAPORATIVE EMISSION CANISTER . 3.7L Refer to: EVAPORATIVE EMISSION CANISTER . 5.0L Refer to: EVAPORATIVE EMISSION CANISTER

As equipped 2.3L Refer to: FUEL TANK . 3.7L Refer to: FUEL TANK . 5.0L Refer to: FUEL TANK .

Refer to: REAR SUBFRAME .

As equipped 2.3L Refer to: MUFFLER AND TAILPIPE . 3.7L Refer to: MUFFLER AND TAILPIPE . 5.0L Refer to: MUFFLER AND TAILPIPE .

Refer to: Back Panel and Reinforcement .

Refer to: WHEEL AND TIRE .

15.

Reposition the carpeting and the wiring harness.

REMOVAL AND INSTALLATION > REAR SIDE MEMBER

Materials

Name	Specification
Seam Sealer TA-2-B	-

REMOVAL AND INSTALLATION > REAR SIDE MEMBER > REMOVAL

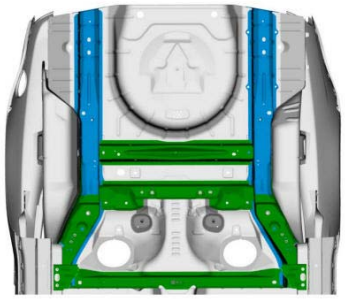
NOTE: The rear side member(s) are constructed of Dual-Phase (DP) 800 steel and cannot be sectioned. Side member assembly must be replaced at factory joints.

1.

If required, dimensionally restore vehicle to pre-accident condition. Refer to: Body and Frame .

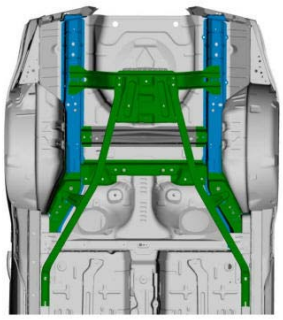
NOTE: ***Coupe***

2.
Overview Refer to: Vehicle Specific Body Construction .



NOTE: ***Convertible***

3.
Overview Refer to: Vehicle Specific Body Construction .



4.

Remove the following items:

Refer to: Rear Subframe .

2.3L Refer to: Fuel Tank .

As equipped 2.3L Refer to: Evaporative Emission Canister .

As equipped 3.7L Refer to: Evaporative Emission Canister .

As equipped 5.0L Refer to: Evaporative Emission Canister .

Refer to: Back Panel and Reinforcement .

5.

Position the carpet and wiring harness away from the working area.

6.

Remove spot welds as required and remove rear side member from damaged side(s).

REMOVAL AND INSTALLATION > REAR SIDE MEMBER > INSTALLATION

1.

Refer to: Joining Techniques .

2.

Metal finish repair area as required using typical metal finishing techniques.

3.

Sealing work: All areas must be sealed to production level.

Material

: Seam Sealer / TA-2-B

4.

Refinish using a Ford approved paint system.

5.

Restore corrosion protection. Refer to: Corrosion Prevention .

6.

Install the following items:

Refer to: Rear Subframe .

Refer to: Fuel Tank .

As equipped 2.3L Refer to: Evaporative Emission Canister .

As equipped 3.7L Refer to: Evaporative Emission Canister .

As equipped 5.0L Refer to: Evaporative Emission Canister .

Refer to: Back Panel and Reinforcement .

7.

Reposition the carpeting and wiring harness.

REMOVAL AND INSTALLATION > REAR WHEELHOUSE OUTER

Special Tool(s) / General Equipment

Resistance Spotwelding Equipment
Air Body Saw
MIG/MAG Welding Equipment
Locking Pliers

Materials

Name	Specification
Seam Sealer TA-2-B	-

REMOVAL AND INSTALLATION > REAR WHEELHOUSE OUTER > REMOVAL

1.

If required, dimensionally restore vehicle to pre-accident condition. Refer to: Body and Frame .

2.

Remove the following items:

Refer to: Quarter Panel - Coupe .

Refer to: Quarter Panel - Convertible .

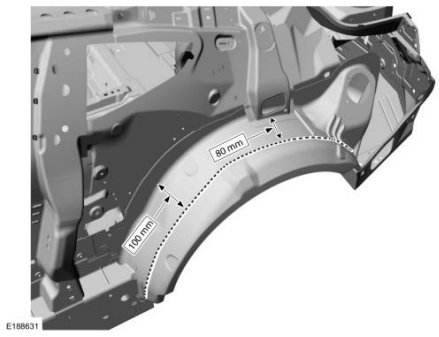
3.

Reposition the carpeting and the wiring harness away from the working area.

NOTE: Cutline shown as a general guideline, depending on extent of the damage. LH side shown, RH similar.

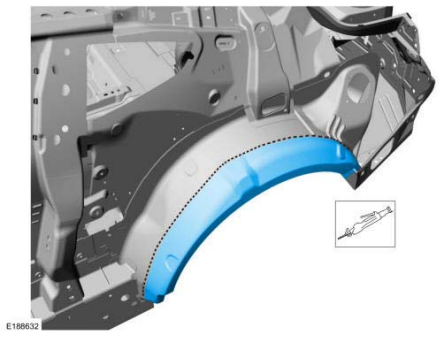
NOTE: Coupe shown, convertible similar.

4.
Mark a cutline on the wheelhouse panel.



5.

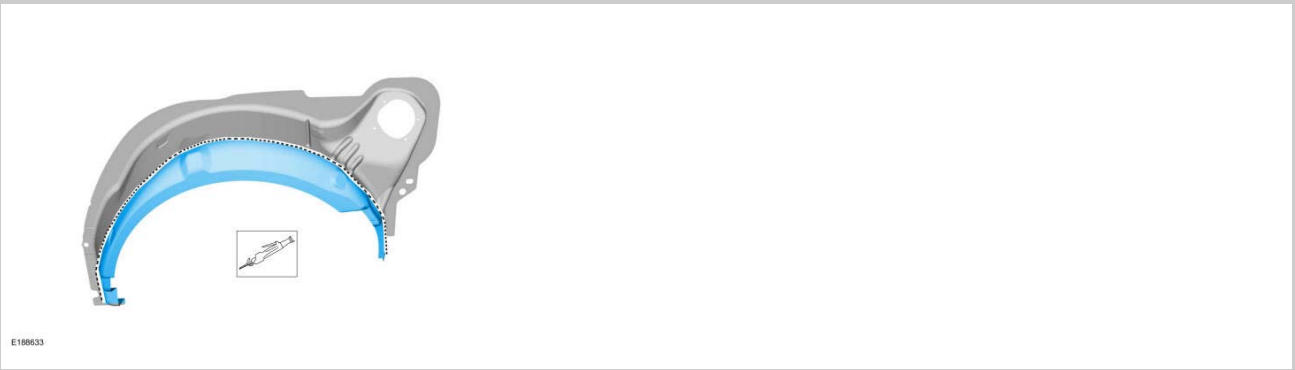
Cut and remove the damaged portion of the wheelhouse panel. Use the General Equipment: Air Body Saw



REMOVAL AND INSTALLATION > REAR WHEELHOUSE OUTER > INSTALLATION

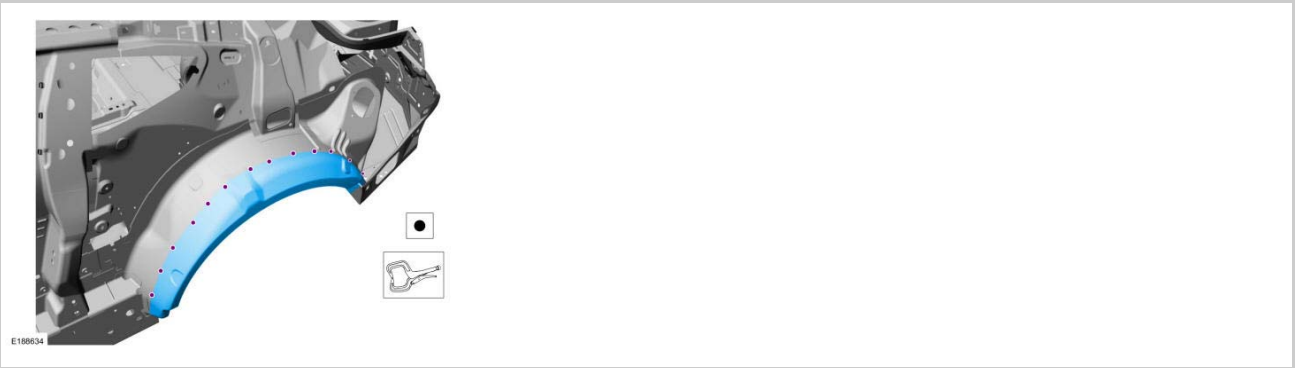
1.

Cut section from the replacement panel. Use the General Equipment: Air Body Saw



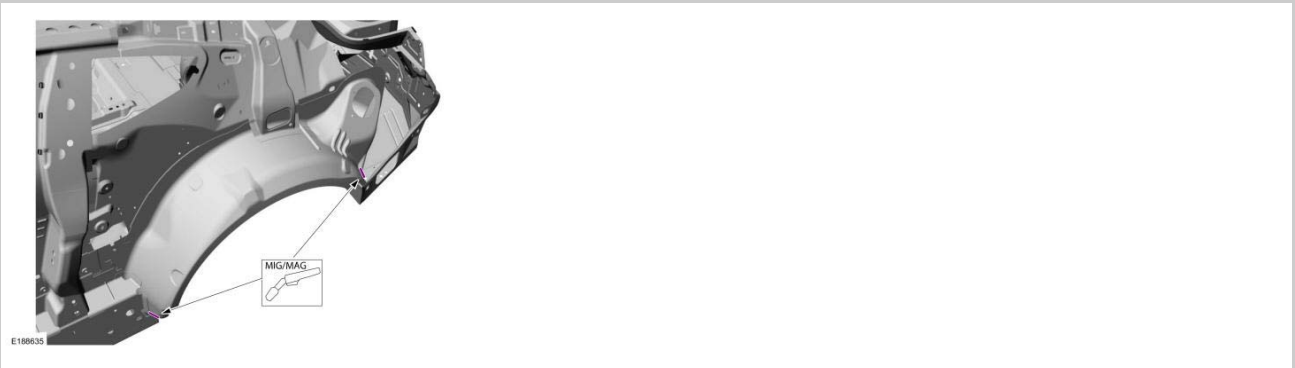
2.

Install and weld the replacement section. Use the General Equipment: Resistance Spotwelding Equipment Use the General Equipment: Locking Pliers



3.

Weld the panel at seams. Use the General Equipment: MIG/MAG Welding Equipment



4.

Metal finish as required using typical metal finishing techniques.

5.

Sealing work: All areas must be sealed to production level.

Material

: Seam Sealer / TA-2-B

6.

Refinish using a Ford approved paint system.

7.

Refer to: Corrosion Prevention .

8.

Reposition the carpet and the wiring harness.

9.

Install the following items:

Refer to: Quarter Panel - Coupe .

Refer to: Quarter Panel - Convertible .

REMOVAL AND INSTALLATION > WATER DRAIN PANEL

Special Tool(s) / General Equipment

Resistance Spotwelding Equipment
Knife
8 mm Drill Bit
MIG/MAG Welding Equipment
Spot Weld Drill Bit
Locking Pliers

Materials

Name	Specification
Seam Sealer TA-2-B	-
Plastic Bonding Adhesive TA-9	-
Fusor ® Flexible Foam Repair3M™ 08463, Fusor ® 121	-

REMOVAL AND INSTALLATION > WATER DRAIN PANEL > REMOVAL

1.

If required, dimensionally restore vehicle to pre-accident condition. Refer to: Body and Frame .

2.

Remove the following items:

Refer to: Fixed Glass .

Refer to: Back Panel and Reinforcement .

As damage requires. Refer to: Quarter Panel - Coupe . Refer to: Quarter Panel - Convertible .

Refer to: Luggage Compartment Lid .

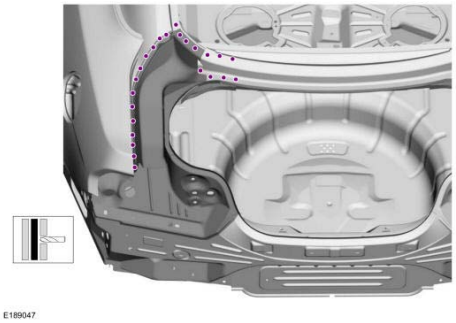
3.

Position the carpeting and wiring harness away from the working area.

NOTE: Coupe shown, convertible similar.

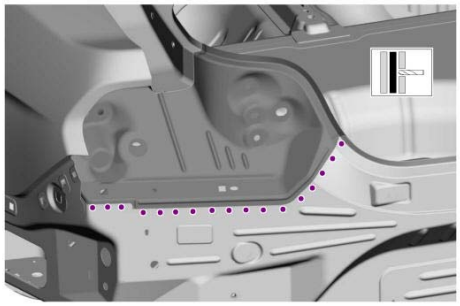
NOTE: LH side shown, RH side similar.

4.
Drill out the welds. Use the General Equipment: Spot Weld Drill Bit



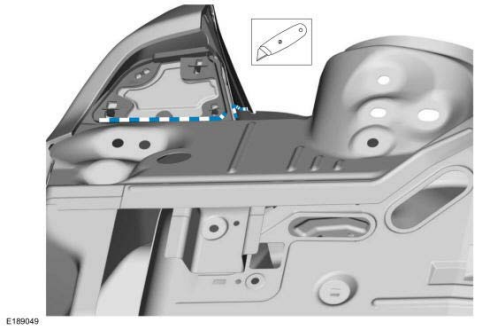
5.

Drill out the spot welds on the lamp mounting panel. Use the General Equipment: Spot Weld Drill Bit



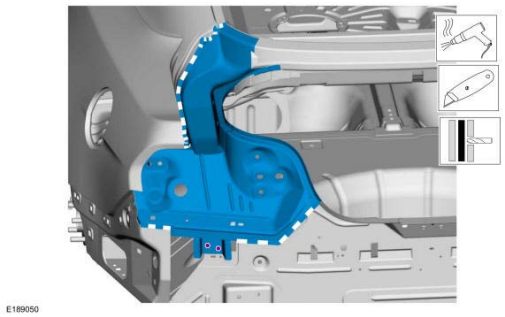
6.

Cut the NVH expanding foam between the quarter panel and rear lamp mounting panel. Use the General Equipment: Knife



NOTE: Heat may be applied, not to exceed 170 °C to aid in softening the adhesive and NVH foam.

7.
Drill out the welds in the reinforcement and remove the water drain panel assembly.



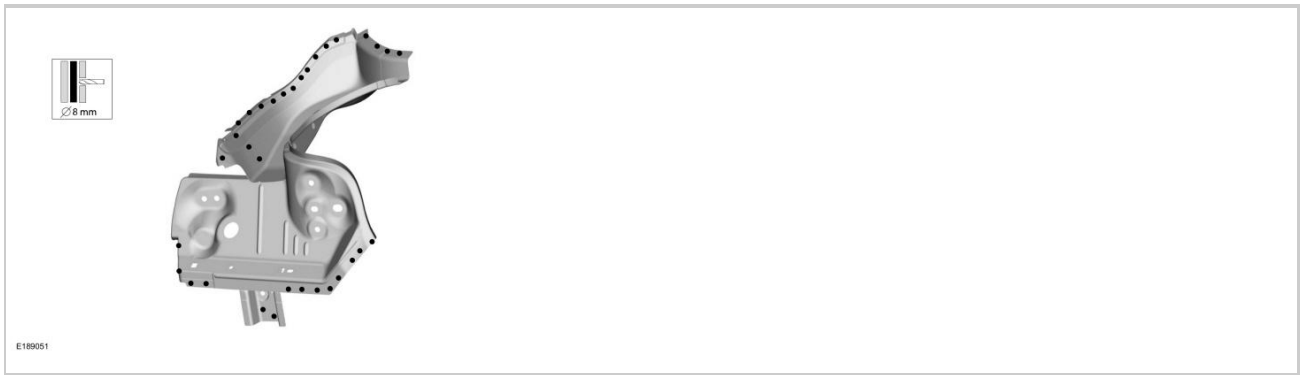
REMOVAL AND INSTALLATION > WATER DRAIN PANEL > INSTALLATION

1.

Refer to: Joining Techniques .

2.

Drill holes in the replacement panel for plug welding. Use the General Equipment: 8 mm Drill Bit



3.

Apply NVH expanding foam the quarter panel.

Material

: Fusor ® Flexible Foam Repair / 3M™ 08463, Fusor ® 121

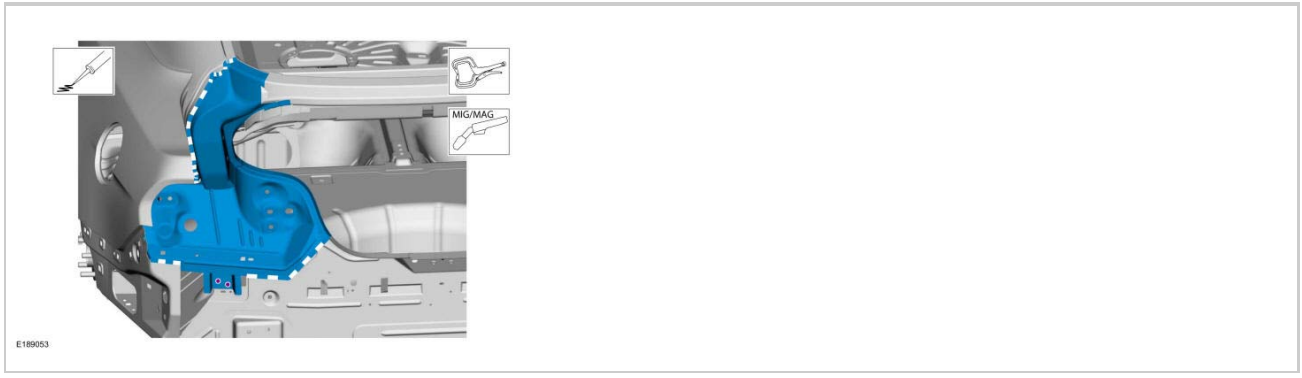


4.

Apply metal bonding adhesive and weld the reinforcement of the panel assembly. Use the General Equipment: MIG/MAG Welding Equipment Use the General Equipment: Locking Pliers

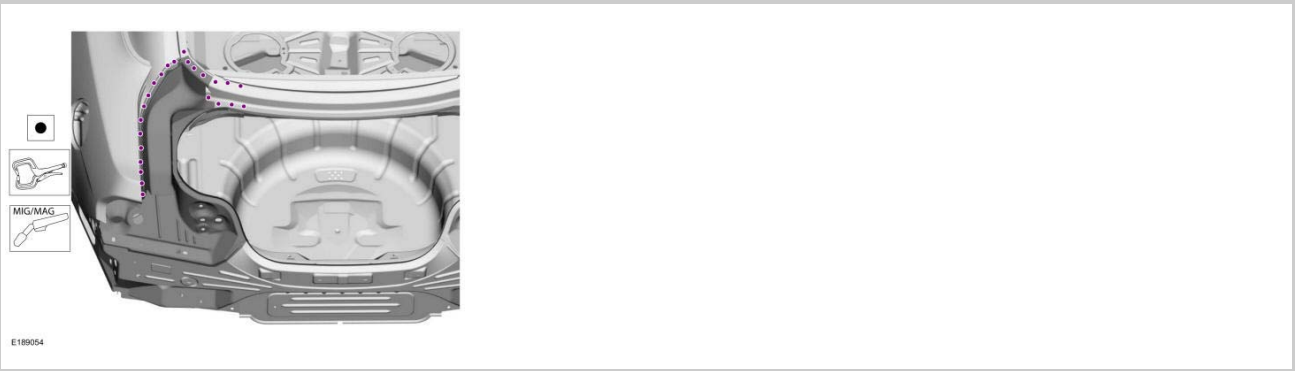
Material

: Plastic Bonding Adhesive / TA-9



5.

Weld the drain panel to the quarter panel and package tray. Use the General Equipment: MIG/MAG Welding Equipment Use the General Equipment: Resistance Spotwelding Equipment Use the General Equipment: Locking Pliers



6.

Metal finish as required using typical metal finishing techniques.

7.

Sealing work: All areas must be sealed to production level.

Material

: Seam Sealer / TA-2-B

8.

Refinish using a Ford approved paint system.

9.

Restore corrosion protection. Refer to: Corrosion Prevention .

10.

Install the following items:

Refer to: Fixed Glass .

Refer to: Back Panel and Reinforcement .

As damage required. Refer to: Quarter Panel - Coupe . Refer to: Quarter Panel - Convertible .

Refer to: Luggage Compartment Lid .

11.

Reposition the carpeting and wiring harness.

Service Manual: REAR SEATS

REMOVAL AND INSTALLATION > REAR SEAT BACKREST - CONVERTIBLE > REMOVAL

1.

Remove the rear seat cushion. Refer to: Rear Seat Cushion .

2.

Release the fasteners attaching the seat backrest to the floor.

Torque

: 35 lb.ft (47.5 Nm)



3.

Release the backrest locking clips. Remove the backrest.



REMOVAL AND INSTALLATION > REAR SEAT BACKREST - CONVERTIBLE > INSTALLATION

NOTE: During installation make sure the safety belt webbing is not twisted and the safety belts and buckles are accessible to the occupant.

1.
To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > REAR SEAT BACKREST - COUPE > REMOVAL

1.

Remove the rear seat cushion. Refer to: Rear Seat Cushion .

NOTE: LH seat shown in illustration, RH seat similar.

2.

Release the fastener attaching the seat backrest to the floor.

Torque

: 35 lb.ft (47.5 Nm)



3.

Remove the backrest.

1.

Release the backrest hinge from the pivot hinge.

2.

Move the safety belt aside. Rotate the backrest toward the outboard side of the vehicle.

3.

Lift the backrest to release it from the floor stud. Remove the backrest.



REMOVAL AND INSTALLATION > REAR SEAT BACKREST - COUPE > INSTALLATION

NOTE: During installation make sure the safety belt webbing is not twisted and the safety belts and buckles are accessible to the occupant.

1.
To install, reverse the removal procedure.

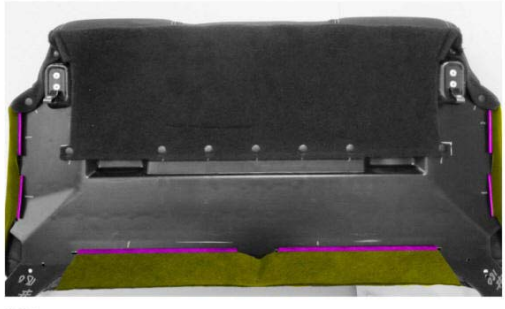
REMOVAL AND INSTALLATION > REAR SEAT BACKREST COVER - CONVERTIBLE > REMOVAL

1.

Remove the backrest. Refer to: Rear Seat Backrest - Convertible .

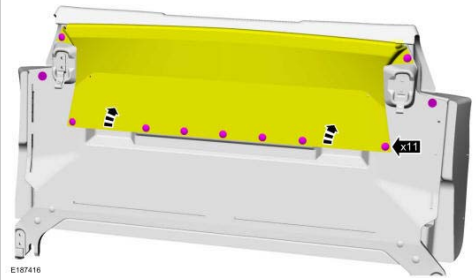
2.

Release the backrest cover J-clips from the backrest frame.



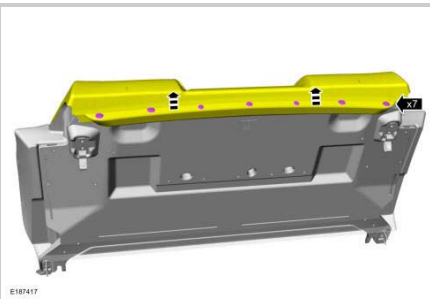
3.

Release the backrest cover carpet pin-type retainers from the backrest frame. Fold the carpet forward.



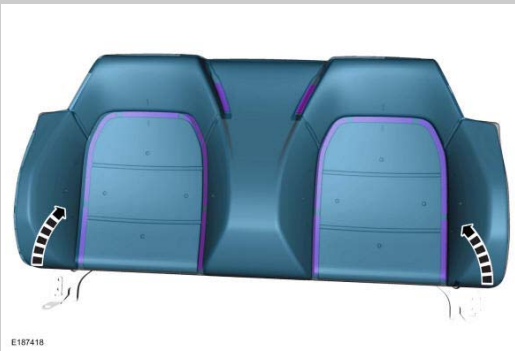
4.

Release the backrest cover pin-type retainers from the top of the backrest frame.



NOTE: Use care when separating the seat backrest cover from the hook-and-loop strips, or the hook-and-loop strips may be torn from the seat backrest foam pad.

5.
Separate the backrest cover hook-and-loop strips from the backrest foam. Remove the backrest cover.



REMOVAL AND INSTALLATION > REAR SEAT BACKREST COVER - CONVERTIBLE > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > REAR SEAT BACKREST COVER - COUPE > REMOVAL

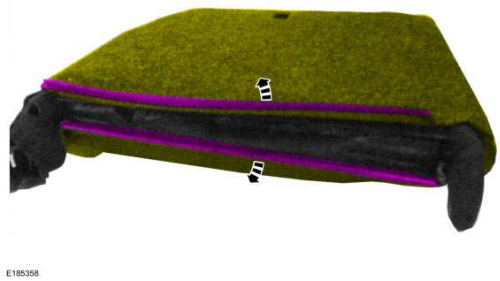
1.

Remove the rear seat backrest. Refer to: Rear Seat Backrest - Coupe .

NOTE: LH seat shown in illustration, RH seat similar.

2.

Release the backrest lower J-clip.



NOTE: Use care when separating the seat backrest cover from the hook-and-loop strips, or the hook-and-loop strips may be torn from the seat backrest foam pad.

3.
Separate the backrest cover hook-and-loop strips from the backrest foam. Position the backrest latch strap through the backrest cover. Remove the backrest cover.



REMOVAL AND INSTALLATION > REAR SEAT BACKREST COVER - COUPE > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > REAR SEAT BACKREST LATCH

Special Tool(s) / General Equipment

Electric Drill

REMOVAL AND INSTALLATION > REAR SEAT BACKREST LATCH > REMOVAL

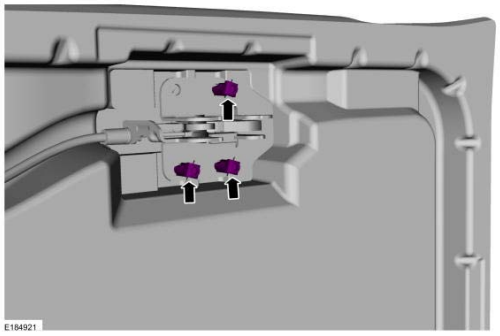
NOTE: LH seat shown in illustration, RH seat similar.

1.

Remove the rear seat backrest cover. Refer to: Rear Seat Backrest Cover - Coupe .

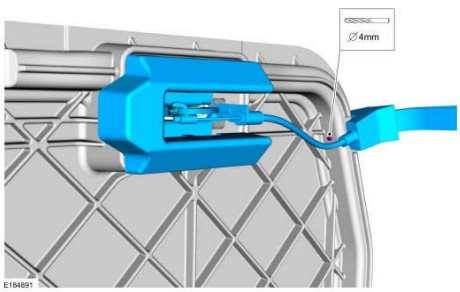
2.

Release the latch fasteners from the rear of the backrest frame.



3.

Using an electric drill, remove the rivet. Remove the seat latch assembly. Use the General Equipment: Electric Drill



REMOVAL AND INSTALLATION > REAR SEAT BACKREST LATCH > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > REAR SEAT CUSHION > REMOVAL

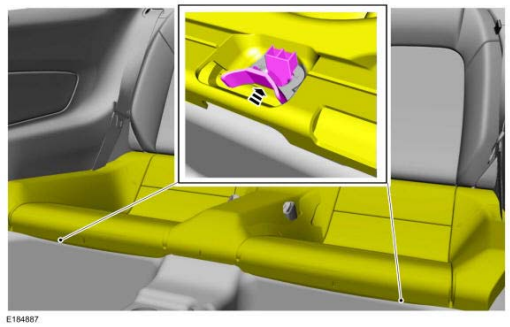
1.

On both sides. Move the front seat to the full forward position.



NOTE: The seat cushion tabs must be pressed in to release them from the floor. If the locking tabs are not pressed in, it may result in damage to the tabs.

2.
Located at the front of the seat cushion, press in on the locking tabs to release the seat cushion from the floor.



3.

Lift and release the seat cushion. Remove the seat cushion.



REMOVAL AND INSTALLATION > REAR SEAT CUSHION > INSTALLATION

NOTE: During installation make sure the seatbelt webbing is not twisted and the seatbelts and buckles are accessible to the occupant.

1.
To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > REAR SEAT CUSHION COVER > REMOVAL

1.

Remove the rear seat cushion. Refer to: Rear Seat Cushion .

2.

Release the cushion cover J-clips and pin-type retainers from bottom of the seat cushion frame. Position the J-clip attaching straps through the openings in the seat cushion foam.



NOTE: Use care when separating the seat cushion cover from the hook-and-loop strips, or the hook-and-loop strips may be torn from the seat cushion foam pad.

3.
Separate the seat cushion cover from the hook-and-loop strips. Remove the cushion cover.



REMOVAL AND INSTALLATION > REAR SEAT CUSHION COVER > INSTALLATION

1.

To install, reverse the removal procedure.

Service Manual: REAR VIEW MIRRORS

DESCRIPTION AND OPERATION > REAR VIEW MIRRORS - OVERVIEW > OVERVIEW - EXTERIOR, POWER

The power mirror system allows the LH and RH exterior mirror glass to be positioned electronically. The movement of the exterior mirror glass is controlled by the exterior mirror control switch and the LH or RH mirror selection buttons determine which exterior mirror glass is controlled. The exterior mirror control switch and the mirror selection buttons are integral to the LH front window control switch.

DESCRIPTION AND OPERATION > REAR VIEW MIRRORS - OVERVIEW > OVERVIEW - EXTERIOR, MEMORY

The memory mirror feature allows the driver to recall or save the preferred positioning of the LH and RH exterior mirror glass. The preferred positioning of the driver seat and exterior mirrors can be associated with a numbered memory preset button or passive key.

DESCRIPTION AND OPERATION > REAR VIEW MIRRORS - OVERVIEW > OVERVIEW - EXTERIOR, HEATED

The exterior mirrors are available with heated mirror glass, which heats the mirror glass to remove frost, snow, ice and condensation. The rear window defrost switch controls operation of the heated exterior mirror glass. The heated exterior mirror glass only operates when the rear window defrost system is active.

DESCRIPTION AND OPERATION > REAR VIEW MIRRORS - OVERVIEW > OVERVIEW - EXTERIOR, POWER FOLDING

The power folding mirror feature allows the exterior mirrors to be electronically folded and unfolded by pressing the exterior mirror fold switch (integral to the LH front window control switch).

DESCRIPTION AND OPERATION > REAR VIEW MIRRORS - OVERVIEW > OVERVIEW - EXTERIOR, TURN SIGNAL LAMPS

The LH and RH exterior mirrors may be equipped with a mirror-mounted turn signal lamps. For repair procedures and information on the mirror-mounted turn signal lamps, Refer to: Turn Signal and Hazard Lamps .

DESCRIPTION AND OPERATION > REAR VIEW MIRRORS - OVERVIEW > OVERVIEW - EXTERIOR, PONY PROJECTION LAMPS

The LH and RH exterior mirrors may be equipped with pony projection lamps. For repair procedures and information on the mirror-mounted pony projection lamps, Refer to: Interior Lighting .

DESCRIPTION AND OPERATION > REAR VIEW MIRRORS - OVERVIEW > OVERVIEW - EXTERIOR, BLIS ® LIGHT EMITTING DIODES (LEDS)

The LH and RH exterior mirrors may be equipped with BLIS ® LED. For repair procedures and information on the mirror-mounted BLIS ® Light Emitting Diodes (LEDs), Refer to: Blind Spot Information System .

DESCRIPTION AND OPERATION > REAR VIEW MIRRORS - OVERVIEW > OVERVIEW - INTERIOR

This vehicle may be equipped with a manual or auto-dimming interior rear view mirror. The manual dimming interior mirror has a lever at the bottom of the mirror assembly that must be pushed forward or pulled rearward to change the reflectance of the interior mirror glass. During nighttime conditions, the auto-dimming interior mirror automatically darkens the mirror glass when headlamps are detected from behind the vehicle to reduce unwanted glare. The auto-dimming feature is active any time the ignition is ON.

DESCRIPTION AND OPERATION > REAR VIEW MIRRORS - SYSTEM OPERATION AND COMPONENT DESCRIPTION

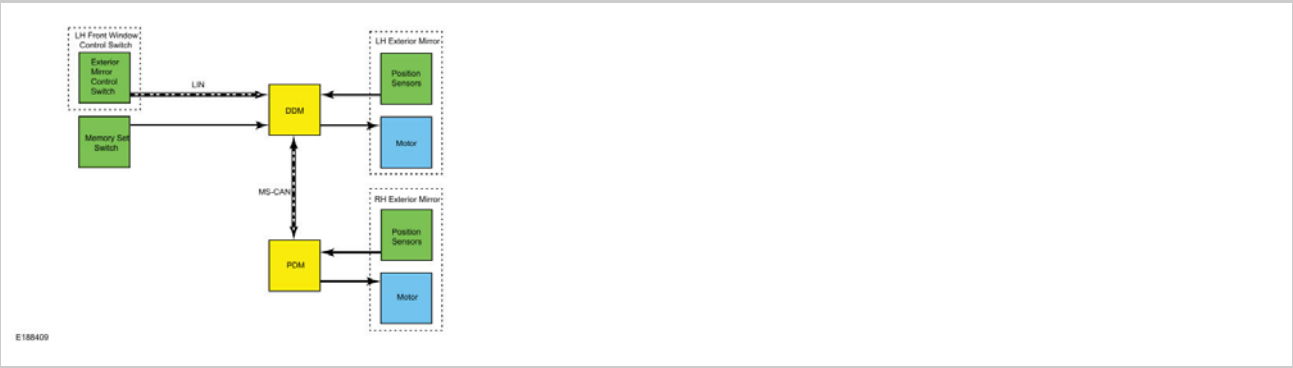
System Operation

DESCRIPTION AND OPERATION > REAR VIEW MIRRORS - SYSTEM OPERATION AND COMPONENT DESCRIPTION > SYSTEM OPERATION - EXTERIOR, POWER, WITHOUT MEMORY

The LH, RH, up or down exterior mirror glass movement is controlled by the exterior mirror control switch, which supplies voltage and ground to the LH and RH exterior mirror motors. The exterior mirror control switch receives voltage from the BCM fuse 23 (10A) any time the ignition is on. When the exterior mirror selection switch is in the LH or RH position and the exterior mirror control switch is pressed left, right, up or down, the switch supplies voltage and ground to the appropriate exterior mirror motor.

Each exterior mirror shares a common ground circuit for left, right, up and down movement.

DESCRIPTION AND OPERATION > REAR VIEW MIRRORS - SYSTEM OPERATION AND COMPONENT DESCRIPTION > SYSTEM DIAGRAM - EXTERIOR, POWER, WITH MEMORY



Network Message Chart

Module Network Input Messages - PDM

Broadcast Message	Originating Module	Message Purpose
Mirror command	DDM	Commands the PDM to initiate the RH exterior mirror glass moments, memory save or recall and also used to abort a memory recall that is in progress.

System Operation - Exterior, Power, With Memory

When a memory recall or save is initiated, the DDM sends the memory command message to the PDM through the MS-CAN. Based on this message, the DDM and PDM recall the requested memory preset mirror position from internal memory or save the current mirror position to correspond with the requested preset. During a memory recall, the DDM and PDM supply voltage and ground to the appropriate exterior mirror motors to achieve the desired memory positions that are stored in memory based on feedback from the mirror motor sensors. If the exterior mirror control switch is activated in any direction during a memory recall, the DDM sends the manual mirror override message to the PDM. After this message is received, the DDM and PDM abort the memory recall. After the recall is aborted, the DDM or PDM respond to the exterior mirror control switch inputs. A memory recall is also aborted if the driver seat control switch is activated in any direction during a memory recall.

The LH exterior mirror glass position memory presets are stored in the DDM and the RH exterior mirror glass position memory presets are stored in the PDM.

A memory recall or memory save can be initiated by the memory set switch, RKE transmitter or Intelligent Access (IA) key (if equipped) or the keyless entry keypad. For additional information on memory recall or memory save, refer to the Owner's Literature.

For additional information on the memory feature, Refer to: Front Seats - System Operation and Component Description .

System Diagram - Exterior, Heated, Without Memory



System Operation - Exterior, Heated, Without Memory

The rear window defrost system controls operation of the heated exterior mirror glass. The heated exterior mirror glass only operates when the rear window defrost system is active. The heated exterior rear view mirror glass deactivates when the rear window defrost deactivates.

The heated mirror glass receives voltage from the rear window defrost relay located inside the BJB. The LH and RH heated mirror glass does not share the same ground.

System Diagram - Exterior, Heated, With Memory



DESCRIPTION AND OPERATION > REAR VIEW MIRRORS - SYSTEM OPERATION AND COMPONENT DESCRIPTION > NETWORK MESSAGE CHART

Module Network Input Messages - PDM

Broadcast Message	Originating Module	Message Purpose
Mirror command	DDM	Commands the PDM to initiate the RH exterior mirror glass movements, memory save or recall and also used to abort a memory recall that is in progress.

DESCRIPTION AND OPERATION > REAR VIEW MIRRORS - SYSTEM OPERATION AND COMPONENT DESCRIPTION > SYSTEM OPERATION - EXTERIOR, POWER, WITH MEMORY

When a memory recall or save is initiated, the DDM sends the memory command message to the PDM through the MS-CAN. Based on this message, the DDM and PDM recall the requested memory preset

mirror position from internal memory or save the current mirror position to correspond with the requested preset. During a memory recall, the DDM and PDM supply voltage and ground to the appropriate exterior mirror motors to achieve the desired memory positions that are stored in memory based on feedback from the mirror motor sensors. If the exterior mirror control switch is activated in any direction during a memory recall, the DDM sends the manual mirror override message to the PDM. After this message is received, the DDM and PDM abort the memory recall. After the recall is aborted, the DDM or PDM respond to the exterior mirror control switch inputs. A memory recall is also aborted if the driver seat control switch is activated in any direction during a memory recall.

The LH exterior mirror glass position memory presets are stored in the DDM and the RH exterior mirror glass position memory presets are stored in the PDM.

A memory recall or memory save can be initiated by the memory set switch, RKE transmitter or Intelligent Access (IA) key (if equipped) or the keyless entry keypad. For additional information on memory recall or memory save, refer to the Owner's Literature.

For additional information on the memory feature, Refer to: Front Seats - System Operation and Component Description .

DESCRIPTION AND OPERATION > REAR VIEW MIRRORS - SYSTEM OPERATION AND COMPONENT DESCRIPTION > SYSTEM OPERATION - EXTERIOR, HEATED, WITHOUT MEMORY

The rear window defrost system controls operation of the heated exterior mirror glass. The heated exterior mirror glass only operates when the rear window defrost system is active. The heated exterior rear view mirror glass deactivates when the rear window defrost deactivates.

The heated mirror glass receives voltage from the rear window defrost relay located inside the BJB. The LH and RH heated mirror glass does not share the same ground.

DESCRIPTION AND OPERATION > REAR VIEW MIRRORS - SYSTEM OPERATION AND COMPONENT DESCRIPTION > NETWORK MESSAGE CHART

Module Network Input Messages - PDM

Broadcast Message	Originating Module	Message Purpose
Mirror command	DDM	Commands the PDM to initiate the RH exterior mirror glass movements, memory save or recall and also used to abort a memory recall that is in progress.

System Operation - Exterior, Power, With Memory

When a memory recall or save is initiated, the DDM sends the memory command message to the PDM through the MS-CAN. Based on this message, the DDM and PDM recall the requested memory preset mirror position from internal memory or save the current mirror position to correspond with the requested preset. During a memory recall, the DDM and PDM supply voltage and ground to the appropriate exterior

mirror motors to achieve the desired memory positions that are stored in memory based on feedback from the mirror motor sensors. If the exterior mirror control switch is activated in any direction during a memory recall, the DDM sends the manual mirror override message to the PDM. After this message is received, the DDM and PDM abort the memory recall. After the recall is aborted, the DDM or PDM respond to the exterior mirror control switch inputs. A memory recall is also aborted if the driver seat control switch is activated in any direction during a memory recall.

The LH exterior mirror glass position memory presets are stored in the DDM and the RH exterior mirror glass position memory presets are stored in the PDM.

A memory recall or memory save can be initiated by the memory set switch, RKE transmitter or Intelligent Access (IA) key (if equipped) or the keyless entry keypad. For additional information on memory recall or memory save, refer to the Owner's Literature.

For additional information on the memory feature, Refer to: Front Seats - System Operation and Component Description .

System Diagram - Exterior, Heated, Without Memory

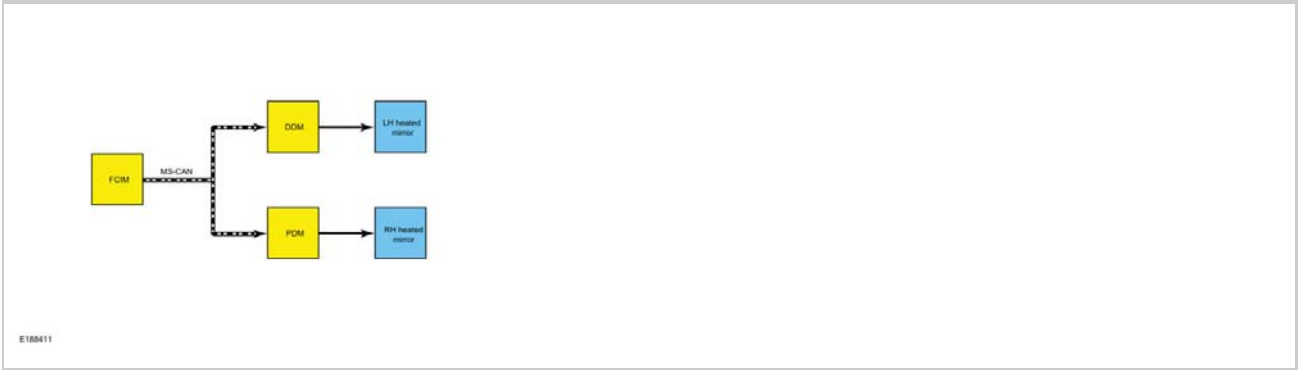


System Operation - Exterior, Heated, Without Memory

The rear window defrost system controls operation of the heated exterior mirror glass. The heated exterior mirror glass only operates when the rear window defrost system is active. The heated exterior rear view mirror glass deactivates when the rear window defrost deactivates.

The heated mirror glass receives voltage from the rear window defrost relay located inside the BJB. The LH and RH heated mirror glass does not share the same ground.

System Diagram - Exterior, Heated, With Memory



Network Message Chart

Module Network Input Messages - DDM and PDM

Broadcast Message	Originating Module	Message Purpose

Mirror heat request	FCIM	Used to command the heated exterior mirror glass on and off

DESCRIPTION AND OPERATION > REAR VIEW MIRRORS - SYSTEM OPERATION AND COMPONENT DESCRIPTION > SYSTEM OPERATION - EXTERIOR, HEATED, WITH MEMORY

The rear window defrost system controls operation of the heated exterior mirror glass. The heated exterior mirror glass only operates when the rear window defrost system is active. The heated exterior rear view mirror glass deactivates when the rear window defrost deactivates.

Based on the mirror heat request message received from the FCIM through the MS-CAN, the DDM controls the operation of the LH heated exterior mirror glass and the PDM controls the operation of the RH heated exterior mirror glass.

DESCRIPTION AND OPERATION > REAR VIEW MIRRORS - SYSTEM OPERATION AND COMPONENT DESCRIPTION > SYSTEM OPERATION - EXTERIOR, POWER FOLD

The power folding exterior mirror feature allows both power exterior rear view mirrors to be folded or unfolded by pressing the exterior mirror fold switch (integral to the LH front window control switch). The power folding exterior mirrors are controlled by the power folding mirror relay. When the ignition is on and a mirror fold is initiated by pressing the exterior mirror fold switch, the exterior mirror control switch sends a ground signal to the power folding mirror relay. The power folding mirror relay activate the power folding mirrors in the opposite direction of the last activation. The power folding mirror relay controls movement by reversing the polarity of the voltage and ground it supplies to the power folding mirror motors. The RH and LH power folding mirrors fold or unfold at the same time and cannot be controlled independently. The power folding mirrors contain a drive motor that is not replaceable. If a power folding mirror drive motor is found to be inoperative, a new power folding exterior rear view mirror assembly must be installed.

NOTE: If the power folding mirrors are folded or unfolded several times continuously, the power lockout feature disables the system for approximately 3-10 minutes to prevent damage to the power fold motors. After 3-10 minutes have elapsed, normal operation resumes.

NOTE: The power folding mirrors may need to be synchronized when the LH, RH or both power folding mirrors are partially folded in toward the door manually, and then folded inward using the power folding mirror control switch. Refer to Power Folding Mirrors Synchronization.

DESCRIPTION AND OPERATION > REAR VIEW MIRRORS - SYSTEM OPERATION

AND COMPONENT DESCRIPTION > SYSTEM OPERATION- INTERIOR MANUAL-DIMMING

The manual interior rear view mirror can be adjusted from a day position to a night position to reduce unwanted glare caused by headlamps from behind the vehicle. Adjusting the interior mirror is accomplished by using the day/night tab, located on the bottom of the interior mirror. Pulling the tab rearward, towards the driver, adjusts the mirror to the night position. Pushing the tap forward, away from the driver, adjusts the mirror to the day position.

DESCRIPTION AND OPERATION > REAR VIEW MIRRORS - SYSTEM OPERATION AND COMPONENT DESCRIPTION > SYSTEM OPERATION- INTERIOR AUTO-DIMMING

The interior auto-dimming mirror uses 2 integral photoelectric sensors to detect exterior lighting conditions. When the forward facing sensor detects daytime conditions, the rearward facing sensor is inactive and the mirror glass stays in a high reflectance mode. When the forward facing sensor detects nighttime conditions, the rearward facing sensor is active. When bright lights (glare) are detected by the rearward facing sensor, the mirror glass is electronically darkened. To provide increased visibility when backing up, the interior rear view mirror automatically returns to a high reflectance mode any time reverse gear is selected, regardless of exterior lighting conditions.

DESCRIPTION AND OPERATION > REAR VIEW MIRRORS - SYSTEM OPERATION AND COMPONENT DESCRIPTION > COMPONENT DESCRIPTION

Exterior Mirror Control Switch

The exterior mirror control switch is a momentary contact switch, integral to the LH front window control switch, that provides the driver with the controls to move the LH and RH exterior rear view mirrors left, right, up or down. The LED on each exterior mirror selection button illuminates to indicate which exterior mirror is selected for adjustment.

On vehicles equipped with the memory mirror feature, the exterior mirror control switch is connected to the DDM through a LIN circuit.

On vehicles without the memory mirror feature, the exterior mirror control switch provides voltage and ground to the selected exterior mirror motor to move the exterior mirror glass to the desired position.

Exterior Mirror Fold Switch

The exterior mirror fold switch is a momentary contact switch, integral to the LH front window control switch, that sends a ground signal to the power folding mirror relay to fold or unfold the exterior rear view mirrors to the desired position.

Memory Set Switch

The memory set switch contains 3 momentary contact switches. It is hard-wired to the DDM and is used to recall 1 of 3 memory positions stored in the DSM. For more information on the memory set switch, Refer to: Front Seats - System Operation and Component Description .

Exterior Mirror

Each exterior mirror has 2 bi-directional motors that are used to control the position of the exterior mirror glass. The sensors used to monitor the mirror glass position are integral to the motors.

If equipped with heated mirrors, the heated exterior mirrors use heating elements that are integral to the exterior mirror glass.

If equipped with power folding mirrors, each exterior mirror has an integral, bi-directional folding motor that is used to fold and unfold the exterior mirror.

If equipped with exterior mirrors that include turn signal indicators and/or puddle lamps, Refer to: Exterior Lighting - System Operation and Component Description .

If equipped with exterior mirrors that include blind spot monitoring (BLIS), Refer to: Blind Spot Information System - System Operation and Component Description .

The exterior mirrors use a jumper harness between the vehicle wiring harness, the exterior mirror motors and the heated mirror glass. The exterior mirror jumper harness is integral to the exterior mirror. Before replacing an exterior mirror or motor, inspect the jumper harness for opens, shorted circuits or damaged and pushed-out pins. If a concern with the exterior mirror jumper harness exists, attempt to repair the jumper harness.

DDM

On vehicles equipped with the memory mirrors feature, the DDM monitors the exterior mirror control switch through a LIN circuit. The DDM is responsible for supplying voltage and ground to the LH exterior mirror motors, LH exterior mirror motor sensors and LH exterior mirror glass heating element.

The DDM sends the RH exterior mirror movement request to the PDM through the MS-CAN.

PDM

On vehicles equipped with the memory mirrors feature, the PDM is responsible for supplying voltage and ground to the RH exterior mirror motors, RH exterior mirror motor sensors and RH exterior mirror glass heating element.

Interior Rear View Mirror - Manual-Dimming

The manual dimming interior rear view mirror has a lever at the back of the mirror that must be pulled forward or pushed rearward by the driver to activate the manual dimming function. Manual dimming is completely controlled by the driver.

Interior Rear View Mirror - Auto-Dimming

The auto-dimming rear view mirror has 2 photoelectric sensors, one on the front of the mirror (facing the windshield) and one on the rear of the mirror (at the top of the mirror glass). Based on inputs from these sensors, the automatic dimming feature adjusts the reflectance level of the interior rear view mirror glass to eliminate unwanted glare. The reflectance level of the mirror glass is variable and depends on the amount of rear glare in relation to ambient light conditions in front of the interior mirror.

DIAGNOSIS AND TESTING > REAR VIEW MIRRORS > DTC CHART: DDM

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic

practices. REFER to: Diagnostic Methods .

DTC	Description	Action
B1163:11	Left Mirror Heater Output: Circuit Short To Ground	GO to Pinpoint Test E
B1163:15	Left Mirror Heater Output: Circuit Short To Battery Or Open	GO to Pinpoint Test E
B1C09:11	Driver Left/Right Mirror Motor: Circuit Short To Ground	GO to Pinpoint Test C
B1C09:15	Driver Left/Right Mirror Motor: Circuit Short To Battery Or Open	GO to Pinpoint Test C
B1C10:11	Driver Up/Down Mirror Motor: Circuit Short To Ground	GO to Pinpoint Test C
B1C10:15	Driver Up/Down Mirror Motor: Circuit Short To Battery Or Open	GO to Pinpoint Test C
B1C13:11	Driver Up/Down Mirror Motor Feedback: Circuit Short To Ground	GO to Pinpoint Test C
B1C13:15	Driver Up/Down Mirror Motor Feedback: Circuit Short To Battery Or Open	GO to Pinpoint Test C
B1C14:11	Driver Left/Right Mirror Motor Feedback: Circuit Short To Ground	GO to Pinpoint Test C
B1C14:15	Driver Left/Right Mirror Motor Feedback: Circuit Short To Battery Or Open	GO to Pinpoint Test C
C1B15:11	Sensor Supply Voltage B: Circuit Short To Ground	GO to Pinpoint Test C
C1B15:15	Sensor Supply Voltage B: Circuit Short To Battery or Open	GO to Pinpoint Test C
All other DDM Diagnostic Trouble Codes (DTCs)	-	REFER to: Locks, Latches and Entry Systems .

DIAGNOSIS AND TESTING > REAR VIEW MIRRORS > DTC CHART: PDM

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

DTC	Description	Action
B1164:11	Right Mirror Heater Output: Circuit Short To Ground	GO to Pinpoint Test E

B1164:15	Right Mirror Heater Output: Circuit Short To Battery Or Open	GO to Pinpoint Test E
B1C11:11	Passenger Left/Right Mirror Motor: Circuit Short To Ground	GO to Pinpoint Test D
B1C11:15	Passenger Left/Right Mirror Motor: Circuit Short To Battery Or Open	GO to Pinpoint Test D
B1C12:11	Passenger Up/Down Mirror Motor: Circuit Short To Ground	GO to Pinpoint Test D
B1C12:15	Passenger Up/Down Mirror Motor: Circuit Short To Battery Or Open	GO to Pinpoint Test D
B1C15:11	Passenger Up/Down Mirror Motor Feedback: Circuit Short To Ground	GO to Pinpoint Test D
B1C15:15	Passenger Up/Down Mirror Motor Feedback: Circuit Short To Battery Or Open	GO to Pinpoint Test D
B1C16:11	Passenger Left/Right Mirror Motor Feedback: Circuit Short To Ground	GO to Pinpoint Test D
B1C16:15	Passenger Left/Right Mirror Motor Feedback: Circuit Short To Battery Or Open	GO to Pinpoint Test D
C1B15:11	Sensor Supply Voltage B: Circuit Short To Ground	GO to Pinpoint Test D
C1B15:15	Sensor Supply Voltage B: Circuit Short To Battery or Open	GO to Pinpoint Test D
All other PDM Diagnostic Trouble Codes (DTCs)	-	REFER to: Locks, Latches and Entry Systems .

DIAGNOSIS AND TESTING > REAR VIEW MIRRORS > SYMPTOM CHART(S) > SYMPTOM CHART: REAR VIEW MIRRORS - EXTERIOR

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

NOTE: Clean the entire mirror assembly and glass to assist in verification of the customer concern and/or impact damage. Do not clean any mirror glass or housing with an ice scraper, razor blade, abrasive pad, harsh chemicals or petroleum based cleaning products, as these may damage the mirror glass and/or housing.

Condition	Possible Causes	Action
The exterior mirror(s) fold inward	Power folding mirrors are not	For vehicles equipped with power

due to wind pressure	synchronized (vehicles equipped with folding mirrors only) Mirror structural bracket is damaged	folding mirror, SYNCHRONIZE the power folding mirrors. If the concern is still present after the power folding mirrors synchronization procedure was performed, INSPECT the mirror for structural damage. If necessary, INSTALL a new mirror. REFER to: Exterior Mirror . For vehicles not equipped with power folding mirror, INSPECT the mirror for structural damage. If necessary, INSTALL a new mirror. REFER to: Exterior Mirror .
The LH or RH exterior mirror selection switch LED is inoperative (exterior mirror selection switch functions normally)	Exterior mirror selection switch	INSTALL a new front door window control switch. REFER to: Front Door Window Control Switch .
A single mirror is inoperative (without memory mirrors)	Refer to the Pinpoint Test	GO to Pinpoint Test A
A single mirror does not function correctly in all directions (without memory mirrors)	Refer to the Pinpoint Test	GO to Pinpoint Test B
Both exterior mirrors are inoperative (without memory mirrors)	Wiring, terminals or connectors Power window concern Exterior mirror control switch (integral to the front door window control switch)	VERIFY that all power windows can be operated normally from the LH front door window control switch. If all power windows operate normally from the LH front door window control switch, INSTALL a new LH front door window control switch. REFER to: Front Door Window Control Switch . If all power window do not operate normally from the LH front door window control switch, DIAGNOSE the power windows before continuing diagnostics of the exterior mirrors. REFER to: Glass, Frames and Mechanisms .
Both exterior mirrors are inoperative (with memory mirrors)	Wiring, terminals or connectors Power window concern Exterior mirror control switch (integral to the front door window control switch) DDM	VERIFY that all power windows can be operated normally from the LH front door window control switch. If all power windows operate normally from the LH front door window control switch, INSTALL a new LH front door window control

		switch. REFER to: Front Door Window Control Switch . If the concern is the same after installing a new LH front door window control switch, INSTALL a new DDM. REFER to: Driver Door Module (DDM) . If all power window do not operate normally from the LH front door window control switch, DIAGNOSE the power windows before continuing diagnostics of the exterior mirrors. REFER to: Glass, Frames and Mechanisms .
The LH exterior mirror is inoperative (with memory mirrors)	Refer to the Pinpoint Test	GO to Pinpoint Test C
The LH exterior mirror does not operate correctly in all directions (with memory mirrors)	Refer to the Pinpoint Test	GO to Pinpoint Test C
The RH exterior mirror is inoperative (with memory mirrors)	Refer to the Pinpoint Test	GO to Pinpoint Test D
The RH exterior mirror does not operate correctly in all directions (with memory mirrors)	Refer to the Pinpoint Test	GO to Pinpoint Test D
The LH or RH heated exterior mirror is inoperative or always on (with memory mirrors)	Refer to the Pinpoint Test	GO to Pinpoint Test E
One or both heated exterior mirrors are inoperative (without memory mirrors)	Refer to the Pinpoint Test	GO to Pinpoint Test F
Both heated exterior mirrors are always on (without memory mirrors)	Refer to the Pinpoint Test	DIAGNOSE the rear window defrost system. REFER to: Glass, Frames and Mechanisms .
The LH and RH heated exterior mirrors do not defrost at the same rate	Normal operation of the heated exterior mirror	No action required, the system is operating correctly at this time.
The LH and/or RH power folding mirror is inoperative/does not operate correctly (if equipped)	Refer to the Pinpoint Test	GO to Pinpoint Test G
The RH and LH power folding mirror do not fold and/or unfold at the same rate of speed (if equipped)	Normal operation of the power folding mirror	No action required, the system is operating correctly at this time.
The projector lamp is inoperative or always on	Wiring, terminals or connectors Projector lamp BCM	REFER to: Interior Lighting .

The exterior mirror turn indicator is inoperative or always on	Wiring, terminals or connectors Communication concern (vehicles with memory mirrors) Turn indicator Door module (vehicles with memory mirrors) BCM	REFER to: Turn Signal and Hazard Lamps .
The Blind Spot Information System (BLIS ®) indicator is inoperative or always on	Wiring, terminals or connectors Exterior mirror glass Side obstacle detection control module	REFER to: Blind Spot Information System .

DIAGNOSIS AND TESTING > REAR VIEW MIRRORS > SYMPTOM CHART(S) > SYMPTOM CHART: REAR VIEW MIRRORS - INTERIOR

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

NOTE: Clean the entire mirror assembly and glass to assist in verification of the customer concern and/or impact damage. Do not clean any mirror glass or housing with an ice scraper, razor blade, abrasive pad, harsh chemicals or petroleum based cleaning products, as these may damage the mirror glass and/or housing.

Condition	Possible Causes	Action
The interior mirror is blemished	Interior mirror glass/housing is dirty	CLEAN the affected interior mirror surface.
The interior mirror vibrates or is loose	Interior mirror mounting loose	If the mirror is still on the windshield, **do not remove** . ATTEMPT to fully seat the mirror first. If the mirror is still loose or vibrates, REMOVE and REINSTALL the mirror. If the condition still exists, INSTALL a new interior mirror. REFER to: Interior Rear View Mirror .
The interior auto-dimming mirror does not operate correctly	Refer to the Pinpoint Test	GO to Pinpoint Test H

DIAGNOSIS AND TESTING > REAR VIEW MIRRORS > SYMPTOM CHART(S) > SYMPTOM CHART: REAR VIEW MIRRORS - EXTERIOR NVH

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

NOTE: Clean the entire mirror assembly and glass to assist in verification of the customer concern and/or impact damage. Do not clean any mirror glass or housing with an ice scraper, razor blade, abrasive pad, harsh chemicals or petroleum based cleaning products, as these may damage the mirror glass and/or housing.

Condition	Possible Causes	Action
Exterior mirror housing vibrates or is loose	Power folding mirrors are not synchronized (if equipped)	SYNCHRONIZE the power folding mirrors.
	Exterior mirror mounting nuts loose	TIGHTEN the exterior mirror mounting nuts. REFER to: Exterior Mirror .
	Aftermarket air deflector/stone shields	If possible, REMOVE the aftermarket parts and ROAD TEST the vehicle. If the concern is no longer present, ADVISE the customer that the aftermarket components were causing the undesired vibration.
Exterior mirror glass vibrates or is loose	Exterior mirror motor mounting screws loose Exterior mirror glass loose	PRESS the center of the exterior mirror glass up, down, left and right to make sure the exterior mirror glass is seated correctly. If the exterior mirror glass is still loose, REMOVE the exterior mirror glass. INSPECT the exterior mirror backing plate for damage. INSPECT the exterior mirror motor mounting screws and TIGHTEN if necessary. If the exterior mirror backing plate is damaged, INSTALL a new exterior mirror glass. REFER to: Exterior Mirror .
Wind noise	Foam gasket between exterior mirror housing and door is misaligned or damaged	VERIFY the gasket is in good condition. If necessary, REPOSITION the gasket between the exterior mirror housing and the door. The foam gasket is not serviceable and if it cannot be repaired, INSTALL a new exterior mirror. REFER to: Exterior Mirror .
	Exterior mirror is not correctly fitted to the door	VERIFY there are no gaps between the exterior mirror and the door. If necessary, LOOSEN the exterior mirror nuts and REPOSITION the exterior mirror as necessary. REFER to: Exterior

		Mirror .
	Exterior mirror impact damage	INSPECT the exterior mirror to ensure that there is no damage to the housing or glass.

DIAGNOSIS AND TESTING > REAR VIEW MIRRORS > PINPOINT TESTS > PINPOINT TEST A : A SINGLE MIRROR IS INOPERATIVE (WITHOUT MEMORY MIRRORS)

Refer to Power Mirrors for schematic and connector information.

Normal Operation and Fault Conditions

The exterior mirror control switch supplies voltage and ground to the exterior mirror motors based on switch inputs. Each exterior mirror shares a common circuit for both up/down and left/right movement.

Possible Causes

- Wiring, terminals or connectors
- Exterior mirror control switch (integral to the front door window control switch)
- Exterior mirror

Visual Inspection and Diagnostic Pre-Checks

Inspect the suspect exterior mirror for damage or obstructions.

NOTE: Clean the entire mirror assembly and glass to assist in verification of the customer concern and/or impact damage. Do not clean any mirror glass or housing with an ice scraper, razor blade, abrasive pad, harsh chemicals or petroleum based cleaning products, as these may damage the mirror glass and/or housing.

DIAGNOSIS AND TESTING > REAR VIEW MIRRORS > PINPOINT TESTS > PINPOINT TEST A : A SINGLE MIRROR IS INOPERATIVE (WITHOUT MEMORY MIRRORS) > PINPOINT TEST A : A SINGLE MIRROR IS INOPERATIVE (WITHOUT MEMORY MIRRORS)

NOTE: The following step uses a test lamp to simulate normal circuit loads. To avoid connector terminal damage, use the Rotunda Flex Probe kit for the test lamp probe connection to the vehicle. Do not use the test lamp probe directly on any connector.

A1 CHECK THE EXTERIOR MIRROR

Ignition OFF.

Disconnect: inoperative exterior mirror C520 (LH exterior mirror) or C626 (RH exterior mirror).

Ignition ON.

Select the inoperative exterior mirror by pressing the appropriate exterior mirror selection switch.

Connect:

LH exterior mirror

Lead 1	Measurement / Action	Lead 2
C520-1		C520-2

RH exterior mirror

Lead 1	Measurement / Action	Lead 2
C626-1		C626-2

Observe the test light while holding the exterior mirror control switch in the up position.

Did the test light illuminate?

Yes	CHECK the inoperative exterior mirror jumper harness between the vehicle harness and the exterior mirror motor for open circuits and damaged or pushed-out pins. If the jumper harness is not OK, REPAIR the jumper harness. If the jumper harness cannot be repaired, INSTALL a new exterior mirror. REFER to: Exterior Mirror .

No	GO to A2

A2 CHECK THE EXTERIOR MIRROR MOTOR COMMON CIRCUIT FOR AN OPEN

Ignition OFF.

Disconnect: Front Door Window Control Switch C504 .

Measure:

LH exterior mirror

Positive Lead	Measurement / Action	Negative Lead
C520-2	Ω	C504-12

RH exterior mirror

Positive Lead	Measurement / Action	Negative Lead

C626-2	Ω	C504-12

Is the resistance less than 3 ohms?

Yes	INSTALL a new exterior mirror control switch (integral to the front door window control switch). REFER to: Front Door Window Control Switch .

No	REPAIR the circuit.

DIAGNOSIS AND TESTING > REAR VIEW MIRRORS > PINPOINT TESTS > PINPOINT TEST B : A SINGLE MIRROR DOES NOT FUNCTION CORRECTLY IN ALL DIRECTIONS (WITHOUT MEMORY MIRRORS)

Refer to Power Mirrors for schematic and connector information.

Normal Operation and Fault Conditions

The exterior mirror control switch supplies voltage and ground to the appropriate exterior mirror motors based on switch inputs. Each exterior mirror shares a common circuit for both up/down and left/right movement.

Possible Causes

- Wiring, terminals or connectors
- Exterior mirror control switch (integral to the front door window control switch)
- Exterior mirror motor
- Exterior mirror

Visual Inspection and Diagnostic Pre-Checks

- Inspect the exterior mirror control switch.
- Inspect the suspect exterior mirror for damage or obstructions.

NOTE: Clean the entire mirror assembly and glass to assist in verification of the customer concern and/or impact damage. Do not clean any mirror glass or housing with an ice scraper, razor blade, abrasive pad, harsh chemicals or petroleum based cleaning products, as these may damage the mirror glass and/or housing.

DIAGNOSIS AND TESTING > REAR VIEW MIRRORS > PINPOINT TESTS > PINPOINT TEST B : A SINGLE MIRROR DOES NOT FUNCTION CORRECTLY IN ALL DIRECTIONS (WITHOUT MEMORY MIRRORS) > PINPOINT TEST B : A SINGLE MIRROR DOES NOT FUNCTION CORRECTLY IN ALL DIRECTIONS (WITHOUT

MEMORY MIRRORS)

NOTE: The following step uses a test lamp to simulate normal circuit loads. To avoid connector terminal damage, use the Rotunda Flex Probe kit for the test lamp probe connection to the vehicle. Do not use the test lamp probe directly on any connector.

B1 CHECK THE EXTERIOR MIRROR LEFT AND RIGHT MOVEMENT

Ignition ON.

Operate the LH and RH exterior mirrors in the left and right direction using the exterior mirror control switch.

Do both exterior mirrors move left and right?

Yes	GO to B2

No	GO to B6

B2 CHECK THE EXTERIOR MIRROR UP/DOWN MOTOR

Ignition OFF.

Disconnect: incorrectly operating C520 (LH exterior mirror) or C626 (RH exterior mirror).

Ignition ON.

Select the incorrectly operating mirror on the exterior mirror control switch.

Connect:

LH exterior mirror

Lead 1	Measurement / Action	Lead 2
C520-1		C520-2

RH exterior mirror

Lead 1	Measurement / Action	Lead 2
C626-1		C626-2

Observe the test light while using the exterior mirror control switch in the up, down and released positions.

Did the test light illuminate in the up and down position and not illuminate in the released position?

Yes	GO to B10

No	GO to B3

B3 CHECK THE EXTERIOR MIRROR UP/DOWN CIRCUIT FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: Front Door Window Control Switch C504 .

Ignition ON.

Measure:

LH exterior mirror

Positive Lead	Measurement / Action	Negative Lead
C520-1		Ground

RH exterior mirror

Positive Lead	Measurement / Action	Negative Lead
C626-1		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to B4

B4 CHECK THE EXTERIOR MIRROR UP/DOWN CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Measure:

LH exterior mirror

Positive Lead	Measurement / Action	Negative Lead
C520-1	Ω	Ground

RH exterior mirror

Positive Lead	Measurement / Action	Negative Lead
C626-1	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to B5

No	REPAIR the circuit.

B5 CHECK THE EXTERIOR MIRROR UP/DOWN CIRCUIT FOR AN OPEN

Measure:

LH exterior mirror

Positive Lead	Measurement / Action	Negative Lead
C520-1	Ω	C504-9

RH exterior mirror

Positive Lead	Measurement / Action	Negative Lead
C626-1	Ω	C504-7

Is the resistance less than 3 ohms?

Yes	INSTALL a new exterior mirror control switch (integral to the front door window control switch). REFER to: Front Door Window Control Switch .

No	REPAIR the circuit.

B6 CHECK THE EXTERIOR MIRROR LEFT/RIGHT MOTOR

Ignition OFF.

Disconnect: incorrectly operating C520 (LH exterior mirror) or C626 (RH exterior mirror).

Ignition ON.

Select the incorrectly operating mirror on the exterior mirror control switch.

Connect:

LH exterior mirror

Lead 1	Measurement / Action	Lead 2
C520-4		C520-2

RH exterior mirror

Lead 1	Measurement / Action	Lead 2
C626-4		C626-2

Observe the test light while using the exterior mirror control switch in the left, right and released positions.

Did the test light illuminate in the right and left position and not illuminate in the released position?

Yes	GO to B10

No	GO to B7

B7 CHECK THE EXTERIOR MIRROR LEFT/RIGHT CIRCUIT FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: Front Door Window Control Switch C504 .

Ignition ON.

Measure:

LH exterior mirror

Positive Lead	Measurement / Action	Negative Lead
C520-4		Ground

RH exterior mirror

Positive Lead	Measurement / Action	Negative Lead
C626-4		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to B8

B8 CHECK THE EXTERIOR MIRROR LEFT/RIGHT CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Measure:

LH exterior mirror

Positive Lead	Measurement / Action	Negative Lead
C520-4	Ω	Ground

RH exterior mirror

Positive Lead	Measurement / Action	Negative Lead
C626-4	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to B9

No	REPAIR the circuit.

B9 CHECK THE EXTERIOR MIRROR LEFT/RIGHT CIRCUIT FOR AN OPEN

Measure:

LH exterior mirror

Positive Lead	Measurement / Action	Negative Lead
C520-4	Ω	C504-8

RH exterior mirror

Positive Lead	Measurement / Action	Negative Lead
C626-4	Ω	C504-6

Is the resistance less than 3 ohms?

Yes	INSTALL a new exterior mirror control switch (integral to the front door window control switch). REFER to: Front Door Window Control Switch .

No	REPAIR the circuit.

B10 CHECK THE EXTERIOR MIRROR JUMPER HARNESS

Inspect the exterior mirror jumper harness between the vehicle harness and the exterior mirror motor for:

Open or short circuits

Damaged or pushed out pins

Corrosion

Is the harness OK?

Yes	INSTALL a new exterior mirror motor. REFER to: Exterior Mirror .

No	REPAIR the harness as necessary. If the harness cannot be repaired, INSTALL a new exterior mirror. REFER to: Exterior Mirror .

DIAGNOSIS AND TESTING > REAR VIEW MIRRORS > PINPOINT TESTS > PINPOINT TEST C : THE LH (LEFT-HAND) EXTERIOR MIRROR IS INOPERATIVE OR DOES NOT OPERATE CORRECTLY IN ONE OR MORE DIRECTION(S) (WITH MEMORY MIRRORS)

Refer to Power Mirrors for schematic and connector information.

Normal Operation and Fault Conditions

The DDM supplies voltage and ground to the LH exterior mirror motors based on input provided by the exterior mirror control switch. To support the memory function, the DDM supplies a 5 volt reference and ground to the mirror motor sensors. The DDM monitors the feedback voltage from the horizontal and vertical sensors to determine the position of the LH mirror glass. The DDM is capable of storing Diagnostic Trouble Codes (DTCs) for the LH exterior mirror motor drive and mirror position feedback circuits when a concern exists.

DTC	Description	Fault Trigger Conditions
B1C09:11	Driver Left/Right Mirror Motor: Circuit Short To Ground	This continuous and on-demand DTC sets if the DDM detects a higher than expected current draw when voltage is applied to the horizontal mirror motor circuit.
B1C09:15	Driver Left/Right Mirror Motor: Circuit Short To Battery Or Open	This continuous and on-demand DTC sets if the DDM detects a lower than expected current draw when voltage is applied to the horizontal mirror motor circuit.
B1C10:11	Driver Up/Down Mirror Motor: Circuit Short To Ground	This continuous and on-demand DTC sets if the DDM detects a higher than expected current draw when voltage is applied to the vertical mirror motor circuit.
B1C10:15	Driver Up/Down Mirror Motor: Circuit Short To Battery Or Open	This continuous and on-demand DTC sets if the DDM detects a lower than expected current draw when voltage is applied to the vertical mirror motor circuit.
B1C13:11	Driver Up/Down Mirror Motor Feedback: Circuit Short To Ground	This continuous and on-demand DTC sets if the DDM detects a short to ground on the vertical

		position feedback circuit.
B1C13:15	Driver Up/Down Mirror Motor Feedback: Circuit Short To Battery Or Open	This continuous and on-demand DTC sets if the DDM detects a short to voltage or open on the vertical position feedback circuit.
B1C14:11	Driver Left/Right Mirror Motor Feedback: Circuit Short To Ground	This continuous and on-demand DTC sets if the DDM detects a short to ground on the horizontal position feedback circuit.
B1C14:15	Driver Left/Right Mirror Motor Feedback: Circuit Short To Battery Or Open	This continuous and on-demand DTC sets if the DDM detects a short to voltage or open on the horizontal position feedback circuit.
C1B15:11	Sensor Supply Voltage B: Circuit Short To Ground	This continuous and on-demand DTC sets if the DDM detects a short to ground on the LH exterior mirror position sensor voltage supply circuit.
C1B15:15	Sensor Supply Voltage B: Circuit Short To Battery or Open	This continuous and on-demand DTC sets if the DDM detects a short to voltage or open on the LH exterior mirror position sensor voltage supply circuit.

Possible Causes

- Wiring, terminals or connectors
- Exterior mirror control switch (integral to the front door window control switch)
- Exterior mirror
- DDM

Visual Inspection and Diagnostic Pre-Checks

Inspect BJB fuse 11 (30A).

DIAGNOSIS AND TESTING > REAR VIEW MIRRORS > PINPOINT TESTS > PINPOINT TEST C : THE LH (LEFT-HAND) EXTERIOR MIRROR IS INOPERATIVE OR DOES NOT OPERATE CORRECTLY IN ONE OR MORE DIRECTION(S) (WITH MEMORY MIRRORS) > PINPOINT TEST C : THE LH (LEFT-HAND) EXTERIOR MIRROR IS INOPERATIVE OR DOES NOT OPERATE CORRECTLY IN ONE OR MORE DIRECTION(S) (WITH MEMORY MIRRORS)

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may cause damage to the connector. Use only Rotunda Flex Probes (NUD105-R025D)

NOTE: The following step uses a test lamp to simulate normal circuit loads. To avoid connector terminal damage, use the Rotunda Flex Probe kit for the test lamp probe connection to the vehicle. Do not use the test lamp probe directly on any connector.

C1 CHECK THE DDM (DRIVER DOOR MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition ON.

Using a diagnostic scan tool, perform the DDM self-test.

Are any Diagnostic Trouble Codes (DTCs) present?

Yes	For Diagnostic Trouble Codes (DTCs) B1C09:11 or B1C09:15, GO to C15 For Diagnostic Trouble Codes (DTCs) B1C10:11 or B1C10:15, GO to C19 For Diagnostic Trouble Codes (DTCs) B1C13:11, B1C13:15, B1C14:11, B1C14:15, C1B15:11, or C1B15:15, GO to C8 For all other DDM Diagnostic Trouble Codes (DTCs), REFER to: Locks, Latches and Entry Systems .

No	GO to C2

C2 CHECK THE EXTERIOR MIRROR SELECTION SWITCH

Using a diagnostic scan tool, monitor the MIR_SEL DDM Parameter Identification (PID).

Operate the exterior mirror selection buttons to select the LH and then RH exterior mirrors.

Does the MIR_SEL DDM Parameter Identification (PID) match the selector switch in both positions?

Yes	GO to C3

No	INSTALL a new front door window control switch. REFER to: Front Door Window Control Switch .

C3 CHECK THE EXTERIOR MIRROR CONTROL SWITCH

Using a diagnostic scan tool, monitor the MIR_SW_DN, MIR_SW_UP, MIR_SW_L, and MIR_SW_R DDM Parameter Identifications (PIDs).

Press the exterior mirror control switch in the left, right, up and down directions.

Do the DDM Parameter Identifications (PIDs) match the control switch in all directions?

Yes	GO to C4

No	INSTALL a new front door window control switch. REFER to: Front Door Window Control Switch .

C4 CHECK THE LH (LEFT-HAND) MIRROR COMMON CIRCUIT FOR VOLTAGE AT THE LH (LEFT-HAND) EXTERIOR MIRROR

Ignition OFF.

Disconnect: LH Exterior Mirror C520 .

Connect:

Lead 1	Measurement / Action	Lead 2
C520-2		Ground

Ignition ON.

Select the LH mirror with the exterior mirror selection switch.

Monitor the test light while pressing the exterior mirror control switch in the left and down directions.

Does the test light illuminate only when the exterior mirror control switch is pressed in the left and down directions?

Yes	GO to C24

No	If the test light is illuminated when the exterior mirror control switch is not pressed in any direction, GO to C5 If the test light does not illuminate when the exterior mirror control switch is pressed in the left and down directions, GO to C6

C5 CHECK THE COMMON CIRCUIT FOR A SHORT TO VOLTAGE AT THE LH (LEFT-HAND) EXTERIOR MIRROR

Ignition OFF.

Disconnect: DDM C501B .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C520-2		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to C23

C6 CHECK THE COMMON CIRCUIT FOR AN OPEN BETWEEN THE LH (LEFT-HAND) EXTERIOR MIRROR AND THE DDM (DRIVER DOOR MODULE)

Ignition OFF.

Disconnect: DDM C501B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C520-2	Ω	C501B-17

Is the resistance less than 3 ohms?

Yes	GO to C7

No	REPAIR the circuit.

C7 CHECK THE COMMON CIRCUIT FOR A SHORT TO GROUND AT THE LH (LEFT-HAND) EXTERIOR MIRROR

Measure:

Positive Lead	Measurement / Action	Negative Lead
C520-2	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to C23

No	REPAIR the circuit.

C8 CHECK THE POSITION SENSOR CIRCUITS FOR A SHORT TO VOLTAGE AT THE LH (LEFT-HAND) EXTERIOR MIRROR

Ignition OFF.

Disconnect: LH Exterior Mirror C520 .

Disconnect: DDM C501B .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C520-12		Ground
C520-10		Ground
C520-9		Ground
C520-8		Ground

Is any voltage present?

Yes	REPAIR the affected circuit.

No	GO to C9

C9 CHECK THE POSITION SENSOR CIRCUITS FOR A SHORT TO GROUND AT THE LH (LEFT-HAND) EXTERIOR MIRROR

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C520-10	Ω	Ground
C520-9	Ω	Ground
C520-8	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to C10

No	REPAIR the affected circuit.

C10 CHECK THE POSITION SENSOR CIRCUITS FOR AN OPEN BETWEEN THE LH (LEFT-HAND) EXTERIOR MIRROR AND THE DDM (DRIVER DOOR MODULE)

Measure:

Positive Lead	Measurement / Action	Negative Lead
C520-12	Ω	C501B-15
C520-10	Ω	C501B-6
C520-9	Ω	C501B-5

C520-8	Ω	C501B-16

Are the resistances less than 3 ohms?

Yes	GO to C11

No	REPAIR the affected circuit.

C11 CHECK THE MIRROR POSITION SENSOR REFERENCE VOLTAGE AT THE LH (LEFT-HAND) EXTERIOR MIRROR

Connect: DDM C501B .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C520-9		C520-12

Is the voltage approximately 5 volts?

Yes	GO to C12

No	GO to C23

C12 CHECK THE DDM (DRIVER DOOR MODULE) DIAGNOSTIC TROUBLE CODES (DTCS) WITH THE LH (LEFT-HAND) EXTERIOR MIRROR DISCONNECTED

Using a diagnostic scan tool, clear the DDM Diagnostic Trouble Codes (DTCs).

Perform the DDM self-test.

Is DTC B1C13:15 or B1C14:15 present?

Yes	GO to C13

No	GO to C23

C13 CHECK THE DDM (DRIVER DOOR MODULE) DIAGNOSTIC TROUBLE CODES (DTCS) WITH THE HORIZONTAL POSITION SENSOR FEEDBACK CIRCUIT SHORTED TO GROUND

Ignition OFF.

Connect:

Lead 1	Measurement / Action	Lead 2

C520-10		C520-12

Ignition ON.

Using a diagnostic scan tool, clear the DDM Diagnostic Trouble Codes (DTCs).

Perform the DDM self-test.

Is DTC B1C14:11 present?

Yes	REMOVE the jumper wire. GO to C14

No	REMOVE the jumper wire. GO to C23

C14 CHECK THE DDM (DRIVER DOOR MODULE) DIAGNOSTIC TROUBLE CODES (DTCS) WITH THE VERTICAL POSITION SENSOR FEEDBACK CIRCUIT SHORTED TO GROUND

Ignition OFF.

Connect:

Lead 1	Measurement / Action	Lead 2
C520-8		C520-12

Ignition ON.

Using a diagnostic scan tool, clear the DDM Diagnostic Trouble Codes (DTCs).

Perform the DDM self-test.

Is DTC B1C13:11 present?

Yes	REMOVE the jumper wire. GO to C24

No	REMOVE the jumper wire. GO to C23

C15 CHECK FOR VOLTAGE TO THE HORIZONTAL MOTOR CIRCUIT AT THE LH (LEFT-HAND) EXTERIOR MIRROR

Ignition OFF.

Disconnect: LH Exterior Mirror C520 .

Connect:

Lead 1	Measurement / Action	Lead 2
C520-4		Ground

Ignition ON.

Select the LH mirror on the exterior mirror selection switch.

Monitor the test light while pressing the exterior mirror control switch in the right direction.

Does the test light illuminate only when the exterior mirror control switch is pressed in the right direction?

Yes	GO to C24

No	If the test light is illuminated when the exterior mirror control switch is not pressed in any direction, GO to C16 If the test light does not illuminate when the exterior mirror control switch is pressed in the right direction, GO to C17

C16 CHECK THE HORIZONTAL MIRROR CIRCUIT FOR A SHORT TO VOLTAGE AT THE LH (LEFT-HAND) EXTERIOR MIRROR

Ignition OFF.

Disconnect: DDM C501B .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C520-4		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to C23

C17 CHECK THE HORIZONTAL MOTOR CIRCUIT FOR A SHORT TO GROUND AT THE LH (LEFT-HAND) EXTERIOR MIRROR

Ignition OFF.

Disconnect: DDM C501B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C520-4	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to C18

No	REPAIR the circuit.

C18 CHECK THE HORIZONTAL MOTOR CIRCUIT FOR AN OPEN BETWEEN THE LH (LEFT-HAND) EXTERIOR MIRROR AND THE DDM (DRIVER DOOR MODULE)

Measure:

Positive Lead	Measurement / Action	Negative Lead
C520-4	Ω	C501B-8

Is the resistance less than 3 ohms?

Yes	GO to C23

No	REPAIR the circuit.

C19 CHECK FOR VOLTAGE TO THE VERTICAL MOTOR CIRCUIT AT THE LH (LEFT-HAND) EXTERIOR MIRROR

Ignition OFF.

Disconnect: LH Exterior Mirror C520 .

Connect:

Lead 1	Measurement / Action	Lead 2
C520-1		Ground

Ignition ON.

Select the LH mirror on the exterior mirror selection switch.

Monitor the test light while pressing the exterior mirror control switch in the up direction.

Does the test light illuminate only when the exterior mirror control switch is pressed in the up direction?

Yes	GO to C24

No	If the test light is illuminated when the exterior mirror control switch is not pressed in any direction, GO to C20 If the test light does not illuminate when the exterior mirror control switch is pressed in the up direction, GO to C21

C20 CHECK THE VERTICAL MIRROR CIRCUIT FOR A SHORT TO VOLTAGE AT THE LH (LEFT-HAND) EXTERIOR MIRROR

Ignition OFF.

Disconnect: DDM C501B .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C520-1		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to C23

C21 CHECK THE VERTICAL MOTOR CIRCUIT FOR A SHORT TO GROUND AT THE LH (LEFT-HAND) EXTERIOR MIRROR

Ignition OFF.

Disconnect: DDM C501B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C520-1	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to C22

No	REPAIR the circuit.

C22 CHECK THE VERTICAL MOTOR CIRCUIT FOR AN OPEN BETWEEN THE LH (LEFT-HAND) EXTERIOR MIRROR AND THE DDM (DRIVER DOOR MODULE)

Measure:

Positive Lead	Measurement / Action	Negative Lead
C520-1	Ω	C501B-7

Is the resistance less than 3 ohms?

Yes	GO to C23

No	REPAIR the circuit.

C23 CHECK FOR CORRECT DDM (DRIVER DOOR MODULE) OPERATION

Disconnect and inspect all DDM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the DDM connectors and all previously disconnected exterior mirror system connectors. Make sure they seat and latch correctly.

Operate the system to determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new DDM. REFER to: Driver Door Module (DDM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

C24 CHECK THE EXTERIOR MIRROR JUMPER HARNESS

Inspect the exterior mirror jumper harness between the vehicle harness and the mirror motors for:

Open or short circuits

Damaged or pushed out pins

Corrosion

Is the harness OK?

Yes	INSTALL a new exterior mirror motor. REFER to: Exterior Mirror .

No	REPAIR the harness as necessary. If the harness cannot be repaired, INSTALL a new exterior mirror. REFER to: Exterior Mirror .

DIAGNOSIS AND TESTING > REAR VIEW MIRRORS > PINPOINT TESTS > PINPOINT TEST D : THE RH (RIGHT-HAND) EXTERIOR MIRROR IS INOPERATIVE OR DOES NOT OPERATE IN ONE OR MORE DIRECTION(S) (WITH MEMORY MIRRORS)

Refer to Power Mirrors for schematic and connector information.

Normal Operation and Fault Conditions

The PDM supplies voltage and ground to the RH exterior mirror motors based on input provided by the exterior mirror control switch. To support the memory function, the PDM supplies a 5 volt reference and ground to the mirror motor sensors. The PDM monitors the feedback voltage from the horizontal and vertical sensors to determine the position of the RH mirror glass. The PDM is capable of storing Diagnostic Trouble Codes (DTCs) for the RH exterior mirror motor drive and mirror position feedback circuits when a problem exists.

DTC	Description	Fault Trigger Conditions
B1C11:11	Passenger Left/Right Mirror Motor: Circuit Short To Ground	This continuous and on-demand DTC sets if the PDM detects a higher than expected current draw when voltage is applied to the horizontal mirror motor circuit.
B1C11:15	Passenger Left/Right Mirror Motor: Circuit Short To Battery Or Open	This continuous memory DTC sets if the PDM detects a lower than expected current draw when voltage is applied to the horizontal mirror motor circuit.
B1C12:11	Passenger Up/Down Mirror Motor: Circuit Short To Ground	This continuous memory DTC sets if the PDM detects a higher than expected current draw when voltage is applied to the vertical mirror motor circuit.
B1C12:15	Passenger Up/Down Mirror Motor: Circuit Short To Battery Or Open	This continuous and on-demand DTC sets if the PDM detects a lower than expected current draw when voltage is applied to the vertical mirror motor circuit.
B1C15:11	Passenger Up/Down Mirror Motor Feedback: Circuit Short To Ground	This continuous and on-demand DTC sets if the PDM detects a short to ground on the vertical position feedback circuit.
B1C15:15	Passenger Up/Down Mirror Motor Feedback: Circuit Short To Battery Or Open	This continuous and on-demand DTC sets if the PDM detects a short to voltage or open on the vertical position feedback circuit.
B1C16:11	Passenger Left/Right Mirror Motor Feedback: Circuit Short To Ground	This continuous and on-demand DTC sets if the PDM detects a short to ground on the horizontal

		position feedback circuit.
B1C16:15	Passenger Left/Right Mirror Motor Feedback: Circuit Short To Battery Or Open	This continuous and on-demand DTC sets if the PDM detects a short to voltage or open on the horizontal position feedback circuit.
C1B15:11	Sensor Supply Voltage B: Circuit Short To Ground	This continuous and on-demand DTC sets if the PDM detects a short to ground on the RH exterior mirror position sensor voltage supply circuit.
C1B15:15	Sensor Supply Voltage B: Circuit Short To Battery or Open	This continuous and on-demand DTC sets if the PDM detects a short to voltage or open on the RH exterior mirror position sensor voltage supply circuit.

Possible Causes

- Wiring, terminals or connectors
- Exterior mirror control switch (integral to the front door window control switch)
- Exterior mirror
- PDM

Visual Inspection and Diagnostic Pre-Checks

Inspect BCM fuse 26 (30A).

DIAGNOSIS AND TESTING > REAR VIEW MIRRORS > PINPOINT TESTS > PINPOINT TEST D : THE RH (RIGHT-HAND) EXTERIOR MIRROR IS INOPERATIVE OR DOES NOT OPERATE IN ONE OR MORE DIRECTION(S) (WITH MEMORY MIRRORS) > PINPOINT TEST D : THE RH (RIGHT-HAND) EXTERIOR MIRROR IS INOPERATIVE OR DOES NOT OPERATE IN ONE OR MORE DIRECTION(S) (WITH MEMORY MIRRORS)

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may cause damage to the connector. Use only Rotunda Flex Probes (NUD105-R025D)

NOTE: The following step uses a test lamp to simulate normal circuit loads. To avoid connector terminal damage, use the Rotunda Flex Probe kit for the test lamp probe connection to the vehicle. Do not use the test lamp probe directly on any connector.

D1 PERFORM A NETWORK TEST

Ignition ON.

Using a diagnostic scan tool, perform a network test.

Do the DDM and PDM pass the network test?

Yes	GO to D2

No	REFER to: MODULE COMMUNICATIONS NETWORK .

D2 CHECK THE PDM (PASSENGER DOOR MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, perform the PDM self-test.

Are any Diagnostic Trouble Codes (DTCs) present?

Yes	For Diagnostic Trouble Codes (DTCs) B1C11:11 or B1C11:15, GO to D16 For Diagnostic Trouble Codes (DTCs) B1C12:11 or B1C12:15, GO to D20 For Diagnostic Trouble Codes (DTCs) B1C15:11, B1C15:15, B1C16:11, B1C16:15, C1B15:11, or C1B15:15, GO to D9 For all other PDM Diagnostic Trouble Codes (DTCs), REFER to: Locks, Latches and Entry Systems .

No	GO to D3

D3 CHECK THE EXTERIOR MIRROR SELECTION SWITCH

Using a diagnostic scan tool, monitor the MIR_SEL DDM Parameter Identification (PID).

Operate the exterior mirror selection buttons to select the LH and then RH exterior mirrors.

Does the MIR_SEL DDM Parameter Identification (PID) match the selector switch in both positions?

Yes	GO to D4

No	INSTALL a new front door window control switch. REFER to: Front Door Window Control Switch .

D4 CHECK THE EXTERIOR MIRROR CONTROL SWITCH

Select the RH mirror with the exterior mirror selection switch.

Using a diagnostic scan tool, monitor the MIR_SW_DN, MIR_SW_UP, MIR_SW_L, and MIR_SW_R DDM Parameter Identifications (PIDs).

Press the exterior mirror control switch in the left, right, up and down directions.

Do the MIR_SW_DN, MIR_SW_UP, MIR_SW_L, and MIR_SW_R DDM Parameter Identifications (PIDs) match the control switch in all directions?

Yes	GO to D5

No	INSTALL a new front door window control switch. REFER to: Front Door Window Control Switch .

D5 CHECK THE RH (RIGHT-HAND) MIRROR COMMON CIRCUIT FOR VOLTAGE AT THE RH (RIGHT-HAND) EXTERIOR MIRROR

Ignition OFF.

Disconnect: RH Exterior Mirror C626 .

Connect:

Lead 1	Measurement / Action	Lead 2
C626-2		Ground

Ignition ON.

Select the RH mirror with the exterior mirror selection switch.

While pressing the exterior mirror control switch in the left and down directions, monitor the test light.

Does the test light illuminate only when the exterior mirror control switch is pressed in the left and down directions?

Yes	GO to D25

No	If the test light is illuminated when the exterior mirror control switch is not pressed in any direction, GO to D6 If the test light does not illuminate when the exterior mirror control switch is pressed in the left and down directions, GO to D7

D6 CHECK THE COMMON CIRCUIT FOR A SHORT TO VOLTAGE AT THE RH (RIGHT-HAND) EXTERIOR MIRROR

Ignition OFF.

Disconnect: PDM C652B .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C626-2		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to D24

D7 CHECK THE COMMON CIRCUIT FOR AN OPEN BETWEEN THE RH (RIGHT-HAND) EXTERIOR MIRROR AND THE PDM (PASSENGER DOOR MODULE)

Ignition OFF.

Disconnect: PDM C652B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C626-2	Ω	C652B-17

Is the resistance less than 3 ohms?

Yes	GO to D8

No	REPAIR the circuit.

D8 CHECK THE COMMON CIRCUIT FOR A SHORT TO GROUND AT THE RH (RIGHT-HAND) EXTERIOR MIRROR

Measure:

Positive Lead	Measurement / Action	Negative Lead
C626-2	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to D24

No	REPAIR the circuit.

D9 CHECK THE MIRROR MOTOR FEEDBACK CIRCUITS FOR A SHORT TO VOLTAGE AT THE RH (RIGHT-HAND) EXTERIOR MIRROR

Ignition OFF.

Disconnect: RH Exterior Mirror C626 .

Disconnect: PDM C652B .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C626-8		Ground
C626-9		Ground
C626-10		Ground
C626-12		Ground

Is any voltage present?

Yes	REPAIR the affected circuit.

No	GO to D10

D10 CHECK THE MIRROR MOTOR FEEDBACK CIRCUITS FOR A SHORT TO GROUND AT THE RH (RIGHT-HAND) EXTERIOR MIRROR

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C626-8	Ω	Ground
C626-9	Ω	Ground
C626-10	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to D11

No	REPAIR the affected circuit.

D11 CHECK THE MIRROR MOTOR FEEDBACK CIRCUITS FOR AN OPEN BETWEEN THE RH (RIGHT-HAND) EXTERIOR MIRROR AND THE PDM (PASSENGER DOOR MODULE)

Measure:

Positive Lead	Measurement / Action	Negative Lead
C626-8	Ω	C652B-16
C626-9	Ω	C652B-5

C626-10	Ω	C652B-6
C626-12	Ω	C652B-15

Are the resistances less than 3 ohms?

Yes	GO to D12

No	REPAIR the affected circuit.

D12 CHECK THE MIRROR MOTOR FEEDBACK REFERENCE VOLTAGE AT THE RH (RIGHT-HAND) EXTERIOR MIRROR

Connect: PDM C652B .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C626-9	V	C626-12

Is the voltage approximately 5 volts?

Yes	GO to D13

No	GO to D24

D13 CHECK THE PDM (PASSENGER DOOR MODULE) DIAGNOSTIC TROUBLE CODES (DTCS) WITH THE RH (RIGHT-HAND) EXTERIOR MIRROR DISCONNECTED

Using a diagnostic scan tool, clear the PDM Diagnostic Trouble Codes (DTCs).

Perform the PDM self-test.

Is DTC B1C15:15 or B1C16:15 present?

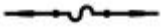
Yes	GO to D14

No	GO to D24

D14 CHECK THE PDM (PASSENGER DOOR MODULE) DIAGNOSTIC TROUBLE CODES (DTCS) WITH THE HORIZONTAL POSITION SENSOR FEEDBACK CIRCUIT SHORTED TO GROUND

Ignition OFF.

Connect:

Lead 1	Measurement / Action	Lead 2
C626-10		C626-12

Ignition ON.

Using a diagnostic scan tool, clear the PDM Diagnostic Trouble Codes (DTCs).

Perform the PDM self-test.

Is DTC B1C16:11 present?

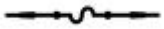
Yes	REMOVE the jumper wire. GO to D15

No	REMOVE the jumper wire. GO to D24

D15 CHECK THE PDM (PASSENGER DOOR MODULE) DIAGNOSTIC TROUBLE CODES (DTCS) WITH THE VERTICAL POSITION SENSOR FEEDBACK CIRCUIT SHORTED TO GROUND

Ignition OFF.

Connect:

Lead 1	Measurement / Action	Lead 2
C626-8		C626-12

Ignition ON.

Using a diagnostic scan tool, clear the PDM Diagnostic Trouble Codes (DTCs).

Perform the PDM self-test.

Is DTC B1C15:11 present?

Yes	REMOVE the jumper wire. GO to D25

No	REMOVE the jumper wire. GO to D24

D16 CHECK FOR VOLTAGE TO THE HORIZONTAL MOTOR CIRCUIT AT THE RH (RIGHT-HAND) EXTERIOR MIRROR

Ignition OFF.

Disconnect: RH Exterior Mirror C626 .

Connect:

Lead 1	Measurement / Action	Lead 2

C626-10		Ground

Ignition ON.

Select the RH mirror with the exterior mirror selection switch.

While pressing the exterior mirror control switch in the right direction, monitor the test light.

Does the test light illuminate only when the exterior mirror control switch is pressed in the right direction?

Yes	GO to D25

No	If the test light is illuminated when the exterior mirror control switch is not pressed in any direction, GO to D17 If the test light does not illuminate when the exterior mirror control switch is pressed in the right direction, GO to D18

D17 CHECK THE HORIZONTAL MIRROR CIRCUIT FOR A SHORT TO VOLTAGE AT THE RH (RIGHT-HAND) EXTERIOR MIRROR

Ignition OFF.

Disconnect: PDM C652B .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C626-10		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to D24

D18 CHECK THE HORIZONTAL MOTOR CIRCUIT FOR A SHORT TO GROUND AT THE RH (RIGHT-HAND) EXTERIOR MIRROR

Ignition OFF.

Disconnect: PDM C652B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C626-10	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to D19

No	REPAIR the circuit.

D19 CHECK THE HORIZONTAL MOTOR CIRCUIT FOR AN OPEN BETWEEN THE RH (RIGHT-HAND) EXTERIOR MIRROR AND THE PDM (PASSENGER DOOR MODULE)

Measure:

Positive Lead	Measurement / Action	Negative Lead
C626-10	Ω	C652B-6

Is the resistance less than 3 ohms?

Yes	GO to D24

No	REPAIR the circuit.

D20 CHECK FOR VOLTAGE TO THE VERTICAL MOTOR CIRCUIT AT THE RH (RIGHT-HAND) EXTERIOR MIRROR

Ignition OFF.

Disconnect: RH Exterior Mirror C626 .

Connect:

Positive Lead	Measurement / Action	Negative Lead
C626-8		Ground

Ignition ON.

Select the RH mirror with the exterior mirror selection switch.

While pressing the exterior mirror control switch in the up direction, monitor the test light.

Does the test light illuminate only when the exterior mirror control switch is pressed in the up direction?

Yes	GO to D25

No	If the test light is illuminated when the exterior mirror control switch is not pressed in any direction, GO to D21 If the test light does not illuminate when the exterior mirror control switch is pressed in the up direction, GO to D22

D21 CHECK THE VERTICAL MIRROR CIRCUIT FOR A SHORT TO VOLTAGE AT THE RH (RIGHT-HAND) EXTERIOR MIRROR

Ignition OFF.

Disconnect: PDM C652B .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C626-8		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to D24

D22 CHECK THE VERTICAL MOTOR CIRCUIT FOR A SHORT TO GROUND AT THE RH (RIGHT-HAND) EXTERIOR MIRROR

Ignition OFF.

Disconnect: PDM C652B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C626-8	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to D23

No	REPAIR the circuit.

D23 CHECK THE VERTICAL MOTOR CIRCUIT FOR AN OPEN BETWEEN THE RH (RIGHT-HAND) EXTERIOR MIRROR AND THE PDM (PASSENGER DOOR MODULE)

Measure:

Positive Lead	Measurement / Action	Negative Lead
C626-8	Ω	C652B-16

Is the resistance less than 3 ohms?

Yes	GO to D24

No	REPAIR the circuit.

D24 CHECK FOR CORRECT PDM (PASSENGER DOOR MODULE) OPERATION

Disconnect and inspect all PDM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the PDM connectors and all previously disconnected exterior mirror system connectors. Make sure they seat and latch correctly.

Operate the system to determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PDM. REFER to: Passenger Door Module (PDM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

D25 CHECK THE EXTERIOR MIRROR JUMPER HARNESS

Inspect the exterior mirror jumper harness between the vehicle harness and the mirror motors for:

Open or short circuits

Damaged or pushed out pins

Corrosion

Is the harness OK?

Yes	INSTALL a new exterior mirror motor. REFER to: Exterior Mirror .

No	REPAIR the harness as necessary. If the harness cannot be repaired, INSTALL a new exterior mirror. REFER to: Exterior Mirror .

DIAGNOSIS AND TESTING > REAR VIEW MIRRORS > PINPOINT TESTS > PINPOINT TEST E : ONE OR BOTH HEATED EXTERIOR MIRRORS IS INOPERATIVE OR ALWAYS ON (WITH MEMORY MIRRORS)

Refer to Power Mirrors for schematic and connector information.

DTC	Description	Fault Trigger Conditions
B1163:11	Left Mirror Heater Output: Circuit Short To Ground	This continuous and on-demand DTC sets if the DDM detects a higher than expected current draw when voltage is applied to the LH exterior mirror heater circuit.
B1163:15	Left Mirror Heater Output: Circuit Short To Battery Or Open	This continuous and on-demand DTC sets if the DDM detects a lower than expected current draw when voltage is applied to the LH exterior mirror heater circuit.
B1164:11	Right Mirror Heater Output: Circuit Short To Ground	This continuous and on-demand DTC sets if the PDM detects a higher than expected current draw when voltage is applied to the RH exterior mirror heater circuit.
B1164:15	Right Mirror Heater Output: Circuit Short To Battery Or Open	This continuous and on-demand DTC sets if the PDM detects a lower than expected current draw when voltage is applied to the RH exterior mirror heater circuit.

Possible Causes

- Wiring, terminals or connectors
- Exterior mirror
- Door module

DIAGNOSIS AND TESTING > REAR VIEW MIRRORS > PINPOINT TESTS > PINPOINT TEST E : ONE OR BOTH HEATED EXTERIOR MIRRORS IS INOPERATIVE OR ALWAYS ON (WITH MEMORY MIRRORS) > PINPOINT TEST E : ONE OR BOTH HEATED EXTERIOR MIRRORS IS INOPERATIVE OR ALWAYS ON (WITH MEMORY MIRRORS)

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may cause damage to the connector. Use only Rotunda Flex

Probes (NUD105-R025D)

NOTE: The following step uses a test lamp to simulate normal circuit loads. To avoid connector terminal damage, use the Rotunda Flex Probe kit for the test lamp probe connection to the vehicle. Do not use the test lamp probe directly on any connector.

E1 CHECK THE DDM (DRIVER DOOR MODULE) OR PDM (PASSENGER DOOR MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition ON.

Using a diagnostic scan tool, perform the DDM (LH heated exterior mirror inoperative or always on) or PDM (RH heated exterior mirror is inoperative or always on) self-test.

Are any Diagnostic Trouble Codes (DTCs) present?

Yes	For DDM DTC B1163:11 or PDM DTC B1164:11, GO to E7 For DDM DTC B1163:15 or PDM DTC B1164:15, GO to E3 For all other DDM or PDM Diagnostic Trouble Codes (DTCs), REFER to: Locks, Latches and Entry Systems .

No	GO to E2

E2 VERIFY THE OPERATION OF THE REAR WINDOW DEFROST SYSTEM

Start the engine.

With the engine running, activate the rear window defrost.

Using an infrared temperature gun or equivalent, measure the temperature of the rear window for approximately 30 seconds, noting changes in temperature.

Did the temperature of the rear window glass rise?

Yes	GO to E3

No	DIAGNOSE the rear window defrost system prior to continuing diagnostics for the heated exterior mirrors. REFER to: Glass, Frames and Mechanisms .

E3 CHECK THE EXTERIOR MIRROR HEATER OUTPUT VOLTAGE AT THE INOPERATIVE EXTERIOR MIRROR

Ignition OFF.

Disconnect: Inoperative Exterior Mirror C520 or C626 .

Start the engine.

Connect:

LH Exterior Mirror

Lead 1	Measurement / Action	Lead 2
C520-6		C520-7

RH Exterior Mirror

Lead 1	Measurement / Action	Lead 2
C626-6		C626-7

With the engine running, activate the rear window defrost.

Does the test light illuminate only when the rear window defrost is activated?

Yes	GO to E11

No	If the test light is illuminated at all times, GO to E4 If the test light does not illuminate, GO to E5

E4 CHECK THE HEATER CIRCUIT FOR A SHORT TO VOLTAGE AT THE EXTERIOR MIRROR

Ignition OFF.

Disconnect: DDM C501B or PDM C652B .

Ignition ON.

Measure:

LH Exterior Mirror

Positive Lead	Measurement / Action	Negative Lead
C520-6		Ground

RH Exterior Mirror

Positive Lead	Measurement / Action	Negative Lead
C626-6		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	For the LH mirror, GO to E10 For the RH mirror, GO to E9

E5 CHECK FOR VOLTAGE TO THE HEATER CIRCUIT AT THE EXTERIOR MIRROR

Turn the rear window defrost off.

Connect:

LH Exterior Mirror

Lead 1	Measurement / Action	Lead 2
C520-6		Ground

RH Exterior Mirror

Lead 1	Measurement / Action	Lead 2
C626-6		Ground

With the engine running, activate the rear window defrost.

Does the test light illuminate?

Yes	REPAIR the ground circuit.

No	GO to E6

E6 CHECK FOR AN OPEN IN THE HEATER CIRCUIT BETWEEN THE MIRROR AND THE DOOR MODULE

Ignition OFF.

Disconnect: DDM C501B or PDM C652B .

Measure:

LH Exterior Mirror

Positive Lead	Measurement / Action	Negative Lead
C520-6	Ω	C501B-20

RH Exterior Mirror

Positive Lead	Measurement / Action	Negative Lead
C626-6	Ω	C652B-20

Is the resistance less than 3 ohms?

Yes	For the LH mirror, GO to E10 For the RH mirror, GO to E9

No	REPAIR the affected circuit.

E7 CHECK THE HEATER CIRCUIT FOR A SHORT TO GROUND AT THE EXTERIOR MIRROR

Ignition OFF.

Disconnect: DDM C501B or PDM C652B .

Disconnect: Inoperative Exterior Mirror C520 or C626 .

Measure:

LH Exterior Mirror

Positive Lead	Measurement / Action	Negative Lead
C520-6	Ω	Ground

RH Exterior Mirror

Positive Lead	Measurement / Action	Negative Lead
C626-6	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to E8

No	REPAIR the circuit.

E8 CHECK THE DOOR MODULE DIAGNOSTIC TROUBLE CODES (DTCS) WITH THE EXTERIOR MIRROR DISCONNECTED

Connect: DDM C501B or PDM C652B .

Ignition ON.

Using a diagnostic scan tool, clear the DDM or PDM Diagnostic Trouble Codes (DTCs).

Is DDM DTC B1163:15 or PDM DTC B1164:15 present?

Yes	GO to E11

No	For the LH exterior mirror, GO to E10 For the RH exterior mirror, GO to E9

E9 CHECK FOR CORRECT PDM (PASSENGER DOOR MODULE) OPERATION

Disconnect and inspect all PDM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the PDM connectors and all previously disconnected exterior mirror system connectors. Make sure they seat and latch correctly.

Operate the system to determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PDM. REFER to: Passenger Door Module (PDM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

E10 CHECK FOR CORRECT DDM (DRIVER DOOR MODULE) OPERATION

Disconnect and inspect all DDM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the DDM connectors and all previously disconnected exterior mirror system connectors. Make sure they seat and latch correctly.

Operate the system to determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new DDM. REFER to: Driver Door Module (DDM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

E11 CHECK THE EXTERIOR MIRROR JUMPER HARNESS

Inspect the exterior mirror jumper harness between the vehicle harness and the mirror glass for:

Open or short circuits

Damaged or pushed out pins

Corrosion

Is the harness OK?

Yes	INSTALL a new exterior mirror glass. REFER to: Exterior Mirror .

No	REPAIR the harness as necessary. If the harness cannot be repaired, INSTALL a new exterior mirror. REFER to: Exterior Mirror .

DIAGNOSIS AND TESTING > REAR VIEW MIRRORS > PINPOINT TESTS > PINPOINT TEST F : ONE OR BOTH HEATED EXTERIOR MIRRORS ARE INOPERATIVE (WITHOUT MEMORY MIRRORS)

Refer to Heated Window for schematic and connector information.

Refer to Power Mirrors for schematic and connector information.

Normal Operation and Fault Conditions

The heated exterior mirrors receive voltage from the rear window defrost system. The heated exterior mirrors only operate when the rear window defrost is on. REFER to: Glass, Frames and Mechanisms - System Operation and Component Description .

Possible Causes

- Fuse
- Wiring, terminals or connectors
- Rear window defrost system concern
- Exterior mirror

Visual Inspection and Diagnostic Pre-Checks

Inspect the suspect exterior mirror housing and glass for damage.

NOTE: Clean the entire mirror assembly and glass to assist in verification of the customer concern and/or impact damage. Do not clean any mirror glass or housing with an ice scraper, razor blade, abrasive pad, harsh chemicals or petroleum based cleaning products, as these may damage the mirror glass and/or housing.

DIAGNOSIS AND TESTING > REAR VIEW MIRRORS > PINPOINT TESTS > PINPOINT TEST F : ONE OR BOTH HEATED EXTERIOR MIRRORS ARE INOPERATIVE (WITHOUT MEMORY MIRRORS) > PINPOINT TEST F : ONE OR BOTH HEATED EXTERIOR MIRRORS ARE INOPERATIVE (WITHOUT MEMORY MIRRORS)

F1 CHECK THE OPERATION OF THE REAR WINDOW DEFROST SYSTEM

Start the engine.

With the engine running, activate the rear window defrost.

Using an infrared temperature gun or equivalent, measure the temperature of the rear window glass for approximately 30 seconds, noting changes in temperature.

Does the temperature of the rear window glass rise?

Yes	GO to F2

No	DIAGNOSE the rear window defrost system. REFER to: Glass, Frames and Mechanisms .

F2 CHECK THE OPERATION OF THE HEATED EXTERIOR MIRRORS

With the rear window defrost ON, using an infrared temperature gun or equivalent, measure the temperature of the LH and RH exterior mirror glass for approximately 30 seconds, noting changes in temperature.

Does the temperature of at least one exterior mirror glass rise?

Yes	For inoperative LH heated mirror glass, GO to F3 For inoperative RH heated mirror glass, GO to F5

No	VERIFY that BJB fuse 11 (10A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short.

F3 CHECK THE VOLTAGE TO THE LH (LEFT-HAND) HEATED EXTERIOR MIRROR GLASS

Ignition OFF.

Disconnect: LH Exterior Mirror C520 .

Start the engine.

With the engine running, activate the rear window defrost.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C520-6		Ground

Is the voltage greater than 11 volts?

Yes	GO to F4

No	REPAIR the circuit.

F4 CHECK THE LH (LEFT-HAND) EXTERIOR MIRROR GROUND CIRCUIT FOR AN OPEN

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C520-7	Ω	Ground

Is the resistance less than 3 ohms?

Yes	GO to F7

No	REPAIR the circuit

F5 CHECK THE VOLTAGE TO THE RH (RIGHT-HAND) HEATED EXTERIOR MIRROR GLASS

Ignition OFF.

Disconnect: RH Exterior Mirror C626 .

Start the engine.

With the engine running, activate the rear window defrost.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C626-6		Ground

Is the voltage greater than 11 volts?

Yes	GO to F6

No	REPAIR the circuit.

F6 CHECK THE RH (RIGHT-HAND) EXTERIOR MIRROR GROUND CIRCUIT FOR AN OPEN

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C626-7	Ω	Ground

Is the resistance less than 3 ohms?

Yes	GO to F7

No	REPAIR the circuit.

F7 CHECK THE EXTERIOR MIRROR JUMPER HARNESS

Inspect the exterior mirror jumper harness between the vehicle harness and the mirror motors for:

Open or short circuits

Damaged or pushed out pins

Corrosion

Is the harness OK?

Yes	INSTALL a new exterior mirror glass. REFER to: Exterior Mirror .

No	REPAIR the harness as necessary. If the harness cannot be repaired, INSTALL a new exterior mirror. REFER to: Exterior Mirror .

DIAGNOSIS AND TESTING > REAR VIEW MIRRORS > PINPOINT TESTS > PINPOINT TEST G : THE LH (LEFT-HAND) AND/OR RH (RIGHT-HAND) POWER FOLDING MIRROR IS INOPERATIVE/ DO NOT OPERATE CORRECTLY (IF EQUIPPED)

Refer to Power Mirrors for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Rear View Mirrors - System Operation and Component Description .

Possible Causes

- Binding or obstructed power folding mirror
- Power folding mirrors are not synchronized

- Power folding mirror motor lockout feature is active
- Wiring, terminals or connectors
- Power folding mirror
- Power folding mirror relay
- Exterior mirror fold switch (integral to the front door window control switch)

Visual Inspection and Diagnostic Pre-Checks

- If the power folding mirrors are folded or unfolded several times continuously, the power lockout feature disables the system for approximately 3-10 minutes to prevent damage to the power fold motors. After 3-10 minutes have elapsed, normal operation resumes.
- The power folding mirrors may need to be synchronized when the LH, RH or both power folding mirrors are partially folded in toward the door manually, and then folded inward using the power folding mirror control switch.
- Verify that the power folding mirrors are not binding or obstructed.

DIAGNOSIS AND TESTING > REAR VIEW MIRRORS > PINPOINT TESTS > PINPOINT TEST G : THE LH (LEFT-HAND) AND/OR RH (RIGHT-HAND) POWER FOLDING MIRROR IS INOPERATIVE/ DO NOT OPERATE CORRECTLY (IF EQUIPPED) > PINPOINT TEST G : THE LH (LEFT-HAND) AND/OR RH (RIGHT-HAND) POWER FOLDING MIRROR IS INOPERATIVE/ DO NOT OPERATE CORRECTLY (IF EQUIPPED)

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may cause damage to the connector. Use only Rotunda Flex Probes (NUD105-R025D)

G1 CHECK POWER FOLDING MIRROR OPERATION

Ignition ON.

Press the exterior mirror folding switch to activate the power folding mirrors.

Are both power folding mirrors inoperative or do not operate correctly?

Yes	GO to G2

No	GO to G10

G2 CHECK THE EXTERIOR FOLDING MIRROR CONTROL SWITCH

Ignition OFF.

Disconnect: Front Door Window Control Switch C504 .

Perform the appropriate component test. Refer to Component Testing for schematic and connector information.

Did the exterior folding mirror control switch pass the component test?

Yes	GO to G3

No	INSTALL a new exterior folding mirror control switch (integral to the front door window control switch). REFER to: Front Door Window Control Switch .

G3 CHECK THE FOLDING MIRROR CONTROL CIRCUIT FOR A SHORT TO GROUND

Disconnect: Power Folding Mirror Relay C3276 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C504-2	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to G4

No	REPAIR the circuit. SYNCHRONIZE the power folding mirrors.

G4 CHECK THE FOLDING MIRROR CONTROL CIRCUIT FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C504-2	Ω	C3276-4

Is the resistance less than 3 ohms?

Yes	GO to G5

No	REPAIR the circuit. SYNCHRONIZE the power folding mirrors.

G5 CHECK FOR VOLTAGE TO THE POWER MIRROR FOLD RELAY

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3276-3		Ground

Is the voltage greater than 11 volts?

Yes	GO to G6

No	VERIFY that BCM fuse 2 (7.5A) is OK. If OK, REPAIR the circuit for an open. If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short.

G6 CHECK FOR GROUND TO THE POWER MIRROR FOLD RELAY

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3276-1	Ω	Ground

Is the resistance less than 3 ohms?

Yes	GO to G7

No	REPAIR the circuit. SYNCHRONIZE the power folding mirrors.

G7 CHECK THE POWER FOLDING MIRROR RELAY FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect: LH Exterior Mirror C520 .

Disconnect: RH Exterior Mirror C626 .

Ignition ON.

Measure:

LH exterior mirror

Positive Lead	Measurement / Action	Negative Lead
C520-10		Ground
C520-12		Ground

RH exterior mirror

Positive Lead	Measurement / Action	Negative Lead
C626-10		Ground
C626-12		Ground

Is any voltage present?

Yes	REPAIR the affected circuit.

No	GO to G8

G8 CHECK THE POWER FOLDING MIRROR RELAY OUTPUT CIRCUITS FOR AN OPEN

Ignition OFF.

Measure:

LH concern

Positive Lead	Measurement / Action	Negative Lead
C3276-2	Ω	C520-10
C3276-5	Ω	C520-12

Are the resistances less than 3 ohms?

Yes	GO to G9

No	REPAIR the circuit(s).

G9 CHECK THE POWER FOLDING MIRROR RELAY FOR A SHORT TO GROUND

Measure:

LH exterior mirror

Positive Lead	Measurement / Action	Negative Lead
C520-10	Ω	Ground
C520-12	Ω	Ground

RH exterior mirror

Positive Lead	Measurement / Action	Negative Lead
C626-10	Ω	Ground

C626-12	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	INSTALL a new power folding mirror relay. SYNCHRONIZE the power folding mirrors.

No	REPAIR the circuit(s). SYNCHRONIZE the power folding mirrors.

G10 CHECK THE POWER FOLDING MIRROR RELAY OUTPUT CIRCUITS FOR AN OPEN

Disconnect: Power Folding Mirror Relay C3276 .

Measure:

LH exterior mirror

Positive Lead	Measurement / Action	Negative Lead
C3276-2	Ω	C520-10
C3276-5	Ω	C520-12

RH exterior mirror

Positive Lead	Measurement / Action	Negative Lead
C3276-2	Ω	C626-10
C3276-5	Ω	C626-12

Are the resistances less than 3 ohms?

Yes	INSTALL a new power folding mirror relay. SYNCHRONIZE the power folding mirrors.

No	REPAIR the circuit(s). SYNCHRONIZE the power folding mirrors.

G11 CHECK THE EXTERIOR MIRROR JUMPER HARNESS

Inspect the exterior mirror jumper harness between the vehicle harness and the mirror motors for:

Open or short circuits

Damaged or pushed out pins

Corrosion

Is the harness OK?

Yes	INSTALL a new exterior mirror. REFER to: Exterior Mirror . SYNCHRONIZE the power

	folding mirrors.

No	REPAIR the harness as necessary. If the harness cannot be repaired, INSTALL a new exterior mirror. REFER to: Exterior Mirror . SYNCHRONIZE the power folding mirrors.

DIAGNOSIS AND TESTING > REAR VIEW MIRRORS > PINPOINT TESTS > PINPOINT TEST H : THE INTERIOR AUTO-DIMMING MIRROR DOES NOT OPERATE CORRECTLY

Refer to Power Mirrors for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Rear View Mirrors - System Operation and Component Description .

Possible Causes

- Fuse
- Wiring, terminals or connectors
- Obstructed forward or rearward sensors
- Gear input concern
- Reverse lamp concern
- Interior auto-dimming mirror

Visual Inspection and Diagnostic Pre-Checks

- Inspect the interior mirror forward and rearward facing sensors for damage, debris or obstructions
- Inspect BCM fuse 23 (10A).

DIAGNOSIS AND TESTING > REAR VIEW MIRRORS > PINPOINT TESTS > PINPOINT TEST H : THE INTERIOR AUTO-DIMMING MIRROR DOES NOT OPERATE CORRECTLY > PINPOINT TEST H : THE INTERIOR AUTO-DIMMING MIRROR DOES NOT OPERATE CORRECTLY

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may cause damage to the connector. Use only Rotunda Flex Probes (NUD105-R025D)

H1 VERIFY THE OPERATION OF THE REVERSE LAMPS

Ignition ON.

Apply the parking brake.

While observing the reversing lamps, select each gear in the entire range.

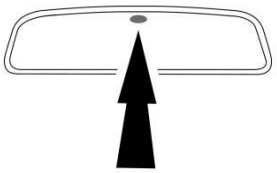
Do the reverse lamps illuminate ONLY in REVERSE?

Yes	Select PARK. GO to H2

No	Select PARK. DIAGNOSE the reverse lamps. REFER to: Reversing Lamps .

H2 INSPECT THE MIRROR FOR PROPER INSTALLATION

Inspect the interior auto-dimming mirror to make sure the rearward facing sensor is at the top of the mirror glass.



E149165

Is the rearward facing sensor at the top of the interior auto-dimming mirror glass?

Yes	GO to H3

No	INSTALL the interior auto-dimming mirror as per the removal and installation procedure. REFER to: Interior Rear View Mirror .

H3 VERIFY THE FORWARD AND REARWARD FACING SENSORS ARE NOT BLOCKED

Visually verify the forward and rearward facing sensors are not blocked or obstructed. Sources of obstruction can include:

Stickers, window decals or tags.

Fold-down screens for TVs or DVD players.

Non-OEM window tinting.

Dirt and debris

Are either of the sensors blocked?

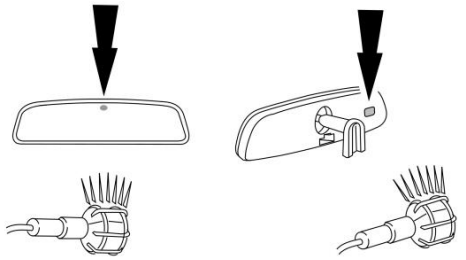
Yes	If possible, REMOVE the obstruction. If it is not possible to remove the obstruction, ADVISE

	the customer the blockage will affect the operation of the auto-dimming mirror.

No	GO to H4

H4 VERIFY THE OPERATION OF THE INTERIOR AUTO-DIMMING MIRROR - DAYLIGHT CONDITIONS

Simulate daylight conditions by using a bright lamp to illuminate the forward and rearward facing sensors. The mirror should adjust to a high reflectance state (mirror will be clear).



E149159

Did the mirror adjust to a high reflectance (clear) state?

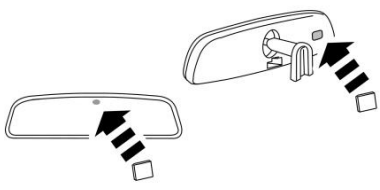
Yes	GO to H5

No	INSTALL a new interior auto-dimming mirror. REFER to: Interior Rear View Mirror .

H5 VERIFY THE OPERATION OF THE INTERIOR AUTO-DIMMING MIRROR - NIGHTTIME CONDITIONS WITHOUT GLARE

NOTE: Covering the sensor(s) with a finger or hand is not adequate for this step.

Simulate nighttime conditions without glare by using black electrical tape or other dark material to cover the forward and rearward facing sensors. The mirror should adjust to a high reflectance state (mirror will be clear).



E149155

Did the mirror adjust to a high reflectance (clear) state?

Yes	GO to H6

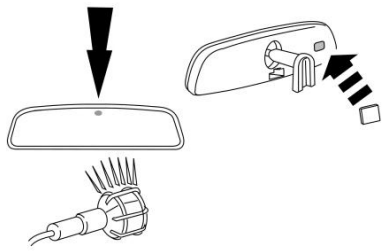
No	INSTALL a new interior auto-dimming mirror. REFER to: Interior Rear View Mirror .

H6 VERIFY THE OPERATION OF THE INTERIOR AUTO-DIMMING MIRROR - NIGHTTIME CONDITIONS WITH GLARE

NOTE: Covering the sensor(s) with a finger or hand is not adequate for this step.

Remove the black electrical tape or other dark material from the rearward facing sensor.

Simulate nighttime conditions with glare by using black electrical tape or other dark material to cover the forward facing sensor while illuminating the rearward facing sensor using a bright light. The mirror should adjust to a low reflectance state (mirror will be darkened).



E149156

Did the mirror adjust to a low reflectance (darkened) state?

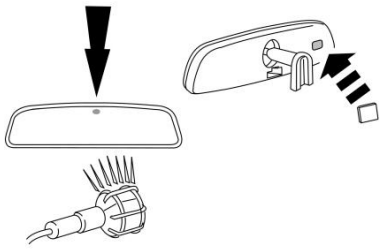
Yes	GO to H7

No	GO to H8

H7 VERIFY THE OPERATION OF THE INTERIOR AUTO-DIMMING MIRROR - VEHICLE IN REVERSE AND NIGHTTIME CONDITIONS WITH GLARE

NOTE: Covering the sensor(s) with a finger or hand is not adequate for this step.

Continue to illuminate the rearward facing sensor with the forward facing sensor covered.



E149156

Select REVERSE.

Did the mirror adjust to a high reflectance (clear) state after reverse was selected?

Yes	Select PARK. The system is operating correctly at this time. REVIEW the operation of the interior auto-dimming mirror feature with the customer.

No	GO to H10

H8 CHECK FOR VOLTAGE TO THE INTERIOR AUTO-DIMMING MIRROR

Ignition OFF.

Disconnect: Interior Auto-Dimming Mirror C911 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C911-1	V	Ground

Is the voltage greater than 11 volts?

Yes	GO to H9

No	Verify BCM fuse 23 (10A) is OK. If the fuse is OK, REPAIR the circuit. If the fuse is not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short.

H9 CHECK FOR GROUND AT THE INTERIOR AUTO-DIMMING MIRROR

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead

C911-4	Ω	Ground

Is the resistance less than 3 ohms?

Yes	GO to H10

No	REPAIR the circuit.

H10 CHECK FOR VOLTAGE TO THE INTERIOR AUTO-DIMMING MIRROR REVERSE INHIBIT CIRCUIT

Ignition OFF.

Disconnect: Interior Auto-Dimming Mirror C911 if not previously disconnected.

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C911-9	V	Ground

Select REVERSE.

Select PARK.

Is the voltage greater than 11 volts when reverse gear is selected and no voltage present when reverse gear is not selected?

Yes	INSTALL a new interior auto-dimming mirror. REFER to: Interior Rear View Mirror .

No	REPAIR the circuit.

REMOVAL AND INSTALLATION > EXTERIOR MIRROR > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

NOTE: The power folding mirrors may need to be synchronized anytime the mirrors are folded or unfolded without using the exterior mirror control switch, or if a new power folding mirror is installed.

Exterior mirror assembly

1.

Operate window to full up position.

2.

Remove the front door trim panel. Refer to: Front Door Trim Panel .

3.

Remove the front door speaker. Refer to: Front Door Speaker LH . Refer to: Front Door Speaker RH .

4.

For vehicles equipped with door mounted tweeters, remove the tweeter. Refer to: Front Door Speaker LH . Refer to: Front Door Speaker RH .

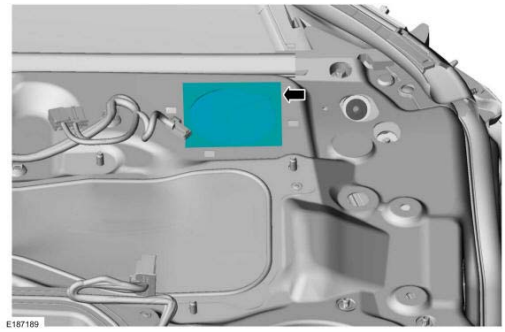
5.

Remove the rectangular tape cover.


E186310

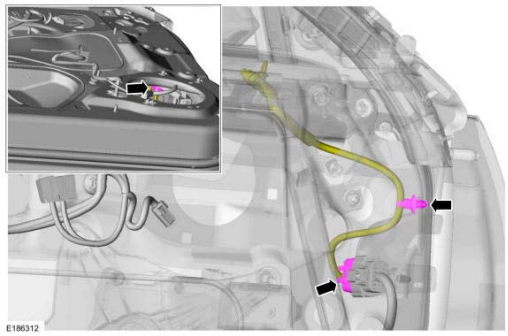
6.

For vehicles not equipped with door mounted tweeters, remove the tape cover.



NOTE: The mirror wiring is accessed through the lower speaker port.

7.
Disconnect the mirror electrical and separate the wiring harness guide.

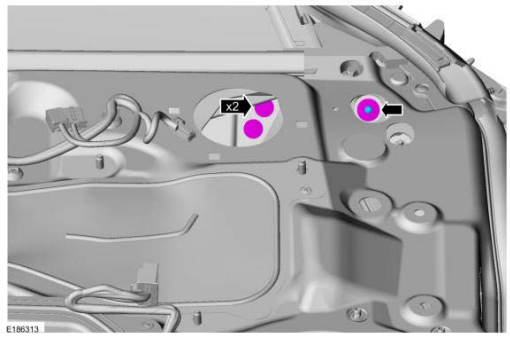


NOTE: Reconnect the window switch.

8.
Operate door glass to the full down position.

NOTE: Support the exterior mirror during fastener removal to prevent damage to the mirror or door surface.

9.
Remove the exterior mirror mounting nut and bolts.



10.

Remove the exterior mirror.



Mirror glass

11.

Position aside the mirror glass.

1.

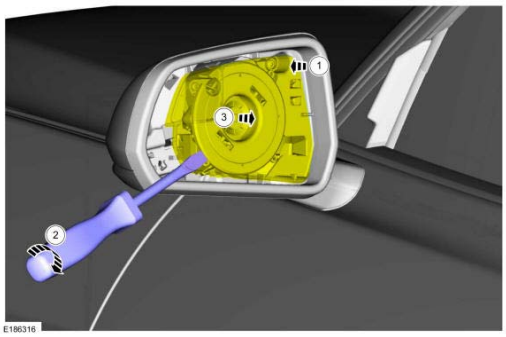
Position the mirror glass fully in and up.

2.

Using a flat blade screwdriver, insert the blade between the mirror glass and motor. Twist and release the mirror glass.

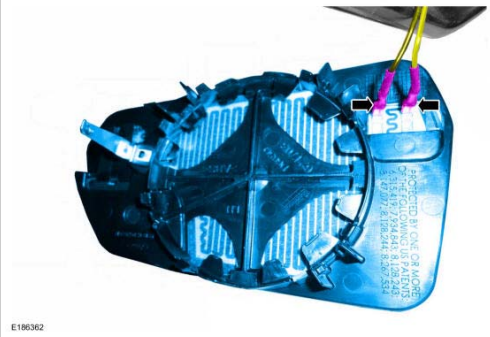
3.

Position aside the mirror glass.



NOTE: The number and location of the electrical connectors will vary due to option content.

12.
Disconnect the mirror glass electrical connectors.



Mirror Motor

13.

Remove the mirror glass.

14.

Remove the mirror bezel.

1.

Remove the screws

2.

Release the tabs.



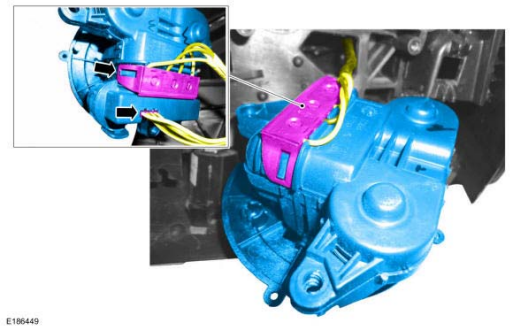
15.

Remove the screws and position the motor aside.



16.

Disconnect the electrical connectors and remove the mirror motor.



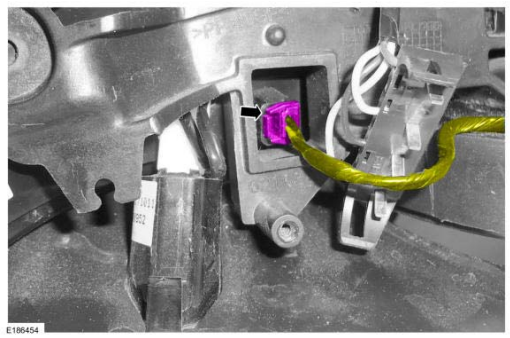
Mirror cover

17.

Remove the mirror motor.

18.

If equipped, disconnect the mirror mounted side turn signal.



19.

Remove the mirror cover.

1.

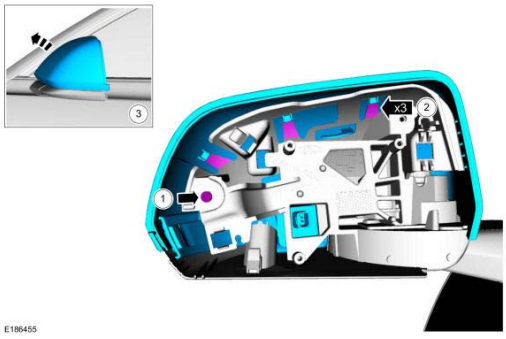
Remove the screw.

2.

Release the tabs.

3.

Remove the mirror cover.



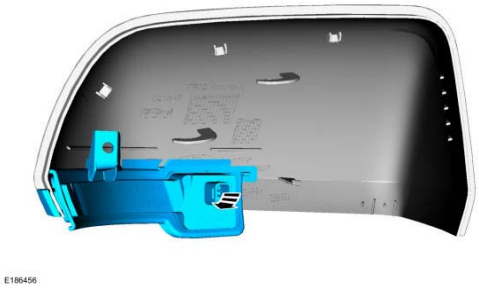
Mirror mounted turn signal

20.

Remove the mirror cover.

21.

Remove the mirror mounted turn signal.



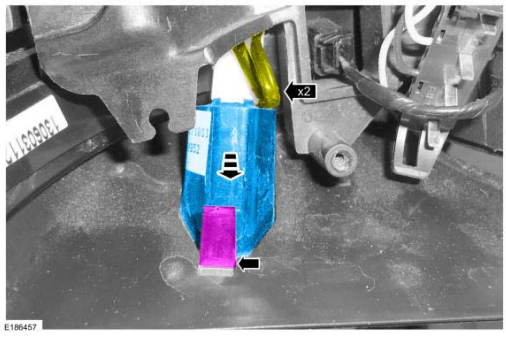
Puddle lamp

22.

Remove the mirror glass.

23.

Press the tab, lower the puddle lamp and disconnect the electrical connectors.



REMOVAL AND INSTALLATION > EXTERIOR MIRROR > INSTALLATION

1.

To install, reverse the removal procedure.

2.

If equipped, synchronize the power folding mirrors.

REMOVAL AND INSTALLATION > INTERIOR REAR VIEW MIRROR

Special Tool(s) / General Equipment

 E161639	501-025 Installer, Rear View Mirror
 E161640	501-D118A (501-D118) Mirror Remover

REMOVAL AND INSTALLATION > INTERIOR REAR VIEW MIRROR > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

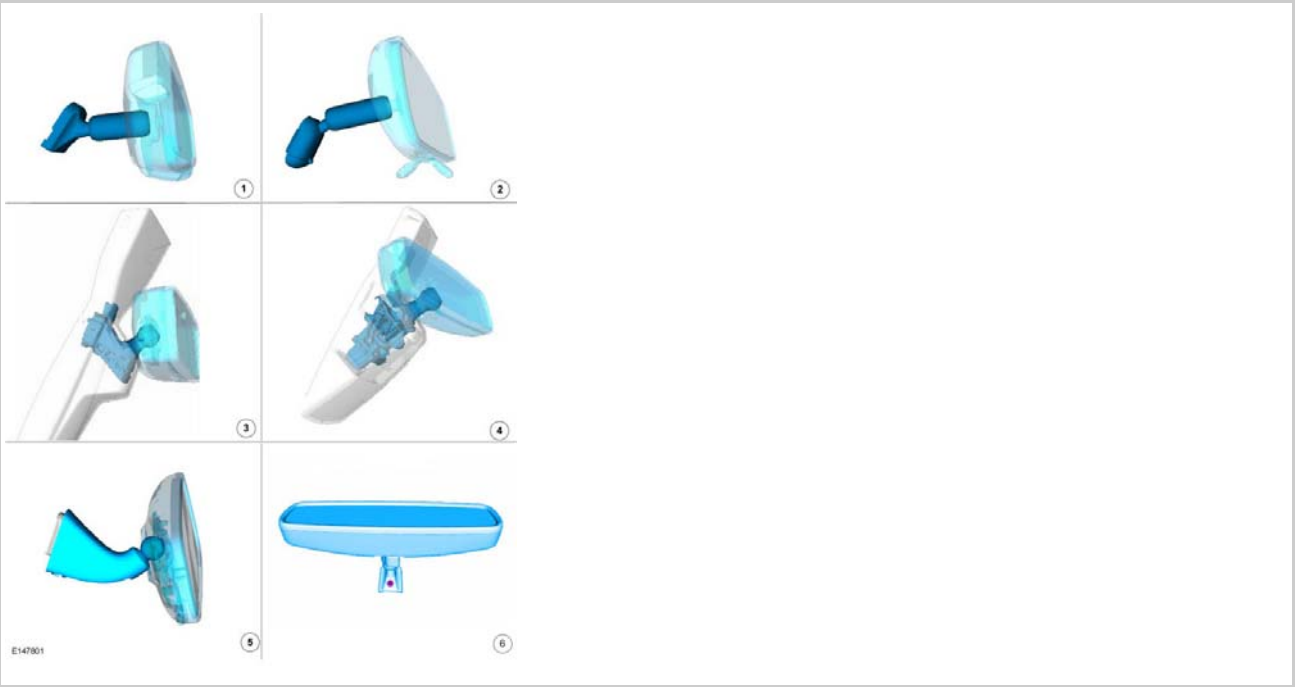
1.

WARNING: Before beginning any service procedure in this article, refer to Safety Warnings in GENERAL INFORMATION . Failure to follow this instruction may result in serious personal injury.

Refer to: Health and Safety Precautions .

2.

Mirror Types



Mirror type 1

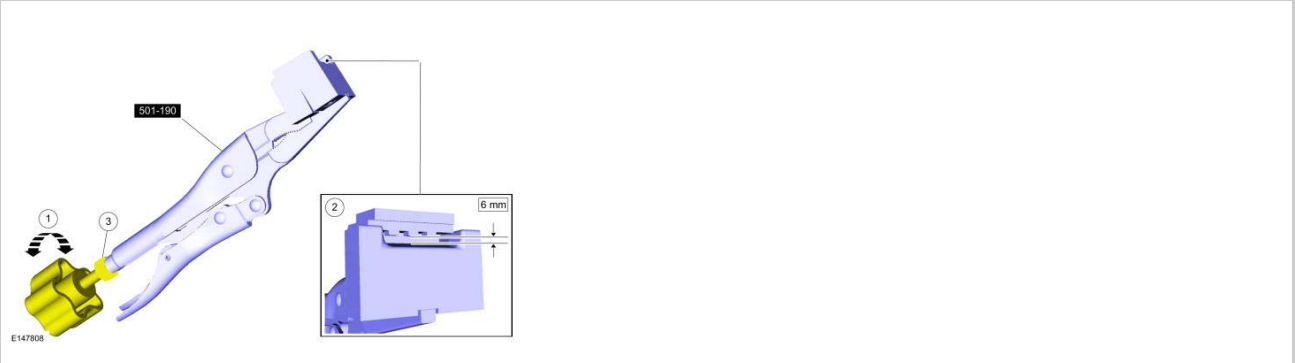
3.

If equipped, disconnect the interior mirror electrical connector.



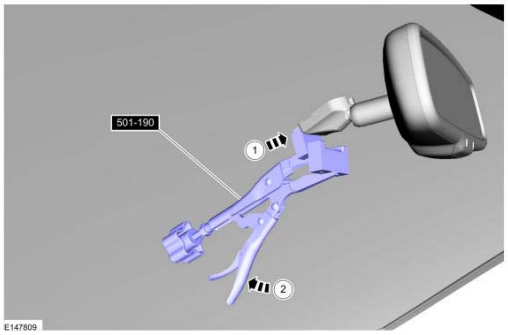
4.

Adjust the jaws on the interior mirror remover.



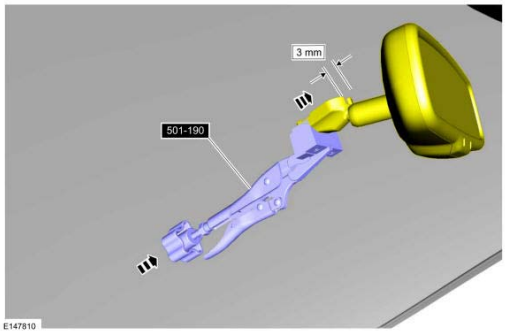
NOTE: Make sure the interior mirror remover is fully inserted into the rear view mirror mount access hole. Otherwise, damage to the windshield glass may occur.

5.
Using the interior mirror remover, release the locking tab.



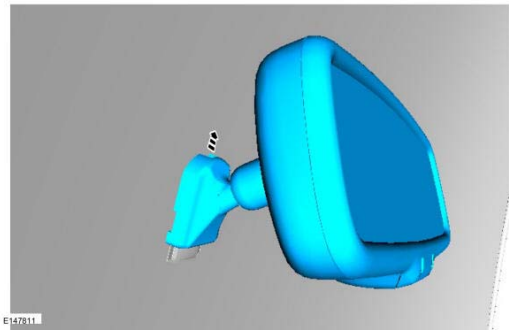
6.

Using a closed hand, bump the adjustment handle of the interior mirror remover to slide the mirror upward on the mirror mount.



7.

Slide the interior mirror off the interior mirror mount.



Mirror type 2

8.

Remove the interior mirror.

1.

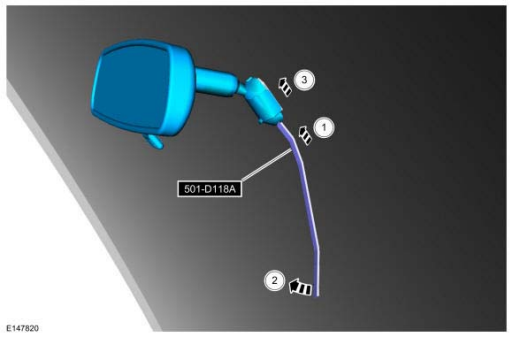
Insert the interior mirror remover into the release tab. Use Special Service Tool: 501-D118A (501-D118) Mirror Remover.

2.

Pull the lower edge of the interior mirror remover away from the windshield.

3.

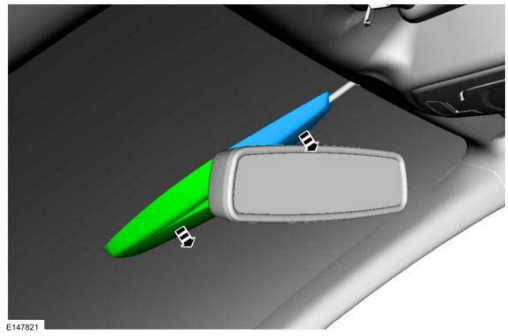
Slide the interior mirror off the mirror mount.



Mirror type 3

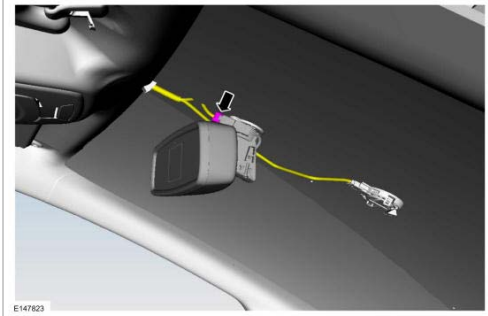
9.

Remove the rain sensor covers.



10.

Disconnect the interior mirror electrical connector.



11.

Remove the interior mirror.

1.

Position the interior mirror assembly to release the indexing tab.

2.

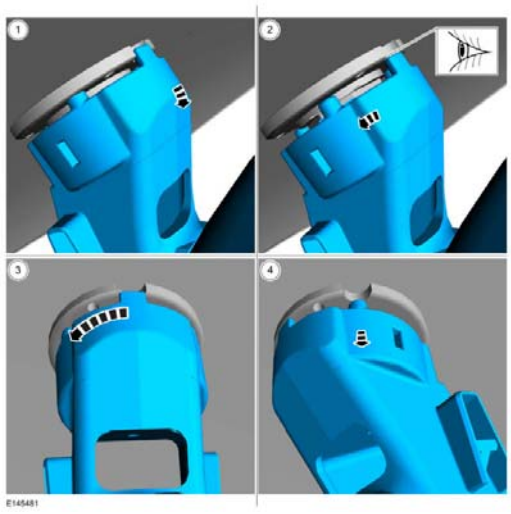
Inspect the indexing tab and turn the interior mirror slightly counter clock-wise.

3.

Turn the interior mirror 45 degrees counter clock-wise.

4.

Pull the interior mirror off the mirror mount.



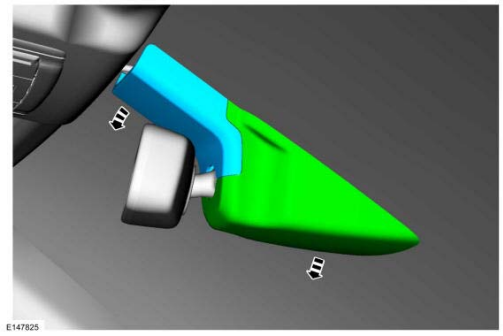
Mirror type 4

12.

If a new mirror is being installed, use a diagnostic scan tool, begin the PMI process for the IPMA following the on-screen instructions.

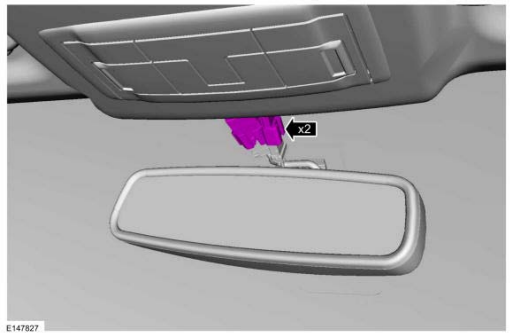
13.

Remove the rain sensor covers.



14.

Disconnect the interior mirror electrical connector.



15.

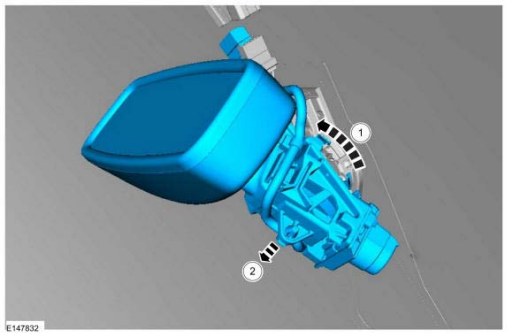
Remove the interior mirror.

1.

Turn the interior mirror assembly counter clock-wise.

2.

Remove the interior mirror off the mirror mount.



Mirror type 5

16.

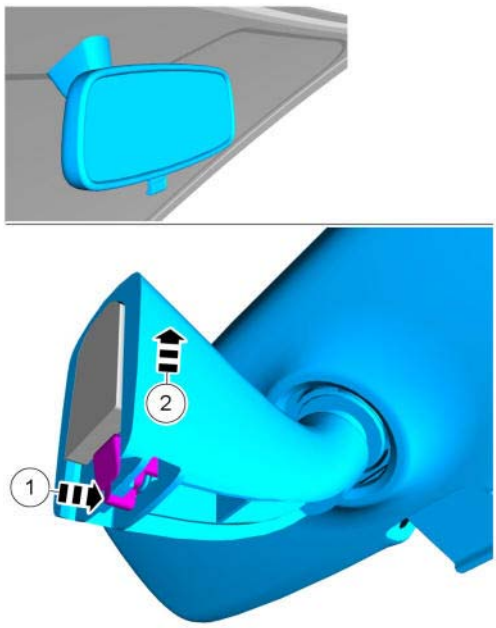
Remove the interior mirror.

1.

Release the locking tab.

2.

Slide the interior mirror off the mirror mount.

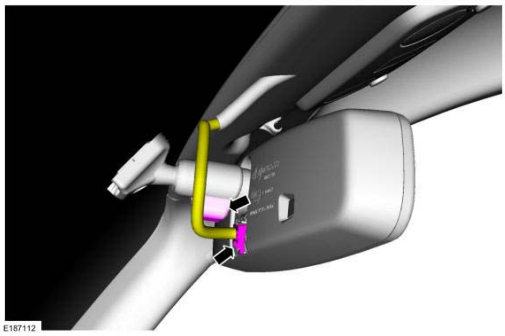


E103429

Mirror type 6

17.

Disconnect the electrical connector and unclip the wiring harness.



E187112

18.

Remove the interior mirror.

1.

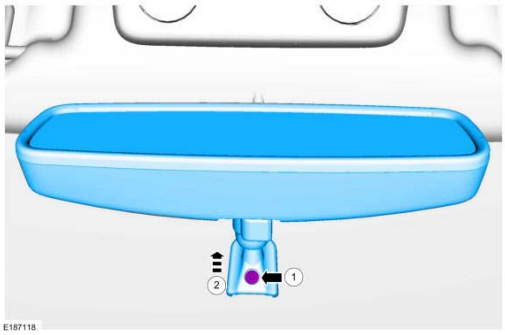
Loosen the set screw.

Torque

: 16 lb.in (1.8 Nm)

2.

Slide the interior mirror upward.

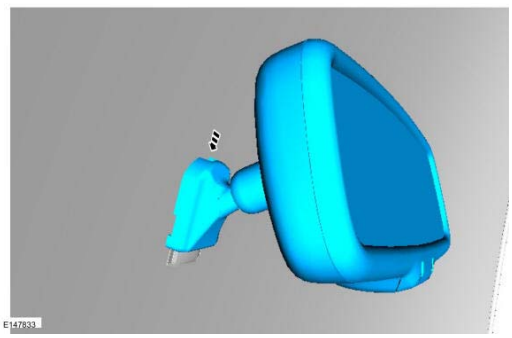


REMOVAL AND INSTALLATION > INTERIOR REAR VIEW MIRROR > INSTALLATION

Mirror type 1

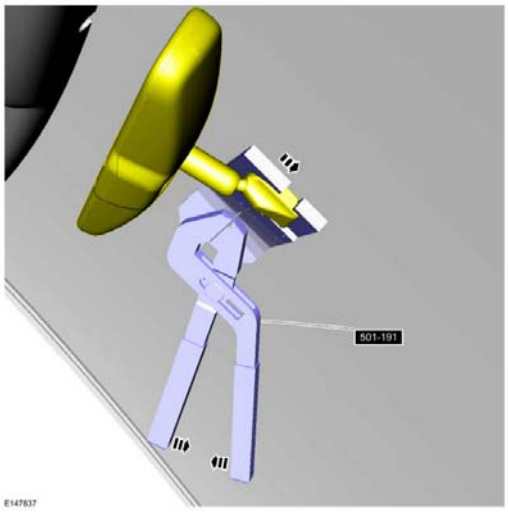
1.

Slide the interior rear view mirror over the windshield bracket from the top.



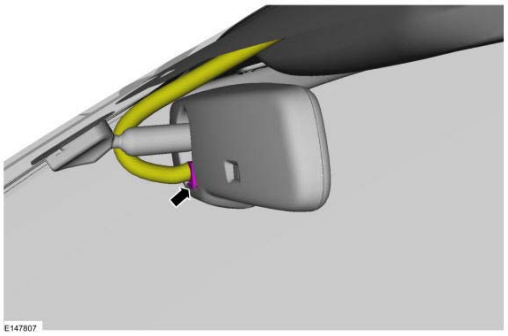
NOTE: An audible click will be heard as the mirror fully seats.

2.
Using the interior mirror installer, fully seat the interior mirror.



3.

If equipped, connect the electrical connector.



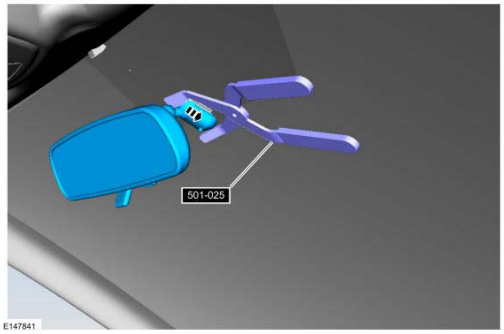
4.

If equipped with a compass module which requires calibration, check the compass zone and calibration.

Mirror type 2

5.

Using the interior mirror installer, fully seat the interior mirror. Use Special Service Tool: 501-025 Installer, Rear View Mirror.



6.

If equipped with a compass module which requires calibration, check the compass zone and calibration.

Mirror type 3

7.

To install, reverse the removal procedure.

Mirror type 4

8.

To install, reverse the removal procedure.

9.

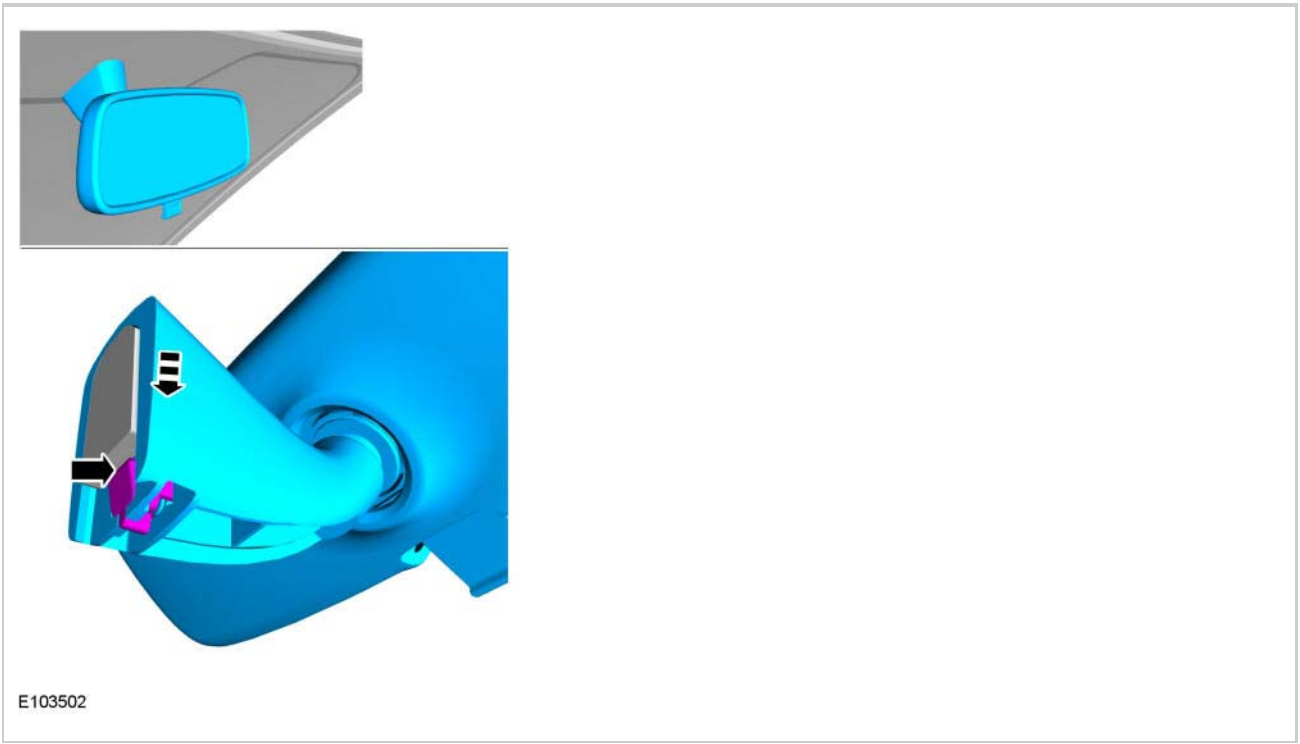
If a new mirror has been installed, use a diagnostic scan tool, complete the PMI process for the IPMA following the on-screen instructions.

If a new mirror has been installed, carry out the camera alignment using a scan tool.

Mirror type 5

10.

Slide the interior mirror onto the mirror mount until the locking tab is engaged.



Mirror type 6

11.

To install, reverse the removal procedure.

Service Manual: ROOF SHEET METAL REPAIRS

REMOVAL AND INSTALLATION > ROOF PANEL

Special Tool(s) / General Equipment

Resistance Spotwelding Equipment
Sherical Cutter
Grinder
Knife
Spot Weld Drill Bit
Locking Pliers

Materials

Name	Specification
Metal Bonding Adhesive TA-1, 3M™ 08115, Fusor® 108B	-
Seam Sealer TA-2-B	-
Roof Ditch Sealer 3M™ 08307, Fusor® 122EZ	-
Fusor® Flexible Foam Repair 3M™ 08463, Fusor® 121	-

REMOVAL AND INSTALLATION > ROOF PANEL > REMOVAL

NOTE: Adequately protect all glass, exterior finish and interior trim during entire repair procedure.

1.

Remove the following items:

Refer to: Fixed Glass .

Refer to: High Mounted Stoplamp - Coupe .

Refer to: Headliner .

Refer to: Audio Unit Antenna - Vehicles With: AM/FM/CD/SYNC.

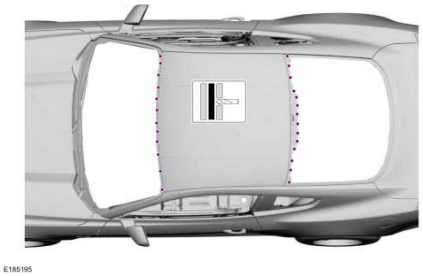
Refer to: Side Curtain Airbag .

2.

If required, dimensionally restore vehicle to pre-accident condition. Refer to: Body and Frame .

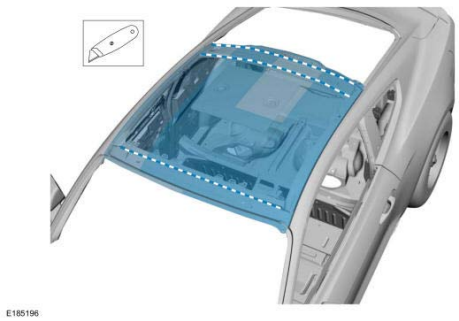
3.

Drill out the spot welds from the front and rear roof panel flanges.Use the General Equipment: Spot Weld Drill Bit



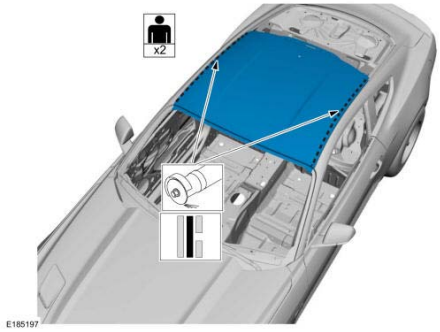
NOTE: Leave as much NVH foam intact on the roof reinforcements as possible.

4.
Cut the NVH foam between the front and rear roof reinforcements and the roof panel. Use the General Equipment: Knife



5.

Using a spherical cutter or equivalent, cut the roof panel along the edge near the roof ditch flange and remove the roof panel. Use the General Equipment: Spherical Cutter



REMOVAL AND INSTALLATION > ROOF PANEL > INSTALLATION

NOTE: Adequately protect all glass, exterior finish and interior trim during entire repair procedure.

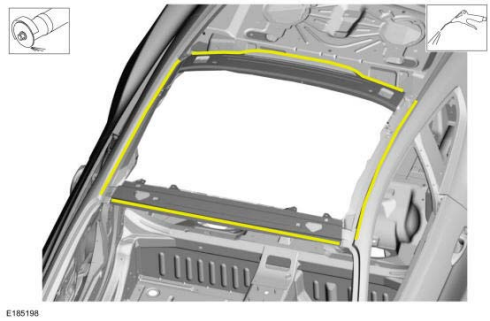
1.

1.

Remove any remaining roof flange material and level the weld nuggets. Use the General Equipment: Grinder

2.

Clean the area and remove any remaining residue.



2.

1.

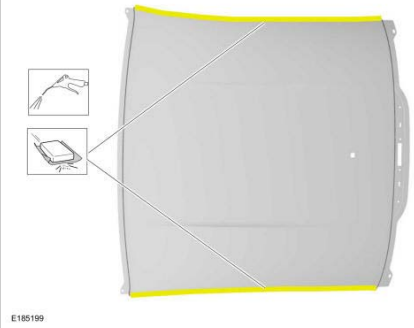
Abrade the flange area of the replacement roof panel.

Material

: Metal Bonding Adhesive / TA-1, 3M™ 08115, Fusor® 108B

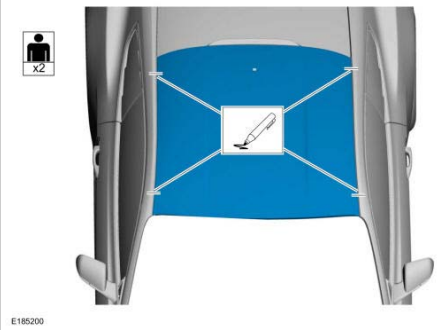
2.

Clean the area and remove any remaining residue.



3.

Locate and reference mark the replacement roof panel. Remove the roof panel after marking.

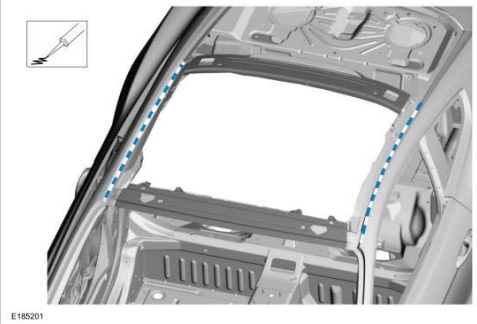


4.

Apply a bead of adhesive to the roof rail flange.

Material

: Metal Bonding Adhesive / TA-1, 3M™ 08115, Fusor® 108B

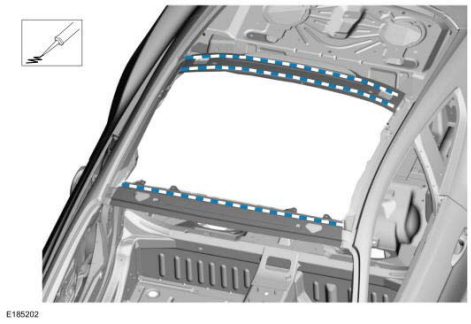


5.

Apply NVH foam to the front and rear roof reinforcements.

Material

: Fusor® Flexible Foam Repair / 3M™ 08463, Fusor® 121



NOTE: Do not lift the panel from the body once installed. If the panel requires repositioning, slide the panel to correct alignment location.

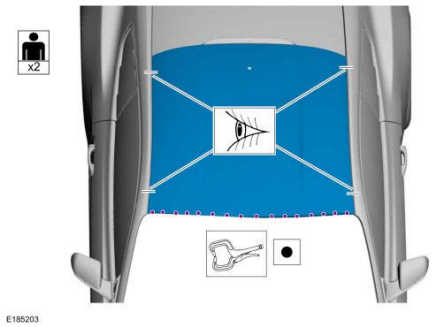
NOTE: To assure complete bonding, check all locations for full adhesive contact. Add additional adhesive as necessary.

NOTE: Inspect the roof panel-to-roof reinforcement contact points for full contact. Fill any voids with additional NVH foam.

6.
Install the roof panel, locate the roof panel to the reference marks and spot weld.

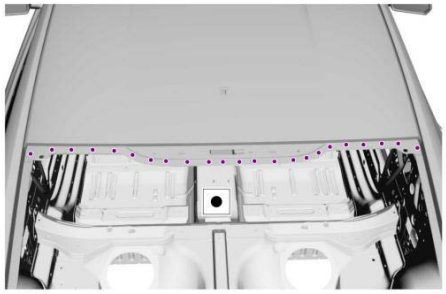
Use the General Equipment: Resistance Spotwelding Equipment

Use the General Equipment: Locking Pliers



7.

Spot weld the rear roof panel flange.Use the General Equipment: Resistance Spotwelding Equipment



E185204

8.

Metal finish the repair area using typical metal finishing procedures.

9.

Sealing work: All areas must be sealed to production level.

Material

: Seam Sealer / TA-2-B

10.

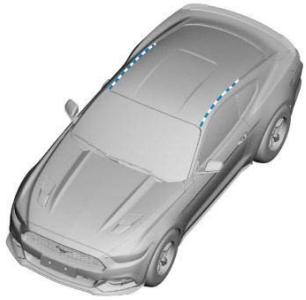
Sand and prime the entire repair area with a Ford approved paint system.

11.

Apply sealant to the roof ditch.

Material

: Roof Ditch Sealer / 3M™ 08307, Fusor® 122EZ



E184193

12.

Refinish using a Ford approved paint system.

13.

Install the following items:

Refer to: Fixed Glass .

Refer to: High Mounted Stoplamp - Coupe .

Refer to: Headliner .

Refer to: Audio Unit Antenna - Vehicles With: AM/FM/CD/SYNC

Refer to: Side Curtain Airbag .

Service Manual: SIDE PANEL SHEET METAL REPAIRS

REMOVAL AND INSTALLATION > A-PILLAR OUTER PANEL

Special Tool(s) / General Equipment

Resistance Spotwelding Equipment
Hot Air Gun
Air Body Saw
8 mm Drill Bit
MIG/MAG Welding Equipment
Spot Weld Drill Bit
Locking Pliers

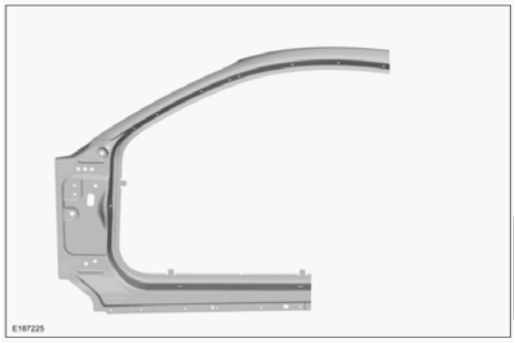
Materials

Name	Specification
Seam Sealer TA-2-B	-
Fusor ® Flexible Foam Repair3M™ 08463, Fusor ® 121	-

REMOVAL AND INSTALLATION > A-PILLAR OUTER PANEL > REMOVAL

1.

Available service part-Coupe.



2.

Available service part-Convertible.



3.

If required, dimensionally restore vehicle to pre-accident condition. Refer to: Body and Frame .

4.

Remove the following items:

Refer to: A-Pillar Trim Panel - Coupe . Refer to: A-Pillar Trim Panel - Convertible .

Refer to: Fender .

Refer to: Hood .

Refer to: FRONT DOOR .

Refer to: Rocker Panel Moulding .

NOTE: Coupe only.

Refer to: Roof Panel .

5.

Position the carpet and wiring harness away from the repair area.

6.

Remove the front door hinges at the A-pillar.

NOTE: Coupe shown, convertible similar.

7.
Carefully cut the **outer** body panel only. Use the General Equipment: Air Body Saw



8.

Drill out the spot welds. Use the General Equipment: Spot Weld Drill Bit



NOTE: Do not heat the area above 170 ° C.

9.
Using a hot air gun, heat the area to aid in softening the NVH foam. Use the General Equipment: Hot Air Gun



10.

Remove the A-pillar panel.



REMOVAL AND INSTALLATION > A-PILLAR OUTER PANEL > INSTALLATION

1.

Drill holes for plug welds in the replacement panel. Use the General Equipment: 8 mm Drill Bit



2.

Apply NVH expanding foam to the inner reinforcement in the indicated area.

Material

: Fusor ® Flexible Foam Repair / 3M™ 08463, Fusor ® 121



3.

Install and seam weld the replacement A-pillar outer panel. Use the General Equipment: MIG/MAG Welding Equipment Use the General Equipment: Locking Pliers



4.

Spot weld the flange areas. Use the General Equipment: Resistance Spotwelding Equipment Use the General Equipment: Locking Pliers



5.

MIG weld the remaining portion of the A-pillar panel. Use the General Equipment: MIG/MAG Welding Equipment



6.

Metal finish the repair area using typical metal finishing techniques.

7.

Apply a Ford approved primer to the repair area.

NOTE: Apply seam sealer after priming the area.

8.
Sealing work: All areas must be sealed to production level.

Material

: Seam Sealer / TA-2-B

9.

Refinish using a Ford approved paint system.

10.

Restore corrosion protection. Refer to: Corrosion Prevention .

11.

Install the front door hinges to the A-pillar.

12.

Reposition the carpet and wiring harness.

13.

Install the following items:

Refer to: A-Pillar Trim Panel - Coupe . Refer to: A-Pillar Trim Panel - Convertible .

Refer to: Fender .

Refer to: FRONT DOOR .

Refer to: Rocker Panel Moulding .

NOTE: Coupe only.

Refer to: Roof Panel .

Refer to: Hood .

14.

Align the hood as necessary. Refer to: Body and Frame .

REMOVAL AND INSTALLATION > A-PILLAR OUTER PANEL SECTION AND REINFORCEMENT

Special Tool(s) / General Equipment

Resistance Spotwelding Equipment
Grinder
Hot Air Gun
Knife
Air Body Saw
8 mm Drill Bit
MIG/MAG Welding Equipment
Spot Weld Drill Bit
Locking Pliers

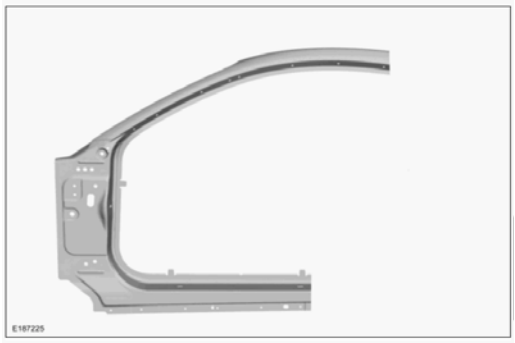
Materials

Name	Specification
Metal Bonding Adhesive TA-1, 3M™ 08115, Fusor ® 108B	-
Seam Sealer TA-2-B	-
Fusor ® Flexible Foam Repair 3M™ 08463, Fusor ® 121	-

REMOVAL AND INSTALLATION > A-PILLAR OUTER PANEL SECTION AND REINFORCEMENT > REMOVAL

1.

Available service part-Coupe.



2.

Available service part-Convertible.



3.

Remove the following items:

Refer to: Fixed Glass .

Refer to: Fender .

Refer to: Hood .

Refer to: FRONT DOOR .

Refer to: Rocker Panel Moulding .

Refer to: A-Pillar Trim Panel - Coupe . Refer to: A-Pillar Trim Panel - Convertible .

4.

If required, dimensionally restore vehicle to pre-accident condition. Refer to: Body and Frame .

5.

Position the carpet and wiring harness away from the repair area.

6.

Remove the front door hinges at the A-pillar.

NOTE: Due to construction and design of the A-pillar reinforcements, no sectioning can be performed on these components. The inner reinforcements must be replaced at the factory seams.

7.
Coupe shown, convertible similar. Carefully cut the **outer** body panel only.



8.

Drill out the spot welds. Use the General Equipment: Spot Weld Drill Bit



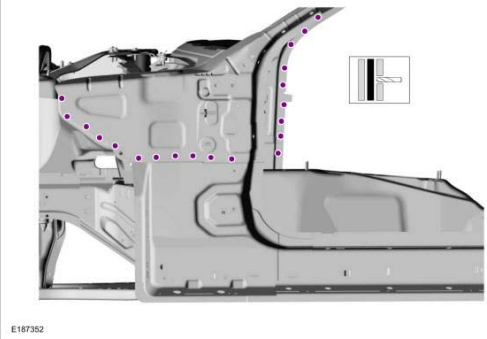
NOTE: Do not heat the area above 170 ° C.

9.
Using a hot air gun, heat the area to aid in softening the NVH foam and remove the panel. Use the General Equipment: Hot Air Gun



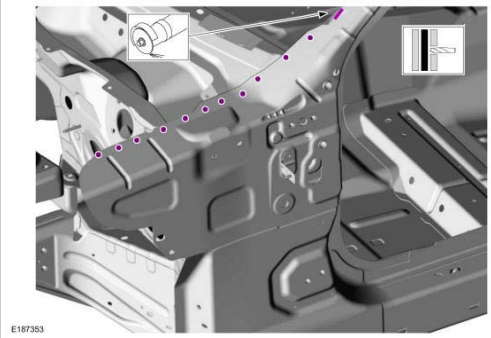
10.

Drill out the spot welds from the upper A-pillar reinforcement. Use the General Equipment: Spot Weld Drill Bit



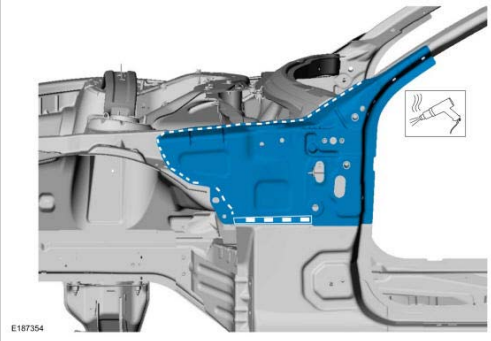
11.

Drill out the spot welds and grind the seam welds. Use the General Equipment: Spot Weld Drill Bit Use the General Equipment: Grinder



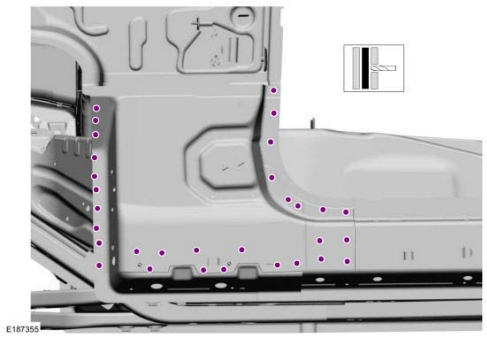
NOTE: Do not heat the area above 170 ° C.

12.
Using a hot air gun, heat the area to aid in softening the NVH foam and remove the upper A-pillar reinforcement. Use the General Equipment: Hot Air Gun



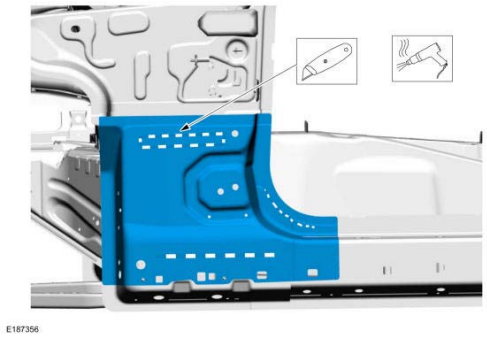
13.

Drill out the welds on lower A-pillar reinforcement. Use the General Equipment: Spot Weld Drill Bit



NOTE: Do not heat the area above 170 ° C.

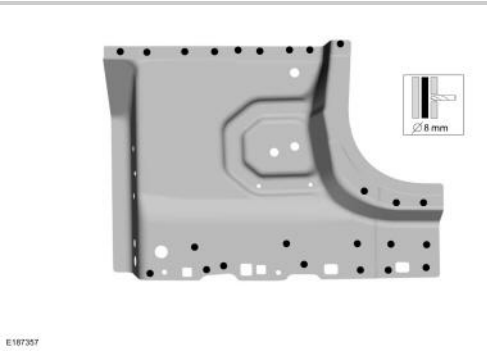
14.
Using a hot air gun, heat the area to aid in softening the NVH foam and remove the lower A-pillar reinforcement. Use the General Equipment: Hot Air Gun Use the General Equipment: Knife



REMOVAL AND INSTALLATION > A-PILLAR OUTER PANEL SECTION AND REINFORCEMENT > INSTALLATION

1.

Drill plug weld holes in the replacement A-pillar lower reinforcement. Use the General Equipment: 8 mm Drill Bit



2.

Apply adhesive and NVH expanding foam as indicated.

Material

: Metal Bonding Adhesive / TA-1, 3M™ 08115, Fusor ® 108B

Material

: Fusor ® Flexible Foam Repair / 3M™ 08463, Fusor ® 121



3.

Install and spot weld the A-pillar lower reinforcement. Use the General Equipment: Locking Pliers Use the General Equipment: Resistance Spotwelding Equipment



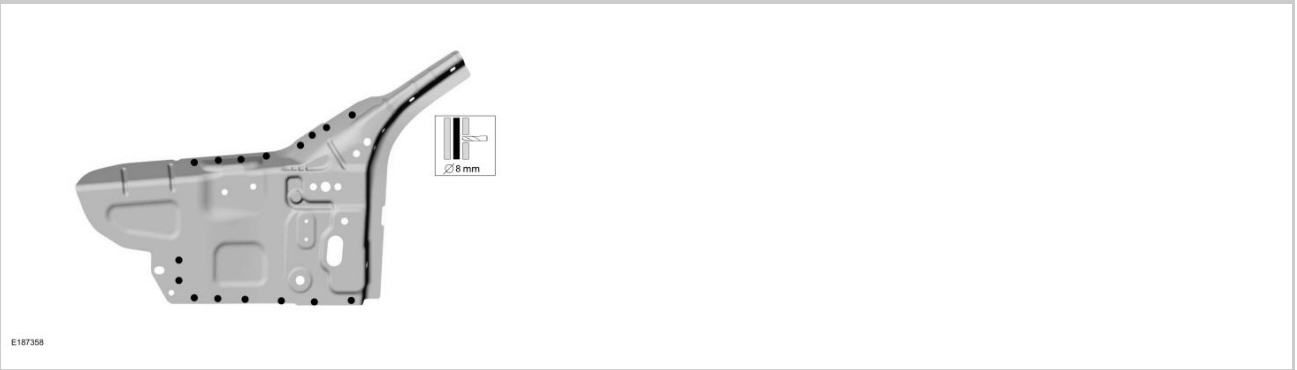
4.

Plug weld the A-pillar lower reinforcement. Use the General Equipment: MIG/MAG Welding Equipment



5.

Drill plug weld holes in the replacement A-pillar upper reinforcement.

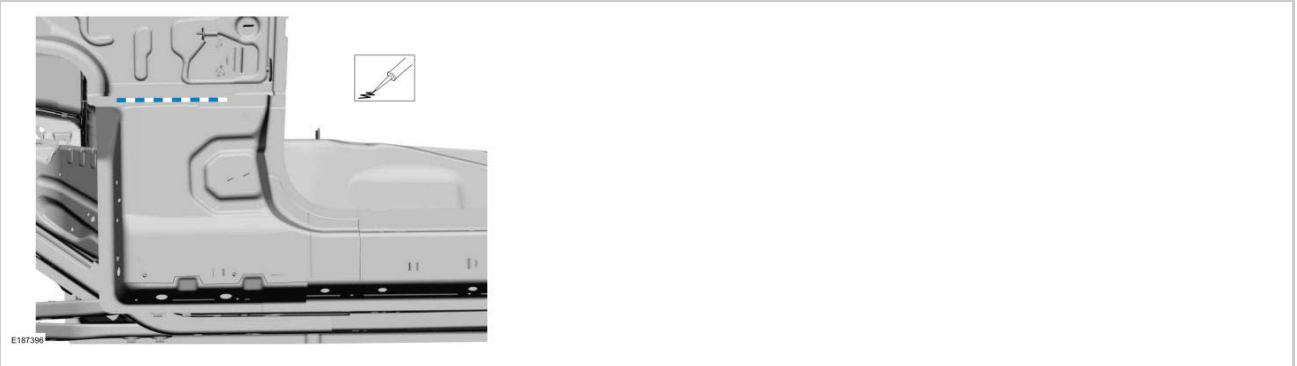


6.

Apply adhesive to the upper flange of the A-pillar lower reinforcement.

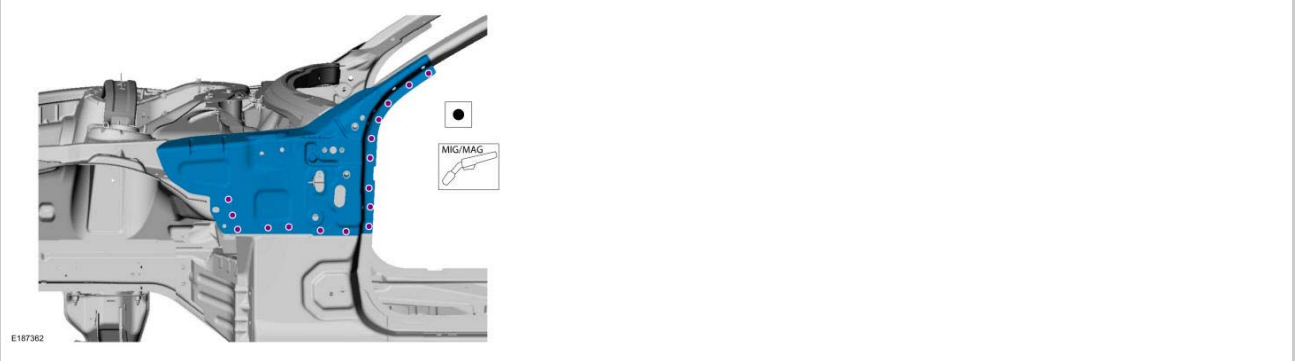
Material

: Metal Bonding Adhesive / TA-1, 3M™ 08115, Fusor ® 108B



7.

Install and weld the A-pillar upper reinforcement. Use the General Equipment: Resistance Spotwelding Equipment Use the General Equipment: MIG/MAG Welding Equipment



8.

Complete welding the A-pillar upper reinforcement. Use the General Equipment: MIG/MAG Welding Equipment



9.

Cut a section from the replacement panel and drill holes for plug welding. Use the General Equipment: 8 mm Drill Bit Use the General Equipment: Air Body Saw



10.

Install the replacement panel and weld. Use the General Equipment: MIG/MAG Welding Equipment Use the General Equipment: Locking Pliers



11.

Spot weld the A-pillar panel. Use the General Equipment: Resistance Spotwelding Equipment Use the General Equipment: Locking Pliers



12.

MIG plug weld the A-pillar panel. Use the General Equipment: MIG/MAG Welding Equipment



13.

Metal finish the repair areas using typical metal finishing techniques.

14.

Apply a Ford approved primer to the repair area.

15.

Sealing work: All areas must be sealed to production level.

Material

: Seam Sealer / TA-2-B

16.

Refinish using a Ford approved paint system.

17.

Restore corrosion protection. Refer to: Corrosion Prevention .

18.

Install the front door hinges to the A-pillar.

19.

Reposition the carpet and wiring harness.

20.

Install the following items:

Refer to: Fixed Glass .

Refer to: Fender .

Refer to: Hood .

Refer to: FRONT DOOR .

Refer to: Rocker Panel Moulding .

21.

Align the hood as necessary. Refer to: Body and Frame .

REMOVAL AND INSTALLATION > B-PILLAR AND REINFORCEMENT - COUPE

Special Tool(s) / General Equipment

Resistance Spotwelding Equipment
8 mm Drill Bit
MIG/MAG Welding Equipment
Spot Weld Drill Bit
Locking Pliers

Materials

Name	Specification
Seam Sealer TA-2-B	-
Fusor ® Flexible Foam Repair 3M™ 08463, Fusor ® 121	-

REMOVAL AND INSTALLATION > B-PILLAR AND REINFORCEMENT - COUPE > REMOVAL

NOTE: LH side shown, RH side similar.

1.

If required, dimensionally restore vehicle to pre-accident condition. Refer to: Body and Frame .

2.

Remove the following items:

Refer to: Roof Panel .

Refer to: QUARTER PANEL - COUPE .

Refer to: Rear Seat Cushion .

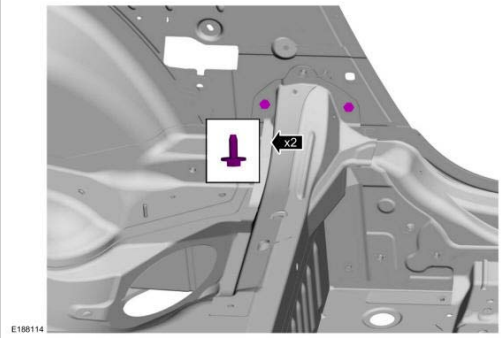
NOTE: B-pillar reinforcement components are constructed of Boron steel and can not be sectioned. Replacement must be done at factory joints.

3.

Position aside the carpet and wiring harness from the repair area.

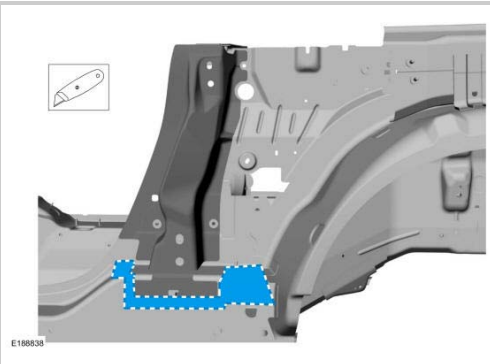
4.

Remove the bolts from the rear floor crossmember to B-pillar.



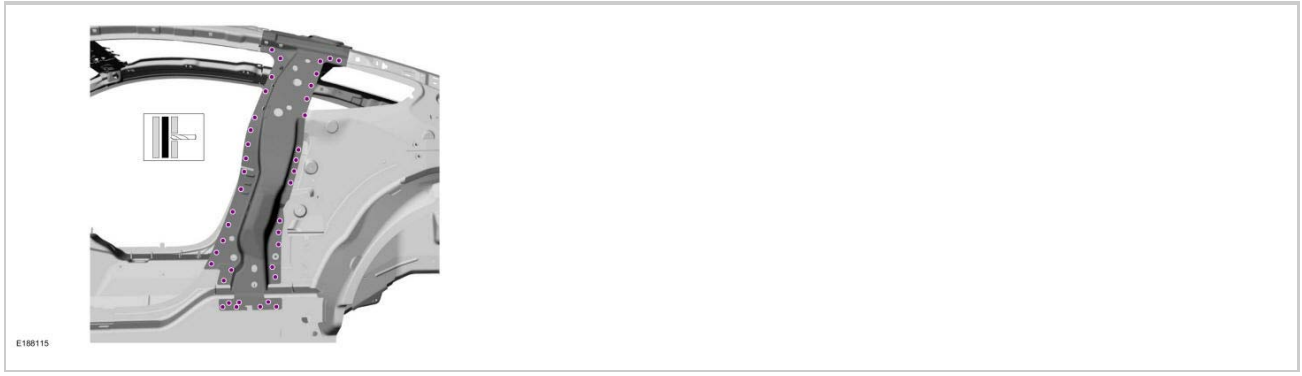
5.

Remove the NVH foam at the base of the B-pillar.



6.

Drill out the spot welds on the B-pillar panel. Use the General Equipment: Spot Weld Drill Bit



7.

Drill out the spot welds from the rear roof reinforcement on both sides. Use the General Equipment: Spot Weld Drill Bit



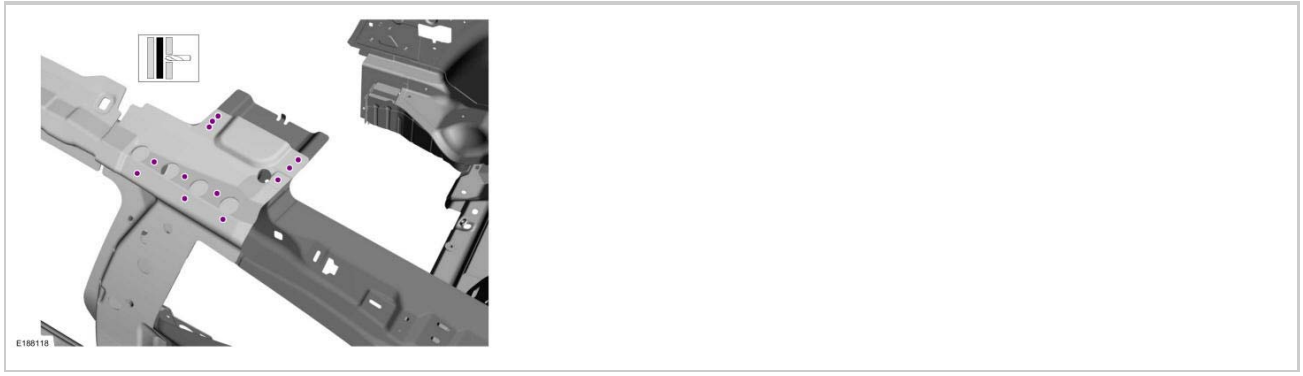
8.

Remove the rear roof reinforcement assembly.



9.

Drill out the spot welds on the B-pillar panel at the rear roof reinforcement flange. Use the General Equipment: Spot Weld Drill Bit



10.

Remove the B-pillar assembly.



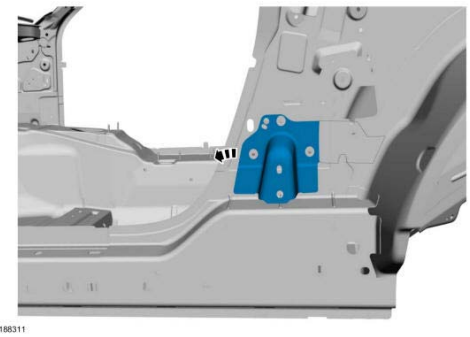
11.

Drill out the spot welds.



12.

Remove the inner reinforcement.

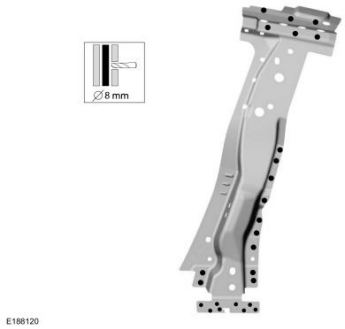


REMOVAL AND INSTALLATION > B-PILLAR AND REINFORCEMENT - COUPE > INSTALLATION

NOTE: LH side shown, RH side similar.

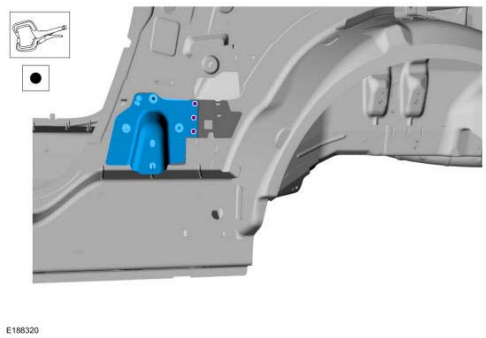
1.

Drill holes for plug welding in the replacement panel. Use the General Equipment: 8 mm Drill Bit



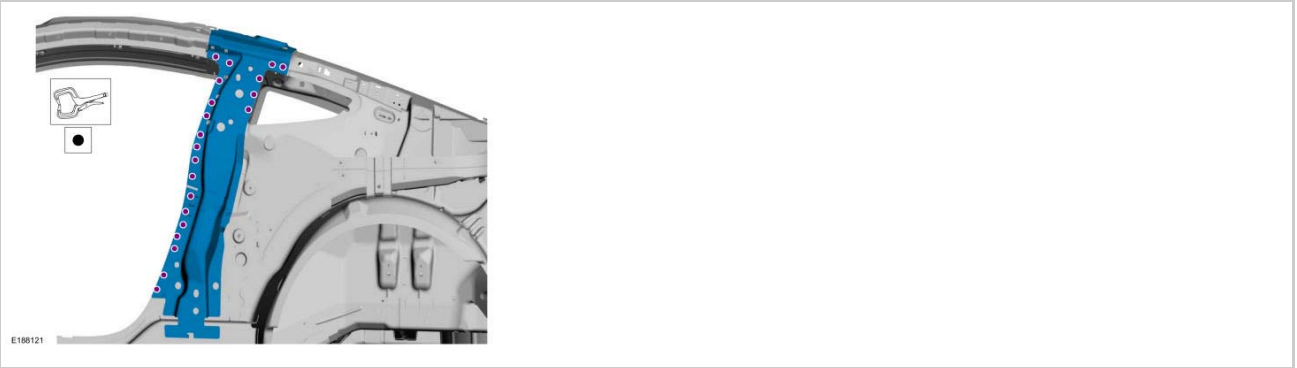
2.

Install the inner reinforcement and spot weld. Use the General Equipment: Locking Pliers Use the General Equipment: Resistance Spotwelding Equipment



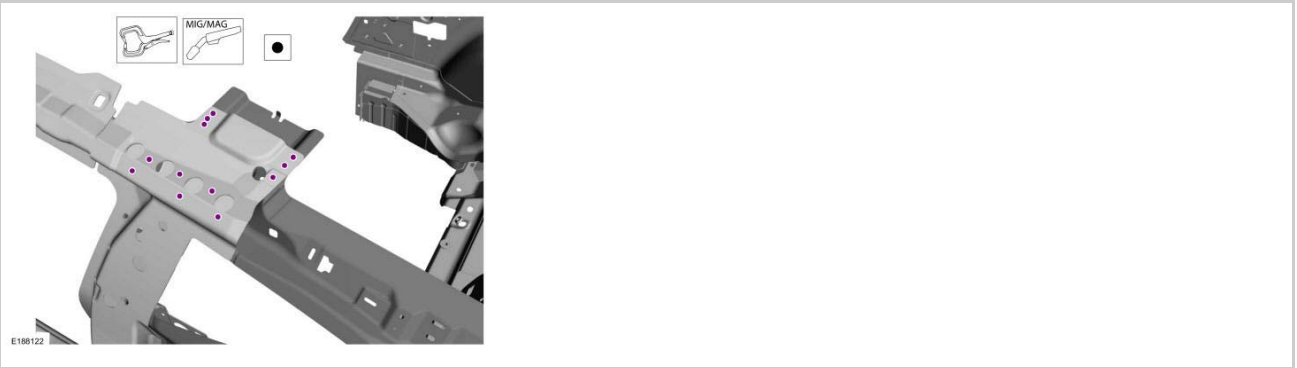
3.

Install the B-pillar assembly and spot weld. Use the General Equipment: Locking Pliers Use the General Equipment: Resistance Spotwelding Equipment



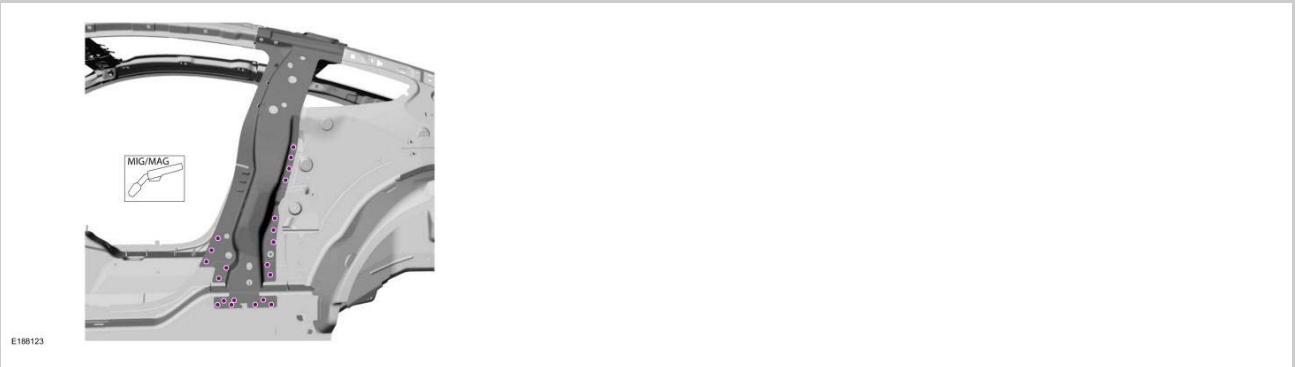
4.

Weld the B-pillar at the rear roof reinforcement flange. Use the General Equipment: Locking Pliers Use the General Equipment: MIG/MAG Welding Equipment Use the General Equipment: Resistance Spotwelding Equipment



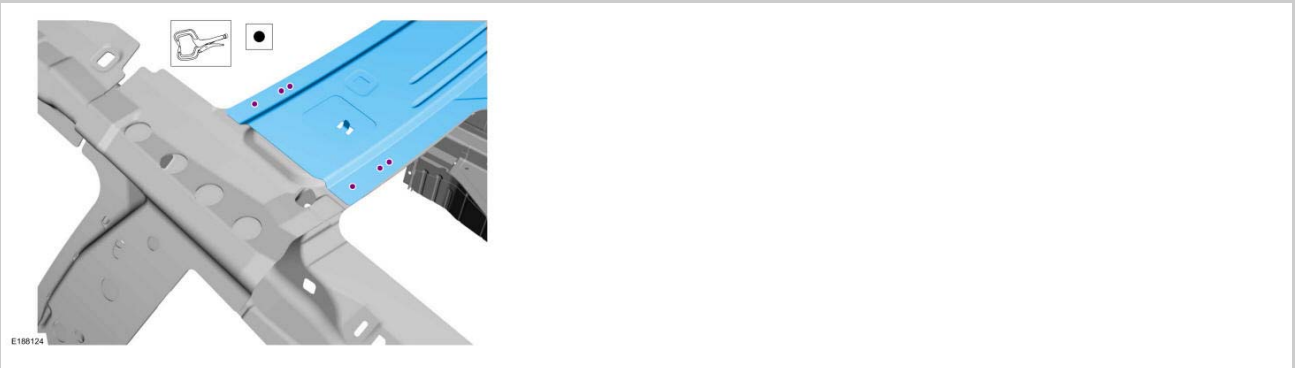
5.

MIG weld the B-pillar panel. Use the General Equipment: MIG/MAG Welding Equipment



6.

Install the rear roof reinforcement panel and weld on both sides. Use the General Equipment: Resistance Spotwelding Equipment Use the General Equipment: Locking Pliers



7.

Apply NVH expanding foam.

Material

: Fusor ® Flexible Foam Repair / 3M™ 08463, Fusor ® 121



8.

Install the rear floor crossmember bolts.

Torque

: 22 lb.ft (30 Nm)



9.

Metal finish the repair area using typical metal finishing techniques.

10.

Sealing work: All areas must be sealed to production level.

Material

: Seam Sealer / TA-2-B

11.

Restore the corrosion protection. Refer to: Corrosion Prevention .

12.

Reposition the carpet and wiring harness.

13.

Install the following items:

Refer to: Roof Panel .

Refer to: QUARTER PANEL - COUPE .

Refer to: Rear Seat Cushion .

REMOVAL AND INSTALLATION > B-PILLAR AND REINFORCEMENT - CONVERTIBLE

Special Tool(s) / General Equipment

Resistance Spotwelding Equipment
Air Body Saw
8 mm Drill Bit
MIG/MAG Welding Equipment
Spot Weld Drill Bit
Locking Pliers

Materials

Name	Specification
Seam Sealer TA-2-B	-
Fusor ® Flexible Foam Repair3M™ 08463, Fusor ® 121	-

REMOVAL AND INSTALLATION > B-PILLAR AND REINFORCEMENT - CONVERTIBLE > REMOVAL

NOTE: LH side shown, RH side similar.

1.

If required, dimensionally restore vehicle to pre-accident condition. Refer to: Body and Frame .

2.

Remove the following items:

Refer to: Rear Seat Cushion .

Refer to: QUARTER PANEL - CONVERTIBLE .

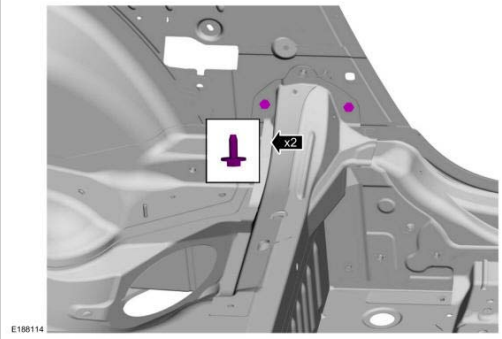
NOTE: B-pillar reinforcement components are constructed of Boron steel and can not be sectioned. Replacement must be done at factory joints.

3.

Position aside the carpet and wiring harness from the repair area.

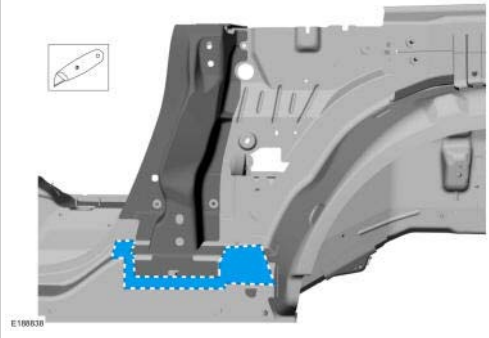
4.

Remove the bolts from the rear floor crossmember to B-pillar.



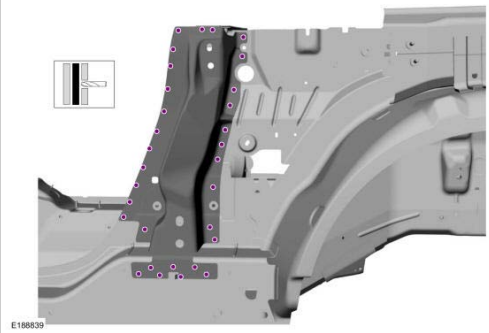
5.

Remove the NVH foam at the base of the B-pillar. Use the General Equipment: Air Body Saw



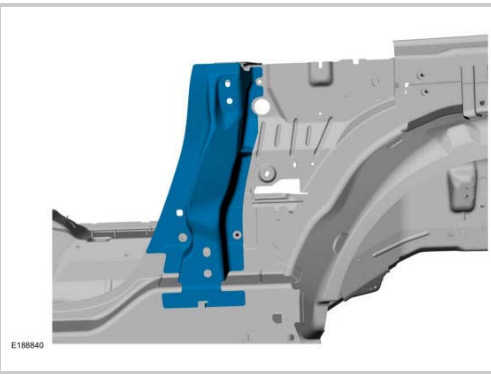
6.

Drill out the spot welds. Use the General Equipment: Spot Weld Drill Bit



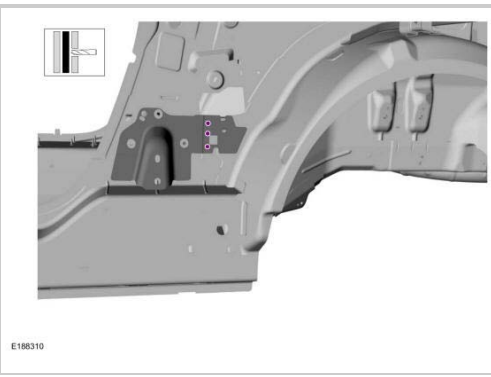
7.

Remove the B-pillar assembly.



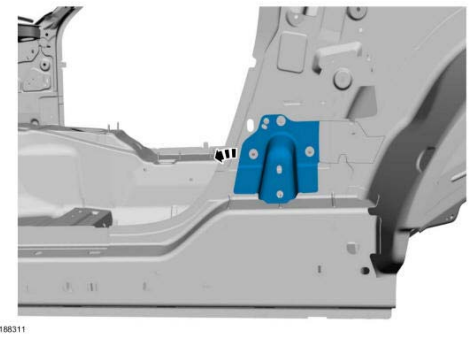
8.

Drill out the spot welds. Use the General Equipment: Spot Weld Drill Bit



9.

Remove the inner reinforcement.

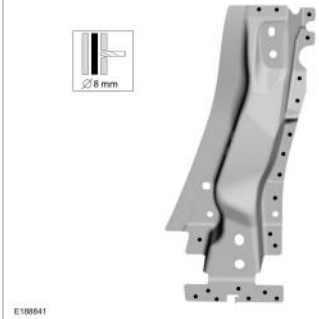


REMOVAL AND INSTALLATION > B-PILLAR AND REINFORCEMENT - CONVERTIBLE > INSTALLATION

NOTE: LH side shown, RH side similar.

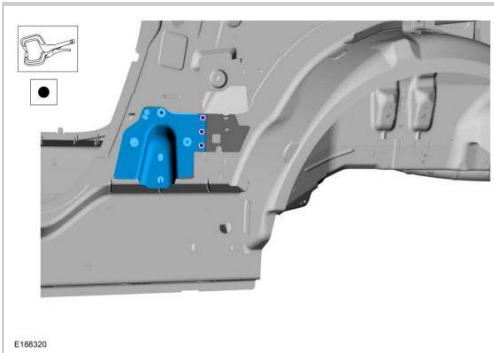
1.

Drill holes for plug welding in the replacement panel. Use the General Equipment: 8 mm Drill Bit



2.

Install the inner reinforcement and resistance spot weld. Use the General Equipment: Locking Pliers Use the General Equipment: Resistance Spotwelding Equipment



3.

Install the B-pillar assembly and resistance spot weld. Use the General Equipment: Resistance Spotwelding Equipment Use the General Equipment: Locking Pliers



4.

MIG weld the B-pillar panel. Use the General Equipment: MIG/MAG Welding Equipment



5.

Apply NVH expanding foam.

Material

: Fusor ® Flexible Foam Repair / 3M™ 08463, Fusor ® 121

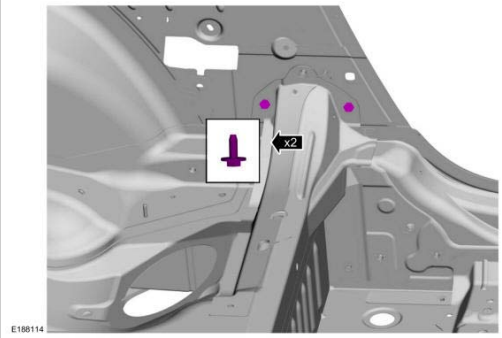


6.

Install the rear floor crossmember bolts.

Torque

: 22 lb.ft (30 Nm)



7.

Metal finish the repair area using typical metal finishing techniques.

8.

Sealing work: All areas must be sealed to production level.

Material

: Seam Sealer / TA-2-B

9.

Restore corrosion protection. Refer to: Corrosion Prevention .

10.

Reposition carpeting and wiring harness.

11.

Install the following items:

Refer to: Rear Seat Cushion .

Refer to: QUARTER PANEL - CONVERTIBLE .

REMOVAL AND INSTALLATION > FRONT DOOR SKIN PANEL

Special Tool(s) / General Equipment

Grinder
Hot Air Gun
Knife
MIG/MAG Welding Equipment
Locking Pliers

Materials

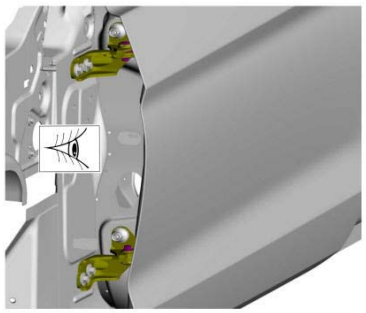
Name	Specification
Metal Bonding Adhesive TA-1, 3M™ 08115, Fusor ® 108B	-
Seam Sealer TA-2-B	-
Fusor ® Flexible Foam Repair 3M™ 08463, Fusor ® 121	-

REMOVAL AND INSTALLATION > FRONT DOOR SKIN PANEL > REMOVAL

NOTE: LH side shown, RH side similar.

1.

Inspect the upper and lower door hinges for wear or damage, install new or rebuild as necessary.



2.

Remove the following items:

Refer to: Front Door Window Glass .

Refer to: FRONT DOOR .

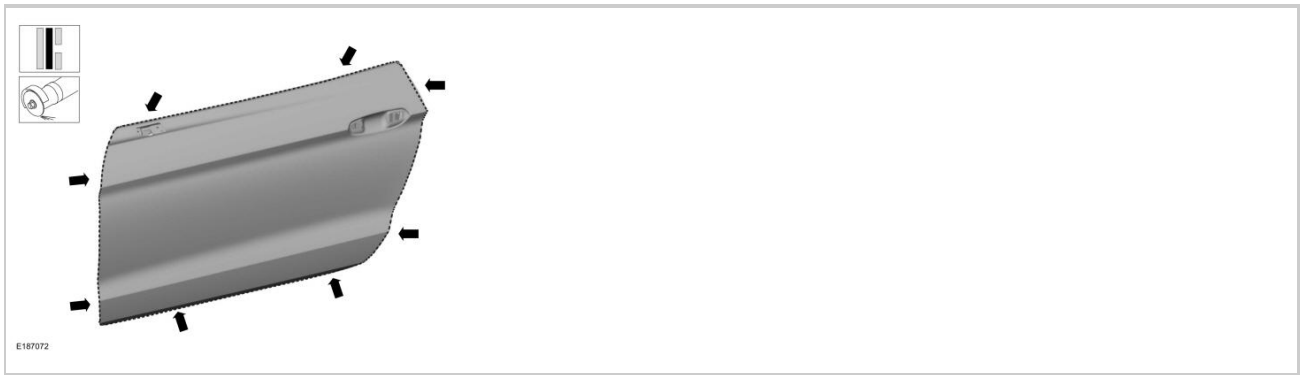
Refer to: Exterior Mirror .

Refer to: Exterior Front Door Handle .

Refer to: Front Door Upper Moulding .

3.

Carefully cut through the **outer** panel only. Use the General Equipment: Grinder



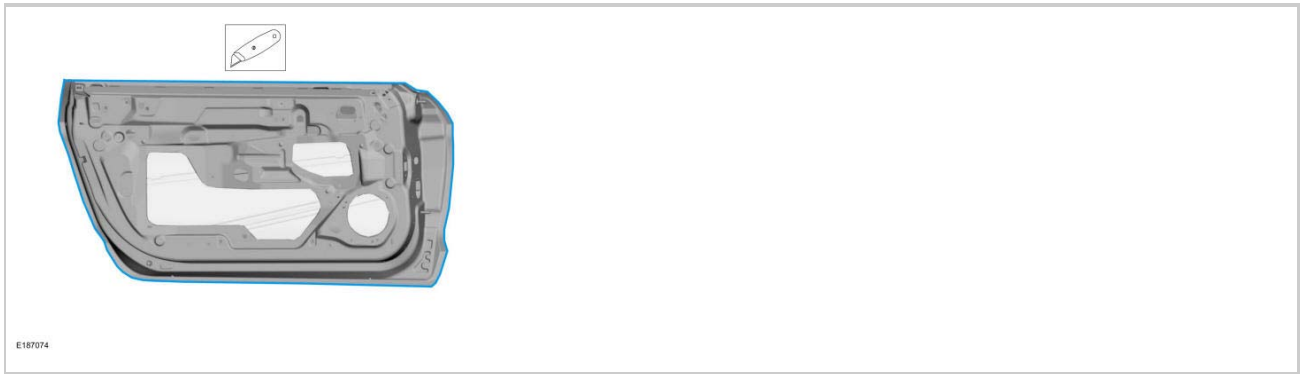
4.

Remove the outer door panel.



5.

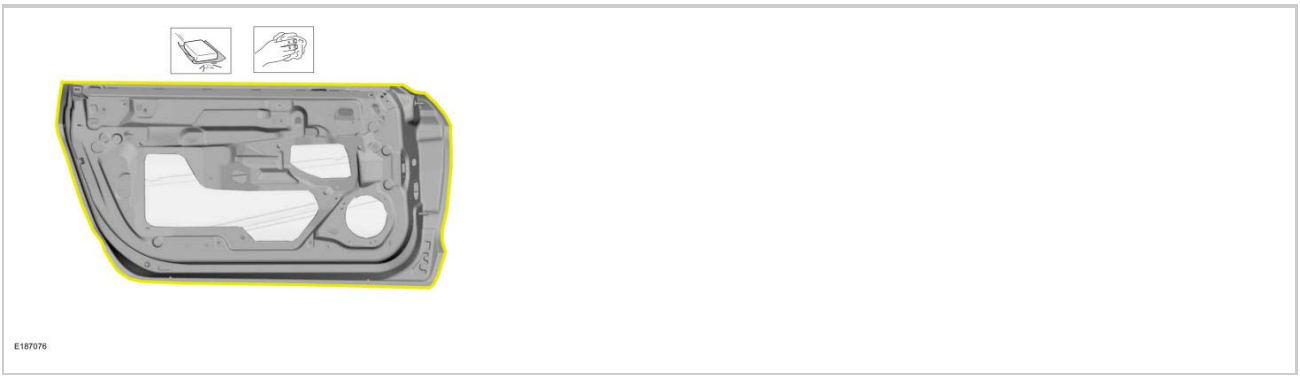
Remove the remaining portion of the front door panel hem flange. Use the General Equipment: Knife Use the General Equipment: Hot Air Gun



REMOVAL AND INSTALLATION > FRONT DOOR SKIN PANEL > INSTALLATION

1.

Remove all adhesive and foreign materials from the door shell to outer door panel mating surfaces.



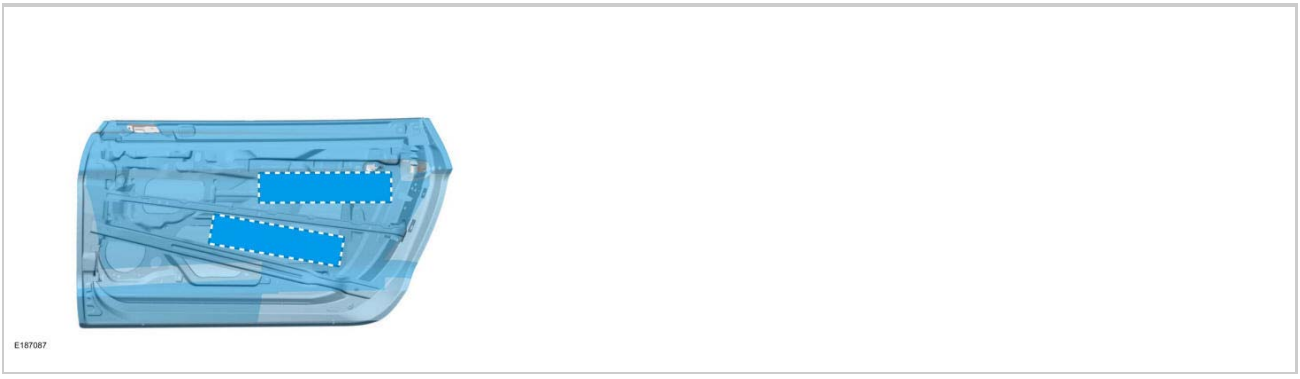
2.

Remove the e-coat from the mating surface.



3.

Install NVH mastic pads to the replacement door panel as required.



4.

Apply adhesive to the door shell mating surface.

Material

: Metal Bonding Adhesive / TA-1, 3M™ 08115, Fusor ® 108B



5.

Apply anti-flutter NVH expanding foam as indicated.

Material

: Fusor ® Flexible Foam Repair / 3M™ 08463, Fusor ® 121



6.

Install the outer door panel and partially crimp the flange. Use the General Equipment: Locking Pliers



7.

Temporarily install the door on the vehicle.



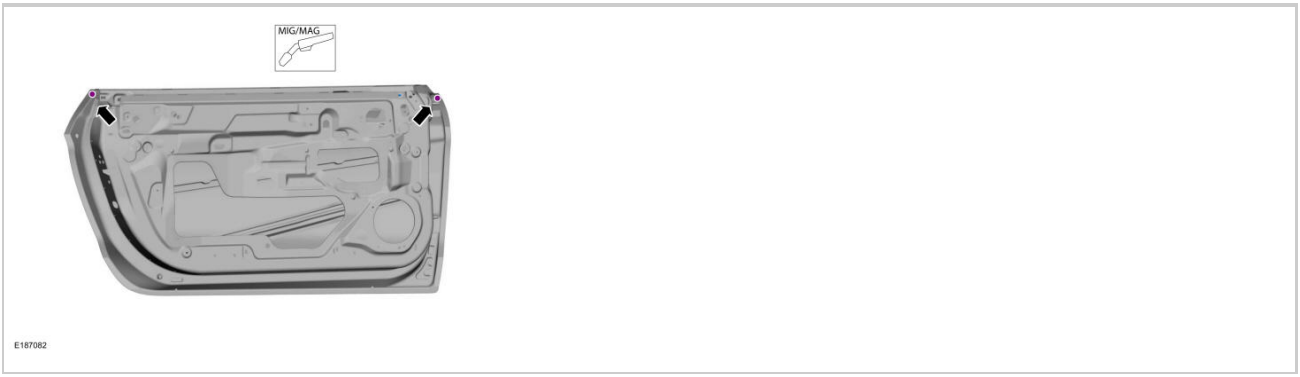
8.

Check for proper alignment and adjust as necessary.



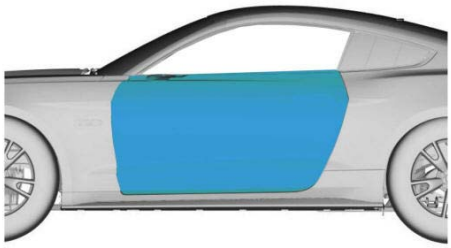
9.

Carefully open the door and tack weld to lock panel in place. Use the General Equipment: MIG/MAG Welding Equipment



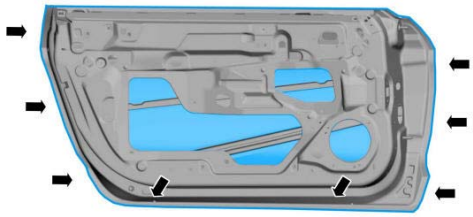
10.

Remove the door from the vehicle.



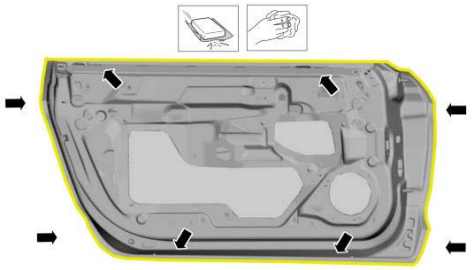
NOTE: Smooth any residual adhesive squeeze-out in to the seam to act as a sealer.

11.
Complete the flanging process.



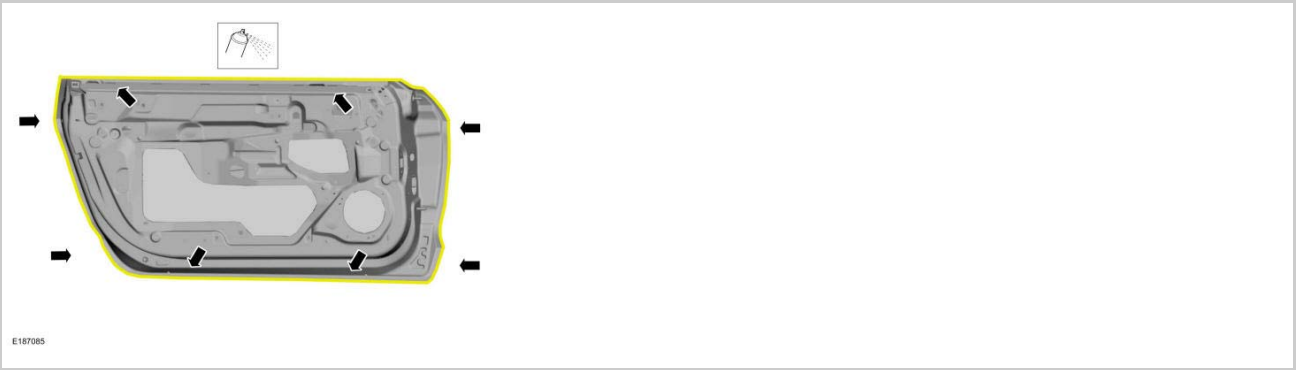
12.

Remove all foreign material.



13.

Apply a Ford approved primer to the flange area.

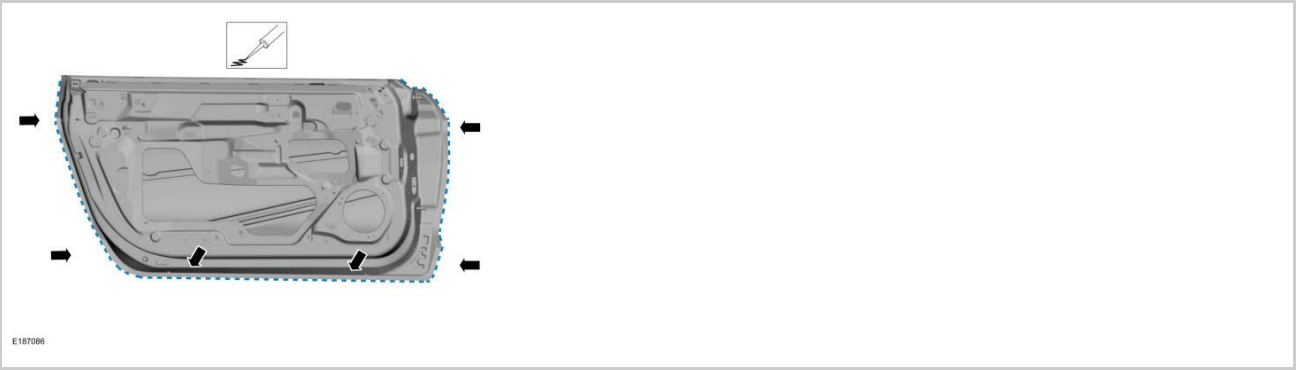


14.

Sealing work: All areas must be sealed to production level.

Material

: Seam Sealer / TA-2-B



15.

Refinish the door shell flange using a Ford approved paint system.

16.

Install the door. Refer to: FRONT DOOR .

17.

Sand and refinish the exterior repair area using a Ford approved paint system.

18.

Restore corrosion protection. Refer to: Corrosion Prevention .

19.

Install the following items:

Refer to: Front Door Window Glass .

Refer to: Exterior Mirror .

Refer to: Exterior Front Door Handle .

Refer to: Front Door Upper Moulding .

REMOVAL AND INSTALLATION > ROCKER PANEL

Special Tool(s) / General Equipment

Resistance Spotwelding Equipment
Air Body Saw
MIG/MAG Welding Equipment
Spot Weld Drill Bit

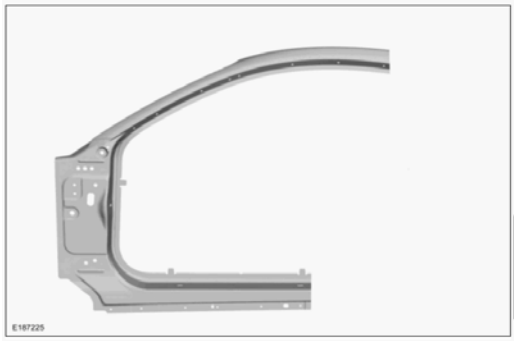
Materials

Name	Specification
Seam Sealer TA-2-B	-

REMOVAL AND INSTALLATION > ROCKER PANEL > REMOVAL

1.

Available service part-Coupe.



2.

Available service part-Convertible.



3.

Remove the following items:

Refer to: FRONT DOOR .

Refer to: ROCKER PANEL MOULDING .

Refer to: FRONT SEATBELT RETRACTOR AND PRETENSIONER .

4.

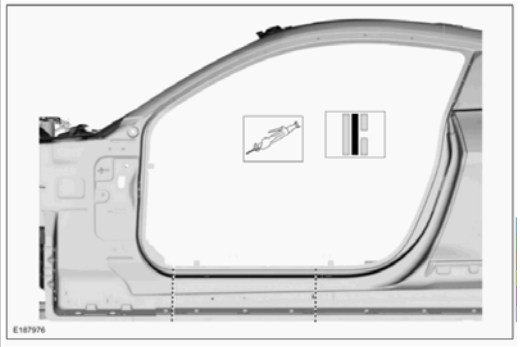
Position aside the carpet and wiring harness in the repair area.

NOTE: Coupe shown, convertible is similar.

5.

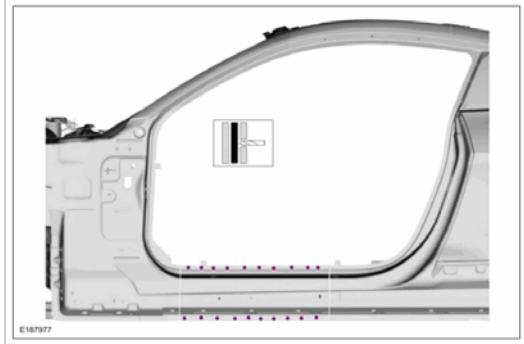
NOTE: ***Partial replacement*** *due to damage* ***for the outer panel only.***

Carefully cut the **outer** panel only. Use the General Equipment: Air Body Saw



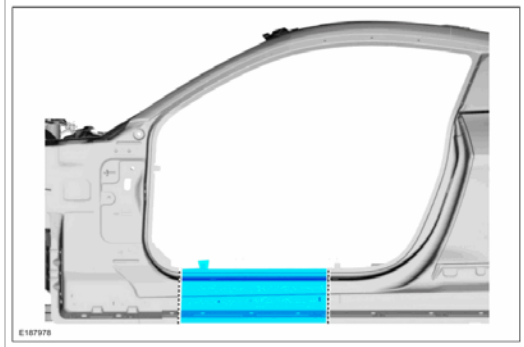
6.

Drill out the spot welds. Use the General Equipment: Spot Weld Drill Bit



7.

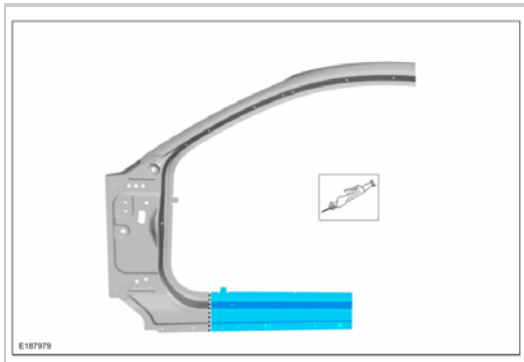
Remove the rocker panel section.



REMOVAL AND INSTALLATION > ROCKER PANEL > INSTALLATION

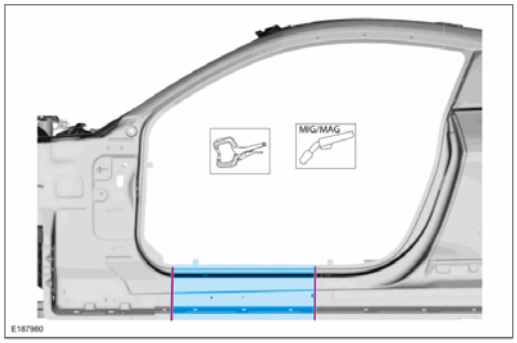
1.

Cut section from the replacement part. Use the General Equipment: Air Body Saw



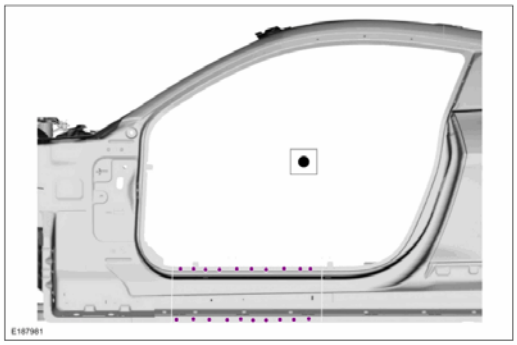
2.

Install and seam weld the rocker panel section. Use the General Equipment: MIG/MAG Welding Equipment



3.

Resistance spot weld the panel. Use the General Equipment: Resistance Spotwelding Equipment



4.

Finish the repair area using typical metal finishing techniques.

5.

Prime the repair area using a Ford approved paint system.

6.

Sealing work: All areas must be sealed to production level.

Material

: Seam Sealer / TA-2-B

7.

Refinish using a Ford approved paint system.

8.

Restore corrosion protection. Refer to: CORROSION PREVENTION .

9.

Position the wiring harness and carpet to original position.

10.

Install the following items:

Refer to: FRONT DOOR .

Refer to: ROCKER PANEL MOULDING .

Refer to: FRONT SEATBELT RETRACTOR AND PRETENSIONER .

REMOVAL AND INSTALLATION > ROCKER PANEL INNER REINFORCEMENT

Special Tool(s) / General Equipment

Resistance Spotwelding Equipment
Hot Air Gun
8 mm Drill Bit
MIG/MAG Welding Equipment
Spot Weld Drill Bit
Locking Pliers

Materials

Name	Specification
Metal Bonding Adhesive TA-1, 3M™ 08115, Fusor ® 108B	-
Seam Sealer TA-2-B	-

REMOVAL AND INSTALLATION > ROCKER PANEL INNER REINFORCEMENT > REMOVAL

1.

If required, dimensionally restore vehicle to pre-accident condition. Refer to: Body and Frame .

NOTE: The rocker panel inner reinforcement is made of martensitic steel and cannot be sectioned. It must be replaced at factory seams.

Coupe shown, convertible is similar.

NOTE: LH side shown, RH side similar.

2.

Available service part.



E188314

3.

Remove the following items:

Refer to: QUARTER PANEL - COUPE . Refer to: QUARTER PANEL - CONVERTIBLE .

Refer to: B-Pillar and Reinforcement - Coupe . Refer to: B-Pillar and Reinforcement - Convertible .

Refer to: A-Pillar Trim Panel - Coupe . Refer to: A-Pillar Trim Panel - Convertible .

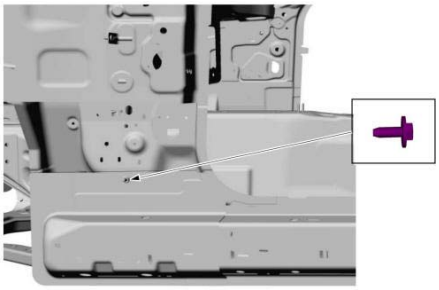
Refer to: A-Pillar Outer Panel Section and Reinforcement .

4.

Position the carpet and wiring harness away from the repair area.

5.

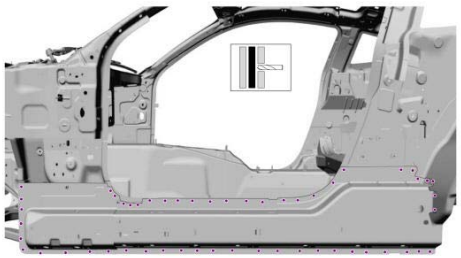
Remove the bolt from the inner rocker panel reinforcement.



E188309

6.

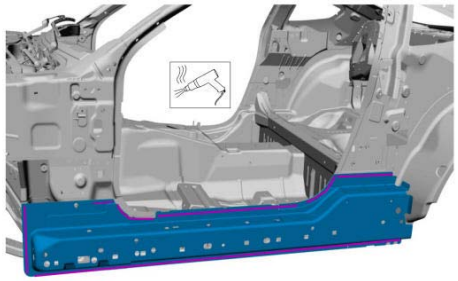
Remove the spot welds from the rocker panel. Use the General Equipment: Spot Weld Drill Bit



E188312

7.

Remove the rocker panel assembly. Use the General Equipment: Hot Air Gun



E188313

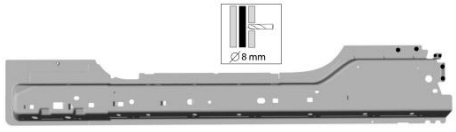
REMOVAL AND INSTALLATION > ROCKER PANEL INNER REINFORCEMENT > INSTALLATION

NOTE: The rocker panel inner reinforcement is made of martensitic steel and cannot be sectioned. It must be replaced at factory seams.

NOTE: LH side shown, RH side similar.

1.

Drill holes for plug welding in the replacement rocker panel. Use the General Equipment: 8 mm Drill Bit



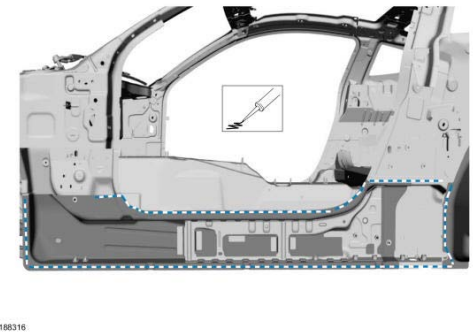
E188315

2.

Apply adhesive to the flange area of the inner reinforcement structure.

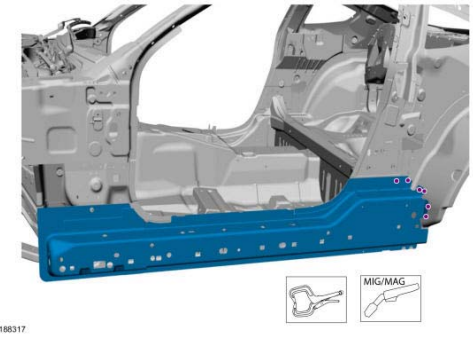
Material

: Metal Bonding Adhesive / TA-1, 3M™ 08115, Fusor ® 108B



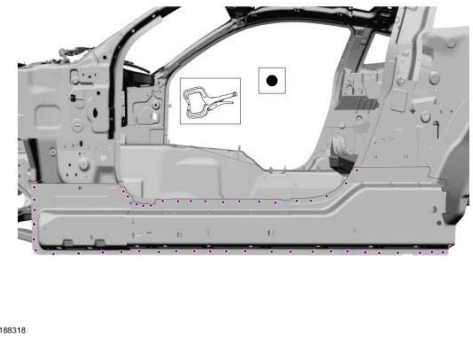
3.

Install the rocker panel assembly and MIG weld. Use the General Equipment: Locking Pliers Use the General Equipment: MIG/MAG Welding Equipment



4.

Resistance spot weld the rocker panel. Use the General Equipment: Locking Pliers Use the General Equipment: Resistance Spotwelding Equipment



5.

Install the bolt in the rocker panel reinforcement.

Torque

: 22 lb.ft (30 Nm)



6.

Metal finish the repair area using typical metal finishing techniques.

7.

Prime the repair area using a Ford approved paint system.

8.

Sealing work: All areas must be sealed to production level.

Material

: Seam Sealer / TA-2-B

9.

Restore corrosion protection. Refer to: Corrosion Prevention .

10.

Install the following items:

Refer to: QUARTER PANEL - COUPE . Refer to: QUARTER PANEL - CONVERTIBLE .

Refer to: B-Pillar and Reinforcement - Coupe . Refer to: B-Pillar and Reinforcement - Convertible .

Refer to: A-Pillar Trim Panel - Coupe . Refer to: A-Pillar Trim Panel - Convertible .

Refer to: A-Pillar Outer Panel Section and Reinforcement .

DESCRIPTION AND OPERATION > FRAME ASSEMBLY - OVERVIEW > OVERVIEW

Underbody misalignment can affect front and rear wheel alignment, the operation of the suspension parts and drivetrain operation. Window glass cracks, door and window opening concerns, and air or water leaks at the doors are often caused by improperly tightened bolts and body misalignment.

Every structural member and outer panel is designed to offer the maximum protection in the event of a collision.

The front subframe is bolted to the body and is used to:

- aid in structural support
- provide mounting surfaces for the front suspension control arms
- provide a mounting point for the engine isolators
- provide a mounting surface for the steering gear

The front crossmember is bolted to the body and is used to:

- aid in structural support
- provide a mounting surface for the front stabilizer bar
- support the radiator, cooling fan and evaporator

The crossmember brace is bolted to the front subframe and front crossmember. It is used to aid in structural support.

The rear subframe is bolted to the body and is used to:

- aid in structural support
- provide mounting surfaces for the rear suspension lower arms and upper arms

The transmission crossmember is bolted to the body and is used to:

- aid in structural support
- provide a mounting surface for the transmission support insulator
- support the transmission

For body dimension specifications, Refer to: Body and Frame .

REMOVAL AND INSTALLATION > FRONT SUBFRAME - 2.3L ECOBOOST (201KW 273PS)

Special Tool(s) / General Equipment

	204-592 Separator, Lower Arm Ball Joint TKIT-2006C-FFMFLM TKIT-2006C-LM TKIT-2006C-ROW
	300-OTC1585AE Powertrain Lift
	303-050 (T70P-6000) Lifting Bracket, Engine
	303-F072 Support Bar, Engine
Tie Rod End Remover	

REMOVAL AND INSTALLATION > FRONT SUBFRAME - 2.3L ECOBOOST (201KW 273PS) > REMOVAL

NOTE: Suspension fasteners are critical parts that affect the performance of vital components and systems. Failure of these fasteners may result in major service expense. Use the same or equivalent parts if replacement is necessary. Do not use a replacement part of lesser quality or substitute design. Tighten fasteners as specified.

NOTE: Disconnect the battery ground cable anytime the steering gear is being serviced or damage to the steering gear internal power relay may occur resulting in steering gear replacement.

1.
Disconnect the battery ground cable. Refer to: Battery Disconnect and Connect .

NOTE: Make sure to minimize damage to sealer foam and avoid pulling apart dash seal brackets from retainer pins. Excessive damage may allow engine noise, fumes, air or water to enter the passenger compartment.

2.

1.

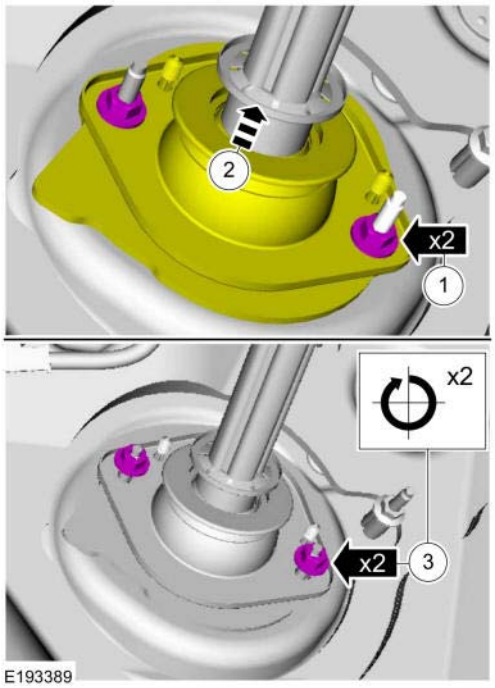
Remove the steering column dash seal nuts.

2.

Loosen the dash seal.

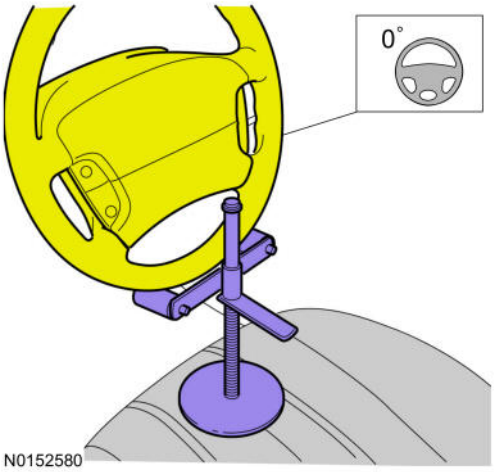
3.

Hand start the dash seal nuts.



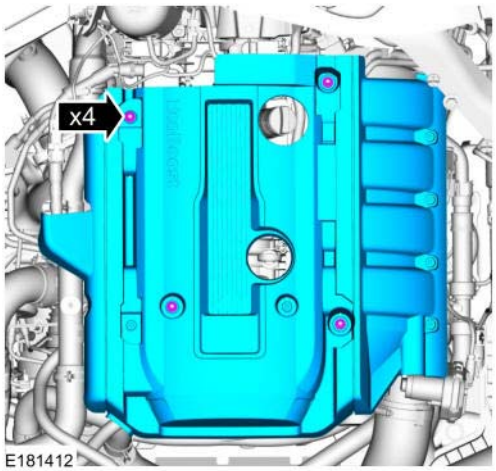
3.

Using a holding device, hold the steering wheel in the straight-ahead position.



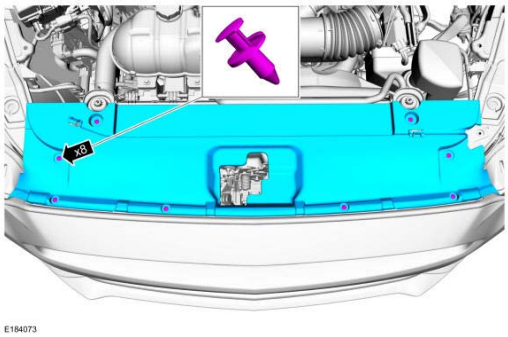
4.

Remove the 4 nuts and the engine appearance cover.



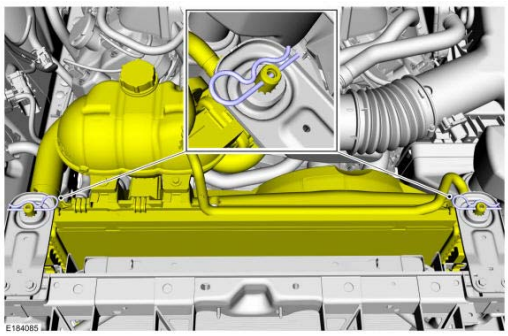
5.

Remove the 8 push pins and the upper radiator shield.



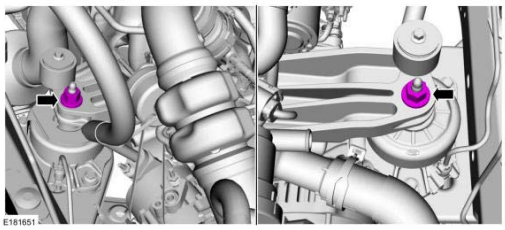
6.

Install clips to support the cooling module.



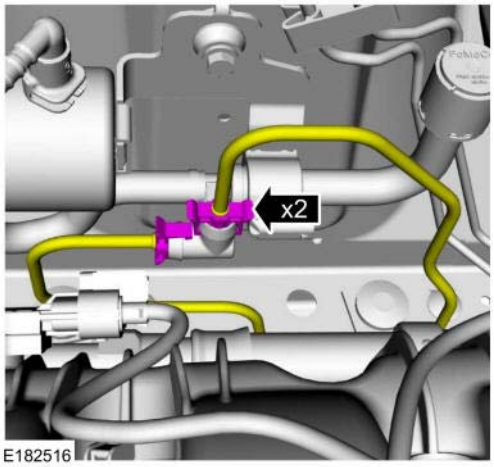
7.

Remove the LH and RH engine mount nuts.



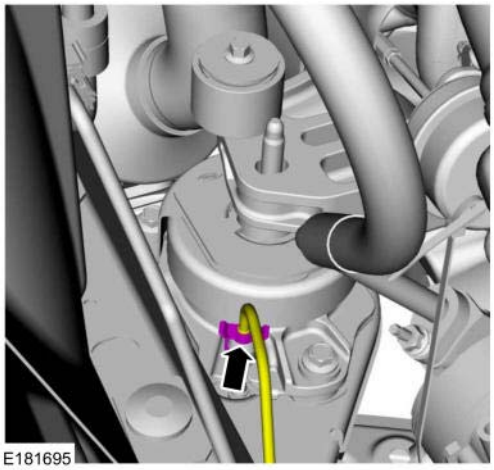
8.

Disconnect the 2 vacuum tubes from the engine mount control vacuum reservoir.



9.

Disconnect the vacuum tube from the RH engine mount.

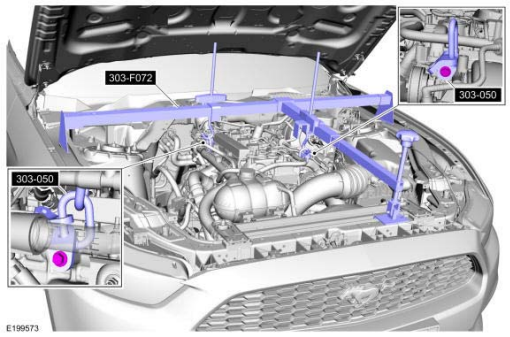


NOTE: The engine does not need to be lifted, only supported in normal position.

NOTE: Do not position the legs of the Engine Support Bar on the fenders. Instead,

position the legs on the body structure near the suspension strut tower. Failure to follow these instructions may result in body damage.

10.
Using the special tools, support the engine. Use Special Service Tool: 303-050 (T70P-6000)Lifting Bracket, Engine., 303-F072 Support Bar, Engine.

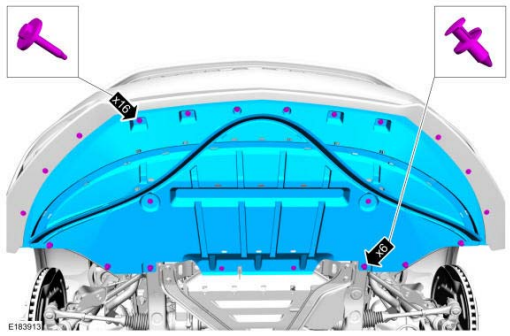


11.

Remove the wheels and tires. Refer to: Wheel and Tire .

12.

Remove the 6 push pins and the 16 screws and remove the under body shield.



NOTE: If equipped.

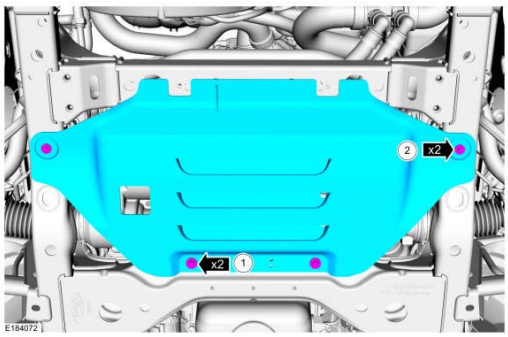
13.

1.

Remove the 2 rearward underbody shield bolts.

2.

Remove the 2 remaining underbody shield bolts and remove the underbody shield.



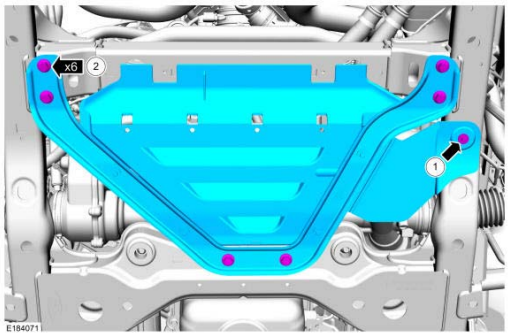
14.

NOTE: If equipped.

1.
Remove the underbody shield bolt.

NOTE: It is not necessary to separate the underbody shield from the V-brace.

2.
Remove the 6 V-brace bolts and remove the V-brace and underbody shield.



NOTE: DO NOT attempt to remove or install the steering column lower coupler at the steering gear without first loosening the steering column dash seal and fasteners. Failure to follow this instruction may cause damage to steering components that could lead to loss of steering control during vehicle operation and could result in serious personal injury or death.

NOTE: DO NOT hammer, pry or force steering column and column shafts during installation or removal. Failure to follow this instruction may cause damage to steering components that could lead to loss of steering control during vehicle operation and could result in serious personal injury or death.

WARNING: Do not reuse steering column shaft bolts. This may result in fastener failure and steering column shaft detachment or loss of steering control. Failure to follow this instruction may result in serious injury to vehicle occupant(s).

15.

Detach the steering column lower shaft from the lower coupler.

1.

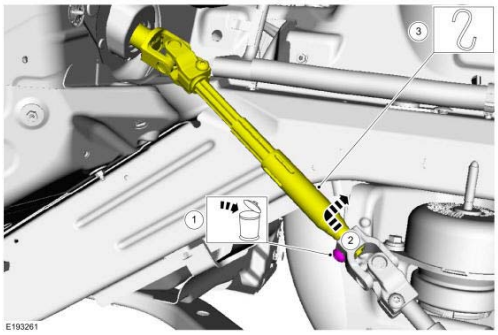
Remove and discard the steering column shaft bolt.

2.

Pull apart the steering column shaft from the coupler.

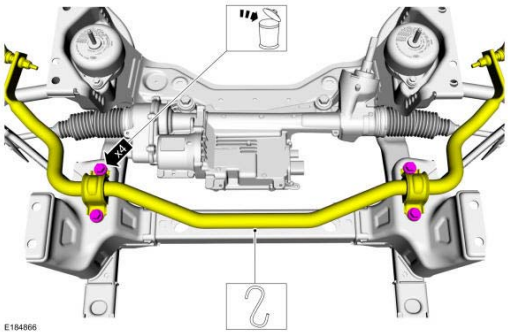
3.

Secure the lower shaft to the frame rail to avoid damaging it during subframe removal.



16.

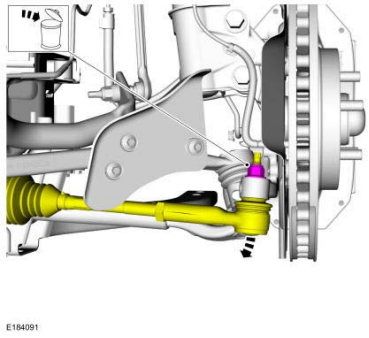
Remove and discard the 4 stabilizer bar bracket bolts and support the stabilizer bar.



NOTE: Use care when installing the tie rod separator or damage to the outer tie-rod end boot may occur.

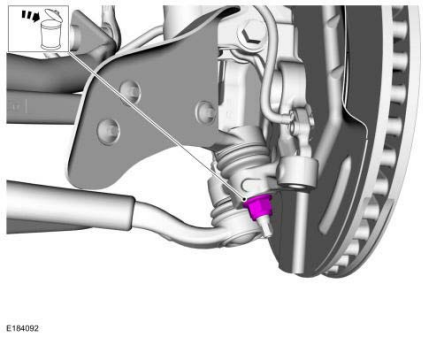
NOTE: Do not use a hammer to separate the outer tie-rod end from the wheel knuckle or damage to the wheel knuckle may result.

17.
On both sides. Remove and discard the tie rod end nut and separate the tie rod end from the wheel knuckle. Use the General Equipment: Tie Rod End Remover



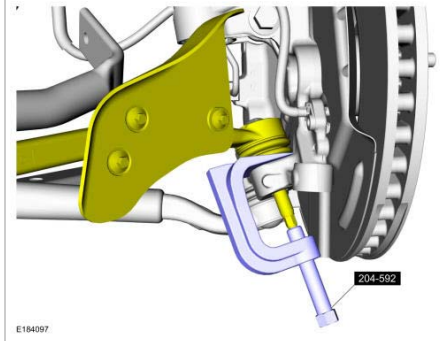
18.

On both sides. Remove and discard the front lower arm ball joint nut.



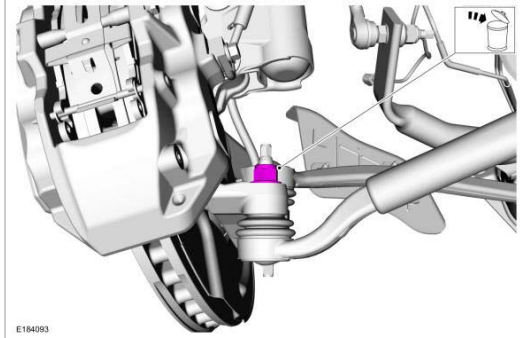
NOTE: Once pressure is applied to the ball joint with the Ball Joint Separator and Adapter, it may be necessary to tap the wheel knuckle at the ball joint area to separate the ball joint from the wheel knuckle.

19.
On both sides. Using the special tool, separate the front lower arm ball joint from the wheel knuckle. Use Special Service Tool: 204-592 Separator, Lower Arm Ball Joint.



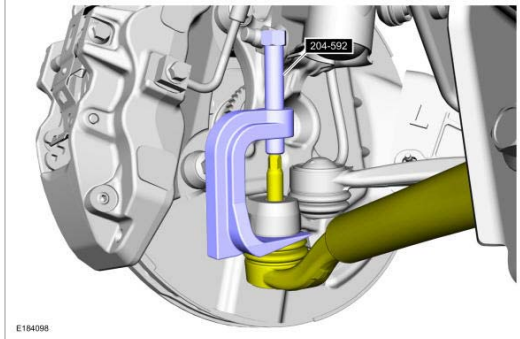
20.

On both sides. Remove and discard the rear lower arm ball joint nut.



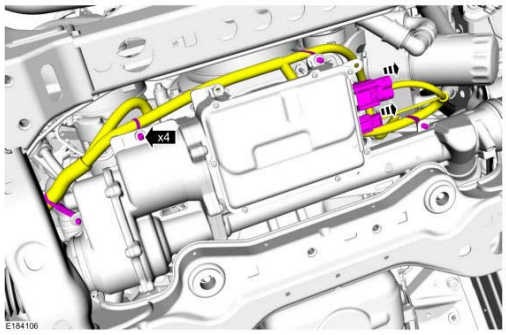
NOTE: Once pressure is applied to the ball joint with the Ball Joint Separator and Adapter, it may be necessary to tap the wheel knuckle at the ball joint area to separate the ball joint from the wheel knuckle.

21.
On both sides. Using the special tool, separate the rear lower arm ball joint from the wheel knuckle. Use Special Service Tool: 204-592 Separator, Lower Arm Ball Joint.



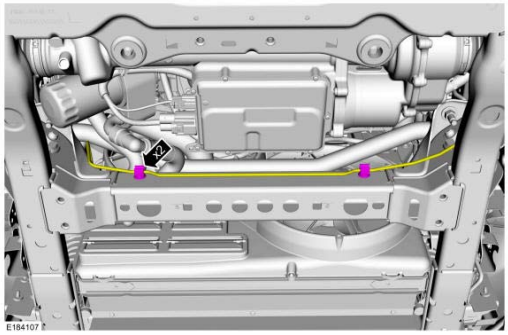
22.

Disconnect the 2 EPAS gear electrical connectors and unclip the 4 wiring fasteners and position the wiring harness aside.



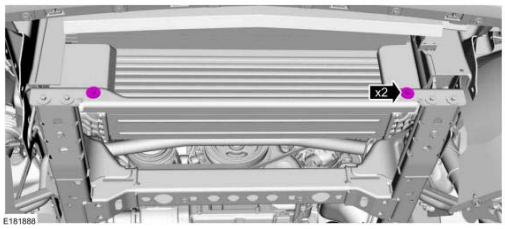
23.

Unclip the crossover brake line from the 2 frame clips.



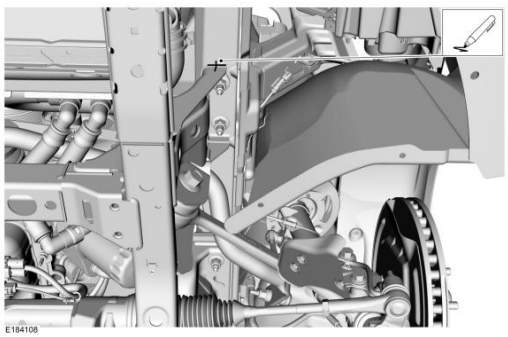
24.

Remove the 2 bolts from the support bar on the front of the subframe.



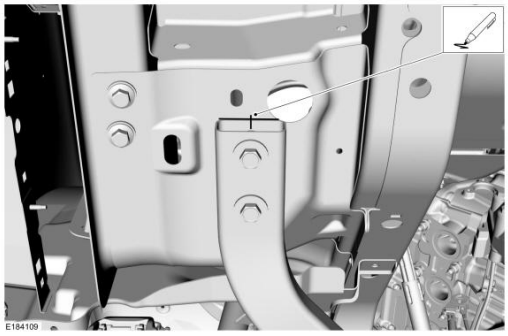
25.

Mark the position of the front subframe for reference during installation.



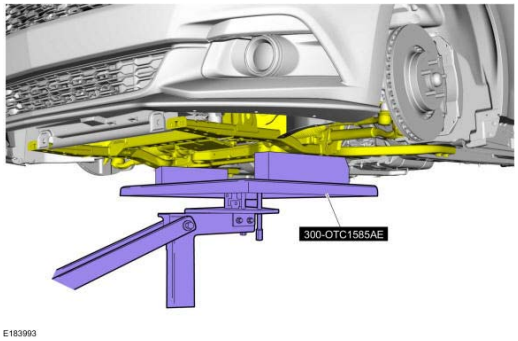
26.

Mark the position of the front subframe for reference during installation.



27.

Position the special tool under the front subframe assembly. Use Special Service Tool: 300-OTC1585AEPowertrain Lift.



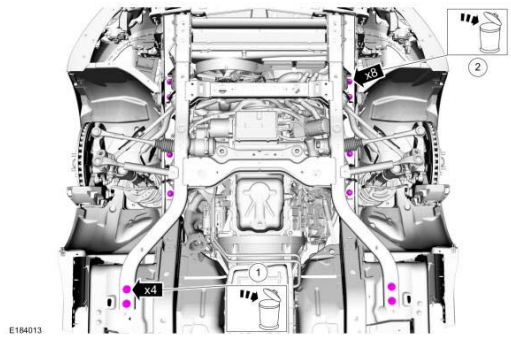
28.

1.

Remove and discard the 4 rearward front subframe bolts.

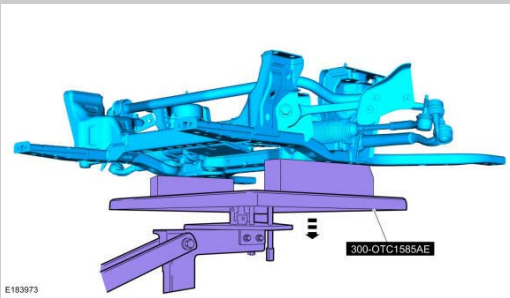
2.

Remove and discard the 8 forward front subframe nuts.



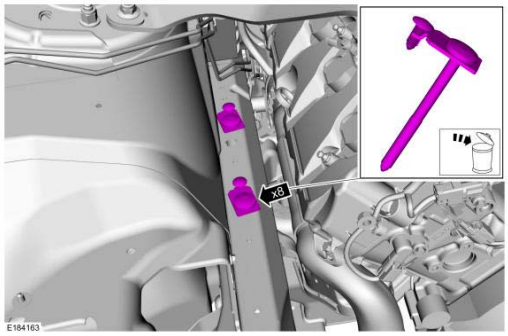
29.

Using the special tool, lower the front subframe assembly from the vehicle. Use Special Service Tool: 300-OTC1585AE Powertrain Lift.



30.

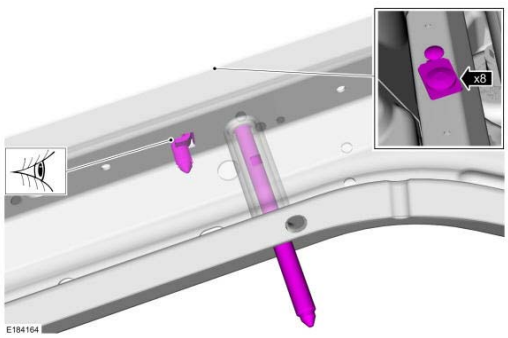
Remove and discard the 8 forward front subframe bolts.



REMOVAL AND INSTALLATION > FRONT SUBFRAME - 2.3L ECOBOOST (201KW 273PS) > INSTALLATION

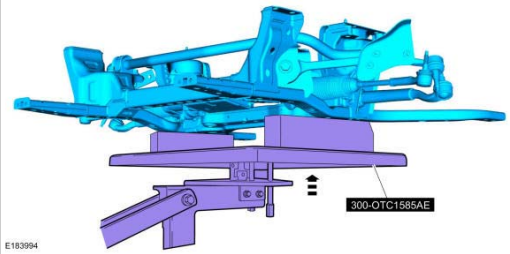
NOTE: Make sure that the tab is engaged to the body rail.

1.
Install 8 new forward front subframe bolts.



2.

Using the special tool, position the front subframe assembly in the vehicle. Use Special Service Tool: 300-OTC1585AE Powertrain Lift.



NOTE: Align the reference marks made during removal before tightening the subframe nuts and bolts.

3.

1.

Install the 8 new forward front subframe nuts.

Torque

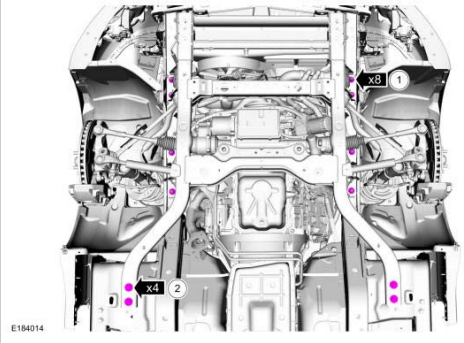
: 85 lb.ft (115 Nm)

2.

Install the 4 new rearward front subframe bolts.

Torque

: 85 lb.ft (115 Nm)

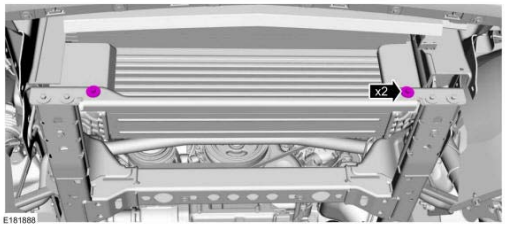


4.

Install the 2 bolts from the support bar on the front of the subframe.

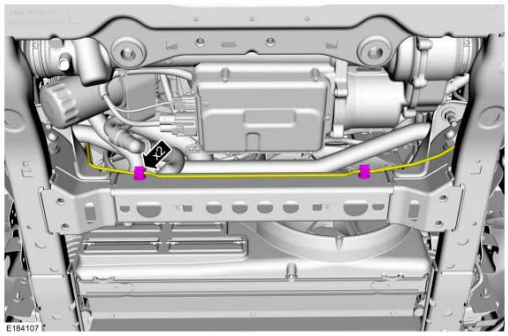
Torque

: 89 lb.in (10 Nm)



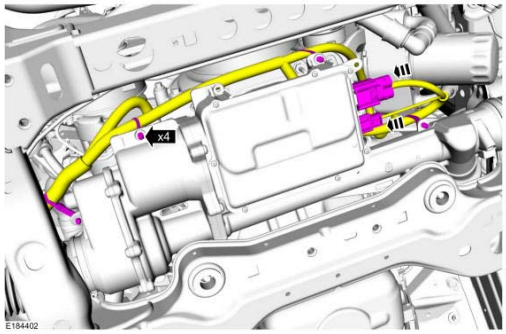
5.

Clip the crossover brake line into the 2 frame clips.



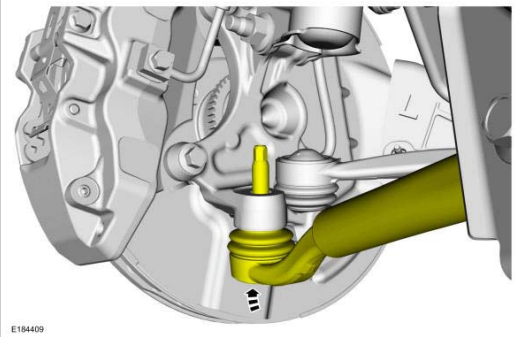
6.

Position the EPAS gear wiring harness, clip the 4 wiring fasteners and connect the 2 electrical connectors.



7.

On both sides. Connect the rear lower arm ball joint to the wheel knuckle.

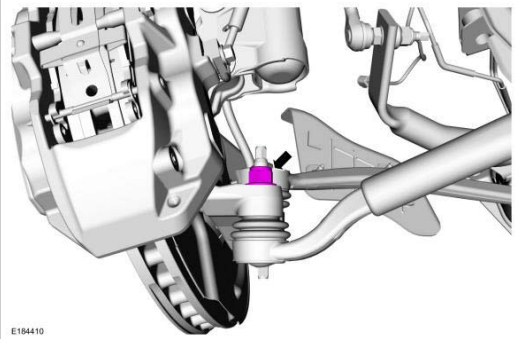


8.

On both sides. Install the new rear lower arm ball joint nut.

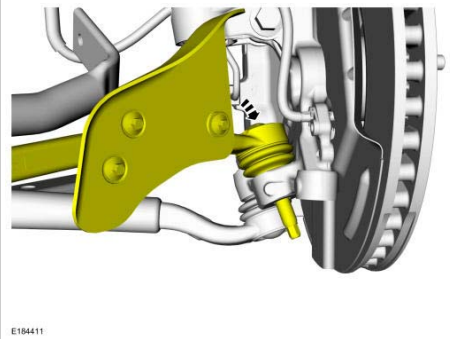
Torque

: 85 lb.ft (115 Nm)



9.

On both sides. Connect the forward lower arm ball joint to the wheel knuckle.

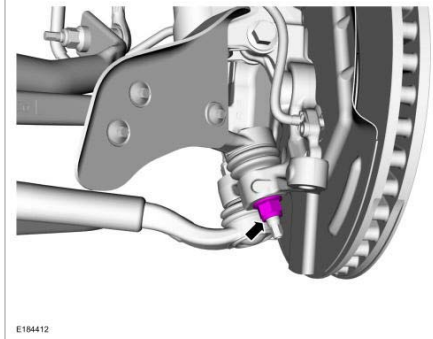


10.

On both sides. Install the new forward lower arm ball joint nut.

Torque

: 85 lb.ft (115 Nm)



11.

1.

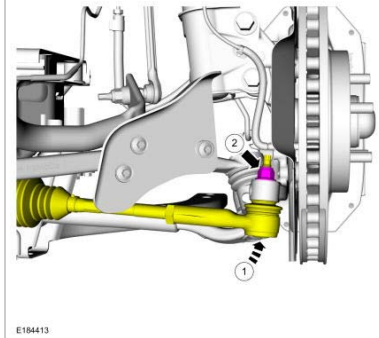
On both sides. Connect the tie rod end to the wheel knuckle.

2.

On both sides. Install the new tie rod end nut.

Torque

: 59 lb.ft (80 Nm)

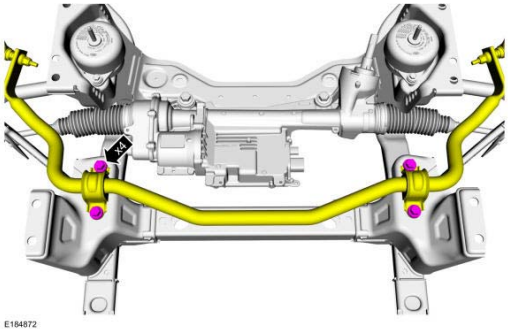


12.

Position the stabilizer bar and install the 4 new stabilizer bar bracket bolts.

Torque

: 76 lb.ft (103 Nm)



NOTE: DO NOT attempt to remove or install the steering column lower coupler at the steering gear without first loosening the steering column dash seal and fasteners. Failure to follow this instruction may cause damage to steering components that could lead to loss of steering control during vehicle operation and could result in serious personal injury or death.

NOTE: DO NOT hammer, pry or force steering column and column shafts during installation or removal. Failure to follow this instruction may cause damage to steering components that could lead to loss of steering control during vehicle operation and could result in serious personal injury or death.

13.

1.

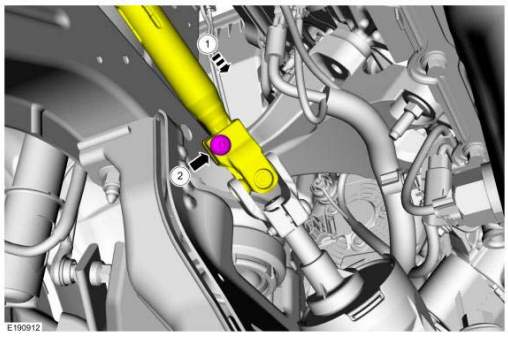
Connect the steering column shaft to the steering gear universal joint.

2.

Install the new steering column shaft bolt.

Torque

: 22 lb.ft (30 Nm)



14.

Inspect the steering column lower shaft. Refer to: Steering Column Collapsed Check .

15.

> *NOTE: If equipped.*

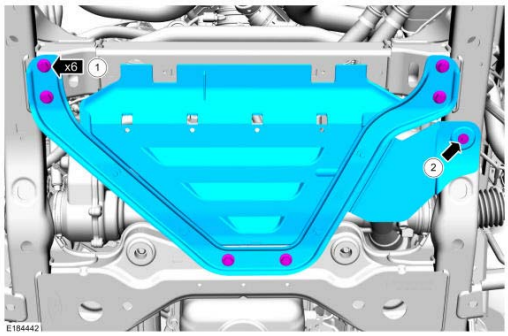
1.
Position the V-brace and underbody shield and install the 6 V-brace bolts.

Torque

: 46 lb.ft (63 Nm)

2.

Install the underbody shield bolt.



> *NOTE: If equipped.*

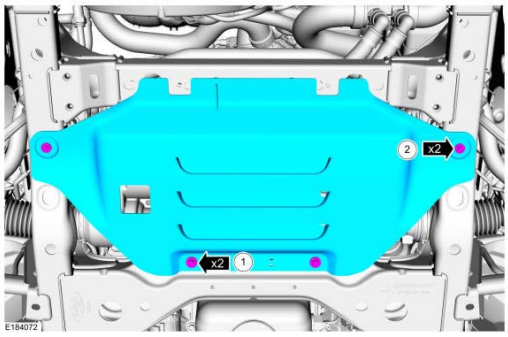
16.

1.

Position the underbody shield and install the 2 rearward underbody shield bolts.

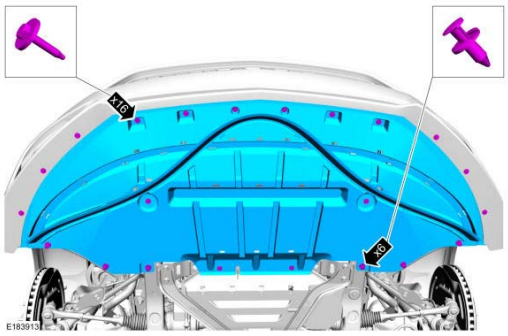
2.

Install the 2 remaining underbody shield bolts.



17.

Position the under body shield and install the 16 screws and the 6 push pins.

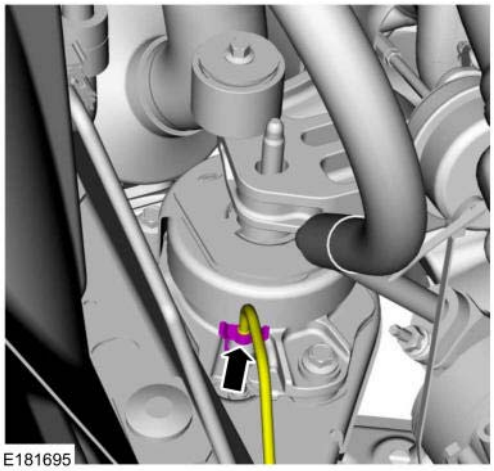


18.

Install the wheels and tires. Refer to: Wheel and Tire .

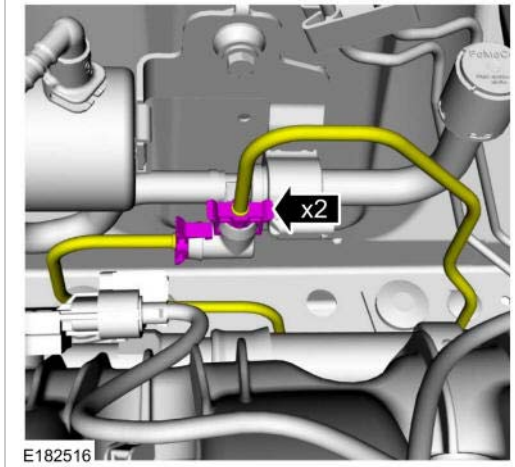
19.

Connect the vacuum tube to the RH engine mount.



20.

Connect the 2 vacuum tubes to the engine mount control vacuum reservoir.

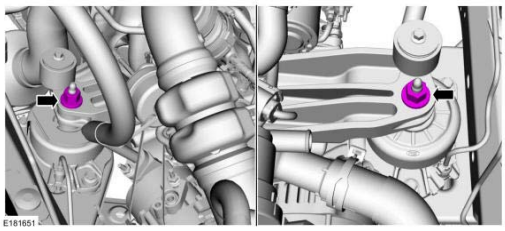


21.

Install the LH and RH engine mount nuts.

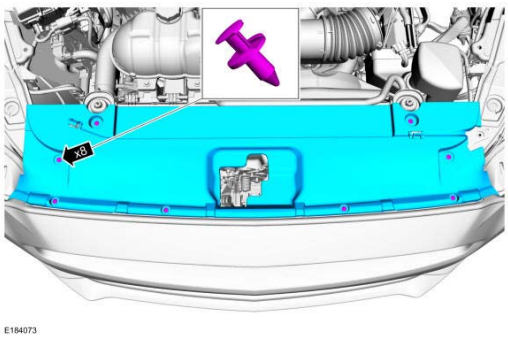
Torque

: 92 lb.ft (125 Nm)



22.

Position the upper radiator shield and install the 8 push pins.

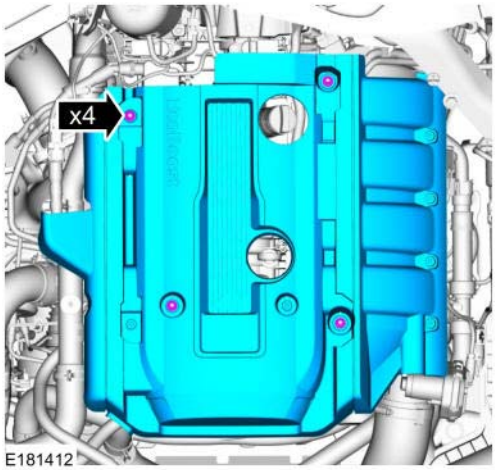


23.

Install the engine appearance cover and the 4 nuts.

Torque

: 80 lb.in (9 Nm)



24.

1.

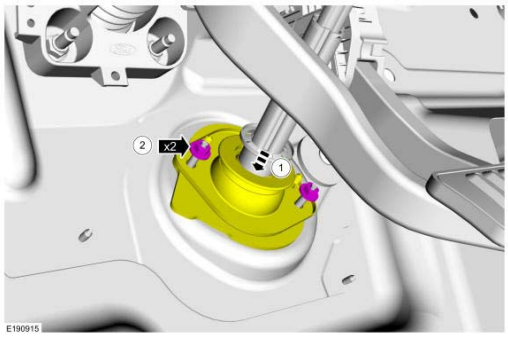
Position the steering column dash seal.

2.

Tighten the steering column dash seal nuts.

Torque

: 80 lb.in (9 Nm)



25.

Connect the battery ground cable. Refer to: Battery Disconnect and Connect .

26.

Check and if necessary, adjust front toe. Refer to: Front Toe Adjustment .

REMOVAL AND INSTALLATION > REAR SUBFRAME

Special Tool(s) / General Equipment

 ST1293-A	300-OTC1585AE Powertrain Lift

REMOVAL AND INSTALLATION > REAR SUBFRAME > REMOVAL

NOTE: Suspension fasteners are critical parts that affect the performance of vital components and systems. Failure of these fasteners may result in major service expense. Use the same or equivalent parts if replacement is necessary. Do not use a replacement part of lesser quality or substitute design. Tighten fasteners as specified.

1.

Remove both rear halfshafts. Refer to: Rear Halfshaft .

2.

Remove both toe links. Refer to: Toe Link .

3.

Remove both rear springs. Refer to: Spring .

4.

Remove the rear stabilizer bar. Refer to: Rear Stabilizer Bar .

NOTE: If equipped with dynamic suspension.

5.
Remove both rear ride height sensors. Refer to: Rear Suspension Height Sensor .

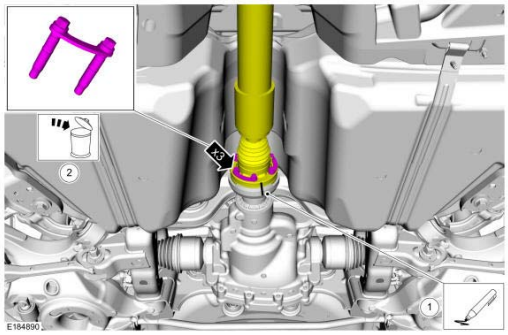
6.

1.

Index mark the driveshaft and the pinion flange for reference during installation.

2.

Remove and discard the driveshaft-to-pinion flange bolts.



NOTE: Do not remove driveshaft from the pinion flange by pulling on the driveshaft tube. Damage to the CV-joint can result.

7.

1.

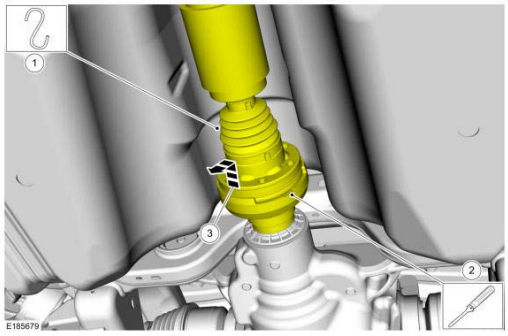
Support the driveshaft.

2.

Using a screwdriver inserted into the slot on the pinion flange, pry the driveshaft from the pinion flange.

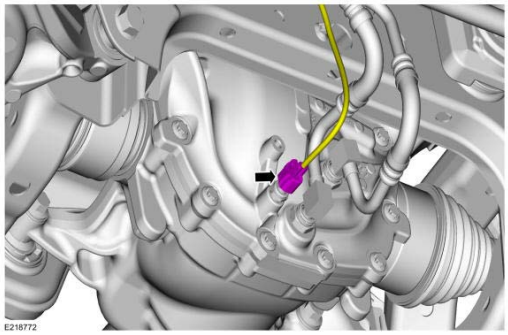
3.

Separate the driveshaft from the pinion flange.



8.

If equipped. Disconnect the differential fluid temperature sensor electrical connector.



9.

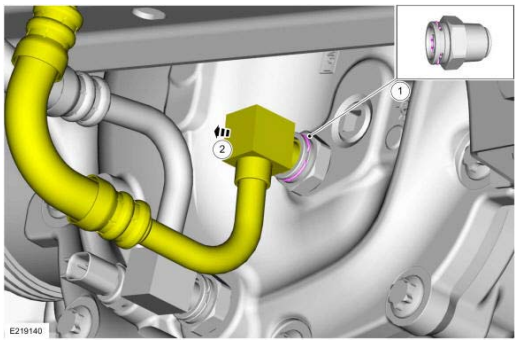
If equipped.

1.

Remove the differential cooling return line retaining clip.

2.

Remove the differential cooling return line and position aside.



10.

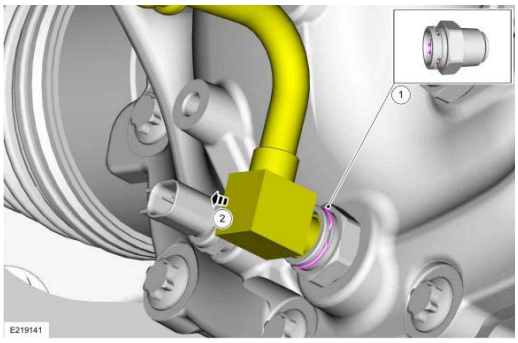
If equipped.

1.

Remove the differential cooling supply line retaining clip.

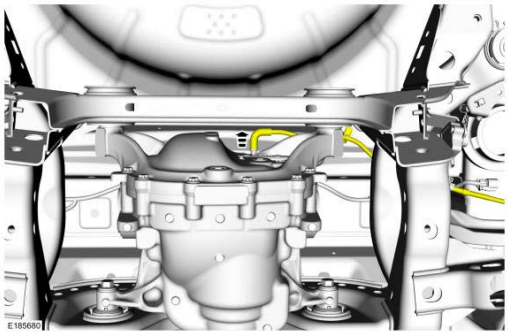
2.

Remove the differential cooling supply line and position aside.



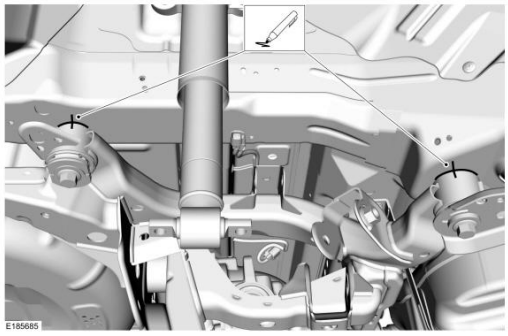
11.

Disconnect the differential vent tube.



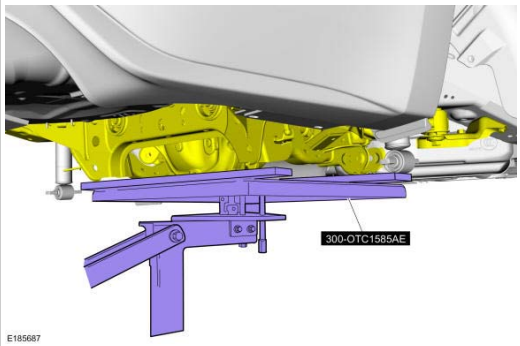
12.

On both sides. Index mark the rear subframe for reference during installation.



13.

Position the powertrain lift under the rear subframe. Use Special Service Tool: 300-OTC1585AE Powertrain Lift.



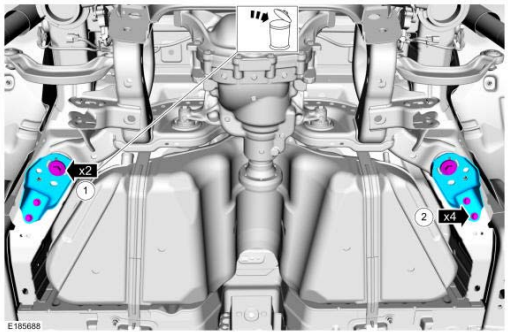
14.

1.

Remove and discard the 2 rear subframe forward bolts.

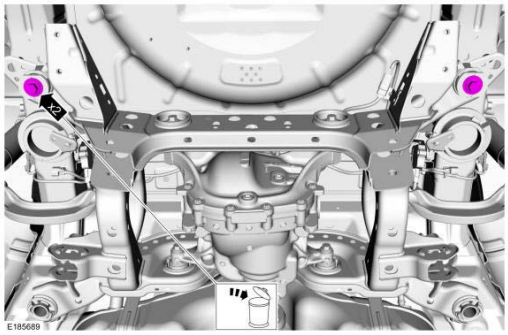
2.

Remove the 4 rear subframe bracket bolts and remove the brackets.



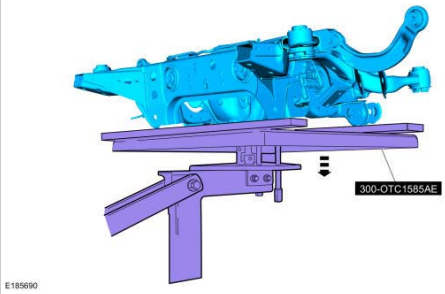
15.

Remove and discard the 2 rear subframe rearward bolts.



16.

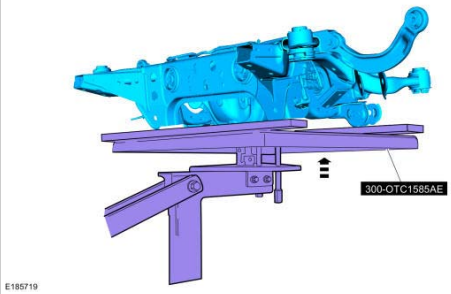
Using the powertrain lift, lower the rear subframe from the vehicle. Use Special Service Tool: 300-OTC1585AE Powertrain Lift.



REMOVAL AND INSTALLATION > REAR SUBFRAME > INSTALLATION

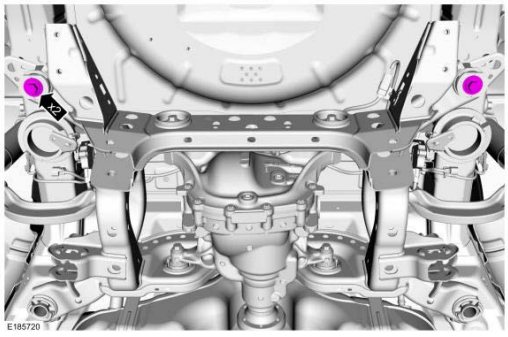
1.

Using the powertrain lift, raise the rear subframe to the vehicle. Use Special Service Tool: 300-OTC1585AE Powertrain Lift.



NOTE: Only tighten the bolts finger tight at this stage.

2.
Install the 2 new rear subframe rearward bolts.



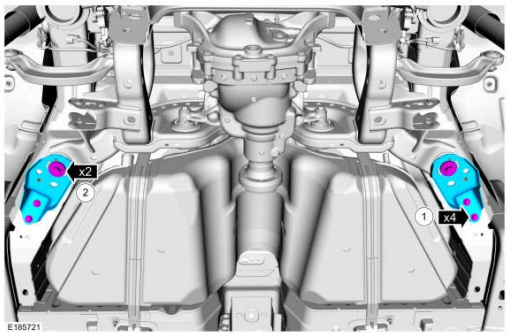
3.

NOTE: Only tighten the bolts finger tight at this stage.

1.
Position the brackets and install the 4 rear subframe bracket bolts.

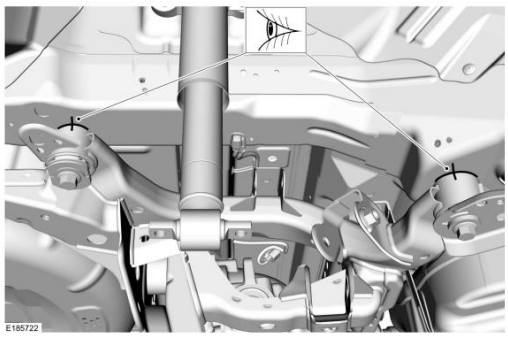
2.

Install the 2 new rear subframe forward bolts.



4.

On both sides. Align the index marks made during removal.



5.

1.

Tighten the 4 rear subframe bracket bolts.

Torque

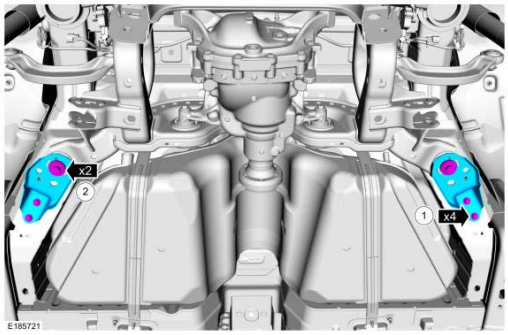
: 41 lb.ft (55 Nm)

2.

Tighten the 2 new rear subframe forward bolts.

Torque

: 129 lb.ft (175 Nm)

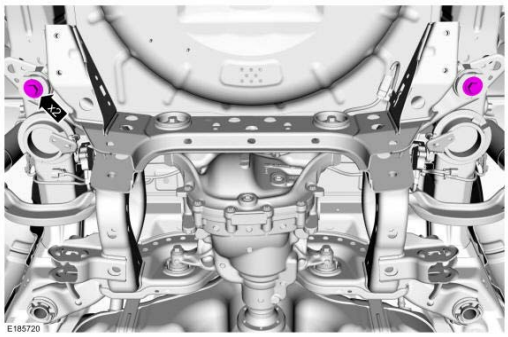


6.

Tighten the 2 new rear subframe rearward bolts.

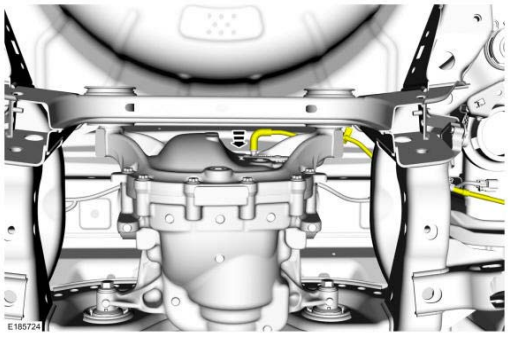
Torque

: 129 lb.ft (175 Nm)



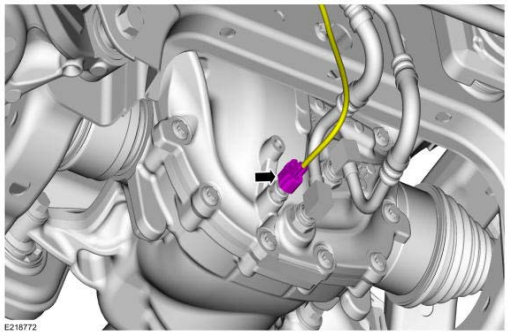
7.

Connect the differential vent tube.



8.

If equipped.Connect the differential fluid temperature sensor electrical connector.



9.

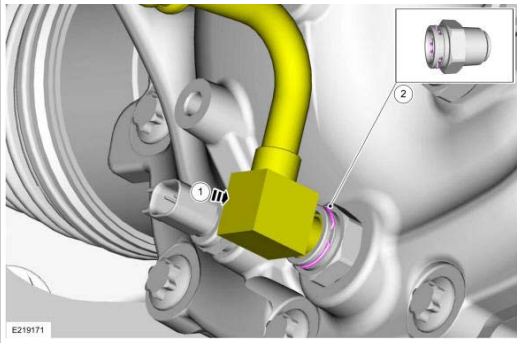
If equipped.

1.

Install the differential cooling supply line.

2.

Install the differential cooling supply line retaining clip.



10.

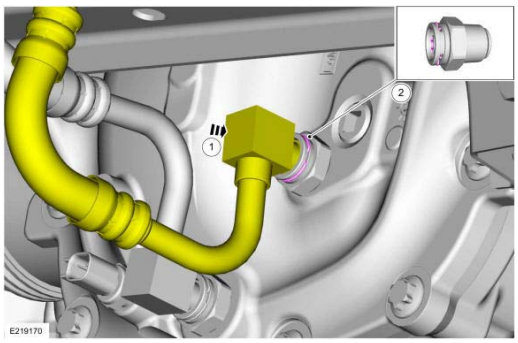
If equipped.

1.

Install the differential cooling return line.

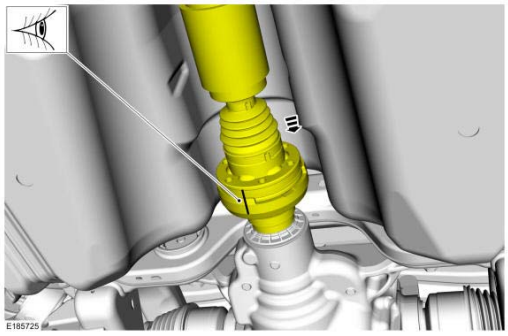
2.

Install the differential cooling return line retaining clip.



11.

Position the driveshaft to the pinion flange and align the index mark made during removal.

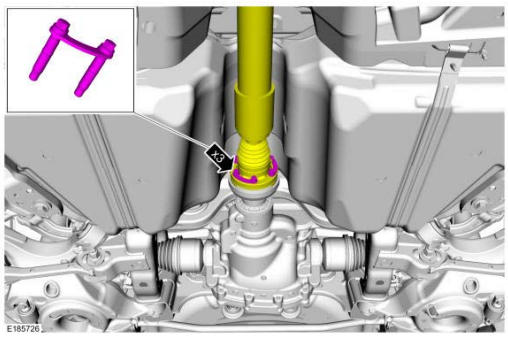


12.

Install the driveshaft-to-pinion flange bolts.

Torque

: 41 lb.ft (55 Nm)



NOTE: If equipped with dynamic suspension.

13.
Install both rear ride height sensors. Refer to: Rear Suspension Height Sensor .

14.

Install the rear stabilizer bar. Refer to: Rear Stabilizer Bar .

15.

Install both rear springs. Refer to: Spring .

16.

Install both toe links. Refer to: Toe Link .

17.

Install both rear halfshafts. Refer to: Rear Halfshaft .

18.

Check the differential fluid level. Refer to: Differential Fluid Level Check .

REMOVAL AND INSTALLATION > TRANSMISSION SUPPORT CROSSMEMBER

Special Tool(s) / General Equipment

Vehicle/Axle Stands
Wooden Block

REMOVAL AND INSTALLATION > TRANSMISSION SUPPORT CROSSMEMBER > REMOVAL

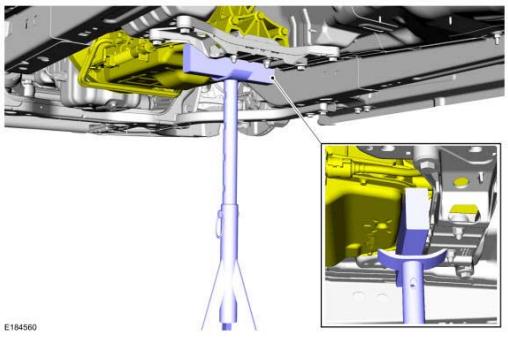
NOTE: The transmission crossmember must be installed in the same orientation as it was removed. An incorrectly installed crossmember will change the driveline angle and cause a shudder when accelerating from a stop or above average engine presence.

1.

With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

NOTE: Automatic transmission shown, manual transmission similar.

2.
Using a jackstand and a wooden block, support the transmission. Use the General Equipment: Vehicle/Axle Stands Use the General Equipment: Wooden Block



NOTE: Note the position of the components before removal.

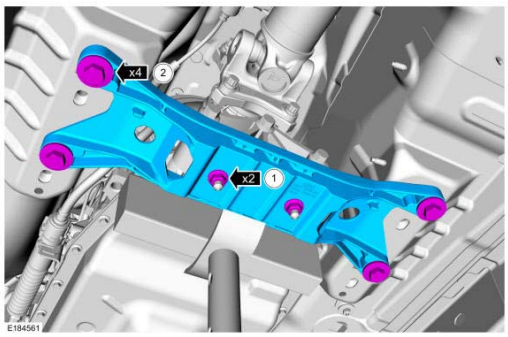
3.

1.

Remove the 2 transmission support insulator-to-transmission support crossmember nuts.

2.

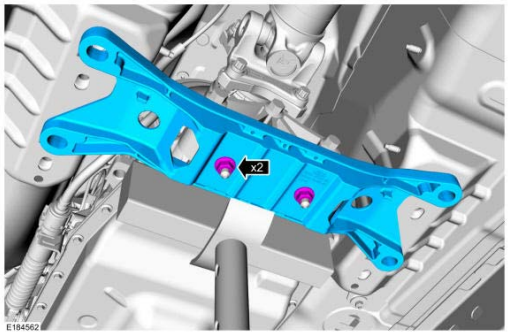
Remove the 4 transmission support crossmember bolts and the transmission support crossmember.



REMOVAL AND INSTALLATION > TRANSMISSION SUPPORT CROSSMEMBER > INSTALLATION

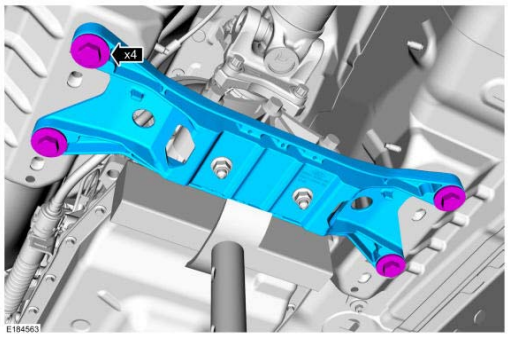
1.

With the same orientation as removed, position the transmission support crossmember and loosely install the 2 transmission support insulator-to-transmission support crossmember nuts.



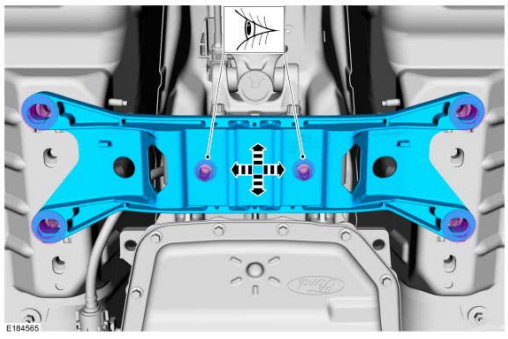
2.

Loosely install the 4 transmission support crossmember bolts.



NOTE: The transmission crossmember must be neutralized.

3.
Slide the transmission support crossmember forward, rearward and side-to-side until the gaps between the transmission support insulator studs and the transmission support crossmember are equal.

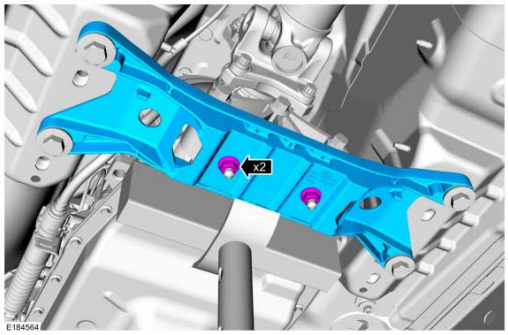


4.

With the transmission support crossmember neutralized, tighten the 2 transmission support insulator-to-transmission support crossmember nuts.

Torque

: 59 lb.ft (80 Nm)

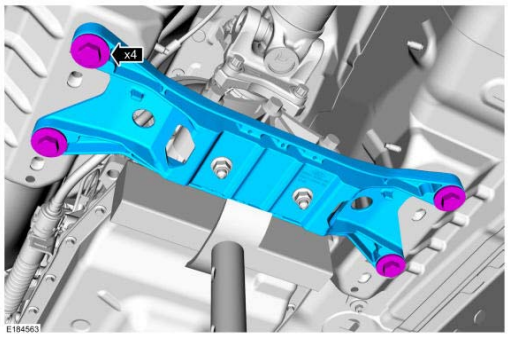


5.

With the transmission support crossmember neutralized, tighten the 4 transmission support crossmember bolts.

Torque

: 46 lb.ft (63 Nm)



REMOVAL AND INSTALLATION > FRONT SUBFRAME - 3.7L DURATEC (227KW 301PS) 5.0L 32V TI-VCT 5.2L 32V TI-VCT

Special Tool(s) / General Equipment

	204-592 Separator, Lower Arm Ball Joint TKIT-2006C-FFMFLM TKIT-2006C-LM TKIT-2006C-ROW
	300-OTC1585AE Powertrain Lift

	303-050 (T70P-6000) Lifting Bracket, Engine
	303-1245 Engine Lift Eye TKIT-2006UF-FLM TKIT-2006UF-ROW
	303-1529 Lift Eye, Engine TKIT-2010A-F TKIT-2010A-LM TKIT-2010A-ROW
	303-F072 Support Bar, Engine
Tie Rod End Remover	

REMOVAL AND INSTALLATION > FRONT SUBFRAME - 3.7L DURATEC (227KW 301PS) 5.0L 32V TI-VCT 5.2L 32V TI-VCT > REMOVAL

All vehicles

NOTE: Suspension fasteners are critical parts that affect the performance of vital components and systems. Failure of these fasteners may result in major service expense. Use the same or equivalent parts if replacement is necessary. Do not use a replacement part of lesser quality or substitute design. Tighten fasteners as specified.

NOTE: Disconnect the battery ground cable anytime the steering gear is being serviced or damage to the steering gear internal power relay may occur resulting in steering gear replacement.

1.
Disconnect the battery ground cable. Refer to: Battery Disconnect and Connect .

NOTE: Make sure to minimize damage to the sealer foam and avoid pulling apart

dash seal brackets from retainer pins. Excessive damage may allow engine noise, fumes, air or water to enter the passenger compartment.

2.

1.

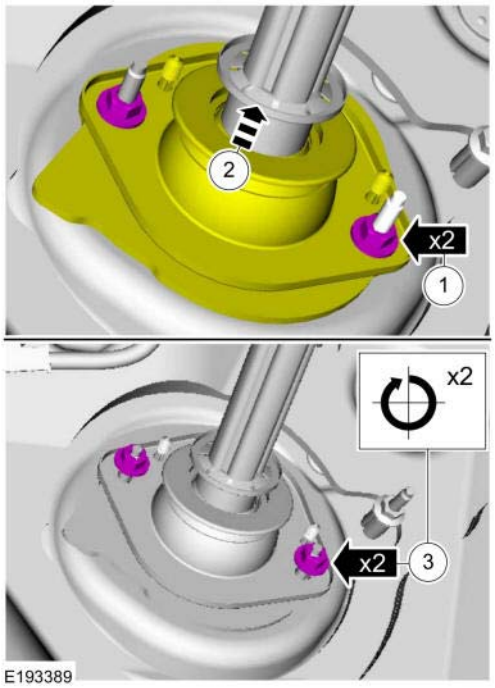
Remove the steering column dash seal nuts.

2.

Loosen the dash seal.

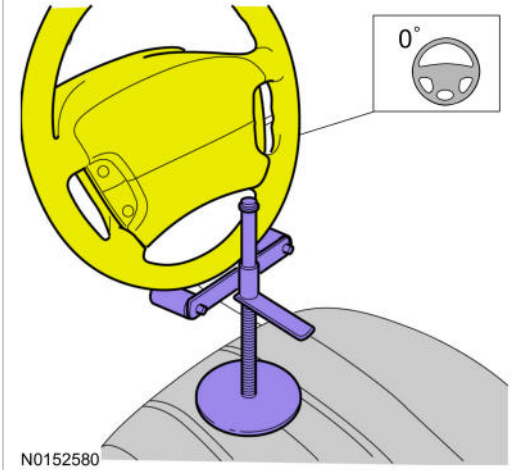
3.

Hand start the dash seal nuts.



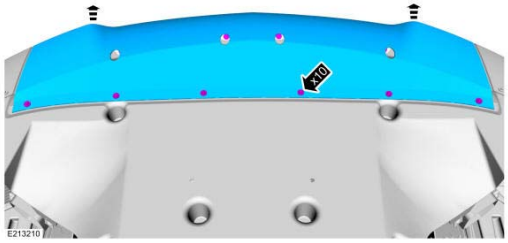
3.

Using a holding device, hold the steering wheel in the straight-ahead position.



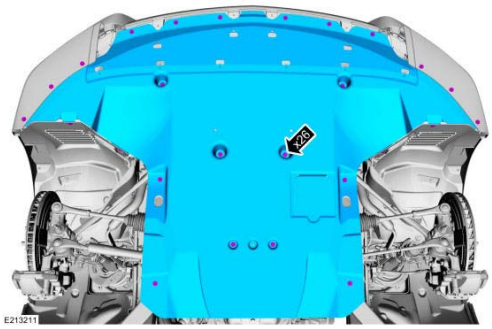
NOTE: If equipped.

4.
Remove the bolts and the underbody shield.



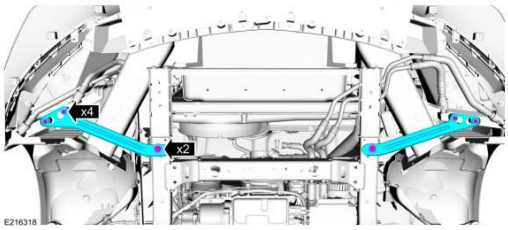
NOTE: If equipped.

5.
Remove the bolts and the underbody shield.



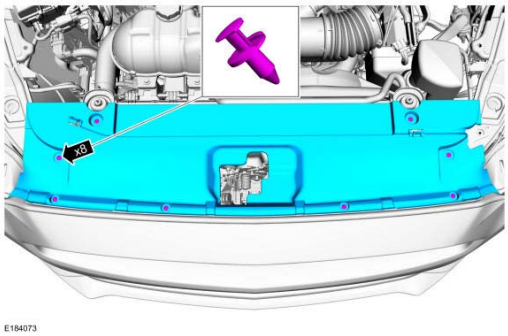
NOTE: If equipped.

6.
Remove the bolts and the support brackets.



7.

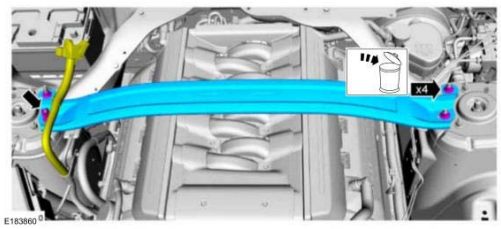
Remove the 8 push pins and the upper radiator shield.



5.0L 32V Ti-VCT

8.

Position aside the battery positive cable. Remove the 4 cross brace nuts and remove the cross brace.



9.

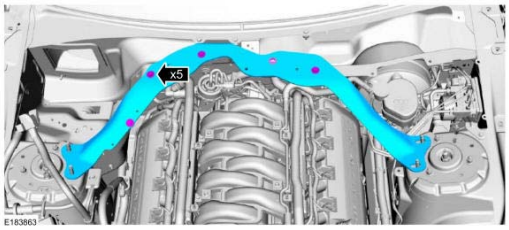
Remove the battery tray. Refer to: Battery Tray .

10.

Remove the cowl panel grille. Refer to: Cowl Panel Grille .

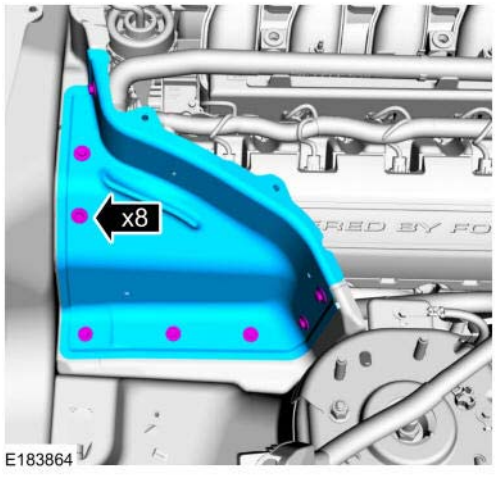
11.

Remove the 4 bolts and remove the cowl extension.



12.

Remove the 8 screws and the battery heat shield.



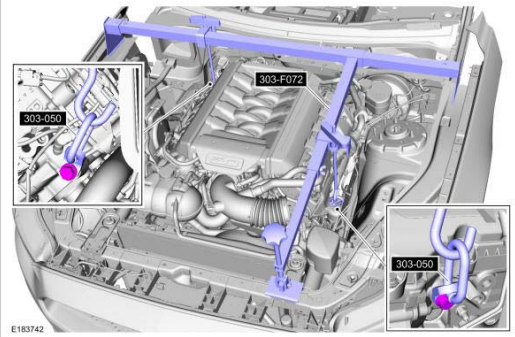
13.

Remove the air cleaner housing. Refer to: Air Cleaner .

NOTE: The engine does not need to be lifted, only supported in normal position.

NOTE: Do not position the legs of the Engine Support Bar on the fenders. Instead, position the legs on the body structure near the suspension strut tower. Failure to follow these instructions may result in body damage.

14.
Using the special tools, support the engine. Install Special Service Tool: 303-050 (T70P-6000) Lifting Bracket, Engine., 303-F072 Support Bar, Engine.



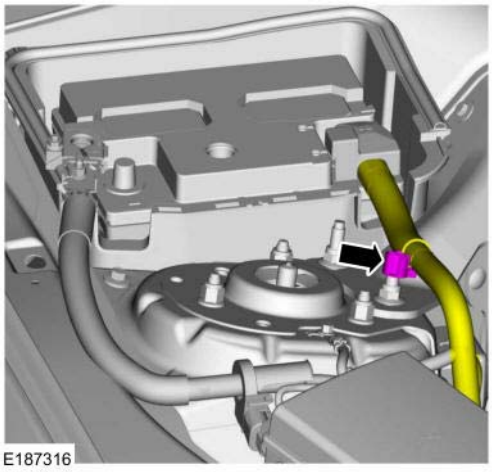
3.7L Duratec (227kW/301PS)

NOTE: If equipped with cowl extension.

15.
Remove the cowl panel grille. Refer to: Cowl Panel Grille .

NOTE: If equipped with cowl extension.

16.
Unclip and disconnect the battery positive cable.

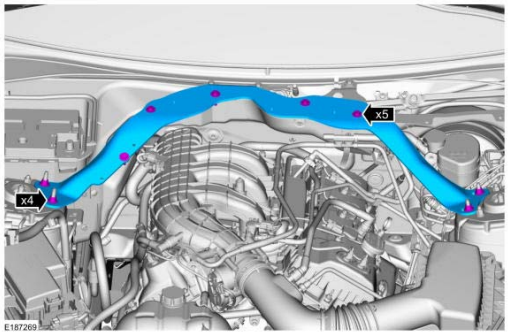


NOTE: If equipped.

17.

Remove the 4 cowl extension-to-strut tower nuts.

Remove the 5 cowl extension-to-cowl bolts and remove the cowl extension.

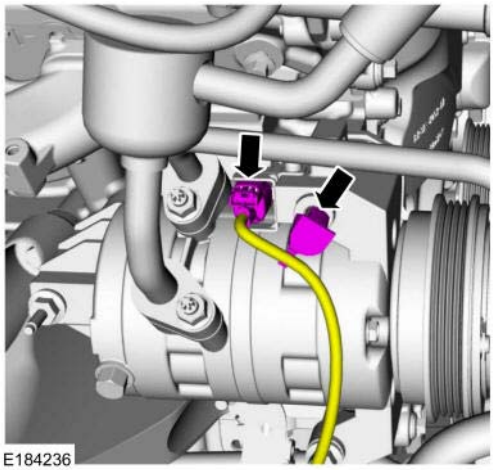


18.

Position aside the A/C compressor belt. Refer to: Air Conditioning (A/C) Compressor Belt .

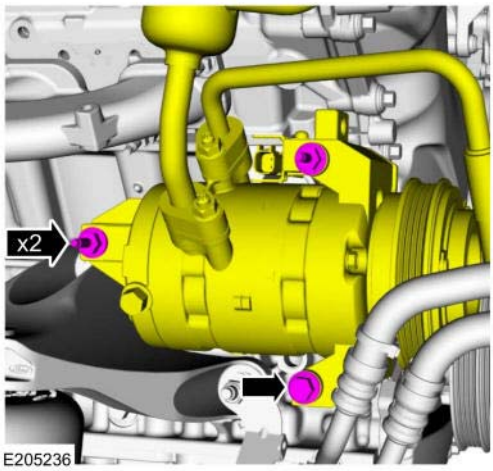
19.

Disconnect the A/C compressor electrical connector and the wire harness retainer.



NOTE: The stud bolts and bolt will stay with the A/C compressor.

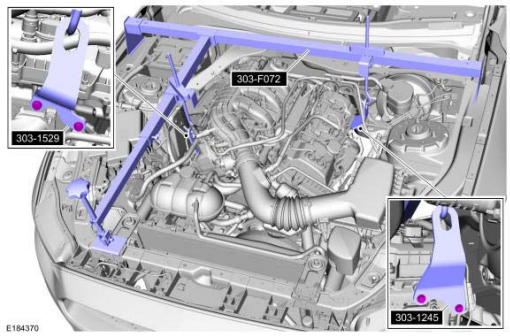
20.
Loosen the bolt and stud bolts and position the A/C compressor aside.



NOTE: The engine does not need to be lifted, only supported in normal position.

NOTE: Do not position the legs of the Engine Support Bar on the fenders. Instead, position the legs on the body structure near the suspension strut tower. Failure to follow these instructions may result in body damage.

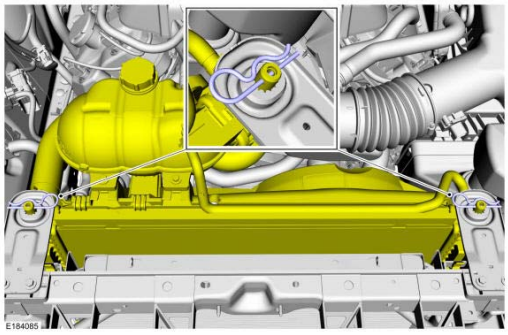
21.
Using the special tools, support the engine. Use Special Service Tool: 303-1529 Lift Eye, Engine., 303-1245 Engine Lift Eye., 303-F072 Support Bar, Engine.



All vehicles

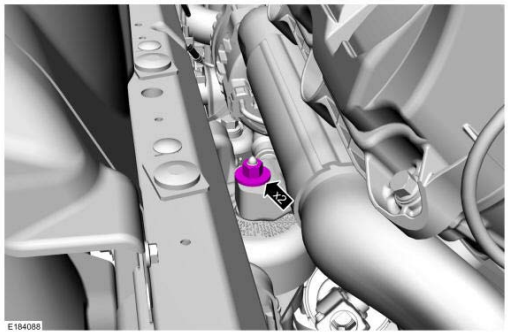
22.

Install clips to support the cooling module.



NOTE: LH shown RH similar.

23.
Remove the LH and RH engine mount nuts.

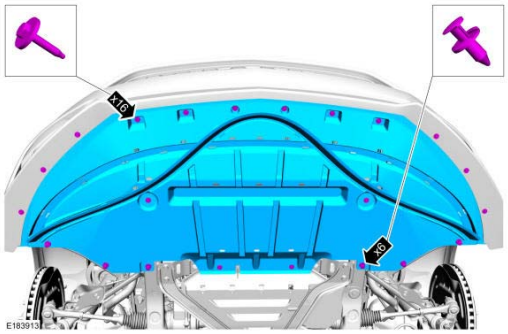


24.

Remove the wheels and tires. Refer to: Wheel and Tire .

25.

Remove the 6 push pins and the 16 screws and remove the under body shield.



NOTE: If equipped.

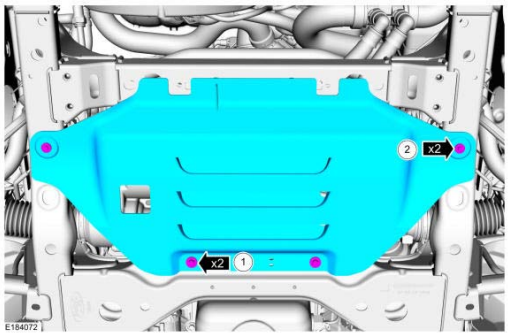
26.

1.

Remove the 2 rearward underbody shield bolts.

2.

Remove the 2 remaining underbody shield bolts and remove the underbody shield.



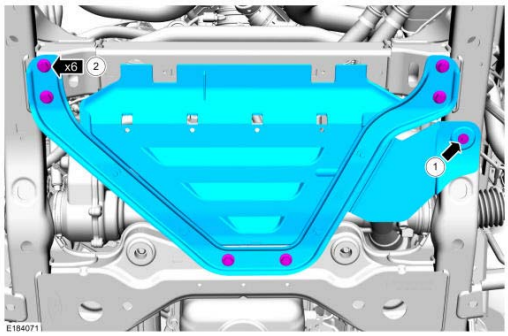
27.

NOTE: If equipped.

1.
Remove the underbody shield bolt.

NOTE: It is not necessary to separate the underbody shield from the V-brace.

2.
Remove the 6 V-brace bolts and remove the V-brace and underbody shield.



NOTE: DO NOT attempt to remove or install the steering column lower coupler at the steering gear without first loosening the steering column dash seal and fasteners. Failure to follow this instruction may cause damage to steering components that could lead to loss of steering control during vehicle operation and could result in serious

personal injury or death.

NOTE: DO NOT hammer, pry or force steering column and column shafts during installation or removal. Failure to follow this instruction may cause damage to steering components that could lead to loss of steering control during vehicle operation and could result in serious personal injury or death.

WARNING: Do not reuse steering column shaft bolts. This may result in fastener failure and steering column shaft detachment or loss of steering control. Failure to follow this instruction may result in serious injury to vehicle occupant(s).

28.

Detach the steering column lower shaft from the lower coupler.

1.

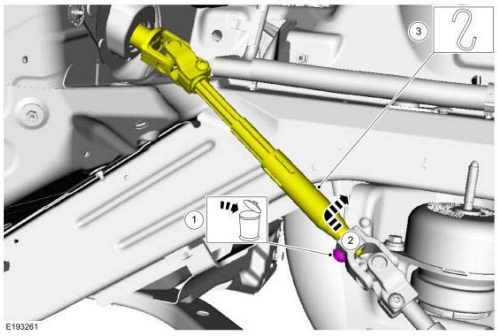
Remove and discard the steering column shaft bolt.

2.

Pull apart the steering column shaft from the coupler.

3.

Secure the lower shaft to the frame rail to avoid damaging it during subframe removal.



NOTE: LH front ride height sensor shown, RH similar.

NOTE: If equipped with dynamic suspension.

NOTE: The front suspension height sensor must be disconnected from the lower control arm prior to servicing suspension components or damage to the suspension

height sensor and/or the vehicle dynamic suspension system may occur. The sensor will need to be recalibrated after reassembly.

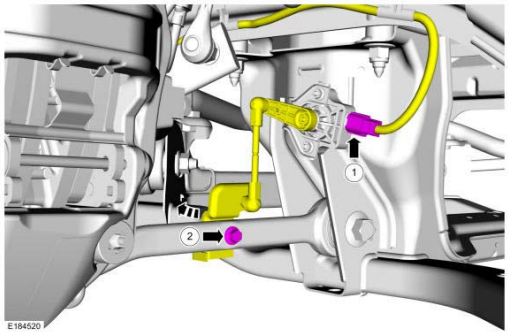
29.

1.

On both sides. Disconnect the front ride height sensor electrical connector.

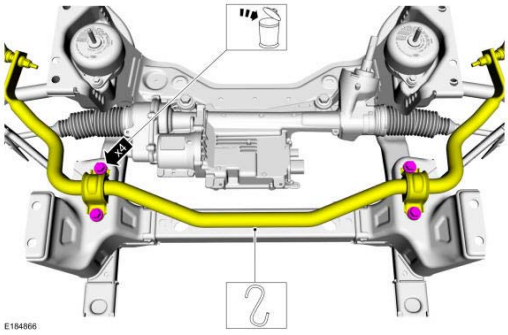
2.

On both sides. Remove the bolt and disconnect the front ride height sensor arm bracket from the reward lower control arm.



30.

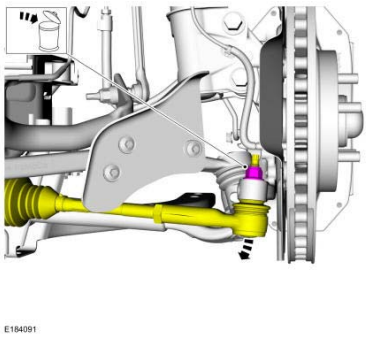
Remove and discard the 4 stabilizer bar bracket bolts and support the stabilizer bar.



NOTE: Use care when installing the tie rod separator or damage to the outer tie-rod end boot may occur.

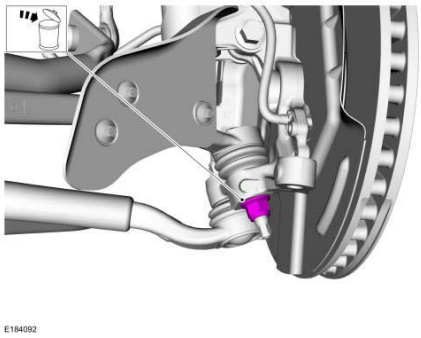
NOTE: Do not use a hammer to separate the outer tie-rod end from the wheel knuckle or damage to the wheel knuckle may result.

31.
On both sides. Remove and discard the tie rod end nut and separate the tie rod end from the wheel knuckle. Use the General Equipment: Tie Rod End Remover



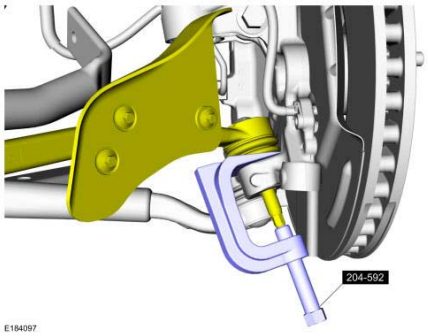
32.

On both sides. Remove and discard the front lower arm ball joint nut.



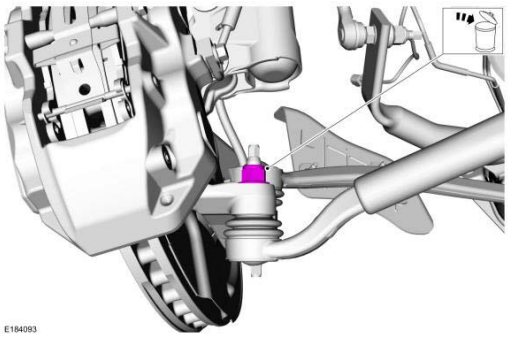
NOTE: Once pressure is applied to the ball joint with the Ball Joint Separator and Adapter, it may be necessary to tap the wheel knuckle at the ball joint area to separate the ball joint from the wheel knuckle.

33.
On both sides. Using the special tool, separate the front lower arm ball joint from the wheel knuckle. Use Special Service Tool: 204-592 Separator, Lower Arm Ball Joint.



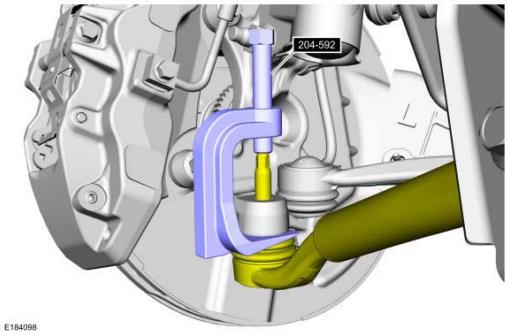
34.

On both sides. Remove and discard the rear lower arm ball joint nut.



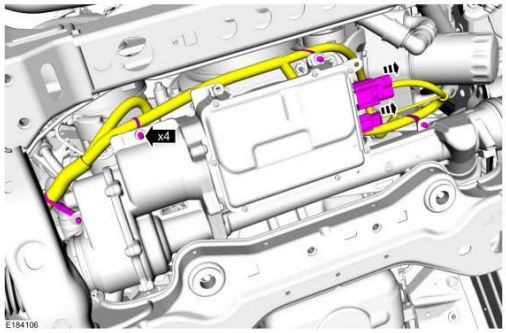
NOTE: Once pressure is applied to the ball joint with the Ball Joint Separator and Adapter, it may be necessary to tap the wheel knuckle at the ball joint area to separate the ball joint from the wheel knuckle.

35.
On both sides. Using the special tool, separate the rear lower arm ball joint from the wheel knuckle. Use Special Service Tool: 204-592 Separator, Lower Arm Ball Joint.



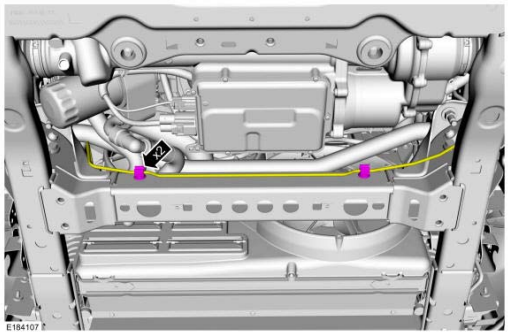
36.

Disconnect the 2 EPAS gear electrical connectors and unclip the 4 wiring fasteners and position the wiring harness aside.



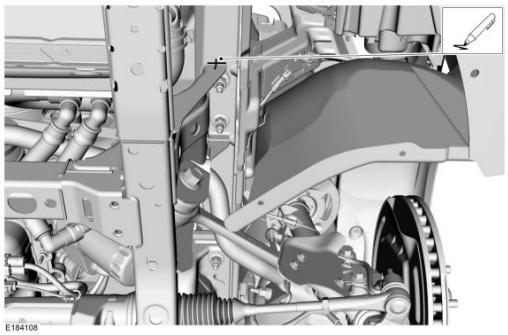
37.

Unclip the crossover brake line from the 2 frame clips.



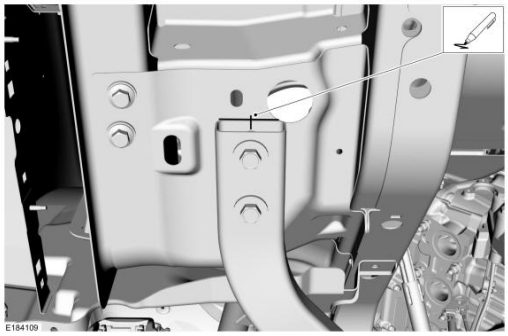
38.

Mark the position of the front subframe for reference during installation.



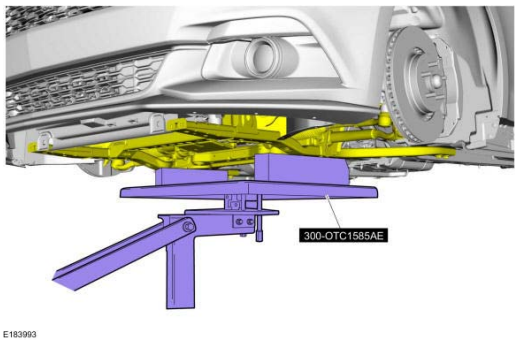
39.

Mark the position of the front subframe for reference during installation.



40.

Position the special tool under the front subframe assembly. Use Special Service Tool: 300-OTC1585AE Powertrain Lift.



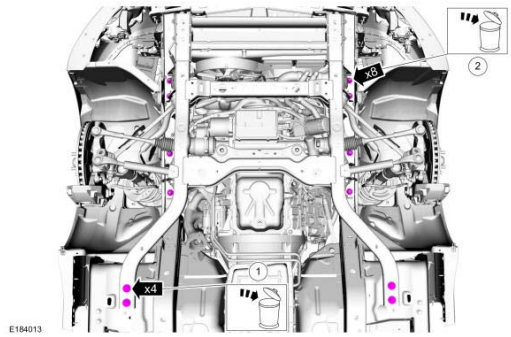
41.

1.

Remove and discard the 4 rearward front subframe bolts.

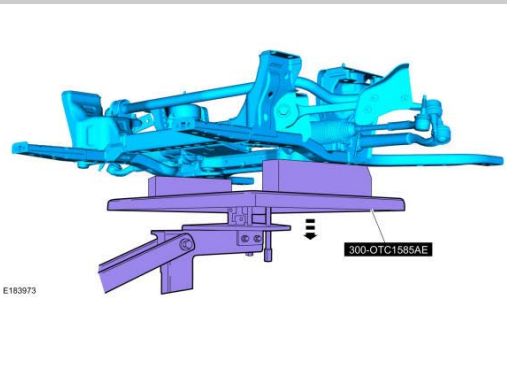
2.

Remove and discard the 8 forward front subframe nuts.



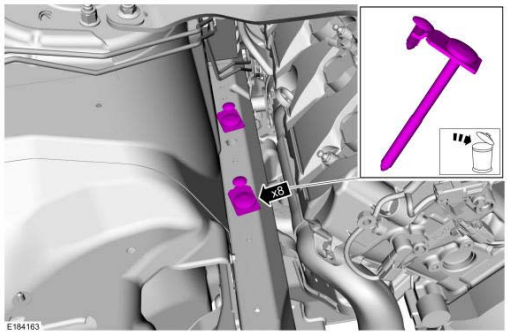
42.

Using the special tool, lower the front subframe assembly from the vehicle. Use Special Service Tool: 300-OTC1585AE Powertrain Lift.



43.

Remove and discard the 8 forward front subframe bolts.

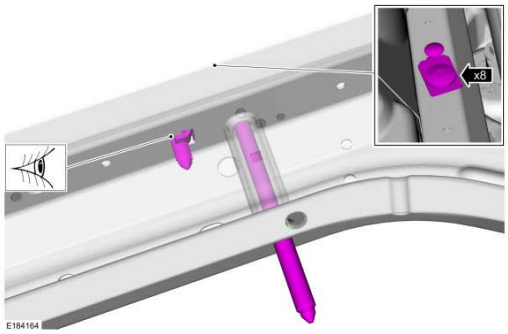


REMOVAL AND INSTALLATION > FRONT SUBFRAME - 3.7L DURATEC (227KW 301PS) 5.0L 32V TI-VCT 5.2L 32V TI-VCT > INSTALLATION

All vehicles

NOTE: Make sure that the tab is engaged to the body rail.

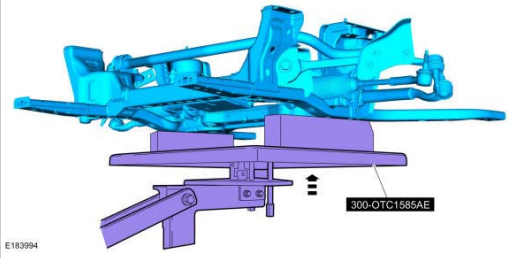
1.
Install 8 new forward front subframe bolts.



5.0L 32V Ti-VCT

2.

Using the special tool, position the front subframe assembly in the vehicle. Use Special Service Tool: 300-OTC1585AE Powertrain Lift.



NOTE: Align the reference marks made during removal before tightening the subframe nuts and bolts.

3.

1.

Install the 8 new forward front subframe nuts.

Torque

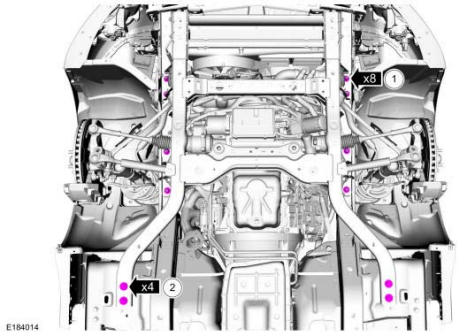
: 85 lb.ft (115 Nm)

2.

Install the 4 new rearward front subframe bolts.

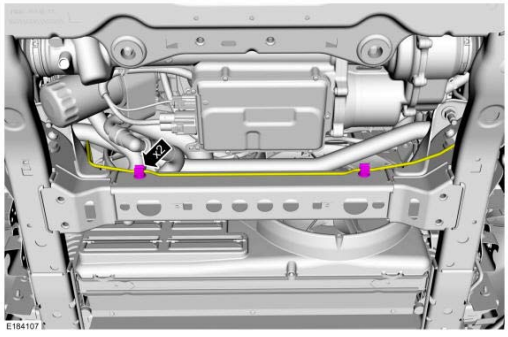
Torque

: 85 lb.ft (115 Nm)



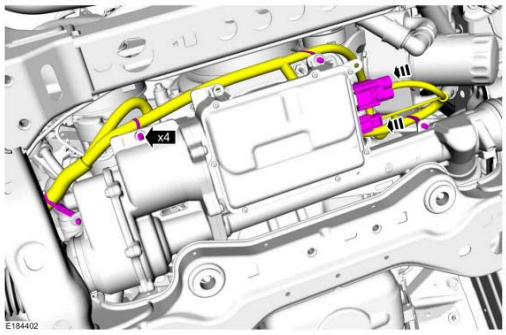
4.

Clip the crossover brake line into the 2 frame clips.



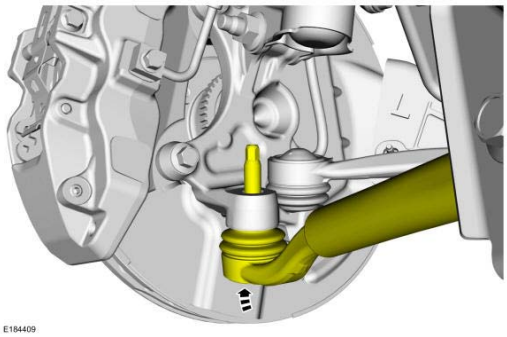
5.

Position the EPAS gear wiring harness, clip the 4 wiring fasteners and connect the 2 electrical connectors.



6.

On both sides. Connect the rear lower arm ball joint to the wheel knuckle.

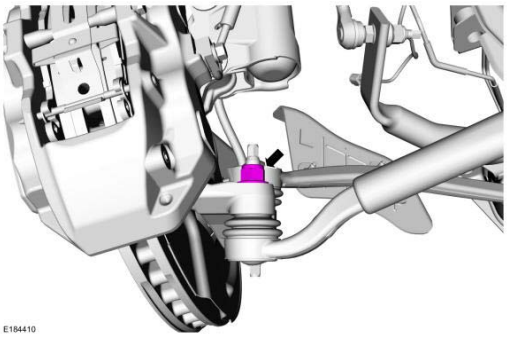


7.

On both sides. Install the new rear lower arm ball joint nut.

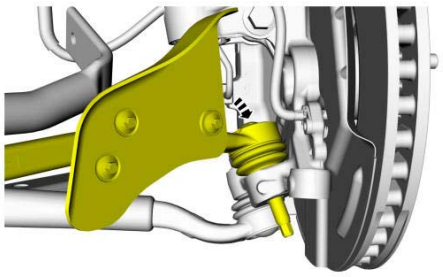
Torque

: Non SVT: 85 lb.ft (115 Nm) SVT: 76 lb.ft (103 Nm)



8.

On both sides. Connect the forward lower arm ball joint to the wheel knuckle.

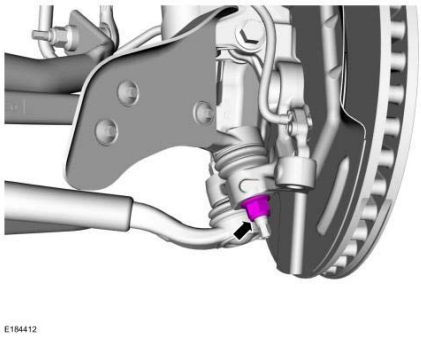


9.

On both sides. Install the new forward lower arm ball joint nut.

Torque

:Non SVT: 85 lb.ft (115 Nm)SVT: 76 lb.ft (103 Nm)



10.

1.

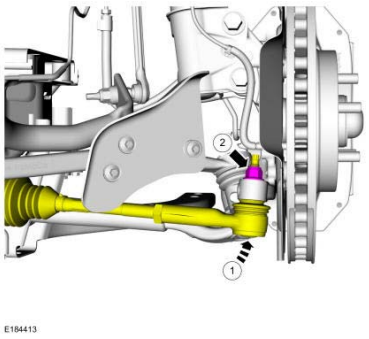
On both sides. Connect the tie rod end to the wheel knuckle.

2.

On both sides. Install the new tie rod end nut.

Torque

: Non SVT: 59 lb.ft (80 Nm) SVT: 30 lb.ft (40 Nm)

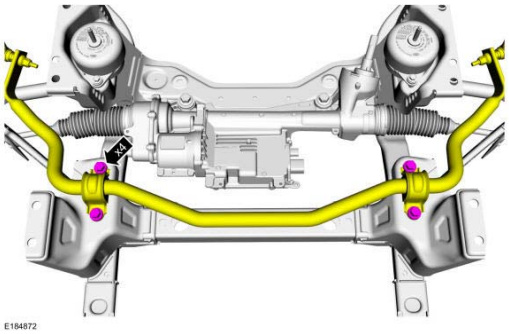


11.

Position the stabilizer bar and install the 4 new stabilizer bar bracket bolts.

Torque

: 76 lb.ft (103 Nm)



NOTE: LH front ride height sensor shown, RH similar.

NOTE: If equipped with dynamic suspension.

12.

1.

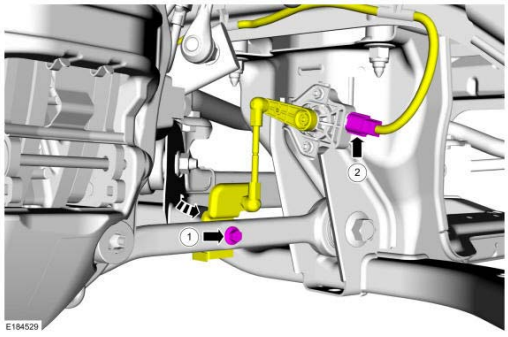
On both sides. Position the front ride height sensor arm bracket and install the bolt.

Torque

: 177 lb.in (20 Nm)

2.

On both sides. Connect the front ride height sensor electrical connector.



NOTE: DO NOT attempt to remove or install the steering column lower coupler at the steering gear without first loosening the steering column dash seal and fasteners. Failure to follow this instruction may cause damage to steering components that could lead to loss of steering control during vehicle operation and could result in serious personal injury or death.

NOTE: DO NOT hammer, pry or force steering column and column shafts during installation or removal. Failure to follow this instruction may cause damage to steering components that could lead to loss of steering control during vehicle operation and could result in serious personal injury or death.

13.

1.

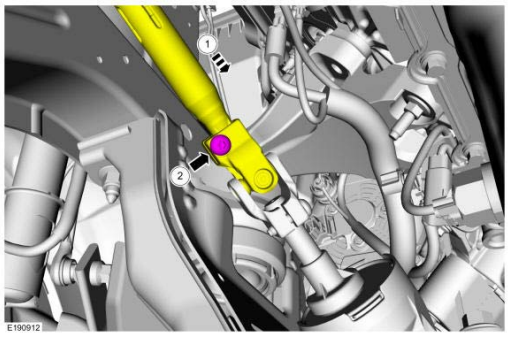
Connect the steering column shaft to the steering gear universal joint.

2.

Install the new steering column shaft bolt.

Torque

: 22 lb.ft (30 Nm)



14.

Inspect the steering column lower shaft. Refer to: Steering Column Collapsed Check .

15.

If equipped.

1.

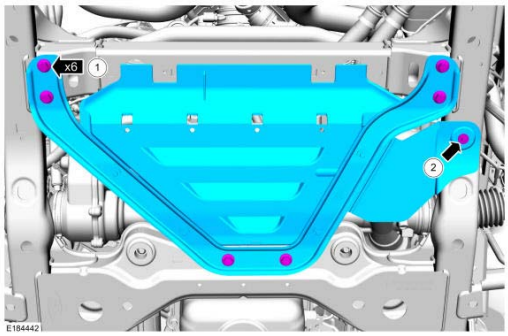
Position the V-brace and underbody shield and install the 6 V-brace bolts.

Torque

: 46 lb.ft (63 Nm)

2.

Install the underbody shield bolt.



16.

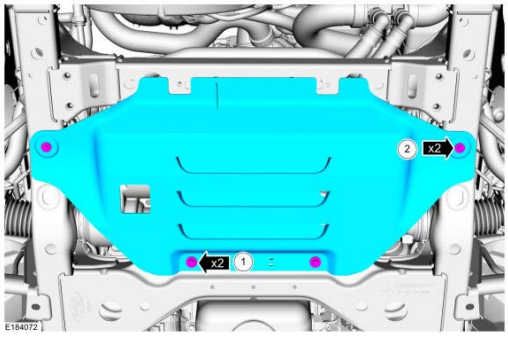
If equipped.

1.

Position the underbody shield and install the 2 rearward underbody shield bolts.

2.

Install the 2 remaining underbody shield bolts.



17.

Position the under body shield and install the 16 screws and the 6 push pins.



NOTE: LH shown RH similar.

18.
Install the LH and RH engine mount nuts.

Torque

: 46 lb.ft (63 Nm)



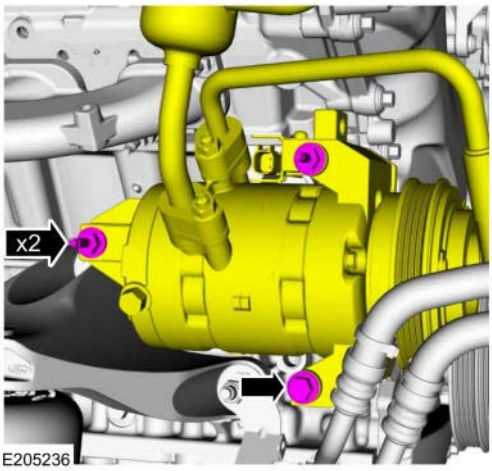
3.7L Duratec (227kW/301PS)

19.

Position the A/C compressor and install the bolt and stud bolts.

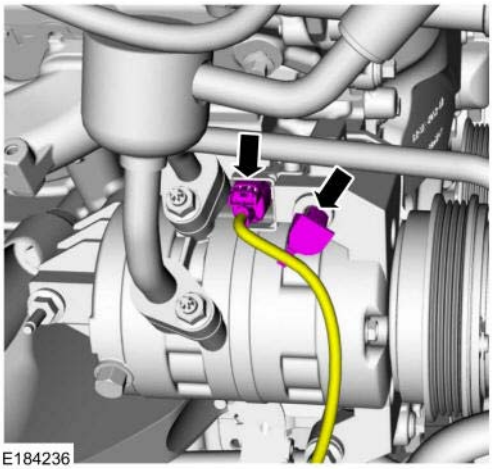
Torque

: 18 lb.ft (25 Nm)



20.

Connect the A/C compressor electrical connector and the wire harness retainer.



21.

Install the A/C compressor belt. Refer to: Air Conditioning (A/C) Compressor Belt .

22.

If equipped.

Position the cowl extension and install the 5 cowl extension-to-cowl bolts.

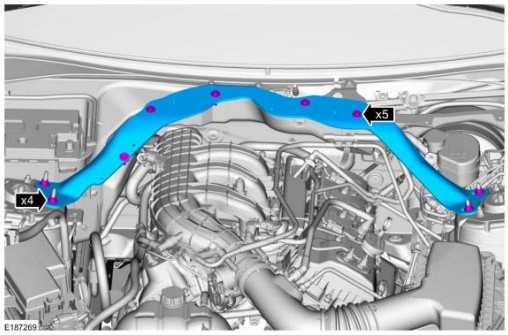
Torque

: 26 lb.ft (35 Nm)

Install the 4 cowl extension-to-strut tower nuts.

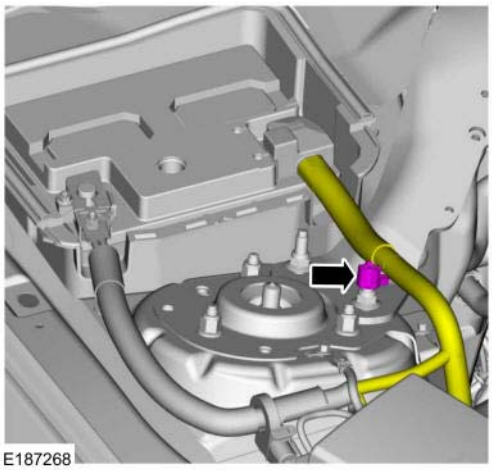
Torque

: 41 lb.ft (55 Nm)



NOTE: If equipped with cowl extension.

23.
Clip the battery cable.



NOTE: If equipped with cowl extension.

24.
Install the cowl panel grille. Refer to: Cowl Panel Grille .

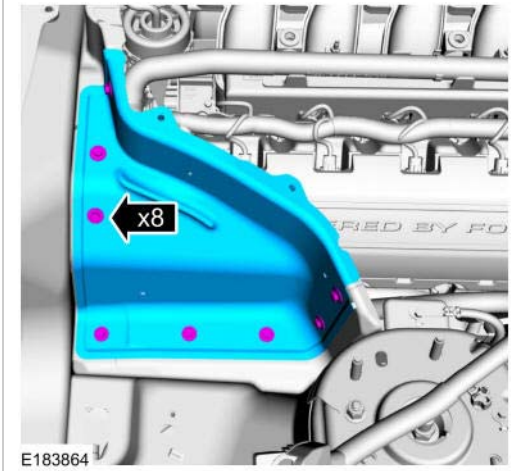
5.0L 32V Ti-VCT

25.

Position the battery heat shield and install the 8 screws.

Torque

: 80 lb.in (9 Nm)

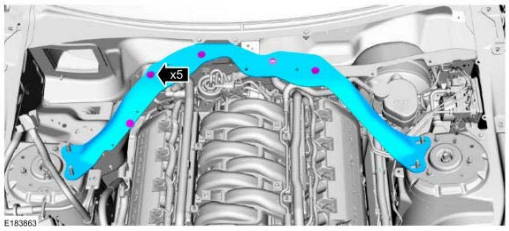


26.

Position the cowl extension and install the 4 bolts.

Torque

: 26 lb.ft (35 Nm)



27.

Install the cowl panel grille. Refer to: Cowl Panel Grille .

28.

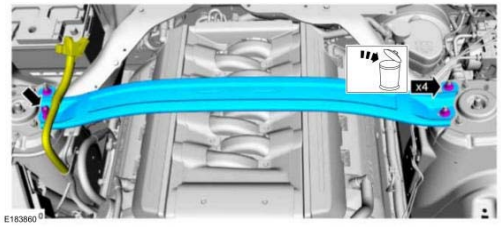
Install the battery tray. Refer to: Battery Tray .

29.

Position the cross brace and install the 4 cross brace nuts. Position the battery positive cable.

Torque

: 41 lb.ft (55 Nm)



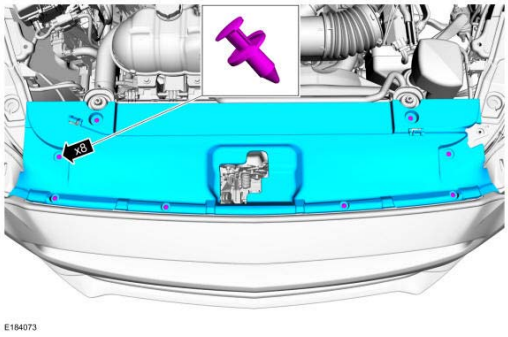
30.

Install the air cleaner housing. Refer to: Air Cleaner .

All vehicles

31.

Position the upper radiator shield and install the 8 push pins.

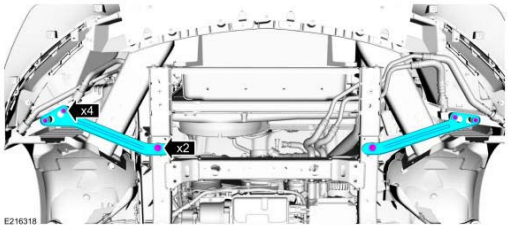


NOTE: If equipped.

32.
Install the 2 support brackets and the bolts.

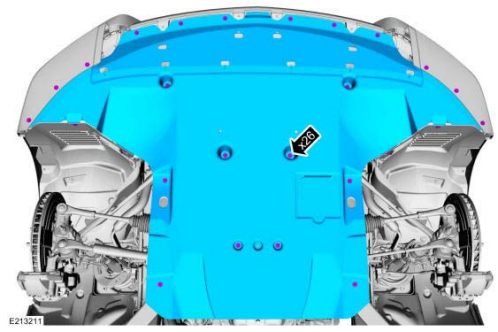
Torque

: Bracket to subframe bolts.: 22 lb.ft (30 Nm) Bracket to cooler bolts.: 93 lb.in (10.5 Nm)



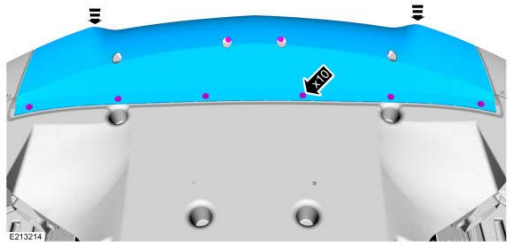
NOTE: If equipped.

33.
Position the underbody shield and install the bolts.



NOTE: If equipped.

34.
Position the underbody shield and install the bolts.



35.

1.

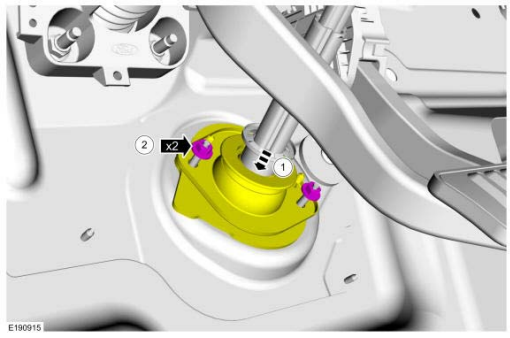
Position the steering column dash seal.

2.

Tighten the steering column dash seal nuts.

Torque

: 80 lb.in (9 Nm)



36.

Connect the battery ground cable. Refer to: Battery Disconnect and Connect .

37.

Check and if necessary, adjust front toe. Refer to: Front Toe Adjustment .

DESCRIPTION AND OPERATION > ANTI-LOCK BRAKE SYSTEM (ABS) AND STABILITY CONTROL - OVERVIEW > OVERVIEW

The ABS and stability control systems are comprised of the following subsystems and features which assist the driver in maintaining control of the vehicle:

- Anti-lock braking
- EBD
- Electronic Stability Control (ESC)
- Hill start assist
- Launch control
- Line lock
- Selectable drive mode
- Supplemental braking assist
- Supports adaptive cruise control
- Supports collision avoidance
- Traction control

Anti-lock braking helps maintain steering control by preventing the wheels from locking up during hard braking.

The EBD system helps maintain vehicle control by keeping a balanced braking condition between the front and rear wheels.

The Electronic Stability Control (ESC) system helps prevent skids or lateral slides by modulating brake fluid to the brake calipers and reducing engine torque.

The hill start assist system is designed to assist the driver during hill starts. Using the ABS, the hill start assist system holds the vehicle on an incline for a short time, allowing the driver to release the brake pedal and press the accelerator pedal without needing to use the parking brake.

The launch control feature works in conjunction with the ABS and the PCM to maximize traction from a standing start acceleration in a straight line. Launch control enables a unique "drag start" traction control calibration designed for high grip surfaces.

The line lock feature allows the rear wheels to spin freely while the front brakes are applied. This allows the rear tires to be "conditioned" to allow maximum traction. This feature is intended for use at race tracks only and should not be used on public roads.

The selectable drive mode system helps maintain vehicle traction by adapting the responses of the engine, transmission, EPAS and stability control system to the demands of the current selected driving mode; normal, snow-wet, sport and track.

The supplemental braking assist feature uses the hydraulic pump motor and HCU to provide additional braking assist in the event of severe vacuum loss at the brake booster or during a severe braking event.

The ABS supports the adaptive cruise control system by applying the brakes as necessary to maintain the distance gap set by the driver. For information on the adaptive cruise control system, Refer to: Cruise Control - System Operation and Component Description .

The ABS supports the collision avoidance system by monitoring information and precharging the brake system allowing the vehicle to stop in the shortest distance possible. For information on the collision avoidance system, Refer to: Collision Warning and Collision Avoidance System - System Operation and Component Description .

The traction control system helps prevent loss of traction by reducing drive wheel spin during acceleration.

Some noise from the system and pulsations in the brake pedal are normal conditions during most ABS and stability control events. Also, longer than normal brake pedal travel may be experienced immediately following an ABS or stability control activation.

DESCRIPTION AND OPERATION > ANTI-LOCK BRAKE SYSTEM (ABS) AND STABILITY CONTROL - SYSTEM OPERATION AND COMPONENT DESCRIPTION

System Operation

DESCRIPTION AND OPERATION > ANTI-LOCK BRAKE SYSTEM (ABS) AND STABILITY CONTROL - SYSTEM OPERATION AND COMPONENT DESCRIPTION > NETWORK MESSAGE CHART

Module Network Input Messages - ABS Module

Broadcast Message	Originating Module	Message Purpose
Accelerator pedal position	PCM	This message is sent to the GWM and then to the ABS module. The ABS module uses accelerator pedal position information for correct operation of the traction control, ESC and hill start assist features.
Ambient air temperature	PCM	This message is sent to the GWM and then to the ABS module. This message informs the ABS module of the current ambient air temperature. The ABS module uses this information for calculations in determining the operational status of the various stability control systems and

		features.
Adaptive cruise control braking cancel	CCM	This messages informs the ABS module the adaptive cruise control system no longer requires vehicle braking.
Adaptive cruise control deceleration	CCM	This message is used to request vehicle deceleration by the ABS module for the adaptive cruise control system, including how much brake force is required and if precharging of the brake system is necessary.
Battery low state of charge	BCM	This message is sent to the GWM and then to the ABS module. This message informs the ABS module of a low state of charge in the vehicle 12-volt battery.
Cruise control system status	PCM	This message is sent to the GWM and then to the ABS module. The ABS module uses cruise control system status for adaptive cruise control deceleration and braking.
Brake pedal applied	PCM	This message is sent to the GWM and then to the ABS module. This message informs the ABS module the driver has pressed the brake pedal. This message is also used by the ABS module to check the brake pressure sensor located inside the HCU.
Clutch pedal position	PCM	This message is sent to the GWM and then to the ABS module. This message is used by the ABS module for the hill start assist feature, launch control feature and line lock feature.
Collision mitigation by braking deceleration	CCM	This message is used to request vehicle deceleration by the ABS module for the collision avoidance system, including how much brake force is required and how much precharging of the brake system is necessary.

Door ajar status	BCM	This message is sent to the GWM and then to the ABS module. This message informs the ABS module of the current door ajar status. There is a separate message for each door. The ABS module resets the parameters used for ESC when a door is opened and closed.
Driver seat belt buckle status	RCM	The ABS module resets the parameters used for the ESC function when the driver seat belt is buckled or unbuckled.
Engine disable status	PCM	This message is sent to the GWM and then to the ABS module. This message informs the ABS module the engine is currently disabled or enabled due to the stop-start feature.
Engine RPM	PCM	This message is sent to the GWM and then to the ABS module. This message informs the ABS module of the current engine RPM. This message is used by the ABS module for the hill start assist feature and launch control feature.
Engine torque output	PCM	This message is sent to the GWM and then to the ABS module. This message informs the ABS module of the current engine torque output. This information is used for the hill start assist feature and launch control feature.
Gear lever position	PCM	This message is sent to the GWM and then to the ABS module. This message informs the ABS module of the current transmission gear lever position. This message is used for operation of the hill start assist feature and the ESC feature. The hill start assist feature operates in forward and reverse gears but the ESC feature does not operate when the transmission is in REVERSE.

Hill start assist mode	IPC	This message is sent to the GWM and then to the ABS module. This message informs the ABS module of the current, driver selected mode for the hill start assist feature; off, auto or manual.
Ignition key type	BCM	This message is sent to the GWM and then to the ABS module. This message informs the ABS module of the current ignition key type; MyKey® admin key, MyKey® restricted key, key not programmed - read failure, unknown key type or invalid key type. The ABS module uses the ignition key type for activation and deactivation of certain stability control features.
Ignition status	BCM	This message is sent to the GWM and then to the ABS module. This message informs the ABS module of the current ignition status; off, accessory, run, start, unknown or invalid.
Launch control request	IPC	This message is sent to the GWM and then to the ABS module. This message informs the ABS module the driver has requested launch control feature activation.
Launch control system status	PCM	This message is sent to the GWM and then to the ABS module. This message informs the ABS module of the launch control system status as selected by the driver.
Line lock request	IPC	This message is sent to the GWM and then to the ABS module. This message informs the ABS module the driver has requested line lock feature activation.
Park brake status	BCM	This message is sent to the GWM and then to the ABS module. This message informs the ABS module of the current parking brake status; applied or released. The ABS module uses

		this information for the hill start assist feature.
Power pack status	PCM	This message is sent to the GWM and then to the ABS module. This message informs the ABS module of the current engine operation status; Off - torque not available, On - torque not available, On - torque available or Start in Progress - torque not available. This information is used for the activation and operation of the stability control features.
RCM serial number	RCM	The ABS module stores the RCM serial number and verifies the serial number when the vehicle is started or the ignition is set to RUN or ACC. Over time, the ABS module learns the offset of the sensors inside the RCM. When a new serial number is found and the IVD Initialization procedure is carried out using a diagnostic scan tool, the ABS module resets the offset number learned for ESC.
Reverse gear selected	PCM	This message is sent to the GWM and then to the ABS module. This message informs the ABS module the driver has requested REVERSE gear and the current status of REVERSE gear; active, inactive or faulted. This message is used for operation of the hill start assist feature and the ESC feature. The hill start assist feature operates in forward and reverse gears but the ESC feature does not operate when the transmission is in REVERSE.
Selectable drive mode	FCIM	This message is sent to the GWM and then to the ABS module. This message informs the ABS module of the current, driver selected vehicle mode; Normal, Sport, Snow-Wet or Track. The ABS module adjusts the thresholds for anti-lock

		braking and stability control system intervention depending on the mode selected.
Stability-traction control mode	FCIM	This message is sent to the GWM and then to the ABS module. This message informs the ABS module of the current, driver selected mode for the traction control and stability control features; on, off or sport.
Steering angle sensor data	PSCM	Several steering angle messages are sent to the ABS module from the PSCM. These messages include steering angle sensor status, steering wheel angle and steering wheel rotation count. The ABS module uses the steering angle sensor data for ESC feature operation.
Transmission in reverse	PCM	This message is sent to the GWM and then to the ABS module. This message informs the ABS module when the transmission is in REVERSE, this is used for the hill start assist feature and the ESC feature. The hill start assist feature operates in forward and reverse gears. The ESC feature does not operate when the transmission is in REVERSE.
Vehicle configuration data	BCM	This message is sent to the GWM and then to the ABS module. This message provides the ABS module with the current optional and configured items such as tire size, axle ratio, manual or automatic transaxle, keyless entry and VIN.
Vehicle lateral acceleration data	RCM	This message provides the ABS module with the current vehicle lateral acceleration data and notifies the ABS module if the data is valid or invalid. The ABS module uses the lateral acceleration data for ESC feature operation.

Vehicle longitudinal acceleration data	RCM	This message provides the ABS module with the current vehicle longitudinal acceleration data and notifies the ABS module if the data is valid or invalid. The ABS module uses the longitudinal acceleration data for ESC feature operation.
Vehicle yaw rate data	RCM	This message provides the ABS module with the current vehicle yaw rate data and notifies the ABS module if the data is valid or invalid. The ABS module uses the yaw rate data for ESC feature operation.

DESCRIPTION AND OPERATION > ANTI-LOCK BRAKE SYSTEM (ABS) AND STABILITY CONTROL - SYSTEM OPERATION AND COMPONENT DESCRIPTION > ANTI-LOCK BRAKING

The ABS module continuously monitors brake pedal input, longitudinal vehicle motion and the rotational speed of each wheel. The ABS module receives the brake pedal input from the PCM and the longitudinal acceleration sensor information from the RCM. The PCM sends the brake pedal input message to the GWM over the HS-CAN1, the GWM relays the message to the ABS module over the HS-CAN2. The RCM sends the longitudinal acceleration sensor message directly to the ABS module over the HS-CAN2. Wheel speed information is received by the ABS module using 4 wheel speed sensors. When the ABS module detects an impending wheel lock during a braking event, the ABS module modulates brake pressure to the appropriate brake caliper by opening and closing the appropriate solenoid valves inside the HCU while the hydraulic pump motor is activated. Once the affected wheel returns to the desired speed, the ABS module returns the solenoid valves in the HCU to their normal position and deactivates the hydraulic pump motor.

When the ABS module is initialized (ignition ON), a preliminary electrical check of the wheel speed and brake booster vacuum sensors is carried out, and the hydraulic pump motor is activated for approximately one-half second. During this time, a buzzing or humming noise may be heard and a vibration may be felt in the brake pedal, this is a normal condition. During the module initialized self-test, the pump motor check is carried out at approximately 10 km/h (6.2 mph). Any malfunction detected in the system causes the ABS module to set a DTC, disable the ABS function and send a message to the IPC to illuminate the ABS warning indicator. The base hydraulic power assist braking system functions normally.

DESCRIPTION AND OPERATION > ANTI-LOCK BRAKE SYSTEM (ABS) AND STABILITY CONTROL - SYSTEM OPERATION AND COMPONENT DESCRIPTION > ELECTRONIC BRAKE FORCE DISTRIBUTION (EBD)

On initial application of the brake pedal, full pressure is applied to the rear brakes. The ABS module then uses wheel speed sensor inputs to evaluate rear wheel slip. Once the rear wheel slip exceeds a

predetermined threshold, the ABS module commands the HCU to close the appropriate isolation valves to hold the rear brake pressure constant while allowing the front brake pressure to build. This creates a balanced braking condition between the front and rear wheels. If the rear wheel slip continues and exceeds a second predetermined threshold, the ABS module commands the HCU to open the dump valves to decrease the rear brake pressure and allow the rear wheels to recover. A slight bump sensation may be felt in the brake pedal when EBD is active.

If the ABS is disabled due to a DTC being present in the ABS module, EBD continues to function unless the DTC is for wheel speed sensors or the HCU. When EBD is disabled, the ABS warning indicator, the red brake warning indicator and stability-traction control indicator (sliding car icon) illuminate.

AdvanceTrac

The AdvanceTrac feature is comprised of the traction control and ESC features.

Traction Control

The ABS module continuously monitors and compares the rotational speed of the drive wheels in relation to the non-driven wheels. When the drive wheels begin to spin faster than the non-driven wheels, the ABS module modulates brake pressure to the appropriate brake caliper(s) by opening and closing the appropriate solenoid valves inside the HCU while the hydraulic pump motor is activated. At the same time, the ABS module calculates how much engine torque reduction is required to eliminate the wheel slip and sends this torque reduction message along with a traction event message to the GWM over the HS-CAN2. The GWM sends the engine torque reduction message to the PCM over the HS-CAN1 and the traction event message to the IPC over the HS-CAN3. When the PCM receives the torque reduction message, it adjusts engine timing and decreases fuel injector pulses to reduce the engine torque to the requested level. When the IPC receives the traction event message it flashes the stability-traction control indicator (sliding car icon). Once the driven wheel speed returns to the desired speed, the ABS module returns the solenoid valves in the HCU to their normal position, deactivates the hydraulic pump motor and stops sending the traction event and torque reduction messages. The PCM returns engine timing and fuel injectors to normal operation and the IPC extinguishes the stability-traction control indicator (sliding car icon).

Traction control can be disabled through the use of the stability-traction control switch in the center of the instrument panel. This is independent of the ABS which cannot be disabled by the driver. When the driver disables traction control, the FCIM communicates traction control status to the GWM over the MS-CAN. The GWM sends the message to the ABS module over the HS-CAN2. The ABS module takes no further action in regards to traction control until the driver activates the function or until the ignition is cycled from OFF to ON.

Traction control is disabled if there is a wheel speed sensor or solenoid valve DTC present in the ABS module. Traction control is also disabled if there is a communication error between the ABS module and the GWM. When traction control is disabled, the ABS module sends a message to the GWM over the HS-CAN2 which relays the message to the IPC over the HS-CAN3 to illuminate the stability-traction control OFF indicator (sliding car OFF icon).

Electronic Stability Control (ESC)

The ABS module continuously monitors the vehicle motion relative to the intended course. This is done by using sensors to compare the steering wheel sensor messages and the yaw rate sensor messages with the actual vehicle motion. The ABS module receives the steering wheel sensor messages from the PSCM and the yaw rate sensor messages from the RCM, both messages are sent over the HS-CAN2. If the ABS module determines from the inputs the vehicle is unable to travel in the intended direction, it modulates the brake pressure to the appropriate brake caliper(s) by opening and closing the appropriate solenoid valves inside the HCU while the hydraulic pump motor is activated. At the same time the ABS

module calculates how much engine torque reduction is required to reduce vehicle speed to help stabilize the vehicle and sends this torque reduction message, along with an ESC event message, to the GWM over the HS-CAN2. The GWM sends the torque reduction message to the PCM over the HS-CAN1 and the ESC event message to the IPC over the HS-CAN3. When the PCM receives the torque reduction message, it adjusts engine timing and decreases fuel injector pulses to reduce the engine torque to the requested level. When the IPC receives this message, it flashes the stability-traction control indicator (sliding car icon). Once the vehicle instability has been corrected, the ABS module returns the solenoid valves in the HCU to their normal position, deactivates the hydraulic pump motor and stops sending the traction event and torque reduction messages. The PCM returns engine timing and fuel injectors to normal operation and the IPC extinguishes the stability-traction control indicator (sliding car icon).

ESC does not operate with the transmission in REVERSE. ESC is disabled if there is a wheel speed sensor, RCM stability sensor or steering angle sensor DTC present in the ABS module. ESC is also disabled if there is a communication error between the ABS module and the PSCM or the ABS module and the RCM. When ESC is disabled, the ABS module sends a message to the GWM over the HS-CAN2 which relays the message to the IPC over the HS-CAN3 to illuminate the stability-traction control OFF indicator (sliding car OFF icon).

DESCRIPTION AND OPERATION > ANTI-LOCK BRAKE SYSTEM (ABS) AND STABILITY CONTROL - SYSTEM OPERATION AND COMPONENT DESCRIPTION > DISABLING ADVANCETRAC

The AdvanceTrac feature is comprised of the traction control and ESC features.

Traction Control

The ABS module continuously monitors and compares the rotational speed of the drive wheels in relation to the non-driven wheels. When the drive wheels begin to spin faster than the non-driven wheels, the ABS module modulates brake pressure to the appropriate brake caliper(s) by opening and closing the appropriate solenoid valves inside the HCU while the hydraulic pump motor is activated. At the same time, the ABS module calculates how much engine torque reduction is required to eliminate the wheel slip and sends this torque reduction message along with a traction event message to the GWM over the HS-CAN2. The GWM sends the engine torque reduction message to the PCM over the HS-CAN1 and the traction event message to the IPC over the HS-CAN3. When the PCM receives the torque reduction message, it adjusts engine timing and decreases fuel injector pulses to reduce the engine torque to the requested level. When the IPC receives the traction event message it flashes the stability-traction control indicator (sliding car icon). Once the driven wheel speed returns to the desired speed, the ABS module returns the solenoid valves in the HCU to their normal position, deactivates the hydraulic pump motor and stops sending the traction event and torque reduction messages. The PCM returns engine timing and fuel injectors to normal operation and the IPC extinguishes the stability-traction control indicator (sliding car icon).

Traction control can be disabled through the use of the stability-traction control switch in the center of the instrument panel. This is independent of the ABS which cannot be disabled by the driver. When the driver disables traction control, the FCIM communicates traction control status to the GWM over the MS-CAN. The GWM sends the message to the ABS module over the HS-CAN2. The ABS module takes no further action in regards to traction control until the driver activates the function or until the ignition is cycled from OFF to ON.

Traction control is disabled if there is a wheel speed sensor or solenoid valve DTC present in the ABS module. Traction control is also disabled if there is a communication error between the ABS module and

the GWM. When traction control is disabled, the ABS module sends a message to the GWM over the HS-CAN2 which relays the message to the IPC over the HS-CAN3 to illuminate the stability-traction control OFF indicator (sliding car OFF icon).

Electronic Stability Control (ESC)

The ABS module continuously monitors the vehicle motion relative to the intended course. This is done by using sensors to compare the steering wheel sensor messages and the yaw rate sensor messages with the actual vehicle motion. The ABS module receives the steering wheel sensor messages from the PSCM and the yaw rate sensor messages from the RCM, both messages are sent over the HS-CAN2. If the ABS module determines from the inputs the vehicle is unable to travel in the intended direction, it modulates the brake pressure to the appropriate brake caliper(s) by opening and closing the appropriate solenoid valves inside the HCU while the hydraulic pump motor is activated. At the same time the ABS module calculates how much engine torque reduction is required to reduce vehicle speed to help stabilize the vehicle and sends this torque reduction message, along with an ESC event message, to the GWM over the HS-CAN2. The GWM sends the torque reduction message to the PCM over the HS-CAN1 and the ESC event message to the IPC over the HS-CAN3. When the PCM receives the torque reduction message, it adjusts engine timing and decreases fuel injector pulses to reduce the engine torque to the requested level. When the IPC receives this message, it flashes the stability-traction control indicator (sliding car icon). Once the vehicle instability has been corrected, the ABS module returns the solenoid valves in the HCU to their normal position, deactivates the hydraulic pump motor and stops sending the traction event and torque reduction messages. The PCM returns engine timing and fuel injectors to normal operation and the IPC extinguishes the stability-traction control indicator (sliding car icon).

ESC does not operate with the transmission in REVERSE. ESC is disabled if there is a wheel speed sensor, RCM stability sensor or steering angle sensor DTC present in the ABS module. ESC is also disabled if there is a communication error between the ABS module and the PSCM or the ABS module and the RCM. When ESC is disabled, the ABS module sends a message to the GWM over the HS-CAN2 which relays the message to the IPC over the HS-CAN3 to illuminate the stability-traction control OFF indicator (sliding car OFF icon).

Disabling AdvanceTrac

The traction control feature can be disabled through the use of the stability-traction control switch, on some models the ESC feature can also be disabled. The ESC feature is disabled when REVERSE gear is selected or when the stability-traction control switch is pressed in the following manner:

- **Button pressed momentarily**

  : traction control is disabled, ESC is enabled.

- **Button pressed twice rapidly**

  : Sport mode is enabled (if equipped), traction control and ESC are enabled with modified intervention thresholds. Sport Mode is not available on vehicles equipped with Selectable Driving Modes.

- **Button pressed and held for more than 5 seconds**

  : AdvanceTrac off mode, traction control and ESC are both disabled.

- **Button pressed again after deactivation**

  : traction control and ESC are both enabled.

Regardless of the driver selected state of the AdvanceTrac feature, when the ignition is cycled from ON

to OFF and back to ON, both the traction control and the ESC are reset to enabled.

DESCRIPTION AND OPERATION > ANTI-LOCK BRAKE SYSTEM (ABS) AND STABILITY CONTROL - SYSTEM OPERATION AND COMPONENT DESCRIPTION > HILL START ASSIST

When the vehicle is stopped on an incline the ABS module holds the brake pressure for approximately 2 seconds while the driver transitions from the brake pedal to the accelerator pedal. This is accomplished by monitoring several HS-CAN messages and several sensors to determine if the vehicle is stopped and not parked, and if the vehicle is on an appropriate incline. The brake pedal message sent by the PCM and the wheel speed sensor inputs allow the ABS module to determine the vehicle has come to a complete stop. The transmission selector lever message sent by the PCM informs the ABS module the vehicle is not parked. The stability sensor messages sent by the RCM enable the ABS module to determine if the vehicle is on an appropriate incline. Once the above conditions have been met, the hill start assist feature automatically engages. As the driver releases the brake pedal, the ABS module commands the HCU to close the isolation valves which maintain the current brake system pressure, preventing the vehicle from rolling down the incline. Once the driver presses the accelerator pedal and the torque produced by the engine reaches a specific level, the ABS module gradually releases the brake pressure to make sure the vehicle is neither rolling back nor driving off until there is sufficient driving torque to move the vehicle forward (or backward if reversing up the incline). For vehicles with an automatic transmission the incline must be greater than 3.5 degrees (approximately a 6% grade), for vehicles with a manual transmission the incline must be greater than 1.5 degrees (approximately a 3% grade). On vehicles with a manual transmission the hill start assist feature can be disabled through the message center. On vehicles with an automatic transmission the hill start assist feature cannot be disabled by the driver.

DESCRIPTION AND OPERATION > ANTI-LOCK BRAKE SYSTEM (ABS) AND STABILITY CONTROL - SYSTEM OPERATION AND COMPONENT DESCRIPTION > SUPPLEMENTAL BRAKING ASSIST

The ABS module uses the HCU and hydraulic pump motor to help bring the vehicle to a safe, controlled stop in the event of severe vacuum loss in the brake booster. The ABS module continually monitors the vacuum in the brake booster through the use of a vacuum sensor. When the vacuum sensor indicates vacuum is below a predetermined level, a DTC is set in the ABS module. The ABS module sends a message to the GWM over the HS-CAN2 to illuminate the red brake warning indicator, the GWM relays this message to the IPC over the HS-CAN3. If a low vacuum condition occurs during a braking event or if the driver attempts to stop the vehicle with a low vacuum condition in the brake booster, the ABS module activates the hydraulic pump motor in the HCU to assist with vehicle braking.

On vehicles equipped with adaptive cruise control, the CCM monitors the area forward of the vehicle. When an object enters this area and closes the distance gap set by the driver, the CCM sends either an adaptive cruise control deceleration request or a collision avoidance deceleration request to the ABS module over the HS-CAN2. When the deceleration request message is received, the ABS module activates the hydraulic pump motor and solenoid valves in the HCU to slow the vehicle down to maintain the distance gap set by the driver. Once the distance gap set by the driver is achieved, the CCM stops sending the deceleration request message and the ABS module deactivates the hydraulic pump motor and solenoid valves in the HCU. If the CCM determines the amount of braking provided by the ABS module is insufficient, the CCM sends a forward collision avoidance braking request message to the

ABS module and warns the driver, both audibly and visually, through the use of the HUD. After receiving the braking request message, the ABS module waits for brake pedal input and at that time applies maximum braking assist using the hydraulic pump motor and the HCU.

Refer to: Cruise Control - System Operation and Component Description . Refer to: Collision Warning and Collision Avoidance System - System Operation and Component Description .

DESCRIPTION AND OPERATION > ANTI-LOCK BRAKE SYSTEM (ABS) AND STABILITY CONTROL - SYSTEM OPERATION AND COMPONENT DESCRIPTION > MYKEY® INTERACTION

Through the MyKey® feature, traction control and ESC can be configured to be always on or allow the driver to select traction control and ESC on or off. When MyKey® traction control feature is configured to be always on and a MyKey® restricted key is in use, the ABS module ignores any requests made by the driver to disable traction control or ESC. In addition, when MyKey® traction control feature is configured to be always on and a MyKey® restricted key is in use, Sport mode and AdvanceTrac Off mode are not available. Refer to Disabling AdvanceTrac for information on Sport mode and AdvanceTrac Off mode. Refer to the Owner's Literature for additional information on the MyKey® feature and settings.

DESCRIPTION AND OPERATION > ANTI-LOCK BRAKE SYSTEM (ABS) AND STABILITY CONTROL - SYSTEM OPERATION AND COMPONENT DESCRIPTION > STABILITY-TRACTION CONTROL INDICATOR (SLIDING CAR ICON)

Refer to: Instrument Panel Cluster (IPC) - System Operation and Component Description

DESCRIPTION AND OPERATION > ANTI-LOCK BRAKE SYSTEM (ABS) AND STABILITY CONTROL - SYSTEM OPERATION AND COMPONENT DESCRIPTION > STABILITY-TRACTION CONTROL DISABLED INDICATOR (SLIDING CAR OFF ICON)

Refer to: Instrument Panel Cluster (IPC) - System Operation and Component Description .

One or both of the stability-traction control indicators may illuminate as a result of momentary sensor disturbances due to environmental or driving conditions (including severe vehicle maneuvers or extreme off road usage). Once Illuminated, the indicator remains illuminated until the environmental or driving condition is no longer present and the ignition is cycled from ON to OFF and then back to ON again. If there are no other customer concerns, symptoms, indicators or Diagnostic Trouble Codes (DTCs), the stability-traction control indicator may have been illuminated due to these environmental or driving conditions.

DESCRIPTION AND OPERATION > ANTI-LOCK BRAKE SYSTEM (ABS) AND STABILITY CONTROL - SYSTEM OPERATION AND COMPONENT DESCRIPTION > SELECTABLE DRIVING MODES

The MODE switch in the center of the instrument panel allows the driver to change between 4 driving modes. These driving modes alter the throttle response, shift patterns, EPAS feel and stability control intervention thresholds. Toggling the switch causes the FCIM to send messages to the PCM, PSCM, ABS module and IPC message center. The IPC message center displays the current selected mode. The PCM, PSCM and ABS module respond to the message by modifying their operation according to a preprogrammed set of instructions.

- **Normal**

  : delivers a balanced combination of comfort, control and handling.

- **Snow-Wet**

  : provides increased handling, braking and control during poor weather conditions.

- **Sport**

  : provides increased steering, throttle and shift responses.

- **Track**

  : provides increased steering, throttle and shift responses as well as modifying the threshold for AdvanceTrac intervention.

One or more of the selectable drive modes is disabled if Diagnostic Trouble Codes (DTCs) are present in the PCM, PSCM or ABS module. If the selectable drive modes are disabled, the IPC message center displays Drive Mode Selection Not Available when the switch is toggled.

DESCRIPTION AND OPERATION > ANTI-LOCK BRAKE SYSTEM (ABS) AND STABILITY CONTROL - SYSTEM OPERATION AND COMPONENT DESCRIPTION > LAUNCH CONTROL

The launch control feature works in conjunction with the stability control system and PCM to maximize traction from a standing start acceleration in a straight line. Launch control enables a unique "drag start" traction control calibration designed for high grip surfaces. The system allows the driver to set and hold a desired launch RPM depending on tire temperature, surface condition or weather.

The driver activates and configures the launch control feature through the message center, see the Owner's Literature for specific information. The launch control system can only be activated when the stability control system is fully enabled. Once activated, the launch control feature remains ON until the driver deactivates it, the system does not reset when the ignition is cycled.

DESCRIPTION AND OPERATION > ANTI-LOCK BRAKE SYSTEM (ABS) AND STABILITY CONTROL - SYSTEM OPERATION AND COMPONENT DESCRIPTION > LINE LOCK

The line lock feature works in conjunction with the stability control system to "lock" the front brakes and allow the rear wheels to spin freely during throttle application to achieve maximum traction prior to use at a race track. The line lock feature is intended for use at race tracks only and should not be used on public roadways.

The driver initializes the line lock feature through the message center, see the Owner's Literature for specific information. Once initialized, the line lock feature **is not** activated and the vehicle brakes function normally. Line lock remains initialized up to 40 km/h (25 mph), once vehicle speed exceeds 40 km/h (25 mph) the line lock feature is automatically cancelled. Following initialization the line lock feature can be engaged, once engaged the ABS module closes isolation valves in the HCU to maintain the brake pressure in the front brake calipers while allowing the rear wheels to spin freely and a count-down timer begins. If the line lock feature is not used within this time limit or a vehicle condition requires the line lock feature to deactivate, the line lock feature is deactivated. Pressing the brake pedal while the line lock feature is activated automatically deactivates the line lock feature and normal brake function resumes.

Component Description

Anti-Lock Brake System (ABS) Module

The ABS module is attached directly to the HCU and is the electronic control unit for all of the ABS and stability control systems. The ABS module monitors all sensor inputs and all CAN messages relating to ABS and stability control, then directly controls the solenoid valves and the hydraulic pump motor in the HCU. The ABS module is available separately for service.

When a new ABS module is installed, it must be programmed with the vehicle configuration information and programmed with the latest level of module software. Refer to: MODULE CONFIGURATION .

When an ABS or stability control system fault has been corrected or a new component has been installed, the ABS module must be calibrated. The calibration procedure (IVD Initialization) is carried out using a diagnostic scan tool and is required for the stability control sensors to learn the zero-position of the vehicle. The calibration procedure requires the vehicle to be on a level surface and not moving.

Brake Booster Vacuum Sensor

The brake booster vacuum sensor is a piezoelectric device used by the ABS module to monitor the vacuum in the brake booster. The sensor is hardwired to the ABS module by 3 circuits. One circuit is for the 5 volt sensor supply, one circuit is for sensor ground and one circuit is for sensor output. The sensor output ranges from 0.2 volt to 4.9 volts, depending on the amount of vacuum in the booster.

Hydraulic Control Unit (HCU)

The HCU contains the solenoid valves, the hydraulic pump motor and the pressure sensor used by the ABS module for the various stability control systems. The ABS module and the HCU are attached directly together. The HCU is available separately for service.

Selectable Driving Modes Switch

The selectable driving modes switch is a momentary-contact, toggle style switch and is part of the FCIM. If a new switch is required, then a new FCIM must be installed.

Stability Control Sensors

The stability control sensors for the vehicle dynamic system consist of the yaw rate sensor, lateral accelerometer and longitudinal accelerometer. The sensors are housed in the RCM which sends sensor information to the ABS module over the HS-CAN2. If any of the sensors are defective, a new RCM must be installed.

- The yaw rate sensor measures the yaw angle which is the difference between the direction the vehicle is pointing when cornering and the direction the vehicle is actually moving.
- The longitudinal accelerometer measures the acceleration and deceleration of the vehicle as it

moves forward and backward.

- The lateral accelerometer measures the force created when a vehicle corners that tends to push a vehicle sideways.

Lateral acceleration has 2 forms. The first is the centrifugal acceleration generated when the vehicle travels around in a circle. The second is the acceleration due to gravity. On level ground there is no lateral acceleration due to gravity. However, if the vehicle is parked sideways on a bank or incline, the sensor measures some lateral acceleration due to gravity, even though the vehicle is not moving.

Stability-Traction Control OFF Switch

The stability-traction control OFF switch is either a momentary-contact, push-button style switch or a momentary-contact, toggle style switch depending on optional vehicle features. Regardless of switch type, the stability-traction control switch is part of the FCIM and if a new switch is required, then a new FCIM must be installed.

Steering Wheel Rotation Sensor

The steering wheel rotation sensor is part of the EPAS gear assembly. The steering wheel rotation speed, angle and direction of travel is calculated by the PSCM and is sent to the ABS module over the HS-CAN2.

Wheel Speed Sensors

All 4 wheel speed sensors are active (magneto resistive) sensors operating on the Hall-effect principle to generate a square wave signal proportional to the rotational speed of the wheel. Because these are active sensors, receiving voltage from the ABS module and sending a varying voltage back to the ABS module, they are able to detect much lower rotational speeds than passive (magnetic inductive) sensors. Each wheel speed sensor is connected to the ABS module by 2 circuits. One circuit provides voltage for sensor operation and the other circuit provides sensor input to the ABS module.

Wheel Speed Sensor Encoders

The front wheel speed senor encoders are non-magnetized, toothed rings pressed into the front wheel hub. The rear wheel speed sensor encoders are magnetized, toothed rings pressed onto the rear wheel hub. As the wheel hub rotates the wheel speed sensor is exposed to magnetic fields or alternating strength. The encoders are part of the wheel hubs and are serviced with the hubs.

DIAGNOSIS AND TESTING > ANTI-LOCK BRAKE SYSTEM (ABS) AND STABILITY CONTROL > DIAGNOSTIC TROUBLE CODE (DTC) CHARTS

DTC Charts

Diagnostics in this service information assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

ABS Module DTC Chart

DTC	Description	Action
B10DF:46	Master Cylinder Isolation Valve: Calibration / Parameter Memory	This DTC sets due to an internal failure of the ABS module or a

	Failure	calibration failure between the HCU and the ABS module. Using a diagnostic scan tool, CARRY OUT the Inlet Valve Calibration and then the Master Cylinder Isolation Calibration. CLEAR the DTC and REPEAT the self-test. If the DTC returns, REPEAT the 2 calibration routines making sure to FOLLOW the diagnostic scan tool directions. CLEAR the DTC and REPEAT the self-test. If the DTC returns, INSTALL a new ABS module. REFER to: Anti-Lock Brake System (ABS) Module .
C0001:01	TCS Control Channel "A" Valve 1: General Electrical Failure	This DTC indicates part of the ABS module has failed internally. CLEAR the DTC. REPEAT the self-test. If the DTC returns, INSTALL a new ABS module. REFER to: Anti-Lock Brake System (ABS) Module .
C0002:01	TCS Control Channel "A" Valve 2: General Electrical Failure	This DTC indicates part of the ABS module has failed internally. CLEAR the DTC. REPEAT the self-test. If the DTC returns, INSTALL a new ABS module. REFER to: Anti-Lock Brake System (ABS) Module .
C0003:01	TCS Control Channel "B" Valve 1: General Electrical Failure	This DTC indicates part of the ABS module has failed internally. CLEAR the DTC. REPEAT the self-test. If the DTC returns, INSTALL a new ABS module. REFER to: Anti-Lock Brake System (ABS) Module .
C0004:01	TCS Control Channel "B" Valve 2: General Electrical Failure	This DTC indicates part of the ABS module has failed internally. CLEAR the DTC. REPEAT the self-test. If the DTC returns, INSTALL a new ABS module. REFER to: Anti-Lock Brake System (ABS) Module .

C0010:01	Left Front Inlet Control: General Electrical Failure	This DTC indicates part of the ABS module has failed internally. CLEAR the DTC. REPEAT the self-test. If the DTC returns, INSTALL a new ABS module. REFER to: Anti-Lock Brake System (ABS) Module .
C0011:01	Left Front Outlet Control: General Electrical Failure	This DTC indicates part of the ABS module has failed internally. CLEAR the DTC. REPEAT the self-test. If the DTC returns, INSTALL a new ABS module. REFER to: Anti-Lock Brake System (ABS) Module .
C0014:01	Right Front Inlet Control: General Electrical Failure	This DTC indicates part of the ABS module has failed internally. CLEAR the DTC. REPEAT the self-test. If the DTC returns, INSTALL a new ABS module. REFER to: Anti-Lock Brake System (ABS) Module .
C0015:01	Right Front Outlet Control: General Electrical Failure	This DTC indicates part of the ABS module has failed internally. CLEAR the DTC. REPEAT the self-test. If the DTC returns, INSTALL a new ABS module. REFER to: Anti-Lock Brake System (ABS) Module .
C0018:01	Left Rear Inlet Control: General Electrical Failure	This DTC indicates part of the ABS module has failed internally. CLEAR the DTC. REPEAT the self-test. If the DTC returns, INSTALL a new ABS module. REFER to: Anti-Lock Brake System (ABS) Module .
C0019:01	Left Rear Outlet Control: General Electrical Failure	This DTC indicates part of the ABS module has failed internally. CLEAR the DTC. REPEAT the self-test. If the DTC returns, INSTALL a new ABS module. REFER to: Anti-Lock Brake System (ABS) Module .

C001C:01	Right Rear Inlet Control: General Electrical Failure	This DTC indicates part of the ABS module has failed internally. CLEAR the DTC. REPEAT the self-test. If the DTC returns, INSTALL a new ABS module. REFER to: Anti-Lock Brake System (ABS) Module .
C001D:01	Right Rear Outlet Control: General Electrical Failure	This DTC indicates part of the ABS module has failed internally. CLEAR the DTC. REPEAT the self-test. If the DTC returns, INSTALL a new ABS module. REFER to: Anti-Lock Brake System (ABS) Module .
C0020:11	ABS Pump Motor Control: Circuit Short To Ground	GO to Pinpoint Test H
C0020:12	ABS Pump Motor Control: Circuit Short To Battery	GO to Pinpoint Test H
C0020:13	ABS Pump Motor Control: Circuit Open	GO to Pinpoint Test H
C0020:71	ABS Pump Motor Control: Actuator Stuck	GO to Pinpoint Test H
C0030:07	Left Front Tone Wheel: Mechanical Failure	GO to Pinpoint Test B
C0031:07	Left Front Wheel Speed Sensor: Mechanical Failure	GO to Pinpoint Test B
C0031:11	Left Front Wheel Speed Sensor: Circuit Short to Ground	GO to Pinpoint Test K
C0031:15	Left Front Wheel Speed Sensor: Circuit Short to Battery or Open	GO to Pinpoint Test K
C0031:29	Left Front Wheel Speed Sensor: Signal Invalid	GO to Pinpoint Test B
C0031:2F	Left Front Wheel Speed Sensor: Signal Erratic	GO to Pinpoint Test B
C0031:4A	Left Front Wheel Speed Sensor: Incorrect Component Installed	DIAGNOSE all other wheel speed sensor Diagnostic Trouble Codes (DTCs) before diagnosing **any** "Incorrect Component Installed" wheel speed sensor Diagnostic Trouble Codes (DTCs). INSTALL a new wheel speed sensor. REFER to: Front Wheel Speed Sensor .

C0031:64	Left Front Wheel Speed Sensor: Signal Plausibility Failure	GO to Pinpoint Test B
C0033:07	Right Front Tone Wheel: Mechanical Failure	GO to Pinpoint Test B
C0034:07	Right Front Wheel Speed Sensor: Mechanical Failure	GO to Pinpoint Test B
C0034:11	Right Front Wheel Speed Sensor: Circuit Short to Ground	GO to Pinpoint Test K
C0034:15	Right Front Wheel Speed Sensor: Circuit Short to Battery or Open	GO to Pinpoint Test K
C0034:29	Right Front Wheel Speed Sensor: Signal Invalid	GO to Pinpoint Test B
C0034:2F	Right Front Wheel Speed Sensor: Signal Erratic	GO to Pinpoint Test B
C0034:4A	Right Front Wheel Speed Sensor: Incorrect Component Installed	DIAGNOSE all other wheel speed sensor Diagnostic Trouble Codes (DTCs) before diagnosing **any** "Incorrect Component Installed" wheel speed sensor Diagnostic Trouble Codes (DTCs). INSTALL a new wheel speed sensor. REFER to: Front Wheel Speed Sensor .
C0034:64	Right Front Wheel Speed Sensor: Signal Plausibility Failure	GO to Pinpoint Test B
C0036:07	Left Rear Tone Wheel: Mechanical Failure	GO to Pinpoint Test B
C0037:07	Left Rear Wheel Speed Sensor: Mechanical Failure	GO to Pinpoint Test B
C0037:11	Left Rear Wheel Speed Sensor: Circuit Short to Ground	GO to Pinpoint Test L
C0037:15	Left Rear Wheel Speed Sensor: Circuit Short to Battery or Open	GO to Pinpoint Test L
C0037:29	Left Rear Wheel Speed Sensor: Signal Invalid	GO to Pinpoint Test B
C0037:2F	Left Rear Wheel Speed Sensor: Signal Erratic	GO to Pinpoint Test B
C0037:4A	Left Rear Wheel Speed Sensor: Incorrect Component Installed	DIAGNOSE DTC U2100:00 and all other wheel speed sensor Diagnostic Trouble Codes (DTCs) before diagnosing DTC C0037:4A. INSTALL a new wheel speed sensor. REFER to: Rear Wheel

		Speed Sensor .
C0037:64	Left Rear Wheel Speed Sensor: Signal Plausibility Failure	GO to Pinpoint Test B
C0039:07	Right Rear Tone Wheel: Mechanical Failure	GO to Pinpoint Test B
C003A:07	Right Rear Wheel Speed Sensor: Mechanical Failure	GO to Pinpoint Test B
C003A:11	Right Rear Wheel Speed Sensor: Circuit Short to Ground	GO to Pinpoint Test L
C003A:15	Right Rear Wheel Speed Sensor: Circuit Short to Battery or Open	GO to Pinpoint Test L
C003A:29	Right Rear Wheel Speed Sensor: Signal Invalid	GO to Pinpoint Test B
C003A:2F	Right Rear Wheel Speed Sensor: Signal Erratic	GO to Pinpoint Test B
C003A:4A	Right Rear Wheel Speed Sensor: Incorrect Component Installed	DIAGNOSE DTC U2100:00 and all other wheel speed sensor Diagnostic Trouble Codes (DTCs) before diagnosing DTC C003A:4A. INSTALL a new wheel speed sensor. REFER to: Rear Wheel Speed Sensor .
C003A:64	Right Rear Wheel Speed Sensor: Signal Plausibility Failure	GO to Pinpoint Test B
C0040:64	Brake Pedal Switch "A": Signal Plausibility Failure	GO to Pinpoint Test C
C0044:28	Brake Pressure Sensor "A": Signal Bias Level Out of Range / Zero Adjustment Failure	DIAGNOSE DTC C0040:64 before diagnosing this DTC. If DTC C0040:64 is not present, CLEAR the DTC. CYCLE the ignition from ON to OFF and back to ON. REPEAT the self-test. If DTC C0044:28 returns, VERIFY all ABS module-to- HCU fasteners are tightened to their correct torque specifications. If all fasteners are tightened to their correct torque specifications, INSTALL a new ABS module. REFER to: Anti-Lock Brake System (ABS) Module .
C0044:47	Brake Pressure Sensor "A": Watchdog / Safety Failure	DIAGNOSE DTC C0040:64 before diagnosing this DTC. If DTC C0040:64 is not present,

		CLEAR the DTC. CYCLE the ignition from ON to OFF and back to ON. REPEAT the self-test. If DTC C0044:47 returns, VERIFY all ABS module-to- HCU fasteners are tightened to their correct torque specifications. If all fasteners are tightened to their correct torque specifications, INSTALL a new ABS module. REFER to: Anti-Lock Brake System (ABS) Module .
C0044:49	Brake Pressure Sensor "A": Internal Electronic Failure	DIAGNOSE DTC C0040:64 before diagnosing this DTC. If DTC C0040:64 is not present, CLEAR the DTC. CYCLE the ignition from ON to OFF and back to ON. REPEAT the self-test. If DTC C0044:49 returns, VERIFY all ABS module-to- HCU fasteners are tightened to their correct torque specifications. If all fasteners are tightened to their correct torque specifications, INSTALL a new ABS module and HCU assembly. REFER to: Hydraulic Control Unit (HCU) .
C0044:51	Brake Pressure Sensor "A": Not Programmed	DIAGNOSE DTC C0040:64 before diagnosing this DTC. If DTC C0040:64 is not present, CLEAR the DTC. CYCLE the ignition from ON to OFF and back to ON. REPEAT the self-test. If DTC C0044:51 returns, VERIFY all ABS module-to- HCU fasteners are tightened to their correct torque specifications. If all fasteners are tightened to their correct torque specifications, INSTALL a new ABS module. REFER to: Anti-Lock Brake System (ABS) Module .
C0044:64	Brake Pressure Sensor "A": Signal Plausibility Failure	DIAGNOSE DTC C0040:64 before diagnosing this DTC. If DTC C0040:64 is not present, CLEAR the DTC. CYCLE the ignition from ON to OFF and back to ON. REPEAT the self-test. If DTC C0044:64 returns, VERIFY all ABS module-to- HCU fasteners

		are tightened to their correct torque specifications. If all fasteners are tightened to their correct torque specifications, INSPECT the brake tubes and connections for damage and leaks. REPAIR or INSTALL new brake tubes as necessary. If brake tubes and connections are OK and there are no brake fluid leaks, BLEED the brake system. REFER to: Brake System Pressure Bleeding . CYCLE the ignition from ON to OFF and back to ON. CARRY OUT the ABS module self-test. If this DTC returns, INSTALL a new ABS module. REFER to: Anti-Lock Brake System (ABS) Module .
C0044:8F	Brake Pressure Sensor "A": Erratic	DIAGNOSE DTC C0040:64 before diagnosing this DTC. If DTC C0040:64 is not present, CLEAR the DTC. CYCLE the ignition from ON to OFF and back to ON. REPEAT the self-test. If DTC C0044:8F returns, VERIFY all ABS module-to- HCU fasteners are tightened to their correct torque specifications. If all fasteners are tightened to their correct torque specifications, INSTALL a new ABS module and HCU assembly. REFER to: Hydraulic Control Unit (HCU) .
C0047:01	Brake Booster Pressure Sensor: General Electric Failure	GO to Pinpoint Test M
C0047:26	Brake Booster Pressure Sensor: Signal Rate of Change Below Threshold	GO to Pinpoint Test M
C0047:27	Brake Booster Pressure Sensor: Signal Rate of Change Above Threshold	GO to Pinpoint Test M
C0051:62	Steering Wheel Position Sensor: Signal Compare Failure	GO to Pinpoint Test J
C0051:64	Steering Wheel Position Sensor: Signal Plausibility Failure	GO to Pinpoint Test J
C0051:67	Steering Wheel Position Sensor: Signal Incorrect After Event	GO to Pinpoint Test J

C0051:85	Steering Wheel Position Sensor: Signal Above Allowable Range	GO to Pinpoint Test J
C0061:28	Lateral Acceleration Sensor: Signal Bias Level Out of Range / Zero Adjustment Failure	GO to Pinpoint Test G
C0061:2F	Lateral Acceleration Sensor: Signal Erratic	GO to Pinpoint Test G
C0061:64	Lateral Acceleration Sensor: Signal Plausibility Failure	GO to Pinpoint Test G
C0062:28	Longitudinal Acceleration Sensor: Signal Bias Level Out of Range / Zero Adjustment Failure	GO to Pinpoint Test G
C0062:54	Longitudinal Acceleration Sensor: Missing Calibration	This DTC sets if the stability sensors in the RCM have not been calibrated or the calibration has been lost. CARRY OUT the IVD Initialization routine, FOLLOW the diagnostic scan tool instructions. If the module fails the initialization routine, VERIFY the RCM is installed correctly and the fasteners are tightened to specifications. REINSTALL the RCM or INSTALL a new RCM as necessary. REFER to: Restraints Control Module (RCM) . If the RCM is OK, CARRY OUT the RCM self-test. RETRIEVE and RECORD any Diagnostic Trouble Codes (DTCs). REFER to: Airbag Supplemental Restraint System (SRS)). If the module passes the calibration routine, CLEAR the DTC. CYCLE the ignition from ON to OFF and back to ON. CARRY OUT the ABS module self-test. If the DTC returns, INSTALL a new ABS module. REFER to: Anti-Lock Brake System (ABS) Module .
C0062:64	Longitudinal Acceleration Sensor: Signal Plausibility Failure	GO to Pinpoint Test G
C0062:76	Longitudinal Acceleration Sensor: Wrong Mounting Position	Due to the nature of the longitudinal acceleration sensor, the RCM must be installed in the correct orientation to the centerline of the vehicle. This

		DTC sets if the RCM has been installed in the wrong position. VERIFY the RCM is installed correctly and the fasteners are tightened to specifications. REINSTALL the RCM or INSTALL a new RCM as necessary. REFER to: Restraints Control Module (RCM) . If the RCM is OK, CARRY OUT the RCM self-test. RETRIEVE and RECORD any Diagnostic Trouble Codes (DTCs). REFER to: Airbag Supplemental Restraint System (SRS) .
C0063:28	Yaw Rate Sensor: Signal Bias Level Out of Range / Zero Adjustment Failure	GO to Pinpoint Test G
C0063:2F	Yaw Rate Sensor: Signal Erratic	GO to Pinpoint Test G
C0063:64	Yaw Rate Sensor: Signal Plausibility Failure	GO to Pinpoint Test G
C0064:28	Roll Rate Sensor: Signal Bias Level Out of Range / Zero Adjustment Failure	GO to Pinpoint Test G
C0064:64	Roll Rate Sensor: Signal Plausibility Failure	GO to Pinpoint Test G
C006B:00	Stability System Active Too Long: No Sub Type Information	GO to Pinpoint Test O
C0072:68	Brake Temperature Too High: Event Information	This DTC is set due to HS-CAN concerns, CCM concerns or a hard reset of the ABS module (battery disconnected or ignition ON with ABS module electrical connector disconnected). When this DTC is set, the ABS module disables adaptive cruise control until the temperature is returned to normal. The DTC **does not** illuminate any warning indicators but the message center displays ADAPTIVE CRUISE CONTROL NOT AVAILABLE. RETRIEVE and DIAGNOSE all CAN Diagnostic Trouble Codes (DTCs) in the ABS module and the CCM. REFER to DTC Chart: ABS Module in Diagnostic Trouble Code (DTC) Charts or REFER to:

		Cruise Control - Vehicles With: Adaptive Cruise Control. If there are no CAN Diagnostic Trouble Codes (DTCs) present, RETRIEVE and DIAGNOSE all CCM Diagnostic Trouble Codes (DTCs) **other than** C0072:00. REFER to: Cruise Control - Vehicles With: Adaptive Cruise Control. If DTC C0072:00 is the only DTC present in the CCM or if DTC C0072:68 is the only DTC present in the ABS module, ALLOW the vehicle to cool down for 30 minutes. CLEAR all ABS module Diagnostic Trouble Codes (DTCs) and REPEAT the self-test. If ABS module DTC C0072:68 returns, INSTALL a new CCM. REFER to: Cruise Control Module (CCM) - Vehicles With: Adaptive Cruise Control.
C1015:08	Vacuum Supply: Bus Signal / Message Failure	GO to Pinpoint Test M
C1015:7A	Vacuum Supply: Fluid Leak or Seal Failure	GO to Pinpoint Test R
C1015:7B	Vacuum Supply: Low Fluid Level	GO to Pinpoint Test R
C1020:00	Brake System Fill Not Complete: No Sub-Type Information	This DTC is pre-set in a new ABS module and HCU assembly and can only be cleared when the Brake System Service Bleed is successfully carried out. CARRY OUT the Brake System Service Bleed. REFER to: Brake System Pressure Bleeding .
C1109:64	Vehicle Dynamics Control Switch: Signal Plausibility Failure	This DTC sets in continuous memory and on-demand when the information in the stability-traction control switch message from the FCIM is implausible (does not match other sensor inputs or messages). This indicates a concern with the MS-CAN, HS-CAN2, the GWM or the FCIM. RETRIEVE and DIAGNOSE all GWM and FCIM Diagnostic Trouble Codes (DTCs). For GWM Diagnostic Trouble

		Codes (DTCs), Refer to: MODULE COMMUNICATIONS NETWORK . For FCIM Diagnostic Trouble Codes (DTCs), Refer to: INFORMATION AND ENTERTAINMENT SYSTEM - Vehicles With: AM/FM/CD/SYNC. REFER to:INFORMATION AND ENTERTAINMENT SYSTEM - Vehicles With Touchscreen Display.
C1137:64	Reverse Gear Switch: Signal Plausibility Failure	This DTC sets when the reverse gear message sent from the PCM indicates the transmission is in REVERSE when other stability control inputs received by the ABS module indicate the vehicle is moving forward. VERIFY the reverse lamps operate correctly. If the lamps do not operate correctly, Refer to: Reversing Lamps (417-01 Exterior Lighting, Diagnosis and Testing). If the reverse lamps operate correctly, RETRIEVE and REPAIR all non-network Diagnostic Trouble Codes (DTCs) in the PCM. REFER to: ELECTRONIC ENGINE CONTROLS - 2.3L ECOBOOST (231KW/314PS) . REFER to: ELECTRONIC ENGINE CONTROLS - 3.7L DURATEC (227KW/301PS) . REFER to: ELECTRONIC ENGINE CONTROLS - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS.
C1A08:1C	Pressure Sensor Supply: Circuit Voltage Out of Range	The brake system pressure sensor is supplied voltage by the ABS module. The ABS module monitors this output and sets this DTC when the voltage is out of range. DIAGNOSE DTC U3003:16 or U3003:17, before diagnosing C1A08:1C. If DTC U3003:16 or U3003:17 is not present, make sure all ABS module-to- HCU fasteners are

		tightened to their correct torque specifications. If all fasteners are tightened to their correct torque specifications, INSTALL a new ABS module. REFER to: Anti-Lock Brake System (ABS) Module .
C1B14:11	Sensor Supply Voltage "A": Circuit Short to Ground	GO to Pinpoint Test M
C1B14:12	Sensor Supply Voltage "A": Circuit Short to Battery	GO to Pinpoint Test M
C1B15:1C	Sensor Supply Voltage "B": Circuit Voltage Out of Range	GO to Pinpoint Test M
P0942:46	Hydraulic Pressure Unit: Calibration / Parameter Memory Failure	The ABS module and HCU should not be swapped between different vehicles. This DTC sets when the identification data stored in the ABS module does not match the identification data from the HCU. Using a diagnostic scan tool, CARRY OUT the Inlet Valve Calibration routine and then the Master Cylinder Isolation Calibration routine. CLEAR the DTC and REPEAT the self-test. If the DTC returns, INSTALL a new ABS module and HCU assembly. REFER to: Hydraulic Control Unit (HCU) .
P0942:49	Hydraulic Pressure Unit: Internal Electronic Failure	The ABS module and HCU should not be swapped between different vehicles. This DTC sets when the identification data stored in the ABS module does not match the identification data from the HCU. Using a diagnostic scan tool, CARRY OUT the Inlet Valve Calibration routine and then the Master Cylinder Isolation Calibration routine. CLEAR the DTC and REPEAT the self-test. If the DTC returns, INSTALL a new ABS module and HCU assembly. REFER to: Hydraulic Control Unit (HCU) .
P193B:86	Throttle / Pedal Signal: Signal Invalid	This DTC sets in continuous memory and on-demand when the information in the accelerator pedal position message from the

		PCM is "faulted" instead of "OK". This indicates a concern with the accelerator pedal sensor, wiring or PCM. If ABS module Diagnostic Trouble Codes (DTCs) U0100:00 or U0401:00 are **also** present, DIAGNOSE those Diagnostic Trouble Codes (DTCs) before diagnosing DTC P193B:86. If ABS module Diagnostic Trouble Codes (DTCs) U0100:00 or U0401:00 are **not** present, RETRIEVE and RECORD all PCM Diagnostic Trouble Codes (DTCs). REFER to: ELECTRONIC ENGINE CONTROLS - 2.3L ECOBOOST (231KW/314PS) . REFER to: ELECTRONIC ENGINE CONTROLS - 3.7L DURATEC (227KW/301PS) . REFER to: ELECTRONIC ENGINE CONTROLS - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS.
U0001:88	High Speed CAN Communication Bus: Bus Off	A HS-CAN fault was present at a point in time. The fault is not currently present since the module is communicating with the diagnostic scan tool. CLEAR the DTC. REPEAT the Network Test with the diagnostic scan tool. VERIFY the integrity of the connectors and wiring. Refer to MODULE COMMUNICATIONS NETWORK for schematic and connector information.
U0100:00	Lost Communication With ECM / PCM "A": No Sub Type Information	GO to Pinpoint Test I
U0104:00	Lost Communication With Cruise Control Module: No Sub Type Information	GO to Pinpoint Test P
U0131:00	Lost Communication With Power Steering Control Module: No Sub Type Information	GO to Pinpoint Test Q
U0140:00	Lost Communication With Body Control Module: No Sub Type Information	GO to Pinpoint Test D

U0151:00	Lost Communication With Restraints Control Module: No Sub Type Information	GO to Pinpoint Test S
U0300:51	Internal Control Module Software Incompatibility: Not Programmed	CHECK vehicle service history for recent service actions related to the ABS module. This DTC sets due to incomplete or improper flash programming procedures. If there have been recent service actions with the ABS module, REPEAT the programming procedure as directed by the diagnostic scan tool.
U0401:00	Invalid Data Received From ECM / PCM "A": No Sub Type Information	GO to Pinpoint Test I
U0405:41	Invalid Data Received From Cruise Control Module: General Checksum Failure	GO to Pinpoint Test P
U0405:82	Invalid Data Received From Cruise Control Module: Alive / Sequence Counter Incorrect / Not Updated	GO to Pinpoint Test P
U0420:41	Invalid Data Received From PSCM: General Checksum Failure	GO to Pinpoint Test Q
U0420:82	Invalid Data Received From PSCM: Alive / Sequence Counter Incorrect / Not Updated	GO to Pinpoint Test Q
U0420:86	Invalid Data Received From PSCM: Signal Invalid	GO to Pinpoint Test Q
U0422:00	Invalid Data Received From Body Control Module: No Sub Type Information	GO to Pinpoint Test D
U0452:41	Invalid Data Received From Restraints Control Module: General Checksum Failure	The ABS module uses other module messages and sensor input to calculate the yaw rate, lateral acceleration and longitudinal acceleration to verify the RCM messages. If the yaw rate, lateral acceleration and longitudinal acceleration data received from the RCM do not match the calculated values more than 2 times, this DTC is set. If ABS module Diagnostic Trouble Codes (DTCs) C0061:xx,

		C0062:xx, C0063:xx or C0064:xx are present, DIAGNOSE them before diagnosing U0452:41. Using a diagnostic scan tool, RETRIEVE and DIAGNOSE all RCM Diagnostic Trouble Codes (DTCs). REFER to: Airbag Supplemental Restraint System (SRS) . If there are no Diagnostic Trouble Codes (DTCs) in the RCM, the condition may be caused by an intermittent concern. SET the ignition to OFF. WAIT one minutes, then DISCONNECT and INSPECT all RCM electrical connectors and related in-line connectors for corrosion, bent pins, pushed-out pins and spread terminals. REPAIR as necessary.
U0452:86	Invalid Data Received From Restraints Control Module: Signal Invalid	Along with the yaw rate, lateral acceleration and longitudinal acceleration data the RCM also sends a rolling counter message the ABS module uses to validate the RCM messages. If the rolling counter indicates an invalid signal more than 4 times, this DTC is set. If ABS module Diagnostic Trouble Codes (DTCs) C0061:xx, C0062:xx, C0063:xx or C0064:xx are present, DIAGNOSE them before diagnosing U0452:86. Using a diagnostic scan tool, RETRIEVE and DIAGNOSE all RCM Diagnostic Trouble Codes (DTCs). REFER to: Airbag Supplemental Restraint System (SRS) . If there are no Diagnostic Trouble Codes (DTCs) in the RCM, the condition may be caused by an intermittent concern. SET the ignition to OFF. WAIT one minutes, then DISCONNECT and INSPECT all RCM electrical connectors and related in-line connectors for corrosion, bent pins, pushed-out pins and spread terminals. REPAIR as necessary.

U2007:46	Valve(s): Calibration / Parameter Memory Failure	This DTC sets due to an internal failure of the ABS module or due to a calibration failure between the HCU and the ABS module. Using a diagnostic scan tool, CARRY OUT the Inlet Valve Calibration routine and then the Master Cylinder Isolation Calibration routine. CLEAR the DTC and REPEAT the self-test. If the DTC returns, INSTALL a new ABS module. REFER to: Anti-Lock Brake System (ABS) Module .
U2007:62	Valve(s): Signal Compare Failure	This DTC sets due to an internal failure of the ABS module or due to a calibration failure between the HCU and the ABS module. CLEAR the DTC and REPEAT the self-test. If the DTC returns, INSTALL a new ABS module. REFER to: Anti-Lock Brake System (ABS) Module .
U2024:51	Control Module Cal-Config Data: Not Programmed	This DTC is only present when a new ABS module is installed, the ABS module is flashed or the ABS module is reconfigured. Using a diagnostic scan tool, CONFIGURE the ABS module, FOLLOW all diagnostic scan tool instructions. REFER to: MODULE CONFIGURATION . Using a diagnostic scan tool, CARRY OUT the ABS module self-test to clear the DTC.
U2100:00	Initial Configuration Not Complete: No Sub Type Information	This DTC is pre-set in a new ABS module and clears automatically when the ABS module is configured correctly. CHECK the service history for recent service actions related to the ABS module. This DTC sets due to incomplete or improper PMI procedures. If there have been recent service actions with the ABS module, REPEAT the PMI procedure as directed by the diagnostic scan tool. If there have been no recent

		service actions, INSTALL a new ABS module to correct the failure to retain the configuration data. REFER to: Anti-Lock Brake System (ABS) Module .
U2101:00	Control Module Configuration Incompatible: No Sub Type Information	CHECK the service history for recent service actions related to the ABS module. This DTC sets due to incomplete or improper PMI procedures. If there have been recent service actions with the ABS module, REPEAT the PMI procedure as directed by the diagnostic scan tool. If there have been no recent service actions, INSTALL a new ABS module to correct the failure to retain the configuration data. REFER to: Anti-Lock Brake System (ABS) Module .
U2107:00	Collision Mitigation By Braking: No Sub Type Information	This DTC sets when the collision deceleration message from the CCM is sent too often or the duration of the message is too long. This is most likely caused by a network communication concern or an internal failure of the CCM. RETRIEVE and REPAIR all Diagnostic Trouble Codes (DTCs) in the CCM. REFER to: Cruise Control .
U2107:68	Collision Mitigation By Braking: Event Information	This DTC sets when the vehicle deceleration detected is implausibly high when compared to the vehicle deceleration requested by the CCM. This is most likely caused by an abrupt stop of the vehicle due to a collision, an extreme driving situation, a mechanical or electrical failure of the cruise control system or an internal failure of the ABS module. RETRIEVE and REPAIR all other ABS module Diagnostic Trouble Codes (DTCs) before diagnosing DTC U2107:68. If there are no other ABS module Diagnostic Trouble Codes (DTCs)

		present, RETRIEVE and REPAIR all Diagnostic Trouble Codes (DTCs) in the CCM. REFER to: Cruise Control . If there are no Diagnostic Trouble Codes (DTCs) in the CCM, INSPECT the vehicle braking system for a dragging condition or another condition that may cause rapid vehicle deceleration.
U2108:00	Adaptive Cruise Control: No Sub Type Information	In order to detect errors in the CCM, the cruise control system is momentarily shut off during a driver braking event. This DTC sets when the ABS module detects cruise control system activation during a driver braking event. This is most likely caused by a network communication concern or an internal failure of the CCM. RETRIEVE and REPAIR all Diagnostic Trouble Codes (DTCs) in the CCM. REFER to: Cruise Control .
U2108:68	Adaptive Cruise Control: Event Information	The ABS module monitors vehicle deceleration during adaptive cruise control braking events to prevent an over-braking situation. This DTC sets when vehicle deceleration is greater than 3.2 meters per second FOOTNOTE(2). This is most likely caused by an abrupt stop of the vehicle due to a collision, an extreme driving situation, a mechanical or electrical failure of the adaptive cruise control system or an internal failure of the ABS module. RETRIEVE and REPAIR all other ABS module Diagnostic Trouble Codes (DTCs) before diagnosing DTC U2108:68. If there are no other ABS module Diagnostic Trouble Codes (DTCs) present, RETRIEVE and REPAIR all Diagnostic Trouble Codes (DTCs) in the CCM. REFER to: Cruise Control . If there are no Diagnostic Trouble

		Codes (DTCs) in the CCM, INSPECT the vehicle braking system for a dragging condition or another condition that may cause rapid vehicle deceleration.
U2200:00	Control Module Configuration Memory Corrupt: No Sub Type Information	CHECK the service history for recent service actions related to the ABS module. This DTC sets due to incomplete or improper PMI procedures. If there have been recent service actions with the ABS module, REPEAT the PMI procedure as directed by the diagnostic scan tool. If there have been no recent service actions, INSTALL a new ABS module to correct the failure to retain the configuration data. REFER to: Anti-Lock Brake System (ABS) Module .
U3000:49	Control Module: Internal Electronic Failure	CLEAR the Diagnostic Trouble Codes (DTCs). CARRY OUT the ABS module self-test. RETRIEVE and RECORD all Diagnostic Trouble Codes (DTCs). If the DTC returns INSTALL a new ABS module. REFER to: Anti-Lock Brake System (ABS) Module .
U3002:62	Vehicle Identification Number: Signal Compare Failure	GO to Pinpoint Test N
U3003:08	Battery Voltage: Bus Signal / Message Failure	GO to Pinpoint Test A
U3003:16	Battery Voltage: Circuit Voltage Below Threshold	
U3003:17	Battery Voltage: Circuit Voltage Above Threshold	GO to Pinpoint Test F
U300A:29	Ignition Switch: Signal Invalid	GO to Pinpoint Test A

Diagnostics in this service information assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

PCM DTC Chart

DTC	Description	Action
P0555	Brake Booster Pressure Sensor Circuit	This DTC sets if the information in the brake booster vacuum sensor

		message is outside of the programmed set of parameters. This is most likely due to vacuum sensor concerns, wiring harness concerns or vehicle communication concerns. Using a diagnostic scan tool, CARRY OUT the ABS module self-test. DIAGNOSE any ABS module Diagnostic Trouble Codes (DTCs).
P0556	Brake Booster Pressure Sensor Circuit Range / Performance	This DTC sets if the information in the brake booster vacuum sensor message is outside of the programmed set of parameters. This is most likely due to vacuum sensor concerns, wiring harness concerns or vehicle communication concerns. Using a diagnostic scan tool, CARRY OUT the ABS module self-test. DIAGNOSE any ABS module Diagnostic Trouble Codes (DTCs).
P0557	Brake Booster Pressure Sensor Circuit Low	This DTC sets if the information in the brake booster vacuum sensor message contains a value lower than allowed by the programmed set of parameters. This is most likely due to vacuum sensor concerns, wiring harness concerns or vehicle communication concerns. Using a diagnostic scan tool, CARRY OUT the ABS module self-test. DIAGNOSE any ABS module Diagnostic Trouble Codes (DTCs).
P0558	Brake Booster Pressure Sensor Circuit High	This DTC sets if the information in the brake booster vacuum sensor message contains a value higher than allowed by the programmed set of parameters. This is most likely due to vacuum sensor concerns, wiring harness concerns or vehicle communication concerns. Using a diagnostic scan tool, CARRY OUT the ABS module self-test. DIAGNOSE any ABS module Diagnostic Trouble Codes (DTCs).
P0559	Brake Booster Pressure Sensor Circuit Intermittent	This DTC sets if the information in the brake booster vacuum sensor message is outside of the programmed set of parameters. This is most likely due to vacuum sensor concerns, wiring harness concerns

		or vehicle communication concerns. Using a diagnostic scan tool, CARRY OUT the ABS module self-test. DIAGNOSE any ABS module Diagnostic Trouble Codes (DTCs).
P1501	Vehicle Speed Sensor Out of Self Test Range	This DTC sets if the information in the wheel speed sensor message is outside of the programmed set of parameters. This is most likely due to wheel speed sensor concerns, wiring harness concerns, wheel speed sensor encoder concerns or vehicle communication concerns. Using a diagnostic scan tool, CARRY OUT the ABS module self-test. DIAGNOSE any ABS module Diagnostic Trouble Codes (DTCs).
-	All Other PCM Diagnostic Trouble Codes (DTCs)	REFER to: ELECTRONIC ENGINE CONTROLS - 2.3L ECOBOOST (231KW/314PS) . REFER to: ELECTRONIC ENGINE CONTROLS - 3.7L DURATEC (227KW/301PS) . REFER to: ELECTRONIC ENGINE CONTROLS - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS.

Symptom Chart

Symptom Chart: Anti-Lock Brake System (ABS) and Stability Control

Diagnostics in this service information assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

DIAGNOSIS AND TESTING > ANTI-LOCK BRAKE SYSTEM (ABS) AND STABILITY CONTROL > SYMPTOM CHART

Symptom Chart: Anti-Lock Brake System (ABS) and Stability Control

Diagnostics in this service information assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

Symptom Chart

Condition	Possible Sources	Actions
A module does not respond to the diagnostic scan tool	Fuse Wiring, terminals or connectors ABS module concern	REFER to: MODULE COMMUNICATIONS NETWORK .

The brake warning indicator is always or never on	Parking brake applied Low brake fluid level Brake fluid level sensor Parking brake switch Brake booster vacuum sensor IPC concern ABS concern	RETRIEVE all ABS module Diagnostic Trouble Codes (DTCs) and GO to the DTC Chart: ABS Module in Diagnostic Trouble Code (DTC) Charts . If there are no Diagnostic Trouble Codes (DTCs) present in the ABS module, DIAGNOSE the warning indicator. REFER to: Instrumentation, Message Center and Warning Chimes .
The ABS warning indicator is always or never on	IPC concern ABS or stability control concern	RETRIEVE all ABS module Diagnostic Trouble Codes (DTCs) and GO to the DTC Chart: ABS Module in Diagnostic Trouble Code (DTC) Charts . If there are no Diagnostic Trouble Codes (DTCs) present in the ABS module, DIAGNOSE the warning indicator. REFER to: Instrumentation, Message Center and Warning Chimes .
The stability-traction control indicator (sliding-car icon) is never or always on	IPC concern ABS or stability control concern	RETRIEVE all ABS module Diagnostic Trouble Codes (DTCs) and GO to the DTC Chart: ABS Module in Diagnostic Trouble Code (DTC) Charts . If there are no Diagnostic Trouble Codes (DTCs) present in the ABS module, DIAGNOSE the warning indicator. REFER to: Instrumentation, Message Center and Warning Chimes .
ABS false activation, ABS too sensitive, ABS activates on normal stop	Front or rear suspension concern	ELIMINATE the front and rear suspension as the cause of the problem. REFER to: Suspension System .
	RCM mounting	CONFIRM the RCM is mounted correctly. REFER to: Restraints Control Module (RCM) .
	Loose wheel speed sensor or excessive air gap	INSPECT wheel speed sensor for looseness or excessive air gap. TIGHTEN or INSTALL new as necessary. REFER to: Front Wheel Speed Sensor . REFER to: Rear Wheel Speed Sensor .
	Parking brake out of adjustment (dragging)	REFER to: Parking Brake .

The traction control system cannot be disabled	Refer to the Pinpoint Test	GO to Pinpoint Test E
The Line Lock feature cannot be selected from the track application menu (grayed out)	Vehicle is on an incline Engine is not running Selectable driving mode is set to Snow-Wet Vehicle is traveling faster than 40-48 km/h (25-30 mph) Diagnostic Trouble Codes (DTCs) present in the ABS module	The vehicle must be on a flat surface for Line Lock feature use. MOVE vehicle to a flat surface and ATTEMPT to select the Line Lock feature. START the engine and ATTEMPT to select the Line Lock feature. The Line Lock feature cannot be used with Snow-Wet drive mode selected. SELECT Track drive mode and ATTEMPT to select the Line Lock feature. The vehicle cannot be moving when selecting the Line Lock feature. STOP the vehicle and ATTEMPT to select the Line Lock feature. Using a diagnostic scan tool, RETRIEVE all ABS module Diagnostic Trouble Codes (DTCs). GO to the DTC Chart: ABS Module in Diagnostic Trouble Code (DTC) Charts .
The Line Lock feature cannot be initialized	Vehicle is on an incline Engine is not running Selectable driving mode is set to Snow-Wet Vehicle is traveling faster than 40-48 km/h (25-30 mph) Diagnostic Trouble Codes (DTCs) present in the ABS module	The vehicle must be on a flat surface for Line Lock feature use. MOVE vehicle to a flat surface and ATTEMPT to initialize the Line Lock feature. START the engine and ATTEMPT to initialize the Line Lock feature. The Line Lock feature cannot be used with Snow-Wet drive mode selected. SELECT Track drive mode and ATTEMPT to initialize the Line Lock feature. The vehicle cannot be moving when initializing the Line Lock feature. STOP the vehicle and ATTEMPT to initialize the Line Lock feature. Using a diagnostic scan tool, RETRIEVE all ABS module Diagnostic Trouble Codes (DTCs). GO to the DTC Chart: ABS Module in Diagnostic Trouble Code (DTC) Charts
The Line Lock feature cannot be engaged	Spare tire is installed Driver or passenger door is open	REPAIR and INSTALL the road wheel and ATTEMPT to engage

	Transmission is in PARK or REVERSE Parking brake is applied Steering wheel is not in the straight-ahead position Vehicle is on an incline Engine is not running Driver applied brake pressure is not high enough OK button not pressed while applying the brake pedal to the required force Selectable driving mode is set to Snow-Wet Vehicle speed exceeded 40-48 km/h (25-30 mph) after the feature was initialized Diagnostic Trouble Codes (DTCs) present in the ABS module	the Line Lock feature. CLOSE the open door and ATTEMPT to engage the Line Lock feature. The transmission must be in a forward gear for the Line Lock feature to engage. PLACE the transmission in DRIVE or FIRST GEAR and ATTEMPT to engage the Line Lock feature. RELEASE the parking brake and ATTEMPT to engage the Line Lock feature TURN the steering wheel to the straight-ahead position and ATTEMPT to engage the Line Lock feature. The vehicle must be on a flat surface for Line Lock feature use. MOVE vehicle to a flat surface and ATTEMPT to engage the Line Lock feature. START the engine and ATTEMPT to engage the Line Lock feature. The brake pressure meter in the message center must be completely filled before the Line Lock feature engages. REFER to the Owner's Literature for Line Lock feature operation. FOLLOW all instructions in the Owner's Literature and in the message center. The OK button must be pressed once the brake pressure meter in the message center to engage the Line Lock feature. REFER to the Owner's Literature for Line Lock feature operation. FOLLOW all instructions in the Owner's Literature and in the message center. The Line Lock feature cannot be used with Snow-Wet drive mode selected. SELECT Track drive mode and ATTEMPT to engage the Line Lock feature. The vehicle cannot be moving when selecting the Line Lock feature. STOP the vehicle and ATTEMPT to engage the Line Lock feature.

		Using a diagnostic scan tool, RETRIEVE all ABS module Diagnostic Trouble Codes (DTCs). GO to the DTC Chart: ABS Module in Diagnostic Trouble Code (DTC) Charts

DIAGNOSIS AND TESTING > ANTI-LOCK BRAKE SYSTEM (ABS) AND STABILITY CONTROL > PINPOINT TESTS

U3003:16, U300A:29

Refer to VEHICLE DYNAMIC SYSTEMS for schematic and connector information.

Normal Operation and Fault Conditions

The ABS module, hydraulic pump and solenoid valves require an operating voltage between 10 and 17 volts. The parking brake system requires an operating voltage of 9 volts or higher. The ABS module receives this voltage from the BJB. The ABS module uses a single ground circuit. The ABS module sets this DTC if there is excessive resistance or an open in one or more of these circuits, a discharged battery or an inoperative charging system.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U3003:16	Battery Voltage: Circuit Voltage Below Threshold	This DTC sets in continuous memory and on-demand if the voltage supplied to the ABS module falls below 10 volts.
U300A:29	Ignition Switch: Signal Invalid	This DTC sets in continuous memory and on-demand if the ABS module receives the power mode or ignition status message from the PCM and BCM, but does not receive the hard-wired ignition switch input.

Possible Causes

- Fuses
- Wiring, terminals or connectors
- ABS module

Visual Inspection and Diagnostic Pre-checks

- Make sure the vehicle battery terminals and cables are free of any corrosion and other contaminants.
- Make sure the vehicle battery terminals are tightened to their correct torque specifications.

- Make sure BJB fuses 5 (50A), 28 (30A) and 62 (5A) are OK.

DIAGNOSIS AND TESTING > ANTI-LOCK BRAKE SYSTEM (ABS) AND STABILITY CONTROL > PINPOINT TESTS > PINPOINT TEST A : U3003:16, U300A:29 > PINPOINT TEST A : U3003:16, U300A:29

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may cause damage to the connector

A1 RECHECK THE ABS (ANTI-LOCK BRAKE SYSTEM) MODULE DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, clear the ABS module Diagnostic Trouble Codes (DTCs).

Ignition OFF.

Ignition ON.

Using a diagnostic scan tool, carry out the ABS module self-test.

Is DTC U3003:16 or U300A:29 still present?

Yes	GO to A2

No	The system is operating correctly at this time. The DTC may have set due to a previous low battery voltage condition.

A2 CHECK FOR CHARGING SYSTEM DIAGNOSTIC TROUBLE CODES (DTCS) IN THE POWERTRAIN CONTROL MODULE (PCM)

Using a diagnostic scan tool, retrieve all Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC B1317, B1318, B1676, U3003:16 or U3003:17 present in one or more modules AND are any charging system Diagnostic Trouble Codes (DTCs) present in the PCM?

Yes	DIAGNOSE the vehicle charging concern. REFER to: Charging System - 2.3L EcoBoost (201kW/273PS) . REFER to: Charging System - 3.7L Duratec (227kW/301PS) . REFER to: Charging System - 5.0L 32V Ti-VCT .

No	GO to A3

A3 CHECK THE BATTERY CONDITION AND STATE OF CHARGE

Carry out the Battery Condition Test. REFER to: BATTERY .

Did the battery pass the condition test?

Yes	If the battery passed the condition test but required a recharge, DIAGNOSE the charging system. REFER to: Charging System - 2.3L EcoBoost (201kW/273PS) . REFER to: Charging System - 3.7L Duratec (227kW/301PS) . REFER to: Charging System - 5.0L 32V Ti-VCT . If the battery passed the condition test and did not require a recharge, GO to A4

No	INSTALL a new battery. REFER to: Battery .

A4 CHECK THE ABS (ANTI-LOCK BRAKE SYSTEM) MODULE VOLTAGE (VPWR_ABS) PID (PARAMETER IDENTIFICATION)

Ignition ON.

Measure and record the voltage at the battery.

Using a diagnostic scan tool, monitor the VPWR_ABS PID.

Is the PID display within 0.2 volt of the recorded battery voltage?

Yes	GO to A7

No	GO to A5

A5 CHECK THE ABS (ANTI-LOCK BRAKE SYSTEM) MODULE VOLTAGE SUPPLY

Ignition OFF.

Disconnect ABS module C135 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C135-1		Ground
C135-30		Ground
C135-35		Ground

Is each voltage within 0.2 volt of the recorded battery voltage?

Yes	GO to A6

No	DISCONNECT and INSPECT C126 for corrosion, pushed-out pins, bent pins and spread terminals. REPAIR as necessary. Refer to CONNECTOR REPAIR PROCEDURES for schematic and connector information. If C126 is OK, VERIFY BJB fuses 5 (50A), 28 (30A) and 62 (5A) are OK.If OK, REPAIR the affected circuit for high resistance or an

	open. If not OK, REFER to the OEM WIRING DIAGRAMS article to identify the cause of the circuit short.

A6 CHECK THE ABS (ANTI-LOCK BRAKE SYSTEM) MODULE GROUND CIRCUIT FOR AN OPEN

Ignition OFF.

Disconnect the battery negative cable. REFER to: Battery Disconnect and Connect .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C135-14	Ω	Ground

Is the resistance less than 3 ohms?

Yes	GO to A7

No	REPAIR the circuit.

A7 VERIFY ALL WIRING CONNECTIONS

Ignition OFF.

Disconnect ABS module C135 and related in-line connectors (if not previously disconnected).

Disconnect C126 .

Using a good light source, inspect ABS module C135 , C126 and related in-line connectors for the following:

corrosion - install a new connector or terminal and clean module pins

damaged or bent pins - install new terminals or pins

pushed-out pins - install new pins as necessary

spread terminals - install new terminals as necessary

Are the connectors free of corrosion, damaged pins, bent pins, pushed-out pins and spread terminals?

Yes	GO to A8

No	REPAIR the affected connectors or terminals. Refer to CONNECTOR REPAIR PROCEDURES for schematic and connector information.

A8 CHECK FOR CORRECT ABS (ANTI-LOCK BRAKE SYSTEM) MODULE OPERATION

Connect ABS module C135 and related in-line connectors. Make sure they seat and latch correctly.

Connect C126 . Make sure it seats and latches correctly.

Connect the battery negative cable. REFER to: Battery Disconnect and Connect .

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ABS module. REFER to: Anti-Lock Brake System (ABS) Module .

No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > ANTI-LOCK BRAKE SYSTEM (ABS) AND STABILITY CONTROL > PINPOINT TESTS > PINPOINT TEST B : WHEEL SPEED SENSOR ERRATIC SIGNAL FAULTS

Normal Operation and Fault Conditions

The wheel speed sensor and encoder (tone wheel) generate a square wave signal proportional to wheel speed and sends this information to the ABS module. The wheel bearing, encoder and wheel speed sensor must be undamaged and free from contamination to produce a clean signal for use by the ABS module. Also, all 4 tires and wheels must be of the same manufacturer recommended size for the wheel speed sensor to generate an accurate wheel speed.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
C0030:07, C0033:07, C0036:07, C0039:07	Tone Wheel: Mechanical Failure	These Diagnostic Trouble Codes (DTCs) set in continuous memory and on-demand if there is damage to the wheel speed sensor encoder, damage to the wheel bearing, or contamination or deformation of the wheel bearing seal.
C0031:07, C0034:07, C0037:07, C003A:07	Wheel Speed Sensor: Mechanical Failure	These Diagnostic Trouble Codes (DTCs) set in continuous memory and on-demand if the wheel speed sensor, encoder or wheel bearing is damaged, or if the wheel bearing

		is not installed correctly. These Diagnostic Trouble Codes (DTCs) also set if an incorrectly sized tire is installed on the vehicle or if an excessive air gap exists between the wheel speed sensor and the encoder due to an incorrect component being installed.
C0031:29, C0034:29, C0037:29, C003A:29	Wheel Speed Sensor: Signal Invalid	These Diagnostic Trouble Codes (DTCs) set in continuous memory and on-demand if the wheel speed sensor is damaged, if the encoder is missing or damaged, if there is an excessive gap between the sensor and encoder, if the wrong sensor is installed (bi-directional versus uni-directional) or if the tire size is incorrect for the vehicle.
C0031:2F, C0034:2F, C0037:2F, C003A:2F	Wheel Speed Sensor: Signal Erratic	These Diagnostic Trouble Codes (DTCs) set in continuous memory and on-demand if the wheel speed sensor is damaged, if the encoder is missing or damaged, if there is an excessive gap between the sensor and encoder or high frequency interference.
C0031:64, C0034:64, C0037:64, C003A:64	Wheel Speed Sensor: Signal Plausibility Failure	These Diagnostic Trouble Codes (DTCs) set in continuous memory and on-demand if the wheel speed sensor is damaged, if the encoder is missing or damaged, if there is an excessive gap between the sensor and encoder, if the wrong sensor is installed (bi-directional versus uni-directional) or if the tire size is incorrect for the vehicle.

Possible Causes

- Wiring, terminals or connectors
- Tire size
- Tire pressure
- Wheel speed sensor
- Wheel speed sensor encoder
- Wheel bearing
- ABS module

DIAGNOSIS AND TESTING > ANTI-LOCK BRAKE SYSTEM (ABS) AND STABILITY CONTROL > PINPOINT TESTS > PINPOINT TEST B : WHEEL SPEED SENSOR ERRATIC SIGNAL FAULTS > PINPOINT TEST B : WHEEL SPEED SENSOR ERRATIC SIGNAL FAULTS

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may cause damage to the connector

B1 CHECK FOR ABS (ANTI-LOCK BRAKE SYSTEM) MODULE DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition ON.

Using a diagnostic scan tool, carry out the ABS module self-test.

Retrieve and record all ABS module Diagnostic Trouble Codes (DTCs).

Is DTC C003x:29 or C003x:64 present?

Yes	GO to B2

No	If DTC C0031:07, C0034:07, C0037:07 or C0039:0A is present, GO to B3If DTC C0031:2F, C0034:2F, C0037:2F or C0039:2F is present, GO to B3. If DTC C0030:07, C0033:07, C0036:07 or C0039:07 is present, GO to B6 For all other ABS module Diagnostic Trouble Codes (DTCs), GO to the DTC Chart: ABS Module in Diagnostic Trouble Code (DTC) Charts .

B2 CHECK THE TIRE SIZE AND PRESSURE

Ignition OFF.

Verify all the tires and wheels are the same size and the tire size and inflation pressures are correct as indicated on the VC label.

Are the tires and wheels OK?

Yes	GO to B3

No	INSTALL the correct size tire or wheel or ADJUST tire pressure as necessary.

B3 CHECK THE WHEEL SPEED SENSOR MOUNTING

With the transmission in NEUTRAL, position the vehicle on a hoist. REFER to: Jacking and Lifting - Overview .

Inspect the wheel speed sensor for correct installation and the fastener for looseness.

Is the wheel speed sensor installed correctly and the fastener tightened to specifications?

Yes	GO to B5

No	REINSTALL the wheel speed sensor and tighten the fastener to specifications. REFER to: Front Wheel Speed Sensor . REFER to: Rear Wheel Speed Sensor . GO to B4

B4 CHECK THE WHEEL SPEED SENSOR PARAMETER IDENTIFICATIONS (PIDS)

Ignition ON.

Using a diagnostic scan tool, access the ABS module Parameter Identifications (PIDs).

Drive the vehicle at a speed greater than 20 km/h (12 mph) while monitoring the following Parameter Identifications (PIDs):

Left front wheel speed sensor (LF_WSPD)

Right front wheel speed sensor (RF_WSPD)

Left rear wheel speed sensor (LR_WSPD)

Right rear wheel speed sensor (RR_WSPD)

Are the wheel speed Parameter Identifications (PIDs) within 5 km/h (3 mph) of each other and the vehicle speed as indicated on the speedometer?

Yes	The system is operating correctly at this time. The concern may have been caused by a loose or incorrectly installed wheel speed sensor.

No	GO to B5

B5 CHECK THE WHEEL SPEED SENSOR FOR DAMAGE

Ignition OFF.

With the transmission in NEUTRAL, position the vehicle on a hoist. REFER to: Jacking and Lifting - Overview .

Disconnect the suspect wheel speed sensor electrical connector.

Inspect the wheel speed sensor and harness for abrasions, broken connector tabs or water intrusion.

Is the wheel speed sensor and harness OK?

Yes	GO to B6

No	INSTALL a new wheel speed sensor. REFER to: Front Wheel Speed Sensor . REFER to:

	Rear Wheel Speed Sensor .

B6 CHECK WHEEL SPEED SENSOR ENCODER FOR DAMAGE

Remove the suspect wheel speed sensor. REFER to: Front Wheel Speed Sensor . REFER to: Rear Wheel Speed Sensor .

Inspect the wheel speed sensor encoder for abnormal wear, deformation or contamination.

Is the wheel speed sensor encoder OK?

Yes	GO to B7

No	INSTALL a new wheel hub as necessary. REFER to: Front Wheel Bearing and Wheel Hub . REFER to: Wheel Bearing and Wheel Hub .

NOTE: Use a meter with a min-max feature or recording capabilities to obtain accurate measurements. The ABS module disables the voltage output immediately if the wheel speed sensor is not present.

NOTE: Make sure all test connections are made at the wheel speed sensor ***before*** *the ignition is set to ON.*

B7 CHECK FOR CORRECT ABS (ANTI-LOCK BRAKE SYSTEM) MODULE OUTPUT

Disconnect the suspect wheel speed sensor electrical connector.

Connect the meter to the suspect wheel speed sensor electrical connector, harness side.

Set the meter to measure DC voltage.

Set the meter range to greater than 15 volts.

Enable the min-max or recording feature on the meter.

Ignition ON.

For the LH front wheel speed sensor, measure:

Positive Lead	Measurement / Action	Negative Lead
C150-1		C150-2

For the RH front wheel speed sensor, measure:

Positive Lead	Measurement / Action	Negative Lead
C160-1		C160-2

For the LH rear wheel speed sensor, measure:

Positive Lead	Measurement / Action	Negative Lead
C440-1		C440-2

For the RH rear wheel speed sensor, measure:

Positive Lead	Measurement / Action	Negative Lead
C426-1		C426-2

Check the maximum recorded voltage on the meter.

Is the voltage greater than 10 volts?

Yes	INSTALL a new wheel speed sensor. REFER to: Front Wheel Speed Sensor . REFER to: Rear Wheel Speed Sensor .

No	GO to B8

B8 VERIFY ALL WIRING CONNECTIONS

Ignition OFF.

Disconnect ABS module C135 .

Using a good light source, inspect ABS module C135 for the following:

corrosion - install a new connector or terminal and clean module pins

damaged or bent pins - install new terminals or pins

pushed-out pins - install new pins as necessary

spread terminals - install new terminals as necessary

Yes	GO to B9

No

B9 CHECK FOR CORRECT ABS (ANTI-LOCK BRAKE SYSTEM) MODULE OPERATION

Connect ABS module C135 . Make sure it seats and latches correctly.

Connect the suspect wheel speed sensor. Make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ABS module. REFER to: Anti-Lock Brake System (ABS) Module .

No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > ANTI-LOCK BRAKE SYSTEM (ABS) AND STABILITY CONTROL > PINPOINT TESTS > PINPOINT TEST C : C0040:64

Refer to CRUISE CONTROL for schematic and connector information.

Normal Operation and Fault Conditions

The ABS module receives BPP switch (stoplamp switch) input from the PCM through the GWM over the HS-CAN2. The ABS module compares this information against the internal pressure sensor in the HCU. An incorrectly installed BPP switch can cause a signal plausibility concern. An implausible signal can also be created if the driver is resting one foot on the brake pedal while using the other foot to press the accelerator.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
C0040:64	Brake Pedal Switch "A": Signal Plausibility Failure	This DTC sets in continuous memory if the master cylinder pressure signal exceeds 15 bar and the BPP switch message from the PCM is inactive for longer than 1 second.

Possible Causes

- Wiring, terminals or connectors.
- BPP switch
- Network communication concern
- PCM

Visual Inspection and Diagnostic Pre-checks

- Make sure the brake pedal switch electrical connector is connected and free of corrosion and other contaminants.
- Make sure the brake pedal switch is installed correctly.
- Make sure the brake pedal switch is operating correctly.

DIAGNOSIS AND TESTING > ANTI-LOCK BRAKE SYSTEM (ABS) AND STABILITY CONTROL > PINPOINT TESTS > PINPOINT TEST C : C0040:64 > PINPOINT TEST C : C0040:64

C1 CHECK THE ABS (ANTI-LOCK BRAKE SYSTEM) MODULE DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, carry out the ABS module self-test.

Retrieve and record all ABS module Diagnostic Trouble Codes (DTCs).

Is DTC U0100:00, U0401:00 present?

Yes	DIAGNOSE DTC U0100:00 or U0401:00 before diagnosing DTC C0040:64. GO to the DTC Chart: ABS Module in Diagnostic Trouble Code (DTC) Charts .

No	GO to C2

C2 CHECK THE STOPLAMP SWITCH AND BRAKE PEDAL ASSEMBLY INSTALLATION

Inspect the stoplamp switch and brake pedal assembly, verify there is no brake pedal pressure unintentionally applied due to incorrect stoplamp switch or brake pedal installation. REFER to: Stoplamp Switch . REFER to: Brake Pedal and Bracket - 6-Speed Manual Transmission - 3160/6-Speed Manual Transmission - MT82 . REFER to: Brake Pedal and Bracket - 6-Speed Automatic Transmission - 6R80 .

Are the stoplamp switch and brake pedal assembly installed correctly?

Yes	GO to C3

No	REINSTALL the stoplamp switch or brake pedal assembly. REFER to: Stoplamp Switch . REFER to: Brake Pedal and Bracket - 6-Speed Manual Transmission - 3160/6-Speed Manual Transmission - MT82 . REFER to: Brake Pedal and Bracket - 6-Speed Automatic Transmission - 6R80 .

C3 CHECK THE PCM (POWERTRAIN CONTROL MODULE) BPP (BRAKE PEDAL POSITION) (BOO1) PID (PARAMETER IDENTIFICATION)

Ignition ON.

Using a diagnostic scan tool, monitor the PCM BOO1 PID while pressing and releasing the brake pedal.

Does the PID reflect the brake pedal movement?

Yes	GO to C4

No	DIAGNOSE the BPP switch. REFER to: Stoplamps .

C4 CHECK THE ABS (ANTI-LOCK BRAKE SYSTEM) MODULE BRAKE ON / OFF (BOO_ABS) PID (PARAMETER IDENTIFICATION)

Using a diagnostic scan tool, monitor the ABS module BOO_ABS PID while pressing and releasing the brake pedal.

Does the PID reflect the brake pedal movement?

Yes	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

No	GO to C5

C5 CHECK THE PCM (POWERTRAIN CONTROL MODULE) FOR DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, carry out the PCM KOEO self-test.

Retrieve and record all PCM Diagnostic Trouble Codes (DTCs).

Are any PCM Diagnostic Trouble Codes (DTCs) present?

Yes	GO to the DTC Chart: PCM. REFER to: ELECTRONIC ENGINE CONTROLS - 2.3L ECOBOOST (231KW/314PS) . REFER to: ELECTRONIC ENGINE CONTROLS - 3.7L DURATEC (227KW/301PS) . REFER to: ELECTRONIC ENGINE CONTROLS - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS.

No	GO to C6

C6 CHECK FOR CORRECT ABS (ANTI-LOCK BRAKE SYSTEM) MODULE TO HCU (HYDRAULIC CONTROL UNIT) FASTENER TORQUE VALUES

Verify all ABS module-to- HCU fasteners are tightened to their correct torque specifications.

Are the ABS module-to- HCU fasteners tightened correctly

Yes	GO to C8

No	TIGHTEN all ABS module-to- HCU fasteners to their specified torque value. GO to C7

C7 CHECK FOR RETURNING ABS (ANTI-LOCK BRAKE SYSTEM) MODULE DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, clear the ABS module Diagnostic Trouble Codes (DTCs).

Ignition OFF.

Ignition ON.

Using a diagnostic scan tool, carry out the ABS module self-test.

Is DTC C0040:64 present?

Yes	GO to C8

No	The condition that caused the concern has been repaired. RETURN the vehicle to the customer.

C8 VERIFY ALL WIRING CONNECTIONS

Ignition OFF.

Disconnect ABS module C135 .

Using a good light source, inspect ABS module C135 for the following:

corrosion - install a new connector or terminal and clean module pins

damaged or bent pins - install new terminals or pins

pushed-out pins - install new pins as necessary

spread terminals - install new terminals as necessary

Are the connectors free of corrosion, damaged pins, bent pins, pushed-out pins and spread terminals?

Yes	GO to C9

No	REPAIR the affected connectors or terminals. Refer to CONNECTOR REPAIR PROCEDURES for schematic and connector information.

C9 CHECK FOR CORRECT ABS (ANTI-LOCK BRAKE SYSTEM) MODULE OPERATION

Connect ABS module C135 . Make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ABS module. REFER to: Anti-Lock Brake System (ABS) Module .

No	The system is operating correctly at this time. The concern may have been caused by a

	loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > ANTI-LOCK BRAKE SYSTEM (ABS) AND STABILITY CONTROL > PINPOINT TESTS > PINPOINT TEST D : U0140:00, U0422:00

Refer to VEHICLE DYNAMIC SYSTEMS for schematic and connector information.

Normal Operation and Fault Conditions

With the ignition ON, the BCM sends messages to the ABS module through the GWM over the HS-CAN1. If the ABS module does not receive these messages within a certain time frame, the module sets Diagnostic Trouble Codes (DTCs). For information on the messages sent to the ABS module by the BCM, refer to the Network Message Chart. REFER to: Anti-Lock Brake System (ABS) and Stability Control - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0140:00	Lost Communication With Body Control Module: No Sub Type Information	This DTC sets in continuous memory and on-demand when any of the messages from the BCM are missing. This can be due to a GWM failure, BCM failure, a circuit failure or excessive load on the HS-CAN1 or HS-CAN2.
U0422:00	Invalid Data Received From Body Control Module: No Sub Type Information	This DTC sets in continuous memory and on-demand if the ABS module receives "fault" or "unknown" in any one of the following BCM messages instead of valid message data; battery low state of charge, door ajar status, ignition key type, ignition status, park brake status or vehicle configuration data.

Possible Causes

- Wiring, terminals or connectors
- Network communication concern
- GWM
- BCM

DIAGNOSIS AND TESTING > ANTI-LOCK BRAKE SYSTEM (ABS) AND STABILITY CONTROL > PINPOINT TESTS > PINPOINT TEST D : U0140:00, U0422:00 > PINPOINT TEST D : U0140:00, U0422:00

D1 CHECK THE COMMUNICATION NETWORK

Ignition ON.

Using a diagnostic scan tool, carry out the Network Test.

Do both the BCM and the GWM pass the Network Test?

Yes	GO to D2

No	DIAGNOSE the no communication with the BCM or GWM. REFER to: MODULE COMMUNICATIONS NETWORK .

D2 CHECK THE ABS (ANTI-LOCK BRAKE SYSTEM) MODULE CONTINUOUS MEMORY DIAGNOSTIC TROUBLE CODES (CMDTCS)

Using a diagnostic scan tool, carry out the ABS module self-test.

Retrieve and record all ABS module Diagnostic Trouble Codes (DTCs).

Clear the Diagnostic Trouble Codes (DTCs).

Ignition OFF.

Ignition ON.

Repeat the ABS module self-test.

Is DTC U0140:00 or U0422:00 retrieved again?

Yes	GO to D3

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

D3 REVIEW THE RECORDED ABS (ANTI-LOCK BRAKE SYSTEM) MODULE SELF-TEST DIAGNOSTIC TROUBLE CODES (DTCS)

Check the recorded Diagnostic Trouble Codes (DTCs) from the ABS module self-test.

Was DTC U3003:16 or U3003:17 recorded in the ABS module?

Yes	For DTC U3003:16, GO to Pinpoint Test A , For DTC U3003:17, GO to Pinpoint Test F

No	GO to D4

D4 RETRIEVE ALL DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE GWM (GATEWAY MODULE A)

Using a diagnostic scan tool, carry out the GWM self-test.

Are any Diagnostic Trouble Codes (DTCs) present in the GWM?

Yes	DIAGNOSE the GWM Diagnostic Trouble Codes (DTCs). REFER to: MODULE COMMUNICATIONS NETWORK .

No	GO to D5

D5 RETRIEVE ALL DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE BCM (BODY CONTROL MODULE)

Using a diagnostic scan tool, carry out the BCM self-test.

Are any Diagnostic Trouble Codes (DTCs) present in the BCM?

Yes	DIAGNOSE the BCM Diagnostic Trouble Codes (DTCs). REFER to: Body Control Module (BCM) .

No	GO to D6

D6 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0140:XX OR U0422:XX SET IN OTHER MODULES

Using a diagnostic scan tool, carry out the self-test for all modules.

Retrieve and record the Continuous Memory Diagnostic Trouble Codes (CMDTCs) from all modules.

Is DTC U0140:xx or U0422:xx set in 1 or more modules in addition to the ABS module?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern and DTC U0140:00 was set by the ABS module, INSTALL a new ABS module. REFER to: Anti-Lock Brake System (ABS) Module .

DIAGNOSIS AND TESTING > ANTI-LOCK BRAKE SYSTEM (ABS) AND STABILITY CONTROL > PINPOINT TESTS > PINPOINT TEST E : THE TRACTION CONTROL SYSTEM CANNOT BE DISABLED

Refer to INSTRUMENT CLUSTER for schematic and connector information.

NOTE: This test requires the use of at least 2 keys programmed to the vehicle, one admin key and one restricted key.

Normal Operation and Fault Conditions

The stability-traction control disabled indicator (sliding car OFF icon) in the IPC provides traction control system status to the driver. When the driver deactivates the traction control, the IPC sends a message to the GWM over the HS-CAN3 indicating the driver has requested the traction control to be disabled. The GWM relays this message to the ABS module over the HS-CAN2. The ABS module continues to monitor for excessive wheel spin, but no longer takes any action when a traction event is detected.

The ABS module then sends a message to the GWM over the HS-CAN2 to illuminate the stability-traction control disabled indicator (sliding car OFF icon). The GWM relays this message to the IPC over the HS-CAN3. The IPC responds by illuminating the stability-traction control disabled indicator (sliding car OFF icon). The traction control system remains deactivated until the driver changes the traction control state in the message center or until the ignition is cycled.

If equipped, MyKey® allows users to configure traction control to be either always on or selectable. If a MyKey® restricted key is in use with the AdvanceTrac® always on feature configured to "on", the traction control system cannot be disabled. An admin key must be used to enable and disable the traction control system.

Possible Causes

- MyKey® restricted key in use
- Network communication concern
- IPC concern
- GWM concern
- Message center concern

DIAGNOSIS AND TESTING > ANTI-LOCK BRAKE SYSTEM (ABS) AND STABILITY CONTROL > PINPOINT TESTS > PINPOINT TEST E : THE TRACTION CONTROL SYSTEM CANNOT BE DISABLED > PINPOINT TEST E : THE TRACTION CONTROL SYSTEM CANNOT BE DISABLED

E1 VERIFY THE KEY IN USE IS NOT RESTRICTED

Place 1 key inside the vehicle and all other keys at least 1 meter (3 feet) away from the vehicle.

Turn the ignition to the ON mode.

Monitor the message center.

Does the message center display MYKEY ACTIVE DRIVE SAFELY?

Yes	The current key is a restricted key and is functioning correctly. REPEAT the test using different keys until the message center **does not** display MYKEY ACTIVE DRIVE SAFELY. GO to E2

No	GO to E2

E2 VERIFY THE MYKEY® TRACTION CONTROL SETTING IN THE MYKEY® MENU

Using the message center, verify the MyKey® traction control setting. Refer to the Owner's Literature for information on setting the MyKey® functions.

Is the MyKey® traction control setting configured to "always on"?

Yes	GO to E3

No	GO to E4

E3 VERIFY THE TRACTION CONTROL FUNCTION CAN BE DISABLED USING THE ADMIN KEY IN THE DRIVER ASSIST MENU

Using the message center, verify the traction control function can be enabled and disabled using the admin key. Refer to the Owner's Literature for information on enabling and disabling the traction control function.

Can the traction control function can be enabled and disabled using the admin key?

Yes	The system is operating correctly at this time. The concern was most likely caused by the use of a restricted key.INFORM the customer the traction control function can only be disabled using an admin key when the MyKey® traction control setting is configured to "always on".

No	GO to E4

E4 CHECK FOR ABS (ANTI-LOCK BRAKE SYSTEM) MODULE DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, carry out the ABS self-test.

Retrieve and record all ABS Diagnostic Trouble Codes (DTCs).

Are there any ABS Diagnostic Trouble Codes (DTCs) present?

Yes	GO to the DTC Chart: Anti-Lock Brake System (ABS) Module in Diagnostic Trouble Code (DTC) Charts .

No	GO to E5

E5 CHECK FOR GWM (GATEWAY MODULE A) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, carry out the GWM self-test.

Retrieve and record all GWM Diagnostic Trouble Codes (DTCs).

Are any Diagnostic Trouble Codes (DTCs) present in the GWM?

Yes	GO to the DTC Chart: GWM. REFER to: MODULE COMMUNICATIONS NETWORK .

No	GO to E6

E6 CHECK FOR IPC (INSTRUMENT PANEL CLUSTER) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, carry out the IPC self-test.

Retrieve and record all IPC Diagnostic Trouble Codes (DTCs).

Are there any IPC Diagnostic Trouble Codes (DTCs) present?

Yes	GO to the DTC Chart: Instrument Panel Cluster (IPC). REFER to: Instrumentation, Message Center and Warning Chimes .

No	The system is operating correctly at this time. The concern may have been caused due to high network traffic or an intermittent fault condition.

DIAGNOSIS AND TESTING > ANTI-LOCK BRAKE SYSTEM (ABS) AND STABILITY CONTROL > PINPOINT TESTS > PINPOINT TEST F : U3003:17

Normal Operation and Fault Conditions

The ABS module, hydraulic pump and solenoid valves require an operating voltage between 10 and 17 volts. The ABS module receives this voltage from the BJB and has a single ground circuit. An overcharging condition in the charging system results in the ABS module setting a DTC. This DTC may also set in the ABS module due to battery charging or vehicle jump starting events.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U3003:17	Battery Voltage: Circuit Voltage Above Threshold	This DTC sets in continuous memory and on-demand if the voltage supplied to the ABS module is above 17 volts.

Possible Causes

- Charging system concern
- ABS module

DIAGNOSIS AND TESTING > ANTI-LOCK BRAKE SYSTEM (ABS) AND STABILITY CONTROL > PINPOINT TESTS > PINPOINT TEST F : U3003:17 > PINPOINT TEST F : U3003:17

F1 CHECK FOR HIGH VOLTAGE DIAGNOSTIC TROUBLE CODES (DTCS) SET IN OTHER MODULES

Ignition ON.

Using a diagnostic scan tool, retrieve and record all Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC B1317, B1318, B1676, U3003:16 or U3003:17 present in one or more modules AND are any charging system Diagnostic Trouble Codes (DTCs) present in the PCM?

Yes	DIAGNOSE the overcharging condition. REFER to: Charging System - 2.3L EcoBoost (201kW/273PS) . REFER to: Charging System - 3.7L Duratec (227kW/301PS)). REFER to: Charging System - 5.0L 32V Ti-VCT .

No	GO to F2

F2 CHECK THE BATTERY VOLTAGE

Turn off all interior lights, exterior lights and accessories.

Start and run the engine at approximately 1, 500 RPM for 3 minutes while monitoring the battery voltage.

Is the battery voltage between 13 and 15.2 volts ?

Yes	GO to F3

No	DIAGNOSE the overcharging condition. REFER to: Charging System - 2.3L EcoBoost (201kW/273PS) . REFER to: Charging System - 3.7L Duratec (227kW/301PS) . REFER to: Charging System - 5.0L 32V Ti-VCT .

F3 RECHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U3003:17

Turn the engine off.

Ignition ON.

Using a diagnostic scan tool, carry out the ABS module self-test.

Clear the ABS module Diagnostic Trouble Codes (DTCs).

Ignition OFF.

Ignition ON.

Repeat the ABS module self-test.

Is DTC U3003:17 still present?

Yes	GO to F4

No	The system is operating normally at this time. The DTC may have been set previously during battery charging or while jump starting the vehicle.

F4 VERIFY ALL WIRING CONNECTIONS

Ignition OFF.

Disconnect and inspect ABS module C135 (if not previously disconnected).

Using a good light source, inspect ABS module C135 for the following:

corrosion - install a new connector or terminal and clean module pins

damaged or bent pins - install new terminals or pins

pushed-out pins - install new pins as necessary

spread terminals - install new terminals as necessary

Are the connectors free of corrosion, damaged pins, bent pins, pushed-out pins and spread terminals?

Yes	GO to F5

No	REPAIR the affected connectors or terminals. Refer to CONNECTOR REPAIR PROCEDURES for schematic and connector information.

F5 CHECK FOR CORRECT ABS (ANTI-LOCK BRAKE SYSTEM) MODULE OPERATION

Connect ABS module C135 . Make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ABS module. REFER to: Anti-Lock Brake System (ABS) Module .

No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > ANTI-LOCK BRAKE SYSTEM (ABS) AND STABILITY CONTROL > PINPOINT TESTS > PINPOINT TEST G : STABILITY CONTROL SENSOR SIGNAL FAULTS

Refer to VEHICLE DYNAMIC SYSTEMS for schematic and connector information.

Normal Operation and Fault Conditions

The ABS module receives vehicle yaw rate, lateral acceleration, longitudinal acceleration and roll rate from RCM over the HS-CAN2. The yaw rate sensor, lateral accelerometer and longitudinal accelerometer are contained in the RCM. A failure of the HS-CAN2, an incorrectly installed RCM, an internal failure of the RCM or the internal sensors causes the ABS to set one or more Diagnostic Trouble Codes (DTCs).

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
C0061:28, C0062:28, C0063:28, C0064:28	Lateral Acceleration Sensor, Longitudinal Acceleration Sensor, Yaw Rate Sensor, Roll Rate Sensor: Signal Bias Level Out of Range / Zero Adjustment Failure	These Diagnostic Trouble Codes (DTCs) set in continuous memory and on-demand if the sensor signal is greater than the programmed maximum plausible sensor signal.
C0061:2F, C0063:2F	Lateral Acceleration Sensor, Yaw Rate Sensor: Signal Erratic	These Diagnostic Trouble Codes (DTCs) set in continuous memory and on-demand if the lateral acceleration sensor signal is out of range when the vehicle is standing still.
C0061:64, C0062:64, C0063:64, C0064:64	Lateral Acceleration Sensor, Longitudinal Acceleration Sensor, Yaw Rate Sensor, Roll Rate Sensor: Signal Plausibility Failure	These Diagnostic Trouble Codes (DTCs) set in continuous memory and on-demand if the sensor signal does not match the other stability sensor signals.

Possible Causes

- Underinflated tires
- Incorrect or mismatched tires
- Network communication concern
- Incorrect or incomplete ABS module IVD Initialization
- Incorrectly installed RCM

- RCM

DIAGNOSIS AND TESTING > ANTI-LOCK BRAKE SYSTEM (ABS) AND STABILITY CONTROL > PINPOINT TESTS > PINPOINT TEST G : STABILITY CONTROL SENSOR SIGNAL FAULTS > PINPOINT TEST G : STABILITY CONTROL SENSOR SIGNAL FAULTS

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may cause damage to the connector.

G1 CHECK FOR RETURNING ABS (ANTI-LOCK BRAKE SYSTEM) MODULE DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition ON.

Using a diagnostic scan tool, clear the ABS module Diagnostic Trouble Codes (DTCs).

Ignition OFF.

Ignition ON.

Test drive the vehicle above 12 km/h (7 mph) and make at least 1 left turn and 1 right turn.

Using a diagnostic scan tool, carry out the ABS module self-test.

Retrieve and record all ABS module Diagnostic Trouble Codes (DTCs).

Are any Diagnostic Trouble Codes (DTCs) present in the ABS module?

Yes	If any of the Diagnostic Trouble Codes (DTCs) listed in the DTC Fault Trigger Conditions table are present, GO to G2 For all other ABS module Diagnostic Trouble Codes (DTCs), GO to the DTC Chart: ABS Module in Diagnostic Trouble Code (DTC) Charts .

No	The fault is not present and cannot be recreated at this time. CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSPECT all in-line connectors and the wire harness between the RCM and the ABS module for corrosion, loose terminals, spread terminals, loose wire connections, frayed wire connections, pinched wire harnesses and cut or pierced wire harnesses. REPAIR as necessary.

G2 CHECK THE WHEELS AND TIRES

Inspect the wheels and tires for any damage or excessive wear.

Verify all wheels and tires are the same size and match the size indicated on the VC label.

Verify the inflation pressure of all 4 tires is correct as indicated on the VC label.

Are the wheels and tires OK?

Yes	GO to G3

No	INSTALL the correct size wheel or tire as necessary. ADJUST tire pressure as necessary. REFER to: Wheel and Tire .

G3 CHECK THE COMMUNICATION NETWORK

Ignition ON.

Using a diagnostic scan tool, carry out the Network Test.

Does the RCM pass the Network Test?

Yes	GO to G4

No	DIAGNOSE the RCM does not communicate with the diagnostic scan tool. REFER to: MODULE COMMUNICATIONS NETWORK .

G4 CHECK THE ABS (ANTI-LOCK BRAKE SYSTEM) MODULE CONTINUOUS MEMORY DIAGNOSTIC TROUBLE CODES (CMDTCS)

Using a diagnostic scan tool, carry out the ABS module self-test.

Retrieve and record all ABS module Diagnostic Trouble Codes (DTCs).

Clear the ABS module Diagnostic Trouble Codes (DTCs).

Ignition OFF.

Ignition ON.

Using a diagnostic scan tool, carry out the ABS module self-test.

Are any Diagnostic Trouble Codes (DTCs) present in the ABS module?

Yes	If any of the Diagnostic Trouble Codes (DTCs) listed in the DTC Fault Trigger Conditions table are present, GO to G5 For all other ABS module Diagnostic Trouble Codes (DTCs), GO to the DTC Chart: ABS Module in Diagnostic Trouble Code (DTC) Charts .

No	GO to G6

G5 CHECK THE RCM (RESTRAINTS CONTROL MODULE) FOR DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition ON.

Using a diagnostic scan tool, carry out the RCM self-test.

Are there any Diagnostic Trouble Codes (DTCs) present in the RCM?

Yes	DIAGNOSE all RCM Diagnostic Trouble Codes (DTCs). REFER to: Airbag Supplemental Restraint System (SRS) .

No	GO to G6

NOTE: The vehicle must be on level ground and at a complete standstill during IVD initialization. Any vehicle movement results in false values for this test.

G6 VERIFY STABILITY CONTROL SENSOR CALIBRATION

Using the diagnostic scan tool, carry out the IVD Initialization routine. Follow the diagnostic scan tool directions.

Ignition OFF.

Ignition ON.

Test drive the vehicle above 12 km/h (7 mph) and make at least 1 left turn and 1 right turn.

Is the Advance Trac® warning indicator illuminated?

Yes	Using a diagnostic scan tool, CARRY OUT the ABS module self-test. If any of the Diagnostic Trouble Codes (DTCs) listed in the DTC Fault Trigger Conditions table are present, GO to G7 For all other ABS module Diagnostic Trouble Codes (DTCs), GO to the DTC Chart: ABS Module in Diagnostic Trouble Code (DTC) Charts .

No	The condition which caused the concern is no longer present. The concern was most likely due to an incomplete calibration or a failed calibration of the stability control sensors.

NOTE: The vehicle must be on level ground and at a complete standstill during this step. Any vehicle movement results in false values for this test.

G7 CHECK THE ABS (ANTI-LOCK BRAKE SYSTEM) MODULE PID (PARAMETER IDENTIFICATION) VALUES

Ignition OFF.

Ignition ON.

Using a diagnostic scan tool, monitor the following ABS module Parameter Identifications (PIDs):

Yaw rate (YAW_RATE)

Lateral accelerometer (LAT_ACCL)

Longitudinal accelerometer (LONG_ACCL)

Roll rate (ROLL_RATE)

Is the YAW_RATE PID value between -0.05 and 0.05, the LAT_ACCL PID value between -0.4 and 0.4, the LONG_ACCL PID value between -0.4 and 0.4, and the ROLL_RATE PID value between -0.05 and 0.05?

Yes	GO to G9

No	GO to G8

G8 CHECK THE RCM (RESTRAINTS CONTROL MODULE) INSTALLATION AND MOUNTING SURFACE

WARNING: Turn the ignition OFF and wait one minute to deplete the backup power supply. Failure to follow this instruction may result in serious personal injury or death in the event of an accidental deployment.

Ignition OFF.

Wait one minute then disconnect RCM C310A and C310B .

Inspect the RCM installation and make sure the fasteners are fully seated and tightened to specifications. REFER to: Restraints Control Module (RCM) .

Inspect the RCM mounting surface for damage, corrosion or dirt.

Is the RCM installed correctly and is the mounting surface clean and free from damage?

Yes	GO to G9

No	CLEAN or REPAIR the mounting surface or correctly REINSTALL the RCM as necessary. REFER to: Restraints Control Module (RCM) .

G9 CHECK FOR CORRECT RCM (RESTRAINTS CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect ABS module C135 and related in-line electrical connectors.

Inspect the ABS module, RCM and related in-line electrical connectors for:

corrosion

loose or spread terminals

loose or frayed wire connections at terminals

pushed-out or bent pins

damage, pinched, cut or pierced wires

Repair any electrical connector concerns found, Refer to CONNECTOR REPAIR PROCEDURES for schematic and connector information.

Ignition OFF.

Wait one minute then connect RCM C310A and C310B . Make sure the connectors seat and latch correctly.

Connect ABS module C135 and related in-line electrical connectors. Make sure the connectors seat and latch correctly.

Test drive the vehicle above 12 km/h (7 mph) and make at least 1 left turn and 1 right turn.

Is the Advance Trac® warning indicator illuminated?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, DIAGNOSE the RCM concern. REFER to: Airbag Supplemental Restraint System (SRS) .

No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > ANTI-LOCK BRAKE SYSTEM (ABS) AND STABILITY CONTROL > PINPOINT TESTS > PINPOINT TEST H : ABS (ANTI-LOCK BRAKE SYSTEM) PUMP MOTOR FAULTS

Refer to VEHICLE DYNAMIC SYSTEMS for schematic and connector information.

Normal Operation and Fault Conditions

The ABS module uses an internal solid state switch to operate the hydraulic pump motor. The ABS module tests the hydraulic pump motor by activating it for 30 milliseconds. The ABS module monitors the voltage drop across the hydraulic pump motor while the pump motor is being activated. After 30 milliseconds have passed, the ABS module stops applying voltage to the pump motor and monitors the voltage the spinning hydraulic pump motor is generating and the voltage drop across the hydraulic pump motor solid state switch. If the monitored voltages are not within the specifications, the ABS module sets one or more Diagnostic Trouble Codes (DTCs).

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
C0020:11	ABS Pump Motor Control: Circuit Short To Ground	This DTC sets in continuous memory and on-demand if the voltage drop across the solid state switch is too high when the

		pump motor is activated. This can be due to a shorted switch, a shorted motor or a locked motor
C0020:12	ABS Pump Motor Control: Circuit Short To Battery	This DTC sets in continuous memory and on-demand if the pump motor supply voltage is greater than 0.93 volt for longer than 3 seconds when the pump motor is deactivated.
C0020:13	ABS Pump Motor Control: Circuit Open	This DTC sets in continuous memory and on-demand if the pump motor supply voltage is less than 6 volts for longer than 2 seconds when the pump motor is deactivated. This DTC also sets if the pump motor supply voltage is less than 7.3 volts for more than 2 seconds when the pump motor is activated.
C0020:71	ABS Pump Motor Control: Actuator Stuck	If insufficient voltage is generated by the pump motor immediately following a pump motor deactivation, a second pump motor test is carried out. If insufficient voltage is again generated by the pump motor, this DTC sets.

Possible Causes

- Fuse
- Wiring, terminals or connectors
- HCU
- ABS module

Visual Inspection and Diagnostic Pre-checks

- Make sure the vehicle battery terminals and cables are free of any corrosion and other contaminants.
- Make sure the vehicle battery terminals are tightened to their correct torque specifications.
- Make sure BJB fuse 5 (50A) and the fuse socket are OK.

DIAGNOSIS AND TESTING > ANTI-LOCK BRAKE SYSTEM (ABS) AND STABILITY CONTROL > PINPOINT TESTS > PINPOINT TEST H : ABS (ANTI-LOCK BRAKE SYSTEM) PUMP MOTOR FAULTS > PINPOINT TEST H : ABS (ANTI-LOCK BRAKE

SYSTEM) PUMP MOTOR FAULTS

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may cause damage to the connector

H1 VERIFY ALL WIRING CONNECTIONS

Ignition OFF.

Disconnect ABS module C135 .

Using a good light source, inspect each connector terminal for any corrosion.

Inspect the connector for any pushed-out terminals.

Using a suitable mating terminal, check each connector terminal for deformed or enlarged contacts by comparing the mating terminal's fit between each of the following pins:

C135-1

C135-14

Is the connector free of terminal corrosion, pushed-out terminals and spread terminals?

Yes	GO to H2

No	REPAIR the affected terminal. Refer to CONNECTOR REPAIR PROCEDURES for schematic and connector information.

H2 CHECK PUMP MOTOR OPERATION

Connect ABS module C135 .

Ignition ON.

Using a diagnostic scan tool, activate the ABS pump motor (PMP_MTR) active command.

Listen for the ABS pump motor noise.

Does the ABS pump motor run for approximately 2 seconds?

Yes	GO to H3

No	GO to H4

H3 CHECK FOR FAULT REPEATABILITY

Using a diagnostic scan tool, clear the ABS module Diagnostic Trouble Codes (DTCs).

Ignition OFF.

Ignition ON.

Test drive the vehicle at speeds greater than 20 km/h (12 mph) and carry out at least 1 ABS stop.

Ignition OFF.

Ignition ON.

Using a diagnostic scan tool, carry out the ABS module self-test.

Retrieve and record all ABS module Diagnostic Trouble Codes (DTCs).

Are any ABS module Diagnostic Trouble Codes (DTCs) retrieved?

Yes	For DTC C0020:12, C0020:13 and C0020:71, GO to H6 For all other ABS module Diagnostic Trouble Codes (DTCs), GO to the DTC Chart: ABS Module in Diagnostic Trouble Code (DTC) Charts .

No	The concern that caused the DTC is not present at this time. DISCONNECT and INSPECT ABS module C135 . CLEAR or REPAIR the connector as necessary. ADDRESS the root cause of any connector or pin issues.

H4 CHECK THE PUMP MOTOR VOLTAGE SUPPLY TO THE ABS (ANTI-LOCK BRAKE SYSTEM) MODULE

Ignition OFF.

Disconnect ABS module C135 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C135-1		Ground

Is the voltage greater than 11 volts?

Yes	GO to H5

No	VERIFY BJB fuse 5 (50A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the OEM WIRING DIAGRAMS article to identify the cause of the circuit short.

H5 CHECK THE ABS (ANTI-LOCK BRAKE SYSTEM) MODULE GROUND CIRCUIT FOR AN OPEN

Ignition OFF.

Disconnect the battery negative cable. REFER to: Battery Disconnect and Connect .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C135-14	Ω	Ground

Is the resistance less than 3 ohms?

Yes	GO to H6

No	REPAIR the circuit.

H6 VERIFY ALL WIRING CONNECTIONS

Ignition OFF.

Disconnect ABS module C135 (if not previously disconnected).

Using a good light source, inspect ABS module C135 for the following:

corrosion - install a new connector or terminal and clean module pins

damaged or bent pins - install new terminals or pins

pushed-out pins - install new pins as necessary

spread terminals - install new terminals as necessary

Are the connectors free of corrosion, damaged pins, bent pins, pushed-out pins and spread terminals?

Yes	GO to H7

No	REPAIR the affected connectors or terminals. Refer to CONNECTOR REPAIR PROCEDURES for schematic and connector information.

H7 CHECK FOR CORRECT ABS (ANTI-LOCK BRAKE SYSTEM) MODULE OPERATION

Connect ABS module C135 . Make sure it seats and latches correctly.

Connect the battery negative cable. REFER to: Battery Disconnect and Connect .

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ABS module and HCU assembly. REFER to: Hydraulic Control Unit (HCU) .

No	The system is operating correctly at this time. The concern may have been caused by a

	loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > ANTI-LOCK BRAKE SYSTEM (ABS) AND STABILITY CONTROL > PINPOINT TESTS > PINPOINT TEST I : U0100:00, U0401:00

Refer to VEHICLE DYNAMIC SYSTEMS for schematic and connector information.

Normal Operation and Fault Conditions

With the ignition ON, the PCM sends messages to the ABS module through the GWM over the HS-CAN1. If the ABS module does not receive these messages within a certain time frame, the ABS module sets Diagnostic Trouble Codes (DTCs). For information on the messages sent to the ABS module by the PCM, refer to the Network Message Chart. REFER to: Anti-Lock Brake System (ABS) and Stability Control - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0100:00	Lost Communication With ECM / PCM "A": No Sub Type Information	This DTC sets in continuous memory and on-demand when any of the messages from the PCM are missing. This can be due to a GWM failure, PCM failure, a circuit failure or excessive load on the HS-CAN1 or HS-CAN2.
U0401:00	Invalid Data Received From ECM / PCM "A": No Sub Type Information	This DTC sets in continuous memory and on-demand if the ABS module receives "fault" or "unknown" messages from the PCM instead of valid accelerator pedal position, ambient air temperature, cruise control system status, brake pedal applied, clutch pedal position, engine RPM, engine torque output, gear lever position, launch control system status, power pack status, reverse gear selected or transmission in reverse messages.

Possible Causes

- Wiring, terminals or connectors
- Network communication concern
- GWM

- PCM

DIAGNOSIS AND TESTING > ANTI-LOCK BRAKE SYSTEM (ABS) AND STABILITY CONTROL > PINPOINT TESTS > PINPOINT TEST I : U0100:00, U0401:00 > PINPOINT TEST I : U0100:00, U0401:00

I1 CHECK THE COMMUNICATION NETWORK

Ignition ON.

Using a diagnostic scan tool, carry out the Network Test.

Do both the PCM and the GWM pass the Network Test?

Yes	GO to I2

No	DIAGNOSE the no communication with the PCM or GWM. REFER to: MODULE COMMUNICATIONS NETWORK .

I2 CHECK THE ABS (ANTI-LOCK BRAKE SYSTEM) MODULE CONTINUOUS MEMORY DIAGNOSTIC TROUBLE CODES (CMDTCS)

Using a diagnostic scan tool, carry out the ABS module self-test.

Clear the Diagnostic Trouble Codes (DTCs).

Ignition OFF.

Ignition ON.

Using a diagnostic scan tool, carry out the ABS module self-test.

Record the ABS module Diagnostic Trouble Codes (DTCs).

Is DTC U0100:00 or U0401:00 retrieved again?

Yes	GO to I3

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

I3 REVIEW THE RECORDED ABS (ANTI-LOCK BRAKE SYSTEM) MODULE SELF-TEST DIAGNOSTIC TROUBLE CODES (DTCS)

Check the recorded Diagnostic Trouble Codes (DTCs) from the ABS self-test.

Was DTC U3003:16 or U3003:17 recorded?

Yes	For DTC U3003:16, GO to Pinpoint Test A For DTC U3003:17, GO to Pinpoint Test F

No	GO to I4

I4 CHECK FOR DIAGNOSTIC TROUBLE CODES (DTCS) IN THE GWM (GATEWAY MODULE A)

Using a diagnostic scan tool, carry out the GWM self-test.

Are any Diagnostic Trouble Codes (DTCs) present in the GWM?

Yes	DIAGNOSE the GWM Diagnostic Trouble Codes (DTCs). REFER to: MODULE COMMUNICATIONS NETWORK .

No	GO to I5

I5 CHECK FOR DIAGNOSTIC TROUBLE CODES (DTCS) IN THE PCM (POWERTRAIN CONTROL MODULE)

Using a diagnostic scan tool, carry out the PCM KOEO self-test.

Is DTC P0562 or P0563 present?

Yes	DIAGNOSE the PCM Diagnostic Trouble Codes (DTCs). REFER to: ELECTRONIC ENGINE CONTROLS - 2.3L ECOBOOST (231KW/314PS) . REFER to: ELECTRONIC ENGINE CONTROLS - 3.7L DURATEC (227KW/301PS) . REFER to: ELECTRONIC ENGINE CONTROLS - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS.

No	GO to I6

I6 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0100:XX OR U0401:XX SET IN OTHER MODULES

Using a diagnostic scan tool, carry out the self-test for all modules.

Retrieve the Continuous Memory Diagnostic Trouble Codes (CMDTCs) from all modules.

Is DTC U0100:xx OR U0401:xx set in 1 or more modules in addition to the ABS module?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PCM. REFER to: POWERTRAIN CONTROL MODULE (PCM) - 2.3L EcoBoost (231kW/314PS). REFER to: POWERTRAIN CONTROL MODULE (PCM) - 3.7L Duratec (227kW/301PS. REFER to: POWERTRAIN CONTROL MODULE (PCM) - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS).

No	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for

	this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ABS module. REFER to: Anti-Lock Brake System (ABS) Module .

DIAGNOSIS AND TESTING > ANTI-LOCK BRAKE SYSTEM (ABS) AND STABILITY CONTROL > PINPOINT TESTS > PINPOINT TEST J : STEERING WHEEL POSITION SENSOR SIGNAL FAULTS

Normal Operation and Fault Conditions

The PSCM monitors steering wheel rotation speed, angle and direction of rotation and sends the information to the ABS module over the HS-CAN2. A failure of the HS-CAN2, PSCM or the internal sensors causes the ABS to set one or more Diagnostic Trouble Codes (DTCs).

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
C0051:62	Steering Wheel Position Sensor: Signal Compare Failure	This DTC sets in continuous memory and on-demand if the difference between the steering wheel angle signal and the calculated reference signal is too high.
C0051:64	Steering Wheel Position Sensor: Signal Plausibility Failure	This DTC sets in continuous memory and on-demand if the difference between the steering wheel angle signal and the calculated reference signal is too high or if the steering wheel angle sensor does not match other stability control sensor inputs (yaw rate, lateral acceleration, longitudinal acceleration, roll rate).
C0051:67	Steering Wheel Position Sensor: Signal Incorrect After Event	This DTC sets in continuous memory and on-demand if the center position of the steering wheel cannot be determined after 30 seconds of driving at a speed between 12 km/h (7 mph) and 50 km/h (31 mph).
C0051:85	Steering Wheel Position Sensor: Signal Above Allowable Range	This DTC sets in continuous memory and on-demand if the absolute value of the calculated steering wheel angle is greater than a predetermined threshold.

Possible Causes

- Incorrectly mounted RCM
- Network communication concern
- Incomplete or incorrect stability control sensor calibration
- Wheels and tires
- Front suspension components
- Steering system components
- PSCM

DIAGNOSIS AND TESTING > ANTI-LOCK BRAKE SYSTEM (ABS) AND STABILITY CONTROL > PINPOINT TESTS > PINPOINT TEST J : STEERING WHEEL POSITION SENSOR SIGNAL FAULTS > PINPOINT TEST J : STEERING WHEEL POSITION SENSOR SIGNAL FAULTS

J1 CHECK THE WHEELS AND TIRES

Inspect the wheels and tires for any damage or excessive wear.

Verify all wheels and tires are the same size and match the size indicated on the VC label.

Verify the inflation pressure of all 4 tires is correct as indicated on the VC label.

Are the wheels and tires OK?

Yes	GO to J2

No	INSTALL the correct size wheel or tire as necessary. REFER to: Wheel and Tire . ADJUST tire pressure as necessary.

J2 CHECK THE FRONT SUSPENSION AND STEERING COMPONENTS

With the transmission in NEUTRAL, position the vehicle on a hoist. REFER to: Jacking and Lifting - Overview .

Inspect the front suspension and steering components for any obvious signs of damage or missing components.

Are the front suspension and steering components OK?

Yes	GO to J3

No	REPAIR or INSTALL new components as necessary.

J3 CHECK FOR PSCM (POWER STEERING CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition ON.

Using a diagnostic scan tool, carry out the PSCM self-test.

Are there any Diagnostic Trouble Codes (DTCs) present in the PSCM?

Yes	DIAGNOSE all PSCM Diagnostic Trouble Codes (DTCs) before diagnosing any ABS C0051:xx codes. REFER to: POWER STEERING .

No	GO to J4

J4 CHECK FOR ABS (ANTI-LOCK BRAKE SYSTEM) MODULE DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, carry out the ABS module self-test.

Retrieve and record all ABS module Diagnostic Trouble Codes (DTCs).

Are any of the following Diagnostic Trouble Codes (DTCs) present in the ABS module; wheel speed sensor, stability control sensor, lost communication with the PSCM or invalid data received from the PSCM?

Yes	DIAGNOSE those ABS module Diagnostic Trouble Codes (DTCs) before diagnosing any C0051:xx codes, beginning with any lost communication or invalid data received from the PSCM, followed by any stability control sensor (yaw rate, lateral acceleration and longitudinal acceleration) Diagnostic Trouble Codes (DTCs) and finally any wheel speed sensor Diagnostic Trouble Codes (DTCs). GO to the DTC Chart: ABS Module in Diagnostic Trouble Code (DTC) Charts .

No	GO to J5

J5 VERIFY STABILITY CONTROL SENSOR CALIBRATION

Using a diagnostic scan tool, carry out the IVD Initialization routine. Follow the diagnostic scan tool directions.

Ignition OFF.

Ignition ON.

Test drive the vehicle above 12 km/h (7 mph) and make at least 1 left turn and 1 right turn.

Using a diagnostic scan tool, carry out the ABS module self-test.

Are any C0051:xx Diagnostic Trouble Codes (DTCs) present?

Yes	GO to J6

No	The condition that caused the concern is no longer present. The concern was most likely due to an incomplete calibration or a failed calibration of the stability control sensors.

NOTE: The vehicle must be on level ground and at a complete standstill. Any vehicle movement results in false values for this test.

J6 CHECK THE ABS (ANTI-LOCK BRAKE SYSTEM) MODULE YAW RATE VALUE (YAW_RATE) PID (PARAMETER IDENTIFICATION)

Ignition ON.

Using a diagnostic scan tool, monitor the ABS module YAW_RATE PID.

Is the YAW_RATE PID value between -0.05 and 0.05?

Yes	GO to J7

No	GO to J9

NOTE: The vehicle must be on level ground and at a complete standstill. Any vehicle movement results in false values for this test.

J7 CHECK THE ABS (ANTI-LOCK BRAKE SYSTEM) MODULE LATERAL ACCELERATION (LAT_ACCL) PID (PARAMETER IDENTIFICATION)

Using a diagnostic scan tool, monitor the ABS module LAT_ACCL PID.

Is the LAT_ACCL PID value between -0.4 and 0.4?

Yes	GO to J8

No	GO to J9

NOTE: The vehicle must be on level ground and at a complete standstill. Any vehicle movement results in false values for this test.

J8 CHECK THE ABS (ANTI-LOCK BRAKE SYSTEM) MODULE LONGITUDINAL ACCELERATION (LONG_ACCL) PID (PARAMETER IDENTIFICATION)

Using a diagnostic scan tool, monitor the ABS module LONG_ACCL PID.

Is the LONG_ACCL PID value between -0.4 and 0.4?

Yes	GO to J10

No	GO to J9

J9 CHECK THE RCM (RESTRAINTS CONTROL MODULE) INSTALLATION AND MOUNTING SURFACE

WARNING: Turn the ignition OFF and wait one minute to deplete the backup power supply. Failure to follow this instruction may result in serious personal injury or death in the event of an accidental deployment.

Ignition OFF.

Wait one minute then disconnect RCM C310A and C310B .

Inspect the RCM installation and make sure the fasteners are fully seated and tightened to specifications. REFER to: Restraints Control Module (RCM) .

Inspect the RCM mounting surface for damage, corrosion or dirt.

Is the RCM installed correctly and is the mounting surface clean and free from damage?

Yes	GO to J10

No	CLEAN or REPAIR the mounting surface or correctly REINSTALL the RCM as necessary. REFER to: Restraints Control Module (RCM) .

NOTE: The ignition must be set to OFF when disconnecting PSCM electrical connectors. Failure to follow this direction may lead to Diagnostic Trouble Codes (DTCs) being set in the PSCM which can not be cleared and result in the need to install a new EPAS gear.

J10 VERIFY ALL WIRING CONNECTIONS

Ignition OFF.

Disconnect PSCM C1463A and C1463B (if not previously disconnected).

Using a good light source, inspect ABS module C135 for the following:

corrosion - install a new connector or terminal and clean module pins

damaged or bent pins - install new terminals or pins

pushed-out pins - install new pins as necessary

spread terminals - install new terminals as necessary

Are the connectors free of corrosion, damaged pins, bent pins, pushed-out pins and spread terminals?

Yes	GO to J11

No	REPAIR the affected connectors or terminals. Refer to CONNECTOR REPAIR PROCEDURES for schematic and connector information.

J11 CHECK FOR CORRECT PSCM (POWER STEERING CONTROL MODULE) OPERATION

Connect PSCM C1463A and C1463B . Make sure they seat and latch correctly.

Connect RCM C310A and C310B (if previously disconnected). Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, REFER to the EPAS symptom chart or DTC chart.

No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > ANTI-LOCK BRAKE SYSTEM (ABS) AND STABILITY CONTROL > PINPOINT TESTS > PINPOINT TEST K : WHEEL SPEED SENSOR ELECTRICAL FAULTS - FRONT

Refer to VEHICLE DYNAMIC SYSTEMS for schematic and connector information.

Normal Operation and Fault Conditions

Active wheel speed sensors generate a square wave signal proportional to wheel speed which is sent to the ABS module. Each wheel speed sensor is connected to the ABS module through 2 wires and a connector at each wheel speed sensor. One wire is for sensor voltage supply from the ABS module and the other wire is for the signal return to the ABS module. With the ignition ON, the ABS module carries out a self-test by sending a reference voltage through the wheel speed sensors and their circuitry.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
C0031:11	Left Front Wheel Speed Sensor: Circuit Short to Ground	These Diagnostic Trouble Codes (DTCs) set in continuous memory and on-demand if there is a short to ground in the sensor signal return circuit or if the sensor has an internal short to ground.
C0034:11	Right Front Wheel Speed Sensor: Circuit Short to Ground	

C0031:15	Left Front Wheel Speed Sensor: Circuit Short to Battery or Open	These Diagnostic Trouble Codes (DTCs) set in continuous memory and on-demand if there is a short to battery voltage or an open in the sensor signal return circuit. A short to battery voltage may be due to the sensor signal return circuit and the sensor voltage supply circuit shorted together. These Diagnostic Trouble Codes (DTCs) also set if the sensor has an internal short to battery voltage or an open circuit.
C0034:15	Right Front Wheel Speed Sensor: Circuit Short to Battery or Open	

Possible Causes

- Wiring, terminals or connectors
- Wheel speed sensors
- ABS module

Visual Inspection and Diagnostic Pre-checks

- Make sure the wheel speed sensor harness is routed correctly and is undamaged.
- Make sure the wheel speed sensor electrical connector is free from any corrosion or other contaminants.

DIAGNOSIS AND TESTING > ANTI-LOCK BRAKE SYSTEM (ABS) AND STABILITY CONTROL > PINPOINT TESTS > PINPOINT TEST K : WHEEL SPEED SENSOR ELECTRICAL FAULTS - FRONT > PINPOINT TEST K : WHEEL SPEED SENSOR ELECTRICAL FAULTS - FRONT

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may cause damage to the connector

K1 CHECK FOR FAULT REPEATABILITY

Ignition ON.

Using a diagnostic scan tool, clear all ABS module Diagnostic Trouble Codes (DTCs).

Ignition OFF.

Ignition ON.

Test drive the vehicle above 20 km/h (12 mph) and carry out at least 1 ABS stop.

Bring the vehicle to a safe stop.

Using a diagnostic scan tool, carry out the ABS module self-test.

Is DTC C0031:11, C0031:15, C0034:11 or C0034:15 present?

Yes	If the Rotunda Active Wheel Speed Sensor Tester **is** available, GO to K2 If the Rotunda Active Wheel Speed Sensor Tester **is not** available and DTC C0031:15 or C0034:15 is present, GO to K5 If the Rotunda Active Wheel Speed Sensor Tester **is not** available and DTC C0031:11 or C0034:11 is present, GO to K7

No	The system is operating correctly at this time. INSPECT both front wheel speed sensor electrical connectors and the ABS module electrical connector. REPAIR or CLEAN the connector as necessary. ADDRESS the root cause of any connector or pin issues.

K2 CHECK THE ABS (ANTI-LOCK BRAKE SYSTEM) MODULE OUTPUT USING THE ROTUNDA ACTIVE WHEEL SPEED SENSOR TESTER

Ignition OFF.

Disconnect the suspect wheel speed sensor electrical connector.

Connect the Rotunda Active Wheel Speed Sensor Tester to the wheel speed sensor connectors.

Ignition ON.

Select the correct system polarity on the Rotunda Active Wheel Speed Sensor Tester and turn the power switch to the ON position.

Is the tester output LED illuminated?

Yes	GO to K3

No	GO to K5

K3 CHECK THE WHEEL SPEED SENSOR FOR A SHORT TO VOLTAGE WITH THE ROTUNDA ACTIVE WHEEL SPEED SENSOR TESTER

Observe the current overload LED on the Rotunda Active Wheel Speed Sensor Tester.

Is the current overload LED illuminated?

Yes	REPAIR the suspect wheel speed sensor circuit for a short to voltage.

No	GO to K4

K4 CHECK THE WHEEL SPEED SENSOR OUTPUT WITH THE ROTUNDA ACTIVE WHEEL SPEED SENSOR TESTER

Raise the suspect wheel until it can spin freely. REFER to: Jacking and Lifting - Overview .

While monitoring the Rotunda Active Wheel Speed Sensor Tester, slowly spin the suspect wheel.

Do the sensor output Light-emitting Diodes (LEDs) illuminate and flash?

Yes	The system is operating correctly at this time. INSPECT all wheel speed sensor electrical connectors and the ABS module electrical connectors. REPAIR or CLEAN the connector as necessary. ADDRESS the root cause of any connector or pin issues.

No	INSTALL a new wheel speed sensor. REFER to: Front Wheel Speed Sensor .

K5 CHECK THE WHEEL SPEED SENSOR CIRCUITS FOR A SHORT TO BATTERY VOLTAGE

Ignition OFF.

Disconnect ABS module C135 .

Disconnect the suspect wheel speed sensor electrical connector.

Ignition ON.

For the LH front wheel speed sensor, measure:

Positive Lead	Measurement / Action	Negative Lead
C135-9		Ground
C135-8		Ground

For the RH front wheel speed sensor, measure:

Positive Lead	Measurement / Action	Negative Lead
C135-5		Ground
C135-4		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to K6

K6 CHECK THE WHEEL SPEED CIRCUITS FOR AN OPEN

Ignition OFF.

For the LH front wheel speed sensor, measure:

Positive Lead	Measurement / Action	Negative Lead
C135-9	Ω	C150-1
C135-8	Ω	C150-2

For the RH front wheel speed sensor, measure:

Positive Lead	Measurement / Action	Negative Lead
C135-5	Ω	C160-1
C135-4	Ω	C160-2

Are the resistances less than 3 ohms?

Yes	GO to K7

No	REPAIR the circuit.

K7 CHECK FOR SHORTED WHEEL SPEED SENSOR CIRCUITS

Ignition OFF.

Disconnect ABS module C135 (if not previously disconnected).

Disconnect the suspect wheel speed sensor electrical connector (if not previously disconnected).

For the LH front wheel speed sensor, measure:

Positive Lead	Measurement / Action	Negative Lead
C150-1	Ω	C150-2

For the RH front wheel speed sensor, measure:

Positive Lead	Measurement / Action	Negative Lead
C160-1	Ω	C160-2

Is the resistance greater 10, 000 ohms?

Yes	If DTC C0031:11 or C0034:11 is present, GO to K8If DTC C0031:15 or C0034:15 is present, GO to K9

No	REPAIR the circuit.

K8 CHECK THE WHEEL SPEED SENSOR CIRCUITS FOR A SHORT TO GROUND

For the LH front wheel speed sensor, measure:

Positive Lead	Measurement / Action	Negative Lead
C135-9	Ω	Ground
C135-8	Ω	Ground

For the RH front wheel speed sensor, measure:

Positive Lead	Measurement / Action	Negative Lead
C135-5	Ω	Ground
C135-4	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to K9

No	REPAIR the circuit.

NOTE: Make sure all test connections are made at the wheel speed sensor ***before*** *the ignition is set to ON.*

NOTE: Use a meter with a min-max feature or recording capabilities to obtain accurate measurements. The ABS module immediately disables the voltage output if the wheel speed sensor is not present.

K9 CHECK THE ABS (ANTI-LOCK BRAKE SYSTEM) MODULE OUTPUT

Ignition OFF.

Connect ABS module C135 .

Connect the meter to the suspect wheel speed sensor electrical connector, harness side.

Set the meter to measure DC voltage.

Set the meter range to greater than 15 volts.

Enable the min-max or recording feature on the meter.

Ignition ON.

For the LH front wheel speed sensor, measure:

Positive Lead	Measurement / Action	Negative Lead

C150-1		C150-2

For the RH front wheel speed sensor, measure:

Positive Lead	Measurement / Action	Negative Lead
C160-1		C160-2

Check the maximum recorded voltage on the meter.

Is the voltage greater 10 volts?

Yes	INSTALL a new wheel speed sensor. REFER to: Front Wheel Speed Sensor .

No	GO to K10

K10 VERIFY ALL WIRING CONNECTIONS

Ignition OFF.

Disconnect ABS module C135 (if not previously disconnected).

Using a good light source, inspect ABS module C135 for the following:

corrosion - install a new connector or terminal and clean module pins

damaged or bent pins - install new terminals or pins

pushed-out pins - install new pins as necessary

spread terminals - install new terminals as necessary

Are the connectors free of corrosion, damaged pins, bent pins, pushed-out pins and spread terminals?

Yes	GO to K11

No	REPAIR the affected connectors or terminals. Refer to CONNECTOR REPAIR PROCEDURES for schematic and connector information.

K11 CHECK FOR CORRECT ABS (ANTI-LOCK BRAKE SYSTEM) MODULE OPERATION

Connect ABS module C135 . Make sure it seats and latches correctly.

Connect the suspect wheel speed sensor electrical connector. Make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ABS module. REFER to: Anti-Lock Brake System (ABS) Module .

No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > ANTI-LOCK BRAKE SYSTEM (ABS) AND STABILITY CONTROL > PINPOINT TESTS > PINPOINT TEST L : WHEEL SPEED SENSOR ELECTRICAL FAULTS - REAR

Refer to VEHICLE DYNAMIC SYSTEMS for schematic and connector information.

Normal Operation and Fault Conditions

Active wheel speed sensors generate a square wave signal proportional to wheel speed which is sent to the ABS module. Each wheel speed sensor is connected to the ABS module through 2 wires and a connector at each wheel speed sensor. One wire is for sensor voltage supply from the ABS and the other wire is for the signal return to the ABS. With the ignition ON, the ABS module carries out a self-test by sending a reference voltage through the wheel speed sensors and their circuitry.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
C0037:11	Left Rear Wheel Speed Sensor: Circuit Short to Ground	These Diagnostic Trouble Codes (DTCs) set in continuous memory and on-demand if there is a short to ground in the sensor signal return circuit or if the sensor has an internal short to ground.
C003A:11	Right Rear Wheel Speed Sensor: Circuit Short to Ground	
C0037:15	Left Rear Wheel Speed Sensor: Circuit Short to Battery or Open	These Diagnostic Trouble Codes (DTCs) set in continuous memory and on-demand if there is a short to battery voltage or an open in the sensor signal return circuit. A short to battery voltage may be due to the sensor signal return circuit and the sensor voltage supply circuit shorted together. These Diagnostic Trouble Codes (DTCs) also set if the sensor has an internal short to battery voltage or an open circuit.
C003A:15	Right Rear Wheel Speed Sensor: Circuit Short to Battery or Open	

Possible Causes

- Wiring, terminals or connectors

- Wheel speed sensors
- ABS module

Visual Inspection and Diagnostic Pre-checks

- Make sure the wheel speed sensor harness is routed correctly and is undamaged.
- Make sure the wheel speed sensor electrical connector is free from any corrosion or other contaminants.

DIAGNOSIS AND TESTING > ANTI-LOCK BRAKE SYSTEM (ABS) AND STABILITY CONTROL > PINPOINT TESTS > PINPOINT TEST L : WHEEL SPEED SENSOR ELECTRICAL FAULTS - REAR > PINPOINT TEST L : WHEEL SPEED SENSOR ELECTRICAL FAULTS - REAR

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may cause damage to the connector

L1 CHECK FOR FAULT REPEATABILITY

Ignition ON.

Using a diagnostic scan tool, clear all ABS module Diagnostic Trouble Codes (DTCs).

Ignition OFF.

Ignition ON.

Test drive the vehicle above 20 km/h (12 mph) and carry out at least 1 ABS stop.

Bring the vehicle to a safe stop.

Using a diagnostic scan tool, carry out the ABS module self-test.

Is DTC C0037:11, C0037:15, C003A:11 or C003A:15 present?

Yes	If the Rotunda Active Wheel Speed Sensor Tester **is** available, GO to L2 If the Rotunda Active Wheel Speed Sensor Tester **is not** available and DTC C0037:15 or C003A:15 is present, GO to L5 If the Rotunda Active Wheel Speed Sensor Tester **is not** available and DTC C0037:11 or C003A:11 is present, GO to L7

No	The system is operating correctly at this time. INSPECT both rear wheel speed sensor electrical connectors and the ABS module electrical connector. REPAIR or CLEAN the connector as necessary. ADDRESS the root cause of any connector or pin issues.

L2 CHECK THE ABS (ANTI-LOCK BRAKE SYSTEM) MODULE OUTPUT USING THE ROTUNDA ACTIVE WHEEL SPEED SENSOR TESTER

Ignition OFF.

Disconnect the suspect wheel speed sensor electrical connector.

Connect the Rotunda Active Wheel Speed Sensor Tester to the wheel speed sensor connectors.

Ignition ON.

Select the correct system polarity on the Rotunda Active Wheel Speed Sensor Tester and turn the power switch to the ON position.

Is the tester output LED illuminated?

Yes	GO to L3

No	GO to L5

L3 CHECK THE WHEEL SPEED SENSOR FOR A SHORT TO VOLTAGE WITH THE ROTUNDA ACTIVE WHEEL SPEED SENSOR TESTER

Observe the current overload LED on the Rotunda Active Wheel Speed Sensor Tester.

Is the current overload LED illuminated?

Yes	REPAIR the suspect wheel speed sensor circuit for a short to voltage.

No	GO to L4

L4 CHECK THE WHEEL SPEED SENSOR OUTPUT WITH THE ROTUNDA ACTIVE WHEEL SPEED SENSOR TESTER

Raise the suspect wheel until it can spin freely. REFER to: Jacking and Lifting - Overview .

While monitoring the Rotunda Active Wheel Speed Sensor Tester, slowly spin the suspect wheel.

Do the sensor output Light-emitting Diodes (LEDs) illuminate and flash?

Yes	The system is operating correctly at this time. INSPECT all wheel speed sensor electrical connectors and the ABS module electrical connectors. REPAIR or CLEAN the connector as necessary. ADDRESS the root cause of any connector or pin issues.

No	INSTALL a new wheel speed sensor. REFER to: Rear Wheel Speed Sensor .

L5 CHECK THE WHEEL SPEED SENSOR CIRCUITS FOR A SHORT TO BATTERY VOLTAGE

Ignition OFF.

Disconnect ABS module C135 .

Disconnect the suspect wheel speed sensor electrical connector.

Ignition ON.

For the LH rear wheel speed sensor, measure:

Positive Lead	Measurement / Action	Negative Lead
C135-6	V	Ground
C135-7	V	Ground

For the RH rear wheel speed sensor, measure:

Positive Lead	Measurement / Action	Negative Lead
C135-10	V	Ground
C135-11	V	Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to L6

L6 CHECK THE WHEEL SPEED CIRCUITS FOR AN OPEN

Ignition OFF.

For the LH rear wheel speed sensor, measure:

Positive Lead	Measurement / Action	Negative Lead
C135-6	Ω	C440-2
C135-7	Ω	C440-1

For the RH rear wheel speed sensor, measure:

Positive Lead	Measurement / Action	Negative Lead
C135-10	Ω	C426-2
C135-11	Ω	C426-1

Are the resistances less than 3 ohms?

Yes	GO to L7

No	REPAIR the circuit.

L7 CHECK FOR SHORTED WHEEL SPEED SENSOR CIRCUITS

Ignition OFF.

Disconnect ABS module C135 (if not previously disconnected)

Disconnect the suspect wheel speed sensor electrical connector (if not previously disconnected).

For the LH rear wheel speed sensor, measure:

Positive Lead	Measurement / Action	Negative Lead
C440-1	Ω	C440-2

For the RH rear wheel speed sensor, measure:

Positive Lead	Measurement / Action	Negative Lead
C426-1	Ω	C426-2

Is the resistance greater 10, 000 ohms?

Yes	If DTC C0037:11 or C003A:11 are present, GO to L8. If DTC C0037:15 or C003A:15 are present, GO to L9

No	REPAIR the circuit.

L8 CHECK THE WHEEL SPEED SENSOR CIRCUITS FOR A SHORT TO GROUND

For the LH rear wheel speed sensor, measure:

Positive Lead	Measurement / Action	Negative Lead
C135-6	Ω	Ground
C135-7	Ω	Ground

For the RH rear wheel speed sensor, measure:

Positive Lead	Measurement / Action	Negative Lead
C135-10	Ω	Ground
C135-11	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to L9

No	REPAIR the circuit.

NOTE: Use a meter with a min-max feature or recording capabilities to obtain accurate measurements. The ABS module immediately disables the voltage output if the wheel speed sensor is not present.

*NOTE: Make sure all test connections are made at the wheel speed sensor **before** the ignition is set to ON.*

L9 CHECK THE ABS (ANTI-LOCK BRAKE SYSTEM) MODULE OUTPUT

Ignition OFF.

Connect ABS module C135 .

Connect the meter to the suspect wheel speed sensor electrical connector, harness side.

Set the meter to measure DC voltage.

Set the meter range to greater than 15 volts.

Enable the min-max or recording feature on the meter.

Ignition ON.

For the LH rear wheel speed sensor, measure:

Positive Lead	Measurement / Action	Negative Lead
C440-1		C440-2

For the RH rear wheel speed sensor, measure:

Positive Lead	Measurement / Action	Negative Lead
C426-1		C426-2

Check the maximum recorded voltage on the meter.

Is the voltage greater 10 volts?

Yes	INSTALL a new wheel speed sensor. REFER to: Rear Wheel Speed Sensor .

No	GO to L10

L10 VERIFY ALL WIRING CONNECTIONS

Ignition OFF.

Disconnect ABS module C135 (if not previously disconnected).

Using a good light source, inspect ABS module C135 for the following:

corrosion - install a new connector or terminal and clean module pins

damaged or bent pins - install new terminals or pins

pushed-out pins - install new pins as necessary

spread terminals - install new terminals as necessary

Are the connectors free of corrosion, damaged pins, bent pins, pushed-out pins and spread terminals?

Yes	GO to L11

No	REPAIR the affected connectors or terminals. Refer to CONNECTOR REPAIR PROCEDURES for schematic and connector information.

L11 CHECK FOR CORRECT ABS (ANTI-LOCK BRAKE SYSTEM) MODULE OPERATION

Connect ABS module C135 . Make sure it seats and latches correctly.

Connect the suspect wheel speed sensor electrical connector. Make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ABS module. REFER to: Anti-Lock Brake System (ABS) Module .

No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > ANTI-LOCK BRAKE SYSTEM (ABS) AND STABILITY CONTROL > PINPOINT TESTS > PINPOINT TEST M : BRAKE BOOSTER VACUUM SENSOR FAULTS

Refer to VEHICLE DYNAMIC SYSTEMS for schematic and connector information.

Normal Operation and Fault Conditions

The brake booster vacuum pressure sensor receives a sensor supply voltage of 5 volts from the ABS

module. The sensor is also grounded through the ABS module. The sensor uses the pressure differential between the atmosphere and the brake booster vacuum chamber to produce a return voltage signal to the ABS module between 0.2 volt and 4.9 volts. The ABS module uses other sensor inputs such as wheel speed, brake pedal and stability sensors to determine if the vehicle is stopping and at what rate of deceleration. This information is compared against the vacuum pressure sensor to determine the validity of the sensor signal and the working condition of the sensor itself.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
C0047:01	Brake Booster Pressure Sensor: General Electrical Failure	This DTC sets when the signal returned by the sensor is above or below a predetermined limit. This is usually caused by a short to voltage, an open or an internal failure of the sensor.
C0047:26	Brake Booster Pressure Sensor: Signal Rate of Change Below Threshold	This DTC sets when the rate of change in the signal transmitted by the vacuum sensor does not match a predetermined threshold depending on the brake system pressure, or if a characteristic oscillation in the vacuum signal is not detected. A signal failure is reported when 3 valid braking cycles, within the same ignition cycle, have met the above criteria. This is usually caused by a failure in the sensor circuits, a vacuum leak in the brake booster, a mechanical failure of the brake booster or an internal failure of the vacuum sensor.
C0047:27	Brake Booster Pressure Sensor: Signal Rate of Change Above Threshold	This DTC sets when the rate of change in the signal transmitted by the vacuum sensor increases beyond a predetermined level when the brakes are not being applied. When this condition is detected, the ABS module starts a counter and monitors the rate of change, if the rate of change increases beyond the limit 3 times during this time period, this DTC sets. This is usually caused by a failure in the sensor circuits or an internal failure of the sensor.
C1015:08	Vacuum Supply: Bus Signal / Message Failure	This DTC sets in continuous memory and on-demand if the ABS module does not receive any data

		from the vacuum sensor or the ABS module receives invalid data from the vacuum sensor.
C1B14:11	Sensor Supply Voltage "A": Circuit Short to Ground	The ABS module supplies 5 volts to the brake booster vacuum sensor. The ABS module monitors this output and sets this DTC when the module detects a short to ground on the voltage supply circuit.
C1B14:12	Sensor Supply Voltage "A": Circuit Short to Battery	The ABS module supplies 5 volts to the brake booster vacuum sensor. The ABS module monitors this output and sets this DTC when the module detects a short to battery voltage on the voltage supply circuit.
C1B15:1C	Sensor Supply Voltage "B": Circuit Voltage Out of Range	The ABS module supplies 5 volts to the brake booster vacuum sensor. The ABS module monitors this output and sets this DTC once the module determines the output voltage is either above or below the specified voltage for a predetermined amount of time.

Possible Causes

- Wiring, terminals or connectors
- Vacuum leak
- Brake booster vacuum sensor
- Brake booster
- ABS module

Visual Inspection and Diagnostic Pre-checks

- Inspect the brake booster for vacuum leaks.
- Inspect the brake booster for any obvious signs of damage.
- Inspect the brake booster vacuum sensor harness and connector of any obvious signs of damage.
- Make sure the brake booster vacuum sensor electrical connector is free from any corrosion or other contaminants.

DIAGNOSIS AND TESTING > ANTI-LOCK BRAKE SYSTEM (ABS) AND STABILITY CONTROL > PINPOINT TESTS > PINPOINT TEST M : BRAKE BOOSTER VACUUM

SENSOR FAULTS > PINPOINT TEST M : BRAKE BOOSTER VACUUM SENSOR FAULTS

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may cause damage to the connector

M1 VERIFY ALL WIRING CONNECTIONS

Ignition OFF.

Disconnect ABS module C135 .

Disconnect brake booster vacuum sensor C1609 .

Using a good light source, inspect each connector terminal for any corrosion.

Inspect both connectors for any pushed-out pins. Refer to CONNECTOR REPAIR PROCEDURES for schematic and connector information.

Using a suitable mating terminal, check each female terminal for deformed or enlarged contacts by comparing the mating terminal's fit between each of the following pins:

C135-36

C135-44

C135-45

C1609-1

C1609-2

C1609-3

Are both connectors free of corrosion, pushed-out pins and deformed or enlarged contacts?

Yes	GO to M2

No	REPAIR the affected terminal.

M2 CHECK THE ABS (ANTI-LOCK BRAKE SYSTEM) MODULE DIAGNOSTIC TROUBLE CODES (DTCS)

Connect ABS module C135 .

Connect brake booster vacuum sensor C1609 .

Ignition ON.

Using a diagnostic scan tool, carry out the ABS module self-test.

Is DTC C0047:26 present?

Yes	GO to M3

No	For DTC C0047:01, C0047:27, C1B14:11, C1015:08, C1B14:12 or C1B15:1C, GO to M4 For all other ABS module codes, GO to the DTC Chart: ABS Module in Diagnostic Trouble Code (DTC) Charts .

M3 CHECK THE BRAKE BOOSTER AND VACUUM HOSES FOR LEAKS

Inspect the vacuum hoses, brake booster and brake booster seals for leaks or evidence of leaks.

Are any leaks or evidence of leaks found?

Yes	REPAIR or INSTALL new components as necessary.

No	GO to M4

M4 CHECK THE VACUUM SENSOR WIRING FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect ABS module C135 .

Disconnect brake booster vacuum sensor C1609 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C135-36		Ground
C135-44		Ground
C135-45		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to M5

M5 CHECK THE VACUUM SENSOR WIRING FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C135-36	Ω	Ground
C135-44	Ω	Ground
C135-45	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to M6

No	REPAIR the circuit.

M6 CHECK THE VACUUM SENSOR WIRING FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C135-36	Ω	C1609-1
C135-44	Ω	C1609-3
C135-45	Ω	C1609-2

Are the resistances less than 3 ohms?

Yes	GO to M7

No	REPAIR the circuit.

M7 CHECK THE VACUUM SENSOR WIRING FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1609-1	Ω	C1609-2
C1609-1	Ω	C1609-3
C1609-2	Ω	C1609-3

Are the resistances greater than 10, 000 ohms?

Yes	GO to M8

No	REPAIR the circuit.

M8 CHECK THE ABS (ANTI-LOCK BRAKE SYSTEM) MODULE OUTPUT

Connect ABS module C135 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1609-3		Ground

Is the approximately 4.7 volts?

Yes	INSTALL a new brake booster vacuum sensor. REFER to: Brake Vacuum Sensor .

No	GO to M9

M9 VERIFY ALL WIRING CONNECTIONS

Ignition OFF.

Disconnect ABS module C135 .

Using a good light source, inspect ABS module C135 for the following:

corrosion - install a new connector or terminal and clean module pins

damaged or bent pins - install new terminals or pins

pushed-out pins - install new pins as necessary

spread terminals - install new terminals as necessary

Are the connectors free of corrosion, damaged pins, bent pins, pushed-out pins and spread terminals?

Yes	GO to M10

No	REPAIR the affected connectors or terminals. Refer to CONNECTOR REPAIR PROCEDURES for schematic and connector information.

M10 CHECK FOR CORRECT ABS (ANTI-LOCK BRAKE SYSTEM) MODULE OPERATION

Connect ABS module C135 . Make sure it seats and latches correctly.

Connect brake booster vacuum sensor C1609 . Make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ABS module. REFER to: Anti-Lock Brake System (ABS) Module .

No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > ANTI-LOCK BRAKE SYSTEM (ABS) AND STABILITY CONTROL > PINPOINT TESTS > PINPOINT TEST N : U3002:62

Refer to VEHICLE DYNAMIC SYSTEMS for schematic and connector information.

Normal Operation and Fault Conditions

When the ignition is in RUN, the ABS module and the PCM share VIN information through the GWM over the HS-CAN1 and the HS-CAN2.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U3002:62	Vehicle Identification Number: Signal Compare Failure	This DTC indicates the VIN message sent by the PCM over the HS-CAN1 does not match the VIN stored in the ABS module.

Possible Causes

- Module configuration (ABS and PCM)
- ABS module

DIAGNOSIS AND TESTING > ANTI-LOCK BRAKE SYSTEM (ABS) AND STABILITY CONTROL > PINPOINT TESTS > PINPOINT TEST N : U3002:62 > PINPOINT TEST N : U3002:62

N1 VERIFY THE PCM (POWERTRAIN CONTROL MODULE) VIN (VEHICLE IDENTIFICATION NUMBER)

Ignition ON.

Using a diagnostic scan tool, compare the VIN in the PCM to the VIN plate on the vehicle.

Does the VIN in the PCM match the VIN plate?

Yes	GO to N2

No	RECONFIGURE the PCM. FOLLOW the instructions on the diagnostic scan tool.

N2 VERIFY THE ABS (ANTI-LOCK BRAKE SYSTEM) MODULE PART NUMBER

Using a diagnostic scan tool, retrieve and record the ABS module part number.

Compare the part number retrieved to the part number in the parts catalog or equivalent.

Is the correct ABS module installed in the vehicle?

Yes	CONFIGURE the ABS module. REFER to: MODULE CONFIGURATION

No	INSTALL a new ABS module. REFER to: Anti-Lock Brake System (ABS) Module .

DIAGNOSIS AND TESTING > ANTI-LOCK BRAKE SYSTEM (ABS) AND STABILITY CONTROL > PINPOINT TESTS > PINPOINT TEST O : C006B:00

Refer to VEHICLE DYNAMIC SYSTEMS for schematic and connector information.

Normal Operation and Fault Conditions

The ABS module uses information from the wheel speed sensors, RCM and PSCM to determine when an ESC intervention is necessary to help stabilize the vehicle. The ABS module uses the HCU to modulate the brake fluid pressure to the brake calipers and continues to monitor the sensor and module input until the instability event has been corrected. Once the sensors and modules indicate the instability event has been corrected, the ABS module deactivates the HCU. Underinflated tires, wheels and tires not matching VC label specifications, suspension and steering damage, or one or more wheel speed sensor failures contribute to the ABS module setting this DTC.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
C006B:00	Stability System Active Too Long: No Sub Type Information	This DTC indicates the ESC function has been active for longer than the various sensors indicate is necessary.

Possible Causes

- Tire pressure
- Wheel and tire size
- Chassis damage

- Steering damage or alignment
- Wheel speed sensor
- Wheel speed sensor encoders
- PSCM
- RCM sensors

DIAGNOSIS AND TESTING > ANTI-LOCK BRAKE SYSTEM (ABS) AND STABILITY CONTROL > PINPOINT TESTS > PINPOINT TEST O : C006B:00 > PINPOINT TEST O : C006B:00

O1 VERIFY ABS (ANTI-LOCK BRAKE SYSTEM) MODULE DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition ON.

Using a diagnostic scan tool, carry out the ABS module self-test.

Is DTC C006B:00 the only DTC present in the ABS module?

Yes	GO to O2

No	DIAGNOSE all other ABS module Diagnostic Trouble Codes (DTCs) before diagnosing DTC C006B:00. GO to the DTC Chart: ABS Module in Diagnostic Trouble Code (DTC) Charts .

O2 VERIFY THE TIRE PRESSURE

Verify all tire inflation pressures are correct as indicated on the VC label.

Are the tires inflated to the correct pressure as indicated on the VC label?

Yes	GO to O3

No	ADJUST the tire pressure as necessary.

O3 VERIFY WHEEL AND TIRE SIZE

Verify all the tires and wheels are the same size and the size is correct as indicated on the VC label.

Are all 4 wheels and tires the correct size as indicated on the VC label?

Yes	GO to O4

No	INSTALL new wheels or tires as necessary. REFER to: Wheel and Tire .

O4 VERIFY SUSPENSION AND STEERING ALIGNMENT

Verify the suspension and steering alignment is correct. REFER to: Suspension System .

Are the suspension and steering alignment correct?

Yes	GO to O5

No	CORRECT the suspension or steering alignment. REFER to: Suspension System .

NOTE: The vehicle must be on level ground and at a complete standstill. Any vehicle movement results in false values for this test.

O5 CHECK THE ABS (ANTI-LOCK BRAKE SYSTEM) MODULE YAW RATE (YAW_RATE) PID (PARAMETER IDENTIFICATION)

Using a diagnostic scan tool, monitor the YAW_RATE PID

Is the YAW_RATE PID value between -0.05 and 0.05?

Yes	GO to O6

No	GO to O9

NOTE: The vehicle must be on level ground and at a complete standstill. Any vehicle movement results in false values for this test.

O6 CHECK THE ABS (ANTI-LOCK BRAKE SYSTEM) MODULE LATERAL ACCELEROMETER (LAT_ACCL) PID (PARAMETER IDENTIFICATION)

Monitor the LAT_ACCL PID

Is the LAT_ACCL PID value between -0.4 and 0.4?

Yes	GO to O7

No	GO to O9

O7 CHECK THE ABS (ANTI-LOCK BRAKE SYSTEM) MODULE LONGITUDINAL ACCELEROMETER SENSOR INPUT (LONG_ACCL) PID (PARAMETER IDENTIFICATION)

Monitor the LONG_ACCL PID

Is the LONG_ACCL PID value between -0.4 and 0.4?

Yes	GO to O8

No	GO to O9

O8 CHECK THE ABS (ANTI-LOCK BRAKE SYSTEM) MODULE STEERING WHEEL ANGLE SENSOR (STEER_ANGL) PID (PARAMETER IDENTIFICATION)

Monitor the STEER_ANGL PID while slowing rotating the steering wheel one complete revolution to the left and then one complete revolution to the right.

Does the PID change in intervals of 4.5 degrees and show a 360-degree increase for each complete revolution of the steering wheel?

Yes	GO to O9

No	GO to Pinpoint Test J

O9 CHECK THE RCM (RESTRAINTS CONTROL MODULE) INSTALLATION AND MOUNTING SURFACE

WARNING: Turn the ignition OFF and wait one minute to deplete the backup power supply. Failure to follow this instruction may result in serious personal injury or death in the event of an accidental deployment.

Ignition OFF.

Wait one minute then disconnect RCM C310A and C310B .

Inspect the RCM installation and verify all fasteners are tightened to specifications.

Inspect the RCM mounting surface for damage, corrosion, dirt and other irregularities.

Is the RCM installed correctly and the mounting surface clean and free from damage?

Yes	GO to Pinpoint Test G

No	CLEAR or REPAIR the RCM mounting surface as necessary. TIGHTEN the fasteners to the correct toque specification.

DIAGNOSIS AND TESTING > ANTI-LOCK BRAKE SYSTEM (ABS) AND STABILITY CONTROL > PINPOINT TESTS > PINPOINT TEST P : U0104:00, U0405:41, U0405:82

Refer to VEHICLE DYNAMIC SYSTEMS for schematic and connector information.

Normal Operation and Fault Conditions

With the ignition ON, the CCM sends messages to the ABS module over the HS-CAN2. If the ABS module does not receive these messages within a certain time frame, the ABS module sets a DTC. For information on the messages sent to the ABS module by the CCM, refer to the Network Message Chart. REFER to: Anti-Lock Brake System (ABS) and Stability Control - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0104:00	Lost Communication With Cruise Control Module: No Sub Type Information	This DTC sets in continuous memory and on-demand when any of the messages from the CCM are missing. This can be due to a CCM failure, a circuit failure or excessive load on the HS-CAN2.
U0405:41	Invalid Data Received From Cruise Control Module: General Checksum Failure	This DTC sets in continuous memory and on-demand if the ABS module receives "fault" or "unknown" information in the collision mitigation by braking messages from the CCM instead of valid checksum information.
U0405:82	Invalid Data Received From Cruise Control Module: Alive / Sequence Counter Incorrect / Not Updated	The CCM sends a rolling counter value to the ABS module. This DTC sets in continuous memory and on-demand if the rolling counter value does not increase past 1.

Possible Causes

- Network communication concern
- CCM
- ABS module

DIAGNOSIS AND TESTING > ANTI-LOCK BRAKE SYSTEM (ABS) AND STABILITY CONTROL > PINPOINT TESTS > PINPOINT TEST P : U0104:00, U0405:41, U0405:82 > PINPOINT TEST P : U0104:00, U0405:41, U0405:82

P1 CHECK THE COMMUNICATION NETWORK

Ignition ON.

Using a diagnostic scan tool, carry out the Network Test.

Does the CCM pass the Network Test?

Yes	GO to P2

No	DIAGNOSE the no communication with the CCM concern. REFER to: MODULE COMMUNICATIONS NETWORK .

P2 RECHECK THE ABS (ANTI-LOCK BRAKE SYSTEM) MODULE DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, carry out the ABS module self-test.

Clear the ABS module Diagnostic Trouble Codes (DTCs).

Ignition OFF.

Ignition ON.

Using a diagnostic scan tool, carry out the ABS module self-test.

Record the ABS module Diagnostic Trouble Codes (DTCs).

Is DTC U0104:00 retrieved again?

Yes	GO to P3

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

P3 REVIEW THE RECORDED ABS (ANTI-LOCK BRAKE SYSTEM) MODULE DIAGNOSTIC TROUBLE CODES (DTCS)

Review the previously recorded ABS module Diagnostic Trouble Codes (DTCs).

Was DTC U3003:16 or U3003:17 recorded?

Yes	For DTC U3003:16, GO to Pinpoint Test A . For DTC U3003:17, GO to Pinpoint Test F

No	GO to P4

P4 CHECK THE CCM (CRUISE CONTROL MODULE) FOR DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, carry out the CCM self-test.

Are any battery voltage Diagnostic Trouble Codes (DTCs) present?

Yes	DIAGNOSE the CCM Diagnostic Trouble Codes (DTCs). REFER to: Cruise Control .

No	GO to P5

P5 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0104:00 OR U0405:XX SET IN OTHER MODULES

Using a diagnostic scan tool, carry out the self-test for all modules.

Retrieve and record all Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U0104:00 or U0405:xx set in 1 or more modules in addition to the ABS module?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new CCM. REFER to: Cruise Control Module (CCM) .

No	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ABS module. REFER to: Anti-Lock Brake System (ABS) Module .

DIAGNOSIS AND TESTING > ANTI-LOCK BRAKE SYSTEM (ABS) AND STABILITY CONTROL > PINPOINT TESTS > PINPOINT TEST Q : U0131:00, U0420:41, U0420:82, U0420:86

Refer to VEHICLE DYNAMIC SYSTEMS for schematic and connector information.

Normal Operation and Fault Conditions

With the ignition ON, the PSCM sends messages to the ABS module over the HS-CAN2. If the ABS module does not receive these messages within a certain time frame, the ABS module sets a DTC. For information on the messages sent to the ABS module by the PSCM, refer to the Network Message Chart. REFER to: Anti-Lock Brake System (ABS) and Stability Control - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0131:00	Lost Communication With Power Steering Control Module: No Sub Type Information	This DTC sets in continuous memory and on-demand when any of the messages from the PSCM are missing. This can be due to a PSCM failure, a circuit failure or excessive load on the HS-CAN2.

U0420:41	Invalid Data Received From Power Steering Control Module: General Checksum Failure	This DTC sets in continuous memory and on-demand if the checksum information in the steering angle sensor messages sent from the PSCM does not match the checksum information calculated by the ABS module.
U0420:82	Invalid Data Received From Power Steering Control Module: Alive / Sequence Counter Incorrect / Not Updated	The PSCM sends a rolling counter value to the ABS module. This DTC sets in continuous memory and on-demand if the rolling counter value does not increase past 1. Also, if the steering wheel angle sensor message number does not increase with each message sent, this DTC sets.
U0420:86	Invalid Data Received From Power Steering Control Module: Signal Invalid	This DTC sets in continuous memory and on-demand if the ABS module receives "fault" or "unknown" information in the steering wheel angle sensor messages from the PSCM instead of valid steering wheel angle sensor information.

Possible Causes

- Network communication concern
- PSCM
- ABS module

DIAGNOSIS AND TESTING > ANTI-LOCK BRAKE SYSTEM (ABS) AND STABILITY CONTROL > PINPOINT TESTS > PINPOINT TEST Q : U0131:00, U0420:41, U0420:82, U0420:86 > PINPOINT TEST Q : U0131:00, U0420:41, U0420:82, U0420:86

Q1 CHECK THE COMMUNICATION NETWORK

Ignition ON.

Using a diagnostic scan tool, carry out the Network Test.

Does the PSCM pass the Network Test?

Yes	GO to Q2

No	DIAGNOSE the no communication with the PSCM concern. REFER to: MODULE COMMUNICATIONS NETWORK .

Q2 RECHECK THE ABS (ANTI-LOCK BRAKE SYSTEM) MODULE DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, carry out the ABS module self-test.

Clear the ABS module Diagnostic Trouble Codes (DTCs).

Ignition OFF.

Ignition ON.

Using a diagnostic scan tool, carry out the ABS module self-test.

Record the ABS module Diagnostic Trouble Codes (DTCs).

Is DTC U0131:00 or U0420:xx retrieved again?

Yes	GO to Q3

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

Q3 REVIEW THE RECORDED ABS (ANTI-LOCK BRAKE SYSTEM) MODULE DIAGNOSTIC TROUBLE CODES (DTCS)

Review the previously recorded ABS module Diagnostic Trouble Codes (DTCs).

Was DTC U3003:16 or U3003:17 recorded?

Yes	For DTC U3003:16, GO to Pinpoint Test A . For DTC U3003:17, GO to Pinpoint Test F

No	GO to Q4

Q4 CHECK THE PSCM (POWER STEERING CONTROL MODULE) FOR DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, carry out the PSCM self-test.

Are any battery voltage Diagnostic Trouble Codes (DTCs) present in the PSCM?

Yes	DIAGNOSE the PSCM Diagnostic Trouble Codes (DTCs). REFER to: POWER STEERING .

No	GO to Q5

Q5 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0131:00 OR U0420:XX SET IN OTHER MODULES

Using a diagnostic scan tool, carry out the self-test for all modules.

Retrieve and record all Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U0131:00 or U0420:xx set in 1 or more modules in addition to the ABS module?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, REFER to the EPAS symptom chart or DTC chart.

No	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ABS module. REFER to: Anti-Lock Brake System (ABS) Module .

DIAGNOSIS AND TESTING > ANTI-LOCK BRAKE SYSTEM (ABS) AND STABILITY CONTROL > PINPOINT TESTS > PINPOINT TEST R : C1015:7A, C1015:7B

C1015:7A, C1015:7B

Refer to VEHICLE DYNAMIC SYSTEMS for schematic and connector information.

Normal Operation and Fault Conditions

The ABS module uses the brake booster vacuum sensor to monitor the brake booster vacuum. On vehicles equipped with a 2.3L EcoBoost engine, a gear driven vacuum pump supplies the necessary vacuum to the brake booster. The vacuum pump is expected to produce at least 600 mBar (18 In-Hg). On vehicles equipped with all other engines, the engine supplies the necessary vacuum to the brake booster. A leak in a vacuum hose, brake booster, brake booster seal or vacuum pump (if equipped) prevents the brake booster from maintaining the required amount of vacuum. Damage or an internal failure prevents the vacuum pump from operating at peak capacity.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
C1015:7A	Vacuum Supply: Fluid Leak or Seal Failure	This DTC sets when the ABS module detects a decrease in brake booster vacuum without brake system activation.
C1015:7B	Vacuum Supply: Low Fluid Level	This DTC sets when the brake vacuum pump or engine is unable to produce the vacuum necessary for brake system operation.

Possible Causes

- Vacuum leak
- Vacuum hose obstruction
- Vacuum pump (if equipped)
- Brake booster

DIAGNOSIS AND TESTING > ANTI-LOCK BRAKE SYSTEM (ABS) AND STABILITY CONTROL > PINPOINT TESTS > PINPOINT TEST R : C1015:7A, C1015:7B > PINPOINT TEST R : C1015:7A, C1015:7B

R1 CHECK FOR VACUUM LEAKS

Start the engine.

For vehicles equipped with a 2.3L EcoBoost engine, inspect the vacuum hose and each hose connection from the vacuum pump to the brake booster for leaks.

For vehicles equipped with all other engines, inspect the vacuum hose and each hose connection from the engine to the brake booster for leaks.

Are any vacuum leaks found?

Yes	REPAIR the vacuum leak or INSTALL new components as necessary.

No	If the vehicle is equipped with a 2.3L EcoBoost engine, GO to R2. If the vehicle is equipped with any other engine, INSTALL a new brake booster. REFER to: Brake Booster - 3.7L Duratec (227kW/301PS) . REFER to: Brake Booster - 5.0L 32V Ti-VCT .

R2 CHECK THE VACUUM PUMP OUTPUT

Ignition OFF.

Disconnect the vacuum hose from the brake booster.

Connect a vacuum gauge to the vacuum hose.

Start the engine.

Monitor the vacuum gauge.

Does the vacuum gauge display greater than 600 mBar (18 In-Hg)?

Yes	INSTALL a new brake booster. REFER to: Brake Booster - 2.3L EcoBoost (201kW/273PS) .

No	INSTALL a new vacuum pump. REFER to: Brake Vacuum Pump - 2.3L EcoBoost (201kW/273PS) .

DIAGNOSIS AND TESTING > ANTI-LOCK BRAKE SYSTEM (ABS) AND STABILITY CONTROL > PINPOINT TESTS > PINPOINT TEST S : U0151:00

Refer to VEHICLE DYNAMIC SYSTEMS for schematic and connector information.

Normal Operation and Fault Conditions

With the ignition ON, the RCM sends messages to the ABS module over the HS-CAN2. If the ABS module does not receive these messages within a certain time frame, the module sets Diagnostic Trouble Codes (DTCs). For information on the messages sent to the ABS module by the RCM, refer to the Network Message Chart. REFER to: Anti-Lock Brake System (ABS) and Stability Control - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0151:00	Lost Communication With Restraints Control Module: No Sub Type Information	This DTC sets in continuous memory and on-demand when any of the messages from the RCM are missing. This can be due to a RCM failure, a circuit failure or excessive load on the HS-CAN2.

Possible Causes

- Wiring, terminals or connectors
- Network communication concern
- RCM

DIAGNOSIS AND TESTING > ANTI-LOCK BRAKE SYSTEM (ABS) AND STABILITY CONTROL > PINPOINT TESTS > PINPOINT TEST S : U0151:00 > PINPOINT TEST S : U0151:00

S1 CHECK THE COMMUNICATION NETWORK

Ignition ON.

Using a diagnostic scan tool, carry out the Network Test.

Does the RCM pass the Network Test?

Yes	GO to S2

No	DIAGNOSE the no communication with the RCM. REFER to: MODULE

	COMMUNICATIONS NETWORK .

S2 RECHECK THE ABS (ANTI-LOCK BRAKE SYSTEM) MODULE DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, carry out the ABS module self-test.

Clear the ABS module Diagnostic Trouble Codes (DTCs).

Ignition OFF.

Ignition ON.

Using a diagnostic scan tool, carry out the ABS module self-test.

Record the ABS module Diagnostic Trouble Codes (DTCs).

Is DTC U0151:00 retrieved again?

Yes	GO to S3

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

S3 REVIEW THE RECORDED ABS (ANTI-LOCK BRAKE SYSTEM) MODULE DIAGNOSTIC TROUBLE CODES (DTCS)

Review the previously recorded ABS module Diagnostic Trouble Codes (DTCs).

Was DTC U3003:16 or U3003:17 recorded?

Yes	For DTC U3003:16, GO to Pinpoint Test A . For DTC U3003:17, GO to Pinpoint Test F

No	GO to S4

S4 CHECK THE RCM (RESTRAINTS CONTROL MODULE) FOR DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, carry out the RCM self-test.

Are any Diagnostic Trouble Codes (DTCs) present in the RCM?

Yes	DIAGNOSE the RCM Diagnostic Trouble Codes (DTCs). REFER to: Airbag Supplemental Restraint System (SRS) .

No	GO to S5

S5 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0151:XX SET IN OTHER MODULES

Using a diagnostic scan tool, carry out the self-test for all modules.

Retrieve and record all Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U0151:xx set in 1 or more modules in addition to the ABS module?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, DIAGNOSE the RCM concern. REFER to: Airbag Supplemental Restraint System (SRS) .

No	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ABS module. REFER to: Anti-Lock Brake System (ABS) Module .

REMOVAL AND INSTALLATION > ANTI-LOCK BRAKE SYSTEM (ABS) MODULE > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

NOTE: The PMI process must begin with the current ABS module installed. If the current ABS module does not respond to the diagnostic scan tool, the tool may prompt for As-Built Data as part of the repair.

NOTE: This step is necessary when installing a new HCU or ABS module.

1.
Using a diagnostic scan tool, begin the PMI process for the ABS module following the on-screen instructions.

2.

Remove the HCU. REFER to: Hydraulic Control Unit (HCU) .

3.

NOTE: Make sure the HCU and ABS module are clean and free of any brake fluid or foreign material before separating the components. Do not allow any brake fluid or foreign material to enter the mating side of the ABS module or component damage can occur.

4.

Remove the 3 retainers and ABS. Discard the retainers.

Torque

: 44 lb.in (5 Nm)



REMOVAL AND INSTALLATION > ANTI-LOCK BRAKE SYSTEM (ABS) MODULE > INSTALLATION

1.

To install, reverse the removal procedure.

> *NOTE: This step is necessary when installing a new HCU or ABS module.*

2.
Using a diagnostic scan tool, begin the PMI process for the ABS module following the on-screen instructions.

3.

If a new HCU/ ABS module was installed, carryout the IVD initialization using the scan tool and following the diagnostic scan tool on-screen instructions.

REMOVAL AND INSTALLATION > HYDRAULIC CONTROL UNIT (HCU) > REMOVAL

> *NOTE: Removal steps in this procedure may contain installation details.*

> *NOTE: This step is necessary when installing a new HCU or ABS module.*

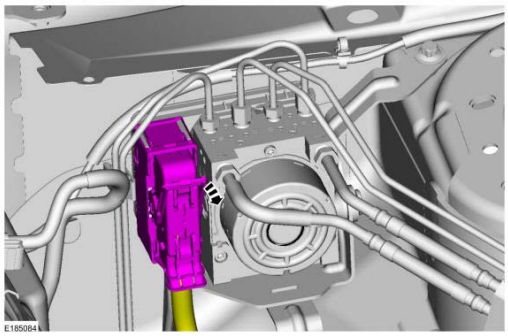
> *NOTE: The PMI process must begin with the current ABS module installed. If the current ABS module does not respond to the diagnostic scan tool, the tool may prompt*

for As-Built Data as part of the repair.

1.
Using a diagnostic scan tool, begin the PMI process for the ABS module following the on-screen instructions.

2.

Disconnect the ABS module electrical connector.



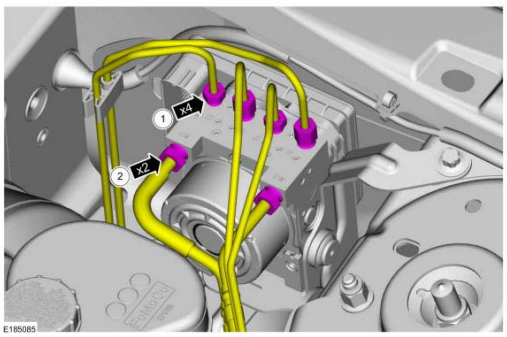
NOTE: Make sure that all openings are sealed.

3.
Disconnect the 6 brake tube fittings.

Torque:

1.: 155 lb.in (17.5 Nm)

2.: 20 lb.ft (27.5 Nm)

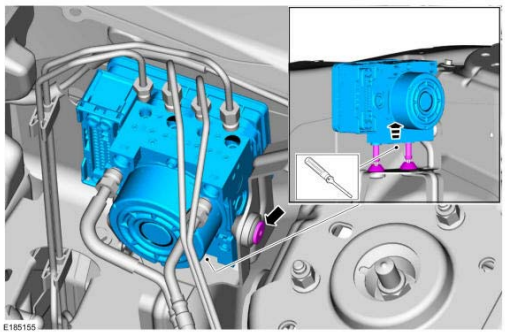


4.

Remove the bolt and separate the HCU from the bracket.

Torque

: 80 lb.in (9 Nm)



REMOVAL AND INSTALLATION > HYDRAULIC CONTROL UNIT (HCU) > INSTALLATION

1.

To install, reverse the removal procedure.

> *NOTE: The following steps are necessary if a new HCU or ABS module was installed.*

2.

Using a diagnostic scan tool, complete the PMI process for the ABS module following the on-screen instructions.

Carry out the IVD initialization using the scan tool and following the diagnostic scan tool on-screen instructions.

3.

Bleed the brake system. REFER to: Brake System Pressure Bleeding .

REMOVAL AND INSTALLATION > FRONT WHEEL SPEED SENSOR > REMOVAL

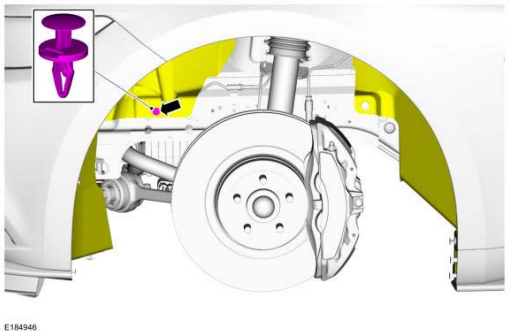
> *NOTE: Removal steps in this procedure may contain installation details.*

1.

Remove the wheel and tire. REFER to: Wheel and Tire .

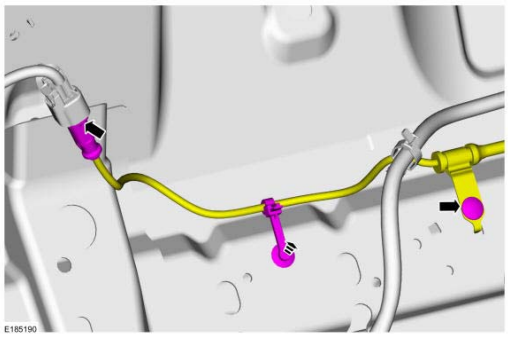
2.

Remove the retainer and position aside the fender splash shield.



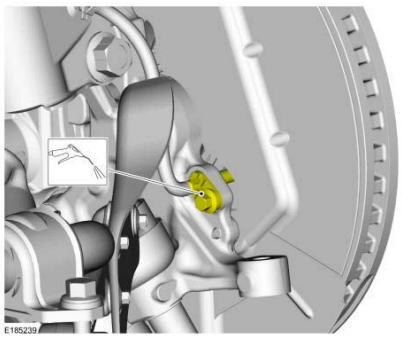
3.

Disconnect the front wheel speed sensor electrical connector and detach the 2 harness retainers.



4.

Using compressed air, clean the area surrounding the front wheel speed sensor.



5.

1.

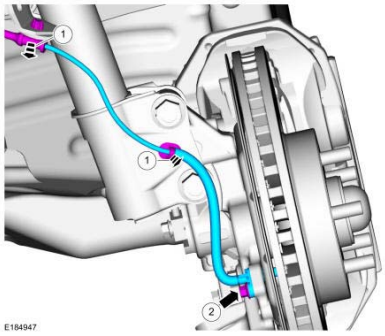
Detach the 2 sensor harness retainers.

2.

Remove the bolt and the front wheel speed sensor.

Torque

: 133 lb.in (15 Nm)



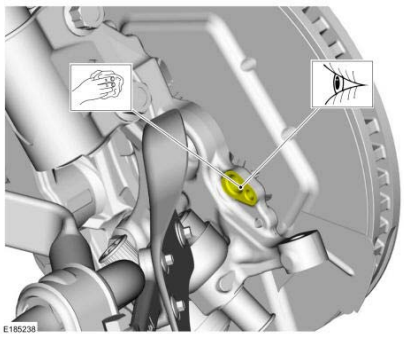
REMOVAL AND INSTALLATION > FRONT WHEEL SPEED SENSOR > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Before installing a new sensor, inspect the sensor housing to make sure the sensor cavity is clean and free of foreign material.



REMOVAL AND INSTALLATION > REAR WHEEL SPEED SENSOR > REMOVAL

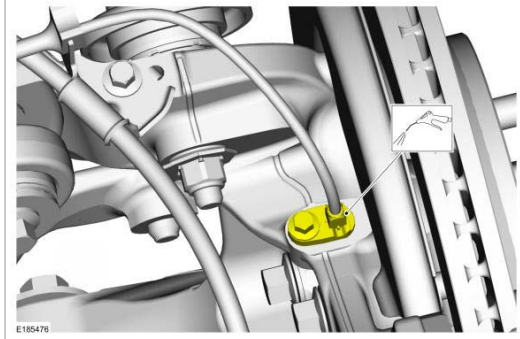
NOTE: Removal steps in this procedure may contain installation details.

1.

Remove the wheel and tire. REFER to: Wheel and Tire .

2.

Using compressed air, clean the area surrounding the rear wheel speed sensor.



3.

1.

Disconnect the rear wheel speed sensor from electrical connector.

2.

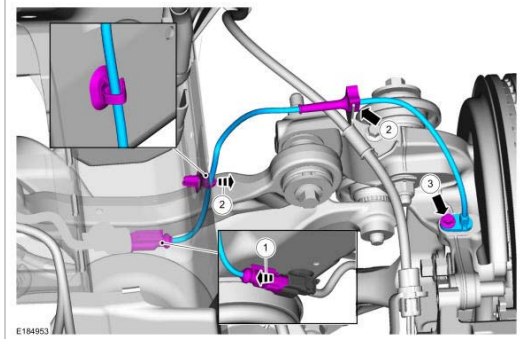
Detach the 2 sensor harness retainers.

3.

Remove the bolt and the rear wheel speed sensor.

Torque

: 80 lb.in (9 Nm)



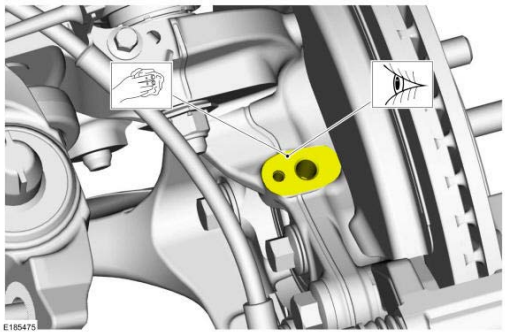
REMOVAL AND INSTALLATION > REAR WHEEL SPEED SENSOR > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Before installing a new sensor, inspect the sensor housing to make sure the sensor cavity is clean and free of foreign material.



REMOVAL AND INSTALLATION > STABILITY ASSIST TRACTION CONTROL SWITCH > REMOVAL

NOTE: The stability/traction control switch is part of the Front Controls Interface Module (FCIM).

1.

Remove the FCIM. REFER to: FRONT CONTROLS INTERFACE MODULE (FCIM) - Vehicles With: AM/FM/CD/SYNC. Refer to: FRONT CONTROLS INTERFACE MODULE (FCIM) - Vehicles With Touchscreen Display.

REMOVAL AND INSTALLATION > STABILITY ASSIST TRACTION CONTROL SWITCH > INSTALLATION

1.

To install, reverse the removal procedure.

Service Manual: BRAKE SYSTEM - GENERAL INFORMATION

SPECIFICATIONS > SPECIFICATIONS > LUBRICANTS, FLUIDS, SEALERS AND ADHESIVES

LUBRICANTS, FLUIDS, SEALERS AND ADHESIVES

	Specifications
Motorcraft® DOT 4 LV High Performance Motor Vehicle Brake Fluid / PM-20	WSS-M6C65-A2

SPECIFICATIONS > SPECIFICATIONS > TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

Item	Nm	lb-ft	lb-in
Front caliper bleeder screw-vehicles with 2 piston brake caliper	11	-	97
Front caliper bleeder screw-vehicles with 4 piston brake caliper	8	-	71
Front caliper bleeder screw-vehicles with 6 piston brake caliper	19	-	71
Rear caliper bleeder screw	11	-	97
Master cylinder brake tube fittings	27.5	-	20

SPECIFICATIONS > SPECIFICATIONS > GENERAL SPECIFICATIONS

GENERAL SPECIFICATIONS

Item	Specification
Front brake disc minimum thickness-vehicles with 2 piston brake caliper	1.122in (28.5mm)
Front brake disc minimum thickness-vehicles with 4 piston brake caliper	1.201in (30.5mm)

Front brake disc minimum thickness-vehicles with 6 piston brake caliper	1.244in (31.6mm)
Rear brake disc minimum thickness-solid	0.390in (9.9mm)
Rear brake disc minimum thickness-vented	0.925in (23.5mm)
Brake pad minimum thickness	0.118in (3mm)
Brake pad maximum taper wear (in any direction)	0.118in (3mm)

DIAGNOSIS AND TESTING > BRAKE SYSTEM > SYMPTOM CHART(S)

Symptom Chart: Brake System

Diagnostics in this service information assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

Condition	Possible Sources	Actions
The red brake warning indicator and the yellow ABS warning indicator are illuminated	Diagnostic Trouble Codes (DTCs) in the ABS	CHECK for ABS diagnostic trouble codes (DTCs). REFER to: Anti-Lock Brake System (ABS) and Stability Control .
The red brake warning indicator is always/never on	Brake fluid level switch Parking brake switch Wiring, terminals or connectors IPC BCM	REFER to: Instrumentation, Message Center and Warning Chimes .
Vehicle pulls or drifts during braking	Brake calipers and/or guide pins Brake flexible hose Brake pads Brake discs	INSPECT the brake system components. INSTALL new components as necessary.
	Tires	REFER to: Wheels and Tires .
	Suspension component(s) and/or wheel alignment	REFER to: Suspension System .
Brake pedal goes down fast or eases down slowly	Brake fluid leaks and/or air in the system	INSPECT the system for leaks. REPAIR as necessary. BLEED the system. REFER to: Brake System Pressure Bleeding .
	Brake master cylinder	CARRY OUT the Component Test-Brake Master Cylinder - Bypass Condition .
	HCU	REFER to: Anti-Lock Brake System (ABS) and Stability Control .

	Brake pedal	INSPECT the brake pedal simulator spring, cam and interface-to-booster. INSTALL a new brake pedal and bracket as necessary.
Brakes lock up under light brake pedal force	Brake pads Brake flexible hose Brake disc Brake calipers and/or guide pins	INSPECT the brake system components. INSTALL new components as necessary.
	ABS	REFER to: Anti-Lock Brake System (ABS) and Stability Control .
Excessive brake pedal travel (low/spongy pedal)	Brake fluid leaks and/or air in the system	INSPECT the system for leaks. REPAIR as necessary. BLEED the system. REFER to: Brake System Pressure Bleeding .
	Brake master cylinder	CARRY OUT the Component Test-Brake Master Cylinder - Bypass Condition .
	Brake calipers and/or guide pins	INSPECT the brake calipers and guide pins. INSTALL new components as necessary.
	Brake flexible hose	INSPECT the brake flexible hoses during brake application. INSTALL a new brake hose as necessary. REFER to: Front Brake Flexible Hose . REFER to: Rear Brake Flexible Hose .
Erratic brake pedal travel	Brake pedal	INSPECT the brake pedal for binding, obstructions and correct interface to booster rod. REPAIR as necessary. CHECK the brake pedal fasteners for correct torque. REFER to: Brake Pedal and Bracket - 6-Speed Manual Transmission - 3160/6-Speed Manual Transmission - MT82 . REFER to: Brake Pedal and Bracket - 6-Speed Automatic Transmission - 6R80 .
	ABS	REFER to: Anti-Lock Brake System (ABS) and Stability Control .
Brake drag	Parking brake component	INSPECT the parking brake system. INSTALL new components as necessary.

	Brake caliper and/or guide pins Brake flexible hose Brake booster	INSPECT the brake system components. INSTALL new components as necessary.
	Brake master cylinder	CARRY OUT the Component Test- Brake Master Cylinder - Compensator Port .
	Hydraulic Control Unit (HCU)	REFER to: Anti-Lock Brake System (ABS) and Stability Control .
	Stoplamp switch	VERIFY correct installation of the stoplamp switch. REFER to: Stoplamp Switch .
Excessive brake pedal effort	Insufficient vacuum for brake booster operation Brake booster manifold vacuum hose Brake booster Brake booster check valve Brake booster vacuum pump	CARRY OUT the Component Test- Brake Booster .
	Brake pads	INSPECT the brake pads. INSTALL new components as necessary. REFER to: Brake Pads - Vehicles With: 2-Piston Brake Caliper . REFER to: Brake Pads - Vehicles With: 4-Piston Brake Caliper . REFER to: Brake Pads - Vehicles With: 6-Piston Brake Caliper . REFER to: Brake Pads .

Symptom Chart: NVH

Diagnostics in this service information assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

Condition	Possible Sources	Actions
Vibration when the brakes are applied	Brake disc(s)/ Suspension components	GO to Pinpoint Test A
Brake vibration/shudder - occurs when the brake pedal is released	Brake drag	REFER to Symptom Chart: Brake System in Symptom Chart(s)
Rattling noise	Caliper guide pins or guide pin bolts Missing or damaged anti-rattle clips or springs Loose brake disc shield	INSPECT the caliper guide pins and guide pin bolts. INSTALL new components as necessary. INSPECT the brake pads for missing clips or broken springs. INSTALL new components as necessary. TIGHTEN the brake disc shield

		bolts to specification. REFER to: Brake Pads - Vehicles With: 2-Piston Brake Caliper . REFER to: Brake Pads - Vehicles With: 4-Piston Brake Caliper . REFER to: Brake Pads - Vehicles With: 6-Piston Brake Caliper . REFER to: Brake Pads .
Squealing noise - occurs on first (morning) brake application	Brake pads	Acceptable condition. Caused by humidity and low brake pad temperature.
Squealing noise - a continuous squeal	Brake pads	INSPECT the brake pads. INSTALL new components as necessary. REFER to: Brake Pads - Vehicles With: 2-Piston Brake Caliper . REFER to: Brake Pads - Vehicles With: 4-Piston Brake Caliper . REFER to: Brake Pads - Vehicles With: 6-Piston Brake Caliper . REFER to: Brake Pads .
Squealing noise - an intermittent squeal	Brake pads	Acceptable condition. Caused by cold, heat, water, mud or snow.
Groaning noise - occurs at low speeds with brake lightly applied (creeping)	Brake pads	Acceptable condition.
Grinding/moaning noise - continuous	Brake pads Brake disc	INSPECT the brake pads, brake discs and attaching hardware for damage. VERIFY brake components are within specifications. INSTALL new components as necessary.

DIAGNOSIS AND TESTING > BRAKE SYSTEM > PINPOINT TESTS

Diagnostics in this service information assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

Vibration When Brakes Are Applied

Normal Operation and Fault Conditions

During moderate to heavy braking, noise from the HCU and pulsation in the brake pedal can be observed. Pedal pulsation coupled with noise during heavy braking or on loose gravel, bumps, wet or snowy surfaces is acceptable and indicates correct functioning of the ABS. Pedal pulsation or steering wheel nibble when the brakes are applied (frequency is proportioned to the vehicle speed) indicates a concern with a brake or suspension component.

DIAGNOSIS AND TESTING > BRAKE SYSTEM > PINPOINT TESTS > PINPOINT TEST A : VIBRATION WHEN BRAKES ARE APPLIED > PINPOINT TEST A : VIBRATION WHEN BRAKES ARE APPLIED

A1 ROAD TEST THE VEHICLE -LIGHT BRAKING

Road test the vehicle. Warm the brakes by slowing the vehicle from 80 to 32 km/h (50 to 20 mph) using light brake force. At highway speeds of 89-97 km/h (55-60 mph), apply the brake using light pedal force.

Is there a vibration/shudder felt in the steering wheel, seat or brake pedal?

Yes	GO to A4

No	GO to A2

A2 ROAD TEST THE VEHICLE -MODERATE TO HEAVY BRAKING

Road test the vehicle. At highway speeds of 89-97 km/h (55-60 mph), apply the brake using a moderate to heavy pedal force.

Is there a vibration/shudder?

Yes	GO to A3

No	The concern is not present at this time.

NOTE: During moderate to heavy braking, noise from the Hydraulic Control Unit (HCU) and pulsation in the brake pedal can be observed. Pedal pulsation coupled with noise during heavy braking or on loose gravel, bumps, wet or snowy surfaces is acceptable and indicates correct operation of the ABS. Pedal pulsation or steering wheel nibble with the frequency proportional to vehicle speed indicates a concern with a brake or suspension component.

A3 CHECK ABS (ANTI-LOCK BRAKE SYSTEM) OPERATION

Road test the vehicle and apply the brakes on a dry, firm surface, then apply the brakes on a wet, snowy or loose surface (such as gravel).

Is the vibration/shudder only present on a wet, snowy or loose surface?

Yes	This is a normal operating condition of the ABS.

No	GO to A5

NOTE: This test step is not applicable to vehicles with drum-in-hat type or electronic parking brakes. For vehicles with drum-in-hat or electronic parking brakes, proceed to the next test step. For all other vehicles, apply the parking brake to identify if the problem is in the front or rear brake.

A4 ISOLATE BRAKE VIBRATION

Apply the parking brake to identify if the problem is in the front or rear brake. At highway speeds of 89-97 km/h (55-60 mph), lightly apply the parking brake until the vehicle slows down. Release the parking brake immediately after the test.

Is there a vibration/shudder?

Yes	GO to A7

No	GO to A5

A5 CHECK THE FRONT SUSPENSION

Check the front suspension.

Are all the suspension components in satisfactory condition?

Yes	GO to A6

No	REPAIR or INSTALL new components as necessary. TEST the system for normal operation.

A6 CHECK THE FRONT BRAKE DISCS

Inspect the front brake discs. MACHINE or INSTALL new brake discs as necessary. REFER to: Brake Disc Machining . REFER to: Brake Disc - Front Disc Brake. REFER to: Brake Disc - Rear Disc Brake.

Road test the vehicle.

Is the vibration/shudder present?

Yes	GO to A7

No	The concern has been repaired.

A7 CHECK THE REAR SUSPENSION

Check the rear suspension.

Are all the suspension components in satisfactory condition?

Yes	INSPECT the rear brake discs. MACHINE or INSTALL new brake discs as necessary. REFER to: Brake Disc Machining . REFER to: Brake Disc - Front Disc Brake. REFER to: Brake Disc - Rear Disc Brake.

No	REPAIR or INSTALL new components as necessary. TEST the system for normal operation.

DIAGNOSIS AND TESTING > BRAKE SYSTEM > COMPONENT TEST- BRAKE BOOSTER

1.

Disconnect the brake booster vacuum sensor/check valve from the brake booster and connect a suitable vacuum/pressure tester to the booster side of the vacuum sensor/check valve.

2.

Apply the parking brake, start the engine and place the transmission in NEUTRAL.

Allow the engine to reach normal operating temperature.

3.

Verify that vacuum is available at the vacuum sensor/check valve with engine running at normal idle speed.

The vacuum gauge should read between 51-74 kPa (15-22 in-Hg).

If specified vacuum is available, stop the engine, connect the vacuum sensor/check valve and continue with Step 5.

If specified vacuum is not available, continue with Step 4.

4.

Disconnect the vacuum sensor/check valve from the vacuum hose and verify that the specified vacuum is available at the hose with the engine at idle speed and the transmission in NEUTRAL.

If specified vacuum is available, stop the engine, install a new check valve and continue with Step 5.

For vehicles equipped with a brake vacuum pump, if specified vacuum is not available, inspect the vacuum hose and install new as necessary. If the vacuum hose is ok, install a new vacuum pump.

For vehicles not equipped with a brake vacuum pump, if specified vacuum is not available, stop the engine, connect the vacuum hose to the check valve and diagnose the no/low vacuum condition. REFER to: ENGINE SYSTEM - GENERAL INFORMATION .

5.

Apply the brake pedal several times to exhaust all vacuum from the system.

6.

Apply the brake pedal and hold it in the applied position. Start the engine and verify that the brake pedal moves downward after the engine starts.

If the brake pedal moves, the brake booster is operating correctly.

If the brake pedal does not move, install a new brake booster. REFER to: Brake Booster - 2.3L EcoBoost (201kW/273PS) . REFER to: Brake Booster - 3.7L Duratec (227kW/301PS) . REFER to: Brake Booster - 5.0L 32V Ti-VCT .

7.

Operate the engine a minimum of 20 seconds at idle. Stop the engine and let the vehicle stand for 10 minutes, then apply the brake pedal. The brake pedal feel should be the same as that noted with the engine operating.

If the brake pedal feels hard (no power assist), install a new brake booster vacuum sensor/check valve and retest.

If condition still exists, install a new brake booster. REFER to: Brake Booster - 2.3L EcoBoost (201kW/273PS) . REFER to: Brake Booster - 3.7L Duratec (227kW/301PS) . REFER to: Brake Booster - 5.0L 32V Ti-VCT .

If the brake pedal feels the same as noted with the engine operating, the vacuum sensor/check valve is functioning properly.

DIAGNOSIS AND TESTING > BRAKE SYSTEM > COMPONENT TEST- BRAKE MASTER CYLINDER - BYPASS CONDITION

1.

Inspect the master cylinder.

2.

Disconnect the brake tubes from the master cylinder.

NOTE: Make sure the outlet port plugs do not show signs of leakage.

3.
Plug the outlet ports of the master cylinder.

4.

Lightly apply the brakes and hold for 10 seconds. Release the brakes and then reapply with heavy force. If brake pedal height cannot be maintained, the brake master cylinder has an internal leak and a new brake master cylinder must be installed.

- If brake pedal height is maintained, reinstall brake tubes and tighten to specification. REFER to: Brake Master Cylinder . After installation, bleed the brake system. REFER to: Brake System Pressure Bleeding .

DIAGNOSIS AND TESTING > BRAKE SYSTEM > COMPONENT TEST- BRAKE MASTER CYLINDER - COMPENSATOR PORT

1.

Inspect the master cylinder.

2.

REFER to: Jacking and Lifting - Overview .

3.

Apply and release the brakes.

4.

With the brakes released, attempt to rotate each wheel and check for any brake drag.

- If an excessive amount of brake drag exists at multiple wheels, continue to Step 5.
- If an excessive amount of brake drag exists at only one wheel, it indicates a possible seized brake caliper, brake wheel cylinder or parking brake component. Repair or install new components as necessary.

5.

Check the brake stoplamp switch and the brake pedal free play to verify the brake pedal is not partially applied.

6.

Loosen the brake master cylinder nuts and position the brake master cylinder away from the brake booster.

7.

With the brakes released, attempt to rotate each wheel and check for any brake drag.

- If the brake drag is no longer present, install a new brake booster. REFER to: Brake Booster - 2.3L EcoBoost (201kW/273PS) . REFER to: Brake Booster - 3.7L Duratec (227kW/301PS) . REFER to: Brake Booster - 5.0L 32V Ti-VCT .
- If the brake drag is still present, install a new master cylinder. REFER to: Brake Master Cylinder .

GENERAL PROCEDURES > BRAKE DISC MACHINING

Repair

NOTE: ***On-Vehicle Brake Lathe Training Videos***

1.

Vehicle preparation.

	A multimedia supplement to the instructions contained in this article is available. To view the multimedia example of the condition described go to; **http://www.youtube.com/user/Mitchell1Tips** **then type, "A00673934.Vid1" into the "Search Channel" box.**

2.

Mounting the machine.

	A multimedia supplement to the instructions contained in this article is available. To view the multimedia example of the condition described go to; **http://www.youtube.com/user/Mitchell1Tips** **then type, "A00673934.Vid2" into the "Search Channel" box.**

3.

Lateral runout adjustment.

	A multimedia supplement to the instructions contained in this article is available. To view the multimedia example of the condition described go to; **http://www.youtube.com/user/Mitchell1Tips** **then type, "A00673934.Vid3" into the "Search Channel" box.**

4.

Making the cut.

	A multimedia supplement to the instructions contained in this article is available. To view the multimedia example of the condition described go to; **http://www.youtube.com/user/Mitchell1Tips** **then type, "A00673934.Vid4" into the "Search Channel"**

	box.

5.

Cutting the opposite side.

	A multimedia supplement to the instructions contained in this article is available. To view the multimedia example of the condition described go to; **http://www.youtube.com/user/Mitchell1Tips** **then type, "A00673934.Vid5" into the "Search Channel" box.**

6.

Lathe maintenance.

	A multimedia supplement to the instructions contained in this article is available. To view the multimedia example of the condition described go to; **http://www.youtube.com/user/Mitchell1Tips** **then type, "A00673934.Vid6" into the "Search Channel" box.**

Repair

NOTE: ***On-Vehicle Brake Disc Machining***

NOTE: Do not use a bench lathe to machine the brake discs. Use an on-vehicle brake lathe only. Read the entire operating manual and/or view the video shipped with the lathe before installing, operating or repairing the lathe.

NOTE: Lateral runout and disc thickness variation measurements are not required because correct adjustment of the on-vehicle brake lathe will make sure that these dimensions are within specification.

1.

Refer to: Wheel and Tire .

NOTE: It is not necessary to disconnect the brake hose from the brake caliper.

NOTE: Do not allow the caliper to hang from the brake hose or damage to the hose may occur.

2.
Remove the bolts and position the brake caliper or brake caliper and anchor plate assembly aside, as required. Support the brake caliper using mechanic's wire.

NOTE: On some vehicle applications the axle on the opposing side may rotate during the machining process. On these applications the brake disc must be secured or damage may occur.

3.
If necessary, secure the opposing brake disc by installing 2 wheel nuts finger tight.

4.

Install the hub adapter using four wheel nuts on a 4, 7 or 8-stud wheel hub.

Install the hub adapter using five wheel nuts on a 5 or 10-stud wheel hub.

Install the hub adapter using six wheel nuts on a 6-stud wheel hub.

5.

Install the cutting lathe.

NOTE: An on-vehicle brake lathe with an automatic runout adjustment feature is preferred. However, if the lathe is not self adjusting, the lathe oscillation must be adjusted using a dial indicator. The total indicated runout target is 0.000 mm (0.000 in). The maximum indicated runout should be no more than 0.050 mm (0.002 in). If the runout adjustment (automatic or manual) is carried out correctly prior to machining, then the final brake disc runout will be within specification and a runout measurement is not necessary after machining.

6.
If the lathe is not self-adjusting, adjust the lathe oscillation using a dial indicator.

7.

Center the cutting head, adjust the cutting bits and install the chip deflector/silencer.

NOTE: The depth of the cut should be between 0.10 and 0.40 mm (0.004 and 0.015 in). Lighter cuts will cause the bit to heat up and wear faster. Heavier cuts will cause poor brake disc surface finish.

8.
Machine the brake disc.

9.

Remove the lathe and the silencer.

10.

Remove the wheel nuts and hub adapter.

11.

Remove the metal shavings.

12.

Measure the brake disc thickness. If the measurement is below the minimum specification, install a new brake disc.

> *NOTE: It is not required to install new brake pads if friction material is within specifications.*

13.
Position the brake caliper or brake caliper and anchor plate assembly and install the bolts. Refer to: Brake Caliper Anchor Plate . Refer to: Brake Caliper Anchor Plate .

14.

Refer to: Wheel and Tire .

GENERAL PROCEDURES > BRAKE SYSTEM PRESSURE BLEEDING

Special Tool(s) / General Equipment

Brake/Clutch System Pressure Bleeder/Filler
Fluid Container

Bleeding

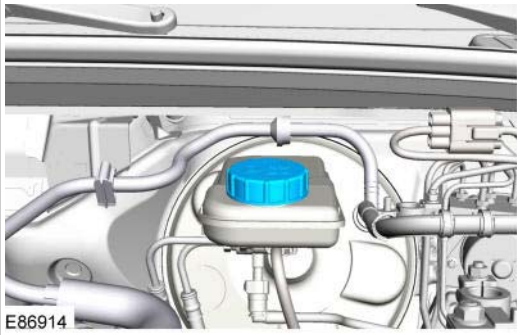
All vehicles

> *NOTE: If the fluid is spilled on the paintwork, the affected area must be immediately washed down with cold water.*

> *NOTE: The HCU bleeding procedure and a second brake system pressure bleed must be carried out if a new HCU has been installed.*

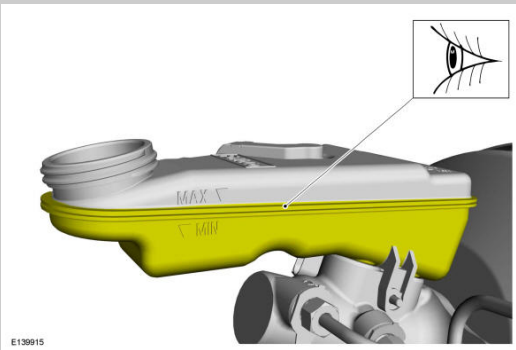
NOTE: Make sure the area around the master cylinder cap is clean and free of foreign material.

1.
Remove the brake fluid reservoir cap.



2.

Make sure the fluid reservoir is filled with clean specified brake fluid. Refer to: Specifications .



3.

NOTE: Master cylinder pressure bleeder adapter tools are available from various manufacturers of pressure bleeding equipment. Follow the instructions of the manufacturer when installing the adapter.

1.
Install the bleeder adapter to the brake master cylinder reservoir and attach the bleeder tank hose to the fitting on the adapter. Use the General Equipment: Brake/Clutch System Pressure Bleeder/Filler

NOTE: Make sure the bleeder tank contains enough clean, specified brake fluid to complete the bleeding operation.

2.

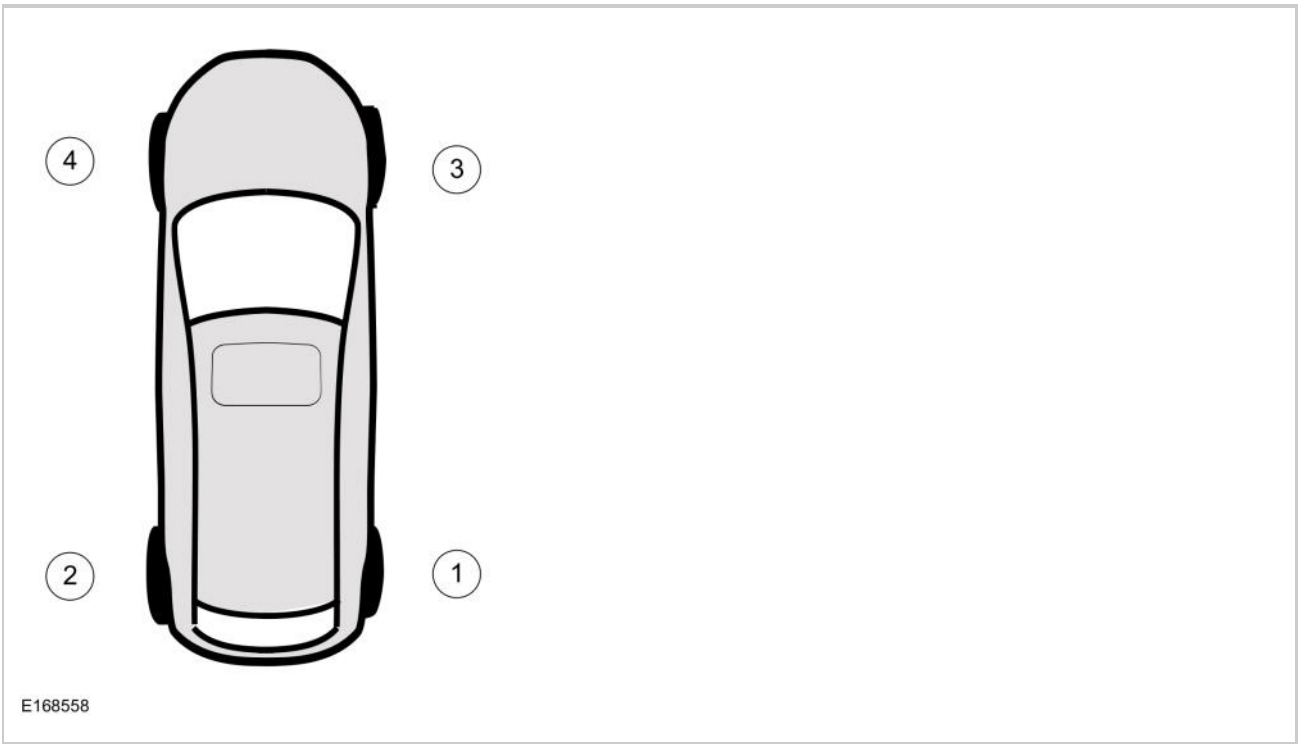
Open the valve on the bleeder tank and apply 207-345 kPa (30-50 psi) to the brake system.

4.

With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

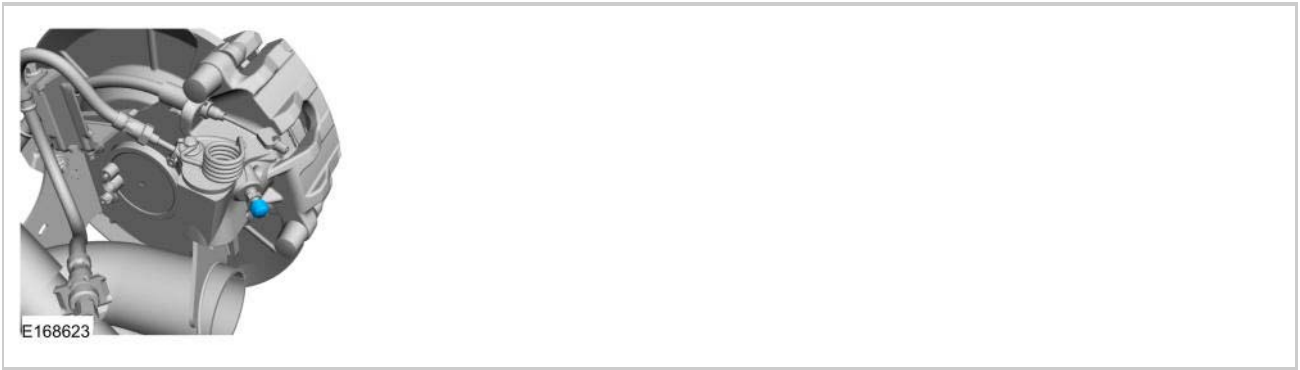
5.

Bleeding steps must be followed in the order indicated in the graphic. For vehicles equipped with 4 or 6 piston brake calipers, bleed the inner bleeder screw first, followed by the outer bleeder screw.



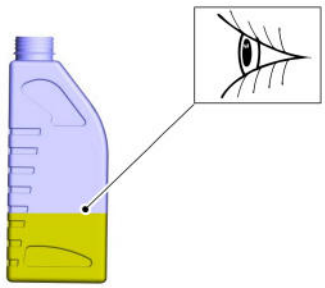
6.

If equipped, remove the bleeder screw cap.



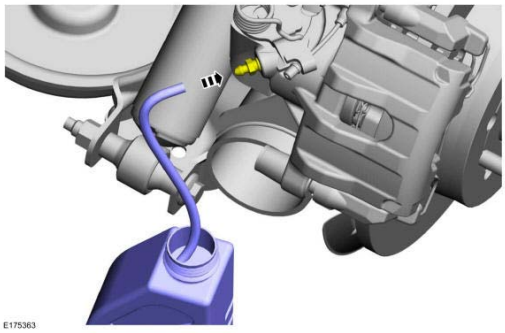
7.

Partially fill a clean brake fluid container with clean specified brake fluid. Refer to: Specifications . Use the General Equipment: Fluid Container



8.

Submerge a hose into the brake fluid in the container and connect the hose to bleeder screw.



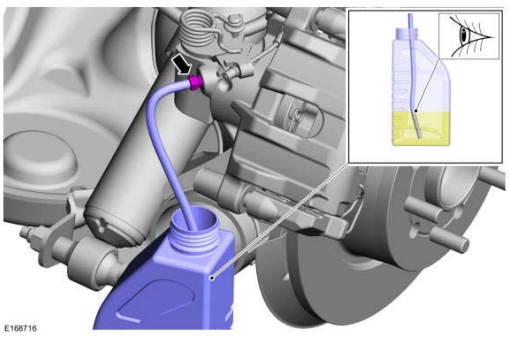
9.

1.

Loosen the bleeder screw. Loosen: 180°

2.

Leave open until clear, bubble-free brake fluid flows, then tighten the bleeder screw.



Vehicles with rear integral parking brake calipers

NOTE: Due to the complexity of the fluid path within the rear integral parking brake calipers, it is necessary to apply and release the parking brake during the bleed

procedure.

10.

1.

Apply and release the parking brake 5 times.

2.

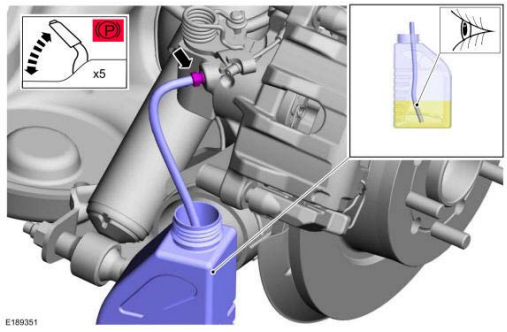
Loosen the bleeder screw. Loosen: 180°

3.

Leave open until clear, bubble-free fluid flows and then tighten the bleeder screw.

4.

Repeat as necessary.

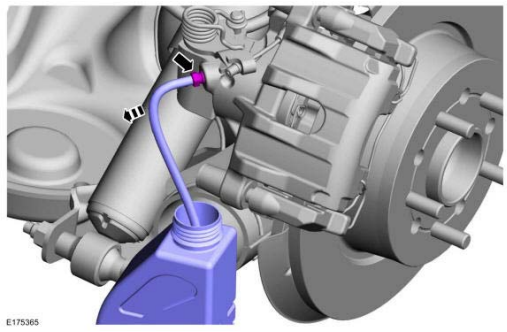


All vehicles

11.

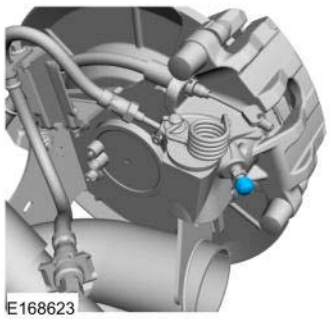
1.

Tighten the bleeder screw to specification and remove the hose and brake fluid container. Refer to: Specifications .



12.

If equipped, install the bleeder screw cap.



NOTE: For vehicles equipped with 4 or 6 piston brake calipers, bleed the inner bleeder screw first, followed by the outer bleeder screw.

13.
Repeat steps 5-12 at the remaining wheel ends.

14.

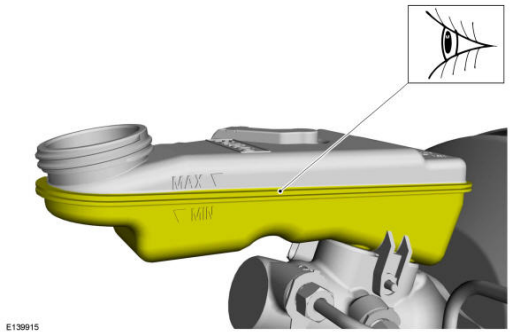
Lower the vehicle.

15.

Close the bleeder tank valve and release the pressure. Remove the General Equipment: Brake/Clutch System Pressure Bleeder/Filler

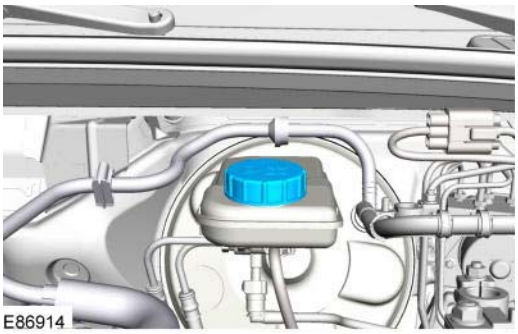
16.

Fill the reservoir with clean, specified brake fluid. Refer to: Specifications .



17.

Install the brake fluid reservoir cap.



Vehicles with new hydraulic control unit (HCU) installed

NOTE: The HCU bleeding procedure and a second brake system pressure bleed must be carried out if a new HCU has been installed.

18.

Using the diagnostic scan tool, follow the ABS Service Bleed instructions.

19.

Repeat brake system pressure bleeding steps.

GENERAL PROCEDURES > COMPONENT BLEEDING

Special Tool(s) / General Equipment

Master Cylinder Bleeding Set

Bleeding

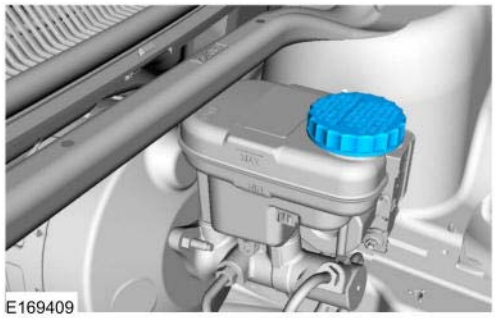
NOTE: If the fluid is spilled on the paintwork, the affected area must be immediately washed down with cold water.

Master Cylinder

NOTE: When a new brake master cylinder has been installed, it should be primed to prevent air from entering the system.

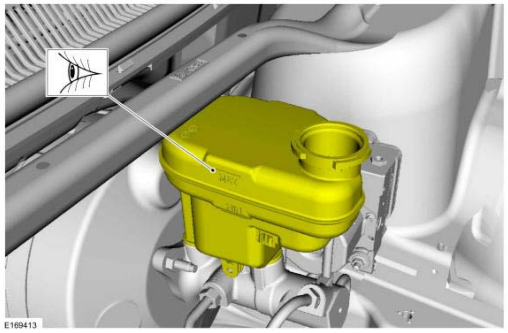
NOTE: Make sure the area around the master cylinder cap is clean and free of foreign material.

1.
Remove the brake fluid reservoir cap.



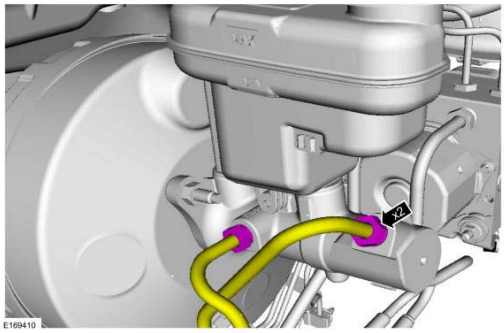
2.

Fill the reservoir with clean, specified brake fluid. Refer to: Specifications .



3.

Loosen and remove the brake tube fittings.



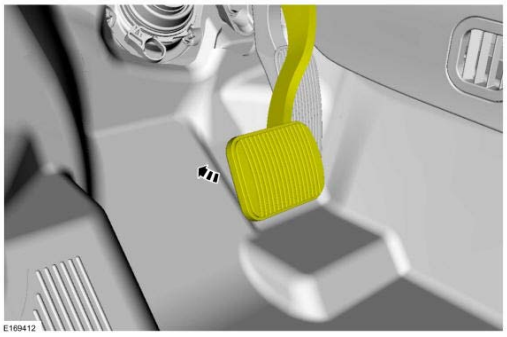
4.

Install the master cylinder bleeding set. Use the General Equipment: Master Cylinder Bleeding Set



5.

Have an assistant pump the brake pedal slowly until clear bubble free fluid flows from the brake tubes.



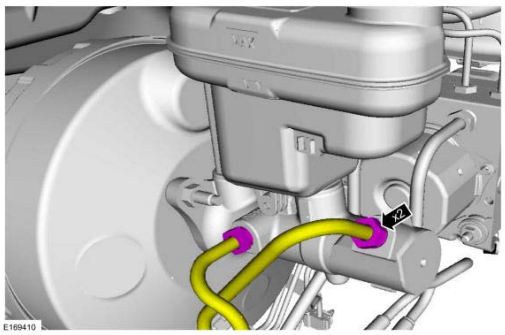
6.

Remove the master cylinder bleeding set. Use the General Equipment: Master Cylinder Bleeding Set



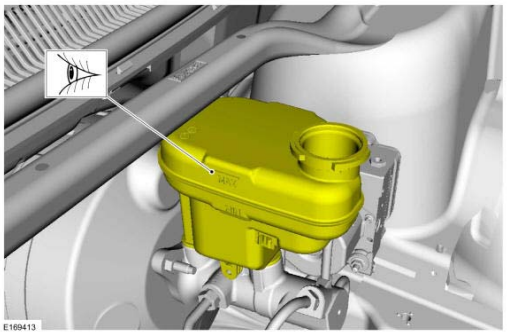
7.

Tighten the brake tube fittings. Refer to: Specifications .



8.

Fill the reservoir with clean, specified brake fluid. Refer to: Specifications .



9.

Refer to: Brake System Pressure Bleeding .

Brake Caliper, Wheel Cylinder, Brake Hose or Brake Tube

NOTE: Pressure bleeding the brake system is required anytime a hydraulic brake system component has been disconnected.

10.
Refer to: Brake System Pressure Bleeding .

Service Manual: FRONT DISC BRAKE

DIAGNOSIS AND TESTING > FRONT DISC BRAKE

REFER to: Brake System .

REMOVAL AND INSTALLATION > BRAKE CALIPER - VEHICLES WITH: 2-PISTON BRAKE CALIPER > REMOVAL

NOTE: Make sure that all openings are sealed.

NOTE: If the fluid is spilled on the paintwork, the affected area must be immediately washed down with cold water.

NOTE: Removal steps in this procedure may contain installation details.

1.

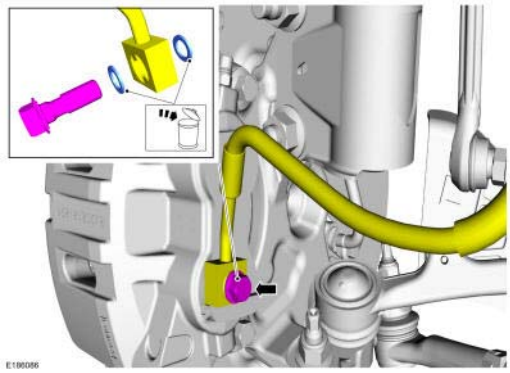
Remove the wheel and tire. Refer to: Wheel and Tire .

2.

Remove the brake caliper flow bolt and disconnect the brake hose. Discard the washers.

Torque

: 30 lb.ft (40 Nm)

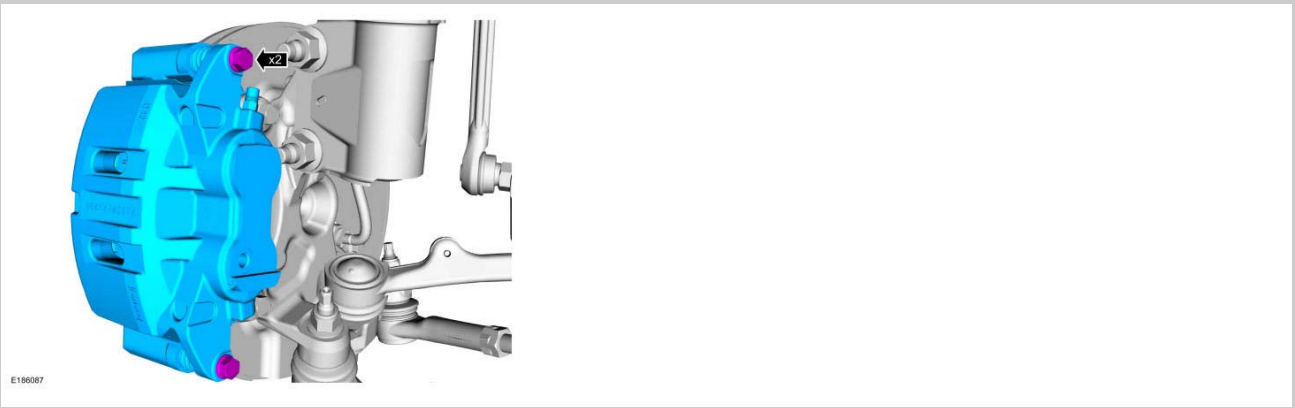


3.

Remove the 2 guide pin bolts and the brake caliper.

Torque

: 24 lb.ft (32 Nm)



REMOVAL AND INSTALLATION > BRAKE CALIPER - VEHICLES WITH: 2-PISTON BRAKE CALIPER > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Bleed the brake system. Refer to: Brake System Pressure Bleeding .

REMOVAL AND INSTALLATION > BRAKE CALIPER - VEHICLES WITH: 4-PISTON BRAKE CALIPER > REMOVAL

NOTE: Make sure that all openings are sealed.

NOTE: If the fluid is spilled on the paintwork, the affected area must be immediately washed down with cold water.

NOTE: Removal steps in this procedure may contain installation details.

1.

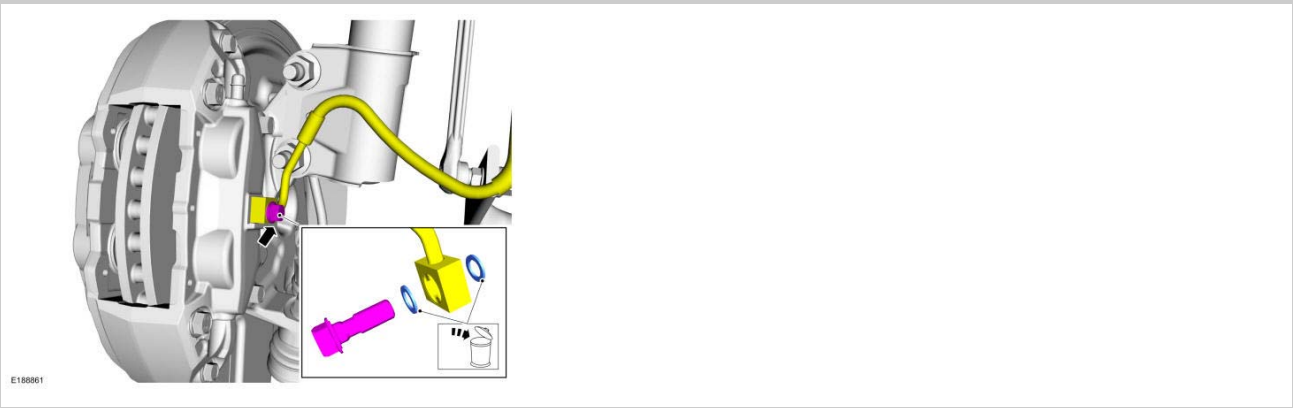
Remove the brake pads. Refer to: Brake Pads - Vehicles With: 4-Piston Brake Caliper .

2.

Remove the brake caliper flow bolt and disconnect the brake hose. Discard the washers.

Torque

: 30 lb.ft (40 Nm)

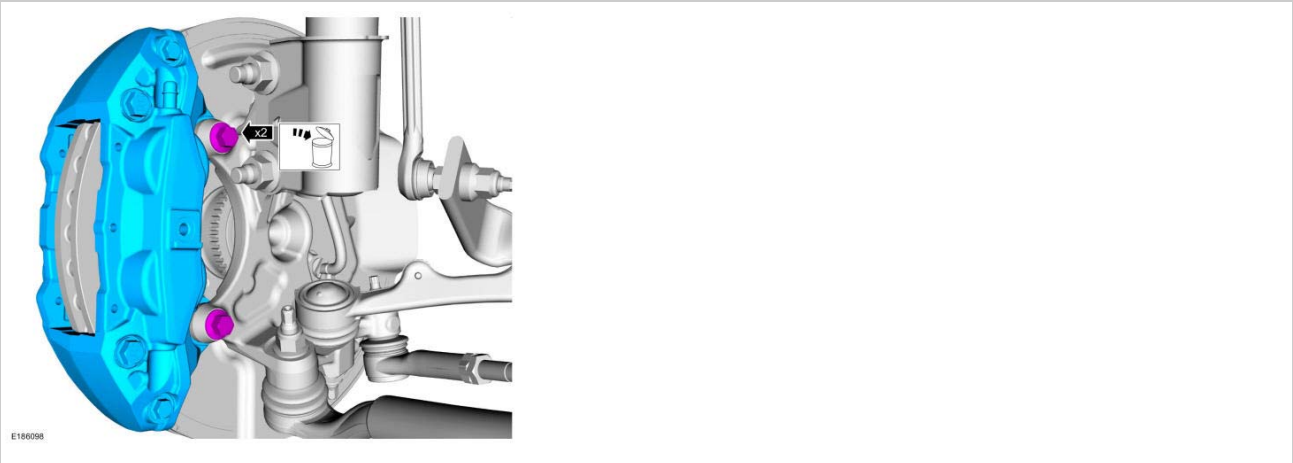


3.

Remove the 2 bolts and the brake caliper. Discard the bolts.

Torque

: 85 lb.ft (115 Nm)



REMOVAL AND INSTALLATION > BRAKE CALIPER - VEHICLES WITH: 4-PISTON BRAKE CALIPER > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Bleed the brake system. Refer to: Brake System Pressure Bleeding .

REMOVAL AND INSTALLATION > BRAKE CALIPER - VEHICLES WITH: 6-PISTON BRAKE CALIPER > REMOVAL

NOTE: Make sure that all openings are sealed.

NOTE: If the fluid is spilled on the paintwork, the affected area must be immediately washed down with cold water.

NOTE: Removal steps in this procedure may contain installation details.

1.

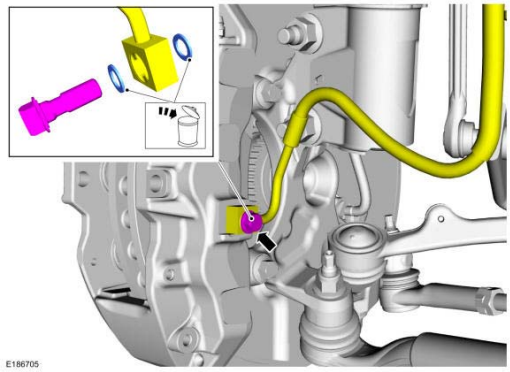
Remove the brake pads. Refer to: Brake Pads - Vehicles With: 6-Piston Brake Caliper .

2.

Remove the brake caliper flow bolt and disconnect the brake hose. Discard the washers.

Torque

: 30 lb.ft (40 Nm)

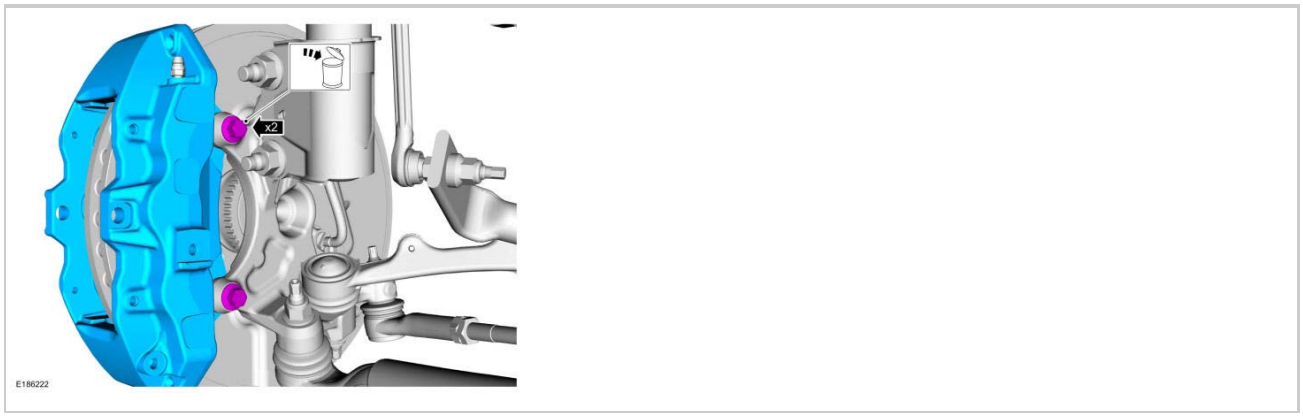


3.

Remove the 2 bolts and the brake caliper. Discard the bolts.

Torque

: 85 lb.ft (115 Nm)



REMOVAL AND INSTALLATION > BRAKE CALIPER - VEHICLES WITH: 6-PISTON BRAKE CALIPER > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Bleed the brake system. Refer to: Brake System Pressure Bleeding .

REMOVAL AND INSTALLATION > BRAKE CALIPER ANCHOR PLATE > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

Remove the brake pads. Refer to: Brake Pads - Vehicles With: 2-Piston Brake Caliper .

2.

Remove the 2 bolts and the anchor plate. Discard the bolts.

Torque

: 85 lb.ft (115 Nm)



REMOVAL AND INSTALLATION > BRAKE CALIPER ANCHOR PLATE > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > BRAKE DISC

Materials

Name	Specification
Metal Brake Parts Cleaner (U.S.) PM-4-A, PM-4-B (U.S.)	-

REMOVAL AND INSTALLATION > BRAKE DISC > REMOVAL

NOTE: Do not allow the brake caliper to hang from the brake hose or damage to the brake hose may occur.

NOTE: Removal steps in this procedure may contain installation details.

All brake calipers

1.

Remove the wheel and Tire. Refer to: Wheel and Tire .

2-piston brake caliper

2.

Remove the 2 bolts and position the brake caliper and brake pads aside.

Torque

: 85 lb.ft (115 Nm)



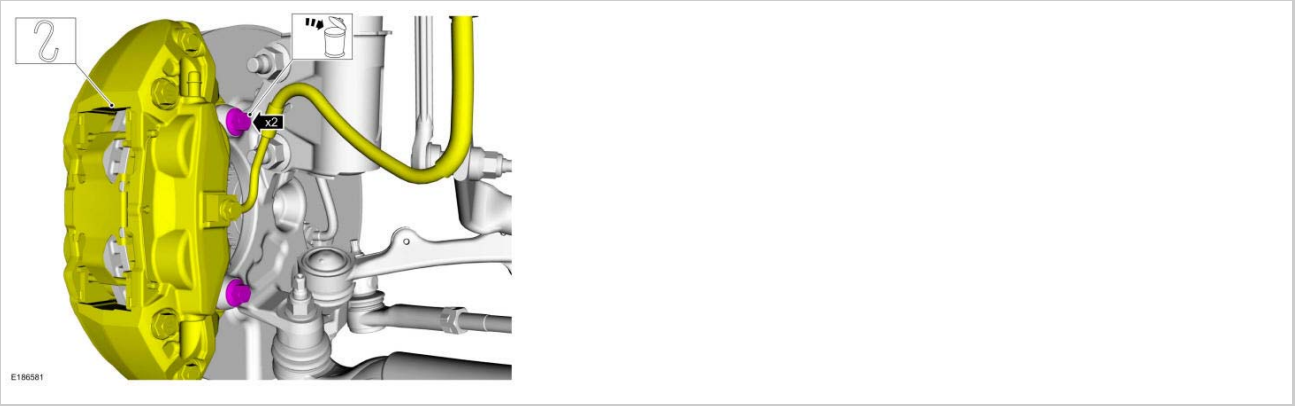
4-piston brake caliper

3.

Remove the 2 bolts and position the brake caliper and brake pads aside. Discard the bolts.

Torque

: 85 lb.ft (115 Nm)



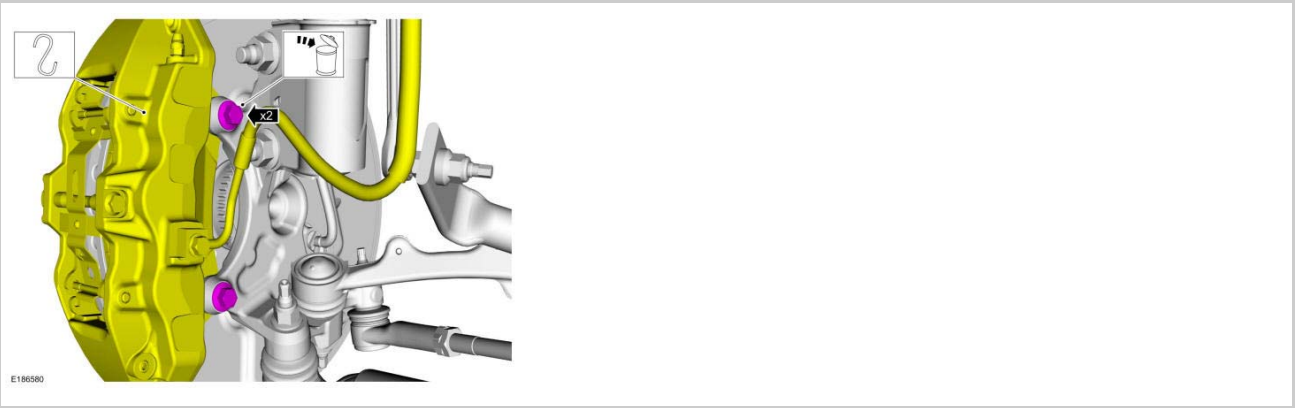
6-piston brake caliper

4.

Remove the 2 bolts and position the brake caliper and brake pads aside. Discard the bolts.

Torque

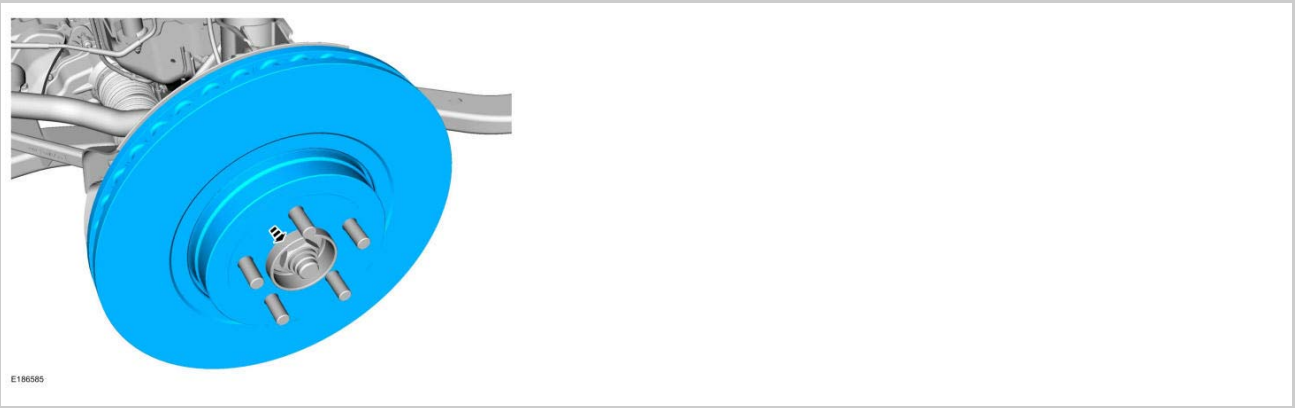
: 85 lb.ft (115 Nm)



All brake calipers

5.

Remove the brake disc.



REMOVAL AND INSTALLATION > BRAKE DISC > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Clean the brake disc mating surfaces using a wire brush and the specified material.

Material

: Metal Brake Parts Cleaner (U.S.) / PM-4-A, PM-4-B (U.S.)

3.

Apply the brake pedal several times to verify correct brake system operation.

REMOVAL AND INSTALLATION > BRAKE DISC SHIELD > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

All brake calipers

1.

Remove the brake disc. Refer to: Brake Disc .

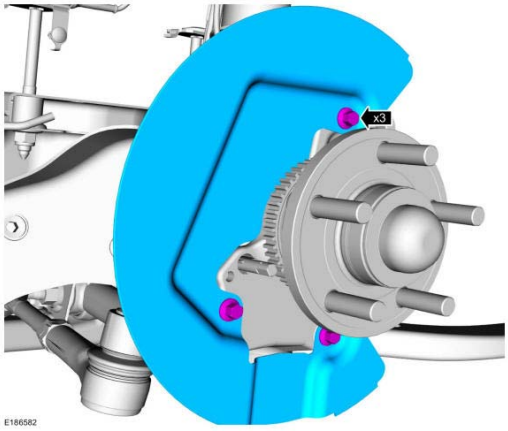
2-piston brake caliper

2.

Remove the 3 bolts and the brake disc shield.

Torque

: 177 lb.in (20 Nm)



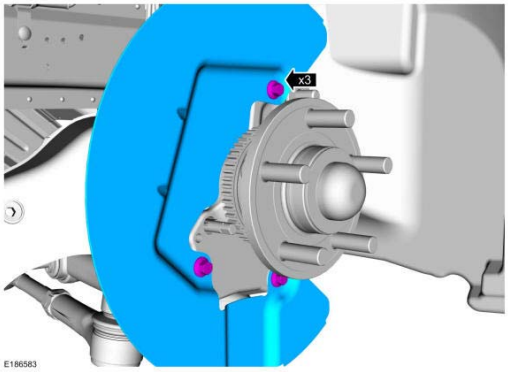
4-piston brake caliper

3.

Remove the 3 bolts and the brake disc shield.

Torque

: 177 lb.in (20 Nm)



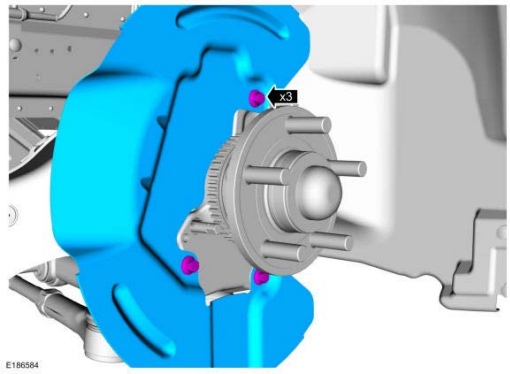
6-piston brake caliper-automatic transmission and convertible

4.

Remove the 3 bolts and the brake disc shield.

Torque

: 177 lb.in (20 Nm)



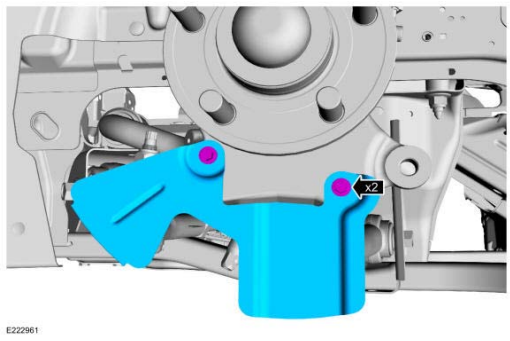
6-piston brake caliper-manual transmission

5.

Remove the 2 bolts and the brake disc shield.

Torque

: 177 lb.in (20 Nm)



REMOVAL AND INSTALLATION > BRAKE DISC SHIELD > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > BRAKE PADS - VEHICLES WITH: 2-PISTON BRAKE

CALIPER > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

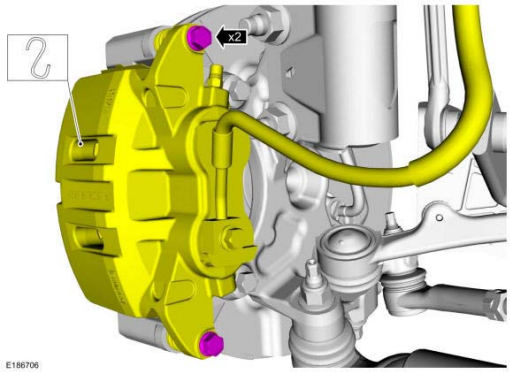
Remove wheel and tire. Refer to: Wheel and Tire .

NOTE: Do not allow the brake caliper to hang from the brake hose or damage to the brake hose may occur.

2.
Remove the 2 brake caliper guide pin bolts and position the brake caliper aside.

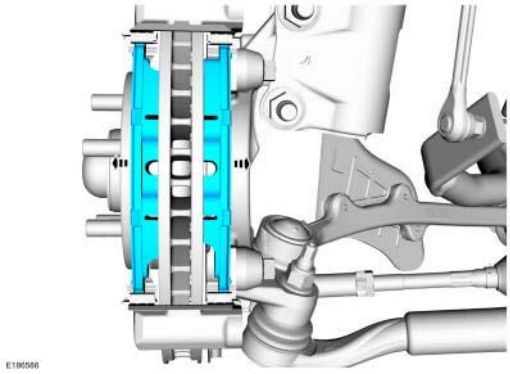
Torque

: 24 lb.ft (32 Nm)



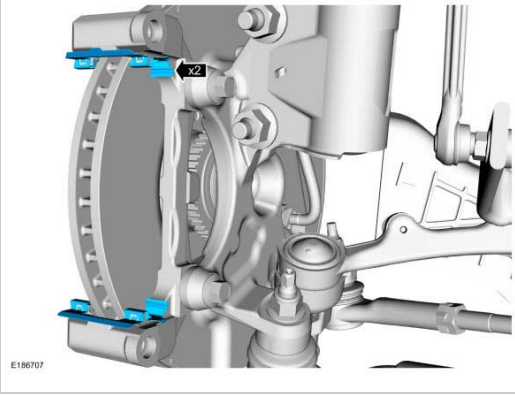
NOTE: Note the position of the components before removal.

3.
Remove the brake pads.



NOTE: There are two different brake pad clips. The brake pad clip with the tab must be installed at the top position on the anchor plate.

4.
Remove the top and bottom brake pad clips.



REMOVAL AND INSTALLATION > BRAKE PADS - VEHICLES WITH: 2-PISTON BRAKE CALIPER > INSTALLATION

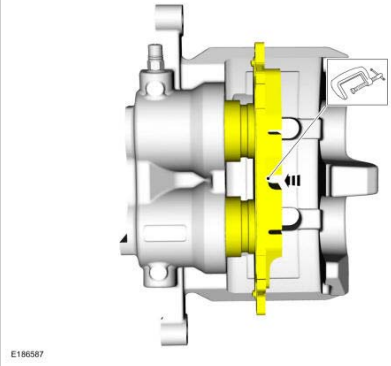
NOTE: If installing new brake pads, make sure to install all new hardware and lubricant supplied with the brake pad kit. Refer to the brake pad instruction sheet when applying lubricant.

1.

To install, reverse the removal procedure.

2.

If installing new brake pads. Use a C-clamp and a worn brake pad to compress the brake caliper pistons into the brake caliper bore.



3.

Depress the brake pedal, check the brake fluid level in the brake fluid reservoir and top up as necessary with brake fluid. Refer to: Specifications .

REMOVAL AND INSTALLATION > BRAKE PADS - VEHICLES WITH: 4-PISTON BRAKE CALIPER > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

Remove the wheel and tire. Refer to: Wheel and Tire .

2.

1.

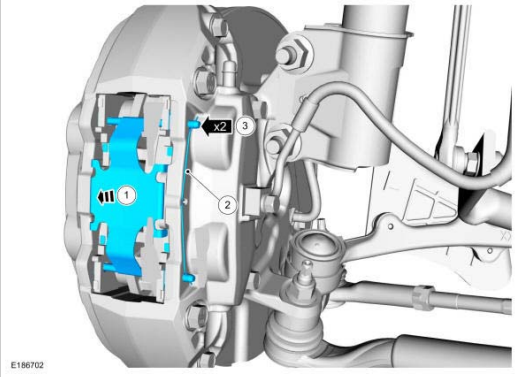
Remove brake pad spring.

2.

Remove the brake pad pin clip.

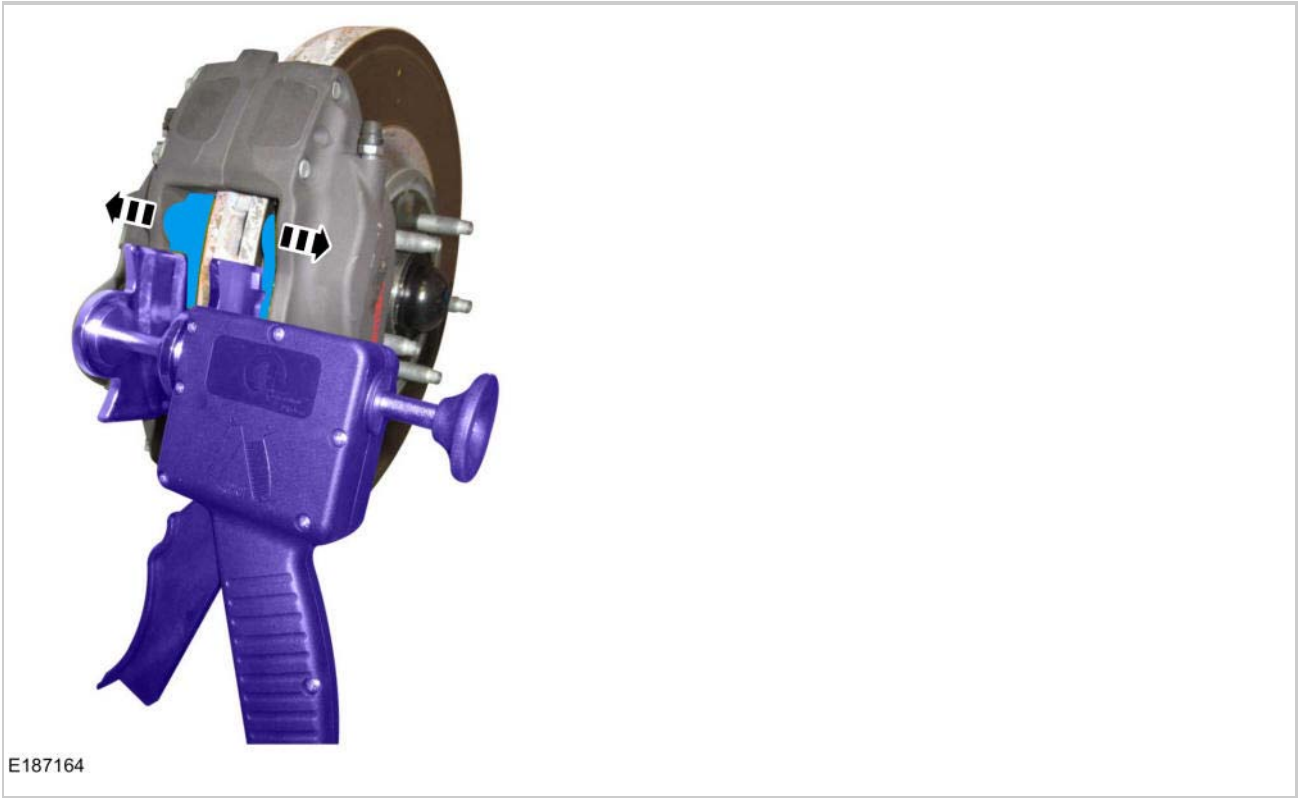
3.

Remove the 2 brake pad pins.



3.

Compress the brake caliper pistons using a brake pad spreader tool and remove the brake pads.



REMOVAL AND INSTALLATION > BRAKE PADS - VEHICLES WITH: 4-PISTON BRAKE CALIPER > INSTALLATION

NOTE: If installing new brake pads, make sure to install all new hardware and lubricant supplied with the brake pad kit. Refer to the brake pad instruction sheet when applying lubricant.

1.

To install, reverse the removal procedure.

2.

Depress the brake pedal, check the brake fluid level in the brake fluid reservoir and top up as necessary with brake fluid. Refer to: Specifications .

REMOVAL AND INSTALLATION > BRAKE PADS - VEHICLES WITH: 6-PISTON BRAKE CALIPER > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

Remove the wheel and tire. Refer to: Wheel and Tire .

2.

1.

Remove the 2 brake pad pins.

2.

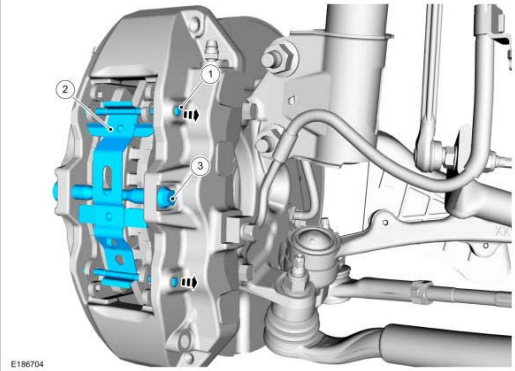
Remove the brake pad spring retainer clip.

3.

Remove the brake caliper pin bolt.

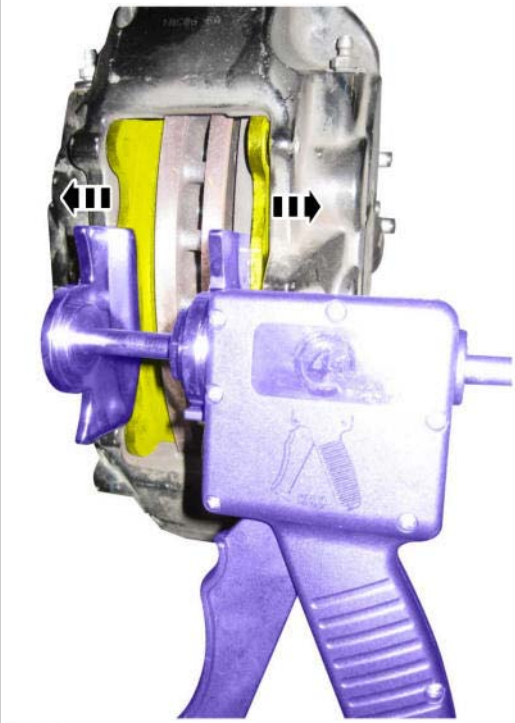
Torque

: 22 lb.ft (30 Nm)



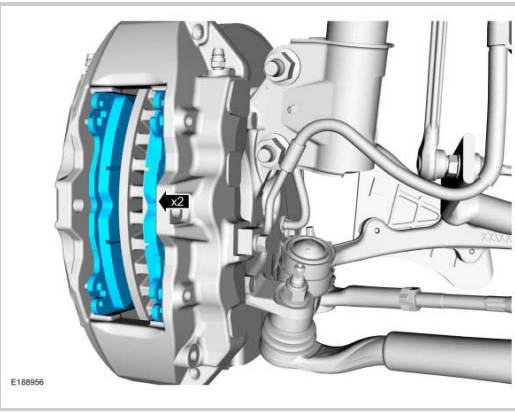
3.

Compress the brake caliper pistons using a brake pad spreader tool.



4.

Remove the brake pads.



REMOVAL AND INSTALLATION > BRAKE PADS - VEHICLES WITH: 6-PISTON BRAKE CALIPER > INSTALLATION

NOTE: If installing new brake pads, make sure to install all new hardware and lubricant supplied with the brake pad kit. Refer to the brake pad instruction sheet when applying lubricant.

1.
To install, reverse the removal procedure.

2.

Depress the brake pedal, check the brake fluid level in the brake fluid reservoir and top up as necessary with brake fluid. Refer to: Specifications .

REMOVAL AND INSTALLATION > FRONT BRAKE FLEXIBLE HOSE > REMOVAL

NOTE: Make sure all openings are sealed.

NOTE: If the fluid is spilled on the paintwork, the affected area must be immediately washed down with cold water.

NOTE: Removal steps in this procedure may contain installation details.

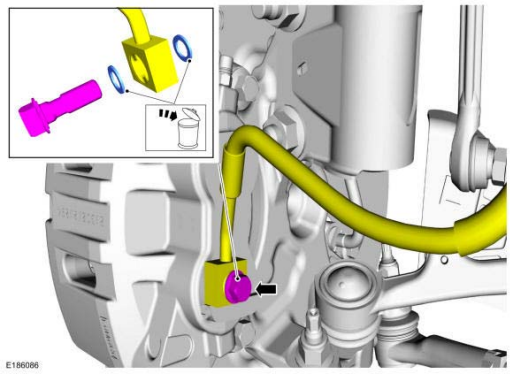
2-piston brake caliper

1.

Remove the brake caliper flow bolt and detach the front brake flexible hose.

Torque

: 30 lb.ft (40 Nm)



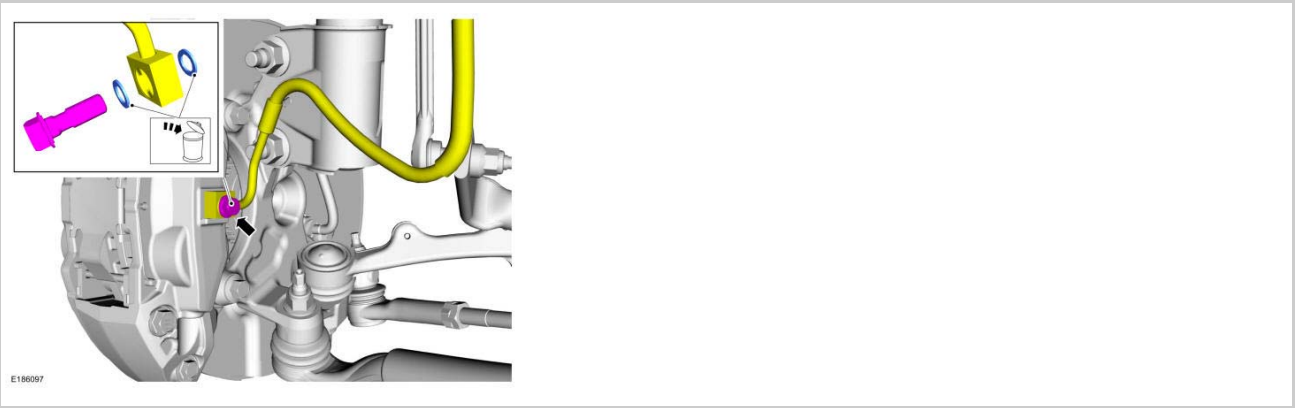
4-piston brake caliper

2.

Remove the brake caliper flow bolt and detach the front brake flexible hose.

Torque

: 30 lb.ft (40 Nm)



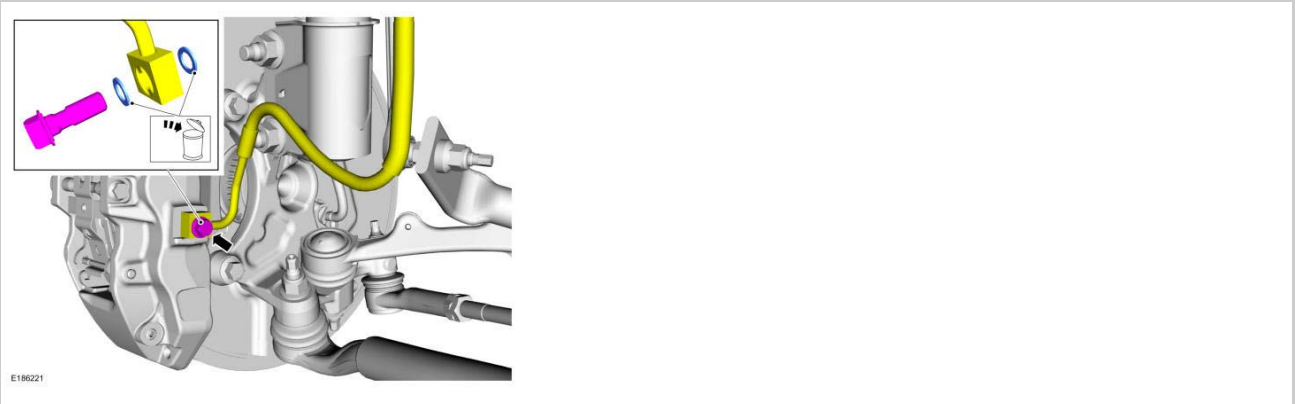
6-piston brake caliper

3.

Remove the brake caliper flow bolt and detach the front brake flexible hose.

Torque

: 30 lb.ft (40 Nm)



All brake calipers

4.

1.

Disconnect the brake tube fitting.

Torque

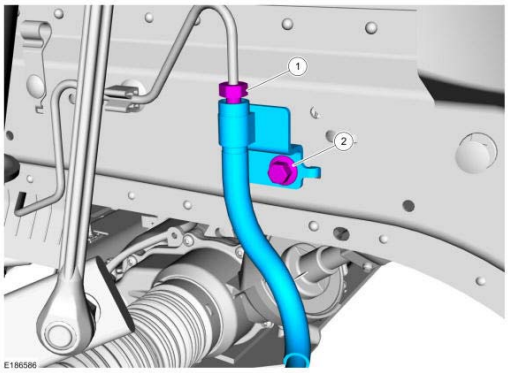
: 155 lb.in (17.5 Nm)

2.

Remove the bolt and the front brake flexible hose.

Torque

: 18 lb.ft (25 Nm)



REMOVAL AND INSTALLATION > FRONT BRAKE FLEXIBLE HOSE > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Bleed the brake system. Refer to: Brake System Pressure Bleeding (206-00 Brake System - General Information, General Procedures).

REMOVAL AND INSTALLATION > BRAKE CALIPER - VEHICLES WITH: SVT PERFORMANCE PACKAGE > REMOVAL

NOTE: Make sure that all openings are sealed.

NOTE: If the fluid is spilled on the paintwork, the affected area must be immediately washed down with cold water.

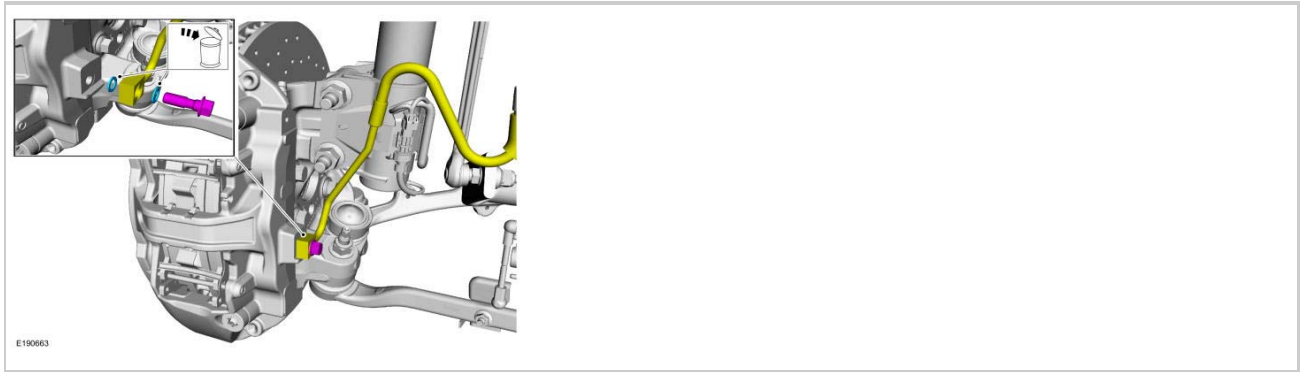
NOTE: Remove the brake caliper flow bolt and disconnect the brake hose. Discard the washers.

1.

Remove the brake caliper flow bolt and disconnect the brake hose. Discard the washers.

Torque

: 35 lb.ft (48 Nm)

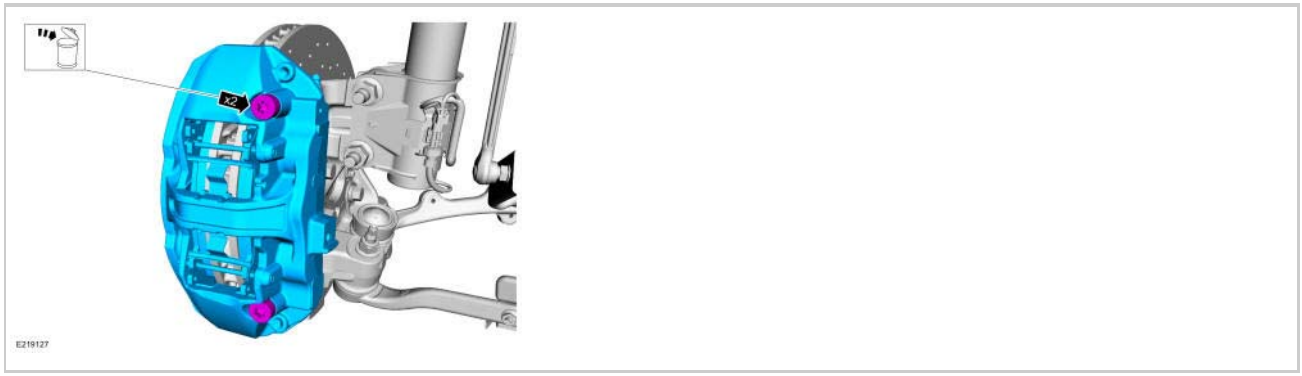


2.

Remove the bolts and the brake caliper. Discard the bolts.

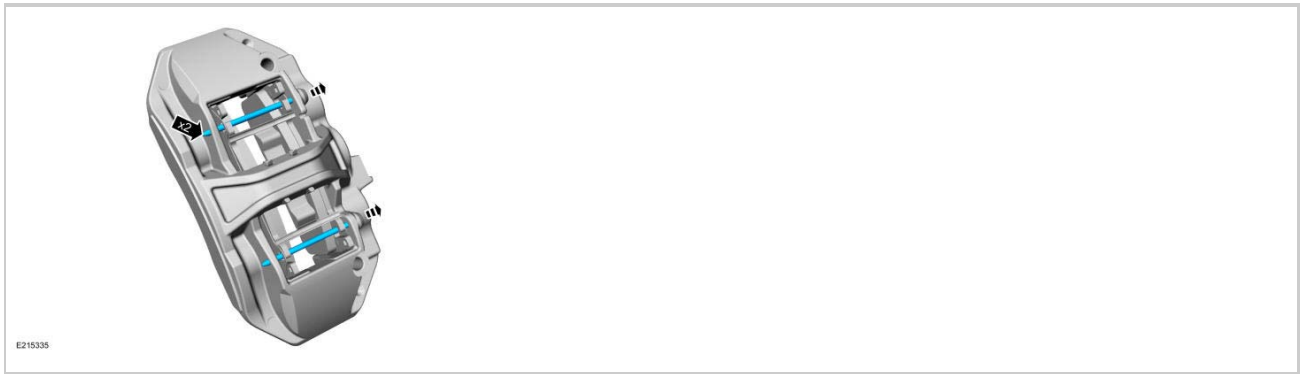
Torque

: 136 lb.ft (185 Nm)



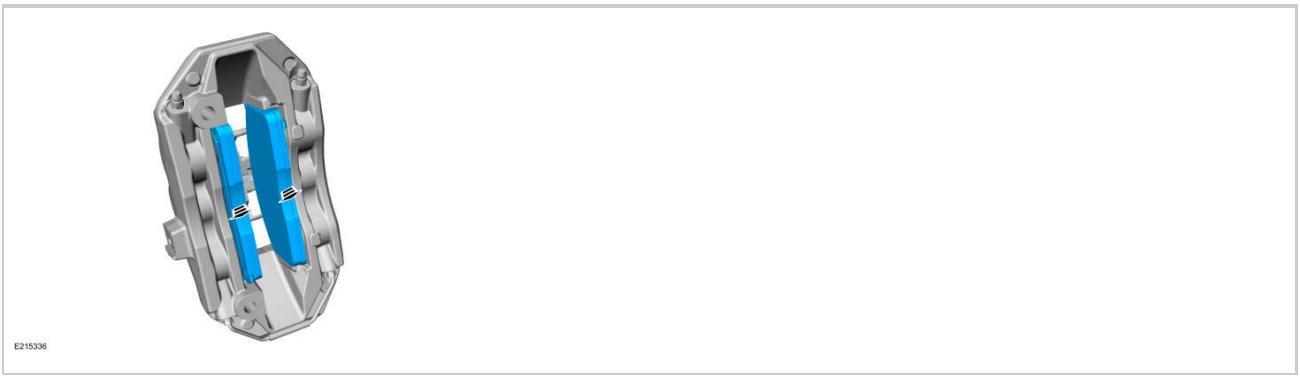
3.

Remove the brake pad pins.



4.

Remove the brake pads.



5.

Remove the brake pad spring retainer clip.



REMOVAL AND INSTALLATION > BRAKE CALIPER - VEHICLES WITH: SVT PERFORMANCE PACKAGE > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Bleed the brake system. Refer to: Brake System Pressure Bleeding .

REMOVAL AND INSTALLATION > BRAKE DISC - VEHICLES WITH: SVT PERFORMANCE PACKAGE > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

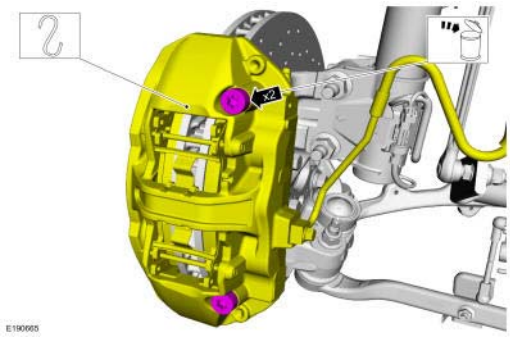
Remove wheel and tire. Refer to: Wheel and Tire .

NOTE: Do not allow the brake caliper to hang from the brake hose or damage to the brake hose may occur.

2.
Remove the bolts and position the brake caliper and brake pads aside. Discard the bolts.

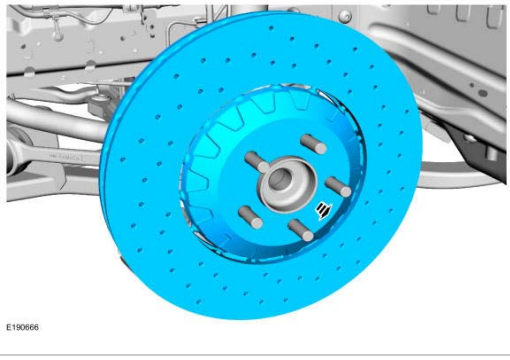
Torque

: 136 lb.ft (185 Nm)



NOTE: Use care when handling the brake disc.

3.
Remove the brake disc.



REMOVAL AND INSTALLATION > BRAKE DISC - VEHICLES WITH: SVT PERFORMANCE PACKAGE > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Apply the brake pedal several times to verify correct brake system operation.

REMOVAL AND INSTALLATION > BRAKE DISC SHIELD - VEHICLES WITH: SVT PERFORMANCE PACKAGE > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

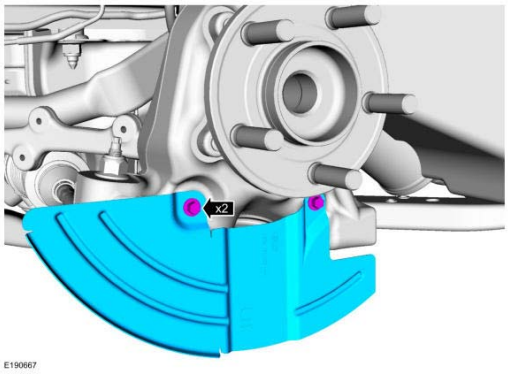
Remove the brake disc. Refer to: Brake Disc - Vehicles With: SVT Performance Package .

2.

Remove the bolts and the brake disc shield.

Torque

: 106 lb.in (12 Nm)



REMOVAL AND INSTALLATION > BRAKE DISC SHIELD - VEHICLES WITH: SVT PERFORMANCE PACKAGE > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > BRAKE PADS - VEHICLES WITH: SVT PERFORMANCE PACKAGE > REMOVAL

NOTE: Do not pry in the caliper sight hole to retract the pistons as this can damage the pistons and boots.

NOTE: Do not allow the brake caliper to hang from the brake hose or damage to the hose can occur.

NOTE: Removal steps in this procedure may contain installation details.

1.

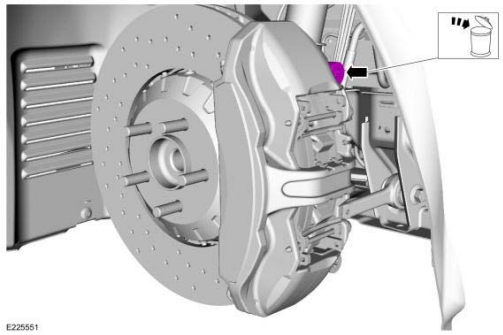
Remove the wheel and tire. Refer to: Wheel and Tire .

2.

Remove and discard the upper brake caliper bolt.

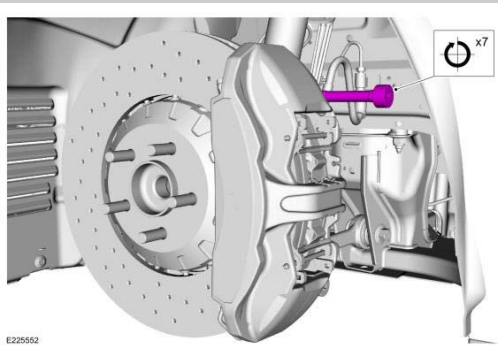
Torque

: 136 lb.ft (185 Nm)



3.

Loosely install a larger bolt (M14 x 180) turning 7 full turns.

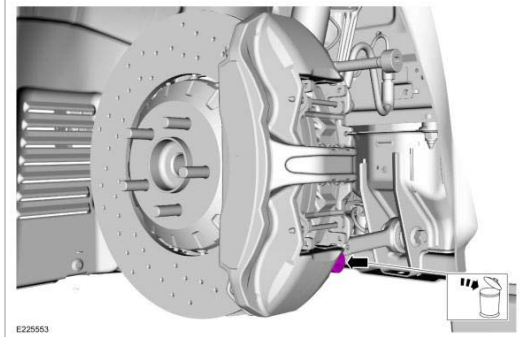


4.

Remove and discard the lower brake caliper bolt.

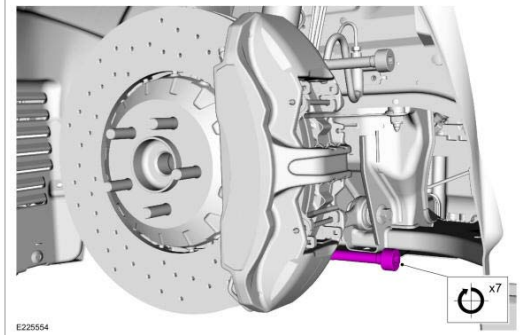
Torque

: 136 lb.ft (185 Nm)



5.

Loosely install a larger bolt (M14 x 180) turning 7 full turns.



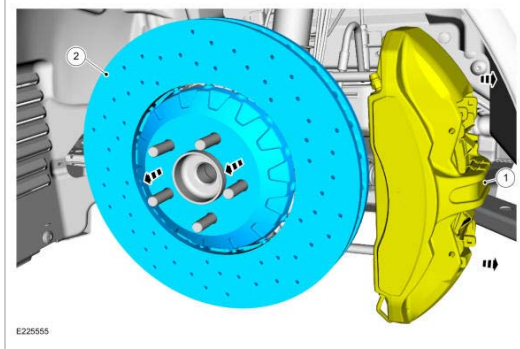
6.

> *NOTE: Make sure the wheels are in the straight-ahead position before moving the brake caliper or damage to the brake hose may occur.*

1.
Slide the brake caliper back on the longer bolts.

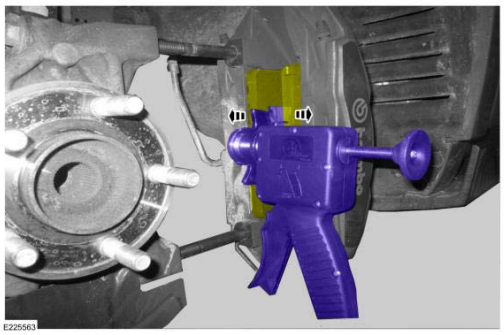
> *NOTE: Use care when handling the brake disc.*

2.
Remove the brake disc.



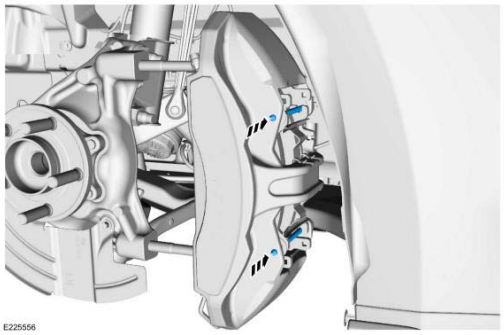
7.

Compress the brake caliper pistons using the brake pad spreader tool.



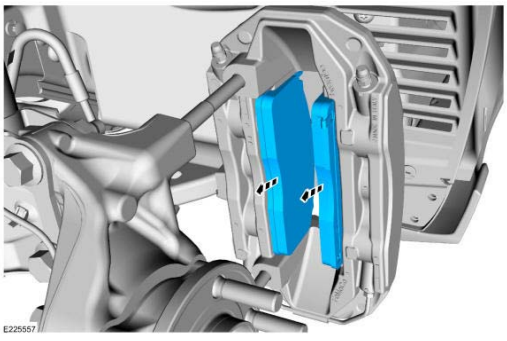
8.

Remove the brake pad pins.



9.

Remove the brake pads.



REMOVAL AND INSTALLATION > BRAKE PADS - VEHICLES WITH: SVT PERFORMANCE PACKAGE > INSTALLATION

NOTE: If installing new brake pads, make sure to install all new hardware and lubricant

supplied with the brake pad kit. Refer to the brake pad instruction sheet when applying lubricant.

1.

To install, reverse the removal procedure.

2.

Depress the brake pedal, check the brake fluid level in the brake fluid reservoir and top up as necessary with brake fluid. Refer to: Specifications .

REMOVAL AND INSTALLATION > FRONT BRAKE FLEXIBLE HOSE - VEHICLES WITH: SVT PERFORMANCE PACKAGE > REMOVAL

NOTE: Make sure all openings are sealed.

NOTE: If the fluid is spilled on the paintwork, the affected area must be immediately washed down with cold water.

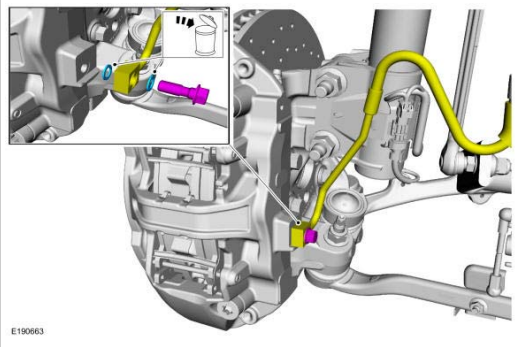
NOTE: Removal steps in this procedure may contain installation details.

1.

Remove the brake caliper flow bolt and disconnect the front brake flexible hose. Discard the washers.

Torque

: 35 lb.ft (48 Nm)



2.

1.

Disconnect the brake tube fitting.

Torque

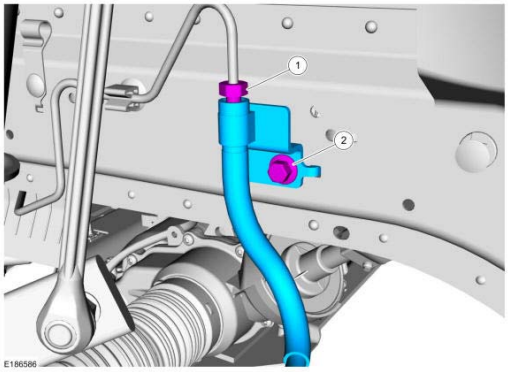
: 159 lb.in (18 Nm)

2.

Remove the bolt and the front brake flexible hose.

Torque

: 18 lb.ft (25 Nm)



REMOVAL AND INSTALLATION > FRONT BRAKE FLEXIBLE HOSE - VEHICLES WITH: SVT PERFORMANCE PACKAGE > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Bleed the brake system. Refer to: Brake System Pressure Bleeding .

Service Manual: HYDRAULIC BRAKE ACTUATION

DIAGNOSIS AND TESTING > HYDRAULIC BRAKE ACTUATION

REFER to: Brake System .

REMOVAL AND INSTALLATION > BRAKE MASTER CYLINDER > REMOVAL

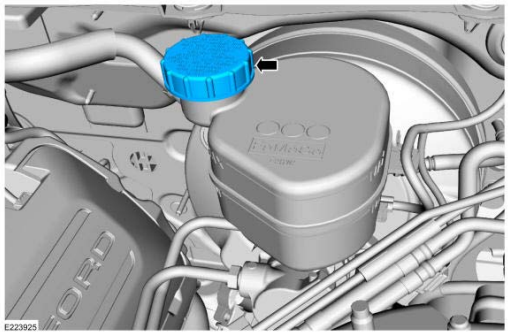
NOTE: If the fluid is spilled on the paintwork, the affected area must be immediately washed down with cold water.

NOTE: Removal steps in this procedure may contain installation details.

Vehicles with manual transmission

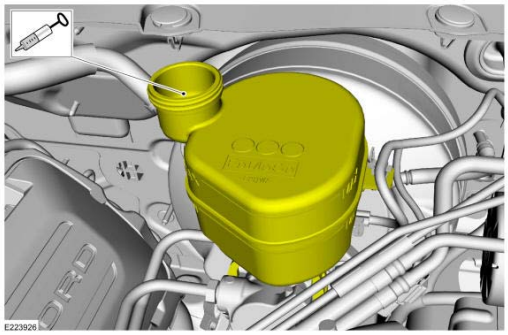
1.

Remove the brake fluid reservoir cap.



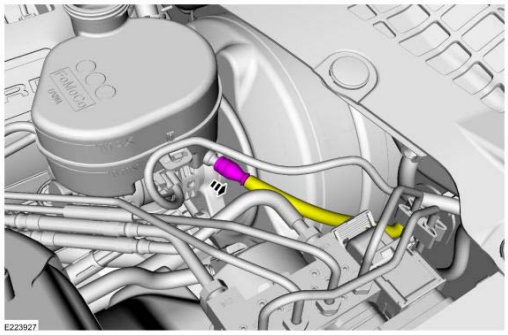
2.

Using a suitable suction device, syphon the brake fluid from the brake fluid reservoir.



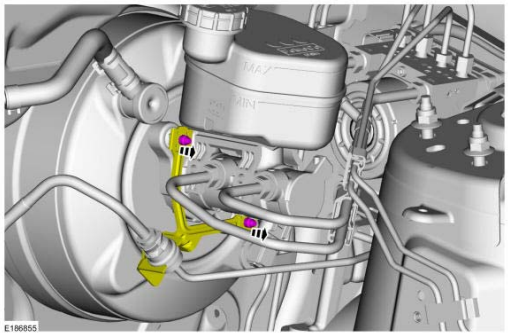
3.

Disconnect the clutch master cylinder tube.



4.

Detach the clutch master cylinder tube bracket from the master cylinder studs.



All vehicles

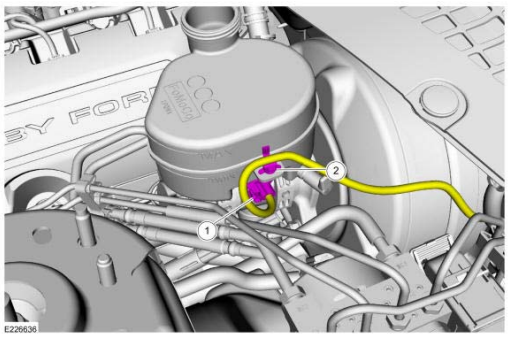
5.

1.

Disconnect the brake fluid level sensor electrical connector.

2.

Detach the wiring harness retainer from the brake fluid reservoir.

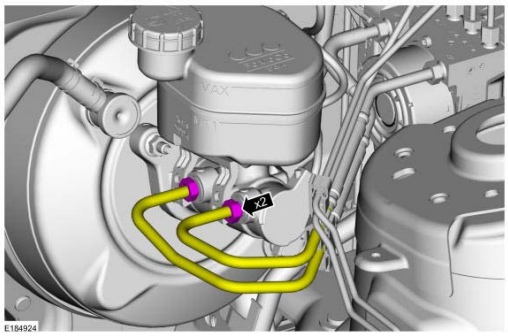


NOTE: Make sure that all openings are sealed.

6.
Disconnect the 2 brake tube fittings.

Torque

: 20 lb.ft (27.5 Nm)

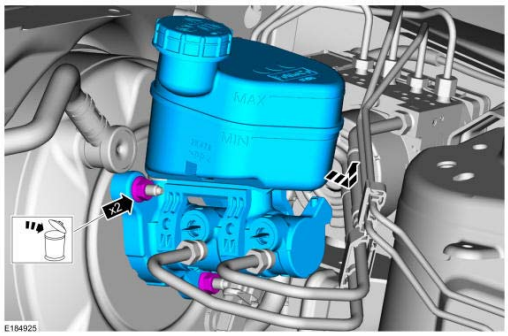


7.

Remove the 2 nuts and the brake master cylinder. Discard the nuts.

Torque

: 17 lb.ft (23 Nm)



REMOVAL AND INSTALLATION > BRAKE MASTER CYLINDER > INSTALLATION

1.

To install, reverse the removal procedure.

2.

If installing a new brake master cylinder, bleed the master cylinder. Refer to: Component Bleeding .

If the brake master cylinder was removed to access other components, bleed the brake system. Refer to: Brake System Pressure Bleeding .

3.

If equipped with a manual transmission, bleed the clutch. Refer to: Clutch System Bleeding .

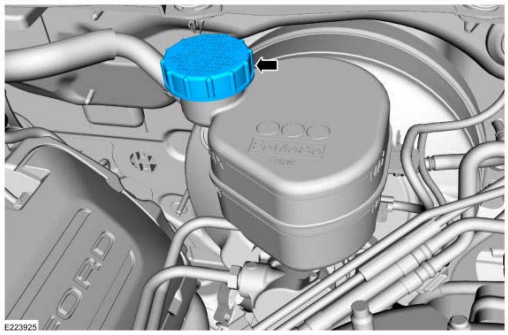
REMOVAL AND INSTALLATION > BRAKE PEDAL AND BRACKET - 6-SPEED MANUAL TRANSMISSION - 3160 6-SPEED MANUAL TRANSMISSION - MT82 > REMOVAL

NOTE: If the fluid is spilled on the paintwork, the affected area must be immediately washed down with cold water.

NOTE: Removal steps in this procedure may contain installation details.

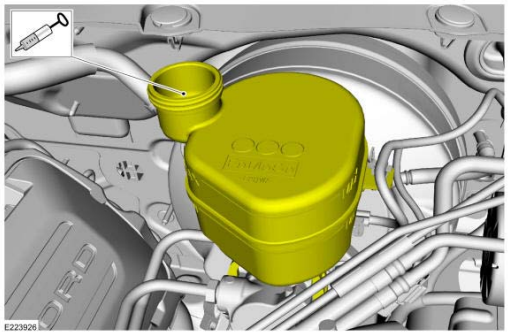
1.

Remove the brake fluid reservoir cap.



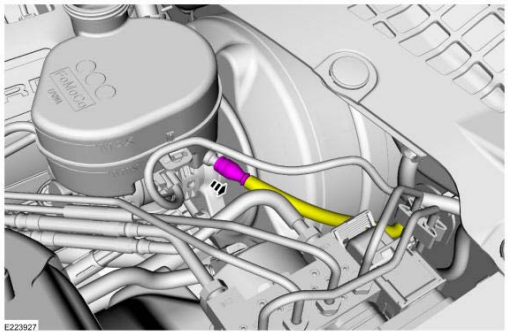
2.

Using a suitable suction device, syphon the brake fluid from the brake fluid reservoir.



3.

Disconnect the clutch master cylinder supply tube from the brake fluid reservoir.



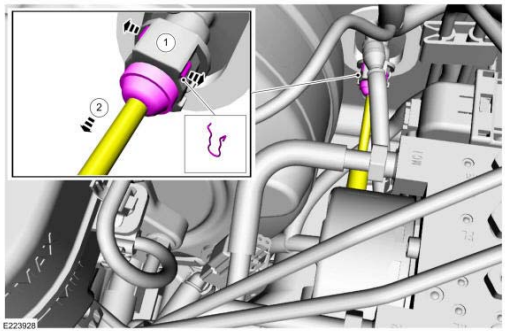
4.

1.

Spread the clip and push the clip downward into the released position.

2.

Disconnect the clutch master cylinder tube.



NOTE: Do not service the brake pedal or brake booster without first removing the stoplamp switch. This switch must be removed with the brake pedal in the at-rest position. The switch plunger must be compressed for the switch to rotate in the bracket. Attempting to remove the switch when the plunger is extended (during pedal apply) will result in damage to the switch.

5.
Remove the stoplamp switch. Refer to: Stoplamp Switch .

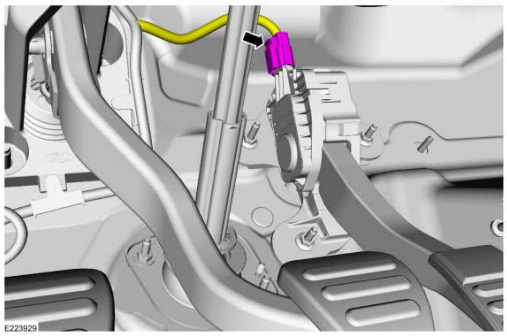
NOTE: Do not service the brake pedal or brake booster without first removing the cruise control deactivator switch. This switch must be removed with the clutch pedal in the at-rest position. The switch plunger must be compressed for the switch to rotate in the bracket. Attempting to remove the switch when the plunger is extended (during pedal apply) will result in damage to the switch.

6.

Remove the cruise control deactivator switch. Refer to: Cruise Control Deactivator Switch .

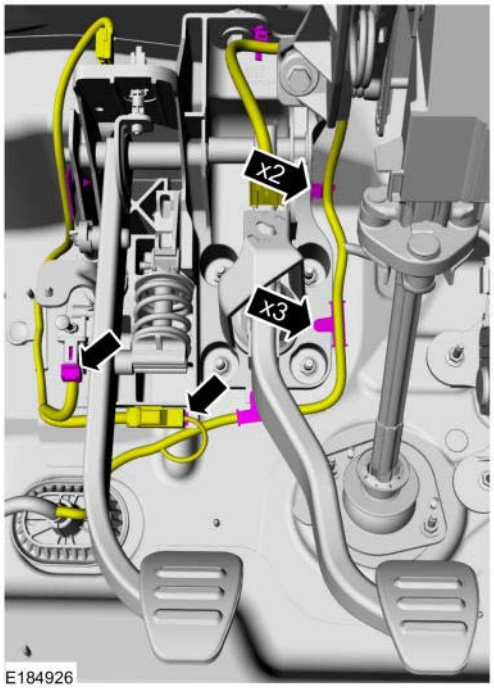
7.

Disconnect the accelerator pedal electrical connector.



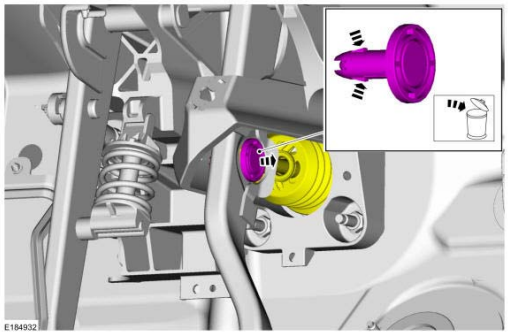
8.

Disconnect the starter inhibitor switch electrical connector and detach the 6 wiring harness retainers. Position the wiring harness aside.



NOTE: The booster push rod clevis-locking pin is a one-time use only part. Any time the booster push rod clevis-locking pin is removed, a new booster push rod clevis-locking pin should be used.

9.
Remove and discard the booster push rod clevis-locking pin and position aside the booster push rod.

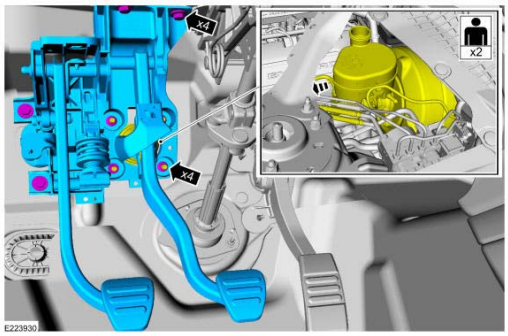


NOTE: Do not pry on the brake booster or damage to the brake booster may occur.

10.
Have an assistant pull the brake booster and master cylinder assembly away from the dash panel. Remove the 4 bolts, 4 nuts and remove the brake pedal/clutch pedal assembly.

Torque

: 17 lb.ft (23 Nm)



REMOVAL AND INSTALLATION > BRAKE PEDAL AND BRACKET - 6-SPEED MANUAL TRANSMISSION - 3160 6-SPEED MANUAL TRANSMISSION - MT82 > INSTALLATION

NOTE: Do not press, pull or otherwise move the brake pedal while installing the stoplamp switch. The switch must be installed with the booster push rod attached to the brake pedal and with the brake pedal in the at-rest position. Installing the switch with the brake pedal in any other position will result in incorrect adjustment and may damage the switch.

1.
To install, reverse the removal procedure.

2.

Bleed the clutch. Refer to: Clutch System Bleeding .

REMOVAL AND INSTALLATION > BRAKE PEDAL AND BRACKET - 6-SPEED AUTOMATIC TRANSMISSION - 6R80 > REMOVAL

NOTE: If the fluid is spilled on the paintwork, the affected area must be immediately washed down with cold water.

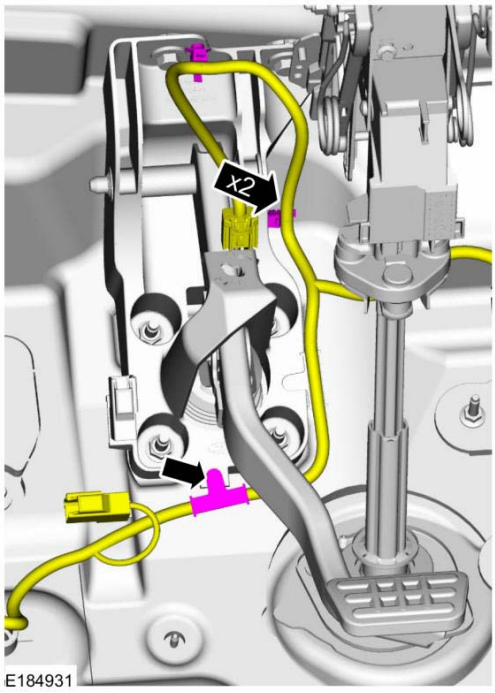
NOTE: Removal steps in this procedure may contain installation details.

NOTE: Do not service the brake pedal or brake booster without first removing the stoplamp switch. The switch must be removed with the brake pedal in the at-rest position. The switch plunger must be compressed for the switch to rotate in the bracket. Attempting to remove the switch when the plunger is extended (during pedal apply) will result in damage to the switch.

1.
Remove the stoplamp switch. Refer to: Stoplamp Switch .

2.

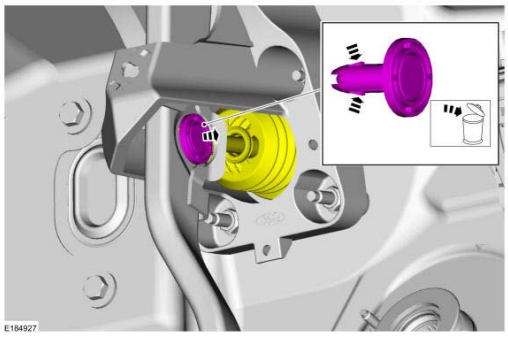
Detach the 3 wiring harness retainers.



NOTE: The booster push rod clevis-locking pin is a one-time use only part. Any

time the booster push rod clevis-locking pin is removed, a new booster push rod clevis-locking pin should be used.

3.
Remove and discard the booster push rod clevis-locking pin and position aside the booster push rod.

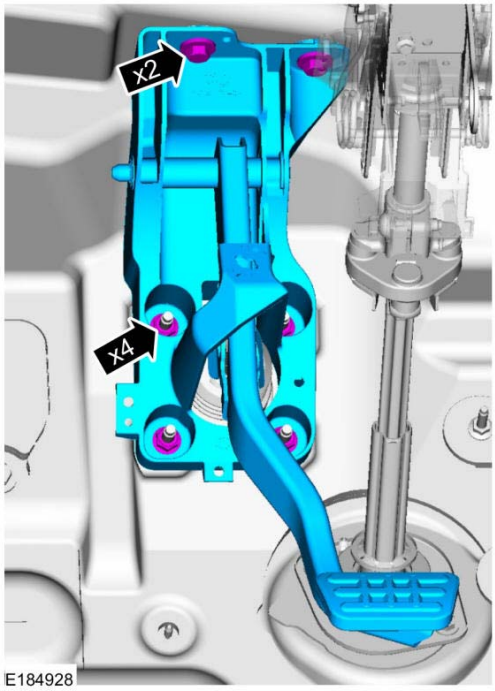


4.

Remove the 2 bolts, 4 nuts and remove the brake pedal and bracket.

Torque

: 17 lb.ft (22.5 Nm)



REMOVAL AND INSTALLATION > BRAKE PEDAL AND BRACKET - 6-SPEED AUTOMATIC TRANSMISSION - 6R80 > INSTALLATION

NOTE: Do not press, pull or otherwise move the brake pedal while installing the stoplamp switch. The switch must be installed with the booster push rod attached to the brake pedal and with the brake pedal in the at-rest position. Installing the switch with the brake pedal in any other position will result in incorrect adjustment and may damage the switch.

1.
To install, reverse the removal procedure.

Service Manual: PARKING BRAKE AND ACTUATION

DIAGNOSIS AND TESTING > PARKING BRAKE > SYMPTOM CHART(S)

Symptom Chart: Parking Brake and Actuation

Diagnostics in this service information assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

Preliminary Inspection

The first indication that something may be wrong in the parking brake system is a change in the feeling through the parking brake control. The parking brake not holding on an incline or dragging after being released are also indicators of system concerns. Check the operation of the parking brake system with the vehicle on a hoist and the parking brake control fully released.

- Verify the customer concern.
- Visually inspect for obvious signs of mechanical damage.
- If an obvious cause for an observed or reported concern is found, correct the cause.
- If the cause is not visually evident, verify the symptom and go to the Symptom Chart below.

Condition	Possible Sources	Actions
The red brake warning indicator is always illuminated	Parking brake not fully released Low brake fluid level Wiring, terminals or connectors Brake master cylinder inoperative	DIAGNOSE the red brake warning indicator. REFER to: Instrumentation, Message Center and Warning Chimes .
The parking brake does not apply/hold vehicle	Refer to the Pinpoint Test	GO to Pinpoint Test A
The parking brake will not release	Refer to the Pinpoint Test	GO to Pinpoint Test B

DIAGNOSIS AND TESTING > PARKING BRAKE > PINPOINT TESTS

The Parking Brake Does Not Apply Or Does Not Hold Vehicle

Normal Operation and Fault Conditions

When the parking brake control is pulled, the parking brake equalizer pulls on both rear parking brake cables, which are attached to the parking brake actuators, and applies the brake shoes/pads.

Possible Sources

- Parking brake cable(s)
- Parking brake control

- Rear brake caliper(s)
- Parking brake cable equalizer

DIAGNOSIS AND TESTING > PARKING BRAKE > PINPOINT TESTS > PINPOINT TEST A : THE PARKING BRAKE DOES NOT APPLY OR DOES NOT HOLD VEHICLE > PINPOINT TEST A : THE PARKING BRAKE DOES NOT APPLY OR DOES NOT HOLD VEHICLE

A1 CHECK THE PARKING BRAKE CONTROL

Pull up the parking brake control handle.

Does the parking brake control move?

Yes	GO to A2

No	GO to A3

NOTE: Have an assistant pull and release the parking brake to help isolate disconnected cables or cables that do not move.

A2 INSPECT THE FOLLOWING PARKING BRAKE COMPONENTS

Parking brake control

Front parking brake cable

Rear parking brake cables and/or equalizer

Rear brake caliper actuators

Is any damage found or are any components disconnected?

Yes	CONNECT the component(s) or INSTALL new parking brake component(s) as necessary. TEST the system for normal operation. ADJUST the parking brake cables. REFER to: Parking Brake Cable Adjustment .

No	VERIFY that the rear pads and brake discs are within thickness specifications. REFER to: Specifications . If the rear pads and brake discs are OK, INSTALL new rear brake caliper(s). REFER to: Brake Caliper .

A3 ISOLATE THE PARKING BRAKE CONTROL AND FRONT PARKING BRAKE CABLE

Disconnect the front parking brake cable from the rear parking brake cable equalizer.

Pull up the parking brake control handle.

Does the parking brake control handle move?

Yes	GO to A4

No	INSTALL a new parking brake control and front cable assembly as necessary. REFER to: Parking Brake Cable LH or REFER to Parking Brake Cable RH . TEST the system for normal operation.

A4 ISOLATE THE REAR PARKING BRAKE CABLES

Disconnect the rear parking brake cable from the rear brake caliper at the affected wheel end(s).

While holding the cable conduit, attempt to slide the cable inside the conduit.

Does the cable slide freely inside the conduit?

Yes	The parking brake system is operating normally at this time. INSPECT the rear brake components on the affected wheel end(s). INSTALL new rear brake components as necessary and ADJUST the parking brake cables. REFER to: Parking Brake Cable Adjustment .

No	INSTALL new RH or LH rear parking brake cables as necessary. REFER to: Parking Brake Cable LH (206-05 Parking Brake and Actuation, Removal and Installation). REFER to: Parking Brake Cable RH .

DIAGNOSIS AND TESTING > PARKING BRAKE > PINPOINT TESTS > PINPOINT TEST B : PARKING BRAKE WILL NOT RELEASE

Normal Operation and Fault Conditions

When the parking brake release button is pressed and the brake control is released, the tension on the parking brake cables return the system to the released position.

Possible Sources

- Parking brake cable(s)
- Parking brake control
- Rear brake caliper(s)
- Parking brake cable equalizer

DIAGNOSIS AND TESTING > PARKING BRAKE > PINPOINT TESTS > PINPOINT TEST B : PARKING BRAKE WILL NOT RELEASE > PINPOINT TEST B : PARKING BRAKE WILL NOT RELEASE

B1 CHECK THE PARKING BRAKE CONTROL

Apply and release the parking brake control.

Does the parking brake control fully release?

Yes	GO to B2

No	INSTALL a new parking brake control and front cable assembly as necessary. REFER to: Parking Brake Control . TEST the system for normal operation.

B2 ISOLATE THE FRONT BRAKE CABLE

Disconnect the front parking brake cable from the rear parking brake cable equalizer.

Do the rear wheel(s) spin freely?

Yes	INSTALL a new parking brake control and front cable assembly as necessary. REFER to: Parking Brake Control . TEST the system for normal operation.

No	GO to B3

B3 ISOLATE THE REAR PARKING BRAKE CABLES

Disconnect the rear parking brake cable from the rear brake caliper at the affected wheel end(s).

Do the wheel(s) spin freely?

Yes	INSTALL new RH or LH rear parking brake cables as necessary. REFER to: Parking Brake Cable LH . REFER to: Parking Brake Cable RH .

No	ADJUST the parking brake cables. REFER to: Parking Brake Cable Adjustment .

GENERAL PROCEDURES > PARKING BRAKE CABLE ADJUSTMENT

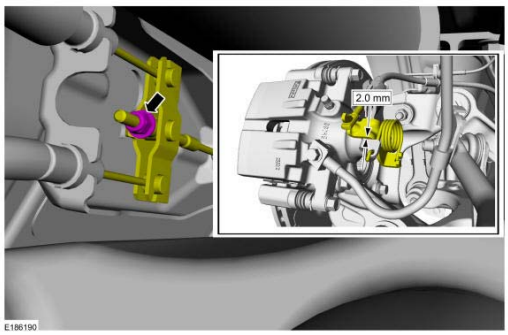
Special Tool(s) / General Equipment

Feeler Gauge

Adjustment

1.

With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

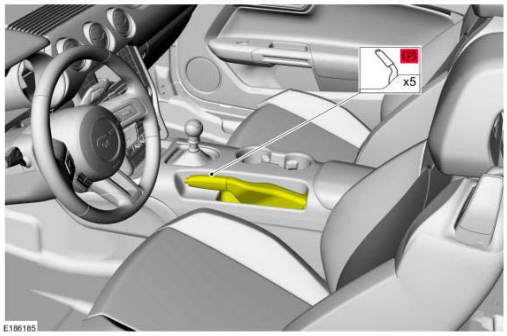


2.

Tighten the parking brake cable adjustment nut until one or both caliper levers are 2.0 mm off of their stops. Use the General Equipment: Feeler Gauge

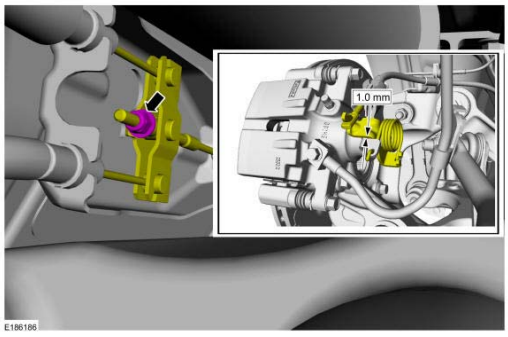
3.

Fully apply and release the parking brake 5 times



4.

Tighten the parking brake cable adjustment nut until one or both caliper levers are 1.0 mm off of their stops. Use the General Equipment: Feeler Gauge



GENERAL PROCEDURES > PARKING BRAKE CABLE ADJUSTMENT - VEHICLES WITH: SVT PERFORMANCE PACKAGE

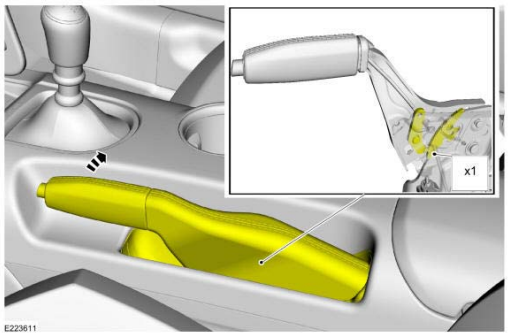
Adjustment

1.

With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

2.

Set the parking brake to the first click/position.

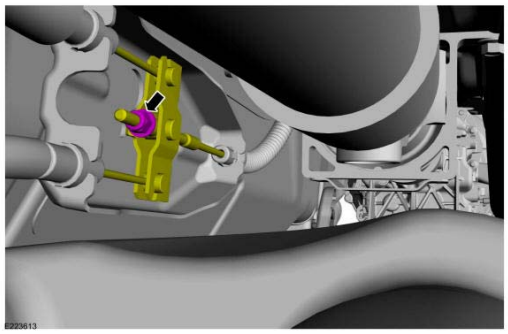


NOTE: While adjusting the parking brake cables, check for rotation of the rear wheels often to prevent over tightening the cables. The cables must only be tightened until the rear wheels do not spin freely. Make sure the rear wheel are not locked.

3.
Raise the vehicle and tighten the parking brake cable adjustment nut until the rear wheels meet the following criteria.

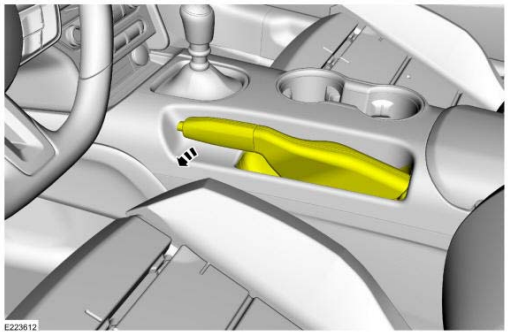
The rear wheel do not spin freely (have resistance).

The rear wheels are not locked.



4.

Lower the vehicle, and with the wheels off the ground in the full rebound position, release the parking brake and confirm both rear wheels spin freely.



GENERAL PROCEDURES > PARKING BRAKE SHOE ADJUSTMENT - VEHICLES WITH: SVT PERFORMANCE PACKAGE

Special Tool(s) / General Equipment

Caliper Gauge

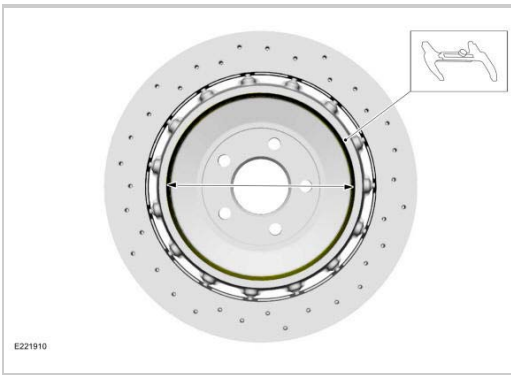
Activation

1.

Remove the brake disc. Refer to: Brake Disc - Vehicles With: SVT Performance Package .

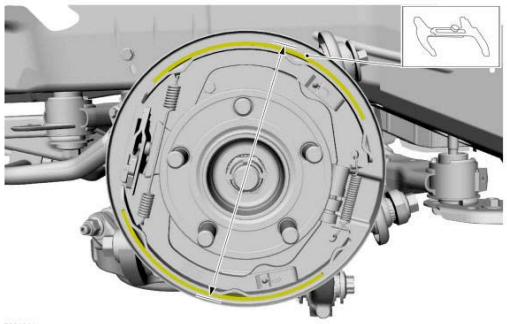
2.

Measure ID of the drum portion of the brake disc. Record the measurement. Use the General Equipment: Caliper Gauge



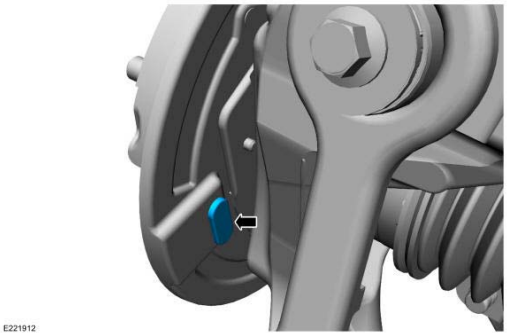
3.

Measure the widest diameter of the parking brake shoes. Use the General Equipment: Caliper Gauge



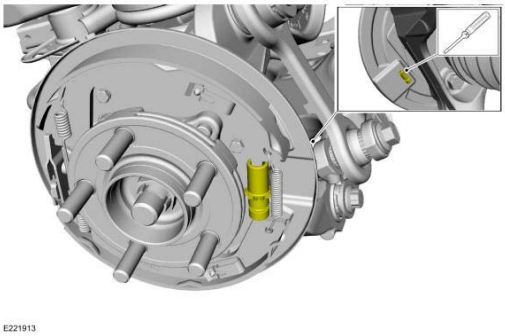
4.

Remove the backing plate plug.



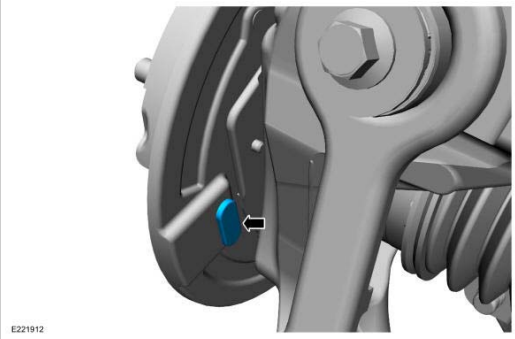
5.

Adjust the parking brake shoe clearance by rotating the adjuster until the parking brake shoes measure 0.59 mm (0.023 in) less than the recorded ID of the drum portion of the brake disc.



6.

Install the backing plate plug.



7.

Install the brake disc. Refer to: Brake Disc - Vehicles With: SVT Performance Package .

REMOVAL AND INSTALLATION > PARKING BRAKE CONTROL > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

Remove the muffler and tailpipe assembly. Refer to: MUFFLER AND TAILPIPE - 2.3L EcoBoost (231kW/314PS). Refer to: MUFFLER AND TAILPIPE - 3.7L Duratec (227kW/301PS). Refer to: MUFFLER AND TAILPIPE - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS).

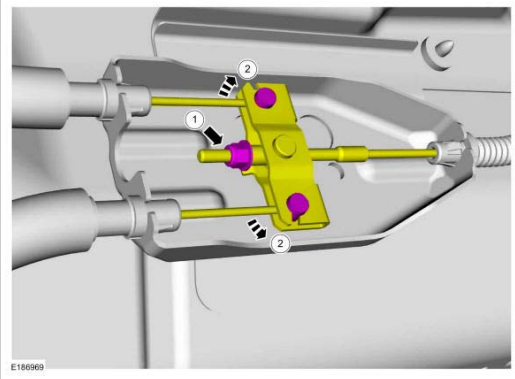
2.

1.

Loosen the parking brake cable adjustment nut.

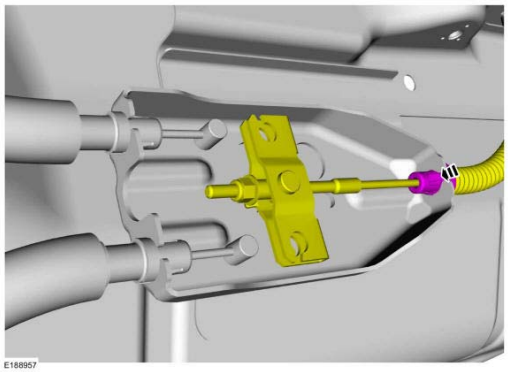
2.

Rotate the cable outward, then pull the pin and cable upwards and disconnect from the equalizer.



3.

Release the tabs and disconnect the front cable from the bracket.

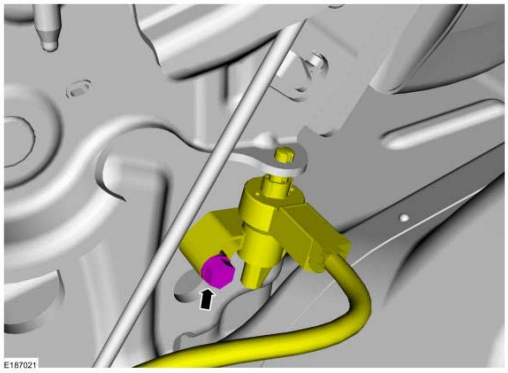


4.

Remove the floor console. Refer to: Floor Console .

5.

Remove the bolt and position the parking brake switch aside.



6.

1.

Remove the 2 bolts.

Torque

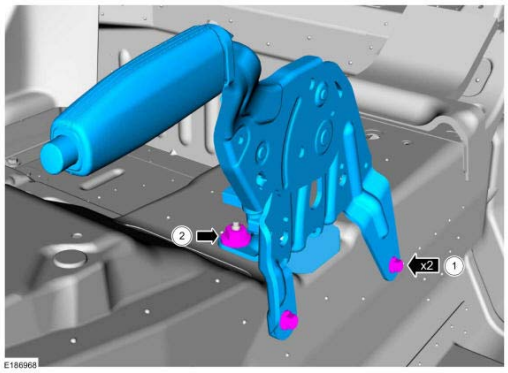
: 22 lb.ft (30 Nm)

2.

Remove the nut and the parking brake control and front cable assembly.

Torque

: 150 lb.in (17 Nm)



REMOVAL AND INSTALLATION > PARKING BRAKE CONTROL > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Adjust the parking brake cables. Refer to: Parking Brake Cable Adjustment . Refer to: Parking Brake Cable Adjustment - Vehicles With: SVT Performance Package .

REMOVAL AND INSTALLATION > PARKING BRAKE CABLE LH > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

Remove the muffler and tailpipe assembly. Refer to: MUFFLER AND TAILPIPE - 2.3L EcoBoost (231kW/314PS). Refer to: MUFFLER AND TAILPIPE - 3.7L Duratec (227kW/301PS). Refer to: MUFFLER AND TAILPIPE - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS).

2.

1.

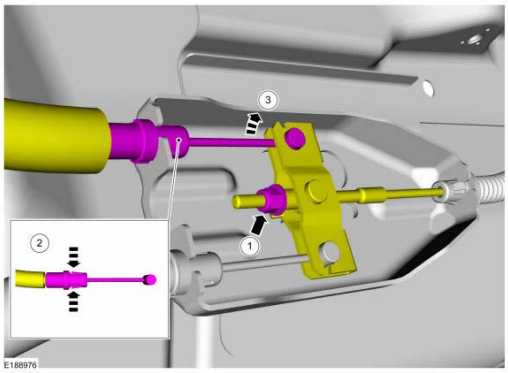
Loosen the parking brake cable adjustment nut.

2.

Push inward on the 2 tabs and detach the LH cable from the bracket.

3.

Rotate the cable, slide the pin upwards and detach the cable from the equalizer.



3.

1.

Remove the parking brake cable bracket nut.

Torque

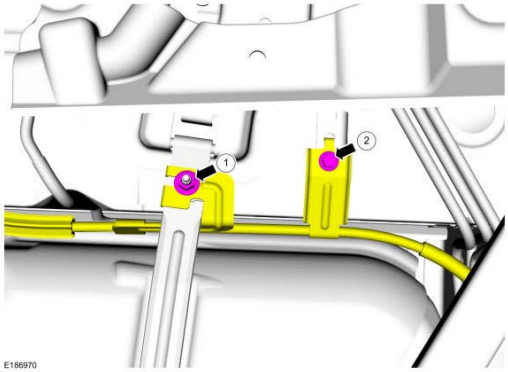
: 18 lb.ft (25 Nm)

2.

Remove the parking brake cable bracket bolt.

Torque

: 18 lb.ft (25 Nm)



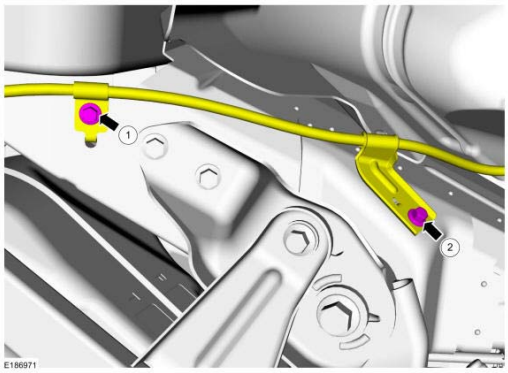
4.

Remove the 2 parking brake cable bracket bolts.

Torque:

1.: 18 lb.ft (25 Nm)

2.: 20 lb.ft (27.5 Nm)



5.

1.

Remove the parking brake cable bracket bolt.

Torque

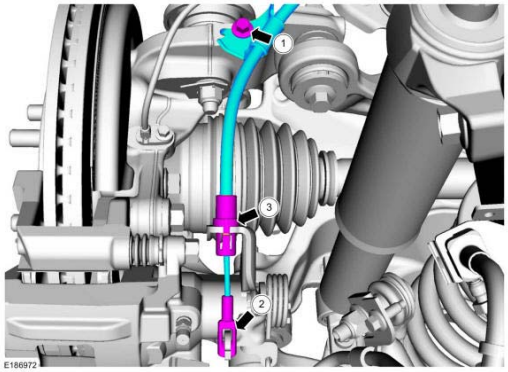
: 20 lb.ft (27.5 Nm)

2.

Disconnect the parking brake cable from the brake caliper lever.

3.

Push inwards on the 2 tabs, detach the parking brake cable from the brake caliper bracket and remove the parking brake cable.



REMOVAL AND INSTALLATION > PARKING BRAKE CABLE LH > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Adjust the parking brake Cables. Refer to: Parking Brake Cable Adjustment .

REMOVAL AND INSTALLATION > PARKING BRAKE CABLE RH > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

Remove the muffler and tailpipe assembly. Refer to: MUFFLER AND TAILPIPE - 2.3L EcoBoost (231kW/314PS). Refer to: MUFFLER AND TAILPIPE - 3.7L Duratec (227kW/301PS). Refer to: MUFFLER AND TAILPIPE - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS).

2.

1.

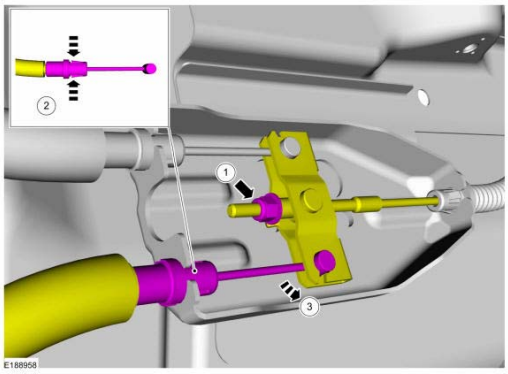
Loosen the parking brake cable adjustment nut.

2.

Push inward on the 2 tabs and detach the RH cable from the bracket.

3.

Rotate the cable, slide the pin upwards and detach the cable from the equalizer.

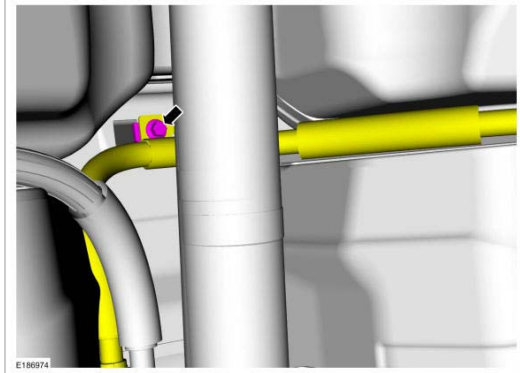


3.

Remove the parking brake cable bracket bolt.

Torque

: 18 lb.ft (25 Nm)



4.

1.

Remove the parking brake cable bracket nut.

Torque

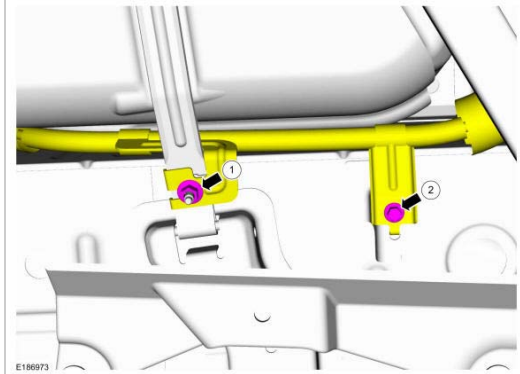
: 18 lb.ft (25 Nm)

2.

Remove the parking brake cable bracket bolt.

Torque

: 18 lb.ft (25 Nm)



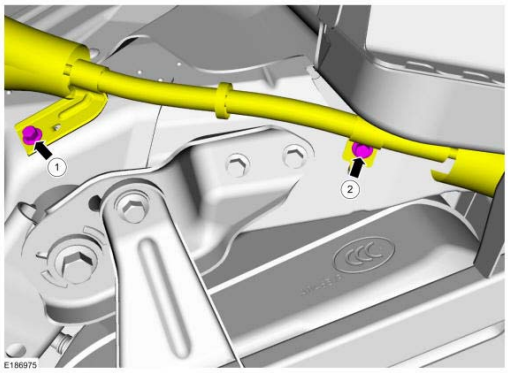
5.

Remove the parking brake cable bracket bolts.

Torque:

1.: 20 lb.ft (27.5 Nm)

2.: 18 lb.ft (25 Nm)



6. -

Remove the wheel and tire.

Refer to: WHEEL AND TIRE .

7.

1.

Remove the parking brake cable bracket bolt.

Torque

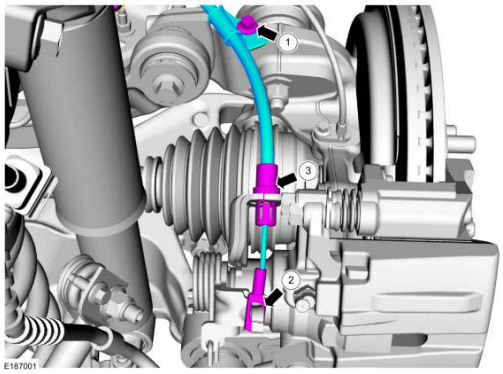
: 20 lb.ft (27.5 Nm)

2.

Disconnect the parking brake cable from the brake caliper lever.

3.

Push inwards on the 2 tabs, detach the parking brake cable from the brake caliper bracket and remove the parking brake cable.



REMOVAL AND INSTALLATION > PARKING BRAKE CABLE RH > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Adjust the parking brake Cables. Refer to: Parking Brake Cable Adjustment .

Service Manual: POWER BRAKE ACTUATION

DIAGNOSIS AND TESTING > POWER BRAKE SYSTEM

REFER to: Brake System .

REMOVAL AND INSTALLATION > BRAKE BOOSTER - 2.3L ECOBOOST (201KW 273PS) > REMOVAL

NOTE: If the fluid is spilled on the paintwork, the affected area must be immediately washed down with cold water.

NOTE: Removal steps in this procedure may contain installation details.

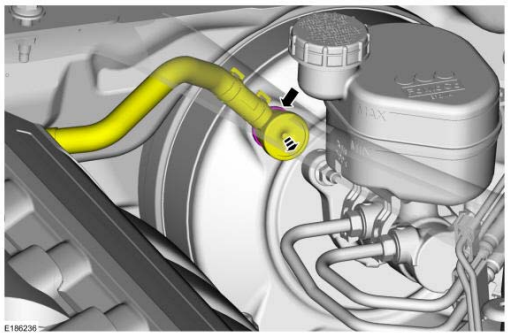
All vehicles

1.

Remove the cowl panel grill. Refer to: Cowl Panel Grille

2.

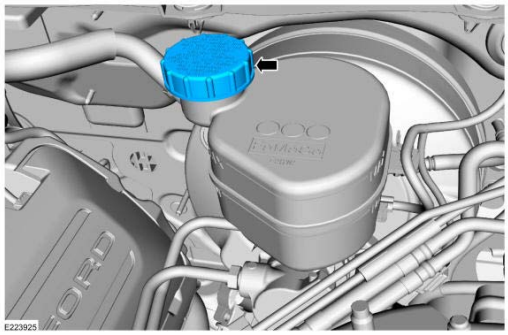
Detach the vacuum check valve from the booster and position aside.



Vehicles with manual transmission

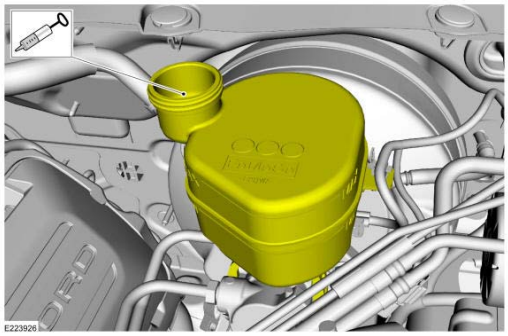
3.

Remove the brake fluid reservoir cap.



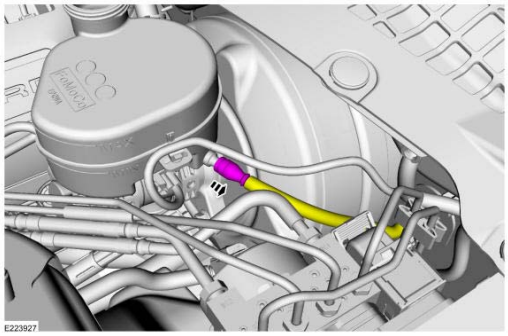
4.

Using a suitable suction device, syphon the brake fluid from the brake fluid reservoir.



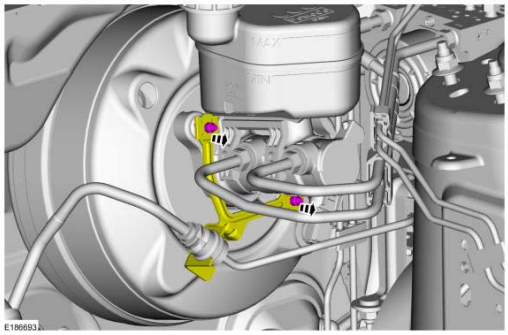
5.

Disconnect the clutch master cylinder tube.



6.

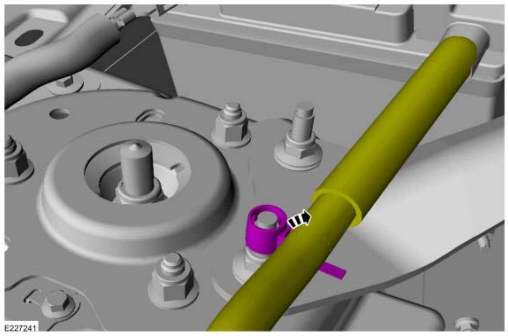
Detach the clutch master cylinder tube bracket from the master cylinder studs.



All vehicles

7.

Detach the battery cable retainer.



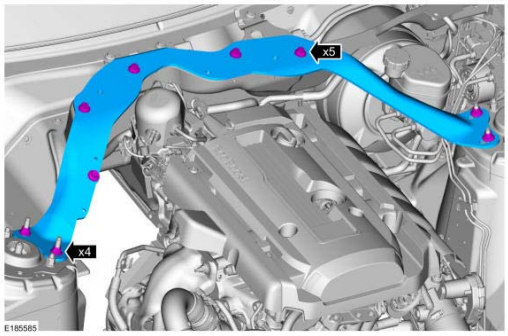
8.

Remove the 5 bolts, 4 nuts and the cowl extension.

Torque:

Bolts: 26 lb.ft (35 Nm)

Nuts: 41 lb.ft (55 Nm)



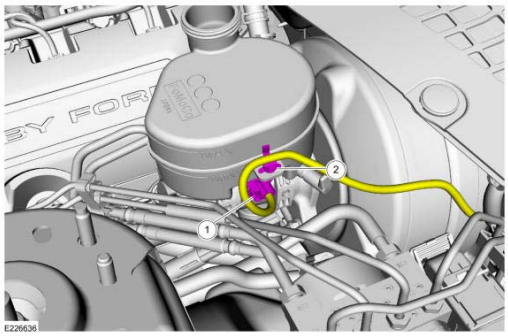
9.

1.

Disconnect the brake fluid level sensor electrical connector.

2.

Detach the wiring harness retainer from the brake fluid reservoir.

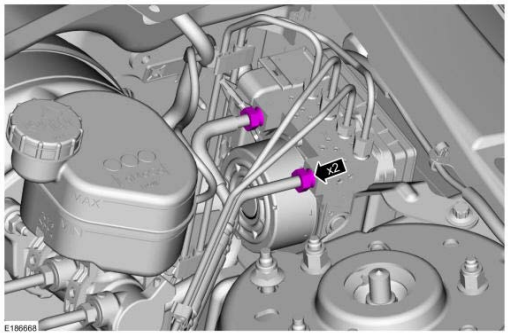


10.

Disconnect the 2 brake tubes at the HCU.

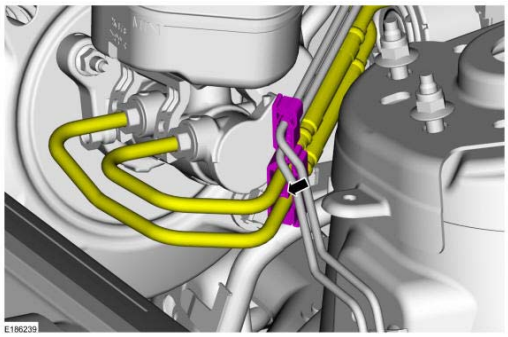
Torque

: 20 lb.ft (27.5 Nm)



11.

Unclip the brake tubes.

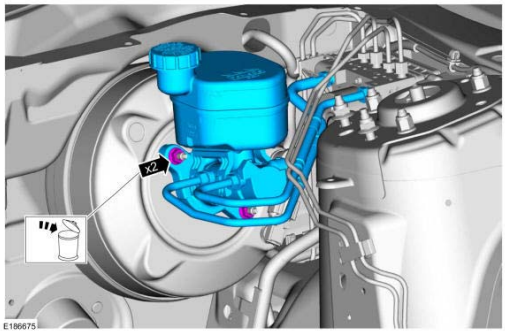


12.

Remove and discard the 2 master cylinder nuts. Remove the master cylinder and brake tubes.

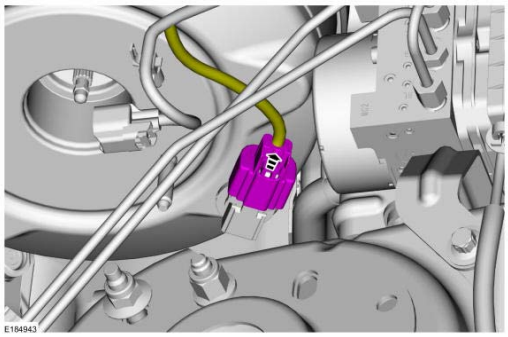
Torque

: 17 lb.ft (23 Nm)



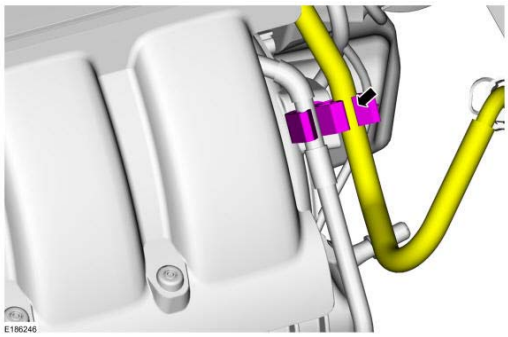
13.

Disconnect the vacuum sensor electrical connector.



14.

Detach and position aside the fuel pressure line from intake manifold clip.



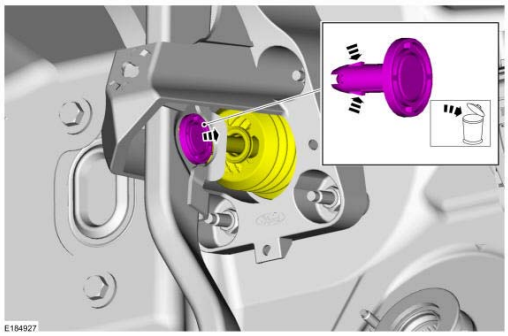
NOTE: Do not service the brake pedal or brake booster without first removing the stoplamp switch. This switch must be removed with the brake pedal in the at-rest position. The switch plunger must be compressed for the switch to rotate in the bracket. Attempting to remove the switch when the plunger is extended (during pedal apply) will result in damage to the switch.

15.

Remove the stop lamp switch. Refer to: Stoplamp Switch .

> *NOTE: The booster push rod clevis-locking pin is a one-time use only part. Any time the booster push rod clevis-locking pin is removed, a new booster push rod clevis-locking pin should be used.*

16.
Remove and discard the booster push rod clevis-locking pin and position aside the booster push rod.

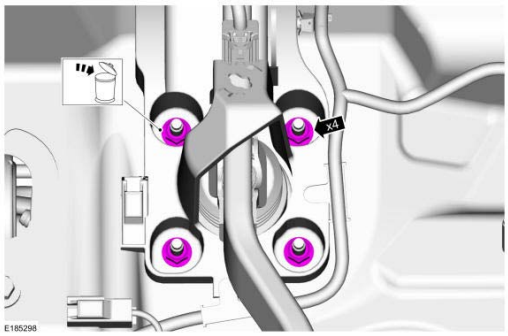


17.

Remove and discard the 4 nuts.

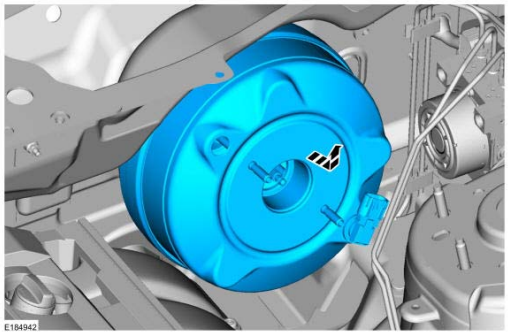
Torque

: 17 lb.ft (22.5 Nm)



18.

Remove the brake booster.



REMOVAL AND INSTALLATION > BRAKE BOOSTER - 2.3L ECOBOOST (201KW 273PS) > INSTALLATION

NOTE: Do not press, pull or otherwise move the brake pedal while installing the stoplamp switch. The switch must be installed with the booster push rod attached to the brake pedal and with the brake pedal in the at-rest position. Installing the switch with the brake pedal in any other position will result in incorrect adjustment and may damage the switch.

1.
To install, reverse the removal procedure.

2.

Bleed the brake system. Refer to: Brake System Pressure Bleeding .

3.

If equipped with a manual transmission, bleed the clutch. Refer to: Clutch System Bleeding .

REMOVAL AND INSTALLATION > BRAKE BOOSTER - 3.7L DURATEC (227KW 301PS) > REMOVAL

NOTE: If the fluid is spilled on the paintwork, the affected area must be immediately washed down with cold water.

NOTE: Removal steps in this procedure may contain installation details.

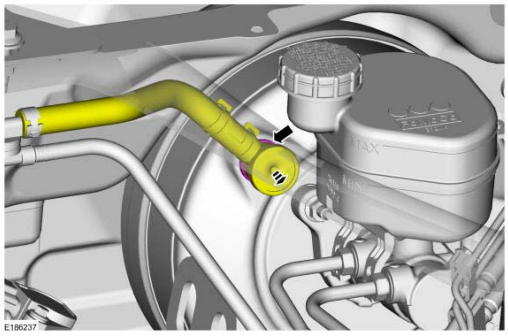
All vehicles

1.

Remove the cowl panel grill. Refer to: Cowl Panel Grille .

2.

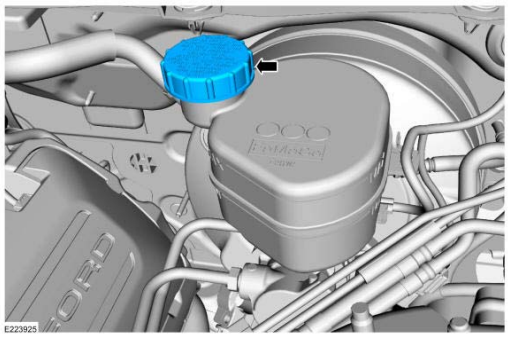
Detach the vacuum check valve from the booster and position aside.



Vehicles with manual transmission

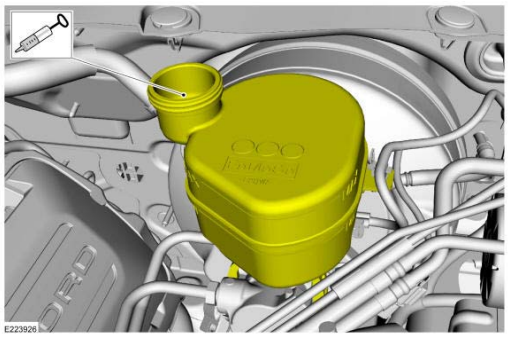
3.

Remove the brake fluid reservoir cap.



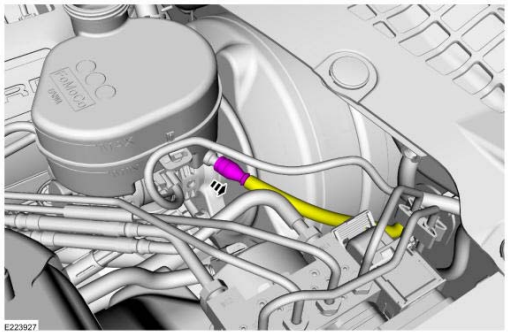
4.

Using a suitable suction device, syphon the brake fluid from the brake fluid reservoir.



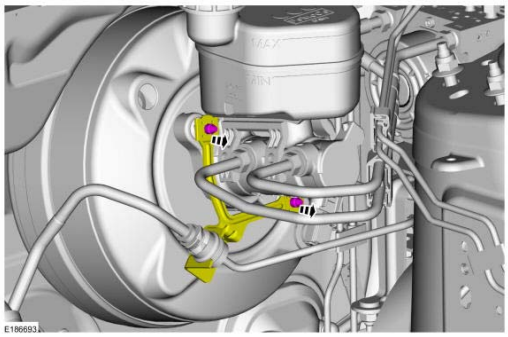
5.

Disconnect the clutch master cylinder tube.



6.

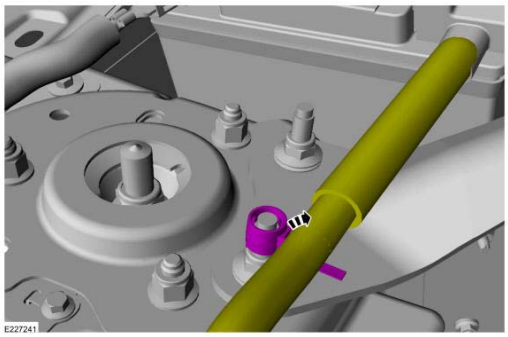
Detach the clutch master cylinder tube bracket from the master cylinder studs.



All vehicles

7.

Detach the battery cable retainer.



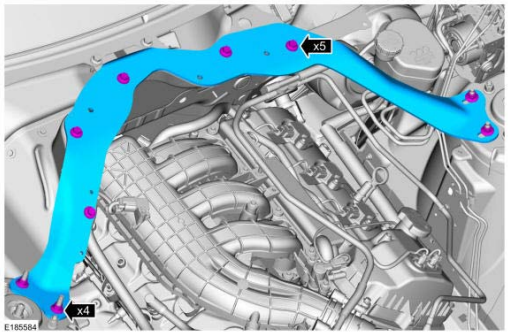
8.

Remove the 5 bolts, 4 nuts and the cowl extension.

Torque:

Bolts: 26 lb.ft (35 Nm)

Nuts: 41 lb.ft (55 Nm)

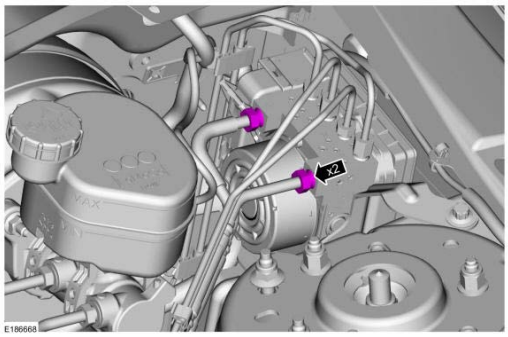


9.

Disconnect the 2 brake tubes at the HCU.

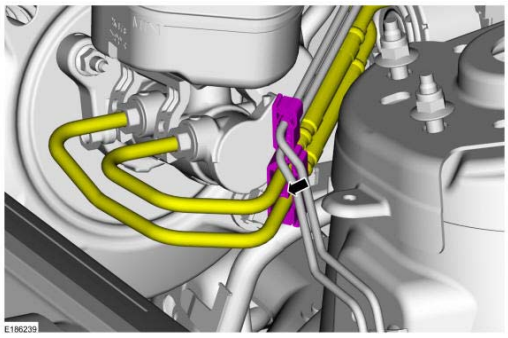
Torque

: 20 lb.ft (27.5 Nm)



10.

Unclip the brake tubes.

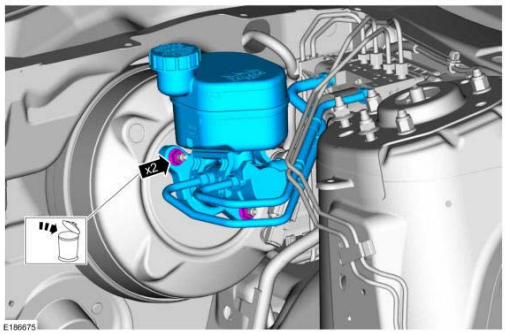


11.

Remove and discard the 2 master cylinder nuts. Remove the master cylinder and brake tubes.

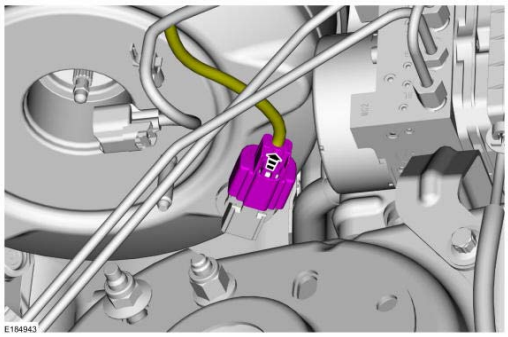
Torque

: 17 lb.ft (23 Nm)



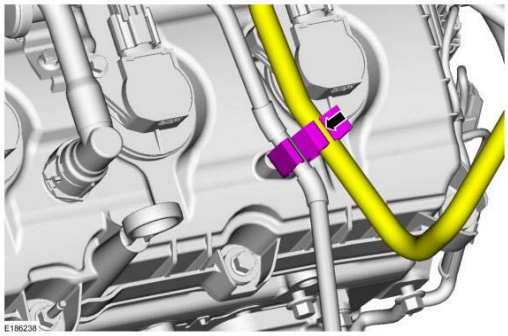
12.

Disconnect the vacuum sensor electrical connector.



13.

Detach and position aside the fuel pressure line from valve cover clip.



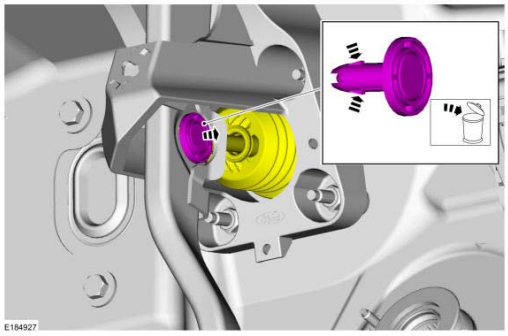
NOTE: Do not service the brake pedal or brake booster without first removing the stoplamp switch. This switch must be removed with the brake pedal in the at-rest position. The switch plunger must be compressed for the switch to rotate in the bracket. Attempting to remove the switch when the plunger is extended (during pedal apply) will result in damage to the switch.

14.
Remove the stop lamp switch. Refer to: Stoplamp Switch .

All vehicles

NOTE: The booster push rod clevis-locking pin is a one-time use only part. Any time the booster push rod clevis-locking pin is removed, a new booster push rod clevis-locking pin should be used.

15.
Remove and discard the booster push rod clevis-locking pin and position aside the booster push rod.

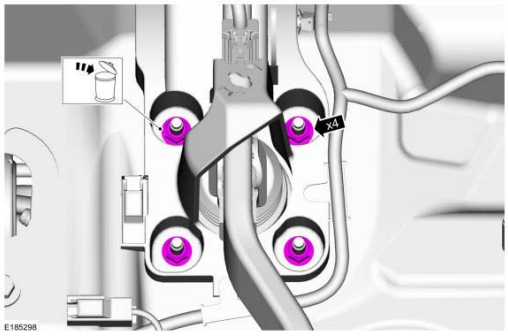


16.

Remove and discard the 4 nuts.

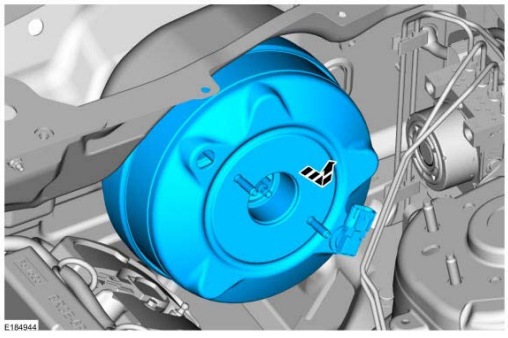
Torque

: 17 lb.ft (22.5 Nm)



17.

Remove the brake booster.



REMOVAL AND INSTALLATION > BRAKE BOOSTER - 3.7L DURATEC (227KW 301PS) > INSTALLATION

NOTE: Do not press, pull or otherwise move the brake pedal while installing the stoplamp switch. The switch must be installed with the booster push rod attached to the brake pedal and with the brake pedal in the at-rest position. Installing the switch with the brake pedal in any other position will result in incorrect adjustment and may damage the switch.

1.
To install, reverse the removal procedure.

2.

Bleed the brake system. Refer to: Brake System Pressure Bleeding .

REMOVAL AND INSTALLATION > BRAKE BOOSTER - 5.0L 32V TI-VCT > REMOVAL

NOTE: If the fluid is spilled on the paintwork, the affected area must be immediately washed down with cold water.

NOTE: Removal steps in this procedure may contain installation details.

All vehicles

1.

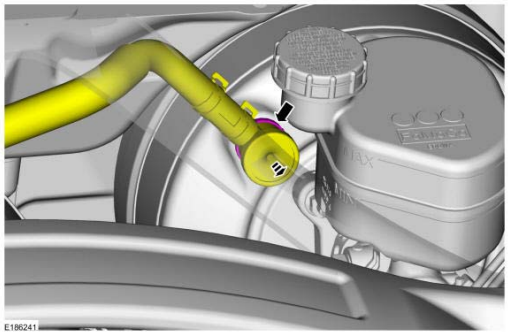
Remove the cowl panel grill. Refer to: Cowl Panel Grille .

2.

Disconnect the battery cables. Refer to: Battery Disconnect and Connect .

3.

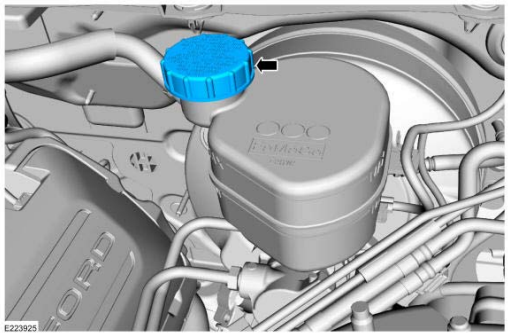
Detach the vacuum check valve from the booster and position aside.



Vehicles equipped with manual transmission

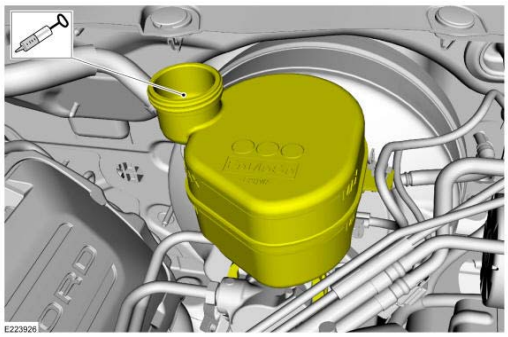
4.

Remove the brake fluid reservoir cap.



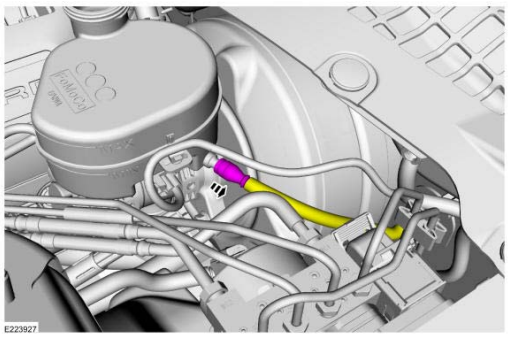
5.

Using a suitable suction device, syphon the brake fluid from the brake fluid reservoir.



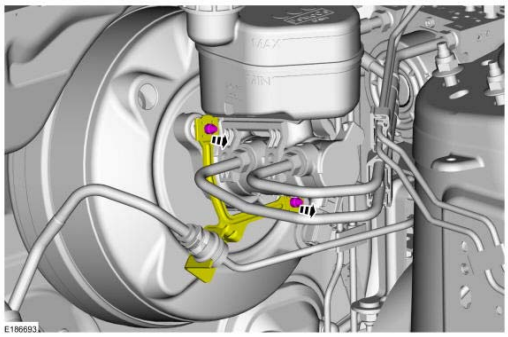
6.

Disconnect the clutch master cylinder tube.



7.

Detach the clutch master cylinder tube bracket from the master cylinder studs.



All vehicles

8.

1.

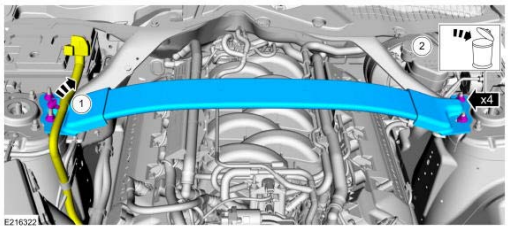
Detach the battery cable retainer.

2.

Remove the nuts and the cross brace. Discard the nuts.

Torque

: 41 lb.ft (55 Nm)

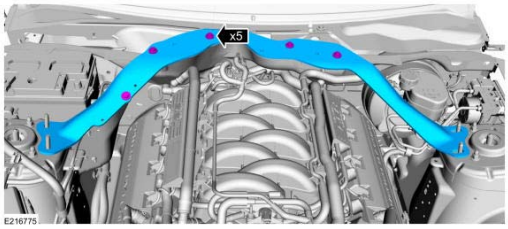


9.

Remove the bolts and the cowl extension.

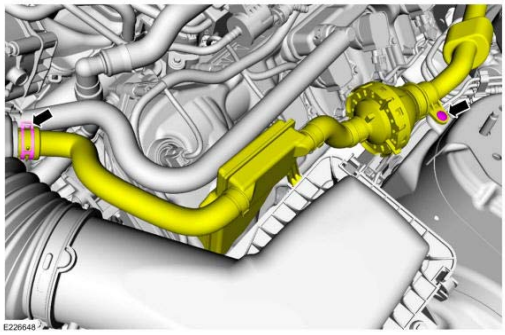
Torque

: 26 lb.ft (35 Nm)



10.

Release the clamp, remove the pin type retainer and position the noise generator aside.



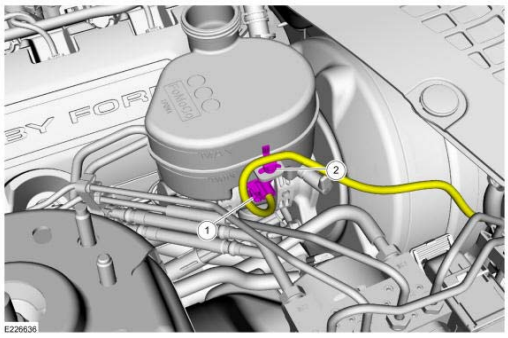
11.

1.

Disconnect the brake fluid level sensor electrical connector.

2.

Detach the wiring harness retainer from the brake fluid reservoir.

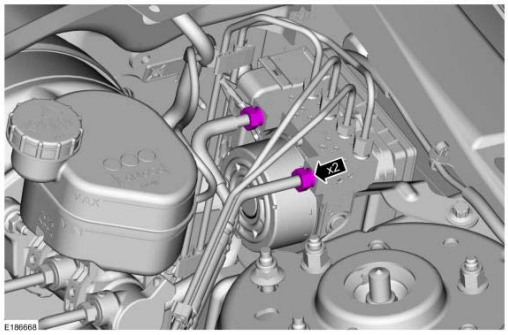


12.

Disconnect the 2 brake tubes at the HCU.

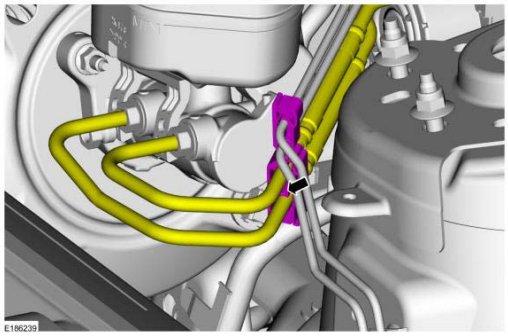
Torque

: 20 lb.ft (27.5 Nm)



13.

Unclip the brake tubes.

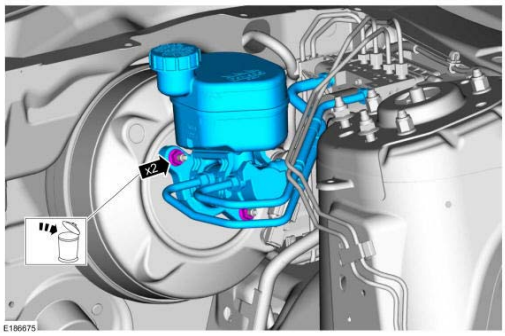


14.

Remove and discard the 2 master cylinder nuts. Remove the master cylinder and brake tubes.

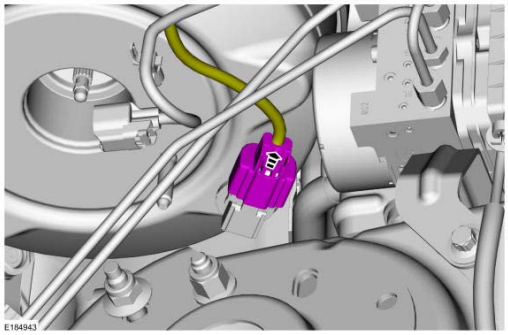
Torque

: 17 lb.ft (23 Nm)



15.

Disconnect the vacuum sensor electrical connector.

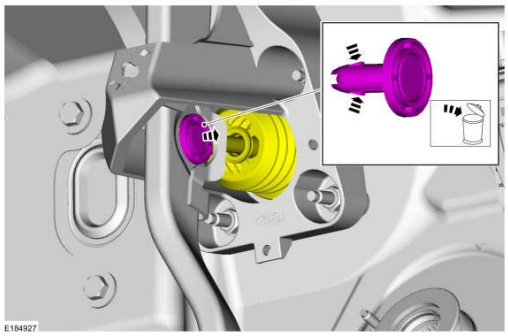


NOTE: Do not service the brake pedal or brake booster without first removing the stoplamp switch. This switch must be removed with the brake pedal in the at-rest position. The switch plunger must be compressed for the switch to rotate in the bracket. Attempting to remove the switch when the plunger is extended (during pedal apply) will result in damage to the switch.

16.
Remove the stop lamp switch. Refer to: Stoplamp Switch .

NOTE: The booster push rod clevis-locking pin is a one-time use only part. Any time the booster push rod clevis-locking pin is removed, a new booster push rod clevis-locking pin should be used.

17.
Remove and discard the booster push rod clevis-locking pin and position aside the booster push rod.

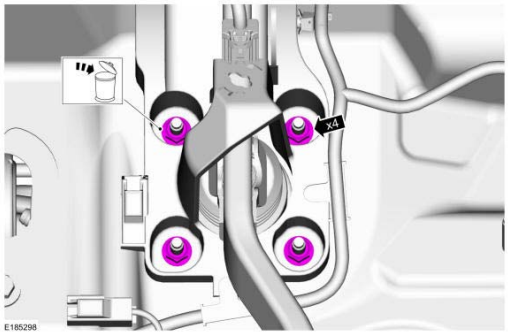


18.

Remove and discard the 4 nuts.

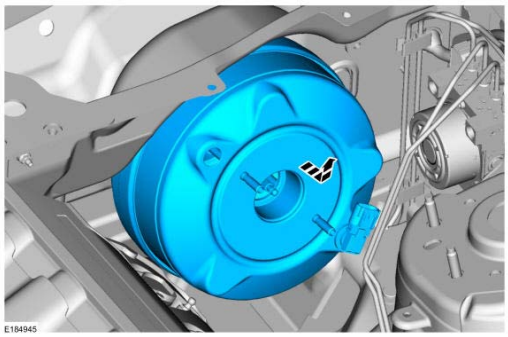
Torque

: 17 lb.ft (22.5 Nm)



19.

Remove the brake booster.



REMOVAL AND INSTALLATION > BRAKE BOOSTER - 5.0L 32V TI-VCT > INSTALLATION

NOTE: Do not press, pull or otherwise move the brake pedal while installing the stoplamp switch. The switch must be installed with the booster push rod attached to the brake pedal and with the brake pedal in the at-rest position. Installing the switch with the brake pedal in any other position will result in incorrect adjustment and may damage the switch.

1.
To install, reverse the removal procedure.

2.

Bleed the brake system. Refer to: Brake System Pressure Bleeding .

3.

If equipped with a manual transmission, bleed the clutch. Refer to: Clutch System Bleeding .

REMOVAL AND INSTALLATION > BRAKE VACUUM PUMP - 2.3L ECOBOOST (201KW

273PS) > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

Remove the cowl vent panel. Refer to: Cowl Panel Grille .

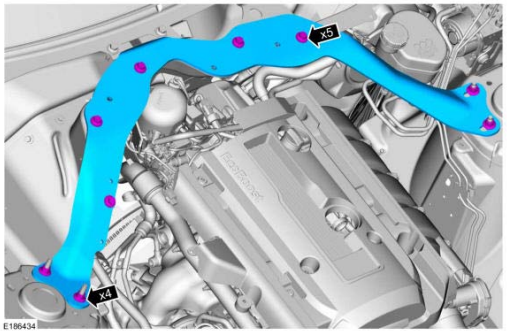
2.

Remove the 5 bolts, 4 nuts and the cowl extension.

Torque:

Bolts: 26 lb.ft (35 Nm)

Nuts: 41 lb.ft (55 Nm)

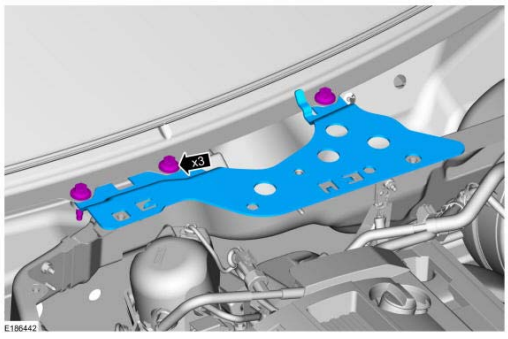


3.

Remove the 3 bolts and bracket.

Torque

: 26 lb.ft (35 Nm)

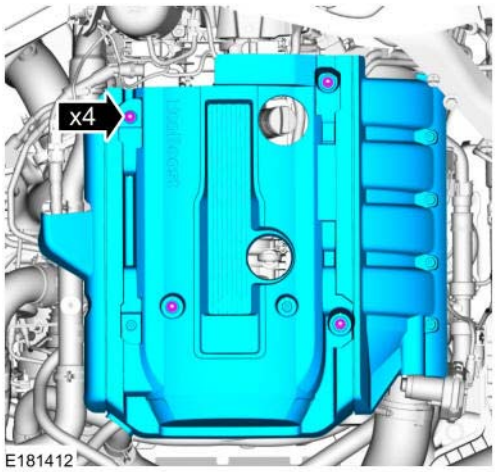


4.

Remove the 4 nuts and the engine appearance cover.

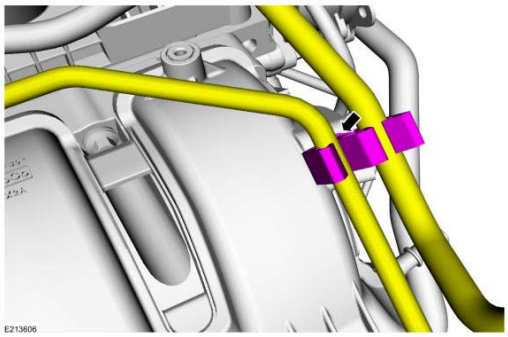
Torque

: 80 lb.in (9 Nm)



5.

Detach the fuel line bracket from the intake manifold.



6.

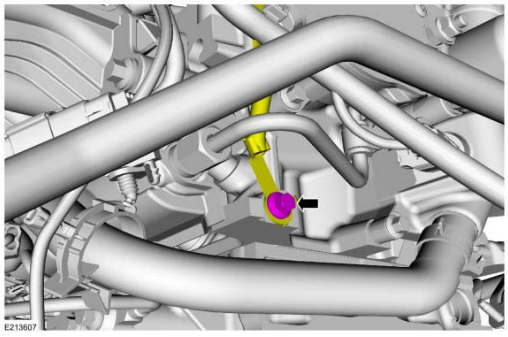
With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

7.

Remove the bolt and detach the ground wire from the cylinder head.

Torque

: 18 lb.ft (25 Nm)



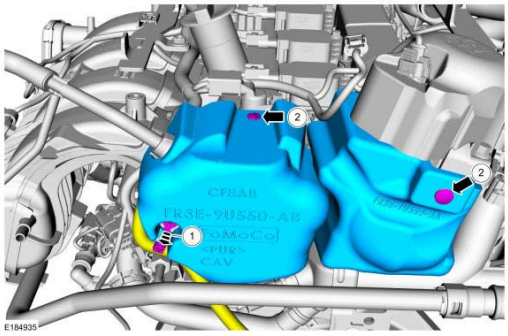
8.

1.

Detach the wiring harness retainer.

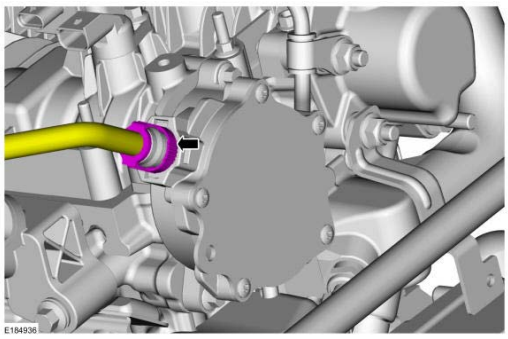
2.

Remove the 2 retainers, the brake vacuum pump cover and the high pressure fuel pump cover.



9.

Release the coupling and disconnect the vacuum tube.

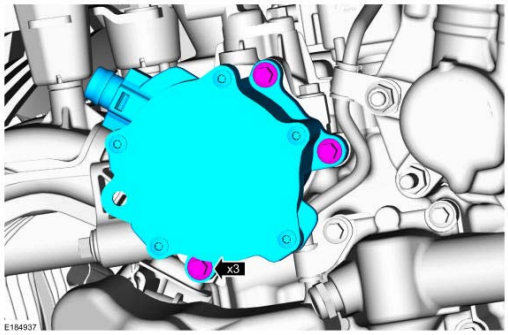


10.

Remove the bolts and vacuum pump.

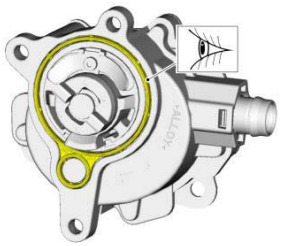
Torque

: 89 lb.in (10 Nm)



NOTE: Make sure that the mating faces are clean and free of foreign material.

11.
Inspect the brake vacuum pump housing gasket and replace as necessary.



REMOVAL AND INSTALLATION > BRAKE VACUUM PUMP - 2.3L ECOBOOST (201KW 273PS) > INSTALLATION

NOTE: Align the camshaft and vacuum pump couplings correctly or damage to the camshaft or vacuum pump may occur.

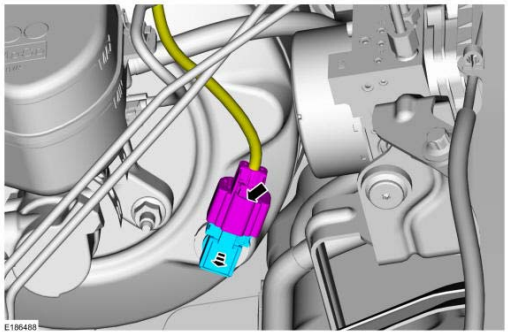
1.
To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > BRAKE VACUUM SENSOR > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

Disconnect the brake booster vacuum sensor electrical connector and remove the brake booster vacuum sensor.



REMOVAL AND INSTALLATION > BRAKE VACUUM SENSOR > INSTALLATION

NOTE: Please note the correct installation position. It is critical that the sensor be installed in the exact position that it was removed.

1.

To install, reverse the removal procedure.

Service Manual: REAR DISC BRAKE

DIAGNOSIS AND TESTING > REAR DISC BRAKE

REFER to: Brake System .

REMOVAL AND INSTALLATION > BRAKE CALIPER > REMOVAL

NOTE: If the fluid is spilled on the paintwork, the affected area must be immediately washed down with cold water.

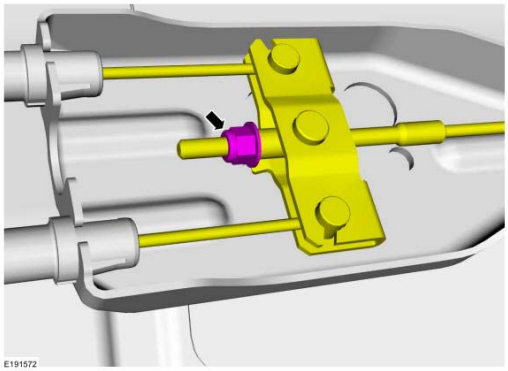
NOTE: Removal steps in this procedure may contain installation details.

1.

Remove wheel and tire. Refer to: Wheel and Tire .

2.

Loosen the parking brake cable adjustment nut.



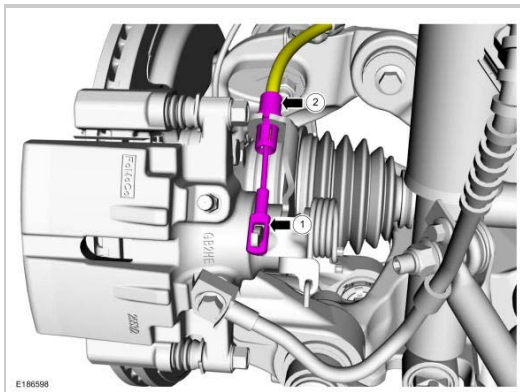
3.

1.

Disconnect the parking brake cable from the lever.

2.

Detach the parking brake cable from the bracket and position aside the parking brake cable.

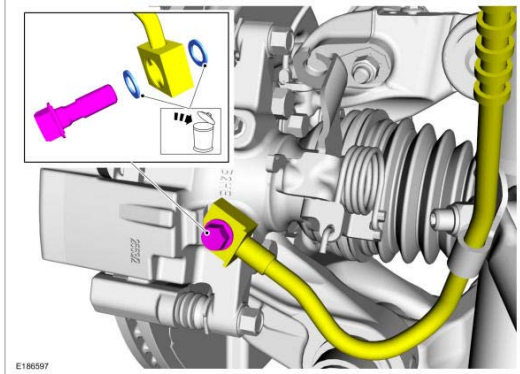


NOTE: Make sure that all openings are sealed.

4.
Remove the brake caliper flow bolt and disconnect the brake hose from the brake caliper. Discard the washers.

Torque

: 35 lb.ft (47.5 Nm)



5.

Remove the 2 bolts and the brake caliper.

Torque

: 24 lb.ft (32 Nm)



REMOVAL AND INSTALLATION > BRAKE CALIPER > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Bleed the brake system. Refer to: Brake System Pressure Bleeding .

3.

Adjust park brake system. Refer to: Parking Brake Cable Adjustment .

REMOVAL AND INSTALLATION > BRAKE CALIPER ANCHOR PLATE > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

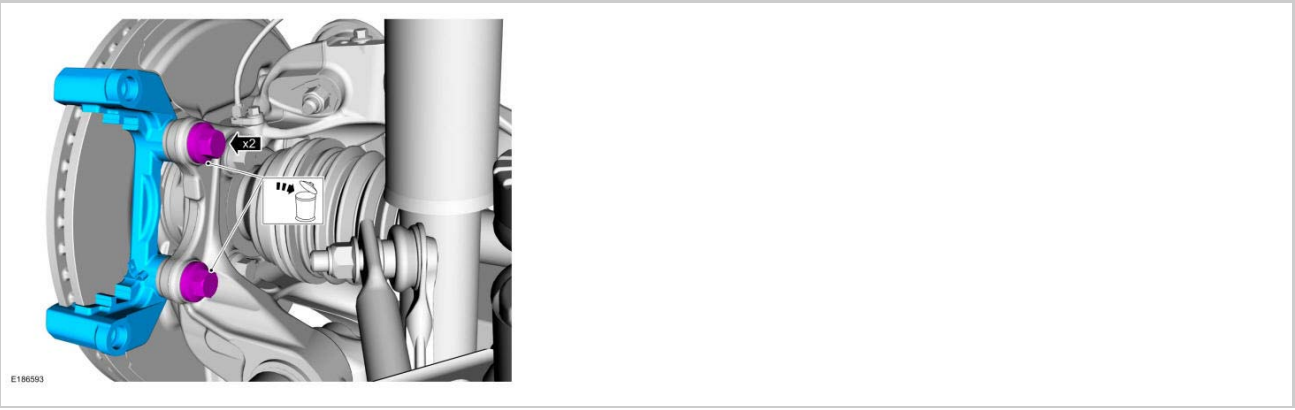
Remove the brake pads. Refer to: Brake Pads .

NOTE: Do not allow the brake caliper and anchor plate assembly to hang from the brake hose or damage to the hose may occur.

2.
Remove the 2 bolts and the brake caliper anchor plate. Discard the bolts.

Torque

: 129 lb.ft (175 Nm)



REMOVAL AND INSTALLATION > BRAKE CALIPER ANCHOR PLATE > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > BRAKE DISC

Materials

Name	Specification
Metal Brake Parts Cleaner (U.S.)PM-4-A, PM-4-B (U.S.)	-

REMOVAL AND INSTALLATION > BRAKE DISC > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

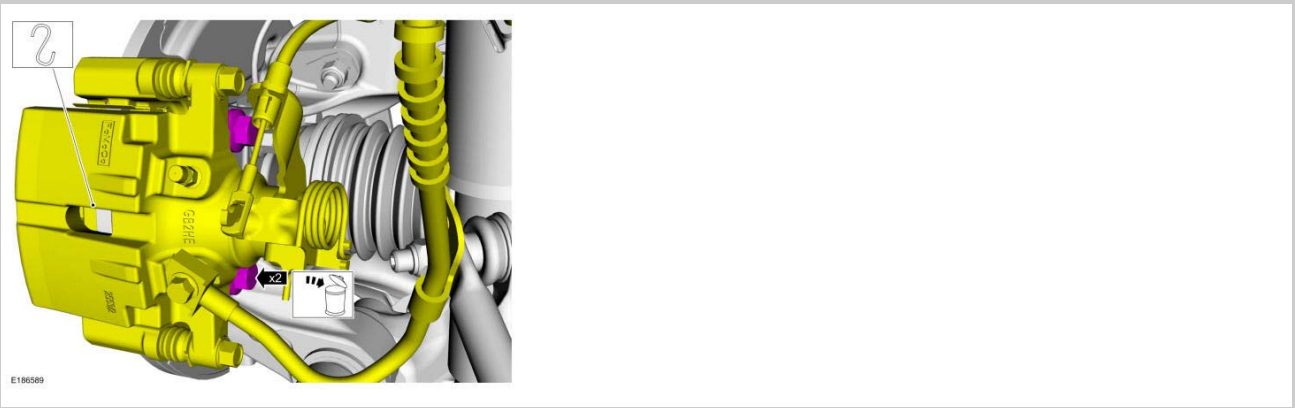
Remove wheel and tire. Refer to: Wheel and Tire .

NOTE: Do not allow the brake caliper and anchor plate assembly to hang from the brake hose or damage to the hose may occur.

2.
Remove the 2 bolts and position the brake caliper and anchor plate assembly aside. Discard the bolts.

Torque

: 129 lb.ft (175 Nm)



3.

Remove the brake disc.



REMOVAL AND INSTALLATION > BRAKE DISC > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Clean the brake disc mating surfaces using a wire brush and the specified material.

Material

: Metal Brake Parts Cleaner (U.S.) / PM-4-A, PM-4-B (U.S.)

3.

Apply the brake pedal several times to verify correct brake system operation.

REMOVAL AND INSTALLATION > BRAKE DISC SHIELD > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

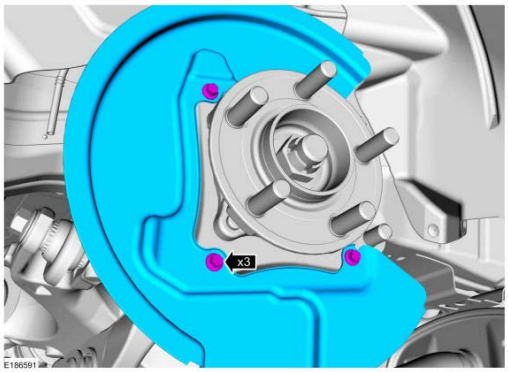
Remove the brake disc. Refer to: Brake Disc .

2.

Remove the 3 bolts and the brake disc shield.

Torque

: 106 lb.in (12 Nm)



REMOVAL AND INSTALLATION > BRAKE DISC SHIELD > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > BRAKE PADS

Special Tool(s) / General Equipment

Brake Caliper Piston Retractor

REMOVAL AND INSTALLATION > BRAKE PADS > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

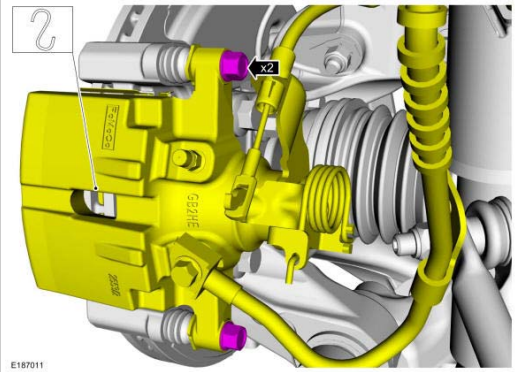
Remove wheel and tire. Refer to: Wheel and Tire .

> *NOTE: Do not allow the brake caliper to hang from the brake hose or damage to the brake hose may occur.*

2.
Remove the 2 bolts and position the brake caliper aside.

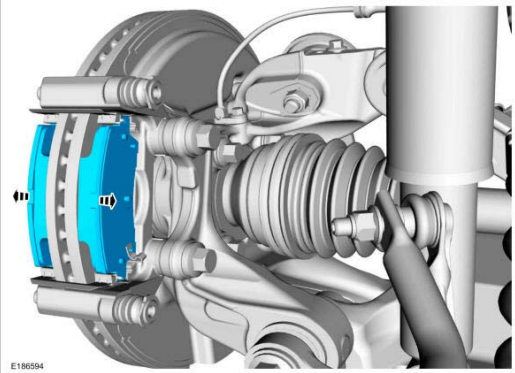
Torque

: 24 lb.ft (32 Nm)



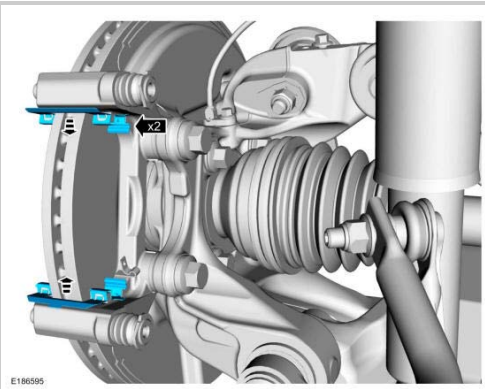
3.

Remove the brake pads.



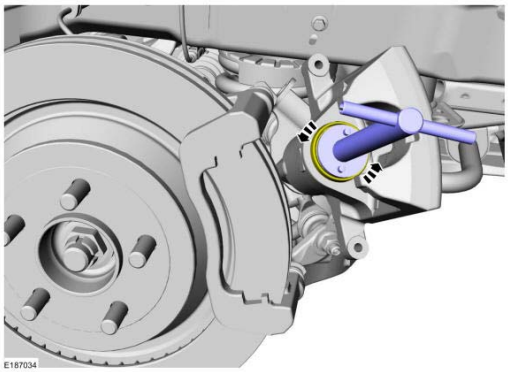
4.

Remove the clips.



NOTE: Make sure the notch on the piston is aligned with the pin on the inboard brake pad before installing the brake caliper. A moderate to heavy force toward the caliper piston must be applied. If sufficient force is not applied, the internal park brake mechanism clutch cone will not engage and the piston will not compress.

5.
If installing new brake pads. Retract the brake caliper pistons into the brake caliper bore. Use the General Equipment: Brake Caliper Piston Retractor



REMOVAL AND INSTALLATION > BRAKE PADS > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Depress the brake pedal, check the brake fluid level in the brake fluid reservoir and top up as necessary with brake fluid. Refer to: Specifications .

REMOVAL AND INSTALLATION > REAR BRAKE FLEXIBLE HOSE > REMOVAL

NOTE: Make sure that all openings are sealed.

NOTE: If the fluid is spilled on the paintwork, the affected area must be immediately washed down with cold water.

NOTE: Removal steps in this procedure may contain installation details.

1.

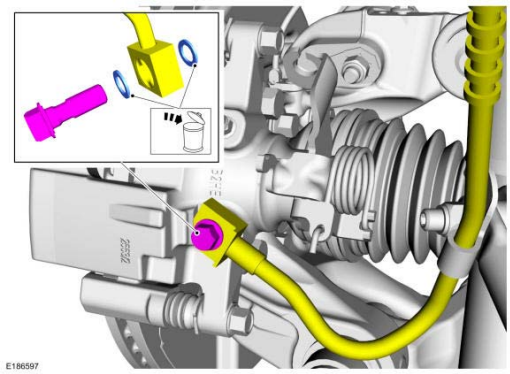
With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

2.

Remove the brake caliper flow bolt and disconnect the brake hose from the brake caliper. Discard the washers.

Torque

: 35 lb.ft (47.5 Nm)



3.

1.

Disconnect the brake tube fitting.

Torque

: 155 lb.in (17.5 Nm)

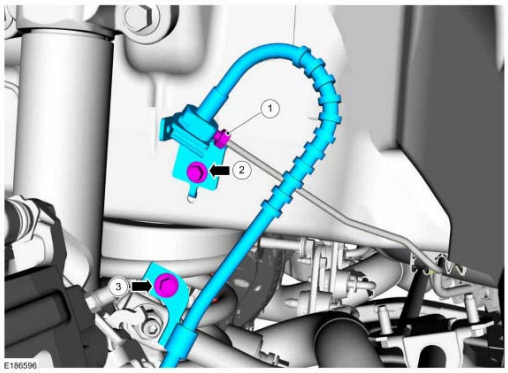
2.

Remove the 2 brake hose bracket bolts and the brake hose.

Torque:

2.: 18 lb.ft (25 Nm)

3.: 22 lb.ft (30 Nm)



REMOVAL AND INSTALLATION > REAR BRAKE FLEXIBLE HOSE > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Bleed the brake system. Refer to: Brake System Pressure Bleeding .

REMOVAL AND INSTALLATION > BRAKE CALIPER - VEHICLES WITH: SVT PERFORMANCE PACKAGE > REMOVAL

NOTE: Make sure that all openings are sealed.

NOTE: If the fluid is spilled on the paintwork, the affected area must be immediately washed down with cold water.

NOTE: Removal steps in this procedure may contain installation details.

1.

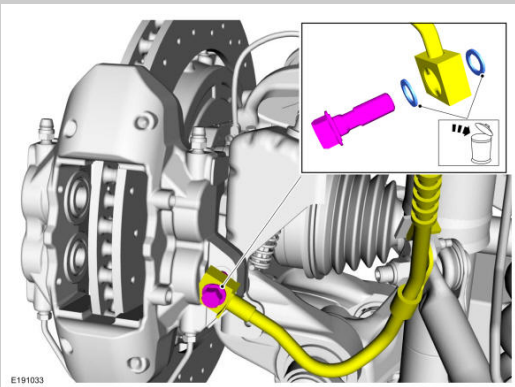
Remove the brake pads. Refer to: Brake Pads - Vehicles With: SVT Performance Package .

2.

Remove the brake caliper flow bolt and disconnect the brake hose from the brake caliper. Discard the washers.

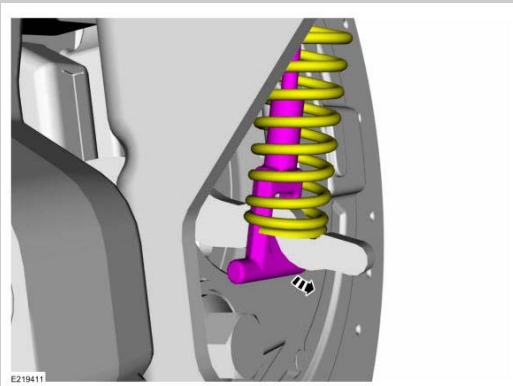
Torque

: 30 lb.ft (40 Nm)



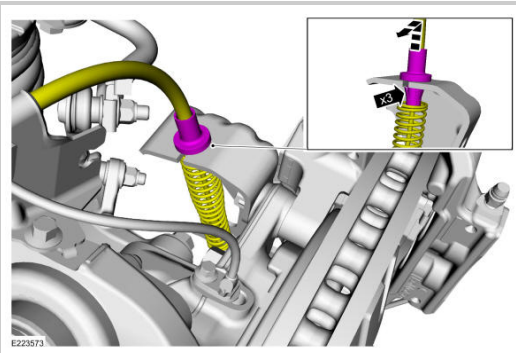
3.

Disconnect parking brake cable from parking brake shoe actuation lever.



4.

Press inward on the tabs and detach the parking brake cable from the bracket.



5.

1.

Remove and discard the bolts.

Torque

: 85 lb.ft (115 Nm)

2.

Remove the bracket.

3.

Remove the brake caliper.



REMOVAL AND INSTALLATION > BRAKE CALIPER - VEHICLES WITH: SVT PERFORMANCE PACKAGE > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Bleed the brake system. Refer to: Brake System Pressure Bleeding .

REMOVAL AND INSTALLATION > BRAKE DISC - VEHICLES WITH: SVT PERFORMANCE PACKAGE > REMOVAL

NOTE: Do not allow the brake caliper to hang from the brake hose or damage to the brake hose may occur.

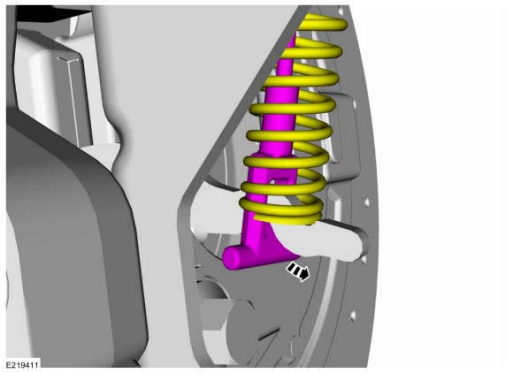
NOTE: Removal steps in this procedure may contain installation details.

1.

Remove wheel and tire. Refer to: Wheel and Tire .

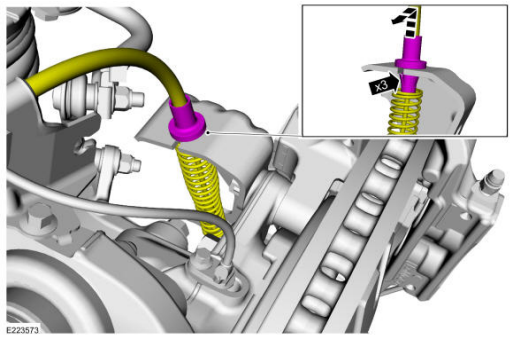
2.

Disconnect parking brake cable from parking brake shoe actuation lever



3.

Press inward on the tabs and detach the parking brake cable from the bracket.



4.

1.

Remove and discard the bolts.

Torque

: 81 lb.ft (110 Nm)

2.

Remove the bracket.

3.

Position the brake caliper aside.



5.

Remove the brake disc.



REMOVAL AND INSTALLATION > BRAKE DISC - VEHICLES WITH: SVT PERFORMANCE PACKAGE > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Apply the brake pedal several times to verify correct brake system operation.

REMOVAL AND INSTALLATION > BRAKE DISC SHIELD - VEHICLES WITH: SVT PERFORMANCE PACKAGE > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

Remove the parking brake shoes. Refer to: PARKING BRAKE SHOE ADJUSTMENT - VEHICLES WITH: SVT PERFORMANCE PACKAGE .

2.

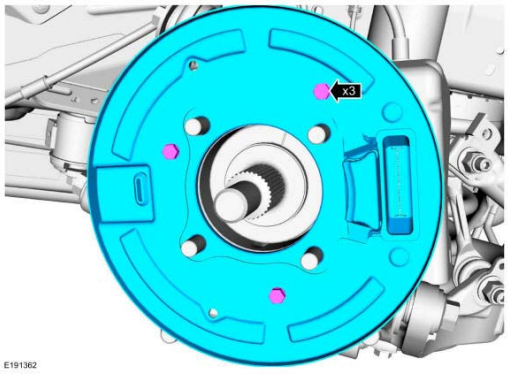
Remove the wheel bearing and wheel hub. Refer to: Wheel Bearing and Wheel Hub .

3.

Remove the bolts and the brake disc shield.

Torque

: 89 lb.in (10 Nm)



REMOVAL AND INSTALLATION > BRAKE DISC SHIELD - VEHICLES WITH: SVT PERFORMANCE PACKAGE > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > BRAKE PADS - VEHICLES WITH: SVT PERFORMANCE PACKAGE

Special Tool(s) / General Equipment

Brake Caliper Piston Retractor

REMOVAL AND INSTALLATION > BRAKE PADS - VEHICLES WITH: SVT PERFORMANCE PACKAGE > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

Remove wheel and tire. Refer to: Wheel and Tire .

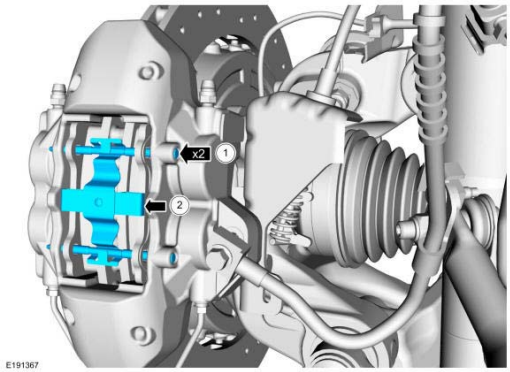
2.

1.

Remove the brake pad pins.

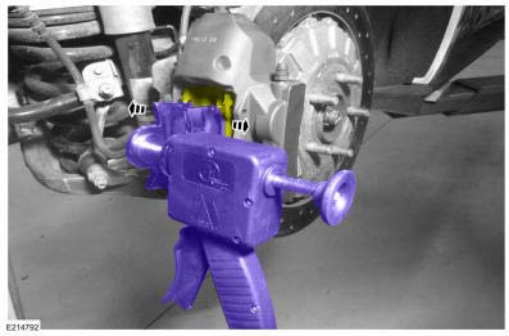
2.

Remove brake pad spring.



3.

Compress the brake caliper pistons using a brake pad spreader tool and remove the brake pads. Use the General Equipment: Brake Caliper Piston Retractor



4.

Remove the brake pads.



REMOVAL AND INSTALLATION > BRAKE PADS - VEHICLES WITH: SVT PERFORMANCE PACKAGE > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Depress the brake pedal, check the brake fluid level in the brake fluid reservoir and top up as necessary with brake fluid. Refer to: Specifications .

REMOVAL AND INSTALLATION > REAR BRAKE FLEXIBLE HOSE - VEHICLES WITH: SVT PERFORMANCE PACKAGE > REMOVAL

NOTE: Make sure that all openings are sealed.

NOTE: If the fluid is spilled on the paintwork, the affected area must be immediately washed down with cold water.

NOTE: Removal steps in this procedure may contain installation details.

1.

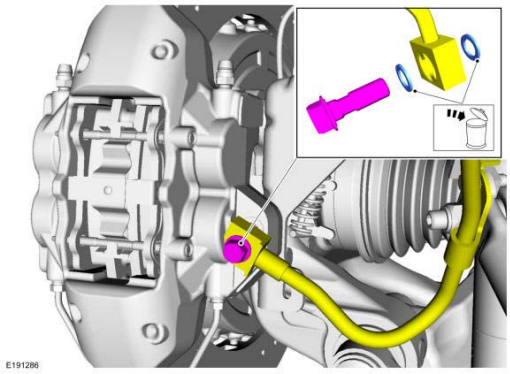
With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

2.

Remove the brake caliper flow bolt and disconnect the brake hose from the brake caliper. Discard the washers.

Torque

: 30 lb.ft (40 Nm)



3.

1.

Disconnect the brake tube fitting.

Torque

: 155 lb.in (17.5 Nm)

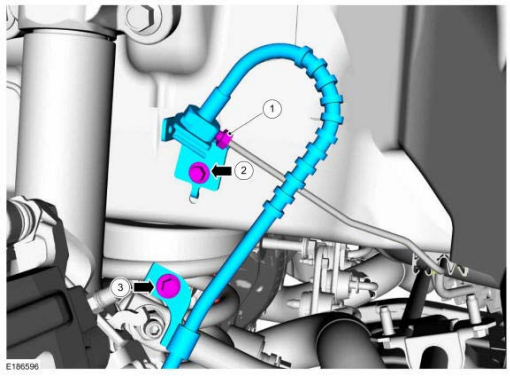
2.

Remove the 2 brake hose bracket bolts and the brake hose.

Torque:

: 2.: 18 lb.ft (25 Nm)

3.: 22 lb.ft (30 Nm)



REMOVAL AND INSTALLATION > REAR BRAKE FLEXIBLE HOSE - VEHICLES WITH: SVT PERFORMANCE PACKAGE > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Bleed the brake system. Refer to: Brake System Pressure Bleeding .

Service Manual: DRIVESHAFT

SPECIFICATIONS > SPECIFICATIONS

Materials

Name	Specification
Premium Long-Life Grease XG-1-E1	ESA-M1C75-B

Lubricants, Fluids, Sealers and Adhesives

Item	Specifications
Material : Premium Long-Life Grease / XG-1-E1 (ESA-M1C75-B)	ESA-M1C75-B

Item	**Specifications**
Driveshaft runout	0.6 mm (0.024 in)
Driveshaft to transmission joint angle @ curb ride height (2.3L EcoBoost Auto Transmission)	0.45 degrees
Driveshaft to transmission joint angle @ curb ride height (2.3L EcoBoost Manual Transmission)	0.46 degrees
Driveshaft to transmission joint angle @ curb ride height (3.7L Duratec Auto Transmission)	0.26 degrees
Driveshaft to transmission joint angle @ curb ride height (3.7L Duratec Manual Transmission)	0.24 degrees
Driveshaft to transmission joint angle @ curb ride height (5.0L 32V Ti-VCT Auto Transmission)	0.58 degrees
Driveshaft to transmission joint angle @ curb ride height (5.0L 32V Ti-VCT Manual Transmission)	0.55 degrees
Driveshaft center bearing joint angle @ curb ride height (2.3L EcoBoost Auto Transmission)	0.63 degrees
Driveshaft center bearing joint angle @ curb ride height (2.3L EcoBoost Manual Transmission)	0.64 degrees
Driveshaft center bearing joint angle @ curb ride height (3.7L Duratec Auto Transmission)	0.42 degrees
Driveshaft center bearing joint angle @ curb ride height (3.7L Duratec Manual Transmission)	0.40 degrees
Driveshaft center bearing joint angle @ curb ride height (5.0L 32V Ti-VCT Auto Transmission)	0.76 degrees

Driveshaft center bearing joint angle @ curb ride height (5.0L 32V Ti-VCT Manual Transmission)	0.79 degrees
Driveshaft to rear differential joint angle @ curb ride height (All except 5.0L 32V Ti-VCT)	0.0 degrees
Driveshaft to rear differential joint angle @ curb ride height (5.0L 32V Ti-VCT only)	0.54 degrees

Torque Specifications

Item	Nm	lb-ft	lb-in
Center bearing support bolts	48	35	-
Front driveshaft (3 bolt flange)	110	81	-
Front driveshaft (4 bolt flange)	109	80	-
Muffler inlet pipe clamp	48	35	-
Rear driveshaft-to-pinion flange bolts	55	41	-

DIAGNOSIS AND TESTING > DRIVESHAFT > INSPECTION AND VERIFICATION

1.

Verify the customer concern.

2.

Visually inspect for obvious signs of mechanical or electrical damage.

3.

If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step

4.

If the cause is not visually evident, verify the symptom and refer to the Symptom Chart(s) .

DIAGNOSIS AND TESTING > DRIVESHAFT > SYMPTOM CHART(S)

Diagnostics in this service information assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

Symptom Chart: NVH

Symptom Chart

Condition	Possible Sources	Actions
Driveline clunk - loud clunk when shifting from REVERSE to DRIVE	Damaged or worn driveshaft CV joint and/or u-joint	INSPECT the driveshaft CV joint and/or u-joint for wear or damage. INSTALL a new driveshaft as necessary. REFER to: Driveshaft .
Driveline clunk - occurs as the vehicle starts to move forward following a stop	Worn driveshaft CV joint and/or u-joint with excessive play	INSPECT the driveshaft CV joint and/or u-joint for a worn condition. INSTALL a new driveshaft if necessary. REFER to: Driveshaft .
Buzz - buzzing noise is the same at cruise or coast/deceleration	Incorrect driveline angles	CHECK for correct driveline angles. REFER to: Driveshaft Angle Measurement .
Rumble or Boom - noise occurs at coast/ deceleration, usually driveshaft speed-related and noticeable over a wide range of speeds	Driveshaft out of balance	CHECK the driveshaft for damage, missing weights or undercoating. INSTALL a new driveshaft as necessary. REFER to: Driveshaft .
Grunting - normally associated with a shudder experienced during acceleration from a complete stop	Driveshaft CV joint and/or u-joint binding	INSTALL a new driveshaft as necessary. REFER to: Driveshaft .
Driveline shudder - occurs during acceleration from a slow speed or stop	Driveline angles out of specification	CHECK for correct driveline angles. REFER to: Driveshaft Angle Measurement .
	Binding or damaged driveshaft CV joint and/or u-joint	INSPECT the driveshaft CV joint and/or u-joint and coupling shaft for wear or damage. INSTALL a new driveshaft as necessary. REFER to: Driveshaft .
Driveline vibration - occurs at cruising speeds	Worn or damaged driveshaft center bearing support	CHECK the insulator for damage or wear. ROTATE the driveshaft and CHECK for rough operation. INSTALL a new driveshaft as necessary. REFER to: Driveshaft .
	Loose axle pinion flange bolts	INSPECT the axle pinion flange. TIGHTEN the pinion flange bolts to specification. REFER to: Driveshaft .
	Excessive axle pinion flange runout	CARRY OUT a runout check. REPAIR as necessary. REFER to: SPECIFICATIONS .
	Driveshaft is out of balance	CHECK the driveshaft for damage, missing balance weights or undercoating. CHECK the

		driveshaft balance. REFER to: Driveshaft Runout and Balancing .
	Binding or damaged driveshaft CV joint and/or u-joint	INSPECT the driveshaft CV joint and/or u-joint for wear or damage. INSTALL a new driveshaft as necessary. REFER to: Driveshaft .
	Excessive driveshaft runout	CARRY OUT a runout check. REFER to: Driveshaft Runout and Balancing .
	Driveline angles out of specification	CHECK for correct driveline angles. REFER to: Driveshaft Angle Measurement . REPAIR as necessary.

GENERAL PROCEDURES > DRIVESHAFT ANGLE MEASUREMENT

Check

NOTE: This procedure does not apply to CV joints, flex couplers or double cardan joints that are used in some driveshafts. This check is for single-cross and roller-style joints found in the driveshafts.

NOTE: Prior to checking driveline angularity, inspect the U-joints for correct operation.

NOTE: An incorrect driveline angle can cause a vibration or shudder.

NOTE: Driveline angularity is the angular relationship between the engine crankshaft, the driveshaft and the rear axle pinion. Factors determining driveline angularity include ride height, rear spring and engine mounts.

1.

Special Tool(s): Anglemaster II Driveline Inclinometer/Protractor 164-R2402. Carry out the following preliminary setup steps:

1.

Inspect the U-joints for correct operation.

2.

Park the vehicle on a level surface such as a drive-on hoist, or back onto a front end

alignment rack.

3.

Verify the curb position ride height is within specifications with the vehicle unloaded and all of the tires are inflated to their normal operating pressures.

4.

Calibrate the Anglemaster II Driveline Inclinometer/Protractor by placing it on a clean, flat level section of the frame rail and press the ALT-ZERO button.

Vehicles with flat-flanged, split-pin or slip-flanged U-joints

NOTE: If equipped, remove the snap ring to allow access to the base of the U-joint cup. Make sure the Anglemaster II Driveline Inclinometer/Protractor is seated against the U-joint cup.

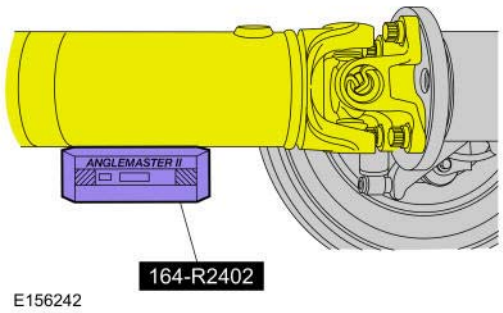
NOTE: Rotate the driveshaft until the flange U-joint cup is parallel with the floor. This will simplify taking measurements.

2.
Special Tool(s): Anglemaster II Driveline Inclinometer/Protractor 164-R2402. Check and record the flange angle as angle A.



3.

Special Tool(s): Anglemaster II Driveline Inclinometer/Protractor 164-R2402. Measure the slope of the connecting component. Record the measurement of the component angle as angle B.

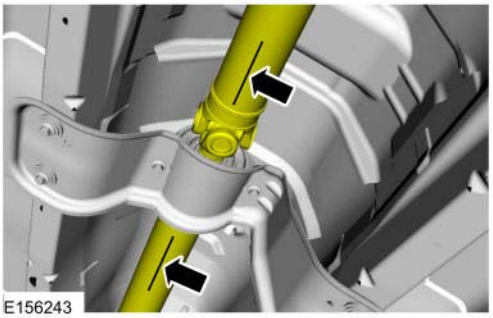


Multiple piece driveshafts

NOTE: Repeat this step for each center support bearing on the driveshaft.

NOTE: It is not necessary to remove the U-joint snap ring, if equipped, for these measurements.

4.
Special Tool(s): Anglemaster II Driveline Inclinometer/Protractor 164-R2402. Measure the slope of the components in front and behind the center support bearing U-joint in the area indicated. Record the front component as angle A and the rear component as angle B.



All vehicles

NOTE: When 2 connected components slope in the same direction, subtract the smallest number from the larger number to find the U-joint operating angle. When 2 connected components slope in the opposite direction, add the measurements to find the U-joint operating angle.

5.
Calculate the difference in the slope of the components to determine the U-joint operating angle.

6.

NOTE: The U-joint operating angle is the angle formed by 2 yokes

connected by a cross and bearing kit. Ideally, the operating angles on each connection of the driveshaft must:

1.

be equal or within one degree of each other.

2.

have a 3 degree maximum operating angle.

3.

have at least one-half of one degree continuous operating angle.

7.

If the angle is not within specifications, repair or adjust to obtain the correct angle. Inspect the engine mounts, transmission mounts, center support bearing mounting, rear suspension, rear axle, rear axle mounting or the frame for wear or damage.

GENERAL PROCEDURES > DRIVESHAFT RUNOUT AND BALANCING

Special Tool(s) / General Equipment

 E139373	100-002 (TOOL-4201-C) Holding Fixture with Dial Indicator Gauge

Inspection

NOTE: Driveline vibration exhibits a higher frequency and lower amplitude then high-speed shake. Driveline vibration is directly related to the speed of the vehicle and is noticed at various speeds. Driveline vibration can be perceived as a tremor in the floorpan or heard as a rumble, hum or boom.

NOTE: Refer to SPECIFICATIONS for runout specifications.

NOTE: Do not make any adjustments before carrying out a road test. Do not change the tire pressure or the vehicle load.

1.

Carry out a visual inspection of the vehicle. Operate the vehicle and verify the condition by reproducing it during the road test.

The concern should be directly related to vehicle road speed. not affected by acceleration or deceleration or could be reduced by coasting in NEUTRAL.

2.

Refer to: Jacking and Lifting - Overview .

NOTE: The driveshaft should be kept at an angle equal to or close to the curb-weighted position. Use a twin-post hoist or a frame hoist with jackstands.

3.

Inspect the driveshaft for damage, undercoating or incorrectly seated U-joints. Rotate the driveshaft slowly by hand and feel for binding or end play in the U-joint trunnions. Remove the driveshaft. Inspect the slip yoke splines for any galling, dirt, rust or incorrect lubrication. Clean the driveshaft or install new U-joints as necessary. Install a new driveshaft if damaged. After any corrections or new components are installed, recheck for the vibration at the road test speed.

If the vibration persists after inspection, measure the driveshaft runout.



Check

1.

Measure and check for the specified maximum value. Install the Dial Indicator Gauge with Holding Fixture. Rotate the driveshaft by turning the axle and measure the runout at the front, center and rear of the driveshaft. Multiple piece driveshaft measure each section at the front, center and rear.

1.

If the runout exceeds 1 mm (0.040 in) at the front or center, install a new driveshaft.

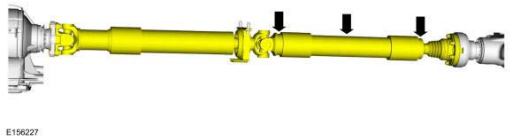
Use Special Service Tool: 100-002 (TOOL-4201-C) Holding Fixture with Dial Indicator Gauge.

2.

If the front and center is within 1 mm (0.040 in), but the rear runout is not, index-mark the rear runout high point and proceed to step 2

3.

If the runout is within 1 mm (0.040 in) at all points, recheck for vibration at road test speed. If the vibration persists, balance the driveshaft. Refer to appropriate Driveshaft Balancing in this procedure.



NOTE: Circular pinion flanges can be turned in 90 degree or one-fourth increments. Half-round pinion flanges are limited to 2 positions. CV joint pinion flanges that have 6 bolts, can be turned in 60 degree or one-sixth increments.

2.

Index-mark the driveshaft to the pinion flange. Disconnect the driveshaft and rotate it 180 degrees. Reconnect the driveshaft. Recheck the runout at the rear of the driveshaft.

1.

If the runout is still over specification, mark the high point and proceed to Step 3.

2.

If the runout is within specification, check for the vibration at the road test speed. If the vibration is still present, balance the driveshaft. Refer to appropriate Driveshaft Balancing in this procedure.

3.

Excessive driveshaft runout can originate in the driveshaft itself or from the pinion flange. To find the source, compare the 2 high points previously determined.

1.

If the index marks are close together, within 25 mm (1 in), the driveshaft is eccentric. Install a new driveshaft.

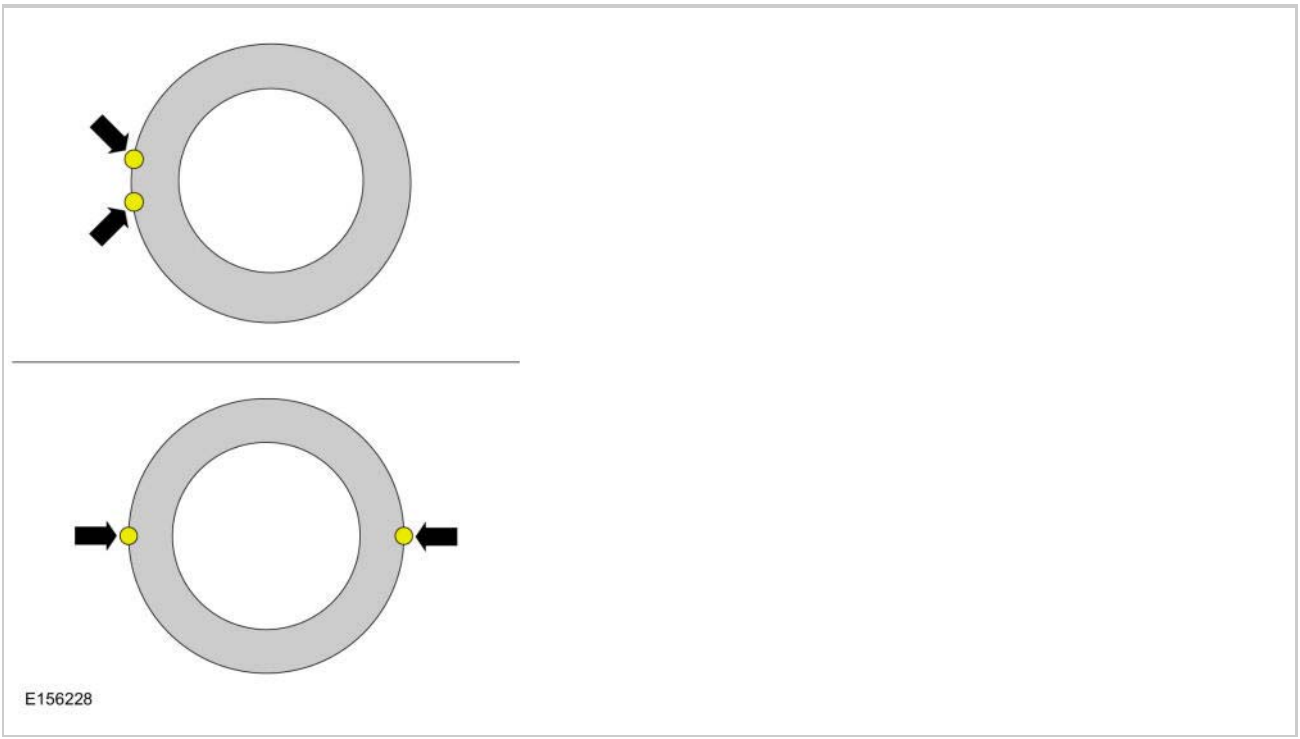
2.

If the marks are on opposite sides of the driveshaft, 180 degrees apart, the slip yoke or pinion flange is responsible. Check the pinion flange runout. If the pinion flange runout exceeds specifications, a bent pinion is indicated.

3.

If the pinion flange and pinion runouts are within specifications, road test and check for the

vibration at the road test speed. If the vibration persists, balance the driveshaft. Refer to appropriate Driveshaft Balancing in this procedure.



Driveshaft Balancing - Using the Mastertech® Series MTS 4000 Driveline Balance and NVH Analyzer (Vetronix)

4.

Special Tool(s): Mastertech® Series MTS 4000 Driveline Balance and NVH Analyzer (Vetronix) 257-00018. Working under the vehicle, install an accelerometer. The accelerometer can be attached and mounted near either the transmission or differential end of the driveshaft.

5.

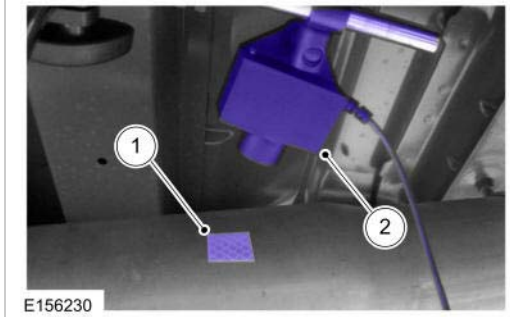
Clean an area of the driveshaft and install the reflective tape, then install the photo-tachometer sensor. The sensor should be placed at approximately a 20-degree angle from perpendicular to the surface of the reflective tape. Make sure the sensor does not get moved during the balance procedure.

1.

Reflective tape.

2.

Photo-tachometer sensor.



6.

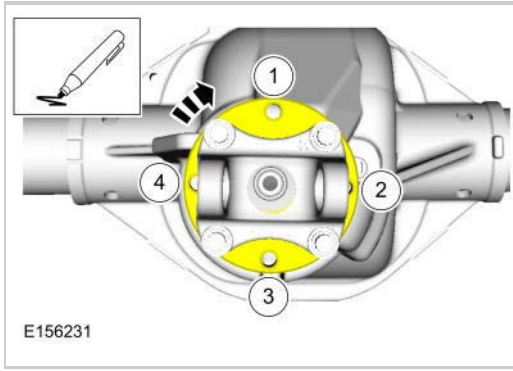
Special Tool(s): Mastertech® Series MTS 4000 Driveline Balance and NVH Analyzer (Vetronix) 257-00018. Run a driveshaft balance test with the driveshaft unmodified.

Use Special Service Tool: 100-002 (TOOL-4201-C) Holding Fixture with Dial Indicator Gauge.

Vehicles with tapped pinion flanges

7.

Label the tapped holes in the pinion flange numerically, starting at the top hole as 1. Mark the remaining holes 2, 3, 4, (depending on flange type, 5 and 6 may also be needed). Label in the direction of rotation.



8.

Special Tool(s): Mastertech® Series MTS 4000 Driveline Balance and NVH Analyzer (Vetronix) 257-00018. Run a second test with the 12 mm (0.47 in) test weight set screw in the No. 1 hole, previously marked on the pinion flange.

9.

Remove the test weight, then install the weight combination directed by the Mastertech® Series MTS 4000 Driveline Balance and NVH Analyzer (Vetronix).

Vehicles without tapped pinion flanges

10.

Special Tool(s): Mastertech® Series MTS 4000 Driveline Balance and NVH Analyzer (Vetronix) 257-00018. Run a second test with a test weight. Using a metal band, secure the

test weight to the end of the driveshaft. The weight should be placed at the end of the driveshaft tube, as close to the tube-to-yoke weld seam as possible. Mark the location of the test weight on the driveshaft, as shown in the figure below.

1.

Test weight.

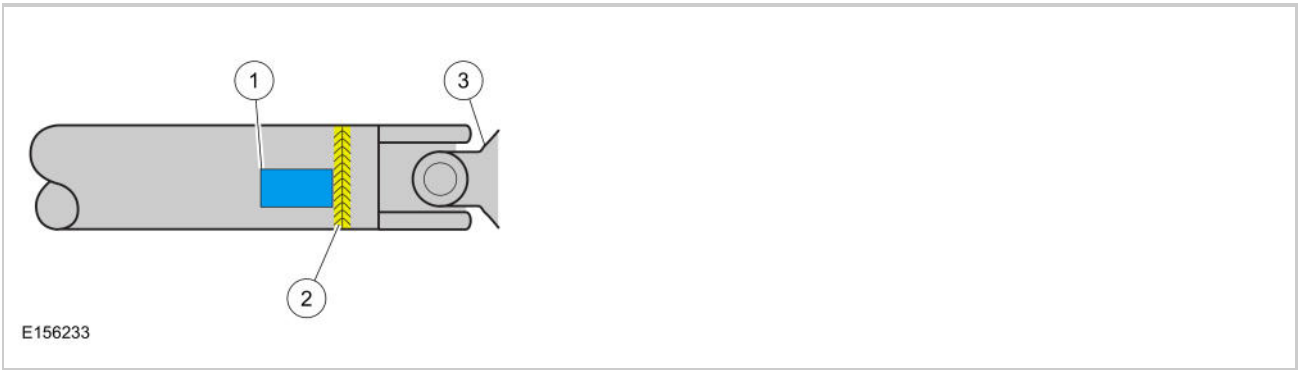
2.

Tube-to-yoke weld seam.

3.

Driveshaft pinion flange.

Select the test weight based on driveshaft size. Larger driveshafts use 10 g (0.353 oz). Smaller driveshafts use 5 g (0.176 oz).



11.

Remove the test weight, then install the recommended weight at the position directed by the Mastertech® Series MTS 4000 Driveline Balance and NVH Analyzer (Vetronix). Using a metal band and epoxy, secure the test weight to the driveshaft, as shown in the figure below.

1.

Test weight.

2.

Measure in this direction.

3.

Driveshaft diameter.

4.

Directional rotation.

5.

Balance weight relative to test weight centerline.

The results are displayed with respect to the location to where the test weight was placed.



All vehicles

12.

Special Tool(s): Mastertech® Series MTS 4000 Driveline Balance and NVH Analyzer (Vetronix) 257-00018. Run a third test to verify the repair.

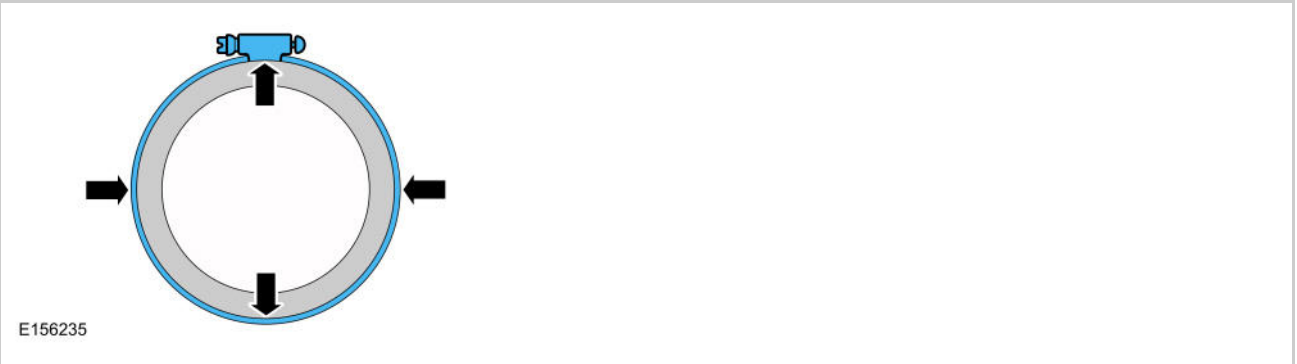
Driveshaft Balancing - Hose Clamp Method

13.

Install 1 or 2 hose clamps on the driveshaft, near the rear. Position of the hose clamp head(s) can be determined through trial and error.

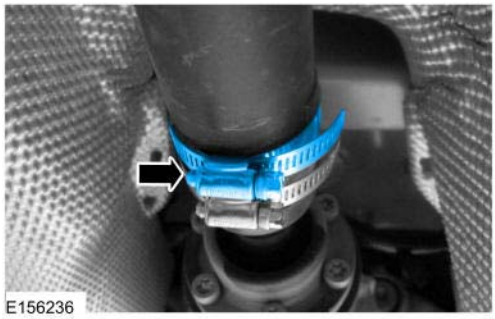
14.

Mark the rear of the driveshaft into 4 approximately equal sectors and number the marks 1 through 4. Install a hose clamp on the driveshaft with its head at position No. 1, as shown in the figure below. Check for vibration at road speed. Recheck with the clamp at each of the other positions to find the position that shows minimum vibration. If 2 adjacent positions show equal improvement, position the clamp head between them.



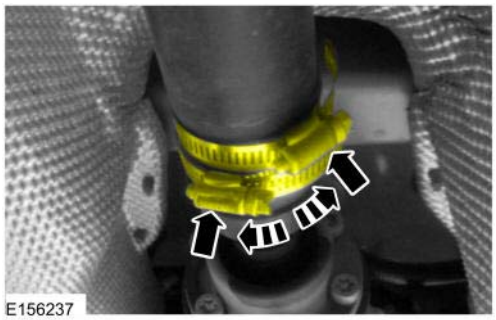
15.

If the vibration persists, add a second clamp at the same position and recheck for vibration.



16.

If no improvement is noted, rotate the clamps in opposite directions, equal distances from the best position determined in Step 14. Separate the clamp heads about 13 mm (1/2 in) and recheck for vibration at the road speed.



17.

Repeat the process with increasing separation until the best combination is found or the vibration is reduced to an acceptable level.

REMOVAL AND INSTALLATION > DRIVESHAFT

Special Tool(s) / General Equipment

Flat Headed Screw Driver

REMOVAL AND INSTALLATION > DRIVESHAFT > REMOVAL

NOTE: The maximum articulation of the flex coupling is 4 degrees. The maximum articulation of any u-joint is 15 degrees. If the flex coupling or any u-joint of the driveshaft is articulated further then the maximum allowable degrees damage may occur.

1.

Remove the muffler and tailpipe. Refer to: MUFFLER AND TAILPIPE - 2.3L EcoBoost (231kW/314PS). Refer to: MUFFLER AND TAILPIPE - 3.7L Duratec (227kW/301PS). Refer to: MUFFLER AND TAILPIPE - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS).

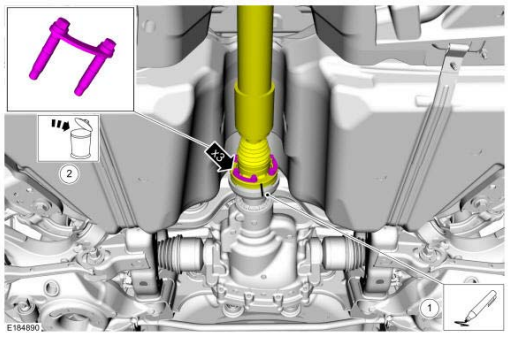
2.

1.

Index mark the driveshaft and the pinion flange for reference during installation.

2.

Remove and discard the driveshaft to pinion flange bolts.



NOTE: Do not over articulate the driveshaft or damage may occur.

3.

1.

Support the driveshaft.

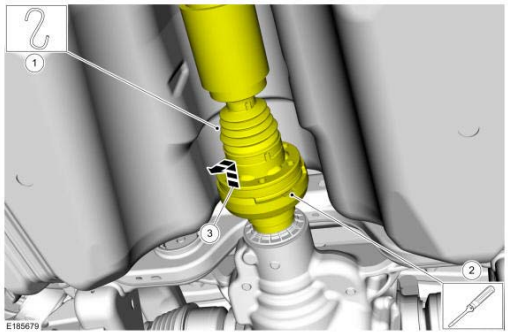
NOTE: The driveshaft coupler is a tight fit, and may not be able to remove from the PTU coupler until the center bearing retainers are removed.

2.
Using a screwdriver inserted into the slot on the pinion flange, pry the driveshaft from the pinion flange.

Use the General Equipment: Flat Headed Screw Driver

3.

Separate the driveshaft from the pinion flange.



NOTE: Do not over articulate the driveshaft or damage may occur.

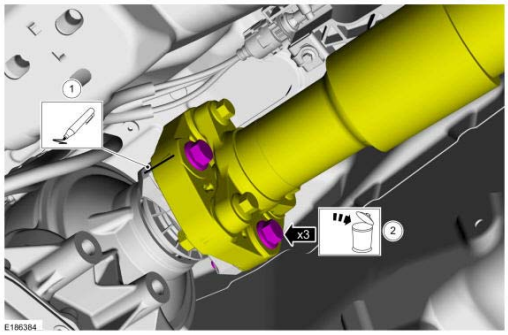
4.
If equipped with 3 bolt flange.

1.

Mark the driveshaft flex coupling to the transmission flange.

2.

Remove and discard the driveshaft to transmission flange bolts. Position and support the driveshaft aside.



NOTE: Do not over articulate the driveshaft or damage may occur.

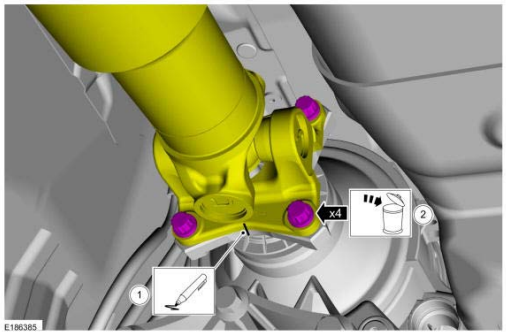
5.
If equipped with 4 bolt flange.

1.

Mark the driveshaft to the transmission flange.

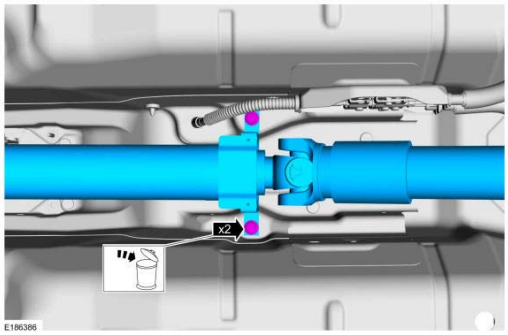
2.

Remove and discard the driveshaft to transmission flange bolts. Position and support the driveshaft aside.



NOTE: The help of a assistant may be needed. Do not over articulate the driveshaft or damage may occur.

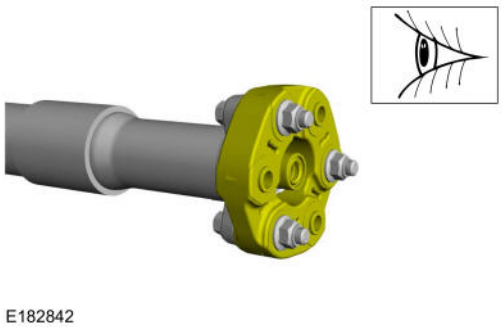
6.
If equipped. Remove and discard the driveshaft center bearing bolts and remove the driveshaft.



REMOVAL AND INSTALLATION > DRIVESHAFT > INSTALLATION

NOTE: If equipped.

1.
Inspect the flex coupling for cracks. If cracks are present, replace the flex coupling.



NOTE: The help of a assistant may be needed. Do not over articulate the

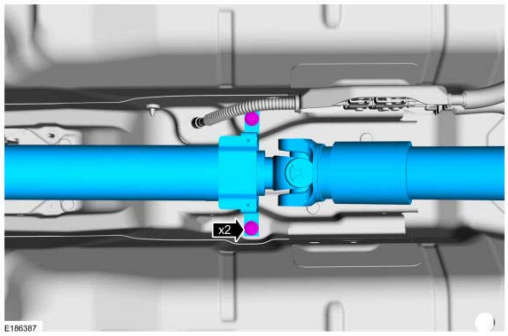
driveshaft or damage may occur.

NOTE: Align the flex coupling before installing the center bearing bolts.

2.
If equipped. Install the driveshaft and the new driveshaft center bearing bolts.

Torque

: 35 lb.ft (48 Nm)



NOTE: Do not over articulate the driveshaft or damage may occur.

NOTE: Do not force the flex coupling bushing on the transmission output shaft or damage will occur.

3.
If equipped with 3 bolt flex coupling.

1.

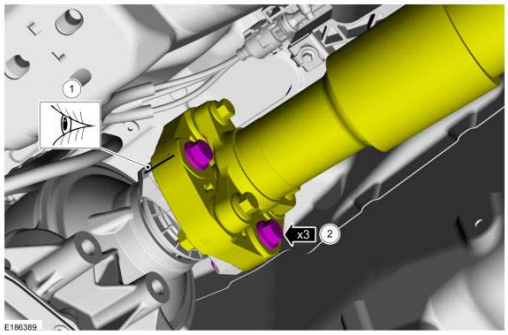
Align the index-mark on driveshaft flex coupling to the transmission flange.

2.

Install the new driveshaft flex coupling to transmission flange bolts.

Torque

: 81 lb.ft (110 Nm)



NOTE: Do not over articulate the driveshaft or damage may occur.

4.
If equipped with 4 bolt flange.

1.

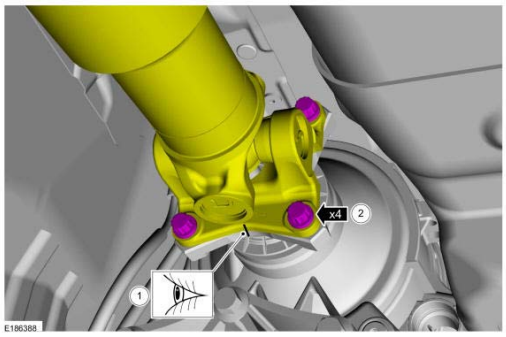
Align the index-mark on driveshaft to the transmission flange.

2.

Install the new driveshaft to transmission flange bolts.

Torque

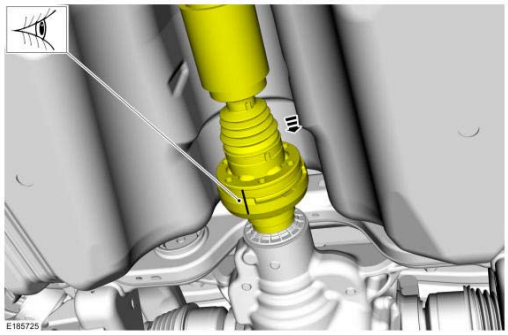
: 80 lb.ft (109 Nm)



NOTE: The help of a assistant will be needed. Do not over articulate the driveshaft or damage may occur.

NOTE: Make sure the mating surfaces are free of any contamination including removing any blue Loctite from any mating surfaces.

5.
Align the index-mark on driveshaft to the rear axle pinion flange.

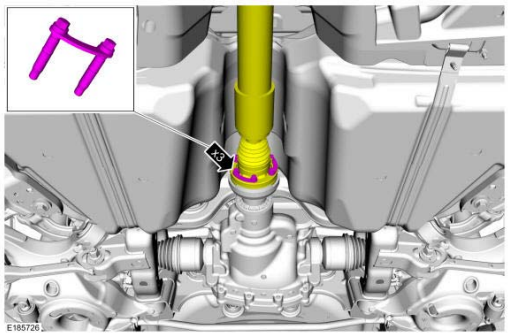


NOTE: Make sure the drive shaft is fully seated in the rear pinion before starting bolts.

6.
Install the new driveshaft-to-pinion flange bolts in a star pattern.

Torque

: 41 lb.ft (55 Nm)



7.

Install the muffler and tailpipe. Refer to: MUFFLER AND TAILPIPE - 2.3L EcoBoost (231kW/314PS). Refer to: MUFFLER AND TAILPIPE - 3.7L Duratec (227kW/301PS). Refer to: MUFFLER AND TAILPIPE - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS).

DISASSEMBLY AND ASSEMBLY > DRIVESHAFT UNIVERSAL JOINT

Special Tool(s) / General Equipment

	205-086 (T74P-4635-C) Installer/Remover, C-Frame and Screw

DISASSEMBLY AND ASSEMBLY > DRIVESHAFT UNIVERSAL JOINT > DISASSEMBLY

NOTE: Do not, under any circumstance, clamp the driveshaft assembly in the jaws of a vise or similar holding fixture. Denting or localized fracturing may result, causing driveshaft failure during vehicle operation.

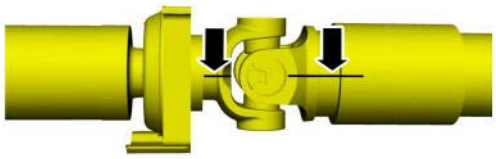
NOTE: Removal steps in this procedure may contain installation details.

1.

Remove the driveshaft. Refer to: Driveshaft .

NOTE: If the components are not marked and therefore installed incorrectly, driveshaft imbalance can occur.

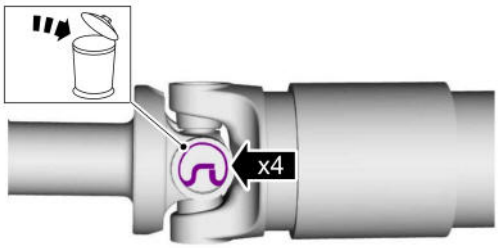
2.
Index-mark the driveshaft for reassembly.



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3.

Remove and discard the snap rings.

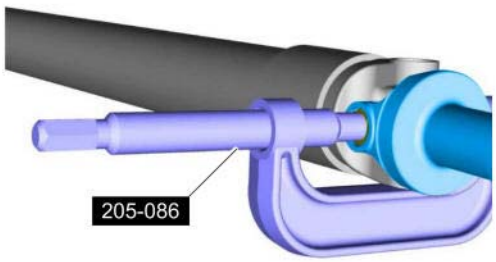


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4.

Using the special tool, press the u-joint bearing cups out of the driveshaft yoke and remove the driveshaft yoke.

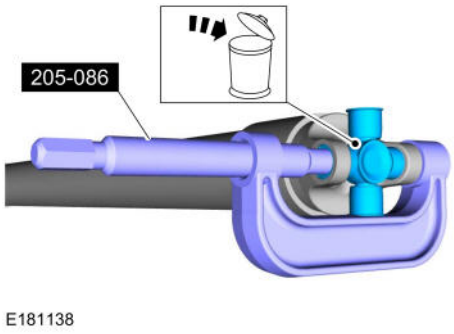
Use Special Service Tool: 205-086 (T74P-4635-C) Installer/Remover, C-Frame and Screw.



5.

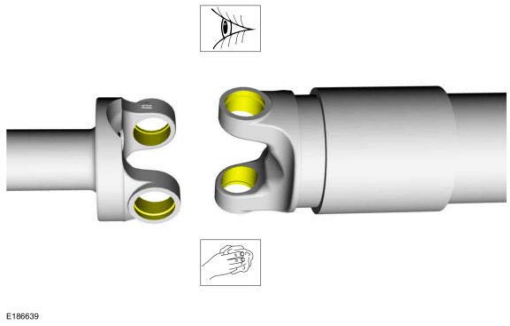
Using the special tool, press the u-joint bearing cups out of the driveshaft yoke and remove the u-joint.

Use Special Service Tool: 205-086 (T74P-4635-C) Installer/Remover, C-Frame and Screw.



6.

Clean and inspect the u-joint bearing cup surfaces.



DISASSEMBLY AND ASSEMBLY > DRIVESHAFT UNIVERSAL JOINT > ASSEMBLY

NOTE: Install the u-joint kits as complete assemblies only. Do not mix components from other u-joint kits.

1.

To install, reverse the removal procedure.

Service Manual: REAR DRIVE AXLE DIFFERENTIAL

SPECIFICATIONS > SPECIFICATIONS > MATERIALS

Name	Specification
Motorcraft ® Additive Friction Modifier (U.S.) XL-3 (U.S.)	EST-M2C118-A
Motorcraft ® SAE 75W-85 Premium Synthetic Hypoid Gear Lubricant XY-75W85-QL	WSS-M2C942-A

SPECIFICATIONS > SPECIFICATIONS > CAPACITIES

Item	**Liters**
Material : Motorcraft ® SAE 75W-85 Premium Synthetic Hypoid Gear Lubricant / XY-75W85-QL (WSS-M2C942-A)	3.15-3.30 pt (1.49-1.56 L) - Traction-Lok ®
Material : Motorcraft ® Additive Friction Modifier (U.S.) / XL-3 (U.S.) (EST-M2C118-A)	3.0-3.5 oz. (0.089-0.104 L) - Traction-Lok ®

SPECIFICATIONS > SPECIFICATIONS > TORQUE SPECIFICATIONS

Item	Nm	lb-ft	lb-in
Differential vent	14	-	124

SPECIFICATIONS > SPECIFICATIONS > GENERAL SPECIFICATIONS

Item	**Specification**
Maximum differential case ring gear flange runout	0.076 mm (0.003 in)
Maximum pinion flange runout	0.25 mm (0.009 in)
Minimum rotational torque (Traction-Lok ®)	27 Nm (20 lb-ft)
Pinion bearing preload	1.8-3.3 Nm (16-29 lb-in)
Ring gear backlash	0.203-0.304 mm (0.008-0.012 in)

SPECIFICATIONS > SPECIFICATIONS > REAR AXLE BACKLASH SHIM ADJUSTMENT TABLE

Backlash Change Required		Thickness Change Required	
mm	**In**	**mm**	**In**
0.025	0.001	0.050	0.002
0.050	0.002	0.050	0.002
0.076	0.003	0.101	0.004
0.101	0.004	0.152	0.006
0.127	0.005	0.152	0.006
0.152	0.006	0.203	0.008
0.177	0.007	0.254	0.010
0.203	0.008	0.254	0.010
0.228	0.009	0.304	0.012
0.254	0.010	0.355	0.014
0.279	0.011	0.355	0.014
0.304	0.012	0.406	0.016
0.330	0.013	0.457	0.018
0.335	0.014	0.457	0.018
0.381	0.015	0.508	0.020

SPECIFICATIONS > SPECIFICATIONS > DIFFERENTIAL SHIM SIZE CHART 4067

Stripes and Color Code	Dimension A	
mm	**Inch**	
3 - Purple	5.9182	0.233
4 - Purple	5.969	0.235
5 - Purple	6.0198	0.237
6 - Purple	6.0706	0.239
1 - Purple	6.1214	0.241
2 - Purple & 1 - Black	6.1468	0.242
2 - Purple	6.1722	0.243
1 - Orange & 1 - Black	6.1976	0.244

2 - Orange & 1 - Black	6.2484	0.246
3 - Orange & 1 - Black	6.2992	0.248
4 - Orange & 1 - Black	6.35	0.250
5 - Orange & 1 - Black	6.4008	0.252
1 - Yellow & 1 - Black	6.4516	0.254
2 - Yellow & 1 - Black	6.5024	0.256
3 - Yellow & 1 - Black	6.5532	0.258
4 - Yellow & 1 - Black	6.604	0.260
4 - Yellow	6.6294	0.261
5 - Yellow & 1 - Black	6.6548	0.262
5 - Yellow	6.6802	0.263
1 - White & 1 - Black	6.7056	0.264
1 - WH	6.731	0.265
2 - White & 1 - Black	6.7564	0.266
2 - White	6.7818	0.267
3 - White & 1 - Black	6.8072	0.268
3 - White	6.8326	0.269
4 - White & 1 - Black	6.858	0.270
4 - White	6.8834	0.271
5 - White & 1 - Black	6.9088	0.272
5- White	6.9342	0.273
1 - Green & 1 - Black	6.9596	0.274
1 - Green	6.985	0.275
2 - Green & 1 - Black	7.0104	0.276
2 - Green	7.0358	0.277
3 - Green & 1 - Black	7.0612	0.278
3 - Green	7.0866	0.279
4 - Green & 1 - Black	7.112	0.280
4 - Green	7.1374	0.281
5 - Green & 1 - Black	7.1628	0.282
5 - Green	7.1882	0.283
1 - Pink & 1 - Black	7.2136	0.284
1 - Pink	7.239	0.285

2 - Pink & 1 - Black	7.2644	0.286
2 - Pink	7.2898	0.287
3 - Pink & 1 - Black	7.3152	0.288
3 - Pink	7.3406	0.289
4 - Pink & 1 - Black	7.366	0.290
4 - Pink	7.3914	0.291
5 - Pink	7.4422	0.293
1 - Blue	7.493	0.295
2 - Blue	7.5438	0.297
3 - Blue	7.5946	0.299
4 - Blue	7.6454	0.301
5 - Blue	7.6962	0.303
1 - Black	7.747	0.305
2 - Black	7.7978	0.307

SPECIFICATIONS > SPECIFICATIONS > DIFFERENTIAL CLUTCH PACK SELECTIVE SHIM CHART

Feeler Gauge Thickness	Part Number	Description
0.072 - 0.080	EOAZ-4A324-G	0.025 inch
0.081 - 0.085	EOAZ-4A324-H	0.030 inch
0.086 - 0.090	EOAZ-4A324-C	0.035 inch
0.091 - 0.095	EOAZ-4A324-D	0.040 inch
0.096 - 0101	EOAZ-4A324-F	0.045 inch

DESCRIPTION AND OPERATION > REAR DRIVE AXLE AND DIFFERENTIAL - OVERVIEW

The 8.8-inch ring gear rear differential is the IRS (Independent Rear Suspension) type. The 8.8-inch rear axle has 3.15, 3.31, 3.55, and 3.73 gear ratio versions.

DESCRIPTION AND OPERATION > REAR DRIVE AXLE AND DIFFERENTIAL - OVERVIEW > REAR DRIVE AXLE AND DIFFERENTIAL

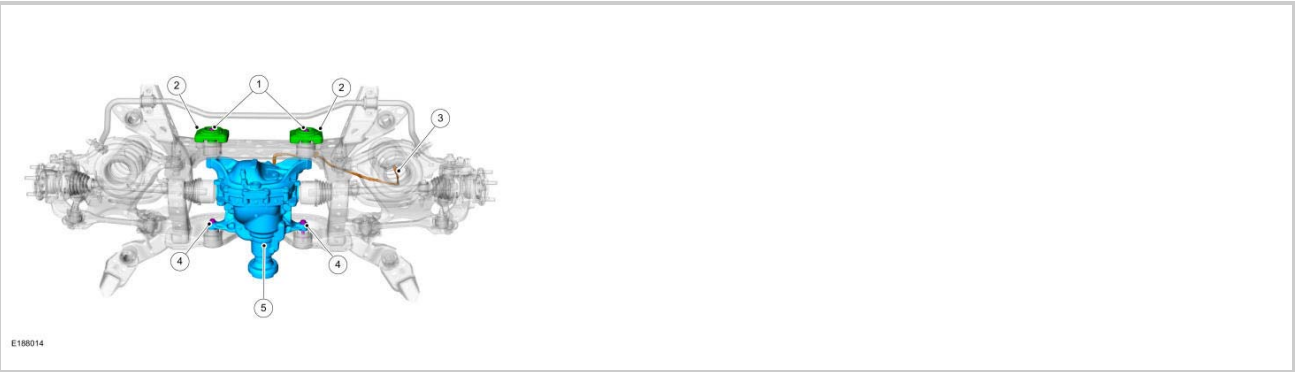
The rear axle assembly consists of the following:

- Integral-type housing hypoid gear design (center of the pinion set below the centerline of the ring gear)
- Hypoid differential ring gear and pinion consisting of a 8.8-inch ring gear and an overhung drive pinion that is supported by 2 opposed tapered roller bearings
- Pinion bearing preload that is maintained by a drive pinion collapsible spacer on the differential pinion shaft and adjusted by the pinion nut
- Cast center section with a cast differential housing cover
- Differential housing cover using silicone rubber based sealant as a gasket
- Differential pinion shaft that is retained by a threaded differential pinion shaft lock bolt attached to the differential case
- Differential case that is mounted in the rear axle housing between 2 opposing differential bearings that are retained in the rear axle housing by 2 removable bearing caps
- Differential bearing preload and ring gear backlash which are adjusted by differential bearing shims that are located between the differential bearing cups and the rear axle housing
- Limited slip axle - (Traction-Lok) 3.15, 3.31 and 3.55 ratio axles
- Limited slip axle - (Torsen) 3.73 ratio axles

The rear drive axle receives rotational torque from the driveshaft. The direction of the rotation determines movement of the vehicle. The rotation enters the rear drive axle through the drive pinion flange, turning the drive pinion and rotating the ring gear. The ring gear is bolted to the differential case. The differential case houses the pinion shaft upon which the differential pinion gears ride. The pinion gears are in mesh with the differential side gears to which the halfshafts are splined. It is the unique arrangement of the differential that allows the halfshafts to be driven at different speed when needed, such as when driving around corners.

The Torsen rear differential carrier is serviced as a assembly only.

Overview



1	Rear differential mounting bolts
2	Rear differential vibration dampners (if equipped)
3	Differential vent tube

4	Front differential mounting bolts
5	IRS (Independent Rear Suspension) Differential

DIAGNOSIS AND TESTING > REAR DRIVE AXLE AND DIFFERENTIAL > PRELIMINARY INSPECTION

1.

Visually inspect the housing, seals, and pinion flange for obvious signs of mechanical damage.

2.

If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step

3.

If the cause is not visually evident, verify the symptom and REFER to Symptom Chart: NVH .

DIAGNOSIS AND TESTING > REAR DRIVE AXLE AND DIFFERENTIAL > SYMPTOM CHART(S)

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

Symptom Chart: NVH

Symptom Chart

Condition	Possible Sources	Actions
Axle howling or whine	Axle lubricant low	CHECK the lubricant level. FILL the axle to specification. REFER to: Differential Fluid Level Check .
	Axle housing damage	INSPECT and INSTALL a new axle assembly as necessary. REFER to: Axle Assembly .
	Damaged, worn or incorrect ring and pinion gear contact	INSPECT and INSTALL a new ring and pinion set as necessary. Refer to, Contact Pattern of this procedure, or REFER to: Drive Pinion .
Driveline clunk - loud clunk when shifting from REVERSE to DRIVE	Incorrect axle lubricant level	CHECK the lubricant level. FILL the axle to specification. REFER to: Differential Fluid Level Check .

	Excessive backlash in the axle	CHECK for excessive axle backlash. ADJUST backlash as necessary. REFER to: Ring Gear Backlash Adjustment .
Driveline clunk - occurs as the vehicle starts to move forward following a stop	Pinion gears	CHECK and REPLACE as necessary REFER to: Drive Pinion Front Bearing .
Grinding, popping or chattering - noise from the rear axle when the vehicle is turning	Damaged or worn differential (differential side gears and pinion gears)	INSPECT the differential carrier and the components of the differential carrier. INSTALL a new differential carrier and/or differential carrier components as necessary. REFER to: Differential Carrier .
Grunting - normally associated with a shudder experienced during acceleration from a complete stop	Loose rear axle mount bolts or suspension fasteners	CHECK for loose bolts. TIGHTEN to specifications. REFER to: Axle Assembly .
Howl - can occur at various speeds and driving conditions. Affected by acceleration and deceleration	Incorrect ring and pinion contact, incorrect bearing preload or gear damage	INSPECT and ADJUST as necessary. Refer to, Contact Pattern of this procedure, or REFER to: Differential Carrier . REFER to: Ring Gear Backlash Adjustment .
Chuckle - heard at coast/ deceleration. Also described as knock	Incorrect ring and pinion contact or damaged teeth on the coast side of the ring and pinion	INSPECT and INSTALL a new ring and pinion set as necessary. Refer to, Contact Pattern of this procedure, or REFER to: Drive Pinion .
Knock - noise occurs at various speeds. Not affected by acceleration or deceleration	Gear tooth damage to the driver side of the ring and pinion	INSPECT and INSTALL a new ring and pinion as necessary. REFER to: Drive Pinion . REFER to: Differential Carrier .
Scraping noise - a continuous low pitched noise starting at low speed	Worn or damaged pinion bearings	INSPECT and INSTALL new pinion bearings as necessary. REFER to: Drive Pinion Front Bearing .
Driveline shudder - occurs during acceleration from a slow speed or stop	Rear drive axle assembly mispositioned	CHECK the axle mounts and the rear suspension for damage or wear. Repair as necessary. REFER to: Axle Assembly .
	Loose rear axle bolts	CHECK the rear axle for loose bolts. TIGHTEN the bolts as necessary. REFER to: Axle Assembly .

	Driveline angles out of specification	CHECK for correct driveline angles. REFER to: Driveshaft Angle Measurement .

DIAGNOSIS AND TESTING > REAR DRIVE AXLE AND DIFFERENTIAL > ANALYSIS OF LEAKAGE

Clean up the leaking area enough to identify the exact source.

A plugged Rear axle housing vent can cause excessive pinion seal lip wear due to internal pressure buildup.

Verify the differential lubricant level is at the correct level. REFER to: Differential Fluid Level Check .

DIAGNOSIS AND TESTING > REAR DRIVE AXLE AND DIFFERENTIAL > AXLE VENT

A plugged vent will cause excessive seal lip wear due to internal pressure buildup. If a leak occurs, check the vent. If the vent cannot be cleared, install a new vent.

DIAGNOSIS AND TESTING > REAR DRIVE AXLE AND DIFFERENTIAL > DRIVE PINION SEAL

Leaks at the drive pinion seal originate from the following causes:

- Damaged seal
- Worn seal journal surface

A new drive pinion flange must be installed if any of these conditions exist.

- Any damage to the seal bore (dings, dents, gouges or other imperfections) distorts the seal casing and allows leakage past the outer edge of the drive pinion seal.
- The drive pinion seal can be torn, cut or gouged if it is not installed correctly. The spring that holds the drive pinion seal against the pinion flange may be knocked out and allow fluid to pass the lip.
- Metal chips trapped at the sealing lip can cause oil leaks. These can cause a wear groove on the drive pinion flange and result in pinion seal wear.
- When a seal leak occurs, install a new drive pinion seal and check the vent to make sure it is clean and free of foreign material.

DIAGNOSIS AND TESTING > REAR DRIVE AXLE AND DIFFERENTIAL > DIFFERENTIAL SEALS

NOTE: When installing shafts, do not allow splines to contact seals during installation or damage to the seals may occur.

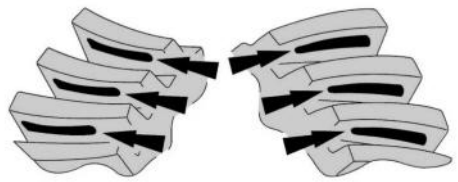
Halfshaft pilot bearing housing seals are susceptible to the same types of damage as drive pinion seals if incorrectly installed. The seal bore must be clean and the lip handled carefully to avoid cutting or tearing it. The seal journal surface must be free of nicks, gouges and rough surface texture.

DIAGNOSIS AND TESTING > REAR DRIVE AXLE AND DIFFERENTIAL > CONTACT PATTERN

In general, desirable ring gear tooth patterns must have the following characteristics:

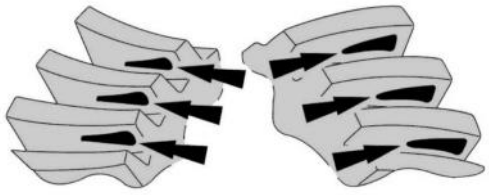
- Drive pattern on the drive side ring gear well centered on the tooth.
- Coast pattern on the coast side ring gear well centered on the tooth.
- Clearance between the pattern and the top of the tooth.
- No hard lines where the pressure is high.

Acceptable ring gear tooth patterns for all axles.



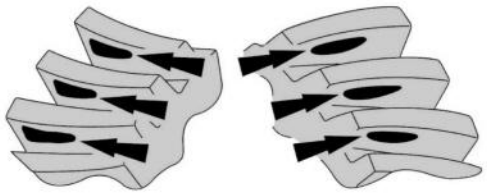
E181792

Correct backlash with a thinner pinion position shim required.



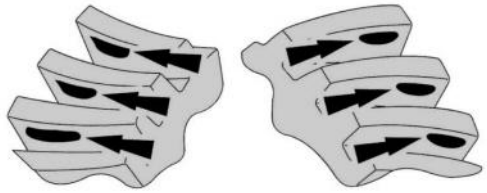
E181793

Correct backlash with a thicker pinion position shim required.



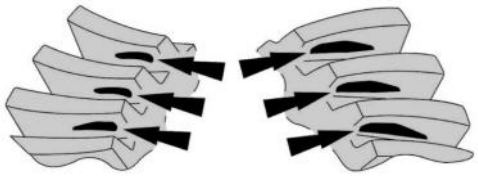
E181794

Correct pinion position shim that requires a decrease in backlash.



E181795

Correct pinion position shim that requires an increase in backlash.



E181796

GENERAL PROCEDURES > AXLE AND DIFFERENTIAL DRAINING AND FILLING

Materials

Name	Specification
Motorcraft ® Additive Friction Modifier (U.S.) XL-3 (U.S.)	EST-M2C118-A
Motorcraft ® SAE 75W-85 Premium Synthetic Hypoid Gear Lubricant XY-75W85-QL	WSS-M2C942-A

Draining

1.

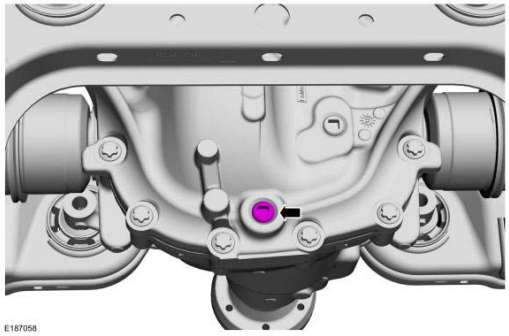
With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

NOTE: If equipped with a drain plug.

2.
Drain the differential gear lubricant.

Torque

: 25 lb.ft (34 Nm)



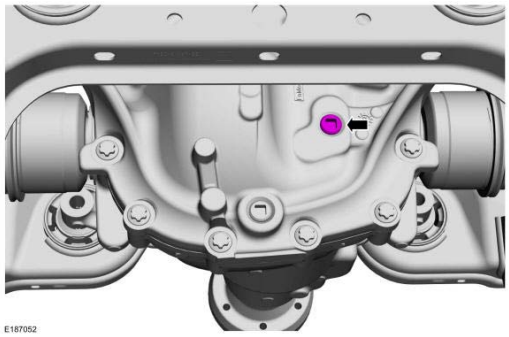
3.

If no drain plug is present, remove the differential housing cover to drain the fluid. Refer to: Differential Housing Cover .

Filling

1.

Remove the differential fill plug.

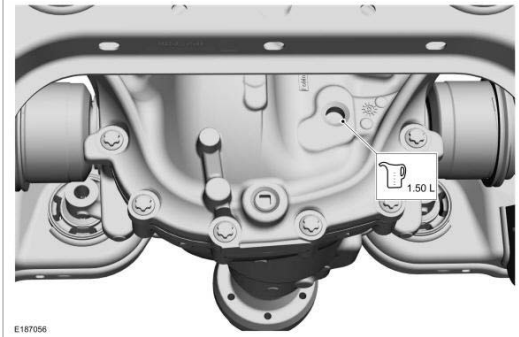


2.

Fill the differential with 1.50 L (3.18 pts) of clean differential gear lubricant.

Material

: Motorcraft ® SAE 75W-85 Premium Synthetic Hypoid Gear Lubricant / XY-75W85-QL (WSS-M2C942-A)

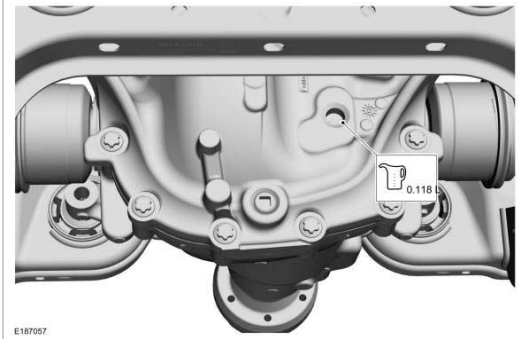


3.

Fill the differential with 4.0 oz. (0.118 L) of clean friction modifier.

Material

: Motorcraft ® Additive Friction Modifier (U.S.) / XL-3 (U.S.) (EST-M2C118-A)

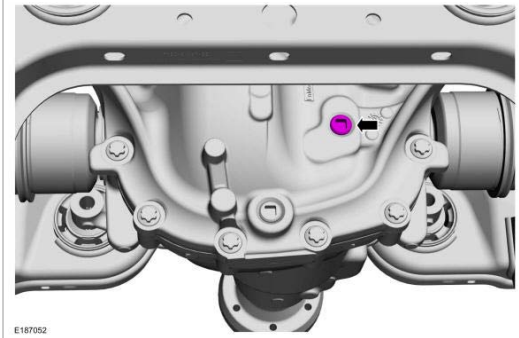


4.

Install the differential fill plug.

Torque

: 25 lb.ft (34 Nm)



GENERAL PROCEDURES > DIFFERENTIAL FLUID LEVEL CHECK

Materials

Name	Specification
Motorcraft ® SAE 75W-85 Premium Synthetic Hypoid Gear Lubricant XY-75W85-QL	WSS-M2C942-A

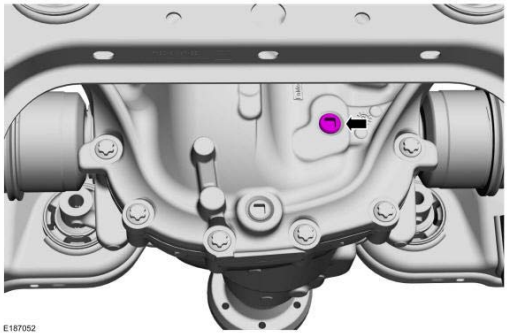
Check

1.

With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

2.

Remove the differential fluid fill plug.

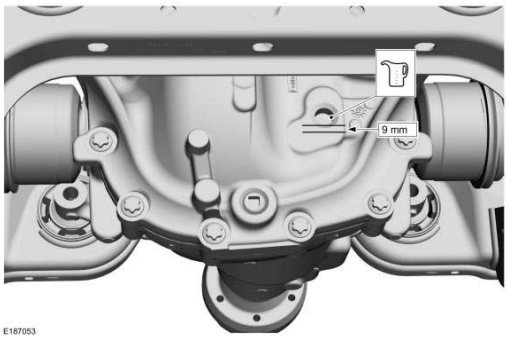


3.

Check and top off the differential with clean differential gear lubricant. The differential gear lubricant level should be within 9mm (0.354 in.) from the fluid level fill plug opening. Refer to: Specifications .

Material

: Motorcraft ® SAE 75W-85 Premium Synthetic Hypoid Gear Lubricant / XY-75W85-QL (WSS-M2C942-A)

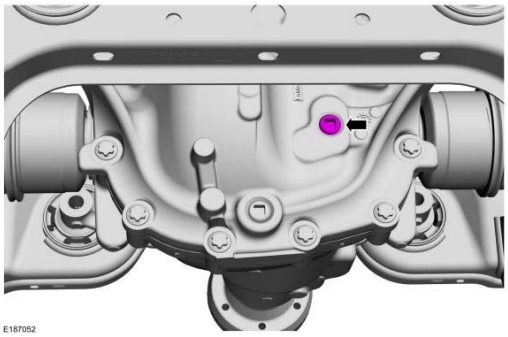


4.

Install the differential fluid fill plug.

Torque

: 25 lb.ft (34 Nm)



GENERAL PROCEDURES > RING GEAR BACKLASH ADJUSTMENT

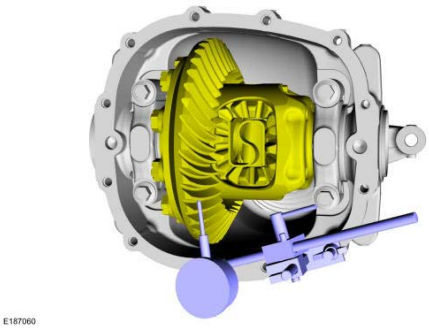
Special Tool(s) / General Equipment

	205-220 Installer, Differential Shim TKIT-1985-FH
	308-021 (T75L-4201-A) Gauge, Clutch Housing
Dial Indicator	
Tire Lever	
Wooden Block	
Copper Hammer	

Adjustment

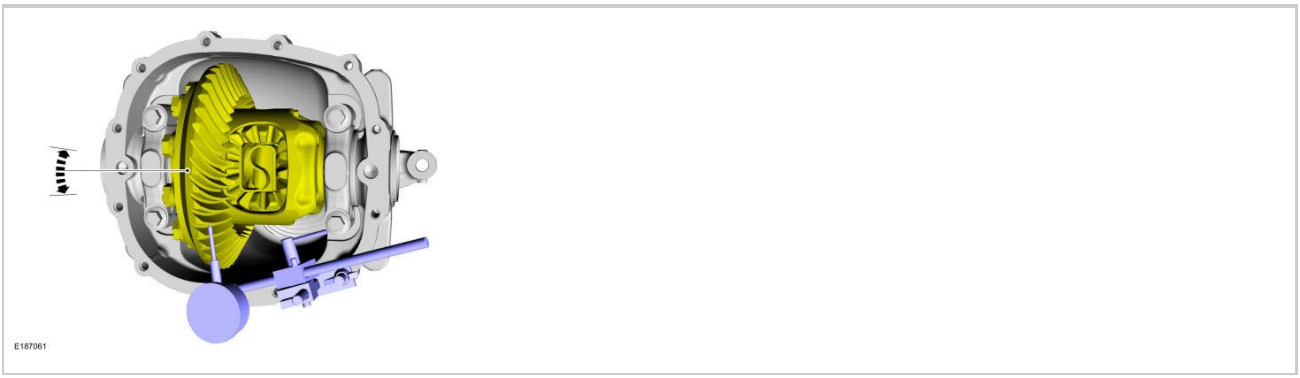
1.

Install the dial indicator gauge with holding fixture, with the dial indicator at a 90 degree angle from the ring gear tooth. Use the General Equipment: Dial Indicator



2.

Using the dial indicator check the ring gear backlash. Rotate the ring gear and carrier back and forth through the free play only. Refer to: Specifications . Use the General Equipment: Dial Indicator



3.

To correct for high or low backlash, increase the thickness of one differential bearing shim and decrease the thickness of the other differential bearing shim by the same amount.

If a zero backlash condition had occurred, add 0.50 mm (0.020 in) to the RH side shim and subtract 0.50 mm (0.020 in) from the LH side shim to allow a backlash indication. Recheck backlash.

Using the backlash chart, determine the thickness of differential shim needed: Refer to: Specifications .

NOTE: The differential bearing caps and differential bearing cap bolts need to be installed in the same location as removed.

4.

1.

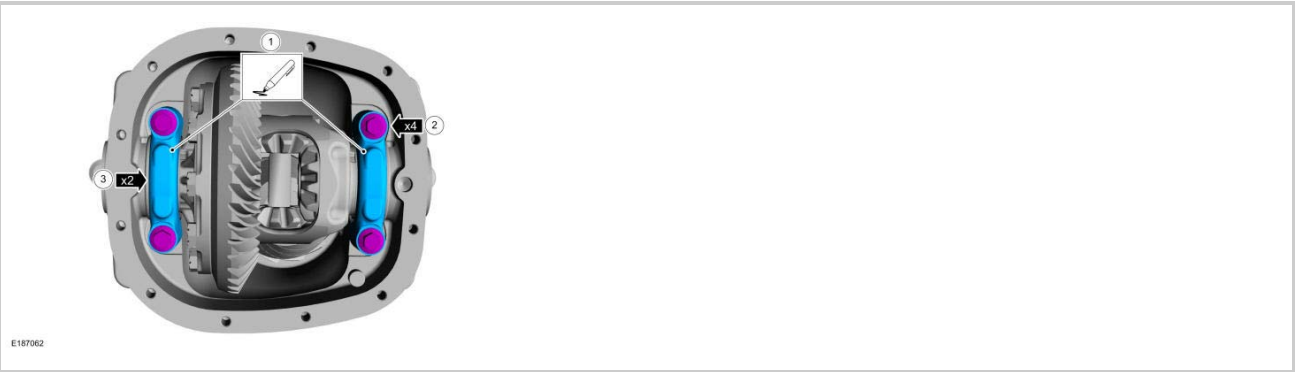
Mark the differential bearing caps.

2.

Remove the differential bearing cap bolts.

3.

Remove the differential bearing caps.



NOTE: If the old differential bearing cups and shims are to be reused, they need to be installed in the same location as removed.

5.

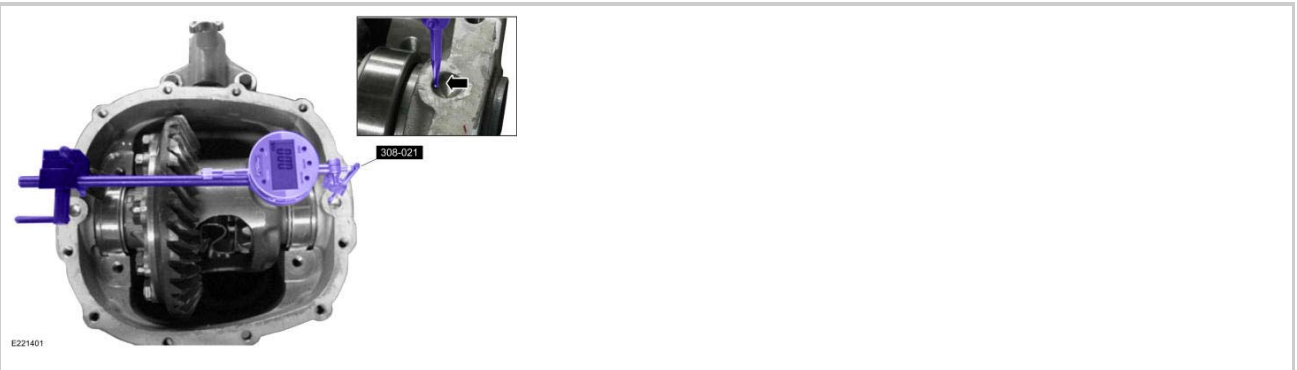
Mark the differential shims.

Mark the differential carrier bearing cups.



6.

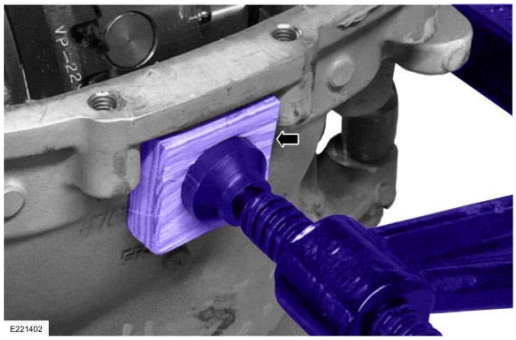
Install the Dial Indicator and special tool. Position the tip of the clutch housing gauge on the inside of the axle housing guide hole. Zero the dial indicator. Use Special Service Tool: 308-021(T75L-4201-A) Gauge, Clutch Housing. Use the General Equipment: Dial Indicator



7.

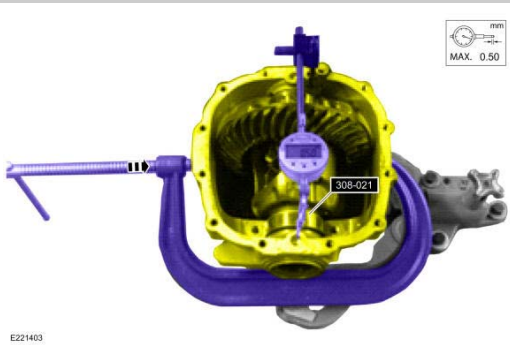
Install a 12" / 300mm C-Clamp on the axle housing at the 12:00 O'clock and 6:00 O'clock positions. Install 2" x 2" x 3/4" blocks of wood between the C-Clamp and the housing to prevent

housing cracks. Use the General Equipment: Wooden Block



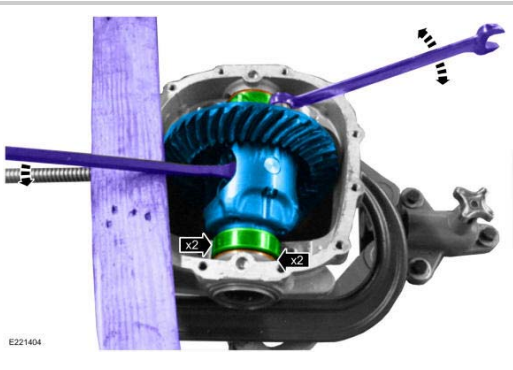
8.

Tighten the C-Clamp until the housing spreads 0.020" / 0.50mm.



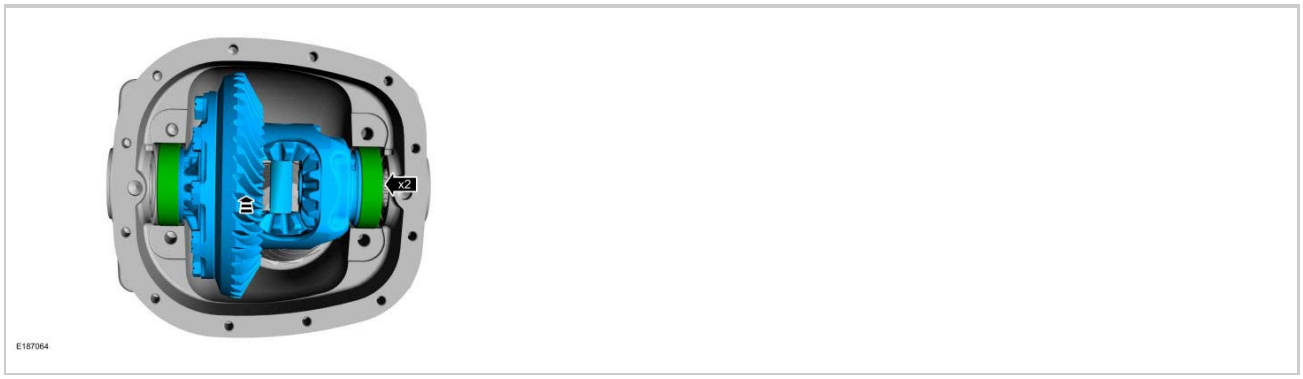
9.

With the dial indicator removed. Position a wood block on the housing sealing surface. Using the tire lever, block of wood and a wrench remove the differential carrier, differential carrier bearing cups and the differential shims. Use the General Equipment: Tire Lever Use the General Equipment: Wooden Block



NOTE: Have the selected shims available at this time. It will be required to hold the differential carrier and the differential carrier bearing cups in until shims are installed.

10.
Remove the dial indicator. Install the differential carrier and the differential carrier bearing cups.



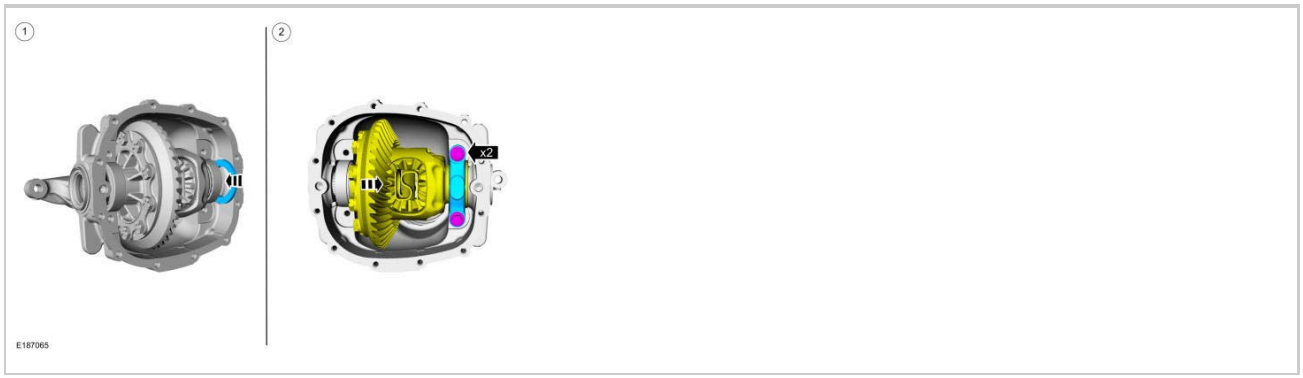
11.

> *NOTE: Differential bearing shims are to be installed with the chamfer facing outboard.*

Install the selected or original RH differential bearing shim. If the original RH shim is not available, install the largest shim available.

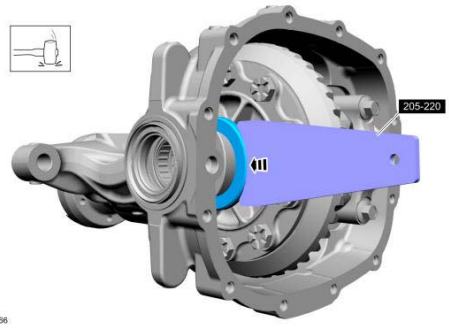
> *NOTE: The differential bearing cap bolts should only be finger tight at this time.*

Position the differential to the RH side of the differential housing. Install the RH differential bearing cap and the differential bearing cap bolts.



> *NOTE: The C-Clamp can be removed after the selected ring gear backlash shim is installed.*

12.
Using the special tool and a soft face copper mallet, install the LH selected differential bearing shim. If the selected or original LH shim is not available, use the largest shim that can be installed by hand. Use Special Service Tool: 205-220 Installer, Differential Shim. Use the General Equipment: Copper Hammer



NOTE: The differential bearing cap bolts should only be finger tight at this time.

13.
Install the LH differential bearing cap and the differential bearing cap bolts.



14.

Tighten the differential bearing cap bolts.

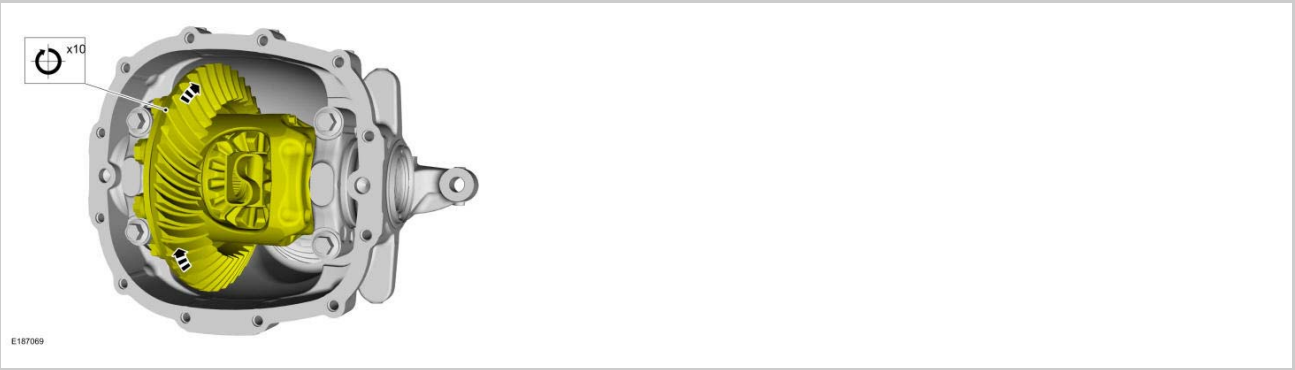
Torque

: 71 lb.ft (96 Nm)



15.

Rotate the differential several times, to assure the differential assembly rotates freely.



16.

Using the dial indicator gauge with holding fixture, do a final check of the ring gear backlash. Refer to: Specifications . Use the General Equipment: Dial Indicator



REMOVAL AND INSTALLATION > AXLE ASSEMBLY

Special Tool(s) / General Equipment

Flat Headed Screw Driver
Transmission Jack

REMOVAL AND INSTALLATION > AXLE ASSEMBLY > REMOVAL

1.

Remove the muffler and tailpipe assembly. 2.3L Refer to: Muffler and Tailpipe . 3.7L Refer to: Muffler and Tailpipe . 5.0L Refer to: Muffler and Tailpipe .

2.

Remove both rear halfshafts. Refer to: Rear Halfshaft .

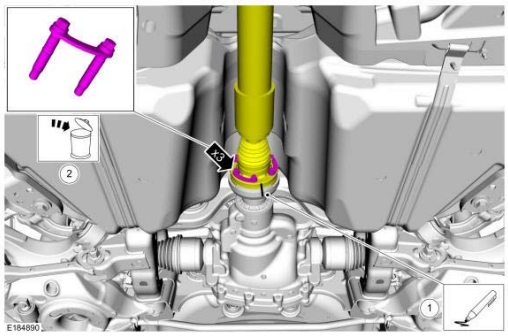
3.

1.

Index mark the driveshaft and the pinion flange for reference during installation.

2.

Remove and discard the driveshaft-to-pinion flange bolts.



NOTE: Do not remove driveshaft from the pinion flange by pulling on the driveshaft tube. Damage to the CV-joint can result.

4.

1.

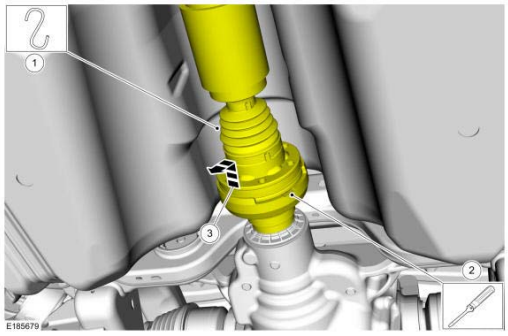
Support the driveshaft.

2.

Using a screwdriver inserted into the slot on the pinion flange, pry the driveshaft from the pinion flange. Use the General Equipment: Flat Headed Screw Driver

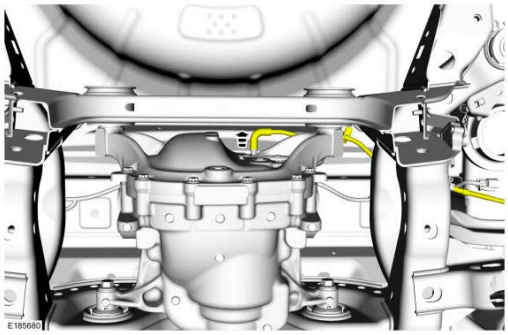
3.

Separate the driveshaft from the pinion flange.



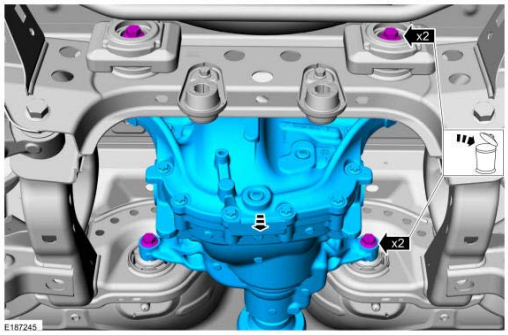
5.

Disconnect the differential vent tube.



NOTE: The rear differential is heavy and will require to be supported by a transmission jack before the fasteners are removed.

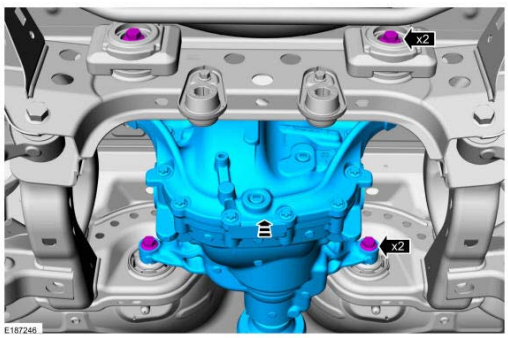
6.
Using a transmission jack, remove and discard the differential mounting bolts and remove the differential. Use the General Equipment: Transmission Jack



REMOVAL AND INSTALLATION > AXLE ASSEMBLY > INSTALLATION

NOTE: Only install the differential mounting bolts hand tight at this time.

1.
Using a transmission jack, install the differential and the new differential mounting bolts hand tight. Use the General Equipment: Transmission Jack



2.

1.

Tighten the forward differential mounting bolts.

Torque

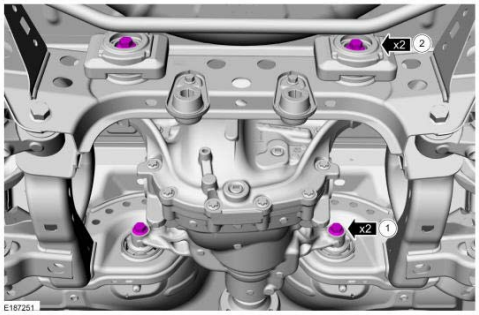
: 129 lb.ft (175 Nm)

2.

Tighten the rear differential mounting bolts.

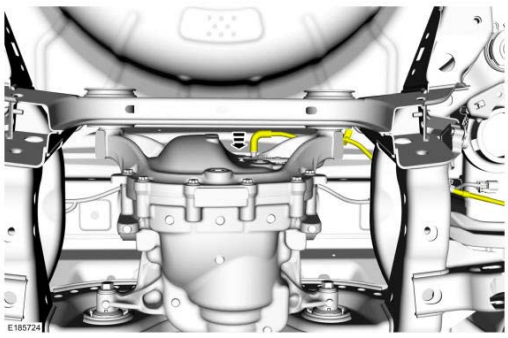
Torque

: 129 lb.ft (175 Nm)



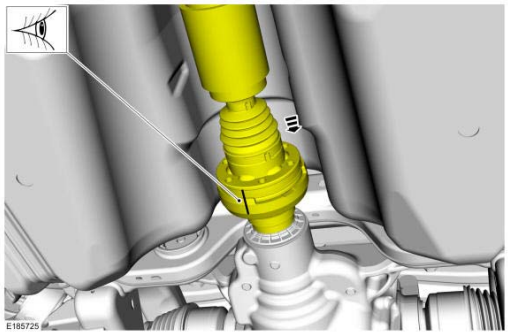
3.

Connect the differential vent tube.



4.

Position the driveshaft to the pinion flange and align the index mark made during removal.

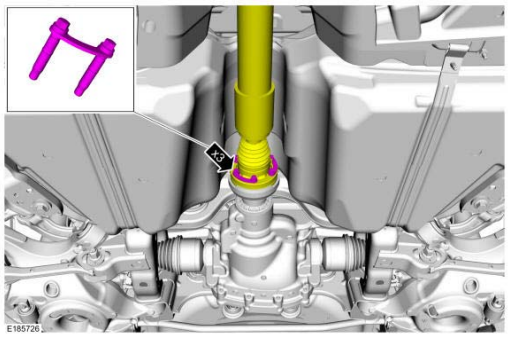


5.

Install the driveshaft-to-pinion flange bolts.

Torque

: 41 lb.ft (55 Nm)



6.

Install both rear halfshafts. Refer to: Rear Halfshaft .

7.

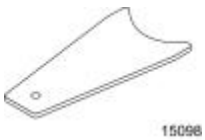
Install the muffler and tailpipe assembly. 2.3L Refer to: Muffler and Tailpipe . 3.7L Refer to: Muffler and Tailpipe . 5.0L Refer to: Muffler and Tailpipe .

8.

Check the differential fluid level. Refer to: Differential Fluid Level Check .

REMOVAL AND INSTALLATION > DIFFERENTIAL CARRIER

Special Tool(s) / General Equipment

	205-220 Installer, Differential Shim TKIT-1985-FH

	308-021 (T75L-4201-A) Gauge, Clutch Housing
Dial Indicator	
Tire Lever	
Wooden Block	
Copper Hammer	

REMOVAL AND INSTALLATION > DIFFERENTIAL CARRIER > REMOVAL

1.

Remove the differential housing cover. Refer to: Differential Housing Cover .

NOTE: The differential bearing caps and differential bearing cap bolts need to be installed in the same location as removed.

2.

1.

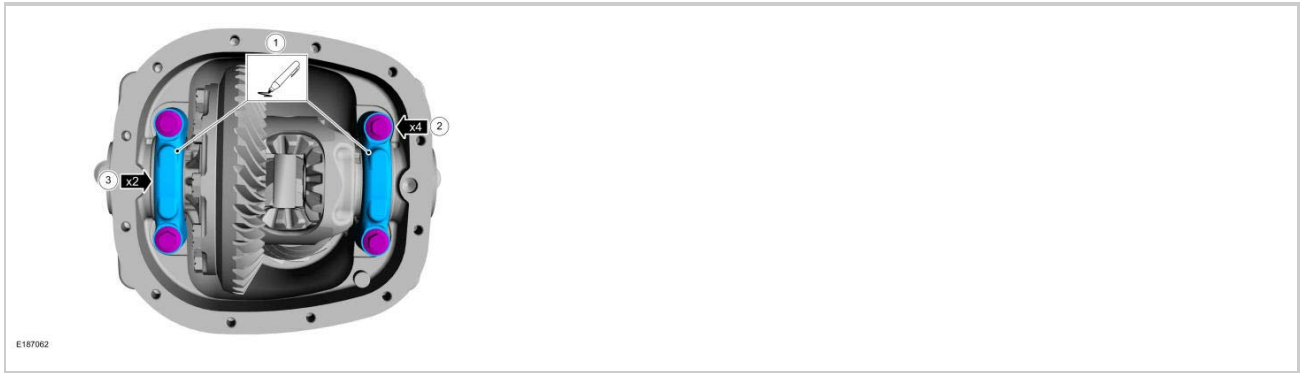
Mark the differential bearing caps.

2.

Remove the differential bearing cap bolts.

3.

Remove the differential bearing caps.

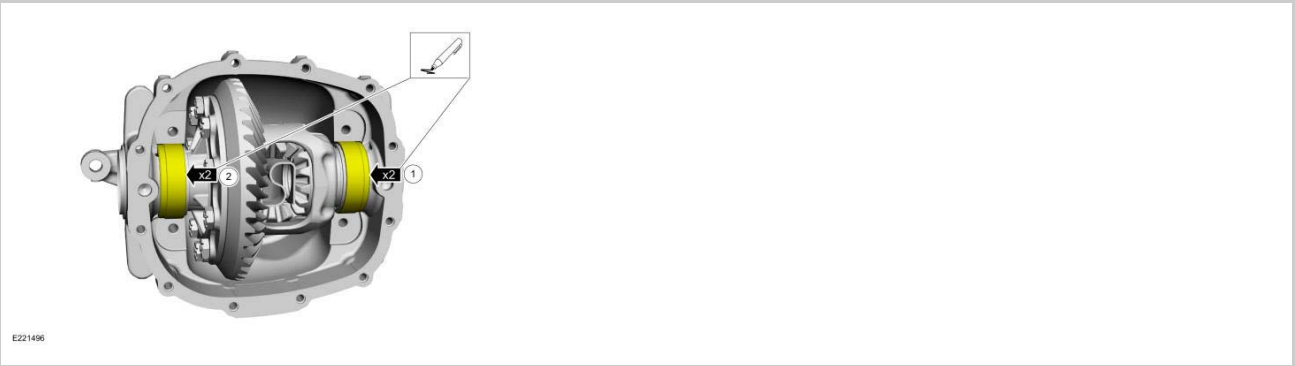


NOTE: If the old differential bearing cups and shims are to be reused, they need to be installed in the same location as removed.

3.

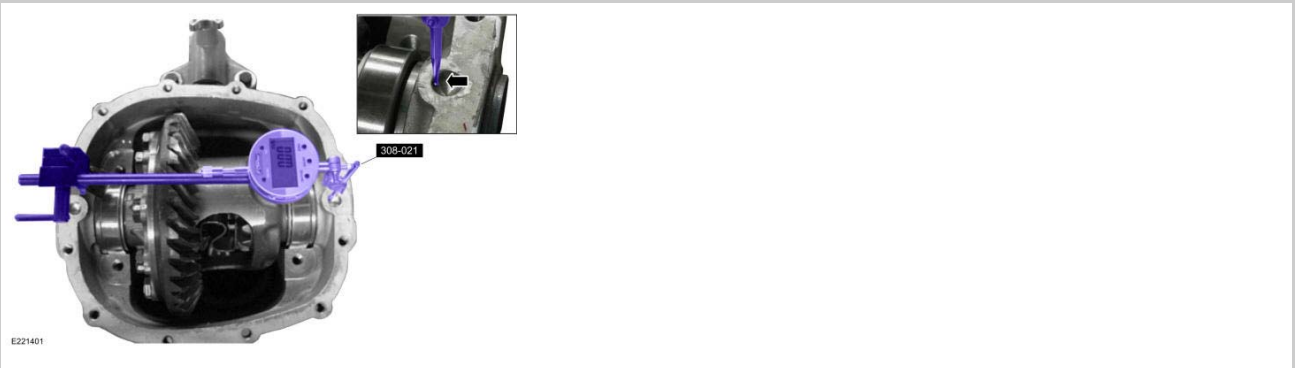
Mark the differential shims.

Mark the differential carrier bearing cups.



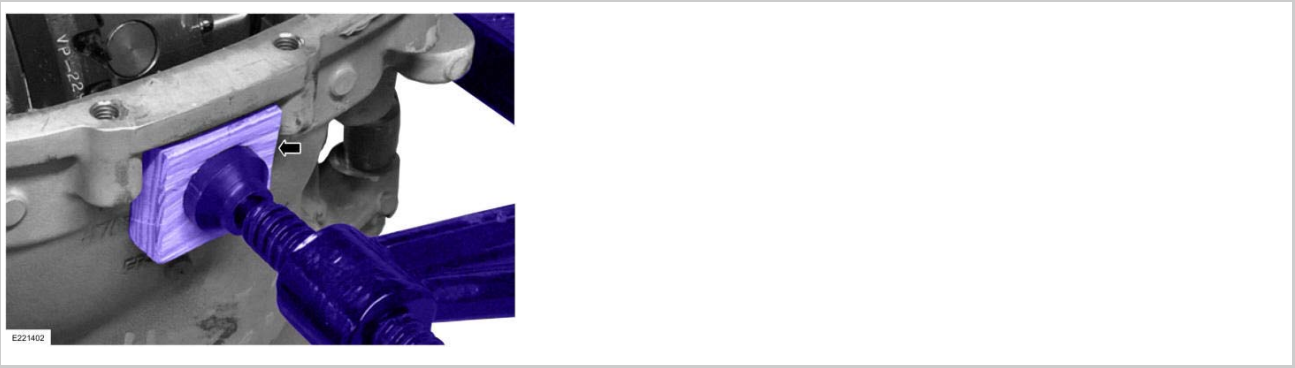
4.

Install the Dial Indicator and special tool. Position the tip of the clutch housing gauge on the inside of the axle housing guide hole. Zero the dial indicator. Use Special Service Tool: 308-021(T75L-4201-A) Gauge, Clutch Housing. Use the General Equipment: Dial Indicator



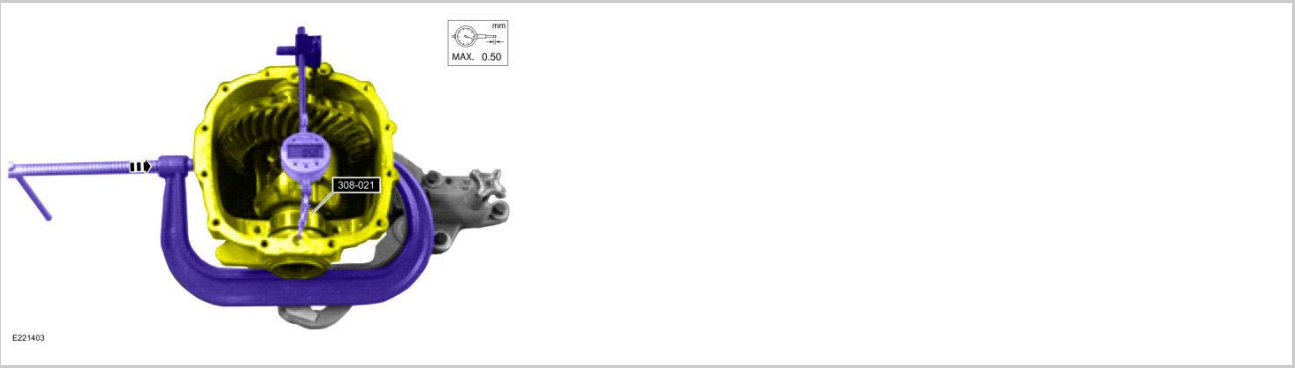
5.

Install a 12" / 300mm C-Clamp on the axle housing at the 12:00 O'clock and 6:00 O'clock positions. Install 2" x 2" x 3/4" blocks of wood between the C-Clamp and the housing to prevent housing cracks. Use the General Equipment: Wooden Block



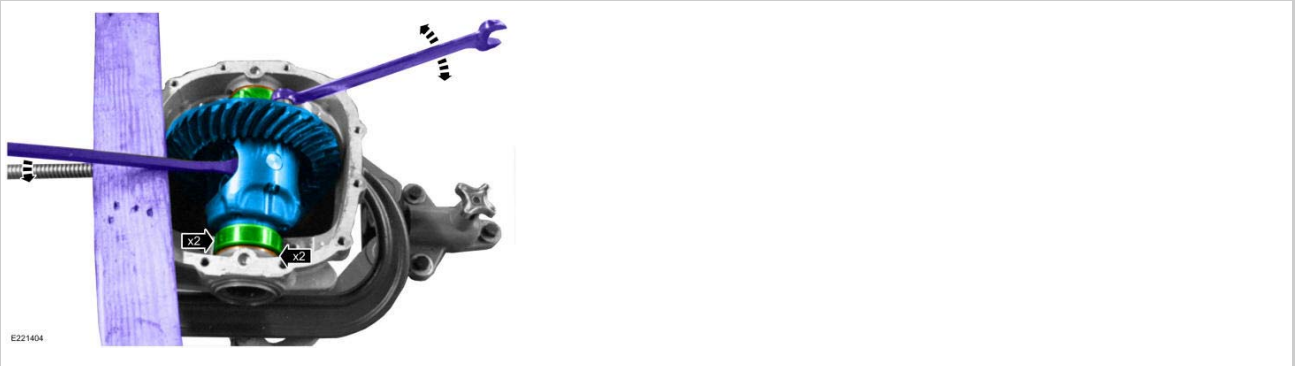
6.

Tighten the C-Clamp until the housing spreads 0.020" / 0.50mm.



7.

With the dial indicator removed. Position a wood block on the housing sealing surface. Using the tire lever, block of wood and a wrench remove the differential carrier, differential carrier bearing cups and the differential shims. Use the General Equipment: Tire Lever Use the General Equipment: Wooden Block



8.

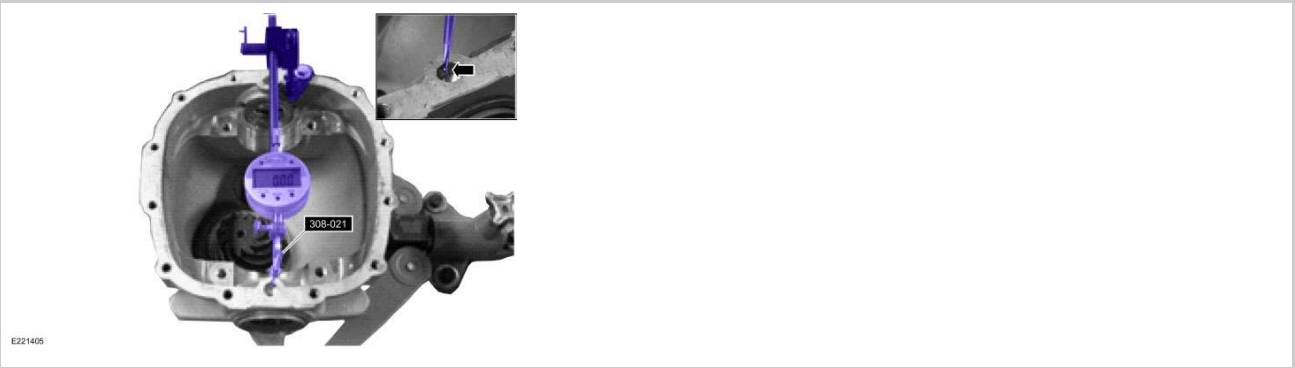
With the C-clamp removed inspect the differential case.



REMOVAL AND INSTALLATION > DIFFERENTIAL CARRIER > INSTALLATION

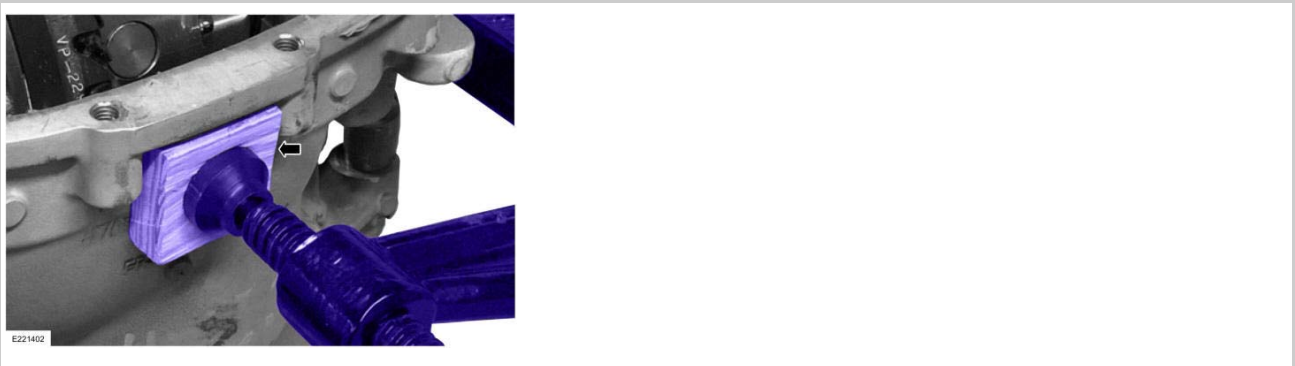
1.

Install the Dial Indicator and special tool. Position the tip of the clutch housing gauge on the inside of the axle housing guide hole. Zero the dial indicator. Use Special Service Tool: 308-021 (T75L-4201-A) Gauge, Clutch Housing. Use the General Equipment: Dial Indicator



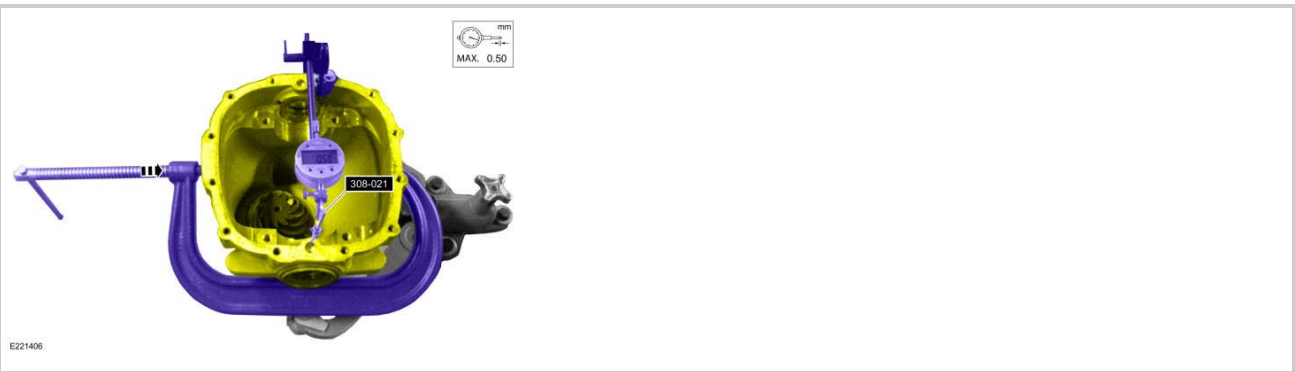
2.

Install a 12" / 300mm C-Clamp on the axle housing at the 12:00 O'clock and 6:00 O'clock positions. Install 2" x 2" x 3/4" blocks of wood between the C-Clamp and the housing to prevent housing cracks. Use the General Equipment: Wooden Block



3.

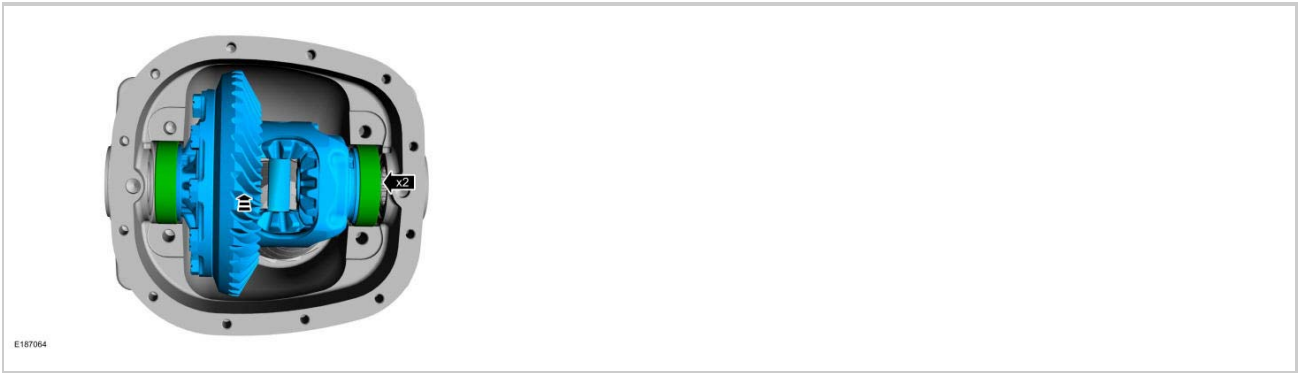
Tighten the C-Clamp until the housing spreads 0.020" / 0.50mm.



NOTE: Differential bearing shims are to be installed with the chamfer facing outboard.

NOTE: Have the selected shims or the previously removed shims available at this time. It will be required to hold the differential carrier and the differential carrier bearing cups in until shims are installed.

4.
With the dial indicator removed, install the differential carrier and the differential carrier bearing cups.

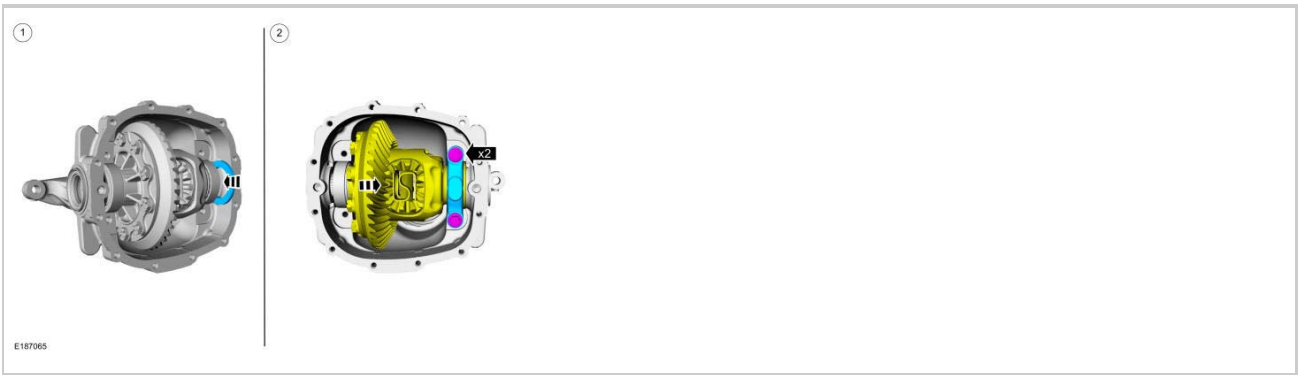


5.

Install the RH ring gear back lash shim.

NOTE: The differential bearing cap bolts should only be finger tight at this time.

Position the differential to the RH side of the differential housing. Install the RH differential bearing cap and the differential bearing cap bolts.



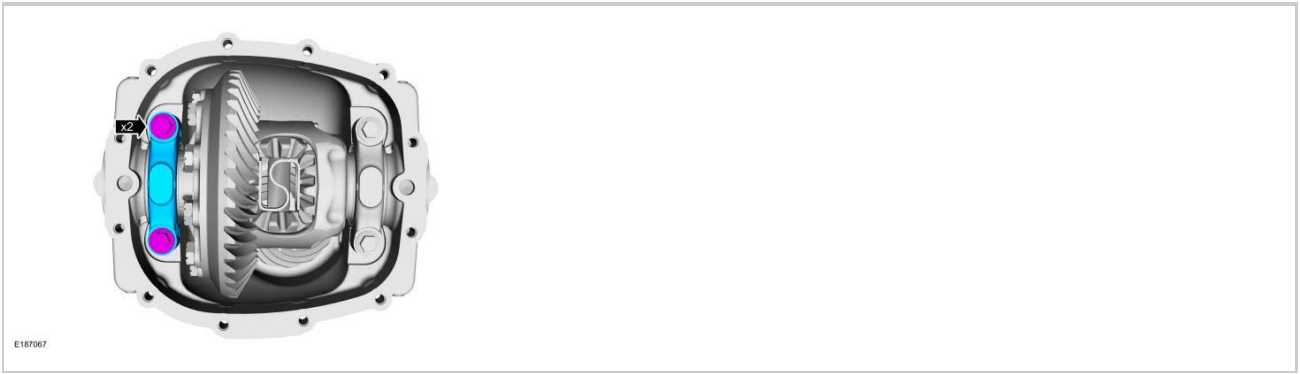
NOTE: The C-Clamp can be removed after the selected ring gear backlash shim is installed.

6.
Using the special tool and a soft face copper mallet, install the LH selected ring gear back lash shim. Use Special Service Tool: 205-220 Installer, Differential Shim. Use the General Equipment: Copper Hammer



NOTE: The differential bearing cap bolts should only be finger tight at this time.

7.
Install the LH differential bearing cap and the differential bearing cap bolts.

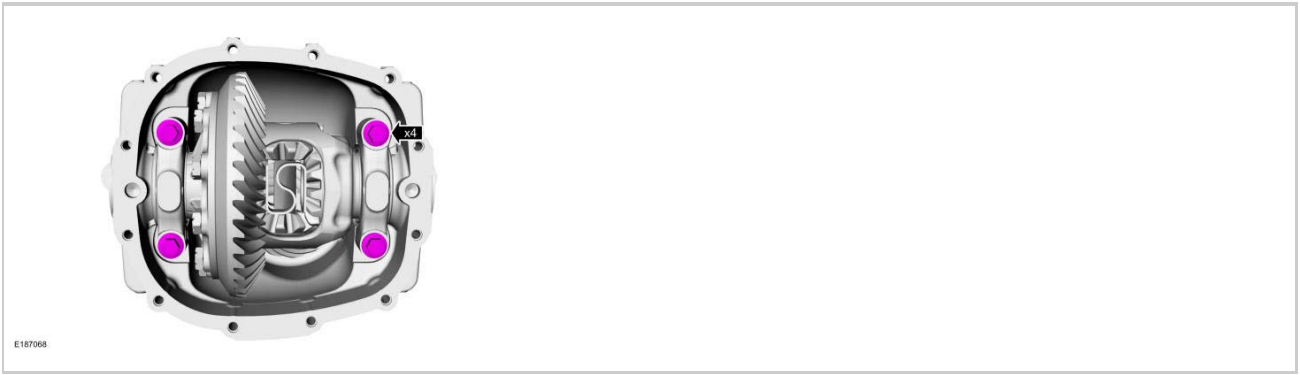


8.

Tighten the differential bearing cap bolts.

Torque

: 71 lb.ft (96 Nm)



9.

Check the ring gear backlash. Refer to: Ring Gear Backlash Adjustment .

10.

Install the differential housing cover. Refer to: Differential Housing Cover .

REMOVAL AND INSTALLATION > DIFFERENTIAL HOUSING COVER

Special Tool(s) / General Equipment

Plastic Scraper

Materials

Name	Specification
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4

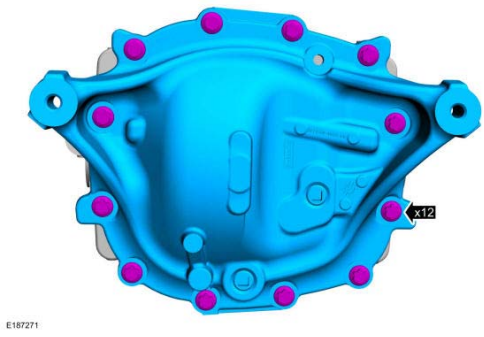
REMOVAL AND INSTALLATION > DIFFERENTIAL HOUSING COVER > REMOVAL

1.

Remove the differential assembly. Refer to: Axle Assembly .

NOTE: The differential housing cover bolts are low profile external torx. Use an EPL16 socket to remove the bolts.

2.
Remove the differential cover bolts and the differential cover.



REMOVAL AND INSTALLATION > DIFFERENTIAL HOUSING COVER > INSTALLATION

1.

Clean the differential cover and differential housing mating surfaces. Refer to: RTV Sealing Surface Cleaning and Preparation . Use the General Equipment: Plastic Scraper



2.

Apply the differential cover gasket material in a 2mm bead.

Material

: Silicone Gasket and Sealant / TA-30 (WSE-M4G323-A4)



3.

Install the differential housing cover, and the differential housing cover bolts.

Torque

: 34 lb.ft (46 Nm)



4.

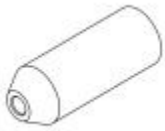
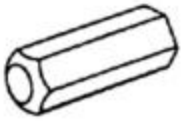
Install the differential assembly. Refer to: Axle Assembly .

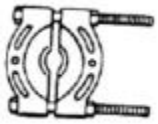
5.

Fill the differential with clean differential fluid. Refer to: Axle and Differential Draining and Filling .

REMOVAL AND INSTALLATION > DRIVE PINION

Special Tool(s) / General Equipment

	205-024 (T67P-4616-A) Installer, Drive Pinion Bearing Cup
 E188619	205-1014 Gauge Disc TKIT-2014D-FL_ROW TKIT-2014D-ROW2
 E188620	205-1015 Gauge Tube TKIT-2014D-FL_ROW TKIT-2014D-ROW2
	205-110 (T76P-4020-A10) Adapter for 205-S127
 E169393	205-111 (T76P-4020-A11) Adapter for 205-S127 Pinion Depth Gauge
 E169394	205-160 (T80T-4020-F43) Adapter for 205-S156 Pinion Depth Gauge
	205-229 (T85T-4209-AH) Protector, Drive Pinion Thread TKIT-1985-FH-1

	205-387 (T97T-4628-A) Installer, Rear Axle Bearing Cup TKIT-1997-F/FLM/LT TKIT-1998-LM (NavigatoR)
 E180811	205-488 Installer, Drive Pinion Bearing TKIT-1999S-FLM/LT
	205-852 Inner Pinion Bearing Cup Installer TKIT-2006UP-FLM TKIT-2006UP-ROW
 E180810	205-937 Adapter, Pinion Aligning TKIT-2009C-F TKIT-2009C-ROW
	205-D064 (D84L-1123-A) Puller, Bearing
Rubber Mallet	
Hydraulic Press	
Punch	
Copper Hammer	

REMOVAL AND INSTALLATION > DRIVE PINION > REMOVAL

1.

Remove the differential carrier. Refer to: Differential Carrier .

2.

Remove the drive pinion seal. Refer to: Drive Pinion Seal .

3.

Remove the drive pinion outer shim.



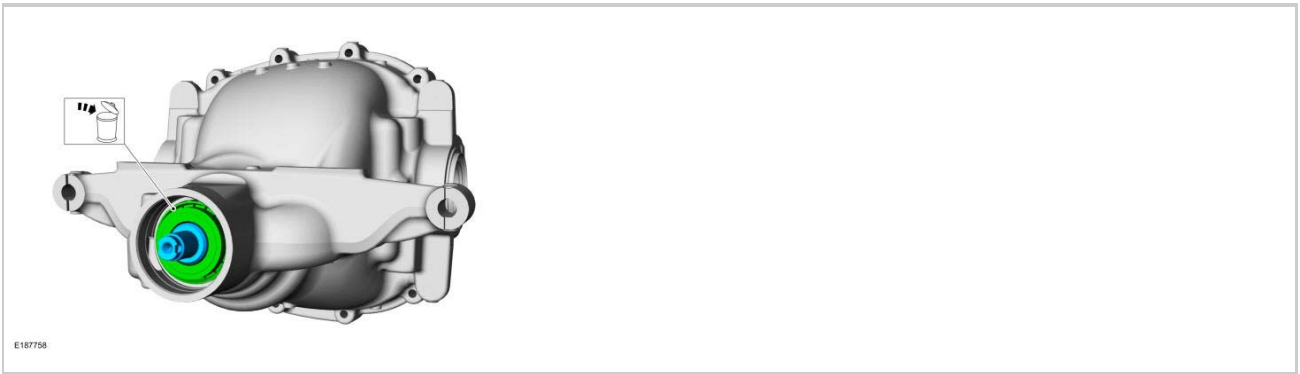
4.

Using the special tool and a soft face mallet, tap drive pinion free of the of the drive pinion outer bearing. Use Special Service Tool: 205-229 (T85T-4209-AH) Protector, Drive Pinion Thread. Use the General Equipment: Rubber Mallet



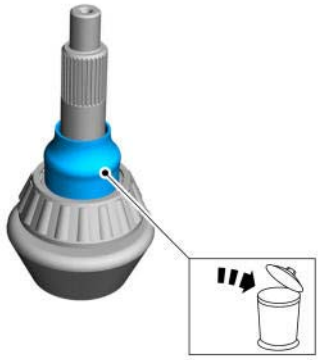
5.

Remove the drive pinion and remove and discard the drive pinion outer bearing.



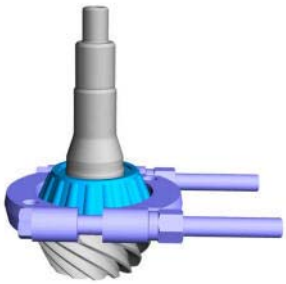
6.

Remove and discard the drive pinion collapsible spacer.


E179187

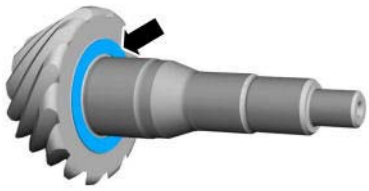
7.

Using the bearing puller and a hydraulic press, remove and discard the inner drive pinion bearing. Use Special Service Tool: 205-D064 (D84L-1123-A) Puller, Bearing. Use the General Equipment: Hydraulic Press


E181945

8.

Remove the inner drive pinion bearing shim.


E181946

9.

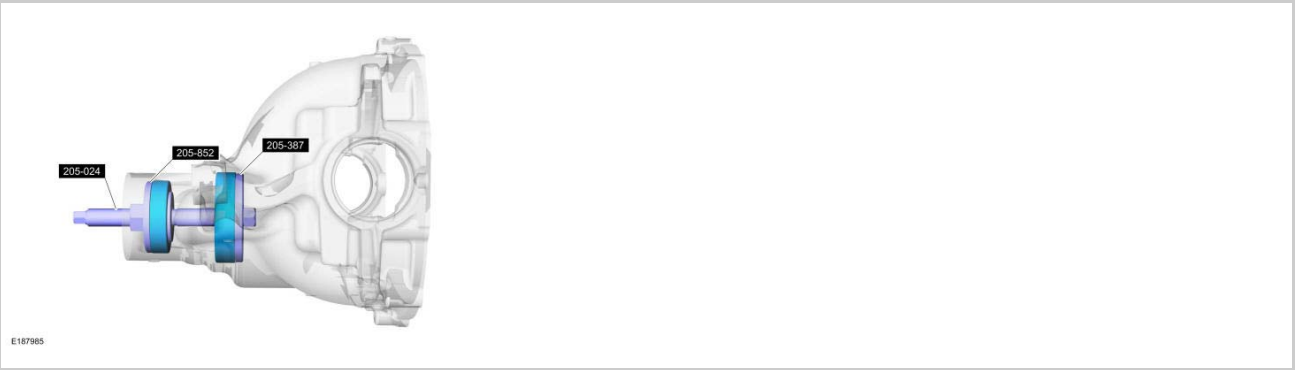
Using the general equipment, remove and discard the drive pinion bearing cups. Use the General Equipment: Punch Use the General Equipment: Copper Hammer



REMOVAL AND INSTALLATION > DRIVE PINION > INSTALLATION

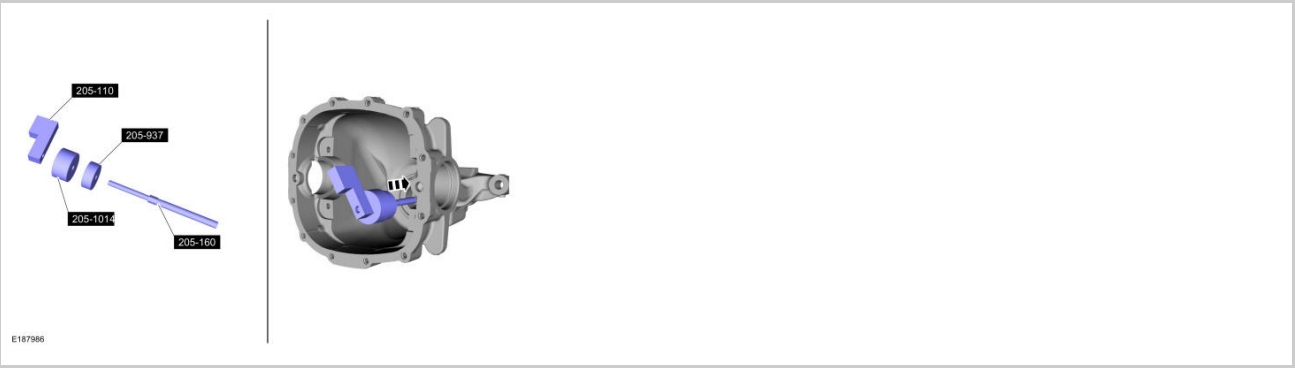
NOTE: Make sure the drive pinion bearing cups are seated correctly or damage to the components may occur.

1.
Using the special tools, install the new inner and new outer drive pinion bearing cups. Use Special Service Tool: 205-024 (T67P-4616-A)Installer, Drive Pinion Bearing Cup., 205-852 Inner Pinion Bearing Cup Installer., 205-387 (T97T-4628-A) Installer, Rear Axle Bearing Cup.



NOTE: Only tighten finger tight at this stage.

2.
Assemble the special tools in the differential housing. Use Special Service Tool: 205-110 (T76P-4020-A10)Adapter for 205-S127., 205-160 (T80T-4020-F43) Adapter for 205-S156 Pinion Depth Gauge., 205-937 Adapter, Pinion Aligning., 205-1014 Gauge Disc.



3.

Install the special tool. Use Special Service Tool: 205-111(T76P-4020-A11) Adapter for 205-S127 Pinion Depth Gauge.

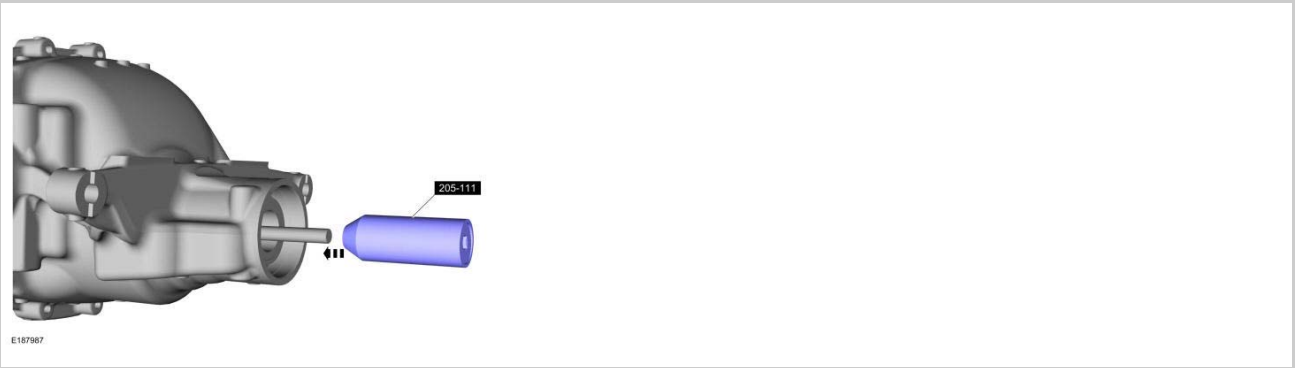
NOTE: This step duplicates final drive pinion bearing preload

Tighten the special tool to the specified torque.

Torque

: 18 lb.in (2 Nm)

Slowly rotate and record the rotational torque readings.



4.

Check for proper location of special tools.

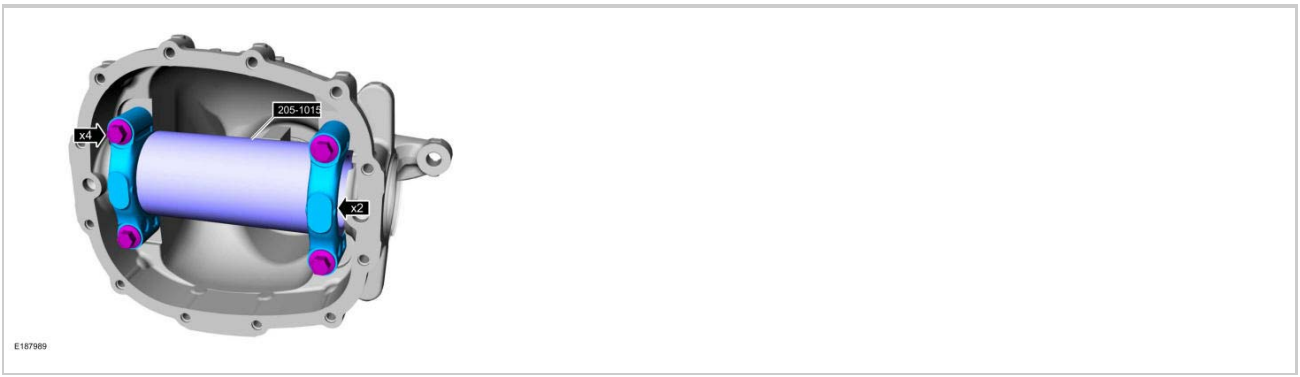


5.

Position the special tool. Install the differential bearing caps and differential bearing cap bolts. Use Special Service Tool: 205-1015 Gauge Tube.

Torque

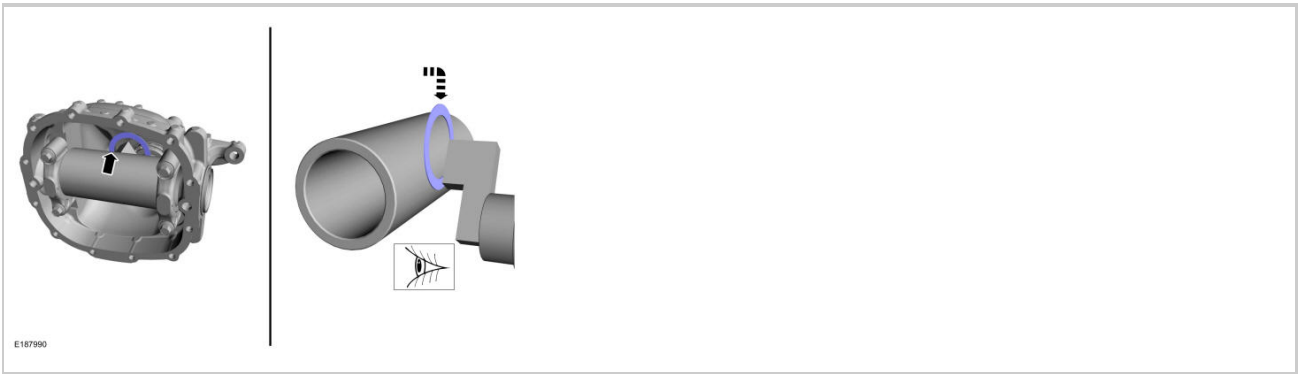
: 71 lb.ft (96 Nm)



NOTE: A slight drag should be felt for correct drive pinion bearing adjustment shim selection. Do not attempt to force the drive pinion bearing adjustment shim between the gauge block and the gauge tube. This will minimize selection of a drive pinion bearing adjustment shim thicker than required, which results in a deep tooth contact in the final assembly of integral axle assemblies.

NOTE: Drive pinion bearing adjustment shims must be flat and clean.

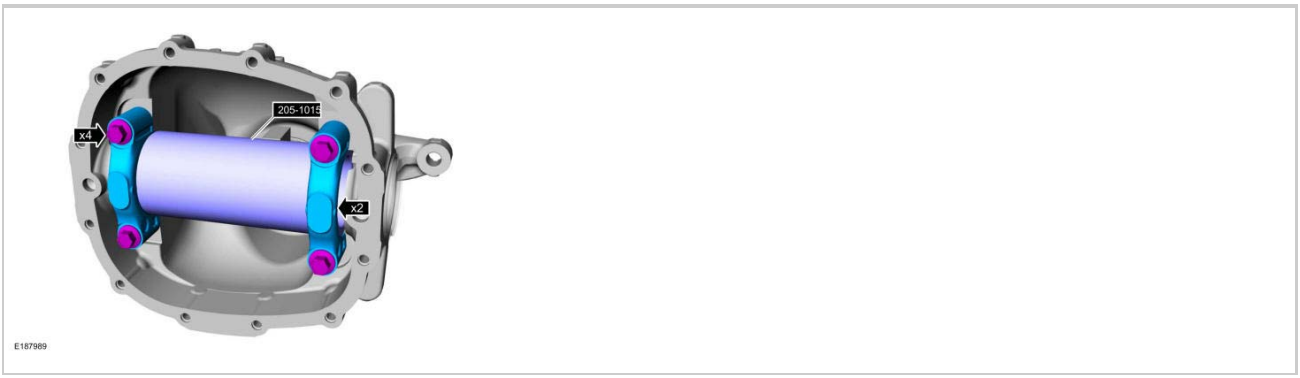
6.
Use a drive pinion bearing adjustment shim as a gauge for drive pinion bearing adjustment shim selection.



NOTE: The differential bearing caps need to stay in the correct orientation for installation.

7.
Remove the differential bearing cap bolts and differential bearing caps, remove the special tools.

Use Special Service Tool: 205-1015 Gauge Tube.



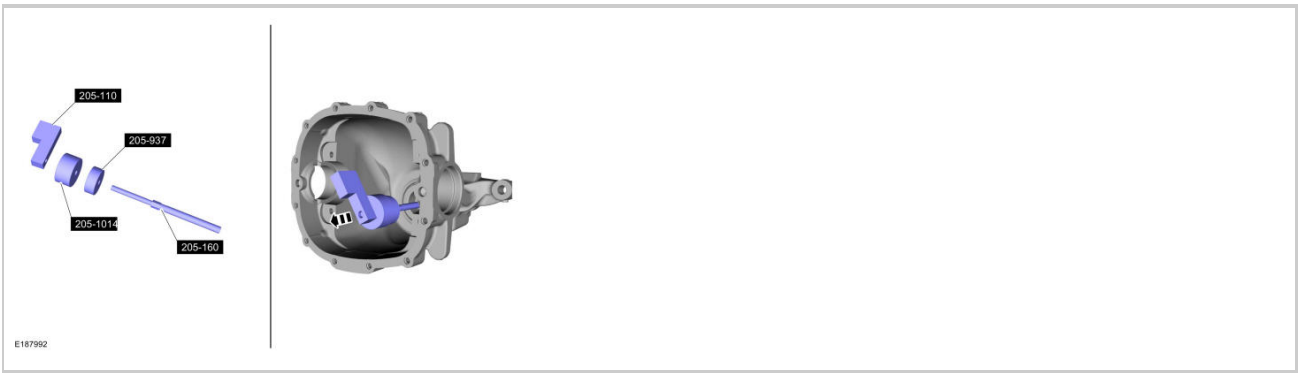
8.

Remove the special tool. Use Special Service Tool: 205-111(T76P-4020-A11)Adapter for 205-S127 Pinion Depth Gauge.



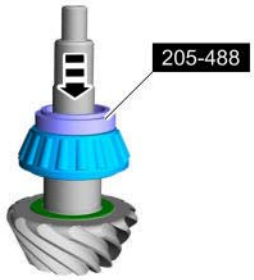
9.

Remove the special tools. Use Special Service Tool: 205-110 (T76P-4020-A10) Adapter for 205-S127., 205-160 (T80T-4020-F43) Adapter for 205-S156 Pinion Depth Gauge., 205-937 Adapter, Pinion Aligning., 205-1014 Gauge Disc.



10.

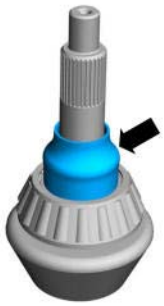
Install the drive pinion inner bearing and selected drive pinion bearing adjustment shim until they are firmly seated on the drive pinion. Use Special Service Tool: 205-488 Installer, Drive Pinion Bearing. Use the General Equipment: Hydraulic Press



E181974

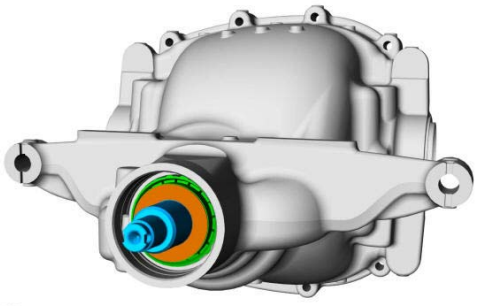
11.

Install the new drive pinion collapsible spacer.


E178165

12.

Install the new outer differential pinion bearing, outer differential pinion shim and the differential pinion.


E187760

NOTE: When installing the drive pinion flange and pinion nut with no differential carrier installed, the drag torque (torque to turn) should be 2.5 to 3.5 Nm (23-33 in-lbs).

13.
Install the drive pinion seal. Refer to: Drive Pinion Seal .

14.

Install the differential carrier. Refer to: Differential Carrier .

REMOVAL AND INSTALLATION > DRIVE PINION FLANGE

Special Tool(s) / General Equipment

	205-126 (T78P-4851-A) Holding Fixture, Drive Pinion Flange
	205-233 (T85T-4851-AH) Installer, Drive Pinion Flange TKIT-1985-FH-1
Flat Headed Screw Driver	
Three Leg Puller	

REMOVAL AND INSTALLATION > DRIVE PINION FLANGE > REMOVAL

NOTE: The rear brake calipers and brake pads must be removed for accurate pinion nut drag torque readings.

1.
Remove the rear brake pads. Refer to: Brake Pads .

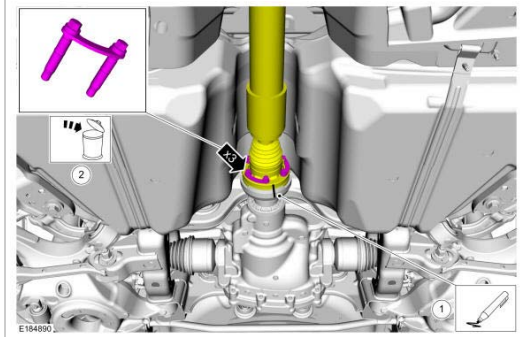
2.

1.

Index mark the driveshaft and the pinion flange for reference during installation.

2.

Remove and discard the driveshaft to pinion flange bolts.



NOTE: Do not over articulate the driveshaft or damage may occur.

3.

1.

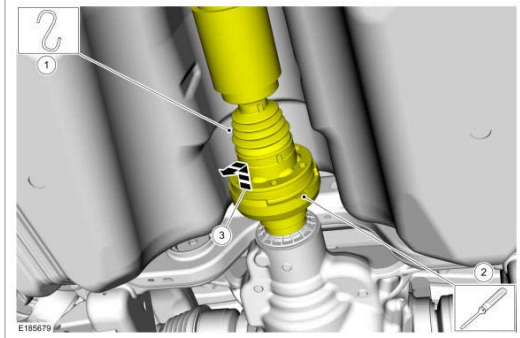
Support the driveshaft.

2.

Using a screwdriver inserted into the slot on the pinion flange, pry the driveshaft from the pinion flange. Use the General Equipment: Flat Headed Screw Driver

3.

Separate the driveshaft from the pinion flange.



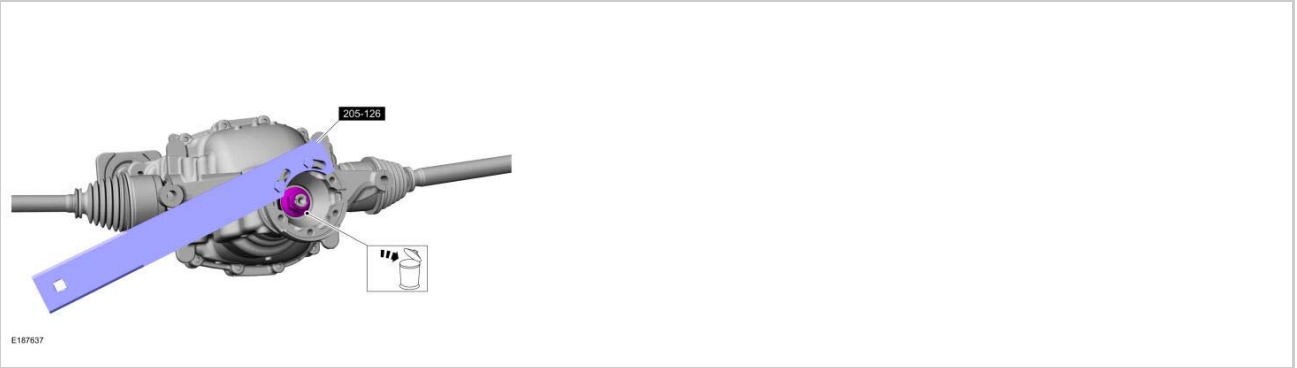
NOTE: Rotational torque of the drive pinion flange must be measured and recorded using a Nm (lb-in) torque wrench for correct pinion bearing preload when reassembled. This will be the torque-to-turn measurement.

4.
Using a dial type torque wrench, measure and record the rotational torque of the drive pinion.



5.

Using the special tool to hold the pinion flange, remove and discard the pinion nut. Use Special Service Tool: 205-126 (T78P-4851-A) Holding Fixture, Drive Pinion Flange.



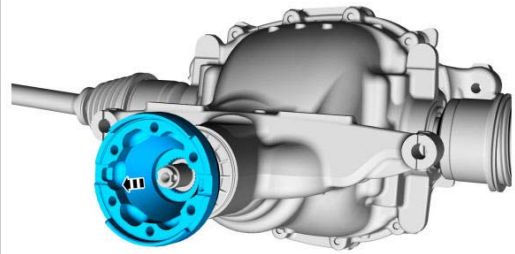
6.

Mark the drive pinion flange and the drive pinion stem for reassembly.



7.

Using the general equipment, remove the pinion flange. Use the General Equipment: Three Leg Puller



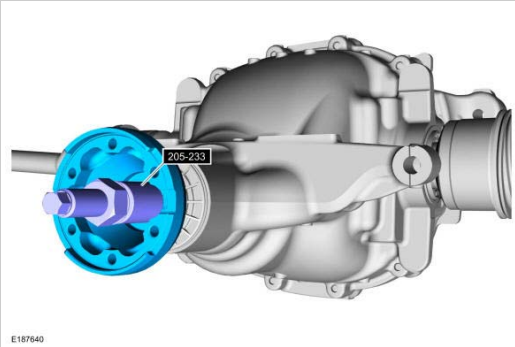
REMOVAL AND INSTALLATION > DRIVE PINION FLANGE > INSTALLATION

1.

If necessary, install a new drive pinion seal. Refer to: Drive Pinion Seal .

> *NOTE: Mure sure drive pinion flange and drive pinion stem are phased correctly using previously applied mark.*

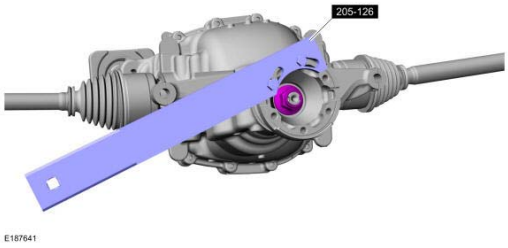
2.
Using the special tool, install the pinion flange. Use Special Service Tool: 205-233 (T85T-4851-AH) Installer, Drive Pinion Flange.



> *NOTE: Refer to the rotational torque previously recorded with the Nm (lb-in) torque wrench. Tighten the pinion nut in small increments until it is 0.00 Nm to +0.3 Nm (0 lb-in to 3 lb-in) of the reference measurement. If 0.3 Nm (3 lb-in) is exceeded, then the collapsible spacer will be damaged and a new collapsible spacer will be required.*

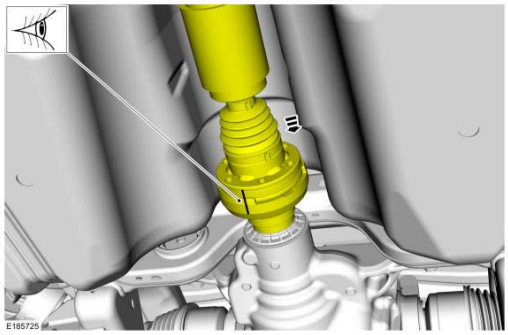
> *NOTE: When installing the drive pinion flange and pinion nut with no differential carrier installed, the drag torque (torque to turn) should be 2.5 to 3.5 Nm (23-33 in-lbs).*

3.
Using the special tool to hold the pinion flange, install the new pinion nut. Use Special Service Tool: 205-126 (T78P-4851-A) Holding Fixture, Drive Pinion Flange.



NOTE: The help of a assistant will be needed. Do not over articulate the driveshaft or damage may occur.

4.
Align the index-mark on driveshaft to the rear axle pinion flange.

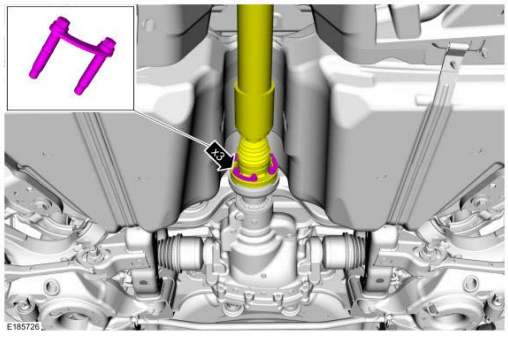


NOTE: Make sure the driveshaft is fully seated into the pinion flange before installing the driveshaft to pinion flange bolts.

5.
Install the new driveshaft-to-pinion flange bolts.

Torque

: 41 lb.ft (55 Nm)



6.

Install the rear brake pads. Refer to: Brake Pads .

REMOVAL AND INSTALLATION > DRIVE PINION FRONT BEARING > REMOVAL AND INSTALLATION

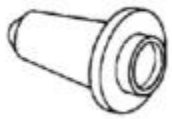
NOTE: The outer differential bearing cup needs to be replaced when replacing the outer differential bearing.

1.

Refer to: Drive Pinion .

REMOVAL AND INSTALLATION > DRIVE PINION SEAL

Special Tool(s) / General Equipment

	205-208 (T83T-4676-A) Installer, Drive Pinion Oil Seal TKIT-1983-F TKIT-1983-FLM TKIT-1983-FX
Flat Headed Screw Driver	

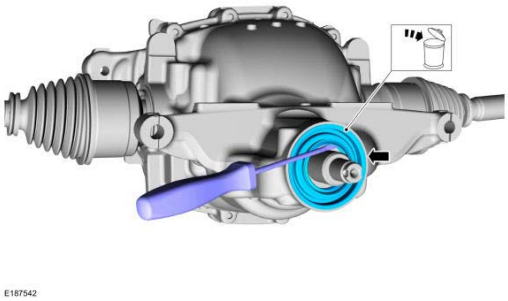
REMOVAL AND INSTALLATION > DRIVE PINION SEAL > REMOVAL

1.

Remove the drive pinion flange. Refer to: Drive Pinion Flange .

2.

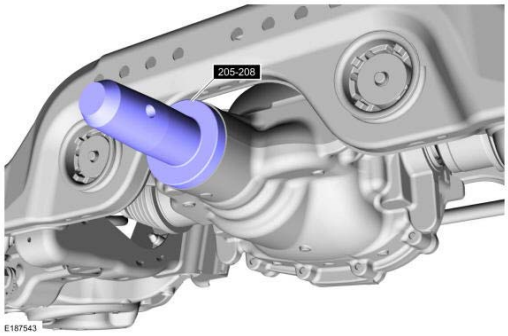
Using a flat blade screwdriver, remove and discard the drive pinion seal. Use the General Equipment: Flat Headed Screw Driver



REMOVAL AND INSTALLATION > DRIVE PINION SEAL > INSTALLATION

1.

Using the special tool, install the drive pinion seal. Use Special Service Tool: 205-208 (T83T-4676-A) Installer, Drive Pinion Oil Seal.



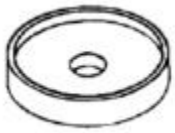
2.

Install the drive pinion flange. Refer to: Drive Pinion Flange .

REMOVAL AND INSTALLATION > REAR HALFSHAFT SEAL

Special Tool(s) / General Equipment

	205-1013 Installer, Rear Axle pilot bearing TKIT-2014D-FL_ROW TKIT-2014D-ROW2
	205-504 Installer, Halfshaft Pilot Bearing TKIT-2002N-F/FM TKIT-2002N-FLM TKIT-2002N-LM

	205-907 Handle, 32 Driver TKIT-2008DH-FLM
	206-034 (T88P-20202-B) Installer, Wheel Speed Sensor Ring TKIT-1988-FLM TKIT-1988-LM
	308-047 (T77F-1102-A) Remover, Bearing Cup
Slide Hammer	

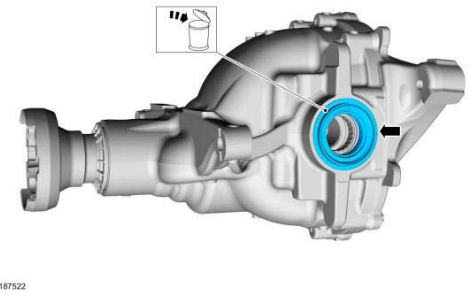
REMOVAL AND INSTALLATION > REAR HALFSHAFT SEAL > REMOVAL

1.

Remove the rear halfshafts. Refer to: Rear Halfshaft .

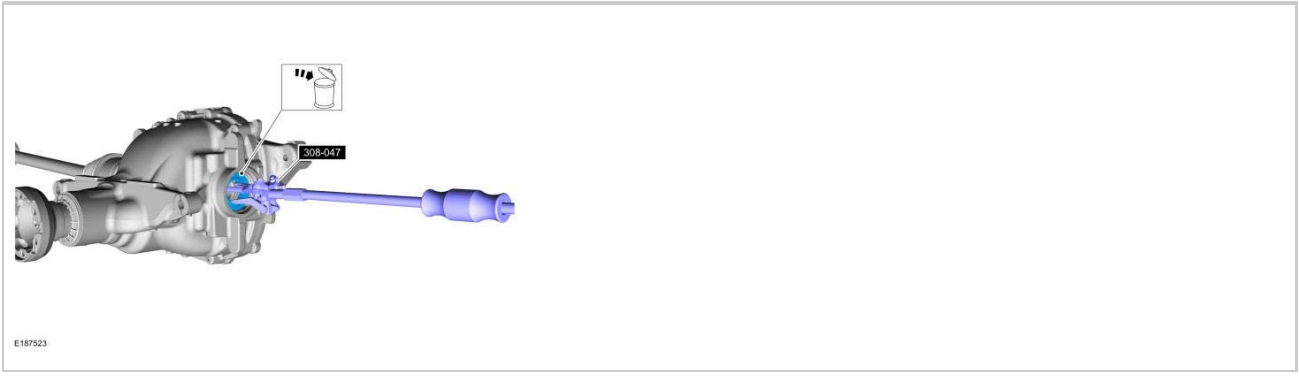
2.

Remove and discard the rear half halfshaft seal.



3.

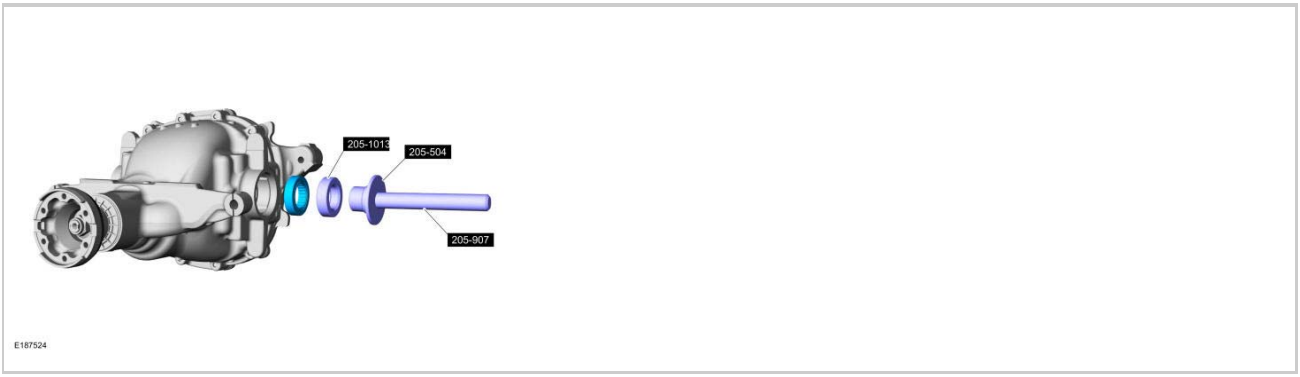
Remove and discard the rear halfshaft pilot bearing. Use Special Service Tool: 308-047 (T77F-1102-A) Remover, Bearing Cup. Use the General Equipment: Slide Hammer



REMOVAL AND INSTALLATION > REAR HALFSHAFT SEAL > INSTALLATION

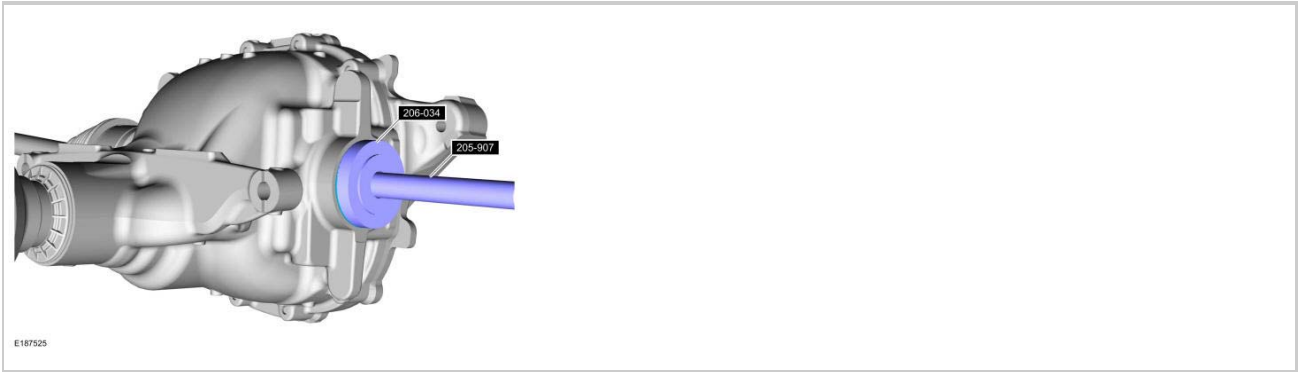
1.

Install the new rear halfshaft pilot bearing. Use Special Service Tool: 205-907 Handle, 32 Driver., 205-504 Installer, Halfshaft Pilot Bearing., 205-1013 Installer, Rear Axle pilot bearing.



2.

Install the new rear half halfshaft seal. Use Special Service Tool: 206-034 (T88P-20202-B) Installer, Wheel Speed Sensor Ring., 205-907 Handle, 32 Driver.



3.

Install the rear halfshaft. Refer to: Rear Halfshaft .

4.

Check the differential fluid level. Refer to: Differential Fluid Level Check .

DISASSEMBLY AND ASSEMBLY > DIFFERENTIAL CARRIER

Special Tool(s) / General Equipment

	205-022 (T66L-4204-A) Gauge, Differential Clutch
 E188621	205-1016 Installer, Differential Bearing TKIT-2014D-FL_ROW TKIT-2014D-ROW2
 15101	205-135 Gauge, Differential Clutch
 E133913	205-153 (T80T-4000-W) Handle
	205-D061 (D83T-4205-C2) Step Plate
 E155534	205-D072 (D97L-4221-A) 2 Jaw Puller
Feeler Gauge	
Rubber Mallet	
Punch	
Copper Hammer	
Vise	

Materials

Name	Specification
Motorcraft ® Additive Friction Modifier (U.S.) XL-3 (U.S.)	EST-M2C118-A
Motorcraft ® SAE 75W-85 Premium Synthetic Hypoid Gear Lubricant XY-75W85-QL	WSS-M2C942-A

DISASSEMBLY AND ASSEMBLY > DIFFERENTIAL CARRIER > DISASSEMBLY

NOTE: This differential is serviced as an assembly with the differential spider gears and the differential side gears.

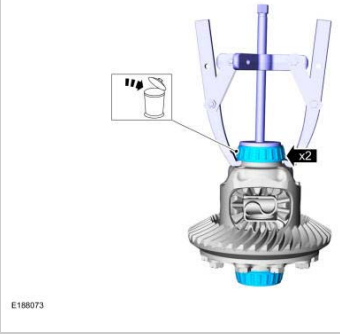
NOTE: Conventional differential carrier assembly shown, limited slip differential assembly similar.

1.

Remove the differential carrier. Refer to: Differential Carrier .

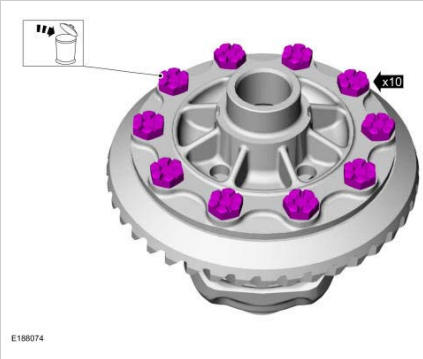
2.

Using the general equipment, remove and discard the differential bearings. Use Special Service Tool: 205-D072 (D97L-4221-A) 2 Jaw Puller., 205-D061 (D83T-4205-C2) Step Plate.



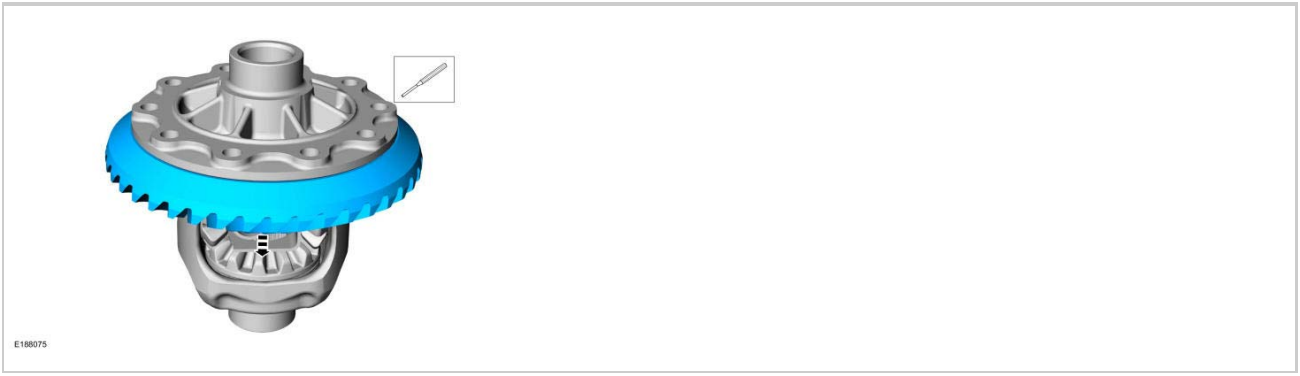
3.

Remove and discard the ring gear bolts.



4.

Using the brass punch and a soft face hammer, remove the ring gear. Use the General Equipment: Punch Use the General Equipment: Copper Hammer



5.

1.

Remove and discard the differential pinion shaft lock bolt.

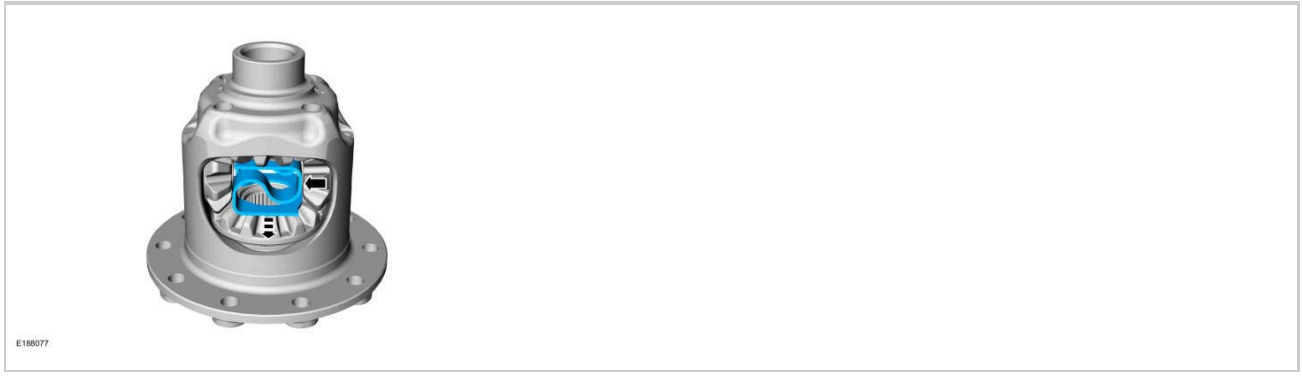
2.

Remove the differential pinion shaft.



NOTE: Due to the spring tension, care must be used when removing the differential s-spring.

6.
Remove the differential s-spring.



7.

Remove the differential pinion gears and the pinion gear thrust washers.



NOTE: Keep the differential clutch packs in order. Do not mix the differential clutch packs. The differential clutch packs must be reassembled in the same sequence.

8.
Remove the differential side gears and disassemble the clutch assemblies.



DISASSEMBLY AND ASSEMBLY > DIFFERENTIAL CARRIER > ASSEMBLY

1.

Lubricate the differential steel clutch plates. Soak the differential friction plates for no less than 15 minutes.

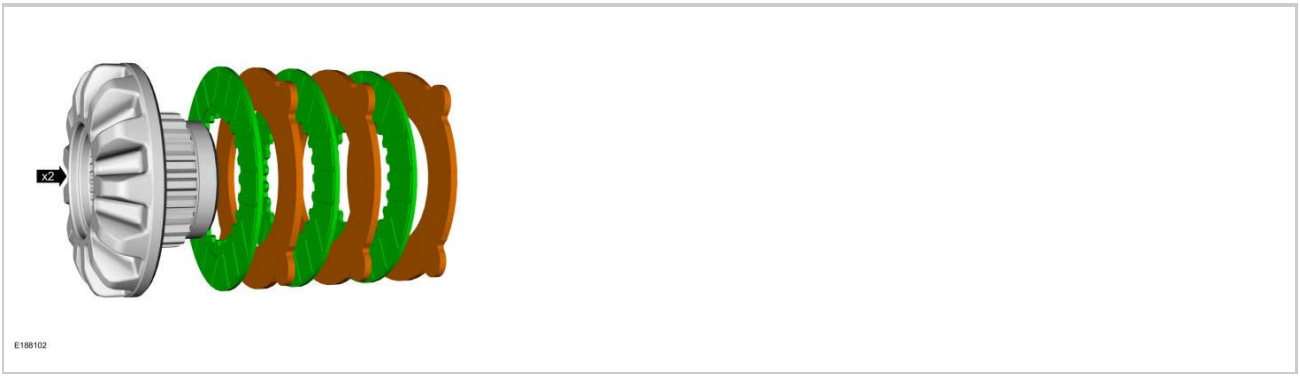
Material

: Motorcraft ® Additive Friction Modifier (U.S.) / XL-3 (U.S.) (EST-M2C118-A)



NOTE: Do not mix the clutch plates, clutch discs or shim from one side with the other.

2.
Assemble the differential clutch packs on their respective differential side gear.



3.

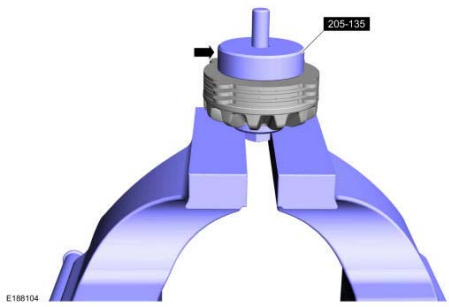
Place the base portion of the Differential Clutch Gauge in a vise. Install the differential side gear and differential clutch pack (without the shim and spacer) on the tool. Use Special Service Tool: 205-135 Gauge, Differential Clutch. Use the General Equipment: Vise



4.

Position the Differential Clutch Gauge hand-tight on top of the differential clutch pack. Use Special

Service Tool: 205-135 Gauge, Differential Clutch. Use the General Equipment: Vise

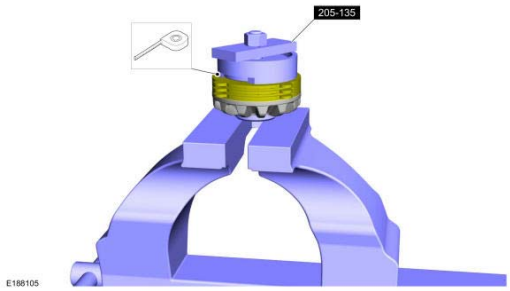


5.

Select and insert the thickest feeler gauge blade that will enter between the tool and the differential clutch pack. Use the differential clutch pack chart to determine the correct thickness clutch shim to use. Refer to: Specifications . Use Special Service Tool: 205-135 Gauge, Differential Clutch. Use the General Equipment: Vise Use the General Equipment: Feeler Gauge

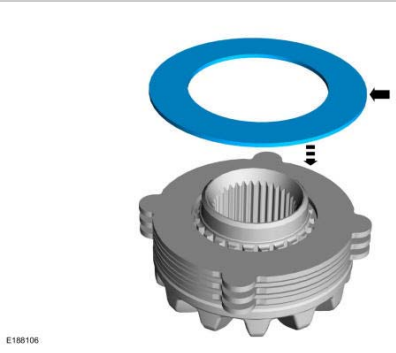
Torque

: 59 lb.in (6.7 Nm)



NOTE: Do not use more than 2 shims per side.

6.
With the special tool removed, Install the selective shim on the differential side gear and clutch pack assembly.

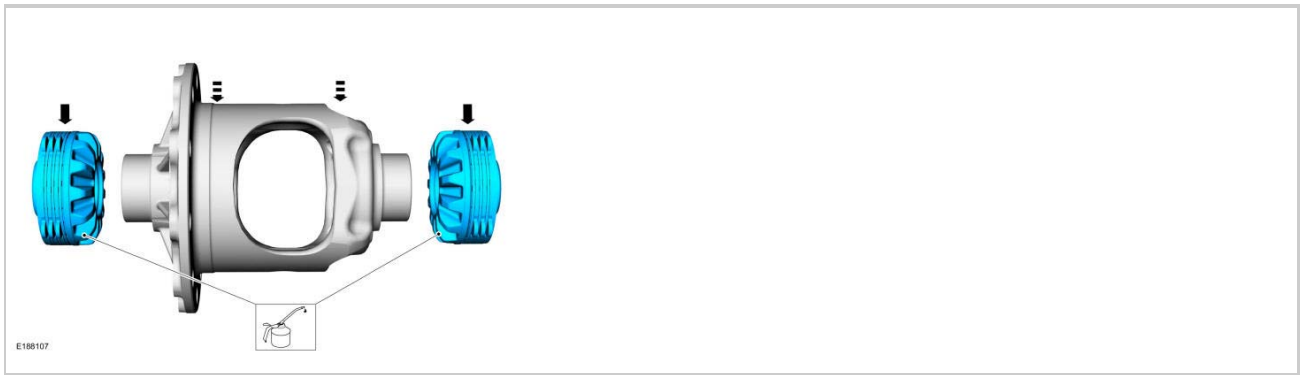


7.

Lube and install the differential side gear assemblies in the differential case.

Material

: Motorcraft ® SAE 75W-85 Premium Synthetic Hypoid Gear Lubricant / XY-75W85-QL (WSS-M2C942-A)



8.

Lube and install the differential pinion gear and differential pinion thrust washer assemblies in the differential case.

Material

: Motorcraft ® SAE 75W-85 Premium Synthetic Hypoid Gear Lubricant / XY-75W85-QL (WSS-M2C942-A)



NOTE: The s-spring has tension and may need to be tapped in with a soft faced mallet.

9.
Install the differential S-spring. Use the General Equipment: Rubber Mallet



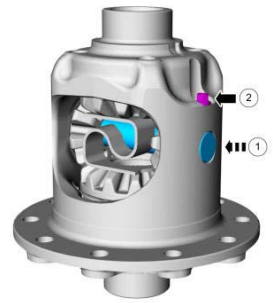
10.

Install the differential pinion shaft.

Install the new differential pinion shaft bolt.

Torque

: 25 lb.ft (34 Nm)

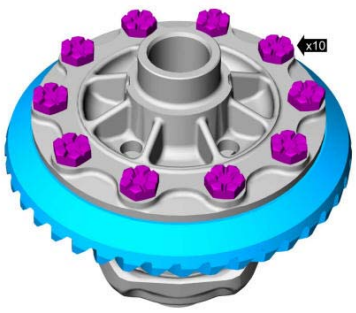


NOTE: Tighten the ring gear bolts in a cross pattern.

11.
Install the ring gear and the new ring gear bolts.

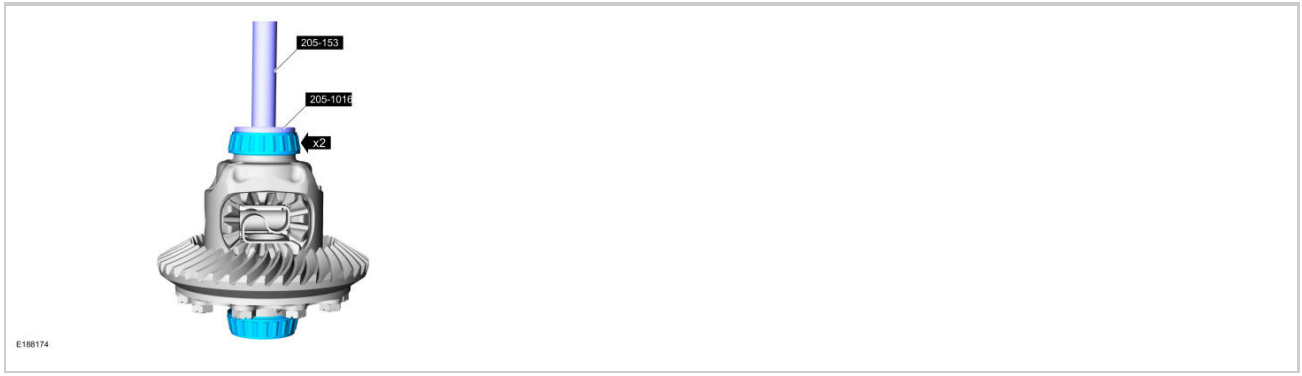
Torque

: 100 lb.ft (135 Nm)



12.

Using the special tools, install the new differential bearings. Use Special Service Tool: 205-153 (T80T-4000-W) Handle., 205-1016 Installer, Differential Bearing.

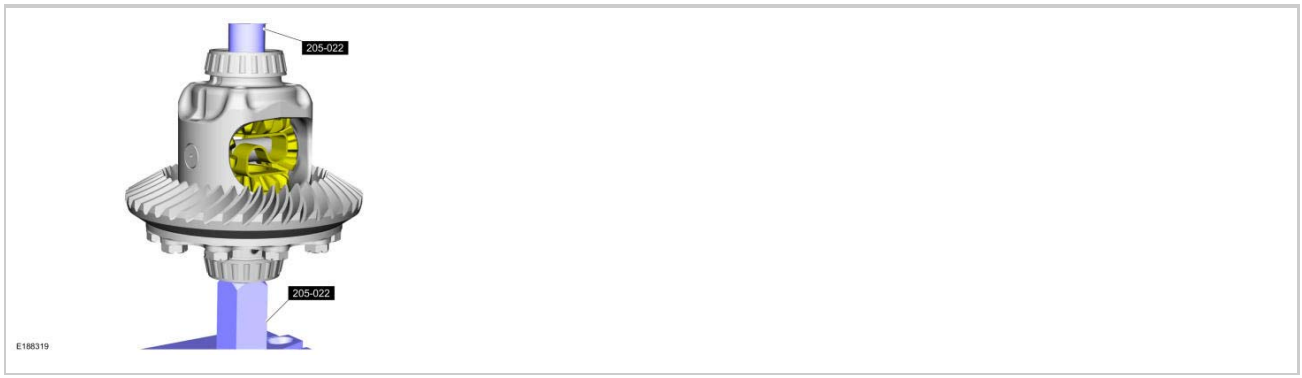


NOTE: The initial minimum break-away torque, if original clutch plates are used, must be within the specification below. The minimum rotating torque required to keep the differential side gear turning with new clutch plates may vary.

13.
Using the special tool, check the torque required to rotate one differential side gear. Use Special Service Tool: 205-022 (T66L-4204-A) Gauge, Differential Clutch. Use the General Equipment: Vise

Torque

: 20 lb.ft (27 Nm)



14.

Install the differential carrier. Refer to: Differential Carrier .

Service Manual: REAR DRIVE HALFSHAFTS

DIAGNOSIS AND TESTING > REAR DRIVE HALFSHAFTS > PRINCIPLES OF OPERATION

Inspection and Verification

1.

Verify the customer concern.

2.

Visually inspect for obvious signs of mechanical or electrical damage.

3.

If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step

4.

If the cause is not visually evident, verify the symptom and refer to the Symptom Chart(s) .

DIAGNOSIS AND TESTING > REAR DRIVE HALFSHAFTS > SYMPTOM CHART(S)

Diagnostics in this service information assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

Symptom Chart: NVH

Symptom Chart

Condition	Possible Sources	Actions
Driveline clunk - loud clunk when shifting from REVERSE to DRIVE	Damaged or worn CV joints	INSPECT the CV joints for wear or damage. INSTALL a new halfshaft as necessary. REFER to: Rear Halfshaft .
	Loose hub nut	CHECK the torque on the hub nut. REPLACE the hub nut if the torque is not at specification. For hub nuts. REFER to: Wheel Bearing and Wheel Hub .
Driveline clunk - occurs as the vehicle starts to move forward following a stop	Loose hub nut	CHECK the torque on the hub nut. REPLACE the hub nut if the torque is not at specification. REFER to: Rear Halfshaft . REFER to: Wheel Bearing and Wheel Hub .

Grunting - normally associated with a shudder experienced during acceleration from a complete stop	Halfshaft CV joint binding	CHECK the outer CV joint for correct seating into the hub. REPAIR as necessary. REFER to: Rear Halfshaft .
Driveline vibration - occurs at cruising speeds	Binding or damaged CV joint	CHECK the outer CV joint for correct seating into the hub. REPAIR as necessary. REFER to: Rear Halfshaft . REFER to: Wheel Bearing and Wheel Hub .

DIAGNOSIS AND TESTING > REAR DRIVE HALFSHAFTS > DIFFERENTIAL SEALS

NOTE: When installing shafts, do not allow splines to contact seals during installation or damage to the seals may occur.

Halfshaft seals are susceptible to the same types of damage as drive pinion seals if incorrectly installed. The seal bore must be clean and the lip handled carefully to avoid cutting or tearing it. The seal journal surface must be free of nicks, gouges and rough surface texture.

For information on differential seals, REFER to: Rear Halfshaft Seal .

REMOVAL AND INSTALLATION > INNER CONSTANT VELOCITY (CV) JOINT BOOT

Special Tool(s) / General Equipment

Flat Headed Screw Driver
Boot Clamp Pliers
Rubber Mallet
Three Leg Puller

Materials

Name	Specification
Constant Velocity Joint Grease (High Temperature) XG-5	WSS-M1C258-A1

REMOVAL AND INSTALLATION > INNER CONSTANT VELOCITY (CV) JOINT BOOT > REMOVAL

1.

Remove the halfshaft. Refer to: Rear Halfshaft .

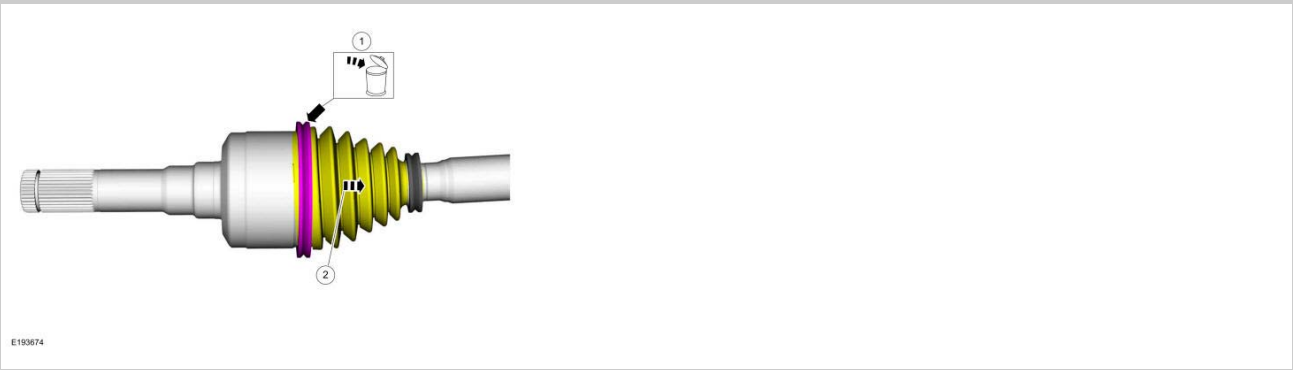
2.

1.

Remove and discard the large CV boot clamp.

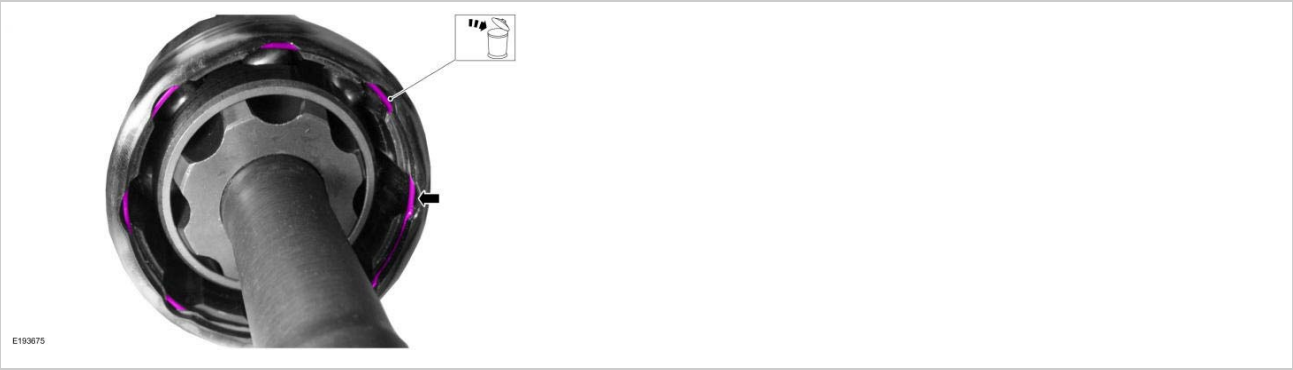
2.

Position the CV boot to access the inner CV housing retaining ring.



3.

Remove and discard the inner CV housing retaining ring.



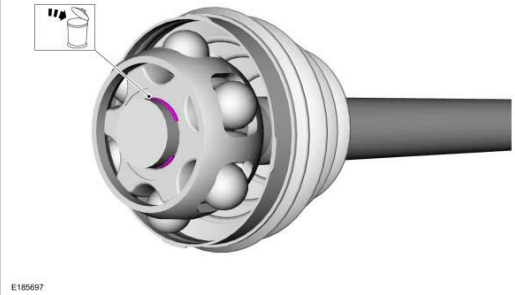
4.

Remove the inner CV joint housing.



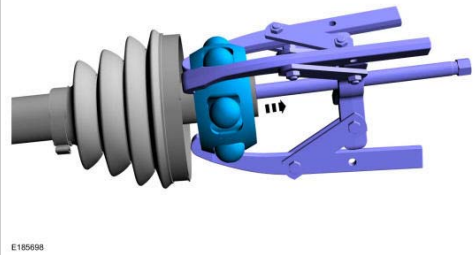
NOTE: The CV joint cage balls are free to fall out.

5.
Remove and discard the CV joint cage circlip.



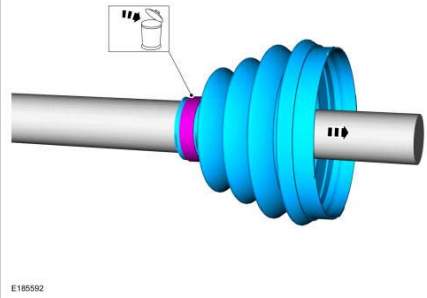
NOTE: The CV joint cage balls are free to fall out.

6.
Using a 3-leg puller, remove the CV joint cage. Use the General Equipment: Three Leg Puller



7.

Remove and discard the small clamp and remove the CV joint boot.



REMOVAL AND INSTALLATION > INNER CONSTANT VELOCITY (CV) JOINT BOOT >

INSTALLATION

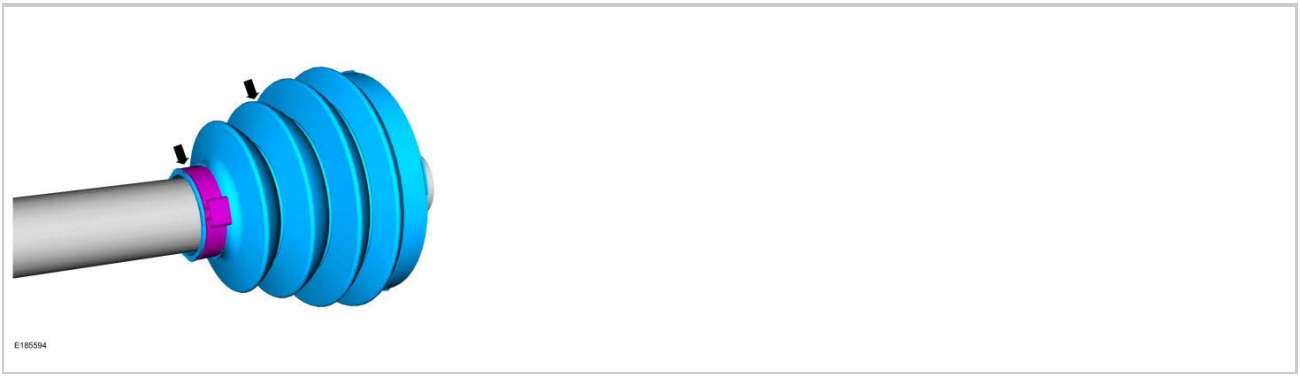
NOTE: CV cage is shown in illustration assembled.

1.
Clean and inspect the CV joint cage.



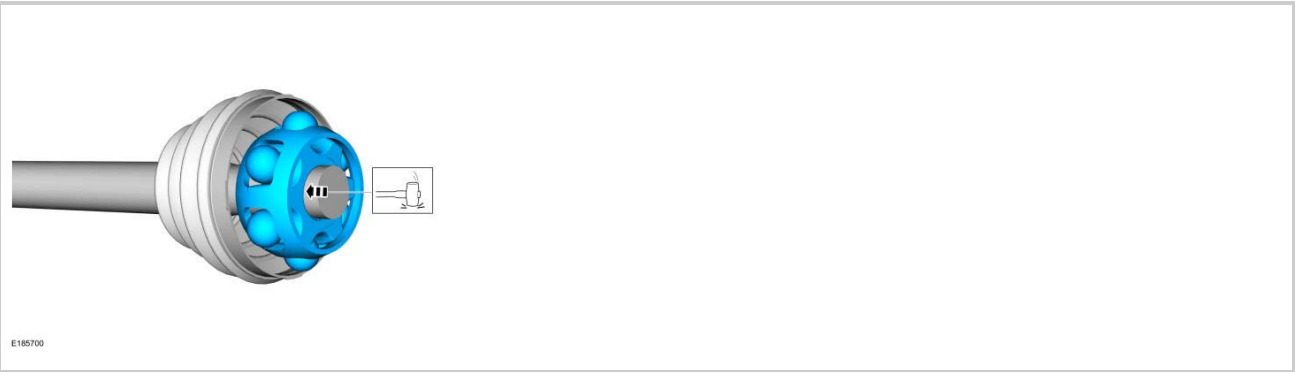
2.

Using boot clamp pliers, install the new CV joint boot and the new small CV joint boot clamp. Use the General Equipment: Boot Clamp Pliers



NOTE: The CV joint cage is a snug fit and may need to tapped on with a soft face mallet.

3.
Using a soft face mallet, install the CV joint cage. Use the General Equipment: Rubber Mallet



4.

Install the new CV joint cage circlip.



5.

Install the grease sachet evenly in the CV joint boot and housing.

Material

: Constant Velocity Joint Grease (High Temperature) / XG-5 (WSS-M1C258-A1)



NOTE: When installing the CV joint housing, insert a small flat blade screwdriver under the CV joint boot seat to allow air to escape.

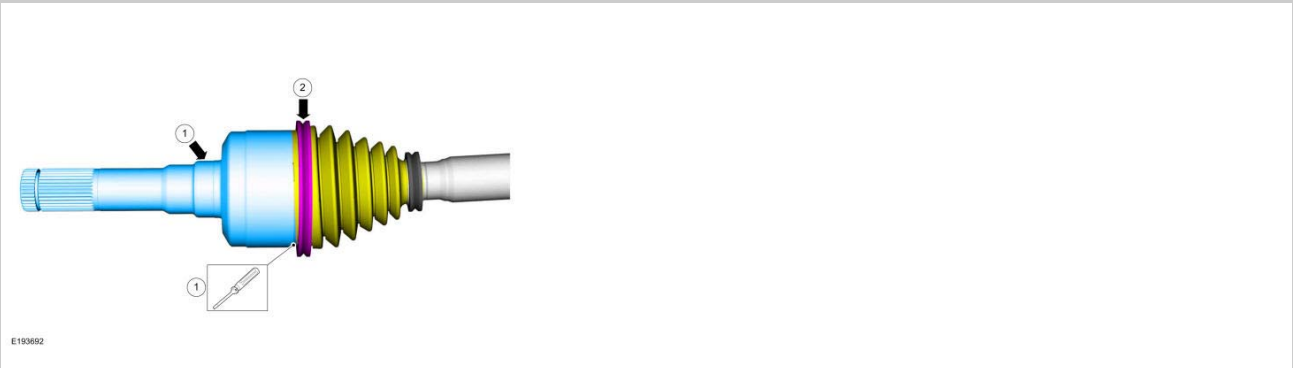
6.
Install the inner CV housing.

1.

Using a flat blade screw driver to allow air to escape, install the CV joint housing. Use the General Equipment: Flat Headed Screw Driver

2.

Using boot clamp pliers, install the new large CV joint boot clamp. Use the General Equipment: Boot Clamp Pliers



7.

Install the halfshaft. Refer to: Rear Halfshaft .

REMOVAL AND INSTALLATION > OUTER CONSTANT VELOCITY (CV) JOINT BOOT

Special Tool(s) / General Equipment

Flat Headed Screw Driver
Boot Clamp Pliers

REMOVAL AND INSTALLATION > OUTER CONSTANT VELOCITY (CV) JOINT BOOT > REMOVAL

NOTE: Only the RH halfshaft outer CV joint boot is serviceable.

1.

Remove the inner CV joint boot. Refer to: Inner Constant Velocity (CV) Joint Boot .

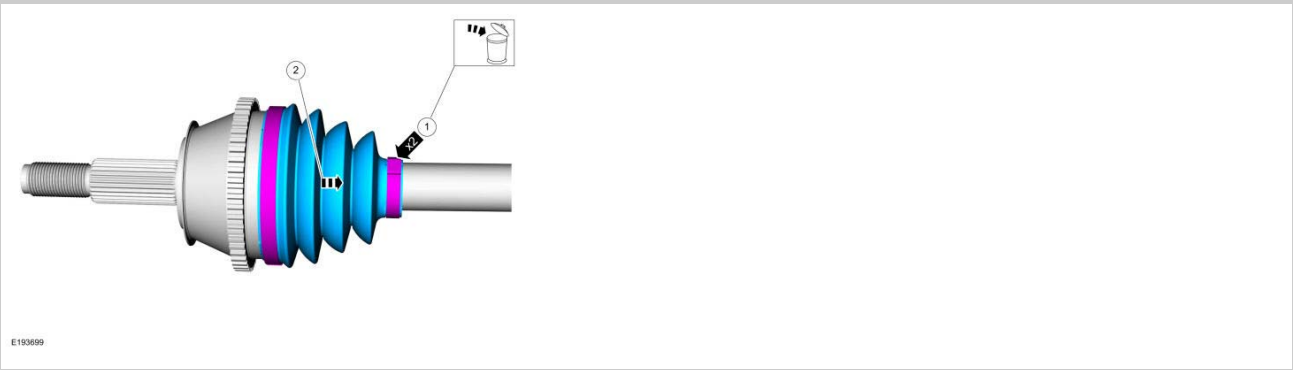
2.

1.

Remove and discard the CV joint boot clamps.

2.

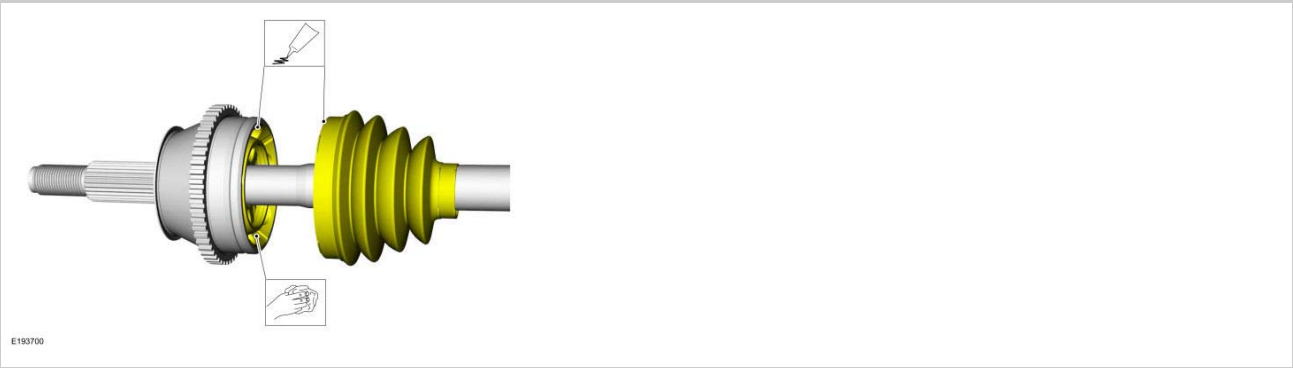
Remove the CV joint boot.



REMOVAL AND INSTALLATION > OUTER CONSTANT VELOCITY (CV) JOINT BOOT > INSTALLATION

1.

Clean and inspect the CV joint cage. Install The grease sachet evenly in the CV joint boot and housing.



2.

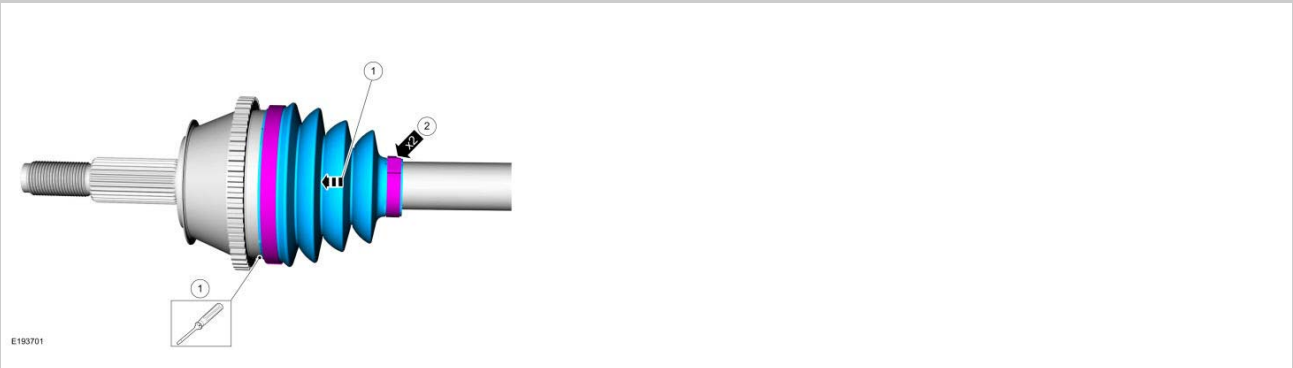
Install the CV joint housing.

> *NOTE: When installing the CV joint housing, insert a small flat blade screwdriver under the CV joint boot seat to allow air to escape.*

1.
Using a flat blade screw driver to allow air to escape, install the CV joint housing. Use the General Equipment: Flat Headed Screw Driver

2.

Using boot clamp pliers, install the new CV joint boot clamps. Use the General Equipment: Boot Clamp Pliers



3.

Install the halfshaft. Refer to: Rear Halfshaft .

REMOVAL AND INSTALLATION > REAR HALFSHAFT > REMOVAL

NOTE: Never pick up or hold the halfshaft by only the inner or outer Constant Velocity (CV) joint. Damage to the CV joint will occur.

NOTE: Never use a hammer to remove or install the halfshafts. Damage to the CV joint may occur.

NOTE: Never use the halfshaft assembly as a lever to position other components. Damage to the halfshaft or CV joint may occur.

NOTE: Do not allow the boots to contact sharp edges or hot exhaust components. Damage to the halfshaft boots will occur.

NOTE: Do not drop assembled halfshafts. The impact may cut the boots from the inside without evidence of external damage.

1.

Remove the wheel knuckle. Refer to: Wheel Knuckle .

2.

Using a pry bar, remove the halfshaft.



3.

Inspect the inner halfshaft seal surface and splines for damage. Remove and discard the inner halfshaft circlip.



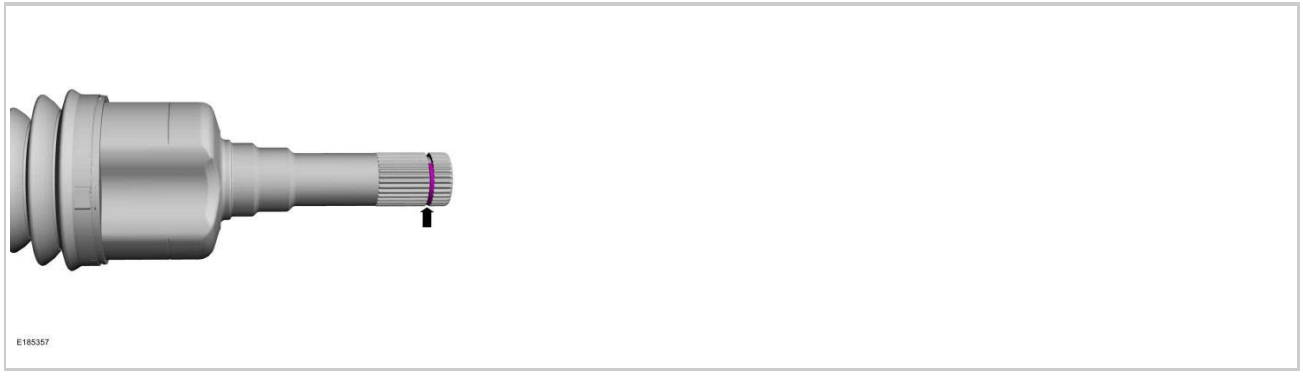
REMOVAL AND INSTALLATION > REAR HALFSHAFT > INSTALLATION

NOTE: The halfshaft seal has to be replaced whenever the halfshaft is removed.

1.
Replace the halfshaft seal. Refer to: Rear Halfshaft Seal .

2.

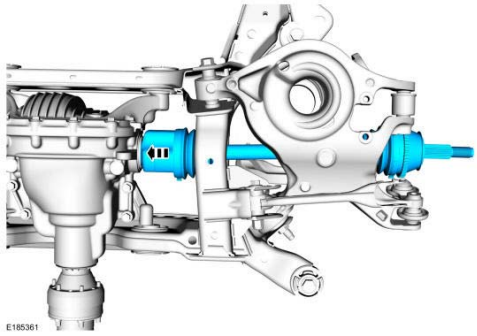
Install a new inner halfshaft circlip.



NOTE: When seated correctly, the halfshaft retainer circlip can be felt as it snaps into the differential side gear groove.

NOTE: After insertion, pull the halfshaft inner end to make sure the circlip is locked.

3.
Install the halfshaft until the halfshaft circlip is fully seated.



4.

Install the wheel knuckle. Refer to: Wheel Knuckle .

5.

Check and top off the rear differential fluid. Refer to: DIFFERENTIAL FLUID LEVEL CHECK .

Service Manual: BATTERY, MOUNTING AND CABLES

SPECIFICATIONS > SPECIFICATIONS

General Specifications

5.2L Ti-VCT (SVT) vehicles	
Item	Specification
Voltage	12 Volts
Battery amps rating	43 amp/hr
Cold Cranking Amps (CCA) measured at -18 C (-0.4 F)	390 Cold Cranking Amps (CCA)

All other vehicles	
Item	Specification
Voltage	12 Volts
Battery amps rating	56 amp/hr
Cold Cranking Amps (CCA) measured at -18 C (-0.4 F)	590 Cold Cranking Amps (CCA)

DESCRIPTION AND OPERATION > BATTERY AND CABLES - OVERVIEW > OVERVIEW

The battery and cable system consists of the following:

- Battery
- Battery cable, with a battery current sensor and a generator current sensor
- BJB
- Battery tray

DESCRIPTION AND OPERATION > BATTERY AND CABLES - SYSTEM OPERATION AND COMPONENT DESCRIPTION

System Operation

DESCRIPTION AND OPERATION > BATTERY AND CABLES - SYSTEM OPERATION

AND COMPONENT DESCRIPTION > BATTERY AND CABLES

The battery is a 12V DC source connected in a negative ground system and is a voltage stabilizer for the 12V electrical system.

The battery cable has a battery current sensor and a generator current sensor attached to the cable. Refer to: Charging System - System Operation and Component Description .

NOTE: The 5.2L Ti-VCT (SVT) vehicles do not have state-of-charge battery eye.

NOTE: The primary purpose of the battery eye is to be a quick indicator of the battery's state-of-charge for the dealership pre-delivery process.

The battery eye indicates the battery state-of-charge by responding to the specific gravity of a single battery cell electrolyte. The battery eye has a viewing plate, 2 colored balls of different specific gravity and a small passage. As the battery's state-of-charge and specific gravity changes, the balls change their position in the passageway and display a different color in the viewing eye.

Do not install a new battery based only on the battery eye color. The battery eye color simply indicates the battery state-of-charge, not its condition. For example, a red or yellow/black battery eye usually indicates the battery is discharged, not defective. If the battery eye indicates the battery may be discharged, recharge the battery before testing its condition.

- Red - low state-of-charge
- Yellow/Black - between high and low state-of-charge
- Green - high state-of-charge
- No color can occur after the battery has been in service for several years and some of the plate material has coated the balls
- A clear battery eye can occur if the battery case becomes damaged and the electrolyte has fallen below the plates

DIAGNOSIS AND TESTING > BATTERY

Special Tool(s)

 E165532	GR1 190 V3.0 Intelligent Diagnostic Charger 162-00036

Battery Condition Test

Battery condition is determined by measuring battery terminal voltage after a specific discharge current

is applied for a specified time period.

Visual Inspection and Diagnostic Pre-checks

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

- Inspect wiring, terminals and connectors.
- Inspect the battery.
- Inspect the battery mounting.
- Inspect the BJB connections.

PINPOINT TEST A : BATTERY CONDITION TEST

> *NOTE: Failure to fully charge the battery before retesting may cause false readings.*

> *NOTE: A red state-of-charge battery eye indicates the battery is discharged, not necessarily damaged.*

> *NOTE: The 5.2L Ti-VCT (SVT) vehicles do not have state-of-charge battery eye.*

A1 TEST THE BATTERY CONDITION

Using the Intelligent Diagnostic Charger and the battery cables removed from the battery, verify the battery condition.

Is the battery OK?

Yes	RETURN the battery to service.

No	If the analyzer reads REPLACE BATTERY or REPLACE-BAD CELL, INSTALL a new battery. REFER to: Battery .

GENERAL PROCEDURES > BATTERY CHARGING

Special Tool(s) / General Equipment

 ST3285-A	162-00036GR-1-190 Diagnostic Charger

Charging

WARNING: Before beginning any service procedure in this article, refer to Safety Warnings in GENERAL INFORMATION . Failure to follow this instruction may result in serious personal injury.

NOTE: Batteries will discharge due to normal parasitic key off-loads when the vehicle is on a dealer lot or parked by the customer for an extended period of time. Vehicles still in dealer inventory or in long-term storage may be driven short distances with heavy electrical loads. Over a period of time (30 days or more), this could result in vehicles having shallow or deeply discharged batteries.

NOTE: The vehicle charging system is designed to supply the electrical power needed to maintain the battery near full charge during normal vehicle use. The charging system is not capable of bringing a deeply discharged battery back to near full charge in a short amount of time such as allowing the vehicle to idle for 15 minutes to recharge the battery. Use an external charger to charge discharged batteries.

NOTE: Cold batteries will not readily accept a charge. Allow batteries to warm to approximately 5 °C (41 °F) before charging. This may require 4 to 8 hours at room temperature.

1.

Disconnect the battery. Refer to: Battery Disconnect and Connect .

2.

Connect the positive (red) charger clamp to the positive battery post. Use Special Service Tool: 162-00036 GR-1-190 Diagnostic Charger.

3.

Connect the negative (black) charger clamp to the negative battery post.

4.

Charge the battery following the battery charger manufacturer's instructions.

GENERAL PROCEDURES > BATTERY DISCONNECT AND CONNECT

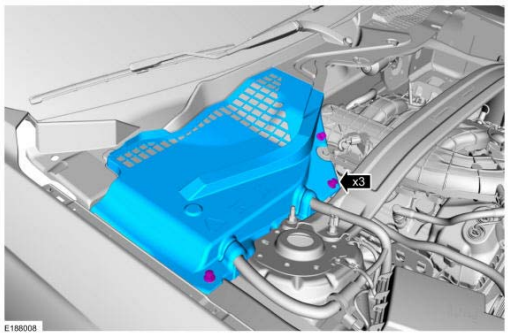
Disconnect

NOTE: When the battery is disconnected and connected, some abnormal drive symptoms may occur while the vehicle relearns its adaptive strategy. The vehicle may need to be driven to allow the PCM to relearn the adaptive strategy values.

NOTE: The following 2 steps are for disconnecting the negative battery cable to interrupt power to the vehicle electrical system. It is not necessary to disconnect the positive battery cable.

1.

Remove the retainers and the battery cover.

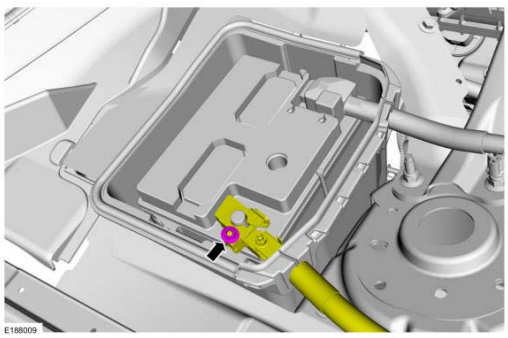


2.

Loosen the nut and position the negative battery cable.

Torque

: 44 lb.in (5 Nm)

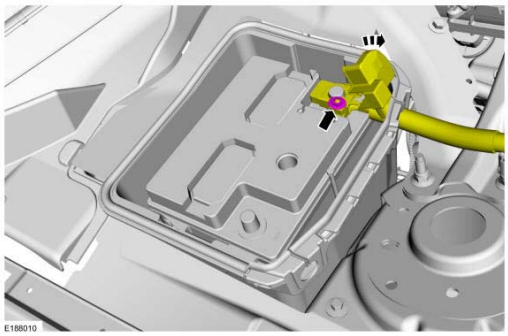


3.

Position the positive battery cable cover, loosen the nut and position the positive battery cable.

Torque

: 44 lb.in (5 Nm)



Connect

1.

To connect, reverse the disconnect procedure.

GENERAL PROCEDURES > BATTERY DRAIN CHECK

Check

NOTE: No factory-equipped vehicle should have more than a 50 mA (0.050 amp) draw. Check for current drains on the battery in excess of 50 mA (0.050 amp) with all the electrical accessories off and the vehicle at rest for at least 40 minutes. Current drains can be tested with the following procedure.

NOTE: Many electronic modules draw 10 mA (0.010 amp) or more continuously.

NOTE: Typically, a drain of approximately 1 amp is attributed to an engine compartment lamp, glove compartment lamp or interior lamp staying on continually. Other component failures or wiring shorts are located by selectively pulling fuses to pinpoint the location of the current drain. When the current drain is found, the meter reading falls to an acceptable level.

NOTE: To accurately test the drain on a battery, an in-line ammeter must be used between the negative battery post and its respective cable. Use of a test lamp or voltmeter is not an accurate method.

1.

Make sure the junction box(es)/fuse panel(s) are accessible without turning on the interior lights or the underhood lights.

2.

Drive the vehicle for at least 5 minutes over 48 km/h (30 mph) to activate the vehicle systems.

3.

Allow the vehicle to sit with the ignition off for at least 40 minutes to allow the modules to time out/power down.

4.

Connect a fused jumper wire (30A) between the negative battery cable and the negative battery post to prevent modules from resetting.

5.

Disconnect the negative battery cable from the negative battery post without breaking the connection of the fused jumper wire.

> *NOTE: The meter must be capable of reading milliamps and should have a 10 amp capability.*

> *NOTE: It is very important that continuity is not broken between the battery and the negative battery cable when connecting the meter. If this happens, repeat the time out/power down procedure.*

6.
Connect a meter between the negative battery cable terminal and the negative battery post.

> *NOTE: If the meter settings need to be switched or the test leads need to be moved to another jack, reinstall the fused jumper wire to avoid breaking continuity.*

7.
Remove the fused jumper wire.

8.

Note the amperage draw. Draw varies from vehicle to vehicle depending on the equipment package. Compare to a similar vehicle for reference.

> *NOTE: For vehicles equipped with aftermarket equipment containing electrical connections, disconnect the aftermarket to factory connections to isolate the body from the chassis.*

NOTE: If the vehicle sits for an extended period of time and the battery drains, there is the possibility of a control module staying alive and not going into sleep mode. If a control module stays alive, it can result in battery drain. If a control module is suspected, isolate individual modules by disconnecting them one at a time and note if the excessive draw goes away.

9.

If the current draw is excessive, remove the fuses from the BJB one at a time and note the current drop. When the current level drops to an acceptable level after removing a fuse, the circuit containing the excessive draw has been located. The excessive draw can be isolated by continuing to pull subsystem fuses. Do not reinstall the fuses until testing is finished. To correctly isolate each of the circuits, all of the fuses may need to be removed, then install one fuse and note the amperage draw, remove the fuse and install the next fuse. Continue this process with each fuse.

10.

Once the main circuit is identified, continue to remove the fuses from the BCM one at a time and note the current reading. Do not reinstall the fuses until testing is finished. To correctly isolate each of the circuits, all of the fuses may need to be removed, then install one fuse and note the amperage draw, remove the fuse and install the next fuse. Continue this process with each fuse.

11.

Check the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION for any circuits that run from the battery without passing through the BJB or the BCM. If the current draw is still excessive, disconnect these circuits until the draw is found. Also, disconnect the generator electrical connections and retest if the draw cannot be located. The generator may be internally shorted, causing the current drain.

REMOVAL AND INSTALLATION > BATTERY > REMOVAL

1.

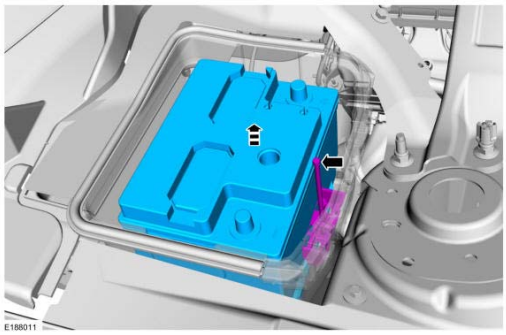
Disconnect the battery. Refer to: Battery Disconnect and Connect .

2.

Loosen and remove the battery hold-down bolt and clamp. Remove the battery.

Torque

: 71 lb.in (8 Nm)



REMOVAL AND INSTALLATION > BATTERY > INSTALLATION

1.

To install, reverse the removal procedure.

2.

If installing a new battery, use the scan tool to carry out the Battery Monitoring System (BMS) reset after the battery is connected.

REMOVAL AND INSTALLATION > BATTERY CABLES - 2.3L ECOBOOST (201KW 273PS) > REMOVAL

NOTE: This procedure provides information about routing, retaining points and connectors of the cable. It does not include the steps for removing components to gain access to the cable.

1.

With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

2.

Disconnect the battery. Refer to: Battery Disconnect and Connect .

3.

1.

Torque

: 44 lb.in (5 Nm)

2.

Torque

: 80 lb.in (9 Nm)

3.

Torque

: 106 lb.in (12 Nm)

4.

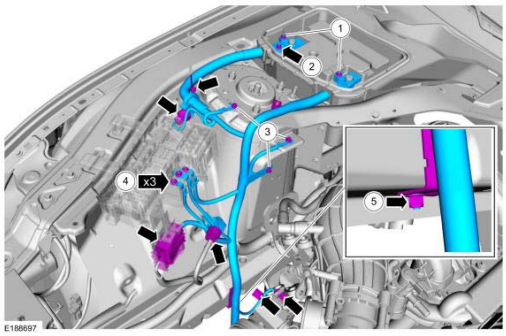
Torque

: 89 lb.in (10 Nm)

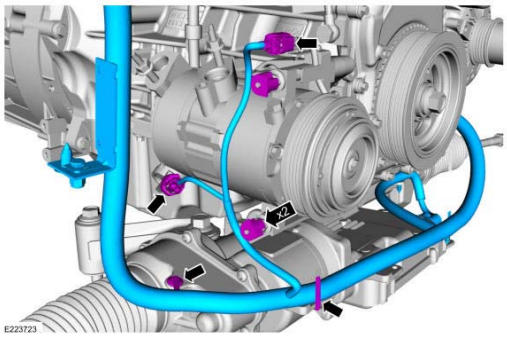
5.

Torque

: 89 lb.in (10 Nm)



4.



5.

1.

Torque

: 18 lb.ft (25 Nm)

2.

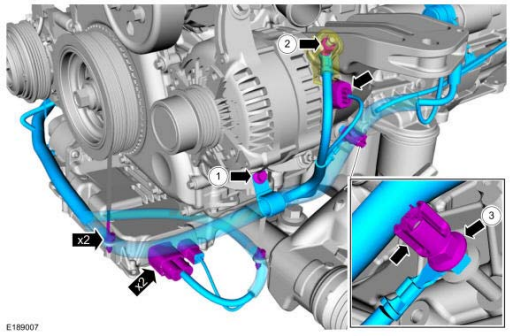
Torque

: 150 lb.in (17 Nm)

3.

Torque

: 35 lb.ft (47 Nm)



NOTE: Vehicle with manual transmission shown, automatic transmission similar.

6.

1.

Torque

: 106 lb.in (12 Nm)

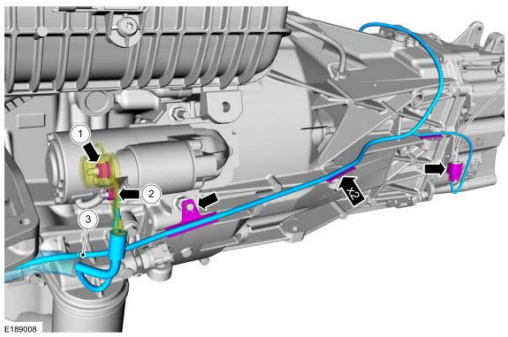
2.

Torque

: 53 lb.in (6 Nm)

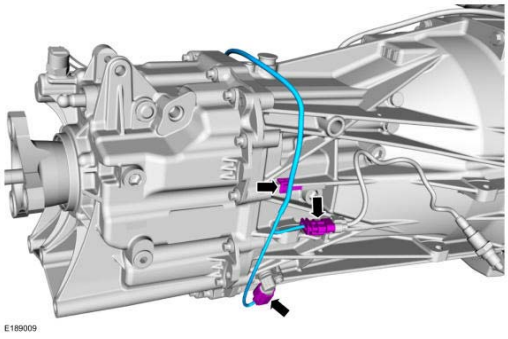
3.

If equipped with a manual transmission.



Vehicles with manual transmission

7.



REMOVAL AND INSTALLATION > BATTERY CABLES - 2.3L ECOBOOST (201KW 273PS) > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > BATTERY CABLES - 3.7L DURATEC (227KW 301PS) > REMOVAL

NOTE: This procedure provides information about routing, retaining points and connectors of the cable. It does not include the steps for removing components to gain access to the cable.

1.

With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

2.

Disconnect the battery. Refer to: Battery Disconnect and Connect .

3.

1.

Torque

: 44 lb.in (5 Nm)

2.

Torque

: 80 lb.in (9 Nm)

3.

Torque

: 106 lb.in (12 Nm)

4.

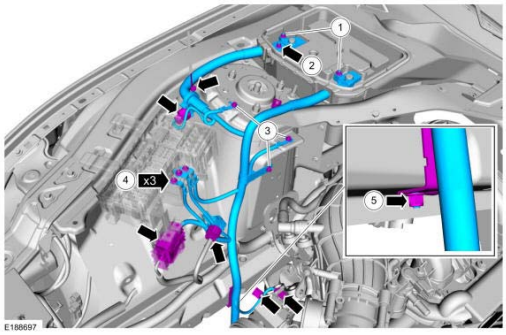
Torque

: 89 lb.in (10 Nm)

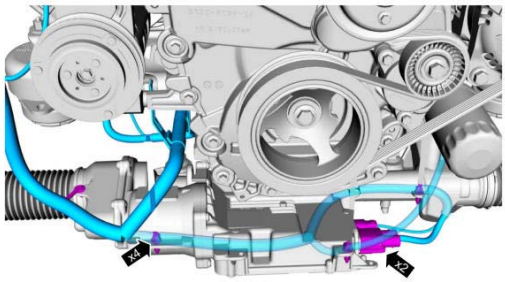
5.

Torque

: 89 lb.in (10 Nm)



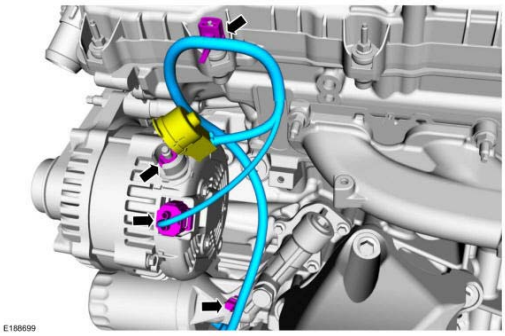
4.



5.

Torque

: 150 lb.in (17 Nm)



NOTE: Vehicle with manual transmission shown, automatic transmission similar.

6.

1.

Torque

: 53 lb.in (6 Nm)

2.

Torque

: 106 lb.in (12 Nm)

3.

If equipped with a manual transmission.

4.

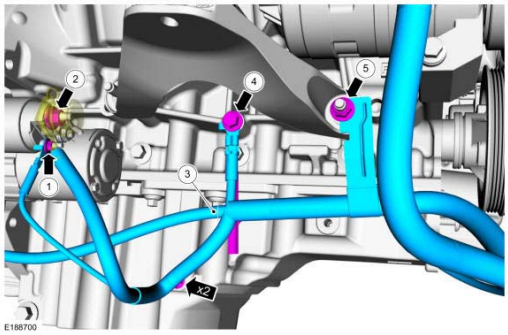
Torque

: 35 lb.ft (47 Nm)

5.

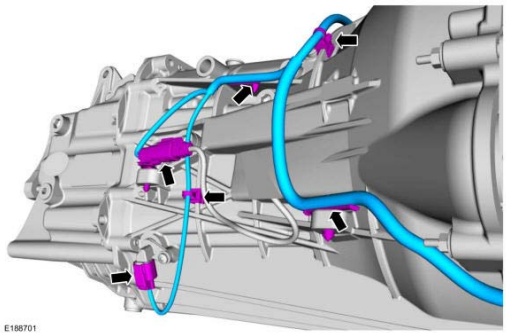
Torque

: 35 lb.ft (47 Nm)

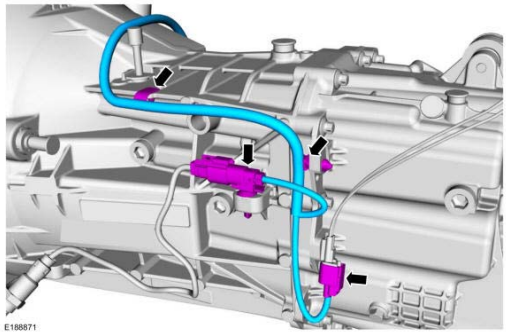


Vehicles with manual transmission

7.



8.



REMOVAL AND INSTALLATION > BATTERY CABLES - 3.7L DURATEC (227KW 301PS) > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > BATTERY CABLES - 5.0L 32V TI-VCT > REMOVAL

NOTE: This procedure provides information about routing, retaining points and connectors of the cable. It does not include the steps for removing components to gain access to the cable.

1.

With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

2.

Disconnect the battery. Refer to: Battery Disconnect and Connect .

3.

1.

Torque

: 44 lb.in (5 Nm)

2.

Torque

: 80 lb.in (9 Nm)

3.

Torque

: 106 lb.in (12 Nm)

4.

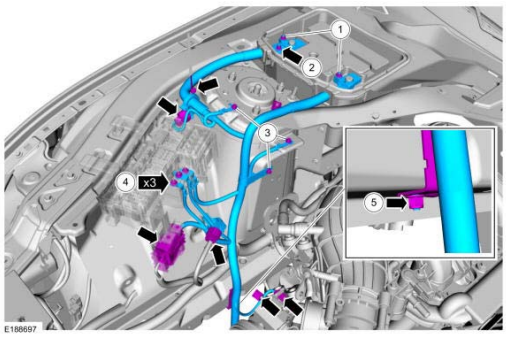
Torque

: 89 lb.in (10 Nm)

5.

Torque

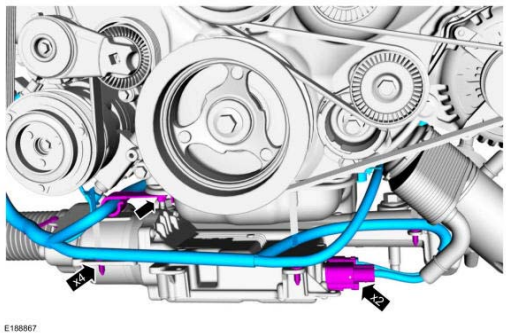
: 89 lb.in (10 Nm)



4.

Torque

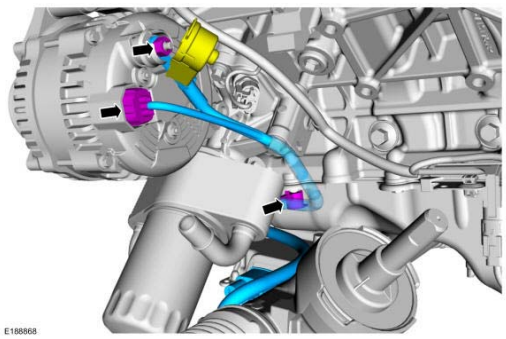
: 115 lb.in (13 Nm)



5.

Torque

: 150 lb.in (17 Nm)



NOTE: Vehicle with manual transmission shown, automatic transmission similar.

6.

1.

If equipped with a manual transmission.

2.

Torque

: 53 lb.in (6 Nm)

3.

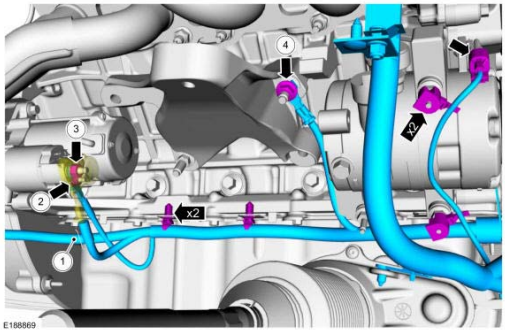
Torque

: 106 lb.in (12 Nm)

4.

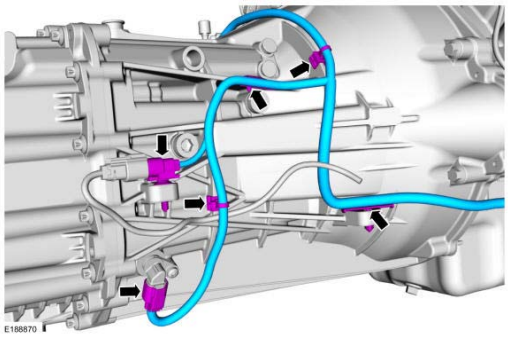
Torque

: 35 lb.ft (47 Nm)

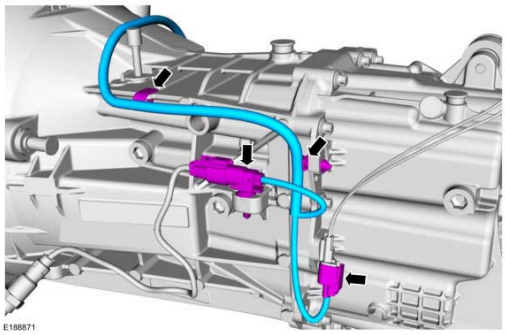


Vehicles with manual transmission

7.



8.



REMOVAL AND INSTALLATION > BATTERY CABLES - 5.0L 32V TI-VCT > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > BATTERY CABLES - 5.2L 32V TI-VCT > REMOVAL

NOTE: This procedure provides information about routing, retaining points and connectors of the cable. It does not include the steps for removing components to gain access to the cable.

1.

With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

2.

Disconnect the battery. Refer to: Battery Disconnect and Connect .

3.

1.

Torque

: 44 lb.in (5 Nm)

2.

Torque

: 80 lb.in (9 Nm)

3.

Torque

: 106 lb.in (12 Nm)

4.

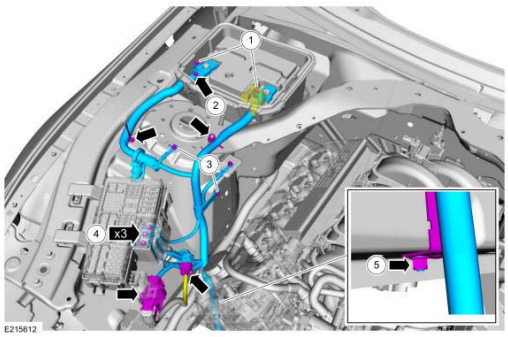
Torque

: 89 lb.in (10 Nm)

5.

Torque

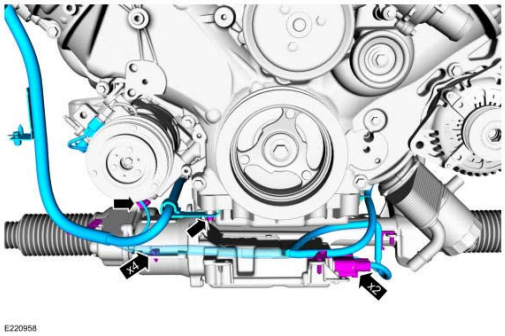
: 89 lb.in (10 Nm)



4.

Torque

: 115 lb.in (13 Nm)



5.

Torque

: 150 lb.in (17 Nm)



6.

1.

Torque

: 106 lb.in (12 Nm)

2.

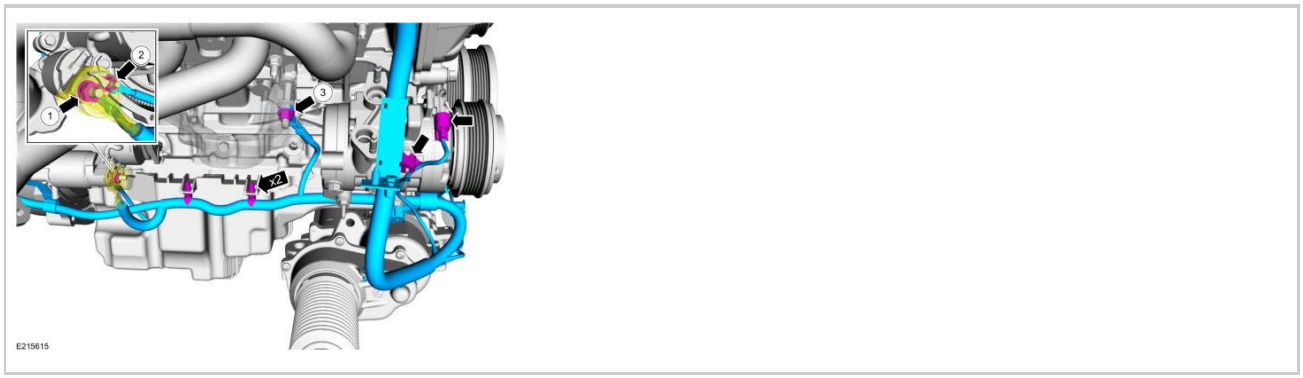
Torque

: 53 lb.in (6 Nm)

3.

Torque

: 35 lb.ft (47 Nm)



7.

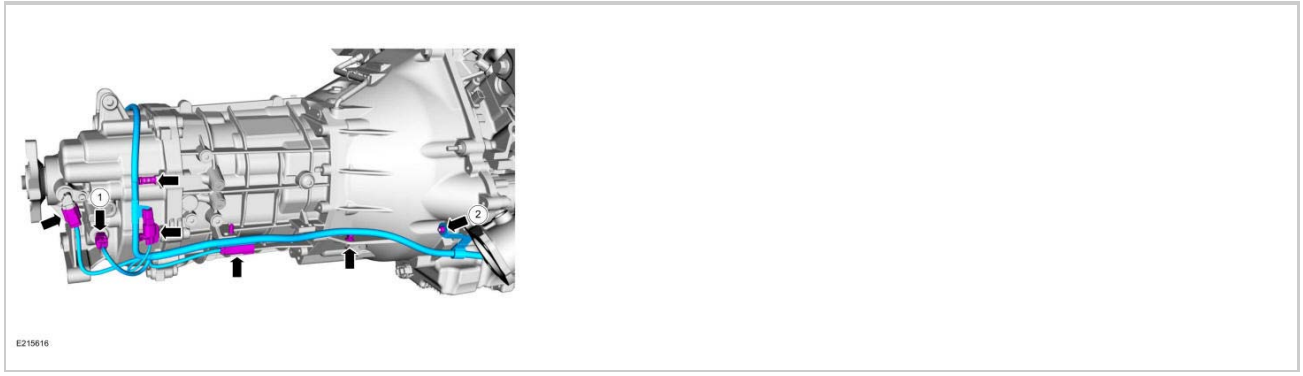
1.

If equipped.

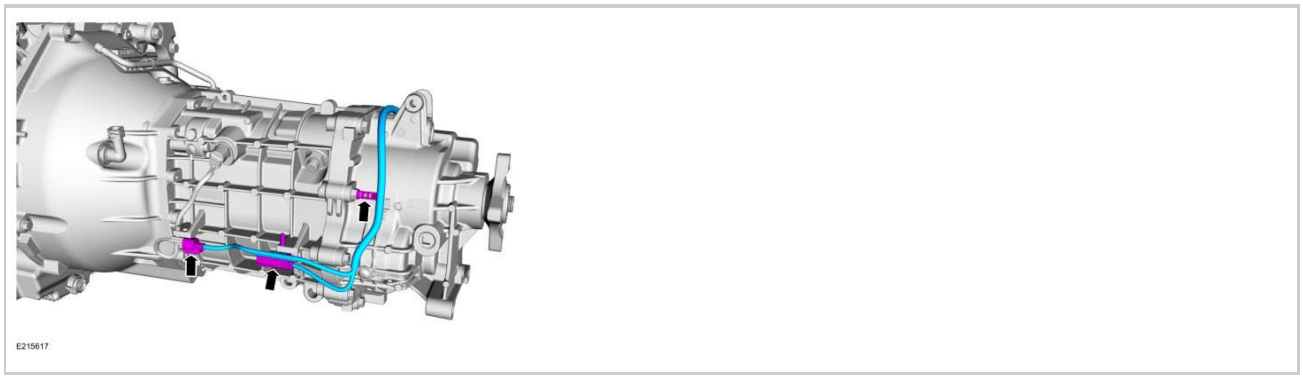
2.

Torque

: 89 lb.in (10 Nm)



8.



REMOVAL AND INSTALLATION > BATTERY CABLES - 5.2L 32V TI-VCT > INSTALLATION

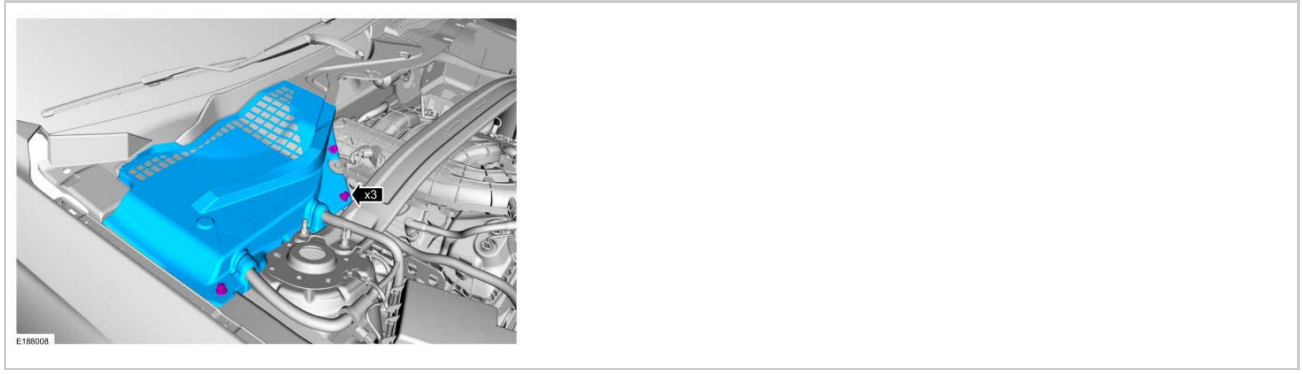
1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > BATTERY CURRENT SENSOR > REMOVAL

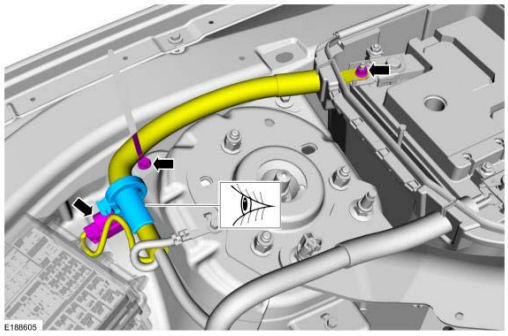
1.

Remove the retainers and the battery cover.



NOTE: Note the orientation and position of the battery current sensor tape tab.

2.
Remove the nut, disconnect the battery cable retainer and position the battery cable. Disconnect the battery current sensor electrical connector. Index-mark the battery cable at the battery current sensor. Remove and discard the tape securing the battery current sensor to the battery cable and remove the battery current sensor.



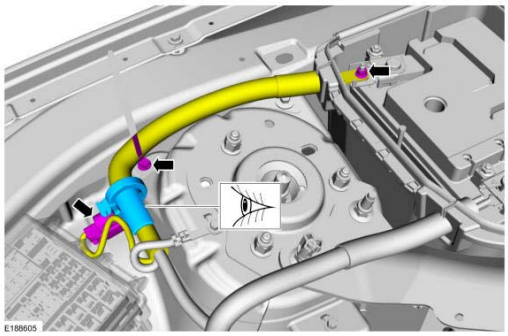
REMOVAL AND INSTALLATION > BATTERY CURRENT SENSOR > INSTALLATION

NOTE: The battery current sensor must be installed in the proper position and orientation to function correctly.

1.
With the battery current sensor tape tab pointing away from the battery, position the battery current sensor to the index-mark on the battery cable and secure with electrical tape. Connect the battery current sensor electrical connector. Position the battery cable and install the wire retainer and nut.

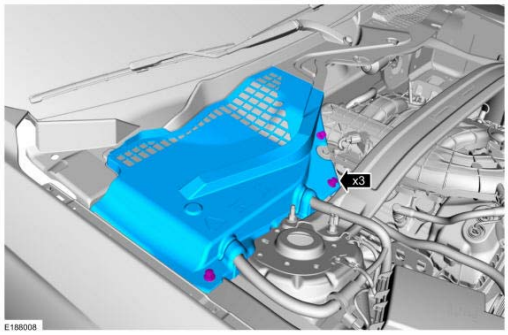
Torque

: 80 lb.in (9 Nm)



2.

Install the battery cover and the retainers.



REMOVAL AND INSTALLATION > BATTERY TRAY > REMOVAL

1.

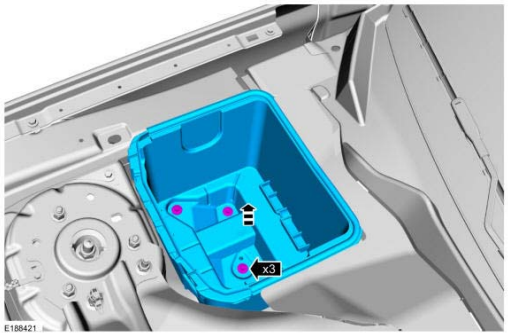
Remove the battery. Refer to: Battery .

2.

Remove the bolts and the battery tray.

Torque

: 89 lb.in (10 Nm)



REMOVAL AND INSTALLATION > BATTERY TRAY > INSTALLATION

1.

To install, reverse the removal procedure.

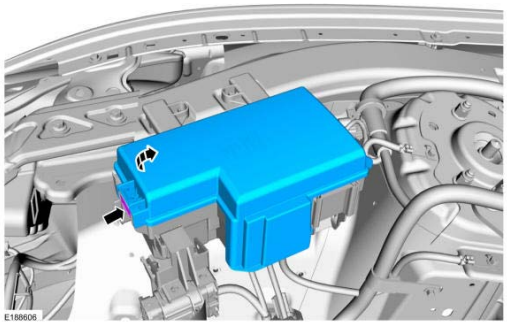
REMOVAL AND INSTALLATION > GENERATOR CURRENT SENSOR > REMOVAL

1.

Disconnect the battery. Refer to: Battery Disconnect and Connect .

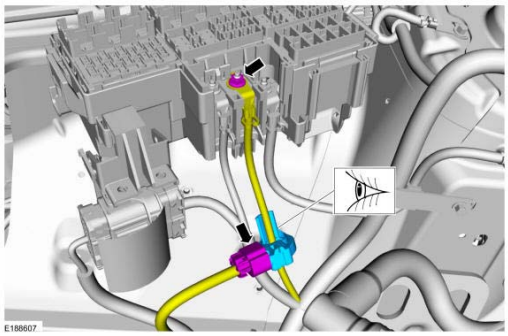
2.

Release the retainer and remove the BJB cover.



NOTE: Note the orientation and position of the generator current sensor tape tab.

3.
Remove the nut and position the battery cable. Disconnect the generator current sensor electrical connector. Index-mark the battery cable at the generator current sensor. Remove and discard the tape securing the generator current sensor to the battery cable and remove the generator current sensor.



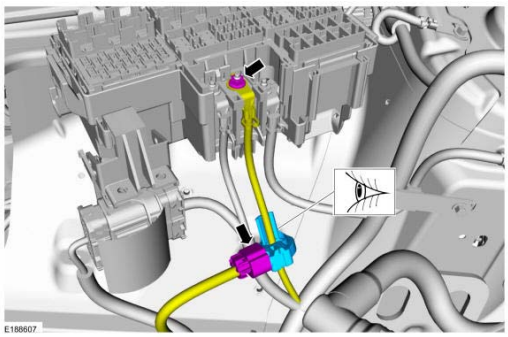
REMOVAL AND INSTALLATION > GENERATOR CURRENT SENSOR > INSTALLATION

NOTE: The generator current sensor must be installed in the proper position and orientation to function correctly.

1.
With the generator current sensor tape tab pointing away from the generator, position the generator current sensor to the index-mark on the battery cable and secure with electrical tape. Connect the generator current sensor electrical connector. Position the battery cable and install the nut.

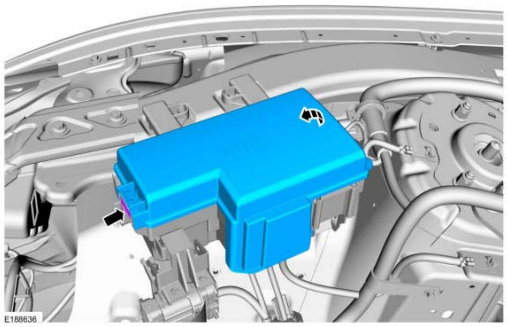
Torque

: 89 lb.in (10 Nm)



2.

Install the BJB cover.



3.

Connect the battery. Refer to: Battery Disconnect and Connect .

DESCRIPTION AND OPERATION > CHARGING SYSTEM - OVERVIEW > OVERVIEW

The generator is driven by the FEAD belt. When the engine is started, the generator begins to generate AC voltage which is internally converted to DC voltage. The DC voltage level is controlled by the voltage regulator (located on the rear of the generator) and is supplied to the battery.

The PCM controls the voltage regulation setpoint and communicates this information to the generator internal voltage regulator over a generator communication (GENCOM) communication circuit. The PCM receives generator load and error conditions from the generator over the generator monitor (GENMON) circuit.

This vehicle is equipped with load shed strategy. With the engine off, the BCM monitors the battery state of charge using the battery current sensor attached to the negative battery cable. With the engine running, the PCM monitors system voltage on the VPWR and PSCM.

The PCM monitors the generator current using the generator current sensor attached to the generator B+ battery cable. The information supplied to the PCM from the generator current sensor is used by the PCM to adjust the engine idle stability and torque control.

DESCRIPTION AND OPERATION > CHARGING SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION

System Operation

DESCRIPTION AND OPERATION > CHARGING SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION > NETWORK MESSAGE CHART

Module Network Input Messages - Body Control Module (BCM)

Broadcast Message	Originating Module	Message Purpose
Alternator fault	PCM	The PCM has detected a fault in the generator or generator circuits.

Module Network Input Messages - Instrument Panel Cluster (IPC)

Broadcast Message	Originating Module	Message Purpose
Power system status	BCM	Reports any generator/charging system faults. Used for charging system fault indicator.
Load Shed Request	BCM	Used to indicate what level of load shed is commanded.

Module Network Input Messages - Powertrain Control Module (PCM)

Broadcast Message	Originating Module	Message Purpose
Load Shed Request	BCM	Used to indicate what level of load shed is commanded.

DESCRIPTION AND OPERATION > CHARGING SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION > CHARGING SYSTEM

The PCM controlled Smart Charge charging system determines the optimal voltage setpoint for the charging system and communicates this information to the voltage regulator. The Smart Charge charging system sets Diagnostic Trouble Codes (DTCs) when a charging system fault is present. All of the Diagnostic Trouble Codes (DTCs) can set continuous faults, but not all Diagnostic Trouble Codes (DTCs) set as on-demand faults.

This system uses 2 communication lines between the PCM and the generator/voltage regulator: A generator communication (GENCOM) line communicates the desired setpoint from the PCM to the voltage regulator, and a generator monitor (GENMON) line communicates the generator load and error conditions to the PCM. Both of these use PWM. The PCM sends the GENCOM command only when it is necessary to adjust the voltage setpoint. If the setpoint does not need to be changed, several seconds may elapse between PCM GENCOM commands. This normal operation appears in the PID as occasional bursts of pulse-width commands. In addition to these two circuits, a third pin on the voltage regulator, the "A" circuit pin, is dedicated to monitor, or sense, the battery voltage.

The PCM simultaneously controls and monitors the generator output. When the current consumption is high or the battery is discharged, the PCM raises engine speed as needed to increase generator output. The generator charges the battery and at the same time supplies power for all of the electrical loads. The battery is more effectively charged with a higher voltage when the battery is cold and a lower voltage when the battery is warm.

The PCM turns off the generator during cranking to reduce the generator load and improve cranking speed. Once the engine starts, the PCM slowly increases generator output to the desired voltage.

The PCM reports any charging system faults and sends a message through the High Speed Controller Area Network (HS-CAN) to the BCM. The BCM controls the charging system warning indicator by sending a message over the Medium Speed Controller Area Network (MS-CAN) to the IPC. The IPC then controls charging system warning indication based on the message from the PCM through the BCM. The status of the PCM charging system warning indicator and/or message is confirmed by viewing PCM PID generator fault indicator lamp (GENFIL). Any charging system fault detected by the PCM results in 1 or more Diagnostic Trouble Codes (DTCs) being set and the PID GENFIL having a status of On. If equipped with a charging system warning indicator, the IPC turns the indicator on or off. If equipped with a message center, the IPC displays a CHECK CHARGING SYSTEM message. In some instances, the CHECK CHARGING SYSTEM message may not display if the ignition is on and the engine is off.

Under certain circumstances, the charging system may have a concern but still keeps the battery charged and the vehicle running. GENCOM normally initiates charging but with a fault in this circuit, the generator can self-excite and start charging on its own. The charging system warning indicator is illuminated and/or the CHECK CHARGING SYSTEM message is displayed, and the generator operates in a default mode (approximately 13.5 volts).

DESCRIPTION AND OPERATION > CHARGING SYSTEM - SYSTEM OPERATION AND

COMPONENT DESCRIPTION > ELECTRICAL ENERGY MANAGEMENT

NOTE: When any vehicle module is being programmed, connect an external battery charger to make sure the module programming is completed without interruption due to the load shedding feature becoming active. The external battery charger must maintain a system voltage above 13 volts. This may require a charger setting higher than the lowest charge setting. The external battery charger negative connection must be made to an engine or vehicle chassis ground and not the negative battery terminal. If the connection is to the negative battery terminal, load shedding may begin and module programming may be corrupted. After charging has begun, start the engine to clear any load shed states and then turn the engine off and proceed with programming.

This vehicle is equipped with an Electrical Energy Management system which manages battery charging and monitors the battery state of charge. The Electrical Energy Management system software is housed in the BCM. It has the algorithms and control structure for the Smart Regenerative Charging, and Load Shed Control Strategy. The Electrical Energy Management system is equipped with 2 unique sensors to monitor the battery depending on the vehicle system features / operation.

- Battery current sensor
- Generator current sensor

These sensors serve as input to the Electrical Energy Management system software. If the sensors malfunction due to wiring issues or failure, a DTC will be set. In most cases the Electrical Energy Management system functions will be turned off until the sensor operation is restored.

DESCRIPTION AND OPERATION > CHARGING SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION > BATTERY STATE OF CHARGE

The BCM uses the battery current sensor to keep track of the battery state of charge. The battery current sensor is a Hall-effect sensor attached to the battery ground cable. During a drive cycle the Electrical Energy Management software adjusts the battery state of charge by monitoring the charge and discharge current and adjusting the state of charge up during charging, and down during discharge. During rest periods (key off with no electrical loads) when the vehicle enters sleep mode, the battery voltage is sampled to calibrate the State of Charge. The BCM automatically executes this calibration anytime the vehicle enters sleep mode and when the total vehicle current draw is below 300mA. It takes 8 hours in the sleep mode to calibrate the battery state of charge to high accuracy. If the system draw does not allow the battery state of charge calibration over the previous 7 to 10 days the State of Charge quality factor changes to flag this and some Electrical Energy Management Functions which rely on the accuracy of the battery state of charge may be temporarily turned off until a calibration takes place.

DESCRIPTION AND OPERATION > CHARGING SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION > ENGINE OFF LOAD SHED

When the engine is off, and the BCM determines the battery state of charge is below 40% or 10% of the charge has been drained or 45 minutes have elapsed, a load shed message is sent over the CAN. This message turns off the audio/navigation system to save the remaining battery charge. Under this condition, the FDIM displays SYS OFF TO SAVE BATT (without navigation) or BATTERY SAVER - SYSTEM OFF PLEASE START THE ENGINE (with navigation) to notify the driver that battery protection actions are

active.

Engine off load shed occurs when the engine is not running, and the ignition is in the ACC or RUN position. To clear the load shed state, restart the engine.

> *NOTE: To maintain correct operation of the load shed system, any electrical devices or equipment must be grounded to the engine or chassis ground and not the negative battery terminal. A connection to the negative battery terminal may cause an inaccurate measurement of the battery state of charge and may cause incorrect load shed system operation.*

When the ignition is in the RUN position and load shed occurs, the IPC message center displays either TURN POWER OFF TO SAVE BATT (base message center) or TURN POWER OFF TO SAVE BATTERY (optional message center). The audio/navigation system will shut down after the message center displays it's warning.

If a fault occurs with the battery current sensor or circuit(s), the only engine off load shed strategy is a 45 minute timer. After 45 minutes have elapsed, the audio/navigation system turns off. To clear the load shed state, restart the engine.

DESCRIPTION AND OPERATION > CHARGING SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION > ENGINE RUNNING LOAD SHED

When the BCM and/or PSCM voltage is low, with the engine running, a message is sent by the BCM to either minimize or shut down the climate controlled seats, rear defrost, heated mirrors and DATC blower motor to improve system voltage. Under this condition, the IPC message center displays either LOW BATTERY LESS FEATURES (base message center) or LOW BATTERY FEATURES TEMPORARILY TURNED OFF (optional message center) to notify the driver that battery protection actions are active.

For more information on message center messages, Refer to the Owner's Literature or Refer to: Message Center - System Operation and Component Description .

There are 3 states of engine running load shed:

Load Shed State	Entry Conditions	Impact to Features	Clear Conditions
Load shed 1	If vehicle speed is **below 16 km/h (10 mph)** , and voltage to the PSCM is less than 11.5 volts or the PSCM measures current draw greater than 0 amps. If vehicle speed is **above 16 kp/h (10 mph)** , and the voltage to the BCM is less than 11.6 volts.	These loads are incrementally reduced (if equipped): Heated steering wheel and climate controlled seats. These loads are turned off (if equipped): smart trailer tow battery charge, heated mirrors, heated backglass, and heated windshield.	Voltage to the BCM is greater than 12.7 volts **or** the generator field duty cycle is less than 88%.
Load shed 2 transient	PSCM indicating reduced voltage and increased current. System voltage less than 11 volts	If equipped, climate controlled seats are disabled, but the indicators remain illuminated. If equipped, rear defrost and	Voltage to the BCM is greater than 12.4 volts.

		heated mirrors are disabled, but the indicator remain illuminated.	
Load shed 2 continuous	Load Shed 2 Transient condition in excess of 20 seconds	If equipped, climate controlled seats are disabled and the indicators are off. If equipped, rear defrost and heated mirrors are disabled and the indicator is off. If equipped with DATC, the blower motor is reduced to 50% speed. If equipped, DC/AC inverter (AC powerpoint) is disabled. The base IPC message center displays LOW BATTERY LESS FEATURES. The optional IPC message center displays LOW BATTERY FEATURES TEMPORARILY TURNED OFF.	Voltage to the BCM is greater than 12.4 volts for more than 60 seconds.

DESCRIPTION AND OPERATION > CHARGING SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION > BATTERY CHARGING

When charging the vehicle battery by **connecting the charger to engine or chassis ground** , the negative charger clamp must be connected to an unpainted chassis surface or a solid engine component such as a generator mount or engine lifting eye. In this instance, after charging, the BMS Reset **is not required** . Through this method of charging the BCM updates the battery state of charge during the charging process.

When charging the vehicle battery by **connecting the charger to the negative battery terminal is necessary** , such as when using a combination battery charger and battery tester/analyzer, like the GR 1 190 V3.0 Intelligent Diagnostic Charger, the BCM does not immediately update the battery state of charge. In this instance, the BMS Reset must be carried out using a diagnostic scan tool. This reset is needed for proper engine off load shedding and to prevent invoking of engine off load shedding earlier than normal.

If the reset is not carried out, when the battery is charged by connecting the charger to the negative battery terminal, it takes approximately 8 hours for the BCM to learn the new battery state of charge. During this 8 hour period, the vehicle must be undisturbed, with no doors opened or keyless entry button presses. If the vehicle is used before the BCM is allowed to learn the new battery state of charge, engine off load shedding can still occur and a message may be displayed.

DESCRIPTION AND OPERATION > CHARGING SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION > JUMP STARTING

When it is necessary to jump start the vehicle it is important to connect the cables properly in order for the

Electrical Energy Management system to measure the energy input to the system to keep an accurate state of charge. Connect the positive cable to the battery positive post and the jump start negative cable to a vehicle ground. Do not connect to the negative battery terminal. Connecting directly to the battery negative post bypasses the ability of the vehicle to measure the input current, and does not adjust the battery state of charge accordingly. For a good connection point, follow the negative cable from the battery monitoring sensor to the vehicle body connection (typically on the shock tower sheet metal). If the vehicle was improperly jump started, the Electrical Energy Management system calibrates the battery state of charge after about 8 hours.

DESCRIPTION AND OPERATION > CHARGING SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION > BATTERY REPLACEMENT

If the vehicle battery is replaced, it is very important to perform the BMS Reset using a diagnostic scan tool. If the BMS Reset is not carried out, it holds the old battery parameters and time in service counter in memory. Additionally it tells the system the battery is in an aged state and may limit the Electrical Energy Management system functions. For more information, Refer to: BATTERY, MOUNTING AND CABLES .

Component Description

Generator

The generator is equipped with an electronic internal voltage regulator.

Generator Current Sensor

The generator current sensor is attached to the generator B+ cable. It is supplied a 5-volt reference voltage and a ground from the PCM. The generator current sensor is a Hall-effect sensor that supplies an analog feedback signal to the PCM. The PCM uses this information for battery charging strategy and idle stability and torque control.

Battery Current Sensor

The battery current sensor is attached to the battery negative cable. It is supplied a 5-volt reference voltage and a ground from the BCM. The battery current sensor is a Hall-effect sensor that supplies an analog feedback signal to the BCM. The BCM reads the battery current sensor feedback voltage to determine how much current is flowing through the battery ground cable. The BCM uses this information for battery state of charge.

Powertrain Control Module (PCM)

The PCM monitors and controls the charging system.

Generator Clutch

Some vehicles are equipped with a one-way clutch (OWC) in the generator pulley. The primary function is to separate the generator rotor inertia from the FEAD belt, lowering belt tension at high engine deceleration rates and reducing NVH. The generator clutch is serviced separately from the generator.

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 2.3L ECOBOOST (201KW 273PS) > INSPECTION AND VERIFICATION

1.

Verify the customer concern by operating the charging system.

2.

Before diagnosing or repairing the charging system inspect the following items:

- Check the battery for loose, damaged or corroded connections.
- Check the generator for loose, damaged or corroded connections.
- Check engine and battery grounds for loose, damaged or corroded connections.
- Check high current BJB for loose or corroded connections.
- Verify fuses or fusible links.
- Inspect wiring, terminals and connectors.

3.

Check the battery condition and state of charge. REFER to: BATTERY, MOUNTING AND CABLES .

4.

Check for abnormal ignition-off current drain(s). REFER to: Battery Drain Check .

5.

If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding.

6.

Using the diagnostic scan tool, retrieve all Diagnostic Trouble Codes (DTCs). Refer to the appropriate DTC Chart .

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 2.3L ECOBOOST (201KW 273PS) > DTC CHARTS (2.3L)

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

PCM DTC Chart

DTC	Description	Action
P0562	System Voltage Low	GO to Pinpoint Test B
P0563	System Voltage High	GO to Pinpoint Test A
P0620	Generator Control Circuit	GO to Pinpoint Test F
P0625	Generator Field Terminal Circuit Low	GO to Pinpoint Test G
P0626	Generator Field Terminal Circuit High	GO to Pinpoint Test G

P065B	Generator Control Circuit Range/performance	GO to Pinpoint Test F
P0A5A	Generator Current Sensor Circuit Range/Performance	GO to Pinpoint Test E
P0A5B	Generator Current Sensor Circuit Low	GO to Pinpoint Test E
P0A5C	Generator Current Sensor Circuit High	GO to Pinpoint Test E
P1397	System Voltage Out Of Self-Test Range	If combined with P0562, GO to Pinpoint Test B If combined with P0563, GO to Pinpoint Test A
All Other DTCs	-	Refer to ENGINE CONTROLS - SYMPTOM CHARTS (EXCEPT DIESEL & HYBRID) .

BCM DTC Chart

NOTE: Diagnose all PCM DTCs first.

DTC	Description	Action
B130C:12	Load Shed Control Circuit Short To Battery	GO to Pinpoint Test I
B130C:14	Load Shed Control Circuit Short To Ground or Open	GO to Pinpoint Test I
B1438:03	Battery Current Sensor: FM (Frequency Modulated) / PWM (Pulse Width Modulated) Failure	GO to Pinpoint Test I
All Other DTCs	-	REFER to: Body Control Module (BCM) .

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 2.3L ECOBOOST (201KW 273PS) > SYMPTOM CHART(S)

Symptom Chart: Charging System

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

Symptom Chart

Condition	Possible Sources	Actions
System voltage high	Refer to the Pinpoint Test	GO to Pinpoint Test A
System voltage low or battery is discharged	Refer to the Pinpoint Test	GO to Pinpoint Test B

The generator is noisy	Refer to the Pinpoint Test	GO to Pinpoint Test C
Radio interference	Refer to the Pinpoint Test	GO to Pinpoint Test D
Charging system warning indicator is never or always on	Wiring, terminals or connectors IPC Generator PCM	RETRIEVE Diagnostic Trouble Codes (DTCs) from all modules. If any Diagnostic Trouble Codes (DTCs) are found, Refer to DTC Chart . If no Diagnostic Trouble Codes (DTCs) are found, REFER to: Instrumentation, Message Center and Warning Chimes .
Load Shed Message Displays in IPC message center and/or centerstack infotainment display	Refer to the Pinpoint Test	GO to Pinpoint Test H
Battery Saver - System Off displays in centerstack infotainment display	Refer to the Pinpoint Test	GO to Pinpoint Test H

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 2.3L ECOBOOST (201KW 273PS) > PINPOINT TESTS (2.3L) > PINPOINT TEST A : SYSTEM VOLTAGE HIGH

Refer to Charging System for schematic and connector information.

NOTE: Diagnostic Trouble Code (DTC) P0563 can be set if the vehicle has been recently jump started or the battery has been recently charged. The battery may become discharged due to excessive load(s) on the charging system from aftermarket accessories or if vehicle accessories have been operating for an extended period of time without the engine running.

Normal Operation and Fault Conditions

With the engine running, the charging system supplies voltage to the battery and the vehicle electrical system through the high current BJB and battery B+ cable. The voltage that is supplied to the vehicle electrical system is used for the operation of the various vehicle systems and modules. Many modules monitor this voltage and if it rises above or below their calibrated setpoints, a DTC sets.

Diagnostic Trouble Code (DTC) Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
P0563	System Voltage High	This DTC sets in the PCM when the PCM detects voltage from the charging system greater than 15.9 volts with vehicle speed above 8 km/h (5 mph).
P1397	System Voltage Out of Self-Test Range	If the voltage rises above or drops below the calibrated set point, the PCM sets this DTC. This DTC may also be set if the vehicle has been

		recently jump started or has had a discharged battery.

Possible Sources

- Battery
- Generator
- Engine, generator or battery ground
- PCM
- Wiring, terminals or connectors

Visual Inspection and Diagnostic Pre-checks

- Inspect the high current BJB for loose or corroded connections.

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 2.3L ECOBOOST (201KW 273PS) > PINPOINT TESTS (2.3L) > PINPOINT TEST A : SYSTEM VOLTAGE HIGH > PINPOINT TEST A : SYSTEM VOLTAGE HIGH

NOTE: Make sure battery voltage is greater than 12.2 volts prior to and during this pinpoint test.

NOTE: Do not have a battery charger attached during vehicle testing.

A1 PERFORM INSPECTION AND VERIFICATION

Perform Inspection and Verification procedure in this article.

Was an obvious cause for an observed or reported concern found?

Yes	CORRECT the cause as necessary.

No	GO to A2

A2 RETRIEVE THE PCM (POWERTRAIN CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition ON.

Using a diagnostic scan tool, perform the PCM self-test.

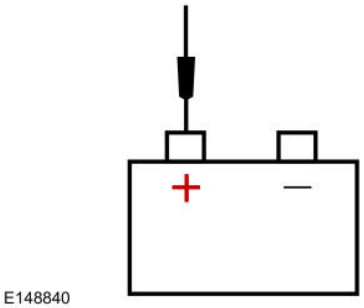
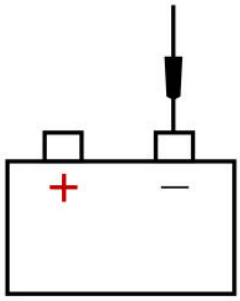
Is DTC P0620, P0625 or P0626 present?

Yes	For DTC P0620, GO to Pinpoint Test F For Diagnostic Trouble Codes (DTCs) P0625 and P0626, GO to Pinpoint Test G

No	GO to A3

A3 COMPARE THE GENERATOR VOLTAGE DESIRED (GENVDSD) PID (PARAMETER IDENTIFICATION) WITH BATTERY VOLTAGE

With the engine running at idle, measure and record:

Positive Lead	Measurement / Action	Negative Lead
 E148840		 E148841

Using a diagnostic scan tool, view the PCM PID GENVDSD.

Is the recorded battery voltage within ±0.5 volt of the PID?

Yes	GO to A6

No	GO to A4

A4 MEASURE THE "A" SENSE VOLTAGE

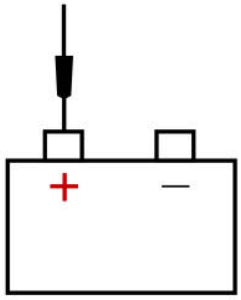
Ignition OFF.

Disconnect Generator C102B .

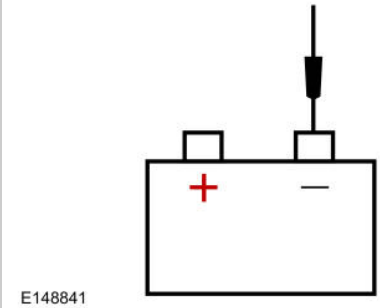
Ignition ON.

Measure and record:

Positive Lead	Measurement / Action	Negative Lead







Measure:

Positive Lead	Measurement / Action	Negative Lead
C102B-3		Ground

Is the "A" sense voltage equal to the recorded battery voltage?

Yes	GO to A5

No	VERIFY the BJB fuse 36 (10A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short.

NOTE: This step puts a load on the "A" sense circuit. If there are corroded or loose connections, loading the circuit may help show the fault. A 250-350 mA incandescent 12-volt test lamp is required for this step. This circuit cannot be loaded correctly using an LED-style test lamp.

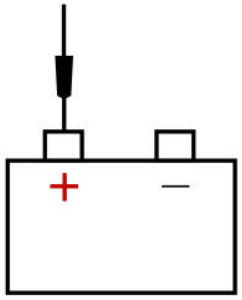
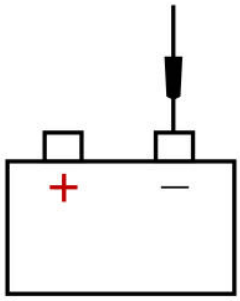
NOTE: The following step uses a test light to simulate normal circuit loads. Use only the test light recommended in the Special Tools table at the beginning of this article. To avoid connector terminal damage, use the Flex Probe Kit for the test light probe connection to the vehicle. Do not use the test light probe directly on any connector.

A5 "A" SENSE CIRCUIT LOAD TEST

Ignition ON.

Measure and record:

Positive Lead	Measurement / Action	Negative Lead

 E148840		 E148841

Connect the load to the circuit and measure:

Positive Lead	Measurement / Action	Negative Lead
C102B-3		Ground

Is the "A" sense voltage within ±0.5 volt of the recorded battery voltage?

Yes	GO to A6

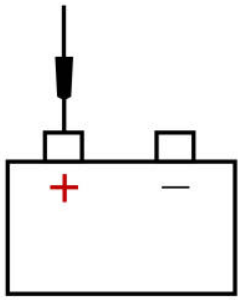
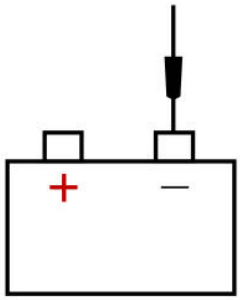
No	VERIFY the BJB fuse 36 (10A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short.

A6 CHECK FOR INTERMITTENT IN THE REGULATOR CIRCUIT

Connect Generator C102B .

Start the engine.

With the engine running at idle, headlamps on and heater blower on high, measure:

Positive Lead	Measurement / Action	Negative Lead
 E148840		 E148841

Perform a wiggle test on the generator wiring and following connections while measuring voltage:

Generator C102B

Inline C1046

Does battery voltage change more than 0.5 volt?

Yes	INSPECT and REPAIR any corrosion in the generator B+ circuit or positive battery cable connections.

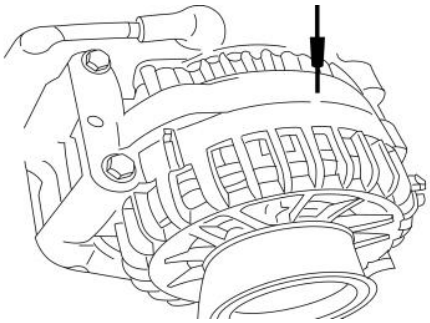
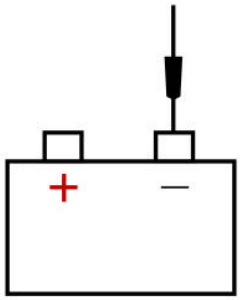
No	GO to A7

A7 CHECK THE VOLTAGE DROP IN THE VEHICLE GROUNDS

Connect Generator C102B .

Start the engine.

With the engine running at idle, headlamps on and heater blower on high, measure:

Positive Lead	Measurement / Action	Negative Lead
 Generator case		 E148841

Is the voltage drop less than 0.5 volt?

Yes	GO to A8

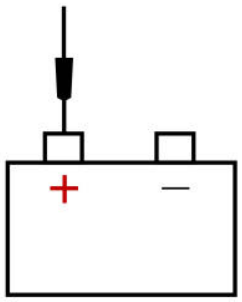
No	INSPECT and REPAIR the engine ground, generator ground or the battery ground for corrosion.

A8 CHECK THE GENERATOR OUTPUT

Increase the engine RPM until the generator starts to generate output.

With the engine running, measure and record:

Positive Lead	Measurement / Action	Negative Lead

 E148840		Ground

Is the voltage above 15.2 volts?

Yes	INSTALL a new generator. REFER to: Generator - 2.3L EcoBoost (201kW/273PS) .

No	GO to A9

A9 MONITOR THE GENERATOR COMMAND (GENCMD), GENERATOR MONITOR (GENMON) AND GENERATOR VOLTAGE DESIRED (GENVDSD) PIDS

Ignition OFF.

Disconnect Generator C102B .

Connect a fused jumper wire:

Positive Lead	Measurement / Action	Negative Lead
C102B-1		C102B-2

Start the engine.

Using a diagnostic scan tool, view PCM Parameter Identifications (PIDs).

Using the active command, set the PID GENVDSD to 14 volts.

Monitor the PCM Parameter Identifications (PIDs) GENMON and GENVDSD.

Do the Parameter Identifications (PIDs) read within 5% of each other?

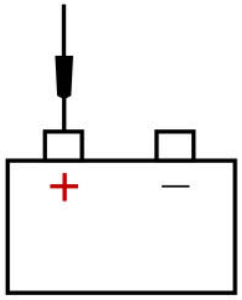
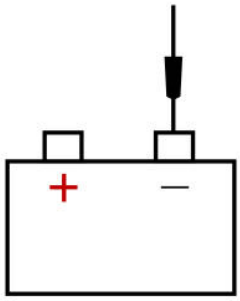
Yes	GO to A10

No	GO to A13

A10 COMPARE THE PCM (POWERTRAIN CONTROL MODULE) SUPPLY VOLTAGE (VPWR) PID (PARAMETER IDENTIFICATION) TO BATTERY VOLTAGE

With the engine running at idle, measure and record:

Positive Lead	Measurement / Action	Negative Lead

 E148840		 E148841

Using a diagnostic scan tool, view PCM Parameter Identifications (PIDs).

Monitor the PCM PID VPWR.

Does the PID accurately display battery voltage within ±0.5 volt of the recorded battery voltage?

Yes	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

No	GO to A11

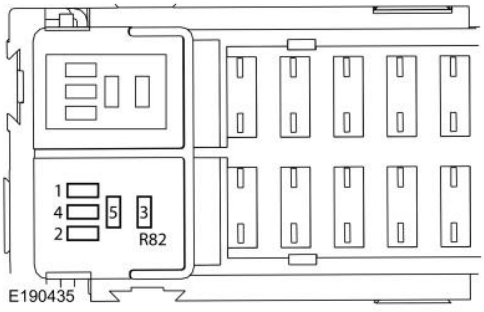
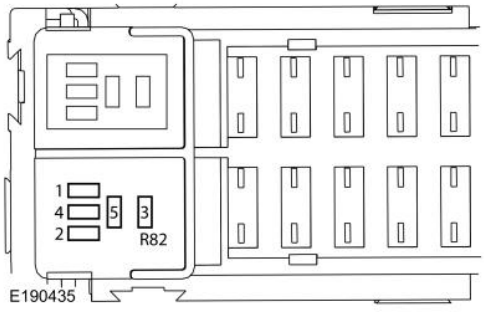
A11 CHECK PCM (POWERTRAIN CONTROL MODULE) SUPPLY VOLTAGE CIRCUITS

Ignition OFF.

Disconnect BJB PCM power relay.

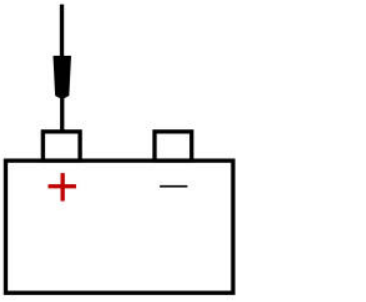
Disconnect PCM C1551B .

Connect a fused jumper wire:

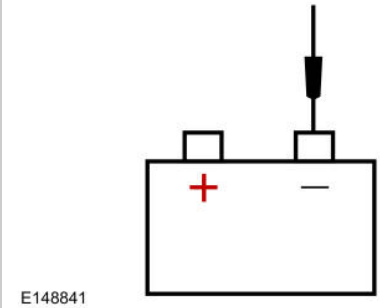
Positive Lead	Measurement / Action	Negative Lead
 E190435 BJB PCM Relay pin 3		 E190435 BJB PCM Relay pin 5

Measure and record:

Positive Lead	Measurement / Action	Negative Lead







NOTE: The following step will load test the circuit. A headlamp bulb would be an effective load. To avoid connector terminal damage, use the Flex Probe Kit for connector connections.

Connect the load to a suitable ground connection.

Connect the load to each circuit and measure:

Positive Lead	Measurement / Action	Negative Lead
C1551B-101		Ground
C1551B-102		Ground
C1551B-103		Ground

Are the voltages within 0.5 volt of the recorded battery voltage?

Yes	REMOVE the fused jumper wire. GO to A12

No	REPAIR the affected circuit(s).

NOTE: The following step will load test the circuit. A headlamp bulb would be an effective load. To avoid connector terminal damage, use the Flex Probe Kit for connector connections.

A12 CHECK PCM (POWERTRAIN CONTROL MODULE) GROUND FOR HIGH RESISTANCE

Connect the load to a suitable 12 volt power connection.

Connect the load to each circuit and measure:

Positive Lead	Measurement / Action	Negative Lead
C1551B-96		Ground
C1551B-97		Ground
C1551B-98		Ground

C1551B-99		Ground

Is the voltage drop less than 0.5 volt?

Yes	GO to A13

No	REPAIR the affected circuit(s).

A13 CHECK FOR CORRECT PCM (POWERTRAIN CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all PCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the PCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PCM. REFER to: Powertrain Control Module (PCM) . CLEAR all Diagnostic Trouble Codes (DTCs) in all modules.

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 2.3L ECOBOOST (201KW 273PS) > PINPOINT TESTS (2.3L) > PINPOINT TEST B : SYSTEM VOLTAGE LOW OR BATTERY IS DISCHARGED

Refer to Charging System for schematic and connector information.

Normal Operation and Fault Conditions

With the engine running, the charging system supplies voltage to the battery and the vehicle electrical system through the high current BJB and battery B+ cable. The PCM monitors this B+ voltage through its own voltage supply circuit.

Diagnostic Trouble Code (DTC) Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
P0562	System Voltage Low	If voltage drops 1.5 volts or more below the generator voltage desired (calculated by the PCM), this DTC sets after 30 seconds.
P1397	System Voltage Out of Self-Test Range	If the voltage rises above or drops below the calibrated set point, the PCM sets this DTC. This DTC may also be set if the vehicle has been recently jump started or has had a discharged battery.

Possible Sources

- Battery
- Fuses or fusible links
- Generator
- Generator clutch
- PCM
- High current BJB
- Wiring, terminals or connectors

Visual Inspection and Diagnostic Pre-checks

- Inspect for abnormal ignition-off current drain(s).
- Inspect the battery.
- Inspect the high current BJB for loose or corroded connections.
- Inspect the generator clutch.

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 2.3L ECOBOOST (201KW 273PS) > PINPOINT TESTS (2.3L) > PINPOINT TEST B : SYSTEM VOLTAGE LOW OR BATTERY IS DISCHARGED > PINPOINT TEST B : SYSTEM VOLTAGE LOW OR BATTERY IS DISCHARGED

NOTE: Make sure battery voltage is greater than 12.2 volts prior to and during this pinpoint test.

NOTE: Do not have a battery charger attached during vehicle testing.

B1 PERFORM INSPECTION AND VERIFICATION

Perform Inspection and Verification procedure in this article.

Was an obvious cause for an observed or reported concern found?

Yes	CORRECT the cause as necessary.

No	GO to B2

B2 RETRIEVE DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, perform the PCM self-test.

Is DTC P0620, P0625 or P0626 present?

Yes	For DTC P0620, GO to Pinpoint Test F For Diagnostic Trouble Codes (DTCs) P0625 and P0626, GO to Pinpoint Test G

No	GO to B3

B3 CHECK THE GENERATOR CONNECTIONS

Ignition OFF.

Disconnect all of the generator connectors and inspect for:

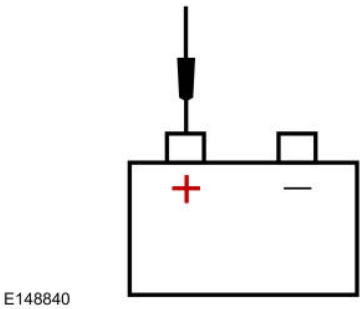
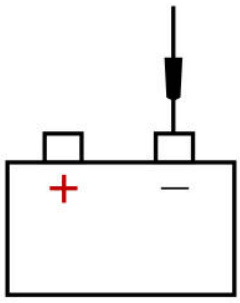
corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the generator connectors. Make sure they seat and latch correctly.

Measure and record:

Positive Lead	Measurement / Action	Negative Lead
 E148840		 E148841

Measure:

Positive Lead	Measurement / Action	Negative Lead
C102A-1	V	Ground

Is the voltage within 0.5 volt of the recorded battery voltage?

Yes	GO to B4

No	TIGHTEN or INSTALL a new generator B+ nut as needed. REFER to: Generator - 2.3L EcoBoost (201kW/273PS) . VERIFY high current BJB MEGA fuse (275A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short.

B4 CHECK THE VOLTAGE DROP IN THE GENERATOR B+ CIRCUIT

Start the engine.

With the engine running at idle, headlamps on and blower on high, measure:

Positive Lead	Measurement / Action	Negative Lead
C102A-1	V	

Perform a wiggle test of the generator wiring and connections while measuring voltage drop.

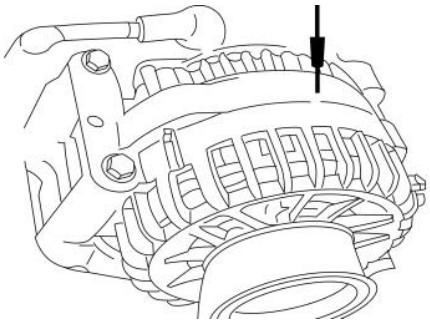
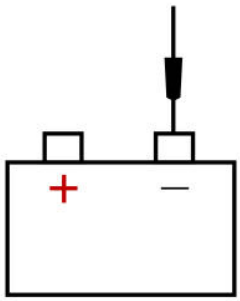
Is the voltage drop less than 0.5 volt?

Yes	GO to B5

No	INSPECT and REPAIR any corrosion in the generator B+ circuit or positive battery cable connections.

B5 CHECK THE VOLTAGE DROP IN THE VEHICLE GROUNDS

With the engine running at idle, headlamps on and heater blower on high, measure:

Positive Lead	Measurement / Action	Negative Lead
 Generator case	V	 E148841

Is the voltage drop less than 0.5 volt?

Yes	GO to B6

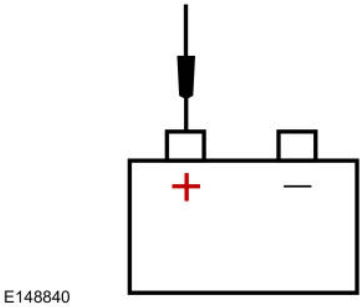
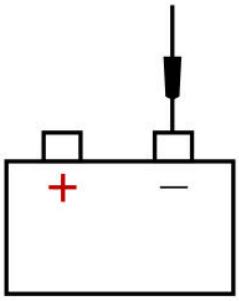
No	INSPECT and REPAIR the engine ground, generator ground or the battery ground for corrosion.

B6 MONITOR THE GENERATOR VOLTAGE DESIRED (GENVDSD) PID (PARAMETER IDENTIFICATION) WHILE COMMANDED

Using a diagnostic scan tool, view the PCM GENVDSD PID.

Using a diagnostic scan tool active command, set the PCM PID GENVDSD to 14 volts.

With the engine running at idle, measure battery and record:

Positive Lead	Measurement / Action	Negative Lead
 E148840		 E148841

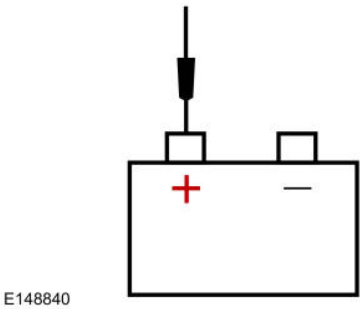
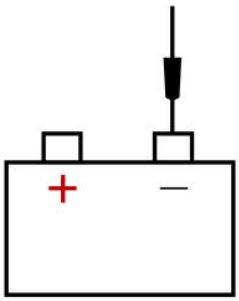
Is the recorded battery voltage within ±0.5 volt of the PID?

Yes	GO to B7

No	GO to B11

B7 COMPARE THE PCM (POWERTRAIN CONTROL MODULE) SUPPLY VOLTAGE (VPWR) PID (PARAMETER IDENTIFICATION) TO BATTERY VOLTAGE

With the engine running at idle, headlamps on and blower on high, measure and record:

Positive Lead	Measurement / Action	Negative Lead
 E148840		 E148841

Using a diagnostic scan tool, view the PCM PID VPWR.

Does the PID accurately display battery voltage within ±0.5 volt of the recorded battery voltage?

Yes	GO to B8

No	REPAIR high resistance or loose connections in the affected PCM power circuit(s).

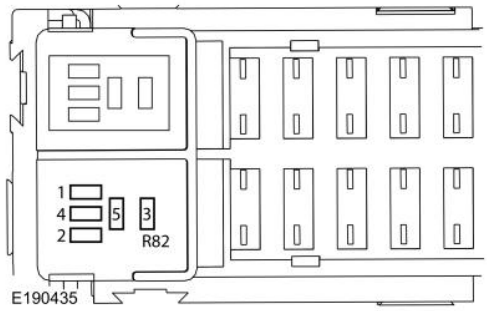
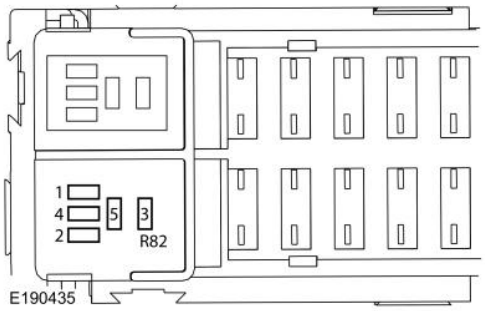
B8 CHECK PCM (POWERTRAIN CONTROL MODULE) SUPPLY VOLTAGE CIRCUITS

Ignition OFF.

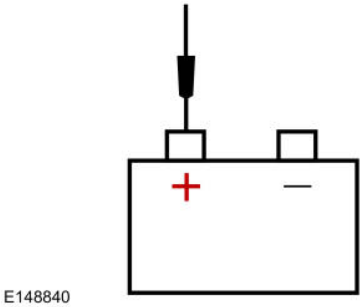
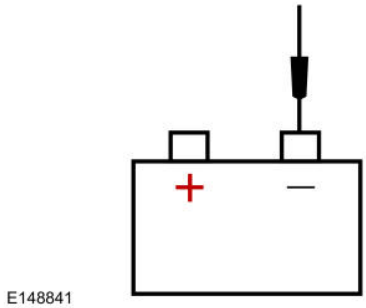
Disconnect BJB PCM power relay.

Disconnect PCM C1551B .

Connect a fused jumper wire:

Positive Lead	Measurement / Action	Negative Lead
 BJB PCM Relay pin 3		 BJB PCM Relay pin 5

Measure and record:

Positive Lead	Measurement / Action	Negative Lead
		

NOTE: The following step will load test the circuit. A headlamp bulb would be an effective load. To avoid connector terminal damage, use the Flex Probe Kit for connector connections.

Connect the load to a suitable ground connection.

Connect the load to each circuit and measure:

Positive Lead	Measurement / Action	Negative Lead
C1551B-101		Ground
C1551B-102		Ground
C1551B-103		Ground

Are the voltages within 0.5 volt of the recorded battery voltage?

Yes	REMOVE the fused jumper wire. GO to B9

No	REPAIR the affected circuit(s).

NOTE: The following step will load test the circuit. A headlamp bulb would be an effective load. To avoid connector terminal damage, use the Flex Probe Kit for connector connections.

B9 CHECK PCM (POWERTRAIN CONTROL MODULE) GROUND FOR HIGH RESISTANCE

Connect the load to a suitable 12 volt power connection.

Connect the load to each circuit and measure:

Positive Lead	Measurement / Action	Negative Lead
C1551B-96		Ground
C1551B-97		Ground
C1551B-98		Ground
C1551B-99		Ground

Is the voltage drop less than 0.5 volt?

Yes	GO to B10

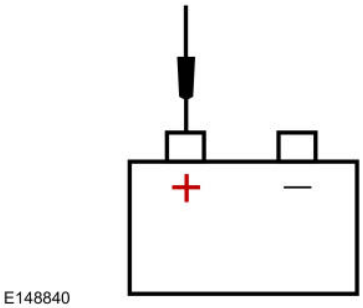
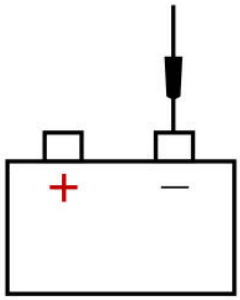
No	REPAIR the affected circuit(s).

B10 MONITOR THE SUPPLY VOLTAGE (VPWR) PID (PARAMETER IDENTIFICATION)

NOTE: Measure battery voltage at the battery.

With the engine running at idle, turn off all accessory loads.

Measure and record:

Positive Lead	Measurement / Action	Negative Lead
 E148840		 E148841

Using a diagnostic scan tool, view PCM PID VPWR and record.

Momentarily accelerate the engine to Wide Open Throttle (WOT) and release. Repeat this step 4-5 times while continuing to monitor the PID.

Does the PID stay within 0.5 volt of the recorded battery voltage when the engine Revolutions Per Minute (RPM) are increased?

Yes	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. INSPECT and REPAIR any connector or pin issues found. If no connector or pin issues are found, Perform the battery drain test. REFER to: Battery Drain Check .

No	GO to B12

B11 CHECK GENERATOR CLUTCH OPERATION

Ignition OFF.

Perform the generator clutch component test .

Is the generator clutch OK?

Yes	INSTALL a new generator. REFER to: Generator - 2.3L EcoBoost (201kW/273PS) .

No	INSTALL a new generator clutch. REFER to: GENERATOR PULLEY .

B12 CHECK FOR CORRECT PCM (POWERTRAIN CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all PCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the PCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PCM. REFER to: Powertrain Control Module (PCM) . CLEAR all Diagnostic Trouble Codes (DTCs) in all modules.

No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 2.3L ECOBOOST (201KW 273PS) > PINPOINT TESTS (2.3L) > PINPOINT TEST C : GENERATOR NOISE OR MECHANICAL PERFORMANCE

Normal Operation and Fault Conditions

The generator is belt-driven by the engine accessory drive system. There are several sources of generator noise which include bearing noise, electrical fault noise, generator or belt pulley misalignment. A generator with certain types of diode or stator failures can also produce an audible noise.

Possible Sources

- FEAD belt
- Loose bolts/brackets
- Generator/pulleys

Visual Inspection and Diagnostic Pre-checks

- Inspect the FEAD belt.
- Inspect for loose bolts/brackets.
- Inspect the generator/pulley.

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 2.3L ECOBOOST (201KW 273PS) > PINPOINT TESTS (2.3L) > PINPOINT TEST C : GENERATOR NOISE OR MECHANICAL PERFORMANCE > PINPOINT TEST C : GENERATOR NOISE OR MECHANICAL PERFORMANCE

C1 CHECK FOR ACCESSORY DRIVE BELT NOISE AND LOOSE MOUNTING BRACKETS

Ignition OFF.

Check the FEAD belt and tensioner for damage and correct installation. REFER to: Accessory Drive .

Is the accessory drive OK?

Yes	GO to C2

No	REPAIR as necessary.

C2 CHECK THE GENERATOR MOUNTING

Check the generator mounting for loose bolts or misalignment.

Is the generator mounted correctly?

Yes	GO to C3

No	REPAIR as necessary.

C3 CHECK THE GENERATOR FOR NOISE

Start the engine.

With the engine running, use a stethoscope or equivalent listening device to probe the generator and the accessory drive area for unusual mechanical noise.

Is the generator the noise source?

Yes	GO to C4

No	REFER to: ENGINE SYSTEM - GENERAL INFORMATION to diagnose the source of the engine noise.

C4 CHECK GENERATOR CLUTCH OPERATION

Ignition OFF.

Perform the generator clutch component test .

Is the generator clutch OK?

Yes	INSTALL a new generator. REFER to: Generator - 2.3L EcoBoost (201kW/273PS) .

No	INSTALL a new generator clutch. REFER to: GENERATOR PULLEY .

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 2.3L ECOBOOST (201KW 273PS) >

PINPOINT TESTS (2.3L) > PINPOINT TEST D : RADIO INTERFERENCE

Refer to Charging System for schematic and connector information.

Normal Operation and Fault Conditions

The generator radio suppression equipment reduces interference transmitted through the speakers by the vehicle electrical system.

> *NOTE: If the Original Equipment Manufacturer (OEM) Audio Control Module (ACM) has been replaced with an aftermarket unit, the vehicle may not pass this test. Return the vehicle to Original Equipment Manufacturer (OEM) condition before following this pinpoint test.*

> *NOTE: If the engine is operated at greater than 2, 000 Revolutions Per Minute (RPM) momentarily, the generator self-excites. Make sure when the generator is disconnected the engine RPM stays below 2, 000 Revolutions Per Minute (RPM). If it rises above 2, 000 Revolutions Per Minute (RPM), turn the ignition to the OFF position and start the test over again.*

> *NOTE: Inspect for any aftermarket accessories that have been added to the vehicle. Check the wiring for these accessories and be sure they have not been attached to the generator circuits and are positioned away from the generator wiring.*

Possible Sources

- Generator
- In-vehicle entertainment system
- Wiring, terminals or connectors

Visual Inspection and Diagnostic Pre-checks

- Inspect the generator.
- Inspect the in-vehicle entertainment system.

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 2.3L ECOBOOST (201KW 273PS) > PINPOINT TESTS (2.3L) > PINPOINT TEST D : RADIO INTERFERENCE > PINPOINT TEST D : RADIO INTERFERENCE

D1 VERIFY THE GENERATOR IS THE SOURCE OF THE AUDIO SYSTEM INTERFERENCE

Start the engine.

Allow the engine to idle.

Tune the audio system to a station where interference is present.

Ignition OFF.

Disconnect Generator C102B .

Disconnect Generator C102A .

Start the engine.

Allow the engine to idle.

Is the interference present with the generator disconnected?

Yes	REFER to: Information and Entertainment System (without touchscreen) , or REFER to: Information and Entertainment System (with touchscreen) .

No	INSTALL a new generator. REFER to: Generator - 2.3L EcoBoost (201kW/273PS) .

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 2.3L ECOBOOST (201KW 273PS) > PINPOINT TESTS (2.3L) > PINPOINT TEST E : GENERATOR CURRENT SENSOR FAULTS

Refer to Power Distribution for schematic and connector information.

Normal Operation and Fault Conditions

The generator current sensor is a Hall-effect sensor attached to the generator B+ cable. It is supplied a 5 volt reference and ground from the PCM. The PCM reads the generator current sensor feedback voltage to determine how much current is flowing through the generator B+ cable.

Diagnostic Trouble Code (DTC) Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
P0A5A	Generator Current Sensor Circuit Range/Performance	Sets in the PCM when the PCM does not detect current through the generator current sensor and there are no generator current sensor circuit Diagnostic Trouble Codes (DTCs) set.
P0A5B	Generator Current Sensor Circuit Low	Sets in the PCM when the PCM senses lower than expected voltage on the generator current sensor feedback circuit, indicating an open or a short directly to ground.
P0A5C	Generator Current Sensor Circuit High	Sets in the PCM when the PCM senses higher than expected voltage on the generator current sensor feedback circuit, indicating a short directly to voltage.

Possible Sources

- Generator current sensor
- Generator clutch
- PCM
- Wiring, terminals or connectors

Visual Inspection and Diagnostic Pre-checks

- Inspect the generator current sensor.
- Inspect the generator current sensor connector.

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 2.3L ECOBOOST (201KW 273PS) > PINPOINT TESTS (2.3L) > PINPOINT TEST E : GENERATOR CURRENT SENSOR FAULTS > PINPOINT TEST E : GENERATOR CURRENT SENSOR FAULTS

NOTE: Make sure battery voltage is greater than 12.2 volts prior to and during this pinpoint test.

NOTE: Do not have a battery charger attached during vehicle testing.

E1 RETRIEVE DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition ON.

Using a diagnostic scan tool, perform the PCM self-test

Is DTC P0562 present?

Yes	GO to Pinpoint Test B

No	For DTC P0A5A, GO to E2 For DTC P0A5B, GO to E3 For DTC P0A5C, GO to E6

E2 CHECK THE GENERATOR CURRENT SENSOR

Ignition OFF.

Inspect the generator current sensor for the following:

physical damage

corrosion

disconnected electrical connector

generator B+ cable routed through the generator current sensor

debris between the generator current sensor and the generator B+ cable

Are any of these conditions found during inspection?

Yes	REPAIR as necessary or INSTALL a new generator current sensor. REFER to: Generator Current Sensor .

No	GO to E10

E3 CHECK THE GENERATOR CURRENT SENSOR REFERENCE VOLTAGE CIRCUIT FOR AN OPEN

Ignition OFF.

Disconnect Generator current sensor C1645 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1645-1		Ground

Is the voltage between 4.8 and 5.2 volts?

Yes	GO to E4

No	If the voltage is less than 4.8 volts, REPAIR the circuit for an open or high resistance. If the voltage is greater than 5.2 volts, REPAIR the circuit for a short to voltage.

E4 CHECK THE GENERATOR CURRENT SENSOR GROUND CIRCUIT FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1645-1		C1645-2

Is the voltage between 4.8 and 5.2 volts?

Yes	GO to E5

No	REPAIR the circuit for an open or high resistance.

E5 CHECK THE GENERATOR CURRENT SENSOR FEEDBACK CIRCUIT FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1645-3		C1645-2

Is the voltage between 4.8 and 5.2 volts?

Yes	GO to E6

No	REPAIR the circuit for an open or high resistance.

E6 CHECK THE GENERATOR CURRENT SENSOR FEEDBACK CIRCUIT FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect PCM C1551B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1645-3		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to E7

E7 CHECK THE GENERATOR CURRENT SENSOR FEEDBACK CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Disconnect PCM C1551B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1645-3	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to E8

No	REPAIR the circuit.

E8 CHECK THE GENERATOR CURRENT SENSOR FEEDBACK CIRCUIT FOR A SHORT TO THE SIGNAL RETURN OR VOLTAGE REFERENCE CIRCUIT

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1645-3	Ω	C1645-1
C1645-3	Ω	C1645-2

Are the resistances greater than 10, 000 ohms?

Yes	GO to E9

No	REPAIR the affected circuit.

E9 CHECK THE GENERATOR CURRENT SENSOR FEEDBACK CIRCUIT FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1551B-94	Ω	C1645-3

Is the resistance less than 3 ohms?

Yes	GO to E10

No	REPAIR the circuit.

E10 CHECK THE GENERATOR CURRENT SENSOR CONNECTION

Ignition OFF.

Disconnect Generator current sensor C1645 .

Inspect the generator current sensor connector for the following:

- corrosion (install new connector or terminals - clean module pins)
- damaged or bent pins - install new terminals/pins
- pushed-out pins - install new pins as necessary

Connect and correctly seat the generator current sensor connector.

Ignition ON.

Using a diagnostic scan tool, clear all Diagnostic Trouble Codes (DTCs) in all modules.

Using a diagnostic scan tool, perform the PCM self-test

Did the DTC return?

Yes	REPAIR as necessary or INSTALL a new generator current sensor. REFER to: Generator Current Sensor . CLEAR the Diagnostic Trouble Codes (DTCs). REPEAT the self-test. If the DTC returns, GO to E11

No	The system is operating correctly at this time. The concern may have been caused by an intermittently loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

E11 CHECK FOR CORRECT PCM (POWERTRAIN CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all PCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the PCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PCM. REFER to: Powertrain Control Module (PCM) . CLEAR all Diagnostic Trouble Codes (DTCs) in all modules.

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 2.3L ECOBOOST (201KW 273PS) > PINPOINT TESTS (2.3L) > PINPOINT TEST F : DTC P0620, P065B

Refer to Charging System for schematic and connector information.

Normal Operation and Fault Conditions

The PCM monitors the generator output via the generator monitor (GENMON) circuit. The PCM uses the generator command (GENCOM) circuit to command the generator to either increase or decrease output. If the GENCOM circuit (generator control circuit) or the "A" sense circuit are open or shorted to ground, the PCM will not be able to control the generator output. When the engine speed is greater than 2, 000 RPM, the generator defaults to a steady voltage output of 13.5 volts and the PCM sends a request to the IPC to illuminate the charging system warning indicator. A GENCOM circuit fault can be confirmed by viewing the PCM PID generator command line fault (GENCMD_LF) (YES status indicator fault).

Diagnostic Trouble Code (DTC) Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
P0620	Generator Control Circuit	The PCM sets this DTC if the GENCOM circuit, "A" sense circuit, or B+ circuit is open or shorted to ground.
P065B	Generator Control Circuit Range/performance	The PCM sets this DTC when the generator reports an internal regulator failure.

Possible Sources

- Fuses or Fusible Links
- Generator
- PCM
- Wiring, terminals or connectors

Visual Inspection and Diagnostic Pre-checks

- Inspect the high current BJB for loose or corroded connections.

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 2.3L ECOBOOST (201KW 273PS) > PINPOINT TESTS (2.3L) > PINPOINT TEST F : DTC P0620, P065B > PINPOINT TEST F : DTC P0620, P065B

NOTE: Make sure battery voltage is greater than 12.2 volts prior to and during this pinpoint test.

NOTE: Do not have a battery charger attached during vehicle testing.

F1 CHECK THE BATTERY CONDITION

Check the battery condition and state of charge. REFER to: BATTERY, MOUNTING AND CABLES .

Does the battery pass the condition test?

Yes	GO to F2

No	CHARGE or INSTALL a new battery as necessary. REFER to: Battery .

F2 CHECK THE GENERATOR CONNECTIONS

Ignition OFF.

Disconnect all of the generator connectors and inspect for:

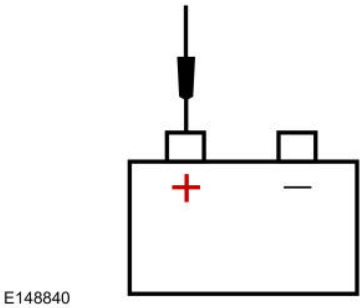
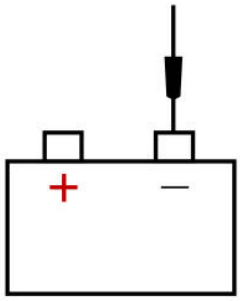
corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the generator connectors. Make sure they seat and latch correctly.

Measure and record:

Positive Lead	Measurement / Action	Negative Lead
 E148840		 E148841

Measure:

Positive Lead	Measurement / Action	Negative Lead
C102B-1		Ground

Is the voltage within 0.5 volt of the recorded battery voltage?

Yes	GO to F3

No	TIGHTEN or INSTALL a new generator B+ nut as needed. REFER to: Generator - 2.3L EcoBoost (201kW/273PS) . VERIFY high current BJB MEGA fuse (275A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short.

F3 CHECK THE VOLTAGE DROP IN THE GENERATOR B+ CIRCUIT

Start the engine.

With the engine running at idle, headlamps on and blower on high, measure:

Positive Lead	Measurement / Action	Negative Lead
C102A-1		

Perform a wiggle test of the generator wiring and connections while measuring voltage drop.

Is the voltage drop less than 0.5 volt?

Yes	GO to F4

No	INSPECT and REPAIR any corrosion in the generator B+ circuit or positive battery cable connections.

NOTE: This step puts a load on the "A" sense circuit. If there are corroded or loose connections, loading the circuit may help show the fault. A 250-350 mA incandescent 12-volt test lamp is required for this step. This circuit cannot be loaded correctly using an LED-style test lamp.

NOTE: The following step uses a test light to simulate normal circuit loads. Use only the test light recommended in the Special Tools table at the beginning of this article. To avoid connector terminal damage, use the Flex Probe Kit for the test light probe connection to the vehicle. Do not use the test light probe directly on any connector.

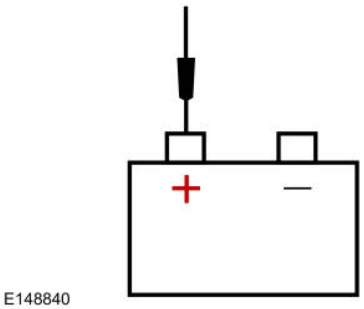
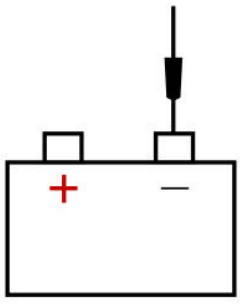
F4 "A" SENSE CIRCUIT LOAD TEST

Ignition OFF.

Disconnect Generator C102B .

Ignition ON.

Measure and record:

Positive Lead	Measurement / Action	Negative Lead
 E148840		 E148841

Install a test lamp between:

Positive Lead	Measurement / Action	Negative Lead
C102B-3		Ground

Perform a wiggle test on the generator wiring and measure:

Positive Lead	Measurement / Action	Negative Lead
C102B-3		Ground

Is the "A" sense voltage within ±0.5 volt of the recorded battery voltage?

Yes	GO to F5

No	VERIFY the BJB fuse 36 (10A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short.

F5 CHECK THE GENERATOR COMMAND CIRCUIT FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect PCM C1551B .

Ignition ON.

Perform a wiggle test on the generator wiring and measure:

Positive Lead	Measurement / Action	Negative Lead
C102B-2		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to F6

F6 CHECK THE GENERATOR COMMAND CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Perform a wiggle test on the generator wiring and measure:

Positive Lead	Measurement / Action	Negative Lead
C102B-2	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to F7

No	REPAIR the circuit.

F7 CHECK THE GENERATOR COMMAND CIRCUIT FOR AN OPEN

Perform a wiggle test on the generator wiring and measure:

Positive Lead	Measurement / Action	Negative Lead
C1551B-59	Ω	C102B-2

Is the resistance less than 3 ohms?

Yes	GO to F8

No	REPAIR the circuit.

F8 COMPARE THE GENERATOR MONITOR (GENMON) AND GENERATOR COMMAND (GENCMD) PIDS

Ignition OFF.

Connect PCM C1551B .

Connect a fused jumper wire:

Positive Lead	Measurement / Action	Negative Lead
C102B-1		C102B-2

Start the engine.

Using a diagnostic scan tool, view PCM Parameter Identifications (PIDs).

Monitor the PCM Parameter Identifications (PIDs) GENMON and GENCMD.

Perform a wiggle test of the generator wiring and connections.

Do the Parameter Identifications (PIDs) read within 5% of each other?

Yes	REMOVE the fused jumper wire. INSTALL a new generator. REFER to: Generator - 2.3L EcoBoost (201kW/273PS) .

No	REMOVE the fused jumper wire. GO to F9

F9 CHECK FOR CORRECT PCM (POWERTRAIN CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all PCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the PCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PCM. REFER to: Powertrain Control Module (PCM) . CLEAR all Diagnostic Trouble Codes (DTCs) in all modules.

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 2.3L ECOBOOST (201KW 273PS) > PINPOINT TESTS (2.3L) > PINPOINT TEST G : DTC P0625, P0626

Refer to Charging System for schematic and connector information.

Normal Operation and Fault Conditions

The PCM monitors the generator output via the generator monitor (GENMON) circuit (generator field terminal circuit). If the PCM cannot read the GENMON circuit due to an open or short to ground, when the engine speed is greater than 2, 000 RPM, the generator defaults to a steady voltage of 13.5 volts and the PCM sends a request to the IPC to illuminate the charging system warning indicator. A GENMON duty cycle of 3% or less indicates a short to ground fault is present and results in DTC P0625 setting in the PCM. A GENMON duty cycle of 98% or more indicates an open or short to voltage fault is present and results in DTC P0626 setting in the PCM.

Diagnostic Trouble Code (DTC) Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
P0625	Generator Field Terminal Circuit Low	The PCM sets this DTC if the GENMON circuit is shorted to ground, the "A" sense circuit is open or the B+ circuit is open. This DTC also sets by a faulted PCM or generator.
P0626	Generator Field Terminal Circuit High	The PCM sets this DTC if the GENMON circuit is open or shorted to power. This DTC can also be set by a faulted PCM or generator.

Possible Sources

- Battery
- Fuses or Fusible Links
- Generator

- PCM
- Wiring, terminals or connectors

Visual Inspection and Diagnostic Pre-checks

- Inspect for abnormal ignition-off current drain(s).
- Inspect the high current BJB for loose or corroded connections.

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 2.3L ECOBOOST (201KW 273PS) > PINPOINT TESTS (2.3L) > PINPOINT TEST G : DTC P0625, P0626 > PINPOINT TEST G : DTC P0625, P0626

G1 CHECK THE BATTERY CONDITION

Check the battery condition and state of charge. REFER to: BATTERY, MOUNTING AND CABLES .

Does the battery pass the condition test?

Yes	GO to G2

No	CHARGE or INSTALL a new battery as necessary. REFER to: Battery .

G2 CHECK THE GENERATOR CONNECTIONS

Ignition OFF.

Disconnect all of the generator connectors and inspect for:

corrosion (install new connector or terminals - clean module pins)

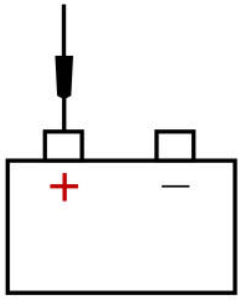
damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

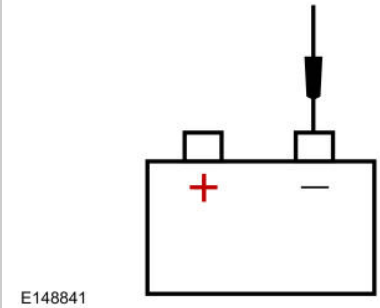
Reconnect the generator connectors. Make sure they seat and latch correctly.

Measure and record:

Positive Lead	Measurement / Action	Negative Lead







Measure:

Positive Lead	Measurement / Action	Negative Lead
C102B-1		Ground

Is the voltage within 0.5 volt of the recorded battery voltage?

Yes	GO to G3

No	TIGHTEN or INSTALL a new generator B+ nut as needed. REFER to: Generator - 2.3L EcoBoost (201kW/273PS) . VERIFY high current BJB MEGA fuse (275A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short.

G3 CHECK THE VOLTAGE DROP IN THE GENERATOR B+ CIRCUIT

Start the engine.

With the engine running at idle, headlamps on and blower on high, measure:

Positive Lead	Measurement / Action	Negative Lead
C102A-1		

Perform a wiggle test of the generator wiring and connections while measuring voltage drop.

Is the voltage drop less than 0.5 volt?

Yes	For DTC P0625, GO to G4 For DTC P0626, GO to G5

No	INSPECT and REPAIR any corrosion in the generator B+ circuit or positive battery cable connections.

NOTE: This step puts a load on the "A" sense circuit. If there are corroded or loose connections, loading the circuit may help show the fault. A 250-350 mA incandescent 12-volt test lamp is required for this step. This circuit cannot be loaded correctly using an LED-style test lamp.

NOTE: The following step uses a test light to simulate normal circuit loads. Use only the test light recommended in the Special Tools table at the beginning of this article. To avoid connector terminal damage, use the Flex Probe Kit for the test light probe connection to the vehicle. Do not use the test light probe directly on any connector.

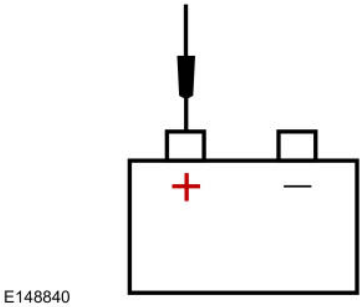
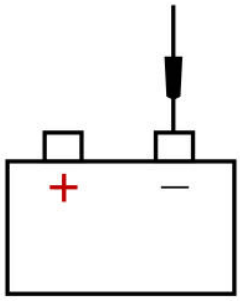
G4 "A" SENSE CIRCUIT LOAD TEST

Ignition OFF.

Disconnect Generator C102B .

Ignition ON.

Measure and record:

Positive Lead	Measurement / Action	Negative Lead
 E148840		 E148841

Install a test lamp between:

Positive Lead	Measurement / Action	Negative Lead
C102B-3		Ground

Perform a wiggle test on the generator wiring and measure:

Positive Lead	Measurement / Action	Negative Lead
C102B-3		Ground

Is the "A" sense voltage within ±0.5 volt of the recorded battery voltage?

Yes	GO to G5

No	VERIFY the BJB fuse 36 (10A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short.

G5 CHECK THE GENERATOR MONITOR CIRCUIT FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect PCM C1551B .

Ignition ON.

Perform a wiggle test on the generator wiring and measure:

Positive Lead	Measurement / Action	Negative Lead
C102B-1		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to G6

G6 CHECK THE GENERATOR MONITOR CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Perform a wiggle test on the generator wiring and measure:

Positive Lead	Measurement / Action	Negative Lead
C102B-1	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to G7

No	REPAIR the circuit.

G7 CHECK THE GENERATOR MONITOR CIRCUIT FOR AN OPEN

Perform a wiggle test on the generator wiring and measure:

Positive Lead	Measurement / Action	Negative Lead
C1551B-26	Ω	C102B-1

Is the resistance less than 3 ohms?

Yes	GO to G8

No	REPAIR the circuit.

G8 CHECK THE GENERATOR B+ INTERNAL RESISTANCE

Disconnect Generator C102B .

Disconnect Generator C102A .

Measure:

Positive Lead	Measurement / Action	Negative Lead
Generator B+ Terminal	Ω	Generator case

Is the resistance greater than 25K ohms?

Yes	GO to G9

No	INSTALL a new generator. REFER to: Generator - 2.3L EcoBoost (201kW/273PS) .

G9 CHECK THE RESISTANCE OF THE VOLTAGE REGULATOR INTERNAL CIRCUITS

Measure:

Positive Lead	Measurement / Action	Negative Lead
Generator pin 1 (Component Side)	Ω	Generator case
Generator pin 2 (Component Side)	Ω	Generator case
Generator pin 3 (Component Side)	Ω	Generator case

Are the resistances greater than 10, 000 ohms?

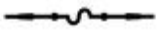
Yes	GO to G10

No	INSTALL a new generator. REFER to: Generator - 2.3L EcoBoost (201kW/273PS) .

G10 COMPARE THE GENMON PID (PARAMETER IDENTIFICATION) AND THE GENCMD PID (PARAMETER IDENTIFICATION)

Connect PCM C1551B .

Connect a fused jumper wire:

Positive Lead	Measurement / Action	Negative Lead
C102B-1		C102B-2

Start the engine.

Using a diagnostic scan tool, view PCM Parameter Identifications (PIDs).

Using the active command, set the PID GENVDSD to 14 volts.

Monitor the PCM Parameter Identifications (PIDs) GENMON and GENCMD.

Perform a wiggle test of the generator wiring and connections.

Do the Parameter Identifications (PIDs) read within 5% of each other?

Yes	REMOVE the fused jumper wire. INSTALL a new generator. REFER to: Generator - 2.3L EcoBoost (201kW/273PS) .

No	REMOVE the fused jumper wire. GO to G11

G11 CHECK FOR CORRECT PCM (POWERTRAIN CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all PCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the PCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PCM. REFER to: Powertrain Control Module (PCM) . CLEAR all Diagnostic Trouble Codes (DTCs) in all modules.

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 2.3L ECOBOOST (201KW 273PS) > PINPOINT TESTS (2.3L) > PINPOINT TEST H : LOAD SHED MESSAGE DISPLAYS IN MESSAGE CENTER

Refer to Charging System for schematic and connector information.

Normal Operation and Fault Conditions

When the engine is off and the key is in on or accessory mode, and the BCM determines the battery state of charge is below 50%, or 45 minutes have elapsed, a load shed message is sent over the CAN. This message turns off the audio/navigation system to save the remaining battery charge. Under this condition the a load shed message will be displayed to notify the driver that battery protection actions are active:

- System Off to Save Battery Turn Ignition Off displays on the FCDIM (without touchscreen controls)

- SYSTEM OFF TO SAVE BATTERY PLEASE TURN IGNITION OFF OR START ENGINE displays on the FDIM (with touchscreen controls)
- Battery Saver - System Off displays on the FDIM (with Sync)

These messages displaying may be normal operation and not indicate a fault. Refer to the Owner Literature and REFER to: Charging System - System Operation and Component Description . Load shed messages displaying with the **engine running** or only on the FCDIM or the FDIM (with touchscreen controls) indicates the audio system has detected a fault.

Possible Sources

- Normal operation
- Audio system
- Battery
- BCM
- Fuses or Fusible Links
- Generator
- Wiring, terminals or connectors

Visual Inspection and Diagnostic Pre-checks

- Inspect the high current BJB for loose or corroded connections.
- Inspect the battery for loose or corroded connections.
- Inspect the generator for loose or corroded connections.
- Inspect the BJB for loose or corroded connections.
- Inspect the high current BJB for loose or corroded connections.
- Inspect C1046 for loose or corroded connections.
- Inspect battery and engine grounds for loose or corroded connections.

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 2.3L ECOBOOST (201KW 273PS) > PINPOINT TESTS (2.3L) > PINPOINT TEST H : LOAD SHED MESSAGE DISPLAYS IN MESSAGE CENTER > PINPOINT TEST H : LOAD SHED MESSAGE DISPLAYS IN MESSAGE CENTER

H1 PERFORM INSPECTION AND VERIFICATION

Perform Inspection and Verification procedure in this article.

Was an obvious cause for an observed or reported concern found?

Yes	CORRECT the cause as necessary.

No	GO to H2

H2 VERIFY THE CUSTOMER CONCERN

Verify the customer concern by operating the charging system.

Did the customer indicate battery saver message only appeared in the centerstack with the engine running?

Yes	REFER to: Information and Entertainment System (without touchscreen) , or REFER to: Information and Entertainment System (with touchscreen) .

No	GO to H3

H3 VERIFY THE NETWORK

Ignition ON.

Using a diagnostic scan tool, perform the Network Test.

Did the APIM, BCM, and PCM pass the Network Test?

Yes	GO to H4

No	REFER to: MODULE COMMUNICATIONS NETWORK .

H4 PERFORM PCM (POWERTRAIN CONTROL MODULE) SELF TEST

Ignition ON.

Using a diagnostic scan tool, perform the PCM self-test.

Were any battery or charging system related Diagnostic Trouble Codes (DTCs) retrieved?

Yes	REFER to PCM DTC chart .

No	GO to H5

H5 RETRIEVE ALL CONTINUOUS MEMORY DIAGNOSTIC TROUBLE CODES (CMDTCS)

Ignition ON.

Using a diagnostic scan tool, retrieve all Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Were any battery or charging system related Diagnostic Trouble Codes (DTCs) retrieved?

Yes	For BCM Diagnostic Trouble Codes (DTCs) refer to BCM DTC chart . For APIM or ACM Diagnostic Trouble Codes (DTCs), Refer to the appropriate article for the procedure. For other

	battery or charging system related Diagnostic Trouble Codes (DTCs), REFER to: Diagnostic Trouble Code Charts .

No	GO to H6

H6 CHECK BCM (BODY CONTROL MODULE) BAT_ST_CHRG PID (PARAMETER IDENTIFICATION)

Ignition ON.

Using a diagnostic scan tool, view the BCM Parameter Identifications (PIDs).

Monitor the BCM BAT_ST_CHRG PID.

Does the PID indicate 50% or more?

Yes	GO to H8

No	GO to H7

NOTE: The battery state of charge is too low and needs to be relearned. Refer to the Description and Operation for more information on battery state of charge.

H7 RELEARN BATTERY STATE OF CHARGE

Remove all accessories from the lighter, all power outlets and DC/AC inverter (if equipped).

NOTE: The key should not be left in the vehicle but should be left in a secure location away from the vehicle such as a lock box.

Allow vehicle to sit undisturbed for at least 6 hours.

Ignition ON.

Using a diagnostic scan tool, view the BCM Parameter Identifications (PIDs).

Monitor the BCM BAT_ST_CHRG PID.

Does the PID indicate 50% or more?

Yes	The concern may have been caused by too low of a battery state of charge. REVIEW Energy Management operation with customer and return vehicle to customer.

No	GO to H8

H8 VERIFY INLINE CONNECTOR

Inspect inline connector C1046 for secure connection.

Disconnect Inline connector C1046 .

Inspect for:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Were any concerns present?

Yes	CORRECT the cause as necessary.

No	GO to H9

H9 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 2.3L ECOBOOST (201KW 273PS) > PINPOINT TESTS (2.3L) > PINPOINT TEST I : BATTERY CURRENT SENSOR FAULTS

Refer to Charging System for schematic and connector information.

Normal Operation and Fault Conditions

For information on the battery current sensor, REFER to: Charging System - System Operation and Component Description .

Diagnostic Trouble Code (DTC) Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B130C:12	Load Shed Control Circuit Short To Battery	This DTC sets in the BCM when the BCM senses a short in the battery current sensor control circuit.
B130C:14	Load Shed Control Circuit Short To Ground or Open	This DTC sets in the BCM when the BCM senses an open or ground in the battery current sensor control circuit.
B1438:03	Battery Current Sensor, FM (Frequency Modulated) / PWM (Pulse Width Modulated) Failure	This DTC sets in the BCM when the BCM does not indicate current from the battery current sensor.

Possible Sources

- Battery current sensor
- Generator clutch (if equipped)
- Wiring, terminals or connectors

Visual Inspection and Diagnostic Pre-checks

- Inspect the battery current sensor
- Inspect the battery current sensor connector

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 2.3L ECOBOOST (201KW 273PS) > PINPOINT TESTS (2.3L) > PINPOINT TEST I : BATTERY CURRENT SENSOR FAULTS > PINPOINT TEST I : BATTERY CURRENT SENSOR FAULTS

NOTE: Make sure battery voltage is greater than 12.2 volts prior to and during this pinpoint test.

NOTE: Do not have a battery charger attached during vehicle testing.

I1 RETRIEVE DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition ON.

Using a diagnostic scan tool, perform the PCM self-test

Is DTC P0562 present?

Yes	GO to Pinpoint Test B

No	For DTC P0A5A, GO to I2 For DTC P0A5B, GO to I6 For DTC P0A5C, GO to I10

I2 CHECK THE BATTERY CURRENT SENSOR

Inspect the battery current sensor for the following:

physical damage

corrosion

disconnected electrical connector

battery ground cable routed through the battery current sensor

debris between the battery current sensor and the battery ground cable

Are any of these conditions found during inspection?

Yes	REPAIR as necessary. GO to I14

No	GO to I3

I3 CHECK THE BATTERY CURRENT SENSOR REFERENCE VOLTAGE CIRCUIT

Ignition OFF.

Disconnect Battery current sensor C1646 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1646-1		Ground

Is the voltage between 4.8 and 5.2 volts?

Yes	GO to I7

No	If the voltage is less than 4.8 volts, GO to I5 If the voltage is greater than 5.2 volts, GO to I4

I4 CHECK THE BATTERY CURRENT SENSOR REFERENCE VOLTAGE CIRCUIT FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect BCM C2280F .

Using the Terminal Release Kit, release and temporarily remove BCM C2280F-3 .

Connect BCM C2280F .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1646-1		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	INSTALL C2280F-3 and GO to I15

I5 CHECK THE BATTERY CURRENT SENSOR REFERENCE VOLTAGE CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Disconnect BCM C2280F .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1646-1	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to I6

No	REPAIR the circuit.

I6 CHECK THE BATTERY CURRENT SENSOR REFERENCE VOLTAGE CIRCUIT FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1646-1	Ω	C2280F-3

Is the resistance less than 3 ohms?

Yes	GO to I14

No	REPAIR the circuit.

I7 CHECK THE BATTERY CURRENT SENSOR SIGNAL RETURN CIRCUIT

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1646-1		C1646-2

Is the voltage between 4.8 and 5.2 volts?

Yes	GO to I10

No	GO to I8

I8 CHECK THE BATTERY CURRENT SENSOR SIGNAL RETURN CIRCUIT FOR VOLTAGE

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1646-2		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to I9

I9 CHECK THE BATTERY CURRENT SENSOR SIGNAL RETURN CIRCUIT FOR AN OPEN

Ignition OFF.

Disconnect BCM C2280C .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1646-2	Ω	C2280F-19

Is the resistance less than 3 ohms?

Yes	GO to I14

No	REPAIR the circuit.

I10 CHECK THE BATTERY CURRENT SENSOR FEEDBACK CIRCUIT FOR A SHORT TO VOLTAGE

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1646-3		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to I11

I11 CHECK THE BATTERY CURRENT SENSOR FEEDBACK CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Disconnect BCM C2280F .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1646-3	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to I12

No	REPAIR the circuit.

I12 CHECK THE BATTERY CURRENT SENSOR FEEDBACK CIRCUIT FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1646-3	Ω	C2280F-8

Is the resistance less than 3 ohms?

Yes	GO to I13

No	REPAIR the circuit.

I13 CHECK THE BATTERY CURRENT SENSOR FEEDBACK CIRCUIT FOR A SHORT TO THE SIGNAL RETURN OR REFERENCE CIRCUIT

Measure:

Positive Lead	Measurement / Action	Negative Lead

C1646-3	Ω	C1646-1
C1646-3	Ω	C1646-2

Are the resistances greater than 10, 000 ohms?

Yes	GO to I14

No	REPAIR the affected circuit.

I14 CHECK THE BATTERY CURRENT SENSOR CONNECTION

Ignition OFF.

Disconnect Battery Current Sensor C1646 , if necessary.

Inspect the battery current sensor connector for:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Connect Battery Current Sensor C1646 .

Connect BCM C2280F .

Ignition ON.

Using a diagnostic scan tool, clear all Diagnostic Trouble Codes (DTCs) in all modules.

Using a diagnostic scan tool, perform the BCM self-test.

Did the DTC return?

Yes	REPAIR as necessary or INSTALL a new battery current sensor. REFER to: Battery Current Sensor . CLEAR the Diagnostic Trouble Codes (DTCs). REPEAT the self-test. If the DTC returns, GO to I15

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

I15 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

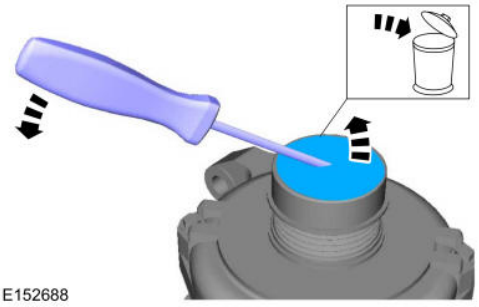
Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 2.3L ECOBOOST (201KW 273PS) > COMPONENT TEST - GENERATOR CLUTCH

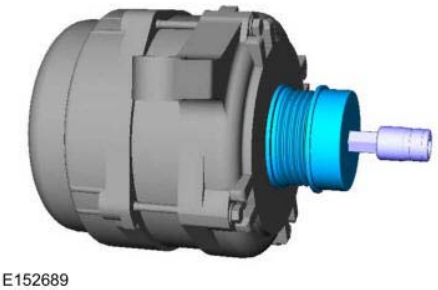
1.

Remove the generator. REFER to: Generator - 2.3L EcoBoost (201kW/273PS) .


E152688

2.

Using a small screwdriver or similar tool, insert the tool through the rubber button on the center of the pulley cap and pry off the cap. Discard the cap. A new cap must be installed if the clutch is OK.


E152689

3.

Using a 17 mm hex tool bit (such as a Snap-on ® SAM17E2 or equivalent) and socket wrench, insert

the 17 mm hex tool bit into the end of the clutch shaft.

4.

While holding the clutch pulley firmly by hand, turn the clutch shaft clockwise. The shaft should rotate smooth and freely. If the shaft rotation is rough or seized, install a new generator clutch. REFER to: GENERATOR PULLEY .

5.

While holding the clutch pulley firmly by hand, turn the clutch shaft counterclockwise. There should be some resistance (a spring feel). If the shaft rotates freely, install a new generator clutch. REFER to: GENERATOR PULLEY .

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 3.7L DURATEC (227KW 301PS) > INSPECTION AND VERIFICATION

1.

Verify the customer concern by operating the charging system.

2.

Before diagnosing or repairing the charging system inspect the following items:

- Check the battery for loose, damaged or corroded connections.
- Check the generator for loose, damaged or corroded connections.
- Check engine and battery grounds for loose, damaged or corroded connections.
- Check high current BJB for loose or corroded connections.
- Verify fuses or fusible links.
- Inspect wiring, terminals and connectors.

3.

Check the battery condition and state of charge. REFER to: BATTERY, MOUNTING AND CABLES .

4.

Check for abnormal ignition-off current drain(s). REFER to: Battery Drain Check .

5.

If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding.

6.

Using the diagnostic scan tool, retrieve all Diagnostic Trouble Codes (DTCs). Refer to the appropriate DTC Chart .

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 3.7L DURATEC (227KW 301PS) > DTC CHARTS (3.7L)

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

BCM DTC Chart

NOTE: Diagnose all PCM DTCs first.

DTC	Description	Action
B130C:12	Load Shed Control Circuit Short To Battery	GO to Pinpoint Test I
B130C:14	Load Shed Control Circuit Short To Ground or Open	GO to Pinpoint Test I
B1438:03	Battery Current Sensor: FM (Frequency Modulated) / PWM (Pulse Width Modulated) Failure	GO to Pinpoint Test I
All Other DTCs	-	REFER to: Body Control Module (BCM) .

PCM DTC Chart

DTC	Description	Action
P0562	System Voltage Low	GO to Pinpoint Test B
P0563	System Voltage High	GO to Pinpoint Test A
P0620	Generator Control Circuit	GO to Pinpoint Test F
P0625	Generator Field Terminal Circuit Low	GO to Pinpoint Test G
P0626	Generator Field Terminal Circuit High	GO to Pinpoint Test G
P065B	Generator Control Circuit Range/performance	GO to Pinpoint Test F
P0A5A	Generator Current Sensor Circuit Range/Performance	GO to Pinpoint Test E
P0A5B	Generator Current Sensor Circuit Low	GO to Pinpoint Test E
P0A5C	Generator Current Sensor Circuit High	GO to Pinpoint Test E
P1397	System Voltage Out Of Self-Test Range	If combined with P0562, GO to Pinpoint Test B If combined with P0563, GO to Pinpoint Test A
All Other DTCs	-	Refer to ENGINE CONTROLS - SYMPTOM CHARTS (EXCEPT

		DIESEL & HYBRID) .

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 3.7L DURATEC (227KW 301PS) > SYMPTOM CHART(S) (3.7L)

Symptom Chart: Charging System

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

Symptom Chart

Condition	Possible Sources	Actions
System voltage high	Refer to the Pinpoint Test	GO to Pinpoint Test A
System voltage low or battery is discharged	Refer to the Pinpoint Test	GO to Pinpoint Test B
The generator is noisy	Refer to the Pinpoint Test	GO to Pinpoint Test C
Radio interference	Refer to the Pinpoint Test	GO to Pinpoint Test D
Charging system warning indicator is never or always on	Wiring, terminals or connectors IPC Generator PCM	RETRIEVE Diagnostic Trouble Codes (DTCs) from all modules. If any Diagnostic Trouble Codes (DTCs) are found, Refer to DTC Chart . If no Diagnostic Trouble Codes (DTCs) are found, REFER to: Instrumentation, Message Center and Warning Chimes .
Load Shed Message Displays in IPC message center and/or centerstack infotainment display	Refer to the Pinpoint Test	GO to Pinpoint Test H
Battery Saver - System Off displays in centerstack infotainment display	Refer to the Pinpoint Test	GO to Pinpoint Test H

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 3.7L DURATEC (227KW 301PS) > PINPOINT TESTS (3.7L) > PINPOINT TEST A : SYSTEM VOLTAGE HIGH

Refer to Charging System for schematic and connector information.

NOTE: Diagnostic Trouble Code (DTC) P0563 can be set if the vehicle has been recently jump started or the battery has been recently charged. The battery may become discharged due to excessive load(s) on the charging system from aftermarket accessories or if vehicle accessories have been operating for an extended period of time without the engine running.

Normal Operation and Fault Conditions

With the engine running, the charging system supplies voltage to the battery and the vehicle electrical system through the high current BJB and battery B+ cable. The voltage that is supplied to the vehicle electrical system is used for the operation of the various vehicle systems and modules. Many modules monitor this voltage and if it rises above or below their calibrated setpoints, a DTC sets.

Diagnostic Trouble Code (DTC) Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
P0563	System Voltage High	This DTC sets in the PCM when the PCM detects voltage from the charging system greater than 15.9 volts with vehicle speed above 8 km/h (5 mph).
P1397	System Voltage Out of Self-Test Range	If the voltage rises above or drops below the calibrated set point, the PCM sets this DTC. This DTC may also be set if the vehicle has been recently jump started or has had a discharged battery.

Possible Sources

- Battery
- Generator
- Engine, generator or battery ground
- PCM
- Wiring, terminals or connectors

Visual Inspection and Diagnostic Pre-checks

- Inspect the high current BJB for loose or corroded connections.

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 3.7L DURATEC (227KW 301PS) > PINPOINT TESTS (3.7L) > PINPOINT TEST A : SYSTEM VOLTAGE HIGH > PINPOINT TEST A : SYSTEM VOLTAGE HIGH

NOTE: Make sure battery voltage is greater than 12.2 volts prior to and during this pinpoint test.

NOTE: Do not have a battery charger attached during vehicle testing.

A1 PERFORM INSPECTION AND VERIFICATION

Perform Inspection and Verification procedure in this article.

Was an obvious cause for an observed or reported concern found?

Yes	CORRECT the cause as necessary.

No	GO to A2

A2 RETRIEVE THE PCM (POWERTRAIN CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition ON.

Using a diagnostic scan tool, perform the PCM self-test.

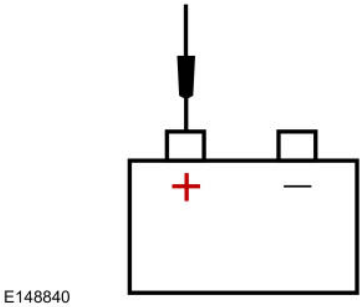
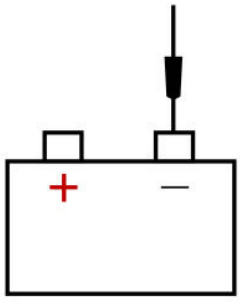
Is DTC P0620, P0625 or P0626 present?

Yes	For DTC P0620, GO to Pinpoint Test F For Diagnostic Trouble Codes (DTCs) P0625 and P0626, GO to Pinpoint Test G

No	GO to A3

A3 COMPARE THE GENERATOR VOLTAGE DESIRED (GENVDSD) PID (PARAMETER IDENTIFICATION) WITH BATTERY VOLTAGE

With the engine running at idle, measure and record:

Positive Lead	Measurement / Action	Negative Lead
 E148840		 E148841

Using a diagnostic scan tool, view the PCM PID GENVDSD.

Is the recorded battery voltage within ±0.5 volt of the PID?

Yes	GO to A6

No	GO to A4

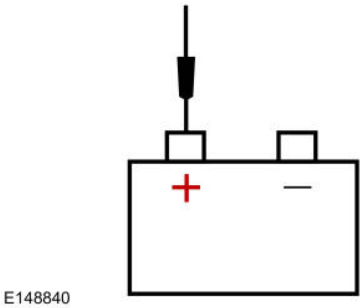
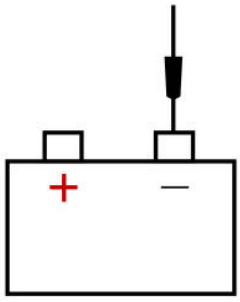
A4 MEASURE THE "A" SENSE VOLTAGE

Ignition OFF.

Disconnect Generator C102B .

Ignition ON.

Measure and record:

Positive Lead	Measurement / Action	Negative Lead
 E148840		 E148841

Measure:

Positive Lead	Measurement / Action	Negative Lead
C102B-3		Ground

Is the "A" sense voltage equal to the recorded battery voltage?

Yes	GO to A5

No	VERIFY the BJB fuse 36 (10A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short.

NOTE: This step puts a load on the "A" sense circuit. If there are corroded or loose connections, loading the circuit may help show the fault. A 250-350 mA incandescent 12-volt test lamp is required for this step. This circuit cannot be loaded correctly using an LED-style test lamp.

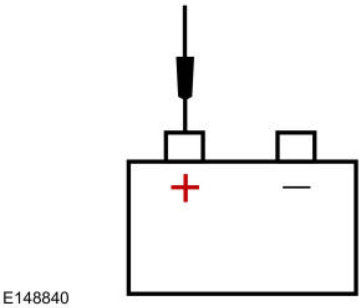
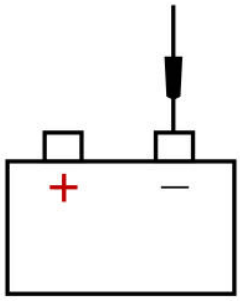
NOTE: The following step uses a test light to simulate normal circuit loads. Use only the test light recommended in the Special Tools table at the beginning of this article. To avoid connector terminal damage, use the Flex Probe Kit for the test light probe connection to the vehicle. Do not use the test light probe directly on any connector.

A5 "A" SENSE CIRCUIT LOAD TEST

Ignition ON.

Measure and record:

Positive Lead	Measurement	Negative Lead

	/ Action	
 E148840		 E148841

Connect the load to the circuit and measure:

Positive Lead	Measurement / Action	Negative Lead
C102B-3		Ground

Is the "A" sense voltage within ±0.5 volt of the recorded battery voltage?

Yes	GO to A6

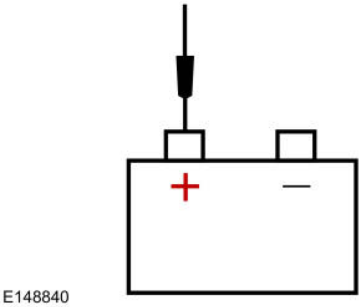
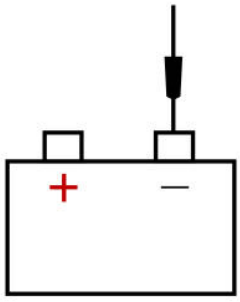
No	VERIFY the BJB fuse 36 (10A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short.

A6 CHECK FOR INTERMITTENT IN THE REGULATOR CIRCUIT

Connect Generator C102B .

Start the engine.

With the engine running at idle, headlamps on and heater blower on high, measure:

Positive Lead	Measurement / Action	Negative Lead
 E148840		 E148841

Perform a wiggle test on the generator wiring and following connections while measuring voltage:

Generator C102B

Inline C1046

Does battery voltage change more than 0.5 volt?

Yes	INSPECT and REPAIR any corrosion in the generator B+ circuit or positive battery cable connections.

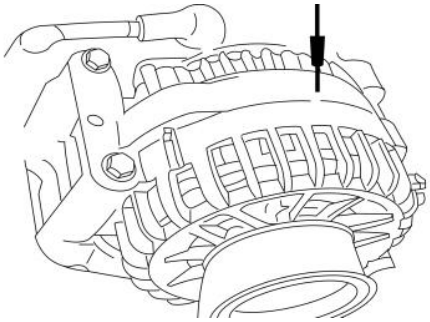
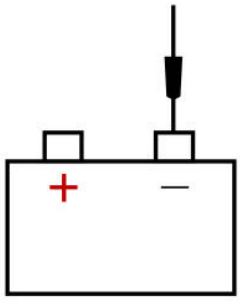
No	GO to A7

A7 CHECK THE VOLTAGE DROP IN THE VEHICLE GROUNDS

Connect Generator C102B .

Start the engine.

With the engine running at idle, headlamps on and heater blower on high, measure:

Positive Lead	Measurement / Action	Negative Lead
 Generator case		 E148841

Is the voltage drop less than 0.5 volt?

Yes	GO to A8

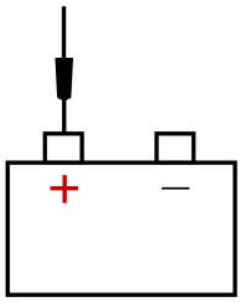
No	INSPECT and REPAIR the engine ground, generator ground or the battery ground for corrosion.

A8 CHECK THE GENERATOR OUTPUT

Increase the engine RPM until the generator starts to generate output.

With the engine running, measure and record:

Positive Lead	Measurement / Action	Negative Lead

 E148840		Ground

Is the voltage above 15.2 volts?

Yes	INSTALL a new generator. REFER to: Generator - 3.7L Duratec (227kW/301PS) .

No	GO to A9

A9 MONITOR THE GENERATOR COMMAND (GENCMD), GENERATOR MONITOR (GENMON) AND GENERATOR VOLTAGE DESIRED (GENVDSD) PIDS

Ignition OFF.

Disconnect Generator C102B .

Connect a fused jumper wire:

Positive Lead	Measurement / Action	Negative Lead
C102B-1		C102B-2

Start the engine.

Using a diagnostic scan tool, view PCM Parameter Identifications (PIDs).

Using the active command, set the PID GENVDSD to 14 volts.

Monitor the PCM Parameter Identifications (PIDs) GENMON and GENVDSD.

Do the Parameter Identifications (PIDs) read within 5% of each other?

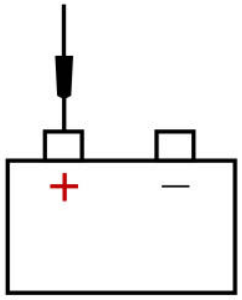
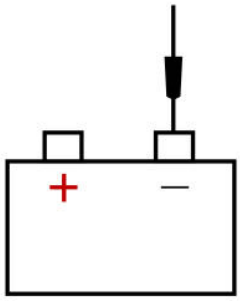
Yes	GO to A10

No	GO to A13

A10 COMPARE THE PCM (POWERTRAIN CONTROL MODULE) SUPPLY VOLTAGE (VPWR) PID (PARAMETER IDENTIFICATION) TO BATTERY VOLTAGE

With the engine running at idle, measure and record:

Positive Lead	Measurement / Action	Negative Lead

 E148840		 E148841

Using a diagnostic scan tool, view PCM Parameter Identifications (PIDs).

Monitor the PCM PID VPWR.

Does the PID accurately display battery voltage within ±0.5 volt of the recorded battery voltage?

Yes	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

No	GO to A11

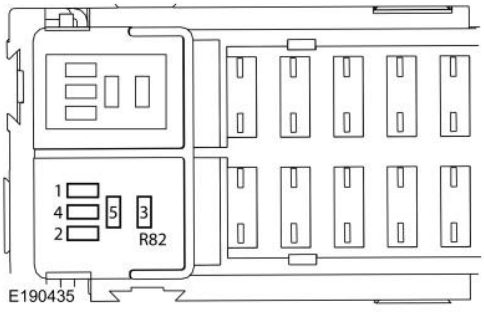
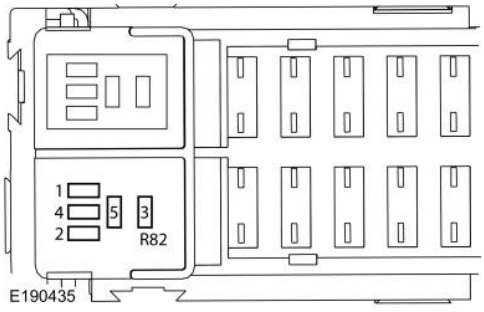
A11 CHECK PCM (POWERTRAIN CONTROL MODULE) SUPPLY VOLTAGE CIRCUITS

Ignition OFF.

Disconnect BJB PCM power relay.

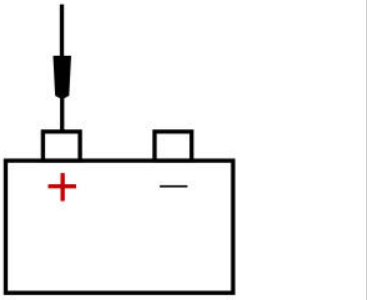
Disconnect PCM C1381B .

Connect a fused jumper wire:

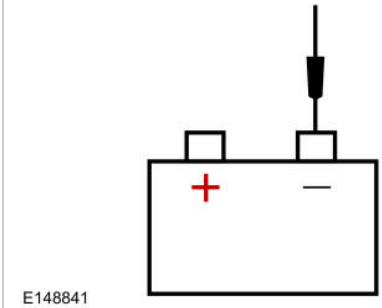
Positive Lead	Measurement / Action	Negative Lead
 E190435 BJB PCM Relay pin 3		 E190435 BJB PCM Relay pin 5

Measure and record:

Positive Lead	Measurement / Action	Negative Lead







NOTE: The following step will load test the circuit. A headlamp bulb would be an effective load. To avoid connector terminal damage, use the Flex Probe Kit for connector connections.

Connect the load to a suitable ground connection.

Connect the load to each circuit and measure:

Positive Lead	Measurement / Action	Negative Lead
C1381B-97		Ground
C1381B-99		Ground

Are the voltages within 0.5 volt of the recorded battery voltage?

Yes	REMOVE the fused jumper wire. GO to A12

No	REPAIR the affected circuit(s).

NOTE: The following step will load test the circuit. A headlamp bulb would be an effective load. To avoid connector terminal damage, use the Flex Probe Kit for connector connections.

A12 CHECK PCM (POWERTRAIN CONTROL MODULE) GROUND FOR HIGH RESISTANCE

Connect the load to a suitable 12 volt power connection.

Connect the load to each circuit and measure:

Positive Lead	Measurement / Action	Negative Lead
C1381B-5		Ground
C1381B-100		Ground
C1381B-102		Ground
C1381B-103		Ground

Is the voltage drop less than 0.5 volt?

Yes	GO to A13

No	REPAIR the affected circuit(s).

A13 CHECK FOR CORRECT PCM (POWERTRAIN CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all PCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the PCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PCM. REFER to: Powertrain Control Module (PCM) . CLEAR all Diagnostic Trouble Codes (DTCs) in all modules.

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 3.7L DURATEC (227KW 301PS) > PINPOINT TESTS (3.7L) > PINPOINT TEST B : SYSTEM VOLTAGE LOW OR BATTERY IS DISCHARGED

System Voltage Low or Battery is Discharged

Refer to Charging System for schematic and connector information.

Normal Operation and Fault Conditions

With the engine running, the charging system supplies voltage to the battery and the vehicle electrical system through the high current BJB and battery B+ cable. The PCM monitors this B+ voltage through its own voltage supply circuit.

Diagnostic Trouble Code (DTC) Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions

P0562	System Voltage Low	If voltage drops 1.5 volts or more below the generator voltage desired (calculated by the PCM), this DTC sets after 30 seconds.
P1397	System Voltage Out of Self-Test Range	If the voltage rises above or drops below the calibrated set point, the PCM sets this DTC. This DTC may also be set if the vehicle has been recently jump started or has had a discharged battery.

Possible Sources

- Battery
- Fuses or fusible links
- Generator
- Generator clutch (if equipped)
- PCM
- High current BJB
- Wiring, terminals or connectors

Visual Inspection and Diagnostic Pre-checks

- Inspect for abnormal ignition-off current drain(s).
- Inspect the battery.
- Inspect the high current BJB for loose or corroded connections.
- Inspect the generator clutch (manual transmission only).

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 3.7L DURATEC (227KW 301PS) > PINPOINT TESTS (3.7L) > PINPOINT TEST B : SYSTEM VOLTAGE LOW OR BATTERY IS DISCHARGED > PINPOINT TEST B : SYSTEM VOLTAGE LOW OR BATTERY IS DISCHARGED

NOTE: Make sure battery voltage is greater than 12.2 volts prior to and during this pinpoint test.

NOTE: Do not have a battery charger attached during vehicle testing.

B1 PERFORM INSPECTION AND VERIFICATION

Perform Inspection and Verification procedure in this article.

Was an obvious cause for an observed or reported concern found?

Yes	CORRECT the cause as necessary.

No	GO to B2

B2 RETRIEVE DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, perform the PCM self-test.

Is DTC P0620, P0625 or P0626 present?

Yes	For DTC P0620, GO to Pinpoint Test F For Diagnostic Trouble Codes (DTCs) P0625 and P0626, GO to Pinpoint Test G

No	GO to B3

B3 CHECK THE GENERATOR CONNECTIONS

Ignition OFF.

Disconnect all of the generator connectors and inspect for:

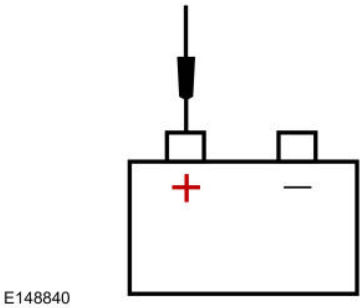
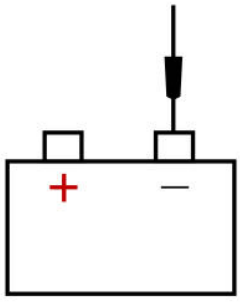
corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the generator connectors. Make sure they seat and latch correctly.

Measure and record:

Positive Lead	Measurement / Action	Negative Lead
 E148840		 E148841

Measure:

Positive Lead	Measurement / Action	Negative Lead

C102D-1		Ground

Is the voltage within 0.5 volt of the recorded battery voltage?

Yes	GO to B4

No	TIGHTEN or INSTALL a new generator B+ nut as needed. REFER to: Generator - 3.7L Duratec (227kW/301PS) . VERIFY high current BJB MEGA fuse (275A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short.

B4 CHECK THE VOLTAGE DROP IN THE GENERATOR B+ CIRCUIT

Start the engine.

With the engine running at idle, headlamps on and blower on high, measure:

Positive Lead	Measurement / Action	Negative Lead
C102D-1		

Perform a wiggle test of the generator wiring and connections while measuring voltage drop.

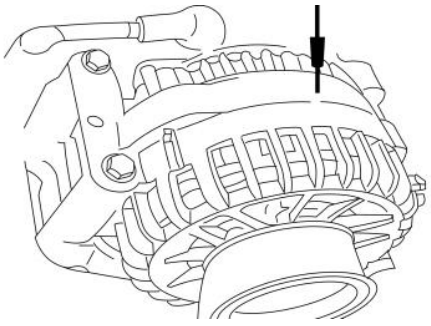
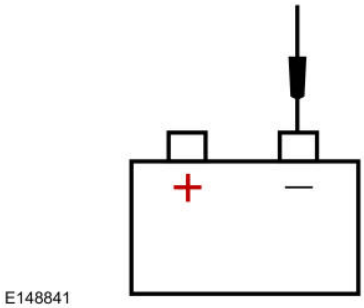
Is the voltage drop less than 0.5 volt?

Yes	GO to B5

No	INSPECT and REPAIR any corrosion in the generator B+ circuit or positive battery cable connections.

B5 CHECK THE VOLTAGE DROP IN THE VEHICLE GROUNDS

With the engine running at idle, headlamps on and heater blower on high, measure:

Positive Lead	Measurement / Action	Negative Lead
 Generator case		 E148841

Is the voltage drop less than 0.5 volt?

Yes	GO to B6

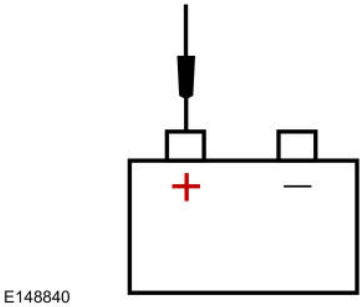
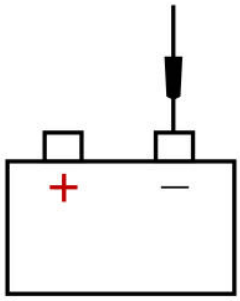
No	INSPECT and REPAIR the engine ground, generator ground or the battery ground for corrosion.

B6 MONITOR THE GENERATOR VOLTAGE DESIRED (GENVDSD) PID (PARAMETER IDENTIFICATION) WHILE COMMANDED

Using a diagnostic scan tool, view the PCM GENVDSD PID.

Using a diagnostic scan tool active command, set the PCM PID GENVDSD to 14 volts.

With the engine running at idle, measure battery and record:

Positive Lead	Measurement / Action	Negative Lead
 E148840		 E148841

Is the recorded battery voltage within ±0.5 volt of the PID?

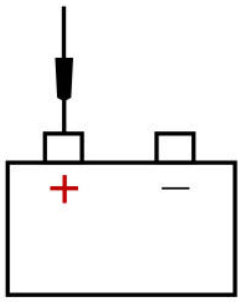
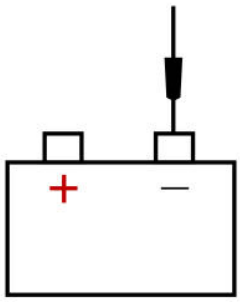
Yes	GO to B7

No	With automatic transmission, INSTALL a new generator. REFER to: Generator - 3.7L Duratec (227kW/301PS) . With manual transmission, GO to B11

B7 COMPARE THE PCM (POWERTRAIN CONTROL MODULE) SUPPLY VOLTAGE (VPWR) PID (PARAMETER IDENTIFICATION) TO BATTERY VOLTAGE

With the engine running at idle, headlamps on and blower on high, measure and record:

Positive Lead	Measurement / Action	Negative Lead

 E148840		 E148841

Using a diagnostic scan tool, view the PCM PID VPWR.

Does the PID accurately display battery voltage within ±0.5 volt of the recorded battery voltage?

Yes	GO to B8

No	REPAIR high resistance or loose connections in the affected PCM power circuit(s).

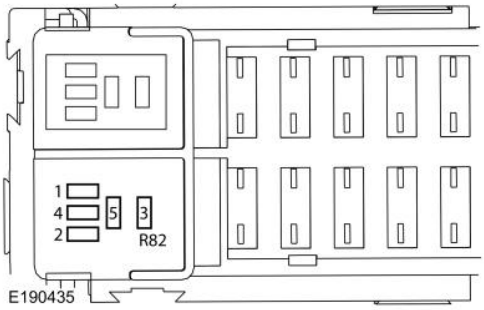
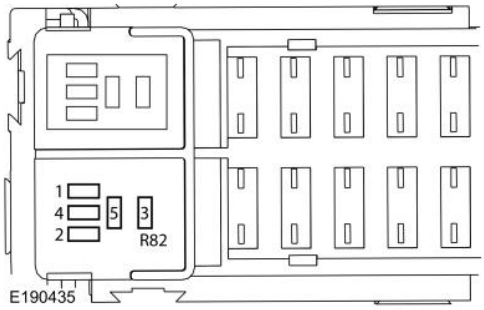
B8 CHECK PCM (POWERTRAIN CONTROL MODULE) SUPPLY VOLTAGE CIRCUITS

Ignition OFF.

Disconnect BJB PCM power relay.

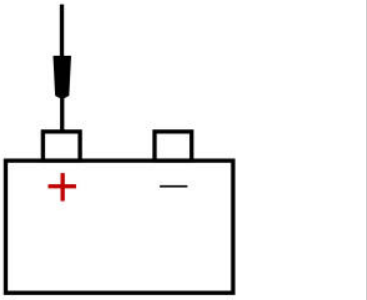
Disconnect PCM C1381B .

Connect a fused jumper wire:

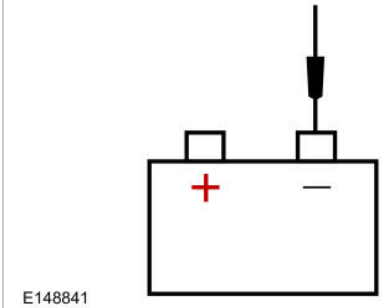
Positive Lead	Measurement / Action	Negative Lead
 E190435 BJB PCM Relay pin 3		 E190435 BJB PCM Relay pin 5

Measure and record:

Positive Lead	Measurement / Action	Negative Lead







NOTE: The following step will load test the circuit. A headlamp bulb would be an effective load. To avoid connector terminal damage, use the Flex Probe Kit for connector connections.

Connect the load to a suitable ground connection.

Connect the load to each circuit and measure:

Positive Lead	Measurement / Action	Negative Lead
C1381B-97		Ground
C1381B-99		Ground

Are the voltages within 0.5 volt of the recorded battery voltage?

Yes	REMOVE the fused jumper wire. GO to B9

No	REPAIR the affected circuit(s).

NOTE: The following step will load test the circuit. A headlamp bulb would be an effective load. To avoid connector terminal damage, use the Flex Probe Kit for connector connections.

B9 CHECK PCM (POWERTRAIN CONTROL MODULE) GROUND FOR HIGH RESISTANCE

Connect the load to a suitable 12 volt power connection.

Connect the load to each circuit and measure:

Positive Lead	Measurement / Action	Negative Lead
C1381B-5		Ground
C1381B-100		Ground
C1381B-102		Ground
C1381B-103		Ground

Is the voltage drop less than 0.5 volt?

Yes	GO to B10

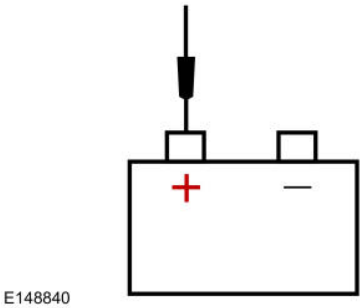
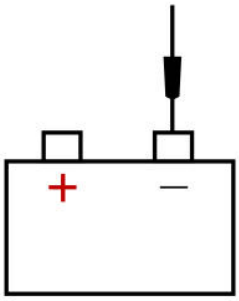
No	REPAIR the affected circuit(s).

B10 MONITOR THE SUPPLY VOLTAGE (VPWR) PID (PARAMETER IDENTIFICATION)

NOTE: Measure battery voltage at the battery.

With the engine running at idle, turn off all accessory loads.

Measure and record:

Positive Lead	Measurement / Action	Negative Lead
 E148840		 E148841

Using a diagnostic scan tool, view PCM PID VPWR and record.

Momentarily accelerate the engine to Wide Open Throttle (WOT) and release. Repeat this step 4-5 times while continuing to monitor the PID.

Does the PID stay within 0.5 volt of the recorded battery voltage when the engine Revolutions Per Minute (RPM) are increased?

Yes	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. INSPECT and REPAIR any connector or pin issues found. If no connector or pin issues are found, Perform the battery drain test. REFER to: Battery Drain Check .

No	GO to B12

B11 CHECK GENERATOR CLUTCH OPERATION

Ignition OFF.

Perform the generator clutch component test .

Is the generator clutch OK?

Yes	INSTALL a new generator. REFER to: Generator - 3.7L Duratec (227kW/301PS) .

No	INSTALL a new generator clutch. REFER to: GENERATOR PULLEY .

B12 CHECK FOR CORRECT PCM (POWERTRAIN CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all PCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the PCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PCM. REFER to: Powertrain Control Module (PCM) . CLEAR all Diagnostic Trouble Codes (DTCs) in all modules.

No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 3.7L DURATEC (227KW 301PS) > PINPOINT TESTS (3.7L) > PINPOINT TEST C : GENERATOR NOISE OR MECHANICAL PERFORMANCE

Normal Operation and Fault Conditions

The generator is belt-driven by the engine accessory drive system. There are several sources of generator noise which include bearing noise, electrical fault noise, generator or belt pulley misalignment. A generator with certain types of diode or stator failures can also produce an audible noise.

Possible Sources

- FEAD belt
- Loose bolts/brackets
- Generator/pulleys

Visual Inspection and Diagnostic Pre-checks

- Inspect the FEAD belt.
- Inspect for loose bolts/brackets.
- Inspect the generator/pulley.

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 3.7L DURATEC (227KW 301PS) > PINPOINT TESTS (3.7L) > PINPOINT TEST C : GENERATOR NOISE OR MECHANICAL PERFORMANCE > PINPOINT TEST C : GENERATOR NOISE OR MECHANICAL PERFORMANCE

C1 CHECK FOR ACCESSORY DRIVE BELT NOISE AND LOOSE MOUNTING BRACKETS

Ignition OFF.

Check the FEAD belt and tensioner for damage and correct installation. REFER to: Accessory Drive .

Is the accessory drive OK?

Yes	GO to C2

No	REPAIR as necessary.

C2 CHECK THE GENERATOR MOUNTING

Check the generator mounting for loose bolts or misalignment.

Is the generator mounted correctly?

Yes	GO to C3

No	REPAIR as necessary.

C3 CHECK THE GENERATOR FOR NOISE

Start the engine.

With the engine running, use a stethoscope or equivalent listening device to probe the generator and the accessory drive area for unusual mechanical noise.

Is the generator the noise source?

Yes	With automatic transmission, INSTALL a new generator. REFER to: Generator - 3.7L Duratec (227kW/301PS) . With manual transmission, GO to C4

No	REFER to: ENGINE SYSTEM - GENERAL INFORMATION to diagnose the source of the engine noise.

C4 CHECK GENERATOR CLUTCH OPERATION

Ignition OFF.

Perform the generator clutch component test .

Is the generator clutch OK?

Yes	INSTALL a new generator. REFER to: Generator - 3.7L Duratec (227kW/301PS) .

No	INSTALL a new generator clutch. REFER to: GENERATOR PULLEY .

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 3.7L DURATEC (227KW 301PS) > PINPOINT TESTS (3.7L) > PINPOINT TEST D : RADIO INTERFERENCE

Radio Interference

Refer to Charging System for schematic and connector information.

Normal Operation and Fault Conditions

The generator radio suppression equipment reduces interference transmitted through the speakers by the vehicle electrical system.

NOTE: If the Original Equipment Manufacturer (OEM) Audio Control Module (ACM) has been replaced with an aftermarket unit, the vehicle may not pass this test. Return the vehicle to Original Equipment Manufacturer (OEM) condition before following this pinpoint test.

NOTE: If the engine is operated at greater than 2, 000 Revolutions Per Minute (RPM) momentarily, the generator self-excites. Make sure when the generator is disconnected the engine RPM stays below 2, 000 Revolutions Per Minute (RPM). If it rises above 2, 000 Revolutions Per Minute (RPM), turn the ignition to the OFF position and start the test over again.

NOTE: Inspect for any aftermarket accessories that have been added to the vehicle. Check the wiring for these accessories and be sure they have not been attached to the generator circuits and are positioned away from the generator wiring.

Possible Sources

- Generator
- In-vehicle entertainment system
- Wiring, terminals or connectors

Visual Inspection and Diagnostic Pre-checks

- Inspect the generator.
- Inspect the in-vehicle entertainment system.

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 3.7L DURATEC (227KW 301PS) > PINPOINT TESTS (3.7L) > PINPOINT TEST D : RADIO INTERFERENCE > PINPOINT TEST D : RADIO INTERFERENCE

D1 VERIFY THE GENERATOR IS THE SOURCE OF THE AUDIO SYSTEM INTERFERENCE

Start the engine.

Allow the engine to idle.

Tune the audio system to a station where interference is present.

Ignition OFF.

Disconnect Generator C102B .

Disconnect Generator C102D .

Start the engine.

Allow the engine to idle.

Is the interference present with the generator disconnected?

Yes	REFER to: Information and Entertainment System (without touchscreen) , or REFER to: Information and Entertainment System (with touchscreen) .

No	INSTALL a new generator. REFER to: Generator - 3.7L Duratec (227kW/301PS) .

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 3.7L DURATEC (227KW 301PS) > PINPOINT TESTS (3.7L) > PINPOINT TEST E : GENERATOR CURRENT SENSOR FAULTS

Refer to Power Distribution for schematic and connector information.

Normal Operation and Fault Conditions

The generator current sensor is a Hall-effect sensor attached to the generator B+ cable. It is supplied a 5 volt reference and ground from the PCM. The PCM reads the generator current sensor feedback voltage to determine how much current is flowing through the generator B+ cable.

Diagnostic Trouble Code (DTC) Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
P0A5A	Generator Current Sensor Circuit	Sets in the PCM when the PCM

	Range/Performance	does not detect current through the generator current sensor and there are no generator current sensor circuit Diagnostic Trouble Codes (DTCs) set.
P0A5B	Generator Current Sensor Circuit Low	Sets in the PCM when the PCM senses lower than expected voltage on the generator current sensor feedback circuit, indicating an open or a short directly to ground.
P0A5C	Generator Current Sensor Circuit High	Sets in the PCM when the PCM senses higher than expected voltage on the generator current sensor feedback circuit, indicating a short directly to voltage.

Possible Sources

- Generator current sensor
- Generator clutch (if equipped)
- PCM
- Wiring, terminals or connectors

Visual Inspection and Diagnostic Pre-checks

- Inspect the generator current sensor.
- Inspect the generator current sensor connector.

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 3.7L DURATEC (227KW 301PS) > PINPOINT TESTS (3.7L) > PINPOINT TEST E : GENERATOR CURRENT SENSOR FAULTS > PINPOINT TEST E : GENERATOR CURRENT SENSOR FAULTS

NOTE: Make sure battery voltage is greater than 12.2 volts prior to and during this pinpoint test.

NOTE: Do not have a battery charger attached during vehicle testing.

E1 RETRIEVE DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition ON.

Using a diagnostic scan tool, perform the PCM self-test

Is DTC P0562 present?

Yes	GO to Pinpoint Test B

No	For DTC P0A5A, GO to E2 For DTC P0A5B, GO to E3 For DTC P0A5C, GO to E6

E2 CHECK THE GENERATOR CURRENT SENSOR

Ignition OFF.

Inspect the generator current sensor for the following:

physical damage

corrosion

disconnected electrical connector

generator B+ cable routed through the generator current sensor

debris between the generator current sensor and the generator B+ cable

Are any of these conditions found during inspection?

Yes	REPAIR as necessary or INSTALL a new generator current sensor. REFER to: Generator Current Sensor .

No	GO to E10

E3 CHECK THE GENERATOR CURRENT SENSOR REFERENCE VOLTAGE CIRCUIT FOR AN OPEN

Ignition OFF.

Disconnect Generator current sensor C1645 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1645-1		Ground

Is the voltage between 4.8 and 5.2 volts?

Yes	GO to E4

No	If the voltage is less than 4.8 volts, REPAIR the circuit for an open or high resistance. If the voltage is greater than 5.2 volts, REPAIR the circuit for a short to voltage.

E4 CHECK THE GENERATOR CURRENT SENSOR GROUND CIRCUIT FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1645-1		C1645-2

Is the voltage between 4.8 and 5.2 volts?

Yes	GO to E5

No	REPAIR the circuit for an open or high resistance.

E5 CHECK THE GENERATOR CURRENT SENSOR FEEDBACK CIRCUIT FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1645-3		C1645-2

Is the voltage between 4.8 and 5.2 volts?

Yes	GO to E6

No	REPAIR the circuit for an open or high resistance.

E6 CHECK THE GENERATOR CURRENT SENSOR FEEDBACK CIRCUIT FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect PCM C1381B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1645-3		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to E7

E7 CHECK THE GENERATOR CURRENT SENSOR FEEDBACK CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Disconnect PCM C1381B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1645-3	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to E8

No	REPAIR the circuit.

E8 CHECK THE GENERATOR CURRENT SENSOR FEEDBACK CIRCUIT FOR A SHORT TO THE SIGNAL RETURN OR VOLTAGE REFERENCE CIRCUIT

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1645-3	Ω	C1645-1
C1645-3	Ω	C1645-2

Are the resistances greater than 10, 000 ohms?

Yes	GO to E9

No	REPAIR the affected circuit.

E9 CHECK THE GENERATOR CURRENT SENSOR FEEDBACK CIRCUIT FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1381B-53	Ω	C1645-3

Is the resistance less than 3 ohms?

Yes	GO to E10

No	REPAIR the circuit.

E10 CHECK THE GENERATOR CURRENT SENSOR CONNECTION

Ignition OFF.

Disconnect Generator current sensor C1645 .

Inspect the generator current sensor connector for the following:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Connect and correctly seat the generator current sensor connector.

Ignition ON.

Using a diagnostic scan tool, clear all Diagnostic Trouble Codes (DTCs) in all modules.

Using a diagnostic scan tool, perform the PCM self-test

Did the DTC return?

Yes	REPAIR as necessary or INSTALL a new generator current sensor. REFER to: Generator Current Sensor . CLEAR the Diagnostic Trouble Codes (DTCs). REPEAT the self-test. If the DTC returns, GO to E11

No	The system is operating correctly at this time. The concern may have been caused by an intermittently loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

E11 CHECK FOR CORRECT PCM (POWERTRAIN CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all PCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the PCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PCM. REFER to: Powertrain Control Module (PCM) . CLEAR all Diagnostic Trouble Codes (DTCs) in all modules.

No	The system is operating correctly at this time. The concern may have been caused by

	module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 3.7L DURATEC (227KW 301PS) > PINPOINT TESTS (3.7L) > PINPOINT TEST F : DTC P0620, P065B

Refer to Charging System for schematic and connector information.

Normal Operation and Fault Conditions

The PCM monitors the generator output via the generator monitor (GENMON) circuit. The PCM uses the generator command (GENCOM) circuit to command the generator to either increase or decrease output. If the GENCOM circuit (generator control circuit) or the "A" sense circuit are open or shorted to ground, the PCM will not be able to control the generator output. When the engine speed is greater than 2, 000 RPM, the generator defaults to a steady voltage output of 13.5 volts and the PCM sends a request to the IPC to illuminate the charging system warning indicator. A GENCOM circuit fault can be confirmed by viewing the PCM PID generator command line fault (GENCMD_LF) (YES status indicator fault).

Diagnostic Trouble Code (DTC) Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
P0620	Generator Control Circuit	The PCM sets this DTC if the GENCOM circuit, "A" sense circuit, or B+ circuit is open or shorted to ground.
P065B	Generator Control Circuit Range/performance	The PCM sets this DTC when the generator reports an internal regulator failure.

Possible Sources

- Fuses or Fusible Links
- Generator
- PCM
- Wiring, terminals or connectors

Visual Inspection and Diagnostic Pre-checks

- Inspect the high current BJB for loose or corroded connections.

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 3.7L DURATEC (227KW 301PS) > PINPOINT TESTS (3.7L) > PINPOINT TEST F : DTC P0620, P065B > PINPOINT TEST F : DTC P0620, P065B

NOTE: Make sure battery voltage is greater than 12.2 volts prior to and during this pinpoint

test.

NOTE: Do not have a battery charger attached during vehicle testing.

F1 CHECK THE BATTERY CONDITION

Check the battery condition and state of charge. REFER to: BATTERY, MOUNTING AND CABLES .

Does the battery pass the condition test?

Yes	GO to F2

No	CHARGE or INSTALL a new battery as necessary. REFER to: Battery .

F2 CHECK THE GENERATOR CONNECTIONS

Ignition OFF.

Disconnect all of the generator connectors and inspect for:

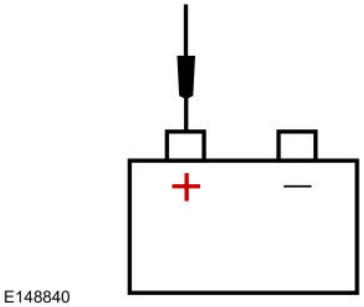
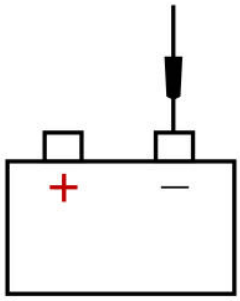
corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the generator connectors. Make sure they seat and latch correctly.

Measure and record:

Positive Lead	Measurement / Action	Negative Lead
 E148840		 E148841

Measure:

Positive Lead	Measurement / Action	Negative Lead
C102B-1		Ground

Is the voltage within 0.5 volt of the recorded battery voltage?

Yes	GO to F3

No	TIGHTEN or INSTALL a new generator B+ nut as needed. REFER to: Generator - 3.7L Duratec (227kW/301PS) . VERIFY high current BJB MEGA fuse (275A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short.

F3 CHECK THE VOLTAGE DROP IN THE GENERATOR B+ CIRCUIT

Start the engine.

With the engine running at idle, headlamps on and blower on high, measure:

Positive Lead	Measurement / Action	Negative Lead
C102D-1		

Perform a wiggle test of the generator wiring and connections while measuring voltage drop.

Is the voltage drop less than 0.5 volt?

Yes	GO to F4

No	INSPECT and REPAIR any corrosion in the generator B+ circuit or positive battery cable connections.

NOTE: This step puts a load on the "A" sense circuit. If there are corroded or loose connections, loading the circuit may help show the fault. A 250-350 mA incandescent 12-volt test lamp is required for this step. This circuit cannot be loaded correctly using an LED-style test lamp.

NOTE: The following step uses a test light to simulate normal circuit loads. Use only the test light recommended in the Special Tools table at the beginning of this article. To avoid connector terminal damage, use the Flex Probe Kit for the test light probe connection to the vehicle. Do not use the test light probe directly on any connector.

F4 "A" SENSE CIRCUIT LOAD TEST

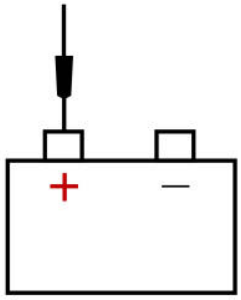
Ignition OFF.

Disconnect Generator C102B .

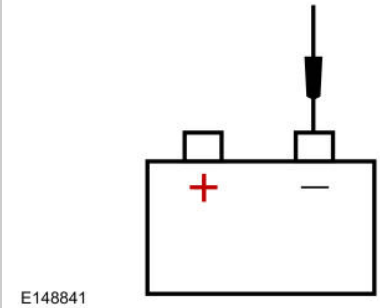
Ignition ON.

Measure and record:

Positive Lead	Measurement / Action	Negative Lead







Install a test lamp between:

Positive Lead	Measurement / Action	Negative Lead
C102B-3		Ground

Perform a wiggle test on the generator wiring and measure:

Positive Lead	Measurement / Action	Negative Lead
C102B-3		Ground

Is the "A" sense voltage within ±0.5 volt of the recorded battery voltage?

Yes	GO to F5

No	VERIFY the BJB fuse 36 (10A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short.

F5 CHECK THE GENERATOR COMMAND CIRCUIT FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect PCM C1381B .

Ignition ON.

Perform a wiggle test on the generator wiring and measure:

Positive Lead	Measurement / Action	Negative Lead
C102B-2		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to F6

F6 CHECK THE GENERATOR COMMAND CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Perform a wiggle test on the generator wiring and measure:

Positive Lead	Measurement / Action	Negative Lead
C102B-2	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to F7

No	REPAIR the circuit.

F7 CHECK THE GENERATOR COMMAND CIRCUIT FOR AN OPEN

Perform a wiggle test on the generator wiring and measure:

Positive Lead	Measurement / Action	Negative Lead
C1381B-13	Ω	C102B-2

Is the resistance less than 3 ohms?

Yes	GO to F8

No	REPAIR the circuit.

F8 COMPARE THE GENERATOR MONITOR (GENMON) AND GENERATOR COMMAND (GENCMD) PIDS

Ignition OFF.

Connect PCM C1381B .

Connect a fused jumper wire:

Positive Lead	Measurement / Action	Negative Lead
C102B-1		C102B-2

Start the engine.

Using a diagnostic scan tool, view PCM Parameter Identifications (PIDs).

Monitor the PCM Parameter Identifications (PIDs) GENMON and GENCMD.

Perform a wiggle test of the generator wiring and connections.

Do the Parameter Identifications (PIDs) read within 5% of each other?

Yes	REMOVE the fused jumper wire. INSTALL a new generator. REFER to: Generator - 3.7L Duratec (227kW/301PS) .

No	REMOVE the fused jumper wire. GO to F9

F9 CHECK FOR CORRECT PCM (POWERTRAIN CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all PCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the PCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PCM. REFER to: Powertrain Control Module (PCM) . CLEAR all Diagnostic Trouble Codes (DTCs) in all modules.

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 3.7L DURATEC (227KW 301PS) > PINPOINT TESTS (3.7L) > PINPOINT TEST G : DTC P0625 OR P0626

Refer to Charging System for schematic and connector information.

Normal Operation and Fault Conditions

The PCM monitors the generator output via the generator monitor (GENMON) circuit (generator field terminal circuit). If the PCM cannot read the GENMON circuit due to an open or short to ground, when the engine speed is greater than 2, 000 RPM, the generator defaults to a steady voltage of 13.5 volts and the PCM sends a request to the IPC to illuminate the charging system warning indicator. A GENMON duty cycle of 3% or less indicates a short to ground fault is present and results in DTC P0625 setting in the PCM. A GENMON duty cycle of 98% or more indicates an open or short to voltage fault is present and results in DTC P0626 setting in the PCM.

Diagnostic Trouble Code (DTC) Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions

P0625	Generator Field Terminal Circuit Low	The PCM sets this DTC if the GENMON circuit is shorted to ground, the "A" sense circuit is open or the B+ circuit is open. This DTC also sets by a faulted PCM or generator.
P0626	Generator Field Terminal Circuit High	The PCM sets this DTC if the GENMON circuit is open or shorted to power. This DTC can also be set by a faulted PCM or generator.

Possible Sources

- Battery
- Fuses or Fusible Links
- Generator
- PCM
- Wiring, terminals or connectors

Visual Inspection and Diagnostic Pre-checks

- Inspect for abnormal ignition-off current drain(s).
- Inspect the high current BJB for loose or corroded connections.

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 3.7L DURATEC (227KW 301PS) > PINPOINT TESTS (3.7L) > PINPOINT TEST G : DTC P0625 OR P0626 > PINPOINT TEST G : DTC P0625 OR P0626

G1 CHECK THE BATTERY CONDITION

Check the battery condition and state of charge. REFER to: BATTERY, MOUNTING AND CABLES .

Does the battery pass the condition test?

Yes	GO to G2

No	CHARGE or INSTALL a new battery as necessary. REFER to: Battery .

G2 CHECK THE GENERATOR CONNECTIONS

Ignition OFF.

Disconnect all of the generator connectors and inspect for:

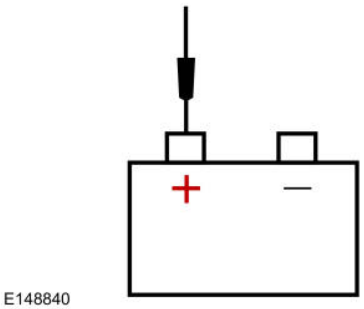
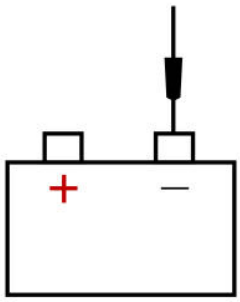
corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the generator connectors. Make sure they seat and latch correctly.

Measure and record:

Positive Lead	Measurement / Action	Negative Lead
 E148840		 E148841

Measure:

Positive Lead	Measurement / Action	Negative Lead
C102B-1		Ground

Is the voltage within 0.5 volt of the recorded battery voltage?

Yes	GO to G3

No	TIGHTEN or INSTALL a new generator B+ nut as needed. REFER to: Generator - 3.7L Duratec (227kW/301PS) . VERIFY high current BJB MEGA fuse (275A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short.

G3 CHECK THE VOLTAGE DROP IN THE GENERATOR B+ CIRCUIT

Start the engine.

With the engine running at idle, headlamps on and blower on high, measure:

Positive Lead	Measurement / Action	Negative Lead
C102D-1		

Perform a wiggle test of the generator wiring and connections while measuring voltage drop.

Is the voltage drop less than 0.5 volt?

Yes	For DTC P0625, GO to G4 For DTC P0626, GO to G5

No	INSPECT and REPAIR any corrosion in the generator B+ circuit or positive battery cable connections.

NOTE: This step puts a load on the "A" sense circuit. If there are corroded or loose connections, loading the circuit may help show the fault. A 250-350 mA incandescent 12-volt test lamp is required for this step. This circuit cannot be loaded correctly using an LED-style test lamp.

NOTE: The following step uses a test light to simulate normal circuit loads. Use only the test light recommended in the Special Tools table at the beginning of this article. To avoid connector terminal damage, use the Flex Probe Kit for the test light probe connection to the vehicle. Do not use the test light probe directly on any connector.

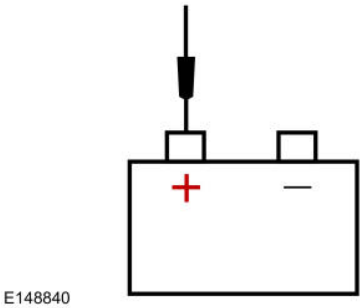
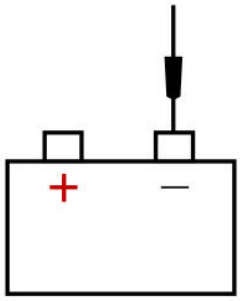
G4 "A" SENSE CIRCUIT LOAD TEST

Ignition OFF.

Disconnect Generator C102B .

Ignition ON.

Measure and record:

Positive Lead	Measurement / Action	Negative Lead
 E148840		 E148841

Install a test lamp between:

Positive Lead	Measurement / Action	Negative Lead
C102B-3		Ground

Perform a wiggle test on the generator wiring and measure:

Positive Lead	Measurement / Action	Negative Lead
C102B-3		Ground

Is the "A" sense voltage within ±0.5 volt of the recorded battery voltage?

Yes	GO to G5

No	VERIFY the BJB fuse 36 (10A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short.

G5 CHECK THE GENERATOR MONITOR CIRCUIT FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect PCM C1381B .

Ignition ON.

Perform a wiggle test on the generator wiring and measure:

Positive Lead	Measurement / Action	Negative Lead
C102B-1		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to G6

G6 CHECK THE GENERATOR MONITOR CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Perform a wiggle test on the generator wiring and measure:

Positive Lead	Measurement / Action	Negative Lead
C102B-1	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to G7

No	REPAIR the circuit.

G7 CHECK THE GENERATOR MONITOR CIRCUIT FOR AN OPEN

Perform a wiggle test on the generator wiring and measure:

Positive Lead	Measurement / Action	Negative Lead
C1381B-26	Ω	C102B-1

Is the resistance less than 3 ohms?

Yes	GO to G8

No	REPAIR the circuit.

G8 CHECK THE GENERATOR B+ INTERNAL RESISTANCE

Disconnect Generator C102B .

Disconnect Generator C102D .

Measure:

Positive Lead	Measurement / Action	Negative Lead
Generator B+ Terminal	Ω	Generator case

Is the resistance greater than 25K ohms?

Yes	GO to G9

No	INSTALL a new generator. REFER to: Generator - 3.7L Duratec (227kW/301PS) .

G9 CHECK THE RESISTANCE OF THE VOLTAGE REGULATOR INTERNAL CIRCUITS

Measure:

Positive Lead	Measurement / Action	Negative Lead
Generator pin 1 (Component Side)	Ω	Generator case
Generator pin 2 (Component Side)	Ω	Generator case
Generator pin 3 (Component Side)	Ω	Generator case

Are the resistances greater than 10, 000 ohms?

Yes	GO to G10

No	INSTALL a new generator. REFER to: Generator - 3.7L Duratec (227kW/301PS) .

G10 COMPARE THE GENMON PID (PARAMETER IDENTIFICATION) AND THE GENCMD PID (PARAMETER IDENTIFICATION)

Connect PCM C1381B .

Connect a fused jumper wire:

Positive Lead	Measurement / Action	Negative Lead
C102B-1		C102B-2

Start the engine.

Using a diagnostic scan tool, view PCM Parameter Identifications (PIDs).

Using the active command, set the PID GENVDSD to 14 volts.

Monitor the PCM Parameter Identifications (PIDs) GENMON and GENCMD.

Perform a wiggle test of the generator wiring and connections.

Do the Parameter Identifications (PIDs) read within 5% of each other?

Yes	REMOVE the fused jumper wire. INSTALL a new generator. REFER to: Generator - 3.7L Duratec (227kW/301PS) .

No	REMOVE the fused jumper wire. GO to G11

G11 CHECK FOR CORRECT PCM (POWERTRAIN CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all PCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the PCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PCM. REFER to: Powertrain Control Module (PCM) . CLEAR all Diagnostic Trouble Codes (DTCs) in all modules.

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 3.7L DURATEC (227KW 301PS) > PINPOINT TESTS (3.7L) > PINPOINT TEST H : LOAD SHED MESSAGE DISPLAYS IN

MESSAGE CENTER

Refer to Charging System for schematic and connector information.

Normal Operation and Fault Conditions

When the engine is off and the key is in on or accessory mode, and the BCM determines the battery state of charge is below 50%, or 45 minutes have elapsed, a load shed message is sent over the CAN. This message turns off the audio/navigation system to save the remaining battery charge. Under this condition the a load shed message will be displayed to notify the driver that battery protection actions are active:

- System Off to Save Battery Turn Ignition Off displays on the FCDIM (without touchscreen controls)
- SYSTEM OFF TO SAVE BATTERY PLEASE TURN IGNITION OFF OR START ENGINE displays on the FDIM (with touchscreen controls)
- Battery Saver - System Off displays on the FDIM (with Sync)

These messages displaying may be normal operation and not indicate a fault. Refer to the Owner Literature and REFER to: Charging System - System Operation and Component Description . Load shed messages displaying with the **engine running** or only on the FCDIM or the FDIM (with touchscreen controls) indicates the audio system has detected a fault.

Possible Sources

- Normal operation
- Audio system
- Battery
- BCM
- Fuses or Fusible Links
- Generator
- Wiring, terminals or connectors

Visual Inspection and Diagnostic Pre-checks

- Inspect the high current BJB for loose or corroded connections.
- Inspect the battery for loose or corroded connections.
- Inspect the generator for loose or corroded connections.
- Inspect the BJB for loose or corroded connections.
- Inspect the high current BJB for loose or corroded connections.
- Inspect C1046 for loose or corroded connections.
- Inspect battery and engine grounds for loose or corroded connections.

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 3.7L DURATEC (227KW 301PS) > PINPOINT TESTS (3.7L) > PINPOINT TEST H : LOAD SHED MESSAGE DISPLAYS IN

MESSAGE CENTER > PINPOINT TEST H : LOAD SHED MESSAGE DISPLAYS IN MESSAGE CENTER

H1 PERFORM INSPECTION AND VERIFICATION

Perform Inspection and Verification procedure in this article.

Was an obvious cause for an observed or reported concern found?

Yes	CORRECT the cause as necessary.

No	GO to H2

H2 VERIFY THE CUSTOMER CONCERN

Verify the customer concern by operating the charging system.

Did the customer indicate battery saver message only appeared in the centerstack with the engine running?

Yes	REFER to: Information and Entertainment System (without touchscreen) , or REFER to: Information and Entertainment System (with touchscreen) .

No	GO to H3

H3 VERIFY THE NETWORK

Ignition ON.

Using a diagnostic scan tool, perform the Network Test.

Did the APIM, BCM, and PCM pass the Network Test?

Yes	GO to H4

No	REFER to: MODULE COMMUNICATIONS NETWORK .

H4 PERFORM PCM (POWERTRAIN CONTROL MODULE) SELF TEST

Ignition ON.

Using a diagnostic scan tool, perform the PCM self-test.

Were any battery or charging system related Diagnostic Trouble Codes (DTCs) retrieved?

Yes	REFER to PCM DTC chart .

No	GO to H5

H5 RETRIEVE ALL CONTINUOUS MEMORY DIAGNOSTIC TROUBLE CODES (CMDTCS)

Ignition ON.

Using a diagnostic scan tool, retrieve all Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Were any battery or charging system related Diagnostic Trouble Codes (DTCs) retrieved?

Yes	For BCM Diagnostic Trouble Codes (DTCs) refer to BCM DTC chart in this article. For APIM or ACM Diagnostic Trouble Codes (DTCs), Refer to the appropriate article for the procedure. For other battery or charging system related Diagnostic Trouble Codes (DTCs), REFER to: Diagnostic Trouble Code Charts .

No	GO to H6

H6 CHECK BCM (BODY CONTROL MODULE) BAT_ST_CHRG PID (PARAMETER IDENTIFICATION)

Ignition ON.

Using a diagnostic scan tool, view the BCM Parameter Identifications (PIDs).

Monitor the BCM BAT_ST_CHRG PID.

Does the PID indicate 50% or more?

Yes	GO to H8

No	GO to H7

NOTE: The battery state of charge is too low and needs to be relearned. Refer to the Description and Operation for more information on battery state of charge.

H7 RELEARN BATTERY STATE OF CHARGE

Remove all accessories from the lighter, all power outlets and DC/AC inverter (if equipped).

NOTE: The key should not be left in the vehicle but should be left in a secure location away from the vehicle such as a lock box.

Allow vehicle to sit undisturbed for at least 6 hours.

Ignition ON.

Using a diagnostic scan tool, view the BCM Parameter Identifications (PIDs).

Monitor the BCM BAT_ST_CHRG PID.

Does the PID indicate 50% or more?

Yes	The concern may have been caused by too low of a battery state of charge. REVIEW Energy Management operation with customer and return vehicle to customer.

No	GO to H8

H8 VERIFY INLINE CONNECTOR

Inspect inline connector C1046 for secure connection.

Disconnect Inline connector C1046 .

Inspect for:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Were any concerns present?

Yes	CORRECT the cause as necessary.

No	GO to H9

H9 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 3.7L DURATEC (227KW 301PS) > PINPOINT TESTS (3.7L) > PINPOINT TEST I : BATTERY CURRENT SENSOR FAULTS

Refer to Charging System for schematic and connector information.

Normal Operation and Fault Conditions

For information on the battery current sensor, REFER to: Charging System - System Operation and Component Description .

Diagnostic Trouble Code (DTC) Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B130C:12	Load Shed Control Circuit Short To Battery	This DTC sets in the BCM when the BCM senses a short in the battery current sensor control circuit.
B130C:14	Load Shed Control Circuit Short To Ground or Open	This DTC sets in the BCM when the BCM senses an open or ground in the battery current sensor control circuit.
B1438:03	Battery Current Sensor, FM (Frequency Modulated) / PWM (Pulse Width Modulated) Failure	This DTC sets in the BCM when the BCM does not indicate current from the battery current sensor.

Possible Sources

- Battery current sensor
- Wiring, terminals or connectors

Visual Inspection and Diagnostic Pre-checks

- Inspect the battery current sensor
- Generator clutch (if equipped)
- Inspect the battery current sensor connector

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 3.7L DURATEC (227KW 301PS) > PINPOINT TESTS (3.7L) > PINPOINT TEST I : BATTERY CURRENT SENSOR FAULTS > PINPOINT TEST I : BATTERY CURRENT SENSOR FAULTS

NOTE: Make sure battery voltage is greater than 12.2 volts prior to and during this pinpoint test.

NOTE: Do not have a battery charger attached during vehicle testing.

I1 RETRIEVE DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition ON.

Using a diagnostic scan tool, perform the PCM self-test

Is DTC P0562 present?

Yes	GO to Pinpoint Test B

No	For DTC P0A5A, GO to I2 For DTC P0A5B, GO to I6 For DTC P0A5C, GO to I10

I2 CHECK THE BATTERY CURRENT SENSOR

Inspect the battery current sensor for the following:

physical damage

corrosion

disconnected electrical connector

battery ground cable routed through the battery current sensor

debris between the battery current sensor and the battery ground cable

Are any of these conditions found during inspection?

Yes	REPAIR as necessary. GO to I14

No	GO to I3

I3 CHECK THE BATTERY CURRENT SENSOR REFERENCE VOLTAGE CIRCUIT

Ignition OFF.

Disconnect Battery current sensor C1646 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1646-1		Ground

Is the voltage between 4.8 and 5.2 volts?

Yes	GO to I7

No	If the voltage is less than 4.8 volts, GO to I5 If the voltage is greater than 5.2 volts, GO to I4

I4 CHECK THE BATTERY CURRENT SENSOR REFERENCE VOLTAGE CIRCUIT FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect BCM C2280F .

Using the Terminal Release Kit, release and temporarily remove BCM C2280F-3 .

Connect BCM C2280F .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1646-1		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	INSTALL C2280F-3 and GO to I15

I5 CHECK THE BATTERY CURRENT SENSOR REFERENCE VOLTAGE CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Disconnect BCM C2280F .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1646-1		Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to I6

No	REPAIR the circuit.

I6 CHECK THE BATTERY CURRENT SENSOR REFERENCE VOLTAGE CIRCUIT FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1646-1	Ω	C2280F-3

Is the resistance less than 3 ohms?

Yes	GO to I14

No	REPAIR the circuit.

I7 CHECK THE BATTERY CURRENT SENSOR SIGNAL RETURN CIRCUIT

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1646-1		C1646-2

Is the voltage between 4.8 and 5.2 volts?

Yes	GO to I10

No	GO to I8

I8 CHECK THE BATTERY CURRENT SENSOR SIGNAL RETURN CIRCUIT FOR VOLTAGE

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1646-2		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to I9

I9 CHECK THE BATTERY CURRENT SENSOR SIGNAL RETURN CIRCUIT FOR AN OPEN

Ignition OFF.

Disconnect BCM C2280C .

Measure:

Positive Lead	Measurement / Action	Negative Lead

C1646-2	Ω	C2280F-19

Is the resistance less than 3 ohms?

Yes	GO to I14

No	REPAIR the circuit.

I10 CHECK THE BATTERY CURRENT SENSOR FEEDBACK CIRCUIT FOR A SHORT TO VOLTAGE

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1646-3	V	Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to I11

I11 CHECK THE BATTERY CURRENT SENSOR FEEDBACK CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Disconnect BCM C2280F .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1646-3	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to I12

No	REPAIR the circuit.

I12 CHECK THE BATTERY CURRENT SENSOR FEEDBACK CIRCUIT FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1646-3	Ω	C2280F-8

Is the resistance less than 3 ohms?

Yes	GO to I13

No	REPAIR the circuit.

I13 CHECK THE BATTERY CURRENT SENSOR FEEDBACK CIRCUIT FOR A SHORT TO THE SIGNAL RETURN OR REFERENCE CIRCUIT

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1646-3	Ω	C1646-1
C1646-3	Ω	C1646-2

Are the resistances greater than 10, 000 ohms?

Yes	GO to I14

No	REPAIR the affected circuit.

I14 CHECK THE BATTERY CURRENT SENSOR CONNECTION

Ignition OFF.

Disconnect Battery Current Sensor C1646 , if necessary.

Inspect the battery current sensor connector for:

- corrosion (install new connector or terminals - clean module pins)
- damaged or bent pins - install new terminals/pins
- pushed-out pins - install new pins as necessary

Connect Battery Current Sensor C1646 .

Connect BCM C2280F .

Ignition ON.

Using a diagnostic scan tool, clear all Diagnostic Trouble Codes (DTCs) in all modules.

Using a diagnostic scan tool, perform the BCM self-test.

Did the DTC return?

Yes	REPAIR as necessary or INSTALL a new battery current sensor. REFER to: Battery Current Sensor . CLEAR the Diagnostic Trouble Codes (DTCs). REPEAT the self-test. If the DTC returns, GO to I15

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

I15 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

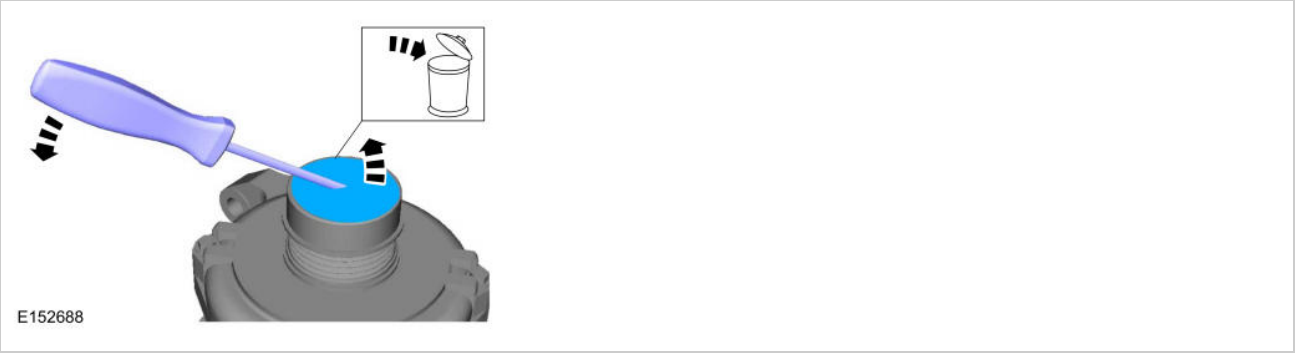
Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 3.7L DURATEC (227KW 301PS) > COMPONENT TEST - GENERATOR CLUTCH

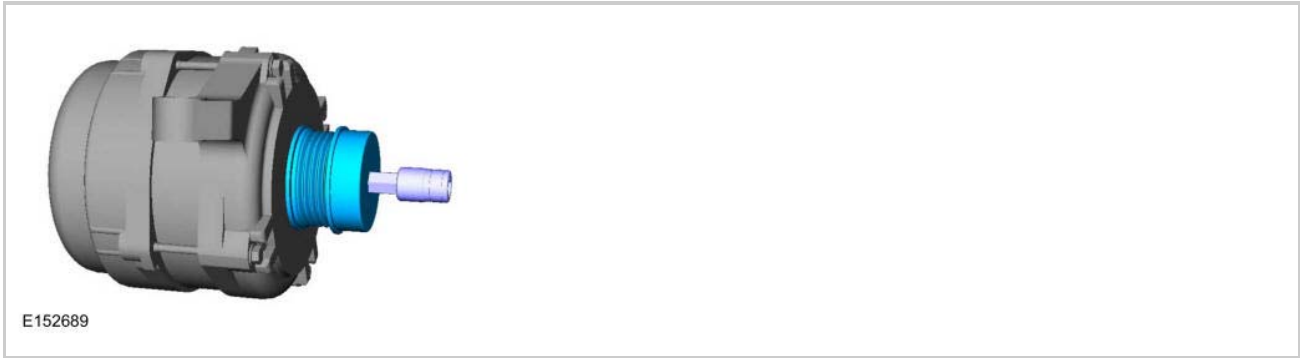
1.

Remove the generator. REFER to: Generator - 3.7L Duratec (227kW/301PS) .



2.

Using a small screwdriver or similar tool, insert the tool through the rubber button on the center of the pulley cap and pry off the cap. Discard the cap. A new cap must be installed if the clutch is OK.



3.

Using a 17 mm hex tool bit (such as a Snap-on ® SAM17E2 or equivalent) and socket wrench, insert the 17 mm hex tool bit into the end of the clutch shaft.

4.

While holding the clutch pulley firmly by hand, turn the clutch shaft clockwise. The shaft should rotate smooth and freely. If the shaft rotation is rough or seized, install a new generator clutch. REFER to: GENERATOR PULLEY .

5.

While holding the clutch pulley firmly by hand, turn the clutch shaft counterclockwise. There should be some resistance (a spring feel). If the shaft rotates freely, install a new generator clutch. REFER to: GENERATOR PULLEY .

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 5.0L 32V TI-VCT > INSPECTION AND VERIFICATION

1.

Verify the customer concern by operating the charging system.

2.

Before diagnosing or repairing the charging system inspect the following items:

- Check the battery for loose, damaged or corroded connections.
- Check the generator for loose, damaged or corroded connections.
- Check engine and battery grounds for loose, damaged or corroded connections.
- Check high current BJB for loose or corroded connections.
- Verify fuses or fusible links.
- Inspect wiring, terminals and connectors.

3.

Check the battery condition and state of charge. REFER to: BATTERY, MOUNTING AND CABLES .

4.

Check for abnormal ignition-off current drain(s). REFER to: Battery Drain Check .

5.

If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding.

6.

Using the diagnostic scan tool, retrieve all Diagnostic Trouble Codes (DTCs). Refer to the appropriate DTC Chart .

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 5.0L 32V TI-VCT > DTC CHARTS (5.0L)

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

BCM DTC Chart

NOTE: Diagnose all PCM DTCs first.

DTC	Description	Action
B130C:12	Load Shed Control Circuit Short To Battery	GO to Pinpoint Test I
B130C:14	Load Shed Control Circuit Short To Ground or Open	GO to Pinpoint Test I
B1438:03	Battery Current Sensor: FM (Frequency Modulated) / PWM (Pulse Width Modulated) Failure	GO to Pinpoint Test I
All Other DTCs	-	REFER to: Body Control Module (BCM) .

PCM DTC Chart

DTC	Description	Action
P0562	System Voltage Low	GO to Pinpoint Test B
P0563	System Voltage High	GO to Pinpoint Test A
P0620	Generator Control Circuit	GO to Pinpoint Test F
P0625	Generator Field Terminal Circuit Low	GO to Pinpoint Test G
P0626	Generator Field Terminal Circuit High	GO to Pinpoint Test G

P065B	Generator Control Circuit Range/performance	GO to Pinpoint Test F
P0A5A	Generator Current Sensor Circuit Range/Performance	GO to Pinpoint Test E
P0A5B	Generator Current Sensor Circuit Low	GO to Pinpoint Test E
P0A5C	Generator Current Sensor Circuit High	GO to Pinpoint Test E
P1397	System Voltage Out Of Self-Test Range	If combined with P0562, GO to Pinpoint Test B If combined with P0563, GO to Pinpoint Test A
All Other DTCs	-	Refer to ENGINE CONTROLS - SYMPTOM CHARTS (EXCEPT DIESEL & HYBRID) .

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 5.0L 32V TI-VCT > SYMPTOM CHART(S) (5.0L)

Symptom Chart: Charging System

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

Symptom Chart

Condition	Possible Sources	Actions
System voltage high	Refer to the Pinpoint Test	GO to Pinpoint Test A
System voltage low or battery is discharged	Refer to the Pinpoint Test	GO to Pinpoint Test B
The generator is noisy	Refer to the Pinpoint Test	GO to Pinpoint Test C
Radio interference	Refer to the Pinpoint Test	GO to Pinpoint Test D
Charging system warning indicator is never or always on	Wiring, terminals or connectors IPC Generator PCM	RETRIEVE Diagnostic Trouble Codes (DTCs) from all modules. If any Diagnostic Trouble Codes (DTCs) are found, Refer to DTC Chart . If no Diagnostic Trouble Codes (DTCs) are found, REFER to: Instrumentation, Message Center and Warning Chimes .
Load Shed Message Displays in IPC message center and/or centerstack infotainment display	Refer to the Pinpoint Test	GO to Pinpoint Test H
Battery Saver - System Off displays in centerstack infotainment display	Refer to the Pinpoint Test	GO to Pinpoint Test H

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 5.0L 32V TI-VCT > PINPOINT TESTS (5.0L) > PINPOINT TEST A : SYSTEM VOLTAGE HIGH

Refer to Charging System for schematic and connector information.

> *NOTE: Diagnostic Trouble Code (DTC) P0563 can be set if the vehicle has been recently jump started or the battery has been recently charged. The battery may become discharged due to excessive load(s) on the charging system from aftermarket accessories or if vehicle accessories have been operating for an extended period of time without the engine running.*

Normal Operation and Fault Conditions

With the engine running, the charging system supplies voltage to the battery and the vehicle electrical system through the high current BJB and battery B+ cable. The voltage that is supplied to the vehicle electrical system is used for the operation of the various vehicle systems and modules. Many modules monitor this voltage and if it rises above or below their calibrated setpoints, a DTC sets.

Diagnostic Trouble Code (DTC) Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
P0563	System Voltage High	This DTC sets in the PCM when the PCM detects voltage from the charging system greater than 15.9 volts with vehicle speed above 8 km/h (5 mph).
P1397	System Voltage Out of Self-Test Range	If the voltage rises above or drops below the calibrated set point, the PCM sets this DTC. This DTC may also be set if the vehicle has been recently jump started or has had a discharged battery.

Possible Sources

- Battery
- Generator
- Engine, generator or battery ground
- PCM
- Wiring, terminals or connectors

Visual Inspection and Diagnostic Pre-checks

- Inspect the high current BJB for loose or corroded connections.

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 5.0L 32V TI-VCT > PINPOINT TESTS

(5.0L) > PINPOINT TEST A : SYSTEM VOLTAGE HIGH > PINPOINT TEST A : SYSTEM VOLTAGE HIGH

NOTE: Make sure battery voltage is greater than 12.2 volts prior to and during this pinpoint test.

NOTE: Do not have a battery charger attached during vehicle testing.

A1 PERFORM INSPECTION AND VERIFICATION

Perform Inspection and Verification procedure in this article.

Was an obvious cause for an observed or reported concern found?

Yes	CORRECT the cause as necessary.

No	GO to A2

A2 RETRIEVE THE PCM (POWERTRAIN CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition ON.

Using a diagnostic scan tool, perform the PCM self-test.

Is DTC P0620, P0625 or P0626 present?

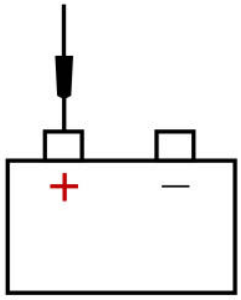
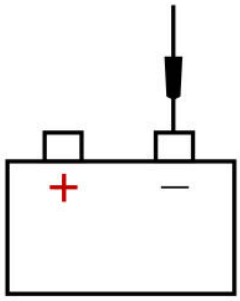
Yes	For DTC P0620, GO to Pinpoint Test F For Diagnostic Trouble Codes (DTCs) P0625 and P0626, GO to Pinpoint Test G

No	GO to A3

A3 COMPARE THE GENERATOR VOLTAGE DESIRED (GENVDSD) PID (PARAMETER IDENTIFICATION) WITH BATTERY VOLTAGE

With the engine running at idle, measure and record:

Positive Lead	Measurement / Action	Negative Lead

 E148840		 E148841

Using a diagnostic scan tool, view the PCM PID GENVDSD.

Is the recorded battery voltage within ±0.5 volt of the PID?

Yes	GO to A6

No	GO to A4

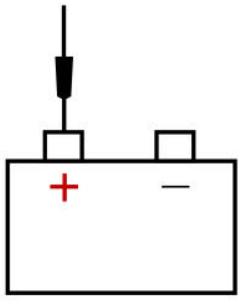
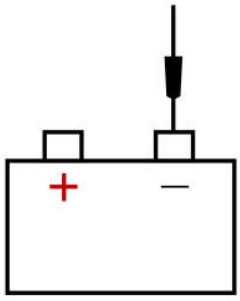
A4 MEASURE THE "A" SENSE VOLTAGE

Ignition OFF.

Disconnect Generator C102B .

Ignition ON.

Measure and record:

Positive Lead	Measurement / Action	Negative Lead
 E148840		 E148841

Measure:

Positive Lead	Measurement / Action	Negative Lead
C102B-3		Ground

Is the "A" sense voltage equal to the recorded battery voltage?

Yes	GO to A5

No	VERIFY the BJB fuse 36 (10A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short.

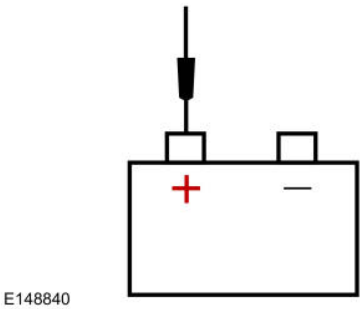
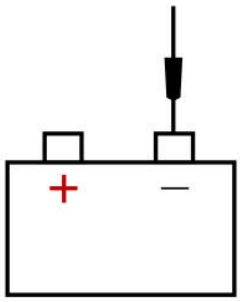
NOTE: This step puts a load on the "A" sense circuit. If there are corroded or loose connections, loading the circuit may help show the fault. A 250-350 mA incandescent 12-volt test lamp is required for this step. This circuit cannot be loaded correctly using an LED-style test lamp.

NOTE: The following step uses a test light to simulate normal circuit loads. Use only the test light recommended in the Special Tools table at the beginning of this article. To avoid connector terminal damage, use the Flex Probe Kit for the test light probe connection to the vehicle. Do not use the test light probe directly on any connector.

A5 "A" SENSE CIRCUIT LOAD TEST

Ignition ON.

Measure and record:

Positive Lead	Measurement / Action	Negative Lead
 E148840		 E148841

Connect the load to each circuit and measure:

Positive Lead	Measurement / Action	Negative Lead
C102B-3		Ground

Is the "A" sense voltage within ±0.5 volt of the recorded battery voltage?

Yes	GO to A6

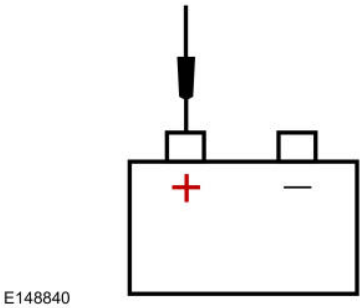
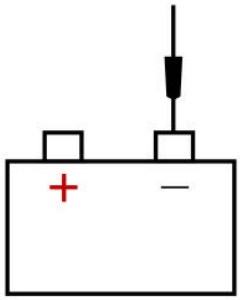
No	VERIFY the BJB fuse 36 (10A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short.

A6 CHECK FOR INTERMITTENT IN THE REGULATOR CIRCUIT

Connect Generator C102B .

Start the engine.

With the engine running at idle, headlamps on and heater blower on high, measure:

Positive Lead	Measurement / Action	Negative Lead
 E148840		 E148841

Perform a wiggle test on the generator wiring and following connections while measuring voltage:

Generator C102B

Inline C1046

Does battery voltage change more than 0.5 volt?

Yes	INSPECT and REPAIR any corrosion in the generator B+ circuit or positive battery cable connections.

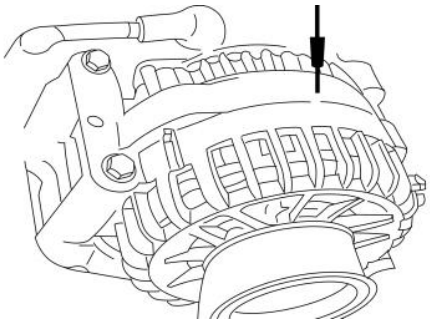
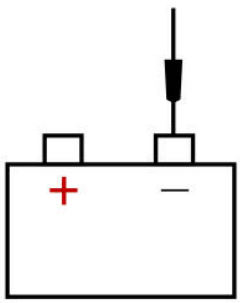
No	GO to A7

A7 CHECK THE VOLTAGE DROP IN THE VEHICLE GROUNDS

Connect Generator C102B .

Start the engine.

With the engine running at idle, headlamps on and heater blower on high, measure:

Positive Lead	Measurement / Action	Negative Lead
		 E148841

Generator case		

Is the voltage drop less than 0.5 volt?

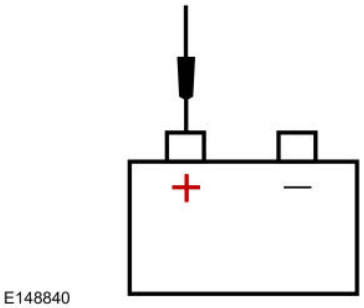
Yes	GO to A8

No	INSPECT and REPAIR the engine ground, generator ground or the battery ground for corrosion.

A8 CHECK THE GENERATOR OUTPUT

Increase the engine RPM until the generator starts to generate output.

With the engine running, measure and record:

Positive Lead	Measurement / Action	Negative Lead
		Ground

Is the voltage above 15.2 volts?

Yes	INSTALL a new generator. REFER to: Generator - 5.0L 32V Ti-VCT .

No	GO to A9

A9 MONITOR THE GENERATOR COMMAND (GENCMD), GENERATOR MONITOR (GENMON) AND GENERATOR VOLTAGE DESIRED (GENVDSD) PIDS

Ignition OFF.

Disconnect Generator C102B .

Connect a fused jumper wire:

Positive Lead	Measurement / Action	Negative Lead
C102B-1		C102B-2

Start the engine.

Using a diagnostic scan tool, view PCM Parameter Identifications (PIDs).

Using the active command, set the PID GENVDSD to 14 volts.

Monitor the PCM Parameter Identifications (PIDs) GENMON and GENVDSD.

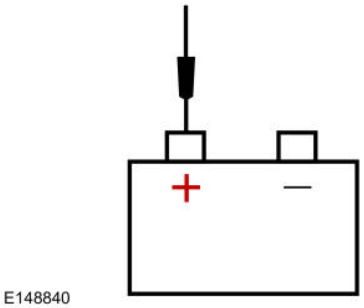
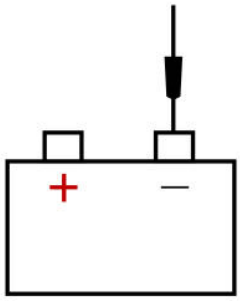
Do the Parameter Identifications (PIDs) read within 5% of each other?

Yes	GO to A10

No	GO to A13

A10 COMPARE THE PCM (POWERTRAIN CONTROL MODULE) SUPPLY VOLTAGE (VPWR) PID (PARAMETER IDENTIFICATION) TO BATTERY VOLTAGE

With the engine running at idle, measure and record:

Positive Lead	Measurement / Action	Negative Lead
 E148840		 E148841

Using a diagnostic scan tool, view PCM Parameter Identifications (PIDs).

Monitor the PCM PID VPWR.

Does the PID accurately display battery voltage within ±0.5 volt of the recorded battery voltage?

Yes	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

No	GO to A11

A11 CHECK PCM (POWERTRAIN CONTROL MODULE) SUPPLY VOLTAGE CIRCUITS

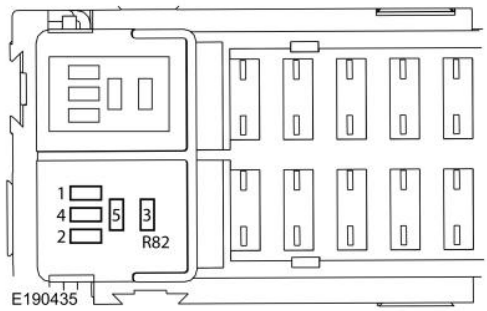
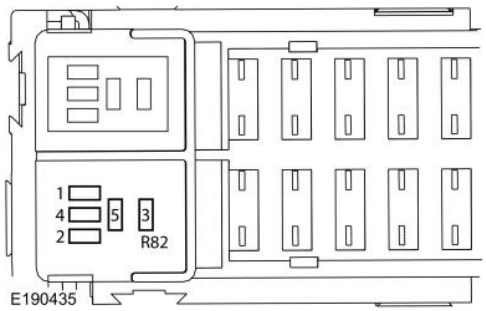
Ignition OFF.

Disconnect BJB PCM power relay.

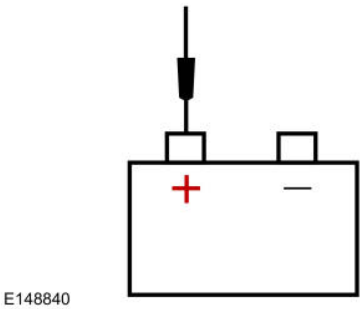
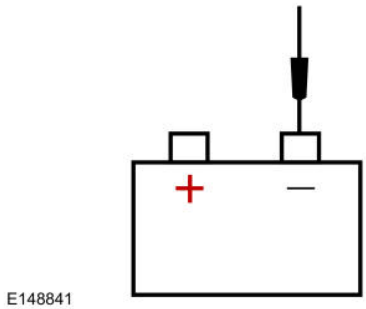
Disconnect PCM C175B .

Connect a fused jumper wire:

Positive Lead	Measurement / Action	Negative Lead

		
BJB PCM Relay pin 3		BJB PCM Relay pin 5

Measure and record:

Positive Lead	Measurement / Action	Negative Lead
		

NOTE: The following step will load test the circuit. A headlamp bulb would be an effective load. To avoid connector terminal damage, use the Flex Probe Kit for connector connections.

Connect the load to a suitable ground connection.

Connect the load to each circuit and measure:

Positive Lead	Measurement / Action	Negative Lead
C175B-97		Ground
C175B-99		Ground

Are the voltages within 0.5 volt of the recorded battery voltage?

Yes	REMOVE the fused jumper wire. GO to A12

No	REPAIR the affected circuit(s).

NOTE: The following step will load test the circuit. A headlamp bulb would be an effective load. To avoid connector terminal damage, use the Flex Probe Kit for connector connections.

A12 CHECK PCM (POWERTRAIN CONTROL MODULE) GROUND FOR HIGH RESISTANCE

Connect the load to a suitable 12 volt power connection.

Connect the load to each circuit and measure:

Positive Lead	Measurement / Action	Negative Lead
C175B-5		Ground
C175B-100		Ground
C175B-102		Ground
C175B-103		Ground

Is the voltage drop less than 0.5 volt?

Yes	GO to A13

No	REPAIR the affected circuit(s).

A13 CHECK FOR CORRECT PCM (POWERTRAIN CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all PCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the PCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PCM. REFER to: Powertrain Control Module (PCM) . CLEAR all Diagnostic Trouble Codes (DTCs) in all modules.

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 5.0L 32V TI-VCT > PINPOINT TESTS (5.0L) > PINPOINT TEST B : SYSTEM VOLTAGE LOW OR BATTERY IS DISCHARGED

Refer to Charging System for schematic and connector information.

Normal Operation and Fault Conditions

With the engine running, the charging system supplies voltage to the battery and the vehicle electrical system through the high current BJB and battery B+ cable. The PCM monitors this B+ voltage through its own voltage supply circuit.

Diagnostic Trouble Code (DTC) Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
P0562	System Voltage Low	If voltage drops 1.5 volts or more below the generator voltage desired (calculated by the PCM), this DTC sets after 30 seconds.
P1397	System Voltage Out of Self-Test Range	If the voltage rises above or drops below the calibrated set point, the PCM sets this DTC. This DTC may also be set if the vehicle has been recently jump started or has had a discharged battery.

Possible Sources

- Battery
- Fuses or fusible links
- Generator
- Generator clutch (if equipped)
- PCM
- High current BJB
- Wiring, terminals or connectors

Visual Inspection and Diagnostic Pre-checks

- Inspect for abnormal ignition-off current drain(s).
- Inspect the battery.
- Inspect the high current BJB for loose or corroded connections.
- Gen "A" Sense
- Gen B+
- Generator clutch (if equipped)

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 5.0L 32V TI-VCT > PINPOINT TESTS (5.0L) > PINPOINT TEST B : SYSTEM VOLTAGE LOW OR BATTERY IS DISCHARGED >

PINPOINT TEST B : SYSTEM VOLTAGE LOW OR BATTERY IS DISCHARGED

NOTE: Make sure battery voltage is greater than 12.2 volts prior to and during this pinpoint test.

NOTE: Do not have a battery charger attached during vehicle testing.

B1 PERFORM INSPECTION AND VERIFICATION

Perform Inspection and Verification procedure in this article.

Was an obvious cause for an observed or reported concern found?

Yes	CORRECT the cause as necessary.

No	GO to B2

B2 RETRIEVE DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, perform the PCM self-test.

Is DTC P0620, P0625 or P0626 present?

Yes	For DTC P0620, GO to Pinpoint Test F For Diagnostic Trouble Codes (DTCs) P0625 and P0626, GO to Pinpoint Test G

No	GO to B3

B3 CHECK THE GENERATOR CONNECTIONS

Ignition OFF.

Disconnect all of the generator connectors and inspect for:

corrosion (install new connector or terminals - clean module pins)

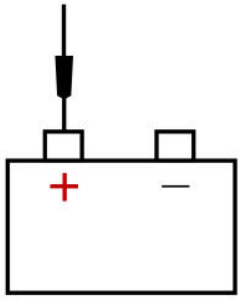
damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

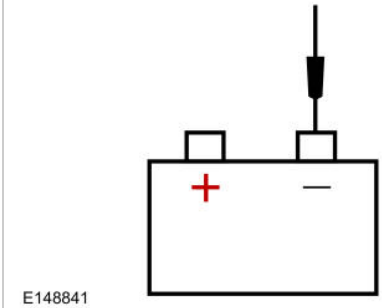
Reconnect the generator connectors. Make sure they seat and latch correctly.

Measure and record:

Positive Lead	Measurement / Action	Negative Lead







Measure:

Positive Lead	Measurement / Action	Negative Lead
C102C-1		Ground

Is the voltage within 0.5 volt of the recorded battery voltage?

Yes	GO to B4

No	TIGHTEN or INSTALL a new generator B+ nut as needed. REFER to: Generator - 5.0L 32V Ti-VCT . VERIFY high current BJB MEGA fuse (275A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short.

B4 CHECK THE VOLTAGE DROP IN THE GENERATOR B+ CIRCUIT

Start the engine.

With the engine running at idle, headlamps on and blower on high, measure:

Positive Lead	Measurement / Action	Negative Lead
C102C-1		

Perform a wiggle test of the generator wiring and connections while measuring voltage drop.

Is the voltage drop less than 0.5 volt?

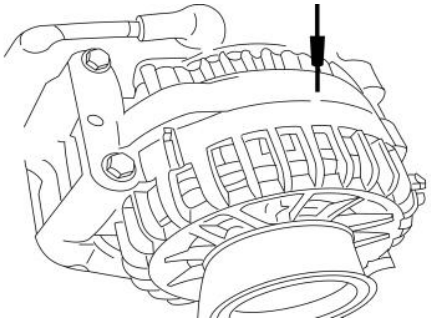
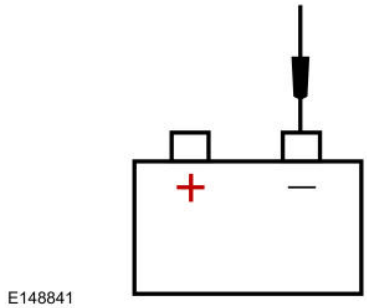
Yes	GO to B5

No	INSPECT and REPAIR any corrosion in the generator B+ circuit or positive battery cable connections.

B5 CHECK THE VOLTAGE DROP IN THE VEHICLE GROUNDS

With the engine running at idle, headlamps on and heater blower on high, measure:

Positive Lead	Measurement / Action	Negative Lead

 Generator case		 E148841

Is the voltage drop less than 0.5 volt?

Yes	GO to B6

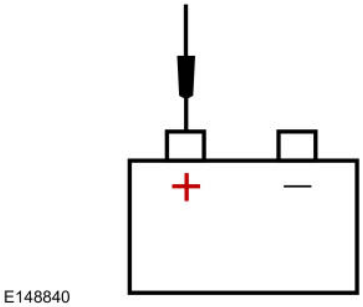
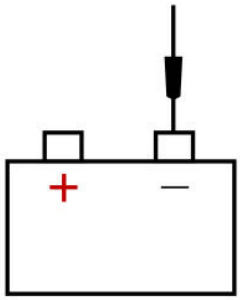
No	INSPECT and REPAIR the engine ground, generator ground or the battery ground for corrosion.

B6 MONITOR THE GENERATOR VOLTAGE DESIRED (GENVDSD) PID (PARAMETER IDENTIFICATION) WHILE COMMANDED

Using a diagnostic scan tool, view the PCM GENVDSD PID.

Using a diagnostic scan tool active command, set the PCM PID GENVDSD to 14 volts.

With the engine running at idle, measure battery and record:

Positive Lead	Measurement / Action	Negative Lead
 E148840		 E148841

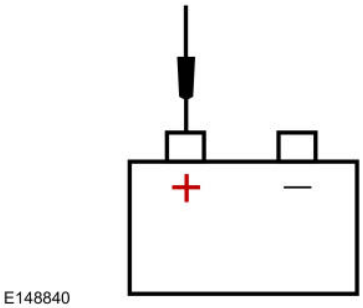
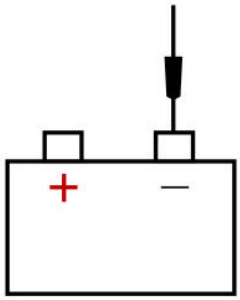
Is the recorded battery voltage within ±0.5 volt of the PID?

Yes	GO to B7

No	With automatic transmission, INSTALL a new generator. REFER to: Generator - 5.0L 32V Ti-VCT . With manual transmission, GO to B11

B7 COMPARE THE PCM (POWERTRAIN CONTROL MODULE) SUPPLY VOLTAGE (VPWR) PID (PARAMETER IDENTIFICATION) TO BATTERY VOLTAGE

With the engine running at idle, headlamps on and blower on high, measure and record:

Positive Lead	Measurement / Action	Negative Lead
 E148840		 E148841

Using a diagnostic scan tool, view the PCM PID VPWR.

Does the PID accurately display battery voltage within ±0.5 volt of the recorded battery voltage?

Yes	GO to B8

No	REPAIR high resistance or loose connections in the affected PCM power circuit(s).

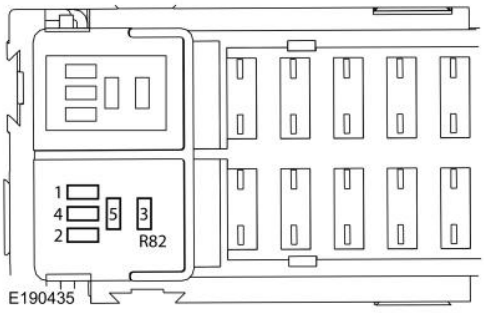
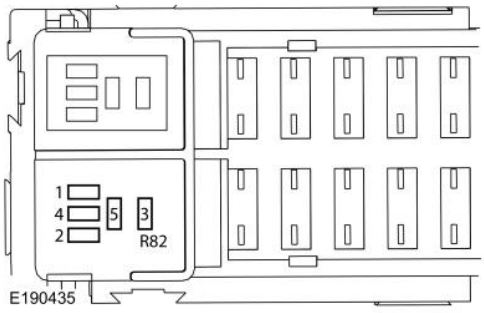
B8 CHECK PCM (POWERTRAIN CONTROL MODULE) SUPPLY VOLTAGE CIRCUITS

Ignition OFF.

Disconnect BJB PCM power relay.

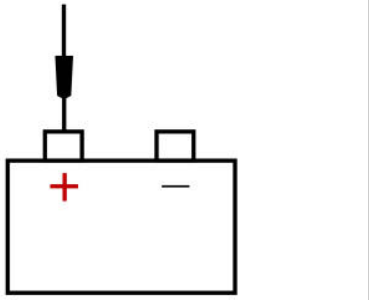
Disconnect PCM C175B .

Connect a fused jumper wire:

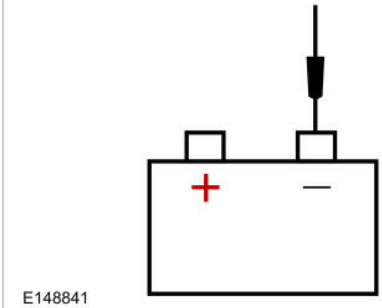
Positive Lead	Measurement / Action	Negative Lead
 E190435 BJB PCM Relay pin 3		 E190435 BJB PCM Relay pin 5

Measure and record:

Positive Lead	Measurement / Action	Negative Lead







NOTE: The following step will load test the circuit. A headlamp bulb would be an effective load. To avoid connector terminal damage, use the Flex Probe Kit for connector connections.

Connect the load to a suitable ground connection.

Connect the load to each circuit and measure:

Positive Lead	Measurement / Action	Negative Lead
C175B-97		Ground
C175B-99		Ground

Are the voltages within 0.5 volt of the recorded battery voltage?

Yes	REMOVE the fused jumper wire. GO to B9

No	REPAIR the affected circuit(s).

NOTE: The following step will load test the circuit. A headlamp bulb would be an effective load. To avoid connector terminal damage, use the Flex Probe Kit for connector connections.

B9 CHECK PCM (POWERTRAIN CONTROL MODULE) GROUND FOR HIGH RESISTANCE

Connect the load to a suitable 12 volt power connection.

Connect the load to each circuit and measure:

Positive Lead	Measurement / Action	Negative Lead
C175B-5		Ground
C175B-100		Ground
C175B-102		Ground
C175B-103		Ground

Is the voltage drop less than 0.5 volt?

Yes	GO to B10

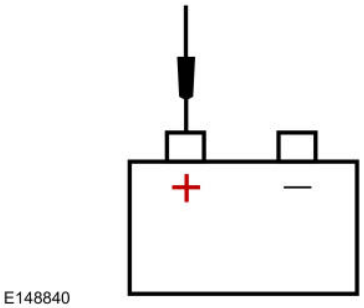
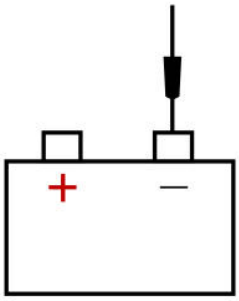
No	REPAIR the affected circuit(s).

B10 MONITOR THE SUPPLY VOLTAGE (VPWR) PID (PARAMETER IDENTIFICATION)

NOTE: Measure battery voltage at the battery.

With the engine running at idle, turn off all accessory loads.

Measure and record:

Positive Lead	Measurement / Action	Negative Lead
 E148840		 E148841

Using a diagnostic scan tool, view PCM PID VPWR and record.

Momentarily accelerate the engine to Wide Open Throttle (WOT) and release. Repeat this step 4-5 times while continuing to monitor the PID.

Does the PID stay within 0.5 volt of the recorded battery voltage when the engine Revolutions Per Minute (RPM) are increased?

Yes	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. INSPECT and REPAIR any connector or pin issues found. If no connector or pin issues are found, Perform the battery drain test. REFER to: Battery Drain Check .

No	GO to B12

B11 CHECK GENERATOR CLUTCH OPERATION

Ignition OFF.

Perform the generator clutch component test .

Is the generator clutch OK?

Yes	INSTALL a new generator. REFER to: Generator - 5.0L 32V Ti-VCT .

No	INSTALL a new generator clutch. REFER to:GENERATOR PULLEY .

B12 CHECK FOR CORRECT PCM (POWERTRAIN CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all PCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the PCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PCM. REFER to: Powertrain Control Module (PCM) . CLEAR all Diagnostic Trouble Codes (DTCs) in all modules.

No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 5.0L 32V TI-VCT > PINPOINT TESTS (5.0L) > PINPOINT TEST C : GENERATOR NOISE OR MECHANICAL PERFORMANCE

Normal Operation and Fault Conditions

The generator is belt-driven by the engine accessory drive system. There are several sources of generator noise which include bearing noise, electrical fault noise, generator or belt pulley misalignment. A generator with certain types of diode or stator failures can also produce an audible noise.

Possible Sources

- FEAD belt
- Loose bolts/brackets
- Generator/pulleys

Visual Inspection and Diagnostic Pre-checks

- Inspect the FEAD belt.

- Inspect for loose bolts/brackets.
- Inspect the generator/pulley.

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 5.0L 32V TI-VCT > PINPOINT TESTS (5.0L) > PINPOINT TEST C : GENERATOR NOISE OR MECHANICAL PERFORMANCE > PINPOINT TEST C : GENERATOR NOISE OR MECHANICAL PERFORMANCE

C1 CHECK FOR ACCESSORY DRIVE BELT NOISE AND LOOSE MOUNTING BRACKETS

Ignition OFF.

Check the FEAD belt and tensioner for damage and correct installation. REFER to: Accessory Drive .

Is the accessory drive OK?

Yes	GO to C2

No	REPAIR as necessary.

C2 CHECK THE GENERATOR MOUNTING

Check the generator mounting for loose bolts or misalignment.

Is the generator mounted correctly?

Yes	GO to C3

No	REPAIR as necessary.

C3 CHECK THE GENERATOR FOR NOISE

Start the engine.

With the engine running, use a stethoscope or equivalent listening device to probe the generator and the accessory drive area for unusual mechanical noise.

Is the generator the noise source?

Yes	INSTALL a new generator. REFER to: Generator - 5.0L 32V Ti-VCT .

No	REFER to: ENGINE SYSTEM - GENERAL INFORMATION to diagnose the source of the engine noise.

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 5.0L 32V TI-VCT > PINPOINT TESTS

(5.0L) > PINPOINT TEST D : RADIO INTERFERENCE

Refer to Charging System for schematic and connector information.

Normal Operation and Fault Conditions

The generator radio suppression equipment reduces interference transmitted through the speakers by the vehicle electrical system.

> *NOTE: If the Original Equipment Manufacturer (OEM) Audio Control Module (ACM) has been replaced with an aftermarket unit, the vehicle may not pass this test. Return the vehicle to Original Equipment Manufacturer (OEM) condition before following this pinpoint test.*

> *NOTE: If the engine is operated at greater than 2, 000 Revolutions Per Minute (RPM) momentarily, the generator self-excites. Make sure when the generator is disconnected the engine RPM stays below 2, 000 Revolutions Per Minute (RPM). If it rises above 2, 000 Revolutions Per Minute (RPM), turn the ignition to the OFF position and start the test over again.*

> *NOTE: Inspect for any aftermarket accessories that have been added to the vehicle. Check the wiring for these accessories and be sure they have not been attached to the generator circuits and are positioned away from the generator wiring.*

Possible Sources

- Generator
- In-vehicle entertainment system
- Wiring, terminals or connectors

Visual Inspection and Diagnostic Pre-checks

- Inspect the generator.
- Inspect the in-vehicle entertainment system.

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 5.0L 32V TI-VCT > PINPOINT TESTS (5.0L) > PINPOINT TEST D : RADIO INTERFERENCE > PINPOINT TEST D : RADIO INTERFERENCE

D1 VERIFY THE GENERATOR IS THE SOURCE OF THE AUDIO SYSTEM INTERFERENCE

Start the engine.

Allow the engine to idle.

Tune the audio system to a station where interference is present.

Ignition OFF.

Disconnect Generator C102B .

Disconnect Generator C102C .

Start the engine.

Allow the engine to idle.

Is the interference present with the generator disconnected?

Yes	REFER to: Information and Entertainment System (without touchscreen) , or REFER to: Information and Entertainment System (with touchscreen) .

No	INSTALL a new generator. REFER to: Generator - 5.0L 32V Ti-VCT .

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 5.0L 32V TI-VCT > PINPOINT TESTS (5.0L) > PINPOINT TEST E : GENERATOR CURRENT SENSOR FAULTS

Refer to Power Distribution for schematic and connector information.

Normal Operation and Fault Conditions

The generator current sensor is a Hall-effect sensor attached to the generator B+ cable. It is supplied a 5 volt reference and ground from the PCM. The PCM reads the generator current sensor feedback voltage to determine how much current is flowing through the generator B+ cable.

Diagnostic Trouble Code (DTC) Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
P0A5A	Generator Current Sensor Circuit Range/Performance	Sets in the PCM when the PCM does not detect current through the generator current sensor and there are no generator current sensor circuit Diagnostic Trouble Codes (DTCs) set.
P0A5B	Generator Current Sensor Circuit Low	Sets in the PCM when the PCM senses lower than expected voltage on the generator current sensor feedback circuit, indicating an open or a short directly to ground.
P0A5C	Generator Current Sensor Circuit High	Sets in the PCM when the PCM senses higher than expected voltage on the generator current sensor feedback circuit, indicating a short directly to voltage.

Possible Sources

- Generator current sensor
- Generator clutch (if equipped)
- PCM
- Wiring, terminals or connectors

Visual Inspection and Diagnostic Pre-checks

- Inspect the generator current sensor.
- Inspect the generator current sensor connector.

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 5.0L 32V TI-VCT > PINPOINT TESTS (5.0L) > PINPOINT TEST E : GENERATOR CURRENT SENSOR FAULTS > PINPOINT TEST E : GENERATOR CURRENT SENSOR FAULTS

NOTE: Make sure battery voltage is greater than 12.2 volts prior to and during this pinpoint test.

NOTE: Do not have a battery charger attached during vehicle testing.

E1 RETRIEVE DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition ON.

Using a diagnostic scan tool, perform the PCM self-test

Is DTC P0562 present?

Yes	GO to Pinpoint Test B

No	For DTC P0A5A, GO to E2 For DTC P0A5B, GO to E3 For DTC P0A5C, GO to E6

E2 CHECK THE GENERATOR CURRENT SENSOR

Ignition OFF.

Inspect the generator current sensor for the following:

physical damage

corrosion

disconnected electrical connector

generator B+ cable routed through the generator current sensor

debris between the generator current sensor and the generator B+ cable

Are any of these conditions found during inspection?

Yes	REPAIR as necessary or INSTALL a new generator current sensor. REFER to: Generator Current Sensor .

No	GO to E10

E3 CHECK THE GENERATOR CURRENT SENSOR REFERENCE VOLTAGE CIRCUIT FOR AN OPEN

Ignition OFF.

Disconnect Generator current sensor C1645 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1645-1		Ground

Is the voltage between 4.8 and 5.2 volts?

Yes	GO to E4

No	If the voltage is less than 4.8 volts, REPAIR the circuit for an open or high resistance. If the voltage is greater than 5.2 volts, REPAIR the circuit for a short to voltage.

E4 CHECK THE GENERATOR CURRENT SENSOR GROUND CIRCUIT FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1645-1		C1645-2

Is the voltage between 4.8 and 5.2 volts?

Yes	GO to E5

No	REPAIR the circuit for an open or high resistance.

E5 CHECK THE GENERATOR CURRENT SENSOR FEEDBACK CIRCUIT FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1645-3		C1645-2

Is the voltage between 4.8 and 5.2 volts?

Yes	GO to E6

No	REPAIR the circuit for an open or high resistance.

E6 CHECK THE GENERATOR CURRENT SENSOR FEEDBACK CIRCUIT FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect PCM C175B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1645-3		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to E7

E7 CHECK THE GENERATOR CURRENT SENSOR FEEDBACK CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Disconnect PCM C175B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1645-3	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to E8

No	REPAIR the circuit.

E8 CHECK THE GENERATOR CURRENT SENSOR FEEDBACK CIRCUIT FOR A SHORT TO THE SIGNAL RETURN OR VOLTAGE REFERENCE CIRCUIT

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1645-3	Ω	C1645-1
C1645-3	Ω	C1645-2

Are the resistances greater than 10, 000 ohms?

Yes	GO to E9

No	REPAIR the affected circuit.

E9 CHECK THE GENERATOR CURRENT SENSOR FEEDBACK CIRCUIT FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C175B-53	Ω	C1645-3

Is the resistance less than 3 ohms?

Yes	GO to E10

No	REPAIR the circuit.

E10 CHECK THE GENERATOR CURRENT SENSOR CONNECTION

Ignition OFF.

Disconnect Generator current sensor C1645 .

Inspect the generator current sensor connector for the following:

- corrosion (install new connector or terminals - clean module pins)
- damaged or bent pins - install new terminals/pins
- pushed-out pins - install new pins as necessary

Connect and correctly seat the generator current sensor connector.

Ignition ON.

Using a diagnostic scan tool, clear all Diagnostic Trouble Codes (DTCs) in all modules.

Using a diagnostic scan tool, perform the PCM self-test

Did the DTC return?

Yes	REPAIR as necessary or INSTALL a new generator current sensor. REFER to: Generator Current Sensor . CLEAR the Diagnostic Trouble Codes (DTCs). REPEAT the self-test. If the DTC returns, GO to E11

No	The system is operating correctly at this time. The concern may have been caused by an intermittently loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

E11 CHECK FOR CORRECT PCM (POWERTRAIN CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all PCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the PCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PCM. REFER to: Powertrain Control Module (PCM) . CLEAR all Diagnostic Trouble Codes (DTCs) in all modules.

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 5.0L 32V TI-VCT > PINPOINT TESTS (5.0L) > PINPOINT TEST F : DTC P0620, P065B

DTC P0620, P065B

Refer to Charging System for schematic and connector information.

Normal Operation and Fault Conditions

The PCM monitors the generator output via the generator monitor (GENMON) circuit. The PCM uses the generator command (GENCOM) circuit to command the generator to either increase or decrease output. If the GENCOM circuit (generator control circuit) or the "A" sense circuit are open or shorted to ground, the PCM will not be able to control the generator output. When the engine speed is greater than 2, 000 RPM, the generator defaults to a steady voltage output of 13.5 volts and the PCM sends a request to the IPC to

illuminate the charging system warning indicator. A GENCOM circuit fault can be confirmed by viewing the PCM PID generator command line fault (GENCMD_LF) (YES status indicator fault).

Diagnostic Trouble Code (DTC) Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
P0620	Generator Control Circuit	The PCM sets this DTC if the GENCOM circuit, "A" sense circuit, or B+ circuit is open or shorted to ground.
P065B	Generator Control Circuit Range/performance	The PCM sets this DTC when the generator reports an internal regulator failure.

Possible Sources

- Fuses or Fusible Links
- Generator
- PCM
- Wiring, terminals or connectors

Visual Inspection and Diagnostic Pre-checks

- Inspect the high current BJB for loose or corroded connections.

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 5.0L 32V TI-VCT > PINPOINT TESTS (5.0L) > PINPOINT TEST F : DTC P0620, P065B > PINPOINT TEST F : DTC P0620, P065B

NOTE: Make sure battery voltage is greater than 12.2 volts prior to and during this pinpoint test.

NOTE: Do not have a battery charger attached during vehicle testing.

F1 CHECK THE BATTERY CONDITION

Check the battery condition and state of charge. REFER to: BATTERY, MOUNTING AND CABLES .

Does the battery pass the condition test?

Yes	GO to F2

No	CHARGE or INSTALL a new battery as necessary. REFER to: Battery .

F2 CHECK THE GENERATOR CONNECTIONS

Ignition OFF.

Disconnect all of the generator connectors and inspect for:

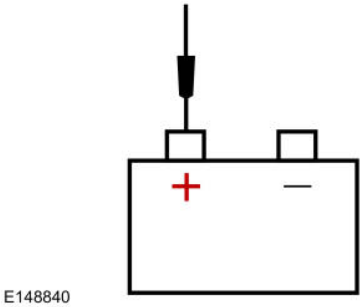
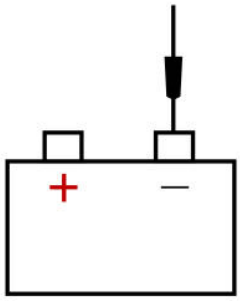
corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the generator connectors. Make sure they seat and latch correctly.

Measure and record:

Positive Lead	Measurement / Action	Negative Lead
 E148840		 E148841

Measure:

Positive Lead	Measurement / Action	Negative Lead
C102B-1		Ground

Is the voltage within 0.5 volt of the recorded battery voltage?

Yes	GO to F3

No	TIGHTEN or INSTALL a new generator B+ nut as needed. REFER to: Generator - 5.0L 32V Ti-VCT . VERIFY high current BJB MEGA fuse (275A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short.

F3 CHECK THE VOLTAGE DROP IN THE GENERATOR B+ CIRCUIT

Start the engine.

With the engine running at idle, headlamps on and blower on high, measure:

Positive Lead	Measurement / Action	Negative Lead

C102C-1		

Perform a wiggle test of the generator wiring and connections while measuring voltage drop.

Is the voltage drop less than 0.5 volt?

Yes	GO to F4

No	INSPECT and REPAIR any corrosion in the generator B+ circuit or positive battery cable connections.

NOTE: This step puts a load on the "A" sense circuit. If there are corroded or loose connections, loading the circuit may help show the fault. A 250-350 mA incandescent 12-volt test lamp is required for this step. This circuit cannot be loaded correctly using an LED-style test lamp.

NOTE: The following step uses a test light to simulate normal circuit loads. Use only the test light recommended in the Special Tools table at the beginning of this article. To avoid connector terminal damage, use the Flex Probe Kit for the test light probe connection to the vehicle. Do not use the test light probe directly on any connector.

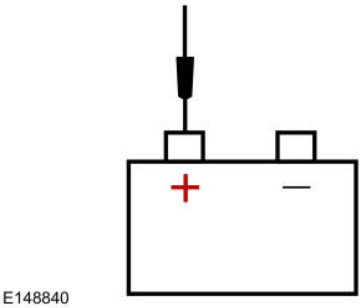
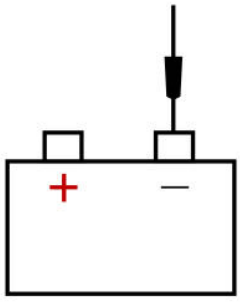
F4 "A" SENSE CIRCUIT LOAD TEST

Ignition OFF.

Disconnect Generator C102B .

Ignition ON.

Measure and record:

Positive Lead	Measurement / Action	Negative Lead
 E148840		 E148841

Install a test lamp between:

Positive Lead	Measurement / Action	Negative Lead
C102B-3		Ground

Perform a wiggle test on the generator wiring and measure:

Positive Lead	Measurement / Action	Negative Lead
C102B-3		Ground

Is the "A" sense voltage within ±0.5 volt of the recorded battery voltage?

Yes	GO to F5

No	VERIFY the BJB fuse 36 (10A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short.

F5 CHECK THE GENERATOR COMMAND CIRCUIT FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect PCM C175B .

Ignition ON.

Perform a wiggle test on the generator wiring and measure:

Positive Lead	Measurement / Action	Negative Lead
C102B-2		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to F6

F6 CHECK THE GENERATOR COMMAND CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Perform a wiggle test on the generator wiring and measure:

Positive Lead	Measurement / Action	Negative Lead
C102B-2	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to F7

No	REPAIR the circuit.

F7 CHECK THE GENERATOR COMMAND CIRCUIT FOR AN OPEN

Perform a wiggle test on the generator wiring and measure:

Positive Lead	Measurement / Action	Negative Lead
C175B-13	Ω	C102B-2

Is the resistance less than 3 ohms?

Yes	GO to F8

No	REPAIR the circuit.

F8 COMPARE THE GENERATOR MONITOR (GENMON) AND GENERATOR COMMAND (GENCMD) PIDS

Ignition OFF.

Connect PCM C175B .

Connect a fused jumper wire:

Positive Lead	Measurement / Action	Negative Lead
C102B-1		C102B-2

Start the engine.

Using a diagnostic scan tool, view PCM Parameter Identifications (PIDs).

Monitor the PCM Parameter Identifications (PIDs) GENMON and GENCMD.

Perform a wiggle test of the generator wiring and connections.

Do the Parameter Identifications (PIDs) read within 5% of each other?

Yes	REMOVE the fused jumper wire. INSTALL a new generator. REFER to: Generator - 5.0L 32V Ti-VCT .

No	REMOVE the fused jumper wire. GO to F9

F9 CHECK FOR CORRECT PCM (POWERTRAIN CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all PCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the PCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PCM. REFER to: Powertrain Control Module (PCM) . CLEAR all Diagnostic Trouble Codes (DTCs) in all modules.

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 5.0L 32V TI-VCT > PINPOINT TESTS (5.0L) > PINPOINT TEST G : DTC P0625 OR P0626

Refer to Charging System for schematic and connector information.

Normal Operation and Fault Conditions

The PCM monitors the generator output via the generator monitor (GENMON) circuit (generator field terminal circuit). If the PCM cannot read the GENMON circuit due to an open or short to ground, when the engine speed is greater than 2, 000 RPM, the generator defaults to a steady voltage of 13.5 volts and the PCM sends a request to the IPC to illuminate the charging system warning indicator. A GENMON duty cycle of 3% or less indicates a short to ground fault is present and results in DTC P0625 setting in the PCM. A GENMON duty cycle of 98% or more indicates an open or short to voltage fault is present and results in DTC P0626 setting in the PCM.

Diagnostic Trouble Code (DTC) Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
P0625	Generator Field Terminal Circuit Low	The PCM sets this DTC if the GENMON circuit is shorted to ground, the "A" sense circuit is open or the B+ circuit is open. This DTC also sets by a faulted PCM or generator.
P0626	Generator Field Terminal Circuit High	The PCM sets this DTC if the GENMON circuit is open or shorted to power. This DTC can also be set by a faulted PCM or generator.

Possible Sources

- Battery
- Fuses or Fusible Links

- Generator
- PCM
- Wiring, terminals or connectors

Visual Inspection and Diagnostic Pre-checks

- Inspect for abnormal ignition-off current drain(s).
- Inspect the high current BJB for loose or corroded connections.

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 5.0L 32V TI-VCT > PINPOINT TESTS (5.0L) > PINPOINT TEST G : DTC P0625 OR P0626 > PINPOINT TEST G : DTC P0625 OR P0626

G1 CHECK THE BATTERY CONDITION

Check the battery condition and state of charge. REFER to: BATTERY, MOUNTING AND CABLES .

Does the battery pass the condition test?

Yes	GO to G2

No	CHARGE or INSTALL a new battery as necessary. REFER to: Battery .

G2 CHECK THE GENERATOR CONNECTIONS

Ignition OFF.

Disconnect all of the generator connectors and inspect for:

corrosion (install new connector or terminals - clean module pins)

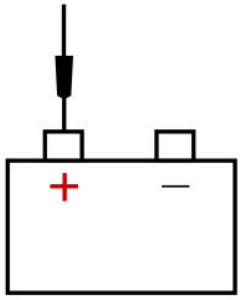
damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

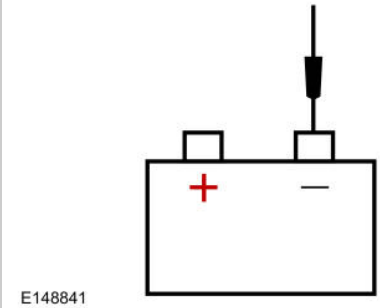
Reconnect the generator connectors. Make sure they seat and latch correctly.

Measure and record:

Positive Lead	Measurement / Action	Negative Lead







Measure:

Positive Lead	Measurement / Action	Negative Lead
C102B-1		Ground

Is the voltage within 0.5 volt of the recorded battery voltage?

Yes	GO to G3

No	TIGHTEN or INSTALL a new generator B+ nut as needed. REFER to: Generator - 5.0L 32V Ti-VCT . VERIFY high current BJB MEGA fuse (275A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short.

G3 CHECK THE VOLTAGE DROP IN THE GENERATOR B+ CIRCUIT

Start the engine.

With the engine running at idle, headlamps on and blower on high, measure:

Positive Lead	Measurement / Action	Negative Lead
C102C-1		

Perform a wiggle test of the generator wiring and connections while measuring voltage drop.

Is the voltage drop less than 0.5 volt?

Yes	For DTC P0625, GO to G4 For DTC P0626, GO to G5

No	INSPECT and REPAIR any corrosion in the generator B+ circuit or positive battery cable connections.

NOTE: This step puts a load on the "A" sense circuit. If there are corroded or loose connections, loading the circuit may help show the fault. A 250-350 mA incandescent 12-volt test lamp is required for this step. This circuit cannot be loaded correctly using an LED-style test lamp.

NOTE: The following step uses a test light to simulate normal circuit loads. Use only the test light recommended in the Special Tools table at the beginning of this article. To avoid connector terminal damage, use the Flex Probe Kit for the test light probe connection to the vehicle. Do not use the test light probe directly on any connector.

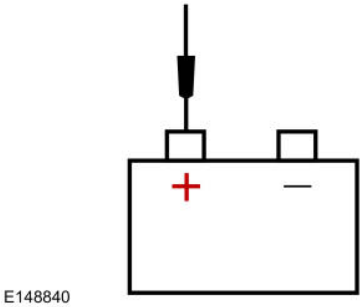
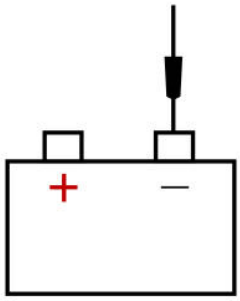
G4 "A" SENSE CIRCUIT LOAD TEST

Ignition OFF.

Disconnect Generator C102B .

Ignition ON.

Measure and record:

Positive Lead	Measurement / Action	Negative Lead
 E148840		 E148841

Install a test lamp between:

Positive Lead	Measurement / Action	Negative Lead
C102B-3		Ground

Perform a wiggle test on the generator wiring and measure:

Positive Lead	Measurement / Action	Negative Lead
C102B-3		Ground

Is the "A" sense voltage within ±0.5 volt of the recorded battery voltage?

Yes	GO to G5

No	VERIFY the BJB fuse 36 (10A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short.

G5 CHECK THE GENERATOR MONITOR CIRCUIT FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect PCM C175B .

Ignition ON.

Perform a wiggle test on the generator wiring and measure:

Positive Lead	Measurement / Action	Negative Lead
C102B-1		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to G6

G6 CHECK THE GENERATOR MONITOR CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Perform a wiggle test on the generator wiring and measure:

Positive Lead	Measurement / Action	Negative Lead
C102B-1	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to G7

No	REPAIR the circuit.

G7 CHECK THE GENERATOR MONITOR CIRCUIT FOR AN OPEN

Perform a wiggle test on the generator wiring and measure:

Positive Lead	Measurement / Action	Negative Lead
C175B-26	Ω	C102B-1

Is the resistance less than 3 ohms?

Yes	GO to G8

No	REPAIR the circuit.

G8 CHECK THE GENERATOR B+ INTERNAL RESISTANCE

Disconnect Generator C102B .

Disconnect Generator C102C .

Measure:

Positive Lead	Measurement / Action	Negative Lead
Generator B+ Terminal	Ω	Generator case

Is the resistance greater than 25K ohms?

Yes	GO to G9

No	INSTALL a new generator. REFER to: Generator - 5.0L 32V Ti-VCT .

G9 CHECK THE RESISTANCE OF THE VOLTAGE REGULATOR INTERNAL CIRCUITS

Measure:

Positive Lead	Measurement / Action	Negative Lead
Generator pin 1 (Component Side)	Ω	Generator case
Generator pin 2 (Component Side)	Ω	Generator case
Generator pin 3 (Component Side)	Ω	Generator case

Are the resistances greater than 10, 000 ohms?

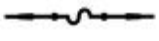
Yes	GO to G10

No	INSTALL a new generator. REFER to: Generator - 5.0L 32V Ti-VCT .

G10 COMPARE THE GENMON PID (PARAMETER IDENTIFICATION) AND THE GENCMD PID (PARAMETER IDENTIFICATION)

Connect PCM C175B .

Connect a fused jumper wire:

Positive Lead	Measurement / Action	Negative Lead
C102B-1		C102B-2

Start the engine.

Using a diagnostic scan tool, view PCM Parameter Identifications (PIDs).

Using the active command, set the PID GENVDSD to 14 volts.

Monitor the PCM Parameter Identifications (PIDs) GENMON and GENCMD.

Perform a wiggle test of the generator wiring and connections.

Do the Parameter Identifications (PIDs) read within 5% of each other?

Yes	REMOVE the fused jumper wire. INSTALL a new generator. REFER to: Generator - 5.0L 32V Ti-VCT .

No	REMOVE the fused jumper wire. GO to G11

G11 CHECK FOR CORRECT PCM (POWERTRAIN CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all PCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the PCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PCM. REFER to: Powertrain Control Module (PCM) . CLEAR all Diagnostic Trouble Codes (DTCs) in all modules.

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 5.0L 32V TI-VCT > PINPOINT TESTS (5.0L) > PINPOINT TEST H : LOAD SHED MESSAGE DISPLAYS IN MESSAGE CENTER

Refer to Charging System for schematic and connector information.

Normal Operation and Fault Conditions

When the engine is off and the key is in on or accessory mode, and the BCM determines the battery state of charge is below 50%, or 45 minutes have elapsed, a load shed message is sent over the CAN. This message turns off the audio/navigation system to save the remaining battery charge. Under this condition the a load shed message will be displayed to notify the driver that battery protection actions are active:

- System Off to Save Battery Turn Ignition Off displays on the FCDIM (without touchscreen controls)
- SYSTEM OFF TO SAVE BATTERY PLEASE TURN IGNITION OFF OR START ENGINE displays on

the FDIM (with touchscreen controls)

- Battery Saver - System Off displays on the FDIM (with Sync)

These messages displaying may be normal operation and not indicate a fault. Refer to the Owner Literature and REFER to: Charging System - System Operation and Component Description . Load shed messages displaying with the **engine running** or only on the FCDIM or the FDIM (with touchscreen controls) indicates the audio system has detected a fault.

Possible Sources

- Normal operation
- Audio system
- Battery
- BCM
- Fuses or Fusible Links
- Generator
- Wiring, terminals or connectors

Visual Inspection and Diagnostic Pre-checks

- Inspect the high current BJB for loose or corroded connections.
- Inspect the battery for loose or corroded connections.
- Inspect the generator for loose or corroded connections.
- Inspect the BJB for loose or corroded connections.
- Inspect the high current BJB for loose or corroded connections.
- Inspect C1046 for loose or corroded connections.
- Inspect battery and engine grounds for loose or corroded connections.

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 5.0L 32V TI-VCT > PINPOINT TESTS (5.0L) > PINPOINT TEST H : LOAD SHED MESSAGE DISPLAYS IN MESSAGE CENTER > PINPOINT TEST H : LOAD SHED MESSAGE DISPLAYS IN MESSAGE CENTER

H1 PERFORM INSPECTION AND VERIFICATION

Perform Inspection and Verification procedure in this article.

Was an obvious cause for an observed or reported concern found?

Yes	CORRECT the cause as necessary.

No	GO to H2

H2 VERIFY THE CUSTOMER CONCERN

Verify the customer concern by operating the charging system.

Did the customer indicate battery saver message only appeared in the centerstack with the engine running?

Yes	REFER to: Information and Entertainment System (without touchscreen) , or REFER to: Information and Entertainment System (with touchscreen) .

No	GO to H3

H3 VERIFY THE NETWORK

Ignition ON.

Using a diagnostic scan tool, perform the Network Test.

Did the APIM, BCM, and PCM pass the Network Test?

Yes	GO to H4

No	REFER to: MODULE COMMUNICATIONS NETWORK .

H4 PERFORM PCM (POWERTRAIN CONTROL MODULE) SELF TEST

Ignition ON.

Using a diagnostic scan tool, perform the PCM self-test.

Were any battery or charging system related Diagnostic Trouble Codes (DTCs) retrieved?

Yes	REFER to PCM DTC Chart .

No	GO to H5

H5 RETRIEVE ALL CONTINUOUS MEMORY DIAGNOSTIC TROUBLE CODES (CMDTCS)

Ignition ON.

Using a diagnostic scan tool, retrieve all Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Were any battery or charging system related Diagnostic Trouble Codes (DTCs) retrieved?

Yes	For BCM Diagnostic Trouble Codes (DTCs) refer to BCM DTC Chart . For APIM or ACM Diagnostic Trouble Codes (DTCs), Refer to the appropriate article for the procedure. For other battery or charging system related Diagnostic Trouble Codes (DTCs), REFER to: Diagnostic Trouble Code Charts .

No	GO to H6

H6 CHECK BCM (BODY CONTROL MODULE) BAT_ST_CHRG PID (PARAMETER IDENTIFICATION)

Ignition ON.

Using a diagnostic scan tool, view the BCM Parameter Identifications (PIDs).

Monitor the BCM BAT_ST_CHRG PID.

Does the PID indicate 50% or more?

Yes	GO to H8

No	GO to H7

NOTE: The battery state of charge is too low and needs to be relearned. Refer to the Description and Operation for more information on battery state of charge.

H7 RELEARN BATTERY STATE OF CHARGE

Remove all accessories from the lighter, all power outlets and DC/AC inverter (if equipped).

NOTE: The key should not be left in the vehicle but should be left in a secure location away from the vehicle such as a lock box.

Allow vehicle to sit undisturbed for at least 6 hours.

Ignition ON.

Using a diagnostic scan tool, view the BCM Parameter Identifications (PIDs).

Monitor the BCM BAT_ST_CHRG PID.

Does the PID indicate 50% or more?

Yes	The concern may have been caused by too low of a battery state of charge. REVIEW Energy Management operation with customer and return vehicle to customer.

No	GO to H8

H8 VERIFY INLINE CONNECTOR

Inspect inline connector C1046 for secure connection.

Disconnect Inline connector C1046 .

Inspect for:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Were any concerns present?

Yes	CORRECT the cause as necessary.

No	GO to H9

H9 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 5.0L 32V TI-VCT > PINPOINT TESTS (5.0L) > PINPOINT TEST I : BATTERY CURRENT SENSOR FAULTS

Battery Current Sensor Faults

Refer to Charging System for schematic and connector information.

Normal Operation and Fault Conditions

For information on the battery current sensor, REFER to: Charging System - System Operation and Component Description .

Diagnostic Trouble Code (DTC) Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B130C:12	Load Shed Control Circuit Short To Battery	This DTC sets in the BCM when the BCM senses a short in the battery current sensor control circuit.
B130C:14	Load Shed Control Circuit Short To Ground or Open	This DTC sets in the BCM when the BCM senses an open or ground in the battery current sensor control circuit.
B1438:03	Battery Current Sensor, FM (Frequency Modulated) / PWM (Pulse Width Modulated) Failure	This DTC sets in the BCM when the BCM does not indicate current from the battery current sensor.

Possible Sources

- Battery current sensor
- Generator clutch (if equipped)
- Wiring, terminals or connectors

Visual Inspection and Diagnostic Pre-checks

- Inspect the battery current sensor
- Inspect the battery current sensor connector

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 5.0L 32V TI-VCT > PINPOINT TESTS (5.0L) > PINPOINT TEST I : BATTERY CURRENT SENSOR FAULTS > PINPOINT TEST I : BATTERY CURRENT SENSOR FAULTS

NOTE: Make sure battery voltage is greater than 12.2 volts prior to and during this pinpoint test.

NOTE: Do not have a battery charger attached during vehicle testing.

I1 RETRIEVE DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition ON.

Using a diagnostic scan tool, perform the PCM self-test

Is DTC P0562 present?

Yes	GO to Pinpoint Test B

No	For DTC P0A5A, GO to I2 For DTC P0A5B, GO to I6 For DTC P0A5C, GO to I10

I2 CHECK THE BATTERY CURRENT SENSOR

Inspect the battery current sensor for the following:

physical damage

corrosion

disconnected electrical connector

battery ground cable routed through the battery current sensor

debris between the battery current sensor and the battery ground cable

Are any of these conditions found during inspection?

Yes	REPAIR as necessary. GO to I14

No	GO to I3

I3 CHECK THE BATTERY CURRENT SENSOR REFERENCE VOLTAGE CIRCUIT

Ignition OFF.

Disconnect Battery current sensor C1646 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1646-1		Ground

Is the voltage between 4.8 and 5.2 volts?

Yes	GO to I7

No	If the voltage is less than 4.8 volts, GO to I5 If the voltage is greater than 5.2 volts, GO to I4

I4 CHECK THE BATTERY CURRENT SENSOR REFERENCE VOLTAGE CIRCUIT FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect BCM C2280F .

Using the Terminal Release Kit, release and temporarily remove BCM C2280F-3 .

Connect BCM C2280F .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1646-1		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	INSTALL C2280F-3 and GO to I15

I5 CHECK THE BATTERY CURRENT SENSOR REFERENCE VOLTAGE CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Disconnect BCM C2280F .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1646-1	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to I6

No	REPAIR the circuit.

I6 CHECK THE BATTERY CURRENT SENSOR REFERENCE VOLTAGE CIRCUIT FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1646-1	Ω	C2280F-3

Is the resistance less than 3 ohms?

Yes	GO to I14

No	REPAIR the circuit.

I7 CHECK THE BATTERY CURRENT SENSOR SIGNAL RETURN CIRCUIT

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1646-1		C1646-2

Is the voltage between 4.8 and 5.2 volts?

Yes	GO to I10

No	GO to I8

I8 CHECK THE BATTERY CURRENT SENSOR SIGNAL RETURN CIRCUIT FOR VOLTAGE

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1646-2		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to I9

I9 CHECK THE BATTERY CURRENT SENSOR SIGNAL RETURN CIRCUIT FOR AN OPEN

Ignition OFF.

Disconnect BCM C2280C .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1646-2	Ω	C2280F-19

Is the resistance less than 3 ohms?

Yes	GO to I14

No	REPAIR the circuit.

I10 CHECK THE BATTERY CURRENT SENSOR FEEDBACK CIRCUIT FOR A SHORT TO VOLTAGE

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1646-3		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to I11

I11 CHECK THE BATTERY CURRENT SENSOR FEEDBACK CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Disconnect BCM C2280F .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1646-3	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to I12

No	REPAIR the circuit.

I12 CHECK THE BATTERY CURRENT SENSOR FEEDBACK CIRCUIT FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1646-3	Ω	C2280F-8

Is the resistance less than 3 ohms?

Yes	GO to I13

No	REPAIR the circuit.

I13 CHECK THE BATTERY CURRENT SENSOR FEEDBACK CIRCUIT FOR A SHORT TO THE SIGNAL RETURN OR REFERENCE CIRCUIT

Measure:

Positive Lead	Measurement / Action	Negative Lead

C1646-3	Ω	C1646-1
C1646-3	Ω	C1646-2

Are the resistances greater than 10, 000 ohms?

Yes	GO to I14

No	REPAIR the affected circuit.

I14 CHECK THE BATTERY CURRENT SENSOR CONNECTION

Ignition OFF.

Disconnect Battery Current Sensor C1646 , if necessary.

Inspect the battery current sensor connector for:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Connect Battery Current Sensor C1646 .

Connect BCM C2280F .

Ignition ON.

Using a diagnostic scan tool, clear all Diagnostic Trouble Codes (DTCs) in all modules.

Using a diagnostic scan tool, perform the BCM self-test.

Did the DTC return?

Yes	REPAIR as necessary or INSTALL a new battery current sensor. REFER to: Battery Current Sensor . CLEAR the Diagnostic Trouble Codes (DTCs). REPEAT the self-test. If the DTC returns, GO to I15

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

I15 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

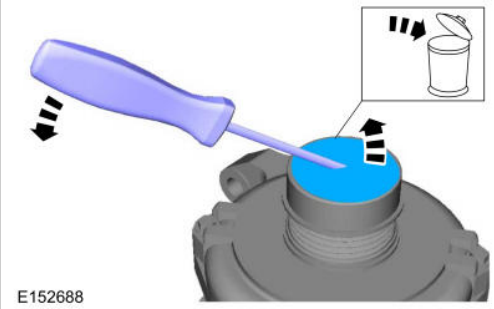
Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 5.0L 32V TI-VCT > COMPONENT TEST - GENERATOR CLUTCH

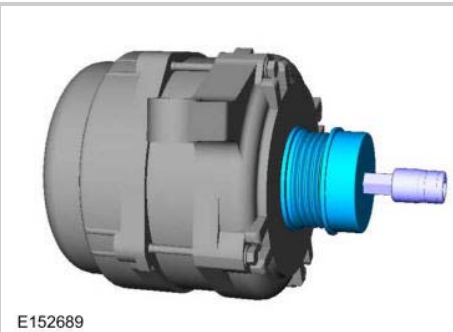
1.

Remove the generator. REFER to: Generator - 5.0L 32V Ti-VCT .



2.

Using a small screwdriver or similar tool, insert the tool through the rubber button on the center of the pulley cap and pry off the cap. Discard the cap. A new cap must be installed if the clutch is OK.



3.

Using a 17 mm hex tool bit (such as a Snap-on ® SAM17E2 or equivalent) and socket wrench, insert

the 17 mm hex tool bit into the end of the clutch shaft.

4.

While holding the clutch pulley firmly by hand, turn the clutch shaft clockwise. The shaft should rotate smooth and freely. If the shaft rotation is rough or seized, install a new generator clutch. REFER to: GENERATOR PULLEY .

5.

While holding the clutch pulley firmly by hand, turn the clutch shaft counterclockwise. There should be some resistance (a spring feel). If the shaft rotates freely, install a new generator clutch. REFER to: GENERATOR PULLEY .

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 5.2L 32V TI-VCT > INSPECTION AND VERIFICATION

1.

Verify the customer concern by operating the charging system.

2.

Before diagnosing or repairing the charging system inspect the following items:

- Check the battery for loose, damaged or corroded connections.
- Check the generator for loose, damaged or corroded connections.
- Check engine and battery grounds for loose, damaged or corroded connections.
- Check high current BJB for loose or corroded connections.
- Verify fuses or fusible links.
- Inspect wiring, terminals and connectors.

3.

Check the battery condition and state of charge. REFER to: BATTERY, MOUNTING AND CABLES 414-01.

4.

Check for abnormal ignition-off current drain(s). REFER to: Battery Drain Check .

5.

If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding.

6.

Using the diagnostic scan tool, retrieve all Diagnostic Trouble Codes (DTCs). Refer to the appropriate DTC Chart .

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 5.2L 32V TI-VCT > DTC CHARTS (5.2L)

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

BCM DTC Chart

NOTE: Diagnose all PCM DTCs first.

DTC	Description	Action
B130C:12	Load Shed Control Circuit Short To Battery	GO to Pinpoint Test I
B130C:14	Load Shed Control Circuit Short To Ground or Open	GO to Pinpoint Test I
B1438:03	Battery Current Sensor: FM (Frequency Modulated) / PWM (Pulse Width Modulated) Failure	GO to Pinpoint Test I
All Other DTCs	-	REFER to: Body Control Module (BCM) .

PCM DTC Chart

DTC	Description	Action
P0562	System Voltage Low	GO to Pinpoint Test B
P0563	System Voltage High	GO to Pinpoint Test A
P0620	Generator Control Circuit	GO to Pinpoint Test F
P0625	Generator Field Terminal Circuit Low	GO to Pinpoint Test G
P0626	Generator Field Terminal Circuit High	GO to Pinpoint Test G
P065B	Generator Control Circuit Range/performance	GO to Pinpoint Test F
P0A5A	Generator Current Sensor Circuit Range/Performance	GO to Pinpoint Test E
P0A5B	Generator Current Sensor Circuit Low	GO to Pinpoint Test E
P0A5C	Generator Current Sensor Circuit High	GO to Pinpoint Test E
P1397	System Voltage Out Of Self-Test Range	If combined with P0562, GO to Pinpoint Test B If combined with P0563, GO to Pinpoint Test A
All Other DTCs	-	Refer to ENGINE CONTROLS - SYMPTOM CHARTS (EXCEPT

		DIESEL & HYBRID) .

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 5.2L 32V TI-VCT > SYMPTOM CHART(S) (5.2L)

Symptom Chart: Charging System

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

Symptom Chart

Condition	Possible Sources	Actions
System voltage high	Refer to the Pinpoint Test	GO to Pinpoint Test A
System voltage low or battery is discharged	Refer to the Pinpoint Test	GO to Pinpoint Test B
The generator is noisy	Refer to the Pinpoint Test	GO to Pinpoint Test C
Radio interference	Refer to the Pinpoint Test	GO to Pinpoint Test D
Charging system warning indicator is never or always on	Wiring, terminals or connectors IPC Generator PCM	RETRIEVE Diagnostic Trouble Codes (DTCs) from all modules. If any Diagnostic Trouble Codes (DTCs) are found, Refer to DTC Chart . If no Diagnostic Trouble Codes (DTCs) are found, REFER to: Instrumentation, Message Center and Warning Chimes .
Load Shed Message Displays in IPC message center and/or centerstack infotainment display	Refer to the Pinpoint Test	GO to Pinpoint Test H
Battery Saver - System Off displays in centerstack infotainment display	Refer to the Pinpoint Test	GO to Pinpoint Test H

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 5.2L 32V TI-VCT > PINPOINT TESTS (5.2L) > PINPOINT TEST A : SYSTEM VOLTAGE HIGH

Refer to Charging System for schematic and connector information.

NOTE: Diagnostic Trouble Code (DTC) P0563 can be set if the vehicle has been recently jump started or the battery has been recently charged. The battery may become discharged due to excessive load(s) on the charging system from aftermarket accessories or if vehicle accessories have been operating for an extended period of time without the engine running.

Normal Operation and Fault Conditions

With the engine running, the charging system supplies voltage to the battery and the vehicle electrical system through the high current BJB and battery B+ cable. The voltage that is supplied to the vehicle electrical system is used for the operation of the various vehicle systems and modules. Many modules monitor this voltage and if it rises above or below their calibrated setpoints, a DTC sets.

Diagnostic Trouble Code (DTC) Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
P0563	System Voltage High	This DTC sets in the PCM when the PCM detects voltage from the charging system greater than 15.9 volts with vehicle speed above 8 km/h (5 mph).
P1397	System Voltage Out of Self-Test Range	If the voltage rises above or drops below the calibrated set point, the PCM sets this DTC. This DTC may also be set if the vehicle has been recently jump started or has had a discharged battery.

Possible Sources

- Battery
- Generator
- Engine, generator or battery ground
- PCM
- Wiring, terminals or connectors

Visual Inspection and Diagnostic Pre-checks

- Inspect the high current BJB for loose or corroded connections.

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 5.2L 32V TI-VCT > PINPOINT TESTS (5.2L) > PINPOINT TEST A : SYSTEM VOLTAGE HIGH > PINPOINT TEST A : SYSTEM VOLTAGE HIGH

NOTE: Make sure battery voltage is greater than 12.2 volts prior to and during this pinpoint test.

NOTE: Do not have a battery charger attached during vehicle testing.

A1 PERFORM INSPECTION AND VERIFICATION

Perform Inspection and Verification procedure in this article.

Was an obvious cause for an observed or reported concern found?

Yes	CORRECT the cause as necessary.

No	GO to A2

A2 RETRIEVE THE PCM (POWERTRAIN CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition ON.

Using a diagnostic scan tool, perform the PCM self-test.

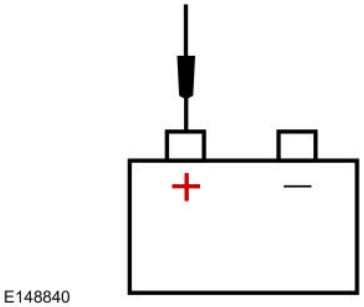
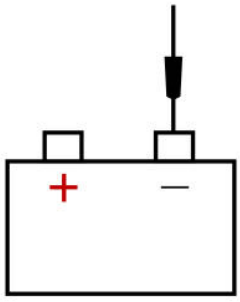
Is DTC P0620, P0625 or P0626 present?

Yes	For DTC P0620, GO to Pinpoint Test F For Diagnostic Trouble Codes (DTCs) P0625 and P0626, GO to Pinpoint Test G

No	GO to A3

A3 COMPARE THE GENERATOR VOLTAGE DESIRED (GENVDSD) PID (PARAMETER IDENTIFICATION) WITH BATTERY VOLTAGE

With the engine running at idle, measure and record:

Positive Lead	Measurement / Action	Negative Lead
 E148840		 E148841

Using a diagnostic scan tool, view the PCM PID GENVDSD.

Is the recorded battery voltage within ±0.5 volt of the PID?

Yes	GO to A6

No	GO to A4

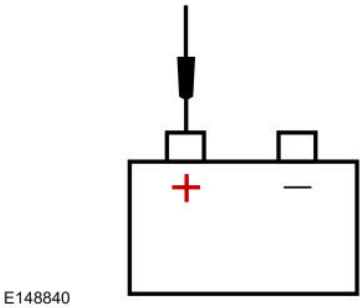
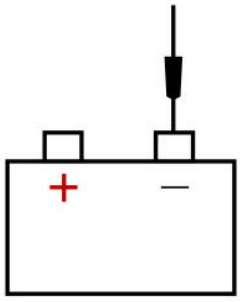
A4 MEASURE THE "A" SENSE VOLTAGE

Ignition OFF.

Disconnect Generator C102B .

Ignition ON.

Measure and record:

Positive Lead	Measurement / Action	Negative Lead
 E148840		 E148841

Measure:

Positive Lead	Measurement / Action	Negative Lead
C102B-3		Ground

Is the "A" sense voltage equal to the recorded battery voltage?

Yes	GO to A5

No	VERIFY the BJB fuse 36 (10A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short.

NOTE: This step puts a load on the "A" sense circuit. If there are corroded or loose connections, loading the circuit may help show the fault. A 250-350 mA incandescent 12-volt test lamp is required for this step. This circuit cannot be loaded correctly using an LED-style test lamp.

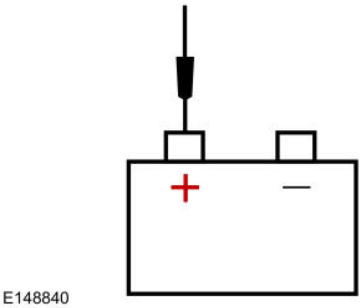
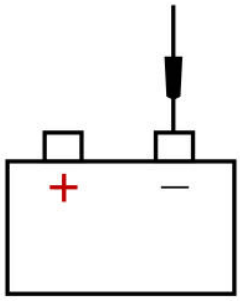
NOTE: The following step uses a test light to simulate normal circuit loads. Use only the test light recommended in the Special Tools table at the beginning of this article. To avoid connector terminal damage, use the Flex Probe Kit for the test light probe connection to the vehicle. Do not use the test light probe directly on any connector.

A5 "A" SENSE CIRCUIT LOAD TEST

Ignition ON.

Measure and record:

Positive Lead	Measurement	Negative Lead

	/ Action	
 E148840		 E148841

Connect the load to each circuit and measure:

Positive Lead	Measurement / Action	Negative Lead
C102B-3		Ground

Is the "A" sense voltage within ±0.5 volt of the recorded battery voltage?

Yes	GO to A6

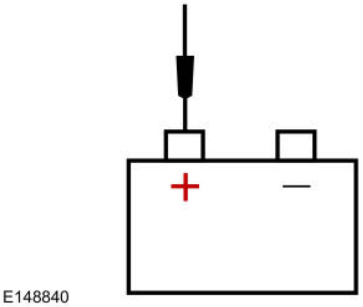
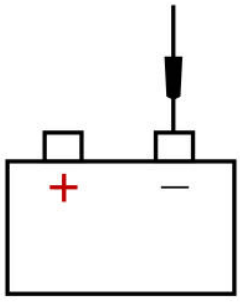
No	VERIFY the BJB fuse 36 (10A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short.

A6 CHECK FOR INTERMITTENT IN THE REGULATOR CIRCUIT

Connect Generator C102B .

Start the engine.

With the engine running at idle, headlamps on and heater blower on high, measure:

Positive Lead	Measurement / Action	Negative Lead
 E148840		 E148841

Perform a wiggle test on the generator wiring and following connections while measuring voltage:

Generator C102B

Inline C1046

Does battery voltage change more than 0.5 volt?

Yes	INSPECT and REPAIR any corrosion in the generator B+ circuit or positive battery cable connections.

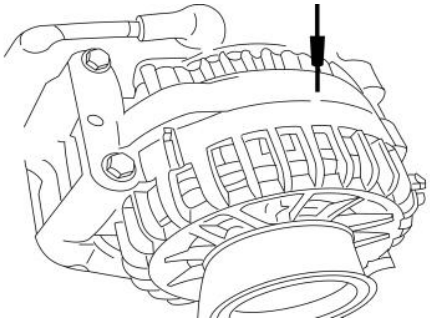
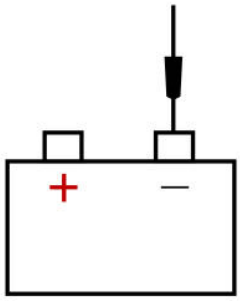
No	GO to A7

A7 CHECK THE VOLTAGE DROP IN THE VEHICLE GROUNDS

Connect Generator C102B .

Start the engine.

With the engine running at idle, headlamps on and heater blower on high, measure:

Positive Lead	Measurement / Action	Negative Lead
 Generator case		 E148841

Is the voltage drop less than 0.5 volt?

Yes	GO to A8

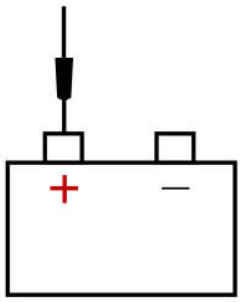
No	INSPECT and REPAIR the engine ground, generator ground or the battery ground for corrosion.

A8 CHECK THE GENERATOR OUTPUT

Increase the engine RPM until the generator starts to generate output.

With the engine running, measure and record:

Positive Lead	Measurement / Action	Negative Lead

 E148840		Ground

Is the voltage above 15.2 volts?

Yes	INSTALL a new generator. REFER to: Generator - 5.2L 32V Ti-VCT .

No	GO to A9

A9 MONITOR THE GENERATOR COMMAND (GENCMD), GENERATOR MONITOR (GENMON) AND GENERATOR VOLTAGE DESIRED (GENVDSD) PIDS

Ignition OFF.

Disconnect Generator C102B .

Connect a fused jumper wire:

Positive Lead	Measurement / Action	Negative Lead
C102B-1		C102B-2

Start the engine.

Using a diagnostic scan tool, view PCM Parameter Identifications (PIDs).

Using the active command, set the PID GENVDSD to 14 volts.

Monitor the PCM Parameter Identifications (PIDs) GENMON and GENVDSD.

Do the Parameter Identifications (PIDs) read within 5% of each other?

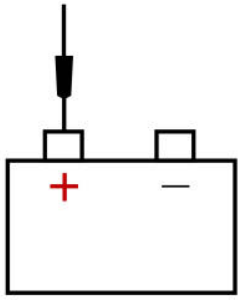
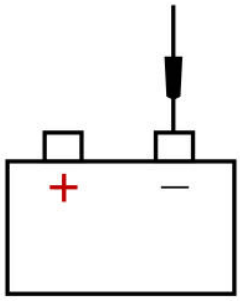
Yes	GO to A10

No	GO to A13

A10 COMPARE THE PCM (POWERTRAIN CONTROL MODULE) SUPPLY VOLTAGE (VPWR) PID (PARAMETER IDENTIFICATION) TO BATTERY VOLTAGE

With the engine running at idle, measure and record:

Positive Lead	Measurement / Action	Negative Lead

 E148840		 E148841

Using a diagnostic scan tool, view PCM Parameter Identifications (PIDs).

Monitor the PCM PID VPWR.

Does the PID accurately display battery voltage within ±0.5 volt of the recorded battery voltage?

Yes	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

No	GO to A11

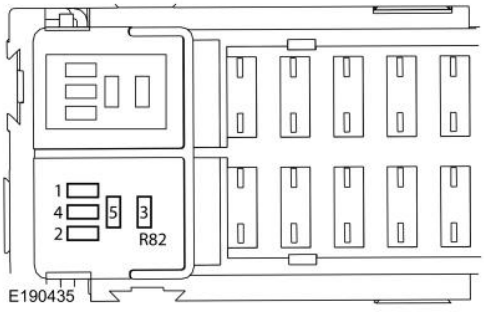
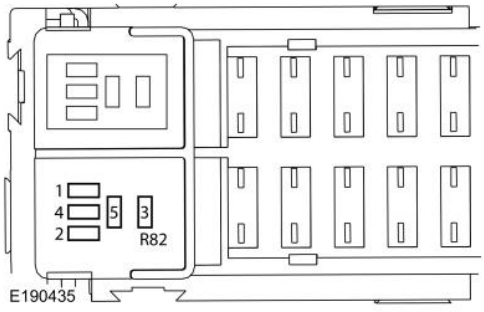
A11 CHECK PCM (POWERTRAIN CONTROL MODULE) SUPPLY VOLTAGE CIRCUITS

Ignition OFF.

Disconnect BJB PCM power relay.

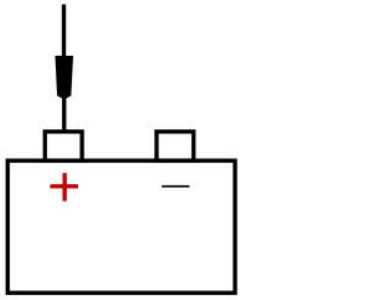
Disconnect PCM C175B .

Connect a fused jumper wire:

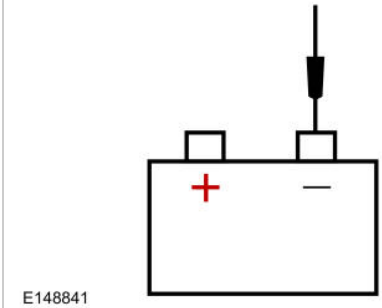
Positive Lead	Measurement / Action	Negative Lead
 BJB PCM Relay pin 3		 BJB PCM Relay pin 5

Measure and record:

Positive Lead	Measurement / Action	Negative Lead







NOTE: The following step will load test the circuit. A headlamp bulb would be an effective load. To avoid connector terminal damage, use the Flex Probe Kit for connector connections.

Connect the load to a suitable ground connection.

Connect the load to each circuit and measure:

Positive Lead	Measurement / Action	Negative Lead
C175B-97		Ground
C175B-99		Ground

Are the voltages within 0.5 volt of the recorded battery voltage?

Yes	REMOVE the fused jumper wire. GO to A12

No	REPAIR the affected circuit(s).

NOTE: The following step will load test the circuit. A headlamp bulb would be an effective load. To avoid connector terminal damage, use the Flex Probe Kit for connector connections.

A12 CHECK PCM (POWERTRAIN CONTROL MODULE) GROUND FOR HIGH RESISTANCE

Connect the load to a suitable 12 volt power connection.

Connect the load to each circuit and measure:

Positive Lead	Measurement / Action	Negative Lead
C175B-5		Ground
C175B-100		Ground
C175B-102		Ground
C175B-103		Ground

Is the voltage drop less than 0.5 volt?

Yes	GO to A13

No	REPAIR the affected circuit(s).

A13 CHECK FOR CORRECT PCM (POWERTRAIN CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all PCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the PCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PCM. REFER to: Powertrain Control Module (PCM) . CLEAR all Diagnostic Trouble Codes (DTCs) in all modules.

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 5.2L 32V TI-VCT > PINPOINT TESTS (5.2L) > PINPOINT TEST B : SYSTEM VOLTAGE LOW OR BATTERY IS DISCHARGED

Refer to Charging System for schematic and connector information.

Normal Operation and Fault Conditions

With the engine running, the charging system supplies voltage to the battery and the vehicle electrical system through the high current BJB and battery B+ cable. The PCM monitors this B+ voltage through its own voltage supply circuit.

Diagnostic Trouble Code (DTC) Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
P0562	System Voltage Low	If voltage drops 1.5 volts or more below the generator voltage desired

		(calculated by the PCM), this DTC sets after 30 seconds.
P1397	System Voltage Out of Self-Test Range	If the voltage rises above or drops below the calibrated set point, the PCM sets this DTC. This DTC may also be set if the vehicle has been recently jump started or has had a discharged battery.

Possible Sources

- Battery
- Fuses or fusible links
- Generator
- Generator clutch (if equipped)
- PCM
- High current BJB
- Wiring, terminals or connectors

Visual Inspection and Diagnostic Pre-checks

- Inspect for abnormal ignition-off current drain(s).
- Inspect the battery.
- Inspect the high current BJB for loose or corroded connections.
- Inspect generator clutch (if equipped)

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 5.2L 32V TI-VCT > PINPOINT TESTS (5.2L) > PINPOINT TEST B : SYSTEM VOLTAGE LOW OR BATTERY IS DISCHARGED > PINPOINT TEST B : SYSTEM VOLTAGE LOW OR BATTERY IS DISCHARGED

NOTE: Make sure battery voltage is greater than 12.2 volts prior to and during this pinpoint test.

NOTE: Do not have a battery charger attached during vehicle testing.

B1 PERFORM INSPECTION AND VERIFICATION

Perform Inspection and Verification procedure in this article.

Was an obvious cause for an observed or reported concern found?

Yes	CORRECT the cause as necessary.

No	GO to B2

B2 RETRIEVE DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, perform the PCM self-test.

Is DTC P0620, P0625 or P0626 present?

Yes	For DTC P0620, GO to Pinpoint Test F For Diagnostic Trouble Codes (DTCs) P0625 and P0626, GO to Pinpoint Test G

No	GO to B3

B3 CHECK THE GENERATOR CONNECTIONS

Ignition OFF.

Disconnect all of the generator connectors and inspect for:

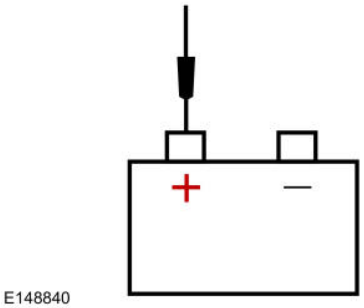
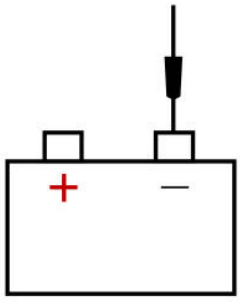
corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the generator connectors. Make sure they seat and latch correctly.

Measure and record:

Positive Lead	Measurement / Action	Negative Lead
 E148840		 E148841

Measure:

Positive Lead	Measurement / Action	Negative Lead
C102C-1		Ground

Is the voltage within 0.5 volt of the recorded battery voltage?

Yes	GO to B4

No	TIGHTEN or INSTALL a new generator B+ nut as needed. REFER to: Generator - 5.2L 32V Ti-VCT . VERIFY high current BJB MEGA fuse (275A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short.

B4 CHECK THE VOLTAGE DROP IN THE GENERATOR B+ CIRCUIT

Start the engine.

With the engine running at idle, headlamps on and blower on high, measure:

Positive Lead	Measurement / Action	Negative Lead
C102C-1		

Perform a wiggle test of the generator wiring and connections while measuring voltage drop.

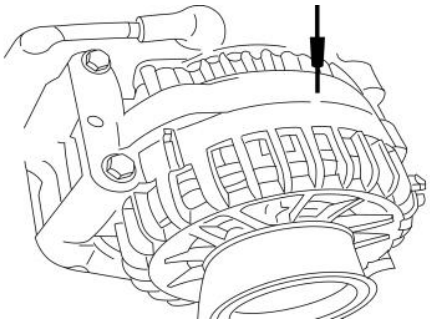
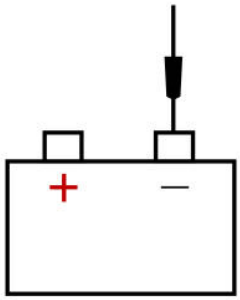
Is the voltage drop less than 0.5 volt?

Yes	GO to B5

No	INSPECT and REPAIR any corrosion in the generator B+ circuit or positive battery cable connections.

B5 CHECK THE VOLTAGE DROP IN THE VEHICLE GROUNDS

With the engine running at idle, headlamps on and heater blower on high, measure:

Positive Lead	Measurement / Action	Negative Lead
 Generator case		 E148841

Is the voltage drop less than 0.5 volt?

Yes	GO to B6

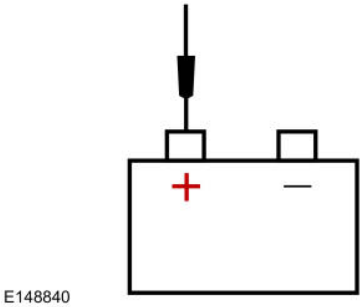
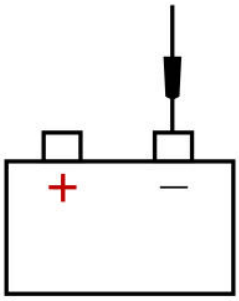
No	INSPECT and REPAIR the engine ground, generator ground or the battery ground for corrosion.

B6 MONITOR THE GENERATOR VOLTAGE DESIRED (GENVDSD) PID (PARAMETER IDENTIFICATION) WHILE COMMANDED

Using a diagnostic scan tool, view the PCM GENVDSD PID.

Using a diagnostic scan tool active command, set the PCM PID GENVDSD to 14 volts.

With the engine running at idle, measure battery and record:

Positive Lead	Measurement / Action	Negative Lead
 E148840		 E148841

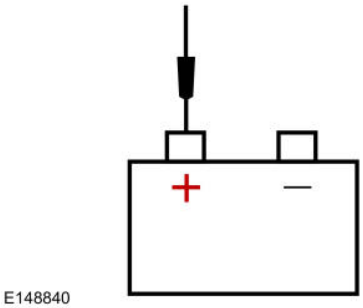
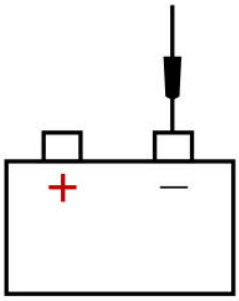
Is the recorded battery voltage within ±0.5 volt of the PID?

Yes	GO to B7

No	GO to B11

B7 COMPARE THE PCM (POWERTRAIN CONTROL MODULE) SUPPLY VOLTAGE (VPWR) PID (PARAMETER IDENTIFICATION) TO BATTERY VOLTAGE

With the engine running at idle, headlamps on and blower on high, measure and record:

Positive Lead	Measurement / Action	Negative Lead
 E148840		 E148841

Using a diagnostic scan tool, view the PCM PID VPWR.

Does the PID accurately display battery voltage within ±0.5 volt of the recorded battery voltage?

Yes	GO to B8

No	REPAIR high resistance or loose connections in the affected PCM power circuit(s).

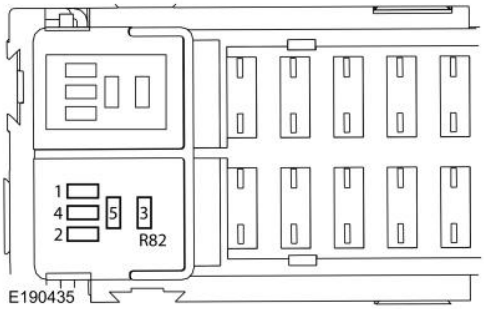
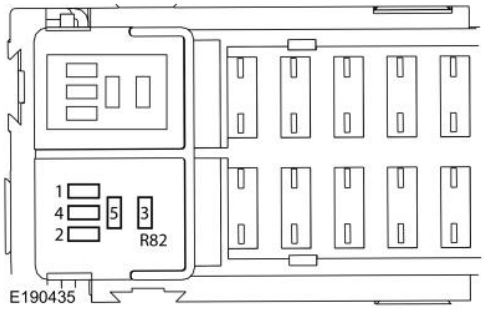
B8 CHECK PCM (POWERTRAIN CONTROL MODULE) SUPPLY VOLTAGE CIRCUITS

Ignition OFF.

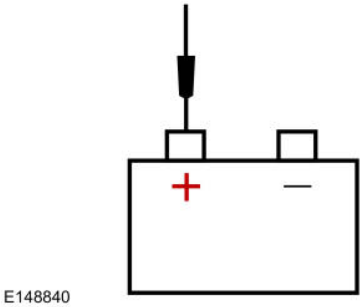
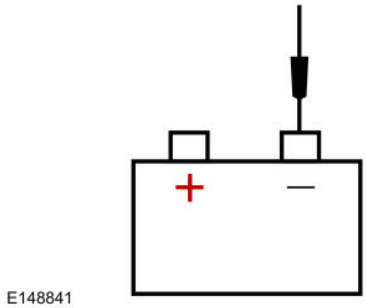
Disconnect BJB PCM power relay.

Disconnect PCM C175B .

Connect a fused jumper wire:

Positive Lead	Measurement / Action	Negative Lead
 BJB PCM Relay pin 3		 BJB PCM Relay pin 5

Measure and record:

Positive Lead	Measurement / Action	Negative Lead
		

NOTE: The following step will load test the circuit. A headlamp bulb would be an effective load. To avoid connector terminal damage, use the Flex Probe Kit for connector connections.

Connect the load to a suitable ground connection.

Connect the load to each circuit and measure:

Positive Lead	Measurement / Action	Negative Lead
C175B-97		Ground
C175B-99		Ground

Are the voltages within 0.5 volt of the recorded battery voltage?

Yes	REMOVE the fused jumper wire. GO to B9

No	REPAIR the affected circuit(s).

NOTE: The following step will load test the circuit. A headlamp bulb would be an effective load. To avoid connector terminal damage, use the Flex Probe Kit for connector connections.

B9 CHECK PCM (POWERTRAIN CONTROL MODULE) GROUND FOR HIGH RESISTANCE

Connect the load to a suitable 12 volt power connection.

Connect the load to each circuit and measure:

Positive Lead	Measurement / Action	Negative Lead
C175B-5		Ground
C175B-100		Ground
C175B-102		Ground
C175B-103		Ground

Is the voltage drop less than 0.5 volt?

Yes	GO to B10

No	REPAIR the affected circuit(s).

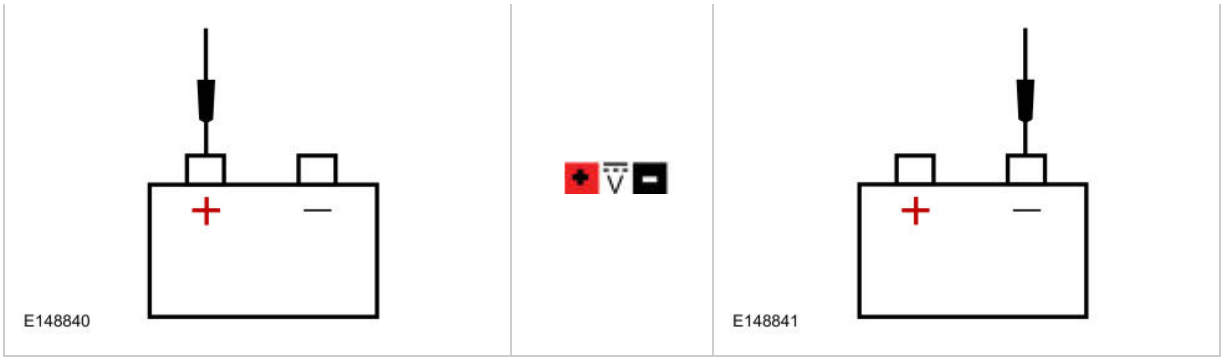
B10 MONITOR THE SUPPLY VOLTAGE (VPWR) PID (PARAMETER IDENTIFICATION)

NOTE: Measure battery voltage at the battery.

With the engine running at idle, turn off all accessory loads.

Measure and record:

Positive Lead	Measurement / Action	Negative Lead



Using a diagnostic scan tool, view PCM PID VPWR and record.

Momentarily accelerate the engine to Wide Open Throttle (WOT) and release. Repeat this step 4-5 times while continuing to monitor the PID.

Does the PID stay within 0.5 volt of the recorded battery voltage when the engine Revolutions Per Minute (RPM) are increased?

Yes	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. INSPECT and REPAIR any connector or pin issues found. If no connector or pin issues are found, Perform the battery drain test. REFER to: Battery Drain Check .

No	GO to B12

B11 CHECK GENERATOR CLUTCH OPERATION

Ignition OFF.

Perform the generator clutch component test .

Is the generator clutch OK?

Yes	INSTALL a new generator. REFER to: Generator - 5.2L 32V Ti-VCT .

No	INSTALL a new generator clutch. REFER to: GENERATOR PULLEY .

B12 CHECK FOR CORRECT PCM (POWERTRAIN CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all PCM connectors.

Repair:

- corrosion (install new connector or terminals - clean module pins)
- damaged or bent pins - install new terminals/pins
- pushed-out pins - install new pins as necessary

Reconnect the PCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PCM. REFER to: Powertrain Control Module (PCM) . CLEAR all Diagnostic Trouble Codes (DTCs) in all modules.

No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 5.2L 32V TI-VCT > PINPOINT TESTS (5.2L) > PINPOINT TEST C : GENERATOR NOISE OR MECHANICAL PERFORMANCE

Normal Operation and Fault Conditions

The generator is belt-driven by the engine accessory drive system. There are several sources of generator noise which include bearing noise, electrical fault noise, generator or belt pulley misalignment. A generator with certain types of diode or stator failures can also produce an audible noise.

Possible Sources

- FEAD belt
- Loose bolts/brackets
- Generator/pulleys

Visual Inspection and Diagnostic Pre-checks

- Inspect the FEAD belt.
- Inspect for loose bolts/brackets.
- Inspect the generator/pulley.

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 5.2L 32V TI-VCT > PINPOINT TESTS (5.2L) > PINPOINT TEST C : GENERATOR NOISE OR MECHANICAL PERFORMANCE > PINPOINT TEST C : GENERATOR NOISE OR MECHANICAL PERFORMANCE

C1 CHECK FOR ACCESSORY DRIVE BELT NOISE AND LOOSE MOUNTING BRACKETS

Ignition OFF.

Check the FEAD belt and tensioner for damage and correct installation. REFER to: Accessory Drive .

Is the accessory drive OK?

Yes	GO to C2

No	REPAIR as necessary.

C2 CHECK THE GENERATOR MOUNTING

Check the generator mounting for loose bolts or misalignment.

Is the generator mounted correctly?

Yes	GO to C3

No	REPAIR as necessary.

C3 CHECK THE GENERATOR FOR NOISE

Start the engine.

With the engine running, use a stethoscope or equivalent listening device to probe the generator and the accessory drive area for unusual mechanical noise.

Is the generator the noise source?

Yes	INSTALL a new generator. REFER to: Generator - 5.2L 32V Ti-VCT .

No	REFER to: ENGINE SYSTEM - GENERAL INFORMATION to diagnose the source of the engine noise.

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 5.2L 32V TI-VCT > PINPOINT TESTS (5.2L) > PINPOINT TEST D : RADIO INTERFERENCE

Refer to Charging System for schematic and connector information.

Normal Operation and Fault Conditions

The generator radio suppression equipment reduces interference transmitted through the speakers by the vehicle electrical system.

NOTE: If the Original Equipment Manufacturer (OEM) Audio Control Module (ACM) has been replaced with an aftermarket unit, the vehicle may not pass this test. Return the vehicle to Original Equipment Manufacturer (OEM) condition before following this pinpoint test.

NOTE: If the engine is operated at greater than 2, 000 Revolutions Per Minute (RPM) momentarily, the generator self-excites. Make sure when the generator is disconnected the engine RPM stays below 2, 000 Revolutions Per Minute (RPM). If it rises above 2, 000

Revolutions Per Minute (RPM), turn the ignition to the OFF position and start the test over again.

NOTE: Inspect for any aftermarket accessories that have been added to the vehicle. Check the wiring for these accessories and be sure they have not been attached to the generator circuits and are positioned away from the generator wiring.

Possible Sources

- Generator
- In-vehicle entertainment system
- Wiring, terminals or connectors

Visual Inspection and Diagnostic Pre-checks

- Inspect the generator.
- Inspect the in-vehicle entertainment system.

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 5.2L 32V TI-VCT > PINPOINT TESTS (5.2L) > PINPOINT TEST D : RADIO INTERFERENCE > PINPOINT TEST D : RADIO INTERFERENCE

D1 VERIFY THE GENERATOR IS THE SOURCE OF THE AUDIO SYSTEM INTERFERENCE

Start the engine.

Allow the engine to idle.

Tune the audio system to a station where interference is present.

Ignition OFF.

Disconnect Generator C102B .

Disconnect Generator C102C .

Start the engine.

Allow the engine to idle.

Is the interference present with the generator disconnected?

Yes	REFER to: Information and Entertainment System (without touchscreen) , or REFER to: Information and Entertainment System (with touchscreen) .

No	INSTALL a new generator. REFER to: Generator - 5.2L 32V Ti-VCT .

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 5.2L 32V TI-VCT > PINPOINT TESTS (5.2L) > PINPOINT TEST E : GENERATOR CURRENT SENSOR FAULTS

Refer to Power Distribution for schematic and connector information.

Normal Operation and Fault Conditions

The generator current sensor is a Hall-effect sensor attached to the generator B+ cable. It is supplied a 5 volt reference and ground from the PCM. The PCM reads the generator current sensor feedback voltage to determine how much current is flowing through the generator B+ cable.

Diagnostic Trouble Code (DTC) Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
P0A5A	Generator Current Sensor Circuit Range/Performance	Sets in the PCM when the PCM does not detect current through the generator current sensor and there are no generator current sensor circuit Diagnostic Trouble Codes (DTCs) set.
P0A5B	Generator Current Sensor Circuit Low	Sets in the PCM when the PCM senses lower than expected voltage on the generator current sensor feedback circuit, indicating an open or a short directly to ground.
P0A5C	Generator Current Sensor Circuit High	Sets in the PCM when the PCM senses higher than expected voltage on the generator current sensor feedback circuit, indicating a short directly to voltage.

Possible Sources

- Generator current sensor
- PCM
- Generator clutch
- Wiring, terminals or connectors

Visual Inspection and Diagnostic Pre-checks

- Inspect the generator current sensor.
- Inspect the generator current sensor connector.

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 5.2L 32V TI-VCT > PINPOINT TESTS (5.2L) > PINPOINT TEST E : GENERATOR CURRENT SENSOR FAULTS > PINPOINT

TEST E : GENERATOR CURRENT SENSOR FAULTS

NOTE: Make sure battery voltage is greater than 12.2 volts prior to and during this pinpoint test.

NOTE: Do not have a battery charger attached during vehicle testing.

E1 RETRIEVE DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition ON.

Using a diagnostic scan tool, perform the PCM self-test.

Is DTC P0562 present?

Yes	GO to Pinpoint Test B

No	For DTC P0A5A, GO to E2 For DTC P0A5B, GO to E3 For DTC P0A5C, GO to E6

E2 CHECK THE GENERATOR CURRENT SENSOR

Ignition OFF.

Inspect the generator current sensor for the following:

physical damage

corrosion

disconnected electrical connector

generator B+ cable routed through the generator current sensor

debris between the generator current sensor and the generator B+ cable

Are any of these conditions found during inspection?

Yes	REPAIR as necessary or INSTALL a new generator current sensor. REFER to: Generator Current Sensor .

No	GO to E10

E3 CHECK THE GENERATOR CURRENT SENSOR REFERENCE VOLTAGE CIRCUIT FOR AN OPEN

Ignition OFF.

Disconnect Generator current sensor C1645 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1645-1		Ground

Is the voltage between 4.8 and 5.2 volts?

Yes	GO to E4

No	If the voltage is less than 4.8 volts, REPAIR the circuit for an open or high resistance. If the voltage is greater than 5.2 volts, REPAIR the circuit for a short to voltage.

E4 CHECK THE GENERATOR CURRENT SENSOR GROUND CIRCUIT FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1645-1		C1645-2

Is the voltage between 4.8 and 5.2 volts?

Yes	GO to E5

No	REPAIR the circuit for an open or high resistance.

E5 CHECK THE GENERATOR CURRENT SENSOR FEEDBACK CIRCUIT FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1645-3		C1645-2

Is the voltage between 4.8 and 5.2 volts?

Yes	GO to E6

No	REPAIR the circuit for an open or high resistance.

E6 CHECK THE GENERATOR CURRENT SENSOR FEEDBACK CIRCUIT FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect PCM C175B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1645-3		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to E7

E7 CHECK THE GENERATOR CURRENT SENSOR FEEDBACK CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Disconnect PCM C175B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1645-3	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to E8

No	REPAIR the circuit.

E8 CHECK THE GENERATOR CURRENT SENSOR FEEDBACK CIRCUIT FOR A SHORT TO THE SIGNAL RETURN OR VOLTAGE REFERENCE CIRCUIT

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1645-3	Ω	C1645-1
C1645-3	Ω	C1645-2

Are the resistances greater than 10, 000 ohms?

Yes	GO to E9

No	REPAIR the affected circuit.

E9 CHECK THE GENERATOR CURRENT SENSOR FEEDBACK CIRCUIT FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C175B-53	Ω	C1645-3

Is the resistance less than 3 ohms?

Yes	GO to E10

No	REPAIR the circuit.

E10 CHECK THE GENERATOR CURRENT SENSOR CONNECTION

Ignition OFF.

Disconnect Generator current sensor C1645 .

Inspect the generator current sensor connector for the following:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Connect and correctly seat the generator current sensor connector.

Ignition ON.

Using a diagnostic scan tool, clear all Diagnostic Trouble Codes (DTCs) in all modules.

Using a diagnostic scan tool, perform the PCM self-test

Did the DTC return?

Yes	REPAIR as necessary or INSTALL a new generator current sensor. REFER to: Generator Current Sensor . CLEAR the Diagnostic Trouble Codes (DTCs). REPEAT the self-test. If the DTC returns, GO to E11

No	The system is operating correctly at this time. The concern may have been caused by an intermittently loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

E11 CHECK FOR CORRECT PCM (POWERTRAIN CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all PCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the PCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PCM. REFER to: Powertrain Control Module (PCM) . CLEAR all Diagnostic Trouble Codes (DTCs) in all modules.

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 5.2L 32V TI-VCT > PINPOINT TESTS (5.2L) > PINPOINT TEST F : DTC P0620, P065B

Refer to Charging System for schematic and connector information.

Normal Operation and Fault Conditions

The PCM monitors the generator output via the generator monitor (GENMON) circuit. The PCM uses the generator command (GENCOM) circuit to command the generator to either increase or decrease output. If the GENCOM circuit (generator control circuit) or the "A" sense circuit are open or shorted to ground, the PCM will not be able to control the generator output. When the engine speed is greater than 2, 000 RPM, the generator defaults to a steady voltage output of 13.5 volts and the PCM sends a request to the IPC to illuminate the charging system warning indicator. A GENCOM circuit fault can be confirmed by viewing the PCM PID generator command line fault (GENCMD_LF) (YES status indicator fault).

Diagnostic Trouble Code (DTC) Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
P0620	Generator Control Circuit	The PCM sets this DTC if the GENCOM circuit, "A" sense circuit, or B+ circuit is open or shorted to ground.
P065B	Generator Control Circuit Range/performance	The PCM sets this DTC when the generator reports an internal regulator failure.

Possible Sources

- Fuses or Fusible Links
- Generator

- PCM
- Wiring, terminals or connectors

Visual Inspection and Diagnostic Pre-checks

- Inspect the high current BJB for loose or corroded connections.

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 5.2L 32V TI-VCT > PINPOINT TESTS (5.2L) > PINPOINT TEST F : DTC P0620, P065B > PINPOINT TEST F : DTC P0620, P065B

NOTE: Make sure battery voltage is greater than 12.2 volts prior to and during this pinpoint test.

NOTE: Do not have a battery charger attached during vehicle testing.

F1 CHECK THE BATTERY CONDITION

Check the battery condition and state of charge. REFER to: BATTERY, MOUNTING AND CABLES .

Does the battery pass the condition test?

Yes	GO to F2

No	CHARGE or INSTALL a new battery as necessary. REFER to: Battery .

F2 CHECK THE GENERATOR CONNECTIONS

Ignition OFF.

Disconnect all of the generator connectors and inspect for:

corrosion (install new connector or terminals - clean module pins)

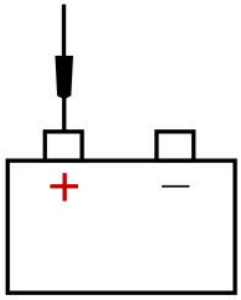
damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

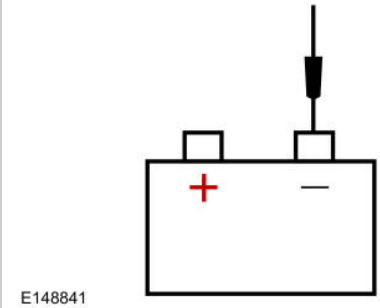
Reconnect the generator connectors. Make sure they seat and latch correctly.

Measure and record:

Positive Lead	Measurement / Action	Negative Lead







Measure:

Positive Lead	Measurement / Action	Negative Lead
C102B-1		Ground

Is the voltage within 0.5 volt of the recorded battery voltage?

Yes	GO to F3

No	TIGHTEN or INSTALL a new generator B+ nut as needed. REFER to: Generator - 5.2L 32V Ti-VCT . VERIFY high current BJB MEGA fuse (275A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short.

F3 CHECK THE VOLTAGE DROP IN THE GENERATOR B+ CIRCUIT

Start the engine.

With the engine running at idle, headlamps on and blower on high, measure:

Positive Lead	Measurement / Action	Negative Lead
C102C-1		

Perform a wiggle test of the generator wiring and connections while measuring voltage drop.

Is the voltage drop less than 0.5 volt?

Yes	GO to F4

No	INSPECT and REPAIR any corrosion in the generator B+ circuit or positive battery cable connections.

NOTE: This step puts a load on the "A" sense circuit. If there are corroded or loose connections, loading the circuit may help show the fault. A 250-350 mA incandescent 12-volt test lamp is required for this step. This circuit cannot be loaded correctly using an LED-style test lamp.

NOTE: The following step uses a test light to simulate normal circuit loads. Use only the test light recommended in the Special Tools table at the beginning of this article. To avoid connector terminal damage, use the Flex Probe Kit for the test light probe connection to the vehicle. Do not use the test light probe directly on any connector.

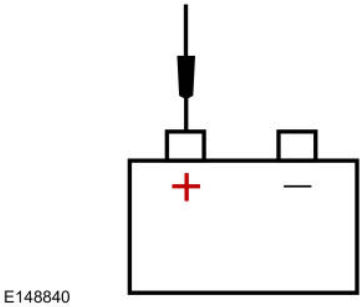
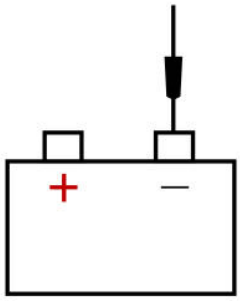
F4 "A" SENSE CIRCUIT LOAD TEST

Ignition OFF.

Disconnect Generator C102B .

Ignition ON.

Measure and record:

Positive Lead	Measurement / Action	Negative Lead
 E148840		 E148841

Install a test lamp between:

Positive Lead	Measurement / Action	Negative Lead
C102B-3		Ground

Perform a wiggle test on the generator wiring and measure:

Positive Lead	Measurement / Action	Negative Lead
C102B-3		Ground

Is the "A" sense voltage within ±0.5 volt of the recorded battery voltage?

Yes	GO to F5

No	VERIFY the BJB fuse 36 (10A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short.

F5 CHECK THE GENERATOR COMMAND CIRCUIT FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect PCM C175B .

Ignition ON.

Perform a wiggle test on the generator wiring and measure:

Positive Lead	Measurement / Action	Negative Lead
C102B-2		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to F6

F6 CHECK THE GENERATOR COMMAND CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Perform a wiggle test on the generator wiring and measure:

Positive Lead	Measurement / Action	Negative Lead
C102B-2	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to F7

No	REPAIR the circuit.

F7 CHECK THE GENERATOR COMMAND CIRCUIT FOR AN OPEN

Perform a wiggle test on the generator wiring and measure:

Positive Lead	Measurement / Action	Negative Lead
C175B-13	Ω	C102B-2

Is the resistance less than 3 ohms?

Yes	GO to F8

No	REPAIR the circuit.

F8 COMPARE THE GENERATOR MONITOR (GENMON) AND GENERATOR COMMAND (GENCMD) PIDS

Ignition OFF.

Connect PCM C175B .

Connect a fused jumper wire:

Positive Lead	Measurement / Action	Negative Lead
C102B-1		C102B-2

Start the engine.

Using a diagnostic scan tool, view PCM Parameter Identifications (PIDs).

Monitor the PCM Parameter Identifications (PIDs) GENMON and GENCMD.

Perform a wiggle test of the generator wiring and connections.

Do the Parameter Identifications (PIDs) read within 5% of each other?

Yes	REMOVE the fused jumper wire. INSTALL a new generator. REFER to: Generator - 5.2L 32V Ti-VCT .

No	REMOVE the fused jumper wire. GO to F9

F9 CHECK FOR CORRECT PCM (POWERTRAIN CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all PCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the PCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PCM. REFER to: Powertrain Control Module (PCM) . CLEAR all Diagnostic Trouble Codes (DTCs) in all modules.

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 5.2L 32V TI-VCT > PINPOINT TESTS

(5.2L) > PINPOINT TEST G : DTC P0625 OR P0626

Refer to Charging System for schematic and connector information.

Normal Operation and Fault Conditions

The PCM monitors the generator output via the generator monitor (GENMON) circuit (generator field terminal circuit). If the PCM cannot read the GENMON circuit due to an open or short to ground, when the engine speed is greater than 2, 000 RPM, the generator defaults to a steady voltage of 13.5 volts and the PCM sends a request to the IPC to illuminate the charging system warning indicator. A GENMON duty cycle of 3% or less indicates a short to ground fault is present and results in DTC P0625 setting in the PCM. A GENMON duty cycle of 98% or more indicates an open or short to voltage fault is present and results in DTC P0626 setting in the PCM.

Diagnostic Trouble Code (DTC) Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
P0625	Generator Field Terminal Circuit Low	The PCM sets this DTC if the GENMON circuit is shorted to ground, the "A" sense circuit is open or the B+ circuit is open. This DTC also sets by a faulted PCM or generator.
P0626	Generator Field Terminal Circuit High	The PCM sets this DTC if the GENMON circuit is open or shorted to power. This DTC can also be set by a faulted PCM or generator.

Possible Sources

- Battery
- Fuses or Fusible Links
- Generator
- PCM
- Wiring, terminals or connectors

Visual Inspection and Diagnostic Pre-checks

- Inspect for abnormal ignition-off current drain(s).
- Inspect the high current BJB for loose or corroded connections.

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 5.2L 32V TI-VCT > PINPOINT TESTS (5.2L) > PINPOINT TEST G : DTC P0625 OR P0626 > PINPOINT TEST G : DTC P0625 OR P0626

G1 CHECK THE BATTERY CONDITION

Check the battery condition and state of charge. REFER to: BATTERY, MOUNTING AND CABLES .

Does the battery pass the condition test?

Yes	GO to G2

No	CHARGE or INSTALL a new battery as necessary. REFER to: Battery .

G2 CHECK THE GENERATOR CONNECTIONS

Ignition OFF.

Disconnect all of the generator connectors and inspect for:

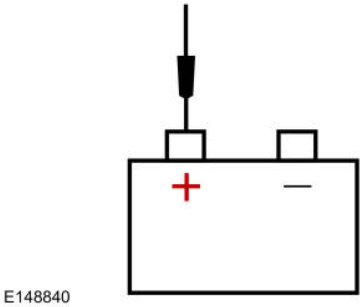
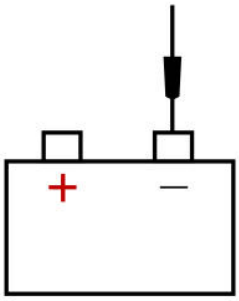
corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the generator connectors. Make sure they seat and latch correctly.

Measure and record:

Positive Lead	Measurement / Action	Negative Lead
 E148840		 E148841

Measure:

Positive Lead	Measurement / Action	Negative Lead
C102B-1		Ground

Is the voltage within 0.5 volt of the recorded battery voltage?

Yes	GO to G3

No	TIGHTEN or INSTALL a new generator B+ nut as needed. REFER to: Generator - 5.2L 32V Ti-VCT . VERIFY high current BJB MEGA fuse (275A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short.

G3 CHECK THE VOLTAGE DROP IN THE GENERATOR B+ CIRCUIT

Start the engine.

With the engine running at idle, headlamps on and blower on high, measure:

Positive Lead	Measurement / Action	Negative Lead
C102C-1		

Perform a wiggle test of the generator wiring and connections while measuring voltage drop.

Is the voltage drop less than 0.5 volt?

Yes	For DTC P0625, GO to G4 For DTC P0626, GO to G5

No	INSPECT and REPAIR any corrosion in the generator B+ circuit or positive battery cable connections.

NOTE: This step puts a load on the "A" sense circuit. If there are corroded or loose connections, loading the circuit may help show the fault. A 250-350 mA incandescent 12-volt test lamp is required for this step. This circuit cannot be loaded correctly using an LED-style test lamp.

NOTE: The following step uses a test light to simulate normal circuit loads. Use only the test light recommended in the Special Tools table at the beginning of this article. To avoid connector terminal damage, use the Flex Probe Kit for the test light probe connection to the vehicle. Do not use the test light probe directly on any connector.

G4 "A" SENSE CIRCUIT LOAD TEST

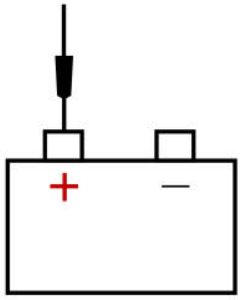
Ignition OFF.

Disconnect Generator C102B .

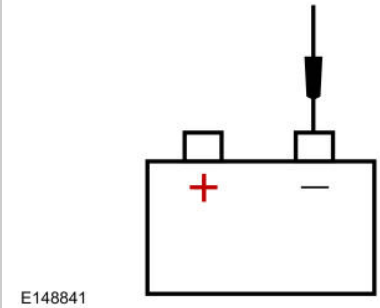
Ignition ON.

Measure and record:

Positive Lead	Measurement / Action	Negative Lead







Install a test lamp between:

Positive Lead	Measurement / Action	Negative Lead
C102B-3		Ground

Perform a wiggle test on the generator wiring and measure:

Positive Lead	Measurement / Action	Negative Lead
C102B-3		Ground

Is the "A" sense voltage within ±0.5 volt of the recorded battery voltage?

Yes	GO to G5

No	VERIFY the BJB fuse 36 (10A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short.

G5 CHECK THE GENERATOR MONITOR CIRCUIT FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect PCM C175B .

Ignition ON.

Perform a wiggle test on the generator wiring and measure:

Positive Lead	Measurement / Action	Negative Lead
C102B-1		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to G6

G6 CHECK THE GENERATOR MONITOR CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Perform a wiggle test on the generator wiring and measure:

Positive Lead	Measurement / Action	Negative Lead
C102B-1	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to G7

No	REPAIR the circuit.

G7 CHECK THE GENERATOR MONITOR CIRCUIT FOR AN OPEN

Perform a wiggle test on the generator wiring and measure:

Positive Lead	Measurement / Action	Negative Lead
C175B-26	Ω	C102B-1

Is the resistance less than 3 ohms?

Yes	GO to G8

No	REPAIR the circuit.

G8 CHECK THE GENERATOR B+ INTERNAL RESISTANCE

Disconnect Generator C102B .

Disconnect Generator C102C .

Measure:

Positive Lead	Measurement / Action	Negative Lead
Generator B+ Terminal	Ω	Generator case

Is the resistance greater than 25K ohms?

Yes	GO to G9

No	INSTALL a new generator. REFER to: Generator - 5.2L 32V Ti-VCT .

G9 CHECK THE RESISTANCE OF THE VOLTAGE REGULATOR INTERNAL CIRCUITS

Measure:

Positive Lead	Measurement / Action	Negative Lead
Generator pin 1 (Component Side)	Ω	Generator case
Generator pin 2 (Component Side)	Ω	Generator case
Generator pin 3 (Component Side)	Ω	Generator case

Are the resistances greater than 10, 000 ohms?

Yes	GO to G10

No	INSTALL a new generator. REFER to: Generator - 5.2L 32V Ti-VCT .

G10 COMPARE THE GENMON PID (PARAMETER IDENTIFICATION) AND THE GENCMD PID (PARAMETER IDENTIFICATION)

Connect PCM C175B .

Connect a fused jumper wire:

Positive Lead	Measurement / Action	Negative Lead
C102B-1		C102B-2

Start the engine.

Using a diagnostic scan tool, view PCM Parameter Identifications (PIDs).

Using the active command, set the PID GENVDSD to 14 volts.

Monitor the PCM Parameter Identifications (PIDs) GENMON and GENCMD.

Perform a wiggle test of the generator wiring and connections.

Do the Parameter Identifications (PIDs) read within 5% of each other?

Yes	REMOVE the fused jumper wire. INSTALL a new generator. REFER to: Generator - 5.2L 32V Ti-VCT .

No	REMOVE the fused jumper wire. GO to G11

G11 CHECK FOR CORRECT PCM (POWERTRAIN CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all PCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the PCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PCM. REFER to: Powertrain Control Module (PCM) . CLEAR all Diagnostic Trouble Codes (DTCs) in all modules.

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 5.2L 32V TI-VCT > PINPOINT TESTS (5.2L) > PINPOINT TEST H : LOAD SHED MESSAGE DISPLAYS IN MESSAGE CENTER

Refer to Charging System for schematic and connector information.

Normal Operation and Fault Conditions

When the engine is off and the key is in on or accessory mode, and the BCM determines the battery state of charge is below 50%, or 45 minutes have elapsed, a load shed message is sent over the CAN. This message turns off the audio/navigation system to save the remaining battery charge. Under this condition the a load shed message will be displayed to notify the driver that battery protection actions are active:

- System Off to Save Battery Turn Ignition Off displays on the FCDIM (without touchscreen controls)
- SYSTEM OFF TO SAVE BATTERY PLEASE TURN IGNITION OFF OR START ENGINE displays on the FDIM (with touchscreen controls)
- Battery Saver - System Off displays on the FDIM (with Sync)

These messages displaying may be normal operation and not indicate a fault. Refer to the Owner Literature and REFER to: Charging System - System Operation and Component Description . Load shed messages displaying with the **engine running** or only on the FCDIM or the FDIM (with touchscreen controls) indicates the audio system has detected a fault.

Possible Sources

- Normal operation
- Audio system
- Battery
- BCM

- Fuses or Fusible Links
- Generator
- Wiring, terminals or connectors

Visual Inspection and Diagnostic Pre-checks

- Inspect the high current BJB for loose or corroded connections.
- Inspect the battery for loose or corroded connections.
- Inspect the generator for loose or corroded connections.
- Inspect the BJB for loose or corroded connections.
- Inspect the high current BJB for loose or corroded connections.
- Inspect C1046 for loose or corroded connections.
- Inspect battery and engine grounds for loose or corroded connections.

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 5.2L 32V TI-VCT > PINPOINT TESTS (5.2L) > PINPOINT TEST H : LOAD SHED MESSAGE DISPLAYS IN MESSAGE CENTER > PINPOINT TEST H : LOAD SHED MESSAGE DISPLAYS IN MESSAGE CENTER

H1 PERFORM INSPECTION AND VERIFICATION

Perform Inspection and Verification procedure in this article.

Was an obvious cause for an observed or reported concern found?

Yes	CORRECT the cause as necessary.

No	GO to H2

H2 VERIFY THE CUSTOMER CONCERN

Verify the customer concern by operating the charging system.

Did the customer indicate battery saver message only appeared in the centerstack with the engine running?

Yes	REFER to: Information and Entertainment System (without touchscreen) , or REFER to: Information and Entertainment System (with touchscreen) .

No	GO to H3

H3 VERIFY THE NETWORK

Ignition ON.

Using a diagnostic scan tool, perform the Network Test.

Did the APIM, BCM, and PCM pass the Network Test?

Yes	GO to H4

No	REFER to: MODULE COMMUNICATIONS NETWORK .

H4 PERFORM PCM (POWERTRAIN CONTROL MODULE) SELF TEST

Ignition ON.

Using a diagnostic scan tool, perform the PCM self-test.

Were any battery or charging system related Diagnostic Trouble Codes (DTCs) retrieved?

Yes	REFER to PCM DTC Chart .

No	GO to H5

H5 RETRIEVE ALL CONTINUOUS MEMORY DIAGNOSTIC TROUBLE CODES (CMDTCS)

Ignition ON.

Using a diagnostic scan tool, retrieve all Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Were any battery or charging system related Diagnostic Trouble Codes (DTCs) retrieved?

Yes	For BCM Diagnostic Trouble Codes (DTCs) refer to BCM DTC Chart . For APIM or ACM Diagnostic Trouble Codes (DTCs), Refer to the appropriate article for the procedure. For other battery or charging system related Diagnostic Trouble Codes (DTCs), REFER to: Diagnostic Trouble Code Charts .

No	GO to H6

H6 CHECK BCM (BODY CONTROL MODULE) BAT_ST_CHRG PID (PARAMETER IDENTIFICATION)

Ignition ON.

Using a diagnostic scan tool, view the BCM Parameter Identifications (PIDs).

Monitor the BCM BAT_ST_CHRG PID.

Does the PID indicate 50% or more?

Yes	GO to H8

No	GO to H7

NOTE: The battery state of charge is too low and needs to be relearned. Refer to the Description and Operation for more information on battery state of charge.

H7 RELEARN BATTERY STATE OF CHARGE

Remove all accessories from the lighter, all power outlets and DC/AC inverter (if equipped).

NOTE: The key should not be left in the vehicle but should be left in a secure location away from the vehicle such as a lock box.

Allow vehicle to sit undisturbed for at least 6 hours.

Ignition ON.

Using a diagnostic scan tool, view the BCM Parameter Identifications (PIDs).

Monitor the BCM BAT_ST_CHRG PID.

Does the PID indicate 50% or more?

Yes	The concern may have been caused by too low of a battery state of charge. REVIEW Energy Management operation with customer and return vehicle to customer.

No	GO to H8

H8 VERIFY INLINE CONNECTOR

Inspect inline connector C1046 for secure connection.

Disconnect Inline connector C1046 .

Inspect for:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Were any concerns present?

Yes	CORRECT the cause as necessary.

No	GO to H9

H9 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 5.2L 32V TI-VCT > PINPOINT TESTS (5.2L) > PINPOINT TEST I : BATTERY CURRENT SENSOR FAULTS

Refer to Charging System for schematic and connector information.

Normal Operation and Fault Conditions

For information on the battery current sensor, REFER to: Charging System - System Operation and Component Description .

Diagnostic Trouble Code (DTC) Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B130C:12	Load Shed Control Circuit Short To Battery	This DTC sets in the BCM when the BCM senses a short in the battery current sensor control circuit.
B130C:14	Load Shed Control Circuit Short To Ground or Open	This DTC sets in the BCM when the BCM senses an open or ground in the battery current sensor control circuit.
B1438:03	Battery Current Sensor, FM (Frequency Modulated) / PWM (Pulse Width Modulated) Failure	This DTC sets in the BCM when the BCM does not indicate current from the battery current sensor.

Possible Sources

- Battery current sensor
- Generator clutch
- Wiring, terminals or connectors

Visual Inspection and Diagnostic Pre-checks

- Inspect the battery current sensor
- Inspect the battery current sensor connector

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 5.2L 32V TI-VCT > PINPOINT TESTS (5.2L) > PINPOINT TEST I : BATTERY CURRENT SENSOR FAULTS > PINPOINT TEST I : BATTERY CURRENT SENSOR FAULTS

NOTE: Make sure battery voltage is greater than 12.2 volts prior to and during this pinpoint test.

NOTE: Do not have a battery charger attached during vehicle testing.

I1 RETRIEVE DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition ON.

Using a diagnostic scan tool, perform the PCM self-test

Is DTC P0562 present?

Yes	GO to Pinpoint Test B

No	For DTC P0A5A, GO to I2 For DTC P0A5B, GO to I6 For DTC P0A5C, GO to I10

I2 CHECK THE BATTERY CURRENT SENSOR

Inspect the battery current sensor for the following:

physical damage

corrosion

disconnected electrical connector

battery ground cable routed through the battery current sensor

debris between the battery current sensor and the battery ground cable

Are any of these conditions found during inspection?

Yes	REPAIR as necessary. GO to I14

No	GO to I3

I3 CHECK THE BATTERY CURRENT SENSOR REFERENCE VOLTAGE CIRCUIT

Ignition OFF.

Disconnect Battery current sensor C1646 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1646-1		Ground

Is the voltage between 4.8 and 5.2 volts?

Yes	GO to I7

No	If the voltage is less than 4.8 volts, GO to I5 If the voltage is greater than 5.2 volts, GO to I4

I4 CHECK THE BATTERY CURRENT SENSOR REFERENCE VOLTAGE CIRCUIT FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect BCM C2280F .

Using the Terminal Release Kit, release and temporarily remove BCM C2280F-3 .

Connect BCM C2280F .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1646-1		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	INSTALL C2280F-3 and GO to I15

I5 CHECK THE BATTERY CURRENT SENSOR REFERENCE VOLTAGE CIRCUIT FOR A SHORT TO

GROUND

Ignition OFF.

Disconnect BCM C2280F .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1646-1	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to I6

No	REPAIR the circuit.

I6 CHECK THE BATTERY CURRENT SENSOR REFERENCE VOLTAGE CIRCUIT FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1646-1	Ω	C2280F-3

Is the resistance less than 3 ohms?

Yes	GO to I14

No	REPAIR the circuit.

I7 CHECK THE BATTERY CURRENT SENSOR SIGNAL RETURN CIRCUIT

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1646-1	V	C1646-2

Is the voltage between 4.8 and 5.2 volts?

Yes	GO to I10

No	GO to I8

I8 CHECK THE BATTERY CURRENT SENSOR SIGNAL RETURN CIRCUIT FOR VOLTAGE

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1646-2		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to I9

I9 CHECK THE BATTERY CURRENT SENSOR SIGNAL RETURN CIRCUIT FOR AN OPEN

Ignition OFF.

Disconnect BCM C2280C .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1646-2	Ω	C2280F-19

Is the resistance less than 3 ohms?

Yes	GO to I14

No	REPAIR the circuit.

I10 CHECK THE BATTERY CURRENT SENSOR FEEDBACK CIRCUIT FOR A SHORT TO VOLTAGE

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1646-3		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to I11

I11 CHECK THE BATTERY CURRENT SENSOR FEEDBACK CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Disconnect BCM C2280F .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1646-3	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to I12

No	REPAIR the circuit.

I12 CHECK THE BATTERY CURRENT SENSOR FEEDBACK CIRCUIT FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1646-3	Ω	C2280F-8

Is the resistance less than 3 ohms?

Yes	GO to I13

No	REPAIR the circuit.

I13 CHECK THE BATTERY CURRENT SENSOR FEEDBACK CIRCUIT FOR A SHORT TO THE SIGNAL RETURN OR REFERENCE CIRCUIT

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1646-3	Ω	C1646-1
C1646-3	Ω	C1646-2

Are the resistances greater than 10, 000 ohms?

Yes	GO to I14

No	REPAIR the affected circuit.

I14 CHECK THE BATTERY CURRENT SENSOR CONNECTION

Ignition OFF.

Disconnect Battery Current Sensor C1646 , if necessary.

Inspect the battery current sensor connector for:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Connect Battery Current Sensor C1646 .

Connect BCM C2280F .

Ignition ON.

Using a diagnostic scan tool, clear all Diagnostic Trouble Codes (DTCs) in all modules.

Using a diagnostic scan tool, perform the BCM self-test.

Did the DTC return?

Yes	REPAIR as necessary or INSTALL a new battery current sensor. REFER to: Battery Current Sensor . CLEAR the Diagnostic Trouble Codes (DTCs). REPEAT the self-test. If the DTC returns, GO to I15

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

I15 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

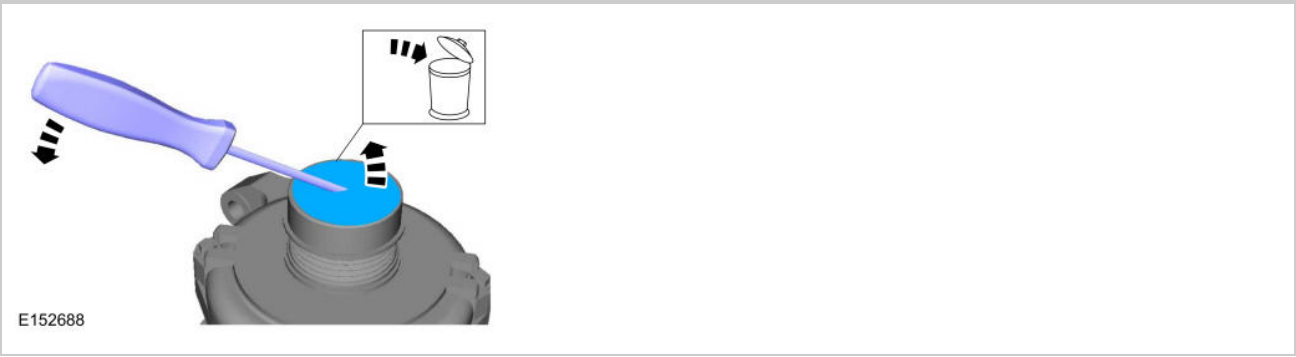
No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > CHARGING SYSTEM - 5.2L 32V TI-VCT > COMPONENT

TEST - GENERATOR CLUTCH

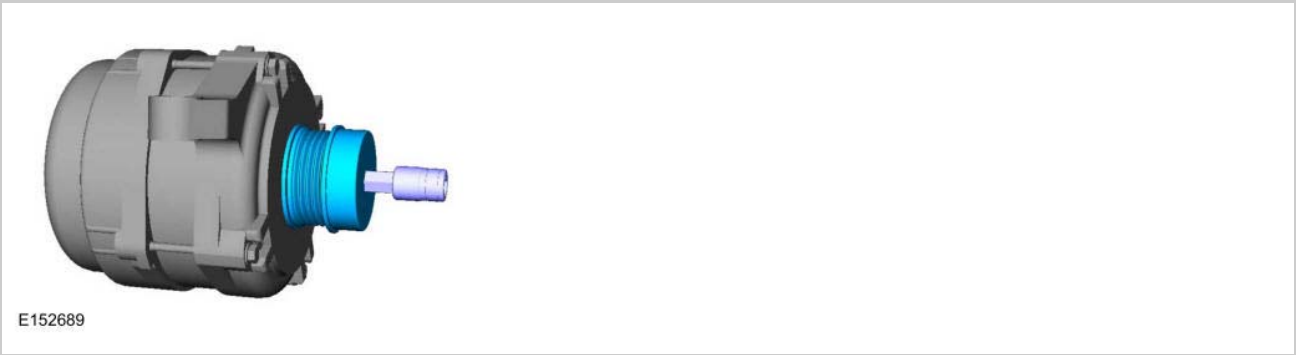
1.

Remove the generator. REFER to: Generator - 5.2L 32V Ti-VCT .



2.

Using a small screwdriver or similar tool, insert the tool through the rubber button on the center of the pulley cap and pry off the cap. Discard the cap. A new cap must be installed if the clutch is OK.



3.

Using a 17 mm hex tool bit (such as a Snap-on ® SAM17E2 or equivalent) and socket wrench, insert the 17 mm hex tool bit into the end of the clutch shaft.

4.

While holding the clutch pulley firmly by hand, turn the clutch shaft clockwise. The shaft should rotate smooth and freely. If the shaft rotation is rough or seized, install a new generator clutch. REFER to: GENERATOR PULLEY .

5.

While holding the clutch pulley firmly by hand, turn the clutch shaft counterclockwise. There should be some resistance (a spring feel). If the shaft rotates freely, install a new generator clutch. REFER to: GENERATOR PULLEY .

Service Manual: GENERATOR AND REGULATOR

SPECIFICATIONS > SPECIFICATIONS

General Specifications

Item	Specification
2.3L EcoBoost 175A (base)	
Generator pulley ratio	2.47:1
Rating	90 amps at 700 RPM (min) to 155 amps at 2, 400 RPM (max)
Voltage regulator type	Electronic internal with generator
2.3L EcoBoost - 200A (optional)	
Generator pulley ratio	2.47:1
Rating	110 amps at 700 RPM (min) to 185 amps at 2, 400 RPM (max)
Voltage regulator type	Electronic internal with generator
3.7L Ti-VCT - 175A (base)	
Generator pulley ratio	2.69:1
Rating	100 amps at 650 RPM (min) to 160 amps at 2, 200 RPM (max)
Voltage regulator type	Electronic internal with generator
5.0L Ti-VCT - 175A (base)	
Generator pulley ratio	2.47:1
Rating	70 amps at 600 RPM (min) to 155 amps at 2, 400 RPM (max)
Voltage regulator type	Electronic internal with generator
5.0L Ti-VCT - 200A (optional)	
Generator pulley ratio	2.47:1
Rating	80 amps at 600 RPM (min) to 185 amps at 2, 400 RPM (max)
Voltage regulator type	Electronic internal with generator

REMOVAL AND INSTALLATION > GENERATOR - 2.3L ECOBOOST (201KW 273PS) > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

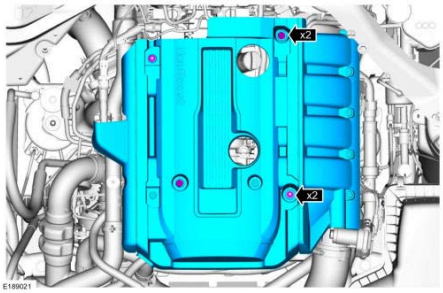
Disconnect the battery ground. Refer to: Battery Disconnect and Connect .

2.

Remove the bolts and nuts and the engine appearance cover.

Torque

: 80 lb.in (9 Nm)



3.

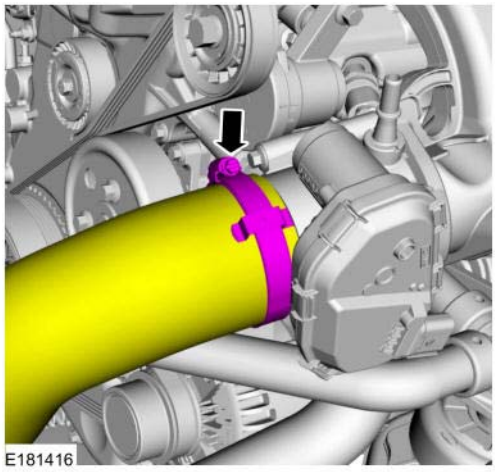
Remove the air cleaner. Refer to: Air Cleaner .

4.

Loosen the clamp and position aside the CAC outlet tube.

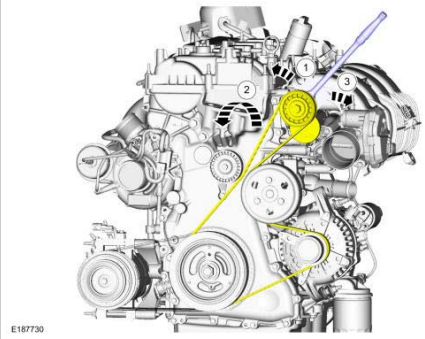
Torque

: 44 lb.in (5 Nm)



5.

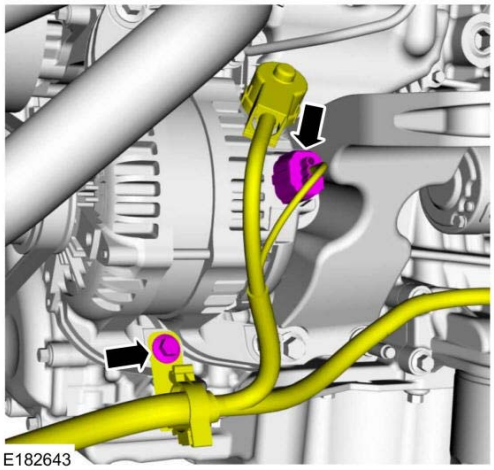
Rotate the accessory drive belt tensioner counterclockwise and position aside the accessory drive belt.



6.

Remove the bolt and the wire harness retainer from the generator.

Disconnect the generator electrical connector.



7.

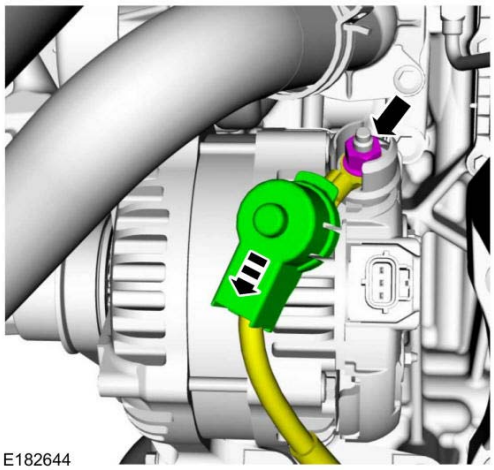
Position the protective cover aside.

NOTE: When installing the B+ terminal nut to the generator, finger-start the nut before tightening or component damage may occur.

Remove the nut and position the B+ cable.

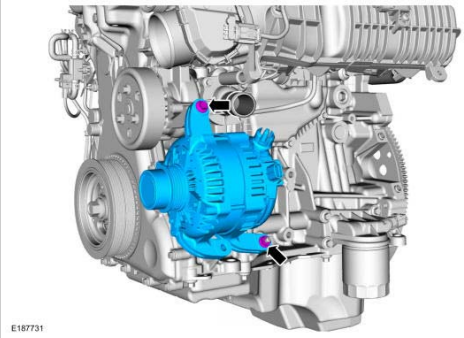
Torque

: 159 lb.in (18 Nm)



8.

Remove the nut, bolt and the generator.



REMOVAL AND INSTALLATION > GENERATOR - 2.3L ECOBOOST (201KW 273PS) > INSTALLATION

1.

To install, reverse the removal procedure.

2.

1.

Position the generator onto the engine and finger-tighten the bolt and nut.

2.

Position the wire harness retainer on generator and finger-tighten the bolt.

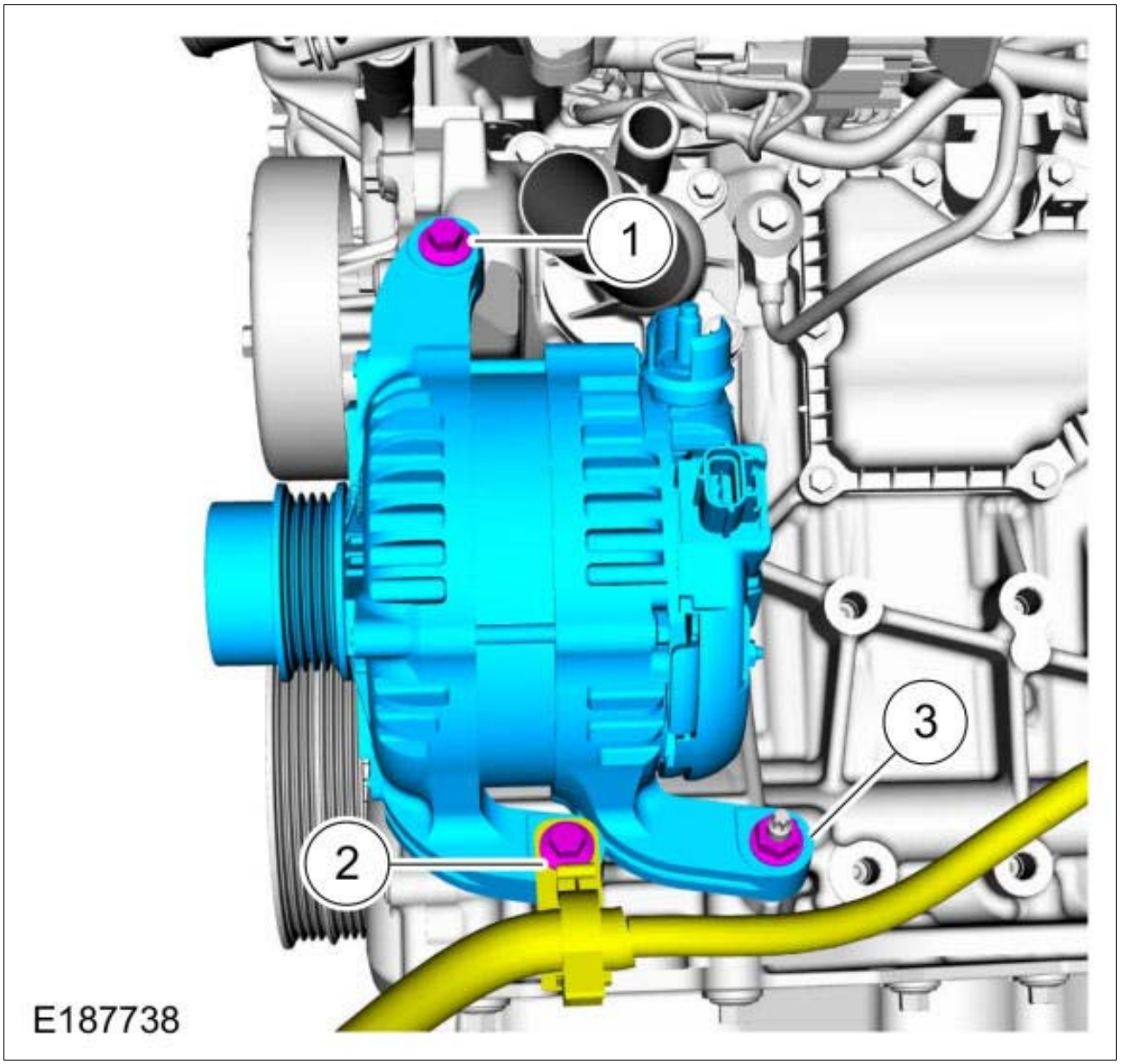
3.

Tighten the bolts and the nut in the sequence shown.

Torque

: 18 lb.ft (25 Nm)

Fig 1: Generator Bolts Tightening Sequence (2.3L)



Courtesy of FORD MOTOR CO.

REMOVAL AND INSTALLATION > GENERATOR - 3.7L DURATEC (227KW 301PS) > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

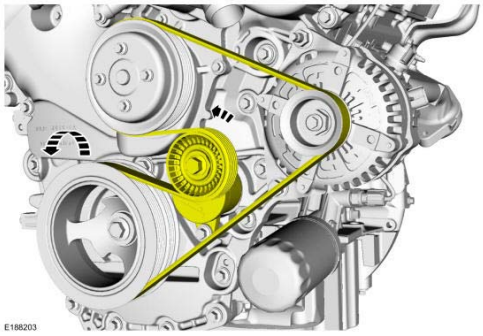
Disconnect the battery ground. Refer to: Battery Disconnect and Connect .

2.

Remove the air cleaner assembly. Refer to: Air Cleaner .

3.

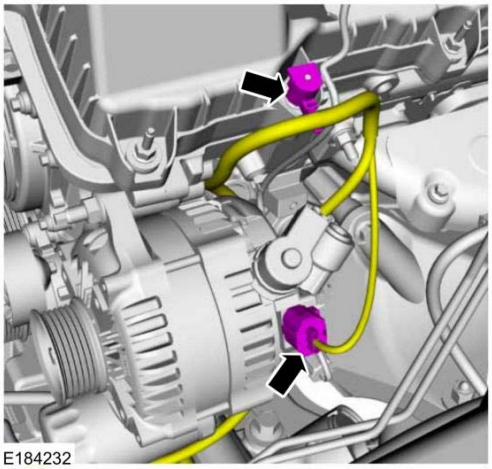
Rotate the accessory drive belt tensioner counter clockwise and position aside the accessory drive belt.



4.

Detach the wire harness retainer from the valve cover stud bolt.

Disconnect the generator electrical connector.



5.

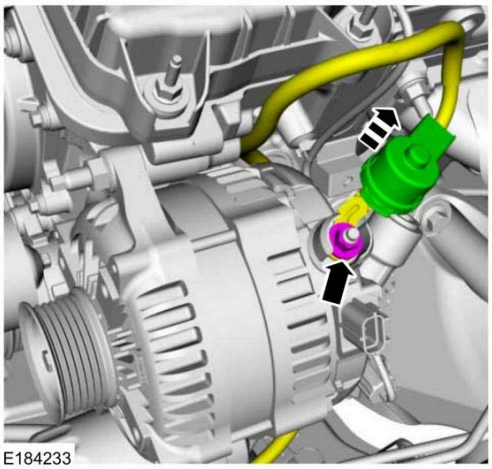
Position the protective cover aside.

NOTE: When installing the B+ terminal nut to the generator, finger-start the nut before tightening or component damage may occur.

Remove the nut and position the generator B+ cable.

Torque

: 159 lb.in (18 Nm)

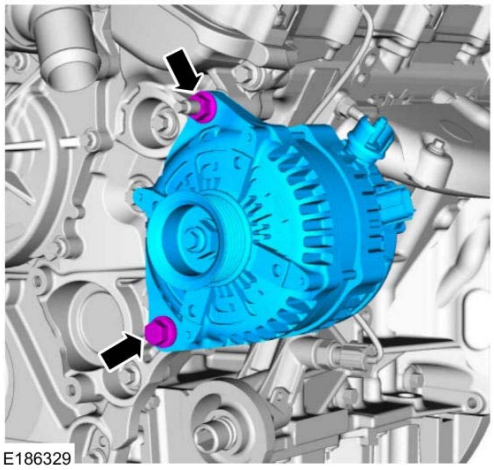


6.

Remove the nut, bolt and the generator.

Torque

: 35 lb.ft (47 Nm)



REMOVAL AND INSTALLATION > GENERATOR - 3.7L DURATEC (227KW 301PS) > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > GENERATOR - 5.0L 32V TI-VCT > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

Disconnect the battery ground. Refer to: Battery Disconnect and Connect .

2.

Remove the air cleaner. Refer to: Air Cleaner .

3.

Remove the accessory drive belt tensioner. Refer to: Accessory Drive Belt Tensioner .

NOTE: When installing the B+ terminal nut to the generator, finger-start the nut before tightening or component damage may occur.

4.

1.

Disconnect the generator electrical connector.

2.

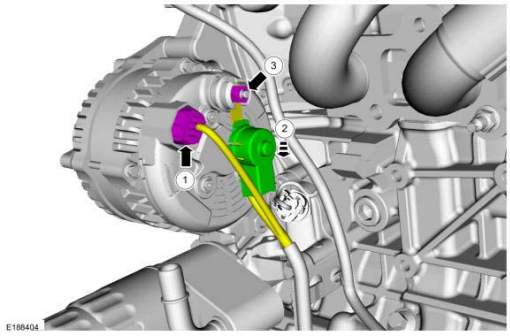
Position the protective cover aside.

3.

Remove the nut and position the generator B+ cable.

Torque

: 159 lb.in (18 Nm)

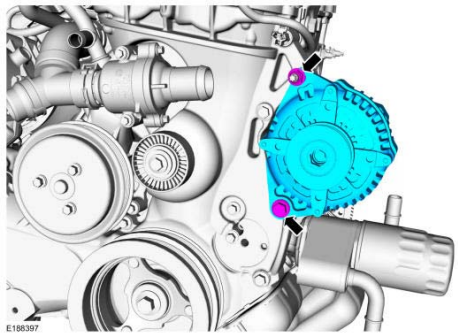


5.

Remove the nut, bolt and the generator.

Torque

: 35 lb.ft (47 Nm)



REMOVAL AND INSTALLATION > GENERATOR - 5.0L 32V TI-VCT > INSTALLATION

1.

To install, reverse the removal procedure.

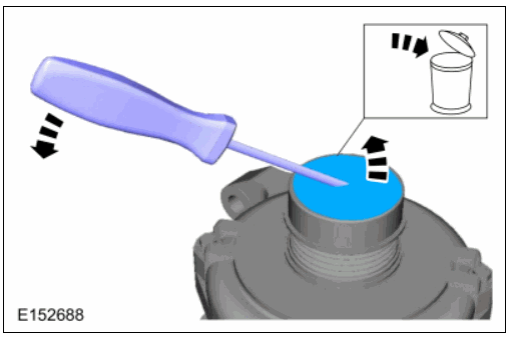
REMOVAL AND INSTALLATION > GENERATOR PULLEY > REMOVAL

1. *WARNING: Before beginning any service procedure in this article, refer to Safety Warnings in GENERAL INFORMATION . Failure to follow this instruction may result in serious personal injury.*

   Follow the health and safety precautions. Refer to: Health and Safety Precautions in GENERAL INFORMATION .

2. Remove the generator. Refer to: Generator - 2.3L EcoBoost (201kW/273PS) , Refer to: Generator - 3.7L Duratec (227kW/301PS) or Refer to Generator 5.0L 32V Ti-VCT

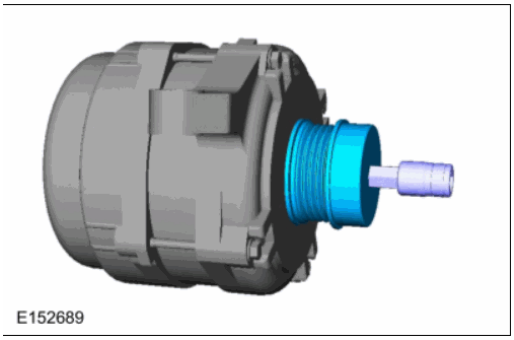
3. Using a small screwdriver or similar tool, insert the tool through the rubber button on the center of the pulley cap and pry off the cap. Discard the cap. A new cap must be installed if the clutch is ok.



4. *NOTE: Do not insert anything into the fins of the generator to prevent the rotor inside the generator from turning. Inserting items into the generator could result in damage to the generator.*

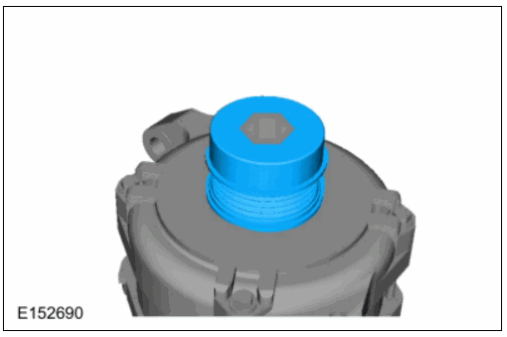
NOTE: The shaft and rotor will turn during removal.

Using a 17 mm hex tool and an impact gun, remove the clutch pulley. A couple of short bursts with the impact gun will remove the clutch pulley.



REMOVAL AND INSTALLATION > GENERATOR PULLEY > INSTALLATION

1. Install the pulley and hand start.

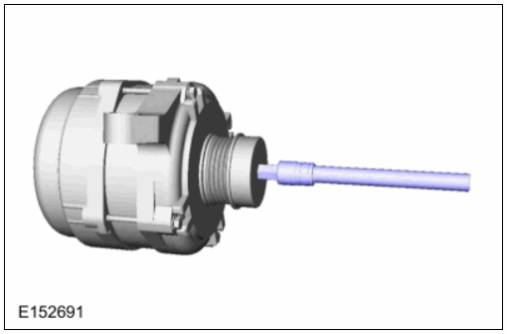


2. *NOTE: Do not insert anything into the fins of the generator to prevent the rotor inside the generator from turning. Inserting items into the generator could result in damage to the generator.*

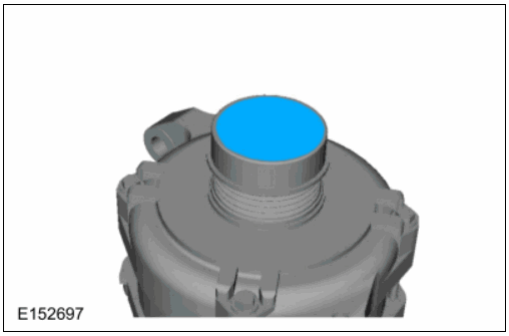
NOTE: The shaft and rotor will turn during installation.

While holding the outer diameter of the clutch pulley, torque the clutch pulley using a 17 mm hex tool, 75 Nm torque stick and an impact gun for 3-4 seconds. This makes sure the proper torque has been applied.

Torque: 55 lb.ft (75 Nm)



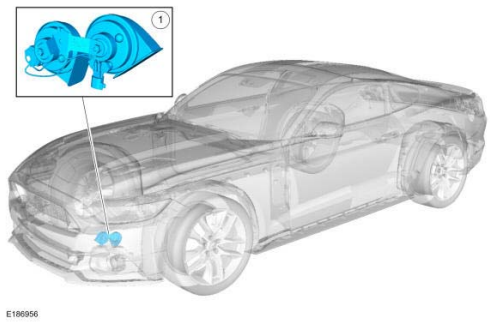
3. Install a new cap onto the pulley with the rubber button facing inwards.



4. Install the generator. Refer to: Generator - 2.3L EcoBoost (201kW/273PS) , Refer to: Generator - 3.7L Duratec (227kW/301PS) or Refer to Generator 5.0L 32V Ti-VCT

Service Manual: HORN

DESCRIPTION AND OPERATION > HORN - COMPONENT LOCATION > HORN



Item	Description
1	Horn **Comments:** Located behind LH fender splash shield.

DESCRIPTION AND OPERATION > HORN - OVERVIEW > OVERVIEW

The BCM controls horn output by energizing the horn relay and sounding the horn.

DESCRIPTION AND OPERATION > HORN - SYSTEM OPERATION AND COMPONENT DESCRIPTION

System Operation

DESCRIPTION AND OPERATION > HORN - SYSTEM OPERATION AND COMPONENT DESCRIPTION > HORN OPERATION

The horn switch uses sets of contacts separated by springs. The lower set is connected to ground and the upper set is connected to the horn signal circuit. When the driver airbag is pressed, it pushes down on the upper set of contacts, collapsing the springs and allowing the contacts to touch. When the contacts touch, it completes the circuit and provides a ground signal through the clockspring to the BCM horn input. The BCM then grounds the horn relay coil to energize the relay. When energized, the horn relay provides voltage to the horn, enabling the horn to sound.

DIAGNOSIS AND TESTING > HORN

Horn

DIAGNOSIS AND TESTING > HORN > DTC CHART(S)

DTC Chart: Horn

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

Body Control Module (BCM) DTC Chart

DTC	Description	Actions
B1323:11	Horn Switch: Circuit Short To Ground	GO to Pinpoint Test B
B1C55:12	Horn Relay: Circuit Short to Battery	GO to Pinpoint Test A
B1C55:14	Horn Relay: Circuit Short to Ground or Open	If the horn is inoperative, GO to Pinpoint Test A If the horn is always on, GO to Pinpoint Test B

DIAGNOSIS AND TESTING > HORN > SYMPTOM CHART(S)

Symptom Chart: Horn

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

Symptom Chart

Condition	Possible Sources	Actions
The horn is inoperative	Refer to Pinpoint Test	GO to Pinpoint Test A
The horn is always on	Refer to Pinpoint Test	GO to Pinpoint Test B

DIAGNOSIS AND TESTING > HORN > PINPOINT TESTS > PINPOINT TEST A : THE HORN IS INOPERATIVE

Refer to Horn/Cigar Lighter for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Horn - System Operation and Component Description .

DTC Chart

DTC	Description	Fault Trigger Condition
B1C55:12	Horn Relay: Circuit Short to Battery	A Continuous Memory Diagnostic Trouble Code (CMDTC) that sets when the BCM detects a short to

		voltage on the horn relay control circuit. The BCM disables the horn when this DTC is set.
B1C55:14	Horn Relay: Circuit Short to Ground or Open	This DTC sets when the BCM detects a short to ground or an open on the horn relay control circuit.

Possible Sources

- Fuse
- Wiring, terminals or connectors
- Clockspring
- Horn
- Horn relay
- Horn switch
- BCM

Visual Inspection and Diagnostic Pre-checks

Verify the BJB fuse 21 (20A) is OK.

DIAGNOSIS AND TESTING > HORN > PINPOINT TESTS > PINPOINT TEST A : THE HORN IS INOPERATIVE > PINPOINT TEST A : THE HORN IS INOPERATIVE

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may damage the connector.

A1 CHECK THE BCM (BODY CONTROL MODULE) OUTPUT BY ACTIVATING THE BCM (BODY CONTROL MODULE) HORN_RELAY PID (PARAMETER IDENTIFICATION)

Ignition ON.

Using a diagnostic scan tool, view BCM Parameter Identifications (PIDs).

Select the active command BCM HORN_RELAY PID and command the horn ON and then OFF.

Does the horn sound when commanded ON?

Yes	GO to A9

No	GO to A2

A2 CHECK THE HORN RELAY

Ignition OFF.

Remove the horn relay and install a known-good relay in its place.

Test the horn for normal operation.

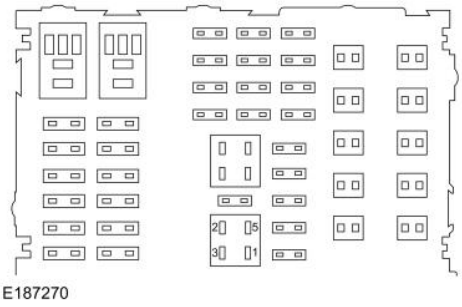
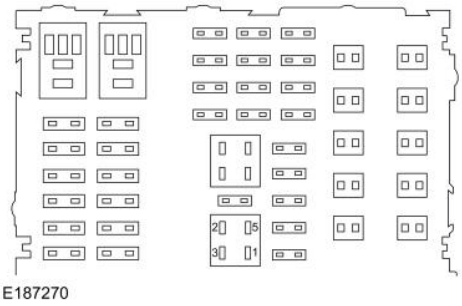
Does the horn operate correctly?

Yes	INSTALL a new horn relay.

No	GO to A3

A3 CHECK THE HORN RELAY VOLTAGE SUPPLY CIRCUIT FOR VOLTAGE

Measure:

Positive Lead	Measurement / Action	Negative Lead
 Horn relay pin socket 1		Ground
 Horn relay pin socket 3		Ground

Is the voltage greater than 11 volts?

Yes	GO to A4

No	VERIFY BJB fuse 21 (20A) is OK. If OK, REPAIR the horn relay voltage supply circuit. If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short.

NOTE: The following step uses a test light to simulate normal circuit loads. Use only a Rotunda Test Lamp (SGT27000) or 250-300mA incandescent bulb test lamp. To avoid

connector terminal damage, use the Rotunda Flex Probe kit for the test lamp probe connection to the vehicle. Do not use the test lamp probe directly on any connector.

A4 CHECK THE HORN CIRCUITS

Disconnect Horn C131 or C1102 .

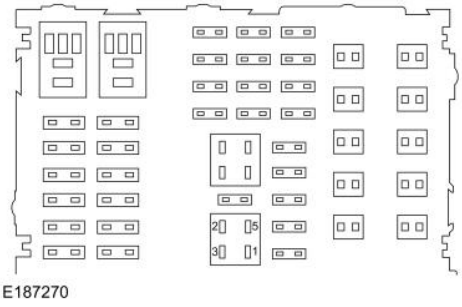
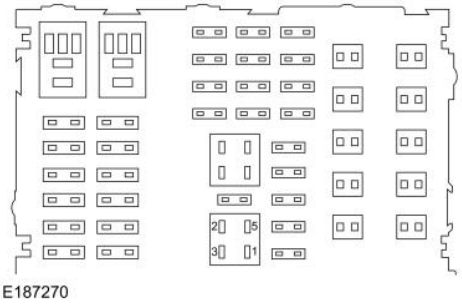
For C131 , connect:

Positive Lead	Measurement / Action	Negative Lead
C131-2		C131-1

For C1102 , connect:

Positive Lead	Measurement / Action	Negative Lead
C1102-2		C1102-1

Momentarily connect a fused jumper wire:

Positive Lead	Measurement / Action	Negative Lead
 Horn relay pin socket 3		 Horn relay pin socket 5

Does the test light momentarily illuminate?

Yes	GO to A5

No	GO to A8

A5 CHECK THE HORN CIRCUIT OPERATION USING THE BCM (BODY CONTROL MODULE) HORN_RELAY PID (PARAMETER IDENTIFICATION)

Install the horn relay.

Ignition ON.

Using a diagnostic scan tool, view BCM Parameter Identifications (PIDs).

Select the active command BCM HORN_RELAY PID and command the horn ON and then OFF.

Does the test light momentarily illuminate?

Yes	INSTALL a new horn. REFER to: Horn .

No	GO to A6

A6 CHECK THE HORN RELAY CONTROL CIRCUIT FOR A SHORT TO VOLTAGE

Ignition OFF.

Remove the horn relay.

Disconnect BCM C2280F .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
Horn relay pin socket 2	V	Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to A7

A7 CHECK THE HORN RELAY CONTROL CIRCUIT FOR AN OPEN

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
Horn relay pin socket 2	Ω	C2280F-20

Is the resistance less than 3 ohms?

Yes	GO to A16

No	REPAIR the circuit.

NOTE: The following step uses a test light to simulate normal circuit loads. Use only a Rotunda Test Lamp (SGT27000) or 250-300mA incandescent bulb test lamp. To avoid connector terminal damage, use the Rotunda Flex Probe kit for the test lamp probe connection to the vehicle. Do not use the test lamp probe directly on any connector.

A8 CHECK THE HORN POWER SUPPLY CIRCUIT

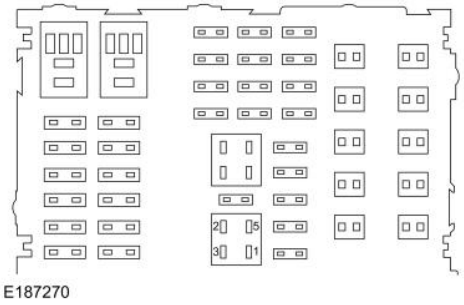
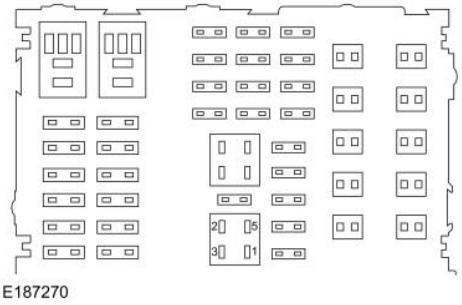
For C131 , connect:

Positive Lead	Measurement / Action	Negative Lead
C131-2		Ground

For C1102 , connect:

Positive Lead	Measurement / Action	Negative Lead
C1102-2		Ground

Momentarily connect a fused jumper wire:

Positive Lead	Measurement / Action	Negative Lead
 Horn relay pin socket 3		 Horn relay pin socket 5

Does the test light momentarily illuminate?

Yes	REPAIR the horn ground circuit.

No	REPAIR the horn power supply circuit.

A9 CHECK THE HORN SWITCH INPUT TO THE BCM (BODY CONTROL MODULE)

Ignition OFF.

Disconnect BCM C2280B .

While pressing the horn, measure:

Positive Lead	Measurement / Action	Negative Lead
C2280B-18	Ω	Ground

Is the resistance less than 3 ohms?

Yes	GO to A16

No	GO to A10

A10 ISOLATE THE HORN SWITCH

Connect BCM C2280B .

Remove the driver airbag. REFER to: Driver Airbag .

Momentarily connect a fused jumper wire:

Positive Lead	Measurement / Action	Negative Lead
C217-3		C217-4

Does the horn sound?

Yes	REMOVE the fused jumper wire. INSTALL a new driver airbag (includes horn switch). REFER to: Driver Airbag .

No	REMOVE the fused jumper wire. GO to A11

A11 CHECK THE HORN SWITCH GROUND

Measure:

Positive Lead	Measurement / Action	Negative Lead
C217-3	Ω	Ground

Is the resistance less than 3 ohms?

Yes	GO to A14

No	GO to A12

A12 CHECK THE HORN SWITCH GROUND

Disconnect Clockspring C218A .

Disconnect Clockspring C218B .

Connect a fused jumper wire:

Positive Lead	Measurement / Action	Negative Lead
C218A-4		C218B-1

Measure:

Positive Lead	Measurement / Action	Negative Lead
C217-3	Ω	Ground

Is the resistance less than 3 ohms?

Yes	REMOVE the fused jumper wire. INSTALL a new clockspring. REFER to: Clockspring .

No	REMOVE the fused jumper wire. GO to A13

A13 CHECK THE CLOCKSPRING GROUND CIRCUIT FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C218A-4	Ω	Ground

Is the resistance less than 3 ohms?

Yes	INSTALL a new steering wheel (includes steering wheel wiring harness). REFER to: Steering Wheel .

No	REPAIR the circuit.

A14 CHECK THE HORN SWITCH SIGNAL CIRCUIT

Disconnect SCCM C226A .

Momentarily connect a fused jumper wire:

Positive Lead	Measurement / Action	Negative Lead
C226A-1		Ground

Does the horn sound?

Yes	REMOVE the fused jumper wire. GO to A15

No	REMOVE the fused jumper wire. REPAIR the open circuit.

A15 CHECK HORN OPERATION WITH STEERING WHEEL HARNESS ISOLATED

Connect SCCM C226A .

Disconnect Clockspring C218B .

Momentarily connect a fused jumper wire:

Positive Lead	Measurement / Action	Negative Lead
Clockspring C218B, pin 4, component side		Ground

Does the horn sound?

Yes	REMOVE the fused jumper wire. INSTALL a new steering wheel (includes steering wheel wiring harness). REFER to: Steering Wheel .

No	REMOVE the fused jumper wire. INSTALL a new clockspring. REFER to: Clockspring . TEST the system for normal operation. If the horn is still inoperative, INSTALL a new SCCM. REFER to: Steering Column Control Module (SCCM) .

A16 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect the BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Install the horn relay (if previously removed).

Connect Horn C131 or C1102 .

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > HORN > PINPOINT TESTS > PINPOINT TEST B : THE HORN IS ALWAYS ON

Refer to Horn/Cigar Lighter for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Horn - System Operation and Component Description .

DTC Chart

DTC	Description	Fault Trigger Condition
B1323:11	Horn Switch: Circuit Short to Ground	A Continuous Memory Diagnostic Trouble Code (CMDTC) that sets when the BCM detects a short to ground on the horn signal circuit.
B1C55:14	Horn Relay: Circuit Short to Ground or Open	This DTC sets when the BCM detects a short to ground or an open on the horn relay control circuit.

Possible Sources

- Wiring, terminals or connectors
- Clockspring
- Horn relay
- Horn switch
- BCM

DIAGNOSIS AND TESTING > HORN > PINPOINT TESTS > PINPOINT TEST B : THE HORN IS ALWAYS ON > PINPOINT TEST B : THE HORN IS ALWAYS ON

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may damage the connector.

NOTE: The following test uses a test light to simulate normal circuit loads. Use only a Rotunda Test Lamp (SGT27000) or 250-300mA incandescent bulb test lamp. To avoid connector terminal damage, use the Rotunda Flex Probe kit for the test lamp probe connection to the vehicle. Do not use the test lamp probe directly on any connector.

B1 ISOLATE THE HORN RELAY

Disconnect Horn C131 or C1102 .

For C131 , connect:

Positive Lead	Measurement / Action	Negative Lead
C131-1		C131-2

For C1102 , connect:

Positive Lead	Measurement / Action	Negative Lead

C1102-1		C1102-2

Remove the horn relay.

Does the test light remain illuminated?

Yes	REPAIR the short to voltage on the horn voltage supply circuit.

No	GO to B2

B2 CHECK THE HORN RELAY

Ignition OFF.

Remove the horn relay and install a known-good relay in its place.

Test the horn for normal operation.

Does the horn operate correctly?

Yes	GO to B3

No	INSTALL a new horn relay.

B3 ISOLATE THE BCM (BODY CONTROL MODULE) HORN SWITCH INPUT CIRCUIT

Ignition ON.

Connect a diagnostic scan tool.

Using a diagnostic scan tool, view BCM Parameter Identifications (PIDs).

Monitor the BCM HORN_SW PID.

Does the PID status display OFF?

Yes	GO to B4

No	GO to B5

B4 ISOLATE THE HORN RELAY CONTROL CIRCUIT

Ignition OFF.

Disconnect BCM C2280F .

Install the horn relay.

Does the test light illuminate?

Yes	REPAIR the short to ground on the horn relay control circuit.

No	GO to B9

B5 ISOLATE THE BCM (BODY CONTROL MODULE) HORN SWITCH INPUT CIRCUIT

Ignition OFF.

Install the horn relay.

Disconnect BCM C2280B .

Does the test light illuminate?

Yes	GO to B9

No	GO to B6

B6 CHECK THE HORN SWITCH INPUT CIRCUIT TO THE BCM (BODY CONTROL MODULE) FOR A SHORT TO GROUND

Disconnect SCCM C226A .

Connect BCM C2280B .

Does the test light illuminate?

Yes	REPAIR the circuit.

No	GO to B7

B7 ISOLATE THE HORN SWITCH

Remove the driver airbag. REFER to: Driver Airbag .

Disconnect Clockspring C218B .

Connect SCCM C226A .

Does the test light illuminate?

Yes	INSTALL a new clockspring. REFER to: Clockspring . TEST the system for normal operation. If the test light remains illuminated, INSTALL a new SCCM. REFER to: Steering Column Control Module (SCCM) .

No	GO to B8

B8 ISOLATE THE STEERING WHEEL WIRING

Connect Clockspring C218B .

Does the test light illuminate?

Yes	INSTALL a new steering wheel (includes steering wheel wiring harness). REFER to: Steering Wheel .

No	INSTALL a new driver airbag (includes horn switch). REFER to: Driver Airbag .

B9 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect the BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Connect Horn C131 or C1102 .

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

REMOVAL AND INSTALLATION > HORN > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

Remove the LH fender splash shield. Refer to: Fender Splash Shield .

2.

Disconnect the electrical connector, remove the bolt and the horn.

Torque

: 106 lb.in (12 Nm)



REMOVAL AND INSTALLATION > HORN > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > AUXILIARY POWER POINT

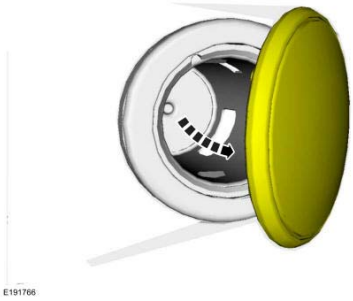
Special Tool(s) / General Equipment

 E188627	501-194 Remover, Power Point TKIT-2014D-FL ROW TKIT-2014D-ROW2

REMOVAL AND INSTALLATION > AUXILIARY POWER POINT > REMOVAL

1.

Open the power point cover.


E191766

2.

Position the power point extractor so that it engages in the adjacent slots in the power point socket. Use Special Service Tool: 501-194 Remover, Power Point.


E191767

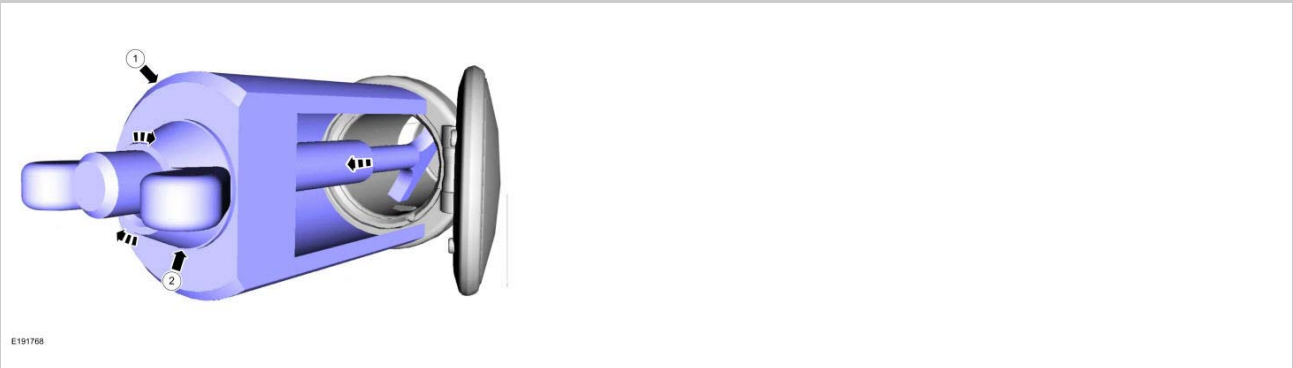
3.

1.

Install the receiver cup.

2.

Install and tighten the wing nut. Use Special Service Tool: 501-194 Remover, Power Point.



4.

Tighten the wing nut to pull the power point socket out of the retainer. Use Special Service Tool: 501-194 Remover, Power Point.



5.

Disconnect the electrical connector.



REMOVAL AND INSTALLATION > AUXILIARY POWER POINT > INSTALLATION

1.

Connect the electrical connector and push the new power point socket into the retainer.

REMOVAL AND INSTALLATION > FLOOR CONSOLE

Special Tool(s) / General Equipment

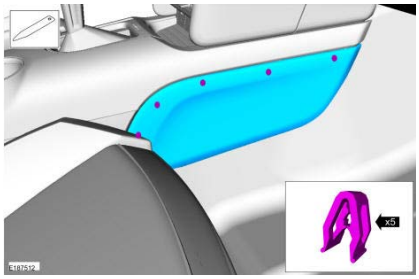
Interior Trim Remover

REMOVAL AND INSTALLATION > FLOOR CONSOLE > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

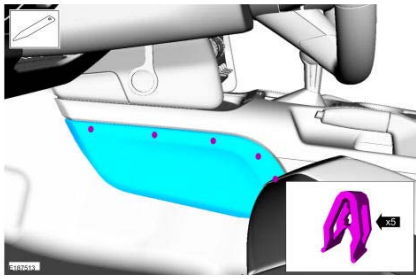
1.

Release the clips and remove the floor console RH side trim panel. Use the General Equipment: Interior Trim Remover



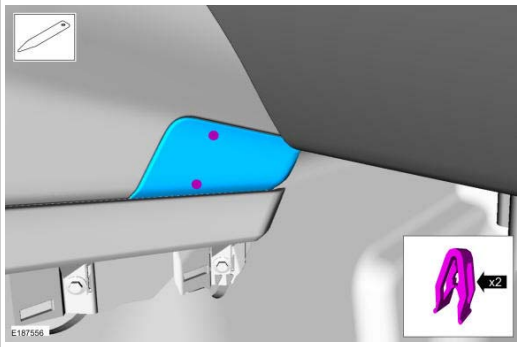
2.

Release the clips and the floor console LH side trim panel. Use the General Equipment: Interior Trim Remover



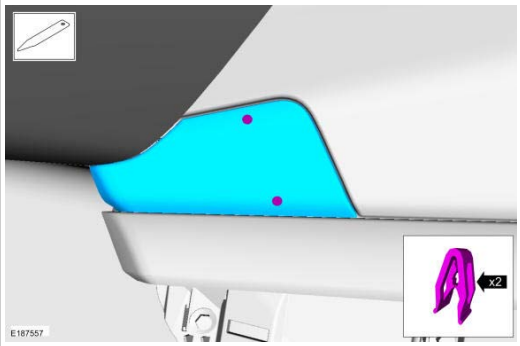
3.

Release the clips and remove the floor console RH side bolt cover. Use the General Equipment: Interior Trim Remover



4.

Release the clips and the floor console LH side bolt cover. Use the General Equipment: Interior Trim Remover



5.

Remove the stowage area mat.

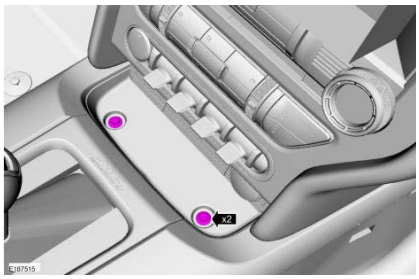


6.

Remove the floor console upper bolts.

Torque

: 18 lb.in (2 Nm)



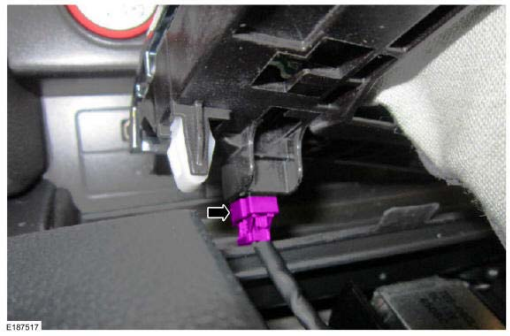
NOTE: Automatic transmission shown, manual transmission similar.

7.
Starting from the front corners, carefully pry up the bezel and position it out of the way. Use the General Equipment: Interior Trim Remover



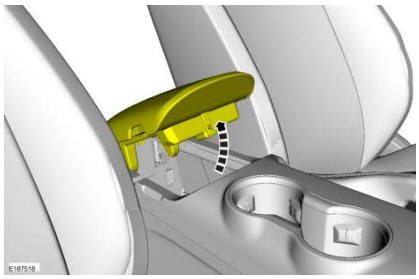
8.

Disconnect the electrical connector.



9.

Open the floor console lid.

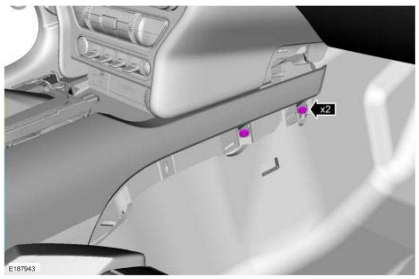


10.

Remove the RH side front retainers.

Torque

: 18 lb.in (2 Nm)

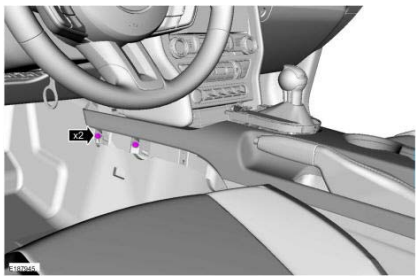


11.

Remove the LH side front retainers.

Torque

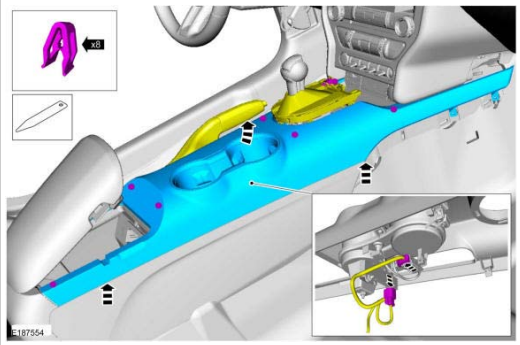
: 18 lb.in (2 Nm)



12.

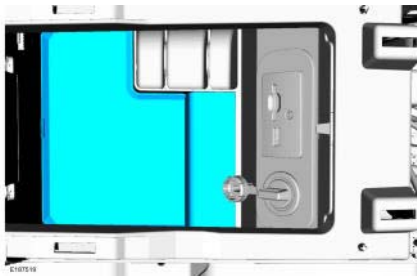
Release the clips, position the gear selector cover aside and remove the floor console upper trim panel.

Disconnect the electrical connectors. Use the General Equipment: Interior Trim Remover



13.

Remove the floor console stowage bin mat.

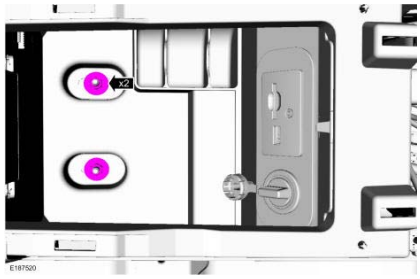


14.

Remove the two nuts.

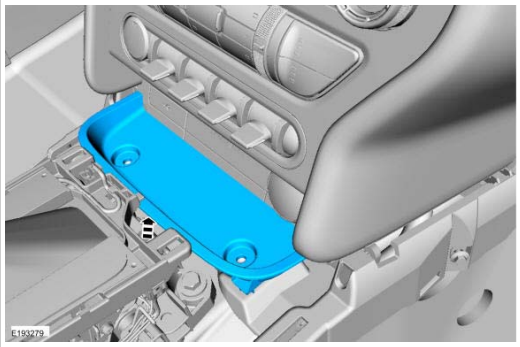
Torque

: 18 lb.in (2 Nm)



15.

Remove the stowage area tray.

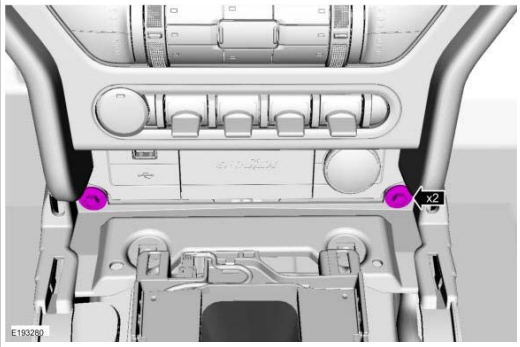


16.

Remove the 2 front upper floor console bolts.

Torque

: 18 lb.in (2 Nm)



17.

Remove the floor console.

1.

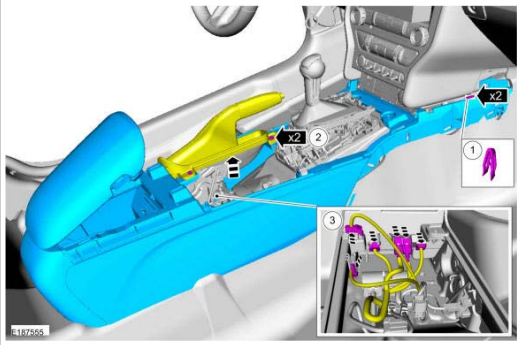
On both sides. Release the clips.

2.

Remove the screws and position aside the parking brake boot from the console.

3.

Disconnect the electrical connectors.



REMOVAL AND INSTALLATION > FLOOR CONSOLE > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > GLOVE COMPARTMENT > REMOVAL

Glove compartment

1.

The glove compartment and the passenger knee air bag are serviced as an assembly. Refer to: Passenger Knee Airbag .

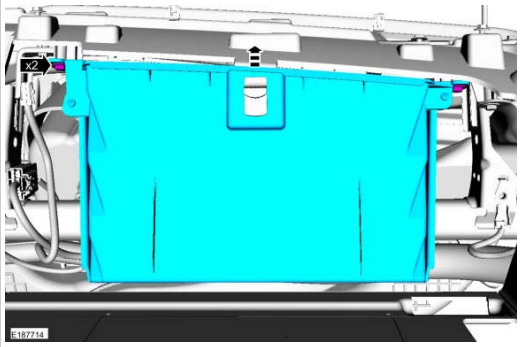
Glove compartment upper stowage bin latch

2.

Open the glove compartment.

3.

Remove the bolts and the glove compartment upper stowage bin latch.



REMOVAL AND INSTALLATION > GLOVE COMPARTMENT > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > INSTRUMENT PANEL

Special Tool(s) / General Equipment

Interior Trim Remover

REMOVAL AND INSTALLATION > INSTRUMENT PANEL > REMOVAL

All vehicles

NOTE: Removal steps in this procedure may contain installation details.

1.

Position both front seats fully rearward.



2.

Depower the SRS. Refer to: Supplemental Restraint System (SRS) Depowering .

3.

Remove the cowl panel grille. Refer to: Cowl Panel Grille .

NOTE: Discard the upper instrument panel cowl bolts.

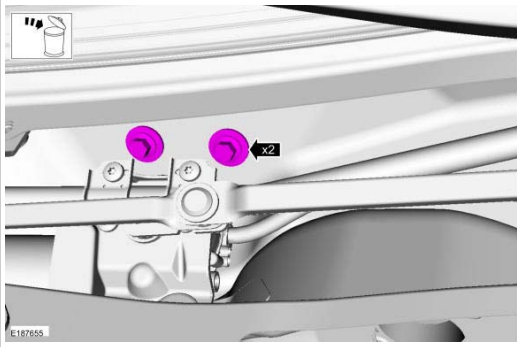
NOTE: Use new factory bolt and washer assemblies or water leaks may occur.

4.

Remove the instrument panel cowl bolts.

Torque

: 133 lb.in (15 Nm)



5.

Remove the floor console. Refer to: Floor Console .

Vehicles with automatic transmission

6.

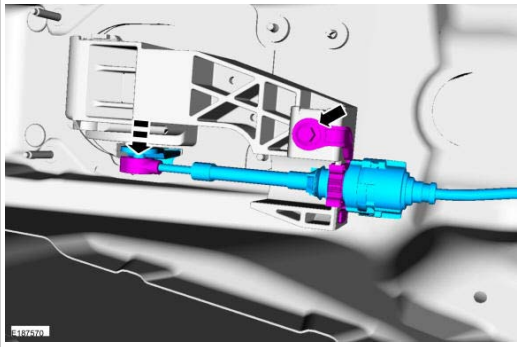
Raise the vehicle on a hoist. Refer to: Jacking and Lifting - Overview .

7.

Remove the selector lever cable bracket bolt and remove the selector lever cable.

Torque

: 62 lb.in (7 Nm)



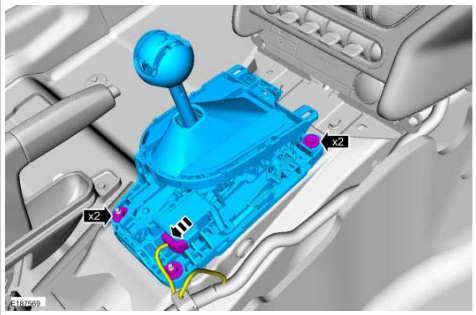
8.

Remove the selector lever assembly.

Disconnect the electrical connector.

Torque

: 80 lb.in (9 Nm)



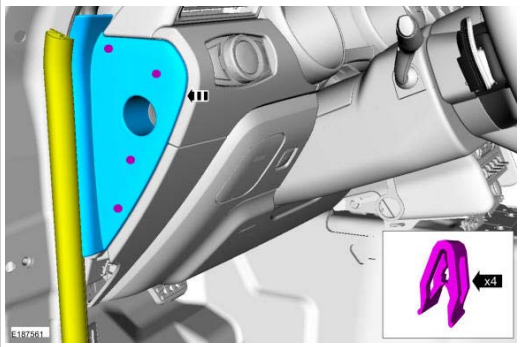
All vehicles

9.

Remove both A-pillar trim panels. Refer to: A-Pillar Trim Panel - Coupe . Refer to: A-Pillar Trim Panel - Convertible .

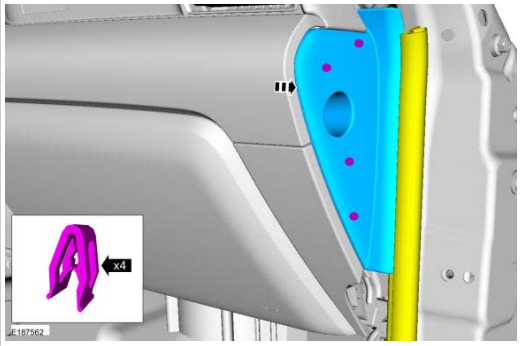
10.

Position aside the weather strip, release the clips and remove the LH instrument panel finish panel.



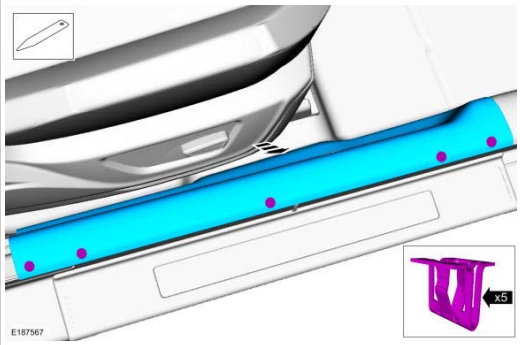
11.

Position aside the weather strip, release the clips and remove the RH instrument panel finish panel.



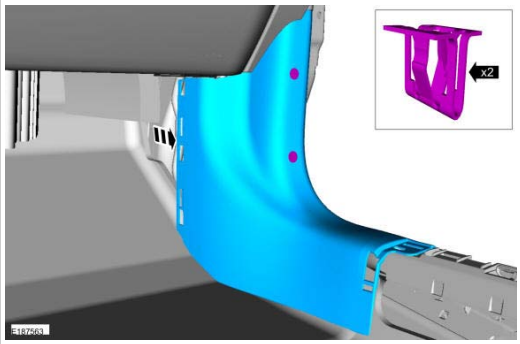
12.

Release the clips and remove the RH scuff plate. Use the General Equipment: Interior Trim Remover



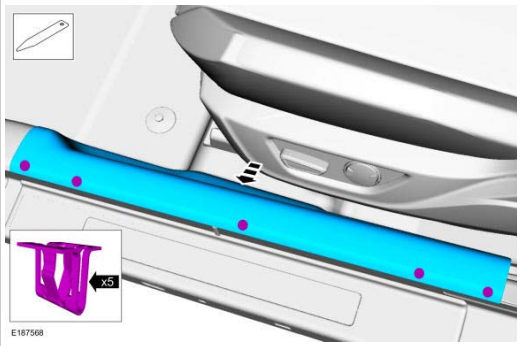
13.

Release the clips and remove the lower RH cowl trim panel.



14.

Release the clips and remove the LH scuff plate. Use the General Equipment: Interior Trim Remover



15.

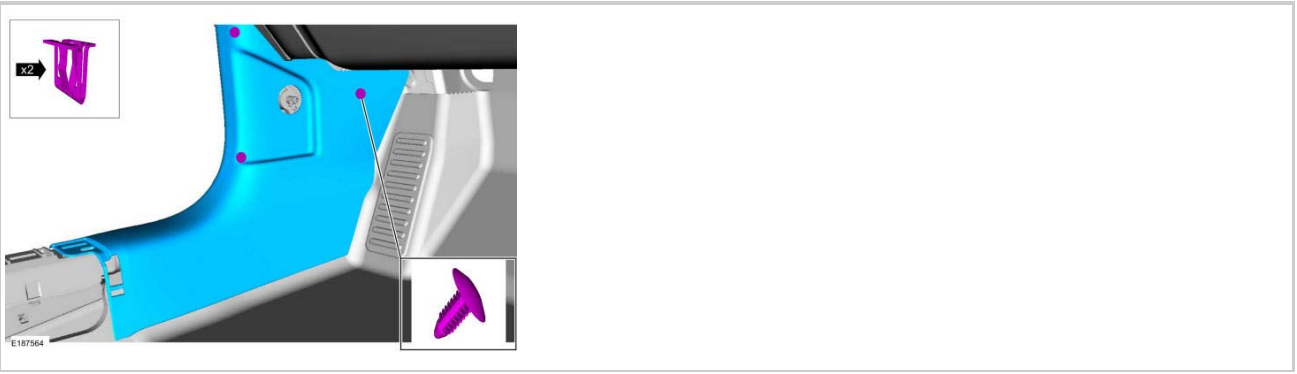
Remove the driver knee airbag. Refer to: Driver Knee Airbag .

16.

Remove the hood latch release handle. Refer to: Hood Latch Release Handle .

17.

Release the pin-type retainer, the clips and remove the LH cowl trim panel.



18.

Disconnect the electrical connectors and release the electrical harness retainer.



NOTE: Placing the Steering Column in the Tilt UP position will make shaft disconnection easier.

NOTE: Secure the steering wheel from rotating to prevent damage to clock spring.

WARNING: DO NOT hammer, pry or force steering column and column shafts during installation or removal. Failure to follow this instruction may cause damage to steering components that could lead to loss of steering control during vehicle operation and could result in serious personal injury or death.

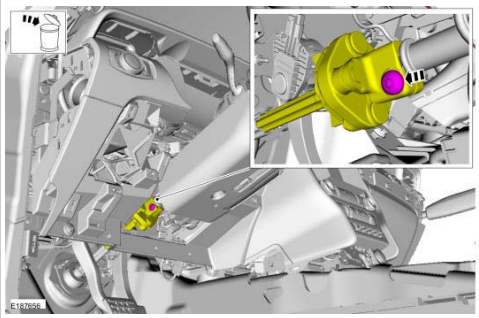
WARNING: Do not reuse steering column shaft bolts. This may result in fastener failure and steering column shaft detachment or loss of steering control. Failure to follow this instruction may result in serious injury to vehicle occupant(s).

19.

Remove and discard the upper steering column shaft-to-steering column bolt and the position aside the upper steering column shaft.

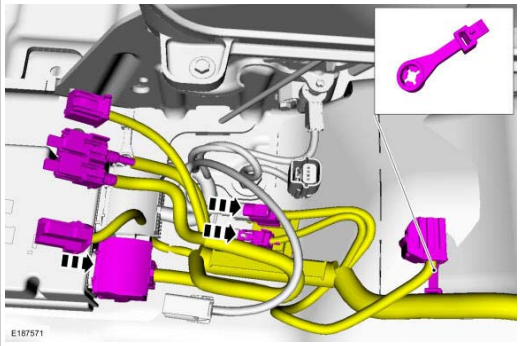
Torque

: 16 lb.ft (22 Nm)



20.

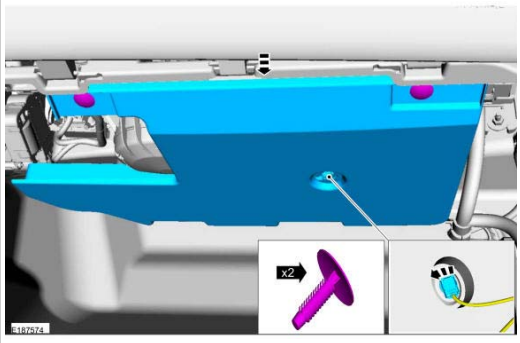
Disconnect the electrical connectors, release the electrical harness retainer(s) and position the electrical harness aside.



21.

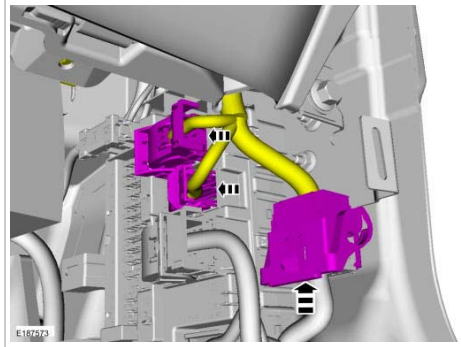
Remove the push pins and remove the RH insulation panel.

Remove the insulation panel ambient light.



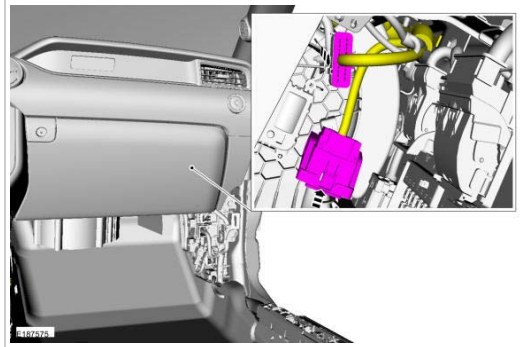
22.

Disconnect the electrical connectors and detach the connector push pin at the RH lower cowl.



23.

Disconnect the electrical connectors behind the glove compartment.

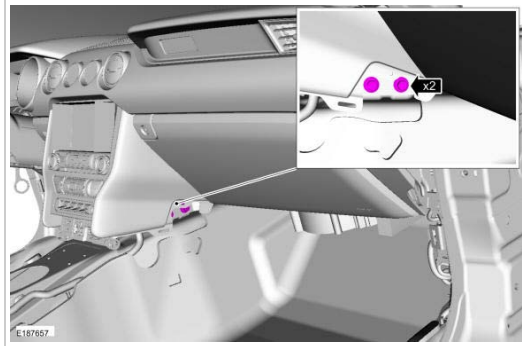


24.

Remove the RH center instrument panel bolts.

Torque

: 17 lb.ft (22.5 Nm)

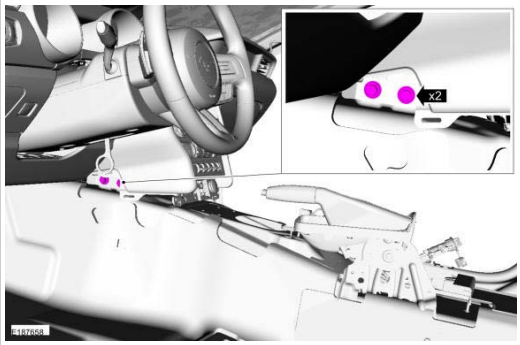


25.

Remove the LH center instrument panel bolts.

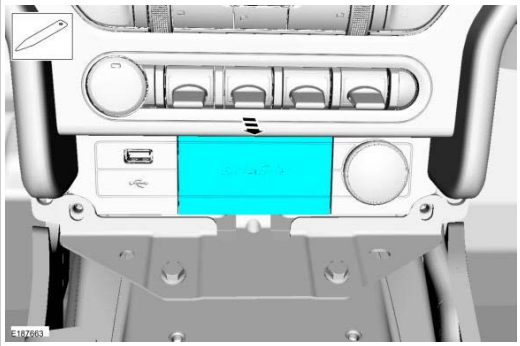
Torque

: 17 lb.ft (22.5 Nm)



26.

Remove the trim cover. Use the General Equipment: Interior Trim Remover

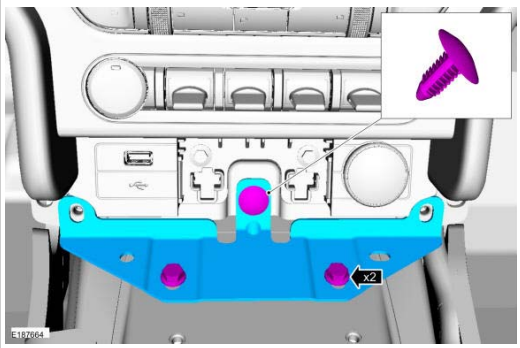


27.

Remove the 2 bolts the push pin and the instrument panel center bracket.

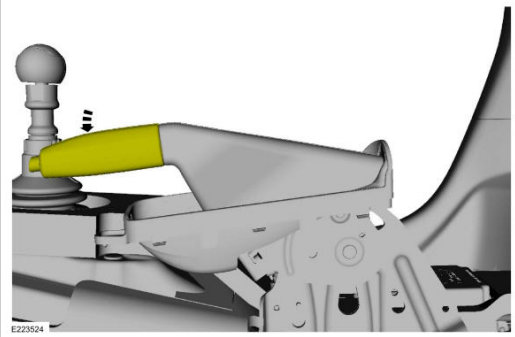
Torque

: 89 lb.in (10 Nm)



28.

Release the emergency brake.

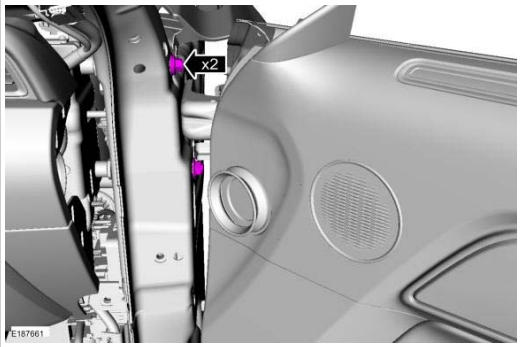


NOTE: The A-pillar to in-vehicle cross beam instrument panel bolts cannot be removed from the A-pillar with the door attached.

29.
Loosen the RH A-pillar to in-vehicle cross beam instrument panel bolts and slide the bolts outward as far as possible.

Torque

: 17 lb.ft (22.5 Nm)

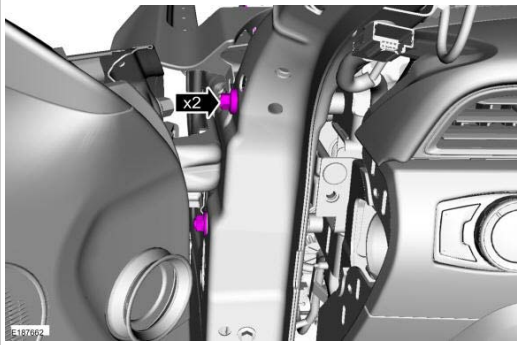


NOTE: The A-pillar to in-vehicle cross beam instrument panel bolts cannot be removed from the A-pillar with the door attached.

30.
Completely loosen the LH A-pillar to in-vehicle cross beam instrument panel bolts and slide the bolts outward as far as possible.

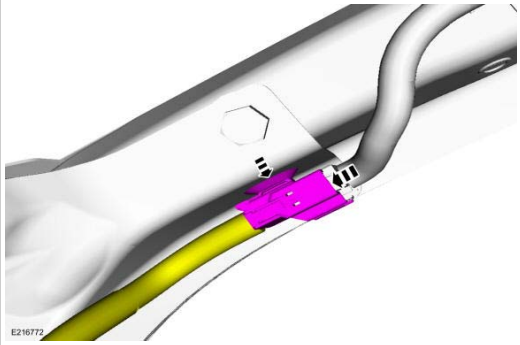
Torque

: 17 lb.ft (22.5 Nm)



NOTE: On both sides.

31.
Disconnect the A-pillar electrical connectors and detach the harness retainers.



32.

Remove the LH instrument panel bolts.

Torque

: 16 lb.ft (22 Nm)

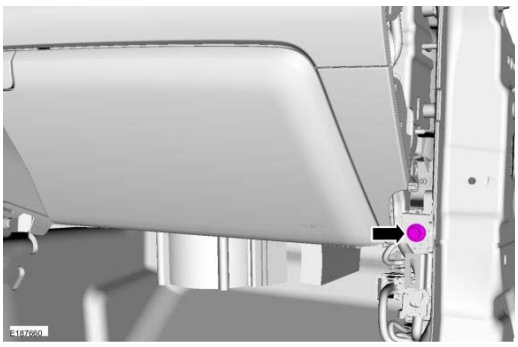


33.

Remove the RH instrument panel bolt.

Torque

: 16 lb.ft (22 Nm)



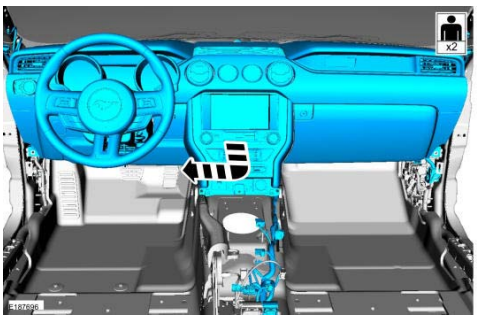
NOTE: Make sure that all electrical connectors and wiring are not hindered before removing the instrument panel or damage to the components may occur.

NOTE: Make sure not to damage the instrument panel when removing the instrument panel from the vehicle.

NOTE: To avoid damaging the instrument panel, an assistant is required when carrying out this step.

NOTE: Seats shown removed for clarity.

34.
Rotate the instrument panel face down and remove through the LH front door opening.



REMOVAL AND INSTALLATION > INSTRUMENT PANEL > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > INSTRUMENT PANEL CENTER FINISH PANEL

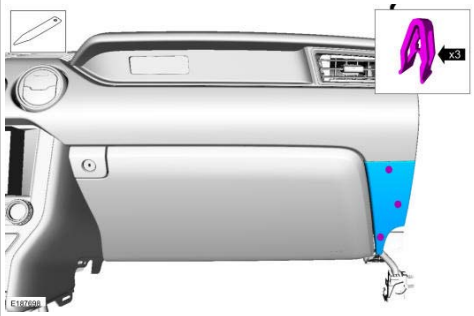
Special Tool(s) / General Equipment

Interior Trim Remover

REMOVAL AND INSTALLATION > INSTRUMENT PANEL CENTER FINISH PANEL > REMOVAL

1.

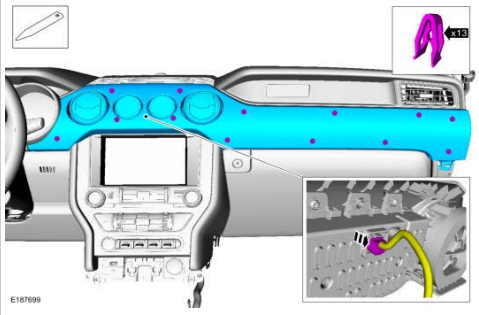
Release the clips and remove RH instrument panel trim panel. Use the General Equipment: Interior Trim Remover



NOTE: Instrument panel center finish panel with optional ICM shown.

2.
Release the clips and remove the instrument panel center finish panel.

Disconnect the ICM electrical connector, if equipped. Use the General Equipment: Interior Trim Remover



REMOVAL AND INSTALLATION > INSTRUMENT PANEL CENTER FINISH PANEL > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > INSTRUMENT PANEL UPPER SECTION > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

All vehicles

NOTE: Place the instrument panel on a suitable work surface that will allow the instrument panel to be rotated front to back without damaging the instrument panel.

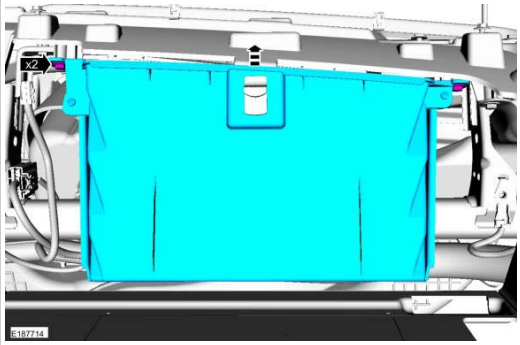
1.
Remove the instrument panel. Refer to: Instrument Panel .

2.

Remove the passenger knee airbag. Refer to: Passenger Knee Airbag .

3.

Remove the bolts and the glove compartment upper stowage bin.

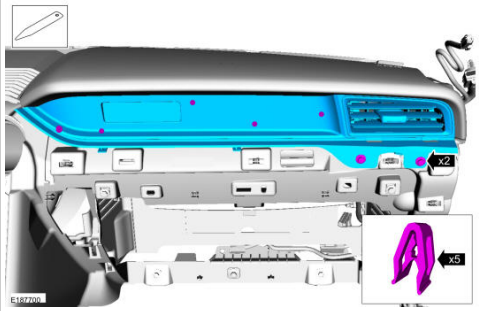


4.

Remove the bolts, release the clips and remove the RH instrument panel finish panel.

Torque

: 18 lb.in (2 Nm)



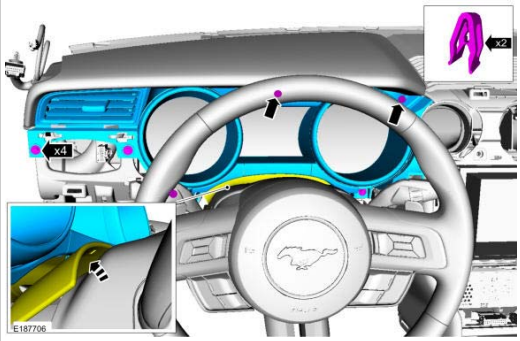
5.

Remove the bolts, release the clips and remove the IPC trim panel.

Detach the gap hider from the upper steering column trim cover.

Torque

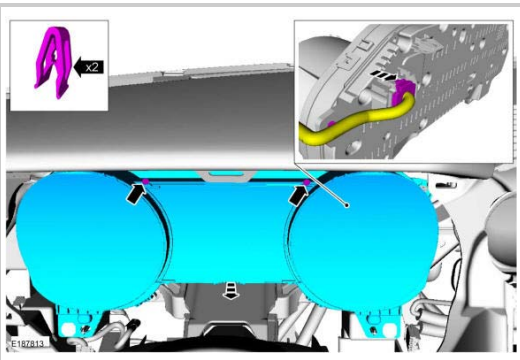
: 22 lb.in (2.5 Nm)



6.

Release the clips and remove the IPC.

Disconnect the electrical connector and release the harness retainer.



7.

Release the clips and remove the defroster grille panel.

Disconnect the electrical connector.



8.

Release the clips and remove the instrument panel speaker grille.



9.

Remove the bolts and the instrument panel speaker.

Disconnect the electrical connectors and release the harness retainer.

Torque

: 22 lb.in (2.5 Nm)



Vehicles with AM/FM/CD/SNYC

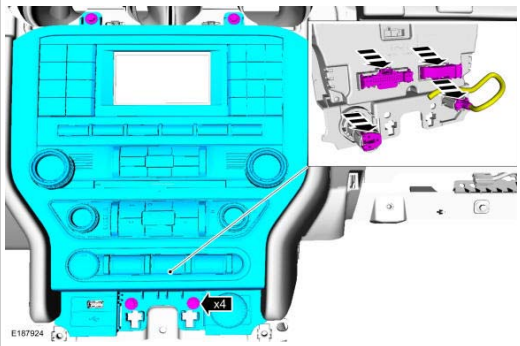
10.

Remove the bolts and the FCIM.

Disconnect the electrical connectors.

Torque

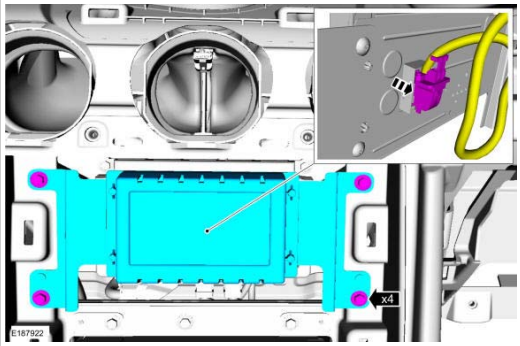
: 22 lb.in (2.5 Nm)



11.

Remove the bolts and the FCDIM.

Disconnect the electrical connector.



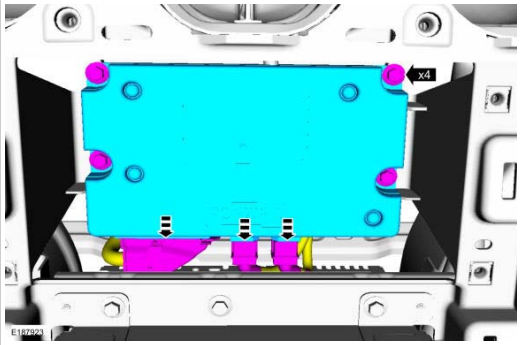
12.

Remove the bolts and APIM.

Disconnect the electrical connectors.

Torque

: 13 lb.in (1.5 Nm)



Vehicles with Touchscreen Display

13.

Remove the bolts and the FCIM.

Disconnect the electrical connectors.

Torque

: 22 lb.in (2.5 Nm)



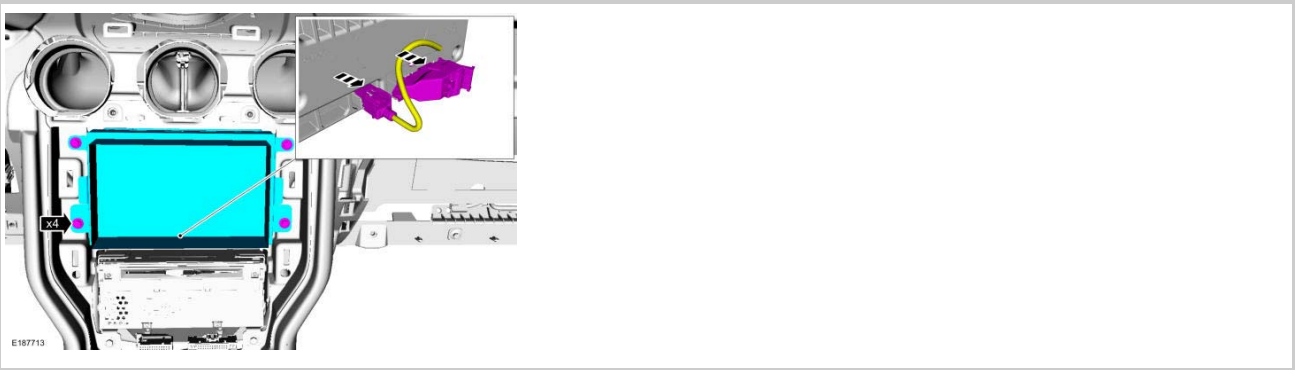
14.

Remove the bolts and the FDIM.

Disconnect the electrical connectors.

Torque

: 22 lb.in (2.5 Nm)



All vehicles

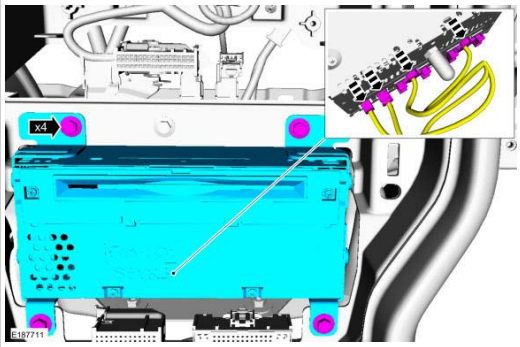
15.

Remove the bolts and the ACM.

Disconnect the electrical connectors.

Torque

: 22 lb.in (2.5 Nm)



16.

Remove the bolt, screw and the lower steering column shroud.

1.

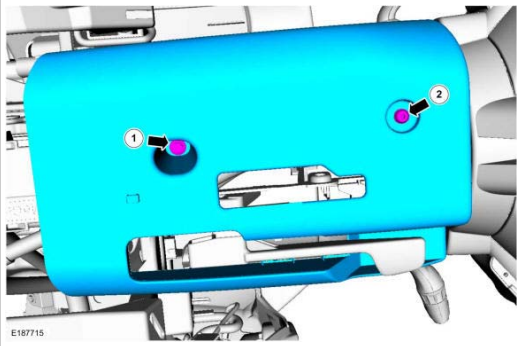
Torque

: 22 lb.in (2.5 Nm)

2.

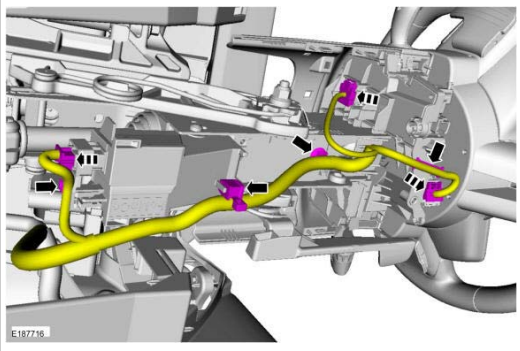
Torque

: 22 lb.in (2.5 Nm)



17.

Disconnect the electrical harness, release the harness retainers and position the harness aside.



18.

Remove the steering column.

1.

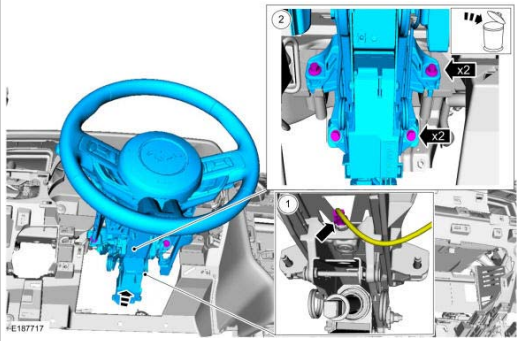
Disconnect the electrical connector.

> *NOTE: The front and rear steering column bolts are not the same, note bolt location before installation.*

2.
Remove and discard the steering column bolts.

Torque

: 18 lb.ft (25 Nm)



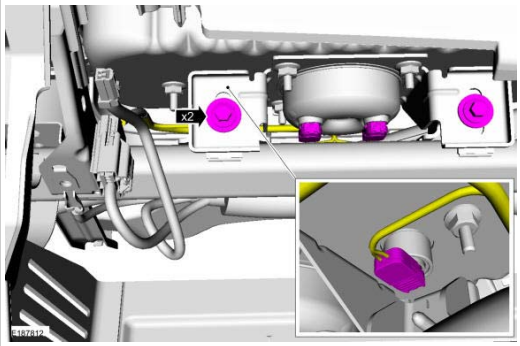
19.

Remove the bolts.

Disconnect the 3 electrical connectors.

Torque

: 80 lb.in (9 Nm)



20.

From the rear of the instrument panel position the electrical harness aside on the LH side.

1.

Remove the instrument panel upper section to in-vehicle cross beam bolts.

Torque

: 22 lb.in (2.5 Nm)

2.

Release the harness retainers.



21.

From the rear of the instrument panel position the electrical harness aside on the RH side.

1.

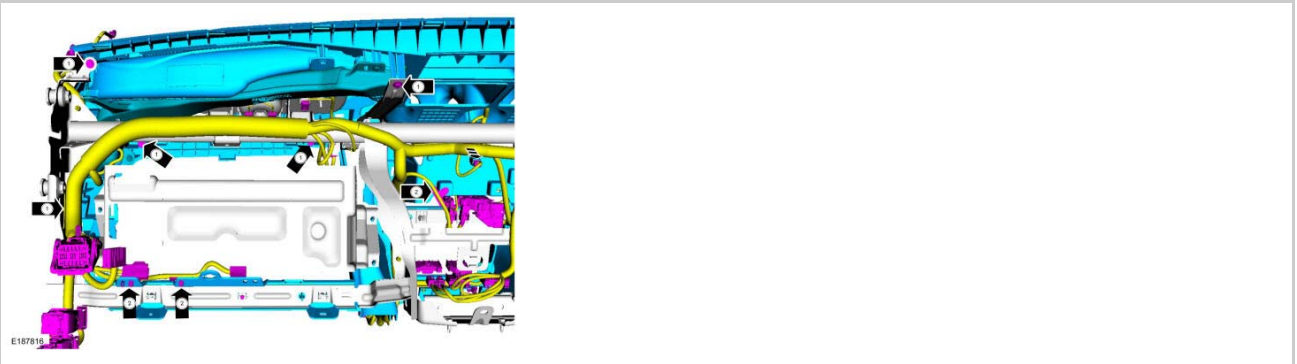
Remove the instrument panel upper section to in-vehicle cross beam bolts.

Torque

: 22 lb.in (2.5 Nm)

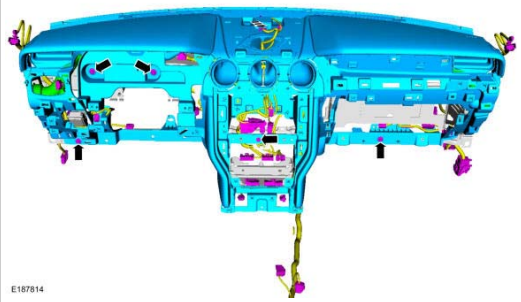
2.

Release the harness retainers.



NOTE: Make sure that all electrical connectors and wiring are not hindered before removing the instrument panel upper section or damage to the components may occur.

22.
From the front of the instrument panel position remove the 5 instrument panel upper section to in-vehicle cross beam bolts and remove the instrument panel upper section.



REMOVAL AND INSTALLATION > INSTRUMENT PANEL UPPER SECTION > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > OVERHEAD CONSOLE

Special Tool(s) / General Equipment

Interior Trim Remover

REMOVAL AND INSTALLATION > OVERHEAD CONSOLE > REMOVAL

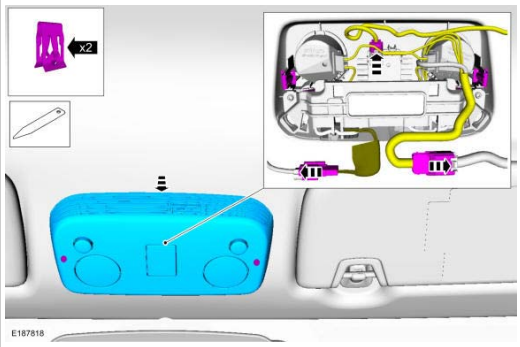
Coupe

1.

Lower the headliner. Refer to: Headliner - Lowering .

2.

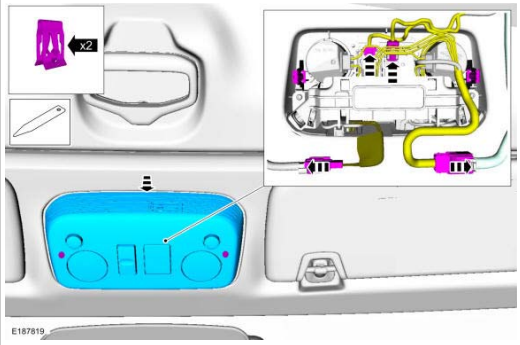
Release the clips, disconnect the electrical connectors and remove the overhead console. Use the General Equipment: Interior Trim Remover



Convertible

3.

Release the clips, disconnect the electrical connectors and remove the overhead console. Use the General Equipment: Interior Trim Remover



REMOVAL AND INSTALLATION > OVERHEAD CONSOLE > INSTALLATION

1.

To install, reverse the removal procedure.

DESCRIPTION AND OPERATION > INSTRUMENT PANEL AND INTERIOR SWITCHES ILLUMINATION - OVERVIEW > OVERVIEW

Dimmable illumination provides backlighting to switches and control components when the headlamps or parking lamps are on. The level of intensity is adjusted by pressing the illumination dim up switch to increase the intensity or the dim down switch to decrease the intensity. The illumination components can be controlled directly (non-networked) or indirectly (networked) by a module.

Non-dimmable illumination is non-networked and provides backlighting to the window switches with the ignition ON or OFF while the accessory relay is energized.

DESCRIPTION AND OPERATION > INSTRUMENT PANEL AND INTERIOR SWITCHES ILLUMINATION - SYSTEM OPERATION AND COMPONENT DESCRIPTION

System Operation

DESCRIPTION AND OPERATION > INSTRUMENT PANEL AND INTERIOR SWITCHES ILLUMINATION - SYSTEM OPERATION AND COMPONENT DESCRIPTION > NETWORK MESSAGE CHART

Module Network Input Messages - APIM, DDM, FCIM,, GWM, IPC and PDM.

Broadcast Message	Originating Module	Message Purpose
Illumination Dimming Level	BCM	Used to command the illumination dimming level for networked modules and outputs that are hardwired to networked modules.

Networked Illumination Operation

The dimmable switches and components are illuminated when the parking lamps are on. The system-wide illumination dimming level is determined by the BCM. Based on the ambient light level input from the light sensor and the requested illumination dimming level input from the dimmer switch, the BCM calculates the correct dimming level. The BCM sends the illumination dimming level message to the GWM on the HS-CAN1.

The GWM distributes illumination messages to the following components:

HS-CAN1

- ICM

MS-CAN

- FCIM
- DDM
- PDM

HS-CAN3

- IPC
- APIM

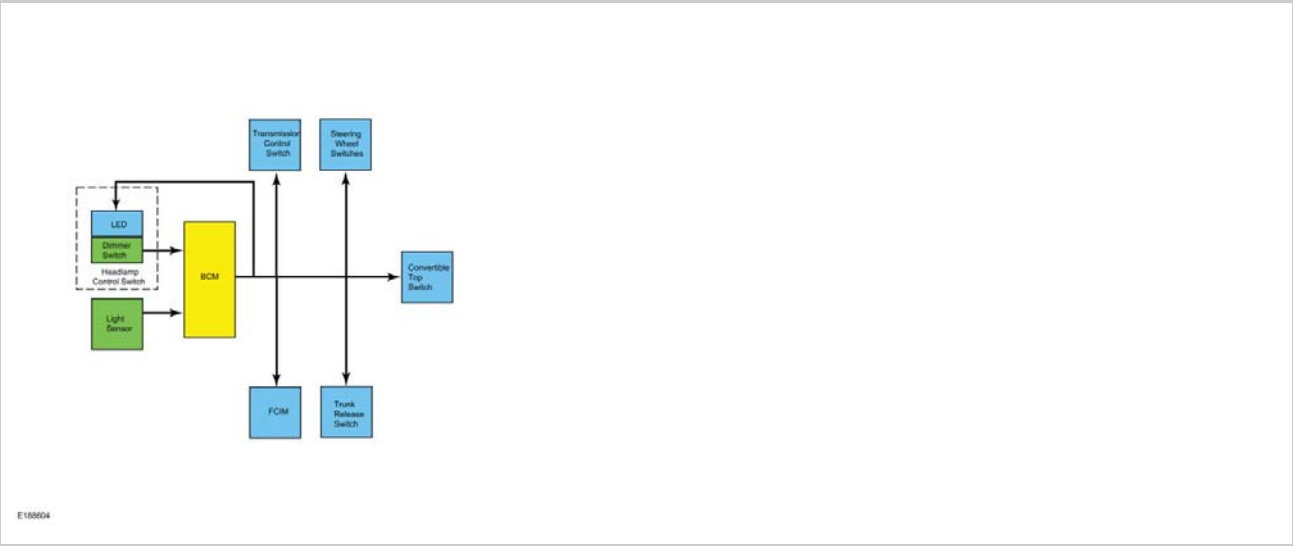
The receiving modules use the illumination dimming level message to determine the backlighting intensity of internal and external non-networked illumination sources. If a module does not receive the illumination dimming level message or the data received is deemed invalid, the module sets a DTC in continuous memory and defaults to full nighttime intensity.

If the IPC does not receive the dimming level or ambient light level network messages from the BCM for up to 5 seconds, the IPC illumination remains at the last level based on the last message received. If the IPC receives invalid or no signals for more than 5 seconds, the IPC defaults to night illumination level.

On vehicles equipped with autolamps, if the exterior lamps are activated during the daytime, the message center illumination remains at full intensity and does not dim from the illumination dimmer switch. If the vehicle travels under a bridge or through a tunnel, the low level of ambient light causes the illumination level of the message center to change to the level set by the dimmer switch. The message center illumination changes back to full intensity when the intense ambient light is restored.

The hazard switch assembly is integral to the FCIM and cannot be serviced separately.

System Diagram - Non-Networked Illumination



Non-

DESCRIPTION AND OPERATION > INSTRUMENT PANEL AND INTERIOR SWITCHES ILLUMINATION - SYSTEM OPERATION AND COMPONENT DESCRIPTION > NETWORKED ILLUMINATION OPERATION

The dimmable switches and components are illuminated when the parking lamps are on. The system-wide illumination dimming level is determined by the BCM. Based on the ambient light level input from the light sensor and the requested illumination dimming level input from the dimmer switch, the BCM calculates the correct dimming level. The BCM sends the illumination dimming level message to the GWM on the HS-CAN1.

The GWM distributes illumination messages to the following components:

HS-CAN1

- ICM

MS-CAN

- FCIM
- DDM
- PDM

HS-CAN3

- IPC
- APIM

The receiving modules use the illumination dimming level message to determine the backlighting intensity of internal and external non-networked illumination sources. If a module does not receive the illumination dimming level message or the data received is deemed invalid, the module sets a DTC in continuous memory and defaults to full nighttime intensity.

If the IPC does not receive the dimming level or ambient light level network messages from the BCM for up to 5 seconds, the IPC illumination remains at the last level based on the last message received. If the IPC receives invalid or no signals for more than 5 seconds, the IPC defaults to night illumination level.

On vehicles equipped with autolamps, if the exterior lamps are activated during the daytime, the message center illumination remains at full intensity and does not dim from the illumination dimmer switch. If the vehicle travels under a bridge or through a tunnel, the low level of ambient light causes the illumination level of the message center to change to the level set by the dimmer switch. The message center illumination changes back to full intensity when the intense ambient light is restored.

The hazard switch assembly is integral to the FCIM and cannot be serviced separately.

DESCRIPTION AND OPERATION > INSTRUMENT PANEL AND INTERIOR SWITCHES ILLUMINATION - SYSTEM OPERATION AND COMPONENT DESCRIPTION > NON-NETWORKED ILLUMINATION OPERATION

Based on the ambient light level input from the light sensor and the requested illumination dimming level input from the dimmer switch, the BCM calculates the correct dimming level for the non-networked illumination sources. The BCM provides a pulse-width modulated voltage to all non-networked illumination sources.

The start/stop switch is non-networked to the BCM but integral to the FCIM and cannot be serviced separately.

Non-dimmable illumination is supplied to the window control switches with the ignition switch ON or OFF, when the accessory relay is energized.

DESCRIPTION AND OPERATION > INSTRUMENT PANEL AND INTERIOR SWITCHES ILLUMINATION - SYSTEM OPERATION AND COMPONENT DESCRIPTION > FIELD-EFFECT TRANSISTOR (FET) PROTECTION

Field-Effect Transistor (FET) protection is used to protect the BCM output drivers from damage in the event that an excessive current draw is detected on a BCM output. Each illumination circuit connected to the BCM is separately protected. Refer to the System Diagram in this article to view the different groups of BCM non-networked illumination outputs. For a full description of Field-Effect Transistor (FET) protection, Refer to: Module Controlled Functions - System Operation and Component Description .

DESCRIPTION AND OPERATION > INSTRUMENT PANEL AND INTERIOR SWITCHES ILLUMINATION - SYSTEM OPERATION AND COMPONENT DESCRIPTION > COMPONENT DESCRIPTION

Dimmer Switch

The dimmer switch is a momentary contact switch that is integral to the headlamp switch. The headlamp switch is non-networked to the BCM. When the dim up or dim down switch is pressed the switch completes a ground circuit to the BCM corresponding to the desired action (increase or decrease illumination brightness).

DIAGNOSIS AND TESTING > INSTRUMENT PANEL AND INTERIOR SWITCHES ILLUMINATION > DTC CHART: BODY CONTROL MODULE (BCM)

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

DTC	Description	Action
B1315:11	Backlighting (Non Reflective Controls) Illumination Output: Circuit Short To Ground	GO to Pinpoint Test B
B1315:15	Backlighting (Non Reflective Controls) Illumination Output: Circuit Short To Battery or Open	If all non-networked illumination sources are inoperative, GO to Pinpoint Test B If all non-networked illumination sources are always on, GO to Pinpoint Test D
B1436:01	Digital Dimmer Switch Input: General Electrical Failure	GO to Pinpoint Test A

U1000:00	Solid State Driver Protection Active- Driver Disabled: No Sub Type Information	REFER to: Body Control Module (BCM) .
U3000:49	Control Module: Internal Electronic Failure	REFER to: Body Control Module (BCM) .

DIAGNOSIS AND TESTING > INSTRUMENT PANEL AND INTERIOR SWITCHES ILLUMINATION > DTC CHART: DRIVER DOOR MODULE (DDM)

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

DTC	Description	Action
U2010:00	Switch Illumination: No Sub Type Information	GO to Pinpoint Test E

DIAGNOSIS AND TESTING > INSTRUMENT PANEL AND INTERIOR SWITCHES ILLUMINATION > DTC CHART: PASSENGER DOOR MODULE (PDM)

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

DTC	Description	Action
U2010:00	Switch Illumination: No Sub Type Information	GO to Pinpoint Test F

DIAGNOSIS AND TESTING > INSTRUMENT PANEL AND INTERIOR SWITCHES ILLUMINATION > SYMPTOM CHART

Symptom Chart: Instrument Panel and Interior Switches Illumination

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

Condition	Possible Sources	Action
All illumination (networked and non-networked components) do not dim	Refer to the Pinpoint Test	GO to Pinpoint Test A
All non-networked illumination components are inoperative (networked illumination functions	Refer to the Pinpoint Test	GO to Pinpoint Test B

correctly)		
One or more non-networked illumination components is inoperative	Refer to the Pinpoint Test	GO to Pinpoint Test C
All non-networked illumination sources are always on (networked illumination functions correctly)	Refer to the Pinpoint Test	GO to Pinpoint Test D
The driver door lock/unlock memory set switch illumination is inoperative or always on	Refer to the Pinpoint Test	GO to Pinpoint Test E
The passenger window control switch illumination is inoperative or always on	Refer to the Pinpoint Test	GO to Pinpoint Test F
The passenger door lock/unlock switch illumination is inoperative or always on	Refer to the Pinpoint Test	GO to Pinpoint Test F
The steering wheel switch(es) illumination is inoperative or always on	Refer to the Pinpoint Test	GO to Pinpoint Test G
All networked illumination is inoperative (non-networked illumination functions correctly)	Network communication concern BCM	Using a diagnostic scan tool, PERFORM a network test. If all modules pass the network test, . If all modules do not pass the network test, REFER to: MODULE COMMUNICATIONS NETWORK .
A single non-network illuminated switch or component is always on	Wiring Component	INSTALL a new illuminated switch or component.
The IPC illumination is inoperative or does not dim	Network communication concern IPC	Using a diagnostic scan tool, PERFORM a network test. If the IPC passes the network test, INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) . If the diagnostic scan tool responds with no communication with the IPC, REFER to: MODULE COMMUNICATIONS NETWORK .
The FCIM illumination is inoperative or does not dim	Network communication concern FCIM	Using a diagnostic scan tool, PERFORM a network test. If the FCIM passes the network test, INSTALL a new FCIM. Vehicles With: AM/FM/CD/SYNC REFER to: Front Controls Interface Module (FCIM) . Vehicles With:

		Touchscreen Display REFER to: Front Controls Interface Module (FCIM) . If the diagnostic scan tool responds with no communication with the FCIM, REFER to: MODULE COMMUNICATIONS NETWORK .
The hazard switch assembly illumination is inoperative or does not dim	Network communication concern FCIM	Using a diagnostic scan tool, PERFORM a network test. If the FCIM passes the network test, INSTALL a new FCIM. Vehicles With: AM/FM/CD/SYNC REFER to: Front Controls Interface Module (FCIM) . Vehicles With: Touchscreen Display REFER to: Front Controls Interface Module (FCIM) . If the diagnostic scan tool responds with no communication with the FCIM, REFER to: MODULE COMMUNICATIONS NETWORK .
The FDIM illumination is inoperative or does not dim	APIM FDIM	VERIFY the audio system can be operated from the FDIM. If the audio system responds normally to FDIM inputs, Refer to APIM HARDWARE TESTING . If the FDIM illumination still does not function correctly after the repair, INSTALL a new FDIM. Vehicles With: Touchscreen Display REFER to: Front Display Interface Module (FDIM) . If the audio system does not respond normally to FDIM inputs, Vehicles With: AM/FM/CD/SYNC REFER to: Information and Entertainment System . Vehicles With: Touchscreen Display REFER to: Information and Entertainment System .

DIAGNOSIS AND TESTING > INSTRUMENT PANEL AND INTERIOR SWITCHES ILLUMINATION > PINPOINT TEST > PINPOINT TEST A : ALL ILLUMINATION (NETWORKED AND NON-NETWORKED COMPONENTS) DO NOT DIM

Refer to Cluster and Panel Illumination for schematic and connector information.

Normal Operation and Fault Conditions

The dimmer switch is integral to the headlamp switch and provides a corresponding voltage signal to the BCM based on which switch is pressed (dim up or dim down).

DTC	Description	Fault Trigger Conditions
B1436:01	Digital Dimmer Switch Input: General Electrical Failure	A continuous and on-demand DTC that sets in the BCM when the BCM detects an open, short to power or to ground on the dim up or dim down circuits.

Possible Sources

- Wiring, terminals or connectors
- Dimmer switch (part of the headlamp switch)
- BCM

DIAGNOSIS AND TESTING > INSTRUMENT PANEL AND INTERIOR SWITCHES ILLUMINATION > PINPOINT TEST > PINPOINT TEST A : ALL ILLUMINATION (NETWORKED AND NON-NETWORKED COMPONENTS) DO NOT DIM > PINPOINT TEST A : ALL ILLUMINATION (NETWORKED AND NON-NETWORKED COMPONENTS) DO NOT DIM

A1 RETRIEVE AND RECORD DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition ON.

Using the diagnostic scan tool, retrieve all Diagnostic Trouble Codes (DTCs).

Is DTC B1436:01 present?

Yes	GO to A2

No	GO to A6

A2 CHECK THE DIM UP AND DIM DOWN CIRCUITS FOR A SHORT TO VOLTAGE

Disconnect Headlamp switch C205 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C205-3		Ground

C205-6		Ground

Is any voltage present?

Yes	REPAIR the circuit in question.

No	GO to A3

A3 CHECK THE DIM UP AND DIM DOWN CIRCUITS FOR AN OPEN

Ignition OFF.

Disconnect BCM

Measure:

Positive Lead	Measurement / Action	Negative Lead
C205-3	Ω	C2280B-3
C205-6	Ω	C2280B-7

Is the resistance less than 3 ohms?

Yes	GO to A4

No	REPAIR the circuit in question.

A4 CHECK THE DIM UP AND DIM DOWN CIRCUITS FOR A SHORT TO GROUND

Measure:

Positive Lead	Measurement / Action	Negative Lead
C205-3	Ω	Ground
C205-6	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to A5

No	REPAIR the circuit in question.

A5 CHECK THE DIM UP AND DIM DOWN CIRCUITS FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C205-3	Ω	C205-6

Is the resistance greater than 10, 000 ohms?

Yes	GO to A6

No	REPAIR the circuit in question.

A6 CHECK THE INSTRUMENT PANEL DIMMER SWITCH

Perform the instrument panel dimmer switch component test (part of the headlamp switch component test). Refer to Component Testing for schematic and connector information.

Does the instrument panel dimmer switch pass the component test?

Yes	GO to A7

No	INSTALL a new headlamp switch. REFER to: Headlamp Switch .

A7 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for the concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no TSB address this concern, .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INSTRUMENT PANEL AND INTERIOR SWITCHES

ILLUMINATION > PINPOINT TEST > PINPOINT TEST B : ALL NON-NETWORKED ILLUMINATION IS INOPERATIVE

Refer to Cluster and Panel Illumination for schematic and connector information.

Normal Operation and Fault Conditions

The dimmer switch is integral to the headlamp switch and provides a corresponding voltage signal to the BCM based on which switch is pressed (dim up or dim down).

DTC	Description	Fault Trigger Conditions
B1315:11	Backlighting (Non Reflective Controls) Illumination Output: Circuit Short To Ground	A continuous and on-demand DTC that sets in the BCM when the BCM detects an excessive current draw from the backlighting illumination circuit.
B1315:15	Backlighting (Non Reflective Controls) Illumination Output: Circuit Short To Battery or Open	A continuous and on-demand DTC that sets in the BCM when the BCM detects a lower than expected current draw from the backlighting illumination circuit.

Possible Sources

- Wiring, terminals or connectors
- Dimmer switch (part of the headlamp switch)
- BCM

DIAGNOSIS AND TESTING > INSTRUMENT PANEL AND INTERIOR SWITCHES ILLUMINATION > PINPOINT TEST > PINPOINT TEST B : ALL NON-NETWORKED ILLUMINATION IS INOPERATIVE > PINPOINT TEST B : ALL NON-NETWORKED ILLUMINATION IS INOPERATIVE

B1 RETRIEVE AND RECORD DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition ON.

Using the diagnostic scan tool, retrieve all Diagnostic Trouble Codes (DTCs).

Is DTC B1315:11 or B1315:15 present?

Yes	For B1315:15 GO to B2 For B1315:11 GO to B4

No	REFER to Symptom Chart .

B2 CHECK THE BACKLIGHTING ILLUMINATION OUTPUT CIRCUIT FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect Headlamp switch C205 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C205-15		Ground

Is any voltage present?

Yes	REPAIR the circuit in question.

No	GO to B3

B3 CHECK THE BACKLIGHTING ILLUMINATION OUTPUT CIRCUIT FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C205-15	Ω	C2280B-45

Is the resistance less than 3 ohms?

Yes	GO to B5

No	REPAIR the circuit in question.

B4 CHECK THE BACKLIGHTING ILLUMINATION OUTPUT CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Disconnect Headlamp switch.

Disconnect BCM C2280B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C205-15	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to B5

No	REPAIR the circuit in question.

B5 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for the concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no TSB address this concern, .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INSTRUMENT PANEL AND INTERIOR SWITCHES ILLUMINATION > PINPOINT TEST > PINPOINT TEST C : ONE OR MORE NON-NETWORKED ILLUMINATION COMPONENTS ARE INOPERATIVE

Refer to Cluster and Panel Illumination for schematic and connector information.

Normal Operation and Fault Conditions

The dimmer switch is integral to the headlamp switch and provides a corresponding voltage signal to the BCM based on which switch is pressed (dim up or dim down).

Possible Sources

- Wiring, terminals or connectors
- Illuminated component

DIAGNOSIS AND TESTING > INSTRUMENT PANEL AND INTERIOR SWITCHES ILLUMINATION > PINPOINT TEST > PINPOINT TEST C : ONE OR MORE

NON-NETWORKED ILLUMINATION COMPONENTS ARE INOPERATIVE > PINPOINT TEST C : ONE OR MORE NON-NETWORKED ILLUMINATION COMPONENTS ARE INOPERATIVE

C1 CHECK FOR VOLTAGE TO THE INOPERATIVE COMPONENT

Ignition OFF.

> *NOTE: If the headlamp switch illumination is inoperative, set the instrument panel illumination to the brightest setting with the ignition on prior to disconnecting the headlamp switch.*

Disconnect: Inoperative Illuminated Component.

Ignition ON.

Place a shop light over the ambient light sensor to make sure the illumination can reach maximum brightness.

Place the headlamp switch in the PARKING LAMPS ON position.

Press the instrument panel dimmer switch up until the illumination reaches full brightness.

Measure:

Headlamp switch

Positive Lead	Measurement / Action	Negative Lead
C205-15		Ground

FCIM

Positive Lead	Measurement / Action	Negative Lead
C2402A-4		Ground

Interior Luggage Compartment Lid Release Switch

Positive Lead	Measurement / Action	Negative Lead
C2610-3		Ground

TCS

Positive Lead	Measurement / Action	Negative Lead
C3245-3		Ground

Convertable Top Switch

Positive Lead	Measurement / Action	Negative Lead
C9013-8		Ground

Is the voltage greater than 11 volts?

Yes	GO to C2

No	REPAIR the circuit in question.

C2 CHECK THE COMPONENT GROUND CIRCUIT

Measure:

Headlamp Switch

Positive Lead	Measurement / Action	Negative Lead
C205-15		C205-5

FCIM

Positive Lead	Measurement / Action	Negative Lead
C2402A-4		C2402A-1

Interior Luggage Compartment Lid Release Switch

Positive Lead	Measurement / Action	Negative Lead
C2610-3		C2610-2

TCS

Positive Lead	Measurement / Action	Negative Lead
C3245-3		C3245-2

Convertable Top Switch

Positive Lead	Measurement / Action	Negative Lead
C9013-8		C9013-2

Is the voltage greater than 11 volts?

Yes	INSTALL a new component.

No	REPAIR the circuit in question.

DIAGNOSIS AND TESTING > INSTRUMENT PANEL AND INTERIOR SWITCHES ILLUMINATION > PINPOINT TEST > PINPOINT TEST D : ALL NON-NETWORKED ILLUMINATION SOURCES ARE ALWAYS ON (NETWORKED ILLUMINATION FUNCTIONS CORRECTLY)

Refer to Cluster and Panel Illumination for schematic and connector information.

Normal Operation and Fault Conditions

The BCM provides PWM voltage to all non-networked illumination sources.

DTC	Description	Fault Trigger Conditions
B1315:15	Backlighting (Non Reflective Controls) Illumination Output: Circuit Short To Battery or Open	A continuous and on-demand DTC that sets in the BCM when the BCM detects a lower than expected current draw from the backlighting illumination output circuit.

Possible Sources

- Wiring, terminals or connectors

DIAGNOSIS AND TESTING > INSTRUMENT PANEL AND INTERIOR SWITCHES ILLUMINATION > PINPOINT TEST > PINPOINT TEST D : ALL NON-NETWORKED ILLUMINATION SOURCES ARE ALWAYS ON (NETWORKED ILLUMINATION FUNCTIONS CORRECTLY) > PINPOINT TEST D : ALL NON-NETWORKED ILLUMINATION SOURCES ARE ALWAYS ON (NETWORKED ILLUMINATION FUNCTIONS CORRECTLY)

D1 RETRIEVE AND RECORD DIAGNOSTIC TROUBLE CODES (DTCS)

Using the diagnostic scan tool, retrieve all Diagnostic Trouble Codes (DTCs).

Is DTC B1315:15 present?

Yes	GO to Pinpoint Test B

No	GO to D2

D2 CHECK THE BACKLIGHTING ILLUMINATION OUTPUT CIRCUITS FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect BCM C2280B .

Ignition ON.

Do the non-networked components continue to illuminate?

Yes	REPAIR the circuit in question.

No	GO to D3

D3 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for the concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no TSB address this concern, .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INSTRUMENT PANEL AND INTERIOR SWITCHES ILLUMINATION > PINPOINT TEST > PINPOINT TEST E : THE DRIVER DOOR LOCK/MEMORY SET SWITCH ILLUMINATION IS INOPERATIVE OR ALWAYS ON

Refer to Power Windows for schematic and connector information.

Normal Operation and Fault Conditions

The DDM supplies voltage to illuminate the driver door lock/unlock memory set switch.

DTC	Description	Fault Trigger Conditions
U2010:00	Switch Illumination: No Sub Type Information	A continuous and on-demand DTC that sets in the BCM when the DDM detects a short to ground or open on the switch illumination circuit.

Possible Sources

- Wiring, terminals or connectors
- Driver door lock/unlock switch
- DDM

DIAGNOSIS AND TESTING > INSTRUMENT PANEL AND INTERIOR SWITCHES ILLUMINATION > PINPOINT TEST > PINPOINT TEST E : THE DRIVER DOOR LOCK/MEMORY SET SWITCH ILLUMINATION IS INOPERATIVE OR ALWAYS ON > PINPOINT TEST E : THE DRIVER DOOR LOCK/MEMORY SET SWITCH ILLUMINATION IS INOPERATIVE OR ALWAYS ON

E1 VERIFY THE DOOR LOCK SWITCH FUNCTIONALITY

Actuate the door locks from the driver door lock switch.

Can the doors be locked and unlocked from the driver door lock switch?

Yes	If the switch illumination is inoperative, GO to E2 If the switch illumination is always on, GO to E5

No	REFER to: Locks, Latches and Entry Systems .

E2 CHECK THE ILLUMINATION CIRCUIT FOR VOLTAGE

Ignition OFF.

Disconnect Driver lock/unlock switch C541 .

Place the headlight switch in the ON position and increase the illumination to full intensity.

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C541-4		Ground

Is the voltage greater than 11 volts?

Yes	INSTALL a new driver door lock/unlock switch. REFER to: Door Lock Control Switch .

No	GO to E3

E3 CHECK THE ILLUMINATION CIRCUIT FOR AN OPEN

Ignition OFF.

Disconnect DDM C501A .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C541-4	Ω	C501A-15

Is the resistance less than 3 ohms?

Yes	GO to E4

No	REPAIR the circuit.

E4 CHECK THE ILLUMINATION CIRCUIT FOR A SHORT TO GROUND

Measure:

Positive Lead	Measurement / Action	Negative Lead
C541-4	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	INSTALL a new DDM. REFER to: Driver Door Module (DDM) .

No	REPAIR the circuit in question.

E5 CHECK THE ILLUMINATION CIRCUIT FOR A SHORT TO VOLTAGE

Disconnect DDM C501A .

Ignition ON.

Is the driver door lock/unlock switch illuminated?

Yes	REPAIR the circuit in question.

No	INSTALL a new DDM. REFER to: Driver Door Module (DDM) .

E6 CHECK FOR CORRECT DDM (DRIVER DOOR MODULE) OPERATION

Disconnect and inspect all DDM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the DDM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for the concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no TSB address this concern, INSTALL a new DDM. REFER to: Driver Door Module (DDM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INSTRUMENT PANEL AND INTERIOR SWITCHES ILLUMINATION > PINPOINT TEST > PINPOINT TEST F : THE PASSENGER DOOR LOCK AND/OR WINDOW CONTROL SWITCH ILLUMINATION IS INOPERATIVE OR ALWAYS ON

Refer to Power Windows for schematic and connector information.

Normal Operation and Fault Conditions

The PDM supplies voltage to the illuminate the passenger door lock/unlock switch and passenger window control switch. The door lock and window control switch illumination share common power and ground circuits.

DTC	Description	Fault trigger conditions
U2010:00	Switch Illumination: No Sub Type Information	A continuous and on-demand DTC that sets in the BCM when the PDM detects a short to ground or open on the switch illumination circuit.

Possible Sources

- Wiring, terminals or connectors
- Passenger door lock/unlock switch
- Passenger window control switch
- PDM

DIAGNOSIS AND TESTING > INSTRUMENT PANEL AND INTERIOR SWITCHES ILLUMINATION > PINPOINT TEST > PINPOINT TEST F : THE PASSENGER DOOR LOCK AND/OR WINDOW CONTROL SWITCH ILLUMINATION IS INOPERATIVE OR ALWAYS ON > PINPOINT TEST F : THE PASSENGER DOOR LOCK AND/OR WINDOW CONTROL SWITCH ILLUMINATION IS INOPERATIVE OR ALWAYS ON

F1 VERIFY THE DOOR SWITCH FUNCTION

Ignition ON.

Actuate the door lock/unlock from the passenger door lock/unlock switch.

Actuate the passenger window up/down from the passenger window switch.

Can the doors be locked and unlocked and the window travel up and down from the passenger door switches?

Yes	If the switch illumination is inoperative, GO to F2 If the switch illumination is always on, GO to F5

No	For the door lock/unlock switch, REFER to: Locks, Latches and Entry Systems . For the window switch, REFER to: Glass, Frames and Mechanisms .

F2 CHECK THE ILLUMINATION CIRCUIT FOR VOLTAGE

Ignition OFF.

Disconnect Inoperative passenger lock/unlock switch C605 or passenger window switch C624 .

Place the headlight switch in the ON position and increase the illumination to full intensity.

Ignition ON.

Measure the inoperative switch:

Positive Lead	Measurement / Action	Negative Lead
C605-4		Ground
C624-4		Ground

Is the voltage greater than 11 volts?

Yes	INSTALL a new passenger door lock/unlock switch. REFER to: Door Lock Control Switch . INSTALL a new passenger door window switch. REFER to: Front Door Window Control Switch .

No	GO to F3

F3 CHECK THE ILLUMINATION CIRCUIT FOR AN OPEN

Ignition OFF.

Disconnect PDM C652A .

Measure the inoperative switch:

Positive Lead	Measurement / Action	Negative Lead
C605-4	Ω	C652A-15
C624-4	Ω	C652A-15

Are the resistances less than 3 ohms?

Yes	GO to F4

No	REPAIR the circuit in question.

F4 CHECK THE ILLUMINATION CIRCUIT FOR A SHORT TO GROUND

Measure the inoperative switch:

Positive Lead	Measurement / Action	Negative Lead
C605-4	Ω	Ground
C624-4	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to F6

No	REPAIR the circuit in question.

F5 CHECK THE ILLUMINATION CIRCUIT FOR A SHORT TO VOLTAGE

Disconnect PDM C652A .

Ignition ON.

Is the passenger door lock/unlock switch and/or the passenger window switch illuminated?

Yes	REPAIR the circuit in question.

No	GO to F6

F6 CHECK FOR CORRECT PDM (PASSENGER DOOR MODULE) OPERATION

Disconnect and inspect all PDM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the PDM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for the concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no TSB address this concern, INSTALL a new PDM. REFER to: Passenger Door Module (PDM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INSTRUMENT PANEL AND INTERIOR SWITCHES ILLUMINATION > PINPOINT TEST > PINPOINT TEST G : THE STEERING WHEEL SWITCH(ES) ILLUMINATION IS INOPERATIVE OR ALWAYS ON

Refer to Cluster and Panel Illumination for schematic and connector information.

Normal Operation and Fault Conditions

The steering wheel switches receive illumination voltage from the BCM on the common illumination circuit through the clockspring.

Possible Sources

- Wiring, terminals or connectors
- Steering wheel switch(es)
- Clockspring

- Steering wheel (includes harness)
- SCCM

DIAGNOSIS AND TESTING > INSTRUMENT PANEL AND INTERIOR SWITCHES ILLUMINATION > PINPOINT TEST > PINPOINT TEST G : THE STEERING WHEEL SWITCH(ES) ILLUMINATION IS INOPERATIVE OR ALWAYS ON > PINPOINT TEST G : THE STEERING WHEEL SWITCH(ES) ILLUMINATION IS INOPERATIVE OR ALWAYS ON

G1 INSPECT THE NON-NETWORKED ILLUMINATION COMPONENTS

Ignition ON.

Place the headlamp switch in the PARKING LAMPS ON position.

While pressing the illumination dimmer switch up and down, monitor the non-networked illumination components.

Are all of the non-networked illumination components inoperative or always on?

Yes	If all non-networked illumination components are always on, GO to Pinpoint Test D If all non-networked illumination components are inoperative, GO to Pinpoint Test B

No	If **all** steering wheel switch(es) illumination is inoperative, GO to G2. If one or more but not all switch illumination is inoperative, GO to G5

G2 CHECK FOR ILLUMINATION VOLTAGE AND GROUND AT THE CLOCKSPRING

Place the headlamp switch in the OFF position.

Ignition OFF.

Disconnect SCCM C218A .

Place the headlamp switch in the PARKING LAMPS ON position.

Ignition ON.

Press the illumination dim up switch to the full illumination position.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C218A-1		C218A-4

Is the voltage greater than 11 volts?

Yes	GO to G4

No	GO to G3

G3 CHECK FOR ILLUMINATION VOLTAGE AT THE CLOCKSPRING

Measure:

Positive Lead	Measurement / Action	Negative Lead
C218A-1		Ground

Is the voltage greater than 11 volts?

Yes	REPAIR the illumination ground circuit.

No	REPAIR the circuit in question.

G4 CHECK FOR ILLUMINATION VOLTAGE AND GROUND TO THE STEERING WHEEL SWITCHES

Place the headlamp switch in the OFF position.

Ignition OFF.

Remove the driver airbag. REFER to: Driver Airbag .

Connect C218A .

Disconnect C218B .

Place the headlamp switch in the PARKING LAMPS ON position.

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C218B-11 Component side		C218B-1 Component side

Is the voltage greater than 11 volts?

Yes	INSTALL a new steering wheel. REFER to: Steering Wheel .

No	INSTALL a new clockspring. REFER to: Clockspring .

G5 CHECK THE SUSPECT STEERING WHEEL SWITCH FOR ILLUMINATION VOLTAGE AND GROUND

Place the headlamp switch in the OFF position.

Ignition OFF.

Remove the driver airbag. REFER to: Driver Airbag .

Disconnect the suspect switch.

Place the headlamp switch in the PARKING LAMPS ON position.

Ignition ON.

Measure the voltage and ground at the inoperative switch, harness side:

LH upper steering wheel switch

Positive Lead	Measurement / Action	Negative Lead
C2998-4		C2998-1

RH upper steering wheel switch

Positive Lead	Measurement / Action	Negative Lead
C2999-4		C2999-1

LH lower steering wheel switch

Positive Lead	Measurement / Action	Negative Lead
C2366-8		C2366-2

RH lower steering wheel switch

Positive Lead	Measurement / Action	Negative Lead
C2367-8		C2367-2

LH downshift paddle switch

Positive Lead	Measurement / Action	Negative Lead
C2429-1		C2429-4

RH upshift paddle switch

Positive Lead	Measurement / Action	Negative Lead
C2428-1		C2428-4

Is the voltage greater than 11 volts?

Yes	INSTALL a new switch. REFER to: Steering Wheel Multifunction Switch . If the downshift paddle switch is a fault, INSTALL a new switch. REFER to: Downshift Paddle Switch . If the upshift paddle switch is a fault, INSTALL a new switch. REFER to: Upshift Paddle Switch .

No	REPAIR the circuit in question. If the circuit cannot be repaired, INSTALL a new steering wheel. REFER to: Steering Wheel .

DESCRIPTION AND OPERATION > INSTRUMENT PANEL CLUSTER (IPC) - OVERVIEW > OVERVIEW

The IPC uses gauges, warning and informational indicators, RTT indicators, warning messages and chimes to alert the driver of vehicle conditions and system operation. The message center provides menu selections to configure various vehicle features. For a complete list and description of the features the message center controls, refer to the Owner's Literature.

The IPC provides a single display screen that contains the message center, RTT indication and virtual gauge displays.

Depending on option level, the IPC provides the following virtual gauge displays:

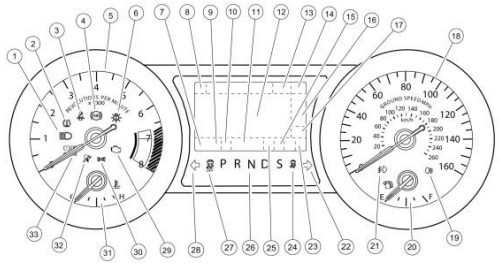
- Accelerometer
- Air fuel ratio
- Battery voltage
- Vacuum boost gauge (non-SVT only)
- Cylinder head temperature
- Engine oil pressure (SVT only)
- Engine oil temperature
- Inlet air temperature
- Transmission fluid temperature

Informational indicators inform the driver of conditions that exist in the vehicle. Warning indicators provide information to the driver of conditions that could potentially cause personal injury or alter vehicle performance.

RTT indicators illuminate in the message center and replace the typical informational or warning indicator, using the same iconic representation. The message center uses a rotating RTT display area that can display multiple indicators, if needed, while using fixed locations for other indicators and displays.

NOTE: Metric IPC similar.

Base IPC

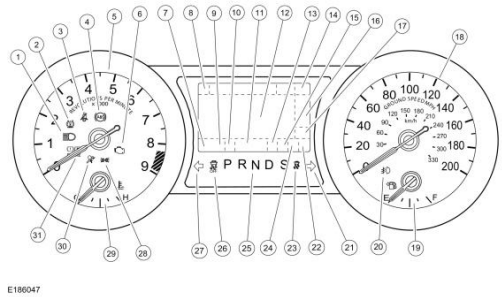


Base IPC

Item	Description
1	High beam indicator
2	TPMS indicator
3	Safety belt warning indicator
4	ABS indicator
5	Tachometer
6	LED low beam malfunction indicator
7	Odometer display
8	Menu navigation indicator
9	Upshift RTT (if equipped)
10	SelectShift ® display
11	Rotating RTT display area Engine over-temperature Hood ajar Low battery Low fuel Low oil pressure Powertrain malfunction (wrench)
12	Main message center display area
13	Overspeed warning RTT
14	Compass
15	Drive mode RTT display Snow-wet Sport Sport plus Track
16	ACC display (if equipped)
17	Digital speed display

18	Speedometer
19	Rear fog lamp indicator (if equipped)
20	Fuel gauge
21	Front fog lamp indicator
22	RH turn indicator
23	Cruise control RTT
24	Stability-traction control indicator (sliding car icon)
25	Launch control RTT display (if equipped)
26	PRNDL display
27	Stability-traction control disabled indicator (sliding car OFF icon)
28	LH turn indicator
29	MIL
30	Lights on indicator
31	Temperature gauge
32	Airbag warning indicator
33	Brake warning indicator

SVT IPC



SVT IPC

Item	Description
1	High beam indicator
2	TPMS indicator
3	Safety belt warning indicator
4	ABS indicator
5	Tachometer

6	MIL
7	Odometer display
8	Menu navigation indicator
9	Upshift RTT (if equipped)
10	SelectShift ® display
11	Rotating RTT display area Engine over-temperature Hood ajar Low battery Low fuel Low oil pressure Powertrain malfunction (wrench)
12	Main message center display area
13	Launch control RTT display (if equipped)
14	Compass
15	Drive mode RTT display Drag strip Normal Sport Track Weather
16	Steering feel RTT (upper half) Adjustable dampers (lower half)
17	Digital speed display
18	Speedometer
19	Fuel gauge
20	Front fog lamp indicator
21	RH turn indicator
22	Cruise control RTT
23	Stability-traction control indicator (sliding car icon)
24	Steering mode RTT
25	PRNDL display
26	Stability-traction control disabled indicator (sliding car OFF icon)
27	LH turn indicator
28	Lights on indicator
29	Temperature gauge
30	Airbag warning indicator

31	Brake warning indicator

ICM

In addition to the IPC gauges, the ICM (mounted in the instrument panel) provides additional gauges. The gauges in the ICM vary based on option content as follows:

- Engine oil pressure
- Engine oil temperature (SVT only)
- Vacuum-boost or vacuum (non-SVT only)

Network Messaged Inputs

Module messaging has increased over time and is the standard for sending and receiving information required to operate the IPC. The majority of the inputs required to operate the IPC are received over the CAN.

Hardwired Inputs

The IPC requires hardwired inputs from components that are not on the CAN. These components are required for specific IPC functions.

The hardwired inputs are provided by the following components:

- CAN
- fuel pump assembly
- fuel level sensor
- park detect switch (part of the floor shifter assembly)

DESCRIPTION AND OPERATION > INSTRUMENT PANEL CLUSTER (IPC) - SYSTEM OPERATION AND COMPONENT DESCRIPTION

System Operation

DESCRIPTION AND OPERATION > INSTRUMENT PANEL CLUSTER (IPC) - SYSTEM OPERATION AND COMPONENT DESCRIPTION > NETWORK MESSAGE CHART - IPC GAUGES

Module Network Input Messages - IPC

Broadcast Message	Originating Module	Message Purpose
Air fuel ratio display	PCM	Input used to control the air fuel ratio virtual gauge display.

Cylinder head temperature data	PCM	Input used to control the cylinder head temperature virtual gauge display.
Engine air inlet temperature data	PCM	Input used to control the inlet air temperature virtual gauge display.
Engine coolant temperature data	PCM	Input used to control the engine temperature gauge.
Engine oil temperature	PCM	Input used to control the engine oil temperature virtual gauge display.
Engine RPM data	PCM	Input used to control the tachometer.
Ignition status	BCM	Input used to provide ignition RUN, START and ACC states.
Transmission fluid temperature data	PCM	Input used to control the transmission oil temperature virtual gauge display.
Vacuum/boost display	PCM	Input used to control the vacuum boost virtual gauge display.
Vehicle lateral acceleration	ABS module	Lateral input used to display the accelerometer.
Vehicle longitudinal acceleration	ABS module	Longitudinal input used to display the accelerometer.
Vehicle speed	PCM	Input used to control the speedometer.

Module Network Input Messages - PCM

Broadcast Message	Originating Module	Message Purpose
Wheel speed data	ABS module	Input used to generate the vehicle speed signal.

DESCRIPTION AND OPERATION > INSTRUMENT PANEL CLUSTER (IPC) - SYSTEM OPERATION AND COMPONENT DESCRIPTION > NETWORK MESSAGE CHART - ICM GAUGES

Module Network Input Messages - ICM

Broadcast Message	Originating Module	Message Purpose
Ignition status	BCM	Input used to provide ignition RUN, START and ACC states.

Oil pressure warning indicator request	PCM	Input used to control the engine oil pressure gauge.
Vacuum/boost display	PCM	Input used to control the vacuum boost gauge.

DESCRIPTION AND OPERATION > INSTRUMENT PANEL CLUSTER (IPC) - SYSTEM OPERATION AND COMPONENT DESCRIPTION > NETWORK MESSAGE CHART - INDICATORS

Module Network Input Messages - IPC

Broadcast Message	Originating Module	Message Purpose
ABS warning indicator request	ABS module	Input used to control the ABS warning indicator.
Airbag warning indicator request	RCM	Input used to control the airbag warning indicator.
Brake fluid level low message request	BCM	Brake fluid level input used to control the brake warning indicator.
Brake (red) warning indicator request	ABS module	Input from the ABS used to control the brake warning indicator.
Driver safety belt buckle status	RCM	Input used to control the safety belt warning indicator.
Front fog lamp indicator request	BCM	Input used to control the front fog lamp indicator.
Headlamp high/low status	BCM	Input used to control the high beam indicator.
Ignition status	BCM	Input used to provide ignition RUN, START and ACC states.
LED low beam malfunction	BCM	Input used to control the LED low beam malfunction indicator.
Left turn lamp on request	BCM	Input used to control the left turn signal indicator.
MIL request	PCM	Input used to control the MIL.
Parking brake status	BCM	Parking brake input used to control the brake warning indicator.
Parklamp status	BCM	Input used to control the lights on indicator.

Rear fog lamp indicator request	BCM	Input used to control the rear fog lamp indicator.
Right turn lamp on request	BCM	Input used to control the right turn signal indicator.
Stability-traction control indicator request	ABS module	Input used to control the stability-traction control indicator (sliding car icon).
Stability-traction control mode indicator	ABS module	Input used to control the stability-traction control disabled indicator (sliding car OFF icon).
Tire pressure warning indicator	BCM	Input used to control the TPMS indicator.

DESCRIPTION AND OPERATION > INSTRUMENT PANEL CLUSTER (IPC) - SYSTEM OPERATION AND COMPONENT DESCRIPTION > NETWORKED INPUT MESSAGES AND DEFAULT STATES

NOTE: Whenever a network message is suspected as missing and confirmed by a missing message DTC (U-code), it is important to look for other symptoms that can also be present in the IPC and throughout the vehicle. Once a DTC sets in the IPC, it is helpful to review the complete message list to determine which other modules also rely on the same message and run the self-test for those modules. If the message is missing from other modules, the same or similar lost communication DTC can also be set in those modules. Confirmation of missing messages common to multiple modules can indicate the originating module is the source of the concern or the communication network may be faulted.

For a list of all the network messages, Refer to: MODULE COMMUNICATIONS NETWORK .

The IPC uses input messages from other modules to control the gauges, informational indicators, warning indicators and message center message displays over the communication networks. The IPC receives all networked data over the HS-CAN3.

The vehicle uses 4 communication networks to transmit the data used by the IPC.

- HS-CAN1
- HS-CAN2
- HS-CAN3
- MS-CAN

Refer to: Communications Network - Overview .

All messaged inputs to the IPC from other networks are received from the GWM over the HS-CAN3. The GWM, as the name implies, acts as a gateway to convert messages from one of the other 3 networks to the HS-CAN3, which is recognized by the IPC.

Network messages can drop out or be missing for a variety of reasons, such as intermittent network concerns or high network traffic on the bus. The IPC incorporates a defined strategy for handling missing network messages based on time. The required time for a network message to be missing differs between the various gauges, indicators and message center displays. The strategy is basically the same for all indication outputs (gauges, indicators or chimes), but differs in the length of time required for the network message to be missing. If a required network message is missing or invalid for less than the programmed length of time, the gauge, indicator or message center display that requires the network message remains at the last commanded state based upon the last network message received. If the messaged input is missing for longer than the programmed length of time, the IPC output (gauge, indicator etc.) reacts according to a pre-defined default action.

For example, if the stability-traction control indicator request network message is missing for less than 5 seconds, and the stability-traction control indicator (sliding car icon) was on, the indicator remains in the on state until the next network message is received. If the network message remains missing or invalid for more than 5 seconds, the IPC sets a U-code DTC and the IPC output becomes a default action for the indicator or gauge. The indicator may default on/off or the gauge may default to the rest position.

Each indicator or gauge utilizes a different default strategy depending on the nature of the indication. Refer to the diagnostic overview descriptions located before each pinpoint test for further descriptions of the default action specific to each indicator or gauge. If the missing messaged input to the IPC returns at any time, the normal function of the gauge, indicator or message center display resumes.

It is very important to understand:

- where the input originates.
- all the information necessary in order for a feature to operate.
- which module(s) receive(s) the input or command message.
- which module controls the output of the feature.
- whether the module that receives the input controls the output of the feature, or whether it outputs a message over the communication network to another module.

DESCRIPTION AND OPERATION > INSTRUMENT PANEL CLUSTER (IPC) - SYSTEM OPERATION AND COMPONENT DESCRIPTION > STARTUP-SHUTDOWN

The IPC provides a startup/shutdown sequence also known as a welcome/goodbye strategy. The IPC initiates and follows a progressive strategy providing increasing IPC functionality from IPC wake up to ready to drive status. This sequence begins at RKE unlock or driver door open through the ignition RUN state. During this period, the IPC provides increasing functionality from backlighting or illuminating gauge rings, gauge pointers, illuminating the PRNDL, backlighting of the message center display, displaying a message center splash screen, gauge and LED prove out, gauge sweep and finally normal IPC operation.

DESCRIPTION AND OPERATION > INSTRUMENT PANEL CLUSTER (IPC) - SYSTEM OPERATION AND COMPONENT DESCRIPTION > MYKEY ®

MyKey ® miles driven by the MyKey ® user can be found in the information display.

- The number of MyKey ® programmed and administrator keys can be found in the MyKey ® menu.
- The parking aid, Blind Spot Monitoring System/Cross Traffic Alert (BLIS ® /CTA), lane departure alert and collision avoidance warning menus are disabled in the message center to force these features always on.

When an administrator key is in use, the IPC provides:

- a menu in the message center guiding the user to create a MyKey ®. When the maximum MyKey ® limit is reached, the MyKey ® creation menu is no longer available.
- a menu in the message center with options for setting 6 MyKey ® features:
  - MyKey ® speed limiter.
  - MyKey ® pre-selected speed warning.
  - MyKey ® radio volume limiter.
  - traction control always on or user selectable.
  - emergency 911 assist feature always on or user selectable.
  - do not disturb feature always on or user selectable.
- a menu in the message center with the option to clear all MyKey ® programmed keys at once.
- MyKey ® mileage driven by the MyKey ® user can be located in system check function of the message center.
- the number of MyKey ® programmed keys and administrator keys can be located in the system check function of the message center.

For information on the MyKey ® features, refer to the Owner's Literature.

DESCRIPTION AND OPERATION > INSTRUMENT PANEL CLUSTER (IPC) - SYSTEM OPERATION AND COMPONENT DESCRIPTION > CONFIGURATION

The IPC contains items that are configurable. Most of the configurable items (configurable parameters) are customer preference items, which can be set with a scan tool. The remaining configurable items can only be set through the vehicle configuration parameters. Refer to: MODULE CONFIGURATION .

DESCRIPTION AND OPERATION > INSTRUMENT PANEL CLUSTER (IPC) - SYSTEM OPERATION AND COMPONENT DESCRIPTION > PROVE-OUT

The IPC carries out a display prove-out to verify the gauges function and all module controlled warning indicator lamps and monitored systems are functioning correctly within the IPC. Upon initiation of the prove-out (ignition on), the analog gauges sweep from one stop to the other then return to the normal indication state based on the input received. The IPC also provides a timed prove-out of some indicators while other indicators illuminate upon engine start up or have no prove-out. When the ignition is cycled on, the indicators illuminate to prove-out according to the following table:

Indicator	Indicator Type	Prove-Out Duration
ABS	Warning	3 seconds
Airbag	Warning	6 seconds
Brake	Warning	3 seconds
Front fog lamp	Informational	None
High beam	Informational	None
LED low beam malfunction	Informational	3 seconds
Lights on	Informational	None
MIL	Informational	Engine start up
Rear fog lamp	Informational	None
Safety belt	Informational	65 seconds if the safety belt is unbuckled, turns off when the safety belt is buckled
Stability-traction control (sliding car icon)	Warning	3 seconds
Stability-traction control disabled (sliding car OFF icon)	Informational	3 seconds
TPMS	Warning	3 seconds
Turn indicators	Informational	None

DESCRIPTION AND OPERATION > INSTRUMENT PANEL CLUSTER (IPC) - SYSTEM OPERATION AND COMPONENT DESCRIPTION > DEALER TEST MODE

NOTE: The table lists the displays as they appear when navigating using the down arrow button.

NOTE: If popup warnings exist, the dealer test mode cannot be entered. All message center warnings and popup displays need to be addressed to enter the dealer test mode.

To enter the IPC engineering test mode or dealer test mode, begin with the ignition OFF. Close all doors and luggage compartment then press and hold the LH steering wheel switch OK button. Place the ignition ON and continue to hold the button for 5-8 seconds until an ET RTT appears at the bottom of the main message center display. Press the up or down arrow buttons to navigate through each of the display windows. To exit the IPC dealer test mode, press and hold the OK button for 5-8 seconds or place the ignition in OFF. Each down arrow button press advances the viewing window to the next set of items.

IPC Display	Description

Engineering Test Mode Use Right Up/Down to scroll screens	Initial entry display into the dealer test mode.
ANALOG GAUGE TEST	Carries out the gauge sweep of the analog gauges. When the sweep (zero to maximum then return to zero) is complete, the actual data is displayed.
TELLTALE AND COLOR TEST	Illuminates all cluster microprocessor controlled LED telltales or indicators. Also displays a color palette of boxes below the title.
PartNo: xxxx-xx Core: xxxx-xx Cal#1: xxxx-xx ECU S/W: xxxx-xx	Displays the IPC part number information.
Man Date: xxxxxx B&A Config Bytesxx xx xx xx xxxx xx xx xx xx	Displays the manufacturing information. Date in the format of YYMMDD. B&A configuration bytes
DTC: HIST CURRxxxxxx x xxxxxxx x x	Displays all of the Diagnostic Trouble Codes (DTCs) set (history and current Diagnostic Trouble Codes [DTCs]). An X in the HIST or CURR column means the DTC is active. Three Diagnostic Trouble Codes (DTCs) display on each screen. If more Diagnostic Trouble Codes (DTCs) are present, there will be additional screens listing them. If there are no Diagnostic Trouble Codes (DTCs) in history or current, the display will only be the title row.
Vehicle Speed:xxx.x km/hxxx.x MPH Tach: xxxx RPM	*NOTE: These are the filtered values used to drive the gauge positions, not the actual positions.* Displays the digital representation of the speedometer in mph and km/h.Displays the digital representation of the tachometer in RPM.
Inst Fuel1: xxxx FLPM: xxxx.xx	Displays the instant fuel level and filtered fuel level in percent. This is used for the fuel pump assembly input on a dual sender fuel tank configuration.
Inst Fuel2: xxxx FLPM: xxxx.xx	Displays the instant fuel level and filtered fuel level in percent. This is used for the fuel level sensor input on a dual sender fuel tank configuration.
DTE: Inst 01 Dispkm xxx xxx xxxmi xxx xxx xxx	Displays the values used for calculating the DTE function.
RAFE RAFE_01xxx.x xxx.x 1/100kmxxx.x xxx.x MPGxxx.x xxx.x km/l	Displays the running average fuel economy. The values are derived from the DTE function.

State Val #ofVS Szero1: xxxx xxxx Off: xxxx xxxx On: xxxx xxxx	Displays the key ON initialization, key OFF reference, and zero speed reference fuel level values in fuel level for the fuel pump assembly input on a dual sender fuel tank configuration.
State Val #ofVS Szero2: xxxx xxxx Off: xxxx xxxx On: xxxx xxxx	Displays the key ON initialization, key OFF reference, and zero speed reference fuel level values in fuel level for the fuel level sensor input on a dual sender fuel tank configuration.
Coolant Temp (°C):xxx	Displays the digital representation of the coolant temperature gauge indication in degrees Celsius.
Odo cnts: xx Trip A: xxxxx.x km Trip A: xxxxx.x mi	Displays the values from the odometer count signal and the trip A statistics.
Odo cnts: xx Trip B: xxxxx.x km Trip B: xxxxx.x mi	Displays the values from the odometer count signal and the trip B statistics.
Fuel cnts: xxx Fuel A: xxxxx.x l Fuel A: xxxxx.x g	Displays the values of the fuel flow display signal from the PCM and the approximate fuel used for the trip stats A.
Fuel cnts: xxx Fuel B: xxxxx.x l Fuel B: xxxxx.x g	Displays the values of the fuel flow display signal from the PCM and the approximate fuel used for the trip stats B.
Battery: xx.xV Compass: xx Last Chime: xx	Displays the current battery level. Displays the compass direction. Displays the number of the last chime sounded.
Dim Step: xx Dim Gauge: xxxxx Dim Pointer: xxxxx	Displays the first screen of dimming information. Dim step is the dimming level. Dim gauge is the internal illumination number for the gauge backlighting (1 to 10, 000). Dim pointer is the internal illumination number for the gauge pointer backlighting (1 to 10, 000).
Dim Step: xx Dim PRNDL: xxxxx Dim Display: xxxxx	Displays the second screen of dimming information. Dim step is dimming level. Dim PRNDL is the internal illumination number for PRNDL backlighting (1 to 10, 000). Dim display is the internal illumination number for the display backlighting (1 to 10, 000).
PDS: x LWS: x	Park detect switch (0 = open/not park, 1 = closed/park).
Engineering Test Mode Use Right Up/Down to scroll screens	Repeats the test display cycle.

DESCRIPTION AND OPERATION > INSTRUMENT PANEL CLUSTER (IPC) - SYSTEM OPERATION AND COMPONENT DESCRIPTION > ANALOG GAUGES

Fuel Gauge

The IPC sends a reference voltage to the fuel level sender(s). As the fuel level changes, a float actuates the variable resistor fuel level sender, raising or lowering the fuel level signal voltage. The IPC monitors the changes in voltage from both senders and commands the fuel gauge with a corresponding movement of the pointer.

After a fuel fill up, the time for the fuel gauge to move from empty (E) to full (F) ranges from 2 seconds to 55 minutes depending on which operating mode the fuel gauge is in.

The IPC uses 4 different operating modes to calculate the fuel level:

- Anti-slosh (default mode)
- Key OFF fueling
- Key ON fueling
- Recovery

Anti-Slosh Mode

The default fuel gauge mode is called the anti-slosh mode. To prevent fuel gauge changes from fuel slosh (gauge instability due to changes in fuel sensor readings caused by fuel moving around in the tank), the fuel gauge takes approximately 40 minutes to go from empty (E) to full (F).

Key OFF Fueling Mode

The key OFF fueling mode (2 seconds to read empty [E] to full [F]) requires 3 conditions to be met:

- The ignition must be in the OFF mode when refueling the vehicle.
- At least 6% of the vehicle's fuel capacity must be added to the fuel tank.
- The IPC must receive a valid ignition ON fuel sensor reading within one second of the ignition being put into the RUN mode. The key ON sample readings are considered valid if the fuel sensor reading is between 10 ohms ± 2 ohms and 180 ohms ± 4 ohms.

If these conditions are not met, the fuel gauge stays in the anti-slosh mode, which results in a slow to read full (F) event.

The key ON fueling mode (approximately 60 seconds to read empty [E] to full [F]) requires the following conditions be met:

- The transmission is in PARK (P) or NEUTRAL (N).
- The ignition is in the RUN mode.
- At least 6% of the vehicle's fuel capacity must be added to the fuel tank

Key ON Fueling Mode

In key ON fueling mode, a 30-second timer activates after the transmission is put into the PARK (P) or NEUTRAL (N) position. When the 30-second time has elapsed and at least 9% of the vehicle's fuel

capacity has been added, the fuel gauge response time is 60 seconds to read from empty (E) to full (F). When the transmission is shifted out of PARK (P) or NEUTRAL (N), the fuel gauge strategy reverts to the anti-slosh mode. The key ON fueling mode prevents slow to read full events from happening if the customer refuels the vehicle with the ignition in the RUN mode.

Recovery Mode

Recovery mode is incorporated into the IPC strategy to recover from a missing fuel level input after a refueling event. Missing fuel level inputs result from intermittent opens in the fuel sensor or its circuits. Recovery mode (empty [E] to full [F] approximately 17 minutes) is initiated when the following 2 conditions are met:

- The IPC is in the anti-slosh (default) mode.
- The actual fuel level in the tank is 5% different from what is being displayed by the fuel gauge.

Speedometer

The PCM receives the wheel speed data from the GWM over the HS-CAN1. The GWM receives the wheel speed data from the ABS module over the HS-CAN2. The PCM uses tire size stored in the vehicle configuration file along with wheel speed inputs to generate a vehicle speed signal.

The IPC receives the vehicle speed message from the GWM over the HS-CAN3. The GWM receives the vehicle speed message from the PCM over the HS-CAN1.

The IPC provides a tolerance that allows the speed indication to display between 3% below and 7% above the actual vehicle speed. This means that with an actual vehicle speed of 97 km/h (60 mph), the speedometer can indicate between 94-103 km/h (58-64 mph). Incorrect tire size or tire size configuration could potentially affect the speedometer accuracy.

Tachometer

The IPC receives the engine RPM data message from the GWM over the HS-CAN3. The GWM receives the engine RPM data message from the PCM over the HS-CAN1.

Temperature

The IPC uses 2 messages to control the temperature gauge. The first is the engine coolant temperature data, which provides the current engine temperature input to the PCM. The second message is the engine overheat indication request, which is sent by the PCM to the IPC when an overheating condition exists. When the IPC receives the engine overheat indication request message, the IPC sends the temperature gauge to full hot and turns on the over-temperature warning indicator.

The IPC receives both temperature gauge inputs from the GWM over the HS-CAN3. The GWM receives the engine coolant temperature data and the engine overheat indication request messages from the PCM over the HS-CAN1.

DESCRIPTION AND OPERATION > INSTRUMENT PANEL CLUSTER (IPC) - SYSTEM OPERATION AND COMPONENT DESCRIPTION > VIRTUAL GAUGES

Accelerometer

The accelerometer is a graphical gauge that is selected through the message center. The IPC receives the vehicle lateral acceleration and vehicle longitudinal acceleration messages from the GWM over the

HS-CAN3. The GWM receives the vehicle lateral acceleration and vehicle longitudinal acceleration messages from the ABS module over the HS-CAN2.

Air Fuel Ratio

The air fuel ratio gauge is a graphical gauge with an additional numeric display ranging between 10 and 20 that is selected through the message center. For the virtual gauge display navigation, see the message center menu options in the Owner's Literature. The IPC receives the air fuel ratio display message from the GWM over the HS-CAN3. The GWM receives the air fuel ratio display message from the PCM over the HS-CAN1.

Axle Oil Temperature (If Equipped-SVT Only)

The axle oil temperature gauge is a graphical gauge with an additional numeric display ranging between 50-175 ° C (100-350 ° F) and is selected through the message center. For the virtual gauge display navigation, see the message center menu options in the Owner's Literature. The IPC receives the axle oil temperature data from the GWM over the HS-CAN3. The GWM receives the axle oil temperature data from the PCM over the HS-CAN1.

Battery Voltage

The battery voltage gauge is a graphical gauge with an additional numeric display ranging between 8 and 18 volts that is selected using the message center switch. For the virtual gauge display navigation, see the message center menu options in the Owner's Literature. The battery voltage gauge uses the voltage input as measured on the hardwired hot at all times voltage input.

Cylinder Head Temperature

The cylinder head temperature gauge is a graphical gauge with an additional numeric display ranging between 60-160 ° C (140-340 ° F) (except SVT) or 50-200 ° C (150-400 ° F) (SVT) that is selected through the message center. For the virtual gauge display navigation, see the message center menu options in the Owner's Literature. The IPC receives the cylinder head temperature data message from the GWM over the HS-CAN3. The GWM receives the cylinder head temperature data message from the PCM over the HS-CAN1.

Engine Oil Pressure (SVT Only)

The engine oil pressure gauge is a graphical gauge with an additional numeric display ranging between 0-150 PSI that is selected through the message center. For the virtual gauge display navigation, see the message center menu options in the Owner's Literature. The IPC receives the oil pressure warning indicator request from the GWM over the HS-CAN3. The GWM receives the oil pressure warning indicator request from the PCM over the HS-CAN1.

Engine Oil Temperature

The engine oil temperature gauge is a graphical gauge with an additional numeric display that is selected through the message center. For the virtual gauge display navigation, see the message center menu options in the Owner's Literature. The engine oil temperature gauge display ranges as follows:

- 38-60 ° C (100-140 ° F) (low)
- 61-137 ° C (141-279 ° F) (normal)
- 138-146 ° C (280-295 ° F) (warm)
- 147-160 ° C (296-320 ° F) (hot)

The IPC receives the oil temperature warning indicator message from the GWM over the HS-CAN3. The GWM receives the oil temperature warning indicator message from the PCM over the HS-CAN1.

Inlet Air Temperature

The air inlet temperature gauge is a graphical gauge with an additional numeric display ranging between -20-120 ° C (0-240 ° F) and is selected through the message center. For the virtual gauge display navigation, see the message center menu options in the Owner's Literature. The IPC receives the engine air inlet temperature data from the GWM over the HS-CAN3. The GWM receives the engine air inlet temperature data from the PCM over the HS-CAN1.

Transmission Fluid Temperature

The transmission fluid temperature gauge is a graphical gauge with an additional numeric display that is selected through the message center. For the virtual gauge display navigation, see the message center menu options in the Owner's Literature. The transmission temperature gauge ranges as follows:

- 24-49 ° C (76-120 ° F) (low)
- 50-120 ° C (121-248 ° F) (normal)
- 121-134 ° C (249-273 ° F) (warm)
- 135-193 ° C (275-379 ° F) (hot)

The SVT transmission fluid temperature gauge display ranges between 50-175 ° C (100-350 ° F).

The IPC receives the transmission fluid temperature data from the GWM over the HS-CAN3. The GWM receives the transmission fluid temperature data from the PCM over the HS-CAN1.

Vacuum-Boost

The vacuum-boost gauge is a graphical gauge with an additional numeric display ranging between 0-30 Hg (vacuum range) and 0-20 PSI (boost range) and is selected through the message center. For the virtual gauge displays, see the message center menu options in the Owner's Literature. The IPC receives the vacuum boost display message from the GWM over the HS-CAN3. The GWM receives the vacuum boost display message from the PCM over the HS-CAN1.

DESCRIPTION AND OPERATION > INSTRUMENT PANEL CLUSTER (IPC) - SYSTEM OPERATION AND COMPONENT DESCRIPTION > ICM GAUGES

Engine Oil Pressure

The engine oil pressure gauge is an analog gauge. The ICM receives the oil pressure warning indicator request from the PCM over the HS-CAN1.

Engine Oil Temperature

The engine oil temperature gauge is an analog gauge. The ICM receives the engine oil temperature message from the PCM over the HS-CAN1.

Vacuum Boost Gauge

The vacuum boost gauge is an analog gauge. The ICM receives the vacuum-boost display message

from the PCM over the HS-CAN1.

DESCRIPTION AND OPERATION > INSTRUMENT PANEL CLUSTER (IPC) - SYSTEM OPERATION AND COMPONENT DESCRIPTION > INDICATORS

ABS Warning

The IPC receives the ABS warning indicator request message from the GWM over the HS-CAN3. The GWM receives the ABS warning indicator request message from the ABS module over the HS-CAN2. If a fault condition exists in the ABS, the ABS module sends the ABS warning indicator request message to either flash or illuminate the ABS warning indicator.

Refer to ABS/Brake/Stability-Traction Control System Indication description for information on the conditions when the ABS warning indicator is turned on

ABS/Brake/Stability-Traction Control System

The brake/stability-traction control system indication is controlled almost entirely by the ABS module. The ABS module can illuminate multiple indicators for various fault conditions. The following table provides a summary of the basic fault conditions and the indicators that are illuminated for each condition.

> *NOTE: Refer to the Normal Operation and Fault Condition description before each brake/stability-traction control system indicator Pinpoint Test (PPT) for the IPC default action for network/missing message conditions.*

Event/Fault Condition	ABS Warning Indicator Status	Brake Warning Indicator Status	Stability-Traction Control Indicator Status	Stability-Traction Control Disabled Indicator Status
Stable driving (no control events)	Off	Off	Off	On or off based on driver request
Parking brake applied	Off	On	Off	Off
Low brake fluid level or brake fluid level input concern	Off	On	Off	Off
Stability-traction control event	Off	Off	Flashing	On or off based on driver request
Stability-traction control disabled by driver	Off	Off	Off	On
Single wheel speed sensor faults	On	Off	On	Off
2 or 3 wheel speed sensor faults	On	On	On	Off
HCU valve fault	On	On	On	Off

ABS module fault	On	On	On	Off
ABS battery voltage faults	On	On or off	On	On
ABS pump motor fault	On	On	On	Off
HCU pressure sensor fault (master cylinder pressure input)	Off	Off	On	Off
Steering wheel angle sensor center not found fault	Off	Off	On	Off
Total CAN failure	On	Off	On	On
Configuration mismatch or not complete	Flashing	Off	Off	Off
Calibration of internal sensors not complete	Off	Off	Flashing	Off
Vehicle Identification Number (VIN) mismatch	On	On	On	Off
ACC and ABS both active	Off	Off	Flashing	Off
Sport/track mode	Off	Off	Off	On
Full system off (ABS on)	Off	Off	Off	On

Airbag Warning

The IPC receives the airbag warning indicator request from the GWM over the HS-CAN3. The GWM receives the airbag warning indicator request from the RCM over the HS-CAN2. If a SRS concern is detected, the RCM sets a DTC and the IPC illuminates the airbag warning indicator.

Brake Warning

The brake warning indicator informs the driver the brake fluid level is low, there is a failure in the base brake system or the parking brake is applied. The IPC uses 3 messaged inputs to control the brake warning indicator.

The IPC receives the brake (red) warning indicator request, the brake fluid level low message request and the parking brake status messages from the GWM over the HS-CAN3.

The GWM receives the brake (red) warning indicator request from the ABS module over the HS-CAN2.

The GWM receives the brake fluid level low message request and the parking brake status messages from the BCM over the HS-CAN1.

Refer to ABS/Brake/Stability-Traction Control System Indication description for information on the conditions when the brake warning indicator is turned on.

Front Fog Lamp

The fog lamp indicator informs the driver that the fog lamps are turned on. The IPC receives the front fog lamp indicator request from the GWM over the HS-CAN3. The GWM receives the fog lamp indicator request from the BCM module over the HS-CAN1.

High Beam

The high beam indicator informs the driver that the high beams are turned on. The IPC receives the headlamp high/low status message from the GWM over the HS-CAN3. The GWM receives the headlamp high/low status message from the BCM module over the HS-CAN1.

LED Low Beam Malfunction

The LED low beam indicator informs the driver an LED low beam is not functioning correctly. The IPC receives the headlamp low beam out message from the GWM over the HS-CAN3. The GWM receives the headlamp low beam out message from the BCM over the HS-CAN1.

Lights On

When the parking lamps are turned on, the BCM sends the parklamp status message to the GWM over the HS-CAN1. The IPC receives the parklamp status message from the GWM over the HS-CAN3 to illuminate the lights on indicator.

MIL

The IPC receives the MIL request from the GWM over the HS-CAN3. The GWM receives the MIL request from the PCM over the HS-CAN1.

PRNDL

The IPC uses the following messages to control the PRNDL:

- Ignition status
- Power shed level request
- Transmission gear display
- Transmission shift mode display
- Vehicle speed
- Transport mode

The IPC receives the transmission gear display, transmission shift mode display and vehicle speed messages from the GWM over the HS-CAN3. The GWM receives the transmission gear display, transmission shift mode display and vehicle speed messages from the PCM over the HS-CAN1.

The IPC receives the ignition status, power shed level request and transport mode messages from the GWM over the HS-CAN3. The GWM receives the ignition status, power shed level request and transport mode messages from the BCM over the HS-CAN1.

When the vehicle is in transport mode, the PRNDL is not displayed upon entry or exit from the vehicle to prevent battery drain during longer periods of time when the vehicle is not in use, such as those experienced during vehicle transport. When load shed management determines the battery state of charge is low or critical when the ignition is OFF or in ACC, the IPC disables the PRNDL display to

conserve battery voltage.

The IPC also uses a park position detect switch (part of the selector lever) input to signal the IPC the shift lever is fully seated in the PARK (P) position. The IPC compares the park position detect switch input with the transmission gear display message sent from the PCM.

Rear Fog Lamp (If Equipped)

The rear fog lamp indicator informs the driver that the rear fog lamps are turned on. The IPC receives the rear fog lamp indicator request from the GWM over the HS-CAN3. The GWM receives the rear fog lamp indicator request from the BCM module over the HS-CAN1.

Safety Belt Warning

The RCM monitors the driver safety belt position through the driver safety belt buckle switch. The RCM provides the driver safety belt buckle status message to the GWM over the HS-CAN2. The GWM provides the driver safety belt buckle status message to the IPC over the HS-CAN3 to either turn on or turn off the safety belt warning indicator.

Stability-Traction Control Indicator (Sliding Car Icon)

The IPC receives the stability-traction control indicator request message from the GWM over the HS-CAN3. The GWM receives the stability-traction control indicator request message from the ABS over the HS-CAN2.

Refer to ABS/Brake/Stability-Traction Control System Indication description for information on the conditions when the stability-traction control indicator (sliding car icon) is turned on.

Stability-Traction Control Disabled Indicator (Sliding Car OFF Icon)

The stability-traction control is configured on/off using the stability assist-traction control mode switch located in the center console. When the driver enables or disables the stability-traction control system, the ABS module sends the stability-traction control mode indicator message to the GWM over the HS-CAN2. The GWM sends the stability-traction control mode indicator message to the IPC over the HS-CAN3 to illuminate or turn off the stability-traction control disabled indicator (sliding car OFF icon) based upon the system state.

Refer to ABS/Brake/Stability-Traction Control System Indication description for information on the conditions when the stability-traction control disabled indicator (sliding car OFF icon) is turned on.

When a MyKey ® administrator has set the AdvanceTrac ® feature to always on and a MyKey ® programmed key is in use, the stability-traction control system cannot be disabled. The menu selection in the message center used to disable the stability-traction control system does not display when a MyKey ® is in use, but remains active for the MyKey ® administrator to select the AdvanceTrac ® always on feature off. The stability-traction control indicator still functions normally to indicate a stability-traction control system fault and a stability-traction control active event.

Refer to ABS/Brake/Stability-Traction Control System Indication description for information on the conditions when the stability-traction control indicator (sliding car icon) is turned on.

TPMS

The IPC receives the tire pressure warning indicator request from the GWM over the HS-CAN3. The GWM receives the tire pressure warning indicator request from the BCM over the HS-CAN1.

If the BCM determines the tire pressure has exceeded the low tire pressure limits, the tire pressure

warning indicator request message is sent to the IPC to illuminate the TPMS warning indicator.

If a TPMS monitor or sensor fault condition exists, the BCM sends the tire pressure warning indicator request message to the IPC to flash the TPMS warning indicator. The IPC flashes the TPMS warning indicator for 75 seconds then turns the indicator on solid.

Turn Signal/Hazard

When the multifunction switch is in the LH or RH turn position or if the hazard switch is on, the BCM sends the left turn lamp on request or right turn lamp on request message to the GWM over the HS-CAN1. The GWM sends the left turn lamp on request or right turn lamp on request message to the IPC over the HS-CAN3. Upon receipt of the applicable turn signal on/off message, the IPC flashes the turn signal indicator on and off.

Component Description

Brake Fluid Level Switch

The brake fluid level switch is mounted in the master cylinder reservoir. The brake fluid level switch is hardwired to the BCM through a signal circuit and grounded through a separate body ground circuit. The BCM provides a reference voltage to the brake fluid level switch. When the brake fluid level is low, the switch closes, pulling the reference voltage low. When the brake fluid level is high, the switch opens, sending the reference voltage high on the signal circuit to the BCM. The brake fluid level switch uses an internal resistor in parallel to enables the BCM to differentiate between a disconnected brake fluid level switch connector and a low level condition.

Fuel Level Sender

The fuel level sender is mounted to the fuel pump assembly or the fuel level sensor. The fuel level sender is a dual sweep potentiometer style resistor connected to a float mechanism. The dual sweep design provides a second resistance measurement that reduces the intermittent loss of data due to corrosion between the resistor wires and the sweep arm. As the fuel level changes, the float rises or falls with the fuel level moving the sweep arm across the resistor wires. This movement either increases or decreases the resistance through the unit. The fuel level sensor resistance ranges from 180 ohms ± 4 ohms at empty (E) to 10 ohms ± 2 ohms at full (F). When the fuel level is low, the fuel level sensor resistance is high. When the fuel level is high, the fuel level sensor resistance is low.

Both the fuel pump assembly and fuel level sensor are hardwired to the IPC through separate signal and return circuits. The fuel level return circuits are grounded internally in the IPC. The IPC provides a reference voltage on the fuel level signal circuit. As the fuel level changes, the change in resistance raises or lowers the fuel level signal voltage depending on the resistance of the fuel level sender.

IPC

The IPC provides the driver with a system status and alerts the driver when certain conditions exist in the vehicle. The IPC receives the ignition status from the BCM through the GWM over the HS-CAN3. The IPC requires Programmable Module Installation (PMI) when the IPC is replaced.

Oil Pressure Switch (2.3L And 3.7L)

The oil pressure switch is a normally open switch that is hardwired to the PCM through a single signal circuit. The ground is provided by the switch housing when it is mounted on the engine. The PCM provides a reference voltage to the oil pressure switch. When oil pressure is low, the oil pressure switch remains open, sending the reference voltage high. When the oil pressure is sufficient, the oil pressure switch closes, pulling the reference voltage low to the PCM.

Oil Pressure Sensor (5.0L)

The oil pressure sensor is hardwired to the PCM through VREF, signal and return circuits. The PCM provides the sensor voltage supply on the VREF circuit and monitors the change in voltage changes though the signal and return circuits as the oil pressure changes.

Park Position Detect Switch

The park position detect switch is hardwired to the IPC through a single signal circuit and is grounded by a separate circuit through the selector lever. The IPC provides a reference voltage to the park position detect switch. When the selector lever is in PARK (P), the park position detect switch closes to ground, pulling the reference voltage low. When the selector lever is moved out of PARK (P), the park position detect switch opens to ground, sending the reference voltage high to the IPC.

Safety Belt Buckle Sensor

The safety belt buckles contain integrated sensors that are Hall-effect switches. The safety belt buckle sensors are serviced as one component with the safety belt buckle.

DESCRIPTION AND OPERATION > MESSAGE CENTER - OVERVIEW > OVERVIEW

The message center is an integral part of the IPC that receives and acts upon much of the same information that is input and used to operate the IPC (gauges, informational indicators, and warning indicators). The message center uses both hardwired and network-based inputs to receive information. The message center functionality is controlled through the message center switch (part of the LH steering wheel switch).

Whenever conditions are present that require a warning message, the message center replaces the last selected display with the new warning display. Once the message is reset or cleared, the message center returns to the last selected display. If multiple warnings are present, the message center rotates through the messages, displaying each warning for approximately 4 seconds. Warning messages are also generally associated with other observable outputs of the IPC (gauges, informational indicators and Reconfigurable Telltale [RTT] indicators). For example, when the BCM detects a low brake fluid condition, the BCM sends the IPC a request through the GWM to illuminate the brake warning indicator and a request to display the LOW BRAKE FLUID message in the message center. This allows the message center to be a more informative supplement to the IPC gauges and indicators.

The system warning messages alert the operator to possible concerns or malfunctions in the vehicle operating systems. System warning messages can be stand-alone messages, but are often associated with another form of indication, such as a gauge or an indicator. The message center displays the last selected feature if there are no additional warning messages. Once a warning message has been displayed, the message must be acknowledged to allow full functionality of the message center by pressing the OK button to acknowledge and clear the warning message. For a complete list of warning messages displayed, refer to the message center portion of the Owner's Literature.

DESCRIPTION AND OPERATION > MESSAGE CENTER - SYSTEM OPERATION AND COMPONENT DESCRIPTION

System Operation

DESCRIPTION AND OPERATION > MESSAGE CENTER - SYSTEM OPERATION AND COMPONENT DESCRIPTION > NETWORK MESSAGE CHART

Module Network Input Messages - IPC

Broadcast Message	Originating Module	Message Purpose
ABS fault	ABS module	ABS input used to display the check brake system warning message.
Adaptive cruise control warning request	CCM	Input used to display the adaptive cruise control message display.
Battery low state of charge	BCM	Input used to control the charging system RTT and the charging system fault message center warning message.
Body service required request	BCM	BCM controlled system faults input used to control the powertrain malfunction (wrench) RTT.
Brake fluid level low message request	BCM	Input used to display the low brake fluid level warning message.
Brake wear message request	VDM	Input used to display the ceramic brakes-replace front brake pads warning message (SVT only).
Convertible top message request	Moveable Roof Control Module-A (MRCMA)	Input used to display the convertible top messages.
Cross traffic alert left status	SODL	Input used to control the Blind Spot Monitoring (BLIS ®)/Cross Traffic Alert (CTA) message display.
Cross traffic alert right status	SODR	Input used to control the Blind Spot Monitoring (BLIS ®)/Cross Traffic Alert (CTA) message display.
Cruise control override	PCM	Input used to control the cruise control RTT.
Cruise control set speed display	PCM	Input used to control the cruise control set speed display.
Cruise control status	PCM	Input used to control the cruise control RTT.
Driver door ajar status	BCM	Input used to control the following: Door ajar RTT. Driver door ajar message center warning message. Engine on warning message. Transmission not in park warning message.

Engine coolant temperature data	PCM	Used to control the engine over-temperature RTT and the engine over-temperature message center warning message.
Engine idle shutdown status	PCM	Input used to control the automatic engine shutdown message display.
Engine oil life	PCM	Input used to display the engine oil life and oil change messages.
Engine overheat indication request	PCM	Used to control the engine over-temperature RTT and the engine over-temperature message center warning message.
Engine RPM data	PCM	Input used to control the low oil pressure RTT, the low oil pressure message center warning message and the Average Fuel Economy (AFE)/ DTE display.
Engine service required request	PCM	Engine input used to control the powertrain malfunction (wrench) RTT.
Engine status	PCM	Input used to display the engine on warning message and the Average Fuel Economy (AFE)/DTE display.
EPAS Failure	PSCM	Input used to display the EPAS messages.
Forward collision warning message request	CCM	Input used to display the forward collision warning messages.
Fuel fill inlet message display	PCM	Input used to display the check fuel fill inlet message.
Fuel flow volume display	PCM	Input used to display the Average Fuel Economy (AFE)/DTE.
GPS compass direction	GPSM	Input used to display the vehicle compass heading.
Hill start assist status	ABS module	Input used to control the hill start assist not available message.
Ignition key type	BCM	Input used to display the Average Fuel Economy (AFE)/DTE.
Ignition status	BCM	Input used for the following: To provide ignition RUN, START and ACC states. To display the transmission not in park warning message. To display the odometer.

Immobilizer message display	BCM	Input used to display the PATS, passive entry and key programming messages.
Lock system message request	BCM	Input used to display the child lock, key battery low and security mode messages.
Luggage compartment lid ajar	BCM	Input used to control the door ajar RTT and the luggage compartment lid ajar message center warning message.
Odometer count	PCM	Input used to display the Average Fuel Economy (AFE)/DTE and odometer.
Oil pressure warning indicator request	PCM	Input used to control the low oil pressure RTT and the low oil pressure message center warning message.
Parking aid fault status	PAM	Input used to display the check parking aid message.
Parking aid rear status	PAM	Input used to display the parking aid on/off status message.
Parking brake status	BCM	Input used to display the parking brake applied warning message.
Passenger door ajar status	BCM	Input used to control the door ajar RTT and the passenger door ajar message center warning message.
Perimeter alarm chime request	BCM	Input used to display the start vehicle to stop alarm message.
Power shed level request	BCM	Input used to display the load shed messages.
Powertrain drive mode	PCM	Input used to control the following drive mode Reconfigurable Telltales (RTT's): Drag strip (SVT) Launch control (SVT) Normal drive Sport Snow/wet (non-SVT) Track (non-SVT) Weather (SVT)
Remote start status	BCM	Input used to display the remote start messages.
Seat memory command	DSM	Input used to display the memory seat operational messages.

Side obstacle detect status-left	SODL	Input used to control the Blind Spot Monitoring (BLIS ®) off RTT and message display.
Side obstacle detect status-right	SODR	Input used to control the Blind Spot Monitoring (BLIS ®) off RTT and message display.
Stability-traction control chime request	ABS module	Input used to display the service AdvanceTrac ® message.
Starting system fault message request	PCM	Input used to display starting system messages.
Steering effort status	PSCM	Input used to control the steering mode RTT.
Suspension driver mode status	VDM	Input used to control the vehicle dynamics (damper control) RTT.
Tire pressure system status	BCM	Input used to display the TPMS fault and tire training messages.
Transmission gear display mode	PCM	Input used to display the engine on warning message and transmission not in park warning message.
Transmission service required	PCM	Transmission input used to control the powertrain malfunction (wrench) RTT.
Transport mode	BCM	Input used to display the factory and transport mode message and not in park warning message.
Trip odometer verify	PCM	Input used to display the trip odometer.
Vehicle configuration data	BCM	Input used to display the odometer and the tire mobility kit expiration message.
Vehicle dynamics SOS	ABS module	Input used to display the spin out detected message.
Vehicle speed	PCM	Input used for the following displays: Average Fuel Economy (AFE)/DTE display. Digital speed display. Engine on warning message. Not in park warning message. Overspeed warning RTT (Gulf Cooperative Countries [GCC])

Module Network Input Messages - PCM

Broadcast Message	Originating Module	Message Purpose

Engine oil life data reset	IPC	Input used to request the oil life minder reset.

DESCRIPTION AND OPERATION > MESSAGE CENTER - SYSTEM OPERATION AND COMPONENT DESCRIPTION > NETWORK MESSAGE CHART - HUD (SVT ONLY)

Module Network Input Messages - HUD

Broadcast Message	Originating Module	Message Purpose
HUD display intensity	IPC	Input used to display the performance shift indication intensity.
HUD mode	IPC	Input used to display the performance shift indication mode.
HUD shift point	IPC	Input used to turn on the performance shift indication at the driver selected shift points.

Module Network Input Messages - IPC

Broadcast Message	Originating Module	Message Purpose
Engine RPM data	PCM	Input used to provide RPM data for the performance shift indication.

DESCRIPTION AND OPERATION > MESSAGE CENTER - SYSTEM OPERATION AND COMPONENT DESCRIPTION > HUD - PERFORMANCE SHIFT INDICATION

The HUD provides the performance shift indication to the driver. The performance shift mode, shift points and display intensity are selected by the driver through the message center. The IPC provides the driver selections to the HUD and provides a shift indicator chime tone to correspond with the indication displayed by the HUD. The driver selected HUD modes are as follows:

- Drag
- Tach
- Track
- Off

The IPC receives engine RPM data from the GWM over the HS-CAN3. The GWM receives the engine RPM data from the PCM over the HS-CAN1.

The HUD receives the HUD display intensity, HUD shift point and HUD mode messages from the GWM

over the HS-CAN2. The GWM receives the HUD display intensity, HUD shift point and HUD mode messages from the IPC over the HS-CAN3.

DESCRIPTION AND OPERATION > MESSAGE CENTER - SYSTEM OPERATION AND COMPONENT DESCRIPTION > MESSAGE CENTER DISPLAYS

Average Fuel Economy (AFE)

Average Fuel Economy (AFE) is calculated using the following messaged inputs:

- Fuel flow volume display
- Odometer count
- Ignition key type
- Vehicle speed
- Engine RPM data
- Engine status

All messaged inputs, except for the ignition key type, are sent to the GWM by the PCM over the HS-CAN1. The GWM sends all message inputs, except for the ignition key type, to the IPC over the HS-CAN3. The GWM receives the ignition key type message from the BCM over the HS-CAN1. The IPC receives the ignition key type message from the GWM over the HS-CAN3.

Compass

The compass is displayed as a 1 or 2 character display in the message center that indicates the current direction of the vehicle (N, NE, E, SE, S, SW, W, or NW). The IPC receives the GPS compass direction from the GWM over the HS-CAN3. The GWM receives the GPS compass direction from the GPSM over the MS-CAN.

DTE

The DTE is calculated in the IPC using the Running Average Fuel Economy (RAFE), which is the fuel economy over the last 480 km (300 miles), and the fuel level input from the fuel sender(s) to determine how many miles the vehicle can be driven based on the remaining fuel in the fuel tank. If the fuel economy is relatively constant, the DTE can be off over a 50 mile range by -24% to +38%. The DTE display and the fuel gauge both use the fuel level input from the fuel tank to provide their respective functions. If the fuel gauge doesn't function correctly, both the fuel gauge and the DTE display are affected.

The IPC defaults to around 21 mpg when the battery is initially connected and changes based on driving habits and conditions. Generally, the driver should be getting somewhere between 13-27 mpg.

> *NOTE: The actual DTE can be higher or lower than the DTE displayed in the message center due to changes in driving conditions. It is important to understand how the DTE is calculated and the factors that impact the DTE display when determining how to address any DTE concerns.*

Since the DTE is calculated and averaged over a longer period of time (480 km [300 miles]), varying driving conditions can have a significant impact on the current or short term DTE as opposed to the displayed DTE. This difference often leads to customer complaints of incorrect or invalid DTE. The following list provides some (not all) of the driving conditions that may lead to an incorrect or fluctuating DTE concern:

- Changing between towing/not towing
- Changing driving between city and highway
- Allowing the vehicle to idle for long periods of time
- Using the remote start feature frequently to allow the vehicle to warm up, particularly when parked on a grade
- Parking or driving on grades
- Inconsistent use of gasoline or E85 fuels
- Over-fueling or not filling the tank completely (partial refueling)
- To better illustrate the affects of how driving conditions can affect DTE, refer to the 2 following examples. The first example below illustrates how the following observations are normal and expected since the low fuel reminder is triggered from a fuel volume and not from a fixed distance to empty.
    - If while driving, the low fuel reminder (low fuel indicator and low fuel warning message) displays when the DTE equals 94.4 km (59 miles) and the driver adds 11.36 L (3 gallons) of fuel, the new DTE may become 124.8 km (78 miles). After continued driving, the low fuel reminder may now display when the DTE equals 83.2 km (52 miles).
- The second example (below) illustrates what occurs when idling on an incline. In this example, the customer should be made aware of how the condition will correct after a few minutes of idling on a level surface.
    - If the customer stops and parks the vehicle on an incline in a driveway, then in the morning remote starts the vehicle, allowing the engine to idle, the DTE may now equal 184 km (115 miles). As the customer drives, the low fuel reminder displays when the DTE equals 148.8 km (93 miles). Finally, after 5 more minutes of driving, the DTE is back to 80 km (50 miles).

Factory-Transport Mode

During vehicle build, some modules, such as the IPC and the BCM, are set in factory mode. While in the factory mode the IPC displays FACTORY MODE CONTACT DEALER in the message center. If the vehicle is set in factory mode, the system does not automatically exit the mode and must be manually set to either the transport or normal operation mode.

When the vehicle build is complete, the vehicle is set to transport mode. While in transport mode, the IPC displays TRANSPORT MODE CONTACT DEALER in the message center. Transport mode is used to reduce the drain on the battery during longer periods where the vehicle is not used. Various systems may be altered or are disabled when in the transport mode. The vehicle automatically reverts to normal operation mode after being driven 201 km (125 mi).

The IPC receives the life cycle mode message from the GWM over the HS-CAN3. The GWM receives the life cycle mode message from the BCM over the HS-CAN1.

MyKey ® Function

The IPC provides message center displays for the MyKey ® feature. MyKey ® displays are controlled through the IPC software based on the MyKey ® settings, configured through the message center, and the type of key in use (MyKey ® or administrator key). The MyKey ® function also uses messages received by the IPC for other indications such as vehicle speed for speed limiter displays.

Odometer

The IPC uses ignition status, transport mode, vehicle configuration and trip odometer verify messages to determine when to display the odometer and the odometer count message to provide the actual odometer reading. The IPC receives the odometer count message from the GWM over the HS-CAN3. The GWM receives the odometer count from the PCM over the HS-CAN1. The IPC monitors the odometer count input from the GWM and commands the odometer with a digital display in the message center.

The IPC receives the ignition status, transport mode, vehicle configuration and trip odometer verify messages from the GWM over the HS-CAN3. The GWM receives the ignition status, transport mode, vehicle configuration and trip odometer verify messages from the BCM over the HS-CAN1.

DESCRIPTION AND OPERATION > MESSAGE CENTER - SYSTEM OPERATION AND COMPONENT DESCRIPTION > RECONFIGURABLE TELLTALES (RTT'S)

Blind Spot Monitoring System (BLIS) Off

The IPC provides a RTT to inform the driver that the Blind Spot Monitoring System (BLIS) is turned off. The IPC receives the side obstacle detect status-left and side obstacle detect status-right messages from the GWM over the HS-CAN3. The GWM receives the side obstacle detect status-left and side obstacle detect status-right messages from the SODL and SODR over the MS-CAN.

Charging System

The IPC provides a charging system message center indicator along with message displays indicating the status of the charging system. When a charging system fault is present, the BCM sends the battery low state of charge message to the GWM over the HS-CAN1. The GWM sends the battery low state of charge message to the IPC to turn on the charging system RTT and to display the message center warning messages.

Cruise Control

The IPC uses the following messaged inputs to control the cruise control RTT:

- cruise control status
- cruise control set speed display
- cruise control override

The IPC receives the cruise control messages from the GWM over the HS-CAN3. The GWM receives the cruise control messages from the PCM over the HS-CAN1.

Door Ajar

The IPC provides a door ajar RTT along with message displays to indicate the status of the doors or

luggage compartment lid. The BCM monitors each of the ajar inputs and sends the corresponding ajar message (driver door ajar status, passenger door ajar status or luggage compartment lid ajar) to the GWM over the HS-CAN1 when a door or the luggage compartment lid is ajar. The IPC receives the door ajar status message from the GWM over the HS-CAN3.

Drive Mode

The IPC provides multiple RTT indicators to inform the driver of the selected drive mode (sport, sport plus, rain/snow, track mode and drag strip mode). The IPC receives the powertrain drive mode message from the GWM over the HS-CAN3. The GWM receives the powertrain drive mode message from the PCM over the HS-CAN1.

Engine Over-Temperature

The IPC provides a RTT to alert the driver the engine is over temperature. The IPC receives the engine overheat indication request and the engine coolant temperature data messages from the GWM over the HS-CAN3. The GWM receives the engine overheat indication request and the engine coolant temperature data messages from the PCM over the HS-CAN1.

Launch Control

The IPC provides the launch control RTT indicator to inform the driver of the launch control system status. The IPC receives the launch control mode message from the GWM over the HS-CAN3. The GWM receives the launch control mode message from the PCM over the HS-CAN1.

Low Fuel

The IPC provides the low fuel RTT indicator in 2 colors, amber and red. The IPC uses both the hardwired fuel level input and the calculated DTE to control the low fuel RTT. The low fuel RTT illuminates whenever the remaining fuel level is below 1/16 of a tank (with an administrator key) or 1/8 of a tank (with a MyKey ® key).

Low Oil Pressure

The engine oil pressure switch is hardwired to the PCM. The IPC requires 2 messaged inputs to control the low oil pressure RTT. The first is the oil pressure warning indicator request message and the second is the engine RPM data message above 400 RPM. Both the oil pressure warning indicator request and engine RPM data messages are sent from the PCM to the GWM over the HS-CAN1. The IPC receives the oil pressure warning indicator request and engine RPM data messages from the GWM over the HS-CAN3.

Overspeed Warning (Gulf Cooperative Countries [GCC])

The IPC provides an overspeed warning RTT to inform the driver that the vehicle speed has reached or exceeded the 120 km/h (75 mph) threshold. The IPC receives the vehicle speed signal from the GWM over the HS-CAN3. The GWM receives the vehicle speed signal from the PCM over the HS-CAN1.

Powertrain Malfunction (Wrench)

The IPC provides a powertrain malfunction (wrench) RTT to indicate transmission, Electronic Throttle Control (ETC) and BCM concerns.

The IPC receives all the required messages from the GWM over the HS-CAN3.

The GWM receives the body service required message from the BCM over the HS-CAN1.

The GWM receives the transmission service required, engine service required and AWD service

required messages from the PCM over the HS-CAN1.

Steering Mode

The IPC provides the steering mode RTT to indicate the driver steering mode selected (sport, comfort or normal). The IPC receives the steering effort status message from the GWM over the HS-CAN3. The GWM receives the steering effort status message from the PSCM over the HS-CAN2.

Vehicle Dynamics (Damper Control) (SVT Only)

The IPC provides 4 RTT indicators to inform the driver of the selected suspension mode. The IPC receives the suspension driver mode status message from the GWM over the HS-CAN3. The GWM receives the suspension driver mode status message from the VDM over the HS-CAN2.

DESCRIPTION AND OPERATION > MESSAGE CENTER - SYSTEM OPERATION AND COMPONENT DESCRIPTION > WARNING MESSAGES

Adaptive Cruise Control

The message center provides messages intended to assist the driver while operating the adaptive cruise control. The IPC receives the adaptive cruise control warning request from the GWM over the HS-CAN3. The GWM receives the adaptive cruise control warning request from the CCM over the HS-CAN2.

Automatic Engine Shutdown

The message center provides messages to inform the driver about a pending engine idle shutdown and the reasons for the shutdown. The IPC receives the engine idle shutdown status from the GWM over the HS-CAN3. The GWM receives the engine idle shutdown status from the PCM over the HS-CAN1.

Blind Spot Monitoring (BLIS ®)/Cross Traffic Alert (CTA)

The message center provides messages to inform the customer which side a vehicle is approaching and for Blind Spot Monitoring (BLIS ®)/Cross Traffic Alert (CTA) faults. The IPC receives the cross traffic left alert status, cross traffic right alert status, side obstacle sensor status-left and the side obstacle sensor status-right messages from the GWM over the HS-CAN3. The GWM receives the cross traffic left alert status and the side obstacle sensor status-left messages from the SODL and the cross traffic right alert status and the side obstacle sensor status-right from the SODR over the MS-CAN.

Brake System

The message center provides brake system warnings for the following concerns and status:

- Worn ceramic brake pads (SVT only)
- Low brake fluid level
- Parking brake status and faults
- ABS faults

On SVT vehicles only, the message center provides a warning message to indicate to the driver the brake pads are worn and require replacing. This is needed since the brake pads do not use the spring steel brake pad wear indicator used on other brake pads. When the brake pads are worn, the GWM

sends the brake wear message request to the IPC over the HS-CAN3. The GWM receives the brake wear message request from the VDM over the HS-CAN2.

When the parking brake is applied, the BCM sends the parking brake status message to the GWM over the HS-CAN1. The GWM gateways the parking brake status message to the IPC over the HS-CAN3 to illuminate the brake warning indicator and display the parking brake applied message in the message center.

When a low brake fluid level condition exists, the BCM sends the brake fluid level low message request to the GWM over the HS-CAN1. The GWM gateways the brake fluid level low message request to the IPC over the HS-CAN3 to illuminate the brake warning indicator and display the brake fluid level low message in the message center.

When an ABS concern exists, the ABS module sends the ABS fault message to the GWM over the HS-CAN2. The GWM gateways the ABS fault message to the IPC over the HS-CAN3 to illuminate the ABS warning indictor and to display the check brake system message center warning message.

Charging System

The message center provides a warning message indicating the status of the charging system. When a fault is present in the charging system, the BCM sends the battery low state of charge message to the GWM over the HS-CAN1. The IPC receives the battery low state of charge message from the GWM over the HS-CAN3.

Check Fuel Fill

The message center provides a check fuel fill inlet message to warn the driver there is a problem with the fuel fill inlet pipe resulting from a significant evaporative emission leak following vehicle refueling.

The IPC receives the check fuel fill inlet message request from the GWM over the HS-CAN3. The GWM receives the check fuel fill inlet message request from the PCM over the HS-CAN1.

Convertible Top

The message center provides a warning message to inform the driver that a convertible top condition exits. The IPC receives the convertible top message request from the GWM over the HS-CAN3. The GWM receives the convertible top message request from the Manual Roof Control Module-A (MRCMA) over the MS-CAN.

Door Ajar

The message center provides specific door ajar and luggage compartment lid ajar warning messages that supplement the door ajar RTT and to indicate the status of the doors or luggage compartment lid. The BCM monitors each of the ajar inputs and sends the corresponding ajar message (driver door ajar status, passenger door ajar status or luggage compartment lid ajar) to the GWM over the HS-CAN1when a door or the luggage compartment lid is ajar. The IPC receives the door ajar status message from the GWM over the HS-CAN3.

Engine On

The message center provides the engine on warning message to inform the driver they are exiting the vehicle when the engine is running. The IPC uses multiple inputs to determine the vehicle is stopped and the driver is preparing to exit the vehicle. The messages required to control the engine on warning message are as follows:

- Driver door ajar status

- Engine status
- Transmission gear display mode
- Vehicle speed

The IPC receives the driver door ajar status from the GWM over the HS-CAN3. The GWM receives the driver door ajar status from the BCM over the HS-CAN1.

The IPC receives the engine status, transmission gear display mode and the vehicle speed messages from the GWM over the HS-CAN3. The GWM receives the engine status, transmission gear display mode and the vehicle speed messages from the PCM over the HS-CAN1.

Engine Over-Temperature

The message center provides the engine coolant over-temperature message to supplement the engine over-temperature RTT and alert the driver the engine is over temperature. The IPC receives the engine overheat indication request and the engine coolant temperature data from the GWM over the HS-CAN3. The GWM receives the engine overheat indication request and the engine over-temperature message from the PCM over the HS-CAN1.

Forward Collision

The message center provides the forward collision warning messages to inform the driver of the forward collision status. The IPC receives the forward collision warning message request from the GWM over the HS-CAN3. The GWM receives the forward collision warning message request from the CCM over the HS-CAN2.

Hill Start Assist

The message center provides the hill start assist message to inform the driver of the hill start assist system status. The IPC receives the hill start assist status message from the GWM over the HS-CAN3. The GWM receives the hill start assist status message from the ABS module over the HS-CAN2.

Load Shed

The message center provides load shed messages to inform the driver to use less options to conserve battery voltage. The IPC receives the power shed level request from the GWM over the HS-CAN3. The GWM receives the power shed level request from the BCM over the HS-CAN1.

Low Key Fob And Switch Inhibit

The IPC provides a switch inhibit warning to notify the driver that some switches have been purposely inhibited and are inoperative. For security purposes, interior switches are inhibited by the BCM 20 seconds after the vehicle is electronically locked and prevents someone from using a stick (or other object) through an open window and activating the switch.

The IPC provides a low key fob battery warning to alert the driver the key fob battery needs to be replaced.

The IPC receives the lock system message request from the GWM over the HS-CAN3. The GWM receives the lock system message request from the BCM over the HS-CAN1.

Low Oil Pressure

The message center provides the low engine oil pressure warning message to supplement the low oil pressure RTT. The engine oil pressure switch is hardwired to the PCM. The IPC requires 2 messaged

inputs to control the low oil pressure warning message. The first is the oil pressure warning indicator request message and the second is the engine RPM data message above 400 RPM. Both the oil pressure warning indicator request and engine RPM data messages are sent from the PCM to the GWM over the HS-CAN1. The IPC receives the oil pressure warning indicator request and engine RPM data messages from the GWM over the HS-CAN3.

Memory Seat Status

The message center provides memory seat status messages to provide the driver confirmation that memory position storing was successful and that recalling a memory position can not be recalled while driving the vehicle. The IPC receives the seat memory command message from the GWM over the HS-CAN3. The GWM receives the seat memory command message from the DSM over the MS-CAN.

Oil Life

The instrument cluster provides messages to inform the driver about the oil life status, oil life reset status and when an oil change is required. The duration of the interval between oil changes is calculated in the PCM and varies due to driving conditions. The PCM assumes a base mileage of 16, 090 km (10, 000 mi) or 1 year for normal driving. However, this number is adjusted down for conditions such as high engine temperature, high engine RPM, use of flex fuel and possibly low oil level. The PCM calculates and provides the engine oil life percent message to the IPC. The IPC further converts the remaining oil life using the driver's configured oil life start value and displays the oil life percentage, indicating the remaining oil life. The oil change minder can be reset at any time by the driver.

The IPC receives the engine oil life message from the GWM over the HS-CAN3. The GWM receives the engine oil life message from the PCM over the HS-CAN1.

The PCM receives the engine oil life data reset message from the GWM over the HS-CAN1. The GWM receives the engine oil life data reset message from the IPC over the HS-CAN3.

Parking Aid

The message center provides messages to indicate the status of the parking aid system. The IPC receives the parking aid status messages from the GWM over the HS-CAN3. The GWM receives the parking aid status messages from the PAM over the HS-CAN1.

PATS And Passive Key And Immobilizer System

The message center provides the starting system fault message to indicate there is a concern with the PATS. The message center provides passive key and immobilizer system messages to indicate the key is in the luggage compartment, the key is left in the vehicle, no key is detected, accessory power is active, to press the brake to start the vehicle or to place the key in the backup slot. The IPC uses the immobilizer message display messaged input from the BCM to display the applicable message center message.

The IPC receives the immobilizer message display data from the GWM over the HS-CAN3.

The GWM receives the immobilizer message display data from the BCM over the HS-CAN1.

Perimeter Alarm

The message center provides the perimeter alarm message to indicate the perimeter alarm has been activated and to start the vehicle to stop the alarm. The IPC receives the perimeter alarm chime request message from the GWM over the HS-CAN3. The GWM receives the perimeter alarm chime request from the BCM over the HS-CAN1.

PRNDL Not In Park

The message center provides a shift to park message to inform the driver the vehicle is not in PARK (P) under 2 sets of conditions. First, the IPC displays the shift to park message if the selector lever is not in PARK (P), the ignition is OFF and the driver door is open or ajar. Second, the message center displays the shift to park message if the selector lever is not in PARK (P), the ignition is ON or in ACC, the driver door is open or ajar and the brake pedal is not applied with vehicle speed less than 5 km/h (3 mph). The IPC uses multiple messages to control the shift to park message.

The IPC receives all required messages from the GWM over the HS-CAN3.

The GWM receives the transmission gear display mode and vehicle speed messages from the PCM over the HS-CAN1.

The GWM receives the driver door ajar status, transport mode and ignition status message from the BCM over the HS-CAN1.

The IPC also uses the park position detect input to determine whether the vehicle is in PARK (P) along with the transmission gear display mode message.

See Park Position Detect Switch component description. Refer to: Instrument Panel Cluster (IPC) - System Operation and Component Description .

Remote Start

The message center provides remote start messages to inform the driver the vehicle is in the remote start active state and steps required to change the state to a drivable state. The remote start message display is active as soon as the vehicle is remote started (the engine is running, but the ignition status is off).

The IPC receives the remote start status message from the GWM over the HS-CAN3. The GWM receives the remote start status message from the BCM over the HS-CAN1.

Stability-Traction Control

The message center provides a stability-traction control system message to indicate the stability-traction control system has a fault and requires service.

When a fault condition exists in the stability-traction control system, the ABS module sets a DTC and sends the stability-traction control chime request to the GWM over the HS-CAN2. The GWM sends the stability-traction control chime request to the IPC over the HS-CAN3.

Starting System

The message center provides a starting system message to inform the driver of further actions required to start the engine or to explain the reason for the inability to start the engine. The IPC receives the starting system fault message request from the GWM over the HS-CAN3. The GWM receives the starting system fault message request from the PCM over the HS-CAN1.

Steering System

The message center provides a message to indicate there is an EPAS system concern. When a fault exists in the EPAS system, the PSCM sends the EPAS failure message to the GWM over the HS-CAN2.

The IPC receives the EPAS failure message from the GWM over the HS-CAN3.

Tire Mobility

The IPC provides a message to inform the driver the tire mobility kit has passed its expiration date. The life of the tire mobility kit is 4 years and the IPC uses vehicle configuration to determine it is equipped with the kit then uses an internal clock to determine when the 4 year life has expired. The IPC receives the vehicle configuration data message from the GWM over the HS-CAN3. The GWM receives the vehicle configuration data from the BCM over the HS-CAN1.

Tire Pressure Monitoring System (TPMS)

The IPC provides message center displays to indicate the TPMS sensor training status or a malfunction in the TPMS.

The IPC receives the tire pressure system status message from the GWM over the HS-CAN3. The GWM receives the tire pressure system status message from the BCM over the HS-CAN1.

Component Description

Brake Fluid Level Switch

The brake fluid level switch is mounted in the master cylinder reservoir. The brake fluid level switch is hardwired to the BCM through a signal circuit and grounded through a separate body ground circuit. The BCM provides a reference voltage to the brake fluid level switch. When the brake fluid level is low, the switch closes, pulling the reference voltage low. When the brake fluid level is high, the switch opens, sending the reference voltage high on the signal circuit to the BCM. The brake fluid level switch uses an internal resistor in parallel to enable the BCM to differentiate between a disconnected brake fluid level switch connector and a low level condition.

Oil Pressure Switch (2.3L And 3.7L)

The oil pressure switch is a normally open switch that is hardwired to the PCM through a single signal circuit. The ground is provided by the switch housing when it is mounted on the engine. The PCM provides a reference voltage to the oil pressure switch. When oil pressure is low, the oil pressure switch remains open, sending the reference voltage high. When the oil pressure is sufficient, the oil pressure switch closes, pulling the reference voltage low to the PCM.

Oil Pressure Sensor (5.0L)

The oil pressure sensor is hardwired to the PCM through VREF, signal and return circuits. The PCM provides the sensor voltage supply on the VREF circuit and monitors the change in voltage changes though the signal and return circuits as the oil pressure changes.

Park Position Detect Switch

The park position detect switch is hardwired to the IPC through a single signal circuit and is grounded by a separate circuit through the selector lever. The IPC provides a reference voltage to the park position detect switch. When the selector lever is in PARK (P), the park position detect switch closes to ground, pulling the reference voltage low. When the selector lever is moved out of PARK (P), the park position detect switch opens to ground, sending the reference voltage high to the IPC.

Steering Wheel Switch - Message Center

The message center switch is part of the LH steering wheel switch and is comprised of 5 buttons. The message center switch uses different resistance values associated with each specific button. The SCCM sends out a reference voltage to the upper LH steering wheel switch on the input circuit and monitors the voltage drops. The voltage drop varies depending upon the resistance of the specific button pressed, providing indication to the SCCM which button is pressed.

DESCRIPTION AND OPERATION > WARNING CHIMES - OVERVIEW > OVERVIEW

The warning chimes provide the driver with audible warnings that act as reminders and supplemental alerts to visual IPC indications such as gauges, indicators and message center warnings. The IPC controls all warning chimes based on messages received from external modules. The IPC prioritizes the chimes according to a preset hierarchy programmed into the IPC software. When more than one chime request is received by the IPC, the most important chime sounds. If a lower priority chime is currently sounding, the higher priority request takes over and replaces or delays the lower priority chime.

The warning chimes are sounded through the audio system speakers and the IPC. The turn signal on (tick-tock) is the only individual chime that the IPC is responsible for sounding. The parking aid and Blind Spot Information System (BLIS ®)/Cross Traffic Alert (CTA) warning chimes are sounded through the rear speakers. All other warning chimes are sounded through the front audio system speakers.

The IPC also acts as a backup. In the event of an audio system chime failure, the IPC sounds all chimes that are required.

DESCRIPTION AND OPERATION > WARNING CHIMES - SYSTEM OPERATION AND COMPONENT DESCRIPTION

System Operation

DESCRIPTION AND OPERATION > WARNING CHIMES - SYSTEM OPERATION AND COMPONENT DESCRIPTION > NETWORK MESSAGE CHART

Module Network Input Messages - IPC

Broadcast Message	Originating Module	Message Purpose
Adaptive cruise control warning request	CCM	Input used to control the adaptive cruise control warning chime.
Brake pedal applied	PCM	Input used to control the PRNDL not in park warning chime.
Cross traffic alert left status	SODL	Input used to control the BLIS ®/CTA warning chime.
Cross traffic alert right status	SODR	Input used to control the BLIS ®/CTA warning chime.
Cruise control status	PCM	Input used to control the adaptive cruise control warning chime.
Driver door ajar status	BCM	Input used to control the igntion-engine on warning chime and the PRNDL not in park warning chime.

Driver safety belt buckle status	RCM	Input used to control the safety belt warning chime and the Belt-Minder ®.
Engine status	PCM	Input used to control the ignition-engine on warning chime.
Forward collision chime request	CCM	Input used to control the forward collision warning chime.
Front passenger detect status	RCM	Input used to control the Belt-Minder ®.
Gear lever position	PCM	Input used to control the Belt-Minder ®. Reverse input on automatic transmissions used for the backup chime (Japan only).
Headlamp on warning chime	BCM	Input used to control the headlamp on warning chime.
Ignition status	BCM	Input used for the following: To provide ignition RUN, START and ACC states. To control the PRNDL not in park warning chime.
Key-in-ignition indicator status	BCM	Input used to control the key-in-ignition warning chime.
Left turn lamp request	BCM	Input used to control the turn signal-hazard tick-tock tone chime.
Memory feedback request	DSM	Input used to control the memory feedback confirmation chime.
Parking aid chime request	PAM	Input used to control the parking aid chime.
Parking brake chime request	BCM	Input used to control the parking brake warning chime.
Passenger safety belt buckle status	RCM	Input used to control the Belt-Minder ®.
Perimeter alarm chime request	BCM	Input used to control the perimeter alarm chime.
Reverse gear state	PCM	Reverse input on manual transmissions used for the backup chime (Japan only).
Right turn lamp request	BCM	Input used to control the turn signal-hazard tick-tock tone chime.
Side obstacle sensor status-left	SODL	Input used to control the BLIS ®/CTA warning chime.

Side obstacle sensor status-right	SODR	Input used to control the BLIS ®/CTA warning chime.
Stability-traction control chime request	ABS module	Input used to control the service AdvanceTrac ® warning chime.
Transmission gear display mode	PCM	Input used to control the ignition-engine on warning chime and the PRNDL not in park warning chime.
Turn signal status	SCCM	Input used to control the turn signal left on warning chime.
Vehicle speed	PCM	Input used to control the Belt-Minder ®, PRNDL not in park warning chime.

Module Network Input Messages - ACM and DSP Module

Broadcast Message	Originating Module	Message Purpose
Chime source	IPC	Input used to configure the chime source (IPC or the audio system).
Cross Traffic Alert (CTA) chime request	IPC	Input from the IPC used to control the Cross Traffic Alert (CTA) audio chime output.
IPC chime request	IPC	Input from the IPC used to control the audio chime output.
MyKey Belt-Minder ® audio mute	IPC	Input from the IPC used to mute the audio for the Belt-Minder ® chime.
Power up chime modules	IPC	Input used to initiate the audio system as the chime source.

DESCRIPTION AND OPERATION > WARNING CHIMES - SYSTEM OPERATION AND COMPONENT DESCRIPTION > WARNING CHIME CHARACTERISTICS

The warning chimes use volume, chime frequency, length of time the chime sounds, decay of the chime tone and the number of chime tones to identify which chime is sounding. Most warning chimes have unique characteristics, however, there are chimes that do sound the same. The chime characteristics are defined by the different chime types:

- Information
- Soft-warning
- Hard-warning
- Tick-tock (on-off)

DESCRIPTION AND OPERATION > WARNING CHIMES - SYSTEM OPERATION AND COMPONENT DESCRIPTION > ADAPTIVE CRUISE CONTROL WARNING CHIME

The adaptive cruise control warning chime supplements the message center displays to draw the driver's attention to the need to intervene and take control of the vehicle. There are 2 levels of chime output (high priority and low priority) based upon the nature and urgency of the warning. The audio system sounds the appropriate warning chime through the front speakers when it receives the adaptive cruise control warning request (high priority chime) or cruise control status (low priority chime) message from the CCM.

The low priority adaptive cruise control warning chime is a single-tone, 1-second chime that sounds to alert the driver the adaptive cruise control system has shut itself off due to low vehicle speed (approximately 32 km/h [20 mph]) and the driver needs to intervene if further braking is required or to resume the adaptive cruise control operation.

The high priority adaptive cruise control warning chime is a 0.25-second chime that sounds 12 times. The chime alerts the driver the vehicle is approaching the vehicle ahead at a faster rate than the adaptive cruise control system can brake the vehicle and the driver needs to apply the brakes to slow the vehicle down.

The IPC receives the cruise control status and the adaptive cruise control warning request messages from the GWM over the HS-CAN3.

The GWM receives the cruise control status message from the PCM over the HS-CAN1.

The GWM receives the adaptive cruise control warning request message from the CCM over the HS-CAN2.

When a chime request is received, the IPC sends the IPC chime request message to the ACM and the audio DSP module to sound the chime.

DESCRIPTION AND OPERATION > WARNING CHIMES - SYSTEM OPERATION AND COMPONENT DESCRIPTION > AIR BAG SECONDARY WARNING CHIME

The air bag secondary warning chime warns the air bag warning indicator LED is inoperative. If the IPC detects a fault with the air bag warning indicator LED during the bulb prove out, the air bag secondary warning chime sounds through the front speakers. If the IPC detects a fault in the air bag warning indicator when a SRS fault condition exists and the RCM has sent the IPC the air bag indicator request, the air bag secondary warning chime sounds through the front speakers. The air bag chime is a 0.5-second chime that sounds 5 times.

When a fault condition is detected, the IPC sends the IPC chime request message to the ACM and the audio DSP module over the HS-CAN3 to sound the chime.

DESCRIPTION AND OPERATION > WARNING CHIMES - SYSTEM OPERATION AND COMPONENT DESCRIPTION > BACKUP WARNING CHIME - JAPAN ONLY

The reverse warning chime warns the vehicle is in reverse. When the selector lever (automatic) or

gearshift lever (manual) is in reverse, the PCM sends the gear lever position (automatic) or reverse gear state (manual) message to the GWM over the HS-CAN1. The GWM sends the gear position status message to the IPC over the HS-CAN3 to sound a 1-second chime tone continuously through the front speakers.

DESCRIPTION AND OPERATION > WARNING CHIMES - SYSTEM OPERATION AND COMPONENT DESCRIPTION > BELT-MINDER ® FEATURE

NOTE: Whenever the vehicle is operated using MyKey ®, the IPC enables the Belt-Minder ®.

The Belt-Minder ® is configurable on or off. Refer to: Seatbelt Minder Deactivating/Activating .

The Belt-Minder ® feature supplements the current safety belt warning function and is enabled after the current safety belt warning is complete. The Belt-Minder ® reminds the driver that the driver or front passenger safety belt is unbuckled by intermittently illuminating the safety belt warning indicator and sounding a chime through the front speakers.

The Belt-Minder ® begins once the current safety belt warning has ended (65 seconds [4 seconds Europe]) and the vehicle speed has exceeded 10 km/h (6 mph) (25 km/h [16 mph] Europe) with the driver or front passenger safety belt unbuckled. While activated, the Belt-Minder ® provides a series of chimes/safety belt warning indicator flash sequences. If the vehicle speed drops below 5 km/h (3 mph) (except Europe) once the Belt-Minder ® chime has activated, the chime turns off and the safety belt warning indicator remains on. For European vehicles, the Belt-Minder ® does not suspend the chime until the driver or passenger safety belt is buckled. When the vehicle speed exceeds 10 km/h (6 mph) again, the Belt-Minder ® chime resumes. With the Belt-Minder ® active for approximately 6 seconds, the safety belt warning indicator continues to flash and the chime suspends for approximately 30 seconds (10 seconds Europe) then resumes the sequence. After approximately 5 minutes the Belt-Minder ® times out and turns off.

When MyKey ® is in use, the driver cannot disable the Belt-Minder ®. Once the Belt-Minder ® is activated, the Belt-Minder ® continues to chime periodically (does not time out after 5 minutes) and the audio system is muted until the driver and passenger safety belts are fastened.

For all markets except Europe, the Belt-Minder ® provides the driver and front passenger with a tollbooth feature where the Belt-Minder ® is suspended for 60 seconds (10 seconds with MyKey ®), after the initial Belt-Minder ® warning and the driver or passenger safety belt is unbuckled (such as when the driver stops at a tollbooth). There is no toll booth feature for Europe.

To control the Belt-Minder ®, the IPC receives the vehicle speed, gear lever position, driver safety belt buckle status, passenger safety belt buckle status and front passenger detect status messages from the GWM over the HS-CAN3.

The GWM receives the vehicle speed and gear lever position messages from the PCM over the HS-CAN1.

The IPC receives the driver safety belt buckle status, passenger safety belt buckle status and the front passenger detect status messages from the RCM over the HS-CAN2.

When the conditions require the Belt-Minder ® chime, the IPC sends the IPC chime request message to the ACM and the audio DSP module over the HS-CAN3 to sound the chime.

DESCRIPTION AND OPERATION > WARNING CHIMES - SYSTEM OPERATION AND COMPONENT DESCRIPTION > BLIND SPOT INFORMATION SYSTEM (BLIS ®)/CROSS TRAFFIC ALERT (CTA) WARNING CHIME

The Blind Spot Information System (BLIS ®)/Cross Traffic Alert (CTA) warning chime sounds to alert the driver that a vehicle has been detected or that there is a system fault. The Blind Spot Information System (BLIS ®)/Cross Traffic Alert (CTA) warning chime sounds a 0.25-second chime continuously through the rear speakers until the request is ended.

The IPC receives the Cross Traffic Alert (CTA) left status, Cross Traffic Alert (CTA) right status, side obstacle sensor status-left and the side obstacle sensor status-right request messages from the GWM over the HS-CAN3.

The GWM receives the Cross Traffic Alert (CTA) left status, the Cross Traffic Alert (CTA) the right status, side obstacle sensor status-left and the side obstacle sensor status-right request messages from the SODL and SODR over the MS-CAN.

When a chime request is received, the IPC sends the IPC chime request message to the ACM and DSP module over the HS-CAN3 to sound the chime.

DESCRIPTION AND OPERATION > WARNING CHIMES - SYSTEM OPERATION AND COMPONENT DESCRIPTION > DOOR AJAR WARNING CHIME

The door ajar warning chime warns that a door is ajar. When a door becomes ajar while the ignition is in RUN with vehicle speed greater than 5 km/h (3 mph), the IPC displays the appropriate door ajar warning message and sounds a single chime tone through the front speakers for each door opened. The door ajar chime only sounds once for each time the door is opened, and only repeats the chime if the door is closed then reopened.

The IPC receives the driver door ajar status and passenger door ajar status from the GWM over the HS-CAN3. The GWM receives the driver door ajar status and passenger door ajar status from the BCM over the HS-CAN1.

When a chime request is received, the IPC sends the IPC chime request message to the ACM and the audio DSP module over the HS-CAN3 to sound the chime.

DESCRIPTION AND OPERATION > WARNING CHIMES - SYSTEM OPERATION AND COMPONENT DESCRIPTION > FORWARD COLLISION WARNING CHIME

The forward collision warning chime warns that a forward collision potential has been detected or the CCM detects a forward collision warning system concern. Once the forward collision system detects a possible forward collision, the CCM sends the HUD module the heads up flash rate message to flash the forward collision warning, and the forward collision warning message request to the IPC through the GWM to sound a 0.25-second chime tone 12 times.

The forward collision warning system and chime can be disabled or turned off using the message center. When MyKey ® is in use, the driver cannot disable the forward collision warning system. When the

driver disables the forward collision warning chime, the CCM sends the IPC the forward collision chime request through the GWM to sound a 0.25-second chime tone 12 times at 50% volume. The forward collision warning chime and confirmation chime are both sounded through the front speakers.

The IPC receives the forward collision warning message request and the forward collision chime request from the GWM over the HS-CAN3.

The GWM receives the forward collision warning message request and the forward collision chime request from the CCM over the HS-CAN2.

When a chime request is received, the IPC sends the IPC chime request message to the ACM and the audio DSP module over the HS-CAN3 to sound the chime.

DESCRIPTION AND OPERATION > WARNING CHIMES - SYSTEM OPERATION AND COMPONENT DESCRIPTION > HEADLAMPS ON WARNING CHIME

The headlamps on warning chime warns the headlamps are on when exiting the vehicle. When the driver exits the vehicle with the driver door ajar, the headlamp switch is in the PARK or HEADLAMP position and the ignition is OFF, the BCM sends the headlamp switch status message to the IPC through the GWM to sound a 1-second chime tone continuously through the front speakers.

The IPC receives the headlamp on warning chime message from the GWM over the HS-CAN3.

The GWM receives the headlamp on warning chime message from the BCM over the HS-CAN1.

When a chime request is received, the IPC sends the IPC chime request message to the ACM and the audio DSP module over the HS-CAN3 to sound the chime.

DESCRIPTION AND OPERATION > WARNING CHIMES - SYSTEM OPERATION AND COMPONENT DESCRIPTION > IGNITION-ENGINE ON WARNING CHIME

The ignition-engine on chime informs the driver they are exiting the vehicle when the ignition has been left on (engine off) or the engine is running. When the driver exits the vehicle with the ignition on or with the engine running, the ignition-engine on warning chime sounds five 1-second chime tones through the front speakers. The IPC uses driver door ajar status, engine status, and transmission gear display mode messaged inputs to control the ignition-engine on warning chime.

The IPC receives the driver door ajar status, engine status and transmission gear display mode messages from the GWM over the HS-CAN3.

The GWM receives the driver door ajar status message from the BCM over the HS-CAN1.

The GWM receives the engine status and transmission gear display mode messages from the PCM over the HS-CAN1.

When a chime request is received, the IPC sends the IPC chime request message to the ACM and the audio DSP module over the HS-CAN3 to sound the chime.

DESCRIPTION AND OPERATION > WARNING CHIMES - SYSTEM OPERATION AND

COMPONENT DESCRIPTION > KEY-IN-IGNITION WARNING CHIME (WITHOUT PUSH BUTTON START)

The key-in-ignition warning chime warns the key is still in the ignition lock cylinder or the ignition is in ACC when the driver door is ajar. The key-in-ignition warning chime sounds repetitive 0.5-second chime tones through the front speakers until either the key is removed from the lock cylinder, the ignition is in RUN or the driver door is closed.

The IPC receives the key-in-ignition status from the GWM over the HS-CAN3.

The GWM receives the key-in-ignition status from the BCM over the HS-CAN1.

When a chime request is received, the IPC sends the IPC chime request message to the ACM and the audio DSP module over the HS-CAN3 to sound the chime.

DESCRIPTION AND OPERATION > WARNING CHIMES - SYSTEM OPERATION AND COMPONENT DESCRIPTION > MEMORY-STORED FEEDBACK CHIME

The memory-stored feedback chime informs the driver their preferences have been successfully programmed through the memory set procedure. The memory-stored feedback chime sounds a 100-millisecond chirp through the front speakers when the DSM successfully stores a memory change.

The IPC receives the memory feedback request from the GWM over the HS-CAN3.

The GWM receives the memory feedback request from the BCM over the HS-CAN1.

When a chime request is received, the IPC sends the IPC chime request message to the ACM and the audio DSP module over the HS-CAN3 to sound the chime.

DESCRIPTION AND OPERATION > WARNING CHIMES - SYSTEM OPERATION AND COMPONENT DESCRIPTION > MESSAGE CENTER WARNING CHIME

The message center warning chime feature draws the driver's attention to the message center display to view new warning messages. There are 3 different message center warning chime types that are defined by the length of the chime tone, which are designed to create a greater sense of urgency based on the nature of the condition and message displayed in the message center.

- Informational (1-second chime)
- Soft warning (0.5-second chime)
- Hard warning (0.25-second chime)

When a new message request is received, the IPC sends the IPC chime request message to the ACM and the audio DSP module over the HS-CAN3 to sound the chime.

DESCRIPTION AND OPERATION > WARNING CHIMES - SYSTEM OPERATION AND COMPONENT DESCRIPTION > PARKING AID CHIME

The parking aid system uses a visual display in the FCDIM and a chime to alert the driver objects are close to the vehicle. The parking aid chime sounds a repetitive chime tone through the rear speakers that decreases the time off between chime tones as objects get closer to the sensor until a continuous tone is heard.

The IPC receives the parking aid chime request from the GWM over the HS-CAN3.

The GWM receives the parking aid chime request from the PAM over the HS-CAN1.

When a chime request is received, the IPC sends the IPC chime request message to the ACM and the audio DSP module over the HS-CAN3 to sound the chime.

DESCRIPTION AND OPERATION > WARNING CHIMES - SYSTEM OPERATION AND COMPONENT DESCRIPTION > PARKING BRAKE WARNING CHIME

The parking brake warning chime warns that the parking brake is engaged when the vehicle is in motion. The parking brake warning chime sounds through the front speakers if the ignition is in ON, the parking brake is engaged, and the vehicle speed is greater than 5 km/h (3 mph). The parking brake warning chime stops sounding and resets if the parking brake is released, the ignition is on, if the vehicle speed is less than 5 kmh (3 mph), or after 90 seconds from the time the chime is activated.

The IPC receives the parking brake chime request from the GWM over the HS-CAN3

The GWM receives the parking brake chime request from the BCM over the HS-CAN1.

When a chime request is received, the IPC sends the IPC chime request message to the ACM and the audio DSP module over the HS-CAN3 to sound the chime.

DESCRIPTION AND OPERATION > WARNING CHIMES - SYSTEM OPERATION AND COMPONENT DESCRIPTION > PERIMETER ALARM WARNING CHIME

The perimeter alarm warning chime alerts the driver the perimeter alarm is armed when the driver door is unlocked before disarming the alarm. The IPC displays a perimeter alarm message in the message center and the perimeter alarm warning chime sounds for 12 1-second chime tones through the front speakers when the driver door is opened. The perimeter alarm warning chime turns off when the perimeter alarm is disarmed (either by using the key fob or turning the key to the ON position). After the twelve second warning chime duration, the warning chime stops sounding and the perimeter alarm activates, sounding the horn and flashing the turn signal lamps.

The IPC receives the perimeter alarm warning chime request from the GWM over the HS-CAN3.

The GWM receives the perimeter alarm warning chime request from the BCM over the HS-CAN1.

When a chime request is received, the IPC sends the IPC chime request message to the ACM and the audio DSP module over the HS-CAN3 to sound the chime.

DESCRIPTION AND OPERATION > WARNING CHIMES - SYSTEM OPERATION AND COMPONENT DESCRIPTION > PRNDL NOT IN PARK WARNING CHIME

The IPC provides a PRNDL not in park warning chime that sounds along with the transmission not in park message center display to inform the driver the vehicle is not in PARK (P). The IPC displays the shift to park message and the PRNDL not in park warning chime sounds three 0.5-second chime tones through the front speakers if the selector lever is not in PARK (P), the ignition is OFF and the driver door is open or ajar. The IPC requires the transmission gear display mode, brake pedal applied, vehicle speed, driver door ajar and ignition status to control the PRNDL not in park warning chime.

The IPC receives all required messages from the GWM over the HS-CAN3.

The GWM receives the brake pedal applied, transmission gear display mode and vehicle speed messages from the PCM over the HS-CAN1.

The GWM receives the driver door ajar status and ignition status message from the BCM over the HS-CAN1.

When a chime request is received, the IPC sends the IPC chime request message to the ACM and the audio DSP module to sound the chime.

DESCRIPTION AND OPERATION > WARNING CHIMES - SYSTEM OPERATION AND COMPONENT DESCRIPTION > SAFETY BELT WARNING CHIME

The safety belt warning chime warns the safety belt is not fastened. The safety belt warning chime sounds a repetitive 1-second chime tone for 6 seconds through the front speakers when the driver safety belt is not fastened and the ignition is transitioned from OFF or ACC to ON or START. The safety belt warning chime stops sounding when the safety belt is fastened, when the ignition is transitioned from ON or START to OFF or ACC, or when the chime has sounded for 6 seconds.

The IPC receives the driver safety belt buckle status message from the GWM over the HS-CAN3.

The GWM receives the driver safety belt buckle status from the RCM over the HS-CAN2.

When the conditions require the safety belt warning chime, the IPC sends the IPC chime request message to the ACM and DSP module over the HS-CAN3 to sound the chime.

DESCRIPTION AND OPERATION > WARNING CHIMES - SYSTEM OPERATION AND COMPONENT DESCRIPTION > SERVICE ADVANCETRAC ® WARNING CHIME

The service AdvanceTrac ® warning chime warns the ABS module has detected a fault condition in the stability-traction control system. If a fault condition exists in the stability-traction control system, the ABS module sends the IPC the stability-traction control chime request to display the service AdvanceTrac ® message in the message center and to sound 3 0.5-second chime tones through the front speakers.

The IPC receives the stability-traction control chime request from the GWM over the HS-CAN3.

The GWM receives the stability-traction control chime request from the ABS module over the HS-CAN2.

When a chime request is received, the IPC sends the IPC chime request message to the ACM and the audio DSP module over the HS-CAN3 to sound the chime.

DESCRIPTION AND OPERATION > WARNING CHIMES - SYSTEM OPERATION AND COMPONENT DESCRIPTION > TURN SIGNAL ON CHIME TONE

The IPC provides a repetitive 1-second on/off tick-tock chime tone along with visual RH or LH turn indicators to inform the driver the turn signal or hazard lamp function is on.

The IPC receives the left turn lamp request and the right turn lamp request messages from the GWM over the HS-CAN3.

The GWM receives the left turn lamp request and the right turn lamp request messages from the BCM over the HS-CAN1.

DESCRIPTION AND OPERATION > WARNING CHIMES - SYSTEM OPERATION AND COMPONENT DESCRIPTION > TURN SIGNAL LEFT ON CHIME

The turn signal left on or turn signal minder chime uses both odometer and the turn signal status message to determine the turn signals have been left on. The turn signal left on chime sounds a repetitive 1-second chime through the front speakers when the vehicle is driven with the turn signal on for more than 3.2 km (2.0 miles).

The IPC receives the turn signal status from the GWM over the HS-CAN3.

The GWM receives the turn signal status from the BCM over the HS-CAN1.

When a chime request is received, the IPC sends the IPC chime request message to the ACM and the audio DSP module over the HS-CAN3 to sound the chime.

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > DTC CHART: INSTRUMENT PANEL CLUSTER (IPC)

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

DTC Chart - IPC

DTC	Description	Action
P0460:11	Fuel Level Sensor "A" Circuit: Circuit Short To Ground	GO to Pinpoint Test C
P0460:13	Fuel Level Sensor "A" Circuit: Circuit Open	GO to Pinpoint Test C
P1243:06	Second Fuel Pump Fault or Ground Fault: Algorithm Based Failure	GO to Pinpoint Test C
P1346:11	Fuel Level Sensor "B" Circuit: Circuit Short To Ground	GO to Pinpoint Test C

P1346:13	Fuel Level Sensor "B" Circuit: Circuit Open	GO to Pinpoint Test C
P1534:01	Restraint Deployment Indicator Circuit: General Electrical Failure	INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) . Diagnose all RCM Diagnostic Trouble Codes (DTCs). REFER to: Airbag Supplemental Restraint System (SRS) .
P1706:00	High Vehicle Speed Observed in Park: No Sub Type Information	GO to Pinpoint Test V
U0100:00	Lost Communication With ECM/PCM "A": No Sub Type Information	GO to Pinpoint Test BM
U0104:00	Lost Communication With Cruise Control Module: No Sub Type Information	GO to Pinpoint Test BO
U0121:00	Lost Communication With Anti-Lock Brake System (ABS) Control Module: No Sub Type Information	GO to Pinpoint Test BP
U0140:00	Lost Communication With Body Control Module: No Sub Type Information	GO to Pinpoint Test BQ
U0146:00	Lost Communication With Gateway "A": No Sub Type Information	GO to Pinpoint Test BS
U0151:00	Lost Communication With Restraints Control Module: No Sub Type Information	GO to Pinpoint Test BT
U0159:00	Lost Communication With Parking Assist Control Module "A": No Sub Type Information	GO to Pinpoint Test BV
U0184:00	Lost Communication With Radio: No Sub Type Information	GO to Pinpoint Test BW
U0212:00	Lost Communication With Steering Column Control Module: No Sub Type Information	GO to Pinpoint Test BX
U0232:00	Lost Communication With Side Obstacle Detection Control Module - Left: No Sub Type Information	GO to Pinpoint Test BY
U0233:00	Lost Communication With Side Obstacle Detection Control Module - Right: No Sub Type Information	GO to Pinpoint Test BY
U0401:00	Invalid Data Received from ECM/PCM A: No Sub Type Information	This DTC sets when the IPC receives invalid network data for the speedometer, engine temperature, or transmission

		fluid temperature data from the PCM. RETRIEVE and REPAIR all non-network Diagnostic Trouble Codes (DTCs) in the PCM and other modules on the network. Refer to the appropriate article for the procedure. If no Diagnostic Trouble Codes (DTCs) are present in the PCM, DIAGNOSE the observable symptom.
U0401:81	Invalid Data Received from ECM/PCM A: Invalid Serial Data Received	This DTC sets when the IPC receives invalid network data for the speedometer, engine temperature, or transmission fluid temperature data from the PCM. RETRIEVE and REPAIR all non-network Diagnostic Trouble Codes (DTCs) in the PCM and other modules on the network. Refer to the appropriate article for the procedure. If no Diagnostic Trouble Codes (DTCs) are present in the PCM, DIAGNOSE the observable symptom.
U0401:82	Invalid Data Received from ECM/PCM A: Alive/Sequence Counter Incorrect/Not Updated	This DTC sets when the IPC receives invalid network data for the forward collision or adaptive cruise control data from the PCM. RETRIEVE and REPAIR all non-network Diagnostic Trouble Codes (DTCs) in the PCM and other modules on the network. Refer to the appropriate article for the procedure. If no Diagnostic Trouble Codes (DTCs) are present in the PCM, DIAGNOSE the observable symptom.
U0405:56	Invalid Data Received From Cruise Control Module: Invalid/Incompatible Configuration	This DTC sets when the IPC receives invalid network data for adaptive cruise control from the CCM. CHECK the vehicle service history for recent service actions related to this module. This DTC sets due to incomplete or incorrect Programmable Module Installation (PMI) procedures. If

		there have been recent service actions with this module, REPEAT the Programmable Module Installation (PMI) procedure as directed by the diagnostic scan tool. If there have been no recent service actions, INSTALL a new module to correct the failure to retain configuration data.
U0415:00	Invalid Data Received From Anti-Lock Brake System (ABS) Control Module: No Sub Type Information	This DTC sets when the IPC receives invalid accelerometer network data from the ABS module. RETRIEVE and REPAIR all non-network Diagnostic Trouble Codes (DTCs) in the ABS module and other modules on the network. REFER to: Anti-Lock Brake System (ABS) and Stability Control . If no Diagnostic Trouble Codes (DTCs) are present in the ABS module, DIAGNOSE the observable symptom.
U0415:81	Invalid Data Received From Anti-Lock Brake System (ABS) Control Module: Invalid Serial Data Received	This DTC sets when the IPC receives invalid accelerometer network data from the ABS module. RETRIEVE and REPAIR all non-network Diagnostic Trouble Codes (DTCs) in the ABS module and other modules on the network. REFER to: Anti-Lock Brake System (ABS) and Stability Control . If no Diagnostic Trouble Codes (DTCs) are present in the ABS module, DIAGNOSE the observable symptom.
U0420:82	Invalid Data Received From Power Steering Control Module: Alive/Sequence Counter Incorrect/Not Updated	GO to Pinpoint Test BZ
U0422:00	Invalid Data Received From Body Control Module: No Sub Type Information	This DTC sets when the IPC receives invalid network TPMS data from the BCM. RETRIEVE and REPAIR all non-network Diagnostic Trouble Codes (DTCs) in the BCM and other modules on the network. REFER to: Body Control Module (BCM) .

		If no Diagnostic Trouble Codes (DTCs) are present in the BCM, DIAGNOSE the observable symptom.
U0452:81	Invalid Data Received From Restraints Control Module: Invalid Serial Data Received	This DTC sets when the IPC receives invalid network data from the RCM due to incorrect Belt-Minder ® configuration in the IPC. RETRIEVE and REPAIR all non-network Diagnostic Trouble Codes (DTCs) in the RCM and other modules on the network. REFER to: Airbag Supplemental Restraint System (SRS) . If no Diagnostic Trouble Codes (DTCs) are present in the RCM, DIAGNOSE the observable symptom.
U046B:86	Invalid Data Received From Global Positioning System Module: Signal Invalid	This DTC sets when the IPC receives invalid network data from the GPSM. RETRIEVE and REPAIR all non-network Diagnostic Trouble Codes (DTCs) in the GPSM and other modules on the network. Refer to the appropriate article for the procedure. If no Diagnostic Trouble Codes (DTCs) are present in the GPSM, DIAGNOSE the observable symptom.
U0533:56	Invalid Data Received From Side Obstacle Detection Control Module-Left: Invalid/Incompatible Configuration	CHECK the vehicle service history for recent service actions related to this module. This DTC sets due to incomplete or incorrect Programmable Module Installation (PMI) procedures. If there have been recent service actions with this module, REPEAT the Programmable Module Installation (PMI) procedure as directed by the diagnostic scan tool. If there have been no recent service actions, INSTALL a new module to correct the failure to retain configuration data.
U0534:56	Invalid Data Received From Side Obstacle Detection Control Module-Right: Invalid/Incompatible	CHECK the vehicle service history for recent service actions related to this module. This DTC

	Configuration	sets due to incomplete or incorrect Programmable Module Installation (PMI) procedures. If there have been recent service actions with this module, REPEAT the Programmable Module Installation (PMI) procedure as directed by the diagnostic scan tool. If there have been no recent service actions, INSTALL a new module to correct the failure to retain configuration data.
U2100:00	Initial Configuration Not Complete: No Sub Type Information	CHECK the vehicle service history for recent service actions related to this module. This DTC sets due to incomplete or incorrect Programmable Module Installation (PMI) procedures. If there have been recent service actions with this module, REPEAT the Programmable Module Installation (PMI) procedure as directed by the diagnostic scan tool. If there have been no recent service actions, INSTALL a new module to correct the failure to retain configuration data.
U3000:41	Control Module: General Checksum Failure	CLEAR the Diagnostic Trouble Codes (DTCs). REPEAT the self-test. If DTC U3000:41 is retrieved again, INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .
U3000:42	Control Module: General Memory Failure	CLEAR the Diagnostic Trouble Codes (DTCs). REPEAT the self-test. If DTC U3000:42 is retrieved again, INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .
U3000:44	Control Module: Data Memory Failure	CLEAR the Diagnostic Trouble Codes (DTCs). REPEAT the self-test. If DTC U3000:44 is retrieved again, INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .
U3000:46	Control Module: Calibration/Parameter Memory Failure	CLEAR the Diagnostic Trouble Codes (DTCs). REPEAT the

		self-test. If DTC U3000:46 is retrieved again, INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .
U3000:54	Control Module: Missing Calibration	CHECK the vehicle service history for recent service actions related to this module. This DTC sets due to incomplete or incorrect calibration files. If there have been recent service actions with this module, REFLASH the IPC. If there have been no recent service actions, INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .
U3003:16	Battery Voltage: Circuit Voltage Below Threshold	GO to Pinpoint Test CA
U3003:17	Battery Voltage: Circuit Voltage Above Threshold	GO to Pinpoint Test CC
U300A:64	Ignition Switch: Signal Plausibility Failure	DTC U300A:64 sets in continuous memory when the IPC detects a messaged START input for 15 seconds or longer. Once the fault condition is detected, the IPC operates with limited functionality for 15 seconds then returns to full functionality. DIAGNOSE any ignition or starting system concerns. REFER to: Steering Wheel and Column Electrical Components .

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > DTC CHART: INFORMATION CENTER MODULE (ICM)

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

DTC Chart - ICM

DTC	Description	Action
U0100:00	Lost Communication With ECM/PCM "A": No Sub Type Information	GO to Pinpoint Test BN
U0140:00	Lost Communication With Body Control Module: No Sub Type	GO to Pinpoint Test BR

	Information	
U0155:00	Lost Communication With Instrument Panel Cluster (IPC) Control Module: No Sub Type Information	GO to Pinpoint Test BU
U2100:00	Initial Configuration Not Complete: No Sub Type Information	CHECK the vehicle service history for recent service actions related to this module. This DTC sets due to incomplete or incorrect Programmable Module Installation (PMI) procedures. If there have been recent service actions with this module, REPEAT the Programmable Module Installation (PMI) procedure as directed by the diagnostic scan tool. REFER to: MODULE CONFIGURATION . If there have been no recent service actions, INSTALL a new module to correct the failure to retain configuration data.
U3000:41	Control Module: General Checksum Failure	CLEAR the Diagnostic Trouble Codes (DTCs). REPEAT the self-test. If DTC U3000:41 is retrieved again, INSTALL a new ICM. REFER to: Information Center Module (ICM) .
U3000:42	Control Module: General Memory Failure	CLEAR the Diagnostic Trouble Codes (DTCs). REPEAT the self-test. If DTC U3000:42 is retrieved again, INSTALL a new ICM. REFER to: Information Center Module (ICM) .
U3000:44	Control Module: Data Memory Failure	CLEAR the Diagnostic Trouble Codes (DTCs). REPEAT the self-test. If DTC U3000:44 is retrieved again, INSTALL a new ICM. REFER to: Information Center Module (ICM) .
U3000:46	Control Module: Calibration/Parameter Memory Failure	CLEAR the Diagnostic Trouble Codes (DTCs). REPEAT the self-test. If DTC U3000:46 is retrieved again, INSTALL a new ICM. REFER to: Information Center Module (ICM) .
U3000:54	Control Module: Missing Calibration	CHECK the vehicle service history for recent service actions related to this module. This DTC sets due to incomplete or incorrect

		calibration files. If there have been recent service actions with this module, REFLASH the IPC. If there have been no recent service actions, INSTALL a new ICM. REFER to: Information Center Module (ICM) .
U3003:16	Battery Voltage: Circuit Voltage Below Threshold	GO to Pinpoint Test CB
U3003:17	Battery Voltage: Circuit Voltage Above Threshold	GO to Pinpoint Test CD

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > DTC CHART: AUDIO DSP MODULE

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

DTC	Description	Action
B13F8:13	Audio Input 2: Circuit Open	GO to Pinpoint Test BC
B13FA:13	Audio Input 4: Circuit Open	GO to Pinpoint Test BC
All other DTCs	-	REFER to: Information and Entertainment System .

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > DTC CHART: BODY CONTROL MODULE (BCM)

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

DTC Chart - BCM

DTC	Description	Action
B1048:01	Brake Fluid Level Switch: General Electrical Failure	GO to Pinpoint Test Q
B1048:7B	Brake Fluid Level Switch: Low Fluid Level	GO to Pinpoint Test Q
B1178:01	Boot/Trunk Ajar Switch: General Electrical Failure	GO to Pinpoint Test AI
C1D00:11	Park Brake Apply Switch: Circuit Short To Ground	GO to Pinpoint Test Q

All other DTCs	-	REFER to: Body Control Module (BCM) .

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > DTC CHART: POWERTRAIN CONTROL MODULE (PCM)

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

DTC Chart - PCM

DTC	Description	Action
P0461	Fuel Level Sensor "A" Circuit Range/Performance	Refer to ENGINE CONTROLS - INTRODUCTION (EXCEPT DIESEL & HYBRID) . If sent here from the Engine Controls article, GO to Pinpoint Test C
P0462	Fuel Level Sensor "A" Circuit Low	Refer to ENGINE CONTROLS - INTRODUCTION (EXCEPT DIESEL & HYBRID) . If sent here from the Engine Controls article, GO to Pinpoint Test C
P0463	Fuel Level Sensor "A" Circuit High	Refer to ENGINE CONTROLS - INTRODUCTION (EXCEPT DIESEL & HYBRID) . If sent here from the Engine Controls article, GO to Pinpoint Test C
P0521	Engine Oil Pressure Sensor/Switch "A" Circuit Range/Performance	For 2.3L and 3.7L, GO to Pinpoint Test AN For 5.0L and 5.2L, GO to Pinpoint Test AO
P0522	Engine Oil Pressure Sensor/Switch "A" Circuit Low	For 2.3L and 3.7L, GO to Pinpoint Test AN For 5.0L and 5.2L, GO to Pinpoint Test AO
P0523	Engine Oil Pressure Sensor/Switch "A" Circuit High	For 2.3L and 3.7L, GO to Pinpoint Test AN For 5.0L and 5.2L, GO to Pinpoint Test AO
P0524	Engine Oil Pressure Too Low	For 2.3L and 3.7L, GO to Pinpoint Test AN For 5.0L and 5.2L, GO to Pinpoint

		Test AO
P2066	Fuel Level Sensor "B" Circuit Range/Performance	Refer to ENGINE CONTROLS - INTRODUCTION (EXCEPT DIESEL & HYBRID) . If sent here from the Engine Controls article, GO to Pinpoint Test C
P2067	Fuel Level Sensor "B" Circuit Low	Refer to ENGINE CONTROLS - INTRODUCTION (EXCEPT DIESEL & HYBRID) . If sent here from the Engine Controls article, GO to Pinpoint Test C
P2068	Fuel Level Sensor "B" Circuit High	Refer to ENGINE CONTROLS - INTRODUCTION (EXCEPT DIESEL & HYBRID) . If sent here from the Engine Controls article, GO to Pinpoint Test C
P25B0	Fuel Level Sensor "A" Stuck	Refer to ENGINE CONTROLS - INTRODUCTION (EXCEPT DIESEL & HYBRID) . If sent here from the Engine Controls article, GO to Pinpoint Test C
P25B1	Fuel Level Sensor "B" Stuck	Refer to ENGINE CONTROLS - INTRODUCTION (EXCEPT DIESEL & HYBRID) . If sent here from the Engine Controls article, GO to Pinpoint Test C
P25B2	Fuel Level Sensor "A" or "B" Stuck	Refer to ENGINE CONTROLS - INTRODUCTION (EXCEPT DIESEL & HYBRID) . If sent here from the Engine Controls article, GO to Pinpoint Test C
All other DTCs	-	Refer to ENGINE CONTROLS - INTRODUCTION (EXCEPT DIESEL & HYBRID) . Refer to the appropriate article for the procedure.

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > DTC CHART: STEERING COLUMN CONTROL MODULE (SCCM)

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

DTC Chart - SCCM

DTC	Description	Action
B137F:09	Steering Wheel Left Switch Pack: Component Failure	GO to Pinpoint Test AB
B137F:11	Steering Wheel Left Switch Pack: Circuit Short To Ground	GO to Pinpoint Test AB
B137F:17	Steering Wheel Left Switch Pack: Circuit Voltage Above Threshold	GO to Pinpoint Test AB
All other DTCs	-	REFER to: Steering Wheel and Column Electrical Components .

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > SYMPTOM CHART(S) > SYMPTOM CHART: INSTRUMENT PANEL CLUSTER (IPC)

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

Symptom Chart

Condition	Possible Sources	Actions
A module does not respond to the diagnostic scan tool	Fuse Wiring, terminals or connectors Communication concern Module	REFER to: MODULE COMMUNICATIONS NETWORK .
The IPC is inoperative	Refer to the Pinpoint Test	GO to Pinpoint Test A
Multiple gauges, indicators, RTT indicators, warnings and chimes are inoperative or always on	Refer to the Pinpoint Test	GO to Pinpoint Test A
A virtual gauge (accelerometer, air fuel ratio, axle temperature, battery voltage gauge, cylinder head temperature, engine oil pressure, engine oil temperature, inlet air temperature, transmission fluid temperature or vacuum-boost), is inoperative	Refer to the Pinpoint Test	GO to Pinpoint Test B
Incorrect fuel gauge indication	Refer to the Pinpoint Test	GO to Pinpoint Test C

The speedometer is inoperative	Refer to the Pinpoint Test	GO to Pinpoint Test D
Incorrect speedometer indication	Refer to the Pinpoint Test	GO to Pinpoint Test E
The odometer is inoperative	Refer to the Pinpoint Test	GO to Pinpoint Test F
The tachometer is inoperative	Refer to the Pinpoint Test	GO to Pinpoint Test G
Incorrect tachometer indication	Refer to the Pinpoint Test	GO to Pinpoint Test H
The temperature gauge is inoperative	Refer to the Pinpoint Test	GO to Pinpoint Test I
Incorrect temperature gauge indication	Refer to the Pinpoint Test	GO to Pinpoint Test J
The engine oil pressure gauge is inoperative (ICM gauge pack)	Refer to the Pinpoint Test	GO to Pinpoint Test K
The engine oil temperature gauge is inoperative (ICM gauge pack) (SVT only)	Refer to the Pinpoint Test	GO to Pinpoint Test L
The vacuum-boost gauge is inoperative (ICM gauge pack) (except SVT)	Refer to the Pinpoint Test	GO to Pinpoint Test M
The ABS warning indicator is never or always on	Refer to the Pinpoint Test	GO to Pinpoint Test N
The airbag warning indicator is never or always on	Refer to the Pinpoint Test	GO to Pinpoint Test O
The brake warning indicator is never on	Refer to the Pinpoint Test	GO to Pinpoint Test P
The brake warning indicator is always on	Refer to the Pinpoint Test	GO to Pinpoint Test Q
The LED low beam malfunction indicator is never or always on	Refer to the Pinpoint Test	GO to Pinpoint Test R
The LH- RH turn signal, front fog lamp or high beam indicator is never or always on	Refer to the Pinpoint Test	GO to Pinpoint Test S
The lights on indicator is never or always on	Refer to the Pinpoint Test	GO to Pinpoint Test T
The MIL is never or always on	Refer to the Pinpoint Test	GO to Pinpoint Test U
The PRNDL indicator is never on or never displays P	Refer to the Pinpoint Test	GO to Pinpoint Test V
The rear fog lamp indicator is never or always on (if equipped)	Refer to the Pinpoint Test	GO to Pinpoint Test W
The safety belt warning indicator is never or always on	Refer to the Pinpoint Test	GO to Pinpoint Test X

The stability-traction control indicator (sliding car icon) is never or always on	Refer to the Pinpoint Test	GO to Pinpoint Test Y
The stability-traction control disabled indicator (sliding car OFF icon) is never or always on	Refer to the Pinpoint Test	GO to Pinpoint Test Z
The TPMS warning indicator is never or always on	Refer to the Pinpoint Test	GO to Pinpoint Test AA

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > SYMPTOM CHART(S) > SYMPTOM CHART: INFORMATION AND MESSAGE CENTER

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

Symptom Chart

Condition	Possible Sources	Actions
The message center is not operating correctly	Refer to the Pinpoint Test	GO to Pinpoint Test AB
The message center display is blank	Refer to the Pinpoint Test	GO to Pinpoint Test A
The compass is inoperative	Refer to the Pinpoint Test	GO to Pinpoint Test AC
The digital speedometer display is inoperative or incorrect	Refer to the Pinpoint Test	VERIFY the message center display operates and functions correctly. If the message center functions correctly, DIAGNOSE the speedometer. For an inoperative speedometer, GO to Pinpoint Test D For an incorrect speedometer, GO to Pinpoint Test E If the message center does not function correctly, GO to Pinpoint Test AB
The DTE or Average Fuel Economy (AFE) display is inoperative	Refer to the Pinpoint Test	CHECK the operation of the speedometer, the fuel gauge and the odometer. If the speedometer does not operate correctly, GO to Pinpoint Test D If the odometer does not operate correctly, GO to Pinpoint Test F

		If the fuel gauge does not operate correctly, GO to Pinpoint Test C If the speedometer, the fuel gauge and odometer operate correctly, INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .
Incorrect or fluctuating DTE display	Refer to the Pinpoint Test	GO to Pinpoint Test AD
The HUD performance shift indication is never on (SVT only)	Refer to the Pinpoint Test	GO to Pinpoint Test AE
The Blind Spot Information System (BLISS ®) off RTT is never or always on	Refer to the Pinpoint Test	GO to Pinpoint Test AF
The charging system RTT is never or always on	Refer to the Pinpoint Test	GO to Pinpoint Test AG
The cruise control RTT is never on	Refer to the Pinpoint Test	GO to Pinpoint Test AH
The door or luggage compartment lid ajar RTT is never or always on	Refer to the Pinpoint Test	GO to Pinpoint Test AI
The drive mode RTT indicators are never or always on	Refer to the Pinpoint Test	GO to Pinpoint Test AJ
The engine over-temperature RTT is never or always on	Refer to the Pinpoint Test	GO to Pinpoint Test AK
The launch control RTT is never on	Refer to the Pinpoint Test	GO to Pinpoint Test AL
The low fuel RTT is never or always on	Refer to the Pinpoint Test	GO to Pinpoint Test AM
The low oil pressure RTT is never or always on	Refer to the Pinpoint Test	For 2.3L and 3.7L, GO to Pinpoint Test AN For 5.0L and 5.2L, GO to Pinpoint Test AO
The overspeed warning RTT (Gulf Cooperative Countries [GCC]) is never or always on	Refer to the Pinpoint Test	GO to Pinpoint Test AP
The powertrain malfunction (wrench) RTT is never or always on	Refer to the Pinpoint Test	GO to Pinpoint Test AQ
The steering mode RTT is never on	Refer to the Pinpoint Test	GO to Pinpoint Test AR
The vehicle dynamics (damper control) RTT is never on (SVT only)	Refer to the Pinpoint Test	GO to Pinpoint Test AS

The adaptive cruise control messages are never displayed	Message center concern Cruise control indication concern	OPEN then CLOSE the driver door and VERIFY the driver door ajar message displays correctly with the door open and closed. If the driver door ajar message does not function correctly, GO to Pinpoint Test AI If the driver door ajar message functions correctly, DIAGNOSE the adaptive cruise control RTT. REFER to: Cruise Control .
A Blind Spot Information System (BLIS ®)/Cross Traffic Alert (CTA) message is always displayed	Message center concern Blind Spot Information System (BLIS ®)/Cross Traffic Alert (CTA) indication concern	OPEN then CLOSE the driver door and VERIFY the driver door ajar message displays correctly with the door open and closed. If the driver door ajar message does not function correctly, GO to Pinpoint Test AI If the driver door ajar message functions correctly, DIAGNOSE the Blind Spot Information System (BLIS ®)/Cross Traffic Alert (CTA) system. REFER to: Blind Spot Information System .
A brake warning (brake fluid level low, parking brake applied or brake system malfunction) message is never or always displayed	Message center concern Brake warning indication concern	*NOTE: Disconnecting the GWM creates an unrelated fault to test the overall message center function and display.* With the ignition OFF, DISCONNECT GWM C2431 . Place the ignition ON and monitor the message center display.If multiple messages and popup displays do not display, GO to Pinpoint Test A If multiple messages and popup displays do display, DIAGNOSE the brake warning indicator.For never on, GO to Pinpoint Test P For always on, GO to Pinpoint Test Q
The ceramic brake wear warning message never or always displayed (SVT only)	Refer to the Pinpoint Test	GO to Pinpoint Test AT
The charging system warning message is never or always displayed	Message center concern Charging system RTT indication concern	OPEN then CLOSE the driver door and VERIFY the driver door ajar message displays correctly with the door open and closed.

		If the driver door ajar message does not function correctly, GO to Pinpoint Test AI If the driver door ajar message functions correctly, DIAGNOSE the charging system RTT. GO to Pinpoint Test AG
The check fuel fill inlet message is always displayed	Refer to the Pinpoint Test	GO to Pinpoint Test AU
The convertible top warning message is always displayed	Refer to the Pinpoint Test	GO to Pinpoint Test AV
A door or luggage compartment lid ajar warning message is never or always displayed	Message center concern Door ajar RTT indication concern	*NOTE: Disconnecting the GWM creates an unrelated fault to test the overall message center function and display.* With the ignition OFF, DISCONNECT GWM C2431 . Place the ignition ON and monitor the message center display.If multiple messages and popup displays do not display, GO to Pinpoint Test A If multiple messages and popup displays do display, DIAGNOSE the door ajar RTT. GO to Pinpoint Test AI
The engine on warning message is always displayed (push button start only)	Refer to the Pinpoint Test	GO to Pinpoint Test AW
The engine oil change message is never displayed	Message center concern The PCM has not reached the programmed mileage/time based on the criteria required to display the message.	*NOTE: Using the system check in the message center, verify that the oil life is between 1 and 5% for the ENGINE OIL CHANGE SOON message or at 0% for the OIL CHANGE REQUIRED message.* OPEN then CLOSE the driver door and VERIFY the DRIVER DOOR AJAR message functions correctly.If the DRIVER DOOR AJAR message does not function correctly, GO to Pinpoint Test AI If the DRIVER DOOR AJAR message functions

		correctly with the oil life between 0-5%, INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .If the DRIVER DOOR AJAR message functions correctly with the oil life **not** at the specified value, INFORM the customer how the message center functions and how the oil life messages are set.
The engine oil change message is always displayed	The oil life needs reset	RESET the oil life. REFER to the Owner's Literature.
The engine over-temperature warning message is never or always displayed	Message center concern Temperature gauge indication concern.	OPEN then CLOSE the driver door and VERIFY the driver door ajar message displays correctly with the door open and closed. If the driver door ajar message does not function correctly, GO to Pinpoint Test Al If the driver door ajar message functions correctly, DIAGNOSE the temperature gauge. For an inoperative gauge, GO to Pinpoint Test I For an incorrect gauge, GO to Pinpoint Test J
The factory or transport mode message is always on	Vehicle is in factory or transport mode	Place the vehicle in normal operation mode. REFER to: Transport and Factory Mode Deactivation in MULTIFUNCTION ELECTRONIC MODULES .
A forward collision warning message is never or always displayed	Message center concern Forward collision system concern.	OPEN then CLOSE the driver door and VERIFY the driver door ajar message displays correctly with the door open and closed. If the driver door ajar message does not function correctly, GO to Pinpoint Test Al If the driver door ajar message functions correctly, DIAGNOSE the forward collision warning system. REFER to: Collision Warning and Collision Avoidance System .
The hill start assist warning message is always displayed	Refer to the Pinpoint Test	GO to Pinpoint Test AX
The launch control message is never displayed	Message center concern Launch control indication concern.	OPEN then CLOSE the driver door and VERIFY the driver door ajar message displays correctly with the door open and closed. If the driver door ajar message

		does not function correctly, GO to Pinpoint Test AI If the driver door ajar message functions correctly, DIAGNOSE the launch control RTT. GO to Pinpoint Test AL
A load shed message is always displayed	Message center concern Battey charging system concern.	OPEN then CLOSE the driver door and VERIFY the driver door ajar message displays correctly with the door open and closed. If the driver door ajar message does not function correctly, GO to Pinpoint Test AI If the driver door ajar message functions correctly, DIAGNOSE the charging system. Refer to the appropriate article for the procedure.
The low oil pressure warning message is never or always displayed	Message center concern Low oil pressure indication concern.	OPEN then CLOSE the driver door and VERIFY the driver door ajar message displays correctly with the door open and closed. If the driver door ajar message does not function correctly, GO to Pinpoint Test AI If the driver door ajar message functions correctly, DIAGNOSE low oil pressure RTT. For 2.3L and 3.7L, GO to Pinpoint Test AN For 5.0L and 5.2L, GO to Pinpoint Test AO
A memory seat message is never displayed	Message center concern Memory seat concern.	OPEN then CLOSE the driver door and VERIFY the driver door ajar message displays correctly with the door open and closed. If the driver door ajar message does not function correctly, GO to Pinpoint Test AI If the driver door ajar message functions correctly, DIAGNOSE memory seats. REFER to: FRONT SEATS .
A MyKey ® menu is not available or incorrect	MyKey ® programmed key in use Number of keys set to unlimited mode Non-Ford approved remote start system installed	*NOTE: MyKey ® may not be compatible with non-Ford approved remote start systems.*

		REFER to the Owner's Literature.
The parking aid malfunction message is always displayed	Message center concern Parking aid system concern	OPEN then CLOSE the driver door and VERIFY the driver door ajar message displays correctly with the door open and closed. If the driver door ajar message does not function correctly, GO to Pinpoint Test AI If the driver door ajar message functions correctly, DIAGNOSE the parking aid. REFER to: Parking Aid .
A passive entry/push button start message (no key detected, key inside vehicle, key not inside vehicle or place key in keyholder) is never or always displayed (push button start only)	Message center concern Passive entry system concern	*NOTE: Disconnecting the GWM creates an unrelated fault to test the overall message center function and display.* With the ignition OFF, DISCONNECT GWM C2431 . Place the ignition ON and monitor the message center display.If multiple messages and popup displays do not display, GO to Pinpoint Test A If multiple messages and popup displays do display, DIAGNOSE the passive entry system. REFER to: Locks, Latches and Entry Systems .
The PATS message (starting system fault) is never or always displayed	Message center concern PATS concern.	*NOTE: Disconnecting the GWM creates an unrelated fault to test the overall message center function and display.* With the ignition OFF, DISCONNECT GWM C2431 . Place the ignition ON and monitor the message center display.If multiple messages and popup displays do not display, GO to Pinpoint Test A If multiple messages and popup displays do display, DIAGNOSE the PATS. REFER to: Passive Anti-Theft System (PATS) .

The perimeter alarm message is always displayed	Message center concern Perimeter alarm concern	*NOTE: Disconnecting the GWM creates an unrelated fault to test the overall message center function and display.* With the ignition OFF, DISCONNECT GWM C2431 . Place the ignition ON and monitor the message center display.If multiple messages and popup displays do not display, GO to Pinpoint Test A If multiple messages and popup displays do display, DIAGNOSE the perimeter alarm. REFER to: Perimeter Anti-Theft Alarm .
A push button start message (press brake to start, accessory power active or starting system fault) message is inoperative or always on	Message center concern Push button starting system concern	*NOTE: Disconnecting the GWM creates an unrelated fault to test the overall message center function and display.* With the ignition OFF, DISCONNECT GWM C2431 . Place the ignition ON and monitor the message center display.If multiple messages and popup displays do not display, GO to Pinpoint Test A If multiple messages and popup displays do display, DIAGNOSE the push button starting system. REFER to: Steering Wheel and Column Electrical Components .
The PRNDL not in park warning message is never or always displayed	Message center concern PRNDL indication concern	OPEN then CLOSE the driver door and VERIFY the driver door ajar message displays correctly with the door open and closed. If the driver door ajar message does not function correctly, GO to Pinpoint Test AI If the driver door ajar message functions correctly, DIAGNOSE the PRNDL. GO to Pinpoint Test V
The stability-traction control malfunction warning is never or always on	Message center concern Stability-traction control indication concern	OPEN then CLOSE the driver door and VERIFY the driver door ajar message displays correctly with the door open and closed.

		If the driver door ajar message does not function correctly, GO to Pinpoint Test AI If the driver door ajar message functions correctly, DIAGNOSE the stability-traction control indicator. GO to Pinpoint Test Y
A steering malfunction message is always on	Message center concern EPAS system concern	OPEN then CLOSE the driver door and VERIFY the driver door ajar message displays correctly with the door open and closed. If the driver door ajar message does not function correctly, GO to Pinpoint Test AI If the driver door ajar message functions correctly, DIAGNOSE the EPAS. REFER to: POWER STEERING .
A TPMS malfunction message is never or always on	Message center concern TPMS warning indication concern	*NOTE: Disconnecting the GWM creates an unrelated fault to test the overall message center function and display.* With the ignition OFF, DISCONNECT GWM C2431 . Place the ignition ON and monitor the message center display.If multiple messages and popup displays do not display, GO to Pinpoint Test A If multiple messages and popup displays do display, DIAGNOSE the TPMS. REFER to: Tire Pressure Monitoring System (TPMS) .
The tire training complete message is never on	TPMS sensor training incomplete	*NOTE: This message only appears at the conclusion of the TPMS sensor training procedure.* CARRY OUT the TPMS sensor training. REFER to: Tire Pressure Monitoring System (TPMS) Sensor Location Calibration .
A tire training message (train left front, right front, left rear or right rear tire) message is never on	TPMS warning indicator concern TPMS sensor training concern	*NOTE: These messages*

		only appear during the TPMS sensor training procedure. VERIFY the TPMS warning indicator functions.If the TPMS warning indicator does not operate, GO to Pinpoint Test AA If the Tire TPMS warning indicator operates, CARRY OUT the TPMS sensor training. REFER to: Tire Pressure Monitoring System (TPMS) Sensor Location Calibration .
The tires not trained message is always on	TPMS sensor training concern	*NOTE: This message only appears during the TPMS sensor training procedure.* CARRY OUT the TPMS sensor training. REFER to: Tire Pressure Monitoring System (TPMS) Sensor Location Calibration .

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > SYMPTOM CHART(S) > SYMPTOM CHART: WARNING CHIMES

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

Symptom Chart

Condition	Possible Sources	Actions
All the chimes are inoperative	IPC	GO to Pinpoint Test A
The adaptive cruise control warning chime is inoperative	Refer to the Pinpoint Test	GO to Pinpoint Test AY
The airbag secondary warning chime is inoperative	Normal condition IPC	Using a diagnostic scan tool, PERFORM the IPC self-test. If DTC P1534:01 is present, INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) . If DTC P1534:01 is **not** present, the system is operating correctly. The airbag secondary warning chime sounds only when a fault in the airbag warning indicator is present and DTC P1534:01 is recorded.

The airbag secondary warning chime has activated	IPC	INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .
The backup warning chime is inoperative (Japan only)	Refer to the Pinpoint Test	GO to Pinpoint Test AZ
The Belt-Minder ® feature is inoperative	Refer to the Pinpoint Test	GO to Pinpoint Test BK
The Belt-Minder ® cannot be deactivated	MyKey ® programmed key in use	*NOTE: When a MyKey ® programmed key is used, the Belt-Minder ® is automatically turned on and cannot be disabled (if previously disabled by an administrator, the Belt-Minder ® remains disabled when an administrator key is used).* The system is operating correctly. Use an administrator key to disable the Belt-Minder ®.
The Blind Spot Information System (BLIS ®)/Cross Traffic Alert (CTA) warning chime is inoperative	Refer to the Pinpoint Test	GO to Pinpoint Test BA
The chime always sounds	Refer to the Pinpoint Test	GO to Pinpoint Test BB
The chime only sounds from the IPC	Refer to the Pinpoint Test	GO to Pinpoint Test BC
The door ajar warning chime is inoperative	Door ajar indication concern IPC	With the ignition OFF, the headlamps in the PARKING LAMPS position and the doors closed, OPEN the driver door and VERIFY the headlamps on warning chime sounds. If the headlamps on chime sounds, DIAGNOSE the door or luggage compartment lid ajar RTT. GO to Pinpoint Test AI If the headlamps on chime does not sound, INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .
The forward collision warning chime is inoperative	Refer to the Pinpoint Test	GO to Pinpoint Test BD
The headlamps on warning chime is inoperative	Refer to the Pinpoint Test	GO to Pinpoint Test BE

The ignition-engine on warning chime is inoperative	Refer to the Pinpoint Test	GO to Pinpoint Test BF
The memory-stored feedback warning chime is inoperative	Refer to the Pinpoint Test	GO to Pinpoint Test BG
The message center warning chime is inoperative	No warnings present IPC	With all the doors closed and the ignition OFF, PLACE the ignition ON. Once the IPC has completed the prove-out, OPEN the driver door and VERIFY the message center displays the door ajar RTT and the chime sounds once. If the chime sounds, the system is operating correctly. The message center warning chime only sounds when a new warning is displayed in the message center. If the door ajar message does not display, GO to Pinpoint Test AI If the door ajar message displays and the chime does not sound, INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .
The parking aid chime is inoperative	Refer to the Pinpoint Test	GO to Pinpoint Test BH
The parking brake warning chime is inoperative	Refer to the Pinpoint Test	GO to Pinpoint Test BI
The perimeter alarm chime is inoperative	Perimeter alarm concern IPC	GO to Pinpoint Test BJ
The PRNDL not in park warning chime is inoperative	PRNDL indication concern IPC	With the ignition OFF, the headlamps in the PARKING LAMPS position and the doors closed, OPEN the driver door and VERIFY the headlamps on warning chime sounds. If the headlamps on chime sounds, DIAGNOSE the PRNDL indicator. GO to Pinpoint Test V If the headlamps on chime does not sound, INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .
The safety belt warning chime is inoperative	Refer to the Pinpoint Test	GO to Pinpoint Test BK
The service AdvanceTrac ® chime is inoperative	Stability-traction control concern IPC	With the ignition OFF, the headlamps in the PARKING LAMPS position and the doors closed, OPEN the driver door and VERIFY the headlamps on warning chime

		sounds. If the headlamps on chime sounds, DIAGNOSE the stability-traction control indicator. GO to Pinpoint Test Y If the headlamps on chime does not sound, INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .
The turn signal-hazard on chime is inoperative	Refer to the Pinpoint Test	GO to Pinpoint Test BL
The turn signal left on chime is inoperative	Refer to the Pinpoint Test	GO to Pinpoint Test BL

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST A : THE IPC (INSTRUMENT PANEL CLUSTER) IS INOPERATIVE OR MULTIPLE GAUGES, INDICATORS, RTT (RECONFIGURABLE TELLTALE) INDICATORS, WARNINGS AND CHIMES ARE INOPERATIVE OR ALWAYS ON

Normal Operation and Fault Conditions

See IPC component description. REFER to: Instrument Panel Cluster (IPC) - System Operation and Component Description .

The IPC receives a hot at all times voltage from the BCM. The IPC receives the ignition status message for the RUN/START or ACC input from the BCM over the HS-CAN3.

Possible Sources

- Fuse
- Communication concern
- GWM
- IPC

Visual Inspection and Diagnostic Pre-checks

Inspect BCM fuse 13 (7.5A).

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST A : THE IPC (INSTRUMENT PANEL CLUSTER) IS INOPERATIVE OR MULTIPLE GAUGES, INDICATORS, RTT (RECONFIGURABLE TELLTALE) INDICATORS, WARNINGS AND CHIMES ARE INOPERATIVE OR ALWAYS ON > PINPOINT TEST A : THE IPC (INSTRUMENT PANEL

CLUSTER) IS INOPERATIVE OR MULTIPLE GAUGES, INDICATORS, RTT (RECONFIGURABLE TELLTALE) INDICATORS, WARNINGS AND CHIMES ARE INOPERATIVE OR ALWAYS ON

A1 PERFORM THE NETWORK TEST FOR ALL MODULES

Ignition ON.

Using a diagnostic scan tool, perform a network test.

Do all equipped modules pass the network test?

Yes	GO to A2

No	REFER to: MODULE COMMUNICATIONS NETWORK .

A2 CHECK THE GWM (GATEWAY MODULE A) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, check the GWM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: MODULE COMMUNICATIONS NETWORK .

No	GO to A3

A3 PERFORM THE IPC (INSTRUMENT PANEL CLUSTER) SELF-TEST

Using a diagnostic scan tool, perform the IPC self-test.

Check for recorded Diagnostic Trouble Codes (DTCs) from the IPC self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to DTC Chart: IPC .

No	INSTALL a new GWM. REFER to: Gateway Module A (GWM) . TEST the system for normal operation. If the IPC is still inoperative, INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST B : A VIRTUAL GAUGE (ACCELEROMETER, AIR FUEL RATIO, AXLE TEMPERATURE, BATTERY VOLTAGE GAUGE, CYLINDER HEAD TEMPERATURE, ENGINE OIL PRESSURE, ENGINE OIL

TEMPERATURE, INLET AIR TEMPERATURE, TRANSMISSION FLUID TEMPERATURE OR VACUUM-BOOST), IS INOPERATIVE

Normal Operation and Fault Conditions

See Virtual Gauges. REFER to: Instrument Panel Cluster (IPC) - System Operation and Component Description .

Accelerometer

- If the vehicle lateral acceleration or vehicle longitudinal acceleration data messages are missing, invalid or unknown for less than 5 seconds, the IPC defaults the accelerometer display to the last setting based upon that last message received.
- If the vehicle lateral acceleration or vehicle longitudinal acceleration data messages are missing for 5 seconds or longer, the IPC sets DTC U0121:00 and defaults the red dot in the accelerometer display off.
- If the vehicle lateral acceleration or vehicle longitudinal acceleration data messages are invalid for 5 seconds or longer, the IPC sets DTC U0415:00 and defaults the red dot in the accelerometer display off.
- If the vehicle lateral acceleration or vehicle longitudinal acceleration data messages are unknown for 5 seconds or longer, the IPC sets DTC U0415:81 and defaults the red dot in the accelerometer display off.

Air Fuel Ratio

- If the air fuel ratio display message is missing for less than 5 seconds, the IPC defaults the air fuel ratio gauge and digital display to the last indication state, based upon the last message received.
- If the air fuel ratio display message is missing for 5 seconds or longer, the IPC sets DTC U0100:00 and defaults the air fuel ratio gauge to the lowest displayed stop (10) and the digital display blank.

Axle Temperature (SVT Only)

- If the axle temperature message is missing for less than 5 seconds, the IPC defaults the axle temperature gauge and digital display to the last indication state, based upon the last message received.
- If the axle temperature message is missing for 5 seconds or longer, the IPC sets DTC U0100:00 and defaults the axle temperature gauge to the lowest displayed stop and the digital display blank.

Battery Voltage

- The battery voltage gauge uses the hot at all times voltage input to measure the voltage available to the IPC. The IPC applies a filter to the input voltage data to remove or level out fluctuations in the data.

Cylinder Head Temperature

- If the cylinder head temperature data message is missing for less than 5 seconds, the IPC defaults the cylinder head temperature gauge and digital display to the last indication state, based upon the last message received.
- If the cylinder head temperature data message is missing for 5 seconds or longer, the IPC sets

DTC U0100:00 and defaults the cylinder head temperature gauge to the full hot position and the digital display blank.

Engine Oil Pressure

- If the oil pressure warning indicator request message is missing for less than 5 seconds, the IPC defaults the oil pressure gauge and digital display to the last indication state, based upon the last message received.
- If the oil pressure warning indicator request message is missing for 5 seconds or longer, the IPC sets DTC U0100:00 and defaults the oil pressure gauge to 0 PSI and the digital display blank.

Engine Oil Temperature

- If the engine oil temperature data message is missing or invalid for less than 5 seconds, the IPC defaults the engine oil temperature gauge and digital display to the last indication state, based upon the last message received.
- If the engine oil temperature data message is missing for 5 seconds or longer, the IPC sets DTC U0100:00 and defaults the engine oil temperature gauge to the full cold position and the digital display blank.
- If the engine oil temperature data message is invalid for 5 seconds or longer, the IPC sets DTC U0401:00 and defaults the engine oil temperature gauge to the full cold position and the digital display blank.

Inlet Air Temperature

- If the engine inlet air temperature data message is missing or invalid for less than 5 seconds, the IPC defaults the inlet air temperature gauge and digital display to the last indication state, based upon the last message received.
- If the engine inlet air temperature data message is missing for 5 seconds or longer, the IPC sets DTC U0100:00 and defaults the inlet air temperature gauge to the full cold position and the digital display blank.
- If the engine inlet air temperature data message is invalid for 5 seconds or longer, the IPC sets DTC U0401:00 and defaults the inlet air temperature gauge to the full cold position and the digital display blank.

Transmission Fluid Temperature

- If the transmission fluid temperature data message is missing or invalid for less than 5 seconds, the IPC defaults the transmission fluid temperature gauge and digital display to the last indication state, based upon the last message received.
- If the transmission fluid temperature data message is missing for 5 seconds or longer, the IPC sets DTC U0100:00 and defaults the transmission fluid temperature gauge to the full cold position and the digital display blank.
- If the transmission fluid temperature data message is invalid for 5 seconds or longer, the IPC sets DTC U0401:00 and defaults the transmission fluid temperature gauge to the full cold position and the digital display blank.

Vacuum-Boost

- If the vacuum-boost display message is missing for less than 5 seconds, the IPC defaults the

vacuum-boost gauge and digital display to the last indication state, based upon the last message received.

- If the vacuum-boost display message is missing for 5 seconds or longer, the IPC sets DTC U0100:00 and defaults the vacuum-boost gauge to the rest position and the digital display blank.

Possible Sources

- Communication concern
- PCM input concern
- IPC

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST B : A VIRTUAL GAUGE (ACCELEROMETER, AIR FUEL RATIO, AXLE TEMPERATURE, BATTERY VOLTAGE GAUGE, CYLINDER HEAD TEMPERATURE, ENGINE OIL PRESSURE, ENGINE OIL TEMPERATURE, INLET AIR TEMPERATURE, TRANSMISSION FLUID TEMPERATURE OR VACUUM-BOOST), IS INOPERATIVE > PINPOINT TEST B : A VIRTUAL GAUGE (ACCELEROMETER, AIR FUEL RATIO, AXLE TEMPERATURE, BATTERY VOLTAGE GAUGE, CYLINDER HEAD TEMPERATURE, ENGINE OIL PRESSURE, ENGINE OIL TEMPERATURE, INLET AIR TEMPERATURE, TRANSMISSION FLUID TEMPERATURE OR VACUUM-BOOST), IS INOPERATIVE

B1 CHECK THE IPC (INSTRUMENT PANEL CLUSTER) OPERATION

Ignition ON.

Using a diagnostic scan tool, perform the BCM self-test.

Verify all functions of the IPC (gauges, indicators, message center and chimes) operate.

Do all functions of the IPC operate?

Yes	GO to B2

No	GO to Pinpoint Test A

B2 VERIFY THE IPC (INSTRUMENT PANEL CLUSTER) IS SET TO THE DISPLAY/GAUGE IN QUESTION

> *NOTE: The IPC and message center navigation can be found in the Owner's Literature.*

Using the message center controls, make sure the IPC is set to the display/gauge for the

gauge in question.

Is the message center set to the display/gauge for the gauge in question?

Yes	If the engine oil pressure gauge does not display, GO to B3If the virtual gauge in question does not display, GO to B4

No	If the virtual gauge in question functions, the system is operating correctly. The IPC was not set to display the gauge in question. If the virtual gauge in question does not display, INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

B3 CHECK THE LOW OIL PRESSURE RTT (RECONFIGURABLE TELLTALE) OPERATION

Start the engine and monitor the low oil pressure RTT.

Ignition OFF.

Disconnect Engine Oil Pressure Switch C103 (2.3L).

Disconnect Engine Oil Pressure Switch C1642 (3.7L).

Disconnect Engine Oil Pressure Switch C1657 (5.0L).

Disconnect Engine Oil Pressure Switch (5.2L).

Start the engine and monitor the low oil pressure RTT.

Is the low oil pressure RTT off with the engine oil pressure switch connected and turn on with the engine oil pressure switch disconnected?

Yes	GO to B4

No	For 2.3L and 3.7L, GO to Pinpoint Test AN For 5.0L and 5.2L, GO to Pinpoint Test AO

B4 PERFORM THE IPC (INSTRUMENT PANEL CLUSTER) SELF-TEST

Using a diagnostic scan tool, perform the IPC self-test.

Check for recorded Diagnostic Trouble Codes (DTCs) from the IPC self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to DTC Chart: IPC .

No	GO to B5

B5 PERFORM THE PCM (POWERTRAIN CONTROL MODULE) SELF-TEST

Using a diagnostic scan tool, perform the PCM self-test.

Check for recorded Diagnostic Trouble Codes (DTCs).

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	Refer to the appropriate article for the procedure.

No	GO to B6

B6 CHECK THE GWM (GATEWAY MODULE A) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, check the GWM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: MODULE COMMUNICATIONS NETWORK .

No	INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST C : INCORRECT FUEL GAUGE INDICATION

Refer to Instrument Cluster for schematic and connector information.

Normal Operation and Fault Conditions

See Fuel Gauge and Fuel Level Sender. REFER to: Instrument Panel Cluster (IPC) - System Operation and Component Description .

IPC DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
P0460:11	Fuel Level Sensor "A" Circuit: Circuit Short To Ground	A continuous and on-demand DTC that sets in the IPC if the fuel level input is pulled low out of range on the fuel level input circuit indicating a short to ground for 33 seconds or longer. The IPC defaults the fuel gauge to empty (E).
P0460:13	Fuel Level Sensor "A" Circuit: Circuit Open	A continuous and on-demand DTC that sets in the IPC if the fuel level input is sent high out of range on the fuel level input circuit indicating an open or short to voltage for 33 seconds or longer. The IPC defaults the fuel gauge to empty

		(E).
P1243:06	Second Fuel Pump Fault or Ground Fault: Algorithm Based Failure	*NOTE: Normal operation of the fuel delivery system allows the fuel level sensor side of the fuel tank (the side opposite of the fuel filler hose) to have less fuel than the side with the fuel pump assembly (side with the fuel filler hose).* Sets when the IPC detects a low fuel condition on the fuel pump module side (active side) of the fuel tank before the fuel level sensor (passive side) indicates empty. DTC P1243:06 indicates a fuel transfer concern with the fuel transfer tube or the jet pump (part of the fuel pump module).
P1346:11	Fuel Level Sensor "B" Circuit: Circuit Short To Ground	A continuous and on-demand DTC that sets in the IPC if the IPC detects that the fuel level sensor is out of range on the fuel level input circuit with a short to ground for 33 seconds. The IPC defaults the fuel gauge to empty (E), once the IPC detects a fault and sets DTC P1346:11.
P1346:13	Fuel Level Sensor "B" Circuit: Circuit Open	A continuous and on-demand DTC that sets in the IPC if the IPC detects that the fuel level sensor is out of range on the fuel level sensor input circuit with an open or short to voltage for 33 seconds. The IPC defaults the fuel gauge to empty (E), once the IPC detects a fault and sets DTC P1346:13.

PCM DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
P0461	Fuel Level Sensor "A" Circuit Range/Performance	Sets when the PCM determines the fuel level input signal repeatedly moves in and out of range, exceeding the minimum or maximum allowable calibrated parameters for a specified fuel

		fill percentage in the fuel tank. Follow the pinpoint test using the Diagnostic Trouble Codes (DTCs) set in the IPC.
P0462	Fuel Level Sensor "A" Circuit Low	Sets in the PCM when the PCM detects a short to ground on the fuel pump assembly signal circuit based on the messaged input received from the BCM. Follow the pinpoint test using the Diagnostic Trouble Codes (DTCs) set in the IPC.
P0463	Fuel Level Sensor "A" Circuit High	Sets in the PCM when the PCM detects an open or a short to voltage on the fuel pump assembly signal circuit based on the messaged input received from the BCM. Follow the pinpoint test using the Diagnostic Trouble Codes (DTCs) set in the IPC.
P2066	Fuel Level Sensor "B" Circuit Range/Performance	Sets when the PCM determines the fuel level input signal repeatedly moves in and out of range, exceeding the minimum or maximum allowable calibrated parameters for a specified fuel fill percentage in the fuel tank. Follow the pinpoint test using the Diagnostic Trouble Codes (DTCs) set in the IPC.
P2067	Fuel Level Sensor "B" Circuit Low	Sets in the PCM when the PCM detects a short to ground on the fuel level sensor signal circuit based on the messaged input received from the BCM. Follow the pinpoint test using the Diagnostic Trouble Codes (DTCs) set in the IPC.
P2068	Fuel Level Sensor "B" Circuit High	Sets in the PCM when the PCM detects an open or a short to voltage on the fuel level sensor signal circuit based on the messaged input received from the BCM. Follow the pinpoint test using the Diagnostic Trouble Codes (DTCs) set in the IPC.

P25B0	Fuel Level Sensor "A" Stuck	Sets when the PCM determines the value of the fuel level input signal is stuck, that the fuel level input signal does not change or does not correspond with the calculated fuel usage. Follow the pinpoint test using the Diagnostic Trouble Codes (DTCs) set in the IPC.
P25B1	Fuel Level Sensor "B" Stuck	Sets when the PCM determines the value of the fuel level input signal is stuck, that the fuel level input signal does not change or does not correspond with the calculated fuel usage. Follow the pinpoint test using the Diagnostic Trouble Codes (DTCs) set in the IPC.
P25B2	Fuel Level Sensor "A" or "B" Stuck	Sets when the PCM determines the value of either fuel level input signals is stuck, that the fuel level input signal does not change or does not correspond with the calculated fuel usage. Follow the pinpoint test using the Diagnostic Trouble Codes (DTCs) set in the IPC.

Possible Sources

- Wiring, terminals or connectors
- Fuel pump assembly
- Fuel level sender (float and card)
- Fuel level sensor
- Fuel tank
- IPC

Visual Inspection and Diagnostic Pre-checks

Inspect the following:

- fuel tank for signs of damage that can affect the float operation inside the tank.
- gauge needle for signs of binding or damage.

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND

WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST C : INCORRECT FUEL GAUGE INDICATION > PINPOINT TEST C : INCORRECT FUEL GAUGE INDICATION

NOTE: Following any fuel gauge repairs, remove BCM fuse 13 (7.5A) for one minute then reinstall to reset the fuel gauge timers.

C1 CARRY OUT THE IPC (INSTRUMENT PANEL CLUSTER) SELF-TEST

Ignition ON.

Using a diagnostic scan tool, perform the IPC self-test.

Check for recorded Diagnostic Trouble Codes (DTCs) from the IPC self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	For DTC P0460:11 or P1346:11, GO to C2For DTC P0460:13 or P1346:13, GO to C6For DTC P1243:06, GO to C14

No	GO to C13

C2 CHECK THE FUEL INPUT FOR A SHORT TO GROUND

Ignition OFF.

Disconnect Fuel Pump Assembly C433 (DTC P0460:11).

Disconnect Fuel Level Sensor C4374 (DTC P1346:11).

Ignition ON.

Wait one minute.

NOTE: DTC P0460:11 or P1346:11 can also be present when carrying out this step and should be disregarded at this time.

Using a diagnostic scan tool, repeat the IPC on-demand self-test.

Is DTC P0460:13 or P1346:13 present?

Yes	GO to C16

No	GO to C3

C3 CHECK THE FUEL PUMP ASSEMBLY AND FUEL LEVEL SENSOR SIGNAL CIRCUIT FOR A SHORT TO GROUND AT THE IPC (INSTRUMENT PANEL CLUSTER)

Ignition OFF.

Disconnect IPC C220 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C220-10 (DTC P0460:11)	Ω	Ground
C220-9 (DTC P1346:11)	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	For DTC P0460:11, GO to C4For DTC P1346:11, GO to C5

No	REPAIR the circuit in question.

C4 CHECK THE FUEL PUMP ASSEMBLY SIGNAL AND RETURN CIRCUITS FOR A SHORT TOGETHER AT THE IPC (INSTRUMENT PANEL CLUSTER)

Measure:

Positive Lead	Measurement / Action	Negative Lead
C220-10	Ω	C220-2

Is the resistance greater than 10, 000 ohms?

Yes	GO to C21

No	REPAIR the circuits.

C5 CHECK THE FUEL LEVEL SENSOR SIGNAL AND RETURN CIRCUITS FOR A SHORT TOGETHER AT THE IPC (INSTRUMENT PANEL CLUSTER)

Measure:

Positive Lead	Measurement / Action	Negative Lead
C220-9	Ω	C220-1

Is the resistance greater than 10, 000 ohms?

Yes	GO to C21

No	REPAIR the circuits.

C6 CHECK THE FUEL PUMP ASSEMBLY OR FUEL LEVEL SENSOR FOR AN OPEN

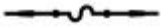
Ignition OFF.

Disconnect Fuel Pump Assembly C433 (DTC P0460:13).

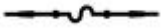
Disconnect Fuel Level Sensor C4374 (DTC P1346:13).

Connect a fused jumper wire:

DTC P0460:13

Lead 1	Measurement / Action	Lead 2
C433-1		C433-2

DTC P1346:13

Lead 1	Measurement / Action	Lead 2
C4374-1		C4374-2

Ignition ON.

Wait one minute.

NOTE: DTC P0460:13 or P1346:13 can also be present when carrying out this step and should be disregarded at this time.

Using a diagnostic scan tool, repeat the IPC self-test.

Is DTC P0460:11 or P1346:11 present?

Yes	REMOVE the fused jumper wire. GO to C16

No	REMOVE the fused jumper wire. For DTC P0460:13, GO to C7REMOVE the fused jumper wire. For DTC P1346:13, GO to C10

C7 CHECK THE FUEL LEVEL SIGNAL CIRCUIT FOR A SHORT TO VOLTAGE AT THE IPC (INSTRUMENT PANEL CLUSTER)

Ignition OFF.

Disconnect IPC C220 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead

C220-10		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to C8

C8 CHECK THE FUEL LEVEL SIGNAL CIRCUIT FOR AN OPEN BETWEEN THE IPC (INSTRUMENT PANEL CLUSTER) AND THE FUEL PUMP ASSEMBLY

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C220-10	Ω	C433-2

Is the resistance less than 3 ohms?

Yes	GO to C9

No	REPAIR the circuit.

C9 CHECK THE FUEL LEVEL RETURN CIRCUIT FOR AN OPEN BETWEEN THE IPC (INSTRUMENT PANEL CLUSTER) AND THE FUEL PUMP ASSEMBLY

Measure:

Positive Lead	Measurement / Action	Negative Lead
C220-2	Ω	C433-1

Is the resistance less than 3 ohms?

Yes	GO to C21

No	REPAIR the circuit.

C10 CHECK THE FUEL LEVEL SENSOR SIGNAL CIRCUIT FOR A SHORT TO VOLTAGE AT THE IPC (INSTRUMENT PANEL CLUSTER)

Ignition OFF.

Disconnect IPC C220 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C220-9		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to C11

C11 CHECK THE FUEL LEVEL SENSOR SIGNAL CIRCUIT FOR AN OPEN BETWEEN THE IPC (INSTRUMENT PANEL CLUSTER) AND THE FUEL LEVEL SENSOR

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C220-9	Ω	C4374-2

Is the resistance less than 3 ohms?

Yes	GO to C12

No	REPAIR the circuit.

C12 CHECK THE FUEL LEVEL SENSOR RETURN CIRCUIT FOR AN OPEN BETWEEN THE IPC (INSTRUMENT PANEL CLUSTER) AND THE FUEL LEVEL SENSOR

Measure:

Positive Lead	Measurement / Action	Negative Lead
C220-1	Ω	C4374-1

Is the resistance less than 3 ohms?

Yes	GO to C21

No	REPAIR the circuit.

C13 CARRY OUT THE IPC (INSTRUMENT PANEL CLUSTER) FUEL GAUGE ACTIVE COMMAND USING A DIAGNOSTIC SCAN TOOL

Ignition ON.

Using a diagnostic scan tool, view the IPC Parameter Identifications (PIDs).

Select the IPC fuel gauge (FUELLEVEL) active command.

Command the fuel gauge from 0% to 25%, 50%, 75% and 100% while observing the fuel gauge.

Does the fuel gauge begin at E (empty), move to approximately 1/4, 1/2, 3/4 and F (full)?

Yes	GO to C14

No	GO to C21

C14 INSPECT THE FUEL TANK

Visually inspect the fuel tank for any damage or deformation.

Is the fuel tank OK?

Yes	GO to C15

No	INSTALL a new fuel tank. Refer to the appropriate article for the procedure.

C15 INSPECT THE FUEL TANK TRANSFER TUBE CONNECTIONS

Remove the fuel pump assembly and the fuel level sensor. Refer to the appropriate article for the procedure.

Inspect the fuel tank transfer tube, connections, the fuel pump assembly and the fuel level sensor for any damage or deformation.

Are the fuel tank transfer tube, connections, the fuel pump assembly and the fuel level sensor OK?

Yes	For DTC P1243:06, INSTALL a new fuel pump module. Refer to the appropriate article for the procedure. For all other concerns, GO to C16

No	INSTALL a new fuel tank transfer tube, fuel pump assembly or fuel level sensor as necessary. Refer to the appropriate article for the procedure.

C16 CHECK THE FUEL PUMP ASSEMBLY AND FUEL LEVEL SENSOR

Disconnect and inspect the fuel pump assembly and fuel level sensor connectors.

Repair:

corrosion (install new connector or terminals-clean module pins)

damaged pins-install new terminals/pins

pushed-out pins-install new pins as necessary

Reconnect the fuel pump assembly and fuel level sensor connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	GO to C17

No	The system is operating correctly at this time. The concern may have been caused by component connections. ADDRESS the root cause of any connector or pin issues.

C17 CHECK THE FUEL PUMP ASSEMBLY AND FUEL LEVEL SENSOR

Remove the fuel pump assembly or fuel level sender. Refer to the appropriate article for the procedure.

NOTE: The fuel resistance measures between 10 ohms ± 2 ohms at the upper stop position and 180 ohms ± 4 ohms at the lower stop position.

Measure the resistance between the fuel level sender (float and card) input wire and the fuel level sender (float and card) ground while slowly moving the float arm between the lower and upper stop position.

Fuel Pump Assembly

Positive Lead	Measurement / Action	Negative Lead
Fuel Pump Assembly (Component Side) - Pin 1	Ω	Fuel Pump Assembly (Component Side) - Pin 2

Fuel Level Sensor

Positive Lead	Measurement / Action	Negative Lead
Fuel Level Sensor (Component Side) - Pin 1	Ω	Fuel Level Sensor (Component Side) - Pin 2

Does the resistance slowly decrease from approximately 180 ohms at the lower stop to 10 ohms at the upper stop?

Yes	GO to C19

No	GO to C18

C18 CHECK THE FUEL PUMP ASSEMBLY AND THE FUEL LEVEL SENSOR FOR CORRECT OPERATION

Remove the fuel pump assembly or fuel level sensor. Refer to the article for the procedure.

Disconnect the fuel level sender (float and card) input wire from the fuel pump assembly or fuel level sensor.

NOTE: The fuel resistance measures between 10 ohms ± 2 ohms at the upper stop position and 180 ohms ± 4 ohms at the lower stop position.

Measure the resistance between the fuel level sender (float and card) input wire and the fuel level sender (float and card) ground while slowly moving the float arm between the lower and upper stop position.

Positive Lead	Measurement / Action	Negative Lead
Fuel Level Sensor - Pin 1	Ω	Fuel Level Sensor - Pin 2

Does the resistance slowly decrease from approximately 180 ohms at the lower stop to 10 ohms at the upper stop?

Yes	INSTALL a new fuel pump assembly or fuel level sensor. Refer to the appropriate article for the procedure.

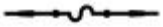
No	INSTALL a new fuel level sender (float and card). Refer to the appropriate article for the procedure.

C19 CHECK THE FUEL PUMP ASSEMBLY SIGNAL AND RETURN CIRCUITS FOR HIGH RESISTANCE

Ignition OFF.

Disconnect IPC C220 .

Connect a fused jumper wire:

Lead 1	Measurement / Action	Lead 2
C433-1		C433-2

Measure:

Positive Lead	Measurement / Action	Negative Lead
C220-10	Ω	C220-2

Is the resistance less than 3 ohms?

Yes	REMOVE the fused jumper wire. GO to C20

No	REMOVE the fused jumper wire. REPAIR the circuits for high resistance.

C20 CHECK THE FUEL LEVEL SENSOR SIGNAL AND RETURN CIRCUITS FOR HIGH RESISTANCE

Ignition OFF.

Connect a fused jumper wire:

Lead 1	Measurement / Action	Lead 2
C4374-1		C4374-2

Measure:

Positive Lead	Measurement / Action	Negative Lead
C220-9	Ω	C220-1

Is the resistance less than 3 ohms?

Yes	GO to C21

No	REMOVE the fused jumper wire. REPAIR the circuits for high resistance.

C21 CHECK FOR CORRECT IPC (INSTRUMENT PANEL CLUSTER) OPERATION

Ignition OFF.

Disconnect and inspect IPC connector.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the IPC connector. Make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST D : THE SPEEDOMETER IS INOPERATIVE

Normal Operation and Fault Conditions

See Speedometer. REFER to: Instrument Panel Cluster (IPC) - System Operation and Component Description .

If the vehicle speed message is missing or invalid for 5 seconds or longer, the IPC defaults the speedometer to 0 km/h (0 mph).

Possible Sources

- ABS concern
- PCM concern
- GWM concern
- IPC

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST D : THE SPEEDOMETER IS INOPERATIVE > PINPOINT TEST D : THE SPEEDOMETER IS INOPERATIVE

D1 PERFORM THE IPC (INSTRUMENT PANEL CLUSTER) SELF-TEST

Ignition ON.

Using a diagnostic scan tool, perform the IPC self-test.

Check for recorded Diagnostic Trouble Codes (DTCs) from the IPC self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to DTC Chart: IPC .

No	GO to D2

D2 PERFORM THE ABS (ANTI-LOCK BRAKE SYSTEM) MODULE SELF-TEST

Using a diagnostic scan tool, perform the ABS module self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: Anti-Lock Brake System (ABS) and Stability Control .

No	GO to D3

D3 CHECK THE GWM (GATEWAY MODULE A) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, check the GWM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: MODULE COMMUNICATIONS NETWORK .

No	GO to D4

D4 PERFORM THE SPEEDOMETER ACTIVE COMMAND USING A DIAGNOSTIC SCAN TOOL

Using a diagnostic scan tool, view the IPC Parameter Identifications (PIDs).

Select the IPC speedometer (SPDOMETER) PID.

Command the speedometer on and off while monitoring the speedometer.

Does the speed begin at 0 km/h (0 mph) move to 257 km/h (160 mph) and return to 0 km/h (0 mph)?

Yes	DIAGNOSE all PCM Diagnostic Trouble Codes (DTCs). Refer to the appropriate article for the procedure.

No	INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST E : INCORRECT SPEEDOMETER INDICATION

Normal Operation and Fault Conditions

See Speedometer. REFER to: Instrument Panel Cluster (IPC) - System Operation and Component Description .

If the vehicle speed message is missing or invalid for less than 5 seconds, the IPC defaults the speedometer to the last indication state, based upon the last message received. If the vehicle speed message is missing or invalid for 5 seconds or less, the speedometer can appear to momentarily freeze or appear sluggish or erratic.

Possible Sources

- Tire size configuration
- Axle ratio configuration
- ABS concern
- IPC

Visual Inspection and Diagnostic Pre-checks

Verify the tire size on the vehicle matches the tire size listed on the vehicle certification label. REFER to: Identification Codes .

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST E : INCORRECT SPEEDOMETER INDICATION > PINPOINT TEST E : INCORRECT SPEEDOMETER INDICATION

E1 CHECK THE TIRE SIZE CONFIGURATION

Ignition ON.

Using a diagnostic scan tool, view Module Programming for the programmed tire size.

NOTE: The correct tire size can be found on the vehicle certification label.

Verify the size of the tires installed on the vehicle matches the vehicle configuration and the vehicle certification label. REFER to: Identification Codes .

Is the tire size correct and is the tire size correctly configured?

Yes	GO to E2

No	INSTALL the correct size tires or CONFIGURE the correct tire size as required.

E2 CHECK THE AXLE RATIO CONFIGURATION

Ignition ON.

Using a diagnostic scan tool, view Module Programming for the programmed axle ratio.

Verify the axle ratio matches the vehicle configuration. REFER to: Identification Codes .

Is the axle ratio correctly configured?

Yes	GO to E3

No	INSTALL the correct axle or CONFIGURE the axle ratio as required.

E3 PERFORM THE IPC (INSTRUMENT PANEL CLUSTER) SELF-TEST

Using a diagnostic scan tool, perform the IPC self-test.

Check for recorded Diagnostic Trouble Codes (DTCs) from the IPC self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to DTC Chart: IPC .

No	GO to E4

E4 PERFORM THE ABS (ANTI-LOCK BRAKE SYSTEM) MODULE SELF-TEST

Using a diagnostic scan tool, perform the ABS self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: Anti-Lock Brake System (ABS) and Stability Control .

No	GO to E5

E5 PERFORM THE SPEEDOMETER ACTIVE COMMAND USING A DIAGNOSTIC SCAN TOOL

Using a diagnostic scan tool, view the IPC Parameter Identifications (PIDs).

Select the IPC speedometer (SPDOMETER) PID.

Command the speedometer in 10% increments while monitoring the speedometer. The speed indicated should increase in increments of approximately 26 km/h (16 mph) for each 10% change.

Except SVT

Command	Indication Range
10% (26 km/h [16 mph])	26-27 km/h (16-17 mph)
20% (51 km/h [32 mph])	50-55 km/h (31-34 mph)
30% (77 km/h [48 mph])	76-82 km/h (47-51 mph)
40% (103 km/h [64 mph])	100-109 km/h (62-68 mph)
50% (129 km/h [80 mph])	126-138 km/h (78-86 mph)
60% (154 km/h [96 mph])	150-166 km/h (93-103 mph)
70% (180 km/h [112 mph])	175-193 km/h (109-120 mph)

80% (206 km/h [128 mph])	200-220 km/h (124-137 mph)
90% (232 km/h [144 mph])	225-248 km/h (140-154 mph)
100% (257 km/h [160 mph])	249-275 km/h (155-171 mph)

SVT

Command	Indication Range
10% (32 km/h [20 mph])	31-34 km/h (19-21 mph)
20% (64 km/h [40 mph])	63-69 km/h (39-43 mph)
30% (97 km/h [60 mph])	93-103 km/h (58-64 mph)
40% (129 km/h [80 mph])	126-138 km/h (78-86 mph)
50% (161 km/h [100 mph])	156-172 km/h (97-107 mph)
60% (193 km/h [120 mph])	187-206 km/h (116-128 mph)
70% (225 km/h [140 mph])	219-241 km/h (136-150 mph)
80% (257 km/h [160 mph])	249-275 km/h (155-171 mph)
90% (290 km/h [180 mph])	282-311 km/h (175-193 mph)
100% (322 km/h [200 mph])	312-344 km/h (194-214 mph)

Does the speedometer increase within the specified range?

Yes	GO to E6

No	INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

E6 CHECK THE PCM (POWERTRAIN CONTROL MODULE) VEHICLE SPEED PID (PARAMETER IDENTIFICATION)

Using a diagnostic scan tool, view the IPC Parameter Identifications (PIDs).

Select the PCM vehicle speed (VSS) PID while driving the vehicle at 32 km/h (20 mph), 64 km/h (40 mph) and 97 km/h (60 mph).

Does the speedometer indicate between 31-34 km/h (19-21 mph), 63-69 km/h (39-43 mph) and 93-103 km/h (58-64 mph) at the 3 PCM PID values?

Yes	GO to E7

No	INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

E7 OBSERVE THE SPEEDOMETER OPERATION

Observe the speedometer while operating at various speeds and stopping frequently.

Does the speedometer begin at 0 km/h (0 mph) and fully return to the 0 km/h (0 mph) position when the vehicle is stopped?

Yes	The speedometer is operating correctly at this time.

No	INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST F : THE ODOMETER IS INOPERATIVE

Normal Operation and Fault Conditions

See Odometer. REFER to: Instrument Panel Cluster (IPC) - System Operation and Component Description .

If the odometer count message is missing or invalid from the GWM for 5 seconds or longer, the IPC defaults the odometer display to all dashes (------).

If the NVM becomes corrupted or if any NVM failure occurs, the odometer displays ERROR.

Possible Sources

- PCM concern
- GWM concern
- IPC

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST F : THE ODOMETER IS INOPERATIVE > PINPOINT TEST F : THE ODOMETER IS INOPERATIVE

F1 CHECK FOR CORRUPTED NON-VOLATILE MEMORY (NVM)

Ignition ON.

Observe the message center display area.

Does the odometer display ERROR?

Yes	INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

No	GO to F2

F2 PERFORM THE IPC (INSTRUMENT PANEL CLUSTER) SELF-TEST

Using a diagnostic scan tool, perform the IPC self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to DTC Chart: IPC .

No	GO to F3

F3 CHECK THE GWM (GATEWAY MODULE A) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, check the GWM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: MODULE COMMUNICATIONS NETWORK .

No	DIAGNOSE all PCM Diagnostic Trouble Codes (DTCs). Refer to ENGINE CONTROLS - INTRODUCTION (EXCEPT DIESEL & HYBRID) .

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST G : THE TACHOMETER IS INOPERATIVE

Normal Operation and Fault Conditions

See Tachometer. REFER to: Instrument Panel Cluster (IPC) - System Operation and Component Description .

If the IPC does not receive the engine RPM data from the PCM for 5 seconds or longer, the IPC defaults the tachometer to 0 RPM.

Possible Sources

- PCM
- GWM concern
- IPC

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST G : THE TACHOMETER IS INOPERATIVE > PINPOINT TEST G : THE TACHOMETER IS INOPERATIVE

G1 PERFORM THE IPC (INSTRUMENT PANEL CLUSTER) SELF-TEST

Using a diagnostic scan tool, perform the IPC self-test.

Check for recorded Diagnostic Trouble Codes (DTCs) from the IPC self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to DTC Chart: IPC .

No	GO to G2

G2 CHECK THE GWM (GATEWAY MODULE A) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, check the GWM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: MODULE COMMUNICATIONS NETWORK .

No	GO to G3

G3 PERFORM THE TACHOMETER ACTIVE COMMAND USING THE DIAGNOSTIC SCAN TOOL

Using a diagnostic scan tool, view the IPC Parameter Identifications (PIDs).

Select the IPC tachometer (TACH_IND) PID.

NOTE: Make sure to set the diagnostic scan tool to 0 RPM before beginning this step.

Command the tachometer on and off while monitoring the tachometer.

Does the tachometer begin at 0 RPM and increase to approximately 800 RPM (except SVT) or 900 RPM (SVT) and return to 0 RPM?

Yes	DIAGNOSE all PCM Diagnostic Trouble Codes (DTCs). Refer to ENGINE CONTROLS - INTRODUCTION (EXCEPT DIESEL & HYBRID) . Refer to the appropriate article for the procedure.

No	INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST H : INCORRECT TACHOMETER INDICATION

Normal Operation and Fault Conditions

See Tachometer. REFER to: Instrument Panel Cluster (IPC) - System Operation and Component Description .

If the RPM data is missing or invalid for 5 seconds or less, the IPC defaults the tachometer to the last setting, based upon the last good message received. If the engine RPM message is missing or invalid for 5 seconds or less, the gauge can appear to momentarily freeze or appear sluggish or erratic.

Possible Sources

- PCM concern
- IPC

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST H : INCORRECT TACHOMETER INDICATION > PINPOINT TEST H : INCORRECT TACHOMETER INDICATION

H1 RETRIEVE THE RECORDED DTCS FROM THE PCM (POWERTRAIN CONTROL MODULE) SELF-TEST

Ignition ON.

Using a diagnostic scan tool, perform the PCM self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	Refer to the appropriate article for the procedure.

No	GO to H2

H2 PERFORM THE IPC (INSTRUMENT PANEL CLUSTER) SELF-TEST

Using a diagnostic scan tool, perform the IPC self-test.

Check for recorded Diagnostic Trouble Codes (DTCs) from the IPC self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to DTC Chart: IPC .

No	GO to H3

H3 PERFORM THE TACHOMETER ACTIVE COMMAND USING THE DIAGNOSTIC SCAN TOOL

Using a diagnostic scan tool, view the IPC Parameter Identifications (PIDs).

Select the IPC tachometer (TACH_IND) PID.

NOTE: Make sure to set the diagnostic scan tool to 0 RPM before beginning this step.

Command the tachometer in 10% increments while monitoring the tachometer.

Does the tachometer increase approximately 800 RPM (base IPC) or 900 RPM (SVT IPC) with each 10% increment?

Yes	GO to H4

No	INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

H4 CHECK THE PCM (POWERTRAIN CONTROL MODULE) RPM PID (PARAMETER IDENTIFICATION)

Using a diagnostic scan tool, view the PCM Parameter Identifications (PIDs).

Select the PCM RPM PID (RPM).

Set the PID to run the engine at 1, 000, 1, 500, 2, 000 and 2, 500 RPM.

Does the tachometer indication range between 944-1, 056 at 1, 000 RPM, 1, 444-1, 556 RPM at 1, 500 RPM, 1, 944-2, 056 RPM at 2, 000 RPM and 2, 444-2, 556 RPM at 2, 500 RPM?

Yes	The tachometer is operating correctly at this time.

No	INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST I : THE TEMPERATURE GAUGE IS INOPERATIVE

Normal Operation and Fault Conditions

See Temperature Gauge. REFER to: Instrument Panel Cluster (IPC) - System Operation and Component Description .

If the IPC does not receive the engine coolant temperature data or engine overheat indication request messages or if the engine coolant temperature message is deemed invalid from the PCM for 5 seconds or longer, the IPC defaults the temperature gauge to cold (C).

Possible Sources

- PCM concern
- GWM concern

- IPC

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST I : THE TEMPERATURE GAUGE IS INOPERATIVE > PINPOINT TEST I : THE TEMPERATURE GAUGE IS INOPERATIVE

I1 RETRIEVE THE RECORDED DTCS FROM THE PCM (POWERTRAIN CONTROL MODULE) SELF-TEST

Ignition ON.

Using a diagnostic scan tool, perform the PCM self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	Refer to the appropriate article for the procedure.

No	GO to I2

I2 PERFORM THE IPC (INSTRUMENT PANEL CLUSTER) SELF-TEST

Using a diagnostic scan tool, perform the IPC self-test.

Check for recorded Diagnostic Trouble Codes (DTCs) from the IPC self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to DTC Chart: IPC .

No	GO to I3

I3 CHECK THE GWM (GATEWAY MODULE A) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, check the GWM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: MODULE COMMUNICATIONS NETWORK .

No	GO to I4

I4 PERFORM THE TEMPERATURE GAUGE ACTIVE COMMAND USING THE DIAGNOSTIC SCAN TOOL

Using a diagnostic scan tool, view the IPC Parameter Identifications (PIDs).

Select the IPC temperature gauge (ENGCOOLNT) PID.

> *NOTE: Make sure to set the diagnostic scan tool to 0 or full cold before beginning this step.*

Command the temperature gauge on and off while monitoring the temperature gauge.

Does the temperature gauge start at cold (C), move to full hot (H) and return to cold (C)?

Yes	INSTALL a new GWM. REFER to: Gateway Module A (GWM) . CLEAR the Diagnostic Trouble Codes (DTCs). REPEAT the self-test. If the temperature gauge is still inoperative, INSTALL a new PCM. Refer to the appropriate article for the procedure.

No	INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST J : INCORRECT TEMPERATURE GAUGE INDICATION

Normal Operation and Fault Conditions

See Temperature Gauge. REFER to: Instrument Panel Cluster (IPC) - System Operation and Component Description .

If the engine coolant temperature data or engine overheat indication request messages are missing for 5 seconds or less or if the IPC receives invalid engine temperature data for 5 seconds or less, the IPC defaults the temperature gauge to the last setting, based upon the last known good temperature status message.

Possible Sources

- Engine cooling system concern
- PCM input concern
- IPC

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST J : INCORRECT TEMPERATURE GAUGE INDICATION > PINPOINT TEST J : INCORRECT TEMPERATURE GAUGE INDICATION

J1 CHECK FOR CORRECT OPERATION OF THE COOLING SYSTEM

Ignition ON.

Verify that the engine cooling system and thermostat are functioning correctly.

Does the engine cooling system and thermostat operate correctly?

Yes	GO to J2

No	Refer to the appropriate article for the procedure.

J2 RETRIEVE THE RECORDED DTCS FROM THE PCM (POWERTRAIN CONTROL MODULE) SELF-TEST

Ignition ON.

Using a diagnostic scan tool, perform the PCM self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	Refer to the appropriate article for the procedure.

No	GO to J3

J3 PERFORM THE IPC (INSTRUMENT PANEL CLUSTER) SELF-TEST

Using a diagnostic scan tool, perform the IPC self-test.

Check for recorded Diagnostic Trouble Codes (DTCs) from the IPC self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to DTC Chart: IPC .

No	GO to J4

J4 PERFORM THE TEMPERATURE GAUGE ACTIVE COMMAND USING THE DIAGNOSTIC SCAN TOOL

Using a diagnostic scan tool, view the IPC Parameter Identifications (PIDs).

Select the IPC temperature gauge (ENGCOOLNT) PID.

NOTE: Make sure to set the diagnostic scan tool to 0 or full cold before beginning this step.

Command the temperature gauge as follows:

Command	Indication Range
0% (under 38 ° C [100 ° F])	Full cold (C)
15% (60 ° C [140 ° F])	Beginning of the normal range
45% (823 ° C [180 ° F]-110 ° C [230 ° F])	Center of the gauge
85% (120 ° C [248 ° F])	End of the normal range
95% (123 ° C [255 ° F])	Hot (H) (red line)

Does the temperature gauge operate according to the above specifications?

Yes	GO to J5

No	INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

J5 CHECK THE PCM (POWERTRAIN CONTROL MODULE) TEMPERATURE PID (PARAMETER IDENTIFICATION)

Using a diagnostic scan tool, view the PCM Parameter Identifications (PIDs).

Start the engine.

Select the PCM temperature PID (ECT).

With the engine running and temperature increasing, monitor the PCM temperature PID.

Does the PCM PID agree with the temperature gauge indication?

Yes	The temperature gauge is operating correctly at this time.

No	INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST K : THE ENGINE OIL PRESSURE GAUGE IS INOPERATIVE (ICM (INFORMATION CENTER MODULE) GAUGE PACK)

Normal Operation and Fault Conditions

See Engine Oil Pressure Gauge. REFER to: Instrument Panel Cluster (IPC) - System Operation and Component Description .

If the ICM does not receive the oil pressure warning indicator request message from the PCM for less than 5 seconds, the ICM defaults the engine oil pressure gauge to the last display state based upon the last message received.

If the oil pressure warning indicator request message is missing for 5 seconds or longer, the ICM sets

DTC U0100:00 and defaults the engine oil pressure gauge to 0 PSI.

Possible Sources

- Communication concern
- Oil pressure indication concern
- PCM concern
- ICM

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST K : THE ENGINE OIL PRESSURE GAUGE IS INOPERATIVE (ICM (INFORMATION CENTER MODULE) GAUGE PACK) > PINPOINT TEST K : THE ENGINE OIL PRESSURE GAUGE IS INOPERATIVE (ICM (INFORMATION CENTER MODULE) GAUGE PACK)

K1 PERFORM THE ICM (INFORMATION CENTER MODULE) SELF-TEST

Ignition ON.

Using a diagnostic scan tool, perform the ICM self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to DTC Chart: Information Center Module (ICM) .

No	GO to K2

K2 PERFORM THE OIL PRESSURE GAUGE ACTIVE COMMAND USING THE DIAGNOSTIC SCAN TOOL

Using a diagnostic scan tool, view the ICM Parameter Identifications (PIDs).

Select the ICM oil pressure gauge (OIL_PRESS) PID.

Command the oil pressure gauge on and off while monitoring the oil pressure gauge.

Does the oil pressure gauge start at 0 PSI, move to 100 PSI and return to 0 PSI?

Yes	GO to K3

No	INSTALL a new ICM. REFER to: Information Center Module (ICM) .

K3 CHECK THE IPC (INSTRUMENT PANEL CLUSTER) LOW OIL PRESSURE RTT (RECONFIGURABLE TELLTALE)

Start the engine and monitor the IPC low oil pressure RTT.

Ignition OFF.

Disconnect Engine Oil Pressure Switch C103 (2.3L).

Disconnect Engine Oil Pressure Switch C1642 (3.7L).

Disconnect Engine Oil Pressure Switch C1657 (5.0L).

Disconnect Engine Oil Pressure Switch (5.2L).

Start the engine and monitor the IPC low oil pressure RTT.

Is the low oil pressure RTT off with the engine oil pressure switch connected and turn on with the engine oil pressure switch disconnected?

Yes	INSTALL a new ICM. REFER to: Information Center Module (ICM) .

No	For 2.3L or 3.7L, GO to Pinpoint Test AN For 5.0L and 5.2L, GO to Pinpoint Test AO

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST L : THE ENGINE OIL TEMPERATURE GAUGE IS INOPERATIVE (ICM (INFORMATION CENTER MODULE) GAUGE PACK) (SVT ONLY)

Normal Operation and Fault Conditions

See Engine Oil Temperature Gauge. REFER to: Instrument Panel Cluster (IPC) - System Operation and Component Description .

If the ICM does not receive the engine oil temperature message from the PCM for less than 5 seconds, the ICM defaults the engine oil temperature gauge to the last display state based upon the last message received.

If the ICM does not receive the engine oil temperature message from the PCM for 5 seconds or longer, the ICM sets DTC U0100:00 and defaults the engine oil temperature gauge to full cold (50 ° C [metric gauge] or 100 ° F [English gauge]).

Possible Sources

- Communication concern
- PCM concern
- ICM

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST L : THE ENGINE OIL

TEMPERATURE GAUGE IS INOPERATIVE (ICM (INFORMATION CENTER MODULE) GAUGE PACK) (SVT ONLY) > PINPOINT TEST L : THE ENGINE OIL TEMPERATURE GAUGE IS INOPERATIVE (ICM (INFORMATION CENTER MODULE) GAUGE PACK) (SVT ONLY)

L1 PERFORM THE ICM (INFORMATION CENTER MODULE) SELF-TEST

Ignition ON.

Using a diagnostic scan tool, perform the ICM self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to DTC Chart: Information Center Module (ICM) .

No	GO to L2

L2 PERFORM THE ENGINE OIL TEMPERATURE GAUGE ACTIVE COMMAND USING THE DIAGNOSTIC SCAN TOOL

Using a diagnostic scan tool, view the ICM Parameter Identifications (PIDs).

Select the ICM engine oil temperature gauge (EOT_GAUGE_PP) PID.

Command the engine oil temperature gauge on and off while monitoring the engine oil temperature gauge.

Does the engine oil temperature gauge start at 50 ° C (metric gauge) or 100 ° F (English gauge), move to 175 ° C (metric gauge) or 350 ° F (English gauge) and return to 50 ° C (metric gauge) or 100 ° F (English gauge)?

Yes	DIAGNOSE any PCM Diagnostic Trouble Codes (DTCs). Refer to the appropriate article for the procedure.

No	INSTALL a new ICM. REFER to: Information Center Module (ICM) .

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST M : THE VACUUM-BOOST GAUGE IS INOPERATIVE (ICM (INFORMATION CENTER MODULE) GAUGE PACK) (EXCEPT SVT)

Normal Operation and Fault Conditions

See Vacuum-Boost Gauge. REFER to: Instrument Panel Cluster (IPC) - System Operation and Component Description .

If the ICM does not receive the vacuum/boost display message from the PCM for less than 5 seconds,

the ICM defaults the vacuum-boost gauge to the last display state based upon the last message received.

If the ICM does not receive the vacuum/boost display message from the PCM for 5 seconds or longer, the ICM sets DTC U0100:00 and defaults the vacuum-boost gauge to 0.

Possible Sources

- Communication concern
- PCM concern
- ICM

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST M : THE VACUUM-BOOST GAUGE IS INOPERATIVE (ICM (INFORMATION CENTER MODULE) GAUGE PACK) (EXCEPT SVT) > PINPOINT TEST M : THE VACUUM-BOOST GAUGE IS INOPERATIVE (ICM (INFORMATION CENTER MODULE) GAUGE PACK) (EXCEPT SVT)

M1 PERFORM THE ICM (INFORMATION CENTER MODULE) SELF-TEST

Ignition ON.

Using a diagnostic scan tool, perform the ICM self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to DTC Chart: Information Center Module (ICM) .

No	GO to M2

M2 PERFORM THE VACUUM-BOOST GAUGE ACTIVE COMMAND USING THE DIAGNOSTIC SCAN TOOL

Using a diagnostic scan tool, view the ICM Parameter Identifications (PIDs).

Select the ICM vacuum-boost gauge (TURBO_GAUGE_ICM) PID.

Command the vacuum-boost gauge on and off while monitoring the vacuum-boost gauge.

Does the vacuum-boost gauge begin at the needles rest position, sweep to the full stop and return to the rest position?

Yes	DIAGNOSE any PCM Diagnostic Trouble Codes (DTCs). Refer to the appropriate article for the procedure.

No	INSTALL a new ICM. REFER to: Information Center Module (ICM) .

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST N : THE ABS (ANTI-LOCK BRAKE SYSTEM) WARNING INDICATOR IS NEVER OR ALWAYS ON

See ABS Warning Indicator and ABS/Brake/Stability-Traction Control System Indication. REFER to: Instrument Panel Cluster (IPC) - System Operation and Component Description .

Normal Operation and Fault Conditions

If the ABS warning indicator request message is missing for less than 5 seconds, the IPC defaults the ABS warning indicator to its last indication state (on or off), based upon the last message received.

If the ABS warning indicator request message is missing for 5 seconds or longer, the IPC defaults the ABS warning indicator on.

Possible Sources

- Communication concern
- ABS concern
- GWM concern
- IPC

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST N : THE ABS (ANTI-LOCK BRAKE SYSTEM) WARNING INDICATOR IS NEVER OR ALWAYS ON > PINPOINT TEST N : THE ABS (ANTI-LOCK BRAKE SYSTEM) WARNING INDICATOR IS NEVER OR ALWAYS ON

N1 PERFORM THE IPC (INSTRUMENT PANEL CLUSTER) SELF-TEST

Ignition ON.

Using a diagnostic scan tool, perform the IPC self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to DTC Chart: IPC .

No	GO to N2

N2 PERFORM THE ABS (ANTI-LOCK BRAKE SYSTEM) MODULE SELF-TEST

Ignition ON.

Using a diagnostic scan tool, perform the ABS module self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: Anti-Lock Brake System (ABS) and Stability Control .

No	GO to N3

N3 PERFORM THE IPC (INSTRUMENT PANEL CLUSTER) INDICATOR LAMP CONTROL ACTIVE COMMAND USING A DIAGNOSTIC SCAN TOOL

Using a diagnostic scan tool, view the IPC Parameter Identifications (PIDs).

Select the IPC ABS warning indicator (ABS_LAMP) PID.

Command the ABS warning indicator on then off. Observe the ABS warning indicator.

Does the ABS warning indicator turn on when commanded on and turn off when commanded off?

Yes	GO to N4

No	INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

N4 CHECK THE GWM (GATEWAY MODULE A) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, check the GWM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: MODULE COMMUNICATIONS NETWORK .

No	If the ABS warning indicator is always on, INSTALL a new ABS module. REFER to: Anti-Lock Brake System (ABS) Module . If the ABS warning indicator is never on, the system is operating correctly.

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST O : THE AIRBAG WARNING INDICATOR IS NEVER OR ALWAYS ON

Normal Operation and Fault Conditions

See Airbag Warning Indicator. REFER to: Instrument Panel Cluster (IPC) - System Operation and Component Description .

If the airbag indicator lamp request message is missing for less than 5 seconds, the IPC defaults the

airbag warning indicator to its last indication state (on or off), based upon the last message received.

If the airbag indicator lamp request message is missing for 5 seconds or longer, the IPC defaults the airbag warning indicator on.

Possible Sources

- Communication concern
- SRS concern
- GWM concern
- IPC

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST O : THE AIRBAG WARNING INDICATOR IS NEVER OR ALWAYS ON > PINPOINT TEST O : THE AIRBAG WARNING INDICATOR IS NEVER OR ALWAYS ON

O1 PERFORM THE IPC (INSTRUMENT PANEL CLUSTER) SELF-TEST

Ignition ON.

Using a diagnostic scan tool, perform the IPC self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to DTC Chart: IPC .

No	GO to O2

O2 PERFORM THE RCM (RESTRAINTS CONTROL MODULE) SELF-TEST

Ignition ON.

Using a diagnostic scan tool, perform the RCM self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: Airbag Supplemental Restraint System (SRS) .

No	GO to O3

O3 CHECK THE GWM (GATEWAY MODULE A) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, check the GWM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: MODULE COMMUNICATIONS NETWORK .

No	GO to O4

O4 PERFORM THE IPC (INSTRUMENT PANEL CLUSTER) INDICATOR LAMP CONTROL ACTIVE COMMAND USING A DIAGNOSTIC SCAN TOOL

Using a diagnostic scan tool, view the IPC Parameter Identifications (PIDs).

Select the IPC airbag warning indicator (AIRBAG_LMP) PID.

Command the airbag warning indicator on then off. Observe the airbag warning indicator.

Does the airbag warning indicator turn on when commanded on and turn off when commanded off?

Yes	If the airbag warning indicator is never on, the system is operating correctly. If the airbag warning indicator is always on, INSTALL a new RCM. REFER to: Restraints Control Module (RCM) .

No	INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST P : THE BRAKE WARNING INDICATOR IS NEVER ON

Refer to Instrument Cluster for schematic and connector information.

Normal Operation and Fault Conditions

See Brake Warning Indicator and ABS/Brake/Stability-Traction Control System Indication descriptions and see Brake Fluid Level Switch component description. REFER to: Instrument Panel Cluster (IPC) - System Operation and Component Description .

If the brake (red) warning indicator request, brake fluid level low message request or parking brake status messages are missing or invalid for less than 5 seconds, the IPC defaults the ABS warning indicator to the last indication state (on or off), based upon the last message received.

Possible Sources

- Brake fluid level switch
- Parking brake system concern
- BCM
- GWM concern

- IPC

Visual Inspection and Diagnostic Pre-checks

Inspect the:

- brake fluid level switch for signs of any external damage.
- wiring harness for signs of a pinched harness causing a shorted circuit.

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST P : THE BRAKE WARNING INDICATOR IS NEVER ON > PINPOINT TEST P : THE BRAKE WARNING INDICATOR IS NEVER ON

P1 PERFORM THE IPC (INSTRUMENT PANEL CLUSTER) INDICATOR LAMP CONTROL ACTIVE COMMAND USING A DIAGNOSTIC SCAN TOOL

Ignition ON.

Using a diagnostic scan tool, view the IPC Parameter Identifications (PIDs).

Select the IPC brake warning indicator (PBA_LMP) PID.

Command the brake warning indicator on then off. Observe the brake warning indicator.

Does the brake warning indicator turn on when commanded on and turn off when commanded off?

Yes	GO to P2

No	INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

P2 CHECK THE GWM (GATEWAY MODULE A) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, check the GWM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: MODULE COMMUNICATIONS NETWORK .

No	GO to P3

P3 DETERMINE IF THE BRAKE WARNING INDICATOR OPERATES WITH THE PARKING BRAKE APPLIED

Apply the parking brake while monitoring the brake warning indicator.

Does the brake warning indicator illuminate?

Yes	GO to P7

No	GO to P4

P4 CHECK THE PARKING BRAKE POSITION SWITCH

Ignition OFF.

Disconnect Parking Brake Position Switch C306 .

Connect a fused jumper wire:

Lead 1	Measurement / Action	Lead 2
C306-1		C306-2

Ignition ON.

Does the brake warning indicator illuminate?

Yes	REMOVE the fused jumper wire. INSTALL a new parking brake position switch.

No	REMOVE the fused jumper wire. GO to P5

P5 CHECK THE PARKING BRAKE POSITION SWITCH GROUND CIRCUIT FOR AN OPEN

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C306-2	Ω	Ground

Is the resistance less than 3 ohms?

Yes	GO to P6

No	REPAIR the circuit.

P6 CHECK THE PARKING BRAKE WARNING INDICATOR SIGNAL CIRCUIT FOR AN OPEN

Disconnect BCM C2280E .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C306-1	Ω	C2280E-47

Is the resistance less than 3 ohms?

Yes	GO to P8

No	REPAIR the circuit.

NOTE: Verify the brake fluid level is low enough to turn on the brake warning indicator or has been reported low enough to turn on the brake warning indicator.

P7 CHECK THE BRAKE FLUID LEVEL SWITCH OPERATION

Ignition OFF.

Disconnect Brake Fluid Level Switch C124 .

Ignition ON.

Wait one minute.

Does the brake warning indicator illuminate?

Yes	If the brake fluid level is currently low or has been reported low, INSTALL a new brake fluid reservoir or master cylinder as required. REFER to: Brake Master Cylinder . If the brake fluid level is not currently low or has not been reported low, the system is operating correctly at this time.

No	GO to P8

P8 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST Q : THE BRAKE WARNING INDICATOR IS ALWAYS ON

Refer to Instrument Cluster for schematic and connector information.

Normal Operation and Fault Conditions

See Brake Warning Indicator and ABS/Brake/Stability-Traction Control System Indication descriptions and see Brake Fluid Level Switch component description. REFER to: Instrument Panel Cluster (IPC) - System Operation and Component Description .

If the brake (red) warning indicator request, brake fluid level low message request or parking brake status messages are missing for 5 seconds longer, the IPC defaults the brake warning indicator on.

BCM DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1048:01	Brake Fluid Level Switch: General Electrical Failure	A continuous and on-demand DTC that sets in the BCM when the BCM detects an open on the brake fluid level switch input.
B1048:7B	Brake Fluid Level Switch: Low Fluid Level	An on-demand DTC that sets in the BCM if the BCM detects a low brake fluid level input from the brake fluid level switch.
C1D00:11	Park Brake Apply Switch: Circuit Short To Ground	An on-demand DTC that sets in the BCM if the BCM detects a short to ground on the parking brake input circuit.

Possible Sources

- Wiring, terminals or connectors
- Brake fluid level switch
- Parking brake position switch
- Communication concern
- ABS concern

- BCM
- GWM concern
- IPC

Visual Inspection and Diagnostic Pre-checks

Inspect the:

- brake fluid level and verify it is full.
- parking brake is fully released.
- base brake system and the parking brake system for correct operation.
- brake fluid level switch connection and check for signs of connector terminal damage, corrosion or pushed-out pins.
- brake fluid level switch wiring for signs of a cut or opened circuit.
- brake fluid level switch for signs of any external damage.

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST Q : THE BRAKE WARNING INDICATOR IS ALWAYS ON > PINPOINT TEST Q : THE BRAKE WARNING INDICATOR IS ALWAYS ON

Q1 PERFORM THE IPC (INSTRUMENT PANEL CLUSTER) SELF-TEST

Ignition ON.

Using a diagnostic scan tool, perform the IPC self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to DTC Chart: IPC .

No	GO to Q2

Q2 PERFORM THE BCM (BODY CONTROL MODULE) SELF-TEST

Using a diagnostic scan tool, perform the BCM self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	For DTC B1048:01, GO to Q8 For DTC B1048:7B, INSTALL a new brake fluid reservoir or master cylinder as required. REFER to: Brake Master Cylinder . For DTC C1D00:11, GO to Q5 For all other Diagnostic Trouble Codes (DTCs), REFER to: Body Control Module (BCM) .

No	GO to Q3

Q3 CHECK THE GWM (GATEWAY MODULE A) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, check the GWM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: MODULE COMMUNICATIONS NETWORK .

No	GO to Q4

Q4 PERFORM THE ABS (ANTI-LOCK BRAKE SYSTEM) MODULE SELF-TEST

Using a diagnostic scan tool, perform the ABS module self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: Anti-Lock Brake System (ABS) and Stability Control .

No	INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

Q5 CHECK THE PARKING BRAKE WARNING INDICATOR SWITCH PID (PARAMETER IDENTIFICATION)

Using a diagnostic scan tool, view the BCM parking brake position switch PID.

Monitor the parking brake PID (PARK_BRK_SW) with the parking brake released.

Does the PID agree with the parking brake position?

Yes	GO to Q12

No	GO to Q6

Q6 CHECK THE PARKING BRAKE POSITION SWITCH

Ignition OFF.

Disconnect Parking Brake Position Switch C306 .

Ignition ON.

Using a diagnostic scan tool, view the BCM parking brake position switch Parameter Identifications (PIDs).

Monitor the parking brake PID (PARK_BRK_SW) with the parking brake released.

Does the PID indicate the parking brake is released?

Yes	INSTALL a new parking brake position switch.

No	GO to Q7

Q7 CHECK THE PARKING BRAKE POSITION SWITCH INPUT CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Disconnect BCM C2280E .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2280E-47	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to Q12

No	REPAIR the circuit.

Q8 CHECK THE BRAKE FLUID LEVEL SWITCH

Ignition OFF.

Disconnect Brake Fluid Level Switch C124 .

Connect a fused jumper wire:

Lead 1	Measurement / Action	Lead 2
C124-1		C124-2

Ignition ON.

Does the brake warning indicator turn on?

Yes	REMOVE the fused jumper wire. INSTALL a new brake fluid reservoir or master cylinder as required. REFER to: Brake Master Cylinder .

No	REMOVE the fuse jumper wire. GO to Q9

Q9 CHECK THE BRAKE FLUID LEVEL SWITCH GROUND CIRCUIT FOR AN OPEN AT THE BRAKE FLUID LEVEL SWITCH

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C124-2	Ω	Ground

Is the resistance less than 3 ohms?

Yes	GO to Q10

No	REPAIR the circuit.

Q10 CHECK THE BRAKE FLUID LEVEL SWITCH INPUT CIRCUIT FOR AN OPEN BETWEEN THE BCM (BODY CONTROL MODULE) AND THE BRAKE FLUID LEVEL SWITCH

Disconnect BCM C2280F .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2280F-28	Ω	C124-1

Is the resistance less than 3 ohms?

Yes	GO to Q11

No	REPAIR the circuit.

Q11 CHECK THE BRAKE FLUID LEVEL SWITCH FOR SHORT TO GROUND AT THE BRAKE FLUID LEVEL SWITCH

Measure:

Positive Lead	Measurement / Action	Negative Lead
C124-2	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to Q12

No	REPAIR the circuit.

Q12 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST R : THE LED (LIGHT EMITTING DIODE) LOW BEAM MALFUNCTION INDICATOR IS NEVER OR ALWAYS ON

Normal Operation and Fault Conditions

See LED Low Beam Malfunction Indicator. REFER to: Instrument Panel Cluster (IPC) - System Operation and Component Description .

If the headlamp low beam out message is missing for less than 5 seconds, the IPC defaults the LED low beam malfunction indicator to its last indication state (on or off), based upon the last message received.

If the headlamp low beam out message is missing for 5 seconds or longer, the IPC defaults the LED low beam malfunction indicator off.

Possible Sources

- Low beam lighting concern
- Communication concern
- BCM concern
- GWM concern
- IPC

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST R : THE LED (LIGHT EMITTING DIODE) LOW BEAM MALFUNCTION INDICATOR IS NEVER OR ALWAYS ON > PINPOINT TEST R : THE LED (LIGHT EMITTING DIODE) LOW BEAM MALFUNCTION INDICATOR IS NEVER OR ALWAYS ON

R1 DETERMINE THE FAULT CONDITION

Ignition ON.

Check the operation of the low beam headlamps.

Do the low beam headlamps operate correctly?

Yes	GO to R2

No	REFER to: Headlamps .

R2 CHECK THE GWM (GATEWAY MODULE A) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, check the GWM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: MODULE COMMUNICATIONS NETWORK .

No	GO to R3

R3 PERFORM THE IPC (INSTRUMENT PANEL CLUSTER) SELF-TEST

Using a diagnostic scan tool, perform the IPC self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to DTC Chart: IPC .

No	GO to R4

R4 CHECK THE LED (LIGHT EMITTING DIODE) LOW BEAM MALFUNCTION INDICATOR OPERATION USING A DIAGNOSTIC SCAN TOOL

Using a diagnostic scan tool, view the IPC Parameter Identifications (PIDs).

Select the IPC LED low beam malfunction indicator (A_F_LIGHT_F) PID.

Command the LED low beam malfunction indicator on then off. Observe the LED low beam malfunction indicator.

Does the LED low beam malfunction indicator illuminate when commanded on and turn off when commanded off?

Yes	DIAGNOSE all BCM Diagnostic Trouble Codes (DTCs). REFER to: Body Control Module (BCM) .

No	INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST S : THE LH (LEFT-HAND) - RH (RIGHT-HAND) TURN SIGNAL, FRONT FOG LAMP OR HIGH BEAM INDICATOR IS NEVER OR ALWAYS ON

Normal Operation and Fault Conditions

See LH- RH Turn Signal Indicator, Front Fog Lamp Indicator Or High Beam Indicator. REFER to: Instrument Panel Cluster (IPC) - System Operation and Component Description .

If the turn indication data, fog lamp indicator or high beam status message is missing for less than 5 seconds, the IPC defaults the turn signal, fog lamp or high beam indicator to its last indication state (on or off), based upon the last message received.

If the turn indication data, fog lamp indicator or high beam status message is missing for 5 seconds or longer, the IPC defaults the turn signal, fog lamp or high beam indicator off.

Possible Sources

- Turn signal concern
- Front Fog lamp concern
- High beam concern
- Communication concern
- BCM concern
- GWM concern
- IPC

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST S : THE LH (LEFT-HAND) - RH (RIGHT-HAND) TURN SIGNAL, FRONT FOG LAMP OR HIGH BEAM INDICATOR IS NEVER OR ALWAYS ON > PINPOINT TEST S : THE LH (LEFT-HAND) - RH

(RIGHT-HAND) TURN SIGNAL, FRONT FOG LAMP OR HIGH BEAM INDICATOR IS NEVER OR ALWAYS ON

S1 DETERMINE THE FAULT CONDITION

Ignition ON.

Check the operation of the high beams, front fog lamps or turn signals.

Do the high beams, front fog lamps or turn signals operate correctly?

Yes	GO to S2

No	For front fog lamps, REFER to: Fog Lamps , REFER to: Headlamps , REFER to: Turn Signal and Hazard Lamps .

S2 CHECK THE GWM (GATEWAY MODULE A) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, check the GWM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: MODULE COMMUNICATIONS NETWORK .

No	GO to S3

S3 PERFORM THE IPC (INSTRUMENT PANEL CLUSTER) SELF-TEST

Using a diagnostic scan tool, perform the IPC self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to DTC Chart: IPC .

No	For the front fog lamp indicator, GO to S4 For the high beam indicator, GO to S5 For the LH or RH turn indicator, GO to S6

S4 CHECK THE FRONT FOG LAMP INDICATOR OPERATION USING A DIAGNOSTIC SCAN TOOL

Using a diagnostic scan tool, view the IPC Parameter Identifications (PIDs).

Select the IPC front fog lamp indicator (F_FOG_IND) PID.

Does the front fog lamp indicator illuminate when commanded on and turn off when commanded off?

Yes	DIAGNOSE all BCM Diagnostic Trouble Codes (DTCs). REFER to: Body Control Module (BCM) .

No	INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

S5 CHECK THE HIGH BEAM INDICATOR OPERATION USING A DIAGNOSTIC SCAN TOOL

Using a diagnostic scan tool, view the IPC Parameter Identifications (PIDs).

Select the IPC high beam indicator (HIGH_BEAM) PID.

Command the high beam indicator on and off while observing the high beam indicator.

Does the high beam indicator illuminate when commanded on and turn off when commanded off?

Yes	DIAGNOSE all BCM Diagnostic Trouble Codes (DTCs). REFER to: Body Control Module (BCM) .

No	INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

S6 CHECK THE LH (LEFT-HAND) AND RH (RIGHT-HAND) TURN INDICATOR OPERATION USING A DIAGNOSTIC SCAN TOOL

Using a diagnostic scan tool, view the IPC Parameter Identifications (PIDs).

Select the IPC RH (RH_TURN_L) or LH (LH_TURN_L) turn signal indicator PID.

Command the RH or LH turn signal indicator on and off while observing the RH or LH turn signal indicator.

Does the RH or LH turn signal indicator illuminate when commanded on and turn off when commanded off?

Yes	DIAGNOSE all BCM Diagnostic Trouble Codes (DTCs). REFER to: Body Control Module (BCM) .

No	INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST T : THE LIGHTS ON INDICATOR IS NEVER OR ALWAYS ON

Normal Operation and Fault Conditions

See Lights On Indicator. REFER to: Instrument Panel Cluster (IPC) - System Operation and Component Description .

If the park lamp status message is missing for less than 5 seconds, the IPC defaults the lights on indicator to its last indication state (on or off), based upon the last message received.

If the park lamp status message is missing for 5 seconds or longer, the IPC defaults the lights on indicator off.

Possible Sources

- Exterior lighting concern
- Communication concern
- BCM concern
- GWM concern
- IPC

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST T : THE LIGHTS ON INDICATOR IS NEVER OR ALWAYS ON > PINPOINT TEST T : THE LIGHTS ON INDICATOR IS NEVER OR ALWAYS ON

T1 CHECK THE PARKING LAMPS OPERATION

Place the headlamp switch in the PARKLAMP position.

Ignition ON.

Observe the parking lamps.

Do the parking lights operate correctly?

Yes	GO to T2

No	REFER to: Parking, Rear and License Plate Lamps .

T2 PERFORM THE IPC (INSTRUMENT PANEL CLUSTER) SELF-TEST

Using a diagnostic scan tool, perform the IPC self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to DTC Chart: IPC .

No	GO to T3

T3 CHECK THE GWM (GATEWAY MODULE A) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, check the GWM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: MODULE COMMUNICATIONS NETWORK .

No	GO to T4

T4 PERFORM THE IPC (INSTRUMENT PANEL CLUSTER) INDICATOR LAMP CONTROL ACTIVE COMMAND USING A DIAGNOSTIC SCAN TOOL

Using a diagnostic scan tool, view the IPC Parameter Identifications (PIDs).

Select the IPC lights on indicator (SIDELIGHT_LMP) PID.

Command the lights on indicator on and off while observing the indicator.

Does the lights on indicator illuminate when commanded on and turn off when commanded off?

Yes	DIAGNOSE all BCM Diagnostic Trouble Codes (DTCs). REFER to: Body Control Module (BCM) .

No	INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST U : THE MIL (MALFUNCTION INDICATOR LAMP) IS NEVER OR ALWAYS ON

Normal Operation and Fault Conditions

See MIL. REFER to: Instrument Panel Cluster (IPC) - System Operation and Component Description .

If the MIL request message is missing or invalid for less than 5 seconds, the IPC defaults the MIL to its last state (on or off) based upon the last known good message received.

If the MIL request message is missing for 5 seconds or longer, the IPC defaults the MIL on.

Possible Sources

- Communication concern
- GWM concern
- PCM concern
- IPC

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST U : THE MIL (MALFUNCTION INDICATOR LAMP) IS NEVER OR ALWAYS ON > PINPOINT TEST U : THE MIL (MALFUNCTION INDICATOR LAMP) IS NEVER OR ALWAYS ON

U1 PERFORM THE IPC (INSTRUMENT PANEL CLUSTER) SELF-TEST

Ignition ON.

Using a diagnostic scan tool, perform the IPC self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to DTC Chart: IPC .

No	GO to U2

U2 CHECK THE GWM (GATEWAY MODULE A) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, check the GWM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: MODULE COMMUNICATIONS NETWORK .

No	GO to U3

U3 PERFORM THE IPC (INSTRUMENT PANEL CLUSTER) INDICATOR LAMP CONTROL ACTIVE COMMAND USING A DIAGNOSTIC SCAN TOOL

Using a diagnostic scan tool, view the IPC Parameter Identifications (PIDs).

Select the IPC (MIL) PID.

Command the MIL on and off while observing the indicator.

Does the MIL illuminate when commanded on and turn off when commanded off?

Yes	If the MIL is always on, DIAGNOSE all PCM Diagnostic Trouble Codes (DTCs). Refer to the appropriate article for the procedure. If the MIL is never on, the system is operating correctly at this time.

No	INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST V : THE PRNDL INDICATOR IS NEVER ON OR NEVER DISPLAYS P

Refer to Instrument Cluster for schematic and connector information.

Normal Operation and Fault Conditions

See PRNDL Indicator. REFER to: Instrument Panel Cluster (IPC) - System Operation and Component Description .

If the transmission gear display or transmission shift mode display message is missing for less than 5 seconds, the PRNDL display remains in the last indication state (selected gear displayed), based upon the last message received.

If the transmission gear display or transmission shift mode display message is missing for 5 seconds or longer, the IPC defaults the PRNDL display off.

IPC DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
P1706:00	High Vehicle Speed Observed in Park: No Sub Type Information	A continuous and on-demand DTC that sets in the IPC if the IPC detects a park detect input with vehicle speed over 16 km/h (10 mph), indicating the vehicle is in park while in motion.

Possible Sources

- Wiring, terminals or connectors
- Communication concern
- Park detect switch (part of the selector lever)
- Transmission concern
- BCM
- GWM concern
- IPC

Visual Inspection And Diagnostic Pre-checks

Verify the vehicle is not in transport mode.

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST V : THE PRNDL INDICATOR IS NEVER ON OR NEVER DISPLAYS P > PINPOINT TEST V : THE PRNDL INDICATOR

IS NEVER ON OR NEVER DISPLAYS P

V1 PERFORM THE IPC (INSTRUMENT PANEL CLUSTER) SELF-TEST

Ignition ON.

Using a diagnostic scan tool, perform the IPC self-test.

Are any DTCs recorded?

Yes	For DTC P1706:00, GO to V5 For all other Diagnostic Trouble Codes (DTCs), REFER to DTC Chart: IPC .

No	GO to V2

V2 PERFORM THE BCM (BODY CONTROL MODULE) SELF-TEST

Using a diagnostic scan tool, perform the BCM self-test.

Are any DTCs recorded?

Yes	REFER to: Body Control Module (BCM) .

No	GO to V3

V3 CHECK THE GWM (GATEWAY MODULE A) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, check the GWM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: MODULE COMMUNICATIONS NETWORK .

No	GO to V4

V4 PERFORM THE PCM (POWERTRAIN CONTROL MODULE) SELF-TEST

Using a diagnostic scan tool, perform the PCM self-test.

Are any transmission related DTCs recorded?

Yes	Refer to the appropriate article for the procedure.

No	GO to V7

V5 CHECK THE PARK DETECT SWITCH CONTROL CIRCUIT FOR A SHORT TO VOLTAGE AT

THE IPC (INSTRUMENT PANEL CLUSTER)

Ignition OFF.

Disconnect IPC C220 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C220-4		Ground

Is any voltage present?

Yes	GO to V6

No	GO to V7

V6 CHECK THE SELECTOR LEVER FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect Selector Lever C3245 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C220-4		Ground

Is any voltage present?

Yes	INSTALL a new selector lever. REFER to: Selector Lever Assembly .

No	REPAIR the circuit.

V7 BYPASS THE SELECTOR LEVER AND CHECK THE PARK DETECT INPUT TO THE IPC (INSTRUMENT PANEL CLUSTER)

Ignition OFF.

Disconnect Selector Lever C3245 .

Connect a fused jumper wire:

Lead 1	Measurement / Action	Lead 2

C3245-1		Ground

Ignition ON.

Monitor the PRNDL indicator with the fused jumper wire installed and with the fused jumper wire removed.

Does the PRNDL display P with the fused jumper wire removed and blank with the fused jumper wire connected?

Yes	REMOVE the fused jumper wire. INSTALL a new selector lever. REFER to: Selector Lever Assembly .

No	REMOVE the fused jumper wire. GO to V8

V8 CHECK THE SELECTOR LEVER INPUT CIRCUIT FOR AN OPEN BETWEEN THE IPC (INSTRUMENT PANEL CLUSTER) AND THE SELECTOR LEVER

Ignition OFF.

Disconnect IPC C220 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C220-4	Ω	C3245-1

Is the resistance less than 3 ohms?

Yes	GO to V9

No	REPAIR the circuit.

V9 CHECK THE SELECTOR LEVER INPUT CIRCUIT FOR A SHORT TO GROUND AT THE IPC (INSTRUMENT PANEL CLUSTER)

Measure:

Positive Lead	Measurement / Action	Negative Lead
C220-4	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to V10

No	REPAIR the circuit.

V10 CHECK THE SELECTOR LEVER GROUND CIRCUIT FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3245-2	Ω	Ground

Is the resistance less than 3 ohms?

Yes	GO to V11

No	REPAIR the circuit.

V11 CHECK FOR CORRECT IPC (INSTRUMENT PANEL CLUSTER) OPERATION

Ignition OFF.

Disconnect and inspect the IPC connector.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the IPC connector. Make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST W : THE REAR FOG LAMP INDICATOR IS NEVER OR ALWAYS ON (IF EQUIPPED)

Normal Operation and Fault Conditions

See Rear Fog Lamp Indicator. REFER to: Fog Lamps .

If the rear fog lamp indicator request is missing for less than 5 seconds, the IPC defaults the rear fog lamps indicator to its last indication state (on or off), based upon the last message received.

If the rear fog lamp indicator request is missing for 5 seconds or longer, the IPC defaults the rear fog lamps indicator off.

Possible Sources

- Rear fog lamp concern
- Communication concern
- GWM concern
- BCM concern
- IPC

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST W : THE REAR FOG LAMP INDICATOR IS NEVER OR ALWAYS ON (IF EQUIPPED) > PINPOINT TEST W : THE REAR FOG LAMP INDICATOR IS NEVER OR ALWAYS ON (IF EQUIPPED)

W1 CHECK THE REAR FOG LAMPS OPERATION

Turn the rear fog lamps on.

Ignition ON.

Observe the rear fog lamps when on then when turned off.

Do the rear fog lamps operate correctly when turned on and off?

Yes	GO to W2

No	REFER to: Fog Lamps .

W2 PERFORM THE IPC (INSTRUMENT PANEL CLUSTER) SELF-TEST

Using a diagnostic scan tool, perform the IPC self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to DTC Chart: IPC .

No	GO to W3

W3 CHECK THE GWM (GATEWAY MODULE A) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, check the GWM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: MODULE COMMUNICATIONS NETWORK .

No	GO to W4

W4 PERFORM THE IPC (INSTRUMENT PANEL CLUSTER) INDICATOR LAMP CONTROL ACTIVE COMMAND USING A DIAGNOSTIC SCAN TOOL

Using a diagnostic scan tool, view the IPC Parameter Identifications (PIDs).

Select the IPC rear fog lamp indicator (R_FOG_IND) PID.

Command the rear fog lamp indicator on and off while observing the indicator.

Does the rear fog lamp indicator illuminate when commanded on and turn off when commanded off?

Yes	DIAGNOSE all BCM Diagnostic Trouble Codes (DTCs). REFER to: Body Control Module (BCM) .

No	INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST X : THE SAFETY BELT WARNING INDICATOR IS NEVER OR ALWAYS ON

Normal Operation and Fault Conditions

See Safety Belt Warning Indicator. REFER to: Instrument Panel Cluster (IPC) - System Operation and Component Description .

If the driver safety belt buckle status is missing for less than 5 seconds, the IPC defaults the safety belt warning indicator to its last indication state (on or off), based upon the last message received.

If the driver safety belt buckle status message is missing for 5 seconds or longer, the IPC defaults the safety belt warning indicator off.

Possible Sources

- Driver safety belt buckle concern
- Communication concern
- GWM concern
- SRS concern

- IPC

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST X : THE SAFETY BELT WARNING INDICATOR IS NEVER OR ALWAYS ON > PINPOINT TEST X : THE SAFETY BELT WARNING INDICATOR IS NEVER OR ALWAYS ON

X1 PERFORM THE IPC (INSTRUMENT PANEL CLUSTER) SELF-TEST

Ignition ON.

Using a diagnostic scan tool, perform the IPC self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to DTC Chart: IPC .

No	GO to X2

X2 CHECK THE GWM (GATEWAY MODULE A) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, check the GWM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: MODULE COMMUNICATIONS NETWORK .

No	GO to X3

X3 CHECK THE DRIVER SAFETY BELT BUCKLE STATUS

Using a diagnostic scan tool, monitor the RCM driver safety belt buckle PID (SBELT_D_ST) while buckling and unbuckling the driver safety belt.

Does the PID display BUCKLED with the safety belt buckled and UNBUCKLED with the safety belt unbuckled?

Yes	GO to X4

No	INSTALL a new safety belt buckle. REFER to: Front Seatbelt Buckle .

X4 PERFORM THE IPC (INSTRUMENT PANEL CLUSTER) INDICATOR LAMP CONTROL ACTIVE COMMAND USING A DIAGNOSTIC SCAN TOOL

Using a diagnostic scan tool, view the IPC Parameter Identifications (PIDs).

Select the IPC safety belt warning indicator (SBLT_LAMP) PID.

Command the safety belt warning indicator on and off while observing the safety belt warning indicator.

Does the safety belt warning indicator illuminate when commanded on and turn off when commanded off?

Yes	INSTALL a new RCM. REFER to: Restraints Control Module (RCM) .

No	INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST Y : THE STABILITY-TRACTION CONTROL INDICATOR (SLIDING CAR ICON) IS NEVER OR ALWAYS ON

Normal Operation and Fault Conditions

See Stability-Traction Control Indicator (Sliding Car Icon). REFER to: Instrument Panel Cluster (IPC) - System Operation and Component Description .

If the stability-traction control indicator request is missing or invalid for less than 5 seconds, the IPC defaults the stability-traction control indicator (sliding car icon) to the last indication state (on or off), based upon the last message received.

If the IPC does not receive the stability-traction control indicator request for 5 seconds or longer, the IPC defaults the stability-traction control indicator (sliding car icon) on.

Possible Sources

- Communication concern
- Stability-traction control system concern
- GWM concern
- IPC

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST Y : THE STABILITY-TRACTION CONTROL INDICATOR (SLIDING CAR ICON) IS NEVER OR ALWAYS ON > PINPOINT TEST Y : THE STABILITY-TRACTION CONTROL INDICATOR (SLIDING CAR ICON) IS NEVER OR ALWAYS ON

Y1 PERFORM THE IPC (INSTRUMENT PANEL CLUSTER) SELF-TEST

Ignition ON.

Using a diagnostic scan tool, perform the IPC self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to DTC Chart: IPC .

No	GO to Y2

Y2 PERFORM THE ABS (ANTI-LOCK BRAKE SYSTEM) MODULE SELF-TEST

Ignition ON.

Using a diagnostic scan tool, perform the ABS module self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: Anti-Lock Brake System (ABS) and Stability Control .

No	GO to Y3

Y3 CHECK THE GWM (GATEWAY MODULE A) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, check the GWM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: MODULE COMMUNICATIONS NETWORK .

No	GO to Y4

Y4 PERFORM THE IPC (INSTRUMENT PANEL CLUSTER) INDICATOR LAMP CONTROL ACTIVE COMMAND USING A DIAGNOSTIC SCAN TOOL

Using a diagnostic scan tool, view the IPC Parameter Identifications (PIDs).

Select the IPC stability-traction control indicator (TC/IVD/RSCLMP) PID.

Command the stability-traction control indicator (sliding car icon) on and off while observing the stability-traction control indicator (sliding car icon).

Does the stability-traction control indicator (sliding car icon) illuminate when commanded on and turn off when commanded off?

Yes	If the stability-traction control indicator (sliding car icon) is never on, the system is operating correctly. If the stability-traction control indicator (sliding car icon) is always on, INSTALL a new ABS module. REFER to: Anti-Lock Brake System (ABS) Module .

No	INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST Z : THE STABILITY-TRACTION CONTROL DISABLED INDICATOR (SLIDING CAR OFF ICON) IS NEVER OR ALWAYS ON

Normal Operation and Fault Conditions

See Stability-Traction Control Disabled Indicator (Sliding Car OFF Icon). REFER to: Instrument Panel Cluster (IPC) - System Operation and Component Description .

If the stability-traction control mode indicator request is missing or invalid for less than 5 seconds, the IPC defaults the stability-traction control disabled indicator (sliding car OFF icon) to the last indication state (on or off), based upon the last message received.

If the IPC does not receive the stability-traction control mode indicator request for 5 seconds or longer, the IPC defaults the stability-traction control disabled indicator (sliding car OFF icon) off.

When a MyKey ® programmed key is in use and the AdvanceTrac ® on feature is configured always on, the traction control system cannot be disabled and the traction control indicator does not turn on when the traction control disable button is pressed. The traction control indicator still functions correctly to indicate a traction control system fault and a traction control active event.

Possible Sources

- MyKey ® programmed key in use
- Stability-traction control system concern
- Stability-traction control system cannot be disabled
- Communication concern
- GWM concern
- IPC

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST Z : THE STABILITY-TRACTION CONTROL DISABLED INDICATOR (SLIDING CAR OFF ICON) IS NEVER OR ALWAYS ON > PINPOINT TEST Z : THE STABILITY-TRACTION CONTROL DISABLED INDICATOR (SLIDING CAR OFF ICON) IS NEVER OR ALWAYS ON

Z1 PERFORM THE IPC (INSTRUMENT PANEL CLUSTER) SELF-TEST

Using a diagnostic scan tool, perform the IPC self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to DTC Chart: IPC .

No	GO to Z2

Z2 CHECK THE GWM (GATEWAY MODULE A) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, check the GWM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: MODULE COMMUNICATIONS NETWORK .

No	GO to Z3

Z3 CHECK FOR THE KEY TYPE

Check if the key is a MyKey ® programmed key or an administrator key. Refer to the Owner's Literature.

Is the key an administrator key?

Yes	GO to Z4

No	GO to Z5

Z4 CHECK FOR THE ADVANCETRAC ® ON FEATURE CONFIGURED ALWAYS ON

Check if the AdvanceTrac ® feature is configured always on. Refer to the Owner's Literature.

Is the AdvanceTrac ® feature configured always on?

Yes	The traction control system cannot be disabled when the AdvanceTrac ® on feature is configured always on.

No	GO to Z5

Z5 PERFORM THE IPC (INSTRUMENT PANEL CLUSTER) INDICATOR LAMP CONTROL ACTIVE COMMAND USING A DIAGNOSTIC SCAN TOOL

Using a diagnostic scan tool, view the IPC Parameter Identifications (PIDs).

Select the IPC stability-traction control disabled indicator (sliding car OFF icon) (STAB_TC_LMP) PID.

Command the stability-traction control disabled indicator (sliding car OFF icon) on and off while observing the stability-traction control disabled indicator (sliding car OFF icon).

Does the stability-traction control disabled indicator (sliding car OFF icon) illuminate when commanded on and turn off when commanded off?

Yes	GO to Z6

No	INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

Z6 CHECK THE TRACTION CONTROL SETTING THROUGH THE MESSAGE CENTER

Using the LH steering wheel switch and an administrator key, navigate to the traction control setting menu and observe the traction control setting.

Configure the stability-traction control on then off again.

Does the traction control selection change when the feature is configured on and off?

Yes	The system is operating correctly at this time.

No	DIAGNOSE the stability-traction control cannot be disabled. REFER to: Anti-Lock Brake System (ABS) and Stability Control .

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST AA : THE TPMS (TIRE PRESSURE MONITORING SYSTEM) WARNING INDICATOR IS NEVER OR ALWAYS ON

Normal Operation and Fault Conditions

See TPMS Indicator. REFER to: Instrument Panel Cluster (IPC) - System Operation and Component Description .

If the tire pressure warning indicator message is missing for 5 seconds or less, the TPMS warning indicator remains in its last indication state (on or off), based upon the last message received.

If the tire pressure warning indicator message is missing for 5 seconds or longer, the IPC flashes the TPMS warning indicator for approximately 75 seconds, then illuminates the TPMS warning indicator.

Possible Sources

- Low tire pressure
- Communication concern
- TPMS concern
- GWM concern

- IPC

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST AA : THE TPMS (TIRE PRESSURE MONITORING SYSTEM) WARNING INDICATOR IS NEVER OR ALWAYS ON > PINPOINT TEST AA : THE TPMS (TIRE PRESSURE MONITORING SYSTEM) WARNING INDICATOR IS NEVER OR ALWAYS ON

AA1 CHECK THE TIRE PRESSURE

Verify the tire pressure in all tires meets the recommended tire pressures on the vehicle certification label. REFER to: Identification Codes .

Do all the tires meet the recommended tire pressures?

Yes	GO to AA2

No	CORRECT the tire pressures.

AA2 PERFORM THE IPC (INSTRUMENT PANEL CLUSTER) SELF-TEST

Using a diagnostic scan tool, perform the IPC self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to DTC Chart: IPC .

No	GO to AA3

AA3 PERFORM THE BCM (BODY CONTROL MODULE) SELF-TEST

Using a diagnostic scan tool, perform the BCM self-test.

Are any DTCs recorded?

Yes	REFER to: Body Control Module (BCM) .

No	GO to AA4

AA4 CHECK THE GWM (GATEWAY MODULE A) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, check the GWM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: MODULE COMMUNICATIONS NETWORK .

No	GO to AA5

AA5 PERFORM THE IPC (INSTRUMENT PANEL CLUSTER) INDICATOR LAMP CONTROL ACTIVE COMMAND USING A DIAGNOSTIC SCAN TOOL

Using a diagnostic scan tool, view the IPC Parameter Identifications (PIDs).

Select the IPC TPMS warning indicator (TPMWARN_LMP) PID.

Command the TPMS warning indicator on and off while observing the TPMS warning indicator.

Does the TPMS warning indicator illuminate when commanded on and turn off when commanded off?

Yes	If the TPMS warning indicator is never on, the system is operating correctly. If the TPMS warning indicator is always on, DIAGNOSE the TPMS. REFER to: Tire Pressure Monitoring System (TPMS) .

No	INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST AB : THE MESSAGE CENTER IS NOT OPERATING CORRECTLY

Refer to Instrument Cluster for schematic and connector information.

Normal Operation and Fault Conditions

See Steering Wheel Switch-Message Center (in Component Description). REFER to: Message Center - System Operation and Component Description .

SCCM DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B137F:09	Steering Wheel Left Switch Pack: Component Failure	A continuous and on-demand DTC that sets in the SCCM when the SCCM detects a message center switch pressed for 2 minutes or longer.
B137F:11	Steering Wheel Left Switch Pack: Circuit Short To Ground	A continuous and on-demand DTC that sets in the SCCM when the SCCM detects a short to ground on the message center switch input circuit.

B137F:17	Steering Wheel Left Switch Pack: Circuit Voltage Above Threshold	A continuous and on-demand DTC that sets in the SCCM when the SCCM detects an open or short to voltage on the message center switch input circuit.

Possible Sources

- Wiring, terminals or connectors
- Clockspring
- Message center switch (part of the LH steering wheel switch)
- SCCM
- IPC

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST AB : THE MESSAGE CENTER IS NOT OPERATING CORRECTLY > PINPOINT TEST AB : THE MESSAGE CENTER IS NOT OPERATING CORRECTLY

AB1 PERFORM THE IPC (INSTRUMENT PANEL CLUSTER) SELF-TEST

Ignition ON.

Using a diagnostic scan tool, perform the IPC self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to DTC Chart: IPC .

No	GO to AB2

AB2 PERFORM THE SCCM (STEERING COLUMN CONTROL MODULE) SELF-TEST

Using a diagnostic scan tool, perform the SCCM self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	For DTC B137F:09, INSTALL a new LH steering wheel switch. REFER to: Steering Wheel Multifunction Switch . For DTC B137F:11, GO to AB5 For DTC B137F:17, GO to AB8

No	GO to AB3

AB3 CHECK THE STEERING WHEEL SWITCH INPUT TO THE SCCM (STEERING COLUMN CONTROL MODULE)

Using a diagnostic scan tool, view the SCCM Parameter Identifications (PIDs).

Select the LH steering wheel switch Parameter Identifications (PIDs) (L_CURS_LFT, L_CURS_RGT, L_CURS_UP, L_CURS_DWN and L_CURS_OK).

Do the Parameter Identifications (PIDs) match the switch positions?

Yes	INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

No	GO to AB4

AB4 CHECK THE SCCM (STEERING COLUMN CONTROL MODULE) OUTPUT AT THE LH (LEFT-HAND) STEERING WHEEL SWITCH

Ignition OFF.

Remove the driver airbag. REFER to: Driver Airbag .

Disconnect LH Steering Wheel Switch C2998 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2998-2		C2998-3

Is the voltage approximately 5 volts?

Yes	INSTALL a new LH steering wheel switch. REFER to: Steering Wheel Multifunction Switch .

No	GO to AB13

AB5 CHECK THE MESSAGE CENTER SWITCH FOR A SHORT TO GROUND

Ignition OFF.

Remove the driver airbag. REFER to: Driver Airbag .

Disconnect LH Steering Wheel Switch C2998 .

Ignition ON.

Using a diagnostic scan tool, perform the SCCM self-test.

Is DTC B137F:17 recorded?

Yes	INSTALL a new LH steering wheel switch. REFER to: Steering Wheel Multifunction Switch .

No	GO to AB6

AB6 CHECK THE STEERING WHEEL SWITCH HARNESS FOR A SHORT TO GROUND

Ignition OFF.

Disconnect Upper Clockspring C218B .

Ignition ON.

Using a diagnostic scan tool, perform the SCCM self-test.

Is DTC B137F:17 recorded?

Yes	INSTALL a new steering wheel. REFER to: Steering Wheel .

No	GO to AB7

AB7 CHECK THE CLOCKSPRING FOR A SHORT TO GROUND

Ignition OFF.

Remove clockspring from the SCCM.

Ignition ON.

Using a diagnostic scan tool, perform the SCCM self-test.

Is DTC B137F:17 recorded?

Yes	INSTALL a new clockspring. REFER to: Clockspring .

No	GO to AB13

AB8 CHECK THE MESSAGE CENTER SWITCH FOR AN OPEN

Ignition OFF.

Remove the driver airbag. REFER to: Driver Airbag .

Disconnect LH Steering Wheel Switch C2998 .

Ignition ON.

NOTE: If the fused jumper wire fails, repair the signal circuit for a short to voltage.

Connect a fused jumper wire:

Lead 1	Measurement / Action	Lead 2
C2998-2		Ground

Ignition ON.

Using a diagnostic scan tool, perform the SCCM self-test.

Is DTC B137F:11 recorded?

Yes	REMOVE the fused jumper wire. INSTALL a new LH steering wheel switch. REFER to: Steering Wheel Multifunction Switch .

No	REMOVE the fused jumper wire. GO to AB9

AB9 CHECK THE STEERING WHEEL HARNESS MESSAGE CENTER SWITCH SIGNAL CIRCUIT FOR AN OPEN

Ignition OFF.

Disconnect Clockspring C218B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2998-2	Ω	C218B-14

Is the resistance less than 3 ohms?

Yes	GO to AB10

No	INSTALL a new steering wheel. REFER to: Steering Wheel .

AB10 CHECK THE STEERING WHEEL HARNESS MESSAGE CENTER SWITCH RETURN CIRCUIT FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2998-3	Ω	C218B-8

Is the resistance less than 3 ohms?

Yes	GO to AB11

No	INSTALL a new steering wheel. REFER to: Steering Wheel .

AB11 CHECK THE MESSAGE CENTER SWITCH SIGNAL CIRCUIT THROUGH THE CLOCKSPRING FOR AN OPEN

Remove clockspring from the SCCM.

Measure:

Positive Lead	Measurement / Action	Negative Lead
Upper Clockspring (Component Side) - Pin 14	Ω	Lower Clockspring (Component Side) - Pin 6

Is the resistance less than 3 ohms?

Yes	GO to AB12

No	INSTALL a new clockspring. REFER to: Clockspring .

AB12 CHECK THE MESSAGE CENTER SWITCH RETURN CIRCUIT THROUGH THE CLOCKSPRING FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
Upper Clockspring (Component Side) - Pin 8	Ω	Lower Clockspring (Component Side) - Pin 9

Is the resistance less than 3 ohms?

Yes	GO to AB13

No	INSTALL a new clockspring. REFER to: Clockspring .

AB13 CHECK FOR CORRECT SCCM (STEERING COLUMN CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all the SCCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect all the SCCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK On-Line Automotive Service Information System (OASIS) for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new SCCM. REFER to: Steering Column Control Module (SCCM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST AC : THE COMPASS IS INOPERATIVE

Normal Operation and Fault Conditions

See Compass Display. REFER to: Message Center - System Operation and Component Description .

If the GPS compass direction message is missing or invalid for 5 seconds or less, the compass displays the last vehicle direction based upon the last known good compass display message received.

If the GPS compass direction message is missing for more than 5 seconds, the IPC defaults the display to all dashes (---).

Possible Sources

- Communication concern
- GPSM concern
- IPC

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST AC : THE COMPASS IS INOPERATIVE > PINPOINT TEST AC : THE COMPASS IS INOPERATIVE

AC1 PERFORM THE GPSM (GLOBAL POSITIONING SYSTEM MODULE) SELF-TEST

Ignition ON.

Using a diagnostic scan tool, perform the GPSM self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	Refer to the appropriate article for the procedure.

No	GO to AC2

AC2 PERFORM THE IPC (INSTRUMENT PANEL CLUSTER) SELF-TEST

Using a diagnostic scan tool, perform the IPC self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to DTC Chart: IPC .

No	INSTALL a new GPSM. Refer to the appropriate article for the procedure.

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST AD : INCORRECT OR FLUCTUATING DTE (DISTANCE TO EMPTY) DISPLAY

Normal Operation and Fault Conditions

See DTE Display. REFER to: Message Center - System Operation and Component Description .

Possible Sources

- Fuel gauge concern
- Changes in driving conditions, such as:
  - extended idle times
  - parking on grades
  - alcohol in the fuel
  - refueling patterns
- IPC

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST AD : INCORRECT OR FLUCTUATING DTE (DISTANCE TO EMPTY) DISPLAY > PINPOINT TEST AD : INCORRECT OR FLUCTUATING DTE (DISTANCE TO EMPTY) DISPLAY

NOTE: Make sure to record the Running Average Fuel Economy (RAFE) prior to disconnecting the battery, removing the IPC or BCM fuse 13 (7.5A). If any of the previous conditions occur, the vehicle must be driven over time to allow the DTE calculations to adjust.

AD1 REVIEW AND INVESTIGATE THE FOLLOWING DRIVING CONDITIONS WITH THE CUSTOMER

Determine whether the driver changes the following driving conditions:

Use of extended idle times Use of remote start frequently Park/drive on grades Use E85 fuel exclusively or switch to non- Ethanol fuel Over fueling of the fuel tank Not filling the tank completely (partial refueling)

Does the driver change driving conditions?

Yes	Advise the customer how changing driving conditions can affect the current DTE as opposed to the DTE displayed.

No	GO to AD2

AD2 CHECK THE FUEL GAUGE FOR CORRECT OPERATION

Ignition ON.

NOTE: If necessary interview the customer to find out if there are any fuel gauge indication concerns.

Verify the fuel gauge is functioning and correctly indicating the fuel level.

Is the fuel gauge operating correctly?

Yes	GO to AD3

No	GO to Pinpoint Test C

AD3 COMPARE THE DISPLAYED DTE (DISTANCE TO EMPTY) WITH THE IPC (INSTRUMENT PANEL CLUSTER) INPUTS

NOTE: The Vehicle Identification Number (VIN) must be entered to enable the OASIS tab. Navigate to PTS> OASIS> HvBOM> Window Sticker to find the fuel tank the vehicle was built with.

Locate and record the fuel tank capacity (example: 28 gallons) using the as-built record.

Using a diagnostic scan tool, view the IPC Parameter Identifications (PIDs).

Select the IPC fuel gauge (FUELLEVEL) active command.

Record the current fuel level percent displayed.

Select the IPC DTE (DIST_2_EMPTY) PID.

Record the instantaneous DTE.

Determine the current DTE.

Multiply the fuel tank capacity by the fuel percent to determine how many gallons of fuel remain in the tank (example: 28 gallons X 50% [.50] = 14 gallons of remaining fuel). Multiply the calculated fuel remaining in the tank by the instantaneous DTE (example: 14 gallons X 20 MPG = 448 km (280 miles) DTE).

Compare the DTE displayed in the message center with the calculated DTE.

Does the current DTE match the displayed DTE?

Yes	The system is operating correctly. REVIEW with the customer the system operation and the conditions that may affect DTE.

No	The vehicle configuration is most likely incorrect for the fuel tank size. INSTALL As-Built data from Professional Technician Society (PTS) following diagnostic scan tool instructions under Module Programming>As-Built.

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST AE : THE HUD (HEAD UP DISPLAY) PERFORMANCE SHIFT INDICATION IS NEVER ON (SVT ONLY)

Normal Operation and Fault Conditions

See HUD Performance Shift Indication. REFER to: Message Center - System Operation and Component Description .

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST AE : THE HUD (HEAD UP DISPLAY) PERFORMANCE SHIFT INDICATION IS NEVER ON (SVT ONLY) > PINPOINT TEST AE : THE HUD (HEAD UP DISPLAY) PERFORMANCE SHIFT INDICATION IS NEVER ON (SVT ONLY)

AE1 VERIFY THE PERFORMANCE SHIFT INDICATION FUNCTION IS TURNED ON

NOTE: The IPC and message center navigation can be found in the Owner's Literature.

Using the message center switch, verify through the message center the performance shift indication function is turned on.

Is the performance shift indication function turned on?

Yes	GO to AE2

No	Turn on the performance shift indication function.

AE2 PERFORM THE IPC (INSTRUMENT PANEL CLUSTER) SELF-TEST

Ignition ON.

Using a diagnostic scan tool, perform the IPC self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to DTC Chart: IPC .

No	GO to AE3

AE3 PERFORM THE HUD (HEAD UP DISPLAY) SELF-TEST

Ignition ON.

Using a diagnostic scan tool, perform the HUD self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	DIAGNOSE the HUD Diagnostic Trouble Codes (DTCs). REFER to: Collision Warning and Collision Avoidance System .

No	GO to AE4

AE4 RETRIEVE THE RECORDED DTCS FROM THE PCM (POWERTRAIN CONTROL MODULE) SELF-TEST

Ignition ON.

Using a diagnostic scan tool, perform the PCM self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	Refer to the appropriate article for the procedure.

No	GO to AE5

AE5 CHECK THE GWM (GATEWAY MODULE A) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, check the GWM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: MODULE COMMUNICATIONS NETWORK .

No	INSTALL a new HUD. REFER to: Head Up Display (HUD) Module .

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST AF : THE BLIND SPOT INFORMATION SYSTEM (BLIS ®) OFF RTT (RECONFIGURABLE TELLTALE) IS NEVER OR ALWAYS ON

Normal Operation and Fault Conditions

See Blind Spot Monitoring System (BLIS ®) Off RTT. REFER to: Message Center - System Operation and Component Description .

If the side obstacle detect status-left or side obstacle detect status-right message is missing or invalid for less than 5 seconds, the IPC defaults the Blind Spot Information System (BLIS) off RTT to the last state (on or off), based upon the last message received.

If the side obstacle detect status-left or side obstacle detect status-right message is missing or invalid for 5 seconds or longer, the IPC defaults the Blind Spot Information System (BLIS) off RTT off.

Possible Sources

- Communication concern
- GWM concern
- SODL concern
- SODR concern
- IPC

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST AF : THE BLIND SPOT INFORMATION SYSTEM (BLIS ®) OFF RTT (RECONFIGURABLE TELLTALE) IS NEVER OR ALWAYS ON > PINPOINT TEST AF : THE BLIND SPOT INFORMATION SYSTEM (BLIS ®) OFF RTT (RECONFIGURABLE TELLTALE) IS NEVER OR ALWAYS ON

AF1 CHECK THE MESSAGE CENTER OPERATION

Ignition ON.

Close all doors, the hood and luggage compartment lid.

Clear all message center warnings by pressing the OK button for each warning present.

Monitor the door ajar RTT.

Open the driver door.

Clear the message center popup warning.

Monitor the door ajar RTT.

Is the door ajar RTT off with the door closed, and on with the door open?

Yes	GO to AF2

No	INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

AF2 PERFORM THE IPC (INSTRUMENT PANEL CLUSTER) SELF-TEST

Ignition ON.

Using a diagnostic scan tool, perform the IPC self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to DTC Chart: IPC .

No	GO to AF3

AF3 PERFORM THE SODL (SIDE OBSTACLE DETECTION CONTROL MODULE LH) AND SODR (SIDE OBSTACLE DETECTION CONTROL MODULE RH) SELF-TESTS

Using a diagnostic scan tool, perform the SODL and SODR self-tests.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: Blind Spot Information System .

No	GO to AF4

AF4 CHECK THE GWM (GATEWAY MODULE A) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, check the GWM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: MODULE COMMUNICATIONS NETWORK .

No	DIAGNOSE the Blind Spot Information System (BLIS). REFER to: Blind Spot Information System .

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST AG : THE CHARGING SYSTEM RTT (RECONFIGURABLE TELLTALE) IS NEVER OR ALWAYS ON

Normal Operation and Fault Conditions

See Charging System RTT. REFER to: Message Center - System Operation and Component Description .

If the battery low state of charge message is missing for less than 5 seconds, the IPC defaults the charging system RTT to the last indication state (on or off), based upon on the last message received.

If the battery low state of charge message is missing for 5 seconds or longer, the IPC defaults the charging system RTT on.

Possible Sources

- Charging system concern
- Communication concern
- GWM concern
- IPC

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST AG : THE CHARGING SYSTEM RTT (RECONFIGURABLE TELLTALE) IS NEVER OR ALWAYS ON > PINPOINT TEST AG : THE CHARGING SYSTEM RTT (RECONFIGURABLE TELLTALE) IS NEVER OR ALWAYS ON

AG1 CHECK THE MESSAGE CENTER OPERATION

Ignition OFF.

Remove BJB fuse 64 (5A).

Ignition ON.

Monitor the message center display.

Does the message center display the power steering malfunction warning?

Yes	GO to AG2

No	INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

AG2 PERFORM THE IPC (INSTRUMENT PANEL CLUSTER) SELF-TEST

Using a diagnostic scan tool, perform the IPC self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to DTC Chart: IPC .

No	GO to AG3

AG3 CHECK THE GWM (GATEWAY MODULE A) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, check the GWM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: MODULE COMMUNICATIONS NETWORK .

No	GO to AG4

AG4 CHECK THE CHARGING SYSTEM OPERATION

Check the charging system operation.

Does the charging system operate correctly?

Yes	If the charging system RTT is never on, the system is operating correctly at this time. If the charging system RTT is always on, DIAGNOSE all BCM Diagnostic Trouble Codes (DTCs). REFER to: Body Control Module (BCM) .

No	Refer to the appropriate article for the procedure.

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST AH : THE CRUISE CONTROL RTT (RECONFIGURABLE TELLTALE) IS NEVER ON

Normal Operation and Fault Conditions

See Cruise Control RTT. REFER to: Message Center - System Operation and Component Description .

If the cruise control status, cruise control override (adaptive cruise) or cruise control set speed display (adaptive cruise) message is missing or deemed invalid by the IPC for less than 5 seconds, the IPC defaults the cruise control indicator to the last indication state (on or off), based upon the last message received.

If the cruise control status, cruise control override (adaptive cruise) or cruise control set speed display

(adaptive cruise) message is missing or if the data is deemed invalid by the IPC for 5 seconds or longer, the IPC defaults the cruise control indicator off.

Possible Sources

- Communication concern
- Cruise control concern
- GWM concern
- IPC

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST AH : THE CRUISE CONTROL RTT (RECONFIGURABLE TELLTALE) IS NEVER ON > PINPOINT TEST AH : THE CRUISE CONTROL RTT (RECONFIGURABLE TELLTALE) IS NEVER ON

AH1 CHECK THE MESSAGE CENTER OPERATION

Ignition ON.

Close all doors, the hood and luggage compartment lid.

Clear all message center warnings by pressing the OK button for each warning present.

Monitor the door ajar RTT.

Open the driver door.

Clear the message center popup warning.

Monitor the door ajar RTT.

Is the door ajar RTT off with the door closed, and on with the door open?

Yes	GO to AH2

No	INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

AH2 PERFORM THE IPC (INSTRUMENT PANEL CLUSTER) SELF-TEST

Using a diagnostic scan tool, perform the IPC self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to DTC Chart: IPC .

No	GO to AH3

AH3 CHECK THE GWM (GATEWAY MODULE A) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, check the GWM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: MODULE COMMUNICATIONS NETWORK .

No	DIAGNOSE the cruise control system. REFER to: Cruise Control . With adaptive cruise control, REFER to: Cruise Control .

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST AI : THE DOOR OR LUGGAGE COMPARTMENT LID AJAR RTT (RECONFIGURABLE TELLTALE) IS NEVER OR ALWAYS ON

Refer to Interior Lamps for schematic and connector information.

Normal Operation and Fault Conditions

See Door Ajar RTT. REFER to: Message Center - System Operation and Component Description .

If the driver door ajar status, passenger door ajar status or luggage compartment lid ajar messages are missing for less than 5 seconds, the IPC defaults all door and luggage compartment lid ajar message center displays to the last indication state (on or off), based upon the last message received.

If the driver door ajar status, passenger door ajar status or luggage compartment lid ajar messages are missing for 5 seconds or longer, the IPC defaults all door and luggage compartment lid ajar message center displays off.

BCM DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1178:01	Boot/Trunk Ajar Switch: General Electrical Failure	An on-demand DTC that sets in the BCM if the BCM detects an open on the luggage compartment lid ajar input.

Possible Sources

- Wiring, terminals or connectors
- Interior lighting concern
- Luggage compartment lid latch ajar switch (part of the luggage compartment lid latch)
- Communication concern

- BCM concern
- GWM concern
- IPC

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST AI : THE DOOR OR LUGGAGE COMPARTMENT LID AJAR RTT (RECONFIGURABLE TELLTALE) IS NEVER OR ALWAYS ON > PINPOINT TEST AI : THE DOOR OR LUGGAGE COMPARTMENT LID AJAR RTT (RECONFIGURABLE TELLTALE) IS NEVER OR ALWAYS ON

AI1 CHECK THE MESSAGE CENTER OPERATION

Ignition OFF.

Disconnect GWM C2431 .

Ignition ON.

Monitor the message center messages and RTT indicators.

Did multiple message center messages and RTT indicators appear?

Yes	GO to AI2

No	INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

AI2 CHECK THE INTERIOR LIGHTING OPERATION

Open and close each door while monitoring the interior lamps.

Do the interior lamps operate correctly with each door?

Yes	GO to AI3

No	REFER to: Interior Lighting .

AI3 PERFORM THE IPC (INSTRUMENT PANEL CLUSTER) SELF-TEST

Using a diagnostic scan tool, perform the IPC self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to DTC Chart: IPC .

No	GO to AI4

AI4 CHECK THE GWM (GATEWAY MODULE A) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, check the GWM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: MODULE COMMUNICATIONS NETWORK .

No	GO to AI5

AI5 PERFORM THE BCM (BODY CONTROL MODULE) SELF-TEST

Using a diagnostic scan tool, perform the BCM self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	For DTC B1178:01, GO to AI6 For all other Diagnostic Trouble Codes (DTCs), REFER to: Body Control Module (BCM) .

No	For a door ajar indication concern, For the luggage compartment lid ajar indication, GO to AI6 For the hood ajar indication never on, DIAGNOSE the perimeter alarm does not arm from the hood ajar switch. REFER to: Perimeter Anti-Theft Alarm .

AI6 CHECK THE LUGGAGE COMPARTMENT LID AJAR INPUT CIRCUIT FOR AN OPEN AT THE BCM (BODY CONTROL MODULE)

Ignition OFF.

Disconnect BCM C2280E .

NOTE: Make sure the luggage compartment lid is fully closed before proceeding with this test step.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2280E-34	Ω	Ground

Is the resistance less than 3 ohms?

Yes	GO to AI10

No	GO to AI7

AI7 BYPASS THE LUGGAGE COMPARTMENT LID AJAR SWITCH AND CHECK FOR OPEN AT THE BCM (BODY CONTROL MODULE)

Disconnect Luggage Compartment Lid Latch C4339 .

Connect a fused jumper wire:

Lead 1	Measurement / Action	Lead 2
C4339-1		C4339-4

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2280E-34	Ω	Ground

Is the resistance less than 3 ohms?

Yes	REMOVE the fused jumper wire. INSTALL a new luggage compartment latch. REFER to: Luggage Compartment Lid Latch - Coupe .

No	REMOVE the fused jumper wire. GO to AI8

AI8 CHECK THE LUGGAGE COMPARTMENT LID LATCH GROUND CIRCUIT FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4339-4	Ω	Ground

Is the resistance less than 3 ohms?

Yes	GO to AI9

No	REPAIR the circuit.

AI9 CHECK THE LUGGAGE COMPARTMENT AJAR INPUT CIRCUIT FOR AN OPEN BETWEEN THE BCM (BODY CONTROL MODULE) AND THE LUGGAGE COMPARTMENT LID LATCH

Measure:

Positive Lead	Measurement / Action	Negative Lead

C2280E-34	Ω	C4339-1

Is the resistance less than 3 ohms?

Yes	GO to AI12

No	REPAIR the circuit.

AI10 CHECK THE LUGGAGE COMPARTMENT AJAR INPUT CIRCUIT FOR A SHORT TO GROUND AT THE BCM (BODY CONTROL MODULE)

Ignition OFF.

Disconnect BCM C2280E .

Open the luggage compartment lid.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2280E-34	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to AI12

No	GO to AI11

AI11 CHECK THE LUGGAGE COMPARTMENT AJAR INPUT CIRCUIT FOR A SHORT TO GROUND AT THE BCM (BODY CONTROL MODULE) WITH THE LUGGAGE COMPARTMENT LID LATCH DISCONNECTED

Disconnect Luggage Compartment Lid Latch C4339 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2280E-34	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	INSTALL a new luggage compartment lid latch. REFER to: Luggage Compartment Lid Latch - Coupe .

No	REPAIR the circuit.

AI12 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST AJ : THE DRIVE MODE RTT (RECONFIGURABLE TELLTALE) INDICATORS ARE NEVER OR ALWAYS ON

Normal Operation and Fault Conditions

See Drive Mode RTT. REFER to: Message Center - System Operation and Component Description .

If the powertrain drive mode message is missing or invalid for less than 5 seconds, the IPC defaults the drive mode RTT to the last indication state (on or off), based upon on the last message received.

If the powertrain drive mode message is missing or invalid for 5 seconds or longer, the IPC defaults the powertrain drive mode RTT off.

Possible Sources

- Communication concern
- GWM concern
- PCM input concern
- IPC

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST AJ : THE DRIVE MODE RTT (RECONFIGURABLE TELLTALE) INDICATORS ARE NEVER OR ALWAYS ON > PINPOINT TEST AJ : THE DRIVE MODE RTT (RECONFIGURABLE TELLTALE) INDICATORS ARE NEVER OR ALWAYS ON

AJ1 CHECK THE MESSAGE CENTER OPERATION

Ignition ON.

Close all doors, the hood and luggage compartment lid.

Clear all message center warnings by pressing the OK button for each warning present.

Monitor the door ajar RTT.

Open the driver door.

Clear the message center popup warning.

Monitor the door ajar RTT.

Is the door ajar RTT off with the door closed, and on with the door open?

Yes	GO to AJ2

No	INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

AJ2 PERFORM THE IPC (INSTRUMENT PANEL CLUSTER) SELF-TEST

Using a diagnostic scan tool, perform the IPC self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to DTC Chart: IPC .

No	GO to AJ3

AJ3 CHECK THE GWM (GATEWAY MODULE A) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, check the GWM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: MODULE COMMUNICATIONS NETWORK .

No	GO to AJ4

AJ4 PERFORM THE PCM (POWERTRAIN CONTROL MODULE) KOEO (KEY ON, ENGINE OFF) SELF-TEST

Using a diagnostic scan tool, perform the PCM KOEO self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	Refer to the appropriate article for the procedure.

No	If the drive mode RTT is never on, the system is operating correctly at this time. If the drive mode RTT is always on, INSTALL a new PCM. Refer to the appropriate article for the procedure.

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST AK : THE ENGINE OVER-TEMPERATURE RTT (RECONFIGURABLE TELLTALE) IS NEVER OR ALWAYS ON

Normal Operation and Fault Conditions

See Engine Over-Temperature RTT. REFER to: Message Center - System Operation and Component Description .

If the engine coolant temperature data or the engine overheat indication request messages are missing or invalid for less than 5 seconds, the IPC defaults the engine over-temperature RTT to the last indication state (on or off), based upon on the last message received.

If the engine coolant temperature data or the engine overheat indication request messages are missing or invalid for 5 seconds or longer, the IPC defaults the engine over-temperature RTT on.

Possible Sources

- Communication concern
- GWM concern
- PCM input concern
- IPC

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST AK : THE ENGINE OVER-TEMPERATURE RTT (RECONFIGURABLE TELLTALE) IS NEVER OR ALWAYS ON > PINPOINT TEST AK : THE ENGINE OVER-TEMPERATURE RTT (RECONFIGURABLE TELLTALE) IS NEVER OR ALWAYS ON

AK1 CHECK THE MESSAGE CENTER OPERATION

Ignition ON.

Close all doors, the hood and luggage compartment lid.

Clear all message center warnings by pressing the OK button for each warning present.

Monitor the door ajar RTT.

Open the driver door.

Clear the message center popup warning.

Monitor the door ajar RTT.

Is the door ajar RTT off with the door closed, and on with the door open?

Yes	GO to AK2

No	INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

AK2 PERFORM THE IPC (INSTRUMENT PANEL CLUSTER) SELF-TEST

Using a diagnostic scan tool, perform the IPC self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to DTC Chart: IPC .

No	GO to AK3

AK3 CHECK THE GWM (GATEWAY MODULE A) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, check the GWM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: MODULE COMMUNICATIONS NETWORK .

No	GO to AK4

AK4 PERFORM THE PCM (POWERTRAIN CONTROL MODULE) KOEO (KEY ON, ENGINE OFF) SELF-TEST

Using a diagnostic scan tool, perform the PCM KOEO self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	Refer to the appropriate article for the procedure.

No	If the engine over-temperature RTT is never on, the system is operating correctly at this time. If the engine over-temperature RTT is always on, INSTALL a new PCM. Refer to the appropriate article for the procedure.

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST AL : THE LAUNCH CONTROL RTT (RECONFIGURABLE TELLTALE) IS NEVER ON

Normal Operation and Fault Conditions

See Launch Control RTT. REFER to: Message Center - System Operation and Component Description .

If the launch control message is missing for less than 5 seconds, the IPC defaults the launch control RTT to the last indication state (on or off), based upon the last message received.

If the launch control message is missing for 5 seconds or longer, the IPC flashes the LC RTT image for 2 seconds.

Possible Sources

- Communication concern
- GWM concern
- PCM concern
- IPC

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST AL : THE LAUNCH CONTROL RTT (RECONFIGURABLE TELLTALE) IS NEVER ON > PINPOINT TEST AL : THE LAUNCH CONTROL RTT (RECONFIGURABLE TELLTALE) IS NEVER ON

AL1 CHECK THE MESSAGE CENTER OPERATION

Ignition ON.

Close all doors, the hood and luggage compartment lid.

Clear all message center warnings by pressing the OK button for each warning present.

Monitor the door ajar RTT.

Open the driver door.

Clear the message center popup warning.

Monitor the door ajar RTT.

Is the door ajar RTT off with the door closed, and on with the door open?

Yes	GO to AL2

No	INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

AL2 VERIFY THE LAUNCH CONTROL IS ENABLED THROUGH THE MESSAGE CENTER

NOTE: The IPC and message center navigation can be found in the Owner's Literature.

Using the message center controls, verify the launch control is enabled.

Is the launch control enabled through the message center?

Yes	GO to AL3

No	The system is operating correctly. The launch control was not enabled.

AL3 PERFORM THE IPC (INSTRUMENT PANEL CLUSTER) SELF-TEST

Using a diagnostic scan tool, perform the IPC self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to DTC Chart: IPC .

No	GO to AL4

AL4 CHECK THE GWM (GATEWAY MODULE A) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, check the GWM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: MODULE COMMUNICATIONS NETWORK .

No	DIAGNOSE any PCM Diagnostic Trouble Codes (DTCs). Refer to the appropriate article for the procedure.

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND

WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST AM : THE LOW FUEL RTT (RECONFIGURABLE TELLTALE) IS NEVER OR ALWAYS ON

Normal Operation and Fault Conditions

See Low Fuel RTT. REFER to: Message Center - System Operation and Component Description .

Possible Sources

- Fuel gauge concern
- IPC

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST AM : THE LOW FUEL RTT (RECONFIGURABLE TELLTALE) IS NEVER OR ALWAYS ON > PINPOINT TEST AM : THE LOW FUEL RTT (RECONFIGURABLE TELLTALE) IS NEVER OR ALWAYS ON

AM1 CHECK THE MESSAGE CENTER OPERATION

Ignition ON.

Close all doors, the hood and luggage compartment lid.

Clear all message center warnings by pressing the OK button for each warning present.

Monitor the door ajar RTT.

Open the driver door.

Clear the message center popup warning.

Monitor the door ajar RTT.

Is the door ajar RTT off with the door closed, and on with the door open?

Yes	GO to AM2

No	INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

AM2 VERIFY THE OPERATION OF THE FUEL GAUGE

Ignition ON.

Verify the fuel gauge operates correctly and there are no customer concerns with the fuel gauge operation.

Does the fuel gauge operate correctly without any customer concerns related to fuel gauge indication?

Yes	GO to AM3

No	GO to Pinpoint Test C

AM3 CONFIRM THE CURRENT FUEL LEVEL AND DTE (DISTANCE TO EMPTY)

Using the message center controls, locate and record the current DTE.

Enter the Dealer Test Mode. REFER to: Instrument Panel Cluster (IPC) - System Operation and Component Description .

Scroll to the

Inst Fuel1 display.

Does the FLPM (second value) indicate 104 or less with a DTE of 80 km or less, 280 or less with a DTE of 60 km using an administrator key or 164 or less with a DTE 100 km using a MyKey ® programmed key?

Yes	If the low fuel RTT is always on, the system is operating correctly at this time based on the current fuel level. If the low fuel RTT is never on, INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

No	If the low fuel RTT is always on, INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) . If the low fuel RTT is never on, the system is operating correctly at this time based on the current fuel level.

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST AN : THE LOW OIL PRESSURE RTT (RECONFIGURABLE TELLTALE) IS NEVER OR ALWAYS ON (2.3L AND 3.7L ENGINE)

Refer to Instrument Cluster for schematic and connector information.

Normal Operation and Fault Conditions

See Low Oil Pressure RTT. REFER to: Message Center - System Operation and Component Description .

If the engine RPM data or oil pressure warning indicator request message is missing less than 5 seconds, the IPC defaults the low oil pressure warning indicator to the last state (on or off), based upon the last message received.

If the engine RPM data or oil pressure warning message is missing for 5 seconds or longer, the IPC defaults the low oil pressure warning indicator on.

DTC Chart - PCM

DTC	Description	Fault Trigger Conditions
P0521	Engine Oil Pressure Sensor/Switch "A" Circuit Range/Performance	Sets in the PCM when the PCM detects signal variation outside of the module parameters on the hardwired input from the oil pressure switch.
P0522	Engine Oil Pressure Sensor/Switch "A" Circuit Low	Sets in the PCM when the PCM detects a short to ground on the hardwired input from the oil pressure switch.
P0523	Engine Oil Pressure Sensor/Switch "A" Circuit High	Sets in the PCM when the PCM detects an open on the hardwired input from the oil pressure switch.
P0524	Engine Oil Pressure Too Low	Sets in the PCM when the PCM detects low oil pressure.

Possible Sources

- Wiring, terminals or connectors
- Tachometer concern
- Engine oil pressure switch
- Base engine concern
- GWM concern
- PCM concern
- IPC

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST AN : THE LOW OIL PRESSURE RTT (RECONFIGURABLE TELLTALE) IS NEVER OR ALWAYS ON (2.3L AND 3.7L ENGINE) > PINPOINT TEST AN : THE LOW OIL PRESSURE RTT (RECONFIGURABLE TELLTALE) IS NEVER OR ALWAYS ON (2.3L AND 3.7L ENGINE)

AN1 CHECK THE MESSAGE CENTER OPERATION

Ignition ON.

Close all doors, the hood and luggage compartment lid.

Clear all message center warnings by pressing the OK button for each warning present.

Monitor the door ajar RTT.

Open the driver door.

Clear the message center popup warning.

Monitor the door ajar RTT.

Is the door ajar RTT off with the door closed, and on with the door open?

Yes	GO to AN2

No	INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

AN2 CHECK THE TACHOMETER OPERATION

Start the engine.

Verify the tachometer operates.

Does the tachometer operate?

Yes	GO to AN3

No	GO to Pinpoint Test G

AN3 PERFORM THE IPC (INSTRUMENT PANEL CLUSTER) SELF-TEST

Using a diagnostic scan tool, perform the IPC self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to DTC Chart: IPC .

No	If the low oil pressure RTT is never on, GO to AN4 If the low oil pressure RTT is always on, GO to AN6

AN4 CHECK FOR A STUCK CLOSED ENGINE OIL PRESSURE SWITCH

Ignition OFF.

Disconnect Engine Oil Pressure Switch C103 (2.3L).

Disconnect Engine Oil Pressure Switch C1642 (3.7L).

Ignition ON.

Observe the low oil pressure warning indicator.

Does the low oil pressure warning indicator turn on?

Yes	INSTALL a new engine oil pressure switch. Refer to the appropriate article for the

	procedure.

No	GO to AN5

AN5 CHECK THE OIL PRESSURE INPUT CIRCUIT FOR A SHORT TO GROUND AT THE PCM (POWERTRAIN CONTROL MODULE)

Ignition OFF.

Disconnect PCM C1551E (2.3L).

Disconnect PCM C1381E (3.7L).

Measure:

2.3L

Positive Lead	Measurement / Action	Negative Lead
C1551E-9	Ω	Ground

3.7L

Positive Lead	Measurement / Action	Negative Lead
C1381E-48	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to AN11

No	REPAIR the circuit.

AN6 CHECK THE GWM (GATEWAY MODULE A) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, check the GWM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: MODULE COMMUNICATIONS NETWORK .

No	GO to AN7

AN7 PERFORM THE PCM (POWERTRAIN CONTROL MODULE) SELF-TEST

Using a diagnostic scan tool, perform the PCM self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	Refer to the appropriate article for the procedure.

No	GO to AN8

AN8 CHECK FOR A STUCK OPEN ENGINE OIL PRESSURE SWITCH

Ignition OFF.

Disconnect Engine Oil Pressure Switch C103 (2.3L).

Disconnect Engine Oil Pressure Switch C1642 (3.7L).

Connect a fused jumper wire:

2.3L

Lead 1	Measurement / Action	Lead 2
C1551E-9		Ground

3.7L

Lead 1	Measurement / Action	Lead 2
C1381E-48		Ground

Ignition ON.

Observe the low oil pressure warning indicator.

Does the low oil pressure indicator turn off?

Yes	REMOVE the fused jumper wire. GO to AN9

No	LEAVE the jumper wire connected. GO to AN10

AN9 CHECK THE OIL PRESSURE

Test the engine for low oil pressure.

Was a low oil pressure concern detected?

Yes	REPAIR the low oil pressure concern. Refer to the appropriate article for the procedure.

No	INSTALL a new engine oil pressure switch. Refer to the appropriate article for the procedure.

AN10 CHECK THE ENGINE OIL PRESSURE INPUT CIRCUIT FOR AN OPEN AT THE PCM (POWERTRAIN CONTROL MODULE)

Ignition OFF.

Disconnect PCM C1551E (2.3L).

Disconnect PCM C1381E (3.7L).

Measure:

2.3L

Positive Lead	Measurement / Action	Negative Lead
C1551E-9	Ω	Ground

3.7L

Positive Lead	Measurement / Action	Negative Lead
C1381E-48	Ω	Ground

Is the resistance less than 3 ohms?

Yes	REMOVE the fused jumper wire. GO to AN11

No	REMOVE the fused jumper wire. REPAIR the circuit.

AN11 CHECK FOR CORRECT PCM (POWERTRAIN CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all PCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the PCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present

Is the concern still present?

Yes	CHECK On-Line Automotive Service Information System (OASIS) for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this

	concern, INSTALL a new PCM. Refer to the appropriate article for the procedure.

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST AO : THE LOW OIL PRESSURE RTT (RECONFIGURABLE TELLTALE) IS NEVER OR ALWAYS ON (5.0L AND 5.2L ENGINES)

Refer to Instrument Cluster for schematic and connector information.

Normal Operation and Fault Conditions

See Low Oil Pressure RTT. REFER to: Message Center - System Operation and Component Description .

If the engine RPM data or oil pressure warning indicator request message is missing less than 5 seconds, the IPC defaults the low oil pressure warning indicator to the last state (on or off), based upon the last message received.

If the engine RPM data or oil pressure warning message is missing for 5 seconds or longer, the IPC defaults the low oil pressure warning indicator on.

DTC Chart - PCM

DTC	Description	Fault Trigger Conditions
P0521	Engine Oil Pressure Sensor/Switch "A" Circuit Range/Performance	Sets in the PCM when the PCM detects signal variation outside of the module parameters on the hardwired input from the oil pressure switch.
P0522	Engine Oil Pressure Sensor/Switch "A" Circuit Low	Sets in the PCM when the PCM detects a short to ground on the hardwired input from the oil pressure switch.
P0523	Engine Oil Pressure Sensor/Switch "A" Circuit High	Sets in the PCM when the PCM detects an open on the hardwired input from the oil pressure switch.
P0524	Engine Oil Pressure Too Low	Sets in the PCM when the PCM detects low oil pressure.

Possible Sources

- Wiring, terminals or connectors

- Tachometer concern
- Engine oil pressure sensor
- Base engine concern
- PCM concern
- IPC

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST AO : THE LOW OIL PRESSURE RTT (RECONFIGURABLE TELLTALE) IS NEVER OR ALWAYS ON (5.0L AND 5.2L ENGINES) > PINPOINT TEST AO : THE LOW OIL PRESSURE RTT (RECONFIGURABLE TELLTALE) IS NEVER OR ALWAYS ON (5.0L AND 5.2L ENGINES)

AO1 CHECK THE MESSAGE CENTER OPERATION

Ignition ON.

Close all doors, the hood and luggage compartment lid.

Clear all message center warnings by pressing the OK button for each warning present.

Monitor the door ajar RTT.

Open the driver door.

Clear the message center popup warning.

Monitor the door ajar RTT.

Is the door ajar RTT off with the door closed, and on with the door open?

Yes	GO to AO2

No	INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

AO2 CHECK THE TACHOMETER OPERATION

Start the engine.

Verify the tachometer operates.

Does the tachometer operate?

Yes	GO to AO3

No	GO to Pinpoint Test G

AO3 PERFORM THE IPC (INSTRUMENT PANEL CLUSTER) SELF-TEST

Using a diagnostic scan tool, perform the IPC self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to DTC Chart: IPC .

No	GO to AO4

AO4 CHECK THE OIL PRESSURE

Test the engine for low oil pressure.

Was a low oil pressure concern detected?

Yes	REPAIR the low oil pressure concern. Refer to the appropriate article for the procedure.

No	GO to AO5

AO5 CHECK FOR VOLTAGE AT THE OIL PRESSURE SWITCH

Ignition OFF.

Disconnect Engine Oil Pressure Switch C1657 (5.0L Engine) or C1652 (5.2L Engine).

Ignition ON.

Measure:

5.0L Engine

Positive Lead	Measurement / Action	Negative Lead
C1657-3		C1657-2

5.2L Engine

Positive Lead	Measurement / Action	Negative Lead
C1652-3		C1652-2

Is the voltage approximately 5 volts?

Yes	GO to AO6

No	GO to AO9

AO6 CHECK THE OIL PRESSURE SENSOR SIGNAL CIRCUIT FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect PCM C175E .

Ignition ON.

Measure:

5.0L Engine

Positive Lead	Measurement / Action	Negative Lead
C1657-1	V	Ground

5.2L Engine

Positive Lead	Measurement / Action	Negative Lead
C1652-1	V	Ground

Is any voltage present?

Yes	GO to AO7

No	REPAIR the circuit.

AO7 CHECK THE OIL PRESSURE SENSOR SIGNAL CIRCUIT FOR AN OPEN

Ignition OFF.

Measure:

5.0L Engine

Positive Lead	Measurement / Action	Negative Lead
C1657-1	Ω	C175E-57

5.2L Engine

Positive Lead	Measurement / Action	Negative Lead
C1652-1	Ω	C175E-57

Is the resistance less than 3 ohms?

Yes	GO to AO8

No	REPAIR the circuit.

AO8 CHECK THE OIL PRESSURE SENSOR SIGNAL CIRCUIT FOR A SHORT TO GROUND

Measure:

5.0L Engine

Positive Lead	Measurement / Action	Negative Lead
C1657-1	Ω	Ground

5.2L Engine

Positive Lead	Measurement / Action	Negative Lead
C1652-1	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	INSTALL a new PCM. Refer to the appropriate article for the procedure. CLEAR the Diagnostic Trouble Codes (DTCs). TEST the system for normal operation. If the oil pressure Reconfigurable Telltale is still never or always on, GO to AO13

No	REPAIR the circuit.

AO9 CHECK THE OIL PRESSURE SENSOR VREF CIRCUIT FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect PCM C175E .

Ignition ON.

Measure:

5.0L Engine

Positive Lead	Measurement / Action	Negative Lead
C1657-3	V	Ground

5.2L Engine

Positive Lead	Measurement / Action	Negative Lead
C1652-3	V	Ground

Is the resistance less than 3 ohms?

Yes	GO to AO10

No	REPAIR the circuit.

AO10 CHECK THE OIL PRESSURE SENSOR VREF CIRCUIT FOR AN OPEN

Ignition OFF.

Measure:

5.0L Engine

Positive Lead	Measurement / Action	Negative Lead
C1657-3	Ω	C175E-34

5.2L Engine

Positive Lead	Measurement / Action	Negative Lead
C1652-3	Ω	C175E-34

Is the resistance less than 3 ohms?

Yes	GO to AO11

No	REPAIR the circuit.

AO11 CHECK THE OIL PRESSURE SENSOR VREF CIRCUIT FOR A SHORT TO GROUND

Measure:

5.0L Engine

Positive Lead	Measurement / Action	Negative Lead
C1657-3	Ω	Ground

5.2L Engine

Positive Lead	Measurement / Action	Negative Lead
C1652-3	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to AO12

No	REPAIR the circuit.

AO12 CHECK THE OIL PRESSURE SENSOR RETURN CIRCUIT FOR AN OPEN

Measure:

5.0L Engine

Positive Lead	Measurement / Action	Negative Lead
C1657-2	Ω	C175E-49

5.2L Engine

Positive Lead	Measurement / Action	Negative Lead
C1652-2	Ω	C175E-49

Is the resistance less than 3 ohms?

Yes	INSTALL a new engine oil pressure sensor. Refer to the appropriate article for the procedure. CLEAR the Diagnostic Trouble Codes (DTCs). TEST the system for normal operation. If the oil pressure Reconfigurable Telltale is still never or always on, GO to AO13

No	REPAIR the circuit.

AO13 CHECK FOR CORRECT PCM (POWERTRAIN CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all PCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the PCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present

Is the concern still present?

Yes	CHECK On-Line Automotive Service Information System (OASIS) for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test

	and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PCM. Refer to the appropriate article for the procedure.

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST AP : THE OVERSPEED WARNING RTT (RECONFIGURABLE TELLTALE) (GULF COOPERATIVE COUNTRIES [GCC]) IS NEVER OR ALWAYS ON

Normal Operation and Fault Conditions

See Overspeed Warning RTT. REFER to: Message Center - System Operation and Component Description .

If the vehicle speed message is missing or invalid for less than 5 seconds, the IPC defaults the overspeed warning RTT to the last indication state (on or off), based upon on the last message received.

If the vehicle speed message is missing or invalid for 5 seconds or longer, the IPC defaults the overspeed warning RTT off.

Possible Sources

- Speedometer indication concern
- IPC configuration concern
- IPC

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST AP : THE OVERSPEED WARNING RTT (RECONFIGURABLE TELLTALE) (GULF COOPERATIVE COUNTRIES [GCC]) IS NEVER OR ALWAYS ON > PINPOINT TEST AP : THE OVERSPEED WARNING RTT (RECONFIGURABLE TELLTALE) (GULF COOPERATIVE COUNTRIES [GCC]) IS NEVER OR ALWAYS ON

AP1 CHECK THE MESSAGE CENTER OPERATION

Ignition ON.

Close all doors, the hood and luggage compartment lid.

Clear all message center warnings by pressing the OK button for each warning present.

Monitor the door ajar RTT.

Open the driver door.

Clear the message center popup warning.

Monitor the door ajar RTT.

Is the door ajar RTT off with the door closed, and on with the door open?

Yes	GO to AP2

No	INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

AP2 CHECK THE SPEEDOMETER OPERATION

Verify the speedometer operates.

Does the speedometer operate?

Yes	GO to AP3

No	GO to Pinpoint Test D

AP3 PERFORM THE IPC (INSTRUMENT PANEL CLUSTER) SELF-TEST

Using a diagnostic scan tool, perform the IPC self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to DTC Chart: IPC .

No	CONFIRM the vehicle was built for the Gulf Cooperative Country [GCC] market. If the vehicle was not built for a Gulf Cooperative Country [GCC], the IPC is functioning correctly. If the vehicle was built for a Gulf Cooperative Country [GCC], PERFORM the Programmable Module Installation (PMI) procedure using as built data as directed by the diagnostic scan tool. REFER to: Module Configuration - System Operation and Component Description .

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST AQ : THE POWERTRAIN MALFUNCTION (WRENCH) RTT (RECONFIGURABLE TELLTALE) IS NEVER OR ALWAYS ON

Normal Operation and Fault Conditions

See Powertrain Malfunction (Wrench) RTT. REFER to: Message Center - System Operation and Component Description .

If the transmission service required, engine service required or body service required message is missing for less than 5 seconds, the IPC defaults the powertrain malfunction (wrench) RTT to the last indication state (on or off), based upon the last message received.

If the transmission service required, engine service required or body service required message is missing for 5 seconds or longer, the IPC defaults the powertrain malfunction (wrench) RTT on.

Possible Sources

- Communication concern
- BCM concern
- GWM concern
- PCM concern
- IPC

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST AQ : THE POWERTRAIN MALFUNCTION (WRENCH) RTT (RECONFIGURABLE TELLTALE) IS NEVER OR ALWAYS ON > PINPOINT TEST AQ : THE POWERTRAIN MALFUNCTION (WRENCH) RTT (RECONFIGURABLE TELLTALE) IS NEVER OR ALWAYS ON

AQ1 CHECK THE MESSAGE CENTER OPERATION

Ignition ON.

Close all doors, the hood and luggage compartment lid.

Clear all message center warnings by pressing the OK button for each warning present.

Monitor the door ajar RTT.

Open the driver door.

Clear the message center popup warning.

Monitor the door ajar RTT.

Is the door ajar RTT off with the door closed, and on with the door open?

Yes	GO to AQ2

No	INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

AQ2 PERFORM THE IPC (INSTRUMENT PANEL CLUSTER) SELF-TEST

Using a diagnostic scan tool, perform the IPC self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to DTC Chart: IPC .

No	GO to AQ3

AQ3 PERFORM THE BCM (BODY CONTROL MODULE) SELF-TEST

Using a diagnostic scan tool, perform the BCM self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: Body Control Module (BCM) .

No	GO to AQ4

AQ4 PERFORM THE PCM (POWERTRAIN CONTROL MODULE) KOEO (KEY ON, ENGINE OFF) SELF-TEST

Using a diagnostic scan tool, perform the PCM KOEO self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	Refer to the appropriate article for the procedure.

No	GO to AQ5

AQ5 CHECK THE GWM (GATEWAY MODULE A) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, check the GWM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: MODULE COMMUNICATIONS NETWORK .

No	If the powertrain malfunction (wrench) RTT is never on, the system is operating correctly at this time. There are currently no vehicle concerns present that require the powertrain malfunction (wrench) RTT display. If the powertrain malfunction (wrench) RTT is always on, INSTALL a new PCM. Refer to the appropriate article for the procedure.

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST AR : THE STEERING MODE RTT (RECONFIGURABLE TELLTALE) RTT (RECONFIGURABLE TELLTALE) IS NEVER

ON

Normal Operation and Fault Conditions

See Steering Mode RTT. REFER to: Message Center - System Operation and Component Description .

If the steering effort status message is missing or deemed invalid by the IPC for less than 5 seconds, the IPC defaults the steering mode RTT to the last indication state (on or off), based upon the last message received.

If the steering effort status message is missing or if the data is deemed invalid by the IPC for 5 seconds or longer, the IPC defaults the steering mode RTT off.

Possible Sources

- Communication concern
- EPAS concern
- GWM concern
- IPC

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST AR : THE STEERING MODE RTT (RECONFIGURABLE TELLTALE) RTT (RECONFIGURABLE TELLTALE) IS NEVER ON > PINPOINT TEST AR : THE STEERING MODE RTT (RECONFIGURABLE TELLTALE) RTT (RECONFIGURABLE TELLTALE) IS NEVER ON

AR1 CHECK THE MESSAGE CENTER OPERATION

Ignition ON.

Close all doors, the hood and luggage compartment lid.

Clear all message center warnings by pressing the OK button for each warning present.

Monitor the door ajar RTT.

Open the driver door.

Clear the message center popup warning.

Monitor the door ajar RTT.

Is the door ajar RTT off with the door closed, and on with the door open?

Yes	GO to AR2

No	INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

AR2 VERIFY THE STEERING MODE SYSTEM OPERATES CORRECTLY

NOTE: Refer to the Owner's Literature for additional information on selecting the different steering modes.

Verify the steering effort changes modes.

Does the steering effort change when selecting different modes?

Yes	GO to AR3

No	DIAGNOSE the EPAS steering effort mode selection. REFER to: POWER STEERING .

AR3 PERFORM THE IPC (INSTRUMENT PANEL CLUSTER) SELF-TEST

Using a diagnostic scan tool, perform the IPC self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to DTC Chart: IPC .

No	GO to AR4

AR4 CHECK THE GWM (GATEWAY MODULE A) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, check the GWM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: MODULE COMMUNICATIONS NETWORK .

No	DIAGNOSE the EPAS. REFER to: POWER STEERING .

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST AS : THE VEHICLE DYNAMICS (DAMPER CONTROL) RTT (RECONFIGURABLE TELLTALE) IS NEVER ON (SVT ONLY)

Normal Operation and Fault Conditions

See Vehicle Dynamics (Damper Control) RTT. REFER to: Message Center - System Operation and Component Description .

If the suspension driver mode status message is missing or deemed invalid by the IPC for less than 5 seconds, the IPC defaults the vehicle dynamics (damper control) RTT to the last indication state (on or off), based upon the last message received.

If the suspension driver mode status message is missing or if the data is deemed invalid by the IPC for 5 seconds or longer, the IPC defaults the vehicle dynamics (damper control) RTT off.

Possible Sources

- Communication concern
- Vehicle dynamics concern
- GWM concern
- IPC

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST AS : THE VEHICLE DYNAMICS (DAMPER CONTROL) RTT (RECONFIGURABLE TELLTALE) IS NEVER ON (SVT ONLY) > PINPOINT TEST AS : THE VEHICLE DYNAMICS (DAMPER CONTROL) RTT (RECONFIGURABLE TELLTALE) IS NEVER ON (SVT ONLY)

AS1 CHECK THE MESSAGE CENTER OPERATION

Ignition ON.

Close all doors, the hood and luggage compartment lid.

Clear all message center warnings by pressing the OK button for each warning present.

Monitor the door ajar RTT.

Open the driver door.

Clear the message center popup warning.

Monitor the door ajar RTT.

Is the door ajar RTT off with the door closed, and on with the door open?

Yes	GO to AS2

No	INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

AS2 VERIFY THE VEHICLE DYNAMICS SYSTEM OPERATES CORRECTLY

Verify the vehicle dynamics (damper control) system operates and changes state using the switch.

Does the vehicle dynamics (damper control) system operate and change state using the switch?

Yes	GO to AS3

No	DIAGNOSE the vehicle dynamics system. REFER to: Vehicle Dynamic Suspension .

AS3 PERFORM THE IPC (INSTRUMENT PANEL CLUSTER) SELF-TEST

Using a diagnostic scan tool, perform the IPC self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to DTC Chart: IPC .

No	GO to AS4

AS4 CHECK THE GWM (GATEWAY MODULE A) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, check the GWM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: MODULE COMMUNICATIONS NETWORK .

No	DIAGNOSE the vehicle dynamics system. REFER to: Vehicle Dynamic Suspension .

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST AT : THE CERAMIC BRAKE WARNING MESSAGE IS NEVER OR ALWAYS DISPLAYED (SVT ONLY)

Normal Operation and Fault Conditions

See Brake System messages. REFER to: Message Center - System Operation and Component Description .

If the brake wear message request is missing for less than 5 seconds, the IPC defaults the ceramic brake warning message center message to the last indication state, based upon the last message received.

If the brake wear message request is missing for 5 seconds or longer, the IPC defaults the ceramic brake warning message center message off.

Possible Sources

- Brake pads

- GWM concern
- VDM concern
- IPC

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST AT : THE CERAMIC BRAKE WARNING MESSAGE IS NEVER OR ALWAYS DISPLAYED (SVT ONLY) > PINPOINT TEST AT : THE CERAMIC BRAKE WARNING MESSAGE IS NEVER OR ALWAYS DISPLAYED (SVT ONLY)

AT1 CHECK THE MESSAGE CENTER OPERATION

Ignition ON.

Close all doors, the hood and luggage compartment lid.

Clear all message center warnings by pressing the OK button for each warning present.

Monitor the door ajar warning message.

Open the driver door.

Does the driver door ajar message display with the door open and turn off with the door closed?

Yes	GO to AT2

No	INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

AT2 CHECK THE BRAKE PADS FOR WEAR

Inspect the brake pads for wear.

Are the brake pads OK?

Yes	GO to AT3

No	INSTALL new brake pads. Refer to the appropriate article for the procedure.

AT3 PERFORM THE IPC (INSTRUMENT PANEL CLUSTER) SELF-TEST

Using a diagnostic scan tool, perform the IPC self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to DTC Chart: IPC .

No	GO to AT4

AT4 CHECK THE GWM (GATEWAY MODULE A) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, check the GWM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: MODULE COMMUNICATIONS NETWORK .

No	DIAGNOSE all brake sensor Diagnostic Trouble Codes (DTCs) in the VDM. REFER to: Vehicle Dynamic Suspension .

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST AU : THE CHECK FUEL FILL INLET MESSAGE IS ALWAYS DISPLAYED

Normal Operation and Fault Conditions

See Check Fuel Fill Inlet Message. REFER to: Message Center - System Operation and Component Description .

If the fuel fill inlet message display message is missing for less than 5 seconds, the IPC defaults the check fuel fill inlet message center message to the last indication state, based upon the last message received.

If the fuel fill inlet message display message request is missing for 5 seconds or longer, the IPC defaults the check fuel fill inlet message center message off.

Possible Sources

- Evaporative emissions system concern
- GWM concern
- PCM
- IPC

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST AU : THE CHECK FUEL FILL INLET MESSAGE IS ALWAYS DISPLAYED > PINPOINT TEST AU : THE CHECK FUEL FILL INLET MESSAGE IS ALWAYS DISPLAYED

AU1 CHECK THE MESSAGE CENTER OPERATION

Ignition ON.

Close all doors, the hood and luggage compartment lid.

Clear all message center warnings by pressing the OK button for each warning present.

Monitor the door ajar RTT.

Open the driver door.

Clear the message center popup warning.

Monitor the door ajar RTT.

Is the door ajar RTT off with the door closed, and on with the door open?

Yes	GO to AU2

No	INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

AU2 PERFORM THE IPC (INSTRUMENT PANEL CLUSTER) SELF-TEST

Using a diagnostic scan tool, perform the IPC self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to DTC Chart: IPC .

No	GO to AU3

AU3 CHECK THE GWM (GATEWAY MODULE A) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, check the GWM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: MODULE COMMUNICATIONS NETWORK .

No	If the check fuel fill inlet message is never on, the system is operating correctly at this time. There are currently no vehicle concerns present that require the check fuel fill inlet message display. If the check fuel fill inlet message is always on, DIAGNOSE all PCM Diagnostic Trouble Codes (DTCs). Refer to the appropriate article for the procedure.

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND

WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST AV : THE CONVERTIBLE TOP WARNING MESSAGE IS ALWAYS DISPLAYED

Normal Operation and Fault Conditions

See Convertible Top Warning Message. REFER to: Message Center - System Operation and Component Description .

If the convertible top message request is missing for less than 5 seconds, the IPC defaults the convertible top warning message to the last indication state, based upon the last message received.

If the convertible top message request is missing for 5 seconds or longer, the IPC defaults the convertible top warning message off.

Possible Sources

- Convertible top system concern
- Moveable Roof Control Module-A (MRCMA) concern
- GWM concern
- IPC

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST AV : THE CONVERTIBLE TOP WARNING MESSAGE IS ALWAYS DISPLAYED > PINPOINT TEST AV : THE CONVERTIBLE TOP WARNING MESSAGE IS ALWAYS DISPLAYED

AV1 CHECK THE MESSAGE CENTER OPERATION

Ignition ON.

Close all doors, the hood and luggage compartment lid.

Clear all message center warnings by pressing the OK button for each warning present.

Monitor the door ajar RTT.

Open the driver door.

Clear the message center popup warning.

Monitor the door ajar RTT.

Is the door ajar RTT off with the door closed, and on with the door open?

Yes	GO to AV2

No	INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

AV2 PERFORM THE IPC (INSTRUMENT PANEL CLUSTER) SELF-TEST

Using a diagnostic scan tool, perform the IPC self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to DTC Chart: IPC .

No	GO to AV3

AV3 CHECK THE GWM (GATEWAY MODULE A) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, check the GWM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: MODULE COMMUNICATIONS NETWORK .

No	DIAGNOSE all Moveable Roof Control Module-A (MRCMA) Diagnostic Trouble Codes (DTCs).

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST AW : THE ENGINE ON WARNING MESSAGE IS ALWAYS DISPLAYED (PUSH BUTTON START ONLY)

Normal Operation and Fault Conditions

See Engine On Message. REFER to: Message Center - System Operation and Component Description .

If the engine status, driver door ajar, transmission gear display mode or vehicle speed messages are missing for less than 5 seconds, the IPC defaults the engine on warning message to the last indication state, based upon the last message received.

If the engine status, driver door ajar, transmission gear display mode or vehicle speed messages are missing for 5 seconds or longer, the IPC defaults the engine on warning message off.

Possible Sources

- BCM concern
- GWM concern
- PCM concern
- IPC

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST AW : THE ENGINE ON WARNING MESSAGE IS ALWAYS DISPLAYED (PUSH BUTTON START ONLY) > PINPOINT TEST AW : THE ENGINE ON WARNING MESSAGE IS ALWAYS DISPLAYED (PUSH BUTTON START ONLY)

AW1 CHECK THE MESSAGE CENTER OPERATION

Ignition ON.

Close all doors, the hood and luggage compartment lid.

Clear all message center warnings by pressing the OK button for each warning present.

Monitor the door ajar RTT.

Open the driver door.

Clear the message center popup warning.

Monitor the door ajar RTT.

Is the door ajar RTT off with the door closed, and on with the door open?

Yes	GO to AW2

No	INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

AW2 PERFORM THE IPC (INSTRUMENT PANEL CLUSTER) SELF-TEST

Using a diagnostic scan tool, perform the IPC self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to DTC Chart: IPC .

No	GO to AW3

AW3 PERFORM THE BCM (BODY CONTROL MODULE) SELF-TEST

Using a diagnostic scan tool, perform the BCM self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: Body Control Module (BCM) .

No	GO to AW4

AW4 CHECK THE GWM (GATEWAY MODULE A) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, check the GWM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: MODULE COMMUNICATIONS NETWORK .

No	DIAGNOSE all PCM Diagnostic Trouble Codes (DTCs). Refer to the appropriate article for the procedure.

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST AX : THE HILL START ASSIST WARNING MESSAGE IS ALWAYS DISPLAYED

Normal Operation and Fault Conditions

See Hill Start Assist Warning Message. REFER to: Message Center - System Operation and Component Description .

If the hill start assist status message is missing for less than 5 seconds, the IPC defaults the hill start assist warning message to the last indication state, based upon the last message received.

If the hill start assist status message is missing for 5 seconds or longer, the IPC defaults the hill start assist warning message off.

Possible Sources

- Hill start assist feature concern
- ABS concern
- GWM concern
- IPC

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST AX : THE HILL START ASSIST WARNING MESSAGE IS ALWAYS DISPLAYED > PINPOINT TEST AX : THE HILL START ASSIST WARNING MESSAGE IS ALWAYS DISPLAYED

AX1 CHECK THE MESSAGE CENTER OPERATION

Ignition ON.

Close all doors, the hood and luggage compartment lid.

Clear all message center warnings by pressing the OK button for each warning present.

Monitor the door ajar RTT.

Open the driver door.

Clear the message center popup warning.

Monitor the door ajar RTT.

Is the door ajar RTT off with the door closed, and on with the door open?

Yes	GO to AX2

No	INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

AX2 PERFORM THE IPC (INSTRUMENT PANEL CLUSTER) SELF-TEST

Using a diagnostic scan tool, perform the IPC self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to DTC Chart: IPC .

No	GO to AX3

AX3 CHECK THE GWM (GATEWAY MODULE A) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, check the GWM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: MODULE COMMUNICATIONS NETWORK .

No	DIAGNOSE the hill start assist feature. REFER to: Anti-Lock Brake System (ABS) and Stability Control .

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST AY : THE ADAPTIVE CRUISE CONTROL WARNING CHIME IS INOPERATIVE

Normal Operation and Fault Conditions

See Adaptive Cruise Control Warning Chime. REFER to: Warning Chimes - System Operation and Component Description .

Possible Sources

- Adaptive cruise control concern
- Communication concern
- GWM concern
- IPC

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST AY : THE ADAPTIVE CRUISE CONTROL WARNING CHIME IS INOPERATIVE > PINPOINT TEST AY : THE ADAPTIVE CRUISE CONTROL WARNING CHIME IS INOPERATIVE

AY1 CHECK THE SAFETY BELT WARNING CHIME OPERATION

Ignition OFF.

Ignition ON.

Unbuckle the driver safety belt.

Monitor the safety belt warning chime when the ignition is transitioned from OFF to RUN for 6 seconds.

Does the safety belt warning chime operate for approximately 6 seconds?

Yes	GO to AY2

No	INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

AY2 PERFORM THE IPC (INSTRUMENT PANEL CLUSTER) SELF-TEST

Using a diagnostic scan tool, perform the IPC self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to DTC Chart: IPC .

No	GO to AY3

AY3 CHECK THE GWM (GATEWAY MODULE A) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, check the GWM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: MODULE COMMUNICATIONS NETWORK .

No	GO to AY4

AY4 CHECK THE CRUISE CONTROL RTT (RECONFIGURABLE TELLTALE) OPERATION

Verify the adaptive cruise control RTT illuminates when the adaptive cruise control is in operation.

Does the adaptive cruise control RTT illuminate when the adaptive cruise control is active?

Yes	DIAGNOSE the cruise control system. For base cruise control, REFER to: Cruise Control . For adaptive cruise control, REFER to: Cruise Control .

No	GO to Pinpoint Test AH

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST AZ : THE BACKUP WARNING CHIME IS INOPERATIVE (JAPAN ONLY)

Normal Operation and Fault Conditions

See Backup Warning Chime. REFER to: Warning Chimes - System Operation and Component Description .

Possible Sources

- Communication concern
- Reverse lamps concern
- GWM concern
- IPC

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST AZ : THE BACKUP WARNING CHIME IS INOPERATIVE (JAPAN ONLY) > PINPOINT TEST AZ : THE BACKUP WARNING CHIME IS INOPERATIVE (JAPAN ONLY)

AZ1 CHECK THE SAFETY BELT WARNING CHIME OPERATION

Ignition OFF.

Ignition ON.

Unbuckle the driver safety belt.

Monitor the safety belt warning chime when the ignition is transitioned from OFF to RUN for 6 seconds.

Does the safety belt warning chime operate for approximately 6 seconds?

Yes	GO to AZ2

No	INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

AZ2 CHECK THE REVERSE LAMPS OPERATION

Apply the parking brake.

Place the selector lever (automatic) or gearshift lever (manual) in REVERSE (R).

Verify the reverse lamps operate correctly.

Do the reverse lamps operate correctly?

Yes	GO to AZ3

No	REFER to: Reversing Lamps .

AZ3 PERFORM THE IPC (INSTRUMENT PANEL CLUSTER) SELF-TEST

Using a diagnostic scan tool, perform the IPC self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to DTC Chart: IPC .

No	GO to AZ4

AZ4 PERFORM THE PCM (POWERTRAIN CONTROL MODULE) SELF-TEST

Using a diagnostic scan tool, perform the PCM self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	Refer to the appropriate article for the procedure.

No	GO to AZ5

AZ5 CHECK THE GWM (GATEWAY MODULE A) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, check the GWM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: MODULE COMMUNICATIONS NETWORK .

No	INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST BA : THE BLIND SPOT INFORMATION SYSTEM (BLIS ®)/CROSS TRAFFIC ALERT (CTA) WARNING CHIME IS INOPERATIVE

Normal Operation and Fault Conditions

See Blind Spot Information System (BLIS ®) Warning Chime. REFER to: Warning Chimes - System Operation and Component Description .

Possible Sources

- Communication concern
- Blind Spot Information System (BLIS ®)/Cross Traffic Alert (CTA) concern
- GWM concern
- IPC

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST BA : THE BLIND SPOT INFORMATION SYSTEM (BLIS ®)/CROSS TRAFFIC ALERT (CTA) WARNING CHIME IS INOPERATIVE > PINPOINT TEST BA : THE BLIND SPOT INFORMATION SYSTEM (BLIS ®)/CROSS TRAFFIC ALERT (CTA) WARNING CHIME IS INOPERATIVE

BA1 CHECK THE SAFETY BELT WARNING CHIME OPERATION

Ignition OFF.

Ignition ON.

Unbuckle the driver safety belt.

Monitor the safety belt warning chime when the ignition is transitioned from OFF to RUN for 6 seconds.

Does the safety belt warning chime operate for approximately 6 seconds?

Yes	GO to BA2

No	INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

BA2 PERFORM THE IPC (INSTRUMENT PANEL CLUSTER) SELF-TEST

Using a diagnostic scan tool, perform the IPC self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to DTC Chart: IPC .

No	GO to BA3

BA3 CHECK THE GWM (GATEWAY MODULE A) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, check the GWM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: MODULE COMMUNICATIONS NETWORK .

No	DIAGNOSE the Blind Spot Information System (BLIS ®)/Cross Traffic Alert (CTA) system. REFER to: Blind Spot Information System .

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST BB : THE CHIME ALWAYS SOUNDS

Refer to Instrument Cluster for schematic and connector information.

Normal Operation and Fault Conditions

See PRNDL Not In Park Warning Chime, Ignition-Engine On Warning Chime and Headlamps On Warning Chime. REFER to: Warning Chimes - System Operation and Component Description .

Possible Sources

- Exterior lighting concern
- Interior lighting concern
- BCM concern
- IPC

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST BB : THE CHIME ALWAYS SOUNDS > PINPOINT TEST BB : THE CHIME ALWAYS SOUNDS

BB1 CHECK THE IPC (INSTRUMENT PANEL CLUSTER) FOR MESSAGE CENTER MESSAGES

Ignition OFF.

Ignition ON.

Check the IPC and message center for illuminated warning indicator or message center displays.

Does the IPC have any RTTs illuminated or message center messages displayed?

Yes	REPAIR all message center indication concerns first. REFER to Symptom Chart: IPC or Symptom Chart: Information And Message Center .

No	GO to BB2

BB2 CHECK THE EXTERIOR LIGHTING OPERATION

Place the headlamp switch in the OFF position.

Close all doors.

Wait one minute.

Observe the exterior lights.

Are the headlamps and parking lamps off?

Yes	GO to BB3

No	REFER to: Headlamps . REFER to: Parking, Rear and License Plate Lamps .

BB3 CHECK THE INTERIOR LIGHTING OPERATION

Open and close the driver door.

Observe the interior lights.

Do the interior lights operate correctly from the driver door?

Yes	If equipped with a manual transmission, GO to BB5 If equipped with an automatic transmission, GO to BB4

No	REFER to: Interior Lighting .

BB4 CHECK THE PRNDL OPERATION

Verify the PRNDL indicates PARK (P) when selector lever is in PARK (P).

Does the PRNDL indicate PARK (P) when the selector lever is in PARK (P)?

Yes	GO to BB5

No	GO to Pinpoint Test V

BB5 PERFORM THE BCM (BODY CONTROL MODULE) SELF-TEST

Using a diagnostic scan tool, perform the BCM self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: Body Control Module (BCM) .

No	GO to BB6

BB6 CHECK THE BCM (BODY CONTROL MODULE) INPUT PIDS FROM THE IGNITION SWITCH

Using a diagnostic scan tool, view the BCM Parameter Identifications (PIDs).

Select and monitor the BCM ignition switch (IGN_SW_ACC), (IGN_SW_RUN) and (IGN_SW_KEY_IN) Parameter Identifications (PIDs) while cycling the ignition switch through the ACC, OFF, and RUN states.

Do the BCM Parameter Identifications (PIDs) match the ignition switch position?

Yes	INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

No	DIAGNOSE the ignition switch outputs to the BCM. REFER to: Steering Wheel and Column Electrical Components .

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST BC : THE CHIME ONLY SOUNDS FROM THE IPC (INSTRUMENT PANEL CLUSTER)

Normal Operation and Fault Conditions

REFER to: Warning Chimes - System Operation and Component Description .

Audio DSP Module DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B13F8:13	Audio Input 2: Circuit Open	Set by the audio DSP module when an open is detected on the LH chime signal circuits between the ACM and audio DSP module.
B13FA:13	Audio Input 4: Circuit Open	Set by the audio DSP module when an open is detected on the RH chime signal circuits between the ACM and audio DSP module.

Possible Sources

- Wiring, terminals or connectors
- Communication concern
- ACM concern
- APIM concern
- DACMC concern
- DSP concern

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST BC : THE CHIME ONLY SOUNDS FROM THE IPC (INSTRUMENT PANEL CLUSTER) > PINPOINT TEST BC : THE CHIME ONLY SOUNDS FROM THE IPC (INSTRUMENT PANEL CLUSTER)

BC1 PERFORM THE IPC (INSTRUMENT PANEL CLUSTER) SELF-TEST

Ignition ON.

Using a diagnostic scan tool, perform the IPC self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to DTC Chart: IPC .

No	GO to BC2

BC2 PERFORM THE ACM (AUDIO FRONT CONTROL MODULE) SELF-TEST

Using a diagnostic scan tool, perform the ACM self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	Refer to the appropriate article for the procedure.

No	GO to BC3

BC3 PERFORM THE APIM (SYNC MODULE) SELF-TEST

Using a diagnostic scan tool, perform the APIM self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	Refer to the appropriate article for the procedure.

No	If equipped with 2.3L automatic, GO to BC4 If **not** equipped with 2.3L automatic, GO to

BC4 PERFORM THE DACMC (DIGITAL AUDIO CONTROL MODULE C) SELF-TEST

Using a diagnostic scan tool, perform the DACMC self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	Refer to the appropriate article for the procedure.

No	If equipped with touchscreen audio system, GO to BC6 If **not** equipped with the touchscreen audio system, GO to BC5

BC5 CHECK FOR CORRECT AUDIO SYSTEM OPERATION

Operate the audio system in AM/ FM mode.

Does the audio system operate correctly?

Yes	If **not** equipped with the touchscreen audio system, GO to **BC17** . If equipped with the touchscreen audio system, GO to **BC6**

No	Diagnose the audio system. REFER to: Information and Entertainment System .

BC6 PERFORM THE AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE SELF-TEST

Using a diagnostic scan tool, perform the audio DSP module self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	For DTC B13F8:13, GO to BC7 For DTC B13FA:13, GO to BC12 For all other Diagnostic Trouble Codes (DTCs), Refer to the appropriate article for the

	procedure.

No	GO to BC17

BC7 CHECK THE LHR (LEFT-HAND REAR) AUDIO SIGNAL TO THE AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE

Ignition OFF.

Disconnect Audio DSP Module C2385A .

Ignition ON.

Operate the audio system in AM/ FM mode.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2385A-6		C2385A-5

Is a fluctuating AC voltage present?

Yes	GO to BC19

No	GO to BC8

BC8 CHECK THE LHR (LEFT-HAND REAR) AUDIO SIGNAL TO THE AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect ACM C240A .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2385A-6		Ground
C2385A-5		Ground

Is any voltage present?

Yes	REPAIR the circuit in question.

No	GO to BC9

BC9 CHECK THE LHR (LEFT-HAND REAR) AUDIO SIGNAL TO THE AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2385A-6	Ω	Ground
C2385A-5	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to BC10

No	REPAIR the circuit in question.

BC10 CHECK THE LHR (LEFT-HAND REAR) AUDIO SIGNAL TO THE AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2385A-6	Ω	C240A-21
C2385A-5	Ω	C240A-9

Are the resistances less than 3 ohms?

Yes	GO to BC11

No	REPAIR the circuit in question.

BC11 CHECK THE LHR (LEFT-HAND REAR) AUDIO SIGNAL TO THE AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2385A-6	Ω	C2385A-5

Is the resistance greater than 10, 000 ohms?

Yes	GO to BC17

No	REPAIR the circuits.

BC12 CHECK THE RHR (RIGHT-HAND REAR) AUDIO SIGNAL TO THE AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE

Ignition OFF.

Disconnect Audio DSP Module C2385A .

Ignition ON.

Operate the audio system in AM/ FM mode.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2385A-2		C2385A-1

Is a fluctuating AC voltage present?

Yes	GO to BC19

No	GO to BC13

BC13 CHECK THE RHR (RIGHT-HAND REAR) AUDIO SIGNAL TO THE AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect ACM C240A .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2385A-2		Ground
C2385A-1		Ground

Is any voltage present?

Yes	REPAIR the circuit in question.

No	GO to BC14

BC14 CHECK THE RHR (RIGHT-HAND REAR) AUDIO SIGNAL TO THE AUDIO DSP (AUDIO

DIGITAL SIGNAL PROCESSING MODULE) MODULE FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2385A-2	Ω	Ground
C2385A-1	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to BC15

No	REPAIR the circuit in question.

BC15 CHECK THE RHR (RIGHT-HAND REAR) AUDIO SIGNAL TO THE AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2385A-2	Ω	C240A-24
C2385A-1	Ω	C240A-12

Are the resistances less than 3 ohms?

Yes	GO to BC16

No	REPAIR the circuit in question.

BC16 CHECK THE RHR (RIGHT-HAND REAR) AUDIO SIGNAL TO THE AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2385A-2	Ω	C2385A-1

Is the resistance greater than 10, 000 ohms?

Yes	GO to BC17

No	REPAIR the circuit in question.

BC17 CHECK FOR CORRECT ACM (AUDIO FRONT CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all the ACM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the ACM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ACM. Vehicles With: AM/FM/CD/SYNC REFER to: Audio Front Control Module (ACM) or Vehicles With: Touchscreen Display REFER to: Audio Front Control Module (ACM) . TEST the system for normal operation. If the chimes still do not sound through the audio system, GO to BC18

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

BC18 CHECK FOR CORRECT IPC (INSTRUMENT PANEL CLUSTER) OPERATION

Ignition OFF.

Disconnect and inspect all IPC connector.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the IPC connector. Make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for

	this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

BC19 CHECK FOR CORRECT AUDIO DSP (AUDIO DIGITAL SIGNAL PROCESSING MODULE) MODULE OPERATION

Ignition OFF.

Disconnect and inspect all the audio DSP module connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the audio DSP module connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, discontinue this test and follow TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new audio DSP module. REFER to: Audio Digital Signal Processing (DSP) Module .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST BD : THE FORWARD COLLISION WARNING CHIME IS INOPERATIVE

Normal Operation and Fault Conditions

See Forward Collision Warning Chime. REFER to: Warning Chimes - System Operation and Component Description .

Possible Sources

- Forward collision system concern
- Communication concern

- GWM concern
- IPC

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST BD : THE FORWARD COLLISION WARNING CHIME IS INOPERATIVE > PINPOINT TEST BD : THE FORWARD COLLISION WARNING CHIME IS INOPERATIVE

BD1 CHECK THE SAFETY BELT WARNING CHIME OPERATION

Ignition OFF.

Ignition ON.

Unbuckle the driver safety belt.

Monitor the safety belt warning chime when the ignition is transitioned from OFF to RUN for 6 seconds.

Does the safety belt warning chime operate for approximately 6 seconds?

Yes	GO to BD2

No	INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

BD2 PERFORM THE IPC (INSTRUMENT PANEL CLUSTER) SELF-TEST

Using a diagnostic scan tool, perform the IPC self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to DTC Chart: IPC .

No	GO to BD3

BD3 CHECK THE GWM (GATEWAY MODULE A) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, check the GWM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: MODULE COMMUNICATIONS NETWORK .

No	DIAGNOSE the collision avoidance system. REFER to: Collision Warning and Collision

	Avoidance System .

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST BE : THE HEADLAMPS ON WARNING CHIME IS INOPERATIVE

Normal Operation and Fault Conditions

See Headlamps On Warning Chime. REFER to: Warning Chimes - System Operation and Component Description .

Possible Sources

- GWM concern
- BCM concern
- IPC

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST BE : THE HEADLAMPS ON WARNING CHIME IS INOPERATIVE > PINPOINT TEST BE : THE HEADLAMPS ON WARNING CHIME IS INOPERATIVE

BE1 CHECK THE SAFETY BELT WARNING CHIME OPERATION

Ignition OFF.

Ignition ON.

Unbuckle the driver safety belt.

Monitor the safety belt warning chime when the ignition is transitioned from OFF to RUN for 6 seconds.

Does the safety belt warning chime operate for approximately 6 seconds?

Yes	GO to BE2

No	INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

BE2 PERFORM THE IPC (INSTRUMENT PANEL CLUSTER) SELF-TEST

Using a diagnostic scan tool, perform the IPC self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to DTC Chart: IPC .

No	GO to BE3

BE3 CHECK THE GWM (GATEWAY MODULE A) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, check the GWM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: MODULE COMMUNICATIONS NETWORK .

No	DIAGNOSE all BCM Diagnostic Trouble Codes (DTCs). REFER to: Body Control Module (BCM) .

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST BF : THE IGNITION-ENGINE ON WARNING CHIME IS INOPERATIVE

Normal Operation and Fault Conditions

See Ignition-Engine On Warning Chime. REFER to: Warning Chimes - System Operation and Component Description .

Possible Sources

- Interior lighting concern
- PRNDL indication concern
- GWM concern
- BCM concern
- IPC

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST BF : THE IGNITION-ENGINE ON WARNING CHIME IS INOPERATIVE > PINPOINT TEST BF : THE IGNITION-ENGINE ON WARNING CHIME IS INOPERATIVE

BF1 CHECK THE SAFETY BELT WARNING CHIME OPERATION

Ignition OFF.

Ignition ON.

Unbuckle the driver safety belt.

Monitor the safety belt warning chime when the ignition is transitioned from OFF to RUN for 6 seconds.

Does the safety belt warning chime operate for approximately 6 seconds?

Yes	GO to BF2

No	INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

BF2 CHECK THE DOOR AJAR INDICATION

Open the driver door.

Observe the door ajar warning indicator or door ajar message center warning indicator.

Does the door ajar warning indicator or door ajar message center warning indicator turn on with the driver door ajar?

Yes	GO to BF3

No	GO to Pinpoint Test AI

BF3 CHECK THE PRNDL OPERATION

Shift the transmission through the ranges while observing the PRNDL indication.

Does the PRNDL indication match the selected transmission range?

Yes	GO to BF4

No	GO to Pinpoint Test V

BF4 PERFORM THE IPC (INSTRUMENT PANEL CLUSTER) SELF-TEST

Using a diagnostic scan tool, perform the IPC self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to DTC Chart: IPC .

No	GO to BF5

BF5 CHECK THE GWM (GATEWAY MODULE A) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, check the GWM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: MODULE COMMUNICATIONS NETWORK .

No	DIAGNOSE any BCM Diagnostic Trouble Codes (DTCs). REFER to: Body Control Module (BCM) .

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST BG : THE MEMORY-STORED FEEDBACK CHIME IS INOPERATIVE

Normal Operation and Fault Conditions

See Memory-Stored Chime. REFER to: Warning Chimes - System Operation and Component Description .

Possible Sources

- Memory set feature concern
- DSM
- GWM concern
- IPC

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST BG : THE MEMORY-STORED FEEDBACK CHIME IS INOPERATIVE > PINPOINT TEST BG : THE MEMORY-STORED FEEDBACK CHIME IS INOPERATIVE

BG1 CHECK THE SAFETY BELT WARNING CHIME OPERATION

Ignition OFF.

Ignition ON.

Unbuckle the driver safety belt.

Monitor the safety belt warning chime when the ignition is transitioned from OFF to RUN for 6 seconds.

Does the safety belt warning chime operate for approximately 6 seconds?

Yes	GO to BG2

No	INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

BG2 CHECK THE MEMORY SET FEATURE

Verify the memory set procedure can successfully change the memory preferences.

Does the memory set procedure successfully change the memory preferences?

Yes	GO to BG3

No	REFER to: FRONT SEATS .

BG3 PERFORM THE IPC (INSTRUMENT PANEL CLUSTER) SELF-TEST

Using a diagnostic scan tool, perform the IPC self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to DTC Chart: IPC .

No	GO to BG4

BG4 CHECK THE GWM (GATEWAY MODULE A) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, check the GWM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: MODULE COMMUNICATIONS NETWORK .

No	DIAGNOSE any DSM Diagnostic Trouble Codes (DTCs). REFER to: FRONT SEATS .

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST BH : THE PARKING AID CHIME IS INOPERATIVE

Normal Operation and Fault Conditions

See Parking Aid Chime. REFER to: Instrumentation, Message Center and Warning Chimes .

Possible Sources

- Parking aid system concern
- Communication concern
- GWM concern
- IPC

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST BH : THE PARKING AID CHIME IS INOPERATIVE > PINPOINT TEST BH : THE PARKING AID CHIME IS INOPERATIVE

BH1 CHECK THE SAFETY BELT WARNING CHIME OPERATION

Ignition OFF.

Ignition ON.

Unbuckle the driver safety belt.

Monitor the safety belt warning chime when the ignition is transitioned from OFF to RUN for 6 seconds.

Does the safety belt warning chime operate for approximately 6 seconds?

Yes	GO to BH2

No	INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

BH2 VERIFY THE CHIMES FUNCTION THROUGH THE AUDIO SPEAKERS

Ignition OFF.

Ignition ON.

Monitor the location of the safety belt warning chime (front/rear audio speakers or IPC) when the ignition is transitioned from OFF to RUN.

Does the chime sound through the audio speakers?

Yes	GO to BH4

No	GO to BH3

BH3 CHECK THE GWM (GATEWAY MODULE A) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, check the GWM Continuous Memory Diagnostic Trouble

Codes (CMDTCs).

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: MODULE COMMUNICATIONS NETWORK .

No	GO to BH4

BH4 PERFORM THE PAM (PARKING ASSIST CONTROL MODULE) SELF-TEST

Using a diagnostic scan tool, perform the PAM self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: Parking Aid .

No	GO to BH5

BH5 PERFORM THE IPC (INSTRUMENT PANEL CLUSTER) SELF-TEST

Using a diagnostic scan tool, perform the IPC self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to DTC Chart: IPC .

No	DIAGNOSE the audible parking aid. REFER to: Parking Aid .

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST BI : THE PARKING BRAKE WARNING CHIME IS INOPERATIVE

Normal Operation and Fault Conditions

See Parking Brake Warning Chime. REFER to: Warning Chimes - System Operation and Component Description .

Possible Sources

- Brake warning indication concern
- Communication concern
- GWM concern
- IPC

Visual Inspection And Diagnostic Pre-checks

Check the operation of the parking brake warning chime with the vehicle moving at least 10 km/h (6.2 mph) and the parking brake slightly applied (just enough to turn the brake warning indicator on without damaging the rear brakes).

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST BI : THE PARKING BRAKE WARNING CHIME IS INOPERATIVE > PINPOINT TEST BI : THE PARKING BRAKE WARNING CHIME IS INOPERATIVE

BI1 CHECK THE SAFETY BELT WARNING CHIME OPERATION

Ignition OFF.

Ignition ON.

Unbuckle the driver safety belt.

Monitor the safety belt warning chime when the ignition is transitioned from OFF to RUN for 6 seconds.

Does the safety belt warning chime operate for approximately 6 seconds?

Yes	GO to BI2

No	INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

BI2 CHECK THE BRAKE WARNING INDICATOR FOR CORRECT OPERATION

Apply the parking brake.

Observe the brake warning indicator.

Does the brake warning indicator illuminate?

Yes	GO to BI3

No	GO to Pinpoint Test P

BI3 PERFORM THE IPC (INSTRUMENT PANEL CLUSTER) SELF-TEST

Using a diagnostic scan tool, perform the IPC self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to DTC Chart: IPC .

No	GO to BI4

BI4 CHECK THE GWM (GATEWAY MODULE A) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, check the GWM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: MODULE COMMUNICATIONS NETWORK .

No	DIAGNOSE all BCM Diagnostic Trouble Codes (DTCs). REFER to: Body Control Module (BCM) .

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST BJ : THE PERIMETER ALARM CHIME IS INOPERATIVE

Normal Operation and Fault Conditions

See Perimeter Alarm Warning Chime. REFER to: Warning Chimes - System Operation and Component Description .

Possible Sources

- Perimeter alarm concern
- BCM
- GWM concern
- IPC

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST BJ : THE PERIMETER ALARM CHIME IS INOPERATIVE > PINPOINT TEST BJ : THE PERIMETER ALARM CHIME IS INOPERATIVE

BJ1 CHECK THE SAFETY BELT WARNING CHIME OPERATION

Ignition OFF.

Ignition ON.

Monitor the safety belt warning chime when the ignition switch is transitioned from OFF to RUN for 6 seconds.

Does the safety belt warning chime operate for approximately 6 seconds?

Yes	GO to BJ2

No	INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

BJ2 CHECK THE OPERATION OF THE PERIMETER ALARM

Arm the perimeter alarm using the remote key locking feature (key fob).

Wait approximately 15 seconds for the system to arm.

Open the driver door using the interior door handle.

Does the perimeter alarm sound after 12 seconds?

Yes	GO to BJ3

No	REFER to: Perimeter Anti-Theft Alarm .

BJ3 PERFORM THE IPC (INSTRUMENT PANEL CLUSTER) SELF-TEST

Using a diagnostic scan tool, perform the IPC self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to DTC Chart: IPC .

No	GO to BJ4

BJ4 CHECK THE GWM (GATEWAY MODULE A) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, check the GWM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: MODULE COMMUNICATIONS NETWORK .

No	DIAGNOSE all BCM Diagnostic Trouble Codes (DTCs). REFER to: Body Control Module (BCM) .

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST BK : THE SAFETY BELT WARNING CHIME OR THE BELT-MINDER ® FEATURE IS INOPERATIVE

Normal Operation and Fault Conditions

See Safety Belt Warning Chime and Belt-Minder ® Feature. REFER to: Warning Chimes - System Operation and Component Description .

Possible Sources

- Belt-Minder ® deactivated
- Communication concern
- Safety belt warning indication concern
- Vehicle speed input concern
- BCM concern
- GWM concern
- RCM
- IPC

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST BK : THE SAFETY BELT WARNING CHIME OR THE BELT-MINDER ® FEATURE IS INOPERATIVE > PINPOINT TEST BK : THE SAFETY BELT WARNING CHIME OR THE BELT-MINDER ® FEATURE IS INOPERATIVE

BK1 CHECK THE HEADLAMPS ON WARNING CHIME

Ignition OFF.

Turn the headlamps on.

Open the driver door.

Monitor the headlamps on warning chime.

Does the headlamps on warning chime operate?

Yes	GO to BK2

No	INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

BK2 CHECK THE SAFETY BELT WARNING CHIME OPERATION

Ignition ON.

Monitor the safety belt warning chime when the ignition switch is transitioned from OFF to RUN for 6 seconds.

Does the safety belt warning chime operate for approximately 6 seconds?

Yes	For the Belt-Minder ®, GO to BK3 For the safety belt warning chime, GO to BK4

No	GO to BK5

BK3 CHECK THE SPEEDOMETER OPERATION

Ignition ON.

Verify the speedometer operates.

Does the speedometer operate?

Yes	GO to BK4

No	GO to Pinpoint Test D

BK4 PERFORM THE IPC (INSTRUMENT PANEL CLUSTER) SELF-TEST

Using a diagnostic scan tool, perform the IPC self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to DTC Chart: IPC .

No	GO to BK5

BK5 PERFORM THE BCM (BODY CONTROL MODULE) SELF-TEST

Using a diagnostic scan tool, perform the BCM self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: Body Control Module (BCM) .

No	GO to BK6

BK6 PERFORM THE RCM (RESTRAINTS CONTROL MODULE) SELF-TEST

Using a diagnostic scan tool, perform the RCM self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: Airbag Supplemental Restraint System (SRS) .

No	GO to BK7

BK7 CHECK THE GWM (GATEWAY MODULE A) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, check the GWM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: MODULE COMMUNICATIONS NETWORK .

No	GO to BK8

BK8 CHECK THE DRIVER AND FRONT PASSENGER SAFETY BELT BUCKLE SWITCH

Using a diagnostic scan tool, monitor the RCM driver and front passenger safety belt buckle Parameter Identifications (PIDs) (SBELT_D_ST) and (SBLT_P_ST) while buckling and unbuckling the safety belt.

Do the Parameter Identifications (PIDs) display BUCKLED with the safety belt buckled and UNBUCKLED with the safety belt unbuckled?

Yes	GO to BK9

No	INSTALL a new safety belt buckle. REFER to: Front Seatbelt Buckle .

NOTE: Verify that an administrator key is used for this test and not a MyKey ® programmed key. When a MyKey ® programmed key is used, the Belt-Minder ® is automatically turned on and cannot be disabled (if previously disabled by an administrator, the Belt-Minder ® remains disabled when an administrator key is used).

BK9 CHECK THE BELT-MINDER ® CONFIGURATION

Verify the Belt-Minder ® is activated or configured on for the seating position in question. REFER to: Seatbelt Minder Deactivating/Activating .

Is the Belt-Minder activated for the seating position in question?

Yes	If the Belt-Minder ® is always on above 10 km/h (6 mph) with the safety belt unfastened, the system is operating correctly. If the Belt-Minder ® is always on with the safety belt fastened or never on with the safety belt unfastened above 10 km/h (6 mph), INSTALL a new RCM. REFER to: Restraints Control Module (RCM) .

No	ACTIVATE the Belt-Minder ® for the seating position in question. REFER to: Seatbelt Minder Deactivating/Activating .

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST BL : THE TURN SIGNAL-HAZARD ON CHIME OR TURN SIGNAL LEFT ON CHIME IS INOPERATIVE

Normal Operation and Fault Conditions

See Turn Signal On Chime Tone. REFER to: Warning Chimes - System Operation and Component Description .

Possible Sources

- Turn signal indication concern
- Communication concern
- BCM concern
- GWM concern
- IPC

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST BL : THE TURN SIGNAL-HAZARD ON CHIME OR TURN SIGNAL LEFT ON CHIME IS INOPERATIVE > PINPOINT TEST BL : THE TURN SIGNAL-HAZARD ON CHIME OR TURN SIGNAL LEFT ON CHIME IS INOPERATIVE

BL1 CHECK THE SAFETY BELT WARNING CHIME OPERATION

Ignition OFF.

Ignition ON.

Unbuckle the driver safety belt.

Monitor the safety belt warning chime when the ignition is transitioned from OFF to RUN for 6 seconds.

Does the safety belt warning chime operate for approximately 6 seconds?

Yes	GO to BL2

No	INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

BL2 CHECK THE TURN SIGNAL INDICATOR OPERATION

Verify the RH and LH turn signal indicators operate correctly.

Do the turn signal indicators operate correctly?

Yes	GO to BL3

No	GO to Pinpoint Test S

BL3 PERFORM THE BCM (BODY CONTROL MODULE) SELF-TEST

Using a diagnostic scan tool, perform the BCM self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: Body Control Module (BCM) .

No	DIAGNOSE all GWM Diagnostic Trouble Codes (DTCs). REFER to: MODULE COMMUNICATIONS NETWORK .

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST BM : U0100:00

Normal Operation and Fault Conditions

IPC DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0100:00	Lost Communication With ECM/PCM "A": No Sub Type Information	Sets in continuous memory in the IPC if data messages received from the PCM through the GWM are missing for 5 seconds or longer.

Possible Sources

- Communication concern
- Battery voltage concern
- GWM concern
- PCM
- IPC

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST BM : U0100:00 > PINPOINT

TEST BM : U0100:00

BM1 VERIFY THE DIAGNOSTIC SCAN TOOL COMMUNICATES WITH THE PCM (POWERTRAIN CONTROL MODULE)

Connect the diagnostic scan tool.

Check that a vehicle session can be established using the diagnostic scan tool.

Can a vehicle session be established?

Yes	GO to BM2

No	REFER to: MODULE COMMUNICATIONS NETWORK .

BM2 CHECK THE IPC (INSTRUMENT PANEL CLUSTER) CONTINUOUS MEMORY DIAGNOSTIC TROUBLE CODES (CMDTCS)

Ignition ON.

Using a diagnostic scan tool, perform the IPC self-test.

Clear the Diagnostic Trouble Codes (DTCs).

Wait 10 seconds.

Repeat the IPC self-test.

Is DTC U0100:00 retrieved again?

Yes	GO to BM3

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

BM3 PERFORM THE PCM (POWERTRAIN CONTROL MODULE) SELF-TEST

Using a diagnostic scan tool, perform the PCM self-test.

Are any DTC recorded?

Yes	Refer to the appropriate article for the procedure.

No	GO to BM4

BM4 PERFORM THE IPC (INSTRUMENT PANEL CLUSTER) SELF-TEST

Using a diagnostic scan tool, perform the IPC self-test.

Is DTC U3003:16 or DTC U3003:17 recorded?

Yes	REFER to DTC Chart: IPC .

No	GO to BM5

BM5 CHECK THE GWM (GATEWAY MODULE A) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, check the GWM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Are any Diagnostic Trouble Codes (DTCs) set?

Yes	REFER to: MODULE COMMUNICATIONS NETWORK .

No	GO to BM6

BM6 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0100:00 OR DTC (DIAGNOSTIC TROUBLE CODE) U0100:87 SET IN OTHER MODULES

Using a diagnostic scan tool, clear all Diagnostic Trouble Codes (DTCs).

Ignition OFF.

Ignition ON.

Wait 10 seconds.

Using a diagnostic scan tool, perform the continuous memory self-test.

Retrieve the Continuous Memory Diagnostic Trouble Codes (CMDTCs) from all modules.

Does DTC U0100:00 set in the ABS module or DTC U0100:87 set in the BCM?

Yes	GO to BM7

No	GO to BM8

BM7 CHECK FOR CORRECT PCM (POWERTRAIN CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all PCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect all the PCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PCM. Refer to the appropriate article for the procedure.

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

BM8 CHECK FOR CORRECT IPC (INSTRUMENT PANEL CLUSTER) OPERATION

Ignition OFF.

Disconnect and inspect IPC connector.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the IPC connector. Make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST BN : U0100:00

Normal Operation and Fault Conditions

ICM DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0100:00	Lost Communication With ECM/PCM "A": No Sub Type Information	Sets in continuous memory in the ICM if data messages received from the PCM are missing for 5 seconds or longer.

Possible Sources

- Communication concern
- Battery voltage concern
- PCM
- ICM

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST BN : U0100:00 > PINPOINT TEST BN : U0100:00

BN1 VERIFY THE DIAGNOSTIC SCAN TOOL COMMUNICATES WITH THE PCM (POWERTRAIN CONTROL MODULE)

Connect the diagnostic scan tool.

Check that a vehicle session can be established using the diagnostic scan tool.

Can a vehicle session be established?

Yes	GO to BN2

No	REFER to: MODULE COMMUNICATIONS NETWORK .

BN2 CHECK THE ICM (INFORMATION CENTER MODULE) CONTINUOUS MEMORY DIAGNOSTIC TROUBLE CODES (CMDTCS)

Ignition ON.

Using a diagnostic scan tool, perform the ICM self-test.

Clear the Diagnostic Trouble Codes (DTCs).

Wait 10 seconds.

Repeat the ICM self-test.

Is DTC U0100:00 retrieved again?

Yes	GO to BN3

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

BN3 PERFORM THE PCM (POWERTRAIN CONTROL MODULE) SELF-TEST

Using a diagnostic scan tool, perform the PCM self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	Refer to the appropriate article for the procedure.

No	GO to BN4

BN4 PERFORM THE ICM (INFORMATION CENTER MODULE) SELF-TEST

Using a diagnostic scan tool, perform the ICM self-test.

Is DTC U3003:16 or DTC U3003:17 recorded?

Yes	REFER to DTC Chart: Information Center Module (ICM) .

No	GO to BN5

BN5 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0100:00 OR DTC (DIAGNOSTIC TROUBLE CODE) U0100:87 SET IN OTHER MODULES

Using a diagnostic scan tool, clear all Diagnostic Trouble Codes (DTCs).

Ignition OFF.

Ignition ON.

Wait 10 seconds.

Using a diagnostic scan tool, perform the continuous memory self-test.

Retrieve the Continuous Memory Diagnostic Trouble Codes (CMDTCs) from all modules.

Is DTC U0100:00 set in the IPC, ABS module or DTC U0100:87 set in the BCM?

Yes	GO to BN6

No	GO to BN7

BN6 CHECK FOR CORRECT PCM (POWERTRAIN CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all PCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect all the PCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PCM. Refer to the appropriate article for the procedure.

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

BN7 CHECK FOR CORRECT ICM (INFORMATION CENTER MODULE) OPERATION

Ignition OFF.

Disconnect and inspect ICM connector.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the ICM connector. Make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ICM. REFER to: Information Center Module (ICM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST BO : U0104:00

Normal Operation and Fault Conditions

IPC DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0104:00	Lost Communication With Cruise Control Module: No Sub Type Information	Sets in continuous memory in the IPC if data messages received from the CCM through the GWM are missing for 5 seconds or longer.

Possible Sources

- Communication concern
- Battery voltage concern
- GWM concern
- CCM
- IPC

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST BO : U0104:00 > PINPOINT TEST BO : U0104:00

BO1 VERIFY THE CUSTOMER CONCERN

Ignition ON.

Verify there is an observable symptom present.

Is an observable symptom present?

Yes	GO to BO2

No	Clear the DTC. The system is operating normally at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

BO2 CHECK THE COMMUNICATION NETWORK

Using a diagnostic scan tool, perform the network test.

Does the CCM pass the network test?

Yes	GO to BO3

No	REFER to: MODULE COMMUNICATIONS NETWORK .

BO3 PERFORM THE CCM (CRUISE CONTROL MODULE) SELF-TEST

Using a diagnostic scan tool, perform the CCM self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	For base cruise control, REFER to: Cruise Control . For adaptive cruise control, REFER to: Cruise Control .

No	GO to BO4

BO4 CHECK THE GWM (GATEWAY MODULE A) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, check the GWM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: MODULE COMMUNICATIONS NETWORK .

No	GO to BO5

BO5 PERFORM THE IPC (INSTRUMENT PANEL CLUSTER) SELF-TEST

Using a diagnostic scan tool, perform the IPC self-test.

Is DTC U3003:16 or DTC U3003:17 recorded?

Yes	REFER to DTC Chart: IPC .

No	GO to BO6

NOTE: If new modules were installed prior to the DTC being set, the module configuration may be incorrectly set during the Programmable Module Installation (PMI), or the Programmable Module Installation (PMI) may not have been carried out.

BO6 RECHECK THE IPC (INSTRUMENT PANEL CLUSTER) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs).

Wait 10 seconds.

Repeat the IPC self-test.

Is DTC U0104:00 still present?

Yes	GO to BO7

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

BO7 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0104:00 SET IN OTHER MODULES

Using a diagnostic scan tool, clear all Diagnostic Trouble Codes (DTCs).

Ignition OFF.

Ignition ON.

Wait 10 seconds.

Using a diagnostic scan tool, perform the continuous memory self-test.

Retrieve the Continuous Memory Diagnostic Trouble Codes (CMDTCs) from all modules.

Is DTC U0104:00 set in the ABS module?

Yes	GO to BO8

No	GO to BO9

BO8 CHECK FOR CORRECT CCM (CRUISE CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all CCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect all the CCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical

	Service Bulletins (TSBs) address this concern, INSTALL a new CCM. REFER to: Cruise Control Module (CCM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

BO9 CHECK FOR CORRECT IPC (INSTRUMENT PANEL CLUSTER) OPERATION

Ignition OFF.

Disconnect and inspect IPC connector.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the IPC connector. Make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST BP : U0121:00

Normal Operation and Fault Conditions

IPC DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0121:00	Lost Communication With Anti-Lock Brake System (ABS) Control Module: No Sub Type Information	Sets in continuous memory in the IPC if data messages received from the ABS module through the GWM are missing for 5 seconds or longer.

Possible Sources

- Communication concern
- Battery voltage concern
- GWM concern
- ABS module
- IPC

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST BP : U0121:00 > PINPOINT TEST BP : U0121:00

BP1 VERIFY THE CUSTOMER CONCERN

Ignition ON.

Verify there is an observable symptom present.

Is an observable symptom present?

Yes	GO to BP2

No	Clear the DTC. The system is operating normally at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

BP2 CHECK THE COMMUNICATION NETWORK

Using a diagnostic scan tool, perform the network test.

Does the ABS module pass the network test?

Yes	GO to BP3

No	REFER to: MODULE COMMUNICATIONS NETWORK .

BP3 PERFORM THE ABS (ANTI-LOCK BRAKE SYSTEM) MODULE SELF-TEST

Using a diagnostic scan tool, perform the ABS module self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: Anti-Lock Brake System (ABS) and Stability Control .

No	GO to BP4

BP4 CHECK THE GWM (GATEWAY MODULE A) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, check the GWM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: MODULE COMMUNICATIONS NETWORK .

No	GO to BP5

BP5 PERFORM THE IPC (INSTRUMENT PANEL CLUSTER) SELF-TEST

Using a diagnostic scan tool, perform the IPC self-test.

Is DTC U3003:16 or DTC U3003:17 recorded?

Yes	REFER to DTC Chart: IPC .

No	GO to BP6

NOTE: If new modules were installed prior to the DTC being set, the module configuration may be incorrectly set during the Programmable Module Installation (PMI), or the Programmable Module Installation (PMI) may not have been carried out.

BP6 RECHECK THE IPC (INSTRUMENT PANEL CLUSTER) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs).

Wait 10 seconds.

Repeat the IPC self-test.

Is DTC U0121:00 still present?

Yes	GO to BP7

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

BP7 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0121:87 SET IN OTHER MODULES

Using a diagnostic scan tool, clear all Diagnostic Trouble Codes (DTCs).

Ignition OFF.

Ignition ON.

Wait 10 seconds.

Using a diagnostic scan tool, perform the continuous memory self-test.

Retrieve the Continuous Memory Diagnostic Trouble Codes (CMDTCs) from all modules.

Is DTC U0121:87 set in the BCM?

Yes	GO to BP8

No	GO to BP9

BP8 CHECK FOR CORRECT ABS (ANTI-LOCK BRAKE SYSTEM) MODULE OPERATION

Ignition OFF.

Disconnect and inspect all ABS module connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect all the ABS module connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ABS module. REFER to: Anti-Lock Brake System (ABS) Module .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

BP9 CHECK FOR CORRECT IPC (INSTRUMENT PANEL CLUSTER) OPERATION

Ignition OFF.

Disconnect and inspect IPC connector.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the IPC connector. Make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST BQ : U0140:00

Normal Operation and Fault Conditions

IPC DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0140:00	Lost Communication With Body Control Module: No Sub Type Information	Sets in continuous memory in the IPC if data messages received from the BCM through the GWM are missing for 5 seconds or longer.

Possible Sources

- Communication concern
- Battery voltage concern
- GWM concern
- BCM
- IPC

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST BQ : U0140:00 > PINPOINT TEST BQ : U0140:00

BQ1 VERIFY THE CUSTOMER CONCERN

Ignition ON.

Verify there is an observable symptom present.

Is an observable symptom present?

Yes	GO to BQ2

No	Clear the DTC. The system is operating normally at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

BQ2 CHECK THE COMMUNICATION NETWORK

Using a diagnostic scan tool, perform the network test.

Does the BCM pass the network test?

Yes	GO to BQ3

No	REFER to: MODULE COMMUNICATIONS NETWORK .

BQ3 PERFORM THE BCM (BODY CONTROL MODULE) SELF-TEST

Using a diagnostic scan tool, perform the BCM self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: Body Control Module (BCM) .

No	GO to BQ4

BQ4 CHECK THE GWM (GATEWAY MODULE A) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, check the GWM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: MODULE COMMUNICATIONS NETWORK .

No	GO to BQ5

BQ5 PERFORM THE IPC (INSTRUMENT PANEL CLUSTER) SELF-TEST

Using a diagnostic scan tool, perform the IPC self-test.

Is DTC U3003:16 or DTC U3003:17 recorded?

Yes	REFER to DTC Chart: IPC .

No	GO to BQ6

NOTE: If new modules were installed prior to the DTC being set, the module configuration may be incorrectly set during the Programmable Module Installation (PMI), or the Programmable Module Installation (PMI) may not have been carried out.

BQ6 RECHECK THE IPC (INSTRUMENT PANEL CLUSTER) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs).

Wait 10 seconds.

Repeat the IPC self-test.

Is DTC U0140:00 still present?

Yes	GO to BQ7

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

BQ7 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0140:00 SET IN OTHER MODULES

Using a diagnostic scan tool, clear all Diagnostic Trouble Codes (DTCs).

Ignition OFF.

Ignition ON.

Wait 10 seconds.

Using a diagnostic scan tool, perform the continuous memory self-test.

Retrieve the Continuous Memory Diagnostic Trouble Codes (CMDTCs) from all modules.

Is DTC U0140:00 set in the ABS, APIM or RCM?

Yes	GO to BQ8

No	GO to BQ9

BQ8 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect all the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

BQ9 CHECK FOR CORRECT IPC (INSTRUMENT PANEL CLUSTER) OPERATION

Ignition OFF.

Disconnect and inspect IPC connector.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the IPC connector. Make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST BR : U0140:00

Normal Operation and Fault Conditions

ICM DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0140:00	Lost Communication With Body Control Module: No Sub Type Information	Sets in continuous memory in the ICM if data messages received from the BCM are missing for 5 seconds or longer.

Possible Sources

- Communication concern
- Battery voltage concern
- BCM
- ICM

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST BR : U0140:00 > PINPOINT TEST BR : U0140:00

BR1 VERIFY THE CUSTOMER CONCERN

Ignition ON.

Verify there is an observable symptom present.

Is an observable symptom present?

Yes	GO to BR2

No	Clear the DTC. The system is operating normally at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

BR2 CHECK THE COMMUNICATION NETWORK

Using a diagnostic scan tool, perform the network test.

Does the BCM pass the network test?

Yes	GO to BR3

No	REFER to: MODULE COMMUNICATIONS NETWORK .

BR3 PERFORM THE BCM (BODY CONTROL MODULE) SELF-TEST

Using a diagnostic scan tool, perform the BCM self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: Body Control Module (BCM) .

No	GO to BR4

BR4 PERFORM THE ICM (INFORMATION CENTER MODULE) SELF-TEST

Using a diagnostic scan tool, perform the ICM self-test.

Is DTC U3003:16 or DTC U3003:17 recorded?

Yes	REFER to DTC Chart: Information Center Module (ICM) .

No	GO to BR5

NOTE: If new modules were installed prior to the DTC being set, the module configuration may be incorrectly set during the Programmable Module Installation (PMI), or the Programmable Module Installation (PMI) may not have been carried out.

BR5 RECHECK THE IPC (INSTRUMENT PANEL CLUSTER) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs).

Wait 10 seconds.

Repeat the IPC self-test.

Is DTC U0140:00 still present?

Yes	GO to BR6

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

BR6 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0140:00 SET IN OTHER MODULES

Using a diagnostic scan tool, clear all Diagnostic Trouble Codes (DTCs).

Ignition OFF.

Ignition ON.

Wait 10 seconds.

Using a diagnostic scan tool, perform the continuous memory self-test.

Retrieve the Continuous Memory Diagnostic Trouble Codes (CMDTCs) from all modules.

Is DTC U0140:00 set in the IPC, ABS, APIM or RCM?

Yes	GO to BR7

No	GO to BR8

BR7 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect all the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

BR8 CHECK FOR CORRECT ICM (INFORMATION CENTER MODULE) OPERATION

Ignition OFF.

Disconnect and inspect ICM connector.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the ICM connector. Make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ICM. REFER to: Information Center Module (ICM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST BS : U0146:00

Normal Operation and Fault Conditions

IPC DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0146:00	Lost Communication With Gateway "A": No Sub Type Information	Sets in continuous memory in the IPC if data messages received from the GWM over the HS-CAN3 are missing for 5 seconds or longer.

Possible Sources

- Communication concern
- Battery voltage concern
- GWM
- IPC

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST BS : U0146:00 > PINPOINT TEST BS : U0146:00

BS1 VERIFY THE CUSTOMER CONCERN

Ignition ON.

Verify there is an observable symptom present.

Is an observable symptom present?

Yes	GO to BS2

No	Clear the DTC. The system is operating normally at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

BS2 CHECK THE COMMUNICATION NETWORK

Using a diagnostic scan tool, perform the network test.

Does the GWM pass the network test?

Yes	GO to BS3

No	REFER to: MODULE COMMUNICATIONS NETWORK .

BS3 CHECK THE GWM (GATEWAY MODULE A) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, check the GWM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: MODULE COMMUNICATIONS NETWORK .

No	GO to BS4

BS4 PERFORM THE IPC (INSTRUMENT PANEL CLUSTER) SELF-TEST

Using a diagnostic scan tool, perform the IPC self-test.

Is DTC U3003:16 or DTC U3003:17 recorded?

Yes	REFER to DTC Chart: IPC .

No	GO to BS5

NOTE: If new modules were installed prior to the DTC being set, the module configuration may be incorrectly set during the Programmable Module Installation (PMI), or the Programmable Module Installation (PMI) may not have been carried out.

BS5 RECHECK THE IPC (INSTRUMENT PANEL CLUSTER) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs).

Wait 10 seconds.

Repeat the IPC self-test.

Is DTC U0146:00 still present?

Yes	GO to BS6

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

BS6 CHECK FOR CORRECT GWM (GATEWAY MODULE A) OPERATION

Ignition OFF.

Disconnect and inspect all GWM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect all the GWM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new GWM. REFER to: Gateway Module A (GWM) . CLEAR the Diagnostic Trouble Codes (DTCs). REPEAT the IPC self-test. If DTC U0146:00 is still present, GO to BS7

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

BS7 CHECK FOR CORRECT IPC (INSTRUMENT PANEL CLUSTER) OPERATION

Ignition OFF.

Disconnect and inspect IPC connector.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the IPC connector. Make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST BT : U0151:00

Normal Operation and Fault Conditions

IPC DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0151:00	Lost Communication With Restraints Control Module: No Sub Type Information	Sets in continuous memory in the IPC if data messages received from the RCM through the GWM are missing for 5 seconds or longer.

Possible Sources

- Communication concern
- Battery voltage concern
- GWM concern
- RCM
- IPC

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST BT : U0151:00 > PINPOINT TEST BT : U0151:00

BT1 VERIFY THE CUSTOMER CONCERN

Ignition ON.

Verify there is an observable symptom present.

Is an observable symptom present?

Yes	GO to BT2

No	Clear the DTC. The system is operating normally at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

BT2 CHECK THE COMMUNICATION NETWORK

Using a diagnostic scan tool, perform the network test.

Does the RCM pass the network test?

Yes	GO to BT3

No	REFER to: MODULE COMMUNICATIONS NETWORK .

BT3 PERFORM THE RCM (RESTRAINTS CONTROL MODULE) SELF-TEST

Using a diagnostic scan tool, perform the RCM self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: Airbag Supplemental Restraint System (SRS) .

No	GO to BT4

BT4 CHECK THE GWM (GATEWAY MODULE A) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, check the GWM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: MODULE COMMUNICATIONS NETWORK .

No	GO to BT5

BT5 PERFORM THE IPC (INSTRUMENT PANEL CLUSTER) SELF-TEST

Using a diagnostic scan tool, perform the IPC self-test.

Is DTC U3003:16 or DTC U3003:17 recorded?

Yes	REFER to DTC Chart: IPC .

No	GO to BT6

NOTE: If new modules were installed prior to the DTC being set, the module configuration may be incorrectly set during the Programmable Module Installation (PMI), or the Programmable Module Installation (PMI) may not have been carried out.

BT6 RECHECK THE IPC (INSTRUMENT PANEL CLUSTER) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs).

Wait 10 seconds.

Repeat the IPC self-test.

Is DTC U0151:00 still present?

Yes	GO to BT7

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

BT7 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0151:87 SET IN OTHER MODULES

Using a diagnostic scan tool, clear all Diagnostic Trouble Codes (DTCs).

Ignition OFF.

Ignition ON.

Wait 10 seconds.

Using a diagnostic scan tool, perform the continuous memory self-test.

Retrieve the Continuous Memory Diagnostic Trouble Codes (CMDTCs) from all modules.

Is DTC U0151:87 set in the BCM?

Yes	GO to BT8

No	GO to BT9

BT8 CHECK FOR CORRECT RCM (RESTRAINTS CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all RCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect all the RCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new RCM. REFER to: Restraints Control Module (RCM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

BT9 CHECK FOR CORRECT IPC (INSTRUMENT PANEL CLUSTER) OPERATION

Ignition OFF.

Disconnect and inspect IPC connector.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the IPC connector. Make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST BU : U0155:00

Normal Operation and Fault Conditions

ICM DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0155:00	Lost Communication With Instrument Panel Cluster (IPC) Control Module: No Sub Type Information	Sets in continuous memory in the ICM if data messages received from the IPC through the GWM are missing for 5 seconds or longer.

Possible Sources

- Communication concern
- Battery voltage concern
- GWM concern
- IPC
- ICM

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST BU : U0155:00 > PINPOINT TEST BU : U0155:00

BU1 VERIFY THE CUSTOMER CONCERN

Ignition ON.

Verify there is an observable symptom present.

Is an observable symptom present?

Yes	GO to BU2

No	Clear the DTC. The system is operating normally at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

BU2 CHECK THE COMMUNICATION NETWORK

Using a diagnostic scan tool, perform the network test.

Does the IPC pass the network test?

Yes	GO to BU3

No	REFER to: MODULE COMMUNICATIONS NETWORK .

BU3 PERFORM THE IPC (INSTRUMENT PANEL CLUSTER) SELF-TEST

Using a diagnostic scan tool, perform the IPC self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to DTC Chart: IPC .

No	GO to BU4

BU4 CHECK THE GWM (GATEWAY MODULE A) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, check the GWM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: MODULE COMMUNICATIONS NETWORK .

No	GO to BU5

BU5 PERFORM THE ICM (INFORMATION CENTER MODULE) SELF-TEST

Using a diagnostic scan tool, perform the ICM self-test.

Is DTC U3003:16 or DTC U3003:17 recorded?

Yes	REFER to DTC Chart: Information Center Module (ICM) .

No	GO to BU6

NOTE: If new modules were installed prior to the DTC being set, the module configuration may be incorrectly set during the Programmable Module Installation (PMI), or the Programmable Module Installation (PMI) may not have been carried out.

BU6 RECHECK THE ICM (INFORMATION CENTER MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs).

Wait 10 seconds.

Repeat the ICM self-test.

Is DTC U0155:00 still present?

Yes	GO to BU7

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

BU7 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0155:87 SET IN OTHER MODULES

Using a diagnostic scan tool, clear all Diagnostic Trouble Codes (DTCs).

Ignition OFF.

Ignition ON.

Wait 10 seconds.

Using a diagnostic scan tool, perform the continuous memory self-test.

Retrieve the Continuous Memory Diagnostic Trouble Codes (CMDTCs) from all modules.

Is DTC U0155:87 set in the BCM?

Yes	GO to BU8

No	GO to BU9

BU8 CHECK FOR CORRECT IPC (INSTRUMENT PANEL CLUSTER) OPERATION

Ignition OFF.

Disconnect and inspect all IPC connector.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect all the IPC connector. Make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

No	The system is operating correctly at this time. The concern may have been caused by

	module connections. ADDRESS the root cause of any connector or pin issues.

BU9 CHECK FOR CORRECT ICM (INFORMATION CENTER MODULE) OPERATION

Ignition OFF.

Disconnect and inspect ICM connector.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the ICM connector. Make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ICM. REFER to: Information Center Module (ICM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST BV : U0159:00

Normal Operation and Fault Conditions

IPC DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0159:00	Lost Communication With Parking Assist Control Module "A": No Sub Type Information	Sets in continuous memory in the IPC if data messages received from the Parking Aid Module (PAM) (part of the BCM) through the GWM are missing for 5 seconds or longer.

Possible Sources

- Communication concern

- Battery voltage concern
- GWM concern
- BCM
- IPC

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST BV : U0159:00 > PINPOINT TEST BV : U0159:00

BV1 VERIFY THE CUSTOMER CONCERN

Ignition ON.

Verify there is an observable symptom present.

Is an observable symptom present?

Yes	GO to BV2

No	Clear the DTC. The system is operating normally at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

BV2 CHECK THE COMMUNICATION NETWORK

Using a diagnostic scan tool, perform the network test.

Does the Parking Aid Module (PAM) pass the network test?

Yes	GO to BV3

No	REFER to: MODULE COMMUNICATIONS NETWORK .

BV3 PERFORM THE BCM (BODY CONTROL MODULE) SELF-TEST

Using a diagnostic scan tool, perform the BCM self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	For rear parking aid, REFER to: Parking Aid . For parking aid with rear camera, REFER to: Parking Aid .

No	GO to BV5

BV4 CHECK THE GWM (GATEWAY MODULE A) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, check the GWM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: MODULE COMMUNICATIONS NETWORK .

No	GO to BV5

BV5 PERFORM THE IPC (INSTRUMENT PANEL CLUSTER) SELF-TEST

Using a diagnostic scan tool, perform the IPC self-test.

Is DTC U3003:16 or DTC U3003:17 recorded?

Yes	REFER to DTC Chart: IPC .

No	GO to BV6

NOTE: If new modules were installed prior to the DTC being set, the module configuration may be incorrectly set during the Programmable Module Installation (PMI), or the Programmable Module Installation (PMI) may not have been carried out.

BV6 RECHECK THE IPC (INSTRUMENT PANEL CLUSTER) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs).

Wait 10 seconds.

Repeat the IPC self-test.

Is DTC U0159:00 still present?

Yes	GO to BV7

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

BV7 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect all the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, CLEAR the Diagnostic Trouble Codes (DTCs). REPEAT the IPC self-test. If DTC U0184:00 is still present, GO to BV8

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

BV8 CHECK FOR CORRECT IPC (INSTRUMENT PANEL CLUSTER) OPERATION

Ignition OFF.

Disconnect and inspect IPC connector.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the IPC connector. Make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST BW : U0184:00

Normal Operation and Fault Conditions

IPC DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0184:00	Lost Communication With Radio: No Sub Type Information	Sets in continuous memory in the IPC if data messages received from the ACM through the GWM are missing for 5 seconds or longer.

Possible Sources

- Communication concern
- Battery voltage concern
- GWM concern
- ACM
- IPC

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST BW : U0184:00 > PINPOINT TEST BW : U0184:00

BW1 VERIFY THE CUSTOMER CONCERN

Ignition ON.

Verify there is an observable symptom present.

Is an observable symptom present?

Yes	GO to BW2

No	Clear the DTC. The system is operating normally at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

BW2 CHECK THE COMMUNICATION NETWORK

Using a diagnostic scan tool, perform the network test.

Does the ACM pass the network test?

Yes	GO to BW3

No	REFER to: MODULE COMMUNICATIONS NETWORK .

BW3 PERFORM THE ACM (AUDIO FRONT CONTROL MODULE) SELF-TEST

Using a diagnostic scan tool, perform the ACM self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: MODULE COMMUNICATIONS NETWORK .

No	GO to BW4

BW4 CHECK THE GWM (GATEWAY MODULE A) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, check the GWM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: MODULE COMMUNICATIONS NETWORK .

No	GO to BW5

BW5 PERFORM THE IPC (INSTRUMENT PANEL CLUSTER) SELF-TEST

Using a diagnostic scan tool, perform the IPC self-test.

Is DTC U3003:16 or DTC U3003:17 recorded?

Yes	REFER to DTC Chart: IPC .

No	GO to BW6

NOTE: If new modules were installed prior to the DTC being set, the module configuration may be incorrectly set during the Programmable Module Installation (PMI), or the Programmable Module Installation (PMI) may not have been carried out.

BW6 RECHECK THE IPC (INSTRUMENT PANEL CLUSTER) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs).

Wait 10 seconds.

Repeat the IPC self-test.

Is DTC U0184:00 still present?

Yes	GO to BW7

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

BW7 CHECK FOR CORRECT ACM (AUDIO FRONT CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all ACM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect all the ACM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ACM. For vehicles with AM/ FM/ CD/SYNC ®, REFER to: Audio Front Control Module (ACM) . For vehicles with touchscreen display, REFER to: Audio Front Control Module (ACM) . CLEAR the Diagnostic Trouble Codes (DTCs). REPEAT the IPC self-test. If DTC U0184:00 is still present, GO to BW8

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

BW8 CHECK FOR CORRECT IPC (INSTRUMENT PANEL CLUSTER) OPERATION

Ignition OFF.

Disconnect and inspect IPC connector.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the IPC connector. Make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST BX : U0212:00

Normal Operation and Fault Conditions

IPC DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0212:00	Lost Communication With Steering Column Control Module: No Sub Type Information	Sets in continuous memory in the IPC if data messages received from the SCCM through the GWM are missing for 5 seconds or longer.

Possible Sources

- Communication concern
- Battery voltage concern
- GWM concern
- SCCM module
- IPC

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST BX : U0212:00 > PINPOINT TEST BX : U0212:00

BX1 VERIFY THE CUSTOMER CONCERN

Ignition ON.

Verify there is an observable symptom present.

Is an observable symptom present?

Yes	GO to BX2

No	Clear the DTC. The system is operating normally at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

BX2 CHECK THE COMMUNICATION NETWORK

Using a diagnostic scan tool, perform the network test.

Does the SCCM pass the network test?

Yes	GO to BX3

No	REFER to: MODULE COMMUNICATIONS NETWORK .

BX3 PERFORM THE SCCM (STEERING COLUMN CONTROL MODULE) SELF-TEST

Using a diagnostic scan tool, perform the SCCM self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: Steering Wheel and Column Electrical Components .

No	GO to BX4

BX4 CHECK THE GWM (GATEWAY MODULE A) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, check the GWM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: MODULE COMMUNICATIONS NETWORK .

No	GO to BX5

BX5 PERFORM THE IPC (INSTRUMENT PANEL CLUSTER) SELF-TEST

Using a diagnostic scan tool, perform the IPC self-test.

Is DTC U3003:16 or DTC U3003:17 recorded?

Yes	REFER to DTC Chart: IPC .

No	GO to BX6

NOTE: If new modules were installed prior to the DTC being set, the module configuration may be incorrectly set during the Programmable Module Installation (PMI), or the Programmable Module Installation (PMI) may not have been carried out.

BX6 RECHECK THE IPC (INSTRUMENT PANEL CLUSTER) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs).

Wait 10 seconds.

Repeat the IPC self-test.

Is DTC U0212:00 still present?

Yes	GO to BX7

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

BX7 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0212:87 SET IN OTHER MODULES

Using a diagnostic scan tool, clear all Diagnostic Trouble Codes (DTCs).

Ignition OFF.

Ignition ON.

Wait 10 seconds.

Using a diagnostic scan tool, perform the continuous memory self-test.

Retrieve the Continuous Memory Diagnostic Trouble Codes (CMDTCs) from all modules.

Is DTC U0212:87 set in the BCM?

Yes	GO to BX8

No	GO to BX9

BX8 CHECK FOR CORRECT SCCM (STEERING COLUMN CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all SCCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect all the SCCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new SCCM. REFER to: Steering Column Control Module (SCCM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

BX9 CHECK FOR CORRECT IPC (INSTRUMENT PANEL CLUSTER) OPERATION

Ignition OFF.

Disconnect and inspect IPC connector.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the IPC connector. Make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST BY : U0232:00 OR U0233:00

Normal Operation and Fault Conditions

IPC DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0232:00	Lost Communication With Side Obstacle Detection Control Module - Left: No Sub Type Information	Sets in continuous memory in the IPC if data messages received from the SODL through the GWM are missing for 5 seconds or longer.
U0233:00	Lost Communication With Side Obstacle Detection Control Module - Right: No Sub Type Information	Sets in continuous memory in the IPC if data messages received from the SODR through the GWM are missing for 5 seconds or longer.

Possible Sources

- Communication concern
- Battery voltage concern
- GWM concern
- SODL
- SODR
- IPC

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST BY : U0232:00 OR U0233:00 > PINPOINT TEST BY : U0232:00 OR U0233:00

BY1 VERIFY THE CUSTOMER CONCERN

Ignition ON.

Verify there is an observable symptom present.

Is an observable symptom present?

Yes	GO to BY2

No	Clear the DTC. The system is operating normally at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

BY2 CHECK THE COMMUNICATION NETWORK

Using a diagnostic scan tool, perform the network test.

Does the SODL or SODR pass the network test?

Yes	GO to BY3

No	REFER to: MODULE COMMUNICATIONS NETWORK .

BY3 PERFORM THE SODL (SIDE OBSTACLE DETECTION CONTROL MODULE LH) OR SODR (SIDE OBSTACLE DETECTION CONTROL MODULE RH) SELF-TEST

Using a diagnostic scan tool, perform the SODL or SODR self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: Blind Spot Information System .

No	GO to BY4

BY4 CHECK THE GWM (GATEWAY MODULE A) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, check the GWM Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: MODULE COMMUNICATIONS NETWORK .

No	GO to BY5

BY5 PERFORM THE IPC (INSTRUMENT PANEL CLUSTER) SELF-TEST

Using a diagnostic scan tool, perform the IPC self-test.

Is DTC U3003:16 or DTC U3003:17 recorded?

Yes	REFER to DTC Chart: IPC .

No	GO to BY6

NOTE: If new modules were installed prior to the DTC being set, the module configuration may be incorrectly set during the Programmable Module Installation (PMI), or the Programmable Module Installation (PMI) may not have been carried out.

BY6 RECHECK THE IPC (INSTRUMENT PANEL CLUSTER) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs).

Wait 10 seconds.

Repeat the IPC self-test.

Is DTC U0232:00 or DTC U0233:00 still present?

Yes	GO to BY7

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

BY7 CHECK FOR CORRECT SODL (SIDE OBSTACLE DETECTION CONTROL MODULE LH) OR SODR (SIDE OBSTACLE DETECTION CONTROL MODULE RH) OPERATION

Ignition OFF.

Disconnect and inspect all SODL or SODR connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect all the SODL or SODR connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new SODL or SODR. REFER to: Side Obstacle Detection Control Module . CLEAR the Diagnostic Trouble Codes (DTCs). REPEAT the IPC self-test. If DTC U0232:00 or U0233:00 is still present, GO to BY8

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

BY8 CHECK FOR CORRECT IPC (INSTRUMENT PANEL CLUSTER) OPERATION

Ignition OFF.

Disconnect and inspect IPC connector.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the IPC connector. Make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST BZ : U0420:82

Normal Operation and Fault Conditions

IPC DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0420:82	Invalid Data Received From Power Steering Control Module: Alive/Sequence Counter Incorrect/Not Updated	Sets in continuous memory in the IPC if EPAS data received from the PSCM through the GWM is missing for 5 seconds or longer.

Possible Sources

- Communication concern
- Battery voltage concern
- PSCM
- IPC

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST BZ : U0420:82 > PINPOINT TEST BZ : U0420:82

BZ1 VERIFY THE CUSTOMER CONCERN

Ignition ON.

Verify there is an observable symptom present.

Is an observable symptom present?

Yes	GO to BZ2

No	Clear the DTC. The system is operating normally at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

BZ2 CHECK THE COMMUNICATION NETWORK

Using a diagnostic scan tool, perform the network test.

Does the PSCM pass the network test?

Yes	GO to BZ3

No	REFER to: MODULE COMMUNICATIONS NETWORK .

BZ3 PERFORM THE PSCM (POWER STEERING CONTROL MODULE) SELF-TEST

Using a diagnostic scan tool, perform the PSCM self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: POWER STEERING .

No	GO to BZ4

BZ4 PERFORM THE IPC (INSTRUMENT PANEL CLUSTER) SELF-TEST

Using a diagnostic scan tool, perform the IPC self-test.

Is DTC U3003:16 or DTC U3003:17 recorded?

Yes	REFER to DTC Chart: IPC .

No	GO to BZ5

NOTE: If new modules were installed prior to the DTC being set, the module configuration may be incorrectly set during the Programmable Module Installation (PMI), or the Programmable Module Installation (PMI) may not have been carried out.

BZ5 RECHECK THE IPC (INSTRUMENT PANEL CLUSTER) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs).

Wait 10 seconds.

Repeat the IPC self-test.

Is DTC U0420:82 still present?

Yes	GO to BZ6

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

BZ6 CHECK FOR CORRECT PSCM (POWER STEERING CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all PSCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect all the PSCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, refer to the EPAS symptom chart. CLEAR the Diagnostic Trouble Codes (DTCs). REPEAT the IPC self-test. If DTC U0424:82 returns, GO to BZ7

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

BZ7 CHECK FOR CORRECT IPC (INSTRUMENT PANEL CLUSTER) OPERATION

Ignition OFF.

Disconnect and inspect IPC connector.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the IPC connector. Make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST CA : U3003:16

Refer to Instrument Cluster for schematic and connector information.

Normal Operation and Fault Conditions

IPC DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U3003:16	Battery Voltage: Circuit Voltage Below Threshold	Sets in the IPC in continuous memory if the IPC detects battery voltage below 9 volts on the voltage supply circuit for 5 seconds or longer.

Possible Sources

- Wiring, terminals or connectors
- High circuit resistance
- Charging system concern
- IPC

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST CA : U3003:16 > PINPOINT TEST CA : U3003:16

CA1 RECHECK THE IPC (INSTRUMENT PANEL CLUSTER) DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition ON.

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs).

Wait 10 seconds.

Using a diagnostic scan tool, perform the IPC self-test.

Is DTC U3003:16 still present?

Yes	GO to CA2

No	Clear the DTC. The system is operating correctly at this time. The DTC may have been set due to a previous low battery voltage condition.

CA2 CHECK FOR CHARGING SYSTEM DIAGNOSTIC TROUBLE CODES (DTCS) IN THE BCM (BODY CONTROL MODULE)

Using a diagnostic scan tool, perform the BCM self-test.

Are any charging system Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: Body Control Module (BCM) .

No	GO to CA3

CA3 CHECK THE BATTERY CONDITION AND STATE OF CHARGE

Check the battery condition and verify the battery is fully charged. REFER to: BATTERY, MOUNTING AND CABLES .

Is the battery OK and fully charged?

Yes	GO to CA4

No	If the battery is discharged, DIAGNOSE the cause of the low battery condition. REFER to: BATTERY, MOUNTING AND CABLES .

CA4 CHECK THE IPC (INSTRUMENT PANEL CLUSTER) VOLTAGE PID (PARAMETER IDENTIFICATION)

Measure and record the voltage at the battery.

Using a diagnostic scan tool, view the IPC Parameter Identifications (PIDs).

Monitor the IPC voltage (MODULE_VOLT) PID

Is the voltage within 0.2 volt of the recorded battery voltage?

Yes	GO to CA7

No	GO to CA5

CA5 CHECK THE IPC (INSTRUMENT PANEL CLUSTER) VOLTAGE SUPPLY

Ignition OFF.

Disconnect IPC C220 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C220-8		Ground

Is the voltage greater than 11 volts?

Yes	GO to CA6

No	REPAIR the circuit for high circuit resistance.

CA6 CHECK THE IPC (INSTRUMENT PANEL CLUSTER) GROUND

Measure:

Positive Lead	Measurement / Action	Negative Lead
C220-8		C220-3

Is the voltage greater than 11 volts?

Yes	GO to CA7

No	REPAIR the circuit for high circuit resistance.

CA7 CHECK FOR CORRECT IPC (INSTRUMENT PANEL CLUSTER) OPERATION

Ignition OFF.

Disconnect and inspect the IPC connector.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the IPC connector. Make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST CB : U3003:16

Refer to Instrument Cluster for schematic and connector information.

Normal Operation and Fault Conditions

ICM DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U3003:16	Battery Voltage: Circuit Voltage Below Threshold	Sets in the ICM in continuous memory if the ICM detects battery voltage below 9 volts on the voltage supply circuit for 5 seconds or longer.

Possible Sources

- Wiring, terminals or connectors
- High circuit resistance
- Charging system concern
- ICM

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST CB : U3003:16 > PINPOINT TEST CB : U3003:16

CB1 RECHECK THE ICM (INFORMATION CENTER MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition ON.

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs).

Wait 10 seconds.

Using a diagnostic scan tool, perform the IPC self-test.

Is DTC U3003:16 still present?

Yes	GO to CB2

No	Clear the DTC. The system is operating correctly at this time. The DTC may have been set due to a previous low battery voltage condition.

CB2 CHECK FOR CHARGING SYSTEM DIAGNOSTIC TROUBLE CODES (DTCS) IN THE BCM (BODY CONTROL MODULE)

Using a diagnostic scan tool, perform the BCM self-test.

Are any charging system Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: Body Control Module (BCM) .

No	GO to CB3

CB3 CHECK THE BATTERY CONDITION AND STATE OF CHARGE

Check the battery condition and verify the battery is fully charged. REFER to: BATTERY, MOUNTING AND CABLES .

Is the battery OK and fully charged?

Yes	GO to CB4

No	If the battery is discharged, DIAGNOSE the cause of the low battery condition. REFER to: BATTERY, MOUNTING AND CABLES .

CB4 CHECK THE ICM (INFORMATION CENTER MODULE) VOLTAGE SUPPLY

Ignition OFF.

Disconnect ICM C2114 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2114-1		Ground

Is the voltage within 0.2 volt of the recorded battery voltage?

Yes	GO to CB5

No	REPAIR the circuit for high circuit resistance.

CB5 CHECK THE ICM (INFORMATION CENTER MODULE) GROUND

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2114-1		C2114-4

Is the voltage greater than 11 volts?

Yes	GO to CB6

No	REPAIR the circuit for high circuit resistance.

CB6 CHECK FOR CORRECT ICM (INFORMATION CENTER MODULE) OPERATION

Ignition OFF.

Disconnect and inspect the ICM connector.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the ICM connector. Make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ICM. REFER to: Information Center Module (ICM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST CC : U3003:17

Normal Operation and Fault Conditions

IPC DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U3003:17	Battery Voltage: Circuit Voltage Above Threshold	Sets in the IPC in continuous memory if the IPC detects battery voltage above 16 volts on the voltage supply circuit for 5 seconds or longer.

Possible Sources

- Charging system concern
- IPC

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST CC : U3003:17 > PINPOINT TEST CC : U3003:17

NOTE: DTC U3003:17 may be stored in the module memory due to past battery charging or vehicle jump starting events.

CC1 CHECK FOR OVERCHARGING DIAGNOSTIC TROUBLE CODES (DTCS) SET IN OTHER MODULES

Ignition ON.

Using a diagnostic scan tool, perform self-test on all modules.

Retrieve the continuous memory DTCs from all modules.

Are any overcharging Diagnostic Trouble Codes (DTCs) set in more than one module?

Yes	DIAGNOSE the overcharging condition. Refer to the appropriate article for the procedure.

No	GO to CC2

CC2 CHECK THE BATTERY VOLTAGE

Turn off all interior/exterior lights and accessories.

Start and run the engine at approximately 2, 000 RPM for 3 minutes while monitoring the battery voltage.

Does the battery voltage rise to 15.5 volts or higher?

Yes	DIAGNOSE the overcharging condition. Refer to the appropriate article for the procedure.

No	GO to CC3

CC3 RECHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U3003:17

Ignition OFF.

Ignition ON.

Using a diagnostic scan tool, clear the continuous memory DTCs.

Carry out the IPC self-test.

Is DTC U3003:17 present?

Yes	INSTALL a new IPC. REFER to: Instrument Panel Cluster (IPC) .

No	The system is operating correctly at this time. The DTC may have been set previously during battery charging or while jump starting the vehicle.

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST CD : U3003:17

Normal Operation and Fault Conditions

ICM DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U3003:17	Battery Voltage: Circuit Voltage Above Threshold	Sets in the ICM in continuous memory if the ICM detects battery voltage above 16 volts on the voltage supply circuit for 5 seconds or longer.

Possible Sources

- Charging system concern
- ICM

DIAGNOSIS AND TESTING > INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES > PINPOINT TESTS > PINPOINT TEST CD : U3003:17 > PINPOINT TEST CD : U3003:17

NOTE: DTC U3003:17 may be stored in the module memory due to past battery charging or vehicle jump starting events.

CD1 CHECK FOR OVERCHARGING DIAGNOSTIC TROUBLE CODES (DTCS) SET IN OTHER MODULES

Ignition ON.

Using a diagnostic scan tool, perform self-test on all modules.

Retrieve the continuous memory DTCs from all modules.

Are any overcharging Diagnostic Trouble Codes (DTCs) set in more than one module?

Yes	DIAGNOSE the overcharging condition. Refer to the appropriate article for the procedure.

No	GO to CD2

CD2 CHECK THE BATTERY VOLTAGE

Turn off all interior/exterior lights and accessories.

Start and run the engine at approximately 2, 000 RPM for 3 minutes while monitoring the battery voltage.

Does the battery voltage rise to 15.5 volts or higher?

Yes	DIAGNOSE the overcharging condition. Refer to the appropriate article for the procedure.

No	GO to CD3

CD3 RECHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U3003:17

Ignition OFF.

Ignition ON.

Using a diagnostic scan tool, clear the continuous memory DTCs.

Carry out the ICM self-test.

Is DTC U3003:17 present?

Yes	INSTALL a new ICM. REFER to: Information Center Module (ICM) .

No	The system is operating correctly at this time. The DTC may have been set previously during battery charging or while jump starting the vehicle.

GENERAL PROCEDURES > SEATBELT MINDER DEACTIVATING ACTIVATING

Activation

WARNING: Before beginning any service procedure in this article, refer to Safety Warnings in GENERAL INFORMATION . Failure to follow this instruction may result in serious personal injury.

NOTE: The driver and passenger seat Belt-Minder ® deactivating/activating can be carried out using a diagnostic scan tool.

NOTE: If you are using a MyKey ® programmed key, the Belt-Minder ® cannot be disabled and does not time out after 5 minutes. If the Belt-Minder ® has been previously disabled, it is re-enabled when a MyKey ® programmed key is used.

NOTE: The driver and front passenger Belt-Minder ® are deactivated/activated independently. When deactivating/activating one seating position, do not buckle the other position.

1.

Apply the parking brake before deactivating/activating the Belt-Minder ®.

2.

Place the selector lever in Park (P) (automatic transmission) or Neutral (N) (manual transmission).

3.

Place the ignition OFF.

4.

Unbuckle the driver and the front passenger safety belts.

5.

Place the ignition in RUN (do not start the engine).

6.

Wait until the safety belt warning indicator turns off (approximately 1 minute).

> *NOTE: Buckle and unbuckle the safety belt at a moderate rate. If the safety belt buckle/unbuckle/buckle sequence is carried out too quickly, the RCM can fail to recognize one of the sequences and the procedure must be repeated.*

> *NOTE: Steps 7 and 8 must be completed within 30 seconds after the safety belt warning indicator turns off (step 6).*

7.
For the seating position to be disabled, buckle then unbuckle the safety belt 3 times at a moderate speed, ending with the safety belt in the unbuckled state. After this step the safety belt warning indicator turns off.

> *NOTE: As confirmation of enabling or disabling the Belt-Minder ®, the safety belt warning indicator, beginning with the safety belt warning indicator in the off state, flashes for 4.5 seconds.*

8.
Within 7 seconds of the indicator turning off, buckle then unbuckle the safety belt at a moderate speed.

9.

After confirmation, the deactivation/activation procedure is complete.

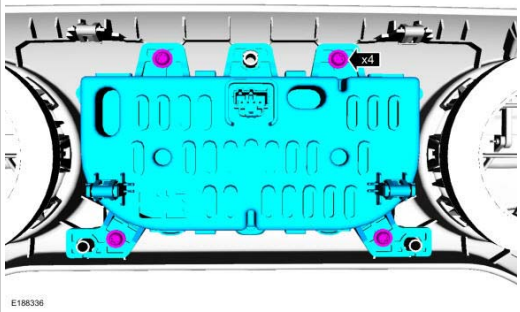
REMOVAL AND INSTALLATION > INFORMATION CENTER MODULE (ICM) > REMOVAL

1.

Remove the instrument panel center finish panel. Refer to: Instrument Panel Center Finish Panel

2.

Remove the screws and the ICM.



REMOVAL AND INSTALLATION > INFORMATION CENTER MODULE (ICM) > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > INSTRUMENT PANEL CLUSTER (IPC)

Special Tool(s) / General Equipment

Interior Trim Remover

REMOVAL AND INSTALLATION > INSTRUMENT PANEL CLUSTER (IPC) > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

NOTE: If installing a new module, it is necessary to upload the module configuration information to the scan tool prior to removing the module. This information must be downloaded into the new module after installation.

1.
Using a diagnostic scan tool, begin the PMI process for the IPC following the on-screen instructions. Record the odometer value from the original IPC. If the odometer value cannot be obtained from the IPC (display failure), perform the diagnostic routine. If the value cannot be obtained after the diagnostic routine, the customer should supply the approximate odometer value.

2.

Remove the instrument panel center finish panel. Refer to: Instrument Panel Center Finish Panel .

3.

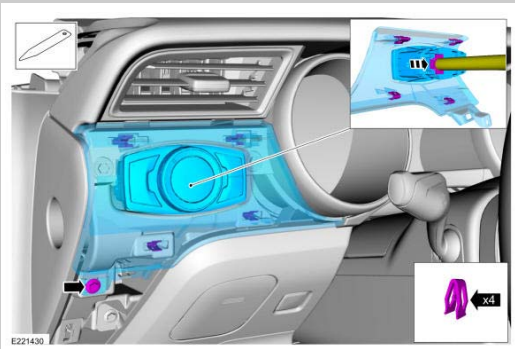
Release the clips and remove LH instrument panel trim panel. Use the General Equipment: Interior Trim Remover



4.

Remove the bolts, release the clips and remove the lighting switch panel.

Disconnect the electrical connector. Use the General Equipment: Interior Trim Remover



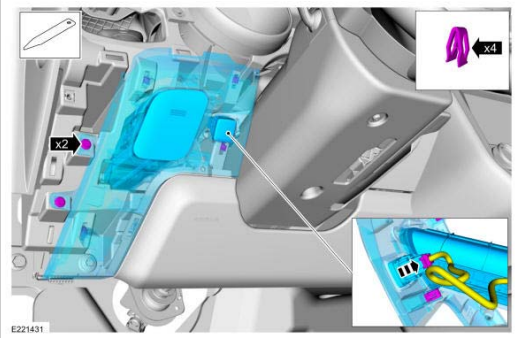
5.

Remove the bolt, release the clips and remove the LH finish panel.

Disconnect the electrical connector.

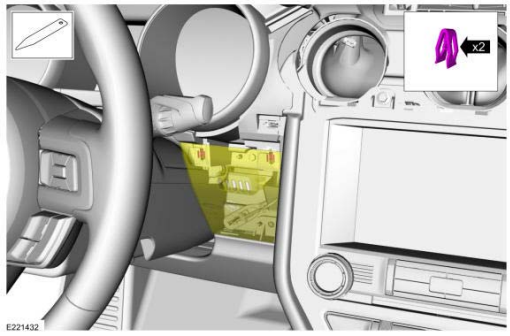
Torque

: 27 lb.in (3 Nm)



6.

Release the clips and position aside the lower instrument panel cover. Use the General Equipment: Interior Trim Remover



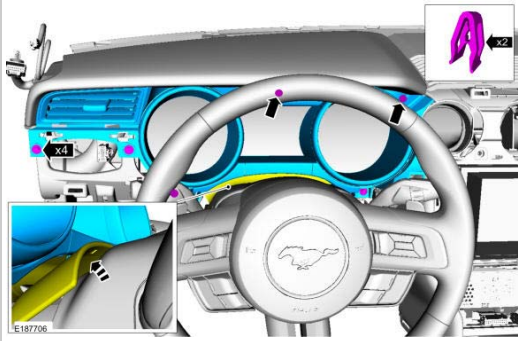
7.

Remove the bolts, release the clips and remove the IPC trim panel.

Detach the gap hider from the upper steering column trim cover.

Torque

: 22 lb.in (2.5 Nm)



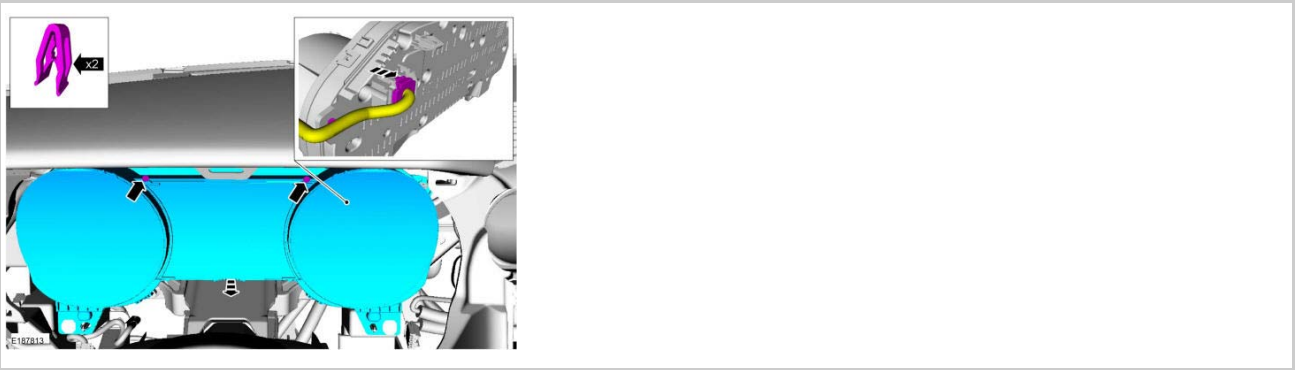
8.

Remove the bolts, release the clips and remove the IPC.

Disconnect the electrical connector.

Torque

: 16 lb.ft (22 Nm)



REMOVAL AND INSTALLATION > INSTRUMENT PANEL CLUSTER (IPC) > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Using a diagnostic scan tool, complete the PMI process for the IPC following the on-screen instructions.

REMOVAL AND INSTALLATION > INSTRUMENT PANEL CLUSTER (IPC) LENS > REMOVAL

1.

Remove the IPC. Refer to: Instrument Panel Cluster (IPC) .

2.

Remove the screws, release the tabs and remove the IPC lens.



REMOVAL AND INSTALLATION > INSTRUMENT PANEL CLUSTER (IPC) LENS >

INSTALLATION

1.

To install, reverse the removal procedure.

Service Manual: OEM CONNECTOR END VIEWS

CONNECTOR VIEWS > CONNECTOR END VIEW C100 - AIR CONDITIONING (A/C) CLUTCH AND AIR CONDITIONING (A/C) CLUTCH FIELD COIL

Connector:C100

Description

AIR CONDITIONING (A/C) CLUTCH AND AIR CONDITIONING (A/C) CLUTCH FIELD COIL

Color

BK

Harness

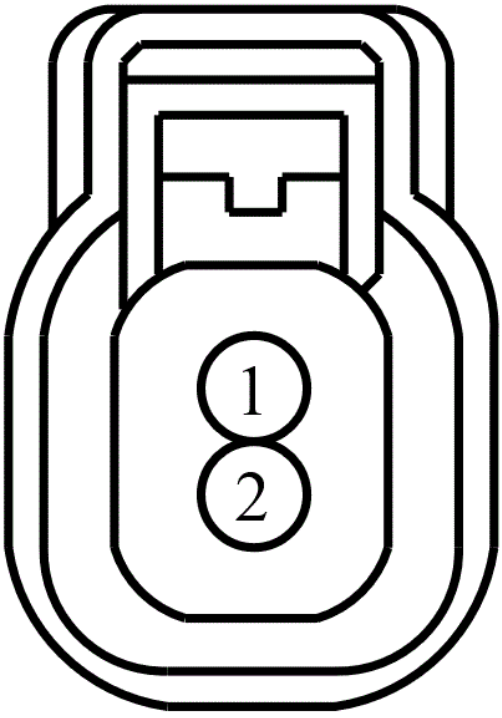
14B060

Base Part #

part# N/A

Service Pigtail

See Below



Check for Terminal Part Numbers

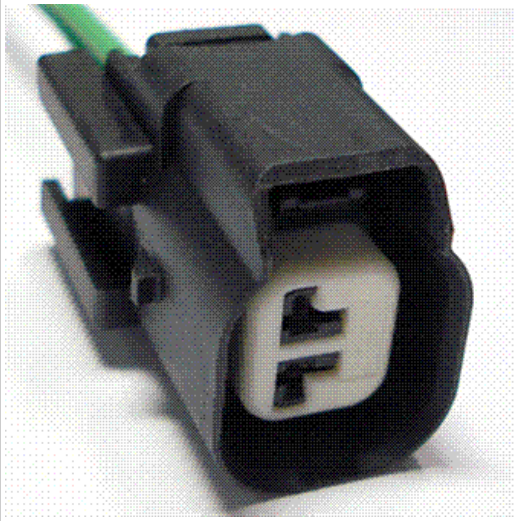
Pin	Circuit	Gauge	Circuit Function	Qualifier

1	CH401 (VT-WH)	20	RELAY - A/C CLUTCH	
2	GD123 (BK-GY)	18	GROUND - FENDER FRONT RIGHT	

Available Pigtail Kits

Pigtail Kit Part Number

WPT-984



Service Part Number:

3U2Z-14S411-BXAB

Gauge:

16

Pin material:

Silver

Cavities:

2

Vehicle Uses

A/C Compressor Clutch

EGR Cooler Outlet

Electronic Locking Differential

Horn

Lamp - CHMSL (Center High Mount Stop Lamp)

Lamp - Rear Park

Lamp - Reverse

Lamp - Side Marker

Motor - Adjustable Pedal

Sensor - Adjustable Pedal

Sensor - Brake Fluid Level

Sensor - Cam Shaft Position

Sensor - Cylinder Head Temperature

Sensor - Exhaust Gas Temperature

	Sensor - Liftgate Obstacle Sensor - Oil Level Sensor - Output Shaft Speed Sensor - Speed Solenoid - Engine Variable Timing Speaker - Door Speaker - Front Speaker - Rear Speaker - Subwoofer Speaker - Tweeter - LH - Front Switch - A/C Compressor Clutch Cycling Switch - Backup Lamp Switch - Deck Lid / Hatch Release Switch - Deck Lid / Lift Gate Ajar Switch - Hood Ajar Switch - Lift Gate Glass Ajar Switch - Power Liftgate Switch - Reverse Park Aid

CONNECTOR VIEWS > CONNECTOR END VIEW C101 - CRANKSHAFT POSITION (CKP) SENSOR

Connector:C101

Description

CRANKSHAFT POSITION (CKP) SENSOR

Color

BK

Harness

12C508

Base Part #

part# N/A

Service Pigtail

See Below

Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	LE423 (GN-VT)	20	CTRL MOD. - POWERTRAIN # VOLTAGE REFERENCE ENGINE (VREF)	
2	VE711 (YE-VT)	20	SENSOR - CRANKSHAFT POSITION (CKP)	
3	RE405 (GN-WH)	20	CTRL MOD. - POWERTRAIN # SIGNAL RETURN ENGINE (SIGRTN)	

Available Pigtail Kits

Pigtail Kit Part Number

WPT-990



Service Part Number:

8U2Z-14S411-ZB

Gauge:

14

Pin material:

Tin (greased)

Cavities:

3

Vehicle Uses

Sensor - Cam Shaft Position

Sensor - Crank Shaft Position

Sensor - Fuel Tank Pressure Transducer

	Sensor - Turbine Shaft Speed Switch - Fuel Delivery Pressure

CONNECTOR VIEWS > CONNECTOR END VIEW C102A - GENERATOR

Connector:C102A

Description

GENERATOR

Color

Harness

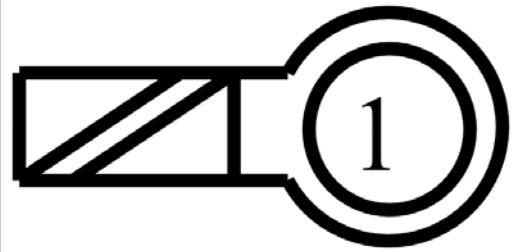
14B060

Base Part #

part# N/A

Service Pigtail

Not Available



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	SBF01 (RD)	4	FUSE - 1 (PREFERRED FOR STARTER)	

CONNECTOR VIEWS > CONNECTOR END VIEW C102B - GENERATOR

Connector:C102B

Description

GENERATOR

Color

Harness

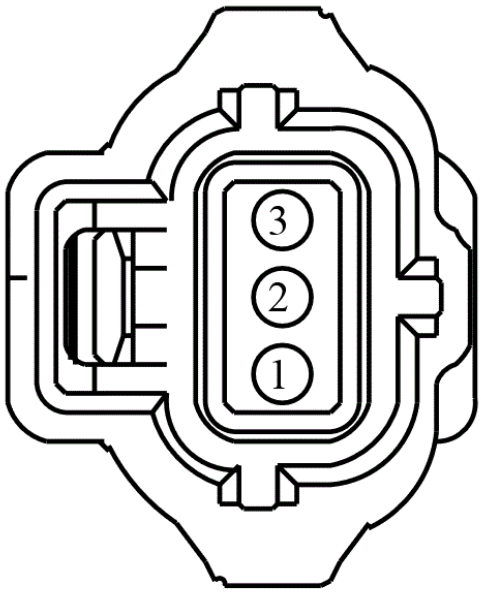
14B060

Base Part #

part# N/A

Service Pigtail

See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CDC15 (VT)	20	GENERATOR (ALTERNATOR) # LOAD INPUT (GENLI)	
2	CDC10 (BU-OG)	20	CTRL MOD. - POWERTRAIN # GENERATOR REGULATOR CONTROL (GENRC)	
3	SBB36 (GN-RD)	20	FUSE - 36 OR CIRCUIT BREAKER	

Available Pigtail Kits	

CONNECTOR VIEWS > CONNECTOR END VIEW C102C - GENERATOR

Connector:C102C

Description

GENERATOR

Color

Harness

14B060

Base Part #

part# N/A

Service Pigtail

Not Available



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	SBF01 (RD)	4	FUSE - 1 (PREFERRED FOR STARTER)	

CONNECTOR VIEWS > CONNECTOR END VIEW C102D - GENERATOR

Connector:C102D

Description

GENERATOR

Color

Harness

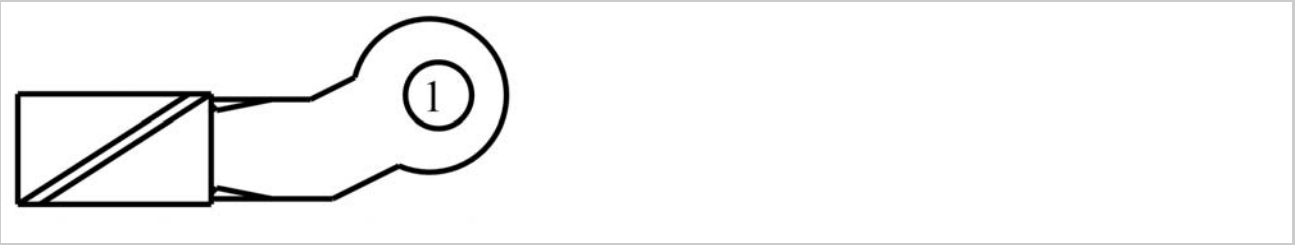
14B060

Base Part #

part# N/A

Service Pigtail

Not Available



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	SBF01 (RD)	4	FUSE - 1 (PREFERRED FOR STARTER)	

CONNECTOR VIEWS > CONNECTOR END VIEW C103 - ENGINE OIL PRESSURE SWITCH

Connector:C103

Description

ENGINE OIL PRESSURE SWITCH

Color

BK

Harness

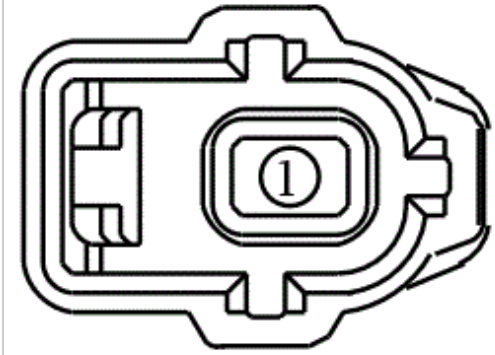
12C508

Base Part #

part# N/A

Service Pigtail

See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CMC24 (GY)	18	SWITCH - OIL PRESSURE	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-439** 	Service Part Number: **3U2Z-14S411-MHA** Gauge: **14** Pin material: **Tin** Cavities: **1** Vehicle Uses Sensor - Oil Pressure Switch - Oil Sending Unit

CONNECTOR VIEWS > CONNECTOR END VIEW C107 - CYLINDER HEAD TEMPERATURE (CHT) SENSOR 2

Connector:C107

Description

CYLINDER HEAD TEMPERATURE (CHT) SENSOR 2

Color

Harness

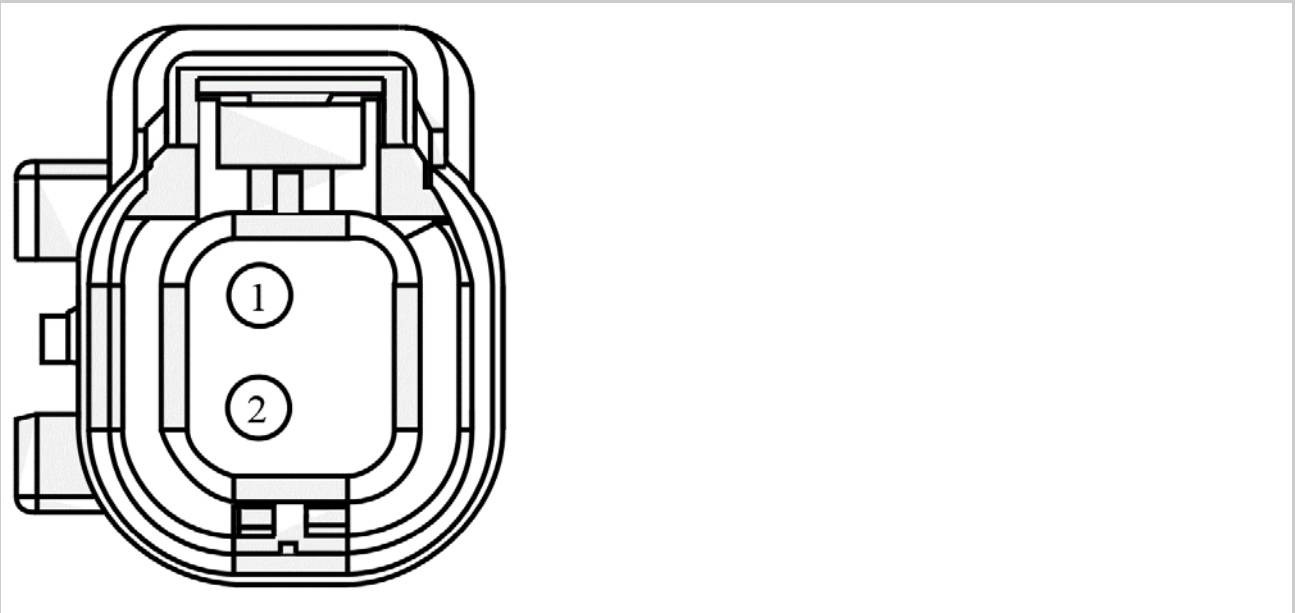
12C508

Base Part #

part# N/A

Service Pigtail

Not Available



Pin	Circuit	Gauge	Circuit Function	Qualifier
1	VE712 (BU-GY)	20	SENSOR - CYLINDER HEAD TEMPERATURE (CHT)	
2	RE454 (YE-GN)	20	CTRL MOD. - POWERTRAIN # SIGNAL RETURN ENGINE #2	

CONNECTOR VIEWS > CONNECTOR END VIEW C108 - KNOCK SENSOR (KS)

Connector:C108

Description

KNOCK SENSOR (KS)

Color

BK

Harness

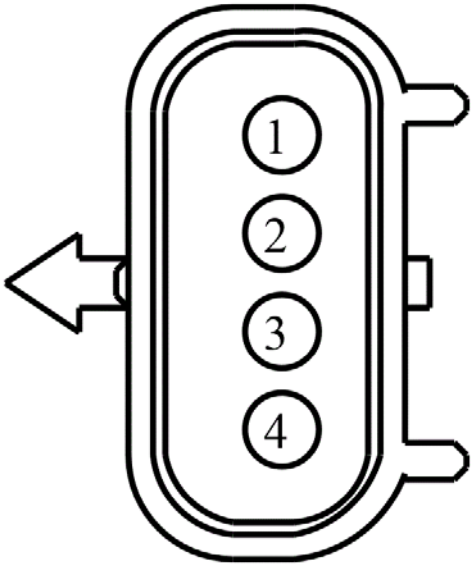
12C508

Base Part #

part# N/A

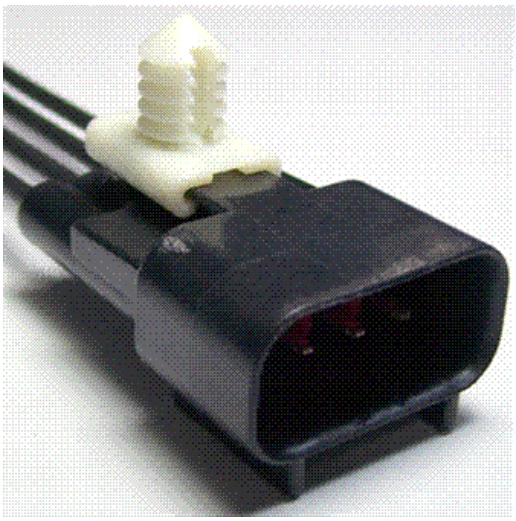
Service Pigtail

See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	VE801 (VT-OG)	18	SENSOR - KNOCK 1ST BANK 1ST OR UNIQUE (KS1+)	
2	RE323 (WH-BN)	18	CTRL MOD. - POWERTRAIN # KNOCK SENSOR 1ST BANK 1ST OR UNIQUE (KS1-)	
3	VE802 (BN-BU)	18	SENSOR - KNOCK 2ND BANK 1ST (KS2+)	
4	RE324 (BN-GN)	18	CTRL MOD. - POWERTRAIN # KNOCK SENSOR 2ND BANK 1ST (KS2-)	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1220** 	Service Part Number: **BU2Z-14S411-AXA** Gauge: **16** Pin material: **Silver** Cavities: **4** Vehicle Uses Sensor - Knock

CONNECTOR VIEWS > CONNECTOR END VIEW C110 - INLINE

InlineC110

Description

INLINE

Color

BK

Base Part #

Service Pigtail

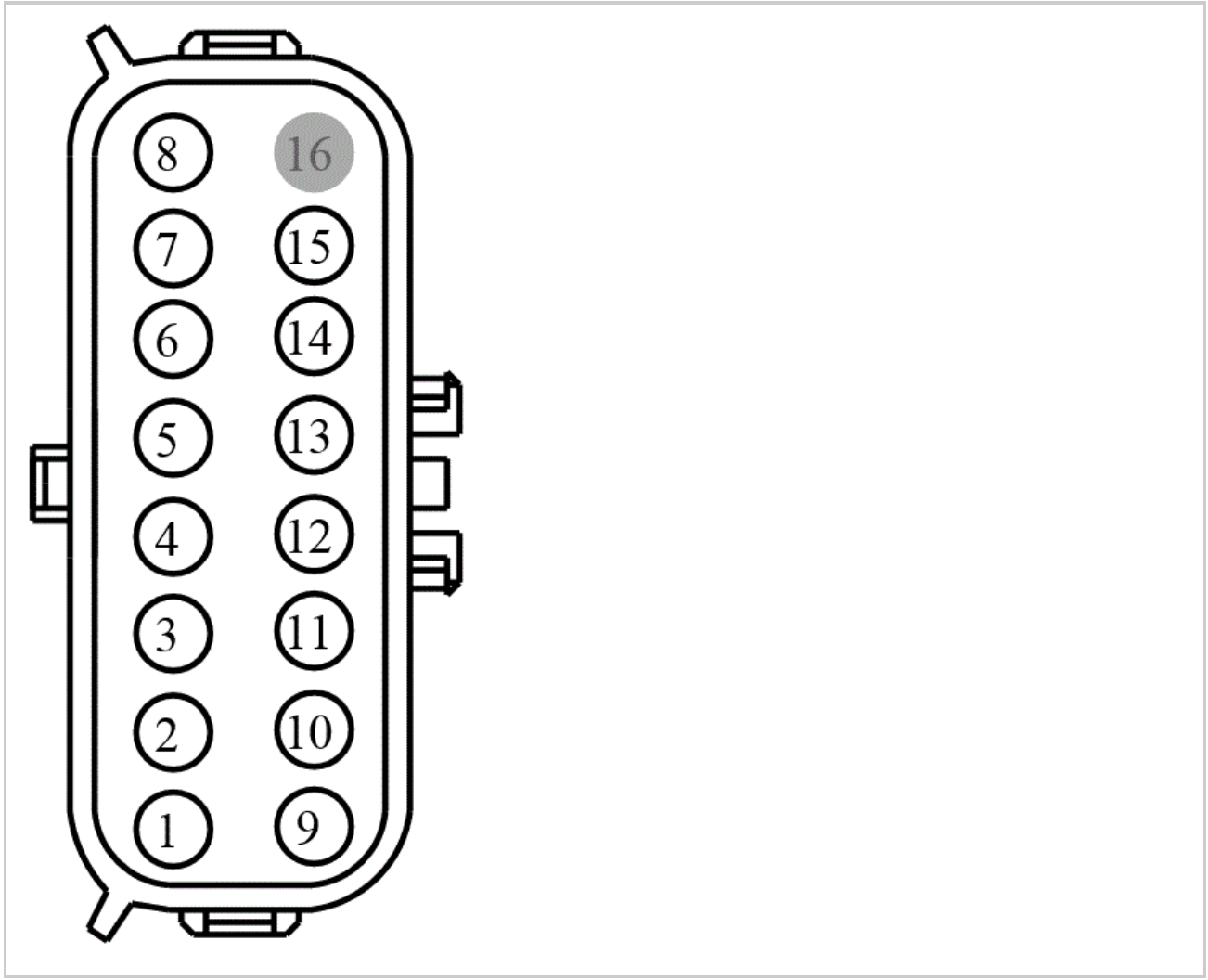
See Below

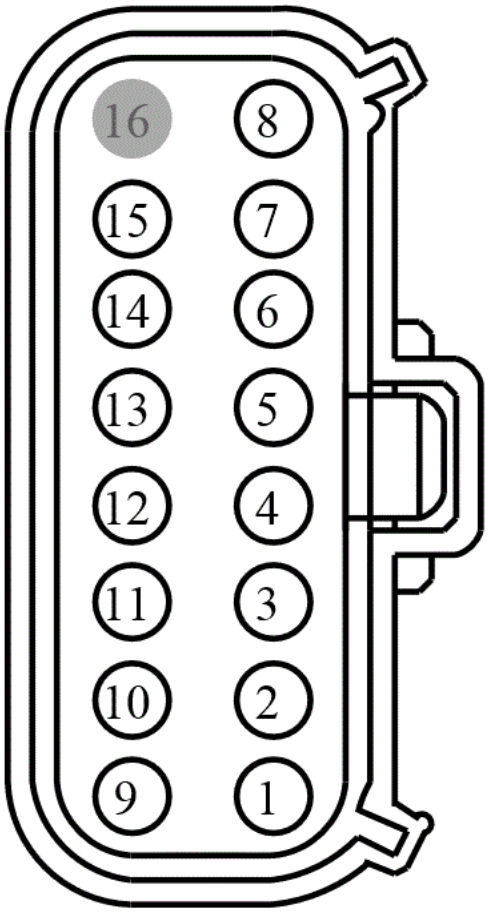
MALE

Harness 12C508

FEMALE

Harness 14B485


8
16
7
15
6
14
5
13
4
12
3
11
2
10
1
9



Pin	Circuit	Gauge	Qualifier
1	CE205 (GN-BU)	16	12C508
1	CE205 (GN-BU)	18	14B485
2	RE323 (WH-BN)	18	12C508
2	RE323 (WH-BN)	20	14B485
3	VE801 (VT-OG)	18	12C508
3	VE801 (VT-OG)	20	14B485
4	CE206 (GY-YE)	16	12C508

4	CE206 (GY-YE)	18	14B485
5	CE207 (VT-GY)	16	12C508
5	CE207 (VT-GY)	18	14B485
6	CE208 (YE-OG)	16	12C508
6	CE208 (YE-OG)	18	14B485
7	RE324 (BN-GN)	18	12C508
7	RE324 (BN-GN)	20	14B485
8	VE802 (BN-BU)	18	12C508
8	VE802 (BN-BU)	20	14B485
9	RE205 (YE-BU)	16	12C508
9	RE205 (YE-BU)	18	14B485
10	RE454 (YE-GN)	20	
11	LE238 (GY)	20	
12	RE206 (BU-OG)	16	12C508
12	RE206 (BU-OG)	18	14B485
13	RE207 (GN-VT)	16	12C508

13	RE207 (GN-VT)	18	14B485
14	RE208 (BU)	16	12C508
14	RE208 (BU)	18	14B485
15	LE423 (GN-VT)	20	
16	*	*	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1404** 	Service Part Number: **EU2Z-14S411-VA** Gauge: **16** Pin material: **Silver** Cavities: **16** Vehicle Uses: Mirror - Sideview

CONNECTOR VIEWS > CONNECTOR END VIEW C123 - EVAPORATIVE EMISSION (EVAP) PURGE VALVE

Connector:C123

Description

EVAPORATIVE EMISSION (EVAP) PURGE VALVE

Color

BK

Harness

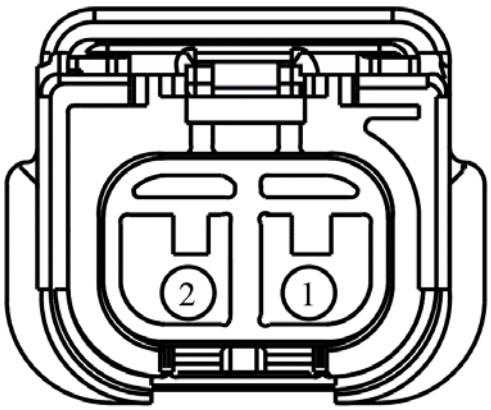
12C508

Base Part #

part# N/A

Service Pigtail

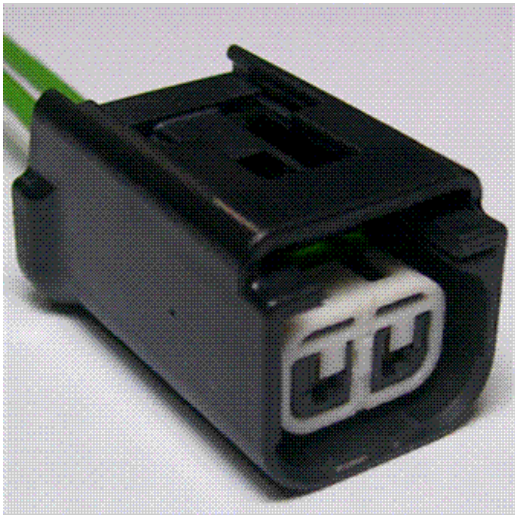
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CE113 (WH-BN)	18	CTRL MOD. - POWERTRAIN # CANISTER PURGE VALVE (EVAPCP)	
2	CBK02 (GN)	18	FUSE - 40 OR CIRCUIT BREAKER (VPWR 2)	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1133**	Service Part Number: **BU2Z-14S411-FA** Gauge: **16** Pin material: **Silver**

	Cavities: **2** Vehicle Uses Coil - Ignition

CONNECTOR VIEWS > CONNECTOR END VIEW C124 - LOW BRAKE FLUID WARNING INDICATOR SWITCH

Connector:C124

Description

LOW BRAKE FLUID WARNING INDICATOR SWITCH

Color

BK

Harness

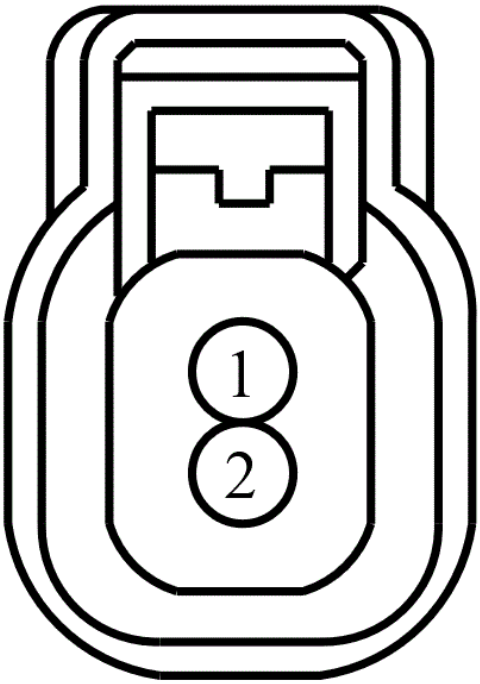
14290

Base Part #

part# N/A

Service Pigtail

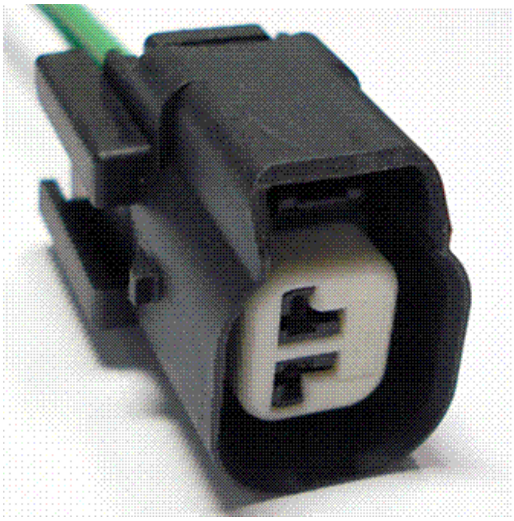
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CMC19 (GY-VT)	20	SWITCH - LOW LEVEL BRAKE FLUID	
2	GD120 (BK-GN)	20	GROUND - FENDER FRONT LEFT	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-984**	Service Part Number: **3U2Z-14S411-BXAB** Gauge: **16** Pin material: **Silver** Cavities: **2** Vehicle Uses



A/C Compressor Clutch

EGR Cooler Outlet

Electronic Locking Differential

Horn

Lamp - CHMSL (Center High Mount Stop Lamp)

Lamp - Rear Park

Lamp - Reverse

Lamp - Side Marker

Motor - Adjustable Pedal

Sensor - Adjustable Pedal

Sensor - Brake Fluid Level

Sensor - Cam Shaft Position

Sensor - Cylinder Head Temperature

Sensor - Exhaust Gas Temperature

Sensor - Liftgate Obstacle

Sensor - Oil Level

Sensor - Output Shaft Speed

Sensor - Speed

Solenoid - Engine Variable Timing

Speaker - Door

Speaker - Front

Speaker - Rear

Speaker - Subwoofer

Speaker - Tweeter - LH - Front

Switch - A/C Compressor Clutch Cycling

Switch - Backup Lamp

Switch - Deck Lid / Hatch Release

Switch - Deck Lid / Lift Gate Ajar

Switch - Hood Ajar

Switch - Lift Gate Glass Ajar

	Switch - Power Liftgate Switch - Reverse Park Aid

CONNECTOR VIEWS > CONNECTOR END VIEW C126 - INLINE

InlineC126

Description

INLINE

Color

BK

Base Part #

Service Pigtail

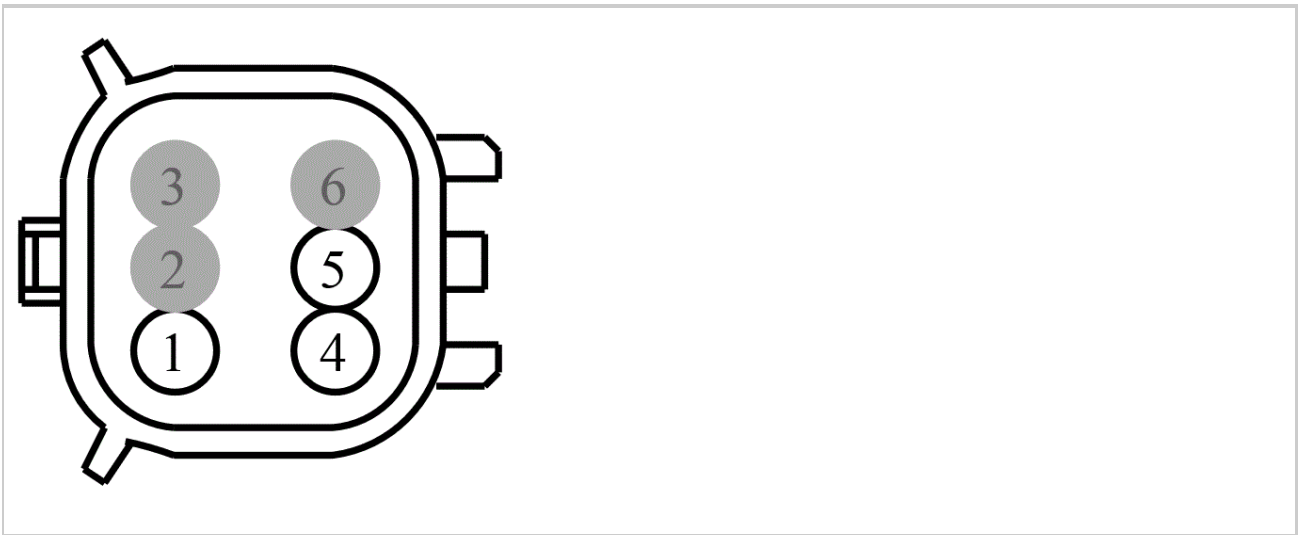
See Below

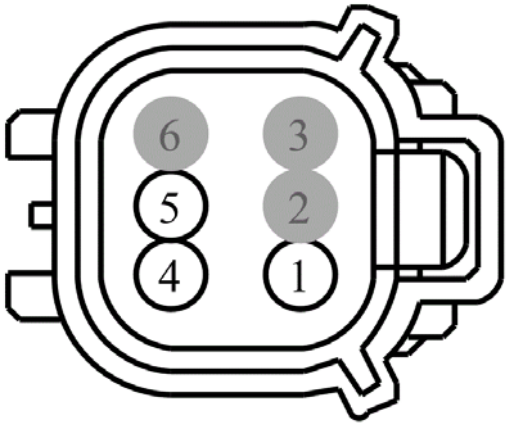
MALE

Harness 14290

FEMALE

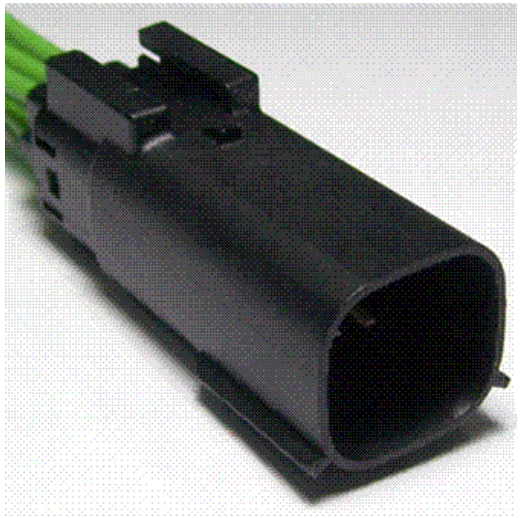
Harness 14290





Pin	Circuit	Gauge	Qualifier
1	CBB62 (GN-OG)	20	14290
1	CBB62 (GN-OG)	22	14290
2	*	*	14290
2	VDB25 (GN-OG)	22	14290
3	*	*	
4	CBB62 (GN)	20	14290
4	CBB62 (GN-OG)	22	14290
5	VDB26 (GY-BU)	22	14290
6	*	*	14290

Available Pigtail Kits	

Pigtail Kit Part Number **WPT-1426** 	Service Part Number: **FU2Z-14S411-TA** Gauge: **16** Pin material: **Silver** Cavities: **6** Vehicle Uses: Camera - Reverse Park Aid Lamp - Park/Turn/Stop Sensor - Coolant Temperature Sensor - O2 (HEGO/ EGO)

CONNECTOR VIEWS > CONNECTOR END VIEW C127 - HOOD SWITCH

Connector:C127

Description

HOOD SWITCH

Color

BK

Harness

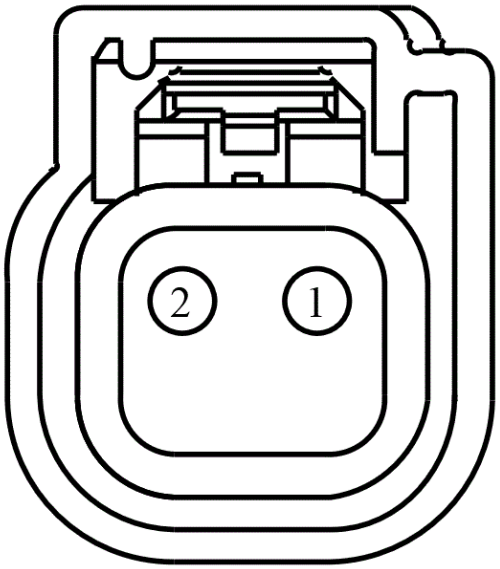
14290

Base Part #

part# N/A

Service Pigtail

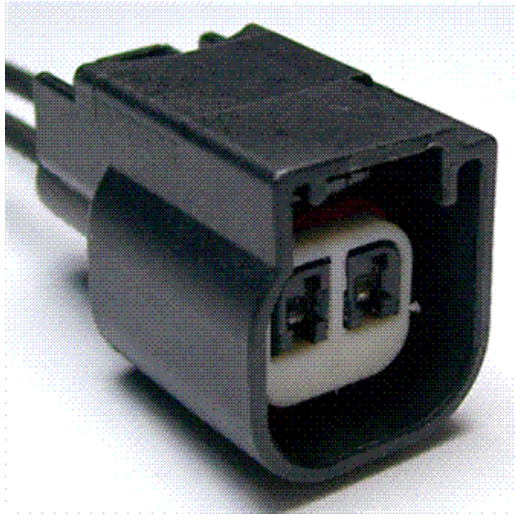
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	GD120 (BK-GN)	20	GROUND - FENDER FRONT LEFT	
1	GD120 (BK-GN)	16	GROUND - FENDER FRONT LEFT	
2	CPL25 (BU-OG)	20	SWITCH - HOOD # AJAR	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1243**	Service Part Number: **3U2Z-14S411-RPC** Gauge: **16** Pin material: **Tin (greased)** Cavities: **2** Vehicle Uses



Actuator - Door Lock - LH - Rear
Actuator - Door Lock - RH - Rear
Handle - Decklid
Lamp - Headlamp - High/Low Beam
Lamp - Headlamp - Low Beam
Lamp - License
Lamp - Rear Turn
Lamp - Side Marker
Sensor - Knock
Sensor - Seat Track Position
Sensor - Throttle Position
Sensor - Turbine Shaft Speed
Sensor - Water in Fuel
Switch - Deck Lid / Lift Gate Ajar
Switch - Door Ajar / Interior Lamp
Switch - Hood Ajar
Switch - Lift Gate Glass Ajar
Switch - Stop Lamp
Valve - Vapor Management

CONNECTOR VIEWS > CONNECTOR END VIEW C128 - MASS AIRFLOW/INTAKE AIR TEMPERATURE (MAF/IAT) SENSOR

Connector:C128

Description

MASS AIRFLOW/INTAKE AIR TEMPERATURE (MAF/IAT) SENSOR

Color

BK

Harness

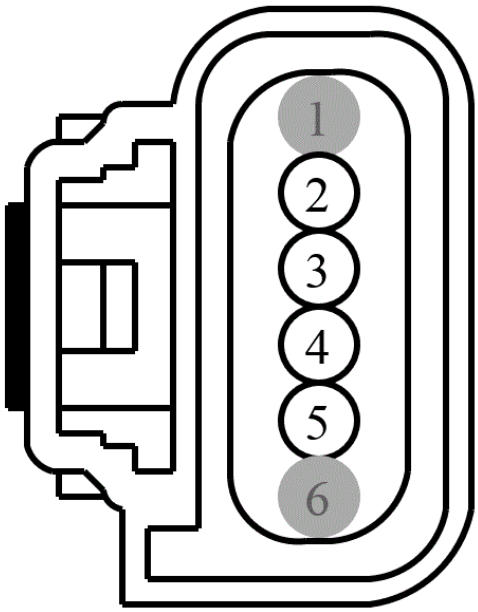
14290

Base Part #

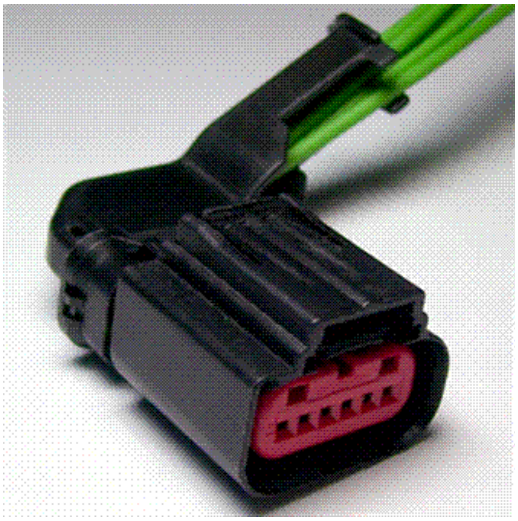
part# N/A

Service Pigtail

See Below



Pin	Circuit	Gauge	Circuit Function	Qualifier
1	*	*	Not Used	
2	VE740 (VT-GY)	18	SENSOR - INTAKE AIR TEMPERATURE (IAT)	
3	CBB74 (VT-BN)	20	FUSE - 74 OR CIRCUIT BREAKER	
4	RE320 (BU)	20	CTRL MOD. - POWERTRAIN # MASS AIRFLOW SEN. LH BANK OR 1ST BANK (SIGRTN)	
5	VE807 (YE-VT)	20	SENSOR - MASS AIRFLOW LH BANK OR 1ST BANK OR UNIQUE (MAF)	
6	*	*	Not Used	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1241** 	Service Part Number: **3U2Z-14S411-FJAC** Gauge: **18** Pin material: **Silver** Cavities: **6** Vehicle Uses Control - Electronic Throttle Sensor - Mass Air Flow

CONNECTOR VIEWS > CONNECTOR END VIEW C129 - INTAKE AIR TEMPERATURE (IAT) SENSOR

Connector:C129

Description

INTAKE AIR TEMPERATURE (IAT) SENSOR

Color

BK

Harness

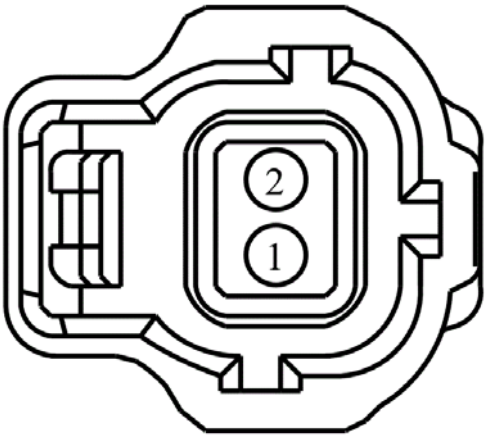
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Base Part #

part# N/A

Service Pigtail

See Below



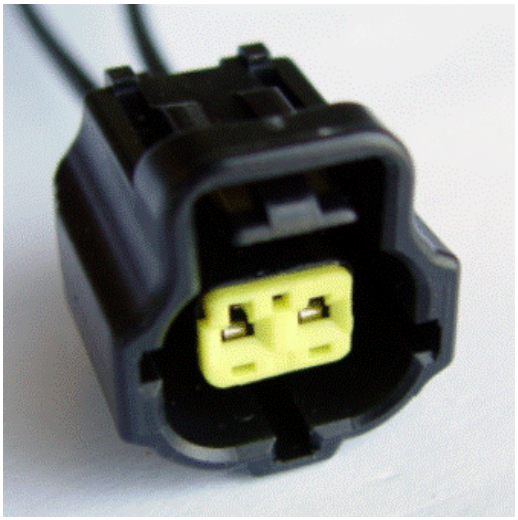
Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	VE740 (VT-GY)	20	SENSOR - INTAKE AIR TEMPERATURE (IAT)	
2	RE320 (BU)	20	CTRL MOD. - POWERTRAIN # INTAKE AIR TEMPERATURE (IAT) LH BANK OR 1ST BANK (SIGRTN)	

Available Pigtail Kits

Pigtail Kit Part Number

WPT-322



Service Part Number:

3U2Z-14S411-JZA

Gauge:

14

Pin material:

Tin (greased)

Cavities:

2

Vehicle Uses

Resistor - Daytime Running Lamp (DRL)

Sensor - Air Charge Temperature

	Sensor - Brake Pressure Solenoid - Canister Vent Switch - Brake Pressure

CONNECTOR VIEWS > CONNECTOR END VIEW C131 - HORN

Connector:C131

Description

HORN

Color

BK

Harness

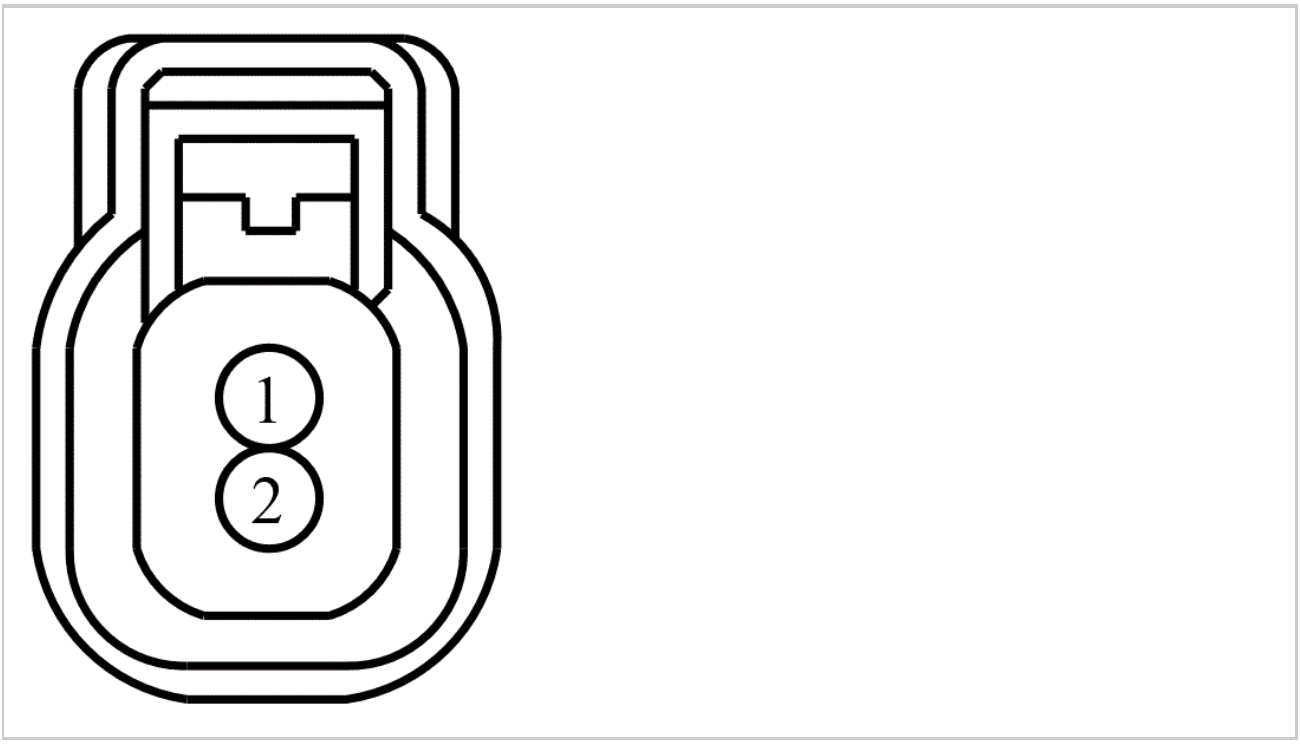
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Base Part #

part# N/A

Service Pigtail

See Below



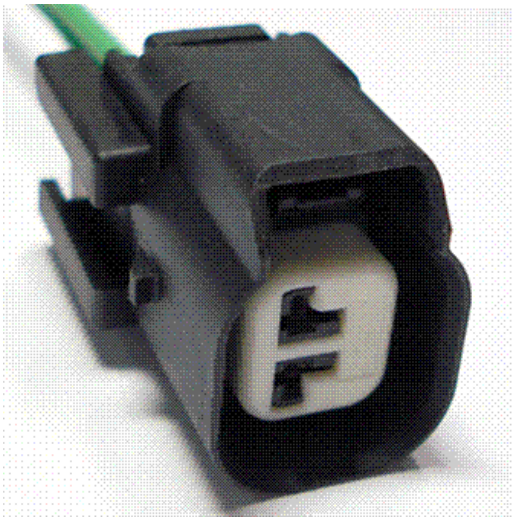
Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	GD123 (BK-GY)	16	GROUND - FENDER FRONT RIGHT	
2	CRH04 (VT-GN)	14	CTRL MOD. - RELAY HORN	

Available Pigtail Kits

Pigtail Kit Part Number

WPT-984



Service Part Number:

3U2Z-14S411-BXAB

Gauge:

16

Pin material:

Silver

Cavities:

2

Vehicle Uses

A/C Compressor Clutch

EGR Cooler Outlet

Electronic Locking Differential

Horn

Lamp - CHMSL (Center High Mount Stop Lamp)

Lamp - Rear Park

Lamp - Reverse

Lamp - Side Marker

Motor - Adjustable Pedal

Sensor - Adjustable Pedal

Sensor - Brake Fluid Level

Sensor - Cam Shaft Position

Sensor - Cylinder Head Temperature

	Sensor - Exhaust Gas Temperature
	Sensor - Liftgate Obstacle
	Sensor - Oil Level
	Sensor - Output Shaft Speed
	Sensor - Speed
	Solenoid - Engine Variable Timing
	Speaker - Door
	Speaker - Front
	Speaker - Rear
	Speaker - Subwoofer
	Speaker - Tweeter - LH - Front
	Switch - A/C Compressor Clutch Cycling
	Switch - Backup Lamp
	Switch - Deck Lid / Hatch Release
	Switch - Deck Lid / Lift Gate Ajar
	Switch - Hood Ajar
	Switch - Lift Gate Glass Ajar
	Switch - Power Liftgate
	Switch - Reverse Park Aid

CONNECTOR VIEWS > CONNECTOR END VIEW C132 - AMBIENT AIR TEMPERATURE (AAT) SENSOR

Connector:C132

Description

AMBIENT AIR TEMPERATURE (AAT) SENSOR

Color

Harness

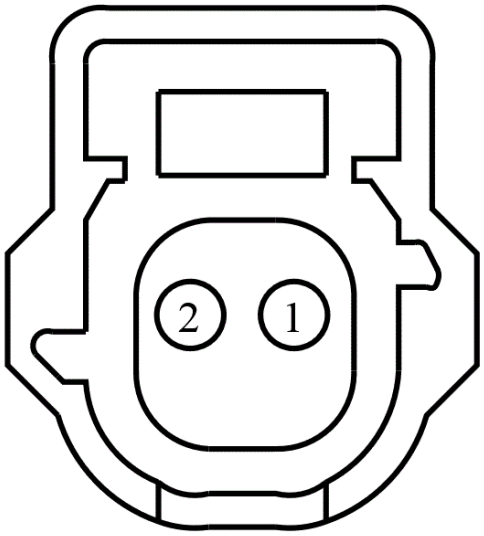
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Base Part #

part# N/A

Service Pigtail

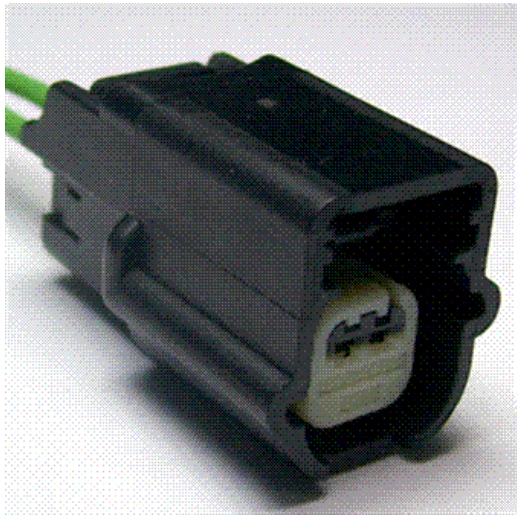
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	VH407 (YE)	20	SENSOR - AMBIENT TEMP.	
1	VH407 (YE-GN)	20	SENSOR - AMBIENT TEMP.	
2	RE406 (GY-VT)	20	CTRL MOD. - POWERTRAIN # SIGNAL RETURN TRANSMISSION (SIGRTN)	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1306**	Service Part Number: **AU2Z-14S411-AGB** Gauge: **20** Pin material:



Silver

Cavities:

2

Vehicle Uses

Sensor - Ambient Temp

Sensor - Side Impact

CONNECTOR VIEWS > CONNECTOR END VIEW C135 - ANTI-LOCK BRAKE SYSTEM (ABS) MODULE

Connector:C135

Description

ANTI-LOCK BRAKE SYSTEM (ABS) MODULE

Color

Harness

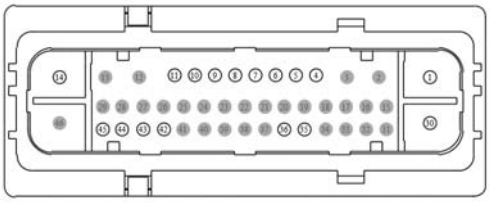
14290

Base Part #

part# N/A

Service Pigtail

Not Available



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier

1	SBB05 (GY-RD)	10	FUSE - 5 OR CIRCUIT BREAKER
2	*	*	Not Used
3	*	*	Not Used
4	RCA19 (VT)	20	CTRL MOD. - SENSOR WHEEL SPEED RIGHT FRONT
5	VCA05 (GY-VT)	20	SENSOR - WHEEL SPEED RIGHT FRONT
6	RCA18 (BN-GN)	20	CTRL MOD. - SENSOR WHEEL SPEED LEFT REAR
7	VCA04 (BU-OG)	20	SENSOR - WHEEL SPEED LEFT REAR
8	RCA17 (YE)	20	CTRL MOD. - SENSOR WHEEL SPEED LEFT FRONT
9	VCA03 (VT-WH)	20	SENSOR - WHEEL SPEED LEFT FRONT
10	RCA20 (BN)	20	CTRL MOD. - SENSOR WHEEL SPEED RIGHT REAR
11	VCA06 (WH-OG)	20	SENSOR - WHEEL SPEED RIGHT REAR
12	*	*	Not Used
13	*	*	Not Used
14	GD121 (BK-YE)	10	GROUND - FENDER FRONT LEFT # 2ND POINT
15	*	*	Not Used

CONNECTOR VIEWS > CONNECTOR END VIEW C137 - WINDSHIELD WASHER PUMP

Connector:C137

Description

WINDSHIELD WASHER PUMP

Color

BK

Harness

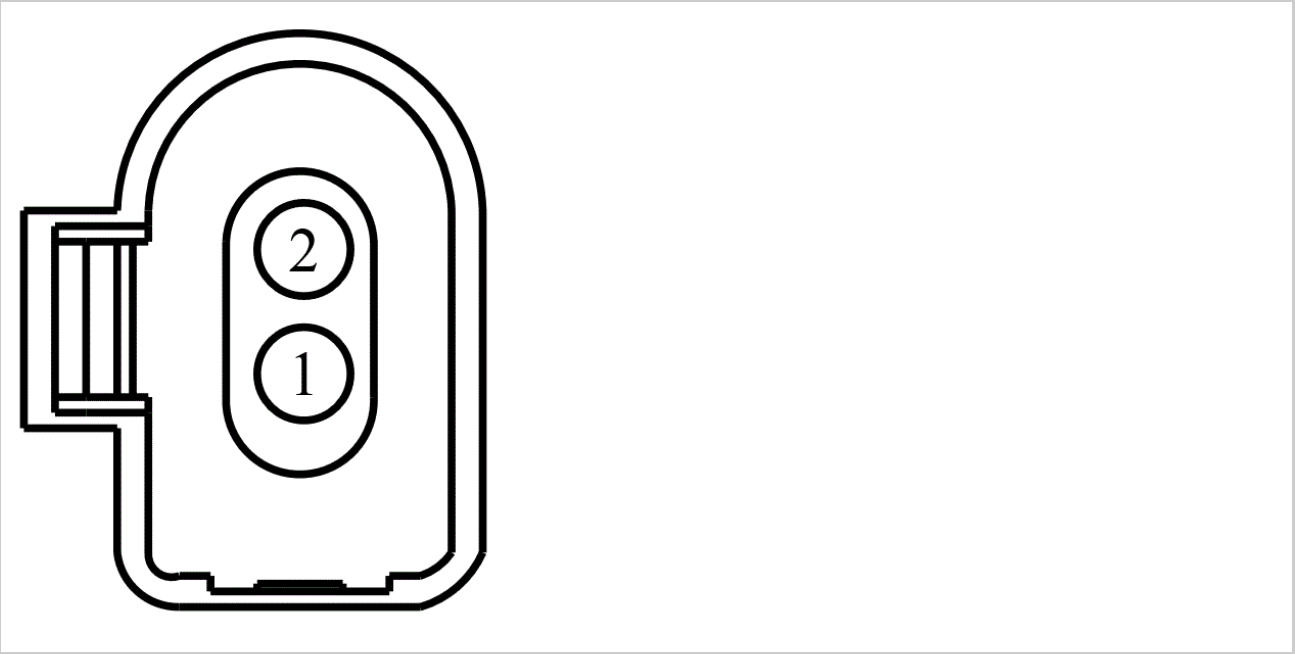
14290

Base Part #

part# N/A

Service Pigtail

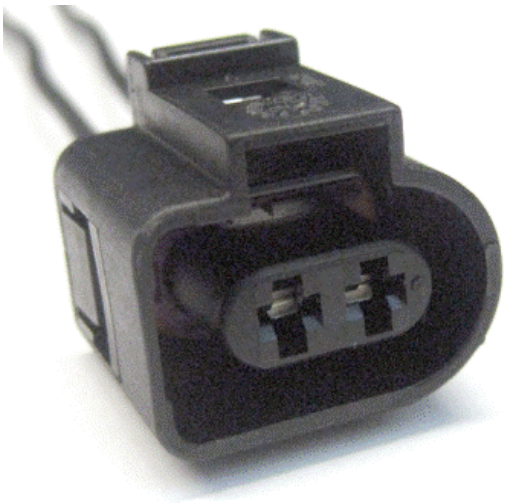
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CRW14 (BU-WH)	14	CTRL MOD. - FRONT WASHER	

2	GD120 (BK-GN)	14	GROUND - FENDER FRONT LEFT	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-908** 	Service Part Number: **8U2Z-14S411-MA** Gauge: **14** Pin material: **Tin** Cavities: **2** Vehicle Uses Monitor - Video/DVD Motor - Convertible Top

CONNECTOR VIEWS > CONNECTOR END VIEW C141 - HEATED OXYGEN SENSOR (HO2S) #22

Connector:C141

Description

HEATED OXYGEN SENSOR (HO2S) #22

Color

GY

Harness

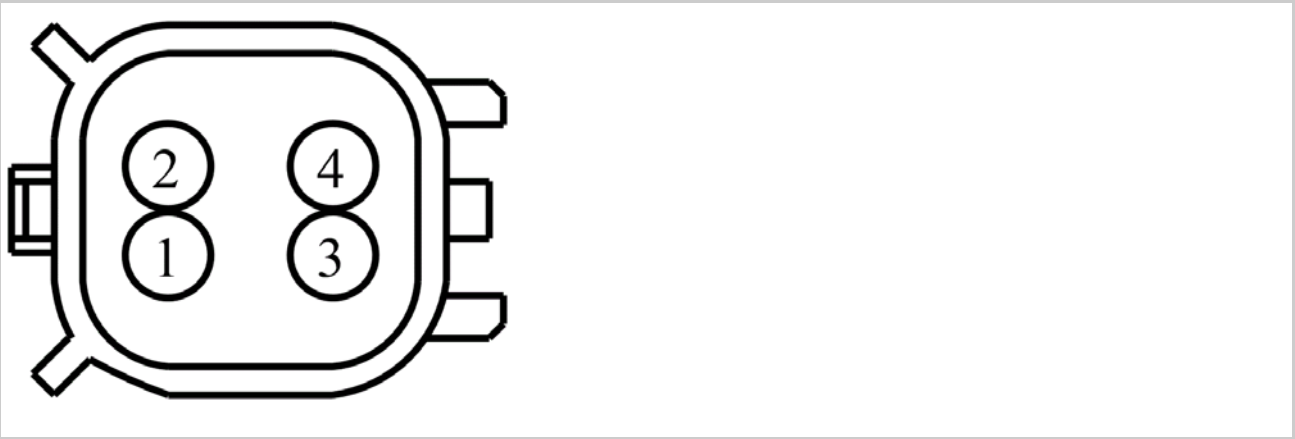
12C508/14B060

Base Part #

part# N/A

Service Pigtail

Not Available



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CBK02 (GN)	18	FUSE - 40 OR CIRCUIT BREAKER (VPWR 2)	
1	CBK02 (GN)	16	FUSE - 40 OR CIRCUIT BREAKER (VPWR 2)	
2	CE234 (BU-WH)	18	CTRL MOD. - POWERTRAIN # HEATER OXYGEN SEN. POST CAT. 2ND (HTR22)	
3	RE249 (WH-GN)	18	CTRL MOD. - POWERTRAIN # HEATED OXYGEN SENSOR POST CAT 2ND	
3	RE407 (YE-VT)	18	CTRL MOD. - POWERTRAIN # SIGNAL RETURN COWL (C-SIGRTN) (SIGRTN-C)	
4	VE733 (WH)	18	SENSOR - HEATED OXYGEN POST CAT. 2ND (HO2S22)	

CONNECTOR VIEWS > CONNECTOR END VIEW C142 - HEATED OXYGEN SENSOR (HO2S) #12

Connector:C142

Description

HEATED OXYGEN SENSOR (HO2S) #12

Color

GY

Harness

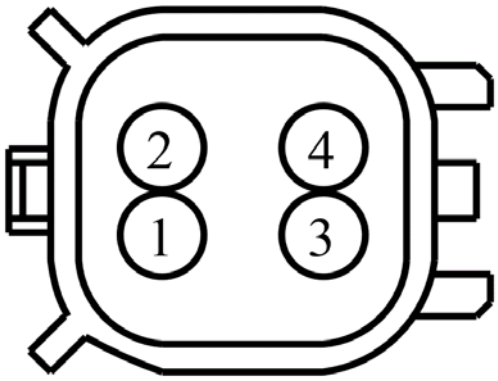
12C508/14B060

Base Part #

part# N/A

Service Pigtail

Not Available



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CBK02 (GN)	18	FUSE - 40 OR CIRCUIT BREAKER (VPWR 2)	
1	CBK02 (GN)	16	FUSE - 40 OR CIRCUIT BREAKER (VPWR 2)	
2	CE233 (WH-OG)	18	CTRL MOD. - POWERTRAIN # HEATER OXYGEN SEN. POST CAT. 1ST OR UNIQUE (HTR12)	
3	RE406 (GY-VT)	18	CTRL MOD. - POWERTRAIN # SIGNAL RETURN TRANSMISSION (T-SIGRTN) (SIGRTN-B)	
3	RE731 (BK)	18	SENSOR - HEATED OXYGEN POST CAT. 1ST OR UNIQUE (LSF_GND)	
4	VE731 (YE-GN)	18	SENSOR - HEATED OXYGEN POST CAT. 1ST OR UNIQUE (HO2S12)	

CONNECTOR VIEWS > CONNECTOR END VIEW C144 - INLINE

InlineC144

Description

INLINE

Color

DK GY

Base Part #

Service Pigtail

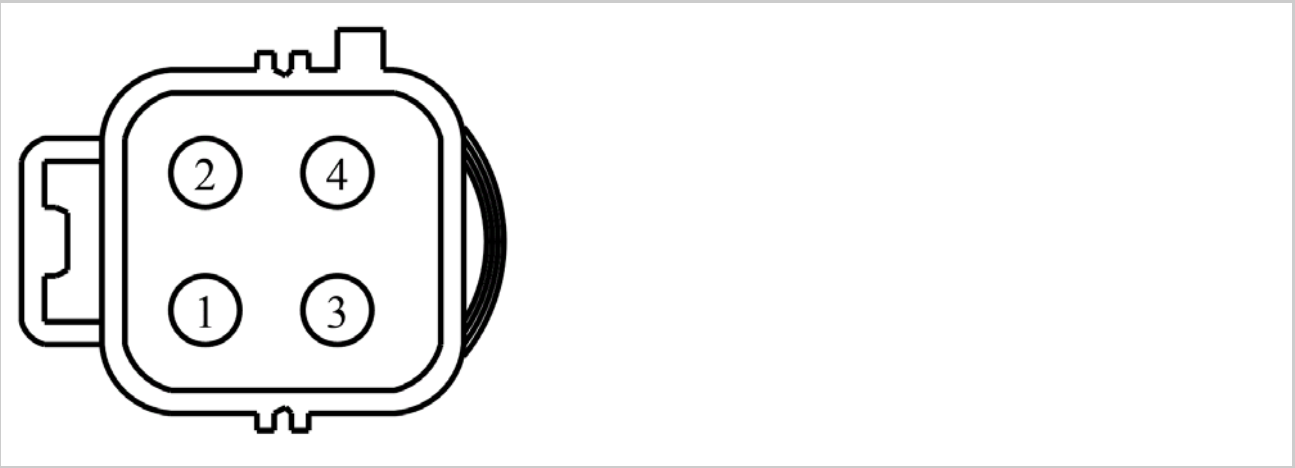
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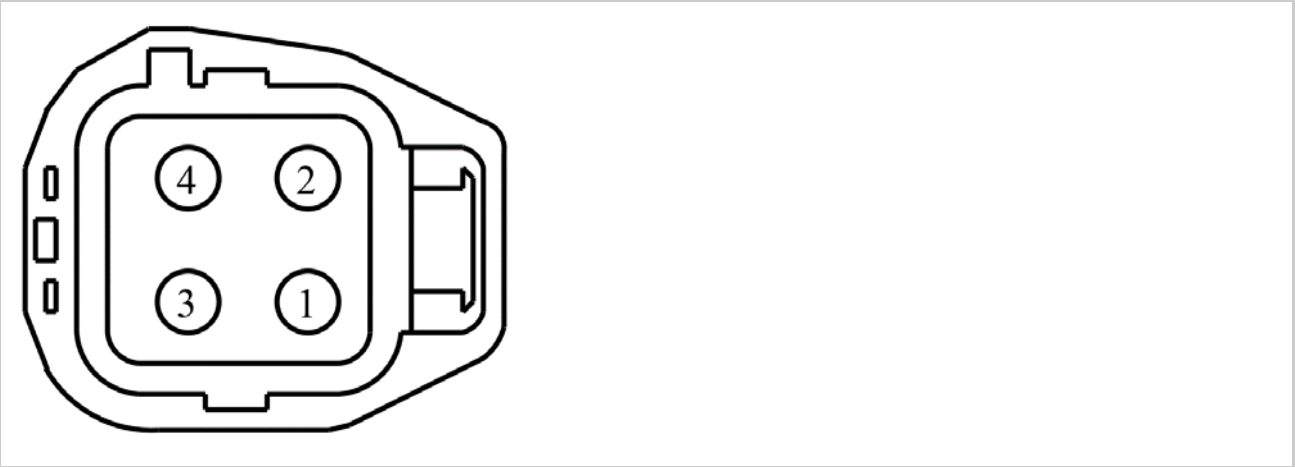
MALE

Harness 14290

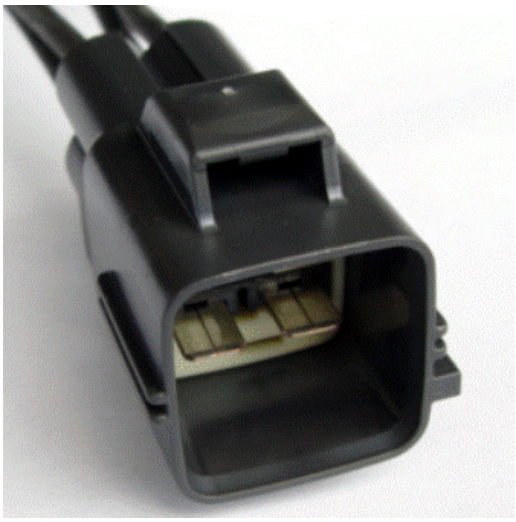
FEMALE

Harness 8C290





Pin	Circuit	Gauge	Qualifier
1	CEC05 (VT-GY)	10	
2	CEC07 (BN)	10	
3	CEC06 (YE-OG)	10	
4	GD122 (BK)	10	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-750** 	Service Part Number: **3U2Z-14S411-EJAA** Gauge: **10** Pin material: **Tin** Cavities: **4** Vehicle Uses: Mating Connector WPT-1343 Motor - Engine Cooling Fan

CONNECTOR VIEWS > CONNECTOR END VIEW C150 - FRONT WHEEL SPEED SENSOR LH

Connector:C150

Description

FRONT WHEEL SPEED SENSOR LH

Color

BK

Harness

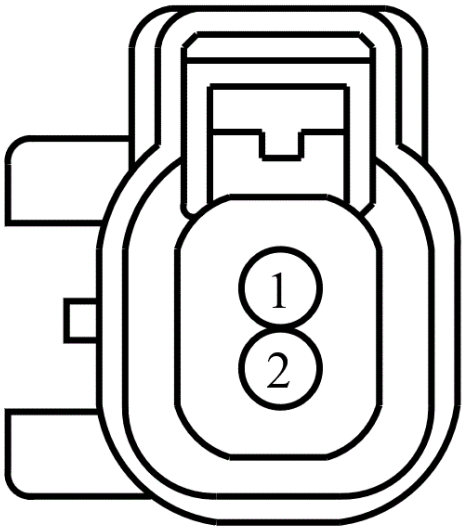
14290

Base Part #

part# N/A

Service Pigtail

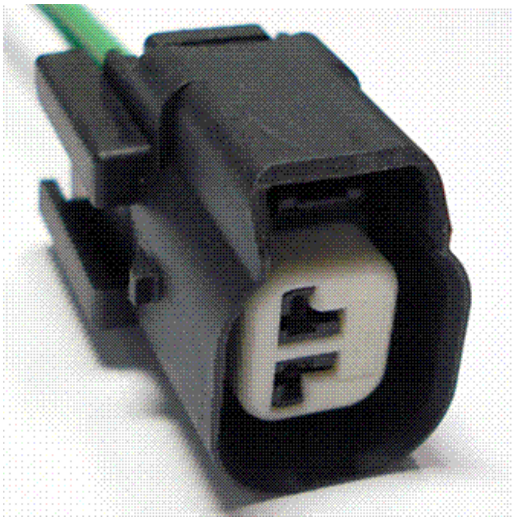
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	VCA03 (VT-WH)	20	SENSOR - WHEEL SPEED LEFT FRONT	
2	RCA17 (YE)	20	CTRL MOD. - SENSOR WHEEL SPEED LEFT FRONT	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-984**	Service Part Number: **3U2Z-14S411-BXAB** Gauge: **16**



Pin material:

Silver

Cavities:

2

Vehicle Uses

A/C Compressor Clutch

EGR Cooler Outlet

Electronic Locking Differential

Horn

Lamp - CHMSL (Center High Mount Stop Lamp)

Lamp - Rear Park

Lamp - Reverse

Lamp - Side Marker

Motor - Adjustable Pedal

Sensor - Adjustable Pedal

Sensor - Brake Fluid Level

Sensor - Cam Shaft Position

Sensor - Cylinder Head Temperature

Sensor - Exhaust Gas Temperature

Sensor - Liftgate Obstacle

Sensor - Oil Level

Sensor - Output Shaft Speed

Sensor - Speed

Solenoid - Engine Variable Timing

Speaker - Door

Speaker - Front

Speaker - Rear

Speaker - Subwoofer

Speaker - Tweeter - LH - Front

Switch - A/C Compressor Clutch Cycling

	Switch - Backup Lamp Switch - Deck Lid / Hatch Release Switch - Deck Lid / Lift Gate Ajar Switch - Hood Ajar Switch - Lift Gate Glass Ajar Switch - Power Liftgate Switch - Reverse Park Aid

CONNECTOR VIEWS > CONNECTOR END VIEW C152 - FRONT FOG LAMP LH

Connector:C152

Description

FRONT FOG LAMP LH

Color

BK

Harness

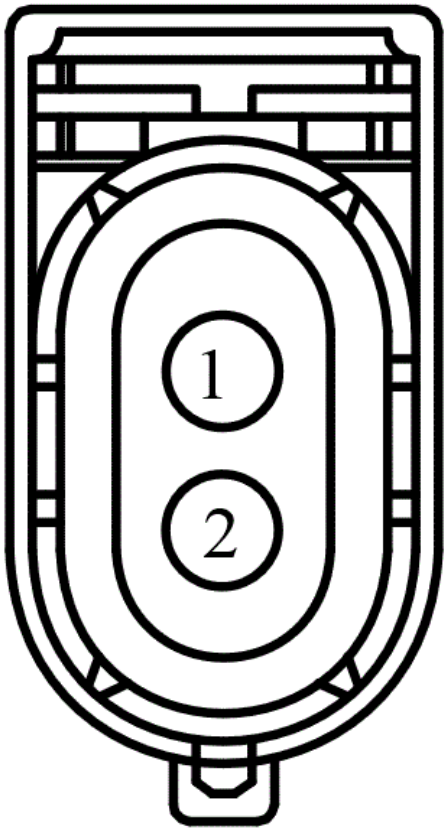
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Base Part #

part# N/A

Service Pigtail

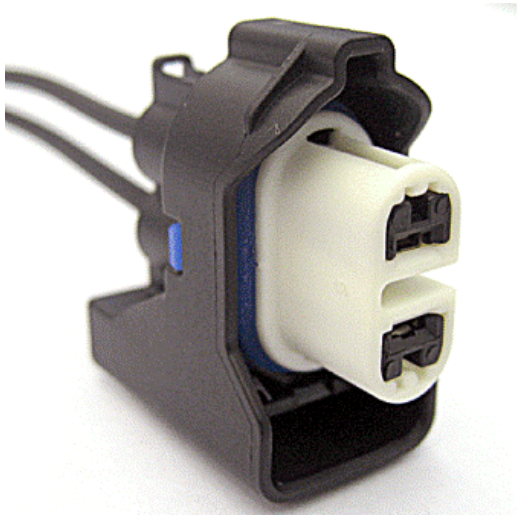
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CLF29 (BN)	20	CTRL MOD. - FOG LAMPS FRONT (LEFT)	
2	GD123 (BK-GY)	16	GROUND - FENDER FRONT RIGHT	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-904**	Service Part Number: **8U2Z-14S411-GA** Gauge: **14** Pin material: **Tin**



Cavities:

2

Vehicle Uses

Lamp - Ash Tray

Lamp - Fog/Driving

CONNECTOR VIEWS > CONNECTOR END VIEW C156 - SIDE TURN SIGNAL LAMP LH

Connector:C156

Description

SIDE TURN SIGNAL LAMP LH

Color

BN

Harness

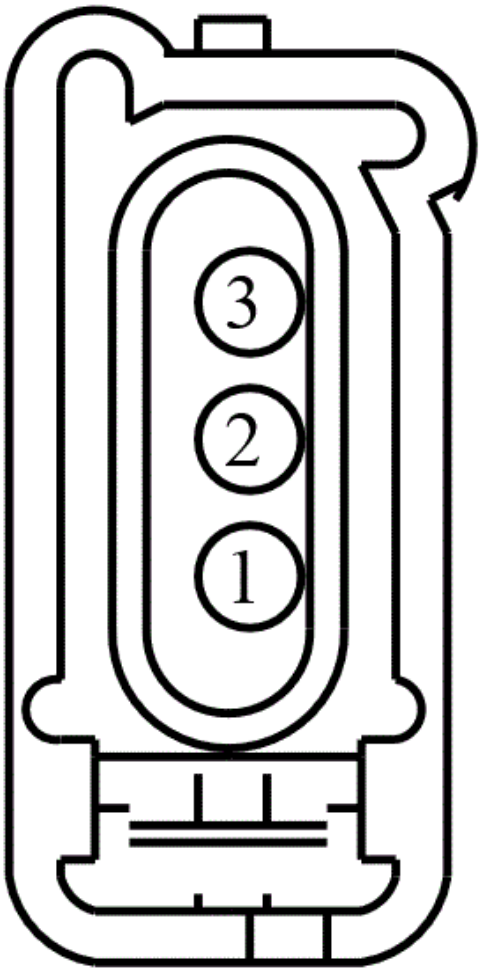
14290

Base Part #

part# N/A

Service Pigtail

See Below



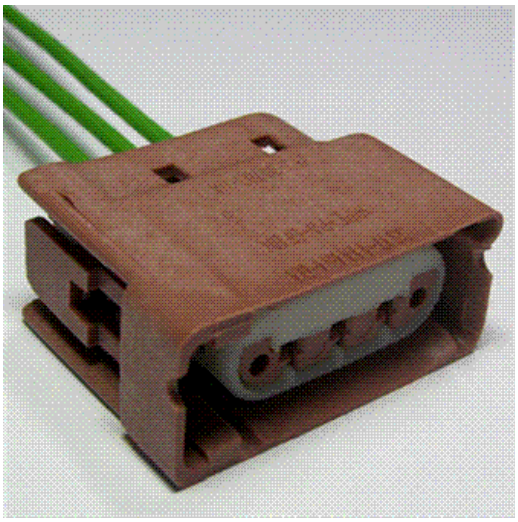
Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	GD123 (BK-GY)	20	GROUND - FENDER FRONT RIGHT	
2	CLS06 (GN-OG)	20	CTRL MOD. - PARK FRONT LEFT OR FRONT/REAR LEFT	
3	CLS21 (BU-GN)	20	CTRL MOD. - TURN LAMP LEFT FRONT	

Available Pigtail Kits	

Pigtail Kit Part Number

WPT-1167



Service Part Number:

3U2Z-14S411-FHAB

Gauge:

16

Pin material:

Silver

Cavities:

3

Vehicle Uses

Lamp - Front Cornering/Turn

Lamp - Front Park

Lamp - Front Turn

Lamp - Front Turn/ Marker

Lamp - Headlamp - High/Low Beam

Lamp - Park/Turn

Lamp - Park/Turn/Stop

Lamp - Rear Park

Lamp - Reverse

Lamp - Stop

CONNECTOR VIEWS > CONNECTOR END VIEW C160 - FRONT WHEEL SPEED SENSOR RH

Connector:C160

Description

FRONT WHEEL SPEED SENSOR RH

Color

BK

Harness

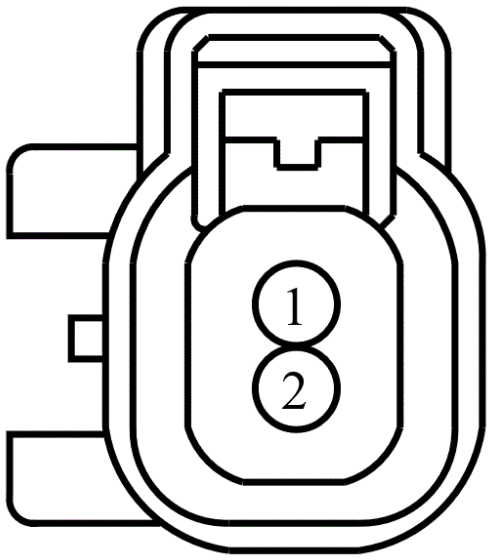
14290

Base Part #

part# N/A

Service Pigtail

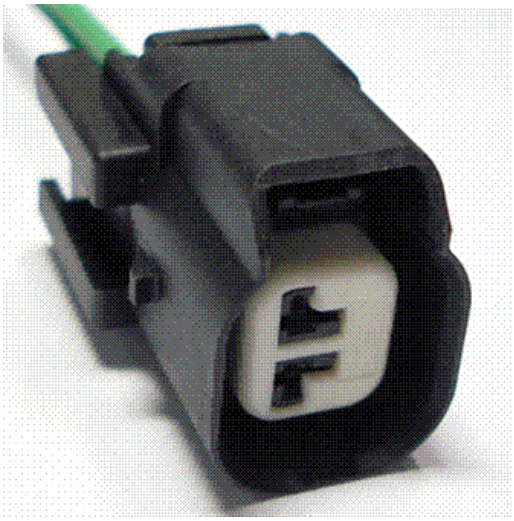
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	VCA05 (GY-VT)	20	SENSOR - WHEEL SPEED RIGHT FRONT	
2	RCA19 (VT)	20	CTRL MOD. - SENSOR WHEEL SPEED RIGHT FRONT	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-984**	Service Part Number: **3U2Z-14S411-BXAB** Gauge: **16** Pin material: **Silver** Cavities:



2

Vehicle Uses

A/C Compressor Clutch

EGR Cooler Outlet

Electronic Locking Differential

Horn

Lamp - CHMSL (Center High Mount Stop Lamp)

Lamp - Rear Park

Lamp - Reverse

Lamp - Side Marker

Motor - Adjustable Pedal

Sensor - Adjustable Pedal

Sensor - Brake Fluid Level

Sensor - Cam Shaft Position

Sensor - Cylinder Head Temperature

Sensor - Exhaust Gas Temperature

Sensor - Liftgate Obstacle

Sensor - Oil Level

Sensor - Output Shaft Speed

Sensor - Speed

Solenoid - Engine Variable Timing

Speaker - Door

Speaker - Front

Speaker - Rear

Speaker - Subwoofer

Speaker - Tweeter - LH - Front

Switch - A/C Compressor Clutch Cycling

Switch - Backup Lamp

Switch - Deck Lid / Hatch Release

Switch - Deck Lid / Lift Gate Ajar

	Switch - Hood Ajar Switch - Lift Gate Glass Ajar Switch - Power Liftgate Switch - Reverse Park Aid

CONNECTOR VIEWS > CONNECTOR END VIEW C162 - FRONT FOG LAMP RH

Connector:C162

Description

FRONT FOG LAMP RH

Color

BK

Harness

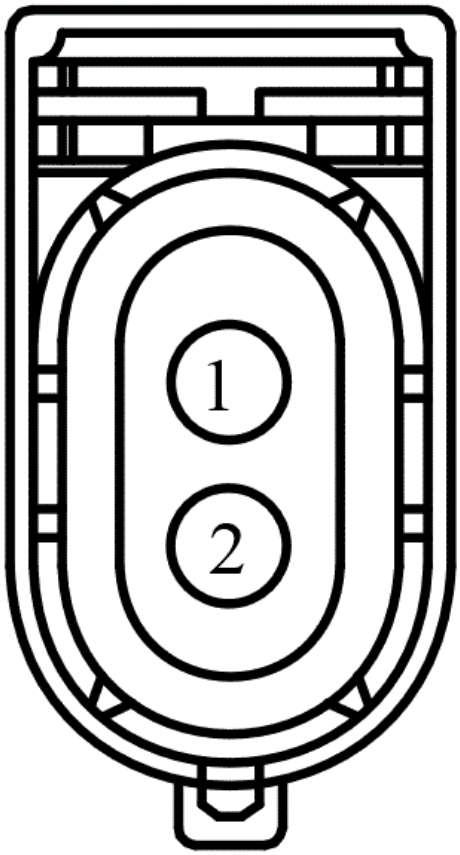
14290

Base Part #

part# N/A

Service Pigtail

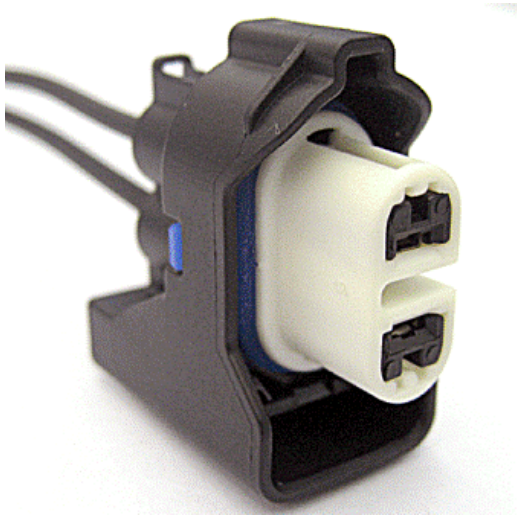
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CLF34 (YE-OG)	20	CTRL MOD. - FOG LAMPS FRONT RIGHT OR COMMON	
2	GD123 (BK-GY)	20	GROUND - FENDER FRONT RIGHT	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-904**	Service Part Number: **8U2Z-14S411-GA** Gauge: **14** Pin material: **Tin**



Cavities:

2

Vehicle Uses

Lamp - Ash Tray

Lamp - Fog/Driving

CONNECTOR VIEWS > CONNECTOR END VIEW C168 - 6R80 TRANSMISSION ASSEMBLY

Connector:C168

Description

6R80 TRANSMISSION ASSEMBLY

Color

Harness

12C508

Base Part #

part# N/A

Service Pigtail

See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	VET33 (WH-OG)	20	SENSOR - TURBINE/TRANSMISSION SHAFT SPEED (TSS) +	
2	*	*	Not Used	
3	CET10 (BU-GY)	20	CTRL MOD. - POWERTRAIN # SOLENOID PRESSURE CONTROL 6 (PC6) [EPC] [VFS]	
4	VET32 (VT)	20	SENSOR - TRANSMISSION RANGE # PWM OUTPUT (TR -P)	
5	RE454 (YE-GN)	20	CTRL MOD. - POWERTRAIN # SIGNAL RETURN ENGINE #2	
6	VET27 (BN-YE)	20	SENSOR - TRANSMISSION FLUID TEMPERATURE (TFT)	
7	CET49 (BN)	18	CTRL MOD. - POWERTRAIN # TRANSMISSION SOLENOID POWER CONTROL 2 (TSPC2)	
8	CET18 (GY-YE)	20	CTRL MOD. - POWERTRAIN # SOLENOID SHIFT CONTROL LOW-SIDE 1 (SS1)	

9	CET05 (BU-GN)	20	CTRL MOD. - POWERTRAIN # SOLENOID PRESSURE CONTROL 1 (PC1) [EPC] [VFS]
10	CET08 (BN-WH)	20	CTRL MOD. - POWERTRAIN # SOLENOID PRESSURE CONTROL 4 (PC4) [EPC] [VFS]
11	RET24 (BN-BU)	20	CTRL MOD. - POWERTRAIN # TRANSMISSION RANGE SIGNAL RETURN (TRGND)
12	LE111 (VT-GN)	20	CTRL MOD. - POWERTRAIN # BUFFERED POWER SUPPLY SENSORS (VBPWR)
13	CET07 (GY-OG)	20	CTRL MOD. - POWERTRAIN # SOLENOID PRESSURE CONTROL 3 (PC3) [EPC] [VFS]
14	CET06 (GN)	20	CTRL MOD. - POWERTRAIN # SOLENOID PRESSURE CONTROL 2 (PC2) [EPC] [VFS]
15	VET26 (BN-GN)	20	SENSOR - OUTPUT SHAFT SPEED (OSS)
16	CET09 (YE-VT)	20	CTRL MOD. - POWERTRAIN # SOLENOID PRESSURE CONTROL 5 (PC5) [EPC] [VFS]

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1390**	Service Part Number: **EU2Z-14S411-HA** Gauge: **18** Pin material: **Silver** Cavities: **16**



Vehicle Uses

Transmission - Bulkhead

CONNECTOR VIEWS > CONNECTOR END VIEW C169 - REVERSING LAMP SWITCH

Connector:C169

Description

REVERSING LAMP SWITCH

Color

GY

Harness

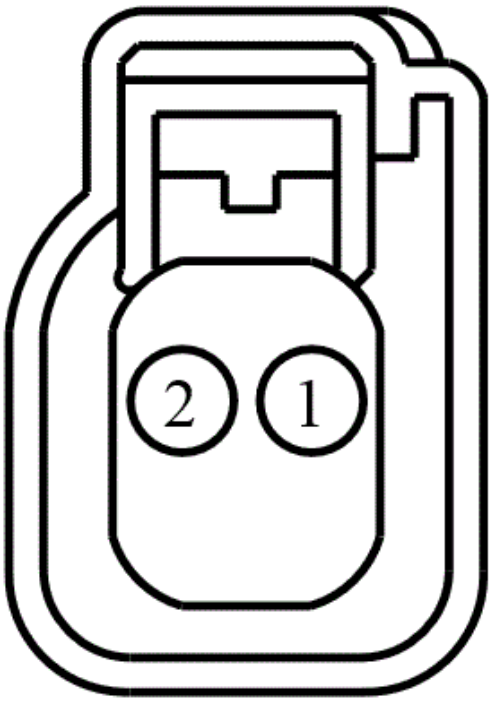
14B060

Base Part #

part# N/A

Service Pigtail

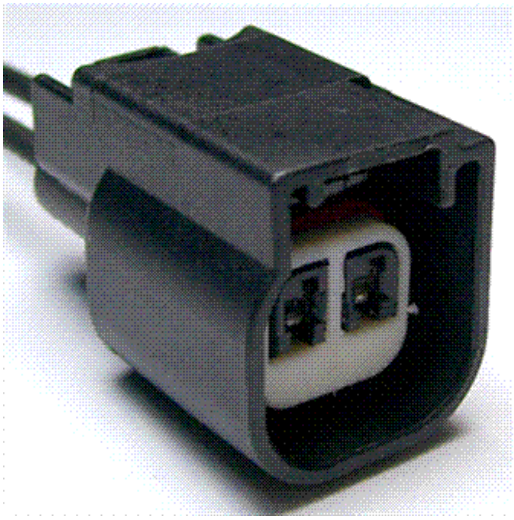
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CET47 (BU)	20	SWITCH - REVERSE (RS)	
2	RE406 (GY-VT)	20	CTRL MOD. - POWERTRAIN # SIGNAL RETURN TRANSMISSION (T-SIGRTN) (SIGRTN-B)	
2	RET24 (BN-BU)	20	CTRL MOD. - POWERTRAIN # TRANSMISSION RANGE SIGNAL RETURN (TRGND)	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1243**	Service Part Number: **3U2Z-14S411-RPC** Gauge: **16** Pin material:



Tin (greased)

Cavities:

2

Vehicle Uses

Actuator - Door Lock - LH - Rear

Actuator - Door Lock - RH - Rear

Handle - Decklid

Lamp - Headlamp - High/Low Beam

Lamp - Headlamp - Low Beam

Lamp - License

Lamp - Rear Turn

Lamp - Side Marker

Sensor - Knock

Sensor - Seat Track Position

Sensor - Throttle Position

Sensor - Turbine Shaft Speed

Sensor - Water in Fuel

Switch - Deck Lid / Lift Gate Ajar

Switch - Door Ajar / Interior Lamp

Switch - Hood Ajar

Switch - Lift Gate Glass Ajar

Switch - Stop Lamp

Valve - Vapor Management

CONNECTOR VIEWS > CONNECTOR END VIEW C174 - IGNITION TRANSFORMER CAPACITOR 1

Connector:C174

Description

IGNITION TRANSFORMER CAPACITOR 1

Color

BK

Harness

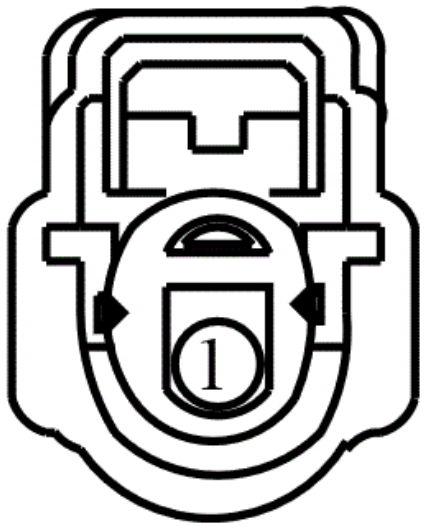
12C508

Base Part #

part# N/A

Service Pigtail

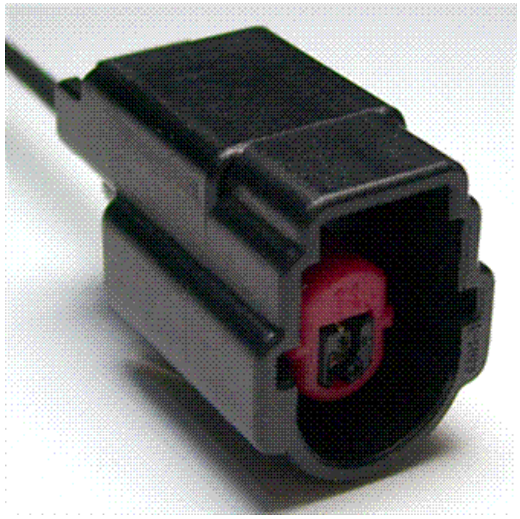
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CBK04 (VT)	18	FUSE - 44 OR CIRCUIT BREAKER (VPWR 4)	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1253**	Service Part Number: **6U2Z-14S411-KB** Gauge: **16**

	Pin material: **Tin (greased)** Cavities: **1** Vehicle Uses Capacitor - Ignition/Radio

CONNECTOR VIEWS > CONNECTOR END VIEW C175B - POWERTRAIN CONTROL MODULE (PCM)

Connector:C175B

Description

POWERTRAIN CONTROL MODULE (PCM)

Color

Harness

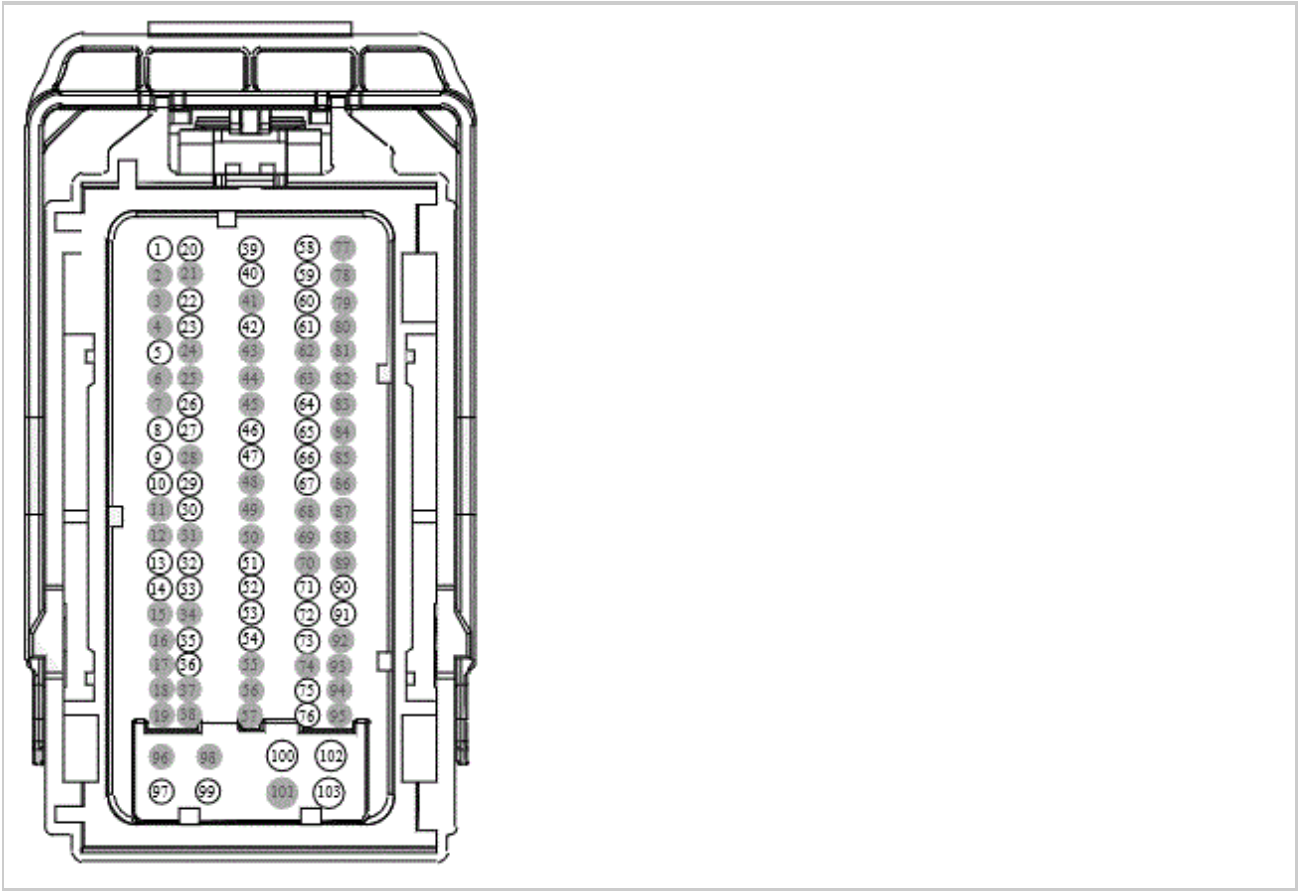
14290

Base Part #

part# N/A

Service Pigtail

Not Available



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CDC54 (WH-GN)	20	CTRL MOD. - POWERTRAIN # STARTER MOTOR CONTROL SENSE (SMCS)	
2	*	*	Not Used	
3	*	*	Not Used	
4	*	*	Not Used	
5	GD113 (BK-YE)	18	GROUND - COWL TOP RIGHT	
6	*	*	Not Used	

7	*	*	Not Used
8	CE904 (GN-VT)	22	SWITCH - CLUTCH PEDAL POSITION # TOP OF TRAVEL (CPP-TT)
9	CE903 (BU-OG)	22	SWITCH - CLUTCH PEDAL POSITION # BOTTOM OF TRAVEL (CPP-BT)
10	CEC01 (WH-BU)	20	CTRL MOD. - COOLING FAN CONTROL HIGH (FC)
11	*	*	Not Used
12	*	*	Not Used
13	CDC10 (BU-OG)	20	CTRL MOD. - POWERTRAIN # GENERATOR REGULATOR CONTROL (GENRC)
14	VE225 (YE-OG)	22	CTRL MOD. - POWERTRAIN # FUEL PUMP MODULE COMMAND (FPC)
14	*	*	Not Used
15	*	*	Not Used
15	CH302 (WH-BN)	20	CTRL MOD. - POWERTRAIN # A/C CLUTCH CONTROL RELAY / WOT AC CUTOFF (ACCR)
16	*	*	Not Used
17	*	*	Not Used
17	CEC02 (GN-BU)	20	CTRL MOD. - COOLING FAN CONTROL LOW (FC)

18	*	*	Not Used
19	*	*	Not Used
20	CE302 (YE-BU)	20	CTRL MOD. - POWERTRAIN # POWERTRAIN CONTROL RELAY (PCMRC)
21	*	*	Not Used
22	CET42 (GN-VT)	22	SWITCH - TRANSMISSION SELECT SHIFT # DOWN (SST)
23	CET43 (GY)	22	SWITCH - TRANSMISSION SELECT SHIFT # UP (SST)
24	*	*	Not Used
25	*	*	Not Used
26	CDC15 (VT)	20	GENERATOR (ALTERNATOR) # LOAD INPUT (GENLI)
27	VE518 (BN-WH)	22	MONITOR - FUEL PUMP (FPM)
28	*	*	Not Used
29	LE230 (BN-BU)	22	CTRL MOD. - POWERTRAIN # FUEL TANK PRESSURE TRANSDUCER REF. VOLT. (VREF)
30	RE407 (YE-VT)	20	CTRL MOD. - POWERTRAIN # SIGNAL RETURN COWL (C-SIGRTN) (SIGRTN-C)
31	*	*	Not Used
32	CET47 (BU)	20	SWITCH - REVERSE (RS)

33	VH433 (VT-OG)	22	TRANSDUCER - A/C PRESSURE (ACPT) +
34	*	*	Not Used
35	RE136 (VT-GN)	22	CTRL MOD. - POWERTRAIN # ACCELERATOR PEDAL POSITION SENSOR 1 (APPRTN1)
36	LE136 (GN-OG)	22	CTRL MOD. - POWERTRAIN # ACCELERATOR PEDAL POSITION SENSOR 1 (APPVREF1)
37	*	*	Not Used
38	*	*	Not Used
39	CE114 (GN-BU)	18	CTRL MOD. - POWERTRAIN # CANISTER VENT SOLENOID (CANV)
40	LE137 (BU-GY)	22	CTRL MOD. - POWERTRAIN # ACCELERATOR PEDAL POSITION SENSOR 2 (APPVREF2)
41	*	*	Not Used
42	CPK34 (BN-VT)	20	CTRL MOD. - KEYLESS VEHICLE # SWITCH START/STOP 1 +
43	*	*	Not Used
44	*	*	Not Used
45	*	*	Not Used
46	VE922 (VT-GN)	22	TRANSDUCER - FUEL TANK PRESSURE (FTP)

47	VH407 (YE-GN)	20	SENSOR - AMBIENT TEMP.
48	*	*	Not Used
49	*	*	Not Used
49	CE621 (YE-GY)	22	RELAY - MOTOR ELECTRONICS COOLING PUMP
50	*	*	Not Used
51	RE406 (GY-VT)	22	CTRL MOD. - POWERTRAIN # SIGNAL RETURN TRANSMISSION (SIGRTN)
52	LE423 (GN-VT)	22	CTRL MOD. - POWERTRAIN # VOLTAGE REFERENCE ENGINE (VREF) (E-VREF) (VREF1)
53	VDC61 (VT-GN)	20	SENSOR - BATTERY MONITORING SYSTEM # ALTERNATOR
54	RE320 (BU)	20	CTRL MOD. - POWERTRAIN # MASS AIRFLOW SEN. LH BANK OR 1ST BANK (SIGRTN)
55	*	*	Not Used
56	*	*	Not Used
57	*	*	Not Used
58	CDC12 (YE)	20	CTRL MOD. - POWERTRAIN # STARTER MOTOR CONTROL (SMC)
59	RE137 (YE-GN)	22	CTRL MOD. - POWERTRAIN # ACCELERATOR PEDAL POSITION SENSOR 2 (APPRTN2)

60	VE702 (BU-WH)	22	SENSOR - ACCELERATOR PEDAL POSITION # 2 (APP2)
61	VE701 (YE-OG)	22	SENSOR - ACCELERATOR PEDAL POSITION # 1 (APP1)
62	*	*	Not Used
63	*	*	Not Used
64	CBB60 (YE-VT)	20	FUSE - 60 OR CIRCUIT BREAKER (ISP-R)
65	CE261 (GY-OG)	22	CTRL MOD. - POWERTRAIN # FUEL PUMP ON (FUEL_PUMP_ON) (IES)
66	CES09 (VT-OG)	22	SWITCH - BRAKE PEDAL # SPEED CONTROL DEACTIVATION (BPS) +
67	CCB08 (VT-WH)	22	SWITCH - BRAKE ON/OFF (BPP) NORMAL OPEN
68	*	*	Not Used
69	*	*	Not Used
70	*	*	Not Used
71	RE731 (WH-OG)	18	SENSOR - HEATED OXYGEN POST CAT. 1ST OR UNIQUE (SIGRTN)
72	VE731 (YE-GN)	18	SENSOR - HEATED OXYGEN POST CAT. 1ST OR UNIQUE (HO2S12)
73	VE807 (YE-VT)	20	SENSOR - MASS AIRFLOW LH BANK OR 1ST BANK OR UNIQUE (MAF)

CONNECTOR VIEWS > CONNECTOR END VIEW C175E - POWERTRAIN CONTROL MODULE (PCM)

Connector:C175E

Description

POWERTRAIN CONTROL MODULE (PCM)

Color

Harness

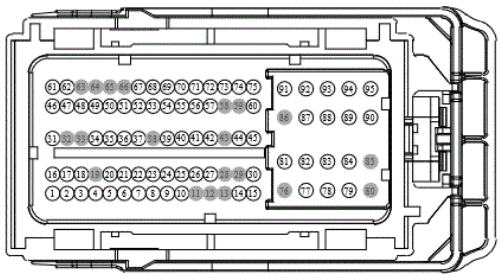
12C508

Base Part #

part# N/A

Service Pigtail

Not Available



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CE205 (GN-BU)	20	CTRL MOD. - POWERTRAIN # FUEL INJECTOR DRIVER 1 (INJ) +	
2	CE209 (BN)	20	CTRL MOD. - POWERTRAIN # FUEL INJECTOR DRIVER 5 (INJ) +	
3	CE208 (YE-OG)	20	CTRL MOD. - POWERTRAIN # FUEL INJECTOR DRIVER 4 (INJ) +	

4	CE422 (WH-OG)	18	CTRL MOD. - POWERTRAIN # VARIABLE CAMSHAFT TIMING VALVE 2 (VCT12)
5	CE421 (VT)	18	CTRL MOD. - POWERTRAIN # VARIABLE CAMSHAFT TIMING VALVE 1 (VCT11)
6	CE443 (BN-VT)	18	CTRL MOD. - POWERTRAIN # VARIABLE CAMSHAFT TIMING VALVE 4 (VCT22)
7	CE442 (YE-GY)	18	CTRL MOD. - POWERTRAIN # VARIABLE CAMSHAFT TIMING VALVE 3 (VCT21)
8	LE134 (YE)	20	CTRL MOD. - POWERTRAIN # ELECTRONIC THROTTLE CONTROL (ETCREF)
9	VE819 (GN-VT)	20	SENSOR - THROTTLE POSITION # POSITIVE SLOPE (TP2-)
10	VE818 (BN)	20	SENSOR - THROTTLE POSITION # NEGATIVE SLOPE (TP1-)
11	*	*	Not Used
12	*	*	Not Used
13	*	*	Not Used
14	CET10 (BU-GY)	20	CTRL MOD. - POWERTRAIN # SOLENOID PRESSURE CONTROL 6 (PC6) [EPC] [VFS]
15	CET09 (YE-VT)	20	CTRL MOD. - POWERTRAIN # SOLENOID PRESSURE CONTROL 5 (PC5) [EPC] [VFS]
16	CE212 (VT-OG)	20	CTRL MOD. - POWERTRAIN # FUEL INJECTOR DRIVER 8 (INJ) +

17	LE111 (VT-GN)	20	CTRL MOD. - POWERTRAIN # BUFFERED POWER SUPPLY SENSORS (VBPWR)
18	CBK01 (BU)	20	FUSE - 41 OR CIRCUIT BREAKER (VPWR F)
19	*	*	Not Used
20	LE449 (VT-GN)	18	CTRL MOD. - POWERTRAIN # VOLTAGE REFERENCE UNIVERSAL HEGO 2ND (UO2SGREF21)
21	LE448 (GY-BU)	18	CTRL MOD. - POWERTRAIN # VOLTAGE REFERENCE UNIVERSAL HEGO 1ST (UO2SGREF11)
22	RET24 (BN-BU)	20	CTRL MOD. - POWERTRAIN # TRANSMISSION RANGE SIGNAL RETURN (TRGND)
22	RET24 (BN-BU)	18	CTRL MOD. - POWERTRAIN # TRANSMISSION RANGE SIGNAL RETURN (TRGND)
23	RE134 (BU-OG)	20	CTRL MOD. - POWERTRAIN # ELECTRONIC THROTTLE CONTROL (ETCRTN)
24	VET27 (BN-YE)	20	SENSOR - TRANSMISSION FLUID TEMPERATURE (TFT)
25	RET33 (WH-VT)	20	SENSOR - TURBINE/TRANSMISSION SHAFT SPEED (TSS) -
26	RET04 (YE-OG)	20	CTRL MOD. - POWERTRAIN # SENSOR OUTPUT SHAFT SPEED (OSS)
26	RET04 (YE-OG)	18	CTRL MOD. - POWERTRAIN # SENSOR OUTPUT SHAFT SPEED (OSS)

27	VE740 (VT-GY)	18	SENSOR - INTAKE AIR TEMPERATURE (IAT)
28	*	*	Not Used
29	*	*	Not Used
30	LE142 (GN-WH)	20	CTRL MOD. - POWERTRAIN # ENGINE OIL QUALITY SENSOR +
31	CE210 (GN-WH)	20	CTRL MOD. - POWERTRAIN # FUEL INJECTOR DRIVER 6 (INJ) +
32	*	*	Not Used
33	*	*	Not Used
34	LE423 (GN-VT)	20	CTRL MOD. - POWERTRAIN # VOLTAGE REFERENCE ENGINE (VREF)
34	LE423 (VT-GN)	20	CTRL MOD. - POWERTRAIN # VOLTAGE REFERENCE ENGINE (VREF)
35	LE450 (WH)	18	CTRL MOD. - POWERTRAIN # UNIVERSAL HEATED OXYGEN PUMPING CURRENT 2ND (UO2SPC21)
36	LE451 (BN-YE)	18	CTRL MOD. - POWERTRAIN # UNIVERSAL HEATED OXYGEN PUMPING CURRENT 1ST (UO2SPC11)
37	VET32 (VT)	20	SENSOR - TRANSMISSION RANGE # PWM OUTPUT (TR -P)
38	*	*	Not Used

39	DE135 (BK)	20	CTRL MOD. - POWERTRAIN # CRANKSHAFT POSITION SENSOR (SHDRTN) D	
40	RE429 (GY-OG)	20	CTRL MOD. - POWERTRAIN # VARIABLE RELUCTANCE SENSOR (VRSRTN) (CAMSHAFT POSITION)	
41	VE707 (GN-VT)	20	SENSOR - CAMSHAFT POSITION BANK 2 IN+EX / IN (CMP22)	
42	VE738 (YE-BU)	18	SENSOR - CAMSHAFT POSITION BANK 2 EX (CMP21)	
43	*	*	Not Used	
44	VE741 (YE-OG)	20	Intake Manifold Runner Control Bank 2 (IMRC2) Sensor (IMRC2M)	
45	VE742 (BU-WH)	20	Intake Manifold Runner Control Bank 1 (IMRC1) Sensor (IMRC1M)	
46	CE207 (VT-GY)	20	CTRL MOD. - POWERTRAIN # FUEL INJECTOR DRIVER 3 (INJ) +	
47	VE712 (BU-GY)	20	SENSOR - CYLINDER HEAD TEMPERATURE (CHT)	
48	CMC24 (GY)	18	SWITCH-ENGINE OIL PRESSURE	WITHOUT PERFORMANCE PACKAGE
49	RE454 (YE-GN)	20	CTRL MOD. - POWERTRAIN # SIGNAL RETURN ENGINE #2 (SIGRTN)	
50	VE827 (WH-GN)	18	SENSOR - UNIVERSAL HEATED OXYGEN 2ND (UO2S21)	

51	VE826 (BN-VT)	18	SENSOR - UNIVERSAL HEATED OXYGEN 1ST OR UNIQUE (UO2S11)	
52	RE323 (WH-BN)	20	CTRL MOD. - POWERTRAIN # KNOCK SENSOR 1ST BANK 1ST OR UNIQUE (KS1-)	
53	VE801 (VT-OG)	20	SENSOR - KNOCK 1ST BANK 1ST OR UNIQUE (KS1+)	
54	RE429 (GY-OG)	20	CTRL MOD. - POWERTRAIN # VARIABLE RELUCTANCE SENSOR (VRSRTN) (CAMSHAFT POSITION)	
55	VE706 (BN-BU)	20	SENSOR - CAMSHAFT POSITION BANK 1 IN+EX / IN (CMP12)	
56	VE736 (WH-GN)	18	SENSOR - CAMSHAFT POSITION BANK 1 EX (CMP11)	
57	CMC24 (GY)	18	SENSOR- ENGINE OIL PRESSURE	WITH PERFORMANCE PACKAGE
58	*	*	Not Used	
59	*	*	Not Used	
60	CE316 (BU)	20	Intake Manifold Runner Control Bank 1 (IMRC1) Solenoid (IMRC1A)	
61	CE211 (GY-BN)	20	CTRL MOD. - POWERTRAIN # FUEL INJECTOR DRIVER 7 (INJ) +	
62	CE206 (GY-YE)	20	CTRL MOD. - POWERTRAIN # FUEL INJECTOR DRIVER 2 (INJ) +	
63	*	*	Not Used	

64	*	*	Not Used
65	*	*	Not Used
66	*	*	Not Used
67	RE324 (BN-GN)	20	CTRL MOD. - POWERTRAIN # KNOCK SENSOR 2ND BANK 1ST (KS2-)
68	VE802 (BN-BU)	20	SENSOR - KNOCK 2ND BANK 1ST (KS2+)
69	RE135 (GN-BN)	20	CTRL MOD. - POWERTRAIN # CRANKSHAFT POSITION SENSOR (CKP-)
70	VE711 (YE-VT)	20	SENSOR - CRANKSHAFT POSITION (CKP+)
71	CE113 (WH-BN)	18	CTRL MOD. - POWERTRAIN # CANISTER PURGE VALVE (CANP)
72	CET08 (BN-WH)	20	CTRL MOD. - POWERTRAIN # SOLENOID PRESSURE CONTROL 4 (PC4) [EPC] [VFS]
73	CET07 (GY-OG)	20	CTRL MOD. - POWERTRAIN # SOLENOID PRESSURE CONTROL 3 (PC3) [EPC] [VFS]
74	CET06 (GN-BN)	20	CTRL MOD. - POWERTRAIN # SOLENOID PRESSURE CONTROL 2 (PC2) [EPC] [VFS]
75	CET05 (BU-GN)	20	CTRL MOD. - POWERTRAIN # SOLENOID PRESSURE CONTROL 1 (PC1) [EPC] [VFS]
76	*	*	Not Used
77	CET16	20	CTRL MOD. - POWERTRAIN # SOLENOID SHIFT

	(WH-BU)		CONTROL HIGH-SIDE 1 (SS-H1) [HMSS]
78	CE233 (WH-OG)	18	CTRL MOD. - POWERTRAIN # HEATER OXYGEN SEN. POST CAT. 1ST OR UNIQUE (HTR12)
79	CE236 (GY-VT)	18	CTRL MOD. - POWERTRAIN # HEATER OXYGEN SEN. PRE CAT. 2ND (UO2SHTR21)
80	*	*	Not Used
81	CE426 (BU-GN)	18	CTRL MOD. - POWERTRAIN # THROTTLE ACTUATOR CONTROL MOTOR (TACM-)
82	CE412 (YE-VT)	18	CTRL MOD. - POWERTRAIN # THROTTLE ACTUATOR CONTROL MOTOR (TACM+)
83	CE234 (BU-WH)	18	CTRL MOD. - POWERTRAIN # HEATER OXYGEN SEN. POST CAT. 2ND (HTR22)
84	CE235 (GN-BN)	18	CTRL MOD. - POWERTRAIN # HEATER OXYGEN SEN. PRE CAT. 1ST OR UNIQUE (UO2SHTR11)
85	*	*	Not Used
86	*	*	Not Used
87	CE309 (YE-GY)	18	CTRL MOD. - POWERTRAIN # IGNITION COIL ON PLUG ASSEMBLY 7 (COP7G)
88	CE308 (VT-BN)	18	CTRL MOD. - POWERTRAIN # IGNITION COIL ON PLUG ASSEMBLY 6 (COP6E)
89	CE307 (WH-BN)	18	CTRL MOD. - POWERTRAIN # IGNITION COIL ON PLUG ASSEMBLY 5 (COP5B)
90	CE310 (BU-BN)	18	CTRL MOD. - POWERTRAIN # IGNITION COIL ON PLUG ASSEMBLY 8 (COP8D)

CONNECTOR VIEWS > CONNECTOR END VIEW C181 - FUEL INJECTOR 1

Connector:C181

Description

FUEL INJECTOR 1

Color

GY

Harness

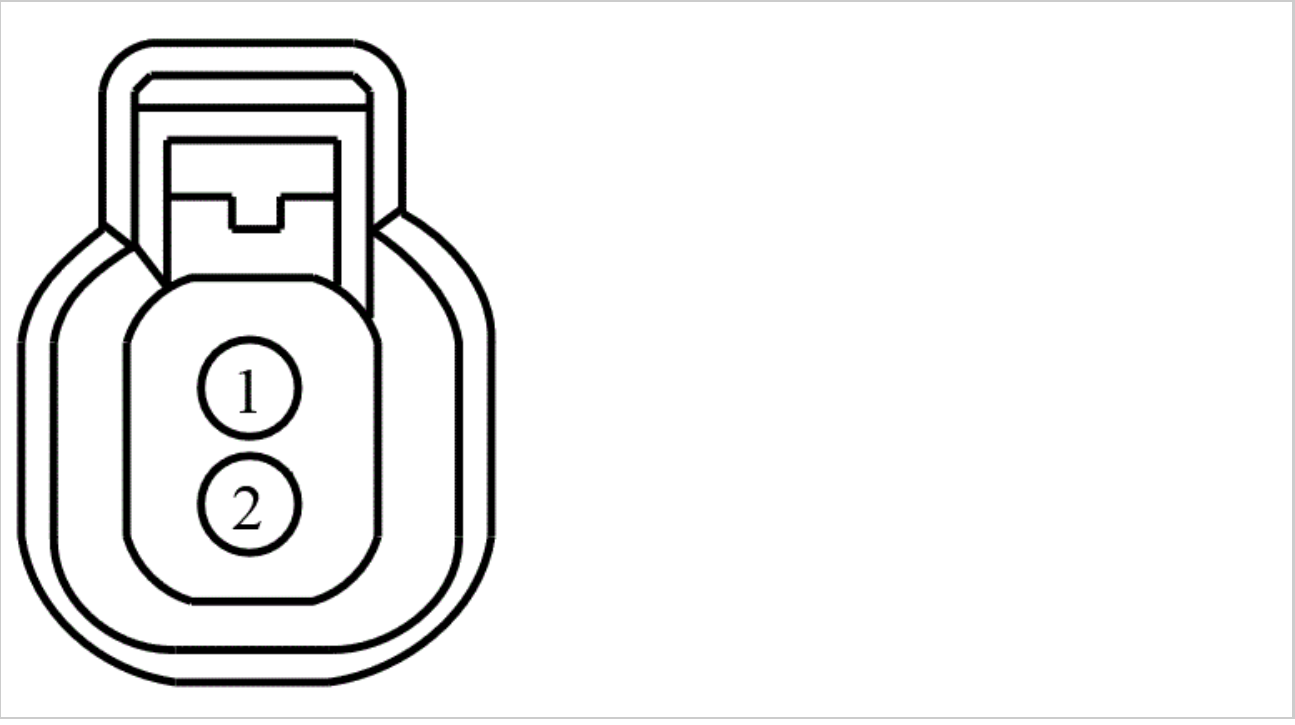
12C508

Base Part #

part# N/A

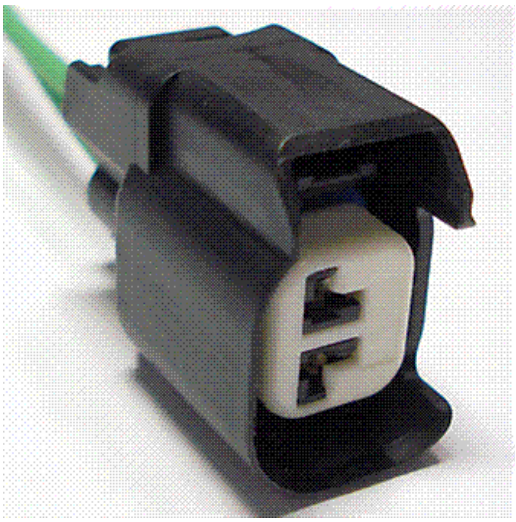
Service Pigtail

See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CE205 (GN-BU)	20	CTRL MOD. - POWERTRAIN # FUEL INJECTOR DRIVER 1 (INJ) +	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1051** 	Service Part Number: **5U2Z-14S411-ZB** Gauge: **16** Pin material: **Silver** Cavities: **2** Vehicle Uses Fuel Injector Horn Switch - Backup Lamp Switch - Hood Ajar

CONNECTOR VIEWS > CONNECTOR END VIEW C182 - FUEL INJECTOR 2

Connector:C182

Description

FUEL INJECTOR 2

Color

GY

Harness

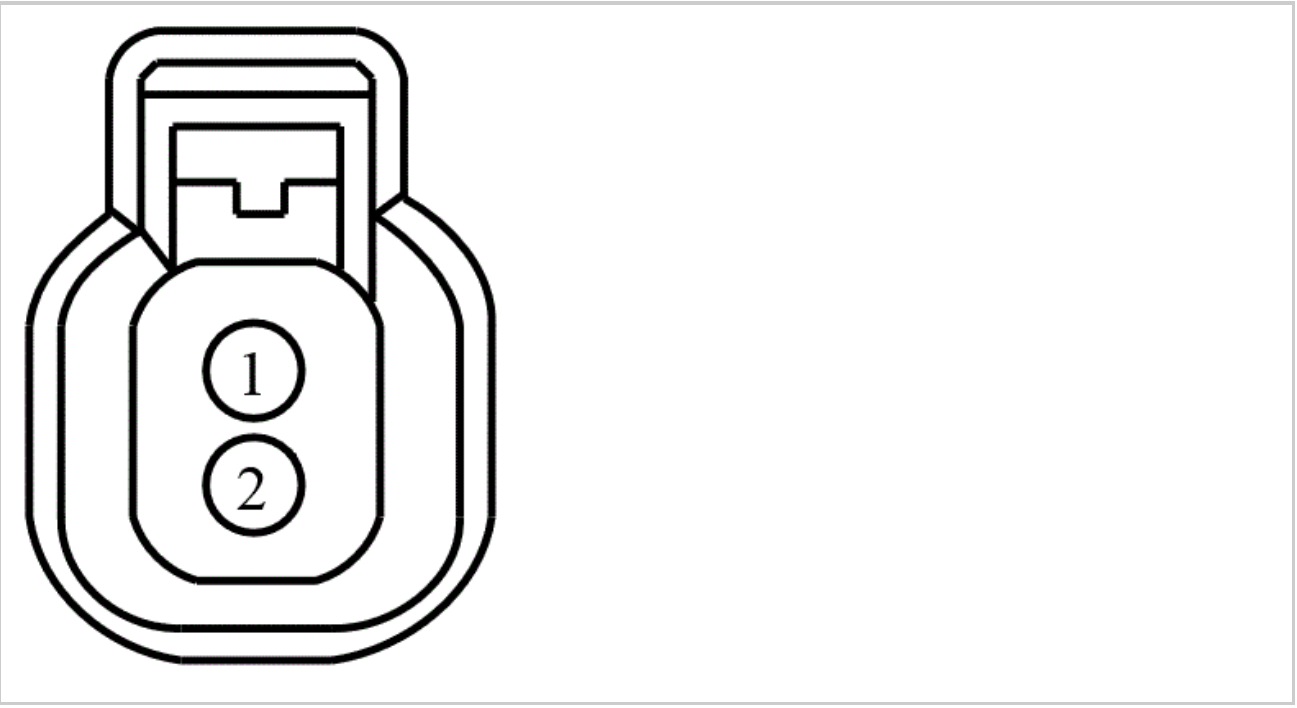
12C508

Base Part #

part# N/A

Service Pigtail

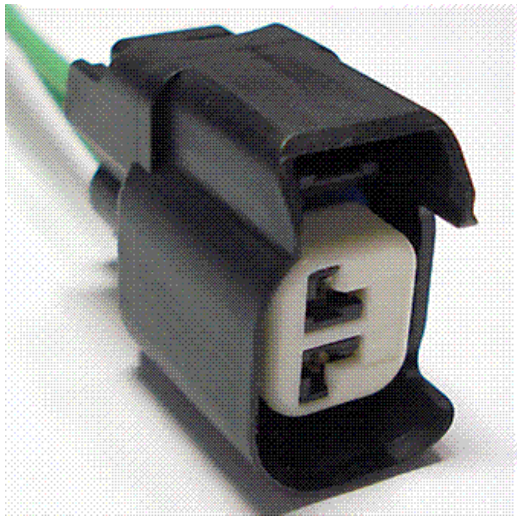
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CE206 (GY-YE)	20	CTRL MOD. - POWERTRAIN # FUEL INJECTOR DRIVER 2 (INJ) +	
2	CBK01 (BU)	20	FUSE - 41 OR CIRCUIT BREAKER (VPWR F)	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1051**	Service Part Number: **5U2Z-14S411-ZB** Gauge: **16** Pin material: **Silver** Cavities: **2** Vehicle Uses

	Fuel Injector Horn Switch - Backup Lamp Switch - Hood Ajar

CONNECTOR VIEWS > CONNECTOR END VIEW C183 - FUEL INJECTOR 3

Connector:C183

Description

FUEL INJECTOR 3

Color

GY

Harness

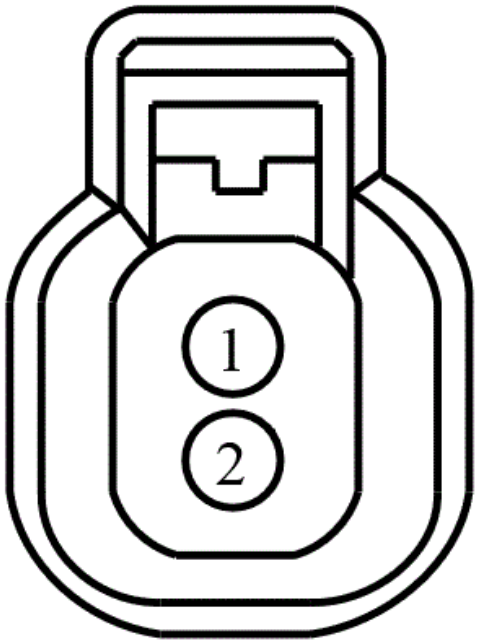
12C508

Base Part #

part# N/A

Service Pigtail

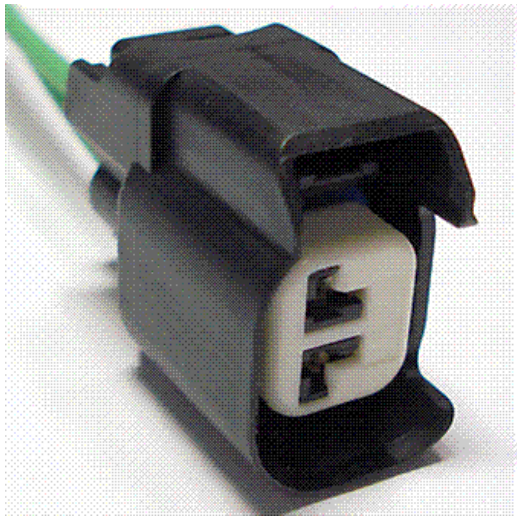
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CE207 (VT-GY)	20	CTRL MOD. - POWERTRAIN # FUEL INJECTOR DRIVER 3 (INJ) +	
2	CBK01 (BU)	20	FUSE - 41 OR CIRCUIT BREAKER (VPWR F)	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1051**	Service Part Number: **5U2Z-14S411-ZB** Gauge: **16** Pin material: **Silver** Cavities: **2**



Vehicle Uses

Fuel Injector

Horn

Switch - Backup Lamp

Switch - Hood Ajar

CONNECTOR VIEWS > CONNECTOR END VIEW C184 - FUEL INJECTOR 4

Connector:C184

Description

FUEL INJECTOR 4

Color

GY

Harness

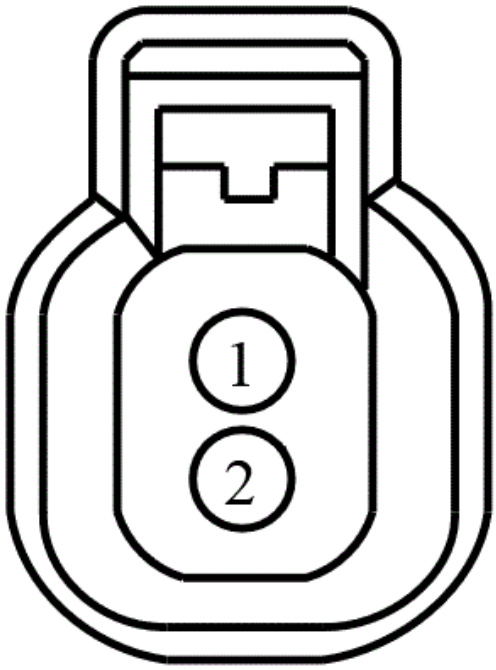
12C508

Base Part #

part# N/A

Service Pigtail

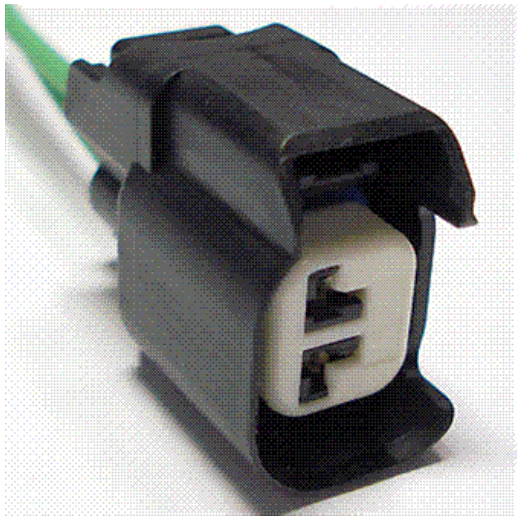
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CE208 (YE-OG)	20	CTRL MOD. - POWERTRAIN # FUEL INJECTOR DRIVER 4 (INJ) +	
2	CBK01 (BU)	20	FUSE - 41 OR CIRCUIT BREAKER (VPWR F)	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1051**	Service Part Number: **5U2Z-14S411-ZB** Gauge: **16** Pin material: **Silver** Cavities: **2**



Vehicle Uses

Fuel Injector

Horn

Switch - Backup Lamp

Switch - Hood Ajar

CONNECTOR VIEWS > CONNECTOR END VIEW C185 - FUEL INJECTOR 5

Connector:C185

Description

FUEL INJECTOR 5

Color

GY

Harness

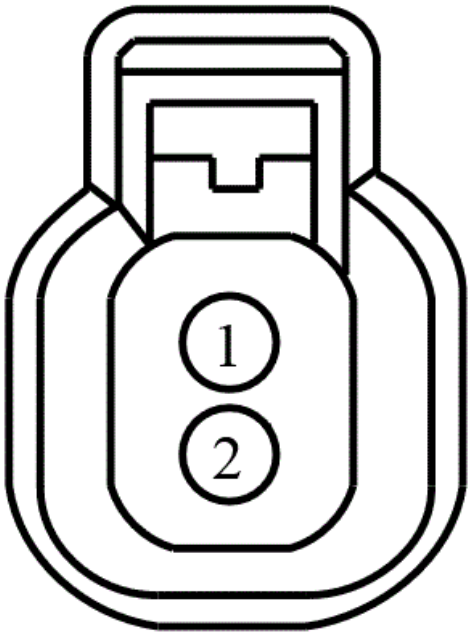
12C508

Base Part #

part# N/A

Service Pigtail

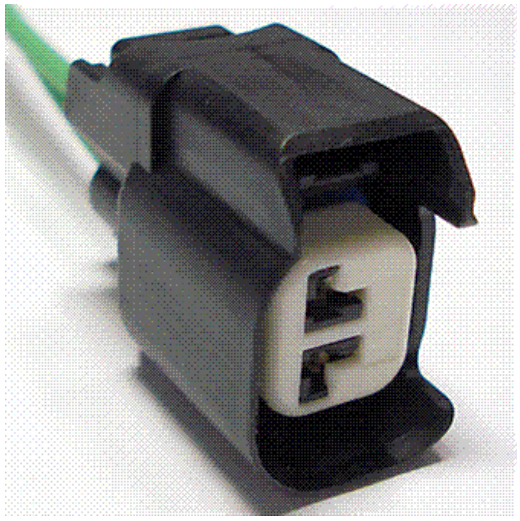
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CE209 (BN)	20	CTRL MOD. - POWERTRAIN # FUEL INJECTOR DRIVER 5 (INJ) +	
2	CBK01 (BU)	20	FUSE - 41 OR CIRCUIT BREAKER (VPWR F)	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1051**	Service Part Number: **5U2Z-14S411-ZB** Gauge: **16** Pin material: **Silver** Cavities: **2**



Vehicle Uses

Fuel Injector

Horn

Switch - Backup Lamp

Switch - Hood Ajar

CONNECTOR VIEWS > CONNECTOR END VIEW C186 - FUEL INJECTOR 6

Connector:C186

Description

FUEL INJECTOR 6

Color

GY

Harness

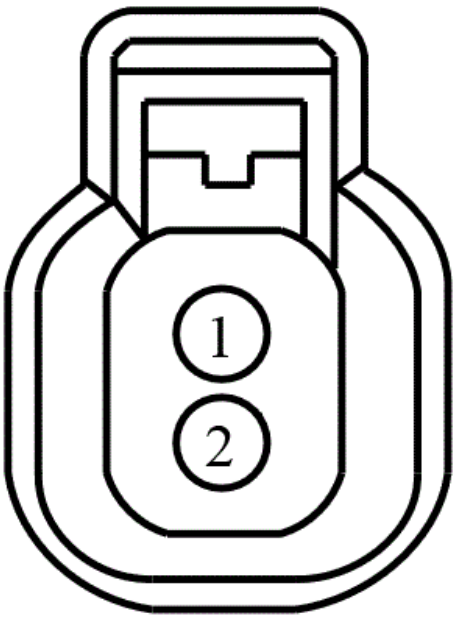
12C508

Base Part #

part# N/A

Service Pigtail

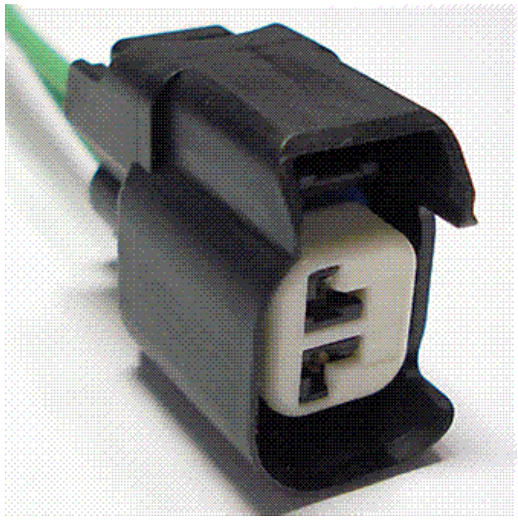
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CE210 (GN-WH)	20	CTRL MOD. - POWERTRAIN # FUEL INJECTOR DRIVER 6 (INJ) +	
2	CBK01 (BU)	20	FUSE - 41 OR CIRCUIT BREAKER (VPWR F)	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1051**	Service Part Number: **5U2Z-14S411-ZB** Gauge: **16** Pin material: **Silver** Cavities: **2** Vehicle Uses

	Fuel Injector Horn Switch - Backup Lamp Switch - Hood Ajar

CONNECTOR VIEWS > CONNECTOR END VIEW C187 - FUEL INJECTOR 7

Connector:C187

Description

FUEL INJECTOR 7

Color

GY

Harness

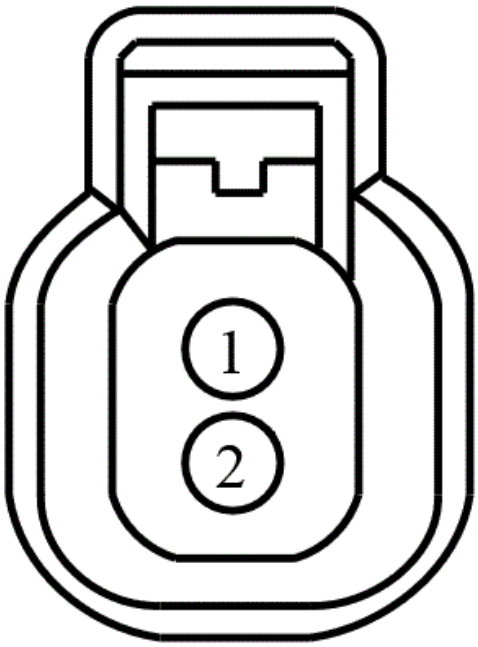
12C508

Base Part #

part# N/A

Service Pigtail

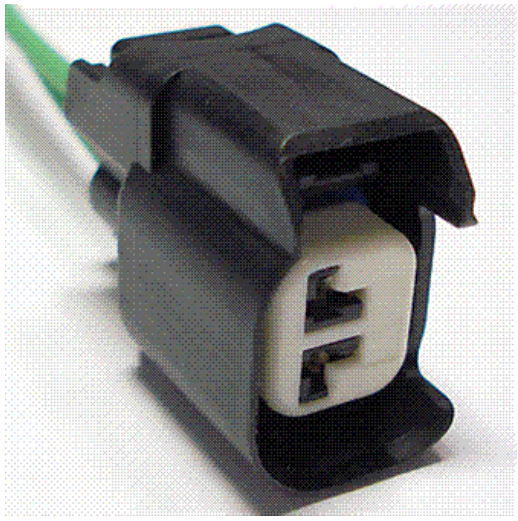
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CE211 (GY-BN)	20	CTRL MOD. - POWERTRAIN # FUEL INJECTOR DRIVER 7 (INJ) +	
2	CBK01 (BU)	20	FUSE - 41 OR CIRCUIT BREAKER (VPWR F)	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1051**	Service Part Number: **5U2Z-14S411-ZB** Gauge: **16** Pin material: **Silver** Cavities: **2** Vehicle Uses

	Fuel Injector Horn Switch - Backup Lamp Switch - Hood Ajar

CONNECTOR VIEWS > CONNECTOR END VIEW C188 - FUEL INJECTOR 8

Connector:C188

Description

FUEL INJECTOR 8

Color

GY

Harness

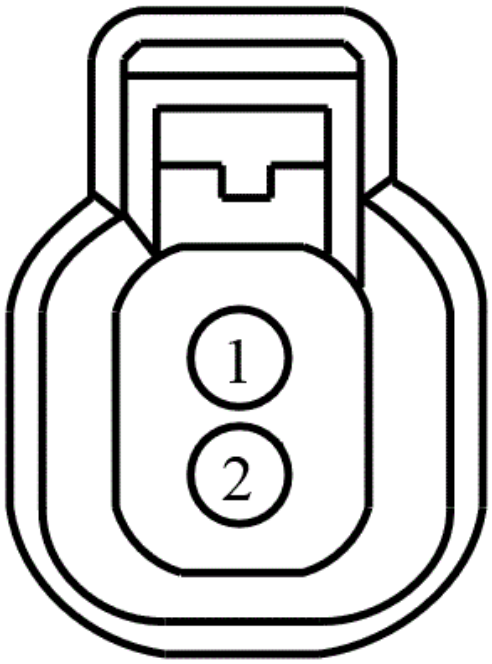
12C508

Base Part #

part# N/A

Service Pigtail

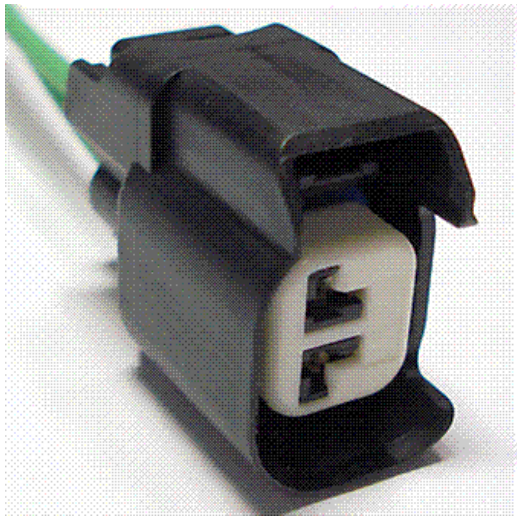
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CE212 (VT-OG)	20	CTRL MOD. - POWERTRAIN # FUEL INJECTOR DRIVER 8 (INJ) +	
2	CBK01 (BU)	20	FUSE - 41 OR CIRCUIT BREAKER (VPWR F)	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1051**	Service Part Number: **5U2Z-14S411-ZB** Gauge: **16** Pin material: **Silver** Cavities: **2**



Vehicle Uses

Fuel Injector

Horn

Switch - Backup Lamp

Switch - Hood Ajar

CONNECTOR VIEWS > CONNECTOR END VIEW C190 - CRANKCASE PRESSURE SENSOR

Connector:C190

Description

CRANKCASE PRESSURE SENSOR

Color

BK

Harness

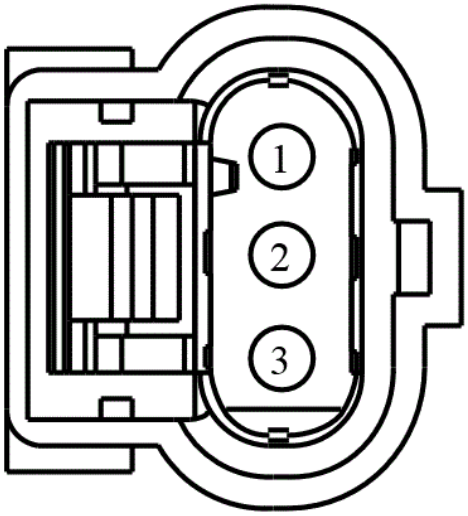
12C508

Base Part #

part# N/A

Service Pigtail

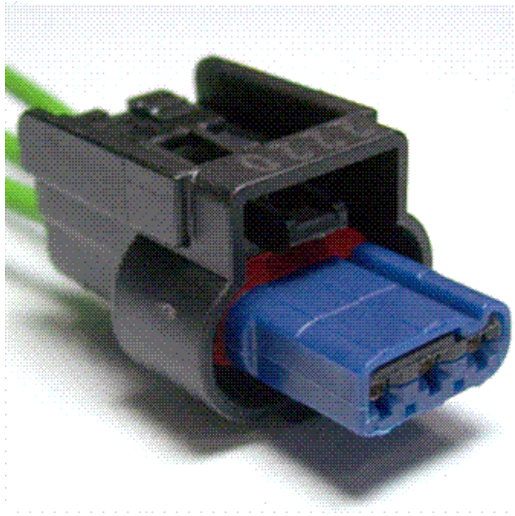
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CE328 (YE-VT)	18	CTRL MOD. - POWERTRAIN # POS. CRANKCASE PRESSURE SENSOR (CKCP)	
2	RE454 (YE-GN)	20	CTRL MOD. - POWERTRAIN # SIGNAL RETURN ENGINE #2	
3	LE458 (BU-WH)	20	CTRL MOD. - POWERTRAIN # VOLTAGE REFERENCE ENGINE 2 (VREF)	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1202**	Service Part Number: **BU2Z-14S411-ARA** Gauge: **16** Pin material: **Silver** Cavities: **3**



Vehicle Uses

Actuator - Turbocharger Waste Gate

Coil - Ignition

Sensor - Cam Shaft Position

Sensor - Crank Shaft Position

CONNECTOR VIEWS > CONNECTOR END VIEW C191 - INTAKE MANIFOLD RUNNER CONTROL BANK 1 (IMRC1) SOLENOID

Connector:C191

Description

INTAKE MANIFOLD RUNNER CONTROL BANK 1 (IMRC1) SOLENOID

Color

Harness

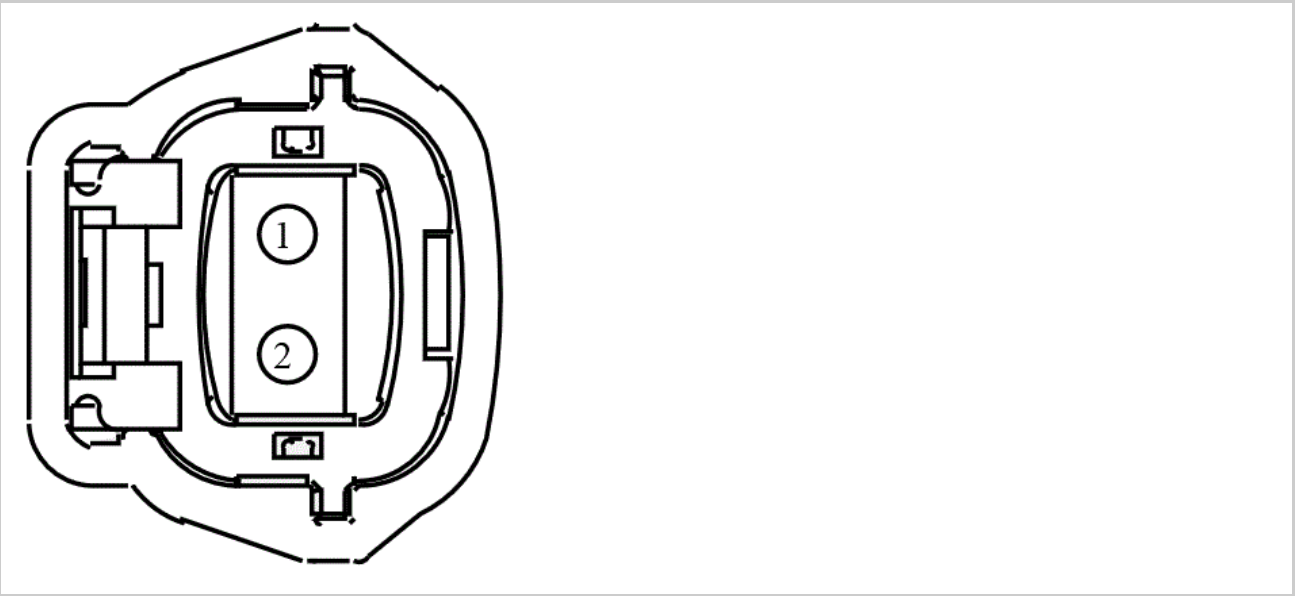
12C508

Base Part #

part# N/A

Service Pigtail

Not Available



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CBK02 (GN)	20	FUSE - 40 OR CIRCUIT BREAKER (VPWR)	
2	CE316 (BU)	20	CTRL MOD. - POWERTRAIN # INTAKE MANIFOLD RUNNER CONTROL BANK 1 (IMRC1A)	

CONNECTOR VIEWS > CONNECTOR END VIEW C192 - TEST CONNECTOR

Connector:C192

Description

TEST CONNECTOR

Color

LT GY

Harness

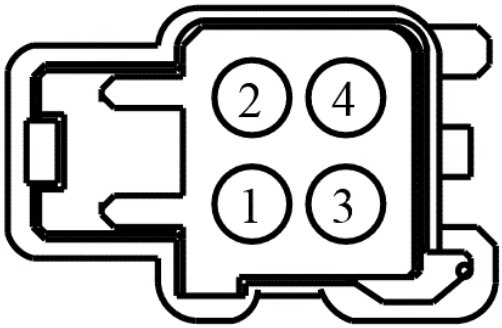
14401

Base Part #

part# N/A

Service Pigtail

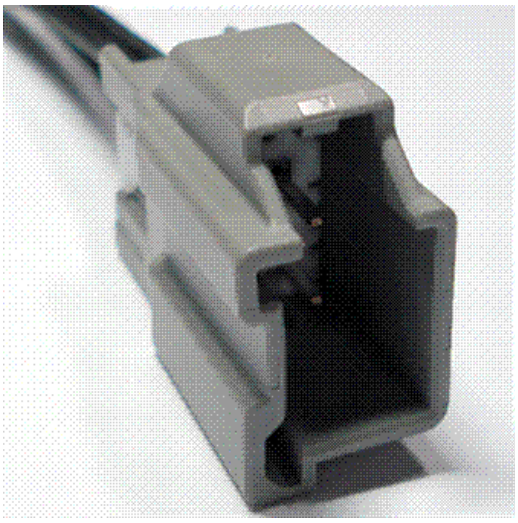
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	VDB29 (GN)	26	CONNECTOR - DIAGNOSTIC # CAN BUS HIGH SPEED 3 (LOWER) HIGH	
2	VDB30 (WH)	26	CONNECTOR - DIAGNOSTIC # CAN BUS HIGH SPEED 3 (LOWER) LOW	
3	VDB06 (GY)	26	CONNECTOR - DIAGNOSTIC # CAN BUS MEDIUM SPEED HIGH	
4	VDB07 (VT)	26	CONNECTOR - DIAGNOSTIC # CAN BUS MEDIUM SPEED LOW	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1076**	Service Part Number: **3U2Z-14S411-BUB** Gauge: **14** Pin material: **Tin (greased)** Cavities: **4**



Vehicle Uses

Connector - Inline

Element - Heated Seat

Lamp - Ash Tray

Lamp - Courtesy - Footwell

Module - Remote Keyless Entry

Motor - Heater/AC Blower (Auxiliary)

Radio - Amplifier

Switch - Convertable Top

CONNECTOR VIEWS > CONNECTOR END VIEW C197A - STARTER MOTOR

Connector:C197A

Description

STARTER MOTOR

Color

Harness

14B060

Base Part #

part# N/A

Service Pigtail

Not Available



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	SDC04 (RD)	2	BATTERY - AUXILIARY # PLUS	

CONNECTOR VIEWS > CONNECTOR END VIEW C197B - STARTER MOTOR

Connector:C197B

Description

STARTER MOTOR

Color

Harness

14B060

Base Part #

part# N/A

Service Pigtail

Not Available



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CDC25 (BN-GN)	14	RELAY - STARTER	

CONNECTOR VIEWS > CONNECTOR END VIEW C197C - STARTER MOTOR

Connector:C197C

Description

STARTER MOTOR

Color

Harness

14B060

Base Part #

part# N/A

Service Pigtail

Not Available



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	SDC04 (RD)	2	BATTERY - AUXILIARY # PLUS	

CONNECTOR VIEWS > CONNECTOR END VIEW C197D - STARTER MOTOR

Connector:C197D

Description

STARTER MOTOR

Color

Harness

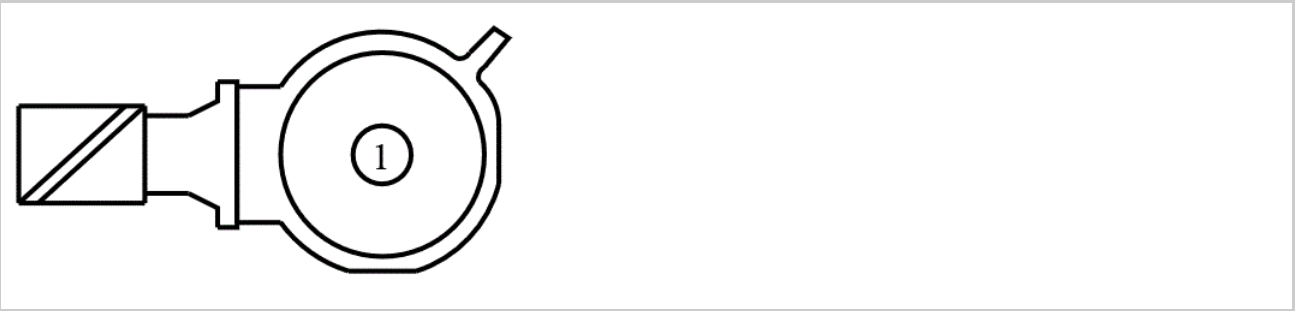
14B060

Base Part #

part# N/A

Service Pigtail

Not Available



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	SDC04 (YE-RD)	4	BATTERY - AUXILIARY # PLUS	

CONNECTOR VIEWS > CONNECTOR END VIEW C205 - HEADLAMP SWITCH

Connector:C205

Description

HEADLAMP SWITCH

Color

BK

Harness

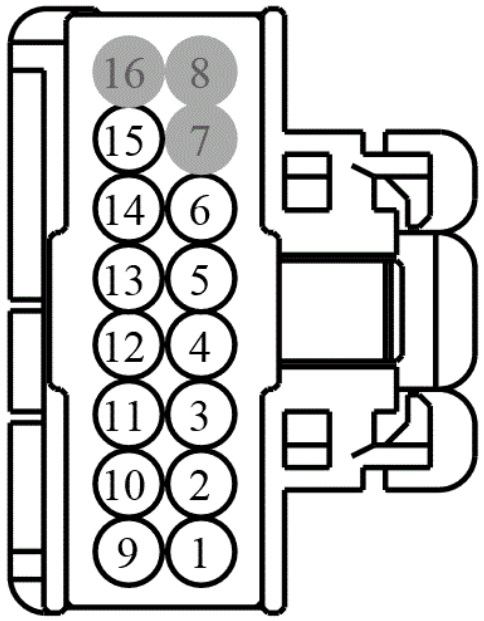
14401

Base Part #

part# N/A

Service Pigtail

See Below



Check for Terminal Part Numbers

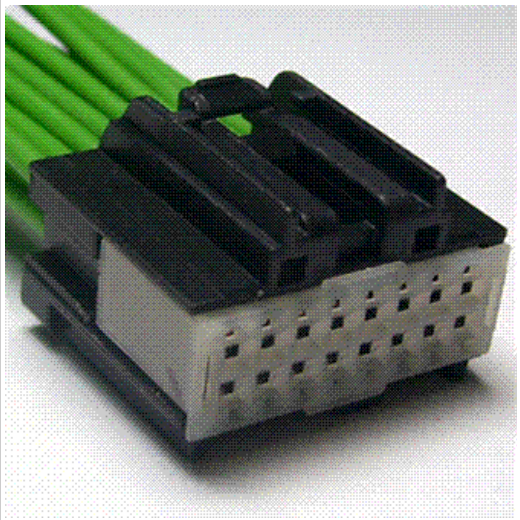
Pin	Circuit	Gauge	Circuit Function	Qualifier
1	VLF63 (VT)	22	CTRL MOD. - MOTOR HEADLAMP LEVELING SIGNAL	
2	CLF57 (YE-BU)	26	SWITCH - FOG LAMPS REAR	
3	CLN56 (BN)	26	DIMMER - IP/SWITCH ILLUMINATION # DIM DOWN	
4	GD214 (BK-BU)	20	GROUND - INSTRUMENT PANEL STRUCTURE	
5	GD216 (BK-VT)	18	GROUND - INSTRUMENT PANEL STRUCTURE # 3RD POINT	
6	CLN55 (YE-GN)	26	DIMMER - IP/SWITCH ILLUMINATION # DIM UP	
7	*	*	Not Used	
8	*	*	Not Used	
9	CBB68 (GY-VT)	22	FUSE - 68 OR CIRCUIT BREAKER	

10	CLF23 (WH)	26	SWITCH - HEADLAMP OFF
11	CLS34 (GY)	26	SWITCH - PARK LAMPS
12	CLF18 (BU)	26	SWITCH - BEAM LOW
13	CLF19 (VT)	26	SWITCH - AUTOLAMP (1) ON
14	CLF21 (GY)	26	SWITCH - FOG LAMPS FRONT
15	VLN04 (VT)	26	CTRL MOD. - IP/SWITCH ILLUMINATION
16	*	*	Not Used

Available Pigtail Kits

Pigtail Kit Part Number

WPT-1294



Service Part Number:

CU2Z-14S411-AJA

Gauge:

18

Pin material:

Silver

Cavities:

16

Vehicle Uses

Mirror - Rearview

Mirror - Rearview (electrochromatic)

CONNECTOR VIEWS > CONNECTOR END VIEW C209 - FOOTWELL LAMP LH

Connector:C209

Description

FOOTWELL LAMP LH

Color

LT GY

Harness

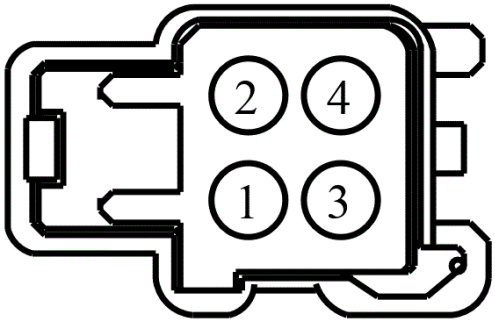
14401

Base Part #

part# N/A

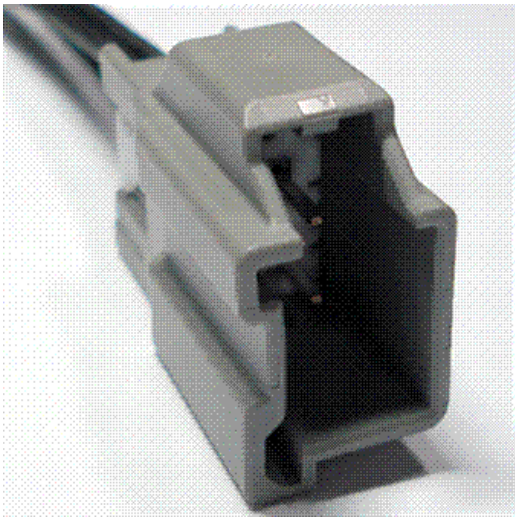
Service Pigtail

See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CLN44 (OG)	26	CTRL MOD. - AMBIENT LIGHTING ZONE 1 OR NON-ZONE # LED RED +	
2	CLN45 (GN)	26	CTRL MOD. - AMBIENT LIGHTING ZONE 1 OR NON-ZONE # LED GREEN +	
3	CLN46 (BU)	26	CTRL MOD. - AMBIENT LIGHTING ZONE 1 OR NON-ZONE # LED BLUE +	
4	RLN44 (BN)	26	CTRL MOD. - AMBIENT LIGHTING ZONE 1 OR NON-ZONE # LED -	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1076** 	Service Part Number: **3U2Z-14S411-BUB** Gauge: **14** Pin material: **Tin (greased)** Cavities: **4** Vehicle Uses Connector - Inline Element - Heated Seat Lamp - Ash Tray Lamp - Courtesy - Footwell Module - Remote Keyless Entry Motor - Heater/AC Blower (Auxiliary) Radio - Amplifier Switch - Convertable Top

CONNECTOR VIEWS > CONNECTOR END VIEW C210 - INLINE

InlineC210

Description

INLINE

Color

BK

Base Part #

Service Pigtail

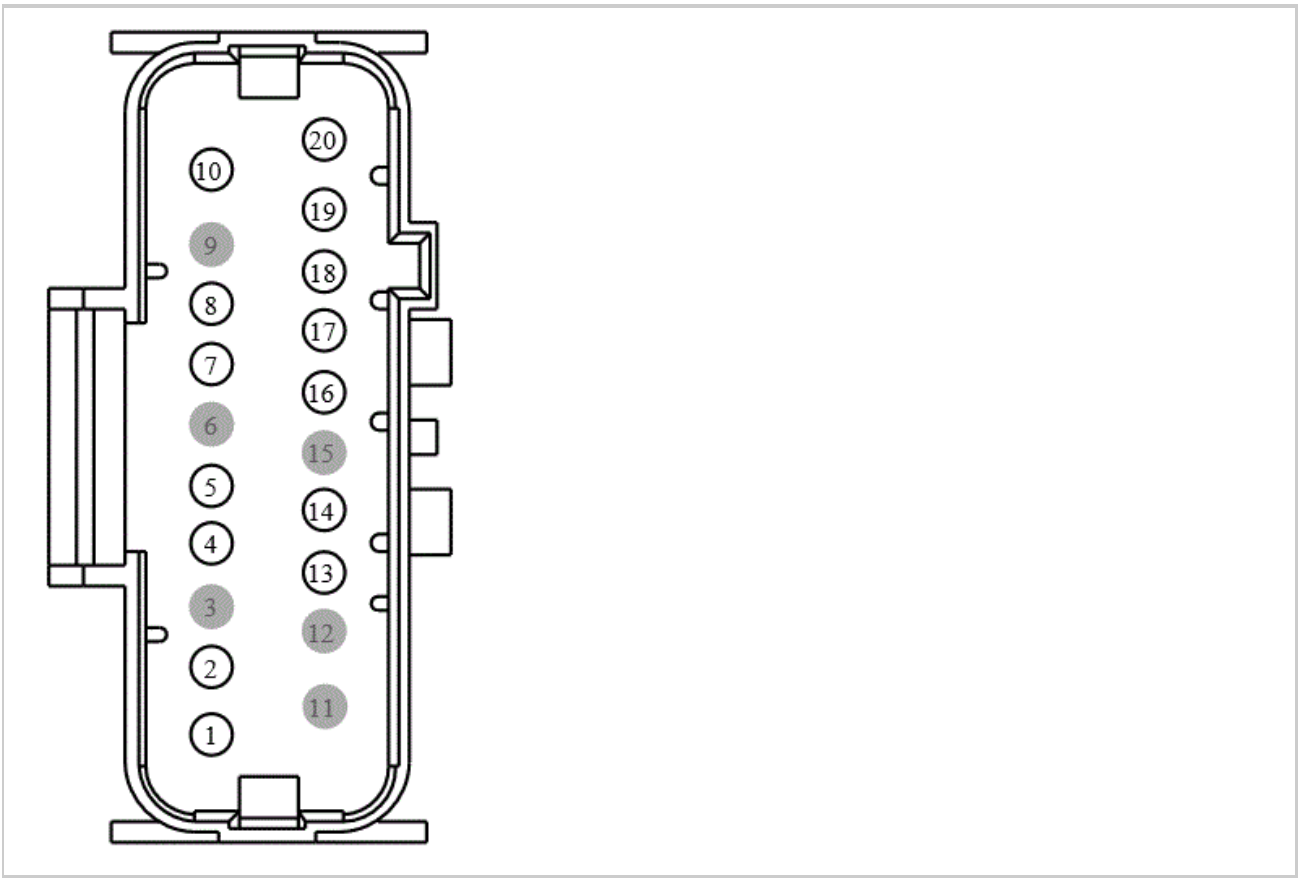
Not Available

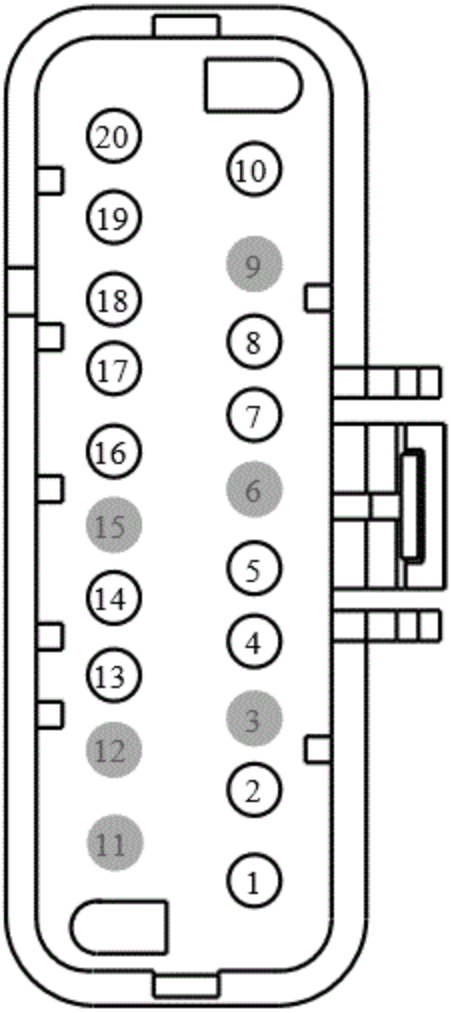
MALE

Harness 14A005

FEMALE

Harness 14401





Pin	Circuit	Gauge	Qualifier
1	RME07 (WH-BN)	18	
1	RME15 (GN-BU)	18	14A005
1	RME15 (GY-BU)	18	14401
2	VME07 (WH)	18	
2	VME15 (GN-BU)	18	14401
2	VME15 (GY-BU)	18	14A005

3	*	*	
4	VMC23 (GN-OG)	18	14A005
4	VMC23 (GN-OG)	22	14401
5	RMC33 (GN-OG)	22	14401
5	RMC33 (WH-VT)	18	14A005
6	*	*	
7	VPRC1 (BU)	26	14401
7	VPRC1 (BU-GN)	22	14A005
8	LPRC1 (YE)	26	14401
8	LPRC1 (YE-OG)	22	14A005
9	*	*	
10	GD215 (BK-GY)	14	14401
10	GD215 (BK-GY)	22	14A005
11	*	*	
12	*	*	
13	VMC11 (YE)	26	14401

13	VMC11 (YE-VT)	18	14A005
14	RMC32 (GN)	26	14401
14	RMC32 (GN-BU)	18	14A005
15	*	*	
16	CME31 (BU-GN)	22	
17	VDB06 (GY)	26	14A005
17	VDB06 (GY)	26	
17	VDB06 (GY-OG)	22	14A005
18	VDB07 (VT)	26	14A005
18	VDB07 (VT)	26	
18	VDB07 (VT-OG)	22	14A005
19	VME06 (GN)	18	
20	RME06 (GY-YE)	18	

CONNECTOR VIEWS > CONNECTOR END VIEW C213 - INLINE

InlineC213

Description

INLINE

Color

Base Part #

Service Pigtail

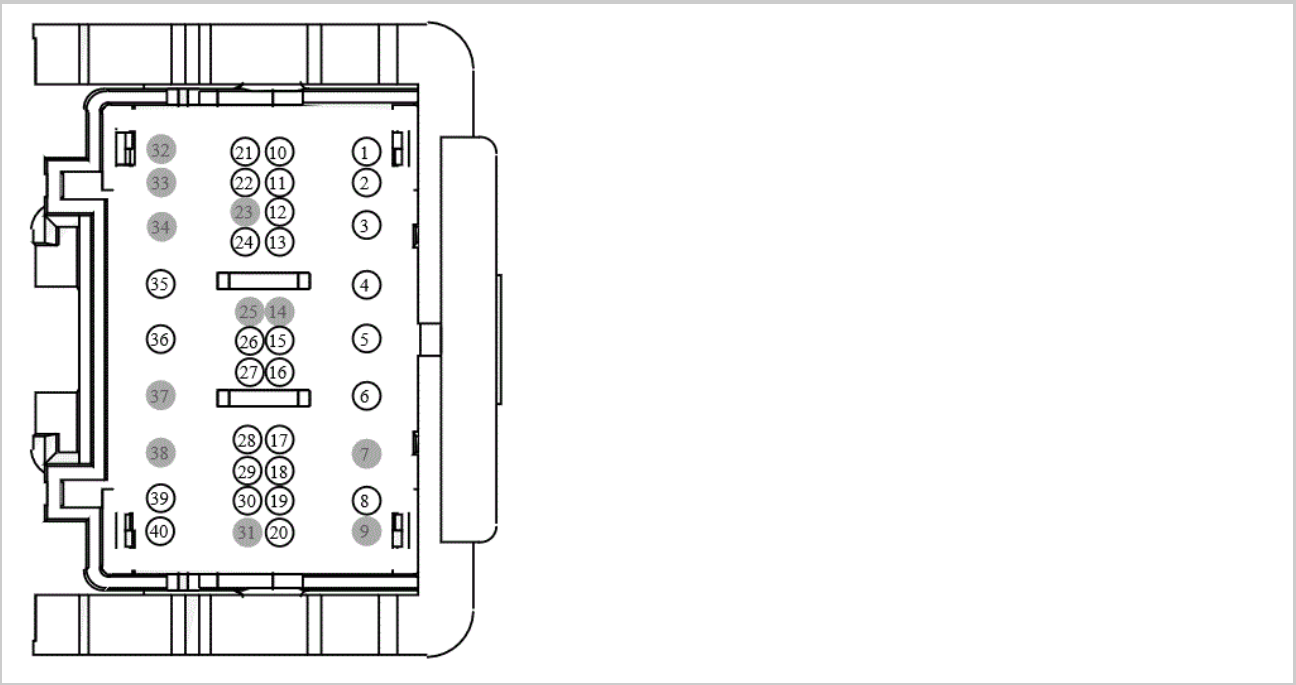
Not Available

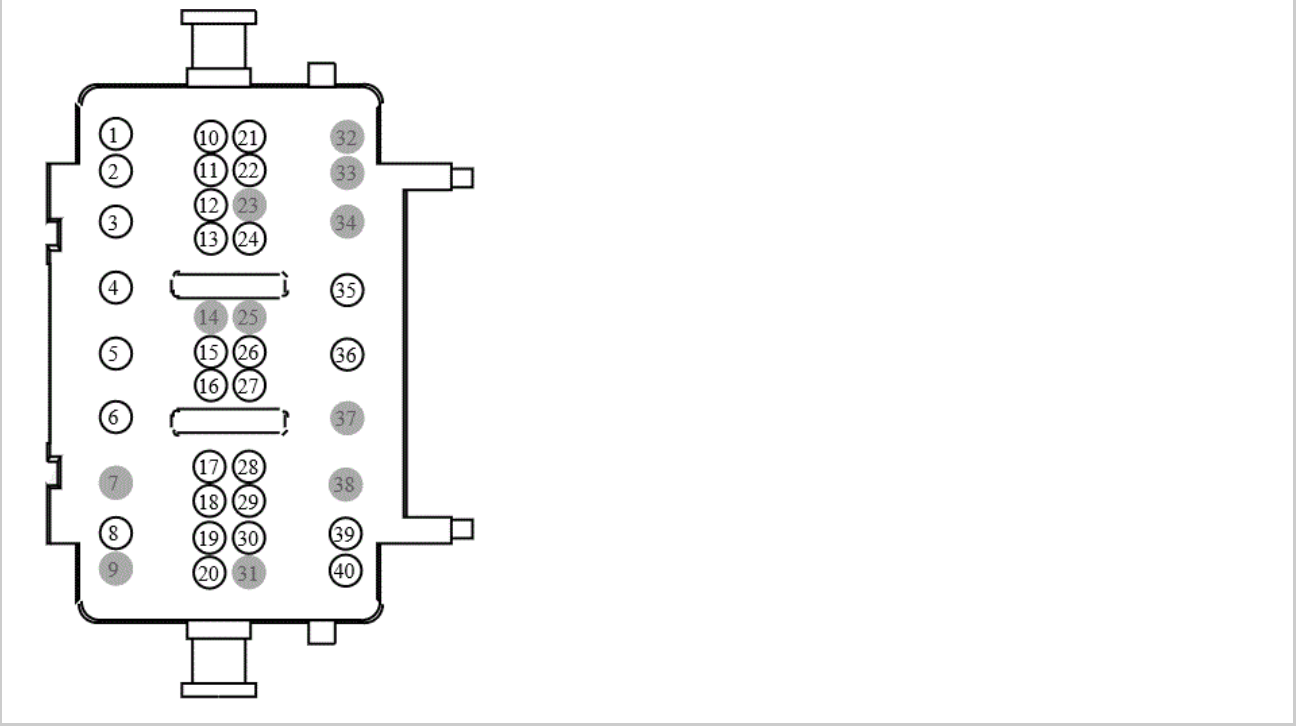
MALE

Harness 14401

FEMALE

Harness 14A005





Pin	Circuit	Gauge	Qualifier
1	CME44 (YE-GN)	20	14A005
1	CME44 (YE-GN)	20	
1	CME44 (YE-GN)	22	14A005
2	CLN09 (YE-GN)	22	
3	VME09 (WH-GN)	18	
4	RME09 (BN-YE)	18	
5	RME12 (BN-BU)	18	
6	VME12 (BN-WH)	18	
7	*	*	
8	CLS10 (GN-BN)	20	
9	*	*	
10	RMEA0 (WH)	26	14401
10	RMEA0 (WH-OG)	22	14A005
11	VMEA0 (BU)	26	14401
11	VMEA0 (BU-GN)	22	14A005

12	CLN44 (OG)	22	14401
12	CLN44 (OG)	26	14A005
13	CLN45 (GN)	22	14401
13	CLN45 (GN)	26	14A005
14	*	*	
15	VDB25 (GN)	26	
16	VDB06 (GY)	26	
17	VPL56 (BU)	26	
18	CPR23 (BU-OG)	22	14A005
18	CPR23 (BU-OG)	26	
19	CPR24 (GN)	26	14401
19	CPR24 (GN-VT)	22	14A005
20	VLN33 (GY-VT)	22	
21	RME99 (YE)	26	14401
21	RME99 (YE-GY)	22	14A005
22	VME99 (VT)	26	14401

22	VME99 (VT-OG)	22	14A005
23	*	*	
24	CLN46 (BU)	22	14401
24	CLN46 (BU)	26	14A005
25	*	*	
26	VDB26 (BU)	26	14A005
26	VDB26 (GY)	26	
27	VDB07 (VT)	26	
28	VDN03 (GY-RD)	26	14A005
28	VDN03 (GY-VT)	22	14401
29	VMP19 (WH-GN)	22	
30	RMP19 (BN-VT)	22	
31	*	*	
32	*	*	
33	*	*	
34	*	*	14A005

34	CE162 (VT)	22	14401
35	RME10 (WH-OG)	18	
35	RME16 (YE-GY)	18	
36	VME10 (WH-VT)	18	
36	VME16 (VT-GY)	18	
37	*	*	
38	*	*	
39	DMP19 (*)	4	
40	RLN44 (BN)	22	14401
40	RLN44 (BN)	26	14A005

CONNECTOR VIEWS > CONNECTOR END VIEW C214 - INLINE

InlineC214

Description

INLINE

Color

LT GY

Base Part #

Service Pigtail

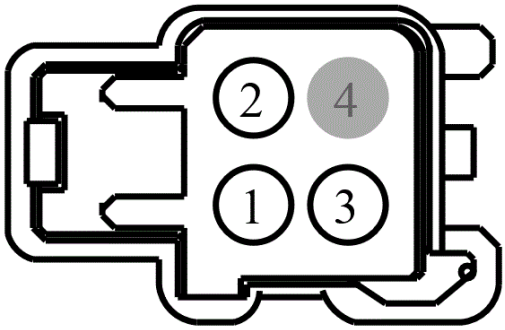
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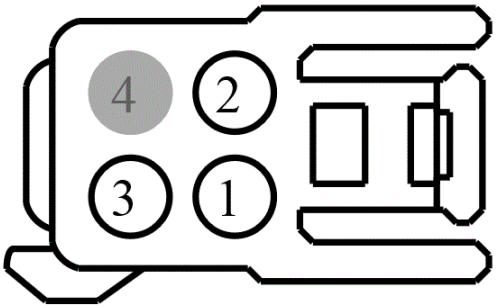
MALE

Harness 14290

FEMALE

Harness 12638



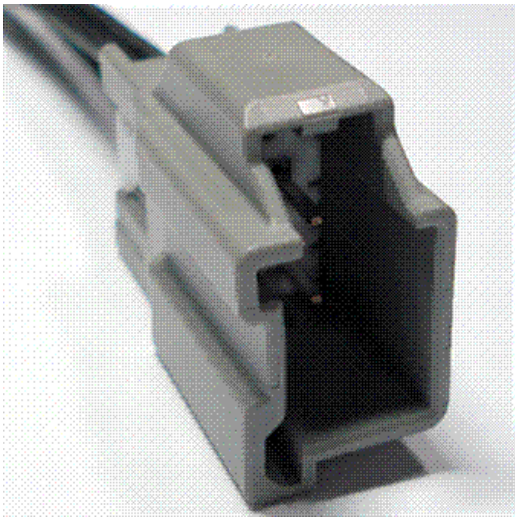


Pin	Circuit	Gauge	Qualifier
1	CE903 (BU-OG)	22	
2	CE904 (GN-VT)	22	
3	GD120 (BK-GN)	20	14290
3	GD120 (BK-GN)	22	12638
4	*	*	

Available Pigtail Kits	

Pigtail Kit Part Number

WPT-1076



Service Part Number:

3U2Z-14S411-BUB

Gauge:

14

Pin material:

Tin (greased)

Cavities:

4

Vehicle Uses:

Connector - Inline

Element - Heated Seat

Lamp - Ash Tray

Lamp - Courtesy - Footwell

Module - Remote Keyless Entry

Motor - Heater/AC Blower (Auxiliary)

Radio - Amplifier

Switch - Convertable Top

CONNECTOR VIEWS > CONNECTOR END VIEW C215 - INLINE

InlineC215

Description

INLINE

Color

LT GY

Base Part #

Service Pigtail

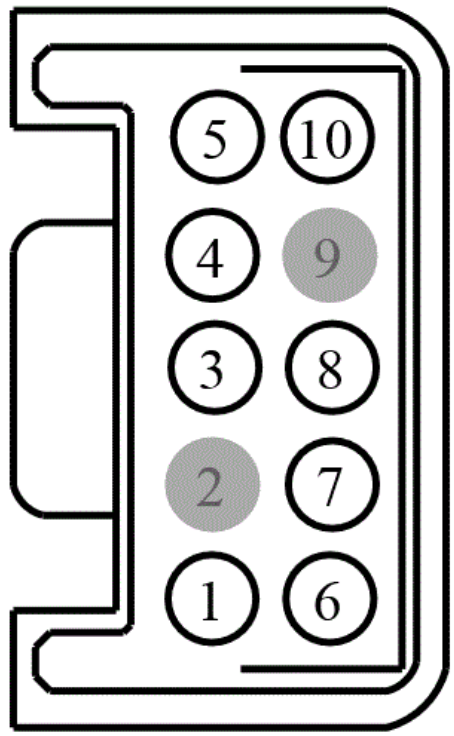
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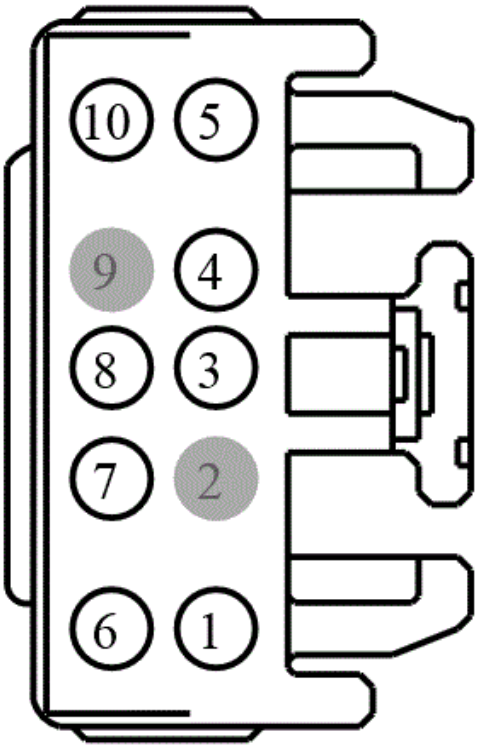
MALE

Harness 14A005

FEMALE

Harness 14290





Pin	Circuit	Gauge	Qualifier

1	CBK02 (GN)	16	
2	*	*	
3	SBB15 (WH-RD)	10	14290
3	SBB15 (WH-RD)	14	14A005
4	SBB14 (BN-RD)	12	
5	SBB13 (GY-RD)	10	14290
5	SBB13 (GY-RD)	14	14A005
6	CE608 (VT-GN)	10	14290
6	CE608 (VT-GN)	12	14A005
7	CRD17 (GY)	10	
8	CBB70 (YE-BU)	20	14290
8	CBB70 (YE-BU)	22	14A005
9	*	*	
10	CBB66 (BU-WH)	20	14290
10	CBB66 (BU-WH)	22	14A005

CONNECTOR VIEWS > CONNECTOR END VIEW C216A - DRIVER AIRBAG

Connector:C216A

Description

DRIVER AIRBAG

Color

Harness

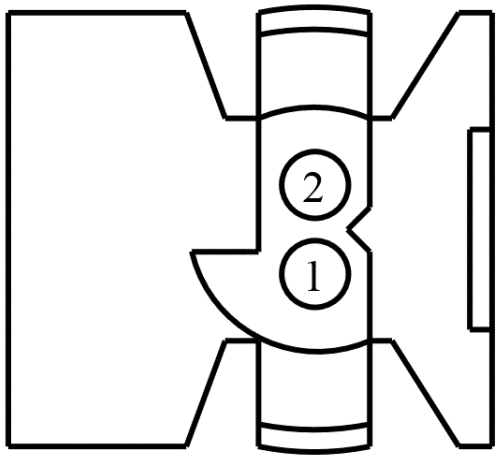
14A664

Base Part #

74043B13

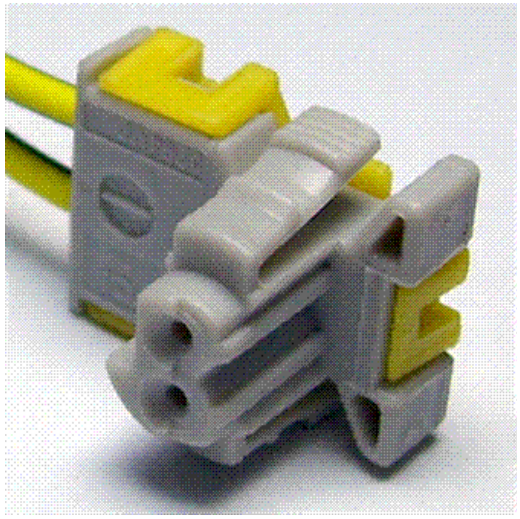
Service Pigtail

See Below



Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CR101 (WH)	20	CTRL MOD. - AIR BAG DRIVER 1 +	
2	RR101 (BU)	20	CTRL MOD. - AIR BAG DRIVER 1 -	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1223**	Service Part Number: **BU2Z-14S411-BFA** Gauge: **20**



Pin material:

FCI - Airbag

Cavities:

2

Vehicle Uses

Squib - Airbag (Passenger)

CONNECTOR VIEWS > CONNECTOR END VIEW C216B - DRIVER AIRBAG

Connector:C216B

Description

DRIVER AIRBAG

Color

Harness

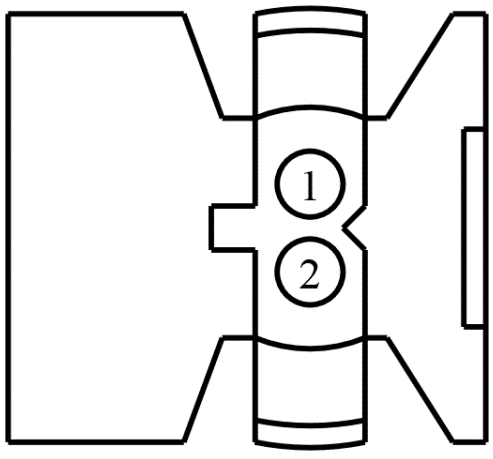
14A664

Base Part #

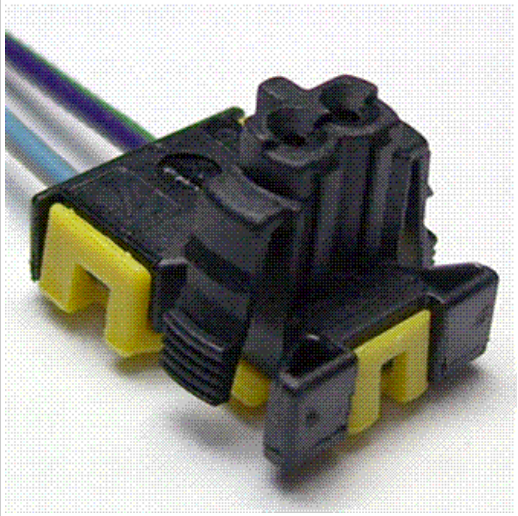
74043B13

Service Pigtail

See Below



Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CR102 (YE-GN)	20	CTRL MOD. - AIR BAG DRIVER 2 +	
2	RR102 (VT-BN)	20	CTRL MOD. - AIR BAG DRIVER 2 -	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1230** 	Service Part Number: **BU2Z-14S411-BPA** Gauge: **20** Pin material: **FCI - Airbag** Cavities: **2** Vehicle Uses Airbag - Side Curtain Squib - Airbag (Passenger)

CONNECTOR VIEWS > CONNECTOR END VIEW C217 - HORN SWITCH

Connector:C217

Description

HORN SWITCH

Color

Harness

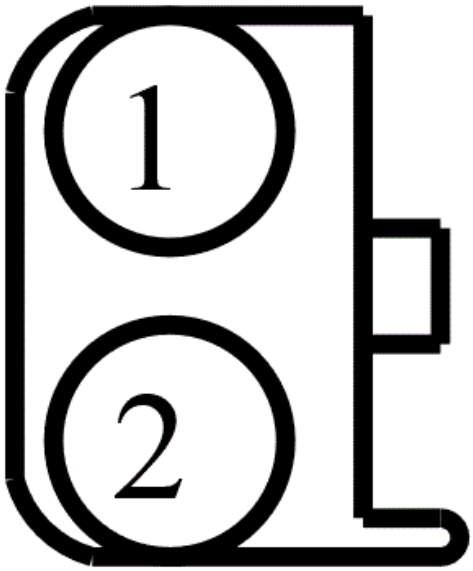
PIA

Base Part #

part# N/A

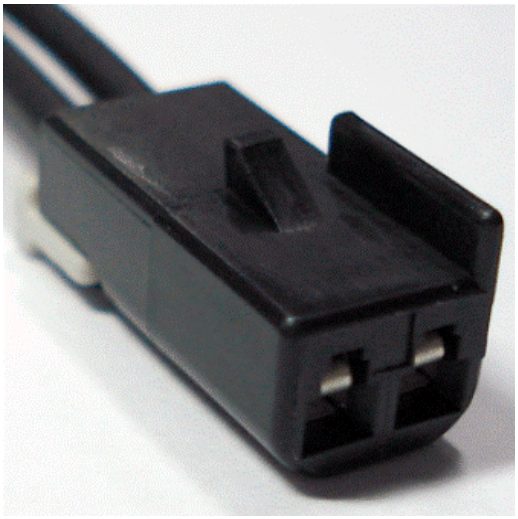
Service Pigtail

See Below



Pin	Circuit	Gauge	Circuit Function	Qualifier
1	* (*)	*	SWITCH - HORN	
2	* (*)	*	GROUND - INSTRUMENT PANEL STRUCTURE	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-967**	Service Part Number: **3U2Z-14S411-CZB** Gauge: **16** Pin material: **Tin** Cavities: **2** Vehicle Uses Module - Auto Lamps

	Sensor - EATC In Car Temperature Sensor - Sunload Switch - Overdrive Cancel

CONNECTOR VIEWS > CONNECTOR END VIEW C218A - CLOCKSPRING

Connector:C218A

Description

CLOCKSPRING

Color

GY

Harness

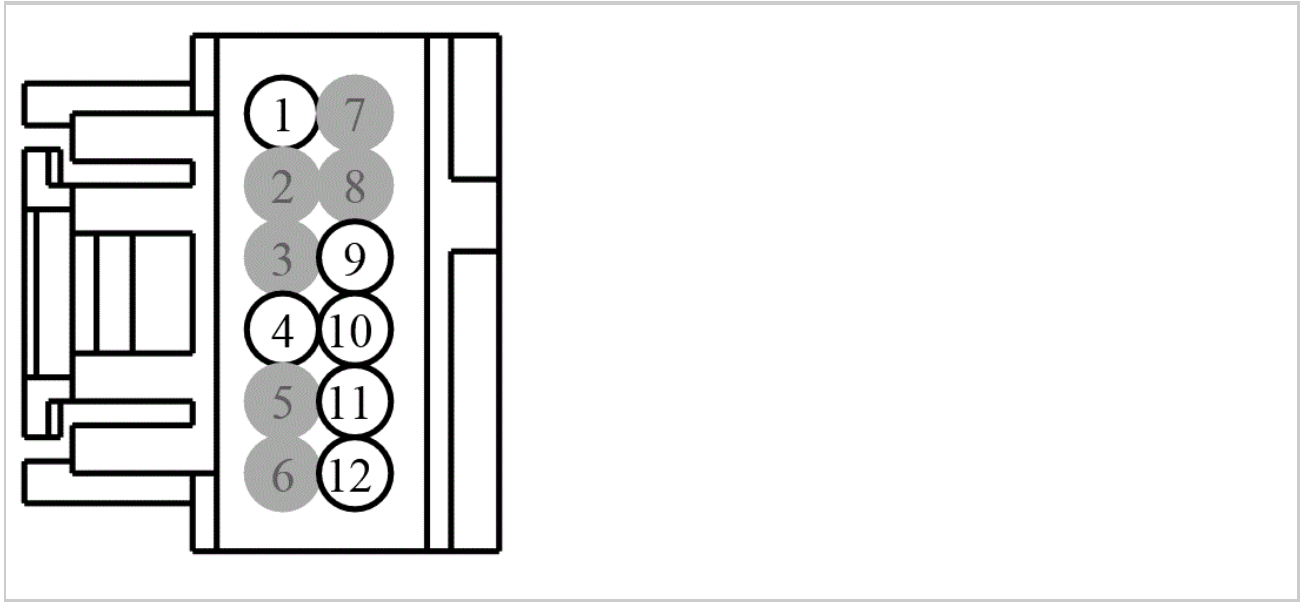
14401

Base Part #

part# N/A

Service Pigtail

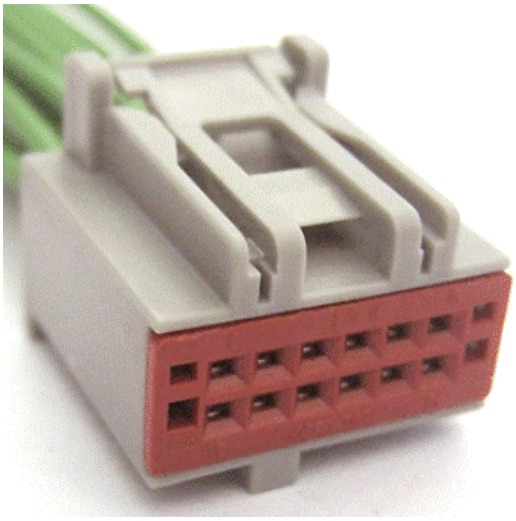
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	VLN04 (VT-GY)	22	CTRL MOD. - IP/SWITCH ILLUMINATION	
2	*	*	Not Used	
3	*	*	Not Used	
4	GD214 (BK-BU)	20	GROUND - INSTRUMENT PANEL STRUCTURE	
5	*	*	Not Used	
6	*	*	Not Used	
7	*	*	Not Used	
8	*	*	Not Used	
9	CR102 (BU)	22	CTRL MOD. - AIR BAG DRIVER 2 +	

10	RR102 (WH)	22	CTRL MOD. - AIR BAG DRIVER 2 -	
11	RR101 (YE-GN)	22	CTRL MOD. - AIR BAG DRIVER 1 -	
12	CR101 (VT-BN)	22	CTRL MOD. - AIR BAG DRIVER 1+	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-949** 	Service Part Number: **3U2Z-14S411-BMAB** Gauge: **18** Pin material: **Silver** Cavities: **12** Vehicle Uses Control - Navigation Display Module - Driver Door Module - Front Interface Monitor - Video/DVD Switch - Gear Shift Select/Neutral Safety

CONNECTOR VIEWS > CONNECTOR END VIEW C218B - CLOCKSPRING

Connector:C218B

Description

CLOCKSPRING

Color

GY

Harness

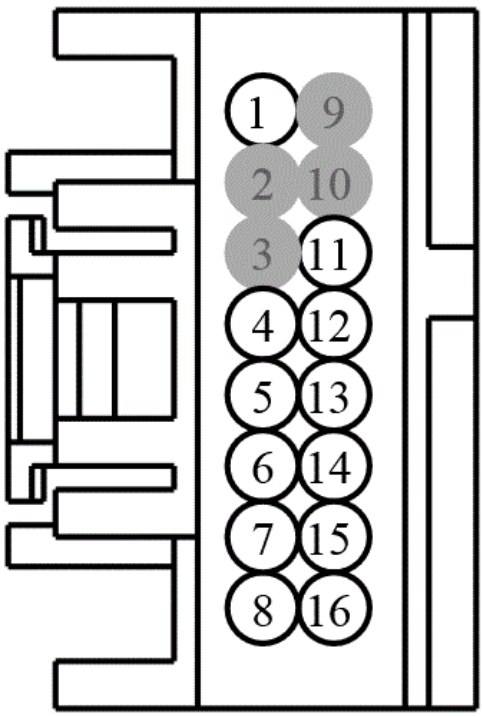
PIA

Base Part #

14A644

Service Pigtail

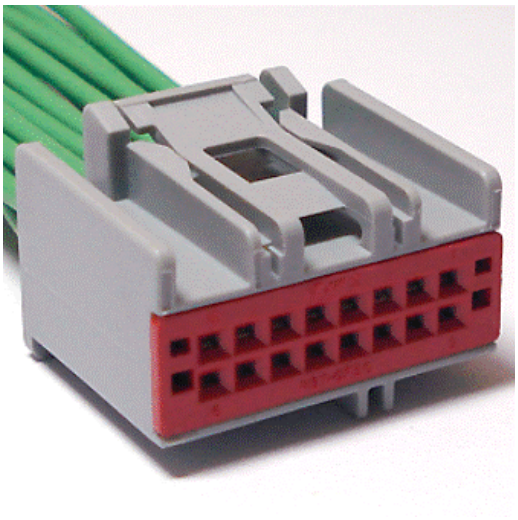
See Below



Pin	Circuit	Gauge	Circuit Function	Qualifier
1	* (*)	*	GROUND - INSTRUMENT PANEL STRUCTURE	
2	*	*	Not Used	
3	*	*	Not Used	
4	* (*)	*	SWITCH - HORN	
5	* (*)	*	SWITCH - TRANSMISSION SELECT SHIFT # DOWN (SST)	

6	* (*)	*	SWITCH - STEERING WHEEL CONTROLS # A/D CHANNEL 3
7	* (*)	*	SWITCH - STEERING WHEEL CONTROLS # A/D CHANNEL 4
8	* (*)	*	SWITCH - STEERING WHEEL CONTROLS # RETURN LEFT (SW GND LEFT)
9	*	*	Not Used
10	*	*	Not Used
11	* (*)	*	CTRL MOD. - IP/SWITCH ILLUMINATION
12	* (*)	*	SWITCH - TRANSMISSION SELECT SHIFT # UP (SST)
13	* (*)	*	CTRL MOD. - POWERTRAIN # SIGNAL RETURN COWL (C-SIGRTN) (SIGRTN-C)
14	* (*)	*	SWITCH - STEERING WHEEL CONTROLS # A/D CHANNEL 1
15	* (*)	*	SWITCH - STEERING WHEEL CONTROLS # A/D CHANNEL 2
16	* (*)	*	SWITCH - STEERING WHEEL CONTROLS # RETURN RIGHT (SW GND RIGHT)

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-968**	Service Part Number: **3U2Z-14S411-DPB** Gauge: **18** Pin material: **Silver**



Cavities:

16

Vehicle Uses

Module - Reverse Park Aid (RPA)

Radio

Switch - Power Window - Driver

Switch - Reverse Park Aid

CONNECTOR VIEWS > CONNECTOR END VIEW C219 - INLINE

InlineC219

Description

INLINE

Color

BK

Base Part #

Service Pigtail

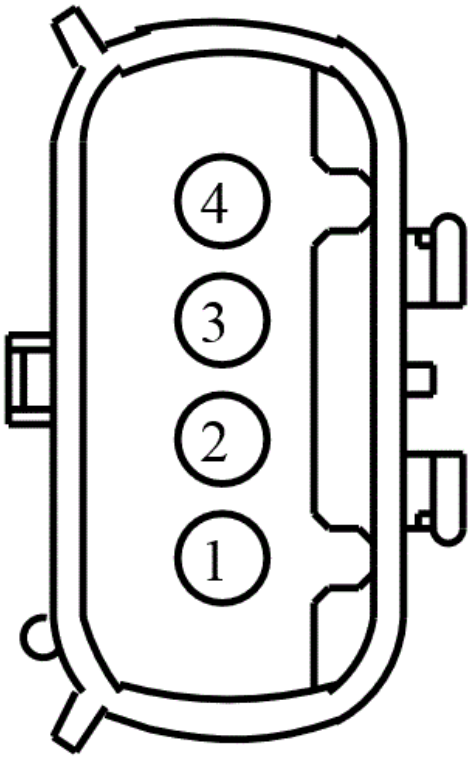
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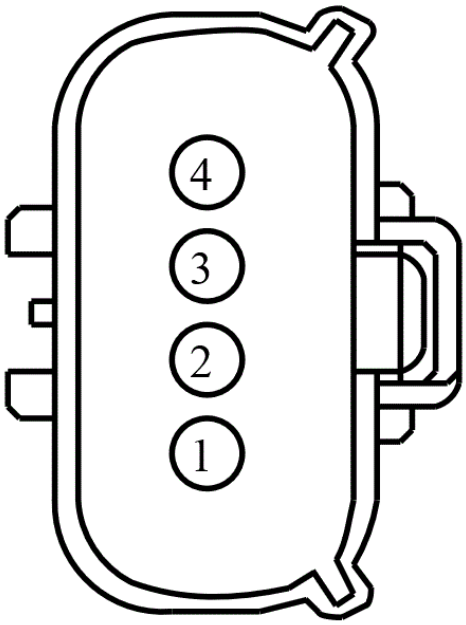
MALE

Harness 14D233

FEMALE

Harness 14D230





Pin	Circuit	Gauge	Qualifier
1	CR105 (GN-BU)	18	14D230
1	CR105 (GN-BU)	20	14D233 - convertible

1	LR142 (GN-BU)	20	14D233 - coupe
2	LR142 (GN-BU)	20	14D233 - coupe
2	RR105 (GY-YE)	18	14D230
2	RR105 (GY-YE)	20	14D233 - convertible
3	CR106 (VT-GY)	18	14D230
3	CR106 (VT-GY)	20	14D233
4	RR106 (YE-OG)	18	14D230
4	RR106 (YE-OG)	20	14D233

CONNECTOR VIEWS > CONNECTOR END VIEW C220 - INSTRUMENT PANEL CLUSTER (IPC)

Connector:C220

Description

INSTRUMENT PANEL CLUSTER (IPC)

Color

BK

Harness

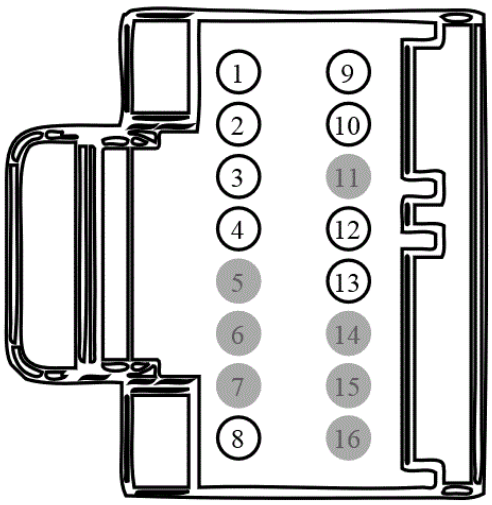
14401

Base Part #

part# N/A

Service Pigtail

Not Available



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	RMC33 (GN-OG)	22	CTRL MOD. - SENSOR FUEL LEVEL 2	
2	RMC32 (GN)	26	CTRL MOD. - SENSOR FUEL LEVEL	
3	GD214 (BK-BU)	20	GROUND - INSTRUMENT PANEL STRUCTURE	
4	CET52 (GN)	26	SWITCH - TRANSMISSION PARK DETECT	
5	*	*	Not Used	
6	*	*	Not Used	
7	*	*	Not Used	
8	SBP13 (GY-RD)	22	FUSE - 13 OR CIRCUIT BREAKER	
9	VMC23	22	SENSOR - FUEL LEVEL 2 (FLI)	

	(GN-OG)		
10	VMC11 (YE)	26	SENSOR - FUEL LEVEL (FLI)
11	*	*	Not Used
12	VDB29 (GN)	26	CONNECTOR - DIAGNOSTIC # CAN BUS HIGH SPEED 3 (LOWER) HIGH
13	VDB30 (WH)	26	CONNECTOR - DIAGNOSTIC # CAN BUS HIGH SPEED 3 (LOWER) LOW
14	*	*	Not Used
15	*	*	Not Used
16	*	*	Not Used

CONNECTOR VIEWS > CONNECTOR END VIEW C226A - STEERING COLUMN CONTROL MODULE (SCCM)

Connector:C226A

Description

STEERING COLUMN CONTROL MODULE (SCCM)

Color

NA

Harness

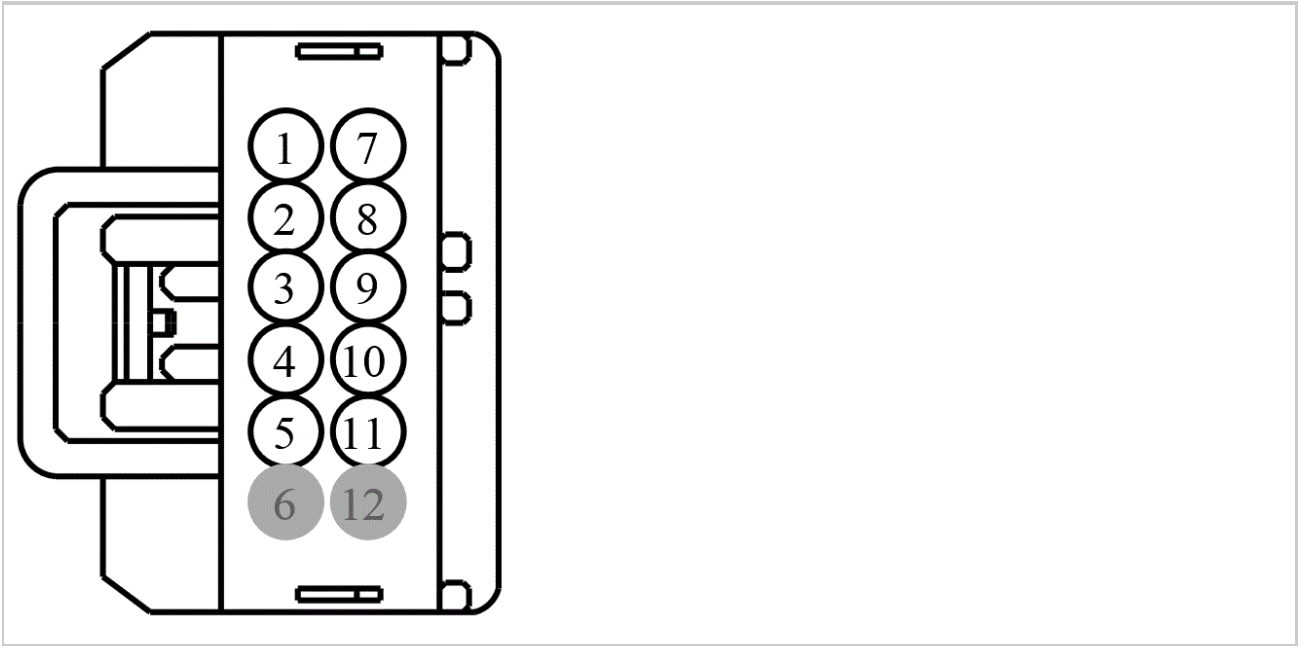
14401

Base Part #

part# N/A

Service Pigtail

See Below



Check for Terminal Part Numbers

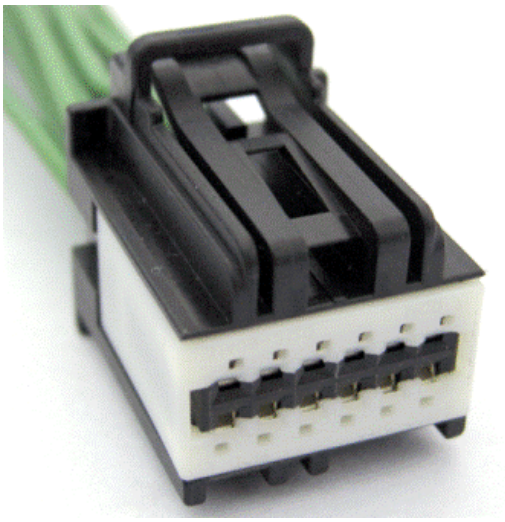
Pin	Circuit	Gauge	Circuit Function	Qualifier
1	RRH02 (GN-WH)	26	CTRL MOD. - SWITCH HORN	
2	CRW15 (BN)	26	CTRL MOD. - FRONT WIPER HIGH	
3	VDB25 (GN)	26	CONNECTOR - DIAGNOSTIC # CAN BUS HIGH SPEED 2 (UPPER) HIGH	
4	VDB26 (GY)	26	CONNECTOR - DIAGNOSTIC # CAN BUS HIGH SPEED 2 (UPPER) LOW	
5	GD214 (BK-BU)	20	GROUND - INSTRUMENT PANEL STRUCTURE	
6	*	*	Not Used	
7	SBP13 (GY-RD)	22	FUSE - 13 OR CIRCUIT BREAKER	

8	VDN05 (YE-GY)	22	CTRL MOD. - LIN BUS # STEERING WHEEL CONTROL MODULE 1
9	CET42 (GN)	26	SWITCH - TRANSMISSION SELECT SHIFT # DOWN (SST)
10	CET43 (GY)	26	SWITCH - TRANSMISSION SELECT SHIFT # UP (SST)
11	RE406 (VT)	26	CTRL MOD. - POWERTRAIN # SIGNAL RETURN TRANSMISSION (T-SIGRTN) (SIGRTN-B)
12	*	*	Not Used

Available Pigtail Kits

Pigtail Kit Part Number

WPT-930



Service Part Number:

9U2Z-14S411-DA

Gauge:

18

Pin material:

Silver

Cavities:

12

Vehicle Uses

Module - Climate Control Seat

Module - Heated Seat (Rear)

CONNECTOR VIEWS > CONNECTOR END VIEW C232 - DEFROST VENT/REGISTER DOOR ACTUATOR

Connector:C232

Description

DEFROST VENT/REGISTER DOOR ACTUATOR

Color

BK

Harness

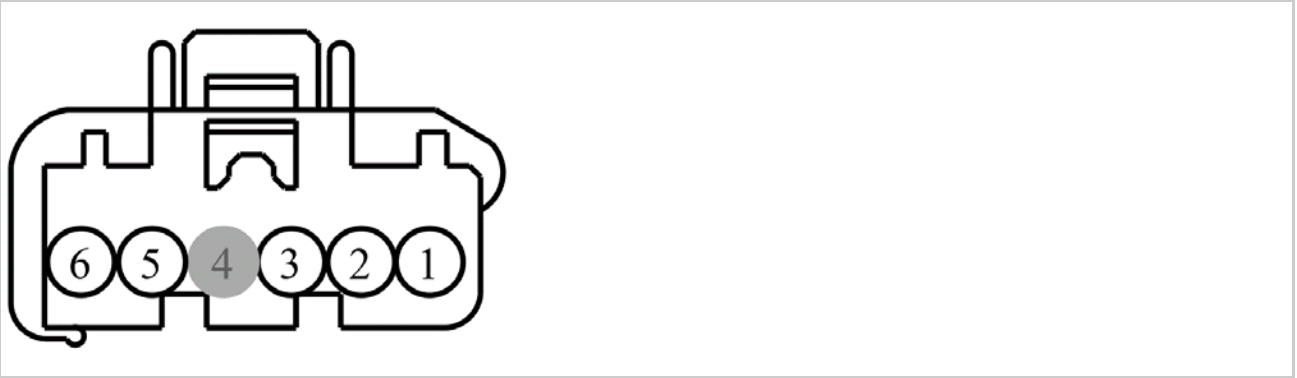
18B574

Base Part #

part# N/A

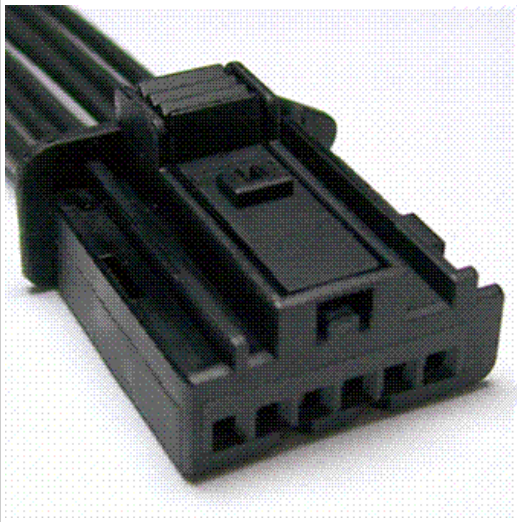
Service Pigtail

See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	RH111 (GY-BU)	22	CTRL MOD. - CLIMATE # GENERIC VREF RETURN	
2	VH436 (YE)	26	SENSOR - DOOR POSITION DEFROST	
3	LH111 (BN)	26	CTRL MOD. - CLIMATE # GENERIC VREF	
4	*	*	Not Used	
5	CH229 (WH)	26	CTRL MOD. - CLIMATE # DOOR MOTOR DEFROST COIL 2 / OPEN (IF PLUS)	
6	CH228 (YE)	26	CTRL MOD. - CLIMATE # DOOR MOTOR DEFROST COIL 1 / CLOSE (IF PLUS)	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1151** 	Service Part Number: **BU2Z-14S411-MA** Gauge: **18** Pin material: **Tin** Cavities: **6** Vehicle Uses Motor - Heater A/C Mode Door Motor - Heater/AC Blend Door Motor - Heater/AC Blower (Auxiliary) Motor - Heater/AC Inlet Door

CONNECTOR VIEWS > CONNECTOR END VIEW C233 - IN-VEHICLE TEMPERATURE SENSOR

Connector:C233

Description

IN-VEHICLE TEMPERATURE SENSOR

Color

BK

Harness

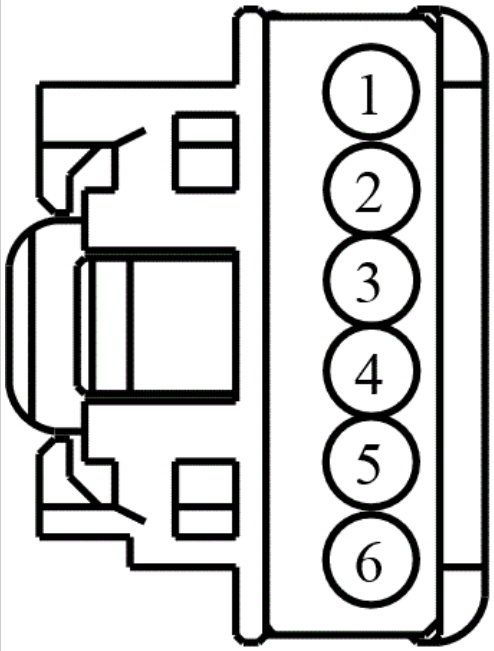
14401

Base Part #

part# N/A

Service Pigtail

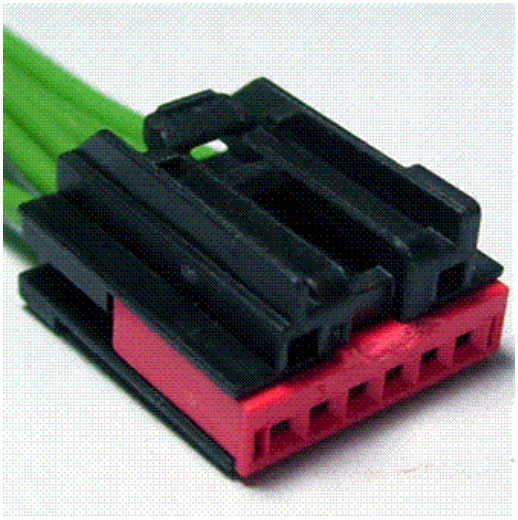
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	RH103 (GY)	22	CTRL MOD. - CLIMATE # I.T.S. ASPIRATOR MOTOR -	
2	VH414 (GN)	26	SENSOR - INCAR TEMP.	
3	LH111 (BN-WH)	22	CTRL MOD. - CLIMATE # GENERIC VREF	
4	VH413 (BU-WH)	26	SENSOR - HUMIDITY	
5	RH111 (GY-BU)	22	CTRL MOD. - CLIMATE # GENERIC VREF RETURN	
6	CBP21 (BU-GY)	22	FUSE - 21 OR CIRCUIT BREAKER	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1242**	Service Part Number: **3U2Z-14S411-MJB**



Gauge:

18

Pin material:

Silver

Cavities:

6

Vehicle Uses

Indicator - Passenger Airbag Deactivation (PADI)

Sensor - EATC In Car Temperature

Switch - Multifunction

CONNECTOR VIEWS > CONNECTOR END VIEW C240A - AUDIO CONTROL MODULE (ACM)

Connector:C240A

Description

AUDIO CONTROL MODULE (ACM)

Color

BK

Harness

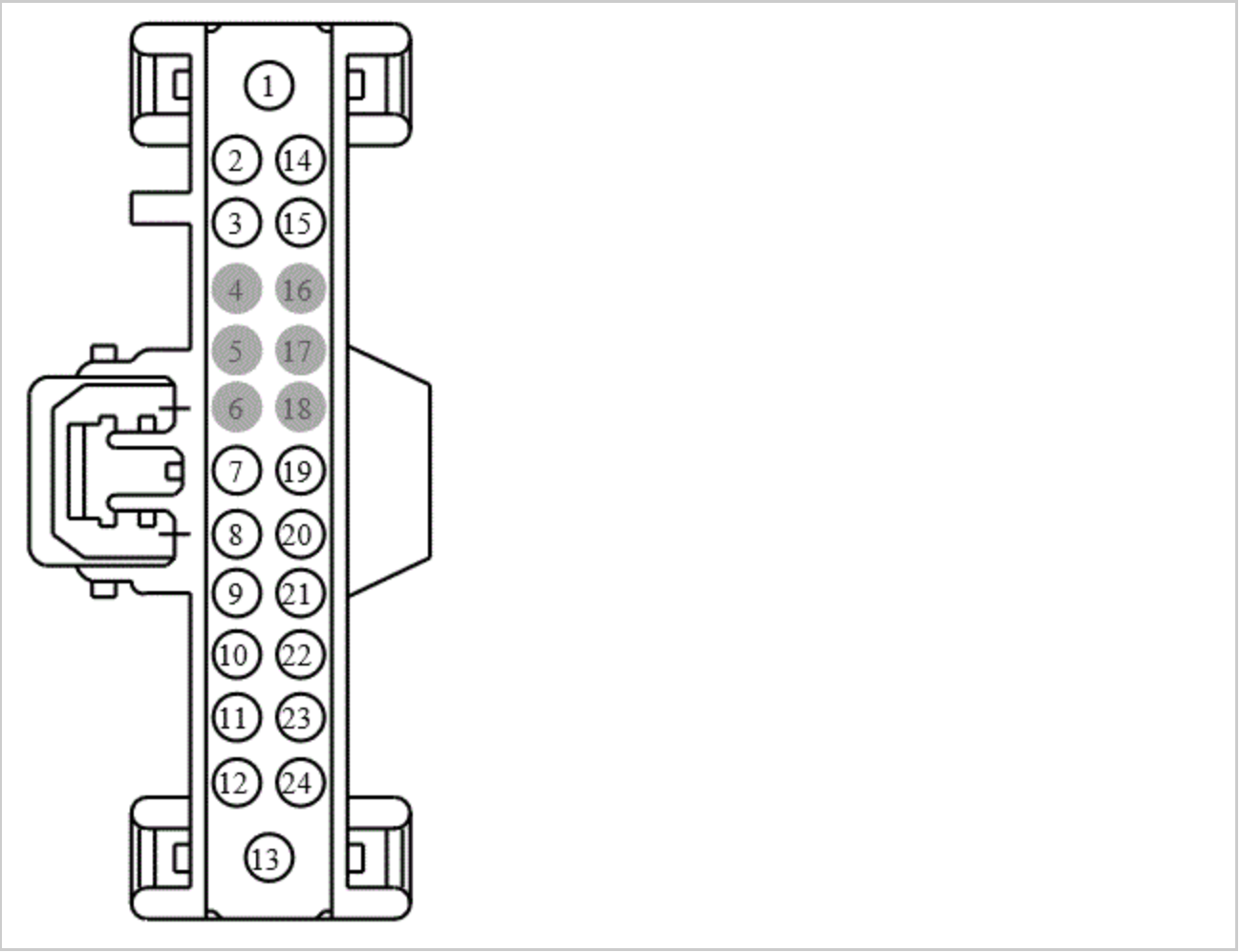
14401

Base Part #

part# N/A

Service Pigtail

See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	SBP33 (RD)	16	FUSE - 33 OR CIRCUIT BREAKER	
2	CME44 (YE-GN)	20	CTRL MOD. - ANTENNA POWER # REAR WINDOW	
3	CDC54 (WH-GN)	22	CTRL MOD. - POWERTRAIN # STARTER MOTOR CONTROL SENSE (SMCS)	
4	*	*	Not Used	
5	*	*	Not Used	

6	*	*	Not Used
7	CME31 (BU-GN)	22	CTRL MOD. - AUDIO # ENABLE 1
8	VMEA6 (YE-BU)	26	CTRL MOD. - ACTIVE NOISE CANCELLATION # OUTPUT RIGHT FRONT NEG (-) (ANC2)
9	RME09 (BN-YE)	18	CTRL MOD. - AUDIO # SPEAKER LEFT REAR (WOOFER) -
9	RME60 (BN)	26	CTRL MOD. - AUDIO # RADIO LEFT REAR -
10	RME07 (WH-BN)	18	CTRL MOD. - AUDIO # SPEAKER LEFT FRONT DOOR (WOOFER) -
10	RME17 (GY)	26	CTRL MOD. - AUDIO # RADIO LEFT -
11	RME10 (WH-OG)	18	CTRL MOD. - AUDIO # SPEAKER RIGHT FRONT DOOR (WOOFER) -
11	RME18 (YE)	26	CTRL MOD. - AUDIO # RADIO RIGHT -
12	RME12 (BN-BU)	18	CTRL MOD. - AUDIO # SPEAKER RIGHT REAR (WOOFER) -
12	RME61 (BU)	26	CTRL MOD. - AUDIO # RADIO RIGHT REAR -
13	GD215 (BK-GY)	16	GROUND - INSTRUMENT PANEL STRUCTURE # 2ND POINT
14	VDB29 (GN)	26	CONNECTOR - DIAGNOSTIC # CAN BUS HIGH SPEED 3 (LOWER) HIGH
15	VDB30 (WH)	26	CONNECTOR - DIAGNOSTIC # CAN BUS HIGH SPEED 3 (LOWER) LOW

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1440** 	Service Part Number: **FU2Z-14S411-ALA** Gauge: **14 20** Pin material: **Tin & Silver** Cavities: **24** Vehicle Uses DVD Player Module - Audio Control Module - Body Control Module Gateway Radio Test Connector - Diagnostic

CONNECTOR VIEWS > CONNECTOR END VIEW C240B - AUDIO CONTROL MODULE (ACM)

Connector:C240B

Description

AUDIO CONTROL MODULE (ACM)

Color

BK

Harness

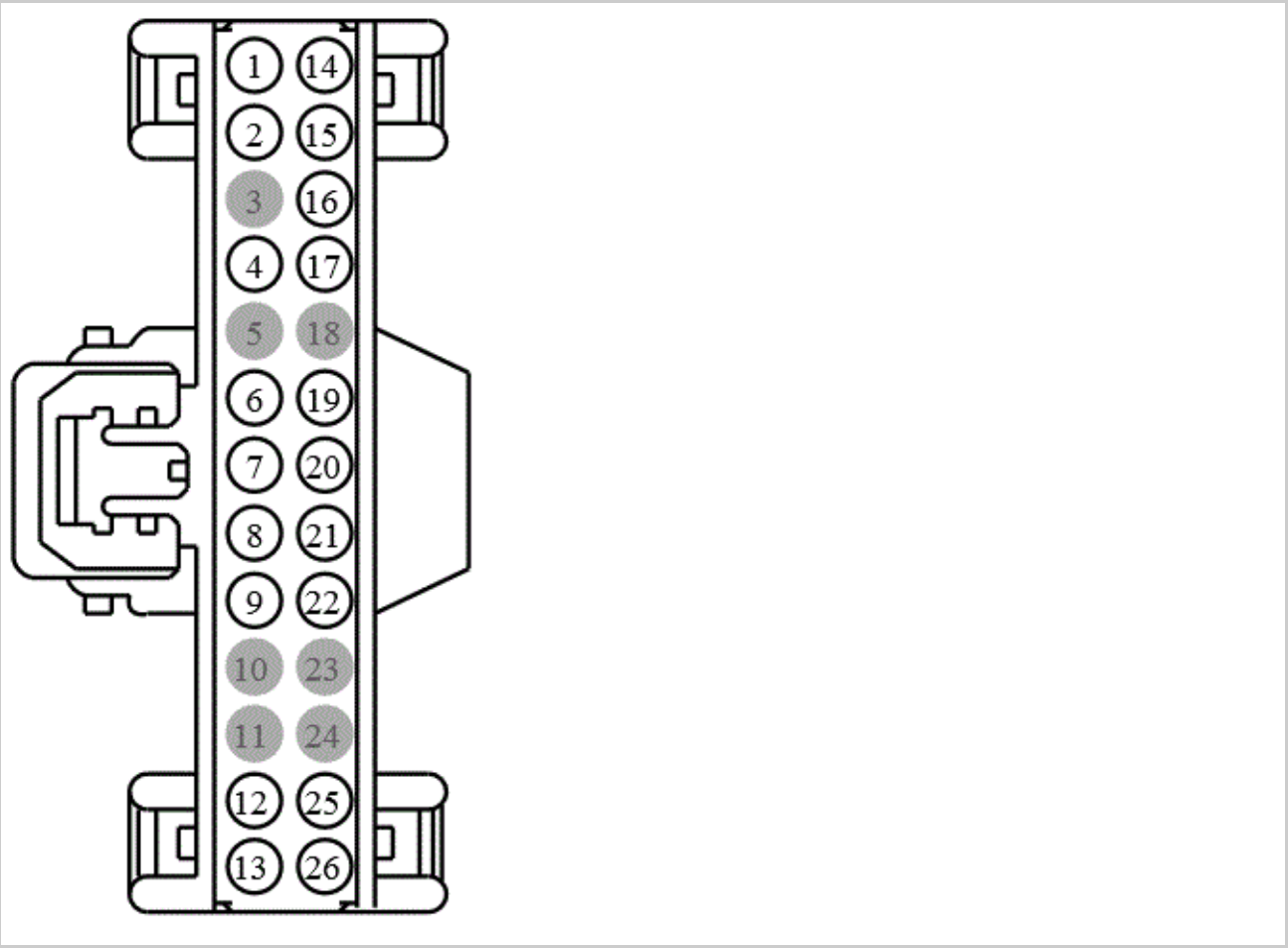
14401

Base Part #

part# N/A

Service Pigtail

Not Available



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	VME57 (YE-BU)	26	MICROPHONE - AMBIENT NOISE +	
2	VME99 (VT)	26	MICROPHONE - AMBIENT NOISE 2 +	
3	*	*	Not Used	
4	VMEA3 (GN)	26	CTRL MOD. - ACTIVE NOISE CANCELLATION # OUTPUT LEFT FRONT POS (+) (ANC1)	

5	*	*	Not Used
6	VME90 (GY-BU)	22	CTRL MOD. - SATELLITE DIGITAL RADIO DATA LINK (+) (SDL-H)
7	VMEA0 (BU)	26	MICROPHONE - AMBIENT NOISE 3 +
8	VMN14 (WH)	26	CTRL MOD. - NAVIGATION/BLUETOOTH/MULTIMEDIA GATEWAY MODULE # AUDIO OUT (MONO) +
8	VMN14 (VT-WH)	26	CTRL MOD. - NAVIGATION/BLUETOOTH/MULTIMEDIA GATEWAY MODULE # AUDIO OUT (MONO) +
9	VMEA7 (GY)	26	CTRL MOD. - ACTIVE NOISE CANCELLATION # OUTPUT REAR POS (+) (ANC3)
10	*	*	Not Used
11	*	*	Not Used
12	VME52 (BU)	26	CTRL MOD. - BLUETOOTH/MULTIMEDIA GATEWAY MODULE # AUDIO [SATELLITE DIGITAL RADIO] LEFT +
13	VME53 (VT)	26	CTRL MOD. - BLUETOOTH/MULTIMEDIA GATEWAY MODULE # AUDIO [SATELLITE DIGITAL RADIO] RIGHT +
14	RME57 (BU)	26	MICROPHONE - AMBIENT NOISE -
15	RME99 (YE)	26	MICROPHONE - AMBIENT NOISE 2 -
16	DMEA3 (*)	4	CTRL MOD. - ACTIVE NOISE CANCELLATION # OUTPUT
17	VMEA4 (YE)	26	CTRL MOD. - ACTIVE NOISE CANCELLATION # OUTPUT LEFT FRONT NEG (-) (ANC1)

18	*	*	Not Used
19	VME91 (WH-BN)	22	CTRL MOD. - SATELLITE DIGITAL RADIO DATA LINK (-) (SDL-L)
20	RMEA0 (WH)	26	MICROPHONE - AMBIENT NOISE 3 -
21	RMN14 (GY)	26	CTRL MOD. - NAVIGATION/BLUETOOTH/MULTIMEDIA GATEWAY MODULE # AUDIO OUT (MONO) -
22	VMEA8 (GN-WH)	26	CTRL MOD. - ACTIVE NOISE CANCELLATION # OUTPUT REAR NEG (-) (ANC3)
23	*	*	Not Used
24	*	*	Not Used
25	RME52 (GY)	26	CTRL MOD. - BLUETOOTH/MULTIMEDIA GATEWAY MODULE # AUDIO [SATELLITE DIGITAL RADIO] LEFT -
26	RME53 (BN)	26	CTRL MOD. - BLUETOOTH/MULTIMEDIA GATEWAY MODULE # AUDIO [SATELLITE DIGITAL RADIO] RIGHT -
26	RME53 (BN-WH)	26	CTRL MOD. - BLUETOOTH/MULTIMEDIA GATEWAY MODULE # AUDIO [SATELLITE DIGITAL RADIO] RIGHT -

CONNECTOR VIEWS > CONNECTOR END VIEW C251 - DATA LINK CONNECTOR (DLC)

Connector:C251

Description

DATA LINK CONNECTOR (DLC)

Color

BK

Harness

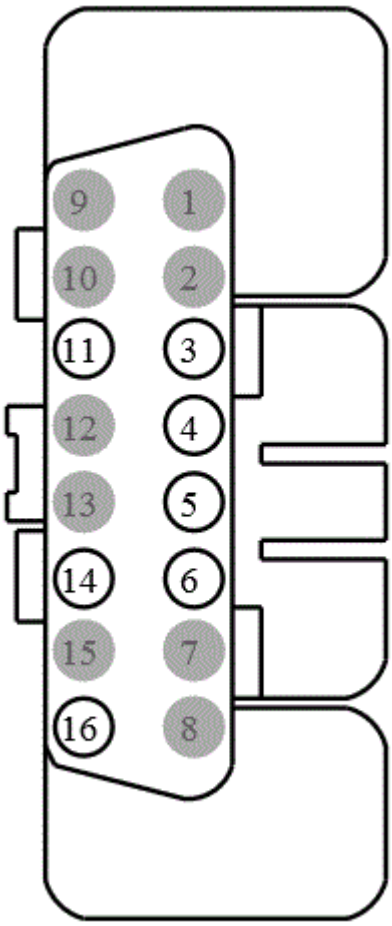
PIA

Base Part #

14489

Service Pigtail

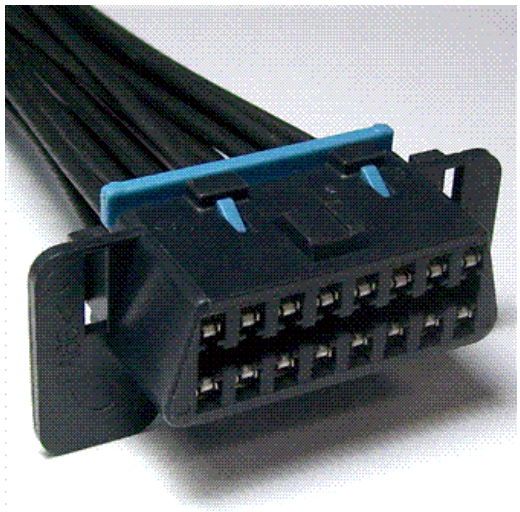
See Below



Pin	Circuit	Gauge	Circuit Function	Qualifier
1	*	*	Not Used	
2	*	*	Not Used	
3	* (*)	*	CONNECTOR - DIAGNOSTIC # CAN BUS HIGH SPEED 2 (UPPER) HIGH	

4	* (*)	*	GROUND - INSTRUMENT PANEL STRUCTURE # 2ND POINT
5	* (*)	*	GROUND - INSTRUMENT PANEL STRUCTURE
6	* (*)	*	CONNECTOR - DIAGNOSTIC # CAN BUS HIGH SPEED HIGH
7	*	*	Not Used
8	*	*	Not Used
9	*	*	Not Used
10	*	*	Not Used
11	* (*)	*	CONNECTOR - DIAGNOSTIC # CAN BUS HIGH SPEED 2 (UPPER) LOW
12	*	*	Not Used
13	*	*	Not Used
14	* (*)	*	CONNECTOR - DIAGNOSTIC # CAN BUS HIGH SPEED LOW
15	*	*	Not Used
16	* (*)	*	FUSE - 15 OR CIRCUIT BREAKER

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1176**	Service Part Number: **AU2Z-14S411-BFA** Gauge:

	**16** Pin material: **Tin** Cavities: **16** Vehicle Uses Test Connector - Diagnostic

CONNECTOR VIEWS > CONNECTOR END VIEW C254 - GLOVE COMPARTMENT LAMP

Connector:C254

Description

GLOVE COMPARTMENT LAMP

Color

BK

Harness

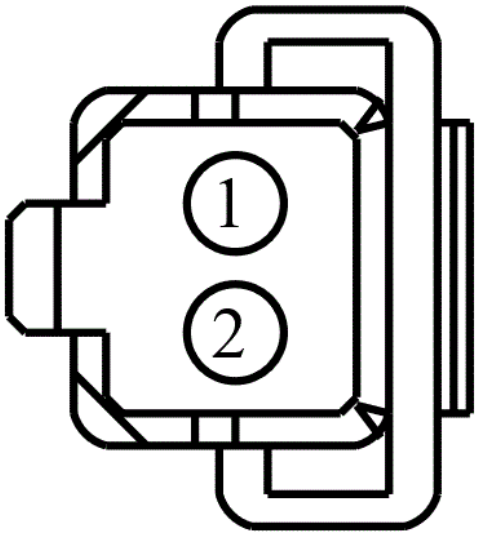
14401

Base Part #

part# N/A

Service Pigtail

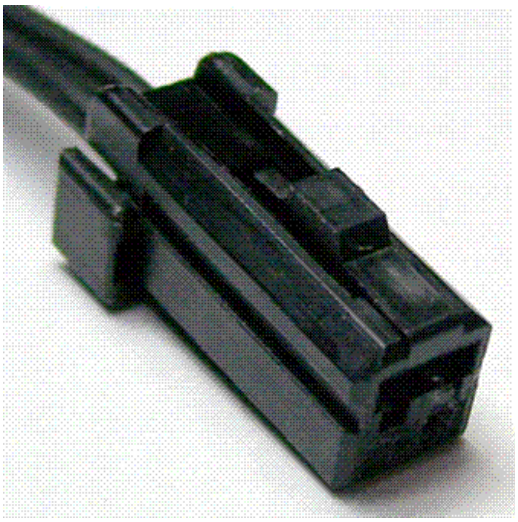
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CLN09 (YE-GN)	22	RELAY - BATTERY SAVER (E.G. SWITCH OFF INTERIOR LIGHTING)	
2	GD216 (BK-VT)	18	GROUND - INSTRUMENT PANEL STRUCTURE # 3RD POINT	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1197**	Service Part Number: **3U2Z-14S411-PFB** Gauge: **20** Pin material: **Tin (greased)** Cavities: **2** Vehicle Uses



Mirror - Vanity

Sensor - Speed

Switch - Brake Deactivation

Switch - Brake Pedal Position

Switch - Brake Pressure

Switch - Park Brake

Switch - Speed Control

Switch - Speed Control Deactivation

Switch - Stop Lamp

Switch - Visor

CONNECTOR VIEWS > CONNECTOR END VIEW C256 - PASSENGER AIRBAG

Connector:C256

Description

PASSENGER AIRBAG

Color

Harness

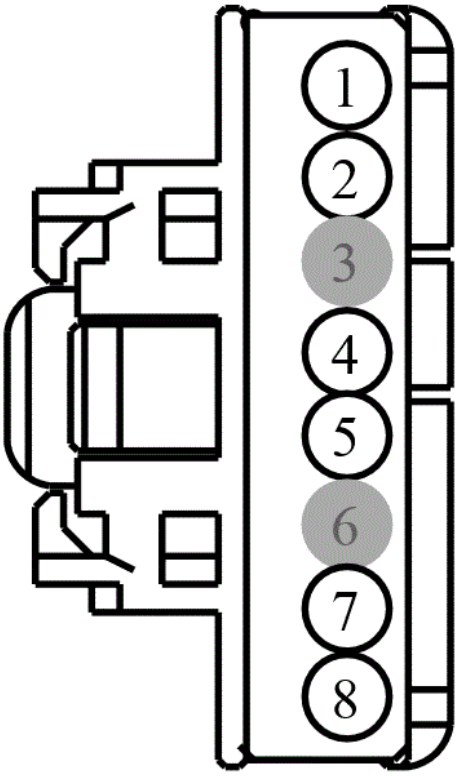
14401

Base Part #

part# N/A

Service Pigtail

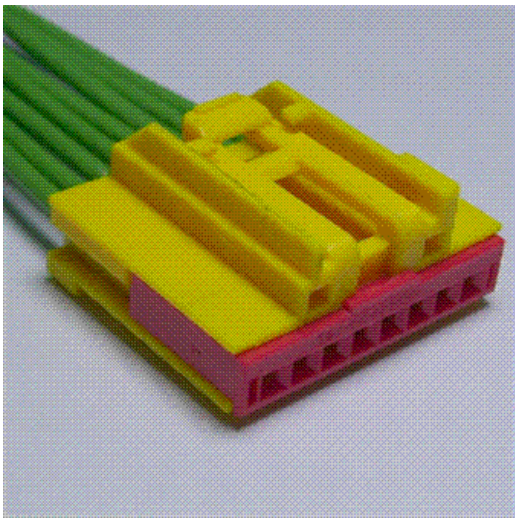
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CR103 (GY-BU)	22	CTRL MOD. - AIR BAG FRONT PASSENGER 1 +	
2	RR103 (VT-GN)	22	CTRL MOD. - AIR BAG FRONT PASSENGER 1 -	
3	*	*	Not Used	
4	CR104 (YE-GY)	22	CTRL MOD. - AIR BAG FRONT PASSENGER 2 +	
5	RR104 (WH-BU)	22	CTRL MOD. - AIR BAG FRONT PASSENGER 2 -	
6	*	*	Not Used	

7	CR144 (GY-OG)	22	CTRL MOD. - AIR BAG FRONT PASSENGER ADAPTIVE VENTING +	
8	RR144 (VT-GN)	22	CTRL MOD. - AIR BAG FRONT PASSENGER ADAPTIVE VENTING -	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1397** 	Service Part Number: **DU2Z-14S411-DB** Gauge: **20** Pin material: **Silver** Cavities: **8** Vehicle Uses Clockspring Module - Power Steering

CONNECTOR VIEWS > CONNECTOR END VIEW C263 - INLINE

InlineC263

Description

INLINE

Color

BK

Base Part #

Service Pigtail

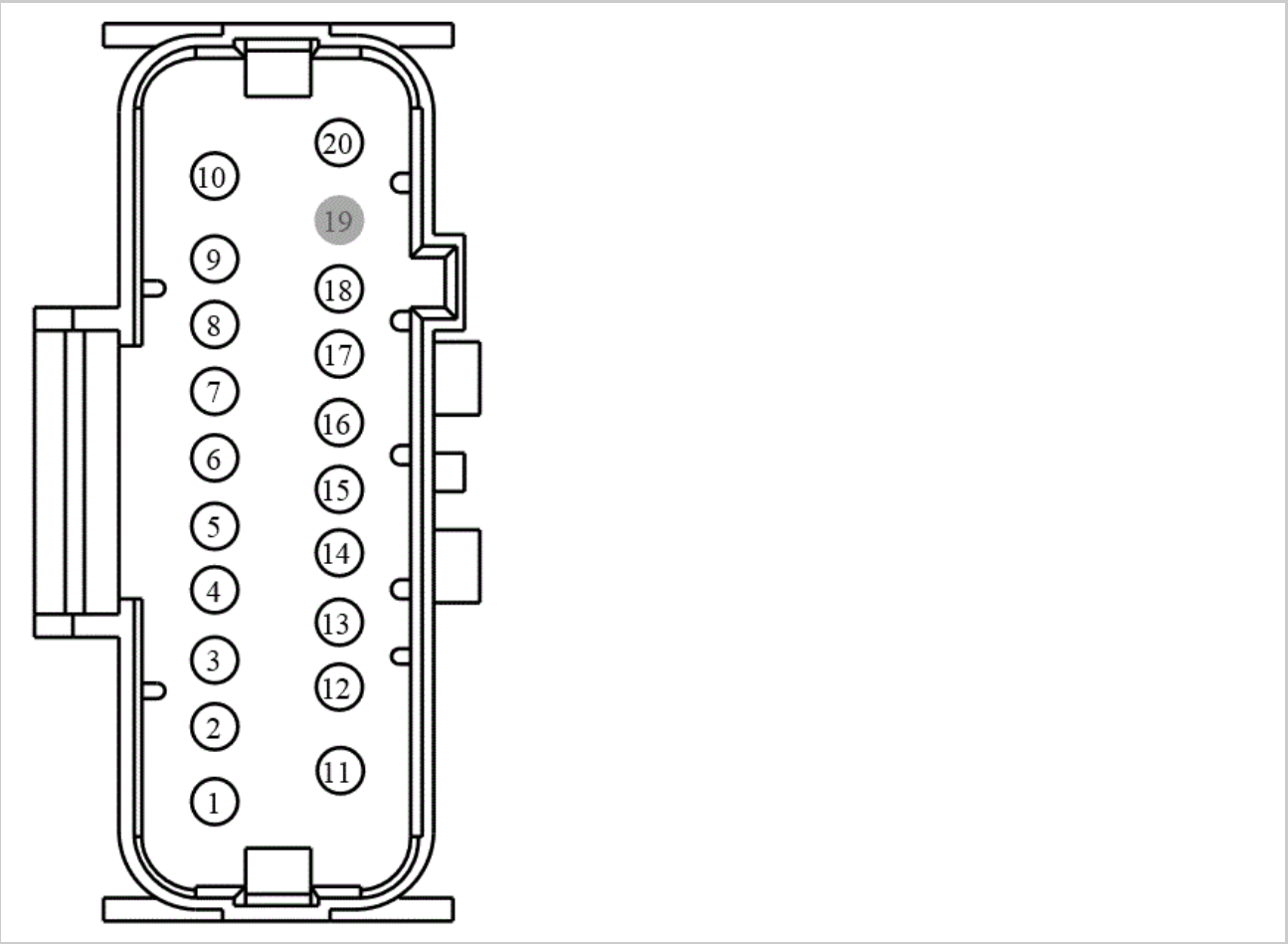
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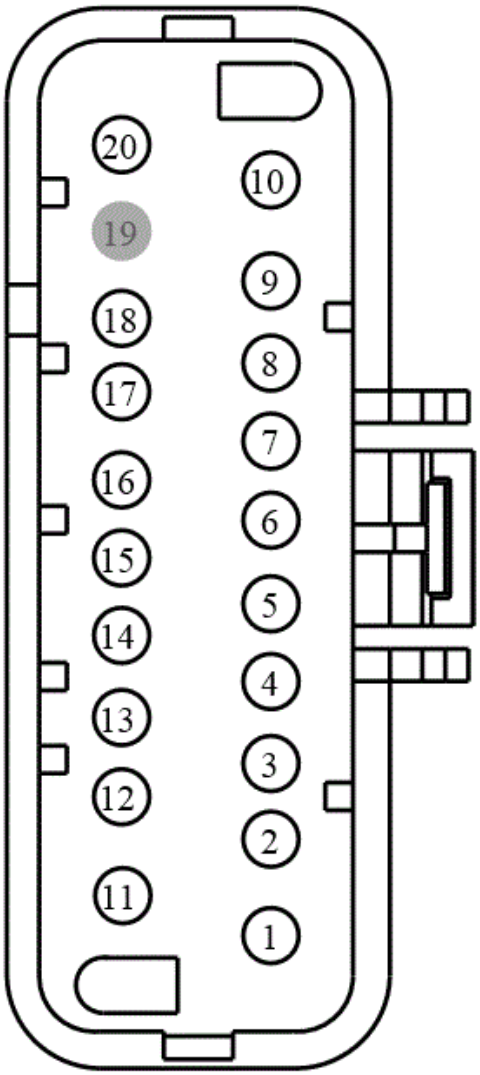
MALE

Harness 18B574

FEMALE

Harness 14401





Pin	Circuit	Gauge	Qualifier
1	VH101 (WH-VT)	20	
2	RH111 (GY-BU)	22	
3	CH238 (OG)	26	
4	CH239 (GY)	26	14401
4	CH239 (WH)	26	18B574

5	VH440 (BN)	26	14401
5	VH440 (BU)	26	18B574
6	VH438 (GN)	26	18B574
6	VH438 (GN-WH)	26	14401
7	VH436 (YE)	26	18B574
7	VH436 (YE-BU)	26	14401
8	VH406 (VT)	26	14401
8	VH406 (VT-BN)	20	18B574
9	CH229 (WH)	26	
10	CH402 (YE-GN)	10	14401
10	CH402 (YE-GN)	12	18B574
11	GD216 (BK-VT)	12	
12	CH207 (BU)	26	14401
12	CH207 (BU-WH)	26	18B574
13	CH212 (BU)	26	18B574
13	CH212 (BU-OG)	26	14401

14	CH213 (BN)	26	
15	VH441 (WH)	26	
16	LH111 (BN-WH)	22	
17	CH208 (GN)	26	14401
17	CH208 (OG)	26	18B574
18	CH228 (YE)	26	
19	*	*	
20	VH410 (GY)	22	18B574
20	VH410 (GY)	26	14401

CONNECTOR VIEWS > CONNECTOR END VIEW C264 - INLINE

InlineC264

Description

INLINE

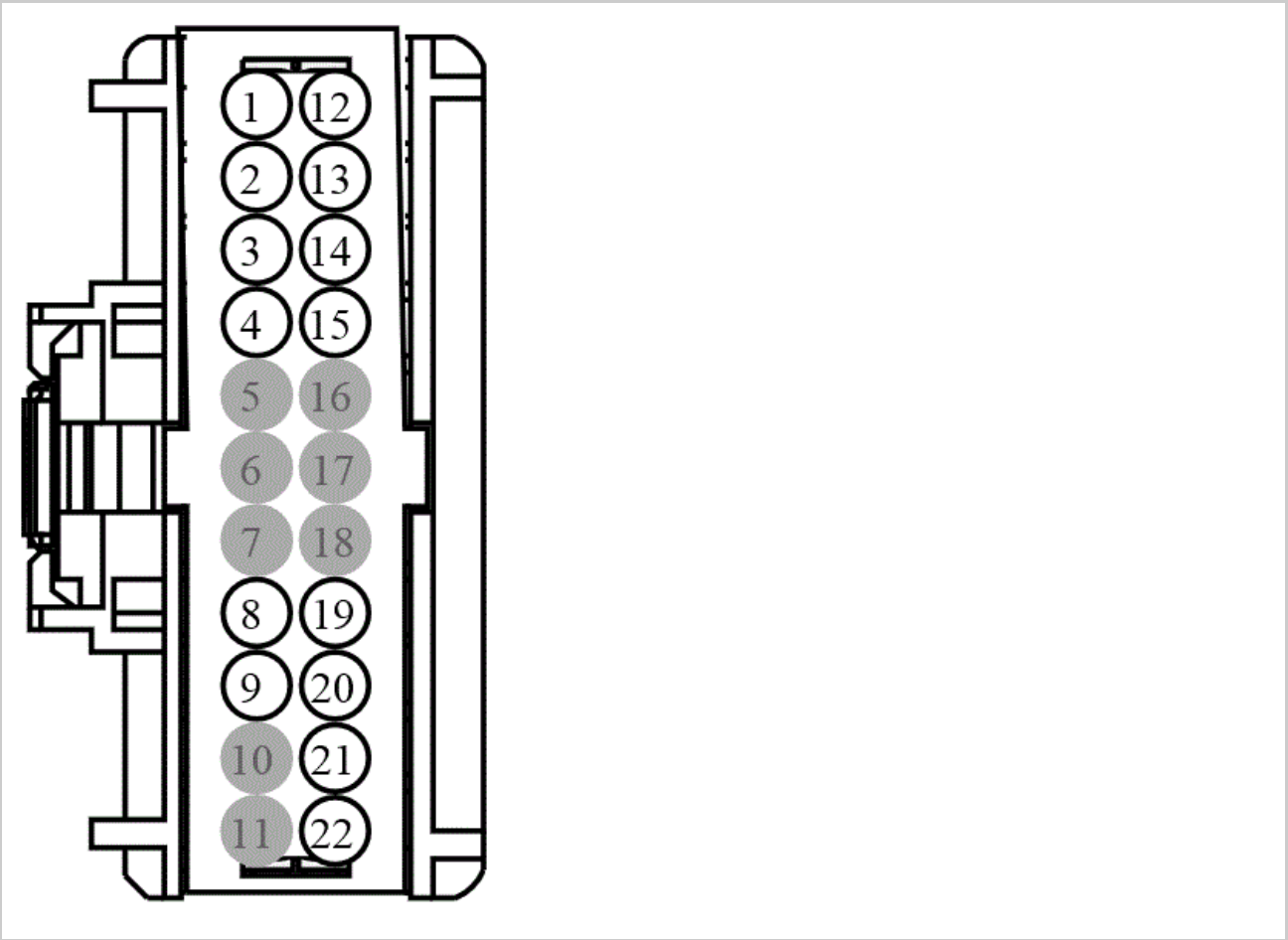
Color

Base Part #

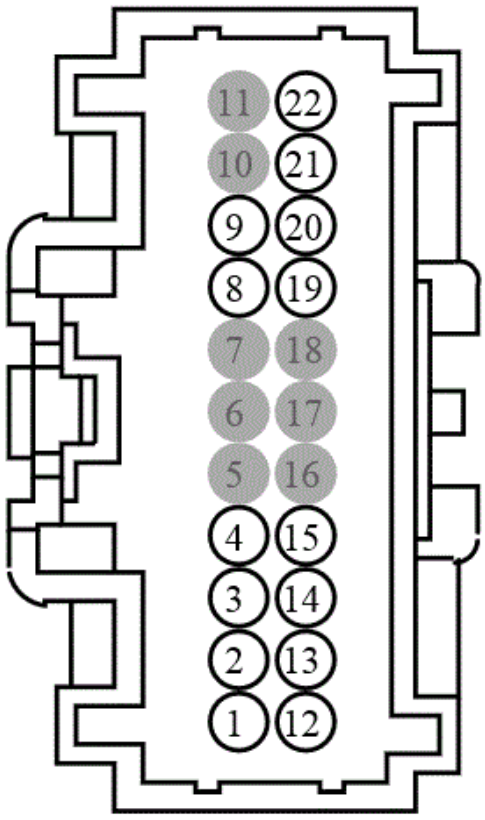
Service Pigtail

Not Available

Harness 14290



Harness 14A005



Pin	Circuit	Gauge	Qualifier
1	CRP03 (YE-GN)	20	
2	VRP01 (WH-GN)	22	
3	VRP02 (BN-VT)	22	
4	VRP06 (YE-GY)	22	
5	*	*	
6	*	*	
7	*	*	

8	VCA04 (BU-OG)	20	
9	RCA18 (BN-GN)	20	
10	*	*	
11	*	*	
12	RRP03 (GN-VT)	20	
13	RRP01 (VT-WH)	22	
14	RRP02 (GN-BN)	22	
15	RRP06 (BU-BN)	22	
16	*	*	
17	*	*	
18	*	*	
19	VCA06 (WH-OG)	20	
20	RCA20 (BN)	20	
21	VDN04 (VT-WH)	22	
22	RE407 (YE-VT)	20	

CONNECTOR VIEWS > CONNECTOR END VIEW C265 - INLINE

InlineC265

Description

INLINE

Color

LT GY

Base Part #

Service Pigtail

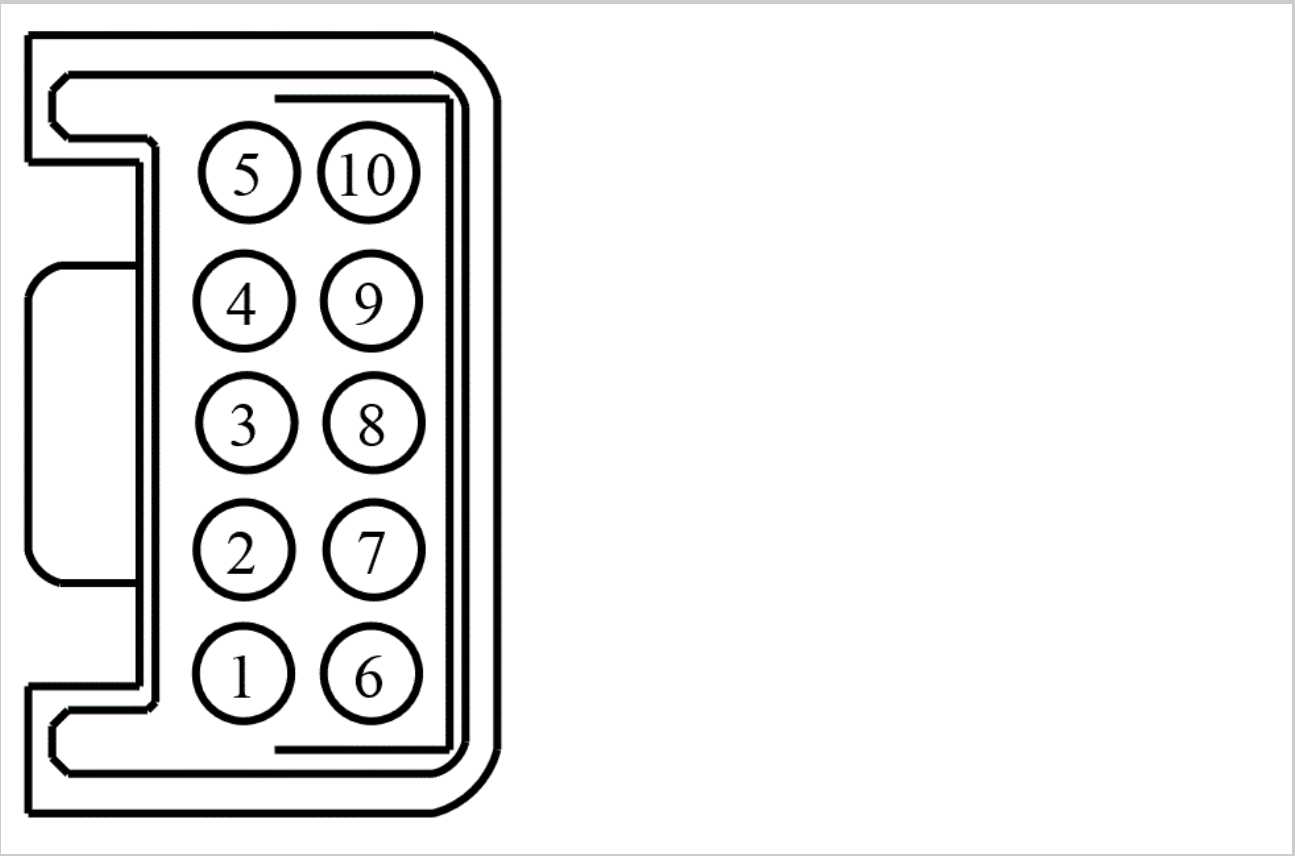
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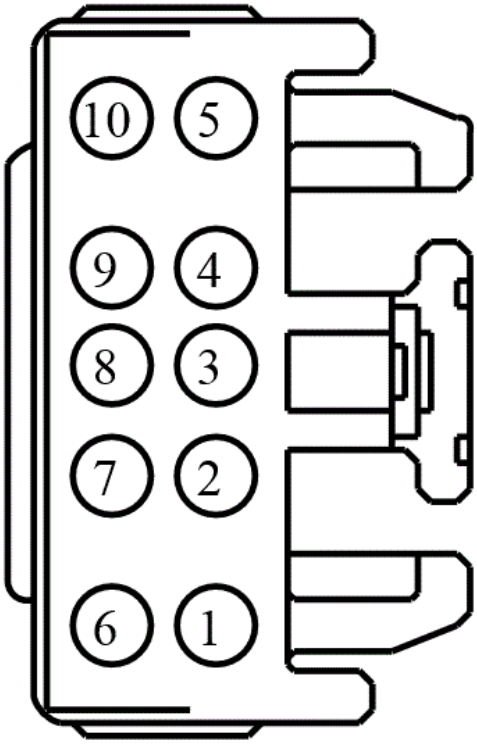
MALE

Harness 14A005

FEMALE

Harness 14290





Pin	Circuit	Gauge	Qualifier
1	SBB11 (BU-RD)	12	14290
1	SBB11 (BU-RD)	14	14A005
2	SBB12 (GN-RD)	10	14290
2	SBB12 (GN-RD)	14	14A005
3	LE230 (BN-BU)	20	14A005
3	LE230 (BN-BU)	22	14290
4	CE114 (GN-BU)	16	14A005
4	CE114 (GN-BU)	18	14290

5	VDB25 (GN-OG)	20	14290
5	VDB25 (GN-OG)	22	14A005
6	SBB17 (RD)	10	14290
6	SBB17 (RD)	14	14A005
7	VE225 (YE-OG)	22	
8	VE518 (BN-WH)	22	
9	VE922 (VT-GN)	20	14A005
9	VE922 (VT-GN)	22	14290
10	VDB26 (GY-BU)	20	14290
10	VDB26 (GY-BU)	22	14A005

CONNECTOR VIEWS > CONNECTOR END VIEW C266 - FOOTWELL LAMP RH

Connector:C266

Description

FOOTWELL LAMP RH

Color

LT GY

Harness

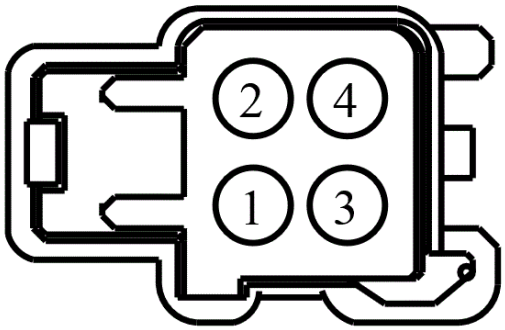
14401

Base Part #

part# N/A

Service Pigtail

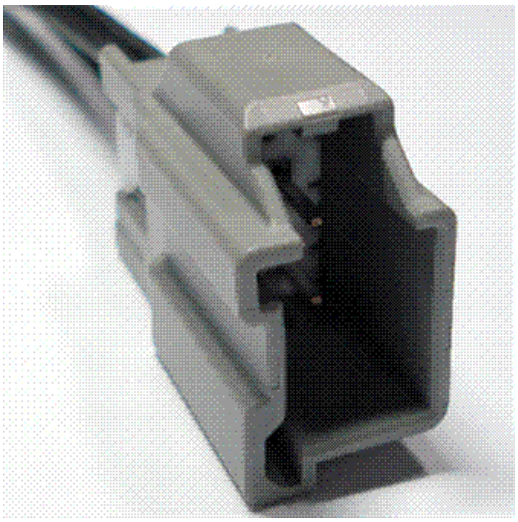
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CLN44 (OG)	22	CTRL MOD. - AMBIENT LIGHTING ZONE 1 OR NON-ZONE # LED RED +	
2	CLN45 (GN)	26	CTRL MOD. - AMBIENT LIGHTING ZONE 1 OR NON-ZONE # LED GREEN +	
3	CLN46 (BU)	26	CTRL MOD. - AMBIENT LIGHTING ZONE 1 OR NON-ZONE # LED BLUE +	
4	RLN44 (BN)	26	CTRL MOD. - AMBIENT LIGHTING ZONE 1 OR NON-ZONE # LED -	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1076**	Service Part Number: **3U2Z-14S411-BUB** Gauge: **14** Pin material: **Tin (greased)** Cavities:

	**4** Vehicle Uses Connector - Inline Element - Heated Seat Lamp - Ash Tray Lamp - Courtesy - Footwell Module - Remote Keyless Entry Motor - Heater/AC Blower (Auxiliary) Radio - Amplifier Switch - Convertable Top

CONNECTOR VIEWS > CONNECTOR END VIEW C278 - BRAKE PEDAL POSITION (BPP) SWITCH

Connector:C278

Description

BRAKE PEDAL POSITION (BPP) SWITCH

Color

NA

Harness

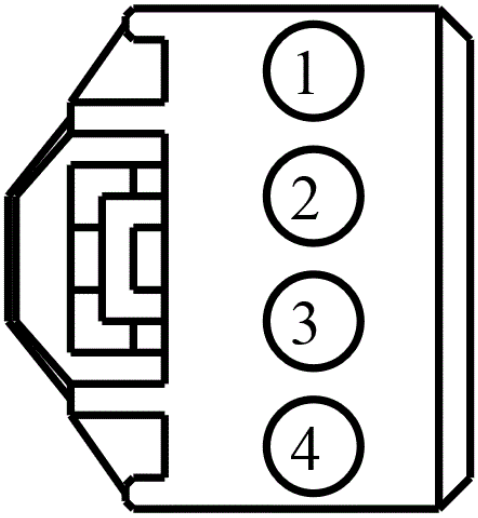
14290

Base Part #

part# N/A

Service Pigtail

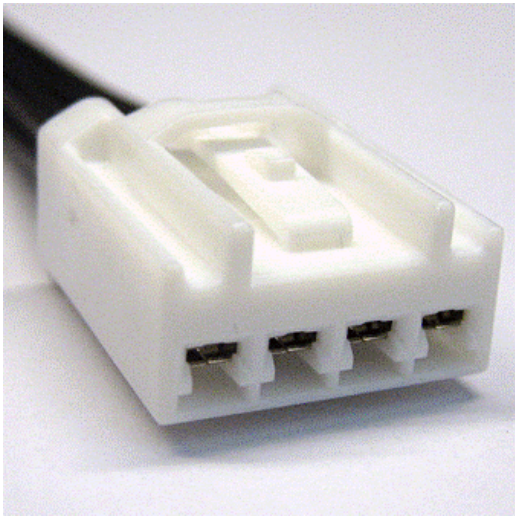
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	SBB20 (GN-RD)	20	FUSE - 20 OR CIRCUIT BREAKER	
2	GD120 (BK-GN)	18	GROUND - FENDER FRONT LEFT	
2	GD120 (BK-GN)	20	GROUND - FENDER FRONT LEFT	
3	CES09 (VT-OG)	22	SWITCH - BRAKE PEDAL # SPEED CONTROL DEACTIVATION (BPS) +	
4	CCB08 (VT-WH)	22	SWITCH - BRAKE ON/OFF (BPP) NORMAL OPEN	
4	CCB08 (VT-WH)	20	SWITCH - BRAKE ON/OFF (BPP) NORMAL OPEN	

Available Pigtail Kits

Pigtail Kit Part Number **WPT-912** 	Service Part Number: **8U2Z-14S411-HA** Gauge: **14** Pin material: **Tin** Cavities: **4** Vehicle Uses Sensor - Oil Temperature Sensor - Power Steering Pressure Sensor - Purge Flow Switch - Gear Shift Select/Neutral Safety

CONNECTOR VIEWS > CONNECTOR END VIEW C282 - AIR INLET DOOR ACTUATOR

Connector:C282

Description

AIR INLET DOOR ACTUATOR

Color

BK

Harness

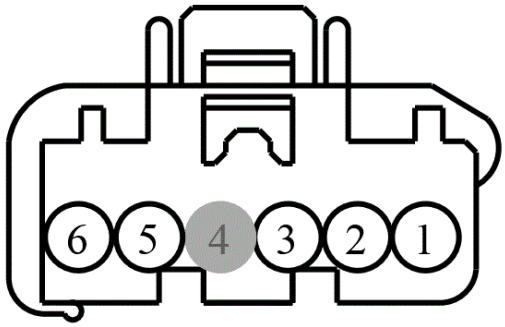
18B574

Base Part #

part# N/A

Service Pigtail

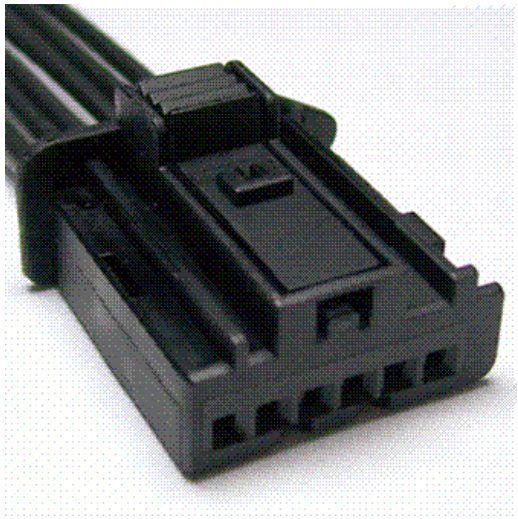
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	RH111 (GY-BU)	22	CTRL MOD. - CLIMATE # GENERIC VREF RETURN	
2	VH438 (GN)	26	SENSOR - DOOR POSITION RECIRC.	
3	LH111 (BN)	26	CTRL MOD. - CLIMATE # GENERIC VREF	
4	*	*	Not Used	
5	CH208 (OG)	26	CTRL MOD. - CLIMATE # DOOR MOTOR RECIRC. COIL 2 / OPEN (IF PLUS)	
6	CH207 (BU-WH)	26	CTRL MOD. - CLIMATE # DOOR MOTOR RECIRC. COIL 1 / CLOSE (IF PLUS)	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1151**	Service Part Number: **BU2Z-14S411-MA** Gauge: **18** Pin material: **Tin**



Cavities:

6

Vehicle Uses

Motor - Heater A/C Mode Door

Motor - Heater/AC Blend Door

Motor - Heater/AC Blower (Auxiliary)

Motor - Heater/AC Inlet Door

CONNECTOR VIEWS > CONNECTOR END VIEW C286 - SUNLOAD SENSOR

Connector:C286

Description

SUNLOAD SENSOR

Color

GY

Harness

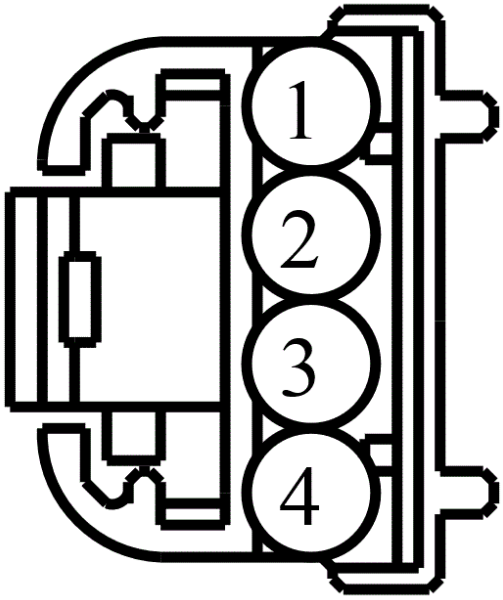
14401

Base Part #

part# N/A

Service Pigtail

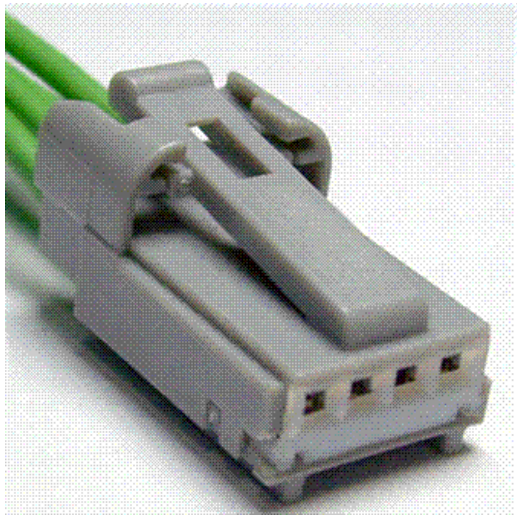
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	VH417 (YE-OG)	22	SENSOR - SUN LOAD # RIGHT	
2	VLF14 (BU-BN)	22	SENSOR - AUTOLAMP DAY/NIGHT (AMBIENT LIGHT) +	
3	VH416 (VT-GY)	22	SENSOR - SUN LOAD # LEFT	
4	RLF14 (GY-BN)	22	SENSOR - AUTOLAMP DAY/NIGHT (AMBIENT LIGHT) -	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1013**	Service Part Number: **9U2Z-14S411-TA** Gauge: **18** Pin material: **Silver**



Cavities:

4

Vehicle Uses

Module - Auto Lamps

Sensor - Sunload

CONNECTOR VIEWS > CONNECTOR END VIEW C287 - AUTOLAMP AND RAIN SENSOR

Connector:C287

Description

AUTOLAMP AND RAIN SENSOR

Color

BK

Harness

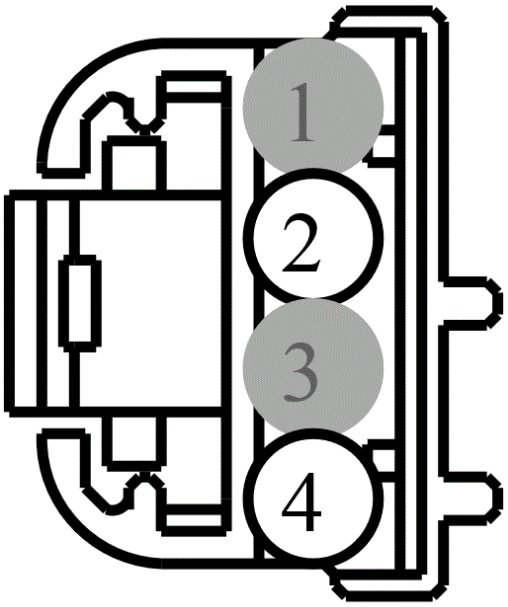
14401

Base Part #

part# N/A

Service Pigtail

See Below



Pin	Circuit	Gauge	Circuit Function	Qualifier
1	*	*	Not Used	
2	VLF14 (BU-BN)	22	SENSOR - AUTOLAMP DAY/NIGHT (AMBIENT LIGHT) +	
3	*	*	Not Used	
4	RLF14 (GY-BN)	22	SENSOR - AUTOLAMP DAY/NIGHT (AMBIENT LIGHT) -	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-982**	Service Part Number: **6U2Z-14S411-JB** Gauge: **18** Pin material: **Silver** Cavities: **4**



Vehicle Uses

Module - Auto Lamps

Module - Front Interface

Sensor - EATC In Car Temperature

Sensor - Sunload

Solenoid - Brake Shift Park Interlock

Switch - Door Lock (LH)

Switch - Door Lock (RH)

CONNECTOR VIEWS > CONNECTOR END VIEW C296 - EVAPORATOR TEMPERATURE SENSOR

Connector:C296

Description

EVAPORATOR TEMPERATURE SENSOR

Color

Harness

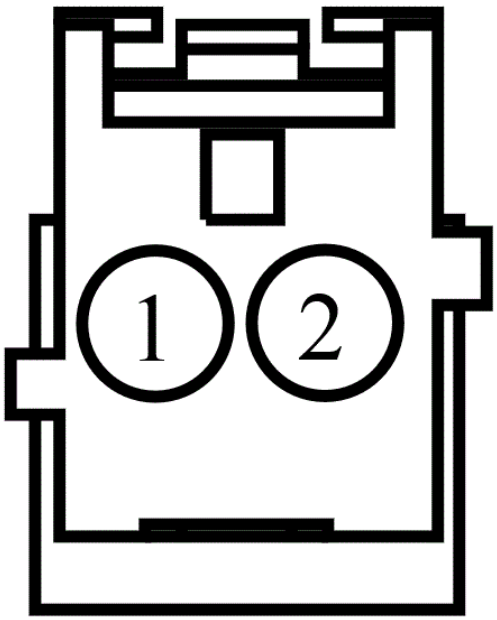
18B574

Base Part #

part# N/A

Service Pigtail

See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	VH406 (VT-BN)	20	SENSOR - A/C EVAPORATOR TEMPERATURE (ACET)	
2	RH111 (GY-BU)	20	CTRL MOD. - CLIMATE # GENERIC VREF RETURN	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1412** Ford Catalog Advantage VIEW	Service Part Number: **EU2Z-14S411-TA** Gauge: **20** Pin material: **Tin** Cavities: **2** Vehicle Uses

	Mirror - Vanity Sensor - A/C Evaporator Temperature

CONNECTOR VIEWS > CONNECTOR END VIEW C297 - BLOWER MOTOR CONTROL MODULE

Connector:C297

Description

BLOWER MOTOR CONTROL MODULE

Color

BK

Harness

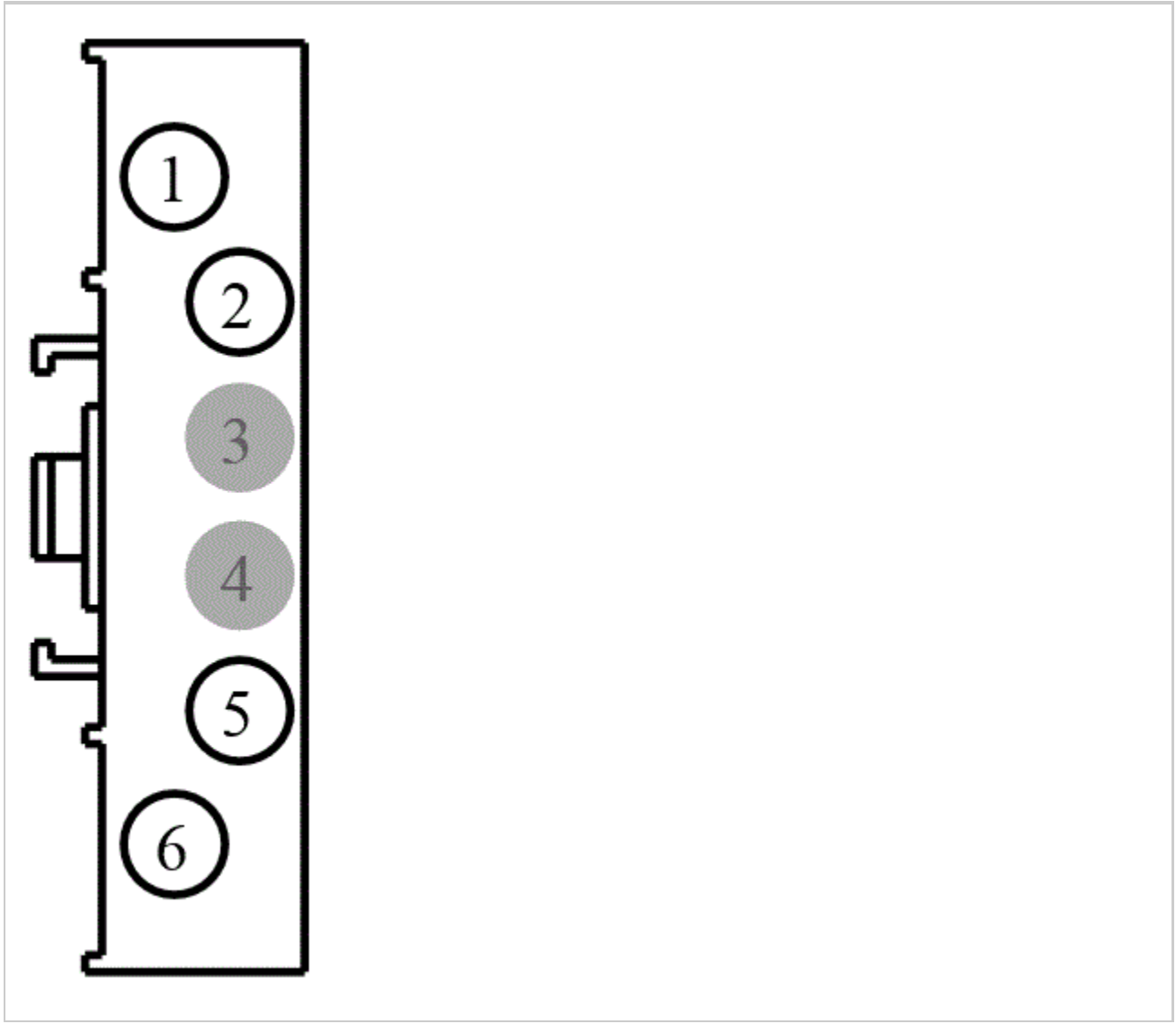
18B574

Base Part #

part# N/A

Service Pigtail

Not Available



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	GD216 (BK-VT)	12	GROUND - INSTRUMENT PANEL STRUCTURE # 3RD POINT	
2	VH101 (WH-VT)	20	CTRL MOD. - CLIMATE # BLOWER MOTOR CONTROL	
3	*	*	Not Used	
4	*	*	Not Used	

5	CH402 (YE-GN)	18	RELAY - FRONT BLOWER	
6	RH301 (GY-VT)	10	CTRL MOD. - BLOWER VARIABLE SPEED # BLOWER MOTOR -	

CONNECTOR VIEWS > CONNECTOR END VIEW C303 - PASSENGER SAFETY BELT PRETENSIONER

Connector:C303

Description

PASSENGER SAFETY BELT PRETENSIONER

Color

Harness

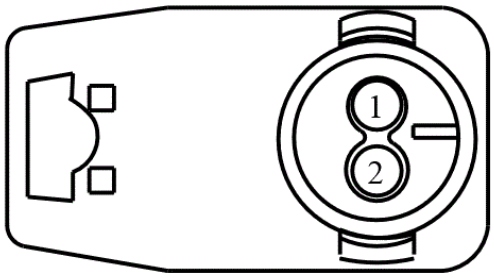
14A005

Base Part #

part# N/A

Service Pigtail

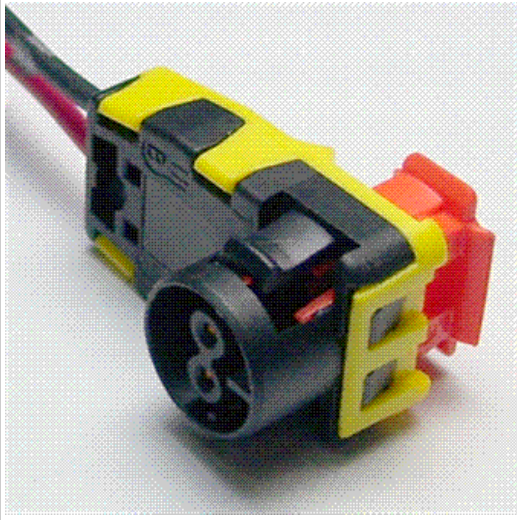
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CR171 (VT-GN)	22	CTRL MOD. - SEAT BELT PRETENSIONER FRONT PASSENGER OUTBOARD (#2) +	

2	RR171 (GY)	22	CTRL MOD. - SEAT BELT PRETENSIONER FRONT PASSENGER OUTBOARD (#2) -	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1225** 	Service Part Number: **BU2Z-14S411-BHA** Gauge: **20** Pin material: **FCI - Airbag** Cavities: **2** Vehicle Uses Airbag - Side Curtain Pretensioner - Seat Belt (Driver) Pretensioner - Seat Belt (Passenger) Sensor - Side Impact Squib - Airbag (Driver) Squib - Airbag (Passenger)

CONNECTOR VIEWS > CONNECTOR END VIEW C306 - PARKING BRAKE SWITCH

Connector:C306

Description

PARKING BRAKE SWITCH

Color

BK

Harness

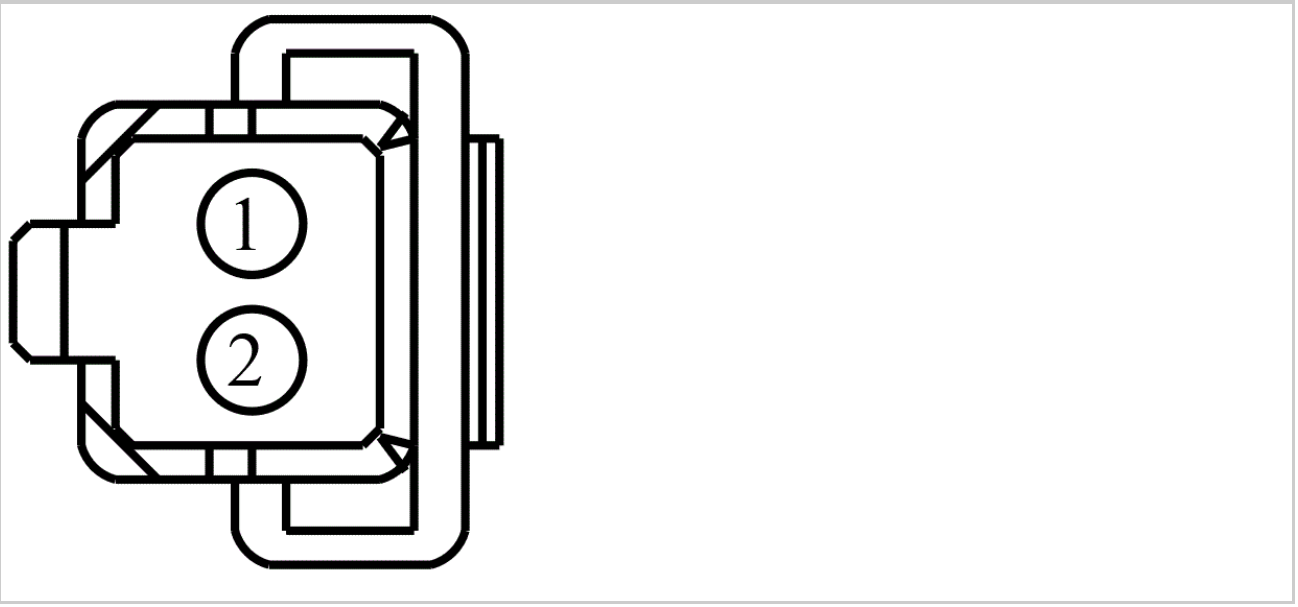
14A005

Base Part #

part# N/A

Service Pigtail

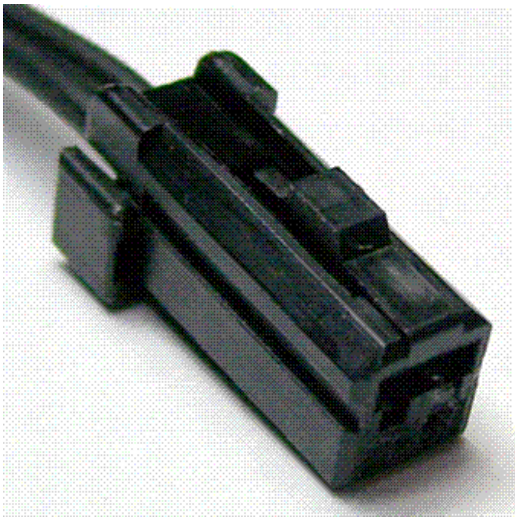
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CMC25 (WH-VT)	22	SWITCH - PARKING BRAKE	
2	GD233 (BK)	20	GROUND - COWL SIDE/PILLAR A LEFT	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1197**	Service Part Number: **3U2Z-14S411-PFB** Gauge: **20** Pin material: **Tin (greased)** Cavities:

	**2** Vehicle Uses Mirror - Vanity Sensor - Speed Switch - Brake Deactivation Switch - Brake Pedal Position Switch - Brake Pressure Switch - Park Brake Switch - Speed Control Switch - Speed Control Deactivation Switch - Stop Lamp Switch - Visor

CONNECTOR VIEWS > CONNECTOR END VIEW C310A - RESTRAINTS CONTROL MODULE (RCM)

Connector:C310A

Description

RESTRAINTS CONTROL MODULE (RCM)

Color

BK

Harness

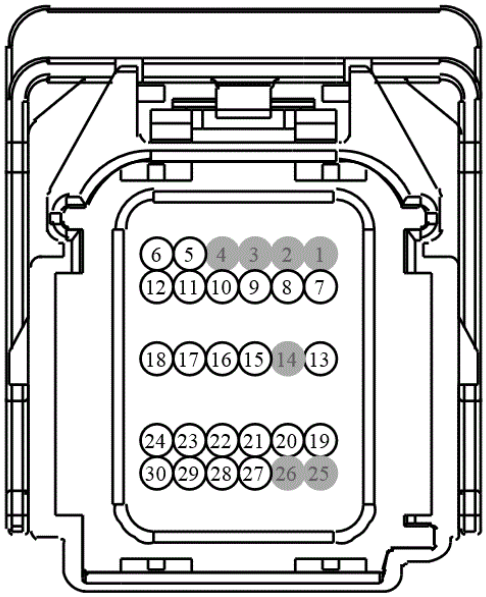
14401

Base Part #

part# N/A

Service Pigtail

Not Available



Pin	Circuit	Gauge	Circuit Function	Qualifier
1	*	*	Not Used	
2	*	*	Not Used	
3	*	*	Not Used	
4	*	*	Not Used	
5	CR169 (VT)	22	CTRL MOD. - AIR BAG PASSENGER KNEE +	
6	RR169 (GY-VT)	22	CTRL MOD. - AIR BAG PASSENGER KNEE -	
7	CR139 (VT-WH)	22	CTRL MOD. - AIR BAG DRIVER KNEE +	
8	RR139 (YE)	22	CTRL MOD. - AIR BAG DRIVER KNEE -	
9	RR144 (VT-GN)	22	CTRL MOD. - AIR BAG FRONT PASSENGER ADAPTIVE VENTING -	

10	CR144 (GY-OG)	22	CTRL MOD. - AIR BAG FRONT PASSENGER ADAPTIVE VENTING +
11	CR168 (WH-GN)	20	CTRL MOD. - PYROTECHNIC STEERING COLUMN +
12	RR168 (VT-WH)	20	CTRL MOD. - PYROTECHNIC STEERING COLUMN -
13	CR116 (GN-WH)	22	CTRL MOD. - INDICATOR PASSENGER AIR BAG DEACTIVATE +
14	*	*	Not Used
15	RR130 (GN-BU)	22	CTRL MOD. - SENSOR IMPACT FRONT 2ND
16	VR214 (WH-BU)	22	SENSOR - IMPACT FRONT 2ND
17	VR213 (VT-GN)	22	SENSOR - IMPACT FRONT 1ST
18	RR129 (YE-GY)	22	CTRL MOD. - SENSOR IMPACT FRONT 1ST -
19	CBP35 (YE-GY)	22	FUSE - 35 OR CIRCUIT BREAKER
20	RR116 (BN-GN)	22	CTRL MOD. - INDICATOR PASSENGER AIR BAG DEACTIVATE -
21	RR102 (WH)	22	CTRL MOD. - AIR BAG DRIVER 2 -
22	CR102 (BU)	22	CTRL MOD. - AIR BAG DRIVER 2 +
23	CR104	22	CTRL MOD. - AIR BAG FRONT PASSENGER 2 +

	(YE-GY)		
24	RR104 (WH-BU)	22	CTRL MOD. - AIR BAG FRONT PASSENGER 2 -
25	*	*	Not Used
26	*	*	Not Used
27	RR103 (VT-GN)	22	CTRL MOD. - AIR BAG FRONT PASSENGER 1 -
28	CR103 (GY-BU)	22	CTRL MOD. - AIR BAG FRONT PASSENGER 1 +
29	CR101 (VT-BN)	22	CTRL MOD. - AIR BAG DRIVER 1+
30	RR101 (YE-GN)	22	CTRL MOD. - AIR BAG DRIVER 1 -

CONNECTOR VIEWS > CONNECTOR END VIEW C310B - RESTRAINTS CONTROL MODULE (RCM)

Connector:C310B

Description

RESTRAINTS CONTROL MODULE (RCM)

Color

BK

Harness

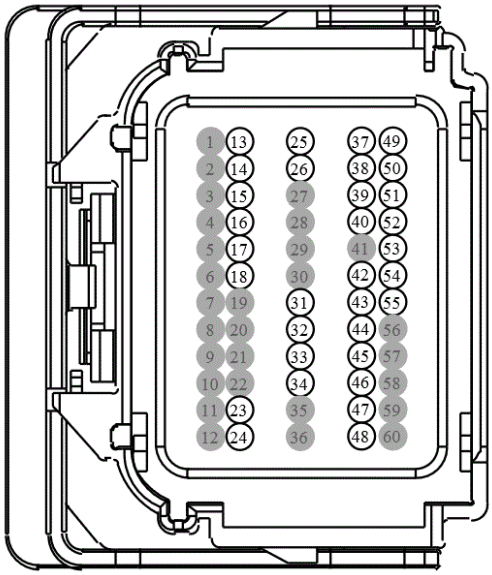
14A005

Base Part #

part# N/A

Service Pigtail

Not Available



Pin	Circuit	Gauge	Circuit Function	Qualifier
1	*	*	Not Used	
2	*	*	Not Used	
3	*	*	Not Used	
4	*	*	Not Used	
5	*	*	Not Used	
6	*	*	Not Used	
7	*	*	Not Used	
8	*	*	Not Used	
9	*	*	Not Used	
10	*	*	Not Used	

11	*	*	Not Used
12	*	*	Not Used
13	CR122 (WH-OG)	22	CTRL MOD. - SEAT BELT PRETENSIONER FRONT PASSENGER OUTBOARD +
14	RR122 (BN)	22	CTRL MOD. - SEAT BELT PRETENSIONER FRONT PASSENGER OUTBOARD -
15	RR120 (BN-GN)	22	CTRL MOD. - SEAT BELT PRETENSIONER FRONT DRIVER SIDE -
16	CR120 (BU-OG)	22	CTRL MOD. - SEAT BELT PRETENSIONER FRONT DRIVER SIDE +
17	CR111 (BN-WH)	18	CTRL MOD. - INFLATABLE CURTAIN PASSENGER SIDE +
17	CR111 (BN-WH)	22	CTRL MOD. - INFLATABLE CURTAIN PASSENGER SIDE +
18	RR111 (YE-VT)	18	CTRL MOD. - INFLATABLE CURTAIN PASSENGER SIDE -
18	RR111 (YE-VT)	22	CTRL MOD. - INFLATABLE CURTAIN PASSENGER SIDE -
19	*	*	Not Used
20	*	*	Not Used
21	*	*	Not Used
22	*	*	Not Used

23	VR215 (YE-VT)	18	SENSOR - SEAT TRACK POSITION DRIVER
24	VR216 (GN-OG)	18	SENSOR - SEAT TRACK POSITION FRONT PASSENGER
25	CR109 (BN-BU)	18	CTRL MOD. - INFLATABLE CURTAIN DRIVER SIDE +
25	CR109 (BN-BU)	22	CTRL MOD. - INFLATABLE CURTAIN DRIVER SIDE +
25	CR109 (BN-BU)	18	CTRL MOD. - INFLATABLE CURTAIN DRIVER SIDE +
26	RR109 (BU-GN)	18	CTRL MOD. - INFLATABLE CURTAIN DRIVER SIDE -
26	RR109 (BU-GN)	22	CTRL MOD. - INFLATABLE CURTAIN DRIVER SIDE -
26	RR109 (BU-GN)	18	CTRL MOD. - INFLATABLE CURTAIN DRIVER SIDE -
27	*	*	Not Used
28	*	*	Not Used
29	*	*	Not Used
30	*	*	Not Used
31	RR134 (BN-BU)	22	CTRL MOD. - SENSOR SIDE IMPACT ROW 2 PASSENGER SIDE -
32	VR220	22	SENSOR - SIDE IMPACT ROW 2 PASSENGER SIDE

	(VT-OG)		
33	VR219 (GN-WH)	22	SENSOR - SIDE IMPACT ROW 2 DRIVER SIDE
34	RR133 (GY-BN)	22	CTRL MOD. - SENSOR SIDE IMPACT ROW 2 DRIVER SIDE -
35	*	*	Not Used
36	*	*	Not Used
37	CR106 (VT-GY)	18	CTRL MOD. - AIR BAG SIDE SEAT MOUNTED FRONT PASSENGER OUTBOARD +
38	RR106 (YE-OG)	18	CTRL MOD. - AIR BAG SIDE SEAT MOUNTED FRONT PASSENGER OUTBOARD -
39	RR105 (GY-YE)	18	CTRL MOD. - AIR BAG SIDE SEAT MOUNTED FRONT DRIVER SIDE -
40	CR105 (GN-BU)	18	CTRL MOD. - AIR BAG SIDE SEAT MOUNTED FRONT DRIVER SIDE +
41	*	*	Not Used
42	CR113 (BN-YE)	22	CTRL MOD. - DEPLOY OUTPUT VEMS/TAS
43	RR131 (VT-GY)	22	CTRL MOD. - SENSOR SIDE IMPACT FRONT DRIVER SIDE -
44	VR217 (GY-YE)	22	SENSOR - SIDE IMPACT FRONT DRIVER SIDE
45	VR218 (YE-OG)	22	SENSOR - SIDE IMPACT FRONT PASSENGER SIDE

CONNECTOR VIEWS > CONNECTOR END VIEW C311 - INLINE

InlineC311

Description

INLINE

Color

Base Part #

Service Pigtail

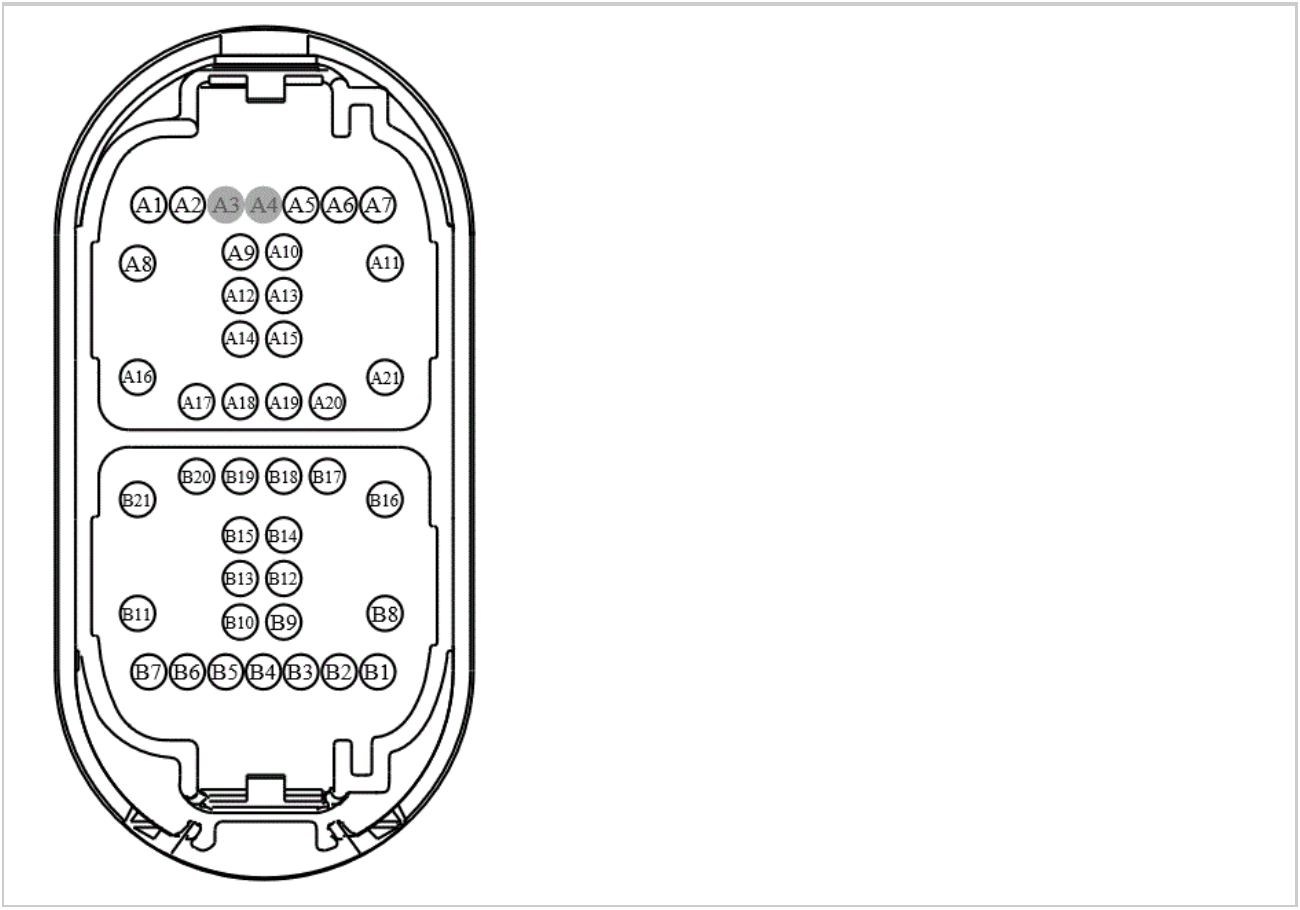
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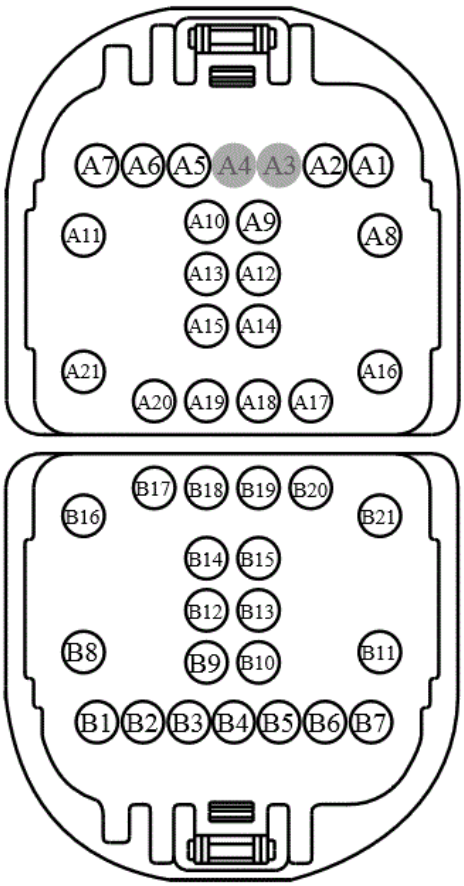
MALE

Harness 14631

FEMALE

Harness 14A005





Pin	Circuit	Gauge	Qualifier
A1	CPK19 (BU)	26	14A005
A1	CPK19 (BU-GN)	22	14631
A2	CPK23 (YE)	26	14A005
A2	CPK23 (YE-VT)	22	14631
A3	*	*	14A005
A4	*	*	14A005
A5	CPW25 (YE-BU)	22	14A005

A5	CPW25 (YE-GN)	22	14631
A6	CPW26 (BU-BN)	22	
A7	CBP23 (BN-YE)	22	
A8	CPL11 (GY-BN)	14	
A9	CPL26 (GN)	26	14A005
A9	CPL26 (GN-VT)	22	14631
A10	CPW73 (GN-RD)	22	14631
A10	CPW73 (GN-VT)	22	14A005
A11	CPL51 (BU-GN)	14	
A12	VPK01 (BN)	26	14A005
A12	VPK01 (BN-YE)	22	14631
A13	RPK01 (WH)	26	14A005
A13	RPK01 (WH-GN)	22	14631
A14	VR217 (GY-YE)	22	
A15	RR131 (VT-GN)	22	14631
A15	RR131 (VT-GY)	22	14A005

A16	GD233 (BK)	14	
A16	GD233 (BK-GY)	14	14A005
A17	RPK39 (VT)	26	14A005
A17	RPK39 (VT-OG)	22	14631
A18	CLN31 (VT-GN)	22	
A19	VPK39 (GN)	26	14A005
A19	VPK39 (GN-VT)	22	14631
A20	CPL87 (BN)	22	14631
A20	CPL87 (BN)	26	14A005
A21	SBB11 (BU-RD)	14	
B1	VDB06 (GY)	26	14A005
B1	VDB06 (GY-YE)	22	14631
B2	VDB07 (VT)	26	14A005
B2	VDB07 (VT-OG)	22	14631
B3	CLS23 (GY-OG)	22	
B4	CLN46 (BU)	22	14631

B4	CLN46 (BU)	26	14A005
B5	CLN45 (GN)	22	14631
B5	CLN45 (GN)	26	14A005
B6	CLN44 (OG)	22	14631
B6	CLN44 (OG)	26	14A005
B7	RLN44 (BN)	22	14631
B7	RLN44 (BN)	26	14A005
B8	CBB70 (YE-BU)	22	14A005
B8	CBB70 (YE-GN)	22	14631
B9	CPM21 (YE-VT)	22	
B10	CPM20 (BN-WH)	22	14A005
B10	CPM20 (BN-YE)	22	14631
B11	CRB06 (GN-WH)	22	
B12	CPM22 (GY-BN)	20	14A005
B12	CPM22 (GY-OG)	22	14631
B13	CPM23 (GY)	22	

B14	CPW13 (BN-YE)	22	
B15	CPW12 (GN-OG)	22	14A005
B15	CPW12 (GN-RD)	22	14631
B16	CPM01 (YE)	22	14631
B16	CPM01 (YE-GN)	20	14A005
B17	RME15 (GY-BU)	18	
B18	VME15 (GN-BU)	18	
B19	VME07 (WH)	18	
B20	RME07 (WH-BN)	18	
B21	CPM02 (BU)	20	14A005
B21	CPM02 (BU)	22	14631

CONNECTOR VIEWS > CONNECTOR END VIEW C312 - INLINE

InlineC312

Description

INLINE

Color

GY

Base Part #

Service Pigtail

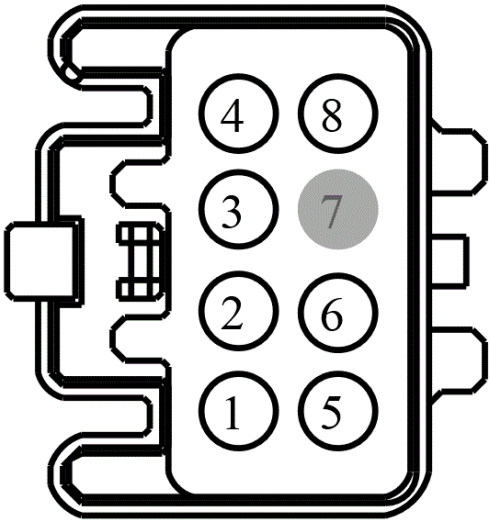
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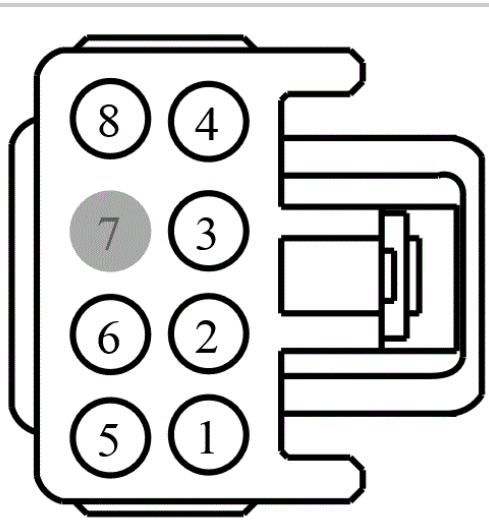
MALE

Harness 14A005

FEMALE

Harness 14A411





Pin	Circuit	Gauge	Qualifier
1	SBP29 (GY-RD)	14	14A005
1	SBP30 (BN-RD)	14	14A411
2	CPW25 (YE-BU)	22	

3	CPW73 (GN-VT)	22	
4	CPW47 (VT-OG)	22	14A005
4	CPW53 (YE-OG)	22	14A411
5	CPW26 (BU-BN)	22	
6	CBP23 (BN-YE)	22	
7	*	*	
8	GD347 (BK-VT)	14	14A005
8	GD348 (BK-YE)	14	14A411

CONNECTOR VIEWS > CONNECTOR END VIEW C313 - INLINE

InlineC313

Description

INLINE

Color

Base Part #

Service Pigtail

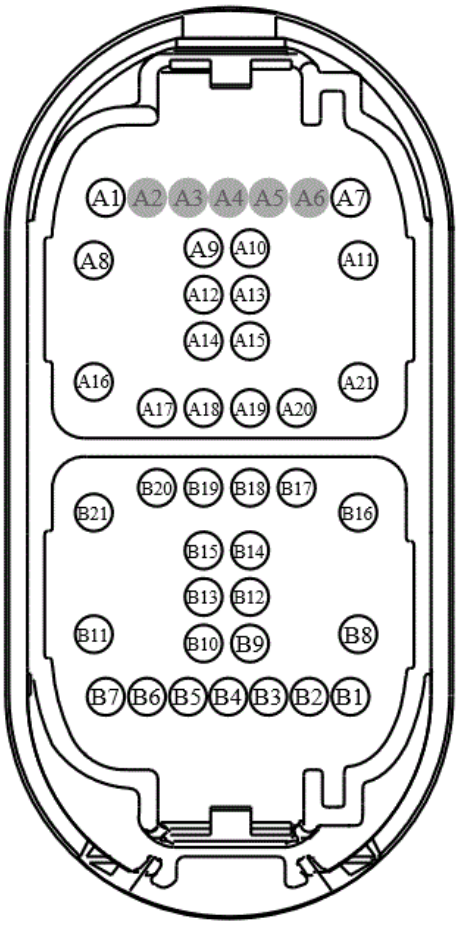
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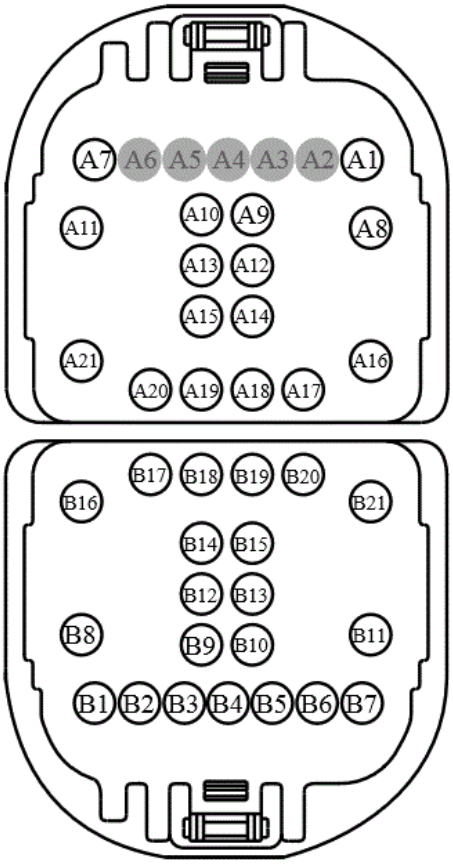
MALE

Harness 14630

FEMALE

Harness 14A005


A1 A2 A3 A4 A5 A6 A7
A8
A9 A10
A11
A12 A13
A14 A15
A16
A21
A17 A18 A19 A20
B20 B19 B18 B17
B21
B16
B15 B14
B13 B12
B11
B10 B9
B8
B7 B6 B5 B4 B3 B2 B1


A7 A6 A5 A4 A3 A2 A1
A11
A10 A9
A8
A13 A12
A15 A14
A21
A16
A20 A19 A18 A17
B17 B18 B19 B20
B16
B21
B14 B15
B12 B13
B8
B9 B10
B11
B1 B2 B3 B4 B5 B6 B7

Pin	Circuit	Gauge	Qualifier
A1	CBB70 (YE-BU)	22	
A2	*	*	14A005
A3	*	*	14A005
A4	*	*	14A005
A5	*	*	14A005
A6	*	*	14A005
A7	CBP23 (BN-YE)	22	
A8	CPK19 (BU)	26	14A005
A8	CPK19 (BU)	26	14A005
A8	CPK19 (BU-GN)	22	14630
A9	CPL31 (WH)	22	14630
A9	CPL31 (WH)	26	14A005
A10	CPW73 (GN-VT)	22	
A11	CPK23 (YE)	26	14A005
A11	CPK23 (YE)	26	14A005

A11	CPK23 (YE-VT)	22	14630
A12	VPK02 (VT)	26	14A005
A12	VPK02 (VT-WH)	22	14630
A13	RPK02 (GY)	26	14A005
A13	RPK02 (GY-YE)	22	14630
A14	VR218 (YE-OG)	22	
A15	RR132 (BU-WH)	22	
A16	GD238 (BK-WH)	14	
A17	CPM01 (YE-GN)	20	14A005
A17	CPM01 (YE-GN)	22	14630
A18	CLN31 (VT-GN)	22	
A19	VPK40 (WH)	26	14A005
A19	VPK40 (WH-OG)	22	14630
A20	CPM02 (BU)	20	14A005
A20	CPM02 (BU)	22	14630
A21	SBP26 (YE-RD)	14	

B1	VDB06 (GY)	26	14A005
B1	VDB06 (GY-OG)	22	14630
B2	VDB07 (VT)	26	14A005
B2	VDB07 (VT-OG)	22	14630
B3	CLS26 (BU-GN)	22	14630
B3	CLS27 (GN-OG)	22	14A005
B4	CLN44 (OG)	22	14630
B4	CLN44 (OG)	26	14A005
B5	CLN45 (GN)	22	14630
B5	CLN45 (GN)	26	14A005
B6	CLN46 (BU)	22	14630
B6	CLN46 (BU)	26	14A005
B7	RLN44 (BN)	22	14A005
B7	RLN44 (BU-BN)	22	14630
B8	RPK39 (VT)	26	14A005
B8	RPK39 (VT)	26	14A005

B8	RPK39 (VT-OG)	22	14630
B9	CPM21 (YE-VT)	22	
B10	CPM20 (BN-WH)	22	
B11	CRB07 (BN)	22	
B12	CPL87 (BN)	22	14630
B12	CPL87 (BN)	26	14A005
B13	CPM23 (GY)	22	
B14	CPW13 (BN-YE)	22	
B15	CPW12 (GN-OG)	22	
B16	CPL11 (GY-BN)	14	
B17	RME16 (YE-GY)	18	
B18	VME16 (VT-GY)	18	
B19	VME10 (WH-VT)	18	
B20	RME10 (WH-OG)	18	
B21	CPL52 (VT-GY)	14	

CONNECTOR VIEWS > CONNECTOR END VIEW C314 - INLINE

InlineC314

Description

INLINE

Color

GY

Base Part #

Service Pigtail

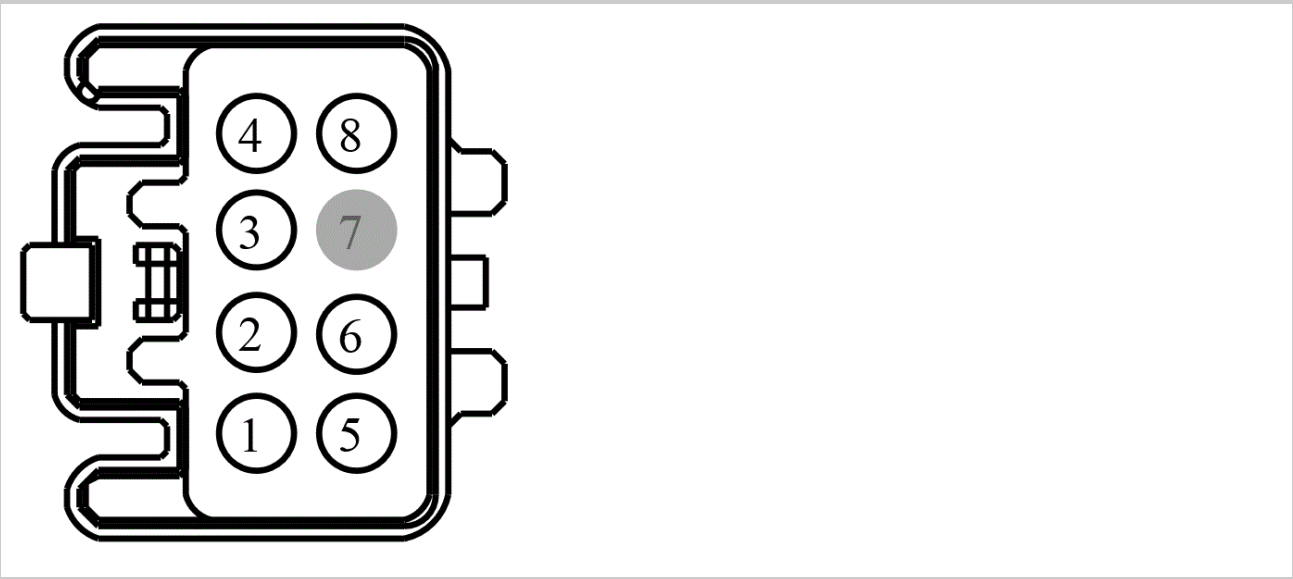
Not Available

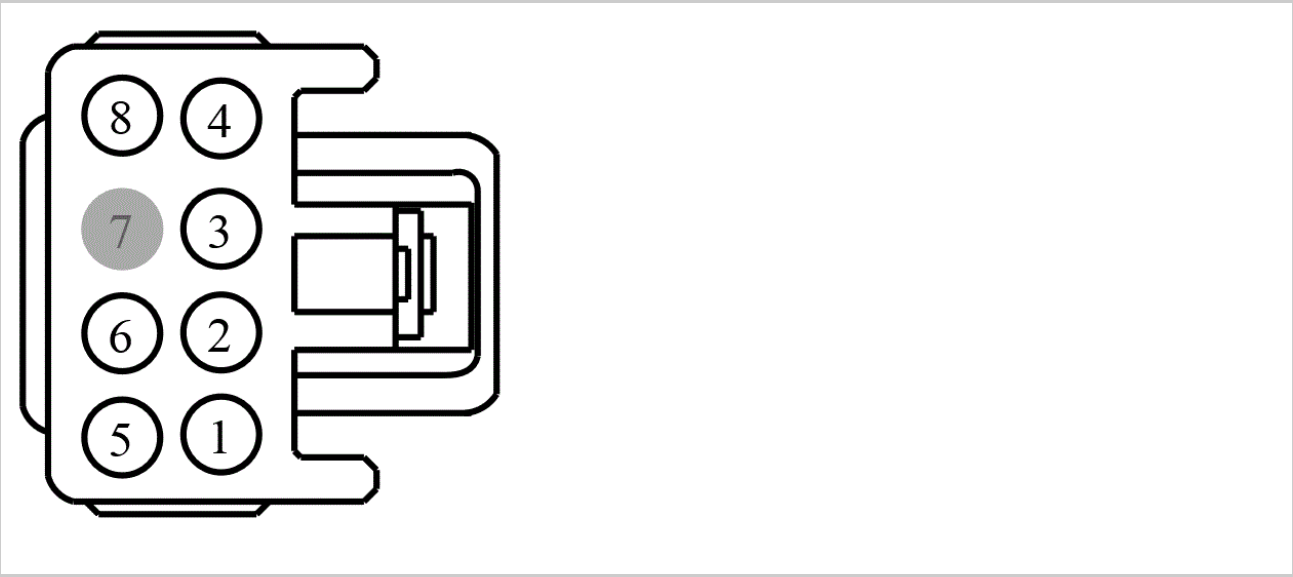
MALE

Harness 14A005

FEMALE

Harness 14A411





Pin	Circuit	Gauge	Qualifier
1	SBP30 (BN-RD)	14	
2	CPW25 (YE-BU)	22	
3	CPW73 (GN-VT)	22	
4	CPW53 (YE-OG)	22	
5	CPW26 (BU-BN)	22	
6	CBP23 (BN-YE)	22	
7	*	*	
8	GD348 (BK-YE)	14	

CONNECTOR VIEWS > CONNECTOR END VIEW C315 - INLINE

InlineC315

Description

INLINE

Color

BK

Base Part #

Service Pigtail

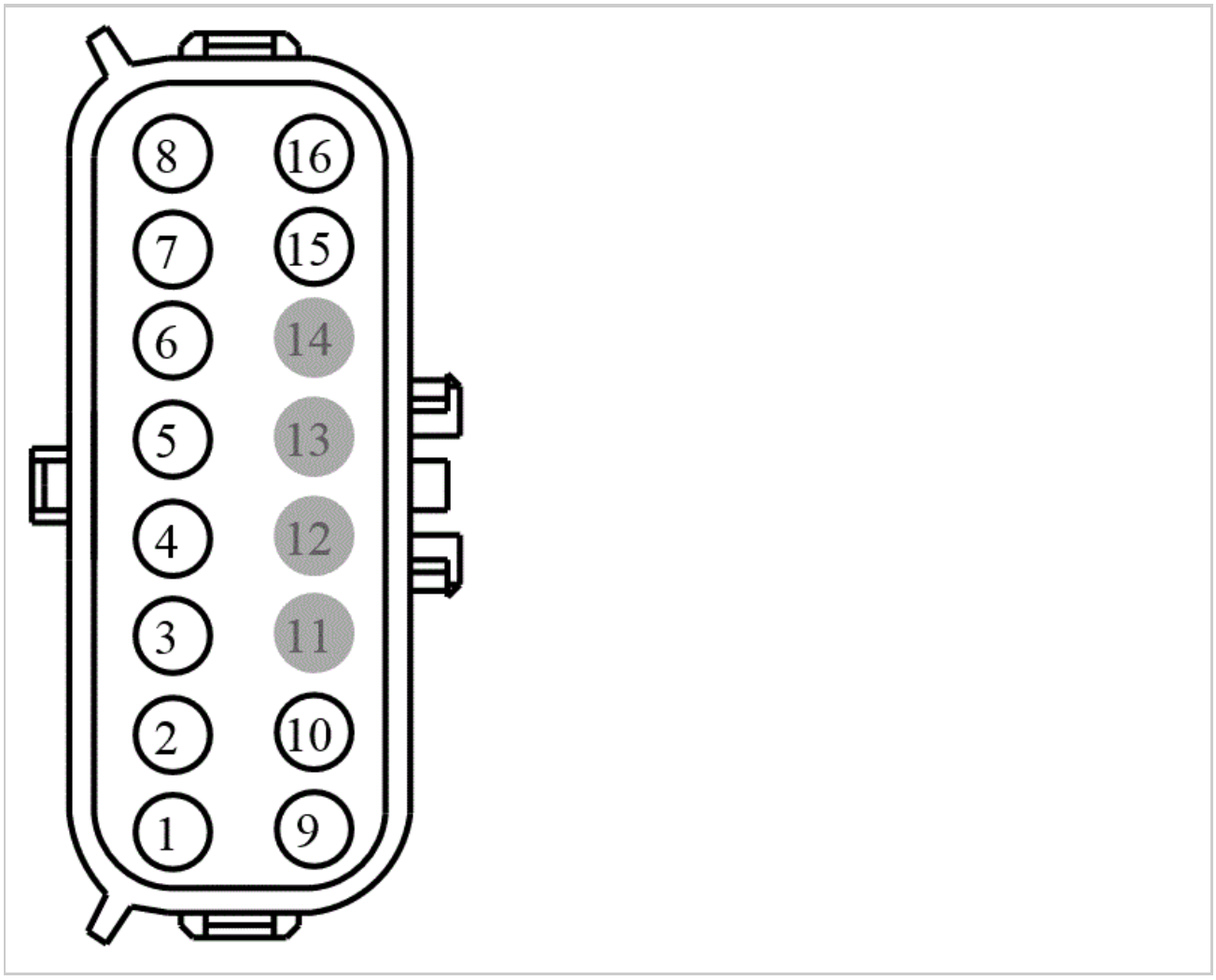
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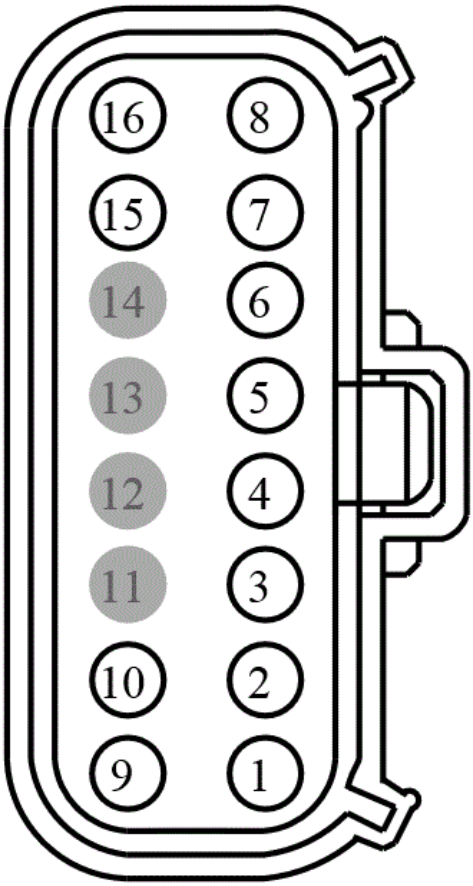
MALE

Harness 14D231

FEMALE

Harness 14A005





Pin	Circuit	Gauge	Qualifier
1	CHS02 (YE-BU)	14	
1	CHS02 (YE-BU)	16	14D231
2	RHS02 (BU-OG)	14	
2	RHS02 (BU-OG)	16	14D231
3	VHS26 (VT)	20	14D231
3	VHS26 (VT)	22	14A005
4	RHS05 (YE-VT)	20	14D231

4	RHS05 (YE-VT)	22	14A005
5	CHS14 (GN)	20	14D231
5	VHS35 (VT-OG)	22	14A005
6	CHS29 (WH-BU)	20	14D231
6	RHS15 (GY-BN)	22	14A005
7	CHS01 (GY-VT)	14	
7	CHS01 (GY-VT)	16	14D231
8	RHS01 (WH-VT)	14	
8	RHS01 (WH-VT)	16	14D231
9	VHS18 (BN-GN)	20	
10	CHS09 (GY)	20	14D231
10	VHS16 (BU-GN)	20	14A005
11	*	*	
12	*	*	
13	*	*	
14	*	*	

15	CHS03 (GN-BN)	18	14D231
15	CHS03 (GN-BN)	20	14A005
16	RHS03 (GY-OG)	18	14D231
16	RHS03 (GY-OG)	20	14A005

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1404** 	Service Part Number: **EU2Z-14S411-VA** Gauge: **16** Pin material: **Silver** Cavities: **16** Vehicle Uses: Mirror - Sideview

CONNECTOR VIEWS > CONNECTOR END VIEW C316 - INLINE

InlineC316

Description

INLINE

Color

BK

Base Part #

Service Pigtail

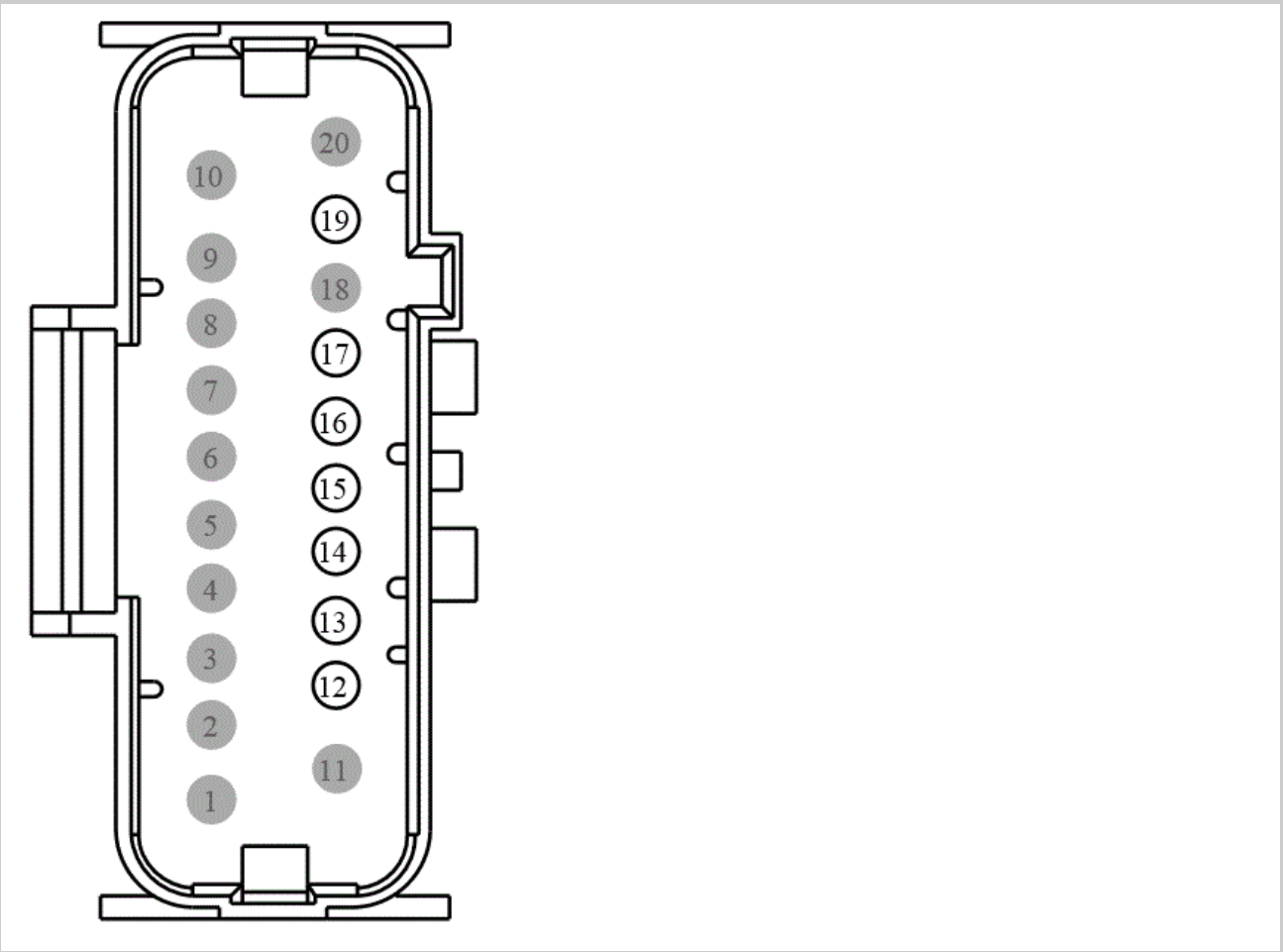
Not Available

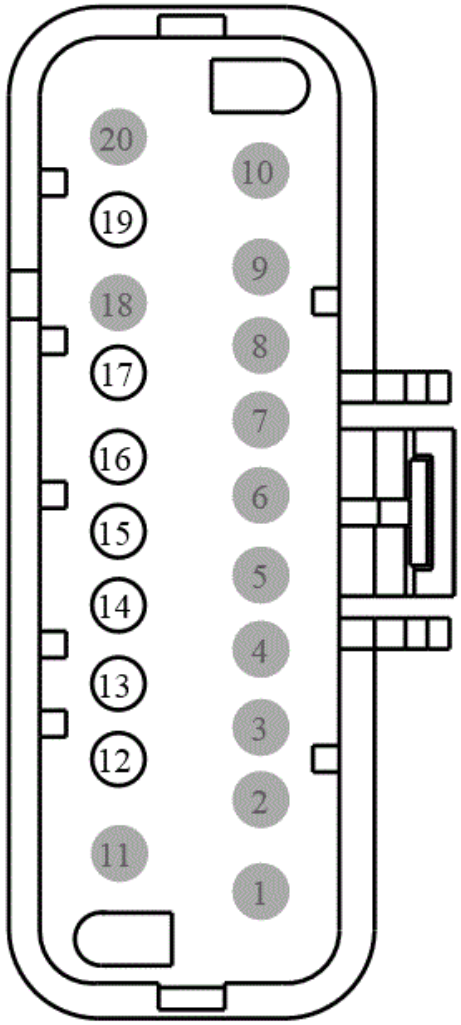
MALE

Harness 14D233

FEMALE

Harness 14D230





Pin	Circuit	Gauge	Qualifier
1	*	*	
2	*	*	
3	*	*	
4	*	*	
5	*	*	
6	*	*	

7	*	*	
8	*	*	
9	*	*	
10	*	*	
11	*	*	
12	VHS21 (BU-WH)	20	
13	RHS08 (VT-WH)	18	14D233
13	RHS08 (VT-WH)	20	14D230
14	RHS06 (WH)	14	14D233
14	RHS06 (WH)	4	14D230
15	CHS06 (BU-BN)	14	14D233
15	CHS06 (BU-BN)	4	14D230
16	VHS36 (YE-BU)	20	
17	RHS20 (GN-BU)	20	
18	*	*	
19	CHS08 (BN-YE)	18	

20	*	*	

CONNECTOR VIEWS > CONNECTOR END VIEW C319 - AUXILIARY POWER POINT

Connector:C319

Description

AUXILIARY POWER POINT

Color

Harness

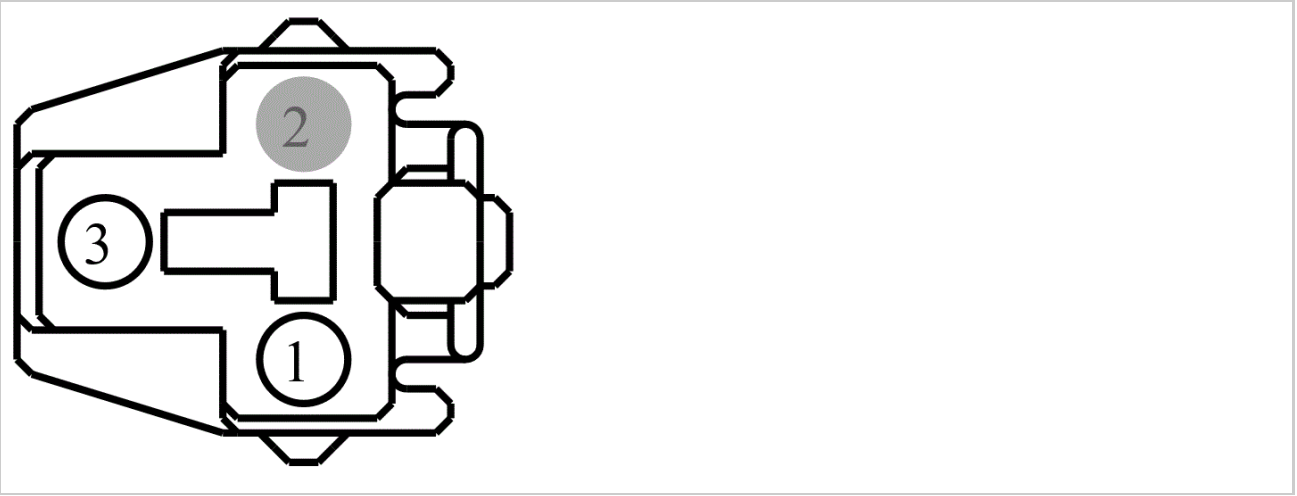
14401

Base Part #

part# N/A

Service Pigtail

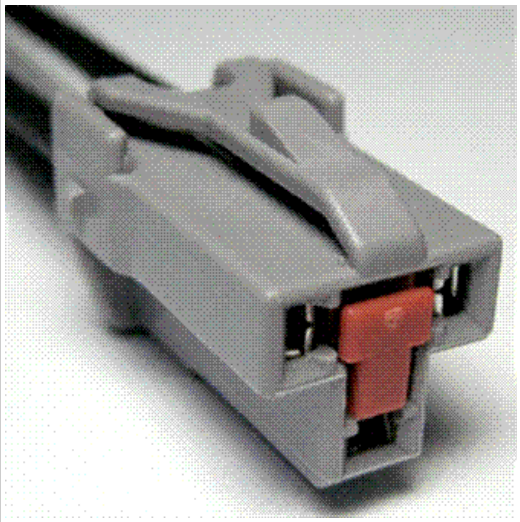
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CBB53 (GY-BN)	16	FUSE - 53 OR CIRCUIT BREAKER	
2	*	*	Not Used	

3	GD216 (BK-VT)	16	GROUND - INSTRUMENT PANEL STRUCTURE # 3RD POINT	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1160** 	Service Part Number: **3U2Z-14S411-SJB** Gauge: **12** Pin material: **Tin** Cavities: **3** Vehicle Uses Cigar Lighter Lamp - Ash Tray Power Point

CONNECTOR VIEWS > CONNECTOR END VIEW C323 - DRIVER SAFETY BELT PRETENSIONER

Connector:C323

Description

DRIVER SAFETY BELT PRETENSIONER

Color

Harness

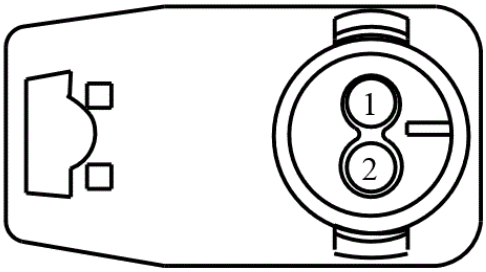
14A005

Base Part #

part# N/A

Service Pigtail

See Below



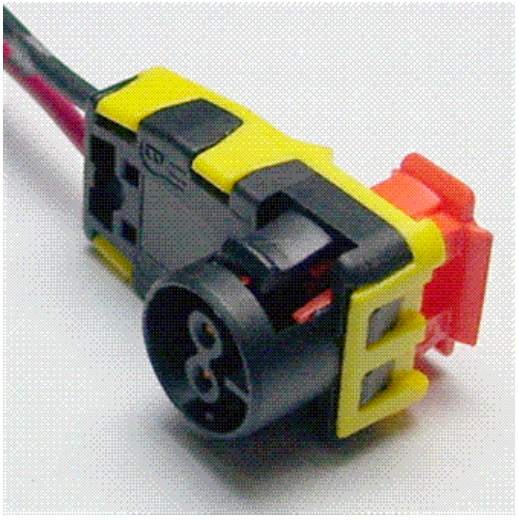
Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CR170 (GN)	22	CTRL MOD. - SEAT BELT PRETENSIONER FRONT DRIVER SIDE (#2) +	
2	RR170 (BN-BU)	22	CTRL MOD. - SEAT BELT PRETENSIONER FRONT DRIVER SIDE (#2) -	

Available Pigtail Kits

Pigtail Kit Part Number

WPT-1225



Service Part Number:

BU2Z-14S411-BHA

Gauge:

20

Pin material:

FCI - Airbag

Cavities:

2

Vehicle Uses

Airbag - Side Curtain

Pretensioner - Seat Belt (Driver)

Pretensioner - Seat Belt (Passenger)

Sensor - Side Impact

Squib - Airbag (Driver)

	Squib - Airbag (Passenger)

CONNECTOR VIEWS > CONNECTOR END VIEW C332 - FRONT SEAT TRACK MOTOR RH

Connector:C332

Description

FRONT SEAT TRACK MOTOR RH

Color

DK GY

Harness

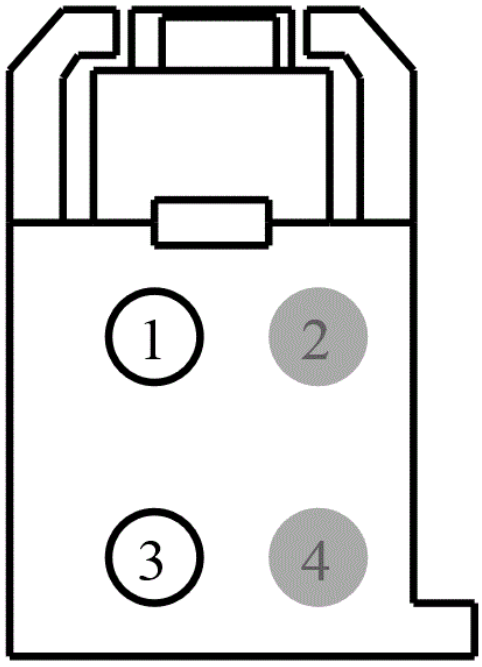
14D230

Base Part #

part# N/A

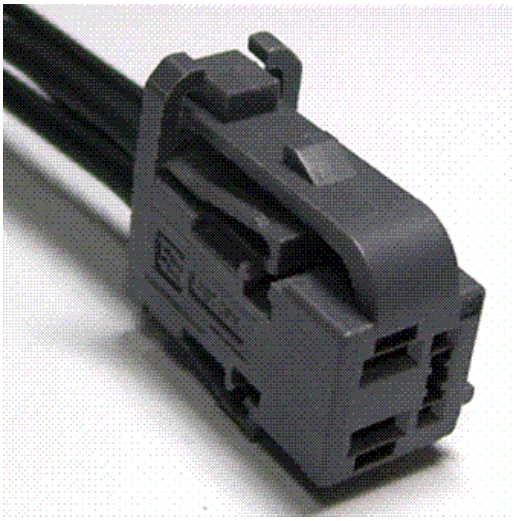
Service Pigtail

See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1350** 	Service Part Number: **DU2Z-14S411-UA** Gauge: **16 20** Pin material: **Tin** Cavities: **4** Vehicle Uses Motor - Power Seat Track Motor - Seat Height (Front)

CONNECTOR VIEWS > CONNECTOR END VIEW C339 - INLINE

InlineC339

Description

INLINE

Color

BK

Base Part #

Service Pigtail

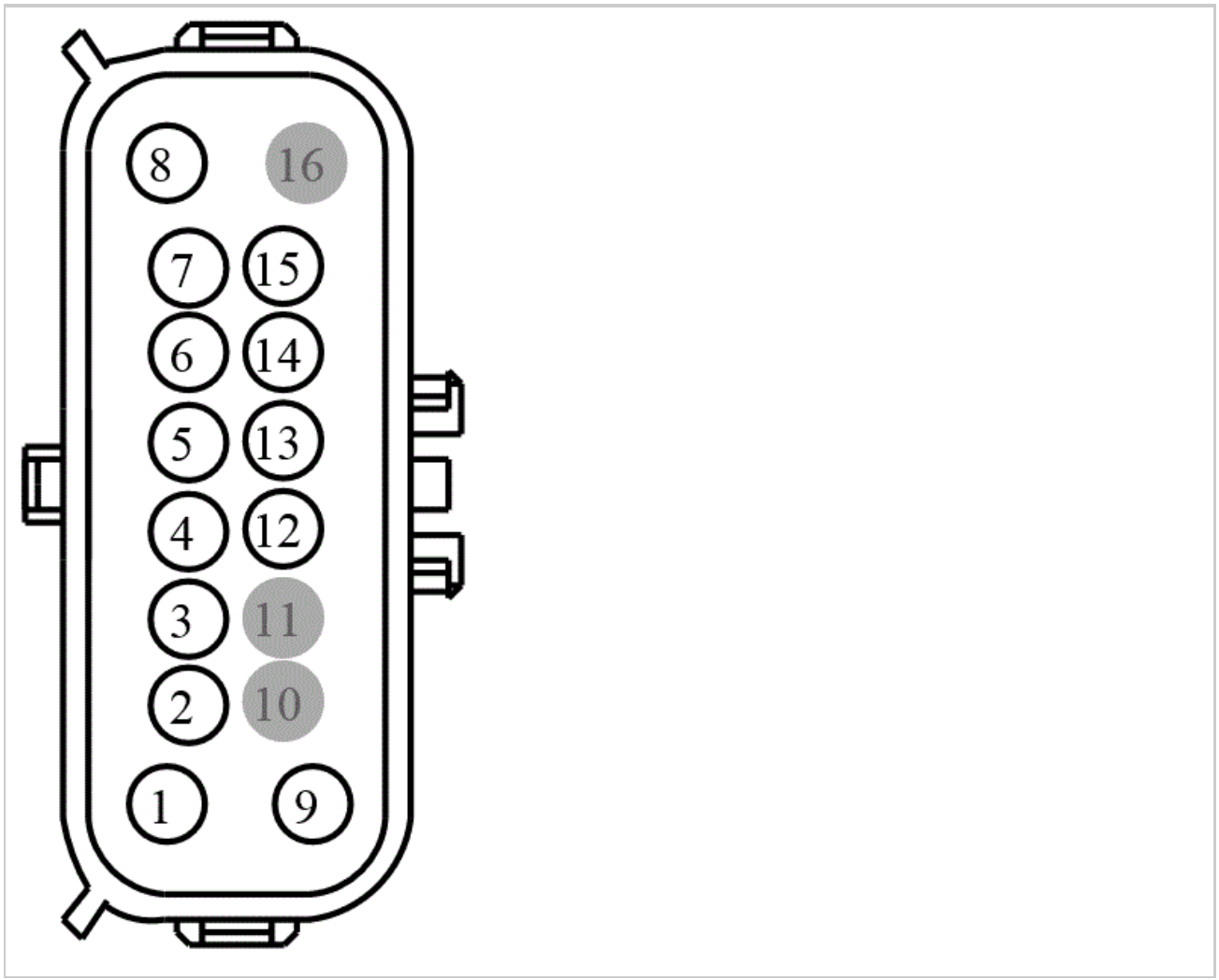
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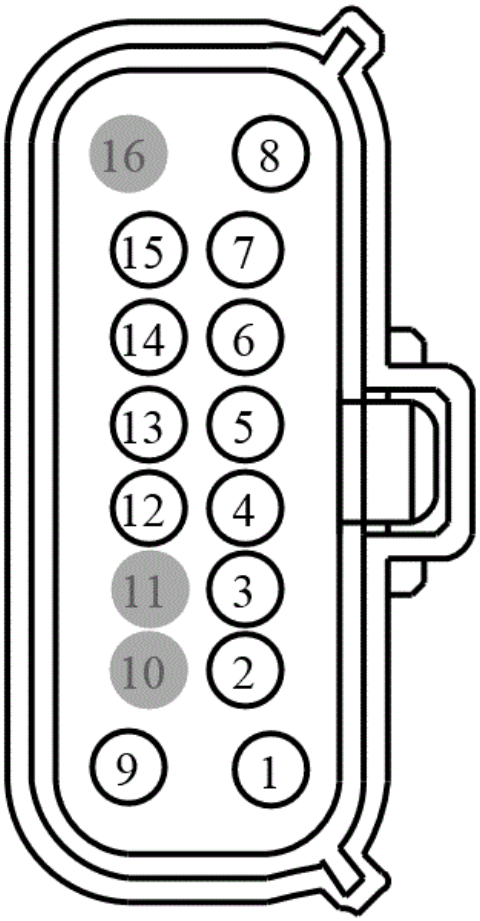
MALE

Harness 14D230

FEMALE

Harness 14A005

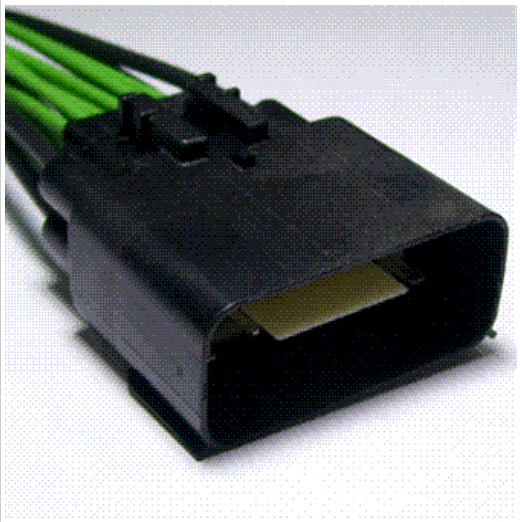

8
16
7
15
6
14
5
13
4
12
3
11
2
10
1
9



Pin	Circuit	Gauge	Qualifier
1	CBX05 (VT-RD)	14	14D230
1	SBB13 (GY-RD)	14	14A005
2	CBP22 (GN-OG)	18	14A005
2	CBX02 (BN-RD)	18	14D230
3	CR201 (GN-BU)	18	14D230
3	CR203 (GY-VT)	18	14A005
4	VR215 (YE-VT)	20	14D230

4	VR216 (GN-OG)	18	14A005
5	VDB04 (WH-BU)	18	14D230
5	VDB25 (GN-OG)	22	14A005
6	VDB05 (WH)	18	14D230
6	VDB26 (GY-BU)	22	14A005
7	GD238 (BK-WH)	18	14A005
7	GD901 (BK)	18	14D230
8	GD238 (BK-WH)	12	14A005
8	GD904 (BK-BU)	14	14D230
9	CBX01 (GN-RD)	14	14D230
9	SBB14 (BN-RD)	12	14A005
10	*	*	
11	*	*	
12	CR106 (VT-GY)	18	
13	RR106 (YE-OG)	18	
14	CR105 (GN-BU)	18	14D230

14	CR111 (BN-WH)	18	14A005
15	RR105 (GY-YE)	18	14D230
15	RR111 (YE-VT)	18	14A005
16	*	*	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1393** 	Service Part Number: **7U2Z-14S411-KB** Gauge: **14 18** Pin material: **Tin & Silver** Cavities: **16** Vehicle Uses: Connector - Inline For Mating Connector Refer To WPT-1142

CONNECTOR VIEWS > CONNECTOR END VIEW C340 - INLINE

InlineC340

Description

INLINE

Color

BK

Base Part #

Service Pigtail

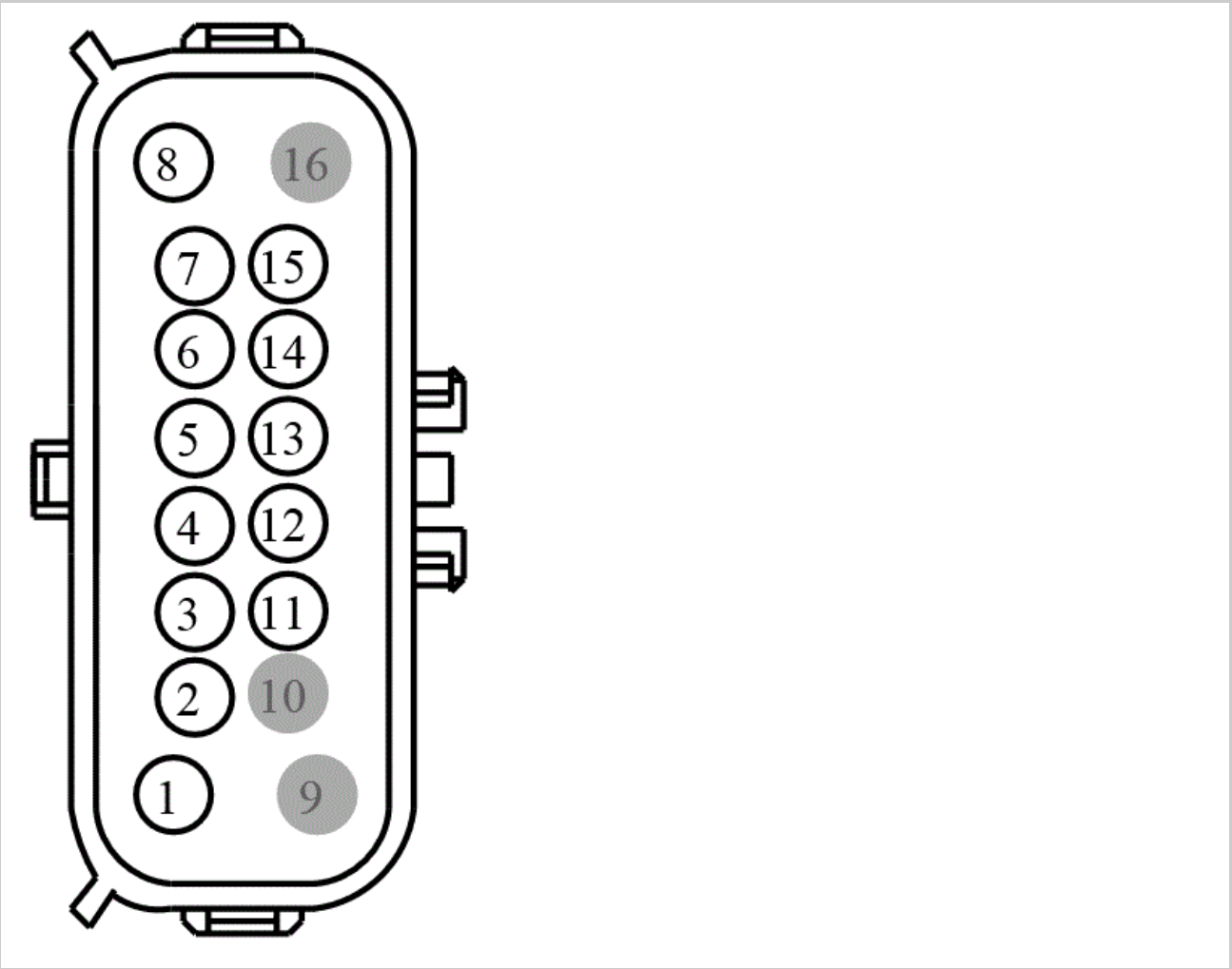
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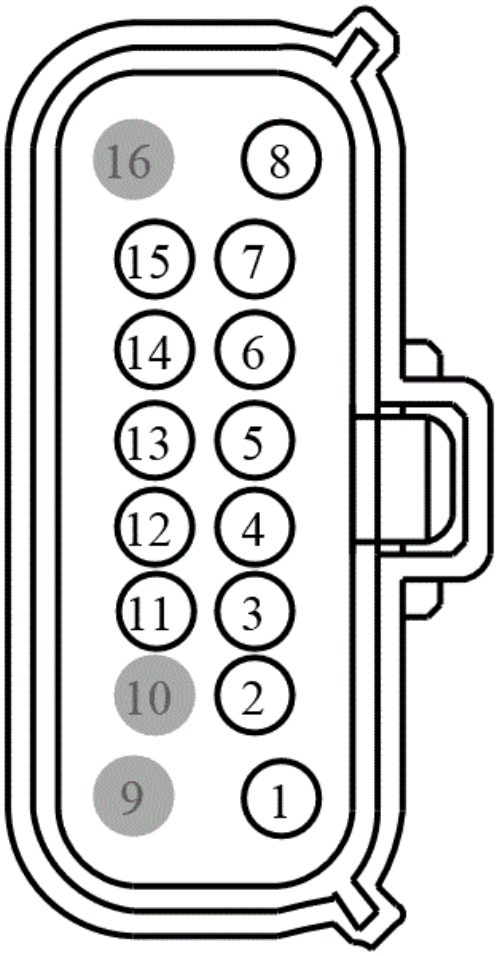
MALE

Harness 14D231

FEMALE

Harness 14A005





Pin	Circuit	Gauge	Qualifier
1	CBX05 (VT-RD)	14	14D231
1	SBB12 (GN-RD)	14	14A005
2	CBX03 (BU-RD)	18	14D231
2	SBP02 (YE-RD)	18	14A005
3	CR201 (GN-BU)	18	
4	VR215 (YE-VT)	18	14A005

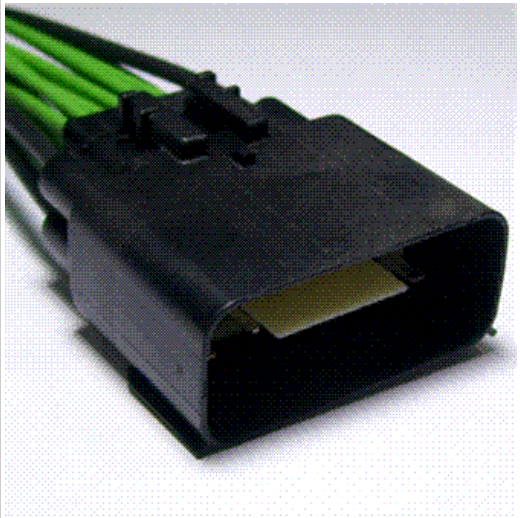
4	VR215 (YE-VT)	20	14D231
5	VDB06 (GY-OG)	18	14D231
5	VDB06 (GY-OG)	22	14A005
6	VDB07 (VT-OG)	18	14D231
6	VDB07 (VT-OG)	22	14A005
7	GD901 (BK)	18	14D231
7	RR137 (BU-GY)	18	14A005
8	GD233 (BK)	14	14A005
8	GD233 (BK)	14	14A005
8	GD233 (BK-GY)	14	14A005
8	GD904 (BK-BU)	14	14D231
9	*	*	
10	*	*	
11	GD233 (BK)	18	14A005
11	GD905 (BK-GN)	18	14D231
12	CR105 (GN-BU)	18	14A005

12	CR106 (VT-GY)	18	14D231
13	RR105 (GY-YE)	18	14A005
13	RR106 (YE-OG)	18	14D231
14	CR105 (GN-BU)	18	14D231
14	CR109 (BN-BU)	18	14A005
15	RR105 (GY-YE)	18	14D231
15	RR109 (BU-GN)	18	14A005
16	*	*	

Available Pigtail Kits

Pigtail Kit Part Number

WPT-1393



Service Part Number:

7U2Z-14S411-KB

Gauge:

14 18

Pin material:

Tin & Silver

Cavities:

16

Vehicle Uses:

Connector - Inline

For Mating Connector Refer To WPT-1142

CONNECTOR VIEWS > CONNECTOR END VIEW C341A - DRIVER SEAT MODULE (DSM)

Connector:C341A

Description

DRIVER SEAT MODULE (DSM)

Color

GY

Harness

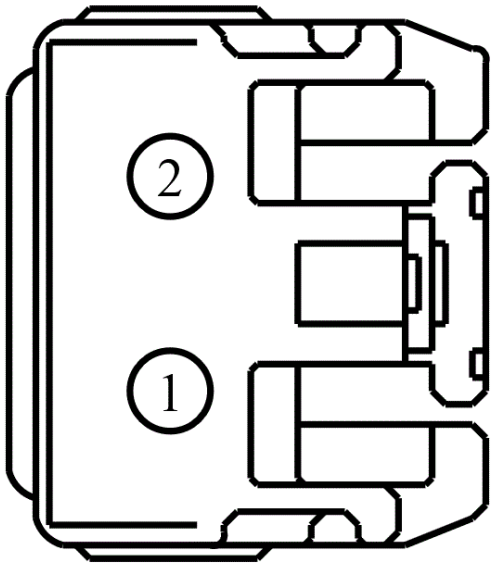
14D231

Base Part #

part# N/A

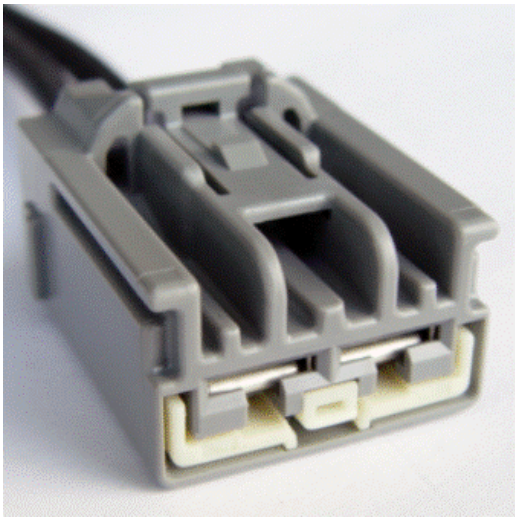
Service Pigtail

See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CBX05 (VT-RD)	14	POWER - SEAT # POWER SEAT SWITCH	
2	GD904 (BK-BU)	14	GROUND - DRIVER SEAT # SEAT SWITCH	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-236** 	Service Part Number: **3U2Z-14S411-PA** Gauge: **10** Pin material: **Tin** Cavities: **2** Vehicle Uses Mirror - Vanity Module - Seat Memory Motor - Heater/AC Blower (Auxiliary) Motor - Heater/AC Blower (Front) Radio - Amplifier Resistor - Blower Motor (Front) Switch - Heater / A/C Blower (Front)

CONNECTOR VIEWS > CONNECTOR END VIEW C341B - DRIVER SEAT MODULE (DSM)

Connector:C341B

Description

DRIVER SEAT MODULE (DSM)

Color

GY

Harness

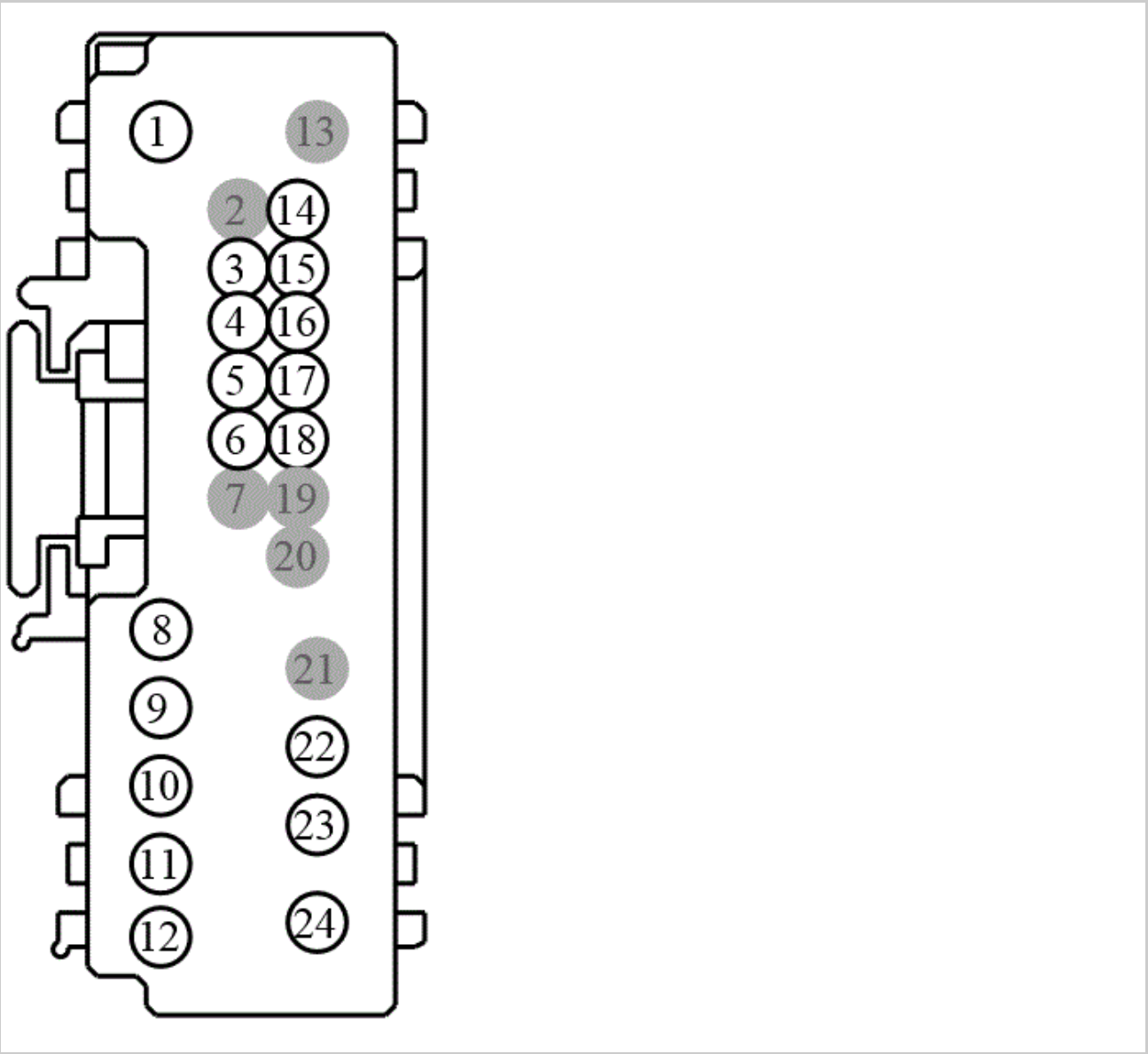
14D231

Base Part #

part# N/A

Service Pigtail

Not Available



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CBX03 (BU-RD)	18	POWER - SEAT # BATTERY LOGIC	
2	*	*	Not Used	

3	VPS11 (GN-BN)	20	SENSOR - DRIVER SEAT HEIGHT REAR / PARALLEL
4	VPS10 (BU-GN)	20	SENSOR - DRIVER SEAT HEIGHT FRONT / TILT
5	CPS26 (YE-BU)	20	SWITCH - SEAT ADJUST. DRIVER REAR HEIGHT DOWN
6	CPS24 (GY)	20	SWITCH - SEAT ADJUST. DRIVER FRONT HEIGHT (TILT) DOWN
7	*	*	Not Used
8	RPS12 (YE-VT)	20	CTRL MOD. - DRIVER SEAT SENSORS RECLINE -
9	CPS06 (GN-WH)	14	CTRL MOD. - DRIVER SEAT SLIDE REARWARD
10	CPS04 (YE-OG)	14	CTRL MOD. - DRIVER SEAT HEIGHT REAR / PARALLEL DOWN
11	CPS02 (GY-YE)	14	CTRL MOD. - DRIVER SEAT HEIGHT FRONT / TILT DOWN
12	CPS01 (GN-BU)	14	CTRL MOD. - DRIVER SEAT SLIDE FORWARD
13	*	*	Not Used
14	VPS09 (BN-BU)	20	SENSOR - DRIVER SEAT SLIDE FORWARD/REARWARD
15	CPS28 (GN)	20	SWITCH - SEAT ADJUST. DRIVER REARWARD
16	CPS23 (GN-VT)	20	SWITCH - SEAT ADJUST. DRIVER FORWARD
17	CPS27 (BU-BN)	20	SWITCH - SEAT ADJUST. DRIVER REAR HEIGHT UP

18	CPS25 (WH-VT)	20	SWITCH - SEAT ADJUST. DRIVER FRONT HEIGHT (TILT) UP
19	*	*	Not Used
20	*	*	Not Used
21	*	*	Not Used
22	CPS05 (BU-WH)	14	CTRL MOD. - DRIVER SEAT HEIGHT REAR / PARALLEL UP
23	CPS03 (VT-GY)	14	CTRL MOD. - DRIVER SEAT HEIGHT FRONT / TILT UP
24	GD905 (BK-GN)	18	GROUND - SEAT # HEATED SEAT DIRTY

CONNECTOR VIEWS > CONNECTOR END VIEW C341D - DRIVER SEAT MODULE (DSM)

Connector:C341D

Description

DRIVER SEAT MODULE (DSM)

Color

GY

Harness

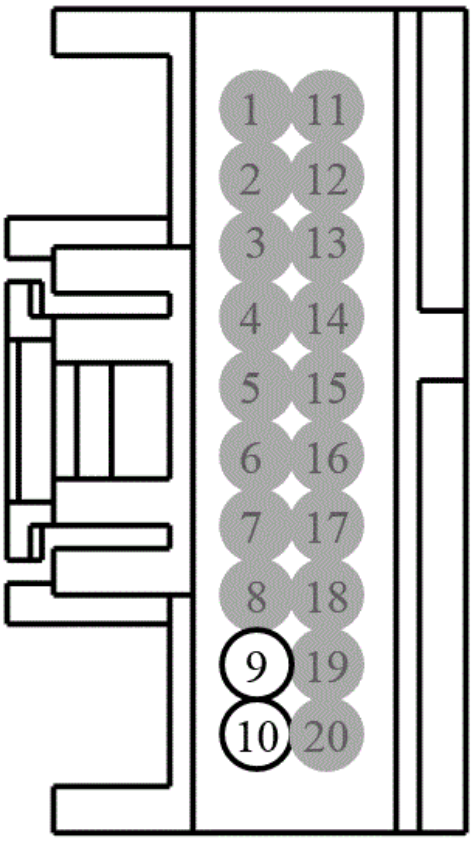
14D231

Base Part #

part# N/A

Service Pigtail

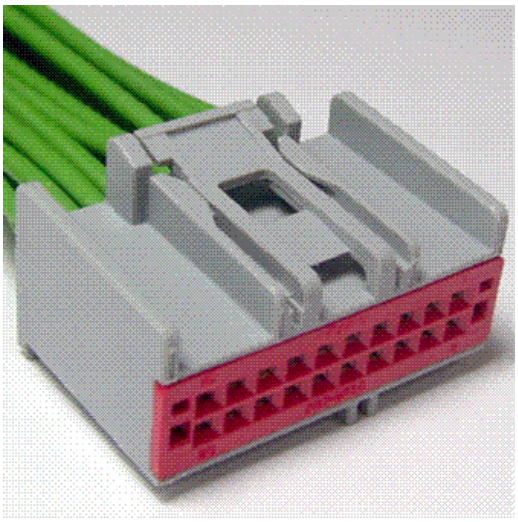
See Below



Pin	Circuit	Gauge	Circuit Function	Qualifier
1	*	*	Not Used	
2	*	*	Not Used	
3	*	*	Not Used	
4	*	*	Not Used	
5	*	*	Not Used	
6	*	*	Not Used	
7	*	*	Not Used	

8	*	*	Not Used
9	VDB07 (VT-OG)	18	CONNECTOR - DIAGNOSTIC # CAN BUS MEDIUM SPEED LOW
10	VDB06 (GY-OG)	18	CONNECTOR - DIAGNOSTIC # CAN BUS MEDIUM SPEED HIGH
11	*	*	Not Used
12	*	*	Not Used
13	*	*	Not Used
14	*	*	Not Used
15	*	*	Not Used
16	*	*	Not Used
17	*	*	Not Used
18	*	*	Not Used
19	*	*	Not Used
20	*	*	Not Used

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1199**	Service Part Number: **3U2Z-14S411-FCB** Gauge:



18

Pin material:

Silver

Cavities:

20

Vehicle Uses

Instrument Cluster

Module - Seat Memory

Monitor - Video/DVD

Radio - Amplifier

Switch - Heater A/C Blower (Rear)

CONNECTOR VIEWS > CONNECTOR END VIEW C352 - FRONT SEAT CONTROL SWITCH LH

Connector:C352

Description

FRONT SEAT CONTROL SWITCH LH

Color

BK

Harness

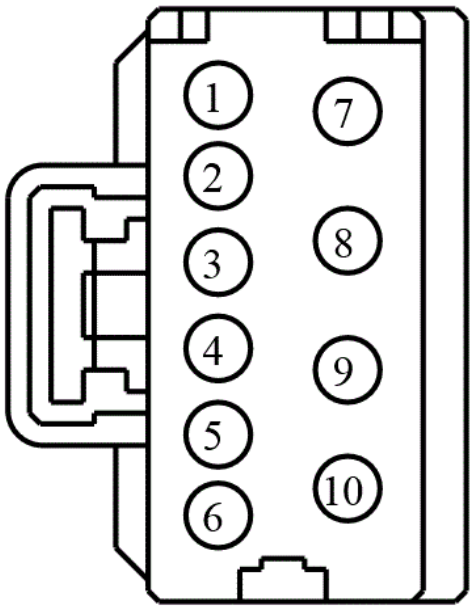
14D231

Base Part #

part# N/A

Service Pigtail

See Below

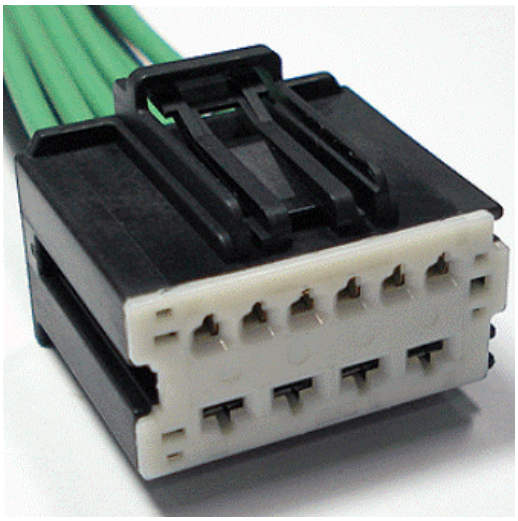


Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CPS25 (WH-VT)	20	SWITCH - SEAT ADJUST. DRIVER FRONT HEIGHT (TILT) UP	
1	CPS25 (WH-VT)	14	SWITCH - SEAT ADJUST. DRIVER FRONT HEIGHT (TILT) UP	
2	CPS24 (GY)	20	SWITCH - SEAT ADJUST. DRIVER FRONT HEIGHT (TILT) DOWN	
2	CPS24 (GY)	14	SWITCH - SEAT ADJUST. DRIVER FRONT HEIGHT (TILT) DOWN	
3	CPS19 (GY-VT)	18	SWITCH - DRIVER LUMBAR SOLENOID (UPPER CELL) DEFLATE	
4	CPS18 (BN-GN)	18	SWITCH - DRIVER LUMBAR PUMP	
5	CPS23 (GN-VT)	20	SWITCH - SEAT ADJUST. DRIVER FORWARD	

5	CPS23 (GN-VT)	14	SWITCH - SEAT ADJUST. DRIVER FORWARD	
6	CPS28 (GN)	20	SWITCH - SEAT ADJUST. DRIVER REARWARD	
6	CPS28 (GN)	14	SWITCH - SEAT ADJUST. DRIVER REARWARD	
7	GD904 (BK-BU)	14	GROUND - DRIVER SEAT # SEAT SWITCH	
8	CPS27 (BU-BN)	20	SWITCH - SEAT ADJUST. DRIVER REAR HEIGHT UP	
8	CPS27 (BU-BN)	14	SWITCH - SEAT ADJUST. DRIVER REAR HEIGHT UP	
9	CBX05 (VT-RD)	14	POWER - SEAT # POWER SEAT SWITCH	
10	CPS26 (YE-BU)	20	SWITCH - SEAT ADJUST. DRIVER REAR HEIGHT DOWN	
10	CPS26 (YE-BU)	14	SWITCH - SEAT ADJUST. DRIVER REAR HEIGHT DOWN	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1042**	Service Part Number: **AU2Z-14S411-CA** Gauge: **12 14** Pin material: **Tin & Silver** Cavities:



10

Vehicle Uses

Module - Transfer Case Shift Control

CONNECTOR VIEWS > CONNECTOR END VIEW C356 - SEAT POSITION SENSOR LH

Connector:C356

Description

SEAT POSITION SENSOR LH

Color

Harness

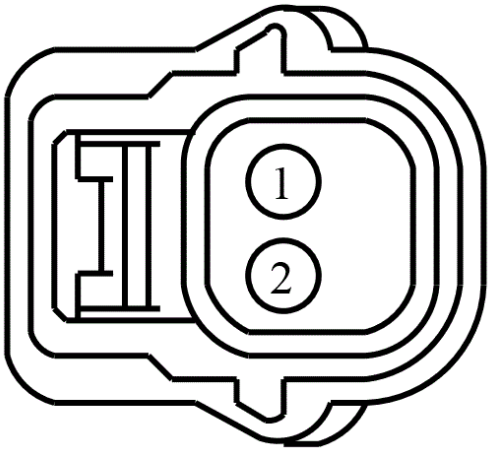
14D231

Base Part #

part# N/A

Service Pigtail

See Below



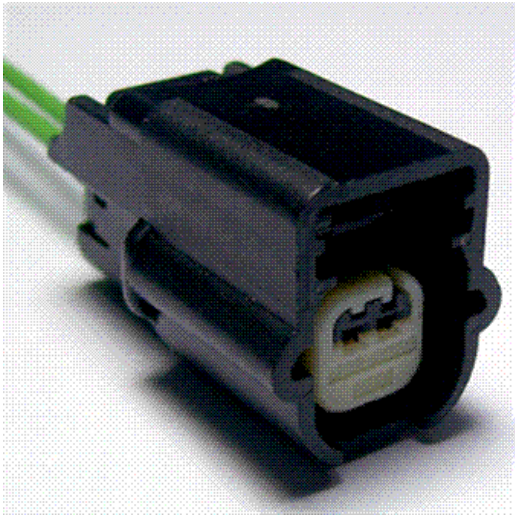
Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	GD901 (BK)	20	GROUND - DRIVER SEAT # RESTRAINTS	
2	VR215 (YE-VT)	20	SENSOR - SEAT TRACK POSITION DRIVER	

Available Pigtail Kits

Pigtail Kit Part Number

WPT-1314



Service Part Number:

8U2Z-14S411-AAC

Gauge:

20

Pin material:

Silver

Cavities:

2

Vehicle Uses

Sensor - Crash (Engine Compartment)

Sensor - Seat Track Position

Sensor - Side Impact

Solenoid - Down Shift

Solenoid - Torque Control Coupling

Valve - Heated PCV

Valve - Heater Core Shut Off

Valve - Transmission Fluid Warmer

CONNECTOR VIEWS > CONNECTOR END VIEW C362 - FRONT SEAT TRACK MOTOR LH

Connector:C362

Description

FRONT SEAT TRACK MOTOR LH

Color

DK GY

Harness

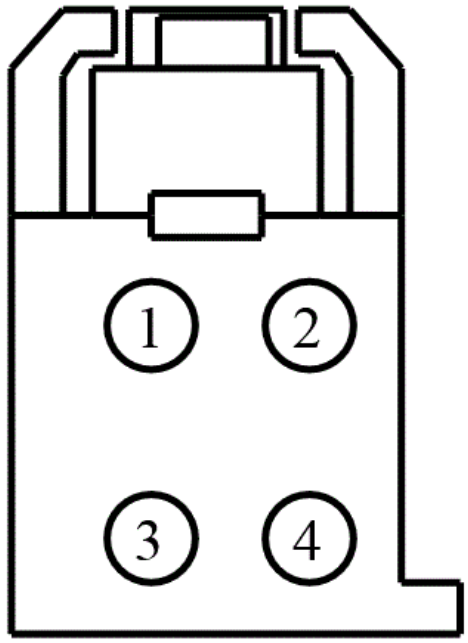
14D231

Base Part #

part# N/A

Service Pigtail

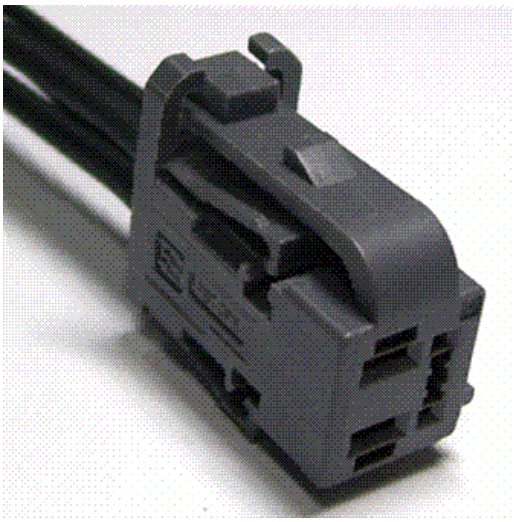
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CPS01 (GN-BU)	14	CTRL MOD. - DRIVER SEAT SLIDE FORWARD	
1	CPS23 (GN-VT)	14	SWITCH - SEAT ADJUST. DRIVER FORWARD	
2	RPS12 (YE-VT)	20	CTRL MOD. - DRIVER SEAT SENSORS RECLINE -	

3	CPS06 (GN-WH)	14	CTRL MOD. - DRIVER SEAT SLIDE REARWARD
3	CPS28 (GN)	14	SWITCH - SEAT ADJUST. DRIVER REARWARD
4	VPS09 (BN-BU)	20	SENSOR - DRIVER SEAT SLIDE FORWARD/REARWARD

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1350** 	Service Part Number: **DU2Z-14S411-UA** Gauge: **16 20** Pin material: **Tin** Cavities: **4** Vehicle Uses Motor - Power Seat Track Motor - Seat Height (Front)

CONNECTOR VIEWS > CONNECTOR END VIEW C363 - FRONT SEAT HEIGHT ADJUSTMENT MOTOR LH

Connector:C363

Description

FRONT SEAT HEIGHT ADJUSTMENT MOTOR LH

Color

BK

Harness

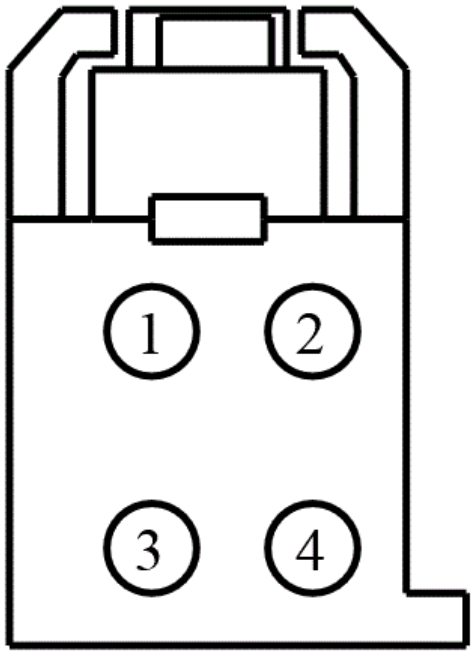
14D231

Base Part #

part# N/A

Service Pigtail

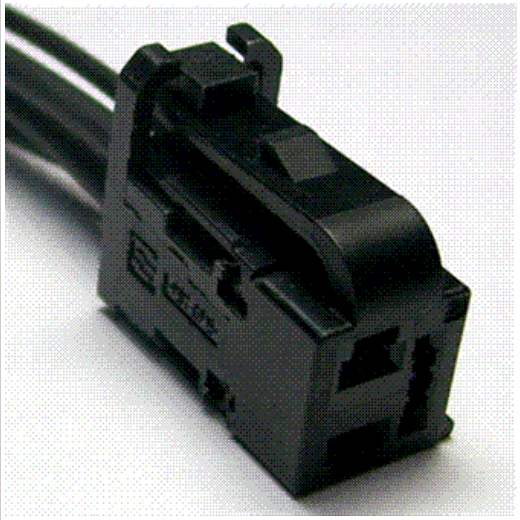
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CPS04 (YE-OG)	14	CTRL MOD. - DRIVER SEAT HEIGHT REAR / PARALLEL DOWN	
1	CPS26 (YE-BU)	14	SWITCH - SEAT ADJUST. DRIVER REAR HEIGHT DOWN	
2	VPS11 (GN-BN)	20	SENSOR - DRIVER SEAT HEIGHT REAR / PARALLEL	
3	CPS05 (BU-WH)	14	CTRL MOD. - DRIVER SEAT HEIGHT REAR / PARALLEL UP	
3	CPS27 (BU-BN)	14	SWITCH - SEAT ADJUST. DRIVER REAR HEIGHT UP	

4	RPS12 (YE-VT)	20	CTRL MOD. - DRIVER SEAT SENSORS RECLINE -	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1311** 	Service Part Number: **CU2Z-14S411-BAA** Gauge: **20** Pin material: **Tin** Cavities: **4** Vehicle Uses Motor - Seat Height (Front) Motor - Seat Recline

CONNECTOR VIEWS > CONNECTOR END VIEW C367 - DRIVER SIDE AIRBAG

Connector:C367

Description

DRIVER SIDE AIRBAG

Color

Harness

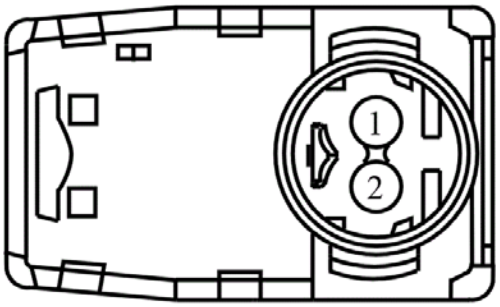
14C687/14D232

Base Part #

part# N/A

Service Pigtail

See Below



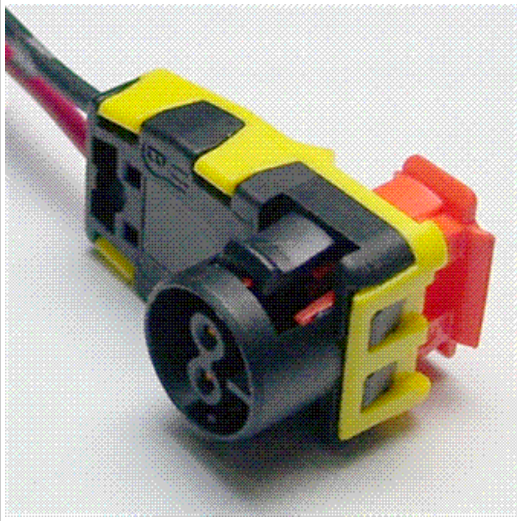
Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CR106 (VT-GY)	20	CTRL MOD. - AIR BAG SIDE SEAT MOUNTED FRONT DRIVER OUTBOARD +	
2	RR106 (YE-OG)	20	CTRL MOD. - AIR BAG SIDE SEAT MOUNTED FRONT DRIVER OUTBOARD -	

Available Pigtail Kits

Pigtail Kit Part Number

WPT-1225



Service Part Number:

BU2Z-14S411-BHA

Gauge:

20

Pin material:

FCI - Airbag

Cavities:

2

Vehicle Uses

Airbag - Side Curtain

Pretensioner - Seat Belt (Driver)

Pretensioner - Seat Belt (Passenger)

Sensor - Side Impact

	Squib - Airbag (Driver) Squib - Airbag (Passenger)

CONNECTOR VIEWS > CONNECTOR END VIEW C380 - FRONT POWER OUTLET SOCKET

Connector:C380

Description

FRONT POWER OUTLET SOCKET

Color

Harness

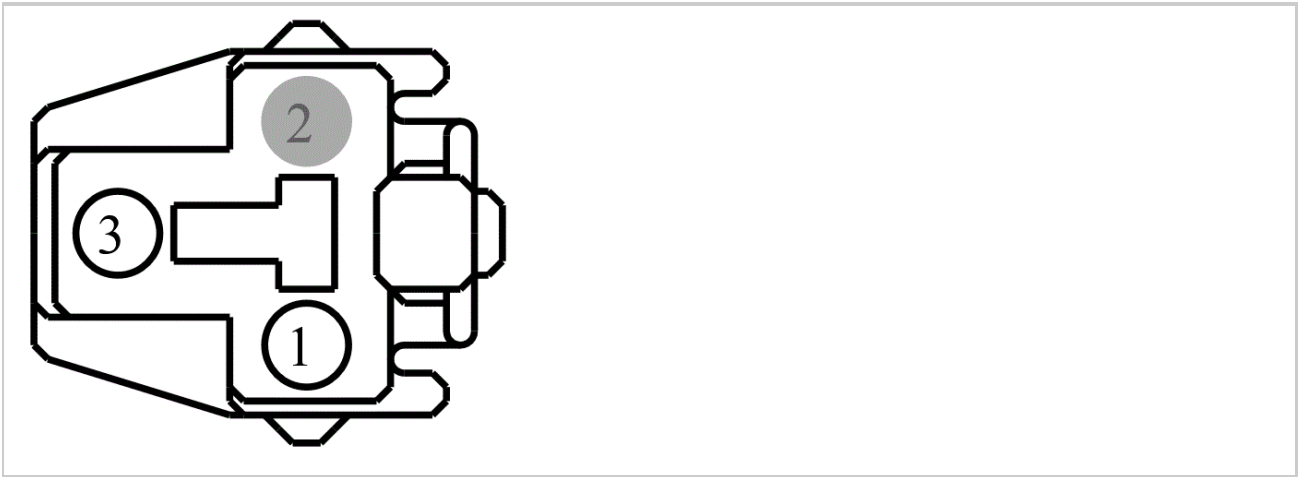
14401

Base Part #

part# N/A

Service Pigtail

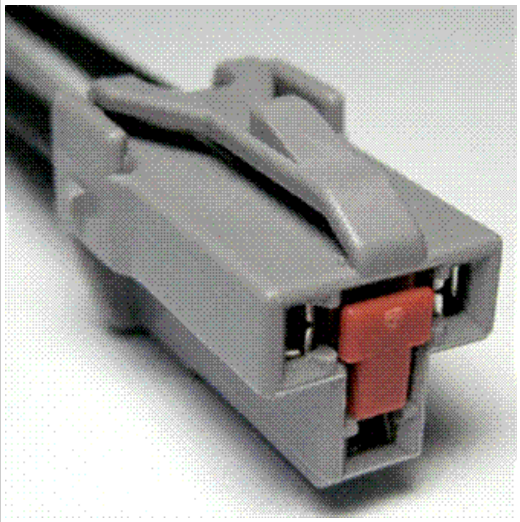
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CBB54 (VT-OG)	16	FUSE - 54 OR CIRCUIT BREAKER	
2	*	*	Not Used	

3	GD216 (BK-VT)	16	GROUND - INSTRUMENT PANEL STRUCTURE # 3RD POINT	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1160** 	Service Part Number: **3U2Z-14S411-SJB** Gauge: **12** Pin material: **Tin** Cavities: **3** Vehicle Uses Cigar Lighter Lamp - Ash Tray Power Point

CONNECTOR VIEWS > CONNECTOR END VIEW C382 - FRONT SEAT FRONT TILT MOTOR LH

Connector:C382

Description

FRONT SEAT FRONT TILT MOTOR LH

Color

DK GY

Harness

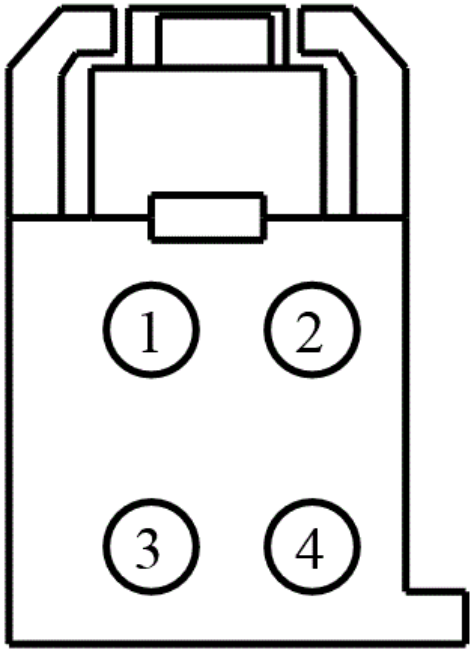
14D231

Base Part #

part# N/A

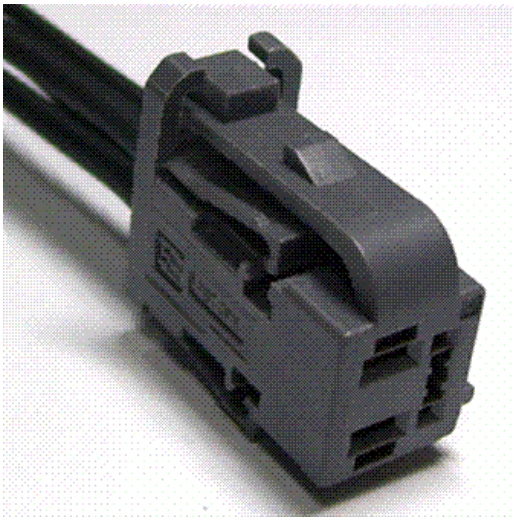
Service Pigtail

See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CPS02 (GY-YE)	14	CTRL MOD. - DRIVER SEAT HEIGHT FRONT / TILT DOWN	
1	CPS24 (GY)	14	SWITCH - SEAT ADJUST. DRIVER FRONT HEIGHT (TILT) DOWN	
2	RPS12 (YE-VT)	20	CTRL MOD. - DRIVER SEAT SENSORS RECLINE -	
3	CPS03 (VT-GY)	14	CTRL MOD. - DRIVER SEAT HEIGHT FRONT / TILT UP	
3	CPS25 (WH-VT)	14	SWITCH - SEAT ADJUST. DRIVER FRONT HEIGHT (TILT) UP	
4	VPS10 (BU-GN)	20	SENSOR - DRIVER SEAT HEIGHT FRONT / TILT	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1350** 	Service Part Number: **DU2Z-14S411-UA** Gauge: **16 20** Pin material: **Tin** Cavities: **4** Vehicle Uses Motor - Power Seat Track Motor - Seat Height (Front)

CONNECTOR VIEWS > CONNECTOR END VIEW C395 - REAR SPEAKER LH

Connector:C395

Description

REAR SPEAKER LH

Color

NA

Harness

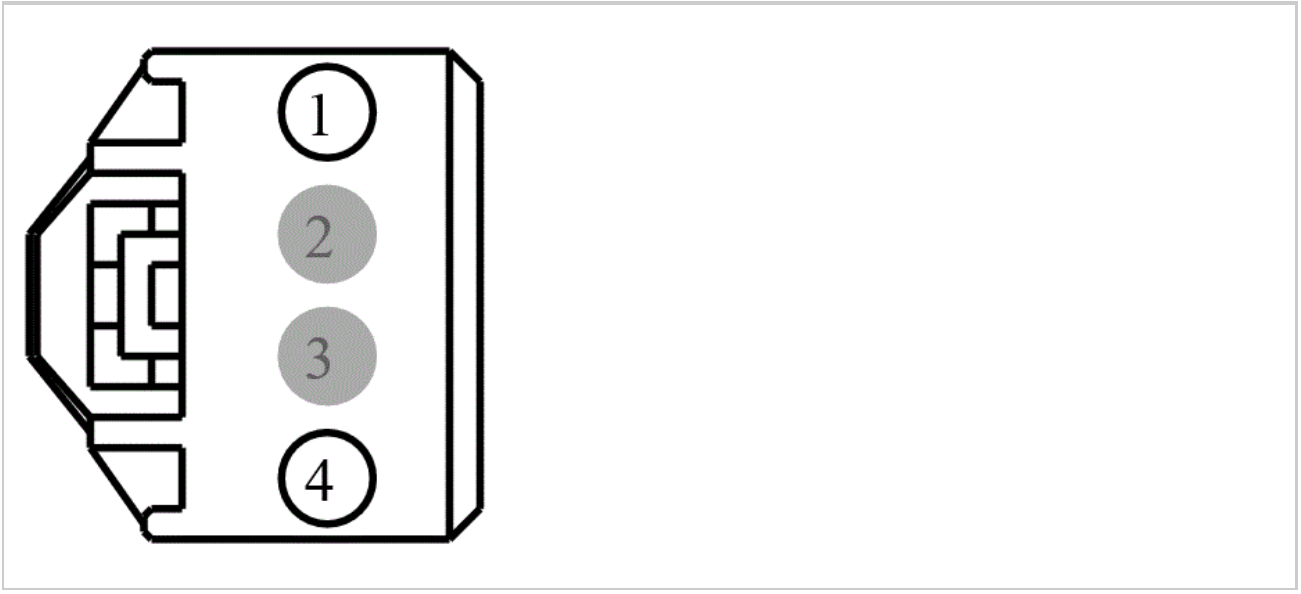
14A005

Base Part #

part# N/A

Service Pigtail

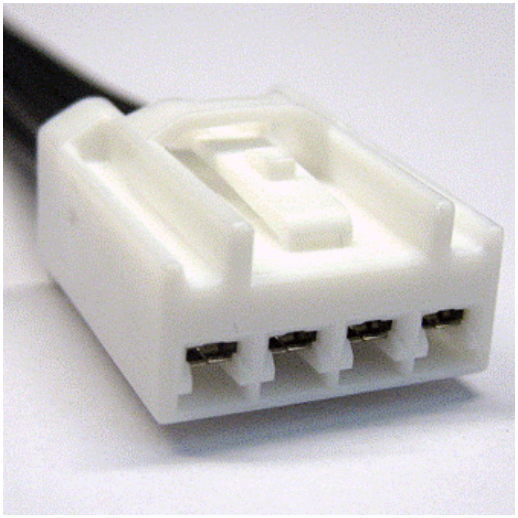
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	VME09 (WH-GN)	18	CTRL MOD. - AUDIO # SPEAKER LEFT REAR (WOOFER) +	
2	*	*	Not Used	
3	*	*	Not Used	
4	RME09 (BN-YE)	18	CTRL MOD. - AUDIO # SPEAKER LEFT REAR (WOOFER) -	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-912**	Service Part Number: **8U2Z-14S411-HA** Gauge: **14** Pin material: **Tin** Cavities:

	**4** Vehicle Uses Sensor - Oil Temperature Sensor - Power Steering Pressure Sensor - Purge Flow Switch - Gear Shift Select/Neutral Safety

CONNECTOR VIEWS > CONNECTOR END VIEW C396 - REAR SPEAKER RH

Connector:C396

Description

REAR SPEAKER RH

Color

NA

Harness

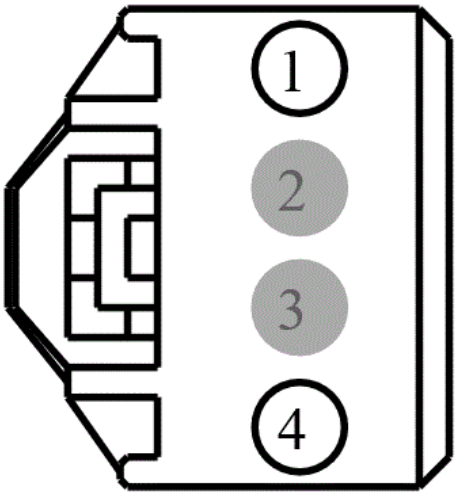
14A005

Base Part #

part# N/A

Service Pigtail

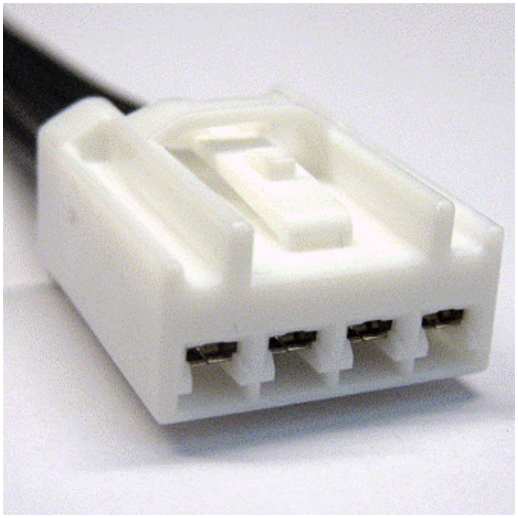
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	VME12 (BN-WH)	18	CTRL MOD. - AUDIO # SPEAKER RIGHT REAR (WOOFER) +	
2	*	*	Not Used	
3	*	*	Not Used	
4	RME12 (BN-BU)	18	CTRL MOD. - AUDIO # SPEAKER RIGHT REAR (WOOFER) -	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-912**	Service Part Number: **8U2Z-14S411-HA** Gauge: **14** Pin material: **Tin** Cavities:

	**4** Vehicle Uses Sensor - Oil Temperature Sensor - Power Steering Pressure Sensor - Purge Flow Switch - Gear Shift Select/Neutral Safety

CONNECTOR VIEWS > CONNECTOR END VIEW C402A - HEATED REAR WINDOW ELEMENT

Connector:C402A

Description

HEATED REAR WINDOW ELEMENT

Color

Harness

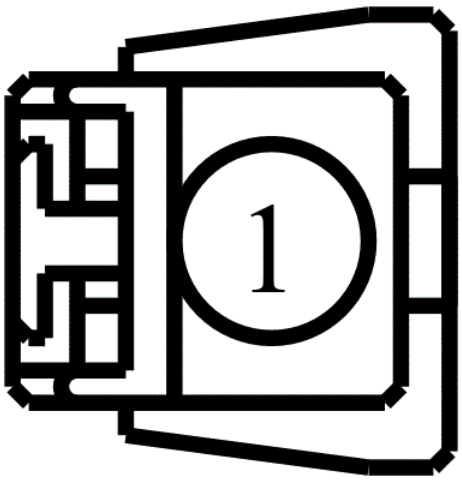
14A005

Base Part #

part# N/A

Service Pigtail

See Below



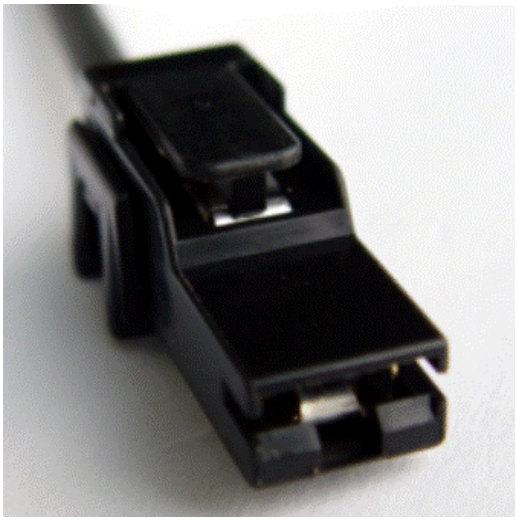
Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CRD17 (GY)	10	RELAY - HEATER MIRROR	

Available Pigtail Kits

Pigtail Kit Part Number

WPT-371



Service Part Number:

3U2Z-14S411-KBA

Gauge:

10

Pin material:

Tin

Cavities:

1

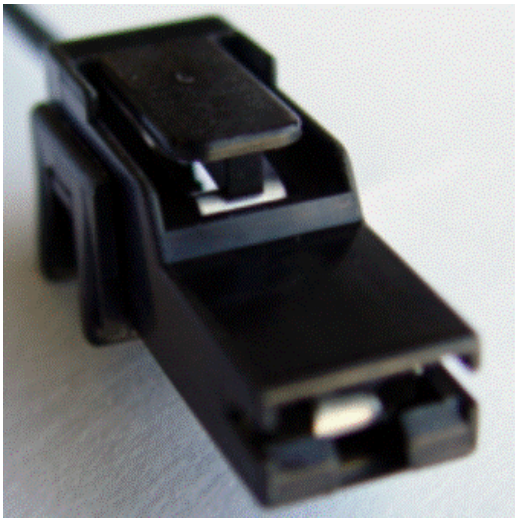
Vehicle Uses

Cigar Lighter

Horn

Lamp - CHMSL (Center High Mount Stop Lamp)

Module - Isolater Antenna

	Module - Radio Power Antenna Relay - Starter Motor Switch - Park Brake Terminal - Rear Window Defroster Grid
Pigtail Kit Part Number **WPT-434** 	Service Part Number: **3U2Z-14S411-MFA** Gauge: **16 18** Pin material: **Tin** Cavities: **1** Vehicle Uses Lamp - Map

CONNECTOR VIEWS > CONNECTOR END VIEW C405 - INLINE

InlineC405

Description

INLINE

Color

BK

Base Part #

Service Pigtail

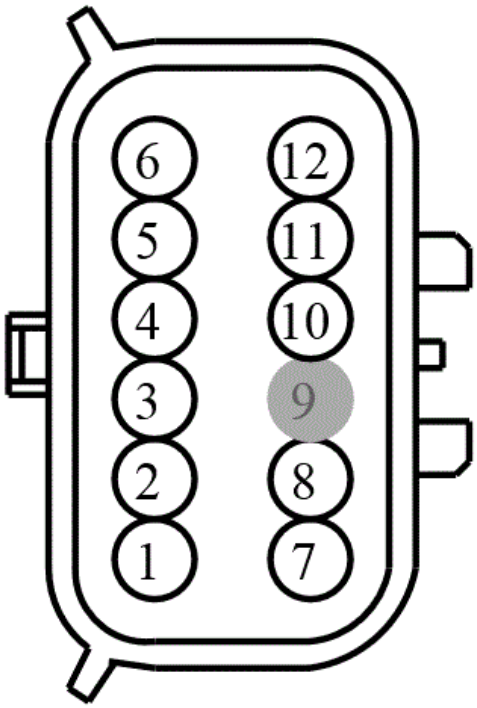
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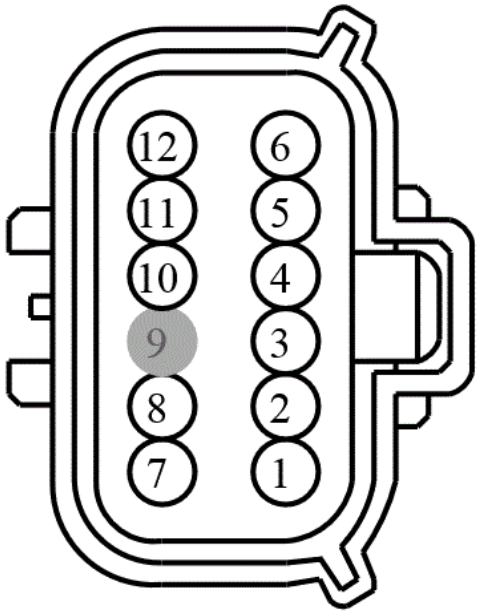
MALE

Harness 14A005

FEMALE

Harness 13412





Pin	Circuit	Gauge	Qualifier
1	CLS30 (VT-WH)	22	
2	CLS10 (GN-BN)	20	
3	LMP07 (BU-WH)	22	

4	VMP15 (YE-GN)	22	
5	VMP14 (WH-OG)	22	
6	RMP07 (GN-WH)	22	
7	CPL60 (BN-YE)	22	
8	CLF58 (YE-OG)	20	
9	*	*	
10	VMP16 (YE-GY)	22	
11	VMP17 (YE-OG)	22	
12	GD301 (BK-BU)	20	

CONNECTOR VIEWS > CONNECTOR END VIEW C406 - INLINE

InlineC406

Description

INLINE

Color

BK

Base Part #

Service Pigtail

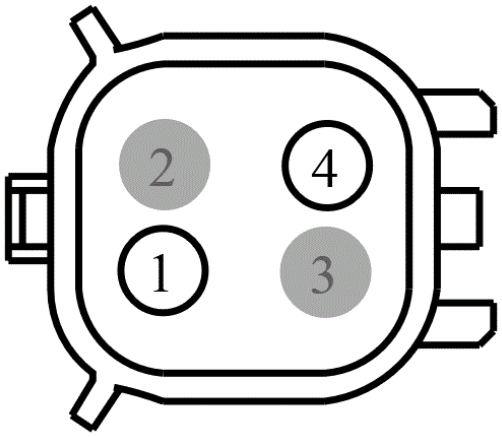
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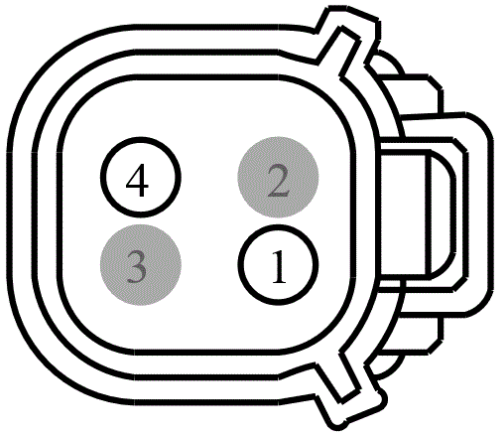
MALE

Harness 14A411

FEMALE

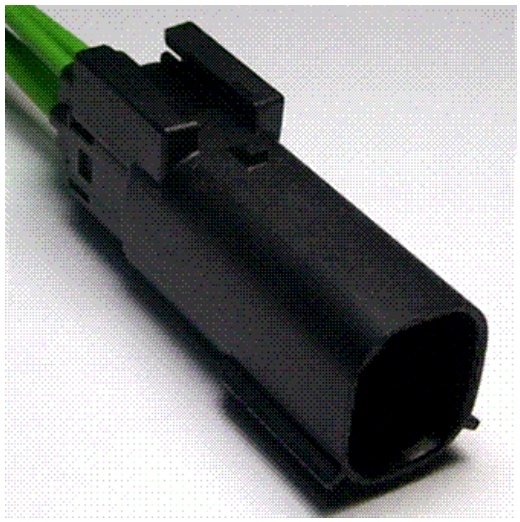
Harness 14A005





Pin	Circuit	Gauge	Qualifier
1	CBK02 (GN)	16	
2	*	*	
3	*	*	
4	CE114 (GN-BU)	16	

Available Pigtail Kits	
Pigtail Kit Part Number	Service Part Number:

WPT-1288 	**CU2Z-14S411-ZA** Gauge: **16** Pin material: **Silver** Cavities: **4** Vehicle Uses: Sensor - Catalyst Monitor Sensor - O2 (HEGO/ EGO)

CONNECTOR VIEWS > CONNECTOR END VIEW C412 - REAR LAMP ASSEMBLY LH

Connector:C412

Description

REAR LAMP ASSEMBLY LH

Color

GY

Harness

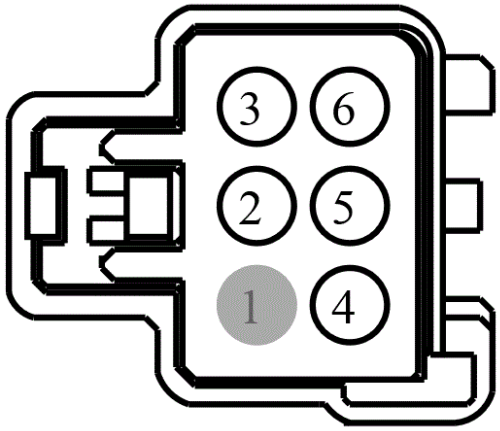
14A005

Base Part #

part# N/A

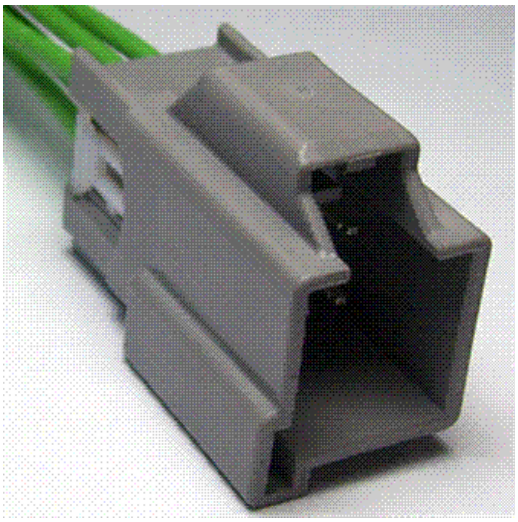
Service Pigtail

See Below



Pin	Circuit	Gauge	Circuit Function	Qualifier
1	*	*	Not Used	
2	CLS06 (GN-OG)	22	CTRL MOD. - PARK FRONT LEFT OR FRONT/REAR LEFT	
3	CLS23 (GY-OG)	22	CTRL MOD. - TURN LAMP LEFT REAR	
4	GD301 (BK-BU)	20	GROUND - PILLAR C OR QUARTER PANEL LEFT # 3RD POINT	
5	CLS54 (BU-OG)	22	LAMP - TURN REAR RIGHT # SIGNAL OUT	
6	CLS44 (VT-BN)	22	CTRL MOD. - STOP	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1299**	Service Part Number: **3U2Z-14S411-NBB** Gauge: **18**



Pin material:

Silver

Cavities:

6

Vehicle Uses

Connector - Inline

Element - Heated Seat

Inverter - DC to AC

Lamp - CHMSL (Center High Mount Stop Lamp)

Lamp - Courtesy - Footwell

Lamp - License

Lamp - Park/Turn/Stop

Lamp - Top Finish Panel

Mating Connector WPT-962

Motor - Adjustable Pedal

Switch - Gear Shift Select/Neutral Safety

Switch - Multifunction

CONNECTOR VIEWS > CONNECTOR END VIEW C415 - REAR LAMP ASSEMBLY RH

Connector:C415

Description

REAR LAMP ASSEMBLY RH

Color

GY

Harness

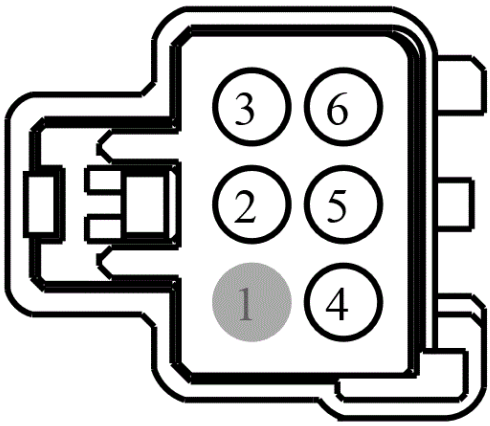
14A005

Base Part #

part# N/A

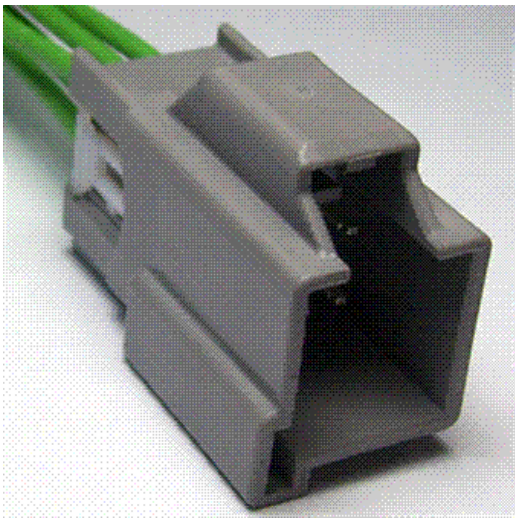
Service Pigtail

See Below



Pin	Circuit	Gauge	Circuit Function	Qualifier
1	*	*	Not Used	
2	CLS07 (BN-YE)	22	CTRL MOD. - PARK FRONT RIGHT OR FRONT/REAR RIGHT	
3	CLS27 (GN-OG)	22	CTRL MOD. - TURN LAMP RIGHT REAR	
4	GD301 (BK-BU)	20	GROUND - PILLAR C OR QUARTER PANEL LEFT # 3RD POINT	
5	CLS55 (GN-BU)	22	LAMP - TURN REAR LEFT # SIGNAL OUT	
6	CLS44 (VT)	22	CTRL MOD. - STOP	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1299**	Service Part Number: **3U2Z-14S411-NBB** Gauge: **18** Pin material:



Silver

Cavities:

6

Vehicle Uses

Connector - Inline

Element - Heated Seat

Inverter - DC to AC

Lamp - CHMSL (Center High Mount Stop Lamp)

Lamp - Courtesy - Footwell

Lamp - License

Lamp - Park/Turn/Stop

Lamp - Top Finish Panel

Mating Connector WPT-962

Motor - Adjustable Pedal

Switch - Gear Shift Select/Neutral Safety

Switch - Multifunction

CONNECTOR VIEWS > CONNECTOR END VIEW C426 - REAR WHEEL SPEED SENSOR RH

Connector:C426

Description

REAR WHEEL SPEED SENSOR RH

Color

BK

Harness

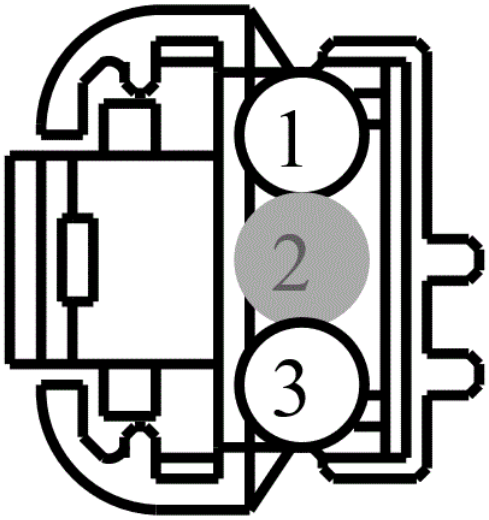
14A005

Base Part #

part# N/A

Service Pigtail

See Below



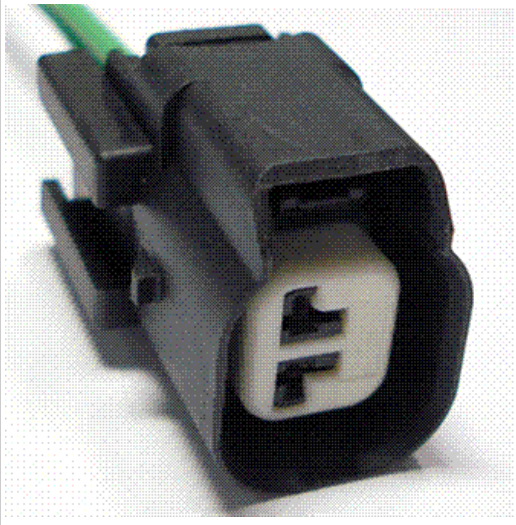
Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	VCA06 (WH-OG)	20	SENSOR - WHEEL SPEED RIGHT REAR	
2	RCA20 (BN)	20	CTRL MOD. - SENSOR WHEEL SPEED RIGHT REAR	

Available Pigtail Kits

Pigtail Kit Part Number

WPT-984



Service Part Number:

3U2Z-14S411-BXAB

Gauge:

16

Pin material:

Silver

Cavities:

2

Vehicle Uses

A/C Compressor Clutch

	EGR Cooler Outlet
	Electronic Locking Differential
	Horn
	Lamp - CHMSL (Center High Mount Stop Lamp)
	Lamp - Rear Park
	Lamp - Reverse
	Lamp - Side Marker
	Motor - Adjustable Pedal
	Sensor - Adjustable Pedal
	Sensor - Brake Fluid Level
	Sensor - Cam Shaft Position
	Sensor - Cylinder Head Temperature
	Sensor - Exhaust Gas Temperature
	Sensor - Liftgate Obstacle
	Sensor - Oil Level
	Sensor - Output Shaft Speed
	Sensor - Speed
	Solenoid - Engine Variable Timing
	Speaker - Door
	Speaker - Front
	Speaker - Rear
	Speaker - Subwoofer
	Speaker - Tweeter - LH - Front
	Switch - A/C Compressor Clutch Cycling
	Switch - Backup Lamp
	Switch - Deck Lid / Hatch Release
	Switch - Deck Lid / Lift Gate Ajar
	Switch - Hood Ajar
	Switch - Lift Gate Glass Ajar
	Switch - Power Liftgate

	Switch - Reverse Park Aid

CONNECTOR VIEWS > CONNECTOR END VIEW C428 - LUGGAGE COMPARTMENT LAMP

Connector:C428

Description

LUGGAGE COMPARTMENT LAMP

Color

BK

Harness

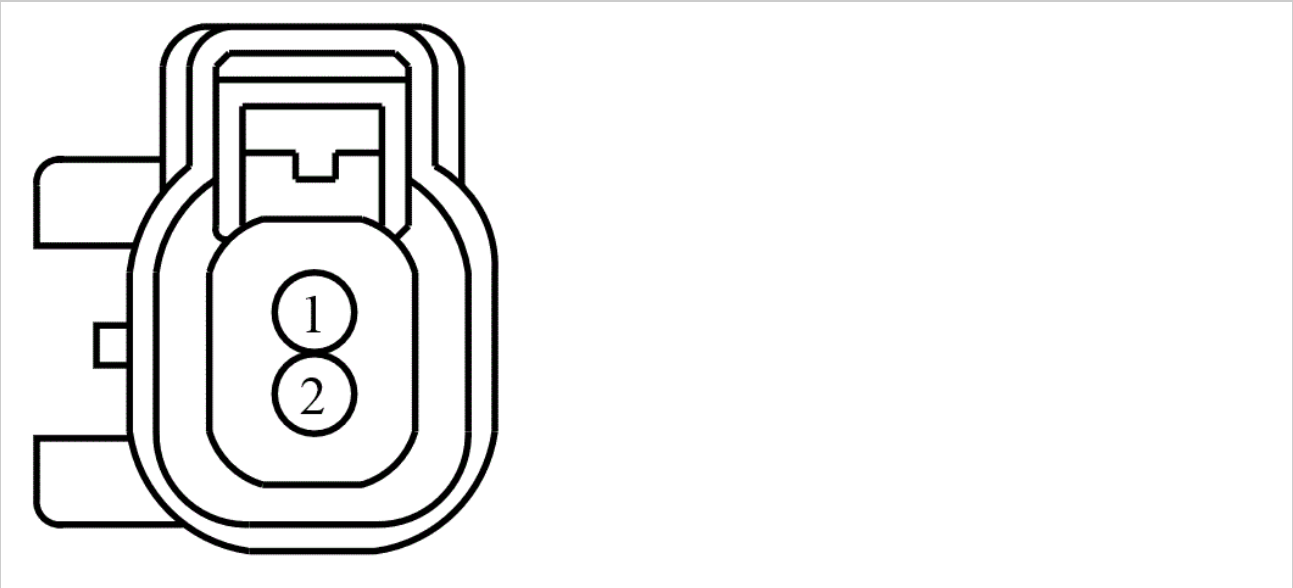
14A005

Base Part #

part# N/A

Service Pigtail

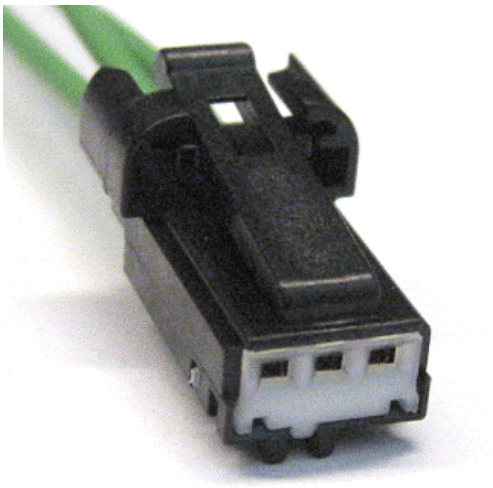
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CLN09	22	RELAY - BATTERY SAVER (E.G. SWITCH OFF INTERIOR	

	(YE-GN)		LIGHTING)
2	*	*	Not Used
3	CLN13 (WH-BU)	22	SWITCH - TRUNK/CARGO LAMP

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-911** 	Service Part Number: **8U2Z-14S411-LA** Gauge: **18** Pin material: **Silver** Cavities: **3** Vehicle Uses Fuse Panel Junction Block Lamp - Ambient Lighting Lamp - Front Park Lamp - Map Lamp - Park/Turn Lamp - PRNDL Indicator Lamp - Roof Marker Module - Driver Door Sensor - Speed Switch - Ambient Lighting Dimmer

CONNECTOR VIEWS > CONNECTOR END VIEW C433 - FUEL PUMP (FP) MODULE

Connector:C433

Description

FUEL PUMP (FP) MODULE

Color

GY

Harness

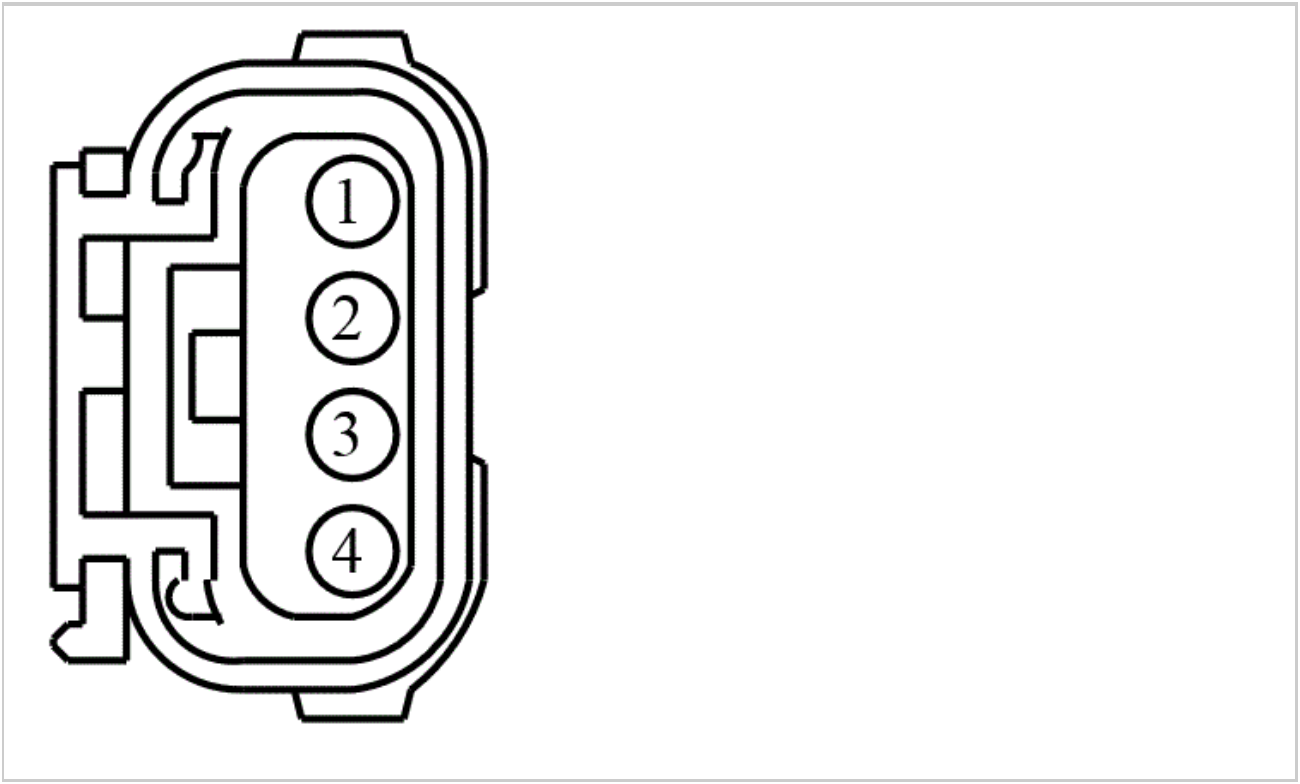
14A005

Base Part #

part# N/A

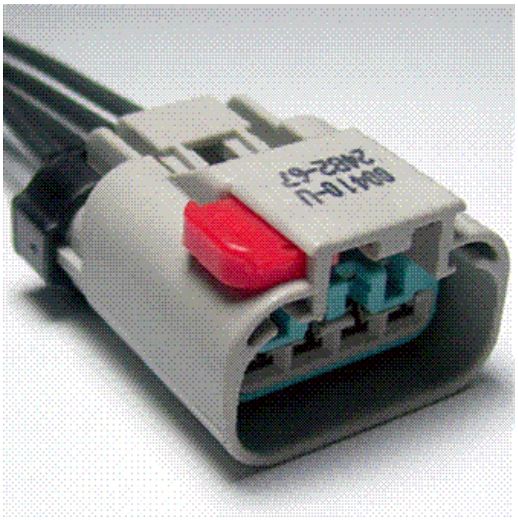
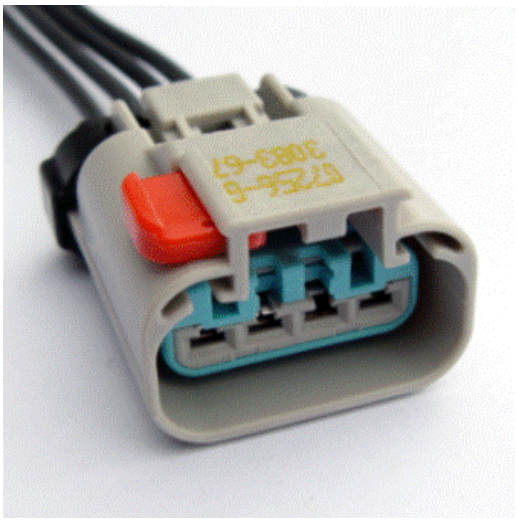
Service Pigtail

See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	RMC32 (GN-BU)	18	CTRL MOD. - SENSOR FUEL LEVEL	
2	VMC11 (YE-VT)	18	SENSOR - FUEL LEVEL (FLI)	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1373** 	Service Part Number: **3U2Z-14S411-DGAB** Gauge: **16** Pin material: **Tin (greased)** Cavities: **4** Vehicle Uses Fuel Pump/Sending Unit Module - Fuel Pump Driver Sensor - Fuel Level
Pigtail Kit Part Number **WPT-709** 	Service Part Number: **3U2Z-14S411-DGAA** Gauge: **14** Pin material: **Tin** Cavities: **4** Vehicle Uses Control - Engine Air Shutoff Fuel Pump/Sending Unit

CONNECTOR VIEWS > CONNECTOR END VIEW C435 - FUEL TANK PRESSURE (FTP) SENSOR

Connector:C435

Description

FUEL TANK PRESSURE (FTP) SENSOR

Color

BK

Harness

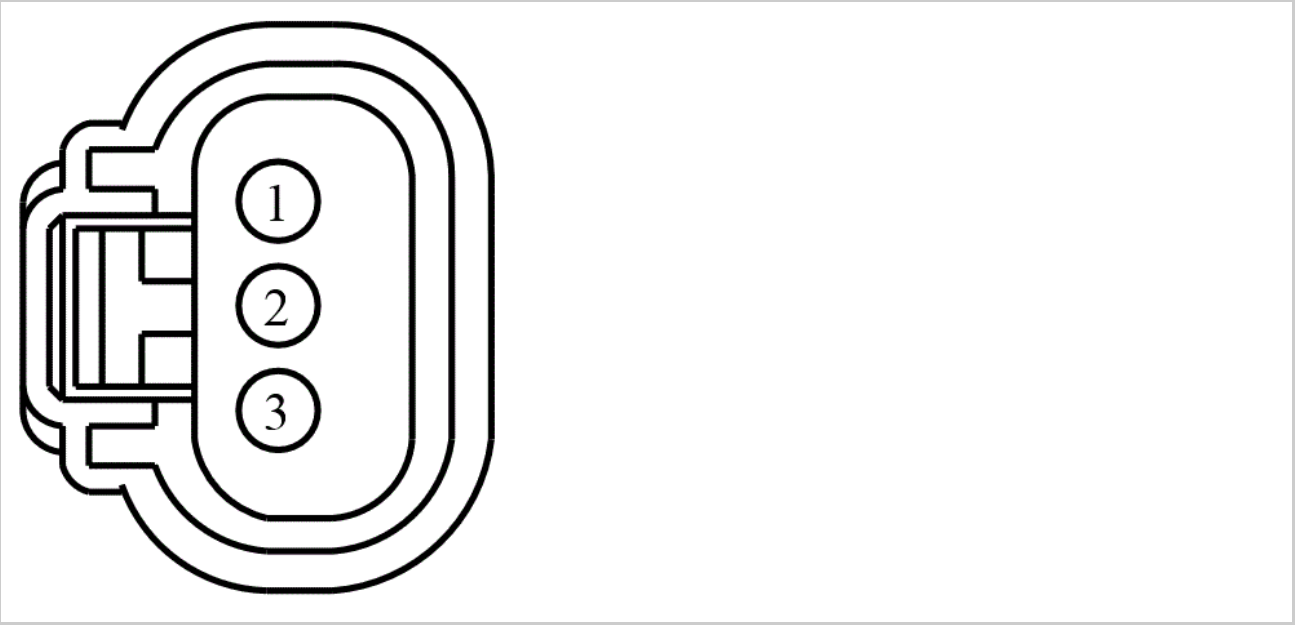
14A005

Base Part #

part# N/A

Service Pigtail

See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	VE922 (VT-GN)	20	TRANSDUCER - FUEL TANK PRESSURE (FTP)	
2	RE407 (YE-VT)	20	CTRL MOD. - POWERTRAIN # SIGNAL RETURN COWL (C-SIGRTN) (SIGRTN-C)	

3	LE230 (BN-BU)	20	CTRL MOD. - POWERTRAIN # FUEL TANK PRESSURE TRANSDUCER REF. VOLT. (VREF)	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-990** 	Service Part Number: **8U2Z-14S411-ZB** Gauge: **14** Pin material: **Tin (greased)** Cavities: **3** Vehicle Uses Sensor - Cam Shaft Position Sensor - Crank Shaft Position Sensor - Fuel Tank Pressure Transducer Sensor - Turbine Shaft Speed Switch - Fuel Delivery Pressure

CONNECTOR VIEWS > CONNECTOR END VIEW C436 - REAR FOG LAMP

Connector:C436

Description

REAR FOG LAMP

Color

BK

Harness

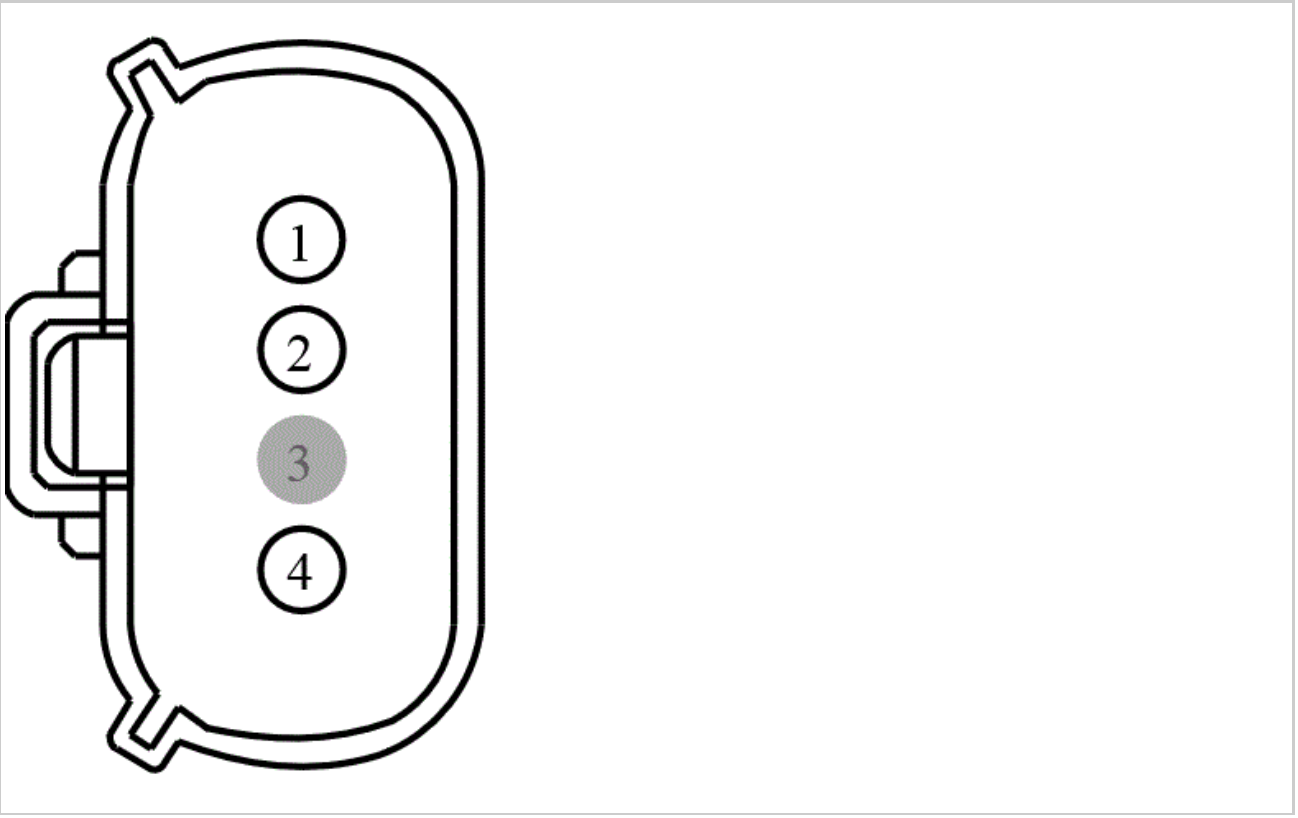
13412

Base Part #

part# N/A

Service Pigtail

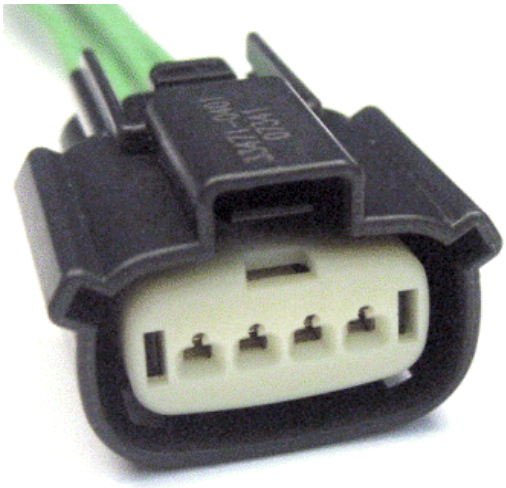
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CLF58 (YE-OG)	20	RELAY - FOG LAMPS REAR	
2	CLS10 (GN-BN)	20	CTRL MOD. - REVERSE LEFT OR COMMON	
3	*	*	Not Used	
4	GD301 (BK-BU)	20	GROUND - PILLAR C OR QUARTER PANEL LEFT # 3RD POINT	

Available Pigtail Kits	

Pigtail Kit Part Number **WPT-925** 	Service Part Number: **8U2Z-14S411-TA** Gauge: **14** Pin material: **Silver** Cavities: **4** Vehicle Uses A/C Compressor Clutch Lamp - Headlamp - High/Low Beam

CONNECTOR VIEWS > CONNECTOR END VIEW C440 - REAR WHEEL SPEED SENSOR LH

Connector:C440

Description

REAR WHEEL SPEED SENSOR LH

Color

BK

Harness

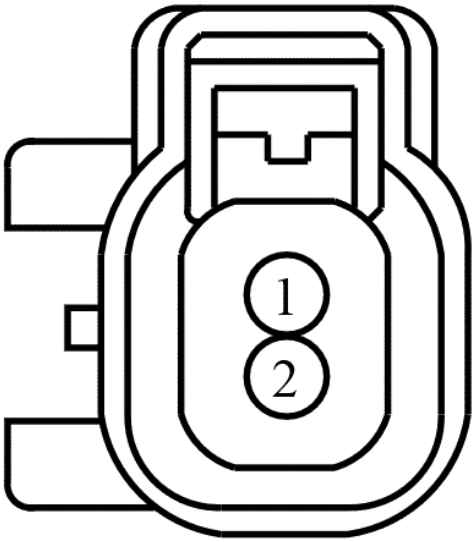
14A005

Base Part #

part# N/A

Service Pigtail

See Below



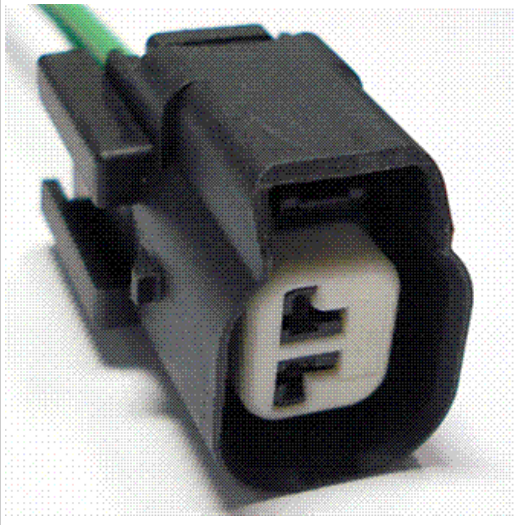
Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	VCA04 (BU-OG)	20	SENSOR - WHEEL SPEED LEFT REAR	
2	RCA18 (BN-GN)	20	CTRL MOD. - SENSOR WHEEL SPEED LEFT REAR	

Available Pigtail Kits

Pigtail Kit Part Number

WPT-984



Service Part Number:

3U2Z-14S411-BXAB

Gauge:

16

Pin material:

Silver

Cavities:

2

Vehicle Uses

A/C Compressor Clutch

EGR Cooler Outlet

	Electronic Locking Differential
	Horn
	Lamp - CHMSL (Center High Mount Stop Lamp)
	Lamp - Rear Park
	Lamp - Reverse
	Lamp - Side Marker
	Motor - Adjustable Pedal
	Sensor - Adjustable Pedal
	Sensor - Brake Fluid Level
	Sensor - Cam Shaft Position
	Sensor - Cylinder Head Temperature
	Sensor - Exhaust Gas Temperature
	Sensor - Liftgate Obstacle
	Sensor - Oil Level
	Sensor - Output Shaft Speed
	Sensor - Speed
	Solenoid - Engine Variable Timing
	Speaker - Door
	Speaker - Front
	Speaker - Rear
	Speaker - Subwoofer
	Speaker - Tweeter - LH - Front
	Switch - A/C Compressor Clutch Cycling
	Switch - Backup Lamp
	Switch - Deck Lid / Hatch Release
	Switch - Deck Lid / Lift Gate Ajar
	Switch - Hood Ajar
	Switch - Lift Gate Glass Ajar
	Switch - Power Liftgate
	Switch - Reverse Park Aid

CONNECTOR VIEWS > CONNECTOR END VIEW C475 - HIGH MOUNTED STOPLAMP

Connector:C475

Description

HIGH MOUNTED STOPLAMP

Color

BK

Harness

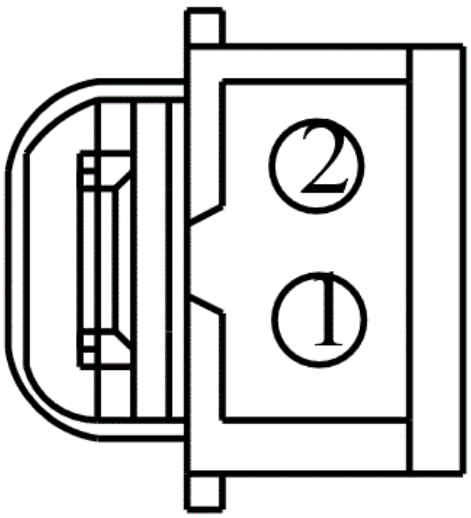
14A005

Base Part #

part# N/A

Service Pigtail

Not Available



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CLS17 (YE-GY)	22	CTRL MOD. - STOP HIGH MOUNT	
2	GD347 (BK-VT)	18	GROUND - PILLAR C OR QUARTER PANEL LEFT	

CONNECTOR VIEWS > CONNECTOR END VIEW C481 - REAR SIDE MARKER LAMP LH

Connector:C481

Description

REAR SIDE MARKER LAMP LH

Color

GY

Harness

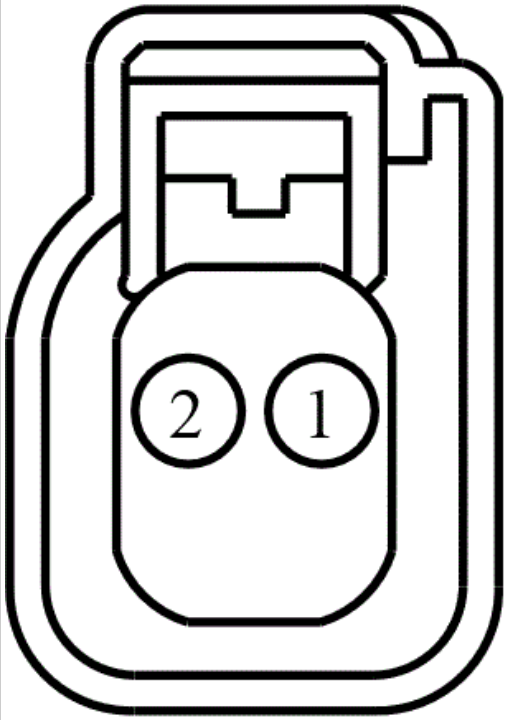
13412

Base Part #

part# N/A

Service Pigtail

See Below



Check for Terminal Part Numbers

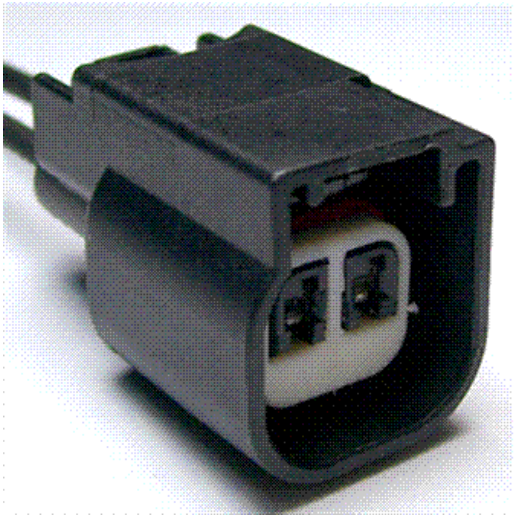
Pin	Circuit	Gauge	Circuit Function	Qualifier

1	GD301 (BK-BU)	22	GROUND - PILLAR C OR QUARTER PANEL LEFT # 3RD POINT	
2	CLS30 (VT-WH)	22	RELAY - PARK LAMP	

Available Pigtail Kits

Pigtail Kit Part Number

WPT-1243



Service Part Number:

3U2Z-14S411-RPC

Gauge:

16

Pin material:

Tin (greased)

Cavities:

2

Vehicle Uses

Actuator - Door Lock - LH - Rear

Actuator - Door Lock - RH - Rear

Handle - Decklid

Lamp - Headlamp - High/Low Beam

Lamp - Headlamp - Low Beam

Lamp - License

Lamp - Rear Turn

Lamp - Side Marker

Sensor - Knock

Sensor - Seat Track Position

Sensor - Throttle Position

Sensor - Turbine Shaft Speed

Sensor - Water in Fuel

	Switch - Deck Lid / Lift Gate Ajar Switch - Door Ajar / Interior Lamp Switch - Hood Ajar Switch - Lift Gate Glass Ajar Switch - Stop Lamp Valve - Vapor Management

CONNECTOR VIEWS > CONNECTOR END VIEW C482 - REAR SIDE MARKER LAMP RH

Connector:C482

Description

REAR SIDE MARKER LAMP RH

Color

GY

Harness

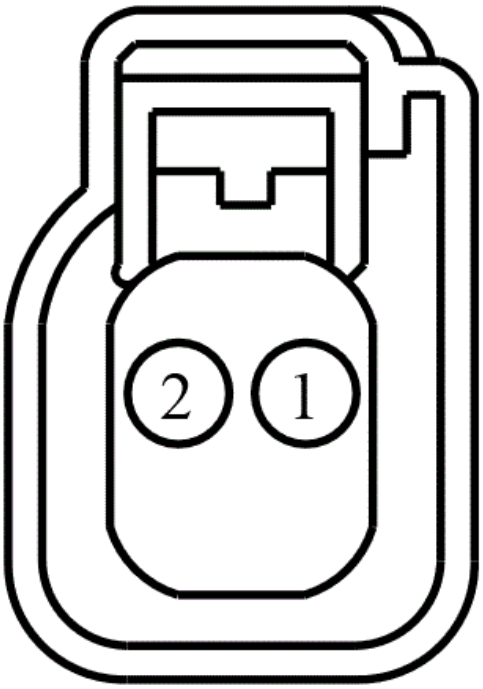
13412

Base Part #

part# N/A

Service Pigtail

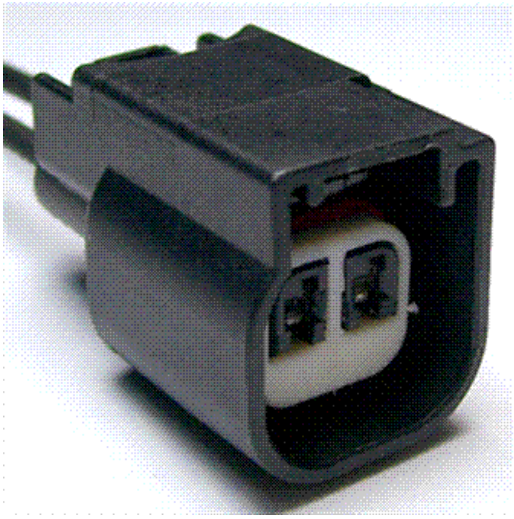
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	GD301 (BK-BU)	22	GROUND - PILLAR C OR QUARTER PANEL LEFT # 3RD POINT	
2	CLS30 (VT-WH)	22	RELAY - PARK LAMP	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1243**	Service Part Number: **3U2Z-14S411-RPC** Gauge: **16** Pin material: **Tin (greased)** Cavities:



2

Vehicle Uses

Actuator - Door Lock - LH - Rear

Actuator - Door Lock - RH - Rear

Handle - Decklid

Lamp - Headlamp - High/Low Beam

Lamp - Headlamp - Low Beam

Lamp - License

Lamp - Rear Turn

Lamp - Side Marker

Sensor - Knock

Sensor - Seat Track Position

Sensor - Throttle Position

Sensor - Turbine Shaft Speed

Sensor - Water in Fuel

Switch - Deck Lid / Lift Gate Ajar

Switch - Door Ajar / Interior Lamp

Switch - Hood Ajar

Switch - Lift Gate Glass Ajar

Switch - Stop Lamp

Valve - Vapor Management

CONNECTOR VIEWS > CONNECTOR END VIEW C484 - REAR SPEAKER LH

Connector:C484

Description

REAR SPEAKER LH

Color

NA

Harness

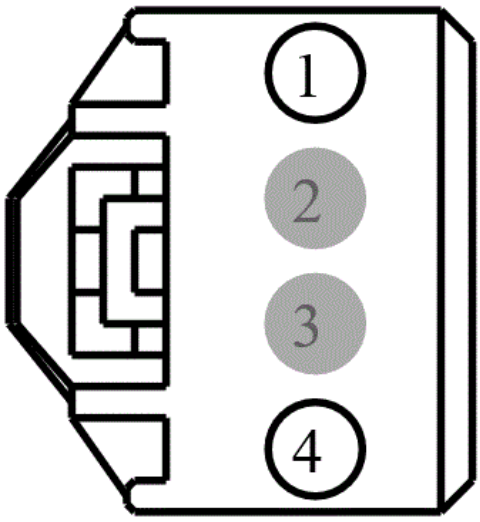
14A005

Base Part #

part# N/A

Service Pigtail

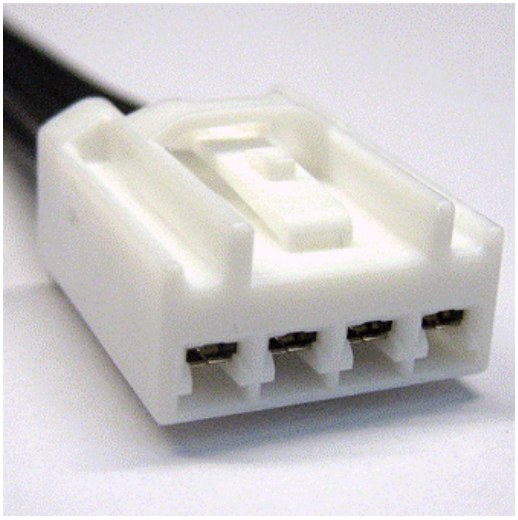
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	VME09 (WH-GN)	18	CTRL MOD. - AUDIO # SPEAKER LEFT REAR (WOOFER) +	
2	*	*	Not Used	
3	*	*	Not Used	
4	RME09 (BN-YE)	18	CTRL MOD. - AUDIO # SPEAKER LEFT REAR (WOOFER) -	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-912**	Service Part Number: **8U2Z-14S411-HA**



Gauge:

14

Pin material:

Tin

Cavities:

4

Vehicle Uses

Sensor - Oil Temperature

Sensor - Power Steering Pressure

Sensor - Purge Flow

Switch - Gear Shift Select/Neutral Safety

CONNECTOR VIEWS > CONNECTOR END VIEW C485 - REAR SPEAKER RH

Connector:C485

Description

REAR SPEAKER RH

Color

NA

Harness

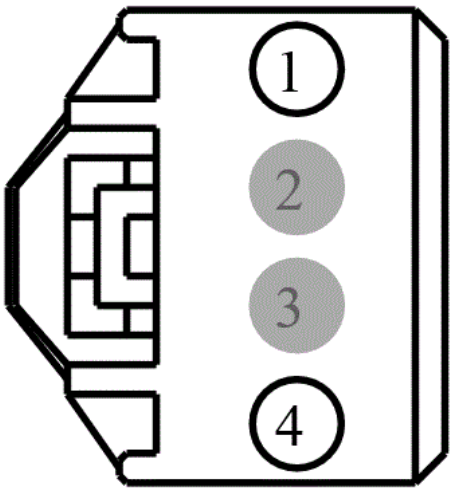
14A005

Base Part #

part# N/A

Service Pigtail

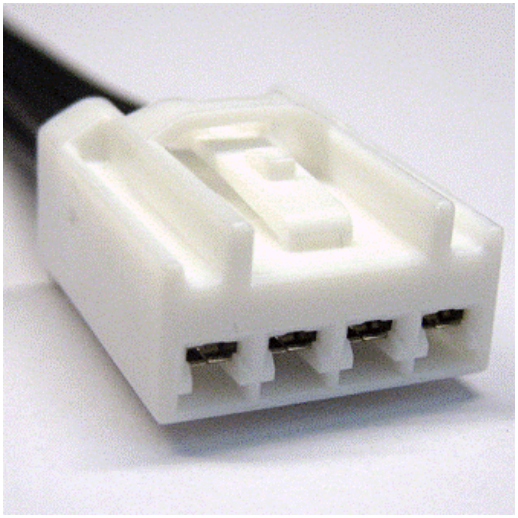
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	VME12 (BN-WH)	18	CTRL MOD. - AUDIO # SPEAKER RIGHT REAR (WOOFER) +	
2	*	*	Not Used	
3	*	*	Not Used	
4	RME12 (BN-BU)	18	CTRL MOD. - AUDIO # SPEAKER RIGHT REAR (WOOFER) -	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-912**	Service Part Number: **8U2Z-14S411-HA** Gauge: **14** Pin material: **Tin**



Cavities:

4

Vehicle Uses

Sensor - Oil Temperature

Sensor - Power Steering Pressure

Sensor - Purge Flow

Switch - Gear Shift Select/Neutral Safety

CONNECTOR VIEWS > CONNECTOR END VIEW C496 - REVERSING LAMP

Connector:C496

Description

REVERSING LAMP

Color

BN

Harness

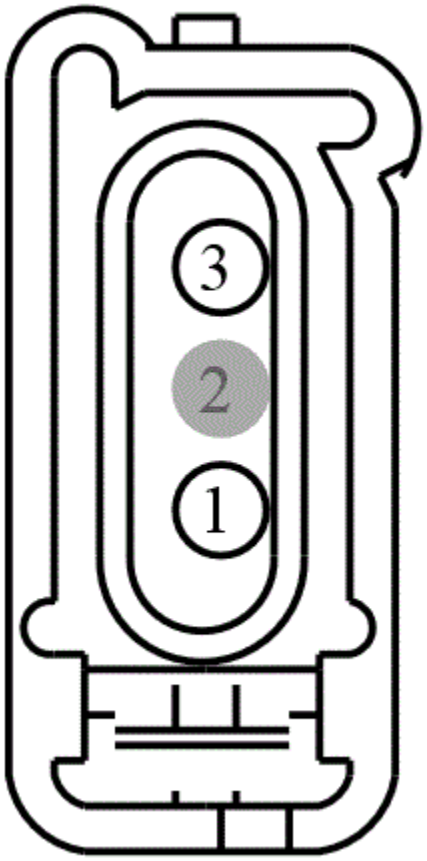
13412

Base Part #

part# N/A

Service Pigtail

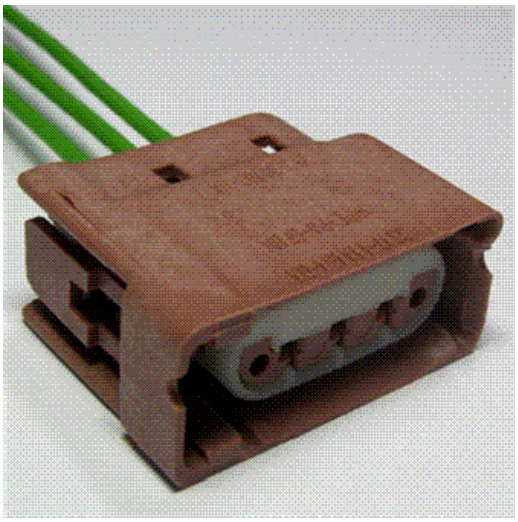
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	GD301 (BK-BU)	20	GROUND - PILLAR C OR QUARTER PANEL LEFT # 3RD POINT	
2	*	*	Not Used	
3	CLS10 (GN-BN)	20	CTRL MOD. - REVERSE LEFT OR COMMON	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1167**	Service Part Number: **3U2Z-14S411-FHAB** Gauge:



16

Pin material:

Silver

Cavities:

3

Vehicle Uses

Lamp - Front Cornering/Turn

Lamp - Front Park

Lamp - Front Turn

Lamp - Front Turn/ Marker

Lamp - Headlamp - High/Low Beam

Lamp - Park/Turn

Lamp - Park/Turn/Stop

Lamp - Rear Park

Lamp - Reverse

Lamp - Stop

CONNECTOR VIEWS > CONNECTOR END VIEW C498 - REAR LAMP ASSEMBLY LH

Connector:C498

Description

REAR LAMP ASSEMBLY LH

Color

LT GY

Harness

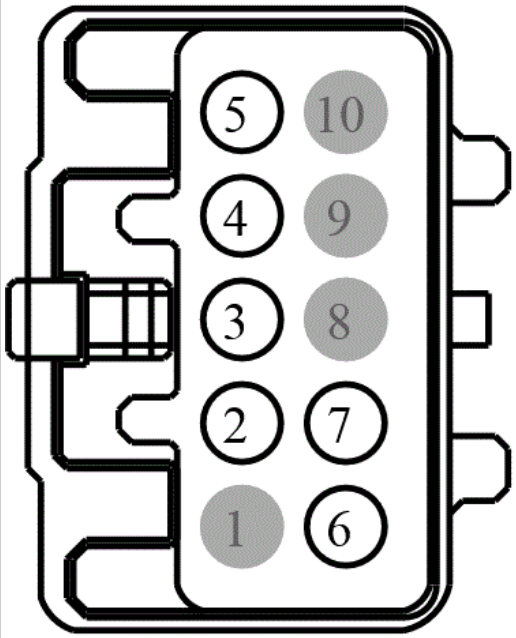
14A005

Base Part #

part# N/A

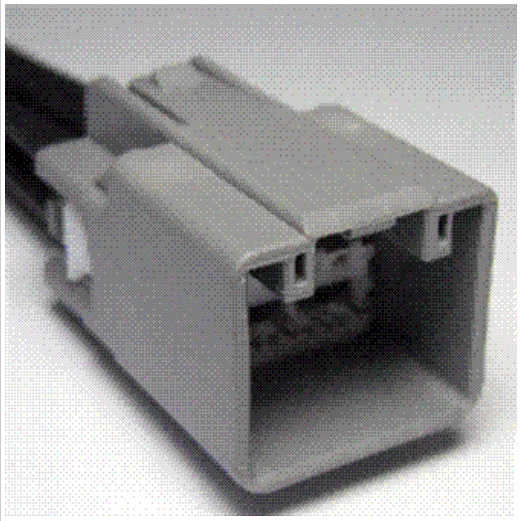
Service Pigtail

See Below



Pin	Circuit	Gauge	Circuit Function	Qualifier
1	*	*	Not Used	
2	CLS06 (GN-OG)	22	CTRL MOD. - PARK FRONT LEFT OR FRONT/REAR LEFT	
3	CLS51 (WH-GN)	22	CTRL MOD. - STOP/TURN LEFT OUTBOARD	
4	CLS50 (BN-VT)	22	CTRL MOD. - STOP/TURN LEFT MIDDLE	
5	CLS18 (GY-BN)	22	CTRL MOD. - STOP/TURN LEFT (INBOARD)	
6	GD301 (BK-BU)	20	GROUND - PILLAR C OR QUARTER PANEL LEFT # 3RD POINT	
7	CLS54 (BU)	26	LAMP - TURN REAR RIGHT # SIGNAL OUT	
8	*	*	Not Used	

9	*	*	Not Used	
10	*	*	Not Used	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1175** 	Service Part Number: **BU2Z-14S411-VA** Gauge: **16** Pin material: **Tin (greased)** Cavities: **10** Vehicle Uses Lamp - Park/Turn/Stop

CONNECTOR VIEWS > CONNECTOR END VIEW C499 - REAR LAMP ASSEMBLY RH

Connector:C499

Description

REAR LAMP ASSEMBLY RH

Color

LT GY

Harness

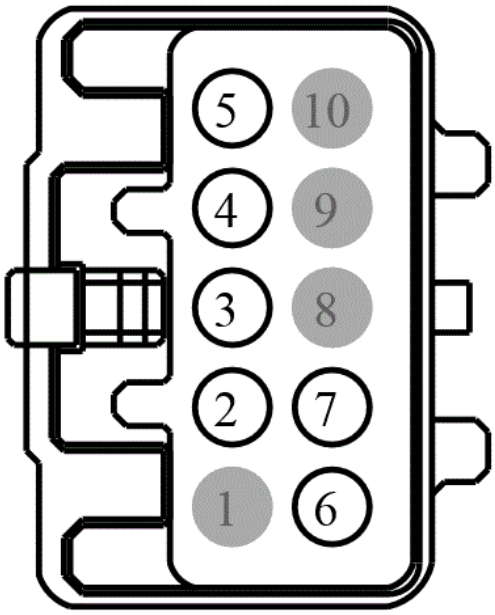
14A005

Base Part #

part# N/A

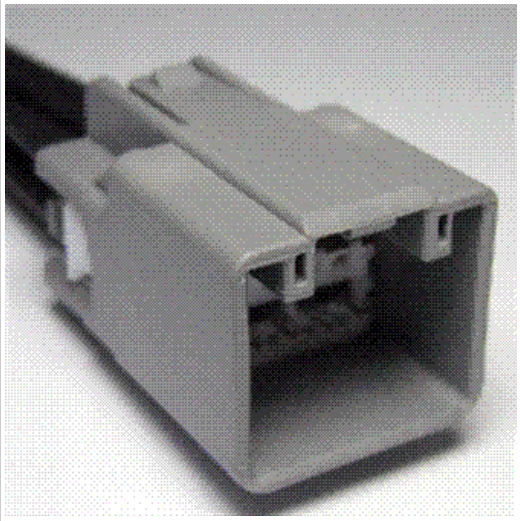
Service Pigtail

See Below



Pin	Circuit	Gauge	Circuit Function	Qualifier
1	*	*	Not Used	
2	CLS07 (BN-YE)	22	CTRL MOD. - PARK FRONT RIGHT OR FRONT/REAR RIGHT	
3	CLS53 (GY-VT)	22	CTRL MOD. - STOP/TURN RIGHT OUTBOARD	
4	CLS52 (BN)	26	CTRL MOD. - STOP/TURN RIGHT MIDDLE	
5	CLS19 (VT-OG)	22	CTRL MOD. - STOP/TURN RIGHT (INBOARD)	
6	GD301 (BK-BU)	20	GROUND - PILLAR C OR QUARTER PANEL LEFT # 3RD POINT	
7	CLS55 (GN)	26	LAMP - TURN REAR LEFT # SIGNAL OUT	
8	*	*	Not Used	

9	*	*	Not Used	
10	*	*	Not Used	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1175** 	Service Part Number: **BU2Z-14S411-VA** Gauge: **16** Pin material: **Tin (greased)** Cavities: **10** Vehicle Uses Lamp - Park/Turn/Stop

CONNECTOR VIEWS > CONNECTOR END VIEW C501A - DRIVER DOOR MODULE (DDM)

Connector:C501A

Description

DRIVER DOOR MODULE (DDM)

Color

Harness

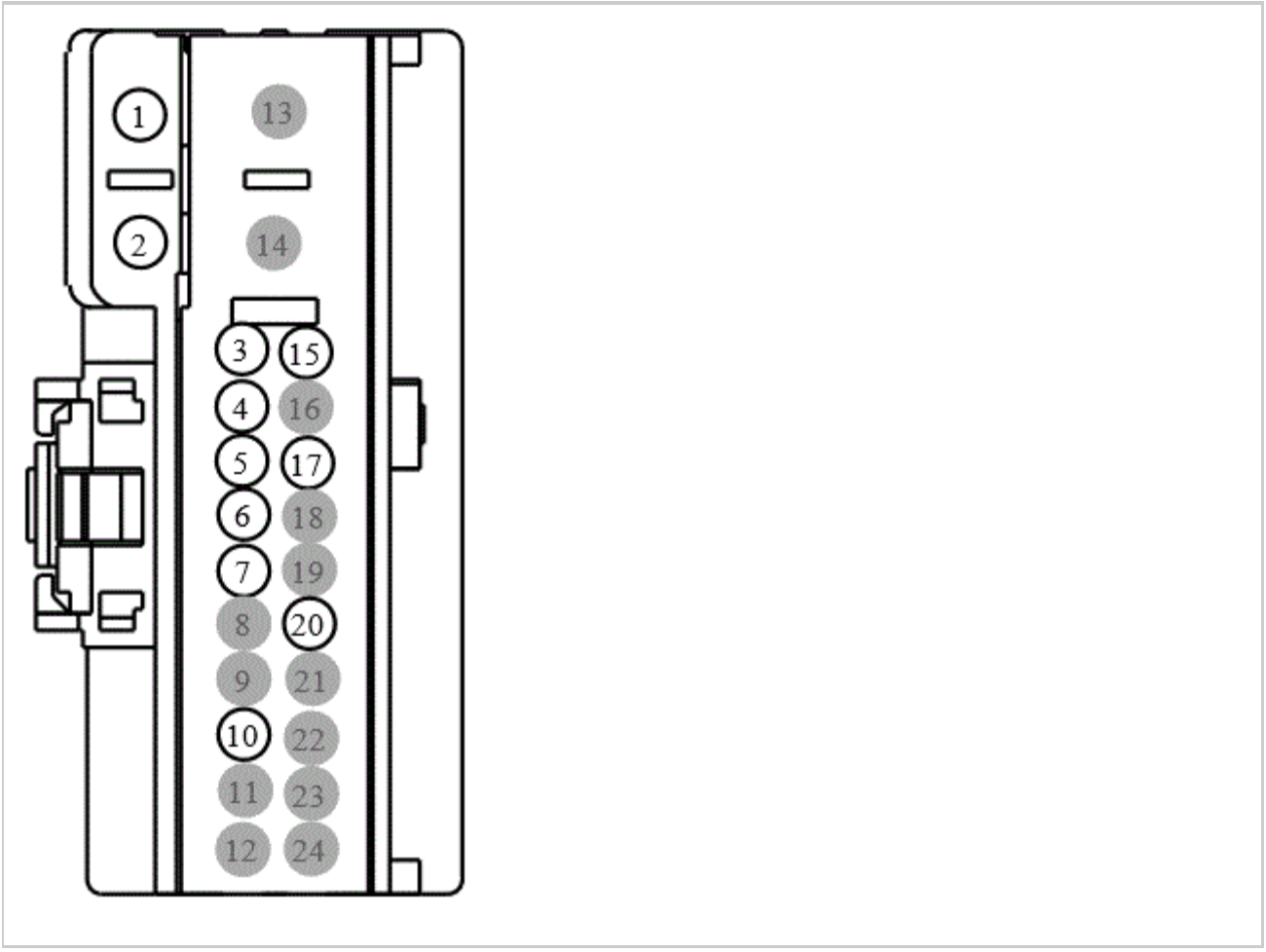
14631

Base Part #

part# N/A

Service Pigtail

Not Available



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	SBB11 (BU-RD)	14	FUSE - 11 OR CIRCUIT BREAKER	
2	GD233 (BK)	14	GROUND - COWL SIDE/PILLAR A LEFT	
3	CPL87 (BN)	22	CTRL MOD. - DOOR LOCK # LOCK STATUS INDICATOR DRIVER	
4	CLS22 (GN-BN)	22	CTRL MOD. - TURN LAMP LEFT MIRROR +	
5	VDN09 (WH-GN)	22	CTRL MOD. - LIN BUS # DRIVER OR LEFT HAND DOOR MODULE	

6	VDB07 (VT-OG)	22	CONNECTOR - DIAGNOSTIC # CAN BUS MEDIUM SPEED LOW
7	VDB06 (GY-YE)	22	CONNECTOR - DIAGNOSTIC # CAN BUS MEDIUM SPEED HIGH
8	*	*	Not Used
9	*	*	Not Used
10	CPK23 (YE-VT)	22	SWITCH - HANDLE UNLOCK DRIVER
11	*	*	Not Used
12	*	*	Not Used
13	*	*	Not Used
14	*	*	Not Used
15	CPL77 (BU)	26	CTRL MOD. - DOOR LOCK # SWITCH TRIM DOOR LOCK DRIVER ILLUMINATION
16	*	*	Not Used
17	RPW03 (BU-GN)	22	CTRL MOD. - POWER WINDOW SWITCH DRIVER RETURN
18	*	*	Not Used
19	*	*	Not Used
20	CPK19 (BU-GN)	22	SWITCH - LOCK DRIVER

CONNECTOR VIEWS > CONNECTOR END VIEW C501B - DRIVER DOOR MODULE (DDM)

Connector:C501B

Description

DRIVER DOOR MODULE (DDM)

Color

BK

Harness

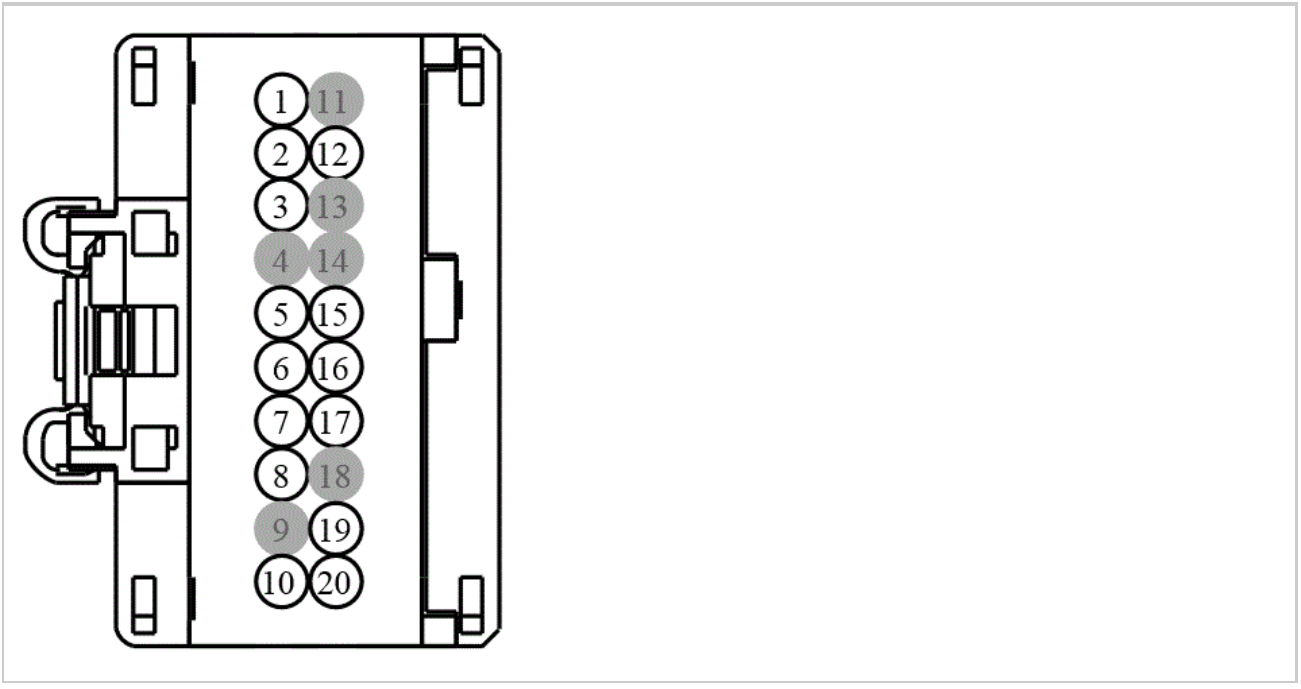
14631

Base Part #

part# N/A

Service Pigtail

Not Available



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CPS15 (VT-WH)	22	SWITCH - MEMORY DRIVER P1	

CONNECTOR VIEWS > CONNECTOR END VIEW C504 - MASTER WINDOW CONTROL SWITCH

Connector:C504

Description

MASTER WINDOW CONTROL SWITCH

Color

BK

Harness

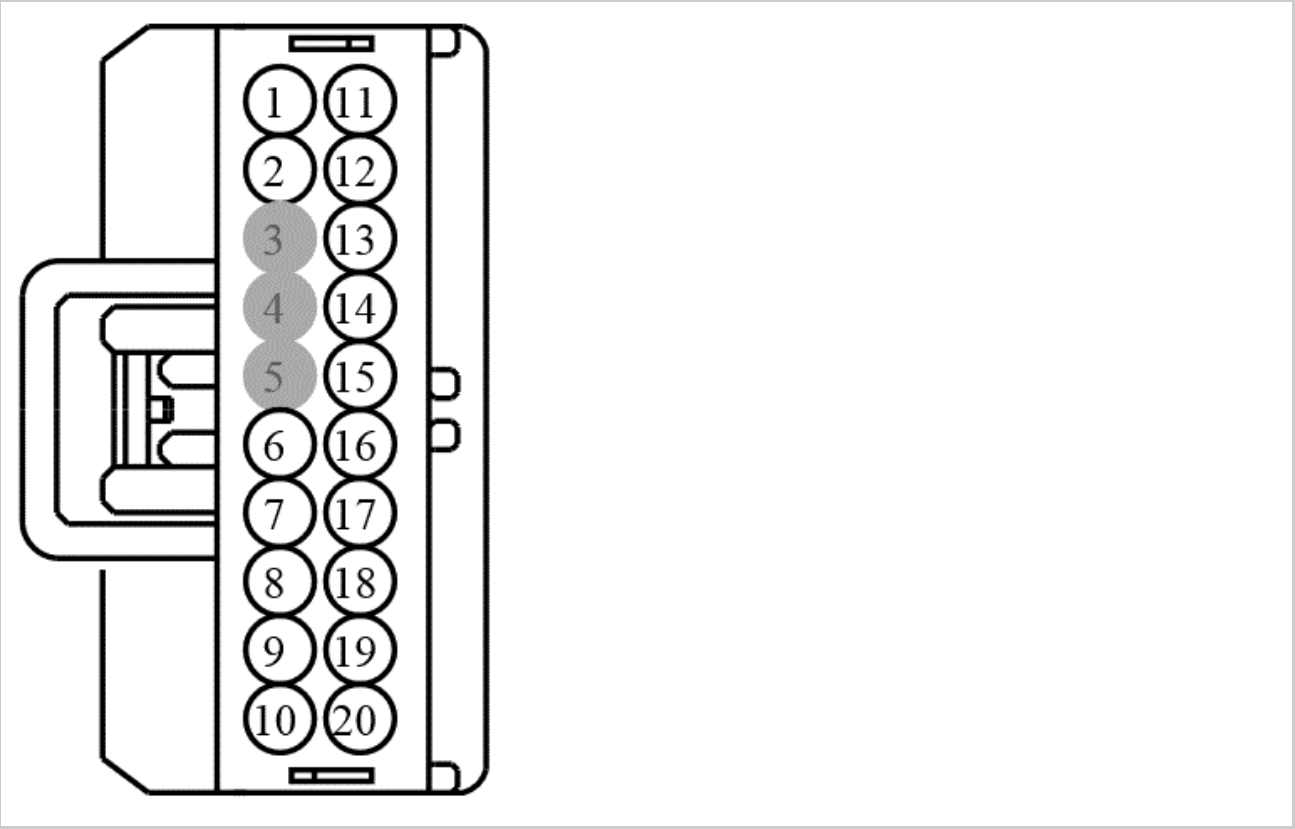
14631

Base Part #

part# N/A

Service Pigtail

Not Available



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier

CONNECTOR VIEWS > CONNECTOR END VIEW C505 - FRONT DOOR LOCK SWITCH LH

Connector:C505

Description

FRONT DOOR LOCK SWITCH LH

Color

BK

Harness

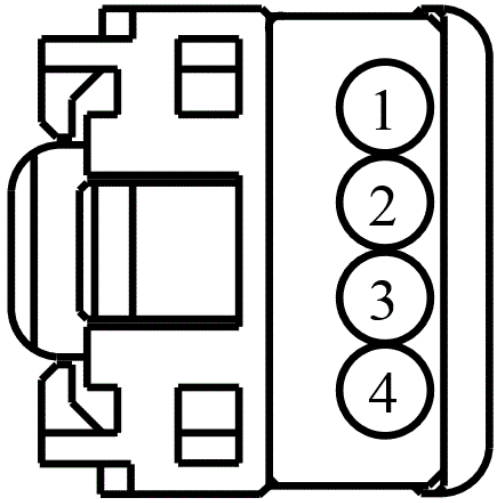
14631

Base Part #

part# N/A

Service Pigtail

See Below



Check for Terminal Part Numbers

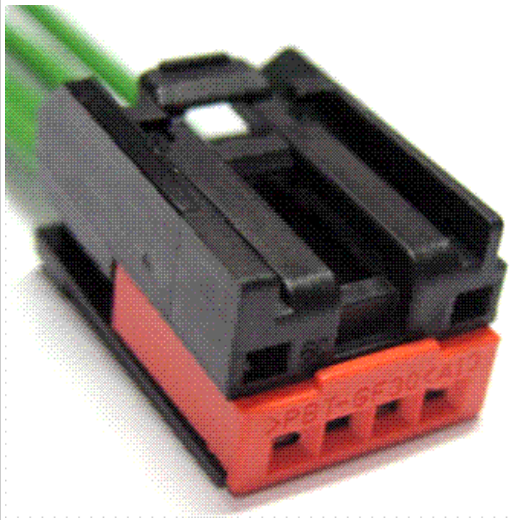
Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CBP23 (BN-YE)	22	FUSE - 23 OR CIRCUIT BREAKER	
2	CPK23 (YE-VT)	22	SWITCH - HANDLE UNLOCK DRIVER	

3	GD233 (BK)	20	GROUND - COWL SIDE/PILLAR A LEFT
4	CPK19 (BU-GN)	22	SWITCH - LOCK DRIVER

Available Pigtail Kits

Pigtail Kit Part Number

WPT-1139



Service Part Number:

3U2Z-14S411-PRC

Gauge:

18

Pin material:

Silver

Cavities:

4

Vehicle Uses

Connector - Audio Input

Lamp - CHMSL (Center High Mount Stop Lamp)

Module - Anti-theft

Module - Power Moonroof

Sensor - Steering Wheel Position

Switch - 4x4 Control

Switch - Clutch Pedal Position

Switch - Deck Lid / Lift Gate Ajar

Switch - Door Lock (LH)

Switch - Door Lock (RH)

Switch - Lift Gate Glass Ajar

Switch - Message Center

Switch - Moon Roof/Sun Roof

Transceiver - Passive Anti-Theft (PATS)

CONNECTOR VIEWS > CONNECTOR END VIEW C513 - FRONT DOOR MIDWOOFER TWEETER SPEAKER LH

Connector:C513

Description

FRONT DOOR MIDWOOFER TWEETER SPEAKER LH

Color

BK

Harness

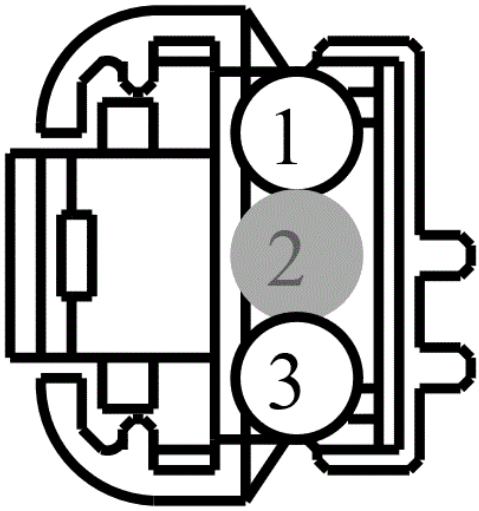
14631

Base Part #

part# N/A

Service Pigtail

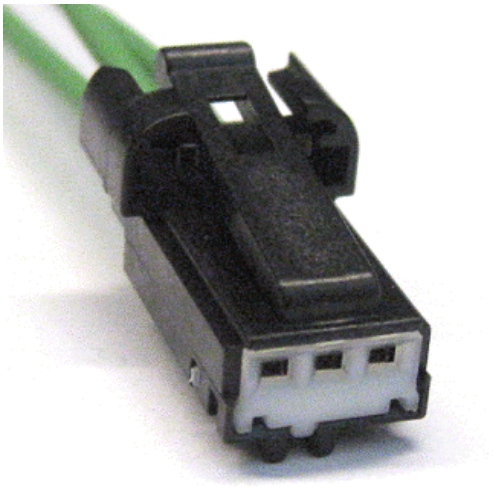
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	VME15 (GN-BU)	18	CTRL MOD. - AUDIO # SPEAKER LEFT MIDDLE +	
2	*	*	Not Used	

3	RME15 (GY-BU)	18	CTRL MOD. - AUDIO # SPEAKER LEFT MIDDLE -	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-911** 	Service Part Number: **8U2Z-14S411-LA** Gauge: **18** Pin material: **Silver** Cavities: **3** Vehicle Uses Fuse Panel Junction Block Lamp - Ambient Lighting Lamp - Front Park Lamp - Map Lamp - Park/Turn Lamp - PRNDL Indicator Lamp - Roof Marker Module - Driver Door Sensor - Speed Switch - Ambient Lighting Dimmer

CONNECTOR VIEWS > CONNECTOR END VIEW C518 - DRIVER DOOR WINDOW REGULATOR MOTOR

Connector:C518

Description

DRIVER DOOR WINDOW REGULATOR MOTOR

Color

BK

Harness

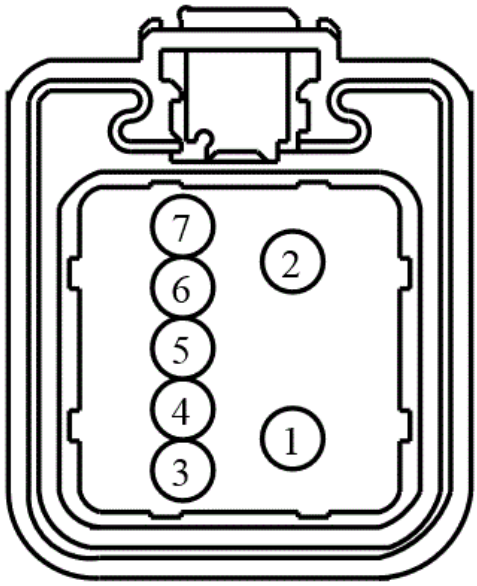
14631

Base Part #

part# N/A

Service Pigtail

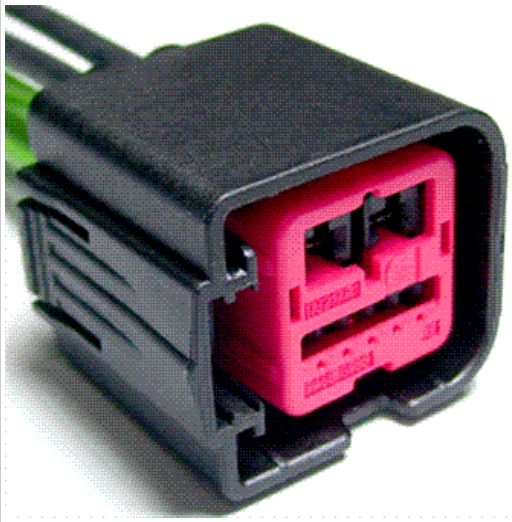
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	SBB11 (BU-RD)	14	FUSE - 11 OR CIRCUIT BREAKER	
2	GD233 (BK)	14	GROUND - COWL SIDE/PILLAR A LEFT	
3	CBP23 (BN-YE)	22	FUSE - 23 OR CIRCUIT BREAKER	
4	CPW11 (BU-GY)	22	SWITCH - POWER WINDOW DRIVER # DRIVER UP	

4	CPW34 (BU)	22	CTRL MOD. - WINDOW MOTOR DRIVER # UP
5	CPW10 (YE-VT)	22	SWITCH - POWER WINDOW DRIVER # DRIVER DOWN
5	CPW35 (GN)	22	CTRL MOD. - WINDOW MOTOR DRIVER # DOWN
6	CPW73 (GN-RD)	22	CTRL MOD. - POWER WINDOW GLOBAL DOWN
7	CPL26 (GN-VT)	22	SWITCH - LATCH DRIVER # AJAR

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1209** 	Service Part Number: **BU2Z-14S411-ASA** Gauge: **12 18** Pin material: **Tin & Silver** Cavities: **7** Vehicle Uses Motor - Power Window - LH - Front Motor - Power Window - LH - Rear Motor - Power Window - RH - Front Motor - Power Window - RH - Rear

CONNECTOR VIEWS > CONNECTOR END VIEW C520 - EXTERIOR MIRROR LH

Connector:C520

Description

EXTERIOR MIRROR LH

Color

BK

Harness

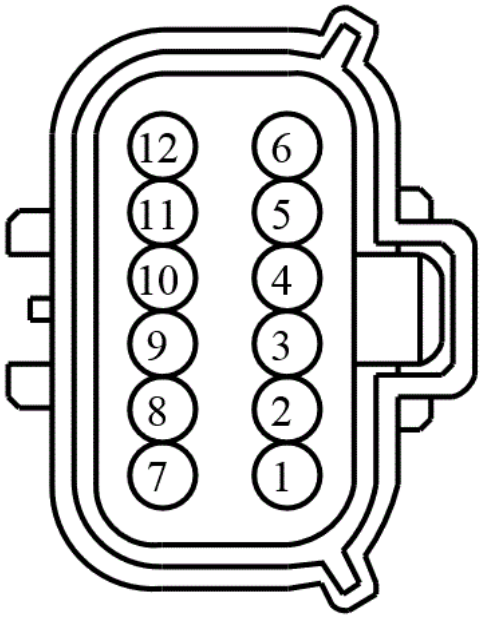
14631

Base Part #

part# N/A

Service Pigtail

See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CPM17 (BU-GN)	22	SWITCH - POWER MIRROR # LEFT MIRROR UPWARD (IF PLUS)	
2	CPM23 (GY)	22	SWITCH - POWER MIRROR # COMMON ALL MOTORS (LEFT AND RIGHT)	
3	CLS22 (GN-BN)	22	CTRL MOD. - TURN LAMP LEFT MIRROR +	

3	CLS23 (GY-OG)	22	CTRL MOD. - TURN LAMP LEFT REAR
4	CPM16 (BN-BU)	22	SWITCH - POWER MIRROR # LEFT MIRROR RIGHTWARD (IF PLUS)
5	CLN31 (VT-GN)	22	CTRL MOD. - PUDDLE LAMP LEFT
6	CRD13 (GN-VT)	22	CTRL MOD. - HEATER MIRROR LEFT
6	CBB70 (YE-GN)	22	FUSE - 70 OR CIRCUIT BREAKER
7	GD233 (BK)	20	GROUND - COWL SIDE/PILLAR A LEFT
8	VPM36 (BN-YE)	22	SENSOR - LEFT MIRROR POSITION # VERTICAL
9	LPM30 (GY-VT)	22	CTRL MOD. - SENSORS MIRROR POSITION (LEFT) +
10	CPM02 (BU)	22	CTRL MOD. - FOLD MIRRORS FOLD POSITION
10	VPM35 (YE-BU)	22	SENSOR - LEFT MIRROR POSITION # HORIZONTAL
11	CRB06 (GN-WH)	22	CTRL MOD. - BLINDSPOT WARNING # LED MIRROR LEFT OR DRIVER +
12	CPM01 (YE)	22	CTRL MOD. - FOLD MIRRORS DRIVE POSITION
12	RPM30 (YE)	22	CTRL MOD. - SENSORS MIRROR POSITION (LEFT) -

Available Pigtail Kits

CONNECTOR VIEWS > CONNECTOR END VIEW C523 - FRONT DOOR WOOFER SPEAKER LH

Connector:C523

Description

FRONT DOOR WOOFER SPEAKER LH

Color

NA

Harness

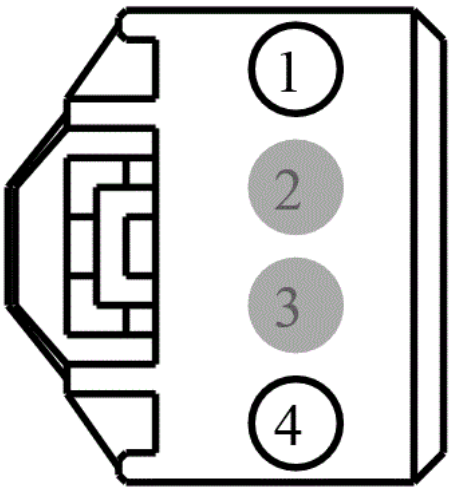
14631

Base Part #

part# N/A

Service Pigtail

See Below



Check for Terminal Part Numbers

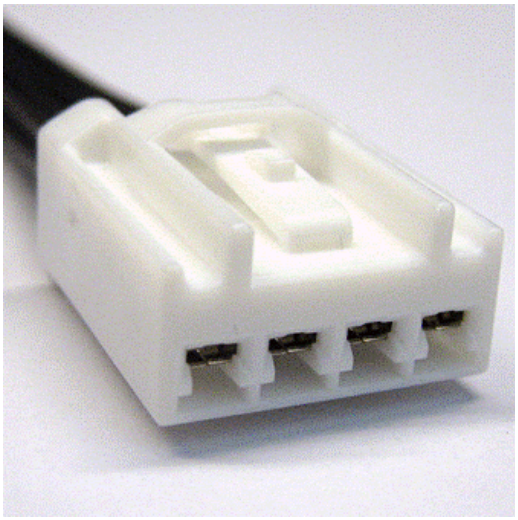
Pin	Circuit	Gauge	Circuit Function	Qualifier
1	VME07 (WH)	18	CTRL MOD. - AUDIO # SPEAKER LEFT FRONT DOOR (WOOFER) +	

2	*	*	Not Used
3	*	*	Not Used
4	RME07 (WH-BN)	18	CTRL MOD. - AUDIO # SPEAKER LEFT FRONT DOOR (WOOFER) -

Available Pigtail Kits

Pigtail Kit Part Number

WPT-912



Service Part Number:

8U2Z-14S411-HA

Gauge:

14

Pin material:

Tin

Cavities:

4

Vehicle Uses

Sensor - Oil Temperature

Sensor - Power Steering Pressure

Sensor - Purge Flow

Switch - Gear Shift Select/Neutral Safety

CONNECTOR VIEWS > CONNECTOR END VIEW C525 - FRONT DOOR LATCH RELEASE MOTOR LH

Connector:C525

Description

FRONT DOOR LATCH RELEASE MOTOR LH

Color

BK

Harness

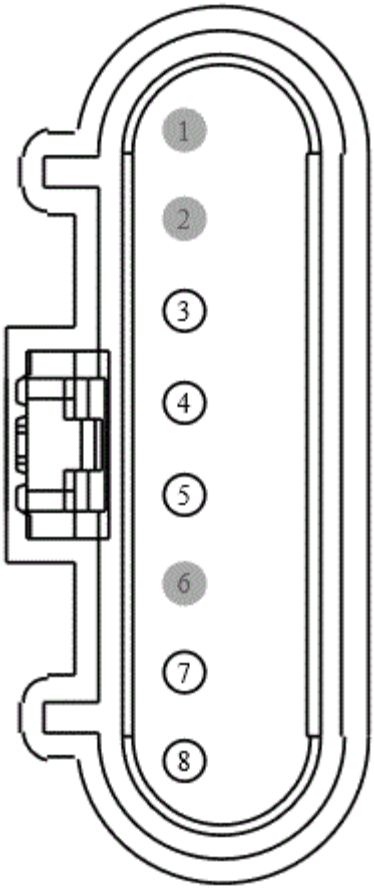
14631

Base Part #

part# N/A

Service Pigtail

See Below



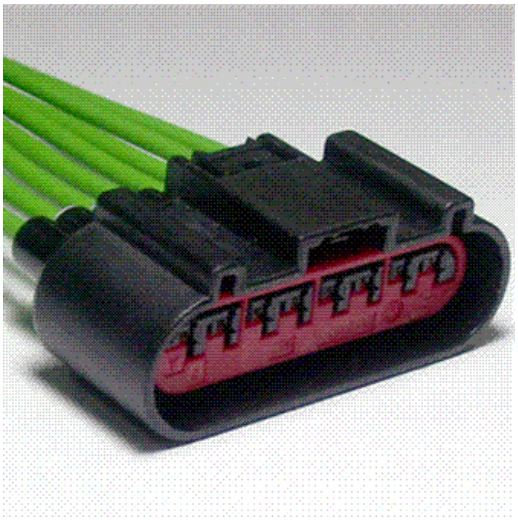
Pin	Circuit	Gauge	Circuit Function	Qualifier
1	*	*	Not Used	
2	*	*	Not Used	
3	CPL26 (GN-VT)	22	SWITCH - LATCH DRIVER # AJAR	

4	CPL30 (BU-BN)	22	SWITCH - LATCH DRIVER # UNLOCK
5	GD233 (BK)	20	GROUND - COWL SIDE/PILLAR A LEFT
5	RPL61 (BN-GN)	22	CTRL MOD. - DOOR LOCK # SWITCH TRIM DOOR LOCK DRIVER
6	*	*	Not Used
7	CPL11 (GY-BN)	14	CTRL MOD. - DOOR LOCK # ALL LOCK
8	CPL51 (BU-GN)	14	CTRL MOD. - DOOR LOCK # DRIVER UNLOCK

Available Pigtail Kits

Pigtail Kit Part Number

WPT-1366



Service Part Number:

3U2Z-14S411-MBB

Gauge:

16

Pin material:

Silver

Cavities:

8

Vehicle Uses

Actuator - Door Lock - LH - Front

Actuator - Door Lock - LH - Rear

Actuator - Door Lock - RH - Front

Actuator - Door Lock - RH - Rear

Module - Liftgate

	Switch - Door Ajar / Interior Lamp Switch - Door Lock (LH) Switch - Door Lock (RH) Switch - Sliding Door Contact

CONNECTOR VIEWS > CONNECTOR END VIEW C535 - MASTER WINDOW CONTROL SWITCH

Connector:C535

Description

MASTER WINDOW CONTROL SWITCH

Color

GY

Harness

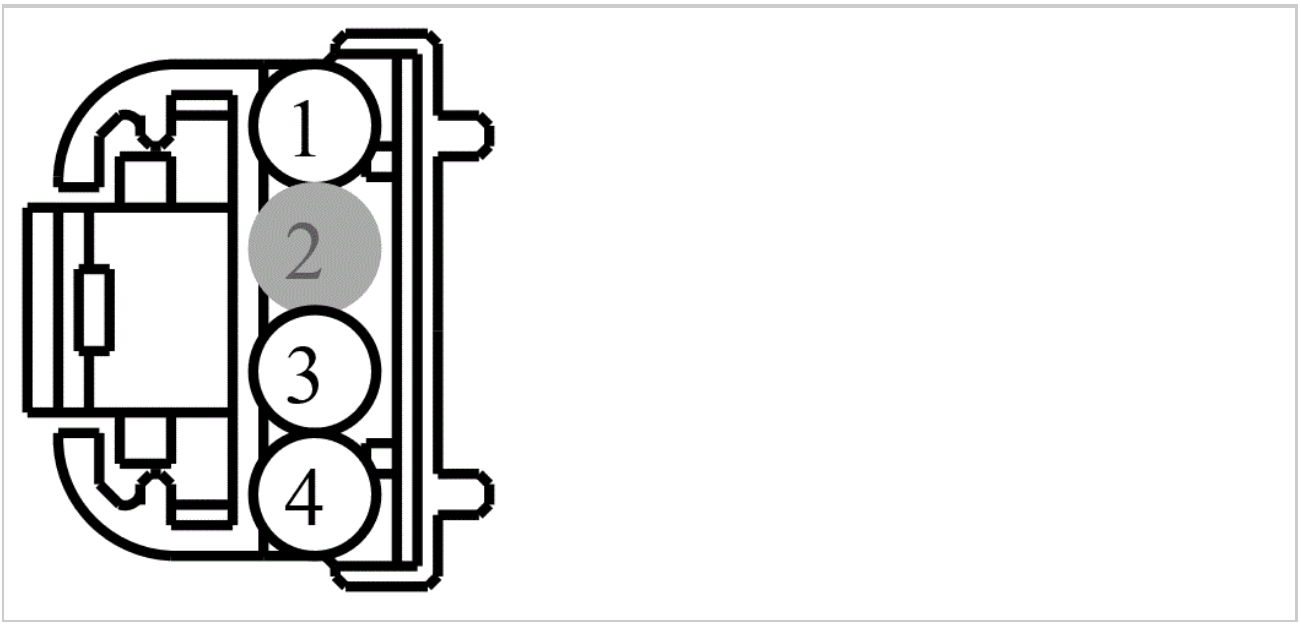
14631

Base Part #

part# N/A

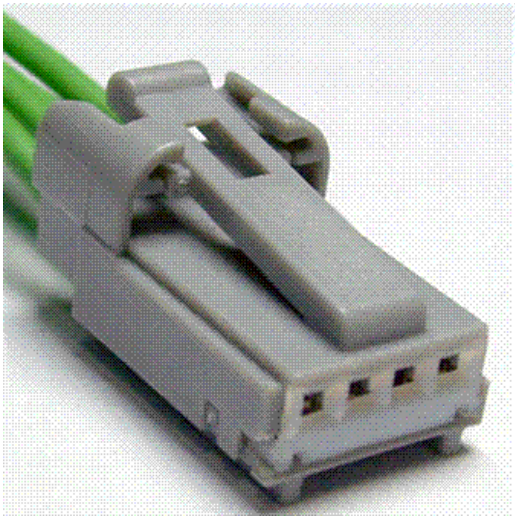
Service Pigtail

See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CBP23 (BN-YE)	22	FUSE - 23 OR CIRCUIT BREAKER	
2	*	*	Not Used	
3	VDN09 (WH-GN)	22	CTRL MOD. - LIN BUS # DRIVER OR LEFT HAND DOOR MODULE	
4	RPW03 (BU-GN)	22	CTRL MOD. - POWER WINDOW SWITCH DRIVER RETURN	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1013** 	Service Part Number: **9U2Z-14S411-TA** Gauge: **18** Pin material: **Silver** Cavities: **4** Vehicle Uses Module - Auto Lamps Sensor - Sunload

CONNECTOR VIEWS > CONNECTOR END VIEW C541 - FRONT DOOR LOCK SWITCH LH

Connector:C541

Description

FRONT DOOR LOCK SWITCH LH

Color

BK

Harness

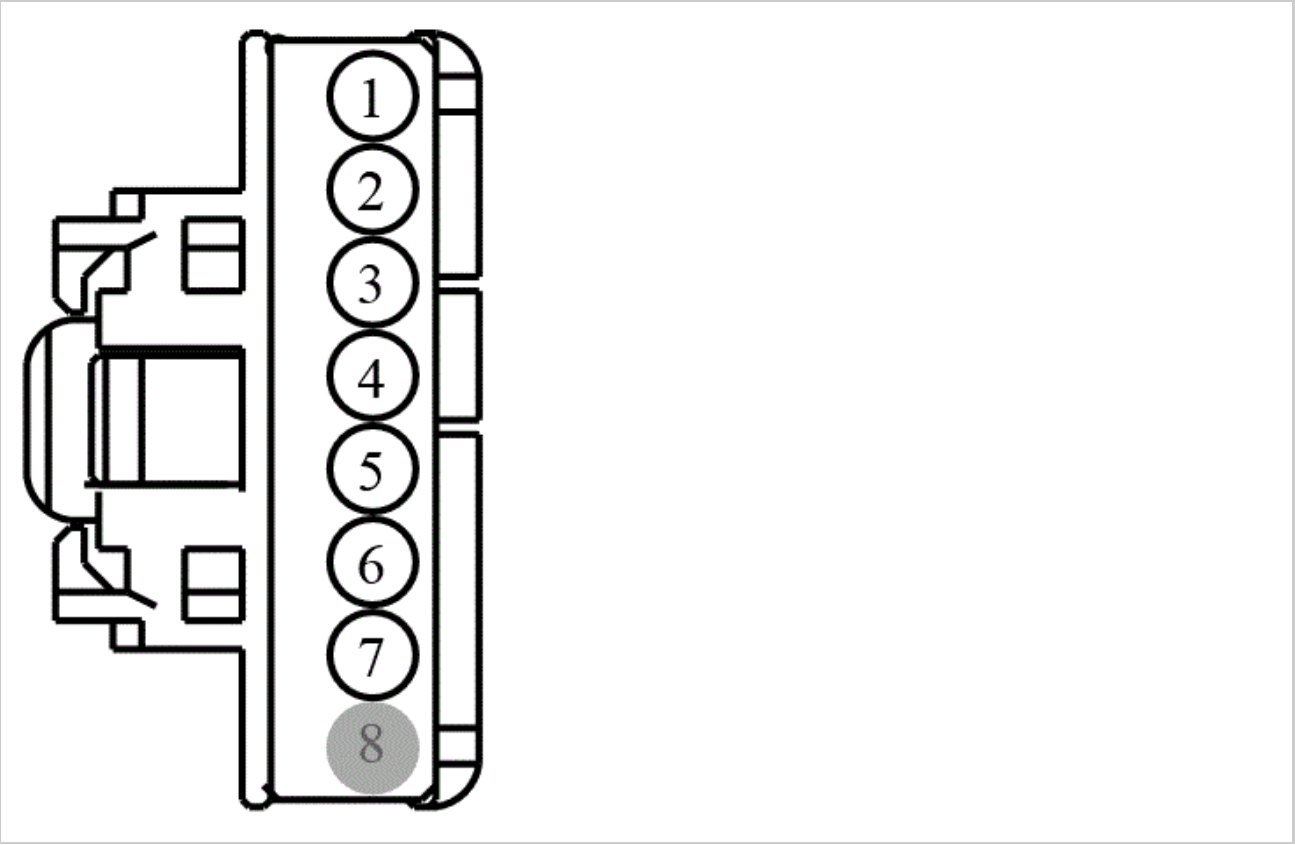
14631

Base Part #

part# N/A

Service Pigtail

See Below



Check for Terminal Part Numbers

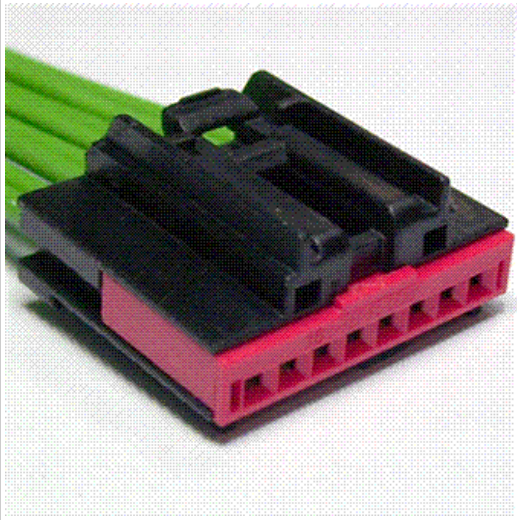
Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CPK23 (YE-VT)	22	SWITCH - HANDLE UNLOCK DRIVER	
2	CPK19 (BU-GN)	22	SWITCH - LOCK DRIVER	

3	RPW03 (BU-GN)	22	CTRL MOD. - POWER WINDOW SWITCH DRIVER RETURN
4	CPL77 (BU)	26	CTRL MOD. - DOOR LOCK # SWITCH TRIM DOOR LOCK DRIVER ILLUMINATION
5	CPS15 (VT-WH)	22	SWITCH - MEMORY DRIVER P1
6	CPS16 (YE-VT)	22	SWITCH - MEMORY DRIVER P2
7	CPS17 (BU-OG)	22	SWITCH - MEMORY DRIVER P3
8	*	*	Not Used

Available Pigtail Kits

Pigtail Kit Part Number

WPT-1219



Service Part Number:

3U2Z-14S411-DAAC

Gauge:

18

Pin material:

Silver

Cavities:

8

Vehicle Uses

Switch - Ambient Lighting Dimmer

Switch - Door Lock (LH)

Switch - Message Center

Switch - Moon Roof/Sun Roof

Switch - Seat Memory

CONNECTOR VIEWS > CONNECTOR END VIEW C543 - EXTERIOR FRONT DOOR HANDLE LH

Connector:C543

Description

EXTERIOR FRONT DOOR HANDLE LH

Color

Harness

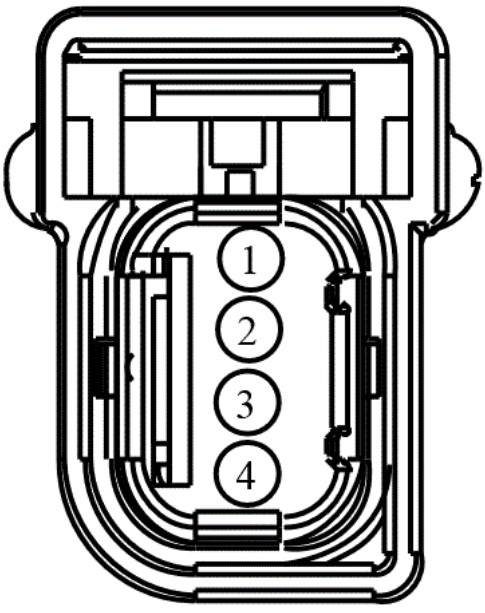
14631

Base Part #

part# N/A

Service Pigtail

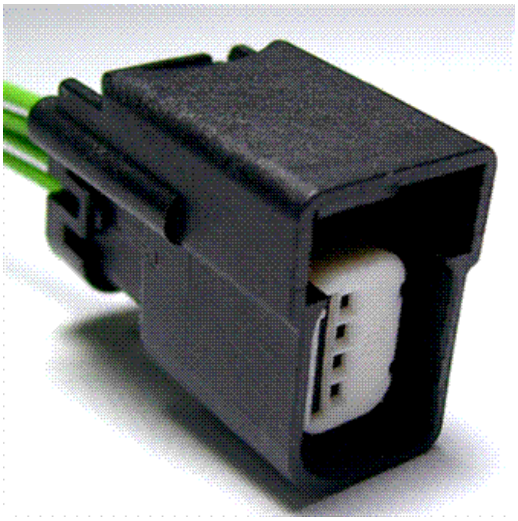
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	VPK39 (GN-VT)	22	SENSOR - KEYLESS VEHICLE HANDLE DRIVER POWER/DATA	

2	VPK01 (BN-YE)	22	CTRL MOD. - KEYLESS VEHICLE # ANTENNA HANDLE DRIVER +	
3	RPK01 (WH-GN)	22	CTRL MOD. - KEYLESS VEHICLE # ANTENNA HANDLE DRIVER -	
4	RPK39 (VT-OG)	22	SENSOR - KEYLESS VEHICLE HANDLE	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1443** 	Service Part Number: **FU2Z-14S411-ANA** Gauge: **20** Pin material: **Silver** Cavities: **4** Vehicle Uses Antenna - Keyless Entry Lamp - Front Turn Lamp - Side Marker (Rear Fender) Switch - Keyless Door Handle

CONNECTOR VIEWS > CONNECTOR END VIEW C567 - DRIVER DOOR SIDE IMPACT SENSOR

Connector:C567

Description

DRIVER DOOR SIDE IMPACT SENSOR

Color

BK

Harness

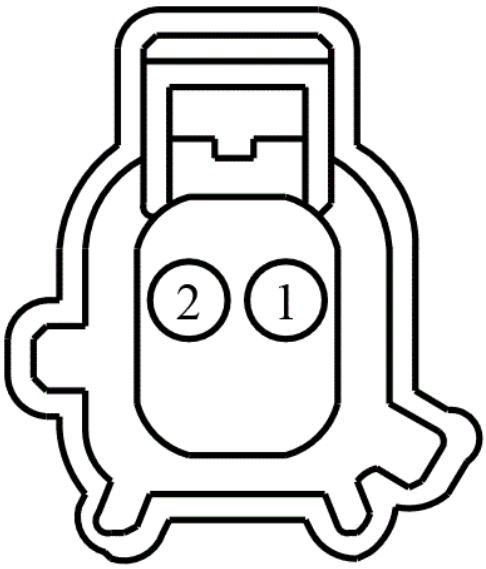
14631

Base Part #

part# N/A

Service Pigtail

See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	VR217 (GY-YE)	22	SENSOR - SIDE IMPACT FRONT DRIVER SIDE	
2	RR131 (VT-GN)	22	CTRL MOD. - SENSOR SIDE IMPACT FRONT DRIVER SIDE -	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-948**	Service Part Number: **3U2Z-14S411-EKB** Gauge: **14**



Pin material:

Tin (greased)

Cavities:

2

Vehicle Uses

Motor - Windshield Washer Fluid Pump

Sensor - Side Impact

CONNECTOR VIEWS > CONNECTOR END VIEW C573 - INTERIOR FRONT DOOR HANDLE AMBIENT LIGHTING LAMP LH

Connector:C573

Description

INTERIOR FRONT DOOR HANDLE AMBIENT LIGHTING LAMP LH

Color

LT GY

Harness

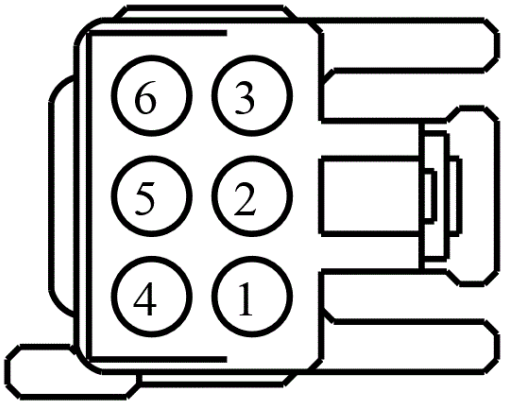
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Base Part #

part# N/A

Service Pigtail

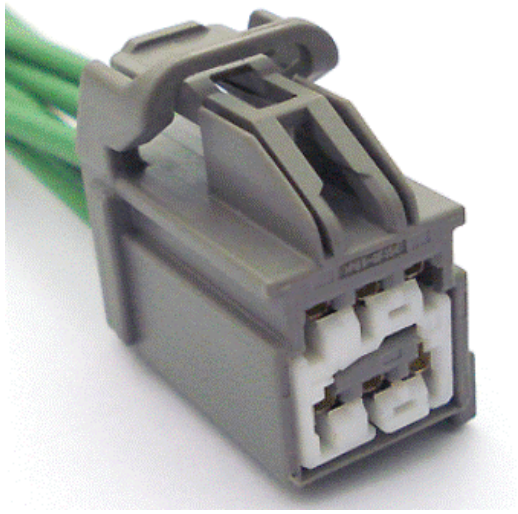
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CLN44 (OG)	22	CTRL MOD. - AMBIENT LIGHTING ZONE 1 OR NON-ZONE # LED RED +	
2	CPL30 (BU-BN)	22	SWITCH - LATCH DRIVER # UNLOCK	
3	CLN45 (GN)	22	CTRL MOD. - AMBIENT LIGHTING ZONE 1 OR NON-ZONE # LED GREEN +	
4	RLN44 (BN)	22	CTRL MOD. - AMBIENT LIGHTING ZONE 1 OR NON-ZONE # LED -	
5	CLN46 (BU)	22	CTRL MOD. - AMBIENT LIGHTING ZONE 1 OR NON-ZONE # LED BLUE +	
6	CPL87 (BN)	22	CTRL MOD. - DOOR LOCK # LOCK STATUS INDICATOR DRIVER	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-962**	Service Part Number: **3U2Z- 14S411-JBB**



Gauge:

14

Pin material:

Silver

Cavities:

6

Vehicle Uses

Mating Connector WPT-1299

Switch - Gear Shift Select/Neutral Safety

Switch - Overdrive Cancel

Switch - Power Sliding Door

CONNECTOR VIEWS > CONNECTOR END VIEW C576 - EXTERIOR MIRROR BLIND SPOT (BLIS) / CROSS TRAFFIC ALERT (CTA) LED LH

Connector:C576

Description

EXTERIOR MIRROR BLIND SPOT (BLIS) / CROSS TRAFFIC ALERT (CTA) LED LH

Color

WH

Harness

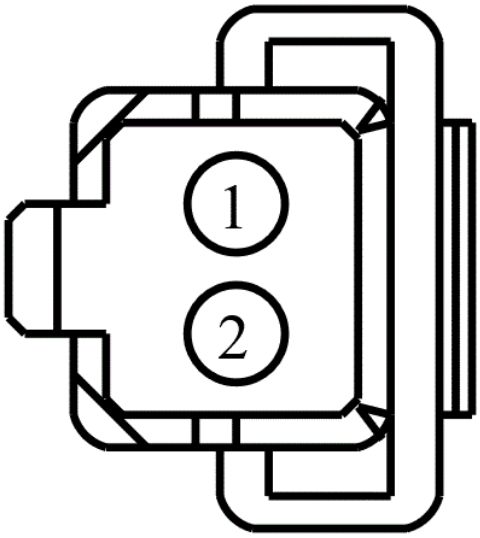
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Base Part #

part# N/A

Service Pigtail

See Below

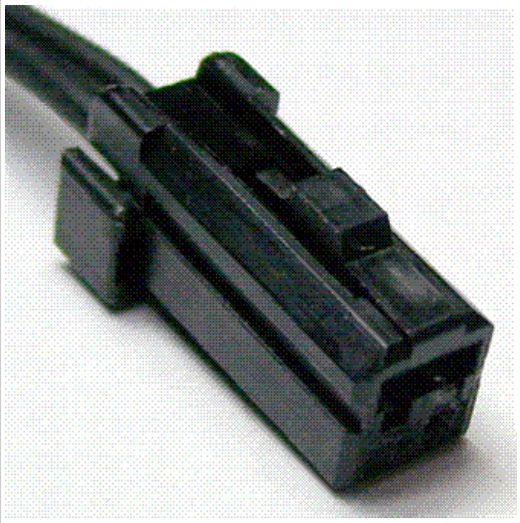


Pin	Circuit	Gauge	Circuit Function	Qualifier
1	* (*)	*	SENSOR - ALERT	
2	* (*)	*	GROUND - COWL SIDE/PILLAR A LEFT	

Available Pigtail Kits

Pigtail Kit Part Number

WPT-1197



Service Part Number:

3U2Z-14S411-PFB

Gauge:

20

Pin material:

Tin (greased)

Cavities:

2

Vehicle Uses

Mirror - Vanity

Sensor - Speed

Switch - Brake Deactivation

	Switch - Brake Pedal Position Switch - Brake Pressure Switch - Park Brake Switch - Speed Control Switch - Speed Control Deactivation Switch - Stop Lamp Switch - Visor

CONNECTOR VIEWS > CONNECTOR END VIEW C605 - FRONT DOOR LOCK SWITCH RH

Connector:C605

Description

FRONT DOOR LOCK SWITCH RH

Color

BK

Harness

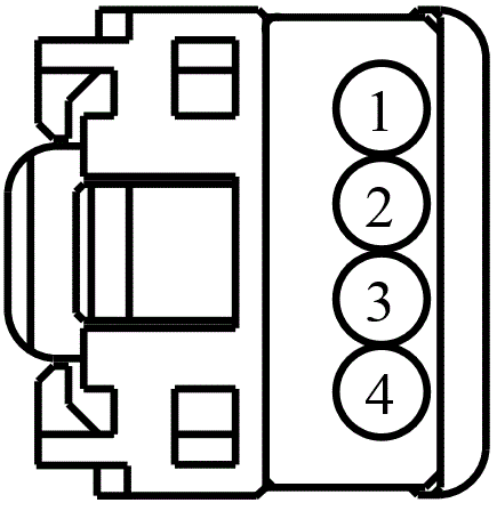
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Base Part #

part# N/A

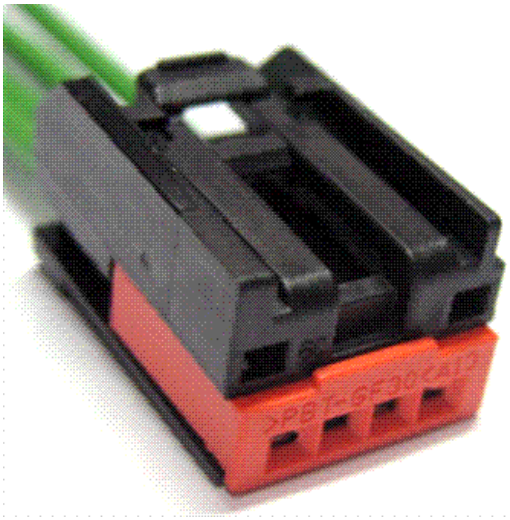
Service Pigtail

See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CPL15 (BU)	26	SWITCH - TRIM DOOR LOCK PASSENGER # LOCK	
1	CPK19 (BU-GN)	22	SWITCH - LOCK DRIVER	
2	GD238 (BK-WH)	20	GROUND - COWL SIDE/PILLAR A RIGHT	
2	RPW05 (GN-BN)	22	CTRL MOD. - POWER WINDOW SWITCH FRONT PASSENGER RETURN	
3	CPL16 (YE)	26	SWITCH - TRIM DOOR LOCK PASSENGER # UNLOCK	
3	CPK23 (YE-VT)	22	SWITCH - HANDLE UNLOCK DRIVER	
4	CPL78 (VT)	26	CTRL MOD. - DOOR LOCK # SWITCH TRIM DOOR LOCK PASSENGER ILLUMINATION	
4	CBP23 (BN-YE)	22	FUSE - 23 OR CIRCUIT BREAKER	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1139** 	Service Part Number: **3U2Z-14S411-PRC** Gauge: **18** Pin material: **Silver** Cavities: **4** Vehicle Uses Connector - Audio Input Lamp - CHMSL (Center High Mount Stop Lamp) Module - Anti-theft Module - Power Moonroof Sensor - Steering Wheel Position Switch - 4x4 Control Switch - Clutch Pedal Position Switch - Deck Lid / Lift Gate Ajar Switch - Door Lock (LH) Switch - Door Lock (RH) Switch - Lift Gate Glass Ajar Switch - Message Center Switch - Moon Roof/Sun Roof Transceiver - Passive Anti-Theft (PATS)

CONNECTOR VIEWS > CONNECTOR END VIEW C608 - PASSENGER DOOR WINDOW REGULATOR MOTOR

Connector:C608

Description

PASSENGER DOOR WINDOW REGULATOR MOTOR

Color

BK

Harness

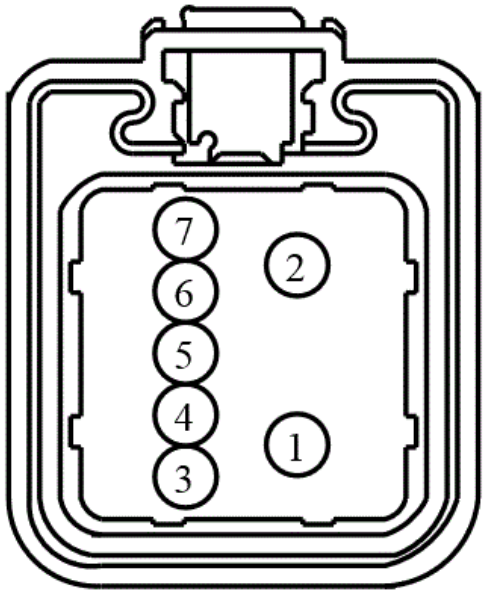
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Base Part #

part# N/A

Service Pigtail

See Below



Check for Terminal Part Numbers

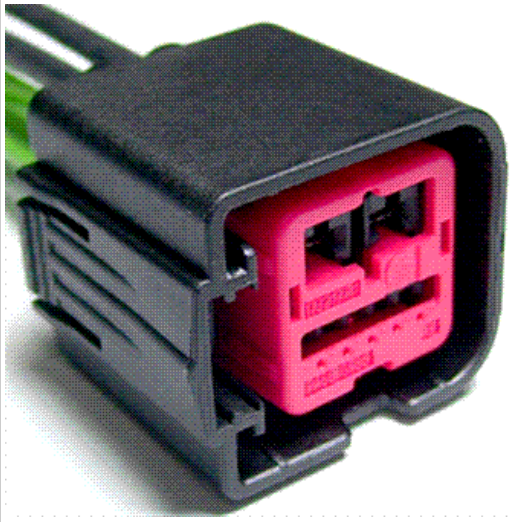
Pin	Circuit	Gauge	Circuit Function	Qualifier
1	SBP26 (YE-RD)	14	FUSE - 26 OR CIRCUIT BREAKER	
2	GD238 (BK-WH)	14	GROUND - COWL SIDE/PILLAR A RIGHT	
3	CBP23 (BN-YE)	22	FUSE - 23 OR CIRCUIT BREAKER	

4	CPW40 (WH)	22	CTRL MOD. - WINDOW MOTOR FRONT PASSENGER # UP
4	CPW13 (BN-YE)	22	SWITCH - POWER WINDOW DRIVER # FRONT PASSENGER UP
5	CPW41 (GY-YE)	22	CTRL MOD. - WINDOW MOTOR FRONT PASSENGER # DOWN
5	CPW12 (GN-OG)	22	SWITCH - POWER WINDOW DRIVER # FRONT PASSENGER DOWN
6	CPW73 (GN-VT)	22	CTRL MOD. - POWER WINDOW GLOBAL DOWN
7	CPL31 (WH)	22	SWITCH - LATCH PASSENGER # AJAR

Available Pigtail Kits

Pigtail Kit Part Number

WPT-1209



Service Part Number:

BU2Z-14S411-ASA

Gauge:

12 18

Pin material:

Tin & Silver

Cavities:

7

Vehicle Uses

Motor - Power Window - LH - Front

Motor - Power Window - LH - Rear

Motor - Power Window - RH - Front

Motor - Power Window - RH - Rear

CONNECTOR VIEWS > CONNECTOR END VIEW C609 - FRONT DOOR LATCH RELEASE MOTOR RH

Connector:C609

Description

FRONT DOOR LATCH RELEASE MOTOR RH

Color

BK

Harness

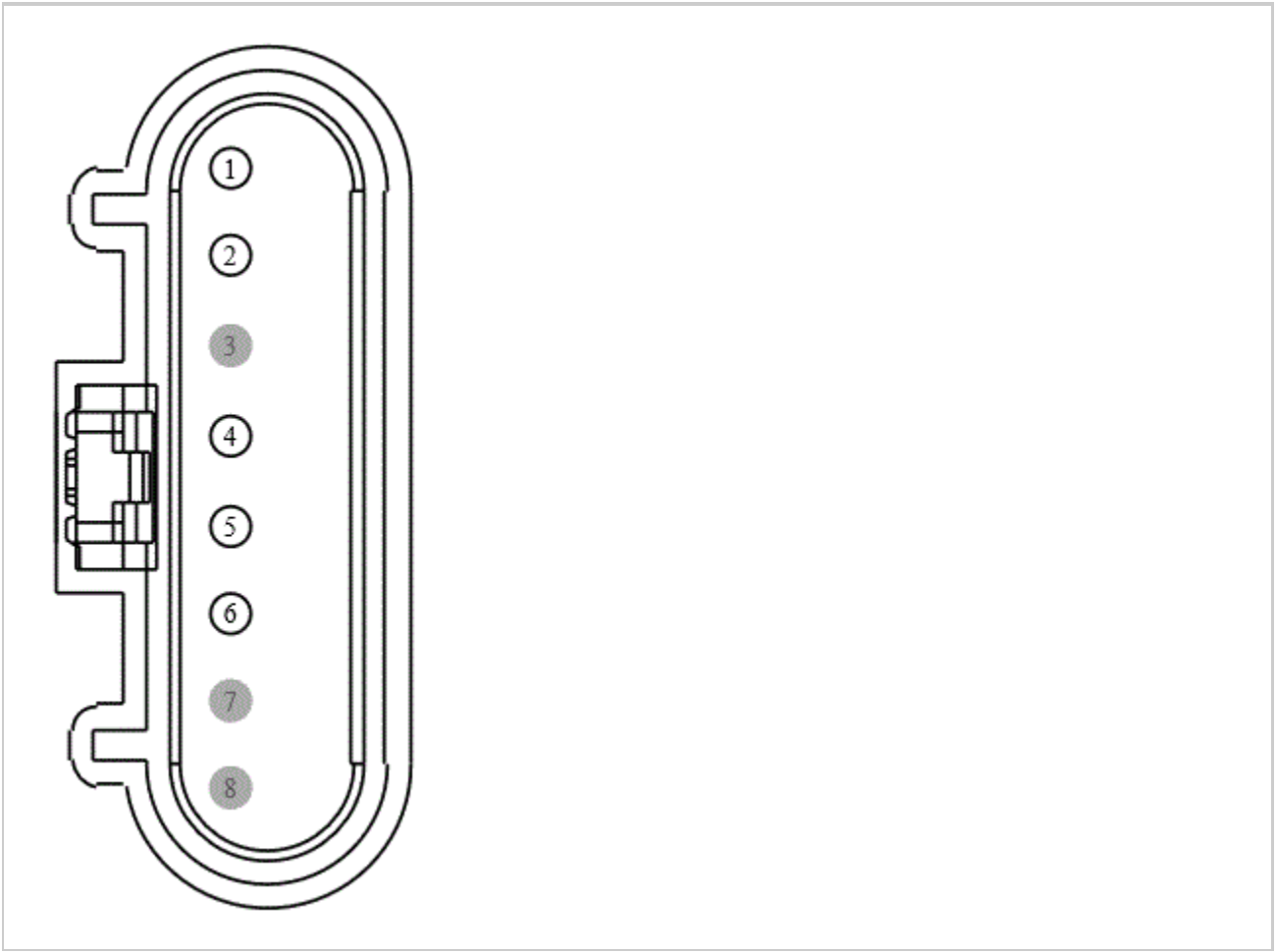
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Base Part #

part# N/A

Service Pigtail

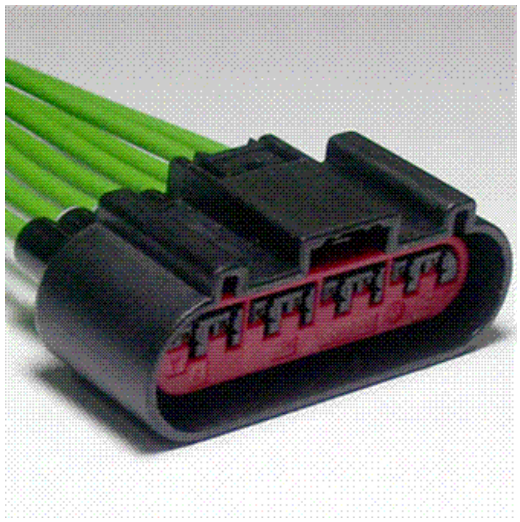
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CPL52 (VT-GY)	14	CTRL MOD. - DOOR LOCK # PASSENGER DOORS UNLOCK (ALL EXCLUDING DRIVER)	
2	CPL11 (GY-BN)	14	CTRL MOD. - DOOR LOCK # ALL LOCK	
3	*	*	Not Used	
4	GD238 (BK-WH)	20	GROUND - COWL SIDE/PILLAR A RIGHT	
4	RPL62 (GY)	22	CTRL MOD. - DOOR LOCK # SWITCH TRIM DOOR LOCK PASSENGER	
5	CPL35 (BU)	22	SWITCH - LATCH PASSENGER # UNLOCK	
6	CPL31 (WH)	22	SWITCH - LATCH PASSENGER # AJAR	
7	*	*	Not Used	
8	*	*	Not Used	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1366**	Service Part Number: **3U2Z-14S411-MBB** Gauge: **16** Pin material: **Silver** Cavities:



8

Vehicle Uses

Actuator - Door Lock - LH - Front

Actuator - Door Lock - LH - Rear

Actuator - Door Lock - RH - Front

Actuator - Door Lock - RH - Rear

Module - Liftgate

Switch - Door Ajar / Interior Lamp

Switch - Door Lock (LH)

Switch - Door Lock (RH)

Switch - Sliding Door Contact

CONNECTOR VIEWS > CONNECTOR END VIEW C612 - FRONT DOOR WOOFER SPEAKER RH

Connector:C612

Description

FRONT DOOR WOOFER SPEAKER RH

Color

NA

Harness

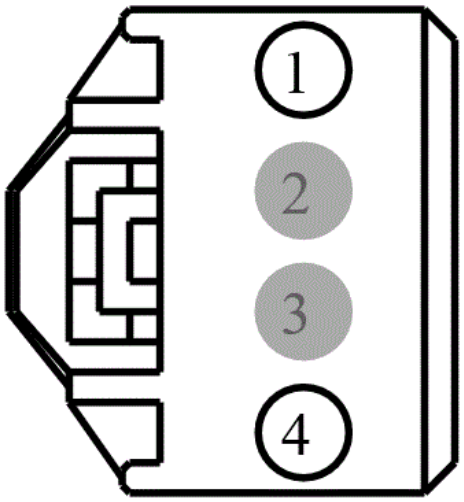
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Base Part #

part# N/A

Service Pigtail

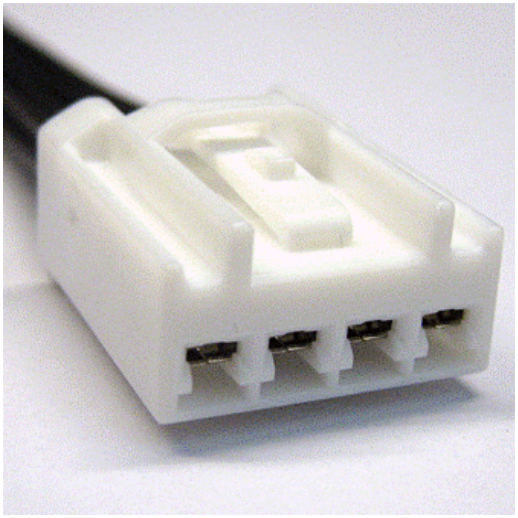
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	VME10 (WH-VT)	18	CTRL MOD. - AUDIO # SPEAKER RIGHT FRONT DOOR (WOOFER) +	
2	*	*	Not Used	
3	*	*	Not Used	
4	RME10 (WH-OG)	18	CTRL MOD. - AUDIO # SPEAKER RIGHT FRONT DOOR (WOOFER) -	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-912**	Service Part Number: **8U2Z-14S411-HA** Gauge: **14** Pin material: **Tin**



Cavities:

4

Vehicle Uses

Sensor - Oil Temperature

Sensor - Power Steering Pressure

Sensor - Purge Flow

Switch - Gear Shift Select/Neutral Safety

CONNECTOR VIEWS > CONNECTOR END VIEW C613 - FRONT DOOR MIDWOOFER TWEETER SPEAKER RH

Connector:C613

Description

FRONT DOOR MIDWOOFER TWEETER SPEAKER RH

Color

BK

Harness

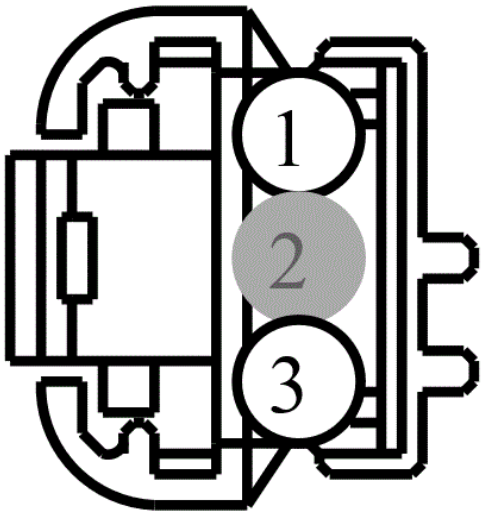
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Base Part #

part# N/A

Service Pigtail

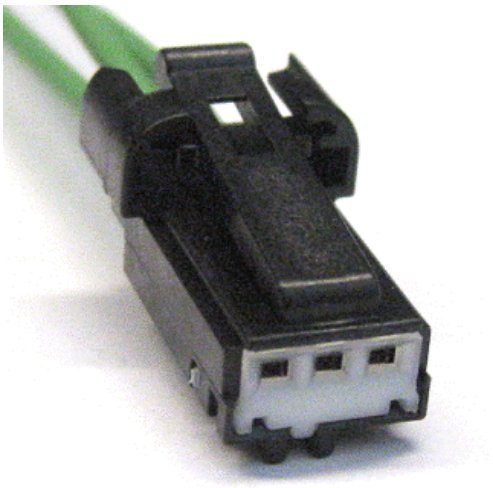
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	VME16 (VT-GY)	18	CTRL MOD. - AUDIO # SPEAKER RIGHT MIDDLE +	
2	*	*	Not Used	
3	RME16 (YE-GY)	18	CTRL MOD. - AUDIO # SPEAKER RIGHT MIDDLE -	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-911**	Service Part Number: **8U2Z-14S411-LA** Gauge: **18** Pin material: **Silver** Cavities: **3** Vehicle Uses

	Fuse Panel Junction Block Lamp - Ambient Lighting Lamp - Front Park Lamp - Map Lamp - Park/Turn Lamp - PRNDL Indicator Lamp - Roof Marker Module - Driver Door Sensor - Speed Switch - Ambient Lighting Dimmer

CONNECTOR VIEWS > CONNECTOR END VIEW C624 - PASSENGER DOOR WINDOW CONTROL SWITCH

Connector:C624

Description

PASSENGER DOOR WINDOW CONTROL SWITCH

Color

GY

Harness

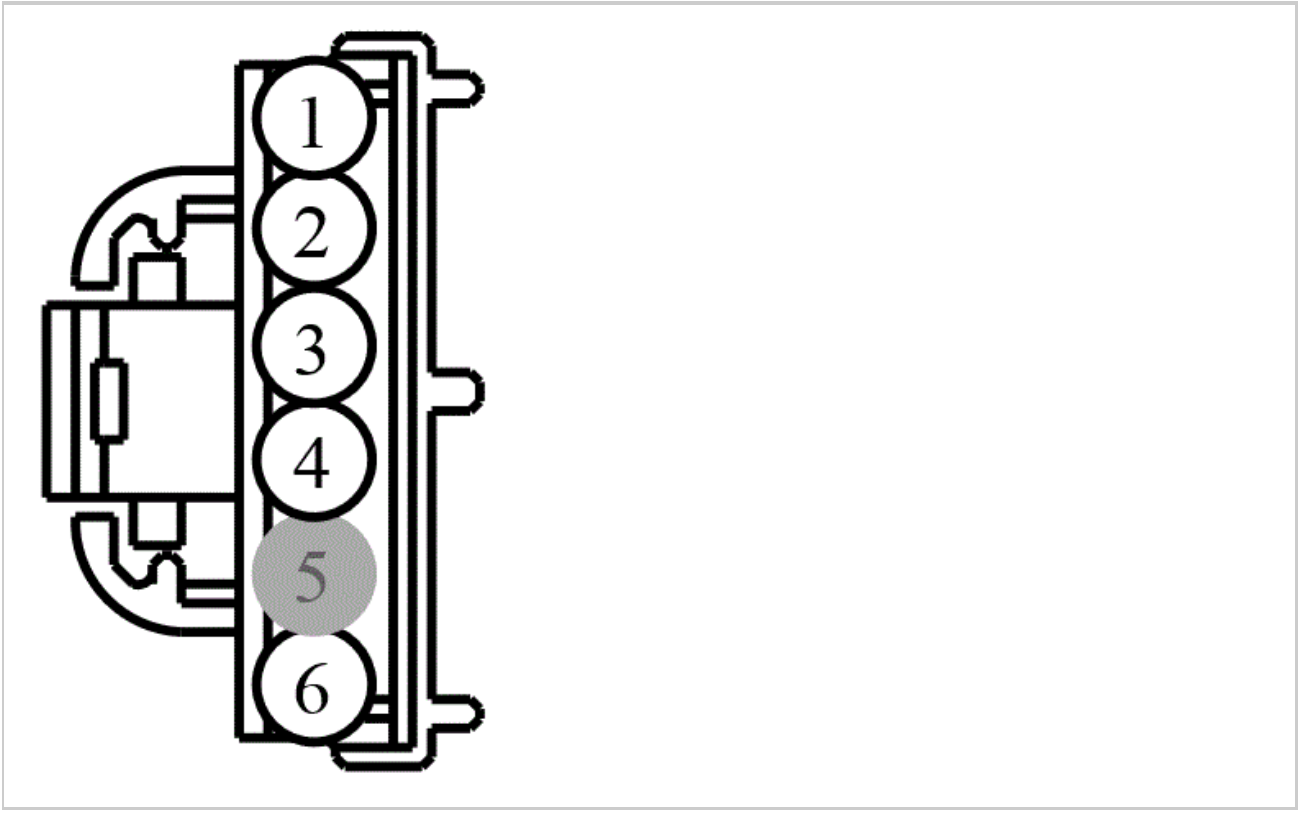
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Base Part #

part# N/A

Service Pigtail

See Below



Check for Terminal Part Numbers

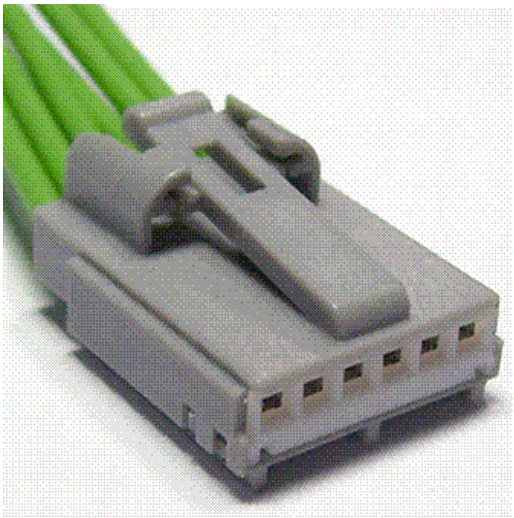
Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CBP23 (BN-YE)	22	FUSE - 23 OR CIRCUIT BREAKER	
1	RPW05 (GN-BN)	22	CTRL MOD. - POWER WINDOW SWITCH FRONT PASSENGER RETURN	
2	CPW20 (WH)	26	SWITCH - POWER WINDOW FRONT PASSENGER # UP	
2	CPW13 (BN-YE)	22	SWITCH - POWER WINDOW DRIVER # FRONT PASSENGER UP	
3	CPW19 (GN)	26	SWITCH - POWER WINDOW FRONT PASSENGER # DOWN	
3	CPW12 (GN-OG)	22	SWITCH - POWER WINDOW DRIVER # FRONT PASSENGER DOWN	

4	CPL78 (VT)	26	CTRL MOD. - DOOR LOCK # SWITCH TRIM DOOR LOCK PASSENGER ILLUMINATION
4	CBP23 (BN-YE)	22	FUSE - 23 OR CIRCUIT BREAKER
5	*	*	Not Used
6	GD238 (BK-WH)	20	GROUND - COWL SIDE/PILLAR A RIGHT
6	RPW05 (GN-BN)	22	CTRL MOD. - POWER WINDOW SWITCH FRONT PASSENGER RETURN

Available Pigtail Kits

Pigtail Kit Part Number

WPT-1028



Service Part Number:

9U2Z-14S411-APA

Gauge:

18

Pin material:

Silver

Cavities:

6

Vehicle Uses

Switch - Power Window - LH - Rear

Switch - Power Window - Passenger (Front)

Switch - Power Window - RH - Rear

CONNECTOR VIEWS > CONNECTOR END VIEW C626 - EXTERIOR MIRROR RH

Connector:C626

Description

EXTERIOR MIRROR RH

Color

BK

Harness

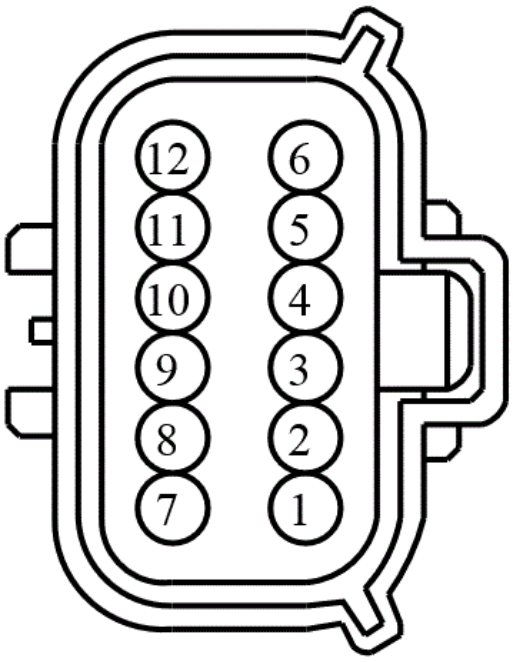
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Base Part #

part# N/A

Service Pigtail

See Below

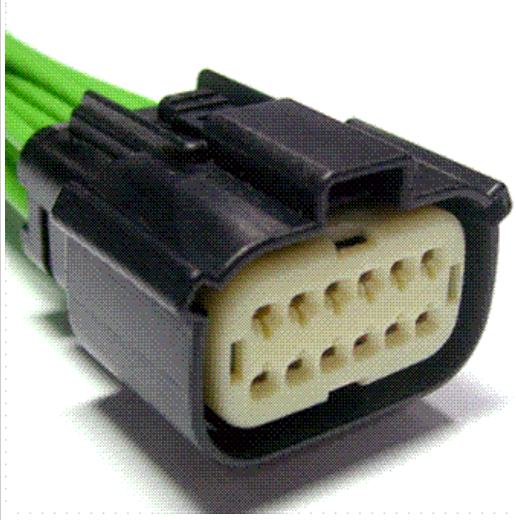


Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CPM34 (WH-BN)	22	CTRL MOD. - RIGHT MIRROR UP	
1	CPM21 (YE-VT)	22	SWITCH - POWER MIRROR # RIGHT MIRROR UPWARD (IF PLUS)	

2	CPM23 (GY)	22	SWITCH - POWER MIRROR # COMMON ALL MOTORS (LEFT AND RIGHT)
2	RPM08 (GN-BU)	22	CTRL MOD. - RIGHT MIRROR RETURN
3	CLS26 (BU)	22	CTRL MOD. - TURN LAMP RIGHT MIRROR +
3	CLS26 (BU-GN)	22	CTRL MOD. - TURN LAMP RIGHT MIRROR +
4	CPM33 (WH-VT)	22	CTRL MOD. - RIGHT MIRROR RIGHT
4	CPM20 (BN-WH)	22	SWITCH - POWER MIRROR # RIGHT MIRROR RIGHTWARD (IF PLUS)
5	CLN31 (VT-GN)	22	CTRL MOD. - PUDDLE LAMP LEFT
6	CRD14 (WH-OG)	22	CTRL MOD. - HEATER MIRROR RIGHT
6	CBB70 (YE-BU)	22	FUSE - 70 OR CIRCUIT BREAKER
7	GD238 (BK-WH)	20	GROUND - COWL SIDE/PILLAR A RIGHT
8	VPM38 (BN-GN)	22	SENSOR - RIGHT MIRROR POSITION # VERTICAL
9	LPM12 (BU-GY)	22	CTRL MOD. - SENSORS MIRROR POSITION (RIGHT) +
10	CPM02 (BU)	22	CTRL MOD. - FOLD MIRRORS FOLD POSITION

10	VPM37 (BU-OG)	22	SENSOR - RIGHT MIRROR POSITION # HORIZONTAL
11	CRB07 (BN)	22	CTRL MOD. - BLINDSPOT WARNING # LED MIRROR RIGHT OR PASSENGER +
12	CPM01 (YE-GN)	22	CTRL MOD. - FOLD MIRRORS DRIVE POSITION
12	RPM12 (VT-WH)	22	CTRL MOD. - SENSORS MIRROR POSITION (RIGHT) -

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1125** 	Service Part Number: **AU2Z-14S411-AMA** Gauge: **16** Pin material: **Silver** Cavities: **12** Vehicle Uses Connector - Inline Mirror - Sideview

CONNECTOR VIEWS > CONNECTOR END VIEW C634 - EXTERIOR FRONT DOOR HANDLE RH

Connector:C634

Description

EXTERIOR FRONT DOOR HANDLE RH

Color

Harness

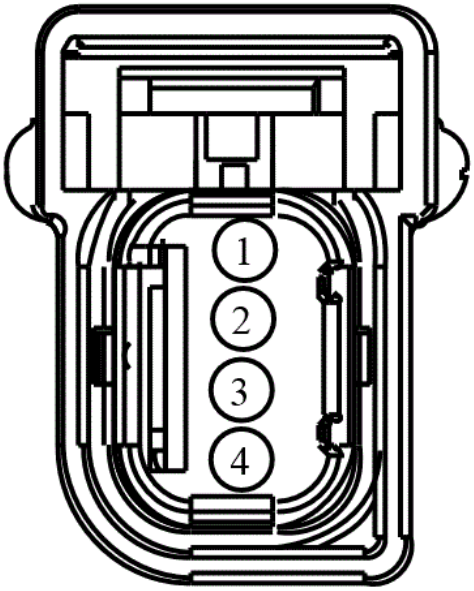
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Base Part #

part# N/A

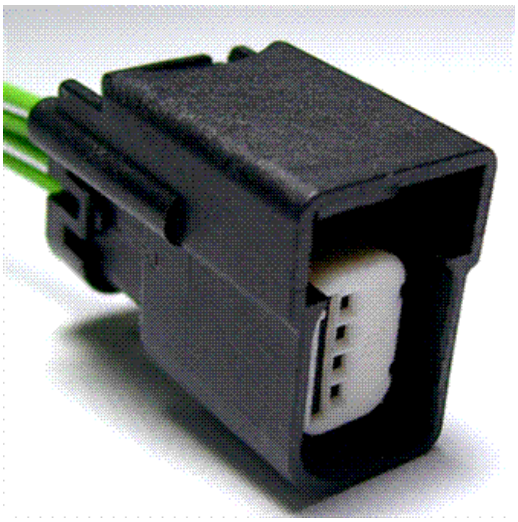
Service Pigtail

See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	VPK40 (WH-OG)	22	SENSOR - KEYLESS VEHICLE HANDLE PASSENGER POWER/DATA	
2	VPK02 (VT-WH)	22	CTRL MOD. - KEYLESS VEHICLE # ANTENNA HANDLE PASSENGER +	
3	RPK02 (GY-YE)	22	CTRL MOD. - KEYLESS VEHICLE # ANTENNA HANDLE PASSENGER -	
4	RPK39 (VT-OG)	22	SENSOR - KEYLESS VEHICLE HANDLE	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1443** 	Service Part Number: **FU2Z-14S411-ANA** Gauge: **20** Pin material: **Silver** Cavities: **4** Vehicle Uses Antenna - Keyless Entry Lamp - Front Turn Lamp - Side Marker (Rear Fender) Switch - Keyless Door Handle

CONNECTOR VIEWS > CONNECTOR END VIEW C644 - PASSENGER DOOR SIDE IMPACT SENSOR

Connector:C644

Description

PASSENGER DOOR SIDE IMPACT SENSOR

Color

BK

Harness

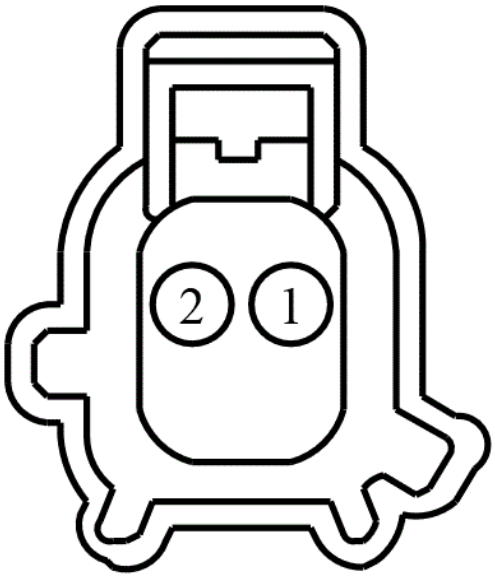
14630

Base Part #

part# N/A

Service Pigtail

See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	VR218 (YE-OG)	22	SENSOR - SIDE IMPACT FRONT PASSENGER SIDE	
2	RR132 (BU-WH)	22	CTRL MOD. - SENSOR SIDE IMPACT FRONT PASSENGER SIDE -	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-948**	Service Part Number: **3U2Z-14S411-EKB** Gauge: **14** Pin material: **Tin (greased)** Cavities: **2** Vehicle Uses



Motor - Windshield Washer Fluid Pump

Sensor - Side Impact

CONNECTOR VIEWS > CONNECTOR END VIEW C649 - INTERIOR FRONT DOOR HANDLE AMBIENT LIGHTING LAMP RH

Connector:C649

Description

INTERIOR FRONT DOOR HANDLE AMBIENT LIGHTING LAMP RH

Color

LT GY

Harness

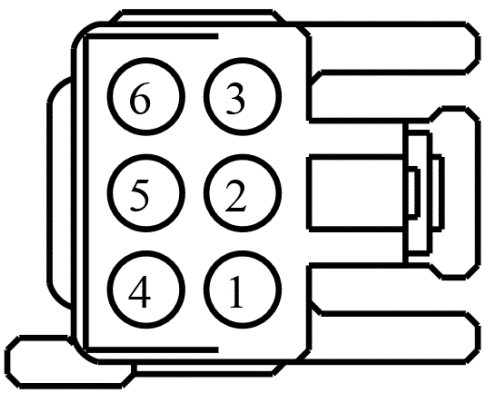
14630

Base Part #

part# N/A

Service Pigtail

See Below



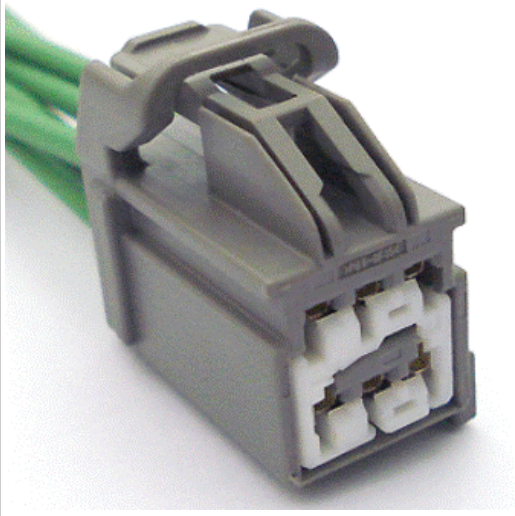
Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CLN44 (OG)	22	CTRL MOD. - AMBIENT LIGHTING ZONE 1 OR NON-ZONE # LED RED +	
2	CPL35 (BU)	22	SWITCH - LATCH PASSENGER # UNLOCK	
3	CLN45 (GN)	22	CTRL MOD. - AMBIENT LIGHTING ZONE 1 OR NON-ZONE # LED GREEN +	
4	RLN44 (BU-BN)	22	CTRL MOD. - AMBIENT LIGHTING ZONE 1 OR NON-ZONE # LED -	
5	CLN46 (BU)	22	CTRL MOD. - AMBIENT LIGHTING ZONE 1 OR NON-ZONE # LED BLUE +	
6	CPL87 (BN)	22	CTRL MOD. - DOOR LOCK # LOCK STATUS INDICATOR DRIVER	

Available Pigtail Kits

Pigtail Kit Part Number

WPT-962



Service Part Number:

3U2Z- 14S411-JBB

Gauge:

14

Pin material:

Silver

Cavities:

6

Vehicle Uses

Mating Connector WPT-1299

Switch - Gear Shift Select/Neutral Safety

	Switch - Overdrive Cancel Switch - Power Sliding Door

CONNECTOR VIEWS > CONNECTOR END VIEW C652A - PASSENGER DOOR MODULE (PDM)

Connector:C652A

Description

PASSENGER DOOR MODULE (PDM)

Color

Harness

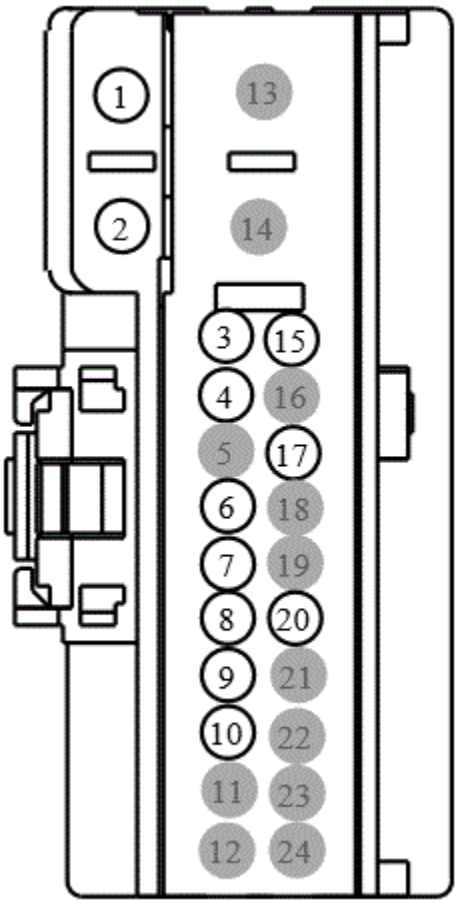
14630

Base Part #

part# N/A

Service Pigtail

Not Available



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	SBP26 (YE-RD)	14	FUSE - 26 OR CIRCUIT BREAKER	
2	GD238 (BK-WH)	14	GROUND - COWL SIDE/PILLAR A RIGHT	
3	CPL87 (BN)	22	CTRL MOD. - DOOR LOCK # LOCK STATUS INDICATOR DRIVER	
4	CLS26 (BU)	22	CTRL MOD. - TURN LAMP RIGHT MIRROR +	
5	*	*	Not Used	

6	VDB07 (VT-OG)	22	CONNECTOR - DIAGNOSTIC # CAN BUS MEDIUM SPEED LOW
7	VDB06 (GY-OG)	22	CONNECTOR - DIAGNOSTIC # CAN BUS MEDIUM SPEED HIGH
8	CPW20 (WH)	26	SWITCH - POWER WINDOW FRONT PASSENGER # UP
9	CPW19 (GN)	26	SWITCH - POWER WINDOW FRONT PASSENGER # DOWN
10	CPL16 (YE)	26	SWITCH - TRIM DOOR LOCK PASSENGER # UNLOCK
11	*	*	Not Used
12	*	*	Not Used
13	*	*	Not Used
14	*	*	Not Used
15	CPL78 (VT)	26	CTRL MOD. - DOOR LOCK # SWITCH TRIM DOOR LOCK PASSENGER ILLUMINATION
16	*	*	Not Used
17	RPW05 (GN-BN)	22	CTRL MOD. - POWER WINDOW SWITCH FRONT PASSENGER RETURN
18	*	*	Not Used
19	*	*	Not Used
20	CPL15 (BU)	26	SWITCH - TRIM DOOR LOCK PASSENGER # LOCK

21	*	*	Not Used	
22	*	*	Not Used	
23	*	*	Not Used	
24	*	*	Not Used	

CONNECTOR VIEWS > CONNECTOR END VIEW C652B - PASSENGER DOOR MODULE (PDM)

Connector:C652B

Description

PASSENGER DOOR MODULE (PDM)

Color

BK

Harness

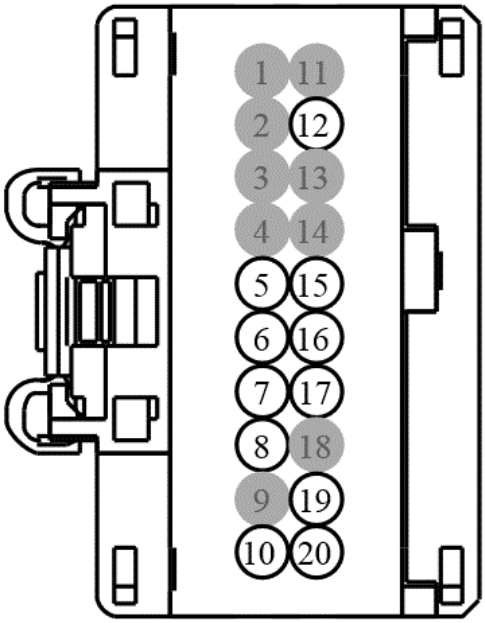
14630

Base Part #

part# N/A

Service Pigtail

Not Available



Pin	Circuit	Gauge	Circuit Function	Qualifier
1	*	*	Not Used	
2	*	*	Not Used	
3	*	*	Not Used	
4	*	*	Not Used	
5	LPM12 (BU-GY)	22	CTRL MOD. - SENSORS MIRROR POSITION (RIGHT) +	
6	VPM37 (BU-OG)	22	SENSOR - RIGHT MIRROR POSITION # HORIZONTAL	
7	CPM34 (WH-BN)	22	CTRL MOD. - RIGHT MIRROR UP	
8	CPM33 (WH-VT)	22	CTRL MOD. - RIGHT MIRROR RIGHT	

9	*	*	Not Used
10	CPW41 (GY-YE)	22	CTRL MOD. - WINDOW MOTOR FRONT PASSENGER # DOWN
11	*	*	Not Used
12	RPL62 (GY)	22	CTRL MOD. - DOOR LOCK # SWITCH TRIM DOOR LOCK PASSENGER
13	*	*	Not Used
14	*	*	Not Used
15	RPM12 (VT-WH)	22	CTRL MOD. - SENSORS MIRROR POSITION (RIGHT) -
16	VPM38 (BN-GN)	22	SENSOR - RIGHT MIRROR POSITION # VERTICAL
17	RPM08 (GN-BU)	22	CTRL MOD. - RIGHT MIRROR RETURN
18	*	*	Not Used
19	CPW40 (WH)	22	CTRL MOD. - WINDOW MOTOR FRONT PASSENGER # UP
20	CRD14 (WH-OG)	22	CTRL MOD. - HEATER MIRROR RIGHT

CONNECTOR VIEWS > CONNECTOR END VIEW C676 - EXTERIOR MIRROR BLIND SPOT (BLIS) / CROSS TRAFFIC ALERT (CTA) LED RH

Connector:C676

Description

EXTERIOR MIRROR BLIND SPOT (BLIS) / CROSS TRAFFIC ALERT (CTA) LED RH

Color

WH

Harness

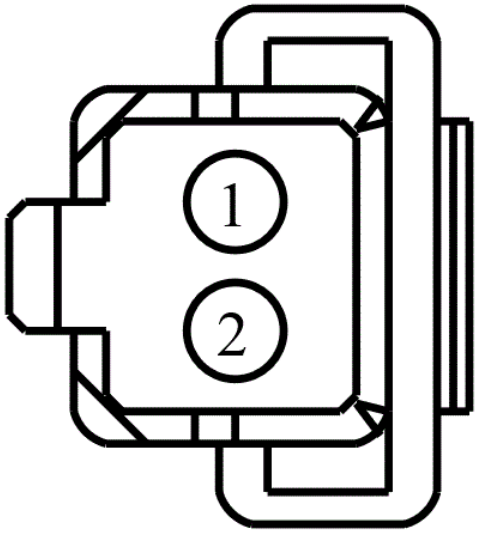
PIA

Base Part #

part# N/A

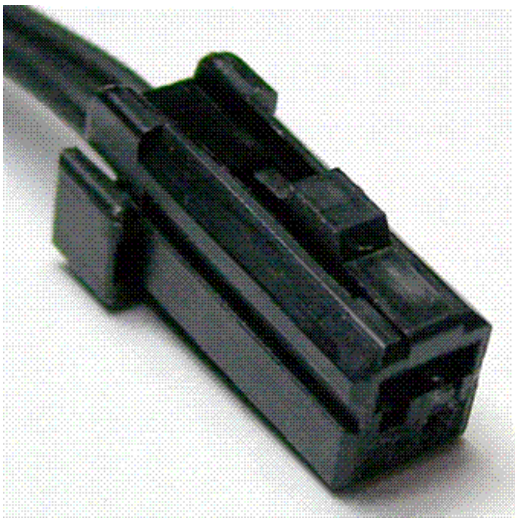
Service Pigtail

See Below



Pin	Circuit	Gauge	Circuit Function	Qualifier
1	* (*)	*	SENSOR - ALERT	
2	* (*)	*	GROUND - COWL SIDE/PILLAR A LEFT	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1197**	Service Part Number: **3U2Z-14S411-PFB** Gauge:



20

Pin material:

Tin (greased)

Cavities:

2

Vehicle Uses

Mirror - Vanity

Sensor - Speed

Switch - Brake Deactivation

Switch - Brake Pedal Position

Switch - Brake Pressure

Switch - Park Brake

Switch - Speed Control

Switch - Speed Control Deactivation

Switch - Stop Lamp

Switch - Visor

CONNECTOR VIEWS > CONNECTOR END VIEW C906 - VANITY MIRROR LAMP RH

Connector:C906

Description

VANITY MIRROR LAMP RH

Color

Harness

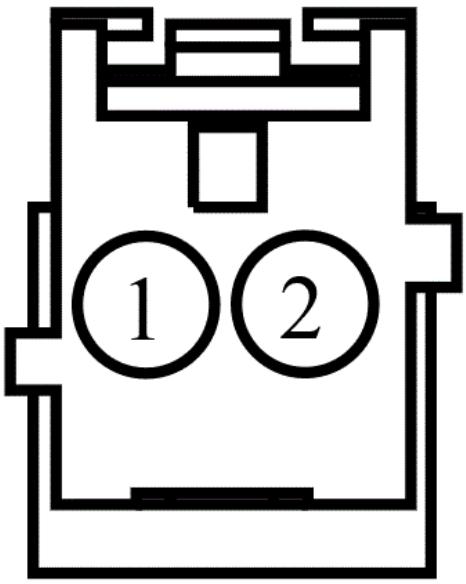
14334/14335

Base Part #

part# N/A

Service Pigtail

See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CLN09 (YE-GN)	22	RELAY - BATTERY SAVER (E.G. SWITCH OFF INTERIOR LIGHTING)	
2	GD216 (BK-VT)	22	GROUND - INSTRUMENT PANEL STRUCTURE # 3RD POINT	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1412** Ford Catalog Advantage VIEW	Service Part Number: **EU2Z-14S411-TA** Gauge: **20** Pin material: **Tin** Cavities: **2** Vehicle Uses

	Mirror - Vanity Sensor - A/C Evaporator Temperature

CONNECTOR VIEWS > CONNECTOR END VIEW C907 - VANITY MIRROR LAMP LH

Connector:C907

Description

VANITY MIRROR LAMP LH

Color

Harness

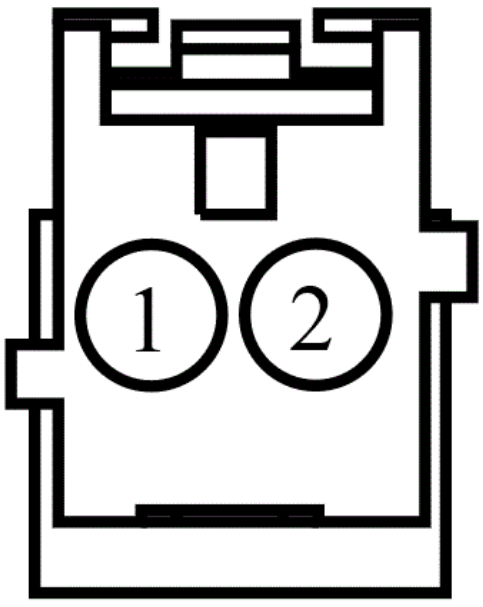
14334/14335

Base Part #

part# N/A

Service Pigtail

See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier

1	CLN09 (YE-GN)	22	RELAY - BATTERY SAVER (E.G. SWITCH OFF INTERIOR LIGHTING)	
2	GD216 (BK-VT)	22	GROUND - INSTRUMENT PANEL STRUCTURE # 3RD POINT	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1412** 	Service Part Number: **EU2Z-14S411-TA** Gauge: **20** Pin material: **Tin** Cavities: **2** Vehicle Uses Mirror - Vanity Sensor - A/C Evaporator Temperature

CONNECTOR VIEWS > CONNECTOR END VIEW C911 - AUTO-DIMMING INTERIOR MIRROR

Connector:C911

Description

AUTO-DIMMING INTERIOR MIRROR

Color

BK

Harness

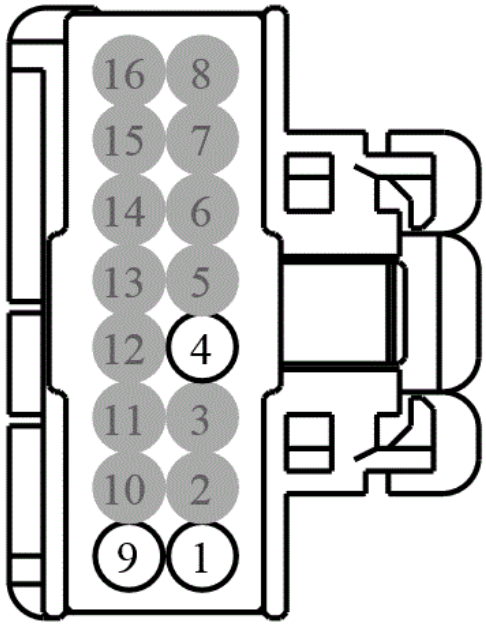
14B242

Base Part #

part# N/A

Service Pigtail

See Below



Check for Terminal Part Numbers

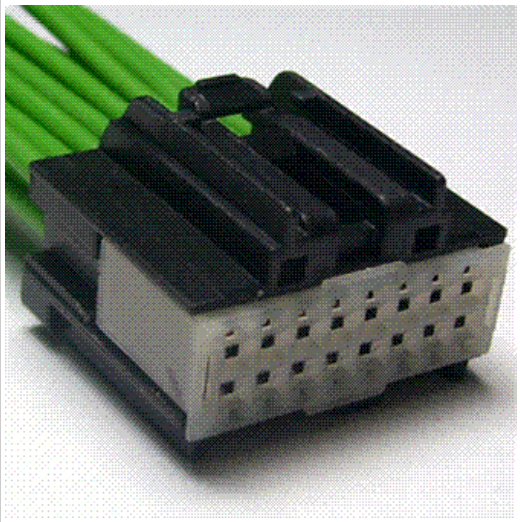
Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CBP23 (BN-YE)	22	FUSE - 23 OR CIRCUIT BREAKER	
2	*	*	Not Used	
3	*	*	Not Used	
4	GD214 (BK-BU)	22	GROUND - INSTRUMENT PANEL STRUCTURE	
5	*	*	Not Used	
6	*	*	Not Used	
7	*	*	Not Used	

8	*	*	Not Used
9	CLS10 (GN-BN)	20	CTRL MOD. - REVERSE LEFT OR COMMON
10	*	*	Not Used
11	*	*	Not Used
12	*	*	Not Used
13	*	*	Not Used
14	*	*	Not Used
15	*	*	Not Used
16	*	*	Not Used

Available Pigtail Kits

Pigtail Kit Part Number

WPT-1294



Service Part Number:

CU2Z-14S411-AJA

Gauge:

18

Pin material:

Silver

Cavities:

16

Vehicle Uses

Mirror - Rearview

Mirror - Rearview (electrochromatic)

CONNECTOR VIEWS > CONNECTOR END VIEW C914 - RAIN SENSOR

Connector:C914

Description

RAIN SENSOR

Color

BK

Harness

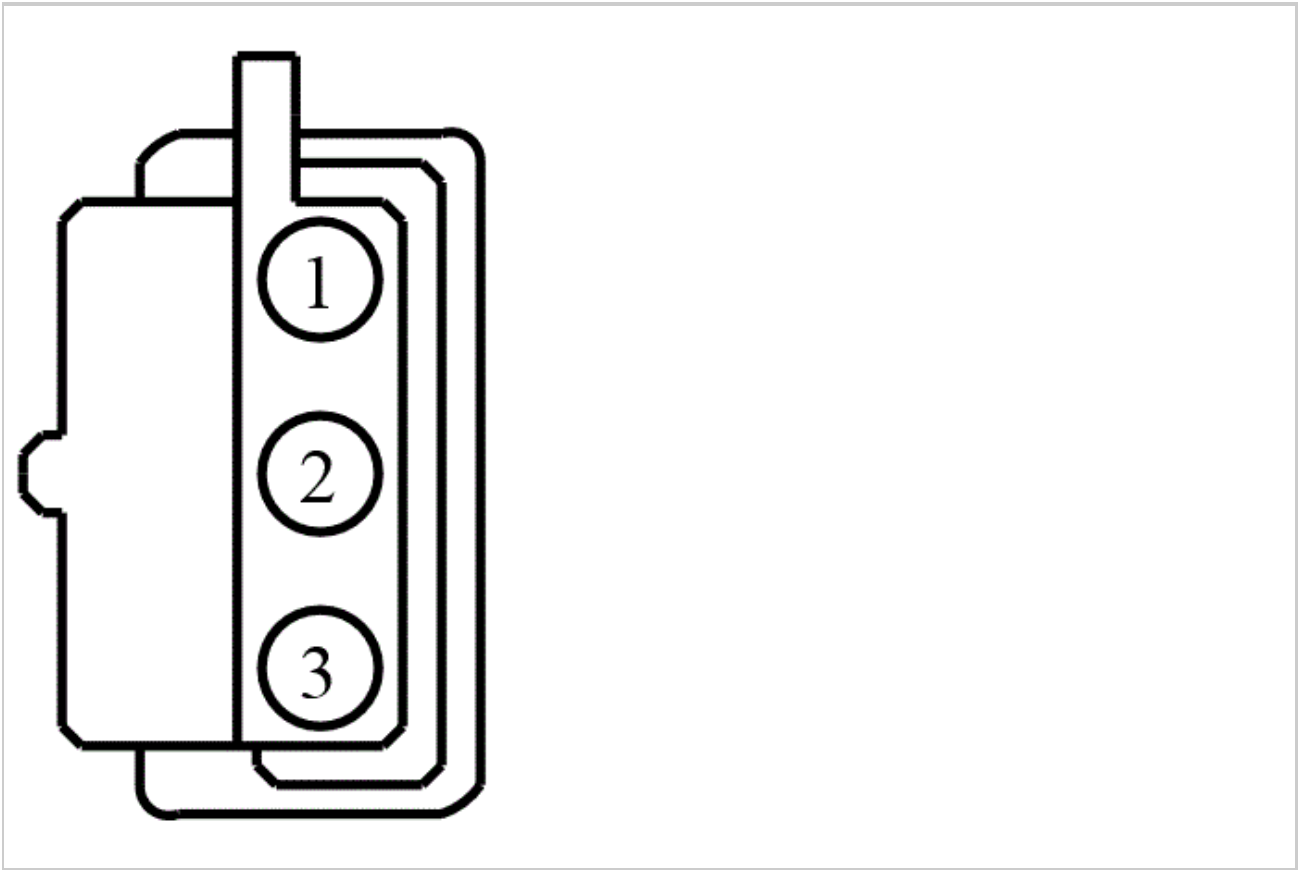
14B242

Base Part #

part# N/A

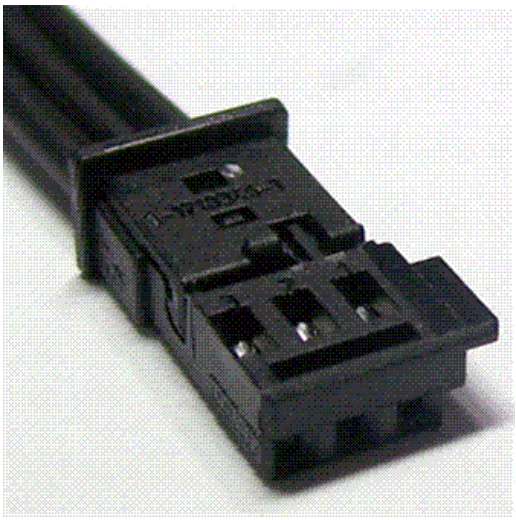
Service Pigtail

See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1096** 	Service Part Number: **AU2Z-14S411-ZA** Gauge: **18** Pin material: **Tin (greased)** Cavities: **3** Vehicle Uses Sensor - Rain

CONNECTOR VIEWS > CONNECTOR END VIEW C918 - INLINE

InlineC918

Description

INLINE

Color

BK

Base Part #

Service Pigtail

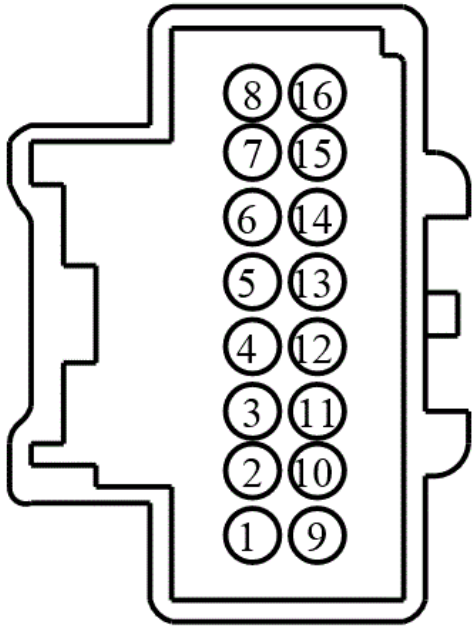
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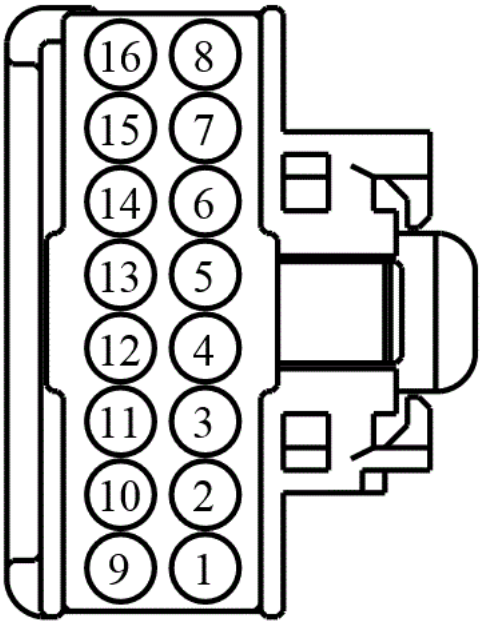
MALE

Harness 14401

FEMALE

Harness 14334/14335



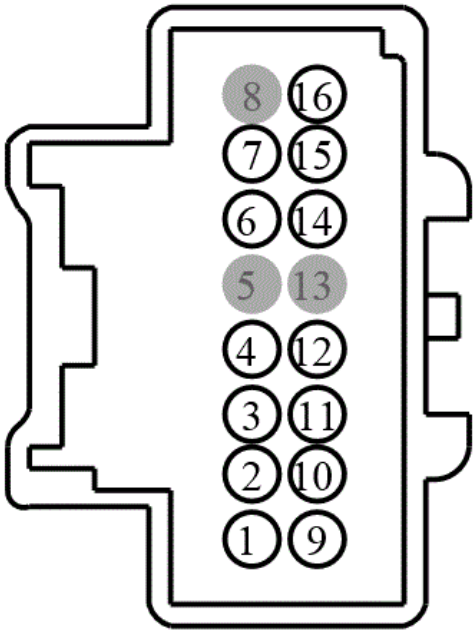


Pin	Circuit	Gauge	Qualifier
1	SBP18 (YE-RD)	22	
2	VLN33 (GY)	22	14334/14335
2	VLN33 (GY-VT)	22	14401

3	VLN04 (VT)	26	14401
3	VLN04 (VT-GY)	22	14334/14335
4	CPR24 (GN-VT)	22	14334/14335
4	VMEA0 (BU-GN)	22	14334/14335
4	VMEA0 (BU-WH)	26	14401
5	CPR23 (BU-OG)	22	14334/14335
5	RMEA0 (WH-OG)	22	14334/14335
5	RMEA0 (WH-RD)	26	14401
6	VMM23 (BN)	26	14401
6	VMM23 (BN-VT)	22	14334/14335
7	RMM23 (GN-WH)	26	14401
7	RMM23 (WH)	26	14401
7	RMM23 (WH-GN)	22	14334/14335
8	DMM23 (*)	4	
9	CBP19 (BN-WH)	22	
10	CR116 (BN-GN)	22	14334/14335

10	CR116 (GN-WH)	22	14401
11	CLN09 (YE-GN)	22	
12	VDN03 (GY-VT)	22	
13	VME57 (YE-BU)	26	14401
13	VME57 (YE-VT)	22	14334/14335
14	RME57 (BU)	26	14401
14	RME57 (BU-BN)	22	14334/14335
15	RR116 (GN-WH)	22	
16	GD216 (BK-VT)	18	14401
16	GD216 (BK-VT)	20	14334/14335

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-997**	Service Part Number: **3U2Z-14S411-DHAB** Gauge: **18** Pin material: **Tin (greased)** Cavities: **16** Vehicle Uses:

	Mirror - Rearview Mirror - Sideview

CONNECTOR VIEWS > CONNECTOR END VIEW C919 - INLINE

InlineC919

Description

INLINE

Color

BK

Base Part #

Service Pigtail

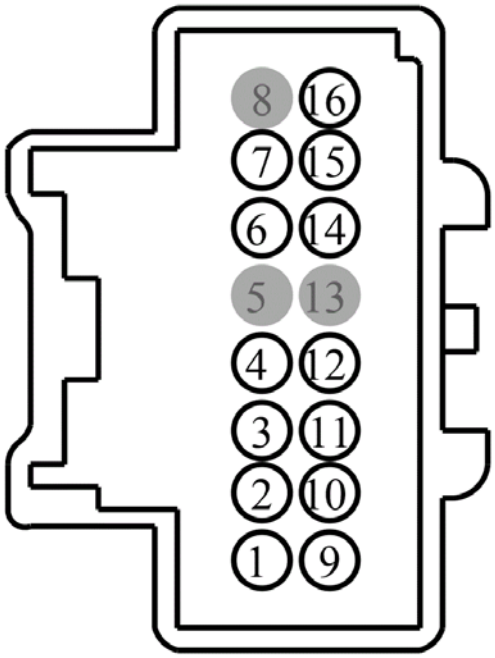
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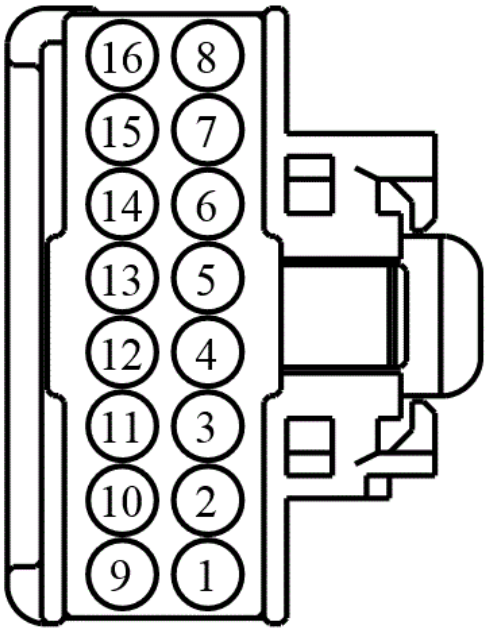
MALE

Harness 14401

FEMALE

Harness 14B242



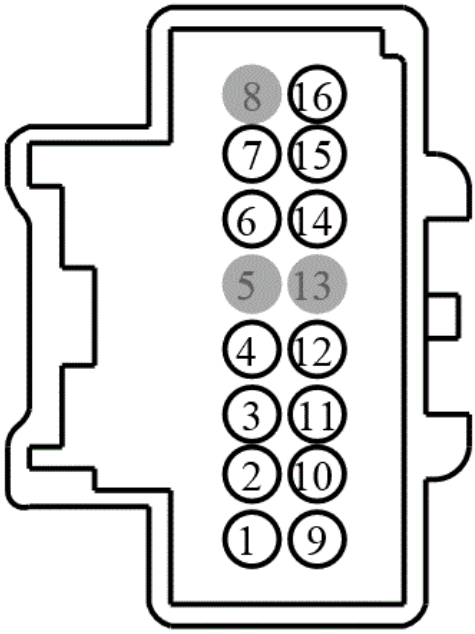


Pin	Circuit	Gauge	Qualifier
1	CBP23 (BN-YE)	22	
2	CLS10 (GN-BN)	20	
3	VDN05 (YE)	26	14B242

3	VDN05 (YE-GY)	22	14401
4	VPRC1 (BU)	26	14401
4	VPRC1 (BU-GN)	22	14B242
5	*	*	14401
5	VMEA0 (BU-GN)	22	14B242
6	VMEA0 (BU)	26	14401
6	VMEA0 (BU-GN)	22	14B242
7	RMEA0 (WH)	26	14401
7	RMEA0 (WH-OG)	22	14B242
8	*	*	
9	CBB72 (GN)	22	14B242
9	CBB72 (GN-VT)	22	14401
10	CPR23 (BU-OG)	22	14B242
10	CPR23 (BU-OG)	26	14401
11	CPR24 (GN)	26	14401
11	CPR24 (GN-VT)	22	14B242

12	LPRC1 (YE)	26	14401
12	LPRC1 (YE-OG)	22	14B242
13	*	*	14401
13	RMEA0 (WH-OG)	22	14B242
14	CPR24 (GN-VT)	22	14B242
14	VMEA0 (BU-GN)	22	14B242
14	VMEA0 (BU-WH)	26	14401
15	CPR23 (BU-OG)	22	14B242
15	RMEA0 (WH-OG)	22	14B242
15	RMEA0 (WH-RD)	26	14401
16	GD214 (BK-BU)	20	14401
16	GD214 (BK-BU)	22	14B242

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-997**	Service Part Number: **3U2Z-14S411-DHAB** Gauge: **18** Pin material: **Tin (greased)**



Cavities:

16

Vehicle Uses:

Mirror - Rearview

Mirror - Sideview

CONNECTOR VIEWS > CONNECTOR END VIEW C930 - OVERHEAD CONSOLE

Connector:C930

Description

OVERHEAD CONSOLE

Color

BK

Harness

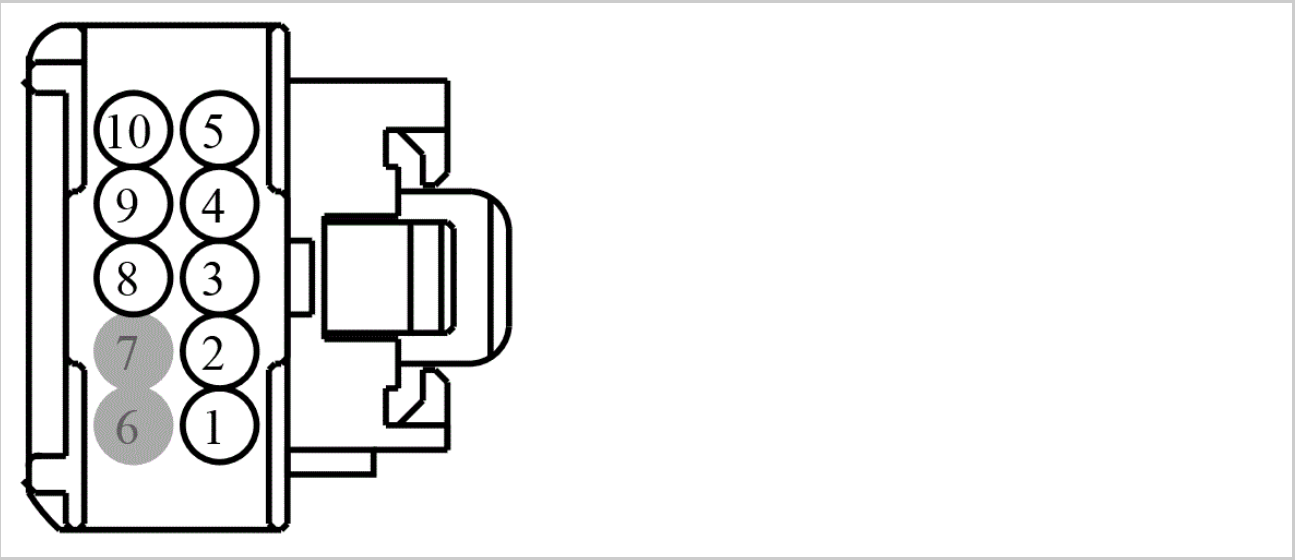
14334/14335

Base Part #

part# N/A

Service Pigtail

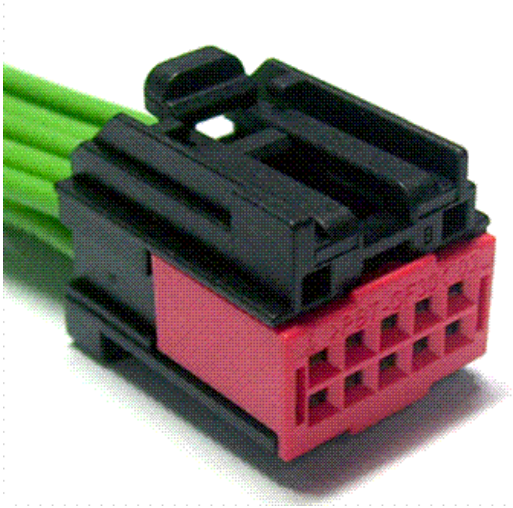
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	SBP18 (YE-RD)	22	FUSE - 18 OR CIRCUIT BREAKER	
2	VDN03 (GY-VT)	22	CTRL MOD. - LIN BUS # SPDJB 3	
3	CLN09 (YE-GN)	22	RELAY - BATTERY SAVER (E.G. SWITCH OFF INTERIOR LIGHTING)	
4	VLN33 (GY)	22	CTRL MOD. - INTERIOR/COURTESY LAMP DIMMING (THEATRE)	
5	GD216 (BK-VT)	22	GROUND - INSTRUMENT PANEL STRUCTURE # 3RD POINT	
6	*	*	Not Used	
7	*	*	Not Used	
8	DMM23 (*)	4	CTRL MOD. - BLUETOOTH/MULTIMEDIA GATEWAY MODULE # MICROPHONE PHONE/VOICE CONTROL D	

9	VMM23 (BN-VT)	22	CTRL MOD. - BLUETOOTH/MULTIMEDIA GATEWAY MODULE # MICROPHONE PHONE/VOICE CONTROL +	
10	RMM23 (WH-GN)	22	CTRL MOD. - BLUETOOTH/MULTIMEDIA GATEWAY MODULE # MICROPHONE PHONE/VOICE CONTROL -	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1083** 	Service Part Number: **AU2Z-14S411-AHA** Gauge: **18** Pin material: **Silver** Cavities: **10** Vehicle Uses Module - Front Interface Switch - Heater A/C Blower (Rear)

CONNECTOR VIEWS > CONNECTOR END VIEW C1019 - INLINE

InlineC1019

Description

INLINE

Color

BK

Base Part #

Service Pigtail

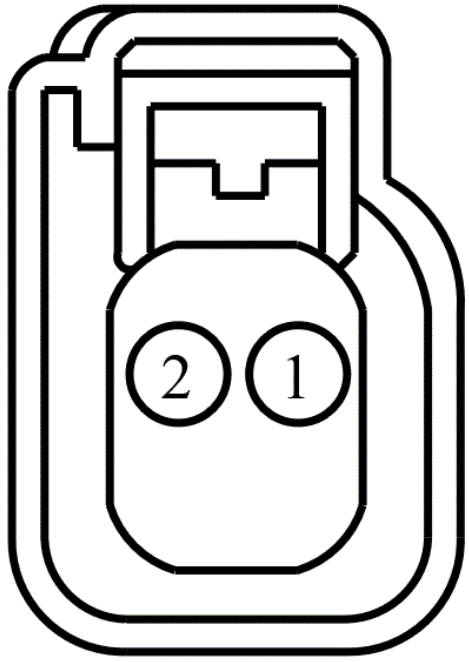
See Below

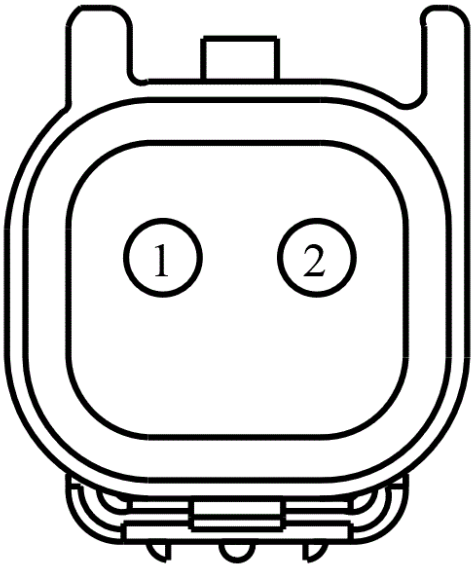
MALE

Harness 12C508

FEMALE

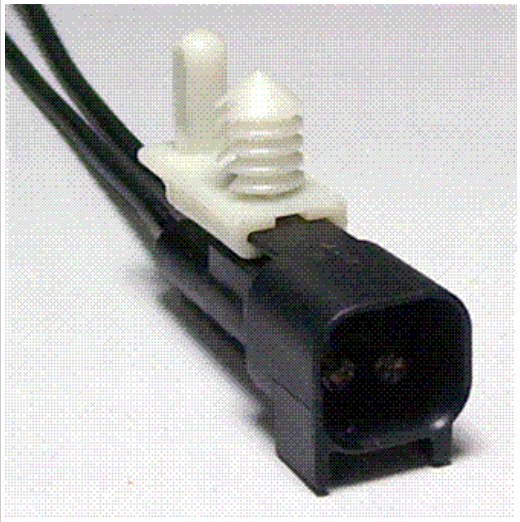
Harness 14B485





Pin	Circuit	Gauge	Qualifier
1	RE454 (YE-GN)	18	12C508
1	VE712 (BU-GY)	18	14B485

1	VE712 (BU-GY)	20	12C508
2	RE405 (GN-WH)	18	14B485
2	RE454 (YE-GN)	20	12C508
2	VE712 (BU-GY)	20	12C508

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1186** 	Service Part Number: **BU2Z-14S411-AKA** Gauge: **16** Pin material: **Tin (greased)** Cavities: **2** Vehicle Uses: Speaker - Tweeter - LH - Front Speaker - Tweeter - LH - Rear Speaker - Tweeter - RH - Front Speaker - Tweeter - RH - Rear Switch - Seatbelt

CONNECTOR VIEWS > CONNECTOR END VIEW C1021 - HEADLAMP ASSEMBLY LH

Connector:C1021

Description

HEADLAMP ASSEMBLY LH

Color

BK

Harness

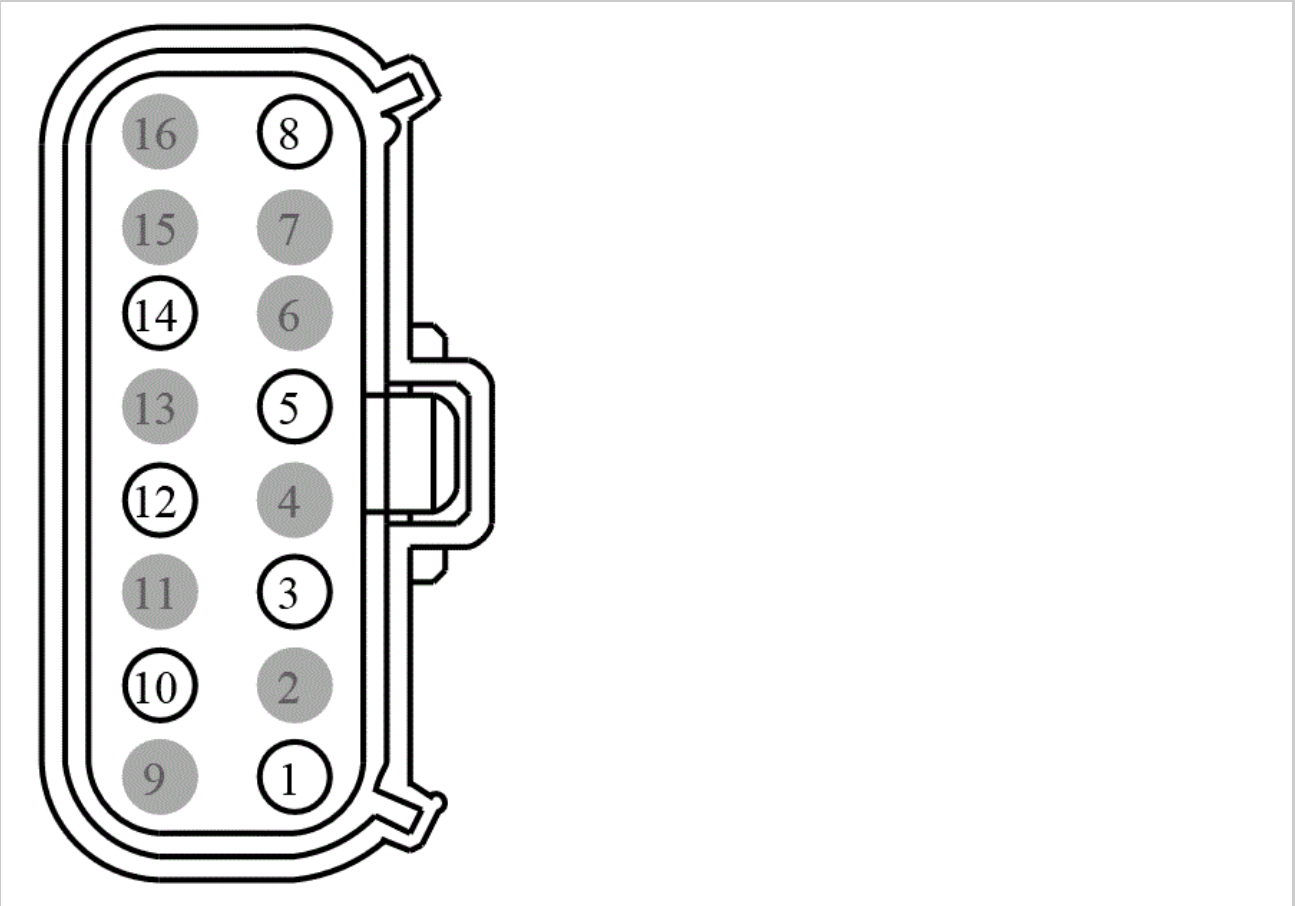
14290

Base Part #

part# N/A

Service Pigtail

See Below



Check for Terminal Part Numbers

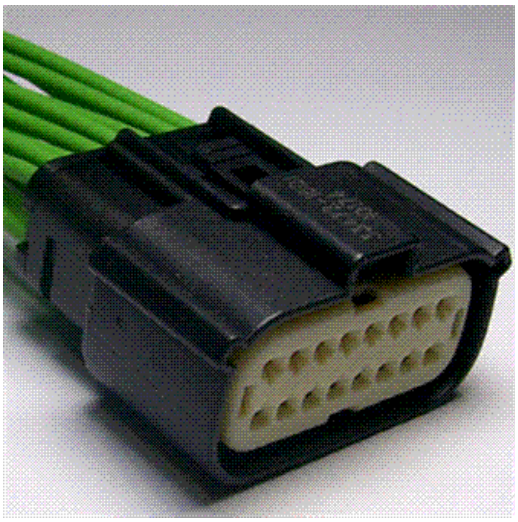
Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CLF04 (BN-BU)	20	CTRL MOD. - BEAM LOW LEFT	
2	*	*	Not Used	

3	CBB68 (GY-VT)	20	FUSE - 68 OR CIRCUIT BREAKER
4	*	*	Not Used
5	CLS30 (VT-WH)	22	RELAY - PARK LAMP
6	*	*	Not Used
7	*	*	Not Used
8	GD120 (BK-GN)	16	GROUND - FENDER FRONT LEFT
9	*	*	Not Used
10	CLF30 (VT-BN)	16	RELAY- BEAM LOW LEFT
10	SBB33 (RD)	16	FUSE - 33 OR CIRCUIT BREAKER
11	*	*	Not Used
12	CLF02 (GY-BN)	20	CTRL MOD. - BEAM HIGH LEFT
13	*	*	Not Used
14	GD120 (BK-GN)	16	GROUND - FENDER FRONT LEFT
15	*	*	Not Used
16	*	*	Not Used

Available Pigtail Kits

Pigtail Kit Part Number

WPT-1279



Service Part Number:

CU2Z-14S411-ADA

Gauge:

16

Pin material:

Silver

Cavities:

16

Vehicle Uses

Lamp - Headlamp - High/Low Beam

Module - Heated Seat (driver)

Module - Transfer Case Shift Control

CONNECTOR VIEWS > CONNECTOR END VIEW C1024 - HEADLAMP CONTROL MODULE LH

Connector:C1024

Description

HEADLAMP CONTROL MODULE LH

Color

BK

Harness

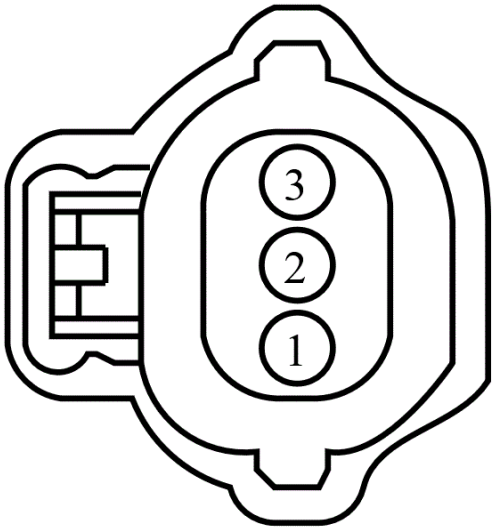
14290

Base Part #

part# N/A

Service Pigtail

See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CBB68 (GY-VT)	20	FUSE - 68 OR CIRCUIT BREAKER	
2	VLF63 (VT)	22	CTRL MOD. - MOTOR HEADLAMP LEVELING SIGNAL	
3	GD120 (BK-GN)	18	GROUND - FENDER FRONT LEFT	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1341**	Service Part Number: **CU2Z-14S411-AXA** Gauge: **20** Pin material: **Tin (greased)** Cavities: **3** Vehicle Uses

	Sensor - Headlamp Leveling

CONNECTOR VIEWS > CONNECTOR END VIEW C1026 - INLINE

InlineC1026

Description

INLINE

Color

BK

Base Part #

Service Pigtail

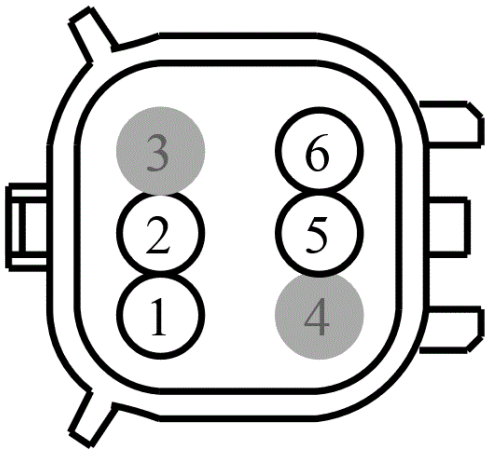
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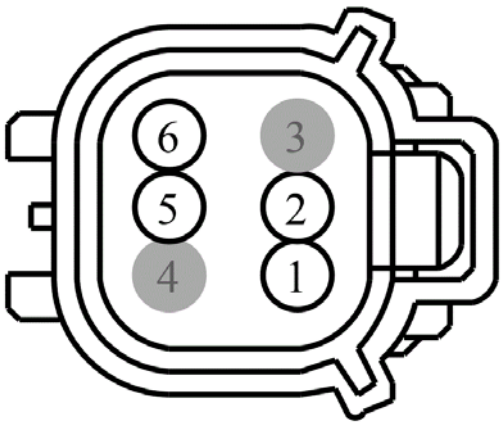
MALE

Harness 12C508

FEMALE

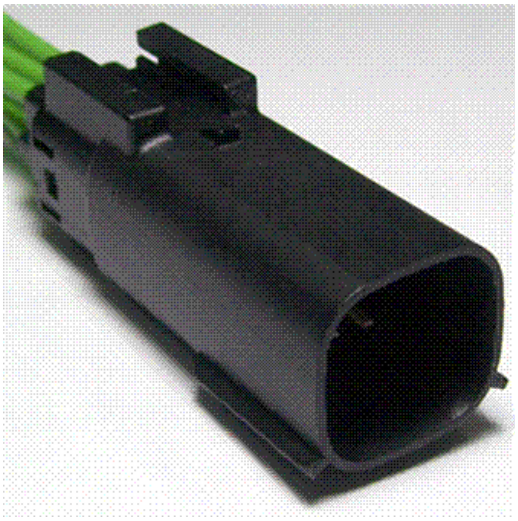
Harness 14B485





Pin	Circuit	Gauge	Qualifier
1	VE802 (BN-BU)	18	14B485
1	VE802 (BN-BU)	20	12C508
2	RE324 (BN-GN)	18	14B485
2	RE324 (BN-GN)	20	12C508
3	*	*	
4	*	*	

5	VE801 (VT-OG)	18	14B485
5	VE801 (VT-OG)	20	12C508
6	RE323 (WH-BN)	18	14B485
6	RE323 (WH-BN)	20	12C508

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1426** 	Service Part Number: **FU2Z-14S411-TA** Gauge: **16** Pin material: **Silver** Cavities: **6** Vehicle Uses: Camera - Reverse Park Aid Lamp - Park/Turn/Stop Sensor - Coolant Temperature Sensor - O2 (HEGO/ EGO)

CONNECTOR VIEWS > CONNECTOR END VIEW C1029 - EVAPORATIVE EMISSION (EVAP) PURGE VALVE

Connector:C1029

Description

EVAPORATIVE EMISSION (EVAP) PURGE VALVE

Color

BK

Harness

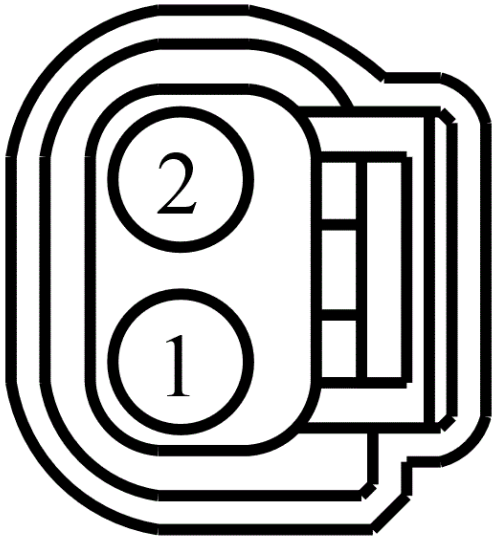
12C508

Base Part #

part# N/A

Service Pigtail

See Below

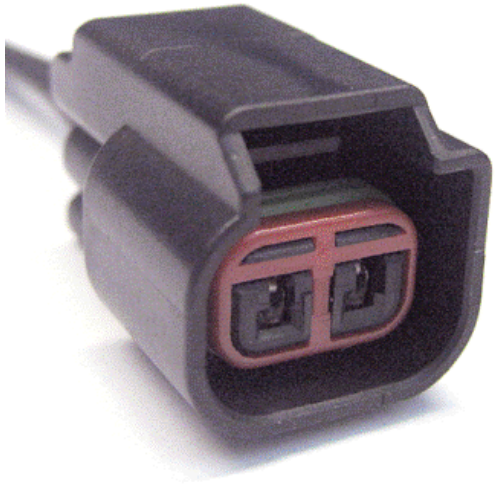


Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CE113 (WH-BN)	20	CTRL MOD. - POWERTRAIN # CANISTER PURGE VALVE (EVAPCP)	
1	CE113 (WH-BN)	18	CTRL MOD. - POWERTRAIN # CANISTER PURGE VALVE (EVAPCP)	
2	CBK02 (GN)	20	FUSE - 40 OR CIRCUIT BREAKER (VPWR 2)	

Available Pigtail Kits	
Pigtail Kit Part Number	Service Part Number:

WPT-905



8U2Z-14S411-EA

Gauge:

16

Pin material:

Tin

Cavities:

2

Vehicle Uses

Relay - Daytime Running Lamp (DRL)

Switch - Heater / A/C Blower (Front)

CONNECTOR VIEWS > CONNECTOR END VIEW C1035A - BATTERY JUNCTION BOX (BJB)

Connector:C1035A

Description

BATTERY JUNCTION BOX (BJB)

Color

Harness

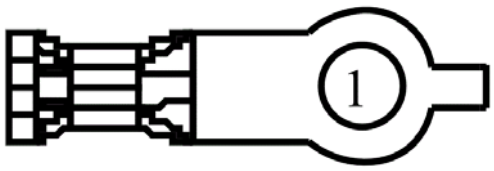
14B060

Base Part #

part# N/A

Service Pigtail

Not Available



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier

CONNECTOR VIEWS > CONNECTOR END VIEW C1035B - BATTERY JUNCTION BOX (BJB)

Connector:C1035B

Description

BATTERY JUNCTION BOX (BJB)

Color

Harness

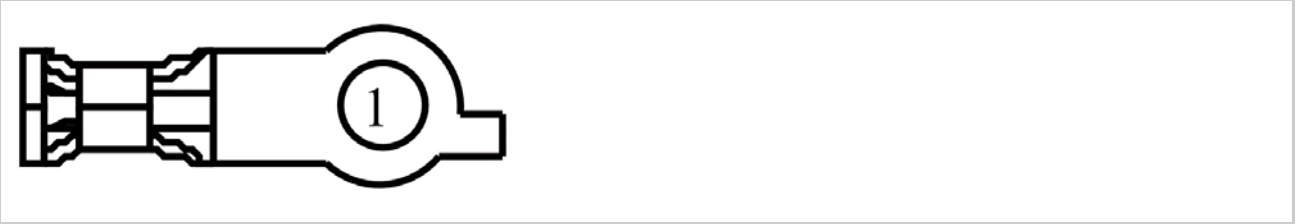
14B060

Base Part #

part# N/A

Service Pigtail

Not Available



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	SBF01 (RD)	4	FUSE - 1 (PREFERRED FOR STARTER)	

CONNECTOR VIEWS > CONNECTOR END VIEW C1035C - BATTERY JUNCTION BOX (BJB)

Connector:C1035C

Description

BATTERY JUNCTION BOX (BJB)

Color

Harness

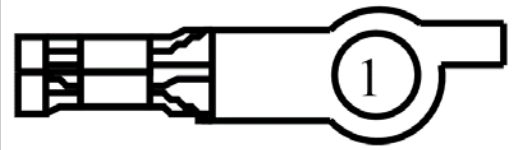
14B060

Base Part #

part# N/A

Service Pigtail

Not Available



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	SBF02 (RD)	4	FUSE - 2	
1	SBF02 (YE-RD)	4	FUSE - 2	

CONNECTOR VIEWS > CONNECTOR END VIEW C1041 - HEADLAMP ASSEMBLY RH

Connector:C1041

Description

HEADLAMP ASSEMBLY RH

Color

BK

Harness

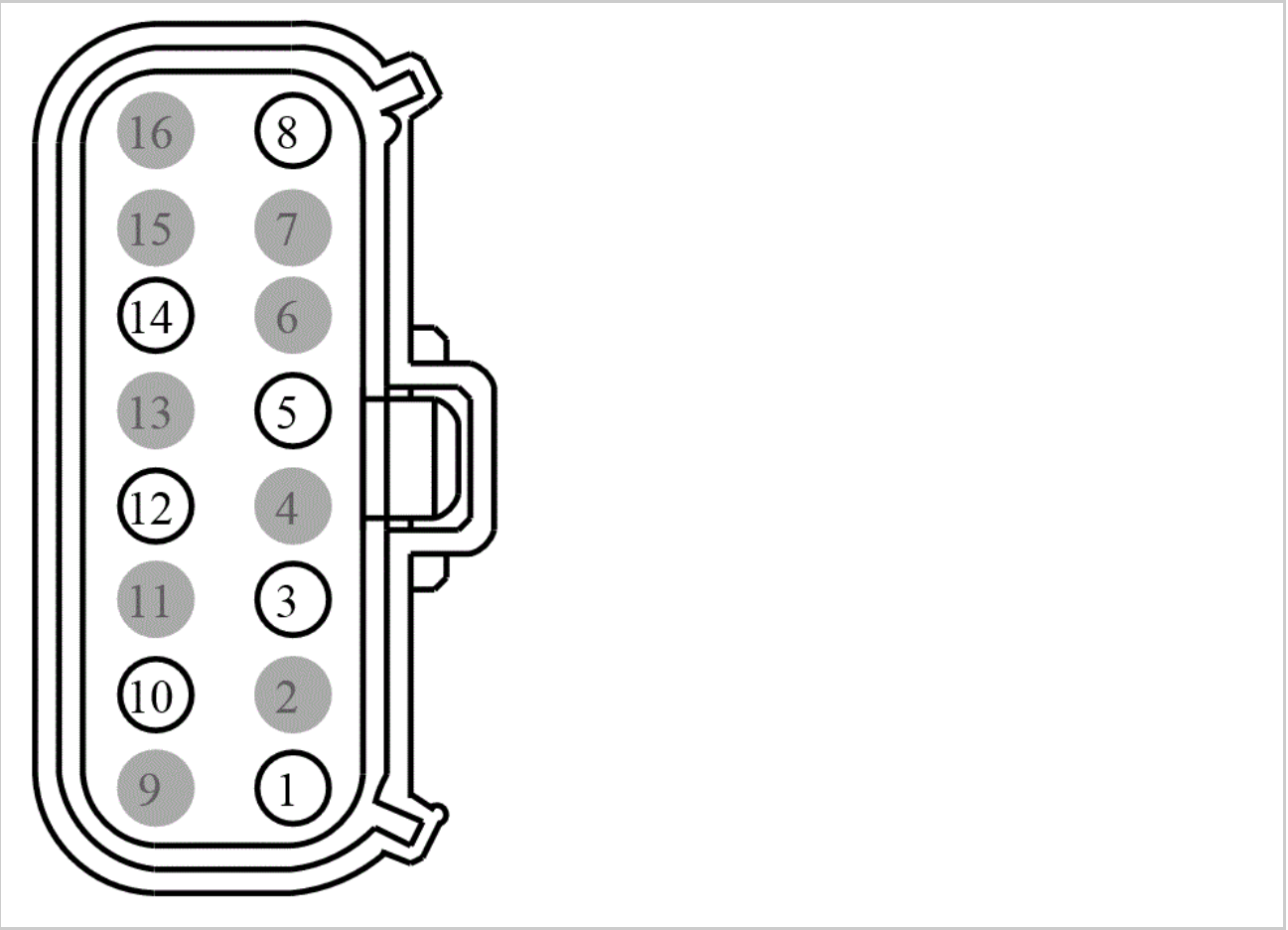
14290

Base Part #

part# N/A

Service Pigtail

See Below

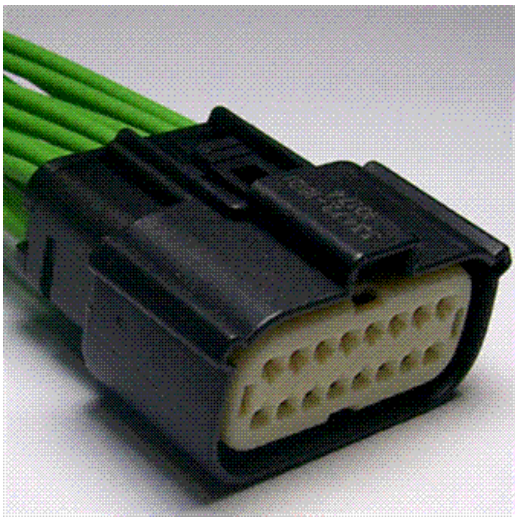


Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CLF05 (BU-GN)	20	CTRL MOD. - BEAM LOW RIGHT	
2	*	*	Not Used	
3	CBB68 (GY-VT)	20	FUSE - 68 OR CIRCUIT BREAKER	
4	*	*	Not Used	
5	CLS30 (VT-WH)	22	RELAY - PARK LAMP	
6	*	*	Not Used	

7	*	*	Not Used
8	GD123 (BK-GY)	16	GROUND - FENDER FRONT RIGHT
9	*	*	Not Used
10	CLF31 (YE-GY)	16	RELAY- BEAM LOW RIGHT
10	SBB35 (BU-RD)	16	FUSE - 35 OR CIRCUIT BREAKER
11	*	*	Not Used
12	CLF03 (VT-RD)	20	CTRL MOD. - BEAM HIGH RIGHT
13	*	*	Not Used
14	GD123 (BK-GY)	16	GROUND - FENDER FRONT RIGHT
15	*	*	Not Used
16	*	*	Not Used

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1279**	Service Part Number: **CU2Z-14S411-ADA** Gauge: **16** Pin material: **Silver** Cavities:

	**16** Vehicle Uses Lamp - Headlamp - High/Low Beam Module - Heated Seat (driver) Module - Transfer Case Shift Control

CONNECTOR VIEWS > CONNECTOR END VIEW C1042 - SIDE TURN SIGNAL LAMP RH

Connector:C1042

Description

SIDE TURN SIGNAL LAMP RH

Color

BN

Harness

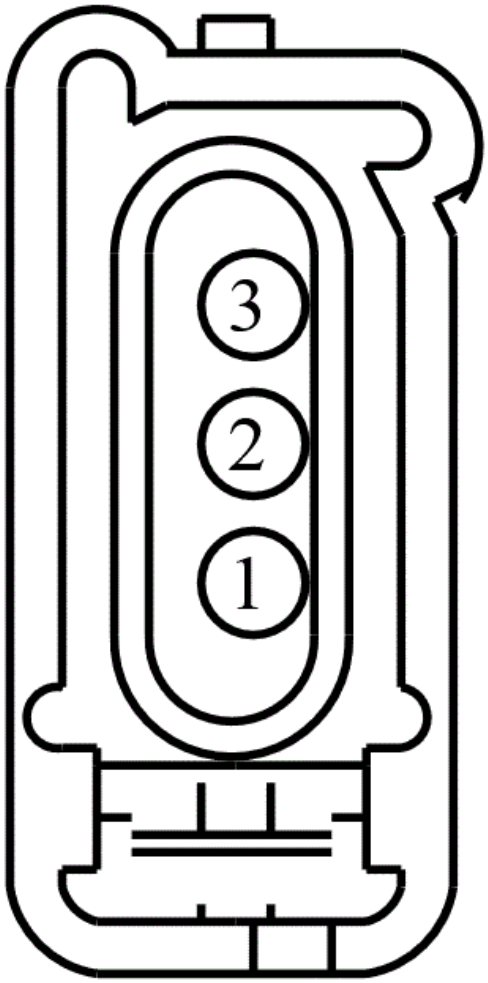
14290

Base Part #

part# N/A

Service Pigtail

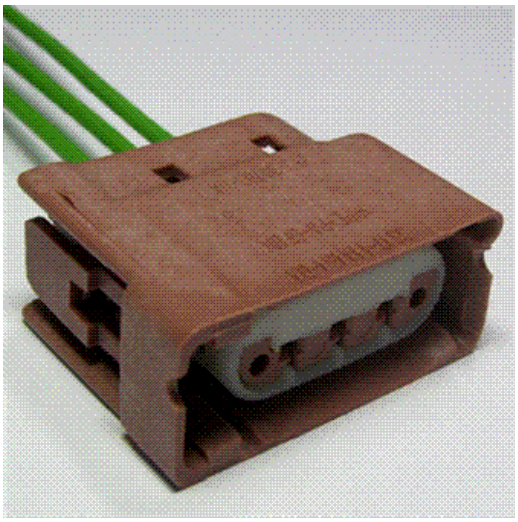
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	GD123 (BK-GY)	20	GROUND - FENDER FRONT RIGHT	
2	CLS07 (BN-YE)	20	CTRL MOD. - PARK FRONT RIGHT OR FRONT/REAR RIGHT	
3	CLS25 (YE-VT)	20	CTRL MOD. - TURN LAMP RIGHT FRONT	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1167**	Service Part Number: **3U2Z-14S411-FHAB**



Gauge:

16

Pin material:

Silver

Cavities:

3

Vehicle Uses

Lamp - Front Cornering/Turn

Lamp - Front Park

Lamp - Front Turn

Lamp - Front Turn/ Marker

Lamp - Headlamp - High/Low Beam

Lamp - Park/Turn

Lamp - Park/Turn/Stop

Lamp - Rear Park

Lamp - Reverse

Lamp - Stop

CONNECTOR VIEWS > CONNECTOR END VIEW C1044 - HEADLAMP CONTROL MODULE RH

Connector:C1044

Description

HEADLAMP CONTROL MODULE RH

Color

BK

Harness

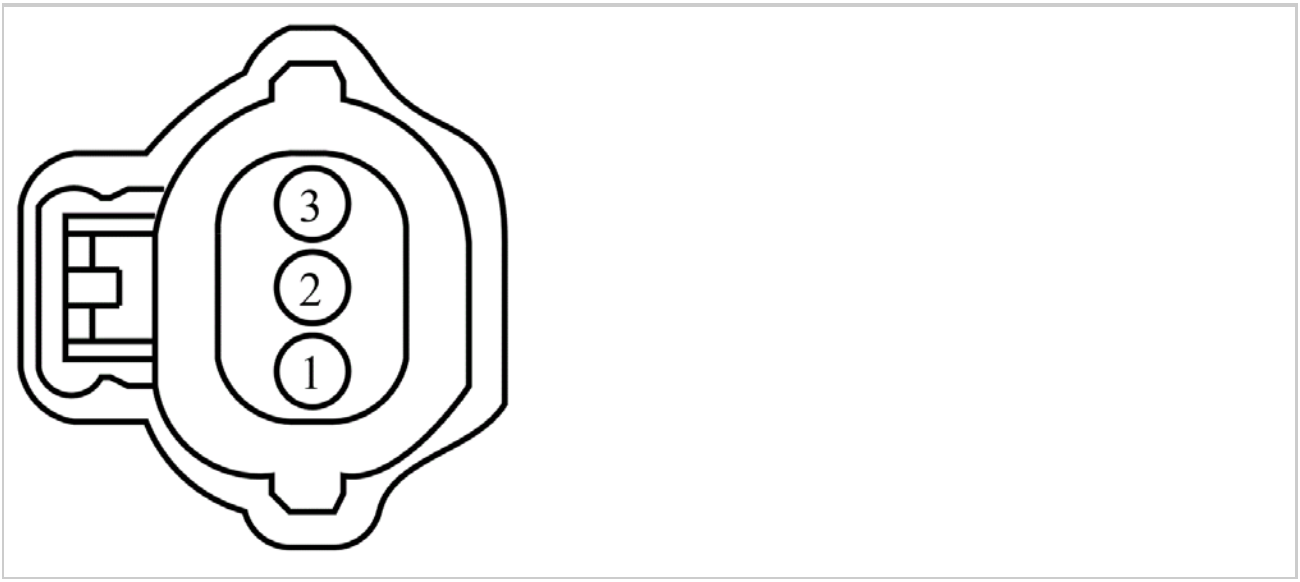
14290

Base Part #

part# N/A

Service Pigtail

See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CBB68 (GY-VT)	20	FUSE - 68 OR CIRCUIT BREAKER	
2	VLF63 (VT)	22	CTRL MOD. - MOTOR HEADLAMP LEVELING SIGNAL	
3	GD123 (BK-GY)	18	GROUND - FENDER FRONT RIGHT	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1341**	Service Part Number: **CU2Z-14S411-AXA** Gauge: **20** Pin material: **Tin (greased)** Cavities:

	**3** Vehicle Uses Sensor - Headlamp Leveling

CONNECTOR VIEWS > CONNECTOR END VIEW C1045 - INLINE

InlineC1045

Description

INLINE

Color

BK

Base Part #

Service Pigtail

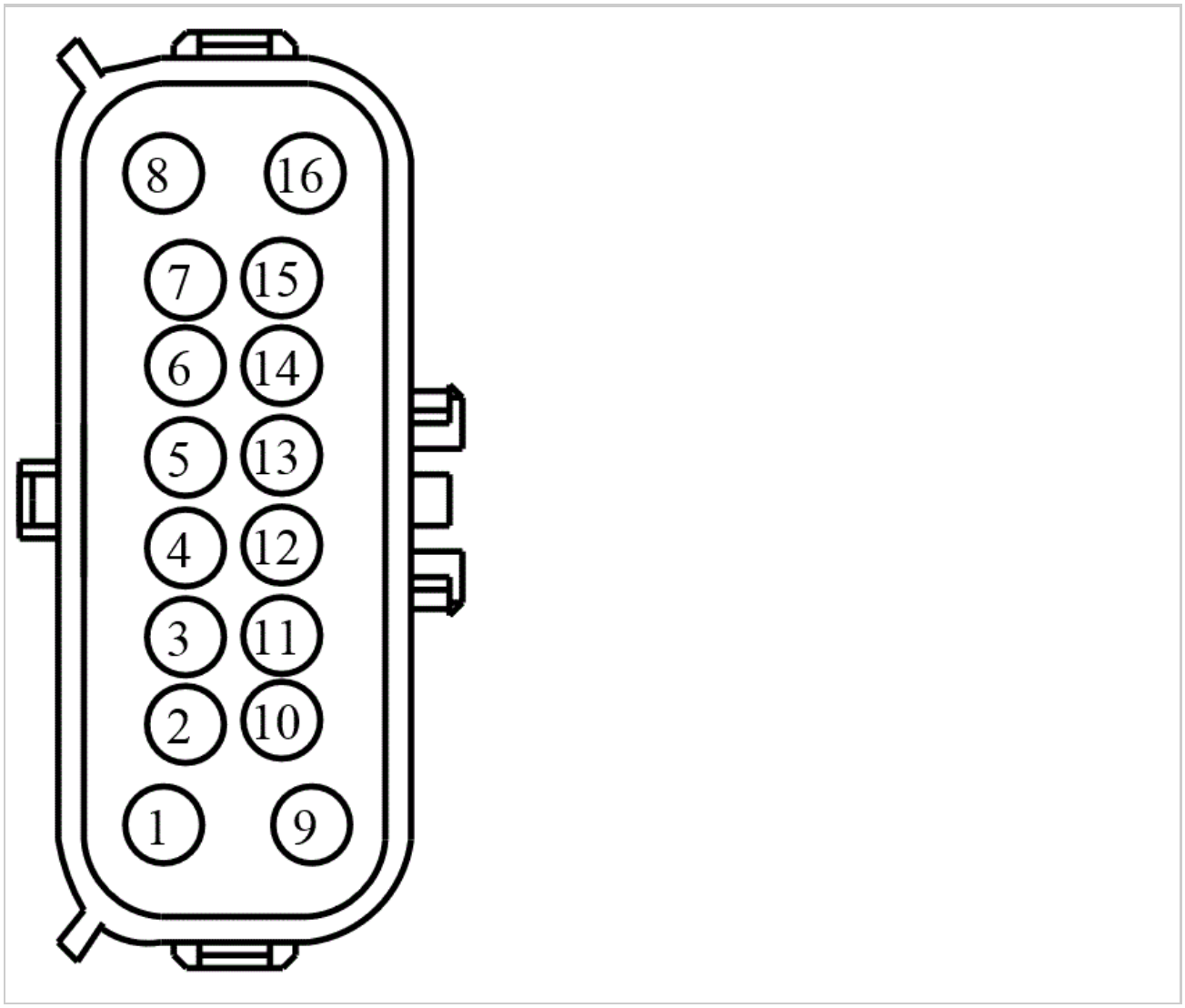
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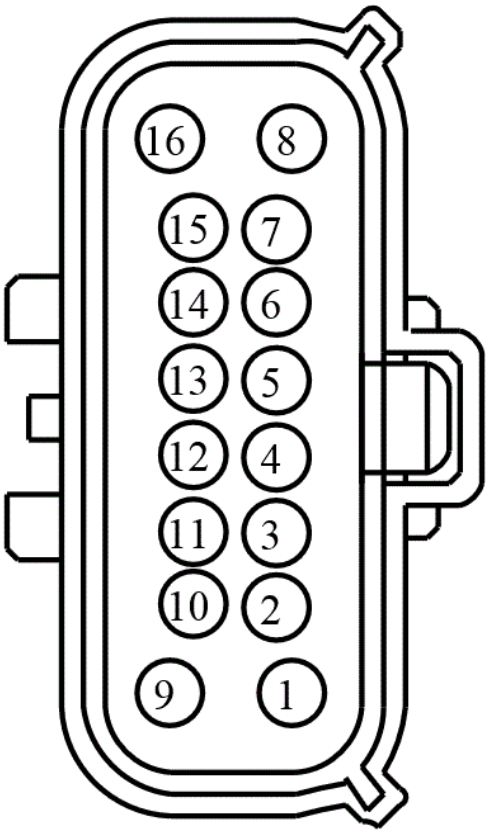
MALE

Harness 12C508

FEMALE

Harness 14290


8
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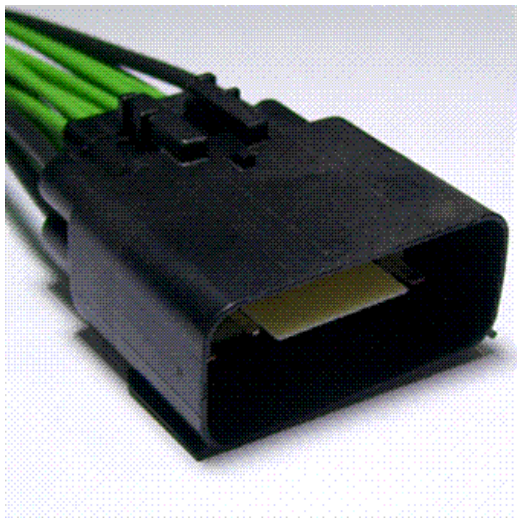


Pin	Circuit	Gauge	Qualifier
1	CBK04 (VT)	12	12C508
1	CBK04 (VT)	14	12C508
1	CBK04 (VT)	18	14290
2	CBK03 (GY)	18	
3	LE111 (VT-GN)	18	
3	RET24 (BN-BU)	18	14290
3	RET24 (BN-BU)	22	12C508

4	CE113 (WH-BN)	18	
4	RET04 (YE-OG)	18	12C508
4	VET26 (BN-GN)	18	14290
5	CMC14 (BN-YE)	18	
5	LE111 (VT-GN)	18	14290
6	CE233 (WH-OG)	18	
6	CE328 (YE-VT)	18	12C508
6	VE779 (YE-GN)	18	14290
7	VE731 (YE-GN)	18	
8	RE406 (GY-VT)	18	12C508
8	RE731 (WH-OG)	18	14290
8	VE761 (BN-BU)	18	
9	CBB41 (BU)	20	14290
9	CBK01 (BU)	16	12C508
9	CBK01 (BU)	18	12C508
10	VE740 (VT-GY)	18	

10	VET26 (BN-GN)	18	14290
11	RET24 (BN-BU)	18	
12	CE233 (WH-OG)	18	
12	GD104 (BK-GN)	16	12C508
12	GD113 (BK-YE)	16	14290
13	VE731 (YE-GN)	18	
14	RE731 (WH)	18	12C508
14	RE731 (WH-OG)	18	14290
14	VE733 (WH)	18	
15	CE234 (BU-WH)	18	
15	RE249 (WH-GN)	18	14290
15	RE407 (YE-VT)	18	12C508
16	CBK02 (GN)	16	
16	CBK02 (GN)	18	12C508

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1393**	Service Part Number: **7U2Z-14S411-KB**



Gauge:

14 18

Pin material:

Tin & Silver

Cavities:

16

Vehicle Uses:

Connector - Inline

For Mating Connector Refer To WPT-1142

CONNECTOR VIEWS > CONNECTOR END VIEW C1046 - INLINE

InlineC1046

Description

INLINE

Color

BK

Base Part #

Service Pigtail

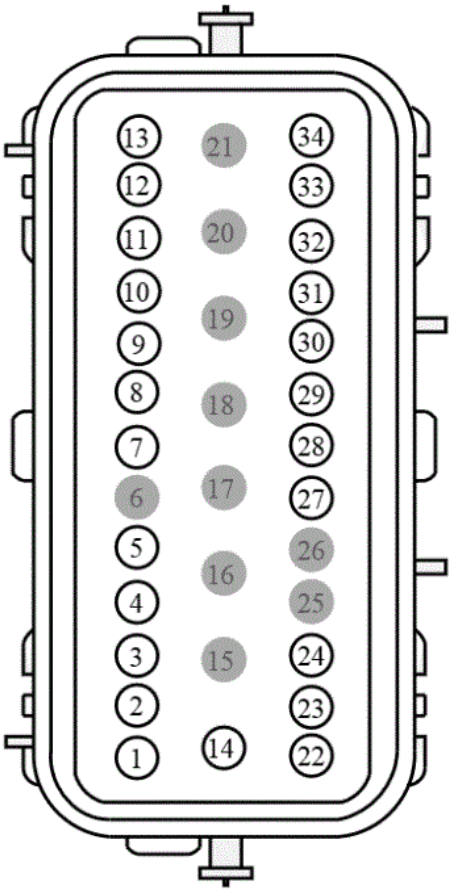
Not Available

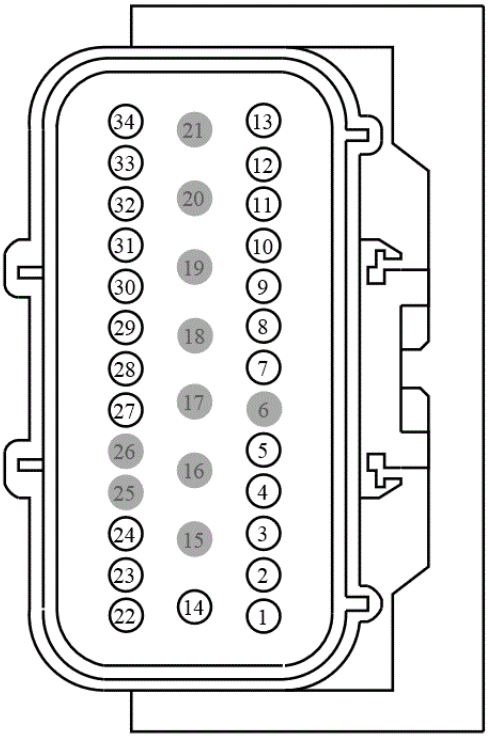
MALE

Harness 14B060

FEMALE

Harness 14290





Pin	Circuit	Gauge	Qualifier

1	SBB36 (GN-RD)	20	
2	CDC10 (BU-OG)	20	
3	CDC15 (VT)	20	
4	CET47 (BU)	20	
5	RE406 (GY-VT)	20	
6	*	*	
7	LE111 (VT-GN)	18	14290
7	LE111 (VT-GN)	20	14B060
8	VET26 (BN-GN)	18	14290
8	VET26 (BN-GN)	20	14B060
9	RET24 (BN-BU)	18	14290
9	RET24 (BN-BU)	20	14B060
10	SDC57 (BU-OG)	20	14290
10	SDC57 (OG-BU)	20	14B060
11	RDC59 (GY-BN)	20	
12	LDC59 (BU-WH)	20	

13	CH401 (VT-WH)	20	
14	CDC25 (BN-GN)	14	
15	*	*	
16	*	*	
17	*	*	
18	*	*	
19	*	*	
20	*	*	
21	*	*	
22	VDB25 (GN-OG)	20	
23	VDB26 (GY-BU)	20	
24	CBB64 (GN-VT)	20	14B060
24	CBB64 (VT-GN)	20	14290
25	*	*	
26	*	*	
27	RE249 (WH-GN)	18	14B060

27	RE249 (WH-GN)	18	
27	RE249 (WH-GN)	20	14B060
27	RE249 (WH-GN)	20	14B060
28	VE462 (WH-BN)	20	
28	VE733 (WH)	18	
29	CBK03 (GY)	16	14290
29	CBK03 (GY)	20	14B060
29	CE234 (BU-WH)	18	
29	RE249 (WH-GN)	20	14B060
30	CBK02 (GN)	16	
30	CBK02 (GN)	18	14B060
31	CE233 (WH-OG)	18	
32	VE731 (WH-OG)	18	14290
32	VE731 (YE-GN)	18	
33	RE731 (BK)	18	14B060
33	RE731 (WH-OG)	18	14290

34	GD123 (BK-GY)	18	

CONNECTOR VIEWS > CONNECTOR END VIEW C1064 - ENGINE COOLANT TEMPERATURE (ECT) SENSOR

Connector:C1064

Description

ENGINE COOLANT TEMPERATURE (ECT) SENSOR

Color

GY

Harness

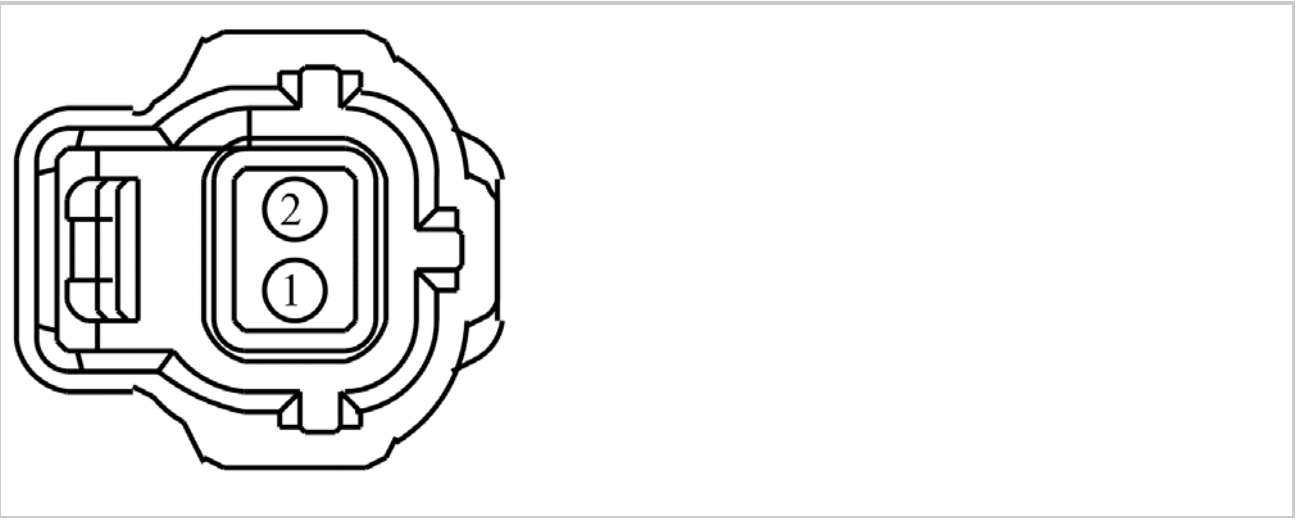
12C508

Base Part #

part# N/A

Service Pigtail

See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	VE716 (YE)	20	SENSOR - ENGINE COOLANT TEMPERATURE (ECT)	

2	RE454 (YE-GN)	20	CTRL MOD. - POWERTRAIN # SIGNAL RETURN ENGINE #2 (SIGRTN)	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-989** 	Service Part Number: **3U2Z-14S411-HYB** Gauge: **14** Pin material: **Tin (greased)** Cavities: **2** Vehicle Uses Sensor - Coolant Temperature Sensor - Cylinder Head Temperature Sensor - Transmission Oil Temperature

CONNECTOR VIEWS > CONNECTOR END VIEW C1073 - FUEL RAIL PRESSURE (FRP) SENSOR

Connector:C1073

Description

FUEL RAIL PRESSURE (FRP) SENSOR

Color

BK

Harness

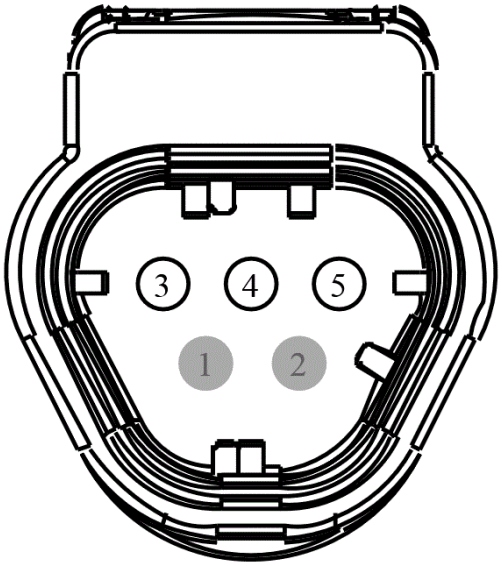
14B485

Base Part #

part# N/A

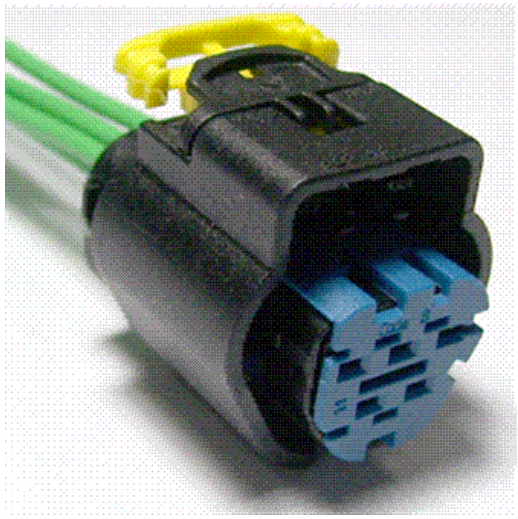
Service Pigtail

See Below



Pin	Circuit	Gauge	Circuit Function	Qualifier
1	*	*	Not Used	
2	*	*	Not Used	
3	RE454 (YE-GN)	20	CTRL MOD. - POWERTRAIN # SIGNAL RETURN (SIGRTN)	
4	LE238 (GY)	20	CTRL MOD. - POWERTRAIN # FUEL RAIL PRESSURE (FRP)	
5	LE423 (GN-VT)	20	CTRL MOD. - POWERTRAIN # VOLTAGE REFERENCE (VREF)	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1418**	Service Part Number: **FU2Z-14S411-HA** Gauge:

	**18** Pin material: **Silver** Cavities: **5** Vehicle Uses Sensor - Fuel Rail Pressure Sensor - Turbo Intake Pressure/Temperature

CONNECTOR VIEWS > CONNECTOR END VIEW C1074 - COOLING FAN MOTOR 2

Connector:C1074

Description

COOLING FAN MOTOR 2

Color

DK GY

Harness

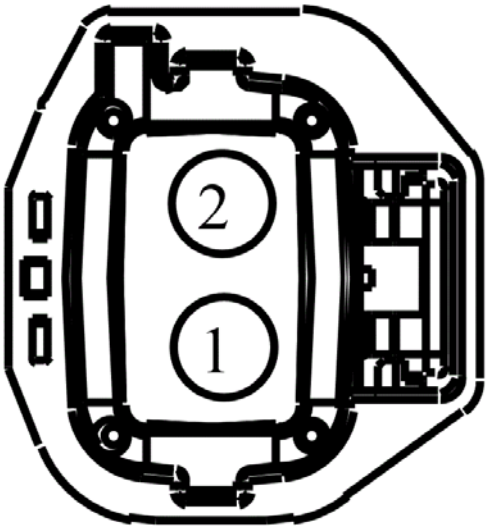
8C290

Base Part #

part# N/A

Service Pigtail

See Below



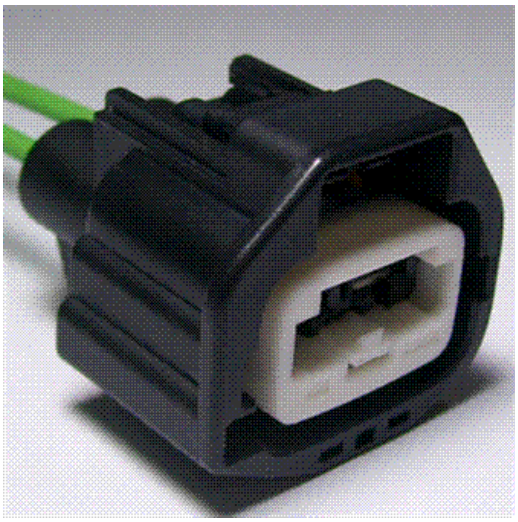
Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CEC07 (BN)	10	RELAY - ENGINE COOLING FAN HIGH SPEED	
2	GD122 (BK)	10	GROUND - FENDER FRONT LEFT # 3RD POINT	

Available Pigtail Kits

Pigtail Kit Part Number

WPT-1417



Service Part Number:

3U2Z-14S411-EUAB

Gauge:

14

Pin material:

Silver

Cavities:

2

Vehicle Uses

Motor - Engine Cooling Fan

Pump - Fuel (External)

	Resistor - Fan Dropping Trailer Tow - Vehicle Side

CONNECTOR VIEWS > CONNECTOR END VIEW C1077 - COOLING FAN MOTOR 1

Connector:C1077

Description

COOLING FAN MOTOR 1

Color

DK GY

Harness

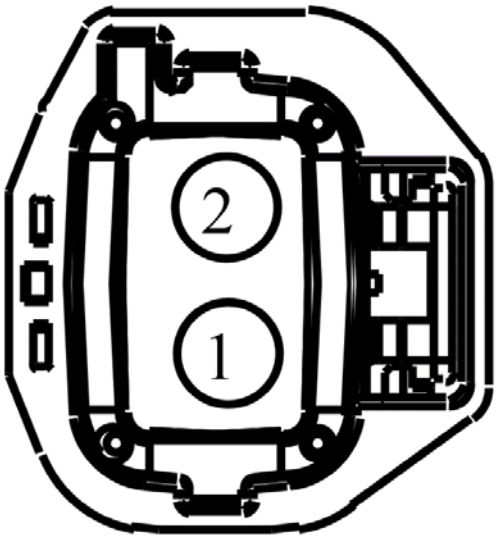
8C290

Base Part #

part# N/A

Service Pigtail

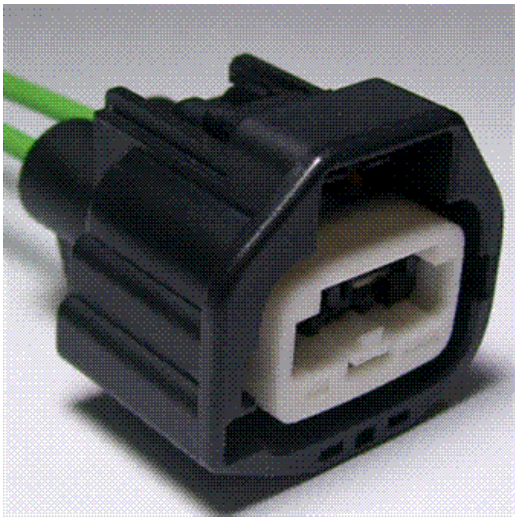
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier

1	CEC05 (VT-GY)	10	RELAY - ENGINE COOLING FAN	
2	CEC06 (YE-OG)	10	RELAY - ENGINE COOLING FAN 2ND	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1417** 	Service Part Number: **3U2Z-14S411-EUAB** Gauge: **14** Pin material: **Silver** Cavities: **2** Vehicle Uses Motor - Engine Cooling Fan Pump - Fuel (External) Resistor - Fan Dropping Trailer Tow - Vehicle Side

CONNECTOR VIEWS > CONNECTOR END VIEW C1100A - BATTERY

Connector:C1100A

Description

BATTERY

Color

Harness

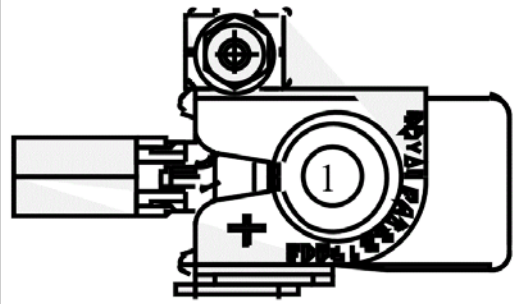
14B060

Base Part #

part# N/A

Service Pigtail

Not Available



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	SDC04 (RD)	2	BATTERY - AUXILIARY # PLUS	
1	SDC04 (YE-RD)	4	BATTERY - AUXILIARY # PLUS	

CONNECTOR VIEWS > CONNECTOR END VIEW C1100B - BATTERY

Connector:C1100B

Description

BATTERY

Color

Harness

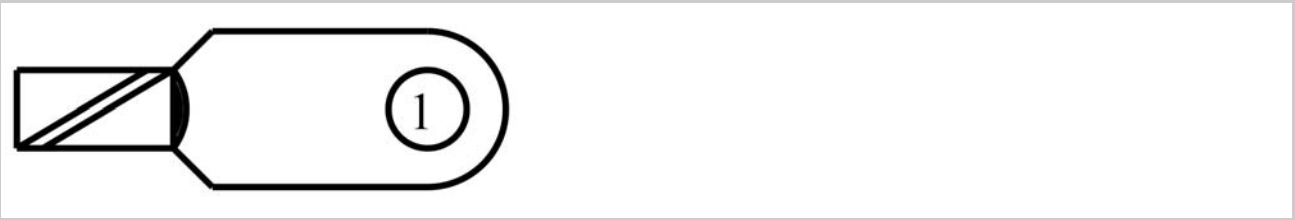
14B060

Base Part #

part# N/A

Service Pigtail

Not Available



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	GD108 (BK)	4	GROUND - CHASSIS / BATTERY	

CONNECTOR VIEWS > CONNECTOR END VIEW C1102 - HORN

Connector:C1102

Description

HORN

Color

WH

Harness

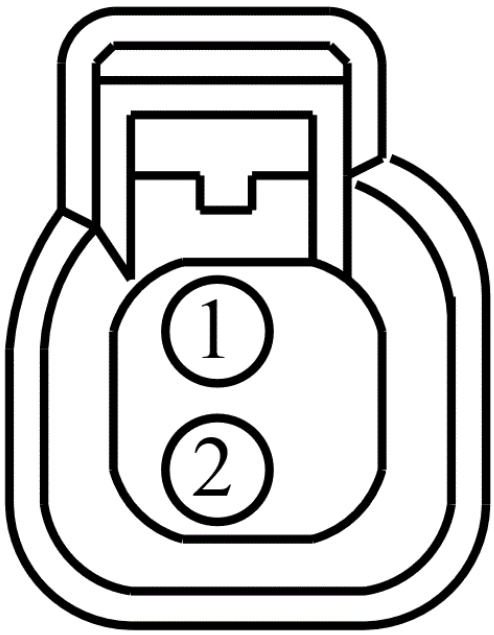
14290

Base Part #

part# N/A

Service Pigtail

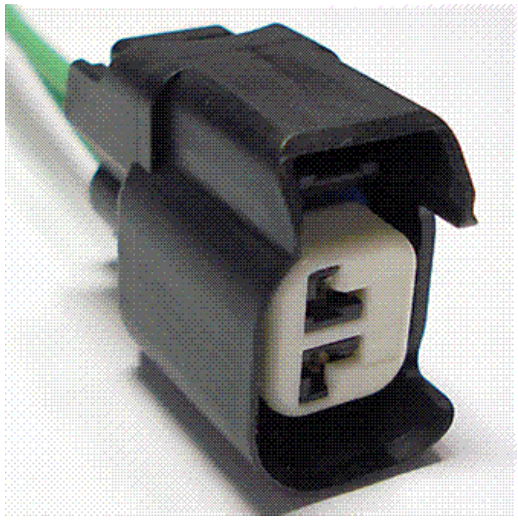
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	GD123 (BK-GY)	16	GROUND - FENDER FRONT RIGHT	
2	CRH04 (VT-GN)	14	CTRL MOD. - RELAY HORN	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1051**	Service Part Number: **5U2Z-14S411-ZB** Gauge: **16** Pin material: **Silver** Cavities: **2** Vehicle Uses

	Fuel Injector Horn Switch - Backup Lamp Switch - Hood Ajar

CONNECTOR VIEWS > CONNECTOR END VIEW C1107 - OUTPUT SHAFT SPEED (OSS) SENSOR

Connector:C1107

Description

OUTPUT SHAFT SPEED (OSS) SENSOR

Color

BK

Harness

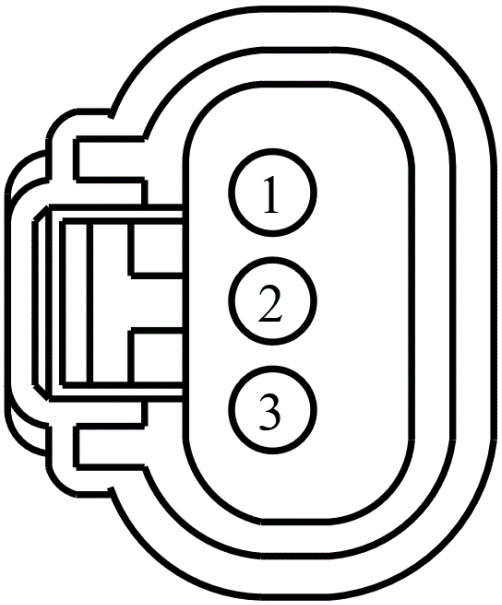
14B060

Base Part #

part# N/A

Service Pigtail

See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	LE111 (VT-GN)	20	CTRL MOD. - POWERTRAIN # BUFFERED POWER SUPPLY SENSORS (VBPWR)	
2	VET26 (BN-GN)	20	SENSOR - OUTPUT SHAFT SPEED (OSS)	
3	RET24 (BN-BU)	20	CTRL MOD. - POWERTRAIN # TRANSMISSION RANGE SIGNAL RETURN (TRGND)	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-990**	Service Part Number: **8U2Z-14S411-ZB** Gauge: **14** Pin material: **Tin (greased)**



Cavities:

3

Vehicle Uses

Sensor - Cam Shaft Position

Sensor - Crank Shaft Position

Sensor - Fuel Tank Pressure Transducer

Sensor - Turbine Shaft Speed

Switch - Fuel Delivery Pressure

CONNECTOR VIEWS > CONNECTOR END VIEW C1110 - AIR CONDITIONING (AC) COMPRESSOR CONTROL SOLENOID

Connector:C1110

Description

AIR CONDITIONING (AC) COMPRESSOR CONTROL SOLENOID

Color

BK

Harness

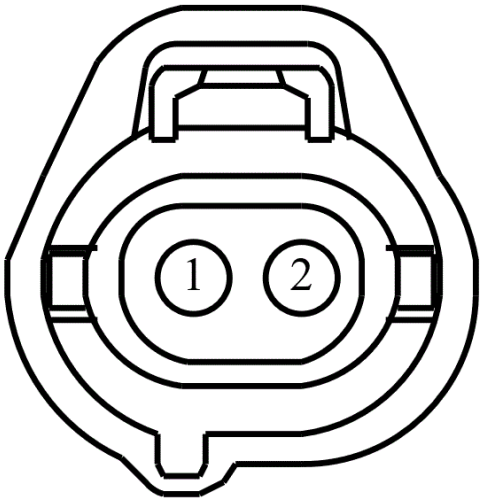
14B060

Base Part #

part# N/A

Service Pigtail

See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	VE462 (WH-BN)	20	CTRL MOD. - POWERTRAIN # VARIABLE A/C COMPRESSOR VALVE	
2	CBK03 (GY)	20	FUSE - 42 OR CIRCUIT BREAKER (VPWR 3)	

Available Pigtail Kits

Pigtail Kit Part Number

WPT-869



Service Part Number:

6U2Z-14S411-DA

Gauge:

18

Pin material:

Tin

Cavities:

2

Vehicle Uses

Lamp - License

CONNECTOR VIEWS > CONNECTOR END VIEW C1120 - CRANKSHAFT POSITION (CKP) SENSOR

Connector:C1120

Description

CRANKSHAFT POSITION (CKP) SENSOR

Color

BK

Harness

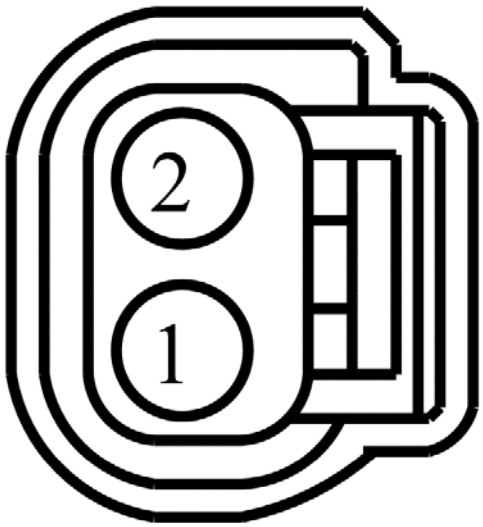
12C508

Base Part #

part# N/A

Service Pigtail

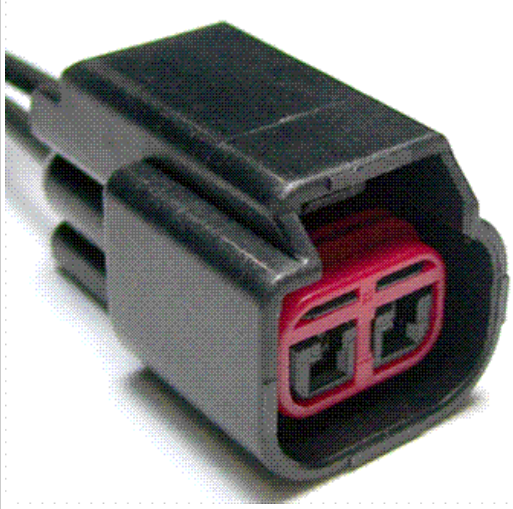
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	RE135 (GN-BN)	18	CTRL MOD. - POWERTRAIN # CRANKSHAFT POSITION SENSOR (CKP-)	

1	RE135 (GN-BN)	20	CTRL MOD. - POWERTRAIN # CRANKSHAFT POSITION SENSOR (CKP-)
2	VE711 (YE-VT)	18	SENSOR - CRANKSHAFT POSITION (CKP+)
2	VE711 (YE-VT)	20	SENSOR - CRANKSHAFT POSITION (CKP+)

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-986** 	Service Part Number: **3U2Z-14S411-SLB** Gauge: **14** Pin material: **Tin** Cavities: **2** Vehicle Uses Coil - Ignition Lamp - License Sensor - Cam Shaft Position Sensor - Crank Shaft Position

CONNECTOR VIEWS > CONNECTOR END VIEW C1126 - FRONT SIDE MARKER LAMP RH

Connector:C1126

Description

FRONT SIDE MARKER LAMP RH

Color

GY

Harness

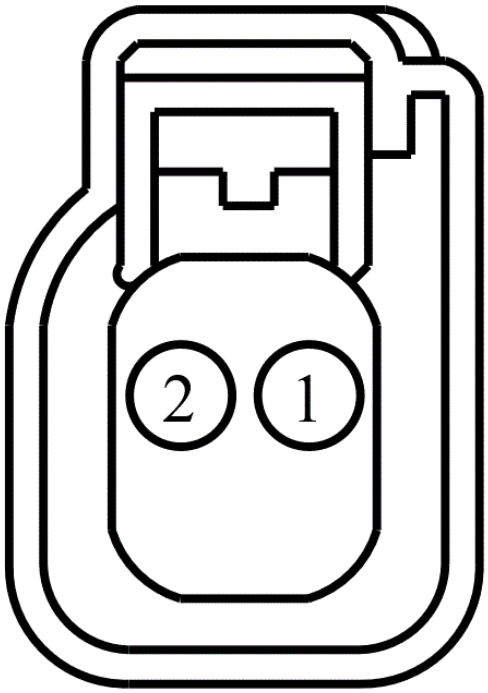
14290

Base Part #

part# N/A

Service Pigtail

See Below

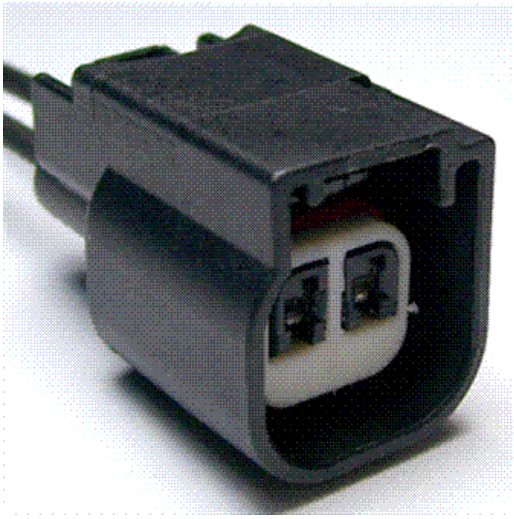


Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	GD123 (BK-GY)	20	GROUND - FENDER FRONT RIGHT	
2	CLS30 (VT-WH)	20	RELAY - PARK LAMP	

Available Pigtail Kits	
Pigtail Kit Part Number	Service Part Number:

WPT-1243



3U2Z-14S411-RPC

Gauge:

16

Pin material:

Tin (greased)

Cavities:

2

Vehicle Uses

Actuator - Door Lock - LH - Rear

Actuator - Door Lock - RH - Rear

Handle - Decklid

Lamp - Headlamp - High/Low Beam

Lamp - Headlamp - Low Beam

Lamp - License

Lamp - Rear Turn

Lamp - Side Marker

Sensor - Knock

Sensor - Seat Track Position

Sensor - Throttle Position

Sensor - Turbine Shaft Speed

Sensor - Water in Fuel

Switch - Deck Lid / Lift Gate Ajar

Switch - Door Ajar / Interior Lamp

Switch - Hood Ajar

Switch - Lift Gate Glass Ajar

Switch - Stop Lamp

Valve - Vapor Management

CONNECTOR VIEWS > CONNECTOR END VIEW C1127 - FRONT SIDE MARKER LAMP

LH

Connector:C1127

Description

FRONT SIDE MARKER LAMP LH

Color

GY

Harness

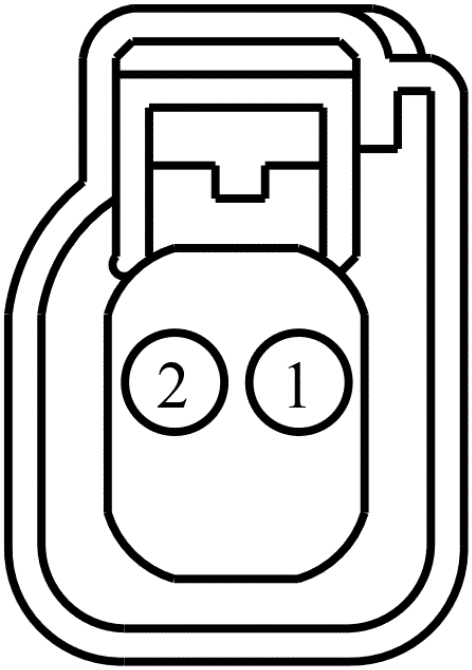
14290

Base Part #

part# N/A

Service Pigtail

See Below



Check for Terminal Part Numbers

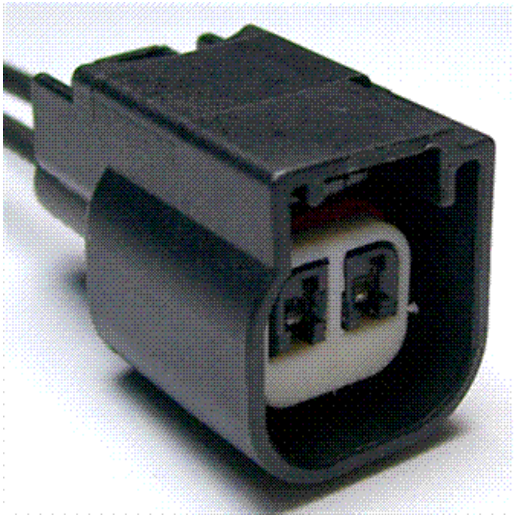
Pin	Circuit	Gauge	Circuit Function	Qualifier
1	GD123 (BK-GY)	20	GROUND - FENDER FRONT RIGHT	

2	CLS30 (VT-WH)	20	RELAY - PARK LAMP	

Available Pigtail Kits

Pigtail Kit Part Number

WPT-1243



Service Part Number:

3U2Z-14S411-RPC

Gauge:

16

Pin material:

Tin (greased)

Cavities:

2

Vehicle Uses

Actuator - Door Lock - LH - Rear

Actuator - Door Lock - RH - Rear

Handle - Decklid

Lamp - Headlamp - High/Low Beam

Lamp - Headlamp - Low Beam

Lamp - License

Lamp - Rear Turn

Lamp - Side Marker

Sensor - Knock

Sensor - Seat Track Position

Sensor - Throttle Position

Sensor - Turbine Shaft Speed

Sensor - Water in Fuel

Switch - Deck Lid / Lift Gate Ajar

Switch - Door Ajar / Interior Lamp

Switch - Hood Ajar

	Switch - Lift Gate Glass Ajar Switch - Stop Lamp Valve - Vapor Management

CONNECTOR VIEWS > CONNECTOR END VIEW C1140 - MANIFOLD ABSOLUTE PRESSURE AND TEMPERATURE (MAPT) SENSOR

Connector:C1140

Description

MANIFOLD ABSOLUTE PRESSURE AND TEMPERATURE (MAPT) SENSOR

Color

BK

Harness

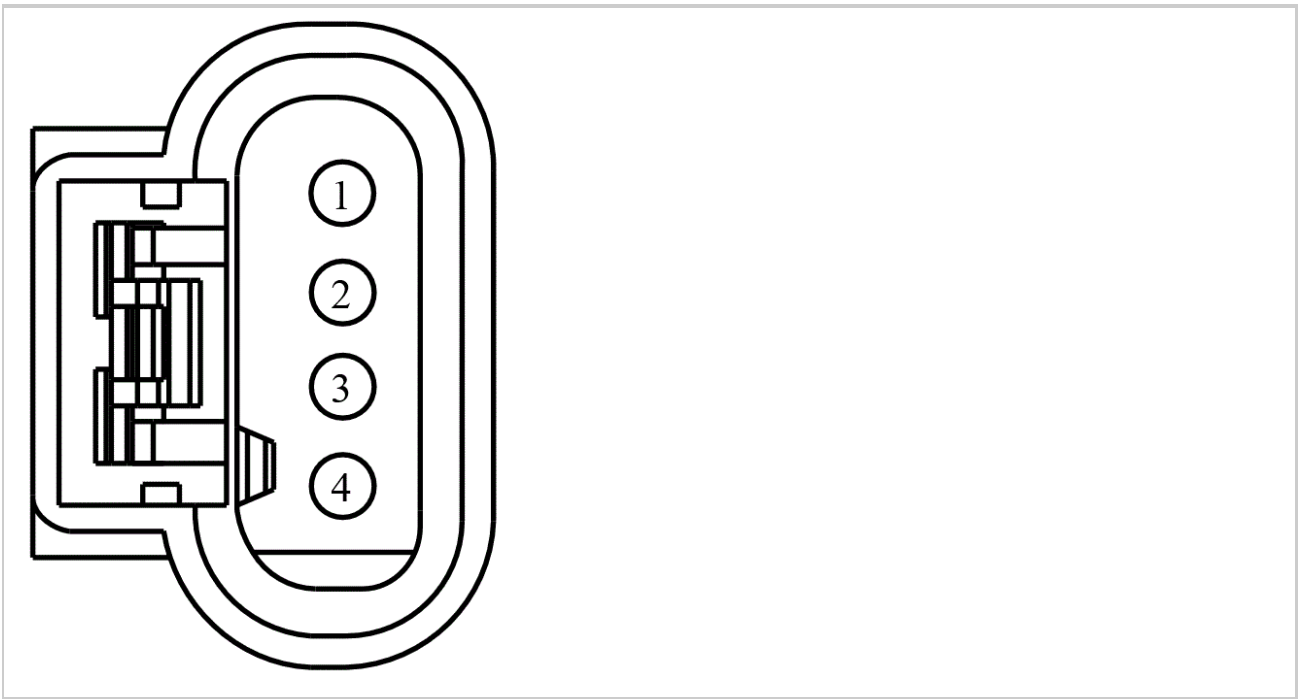
12C508

Base Part #

part# N/A

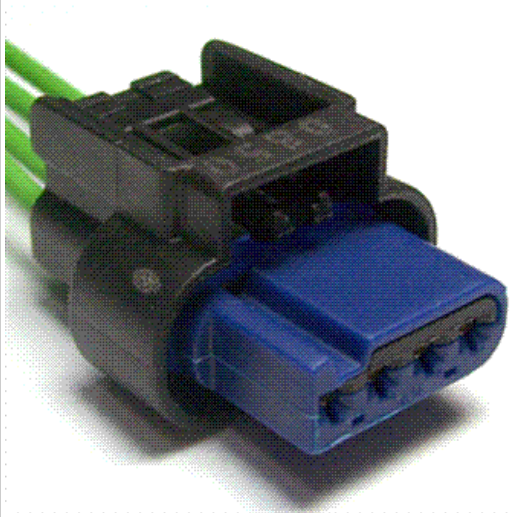
Service Pigtail

See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	VE803 (BU-GN)	18	SENSOR - MANIFOLD ABSOLUTE PRESSURE (MAP)	
2	LE458 (BU-WH)	18	CTRL MOD. - POWERTRAIN # VOLTAGE REFERENCE ENGINE 2 (VREF)	
3	VE740 (VT-GY)	18	SENSOR - INTAKE AIR TEMPERATURE (IAT)	
4	RE405 (GN-WH)	18	CTRL MOD. - POWERTRAIN # SIGNAL RETURN ENGINE (SIGRTN)	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1309** 	Service Part Number: **CU2Z-14S411-AYA** Gauge: **18** Pin material: **Silver** Cavities: **4** Vehicle Uses Motor - Active Grill Shutter

CONNECTOR VIEWS > CONNECTOR END VIEW C1141 - FUEL INJECTOR 1

Connector:C1141

Description

FUEL INJECTOR 1

Color

Harness

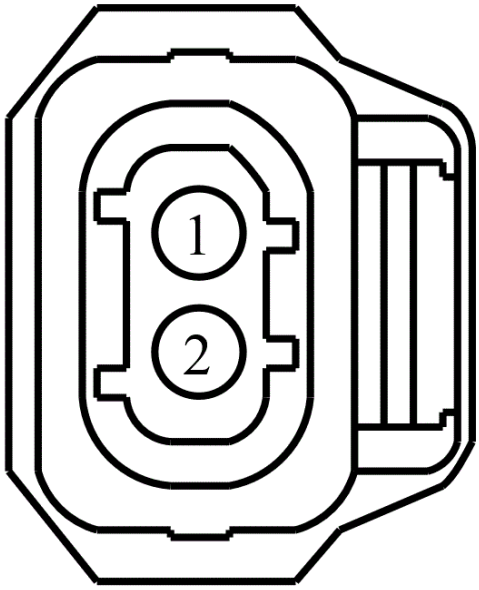
14B485

Base Part #

part# N/A

Service Pigtail

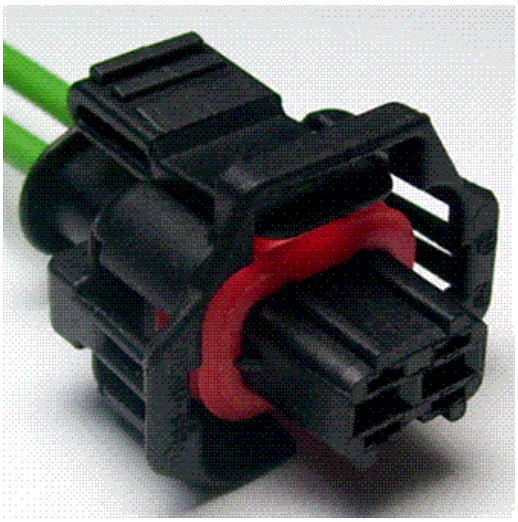
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CE205 (GN-BU)	18	CTRL MOD. - POWERTRAIN # FUEL INJECTOR DRIVER 1 (INJ) +	
2	RE205 (YE-BU)	18	CTRL MOD. - POWERTRAIN # FUEL INJECTOR DRIVER 1 (INJ) -	

Available Pigtail Kits	

Pigtail Kit Part Number **WPT-1302** 	Service Part Number: **CU2Z-14S411-ARA** Gauge: **16** Pin material: **Silver** Cavities: **2** Vehicle Uses Fuel Injector Pump - Fuel Injection Solenoid - Fuel Volume Regulator Control

CONNECTOR VIEWS > CONNECTOR END VIEW C1142 - FUEL INJECTOR 2

Connector:C1142

Description

FUEL INJECTOR 2

Color

Harness

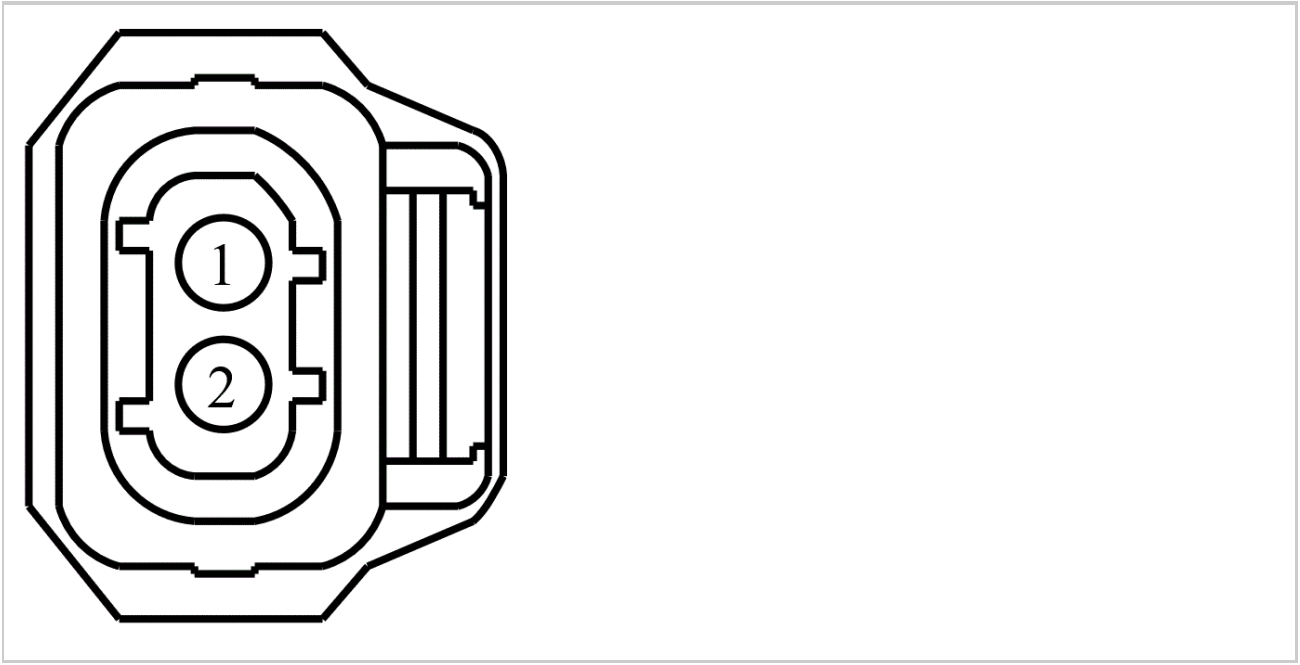
14B485

Base Part #

part# N/A

Service Pigtail

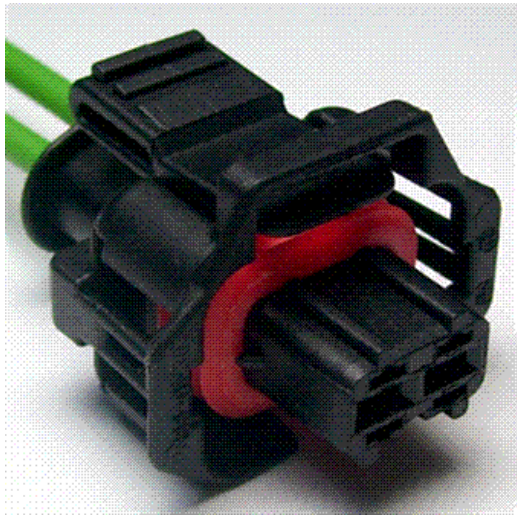
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CE206 (GY-YE)	18	CTRL MOD. - POWERTRAIN # FUEL INJECTOR DRIVER 2 (INJ) +	
2	RE206 (BU-OG)	18	CTRL MOD. - POWERTRAIN # FUEL INJECTOR DRIVER 2 (INJ) -	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1302**	Service Part Number: **CU2Z-14S411-ARA** Gauge: **16** Pin material: **Silver** Cavities: **2** Vehicle Uses

	Fuel Injector Pump - Fuel Injection Solenoid - Fuel Volume Regulator Control

CONNECTOR VIEWS > CONNECTOR END VIEW C1143 - FUEL INJECTOR 3

Connector:C1143

Description

FUEL INJECTOR 3

Color

Harness

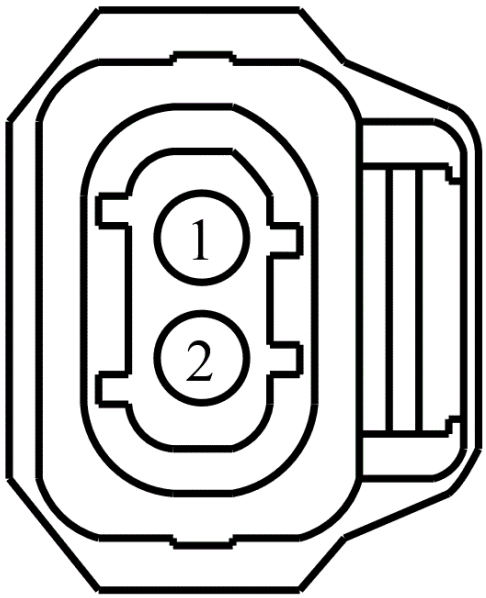
14B485

Base Part #

part# N/A

Service Pigtail

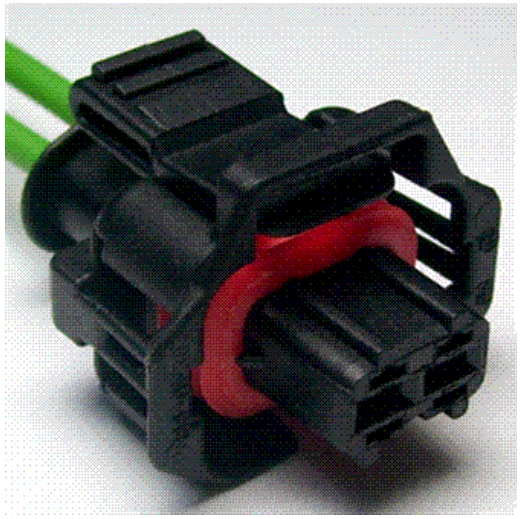
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CE207 (VT-GY)	18	CTRL MOD. - POWERTRAIN # FUEL INJECTOR DRIVER 3 (INJ) +	
2	RE207 (GN-VT)	18	CTRL MOD. - POWERTRAIN # FUEL INJECTOR DRIVER 3 (INJ) -	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1302**	Service Part Number: **CU2Z-14S411-ARA** Gauge: **16** Pin material: **Silver** Cavities: **2** Vehicle Uses

	Fuel Injector Pump - Fuel Injection Solenoid - Fuel Volume Regulator Control

CONNECTOR VIEWS > CONNECTOR END VIEW C1144 - FUEL INJECTOR 4

Connector:C1144

Description

FUEL INJECTOR 4

Color

Harness

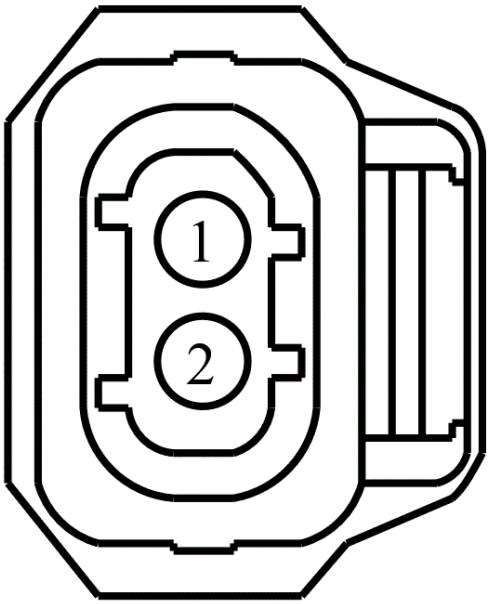
14B485

Base Part #

part# N/A

Service Pigtail

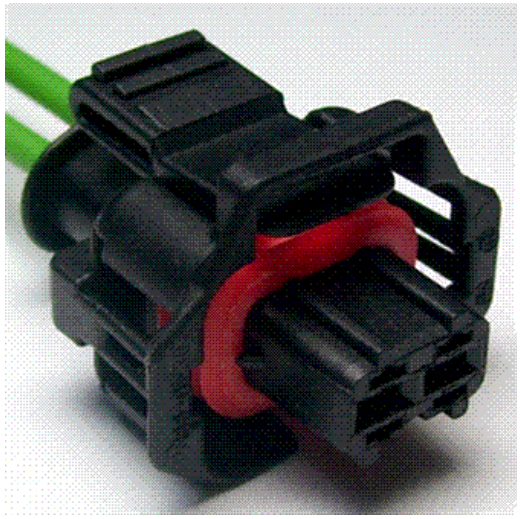
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CE208 (YE-OG)	18	CTRL MOD. - POWERTRAIN # FUEL INJECTOR DRIVER 4 (INJ) +	
2	RE208 (BU)	18	CTRL MOD. - POWERTRAIN # FUEL INJECTOR DRIVER 4 (INJ) -	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1302**	Service Part Number: **CU2Z-14S411-ARA** Gauge: **16** Pin material: **Silver** Cavities: **2** Vehicle Uses

	Fuel Injector Pump - Fuel Injection Solenoid - Fuel Volume Regulator Control

CONNECTOR VIEWS > CONNECTOR END VIEW C1149 - LOW OIL LEVEL SWITCH

Connector:C1149

Description

LOW OIL LEVEL SWITCH

Color

BK

Harness

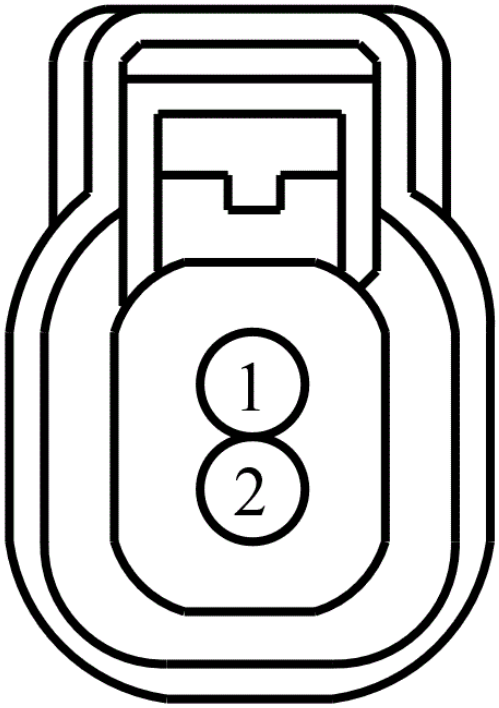
12C508

Base Part #

part# N/A

Service Pigtail

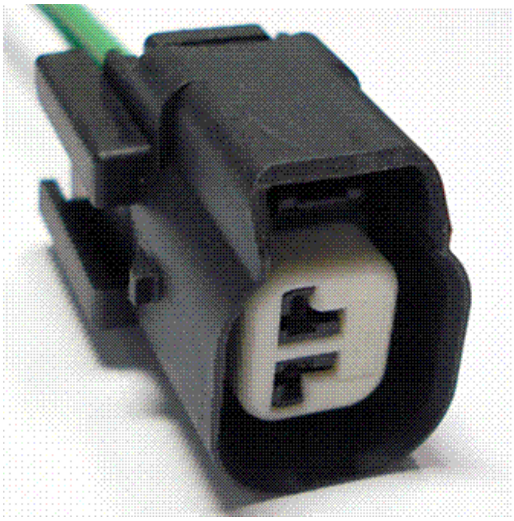
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	LE142 (GN-WH)	20	CTRL MOD. - POWERTRAIN # ENGINE OIL QUALITY SENSOR +	
2	RE454 (YE-GN)	20	CTRL MOD. - POWERTRAIN # SIGNAL RETURN ENGINE #2	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-984**	Service Part Number: **3U2Z-14S411-BXAB** Gauge: **16** Pin material: **Silver** Cavities:



2

Vehicle Uses

A/C Compressor Clutch

EGR Cooler Outlet

Electronic Locking Differential

Horn

Lamp - CHMSL (Center High Mount Stop Lamp)

Lamp - Rear Park

Lamp - Reverse

Lamp - Side Marker

Motor - Adjustable Pedal

Sensor - Adjustable Pedal

Sensor - Brake Fluid Level

Sensor - Cam Shaft Position

Sensor - Cylinder Head Temperature

Sensor - Exhaust Gas Temperature

Sensor - Liftgate Obstacle

Sensor - Oil Level

Sensor - Output Shaft Speed

Sensor - Speed

Solenoid - Engine Variable Timing

Speaker - Door

Speaker - Front

Speaker - Rear

Speaker - Subwoofer

Speaker - Tweeter - LH - Front

Switch - A/C Compressor Clutch Cycling

Switch - Backup Lamp

Switch - Deck Lid / Hatch Release

Switch - Deck Lid / Lift Gate Ajar

	Switch - Hood Ajar Switch - Lift Gate Glass Ajar Switch - Power Liftgate Switch - Reverse Park Aid

CONNECTOR VIEWS > CONNECTOR END VIEW C1164 - CYLINDER HEAD TEMPERATURE (CHT) SENSOR

Connector:C1164

Description

CYLINDER HEAD TEMPERATURE (CHT) SENSOR

Color

BK

Harness

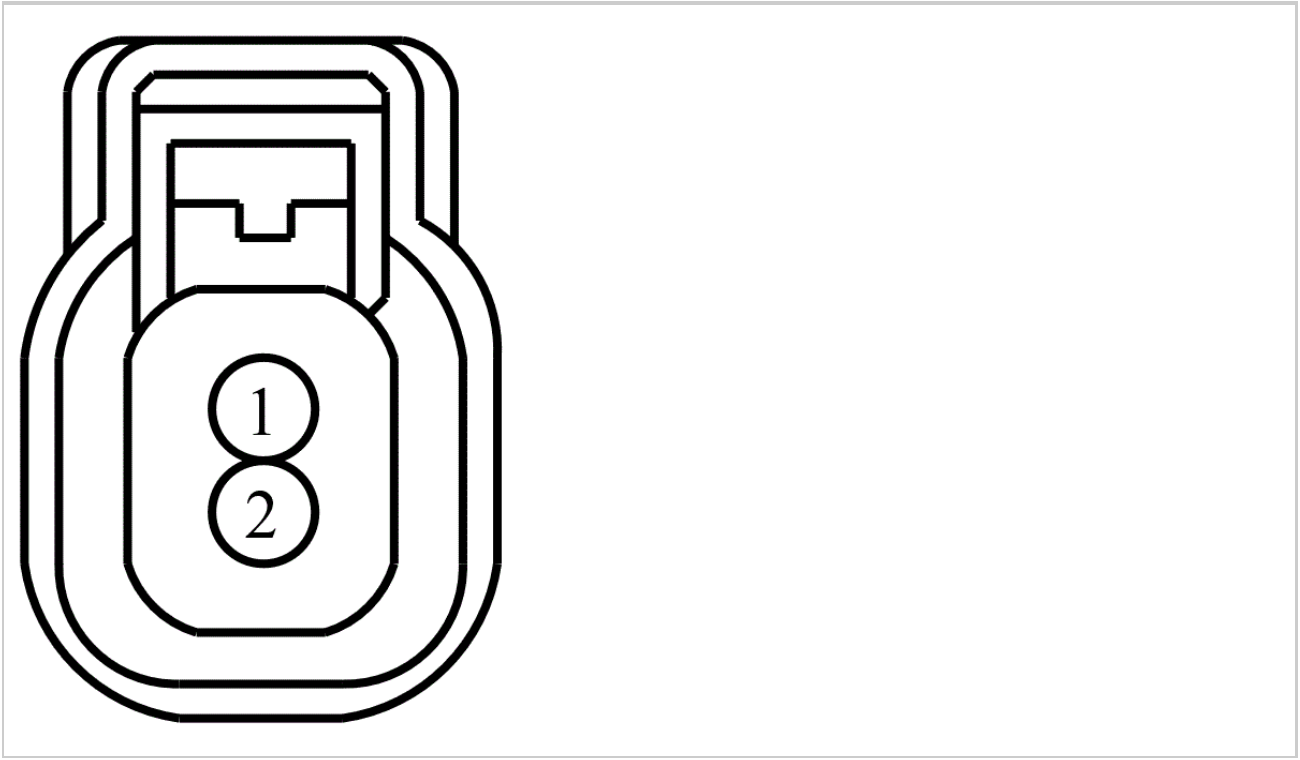
12C508

Base Part #

part# N/A

Service Pigtail

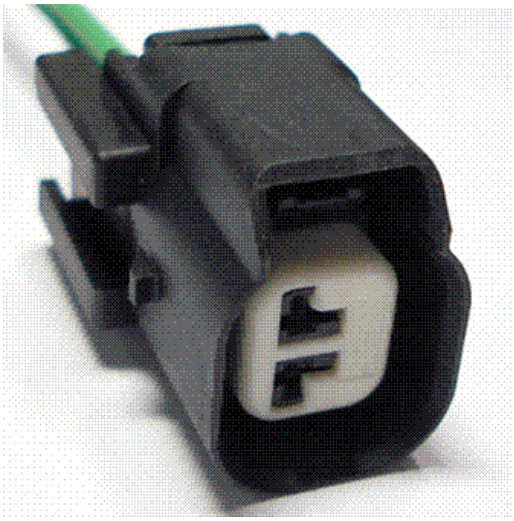
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	VE712 (BU-GY)	20	SENSOR - CYLINDER HEAD TEMPERATURE (CHT)	
2	RE454 (YE-GN)	20	CTRL MOD. - POWERTRAIN # SIGNAL RETURN ENGINE #2 (SIGRTN)	
2	RE454 (YE-GN)	18	CTRL MOD. - POWERTRAIN # SIGNAL RETURN ENGINE #2 (SIGRTN)	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-984**	Service Part Number: **3U2Z-14S411-BXAB** Gauge: **16** Pin material:



Silver

Cavities:

2

Vehicle Uses

A/C Compressor Clutch

EGR Cooler Outlet

Electronic Locking Differential

Horn

Lamp - CHMSL (Center High Mount Stop Lamp)

Lamp - Rear Park

Lamp - Reverse

Lamp - Side Marker

Motor - Adjustable Pedal

Sensor - Adjustable Pedal

Sensor - Brake Fluid Level

Sensor - Cam Shaft Position

Sensor - Cylinder Head Temperature

Sensor - Exhaust Gas Temperature

Sensor - Liftgate Obstacle

Sensor - Oil Level

Sensor - Output Shaft Speed

Sensor - Speed

Solenoid - Engine Variable Timing

Speaker - Door

Speaker - Front

Speaker - Rear

Speaker - Subwoofer

Speaker - Tweeter - LH - Front

Switch - A/C Compressor Clutch Cycling

Switch - Backup Lamp

	Switch - Deck Lid / Hatch Release Switch - Deck Lid / Lift Gate Ajar Switch - Hood Ajar Switch - Lift Gate Glass Ajar Switch - Power Liftgate Switch - Reverse Park Aid

CONNECTOR VIEWS > CONNECTOR END VIEW C1181 - FUEL INJECTOR 1

Connector:C1181

Description

FUEL INJECTOR 1

Color

BK

Harness

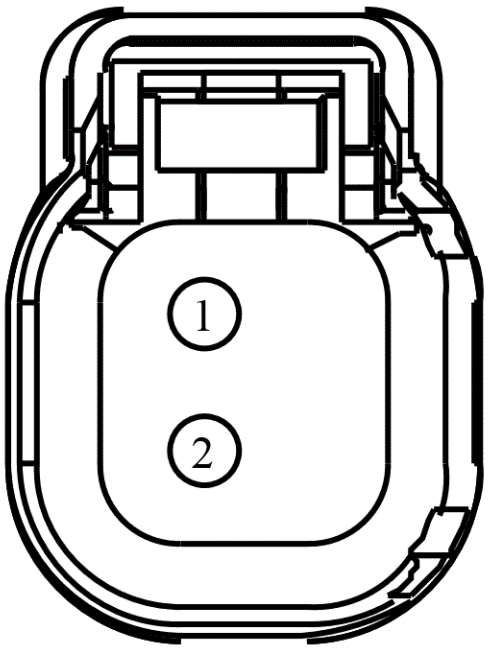
12C508

Base Part #

part# N/A

Service Pigtail

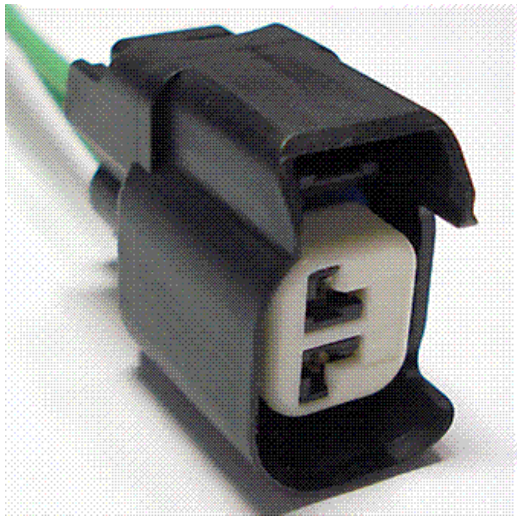
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CE205 (GN-BU)	20	CTRL MOD. - POWERTRAIN # FUEL INJECTOR DRIVER 1 (INJ) +	
2	CBK01 (BU)	20	FUSE - 41 OR CIRCUIT BREAKER (VPWR F)	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1051**	Service Part Number: **5U2Z-14S411-ZB** Gauge: **16** Pin material: **Silver** Cavities: **2** Vehicle Uses

	Fuel Injector Horn Switch - Backup Lamp Switch - Hood Ajar

CONNECTOR VIEWS > CONNECTOR END VIEW C1182 - FUEL INJECTOR 2

Connector:C1182

Description

FUEL INJECTOR 2

Color

BK

Harness

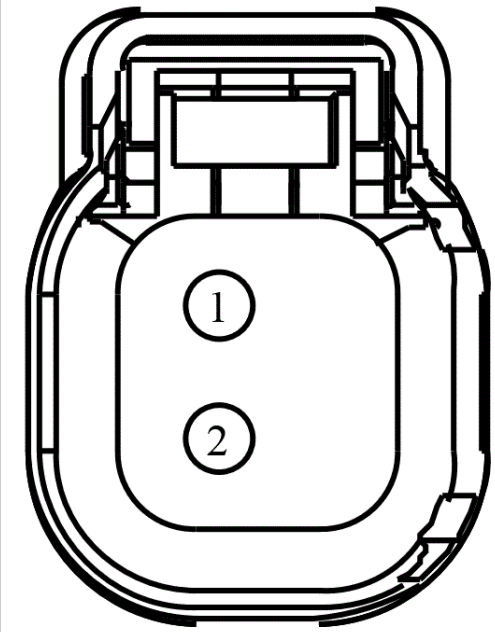
12C508

Base Part #

part# N/A

Service Pigtail

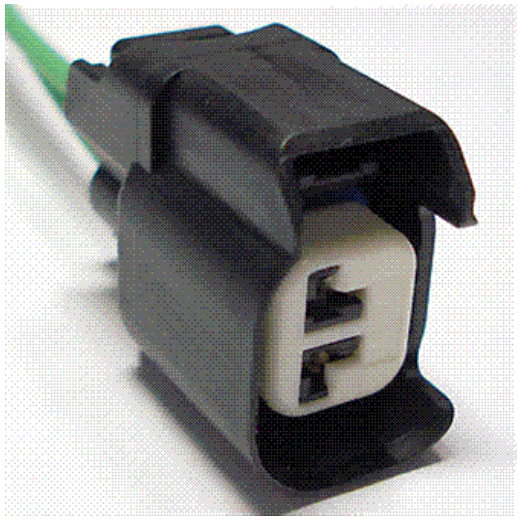
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CE206 (GY-YE)	20	CTRL MOD. - POWERTRAIN # FUEL INJECTOR DRIVER 2 (INJ) +	
2	CBK01 (BU)	20	FUSE - 41 OR CIRCUIT BREAKER (VPWR F)	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1051**	Service Part Number: **5U2Z-14S411-ZB** Gauge: **16** Pin material: **Silver** Cavities: **2** Vehicle Uses

	Fuel Injector Horn Switch - Backup Lamp Switch - Hood Ajar

CONNECTOR VIEWS > CONNECTOR END VIEW C1183 - FUEL INJECTOR 3

Connector:C1183

Description

FUEL INJECTOR 3

Color

BK

Harness

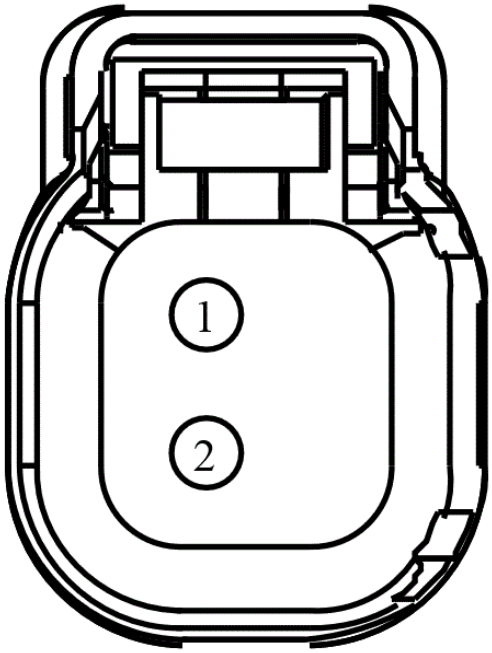
12C508

Base Part #

part# N/A

Service Pigtail

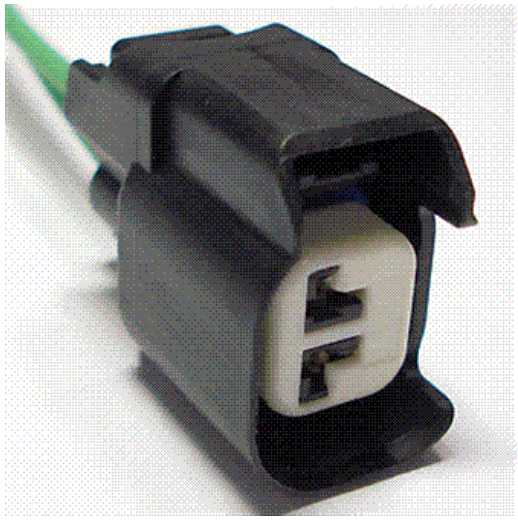
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CE207 (VT-GY)	20	CTRL MOD. - POWERTRAIN # FUEL INJECTOR DRIVER 3 (INJ) +	
2	CBK01 (BU)	20	FUSE - 41 OR CIRCUIT BREAKER (VPWR F)	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1051**	Service Part Number: **5U2Z-14S411-ZB** Gauge: **16** Pin material: **Silver** Cavities: **2** Vehicle Uses

	Fuel Injector Horn Switch - Backup Lamp Switch - Hood Ajar

CONNECTOR VIEWS > CONNECTOR END VIEW C1184 - FUEL INJECTOR 4

Connector:C1184

Description

FUEL INJECTOR 4

Color

BK

Harness

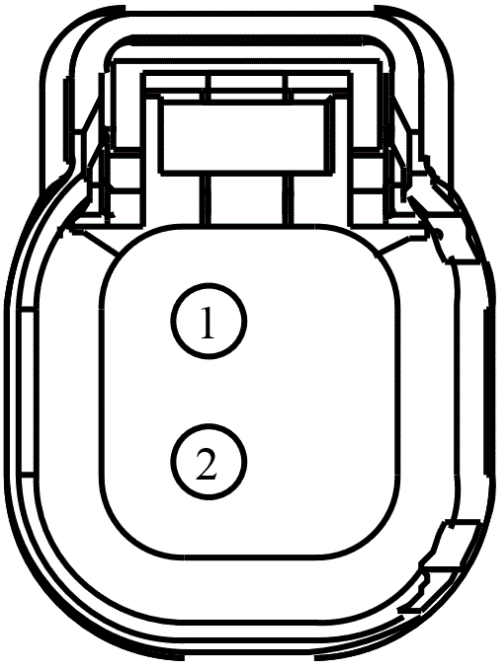
12C508

Base Part #

part# N/A

Service Pigtail

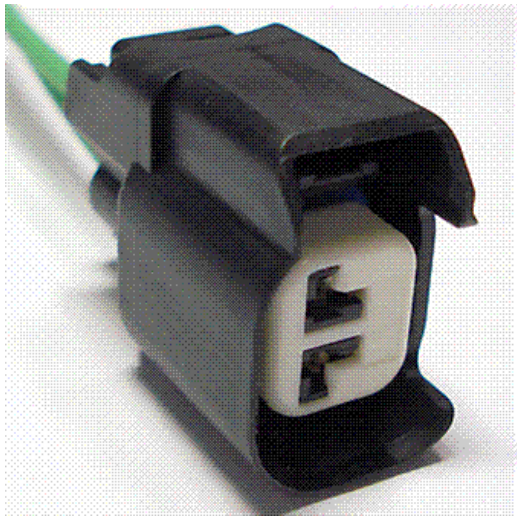
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CE208 (YE-OG)	20	CTRL MOD. - POWERTRAIN # FUEL INJECTOR DRIVER 4 (INJ) +	
2	CBK01 (BU)	20	FUSE - 41 OR CIRCUIT BREAKER (VPWR F)	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1051**	Service Part Number: **5U2Z-14S411-ZB** Gauge: **16** Pin material: **Silver** Cavities: **2** Vehicle Uses

	Fuel Injector Horn Switch - Backup Lamp Switch - Hood Ajar

CONNECTOR VIEWS > CONNECTOR END VIEW C1185 - FUEL INJECTOR 5

Connector:C1185

Description

FUEL INJECTOR 5

Color

BK

Harness

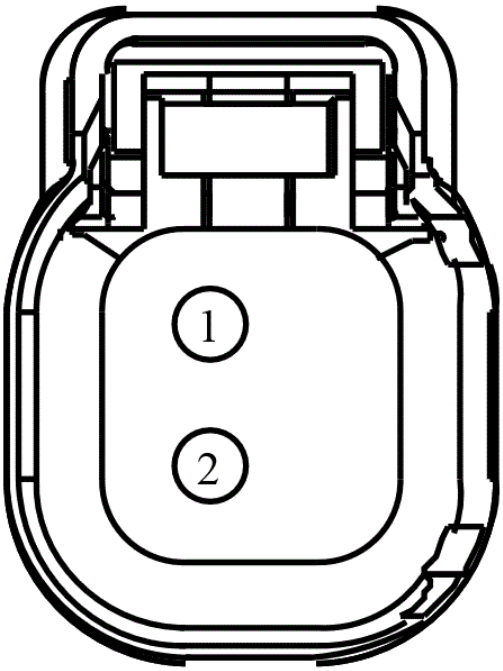
12C508

Base Part #

part# N/A

Service Pigtail

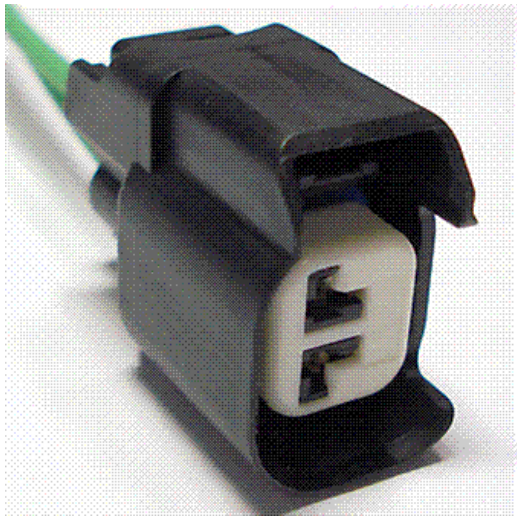
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CE209 (BN)	20	CTRL MOD. - POWERTRAIN # FUEL INJECTOR DRIVER 5 (INJ) +	
2	CBK01 (BU)	20	FUSE - 41 OR CIRCUIT BREAKER (VPWR F)	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1051**	Service Part Number: **5U2Z-14S411-ZB** Gauge: **16** Pin material: **Silver** Cavities: **2**



Vehicle Uses

Fuel Injector

Horn

Switch - Backup Lamp

Switch - Hood Ajar

CONNECTOR VIEWS > CONNECTOR END VIEW C1186 - FUEL INJECTOR 6

Connector:C1186

Description

FUEL INJECTOR 6

Color

BK

Harness

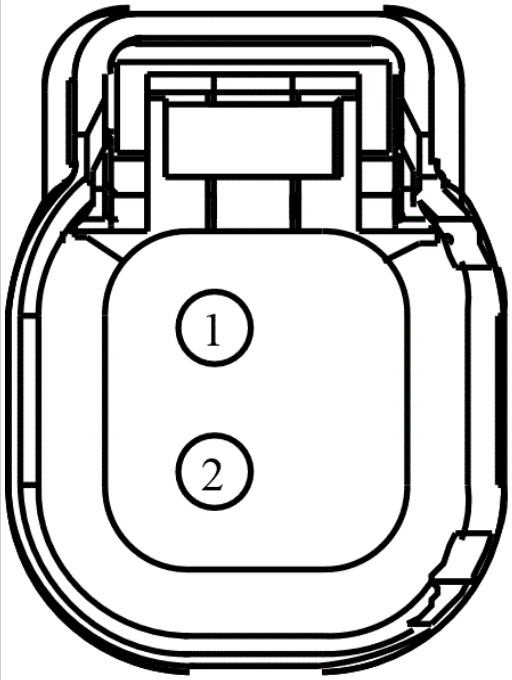
12C508

Base Part #

part# N/A

Service Pigtail

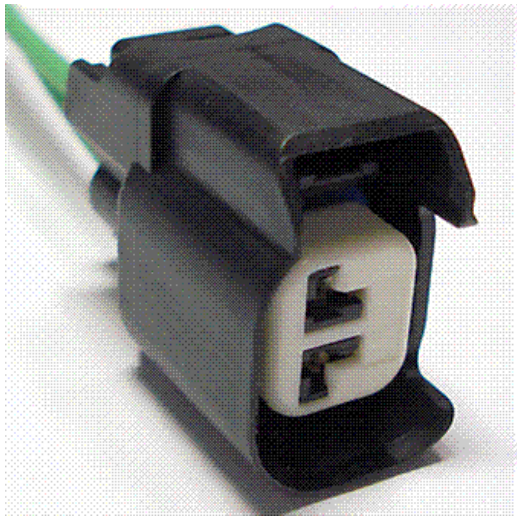
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CE210 (GN-WH)	20	CTRL MOD. - POWERTRAIN # FUEL INJECTOR DRIVER 6 (INJ) +	
2	CBK01 (BU)	20	FUSE - 41 OR CIRCUIT BREAKER (VPWR F)	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1051**	Service Part Number: **5U2Z-14S411-ZB** Gauge: **16** Pin material: **Silver** Cavities: **2**

	Vehicle Uses Fuel Injector Horn Switch - Backup Lamp Switch - Hood Ajar

CONNECTOR VIEWS > CONNECTOR END VIEW C1246 - TURBOCHARGER (TC) WASTEGATE REGULATING VALVE SOLENOID

Connector:C1246

Description

TURBOCHARGER (TC) WASTEGATE REGULATING VALVE SOLENOID

Color

BK

Harness

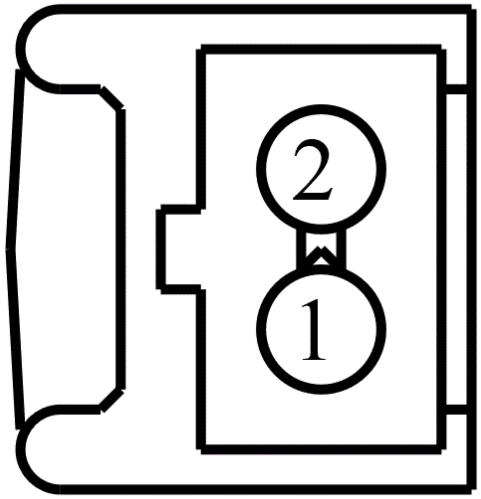
12C508

Base Part #

9K378

Service Pigtail

See Below



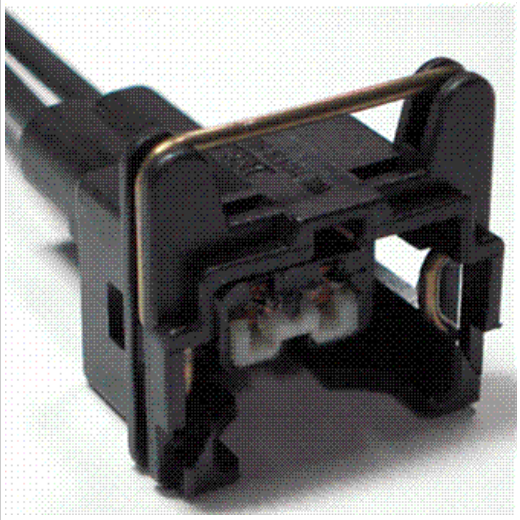
Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CE460 (VT-WH)	18	CTRL MOD. - POWERTRAIN # WASTEGATE SOLENOID (WGT_CV)	
2	CBK03 (GY)	18	FUSE - 42 OR CIRCUIT BREAKER (VPWR 3)	

Available Pigtail Kits

Pigtail Kit Part Number

WPT-1054



Service Part Number:

3U2Z-14S411-GLB

Gauge:

14

Pin material:

Tin (greased)

Cavities:

2

Vehicle Uses

Actuator - Turbocharger Waste Gate

Fuel Injector

	Sensor - Cam Shaft Position Sensor - Crank Shaft Position Valve - Cold Start

CONNECTOR VIEWS > CONNECTOR END VIEW C1260 - AIR CONDITIONING (A/C) PRESSURE TRANSDUCER

Connector:C1260

Description

AIR CONDITIONING (A/C) PRESSURE TRANSDUCER

Color

Harness

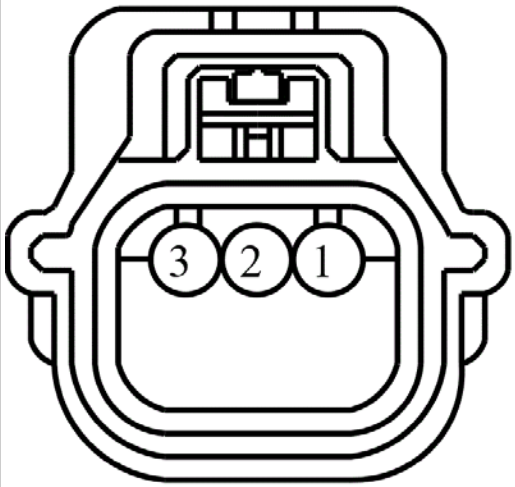
14290

Base Part #

part# N/A

Service Pigtail

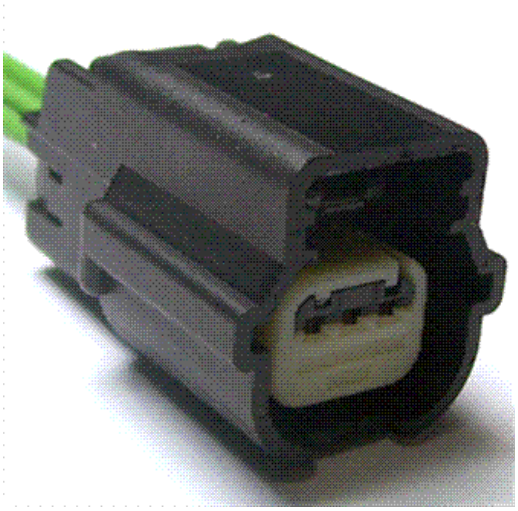
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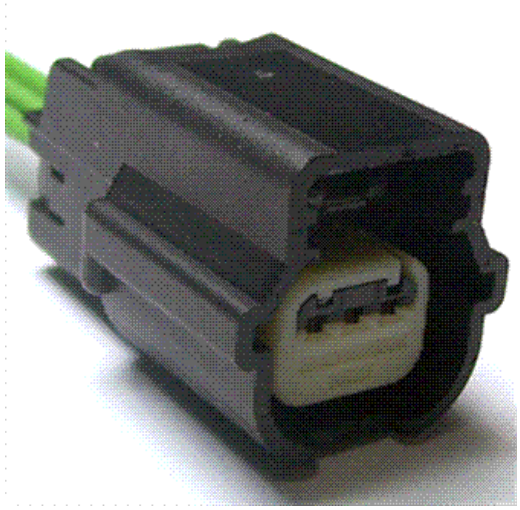


Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier

1	RE406 (GY-VT)	22	CTRL MOD. - POWERTRAIN # SIGNAL RETURN TRANSMISSION (T-SIGRTN) (SIGRTN-B)
2	VH433 (VT-OG)	22	TRANSDUCER - A/C PRESSURE (ACPT) +
3	LE423 (GN-VT)	22	CTRL MOD. - POWERTRAIN # VOLTAGE REFERENCE ENGINE (VREF) (E-VREF) (VREF1)

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1400** 	Service Part Number: **9U2Z-14S411-CC** Gauge: **20** Pin material: **Silver** Cavities: **3** Vehicle Uses Monitor - Crankcase Ventilation Sensor - Air Suspension Sensor - Front Park Aid (FPA) Sensor - Occupant Classification Sensor - Reverse Park Aide (RPA) Switch - A/C Compressor Clutch Cycling Switch - A/C High Pressure
Pigtail Kit Part Number **WPT-1315**	Service Part Number: **9U2Z-14S411-CB** Gauge:



20

Pin material:

Silver

Cavities:

3

Vehicle Uses

Monitor - Crankcase Ventilation

Sensor - Air Suspension

Sensor - Front Park Aid (FPA)

Sensor - Occupant Classification

Sensor - Reverse Park Aide (RPA)

Switch - A/C Compressor Clutch Cycling

Switch - A/C High Pressure

CONNECTOR VIEWS > CONNECTOR END VIEW C1286 - INTAKE MANIFOLD RUNNER CONTROL BANK 1 (IMRC1) SENSOR

Connector:C1286

Description

INTAKE MANIFOLD RUNNER CONTROL BANK 1 (IMRC1) SENSOR

Color

LT GY

Harness

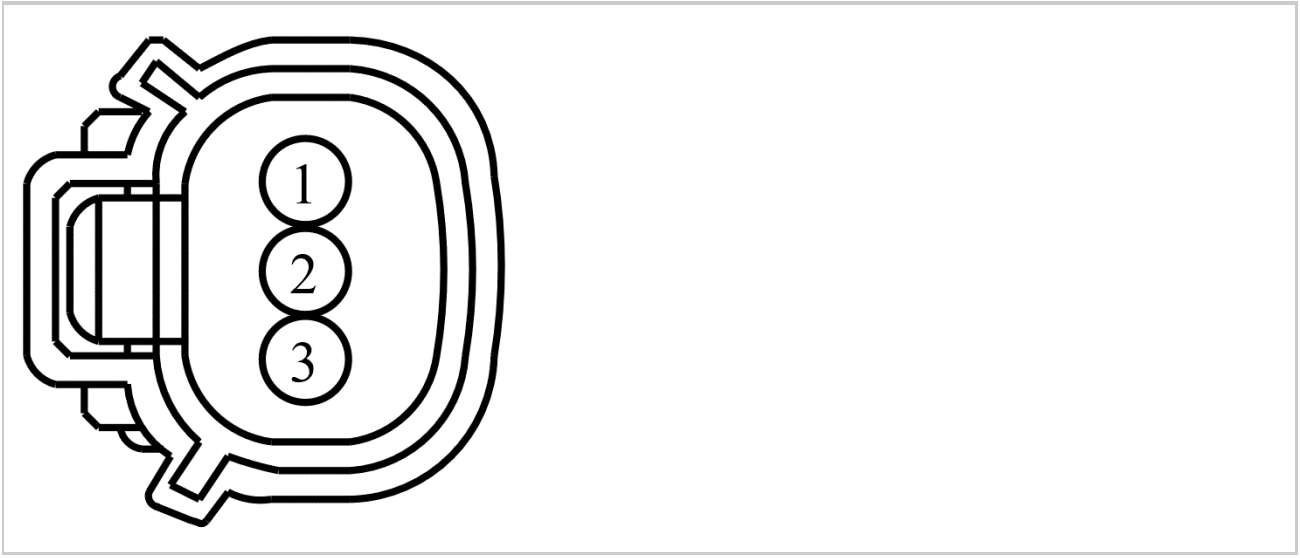
12C508

Base Part #

part# N/A

Service Pigtail

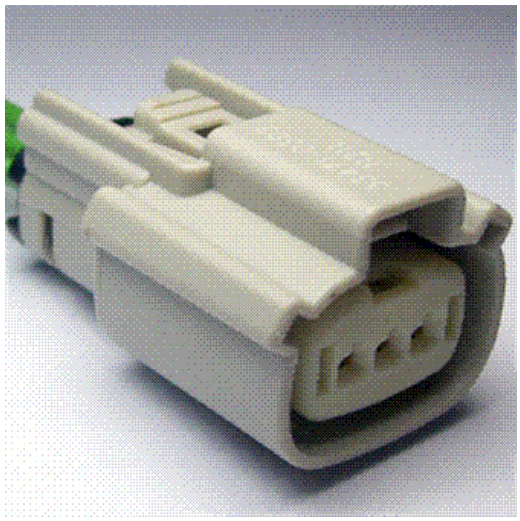
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	VE742 (BU-WH)	20	SENSOR - INTAKE PORT DEACT VALVE POSITION (IMRC1M)	
2	LE423 (GN-VT)	20	CTRL MOD. - POWERTRAIN # VOLTAGE REFERENCE ENGINE (VREF)	
3	RE454 (YE-GN)	20	CTRL MOD. - POWERTRAIN # SIGNAL RETURN ENGINE #2 (SIGRTN)	
3	RE454 (YE-GN)	18	CTRL MOD. - POWERTRAIN # SIGNAL RETURN ENGINE #2 (SIGRTN)	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1261**	Service Part Number: **CU2Z-14S411-MA** Gauge: **16** Pin material: **Silver**



Cavities:

3

Vehicle Uses

Coil - Ignition

CONNECTOR VIEWS > CONNECTOR END VIEW C1288 - INTAKE MANIFOLD RUNNER CONTROL BANK 2 (IMRC2) SENSOR

Connector:C1288

Description

INTAKE MANIFOLD RUNNER CONTROL BANK 2 (IMRC2) SENSOR

Color

LT GY

Harness

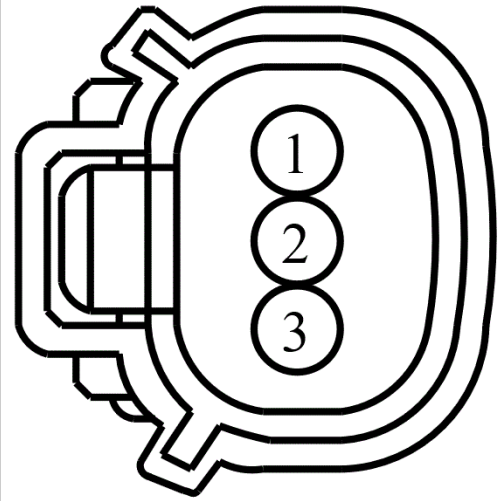
12C508

Base Part #

part# N/A

Service Pigtail

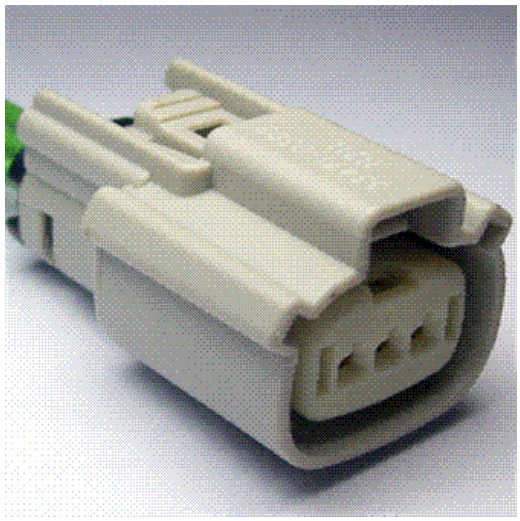
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	VE741 (YE-OG)	20	SENSOR - INTAKE MANIFOLD MONITOR (IMRC2)	
2	LE423 (GN-VT)	20	CTRL MOD. - POWERTRAIN # VOLTAGE REFERENCE ENGINE (VREF)	
3	RE454 (YE-GN)	20	CTRL MOD. - POWERTRAIN # SIGNAL RETURN ENGINE #2 (SIGRTN)	
3	RE454 (YE-GN)	18	CTRL MOD. - POWERTRAIN # SIGNAL RETURN ENGINE #2 (SIGRTN)	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1261**	Service Part Number: **CU2Z-14S411-MA** Gauge: **16** Pin material: **Silver**



Cavities:

3

Vehicle Uses

Coil - Ignition

CONNECTOR VIEWS > CONNECTOR END VIEW C1322 - FRONT FOG LAMP LH

Connector:C1322

Description

FRONT FOG LAMP LH

Color

Harness

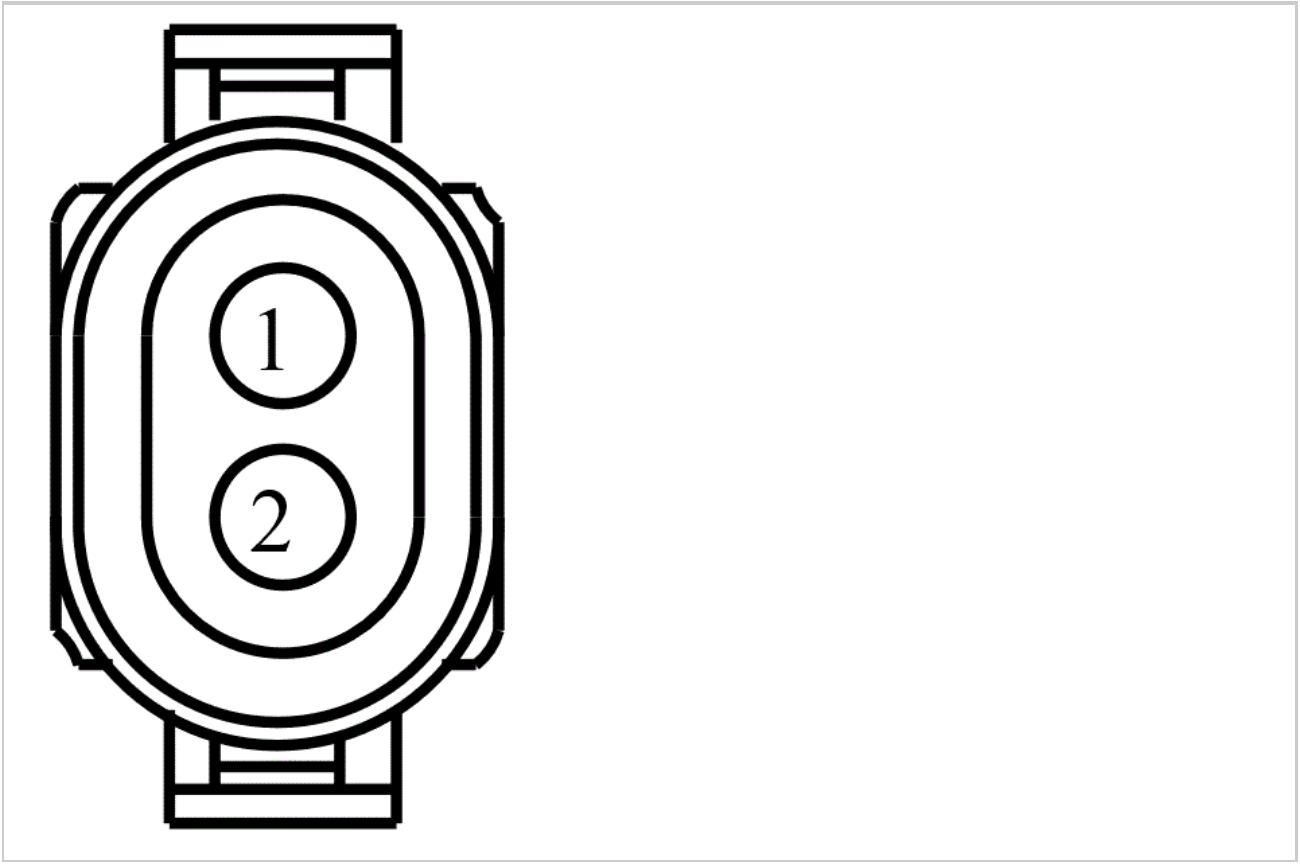
14290

Base Part #

part# N/A

Service Pigtail

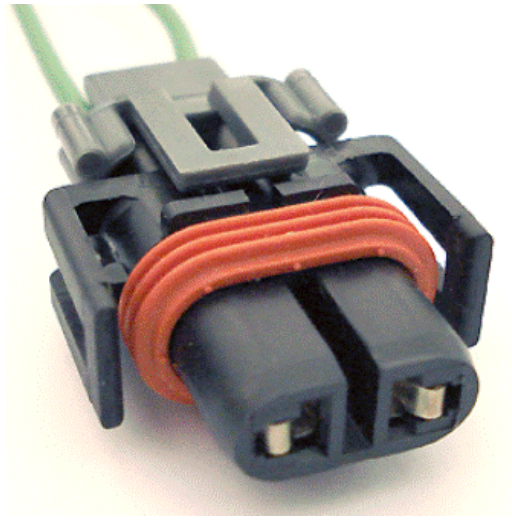
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CLF29 (BN)	20	CTRL MOD. - FOG LAMPS FRONT (LEFT)	
2	GD123 (BK-GY)	16	GROUND - FENDER FRONT RIGHT	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-952**	Service Part Number: **3U2Z-14S411-VZB** Gauge: **16** Pin material: **Silver** Cavities:

	**2** Vehicle Uses Lamp - Fog/Driving Lamp - Headlamp - Low Beam

CONNECTOR VIEWS > CONNECTOR END VIEW C1323 - FRONT FOG LAMP RH

Connector:C1323

Description

FRONT FOG LAMP RH

Color

Harness

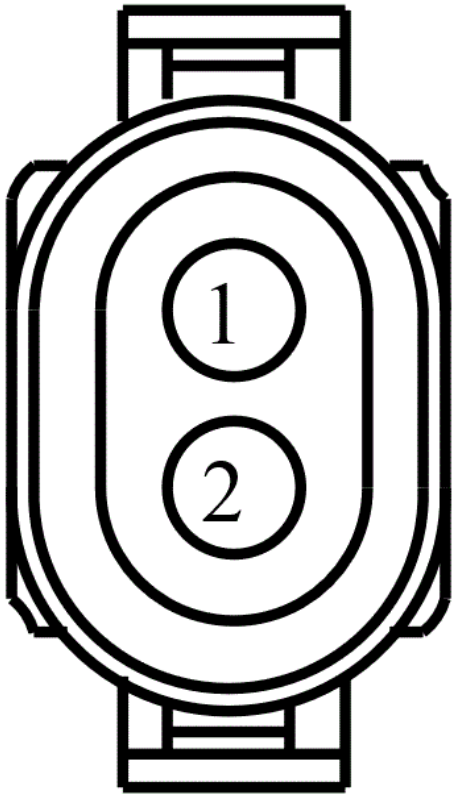
14290

Base Part #

part# N/A

Service Pigtail

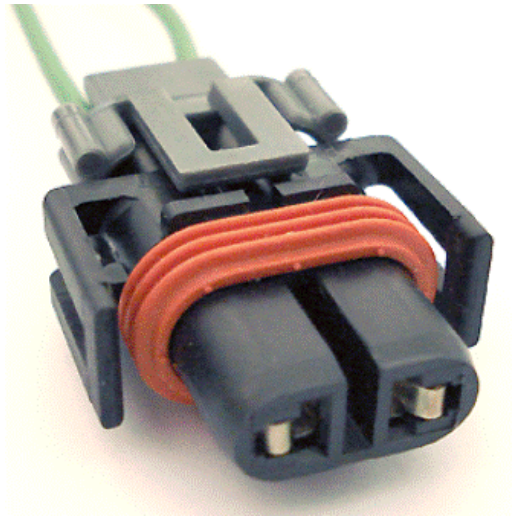
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CLF34 (YE-OG)	20	CTRL MOD. - FOG LAMPS FRONT RIGHT OR COMMON	
2	GD123 (BK-GY)	20	GROUND - FENDER FRONT RIGHT	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-952**	Service Part Number: **3U2Z-14S411-VZB** Gauge: **16** Pin material: **Silver** Cavities:



2

Vehicle Uses

Lamp - Fog/Driving

Lamp - Headlamp - Low Beam

CONNECTOR VIEWS > CONNECTOR END VIEW C1366 - CAMSHAFT POSITION BANK 1 SENSOR 1 (CMP11)

Connector:C1366

Description

CAMSHAFT POSITION BANK 1 SENSOR 1 (CMP11)

Color

Harness

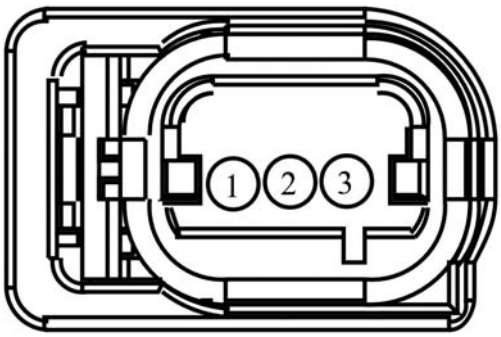
12C508

Base Part #

part# N/A

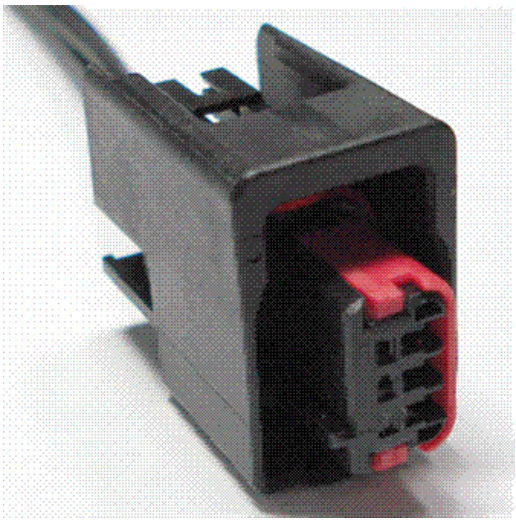
Service Pigtail

See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	LE111 (VT-GN)	18	CTRL MOD. - POWERTRAIN # BUFFERED POWER SUPPLY SENSORS (VBPWR)	
2	VE736 (WH-GN)	18	SENSOR - CAMSHAFT POSITION BANK 1 EX (CMP11)	
3	RE454 (YE-GN)	18	CTRL MOD. - POWERTRAIN # SIGNAL RETURN ENGINE #2 (SIGRTN)	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1039** 	Service Part Number: **9U2Z-14S411-AGA** Gauge: **18** Pin material: **Tin (greased)** Cavities: **3** Vehicle Uses Sensor - Adjustable Pedal Sensor - Cam Shaft Position Sensor - Crank Shaft Position

CONNECTOR VIEWS > CONNECTOR END VIEW C1367 - CAMSHAFT POSITION BANK 2 SENSOR 1 (CMP21)

Connector:C1367

Description

CAMSHAFT POSITION BANK 2 SENSOR 1 (CMP21)

Color

Harness

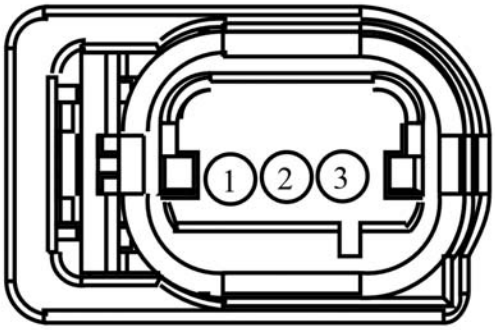
12C508

Base Part #

part# N/A

Service Pigtail

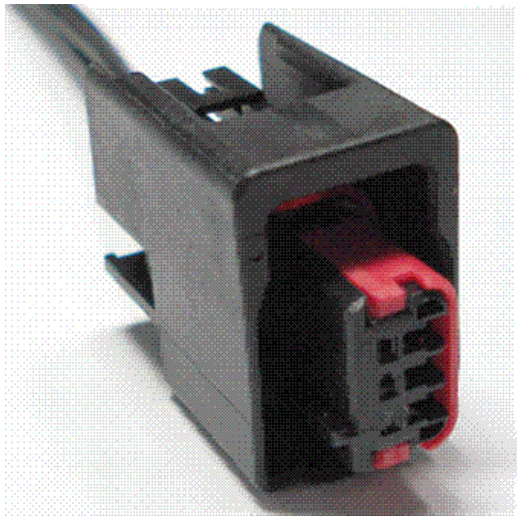
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	LE111 (VT-GN)	18	CTRL MOD. - POWERTRAIN # BUFFERED POWER SUPPLY SENSORS (VBPWR)	
2	VE738 (YE-BU)	18	SENSOR - CAMSHAFT POSITION BANK 2 EX (CMP21)	
3	RE454 (YE-GN)	18	CTRL MOD. - POWERTRAIN # SIGNAL RETURN ENGINE #2 (SIGRTN)	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1039**	Service Part Number: **9U2Z-14S411-AGA** Gauge: **18**



Pin material:

Tin (greased)

Cavities:

3

Vehicle Uses

Sensor - Adjustable Pedal

Sensor - Cam Shaft Position

Sensor - Crank Shaft Position

CONNECTOR VIEWS > CONNECTOR END VIEW C1369 - VARIABLE CAMSHAFT TIMING BANK 1 SOLENOID 2 (VCT12)

Connector:C1369

Description

VARIABLE CAMSHAFT TIMING BANK 1 SOLENOID 2 (VCT12)

Color

Harness

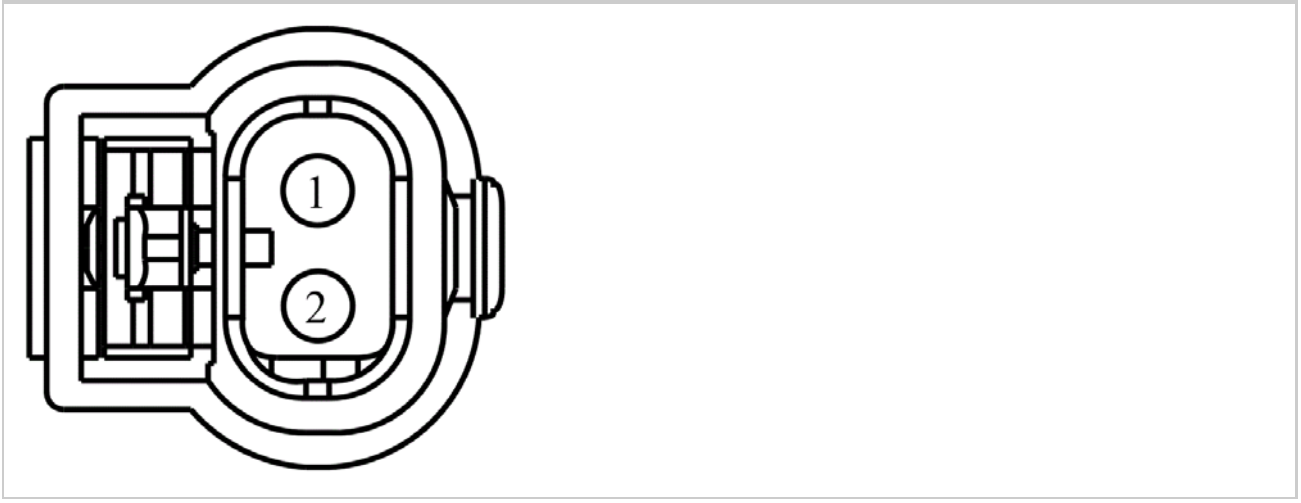
12C508

Base Part #

part# N/A

Service Pigtail

See Below



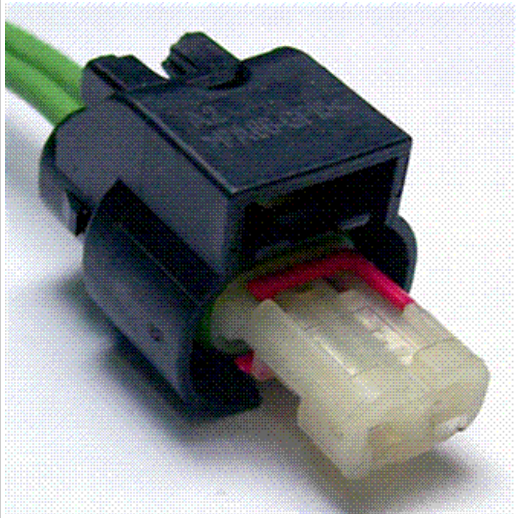
Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CBK02 (GN)	20	FUSE - 40 OR CIRCUIT BREAKER (VPWR)	
2	CE422 (WH-OG)	20	CTRL MOD. - POWERTRAIN # VARIABLE CAMSHAFT TIMING VALVE 2 (VCT12)	

Available Pigtail Kits

Pigtail Kit Part Number

WPT-1250



Service Part Number:

CU2Z-14S411-CA

Gauge:

18

Pin material:

Silver

Cavities:

2

Vehicle Uses

Solenoid - Engine Variable Timing

CONNECTOR VIEWS > CONNECTOR END VIEW C1370 - VARIABLE CAMSHAFT TIMING BANK 1 SOLENOID 1 (VCT11)

Connector:C1370

Description

VARIABLE CAMSHAFT TIMING BANK 1 SOLENOID 1 (VCT11)

Color

Harness

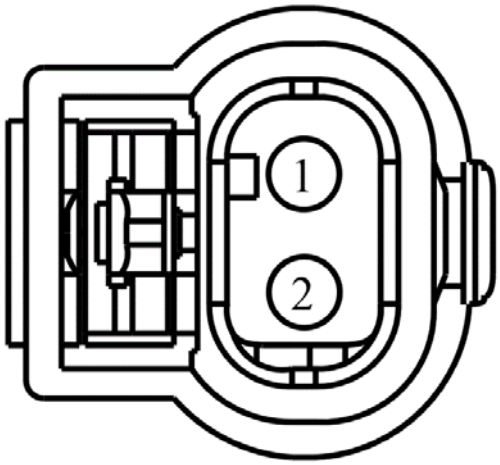
12C508

Base Part #

part# N/A

Service Pigtail

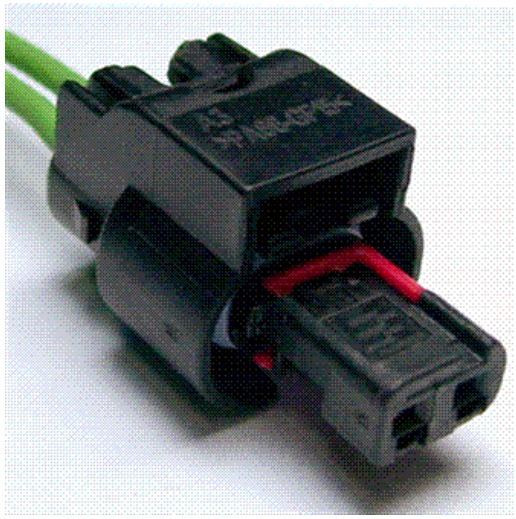
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CBK02 (GN)	20	FUSE - 40 OR CIRCUIT BREAKER (VPWR)	
2	CE421 (VT)	20	CTRL MOD. - POWERTRAIN # VARIABLE CAMSHAFT TIMING VALVE 1 (VCT11)	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1251**	Service Part Number: **CU2Z-14S411-DA** Gauge: **18** Pin material: **Silver** Cavities: **2**



Vehicle Uses

Solenoid - Engine Variable Timing

CONNECTOR VIEWS > CONNECTOR END VIEW C1381B - POWERTRAIN CONTROL MODULE (PCM)

Connector:C1381B

Description

POWERTRAIN CONTROL MODULE (PCM)

Color

Harness

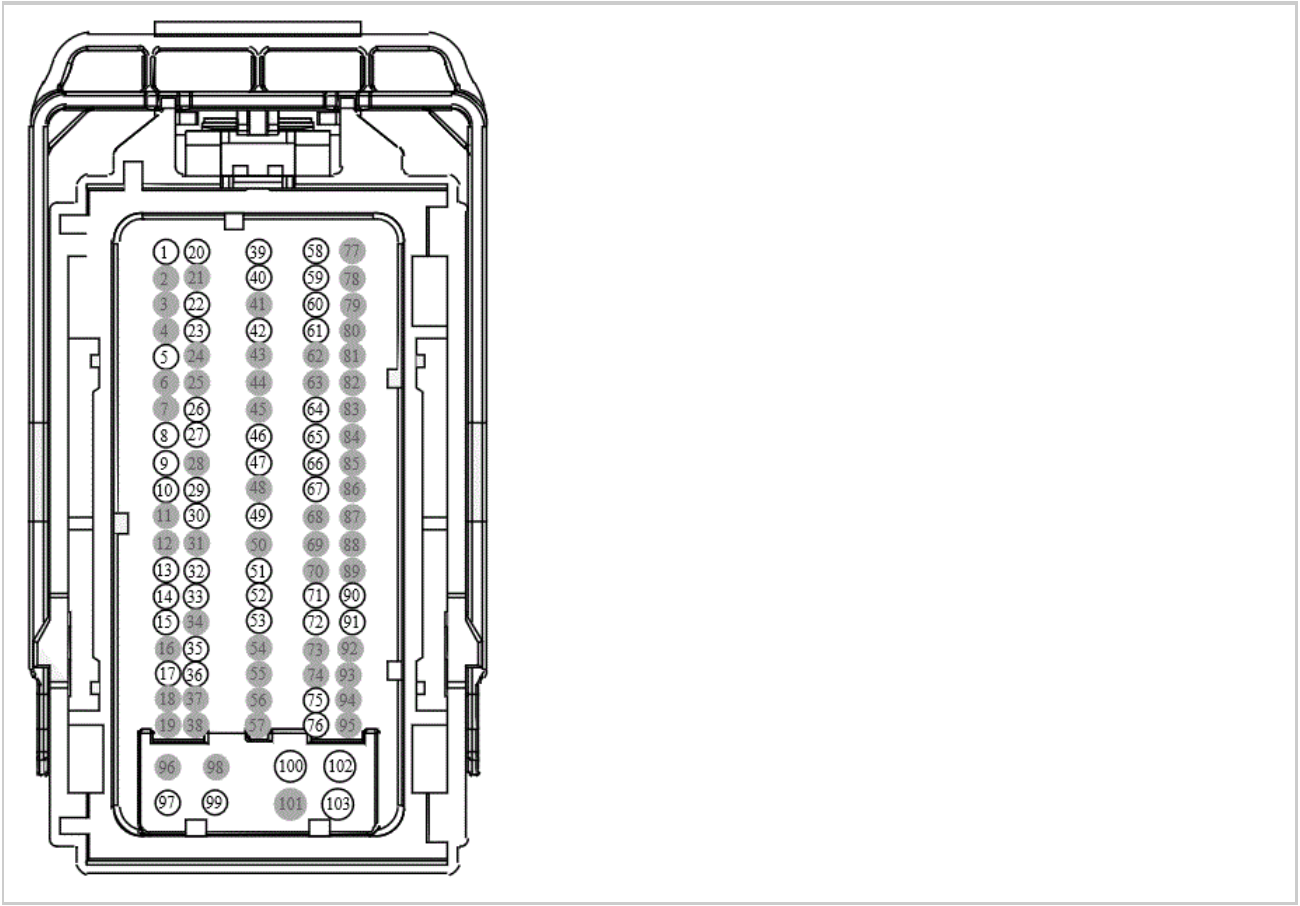
14290

Base Part #

part# N/A

Service Pigtail

Not Available



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CDC54 (WH-GN)	20	CTRL MOD. - POWERTRAIN # STARTER MOTOR CONTROL SENSE (SMCS)	
2	*	*	Not Used	
3	*	*	Not Used	
4	*	*	Not Used	
5	GD113 (BK-YE)	18	GROUND - COWL TOP RIGHT	
6	*	*	Not Used	

7	*	*	Not Used
8	CE904 (GN-VT)	22	SWITCH - CLUTCH PEDAL POSITION # TOP OF TRAVEL (CPP-TT)
9	CE903 (BU-OG)	22	SWITCH - CLUTCH PEDAL POSITION # BOTTOM OF TRAVEL (CPP-BT)
10	CEC01 (WH-BU)	20	CTRL MOD. - COOLING FAN CONTROL HIGH (HFC)
11	*	*	Not Used
12	*	*	Not Used
13	CDC10 (BU-OG)	20	CTRL MOD. - POWERTRAIN # GENERATOR REGULATOR CONTROL (GENRC)
14	VE225 (YE-OG)	22	CTRL MOD. - POWERTRAIN # FUEL PUMP COMMAND (FPC)
15	CH302 (WH-BN)	20	CTRL MOD. - POWERTRAIN # A/C CLUTCH CONTROL RELAY / WOT AC CUTOFF (ACCR)
16	*	*	Not Used
17	CEC02 (GN-BU)	20	CTRL MOD. - COOLING FAN CONTROL LOW (LFC)
18	*	*	Not Used
19	*	*	Not Used
20	CE302 (YE-BU)	20	CTRL MOD. - POWERTRAIN # POWERTRAIN CONTROL RELAY (PCMRC)

21	*	*	Not Used
22	CET42 (GN-VT)	22	SWITCH - TRANSMISSION SELECT SHIFT # DOWN (SST)
23	CET43 (GY)	22	SWITCH - TRANSMISSION SELECT SHIFT # UP (SST)
24	*	*	Not Used
25	*	*	Not Used
26	CDC15 (VT)	20	GENERATOR (ALTERNATOR) # LOAD INPUT (GENLI)
27	VE518 (BN-WH)	22	MONITOR - FUEL PUMP (FPM)
28	*	*	Not Used
29	LE230 (BN-BU)	22	CTRL MOD. - POWERTRAIN # FUEL TANK PRESSURE TRANSDUCER REF. VOLT. (VREF)
30	RE407 (YE-VT)	20	CTRL MOD. - POWERTRAIN # SIGNAL RETURN COWL (C-SIGRTN) (SIGRTN-C)
31	*	*	Not Used
32	CET47 (BU)	20	SWITCH - REVERSE (RS)
33	VH433 (VT-OG)	22	TRANSDUCER - A/C PRESSURE (ACPT) +
34	*	*	Not Used
35	RE136 (VT-GN)	22	CTRL MOD. - POWERTRAIN # ACCELERATOR PEDAL POSITION SENSOR 1 (APPRTN1)

CONNECTOR VIEWS > CONNECTOR END VIEW C1381E - POWERTRAIN CONTROL MODULE (PCM)

Connector:C1381E

Description

POWERTRAIN CONTROL MODULE (PCM)

Color

Harness

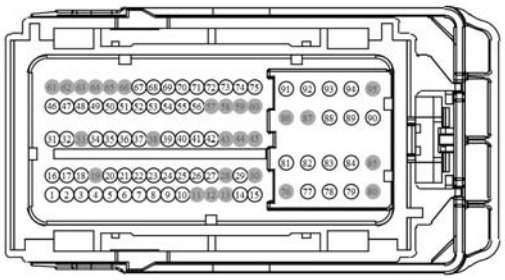
12C508

Base Part #

part# N/A

Service Pigtail

Not Available



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CE205 (GN-BU)	20	CTRL MOD. - POWERTRAIN # FUEL INJECTOR DRIVER 1 (INJ) +	
2	CE208 (YE-OG)	20	CTRL MOD. - POWERTRAIN # FUEL INJECTOR DRIVER 4 (INJ) +	
3	CE206 (GY-YE)	20	CTRL MOD. - POWERTRAIN # FUEL INJECTOR DRIVER 2 (INJ) +	

4	CE422 (WH-OG)	20	CTRL MOD. - POWERTRAIN # VARIABLE CAMSHAFT TIMING VALVE 2 (VCT12)
5	CE421 (VT)	20	CTRL MOD. - POWERTRAIN # VARIABLE CAMSHAFT TIMING VALVE 1 (VCT11)
6	CE443 (BN-VT)	20	CTRL MOD. - POWERTRAIN # VARIABLE CAMSHAFT TIMING VALVE 4 (VCT22)
7	CE442 (YE-GY)	20	CTRL MOD. - POWERTRAIN # VARIABLE CAMSHAFT TIMING VALVE 3 (VCT21)
8	LE134 (YE)	20	CTRL MOD. - POWERTRAIN # ELECTRONIC THROTTLE CONTROL (ETCREF)
9	VE819 (GN-VT)	20	SENSOR - THROTTLE POSITION # POSITIVE SLOPE (TP2-)
10	VE818 (BN)	20	SENSOR - THROTTLE POSITION # NEGATIVE SLOPE (TP-1)
11	*	*	Not Used
12	*	*	Not Used
13	*	*	Not Used
14	CET10 (BU-GY)	20	CTRL MOD. - POWERTRAIN # SOLENOID PRESSURE CONTROL 6 (PC6) [EPC] [VFS]
15	CET09 (YE-VT)	20	CTRL MOD. - POWERTRAIN # SOLENOID PRESSURE CONTROL 5 (PC5) [EPC] [VFS]
16	CE209 (BN)	20	CTRL MOD. - POWERTRAIN # FUEL INJECTOR DRIVER 5 (INJ) +
17	LE111	20	CTRL MOD. - POWERTRAIN # BUFFERED POWER SUPPLY

	(VT-GN)		SENSORS (VBPWR)
18	CBK01 (BU)	20	FUSE - 41 OR CIRCUIT BREAKER (VPWR F)
18	CBK01 (BU)	18	FUSE - 41 OR CIRCUIT BREAKER (VPWR F)
19	*	*	Not Used
20	LE449 (VT-GN)	18	CTRL MOD. - POWERTRAIN # VOLTAGE REFERENCE UNIVERSAL HEGO 2ND (UO2SGREF21)
21	LE448 (GY-BU)	18	CTRL MOD. - POWERTRAIN # VOLTAGE REFERENCE UNIVERSAL HEGO 1ST UO2SGREF11)
22	RET24 (BN-BU)	20	CTRL MOD. - POWERTRAIN # TRANSMISSION RANGE SIGNAL RETURN (TRGND)
22	RET24 (BN-BU)	18	CTRL MOD. - POWERTRAIN # TRANSMISSION RANGE SIGNAL RETURN (TRGND)
23	RE134 (BU-OG)	20	CTRL MOD. - POWERTRAIN # ELECTRONIC THROTTLE CONTROL (ETCRTN)
24	VET27 (BN-YE)	20	SENSOR - TRANSMISSION FLUID TEMPERATURE (TFT)
25	RET33 (WH-VT)	20	SENSOR - TURBINE/TRANSMISSION SHAFT SPEED (TSS) -
26	RET04 (YE-OG)	18	CTRL MOD. - POWERTRAIN # SENSOR OUTPUT SHAFT SPEED (OSS)
26	RET04 (YE-OG)	20	CTRL MOD. - POWERTRAIN # SENSOR OUTPUT SHAFT SPEED (OSS)
27	VE740 (VT-GY)	18	SENSOR - INTAKE AIR TEMPERATURE (IAT)

CONNECTOR VIEWS > CONNECTOR END VIEW C1427 - MANIFOLD ABSOLUTE PRESSURE/INTAKE AIR TEMPERATURE 2 (MAP/IAT2) SENSOR

Connector:C1427

Description

MANIFOLD ABSOLUTE PRESSURE/INTAKE AIR TEMPERATURE 2 (MAP/IAT2) SENSOR

Color

BK

Harness

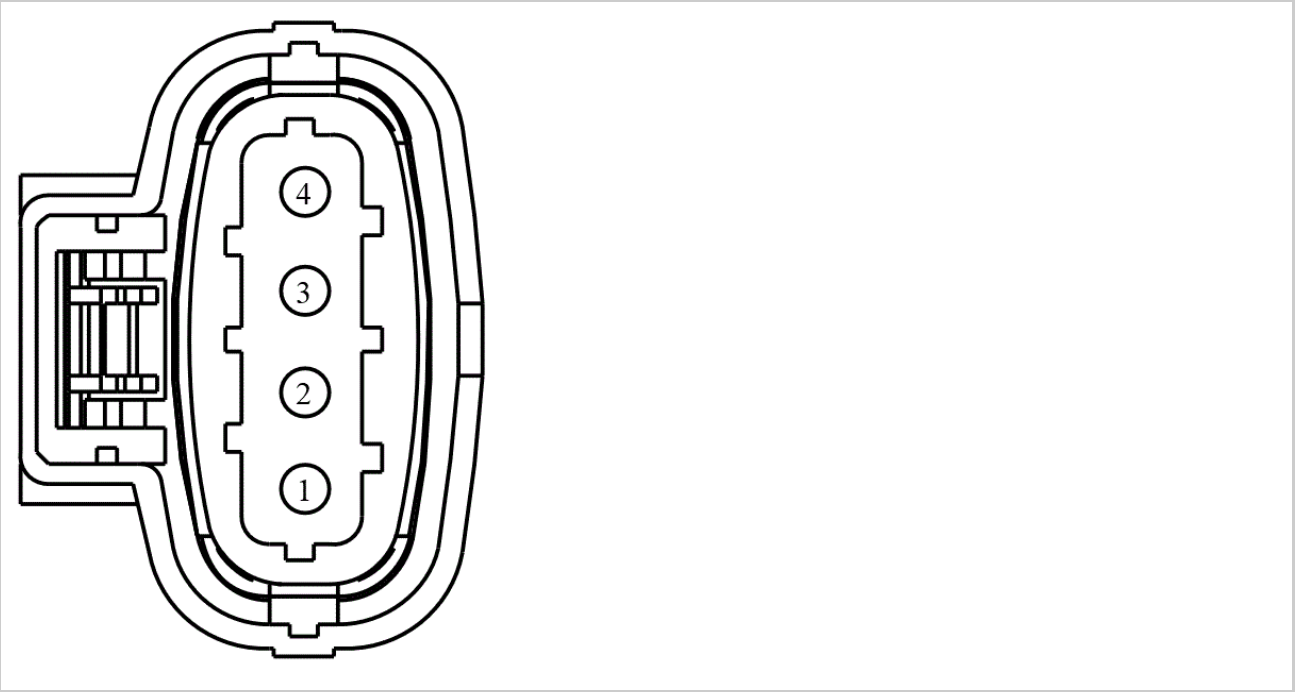
12C508

Base Part #

part# N/A

Service Pigtail

See Below

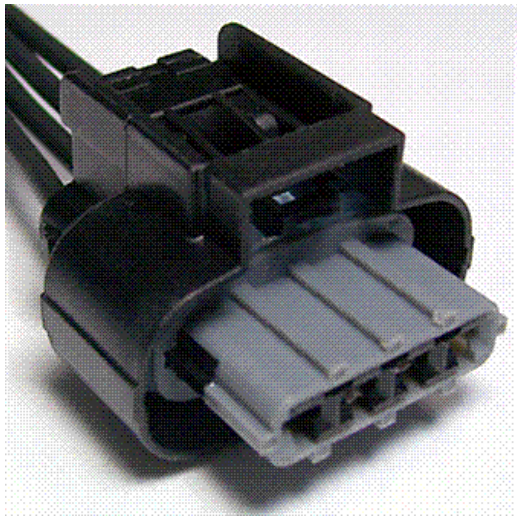


Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	RE454	20	CTRL MOD. - POWERTRAIN # SIGNAL RETURN ENGINE #2	

	(YE-GN)		
1	RE454 (YE-GN)	18	CTRL MOD. - POWERTRAIN # SIGNAL RETURN ENGINE #2
2	RE804 (GY-BU)	20	SENSOR - MANIFOLD ABSOLUTE PRESSURE THERMISTOR (TMAP) -
2	RE804 (GY-BU)	18	SENSOR - MANIFOLD ABSOLUTE PRESSURE THERMISTOR (TMAP) -
3	LE458 (BU-WH)	20	CTRL MOD. - POWERTRAIN # VOLTAGE REFERENCE ENGINE 2 (VREF2)
3	LE458 (BU-WH)	18	CTRL MOD. - POWERTRAIN # VOLTAGE REFERENCE ENGINE 2 (VREF2)
4	VE804 (GN-BN)	20	SENSOR - MANIFOLD ABSOLUTE PRESSURE THERMISTOR (TMAP) +
4	VE804 (GN-BN)	18	SENSOR - MANIFOLD ABSOLUTE PRESSURE THERMISTOR (TMAP) +

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1232**	Service Part Number: **BU2Z-14S411-ATA** Gauge: **14** Pin material: **Tin (greased)** Cavities: **4** Vehicle Uses

	Sensor - Manifold Pressure/Intake Temperature

CONNECTOR VIEWS > CONNECTOR END VIEW C1449 - THROTTLE POSITION (TP) SENSOR

Connector:C1449

Description

THROTTLE POSITION (TP) SENSOR

Color

BK

Harness

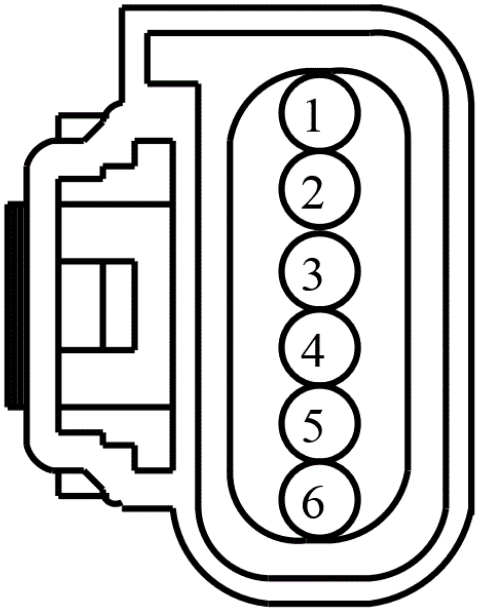
12C508

Base Part #

part# N/A

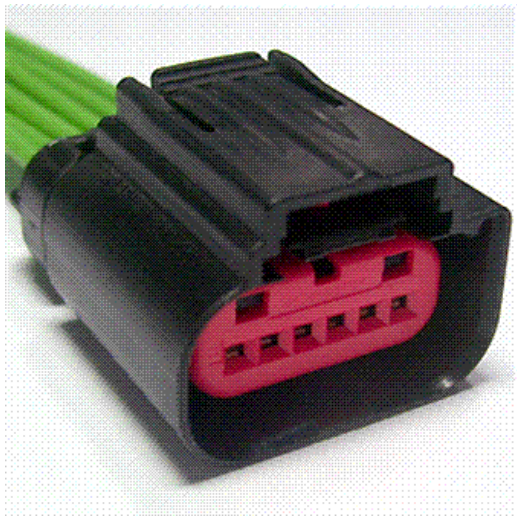
Service Pigtail

See Below



Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CE412 (YE-VT)	18	CTRL MOD. - POWERTRAIN # THROTTLE ACTUATOR CONTROL MOTOR (TACM+)	
2	CE426 (BU-GN)	18	CTRL MOD. - POWERTRAIN # THROTTLE ACTUATOR CONTROL MOTOR (TACM-)	
3	VE818 (BN)	20	SENSOR - THROTTLE POSITION # NEGATIVE SLOPE (TP1-)	
4	RE134 (BU-OG)	20	CTRL MOD. - POWERTRAIN # ELECTRONIC THROTTLE CONTROL (ETCRTN)	
5	LE134 (YE)	20	CTRL MOD. - POWERTRAIN # ELECTRONIC THROTTLE CONTROL (ETCREF)	
6	VE819 (GN-VT)	20	SENSOR - THROTTLE POSITION # POSITIVE SLOPE (TP2-)	

Available Pigtail Kits	
Pigtail Kit Part Number	Service Part Number:

WPT-1063 	**AU2Z-14S411-MA** Gauge: **18** Pin material: **Silver** Cavities: **6** Vehicle Uses Control - Electronic Throttle

CONNECTOR VIEWS > CONNECTOR END VIEW C1451 - VARIABLE CAMSHAFT TIMING BANK 1 SOLENOID 1 (VCT11)

Connector:C1451

Description

VARIABLE CAMSHAFT TIMING BANK 1 SOLENOID 1 (VCT11)

Color

Harness

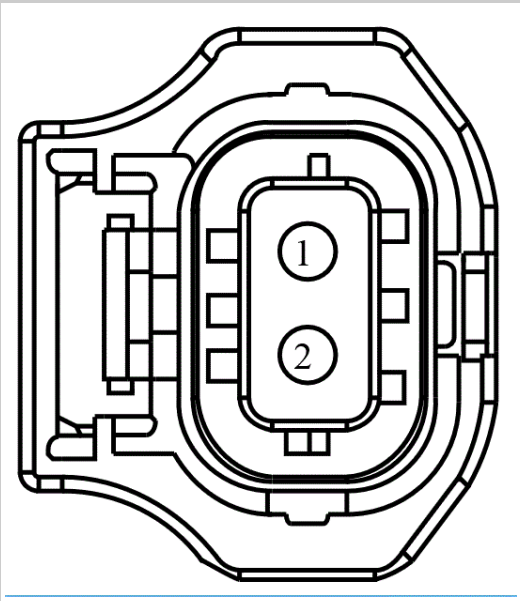
12C508

Base Part #

part# N/A

Service Pigtail

Not Available



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CE421 (VT)	18	CTRL MOD. - POWERTRAIN # VARIABLE CAMSHAFT TIMING VALVE 1 (VCT11)	
2	CBK02 (GN)	18	FUSE - 40 OR CIRCUIT BREAKER (VPWR)	

CONNECTOR VIEWS > CONNECTOR END VIEW C1452 - VARIABLE CAMSHAFT TIMING BANK 2 SOLENOID 1 (VCT21)

Connector:C1452

Description

VARIABLE CAMSHAFT TIMING BANK 2 SOLENOID 1 (VCT21)

Color

Harness

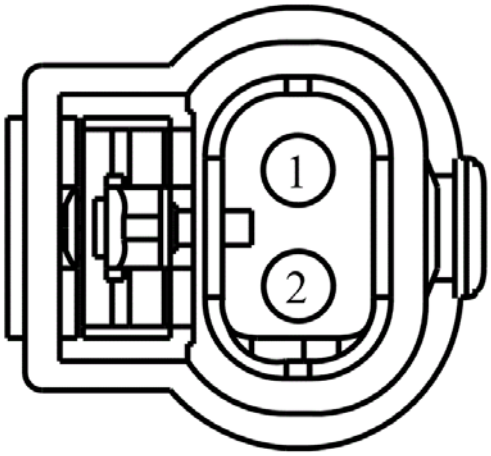
12C508

Base Part #

part# N/A

Service Pigtail

See Below



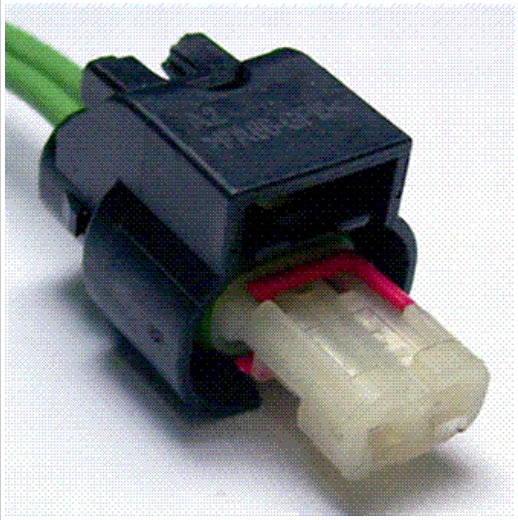
Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CBK02 (GN)	20	FUSE - 40 OR CIRCUIT BREAKER (VPWR 2)	
2	CE442 (YE-GY)	20	CTRL MOD. - POWERTRAIN # VARIABLE CAMSHAFT TIMING VALVE 3	

Available Pigtail Kits

Pigtail Kit Part Number

WPT-1250



Service Part Number:

CU2Z-14S411-CA

Gauge:

18

Pin material:

Silver

Cavities:

2

Vehicle Uses

Solenoid - Engine Variable Timing

CONNECTOR VIEWS > CONNECTOR END VIEW C1463A - POWER STEERING CONTROL MODULE (PSCM)

Connector:C1463A

Description

POWER STEERING CONTROL MODULE (PSCM)

Color

BK

Harness

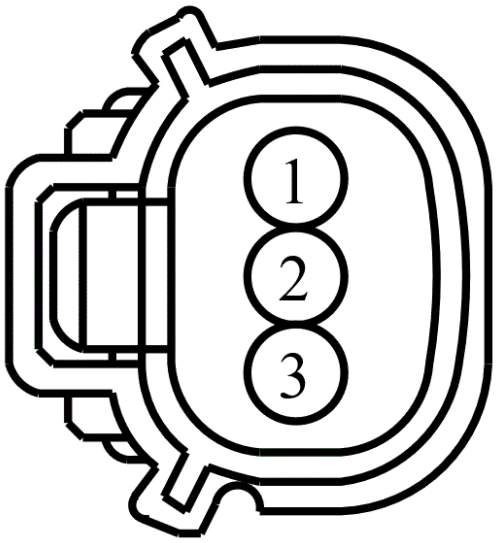
14B060

Base Part #

part# N/A

Service Pigtail

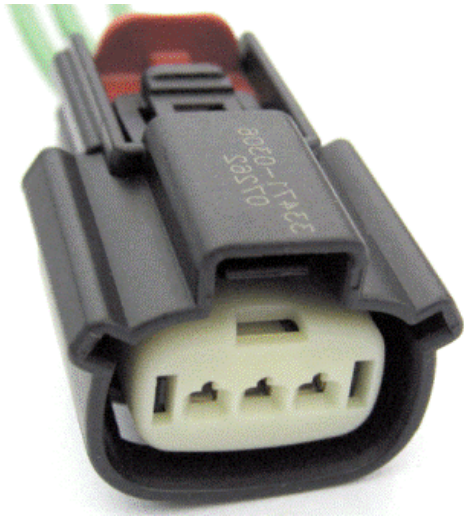
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CBB64 (GN-VT)	20	FUSE - 64 OR CIRCUIT BREAKER	

2	VDB25 (GN-OG)	20	CONNECTOR - DIAGNOSTIC # CAN BUS HIGH SPEED 2 (UPPER) HIGH	
3	VDB26 (GY-BU)	20	CONNECTOR - DIAGNOSTIC # CAN BUS HIGH SPEED 2 (UPPER) LOW	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-931** 	Service Part Number: **9U2Z-14S411-EA** Gauge: **14** Pin material: **Silver** Cavities: **3** Vehicle Uses Coil - Ignition

CONNECTOR VIEWS > CONNECTOR END VIEW C1463B - POWER STEERING CONTROL MODULE (PSCM)

Connector:C1463B

Description

POWER STEERING CONTROL MODULE (PSCM)

Color

BK

Harness

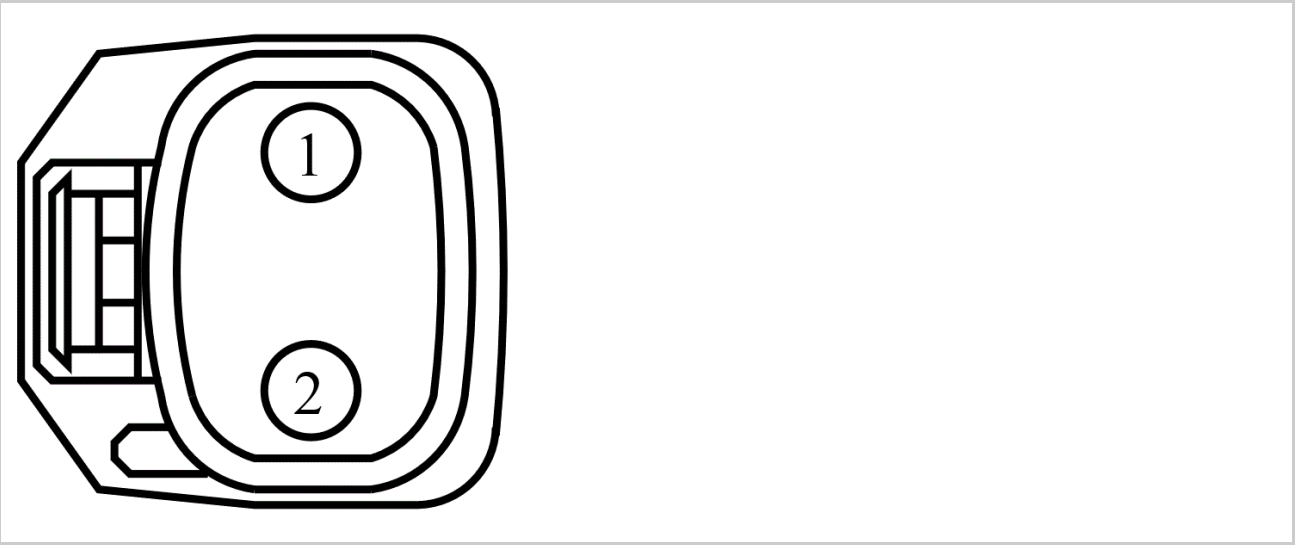
14B060

Base Part #

part# N/A

Service Pigtail

Not Available



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	GD192 (BK)	4	GROUND - FENDER FRONT LEFT # 5TH POINT	
2	SBF02 (RD)	4	FUSE - 2	
2	SBF02 (YE-RD)	4	FUSE - 2	

CONNECTOR VIEWS > CONNECTOR END VIEW C1465 - FRONT IMPACT SEVERITY SENSOR LH

Connector:C1465

Description

FRONT IMPACT SEVERITY SENSOR LH

Color

Harness

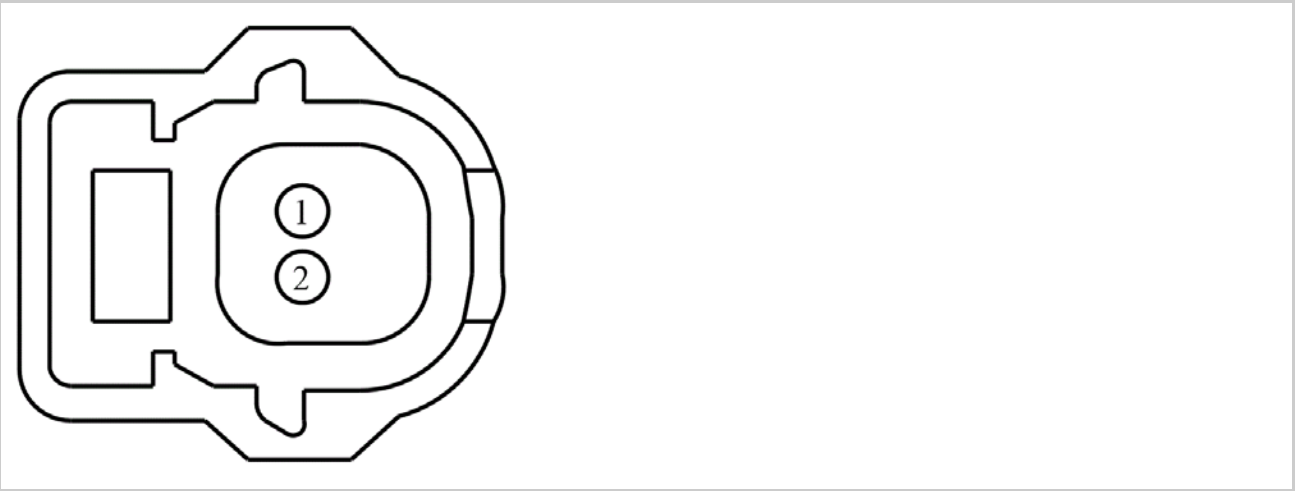
14290

Base Part #

part# N/A

Service Pigtail

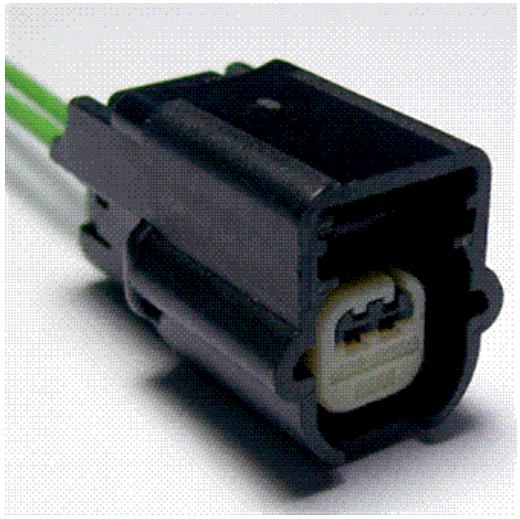
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	VR213 (VT-GN)	20	SENSOR - IMPACT FRONT 1ST	
2	RR129 (YE-GY)	20	CTRL MOD. - SENSOR IMPACT FRONT 1ST -	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1314**	Service Part Number: **8U2Z-14S411-AAC** Gauge: **20** Pin material: **Silver** Cavities: **2** Vehicle Uses



Sensor - Crash (Engine Compartment)

Sensor - Seat Track Position

Sensor - Side Impact

Solenoid - Down Shift

Solenoid - Torque Control Coupling

Valve - Heated PCV

Valve - Heater Core Shut Off

Valve - Transmission Fluid Warmer

CONNECTOR VIEWS > CONNECTOR END VIEW C1466 - FRONT IMPACT SEVERITY SENSOR RH

Connector:C1466

Description

FRONT IMPACT SEVERITY SENSOR RH

Color

Harness

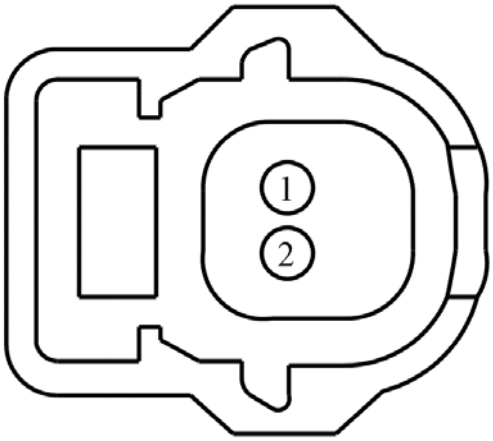
14290

Base Part #

part# N/A

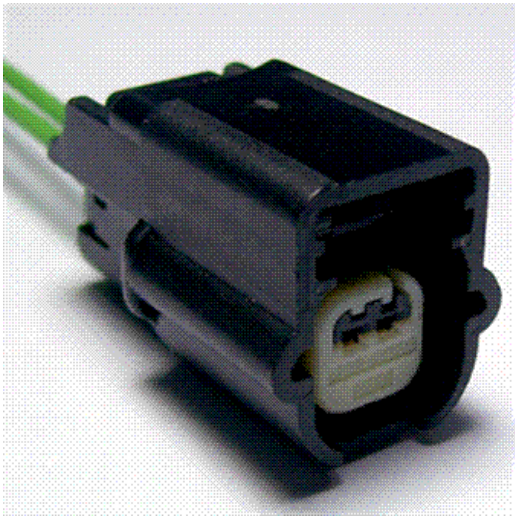
Service Pigtail

See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	VR214 (WH-BU)	20	SENSOR - IMPACT FRONT 2ND	
2	RR130 (GN-BU)	20	CTRL MOD. - SENSOR IMPACT FRONT 2ND	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1314** 	Service Part Number: **8U2Z-14S411-AAC** Gauge: **20** Pin material: **Silver** Cavities: **2** Vehicle Uses Sensor - Crash (Engine Compartment) Sensor - Seat Track Position Sensor - Side Impact Solenoid - Down Shift Solenoid - Torque Control Coupling Valve - Heated PCV Valve - Heater Core Shut Off Valve - Transmission Fluid Warmer

CONNECTOR VIEWS > CONNECTOR END VIEW C1510 - UNIVERSAL HEATED OXYGEN SENSOR (HO2S) #11

Connector:C1510

Description

UNIVERSAL HEATED OXYGEN SENSOR (HO2S) #11

Color

BN

Harness

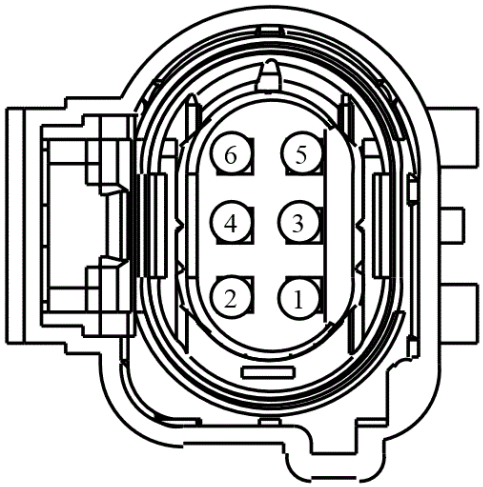
12C508

Base Part #

part# N/A

Service Pigtail

Not Available



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	LE451 (BN-YE)	18	CTRL MOD. - POWERTRAIN # UNIVERSAL HEATED OXYGEN PUMPING CURRENT 1ST (UO2SPC11)	
2	LE448 (GY-BU)	18	CTRL MOD. - POWERTRAIN # VOLTAGE REFERENCE UNIVERSAL HEGO 1ST (UO2SGREF11)	
3	CE235 (GN-BN)	18	CTRL MOD. - POWERTRAIN # HEATER OXYGEN SEN. PRE CAT. 1ST OR UNIQUE (UO2SHTR11)	

CONNECTOR VIEWS > CONNECTOR END VIEW C1512 - KNOCK SENSOR 1 (KS1)

Connector:C1512

Description

KNOCK SENSOR 1 (KS1)

Color

DK GY

Harness

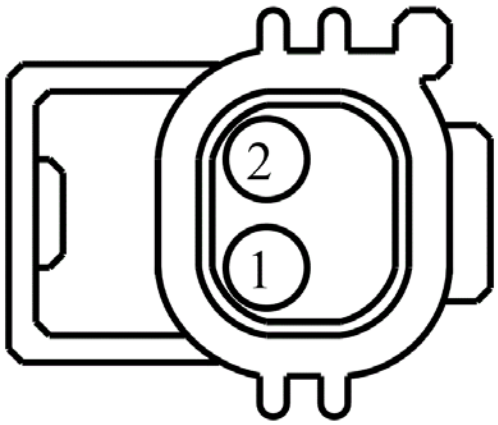
14B485

Base Part #

part# N/A

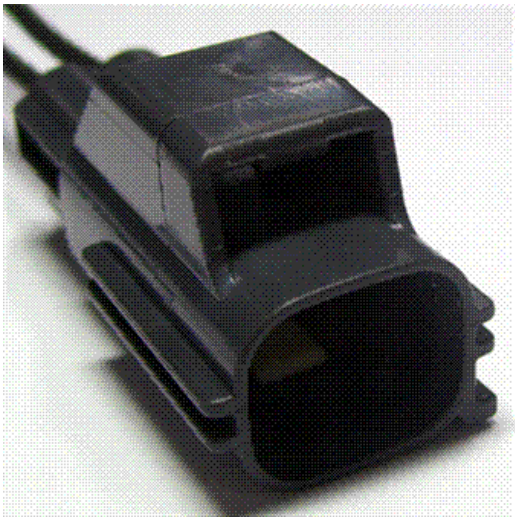
Service Pigtail

See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	RE323 (WH-BN)	20	CTRL MOD. - POWERTRAIN # KNOCK SENSOR 1ST BANK 1ST OR UNIQUE (KS1-)	
2	VE801 (VT-OG)	20	SENSOR - KNOCK 1ST BANK 1ST OR UNIQUE (KS1+)	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-987** 	Service Part Number: **3U2Z-14S411-CZAB** Gauge: **16** Pin material: **Tin (greased)** Cavities: **2** Vehicle Uses Sensor - Cylinder Head Temperature Sensor - Knock

CONNECTOR VIEWS > CONNECTOR END VIEW C1514 - KNOCK SENSOR 2 (KS2)

Connector:C1514

Description

KNOCK SENSOR 2 (KS2)

Color

DK GY

Harness

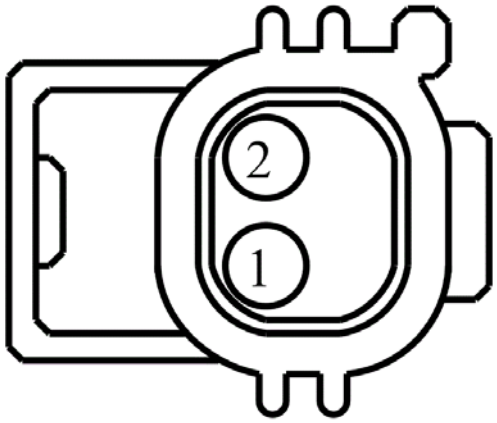
14B485

Base Part #

part# N/A

Service Pigtail

See Below



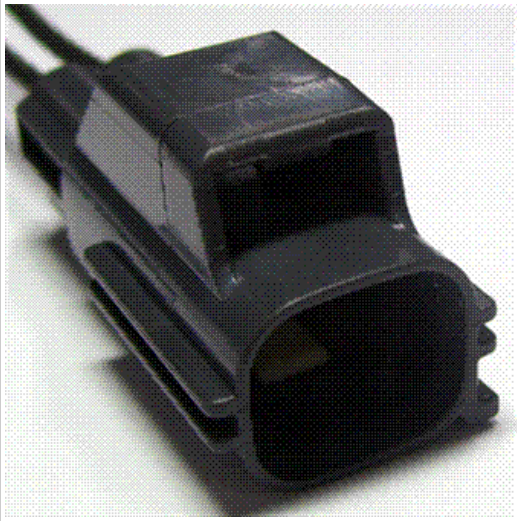
Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	RE324 (BN-GN)	20	CTRL MOD. - POWERTRAIN # KNOCK SENSOR 2ND BANK 1ST (KS2-)	
2	VE802 (BN-BU)	20	SENSOR - KNOCK 2ND BANK 1ST (KS2+)	

Available Pigtail Kits

Pigtail Kit Part Number

WPT-987



Service Part Number:

3U2Z-14S411-CZAB

Gauge:

16

Pin material:

Tin (greased)

Cavities:

2

Vehicle Uses

Sensor - Cylinder Head Temperature

Sensor - Knock

CONNECTOR VIEWS > CONNECTOR END VIEW C1538 - IGNITION COIL-ON-PLUG 1

Connector:C1538

Description

IGNITION COIL-ON-PLUG 1

Color

Harness

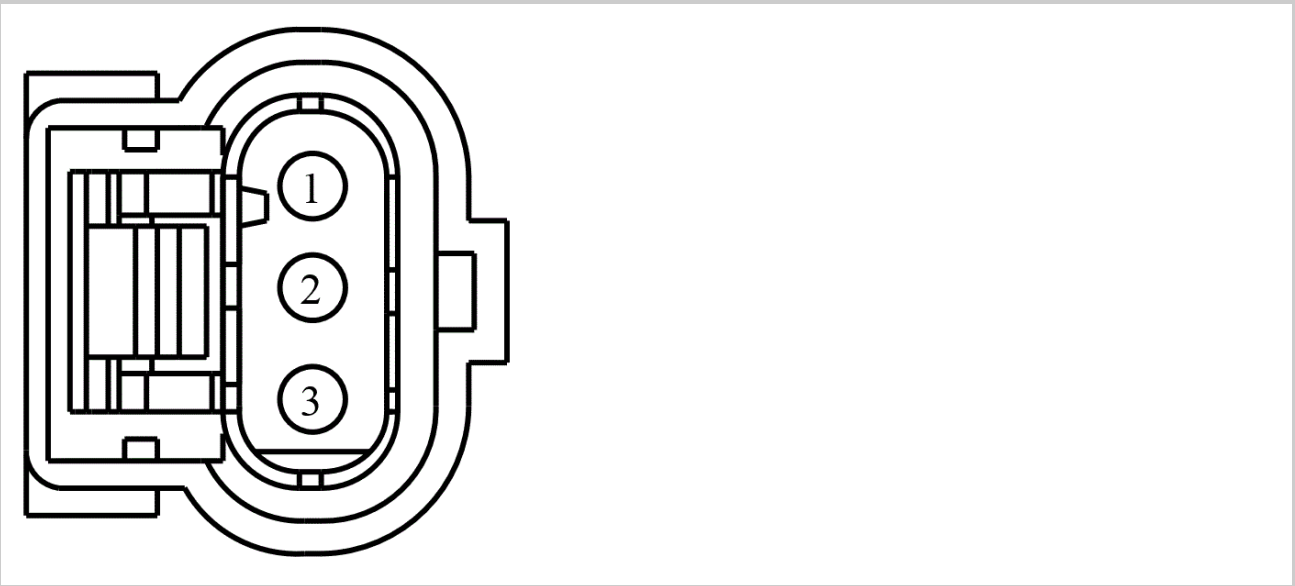
12C508

Base Part #

part# N/A

Service Pigtail

Not Available



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CE303 (WH-VT)	18	CTRL MOD. - POWERTRAIN # IGNITION COIL ON PLUG ASSEMBLY 1 (COP1A)	
2	GD108 (BK-VT)	16	GROUND - CHASSIS / BATTERY	

3	CBK04 (VT)	16	FUSE - 44 OR CIRCUIT BREAKER (VPWR)	

CONNECTOR VIEWS > CONNECTOR END VIEW C1539 - IGNITION COIL-ON-PLUG 2

Connector:C1539

Description

IGNITION COIL-ON-PLUG 2

Color

Harness

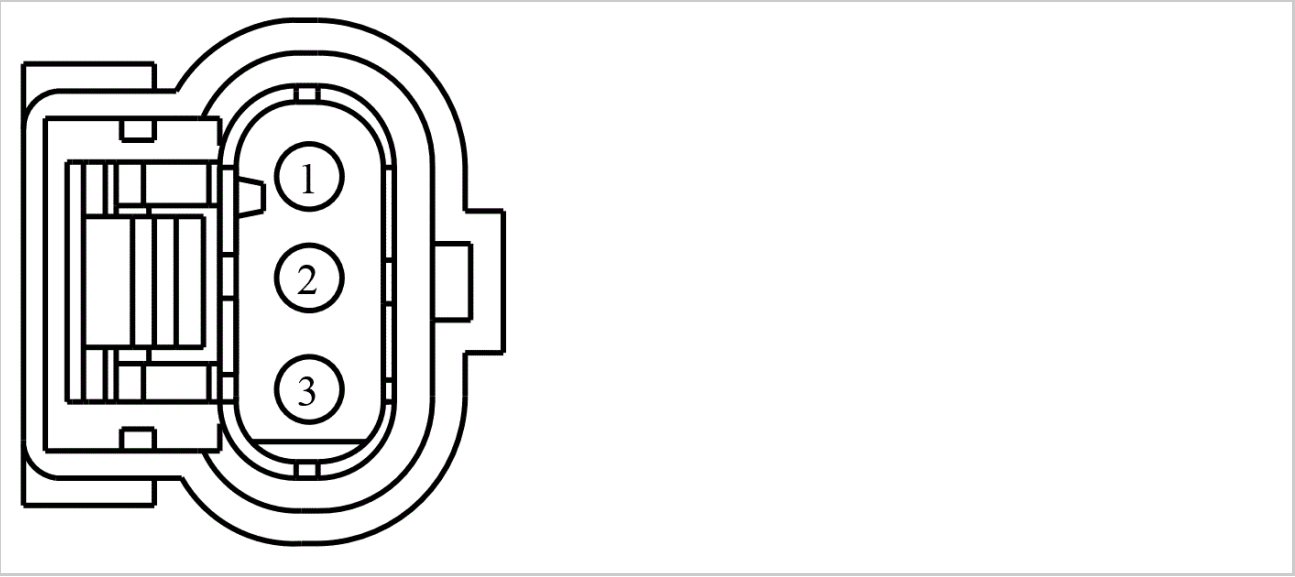
12C508

Base Part #

part# N/A

Service Pigtail

Not Available



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CE304 (YE-BU)	18	CTRL MOD. - POWERTRAIN # IGNITION COIL ON PLUG ASSEMBLY 2 (COP2D)	

2	GD108 (BK-VT)	16	GROUND - CHASSIS / BATTERY	
3	CBK04 (VT)	16	FUSE - 44 OR CIRCUIT BREAKER (VPWR)	

CONNECTOR VIEWS > CONNECTOR END VIEW C1540 - IGNITION COIL-ON-PLUG 3

Connector:C1540

Description

IGNITION COIL-ON-PLUG 3

Color

Harness

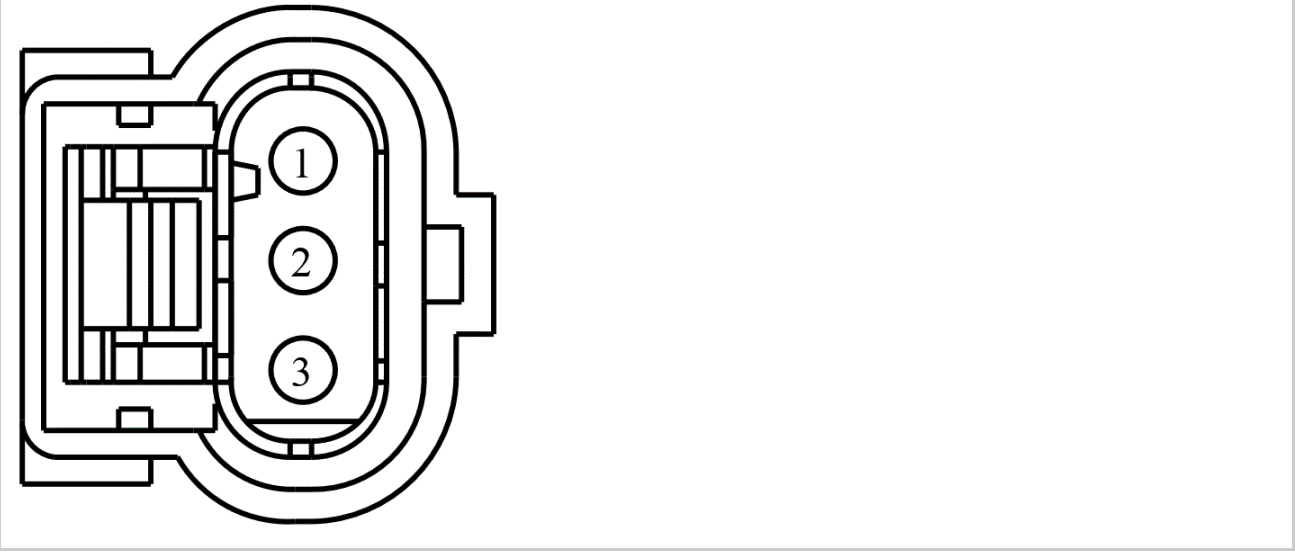
12C508

Base Part #

part# N/A

Service Pigtail

Not Available



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier

1	CE305 (BU-OG)	18	CTRL MOD. - POWERTRAIN # IGNITION COIL ON PLUG ASSEMBLY 3 (COP3B)	
2	GD108 (BK-VT)	16	GROUND - CHASSIS / BATTERY	
3	CBK04 (VT)	16	FUSE - 44 OR CIRCUIT BREAKER (VPWR)	

CONNECTOR VIEWS > CONNECTOR END VIEW C1541 - IGNITION COIL-ON-PLUG 4

Connector:C1541

Description

IGNITION COIL-ON-PLUG 4

Color

Harness

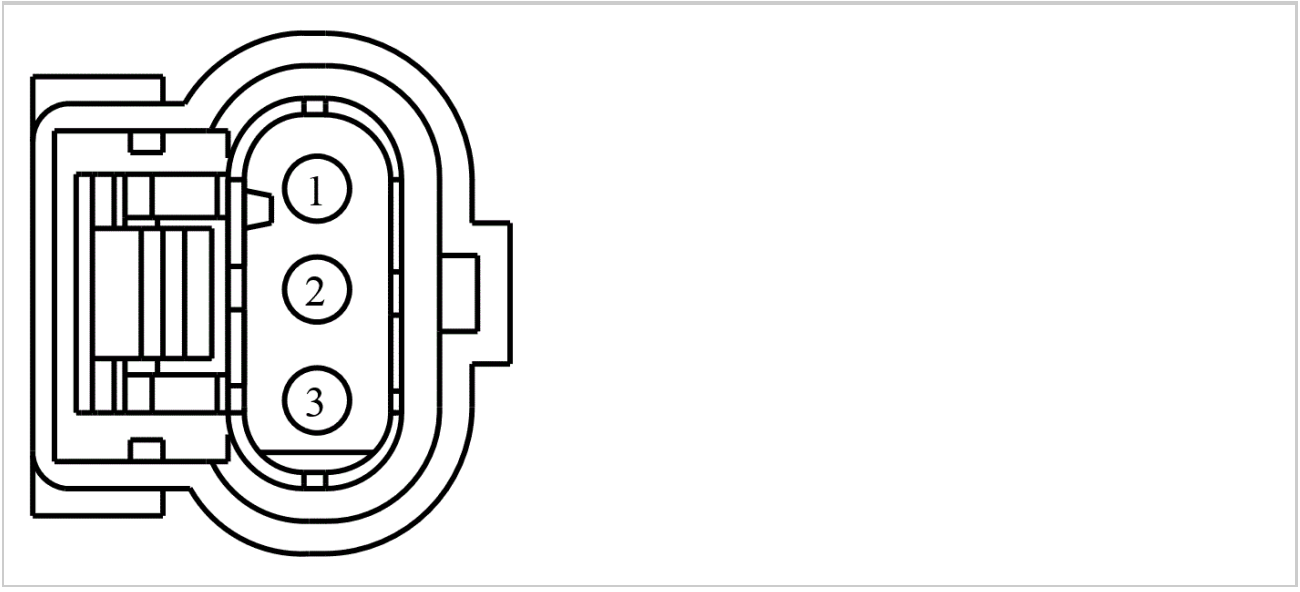
12C508

Base Part #

part# N/A

Service Pigtail

Not Available



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CE306 (GN-VT)	18	CTRL MOD. - POWERTRAIN # IGNITION COIL ON PLUG ASSEMBLY 4 (COP4C)	
2	GD108 (BK-VT)	16	GROUND - CHASSIS / BATTERY	
3	CBK04 (VT)	16	FUSE - 44 OR CIRCUIT BREAKER (VPWR)	

CONNECTOR VIEWS > CONNECTOR END VIEW C1548 - VARIABLE CAMSHAFT TIMING BANK 2 SOLENOID 2 (VCT22)

Connector:C1548

Description

VARIABLE CAMSHAFT TIMING BANK 2 SOLENOID 2 (VCT22)

Color

Harness

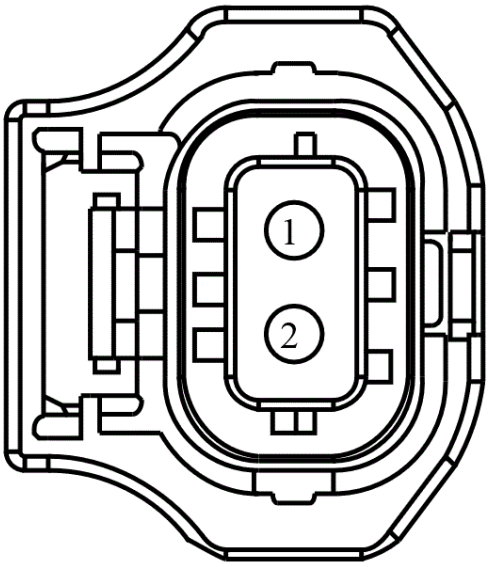
12C508

Base Part #

part# N/A

Service Pigtail

Not Available



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CE443 (BN-VT)	18	CTRL MOD. - POWERTRAIN # VARIABLE CAMSHAFT TIMING VALVE 4 (VCT22)	
2	CBK02 (GN)	18	FUSE - 40 OR CIRCUIT BREAKER (VPWR)	

CONNECTOR VIEWS > CONNECTOR END VIEW C1551B - POWERTRAIN CONTROL MODULE (PCM)

Connector:C1551B

Description

POWERTRAIN CONTROL MODULE (PCM)

Color

Harness

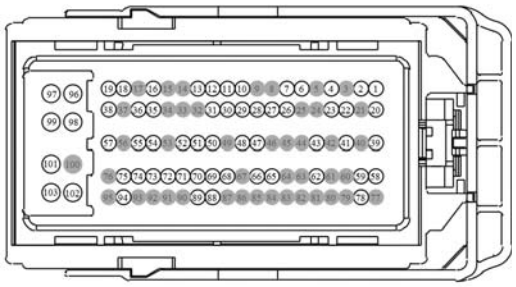
14290

Base Part #

part# N/A

Service Pigtail

Not Available



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CE233 (WH-OG)	18	CTRL MOD. - POWERTRAIN # HEATER OXYGEN SEN. POST CAT. 1ST OR UNIQUE (HTR12)	
2	CH302 (WH-BN)	20	CTRL MOD. - POWERTRAIN # A/C CLUTCH CONTROL RELAY / WOT AC CUTOFF (ACCR)	
3	*	*	Not Used	
4	CEC01 (WH-BU)	20	CTRL MOD. - COOLING FAN CONTROL HIGH (HFC)	
5	*	*	Not Used	
6	CE904 (GN-VT)	22	SWITCH - CLUTCH PEDAL POSITION # TOP OF TRAVEL (CPP-TT)	
7	RES08 (GY-VT)	20	CTRL MOD. - POWERTRAIN # SPEED CONTROL COMMAND RETURN (SCCSRTN)	
8	*	*	Not Used	
9	*	*	Not Used	
10	LE137 (BU-GY)	22	CTRL MOD. - POWERTRAIN # ACCELERATOR PEDAL POSITION SENSOR 2 (APPVREF2)	

11	LE423 (GN-VT)	22	CTRL MOD. - POWERTRAIN # VOLTAGE REFERENCE ENGINE (VREF) (E-VREF) (VREF1)
12	LE136 (GN-OG)	22	CTRL MOD. - POWERTRAIN # ACCELERATOR PEDAL POSITION SENSOR 1 (APPVREF1)
13	LE230 (BN-BU)	22	CTRL MOD. - POWERTRAIN # FUEL TANK PRESSURE TRANSDUCER REF. VOLT. (VREF)
14	*	*	Not Used
15	*	*	Not Used
16	RE407 (YE-VT)	20	CTRL MOD. - POWERTRAIN # SIGNAL RETURN COWL (C-SIGRTN) (SIGRTN-C)
17	*	*	Not Used
18	RE406 (GY-VT)	22	CTRL MOD. - POWERTRAIN # SIGNAL RETURN TRANSMISSION (SIGRTN)
19	RE320 (BU)	20	CTRL MOD. - POWERTRAIN # MASS AIRFLOW SEN. LH BANK OR 1ST BANK (SIGRTN)
20	CE114 (GN-BU)	18	CTRL MOD. - POWERTRAIN # CANISTER VENT SOLENOID (CANV)
21	*	*	Not Used
22	CE113 (WH-BN)	18	CTRL MOD. - POWERTRAIN # CANISTER PURGE VALVE
23	CEC02 (GN-BU)	20	CTRL MOD. - COOLING FAN CONTROL LOW (LFC)
24	*	*	Not Used

CONNECTOR VIEWS > CONNECTOR END VIEW C1551E - POWERTRAIN CONTROL MODULE (PCM)

Connector:C1551E

Description

POWERTRAIN CONTROL MODULE (PCM)

Color

Harness

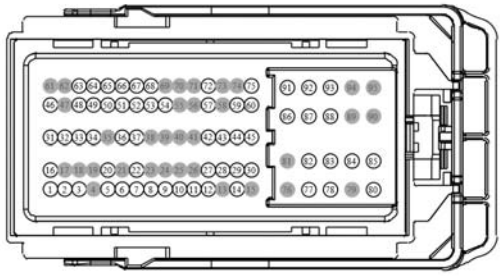
12C508

Base Part #

part# N/A

Service Pigtail

Not Available



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CE421 (VT)	18	CTRL MOD. - POWERTRAIN # VARIABLE CAMSHAFT TIMING VALVE 1 (VCT11)	
2	CET18 (GY-YE)	20	CTRL MOD. - POWERTRAIN # SOLENOID SHIFT CONTROL LOW-SIDE 1 (SS1)	
3	CE148 (YE-GY)	18	CTRL MOD. - POWERTRAIN # ENGINE COOLANT BYPASS VALVE (TCBY)	

4	*	*	Not Used
5	LE230 (BU)	18	CTRL MOD. - POWERTRAIN # FUEL TANK PRESSURE TRANSDUCER REF. VOLT. (VREF)
5	LE230 (BN-BU)	18	CTRL MOD. - POWERTRAIN # FUEL TANK PRESSURE TRANSDUCER REF. VOLT. (VREF)
6	LE458 (BU-WH)	20	CTRL MOD. - POWERTRAIN # VOLTAGE REFERENCE ENGINE 2 (VREF2)
7	LE134 (YE)	20	CTRL MOD. - POWERTRAIN # ELECTRONIC THROTTLE CONTROL (ETCREF)
8	LE423 (GN-VT)	20	CTRL MOD. - POWERTRAIN # VOLTAGE REFERENCE ENGINE (VREF)
9	CMC24 (GY)	18	SWITCH - OIL PRESSURE
10	VET32 (VT)	20	SENSOR - TRANSMISSION RANGE # PWM OUTPUT (TR -P)
11	VE711 (YE-VT)	20	SENSOR - CRANKSHAFT POSITION (CKP)
12	VET26 (BN-GN)	20	SENSOR - OUTPUT SHAFT SPEED (OSS)
13	*	*	Not Used
14	CE235 (GN-BN)	18	CTRL MOD. - POWERTRAIN # HEATER OXYGEN SEN. PRE CAT. 1ST OR UNIQUE (UO2SHTR11)
15	*	*	Not Used
16	CE460	18	CTRL MOD. - POWERTRAIN # WASTEGATE SOLENOID

	(VT-WH)		(TCWRVS)
17	*	*	Not Used
18	*	*	Not Used
19	*	*	Not Used
20	RE454 (YE-GN)	18	CTRL MOD. - POWERTRAIN # SIGNAL RETURN ENGINE #2 (SIGRTN)
21	*	*	Not Used
22	LE111 (VT-GN)	20	CTRL MOD. - POWERTRAIN # BUFFERED POWER SUPPLY SENSORS (VBPWR)
23	*	*	Not Used
24	*	*	Not Used
25	*	*	Not Used
26	*	*	Not Used
27	VET33 (WH-OG)	20	SENSOR - TURBINE/TRANSMISSION SHAFT SPEED (TSS) +
28	VE706 (BN-BU)	20	SENSOR - CAMSHAFT POSITION BANK 1 IN+EX / IN (CMP11)
29	CE422 (WH-OG)	18	CTRL MOD. - POWERTRAIN # VARIABLE CAMSHAFT TIMING VALVE 2 (VCT12)
30	CET08 (BN-WH)	20	CTRL MOD. - POWERTRAIN # SOLENOID PRESSURE CONTROL 4 (PC4) [EPC] [VFS]

31	RE134 (BU-OG)	20	CTRL MOD. - POWERTRAIN # ELECTRONIC THROTTLE CONTROL (ETCRTN)
32	RET24 (BN-BU)	20	CTRL MOD. - POWERTRAIN # TRANSMISSION RANGE SIGNAL RETURN (TRGND)
33	VE804 (GN-BN)	20	SENSOR - MANIFOLD ABSOLUTE PRESSURE (MAP)
33	VE804 (GN-BN)	18	SENSOR - MANIFOLD ABSOLUTE PRESSURE (MAP)
34	RE804 (GY-BU)	18	SENSOR - MANIFOLD ABSOLUTE PRESSURE (MAP)
34	RE804 (GY-BU)	20	SENSOR - MANIFOLD ABSOLUTE PRESSURE (MAP)
35	*	*	Not Used
36	VE716 (YE)	20	SENSOR - ENGINE COOLANT TEMPERATURE (ECT)
37	LE238 (GY)	20	CTRL MOD. - POWERTRAIN # FUEL RAIL PRESSURE (FRP)
38	*	*	Not Used
39	*	*	Not Used
40	*	*	Not Used
41	*	*	Not Used
42	CE303 (WH-VT)	18	CTRL MOD. - POWERTRAIN # IGNITION COIL ON PLUG ASSEMBLY 1 (COP1A)

43	CE306 (GN-VT)	18	CTRL MOD. - POWERTRAIN # IGNITION COIL ON PLUG ASSEMBLY 4 (COP4C)
44	CET10 (BU-GY)	20	CTRL MOD. - POWERTRAIN # SOLENOID PRESSURE CONTROL 6 (PC6) [EPC] [VFS]
45	CET06 (GN)	20	CTRL MOD. - POWERTRAIN # SOLENOID PRESSURE CONTROL 2 (PC2) [EPC] [VFS]
46	VE712 (BU-GY)	20	SENSOR - CYLINDER HEAD TEMPERATURE 2 (CHT)
47	*	*	Not Used
48	LE452 (GN)	18	CTRL MOD. - POWERTRAIN # UNIVERSAL HEATED OXYGEN MEASURED PUMPING CURRENT 1ST (UO2SPCT11)
49	LE448 (GY-BU)	18	CTRL MOD. - POWERTRAIN # VOLTAGE REFERENCE UNIVERSAL HEGO 1ST (UO2SGREF11)
50	VE802 (BN-BU)	18	SENSOR - KNOCK 2ND BANK 1ST (KS2+)
51	RE324 (BN-GN)	18	CTRL MOD. - POWERTRAIN # KNOCK SENSOR 2ND BANK 1ST (KS2-)
52	VE819 (GN-VT)	20	SENSOR - THROTTLE POSITION # POSITIVE SLOPE (TP2-)
53	RE405 (GN-WH)	20	CTRL MOD. - POWERTRAIN # SIGNAL RETURN ENGINE (SIGRTN)
54	VE707 (GN-VT)	20	SENSOR - CAMSHAFT POSITION BANK 2 IN+EX / IN (CMP12)
55	*	*	Not Used

56	*	*	Not Used
57	CE304 (YE-BU)	18	CTRL MOD. - POWERTRAIN # IGNITION COIL ON PLUG ASSEMBLY 2 (COP-2D)
58	*	*	Not Used
59	CET09 (YE-VT)	20	CTRL MOD. - POWERTRAIN # SOLENOID PRESSURE CONTROL 5 (PC5) [EPC] [VFS]
60	CET05 (BU-GN)	20	CTRL MOD. - POWERTRAIN # SOLENOID PRESSURE CONTROL 1 (PC1) [EPC] [VFS]
61	*	*	Not Used
62	*	*	Not Used
63	LE451 (BN-YE)	18	CTRL MOD. - POWERTRAIN # UNIVERSAL HEATED OXYGEN PUMPING CURRENT 1ST (UO2SPC11)
64	VE826 (BN-VT)	18	SENSOR - UNIVERSAL HEATED OXYGEN 1ST OR UNIQUE (UO2S11)
65	VE801 (VT-OG)	18	SENSOR - KNOCK 1ST BANK 1ST OR UNIQUE (KS1+)
66	RE323 (WH-BN)	18	CTRL MOD. - POWERTRAIN # KNOCK SENSOR 1ST BANK 1ST OR UNIQUE (KS1-)
67	VET27 (BN-YE)	20	SENSOR - TRANSMISSION FLUID TEMPERATURE (TFT)
68	VE818 (BN)	20	SENSOR - THROTTLE POSITION # NEGATIVE SLOPE (TP1-)
69	*	*	Not Used

70	*	*	Not Used
71	*	*	Not Used
72	CE305 (BU-OG)	18	CTRL MOD. - POWERTRAIN # IGNITION COIL ON PLUG ASSEMBLY 3 (COP3B)
73	*	*	Not Used
74	*	*	Not Used
75	CET07 (GY-OG)	20	CTRL MOD. - POWERTRAIN # SOLENOID PRESSURE CONTROL 3 (PC3) [EPC] [VFS]
76	*	*	Not Used
77	RE226 (GN-VT)	16	CTRL MOD. - POWERTRAIN # FUEL VOLUME REGULATOR RETURN (FVRRTN)
78	CE226 (YE-VT)	16	CTRL MOD. - POWERTRAIN # FUEL VOLUME REGULATOR (FVR)
79	*	*	Not Used
80	CET49 (BN)	18	CTRL MOD. - POWERTRAIN # TRANSMISSION SOLENOID POWER CONTROL 2 (TSPC2)
81	*	*	Not Used
82	CE207 (VT-GY)	16	CTRL MOD. - POWERTRAIN # FUEL INJECTOR DRIVER 3 (INJ) +
83	CE206 (GY-YE)	16	CTRL MOD. - POWERTRAIN # FUEL INJECTOR DRIVER 2 (INJ) +

84	CE205 (GN-BU)	16	CTRL MOD. - POWERTRAIN # FUEL INJECTOR DRIVER 1 (INJ) +
85	CE208 (YE-OG)	16	CTRL MOD. - POWERTRAIN # FUEL INJECTOR DRIVER 4 (INJ) +
86	CE412 (YE-VT)	18	CTRL MOD. - POWERTRAIN # THROTTLE ACTUATOR CONTROL MOTOR (TACM+)
87	RE205 (YE-BU)	16	CTRL MOD. - POWERTRAIN # FUEL INJECTOR DRIVER 1 (INJ) -
88	RE206 (BU-OG)	16	CTRL MOD. - POWERTRAIN # FUEL INJECTOR DRIVER 2 (INJ) -
89	*	*	Not Used
90	*	*	Not Used
91	CE426 (BU-GN)	18	CTRL MOD. - POWERTRAIN # THROTTLE ACTUATOR CONTROL MOTOR (TACM-)
92	RE208 (BU)	16	CTRL MOD. - POWERTRAIN # FUEL INJECTOR DRIVER 4 (INJ) -
93	RE207 (GN-VT)	16	CTRL MOD. - POWERTRAIN # FUEL INJECTOR DRIVER 3 (INJ) -
94	*	*	Not Used
95	*	*	Not Used

CONNECTOR VIEWS > CONNECTOR END VIEW C1569 - HEATED OXYGEN SENSOR (HO2S) #22

Connector:C1569

Description

HEATED OXYGEN SENSOR (HO2S) #22

Color

BK

Harness

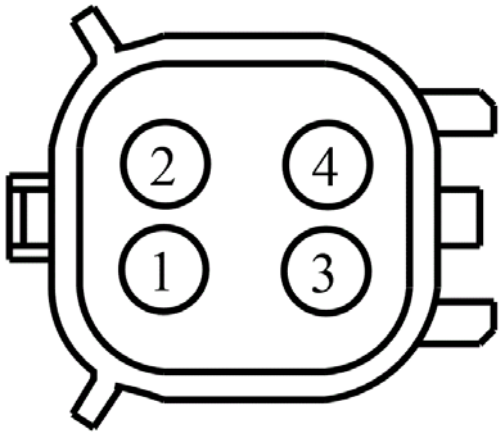
12C508/14B060

Base Part #

part# N/A

Service Pigtail

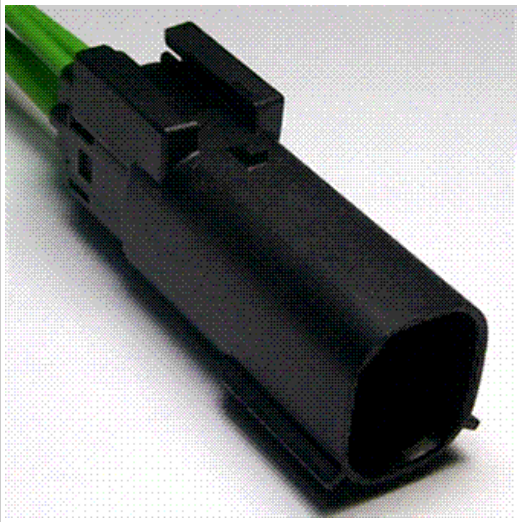
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CBK02 (GN)	18	FUSE - 40 OR CIRCUIT BREAKER (VPWR 2)	
1	CBK02 (GN)	16	FUSE - 40 OR CIRCUIT BREAKER (VPWR 2)	
2	CE234 (BU-WH)	18	CTRL MOD. - POWERTRAIN # HEATER OXYGEN SEN. POST CAT. 2ND (HTR22)	
3	RE249 (WH-GN)	18	CTRL MOD. - POWERTRAIN # HEATED OXYGEN SENSOR POST CAT 2ND	

3	RE407 (YE-VT)	18	CTRL MOD. - POWERTRAIN # SIGNAL RETURN COWL (C-SIGRTN) (SIGRTN-C)	
4	VE733 (WH)	18	SENSOR - HEATED OXYGEN POST CAT. 2ND (HO2S22)	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1288** 	Service Part Number: **CU2Z-14S411-ZA** Gauge: **16** Pin material: **Silver** Cavities: **4** Vehicle Uses Sensor - Catalyst Monitor Sensor - O2 (HEGO/ EGO)

CONNECTOR VIEWS > CONNECTOR END VIEW C1570 - HEATED OXYGEN SENSOR (HO2S) #12

Connector:C1570

Description

HEATED OXYGEN SENSOR (HO2S) #12

Color

BK

Harness

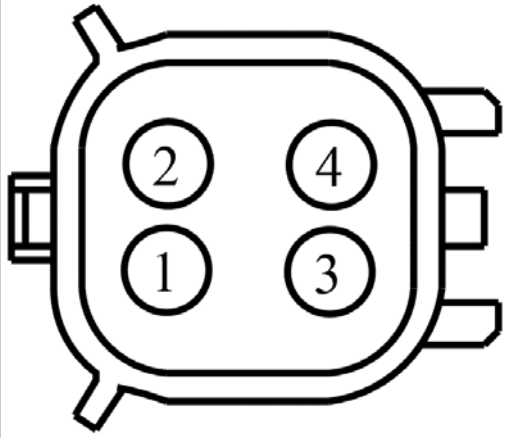
12C508/14B060

Base Part #

part# N/A

Service Pigtail

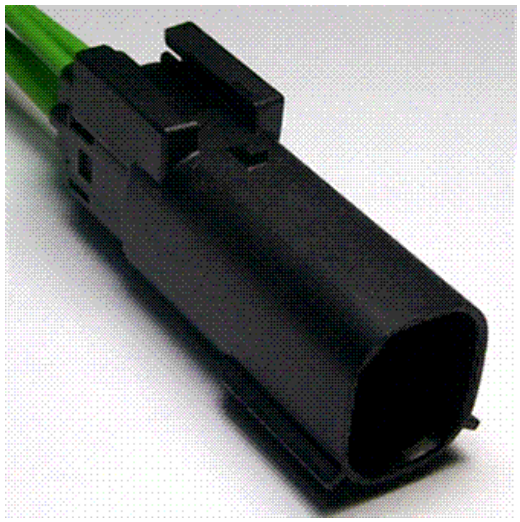
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CBK02 (GN)	18	FUSE - 40 OR CIRCUIT BREAKER (VPWR 2)	
1	CBK02 (GN)	16	FUSE - 40 OR CIRCUIT BREAKER (VPWR 2)	
2	CE233 (WH-OG)	18	CTRL MOD. - POWERTRAIN # HEATER OXYGEN SEN. POST CAT. 1ST OR UNIQUE (HTR12)	
3	RE406 (GY-VT)	18	CTRL MOD. - POWERTRAIN # SIGNAL RETURN TRANSMISSION (T-SIGRTN) (SIGRTN-B)	
3	RE731 (BK)	18	SENSOR - HEATED OXYGEN POST CAT. 1ST OR UNIQUE (LSF_GND)	
4	VE731 (YE-GN)	18	SENSOR - HEATED OXYGEN POST CAT. 1ST OR UNIQUE (HO2S12)	

Available Pigtail Kits	
Pigtail Kit Part Number	Service Part Number:

WPT-1288 	**CU2Z-14S411-ZA** Gauge: **16** Pin material: **Silver** Cavities: **4** Vehicle Uses Sensor - Catalyst Monitor Sensor - O2 (HEGO/ EGO)

CONNECTOR VIEWS > CONNECTOR END VIEW C1571 - UNIVERSAL HEATED OXYGEN SENSOR (HO2S) #11

Connector:C1571

Description

UNIVERSAL HEATED OXYGEN SENSOR (HO2S) #11

Color

BK

Harness

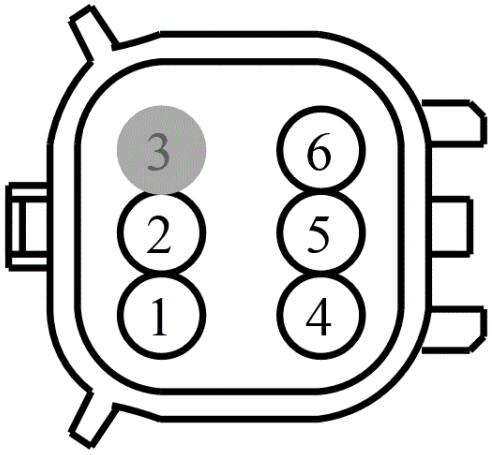
12C508

Base Part #

part# N/A

Service Pigtail

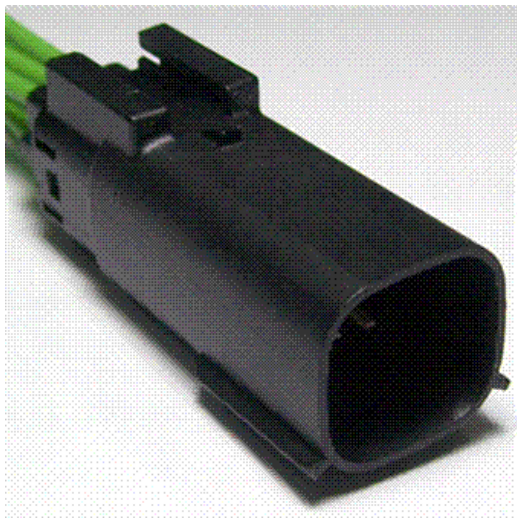
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CBK02 (GN)	18	FUSE - 40 OR CIRCUIT BREAKER (VPWR)	
2	CE235 (GN-BN)	18	CTRL MOD. - POWERTRAIN # HEATER OXYGEN SEN. PRE CAT. 1ST OR UNIQUE (UO2SHTR11)	
3	*	*	Not Used	
4	VE826 (BN-VT)	18	SENSOR - UNIVERSAL HEATED OXYGEN 1ST OR UNIQUE (UO2S11)	
5	LE448 (GY-BU)	18	CTRL MOD. - POWERTRAIN # VOLTAGE REFERENCE UNIVERSAL HEGO 1ST (UO2SGREF11)	
6	LE451 (BN-YE)	18	CTRL MOD. - POWERTRAIN # UNIVERSAL HEATED OXYGEN PUMPING CURRENT 1ST (UO2SPC11)	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1426**	Service Part Number: **FU2Z-14S411-TA** Gauge:



16

Pin material:

Silver

Cavities:

6

Vehicle Uses

Camera - Reverse Park Aid

Lamp - Park/Turn/Stop

Sensor - Coolant Temperature

Sensor - O2 (HEGO/ EGO)

CONNECTOR VIEWS > CONNECTOR END VIEW C1572 - UNIVERSAL HEATED OXYGEN SENSOR (HO2S) #21

Connector:C1572

Description

UNIVERSAL HEATED OXYGEN SENSOR (HO2S) #21

Color

BK

Harness

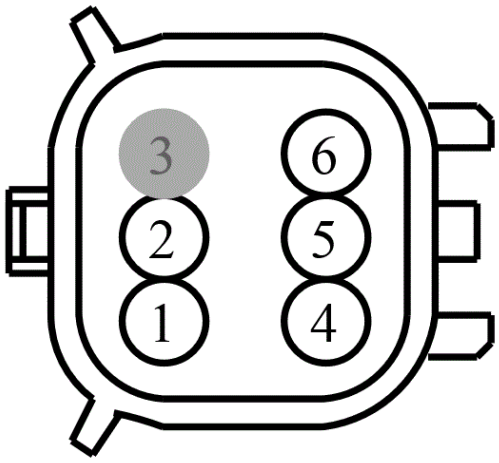
12C508

Base Part #

part# N/A

Service Pigtail

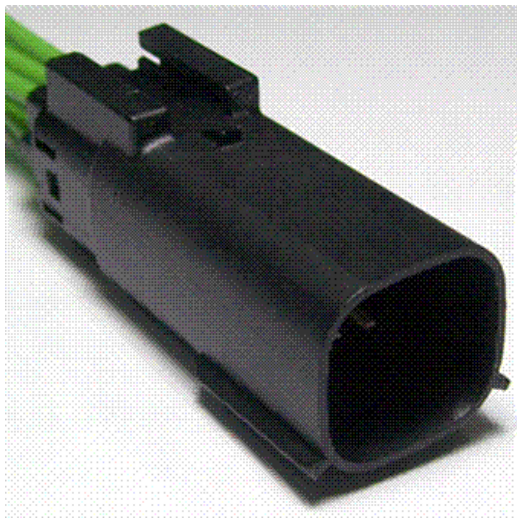
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CBK02 (GN)	18	FUSE - 40 OR CIRCUIT BREAKER (VPWR)	
2	CE236 (GY-VT)	18	CTRL MOD. - POWERTRAIN # HEATER OXYGEN SEN. PRE CAT. 2ND (UO2SHTR21)	
3	*	*	Not Used	
4	VE827 (WH-GN)	18	SENSOR - UNIVERSAL HEATED OXYGEN 2ND (UO2S21)	
5	LE449 (VT-GN)	18	CTRL MOD. - POWERTRAIN # VOLTAGE REFERENCE UNIVERSAL HEGO 2ND (UO2SGREF21)	
6	LE450 (WH)	18	CTRL MOD. - POWERTRAIN # UNIVERSAL HEATED OXYGEN PUMPING CURRENT 2ND (UO2SPC21)	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1426**	Service Part Number: **FU2Z-14S411-TA** Gauge:



16

Pin material:

Silver

Cavities:

6

Vehicle Uses

Camera - Reverse Park Aid

Lamp - Park/Turn/Stop

Sensor - Coolant Temperature

Sensor - O2 (HEGO/ EGO)

CONNECTOR VIEWS > CONNECTOR END VIEW C1575 - 6R80 TRANSMISSION ASSEMBLY

Connector:C1575

Description

6R80 TRANSMISSION ASSEMBLY

Color

BK

Harness

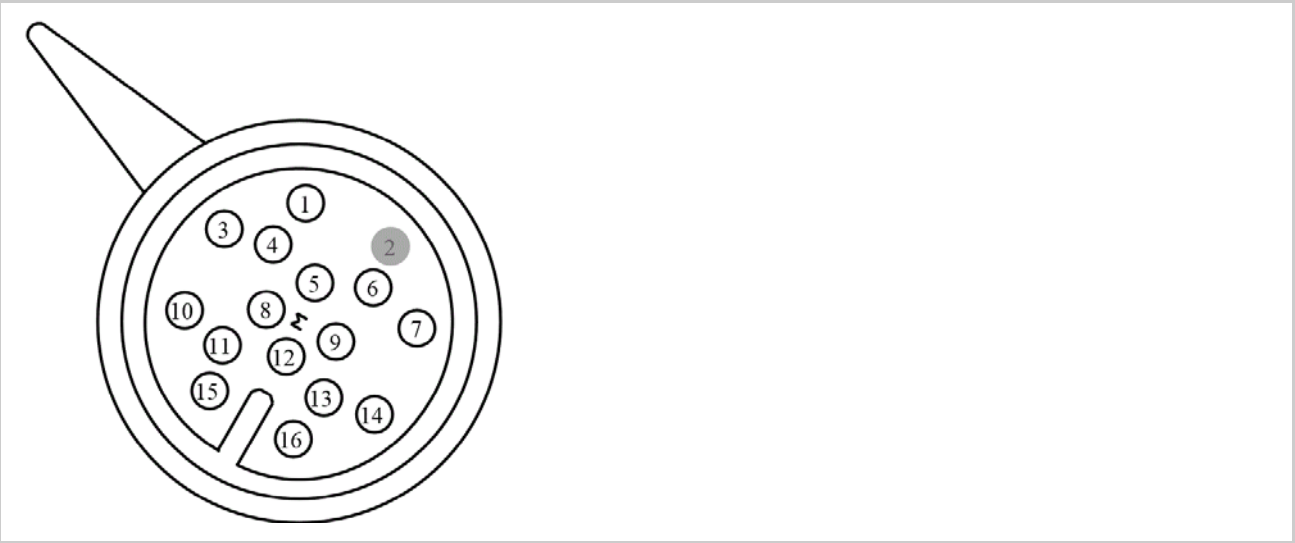
12C508

Base Part #

part# N/A

Service Pigtail

See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	RET33 (WH-VT)	20	SENSOR - TURBINE/TRANSMISSION SHAFT SPEED (TSS) -	
2	*	*	Not Used	
3	CET10 (BU-GY)	20	CTRL MOD. - POWERTRAIN # SOLENOID PRESSURE CONTROL 6 (PC6) [EPC] [VFS]	
4	VET32 (VT)	20	SENSOR - TRANSMISSION RANGE # PWM OUTPUT (TR -P)	
5	RE454 (YE-GN)	18	CTRL MOD. - POWERTRAIN # SIGNAL RETURN ENGINE #2	
6	VET27 (BN-YE)	20	SENSOR - TRANSMISSION FLUID TEMPERATURE (TFT)	
7	CET25 (BU-GN)	20	CTRL MOD. - POWERTRAIN # TRANSMISSION SOLENOID POWER CONTROL (TSPC)	
7	CET25 (BU-GN)	18	CTRL MOD. - POWERTRAIN # TRANSMISSION SOLENOID POWER CONTROL (TSPC)	

8	CET16 (WH-BU)	20	CTRL MOD. - POWERTRAIN # SOLENOID SHIFT CONTROL HIGH-SIDE 1 (SS-H1) [HMSS]
8	CET16 (WH-BU)	18	CTRL MOD. - POWERTRAIN # SOLENOID SHIFT CONTROL HIGH-SIDE 1 (SS-H1) [HMSS]
9	CET05 (BU-GN)	20	CTRL MOD. - POWERTRAIN # SOLENOID PRESSURE CONTROL 1 (PC1) [EPC] [VFS]
10	CET08 (BN-WH)	20	CTRL MOD. - POWERTRAIN # SOLENOID PRESSURE CONTROL 4 (PC4) [EPC] [VFS]
11	RET24 (BN-BU)	20	CTRL MOD. - POWERTRAIN # TRANSMISSION RANGE SIGNAL RETURN (TRGND)
12	LE111 (VT-GN)	20	CTRL MOD. - POWERTRAIN # BUFFERED POWER SUPPLY SENSORS (VBPWR)
12	LE111 (VT-GN)	18	CTRL MOD. - POWERTRAIN # BUFFERED POWER SUPPLY SENSORS (VBPWR)
13	CET07 (GY-OG)	20	CTRL MOD. - POWERTRAIN # SOLENOID PRESSURE CONTROL 3 (PC3) [EPC] [VFS]
14	CET06 (GN-BN)	20	CTRL MOD. - POWERTRAIN # SOLENOID PRESSURE CONTROL 2 (PC2) [EPC] [VFS]
15	RET04 (YE-OG)	20	CTRL MOD. - POWERTRAIN # SENSOR OUTPUT SHAFT SPEED (OSS)
16	CET09 (YE-VT)	20	CTRL MOD. - POWERTRAIN # SOLENOID PRESSURE CONTROL 5 (PC5) [EPC] [VFS]

Available Pigtail Kits	
Pigtail Kit Part Number	Service Part Number:

WPT-1390



EU2Z-14S411-HA

Gauge:

18

Pin material:

Silver

Cavities:

16

Vehicle Uses

Transmission - Bulkhead

CONNECTOR VIEWS > CONNECTOR END VIEW C1582 - PROXIMITY WARNING RADAR UNIT

Connector:C1582

Description

PROXIMITY WARNING RADAR UNIT

Color

BK

Harness

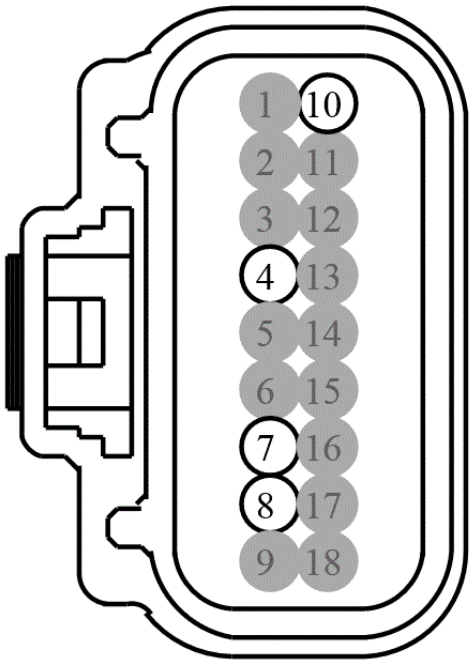
14290

Base Part #

part# N/A

Service Pigtail

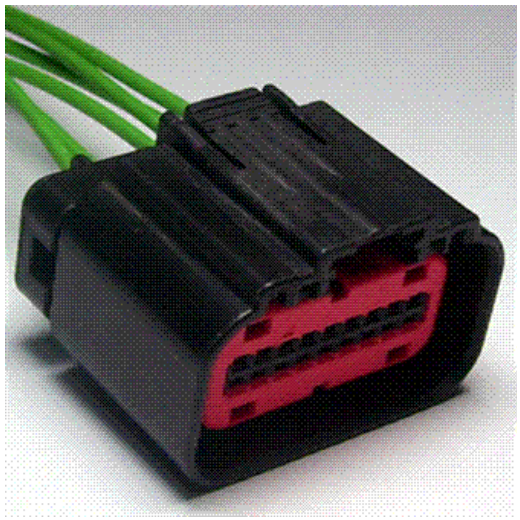
See Below



Pin	Circuit	Gauge	Circuit Function	Qualifier
1	*	*	Not Used	
2	*	*	Not Used	
3	*	*	Not Used	
4	GD120 (BK-GN)	18	GROUND - FENDER FRONT LEFT	
5	*	*	Not Used	
6	*	*	Not Used	
7	VDB26 (GY-BU)	22	CONNECTOR - DIAGNOSTIC # CAN BUS HIGH SPEED 2 (UPPER) LOW	
8	VDB25 (GN-OG)	22	CONNECTOR - DIAGNOSTIC # CAN BUS HIGH SPEED 2 (UPPER) HIGH	

9	*	*	Not Used
10	CBB66 (BU-WH)	20	FUSE - 66 OR CIRCUIT BREAKER
11	*	*	Not Used
12	*	*	Not Used
13	*	*	Not Used
14	*	*	Not Used
15	*	*	Not Used
16	*	*	Not Used
17	*	*	Not Used
18	*	*	Not Used

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1342**	Service Part Number: **CU2Z-14S411-GA** Gauge: **20** Pin material: **Silver** Cavities: **18** Vehicle Uses

	Module - Adaptive Cruise Control
Pigtail Kit Part Number **WPT-1411** Ford Catalog Advantage VIEW	Service Part Number: **CU2Z-14S411-GB** Gauge: **18** Pin material: **Silver** Cavities: **18** Vehicle Uses Module - Adaptive Cruise Control Module - Occupant Classification Module - Reverse Park Aid (RPA)

CONNECTOR VIEWS > CONNECTOR END VIEW C1588 - TURBOCHARGER BOOST PRESSURE (TCBP) SENSOR

Connector:C1588

Description

TURBOCHARGER BOOST PRESSURE (TCBP) SENSOR

Color

Harness

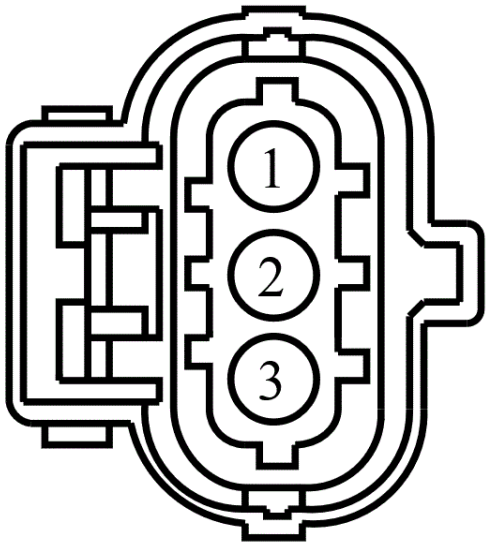
14290

Base Part #

part# N/A

Service Pigtail

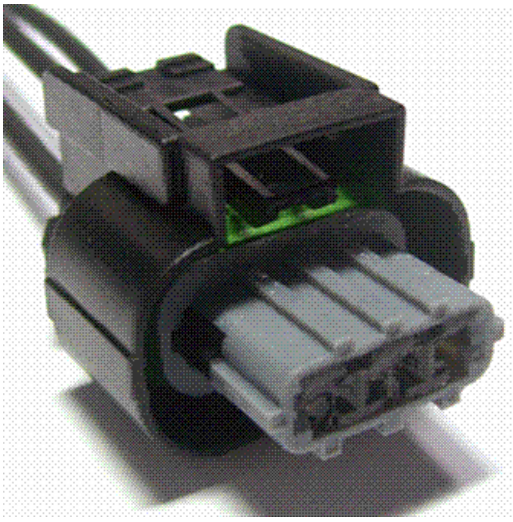
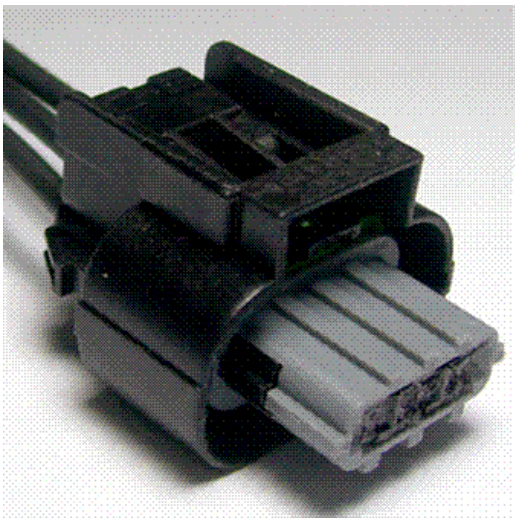
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	VE824 (YE-GN)	18	SENSOR - BOOST PRESSURE	
2	RE406 (GY-VT)	18	CTRL MOD. - POWERTRAIN # SIGNAL RETURN TRANSMISSION (SIGRTN)	
3	LE423 (GN-VT)	18	CTRL MOD. - POWERTRAIN # VOLTAGE REFERENCE ENGINE (VREF)	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1068**	Service Part Number: **AU2Z-14S411-JA**

	Gauge: **14** Pin material: **Tin (greased)** Cavities: **3** Vehicle Uses Sensor - Cam Shaft Position Sensor - Manifold Absolute Pressure (MAP)
Pigtail Kit Part Number **WPT-1369** 	Service Part Number: **AU2Z-14S411-JB** Gauge: **16** Pin material: **Tin (greased)** Cavities: **3** Vehicle Uses Sensor - Cam Shaft Position Sensor - Manifold Absolute Pressure (MAP) Sensor - Turbo Intake Pressure/Temperature

CONNECTOR VIEWS > CONNECTOR END VIEW C1601 - IGNITION COIL-ON-PLUG 1

Connector:C1601

Description

IGNITION COIL-ON-PLUG 1

Color

BK

Harness

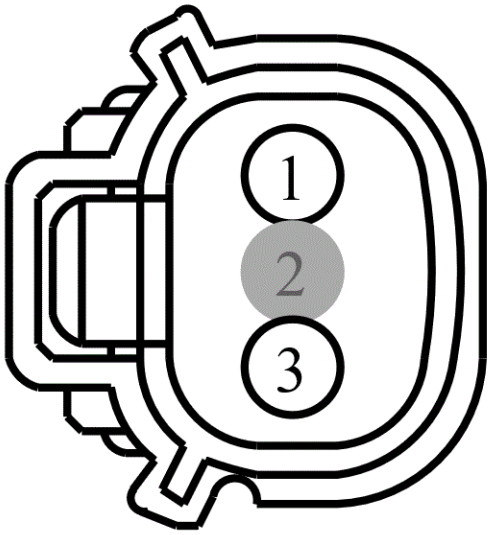
12C508

Base Part #

part# N/A

Service Pigtail

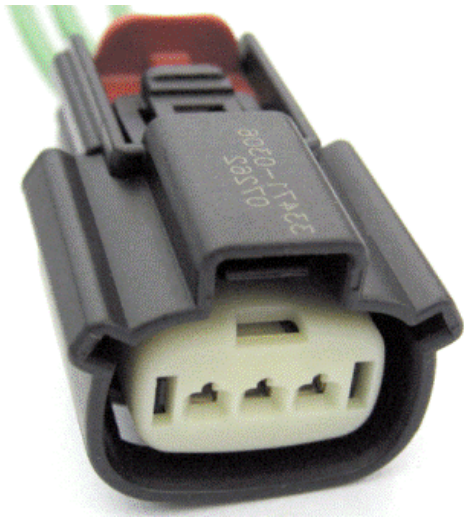
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CE303 (WH-VT)	18	CTRL MOD. - POWERTRAIN # IGNITION COIL ON PLUG ASSEMBLY 1 (COP1A)	
2	*	*	Not Used	
3	CBK04 (VT)	16	FUSE - 44 OR CIRCUIT BREAKER (VPWR)	
3	CBK04 (VT)	18	FUSE - 44 OR CIRCUIT BREAKER (VPWR)	

Available Pigtail Kits	

Pigtail Kit Part Number **WPT-931** 	Service Part Number: **9U2Z-14S411-EA** Gauge: **14** Pin material: **Silver** Cavities: **3** Vehicle Uses Coil - Ignition

CONNECTOR VIEWS > CONNECTOR END VIEW C1602 - IGNITION COIL-ON-PLUG 2

Connector:C1602

Description

IGNITION COIL-ON-PLUG 2

Color

BK

Harness

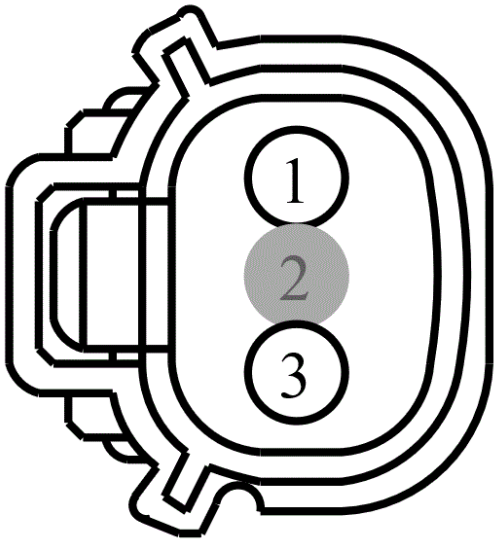
12C508

Base Part #

part# N/A

Service Pigtail

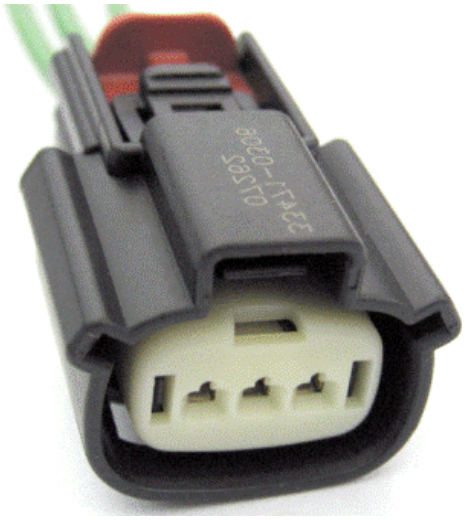
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CE304 (YE-BU)	20	CTRL MOD. - POWERTRAIN # IGNITION COIL ON PLUG ASSEMBLY 2 (COP2C)	3.7L
1	CE304 (YE-BU)	18	CTRL MOD. - POWERTRAIN # IGNITION COIL ON PLUG ASSEMBLY 2 (COP2H)	5.0L
2	*	*	Not Used	
3	CBK04 (VT)	18	FUSE - 44 OR CIRCUIT BREAKER (VPWR)	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-931**	Service Part Number: **9U2Z-14S411-EA** Gauge: **14** Pin material: **Silver**



Cavities:

3

Vehicle Uses

Coil - Ignition

CONNECTOR VIEWS > CONNECTOR END VIEW C1603 - IGNITION COIL-ON-PLUG 3

Connector:C1603

Description

IGNITION COIL-ON-PLUG 3

Color

BK

Harness

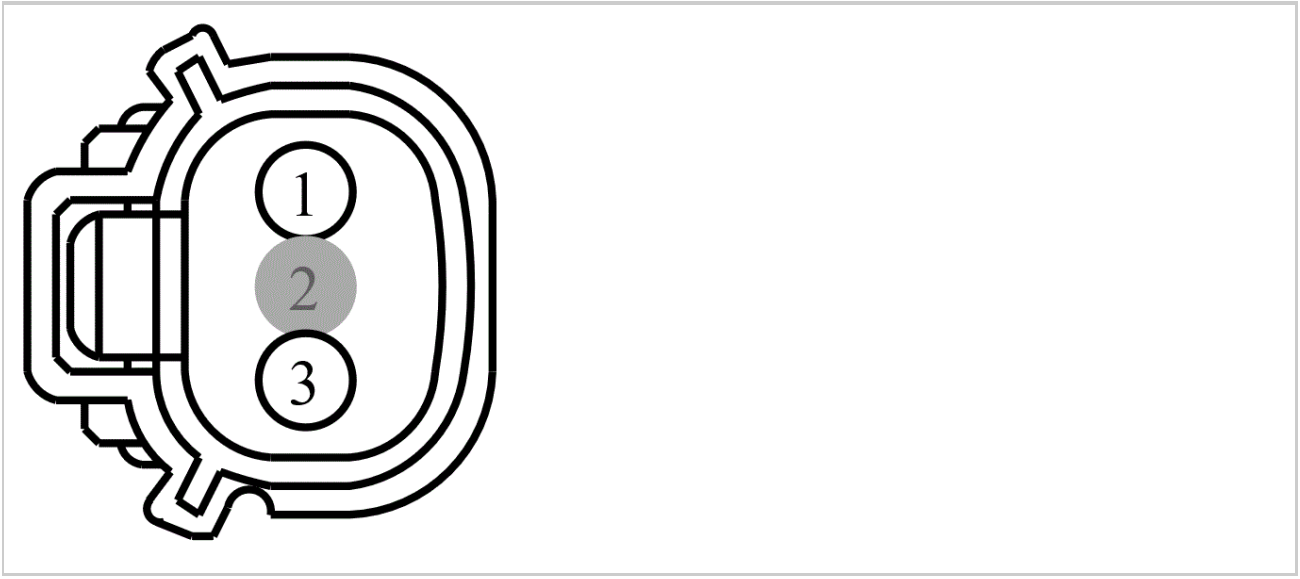
12C508

Base Part #

part# N/A

Service Pigtail

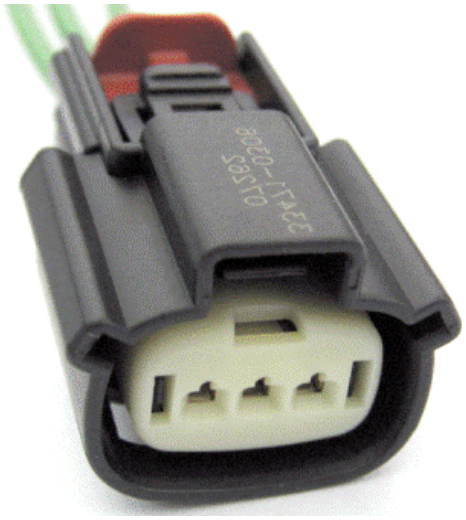
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CE305 (BU-OG)	20	CTRL MOD. - POWERTRAIN # IGNITION COIL ON PLUG ASSEMBLY 3 (COP3E)	3.7L
1	CE305 (BU-OG)	18	CTRL MOD. - POWERTRAIN # IGNITION COIL ON PLUG ASSEMBLY 3 (COP3F)	5.0L
2	*	*	Not Used	
3	CBK04 (VT)	16	FUSE - 44 OR CIRCUIT BREAKER (VPWR)	
3	CBK04 (VT)	18	FUSE - 44 OR CIRCUIT BREAKER (VPWR)	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-931**	Service Part Number: **9U2Z-14S411-EA** Gauge: **14** Pin material:



Silver

Cavities:

3

Vehicle Uses

Coil - Ignition

CONNECTOR VIEWS > CONNECTOR END VIEW C1604 - IGNITION COIL-ON-PLUG 4

Connector:C1604

Description

IGNITION COIL-ON-PLUG 4

Color

BK

Harness

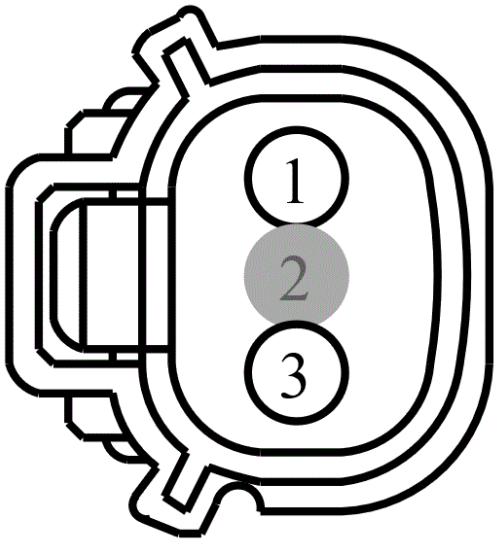
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Base Part #

part# N/A

Service Pigtail

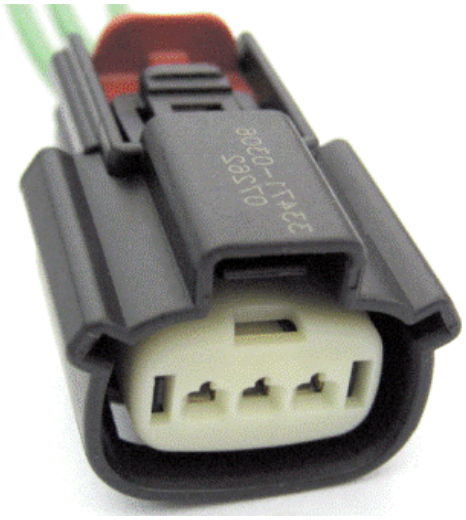
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CE306 (GN-VT)	20	CTRL MOD. - POWERTRAIN # IGNITION COIL ON PLUG ASSEMBLY 4 (COP4B)	3.7L
1	CE306 (GN-VT)	18	CTRL MOD. - POWERTRAIN # IGNITION COIL ON PLUG ASSEMBLY 4 (COP4C)	5.0L
2	*	*	Not Used	
3	CBK04 (VT)	18	FUSE - 44 OR CIRCUIT BREAKER (VPWR)	
3	CBK04 (VT)	16	FUSE - 44 OR CIRCUIT BREAKER (VPWR)	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-931**	Service Part Number: **9U2Z-14S411-EA** Gauge: **14**



Pin material:

Silver

Cavities:

3

Vehicle Uses

Coil - Ignition

CONNECTOR VIEWS > CONNECTOR END VIEW C1605 - IGNITION COIL-ON-PLUG 5

Connector:C1605

Description

IGNITION COIL-ON-PLUG 5

Color

BK

Harness

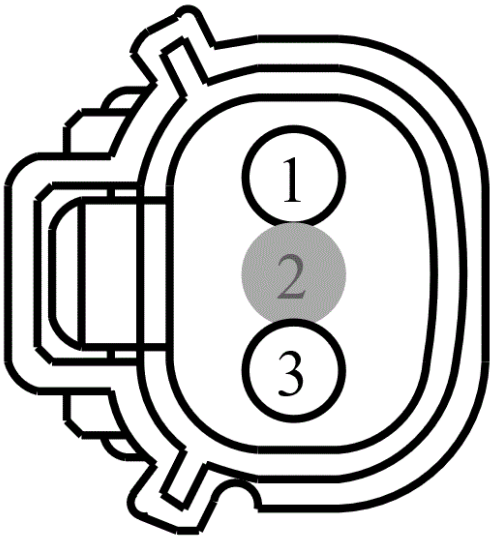
12C508

Base Part #

part# N/A

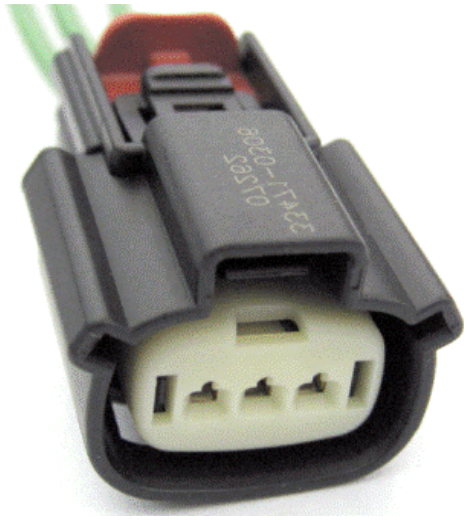
Service Pigtail

See Below



Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CE307 (WH-BN)	18	CTRL MOD. - POWERTRAIN # IGNITION COIL ON PLUG ASSEMBLY 5 (COP5B)	5.0L
1	CE307 (WH-BN)	18	CTRL MOD. - POWERTRAIN # IGNITION COIL ON PLUG ASSEMBLY 5 (COP5D)	3.7L
2	*	*	Not Used	
3	CBK04 (VT)	16	FUSE - 44 OR CIRCUIT BREAKER (VPWR)	
3	CBK04 (VT)	18	FUSE - 44 OR CIRCUIT BREAKER (VPWR)	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-931**	Service Part Number: **9U2Z-14S411-EA** Gauge: **14** Pin material:



Silver

Cavities:

3

Vehicle Uses

Coil - Ignition

CONNECTOR VIEWS > CONNECTOR END VIEW C1606 - IGNITION COIL-ON-PLUG 6

Connector:C1606

Description

IGNITION COIL-ON-PLUG 6

Color

BK

Harness

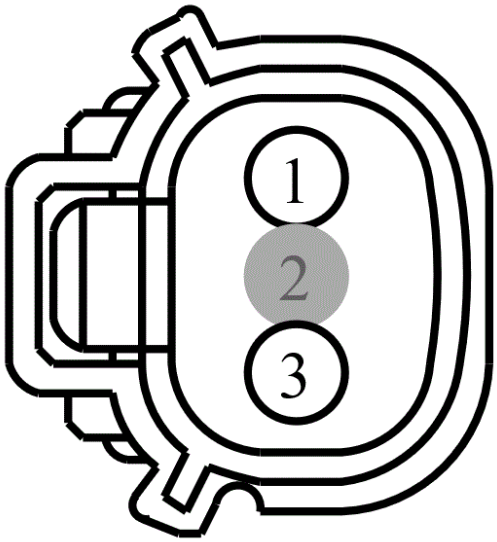
12C508

Base Part #

part# N/A

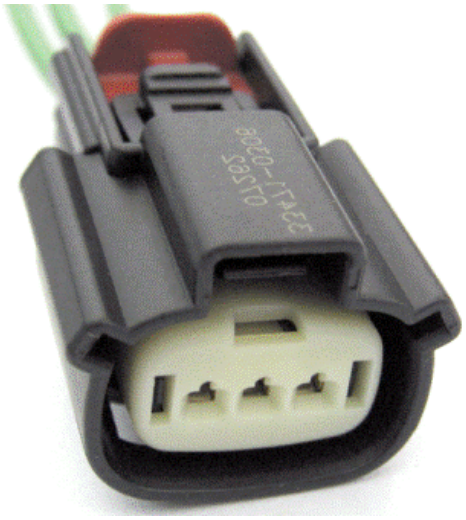
Service Pigtail

See Below



Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CE308 (VT-BN)	18	CTRL MOD. - POWERTRAIN # IGNITION COIL ON PLUG ASSEMBLY 6 (COP6E)	5.0L
1	CE308 (VT-BN)	18	CTRL MOD. - POWERTRAIN # IGNITION COIL ON PLUG ASSEMBLY 6 (COP6F)	3.7L
2	*	*	Not Used	
3	CBK04 (VT)	16	FUSE - 44 OR CIRCUIT BREAKER (VPWR)	
3	CBK04 (VT)	18	FUSE - 44 OR CIRCUIT BREAKER (VPWR)	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-931**	Service Part Number: **9U2Z-14S411-EA** Gauge: **14** Pin material:



Silver

Cavities:

3

Vehicle Uses

Coil - Ignition

CONNECTOR VIEWS > CONNECTOR END VIEW C1607 - IGNITION COIL-ON-PLUG 7

Connector:C1607

Description

IGNITION COIL-ON-PLUG 7

Color

BK

Harness

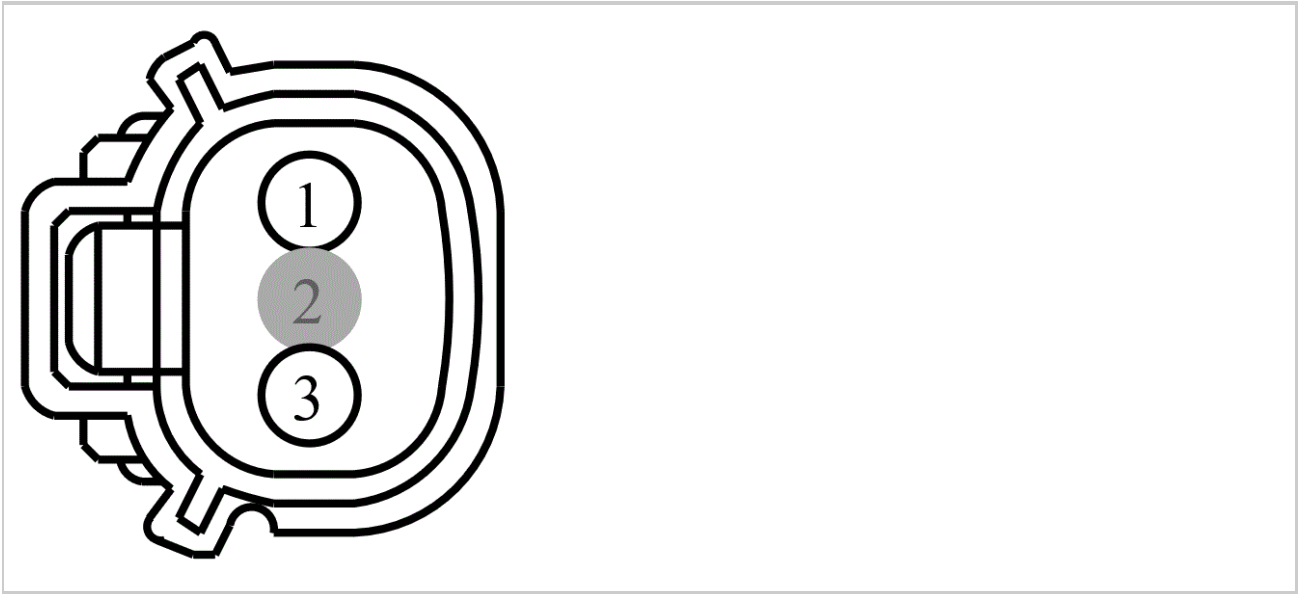
12C508

Base Part #

part# N/A

Service Pigtail

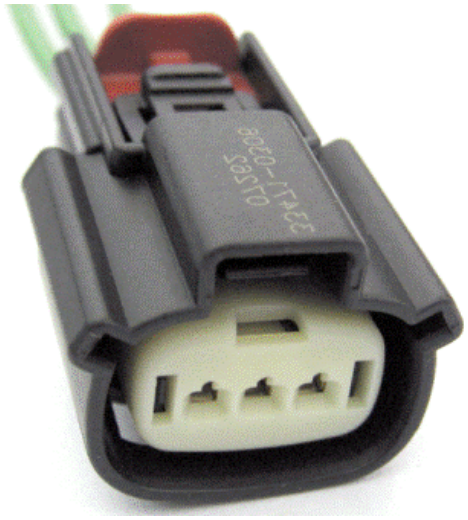
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CE309 (YE-GY)	18	CTRL MOD. - POWERTRAIN # IGNITION COIL ON PLUG ASSEMBLY 7 (COP7G)	
2	*	*	Not Used	
3	CBK04 (VT)	18	FUSE - 44 OR CIRCUIT BREAKER (VPWR)	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-931**	Service Part Number: **9U2Z-14S411-EA** Gauge: **14** Pin material: **Silver** Cavities: **3** Vehicle Uses

	Coil - Ignition

CONNECTOR VIEWS > CONNECTOR END VIEW C1608 - IGNITION COIL-ON-PLUG 8

Connector:C1608

Description

IGNITION COIL-ON-PLUG 8

Color

BK

Harness

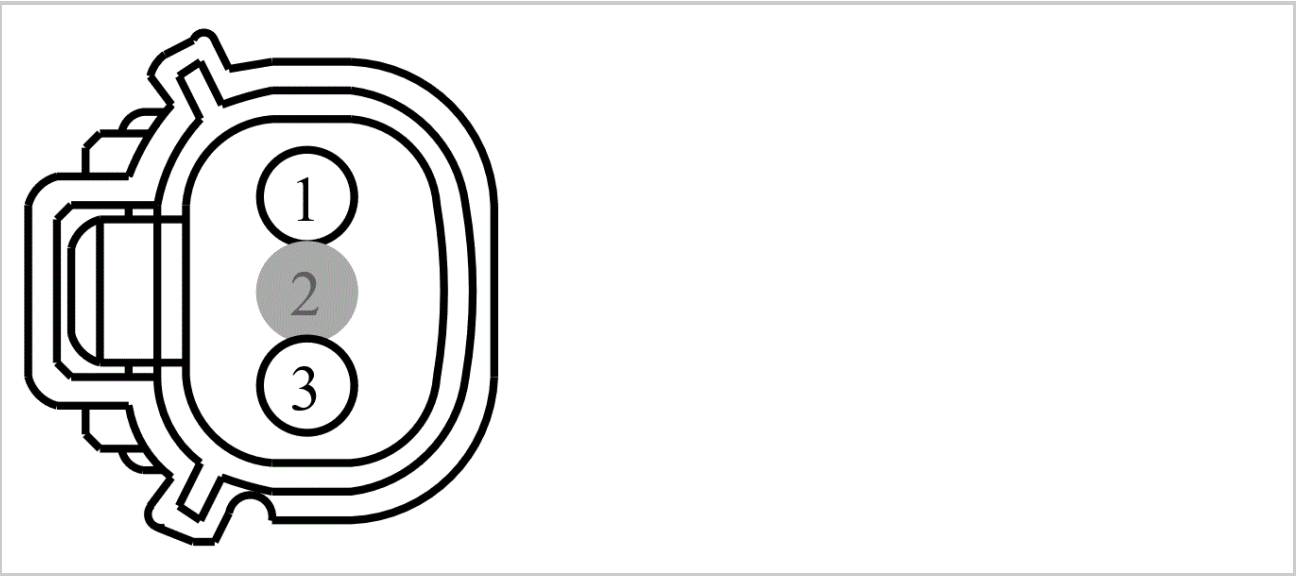
12C508

Base Part #

part# N/A

Service Pigtail

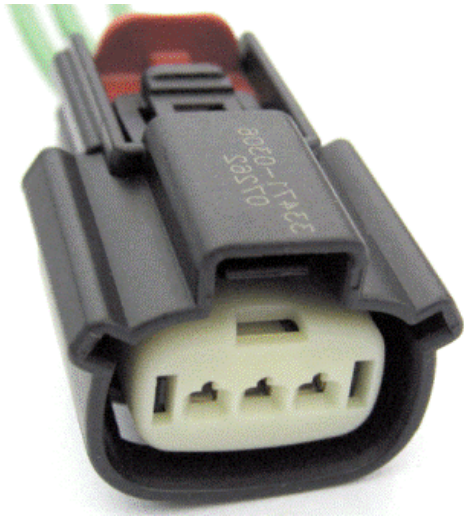
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CE310 (BU-BN)	18	CTRL MOD. - POWERTRAIN # IGNITION COIL ON PLUG ASSEMBLY 8 (COP8D)	
2	*	*	Not Used	
3	CBK04 (VT)	18	FUSE - 44 OR CIRCUIT BREAKER (VPWR)	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-931**	Service Part Number: **9U2Z-14S411-EA** Gauge: **14** Pin material: **Silver** Cavities: **3** Vehicle Uses

	Coil - Ignition

CONNECTOR VIEWS > CONNECTOR END VIEW C1609 - BRAKE VACUUM SWITCH

Connector:C1609

Description

BRAKE VACUUM SWITCH

Color

Harness

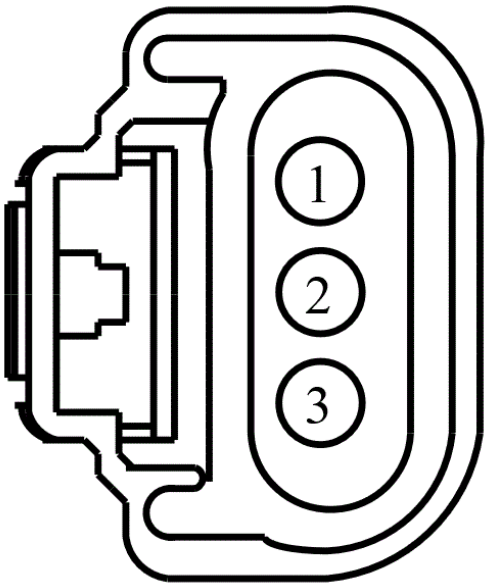
14290

Base Part #

part# N/A

Service Pigtail

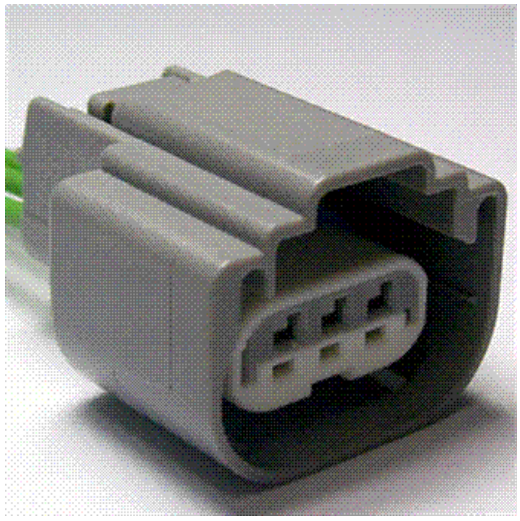
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	VCA38 (BN-VT)	20	SENSOR - BRAKE VACUUM SIGNAL 1	
2	RCA37 (WH-BU)	20	CTRL MOD. - SENSOR BRAKE VACUUM -	
3	LCA37 (YE-RD)	20	CTRL MOD. - SENSOR BRAKE VACUUM +	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1337**	Service Part Number: **9U2Z-14S411-AB** Gauge: **16** Pin material: **Silver** Cavities: **3**



Vehicle Uses

Sensor - Brake Booster Travel

Sensor - Brake Pressure

Sensor - Brake Vacuum

Sensor - Manifold Absolute Pressure (MAP)

Sensor - Occupant Classification

CONNECTOR VIEWS > CONNECTOR END VIEW C1610 - VARIABLE CAMSHAFT TIMING BANK 1 SOLENOID 2 (VCT12)

Connector:C1610

Description

VARIABLE CAMSHAFT TIMING BANK 1 SOLENOID 2 (VCT12)

Color

Harness

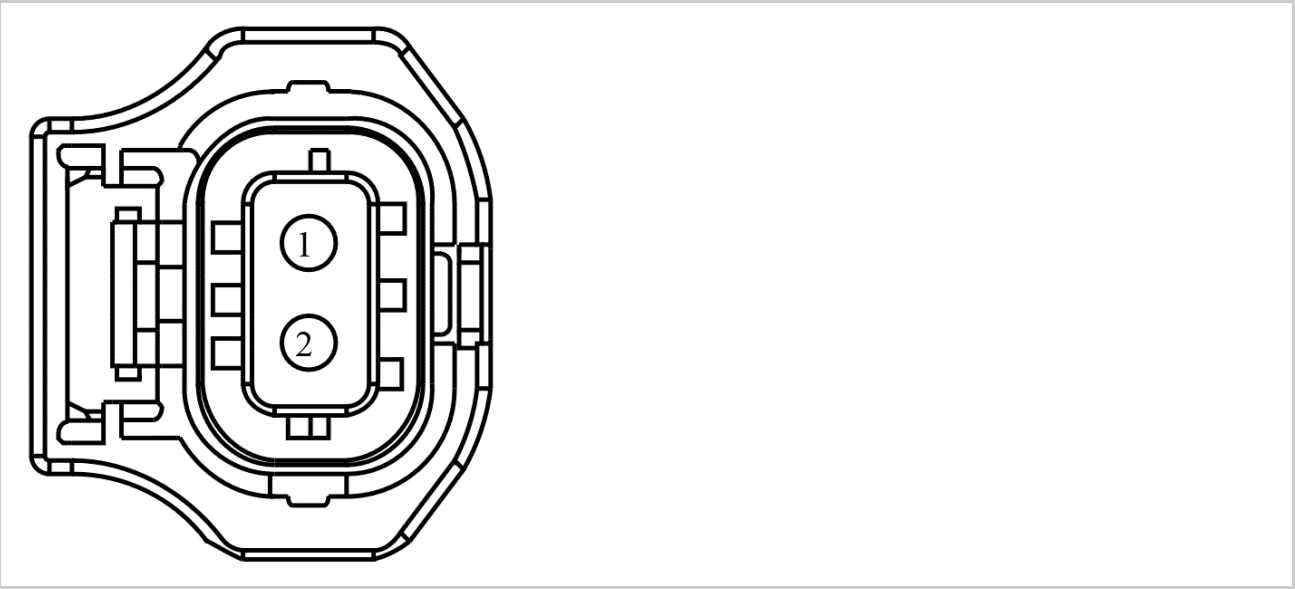
12C508

Base Part #

part# N/A

Service Pigtail

Not Available



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CE422 (WH-OG)	18	CTRL MOD. - POWERTRAIN # VARIABLE CAMSHAFT TIMING VALVE 2 (VCT12)	
2	CBK02 (GN)	18	FUSE - 40 OR CIRCUIT BREAKER (VPWR)	

CONNECTOR VIEWS > CONNECTOR END VIEW C1611 - VARIABLE CAMSHAFT TIMING BANK 2 SOLENOID 2 (VCT22)

Connector:C1611

Description

VARIABLE CAMSHAFT TIMING BANK 2 SOLENOID 2 (VCT22)

Color

Harness

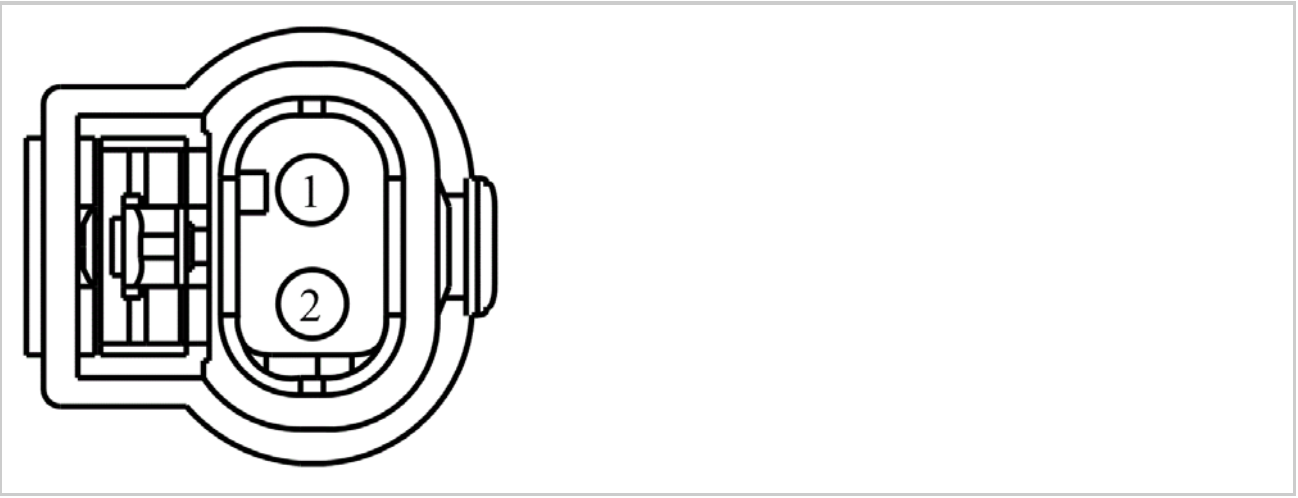
12C508

Base Part #

part# N/A

Service Pigtail

See Below



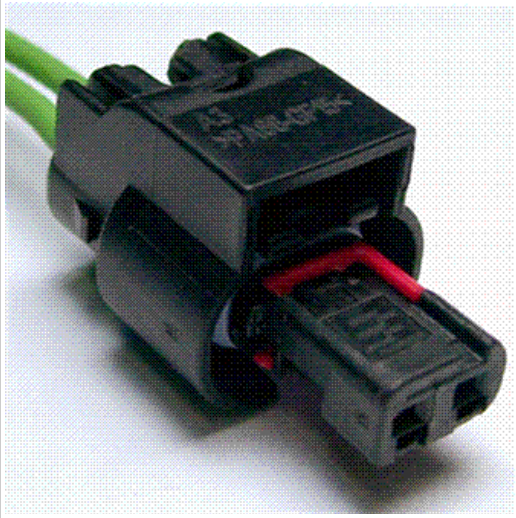
Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CBK02 (GN)	20	FUSE - 40 OR CIRCUIT BREAKER (VPWR)	
2	CE443 (BN-VT)	20	CTRL MOD. - POWERTRAIN # VARIABLE CAMSHAFT TIMING VALVE 4 (VCT22)	

Available Pigtail Kits

Pigtail Kit Part Number

WPT-1251



Service Part Number:

CU2Z-14S411-DA

Gauge:

18

Pin material:

Silver

Cavities:

2

Vehicle Uses

Solenoid - Engine Variable Timing

CONNECTOR VIEWS > CONNECTOR END VIEW C1612 - CAMSHAFT POSITION BANK 1 SENSOR 1 (CMP11)

Connector:C1612

Description

CAMSHAFT POSITION BANK 1 SENSOR 1 (CMP11)

Color

BK

Harness

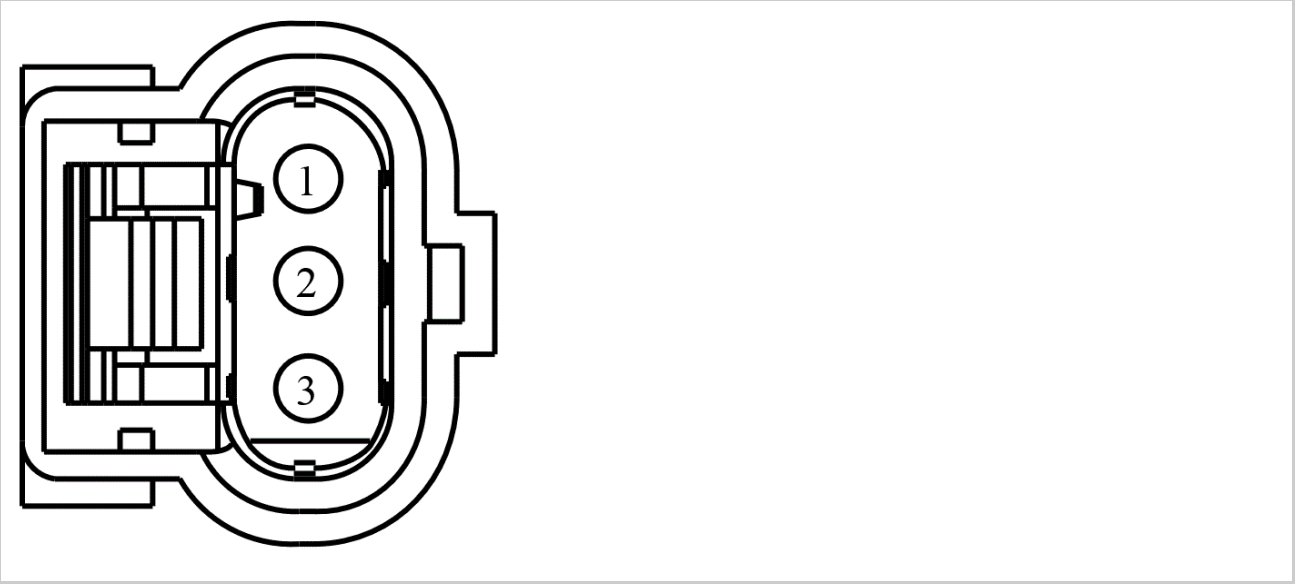
12C508

Base Part #

part# N/A

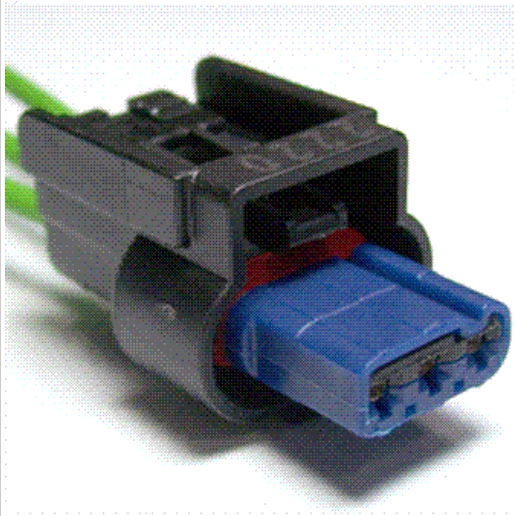
Service Pigtail

See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	VE736 (WH-GN)	18	SENSOR - CAMSHAFT POSITION BANK 1 EX (CMP11)	
2	RE454 (YE-GN)	18	CTRL MOD. - POWERTRAIN # SIGNAL RETURN ENGINE #2 (SIGRTN)	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1202** 	Service Part Number: **BU2Z-14S411-ARA** Gauge: **16** Pin material: **Silver** Cavities: **3** Vehicle Uses Actuator - Turbocharger Waste Gate Coil - Ignition Sensor - Cam Shaft Position Sensor - Crank Shaft Position

CONNECTOR VIEWS > CONNECTOR END VIEW C1613 - CAMSHAFT POSITION BANK 2 SENSOR 1 (CMP21)

Connector:C1613

Description

CAMSHAFT POSITION BANK 2 SENSOR 1 (CMP21)

Color

BK

Harness

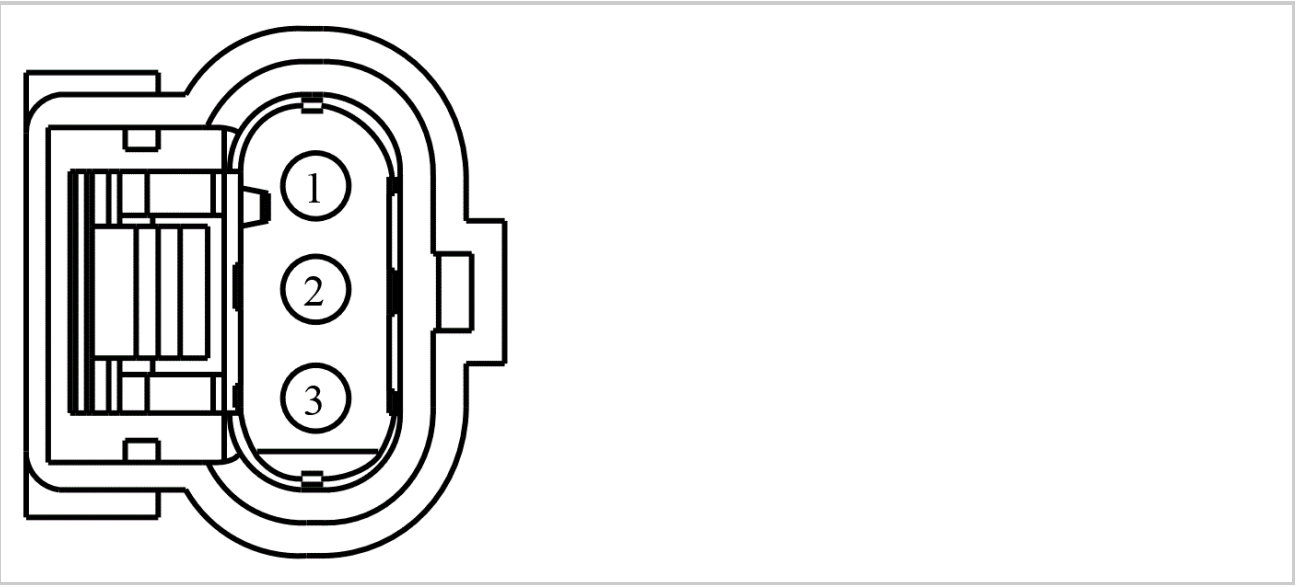
12C508

Base Part #

part# N/A

Service Pigtail

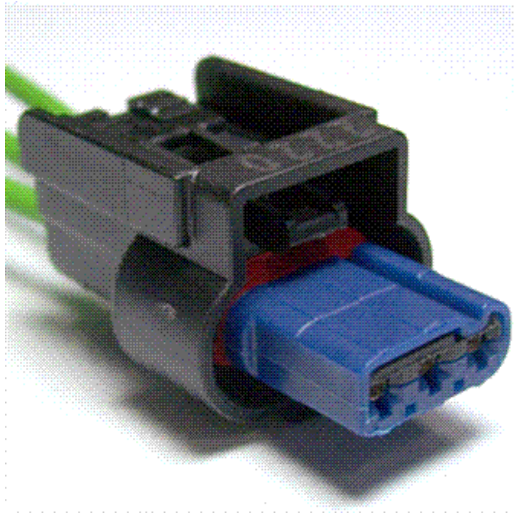
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	VE738 (YE-BU)	18	SENSOR - CAMSHAFT POSITION BANK 2 EX (CMP21)	
2	RE454 (YE-GN)	18	CTRL MOD. - POWERTRAIN # SIGNAL RETURN ENGINE #2 (SIGRTN)	
3	LE111 (VT-GN)	18	CTRL MOD. - POWERTRAIN # BUFFERED POWER SUPPLY SENSORS (VBPWR)	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1202**	Service Part Number: **BU2Z-14S411-ARA** Gauge: **16** Pin material: **Silver** Cavities: **3**



Vehicle Uses

Actuator - Turbocharger Waste Gate

Coil - Ignition

Sensor - Cam Shaft Position

Sensor - Crank Shaft Position

CONNECTOR VIEWS > CONNECTOR END VIEW C1614 - KNOCK SENSOR 1 (KS1)

Connector:C1614

Description

KNOCK SENSOR 1 (KS1)

Color

GY

Harness

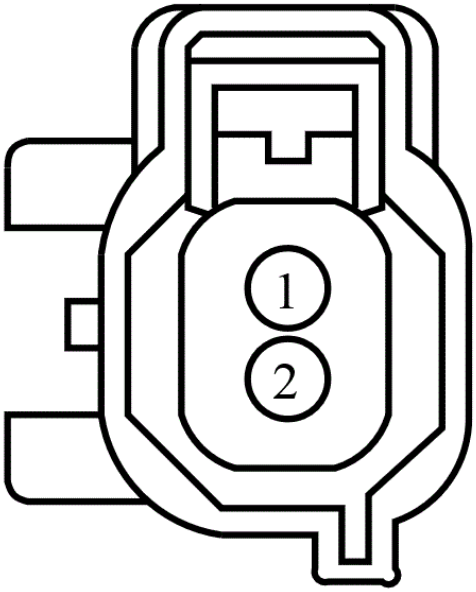
14B485

Base Part #

part# N/A

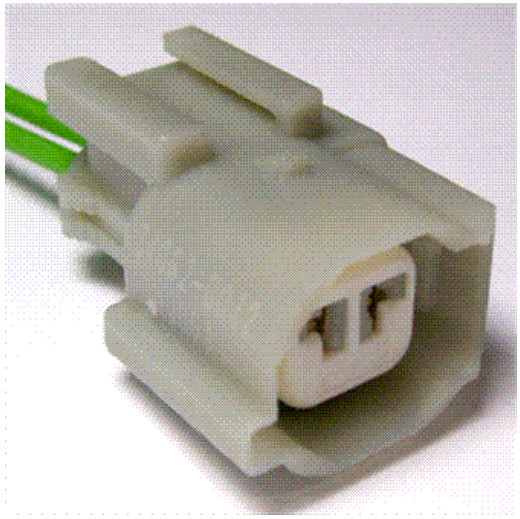
Service Pigtail

See Below



Pin	Circuit	Gauge	Circuit Function	Qualifier
1	VE801 (VT-OG)	18	SENSOR - KNOCK 1ST BANK 1ST OR UNIQUE (KS1+)	
2	RE323 (WH-BN)	18	CTRL MOD. - POWERTRAIN # KNOCK SENSOR 1ST BANK 1ST OR UNIQUE (KS1-)	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1116**	Service Part Number: **AU2Z-14S411-BJA** Gauge: **16** Pin material: **Silver** Cavities: **2** Vehicle Uses Lamp - Running Board

	Sensor - Knock Sensor - Speed Sensor - Water in Fuel

CONNECTOR VIEWS > CONNECTOR END VIEW C1615 - KNOCK SENSOR 2 (KS2)

Connector:C1615

Description

KNOCK SENSOR 2 (KS2)

Color

GY

Harness

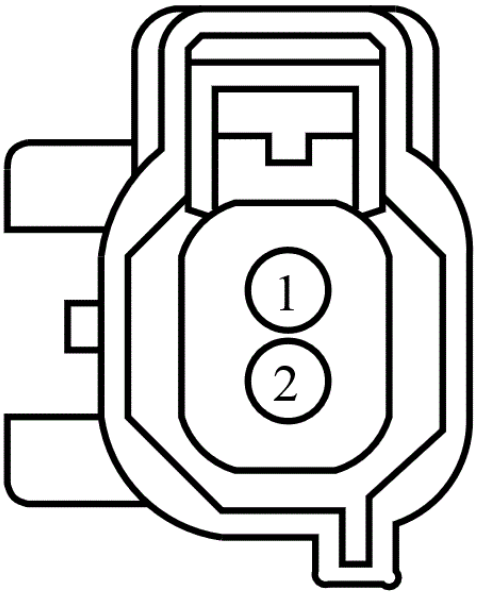
14B485

Base Part #

part# N/A

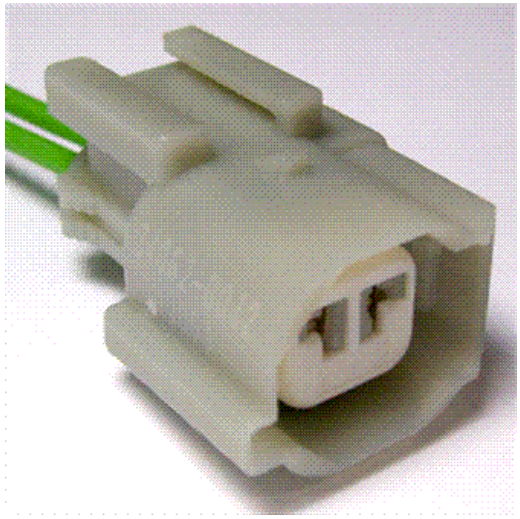
Service Pigtail

See Below



Pin	Circuit	Gauge	Circuit Function	Qualifier
1	VE802 (BN-BU)	18	SENSOR - KNOCK 2ND BANK 1ST (KS2+)	
2	RE324 (BN-GN)	18	CTRL MOD. - POWERTRAIN # KNOCK SENSOR 2ND BANK 1ST (KS2-)	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1116**	Service Part Number: **AU2Z-14S411-BJA** Gauge: **16** Pin material: **Silver** Cavities: **2** Vehicle Uses Lamp - Running Board

	Sensor - Knock Sensor - Speed Sensor - Water in Fuel

CONNECTOR VIEWS > CONNECTOR END VIEW C1624 - CAMSHAFT POSITION BANK 1 SENSOR 2 (CMP12)

Connector:C1624

Description

CAMSHAFT POSITION BANK 1 SENSOR 2 (CMP12)

Color

BK

Harness

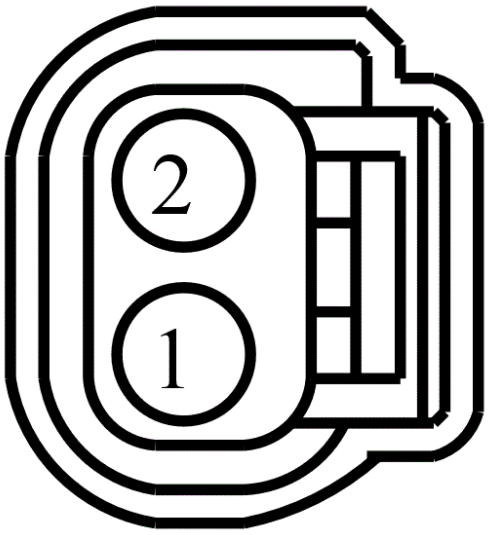
12C508

Base Part #

part# N/A

Service Pigtail

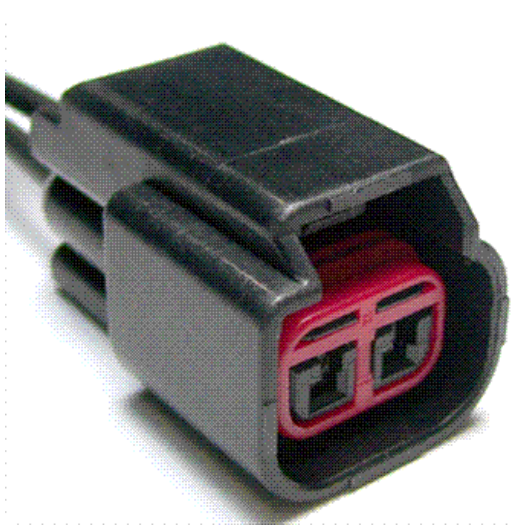
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	RE429 (GY-OG)	20	CTRL MOD. - POWERTRAIN # VARIABLE RELUCTANCE SENSOR (VRSRTN) (CAMSHAFT POSITION)	
2	VE706 (BN-BU)	20	SENSOR - CAMSHAFT POSITION BANK 1 IN+EX / IN (CMP12)	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-986**	Service Part Number: **3U2Z-14S411-SLB** Gauge: **14** Pin material: **Tin** Cavities: **2** Vehicle Uses Coil - Ignition



Lamp - License

Sensor - Cam Shaft Position

Sensor - Crank Shaft Position

CONNECTOR VIEWS > CONNECTOR END VIEW C1625 - CAMSHAFT POSITION BANK 2 SENSOR 2 (CMP22)

Connector:C1625

Description

CAMSHAFT POSITION BANK 2 SENSOR 2 (CMP22)

Color

BK

Harness

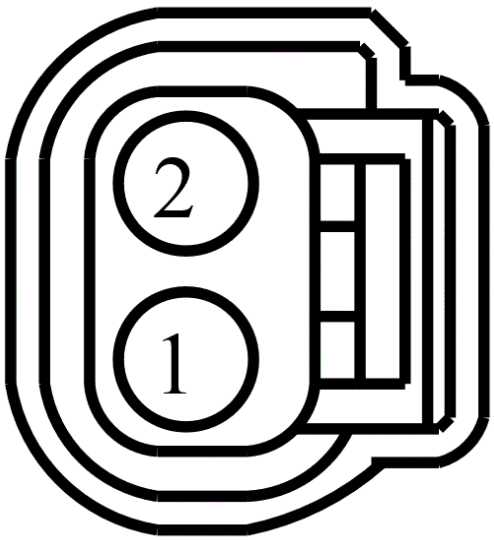
12C508

Base Part #

part# N/A

Service Pigtail

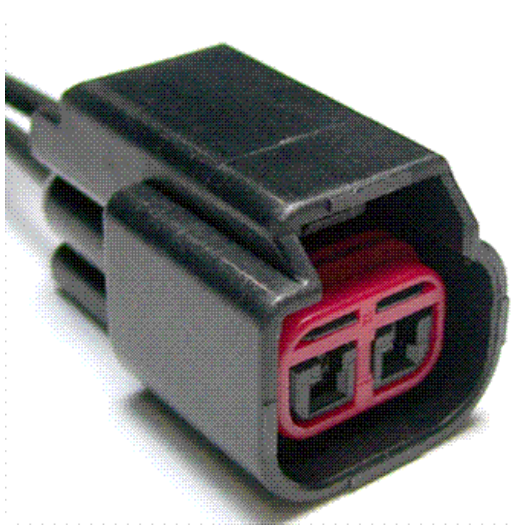
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	RE429 (GY-OG)	20	CTRL MOD. - POWERTRAIN # VARIABLE RELUCTANCE SENSOR (VRSRTN) (CAMSHAFT POSITION)	
2	VE707 (GN-VT)	20	SENSOR - CAMSHAFT POSITION BANK 2 IN+EX / IN (CMP22)	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-986**	Service Part Number: **3U2Z-14S411-SLB** Gauge: **14** Pin material: **Tin** Cavities: **2** Vehicle Uses Coil - Ignition



Lamp - License

Sensor - Cam Shaft Position

Sensor - Crank Shaft Position

CONNECTOR VIEWS > CONNECTOR END VIEW C1642 - ENGINE OIL PRESSURE (EOP) SENSOR

Connector:C1642

Description

ENGINE OIL PRESSURE (EOP) SENSOR

Color

NA

Harness

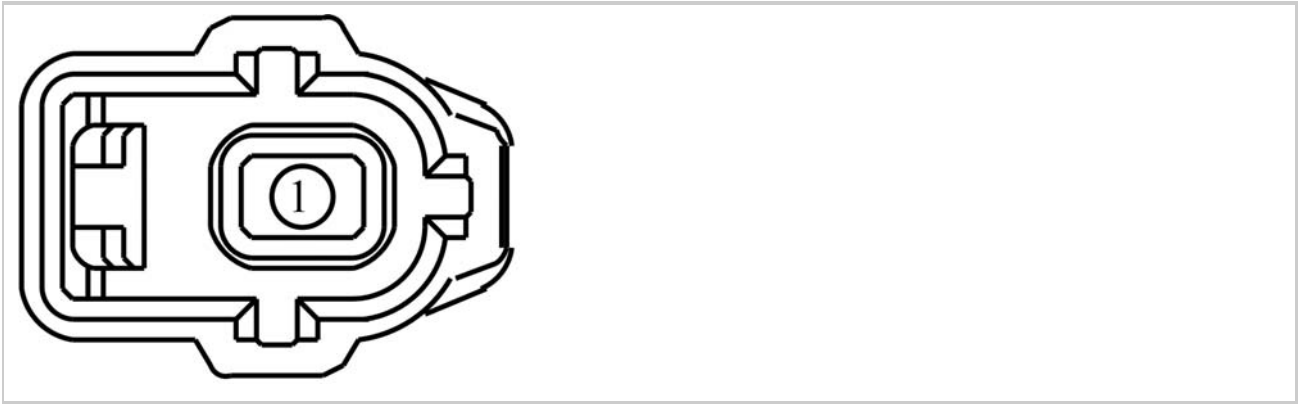
12C508

Base Part #

part# N/A

Service Pigtail

See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CMC24 (GY)	18	SWITCH - OIL PRESSURE	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-439** 	Service Part Number: **3U2Z-14S411-MHA** Gauge: **14** Pin material: **Tin** Cavities: **1** Vehicle Uses Sensor - Oil Pressure Switch - Oil Sending Unit

CONNECTOR VIEWS > CONNECTOR END VIEW C1643 - FUEL PRESSURE SENSOR

Connector:C1643

Description

FUEL PRESSURE SENSOR

Color

LT GY

Harness

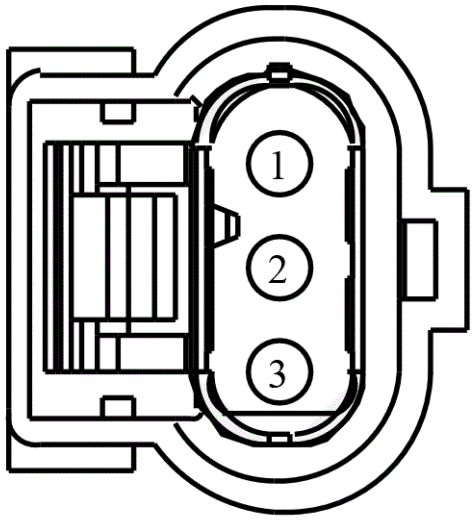
12C508

Base Part #

part# N/A

Service Pigtail

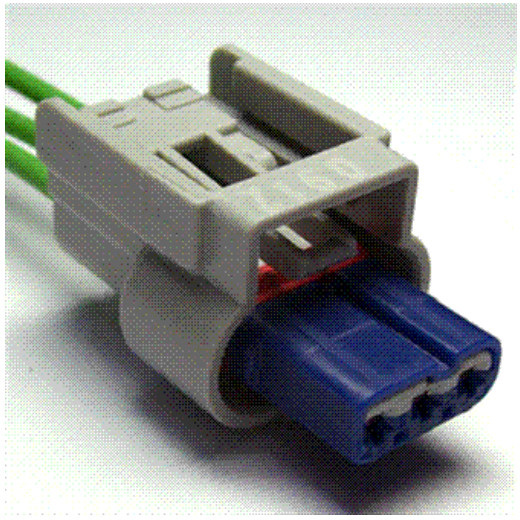
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	VE761 (BN-BU)	18	SENSOR - FUEL LOW PRESSURE (FLP)	
2	RE454 (YE-GN)	20	CTRL MOD. - POWERTRAIN # SIGNAL RETURN (SIGRTN)	
3	LE230 (BU)	18	CTRL MOD. - POWERTRAIN # FUEL TANK PRESSURE TRANSDUCER REF. VOLT. (VREF)	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1308**	Service Part Number: **CU2Z-14S411-AVA** Gauge: **18** Pin material: **Silver**

	Cavities: **3** Vehicle Uses Coil - Ignition Sensor - Fuel Low Pressure

CONNECTOR VIEWS > CONNECTOR END VIEW C1645 - GENERATOR CURRENT SENSOR

Connector:C1645

Description

GENERATOR CURRENT SENSOR

Color

GY

Harness

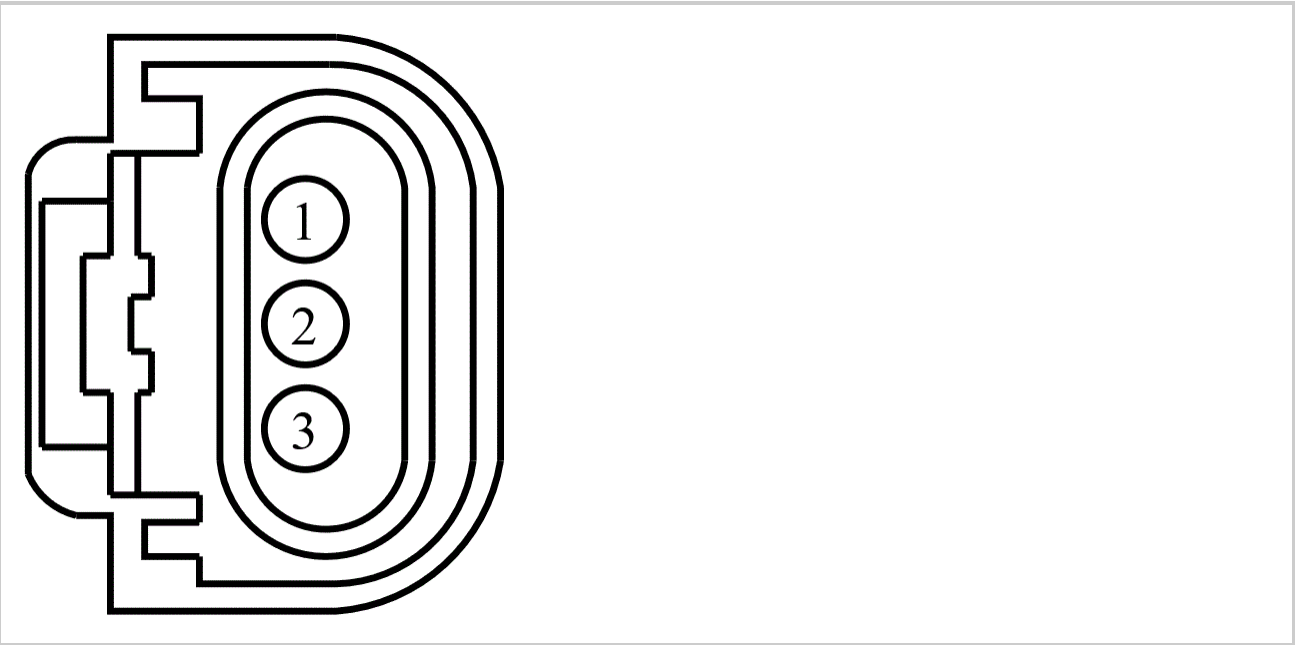
14290

Base Part #

part# N/A

Service Pigtail

See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	LE423 (GN-VT)	20	CTRL MOD. - POWERTRAIN # VOLTAGE REFERENCE ENGINE (VREF) (E-VREF) (VREF1)	
2	RE406 (GY-VT)	20	CTRL MOD. - POWERTRAIN # SIGNAL RETURN TRANSMISSION (T-SIGRTN) (SIGRTN-B)	
3	VDC61 (VT-GN)	20	SENSOR - BATTERY MONITORING SYSTEM # ALTERNATOR	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1413** Ford Catalog Advantage VIEW	Service Part Number: **EU2Z-14S411-UA** Gauge: **18** Pin material: **Tin (greased)** Cavities:

	3 Vehicle Uses Sensor - Battery Current Sensor - Brake Vacuum Sensor - Fuel Tank Pressure Transducer

CONNECTOR VIEWS > CONNECTOR END VIEW C1646 - BATTERY MONITORING SENSOR

Connector:C1646

Description

BATTERY MONITORING SENSOR

Color

BK

Harness

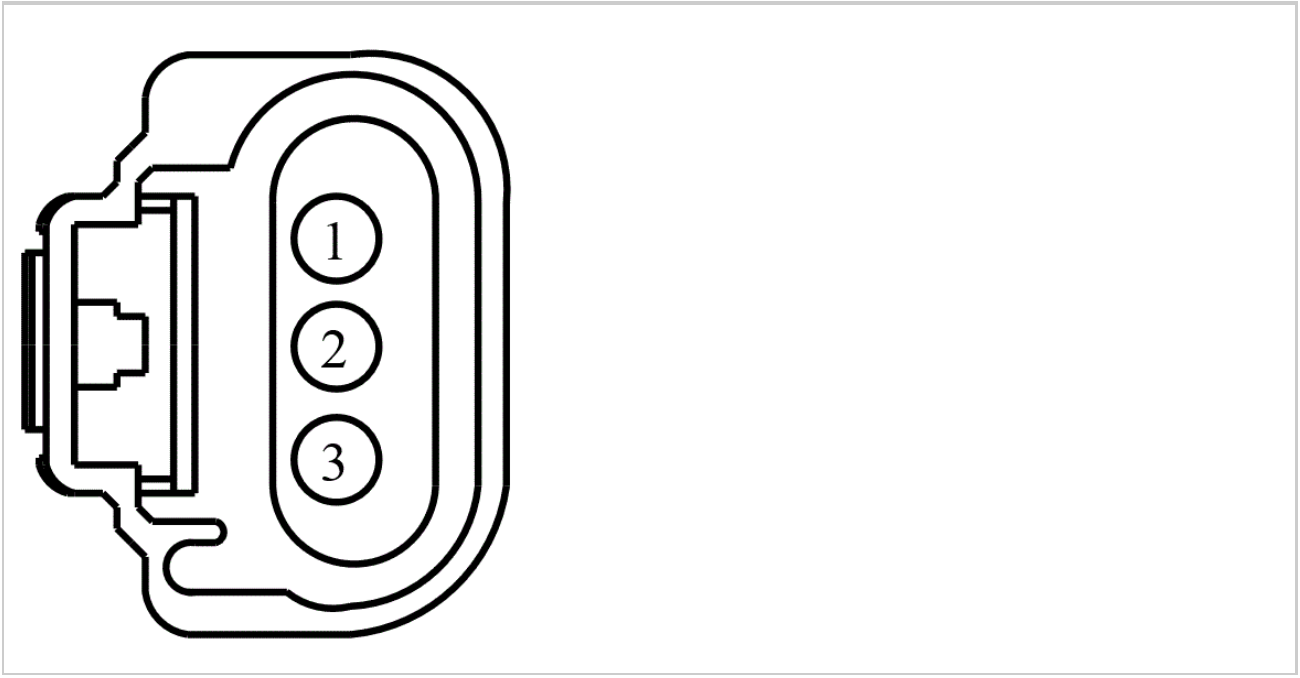
14B060

Base Part #

part# N/A

Service Pigtail

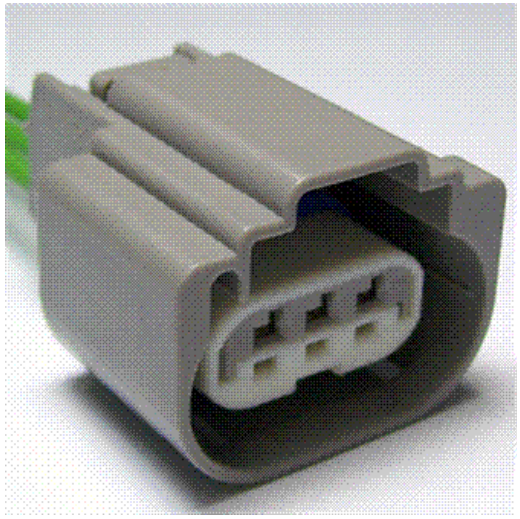
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	LDC59 (BU-WH)	20	CTRL MOD. - BATTERY MONITORING SYSTEM SENSOR +	
2	RDC59 (GY-BN)	20	CTRL MOD. - BATTERY MONITORING SYSTEM SENSOR -	
3	SDC57 (OG-BU)	20	CTRL MOD. - BATTERY MONITORING SYSTEM MONITOR	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1236**	Service Part Number: **3U2Z-14S411-FKAE** Gauge: **16** Pin material: **Silver** Cavities: **3**



Vehicle Uses

Lamp - Headlamp - High/Low Beam

CONNECTOR VIEWS > CONNECTOR END VIEW C1650 - TURBOCHARGER BYPASS VALVE (TCBY)

Connector:C1650

Description

TURBOCHARGER BYPASS VALVE (TCBY)

Color

LT GY

Harness

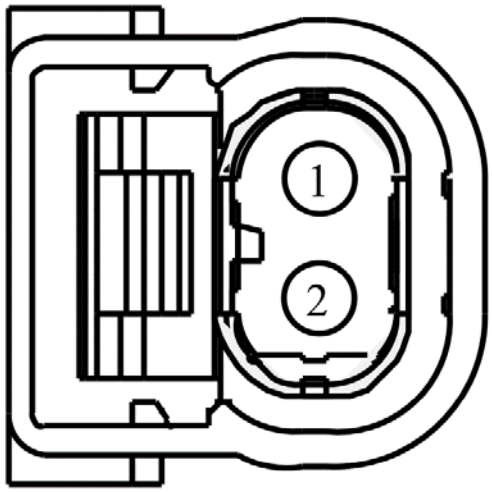
12C508

Base Part #

9U465

Service Pigtail

See Below



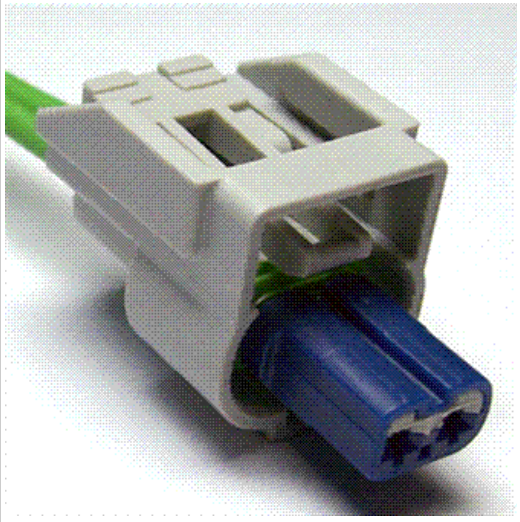
Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CBK03 (GY)	18	FUSE - 42 OR CIRCUIT BREAKER (VPWR 3)	
2	CE148 (YE-GY)	18	CTRL MOD. - POWERTRAIN # ENGINE COOLANT BYPASS VALVE	

Available Pigtail Kits

Pigtail Kit Part Number

WPT-1303



Service Part Number:

CU2Z-14S411-ATA

Gauge:

16

Pin material:

Silver

Cavities:

2

Vehicle Uses

Solenoid - Turbo Charger Bypass

CONNECTOR VIEWS > CONNECTOR END VIEW C1651 - ACTIVE GRILLE SHUTTER

Connector:C1651

Description

ACTIVE GRILLE SHUTTER

Color

BK

Harness

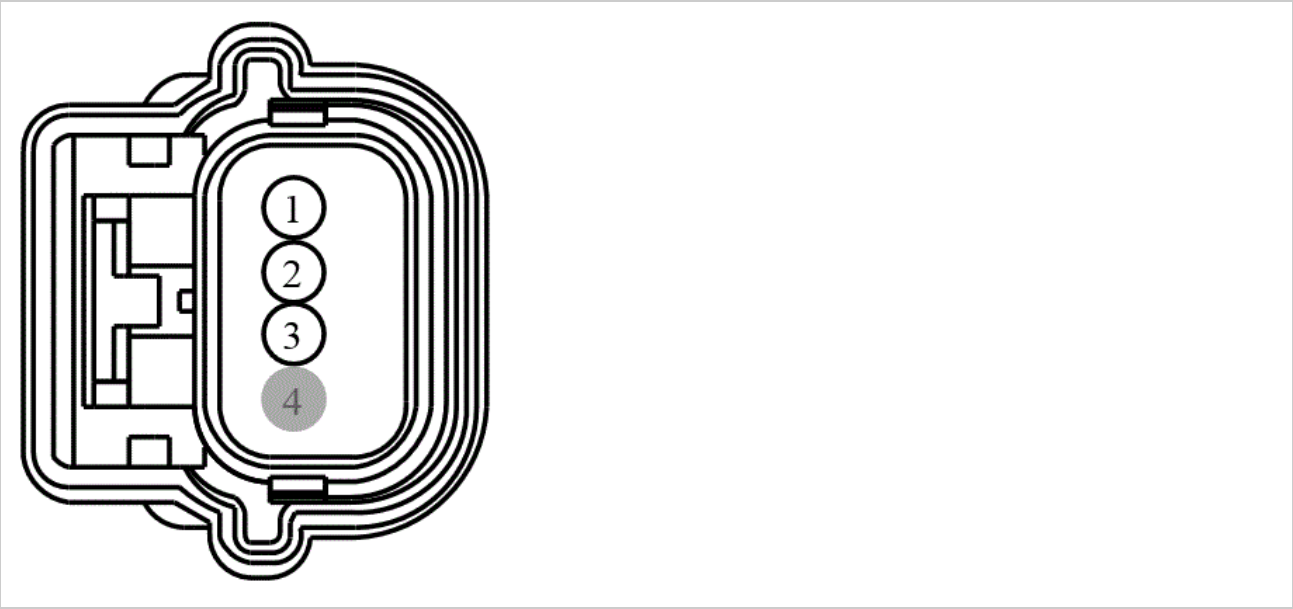
14290

Base Part #

part# N/A

Service Pigtail

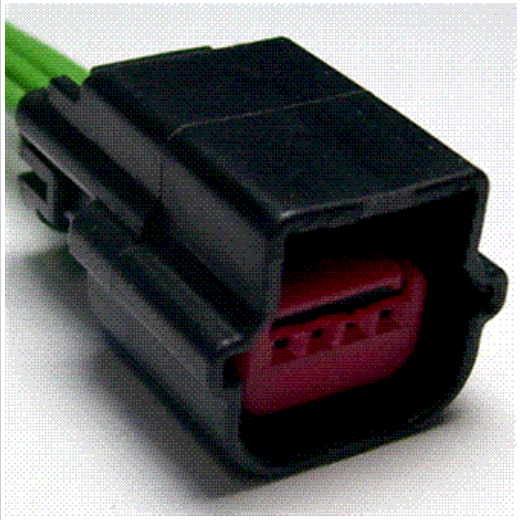
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	GD120 (BK-GN)	18	GROUND - FENDER FRONT LEFT	
2	VDN06 (WH-GN)	20	CTRL MOD. - LIN BUS # POWERTRAIN CONTROL MODULE 1	

3	CBK03 (GY)	18	FUSE - 42 OR CIRCUIT BREAKER (VPWR 3)	
4	*	*	Not Used	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1307** 	Service Part Number: **CU2Z-14S411-AGA** Gauge: **18** Pin material: **Silver** Cavities: **4** Vehicle Uses Antenna - Keyless Entry Sensor - Brake Pedal Position Sensor - Clutch Master Cylinder

CONNECTOR VIEWS > CONNECTOR END VIEW C1656 - WINDSHIELD WIPER MOTOR

Connector:C1656

Description

WINDSHIELD WIPER MOTOR

Color

Harness

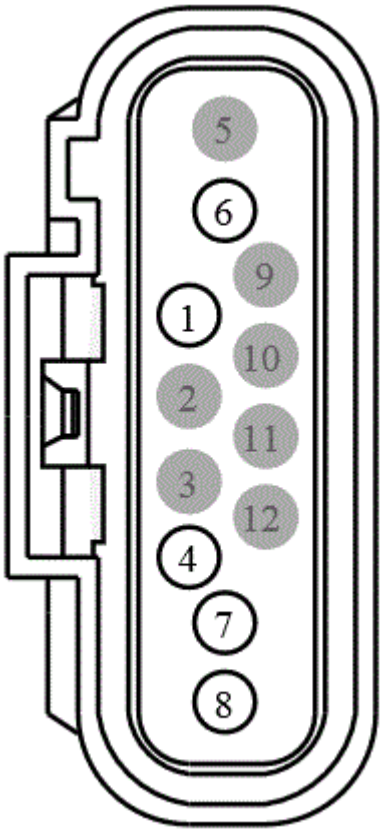
14290

Base Part #

part# N/A

Service Pigtail

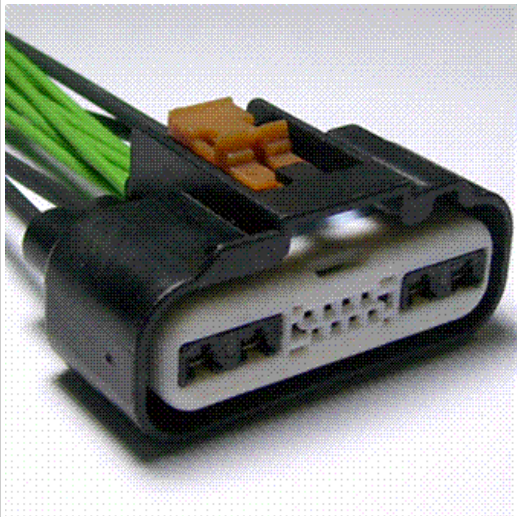
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CRW15 (BN-WH)	18	CTRL MOD. - FRONT WIPER HIGH	
2	*	*	Not Used	
3	*	*	Not Used	
4	VDN05 (YE)	18	CTRL MOD. - LIN BUS # STEERING WHEEL CONTROL MODULE 1	
5	*	*	Not Used	

6	GD120 (BK-GN)	14	GROUND - FENDER FRONT LEFT
7	CRW14 (BU-WH)	14	CTRL MOD. - FRONT WASHER
8	CRW03 (VT-WH)	12	RELAY - FRONT WIPER
9	*	*	Not Used
10	*	*	Not Used
11	*	*	Not Used
12	*	*	Not Used

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1316** 	Service Part Number: **BU2Z-14S411-AB** Gauge: **14 20** Pin material: **Tin & Silver** Cavities: **12** Vehicle Uses Motor - Windshield Wiper

CONNECTOR VIEWS > CONNECTOR END VIEW C1657 - ENGINE OIL PRESSURE (EOP) SENSOR

Connector:C1657

Description

ENGINE OIL PRESSURE (EOP) SENSOR

Color

BK

Harness

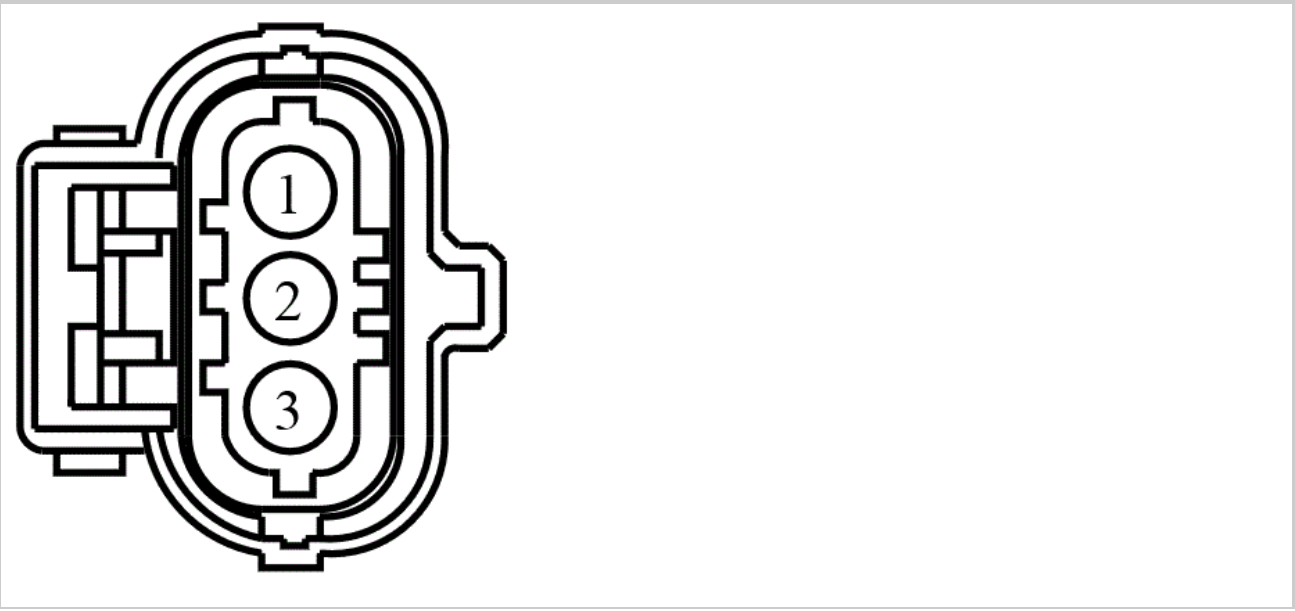
12C508

Base Part #

part# N/A

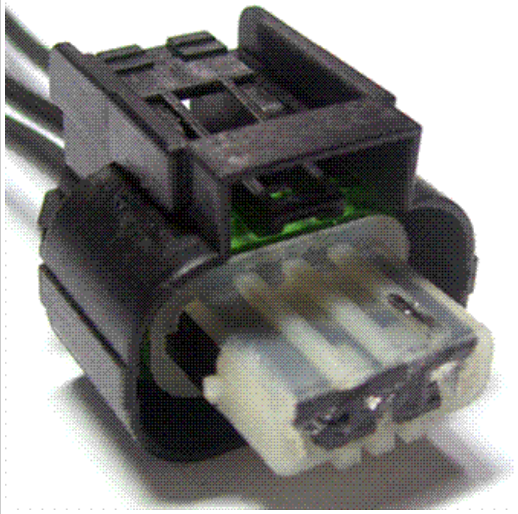
Service Pigtail

See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CMC24 (GY)	18	SWITCH - OIL PRESSURE	
2	RE454 (YE-GN)	18	CTRL MOD. - POWERTRAIN # SIGNAL RETURN ENGINE #2	
3	LE423 (GN-VT)	18	CTRL MOD. - POWERTRAIN # VOLTAGE REFERENCE ENGINE (VREF) (E-VREF) (VREF1)	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1066** 	Service Part Number: **AU2Z-14S411-GA** Gauge: **14** Pin material: **Tin (greased)** Cavities: **3** Vehicle Uses Sensor - Fuel Rail Pressure

CONNECTOR VIEWS > CONNECTOR END VIEW C1670 - VARIABLE CAMSHAFT TIMING BANK 1 SOLENOID 1 (VCT11)

Connector:C1670

Description

VARIABLE CAMSHAFT TIMING BANK 1 SOLENOID 1 (VCT11)

Color

BK

Harness

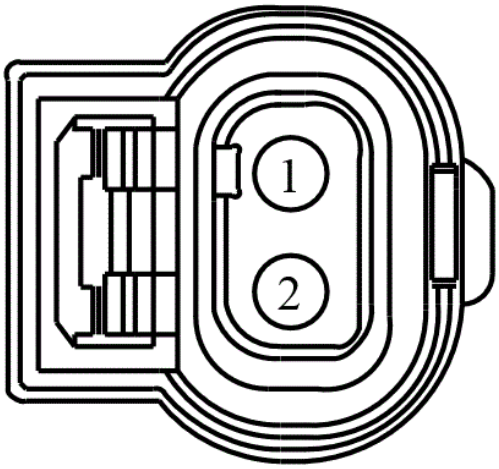
12C508

Base Part #

part# N/A

Service Pigtail

See Below



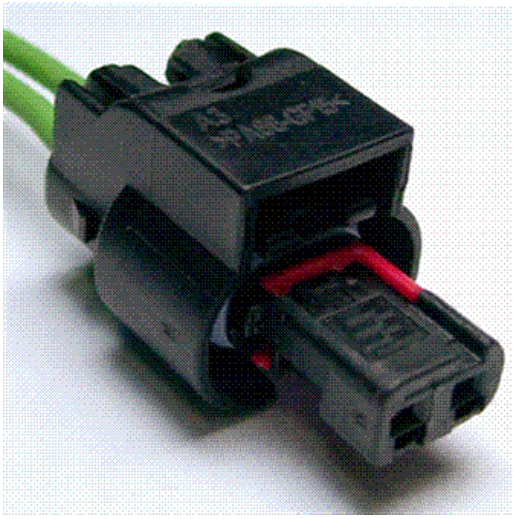
Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CBK02 (GN)	18	FUSE - 40 OR CIRCUIT BREAKER (VPWR)	
2	CE421 (VT)	18	CTRL MOD. - POWERTRAIN # VARIABLE CAMSHAFT TIMING VALVE 1 (VCT11)	

Available Pigtail Kits

Pigtail Kit Part Number

WPT-1251



Service Part Number:

CU2Z-14S411-DA

Gauge:

18

Pin material:

Silver

Cavities:

2

Vehicle Uses

Solenoid - Engine Variable Timing

CONNECTOR VIEWS > CONNECTOR END VIEW C1671 - VARIABLE CAMSHAFT TIMING BANK 1 SOLENOID 2 (VCT12)

Connector:C1671

Description

VARIABLE CAMSHAFT TIMING BANK 1 SOLENOID 2 (VCT12)

Color

BK

Harness

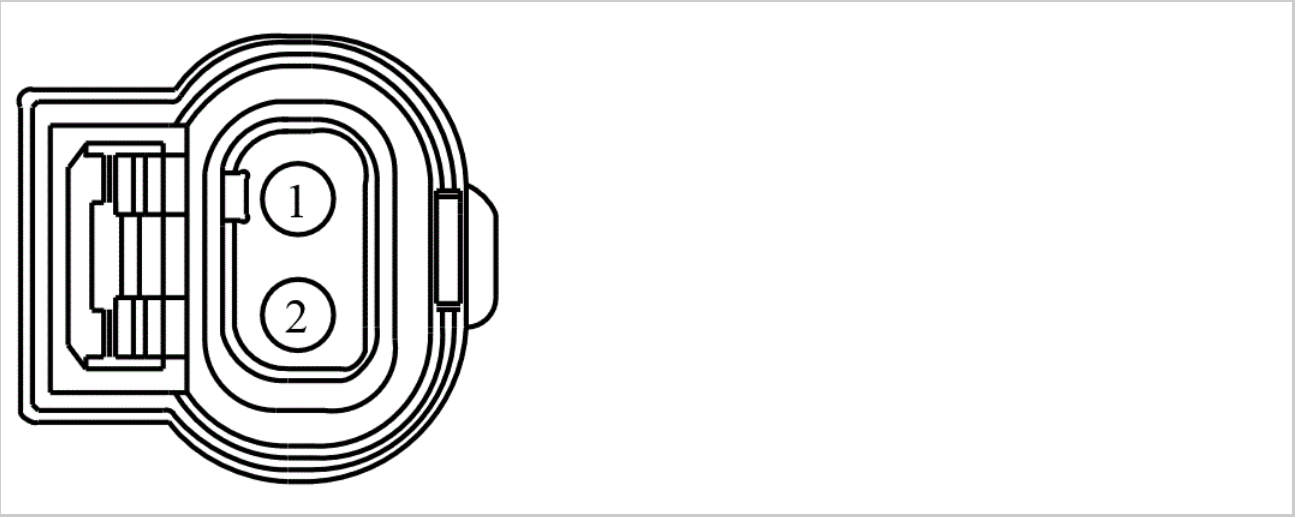
12C508

Base Part #

part# N/A

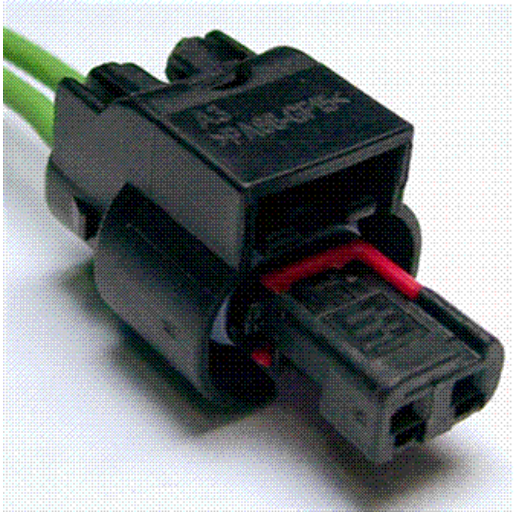
Service Pigtail

See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CBK02 (GN)	18	FUSE - 40 OR CIRCUIT BREAKER (VPWR)	
2	CE422 (WH-OG)	18	CTRL MOD. - POWERTRAIN # VARIABLE CAMSHAFT TIMING VALVE 2 (VCT12)	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1251** 	Service Part Number: **CU2Z-14S411-DA** Gauge: **18** Pin material: **Silver** Cavities: **2** Vehicle Uses Solenoid - Engine Variable Timing

CONNECTOR VIEWS > CONNECTOR END VIEW C1673 - FUEL INJECTION PUMP

Connector:C1673

Description

FUEL INJECTION PUMP

Color

Harness

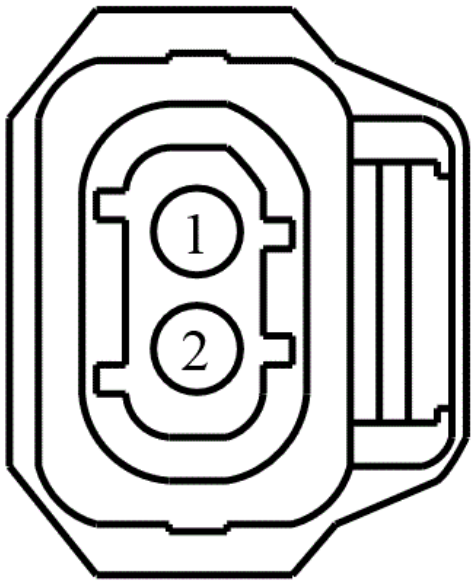
12C508

Base Part #

part# N/A

Service Pigtail

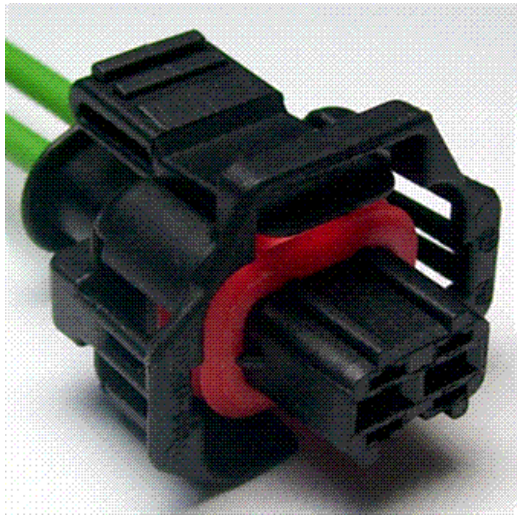
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	RE226 (GN-VT)	16	CTRL MOD. - POWERTRAIN # FUEL VOLUME REGULATOR RETURN (FVRRTN)	
2	CE226 (YE-VT)	16	CTRL MOD. - POWERTRAIN # FUEL VOLUME REGULATOR (FVR)	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1302**	Service Part Number: **CU2Z-14S411-ARA** Gauge: **16** Pin material: **Silver** Cavities: **2** Vehicle Uses

	Fuel Injector Pump - Fuel Injection Solenoid - Fuel Volume Regulator Control

CONNECTOR VIEWS > CONNECTOR END VIEW C1691 - FUEL PRESSURE SENSOR

Connector:C1691

Description

FUEL PRESSURE SENSOR

Color

BK

Harness

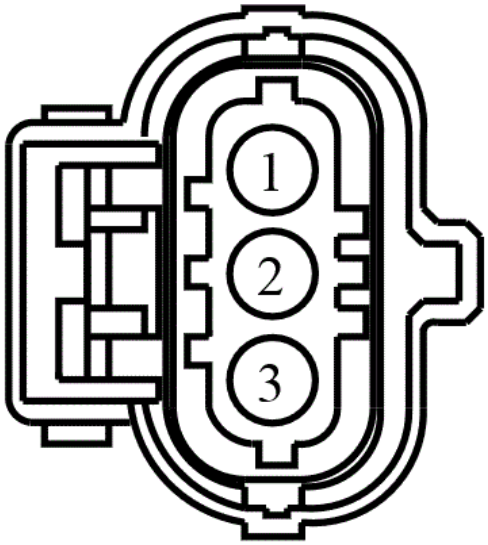
12C508

Base Part #

part# N/A

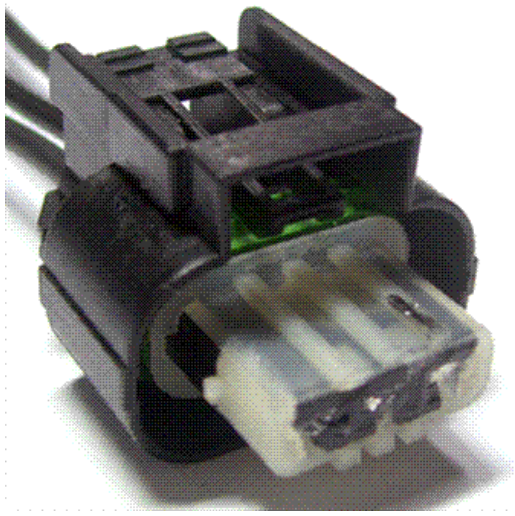
Service Pigtail

See Below



Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CMC14 (BN-YE)	18	SENSOR - LOW LEVEL ENGINE OIL	
2	RE454 (YE-GN)	18	CTRL MOD. - POWERTRAIN # SIGNAL RETURN ENGINE #2	
3	LE458 (BU-WH)	18	CTRL MOD. - POWERTRAIN # VOLTAGE REFERENCE ENGINE 2 (VREF2)	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1066**	Service Part Number: **AU2Z-14S411-GA** Gauge: **14** Pin material: **Tin (greased)** Cavities: **3**



Vehicle Uses

Sensor - Fuel Rail Pressure

CONNECTOR VIEWS > CONNECTOR END VIEW C1698 - CAMSHAFT POSITION BANK 1 SENSOR 1 (CMP11)

Connector:C1698

Description

CAMSHAFT POSITION BANK 1 SENSOR 1 (CMP11)

Color

DK GY

Harness

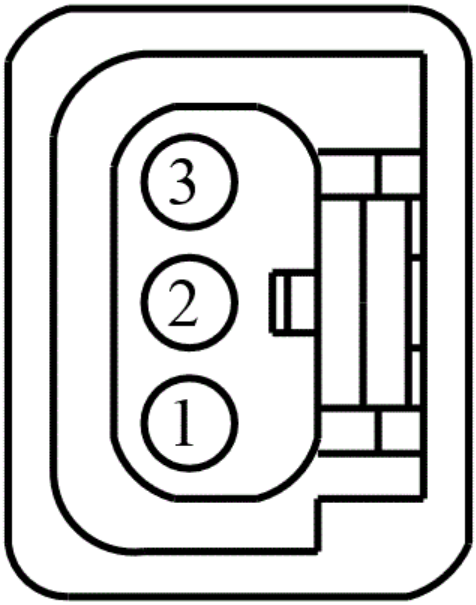
12C508

Base Part #

part# N/A

Service Pigtail

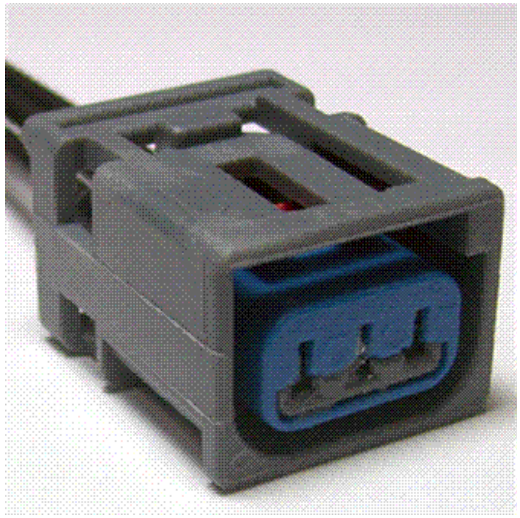
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	LE458 (BU-WH)	20	CTRL MOD. - POWERTRAIN # VOLTAGE REFERENCE ENGINE 2 (VREF)	
2	RE405 (GN-WH)	20	CTRL MOD. - POWERTRAIN # SIGNAL RETURN ENGINE (SIGRTN)	
3	VE706 (BN-BU)	20	SENSOR - CAMSHAFT POSITION BANK 1 IN+EX / IN (CMP11)	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1205**	Service Part Number: **3U2Z-14S411-KMB** Gauge: **16** Pin material: **Tin (greased)**



Cavities:

3

Vehicle Uses

Sensor - Cam Shaft Position

Sensor - Delta Pressure Feedback EGR

Sensor - Fuel Tank Pressure Transducer

CONNECTOR VIEWS > CONNECTOR END VIEW C1699 - CAMSHAFT POSITION BANK 1 SENSOR 2 (CMP12)

Connector:C1699

Description

CAMSHAFT POSITION BANK 1 SENSOR 2 (CMP12)

Color

DK GY

Harness

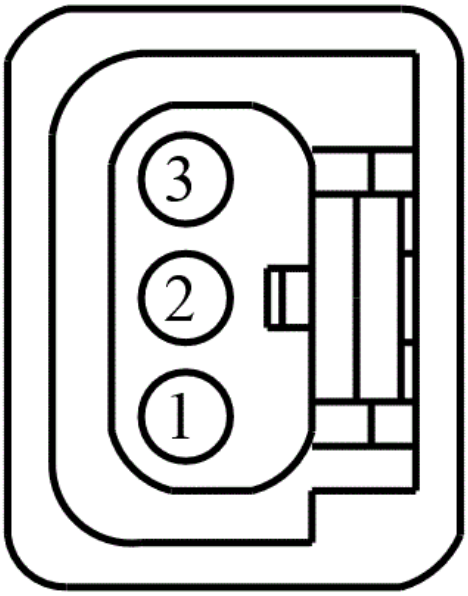
12C508

Base Part #

part# N/A

Service Pigtail

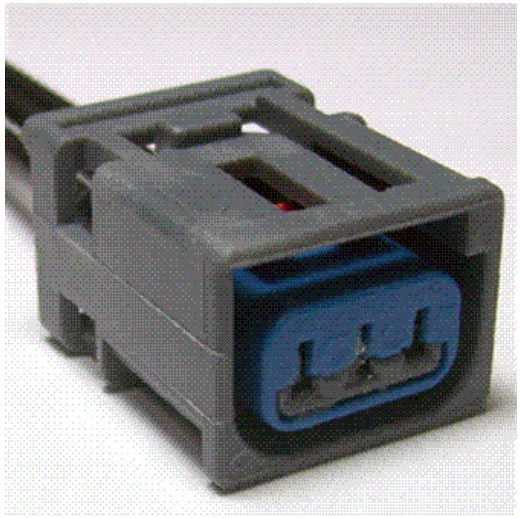
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	LE458 (BU-WH)	20	CTRL MOD. - POWERTRAIN # VOLTAGE REFERENCE ENGINE 2 (VREF)	
2	RE405 (GN-WH)	20	CTRL MOD. - POWERTRAIN # SIGNAL RETURN ENGINE (SIGRTN)	
3	VE707 (GN-VT)	20	SENSOR - CAMSHAFT POSITION BANK 2 IN+EX / IN (CMP12)	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1205**	Service Part Number: **3U2Z-14S411-KMB** Gauge: **16** Pin material: **Tin (greased)** Cavities:

	**3** Vehicle Uses Sensor - Cam Shaft Position Sensor - Delta Pressure Feedback EGR Sensor - Fuel Tank Pressure Transducer

CONNECTOR VIEWS > CONNECTOR END VIEW C1739 - VARIABLE CAMSHAFT TIMING BANK 2 SOLENOID 1 (VCT21)

Connector:C1739

Description

VARIABLE CAMSHAFT TIMING BANK 2 SOLENOID 1 (VCT21)

Color

Harness

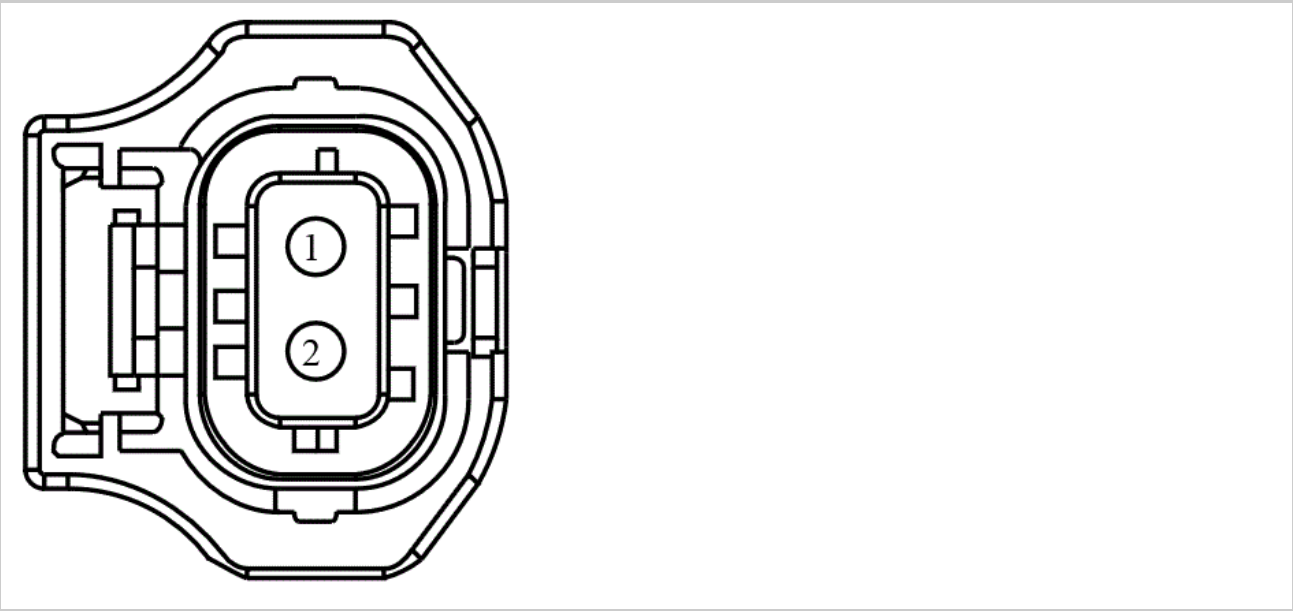
12C508

Base Part #

part# N/A

Service Pigtail

Not Available



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CE442 (YE-GY)	18	CTRL MOD. - POWERTRAIN # VARIABLE CAMSHAFT TIMING VALVE 3	
2	CBK02 (GN)	18	FUSE - 40 OR CIRCUIT BREAKER (VPWR 2)	

CONNECTOR VIEWS > CONNECTOR END VIEW C1745 - CYLINDER HEAD TEMPERATURE (CHT) SENSOR

Connector:C1745

Description

CYLINDER HEAD TEMPERATURE (CHT) SENSOR

Color

Harness

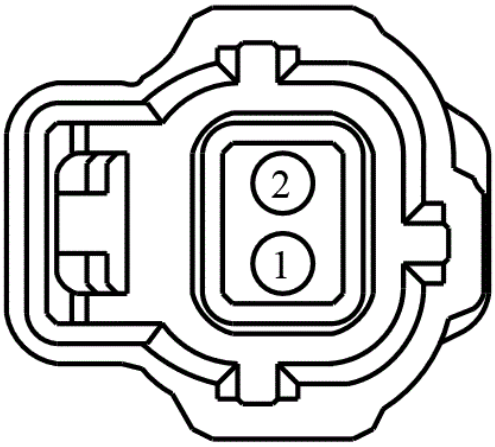
14B485

Base Part #

part# N/A

Service Pigtail

See Below

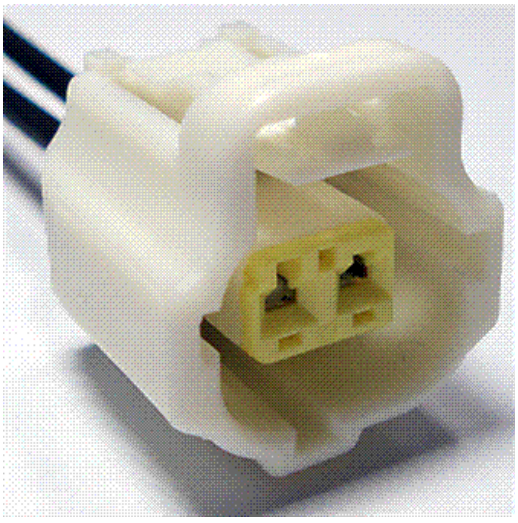


Pin	Circuit	Gauge	Circuit Function	Qualifier
1	VE712 (BU-GY)	18	SENSOR - CYLINDER HEAD TEMPERATURE (CHT)	
2	RE405 (GN-WH)	18	CTRL MOD. - POWERTRAIN # SIGNAL RETURN ENGINE (SIGRTN)	

Available Pigtail Kits

Pigtail Kit Part Number

WPT-1120



Service Part Number:

3U2Z-14S411-ARB

Gauge:

14

Pin material:

Tin (greased)

Cavities:

2

Vehicle Uses

Sensor - Cylinder Head Temperature

CONNECTOR VIEWS > CONNECTOR END VIEW C1750 - DAYTIME RUNNING LAMP

(DRL), LF

Connector:C1750

Description

DAYTIME RUNNING LAMP (DRL), LF

Color

Harness

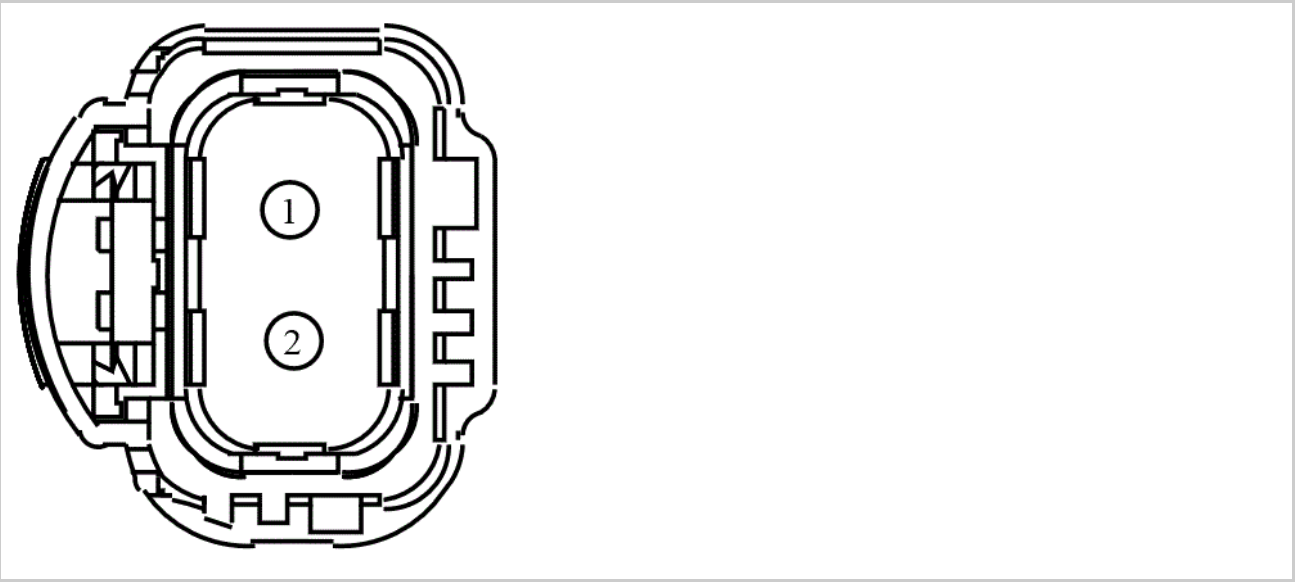
14290

Base Part #

part# N/A

Service Pigtail

Not Available



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	GD123 (BK-GY)	20	GROUND - FENDER FRONT RIGHT	
2	CLF61 (GY-BU)	20	CTRL MOD. - DAYTIME RUNNING LIGHT LEFT	

CONNECTOR VIEWS > CONNECTOR END VIEW C1751 - DAYTIME RUNNING LAMP

(DRL), RF

Connector:C1751

Description

DAYTIME RUNNING LAMP (DRL), RF

Color

Harness

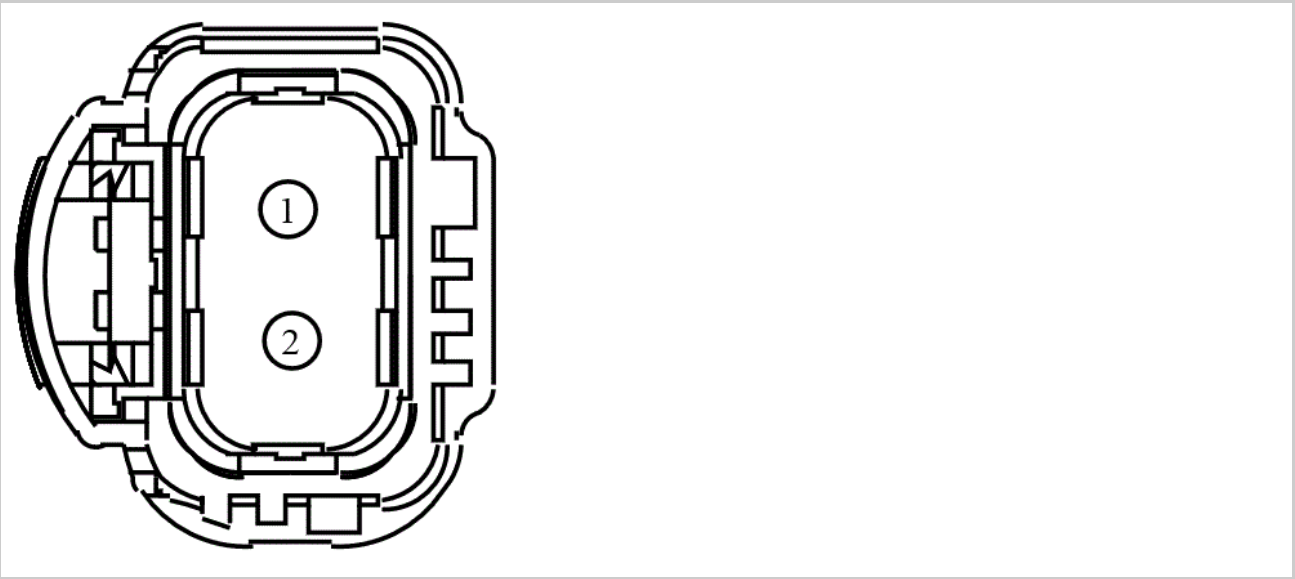
14290

Base Part #

part# N/A

Service Pigtail

Not Available



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	GD123 (BK-GY)	20	GROUND - FENDER FRONT RIGHT	
2	CLF62 (VT-WH)	20	CTRL MOD. - DAYTIME RUNNING LIGHT RIGHT	

CONNECTOR VIEWS > CONNECTOR END VIEW C1757 - ENGINE MOUNT CONTROL

SOLENOID

Connector:C1757

Description

ENGINE MOUNT CONTROL SOLENOID

Color

Harness

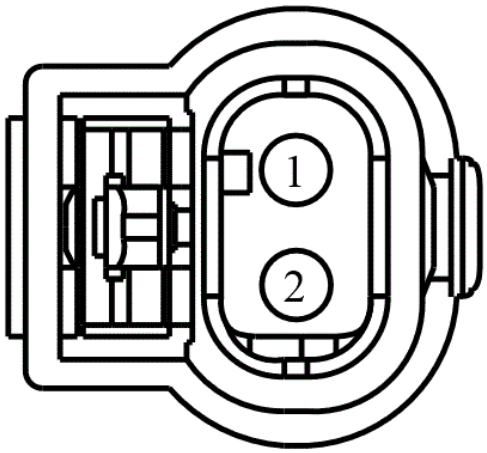
14290

Base Part #

part# N/A

Service Pigtail

See Below

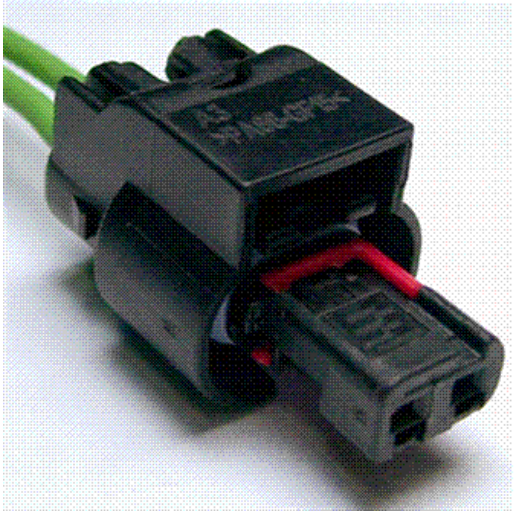


Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CBK03 (GY)	18	FUSE - 42 OR CIRCUIT BREAKER (VPWR 3)	
2	CE106 (BU-OG)	20	CTRL MOD. - POWERTRAIN # ACTIVE MOUNTS (AMC)	

Available Pigtail Kits	
Pigtail Kit Part Number	Service Part Number:

WPT-1251



CU2Z-14S411-DA

Gauge:

18

Pin material:

Silver

Cavities:

2

Vehicle Uses

Solenoid - Engine Variable Timing

CONNECTOR VIEWS > CONNECTOR END VIEW C1785 - HOOD HINGE, DRIVER SIDE

Connector:C1785

Description

HOOD HINGE, DRIVER SIDE

Color

Harness

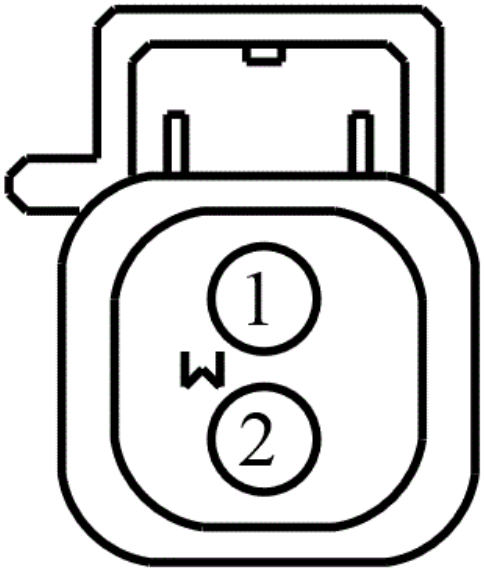
14290

Base Part #

part# N/A

Service Pigtail

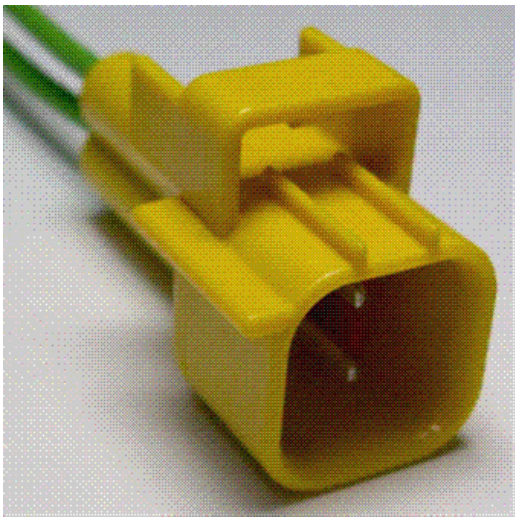
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CRP03 (YE-GN)	20	CTRL MOD. - ACTUATOR PEDESTRIAN IMPACT HOOD LEFT HAND POS	
2	RRP03 (GN-VT)	20	CTRL MOD. - ACTUATOR PEDESTRIAN IMPACT HOOD LEFT HAND NEG	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1244**	Service Part Number: **AU2Z-14S411-BMA** Gauge: **16** Pin material: **Silver** Cavities: **2** Vehicle Uses

	Pretensioner - Seat Belt (Passenger)

CONNECTOR VIEWS > CONNECTOR END VIEW C1786 - HOOD HINGE, PASSENGER SIDE

Connector:C1786

Description

HOOD HINGE, PASSENGER SIDE

Color

Harness

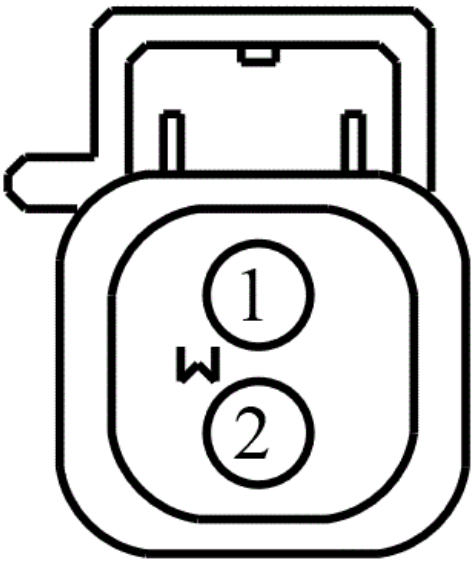
14290

Base Part #

part# N/A

Service Pigtail

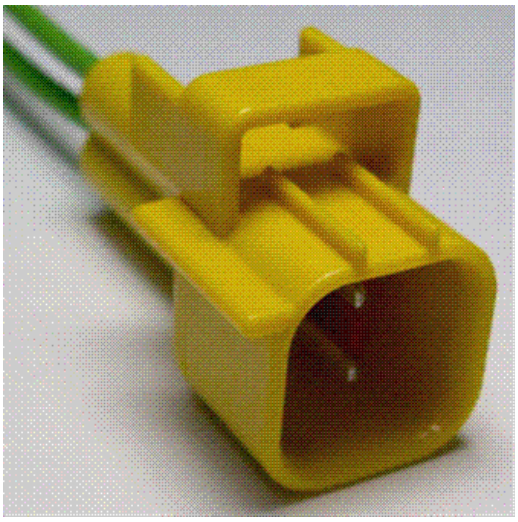
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CRP04 (BU-GN)	18	CTRL MOD. - ACTUATOR PEDESTRIAN IMPACT HOOD RIGHT HAND POS	
2	RRP04 (GY-BU)	18	CTRL MOD. - ACTUATOR PEDESTRIAN IMPACT HOOD RIGHT HAND NEG	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1244**	Service Part Number: **AU2Z-14S411-BMA** Gauge: **16** Pin material: **Silver** Cavities: **2** Vehicle Uses

	Pretensioner - Seat Belt (Passenger)

CONNECTOR VIEWS > CONNECTOR END VIEW C1917 - HEATED OXYGEN SENSOR (HO2S) #12

Connector:C1917

Description

HEATED OXYGEN SENSOR (HO2S) #12

Color

Harness

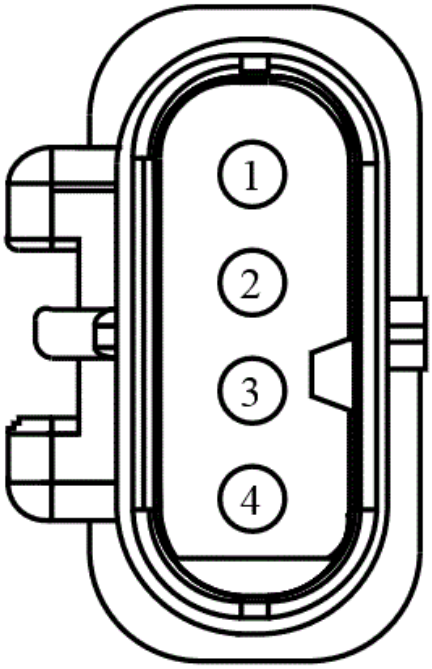
12C508/14B060

Base Part #

part# N/A

Service Pigtail

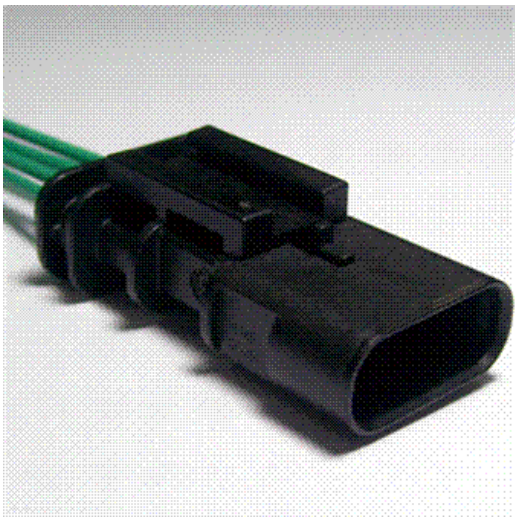
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CBK02 (GN)	18	FUSE - 40 OR CIRCUIT BREAKER (VPWR 2)	
2	CE233 (WH-OG)	18	CTRL MOD. - POWERTRAIN # HEATER OXYGEN SEN. POST CAT. 1ST OR UNIQUE (HTR12)	
3	RE731 (WH)	18	SENSOR - HEATED OXYGEN POST CAT. 1ST OR UNIQUE (LSF_GND)	
3	RE731 (BK)	18	SENSOR - HEATED OXYGEN POST CAT. 1ST OR UNIQUE (LSF_GND)	
4	VE731 (YE-GN)	18	SENSOR - HEATED OXYGEN POST CAT. 1ST OR UNIQUE (HO2S12)	

Available Pigtail Kits	

Pigtail Kit Part Number **WPT-1381** 	Service Part Number: **EU2Z-14S411-EA** Gauge: **18** Pin material: **Silver** Cavities: **4** Vehicle Uses Sensor - Catalyst Monitor

CONNECTOR VIEWS > CONNECTOR END VIEW C2040 - ACCELERATOR PEDAL POSITION (APP) SENSOR

Connector:C2040

Description

ACCELERATOR PEDAL POSITION (APP) SENSOR

Color

Harness

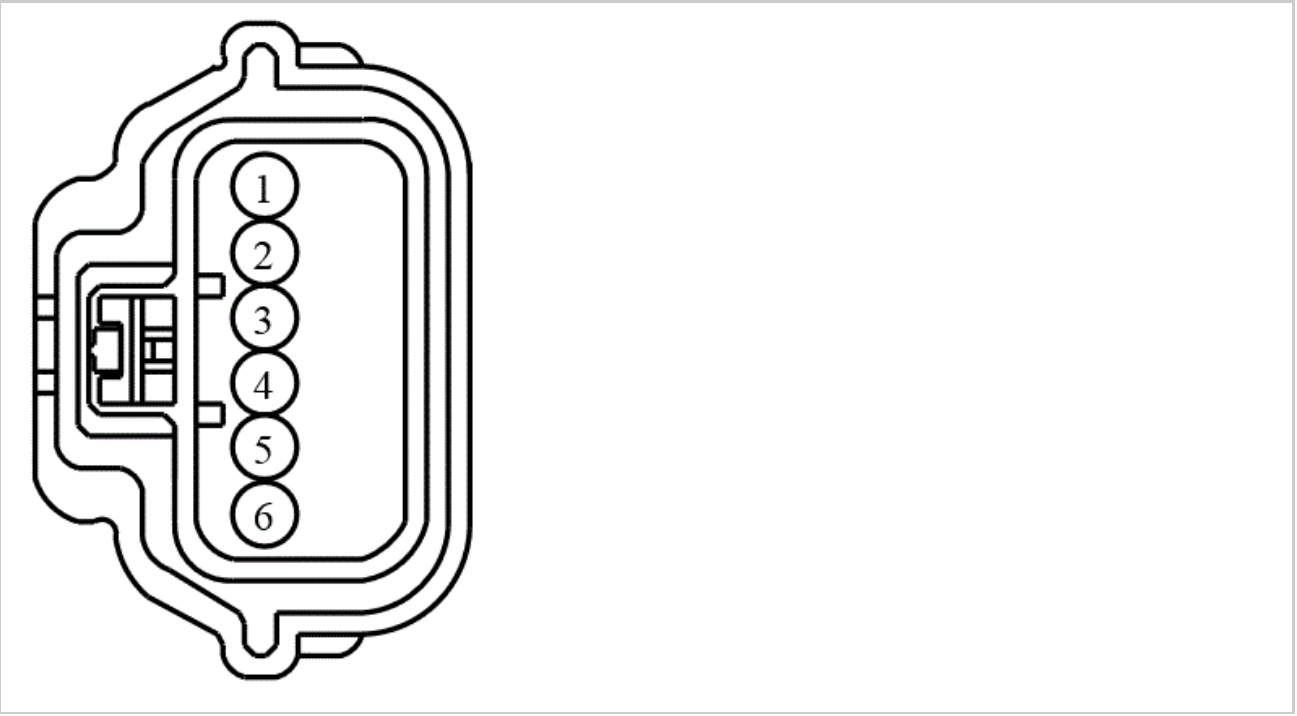
14290

Base Part #

part# N/A

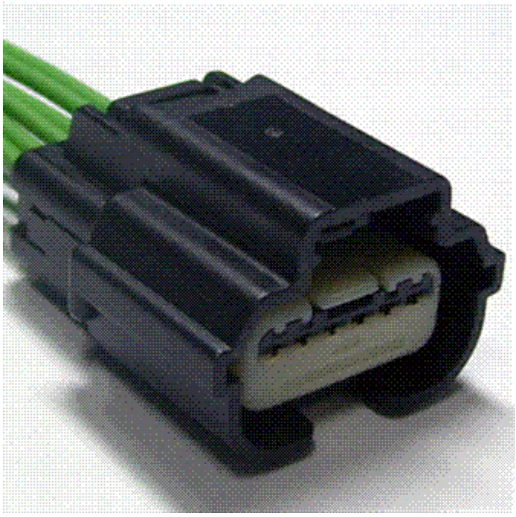
Service Pigtail

See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	LE136 (GN-OG)	22	CTRL MOD. - POWERTRAIN # ACCELERATOR PEDAL POSITION SENSOR 1 (APPVREF1)	
2	VE701 (YE-OG)	22	SENSOR - ACCELERATOR PEDAL POSITION # 1 (APP1)	
3	RE136 (VT-GN)	22	CTRL MOD. - POWERTRAIN # ACCELERATOR PEDAL POSITION SENSOR 1 (APPRTN1)	
4	RE137 (YE-GN)	22	CTRL MOD. - POWERTRAIN # ACCELERATOR PEDAL POSITION SENSOR 2 (APPRTN2)	
5	VE702 (BU-WH)	22	SENSOR - ACCELERATOR PEDAL POSITION # 2 (APP2)	
6	LE137 (BU-GY)	22	CTRL MOD. - POWERTRAIN # ACCELERATOR PEDAL POSITION SENSOR 2 (APPVREF2)	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1338** 	Service Part Number: **9U2Z-14S411-BB** Gauge: **20** Pin material: **Silver** Cavities: **6** Vehicle Uses Actuator - Door Lock - LH - Front Actuator - Door Lock - LH - Rear Actuator - Door Lock - RH - Front Actuator - Door Lock - RH - Rear Module - Occupant Classification Sensor - Acceleration Pedal Position Sensor - Transmission Range Switch - Door Ajar / Interior Lamp

CONNECTOR VIEWS > CONNECTOR END VIEW C2066 - BLOWER MOTOR

Connector:C2066

Description

BLOWER MOTOR

Color

GY

Harness

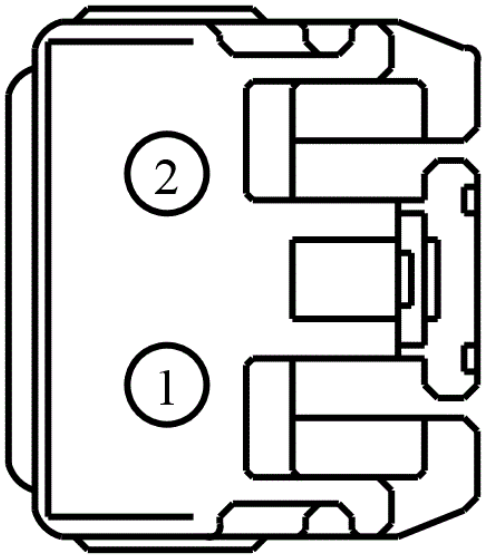
18B574

Base Part #

part# N/A

Service Pigtail

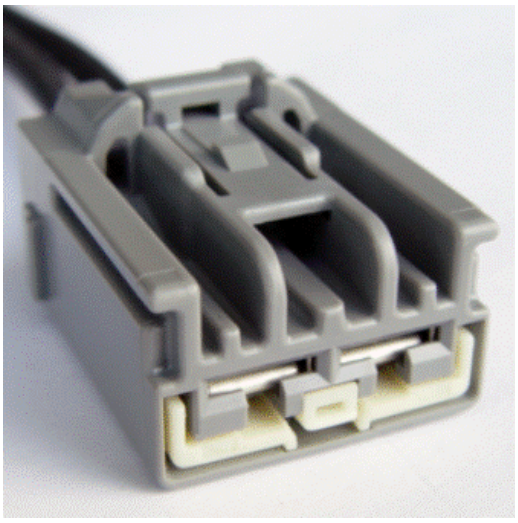
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	RH301 (GY-VT)	10	CTRL MOD. - BLOWER VARIABLE SPEED # BLOWER MOTOR -	
2	CH402 (YE-GN)	10	RELAY - FRONT BLOWER	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-236**	Service Part Number: **3U2Z-14S411-PA** Gauge: **10** Pin material: **Tin** Cavities:



2

Vehicle Uses

Mirror - Vanity

Module - Seat Memory

Motor - Heater/AC Blower (Auxiliary)

Motor - Heater/AC Blower (Front)

Radio - Amplifier

Resistor - Blower Motor (Front)

Switch - Heater / A/C Blower (Front)

CONNECTOR VIEWS > CONNECTOR END VIEW C2091 - TEMPERATURE DOOR ACTUATOR LH

Connector:C2091

Description

TEMPERATURE DOOR ACTUATOR LH

Color

BK

Harness

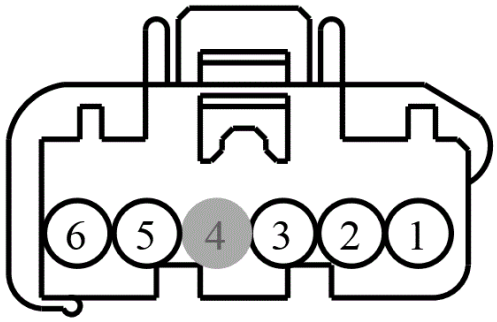
18B574

Base Part #

part# N/A

Service Pigtail

See Below



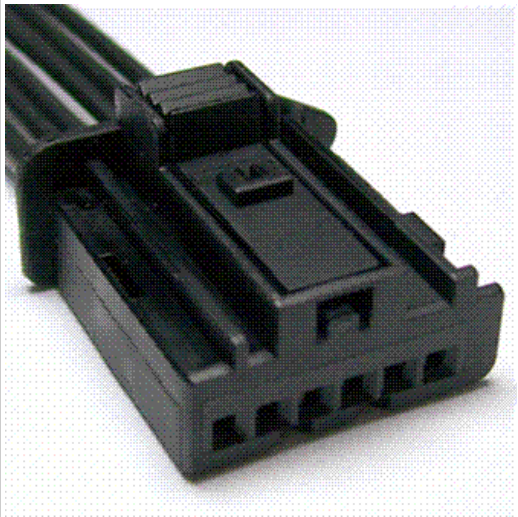
Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	RH111 (GY-BU)	22	CTRL MOD. - CLIMATE # GENERIC VREF RETURN	
2	VH440 (BU)	26	SENSOR - DOOR POSITION TEMP. LEFT	
3	LH111 (BN)	26	CTRL MOD. - CLIMATE # GENERIC VREF	
4	*	*	Not Used	
5	CH239 (WH)	26	CTRL MOD. - CLIMATE # DOOR MOTOR TEMP. LEFT COIL 2 / OPEN (IF PLUS)	
6	CH238 (OG)	26	CTRL MOD. - CLIMATE # DOOR MOTOR TEMP. LEFT COIL 1 / CLOSE (IF PLUS)	

Available Pigtail Kits

Pigtail Kit Part Number

WPT-1151



Service Part Number:

BU2Z-14S411-MA

Gauge:

18

Pin material:

Tin

Cavities:

6

Vehicle Uses

Motor - Heater A/C Mode Door

Motor - Heater/AC Blend Door

Motor - Heater/AC Blower (Auxiliary)

	Motor - Heater/AC Inlet Door

CONNECTOR VIEWS > CONNECTOR END VIEW C2092 - TEMPERATURE DOOR ACTUATOR RH

Connector:C2092

Description

TEMPERATURE DOOR ACTUATOR RH

Color

BK

Harness

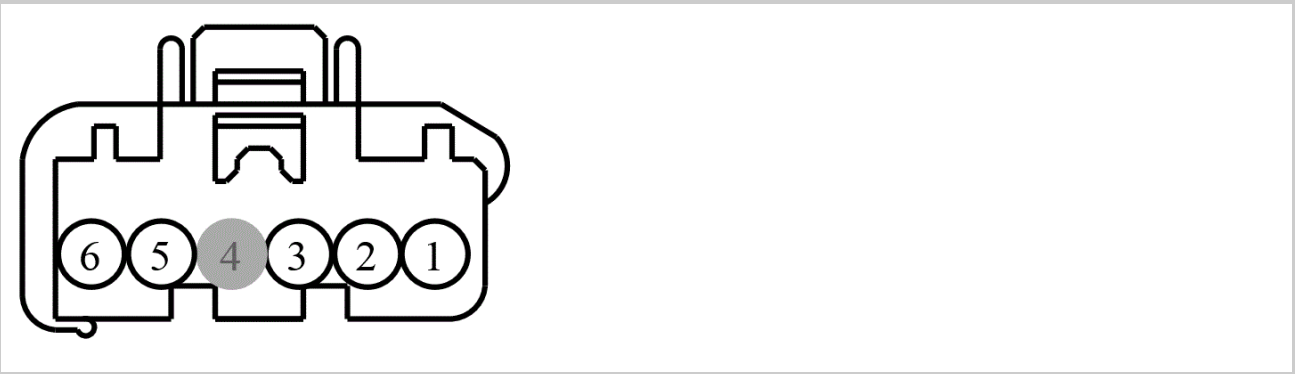
18B574

Base Part #

part# N/A

Service Pigtail

See Below



Check for Terminal Part Numbers

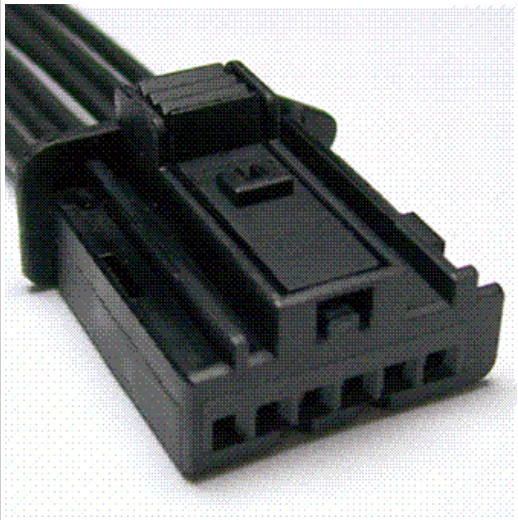
Pin	Circuit	Gauge	Circuit Function	Qualifier
1	RH111 (GY-BU)	22	CTRL MOD. - CLIMATE # GENERIC VREF RETURN	
2	VH441 (WH)	26	SENSOR - DOOR POSITION TEMP. RIGHT	

3	LH111 (BN)	26	CTRL MOD. - CLIMATE # GENERIC VREF
4	*	*	Not Used
5	CH212 (BU)	26	CTRL MOD. - CLIMATE # DOOR MOTOR TEMP. RIGHT COIL 1 / CLOSE (IF PLUS)
6	CH213 (BN)	26	CTRL MOD. - CLIMATE # DOOR MOTOR TEMP. RIGHT COIL 2 / OPEN (IF PLUS)

Available Pigtail Kits

Pigtail Kit Part Number

WPT-1151



Service Part Number:

BU2Z-14S411-MA

Gauge:

18

Pin material:

Tin

Cavities:

6

Vehicle Uses

Motor - Heater A/C Mode Door

Motor - Heater/AC Blend Door

Motor - Heater/AC Blower (Auxiliary)

Motor - Heater/AC Inlet Door

CONNECTOR VIEWS > CONNECTOR END VIEW C2114 - INFORMATION CONTROL MODULE

Connector:C2114

Description

INFORMATION CONTROL MODULE

Color

BK

Harness

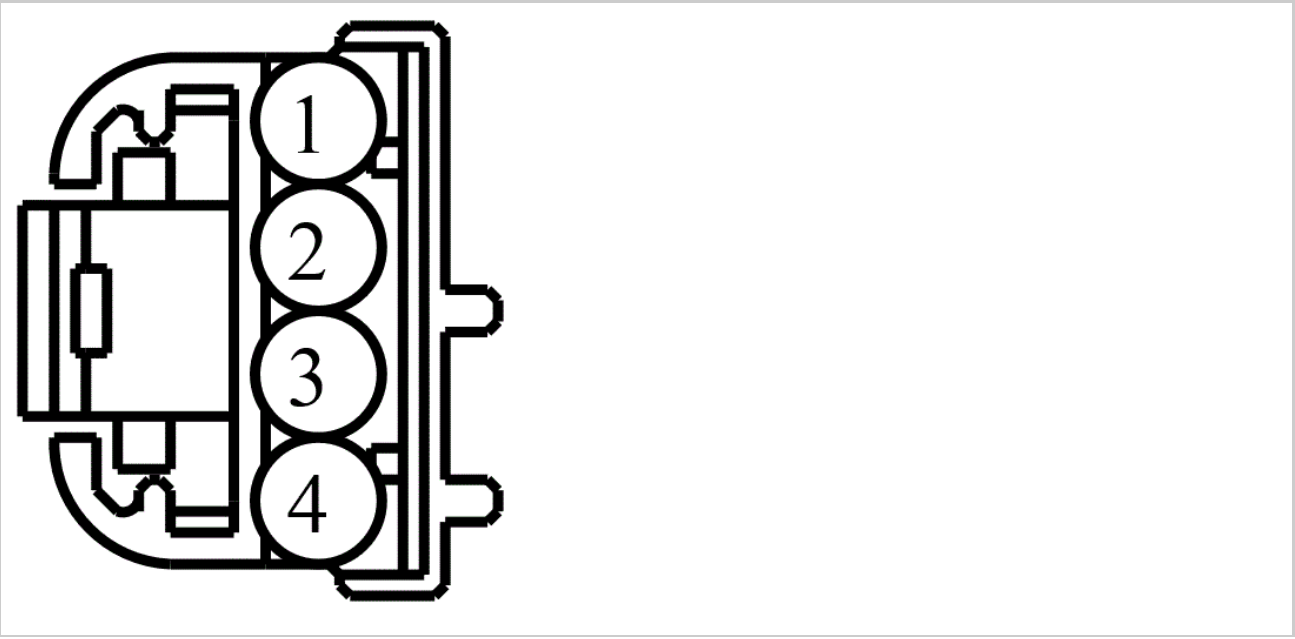
14401

Base Part #

part# N/A

Service Pigtail

See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	SBP32 (VT-RD)	22	FUSE - 32 OR CIRCUIT BREAKER	
2	VDB04 (BU)	26	CONNECTOR - DIAGNOSTIC # CAN BUS HIGH SPEED HIGH	
3	VDB05 (WH)	26	CONNECTOR - DIAGNOSTIC # CAN BUS HIGH SPEED LOW	
4	GD214 (BK-BU)	20	GROUND - INSTRUMENT PANEL STRUCTURE	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-982** 	Service Part Number: **6U2Z-14S411-JB** Gauge: **18** Pin material: **Silver** Cavities: **4** Vehicle Uses Module - Auto Lamps Module - Front Interface Sensor - EATC In Car Temperature Sensor - Sunload Solenoid - Brake Shift Park Interlock Switch - Door Lock (LH) Switch - Door Lock (RH)

CONNECTOR VIEWS > CONNECTOR END VIEW C2123 - FRONT CONTROL/DISPLAY INTERFACE MODULE (FCDIM)

Connector:C2123

Description

FRONT CONTROL/DISPLAY INTERFACE MODULE (FCDIM)

Color

BK

Harness

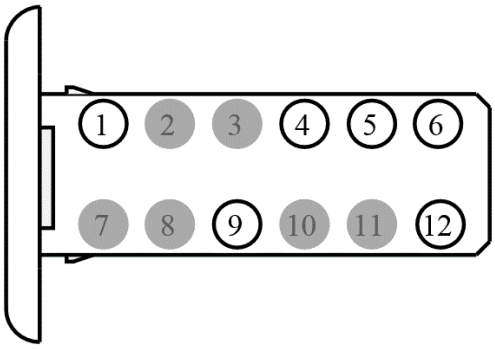
14401

Base Part #

part# N/A

Service Pigtail

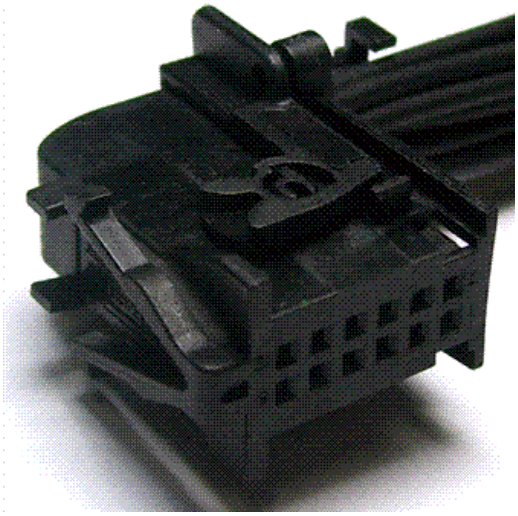
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	SBP32 (VT-RD)	22	FUSE - 32 OR CIRCUIT BREAKER	
2	*	*	Not Used	
3	*	*	Not Used	
4	VDB29 (GN-BU)	22	CONNECTOR - DIAGNOSTIC # CAN BUS HIGH SPEED 3 (LOWER) HIGH	
5	VDB30 (WH-GN)	22	CONNECTOR - DIAGNOSTIC # CAN BUS HIGH SPEED 3 (LOWER) LOW	
6	VMP19 (WH-GN)	22	CAMERA - PARKING AID REAR VIDEO +	
7	*	*	Not Used	
8	*	*	Not Used	

9	GD215 (BK-GY)	20	GROUND - INSTRUMENT PANEL STRUCTURE # 2ND POINT	
10	*	*	Not Used	
11	*	*	Not Used	
12	RMP19 (BN-VT)	22	CAMERA - PARKING AID REAR VIDEO -	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1278** 	Service Part Number: **CU2Z-14S411-ABA** Gauge: **18** Pin material: **Tin (greased)** Cavities: **12** Vehicle Uses Message Center Module - Driver Information Module - Front Interface

CONNECTOR VIEWS > CONNECTOR END VIEW C2280A - BODY CONTROL MODULE (BCM)

Connector:C2280A

Description

BODY CONTROL MODULE (BCM)

Color

BK

Harness

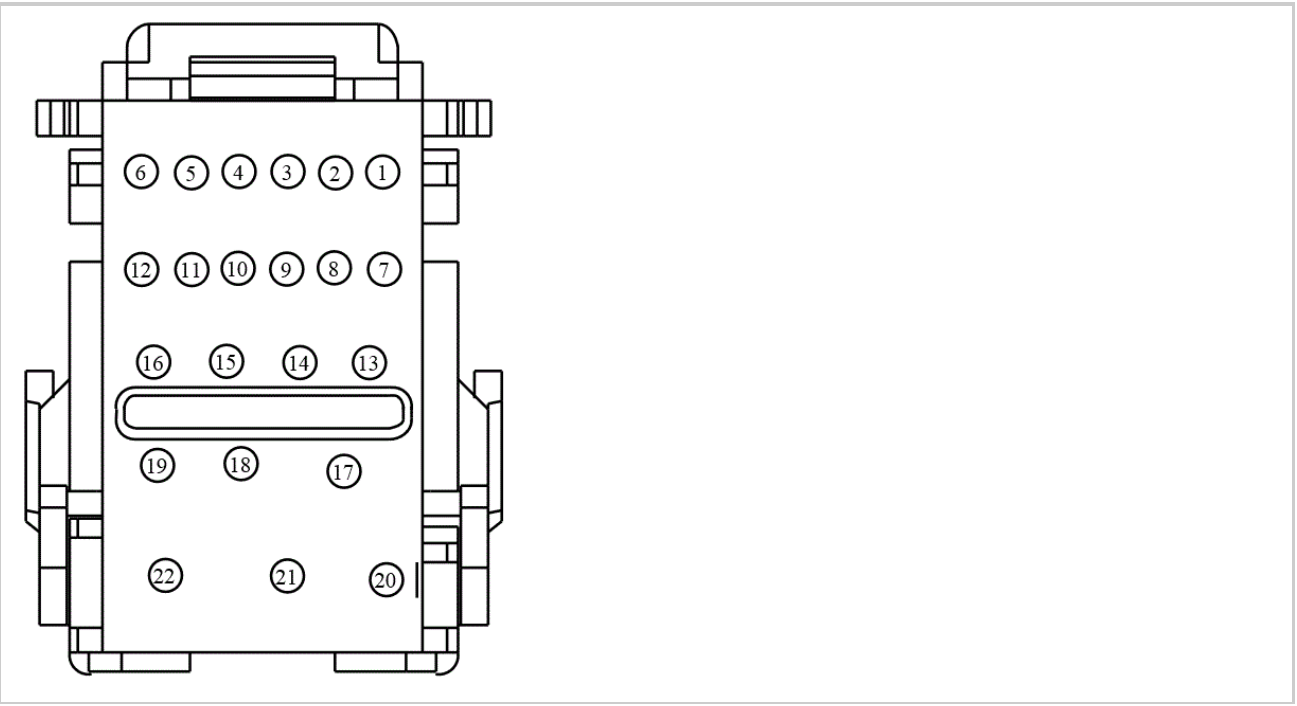
14401

Base Part #

part# N/A

Service Pigtail

Not Available



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CCB08 (VT-WH)	22	SWITCH - BRAKE ON/OFF (BOO) NORMAL OPEN	
2	CBP23 (BN-YE)	22	FUSE - 23 OR CIRCUIT BREAKER	
3	*	*	Not Used	
4	CBP35 (YE-GY)	22	FUSE - 35 OR CIRCUIT BREAKER	

5	*	*	Not Used
6	CBP21 (BU-GY)	22	FUSE - 21 OR CIRCUIT BREAKER
7	CBP19 (BN-WH)	22	FUSE - 19 OR CIRCUIT BREAKER
8	SBP13 (GY-RD)	22	FUSE - 13 OR CIRCUIT BREAKER
9	SBP32 (VT-RD)	22	FUSE - 32 OR CIRCUIT BREAKER
10	SBP12 (GN-RD)	22	FUSE - 12 OR CIRCUIT BREAKER
11	SBP17 (RD)	22	FUSE - 17 OR CIRCUIT BREAKER
12	SBP18 (YE-RD)	22	FUSE - 18 OR CIRCUIT BREAKER
13	*	*	Not Used
14	*	*	Not Used
15	*	*	Not Used
16	CBP37 (WH)	20	FUSE - 37 OR CIRCUIT BREAKER
17	*	*	Not Used
18	*	*	Not Used
19	SBP15 (WH-RD)	22	FUSE - 15 OR CIRCUIT BREAKER
20	SBP32 (VT-RD)	22	FUSE - 32 OR CIRCUIT BREAKER

21	*	*	Not Used	
22	SBP33 (RD)	16	FUSE - 33 OR CIRCUIT BREAKER	

CONNECTOR VIEWS > CONNECTOR END VIEW C2280B - BODY CONTROL MODULE (BCM)

Connector:C2280B

Description

BODY CONTROL MODULE (BCM)

Color

BK

Harness

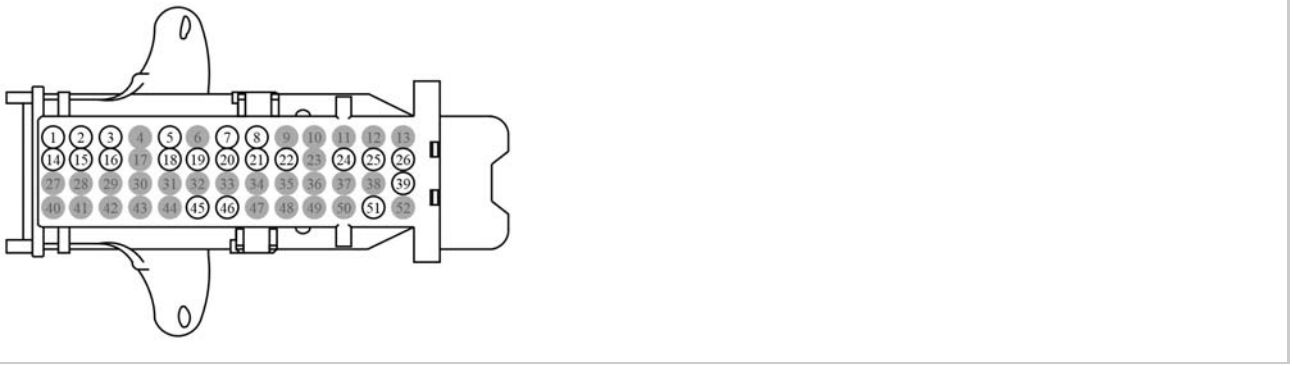
14401

Base Part #

part# N/A

Service Pigtail

Not Available



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CPL45 (BN-WH)	22	SWITCH - LIFTGATE/DECKLID RELEASE	

2	CLS34 (GY)	26	SWITCH - PARK LAMPS
3	CLN56 (BN)	26	DIMMER - IP/SWITCH ILLUMINATION # DIM DOWN
4	*	*	Not Used
5	CPK35 (YE)	26	CTRL MOD. - KEYLESS VEHICLE # SWITCH START/STOP 2 +
6	*	*	Not Used
7	CLN55 (YE-GN)	26	DIMMER - IP/SWITCH ILLUMINATION # DIM UP
8	CLF57 (YE-BU)	26	SWITCH - FOG LAMPS REAR
9	*	*	Not Used
10	*	*	Not Used
11	*	*	Not Used
12	*	*	Not Used
13	*	*	Not Used
14	CE903 (BU-OG)	22	SWITCH - CLUTCH PEDAL POSITION # BOTTOM OF TRAVEL (CPP-BT)
15	CLF18 (BU)	26	SWITCH - BEAM LOW
16	CLF23 (WH)	26	SWITCH - HEADLAMP OFF

17	*	*	Not Used
18	RRH02 (GN-WH)	26	CTRL MOD. - SWITCH HORN
19	CLS32 (BN)	26	SWITCH - HAZARD
20	CLF21 (GY)	26	SWITCH - FOG LAMPS FRONT
21	CLF19 (VT)	26	SWITCH - AUTOLAMP (1) ON
22	RLF14 (GY-BN)	22	SENSOR - AUTOLAMP DAY/NIGHT (AMBIENT LIGHT) -
23	*	*	Not Used
24	VLF14 (BU-BN)	22	SENSOR - AUTOLAMP DAY/NIGHT (AMBIENT LIGHT) +
25	VDN02 (GN-OG)	22	CTRL MOD. - LIN BUS # SPDJB 2
26	VPL56 (BU)	26	RECEIVER - REMOTE RF
27	*	*	Not Used
28	*	*	Not Used
29	*	*	Not Used
30	*	*	Not Used
31	*	*	Not Used

32	*	*	Not Used
33	*	*	Not Used
34	*	*	Not Used
35	*	*	Not Used
36	*	*	Not Used
37	*	*	Not Used
38	*	*	Not Used
39	CPK36 (VT)	26	CTRL MOD. - KEYLESS VEHICLE # SWITCH START/STOP RUN LED
40	*	*	Not Used
41	*	*	Not Used
42	*	*	Not Used
43	*	*	Not Used
44	*	*	Not Used
45	VLN04 (VT)	26	CTRL MOD. - IP/SWITCH ILLUMINATION
46	CET53 (BU-OG)	22	CTRL MOD. - POWERTRAIN # BRAKE SHIFT INTERLOCK
47	*	*	Not Used

48	*	*	Not Used
49	*	*	Not Used
50	*	*	Not Used
51	CPK34 (BN-VT)	22	CTRL MOD. - KEYLESS VEHICLE # SWITCH START/STOP 1 +
52	*	*	Not Used

CONNECTOR VIEWS > CONNECTOR END VIEW C2280C - BODY CONTROL MODULE (BCM)

Connector:C2280C

Description

BODY CONTROL MODULE (BCM)

Color

Harness

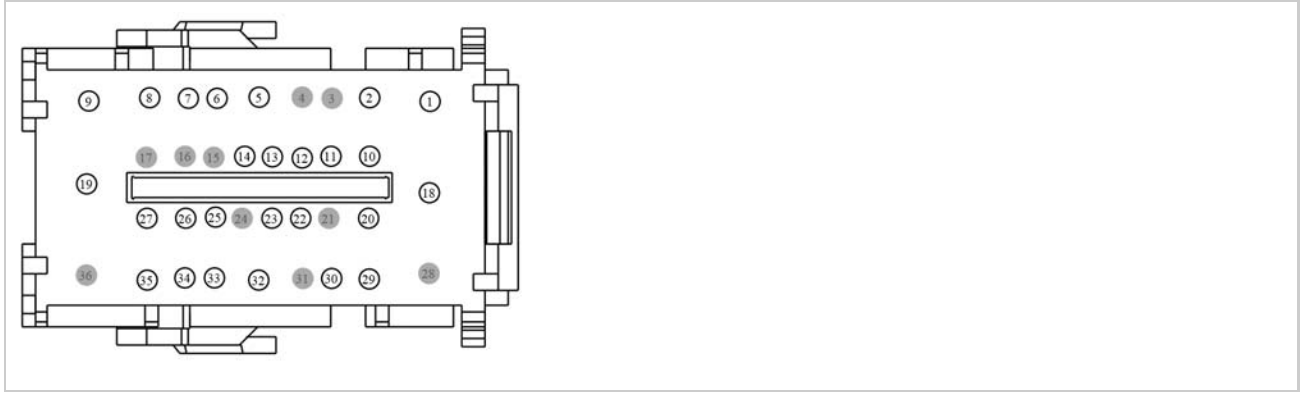
14A005

Base Part #

part# N/A

Service Pigtail

Not Available



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	SBP29 (GY-RD)	14	FUSE - 29 OR CIRCUIT BREAKER	
2	SBP28 (GN-RD)	16	FUSE - 28 OR CIRCUIT BREAKER	
3	*	*	Not Used	
4	*	*	Not Used	
5	ZA104 (OG-GN)	14	CTRL MOD. - DOUBLE/AUX LOCK RELAY # LOCK	
6	GD239 (BK-YE)	16	GROUND - COWL SIDE/PILLAR A RIGHT # 2ND POINT	
7	GD239 (BK-YE)	16	GROUND - COWL SIDE/PILLAR A RIGHT # 2ND POINT	
8	CBP36 (BU-BN)	20	FUSE - 36 OR CIRCUIT BREAKER	
9	SBP30 (BN-RD)	14	FUSE - 30 OR CIRCUIT BREAKER	
10	GD238 (BK-WH)	14	GROUND - COWL SIDE/PILLAR A RIGHT	
11	CLS10 (GN-BN)	20	CTRL MOD. - REVERSE LEFT OR COMMON	
12	CLS30 (VT-WH)	22	RELAY - PARK LAMP	

13	VLN33 (GY-VT)	22	CTRL MOD. - INTERIOR/COURTESY LAMP DIMMING (THEATRE)
14	CLN09 (YE-GN)	22	RELAY - BATTERY SAVER (E.G. SWITCH OFF INTERIOR LIGHTING)
15	*	*	Not Used
16	*	*	Not Used
17	*	*	Not Used
18	SBP26 (YE-RD)	14	FUSE - 26 OR CIRCUIT BREAKER
19	SBP27 (BU-RD)	14	FUSE - 27 OR CIRCUIT BREAKER
20	SBP05 (GY-RD)	14	FUSE - 5 OR CIRCUIT BREAKER
21	*	*	Not Used
22	SBP32 (VT-RD)	22	FUSE - 32 OR CIRCUIT BREAKER
23	CBP22 (GN-OG)	18	FUSE - 22 OR CIRCUIT BREAKER
24	*	*	Not Used
25	CLF58 (YE-OG)	20	RELAY - FOG LAMPS REAR
26	CLN31 (VT-GN)	22	CTRL MOD. - PUDDLE LAMP LEFT

CONNECTOR VIEWS > CONNECTOR END VIEW C2280D - BODY CONTROL MODULE (BCM)

Connector:C2280D

Description

BODY CONTROL MODULE (BCM)

Color

BK

Harness

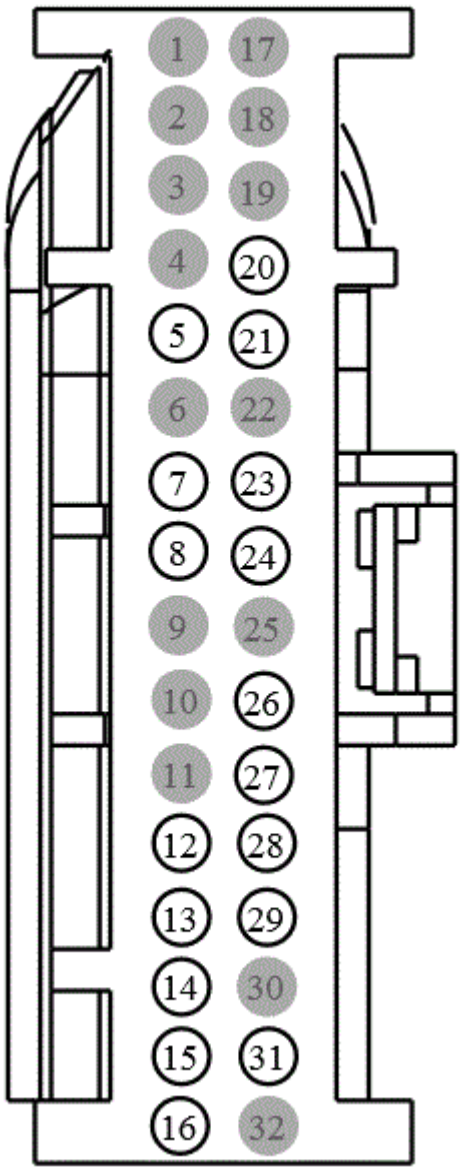
14A005

Base Part #

part# N/A

Service Pigtail

Not Available



Pin	Circuit	Gauge	Circuit Function	Qualifier
1	*	*	Not Used	
2	*	*	Not Used	
3	*	*	Not Used	
4	*	*	Not Used	

5	VPK40 (WH)	26	SENSOR - KEYLESS VEHICLE HANDLE PASSENGER POWER/DATA
6	*	*	Not Used
7	VMP17 (YE-OG)	22	SENSOR - PARKING AID # REAR # (RIGHT OUTER)
8	VMP16 (YE-GY)	22	SENSOR - PARKING AID # REAR # (RIGHT INNER)
9	*	*	Not Used
10	*	*	Not Used
11	*	*	Not Used
12	VPK02 (VT)	26	CTRL MOD. - KEYLESS VEHICLE # ANTENNA HANDLE PASSENGER +
13	VPK01 (BN)	26	CTRL MOD. - KEYLESS VEHICLE # ANTENNA HANDLE DRIVER +
14	RPK05 (YE-OG)	20	CTRL MOD. - KEYLESS VEHICLE # ANTENNA INTERIOR 1 (FRONT) -
15	RPK06 (BU-WH)	20	CTRL MOD. - KEYLESS VEHICLE # ANTENNA INTERIOR 2 (CENTER) -
16	VPK06 (GY-VT)	20	CTRL MOD. - KEYLESS VEHICLE # ANTENNA INTERIOR 2 (CENTER) +
17	*	*	Not Used
18	*	*	Not Used

19	*	*	Not Used	
20	RPK39 (VT)	26	SENSOR - KEYLESS VEHICLE HANDLE	
21	VPK39 (GN)	26	SENSOR - KEYLESS VEHICLE HANDLE DRIVER POWER/DATA	
22	*	*	Not Used	
23	VMP15 (YE-GN)	22	SENSOR - PARKING AID # REAR # (LEFT OUTER)	
24	VMP14 (WH-OG)	22	SENSOR - PARKING AID # REAR # (LEFT INNER OR MIDDLE)	
25	*	*	Not Used	
26	LMP07 (BU-WH)	22	CTRL MOD. - PARKING AID # SENSORS REAR +	
27	RMP07 (GN-WH)	22	CTRL MOD. - PARKING AID # SENSORS REAR -	
28	RPK01 (WH)	26	CTRL MOD. - KEYLESS VEHICLE # ANTENNA HANDLE DRIVER -	
29	RPK02 (GY)	26	CTRL MOD. - KEYLESS VEHICLE # ANTENNA HANDLE PASSENGER -	
30	*	*	Not Used	
31	VPK05 (BN-GN)	20	CTRL MOD. - KEYLESS VEHICLE # ANTENNA INTERIOR 1 (FRONT) +	
32	*	*	Not Used	

CONNECTOR VIEWS > CONNECTOR END VIEW C2280E - BODY CONTROL MODULE (BCM)

Connector:C2280E

Description

BODY CONTROL MODULE (BCM)

Color

BU

Harness

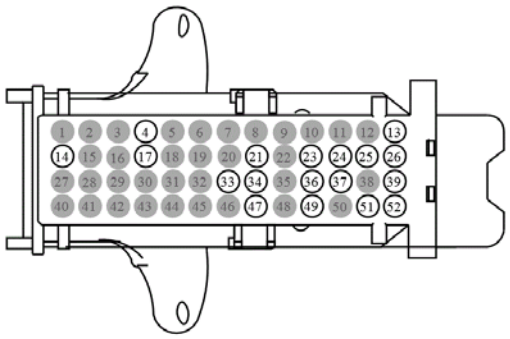
14A005

Base Part #

part# N/A

Service Pigtail

Not Available



Pin	Circuit	Gauge	Circuit Function	Qualifier
1	*	*	Not Used	
2	*	*	Not Used	
3	*	*	Not Used	
4	CPK23 (YE)	26	SWITCH - HANDLE UNLOCK DRIVER	

5	*	*	Not Used
6	*	*	Not Used
7	*	*	Not Used
8	*	*	Not Used
9	*	*	Not Used
10	*	*	Not Used
11	*	*	Not Used
12	*	*	Not Used
13	CLS17 (YE-GY)	22	CTRL MOD. - STOP HIGH MOUNT
14	CPL60 (BN-YE)	22	SWITCH - LIFTGATE GLASS RELEASE
15	*	*	Not Used
16	*	*	Not Used
17	CPK19 (BU)	26	SWITCH - LOCK DRIVER
18	*	*	Not Used
19	*	*	Not Used
20	*	*	Not Used

21	CPL31 (WH)	26	SWITCH - LATCH PASSENGER # AJAR
22	*	*	Not Used
23	CLS44 (VT)	22	CTRL MOD. - STOP
24	CLS44 (VT-BN)	22	CTRL MOD. - STOP
25	CLS06 (GN-OG)	22	CTRL MOD. - PARK FRONT LEFT OR FRONT/REAR LEFT
26	CLS23 (GY-OG)	22	CTRL MOD. - TURN LAMP LEFT REAR
27	*	*	Not Used
28	*	*	Not Used
29	*	*	Not Used
30	*	*	Not Used
31	*	*	Not Used
32	*	*	Not Used
33	CPL26 (GN)	26	SWITCH - LATCH DRIVER # AJAR
34	CPL58 (GY)	26	SWITCH - LIFTGATE/DECKLID # GLASS AJAR
35	*	*	Not Used
36	VDN03 (GY-RD)	26	CTRL MOD. - LIN BUS # SPDJB 3

37	VDN04 (VT-WH)	22	CTRL MOD. - LIN BUS # SPDJB 4
38	*	*	Not Used
39	CPL87 (BN)	26	CTRL MOD. - DOOR LOCK # LOCK STATUS INDICATOR DRIVER
40	*	*	Not Used
41	*	*	Not Used
42	*	*	Not Used
43	*	*	Not Used
44	*	*	Not Used
45	*	*	Not Used
46	*	*	Not Used
47	CMC25 (WH-VT)	22	SWITCH - PARKING BRAKE
48	*	*	Not Used
49	CR113 (BN-YE)	22	CTRL MOD. - DEPLOY OUTPUT VEMS/TAS
50	*	*	Not Used
51	CLS07 (BN-YE)	22	CTRL MOD. - PARK FRONT RIGHT OR FRONT/REAR RIGHT

52	CLS27 (GN-OG)	22	CTRL MOD. - TURN LAMP RIGHT REAR	

CONNECTOR VIEWS > CONNECTOR END VIEW C2280F - BODY CONTROL MODULE (BCM)

Connector:C2280F

Description

BODY CONTROL MODULE (BCM)

Color

BK

Harness

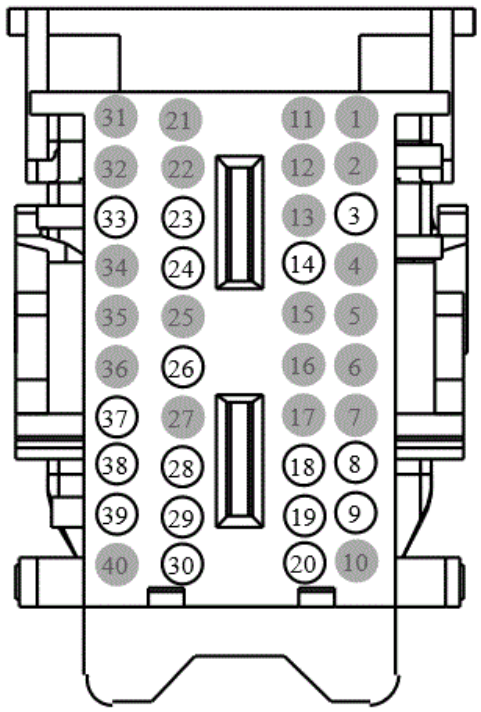
14290

Base Part #

part# N/A

Service Pigtail

Not Available



Pin	Circuit	Gauge	Circuit Function	Qualifier
1	*	*	Not Used	
2	*	*	Not Used	
3	LDC59 (BU-WH)	20	CTRL MOD. - BATTERY MONITORING SYSTEM SENSOR +	
4	*	*	Not Used	
5	*	*	Not Used	
6	*	*	Not Used	
7	*	*	Not Used	
8	SDC57 (BU-OG)	20	CTRL MOD. - BATTERY MONITORING SYSTEM MONITOR	
9	CDC43 (YE-BU)	20	RELAY - ELECTRICAL STEERING COLUMN LOCK	
10	*	*	Not Used	
11	*	*	Not Used	
12	*	*	Not Used	
13	*	*	Not Used	
14	CPL25 (BU-OG)	20	SWITCH - HOOD # AJAR	

15	*	*	Not Used
16	*	*	Not Used
17	*	*	Not Used
18	CE261 (GY-OG)	22	CTRL MOD. - POWERTRAIN # FUEL PUMP ON (FUEL_PUMP_ON) (IES)
19	RDC59 (GY-BN)	20	CTRL MOD. - BATTERY MONITORING SYSTEM SENSOR -
20	CRH02 (BU-WH)	20	SWITCH - HORN
21	*	*	Not Used
22	*	*	Not Used
23	CDC71 (YE-GY)	20	CTRL MOD. - POWER OUTLET ENABLE OR SET
24	RRW24 (GN-VT)	20	CTRL MOD. - RELAY FRONT WIPER RUN/PARK
25	*	*	Not Used
26	CE226 (YE)	20	CTRL MOD. - POWERTRAIN # FUEL PUMP (FP)
27	*	*	Not Used
28	CMC19 (GY-VT)	20	SWITCH - LOW LEVEL BRAKE FLUID
29	CE621	22	RELAY - MOTOR ELECTRONICS COOLING PUMP

	(YE-GY)		
30	CLS06 (GN-OG)	20	CTRL MOD. - PARK FRONT LEFT OR FRONT/REAR LEFT
31	*	*	Not Used
32	*	*	Not Used
33	CDC72 (BN-WH)	20	CTRL MOD. - POWER OUTLET DISABLE OR RESET
34	*	*	Not Used
35	*	*	Not Used
36	*	*	Not Used
37	CLS07 (BN-YE)	20	CTRL MOD. - PARK FRONT RIGHT OR FRONT/REAR RIGHT
38	CLS25 (YE-VT)	20	CTRL MOD. - TURN LAMP RIGHT FRONT
39	CLS21 (BU-GN)	20	CTRL MOD. - TURN LAMP LEFT FRONT
40	*	*	Not Used

CONNECTOR VIEWS > CONNECTOR END VIEW C2280G - BODY CONTROL MODULE (BCM)

Connector:C2280G

Description

BODY CONTROL MODULE (BCM)

Color

BK

Harness

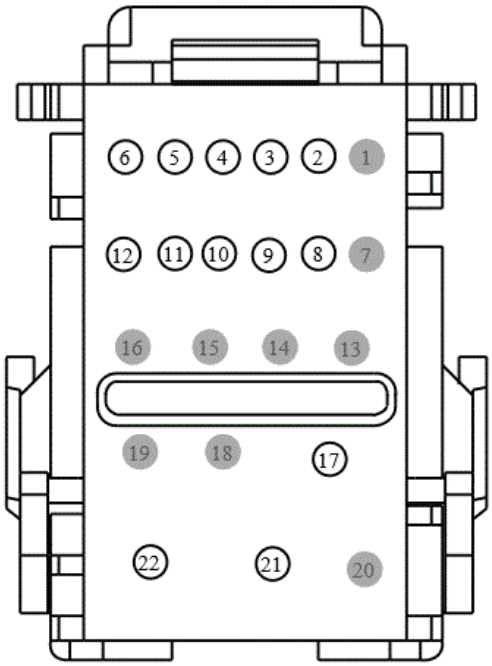
14290

Base Part #

part# N/A

Service Pigtail

Not Available



Pin	Circuit	Gauge	Circuit Function	Qualifier
1	*	*	Not Used	
2	CLF05 (BU-GN)	18	CTRL MOD. - BEAM LOW RIGHT	
2	CLF05 (BU-GN)	20	CTRL MOD. - BEAM LOW RIGHT	
3	CLS30 (VT-WH)	22	RELAY - PARK LAMP	

4	CLF04 (BN-BU)	18	CTRL MOD. - BEAM LOW LEFT
4	CLF04 (BN-BU)	20	CTRL MOD. - BEAM LOW LEFT
5	CLF34 (YE-OG)	20	CTRL MOD. - FOG LAMPS FRONT RIGHT OR COMMON
6	CLF03 (VT-RD)	18	CTRL MOD. - BEAM HIGH RIGHT
6	CLF03 (VT-RD)	20	CTRL MOD. - BEAM HIGH RIGHT
7	*	*	Not Used
8	CDC45 (VT-BN)	16	CTRL MOD. - ELECTRICAL STEERING COLUMN LOCK +
9	VDB05 (WH)	22	CONNECTOR - DIAGNOSTIC # CAN BUS HIGH SPEED LOW
10	VDB04 (WH-BU)	22	CONNECTOR - DIAGNOSTIC # CAN BUS HIGH SPEED HIGH
11	CLF02 (GY-BN)	18	CTRL MOD. - BEAM HIGH LEFT
11	CLF02 (GY-BN)	20	CTRL MOD. - BEAM HIGH LEFT
12	CLF29 (BN)	20	CTRL MOD. - FOG LAMPS FRONT (LEFT)
13	*	*	Not Used
14	*	*	Not Used
15	*	*	Not Used
16	*	*	Not Used

17	SBB24 (VT-RD)	12	FUSE - 24 OR CIRCUIT BREAKER
18	*	*	Not Used
19	*	*	Not Used
20	*	*	Not Used
21	SBB08 (VT-RD)	10	FUSE - 8 OR CIRCUIT BREAKER
22	SBB06 (BN-RD)	10	FUSE - 6 OR CIRCUIT BREAKER

CONNECTOR VIEWS > CONNECTOR END VIEW C2280H - BODY CONTROL MODULE (BCM)

Connector:C2280H

Description

BODY CONTROL MODULE (BCM)

Color

Harness

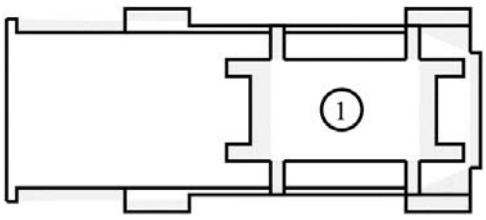
14290

Base Part #

part# N/A

Service Pigtail

Not Available



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	SBB07 (WH-RD)	10	FUSE - 7 OR CIRCUIT BREAKER	

CONNECTOR VIEWS > CONNECTOR END VIEW C2342 - SYNC MODULE [APIM]

Connector:C2342

Description

SYNC MODULE [APIM]

Color

Harness

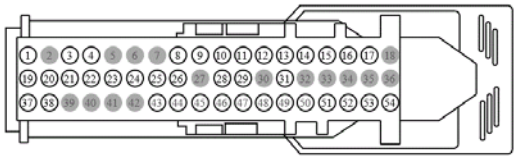
14401

Base Part #

part# N/A

Service Pigtail

Not Available



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	SBP32 (VT-RD)	22	FUSE - 32 OR CIRCUIT BREAKER	
2	*	*	Not Used	
3	VMN14 (VT-WH)	26	CTRL MOD. - NAVIGATION/BLUETOOTH/MULTIMEDIA GATEWAY MODULE # AUDIO OUT (MONO) +	

4	RMN14 (GY)	26	CTRL MOD. - NAVIGATION/BLUETOOTH/MULTIMEDIA GATEWAY MODULE # AUDIO OUT (MONO) -
5	*	*	Not Used
6	*	*	Not Used
7	*	*	Not Used
8	LME89 (YE)	26	CTRL MOD. - MEDIA CONNECTIVITY POWER
9	DME66 (*)	4	CTRL MOD. - MULTIMEDIA GATEWAY MODULE # AUDIO 2 D
10	VME66 (VT)	26	CTRL MOD. - MULTIMEDIA GATEWAY MODULE # AUDIO 2 LEFT +
11	RME66 (GN)	26	CTRL MOD. - MULTIMEDIA GATEWAY MODULE # AUDIO 2 LEFT -
12	VMM23 (BN)	26	CTRL MOD. - BLUETOOTH/MULTIMEDIA GATEWAY MODULE # MICROPHONE PHONE/VOICE CONTROL +
13	RMM23 (GN-WH)	26	CTRL MOD. - BLUETOOTH/MULTIMEDIA GATEWAY MODULE # MICROPHONE PHONE/VOICE CONTROL -
14	VMP19 (WH-GN)	22	CAMERA - PARKING AID REAR VIDEO +
15	RMP19 (BN-VT)	22	CAMERA - PARKING AID REAR VIDEO -
16	VDB06 (GY)	26	CONNECTOR - DIAGNOSTIC # CAN BUS MEDIUM SPEED HIGH
17	VDB07 (VT)	26	CONNECTOR - DIAGNOSTIC # CAN BUS MEDIUM SPEED LOW

18	*	*	Not Used
19	VDB29 (GN)	26	CONNECTOR - DIAGNOSTIC # CAN BUS HIGH SPEED 3 (LOWER) HIGH
20	VDB30 (WH)	26	CONNECTOR - DIAGNOSTIC # CAN BUS HIGH SPEED 3 (LOWER) LOW
21	DMN14 (*)	4	CTRL MOD. - NAVIGATION/BLUETOOTH/MULTIMEDIA GATEWAY MODULE # AUDIO OUT (MONO) D
22	DME52 (*)	4	CTRL MOD. - BLUETOOTH/MULTIMEDIA GATEWAY MODULE # AUDIO [SATELLITE DIGITAL RADIO] D
23	VME52 (BU)	26	CTRL MOD. - BLUETOOTH/MULTIMEDIA GATEWAY MODULE # AUDIO [SATELLITE DIGITAL RADIO] LEFT +
24	RME52 (GY)	26	CTRL MOD. - BLUETOOTH/MULTIMEDIA GATEWAY MODULE # AUDIO [SATELLITE DIGITAL RADIO] LEFT -
25	VME53 (VT)	26	CTRL MOD. - BLUETOOTH/MULTIMEDIA GATEWAY MODULE # AUDIO [SATELLITE DIGITAL RADIO] RIGHT +
26	RME53 (BN-WH)	26	CTRL MOD. - BLUETOOTH/MULTIMEDIA GATEWAY MODULE # AUDIO [SATELLITE DIGITAL RADIO] RIGHT -
27	*	*	Not Used
28	VME67 (GY)	26	CTRL MOD. - MULTIMEDIA GATEWAY MODULE # AUDIO 2 RIGHT +
29	RME67 (BN)	26	CTRL MOD. - MULTIMEDIA GATEWAY MODULE # AUDIO 2 RIGHT -
30	*	*	Not Used

31	DMM23 (*)	4	CTRL MOD. - BLUETOOTH/MULTIMEDIA GATEWAY MODULE # MICROPHONE PHONE/VOICE CONTROL D
32	*	*	Not Used
33	*	*	Not Used
34	*	*	Not Used
35	*	*	Not Used
36	*	*	Not Used
37	GD215 (BK-GY)	20	GROUND - INSTRUMENT PANEL STRUCTURE # 2ND POINT
38	RME89 (BU-WH)	26	CTRL MOD. - MEDIA CONNECTIVITY GROUND
39	*	*	Not Used
40	*	*	Not Used
41	*	*	Not Used
42	*	*	Not Used
43	*	*	Not Used
44	*	*	Not Used
45	*	*	Not Used

46	*	*	Not Used
47	*	*	Not Used
48	*	*	Not Used
49	*	*	Not Used
50	*	*	Not Used
51	VME90 (GY-BU)	22	CTRL MOD. - SATELLITE DIGITAL RADIO DATA LINK (+) (SDL-H)
52	VME91 (WH-BN)	22	CTRL MOD. - SATELLITE DIGITAL RADIO DATA LINK (-) (SDL-L)
53	VDB04 (BU)	26	CONNECTOR - DIAGNOSTIC # CAN BUS HIGH SPEED HIGH
54	VDB05 (WH)	26	CONNECTOR - DIAGNOSTIC # CAN BUS HIGH SPEED LOW

CONNECTOR VIEWS > CONNECTOR END VIEW C2353 - CLUTCH PEDAL POSITION (CPP) BOTTOM OF TRAVEL SWITCH

Connector:C2353

Description

CLUTCH PEDAL POSITION (CPP) BOTTOM OF TRAVEL SWITCH

Color

LT GY

Harness

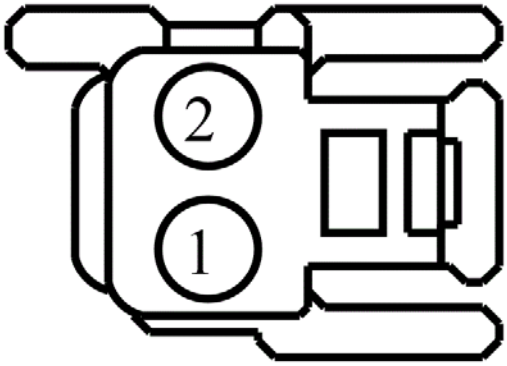
12638

Base Part #

part# N/A

Service Pigtail

See Below



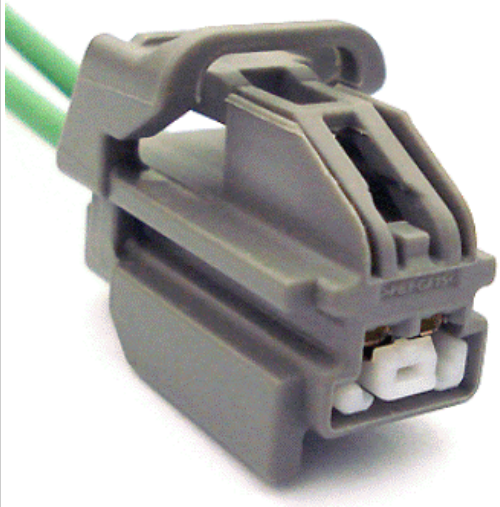
Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CE903 (BU-OG)	22	SWITCH - CLUTCH PEDAL POSITION # BOTTOM OF TRAVEL (CPP-BT)	
2	GD120 (BK-GN)	22	GROUND - FENDER FRONT LEFT	

Available Pigtail Kits

Pigtail Kit Part Number

WPT-965



Service Part Number:

3U2Z-14S411-AEB

Gauge:

14

Pin material:

Silver

Cavities:

2

Vehicle Uses

Actuator - Door Lock - Decklid/Liftgate

	Element - Heated Seat Lamp - CHMSL (Center High Mount Stop Lamp) Module - Heated Seat Motor - Adjustable Pedal Motor - Decklid / Liftgate Sensor - Air Charge Temperature Sensor - EATC In Car Temperature Speaker - Subwoofer Switch - Adjustable Pedal Switch - Brake Deactivation Switch - Brake Pressure Switch - Clutch Pedal Position Switch - Stop Lamp Switch - Third Row Power Folding Seat

CONNECTOR VIEWS > CONNECTOR END VIEW C2354 - CLUTCH PEDAL POSITION (CPP) TOP OF TRAVEL SWITCH

Connector:C2354

Description

CLUTCH PEDAL POSITION (CPP) TOP OF TRAVEL SWITCH

Color

BK

Harness

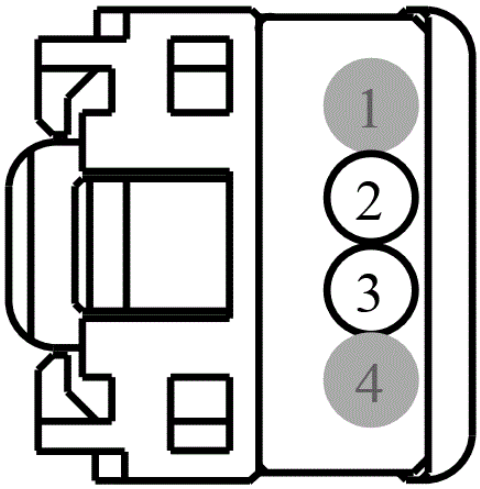
12638

Base Part #

part# N/A

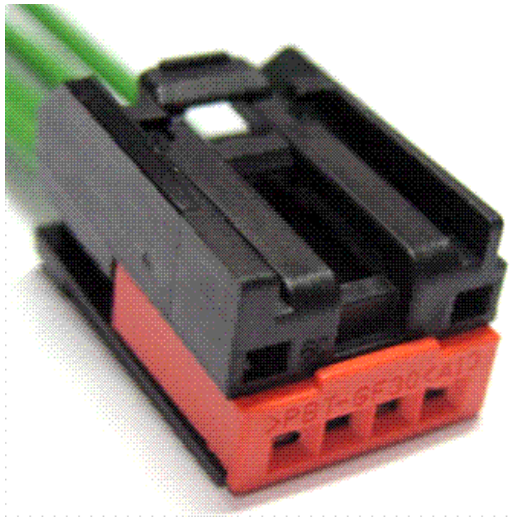
Service Pigtail

See Below



Pin	Circuit	Gauge	Circuit Function	Qualifier
1	*	*	Not Used	
2	CE904 (GN-VT)	22	SWITCH - CLUTCH PEDAL POSITION # TOP OF TRAVEL (CPP-TT)	
3	GD120 (BK-GN)	22	GROUND - FENDER FRONT LEFT	
4	*	*	Not Used	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1139**	Service Part Number: **3U2Z-14S411-PRC** Gauge: **18** Pin material: **Silver** Cavities: **4**



Vehicle Uses

Connector - Audio Input

Lamp - CHMSL (Center High Mount Stop Lamp)

Module - Anti-theft

Module - Power Moonroof

Sensor - Steering Wheel Position

Switch - 4x4 Control

Switch - Clutch Pedal Position

Switch - Deck Lid / Lift Gate Ajar

Switch - Door Lock (LH)

Switch - Door Lock (RH)

Switch - Lift Gate Glass Ajar

Switch - Message Center

Switch - Moon Roof/Sun Roof

Transceiver - Passive Anti-Theft (PATS)

CONNECTOR VIEWS > CONNECTOR END VIEW C2359 - INSTRUMENT PANEL CENTER SPEAKER

Connector:C2359

Description

INSTRUMENT PANEL CENTER SPEAKER

Color

BK

Harness

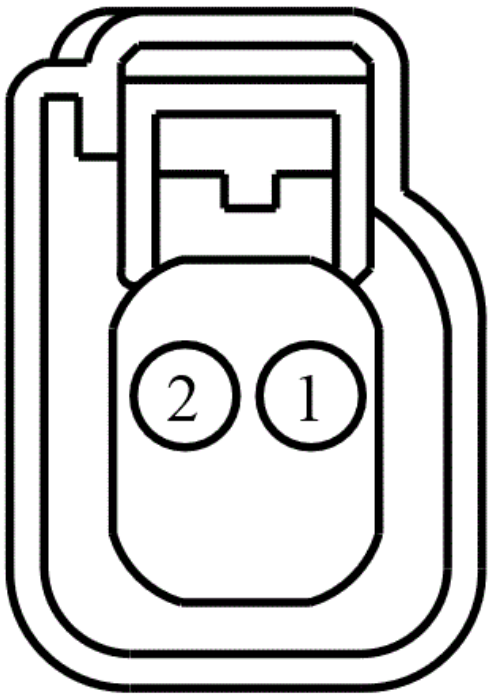
14401

Base Part #

part# N/A

Service Pigtail

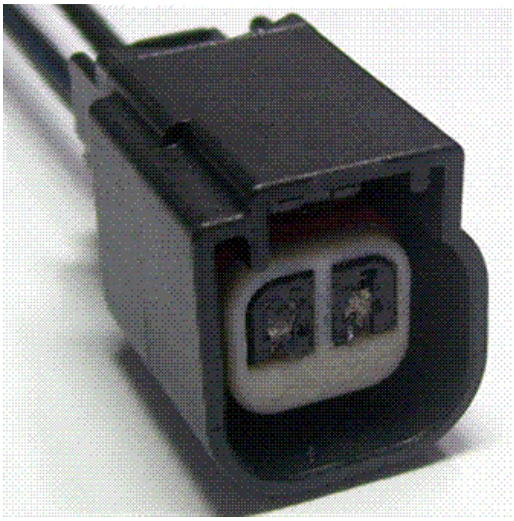
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	VME06 (GN)	18	CTRL MOD. - AUDIO # SPEAKER CENTER FRONT IP +	
2	RME06 (GY-YE)	18	CTRL MOD. - AUDIO # SPEAKER CENTER FRONT IP -	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1052**	Service Part Number: **3U2Z-14S411-JLB** Gauge: **14** Pin material: **Tin (greased)** Cavities: **2**



Vehicle Uses
A/C Compressor Clutch
Actuator - Door Lock
Actuator - Door Lock - LH - Front
Actuator - Door Lock - LH - Rear
Actuator - Door Lock - LH - Sliding Door
Actuator - Door Lock - RH - Front
Actuator - Door Lock - RH - Rear
Actuator - Door Lock - RH - Sliding Door
Actuator - Liftgate Glass
Lamp - Headlamp - Low Beam
Lamp - License
Lamp - Side Marker
Motor - Power Window - LH - Rear
Pump - Fuel (External)
Sensor - Side Impact
Solenoid - Brake Shift Park Interlock
Speaker - Door (front)
Speaker - Door (rear)
Speaker - Front
Speaker - Rear
Speaker - Tweeter - LH - Front
Speaker - Tweeter - LH - Rear
Speaker - Tweeter - RH - Front
Speaker - Tweeter - RH - Rear

CONNECTOR VIEWS > CONNECTOR END VIEW C2360 - DEPLOYABLE STEERING COLUMN

Connector:C2360

Description

DEPLOYABLE STEERING COLUMN

Color

Harness

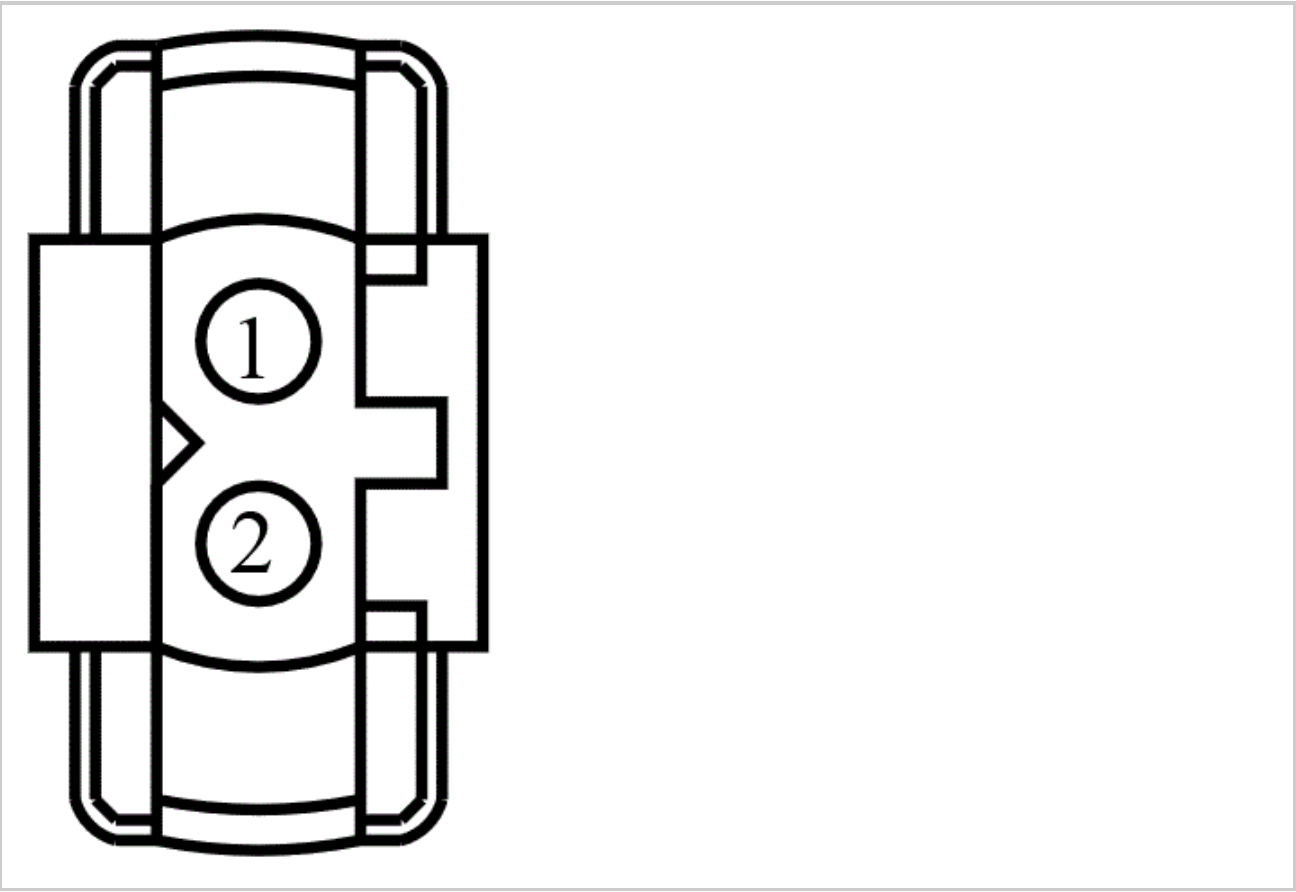
14401

Base Part #

part# N/A

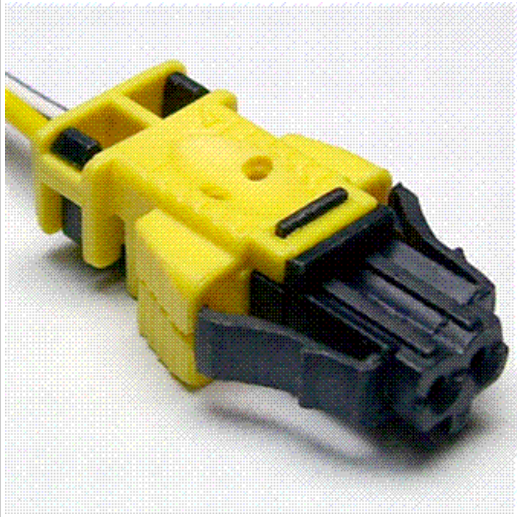
Service Pigtail

See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CR168 (WH-GN)	20	CTRL MOD. - PYROTECHNIC STEERING COLUMN +	
2	RR168 (VT-WH)	20	CTRL MOD. - PYROTECHNIC STEERING COLUMN -	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1229** 	Service Part Number: **BU2Z-14S411-BNA** Gauge: **20** Pin material: **FCI - Airbag** Cavities: **2** Vehicle Uses Deployable Steering Column

CONNECTOR VIEWS > CONNECTOR END VIEW C2366 - STEERING WHEEL SWITCH LH LOWER

Connector:C2366

Description

STEERING WHEEL SWITCH LH LOWER

Color

BK

Harness

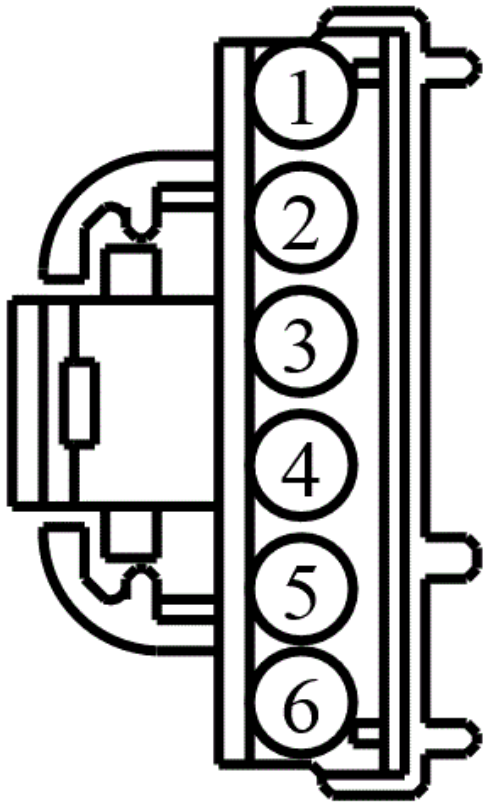
14K147

Base Part #

part# N/A

Service Pigtail

See Below

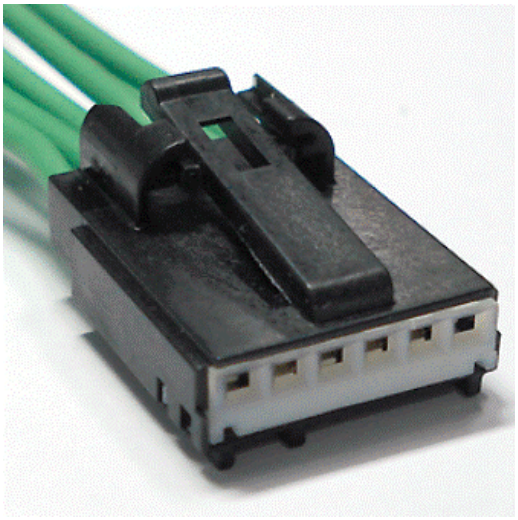


Pin	Circuit	Gauge	Circuit Function	Qualifier
1	* (*)	*	ILLUMINATION GROUND	
2	* (*)	*	SWITCH - STEERING WHEEL CONTROLS # A/D CHANNEL 3	
3	* (*)	*	SWITCH - STEERING WHEEL CONTROLS # A/D CHANNEL 4	
4	* (*)	*	SWITCH - STEERING WHEEL CONTROLS # RETURN LEFT (SW GND LEFT)	
5	* (*)	*	SWITCH - STEERING WHEEL CONTROLS # A/D CHANNEL 2	
6	* (*)	*	ILLUMINATION FEED	

Available Pigtail Kits	

Pigtail Kit Part Number

WPT-1006



Service Part Number:

7U2Z-14S411-NB

Gauge:

18

Pin material:

Silver

Cavities:

6

Vehicle Uses

Lamp - Dimmer Switch

Module - Front Interface

Switch - Adjustable Pedal

Switch - Dimmer

Switch - Dimmer (Instrument Panel)

Switch - Message Center

Switch - Power Window - Passenger (Front)

CONNECTOR VIEWS > CONNECTOR END VIEW C2367 - STEERING WHEEL SWITCH RH LOWER

Connector:C2367

Description

STEERING WHEEL SWITCH RH LOWER

Color

BK

Harness

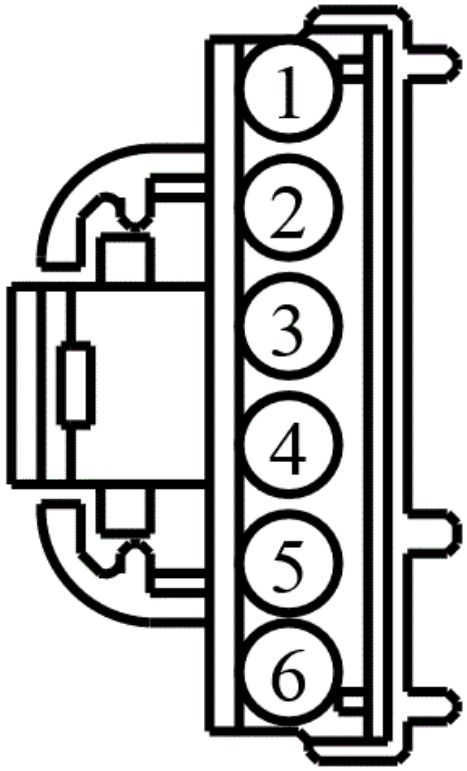
14K147

Base Part #

part# N/A

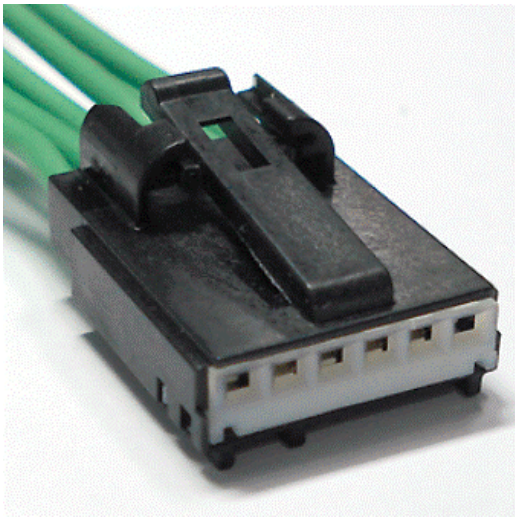
Service Pigtail

See Below



Pin	Circuit	Gauge	Circuit Function	Qualifier
1	* (*)	*	ILLUMINATION GROUND	
2	* (*)	*	SWITCH - STEERING WHEEL CONTROLS # A/D CHANNEL 3	
3	* (*)	*	SWITCH - STEERING WHEEL CONTROLS # A/D CHANNEL 4	
4	* (*)	*	SWITCH - STEERING WHEEL CONTROLS # RETURN RIGHT (SW GND RIGHT)	
5	* (*)	*	SWITCH - STEERING WHEEL CONTROLS # A/D CHANNEL 2	
6	* (*)	*	ILLUMINATION FEED	

Available Pigtail Kits	

Pigtail Kit Part Number **WPT-1006** 	Service Part Number: **7U2Z-14S411-NB** Gauge: **18** Pin material: **Silver** Cavities: **6** Vehicle Uses Lamp - Dimmer Switch Module - Front Interface Switch - Adjustable Pedal Switch - Dimmer Switch - Dimmer (Instrument Panel) Switch - Message Center Switch - Power Window - Passenger (Front)

CONNECTOR VIEWS > CONNECTOR END VIEW C2383 - SYNC MODULE [APIM]

Connector:C2383

Description

SYNC MODULE [APIM]

Color

BK

Harness

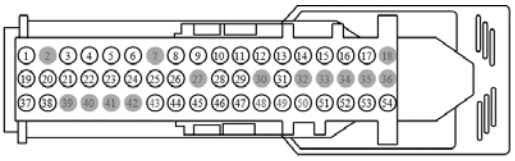
14401

Base Part #

part# N/A

Service Pigtail

Not Available



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	SBP32 (VT-RD)	22	FUSE - 32 OR CIRCUIT BREAKER	
2	*	*	Not Used	
3	VMN14 (WH)	26	CTRL MOD. - NAVIGATION/BLUETOOTH/MULTIMEDIA GATEWAY MODULE # AUDIO OUT (MONO) +	
4	RMN14 (GY)	26	CTRL MOD. - NAVIGATION/BLUETOOTH/MULTIMEDIA GATEWAY MODULE # AUDIO OUT (MONO) -	
5	VMM23 (BN)	26	CTRL MOD. - BLUETOOTH/MULTIMEDIA GATEWAY MODULE # MICROPHONE PHONE/VOICE CONTROL +	without touchscreen
6	RMM23 (WH)	26	CTRL MOD. - BLUETOOTH/MULTIMEDIA GATEWAY MODULE # MICROPHONE PHONE/VOICE CONTROL -	without touchscreen
7	*	*	Not Used	
8	LME89 (YE)	26	CTRL MOD. - MEDIA CONNECTIVITY POWER	with touchscreen
9	DME66 (*)	4	CTRL MOD. - MULTIMEDIA GATEWAY MODULE # AUDIO 2 D	with touchscreen
10	VME66 (VT)	26	CTRL MOD. - MULTIMEDIA GATEWAY MODULE # AUDIO 2 LEFT +	with touchscreen

11	RME66 (GN)	26	CTRL MOD. - MULTIMEDIA GATEWAY MODULE # AUDIO 2 LEFT -	with touchscreen
12	VMM23 (BN)	26	CTRL MOD. - BLUETOOTH/MULTIMEDIA GATEWAY MODULE # MICROPHONE PHONE/VOICE CONTROL +	with touchscreen
13	RMM23 (GN-WH)	26	CTRL MOD. - BLUETOOTH/MULTIMEDIA GATEWAY MODULE # MICROPHONE PHONE/VOICE CONTROL -	with touchscreen
14	VMP19 (WH-GN)	22	CAMERA - PARKING AID REAR VIDEO +	with touchscreen
15	RMP19 (BN-VT)	22	CAMERA - PARKING AID REAR VIDEO -	with touchscreen
16	VDB29 (GN)	26	CONNECTOR - DIAGNOSTIC # CAN BUS HIGH SPEED 3 (LOWER) HIGH	without touchscreen
16	VDB06 (GY)	26	CONNECTOR - DIAGNOSTIC # CAN BUS MEDIUM SPEED HIGH	with touchscreen
17	VDB07 (VT)	26	CONNECTOR - DIAGNOSTIC # CAN BUS MEDIUM SPEED LOW	with touchscreen
17	VDB30 (WH)	26	CONNECTOR - DIAGNOSTIC # CAN BUS HIGH SPEED 3 (LOWER) LOW	without touchscreen
18	*	*	Not Used	
19	VDB29 (GN)	26	CONNECTOR - DIAGNOSTIC # CAN BUS HIGH SPEED 3 (LOWER) HIGH	with touchscreen
20	VDB30 (WH)	26	CONNECTOR - DIAGNOSTIC # CAN BUS HIGH SPEED 3 (LOWER) LOW	with touchscreen
21	DMN14 (*)	4	CTRL MOD. - NAVIGATION/BLUETOOTH/MULTIMEDIA GATEWAY MODULE # AUDIO OUT (MONO) D	

22	DME52 (*)	4	CTRL MOD. - BLUETOOTH/MULTIMEDIA GATEWAY MODULE # AUDIO [SATELLITE DIGITAL RADIO] D	
23	VME53 (VT)	26	CTRL MOD. - BLUETOOTH/MULTIMEDIA GATEWAY MODULE # AUDIO [SATELLITE DIGITAL RADIO] RIGHT +	without touchscreen
23	VME52 (BU)	26	CTRL MOD. - BLUETOOTH/MULTIMEDIA GATEWAY MODULE # AUDIO [SATELLITE DIGITAL RADIO] LEFT +	with touchscreen
24	RME52 (GY)	26	CTRL MOD. - BLUETOOTH/MULTIMEDIA GATEWAY MODULE # AUDIO [SATELLITE DIGITAL RADIO] LEFT -	with touchscreen
24	RME53 (BN)	26	CTRL MOD. - BLUETOOTH/MULTIMEDIA GATEWAY MODULE # AUDIO [SATELLITE DIGITAL RADIO] RIGHT -	without touchscreen
25	VME52 (BU)	26	CTRL MOD. - BLUETOOTH/MULTIMEDIA GATEWAY MODULE # AUDIO [SATELLITE DIGITAL RADIO] LEFT +	without touchscreen
25	VME53 (VT)	26	CTRL MOD. - BLUETOOTH/MULTIMEDIA GATEWAY MODULE # AUDIO [SATELLITE DIGITAL RADIO] RIGHT +	with touchscreen
26	RME53 (BN-WH)	26	CTRL MOD. - BLUETOOTH/MULTIMEDIA GATEWAY MODULE # AUDIO [SATELLITE DIGITAL RADIO] RIGHT -	with touchscreen
26	RME52 (GY)	26	CTRL MOD. - BLUETOOTH/MULTIMEDIA GATEWAY MODULE # AUDIO [SATELLITE DIGITAL RADIO] LEFT -	without touchscreen
27	*	*	Not Used	
28	VME67 (GY)	26	CTRL MOD. - MULTIMEDIA GATEWAY MODULE # AUDIO 2 RIGHT +	with touchscreen
29	DMM23 (*)	4	CTRL MOD. - BLUETOOTH/MULTIMEDIA GATEWAY MODULE # MICROPHONE PHONE/VOICE CONTROL D	without touchscreen
29	RME67 (BN)	26	CTRL MOD. - MULTIMEDIA GATEWAY MODULE # AUDIO 2 RIGHT -	with touchscreen

30	*	*	Not Used	
31	DMM23 (*)	4	CTRL MOD. - BLUETOOTH/MULTIMEDIA GATEWAY MODULE # MICROPHONE PHONE/VOICE CONTROL D	with touchscreen
32	*	*	Not Used	
33	*	*	Not Used	
34	*	*	Not Used	
35	*	*	Not Used	
36	*	*	Not Used	
37	GD215 (BK-GY)	20	GROUND - INSTRUMENT PANEL STRUCTURE # 2ND POINT	
38	GD215 (BK-GY)	20	GROUND - INSTRUMENT PANEL STRUCTURE # 2ND POINT	without touchscreen
38	RME89 (BU-WH)	26	CTRL MOD. - MEDIA CONNECTIVITY GROUND	with touchscreen
39	*	*	Not Used	
40	*	*	Not Used	
41	*	*	Not Used	
42	*	*	Not Used	
43	*	*	Not Used	

44	DME45 (*)	4	JACK - AUDIO # EXT. AUX IN D	without touchscreen
45	VME45 (BU)	26	JACK - AUDIO # EXT. AUX IN LEFT (+)	without touchscreen
46	RME45 (YE)	26	JACK - AUDIO # EXT. AUX IN LEFT OR COMMON (-)	without touchscreen
47	VME46 (GN)	26	JACK - AUDIO # EXT. AUX IN RIGHT (+)	without touchscreen
48	*	*	Not Used	
49	*	*	Not Used	
50	*	*	Not Used	
51	VME90 (GY-BU)	22	CTRL MOD. - SATELLITE DIGITAL RADIO DATA LINK (+) (SDL-H)	with touchscreen
52	VME91 (WH-BN)	22	CTRL MOD. - SATELLITE DIGITAL RADIO DATA LINK (-) (SDL-L)	with touchscreen
53	VDB04 (BU)	26	CONNECTOR - DIAGNOSTIC # CAN BUS HIGH SPEED HIGH	
54	VDB05 (WH)	26	CONNECTOR - DIAGNOSTIC # CAN BUS HIGH SPEED LOW	

CONNECTOR VIEWS > CONNECTOR END VIEW C2385A - AUDIO DIGITAL SIGNAL PROCESSING (DSP) MODULE

Connector:C2385A

Description

AUDIO DIGITAL SIGNAL PROCESSING (DSP) MODULE

Color

BK

Harness

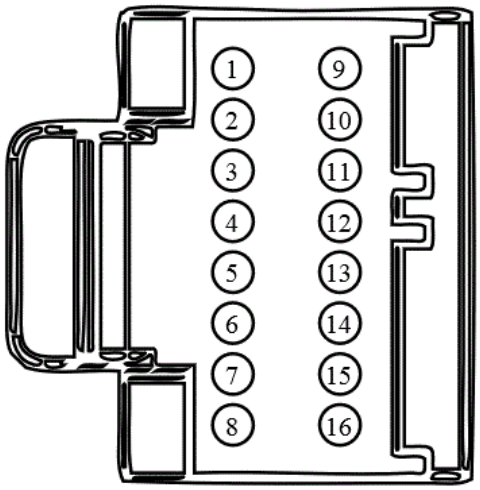
14401

Base Part #

part# N/A

Service Pigtail

Not Available



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	RME61 (BU)	26	CTRL MOD. - AUDIO # RADIO RIGHT REAR -	
2	VME61 (VT-WH)	26	CTRL MOD. - AUDIO # RADIO RIGHT REAR +	
3	RME18 (YE)	26	CTRL MOD. - AUDIO # RADIO RIGHT -	
4	VME18 (VT)	26	CTRL MOD. - AUDIO # RADIO RIGHT +	

5	RME60 (BN)	26	CTRL MOD. - AUDIO # RADIO LEFT REAR -
6	VME60 (GN-WH)	26	CTRL MOD. - AUDIO # RADIO LEFT REAR +
7	RME17 (GY)	26	CTRL MOD. - AUDIO # RADIO LEFT -
8	VME17 (GN)	26	CTRL MOD. - AUDIO # RADIO LEFT +
9	VMEA5 (BU-WH)	26	CTRL MOD. - ACTIVE NOISE CANCELLATION # OUTPUT RIGHT FRONT POS (+) (ANC2)
10	VMEA6 (YE-BU)	26	CTRL MOD. - ACTIVE NOISE CANCELLATION # OUTPUT RIGHT FRONT NEG (-) (ANC2)
11	VMEA3 (GN)	26	CTRL MOD. - ACTIVE NOISE CANCELLATION # OUTPUT LEFT FRONT POS (+) (ANC1)
12	VMEA4 (YE)	26	CTRL MOD. - ACTIVE NOISE CANCELLATION # OUTPUT LEFT FRONT NEG (-) (ANC1)
13	VMEA7 (GY)	26	CTRL MOD. - ACTIVE NOISE CANCELLATION # OUTPUT REAR POS (+) (ANC3)
14	VMEA8 (GN-WH)	26	CTRL MOD. - ACTIVE NOISE CANCELLATION # OUTPUT REAR NEG (-) (ANC3)
15	VDB29 (GN)	26	CONNECTOR - DIAGNOSTIC # CAN BUS HIGH SPEED 3 (LOWER) HIGH
16	VDB30 (WH)	26	CONNECTOR - DIAGNOSTIC # CAN BUS HIGH SPEED 3 (LOWER) LOW

CONNECTOR VIEWS > CONNECTOR END VIEW C2385B - AUDIO DIGITAL SIGNAL PROCESSING (DSP) MODULE

Connector:C2385B

Description

AUDIO DIGITAL SIGNAL PROCESSING (DSP) MODULE

Color

GY

Harness

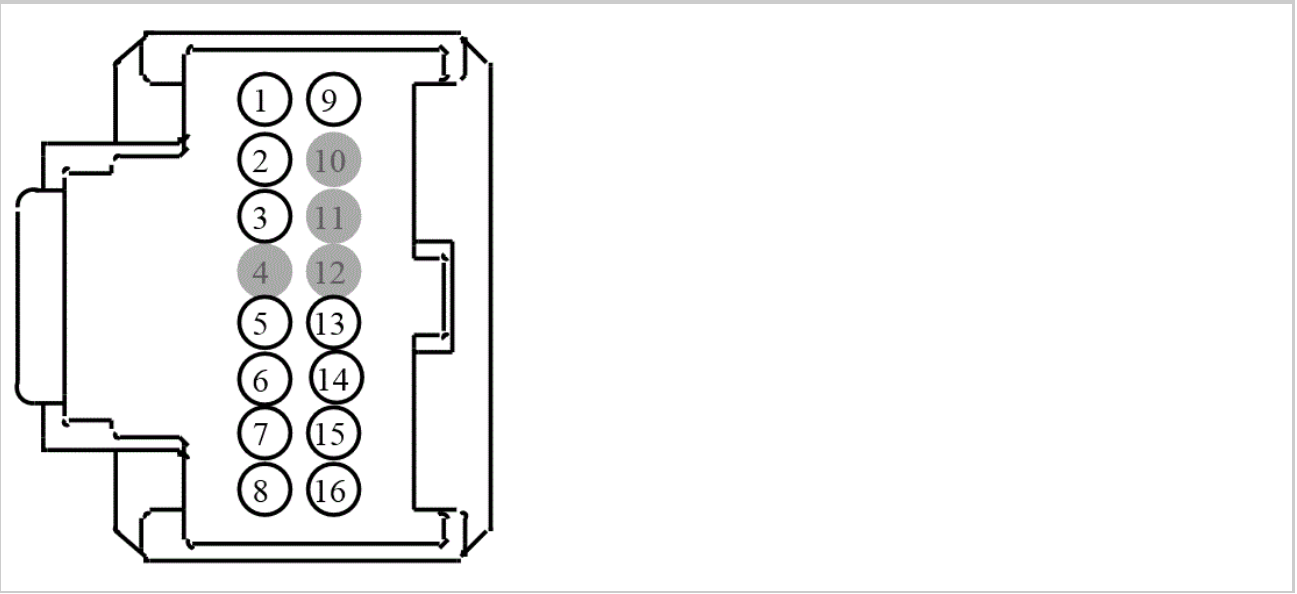
14A005

Base Part #

part# N/A

Service Pigtail

Not Available



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	VME22 (VT-GN)	22	CTRL MOD. - AUDIO # SUBWOOFER/AMPLIFIER AUDIO +	
2	RME22 (GN-WH)	22	CTRL MOD. - AUDIO # SUBWOOFER/AMPLIFIER AUDIO -	
3	DME22 (*)	4	CTRL MOD. - AUDIO # SUBWOOFER/AMPLIFIER AUDIO D	

4	*	*	Not Used
5	RME10 (WH-OG)	18	CTRL MOD. - AUDIO # SPEAKER RIGHT FRONT DOOR (WOOFER) -
6	VME10 (WH-VT)	18	CTRL MOD. - AUDIO # SPEAKER RIGHT FRONT DOOR (WOOFER) +
7	RME12 (BN-BU)	18	CTRL MOD. - AUDIO # SPEAKER RIGHT REAR (WOOFER) -
8	VME12 (BN-WH)	18	CTRL MOD. - AUDIO # SPEAKER RIGHT REAR (WOOFER) +
9	SME23 (VT-RD)	22	CTRL MOD. - AUDIO # SUBWOOFER/AMPLIFIER ENABLE
10	*	*	Not Used
11	*	*	Not Used
12	*	*	Not Used
13	RME07 (WH-BN)	18	CTRL MOD. - AUDIO # SPEAKER LEFT FRONT DOOR (WOOFER) -
14	VME07 (WH)	18	CTRL MOD. - AUDIO # SPEAKER LEFT FRONT DOOR (WOOFER) +
15	RME09 (BN-YE)	18	CTRL MOD. - AUDIO # SPEAKER LEFT REAR (WOOFER) -
16	VME09 (WH-GN)	18	CTRL MOD. - AUDIO # SPEAKER LEFT REAR (WOOFER) +

CONNECTOR VIEWS > CONNECTOR END VIEW C2385C - AUDIO DIGITAL SIGNAL PROCESSING (DSP) MODULE

Connector:C2385C

Description

AUDIO DIGITAL SIGNAL PROCESSING (DSP) MODULE

Color

Harness

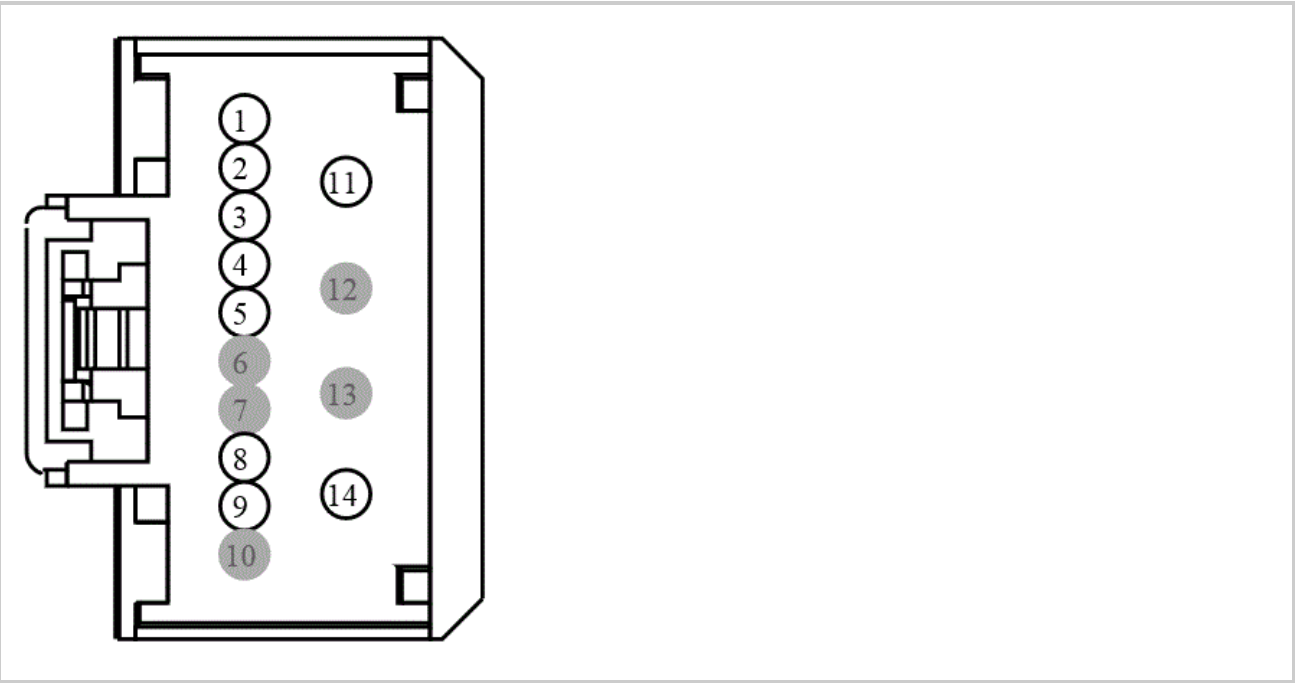
14A005

Base Part #

part# N/A

Service Pigtail

Not Available



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CME31 (BU-GN)	22	CTRL MOD. - AUDIO # ENABLE 1	
2	VME06 (GN)	18	CTRL MOD. - AUDIO # SPEAKER CENTER FRONT IP +	

3	RME06 (GY-YE)	18	CTRL MOD. - AUDIO # SPEAKER CENTER FRONT IP -	
4	VME16 (VT-GY)	18	CTRL MOD. - AUDIO # SPEAKER RIGHT MIDDLE +	
5	RME16 (YE-GY)	18	CTRL MOD. - AUDIO # SPEAKER RIGHT MIDDLE -	
6	*	*	Not Used	
7	*	*	Not Used	
8	VME15 (GN-BU)	18	CTRL MOD. - AUDIO # SPEAKER LEFT MIDDLE +	
9	RME15 (GY-BU)	18	CTRL MOD. - AUDIO # SPEAKER LEFT MIDDLE -	
10	*	*	Not Used	
11	GD215 (BK-GY)	22	GROUND - INSTRUMENT PANEL STRUCTURE # 2ND POINT	
12	*	*	Not Used	
13	*	*	Not Used	
14	SBP27 (BU-RD)	14	FUSE - 27 OR CIRCUIT BREAKER	

CONNECTOR VIEWS > CONNECTOR END VIEW C2395 - HEAD UP DISPLAY (HUD) MODULE

Connector:C2395

Description

HEAD UP DISPLAY (HUD) MODULE

Color

BK

Harness

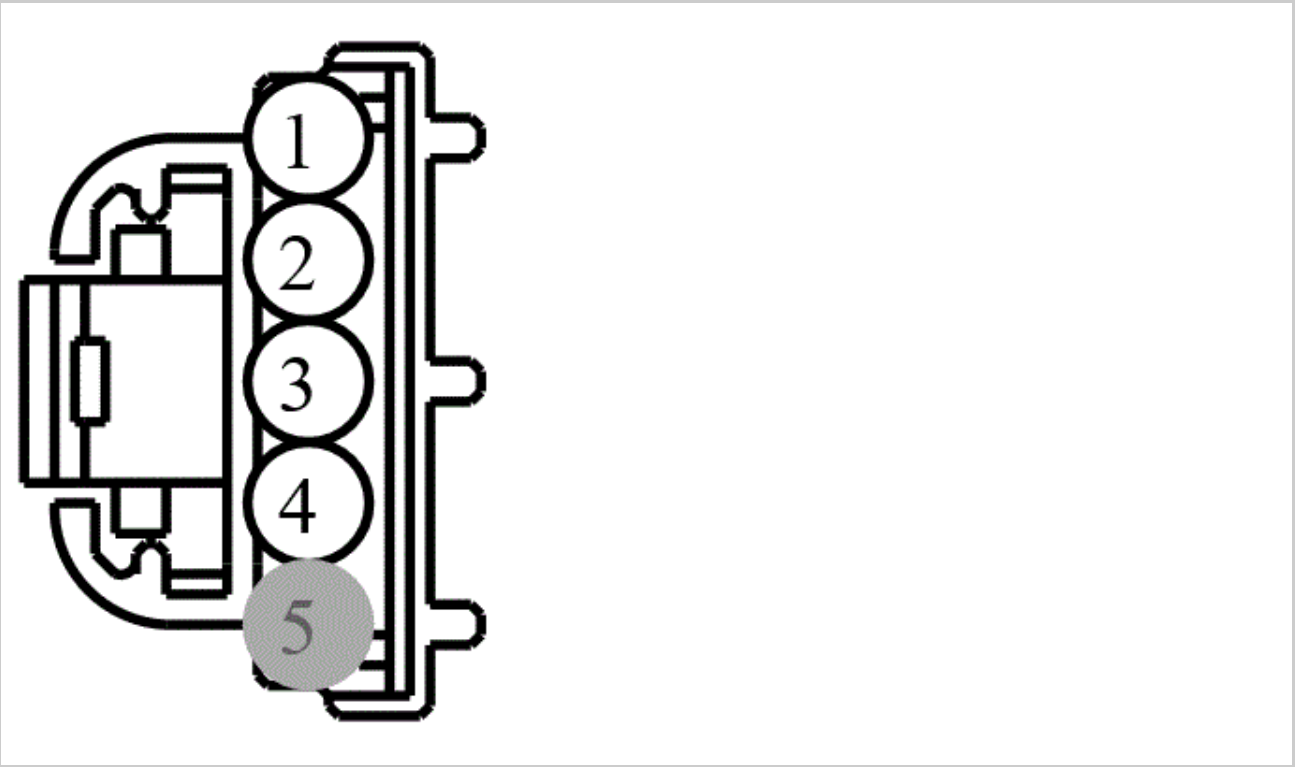
14401

Base Part #

part# N/A

Service Pigtail

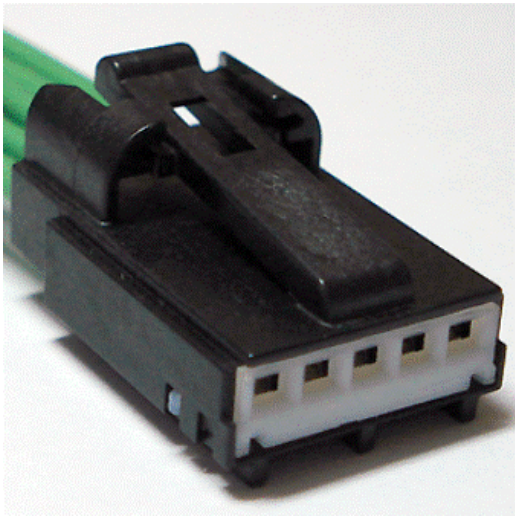
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	GD214 (BK-BU)	20	GROUND - INSTRUMENT PANEL STRUCTURE	
2	VDB26 (GY)	26	CONNECTOR - DIAGNOSTIC # CAN BUS HIGH SPEED 2 (UPPER) LOW	
3	VDB25 (GN)	26	CONNECTOR - DIAGNOSTIC # CAN BUS HIGH SPEED 2 (UPPER) HIGH	
4	CBB66	22	FUSE - 66 OR CIRCUIT BREAKER	

	(BU-WH)		
5	*	*	Not Used

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-983** 	Service Part Number: **6U2Z-14S411-SB** Gauge: **18** Pin material: **Silver** Cavities: **5** Vehicle Uses Module - Heads Up Display Switch - Overdrive Cancel Switch - Power Window - LH - Rear Switch - Power Window - Passenger (Front)

CONNECTOR VIEWS > CONNECTOR END VIEW C2398 - GLOBAL POSITIONING SYSTEM MODULE (GPSM)

Connector:C2398

Description

GLOBAL POSITIONING SYSTEM MODULE (GPSM)

Color

BK

Harness

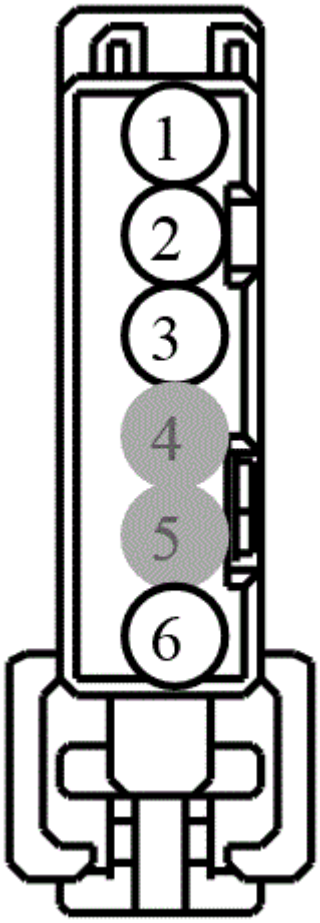
14401

Base Part #

part# N/A

Service Pigtail

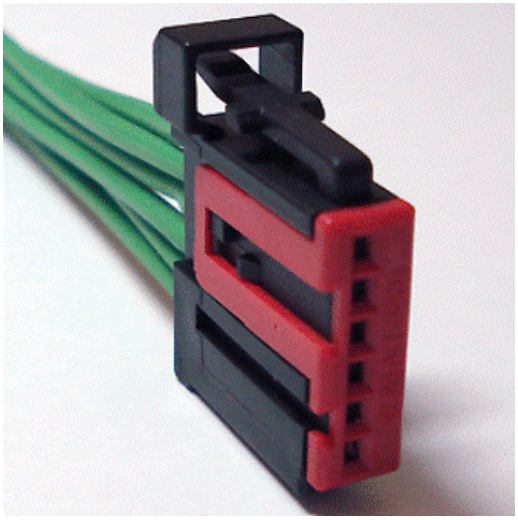
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	SBP32 (VT-RD)	22	FUSE - 32 OR CIRCUIT BREAKER	
2	VDB06 (GY)	26	CONNECTOR - DIAGNOSTIC # CAN BUS MEDIUM SPEED HIGH	
3	VDB07 (VT)	26	CONNECTOR - DIAGNOSTIC # CAN BUS MEDIUM SPEED LOW	
4	*	*	Not Used	

5	*	*	Not Used	
6	GD215 (BK-GY)	20	GROUND - INSTRUMENT PANEL STRUCTURE # 2ND POINT	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-958** 	Service Part Number: **6U2Z-14S411-LB** Gauge: **18 20** Pin material: **Tin & Silver** Cavities: **6** Vehicle Uses Antenna - GPS Module - Global Positioning

CONNECTOR VIEWS > CONNECTOR END VIEW C2402A - FRONT CONTROLS INTERFACE MODULE (FCIM)

Connector:C2402A

Description

FRONT CONTROLS INTERFACE MODULE (FCIM)

Color

BK

Harness

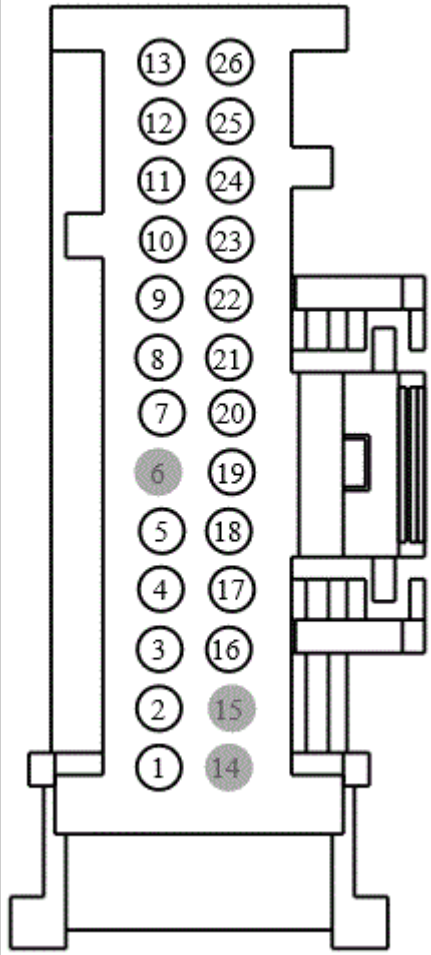
14401

Base Part #

part# N/A

Service Pigtail

Not Available



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	GD216 (BK-VT)	18	GROUND - INSTRUMENT PANEL STRUCTURE # 3RD POINT	
2	RH111 (GY-BU)	22	CTRL MOD. - CLIMATE # GENERIC VREF RETURN	
3	LH111 (BN-WH)	22	CTRL MOD. - CLIMATE # GENERIC VREF	
4	VLN04 (VT)	26	CTRL MOD. - IP/SWITCH ILLUMINATION	

5	CPK36 (VT)	26	CTRL MOD. - KEYLESS VEHICLE # SWITCH START/STOP RUN LED
6	*	*	Not Used
7	CH122 (WH)	26	CTRL MOD. - CLIMATE # HEATER REAR WINDOW REQUEST
8	CH239 (GY)	26	CTRL MOD. - CLIMATE # DOOR MOTOR TEMP. LEFT COIL 2 / OPEN (IF PLUS)
9	CH238 (OG)	26	CTRL MOD. - CLIMATE # DOOR MOTOR TEMP. LEFT COIL 1 / CLOSE (IF PLUS)
10	VH440 (BN)	26	SENSOR - DOOR POSITION TEMP. LEFT
11	CH123 (VT-WH)	26	CTRL MOD. - BLOWER MOTOR RELAY
12	CPK34 (BN-VT)	22	CTRL MOD. - KEYLESS VEHICLE # SWITCH START/STOP 1 +
13	CPK35 (YE)	26	CTRL MOD. - KEYLESS VEHICLE # SWITCH START/STOP 2 +
14	*	*	Not Used
15	*	*	Not Used
16	VH438 (GN-WH)	26	SENSOR - DOOR POSITION RECIRC.
17	VDB06 (GY)	26	CONNECTOR - DIAGNOSTIC # CAN BUS MEDIUM SPEED HIGH
18	VDB07 (VT)	26	CONNECTOR - DIAGNOSTIC # CAN BUS MEDIUM SPEED LOW

19	VH406 (VT)	26	SENSOR - A/C EVAPORATOR TEMPERATURE (ACET)
20	CH229 (WH)	26	CTRL MOD. - CLIMATE # DOOR MOTOR DEFROST COIL 2 / OPEN (IF PLUS)
21	CH228 (YE)	26	CTRL MOD. - CLIMATE # DOOR MOTOR DEFROST COIL 1 / CLOSE (IF PLUS)
22	VH436 (YE-BU)	26	SENSOR - DOOR POSITION DEFROST
23	VH101 (WH-VT)	20	CTRL MOD. - CLIMATE # BLOWER MOTOR CONTROL
24	CH208 (GN)	26	CTRL MOD. - CLIMATE # DOOR MOTOR RECIRC. COIL 2 / OPEN (IF PLUS)
25	CH207 (BU)	26	CTRL MOD. - CLIMATE # DOOR MOTOR RECIRC. COIL 1 / CLOSE (IF PLUS)
26	SBP12 (GN-RD)	22	FUSE - 12 OR CIRCUIT BREAKER

CONNECTOR VIEWS > CONNECTOR END VIEW C2402B - FRONT CONTROLS INTERFACE MODULE (FCIM)

Connector:C2402B

Description

FRONT CONTROLS INTERFACE MODULE (FCIM)

Color

BK

Harness

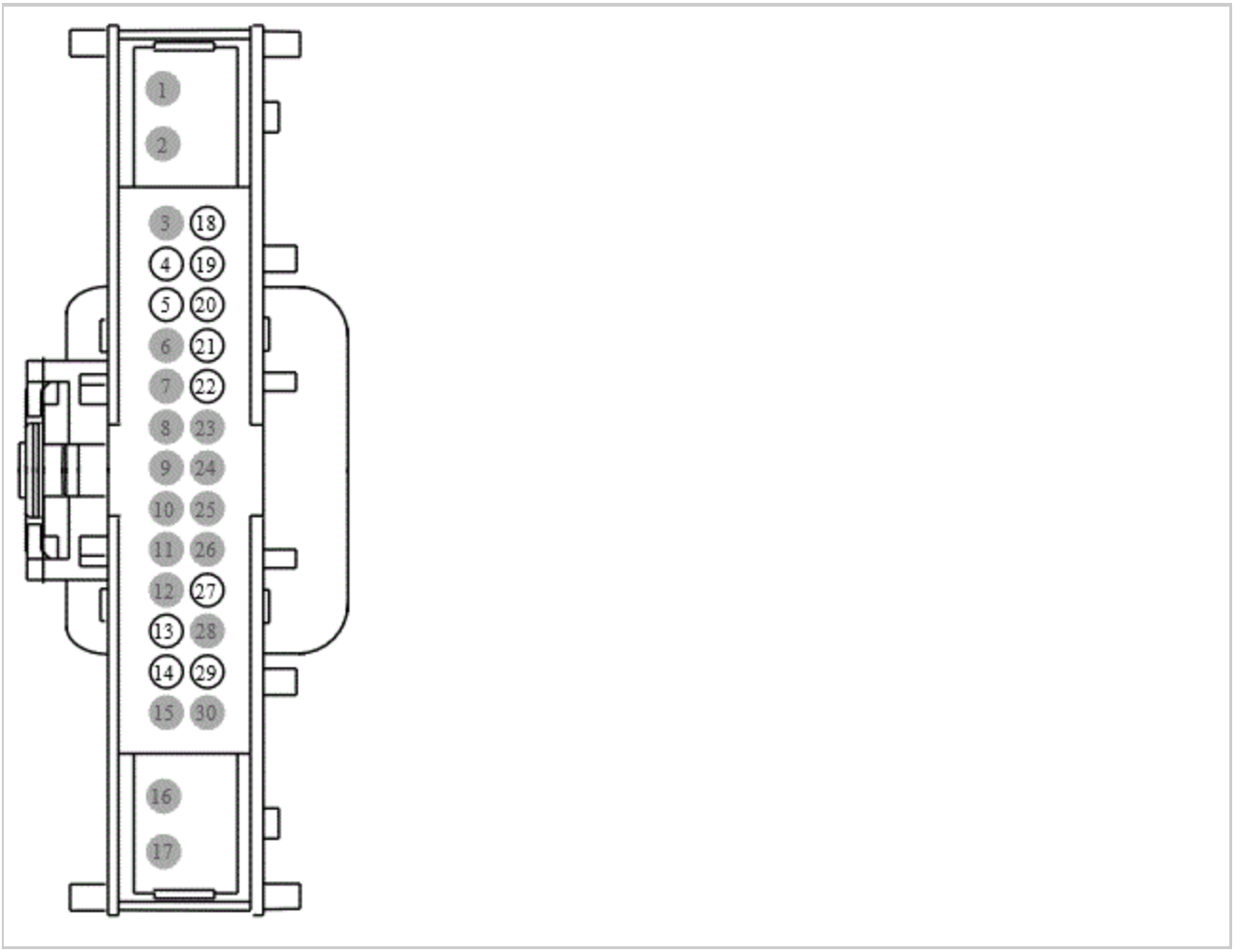
14401

Base Part #

part# N/A

Service Pigtail

Not Available



Pin	Circuit	Gauge	Circuit Function	Qualifier
1	*	*	Not Used	
2	*	*	Not Used	
3	*	*	Not Used	
4	VH409 (WH)	22	SENSOR - DISCHARGE TEMP. # LEFT	
5	VH410 (GY)	26	SENSOR - DISCHARGE TEMP. # LEFT 2ND	

6	*	*	Not Used
7	*	*	Not Used
8	*	*	Not Used
9	*	*	Not Used
10	*	*	Not Used
11	*	*	Not Used
12	*	*	Not Used
13	CH212 (BU-OG)	26	CTRL MOD. - CLIMATE # DOOR MOTOR TEMP. RIGHT COIL 1 / CLOSE (IF PLUS)
14	CH213 (BN)	26	CTRL MOD. - CLIMATE # DOOR MOTOR TEMP. RIGHT COIL 2 / OPEN (IF PLUS)
15	*	*	Not Used
16	*	*	Not Used
17	*	*	Not Used
18	VH441 (WH)	26	SENSOR - DOOR POSITION TEMP. RIGHT
19	VH413 (BU-WH)	26	SENSOR - HUMIDITY
20	CLS32 (BN)	26	SWITCH - HAZARD

21	VH416 (VT-GY)	22	SENSOR - SUN LOAD # LEFT
22	VH417 (YE-OG)	22	SENSOR - SUN LOAD # RIGHT
23	*	*	Not Used
24	*	*	Not Used
25	*	*	Not Used
26	*	*	Not Used
27	RH103 (GY)	22	CTRL MOD. - CLIMATE # I.T.S. ASPIRATOR MOTOR -
28	*	*	Not Used
29	VH414 (GN)	26	SENSOR - INCAR TEMP.
30	*	*	Not Used

CONNECTOR VIEWS > CONNECTOR END VIEW C2428 - UPSHIFT PADDLE SWITCH

Connector:C2428

Description

UPSHIFT PADDLE SWITCH

Color

GY

Harness

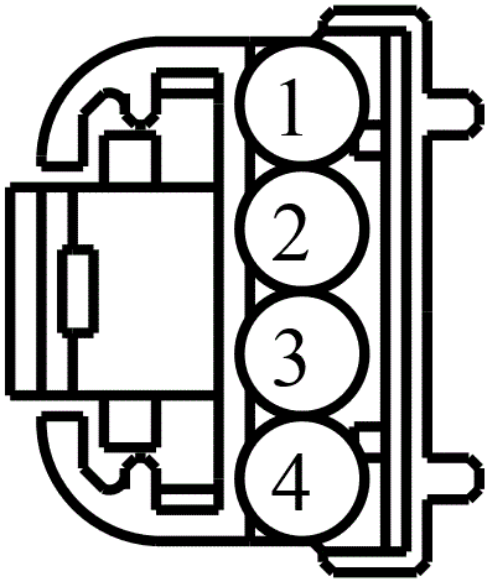
PIA

Base Part #

3F818

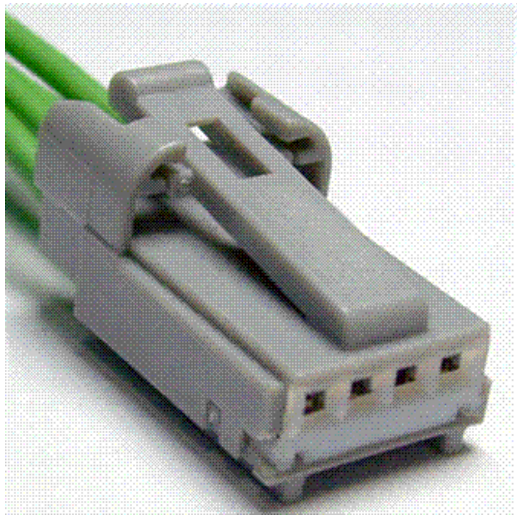
Service Pigtail

See Below



Pin	Circuit	Gauge	Circuit Function	Qualifier
1	* (*)	*	SWITCH - TRANSMISSION SELECT SHIFT # UP (SST)	
2	* (*)	*	CTRL MOD. - POWERTRAIN # SIGNAL RETURN COWL (SIGRTN)	
3	* (*)	*	GROUND - CROSS CAR BEAM # 2ND POINT	
4	* (*)	*	CTRL MOD. - IP/SWITCH ILLUMINATION	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1013**	Service Part Number: **9U2Z-14S411-TA** Gauge: **18** Pin material:



Silver

Cavities:

4

Vehicle Uses

Module - Auto Lamps

Sensor - Sunload

CONNECTOR VIEWS > CONNECTOR END VIEW C2429 - DOWNSHIFT PADDLE SWITCH

Connector:C2429

Description

DOWNSHIFT PADDLE SWITCH

Color

BK

Harness

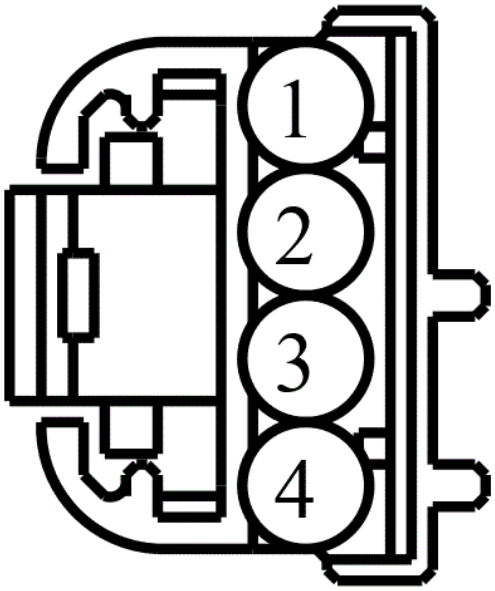
PIA

Base Part #

15607

Service Pigtail

See Below



Pin	Circuit	Gauge	Circuit Function	Qualifier
1	* (*)	*	CTRL MOD. - IP/SWITCH ILLUMINATION	
2	* (*)	*	GROUND - CROSS CAR BEAM # 2ND POINT	
3	* (*)	*	CTRL MOD. - POWERTRAIN # SIGNAL RETURN COWL (SIGRTN)	
4	* (*)	*	SWITCH - TRANSMISSION SELECT SHIFT # DOWN (SST)	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-982**	Service Part Number: **6U2Z-14S411-JB** Gauge: **18** Pin material: **Silver** Cavities: **4**



Vehicle Uses

Module - Auto Lamps

Module - Front Interface

Sensor - EATC In Car Temperature

Sensor - Sunload

Solenoid - Brake Shift Park Interlock

Switch - Door Lock (LH)

Switch - Door Lock (RH)

CONNECTOR VIEWS > CONNECTOR END VIEW C2431 - GATEWAY MODULE

Connector:C2431

Description

GATEWAY MODULE

Color

BK

Harness

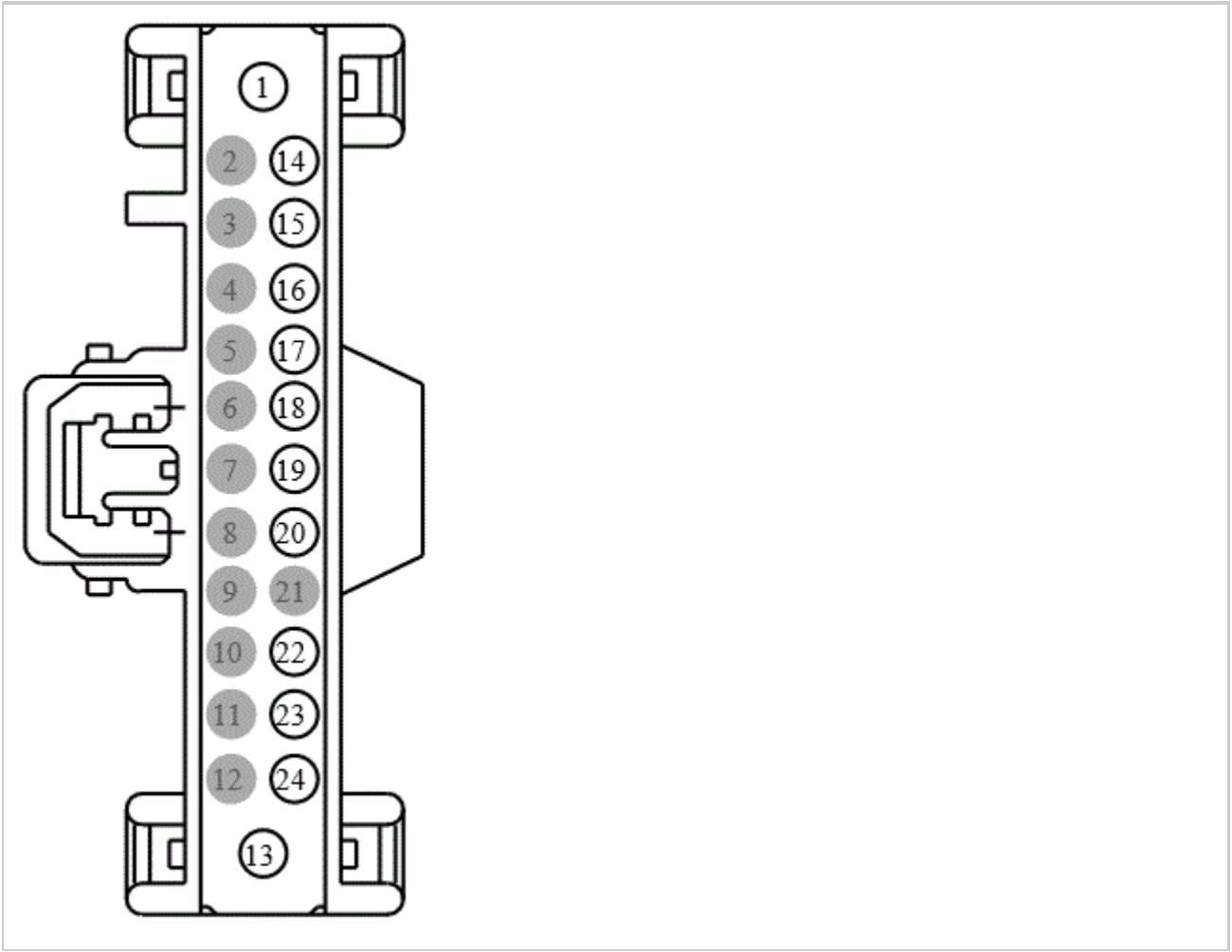
14401

Base Part #

part# N/A

Service Pigtail

See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	GD215 (BK-GY)	20	GROUND - INSTRUMENT PANEL STRUCTURE # 2ND POINT	
2	*	*	Not Used	
3	*	*	Not Used	
4	*	*	Not Used	
5	*	*	Not Used	

6	*	*	Not Used
7	*	*	Not Used
8	*	*	Not Used
9	*	*	Not Used
10	*	*	Not Used
11	*	*	Not Used
12	*	*	Not Used
13	SBP15 (WH-RD)	22	FUSE - 15 OR CIRCUIT BREAKER
14	GD214 (BK-BU)	20	GROUND - INSTRUMENT PANEL STRUCTURE
15	VDB30 (WH)	26	CONNECTOR - DIAGNOSTIC # CAN BUS HIGH SPEED 3 (LOWER) LOW
16	VDB29 (GN)	26	CONNECTOR - DIAGNOSTIC # CAN BUS HIGH SPEED 3 (LOWER) HIGH
17	VDB26 (GY)	26	CONNECTOR - DIAGNOSTIC # CAN BUS HIGH SPEED 2 (UPPER) LOW
18	VDB25 (GN)	26	CONNECTOR - DIAGNOSTIC # CAN BUS HIGH SPEED 2 (UPPER) HIGH
19	VDB05 (WH)	26	CONNECTOR - DIAGNOSTIC # CAN BUS HIGH SPEED LOW
20	VDB04 (BU)	26	CONNECTOR - DIAGNOSTIC # CAN BUS HIGH SPEED HIGH

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1440** 	Service Part Number: **FU2Z-14S411-ALA** Gauge: **14 20** Pin material: **Tin & Silver** Cavities: **24** Vehicle Uses DVD Player Module - Audio Control Module - Body Control Module Gateway Radio Test Connector - Diagnostic

CONNECTOR VIEWS > CONNECTOR END VIEW C2432 - DRIVER KNEE AIRBAG

Connector:C2432

Description

DRIVER KNEE AIRBAG

Color

GY

Harness

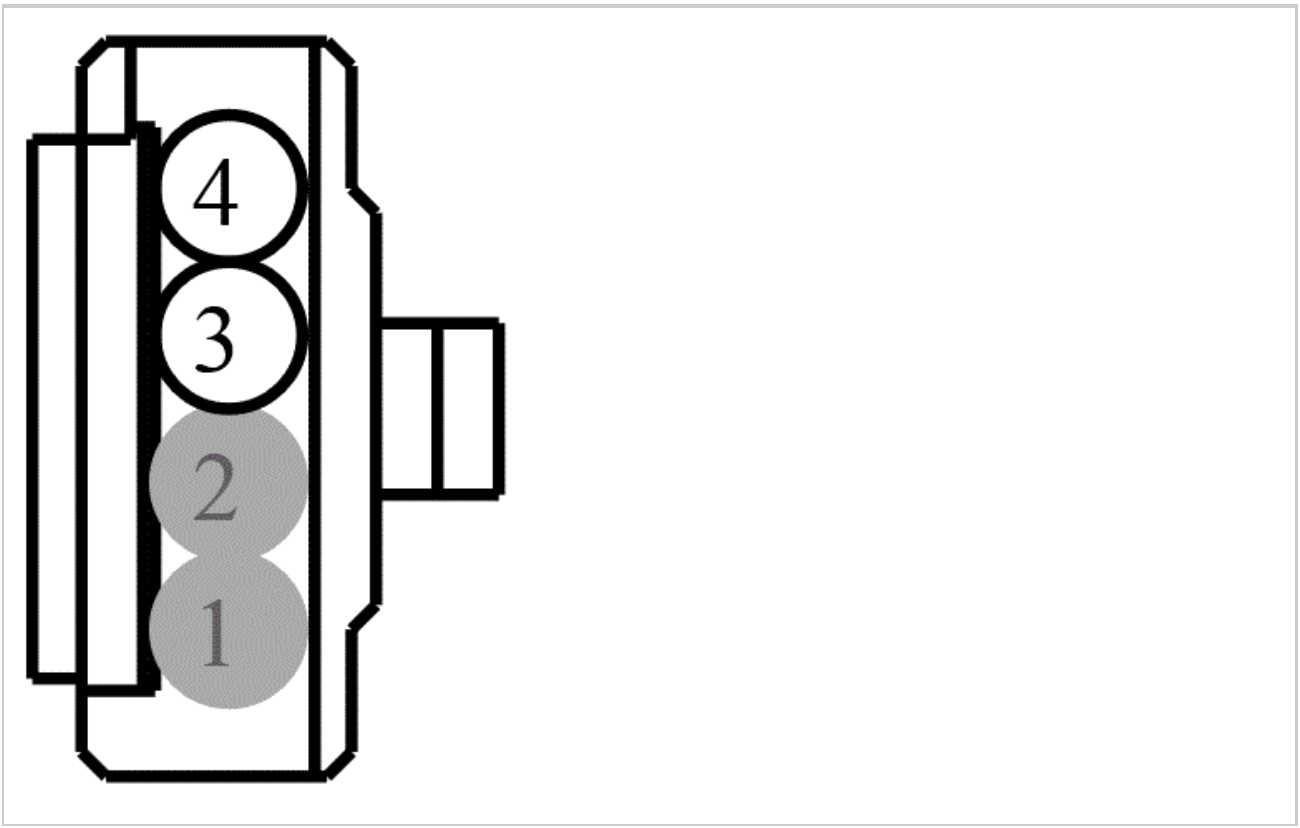
14401

Base Part #

part# N/A

Service Pigtail

Not Available



Pin	Circuit	Gauge	Circuit Function	Qualifier
1	*	*	Not Used	
2	*	*	Not Used	
3	CR139 (VT-WH)	22	CTRL MOD. - AIR BAG DRIVER KNEE +	
4	RR139 (YE)	22	CTRL MOD. - AIR BAG DRIVER KNEE -	

CONNECTOR VIEWS > CONNECTOR END VIEW C2434 - STEERING COLUMN LOCK MODULE

Connector:C2434

Description

STEERING COLUMN LOCK MODULE

Color

Harness

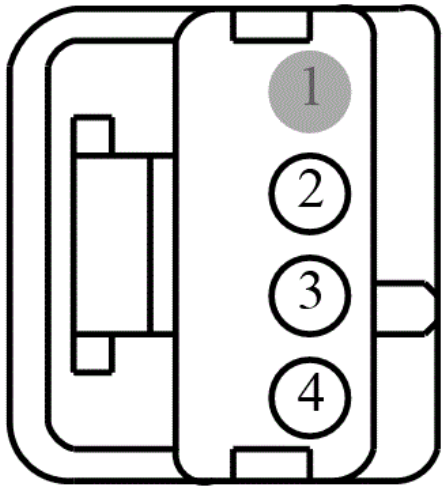
14401

Base Part #

part# N/A

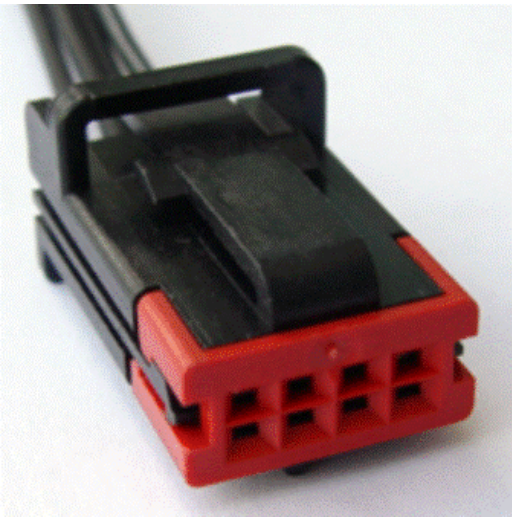
Service Pigtail

See Below



Pin	Circuit	Gauge	Circuit Function	Qualifier
1	*	*	Not Used	
2	CDC45 (VT-BN)	16	CTRL MOD. - ELECTRICAL STEERING COLUMN LOCK +	
3	GD214 (BK-BU)	16	GROUND - INSTRUMENT PANEL STRUCTURE	
4	VDN02 (GN-OG)	22	CTRL MOD. - LIN BUS # SPDJB 2	

Available Pigtail Kits	

Pigtail Kit Part Number **WPT-582** 	Service Part Number: **3U2Z-14S411-XHA** Gauge: **20** Pin material: **Tin** Cavities: **4** Vehicle Uses Lamp - Dome/Map Lamp - Map Lamp - Overhead Console Module - Warning Chime/ Beltminder Monitor - Video/DVD Sensor - EATC In Car Temperature

CONNECTOR VIEWS > CONNECTOR END VIEW C2436 - FOOTWELL AIR DISCHARGE TEMPERATURE SENSOR LH

Connector:C2436

Description

FOOTWELL AIR DISCHARGE TEMPERATURE SENSOR LH

Color

Harness

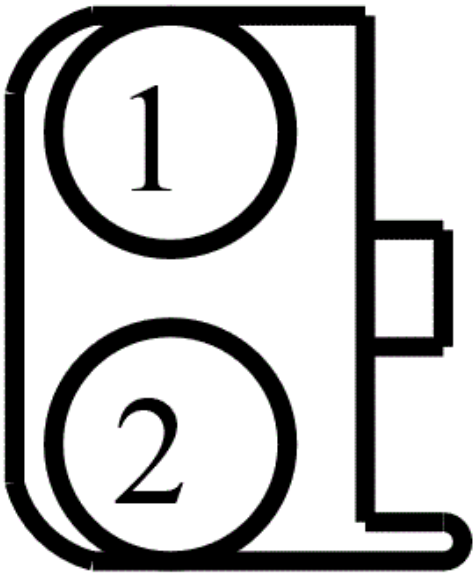
14401

Base Part #

part# N/A

Service Pigtail

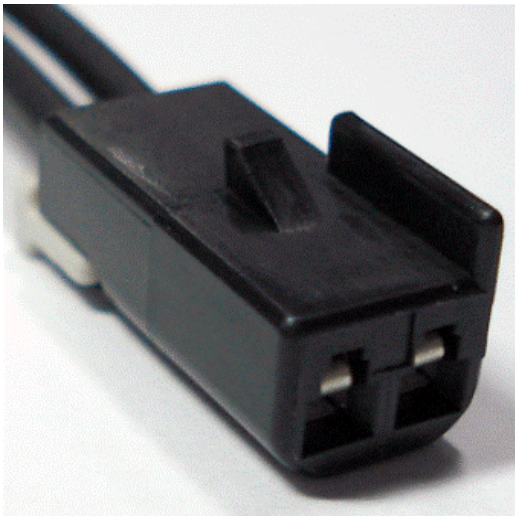
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	VH409 (WH)	22	SENSOR - DISCHARGE TEMP. # LEFT	
2	RH111 (GY-BU)	22	CTRL MOD. - CLIMATE # GENERIC VREF RETURN	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-967**	Service Part Number: **3U2Z-14S411-CZB** Gauge: **16** Pin material: **Tin** Cavities: **2** Vehicle Uses Module - Auto Lamps

	Sensor - EATC In Car Temperature Sensor - Sunload Switch - Overdrive Cancel

CONNECTOR VIEWS > CONNECTOR END VIEW C2438 - DRIVER SIDE CENTER REGISTER AIR DISCHARGE TEMPERATURE SENSOR

Connector:C2438

Description

DRIVER SIDE CENTER REGISTER AIR DISCHARGE TEMPERATURE SENSOR

Color

Harness

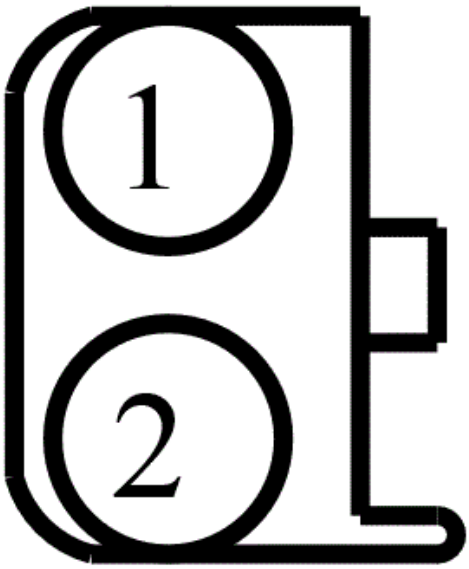
18B574

Base Part #

part# N/A

Service Pigtail

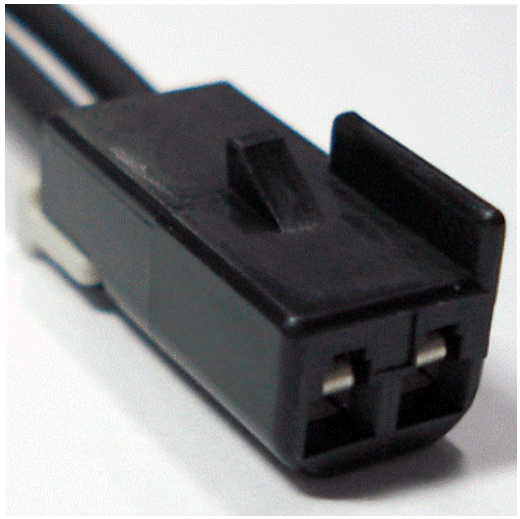
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	RH111 (GY-BU)	22	CTRL MOD. - CLIMATE # GENERIC VREF RETURN	
2	VH410 (GY)	22	SENSOR - DISCHARGE TEMP. # LEFT 2ND	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-967**	Service Part Number: **3U2Z-14S411-CZB** Gauge: **16** Pin material: **Tin** Cavities: **2** Vehicle Uses Module - Auto Lamps



Sensor - EATC In Car Temperature

Sensor - Sunload

Switch - Overdrive Cancel

CONNECTOR VIEWS > CONNECTOR END VIEW C2470 - AUDIO AMPLIFIER

Connector:C2470

Description

AUDIO AMPLIFIER

Color

Harness

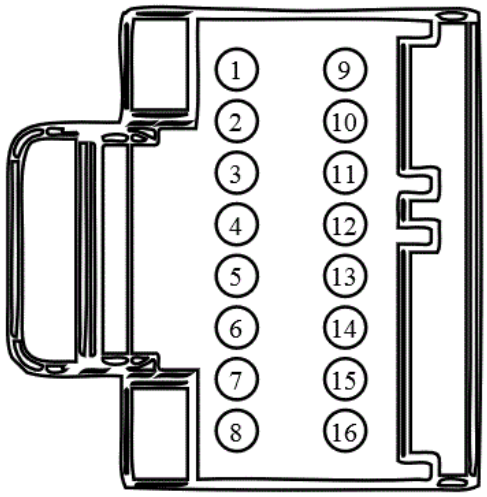
14401

Base Part #

part# N/A

Service Pigtail

Not Available



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	RME61 (BU)	26	CTRL MOD. - AUDIO # RADIO RIGHT REAR -	
2	VME61 (VT-WH)	26	CTRL MOD. - AUDIO # RADIO RIGHT REAR +	
3	RME18 (YE)	26	CTRL MOD. - AUDIO # RADIO RIGHT -	
4	VME18 (VT)	26	CTRL MOD. - AUDIO # RADIO RIGHT +	
5	RME60 (BN)	26	CTRL MOD. - AUDIO # RADIO LEFT REAR -	
6	VME60 (GN-WH)	26	CTRL MOD. - AUDIO # RADIO LEFT REAR +	
7	RME17 (GY)	26	CTRL MOD. - AUDIO # RADIO LEFT -	
8	VME17 (GN)	26	CTRL MOD. - AUDIO # RADIO LEFT +	
9	VMEA5 (BU-WH)	26	CTRL MOD. - ACTIVE NOISE CANCELLATION # OUTPUT RIGHT FRONT POS (+) (ANC2)	
10	VMEA6 (YE-BU)	26	CTRL MOD. - ACTIVE NOISE CANCELLATION # OUTPUT RIGHT FRONT NEG (-) (ANC2)	
11	VMEA3 (GN)	26	CTRL MOD. - ACTIVE NOISE CANCELLATION # OUTPUT LEFT FRONT POS (+) (ANC1)	
12	VMEA4 (YE)	26	CTRL MOD. - ACTIVE NOISE CANCELLATION # OUTPUT LEFT FRONT NEG (-) (ANC1)	
13	VMEA7 (GY)	26	CTRL MOD. - ACTIVE NOISE CANCELLATION # OUTPUT REAR POS (+) (ANC3)	

14	VMEA8 (GN-WH)	26	CTRL MOD. - ACTIVE NOISE CANCELLATION # OUTPUT REAR NEG (-) (ANC3)	
15	VDB29 (GN)	26	CONNECTOR - DIAGNOSTIC # CAN BUS HIGH SPEED 3 (LOWER) HIGH	
16	VDB30 (WH)	26	CONNECTOR - DIAGNOSTIC # CAN BUS HIGH SPEED 3 (LOWER) LOW	

CONNECTOR VIEWS > CONNECTOR END VIEW C2600 - INLINE

InlineC2600

Description

INLINE

Color

GY

Base Part #

Service Pigtail

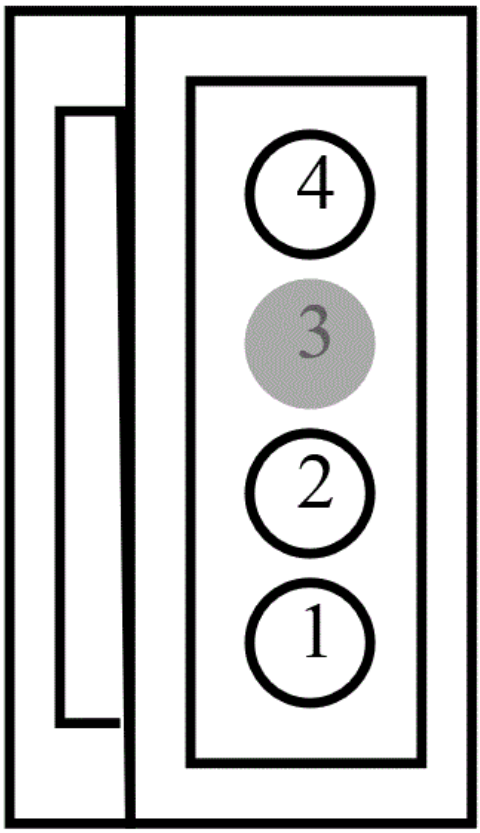
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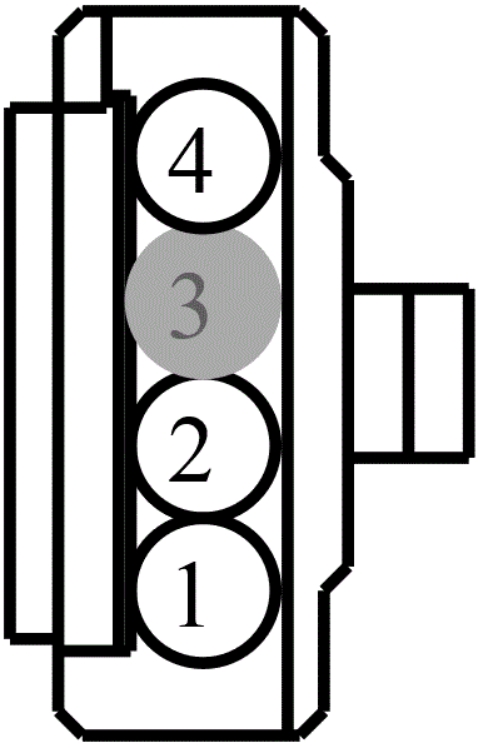
MALE

Harness 14B242

FEMALE

Harness 14401





Pin	Circuit	Gauge	Qualifier

1	CR169 (BU-WH)	20	14B242
1	CR169 (VT)	22	14401
2	RR169 (GY-VT)	22	14401
2	RR169 (WH-GN)	20	14B242
3	*	*	14401
4	GD216 (BK-VT)	18	
4	GD216 (BN)	20	14B242

CONNECTOR VIEWS > CONNECTOR END VIEW C2607 - PASSENGER KNEE AIRBAG

Connector:C2607

Description

PASSENGER KNEE AIRBAG

Color

Harness

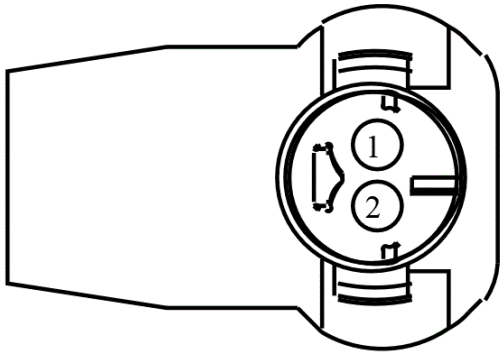
14B242

Base Part #

part# N/A

Service Pigtail

See Below



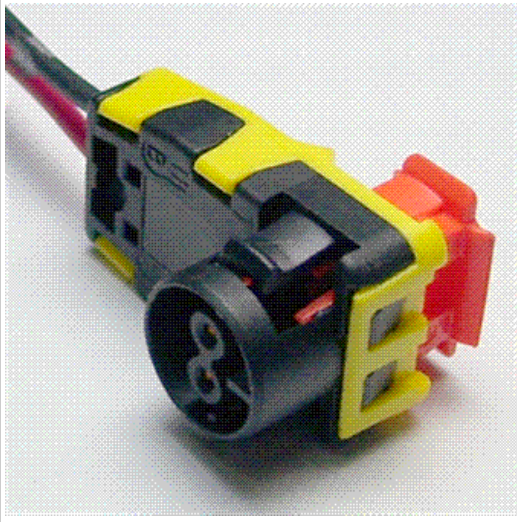
Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CR169 (BU-WH)	20	CTRL MOD. - AIR BAG PASSENGER KNEE +	
2	RR169 (WH-GN)	20	CTRL MOD. - AIR BAG PASSENGER KNEE -	

Available Pigtail Kits

Pigtail Kit Part Number

WPT-1225



Service Part Number:

BU2Z-14S411-BHA

Gauge:

20

Pin material:

FCI - Airbag

Cavities:

2

Vehicle Uses

Airbag - Side Curtain

Pretensioner - Seat Belt (Driver)

Pretensioner - Seat Belt (Passenger)

Sensor - Side Impact

Squib - Airbag (Driver)

	Squib - Airbag (Passenger)

CONNECTOR VIEWS > CONNECTOR END VIEW C2610 - LUGGAGE COMPARTMENT LID RELEASE SWITCH

Connector:C2610

Description

LUGGAGE COMPARTMENT LID RELEASE SWITCH

Color

BK

Harness

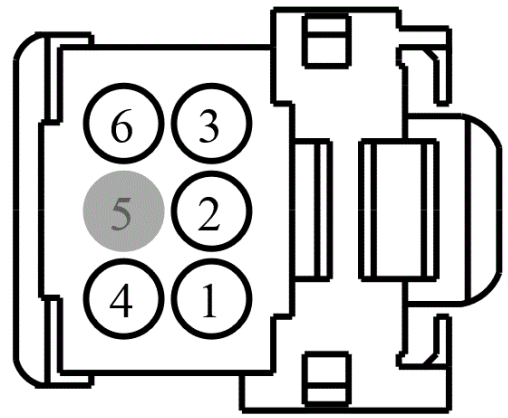
14401

Base Part #

part# N/A

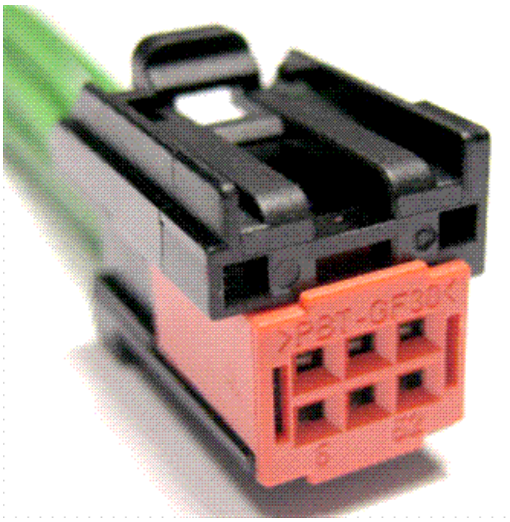
Service Pigtail

See Below



Pin	Circuit	Gauge	Circuit Function	Qualifier
1	*	*	Not Used	
2	GD214 (BK-BU)	20	GROUND - INSTRUMENT PANEL STRUCTURE	

3	VLN04 (VT-GY)	22	CTRL MOD. - IP/SWITCH ILLUMINATION
4	*	*	Not Used
5	*	*	Not Used
6	CPL45 (BN-WH)	22	SWITCH - LIFTGATE/DECKLID RELEASE

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1164** 	Service Part Number: **8U2Z-14S411-JB** Gauge: **18** Pin material: **Silver** Cavities: **6** Vehicle Uses Switch - Deck Lid / Hatch Release Switch - Deck Lid / Lift Gate Ajar Switch - Hazard Warning Switch - Heated Back Light (Rear Defrost) Switch - Power Liftgate Switch - Reverse Park Aid Switch - Start/Stop Switch - Sunshade Switch - Traction Control

CONNECTOR VIEWS > CONNECTOR END VIEW C2998 - STEERING WHEEL SWITCH LH UPPER

Connector:C2998

Description

STEERING WHEEL SWITCH LH UPPER

Color

GY

Harness

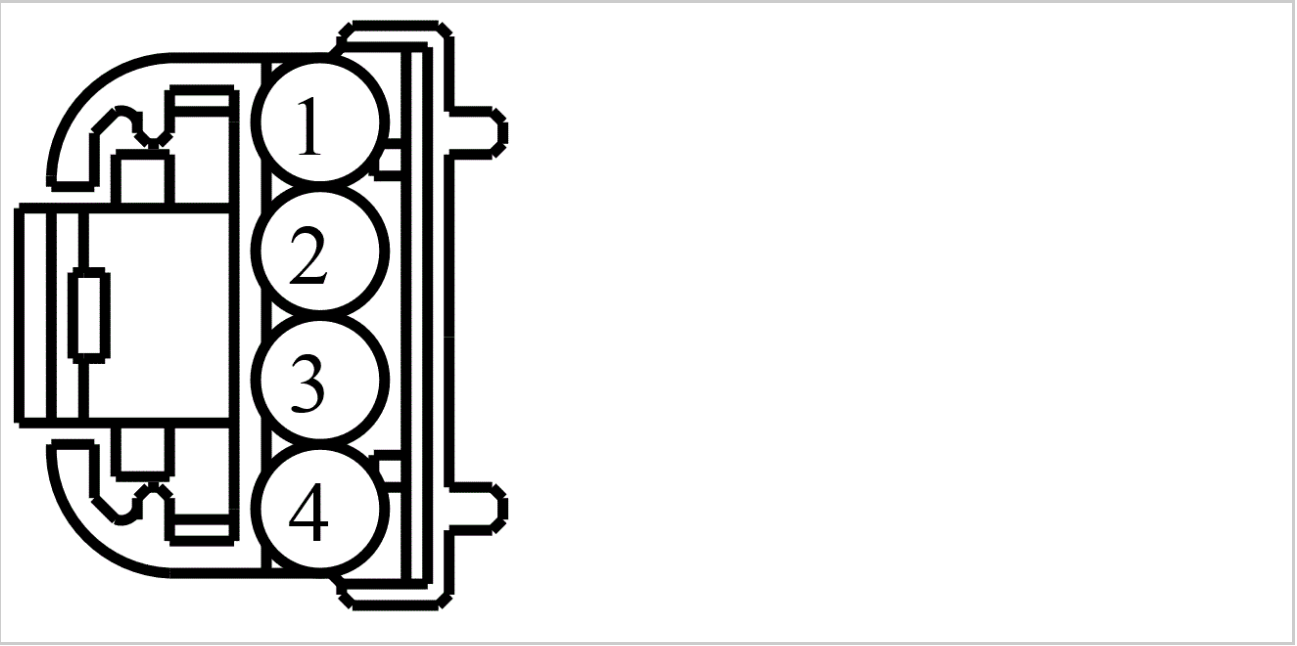
14K147

Base Part #

part# N/A

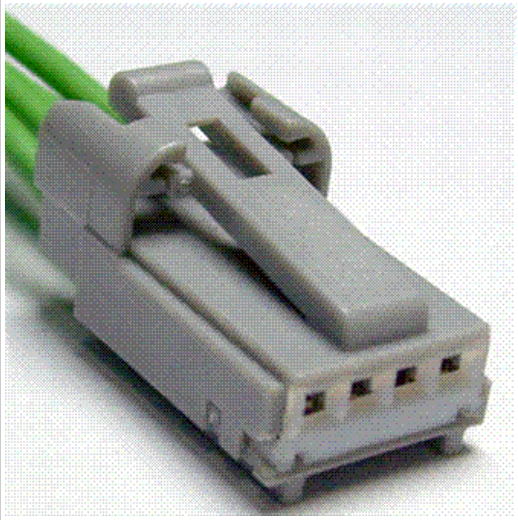
Service Pigtail

See Below



Pin	Circuit	Gauge	Circuit Function	Qualifier
1	* (*)	*	ILLUMINATION GROUND	
2	* (*)	*	SWITCH - STEERING WHEEL CONTROLS # A/D CHANNEL 1	

3	* (*)	*	SWITCH - STEERING WHEEL CONTROLS # RETURN LEFT (SW GND LEFT)	
4	* (*)	*	ILLUMINATION FEED	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1013** 	Service Part Number: **9U2Z-14S411-TA** Gauge: **18** Pin material: **Silver** Cavities: **4** Vehicle Uses Module - Auto Lamps Sensor - Sunload

CONNECTOR VIEWS > CONNECTOR END VIEW C2999 - STEERING WHEEL SWITCH RH UPPER

Connector:C2999

Description

STEERING WHEEL SWITCH RH UPPER

Color

GY

Harness

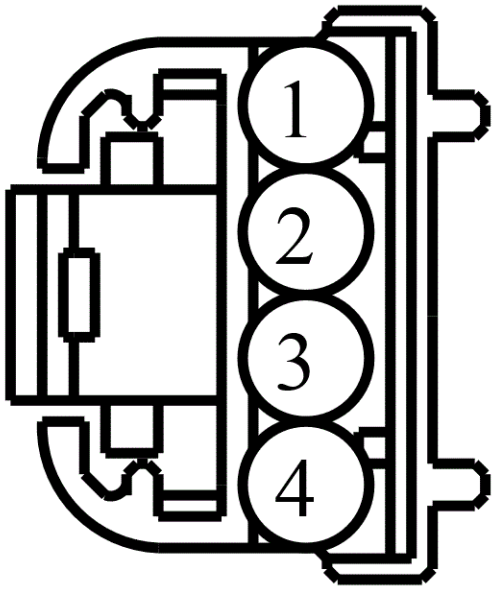
14K147

Base Part #

part# N/A

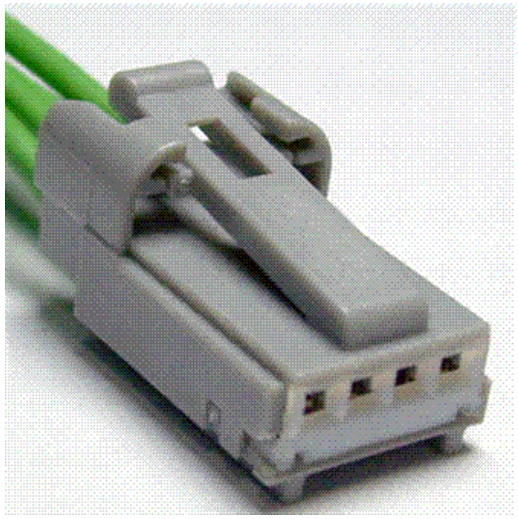
Service Pigtail

See Below



Pin	Circuit	Gauge	Circuit Function	Qualifier
1	* (*)	*	ILLUMINATION GROUND	
2	* (*)	*	SWITCH - STEERING WHEEL CONTROLS # A/D CHANNEL 1	
3	* (*)	*	SWITCH - STEERING WHEEL CONTROLS # RETURN RIGHT (SW GND RIGHT)	
4	* (*)	*	ILLUMINATION FEED	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1013**	Service Part Number: **9U2Z-14S411-TA** Gauge: **18** Pin material:



Silver

Cavities:

4

Vehicle Uses

Module - Auto Lamps

Sensor - Sunload

CONNECTOR VIEWS > CONNECTOR END VIEW C3034 - FRONT SEAT BACKREST BLOWER MOTOR LH

Connector:C3034

Description

FRONT SEAT BACKREST BLOWER MOTOR LH

Color

LT GY

Harness

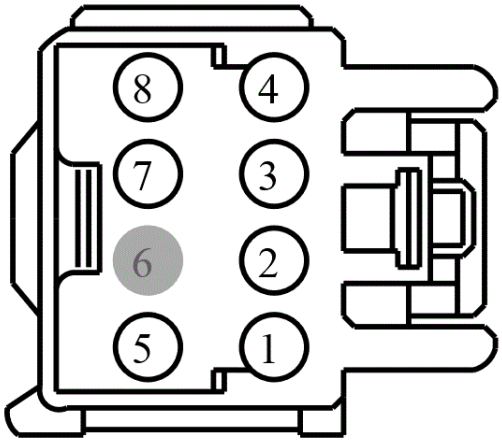
14D232

Base Part #

part# N/A

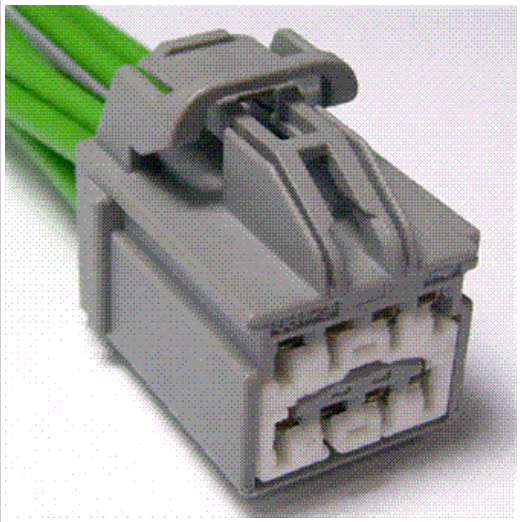
Service Pigtail

See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CHS01 (GY-VT)	14	CTRL MOD. - HOT/COLD SEAT # DRIVER BACK HEATER +	
2	RHS01 (WH-VT)	14	CTRL MOD. - HOT/COLD SEAT # DRIVER BACK HEATER -	
3	CHS03 (GN-BN)	18	CTRL MOD. - HOT/COLD SEAT # DRIVER FAN +	
4	RHS03 (GY-OG)	18	CTRL MOD. - HOT/COLD SEAT # DRIVER FAN -	
5	CHS14 (GN)	20	CTRL MOD. - HOT/COLD SEAT # PASSENGER INDICATOR HIGH	
6	*	*	Not Used	
7	CHS09 (GY)	20	CTRL MOD. - HOT/COLD SEAT # PASSENGER INDICATOR LOW	
8	CHS29 (WH-BU)	20	SWITCH - SEAT HEATER FRONT DRIVER SIDE	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1128** 	Service Part Number: **3U2Z-14S411-BCB** Gauge: **16** Pin material: **Silver** Cavities: **8** Vehicle Uses Actuator - Door Lock - Decklid/Liftgate Mirror - Sideview Solenoid - Brake Shift Park Interlock Switch - Headlamp Switch - Power Window - Quarter Glass Switch - Sliding Door Contact

CONNECTOR VIEWS > CONNECTOR END VIEW C3035 - FRONT SEAT CUSHION BLOWER MOTOR LH

Connector:C3035

Description

FRONT SEAT CUSHION BLOWER MOTOR LH

Color

LT GY

Harness

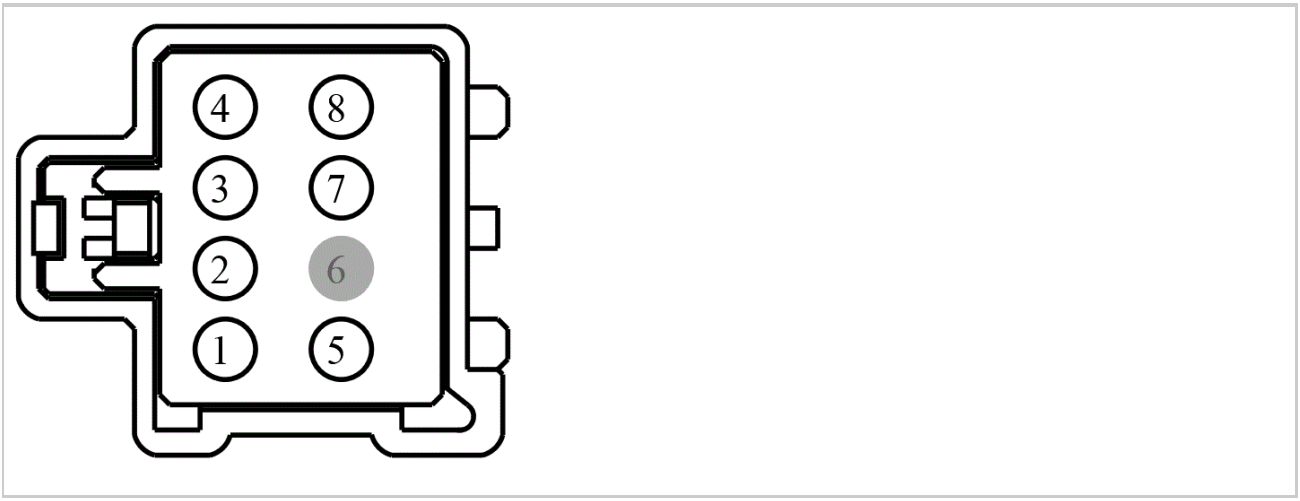
14D231

Base Part #

part# N/A

Service Pigtail

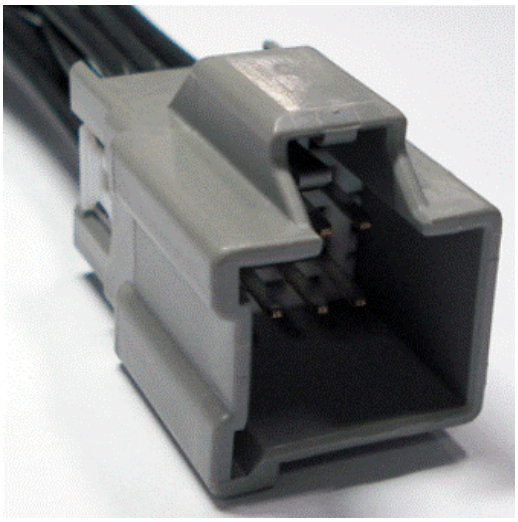
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CHS02 (YE-BU)	16	CTRL MOD. - HOT/COLD SEAT # DRIVER CUSHION HEATER +	
1	CHS02 (YE-BU)	14	CTRL MOD. - HOT/COLD SEAT # DRIVER CUSHION HEATER +	
2	RHS02 (BU-OG)	16	CTRL MOD. - HOT/COLD SEAT # DRIVER CUSHION HEATER -	
2	RHS02 (BU-OG)	14	CTRL MOD. - HOT/COLD SEAT # DRIVER CUSHION HEATER -	
3	CHS03 (GN-BN)	18	CTRL MOD. - HOT/COLD SEAT # DRIVER FAN +	
4	RHS03 (GY-OG)	18	CTRL MOD. - HOT/COLD SEAT # DRIVER FAN -	
5	VHS26 (VT)	20	SENSOR - CUSHION TEMP. DRIVER	

6	*	*	Not Used
7	VHS18 (BN-GN)	20	CTRL MOD. - HOT/COLD SEAT # DRIVER CUSHION BLOWER SPEED CONTROL
8	RHS05 (YE-VT)	20	CTRL MOD. - HOT/COLD SEAT # DRIVER SENSOR CUSHION TEMP.

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1034** 	Service Part Number: **3U2Z-14S411-ZTB** Gauge: **14** Pin material: **Tin** Cavities: **8** Vehicle Uses Lamp - Park/Turn/Stop Lamp - Park/Turn/Stop/Reverse - Inline (Male)

CONNECTOR VIEWS > CONNECTOR END VIEW C3039 - FRONT SEAT BACKREST BLOWER MOTOR RH

Connector:C3039

Description

FRONT SEAT BACKREST BLOWER MOTOR RH

Color

LT GY

Harness

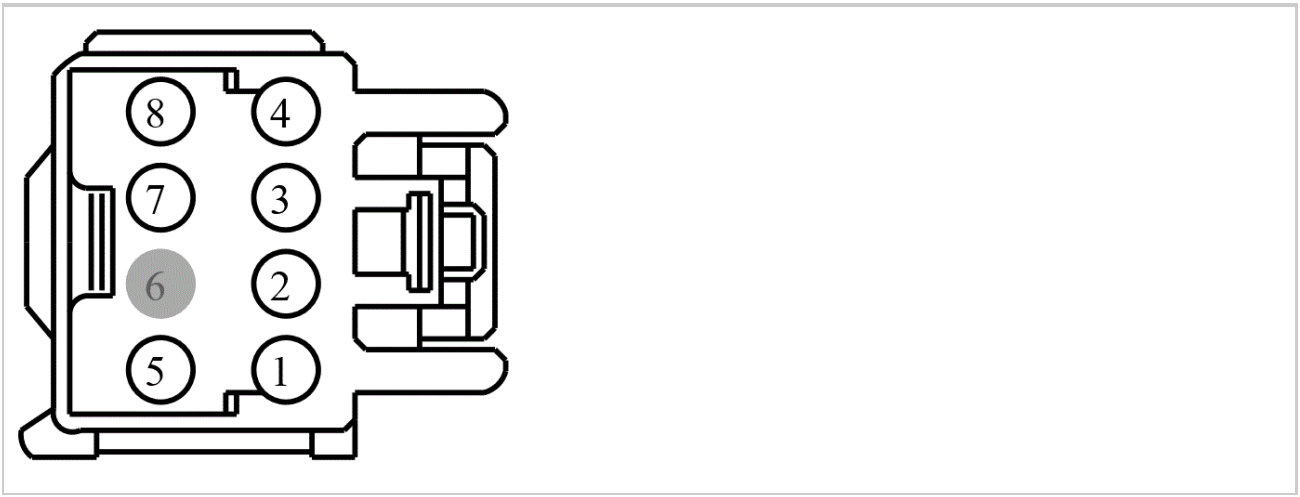
14D233

Base Part #

part# N/A

Service Pigtail

See Below



Check for Terminal Part Numbers

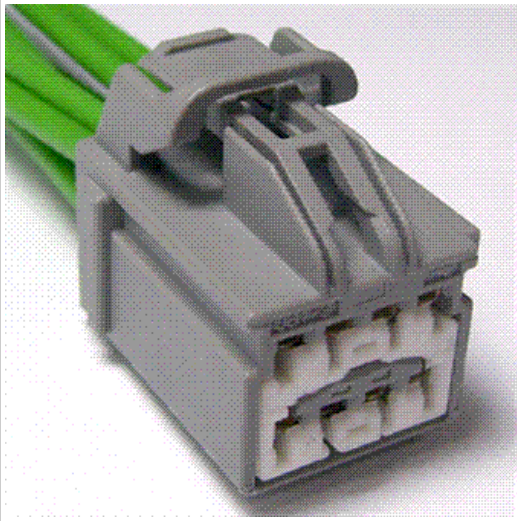
Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CHS06 (BU-BN)	14	CTRL MOD. - HOT/COLD SEAT # PASSENGER BACK HEATER +	
2	RHS06 (WH)	14	CTRL MOD. - HOT/COLD SEAT # PASSENGER BACK HEATER -	
3	CHS08 (BN-YE)	18	CTRL MOD. - HOT/COLD SEAT # PASSENGER FAN +	
4	RHS08 (VT-WH)	18	CTRL MOD. - HOT/COLD SEAT # PASSENGER FAN -	
5	VHS36 (YE-BU)	20	SENSOR - BACK TEMP. PASSENGER	
6	*	*	Not Used	

7	VHS21 (BU-WH)	20	CTRL MOD. - HOT/COLD SEAT # PASSENGER BACK BLOWER SPEED CONTROL	
8	RHS20 (GN-BU)	20	CTRL MOD. - HOT/COLD SEAT # PASSENGER SENSOR BACK TEMP.	

Available Pigtail Kits

Pigtail Kit Part Number

WPT-1128



Service Part Number:

3U2Z-14S411-BCB

Gauge:

16

Pin material:

Silver

Cavities:

8

Vehicle Uses

Actuator - Door Lock - Decklid/Liftgate

Mirror - Sideview

Solenoid - Brake Shift Park Interlock

Switch - Headlamp

Switch - Power Window - Quarter Glass

Switch - Sliding Door Contact

CONNECTOR VIEWS > CONNECTOR END VIEW C3040 - FRONT SEAT CUSHION BLOWER MOTOR RH

Connector:C3040

Description

FRONT SEAT CUSHION BLOWER MOTOR RH

Color

LT GY

Harness

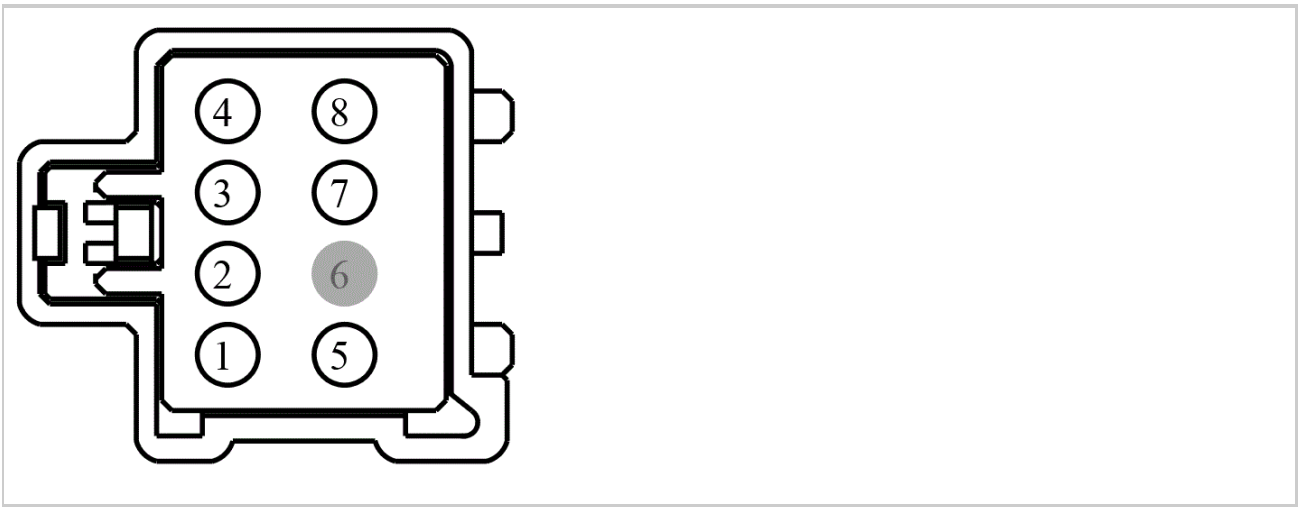
14D230

Base Part #

part# N/A

Service Pigtail

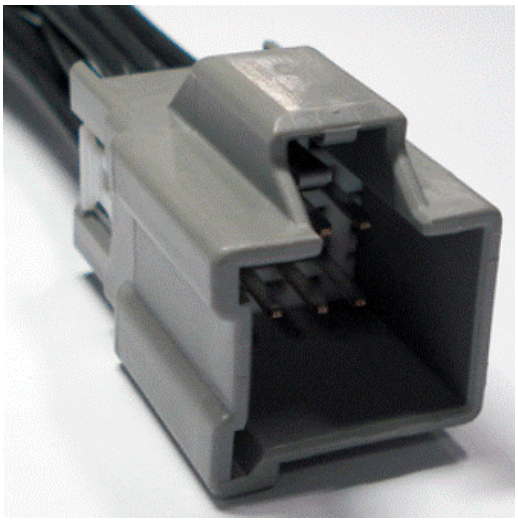
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CHS07 (GY-BU)	4	CTRL MOD. - HOT/COLD SEAT # PASSENGER CUSHION HEATER +	
2	RHS07 (BU)	4	CTRL MOD. - HOT/COLD SEAT # PASSENGER CUSHION HEATER -	
3	CHS08 (BN-YE)	18	CTRL MOD. - HOT/COLD SEAT # PASSENGER FAN +	
4	RHS08 (VT-WH)	18	CTRL MOD. - HOT/COLD SEAT # PASSENGER FAN -	
5	VHS27 (WH-OG)	20	SENSOR - CUSHION TEMP. PASSENGER	

6	*	*	Not Used
7	VHS23 (BN-BU)	20	CTRL MOD. - HOT/COLD SEAT # PASSENGER CUSHION BLOWER SPEED CONTROL
8	RHS10 (BU-OG)	20	CTRL MOD. - HOT/COLD SEAT # PASSENGER SENSOR CUSHION TEMP.

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1034** 	Service Part Number: **3U2Z-14S411-ZTB** Gauge: **14** Pin material: **Tin** Cavities: **8** Vehicle Uses Lamp - Park/Turn/Stop Lamp - Park/Turn/Stop/Reverse - Inline (Male)

CONNECTOR VIEWS > CONNECTOR END VIEW C3043 - OCCUPANT CLASSIFICATION SYSTEM MODULE (OCSM)

Connector:C3043

Description

OCCUPANT CLASSIFICATION SYSTEM MODULE (OCSM)

Color

Harness

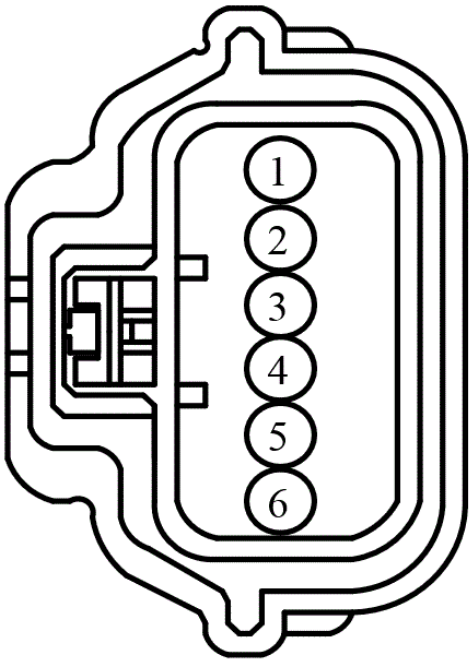
14D230

Base Part #

part# N/A

Service Pigtail

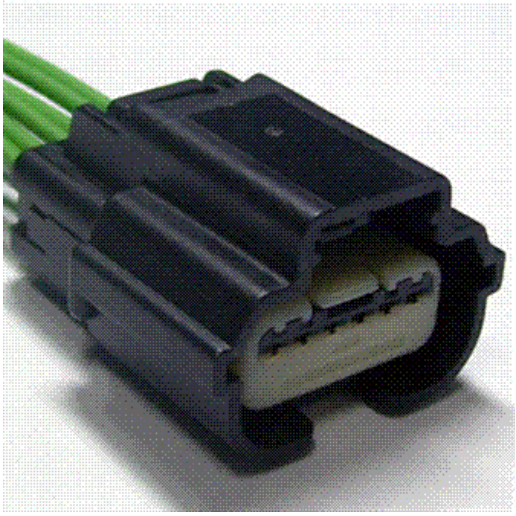
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CBX02 (BN-RD)	18	POWER - SEAT # RUN/START OCCUPANT CLASSIFICATION MODULE	
2	VDB04 (WH-BU)	18	CONNECTOR - DIAGNOSTIC # CAN BUS HIGH SPEED HIGH	
3	VDB05 (WH)	18	CONNECTOR - DIAGNOSTIC # CAN BUS HIGH SPEED LOW	
4	GD901 (BK)	20	GROUND - PASSENGER SEAT # RESTRAINTS CLEAN	
5	LR142 (YE-BU)	20	CTRL MOD. - SENSOR SEAT BELT TENSION FRONT PASSENGER OUTBOARD +	

6	VR210 (BU-BN)	20	SENSOR - SEAT BELT TENSION FRONT PASSENGER OUTBOARD	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1338** 	Service Part Number: **9U2Z-14S411-BB** Gauge: **20** Pin material: **Silver** Cavities: **6** Vehicle Uses Actuator - Door Lock - LH - Front Actuator - Door Lock - LH - Rear Actuator - Door Lock - RH - Front Actuator - Door Lock - RH - Rear Module - Occupant Classification Sensor - Acceleration Pedal Position Sensor - Transmission Range Switch - Door Ajar / Interior Lamp

CONNECTOR VIEWS > CONNECTOR END VIEW C3050 - INLINE

InlineC3050

Description

INLINE

Color

BK

Base Part #

Service Pigtail

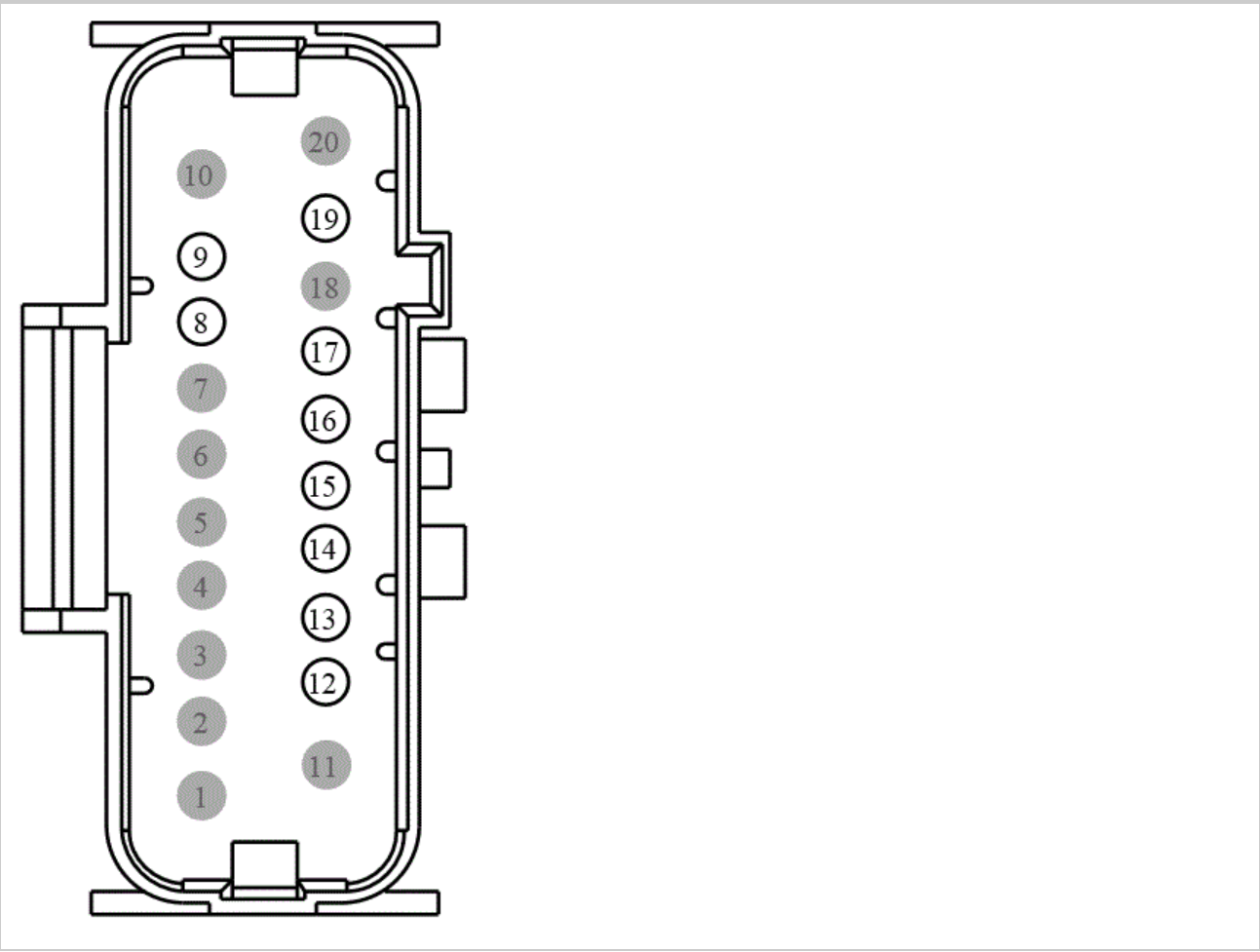
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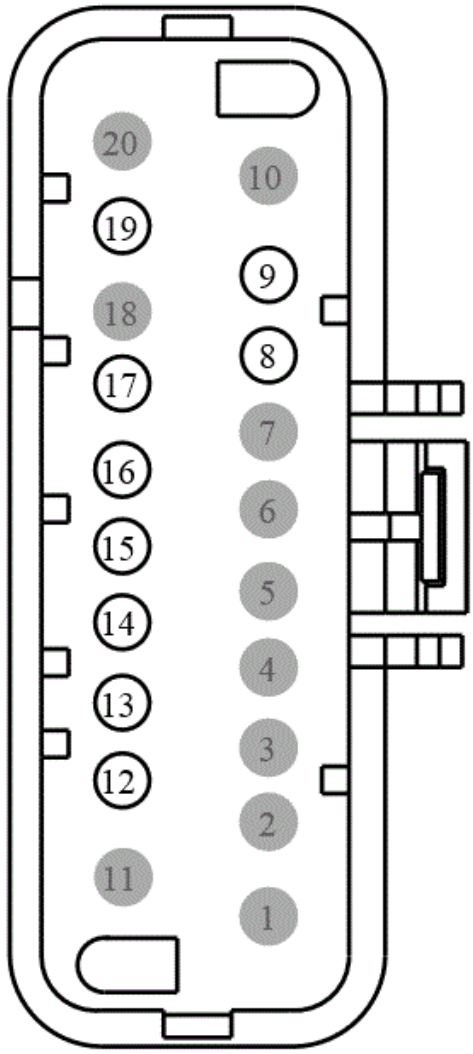
MALE

Harness 14D232

FEMALE

Harness 14D231





Pin	Circuit	Gauge	Qualifier
1	*	*	
2	*	*	
3	*	*	
4	*	*	
5	*	*	

6	*	*	
7	*	*	
8	CPS18 (BN-GN)	18	
9	CPS19 (GY-VT)	18	
10	*	*	
11	*	*	
12	CHS09 (GY)	20	
13	RHS03 (GY-OG)	18	
14	RHS01 (WH-VT)	14	
14	RHS01 (WH-VT)	16	14D231
15	CHS01 (GY-VT)	14	
15	CHS01 (GY-VT)	16	14D231
16	CHS14 (GN)	20	
17	CHS29 (WH-BU)	20	
18	*	*	
19	CHS03 (GN-BN)	18	

20	*	*	

CONNECTOR VIEWS > CONNECTOR END VIEW C3065 - FRONT SAFETY BELT ANCHOR AND PRETENSIONER LH

Connector:C3065

Description

FRONT SAFETY BELT ANCHOR AND PRETENSIONER LH

Color

Harness

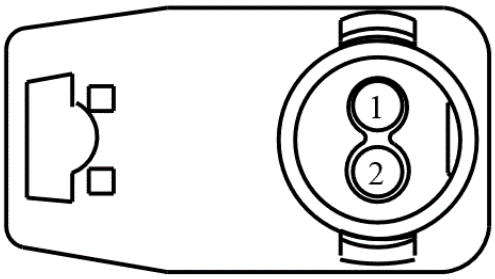
14A005

Base Part #

part# N/A

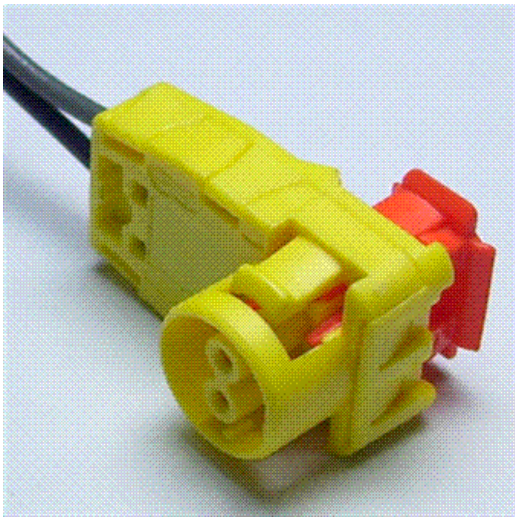
Service Pigtail

See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CR120 (BU-OG)	22	CTRL MOD. - SEAT BELT PRETENSIONER FRONT DRIVER SIDE +	
2	RR120 (BN-GN)	22	CTRL MOD. - SEAT BELT PRETENSIONER FRONT DRIVER SIDE -	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1227** 	Service Part Number: **BU2Z-14S411-BKA** Gauge: **20** Pin material: **FCI - Airbag** Cavities: **2** Vehicle Uses Sensor - Side Impact Squib - Airbag (Driver) Squib - Airbag (Passenger)

CONNECTOR VIEWS > CONNECTOR END VIEW C3066 - FRONT SAFETY BELT ANCHOR AND PRETENSIONER RH

Connector:C3066

Description

FRONT SAFETY BELT ANCHOR AND PRETENSIONER RH

Color

Harness

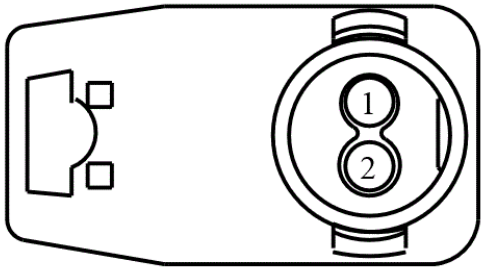
14A005

Base Part #

part# N/A

Service Pigtail

See Below



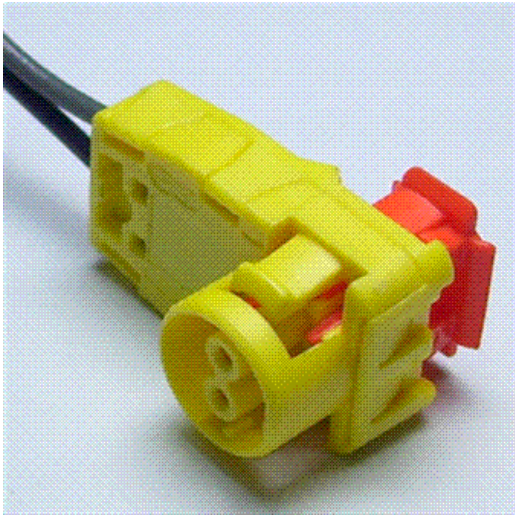
Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CR122 (WH-OG)	22	CTRL MOD. - SEAT BELT PRETENSIONER FRONT PASSENGER OUTBOARD +	
2	RR122 (BN)	22	CTRL MOD. - SEAT BELT PRETENSIONER FRONT PASSENGER OUTBOARD -	

Available Pigtail Kits

Pigtail Kit Part Number

WPT-1227



Service Part Number:

BU2Z-14S411-BKA

Gauge:

20

Pin material:

FCI - Airbag

Cavities:

2

Vehicle Uses

Sensor - Side Impact

Squib - Airbag (Driver)

Squib - Airbag (Passenger)

CONNECTOR VIEWS > CONNECTOR END VIEW C3074 - FRONT SEAT FRONT TILT MOTOR RH

Connector:C3074

Description

FRONT SEAT FRONT TILT MOTOR RH

Color

DK GY

Harness

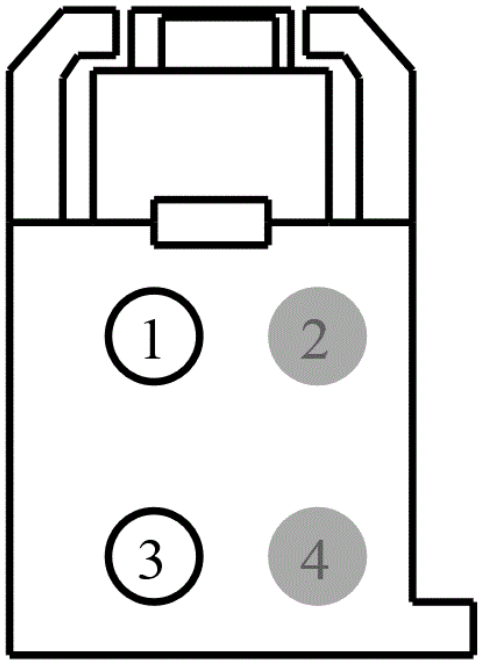
14D230

Base Part #

part# N/A

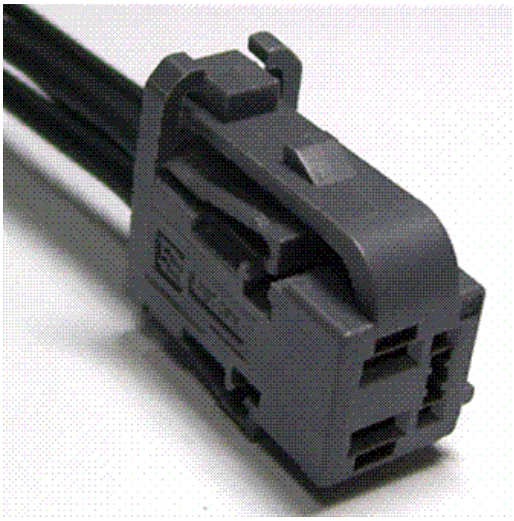
Service Pigtail

See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CPS24 (GY)	14	SWITCH - SEAT ADJUST. PASSENGER FRONT HEIGHT (TILT) DOWN	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1350** 	Service Part Number: **DU2Z-14S411-UA** Gauge: **16 20** Pin material: **Tin** Cavities: **4** Vehicle Uses Motor - Power Seat Track Motor - Seat Height (Front)

CONNECTOR VIEWS > CONNECTOR END VIEW C3075 - FRONT SEAT HEIGHT ADJUSTMENT MOTOR RH

Connector:C3075

Description

FRONT SEAT HEIGHT ADJUSTMENT MOTOR RH

Color

BK

Harness

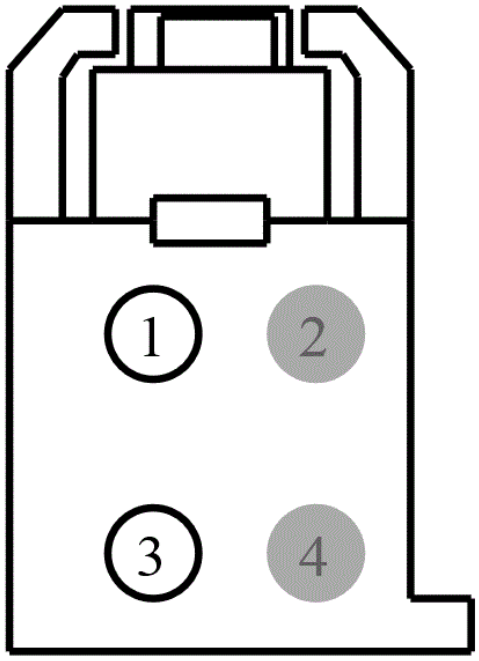
14D230

Base Part #

part# N/A

Service Pigtail

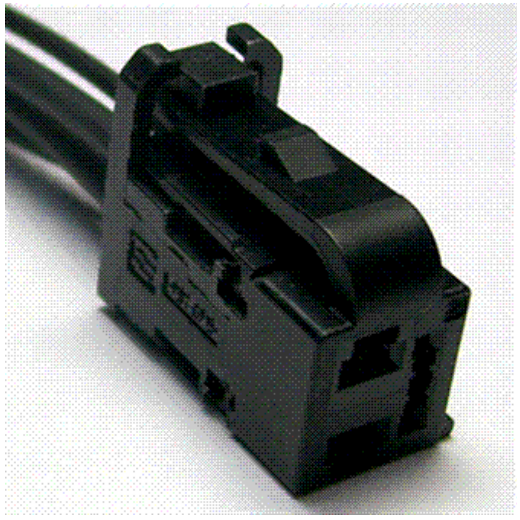
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CPS26 (YE-BU)	14	SWITCH - SEAT ADJUST. PASSENGER REAR HEIGHT DOWN	
2	*	*	Not Used	
3	CPS27 (BU-BN)	14	SWITCH - SEAT ADJUST. PASSENGER REAR HEIGHT UP	
4	*	*	Not Used	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1311**	Service Part Number: **CU2Z-14S411-BAA** Gauge: **20**



Pin material:

Tin

Cavities:

4

Vehicle Uses

Motor - Seat Height (Front)

Motor - Seat Recline

CONNECTOR VIEWS > CONNECTOR END VIEW C3118 - POWER WINDOW MOTOR LEFT REAR

Connector:C3118

Description

POWER WINDOW MOTOR LEFT REAR

Color

BK

Harness

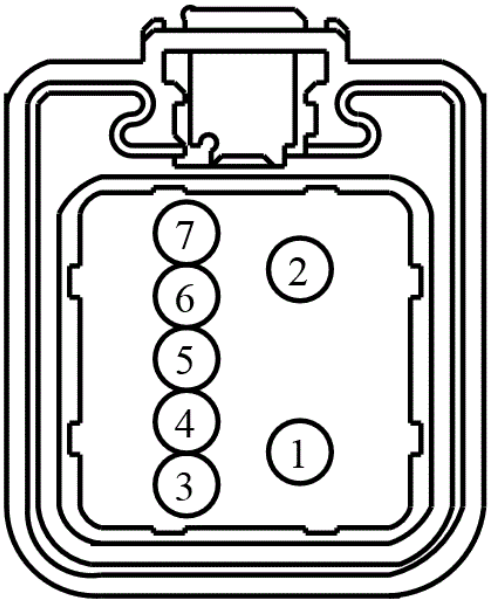
14A411

Base Part #

part# N/A

Service Pigtail

See Below

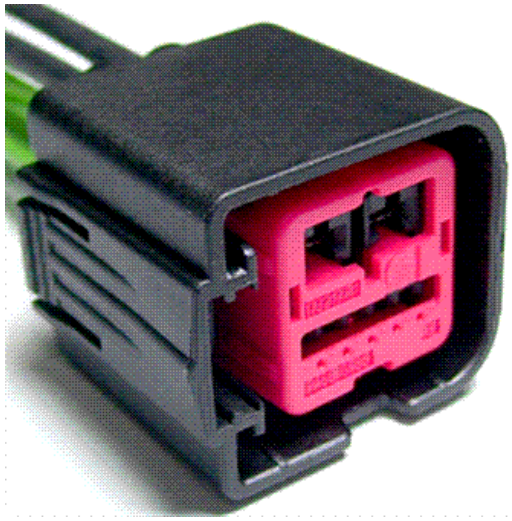


Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	SBP30 (BN-RD)	14	FUSE - 29 OR CIRCUIT BREAKER	
2	GD348 (BK-YE)	14	GROUND - PILLAR C OR QUARTER PANEL LEFT	
3	CBP23 (BN-YE)	22	FUSE - 23 OR CIRCUIT BREAKER	
4	CPW25 (YE-BU)	22	SWITCH - REAR WINDOW FLIP # LEFT CLOSE	
5	CPW26 (BU-BN)	22	SWITCH - REAR WINDOW FLIP # LEFT OPEN	
6	CPW73 (GN-VT)	22	CTRL MOD. - POWER WINDOW GLOBAL DOWN	
7	CPW53 (YE-OG)	22	CTRL MOD. - WINDOW MOTOR REAR LEFT # DOWN	

Available Pigtail Kits	
Pigtail Kit Part Number	Service Part Number:

WPT-1209



BU2Z-14S411-ASA

Gauge:

12 18

Pin material:

Tin & Silver

Cavities:

7

Vehicle Uses

Motor - Power Window - LH - Front

Motor - Power Window - LH - Rear

Motor - Power Window - RH - Front

Motor - Power Window - RH - Rear

CONNECTOR VIEWS > CONNECTOR END VIEW C3119 - POWER WINDOW MOTOR RIGHT REAR

Connector:C3119

Description

POWER WINDOW MOTOR RIGHT REAR

Color

BK

Harness

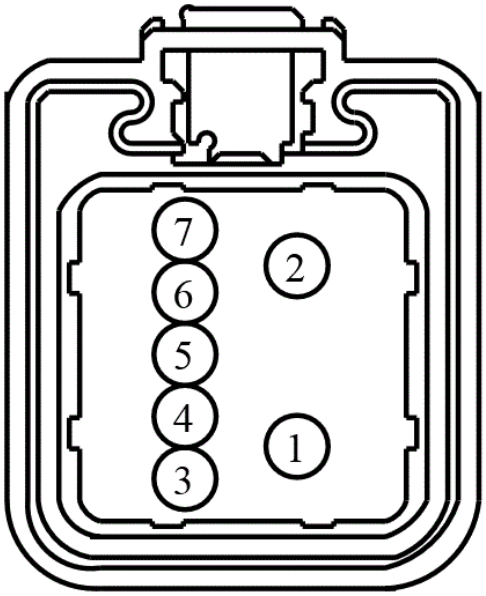
14A411

Base Part #

part# N/A

Service Pigtail

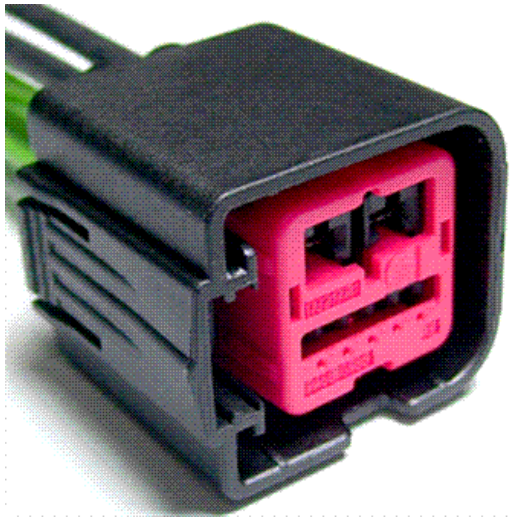
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	SBP30 (BN-RD)	14	FUSE - 30 OR CIRCUIT BREAKER	
2	GD348 (BK-YE)	14	GROUND - PILLAR C OR QUARTER PANEL RIGHT	
3	CBP23 (BN-YE)	22	FUSE - 23 OR CIRCUIT BREAKER	
4	CPW25 (YE-BU)	22	SWITCH - REAR WINDOW FLIP # LEFT CLOSE	
5	CPW26 (BU-BN)	22	SWITCH - REAR WINDOW FLIP # LEFT OPEN	
6	CPW73 (GN-VT)	22	CTRL MOD. - POWER WINDOW GLOBAL DOWN	
7	CPW53 (YE-OG)	22	CTRL MOD. - WINDOW MOTOR REAR RIGHT # DOWN	

Available Pigtail Kits	
Pigtail Kit Part Number	Service Part Number:

WPT-1209 	**BU2Z-14S411-ASA** Gauge: **12 18** Pin material: **Tin & Silver** Cavities: **7** Vehicle Uses Motor - Power Window - LH - Front Motor - Power Window - LH - Rear Motor - Power Window - RH - Front Motor - Power Window - RH - Rear

CONNECTOR VIEWS > CONNECTOR END VIEW C3190 - FRONT SEAT CONTROL SWITCH RH

Connector:C3190

Description

FRONT SEAT CONTROL SWITCH RH

Color

BK

Harness

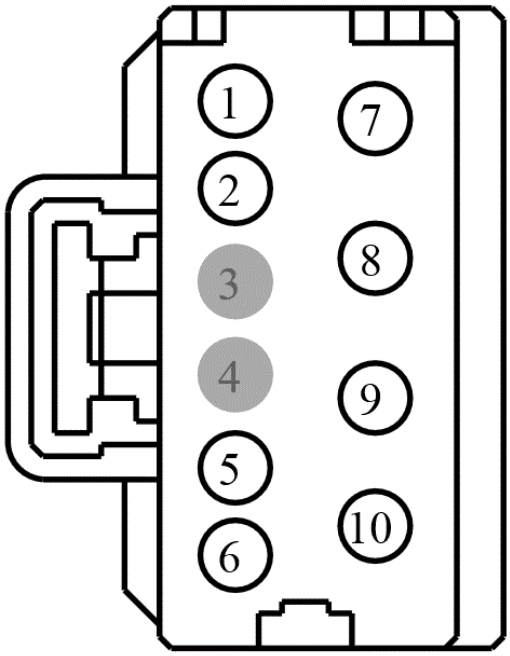
14D230

Base Part #

part# N/A

Service Pigtail

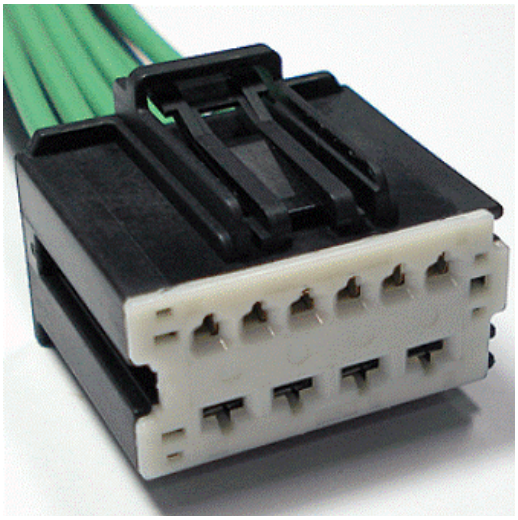
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CPS28 (GN)	14	SWITCH - SEAT ADJUST. PASSENGER REARWARD	
2	CPS23 (GN-VT)	14	SWITCH - SEAT ADJUST. PASSENGER FORWARD	
3	*	*	Not Used	
4	*	*	Not Used	
5	CPS24 (GY)	14	SWITCH - SEAT ADJUST. PASSENGER FRONT HEIGHT (TILT) DOWN	
6	CPS25 (WH-VT)	14	SWITCH - SEAT ADJUST. PASSENGER FRONT HEIGHT (TILT) UP	
7	CPS26 (YE-BU)	14	SWITCH - SEAT ADJUST. PASSENGER REAR HEIGHT DOWN	

8	CBX05 (VT-RD)	14	POWER - SEAT # POWER SEAT SWITCH	
9	CPS27 (BU-BN)	14	SWITCH - SEAT ADJUST. PASSENGER REAR HEIGHT UP	
10	GD904 (BK-BU)	14	GROUND - PASSENGER SEAT # SEAT SWITCH	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1042** 	Service Part Number: **AU2Z-14S411-CA** Gauge: **12 14** Pin material: **Tin & Silver** Cavities: **10** Vehicle Uses Module - Transfer Case Shift Control

CONNECTOR VIEWS > CONNECTOR END VIEW C3201 - DRIVER SAFETY BELT BUCKLE

Connector:C3201

Description

DRIVER SAFETY BELT BUCKLE

Color

BK

Harness

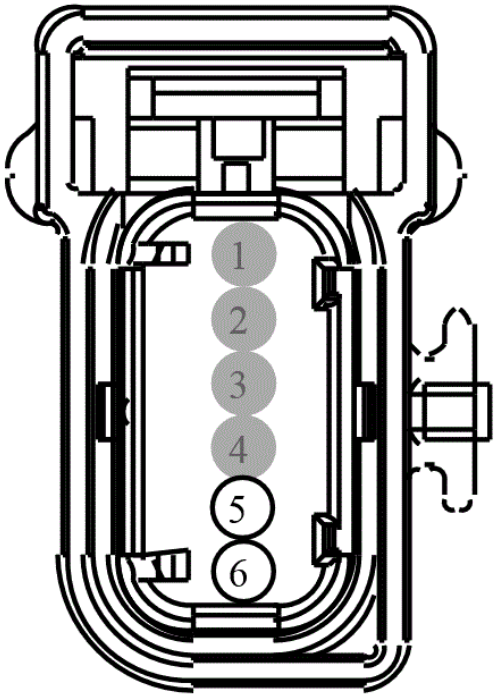
14D231

Base Part #

part# N/A

Service Pigtail

See Below



Pin	Circuit	Gauge	Circuit Function	Qualifier
1	*	*	Not Used	
2	*	*	Not Used	
3	*	*	Not Used	
4	*	*	Not Used	
5	CR201 (GN-BU)	18	SENSOR - SEAT BELT BUCKLE (SEAT BELT REMINDER) FRONT DRIVER SIDE	
6	GD901 (BK)	20	GROUND - DRIVER SEAT # RESTRAINTS	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1329** 	Service Part Number: **DU2Z-14S411-EA** Gauge: **20** Pin material: **Tin** Cavities: **6** Vehicle Uses Antenna - Keyless Entry Handle - Decklid Switch - Keyless Entry Switch - Seatbelt

CONNECTOR VIEWS > CONNECTOR END VIEW C3206 - INLINE

InlineC3206

Description

INLINE

Color

BK

Base Part #

Service Pigtail

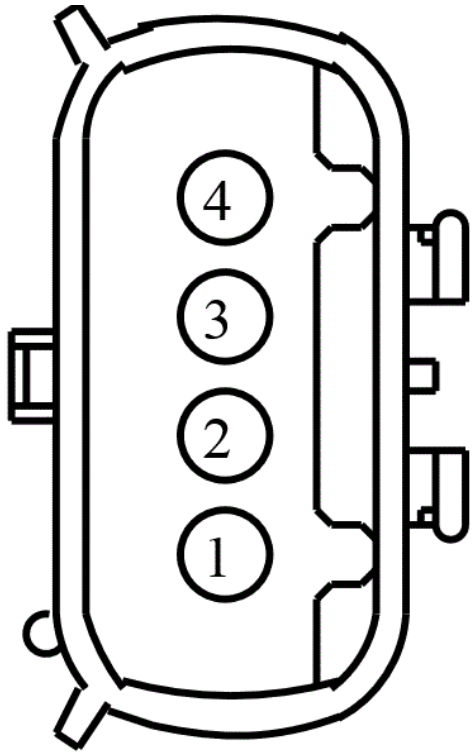
Not Available

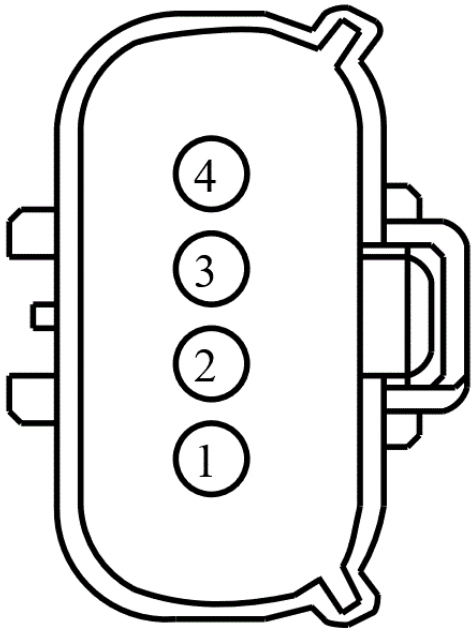
MALE

Harness 14C687/14D232

FEMALE

Harness 14D231





Pin	Circuit	Gauge	Qualifier
1	CR105 (GN-BU)	18	14D231
1	CR105 (GN-BU)	20	14C687/14D232

1	LR142 (YE-BU)	20	14C687/14D232
2	CR105 (GN-BU)	20	14C687/14D232
2	LR142 (YE-BU)	20	14C687/14D232
2	RR105 (GY-YE)	18	14D231
2	RR105 (GY-YE)	20	14C687/14D232
3	CR106 (VT-GY)	18	14D231
3	CR106 (VT-GY)	20	14C687/14D232
4	RR106 (YE-OG)	18	14D231
4	RR106 (YE-OG)	20	14C687/14D232

CONNECTOR VIEWS > CONNECTOR END VIEW C3210 - LH B-PILLAR SIDE IMPACT SENSOR

Connector:C3210

Description

LH B-PILLAR SIDE IMPACT SENSOR

Color

Harness

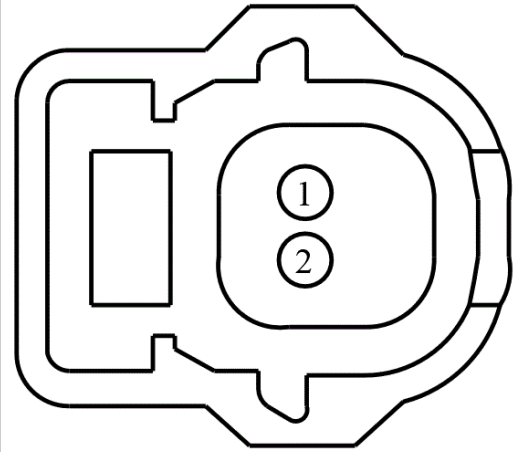
14A005

Base Part #

part# N/A

Service Pigtail

See Below



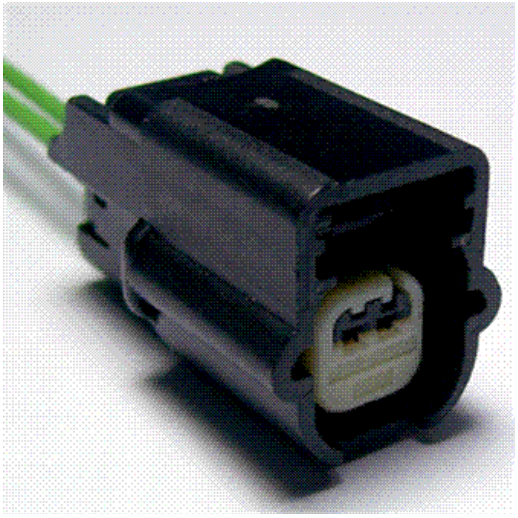
Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	VR219 (GN-WH)	22	SENSOR - SIDE IMPACT ROW 2 DRIVER SIDE	
2	RR133 (GY-BN)	22	CTRL MOD. - SENSOR SIDE IMPACT ROW 2 DRIVER SIDE -	

Available Pigtail Kits

Pigtail Kit Part Number

WPT-1314



Service Part Number:

8U2Z-14S411-AAC

Gauge:

20

Pin material:

Silver

Cavities:

2

Vehicle Uses

Sensor - Crash (Engine Compartment)

Sensor - Seat Track Position

	Sensor - Side Impact Solenoid - Down Shift Solenoid - Torque Control Coupling Valve - Heated PCV Valve - Heater Core Shut Off Valve - Transmission Fluid Warmer

CONNECTOR VIEWS > CONNECTOR END VIEW C3212 - RH B-PILLAR SIDE IMPACT SENSOR

Connector:C3212

Description

RH B-PILLAR SIDE IMPACT SENSOR

Color

Harness

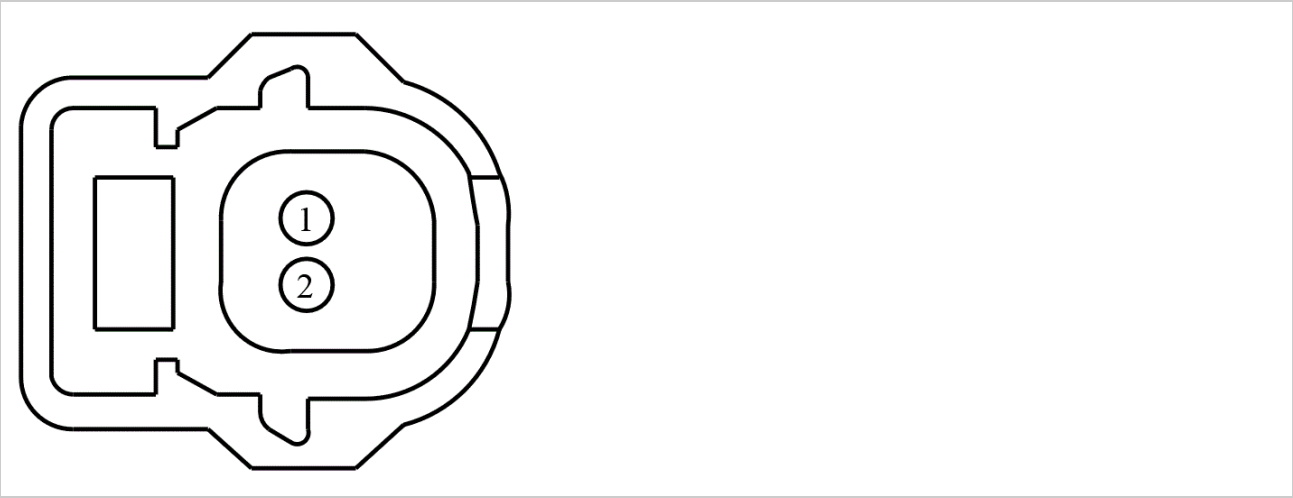
14A005

Base Part #

part# N/A

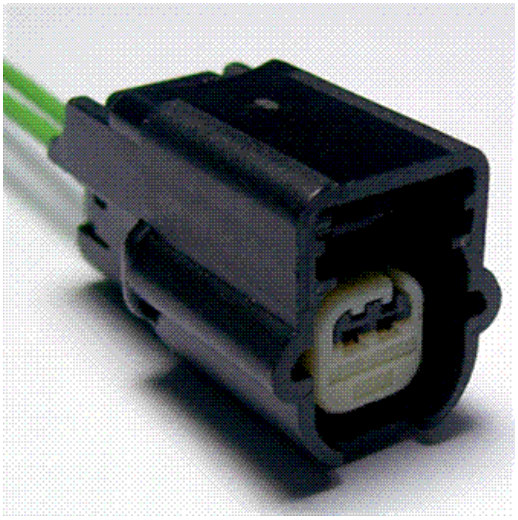
Service Pigtail

See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	VR220 (VT-OG)	22	SENSOR - SIDE IMPACT ROW 2 PASSENGER SIDE	
2	RR134 (BN-BU)	22	CTRL MOD. - SENSOR SIDE IMPACT ROW 2 PASSENGER SIDE -	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1314** 	Service Part Number: **8U2Z-14S411-AAC** Gauge: **20** Pin material: **Silver** Cavities: **2** Vehicle Uses Sensor - Crash (Engine Compartment) Sensor - Seat Track Position Sensor - Side Impact Solenoid - Down Shift Solenoid - Torque Control Coupling Valve - Heated PCV Valve - Heater Core Shut Off Valve - Transmission Fluid Warmer

CONNECTOR VIEWS > CONNECTOR END VIEW C3215 - FRONT SEAT POWER LUMBAR ASSEMBLY LH

Connector:C3215

Description

FRONT SEAT POWER LUMBAR ASSEMBLY LH

Color

Harness

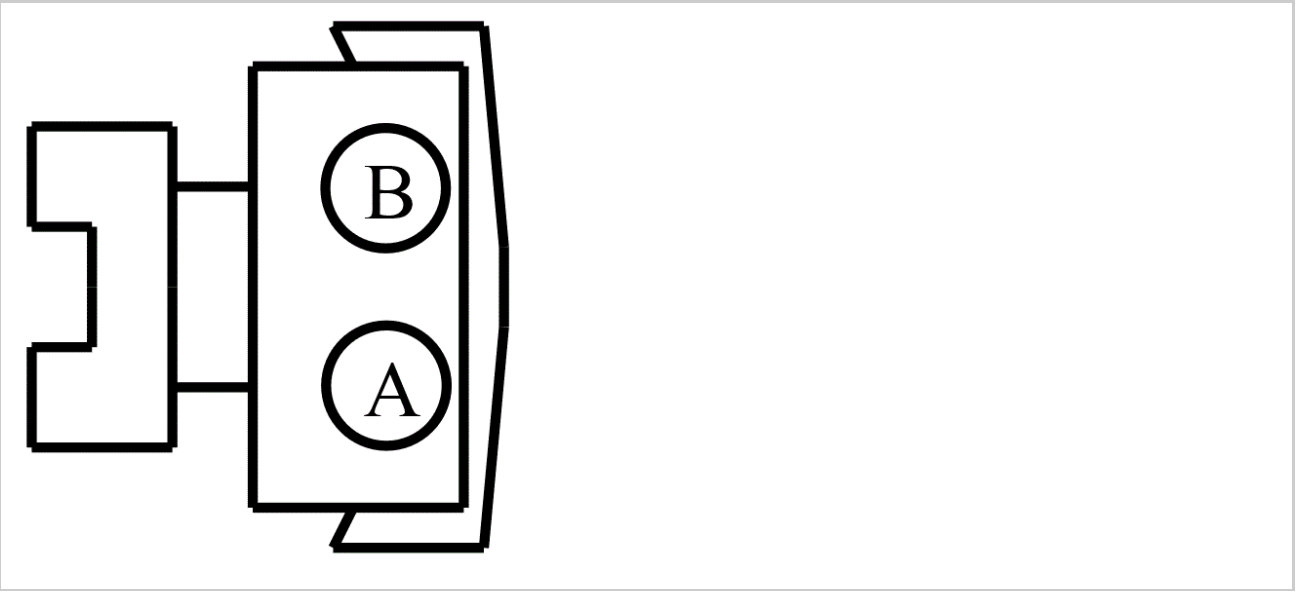
14D232

Base Part #

part# N/A

Service Pigtail

See Below



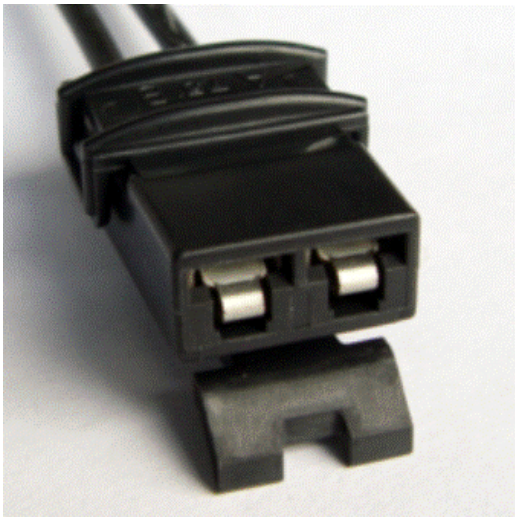
Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
A	CPS19 (GY-VT)	18	SWITCH - DRIVER LUMBAR SOLENOID (UPPER CELL) DEFLATE	
B	CPS18 (BN-GN)	18	SWITCH - DRIVER LUMBAR PUMP	

Available Pigtail Kits	

Pigtail Kit Part Number

WPT-687



Service Part Number:

3U2Z-14S411-ZAA

Gauge:

14

Pin material:

Tin

Cavities:

2

Vehicle Uses

Motor - Air Suspension Compressor

Switch - Dimmer (Instrument Panel)

CONNECTOR VIEWS > CONNECTOR END VIEW C3238 - PASSENGER SAFETY BELT BUCKLE

Connector:C3238

Description

PASSENGER SAFETY BELT BUCKLE

Color

BK

Harness

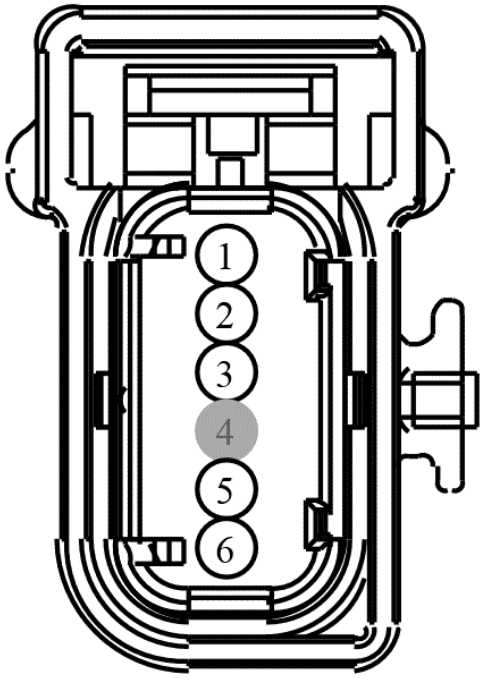
14D230

Base Part #

part# N/A

Service Pigtail

See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	VR210 (BU-BN)	20	SENSOR - SEAT BELT TENSION FRONT PASSENGER OUTBOARD	
2	LR142 (YE-BU)	20	CTRL MOD. - SENSOR SEAT BELT TENSION FRONT PASSENGER OUTBOARD +	
3	GD901 (BK)	20	GROUND - PASSENGER SEAT # RESTRAINTS CLEAN	
4	*	*	Not Used	
5	CR201 (GN-BU)	18	SENSOR - SEAT BELT BUCKLE (SEAT BELT REMINDER) FRONT PASSENGER SIDE	
6	GD901 (BK)	20	GROUND - PASSENGER SEAT # RESTRAINTS CLEAN	

Available Pigtail Kits	

Pigtail Kit Part Number **WPT-1329** 	Service Part Number: **DU2Z-14S411-EA** Gauge: **20** Pin material: **Tin** Cavities: **6** Vehicle Uses Antenna - Keyless Entry Handle - Decklid Switch - Keyless Entry Switch - Seatbelt

CONNECTOR VIEWS > CONNECTOR END VIEW C3240 - SEAT POSITION SENSOR RH

Connector:C3240

Description

SEAT POSITION SENSOR RH

Color

Harness

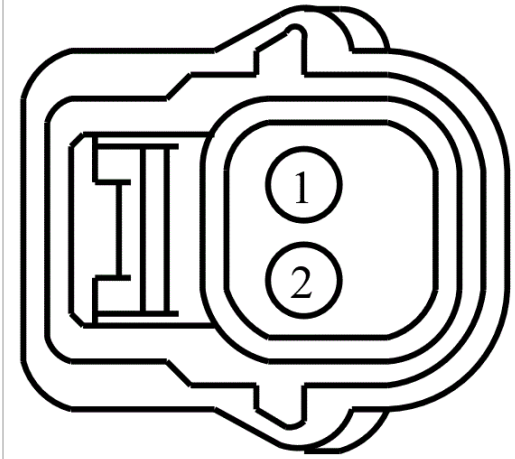
14D230

Base Part #

part# N/A

Service Pigtail

See Below



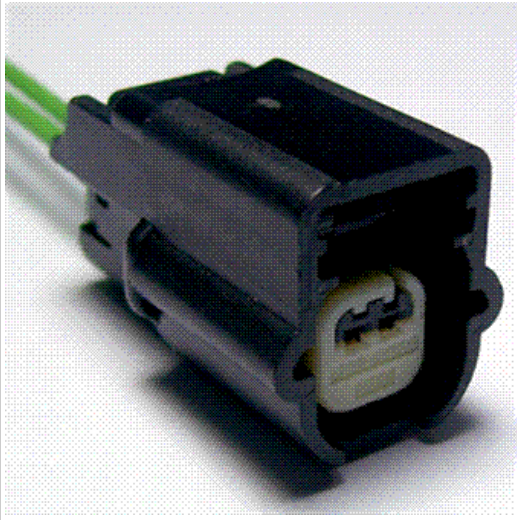
Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	GD901 (BK)	20	GROUND - PASSENGER SEAT # RESTRAINTS CLEAN	
2	VR215 (YE-VT)	20	SENSOR - SEAT TRACK POSITION PASSENGER	

Available Pigtail Kits

Pigtail Kit Part Number

WPT-1314



Service Part Number:

8U2Z-14S411-AAC

Gauge:

20

Pin material:

Silver

Cavities:

2

Vehicle Uses

Sensor - Crash (Engine Compartment)

Sensor - Seat Track Position

Sensor - Side Impact

	Solenoid - Down Shift Solenoid - Torque Control Coupling Valve - Heated PCV Valve - Heater Core Shut Off Valve - Transmission Fluid Warmer

CONNECTOR VIEWS > CONNECTOR END VIEW C3245 - SELECTOR LEVER ASSEMBLY

Connector:C3245

Description

SELECTOR LEVER ASSEMBLY

Color

LT GY

Harness

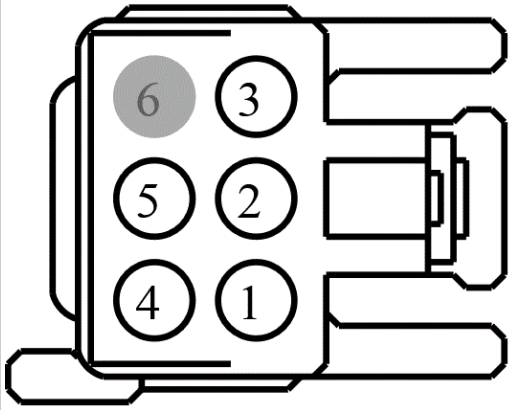
14401

Base Part #

part# N/A

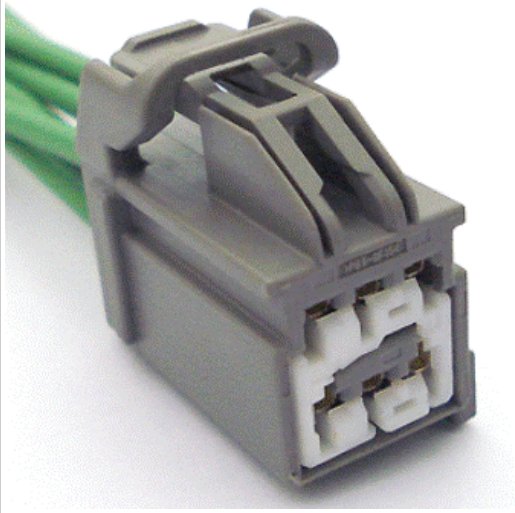
Service Pigtail

See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-962** 	Service Part Number: **3U2Z- 14S411-JBB** Gauge: **14** Pin material: **Silver** Cavities: **6** Vehicle Uses Mating Connector WPT-1299 Switch - Gear Shift Select/Neutral Safety Switch - Overdrive Cancel Switch - Power Sliding Door

CONNECTOR VIEWS > CONNECTOR END VIEW C3265A - FRONT SEAT CLIMATE CONTROL MODULE [SCME]

Connector:C3265A

Description

FRONT SEAT CLIMATE CONTROL MODULE [SCME]

Color

BK

Harness

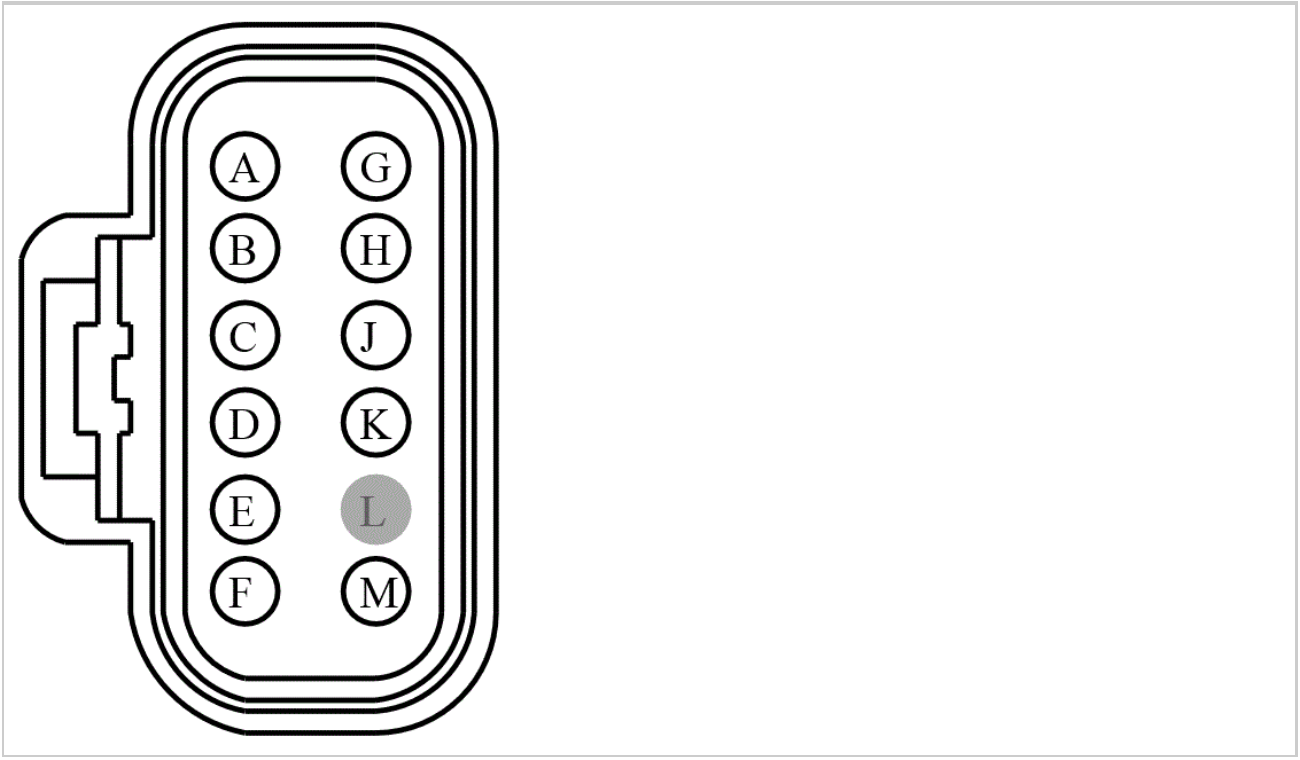
14D230

Base Part #

part# N/A

Service Pigtail

See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
A	CHS07 (GY-BU)	4	CTRL MOD. - HOT/COLD SEAT # PASSENGER CUSHION HEATER +	
B	RHS07 (BU)	4	CTRL MOD. - HOT/COLD SEAT # PASSENGER CUSHION HEATER -	
C	CHS06 (BU-BN)	4	CTRL MOD. - HOT/COLD SEAT # PASSENGER BACK HEATER +	
D	RHS06 (WH)	4	CTRL MOD. - HOT/COLD SEAT # PASSENGER BACK HEATER -	
E	CBX01 (GN-RD)	4	POWER - SEAT # RUN/START	
F	CBX01 (GN-RD)	4	POWER - SEAT # RUN/START	

G	CHS02 (YE-BU)	4	CTRL MOD. - HOT/COLD SEAT # DRIVER CUSHION HEATER +
H	RHS02 (BU-OG)	4	CTRL MOD. - HOT/COLD SEAT # DRIVER CUSHION HEATER -
J	CHS01 (GY-VT)	4	CTRL MOD. - HOT/COLD SEAT # DRIVER BACK HEATER +
K	RHS01 (WH-VT)	4	CTRL MOD. - HOT/COLD SEAT # DRIVER BACK HEATER -
L	*	*	Not Used
M	GD904 (BK-BU)	4	GROUND - DRIVER SEAT # SEAT SWITCH

Available Pigtail Kits

Pigtail Kit Part Number

WPT-928



Service Part Number:

3U2Z-14S411-ZMB

Gauge:

12

Pin material:

Tin

Cavities:

12

Vehicle Uses

Module - Climate Control Seat

Switch - Seat (driver)

Switch - Seat (passenger)

CONNECTOR VIEWS > CONNECTOR END VIEW C3265B - FRONT SEAT CLIMATE CONTROL MODULE [SCME]

Connector:C3265B

Description

FRONT SEAT CLIMATE CONTROL MODULE [SCME]

Color

BK

Harness

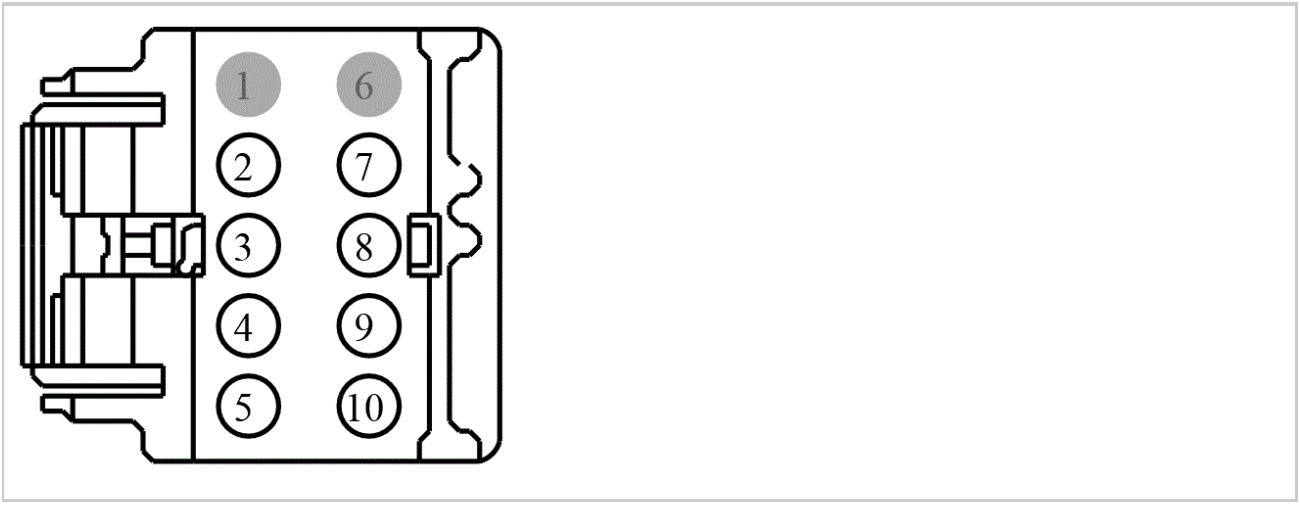
14D230

Base Part #

part# N/A

Service Pigtail

See Below



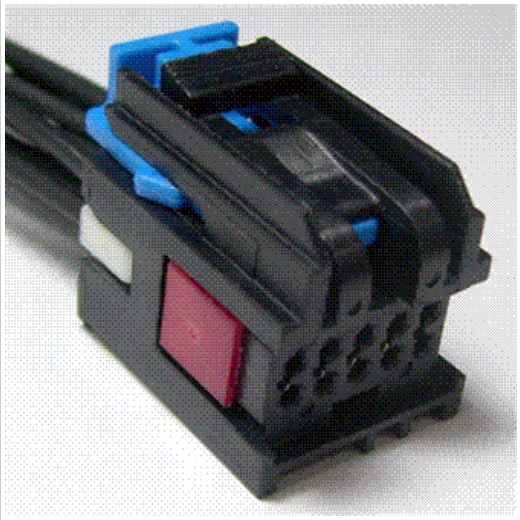
Pin	Circuit	Gauge	Circuit Function	Qualifier
1	*	*	Not Used	
2	VHS27 (WH-OG)	20	SENSOR - CUSHION TEMP. PASSENGER	
3	RHS10 (BU-OG)	20	CTRL MOD. - HOT/COLD SEAT # PASSENGER SENSOR CUSHION TEMP.	

4	VHS36 (YE-BU)	20	SENSOR - BACK TEMP. PASSENGER
5	RHS20 (GN-BU)	20	CTRL MOD. - HOT/COLD SEAT # PASSENGER SENSOR BACK TEMP.
6	*	*	Not Used
7	VHS26 (VT)	20	SENSOR - CUSHION TEMP. DRIVER
8	RHS05 (YE-VT)	20	CTRL MOD. - HOT/COLD SEAT # DRIVER SENSOR CUSHION TEMP.
9	CHS14 (GN)	20	CTRL MOD. - HOT/COLD SEAT # PASSENGER INDICATOR HIGH
10	CHS29 (WH-BU)	20	SWITCH - SEAT HEATER FRONT DRIVER SIDE

Available Pigtail Kits

Pigtail Kit Part Number

WPT-1174



Service Part Number:

AU2Z-14S411-BLA

Gauge:

20

Pin material:

Tin

Cavities:

10

Vehicle Uses

Module - Climate Control Seat

CONNECTOR VIEWS > CONNECTOR END VIEW C3265C - FRONT SEAT CLIMATE CONTROL MODULE [SCME]

Connector:C3265C

Description

FRONT SEAT CLIMATE CONTROL MODULE [SCME]

Color

BK

Harness

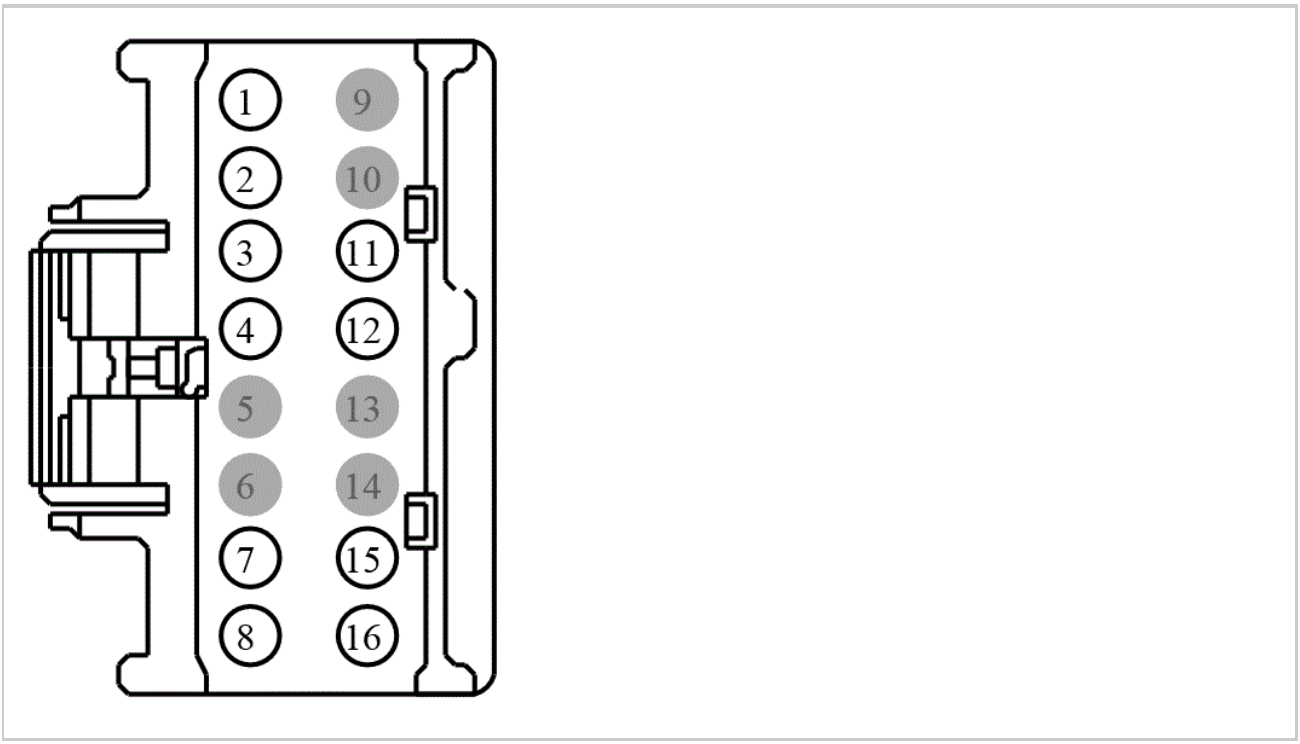
14D230

Base Part #

part# N/A

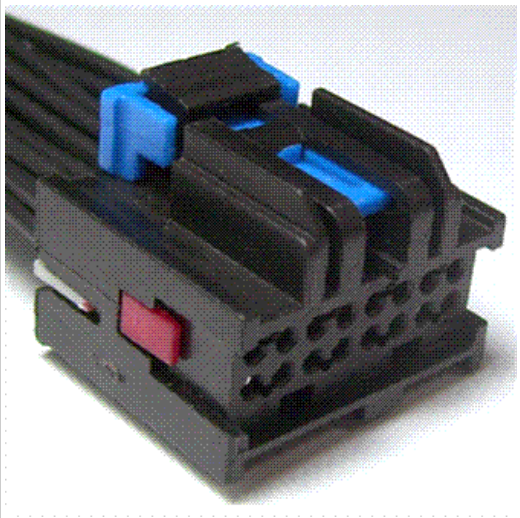
Service Pigtail

See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	VDB06 (GY-OG)	20	CONNECTOR - DIAGNOSTIC # CAN BUS MEDIUM SPEED HIGH	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1165** 	Service Part Number: **AU2Z-14S411-BGA** Gauge: **20** Pin material: **Tin** Cavities: **16** Vehicle Uses Module - Climate Control Seat

CONNECTOR VIEWS > CONNECTOR END VIEW C3276 - POWER FOLDING MIRROR RELAY

Connector:C3276

Description

POWER FOLDING MIRROR RELAY

Color

Harness

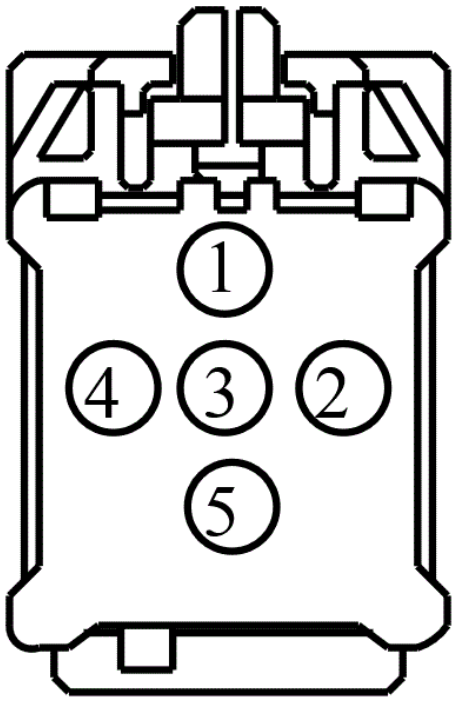
14A005

Base Part #

part# N/A

Service Pigtail

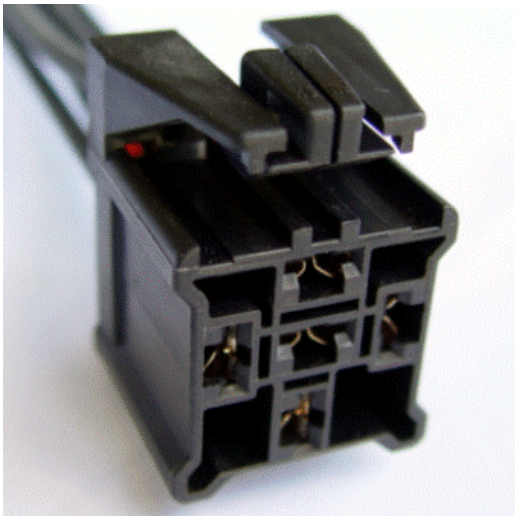
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	GD238 (BK-WH)	16	GROUND - COWL SIDE/PILLAR A RIGHT	
2	CPM02 (BU)	20	CTRL MOD. - FOLD MIRRORS FOLD POSITION	
3	SBP02 (YE-RD)	20	FUSE - 2 OR CIRCUIT BREAKER	
4	CPM22 (GY-BN)	20	SWITCH - POWER MIRROR # FOLD/DRIVE TOGGLE	
5	CPM01 (YE-GN)	20	CTRL MOD. - FOLD MIRRORS DRIVE POSITION	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-662**	Service Part Number: **3U2Z-14S411-ZVA** Gauge:



10 20

Pin material:

Tin

Cavities:

5

Vehicle Uses

Relay - Flasher

CONNECTOR VIEWS > CONNECTOR END VIEW C3312 - AUDIO INPUT SOCKET

Connector:C3312

Description

AUDIO INPUT SOCKET

Color

BK

Harness

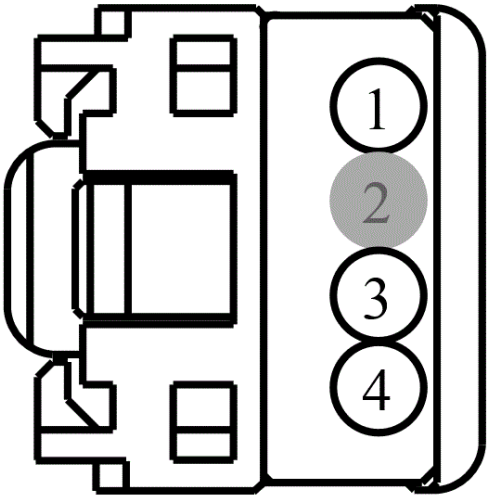
14401

Base Part #

part# N/A

Service Pigtail

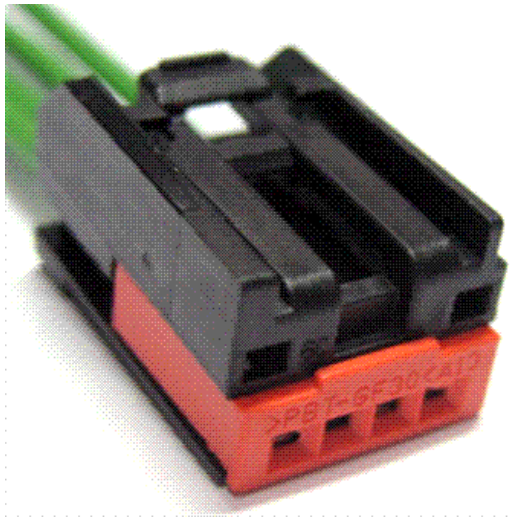
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	VME46 (GN)	26	JACK - AUDIO # EXT. AUX IN RIGHT (+)	
2	*	*	Not Used	
3	RME45 (YE)	26	JACK - AUDIO # EXT. AUX IN LEFT OR COMMON (-)	
4	VME45 (BU)	26	JACK - AUDIO # EXT. AUX IN LEFT (+)	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1139**	Service Part Number: **3U2Z-14S411-PRC** Gauge: **18** Pin material: **Silver** Cavities: **4**



Vehicle Uses

Connector - Audio Input

Lamp - CHMSL (Center High Mount Stop Lamp)

Module - Anti-theft

Module - Power Moonroof

Sensor - Steering Wheel Position

Switch - 4x4 Control

Switch - Clutch Pedal Position

Switch - Deck Lid / Lift Gate Ajar

Switch - Door Lock (LH)

Switch - Door Lock (RH)

Switch - Lift Gate Glass Ajar

Switch - Message Center

Switch - Moon Roof/Sun Roof

Transceiver - Passive Anti-Theft (PATS)

CONNECTOR VIEWS > CONNECTOR END VIEW C3349 - FLOOR CONSOLE CUP HOLDER AMBIENT LIGHTING LAMP

Connector:C3349

Description

FLOOR CONSOLE CUP HOLDER AMBIENT LIGHTING LAMP

Color

LT GY

Harness

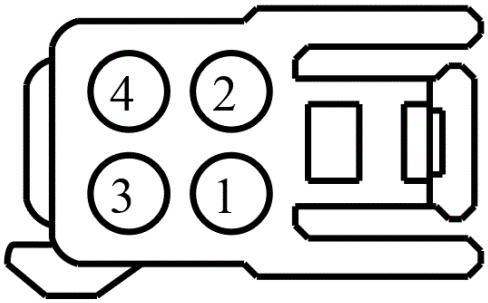
14401

Base Part #

part# N/A

Service Pigtail

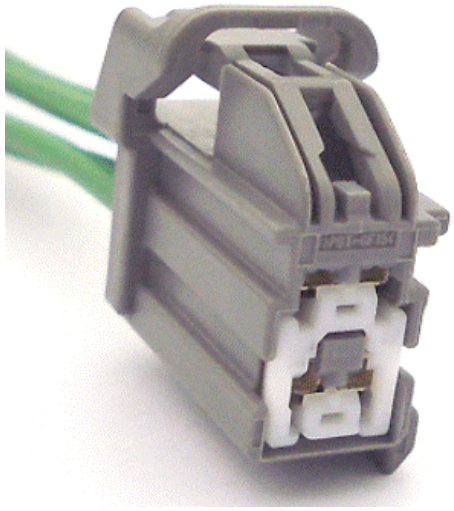
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CLN44 (OG)	26	CTRL MOD. - AMBIENT LIGHTING ZONE 1 OR NON-ZONE # LED RED +	
2	CLN45 (GN)	26	CTRL MOD. - AMBIENT LIGHTING ZONE 1 OR NON-ZONE # LED GREEN +	
3	CLN46 (BU)	26	CTRL MOD. - AMBIENT LIGHTING ZONE 1 OR NON-ZONE # LED BLUE +	
4	RLN44 (BN)	26	CTRL MOD. - AMBIENT LIGHTING ZONE 1 OR NON-ZONE # LED -	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-977**	Service Part Number: **3U2Z-14S411-LUB** Gauge: **14** Pin material: **Silver** Cavities: **4** Vehicle Uses



Element - Heated Seat

Lamp - Ambient Lighting

Lamp - Courtesy - Footwell

Mirror - Sideview

Motor - Adjustable Pedal

Motor - Steering Column Adjust

Solenoid - Brake Shift Park Interlock

Speaker - Subwoofer

Switch - Gear Shift Select/Neutral Safety

Transceiver - Passive Anti-Theft (PATS)

CONNECTOR VIEWS > CONNECTOR END VIEW C3369 - SCUFF PLATE LAMP DRIVER

Connector:C3369

Description

SCUFF PLATE LAMP DRIVER

Color

BK

Harness

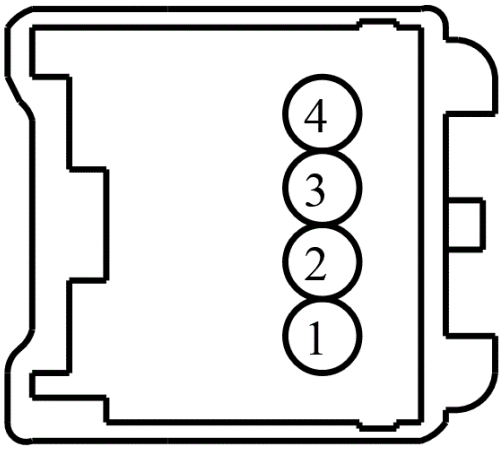
14A005

Base Part #

part# N/A

Service Pigtail

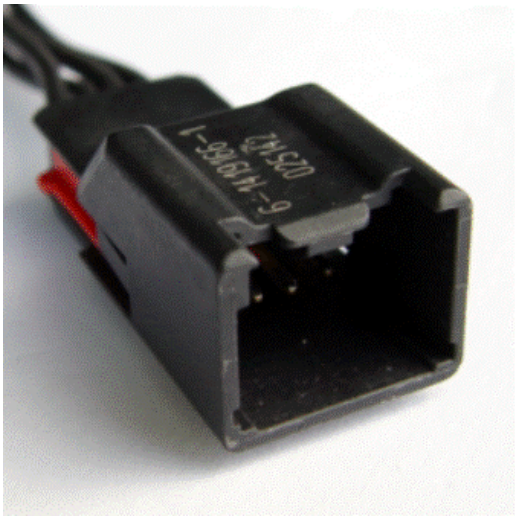
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CLN53 (BU)	26	CTRL MOD. - AMBIENT LIGHTING ZONE 3 # LED BLUE +	
2	CLN52 (GN)	26	CTRL MOD. - AMBIENT LIGHTING ZONE 3 # LED GREEN +	
3	CLN51 (OG)	26	CTRL MOD. - AMBIENT LIGHTING ZONE 3 # LED RED +	
4	RLN44 (BN)	26	CTRL MOD. - AMBIENT LIGHTING ZONE 1 OR NON-ZONE # LED -	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-394**	Service Part Number: **3U2Z-14S411-KNA** Gauge: **18** Pin material: **Tin** Cavities: **4**



Vehicle Uses

Element - Heated Seat

Lamp - License

CONNECTOR VIEWS > CONNECTOR END VIEW C3370 - SCUFF PLATE LAMP PASSENGER

Connector:C3370

Description

SCUFF PLATE LAMP PASSENGER

Color

BK

Harness

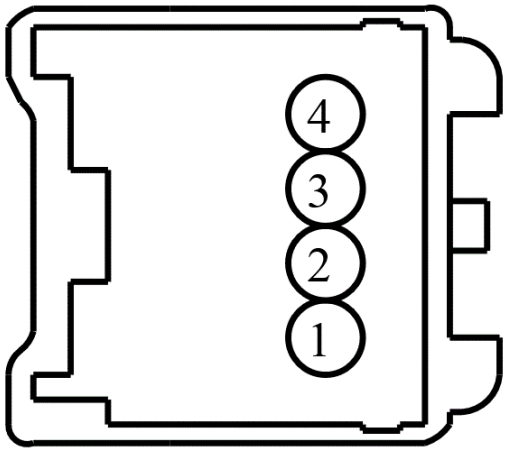
14A005

Base Part #

part# N/A

Service Pigtail

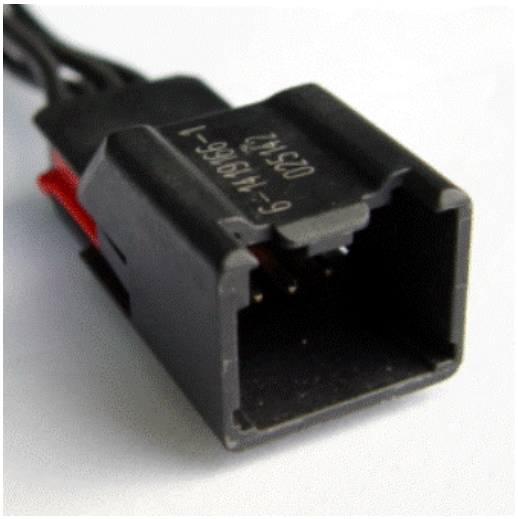
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CLN53 (WH-BU)	22	CTRL MOD. - AMBIENT LIGHTING ZONE 3 # LED BLUE +	
2	CLN52 (WH-GN)	22	CTRL MOD. - AMBIENT LIGHTING ZONE 3 # LED GREEN +	
3	CLN51 (WH-OG)	22	CTRL MOD. - AMBIENT LIGHTING ZONE 3 # LED RED +	
4	RLN44 (BN)	26	CTRL MOD. - AMBIENT LIGHTING ZONE 1 OR NON-ZONE # LED -	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-394**	Service Part Number: **3U2Z-14S411-KNA** Gauge: **18** Pin material: **Tin**



Cavities:

4

Vehicle Uses

Element - Heated Seat

Lamp - License

CONNECTOR VIEWS > CONNECTOR END VIEW C3459 - PASSENGER SIDE AIRBAG

Connector:C3459

Description

PASSENGER SIDE AIRBAG

Color

Harness

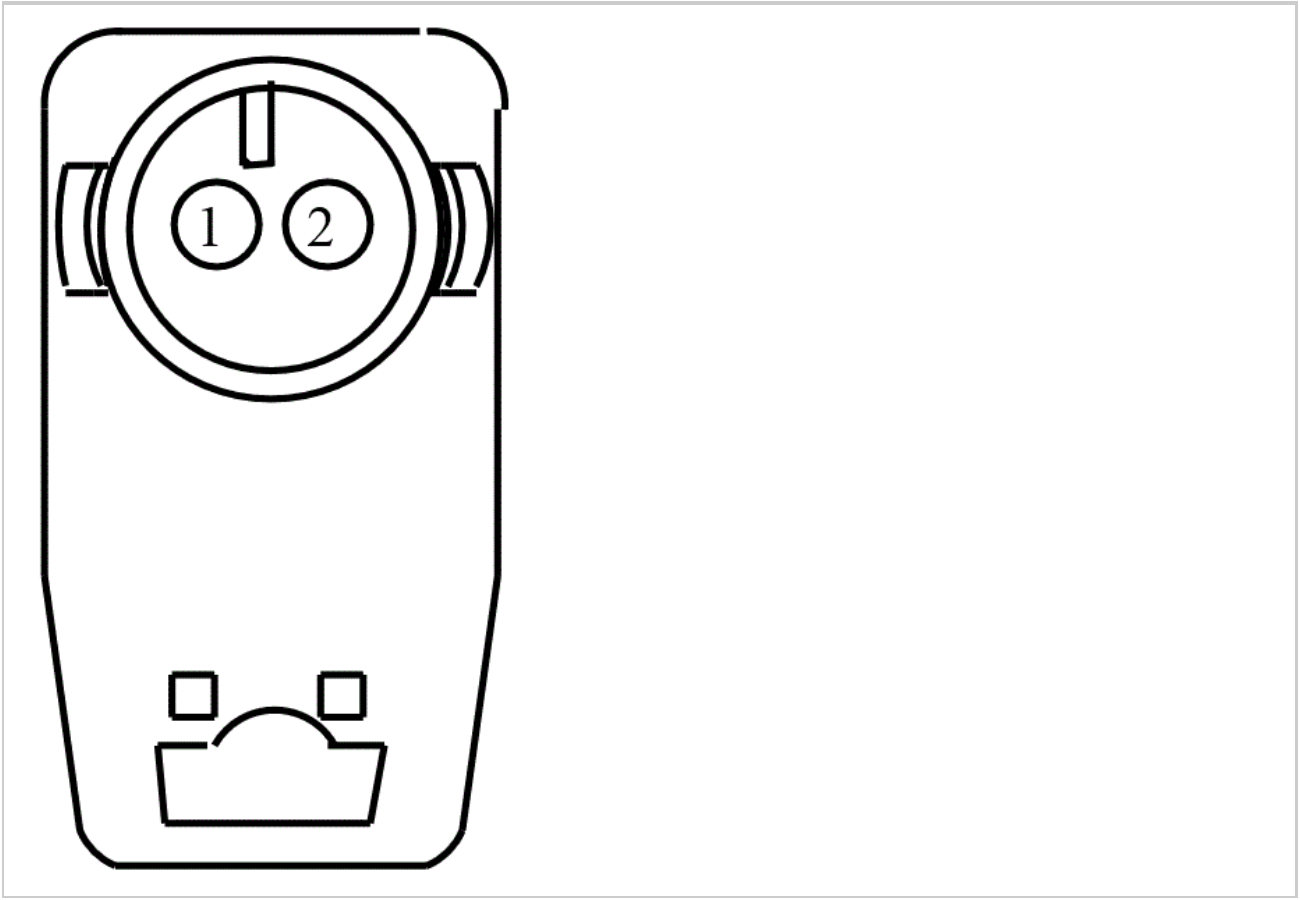
14C687/14D233

Base Part #

part# N/A

Service Pigtail

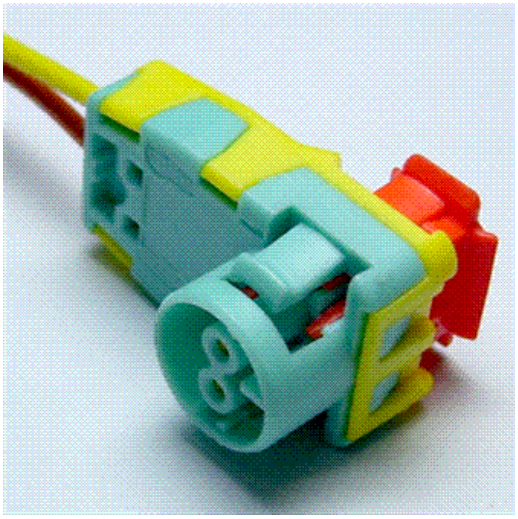
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CR106 (VT-GY)	20	CTRL MOD. - AIR BAG SIDE SEAT MOUNTED FRONT PASSENGER OUTBOARD +	
2	RR106 (YE-OG)	20	CTRL MOD. - AIR BAG SIDE SEAT MOUNTED FRONT PASSENGER OUTBOARD -	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1226**	Service Part Number: **BU2Z-14S411-BJA** Gauge: **20** Pin material:



FCI - Airbag

Cavities:

2

Vehicle Uses

Squib - Airbag (Passenger)

CONNECTOR VIEWS > CONNECTOR END VIEW C3463 - CENTER CONSOLE LOCK ASSEMBLY

Connector:C3463

Description

CENTER CONSOLE LOCK ASSEMBLY

Color

GN

Harness

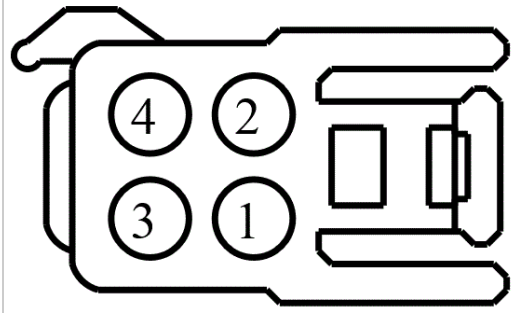
14A005

Base Part #

part# N/A

Service Pigtail

See Below



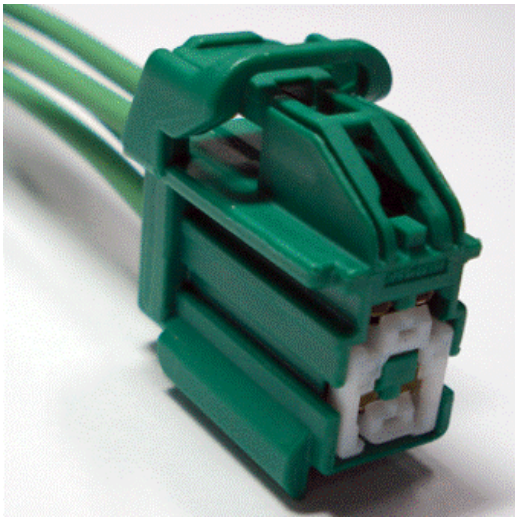
Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	ZA104 (OG-GN)	14	CTRL MOD. - DOUBLE/AUX LOCK RELAY # LOCK	
2	CLN09 (YE-GN)	22	RELAY - BATTERY SAVER (E.G. SWITCH OFF INTERIOR LIGHTING)	
3	RLN44 (BN)	26	CTRL MOD. - AMBIENT LIGHTING ZONE 1 OR NON-ZONE # LED -	
4	CPL51 (BU-GN)	14	CTRL MOD. - DOOR LOCK # DRIVER UNLOCK	

Available Pigtail Kits

Pigtail Kit Part Number

WPT-1016



Service Part Number:

3U2Z-14S411-FFB

Gauge:

14

Pin material:

Silver

Cavities:

4

Vehicle Uses

Motor - Steering Column Adjust

Speaker - Subwoofer

Transceiver - Passive Anti-Theft (PATS)

CONNECTOR VIEWS > CONNECTOR END VIEW C3464 - DRIVER UPPER SIDE AIRBAG

Connector:C3464

Description

DRIVER UPPER SIDE AIRBAG

Color

Harness

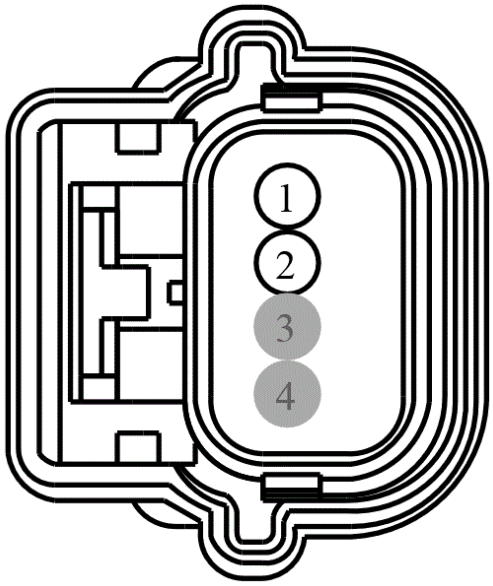
14C687/14D232

Base Part #

part# N/A

Service Pigtail

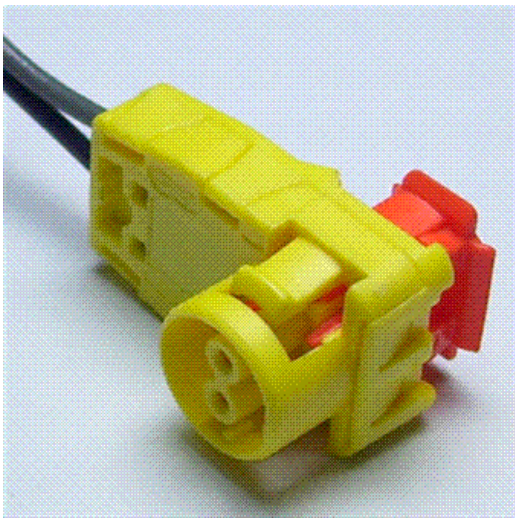
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CR105 (GN-BU)	20	CTRL MOD. - AIR BAG SIDE SEAT MOUNTED FRONT DRIVER SIDE +	
2	RR105 (GY-YE)	20	CTRL MOD. - AIR BAG SIDE SEAT MOUNTED FRONT DRIVER SIDE -	

Available Pigtail Kits	

Pigtail Kit Part Number **WPT-1227** 	Service Part Number: **BU2Z-14S411-BKA** Gauge: **20** Pin material: **FCI - Airbag** Cavities: **2** Vehicle Uses Sensor - Side Impact Squib - Airbag (Driver) Squib - Airbag (Passenger)

CONNECTOR VIEWS > CONNECTOR END VIEW C3465 - PASSENGER UPPER SIDE AIRBAG

Connector:C3465

Description

PASSENGER UPPER SIDE AIRBAG

Color

Harness

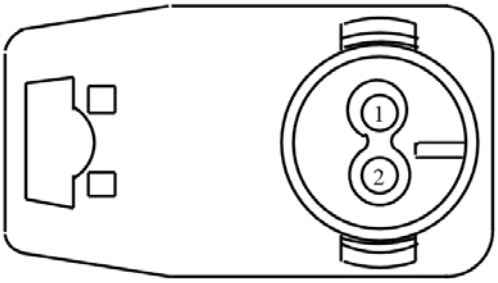
14D233

Base Part #

part# N/A

Service Pigtail

See Below



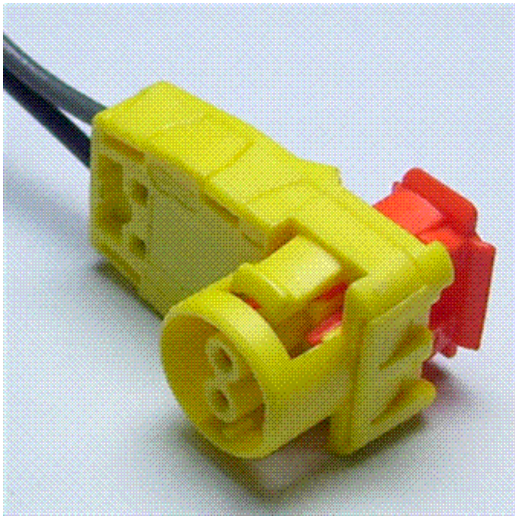
Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CR105 (GN-BU)	20	CTRL MOD. - AIR BAG SIDE SEAT MOUNTED FRONT PASSENGER SIDE +	
2	RR105 (GY-YE)	20	CTRL MOD. - AIR BAG SIDE SEAT MOUNTED FRONT PASSENGER SIDE -	

Available Pigtail Kits

Pigtail Kit Part Number

WPT-1227



Service Part Number:

BU2Z-14S411-BKA

Gauge:

20

Pin material:

FCI - Airbag

Cavities:

2

Vehicle Uses

Sensor - Side Impact

Squib - Airbag (Driver)

Squib - Airbag (Passenger)

CONNECTOR VIEWS > CONNECTOR END VIEW C3513 - PASSIVE ANTI-THEFT SYSTEM (PATS) FRONT ANTENNA

Connector:C3513

Description

PASSIVE ANTI-THEFT SYSTEM (PATS) FRONT ANTENNA

Color

BK

Harness

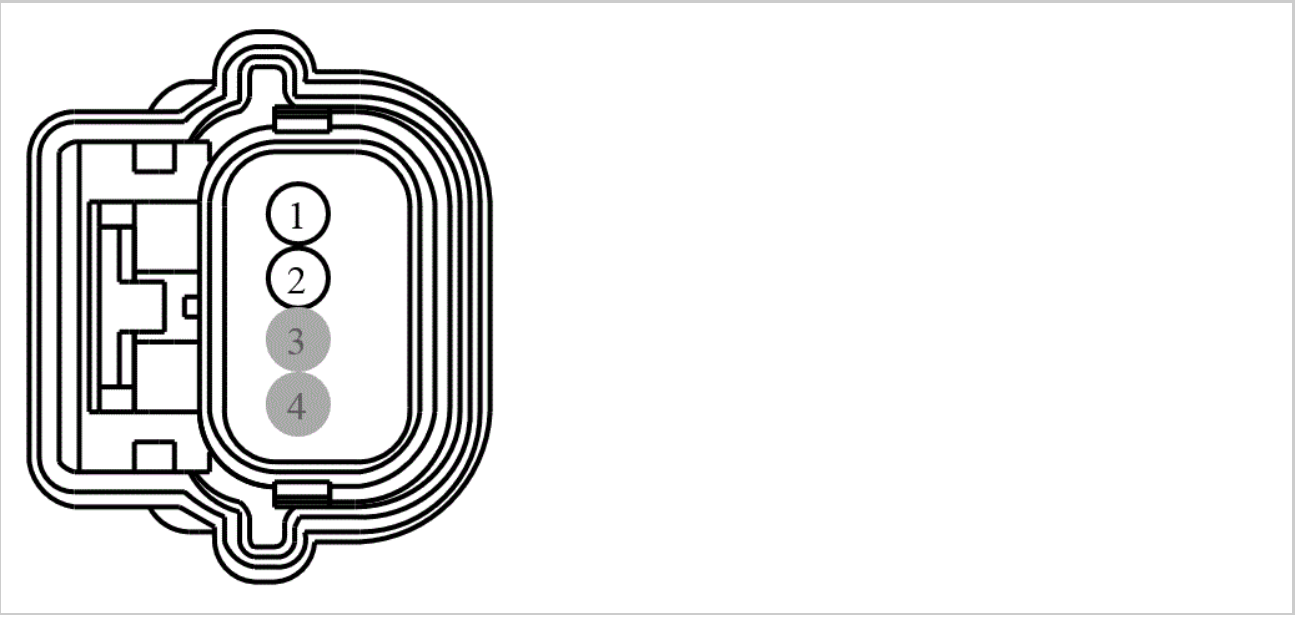
14A005

Base Part #

part# N/A

Service Pigtail

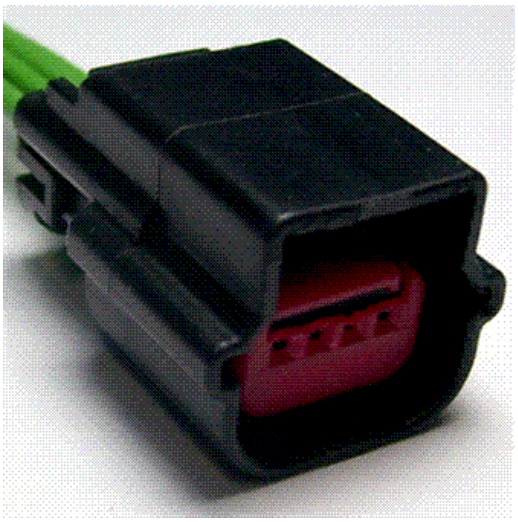
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	VPK05 (BN-GN)	20	CTRL MOD. - KEYLESS VEHICLE # ANTENNA INTERIOR 1 (FRONT) +	
2	RPK05	20	CTRL MOD. - KEYLESS VEHICLE # ANTENNA INTERIOR 1	

	(YE-OG)		(FRONT) -
3	*	*	Not Used
4	*	*	Not Used

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1307** 	Service Part Number: **CU2Z-14S411-AGA** Gauge: **18** Pin material: **Silver** Cavities: **4** Vehicle Uses Antenna - Keyless Entry Sensor - Brake Pedal Position Sensor - Clutch Master Cylinder

CONNECTOR VIEWS > CONNECTOR END VIEW C3618 - MEDIA HUB

Connector:C3618

Description

MEDIA HUB

Color

GY

Harness

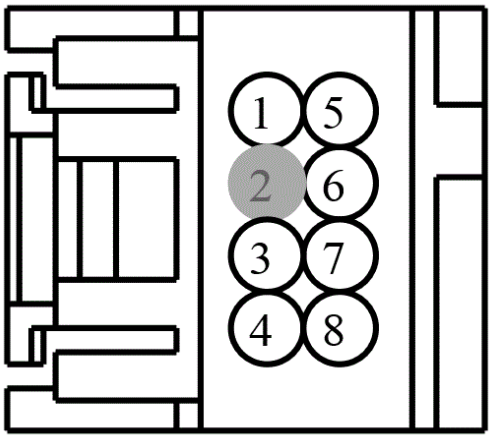
14401

Base Part #

part# N/A

Service Pigtail

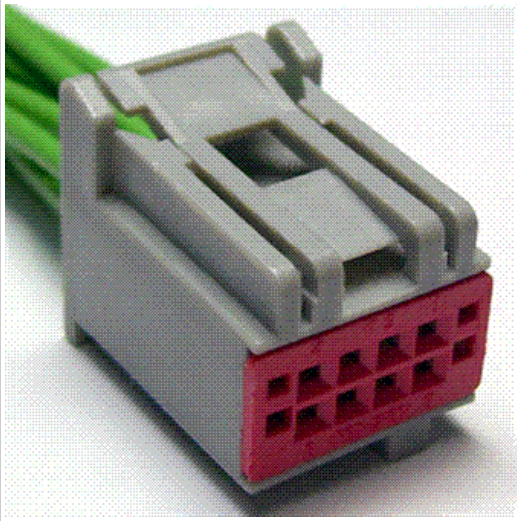
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	LME89 (YE)	26	CTRL MOD. - MEDIA CONNECTIVITY POWER	
2	*	*	Not Used	
3	VME66 (VT)	26	CTRL MOD. - MULTIMEDIA GATEWAY MODULE # AUDIO 2 LEFT +	
4	RME66 (GN)	26	CTRL MOD. - MULTIMEDIA GATEWAY MODULE # AUDIO 2 LEFT -	
5	VME67 (GY)	26	CTRL MOD. - MULTIMEDIA GATEWAY MODULE # AUDIO 2 RIGHT +	
6	RME67 (BN)	26	CTRL MOD. - MULTIMEDIA GATEWAY MODULE # AUDIO 2 RIGHT -	
7	DME66 (*)	4	CTRL MOD. - MULTIMEDIA GATEWAY MODULE # AUDIO 2 D	

8	RME89 (BU-WH)	26	CTRL MOD. - MEDIA CONNECTIVITY GROUND	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-998** 	Service Part Number: **3U2Z-14S411-DLB** Gauge: **18** Pin material: **Silver** Cavities: **8** Vehicle Uses Radio Radio - Amplifier Switch - Fuel Filler Door Switch - Message Center Switch - Power Mirror Switch - Power Window - Driver Switch - Seat Lumbar Switch - Steering Column Tilt/Telescope Switch - Upfitter

CONNECTOR VIEWS > CONNECTOR END VIEW C3808 - INLINE

InlineC3808

Description

INLINE

Color

BK

Base Part #

Service Pigtail

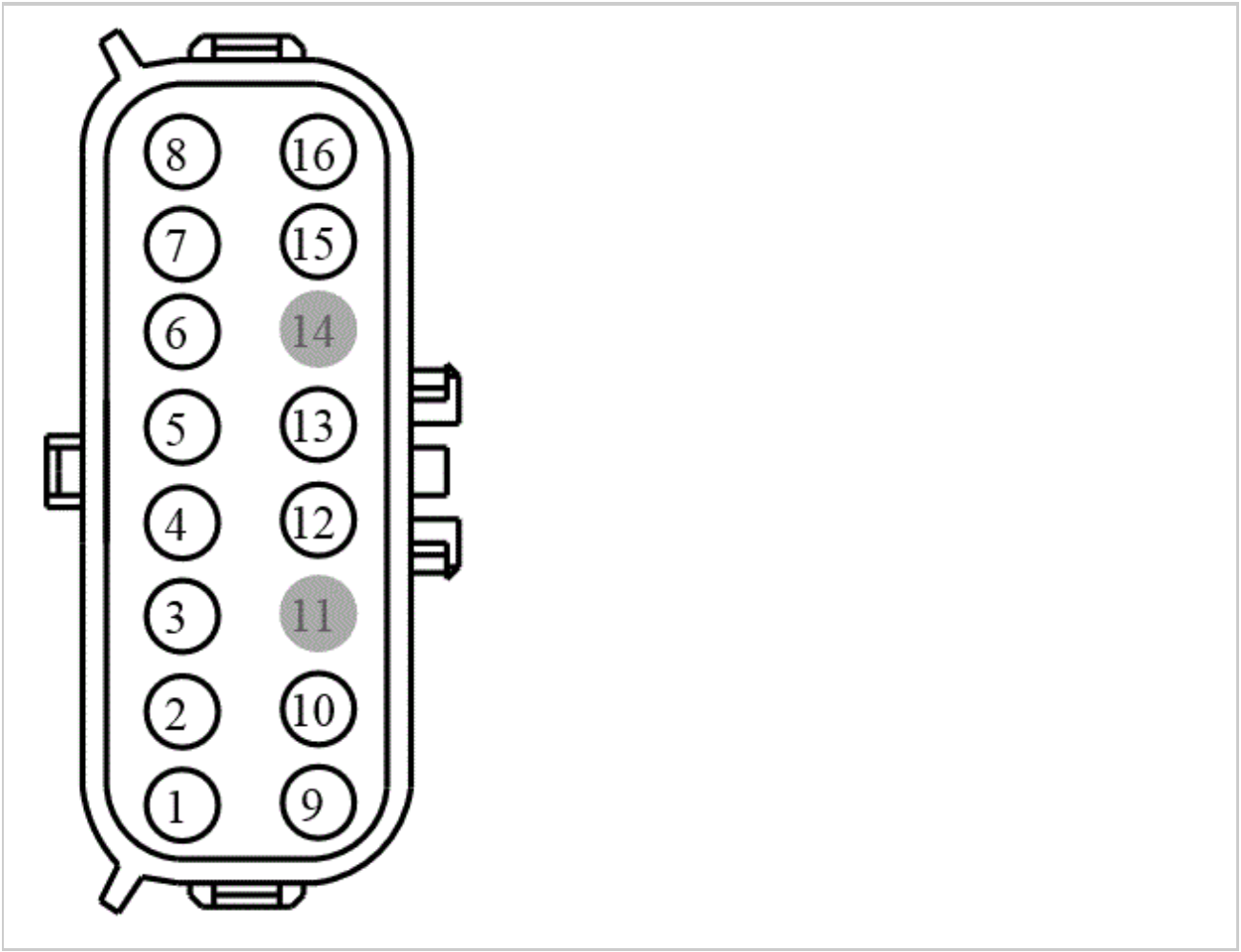
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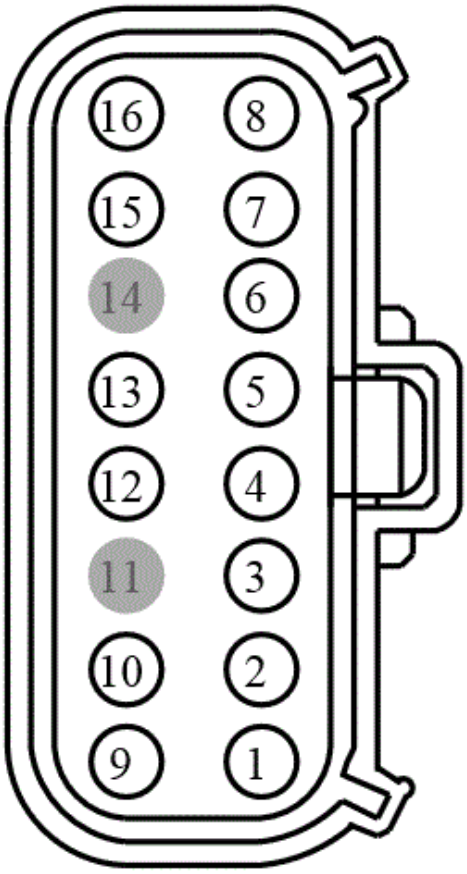
MALE

Harness 14D230

FEMALE

Harness 14A005





Pin	Circuit	Gauge	Qualifier
1	CHS02 (YE-BU)	14	14A005
1	CHS02 (YE-BU)	4	14D230
2	RHS02 (BU-OG)	14	14A005
2	RHS02 (BU-OG)	4	14D230
3	VHS26 (VT)	20	14D230
3	VHS26 (VT)	22	14A005
4	RHS05 (YE-VT)	20	14D230

4	RHS05 (YE-VT)	22	14A005
5	CHS14 (GN)	20	14D230
5	VHS35 (VT-OG)	22	14A005
6	CHS29 (WH-BU)	20	14D230
6	RHS15 (GY-BN)	22	14A005
7	CHS01 (GY-VT)	14	14A005
7	CHS01 (GY-VT)	4	14D230
8	RHS01 (WH-VT)	14	14A005
8	RHS01 (WH-VT)	4	14D230
9	VHS18 (BN-GN)	20	
10	CHS09 (GY)	20	14D230
10	VHS16 (BU-GN)	20	14A005
11	*	*	
12	VDB06 (GY-OG)	20	14D230
12	VDB06 (GY-OG)	22	14A005
13	VDB07 (VT-OG)	20	14D230

13	VDB07 (VT-OG)	22	14A005
14	*	*	
15	CHS03 (GN-BN)	18	14D230
15	CHS03 (GN-BN)	20	14A005
16	RHS03 (GY-OG)	18	14D230
16	RHS03 (GY-OG)	20	14A005

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1404** 	Service Part Number: **EU2Z-14S411-VA** Gauge: **16** Pin material: **Silver** Cavities: **16** Vehicle Uses: Mirror - Sideview

CONNECTOR VIEWS > CONNECTOR END VIEW C4009 - REAR OUTER PARKING AID SENSOR LH

Connector:C4009

Description

REAR OUTER PARKING AID SENSOR LH

Color

Harness

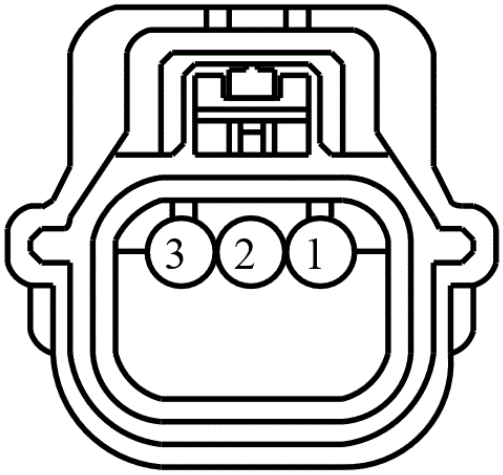
13412

Base Part #

part# N/A

Service Pigtail

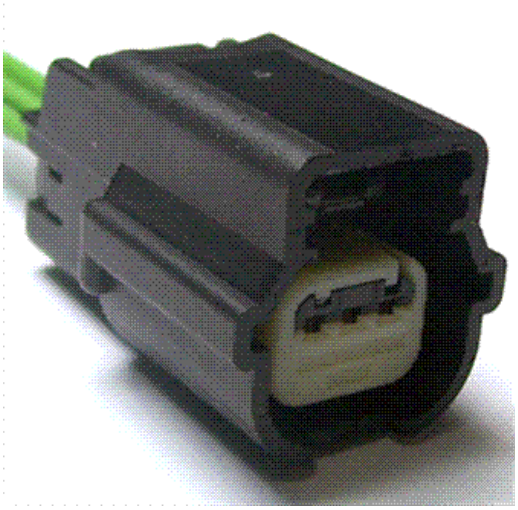
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	LMP07 (BU-WH)	22	CTRL MOD. - PARKING AID # SENSORS REAR +	
2	VMP15 (YE-GN)	22	SENSOR - PARKING AID # REAR # (LEFT OUTER)	
3	RMP07 (GN-WH)	22	CTRL MOD. - PARKING AID # SENSORS REAR -	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1400**	Service Part Number: **9U2Z-14S411-CC** Gauge:



20

Pin material:

Silver

Cavities:

3

Vehicle Uses

Monitor - Crankcase Ventilation

Sensor - Air Suspension

Sensor - Front Park Aid (FPA)

Sensor - Occupant Classification

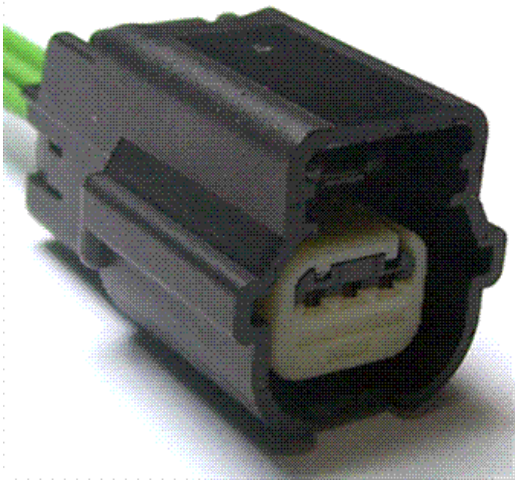
Sensor - Reverse Park Aide (RPA)

Switch - A/C Compressor Clutch Cycling

Switch - A/C High Pressure

Pigtail Kit Part Number

WPT-1315



Service Part Number:

9U2Z-14S411-CB

Gauge:

20

Pin material:

Silver

Cavities:

3

Vehicle Uses

Monitor - Crankcase Ventilation

Sensor - Air Suspension

Sensor - Front Park Aid (FPA)

Sensor - Occupant Classification

Sensor - Reverse Park Aide (RPA)

Switch - A/C Compressor Clutch Cycling

Switch - A/C High Pressure

CONNECTOR VIEWS > CONNECTOR END VIEW C4010 - REAR INNER PARKING AID SENSOR LH/CENTER

Connector:C4010

Description

REAR INNER PARKING AID SENSOR LH/CENTER

Color

Harness

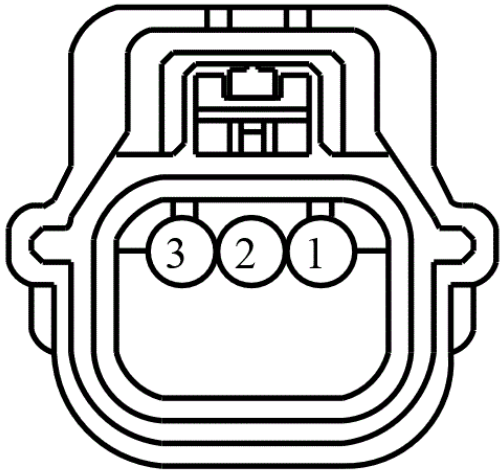
13412

Base Part #

part# N/A

Service Pigtail

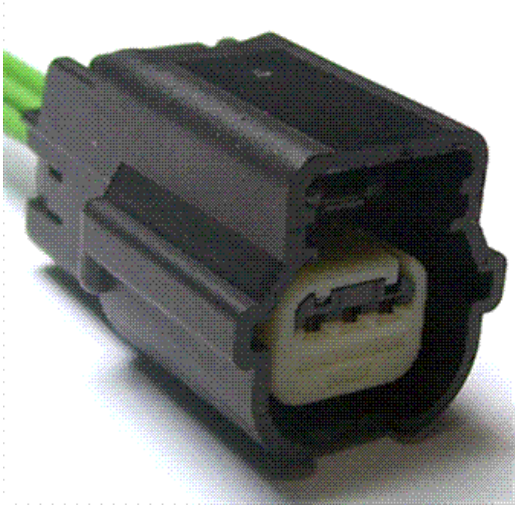
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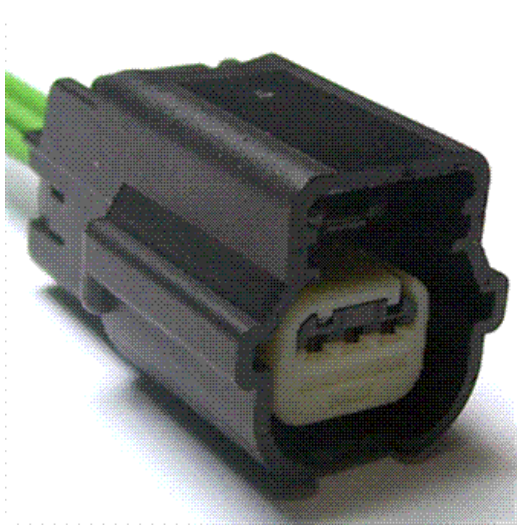


Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	LMP07 (BU-WH)	22	CTRL MOD. - PARKING AID # SENSORS REAR +	
2	VMP14 (WH-OG)	22	SENSOR - PARKING AID # REAR # (LEFT INNER OR MIDDLE)	

3	RMP07 (GN-WH)	22	CTRL MOD. - PARKING AID # SENSORS REAR -	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1400** 	Service Part Number: **9U2Z-14S411-CC** Gauge: **20** Pin material: **Silver** Cavities: **3** Vehicle Uses Monitor - Crankcase Ventilation Sensor - Air Suspension Sensor - Front Park Aid (FPA) Sensor - Occupant Classification Sensor - Reverse Park Aide (RPA) Switch - A/C Compressor Clutch Cycling Switch - A/C High Pressure
Pigtail Kit Part Number **WPT-1315**	Service Part Number: **9U2Z-14S411-CB** Gauge: **20** Pin material: **Silver** Cavities: **3**



Vehicle Uses

Monitor - Crankcase Ventilation

Sensor - Air Suspension

Sensor - Front Park Aid (FPA)

Sensor - Occupant Classification

Sensor - Reverse Park Aide (RPA)

Switch - A/C Compressor Clutch Cycling

Switch - A/C High Pressure

CONNECTOR VIEWS > CONNECTOR END VIEW C4011 - REAR OUTER PARKING AID SENSOR RH

Connector:C4011

Description

REAR OUTER PARKING AID SENSOR RH

Color

Harness

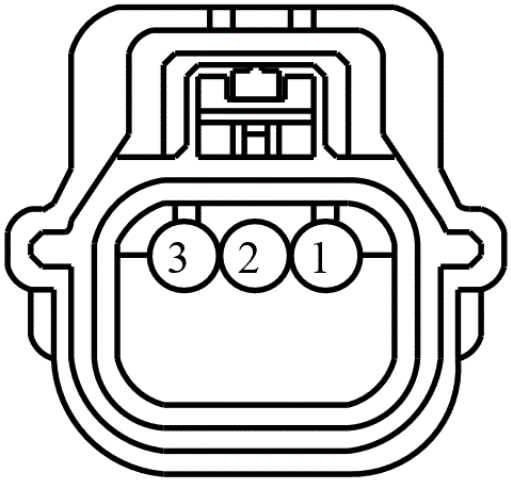
13412

Base Part #

part# N/A

Service Pigtail

See Below



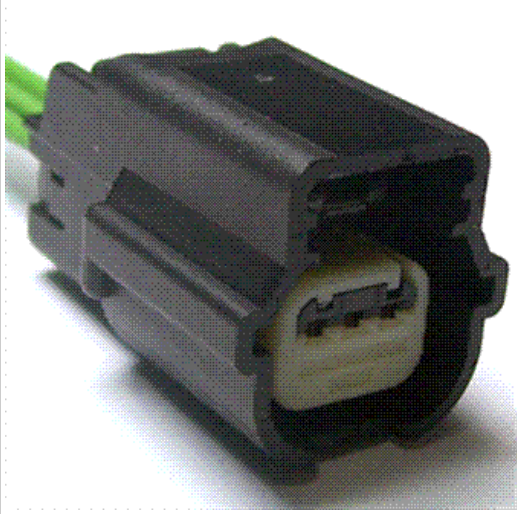
Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	LMP07 (BU-WH)	22	CTRL MOD. - PARKING AID # SENSORS REAR +	
2	VMP17 (YE-OG)	22	SENSOR - PARKING AID # REAR # (RIGHT OUTER)	
3	RMP07 (GN-WH)	22	CTRL MOD. - PARKING AID # SENSORS REAR -	

Available Pigtail Kits

Pigtail Kit Part Number

WPT-1400



Service Part Number:

9U2Z-14S411-CC

Gauge:

20

Pin material:

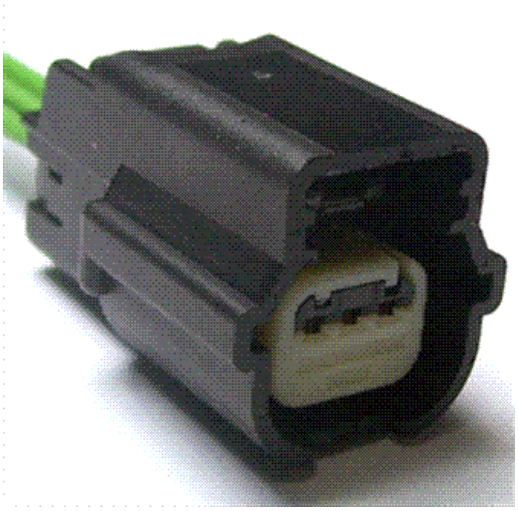
Silver

Cavities:

3

Vehicle Uses

Monitor - Crankcase Ventilation

	Sensor - Air Suspension Sensor - Front Park Aid (FPA) Sensor - Occupant Classification Sensor - Reverse Park Aide (RPA) Switch - A/C Compressor Clutch Cycling Switch - A/C High Pressure
Pigtail Kit Part Number **WPT-1315** 	Service Part Number: **9U2Z-14S411-CB** Gauge: **20** Pin material: **Silver** Cavities: **3** Vehicle Uses Monitor - Crankcase Ventilation Sensor - Air Suspension Sensor - Front Park Aid (FPA) Sensor - Occupant Classification Sensor - Reverse Park Aide (RPA) Switch - A/C Compressor Clutch Cycling Switch - A/C High Pressure

CONNECTOR VIEWS > CONNECTOR END VIEW C4012 - REAR INNER PARKING AID SENSOR RH

Connector:C4012

Description

REAR INNER PARKING AID SENSOR RH

Color

Harness

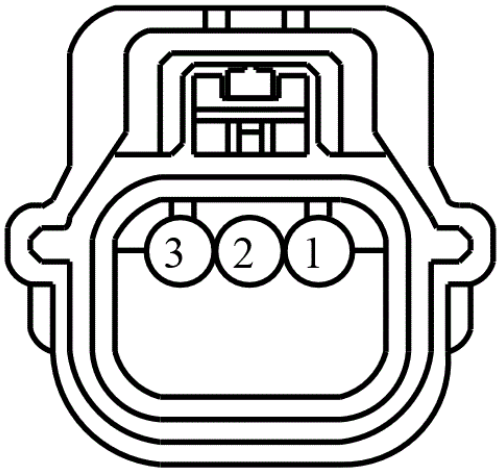
13412

Base Part #

part# N/A

Service Pigtail

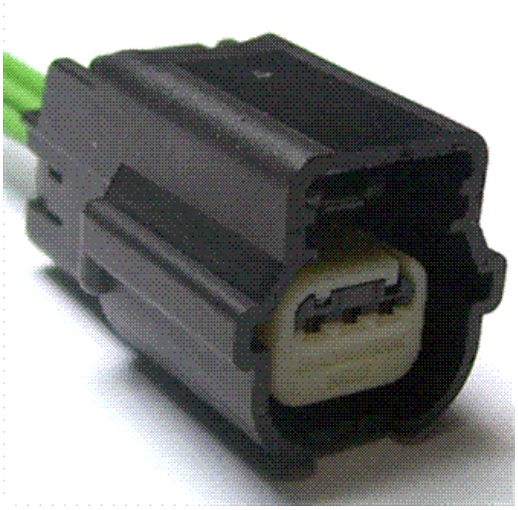
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	LMP07 (BU-WH)	22	CTRL MOD. - PARKING AID # SENSORS REAR +	
2	VMP16 (YE-GY)	22	SENSOR - PARKING AID # REAR # (RIGHT INNER)	
3	RMP07 (GN-WH)	22	CTRL MOD. - PARKING AID # SENSORS REAR -	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1400**	Service Part Number: **9U2Z-14S411-CC** Gauge:



20

Pin material:

Silver

Cavities:

3

Vehicle Uses

Monitor - Crankcase Ventilation

Sensor - Air Suspension

Sensor - Front Park Aid (FPA)

Sensor - Occupant Classification

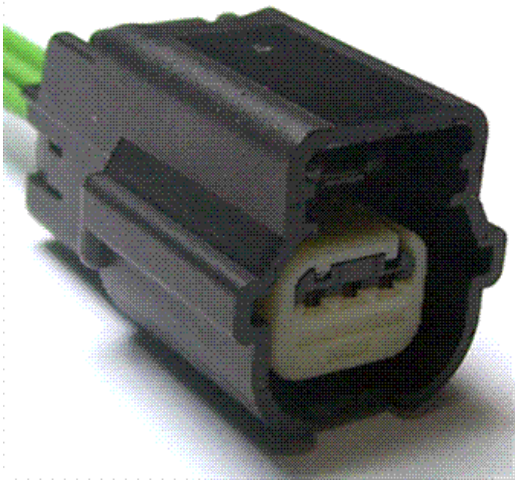
Sensor - Reverse Park Aide (RPA)

Switch - A/C Compressor Clutch Cycling

Switch - A/C High Pressure

Pigtail Kit Part Number

WPT-1315



Service Part Number:

9U2Z-14S411-CB

Gauge:

20

Pin material:

Silver

Cavities:

3

Vehicle Uses

Monitor - Crankcase Ventilation

Sensor - Air Suspension

Sensor - Front Park Aid (FPA)

Sensor - Occupant Classification

Sensor - Reverse Park Aide (RPA)

Switch - A/C Compressor Clutch Cycling

Switch - A/C High Pressure

CONNECTOR VIEWS > CONNECTOR END VIEW C4033 - FUEL PUMP CONTROL MODULE

Connector:C4033

Description

FUEL PUMP CONTROL MODULE

Color

LT GY

Harness

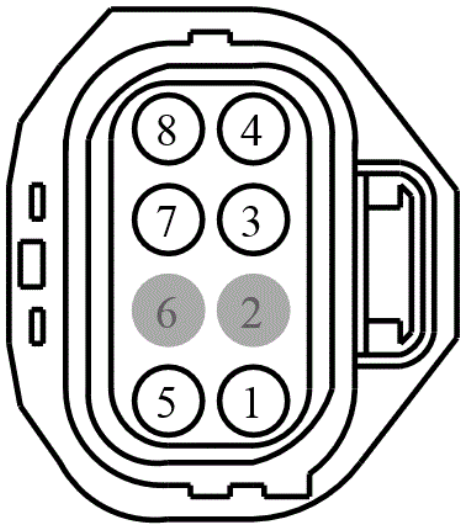
14A005

Base Part #

part# N/A

Service Pigtail

See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CE608 (VT-GN)	12	RELAY - FUEL PUMP (VPWR)	

2	*	*	Not Used
3	VE225 (YE-OG)	22	CTRL MOD. - POWERTRAIN # FUEL PUMP COMMAND (FPC)
4	GD347 (BK-VT)	12	GROUND - PILLAR C OR QUARTER PANEL LEFT
5	CE515 (YE-GY)	12	DRIVER - FUEL PUMP POWER (FPPWR)
6	*	*	Not Used
7	VE518 (BN-WH)	22	MONITOR - FUEL PUMP (FPM)
8	RE515 (WH-BN)	12	DRIVER - FUEL PUMP RETURN (FPRTN)

Available Pigtail Kits

Pigtail Kit Part Number

WPT-1332



Service Part Number:

DU2Z-14S411-CA

Gauge:

14

Pin material:

Tin

Cavities:

8

Vehicle Uses

Module - Fuel Pump Driver

CONNECTOR VIEWS > CONNECTOR END VIEW C4046A - LICENSE PLATE LAMP LH

Connector:C4046A

Description

LICENSE PLATE LAMP LH

Color

BK

Harness

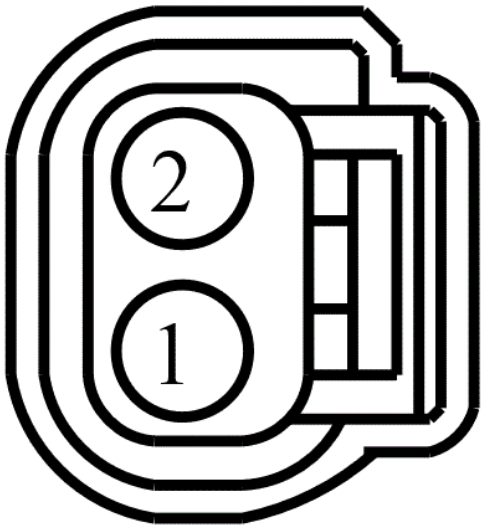
13412

Base Part #

part# N/A

Service Pigtail

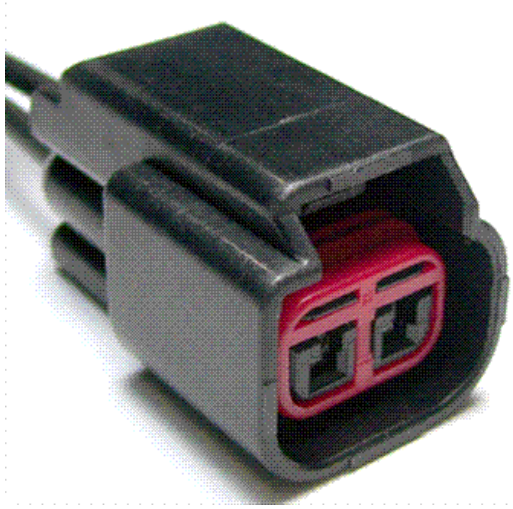
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	GD301 (BK-BU)	22	GROUND - PILLAR C OR QUARTER PANEL LEFT # 3RD POINT	
2	CLS30 (VT-WH)	22	RELAY - PARK LAMP	

Available Pigtail Kits	

Pigtail Kit Part Number **WPT-986** 	Service Part Number: **3U2Z-14S411-SLB** Gauge: **14** Pin material: **Tin** Cavities: **2** Vehicle Uses Coil - Ignition Lamp - License Sensor - Cam Shaft Position Sensor - Crank Shaft Position

CONNECTOR VIEWS > CONNECTOR END VIEW C4046B - LICENSE PLATE LAMP RH

Connector:C4046B

Description

LICENSE PLATE LAMP RH

Color

BK

Harness

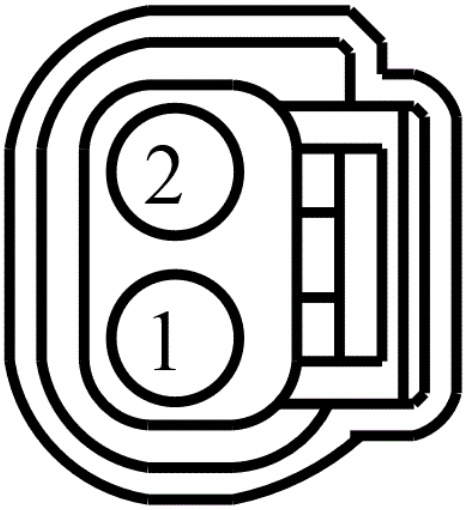
13412

Base Part #

part# N/A

Service Pigtail

See Below



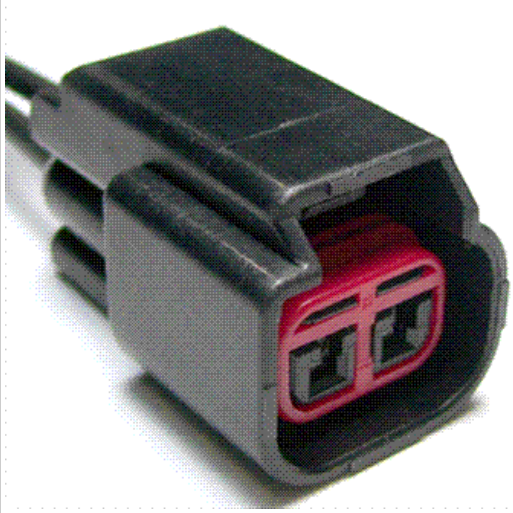
Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	GD301 (BK-BU)	22	GROUND - PILLAR C OR QUARTER PANEL LEFT # 3RD POINT	
2	CLS30 (VT-WH)	22	RELAY - PARK LAMP	

Available Pigtail Kits

Pigtail Kit Part Number

WPT-986



Service Part Number:

3U2Z-14S411-SLB

Gauge:

14

Pin material:

Tin

Cavities:

2

Vehicle Uses

Coil - Ignition

	Lamp - License Sensor - Cam Shaft Position Sensor - Crank Shaft Position

CONNECTOR VIEWS > CONNECTOR END VIEW C4082 - AUDIO ANTENNA

Connector:C4082

Description

AUDIO ANTENNA

Color

Harness

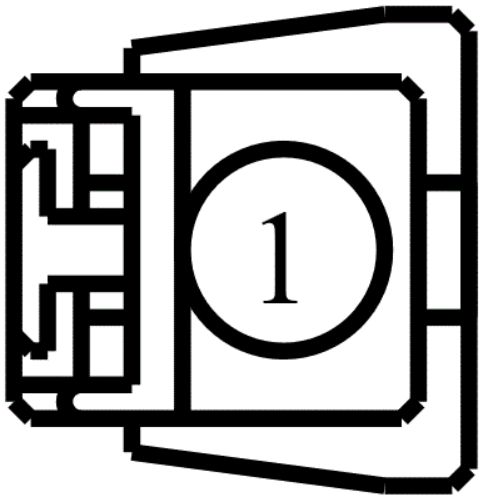
14A005

Base Part #

part# N/A

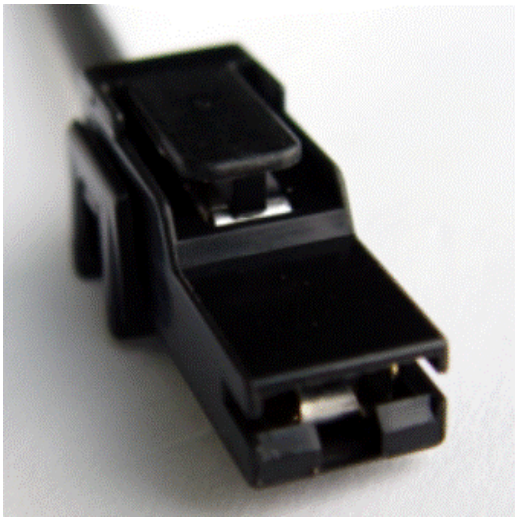
Service Pigtail

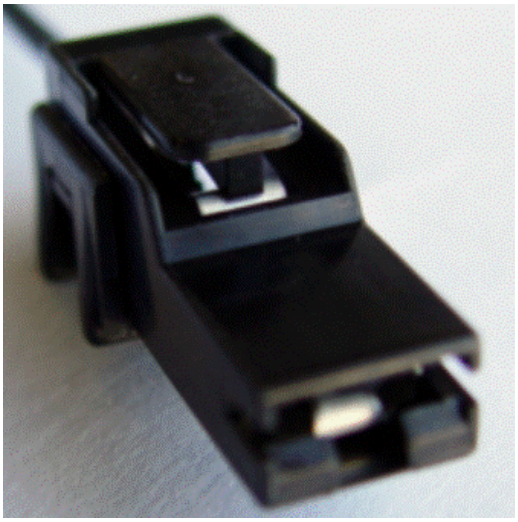
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CME44 (YE-GN)	20	CTRL MOD. - ANTENNA POWER # REAR WINDOW	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-371** 	Service Part Number: **3U2Z-14S411-KBA** Gauge: **10** Pin material: **Tin** Cavities: **1** Vehicle Uses Cigar Lighter Horn Lamp - CHMSL (Center High Mount Stop Lamp) Module - Isolater Antenna Module - Radio Power Antenna Relay - Starter Motor Switch - Park Brake Terminal - Rear Window Defroster Grid
Pigtail Kit Part Number **WPT-434**	Service Part Number: **3U2Z-14S411-MFA** Gauge: **16 18** Pin material: **Tin** Cavities: **1** Vehicle Uses Lamp - Map



CONNECTOR VIEWS > CONNECTOR END VIEW C4109A - SUBWOOFER AMPLIFIER REAR

Connector:C4109A

Description

SUBWOOFER AMPLIFIER REAR

Color

Harness

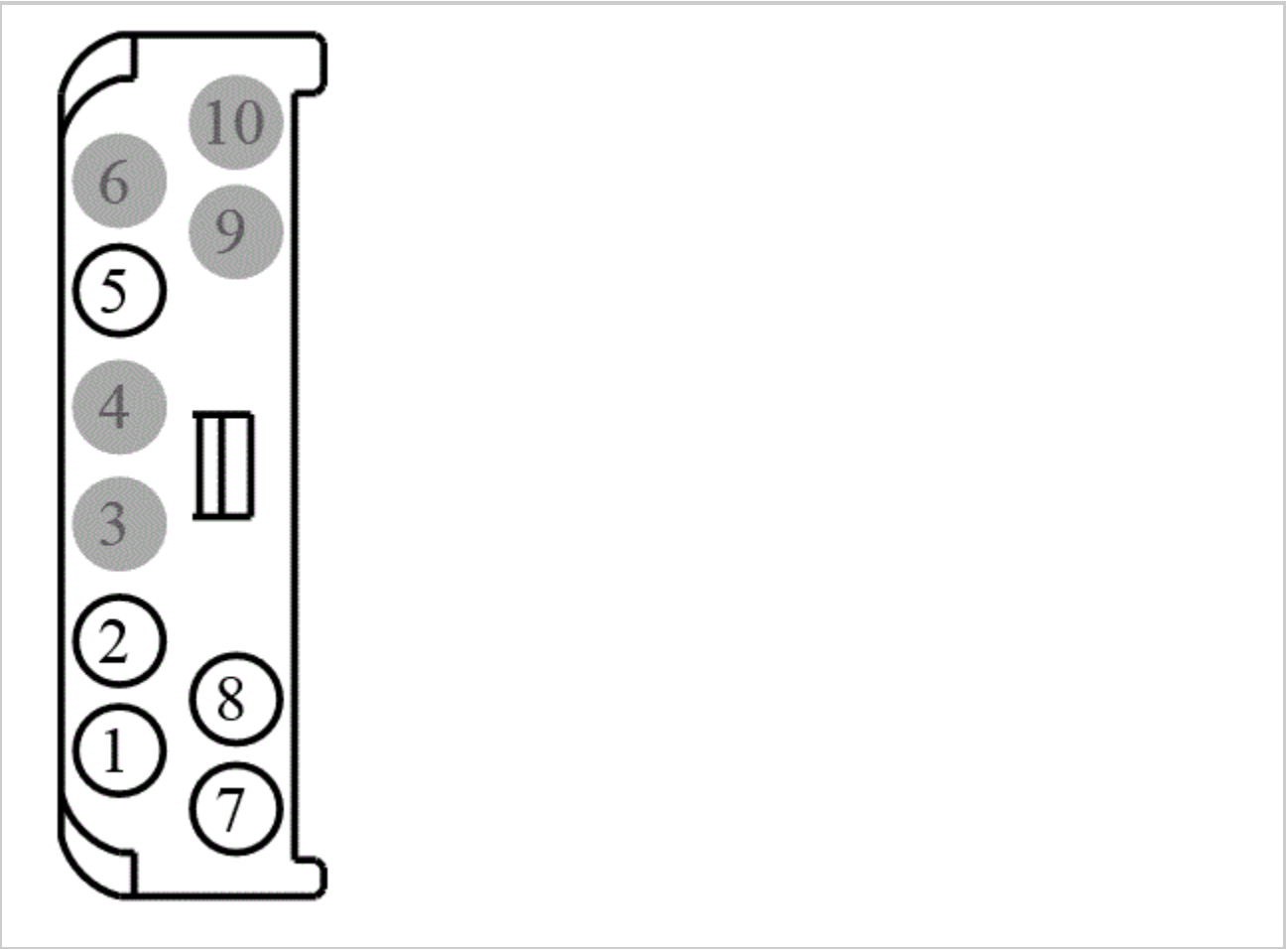
14A005

Base Part #

part# N/A

Service Pigtail

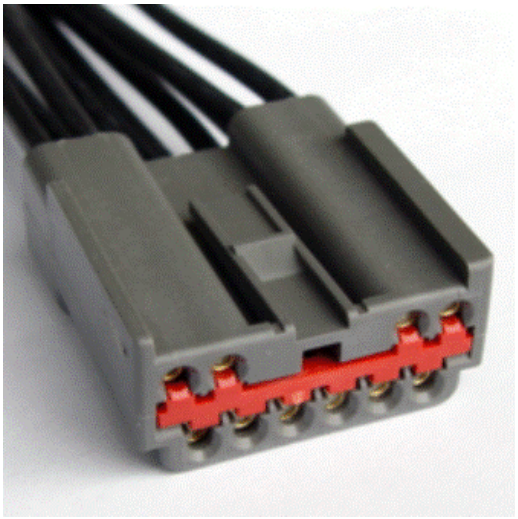
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	SME23 (VT-RD)	22	CTRL MOD. - AUDIO # SUBWOOFER/AMPLIFIER ENABLE	
2	GD313 (BK-GN)	14	GROUND - PILLAR C OR QUARTER PANEL RIGHT # 2ND POINT	
3	*	*	Not Used	
4	*	*	Not Used	
5	SBP05 (GY-RD)	14	FUSE - 5 OR CIRCUIT BREAKER	
6	*	*	Not Used	

7	VME22 (VT-GN)	22	CTRL MOD. - AUDIO # SUBWOOFER/AMPLIFIER AUDIO +
8	RME22 (GN-WH)	22	CTRL MOD. - AUDIO # SUBWOOFER/AMPLIFIER AUDIO -
9	*	*	Not Used
10	*	*	Not Used

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-667** 	Service Part Number: **3U2Z-14S411-CAAA** Gauge: **14** Pin material: **Tin** Cavities: **10** Vehicle Uses Motor - Heater/AC Blower (Front) Sensor - Headlamp Leveling

CONNECTOR VIEWS > CONNECTOR END VIEW C4109B - SUBWOOFER AMPLIFIER REAR

Connector:C4109B

Description

SUBWOOFER AMPLIFIER REAR

Color

Harness

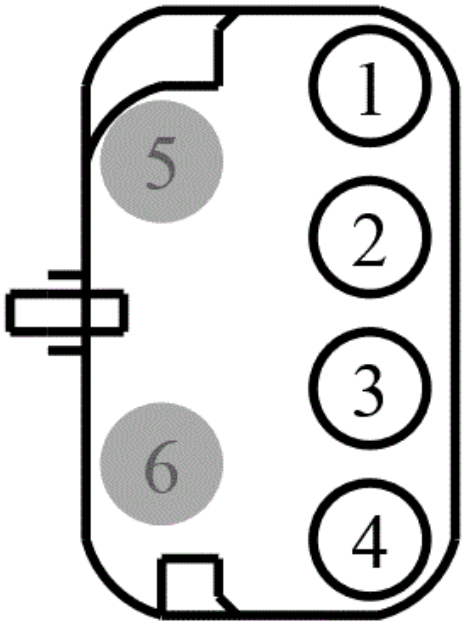
14B644

Base Part #

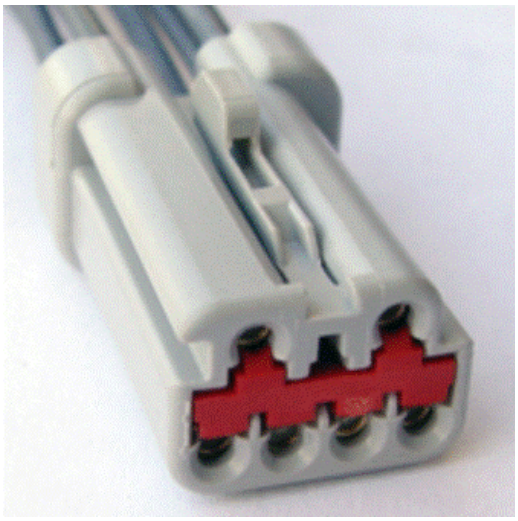
part# N/A

Service Pigtail

See Below



Pin	Circuit	Gauge	Circuit Function	Qualifier
1	* (BU-WH)	*	SUBWOOFER REAR	
2	* (BU)	*	SUBWOOFER REAR	
3	* (RD-WH)	*	SUBWOOFER REAR	
4	* (RD)	*	SUBWOOFER REAR	
5	*	*	Not Used	
6	*	*	Not Used	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-663** 	Service Part Number: **3U2Z-14S411-ANAA** Gauge: **16** Pin material: **Tin** Cavities: **6** Vehicle Uses Motor - Heater/AC Blower (Front)

CONNECTOR VIEWS > CONNECTOR END VIEW C4116 - EVAPORATIVE EMISSION CANISTER VENT SOLENOID

Connector:C4116

Description

EVAPORATIVE EMISSION CANISTER VENT SOLENOID

Color

BK

Harness

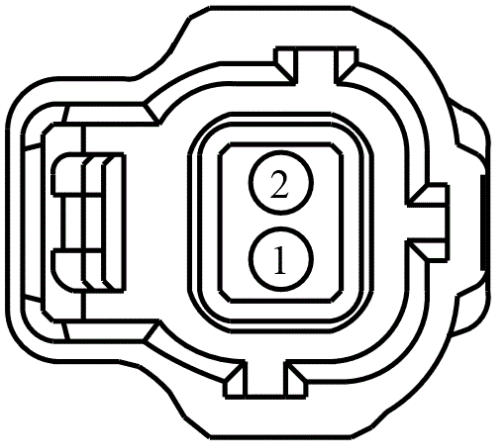
14A411

Base Part #

part# N/A

Service Pigtail

See Below



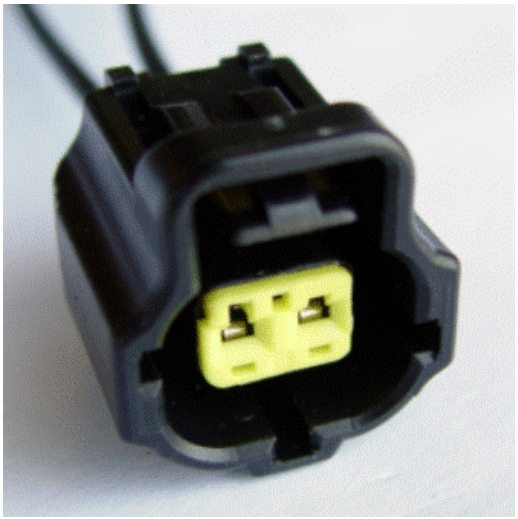
Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CBK02 (GN)	16	FUSE - 40 OR CIRCUIT BREAKER (VPWR 2)	
2	CE114 (GN-BU)	16	CTRL MOD. - POWERTRAIN # CANISTER VENT SOLENOID (CANV)	

Available Pigtail Kits

Pigtail Kit Part Number

WPT-322



Service Part Number:

3U2Z-14S411-JZA

Gauge:

14

Pin material:

Tin (greased)

Cavities:

2

Vehicle Uses

Resistor - Daytime Running Lamp (DRL)

Sensor - Air Charge Temperature

Sensor - Brake Pressure

	Solenoid - Canister Vent Switch - Brake Pressure

CONNECTOR VIEWS > CONNECTOR END VIEW C4333 - LUGGAGE COMPARTMENT LID REAR CONTROL SWITCH

Connector:C4333

Description

LUGGAGE COMPARTMENT LID REAR CONTROL SWITCH

Color

BK

Harness

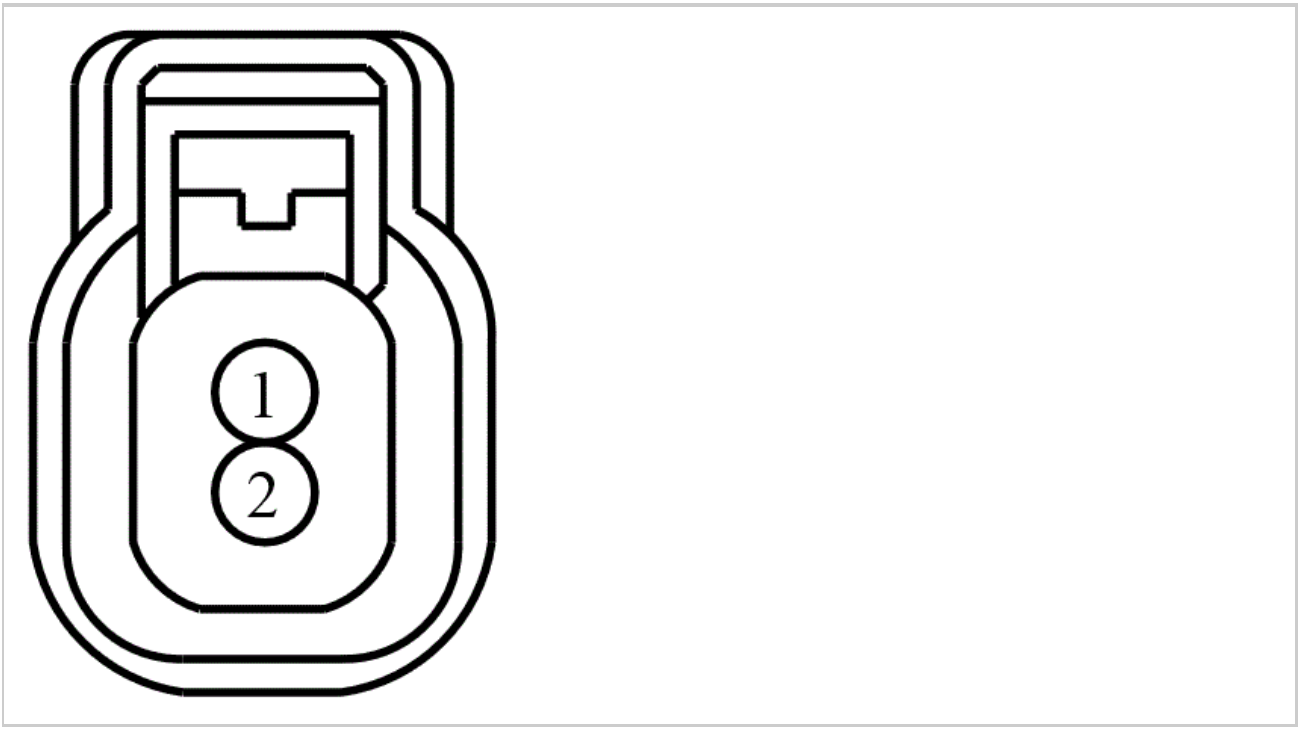
13412

Base Part #

part# N/A

Service Pigtail

See Below



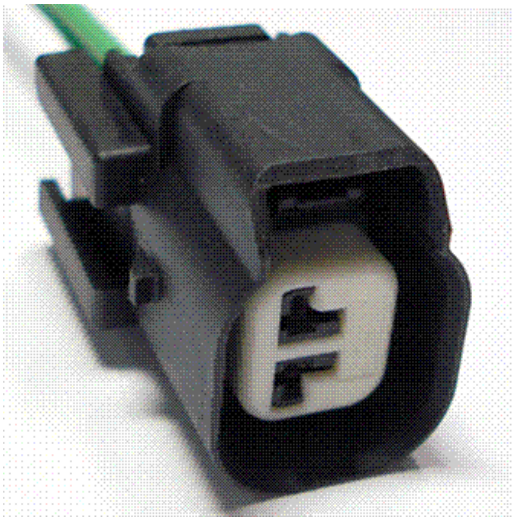
Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CPL60 (BN-YE)	22	SWITCH - LIFTGATE GLASS RELEASE	
2	GD301 (BK-BU)	22	GROUND - PILLAR C OR QUARTER PANEL LEFT # 3RD POINT	

Available Pigtail Kits

Pigtail Kit Part Number

WPT-984



Service Part Number:

3U2Z-14S411-BXAB

Gauge:

16

Pin material:

Silver

Cavities:

2

Vehicle Uses

A/C Compressor Clutch

EGR Cooler Outlet

Electronic Locking Differential

Horn

Lamp - CHMSL (Center High Mount Stop Lamp)

Lamp - Rear Park

Lamp - Reverse

Lamp - Side Marker

Motor - Adjustable Pedal

Sensor - Adjustable Pedal

Sensor - Brake Fluid Level

Sensor - Cam Shaft Position

	Sensor - Cylinder Head Temperature
	Sensor - Exhaust Gas Temperature
	Sensor - Liftgate Obstacle
	Sensor - Oil Level
	Sensor - Output Shaft Speed
	Sensor - Speed
	Solenoid - Engine Variable Timing
	Speaker - Door
	Speaker - Front
	Speaker - Rear
	Speaker - Subwoofer
	Speaker - Tweeter - LH - Front
	Switch - A/C Compressor Clutch Cycling
	Switch - Backup Lamp
	Switch - Deck Lid / Hatch Release
	Switch - Deck Lid / Lift Gate Ajar
	Switch - Hood Ajar
	Switch - Lift Gate Glass Ajar
	Switch - Power Liftgate
	Switch - Reverse Park Aid

CONNECTOR VIEWS > CONNECTOR END VIEW C4339 - LUGGAGE COMPARTMENT LID LATCH

Connector:C4339

Description

LUGGAGE COMPARTMENT LID LATCH

Color

BK

Harness

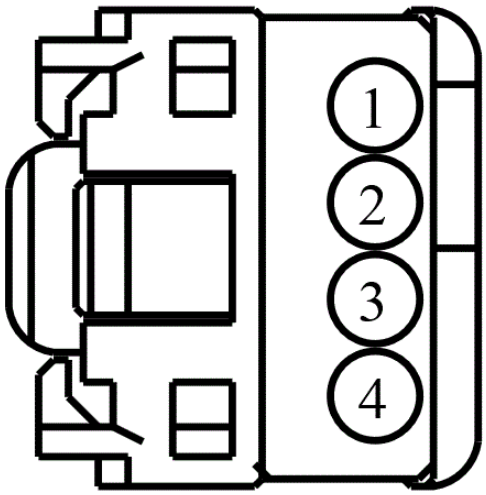
14A005

Base Part #

part# N/A

Service Pigtail

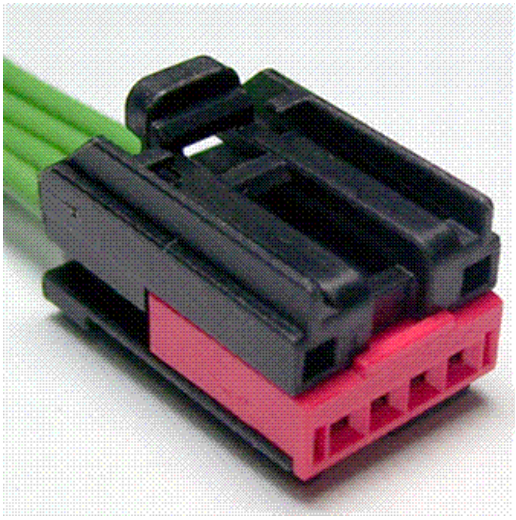
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CPL58 (GY)	26	SWITCH - LIFTGATE/DECKLID # GLASS AJAR	
2	CLN13 (WH-BU)	22	SWITCH - TRUNK/CARGO LAMP	
3	CPL59 (BN-BU)	20	RELAY - DOOR LOCK # LIFTGATE GLASS RELEASE	
4	GD348 (BK-YE)	18	GROUND - PILLAR C OR QUARTER PANEL RIGHT	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1055**	Service Part Number: **3U2Z-14S411-KYB** Gauge:

	**18** Pin material: **Silver** Cavities: **4** Vehicle Uses Actuator - Door Lock - Decklid/Liftgate Actuator - Liftgate Glass Switch - Deck Lid / Lift Gate Ajar Switch - Steering Column Tilt/Telescope

CONNECTOR VIEWS > CONNECTOR END VIEW C4357 - REAR PARKING AID CAMERA

Connector:C4357

Description

REAR PARKING AID CAMERA

Color

Harness

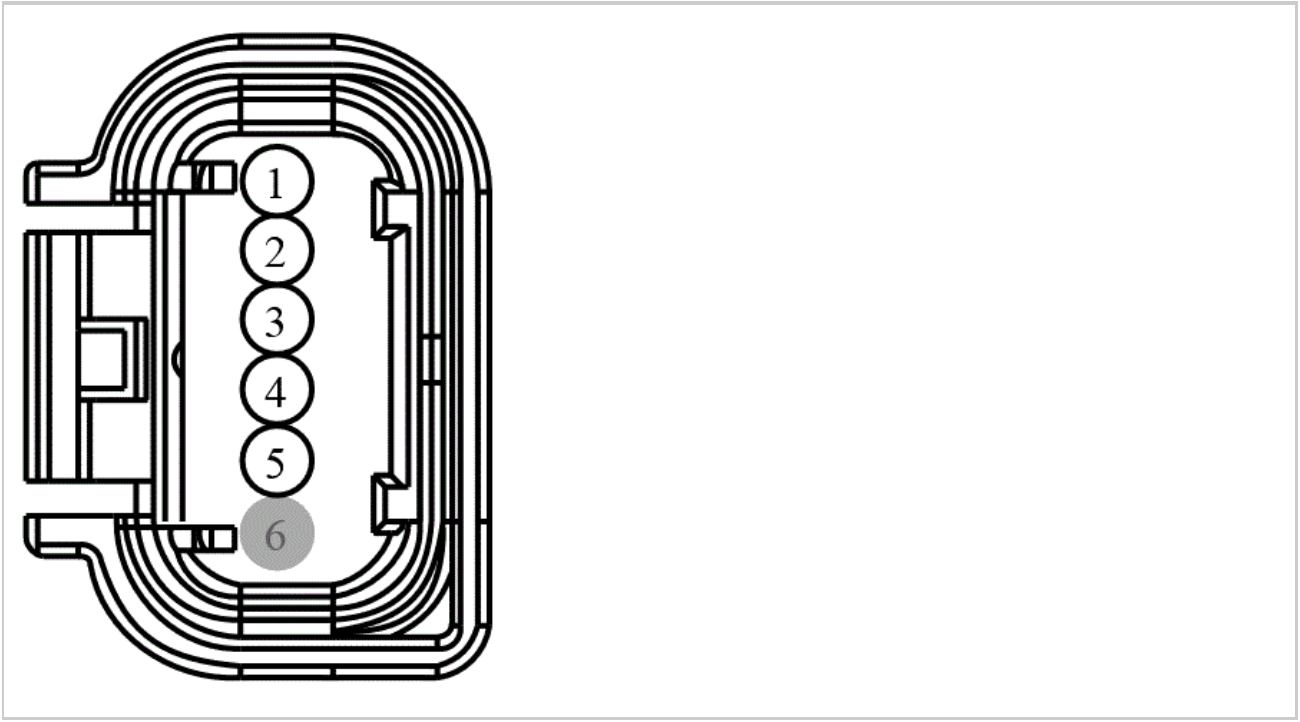
14A005

Base Part #

part# N/A

Service Pigtail

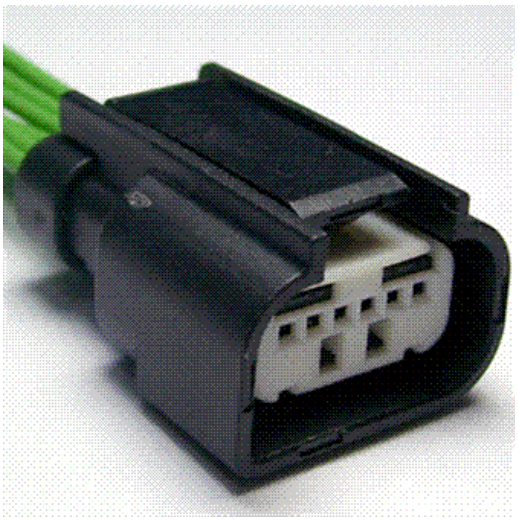
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CBB66 (BU-WH)	22	FUSE - 66 OR CIRCUIT BREAKER	
2	VDN04 (VT-WH)	22	CTRL MOD. - LIN BUS # SPDJB 4	
3	RMP19 (BN-VT)	22	CAMERA - PARKING AID REAR VIDEO -	
4	VMP19 (WH-GN)	22	CAMERA - PARKING AID REAR VIDEO +	
5	DMP19 (BK)	22	CAMERA - PARKING AID REAR VIDEO D	
6	*	*	Not Used	

Available Pigtail Kits	

Pigtail Kit Part Number **WPT-1280** 	Service Part Number: **CU2Z-14S411-AEA** Gauge: **20** Pin material: **Silver** Cavities: **6** Vehicle Uses Camera - Reverse Park Aid

CONNECTOR VIEWS > CONNECTOR END VIEW C4368A - BODY CONTROL MODULE B

Connector:C4368A

Description

BODY CONTROL MODULE B

Color

BK

Harness

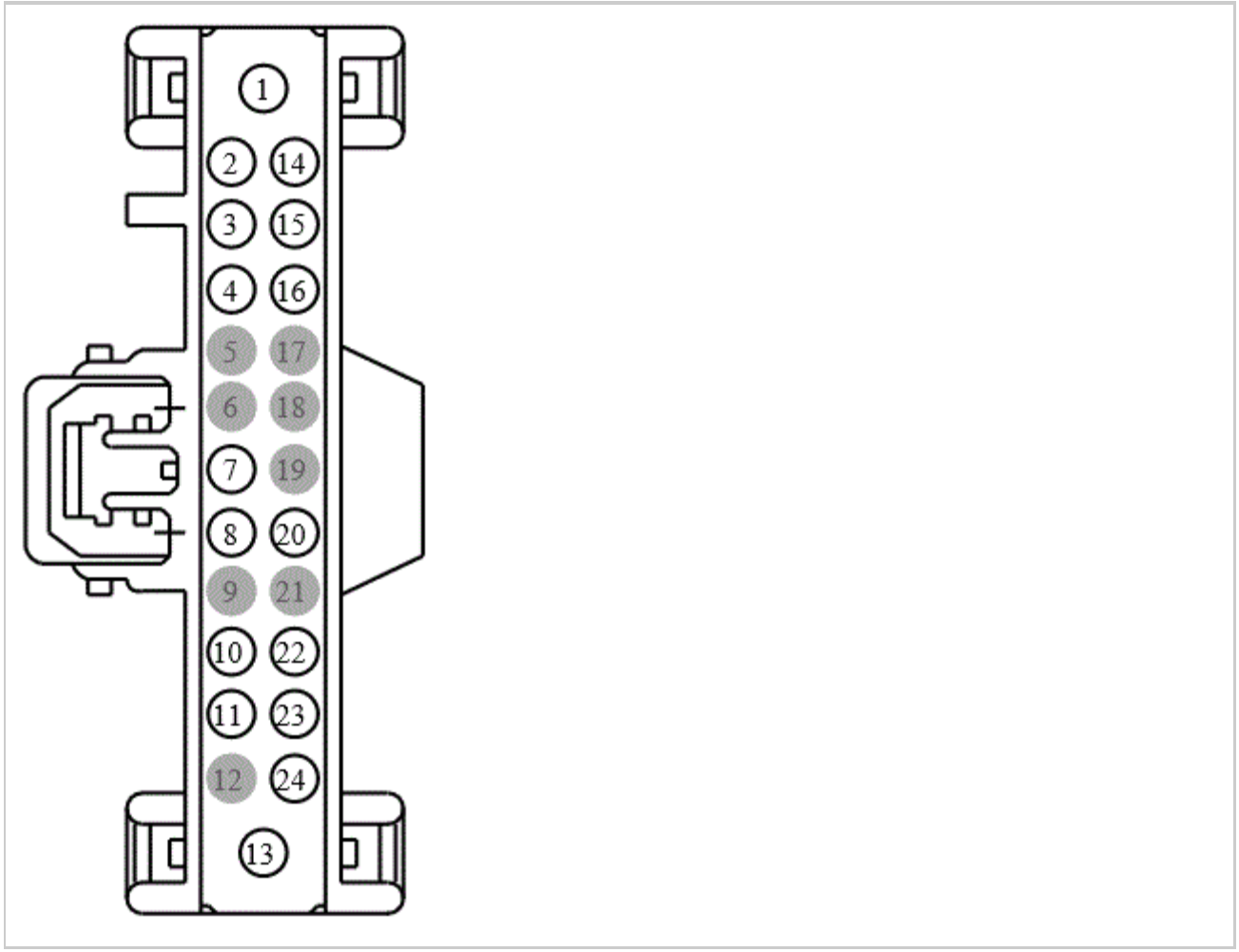
14A005

Base Part #

part# N/A

Service Pigtail

See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	SBP28 (GN-RD)	16	FUSE - 28 OR CIRCUIT BREAKER	
2	CLS51 (WH-GN)	22	CTRL MOD. - STOP/TURN LEFT OUTBOARD	
3	CLS50 (BN-VT)	22	CTRL MOD. - STOP/TURN LEFT MIDDLE	
4	CLS18 (GY-BN)	22	CTRL MOD. - STOP/TURN LEFT (INBOARD)	
5	*	*	Not Used	

6	*	*	Not Used
7	CBP36 (BU-BN)	20	FUSE - 36 OR CIRCUIT BREAKER
8	CLS54 (BU)	26	LAMP - TURN REAR RIGHT # SIGNAL OUT
8	CLS54 (BU-OG)	22	LAMP - TURN REAR RIGHT # SIGNAL OUT
9	*	*	Not Used
10	CPW73 (GN-VT)	22	CTRL MOD. - POWER WINDOW GLOBAL DOWN
11	VDB06 (GY)	26	CONNECTOR - DIAGNOSTIC # CAN BUS MEDIUM SPEED HIGH
11	VDB06 (GY-OG)	22	CONNECTOR - DIAGNOSTIC # CAN BUS MEDIUM SPEED HIGH
11	VDB06 (GY)	26	CONNECTOR - DIAGNOSTIC # CAN BUS MEDIUM SPEED HIGH
11	VDB06 (GY-OG)	22	CONNECTOR - DIAGNOSTIC # CAN BUS MEDIUM SPEED HIGH
11	VDB06 (GY)	26	CONNECTOR - DIAGNOSTIC # CAN BUS MEDIUM SPEED HIGH
12	*	*	Not Used
13	GD301 (BK-BU)	16	GROUND - PILLAR C OR QUARTER PANEL LEFT # 3RD POINT
14	CLS53 (GY-VT)	22	CTRL MOD. - STOP/TURN RIGHT OUTBOARD

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1440** 	Service Part Number: **FU2Z-14S411-ALA** Gauge: **14 20** Pin material: **Tin & Silver** Cavities: **24** Vehicle Uses DVD Player Module - Audio Control Module - Body Control Module Gateway Radio Test Connector - Diagnostic

CONNECTOR VIEWS > CONNECTOR END VIEW C4368B - BODY CONTROL MODULE B

Connector:C4368B

Description

BODY CONTROL MODULE B

Color

GY

Harness

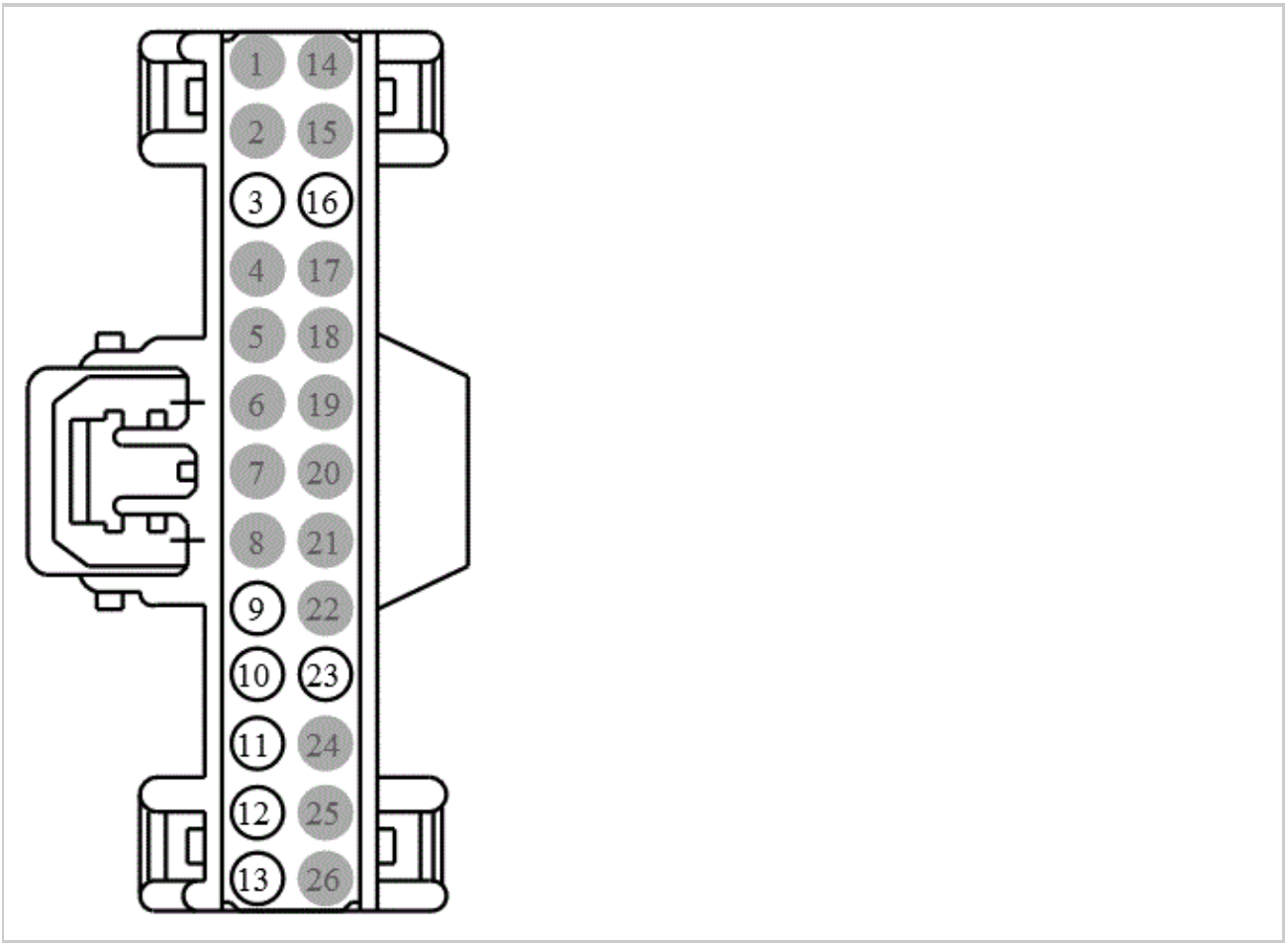
14A005

Base Part #

part# N/A

Service Pigtail

Not Available



Pin	Circuit	Gauge	Circuit Function	Qualifier
1	*	*	Not Used	
2	*	*	Not Used	
3	CPW47 (VT-OG)	22	CTRL MOD. - WINDOW MOTOR REAR LEFT # DOWN	
4	*	*	Not Used	
5	*	*	Not Used	

6	*	*	Not Used
7	*	*	Not Used
8	*	*	Not Used
9	CLN51 (WH-OG)	22	CTRL MOD. - AMBIENT LIGHTING ZONE 3 # LED RED +
10	CLN52 (WH-GN)	22	CTRL MOD. - AMBIENT LIGHTING ZONE 3 # LED GREEN +
11	CLN44 (OG)	22	CTRL MOD. - AMBIENT LIGHTING ZONE 1 OR NON-ZONE # LED RED +
12	CLN45 (GN)	22	CTRL MOD. - AMBIENT LIGHTING ZONE 1 OR NON-ZONE # LED GREEN +
13	CLN46 (BU)	22	CTRL MOD. - AMBIENT LIGHTING ZONE 1 OR NON-ZONE # LED BLUE +
14	*	*	Not Used
15	*	*	Not Used
16	CPW53 (YE-OG)	22	CTRL MOD. - WINDOW MOTOR REAR RIGHT # DOWN
17	*	*	Not Used
18	*	*	Not Used
19	*	*	Not Used
20	*	*	Not Used

CONNECTOR VIEWS > CONNECTOR END VIEW C4369 - SIDE OBSTACLE DETECTION CONTROL MODULE LH (SODL)

Connector:C4369

Description

SIDE OBSTACLE DETECTION CONTROL MODULE LH (SODL)

Color

Harness

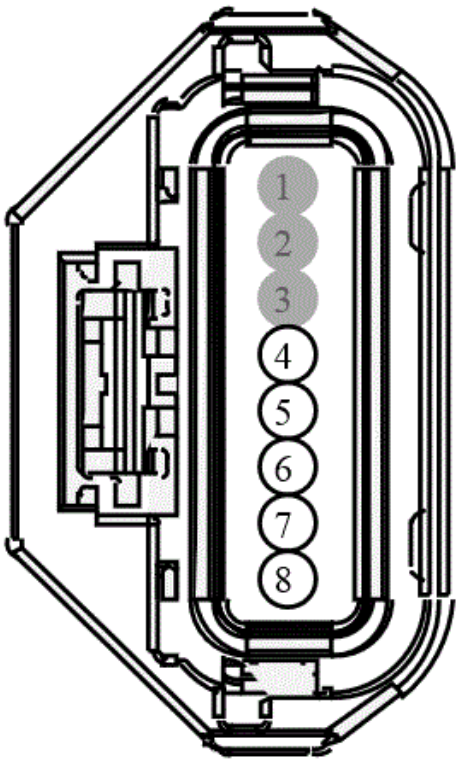
14A005

Base Part #

part# N/A

Service Pigtail

See Below



Pin	Circuit	Gauge	Circuit Function	Qualifier
1	*	*	Not Used	

2	*	*	Not Used
3	*	*	Not Used
4	CRB06 (GN-WH)	22	CTRL MOD. - BLINDSPOT WARNING # LED MIRROR LEFT OR DRIVER +
5	CBB66 (BU-WH)	22	FUSE - 66 OR CIRCUIT BREAKER
6	VDB06 (GY-OG)	22	CONNECTOR - DIAGNOSTIC # CAN BUS MEDIUM SPEED HIGH
7	VDB07 (VT-OG)	22	CONNECTOR - DIAGNOSTIC # CAN BUS MEDIUM SPEED LOW
8	GD301 (BK-BU)	20	GROUND - PILLAR C OR QUARTER PANEL LEFT # 3RD POINT

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1434** 	Service Part Number: **FU2Z-14S411-ADA** Gauge: **20** Pin material: **Silver** Cavities: **8** Vehicle Uses Sensor - Blind Spot Detection

CONNECTOR VIEWS > CONNECTOR END VIEW C4370 - SIDE OBSTACLE DETECTION CONTROL MODULE RH (SODR)

Connector:C4370

Description

SIDE OBSTACLE DETECTION CONTROL MODULE RH (SODR)

Color

Harness

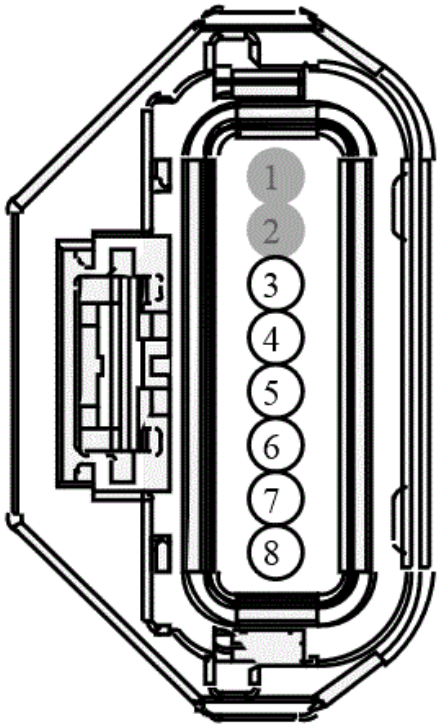
14A005

Base Part #

part# N/A

Service Pigtail

See Below



Pin	Circuit	Gauge	Circuit Function	Qualifier
1	*	*	Not Used	

2	*	*	Not Used
3	GD301 (BK-BU)	20	GROUND - PILLAR C OR QUARTER PANEL LEFT # 3RD POINT
4	CRB07 (BN)	22	CTRL MOD. - BLINDSPOT WARNING # LED MIRROR RIGHT OR PASSENGER +
5	CBB66 (BU-WH)	22	FUSE - 66 OR CIRCUIT BREAKER
6	VDB06 (GY-OG)	22	CONNECTOR - DIAGNOSTIC # CAN BUS MEDIUM SPEED HIGH
7	VDB07 (VT-OG)	22	CONNECTOR - DIAGNOSTIC # CAN BUS MEDIUM SPEED LOW
8	GD301 (BK-BU)	20	GROUND - PILLAR C OR QUARTER PANEL LEFT # 3RD POINT

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1434** 	Service Part Number: **FU2Z-14S411-ADA** Gauge: **20** Pin material: **Silver** Cavities: **8** Vehicle Uses Sensor - Blind Spot Detection

CONNECTOR VIEWS > CONNECTOR END VIEW C4374 - FUEL LEVEL SENSOR

Connector:C4374

Description

FUEL LEVEL SENSOR

Color

GY

Harness

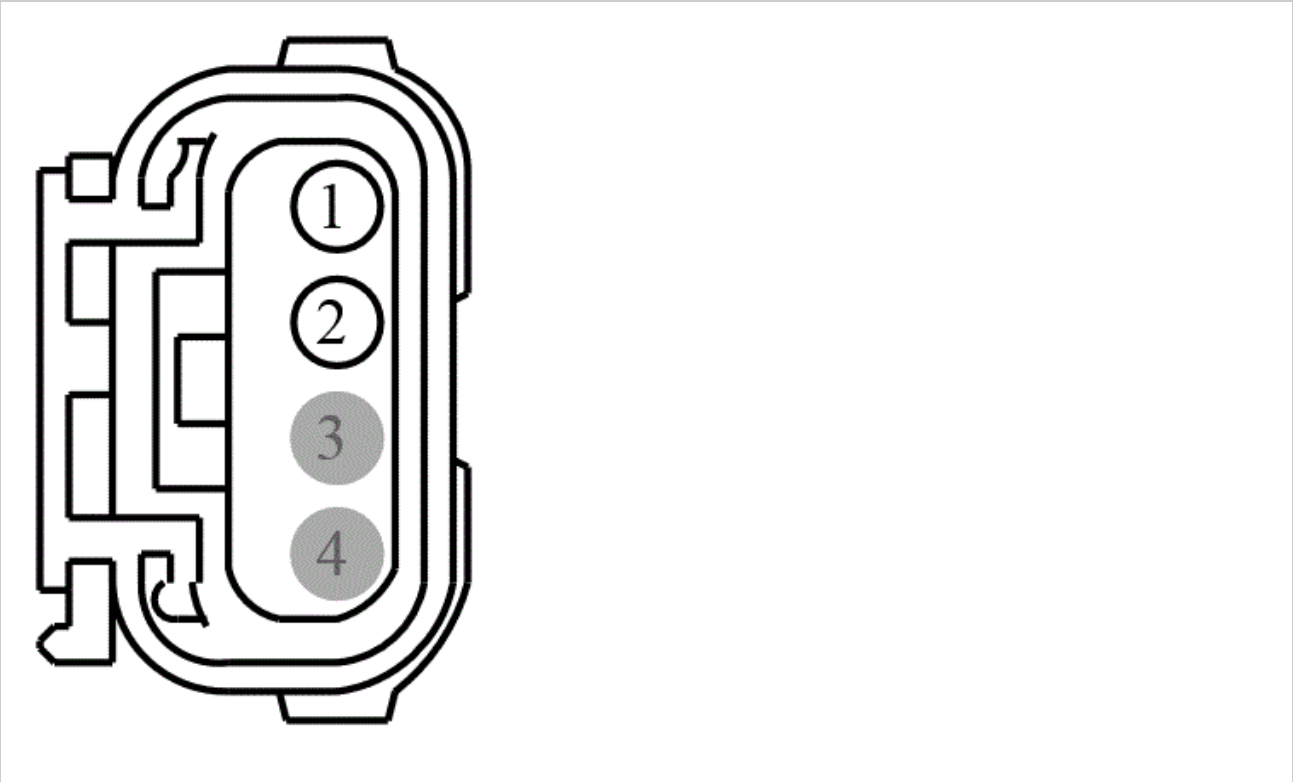
14A005

Base Part #

part# N/A

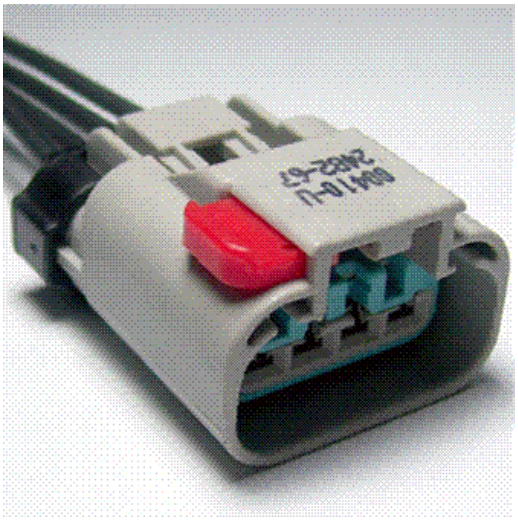
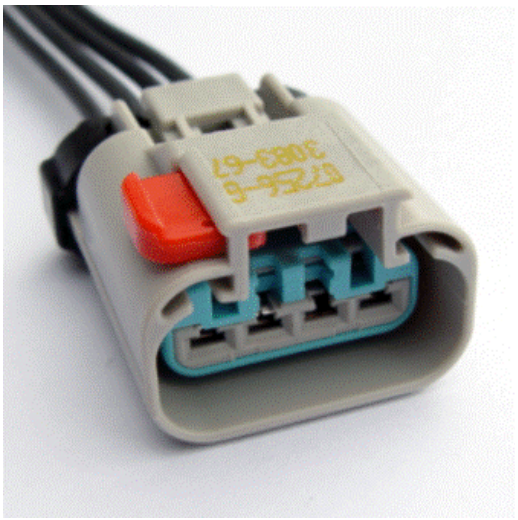
Service Pigtail

See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	RMC33 (WH-VT)	18	CTRL MOD. - SENSOR FUEL LEVEL 2	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1373** 	Service Part Number: **3U2Z-14S411-DGAB** Gauge: **16** Pin material: **Tin (greased)** Cavities: **4** Vehicle Uses Fuel Pump/Sending Unit Module - Fuel Pump Driver Sensor - Fuel Level
Pigtail Kit Part Number **WPT-709** 	Service Part Number: **3U2Z-14S411-DGAA** Gauge: **14** Pin material: **Tin** Cavities: **4** Vehicle Uses Control - Engine Air Shutoff Fuel Pump/Sending Unit

CONNECTOR VIEWS > CONNECTOR END VIEW C4378 - KEYLESS ENTRY REAR ANTENNA

Connector:C4378

Description

KEYLESS ENTRY REAR ANTENNA

Color

BK

Harness

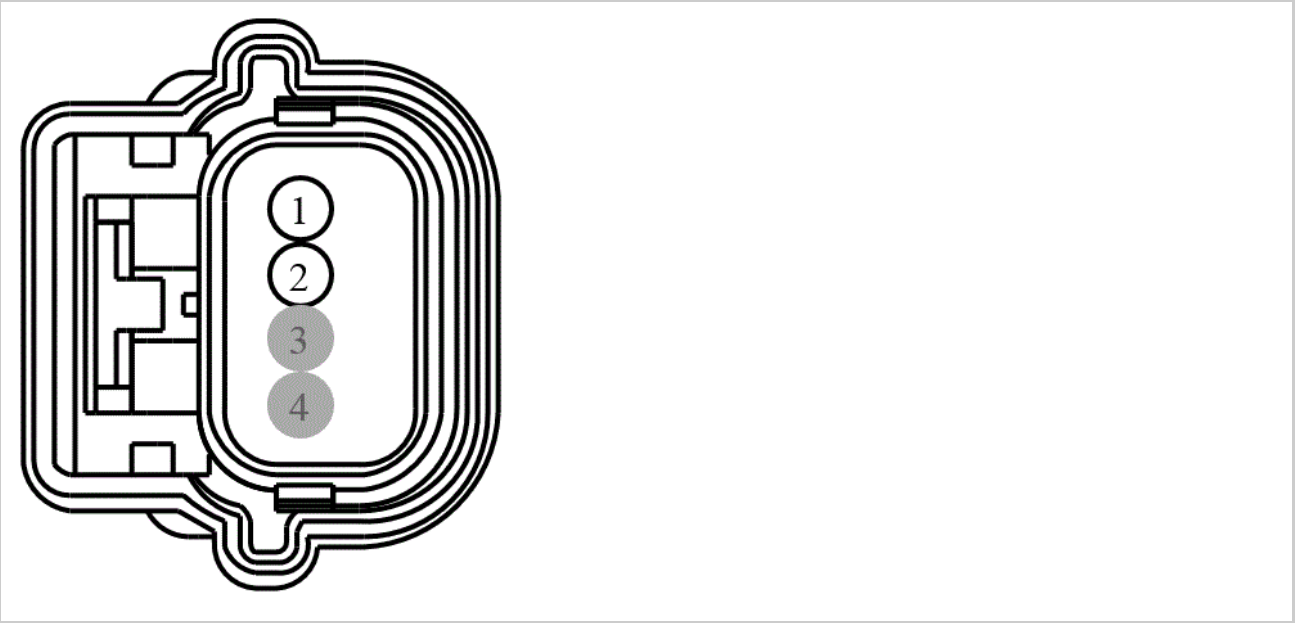
14A005

Base Part #

part# N/A

Service Pigtail

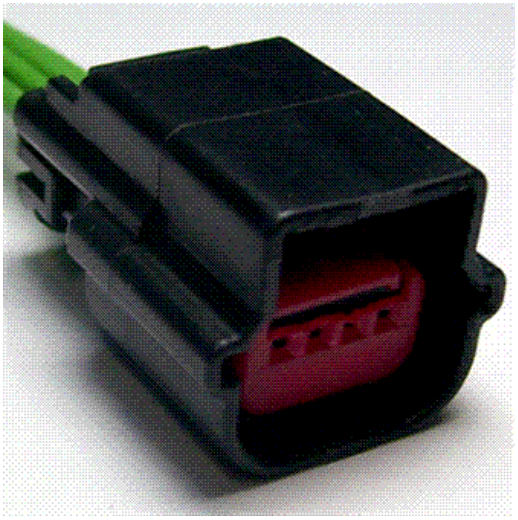
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	VPK06 (GY-VT)	20	CTRL MOD. - KEYLESS VEHICLE # ANTENNA INTERIOR 2 (CENTER) +	
2	RPK06 (BU-WH)	20	CTRL MOD. - KEYLESS VEHICLE # ANTENNA INTERIOR 2 (CENTER) -	

3	*	*	Not Used	
4	*	*	Not Used	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1307** 	Service Part Number: **CU2Z-14S411-AGA** Gauge: **18** Pin material: **Silver** Cavities: **4** Vehicle Uses Antenna - Keyless Entry Sensor - Brake Pedal Position Sensor - Clutch Master Cylinder

CONNECTOR VIEWS > CONNECTOR END VIEW C4398 - NOISE SUPPRESSION CAPACITOR

Connector:C4398

Description

NOISE SUPPRESSION CAPACITOR

Color

GY

Harness

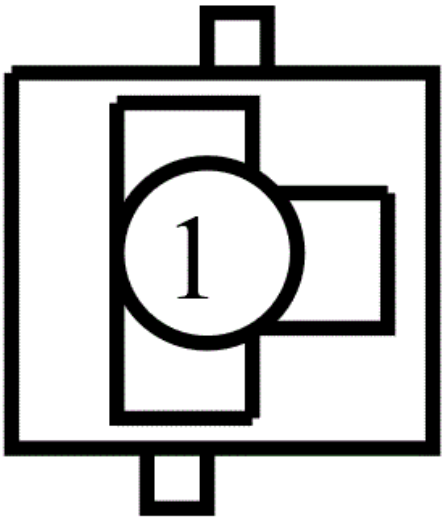
14A005

Base Part #

part# N/A

Service Pigtail

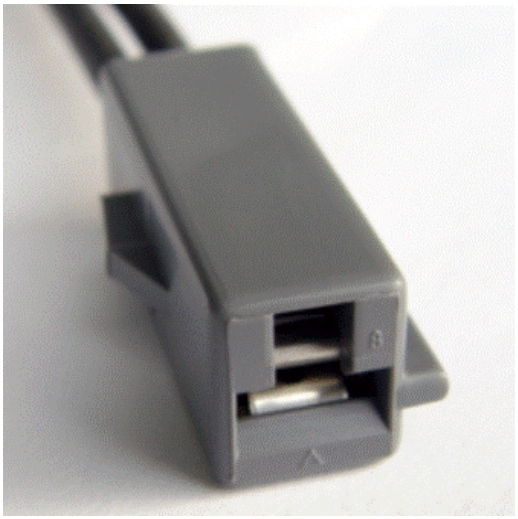
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CLS17 (YE-GY)	22	CTRL MOD. - STOP HIGH MOUNT	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-352**	Service Part Number: **3U2Z-14S411-HNA** Gauge: **12** Pin material: **Tin** Cavities: **1** Vehicle Uses

	Capacitor - Ignition/Radio

CONNECTOR VIEWS > CONNECTOR END VIEW C4425 - HEATED REAR WINDOW ELEMENT

Connector:C4425

Description

HEATED REAR WINDOW ELEMENT

Color

GY

Harness

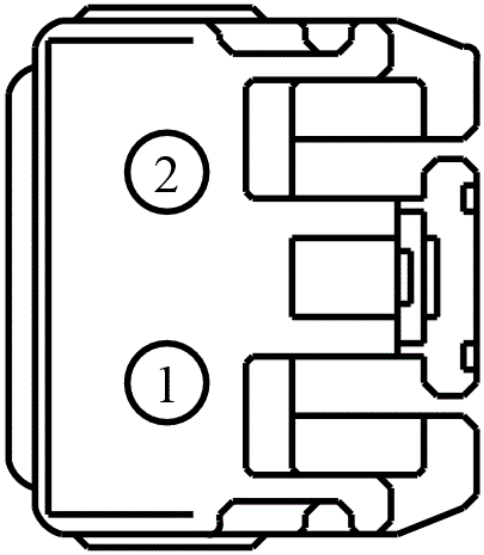
14A005

Base Part #

part# N/A

Service Pigtail

See Below



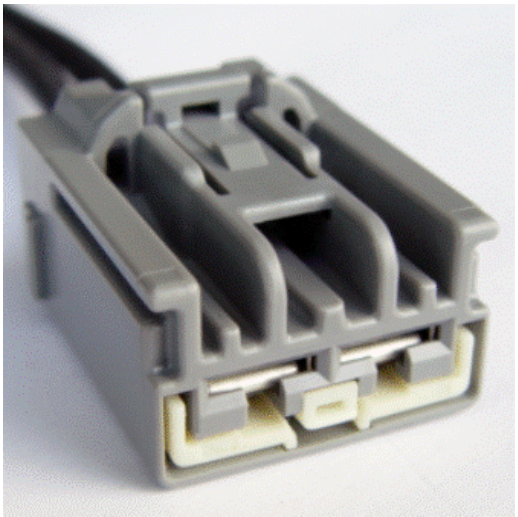
Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CRD17 (GY)	10	RELAY - HEATER MIRROR	
2	GD348 (BK-YE)	12	GROUND - PILLAR C OR QUARTER PANEL RIGHT	

Available Pigtail Kits

Pigtail Kit Part Number

WPT-236



Service Part Number:

3U2Z-14S411-PA

Gauge:

10

Pin material:

Tin

Cavities:

2

Vehicle Uses

Mirror - Vanity

Module - Seat Memory

	Motor - Heater/AC Blower (Auxiliary) Motor - Heater/AC Blower (Front) Radio - Amplifier Resistor - Blower Motor (Front) Switch - Heater / A/C Blower (Front)

CONNECTOR VIEWS > CONNECTOR END VIEW C4458 - RADIO TRANSCEIVER MODULE (RTM)

Connector:C4458

Description

RADIO TRANSCEIVER MODULE (RTM)

Color

BK

Harness

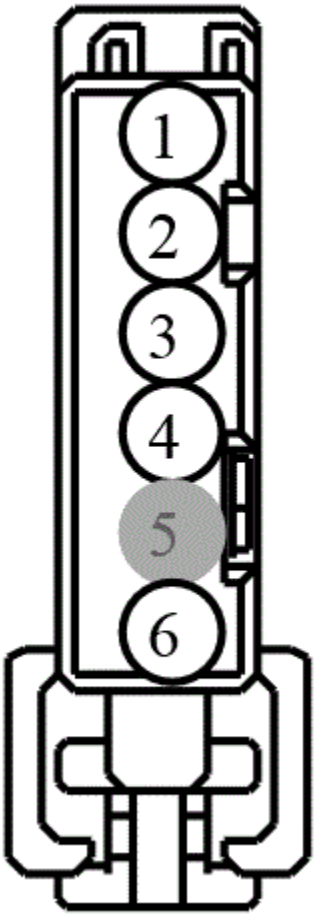
14A005

Base Part #

part# N/A

Service Pigtail

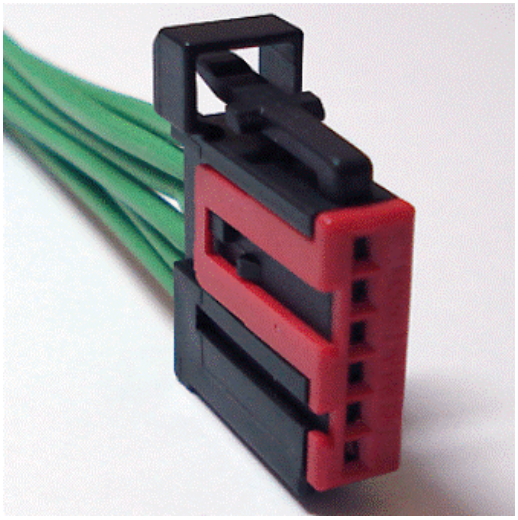
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	GD239 (BK-YE)	20	GROUND - COWL SIDE/PILLAR A RIGHT # 2ND POINT	
2	VPL56 (BU)	26	RECEIVER - REMOTE RF	
3	VDB07 (VT)	26	CONNECTOR - DIAGNOSTIC # CAN BUS MEDIUM SPEED LOW	
4	VDB06 (GY)	26	CONNECTOR - DIAGNOSTIC # CAN BUS MEDIUM SPEED HIGH	
5	*	*	Not Used	

6	SBP32 (VT-RD)	22	FUSE - 32 OR CIRCUIT BREAKER	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-958** 	Service Part Number: **6U2Z-14S411-LB** Gauge: **18 20** Pin material: **Tin & Silver** Cavities: **6** Vehicle Uses Antenna - GPS Module - Global Positioning

CONNECTOR VIEWS > CONNECTOR END VIEW C4823 - AUDIO ANTENNA

Connector:C4823

Description

AUDIO ANTENNA

Color

Harness

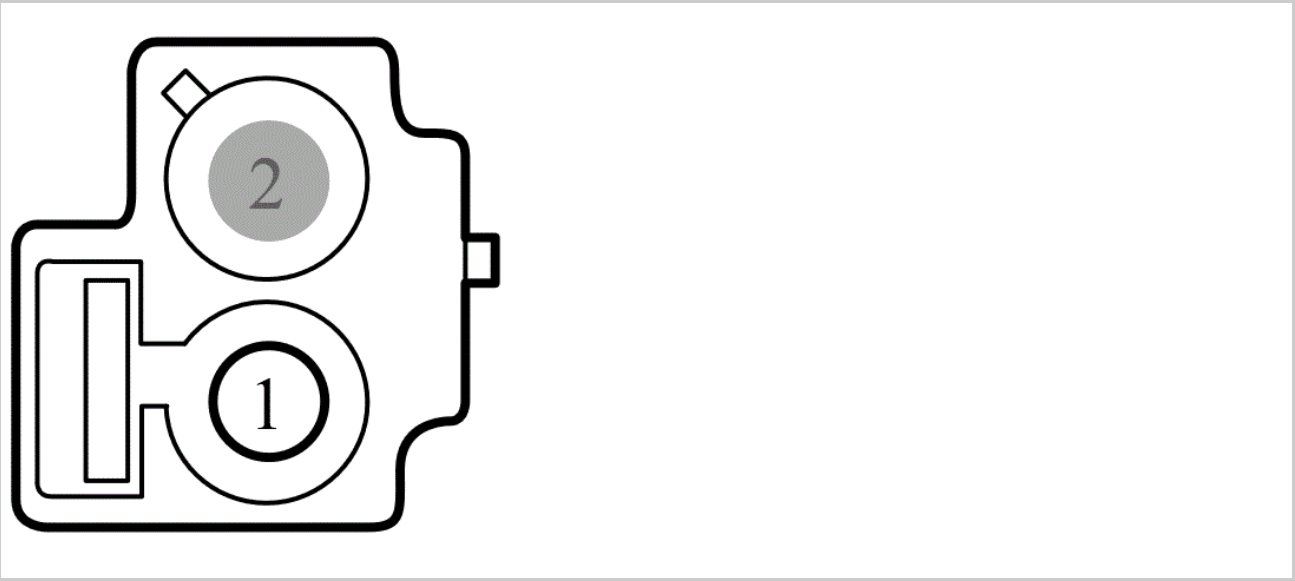
14A005

Base Part #

part# N/A

Service Pigtail

Not Available



Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CME44 (YE-GN)	22	CTRL MOD. - ANTENNA POWER # REAR WINDOW	
1	CME44 (YE-GN)	20	CTRL MOD. - ANTENNA POWER # REAR WINDOW	
2	*	*	Not Used	

CONNECTOR VIEWS > CONNECTOR END VIEW C4828 - ACTIVE NOISE CONTROL MICROPHONE LEFT REAR

Connector:C4828

Description

ACTIVE NOISE CONTROL MICROPHONE LEFT REAR

Color

BK

Harness

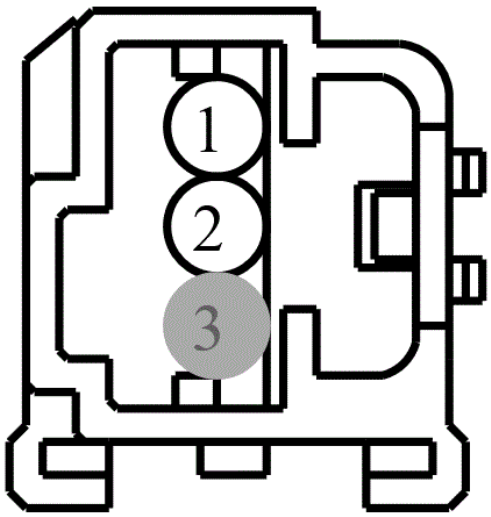
14A005

Base Part #

part# N/A

Service Pigtail

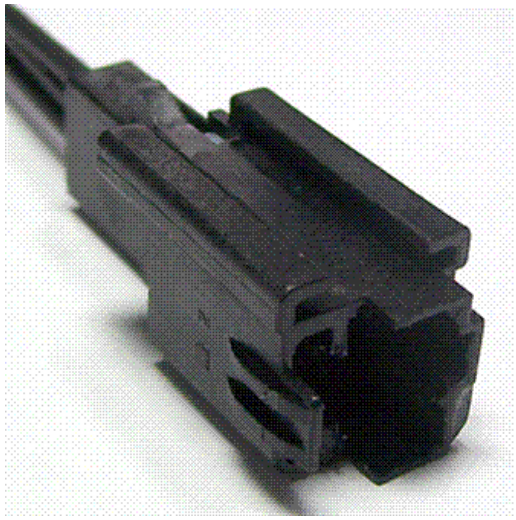
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	VME99 (VT-OG)	22	MICROPHONE - AMBIENT NOISE 2 +	
2	RME99 (YE-GY)	22	MICROPHONE - AMBIENT NOISE 2 -	
3	*	*	Not Used	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1103**	Service Part Number: **3U2Z-14S411-EXAB** Gauge: **18** Pin material: **Tin (greased)** Cavities: **3**



Vehicle Uses

Lamp - PRNDL Indicator

Module - Radio Power Antenna

Switch - Overdrive Cancel

CONNECTOR VIEWS > CONNECTOR END VIEW C4829 - ACTIVE NOISE CONTROL MICROPHONE RIGHT REAR

Connector:C4829

Description

ACTIVE NOISE CONTROL MICROPHONE RIGHT REAR

Color

BK

Harness

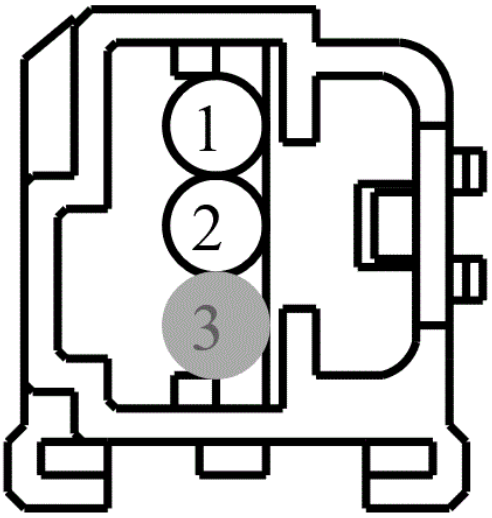
14A005

Base Part #

part# N/A

Service Pigtail

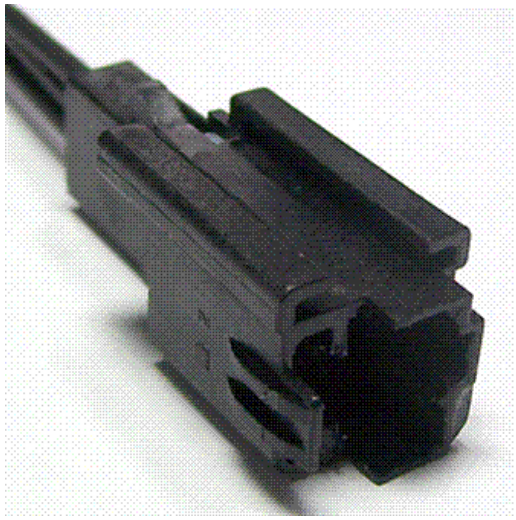
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	VMEA0 (BU-GN)	22	MICROPHONE - AMBIENT NOISE 3 +	
2	RMEA0 (WH-OG)	22	MICROPHONE - AMBIENT NOISE 3 -	
3	*	*	Not Used	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1103**	Service Part Number: **3U2Z-14S411-EXAB** Gauge: **18** Pin material: **Tin (greased)** Cavities: **3** Vehicle Uses

	Lamp - PRNDL Indicator Module - Radio Power Antenna Switch - Overdrive Cancel

CONNECTOR VIEWS > CONNECTOR END VIEW C4830 - CONVERTIBLE TOP MOTOR 1

Connector:C4830

Description

CONVERTIBLE TOP MOTOR 1

Color

LT GY

Harness

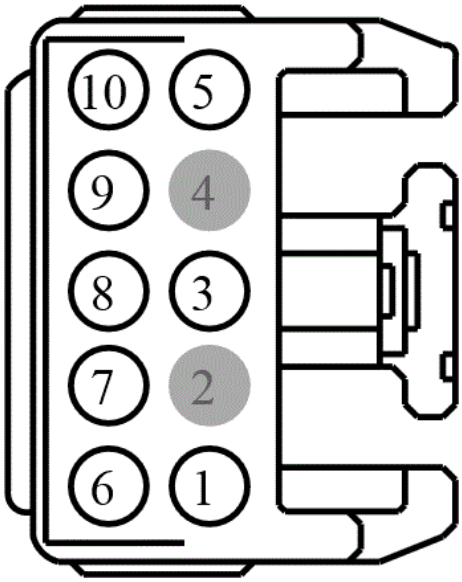
14A005

Base Part #

part# N/A

Service Pigtail

See Below



Check for Terminal Part Numbers

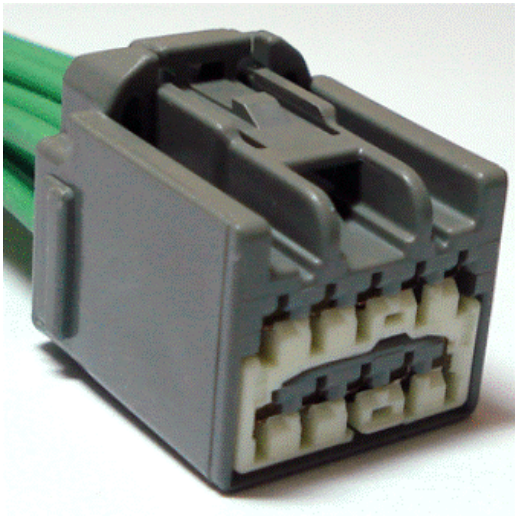
Pin	Circuit	Gauge	Circuit Function	Qualifier
1	LPRC1 (YE-OG)	22	CTRL MOD. - CONVERTIIBLE TOP LATCH SOLENOID # VPWR	
2	*	*	Not Used	
3	LPRC1 (YE-OG)	22	CTRL MOD. - CONVERTIIBLE TOP LATCH SOLENOID # VPWR	
4	*	*	Not Used	
5	GD347 (BK-VT)	14	GROUND - PILLAR C OR QUARTER PANEL LEFT	
6	SBB17 (RD)	14	FUSE - 17 OR CIRCUIT BREAKER	
7	VPRC1 (BU-GN)	22	CTRL MOD. - CONVERTIIBLE TOP LATCH SOLENOID # SIGNAL	
8	CPR23 (BU-OG)	22	SWITCH - CONVERTIBLE ROOF DOWN	

8	CPR23 (BU-OG)	26	SWITCH - CONVERTIBLE ROOF DOWN
9	VDB06 (GY-OG)	22	CONNECTOR - DIAGNOSTIC # CAN BUS MEDIUM SPEED HIGH
9	VDB06 (GY)	26	CONNECTOR - DIAGNOSTIC # CAN BUS MEDIUM SPEED HIGH
10	VDB07 (VT-OG)	22	CONNECTOR - DIAGNOSTIC # CAN BUS MEDIUM SPEED LOW
10	VDB07 (VT)	26	CONNECTOR - DIAGNOSTIC # CAN BUS MEDIUM SPEED LOW

Available Pigtail Kits

Pigtail Kit Part Number

WPT-1037



Service Part Number:

1U2Z-14S411-BLB

Gauge:

14

Pin material:

Silver

Cavities:

10

Vehicle Uses

Inverter - DC to AC

Module - Anti-theft

Module - Heated Seat

Module - Power Moonroof

Radio - Amplifier

Solenoid - Brake Shift Park Interlock

	Switch - Gear Shift Select/Neutral Safety Switch - Headlamp Switch - Heated Seat Switch - Moon Roof/Sun Roof Switch - Multifunction Switch - Overdrive Cancel Switch - Turn Signal Switch - Windshield Wiper / Washer

CONNECTOR VIEWS > CONNECTOR END VIEW C4831 - CONVERTIBLE TOP MOTOR 2

Connector:C4831

Description

CONVERTIBLE TOP MOTOR 2

Color

LT GY

Harness

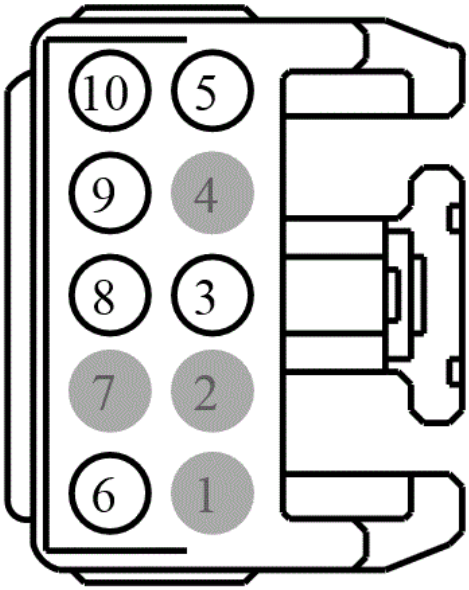
14A005

Base Part #

part# N/A

Service Pigtail

See Below



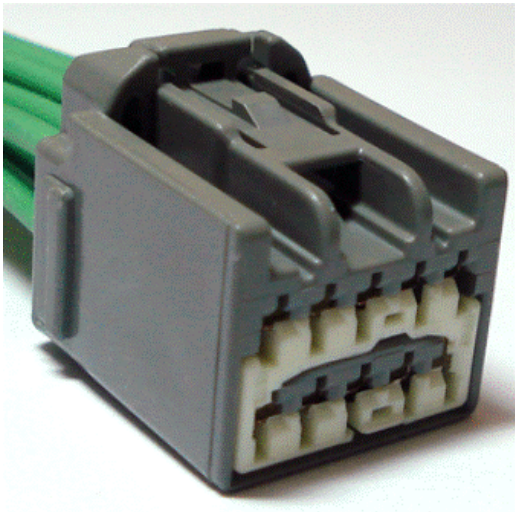
Pin	Circuit	Gauge	Circuit Function	Qualifier
1	*	*	Not Used	
2	*	*	Not Used	
3	GD348 (BK-YE)	14	GROUND - PILLAR C OR QUARTER PANEL RIGHT	
4	*	*	Not Used	
5	GD348 (BK-YE)	14	GROUND - PILLAR C OR QUARTER PANEL RIGHT	
6	SBB15 (WH-RD)	14	FUSE - 15 OR CIRCUIT BREAKER	
7	*	*	Not Used	
8	CPR24 (GN-VT)	22	SWITCH - CONVERTIBLE ROOF UP	
9	VDB06 (GY-OG)	22	CONNECTOR - DIAGNOSTIC # CAN BUS MEDIUM SPEED HIGH	

9	VDB06 (GY)	26	CONNECTOR - DIAGNOSTIC # CAN BUS MEDIUM SPEED HIGH	
10	VDB07 (VT-OG)	22	CONNECTOR - DIAGNOSTIC # CAN BUS MEDIUM SPEED LOW	
10	VDB07 (VT)	26	CONNECTOR - DIAGNOSTIC # CAN BUS MEDIUM SPEED LOW	

Available Pigtail Kits

Pigtail Kit Part Number

WPT-1037



Service Part Number:

1U2Z-14S411-BLB

Gauge:

14

Pin material:

Silver

Cavities:

10

Vehicle Uses

Inverter - DC to AC

Module - Anti-theft

Module - Heated Seat

Module - Power Moonroof

Radio - Amplifier

Solenoid - Brake Shift Park Interlock

Switch - Gear Shift Select/Neutral Safety

Switch - Headlamp

Switch - Heated Seat

Switch - Moon Roof/Sun Roof

Switch - Multifunction

	Switch - Overdrive Cancel Switch - Turn Signal Switch - Windshield Wiper / Washer

CONNECTOR VIEWS > CONNECTOR END VIEW C4845 - AAA_INLINE

InlineC4845

Description

AAA_INLINE

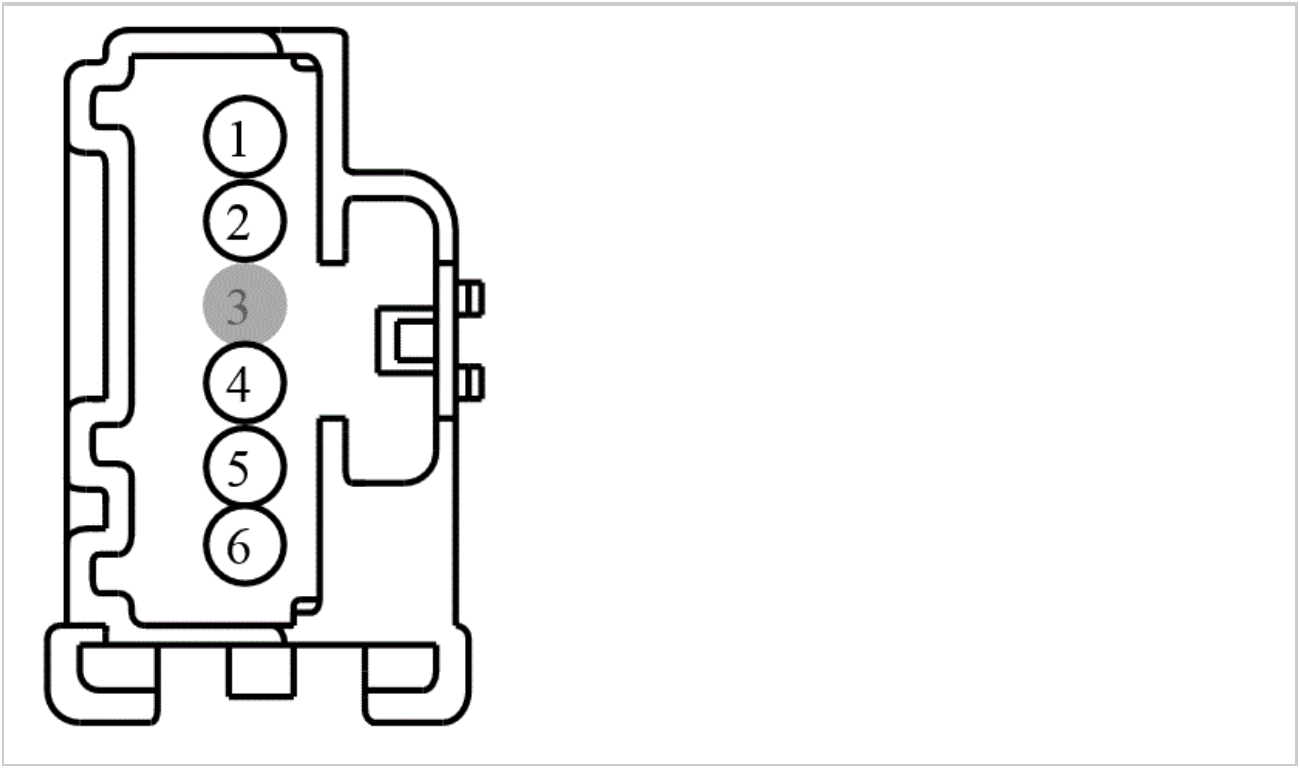
Color

Base Part #

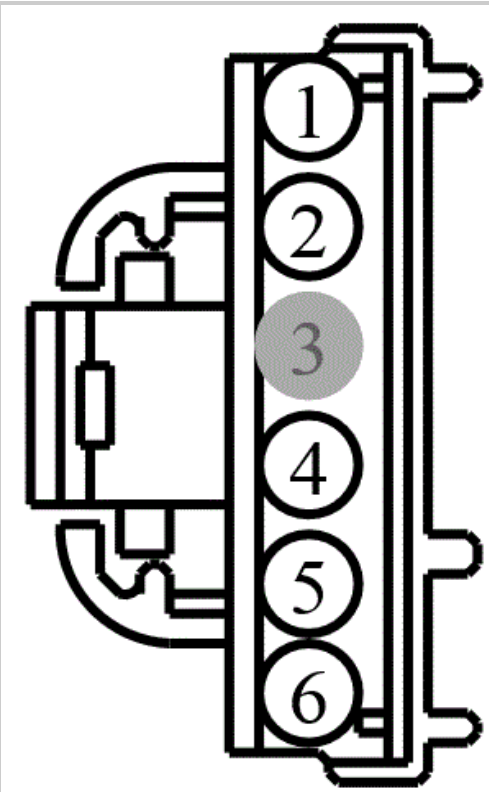
Service Pigtail

Not Available

Harness 14A005



Harness 14A005



Pin	Circuit	Gauge	Qualifier
1	CME44 (YE-GN)	20	
2	CLS17 (YE-GY)	22	
3	*	*	
4	GD347 (BK-VT)	18	14A005
4	GD347 (BK-VT)	22	14A005
5	DME63 (*)	4	14A005
5	GD347 (BK-VT)	18	14A005
6	DME62 (*)	4	14A005

6	GD347 (BK-VT)	18	14A005

CONNECTOR VIEWS > CONNECTOR END VIEW C4848 - CONVERTIBLE TOP SENSOR LH

Connector:C4848

Description

CONVERTIBLE TOP SENSOR LH

Color

BK

Harness

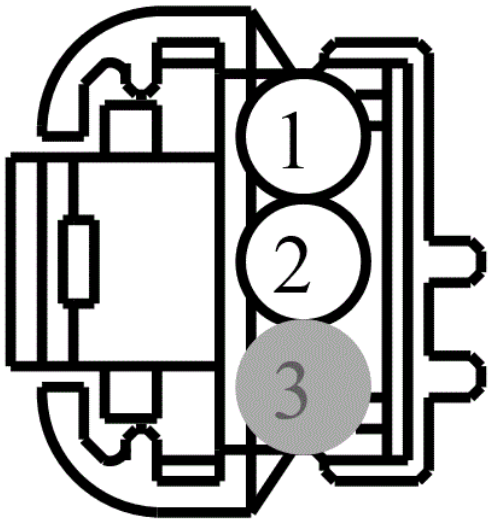
14A005

Base Part #

part# N/A

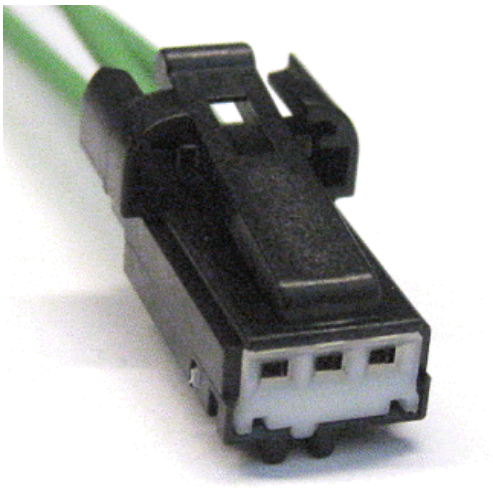
Service Pigtail

See Below



Pin	Circuit	Gauge	Circuit Function	Qualifier
1	VPRC2 (WH-BN)	22	CTRL MOD. - CONVERTIIBLE TOP SENSOR LH # SIGNAL	

2	LPRC1 (YE-OG)	22	CTRL MOD. - CONVERTIIBLE TOP SENSOR LH # VPWR	
3	*	*	Not Used	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-911** 	Service Part Number: **8U2Z-14S411-LA** Gauge: **18** Pin material: **Silver** Cavities: **3** Vehicle Uses Fuse Panel Junction Block Lamp - Ambient Lighting Lamp - Front Park Lamp - Map Lamp - Park/Turn Lamp - PRNDL Indicator Lamp - Roof Marker Module - Driver Door Sensor - Speed Switch - Ambient Lighting Dimmer

CONNECTOR VIEWS > CONNECTOR END VIEW C4849 - CONVERTIBLE TOP SENSOR RH

Connector:C4849

Description

CONVERTIBLE TOP SENSOR RH

Color

BK

Harness

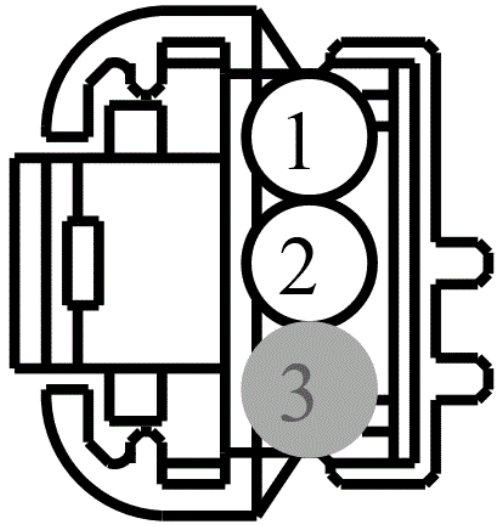
14A005

Base Part #

part# N/A

Service Pigtail

See Below

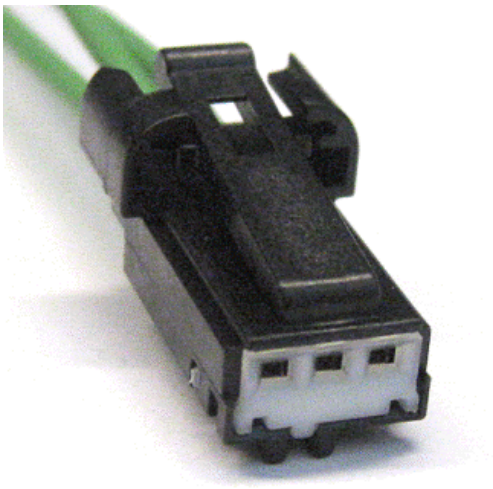


Pin	Circuit	Gauge	Circuit Function	Qualifier
1	VPRC2 (WH-BN)	22	CTRL MOD. - CONVERTIIBLE TOP SENSOR RH # SIGNAL	
2	LPRC1 (YE-OG)	22	CTRL MOD. - CONVERTIIBLE TOP SENSOR RH # VPWR	
3	*	*	Not Used	

Available Pigtail Kits	

Pigtail Kit Part Number

WPT-911



Service Part Number:

8U2Z-14S411-LA

Gauge:

18

Pin material:

Silver

Cavities:

3

Vehicle Uses

Fuse Panel Junction Block

Lamp - Ambient Lighting

Lamp - Front Park

Lamp - Map

Lamp - Park/Turn

Lamp - PRNDL Indicator

Lamp - Roof Marker

Module - Driver Door

Sensor - Speed

Switch - Ambient Lighting Dimmer

CONNECTOR VIEWS > CONNECTOR END VIEW C4850 - CONVERTIBLE TOP SENSOR LH

Connector:C4850

Description

CONVERTIBLE TOP SENSOR LH

Color

Harness

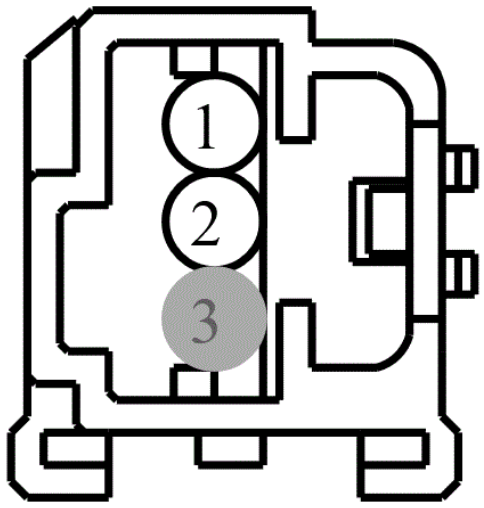
14A005

Base Part #

part# N/A

Service Pigtail

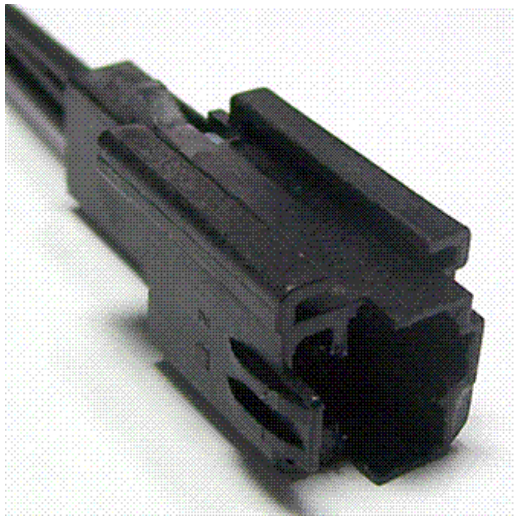
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	VPRC2 (WH-BN)	22	CTRL MOD. - CONVERTIIBLE TOP SENSOR LH # SIGNAL	
2	LPRC1 (YE-OG)	22	CTRL MOD. - CONVERTIIBLE TOP SENSOR LH # VPWR	
3	*	*	Not Used	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1103**	Service Part Number: **3U2Z-14S411-EXAB** Gauge: **18** Pin material: **Tin (greased)** Cavities:

	**3** Vehicle Uses Lamp - PRNDL Indicator Module - Radio Power Antenna Switch - Overdrive Cancel

CONNECTOR VIEWS > CONNECTOR END VIEW C4851 - CONVERTIBLE TOP SENSOR RH

Connector:C4851

Description

CONVERTIBLE TOP SENSOR RH

Color

Harness

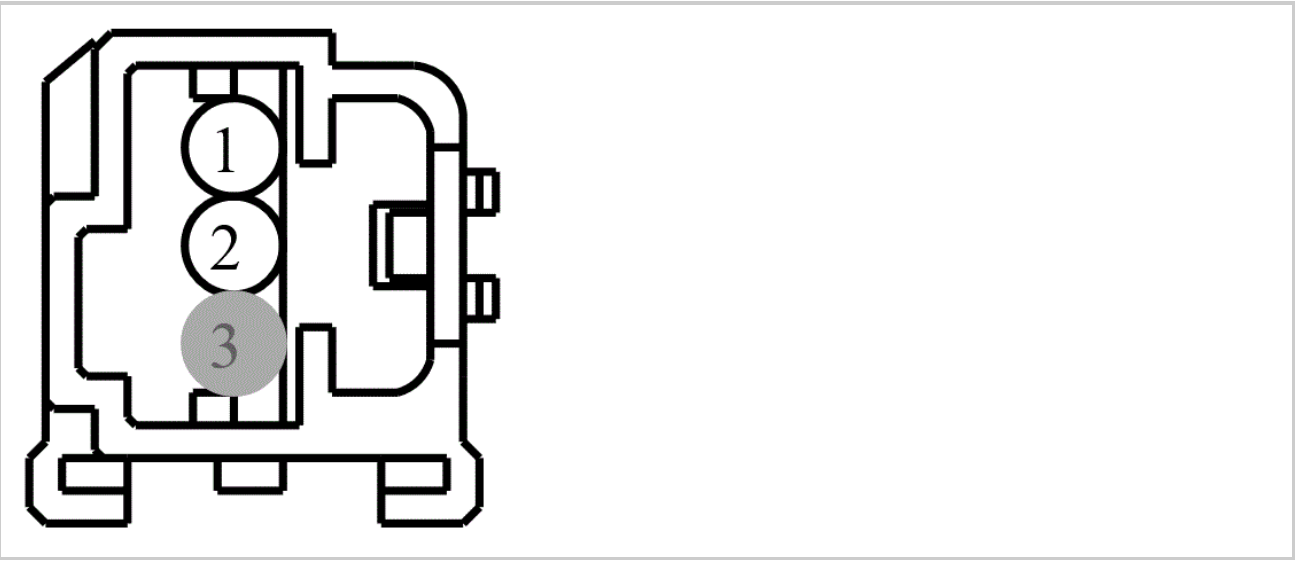
14A005

Base Part #

part# N/A

Service Pigtail

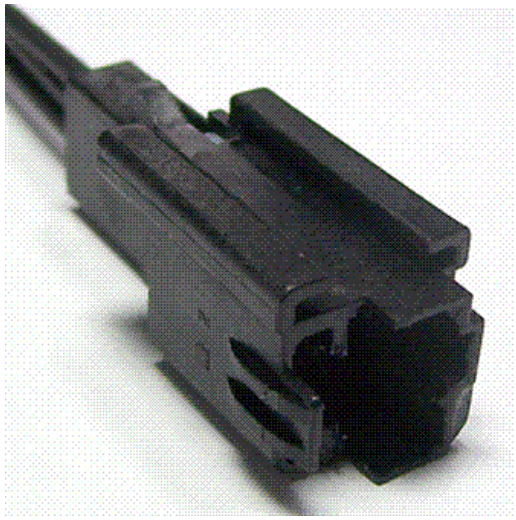
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	VPRC2 (WH-BN)	22	CTRL MOD. - CONVERTIIBLE TOP SENSOR RH # SIGNAL	
2	LPRC1 (YE-OG)	22	CTRL MOD. - CONVERTIIBLE TOP SENSOR RH # VPWR	
3	*	*	Not Used	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1103**	Service Part Number: **3U2Z-14S411-EXAB** Gauge: **18** Pin material: **Tin (greased)** Cavities: **3** Vehicle Uses Lamp - PRNDL Indicator

	Module - Radio Power Antenna Switch - Overdrive Cancel

CONNECTOR VIEWS > CONNECTOR END VIEW C9013 - CONVERTIBLE TOP SWITCH

Connector:C9013

Description

CONVERTIBLE TOP SWITCH

Color

BK

Harness

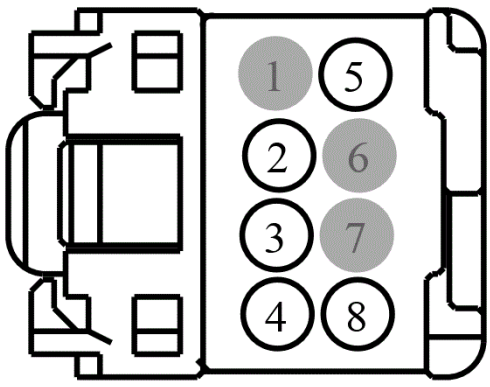
14335

Base Part #

part# N/A

Service Pigtail

See Below

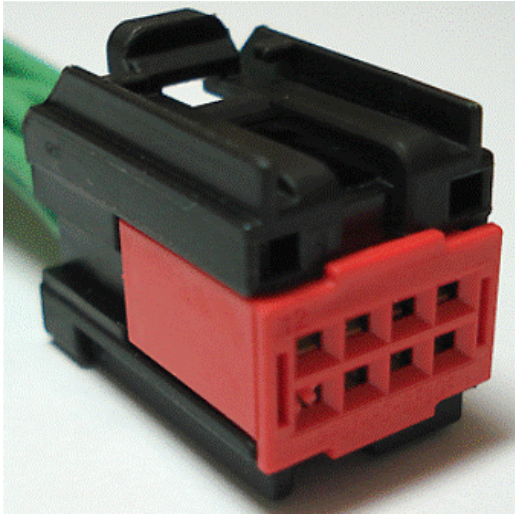


Pin	Circuit	Gauge	Circuit Function	Qualifier
1	*	*	Not Used	
2	GD216 (BK-VT)	22	GROUND - INSTRUMENT PANEL STRUCTURE # 3RD POINT	
3	CPR24 (GN-VT)	22	SWITCH - CONVERTIBLE ROOF UP	
4	CPR23 (BU-OG)	22	SWITCH - CONVERTIBLE ROOF DOWN	
5	GD216 (BK-VT)	22	GROUND - INSTRUMENT PANEL STRUCTURE # 3RD POINT	
6	*	*	Not Used	
7	*	*	Not Used	
8	VLN04 (VT-GY)	22	CTRL MOD. - IP/SWITCH ILLUMINATION	

Available Pigtail Kits

Pigtail Kit Part Number

WPT-995



Service Part Number:

3U2Z-14S411-BGB

Gauge:

18

Pin material:

Silver

Cavities:

8

Vehicle Uses

Lamp - Dimmer Switch

Switch - 4x4 Control

	Switch - Adjustable Pedal
	Switch - Center Stack (Multipurpose)
	Switch - Dimmer
	Switch - Hazard Warning
	Switch - Moon Roof/Sun Roof
	Switch - Multifunction
	Switch - Multifunction (Wiper)
	Switch - Seat (3rd Row)
	Switch - Third Row Power Folding Seat
	Switch - Traction Control

CONNECTOR VIEWS > CONNECTOR END VIEW C9031 - LH SIDE AIR CURTAIN

Connector:C9031

Description

LH SIDE AIR CURTAIN

Color

Harness

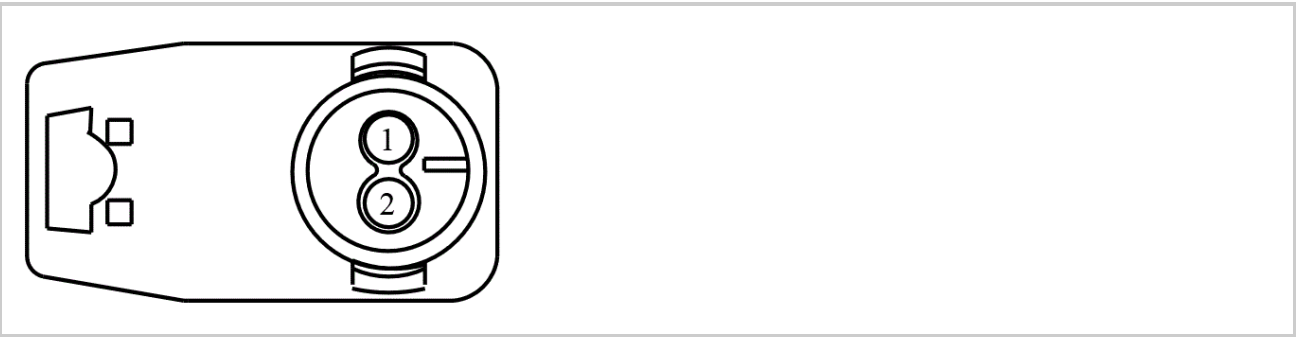
14A005

Base Part #

part# N/A

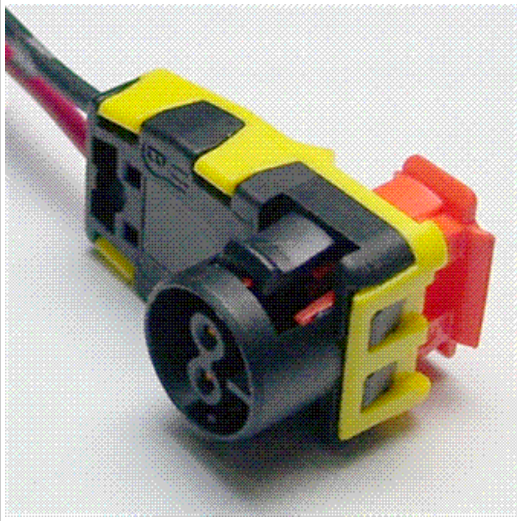
Service Pigtail

See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CR109 (BN-BU)	22	CTRL MOD. - INFLATABLE CURTAIN DRIVER SIDE +	
2	RR109 (BU-GN)	22	CTRL MOD. - INFLATABLE CURTAIN DRIVER SIDE -	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1225** 	Service Part Number: **BU2Z-14S411-BHA** Gauge: **20** Pin material: **FCI - Airbag** Cavities: **2** Vehicle Uses Airbag - Side Curtain Pretensioner - Seat Belt (Driver) Pretensioner - Seat Belt (Passenger) Sensor - Side Impact Squib - Airbag (Driver) Squib - Airbag (Passenger)

CONNECTOR VIEWS > CONNECTOR END VIEW C9032 - RH SIDE AIR CURTAIN

Connector:C9032

Description

RH SIDE AIR CURTAIN

Color

Harness

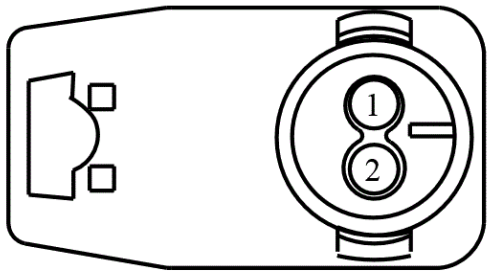
14A005

Base Part #

part# N/A

Service Pigtail

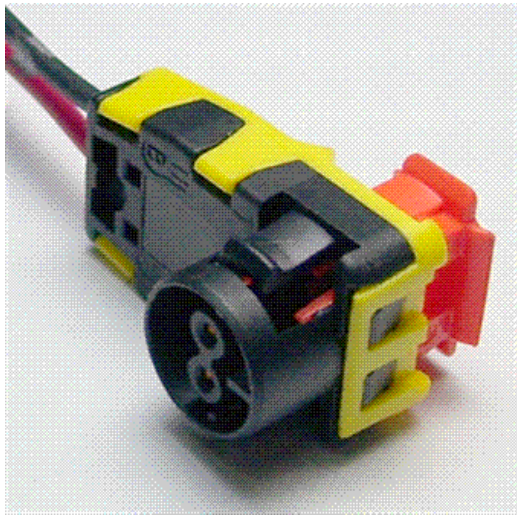
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CR111 (BN-WH)	22	CTRL MOD. - INFLATABLE CURTAIN PASSENGER SIDE +	
2	RR111 (YE-VT)	22	CTRL MOD. - INFLATABLE CURTAIN PASSENGER SIDE -	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1225**	Service Part Number: **BU2Z-14S411-BHA** Gauge: **20** Pin material: **FCI - Airbag** Cavities: **2** Vehicle Uses



Airbag - Side Curtain

Pretensioner - Seat Belt (Driver)

Pretensioner - Seat Belt (Passenger)

Sensor - Side Impact

Squib - Airbag (Driver)

Squib - Airbag (Passenger)

CONNECTOR VIEWS > CONNECTOR END VIEW C9063 - TWEETER LH A-PILLAR

Connector:C9063

Description

TWEETER LH A-PILLAR

Color

BK

Harness

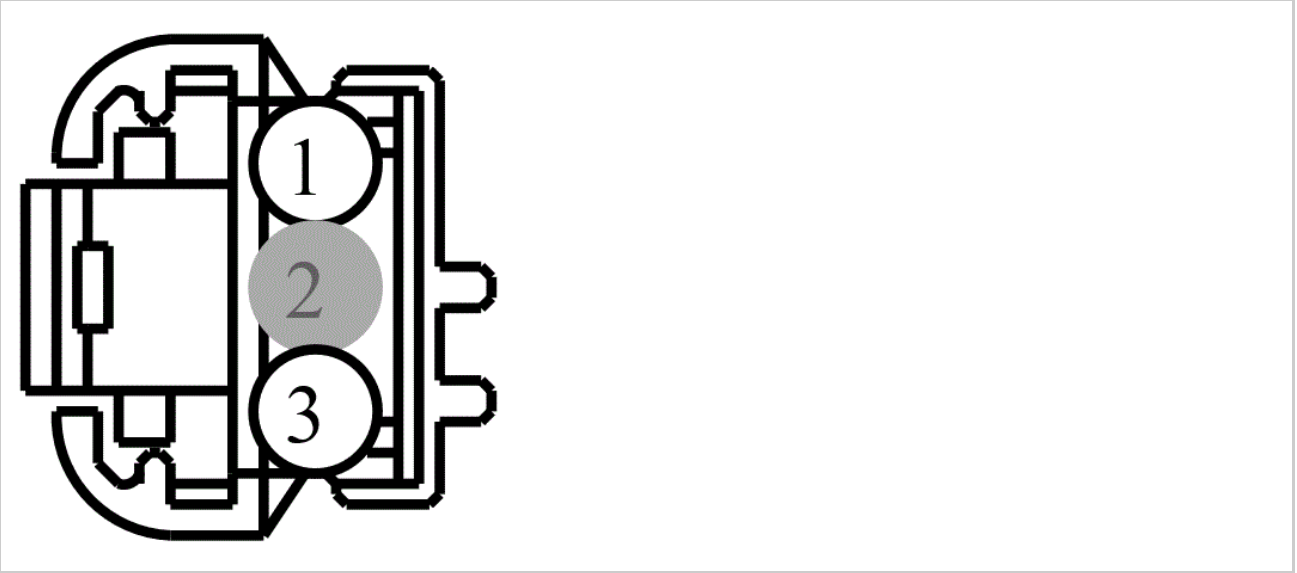
14401

Base Part #

part# N/A

Service Pigtail

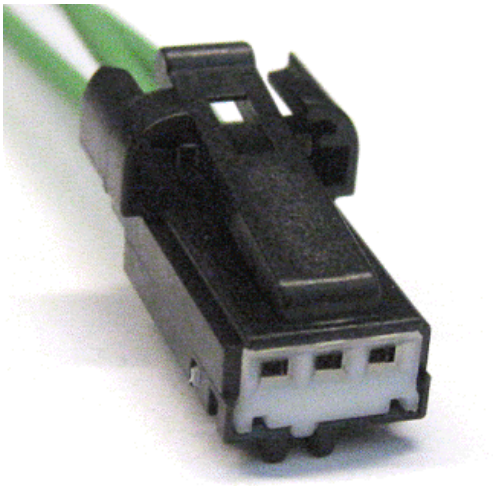
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	VME07 (WH)	18	CTRL MOD. - AUDIO # SPEAKER LEFT FRONT DOOR (WOOFER) +	
1	VME15 (GN-BU)	18	CTRL MOD. - AUDIO # SPEAKER LEFT MIDDLE +	
2	*	*	Not Used	
3	RME07 (WH-BN)	18	CTRL MOD. - AUDIO # SPEAKER LEFT FRONT DOOR (WOOFER) -	
3	RME15 (GY-BU)	18	CTRL MOD. - AUDIO # SPEAKER LEFT MIDDLE -	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-911**	Service Part Number: **8U2Z-14S411-LA** Gauge: **18**



Pin material:

Silver

Cavities:

3

Vehicle Uses

Fuse Panel Junction Block

Lamp - Ambient Lighting

Lamp - Front Park

Lamp - Map

Lamp - Park/Turn

Lamp - PRNDL Indicator

Lamp - Roof Marker

Module - Driver Door

Sensor - Speed

Switch - Ambient Lighting Dimmer

CONNECTOR VIEWS > CONNECTOR END VIEW C9065 - TWEETER RH A-PILLAR

Connector:C9065

Description

TWEETER RH A-PILLAR

Color

BK

Harness

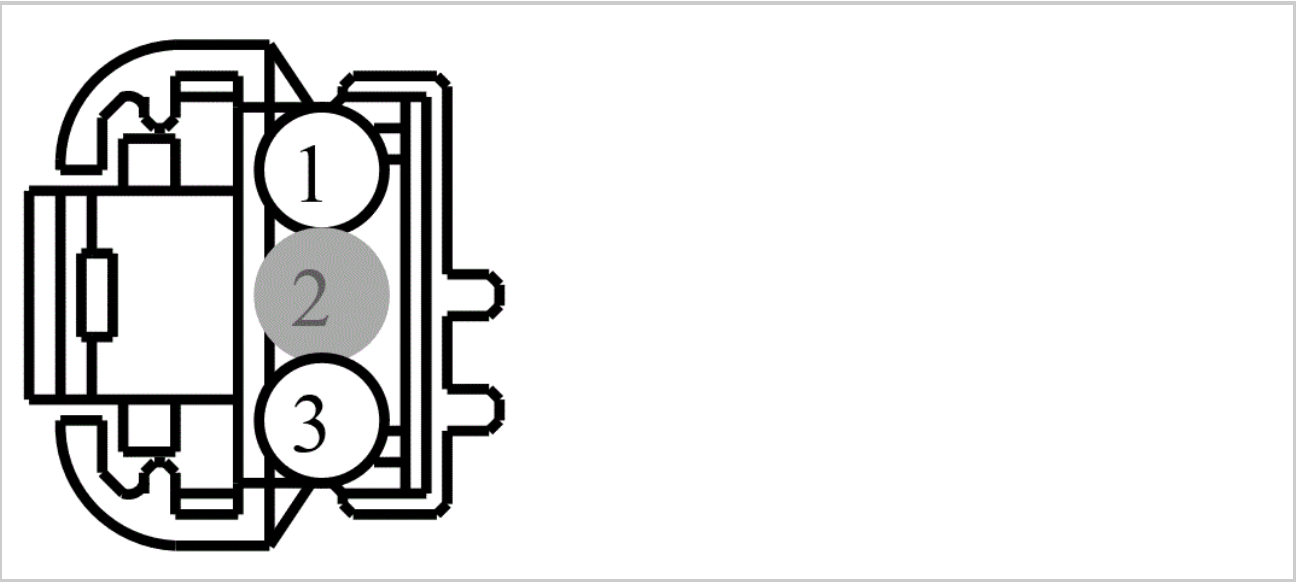
14401

Base Part #

part# N/A

Service Pigtail

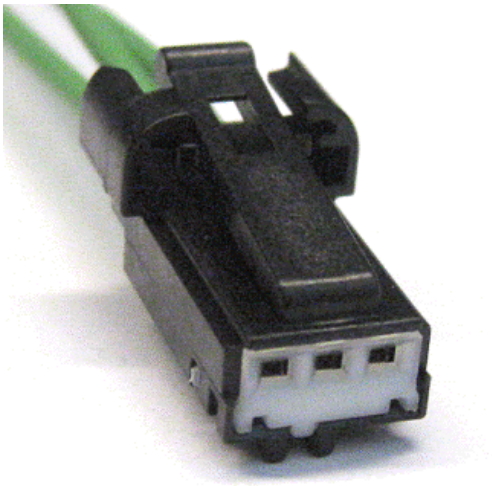
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	VME10 (WH-VT)	18	CTRL MOD. - AUDIO # SPEAKER RIGHT FRONT DOOR (WOOFER) +	
1	VME16 (VT-GY)	18	CTRL MOD. - AUDIO # SPEAKER RIGHT MIDDLE +	
2	*	*	Not Used	
3	RME10 (WH-OG)	18	CTRL MOD. - AUDIO # SPEAKER RIGHT FRONT DOOR (WOOFER) -	
3	RME16 (YE-GY)	18	CTRL MOD. - AUDIO # SPEAKER RIGHT MIDDLE -	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-911**	Service Part Number: **8U2Z-14S411-LA** Gauge: **18**



Pin material:

Silver

Cavities:

3

Vehicle Uses

Fuse Panel Junction Block

Lamp - Ambient Lighting

Lamp - Front Park

Lamp - Map

Lamp - Park/Turn

Lamp - PRNDL Indicator

Lamp - Roof Marker

Module - Driver Door

Sensor - Speed

Switch - Ambient Lighting Dimmer

CONNECTOR VIEWS > CONNECTOR END VIEW C9111 - CONVERTIBLE TOP LATCH SOLINOID

Connector:C9111

Description

CONVERTIBLE TOP LATCH SOLINOID

Color

BK

Harness

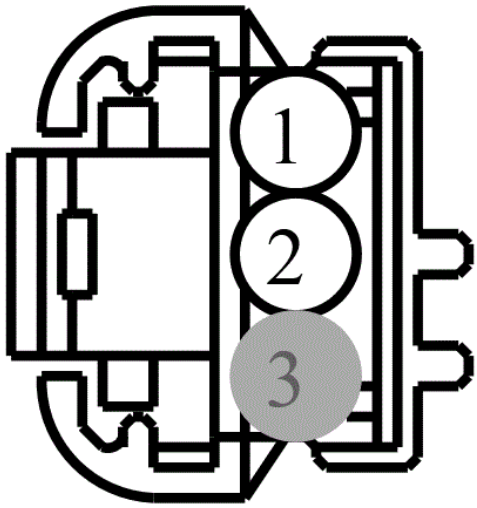
14B242

Base Part #

part# N/A

Service Pigtail

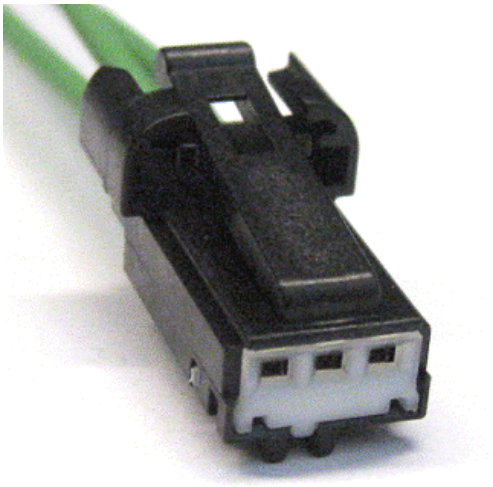
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	VPRC1 (BU-GN)	22	CTRL MOD. - CONVERTIIBLE TOP LATCH SOLENOID # SIGNAL	
2	LPRC1 (YE-OG)	22	CTRL MOD. - CONVERTIIBLE TOP LATCH SOLENOID # VPWR	
3	*	*	Not Used	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-911**	Service Part Number: **8U2Z-14S411-LA** Gauge: **18** Pin material: **Silver** Cavities: **3**



Vehicle Uses

Fuse Panel Junction Block

Lamp - Ambient Lighting

Lamp - Front Park

Lamp - Map

Lamp - Park/Turn

Lamp - PRNDL Indicator

Lamp - Roof Marker

Module - Driver Door

Sensor - Speed

Switch - Ambient Lighting Dimmer

CONNECTOR VIEWS > CONNECTOR END VIEW C9222 - ACTIVE NOISE CONTROL MICROPHONE- FRONT

Connector:C9222

Description

ACTIVE NOISE CONTROL MICROPHONE- FRONT

Color

BK

Harness

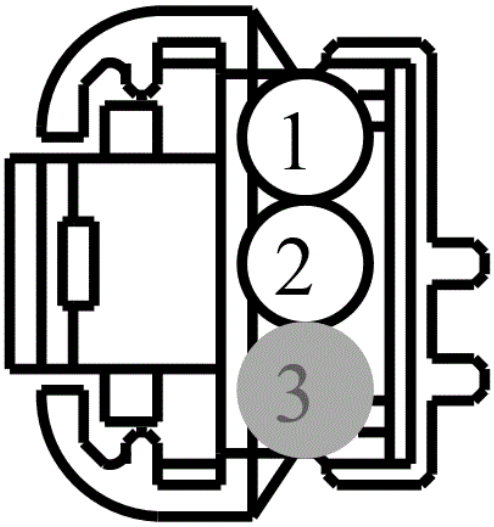
14334/14335

Base Part #

part# N/A

Service Pigtail

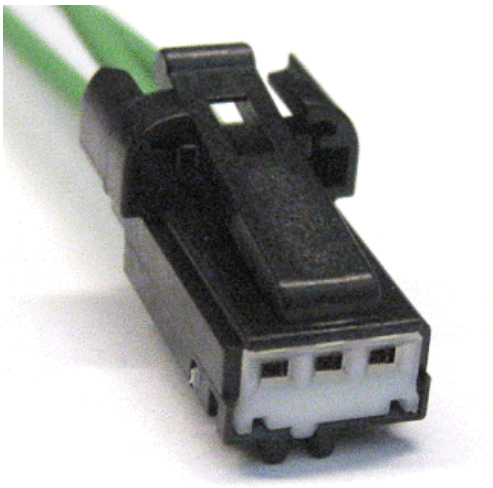
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	VME57 (YE-VT)	22	MICROPHONE - AMBIENT NOISE +	
2	RME57 (BU-BN)	22	MICROPHONE - AMBIENT NOISE -	
3	*	*	Not Used	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-911**	Service Part Number: **8U2Z-14S411-LA** Gauge: **18** Pin material: **Silver** Cavities: **3** Vehicle Uses



Fuse Panel Junction Block

Lamp - Ambient Lighting

Lamp - Front Park

Lamp - Map

Lamp - Park/Turn

Lamp - PRNDL Indicator

Lamp - Roof Marker

Module - Driver Door

Sensor - Speed

Switch - Ambient Lighting Dimmer

CONNECTOR VIEWS > CONNECTOR END VIEW C9223 - ACTIVE NOISE CONTROL MICROPHONE- REAR

Connector:C9223

Description

ACTIVE NOISE CONTROL MICROPHONE- REAR

Color

BK

Harness

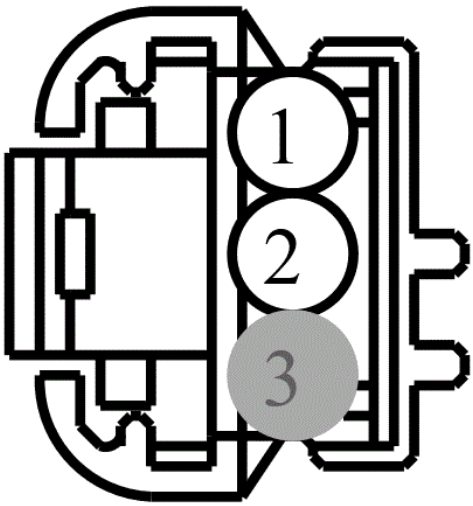
14334

Base Part #

part# N/A

Service Pigtail

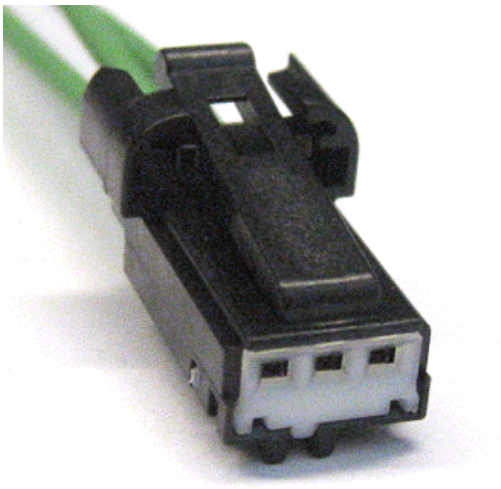
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	VMEA0 (BU-GN)	22	MICROPHONE - AMBIENT NOISE 3 +	
2	RMEA0 (WH-OG)	22	MICROPHONE - AMBIENT NOISE 3 -	
3	*	*	Not Used	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-911**	Service Part Number: **8U2Z-14S411-LA** Gauge: **18** Pin material: **Silver** Cavities: **3** Vehicle Uses Fuse Panel Junction Block

	Lamp - Ambient Lighting Lamp - Front Park Lamp - Map Lamp - Park/Turn Lamp - PRNDL Indicator Lamp - Roof Marker Module - Driver Door Sensor - Speed Switch - Ambient Lighting Dimmer

CONNECTOR VIEWS > CONNECTOR END VIEW C9801 - PASSENGER AIRBAG DEACTIVATION (PAD) INDICATOR

Connector:C9801

Description

PASSENGER AIRBAG DEACTIVATION (PAD) INDICATOR

Color

BK

Harness

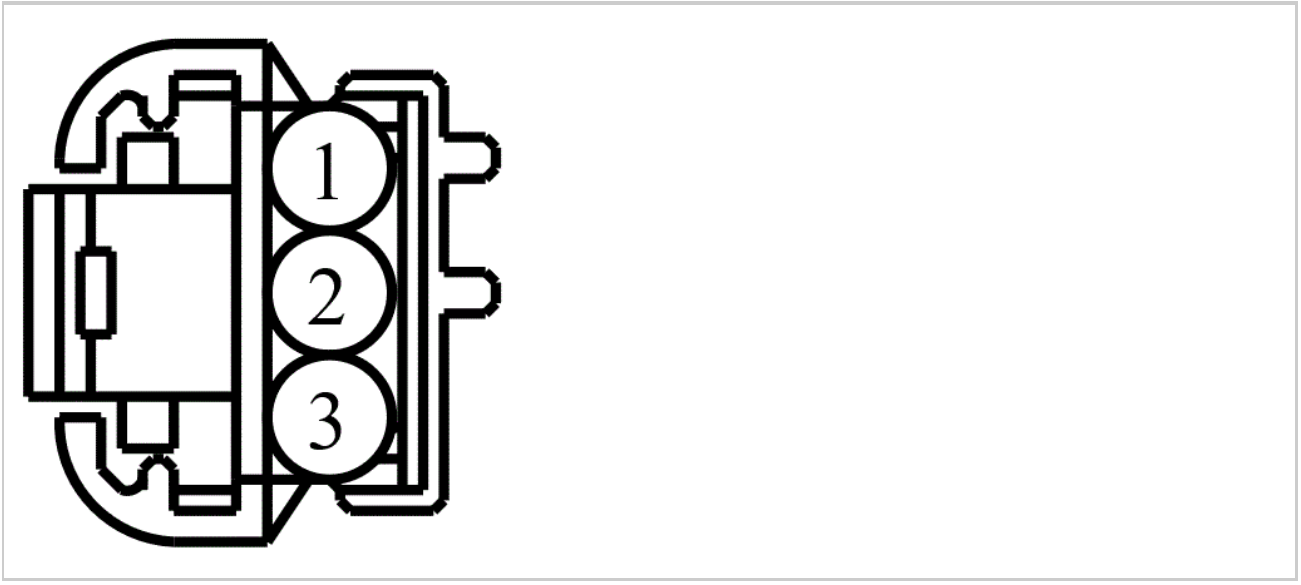
14334/14335

Base Part #

part# N/A

Service Pigtail

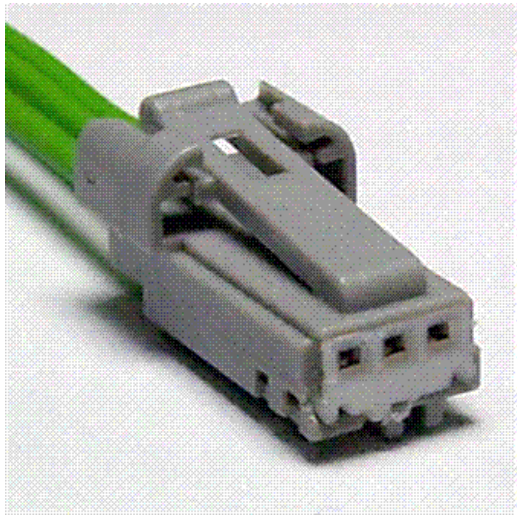
See Below



Check for Terminal Part Numbers

Pin	Circuit	Gauge	Circuit Function	Qualifier
1	CR116 (BN-GN)	22	CTRL MOD. - INDICATOR PASSENGER AIR BAG DEACTIVATE +	
2	RR116 (GN-WH)	22	CTRL MOD. - INDICATOR PASSENGER AIR BAG DEACTIVATE -	
3	CBP19 (BN-WH)	22	FUSE - 19 OR CIRCUIT BREAKER	

Available Pigtail Kits	
Pigtail Kit Part Number **WPT-1182**	Service Part Number: **BU2Z-14S411-AFA** Gauge: **18** Pin material: **Silver** Cavities: **3**

	Vehicle Uses Microphone

Service Manual: OEM FUSE AND RELAY IDENTIFICATION

FUSE AND RELAY INFORMATION > BATTERY JUNCTION BOX

Fig 1: Battery Junction Box

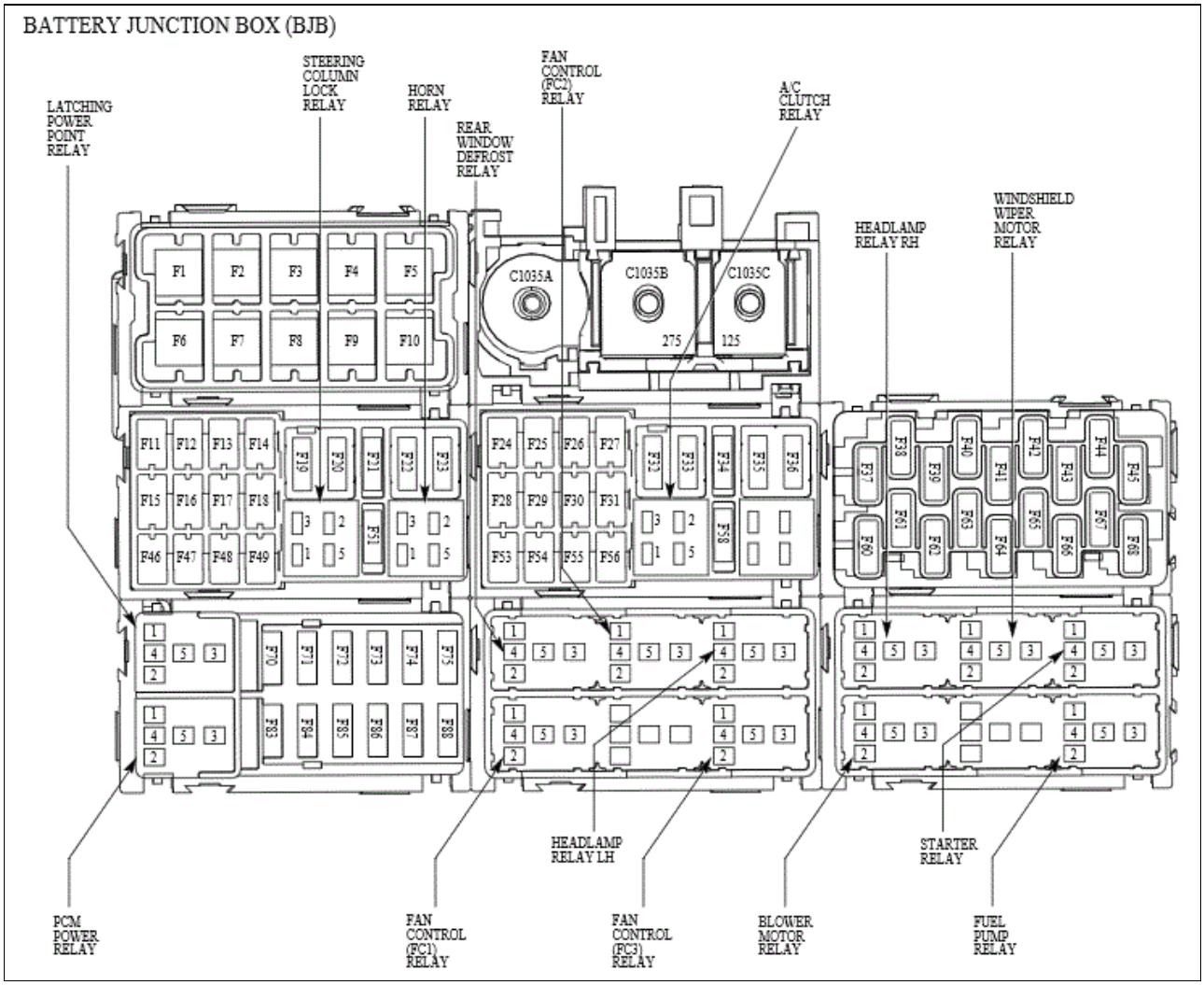


Fig 2: Battery Junction Box Legend (1 Of 2)

BATTERY JUNCTION BOX (BJB)

Fuse	Amps	Circuits protected
MEGA	275	Generator
MIDI	125	Power Steering Control Module (PSCM)
F1	-	Not used
F2	-	Not used
F3	-	Not used
F4	-	Not used
F5	50	Anti-lock Brake System (ABS) module
F6	50	Body Control Module (BCM)
F7	60	Body Control Module (BCM)
F8	50	Body Control Module (BCM)
F9	40	Heated rear window element, Front Controls Interface Module (FCIM)
F10	40	Blower motor relay
F11	30	Driver Door Module (DDM), Driver door window regulator motor
F12	30	Front seat control switch LH, Driver Seat Module (DSM)
F13	30	Front seat control switch RH
F14	30	Front seat climate control Module [SCME]
F15	20	Convertible top motor 2
F16	-	Not used
F17	20	Convertible top motor 1
F18	-	Not used
F19	20	Steering column lock relay
F20	10	Brake Pedal Position (BPP) switch
F21	20	Horn relay
F22	10	PCM power relay
F23	10	A/C clutch relay
F24	30	Body Control Module (BCM)
F25	-	Not used
F26	25	Windshield wiper motor, rain sensor
F27	-	Not used
F28	30	Anti-lock Brake System (ABS) module
F29	30	Fan Control (FC1) relay, Engine cooling fan motor 1
F30	30	Starter relay
F31	40	Fan control (FC3) relay
F32	10	Latching power point relay, F53, F54
F33	20	Headlamp assembly LH
F34	-	Not used
F35	20	Headlamp assembly RH

Fuse	Amps	Circuits protected
F36	10	Generator
F37	-	Not used
F38	20	Powertrain Control Module (PCM)
F40	20	Evaporative emission canister vent valve, Intake Manifold Runner Control Bank 1 (IMRC1) solenoid, Evaporative emission (EVAP) purge valve, Variable Camshaft Timing (VCT) solenoids, Heated Oxygen Sensors (HO2S), Universal Heated Oxygen Sensors (HO2S)
F41	15	Powertrain Control Module (PCM) - 3.7L, Fuel injectors - 3.7L/5.0L
F42	15	Fan Control (FC2) relay, Fan Control (FC3) relay, Fan Control (FC1) relay, Engine mount control solenoid, Active grille shutter, Turbocharger Bypass Valve (TCBY) - 2.3L, Turbocharger wastegate regulator valve solenoid - 2.3L, Air Conditioning (A/C) compressor control solenoid - 2.3L
F43	-	Not used
F44	15	Ignition coil-on-plugs, Ignition transformer capacitor 1 - 5.0L
F45	-	Not used
F46	-	Not used
F47	-	Not used
F48	-	Not used
F49	30	Fuel pump relay
F51	-	Not used
F53	20	Auxiliary power point
F54	20	Front power outlet socket
F55	25	Engine cooling fan motor 2
F56	-	Not used
F58	-	Not used
F60	5	Powertrain Control Module (PCM)
F61	-	Not used
F62	5	Anti-lock Brake System (ABS) module
F63	-	Not used
F64	5	Power Steering Control Module (PSCM)
F65	-	Not used
F66	5	Rear window defrost relay, Proximity warning radar unit, Head Up Display (HUD) module, Rear parking aid camera, Side Obstacle Detection Control Modules
F67	-	Not used
F68	10	Headlamp switch. Headlamp control modules, Headlamp assemblies
F70	10	Exterior mirrors
F71	-	Not used

Fig 3: Battery Junction Box Legend (2 Of 2)

BATTERY JUNCTION BOX (BJB)

Fuse	Amps	Circuits protected
F72	5	Rain sensor
F73	-	Not used
F74	5	Mass Airflow/Intake Air Temperature (MAF/IAT) sensor
F75	-	Not used

FUSE AND RELAY INFORMATION > BODY CONTROL MODULE

Fig 1: Body Control Module

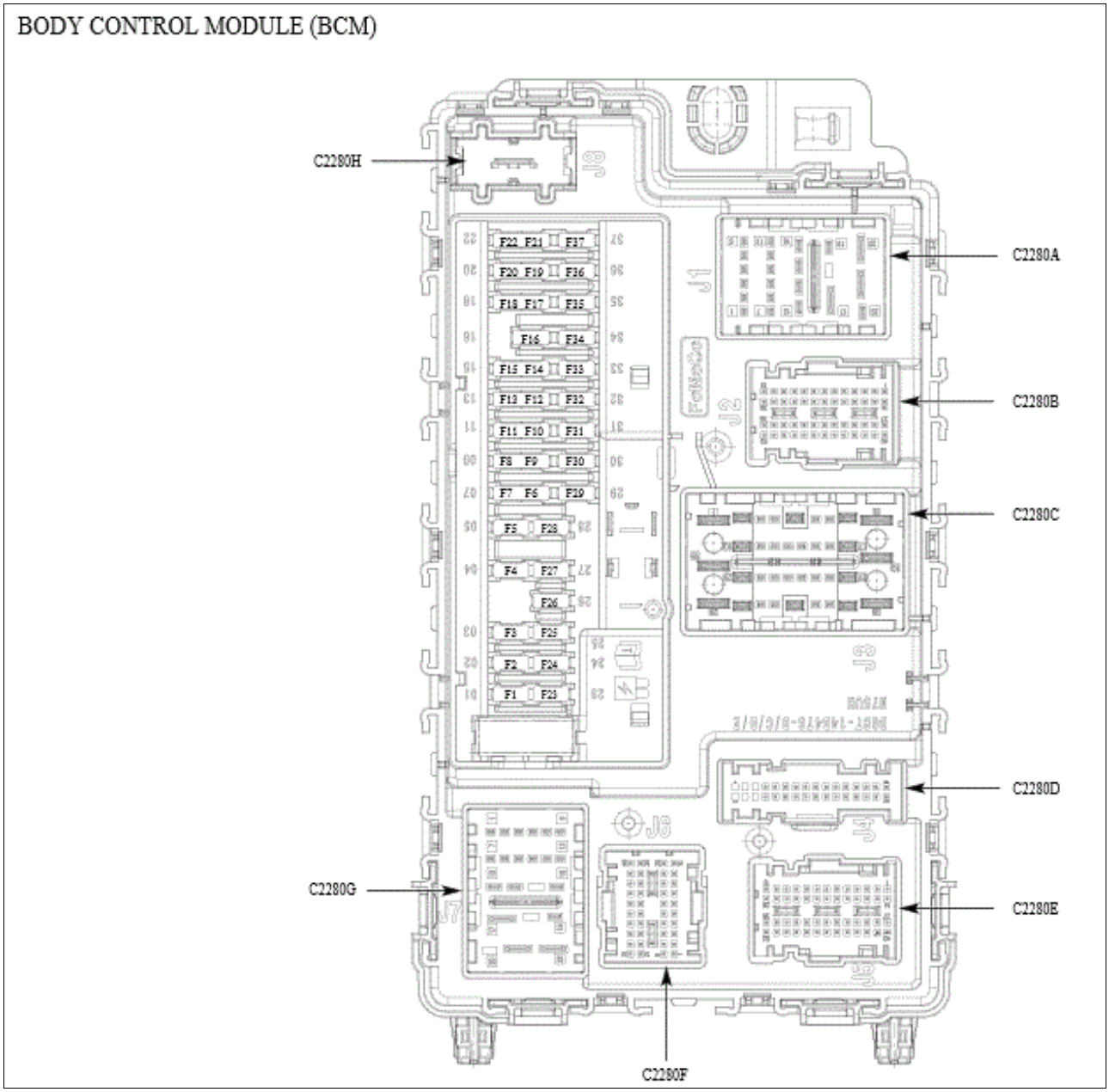


Fig 2: Body Control Module Legend

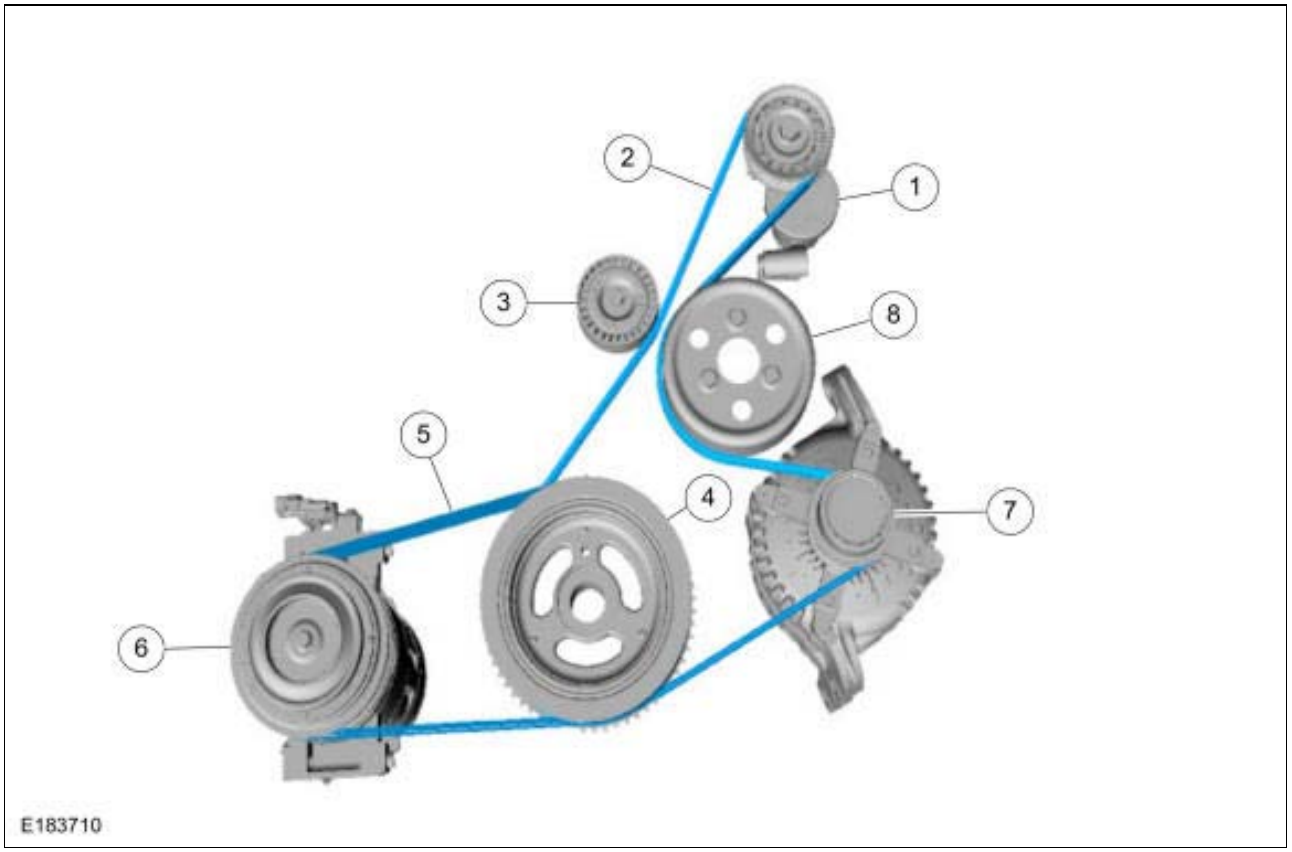
BODY CONTROL MODULE (BCM)

Fuse	Amps	Circuits protected
F1	10	Battery saver relay, Center console lock assembly, luggage compartment, Glove compartment lamp, Overhead console, Vanity mirror lamps
F2	7.5	Power folding mirror relay, Driver Seat Module (DSM)
F3	20	Driver unlock relay, Center console lock assembly, Front door latch motor LH
F4	5	Not used
F5	20	Subwoofer amplifier rear
F6	10	Not used
F7	10	Not used
F8	10	Security horn relay, Anti-theft horn
F9	10	Not used
F10	5	Not used
F11	5	Not used
F12	7.5	Front Controls Interface Module (FCIM)
F13	7.5	Gateway module, Instrument Panel Cluster (IPC), Steering Column Module (SCCM)
F14	10	Not used
F15	10	Gateway module
F16	15	Luggage relay, Luggage compartment lid latch
F17	5	Not used
F18	5	Overhead console
F19	7.5	Passenger Airbag Deactivation (PAD) indicator
F20	7.5	Not used
F21	5	In-vehicle temperature sensor

Fuse	Amps	Circuits protected
F22	5	Occupant Classification System Module (OCSM)
F23	10	Power window motors (Rear), Passenger door window regulator motor, Front door lock switch RH, Passenger door window control switch, Master window control switch, Driver door window regulator switch, Front door lock switch LH, Auto-dimming interior mirror
F24	20	Central lock and unlock relays, Front door latch release motor RH, Front doors latch release motors
F25	30	Not used
F26	30	Passenger Door Module (PDM), Passenger door window regulator motor
F27	30	Audio Digital Signal Processing (DSP) module
F28	20	Body control module B
F29	30	Power window motor left rear
F30	30	Power window motor right rear
F31	15	Not used
F32	10	Global Positioning System Module (GPSM), Accessory Protocol Interface Module (APIM), Front Control/Display Interface Module (FCDIM), Information control module, Radio Transceiver Module (RTM)
F33	20	Audio Control Module (ACM)
F34	30	Run/start relay, BCM F19, F20, F21, F22, F35, F36, F37
F35	5	Restraints Control Module (RCM)
F36	15	Body control module B
F37	15	Battery Junction Box (BJB) F60, F62, F64, F66, F68

DESCRIPTION AND OPERATION > ACCESSORY DRIVE - COMPONENT LOCATION

Fig 1: View Of Drive Belt Routing And Pulley



Courtesy of FORD MOTOR COMPANY

Item	Description
1	Accessory drive belt tensioner
2	Accessory drive belt
3	Drive belt idler pulley assembly
4	Crankshaft belt pulley
5	Belt - A/C compressor
6	Pulley - A/C compressor
7	Generator pulley
8	Coolant pump pulley

DIAGNOSIS AND TESTING > ACCESSORY DRIVE > INSPECTION AND VERIFICATION

1.

Verify the customer concern.

2.

Visually inspect for obvious signs of mechanical damage.

Visual Inspection Chart

Mechanical
Damaged or contaminated accessory drive belt Damaged or contaminated pulley(s) Incorrect accessory drive belt Incorrect fitment of the accessory drive belt Generator Air conditioning (A/C) compressor Pulley(s) Loose hardware

3.

If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.

DIAGNOSIS AND TESTING > ACCESSORY DRIVE > ACCESSORY DRIVE BELT CONCERNS

NOTE: Do not lubricate the accessory drive belt as potential damage to the accessory drive belt material construction may occur.

Cracking

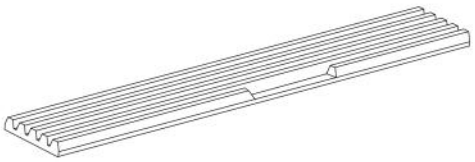
Accessory drive belts are made from rubber which hardens with time and can develop cracks. As the accessory drive belt runs on the back of some of the pulleys, the cracks are opened up. Small cracks are not considered to be a failure of the accessory drive belt. Only if the crack is deep enough to reach the bottom of the groove to expose the cord or any chunks are found to be missing from the accessory drive belt, is the accessory drive belt condition considered to be unacceptable.

1.

Check the accessory drive belt for cracks. If the damage exceeds the acceptable limit, install a new accessory drive belt. REFER to: Accessory Drive Belt .

Chunking

Chunking describes the condition where long lengths of rubber become detached from the ribs of the accessory drive belt. This is considered to be a failure of the accessory drive belt.



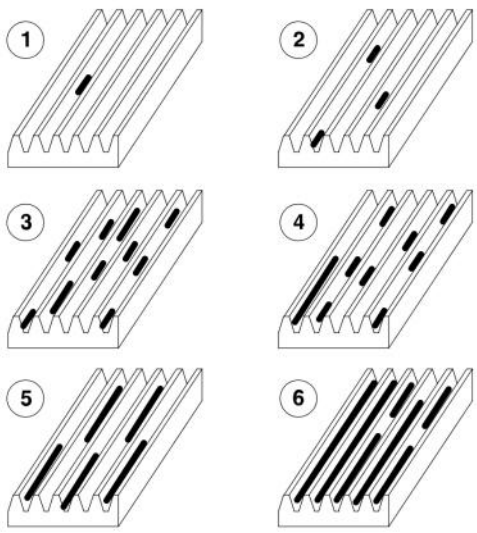
MPZ9632071

2.

Check the accessory drive belt for damage. If any chunks are found to be missing, install a new accessory drive belt. REFER to: Accessory Drive Belt .

Pilling

Pilling is dust that forms in between the ribs of the accessory drive belt from rubber that is worn off the accessory drive belt when it is new. There may also be loose particles left on the accessory drive belt during the manufacturing process. These are worn off and form into small balls of rubber that then get trapped in the grooves of the accessory drive belt. This condition will usually clear itself within 4800 km - 8000 km (3000 miles - 5000 miles) of normal driving.



VUE0037805

3.

Check the accessory drive belt for pilling. The condition of the accessory drive belt should be compared against the illustration.

1.

Small scattered pills. Not considered a concern. No action required.

2.

Small scattered pills. Not considered a concern. No action required.

3.

Longer pills up to 50% of the rib height. Possible noise concern. INSTALL a new accessory drive belt if noise is apparent. REFER to: Accessory Drive Belt .

4.

Longer pills up to 50% of the rib height. Possible noise concern. INSTALL a new accessory drive belt if noise is apparent. REFER to: Accessory Drive Belt .

5.

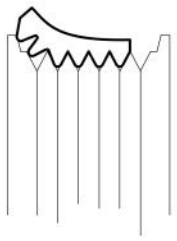
Heavy deposits in the grooves. Possible noise and stability concern. INSTALL a new accessory drive belt. REFER to: Accessory Drive Belt .

6.

Heavy deposits in the grooves. Possible noise and stability concern. INSTALL a new accessory drive belt. REFER to: Accessory Drive Belt .

Incorrect fitment

Accessory drive belt noise can be generated by the accessory drive belt being incorrectly fitted on the pulley as shown in the following illustration. Make sure that all the V grooves on the accessory drive belt contact correctly with the pulley.



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4.

If the cause is not visually evident, verify the symptom and refer to the Symptom Chart .

DIAGNOSIS AND TESTING > ACCESSORY DRIVE > SYMPTOM CHART

Symptom	Possible Sources	Action
Accessory drive belt noise	Accessory drive system	Use a stethoscope or other listening device to determine the source of the noise. INSTALL new

		components as necessary. TEST the system for normal operation.
Accessory drive belt incorrectly installed.		CHECK the accessory drive belt is correctly installed in the pulley grooves. INSTALL a new accessory drive belt as necessary. REFER to: Accessory Drive Belt . TEST the system for normal operation.
Pulley(s).		CHECK the pulley(s) for damage, freedom of rotation, stone entrapment and alignment. INSTALL new components as necessary. TEST the system for normal operation.
Lubricant or other contamination.		CHECK the accessory drive belt for contamination or damage. RECTIFY the source of the leak and INSTALL a new accessory drive belt. REFER to: Accessory Drive Belt . TEST the system for normal operation.
NOTE: Chirp is defined as a twittering noise, often intermittent Accessory drive belt chirp	Pulley misalignment (usually evident at idle).	CHECK that the accessory drive belt is running centrally on the flat pulleys. TEST the system for normal operation. CHECK the pulleys for excessive end float and bent flanges. With the engine running at idle, use a stethoscope to identify the source of the noise. INSTALL new components as necessary. TEST the system for normal operation.
NOTE: Rattle is defined as a metallic knocking noise Accessory drive belt rattle	Loose components or hardware.	CHECK the components or hardware for correct installation and tighten as necessary. TEST the system for normal operation.

DIAGNOSIS AND TESTING > ACCESSORY DRIVE > COMPONENT TESTS

Accessory Drive Belt Tensioner - Static Check

The accessory drive belt tensioner may be checked statically as follows:

1.

Inspect the area surrounding the accessory drive belt tensioner for lubricant or other contamination. Rectify any leaks before installing a new accessory drive belt tensioner. If the accessory drive belt tensioner is contaminated, do not attempt to clean it as the damping mechanism inside may be damaged. INSTALL a new accessory drive belt tensioner as necessary. REFER to: Accessory Drive Belt Tensioner .

TEST the system for normal operation.

2.

Detach the accessory drive belt in the area of the accessory drive belt tensioner.

NOTE: The accessory drive belt tensioner has a damping feature, which is usually a friction device, therefore some friction within the system is normal.

3.
Using the correct tool, move the accessory drive belt tensioner from its relaxed position through its full stroke and back to the relaxed position to make sure there is no excessive stick, grab or bind, and to make sure there is tension on the accessory drive belt tensioner spring.

4.

Rotate the accessory drive belt tensioner pulley and check for damage, freedom of rotation and alignment. INSTALL a new accessory drive belt tensioner as necessary. REFER to: Accessory Drive Belt Tensioner .

TEST the system for normal operation.

5.

If the accessory drive belt tensioner meets the above criteria, proceed to test the accessory drive belt tensioner dynamically. If the accessory drive belt tensioner does not meet the above criteria, INSTALL a new accessory drive belt tensioner. REFER to: Accessory Drive Belt Tensioner .

TEST the system for normal operation.

Accessory Drive Belt Tensioner - Dynamic Check

The accessory drive belt tensioner may be checked dynamically as follows:

1.

With the engine running, observe the accessory drive belt tensioner movement. The accessory drive belt tensioner should move (respond) when the engine is accelerated rapidly or when the A/C clutch cycles ON and OFF (the degree of movement can be up to 4 mm). If the accessory drive belt tensioner movement is not constant without engine acceleration or A/C clutch cycling, a pulley or shaft is possibly bent, out of round, or the damping mechanism inside the accessory drive belt tensioner may be damaged. INSTALL a new accessory drive belt tensioner as necessary. REFER to: Accessory Drive Belt Tensioner .

TEST the system for normal operation.

2.

Excessive accessory drive belt ride out (uneven depth of grooves in the accessory drive belt) may cause excessive accessory drive belt tensioner movement. Check the condition by installing a new accessory drive belt. REFER to: Accessory Drive Belt .

TEST the system for normal operation.

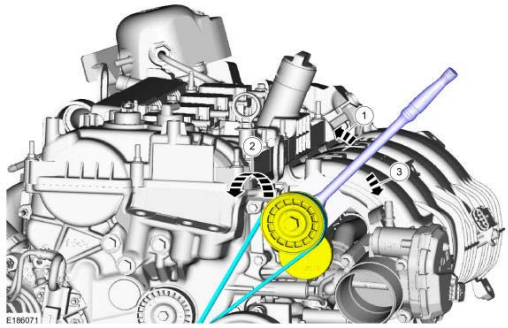
REMOVAL AND INSTALLATION > ACCESSORY DRIVE BELT > REMOVAL

1.

Remove the A/C belt. Refer to: Air Conditioning (A/C) Compressor Belt .

2.

Rotate the accessory drive belt tensioner counter clockwise and remove the accessory drive belt.



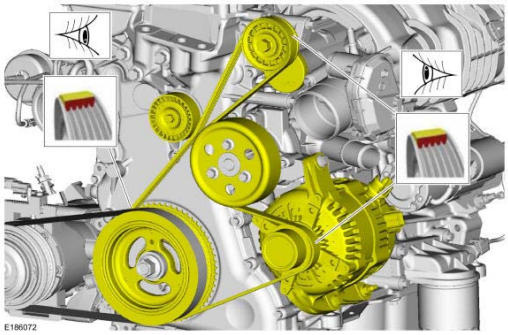
REMOVAL AND INSTALLATION > ACCESSORY DRIVE BELT > INSTALLATION

1.

To install, reverse the removal procedure.

2.

After installation, make sure the accessory drive belt is correctly seated on all pulleys.



REMOVAL AND INSTALLATION > ACCESSORY DRIVE BELT TENSIONER > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

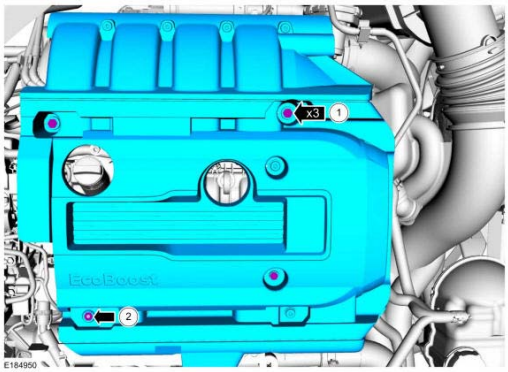
1.

Remove the bolts, nut and the engine appearance cover.

Torque:

1.: 53 lb.in (6 Nm)

2.: 89 lb.in (10 Nm)

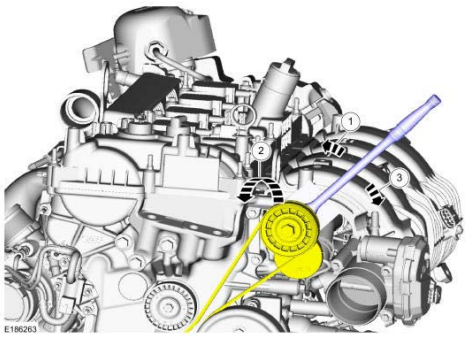


2.

Remove the air cleaner outlet pipe. Refer to: AIR CLEANER OUTLET PIPE - 2.3L EcoBoost (231kW/314PS).

3.

Rotate the accessory drive belt tensioner counter clockwise and position aside the accessory drive belt.

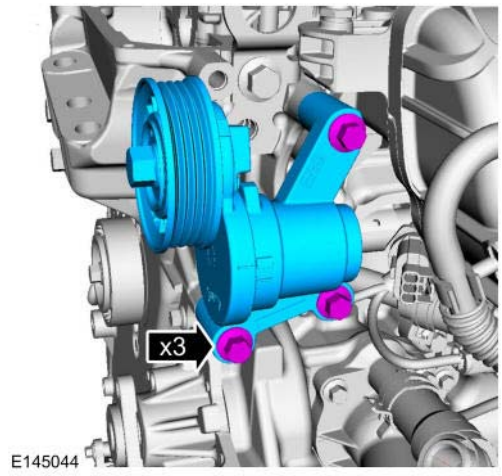


4.

Remove the bolts and the accessory drive belt tensioner.

Torque

: 18 lb.ft (25 Nm)



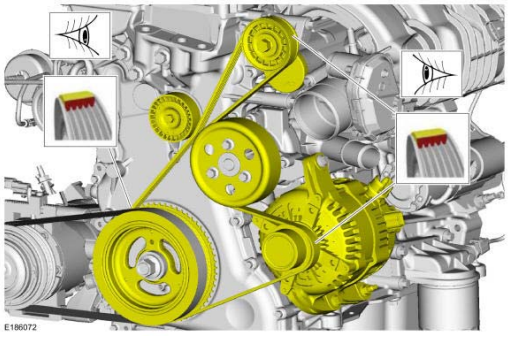
REMOVAL AND INSTALLATION > ACCESSORY DRIVE BELT TENSIONER > INSTALLATION

1.

To install, reverse the removal procedure.

2.

After installation, make sure the accessory drive belt is correctly seated on all pulleys.



REMOVAL AND INSTALLATION > AIR CONDITIONING (A C) COMPRESSOR BELT

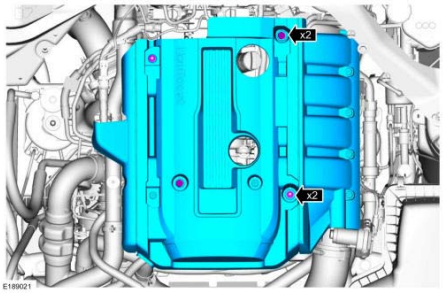
Special Tool(s) / General Equipment

Cable Ties

REMOVAL AND INSTALLATION > AIR CONDITIONING (A C) COMPRESSOR BELT > REMOVAL

1.

Remove the bolts and nuts and the engine appearance cover.



2.

Remove the air cleaner outlet pipe. Refer to: AIR CLEANER OUTLET PIPE - 2.3L EcoBoost (231kW/314PS).

NOTE: Typical application shown in illustration.

3.
Remove the A/C compressor belt.

1.

Turn the crankshaft pulley bolt clockwise and feed the stretchy belt tool on to the A/C

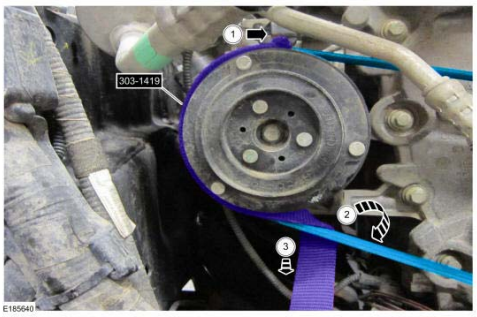
compressor pulley approximately 180°.

2.

Fold the stretchy belt tool under the inside of the A/C compressor belt as shown in illustration.

3.

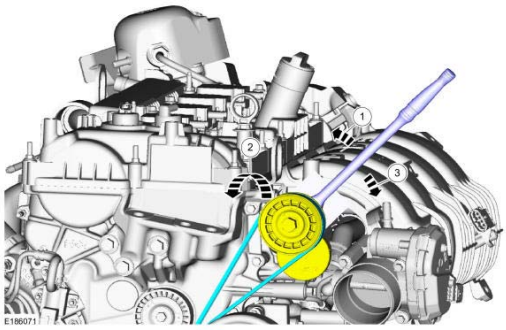
In one quick motion, firmly pull the stretchy belt tool and remove the A/C compressor belt.



REMOVAL AND INSTALLATION > AIR CONDITIONING (A C) COMPRESSOR BELT > INSTALLATION

1.

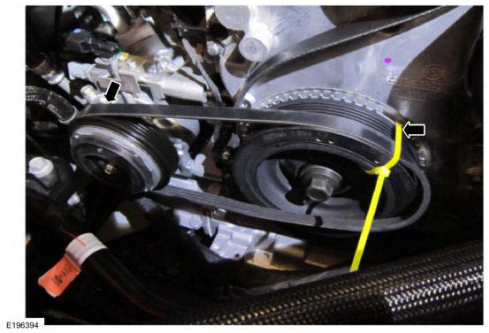
Remove the accessory drive belt from the accessory drive belt tensioner. Position the belt away from the crankshaft pulley.



NOTE: After installation, make sure the A/C compressor belt is correctly seated on the crankshaft and A/C compressor pulleys.

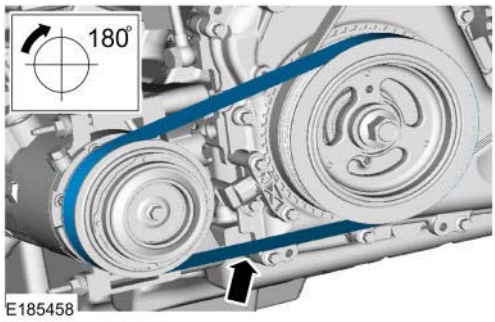
2.
Position the A/C compressor belt onto the A/C compressor pulley. Position the A/C compressor belt on top of the crankshaft pulley and feed a cable tie with a minimum width of 3 mm (0.12 in) through the crankshaft pulley spokes, then up and over the A/C compressor belt and tighten the cable tie as shown in illustration.

Use the General Equipment: Cable Ties



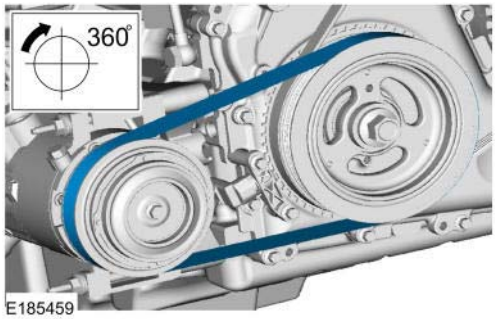
3.

Rotate the crankshaft pulley by hand 180° and install the A/C compressor belt.



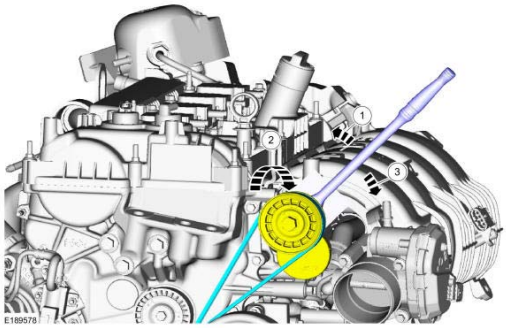
4.

Remove the cable tie and rotate the crankshaft by hand 360° to verify the A/C compressor belt has correctly seated onto the crankshaft and A/C compressor pulleys.



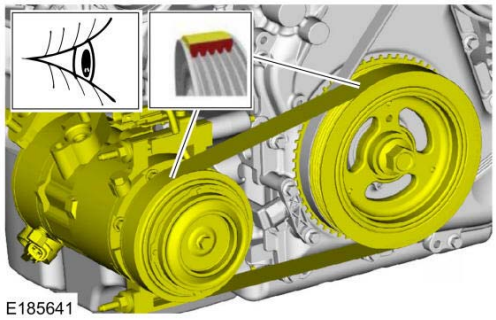
5.

Install accessory drive belt.



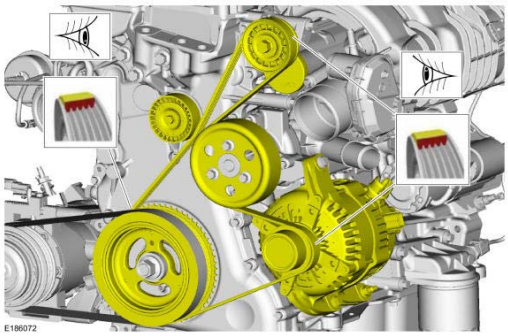
6.

After installation, make sure the A/C compressor belt is correctly seated on all pulleys.



7.

After installation, make sure the accessory drive belt is correctly seated on all pulleys.



8.

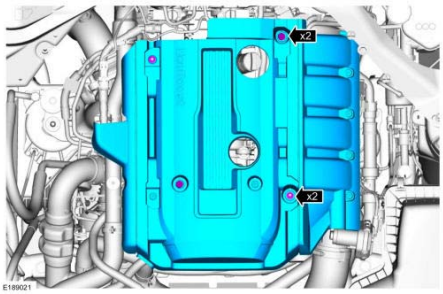
Install the air cleaner outlet pipe. Refer to: AIR CLEANER OUTLET PIPE - 2.3L EcoBoost (231kW/314PS).

9.

Install the bolts and nuts and the engine appearance cover.

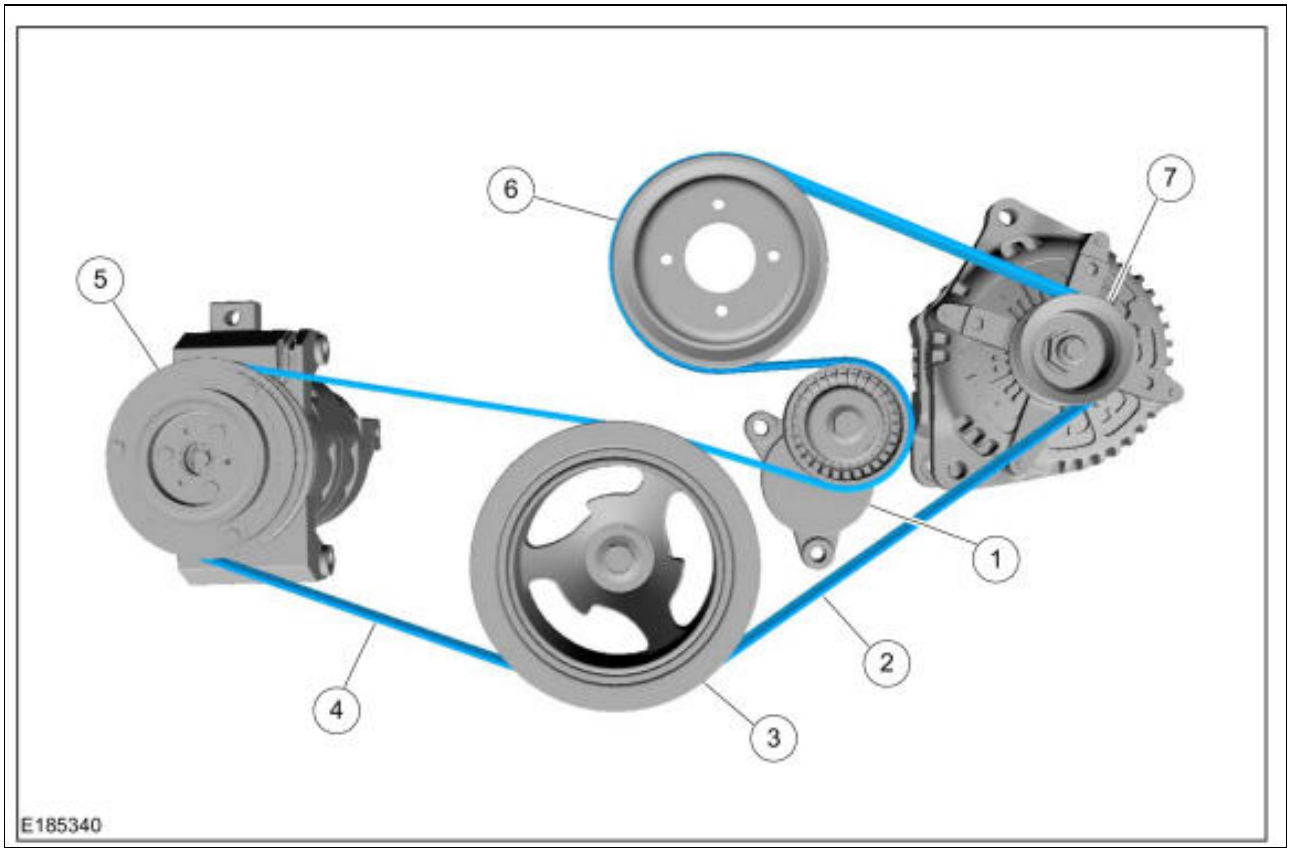
Torque

: 80 lb.in (9 Nm)


x2
x2
E189021

DESCRIPTION AND OPERATION > ACCESSORY DRIVE - COMPONENT LOCATION

Fig 1: View Of Drive Belt Routing And Pulley



Courtesy of FORD MOTOR COMPANY

Item	Description
1	Accessory drive belt tensioner
2	Accessory drive belt
3	Crankshaft belt pulley
4	Belt - A/C compressor
5	Pulley - A/C compressor
6	Coolant pump pulley
7	Generator pulley

DIAGNOSIS AND TESTING > ACCESSORY DRIVE > INSPECTION AND VERIFICATION

1.

Verify the customer concern.

2.

Visually inspect for obvious signs of mechanical damage.

Visual Inspection Chart

Mechanical
Damaged or contaminated accessory drive belt Damaged or contaminated pulley(s) Incorrect accessory drive belt Incorrect fitment of the accessory drive belt Generator Air conditioning (A/C) compressor Pulley(s) Loose hardware

3.

If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.

DIAGNOSIS AND TESTING > ACCESSORY DRIVE > ACCESSORY DRIVE BELT CONCERNS

NOTE: Do not lubricate the accessory drive belt as potential damage to the accessory drive belt material construction may occur.

Cracking

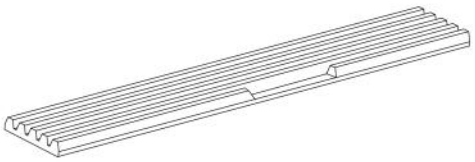
Accessory drive belts are made from rubber which hardens with time and can develop cracks. As the accessory drive belt runs on the back of some of the pulleys, the cracks are opened up. Small cracks are not considered to be a failure of the accessory drive belt. Only if the crack is deep enough to reach the bottom of the groove to expose the cord or any chunks are found to be missing from the accessory drive belt, is the accessory drive belt condition considered to be unacceptable.

1.

Check the accessory drive belt for cracks. If the damage exceeds the acceptable limit, install a new accessory drive belt. REFER to: Accessory Drive Belt .

Chunking

Chunking describes the condition where long lengths of rubber become detached from the ribs of the accessory drive belt. This is considered to be a failure of the accessory drive belt.



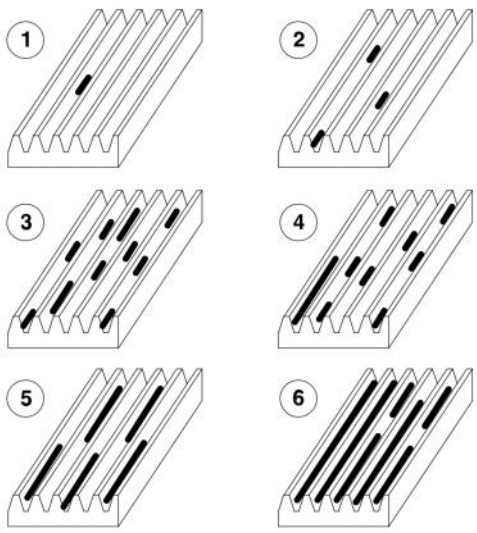
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2.

Check the accessory drive belt for damage. If any chunks are found to be missing, install a new accessory drive belt. REFER to: Accessory Drive Belt .

Pilling

Pilling is dust that forms in between the ribs of the accessory drive belt from rubber that is worn off the accessory drive belt when it is new. There may also be loose particles left on the accessory drive belt during the manufacturing process. These are worn off and form into small balls of rubber that then get trapped in the grooves of the accessory drive belt. This condition will usually clear itself within 4800 km - 8000 km (3000 miles - 5000 miles) of normal driving.



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3.

Check the accessory drive belt for pilling. The condition of the accessory drive belt should be compared against the illustration.

1.

Small scattered pills. Not considered a concern. No action required.

2.

Small scattered pills. Not considered a concern. No action required.

3.

Longer pills up to 50% of the rib height. Possible noise concern. INSTALL a new accessory drive belt if noise is apparent. REFER to: Accessory Drive Belt .

4.

Longer pills up to 50% of the rib height. Possible noise concern. INSTALL a new accessory drive belt if noise is apparent. REFER to: Accessory Drive Belt .

5.

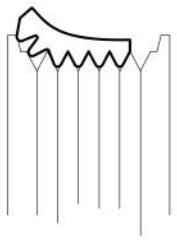
Heavy deposits in the grooves. Possible noise and stability concern. INSTALL a new accessory drive belt. REFER to: Accessory Drive Belt .

6.

Heavy deposits in the grooves. Possible noise and stability concern. INSTALL a new accessory drive belt. REFER to: Accessory Drive Belt .

Incorrect fitment

Accessory drive belt noise can be generated by the accessory drive belt being incorrectly fitted on the pulley as shown in the following illustration. Make sure that all the V grooves on the accessory drive belt contact correctly with the pulley.



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4.

If the cause is not visually evident, verify the symptom and refer to the Symptom Chart .

DIAGNOSIS AND TESTING > ACCESSORY DRIVE > SYMPTOM CHART

Symptom	Possible Sources	Action
Accessory drive belt noise	Accessory drive system	Use a stethoscope or other listening device to determine the source of the noise. INSTALL new

		components as necessary. TEST the system for normal operation.
Accessory drive belt incorrectly installed.		CHECK the accessory drive belt is correctly installed in the pulley grooves. INSTALL a new accessory drive belt as necessary. REFER to: Accessory Drive Belt . TEST the system for normal operation.
Pulley(s).		CHECK the pulley(s) for damage, freedom of rotation, stone entrapment and alignment. INSTALL new components as necessary. TEST the system for normal operation.
Lubricant or other contamination.		CHECK the accessory drive belt for contamination or damage. RECTIFY the source of the leak and INSTALL a new accessory drive belt. REFER to: Accessory Drive Belt . TEST the system for normal operation.
NOTE: Chirp is defined as a twittering noise, often intermittent Accessory drive belt chirp	Pulley misalignment (usually evident at idle).	CHECK that the accessory drive belt is running centrally on the flat pulleys. TEST the system for normal operation. CHECK the pulleys for excessive end float and bent flanges. With the engine running at idle, use a stethoscope to identify the source of the noise. INSTALL new components as necessary. TEST the system for normal operation.
NOTE: Rattle is defined as a metallic knocking noise Accessory drive belt rattle	Loose components or hardware.	CHECK the components or hardware for correct installation and tighten as necessary. TEST the system for normal operation.

DIAGNOSIS AND TESTING > ACCESSORY DRIVE > COMPONENT TESTS

Accessory Drive Belt Tensioner - Static Check

The accessory drive belt tensioner may be checked statically as follows:

1.

Inspect the area surrounding the accessory drive belt tensioner for lubricant or other contamination. Rectify any leaks before installing a new accessory drive belt tensioner. If the accessory drive belt tensioner is contaminated, do not attempt to clean it as the damping mechanism inside may be damaged. INSTALL a new accessory drive belt tensioner as necessary. REFER to: Accessory Drive Belt Tensioner .

TEST the system for normal operation.

2.

Detach the accessory drive belt in the area of the accessory drive belt tensioner.

NOTE: The accessory drive belt tensioner has a damping feature, which is usually a friction device, therefore some friction within the system is normal.

3.
Using the correct tool, move the accessory drive belt tensioner from its relaxed position through its full stroke and back to the relaxed position to make sure there is no excessive stick, grab or bind, and to make sure there is tension on the accessory drive belt tensioner spring.

4.

Rotate the accessory drive belt tensioner pulley and check for damage, freedom of rotation and alignment. INSTALL a new accessory drive belt tensioner as necessary. REFER to: Accessory Drive Belt Tensioner .

TEST the system for normal operation.

5.

If the accessory drive belt tensioner meets the above criteria, proceed to test the accessory drive belt tensioner dynamically. If the accessory drive belt tensioner does not meet the above criteria, INSTALL a new accessory drive belt tensioner. REFER to: Accessory Drive Belt Tensioner .

TEST the system for normal operation.

Accessory Drive Belt Tensioner - Dynamic Check

The accessory drive belt tensioner may be checked dynamically as follows:

1.

With the engine running, observe the accessory drive belt tensioner movement. The accessory drive belt tensioner should move (respond) when the engine is accelerated rapidly or when the A/C clutch cycles ON and OFF (the degree of movement can be up to 4 mm). If the accessory drive belt tensioner movement is not constant without engine acceleration or A/C clutch cycling, a pulley or shaft is possibly bent, out of round, or the damping mechanism inside the accessory drive belt tensioner may be damaged. INSTALL a new accessory drive belt tensioner as necessary. REFER to: Accessory Drive Belt Tensioner .

TEST the system for normal operation.

2.

Excessive accessory drive belt rideout (uneven depth of grooves in the accessory drive belt) may cause excessive accessory drive belt tensioner movement. Check the condition by installing a new accessory drive belt. REFER to: Accessory Drive Belt .

TEST the system for normal operation.

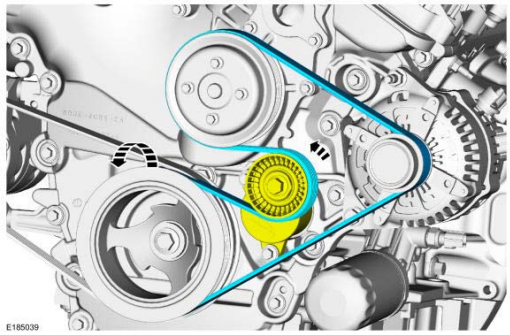
REMOVAL AND INSTALLATION > ACCESSORY DRIVE BELT > REMOVAL

1.

Remove the air cleaner outlet pipe. Refer to: AIR CLEANER OUTLET PIPE .

2.

Rotate the accessory drive belt tensioner counter clockwise and remove the accessory drive belt.



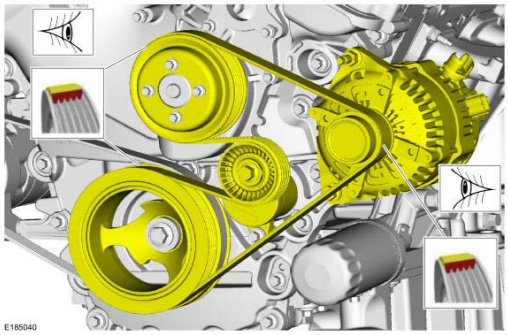
REMOVAL AND INSTALLATION > ACCESSORY DRIVE BELT > INSTALLATION

1.

To install, reverse the removal procedure.

2.

After installation, make sure the accessory drive belt is correctly seated on all pulleys.



REMOVAL AND INSTALLATION > ACCESSORY DRIVE BELT TENSIONER > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

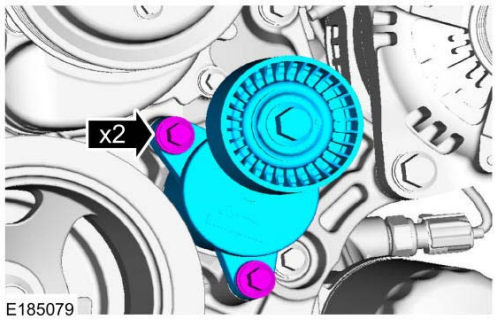
Remove the accessory drive belt. Refer to: Accessory Drive Belt .

2.

Remove the bolts and the accessory drive belt tensioner.

Torque

: 18 lb.ft (25 Nm)



REMOVAL AND INSTALLATION > ACCESSORY DRIVE BELT TENSIONER > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > AIR CONDITIONING (A C) COMPRESSOR BELT

Special Tool(s) / General Equipment

Chart Ties

REMOVAL AND INSTALLATION > AIR CONDITIONING (A C) COMPRESSOR BELT > REMOVAL

NOTE: Under no circumstances should the A/C compressor belt, accessory drive belt, tensioner or pulleys be lubricated as potential damage to the belt material and tensioner damping mechanism will occur. Do not apply any fluids or belt dressing to the A/C compressor belt, accessory drive belt or pulleys.

NOTE: Removal steps in this procedure may contain installation details.

1.

Remove the air cleaner outlet pipe. Refer to: AIR CLEANER OUTLET PIPE .

2.

Remove the accessory drive belt. Refer to: Accessory Drive Belt .

NOTE: Typical application shown in illustration.

3.
Remove the A/C compressor belt.

1.

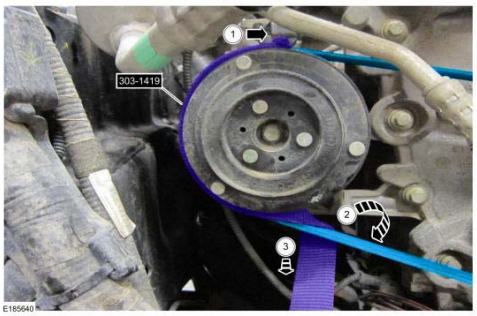
Turn the crankshaft pulley bolt clockwise and feed the stretchy belt tool on to the A/C compressor pulley approximately 180°.

2.

Fold the stretchy belt tool under the inside of the A/C compressor belt as shown in illustration.

3.

In one quick motion, firmly pull the stretchy belt tool and remove the A/C compressor belt.



REMOVAL AND INSTALLATION > AIR CONDITIONING (A C) COMPRESSOR BELT > INSTALLATION

NOTE: Make sure the A/C compressor belt is correctly seated on the A/C compressor pulley.

1.
Position the A/C compressor belt in 3 stages.

Stage 1: Slide the A/C compressor belt between the crankshaft pulley and the accessory drive belt tensioner.

Stage 2: Position the A/C compressor belt behind the crankshaft pulley with the accessory drive belt ribs facing towards the front of the vehicle.

Stage 3: Position the A/C compressor belt onto the A/C compressor pulley with the lower portion of the accessory drive belt ribs facing towards the front of the vehicle and above the oil pan as shown in illustration.



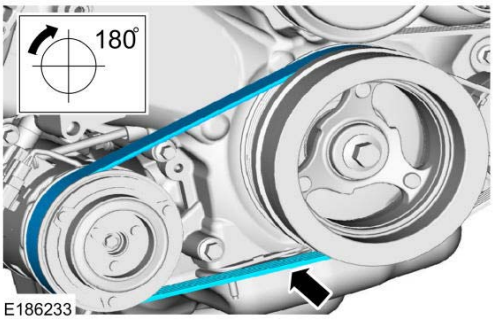
NOTE: After installation, make sure the A/C compressor belt is correctly seated on the crankshaft and A/C compressor pulleys.

2.
Position the A/C compressor belt onto the top of the crankshaft pulley and feed a cable tie with a minimum width of 3 mm (0.12 in) through the crankshaft pulley spokes, up and over the A/C compressor belt and tighten the cable tie. Use the General Equipment: Cable Ties



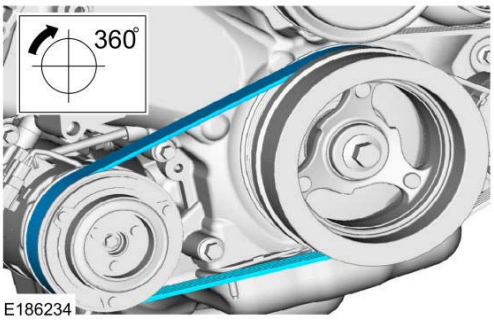
NOTE: The A/C compressor belt must be above the oil pan flange or damage to the A/C compressor belt and engine can occur.

3.
With the A/C compressor belt positioned above the oil pan flange, rotate the crankshaft by hand clockwise 180°.



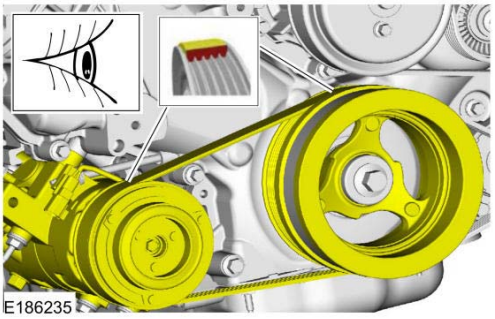
4.

Remove the cable tie and rotate the crankshaft clockwise by hand 360° to verify the A/C compressor belt has correctly seated onto the crankshaft and A/C compressor pulleys.



5.

After installation, make sure the A/C compressor belt is correctly seated on all pulleys.



6.

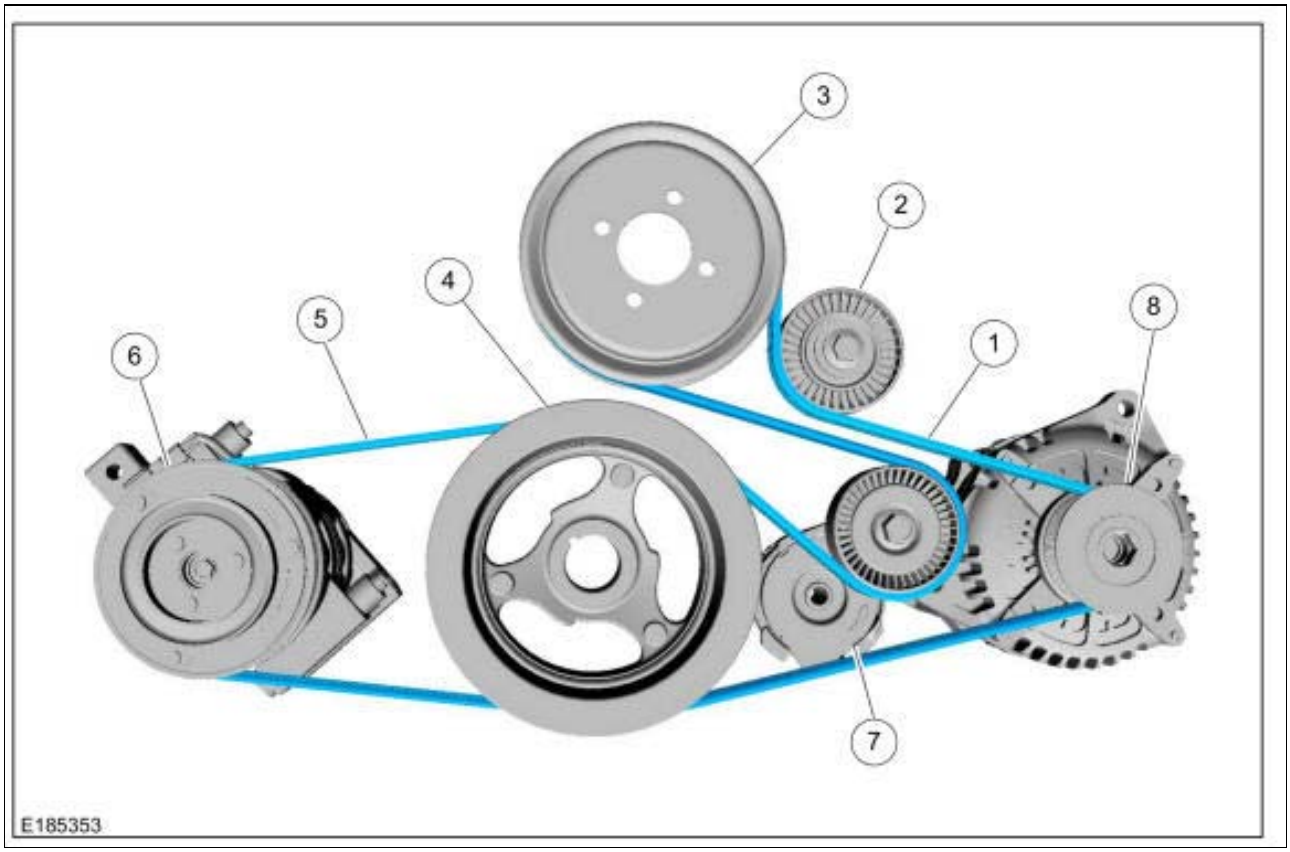
Install the accessory drive belt. Refer to: Accessory Drive Belt .

7.

Install the air cleaner outlet pipe. Refer to: AIR CLEANER OUTLET PIPE .

DESCRIPTION AND OPERATION > ACCESSORY DRIVE - COMPONENT LOCATION

Fig 1: View Of Drive Belt Routing And Pulley



Courtesy of FORD MOTOR COMPANY

Item	Description
1	Accessory drive belt
2	Drive belt idler pulley assembly
3	Coolant pump pulley
4	Crankshaft belt pulley
5	Belt - A/C compressor
6	Pulley - A/C compressor
7	Accessory drive belt tensioner
8	Generator pulley

DIAGNOSIS AND TESTING > ACCESSORY DRIVE > INSPECTION AND VERIFICATION

1.

Verify the customer concern.

2.

Visually inspect for obvious signs of mechanical damage.

Visual Inspection Chart

Mechanical
Damaged or contaminated accessory drive belt Damaged or contaminated pulley(s) Incorrect accessory drive belt Incorrect fitment of the accessory drive belt Generator Air conditioning (A/C) compressor Pulley(s) Loose hardware

3.

If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.

DIAGNOSIS AND TESTING > ACCESSORY DRIVE > ACCESSORY DRIVE BELT CONCERNS

NOTE: Do not lubricate the accessory drive belt as potential damage to the accessory drive belt material construction may occur.

Cracking

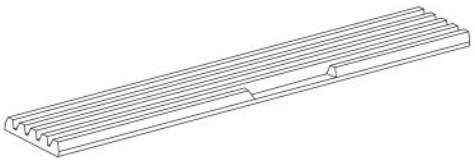
Accessory drive belts are made from rubber which hardens with time and can develop cracks. As the accessory drive belt runs on the back of some of the pulleys, the cracks are opened up. Small cracks are not considered to be a failure of the accessory drive belt. Only if the crack is deep enough to reach the bottom of the groove to expose the cord or any chunks are found to be missing from the accessory drive belt, is the accessory drive belt condition considered to be unacceptable.

1.

Check the accessory drive belt for cracks. If the damage exceeds the acceptable limit, install a new accessory drive belt. REFER to: Accessory Drive Belt .

Chunking

Chunking describes the condition where long lengths of rubber become detached from the ribs of the accessory drive belt. This is considered to be a failure of the accessory drive belt.



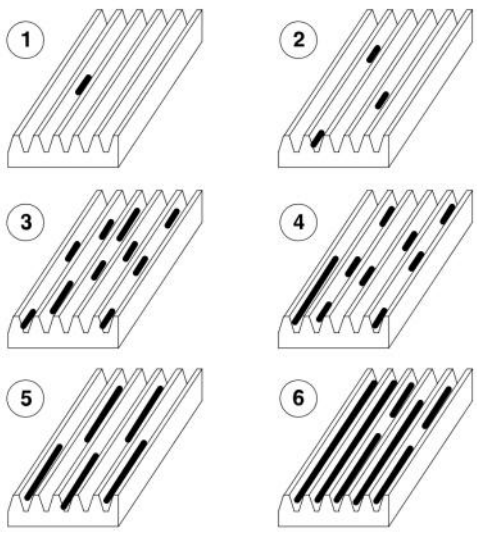
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2.

Check the accessory drive belt for damage. If any chunks are found to be missing, install a new accessory drive belt. REFER to: Accessory Drive Belt .

Pilling

Pilling is dust that forms in between the ribs of the accessory drive belt from rubber that is worn off the accessory drive belt when it is new. There may also be loose particles left on the accessory drive belt during the manufacturing process. These are worn off and form into small balls of rubber that then get trapped in the grooves of the accessory drive belt. This condition will usually clear itself within 4800 km - 8000 km (3000 miles - 5000 miles) of normal driving.



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3.

Check the accessory drive belt for pilling. The condition of the accessory drive belt should be compared against the illustration.

1.

Small scattered pills. Not considered a concern. No action required.

2.

Small scattered pills. Not considered a concern. No action required.

3.

Longer pills up to 50% of the rib height. Possible noise concern. INSTALL a new accessory drive belt if noise is apparent. REFER to: Accessory Drive Belt .

4.

Longer pills up to 50% of the rib height. Possible noise concern. INSTALL a new accessory drive belt if noise is apparent. REFER to: Accessory Drive Belt .

5.

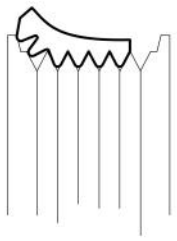
Heavy deposits in the grooves. Possible noise and stability concern. INSTALL a new accessory drive belt. REFER to: Accessory Drive Belt .

6.

Heavy deposits in the grooves. Possible noise and stability concern. INSTALL a new accessory drive belt. REFER to: Accessory Drive Belt .

Incorrect fitment

Accessory drive belt noise can be generated by the accessory drive belt being incorrectly fitted on the pulley as shown in the following illustration. Make sure that all the V grooves on the accessory drive belt contact correctly with the pulley.



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4.

If the cause is not visually evident, verify the symptom and refer to the Symptom Chart .

DIAGNOSIS AND TESTING > ACCESSORY DRIVE > SYMPTOM CHART

Symptom	Possible Sources	Action
Accessory drive belt noise	Accessory drive system	Use a stethoscope or other listening device to determine the source of the noise. INSTALL new

		components as necessary. TEST the system for normal operation.
Accessory drive belt incorrectly installed.		CHECK the accessory drive belt is correctly installed in the pulley grooves. INSTALL a new accessory drive belt as necessary. REFER to: Accessory Drive Belt . TEST the system for normal operation.
Pulley(s).		CHECK the pulley(s) for damage, freedom of rotation, stone entrapment and alignment. INSTALL new components as necessary. TEST the system for normal operation.
Lubricant or other contamination.		CHECK the accessory drive belt for contamination or damage. RECTIFY the source of the leak and INSTALL a new accessory drive belt. REFER to: Accessory Drive Belt . TEST the system for normal operation.
NOTE: Chirp is defined as a twittering noise, often intermittent Accessory drive belt chirp	Pulley misalignment (usually evident at idle).	CHECK that the accessory drive belt is running centrally on the flat pulleys. TEST the system for normal operation. CHECK the pulleys for excessive end float and bent flanges. With the engine running at idle, use a stethoscope to identify the source of the noise. INSTALL new components as necessary. TEST the system for normal operation.
NOTE: Rattle is defined as a metallic knocking noise Accessory drive belt rattle	Loose components or hardware.	CHECK the components or hardware for correct installation and tighten as necessary. TEST the system for normal operation.

DIAGNOSIS AND TESTING > ACCESSORY DRIVE > COMPONENT TESTS

Accessory Drive Belt Tensioner - Static Check

The accessory drive belt tensioner may be checked statically as follows:

1.

Inspect the area surrounding the accessory drive belt tensioner for lubricant or other contamination. Rectify any leaks before installing a new accessory drive belt tensioner. If the accessory drive belt tensioner is contaminated, do not attempt to clean it as the damping mechanism inside may be damaged. INSTALL a new accessory drive belt tensioner as necessary. REFER to: Accessory Drive Belt Tensioner .

TEST the system for normal operation.

2.

Detach the accessory drive belt in the area of the accessory drive belt tensioner.

NOTE: The accessory drive belt tensioner has a damping feature, which is usually a friction device, therefore some friction within the system is normal.

3.
Using the correct tool, move the accessory drive belt tensioner from its relaxed position through its full stroke and back to the relaxed position to make sure there is no excessive stick, grab or bind, and to make sure there is tension on the accessory drive belt tensioner spring.

4.

Rotate the accessory drive belt tensioner pulley and check for damage, freedom of rotation and alignment. INSTALL a new accessory drive belt tensioner as necessary. REFER to: Accessory Drive Belt Tensioner .

TEST the system for normal operation.

5.

If the accessory drive belt tensioner meets the above criteria, proceed to test the accessory drive belt tensioner dynamically. If the accessory drive belt tensioner does not meet the above criteria, INSTALL a new accessory drive belt tensioner. REFER to: Accessory Drive Belt Tensioner .

TEST the system for normal operation.

Accessory Drive Belt Tensioner - Dynamic Check

The accessory drive belt tensioner may be checked dynamically as follows:

1.

With the engine running, observe the accessory drive belt tensioner movement. The accessory drive belt tensioner should move (respond) when the engine is accelerated rapidly or when the A/C clutch cycles ON and OFF (the degree of movement can be up to 4 mm). If the accessory drive belt tensioner movement is not constant without engine acceleration or A/C clutch cycling, a pulley or shaft is possibly bent, out of round, or the damping mechanism inside the accessory drive belt tensioner may be damaged. INSTALL a new accessory drive belt tensioner as necessary. REFER to: Accessory Drive Belt Tensioner .

TEST the system for normal operation.

2.

Excessive accessory drive belt ride out (uneven depth of grooves in the accessory drive belt) may cause excessive accessory drive belt tensioner movement. Check the condition by installing a new accessory drive belt. REFER to: Accessory Drive Belt .

TEST the system for normal operation.

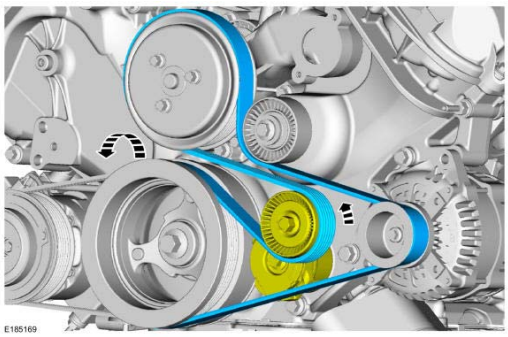
REMOVAL AND INSTALLATION > ACCESSORY DRIVE BELT > REMOVAL

1.

Remove the air cleaner outlet pipe. Refer to: AIR CLEANER OUTLET PIPE - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS).

2.

Rotate the accessory drive belt tensioner counter clockwise and remove the accessory drive belt.



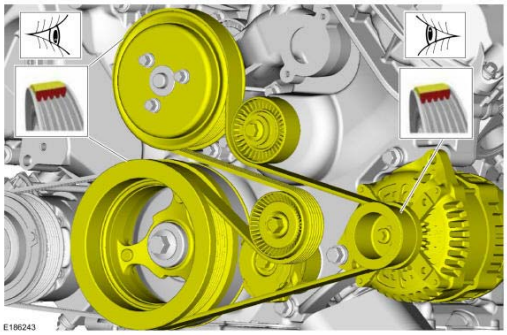
REMOVAL AND INSTALLATION > ACCESSORY DRIVE BELT > INSTALLATION

1.

To install, reverse the removal procedure.

2.

After installation, make sure the accessory drive belt is correctly seated on all pulleys.



REMOVAL AND INSTALLATION > ACCESSORY DRIVE BELT TENSIONER > REMOVAL

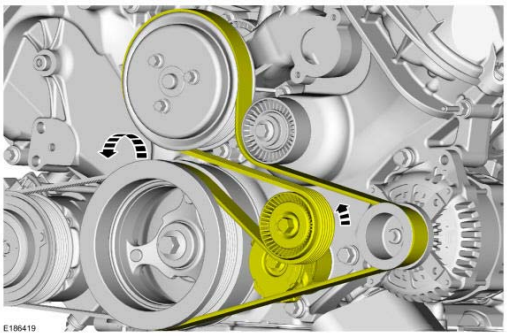
NOTE: Removal steps in this procedure may contain installation details.

1.

Remove the air cleaner outlet pipe. Refer to: AIR CLEANER OUTLET PIPE - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS).

2.

Rotate the accessory drive belt tensioner counter clockwise and position aside the accessory drive belt.

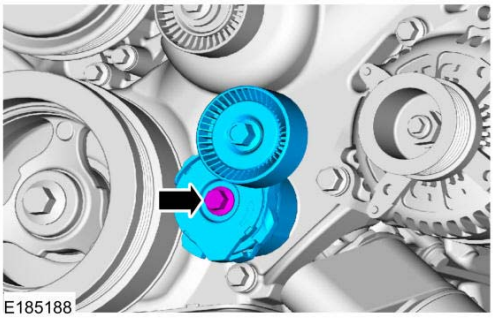


3.

Remove the bolt and the accessory drive belt tensioner.

Torque

: 35 lb.ft (48 Nm)



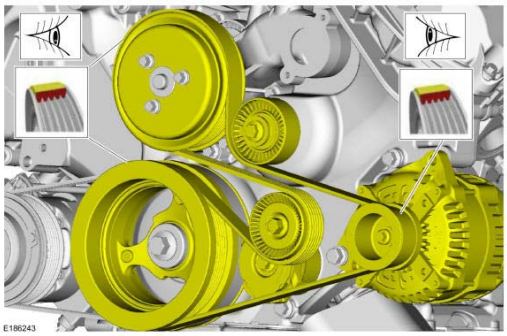
REMOVAL AND INSTALLATION > ACCESSORY DRIVE BELT TENSIONER > INSTALLATION

1.

To install, reverse the removal procedure.

2.

After installation, make sure the accessory drive belt is correctly seated on all pulleys.



REMOVAL AND INSTALLATION > AIR CONDITIONING (A C) COMPRESSOR BELT

Special Tool(s) / General Equipment

Cable Ties

REMOVAL AND INSTALLATION > AIR CONDITIONING (A C) COMPRESSOR BELT > REMOVAL

NOTE: Under no circumstances should the A/C compressor belt, accessory drive belt, tensioner or pulleys be lubricated as potential damage to the belt material and tensioner damping mechanism will occur. Do not apply any fluids or belt dressing to the A/C

compressor belt, accessory drive belt or pulleys.

1.

Remove the air cleaner outlet pipe. Refer to: AIR CLEANER OUTLET PIPE - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS).

2.

Remove the accessory drive belt. Refer to: Accessory Drive Belt .

3.

Cut the A/C compressor belt and discard the belt.

REMOVAL AND INSTALLATION > AIR CONDITIONING (A C) COMPRESSOR BELT > INSTALLATION

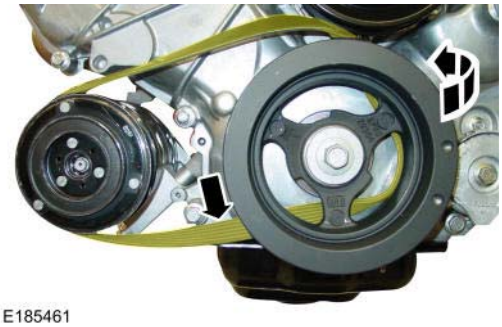
NOTE: Make sure the A/C compressor belt is correctly seated on the A/C compressor pulley.

1.
Position the A/C compressor belt in 3 stages.

Stage 1: Slide the A/C compressor belt between the crankshaft pulley and the accessory drive belt tensioned.

Stage 2: Position the A/C compressor belt behind the crankshaft pulley with the accessory drive belt ribs facing towards the front of the vehicle.

Stage 3: Position the A/C compressor belt onto the A/C compressor pulley with the lower portion of the accessory drive belt ribs facing towards the front of the vehicle and above the oil pan as shown in illustration.


E185461

NOTE: After installation, make sure the A/C compressor belt is correctly seated on the crankshaft and A/C compressor pulleys.

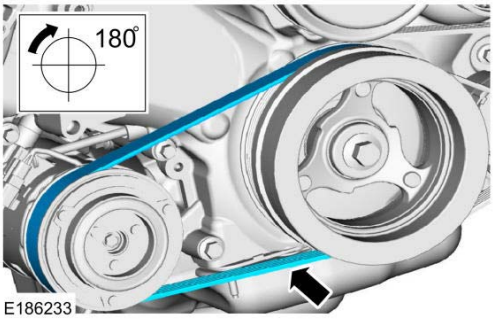
2.
Position the A/C compressor belt onto the top of the crankshaft pulley and feed a cable tie with a minimum width of 3 mm (0.12 in) through the crankshaft pulley spokes, up and over the A/C compressor belt and tighten the cable tie.

Use the General Equipment: Cable Ties



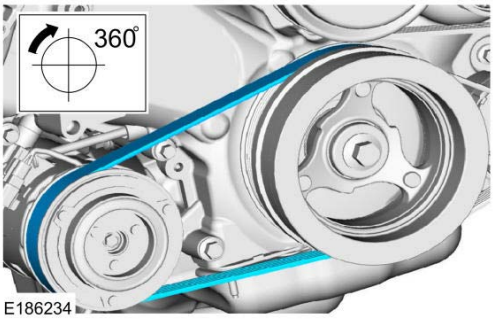
NOTE: The A/C compressor belt must be above the oil pan flange or damage to the A/C compressor belt and engine can occur.

3.
With the A/C compressor belt positioned above the oil pan flange, rotate the crankshaft by hand clockwise 180°.



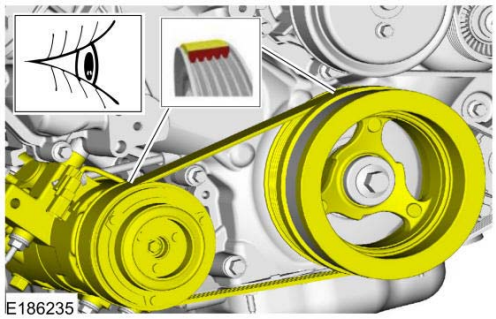
4.

Remove the cable tie and rotate the crankshaft clockwise by hand 360° to verify the A/C compressor belt has correctly seated onto the crankshaft and A/C compressor pulleys.



5.

After installation, make sure the accessory drive belt is correctly seated on all pulleys.



6.

Install the accessory drive belt. Refer to: Accessory Drive Belt .

7.

Install the air cleaner outlet pipe. Refer to: AIR CLEANER OUTLET PIPE - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS).

Service Manual: ENGINE - 2.3L ECOBOOST (231KW/314PS)

SPECIFICATIONS > SPECIFICATIONS

ENGINE

Item	Specification
Displacement	140 in^3 (2.3L)
No. of cylinders	4
Bore	3.4449 in (87.5 mm)
Stroke	3.7008 in (94 mm)
Firing order	1-3-4-2
Compression ratio	9.5:1
Spark plug	12405
Spark plug gap	0.030 in (.75 mm)
Engine weight - (without accessory drive components and flexplate)	31 1b (141 kg)

LUBRICANTS

Item	Specification
Motorcraft® SAE 5W-30 Premium Synthetic Blend Motor Oil (US); Motorcraft® SAE 5W-30 Super Premium Motor Oil (Canada) XO-5W30-QSP (US); CXO-5W30-LSP12 (Canada); or equivalent	WSS-M2C946-A, 5W30

ENGINE OIL CAPACITY

Item	Specification
Service fill including oil filter	6.0qt (5.7L)

OIL PRESSURE

Item	Specification
Oil pressure (hot @ 2, 000 rpm)	29-60psi (200-414kPa)

CYLINDER BLOCK

Item	Specification

Cylinder bore diameter	3.4449-3.4457in (87.5-87.52mm)
Cylinder bore maximum out-of-round	0.0003in (.008mm)
Main bearing bore diameter	2.245-2.246in (57.018-57.04mm)
Head gasket surface flatness	0.1 mm (0.0039 in) - 0.05 mm (0.002 in)/200 mm (7.874 in) x 200 mm (7.874 in)

PISTON

Item	Specification
Piston diameter (single grade)	3.4441 ± 0.0003in (87.48 ±.007mm)
Piston-to-bore clearance	0.0005-0.0019in (.013-.047mm)
Piston ring groove width - compression (top)	0.0484-0.0492in (1.23-1.25mm)
Piston ring groove width - compression (bottom)	0.0480-0.0488in (1.22-1.24mm)
Piston ring groove width - oil	0.0791-0.0799in (2.01-2.03mm)
Piston ring width - compression (top) (Axial)	0.05in (1.2mm)
Piston ring width - compression (bottom) (Axial)	0.05in (1.2mm)
Piston ring width - oil (Radial)	0.08in (2mm)
Piston ring gap (in bore) - compression (top)	0.0067-0.0106in (.17-.27mm)
Piston ring gap (in bore) - compression (bottom)	0.0157-0.0236in (.4-.6mm)
Piston ring gap (in bore) - oil	0.0059-0.0177in (.15-.45mm)
Piston skirt coating thickness	0.0002-0.0006in (.005-.015mm)

PISTON PIN

Item	Specification
Diameter	0.8857-0.8858in (22.497-22.5mm)
Length	2.3425-2.3622in (59.5-60mm)
Piston-to-pin clearance	0.0002-0.0005in (.006-.013mm)
Piston pin-to-connecting rod clearance	0.0003-0.0007in (.008-.019mm)
Connecting rod bearing-to-crankshaft clearance	0.0011-0.0020in (.027-.052mm)
Connecting rod bearing thickness	0.0589-0.0598in (1.495-1.519mm)
Connecting rod crankshaft bore diameter	2.1665-2.1670in (55.028-55.042mm)
Connecting rod pin bore diameter	0.8861-0.8865in (22.508-22.516mm)
Connecting rod length (center-to-center)	5.8787in (149.32mm)

Connecting rod side clearance (assembled-to-crankshaft)	0.1020-0.1453in (2.59-3.69mm)
Axial clearance	0.0055-0.0142in (.14-.36mm)

CRANKSHAFT

Item	Specification
Main bearing journal diameter	2.0464-2.0473in (51.978-52.002mm)
Main bearing clearance	0.0006-0.0018in (.016-.046mm)
Connecting rod journal diameter	2.0464-2.0473in (51.978-52.002mm)
End play	0.0087-0.0177in (.22-.45mm)

CYLINDER HEAD

Item	Specification
Cylinder head flatness	0.08 mm (0.0031 in) maxim overall, a maximum of 0.05 mm (0.0020 in) within 150 mm (5.9055 in) and a maximum of 0.025 mm (0.0010 in) within 25 mm (0.9843 in)
Maximum valve lift @ zero lash (exhaust)	0.291in (7.4mm)
Maximum valve lift @ zero lash (intake)	0.327in (8.3mm)
Valve guide diameter	0.2169-0.2181in (5.509-5.539mm)
Valve seat width - intake	0.0650-0.0807in (1.65-2.05mm)
Valve seat width - exhaust	0.0728-0.0886in (1.85-2.25mm)
Valve seat angle	45°
Valve guide runout	0.001in (.029mm)
Valve tappet bore diameter	1.2205-1.2217in (31-31.03mm)
Cam bore diameter	0.9848-0.9858in (25.015-25.04mm)

VALVE

Item	Specification
Valve head diameter - intake	1.2795in (32.5mm)
Valve head diameter - exhaust	1.1811in (30mm)
Valve stem diameter - intake	0.2165in (5.5mm)
Valve stem diameter - exhaust	0.2165in (5.5mm)
Valve stem-to-guide clearance - intake	0.0012-0.0028in (.03-.07mm)

Valve stem-to-guide clearance - exhaust	0.0012-0.0028in (.03-.07mm)
Valve face runout	0.002in (.05mm)
Valve face angle	45-45.3°

Valve Spring Compression Pressure

Item	Specification
Intake and exhaust (installed)	40lb (180N)
Intake (valve open) 9.2 mm (0.3622 in) of lift	103lb (460N)
Exhaust (valve open) 9.2 mm (0.3622 in) of lift	103lb (460N)
Free length	1.8860in (47.904mm)
Assembled height	1.4921in (37.9mm)

VALVE TAPPET

Item	Specification
Diameter	1.2197-1.2191in (30.98-30.964mm)
Tappet-to-valve clearance - intake	0.0075-0.0122in (.19-.31mm)
Tappet-to-valve clearance - exhaust	0.0118-0.0165in (.3-.42mm)
Tappet-to-bore clearance	0.0008-0.0024in (.02-.06mm)

CRANKSHAFT

Item	Specification
Lobe lift - intake	0.327in (8.3mm)
Lobe lift - exhaust	0.291in (7.4mm)
Runout	0.0012in (.03mm)
Thrust clearance	0.0045-0.0057in (.115-.145mm)
Journal diameter	0.9827-0.9835in (24.96-24.98mm)
Journal-to-bore clearance	0.0014-0.0031in (.035-.08mm)

DESCRIPTION AND OPERATION > ENGINE - OVERVIEW > OVERVIEW

The 2.3L Gasoline Turbocharged Direct Injection (GTDI) 4-cylinder engine has the following features:

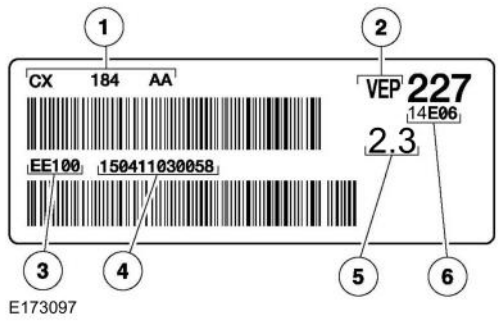
- Dual overhead camshafts

- Four valves per cylinder
- Composite intake manifold
- Aluminum cylinder head
- Aluminum cylinder block
- GTDI
- Twin Independent Variable Camshaft Timing (Ti-VCT)

Engine Identification

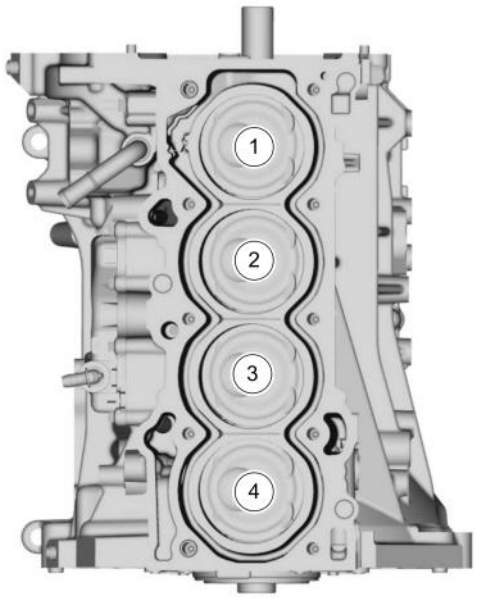
Always refer to these labels when installation of new parts is necessary or when checking engine calibrations. The engine parts often differ within a CID family. Verification of the identification codes will make sure the correct parts are obtained. The codes contain all the pertinent information relating to the dates, optional equipment and revisions.

Engine Code Information Label



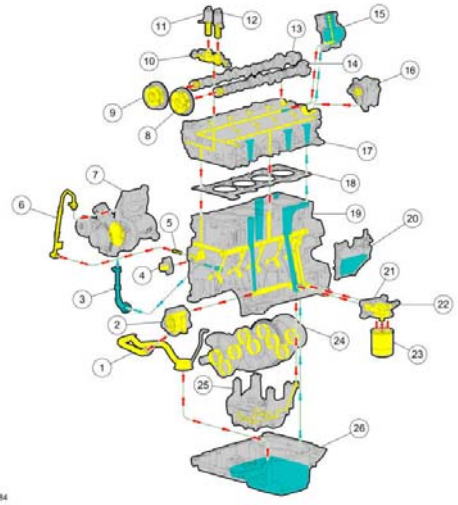
Item	Description
1	Engine part number
2	Valencia Engine Plant
3	Plant code
4	Engine serial number
5	Engine displacement
6	Engine build date YYM(A-L)DD

Engine Cylinder Identification



N0152530

Engine Oil Flow Illustration



Item	Description
1	Oil pump screen and pickup tube
2	Oil pump
3	Turbocharger oil return tube
4	Timing chain tensioner
5	Turbocharger oil filter
6	Turbocharger oil supply tube
7	Turbocharger

8	Intake VCT unit
9	Exhaust VCT unit
10	Camshaft front bearing cap (part of 6049)
11	Exhaust VCT oil control solenoid
12	Intake VCT oil control solenoid
13	Exhaust camshaft
14	Intake camshaft
15	Fuel pump housing
16	Vacuum pump
17	Cylinder head
18	Head gasket
19	Cylinder block
20	Crankcase vent oil separator
21	Oil Filter Adapter
22	Oil pressure switch
23	Oil filter
24	Crankshaft assembly
25	Balance shaft assembly
26	Oil pan

Lubrication System

The engine lubrication system is of the force-feed type in which oil is supplied under full pressure to the crankshaft, connecting rod bearings, timing chain tensioners, camshaft bearing caps and VCT solenoids. The flow of oil to the valve tappets and valve train is controlled by a restricting orifice located in the cylinder head gasket.

The lubrication system is designed to provide optimum oil flow to critical components of the engine through its entire operating range.

The heart of the system is a positive displacement internal gear oil pump.

Generically, this design is known as a gerotor pump, which operates as follows:

- The oil pump is chain driven off of the crankshaft.
- System pressure is limited by an integral, internally-vented relief valve which directs the bypassed oil back to the inlet side of the oil pump.
- Oil pump displacement has been selected to provide adequate volume to make sure of correct oil pressure both at hot idle and maximum speed.
- The relief valve calibration protects the system from excessive pressure during high-viscosity

conditions.

- The relief valve is designed to provide adequate connecting rod bearing lubrication under high temperature and high-speed conditions.

Valve Train

The valve train uses Direct Acting Mechanical Buckets (DAMB). The camshaft lobes are positioned directly above mechanical buckets which are positioned on top of the valves.

Ti-VCT

The Ti-VCT system allows variable control of the valves closing which optimizes combustion at full load providing improved power and low speed torque (broadening the torque curve) which enables variable valve overlap which provides better fuel economy and emissions and provides optimized cold start operation with improved exhaust emissions.

Switchable Engine Mounts

The switchable engine mounts are a hydro dampening design to improve engine vibration at idle.

The switchable engine mounts consists of:

- 2 glycol filled engine mounts.
- Vacuum reservoir and vacuum solenoid switch mounted on the drivers side of the engine compartment frame rail.
- Vacuum hoses with check valves.

Vacuum On trigger is set when all three conditions are satisfied:

- Vehicle speed is below 20 MPH (drive) or vehicle speed is below 10 MPH. (reverse/neutral/park).
- Engine speed is between 360 RPM and 860 RPM.
- Run Time greater than 1.5 seconds.

Vacuum OFF trigger is set when:

- Engine speed is greater than 960 RPM.
- Engine speed is less than 260 RPM.
- Vehicle speed is greater than 22 MPH.

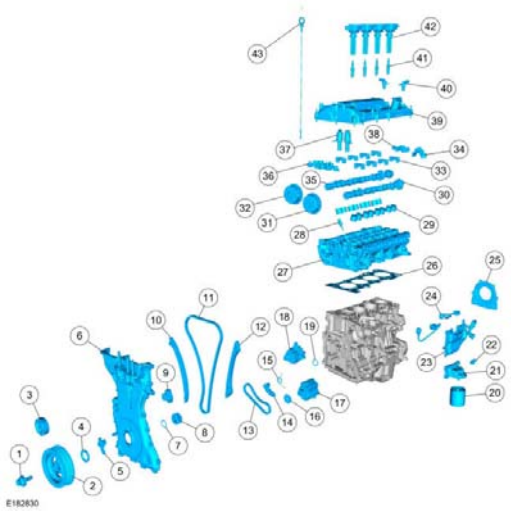
DESCRIPTION AND OPERATION > ENGINE COMPONENT VIEW

Engine - External Components



Item	Part Number	Description
1	8509	Coolant pump pulley
2	6K682	Turbocharger
3	9G479	Turbocharger heat shield
4	8B535	Coolant outlet tube
5	9C374	High-pressure fuel pump cover
6	9A397	High-pressure fuel pump bracket
7	9D376	High-pressure fuel pump
8	9U550	High-pressure fuel pump drive unit cover
9	A413	High-pressure fuel pump drive unit
10	8K556	Coolant outlet
11	2A451	Brake vacuum pump
12	9U550	Brake vacuum pump cover
13	12A648	Engine coolant temperature (ECT) sensor
14	6477	Flywheel
15	6375	Flexplate
16	6A228	Accessory drive belt tensioner
17	8575	Thermostat assembly
18	9F797	Fuel rail
19	9U550	Fuel rail shield
20	9424	Intake manifold
21	9F991	Throttle body

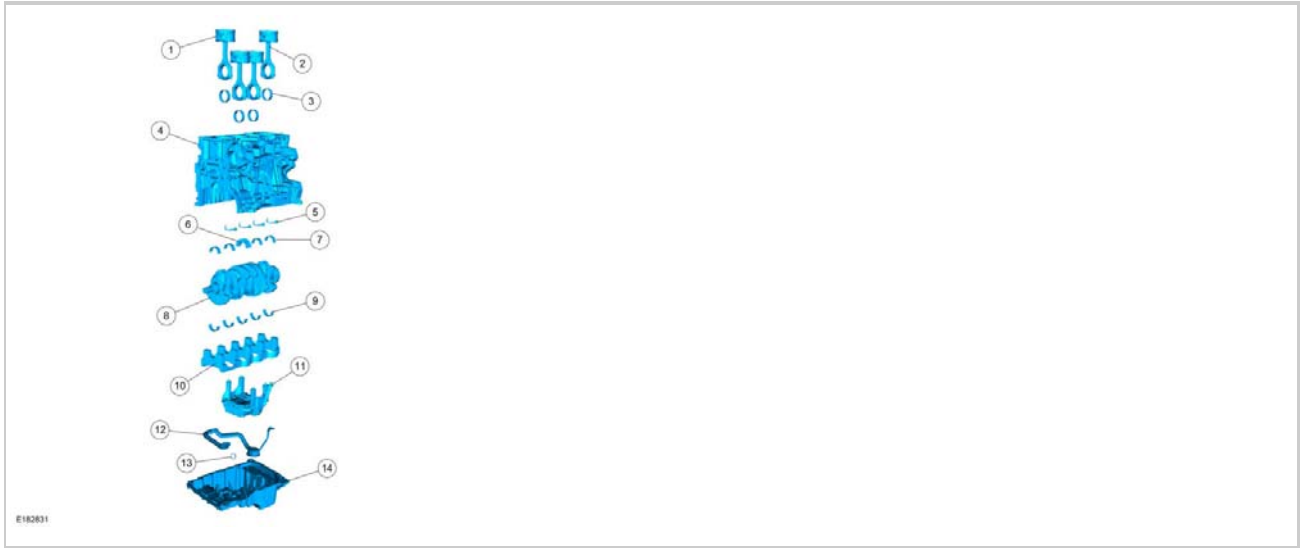
Engine - Front and Upper Components



Item	Part Number	Description
1	6K340	Crankshaft pulley bolt
2	6316	Crankshaft damper
3	19A216	Accessory drive belt idler pulley
4	6700	Crankshaft front seal
5	6C315	Crankshaft Position (CKP) sensor
6	6019	Engine front cover
7	6378	Diamond washer
8	6306	Crankshaft sprocket
9	6K254	Timing chain tensioner
10	6K255	Timing chain tensioner arm
11	6268	Timing chain
12	6K297	Timing chain guide
13	6A895	Oil pump chain
14	6C271	Oil pump chain tensioner
15	-	Oil pump chain tensioner spring (part of 6C271)
16	6652	Oil pump drive gear
17	6600	Oil pump
18	8501	Coolant pump
19	6378	Diamond washer
20	6714	Oil filter
21	6881	Oil filter adapter

22	9278	Oil pressure switch
23	6A785	Crankcase vent oil separator
24	12A699	Knock sensor (KS) (2 required)
25	6K318	Crankshaft rear oil seal
26	6051	Head gasket
27	6049	Cylinder head
28	6G004	Cylinder head temperature (CHT) sensor
29	6500	Valve tappet (16 required)
30	6A271	Camshaft (intake)
31	6C524	Intake variable camshaft timing (VCT) unit
32	6C525	Exhaust variable camshaft timing (VCT) unit
33	-	Camshaft bearing cap (part of 6049) (8 required)
34	-	Intake camshaft rear bearing cap (part of 6049)
35	6A272	Camshaft (exhaust)
36	-	Camshaft front bearing cap (part of 6049)
37	6B297	Variable camshaft timing (VCT) oil control solenoid (2 required)
38	-	Exhaust camshaft rear bearing cap (part of 6049)
39	6K271	Valve cover
40	12K073	Camshaft position (CMP) sensor (2 required)
41	12405	Spark plug (4 required)
42	2A366	Ignition coil-on-plugs (4 required)
43	6750	Oil indicator

Engine - Lower Block Components



Item	Part Number	Description
1	6110	Piston (4 required)
2	6200	Connecting rod (4 required)
3	6211	Connecting rod bearing (8 required)
4	6010	Cylinder block
5	6K868	Piston oil cooler valve (4 required)
6	6337	Cylinder block crankshaft main thrust bearing
7	6333	Cylinder block crankshaft main bearing (4 required)
8	6300	Crankshaft assembly
9	6A338	Crankshaft main bearing beam bearing (5 required)
10	-	Main bearing beam (part of 6010)
11	6K360	Balance shaft assembly
12	6622	Oil pump screen and cover assembly
13	6625	Oil pump screen and cover assembly O-ring
14	6675	Oil pan

DIAGNOSIS AND TESTING > ENGINE

Engine

1.

For basic mechanical concerns, REFER to: ENGINE SYSTEM - GENERAL INFORMATION . For driveability concerns, Refer to ENGINE CONTROLS - INTRODUCTION (EXCEPT DIESEL & HYBRID) .

GENERAL PROCEDURES > BALANCE SHAFT BACKLASH

Special Tool(s) / General Equipment

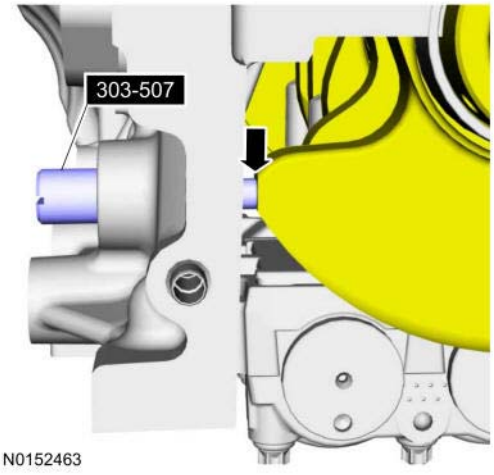
 E139373	100-002 (TOOL-4 201-C) Holding Fixture with Dial Indicator Gauge
 PZ21210	303-507 Timing Peg, Crankshaft TDC TKIT-2001N-FLM TKIT-2001N-ROW

Check

1.

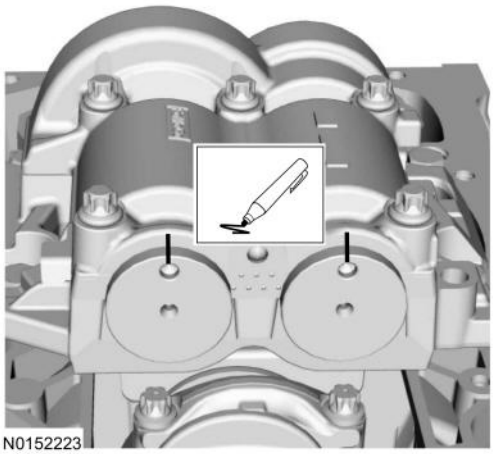
Install the special tool and rotate the crankshaft slowly clockwise until the crankshaft balance weight is up against the Crankshaft TDC Timing Peg. The engine is now at TDC.

Use Special Service Tool: 303-507 Timing Peg, Crankshaft TDC.



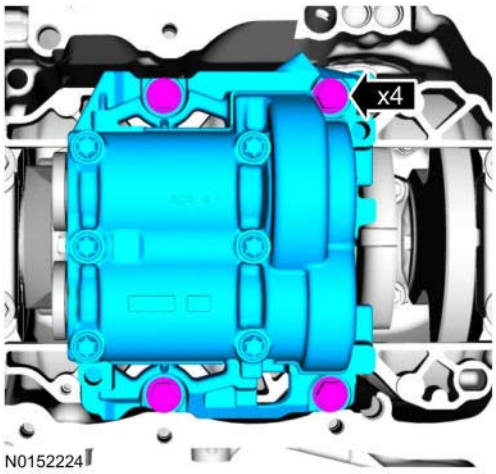
2.

Mark the balancer unit and shafts on the top for reference that the balancer unit is at TDC.



NOTE: Due to the precision interior construction of the balancer unit, it should not be disassembled.

3.
Remove the bolts and the balance unit.



4.

Remove the adjustment shims from the seat faces of the balancer unit.

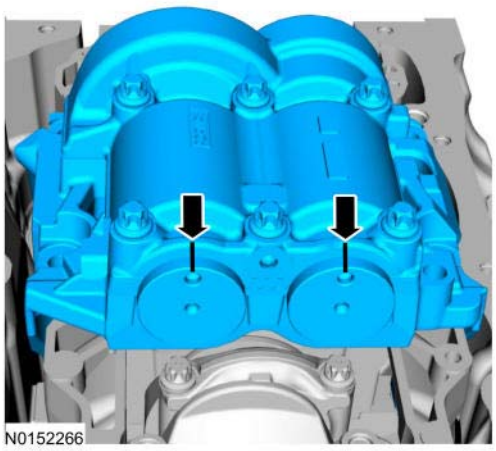
NOTE: Visually inspect the balancer unit gear for damage and verify that the shaft turns smoothly. If there is any damage or malfunction, replace the balancer unit.

5.
Install the master adjustment shims (No. 50) on the seat faces of the balancer unit.

6.

With the balancer unit shaft marks at the TDC position, slowly install the balancer unit to the

cylinder block to avoid interference between the crankshaft drive gear and the balancer unit driven gear.



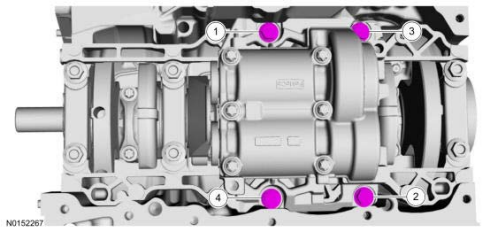
7.

Install the bolts and tighten.

Torque:

Stage 1: 18 lb.ft (25 Nm)

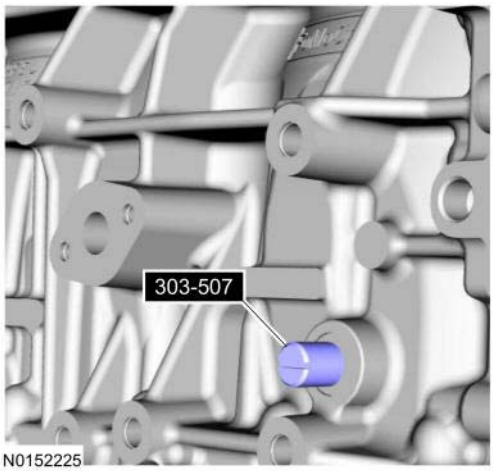
Stage 2: 31 lb.ft (42 Nm)



8.

Remove the special tool and rotate the crankshaft to confirm that there are no meshing problems between the balancer unit gear and the crankshaft gear.

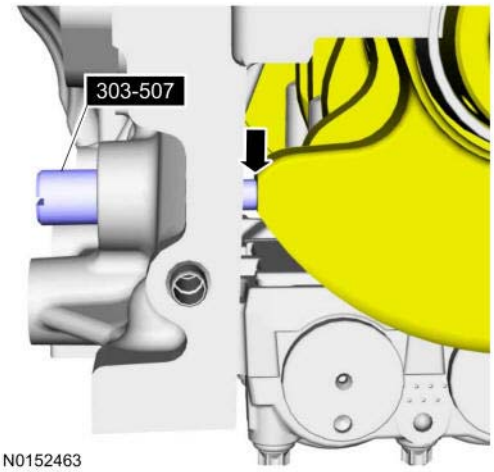
Use Special Service Tool: 303-507 Timing Peg, Crankshaft TDC.



9.

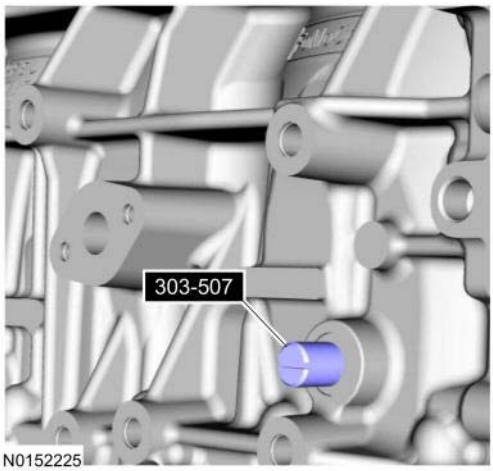
Install the special tool and rotate the crankshaft slowly clockwise until the crankshaft balance weight is up against the Crankshaft TDC Timing Peg. The engine is now at TDC.

Use Special Service Tool: 303-507 Timing Peg, Crankshaft TDC.



10.

Remove Special Service Tool: 303-507 Timing Peg, Crankshaft TDC.



NOTE: For an accurate measurement while measuring the gear backlash, insert a screwdriver as shown into the crankshaft No. 1 crankweight area and set both the rotation and the thrust direction with the screwdriver, using a prying action as shown in illustration below.

NOTE: The measurement must be taken with the Dial Indicator Gauge with Holding Fixture, a 5-mm Allen wrench and worm clamp set up as shown in illustration. Mark the Allen wrench with a file 80 mm (3.149 in) above the driven gear shaft center. Make sure the worm clamp and Allen wrench are not touching the balance shaft housing.

NOTE: Measure the backlash and verify that it is within specified range at all of the following 6 positions: 10 degrees, 30 degrees, 100 degrees, 190 degrees, 210 degrees and 280 degrees. It will be necessary to reset the measuring equipment between measurements.

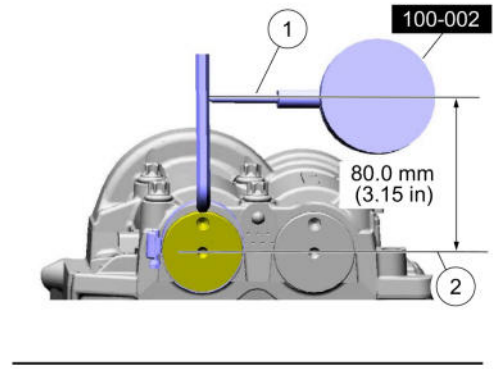
11.

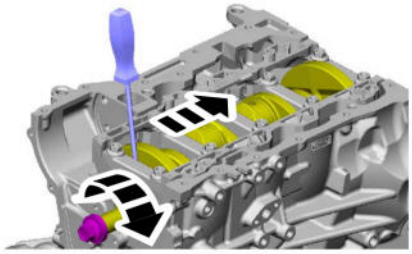
Position as shown in illustration. Measure the gear backlash.

Use Special Service Tool: 100-002 (TOOL-4201-C) Holding Fixture with Dial Indicator Gauge.

Position the Dial Indicator Gauge with Holding Fixture (1) on the Allen wrench 80 mm (3.149 in) above the driven gear shaft center (2) on the balancer unit.

Rotate the crankshaft clockwise and measure the backlash at all of the following 6 positions: 10 degrees, 30 degrees, 100 degrees, 190 degrees, 210 degrees and 280 degrees.





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NOTE: If maximum backlash exceeds 0.140 mm (0.0055 in), install a new balancer unit.

12.

Using the backlash measurement, select the proper shims from the Adjustment Shim Selection Table in illustration below.

Remove the balancer unit from the cylinder block.

Install the selected adjustment shims on the seat faces of the balancer unit.

ADJUSTMENT SHIM SELECTION TABLE

Backlash mm (in)	Selection shim (No.)	Shim thickness mm (in)	Backlash mm (in)	Selection shim (No.)	Shim thickness mm (in)
0.515-0.538 (0.0203-0.0207)	15	1.15 (0.0452)	0.345-0.367 (0.0099-0.0101)	35	1.35 (0.0531)
0.502-0.514 (0.0197-0.0202)	16	1.16 (0.0456)	0.232-0243 (0.0091-0.0095)	36	1.36 (0.535)
0.489-0.500 (0.0192-0.0196)	17	1.17 (0.0460)	0.218-0.230 (0.0085-0.0090)	37	1.37 (0.539)
0.475-0.487 (0.0187-0.0191)	18	1.18 (0.0464)	0.205-.0216 (0.0080-0.0085)	38	1.38 (0.0543)
0.462-0.473 (0.0181-0.0186)	19	1.19 (0.0468)	0.191-0.203 (0.0075-0.0079)	39	1.39 (0.0547)
0.448-0.460 (0.0176-0.0181)	20	1.20 (0.0472)	0.178-0.189 (0.0070-0.0074)	40	1.40 (0.0551)
0.435-0.446 (0.0171-0.0175)	21	1.21 (0.0476)	0.164-0.176 (0.0064-0.0069)	41	1.41 (0.0555)
0.421-0.433 (0.0165-0.0170)	22	1.22 (0.0480)	0.151-0.162 (0.0059-0.0063)	42	1.42 (0.0559)
0.408-0.419 (0.0160-0.0164)	23	1.23 (0.0484)	0.137-0.149 (0.0053-0.0058)	43	1.43 (0.0562)
0.394-0.406 (0.0155-0.0159)	24	1.24 (0.0488)	0.124-0.135 (0.0048-0.0053)	44	1.44 (0.0566)
0.381-0.392 (0.0150-0.0154)	25	1.25 (0.492)	0.110-0.122 (0.0043-0.0048)	45	1.45 (0.0570)
0.367-0.379 (0.0144-0.0149)	26	1.26 (0.0496)	0.097-0.108 (0.0038-0.0042)	46	1.46 (0.0574)
0.354-0.365 (0.0139-0.0143)	27	1.27 (0.0499)	0.083-0.095 (0.0032-0.0037)	47	1.47 (0.0578)
0.340-0.352 (0.0133-0.0138)	28	1.28 (0.0503)	0.070-0.081 (0.0027-0.0031)	48	1.48 (0.0582)
0.327-0.338 (0.0128-0.0133)	29	1.29 (0.0507)	0.056-0.068 (0.0022-0.0026)	49	1.49 (0.0586)
0.313-0.325 (0.0123-0.0127)	30	1.30 (0.0511)	0.043-0.054 (0.0016-0.0021)	50 (master)	1.50 (0.0590)
0.300-0.311 (0.0118-0.0122)	31	1.31 (0.0515)	0.029-0.041 (0.0011-0.0016)	51	1.51 (0.0594)
0.286-0.298 (0.0112-0.0117)	32	1.32 (0.0519)	0.015-0.027 (0.0005-0.0010)	52	1.52 (0.0598)
0.272-0.284 (0.0107-0.0111)	33	1.33 (0.0523)	0.002-0.014 (0.00007-0.0005)	53	1.53 (0.0602)
0.259-0.271 (0.0101-0.0106)	34	1.34 (0.0527)	0.000-0.000 (0.0000-0.0000)	54	1.54 (0.0606)

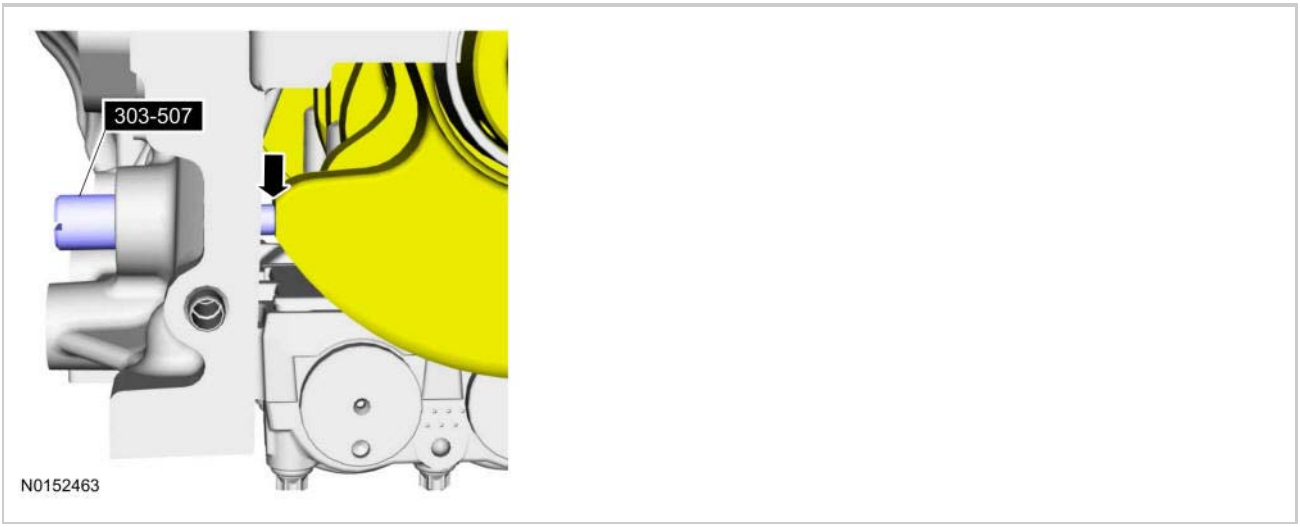
E152012

13.

Install the special tool and rotate the crankshaft slowly clockwise until the crankshaft balance

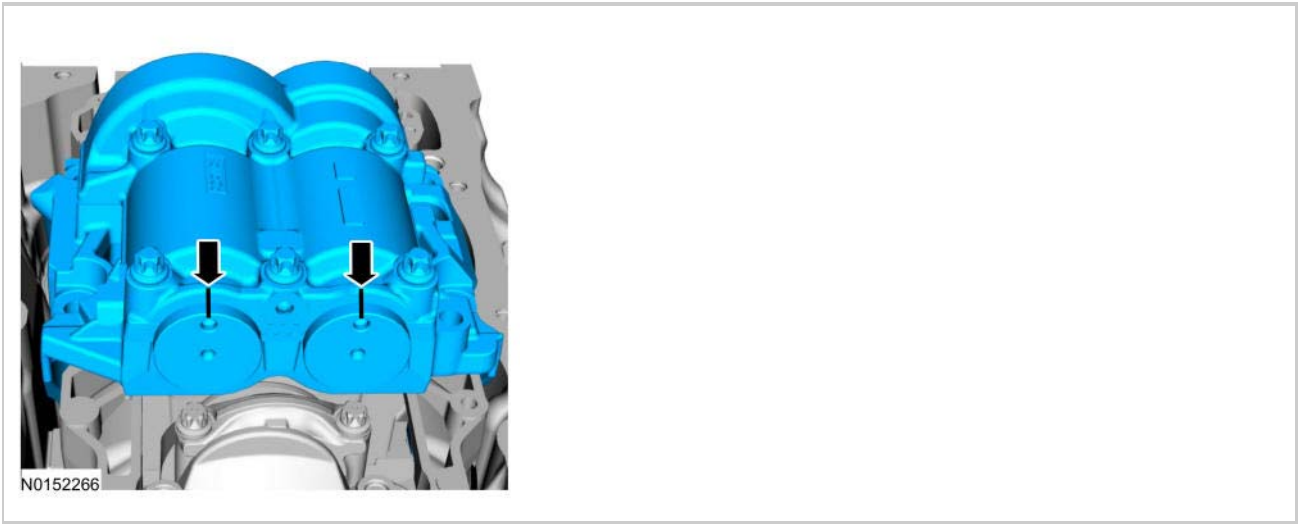
weight is up against the Crankshaft TDC Timing Peg. The engine is now at TDC.

Use Special Service Tool: 303-507 Timing Peg, Crankshaft TDC.



14.

With the balancer unit shaft marks at the TDC position, slowly install the balancer unit to the cylinder block to avoid interference between the crankshaft drive gear and the balancer unit driven gear.



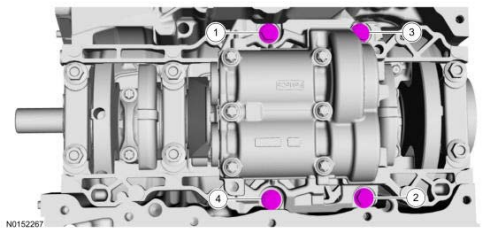
15.

Install the bolts and tighten.

Torque:

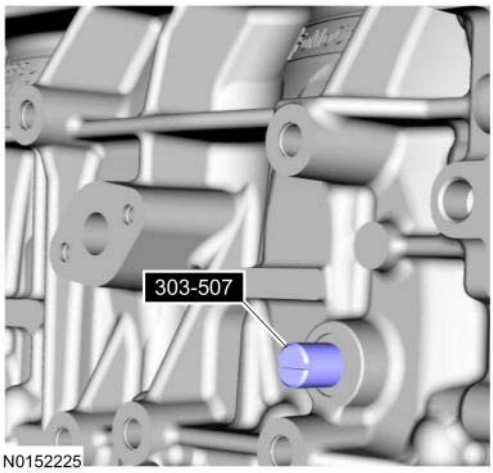
Stage 1: 18 lb.ft (25 Nm)

Stage 2: 31 lb.ft (42 Nm)



16.

Remove Special Service Tool: 303-507 Timing Peg, Crankshaft TDC.



NOTE: For an accurate measurement while measuring the gear backlash, insert a screwdriver as shown into the crankshaft No. 1 crankweight area and set both the rotation and the thrust direction with the screwdriver, using a prying action as shown in illustration below.

NOTE: The measurement must be taken with the Dial Indicator Gauge with Holding Fixture, a 5-mm Allen wrench and worm clamp set up as shown in illustration. Mark the Allen wrench with a file 80 mm (3.149 in) above the driven gear shaft center. Make sure the worm clamp and Allen wrench are not touching the balance shaft housing.

NOTE: Measure the backlash and verify that it is within specified range at all of the following 6 positions: 10 degrees, 30 degrees, 100 degrees, 190 degrees, 210 degrees and 280 degrees. It will be necessary to reset the measuring equipment between measurements.

17.

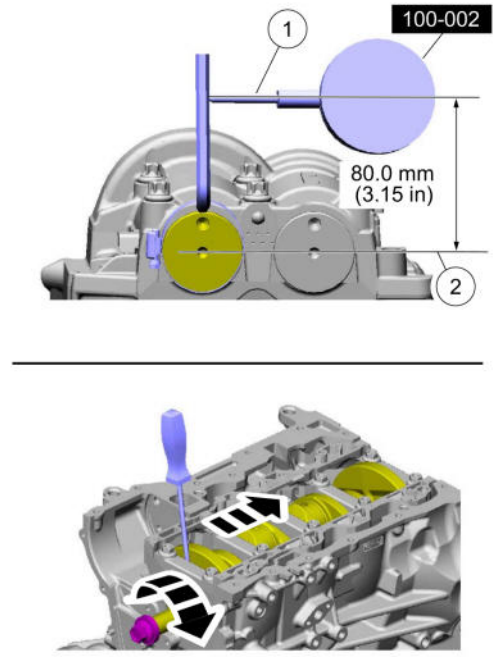
Position as shown in illustration. Measure the gear backlash.

Use Special Service Tool: 100-002 (TOOL-4201-C) Holding Fixture with Dial Indicator Gauge.

Position the Dial Indicator Gauge with Holding Fixture (1) on the Allen wrench 80 mm (3.149 in) above the driven gear shaft center (2) on the balancer unit.

Rotate the crankshaft clockwise and measure the backlash at all of the following 6 positions: 10 degrees, 30 degrees, 100 degrees, 190 degrees, 210 degrees and 280 degrees.

If the backlash exceeds the specified range of 0.040 to 0.140 mm (0.00157 to 0.0055 in), install a new balancer unit and repeat the procedure.



E152011

GENERAL PROCEDURES > VALVE CLEARANCE ADJUSTMENT

Special Tool(s) / General Equipment

Feeler Gauge

Check

1.

Remove the valve cover. Refer to: Valve Cover .

2.

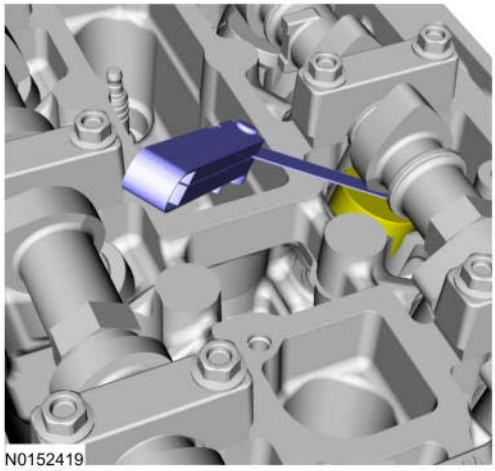
Remove the air cleaner outlet tube. Refer to: AIR CLEANER OUTLET PIPE - 2.3L EcoBoost (231kW/314PS).

NOTE: Turn the engine clockwise only, and only use the crankshaft bolt.

NOTE: Measure the clearance of each valve at base circle, with the lobe pointed away from the tappet.

3.
Use a feeler gauge to measure the clearance of each valve and record its location.

Use the General Equipment: Feeler Gauge



4.

NOTE: The number on the valve tappet only reflects the digits that follow the decimal. For example, a tappet with the number 0.650 has the thickness of 3.650 mm.

NOTE: Select tappets using this formula: tappet thickness = measured clearance + the existing tappet thickness - nominal clearance.

NOTE: The nominal clearance is:

intake: 0.25 mm (0.0095 in).

exhaust: 0.36 mm (0.0142 in).

NOTE: The acceptable clearances after being fully installed are:

intake: 0.19-0.31 mm (0.007-0.012 in).

exhaust: 0.30-0.42 mm (0.012-0.017 in).

Select the closest tappet size to the ideal tappet thickness available and mark the installation location.

5.

If any tappets do not measure within specifications, install new tappets in these locations.

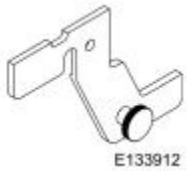
Adjustment

> *NOTE: The following step is only necessary if adjustment is required.*

1.
Remove the camshafts. Refer to: Camshafts .

REMOVAL AND INSTALLATION > CAMSHAFTS

Special Tool(s) / General Equipment

 E133912	303-1565 Alignment Tool, Camshaft TKIT-2010C-FLM
 PZ21210	303-507 Timing Peg, Crankshaft TDC TKIT-2001N-FLM TKIT-2001N-ROW
Feeler Gauge	

Materials

Name	Specification
Motorcraft® SAE 5W-30 Premium Synthetic Blend Motor Oil (U.S.) XO-5W30-QSP (U.S.)	WSS-M2C946-A
Gasket Maker TA-16	WSK-M2G348-A5

REMOVAL AND INSTALLATION > CAMSHAFTS > REMOVAL

> *NOTE: During engine repair procedures, cleanliness is extremely important. Any foreign material (including any material created while cleaning gasket surfaces) that enters the oil passages, coolant passages or the oil pan can cause engine failure.*

NOTE: Do not rotate the camshafts unless instructed to in this procedure. Rotating the camshafts or crankshaft with timing components loosened or removed can cause serious damage to the valves and pistons.

1.

With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

2.

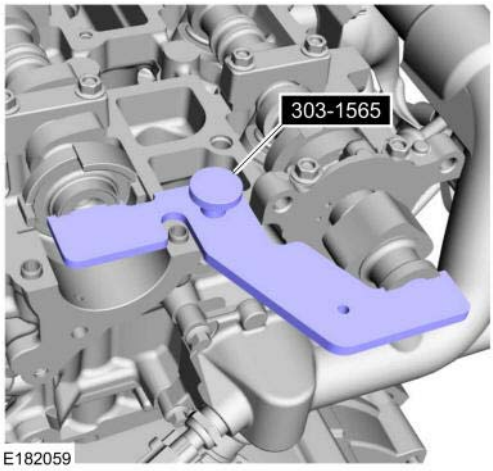
Release the fuel system pressure. Refer to: FUEL SYSTEM PRESSURE RELEASE - 2.3L EcoBoost (231kW/314PS).

3.

Remove the VCT units. Refer to: Variable Camshaft Timing (VCT) Unit .

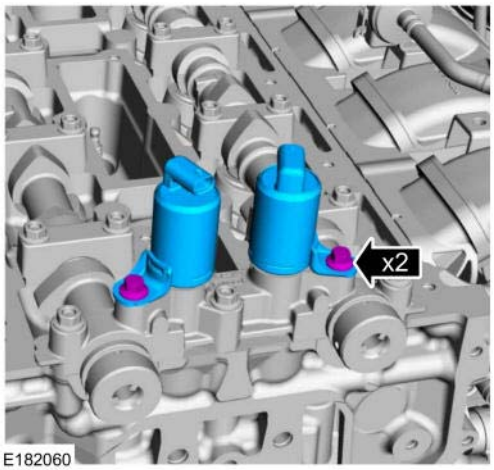
4.

Remove Special Service Tool: 303-1565 Alignment Tool, Camshaft.



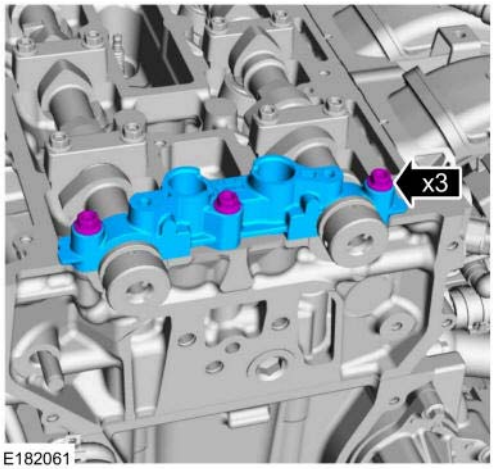
5.

Remove the bolts and the VCT oil control solenoids.



6.

Remove the bolts and the front camshaft cap.

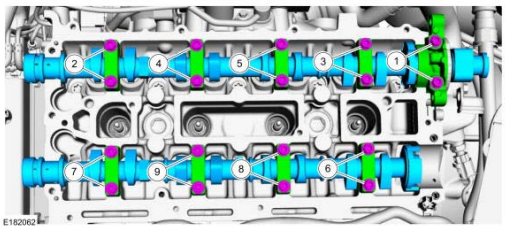


NOTE: Failure to follow the camshaft loosening procedure can result in damage to the camshafts.

NOTE: Note the location and orientation of each camshaft bearing cap and the position of the camshaft lobes on the No. 1 cylinder for installation reference.

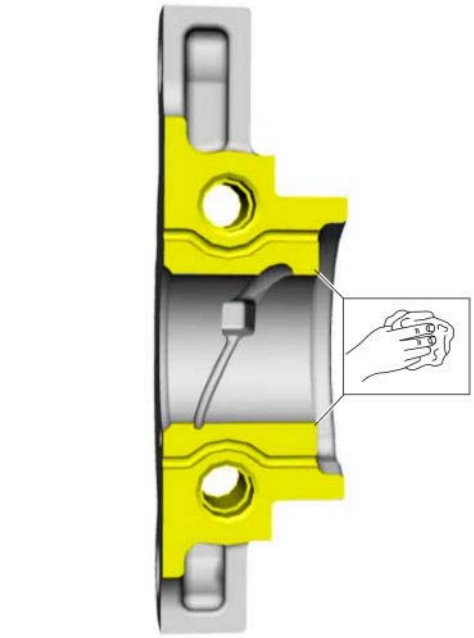
NOTE: Inspect the camshaft bores for any scratches that can be felt by hand.

7.
Loosen the camshaft bearing caps in sequence 2 turns at a time until all tension is released from the camshaft bearing caps and remove the bolts, caps and camshafts.



8.

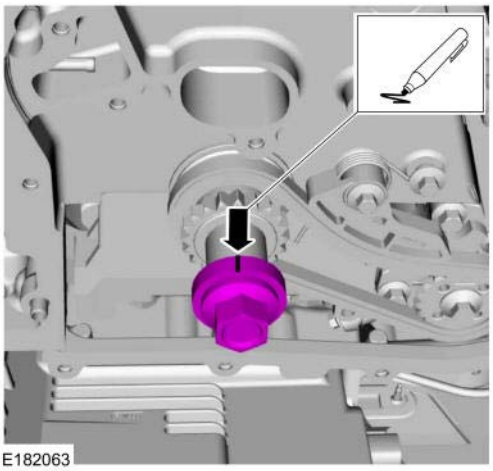
Clean the rear camshaft cap.



REMOVAL AND INSTALLATION > CAMSHAFTS > INSTALLATION

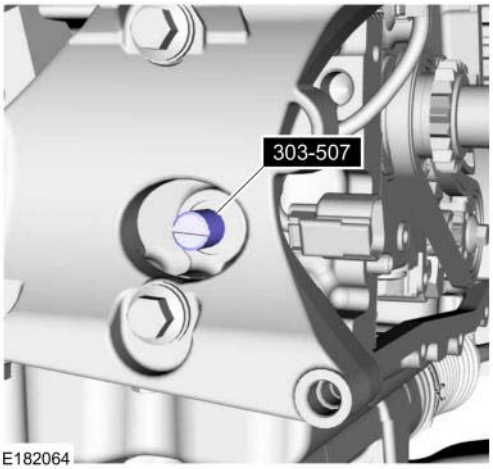
NOTE: If any new parts are being installed (cylinder head, valves, tappets, camshafts) it is necessary to check the valve clearance, follow the next 12 steps exactly or serious damage to the engine may occur. If the original parts are being installed it is not necessary to check the valve clearance so proceed to step 13.

1.
Install the crankshaft bolt, washer and place a paint mark on the crankshaft bolt at the 12 o'clock position.



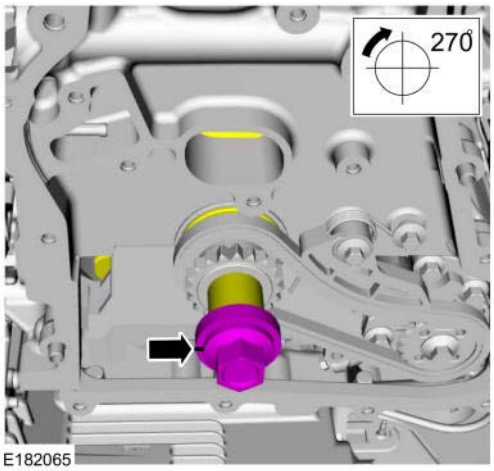
2.

Remove Special Service Tool: 303-507 Timing Peg, Crankshaft TDC.



NOTE: Rotating the crankshaft will position all of the pistons below the deck of the cylinder block and allow the camshafts to be installed and the valve clearance checked without the possibility of damage to the valves or pistons.

3.
Using the crankshaft bolt and washer, rotate the crankshaft clockwise 270 degrees until the paint mark is at the 9 o'clock position.



NOTE: Failure to follow the camshaft tightening procedure can result in damage to the camshafts.

4.

Lubricate the camshafts, camshaft journals and camshaft bearing caps with clean engine oil and install.

Material

: Motorcraft® SAE 5W-30 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W30-QSP (U.S.) (WSS-M2C946-A)

Install the camshaft caps and the bolts.

Material

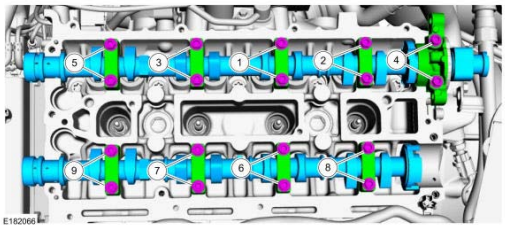
: Motorcraft® SAE 5W-30 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W30-QSP (U.S.) (WSS-M2C946-A)

Tighten 2 turns at a time in the sequence shown in illustration in 2 stages.

Torque:

Stage 1: 62 lb.in (7 Nm)

Stage 2: 142 lb.in (16 Nm)



5.

Lubricate the camshafts journals with clean engine oil and install the camshaft cap and the bolts.

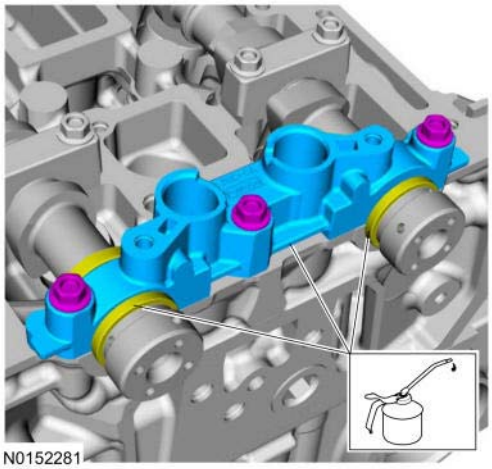
Material

: Motorcraft® SAE 5W-30 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W30-QSP (U.S.) (WSS-M2C946-A)

Torque:

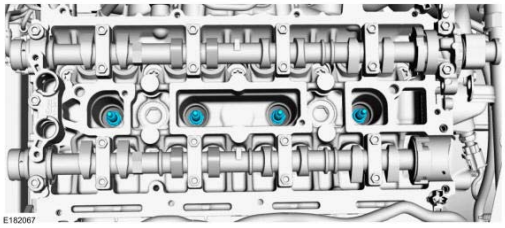
Stage 1: 62 lb.in (7 Nm)

Stage 2: 142 lb.in (16 Nm)



6.

Remove the spark plugs.



7.

1.

Using the flats of the camshaft, rotate the camshaft to place the cam lobe at base circle, with the lobe pointed away from the tappet.

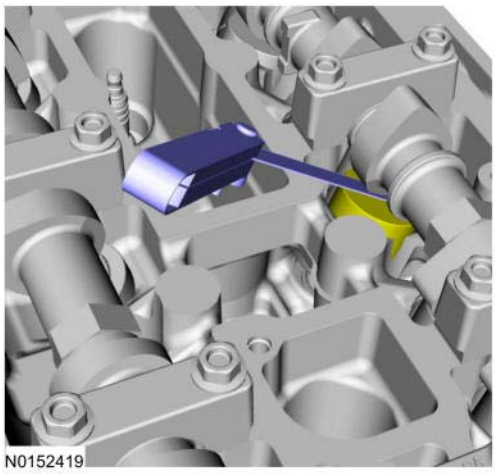
2.

Use a feeler gauge to measure the clearance of each valve and record its location.

Use the General Equipment: Feeler Gauge

3.

Repeat to measure all of the lobe/tappet clearances.



NOTE: The number on the valve tappet only reflects the digits that follow the decimal. For example, a tappet with the number 0.650 has the thickness of 3.650 mm.

NOTE: Select tappets using this formula: tappet thickness = measured clearance + the existing tappet thickness - nominal clearance.

NOTE: The nominal clearance is:

- intake: 0.25 mm (0.0095 in).
- exhaust: 0.36 mm (0.0142 in).

NOTE: The acceptable clearances after being fully installed are:

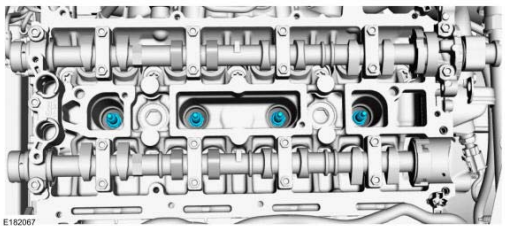
- intake: 0.19-0.31 mm (0.007-0.012 in).
- exhaust: 0.30-0.42 mm (0.012-0.017 in).

8.

Select the closest tappet size to the ideal tappet thickness available and mark the installation location.

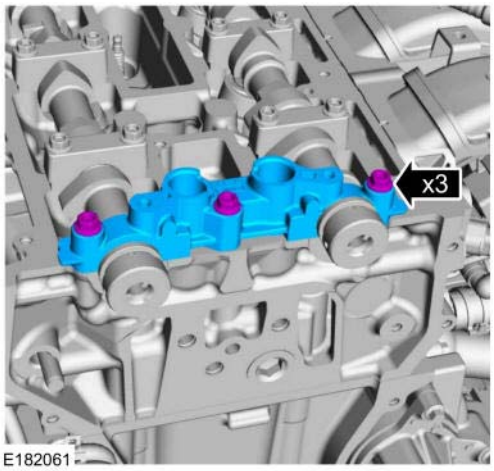
9.

Install the spark plugs.



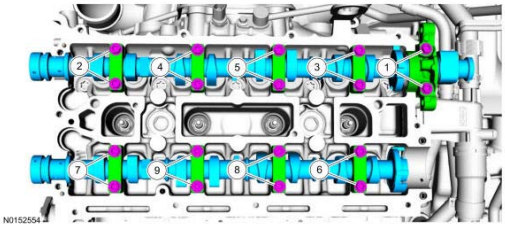
10.

Remove the bolts and the front camshaft cap.



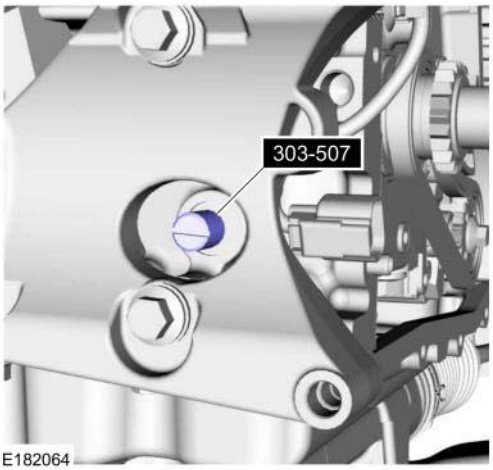
NOTE: Failure to follow the camshaft loosening procedure can result in damage to the camshafts.

11.
Loosen the camshaft bearing caps in sequence 2 turns at a time until all tension is released from the camshaft bearing caps and remove the bolts, caps and camshafts.



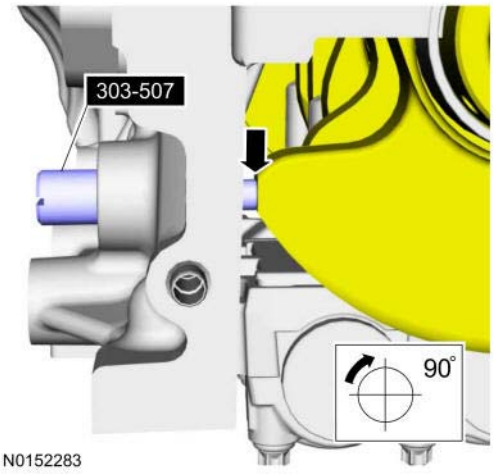
12.

Install Special Service Tool: 303-507 Timing Peg, Crankshaft TDC.



NOTE: Rotating the crankshaft will position the engine at TDC and allow you to install the camshafts in the same position as noted during the disassembly.

13.
Rotate the crankshaft clockwise 90 degrees so the crankshaft contacts the crankshaft timing peg.

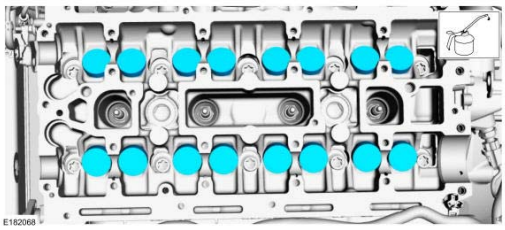


14.

If necessary, replace any tappets with the correct tappets selected during the valve clearance check.

Material

: Motorcraft® SAE 5W-30 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W30-QSP (U.S.) (WSS-M2C946-A)



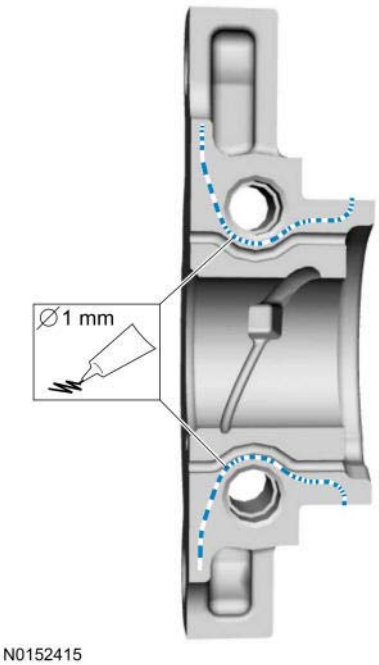
NOTE: The exhaust camshaft rear bearing cap must be secured within 10 minutes of gasket maker application. If the bearing cap is not secured within 10 minutes, the gasket maker must be removed and the sealing area cleaned.

NOTE: Do not allow sealant to enter the camshaft bearing journal. If gasket maker is applied to the camshaft bearing journal, the journal and sealing area must be cleaned.

15.
Apply 1 mm (0.039 in) beads of gasket maker to the intake rear camshaft bearing cap mating surface as shown in illustration.

Material

: Gasket Maker / TA-16 (WSK-M2G348-A5)



NOTE: Install the camshafts with the alignment slots in the camshafts lined up so the Camshaft Alignment Plate can be installed without rotating the camshafts. Make sure the lobes on the No. 1 cylinder are in the same position as noted in the removal

procedure. Rotating the camshafts when the timing chain is removed, or installing the camshafts 180 degrees out of position can cause severe damage to the valves and pistons.

NOTE: Failure to follow the camshaft tightening procedure can result in damage to the camshafts.

NOTE: Wipe off any excess sealer from the fuel injection pump housing sealing surface of the cylinder head and rear camshaft cap.

NOTE: Lubricate the camshaft, camshaft journals and camshaft bearing caps with clean engine oil.

16.
Install the camshafts, caps, bolts and tighten the camshaft bearing cap bolts one turn at a time, until finger-tight.

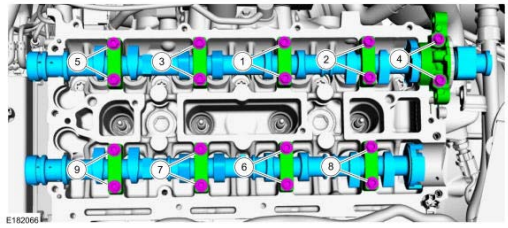
Material

: Motorcraft® SAE 5W-30 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W30-QSP (U.S.) (WSS-M2C946-A)

Torque:

Stage 1: 62 lb.in (7 Nm)

Stage 2: 142 lb.in (16 Nm)



17.

Lubricate the camshafts journals with clean engine oil and install the camshaft cap and the bolts.

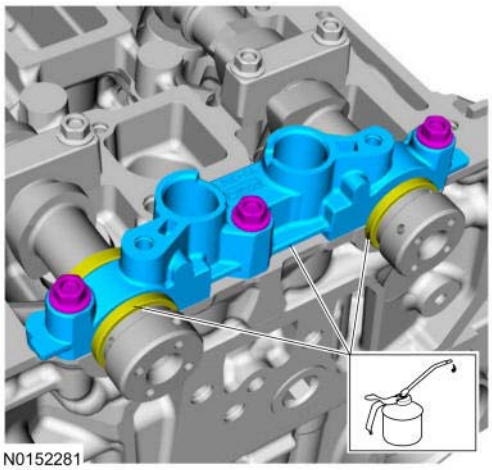
Material

: Motorcraft® SAE 5W-30 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W30-QSP (U.S.) (WSS-M2C946-A)

Torque:

Stage 1: 62 lb.in (7 Nm)

Stage 2: 142 lb.in (16 Nm)

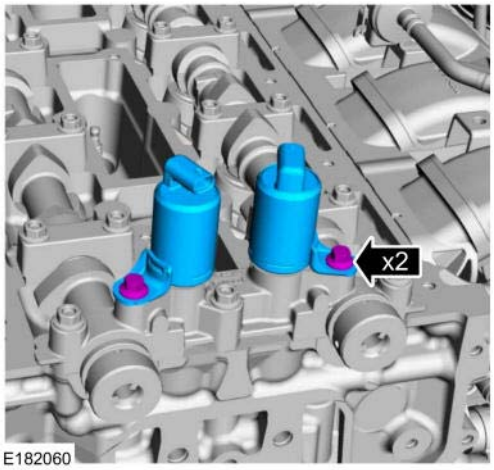


18.

Install the VCT oil control solenoids and the bolts.

Torque

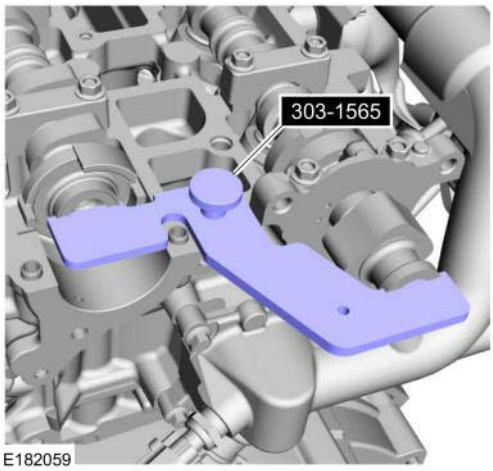
: 89 lb.in (10 Nm)



NOTE: The Camshaft Alignment Tool is for camshaft alignment only. Using this tool to prevent engine rotation can result in engine damage.

19.
Install the special tool into the slots on the back of the camshafts.

Install Special Service Tool: 303-1565 Alignment Tool, Camshaft.

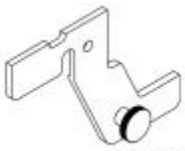


20.

Install the VCT units. Refer to: Variable Camshaft Timing (VCT) Unit .

REMOVAL AND INSTALLATION > CRANKSHAFT FRONT SEAL

Special Tool(s) / General Equipment

	303-096 (T74P-6150-A) Installer, Camshaft Front Oil Seal TKIT-2009TC-F
	303-1521 Alignment Tool, Crankshaft Position Sensor TKIT-2010C-FLM
	303-1565 Alignment Tool, Camshaft TKIT-2010C-FLM
	303-409 (T92C-6700-CH) Remover, Crankshaft Seal TKIT-1992-FH/FMH/FLMH TKIT-1993-LMH/MH

 PZ21210	303-507 Timing Peg, Crankshaft TDC TKIT-2001N-FLM TKIT-2001N-ROW
Strap Wrench	

Materials

Name	Specification
Motorcraft® SAE 5W-30 Premium Synthetic Blend Motor Oil (U.S.) XO-5W30-QSP (U.S.)	WSS-M2C946-A
Gasket Maker TA-16	WSK-M2G348-A5

REMOVAL AND INSTALLATION > CRANKSHAFT FRONT SEAL > REMOVAL

NOTE: Do not loosen or remove the crankshaft pulley bolt without first installing the special tools as instructed in this procedure. The crankshaft pulley and the crankshaft timing sprocket are not keyed to the crankshaft. The crankshaft, the crankshaft sprocket and the pulley are fitted together by friction, using diamond washers between the flange faces on each part. For that reason, the crankshaft sprocket is also unfastened if the pulley bolt is loosened. Before any repair requiring loosening or removal of the crankshaft pulley bolt, the crankshaft and camshafts must be locked in place by the special service tools, otherwise severe engine damage can occur.

NOTE: During engine repair procedures, cleanliness is extremely important. Any foreign material (including any material created while cleaning gasket surfaces) that enters the oil passages, coolant passages or the oil pan can cause engine failure.

1.

With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

2.

Remove the following items:

Refer to: AIR CLEANER OUTLET PIPE - 2.3L EcoBoost (231kW/314PS).

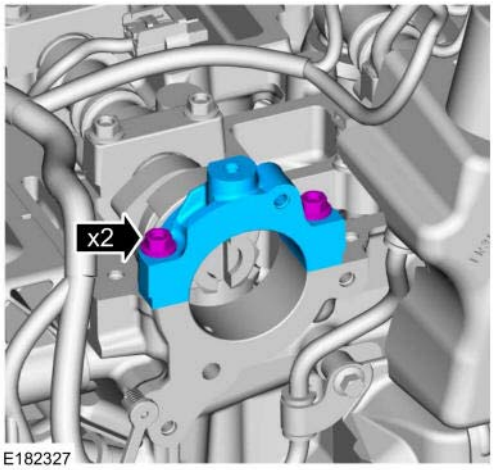
Refer to: ACCESSORY DRIVE BELT - 2.3L EcoBoost (231kW/314PS).

Refer to: Valve Cover .

Refer to: Brake Vacuum Pump - 2.3L EcoBoost (201kW/273PS) .

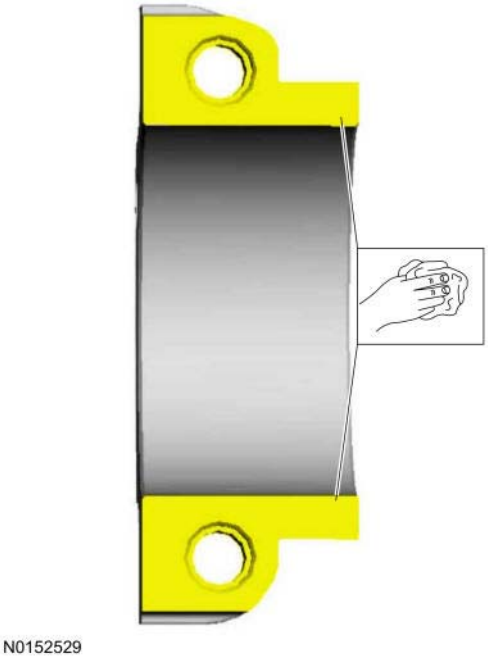
3.

Remove the bolts and the rear intake camshaft cap.



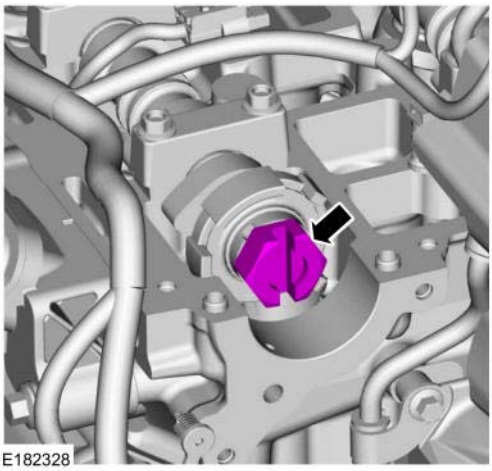
4.

Clean the rear intake camshaft cap.



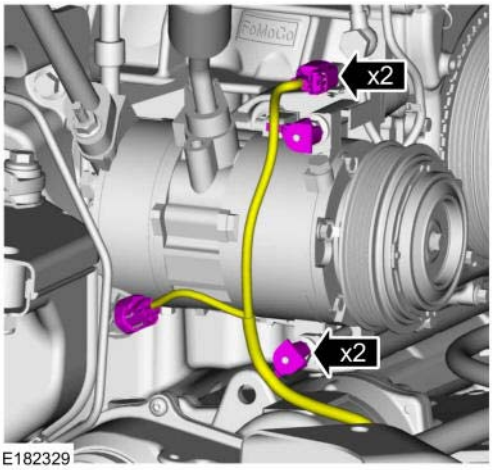
5.

Using a wrench on the flats of the intake camshaft to prevent cam rotation, remove the brake vacuum pump adapter.



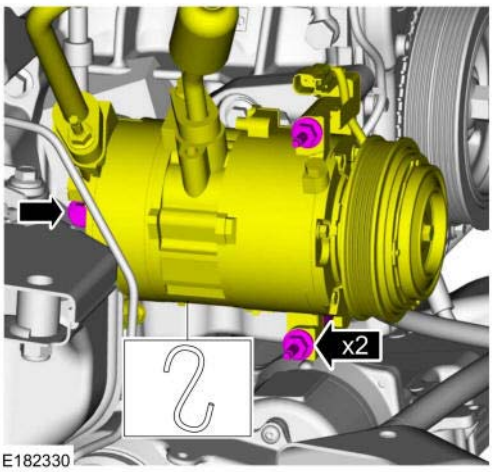
6.

Disconnect the A/C compressor electrical connectors and the wire harness retainers.



7.

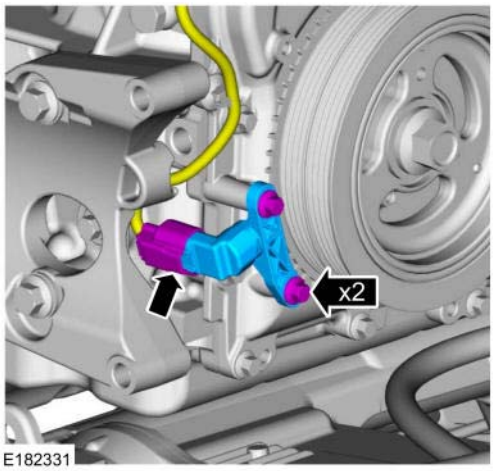
Remove the bolts, position and support the A/C compressor aside.



8.

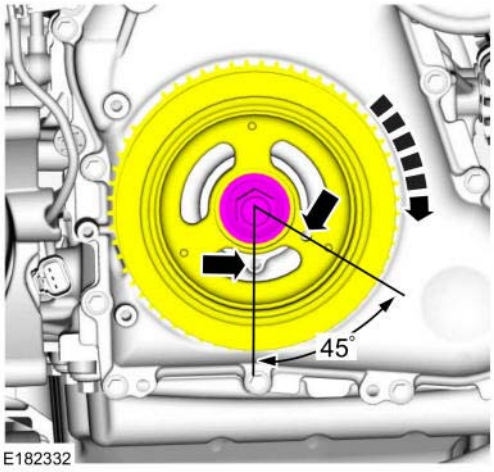
Remove the 2 bolts and the CKP sensor.

Disconnect the CKP sensor electrical connector.



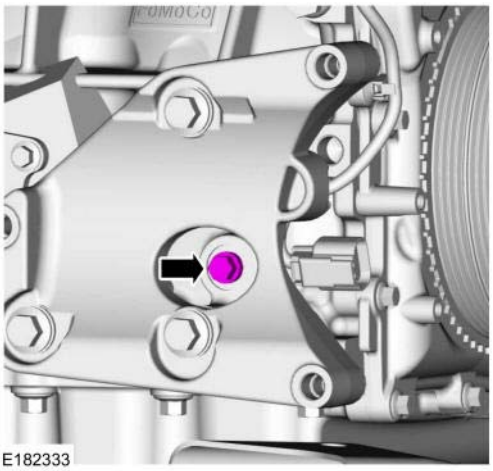
9.

Turn the crankshaft clockwise until the No. 1 piston is 45 degrees BTDC using the guide holes on the engine front cover and the crankshaft pulley.



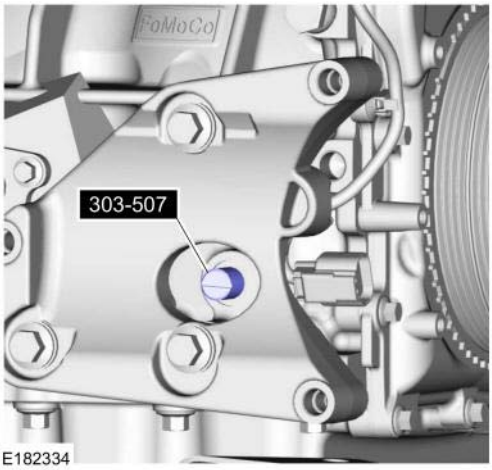
10.

Remove the engine plug bolt.



11.

Install Special Service Tool: 303-507Timing Peg, Crankshaft TDC.

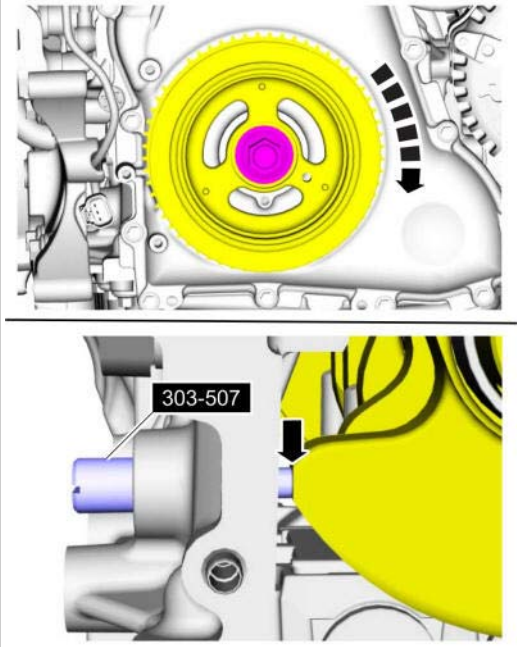


NOTE: The Crankshaft TDC Timing Peg will contact the crankshaft and prevent it from turning past TDC. However, the crankshaft can still be rotated in the counterclockwise direction. The crankshaft must remain at the TDC position during the crankshaft pulley removal and installation.

NOTE: The engine front cover is removed from graphic for clarity.

12.
Rotate the crankshaft clockwise until the contacts the special tool.

Use Special Service Tool: 303-507 Timing Peg, Crankshaft TDC.

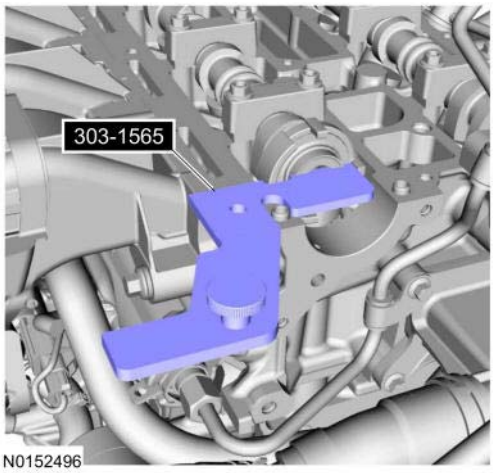


E182335

NOTE: The Camshaft Alignment Tool is for camshaft alignment only. Using this tool to prevent engine rotation can result in engine damage.

NOTE: The camshaft timing slots are offset. If the Camshaft Alignment Tool cannot be installed, remove the TDC Timing Peg and rotate the crankshaft three-fourths of a revolution clockwise and repeat the previous 2 steps of this procedure.

13.
Install Special Service Tool: 303-1565 Alignment Tool, Camshaft.



N0152496

NOTE: The crankshaft must remain in the TDC position during removal of the

pulley bolt or damage to the engine can occur. Therefore, the crankshaft pulley must be held in place with the Strap Wrench and the bolt should be removed using an air impact wrench (1/2-in drive minimum).

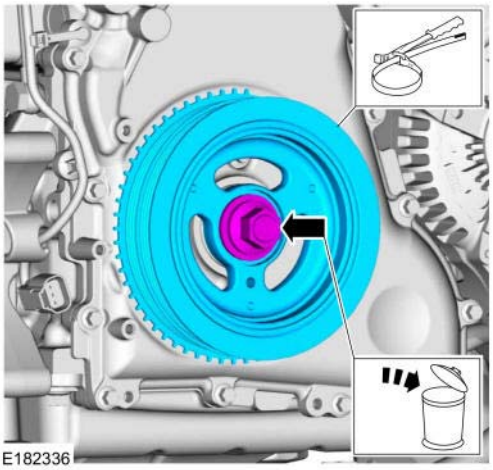
NOTE: The crankshaft sprocket diamond washer may come off with the crankshaft pulley.

14.

Remove the bolt, washer and the crankshaft pulley.

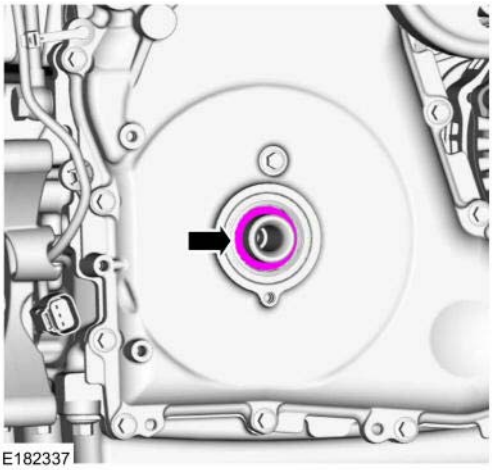
Use the General Equipment: Strap Wrench

Discard the bolt.



15.

If the diamond washer did not come off with the crankshaft pulley, remove the diamond washer.

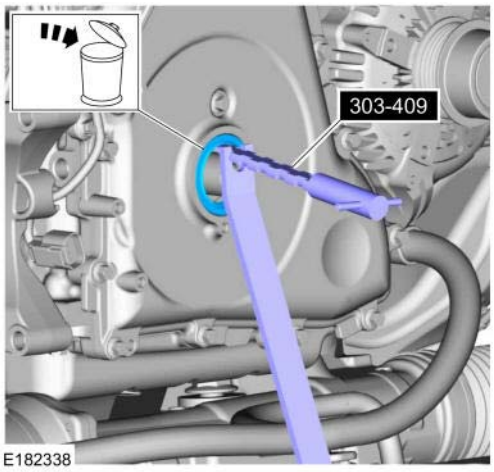


NOTE: Use care not to damage the engine front cover or the crankshaft when

removing the seal.

16.
Using the special tools, remove the crankshaft front seal.

Use Special Service Tool: 303-409 (T92C-6700-CH) Remover, Crankshaft Seal.



REMOVAL AND INSTALLATION > CRANKSHAFT FRONT SEAL > INSTALLATION

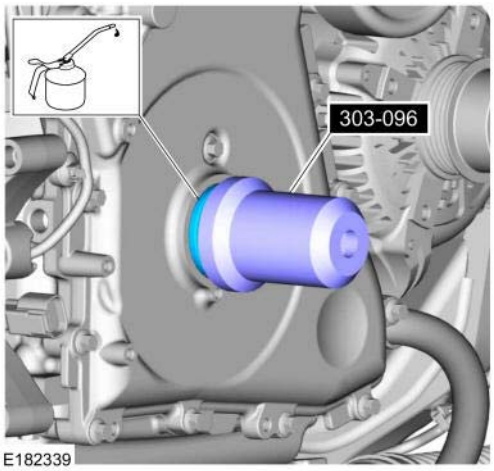
NOTE: Remove the through-bolt from the Camshaft Front Oil Seal Installer.

1.
Using the special tools, install the crankshaft front seal.

Use Special Service Tool: 303-096 (T74P-6150-A) Installer, Camshaft Front Oil Seal.

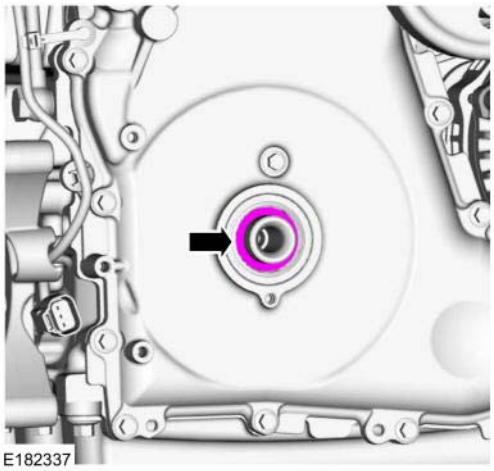
Material

: Motorcraft® SAE 5W-30 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W30-QSP (U.S.) (WSS-M2C946-A)



NOTE: The crankshaft sprocket diamond washer may come off with the crankshaft pulley. The diamond washer should be cleaned and inspected for any damage. If damage is evident, replace the diamond washer. If no damage, the diamond washer is to be reused. If the diamond washer is not installed, engine damage may occur.

2.
Install the diamond washer onto the crankshaft.

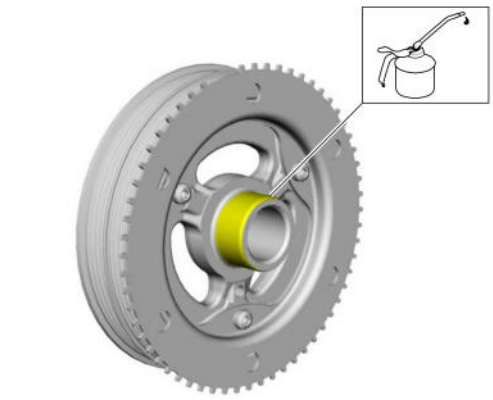


3.

Lubricate the crankshaft pulley with clean engine oil.

Material

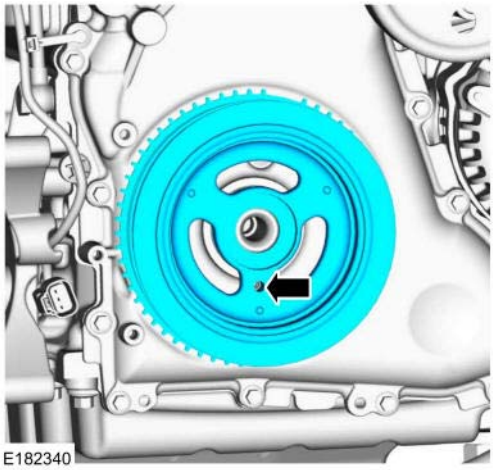
: Motorcraft® SAE 5W-30 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W30-QSP (U.S.) (WSS-M2C946-A)



N0152293

4.

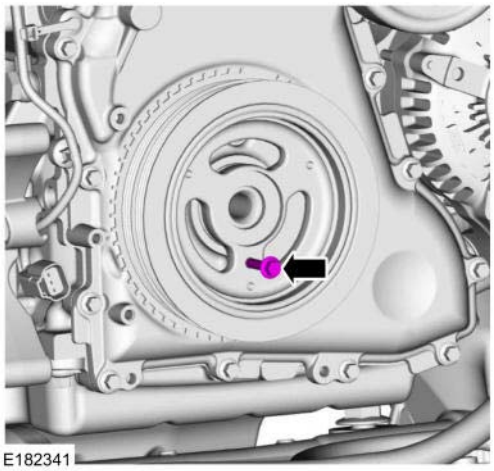
Position the crankshaft pulley onto the crankshaft with the access hole at the 6 o'clock position.



E182340

NOTE: This step will correctly align the crankshaft pulley to the crankshaft.

5.
Install an M6 bolt.



NOTE: The crankshaft must remain in the TDC position during installation of the pulley bolt or damage to the engine can occur. Therefore, the crankshaft pulley must be held in place with the Strap Wrench and the bolt should be installed using hand tools only.

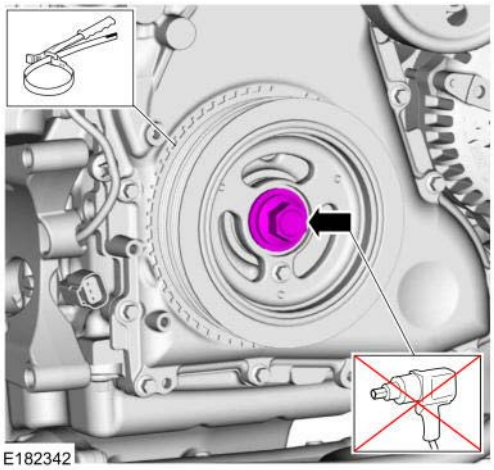
6.
Install the crankshaft bolt and washer and tighten.

Use the General Equipment: Strap Wrench

Torque:

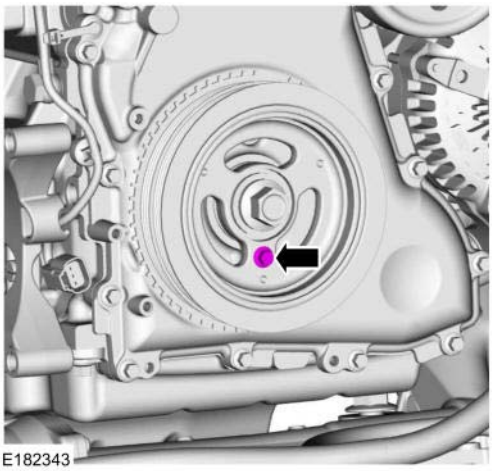
Stage 1: 74 lb.ft (100 Nm)

Stage 2: 90°



7.

Remove the M6 bolt.

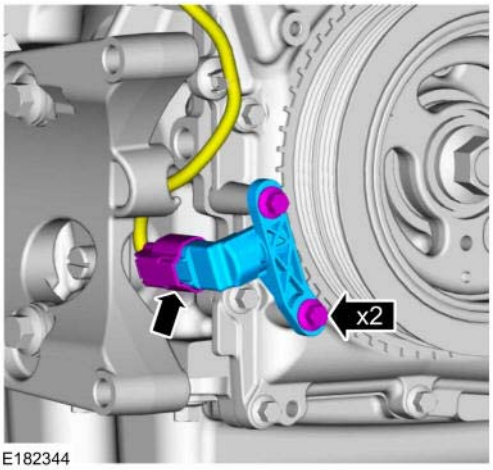


8.

Connect the CKP sensor electrical connector.

> *NOTE: Do not tighten the CKP sensor bolts at this time.*

Install the CKP sensor and the bolts finger tight.



9.

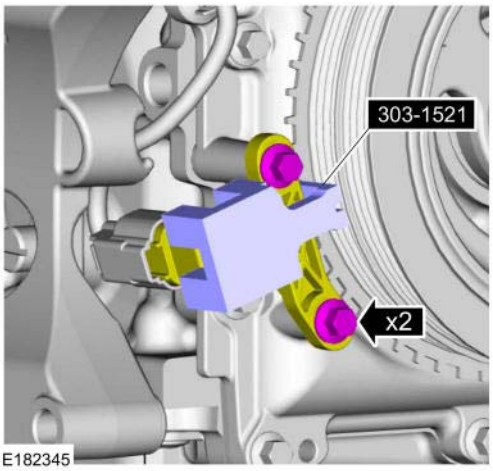
Install the Special Tool onto the CKP sensor and the tooth of the crankshaft pulley trigger wheel.

Use Special Service Tool: 303-1521 Alignment Tool, Crankshaft Position Sensor.

Tighten the bolts.

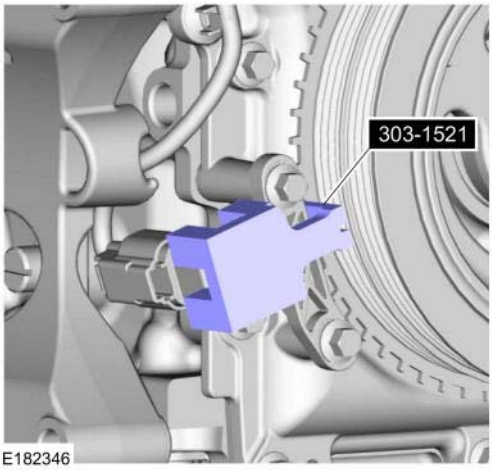
Torque

: 62 lb.in (7 Nm)



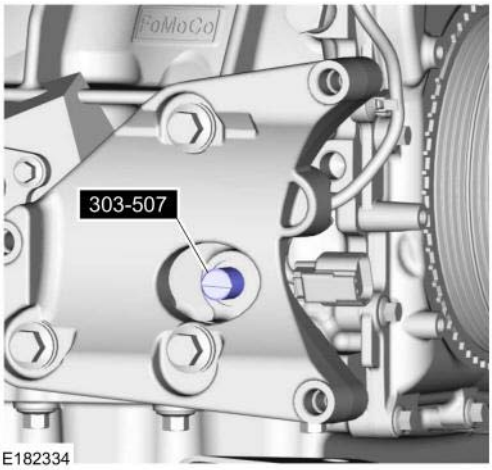
10.

Remove Special Service Tool: 303-1521 Alignment Tool, Crankshaft Position Sensor.



11.

Remove Special Service Tool: 303-507 Timing Peg, Crankshaft TDC.

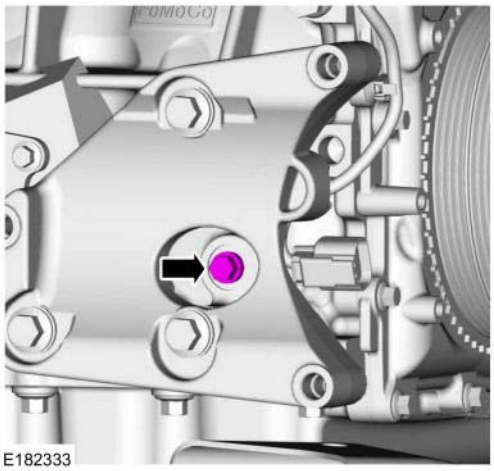


12.

Install the engine plug bolt.

Torque

: 177 lb.in (20 Nm)

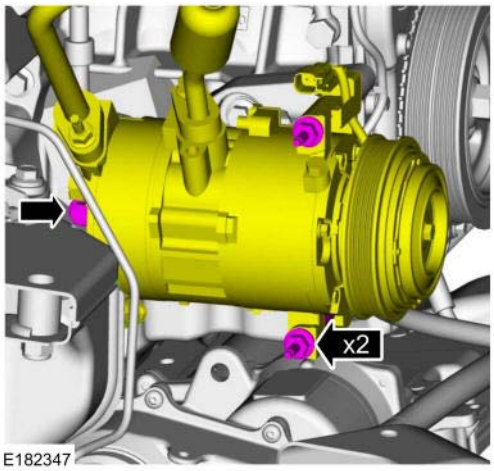


13.

Position the A/C compressor and install the bolts.

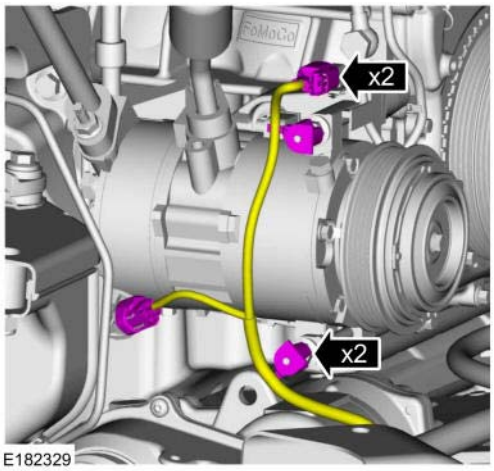
Torque

: 18 lb.ft (25 Nm)



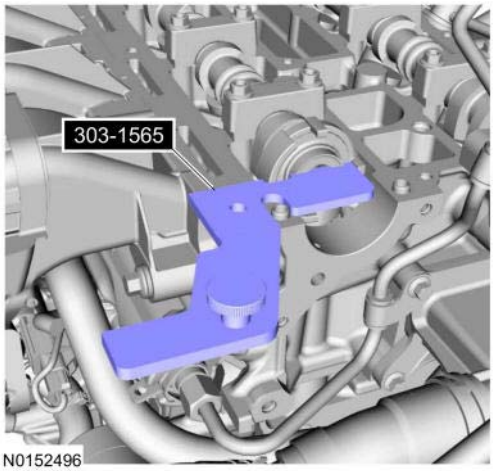
14.

Connect the A/C compressor electrical connectors and the wire harness retainers.



15.

Remove Special Service Tool: 303-1565 Alignment Tool, Camshaft.

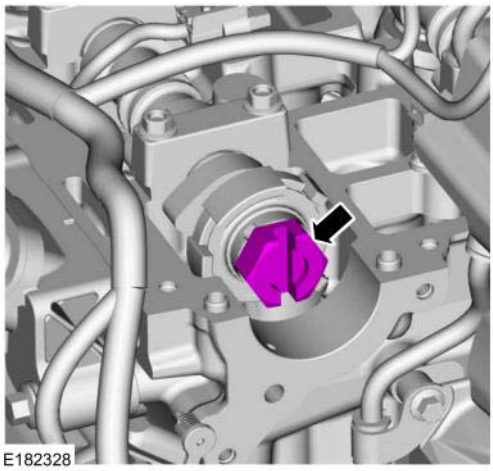


16.

Using a wrench on the flats of the intake camshaft to prevent cam rotation, install the brake vacuum pump adapter.

Torque

: 46 lb.ft (63 Nm)

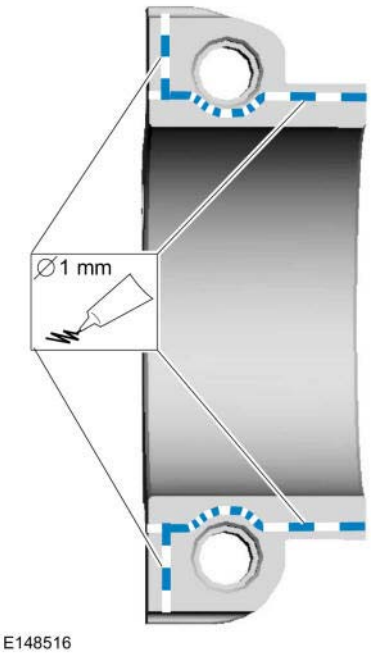


NOTE: The intake camshaft rear bearing cap must be secured within 10 minutes of gasket maker application. If the bearing cap is not secured within 10 minutes, the gasket maker must be removed.

17.
Apply 1 mm (0.039 in) beads of gasket maker to the intake rear camshaft bearing cap mating surface as shown in illustration.

Material

: Gasket Maker / TA-16 (WSK-M2G348-A5)



NOTE: Wipe off any excess gasket maker from the vacuum pump sealing surface

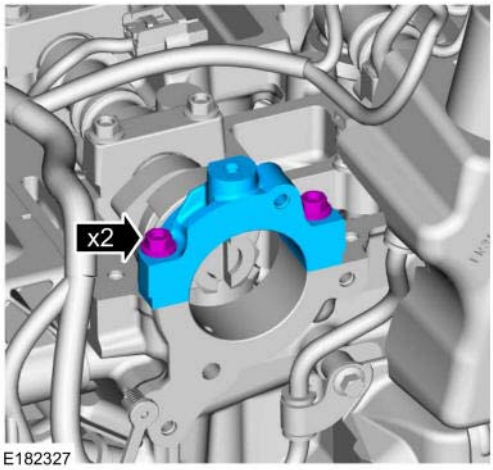
of the cylinder head and camshaft cap.

18.
Install the rear intake camshaft cap and the bolts.

Torque:

Stage 1: 62 lb.in (7 Nm)

Stage 2: 142 lb.in (16 Nm)



19.

Install the following items:

Refer to: Brake Vacuum Pump - 2.3L EcoBoost (201kW/273PS) .

Refer to: Valve Cover .

Refer to: ACCESSORY DRIVE BELT - 2.3L EcoBoost (231kW/314PS).

Refer to: AIR CLEANER OUTLET PIPE - 2.3L EcoBoost (231kW/314PS).

20.

After completing the repairs, perform the Misfire Monitor Neutral Profile Correction procedure using a diagnostic scan tool.

REMOVAL AND INSTALLATION > CRANKSHAFT REAR SEAL

Special Tool(s) / General Equipment

 E134675	303-328 (T88P-6701-B1) Replacer, Rear Seal TKIT-1988-F TKIT-1988-FLM TKIT-1988-LM

Plastic Scraper
Oil Drain Equipment

Materials

Name	Specification
Motorcraft® SAE 5W-30 Premium Synthetic Blend Motor Oil (U.S.) XO-5W30-QSP (U.S.)	WSS-M2C946-A
Motorcraft® Silicone Gasket Remover ZC-30-A	-
Motorcraft® Metal Surface Prep ZC-31-B	-
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4
Metal Brake Parts Cleaner (U.S.) PM-4-A, PM-4-B (U.S.)	-

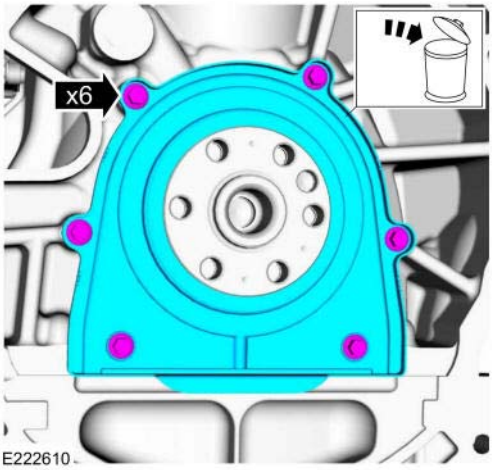
REMOVAL AND INSTALLATION > CRANKSHAFT REAR SEAL > REMOVAL

1.

Remove the flexplate or flywheel. Refer to: Flexplate . Refer to: Flywheel .

2.

Remove the bolts and the crankshaft rear seal, discard the crankshaft rear seal.



NOTE: Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges, which make leak paths. Use a plastic scraping tool to remove traces of sealant.

3.
Clean and inspect the oil pan and cylinder block mating surfaces. Refer to: RTV Sealing Surface

Cleaning and Preparation .

Use the General Equipment: Plastic Scraper

Material

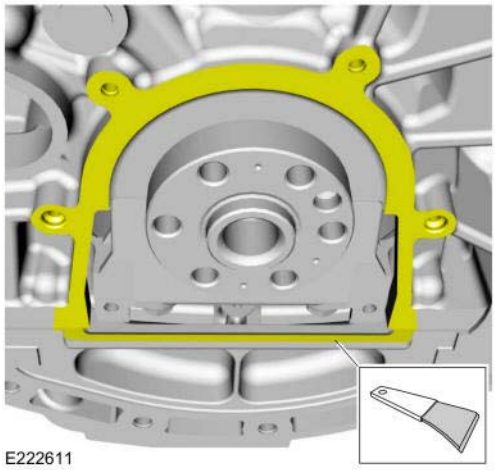
: Motorcraft® Silicone Gasket Remover / ZC-30-A

Material

: Metal Brake Parts Cleaner (U.S.) / PM-4-A, PM-4-B (U.S.)

Material

: Motorcraft® Metal Surface Prep / ZC-31-B



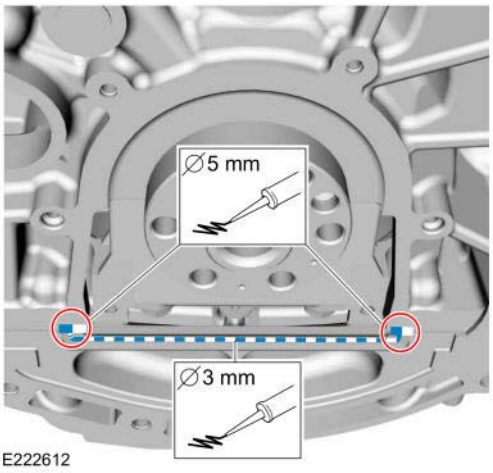
REMOVAL AND INSTALLATION > CRANKSHAFT REAR SEAL > INSTALLATION

NOTE: If the crankshaft rear seal is not secured within 10 minutes of sealant application, the sealant must be removed and the sealing area cleaned. Failure to follow this procedure can cause future oil leakage.

1.
Apply a 3 mm (0.118 in) bead of silicone to the oil pan surface and a 5 mm (0.196 in) bead at the T-joints.

Material

: Silicone Gasket and Sealant / TA-30 (WSE-M4G323-A4)



2.

1.

Install the crankshaft rear main oil seal installer.

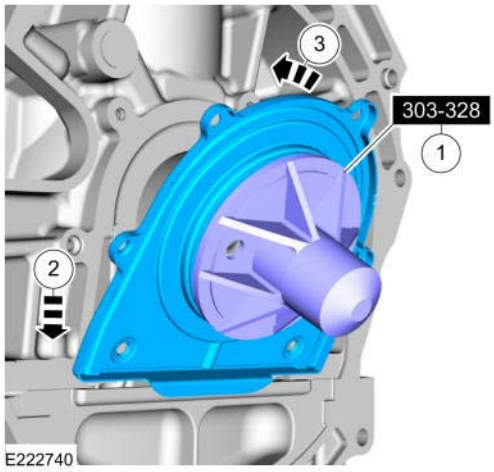
Use Special Service Tool: 303-328 (T88P-6701-B1) Replacer, Rear Seal.

2.

Install the crankshaft rear seal retainer at an angle above the oil pan flange to avoid scraping off the sealer.

3.

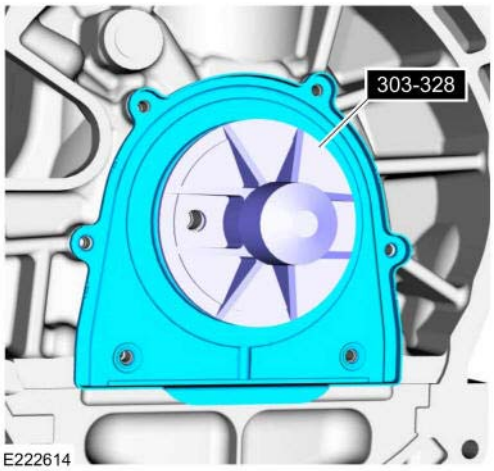
Tilt the seal retainer up and onto the rear of the cylinder block.



3.

Using the special tool, seat the crankshaft rear seal.

Use Special Service Tool:303-328 (T88P-6701-B1) Replacer, Rear Seal.

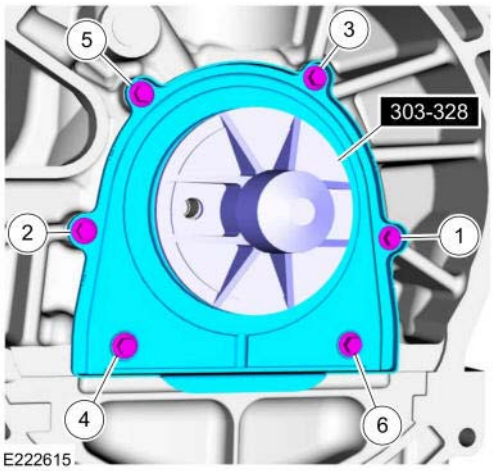


4.

Install the bolts and tighten in sequence shown in illustration. Remove Special Service Tool: 303-328 (T88P-6701-B1) Replacer, Rear Seal.

Torque

: 89 lb.in (10 Nm)



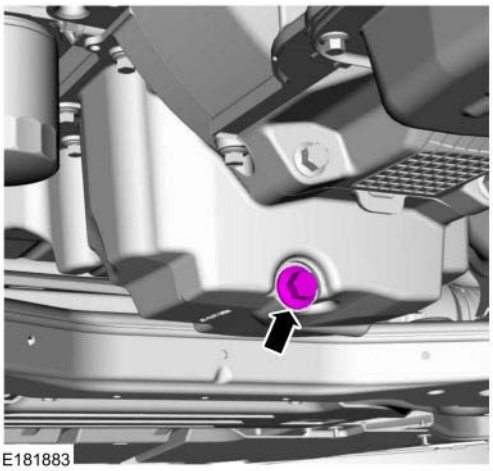
5.

Drain engine oil and install drain plug.

Use the General Equipment: Oil Drain Equipment

Torque

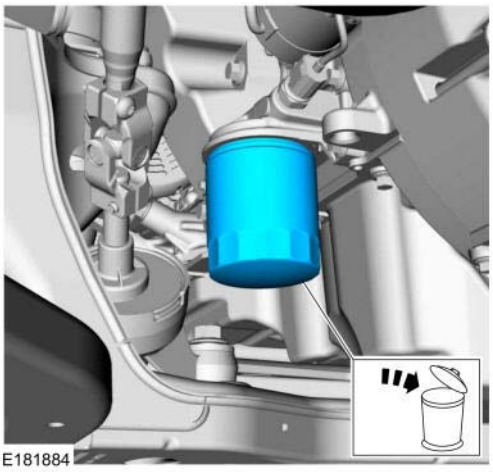
: 20 lb.ft (27 Nm)



6.

Remove and discard the engine oil filter.

Use the General Equipment: Oil Drain Equipment



NOTE: Lubricate the engine oil filter seal with clean engine oil.

7.
Install a new engine oil filter.

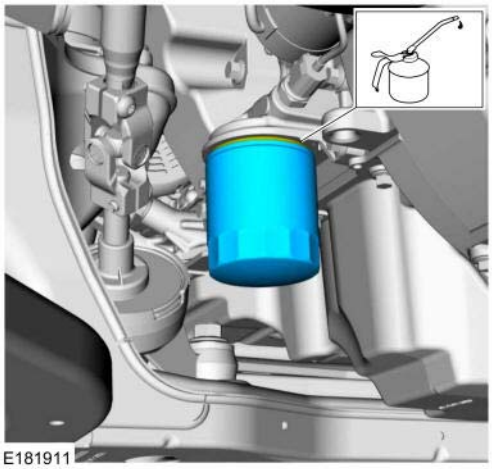
Material

: Motorcraft® SAE 5W-30 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W30-QSP (U.S.) (WSS-M2C946-A)

Torque:

Stage 1: 71 lb.in (8 Nm)

Stage 2: 180°

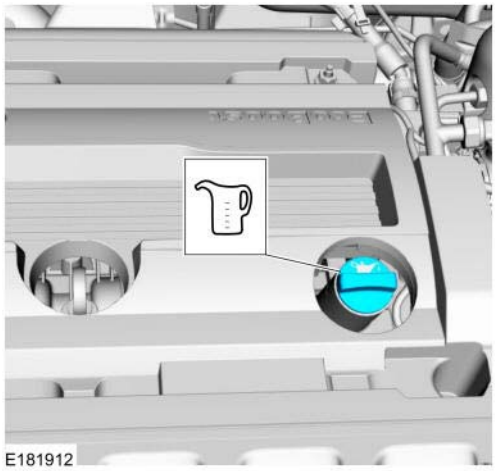


8.

Fill the engine with clean engine oil. Refer to: Specifications .

Material

: Motorcraft® SAE 5W-30 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W30-QSP (U.S.) (WSS-M2C946-A)



9.

Install the flexplate or flywheel. Refer to: Flexplate . Refer to: Flywheel .

REMOVAL AND INSTALLATION > CYLINDER HEAD

Special Tool(s) / General Equipment

Oil Drain Equipment
Hose Clamp Remover/Installer

Materials

Name	Specification
Motorcraft® SAE 5W-30 Premium Synthetic Blend Motor Oil (U.S.) XO-5W30-QSP (U.S.)	WSS-M2C946-A
Motorcraft® Orange Antifreeze/Coolant Prediluted (U.S.)VC-3DIL-B (U.S.)	WSS-M97B44-D2

REMOVAL AND INSTALLATION > CYLINDER HEAD > REMOVAL

NOTE: Do not loosen or remove the crankshaft pulley bolt without first installing the special tools as instructed in this procedure. The crankshaft pulley and the crankshaft timing sprocket are not keyed to the crankshaft. The crankshaft, the crankshaft sprocket and the pulley are fitted together by friction, using diamond washers between the flange faces on each part. For that reason, the crankshaft sprocket is also unfastened if the pulley bolt is loosened. Before any repair requiring loosening or removal of the crankshaft pulley bolt, the crankshaft and camshafts must be locked in place by the special service tools, otherwise severe engine damage can occur.

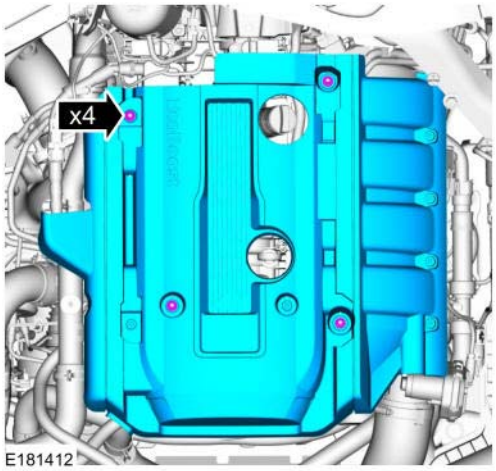
NOTE: During engine repair procedures, cleanliness is extremely important. Any foreign material, including any material created while cleaning gasket surfaces, that enters the oil passages, coolant passages or the oil pan can cause engine failure.

1.

With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

2.

Remove the nuts and the engine appearance cover.



3.

Release the fuel system pressure. Refer to: FUEL SYSTEM PRESSURE RELEASE - 2.3L EcoBoost (231kW/314PS).

4.

Disconnect the battery ground. Refer to: Battery Disconnect and Connect .

5.

Drain the cooling system. Refer to: COOLING SYSTEM DRAINING AND VACUUM FILLING .

6.

Remove the following items:

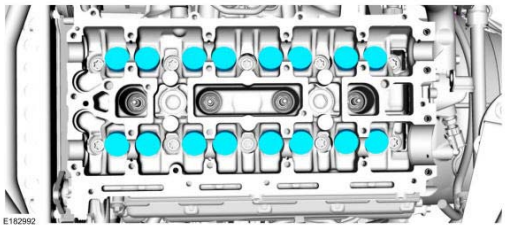
Refer to: Turbocharger .

Refer to: Intake Manifold .

Refer to: Camshafts .

NOTE: If the valve tappets are to be reused, note the location of the valve tappets to make sure they are assembled in their original positions.

7.
Remove the valve tappets.

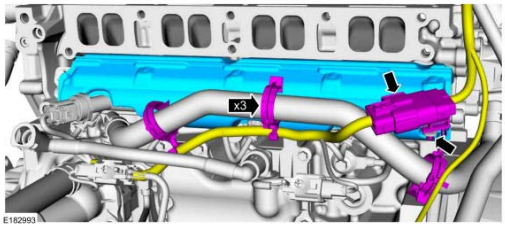


8.

Detach and disconnect the fuel rail electrical connector.

Detach the wiring harness retainers.

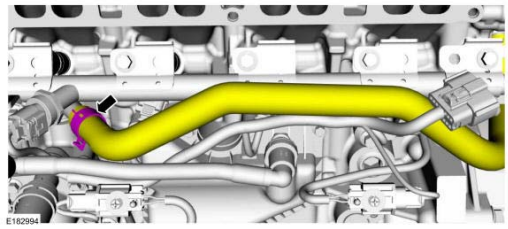
Remove the fuel rail insulator shield.



9.

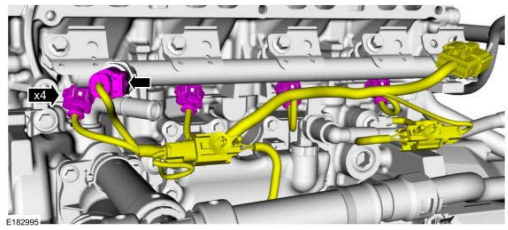
Disconnect and position the coolant tube aside.

Use the General Equipment: Hose Clamp Remover/Installer



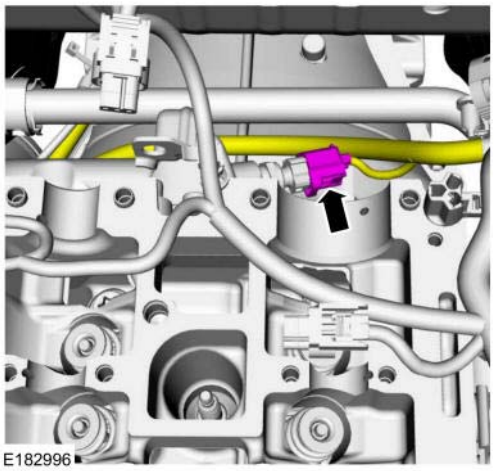
10.

Disconnect the fuel injector and the FRP sensor electrical connectors.



11.

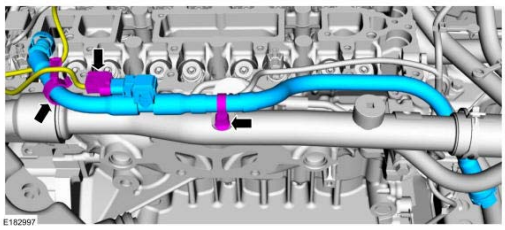
Disconnect the ECT sensor electrical connector from the back of the engine.



12.

Disconnect the crankcase vent tube sensor electrical connector and wire harness retainer.

Detach the crankcase vent tube retainer and remove.



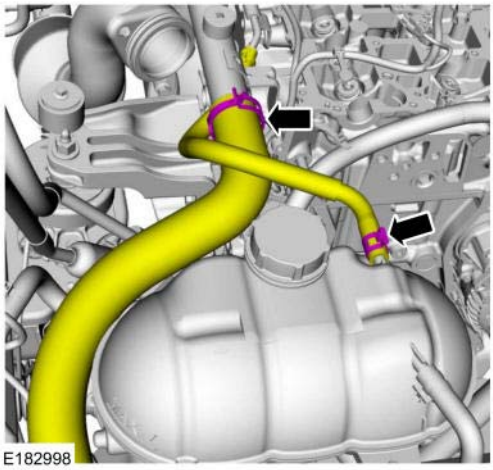
13.

Disconnect the upper radiator hose from the coolant outlet tube.

Use the General Equipment: Hose Clamp Remover/Installer

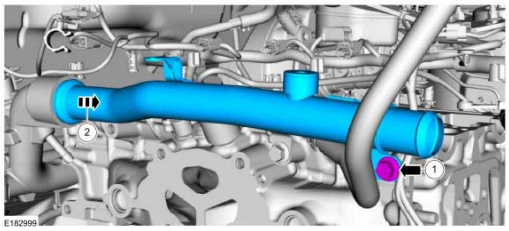
Disconnect the coolant by-pass hose from the degas bottle.

Use the General Equipment: Hose Clamp Remover/Installer



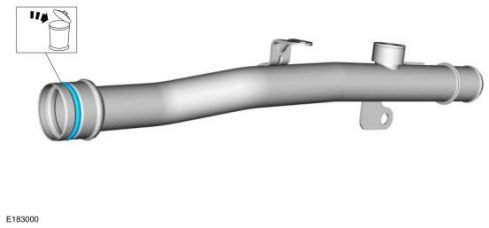
14.

Remove the bolt from the cylinder head and remove the coolant tube from coolant outlet.



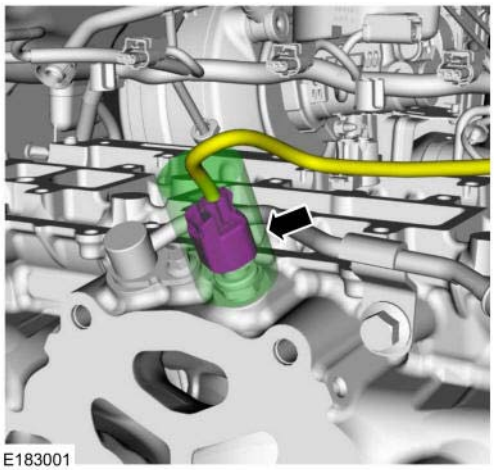
15.

Remove and discard the coolant tube O-ring seal.



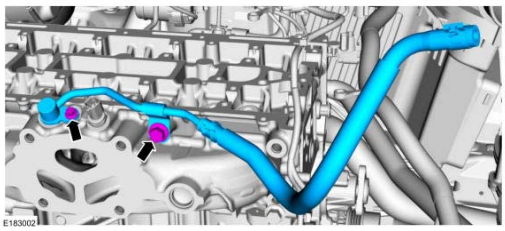
16.

Slide the insulator up and disconnect the CHT sensor electrical connector.



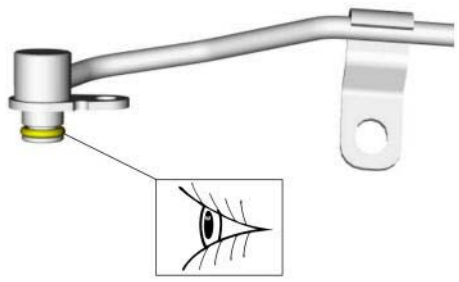
17.

Remove the bolts and the coolant tube.



18.

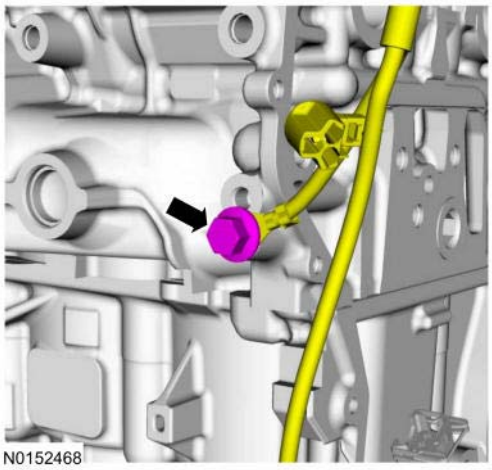
Inspect the coolant tube O-ring seal and replace if necessary.



E183003

19.

Remove the bolt and the ground wire.

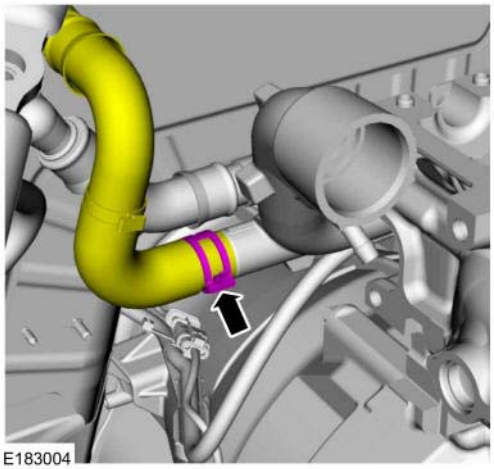


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20.

Disconnect the heater hose from the coolant outlet.

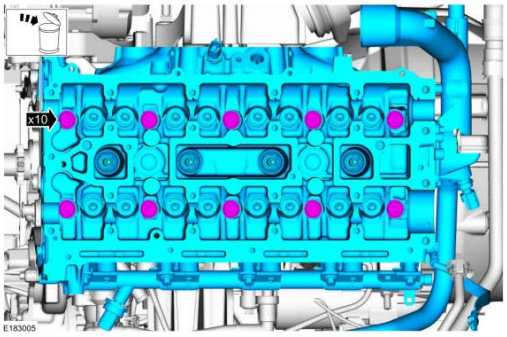
Use the General Equipment: Hose Clamp Remover/Installer



21.

Remove the bolts and the cylinder head.

Discard the bolts.



22.

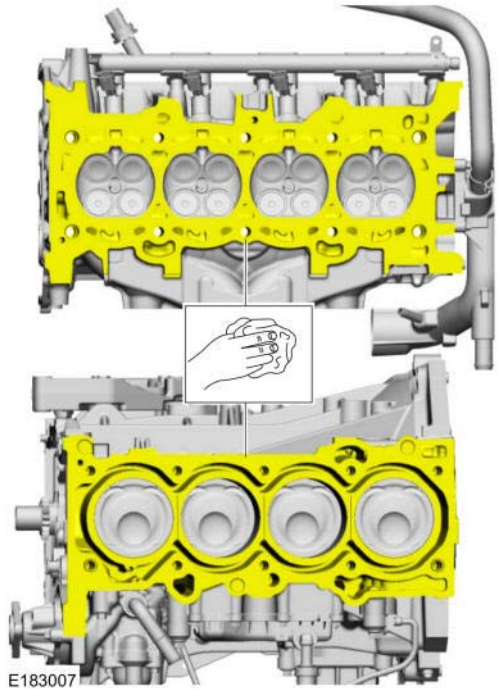
Remove and discard the cylinder head gasket.



NOTE: Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges that make leak paths. Use a plastic scraping tool to remove all traces of the head gasket.

NOTE: Clean the cylinder head bolt holes in the cylinder block. Make sure all coolant, oil or other foreign material is removed.

23.
Make sure that the mating faces are clean and free of foreign material.



24.

Check the cylinder head distortion. Refer to: Cylinder Head Distortion .

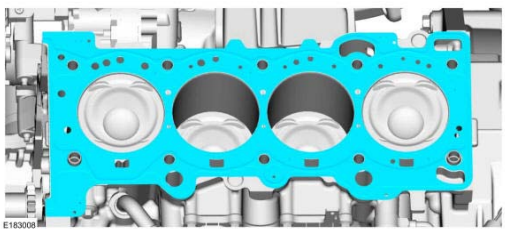
25.

Check the cylinder block distortion. Refer to: Cylinder Block Distortion .

REMOVAL AND INSTALLATION > CYLINDER HEAD > INSTALLATION

1.

Install the cylinder head gasket.



NOTE: The cylinder head bolts are torque-to-yield and must not be reused. New cylinder head bolts must be installed.

2.
Install the cylinder head and the new bolts.

Torque:

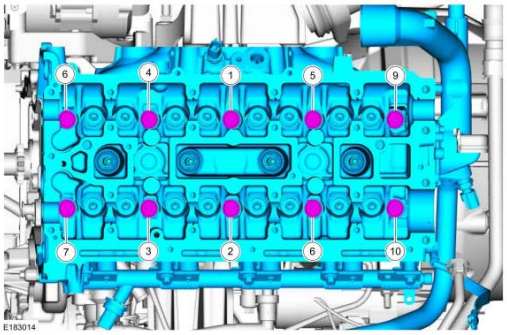
Stage 1: 62 lb.in (7 Nm)

Stage 2: 133 lb.in (15 Nm)

Stage 3: 41 lb.ft (55 Nm)

Stage 4: 90°

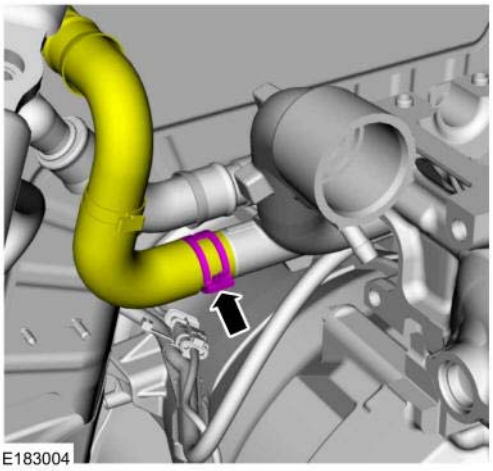
Stage 5: 90°



3.

Connect the heater hose to the coolant outlet.

Use the General Equipment: Hose Clamp Remover/Installer

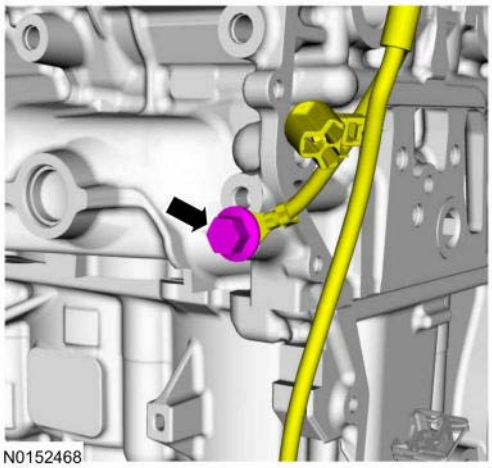


4.

Install the ground wire and the bolt.

Torque

: 177 lb.in (20 Nm)

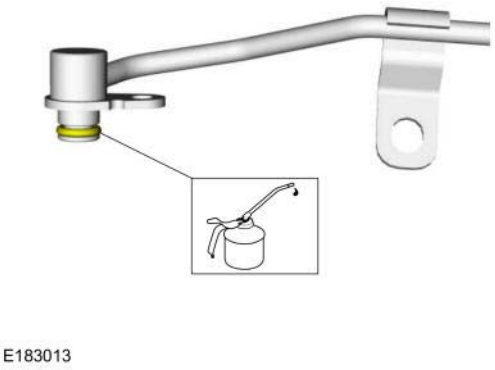


5.

Lubricate the coolant tube O-ring seal with clean engine coolant.

Material

: Motorcraft® Orange Antifreeze/Coolant Prediluted (U.S.) / VC-3DIL-B (U.S.) (WSS-M97B44-D2)



6.

NOTE: The coolant tube must be fully seated prior to tighten the bolt.

1.
Install the coolant tube and the bolt.

Torque

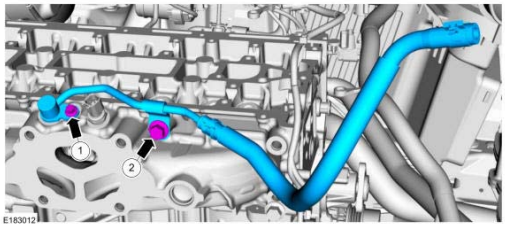
: 97 lb.in (11 Nm)

2.

Install the coolant tube retainer bolt.

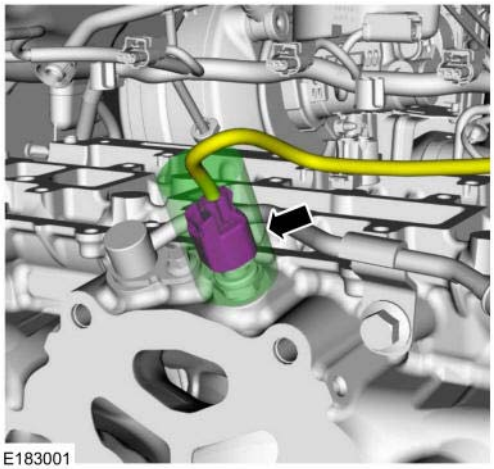
Torque

: 22 lb.ft (30 Nm)



7.

Connect the CHT sensor electrical connector and slide the insulator down.

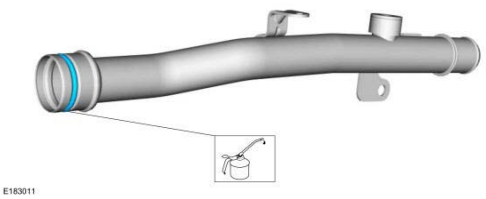


8.

Lubricate the new coolant tube O-ring seal with clean engine coolant.

Material

: Motorcraft® Orange Antifreeze/Coolant Prediluted (U.S.) / VC-3DIL-B (U.S.) (WSS-M97B44-D2)



9.

1.

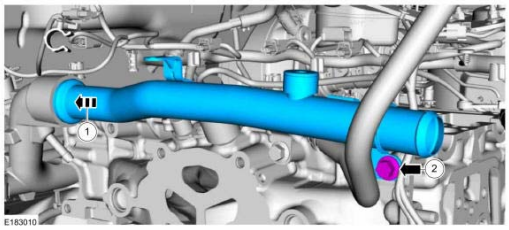
Install the coolant tube coolant outlet.

2.

Install the bolt.

Torque

: 89 lb.in (10 Nm)



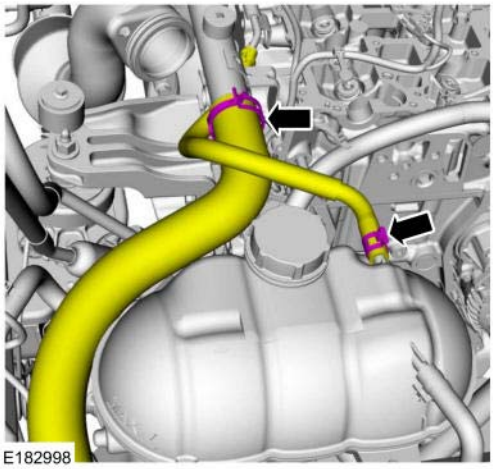
10.

Connect the coolant by-pass hose to the degas bottle.

Use the General Equipment: Hose Clamp Remover/Installer

Connect the upper radiator hose to the coolant outlet tube.

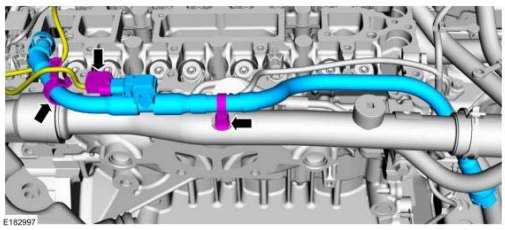
Use the General Equipment: Hose Clamp Remover/Installer



11.

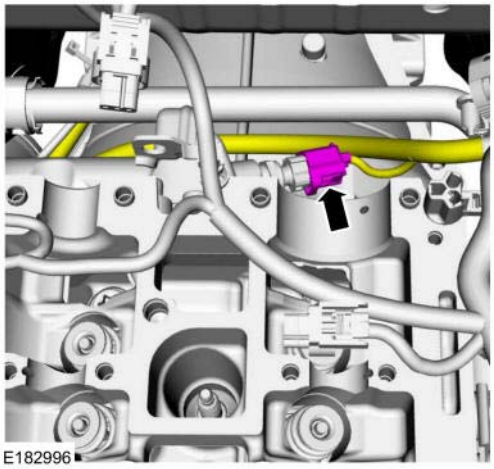
Install the crankcase vent tube and retainer.

Connect the crankcase vent tube sensor electrical connector and wire harness retainer.



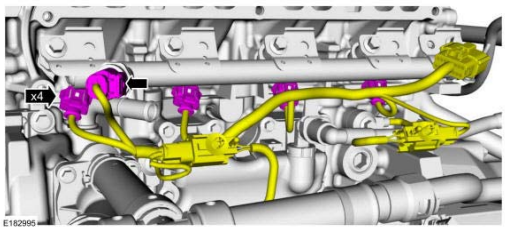
12.

Connect the ECT sensor electrical connector.



13.

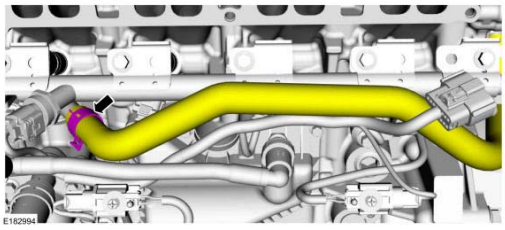
Connect the fuel injector and the FRP sensor electrical connectors.



14.

Position and connect the coolant tube.

Use the General Equipment: Hose Clamp Remover/Installer

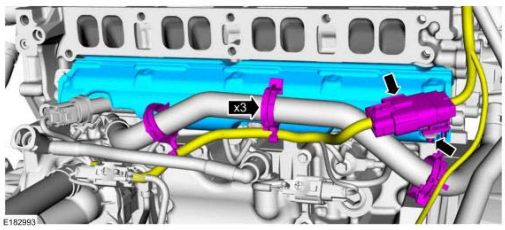


15.

Install the fuel rail insulator shield.

Attach the wiring harness retainers.

Connect and attach the fuel rail electrical connector.

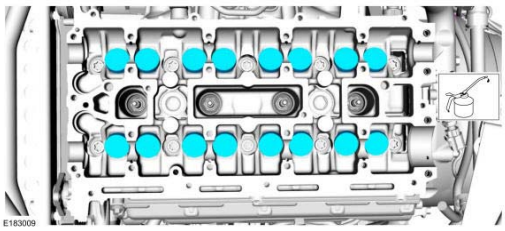


16.

Install the valve tappets in their original position.

Material

: Motorcraft® SAE 5W-30 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W30-QSP (U.S.) (WSS-M2C946-A)



17.

Install the following items:

Refer to: Camshafts .

Refer to: Intake Manifold .

Refer to: Turbocharger .

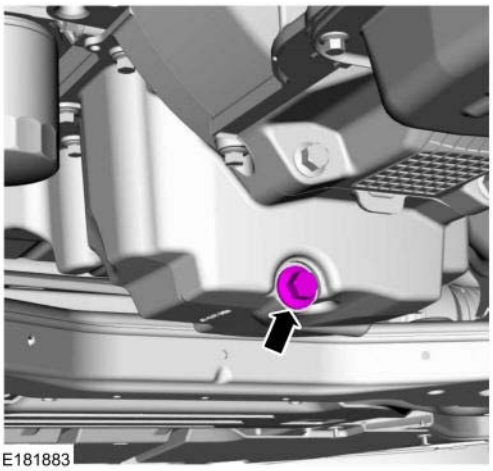
18.

Drain engine oil and install drain plug.

Use the General Equipment: Oil Drain Equipment

Torque

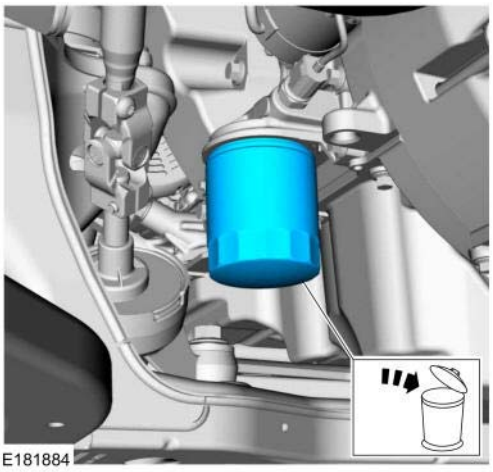
: 20 lb.ft (27 Nm)



19.

Remove and discard the engine oil filter.

Use the General Equipment: Oil Drain Equipment



NOTE: Lubricate the engine oil filter seal with clean engine oil.

20.
Install a new engine oil filter.

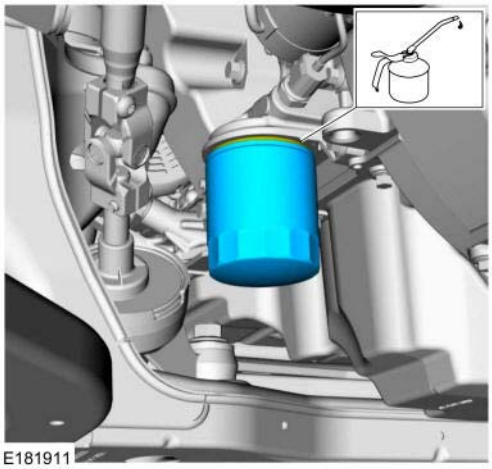
Material

: Motorcraft® SAE 5W-30 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W30-QSP (U.S.) (WSS-M2C946-A)

Torque:

Stage 1: 71 lb.in (8 Nm)

Stage 2: 180°

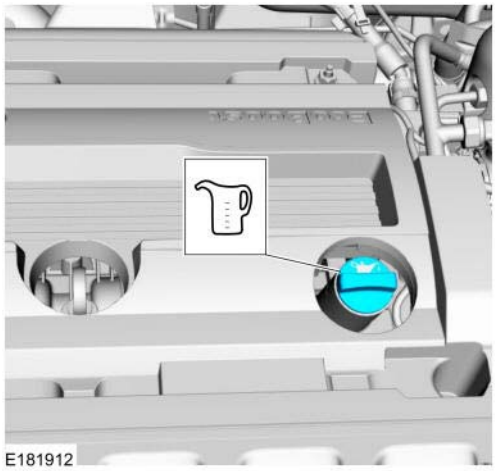


21.

Fill the engine with clean engine oil. Refer to: Specifications .

Material

: Motorcraft® SAE 5W-30 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W30-QSP (U.S.) (WSS-M2C946-A)



22.

Connect the battery ground. Refer to: Battery Disconnect and Connect .

23.

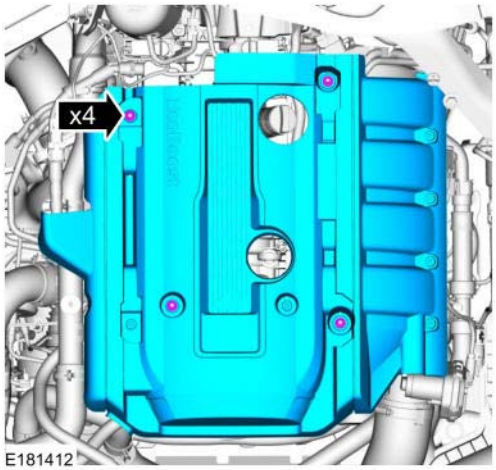
Fill the cooling system. Refer to: COOLING SYSTEM DRAINING AND VACUUM FILLING .

24.

Install the engine appearance cover and the nuts.

Torque

: 80 lb.in (9 Nm)



REMOVAL AND INSTALLATION > ENGINE FRONT COVER

Special Tool(s) / General Equipment

Plastic Scraper

Materials

Name	Specification
Motorcraft® Silicone Gasket Remover ZC-30-A	-
Motorcraft® Metal Surface Prep ZC-31-B	-
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4
Metal Brake Parts Cleaner (U.S.) PM-4-A, PM-4-B (U.S.)	-

REMOVAL AND INSTALLATION > ENGINE FRONT COVER > REMOVAL

NOTE: During engine repair procedures, cleanliness is extremely important. Any foreign material (including any material created while cleaning gasket surfaces) that enters the oil passages, coolant passages or the oil pan can cause engine failure.

NOTE: Do not loosen or remove the crankshaft pulley bolt without first installing the special tools as instructed in this procedure. The crankshaft pulley and the crankshaft timing sprocket are not keyed to the crankshaft. The crankshaft, the crankshaft sprocket and the pulley are fitted together by friction, using diamond washers between the flange faces on each part. For that reason, the crankshaft sprocket is also unfastened if the pulley bolt is loosened. Before any repair requiring loosening or removal of the crankshaft pulley bolt, the crankshaft and camshafts must be locked in place by the special service tools, otherwise

severe engine damage can occur.

1.

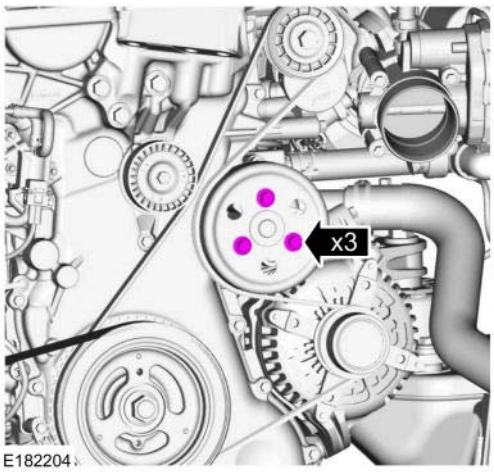
With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

2.

Remove the air cleaner outlet pipe. Refer to: AIR CLEANER OUTLET PIPE - 2.3L EcoBoost (231kW/314PS).

3.

Loosen the coolant pump pulley bolts.

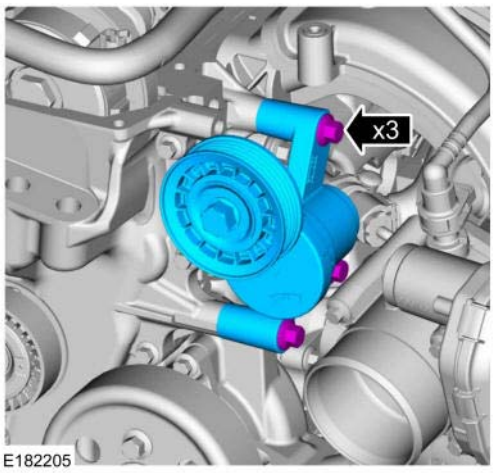


4.

Remove the crankshaft front seal. Refer to: Crankshaft Front Seal .

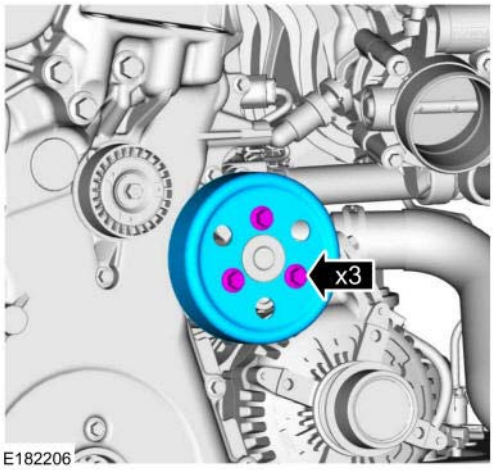
5.

Remove the bolts and the accessory drive belt tensioner.



6.

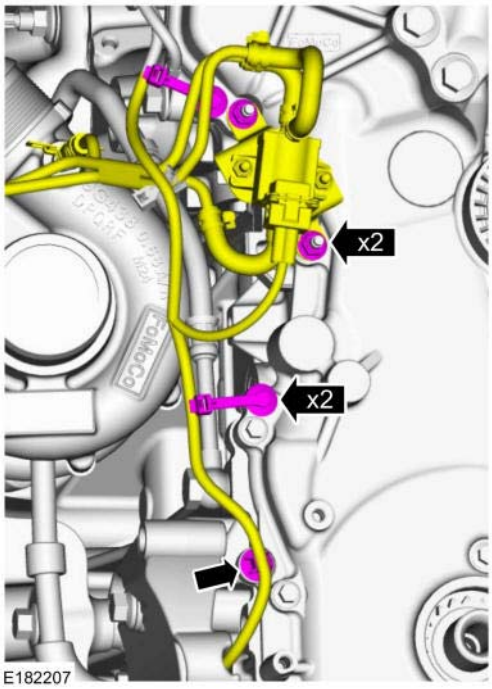
Remove the bolts and the coolant pump pulley.



7.

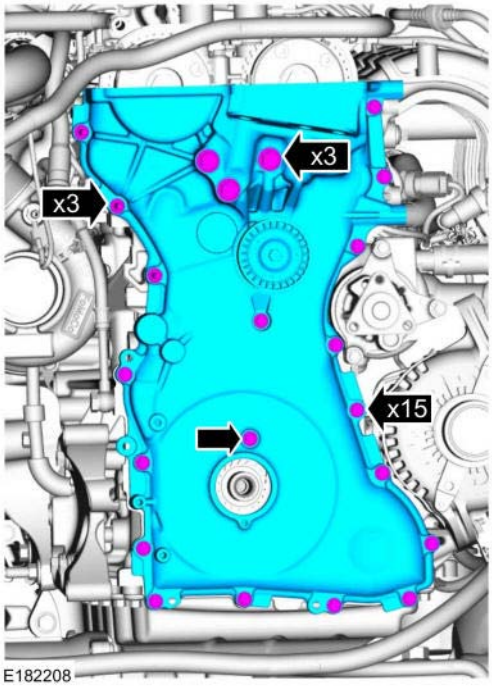
Detach the wiring harness retainer.

Remove the nuts and position aside the turbocharger vacuum valve.



8.

Remove the bolts and the engine front cover.



9.

Make sure that the mating faces are clean and free of foreign material. Refer to: RTV Sealing Surface Cleaning and Preparation

Material

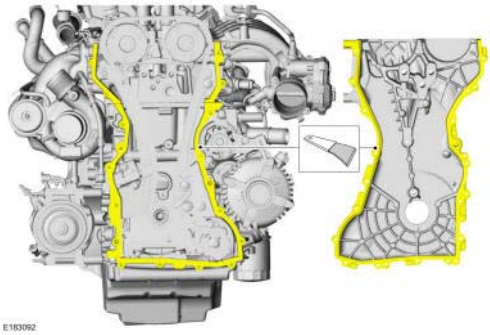
: Motorcraft® Silicone Gasket Remover / ZC-30-A

Material

: Metal Brake Parts Cleaner (U.S.) / PM-4-A, PM-4-B (U.S.)

Material

: Motorcraft® Metal Surface Prep / ZC-31-B



REMOVAL AND INSTALLATION > ENGINE FRONT COVER > INSTALLATION

NOTE: The engine front cover must be secured within 10 minutes of Silicone Gasket and Sealant application. If the valve cover is not secured within 10 minutes, the sealant must be removed and the sealing area cleaned.

1.

Apply beads of silicone sealant that are 2 mm (0.078 in) around the inner bolt holes.

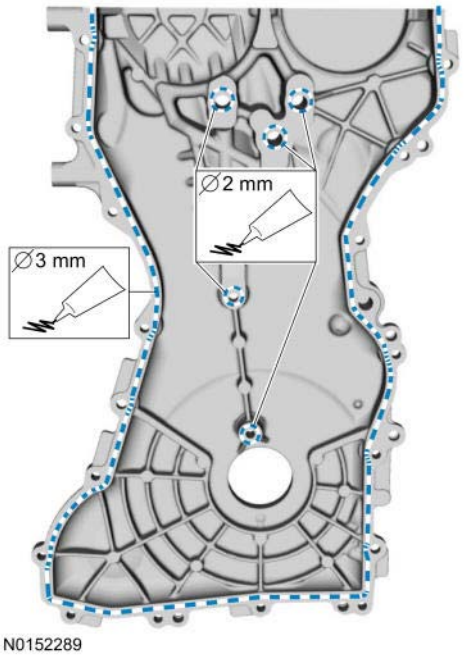
Material

: Silicone Gasket and Sealant / TA-30 (WSE-M4G323-A4)

Apply a bead of silicone sealant that are 3 mm (0.00 in) on the edge of the engine front cover.

Material

: Silicone Gasket and Sealant / TA-30 (WSE-M4G323-A4)

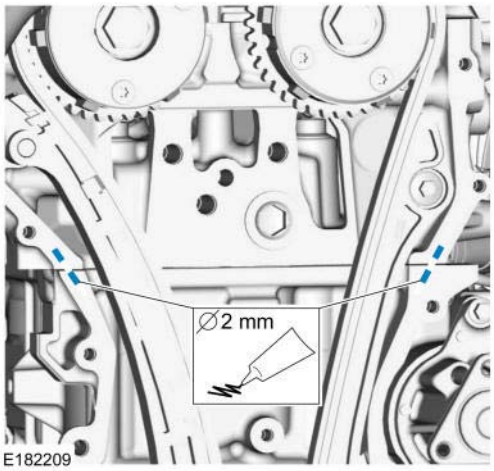


NOTE: The engine front cover must be secured within 10 minutes of silicone sealant application. If the engine front cover is not secured within 10 minutes, the sealant must be removed and the sealing area cleaned.

2.
Apply beads of silicone gasket and sealant that are 2 mm (0.078 in) in diameter and 5 mm (0.19 in) in length across the cylinder head and cylinder block joint areas.

Material

: Silicone Gasket and Sealant / TA-30 (WSE-M4G323-A4)



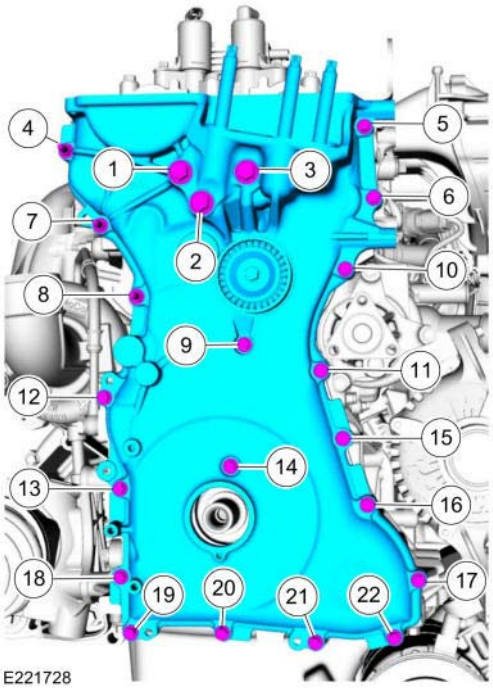
3.

Install the engine front cover and the bolts.

Torque

Bolts 1 - 3: 35 lb.ft (48 Nm)

Bolts 4 - 22: 89 lb.in (10 Nm)



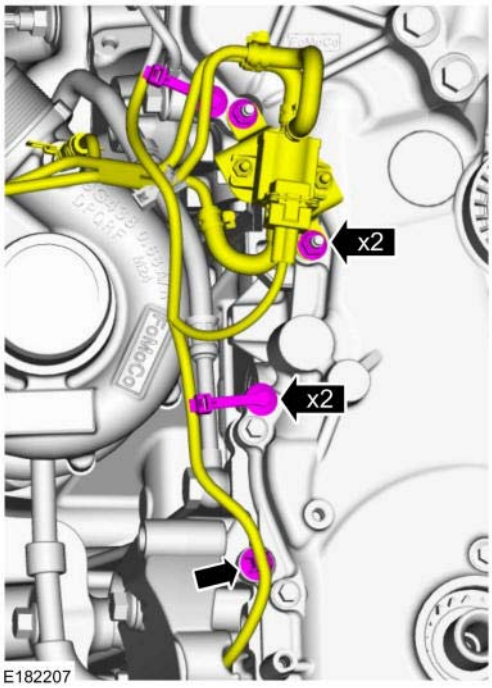
4.

Position the vacuum valve and install the nuts.

Torque

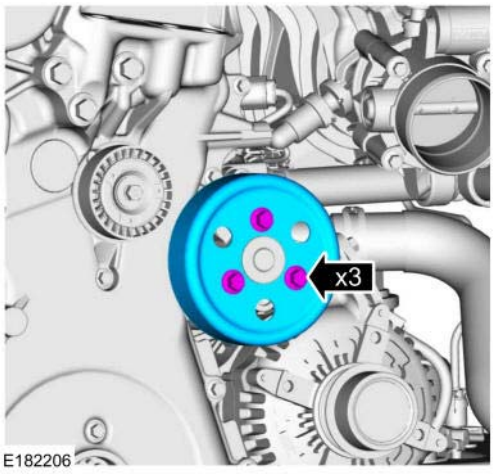
: 89 lb.in (10 Nm)

Attach the wiring harness retainer.



5.

Finger-tight.Install the coolant pump pulley and the bolts finger-tight.

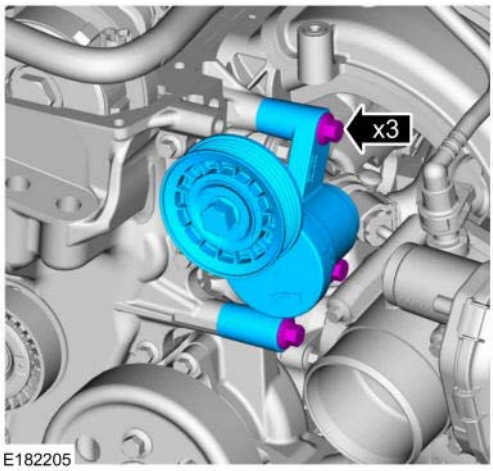


6.

Install the accessory drive belt tensioner and the bolts.

Torque

: 18 lb.ft (25 Nm)



7.

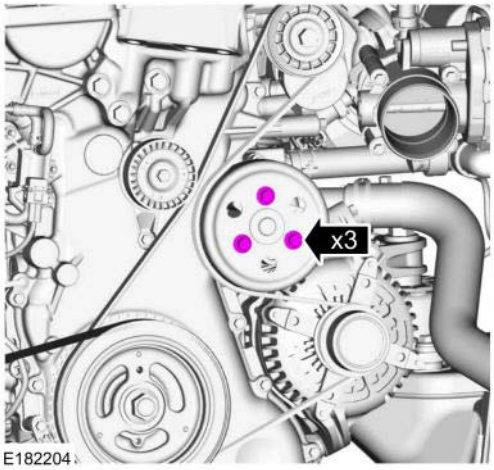
Install the crankshaft front seal. Refer to: Crankshaft Front Seal .

8.

Tighten the coolant pump pulley bolts.

Torque

: 177 lb.in (20 Nm)



9.

Install the air cleaner outlet pipe. Refer to: AIR CLEANER OUTLET PIPE - 2.3L EcoBoost (231kW/314PS).

REMOVAL AND INSTALLATION > ENGINE MOUNT LH

Special Tool(s) / General Equipment

	303-050 (T70P-6000) Lifting Bracket, Engine
	303-F072 Support Bar, Engine

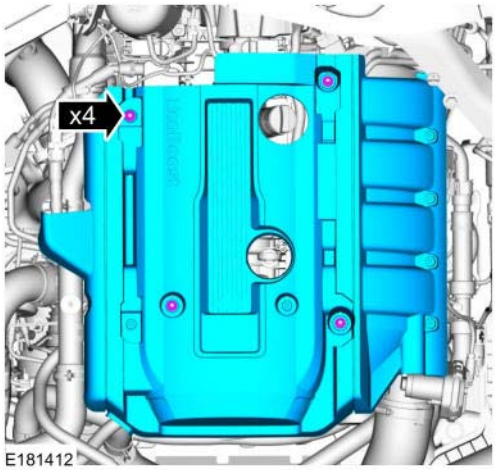
REMOVAL AND INSTALLATION > ENGINE MOUNT LH > REMOVAL

1.

With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

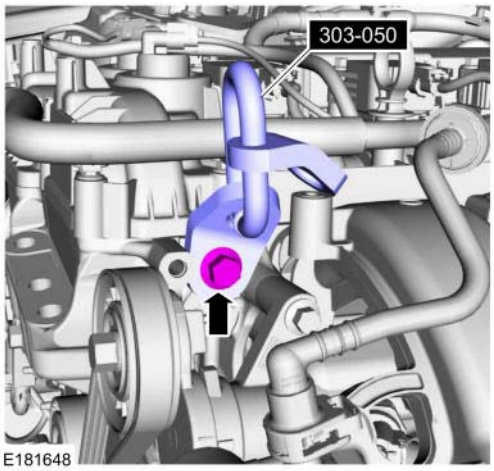
2.

Remove the nuts and the engine appearance cover.



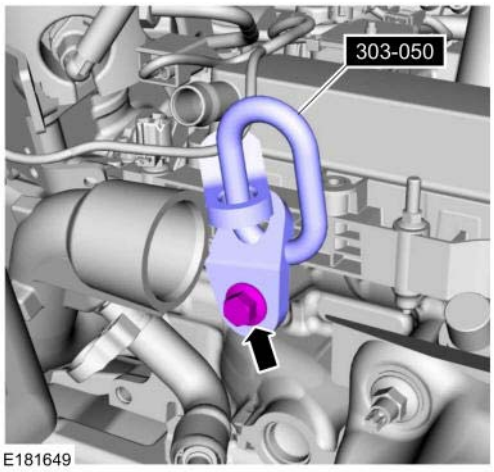
3.

Install the special tool on the LH side of the cylinder head. Install Special Service Tool: 303-050 (T70P-6000) Lifting Bracket, Engine.



NOTE: Coolant tube removed for clarity.

4.
Install the special tool on the RH side of the cylinder head. Install Special Service Tool: 303-050 (T70P-6000) Lifting Bracket, Engine.

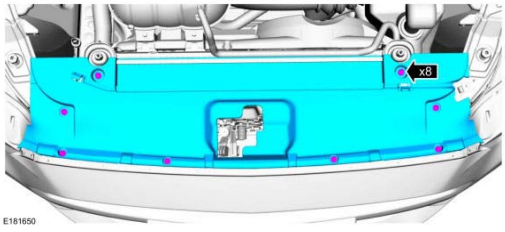


5.

Disconnect the battery ground. Refer to: Battery Disconnect and Connect .

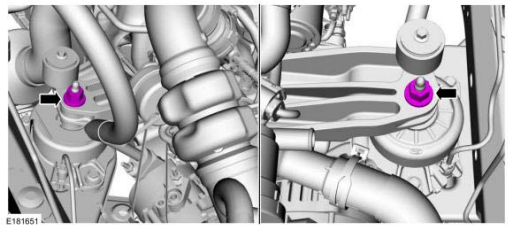
6.

Remove the retainers and the radiator top shield.



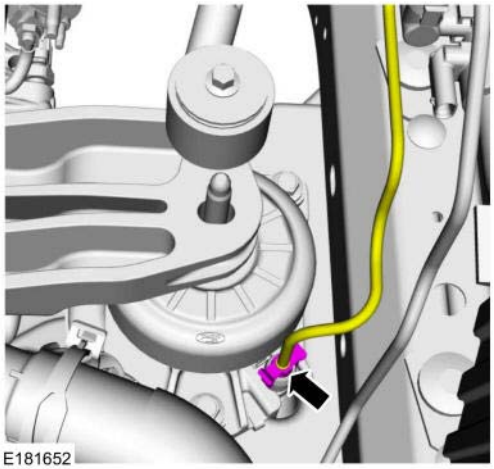
NOTE: Both the engine mount nuts must be removed to allow the engine to be raised.

7.
Remove the RH and LH engine mount bracket nuts.



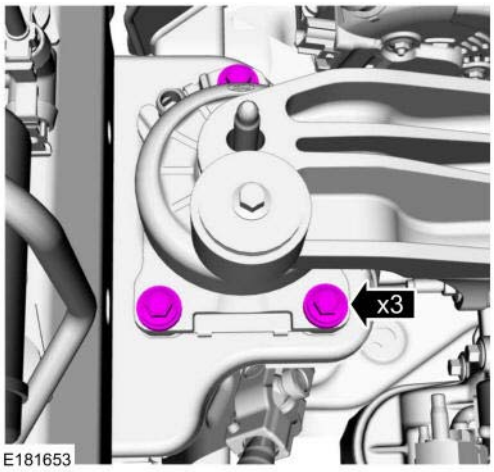
8.

Disconnect the vacuum tube from the LH engine mount.



9.

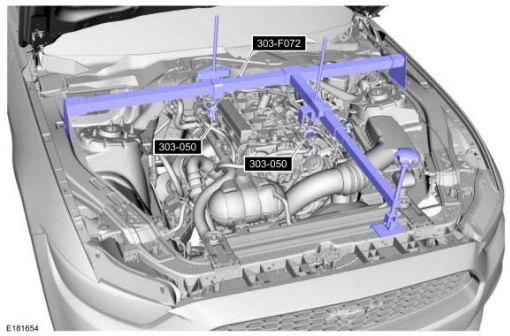
Remove the bolts for the engine mount.



10.

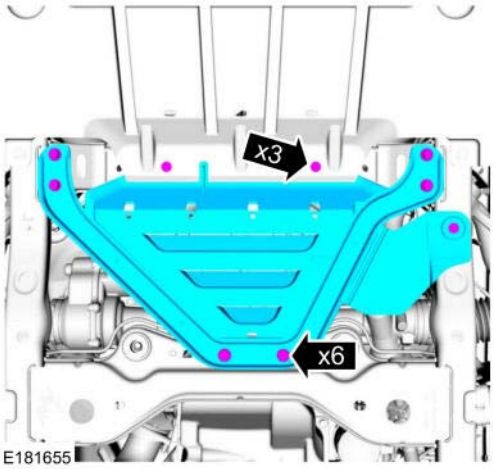
Install the special tool and raise the engine 26 mm (1.0 in).

Use Special Service Tool: 303-F072 Support Bar, Engine.



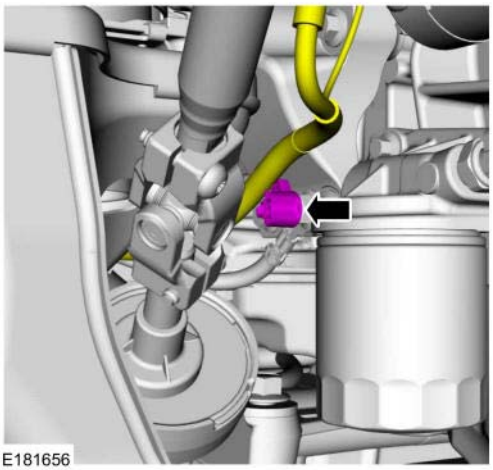
NOTE: The underbody shield will need to be remove for access to the LH front engine mount bracket bolt.

11.
Remove the screws, bolts and the underbody shield.



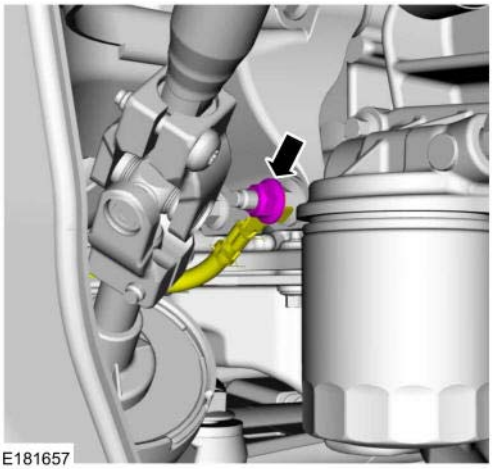
12.

Detach the wire harness retainer from the LH engine mount bracket stud bolt.



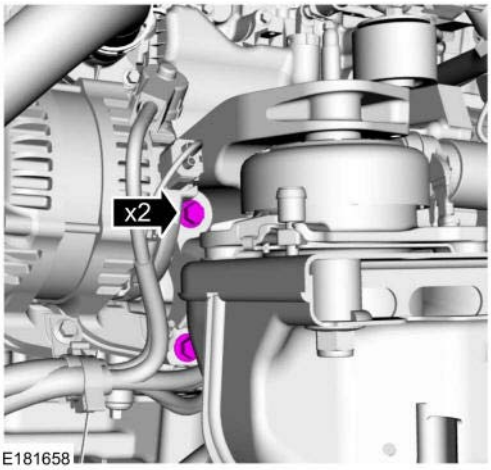
13.

Remove the nut and ground wire from the LH engine mount bracket stud bolt.



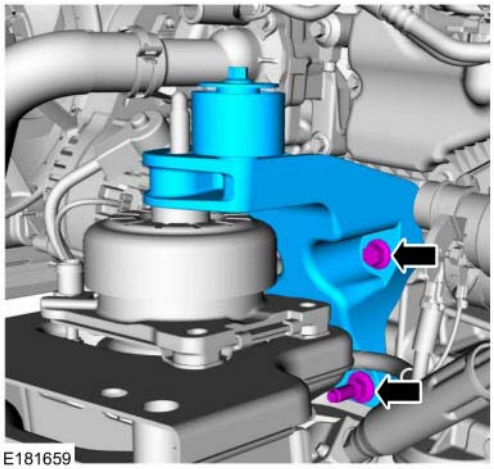
14.

Remove the bolts for the engine mount bracket.



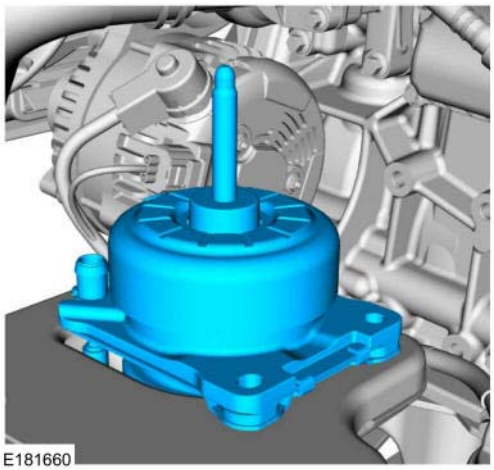
15.

Remove the bolt, stud bolt and the engine mount bracket.



16.

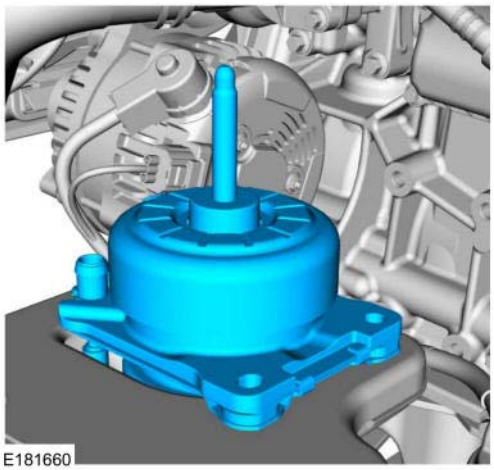
Remove the engine mount.



REMOVAL AND INSTALLATION > ENGINE MOUNT LH > INSTALLATION

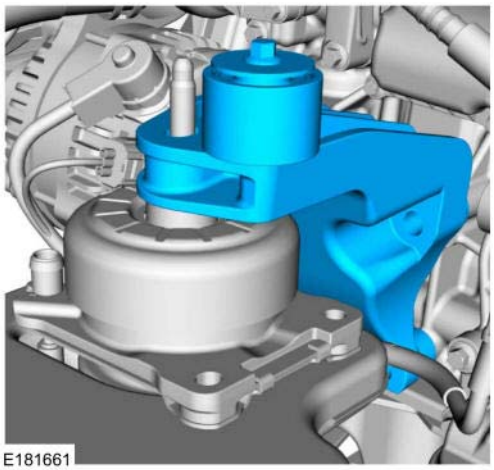
NOTE: Do not install the engine mount bolts at this time.

1.
Install the engine mount.



NOTE: Do not install the engine mount bracket bolts at this time.

2.
Install the engine mount bracket.

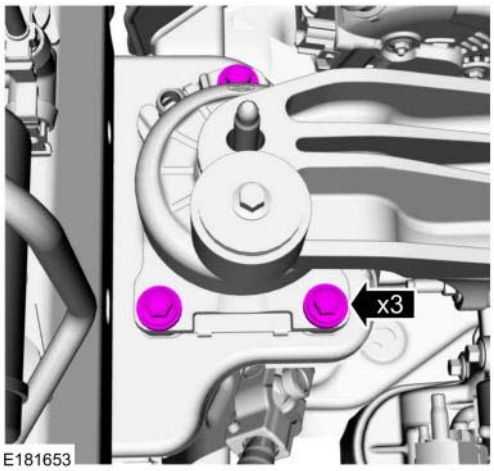


3.

Install the engine mount bolts.

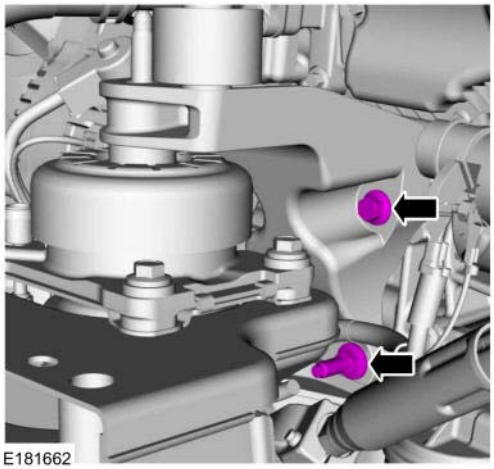
Torque

: 52 lb.ft (70 Nm)



4.

Install the bolt, stud bolt for the engine mount bracket finger tight.

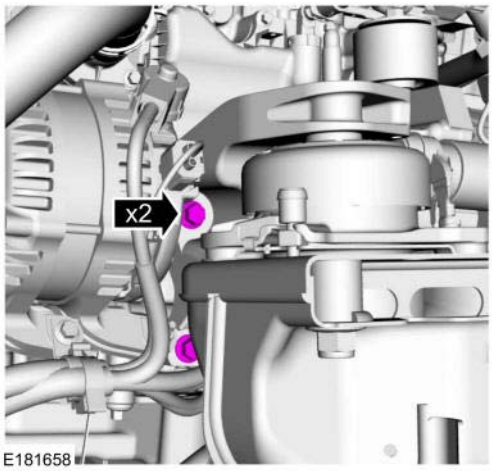


5.

Install the bolts for the engine mount bracket.

Torque

: 41 lb.ft (55 Nm)

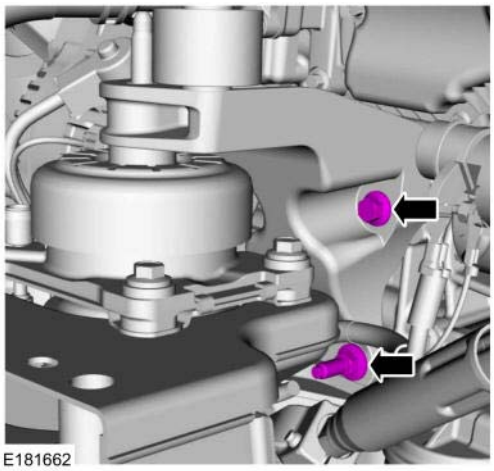


6.

Tighten the bolt, stud bolt for the engine mount bracket.

Torque

: 41 lb.ft (55 Nm)

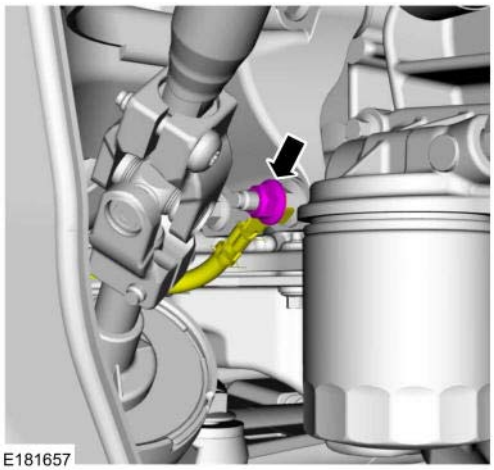


7.

Install the ground wire and nut to the LH engine mount bracket stud bolt.

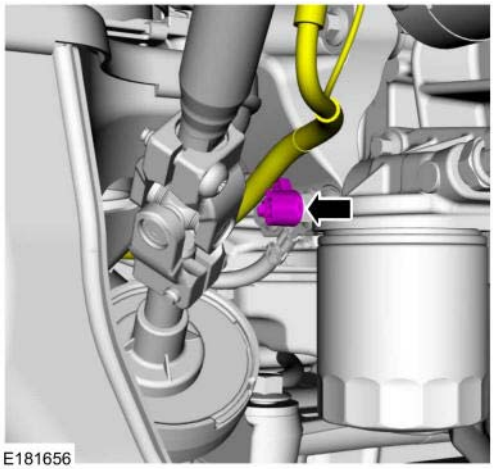
Torque

: 35 lb.ft (48 Nm)



8.

Attach the wire harness retainer to the LH engine mount bracket stud bolt.



9.

1.

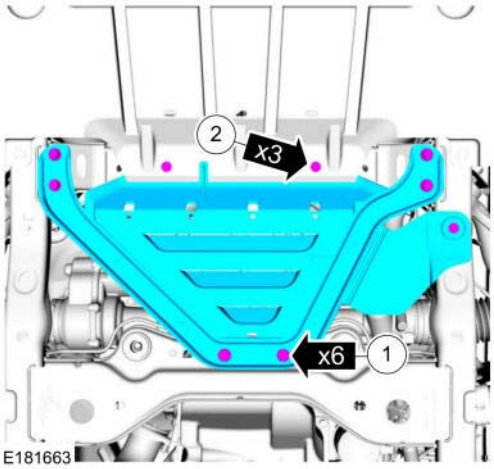
Install the underbody shield and the bolts.

Torque

: 46 lb.ft (63 Nm)

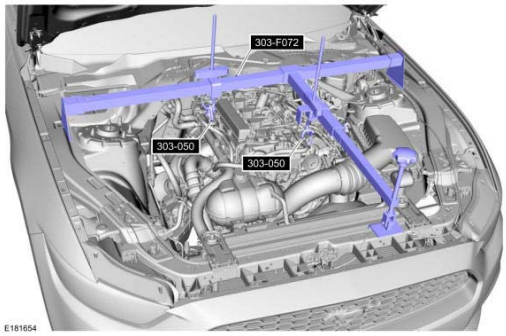
2.

Install the underbody shield screws.



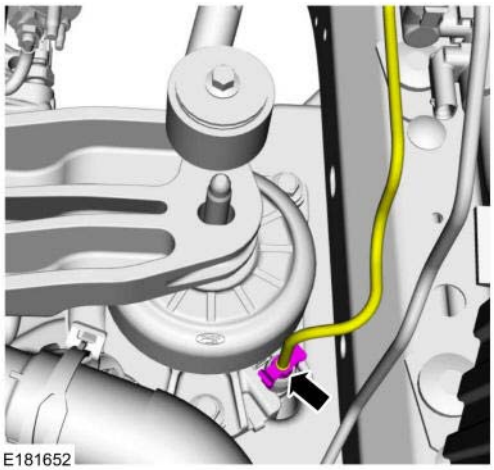
10.

Lower the engine 26 mm (1.0 in) and remove the special tool. Remove Special Service Tool: 303-F072 Support Bar, Engine.



11.

Connect the vacuum tube to the LH engine mount.

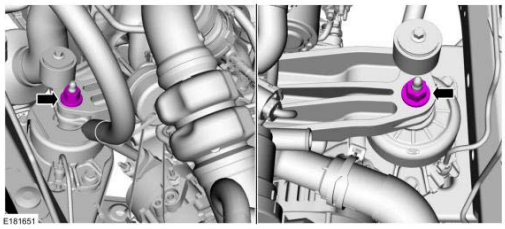


12.

Install the RH and LH engine mount bracket nuts.

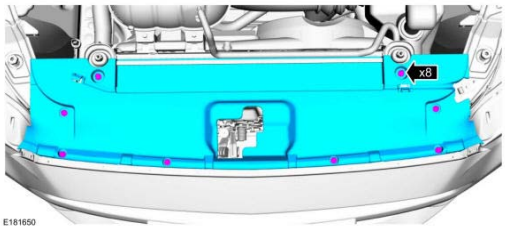
Torque

: 92 lb.ft (125 Nm)



13.

Install the radiator top shield and the retainers.

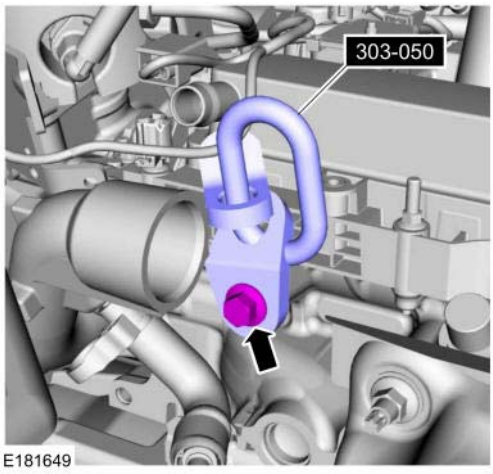


14.

Connect the battery ground. Refer to: Battery Disconnect and Connect .

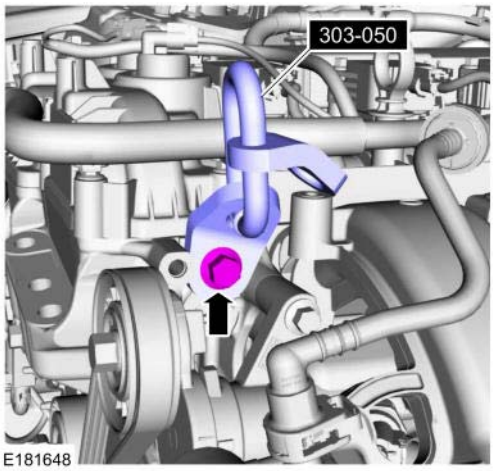
15.

Remove Special Service Tool: 303-050 (T70P-6000) Lifting Bracket, Engine.



16.

Remove Special Service Tool: 303-050 (T70P-6000) Lifting Bracket, Engine.

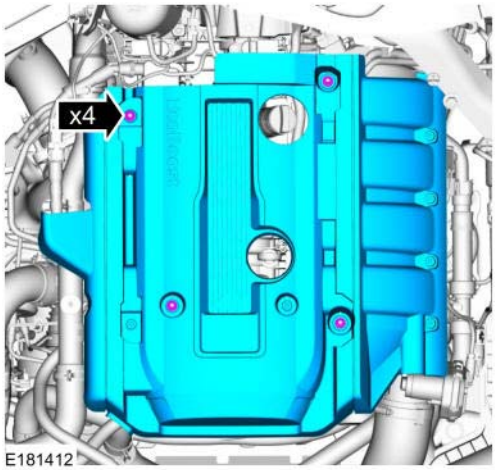


17.

Install the engine appearance cover and the nuts.

Torque

: 80 lb.in (9 Nm)



REMOVAL AND INSTALLATION > ENGINE MOUNT RH

Special Tool(s) / General Equipment

	303-050 (T70P-6000) Lifting Bracket, Engine

	303-F072 Support Bar, Engine

REMOVAL AND INSTALLATION > ENGINE MOUNT RH > REMOVAL

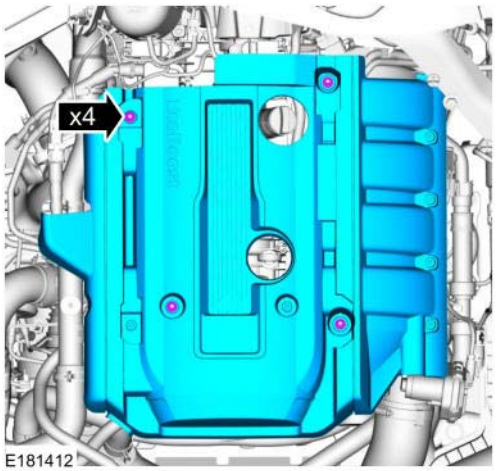
6-Speed Automatic Transmission - 6R80/6-Speed Manual Transmission - MT82

1.

With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

2.

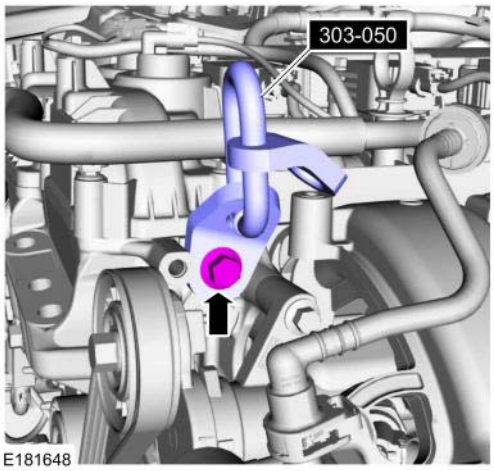
Remove the nuts and the engine appearance cover.



3.

Install the special tool on the LH side of the cylinder head.

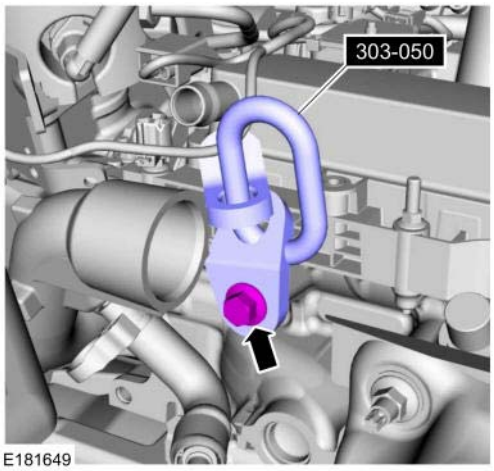
Install Special Service Tool: (T70P-6000) Lifting Bracket, Engine.



NOTE: Coolant tube removed for clarity.

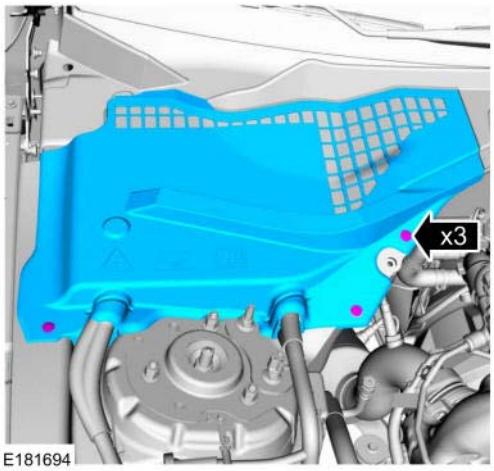
4.
Install the special tool on the RH side of the cylinder head.

Install Special Service Tool: 303-050 (T70P-6000) Lifting Bracket, Engine.



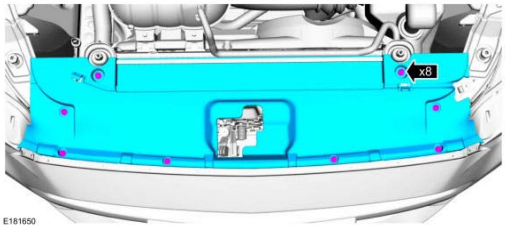
5.

Remove the retainers and the battery cover.



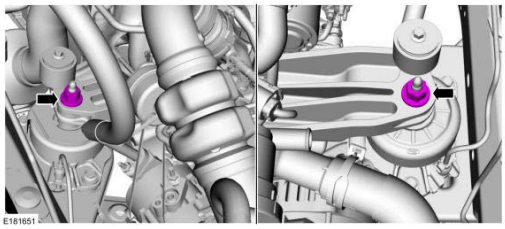
6.

Remove the retainers and the radiator top shield.



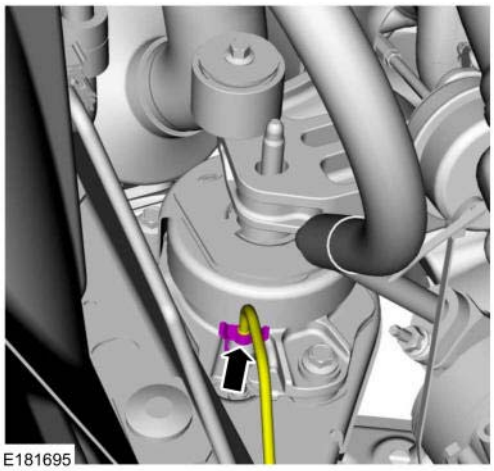
NOTE: Both the engine mount nuts must be removed to allow the engine to be raised.

7.
Remove the RH and LH engine mount nuts.



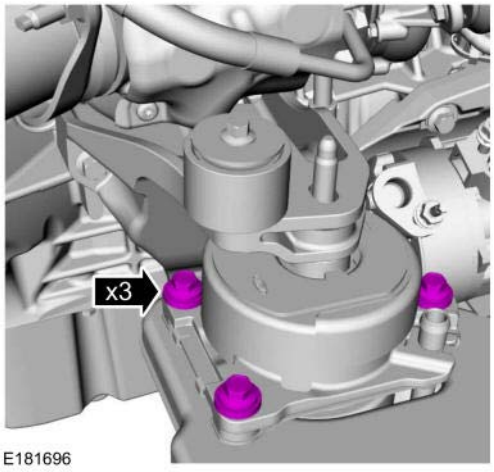
8.

Disconnect the vacuum tube from the RH engine mount.



9.

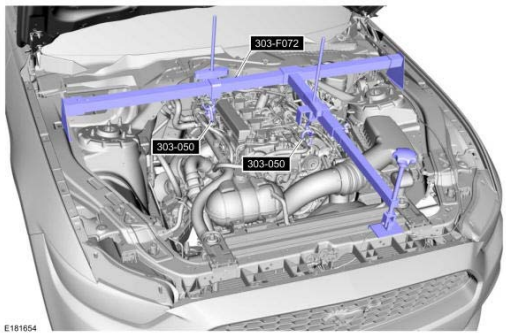
Remove the bolts for the engine mount.



10.

Install the special tool and raise the engine 26 mm (1.0 in).

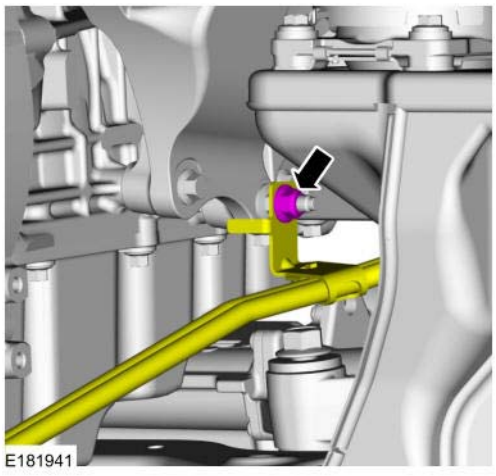
Use Special Service Tool: 303-F072 Support Bar, Engine.



6-Speed Automatic Transmission - 6R80

11.

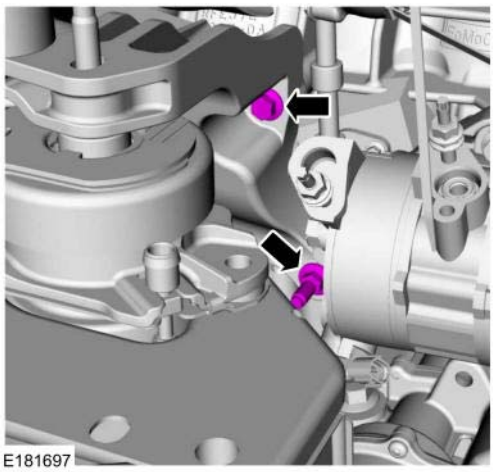
Remove the nut from the engine mount bracket stud bolt and position the automatic transmission tube bracket aside.



6-Speed Automatic Transmission - 6R80/6-Speed Manual Transmission - MT82

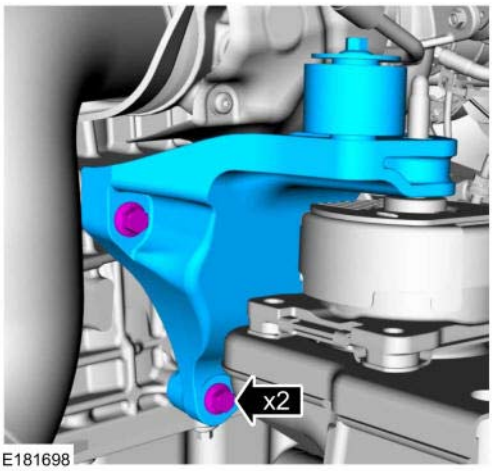
12.

Remove the bolt, stud bolt for the engine mount bracket.



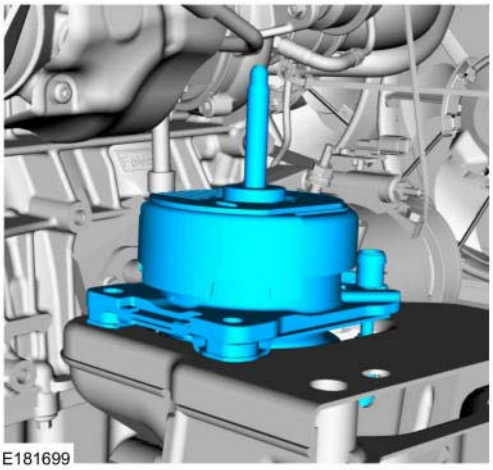
13.

Remove the bolts and the engine mount bracket.



14.

Remove the engine mount.

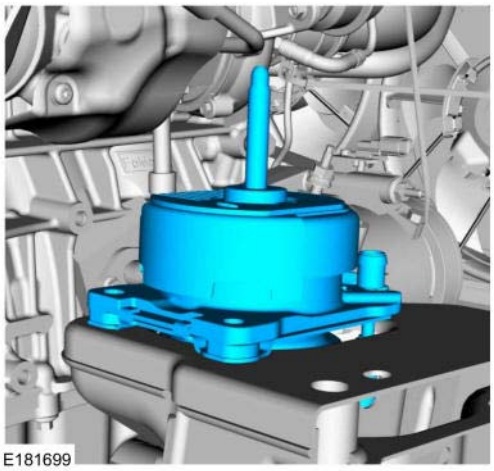


REMOVAL AND INSTALLATION > ENGINE MOUNT RH > INSTALLATION

6-Speed Automatic Transmission - 6R80/6-Speed Manual Transmission - MT82

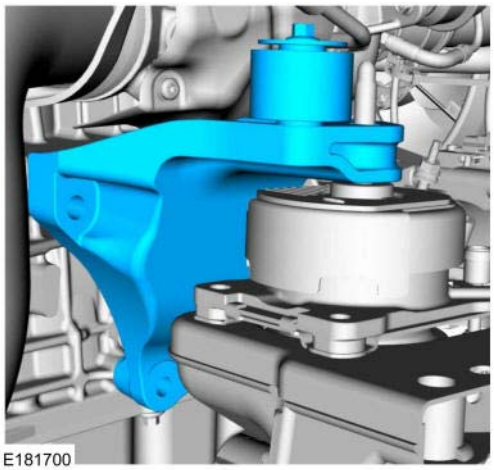
NOTE: Do not install the engine mount bolts at this time.

1.
Install the engine mount.


E181699

NOTE: Do not install the engine mount bracket bolts at this time.

2.
Install the engine mount bracket.

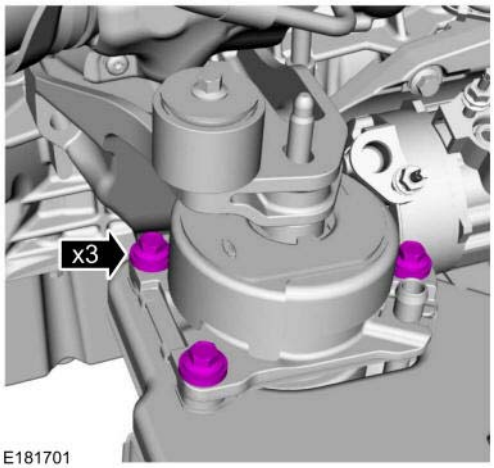

E181700

3.

Install the engine mount bolts.

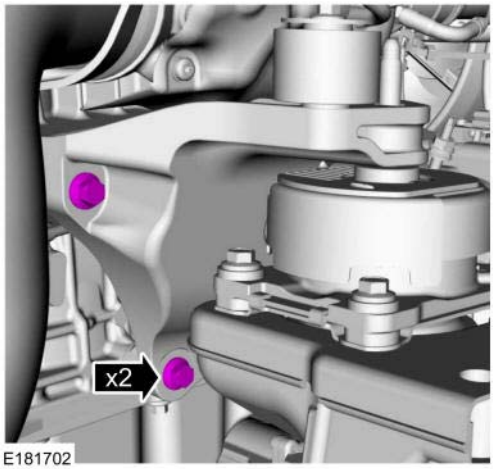
Torque

: 52 lb.ft (70 Nm)



4.

Install the bolts for the engine mount bracket finger tight.

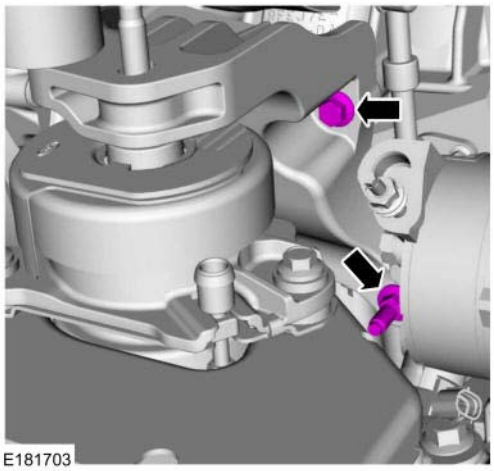


5.

Install the bolt, stud bolt for the engine mount bracket.

Torque

: 41 lb.ft (55 Nm)

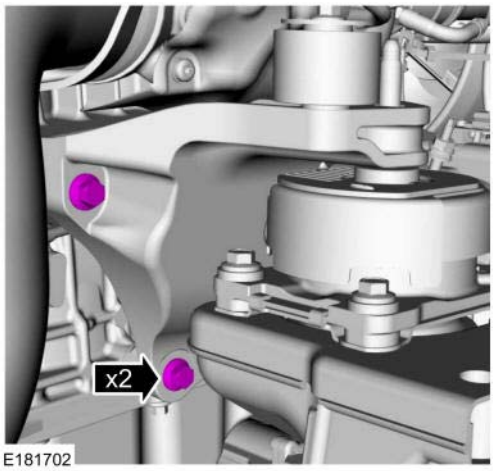


6.

Tighten the bolts for the engine mount bracket.

Torque

: 41 lb.ft (55 Nm)



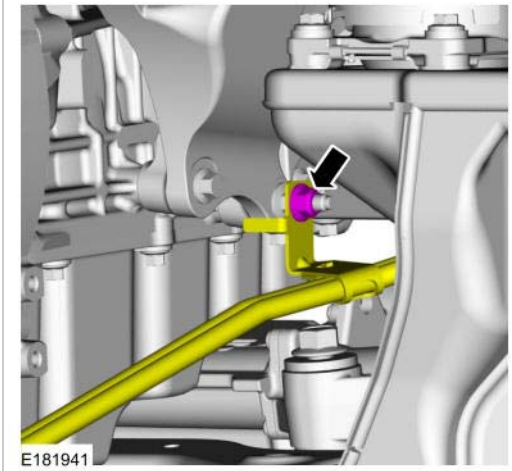
6-Speed Automatic Transmission - 6R80

7.

Position the automatic transmission tube bracket and install the nut.

Torque

: 35 lb.ft (48 Nm)

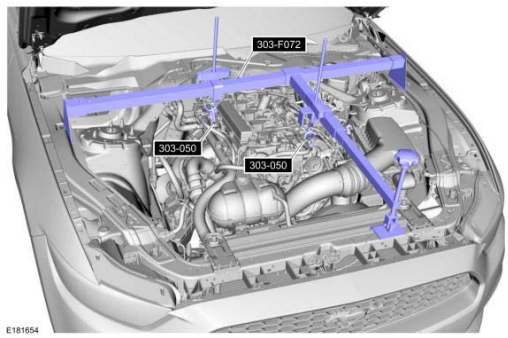


6-Speed Automatic Transmission - 6R80/6-Speed Manual Transmission - MT82

8.

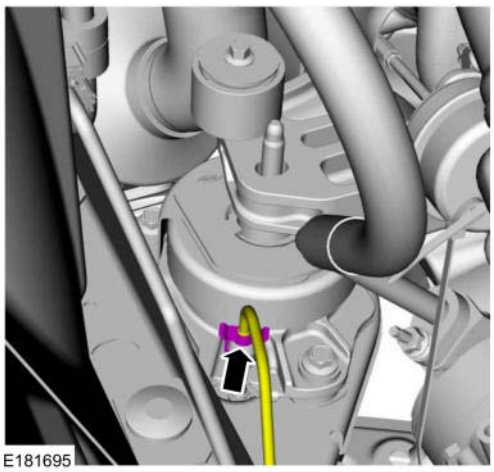
Lower the engine 26 mm (1.0 in) and remove the special tool.

Remove Special Service Tool: 303-F072 Support Bar, Engine.



9.

Connect the vacuum tube to the RH engine mount.

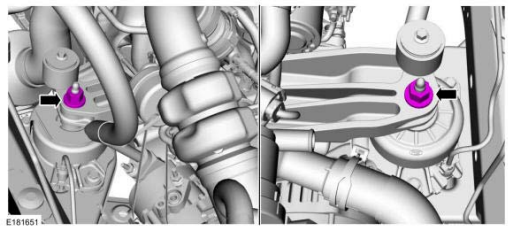


10.

Install the RH and LH engine mount nuts.

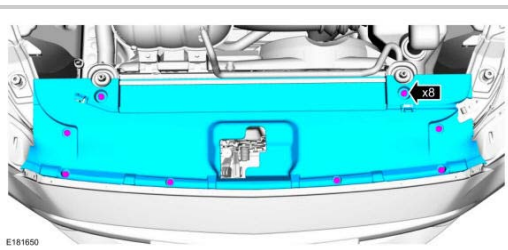
Torque

: 92 lb.ft (125 Nm)



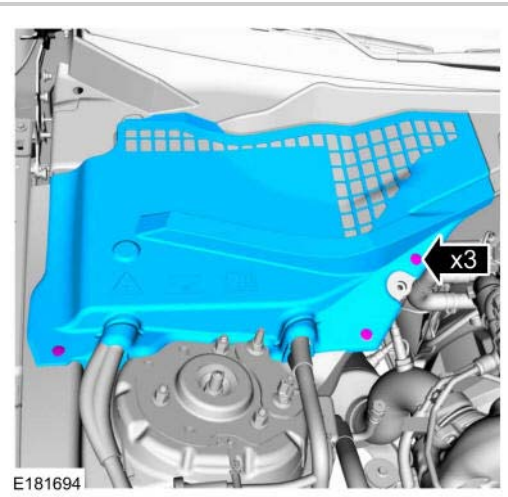
11.

Install the radiator top shield and the retainers.



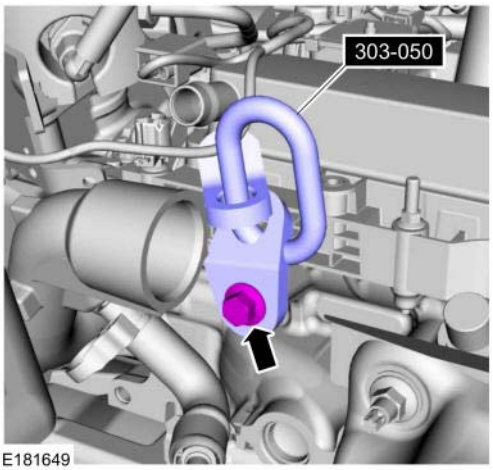
12.

Install the battery cover and the retainers.



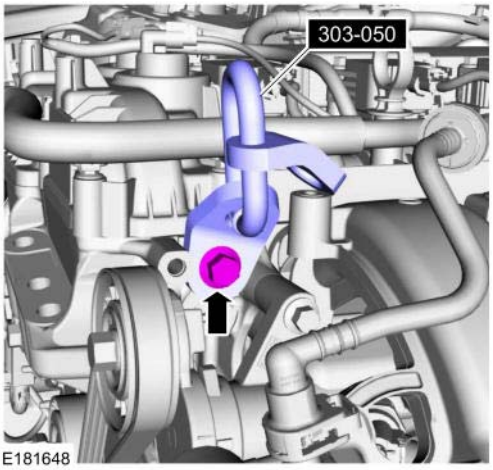
13.

Remove Special Service Tool: 303-050 (T70P-6000) Lifting Bracket, Engine.



14.

Remove Special Service Tool: 303-050 (T70P-6000) Lifting Bracket, Engine.

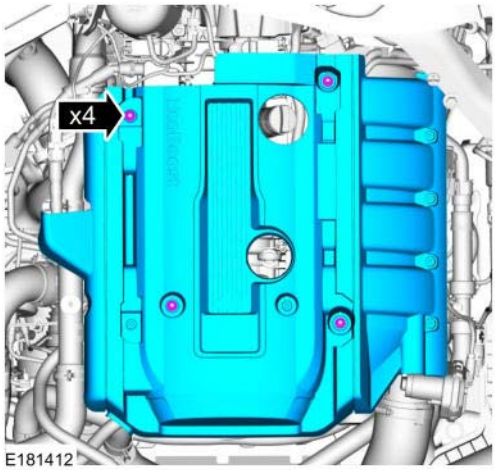


15.

Install the engine appearance cover and the nuts.

Torque

: 80 lb.in (9 Nm)



REMOVAL AND INSTALLATION > FLEXPLATE

Special Tool(s) / General Equipment

 E222983	303-103 (T74P-6375-A) Holding Tool, Flywheel T74P-77000-A TKIT-2009TC-F

REMOVAL AND INSTALLATION > FLEXPLATE > REMOVAL

1.

With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

2.

Remove the automatic transmission. Refer to: Transmission - 2.3L EcoBoost (231kW/314PS) .

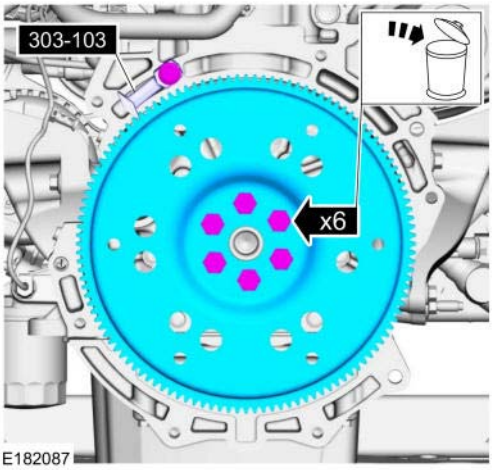
3.

Install Special Service Tool: 303-103 (T74P-6375-A) Holding Tool, Flywheel.

NOTE: Do not reuse the flexplate bolts.

Remove the bolts and the flexplate.

Discard the bolts.



REMOVAL AND INSTALLATION > FLEXPLATE > INSTALLATION

1.

> *NOTE: Special bolts are used for installation. Do not use standard bolts.*

Install the flexplate and the new bolts.

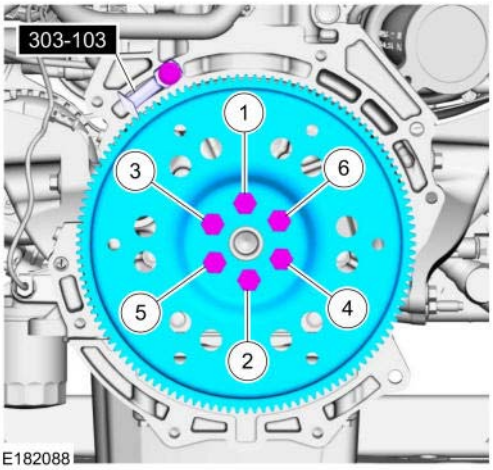
Torque

:Stage 1: 37 lb.ft (50 Nm)

Stage 2: 59 lb.ft (80 Nm)

Stage 3: 83 lb.ft (112 Nm)

Remove Special Service Tool: 303-103 (T74P-6375-A) Holding Tool, Flywheel.



2.

Install the automatic transmission. Refer to: Transmission - 2.3L EcoBoost (231kW/314PS) .

3.

After completing the repairs, perform the Misfire Monitor Neutral Profile Correction procedure using a diagnostic scan tool.

REMOVAL AND INSTALLATION > FLYWHEEL

Special Tool(s) / General Equipment

 E222983	303-103 (T74P-6375-A) Holding Tool, Flywheel T74P-77000-A TKIT-2009TC-F

REMOVAL AND INSTALLATION > FLYWHEEL > REMOVAL

1.

With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

2.

Remove the clutch. Refer to: Clutch Disc and Pressure Plate - 2.3L EcoBoost (201kW/273PS) .

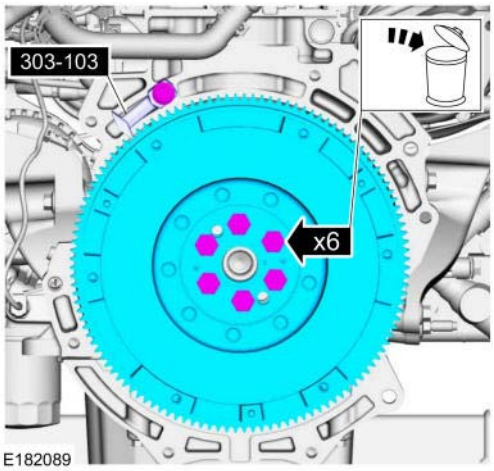
3.

Install Special Service Tool: 303-103 (T74P-6375-A) Holding Tool, Flywheel.

NOTE: Do not reuse the flywheel bolts.

Remove the bolts and the flywheel.

Discard the bolts.



REMOVAL AND INSTALLATION > FLYWHEEL > INSTALLATION

1.

> *NOTE: Special bolts are used for installation. Do not use standard bolts.*

Install the flywheel and the new bolts.

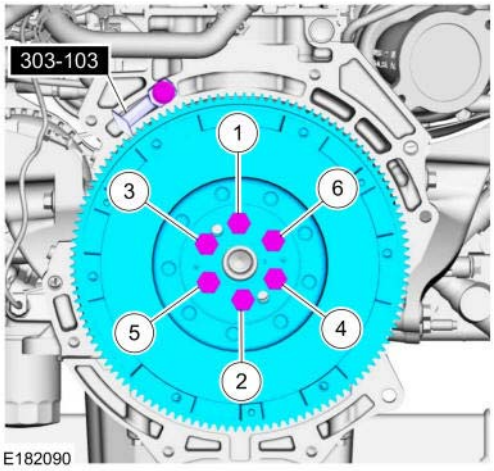
Torque:

Stage 1: 37 lb.ft (50 Nm)

Stage 2: 59 lb.ft (80 Nm)

Stage 3: 83 lb.ft (112 Nm)

Remove Special Service Tool: 303-103 (T74P-6375-A) Holding Tool, Flywheel.



2.

Install the clutch. Refer to: Clutch Disc and Pressure Plate - 2.3L EcoBoost (201kW/273PS) .

3.

After completing the repairs, perform the Misfire Monitor Neutral Profile Correction procedure using a diagnostic scan tool.

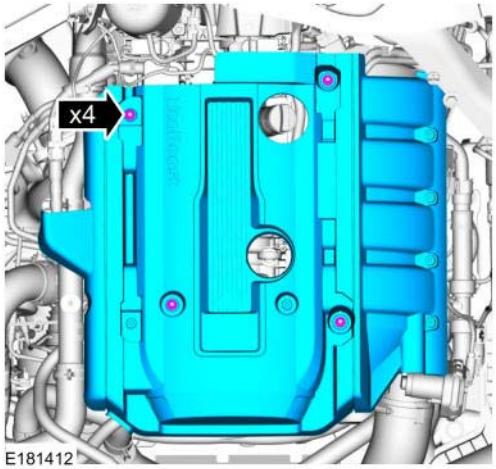
REMOVAL AND INSTALLATION > INTAKE MANIFOLD > REMOVAL

1.

With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

2.

Remove the nuts and the engine appearance cover.



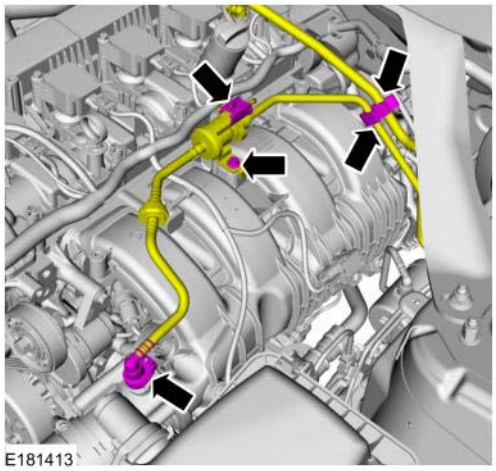
3.

Disconnect the EVAP canister purge valve quick release coupling at the front of the intake manifold. Refer to: QUICK RELEASE COUPLING - 2.3L EcoBoost (231kW/314PS).

Detach the fuel tube and EVAP tube from the retainer on the intake manifold.

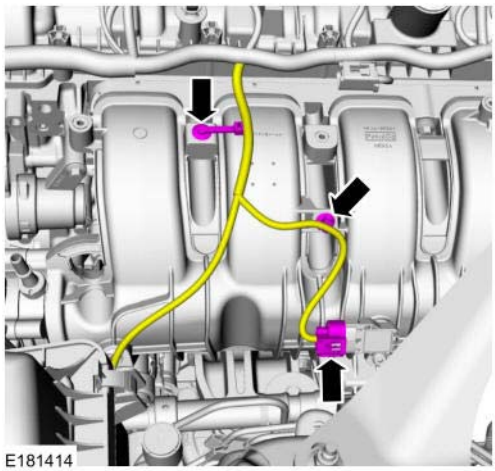
Disconnect the EVAP canister purge valve electrical connector.

Remove the bolt and position the EVAP canister purge valve aside.



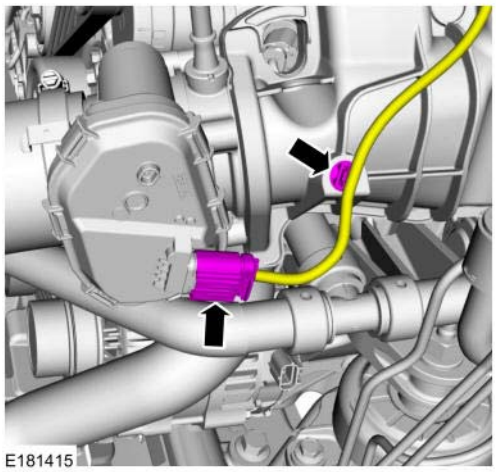
4.

Disconnect the MAPT sensor electrical connector and the wire harness retainers.



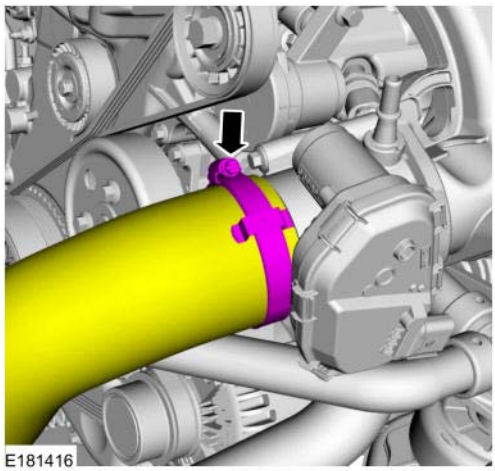
5.

Disconnect the throttle body electrical connector and the wire harness retainer.



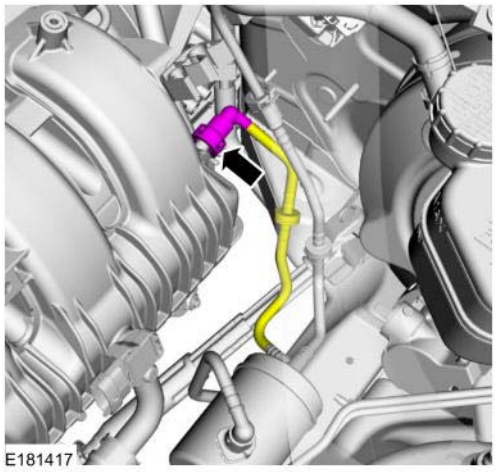
6.

Loosen the clamp and position aside the CAC outlet tube.



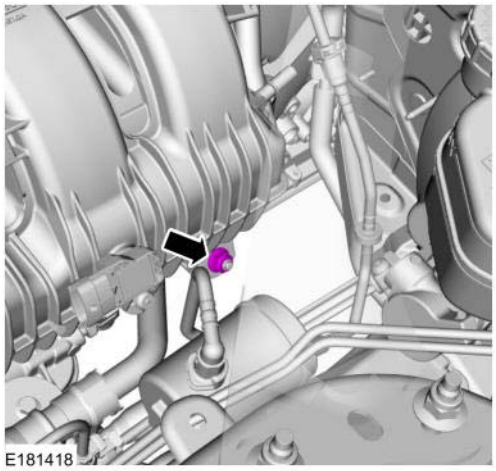
7.

Disconnect the vacuum tube quick release coupling at the rear of the intake manifold.



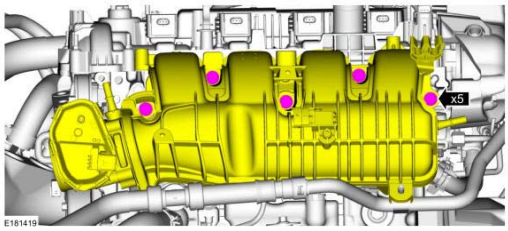
8.

Remove the nut from the coolant tube on the intake manifold.



9.

Remove the bolts and position intake manifold back.

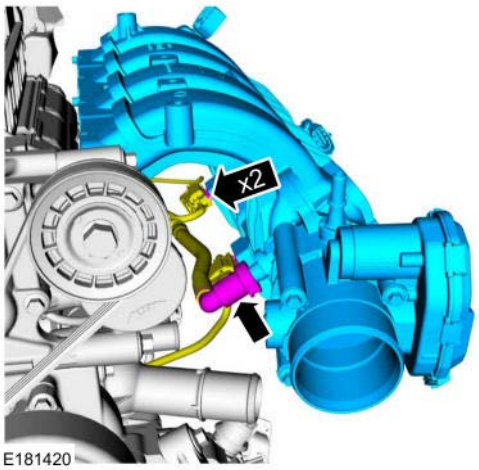


10.

Disconnect the PCV tube quick release coupling.

Detach the KS electrical connector retainers from the intake manifold.

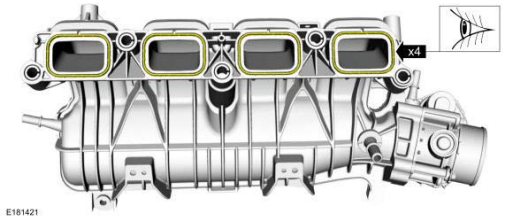
Remove the intake manifold.



NOTE: If the engine is repaired or replaced because of upper engine failure,

typically including valve or piston damage, check the intake manifold for metal debris. If metal debris is found, install a new intake manifold. Failure to follow these instructions can result in engine damage.

11.
Visually inspect the intake manifold gaskets for nicks, cuts and abrasions. If these conditions are not present, the gaskets may be reused.



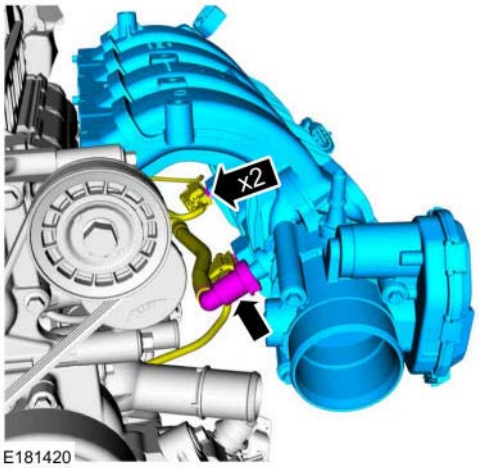
REMOVAL AND INSTALLATION > INTAKE MANIFOLD > INSTALLATION

1.

Position the intake manifold for installation.

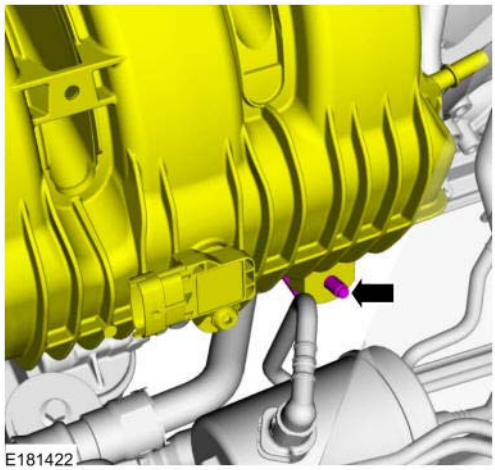
Attach the KS electrical connector retainers to the intake manifold.

Connect the PCV tube quick release coupling.



NOTE: Make sure the coolant tube is in position when intake is installed.

2.
Position the intake manifold on the coolant tube stud.

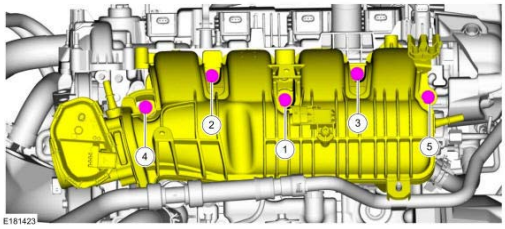


3.

Install the bolts.

Torque

: 177 lb.in (20 Nm)

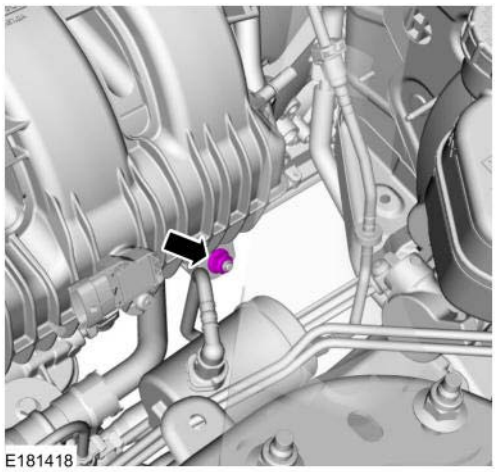


4.

Install the nut on the coolant tube.

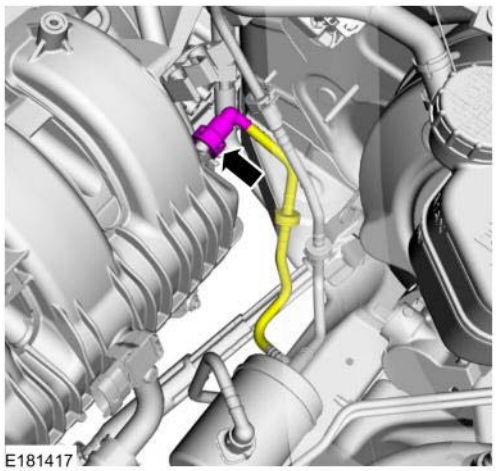
Torque

: 106 lb.in (12 Nm)



5.

Connect the vacuum tube quick release coupling at the rear of the intake manifold.

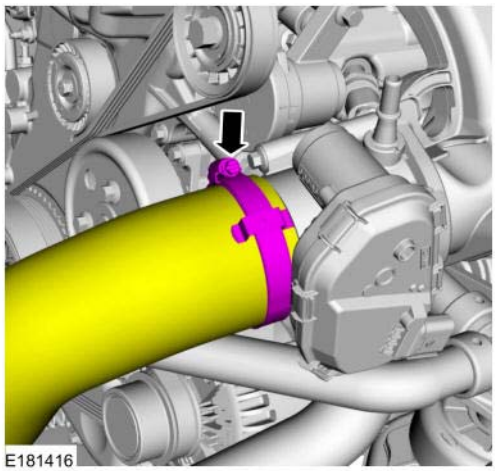


6.

Position the CAC outlet tube and tighten the clamp.

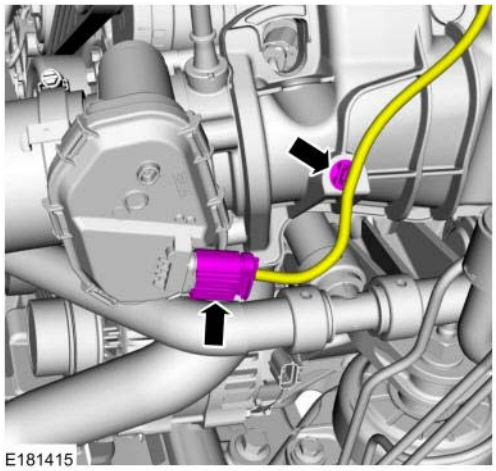
Torque

: 44 lb.in (5 Nm)



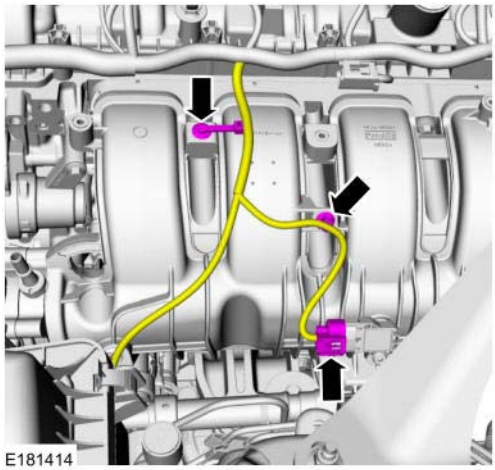
7.

Connect the throttle body electrical connector and the wire harness retainer.



8.

Connect the MAPT sensor electrical connector and the wire harness retainers.



9.

Install the EVAP canister purge valve and the bolt.

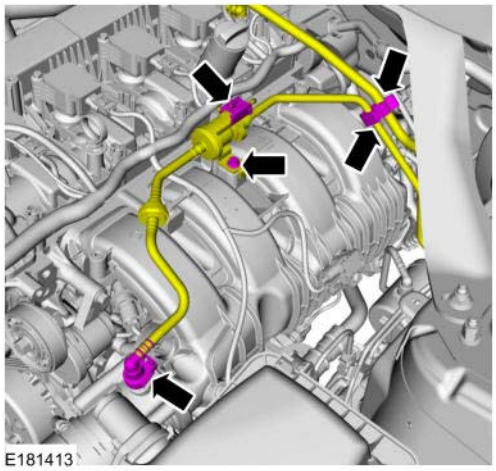
Torque

: 71 lb.in (8 Nm)

Connect the EVAP canister purge valve electrical connector.

Attach the fuel tube and EVAP tube to the retainer on the intake manifold.

Connect the EVAP canister purge valve quick release coupling at the front of the intake manifold.

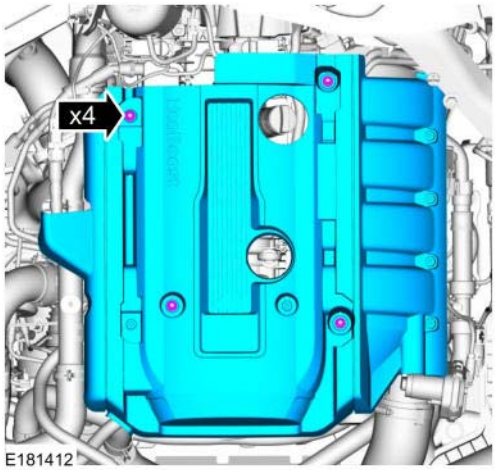


10.

Install the engine appearance cover and the nuts.

Torque

: 80 lb.in (9 Nm)



REMOVAL AND INSTALLATION > OIL PAN

Special Tool(s) / General Equipment

	303-050 (T70P-6000) Lifting Bracket, Engine

	303-F072 Support Bar, Engine
Plastic Scraper	
Oil Drain Equipment	
Vehicle/Axle Stands	

Materials

Name	Specification
Motorcraft® SAE 5W-30 Premium Synthetic Blend Motor Oil (U.S.) XO-5W30-QSP (U.S.)	WSS-M2C946-A
Motorcraft® Silicone Gasket Remover ZC-30-A	-
Motorcraft® Metal Surface Prep ZC-31-B	-
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4
Metal Brake Parts Cleaner (U.S.) PM-4-A, PM-4-B (U.S.)	-

REMOVAL AND INSTALLATION > OIL PAN > REMOVAL

6-Speed Automatic Transmission - 6R80/6-Speed Manual Transmission - MT82

1.

With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

NOTE: Make sure to minimize damage to sealer foam and avoid pulling apart dash seal brackets from retainer pins. Excessive damage may allow engine noise, fumes, air or water to enter the passenger compartment.

2.

1.

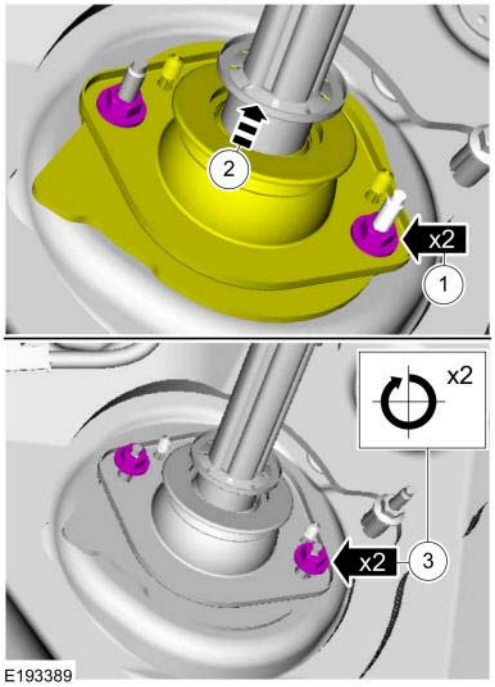
Remove the steering column dash seal nuts.

2.

Loosen the dash seal.

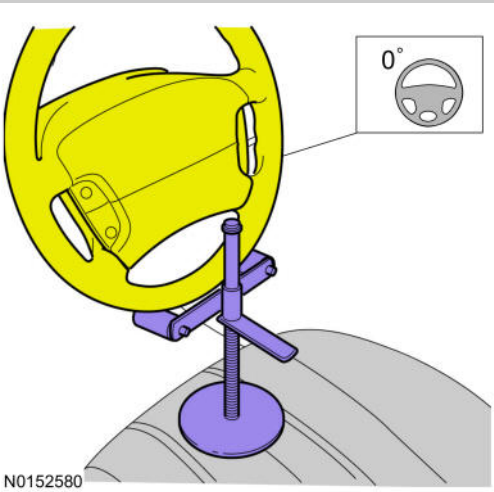
3.

Hand start the dash seal nuts.



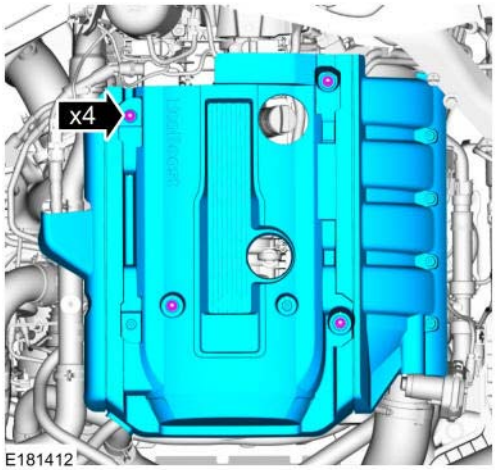
3.

Using a holding device, hold the steering wheel in the straight-ahead position.



4.

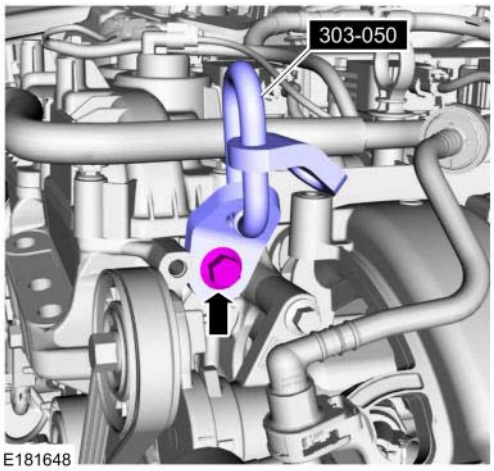
Remove the nuts and the engine appearance cover.



5.

Install the special tool on the LH side of the cylinder head.

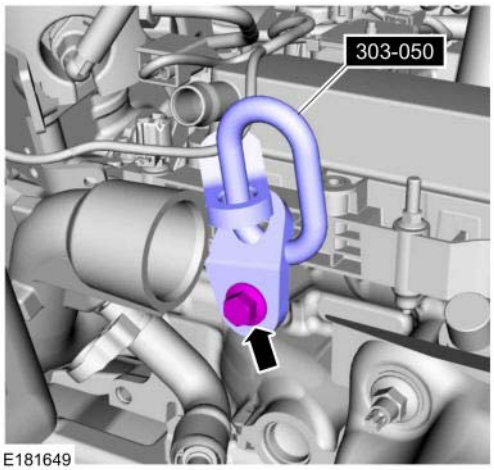
Use Special Service Tool: 303-050 (T70P-6000) Lifting Bracket, Engine.



NOTE: Coolant tube removed for clarity.

6.
Install the special tool on the RH side of the cylinder head.

Use Special Service Tool: 303-050 (T70P-6000) Lifting Bracket, Engine.

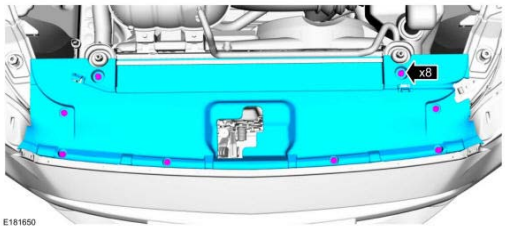


7.

Disconnect the battery ground. Refer to: Battery Disconnect and Connect .

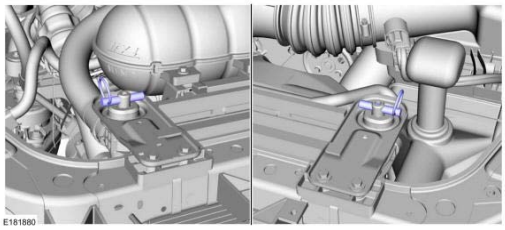
8.

Remove the retainers and the radiator top shield.



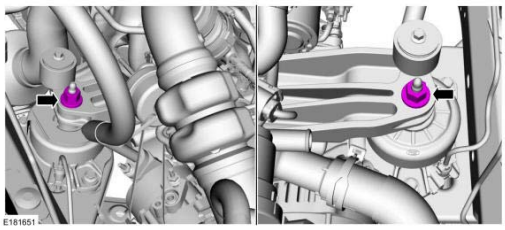
9.

Install retaining pins to support cooling module.



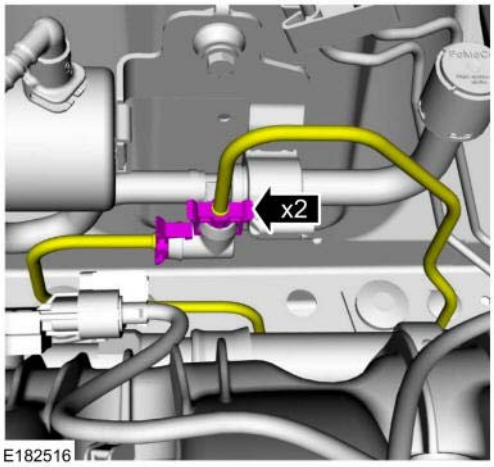
10.

Remove the RH and LH engine mount bracket nuts.



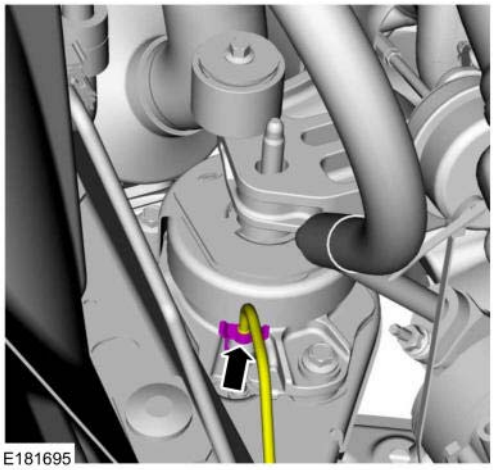
11.

Disconnect the vacuum tubes from the engine mount control vacuum reservoir.



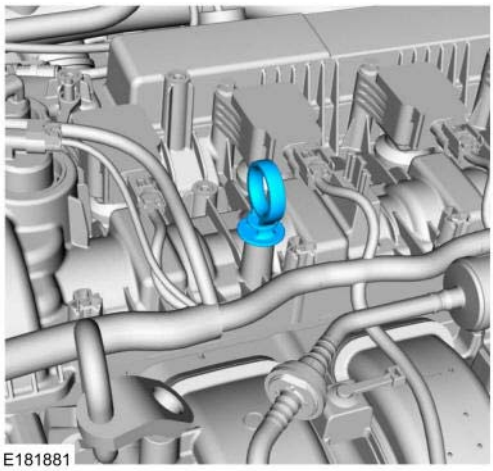
12.

Disconnect the vacuum tube from the RH engine mount.



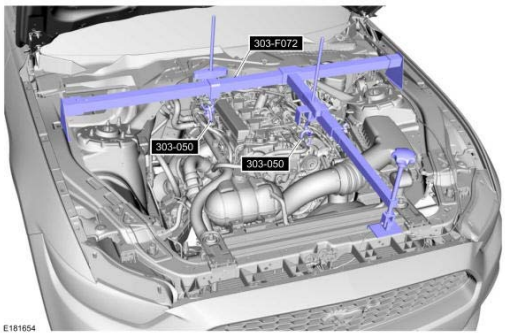
13.

Remove the oil level indicator.



NOTE: Do not position the legs of the Engine Support Bar on the fenders. Instead, position the legs on the body structure near the suspension strut tower. Failure to follow these instructions may result in body damage.

14.
Install the special tool to support the engine. Install Special Service Tool: 303-F072 Support Bar, Engine.

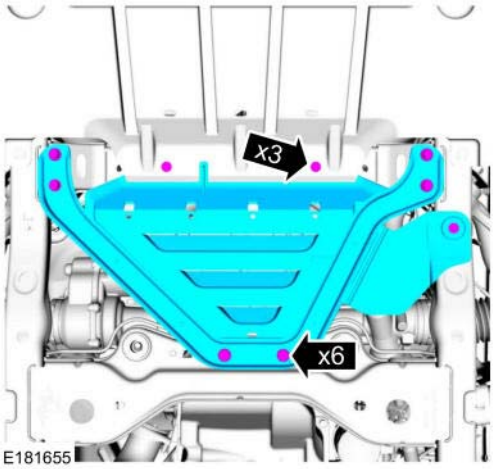


15.

Remove the front wheels and tires. Refer to: Wheel and Tire .

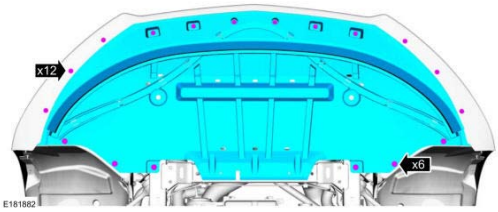
16.

Remove the screws, bolts and the underbody shield.



17.

Remove the pin-type retainers, bolts and the underbody shield.



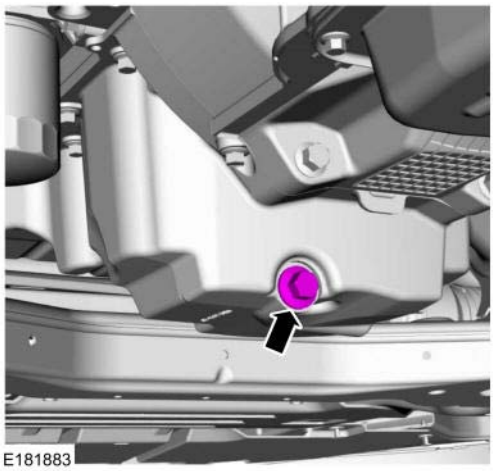
18.

Drain engine oil and install drain plug.

Use the General Equipment: Oil Drain Equipment

Torque

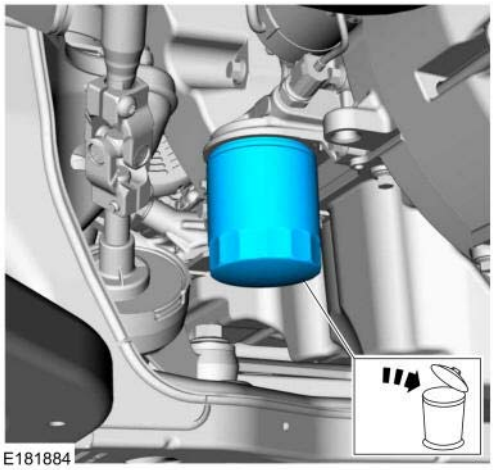
: 20 lb.ft (27 Nm)



19.

Remove and discard the engine oil filter.

Use the General Equipment: Oil Drain Equipment



WARNING: DO NOT attempt to remove or install the steering column lower u-joint at the steering gear without first loosening the steering column dash seal and fasteners. Failure to follow this instruction may cause damage to steering components that could lead to loss of steering control during vehicle operation and could result in serious personal injury or death.

WARNING: DO NOT hammer, pry or force steering column and column shafts during installation or removal. Failure to follow this instruction may cause damage to steering components that could lead to loss of steering control during vehicle operation and could result in serious personal injury or death.

WARNING: Do not reuse steering column shaft bolts. This may result in fastener failure and steering column shaft detachment or loss of steering control. Failure to follow this instruction may result in serious injury to vehicle occupant(s).

20.

Detach the steering column lower shaft from the lower coupling.

1.

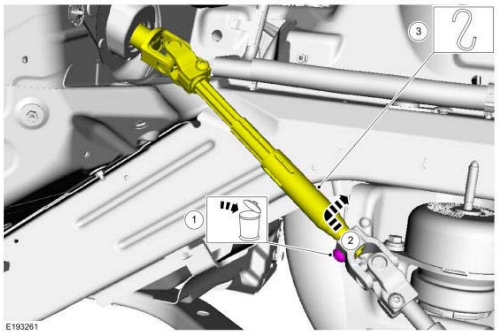
Remove and discard the steering column shaft bolt.

2.

Pull apart the steering column shaft from the coupling.

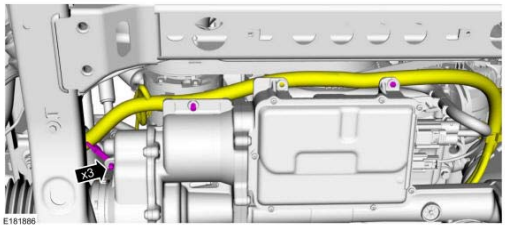
3.

Secure the lower shaft to the frame rail to avoid damaging it during subframe removal.



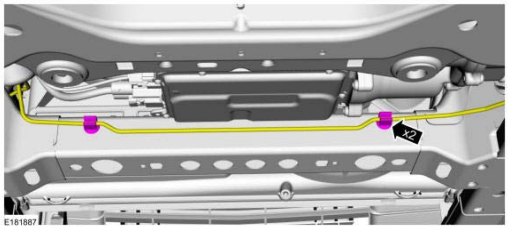
21.

Detach the EPAS wiring harness pin-type retainers.



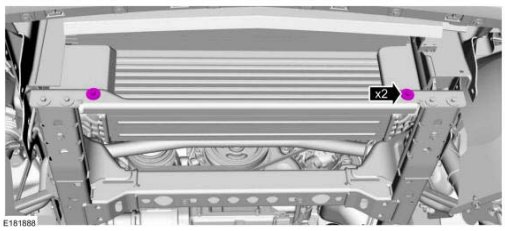
22.

Detach the brake line retainers from the subframe.



23.

Remove the bolts from the support bar on the front of the subframe.

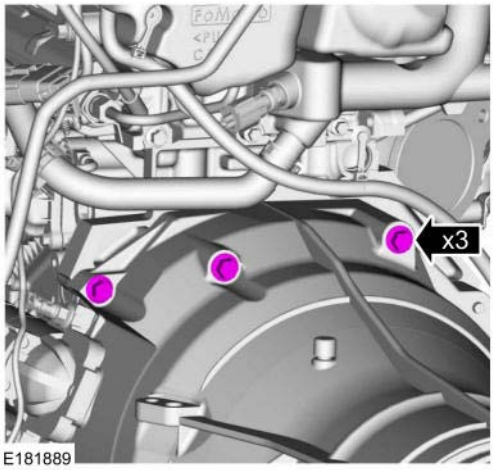


NOTE: To prevent damage to the transmission, do not loosen the transmission-

to-engine fasteners more than 5 mm (0.19 in).

NOTE: Automatic transmission shown in illustration, manual transmission similar.

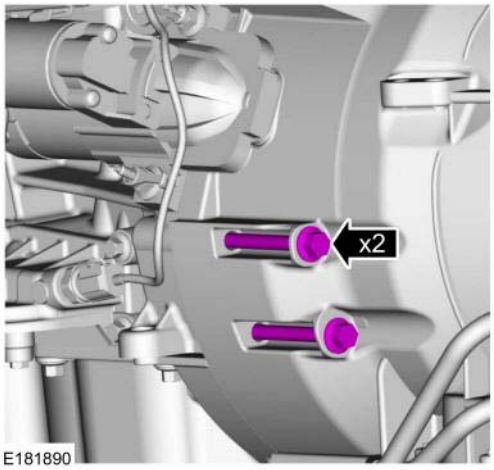
24.
Loosen the bolts 5 mm (0.19 in).



NOTE: Automatic transmission shown in illustration, manual transmission similar.

NOTE: To prevent damage to the transmission, do not loosen the transmission-to-engine fasteners more than 5 mm (0.19 in).

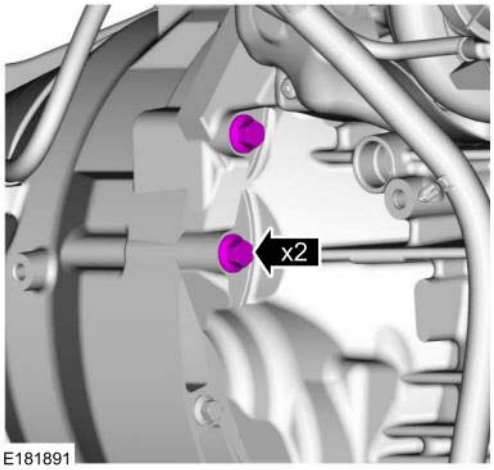
25.
Loosen the bolts 5 mm (0.19 in).



NOTE: Automatic transmission shown in illustration, manual transmission similar.

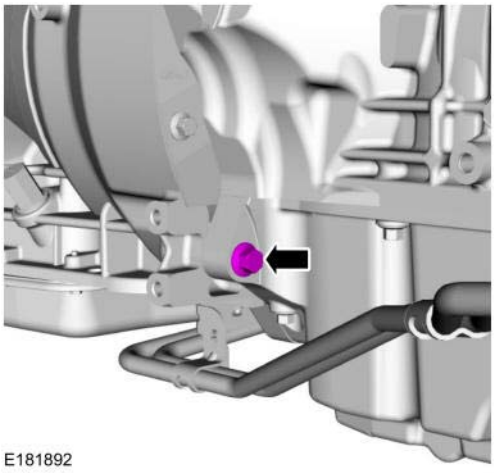
NOTE: To prevent damage to the transmission, do not loosen the engine-to-transmission fasteners more than 5 mm (0.19 in).

26.
Loosen bolts 5 mm (0.19 in).



NOTE: Automatic transmission shown in illustration, manual transmission similar.

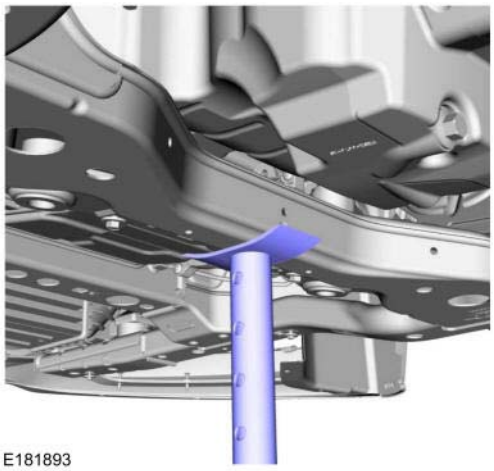
27.
Remove the oil pan bolt.



28.

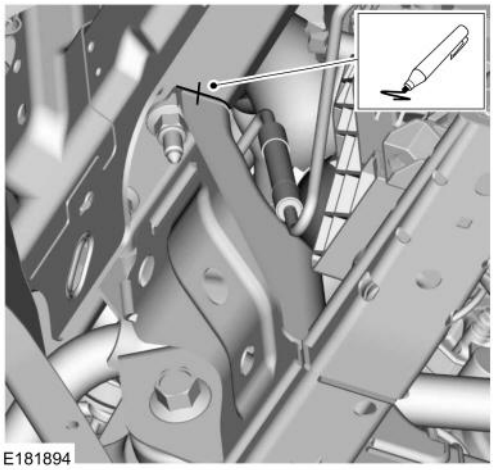
Using an adjustable stand, support the subframe.

Use the General Equipment: Vehicle/Axle Stands



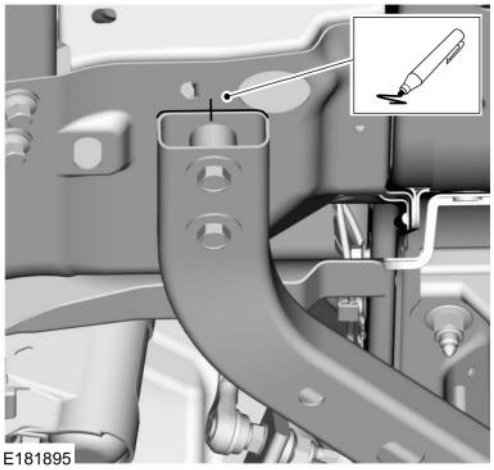
29.

Mark the position of the front subframe for reference during installation.



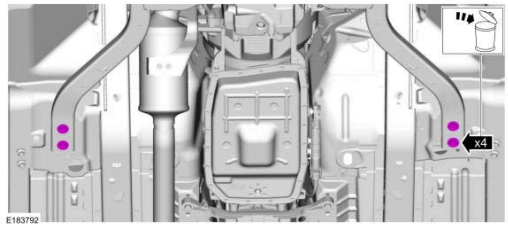
30.

Mark the position of the rear subframe for reference during installation.



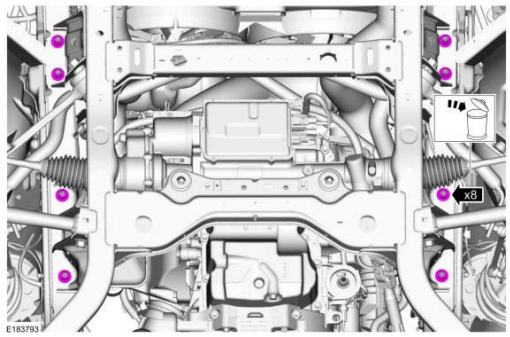
31.

Remove and discard the rear subframe bolts.



32.

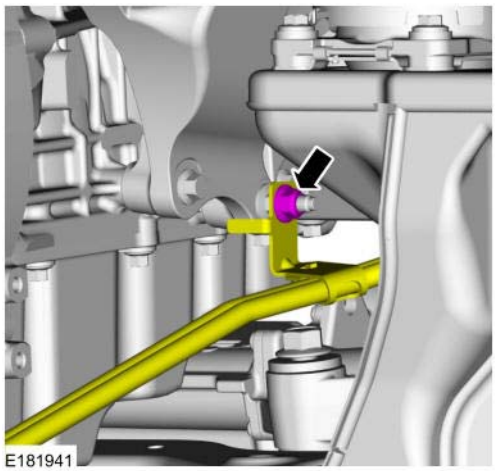
Remove and discard the front subframe nuts.



6-Speed Automatic Transmission - 6R80

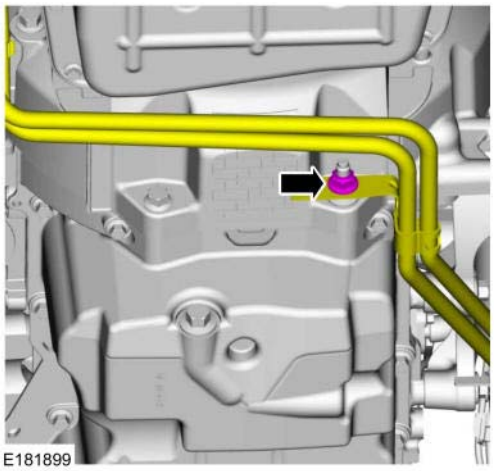
33.

Remove the nut from the RH engine mount bracket stud bolt for the transmission cooling tubes.



34.

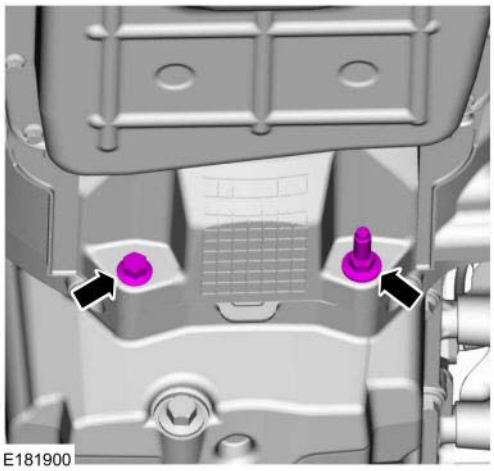
Remove the transmission cooling tube bracket nut and position aside.



6-Speed Automatic Transmission - 6R80/6-Speed Manual Transmission - MT82

NOTE: Automatic transmission shown in illustration, manual transmission similar.

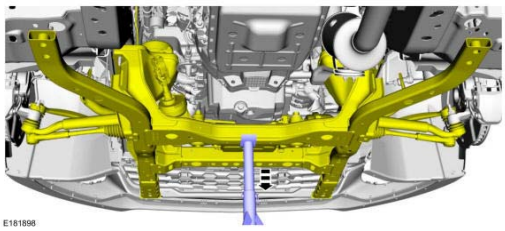
35.
Remove the oil pan bolts.



36.

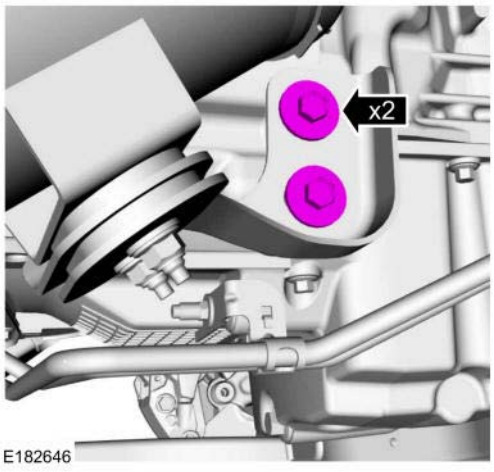
Using an adjustable stand, lower the subframe 102 mm (4.0 in).

Use the General Equipment: Vehicle/Axle Stands



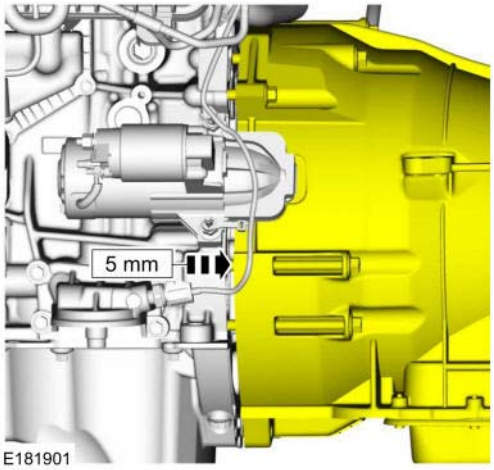
NOTE: Automatic transmission shown in illustration, manual transmission similar.

37.
Remove the bolts for the catalytic converter bracket.



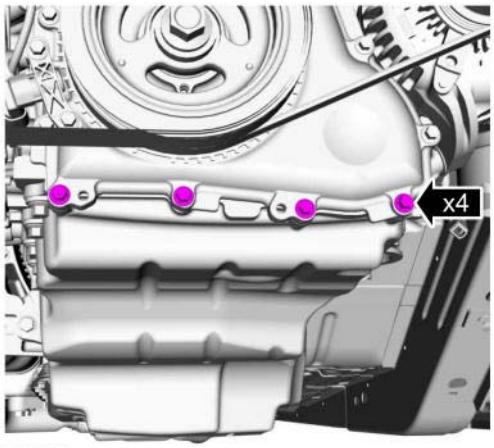
38.

Separate the engine from the transmission 5 mm (0.19 in).



39.

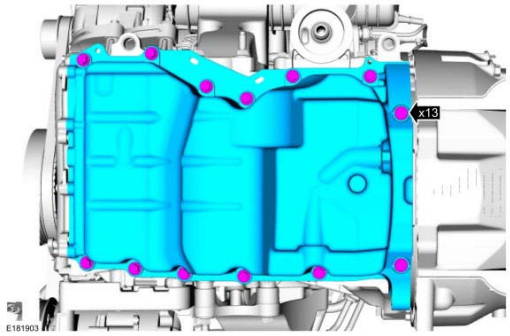
Remove the engine front cover bolts.



E181902

40.

Remove the bolts and the oil pan.



E181903

NOTE: Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges, which make leak paths. Use a plastic scraping tool to remove traces of sealant.

41.
Make sure that the mating faces are clean and free of foreign material. Refer to: RTV Sealing Surface Cleaning and Preparation .

Use the General Equipment: Plastic Scraper

Material

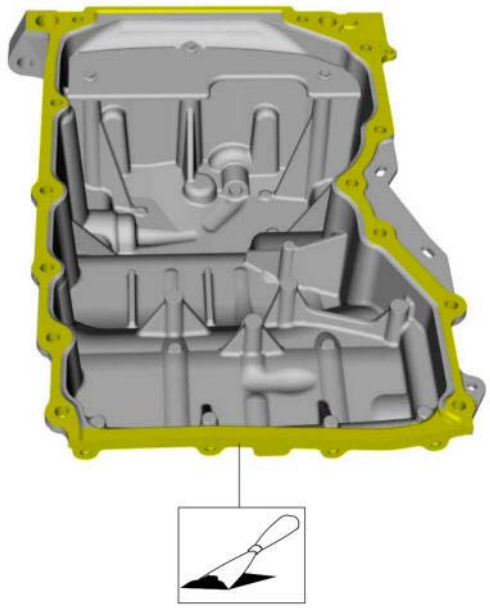
: Motorcraft® Silicone Gasket Remover / ZC-30-A

Material

: Metal Brake Parts Cleaner (U.S.) / PM-4-A, PM-4-B (U.S.)

Material

: Motorcraft® Metal Surface Prep / ZC-31-B



E183089

NOTE: Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges, which make leak paths. Use a plastic scraping tool to remove traces of sealant.

42.
Make sure that the mating faces are clean and free of foreign material. Refer to: RTV Sealing Surface Cleaning and Preparation .

Use the General Equipment: Plastic Scraper

Material

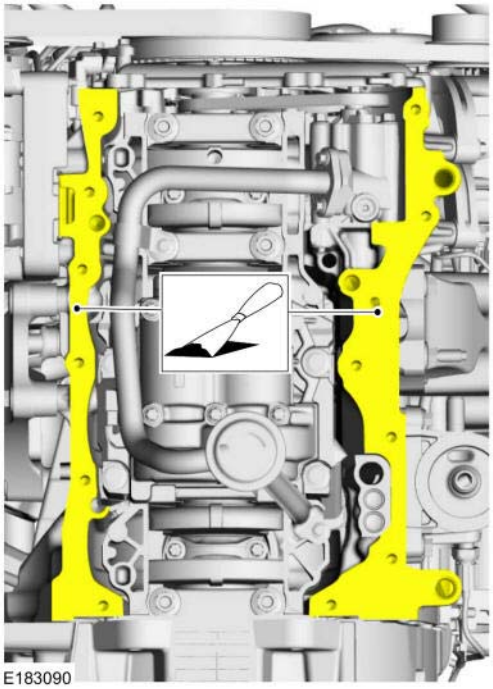
: Motorcraft® Silicone Gasket Remover / ZC-30-A

Material

: Metal Brake Parts Cleaner (U.S.) / PM-4-A, PM-4-B (U.S.)

Material

: Motorcraft® Metal Surface Prep / ZC-31-B



NOTE: Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges, which make leak paths. Use a plastic scraping tool to remove traces of sealant.

43.
Make sure that the mating faces are clean and free of foreign material. Refer to: RTV Sealing Surface Cleaning and Preparation .

Use the General Equipment: Plastic Scraper

Material

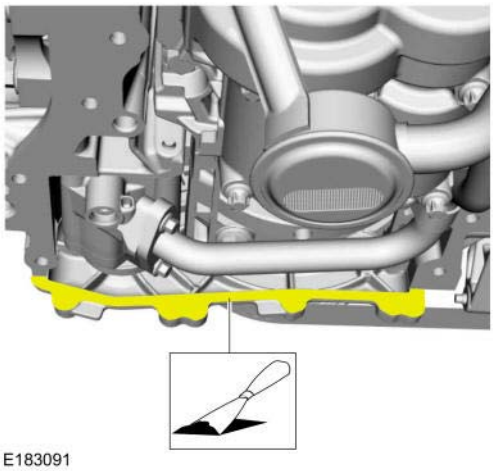
: Motorcraft® Silicone Gasket Remover / ZC-30-A

Material

: Metal Brake Parts Cleaner (U.S.) / PM-4-A, PM-4-B (U.S.)

Material

: Motorcraft® Metal Surface Prep / ZC-31-B



REMOVAL AND INSTALLATION > OIL PAN > INSTALLATION

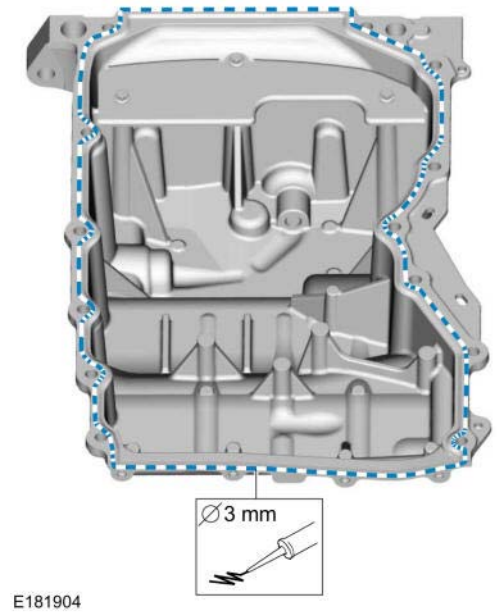
6-Speed Automatic Transmission - 6R80/6-Speed Manual Transmission - MT82

NOTE: If the oil pan is not secured within 10 minutes of sealant application, the sealant must be removed and the sealing area cleaned. Allow to dry until there is no sign of wetness, or 10 minutes, whichever is longer. Failure to follow this procedure can cause future oil leakage.

1.
Apply a 3 mm (0.19 in) bead of silicone sealant.

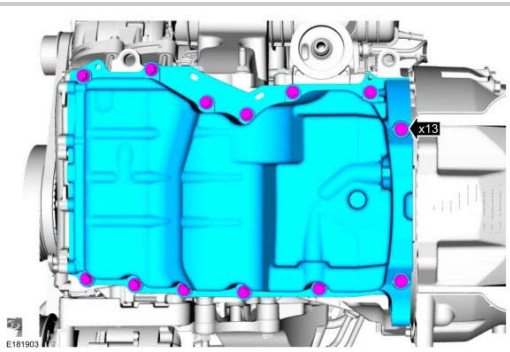
Material

: Silicone Gasket and Sealant / TA-30 (WSE-M4G323-A4)



2.

Install the oil pan and the bolts finger tight.

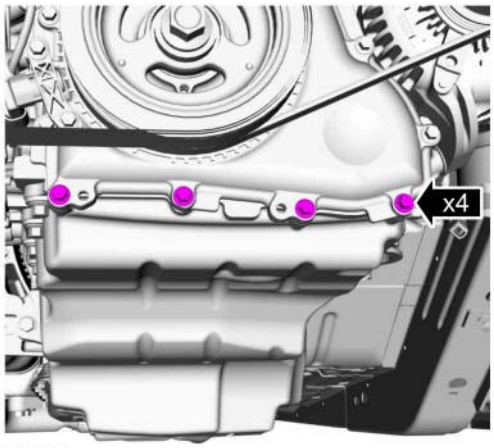


NOTE: The engine front cover-to-oil pan fasteners must be tightened first to align the front surface of the oil pan flush with the front surface of the engine block.

3.
Install the engine front cover bolts.

Torque

: 89 lb.in (10 Nm)



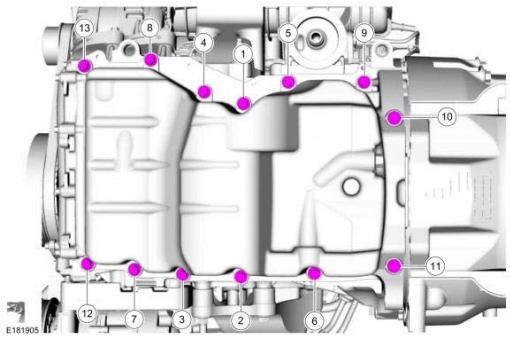
E181902

4.

Tighten the oil pan bolts.

Torque

: 18 lb.ft (25 Nm)



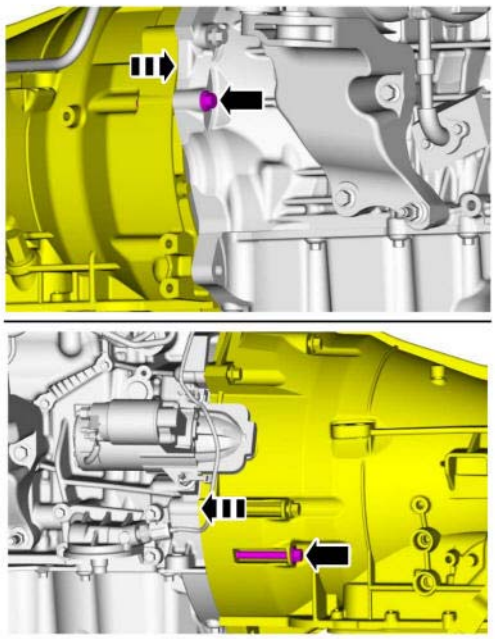
E181905

NOTE: Automatic transmission shown in illustration, manual transmission similar.

5.
Alternate tightening the LH bellhousing-to-engine and RH engine-to-bellhousing lower bolts to draw the transmission and engine together.

Torque

: 35 lb.ft (48 Nm)



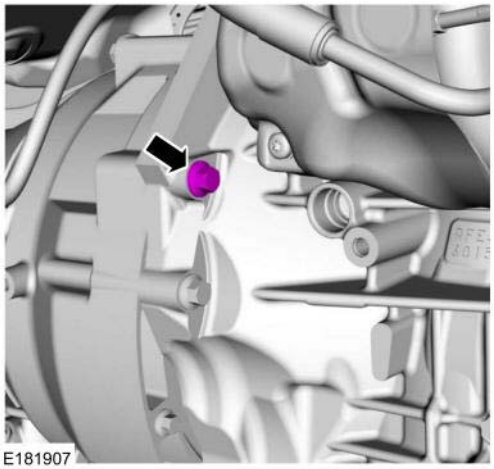
E181906

NOTE: Automatic transmission shown in illustration, manual transmission similar.

6.
Tighten the bolt.

Torque

: 35 lb.ft (48 Nm)



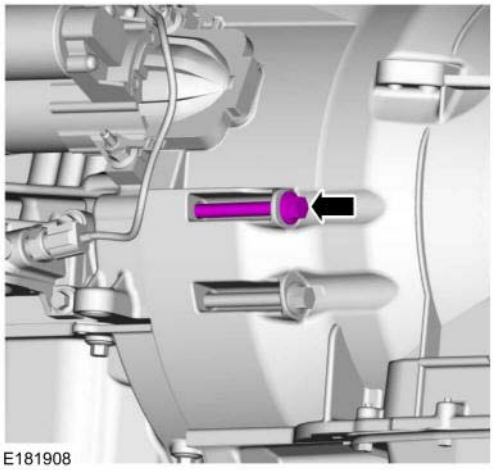
E181907

NOTE: Automatic transmission shown in illustration, manual transmission similar.

7.
Tighten the bolt.

Torque

: 35 lb.ft (48 Nm)

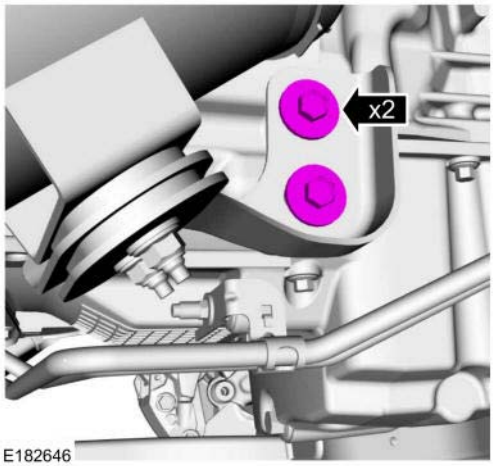


NOTE: Automatic transmission shown in illustration, manual transmission similar.

8.
Install the bolts for the catalytic converter bracket.

Torque

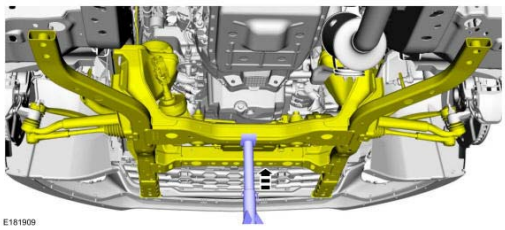
: 18 lb.ft (25 Nm)



9.

Using an adjustable stand, raise the subframe.

Use the General Equipment: Vehicle/Axle Stands

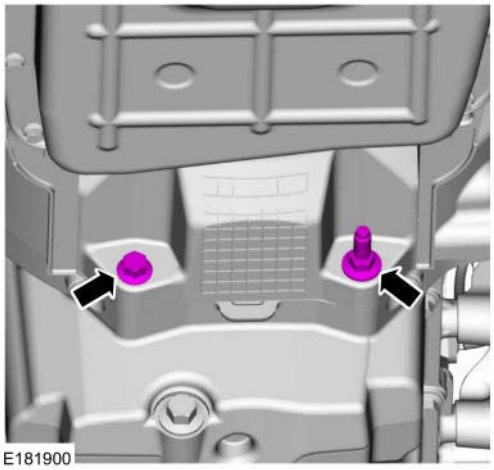


NOTE: Automatic transmission shown in illustration, manual transmission similar.

10.
Install the oil pan bolts.

Torque

: 35 lb.ft (48 Nm)



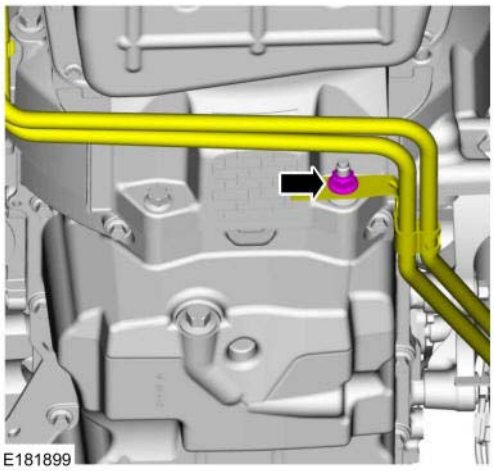
6-Speed Automatic Transmission - 6R80

11.

Position the transmission cooling tube bracket and install the nut.

Torque

: 124 lb.in (14 Nm)

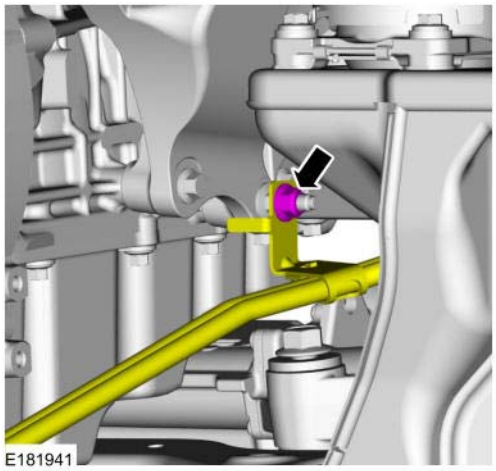


12.

Install the nut on the RH engine mount bracket stud bolt.

Torque

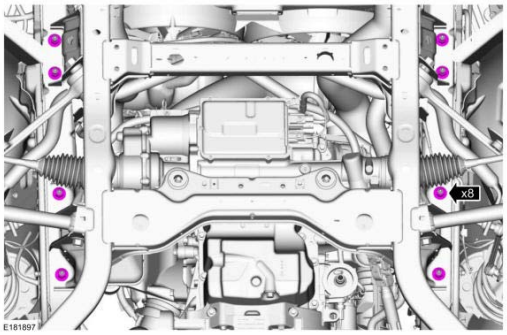
: 35 lb.ft (48 Nm)



6-Speed Automatic Transmission - 6R80/6-Speed Manual Transmission - MT82

13.

Install the new front subframe nuts loosely.

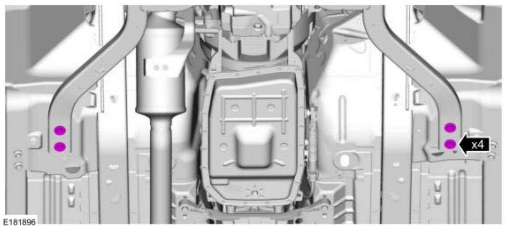


14.

Use a suitable alignment tool with a 15 mm (0.59 in) OD shaft that is long enough to go through the subframe and body.

Align the subframe to the alignment marks made during removal.

Install the new rear subframe bolts loosely.

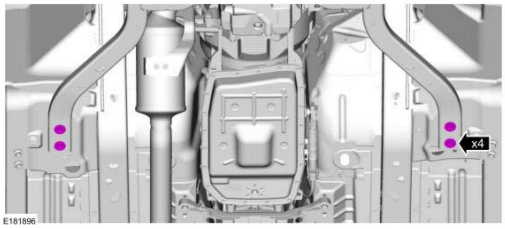


15.

Tighten the rear subframe bolts in a cross pattern.

Torque

: 85 lb.ft (115 Nm)

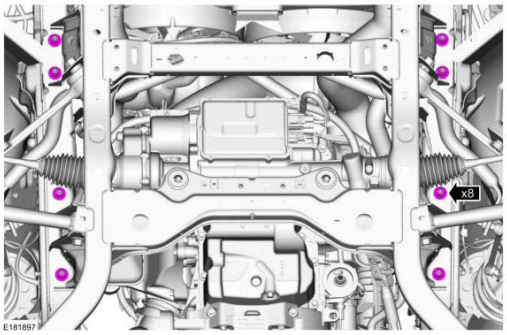


16.

Tighten the front subframe nuts in a cross pattern.

Torque

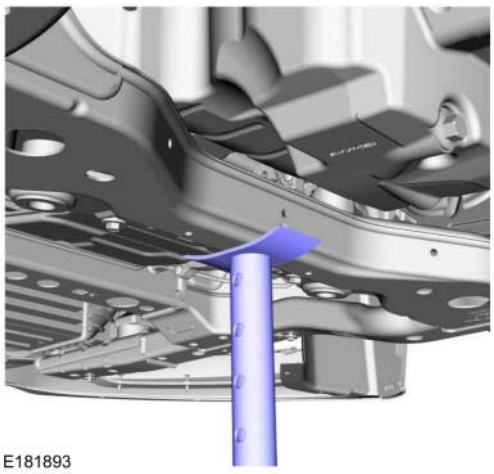
: 85 lb.ft (115 Nm)



17.

Remove the adjustable stand.

Use the General Equipment: Vehicle/Axle Stands

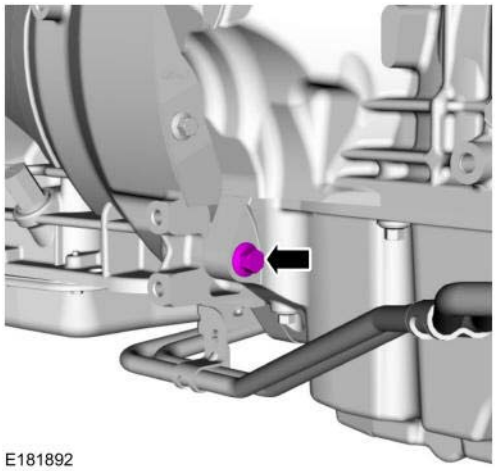


NOTE: Automatic transmission shown in illustration, manual transmission similar.

18.
Install the oil pan bolt.

Torque

: 35 lb.ft (48 Nm)

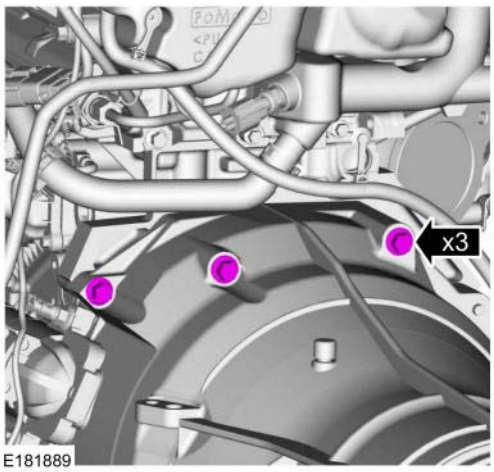


NOTE: Automatic transmission shown in illustration, manual transmission similar.

19.
Tighten the bolts.

Torque

: 35 lb.ft (48 Nm)

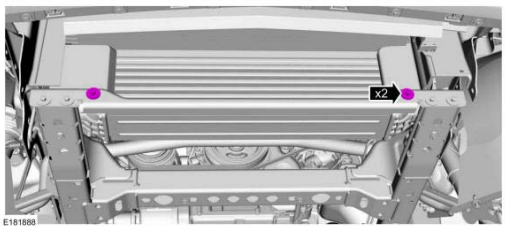


20.

Install the bolts in the support bar.

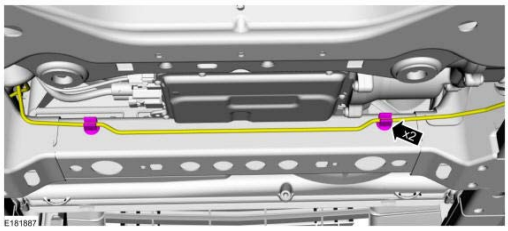
Torque

: 89 lb.in (10 Nm)



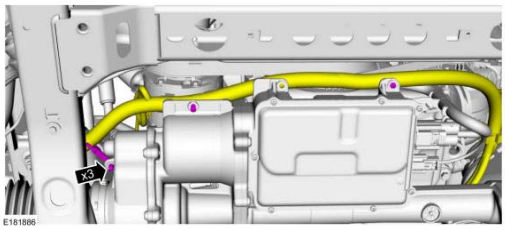
21.

Attach the brake line retainers to the subframe.



22.

Attach the EPAS wiring harness pin-type retainers.



WARNING: DO NOT hammer, pry or force steering column and column shafts during installation or removal. Failure to follow this instruction may cause damage to steering components that could lead to loss of steering control during vehicle operation and could result in serious personal injury or death.

WARNING: DO NOT attempt to remove or install the steering column lower u-joint at the steering gear without first loosening the steering column dash seal and fasteners. Failure to follow this instruction may cause damage to steering components that could lead to loss of steering control during vehicle operation and could result in serious personal injury or death.

23.

1.

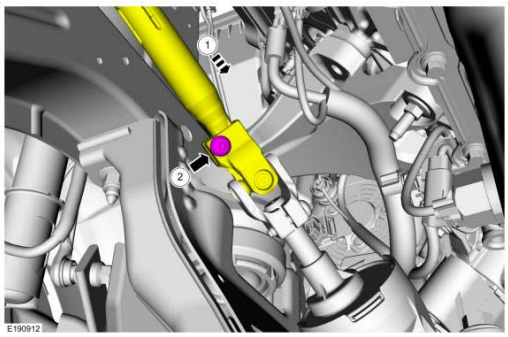
Connect the steering column shaft to the steering gear universal joint.

2.

Install the new steering column shaft bolt.

Torque

: 22 lb.ft (30 Nm)



24.

Inspect the steering column lower shaft. Refer to: Steering Column Collapsed Check .

NOTE: Lubricate the engine oil filter seal with clean engine oil.

25.
Install a new engine oil filter.

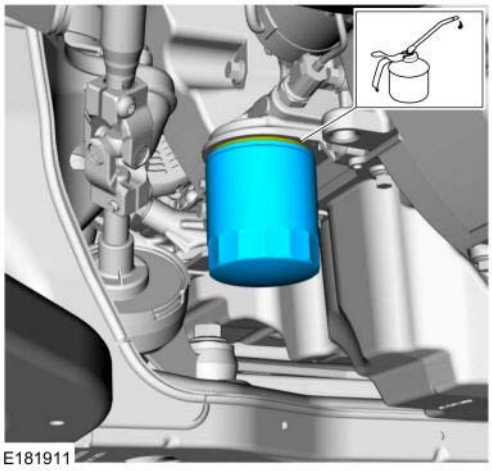
Material

: Motorcraft® SAE 5W-30 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W30-QSP (U.S.) (WSS-M2C946-A)

Torque:

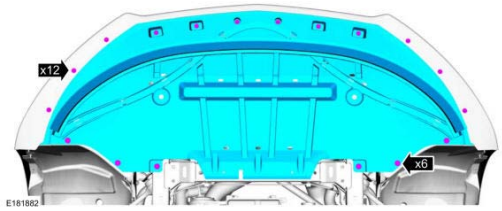
Stage 1: 71 lb.in (8 Nm)

Stage 2: 180°



26.

Install the underbody shield, bolts and the pin-type retainers.



27.

1.

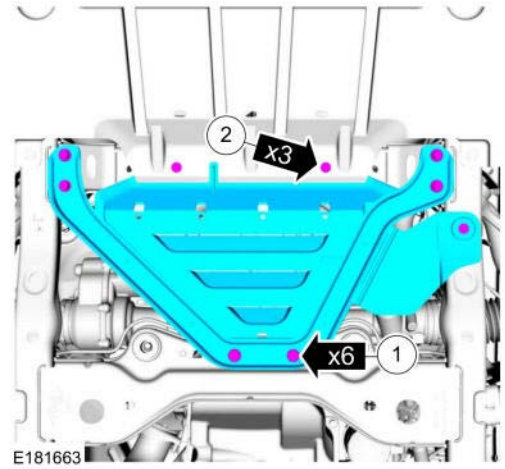
Install the underbody shield and the bolts.

Torque

: 46 lb.ft (63 Nm)

2.

Install the underbody shield screws.

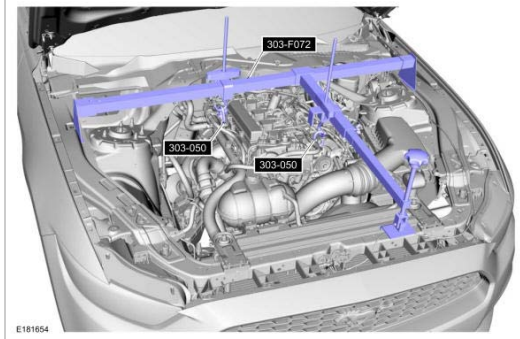


28.

Install the front wheels and tires. Refer to: Wheel and Tire .

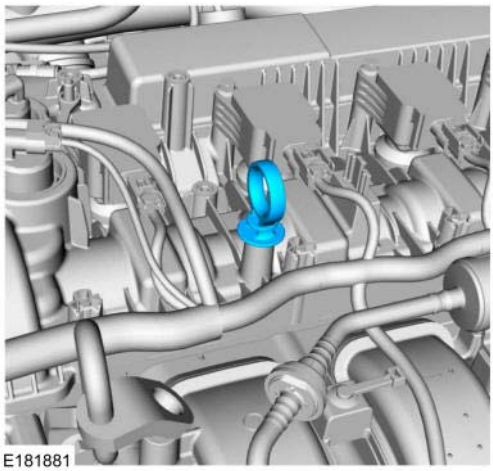
29.

Remove Special Service Tool: 303-F072 Support Bar, Engine.



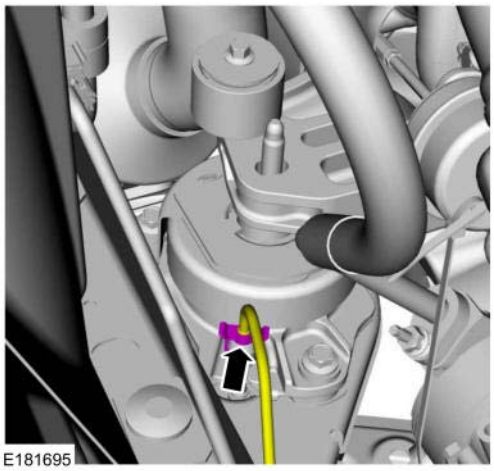
30.

Install the oil level indicator.



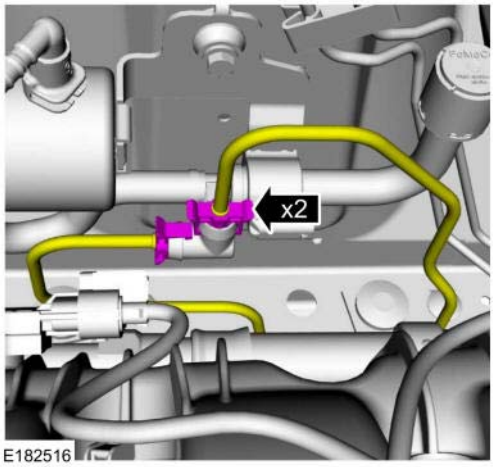
31.

Connect the vacuum tube to the RH engine mount.



32.

Connect the vacuum tubes to the engine mount control vacuum reservoir.

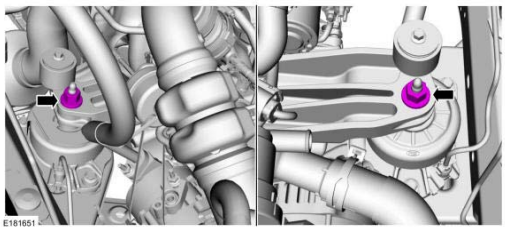


33.

Install the RH and LH engine mount bracket nuts.

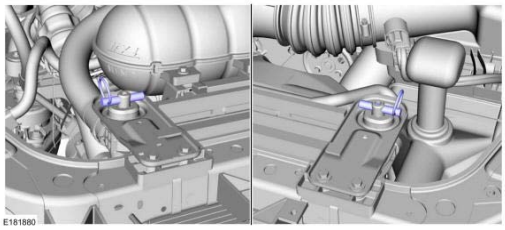
Torque

: 92 lb.ft (125 Nm)



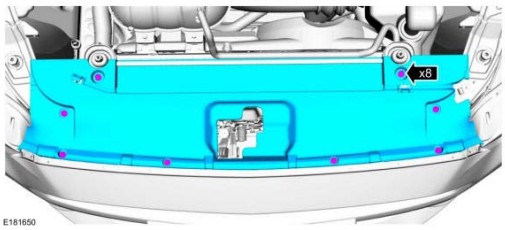
34.

Remove the retaining pins.



35.

Install the radiator top shield and the retainers.

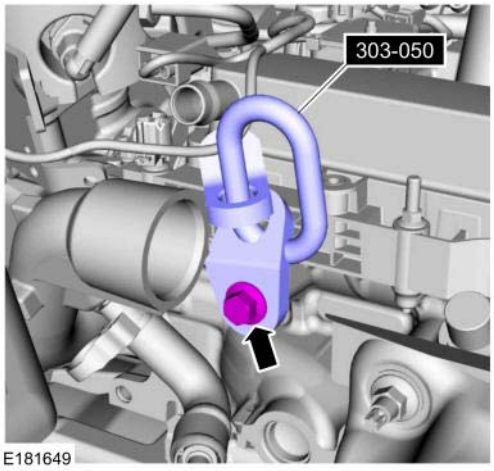


36.

Connect the battery ground. Refer to: Battery Disconnect and Connect .

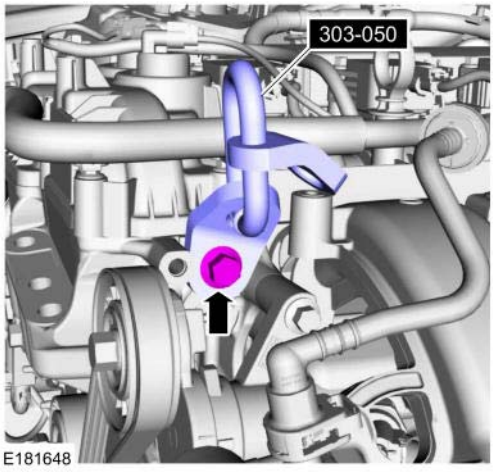
37.

Remove Special Service Tool: 303-050 (T70P-6000) Lifting Bracket, Engine.



38.

Remove Special Service Tool: 303-050 (T70P-6000) Lifting Bracket, Engine.

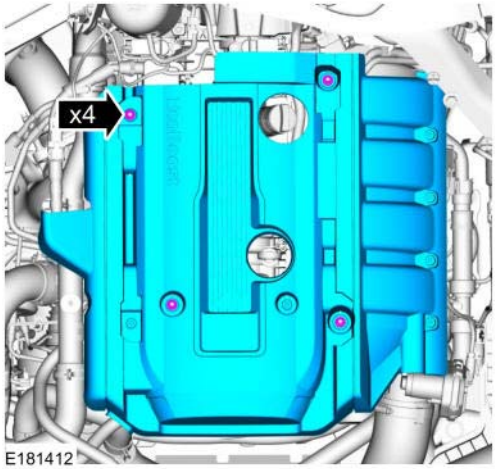


39.

Install the engine appearance cover and the nuts.

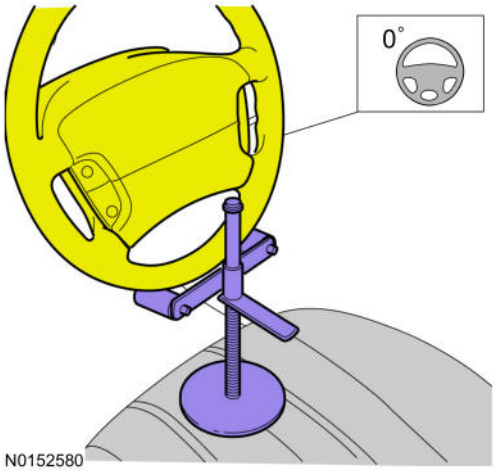
Torque

: 80 lb.in (9 Nm)



40.

Remove the holding device.



41.

1.

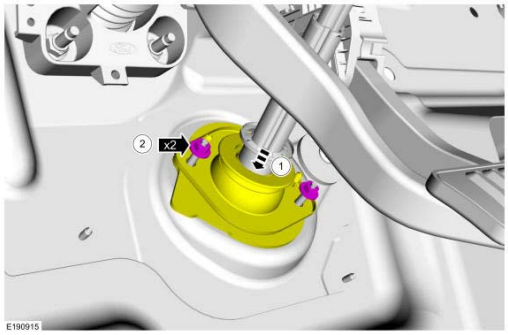
Position the steering column dash seal.

2.

Tighten the steering column dash seal nuts.

Torque

: 80 lb.in (9 Nm)

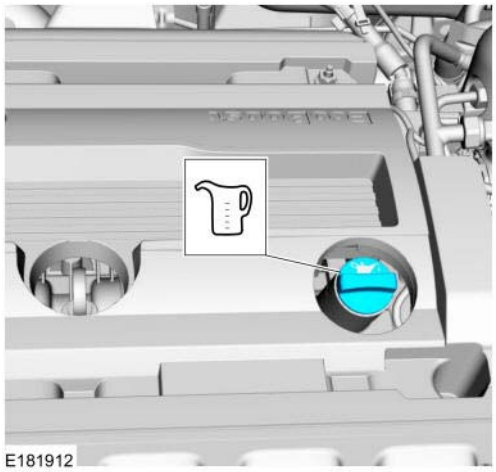


42.

Fill the engine with clean engine oil. Refer to: Specifications .

Material

: Motorcraft® SAE 5W-30 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W30-QSP (U.S.) (WSS-M2C946-A)



REMOVAL AND INSTALLATION > OIL PRESSURE SWITCH > REMOVAL

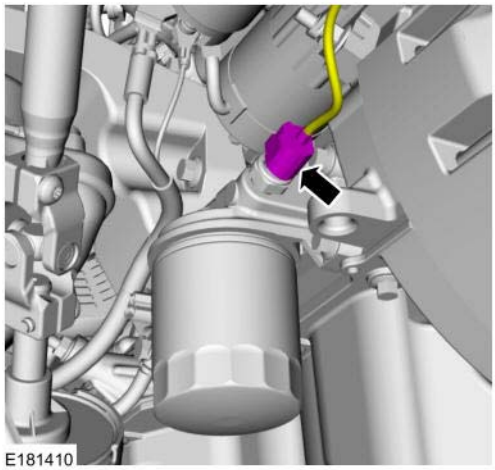
NOTE: Removal steps in this procedure may contain installation details.

1.

With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

2.

Disconnect the oil pressure switch electrical connector.

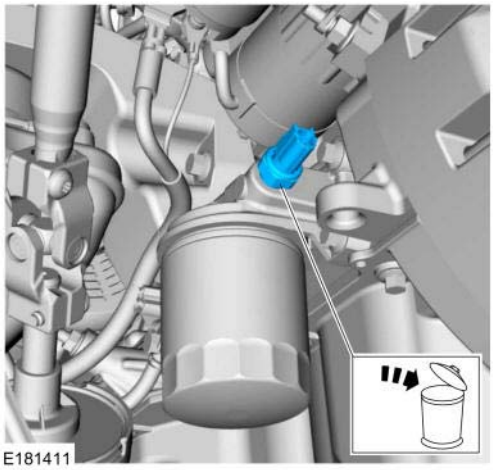


3.

Remove and discard the oil pressure switch.

Torque

: 133 lb.in (15 Nm)



REMOVAL AND INSTALLATION > OIL PRESSURE SWITCH > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > OIL PUMP

Special Tool(s) / General Equipment

	303-050 (T70P-6000) Lifting Bracket, Engine
	303-F072 Support Bar, Engine
Plastic Scraper	
Oil Drain Equipment	
Vehicle/Axle Stands	
Round-Ended Steel Rule	

Materials

Name	Specification
Motorcraft® SAE 5W-30 Premium Synthetic Blend Motor Oil (U.S.) XO-5W30-QSP (U.S.)	WSS-M2C946-A
Motorcraft® Silicone Gasket Remover ZC-30-A	-
Motorcraft® Metal Surface Prep ZC-31-B	-
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4
Metal Brake Parts Cleaner (U.S.) PM-4-A, PM-4-B (U.S.)	-

REMOVAL AND INSTALLATION > OIL PUMP > REMOVAL

6-Speed Automatic Transmission - 6R80/6-Speed Manual Transmission - MT82

1.

With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

> *NOTE: Make sure to minimize damage to sealer foam and avoid pulling apart dash seal brackets from retainer pins. Excessive damage may allow engine noise, fumes, air or water to enter the passenger compartment.*

2.

1.

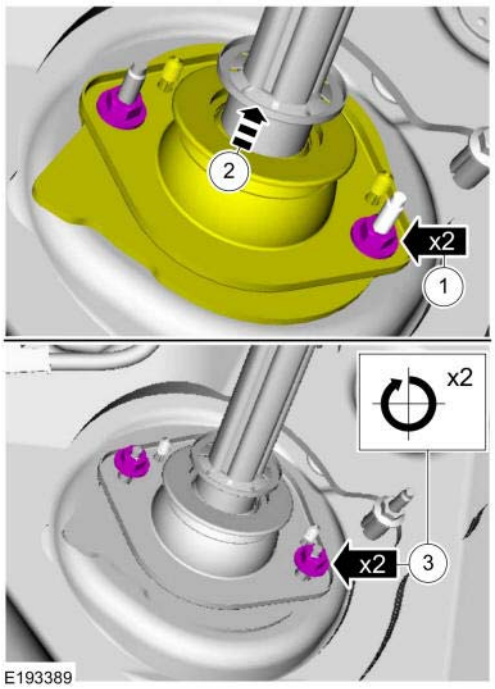
Remove the steering column dash seal nuts.

2.

Loosen the dash seal.

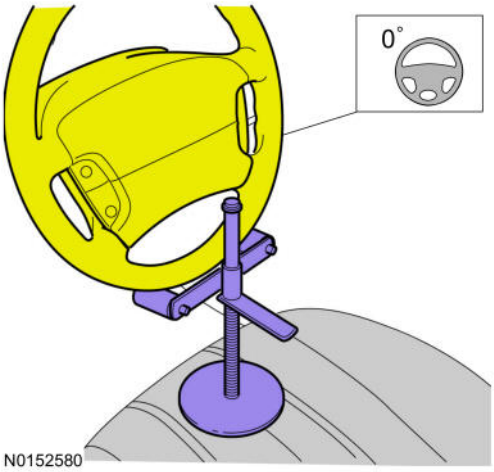
3.

Hand start the dash seal nuts.



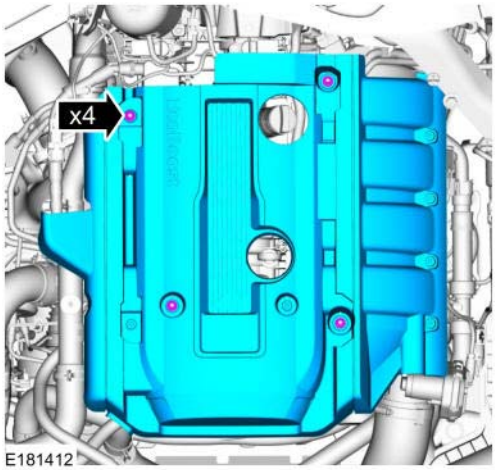
3.

Using a holding device, hold the steering wheel in the straight-ahead position.



4.

Remove the nuts and the engine appearance cover.



5.

Disconnect the battery ground. Refer to: Battery Disconnect and Connect .

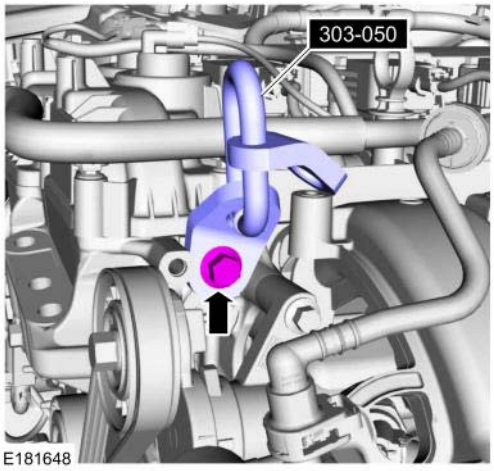
6.

Remove the engine front cover. Refer to: Engine Front Cover .

7.

Install the special tool on the LH side of the cylinder head.

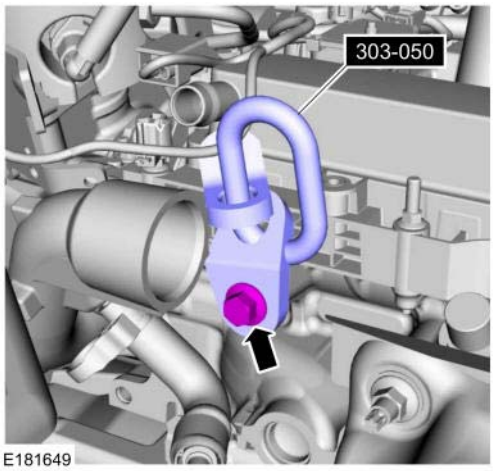
Use Special Service Tool: 303-050 (T70P-6000) Lifting Bracket, Engine.



NOTE: Coolant tube removed for clarity.

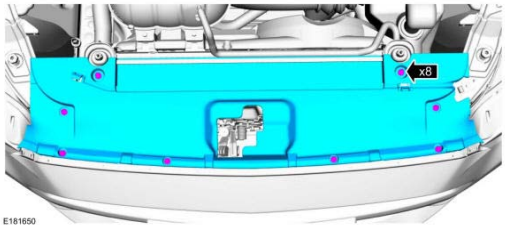
8.
Install the special tool on the RH side of the cylinder head.

Use Special Service Tool: 303-050 (T70P-6000) Lifting Bracket, Engine.



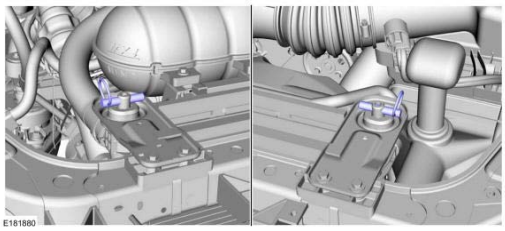
9.

Remove the retainers and the radiator top shield.



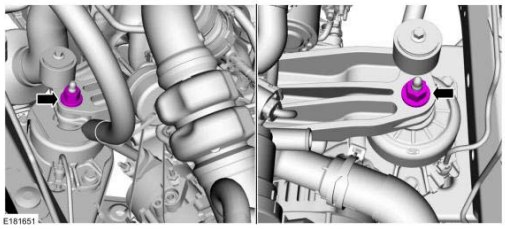
10.

Install retaining pins to support cooling module.



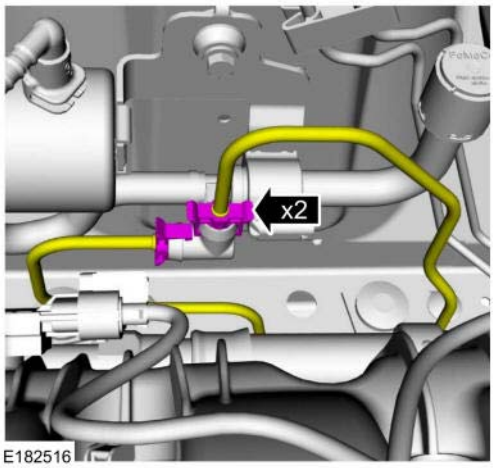
11.

Remove the RH and LH engine mount bracket nuts.



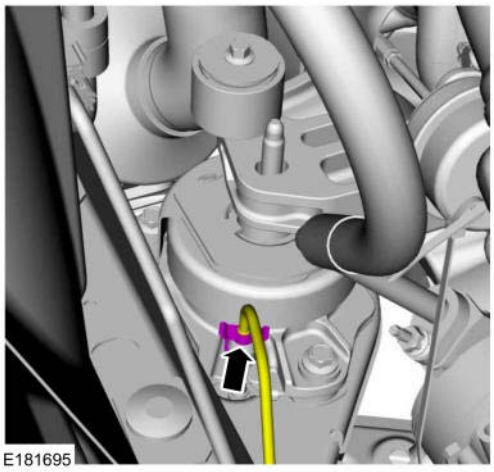
12.

Disconnect the vacuum tubes from the engine mount control vacuum reservoir.



13.

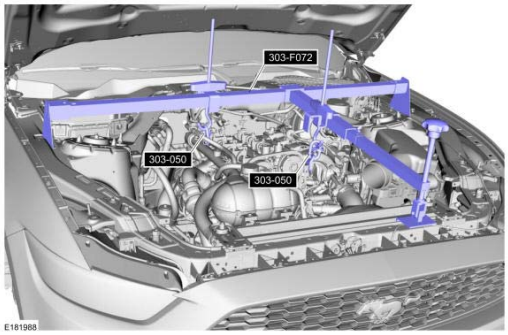
Disconnect the vacuum tube from the RH engine mount.



NOTE: Do not position the legs of the Engine Support Bar on the fenders. Instead, position the legs on the body structure near the suspension strut tower. Failure to follow these instructions may result in body damage.

14.
Install the special tool to support the engine.

Install Special Service Tool: 303-F072 Support Bar, Engine.

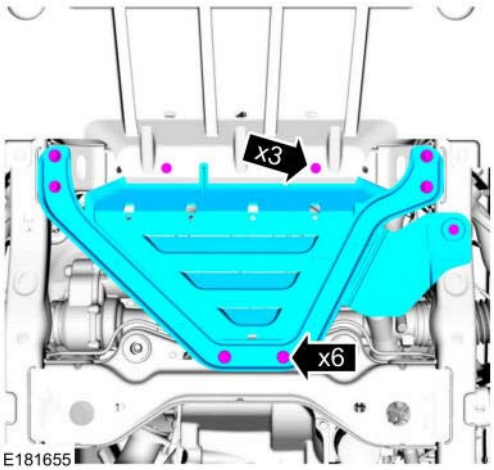


15.

Remove the front wheels and tires. Refer to: Wheel and Tire .

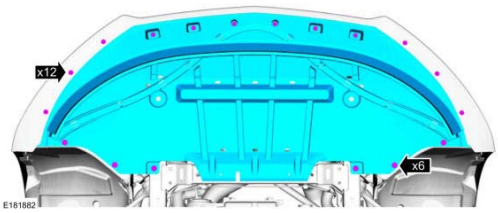
16.

Remove the screws, bolts and the underbody shield.



17.

Remove the pin-type retainers, bolts and the underbody shield.



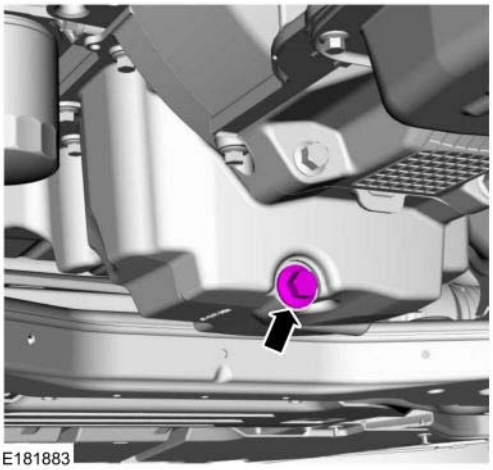
18.

Drain engine oil and install drain plug.

Use the General Equipment: Oil Drain Equipment

Torque

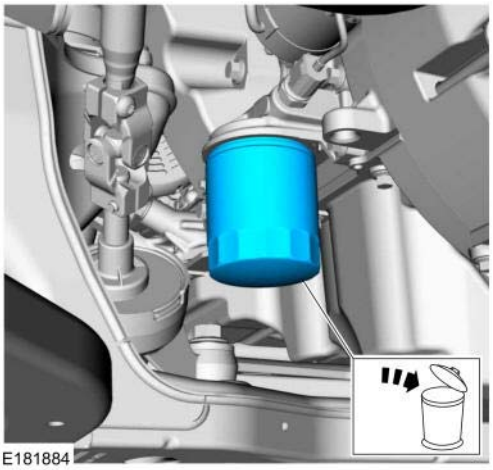
: 20 lb.ft (27 Nm)



19.

Remove and discard the engine oil filter.

Use the General Equipment: Oil Drain Equipment



20.

WARNING: Do not reuse steering column shaft bolts. This may result in fastener failure and steering column shaft detachment or loss of steering control. Failure to follow this instruction may result in serious injury to vehicle occupant(s).

WARNING: DO NOT hammer, pry or force steering column and column shafts during installation or removal. Failure to follow this instruction may cause damage to steering components that could lead to loss of steering control during vehicle operation and could result in serious personal injury or death.

WARNING: DO NOT attempt to remove or install the steering column lower u-joint at the steering gear without first loosening the steering column dash seal and fasteners. Failure to follow this instruction may cause damage to steering components that could lead to loss of steering control during vehicle operation and could result in serious personal injury or death.

Detach the steering column lower shaft from the lower coupling.

1.

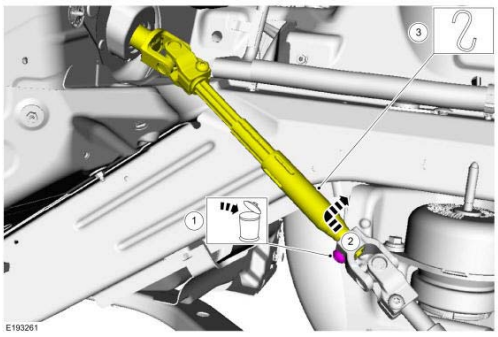
Remove and discard the steering column shaft bolt.

2.

Pull apart the steering column shaft from the coupling.

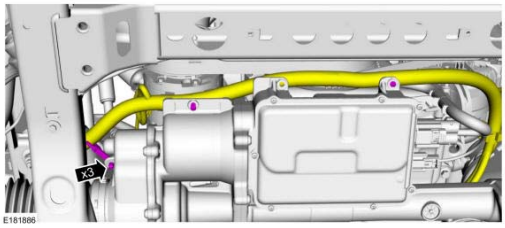
3.

Secure the lower shaft to the frame rail to avoid damaging it during subframe removal.



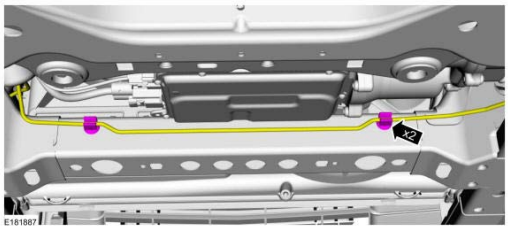
21.

Detach the EPAS wiring harness pin-type retainers.



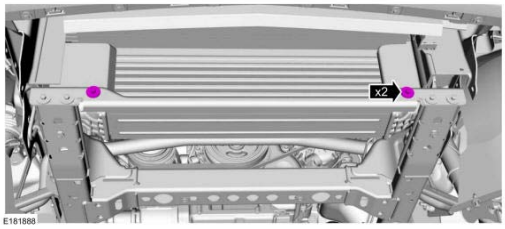
22.

Detach the brake line retainers from the subframe.



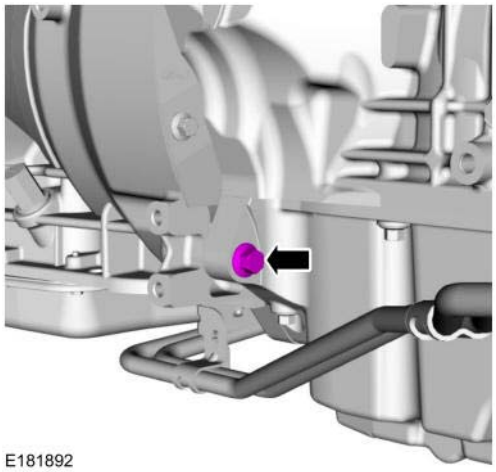
23.

Remove the bolts from the support bar.



24.

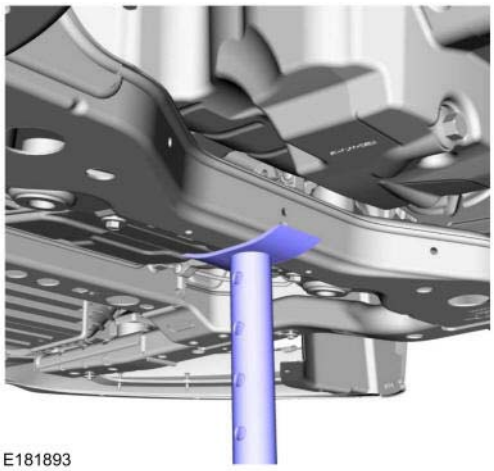
Remove the oil pan bolt.



25.

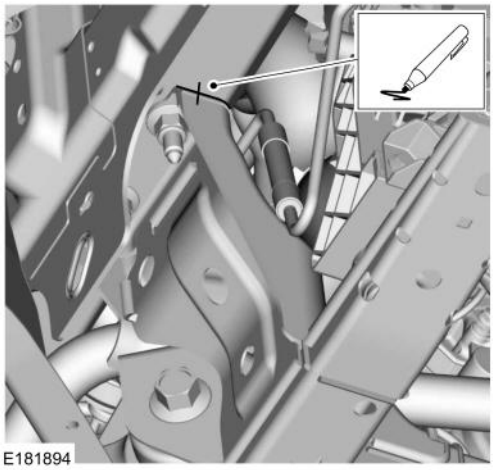
Using an adjustable stand, support the subframe.

Use the General Equipment: Vehicle/Axle Stands



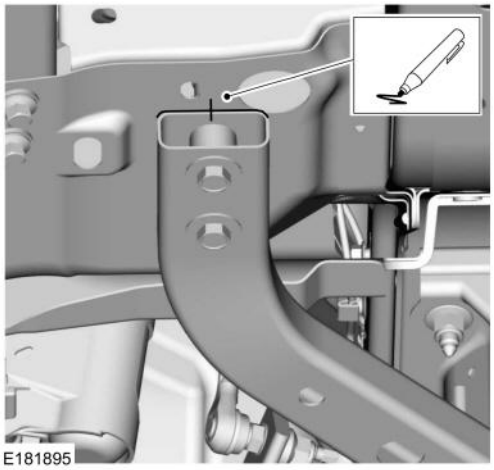
26.

Mark the position of the front subframe for reference during installation.



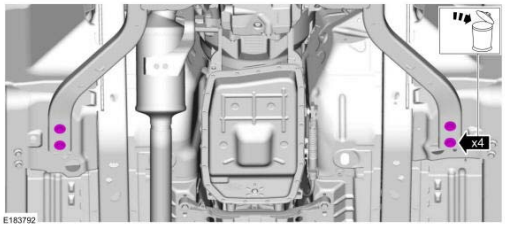
27.

Mark the position of the rear subframe for reference during installation.



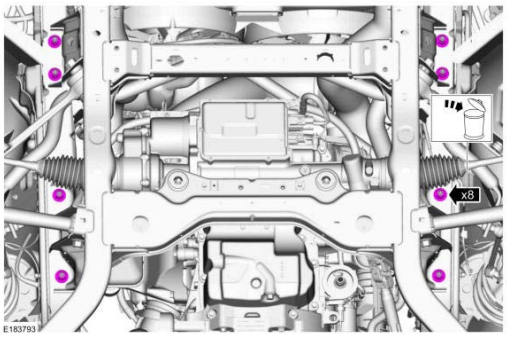
28.

Remove and discard the rear subframe bolts.



29.

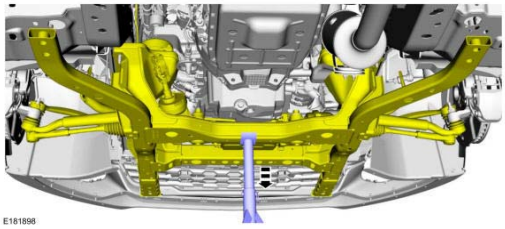
Remove and discard the front subframe nuts.



30.

Using an adjustable stand, lower the subframe 101.6 mm (4 in.).

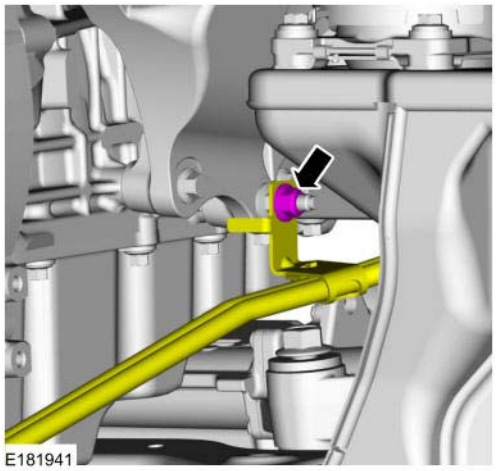
Use the General Equipment: Vehicle/Axle Stands



6-Speed Automatic Transmission - 6R80

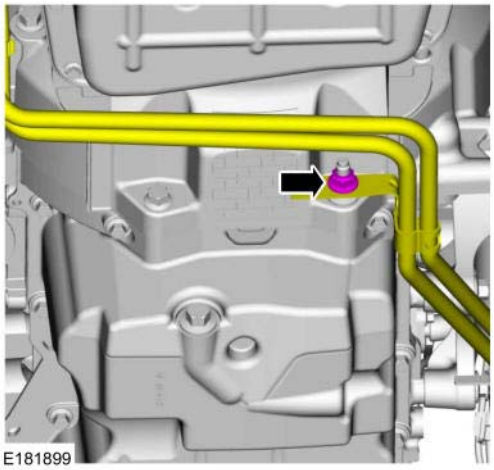
31.

Remove the nut from the RH engine mount bracket stud bolt for the transmission cooling tubes.



32.

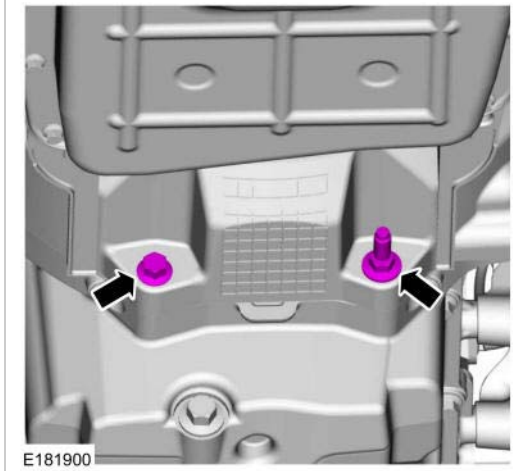
Remove the transmission cooling tube bracket nut and position aside.



6-Speed Automatic Transmission - 6R80/6-Speed Manual Transmission - MT82

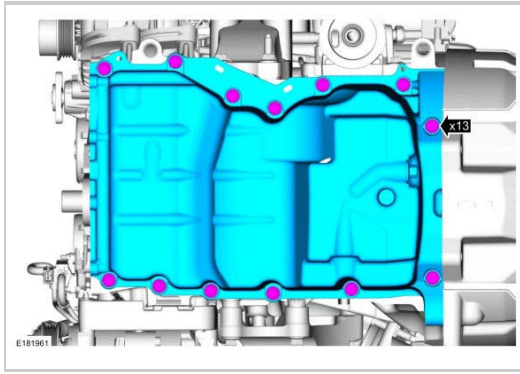
33.

Remove the oil pan bolts.



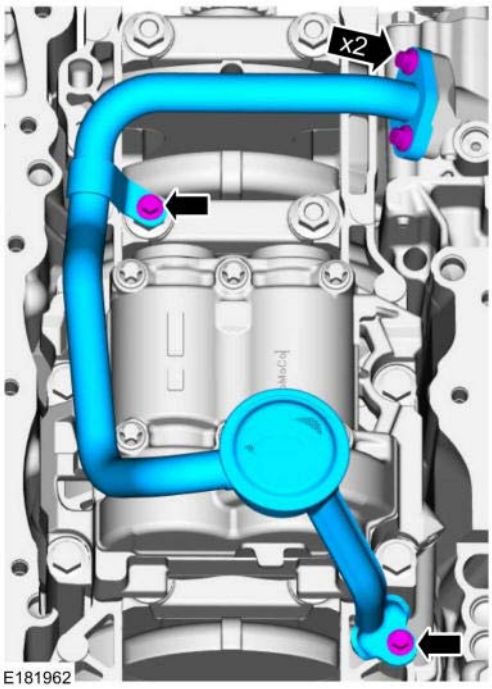
34.

Remove the bolts and the oil pan.



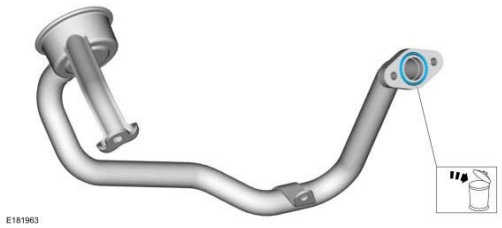
35.

Remove the bolts and the oil pump screen and pickup tube.



36.

Remove and discard the oil pump screen and pickup tube gasket.



NOTE: Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges, which make leak paths. Use a plastic scraping tool to remove traces of sealant.

37.
Make sure that the mating faces are clean and free of foreign material. Refer to: RTV Sealing Surface Cleaning and Preparation .

Use the General Equipment: Plastic Scraper

Material

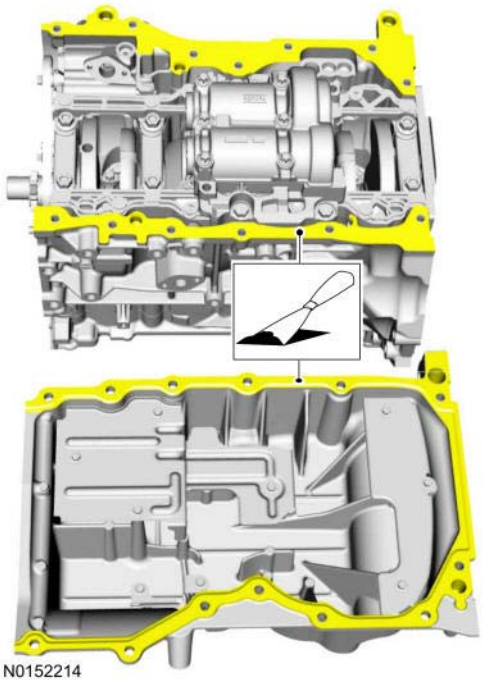
: Motorcraft® Silicone Gasket Remover / ZC-30-A

Material

: Metal Brake Parts Cleaner (U.S.) / PM-4-A, PM-4-B (U.S.)

Material

: Motorcraft® Metal Surface Prep / ZC-31-B



38.

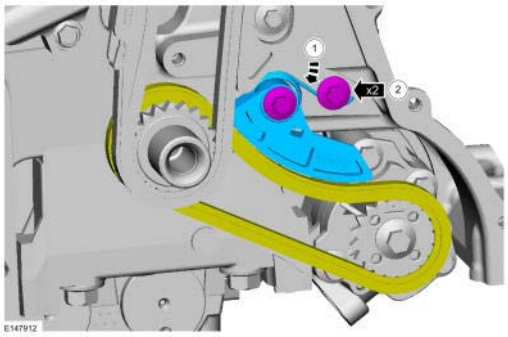
1.

WARNING: Take extra care when handling the compressed spring.

Release the tension on the tensioner spring.

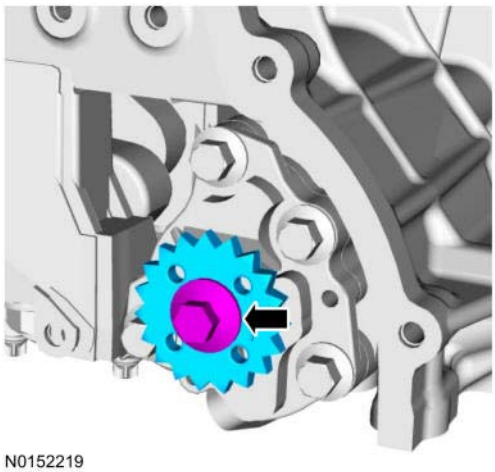
2.

Remove the shoulder bolts and the tensioner and position the chain aside.



39.

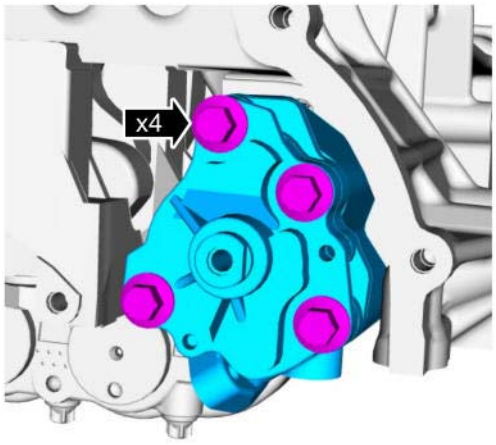
Remove the bolt and oil pump sprocket.



N0152219

40.

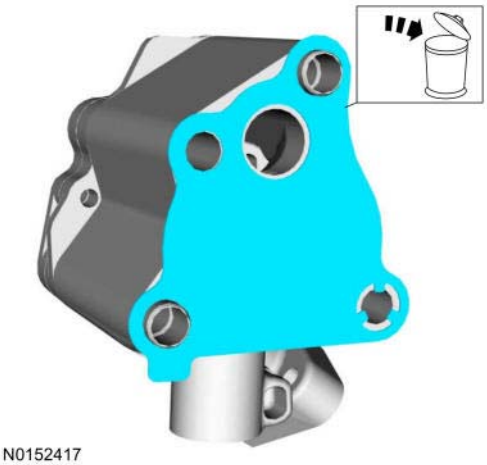
Remove the bolts and the oil pump.



N0152220

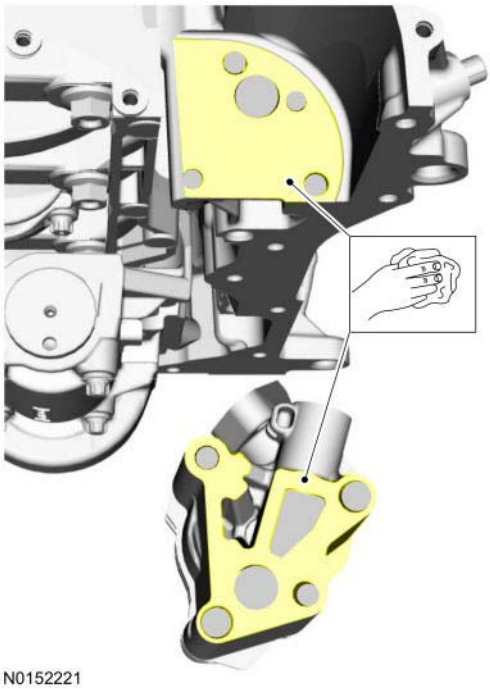
41.

Remove and discard the oil pump gasket.



42.

Clean the mating surfaces of the oil pump.

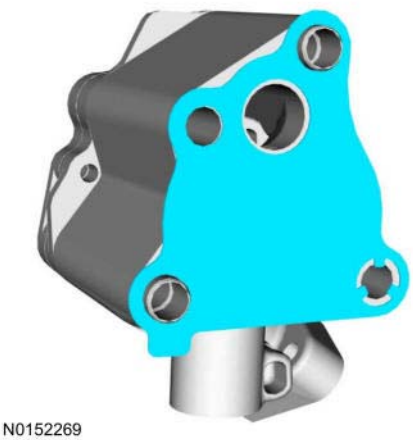


REMOVAL AND INSTALLATION > OIL PUMP > INSTALLATION

6-Speed Automatic Transmission - 6R80/6-Speed Manual Transmission - MT82

1.

Install the oil pump gasket.



N0152269

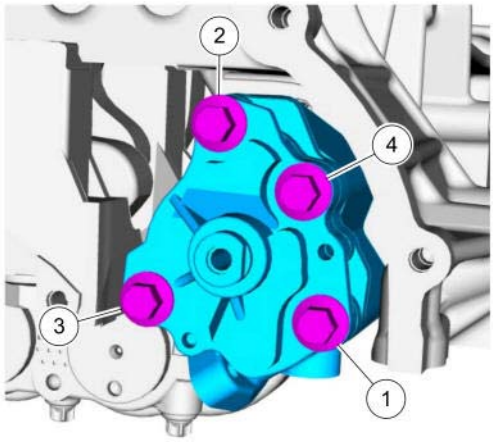
2.

Install the oil pump and the bolts.

Torque:

Stage 1: 89 lb.in (10 Nm)

Stage 2: 177 lb.in (20 Nm)



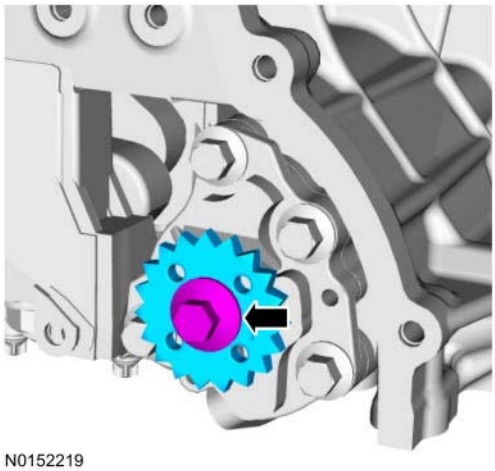
N0152268

3.

Install the oil pump sprocket and bolt.

Torque

: 18 lb.ft (25 Nm)



4.

1.

> *WARNING: Take extra care when handling the compressed spring.*

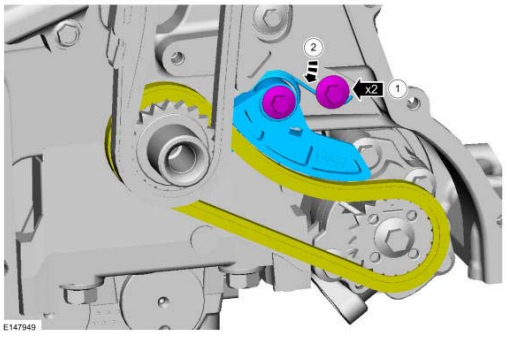
Install the oil pump drive chain, tensioner and the shoulder bolts.

Torque

: 89 lb.in (10 Nm)

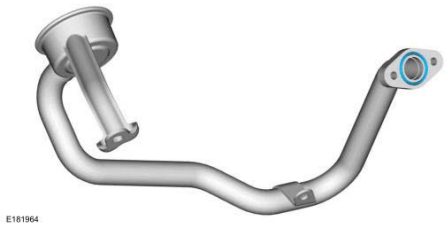
2.

Hook the tensioner spring around the shoulder bolt.



5.

Install the new oil pump screen and pickup tube gasket.

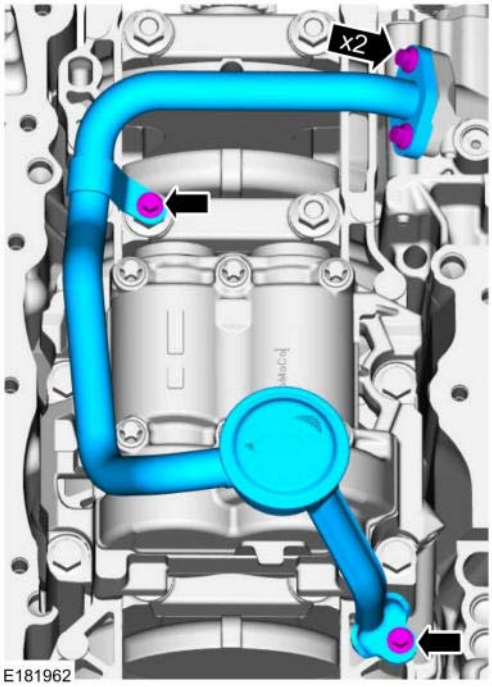


6.

Install the oil pump screen and pickup tube and the bolts.

Torque

: 89 lb.in (10 Nm)

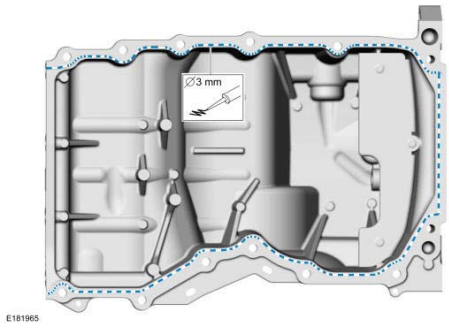


NOTE: If the oil pan is not secured within 10 minutes of sealant application, the sealant must be removed and the sealing area cleaned. Allow to dry until there is no sign of wetness, or 10 minutes, whichever is longer. Failure to follow this procedure can cause future oil leakage.

7.
Apply a 3 mm (0.19 in) bead of silicone sealant.

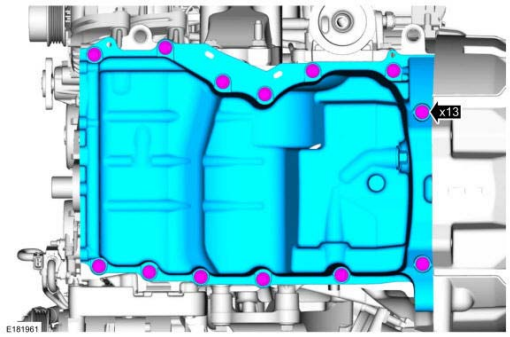
Material

: Silicone Gasket and Sealant / TA-30 (WSE-M4G323-A4)



8.

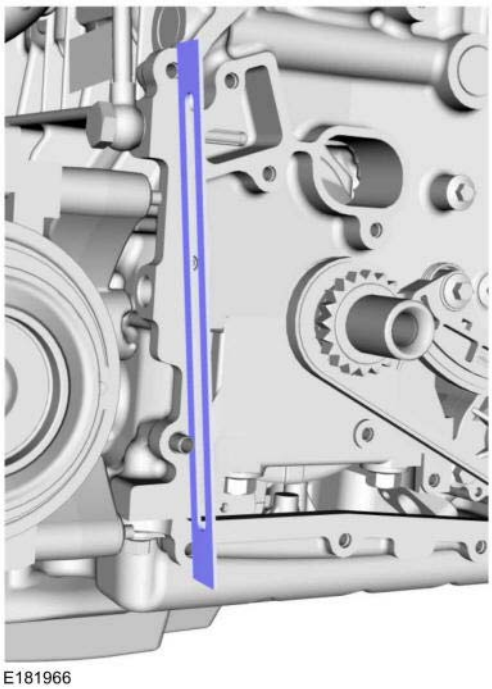
Install the oil pan and the bolts finger tight.



9.

Align the front surface of the oil pan flush with the front surface of the engine block.

Use the General Equipment: Round-Ended Steel Rule

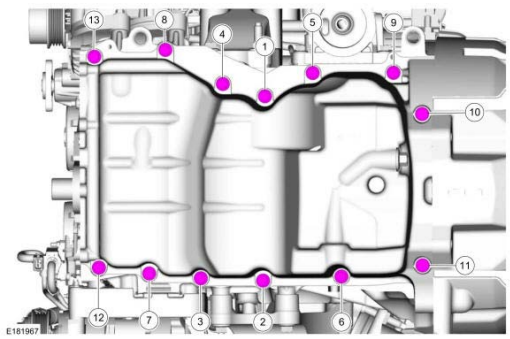


10.

Tighten the oil pan bolts.

Torque

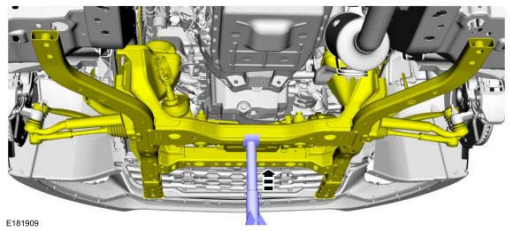
: 18 lb.ft (25 Nm)



11.

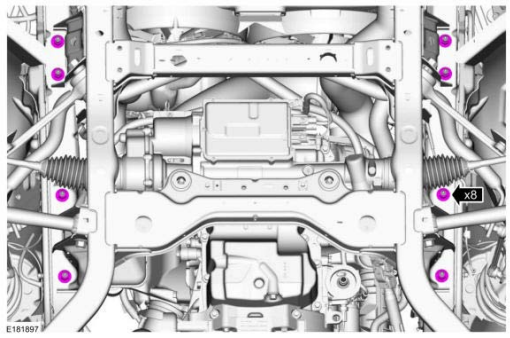
Using an adjustable stand, raise the subframe.

Use the General Equipment: Vehicle/Axle Stands



12.

Install the new front subframe nuts loosely.

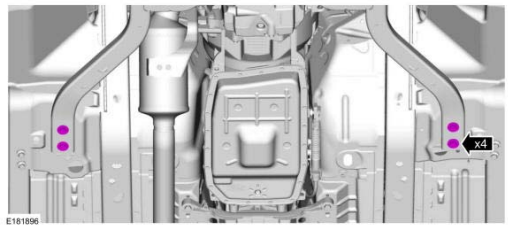


13.

Use a suitable alignment tool with a 15 mm (0.59 in) OD shaft that is long enough to go through the subframe and body.

Align the subframe to the alignment marks made during removal.

Install the new rear subframe bolts loosely.

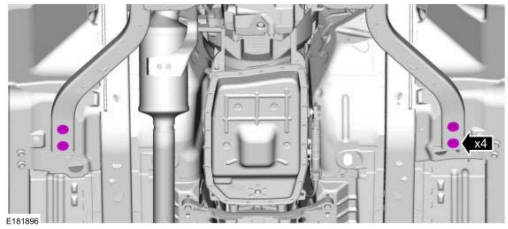


14.

Tighten the rear subframe bolts in a cross pattern.

Torque

: 85 lb.ft (115 Nm)

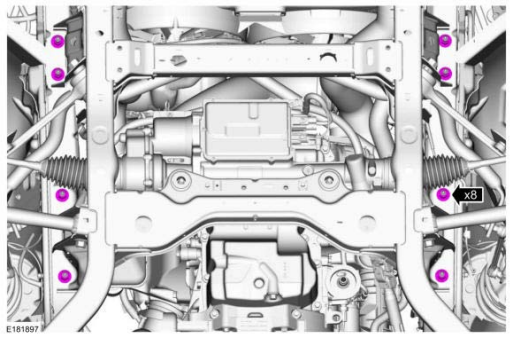


15.

Tighten the front subframe nuts in a cross pattern.

Torque

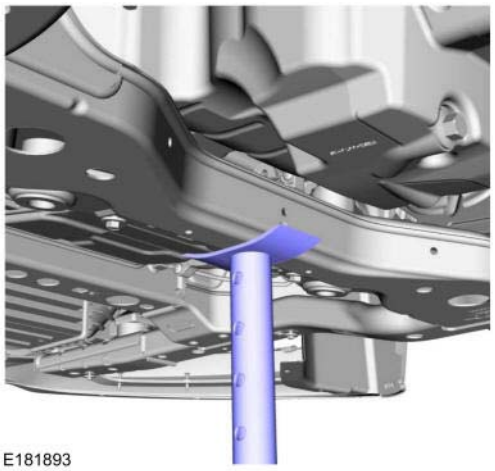
: 85 lb.ft (115 Nm)



16.

Remove the adjustable stand.

Use the General Equipment: Vehicle/Axle Stands

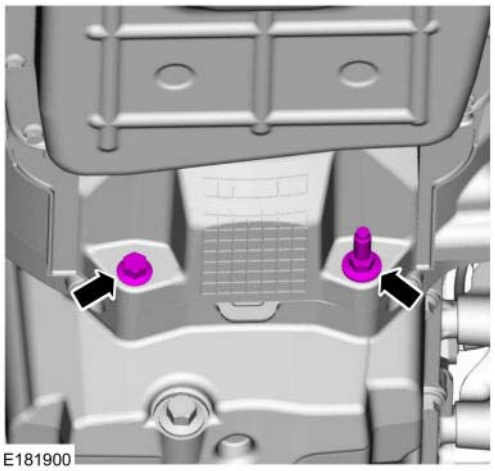


17.

Install the oil pan bolts.

Torque

: 35 lb.ft (48 Nm)



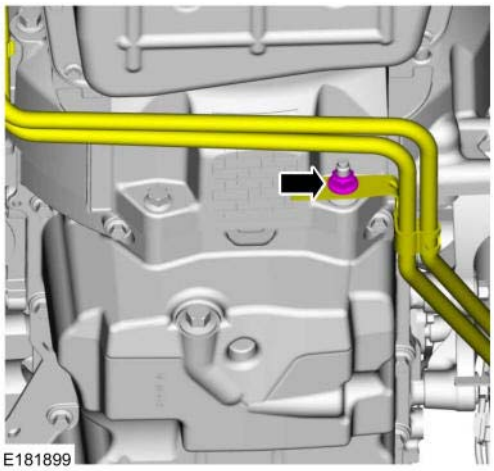
6-Speed Automatic Transmission - 6R80

18.

Position the transmission cooling tube bracket and install the nut.

Torque

: 124 lb.in (14 Nm)

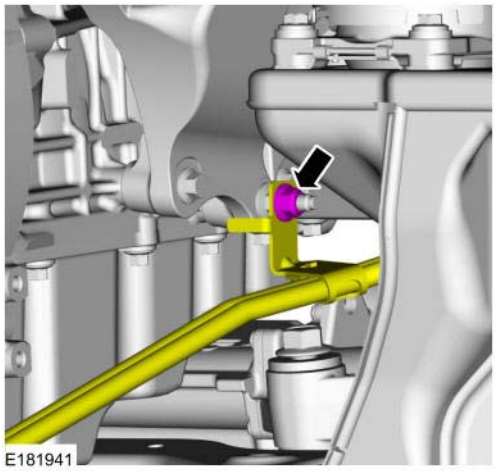


19.

Install the nut on the RH engine mount bracket stud bolt.

Torque

: 35 lb.ft (48 Nm)



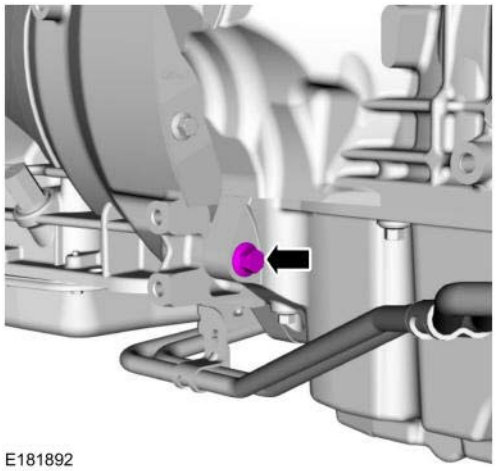
6-Speed Automatic Transmission - 6R80/6-Speed Manual Transmission - MT82

20.

Install the oil pan bolt.

Torque

: 35 lb.ft (48 Nm)

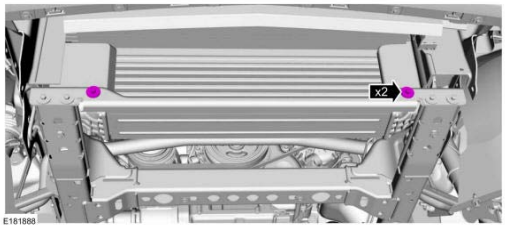


21.

Install the bolts in the support bar.

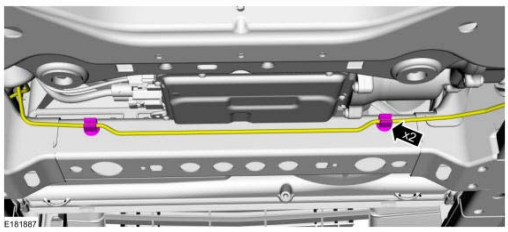
Torque

: 89 lb.in (10 Nm)



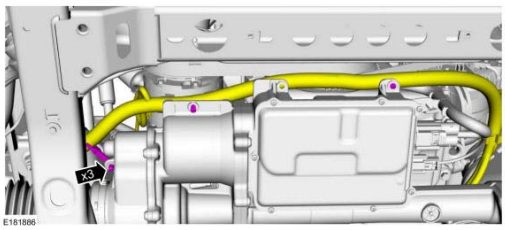
22.

Attach the brake line retainers to the subframe.



23.

Attach the EPAS wiring harness pin-type retainers.



24.

WARNING: DO NOT hammer, pry or force steering column and column shafts during installation or removal. Failure to follow this instruction may cause damage to steering components that could lead to loss of steering control during vehicle operation and could result in serious personal injury or death.

WARNING: DO NOT attempt to remove or install the steering column lower u-joint at the steering gear without first loosening the steering column dash seal and fasteners. Failure to follow this instruction may cause damage to steering components that could lead to loss of steering control during vehicle operation and could result in serious personal injury or death.

1.

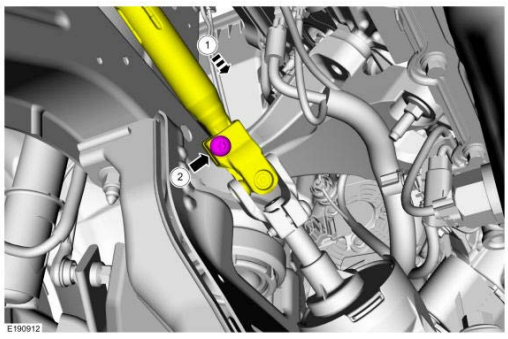
Connect the steering column shaft to the steering gear universal joint.

2.

Install the new steering column shaft bolt.

Torque

: 22 lb.ft (30 Nm)



25.

Inspect the steering column lower shaft. Refer to: Steering Column Collapsed Check .

NOTE: Lubricate the engine oil filter seal with clean engine oil.

26.
Install a new engine oil filter.

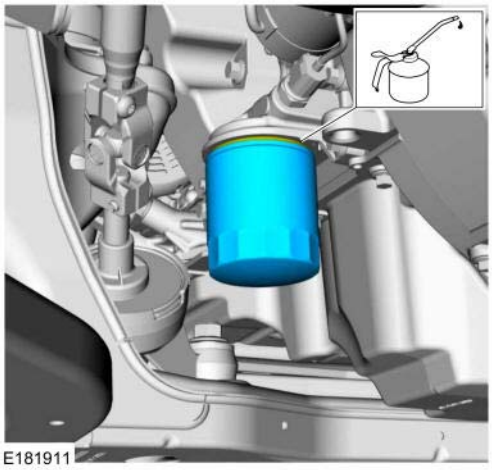
Material

: Motorcraft® SAE 5W-30 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W30-QSP (U.S.) (WSS-M2C946-A)

Torque

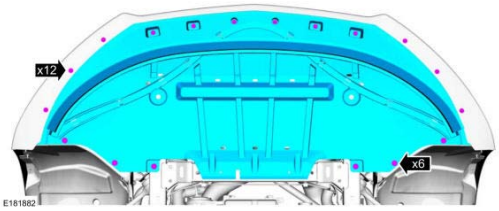
Stage 1: 71 lb.in (8 Nm)

Stage 2: 180°



27.

Install the underbody shield, bolts and the pin-type retainers.



28.

1.

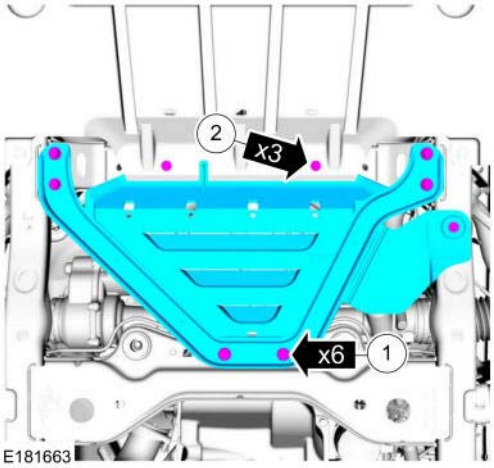
Install the underbody shield and the bolts.

Torque

: 46 lb.ft (63 Nm)

2.

Install the underbody shield screws.

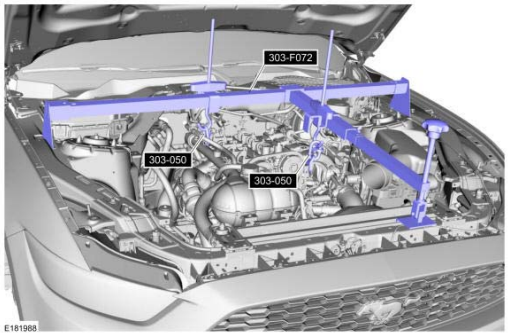


29.

Install the front wheels and tires. Refer to: Wheel and Tire .

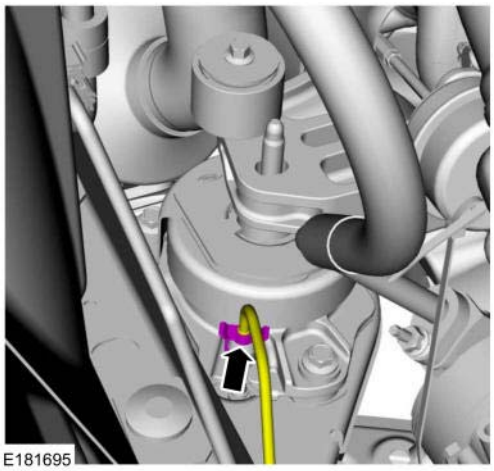
30.

Remove Special Service Tool: 303-F072 Support Bar, Engine.



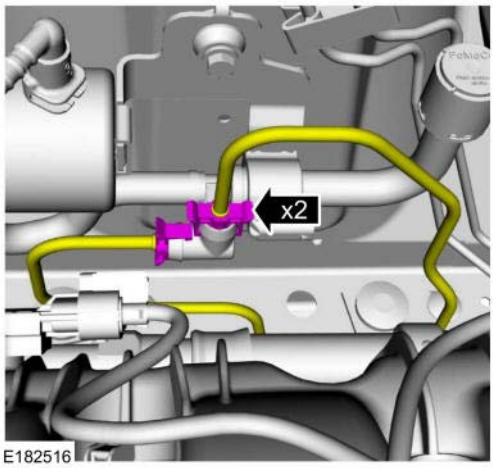
31.

Connect the vacuum tube to the RH engine mount.



32.

Connect the vacuum tubes to the engine mount control vacuum reservoir.

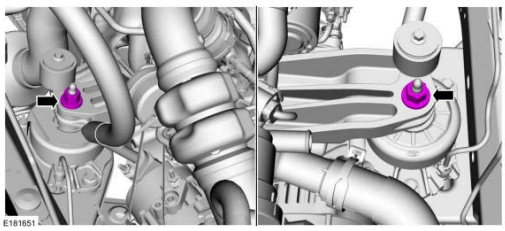


33.

Install the RH and LH engine mount bracket nuts.

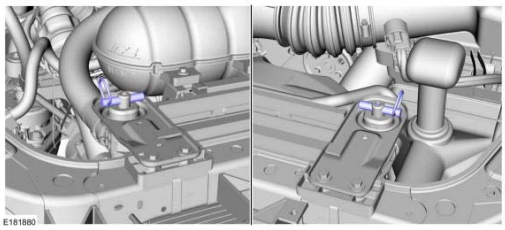
Torque

: 92 lb.ft (125 Nm)



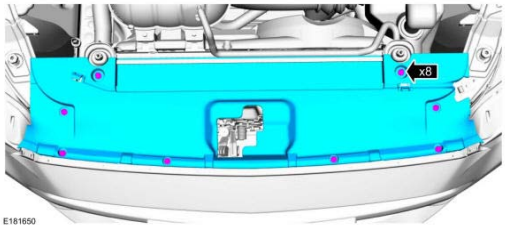
34.

Remove the retaining pins.



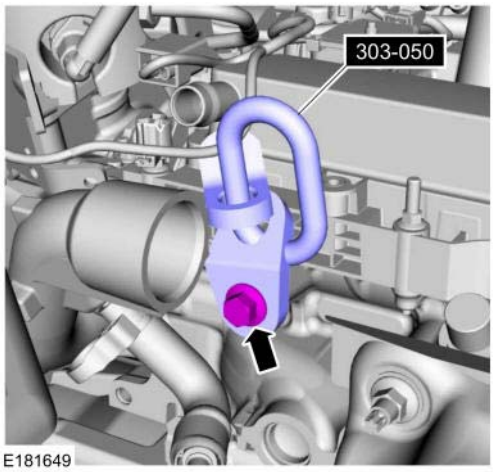
35.

Install the radiator top shield and the retainers.



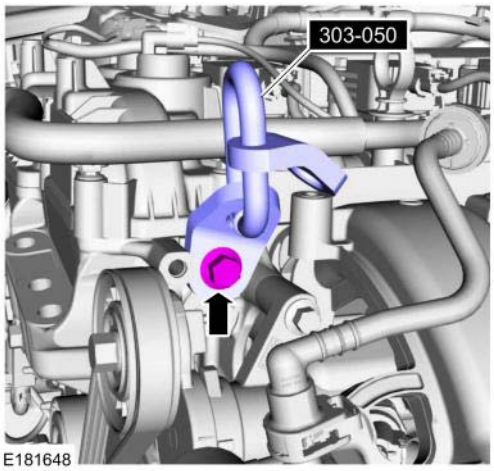
36.

Remove Special Service Tool: 303-050 (T70P-6000) Lifting Bracket, Engine.



37.

Remove Special Service Tool: 303-050 (T70P-6000) Lifting Bracket, Engine.



38.

Install the engine front cover. Refer to: Engine Front Cover .

39.

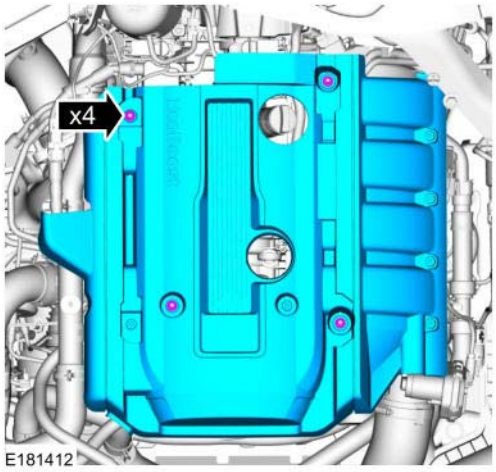
Connect the battery ground. Refer to: Battery Disconnect and Connect .

40.

Install the engine appearance cover and the nuts.

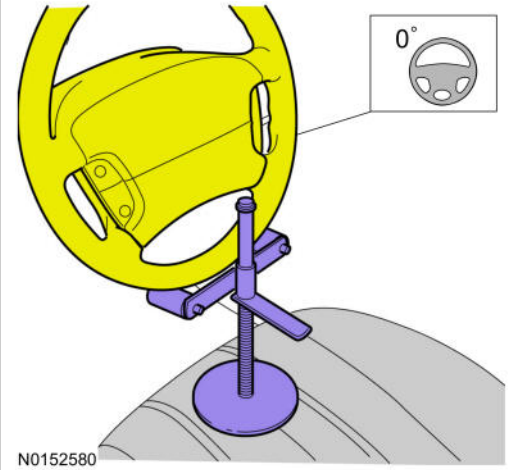
Torque

: 80 lb.in (9 Nm)



41.

Remove the holding device.



42.

1.

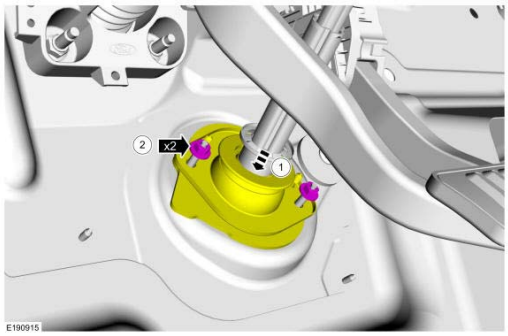
Position the steering column dash seal.

2.

Tighten the steering column dash seal nuts.

Torque

: 80 lb.in (9 Nm)

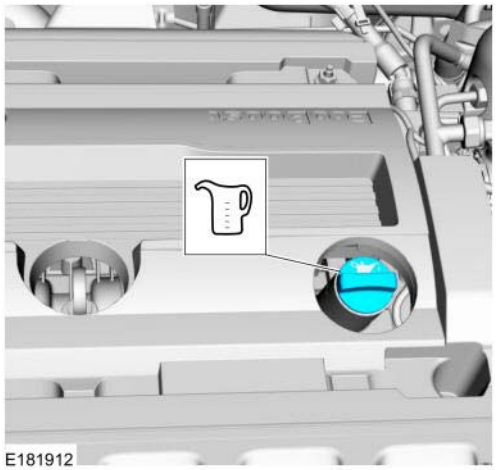


43.

Fill the engine with clean engine oil. Refer to: Specifications .

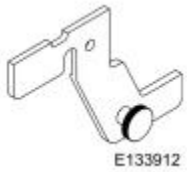
Material

: Motorcraft® SAE 5W-30 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W30-QSP (U.S.) (WSS-M2C946-A)



REMOVAL AND INSTALLATION > TIMING CHAIN

Special Tool(s) / General Equipment

 E133912	303-1565 Alignment Tool, Camshaft TKIT-2010C-FLM

REMOVAL AND INSTALLATION > TIMING CHAIN > REMOVAL

NOTE: Do not loosen or remove the crankshaft pulley bolt without first installing the special tools as instructed in this procedure. The crankshaft pulley and the crankshaft timing sprocket are not keyed to the crankshaft. The crankshaft, the crankshaft sprocket and the pulley are fitted together by friction, using diamond washers between the flange faces on each part. For that reason, the crankshaft sprocket is also unfastened if the pulley bolt is loosened. Before any repair requiring loosening or removal of the crankshaft pulley bolt, the crankshaft and camshafts must be locked in place by the special service tools, otherwise severe engine damage can occur.

NOTE: During engine repair procedures, cleanliness is extremely important. Any foreign material, including any material created while cleaning gasket surfaces, that enters the oil passages, coolant passages or the oil pan can cause engine failure.

1.

With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

2.

Remove the high-Pressure fuel pump drive unit. Refer to: HIGH-PRESSURE FUEL PUMP DRIVE UNIT - 2.3L EcoBoost (231kW/314PS).

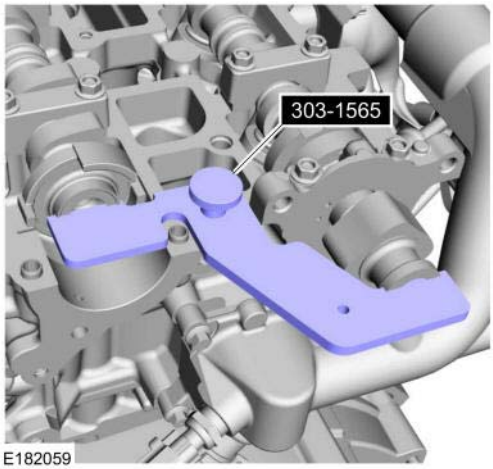
3.

Remove the engine front cover. Refer to: Engine Front Cover .

NOTE: The Camshaft Alignment Tool is for camshaft alignment only. Do not rely on the Camshaft Alignment Tool to prevent camshaft rotation. Damage to the tool or the camshaft can occur.

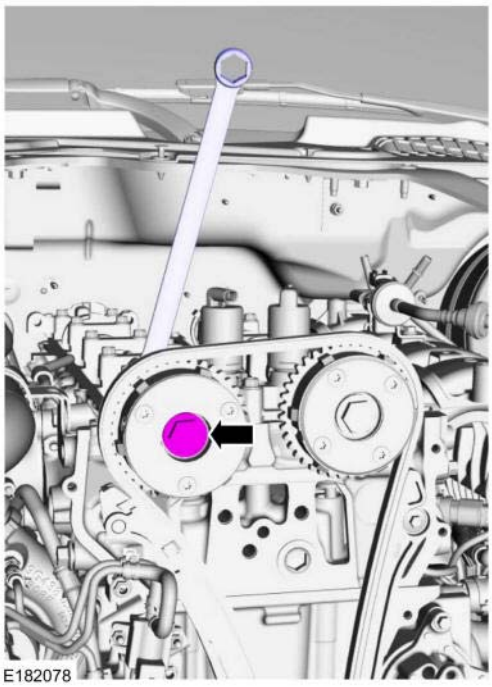
4.
Install the special tool into the slots on the back of the camshafts.

Install Special Service Tool: 303-1565 Alignment Tool, Camshaft.



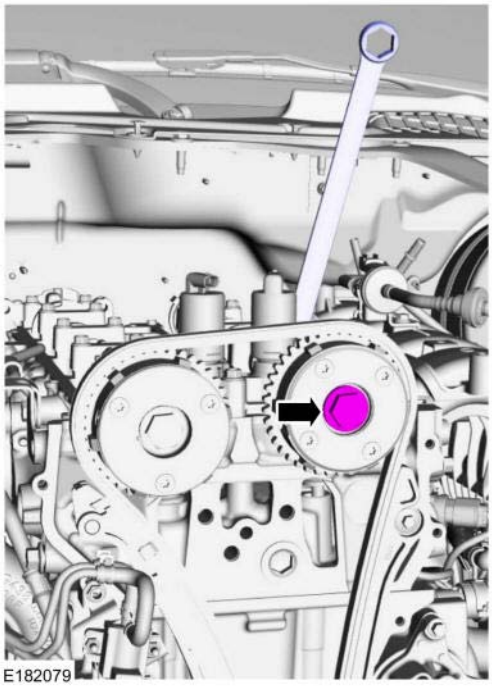
NOTE: Use an open-ended wrench to prevent the component from turning.

5.
Using an open-ended wrench, loosen the exhaust VCT unit bolt.



NOTE: Use an open-ended wrench to prevent the component from turning.

6.
Using an open-ended wrench, loosen the intake VCT unit bolt.



7.

1.

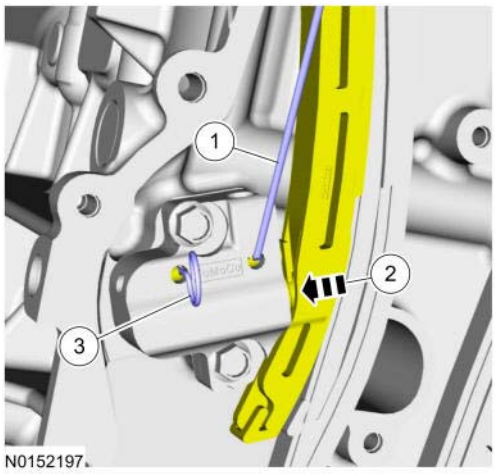
Using a small pick, release and hold the ratchet mechanism.

2.

While holding the ratchet mechanism in the released position, compress the tensioner by pushing the timing chain arm toward the tensioner.

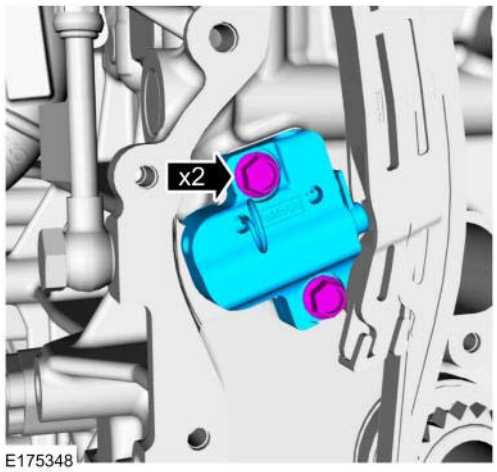
3.

Insert a holding pin into the hole to retain the tensioner.



8.

Remove the bolts and the timing chain tensioner.

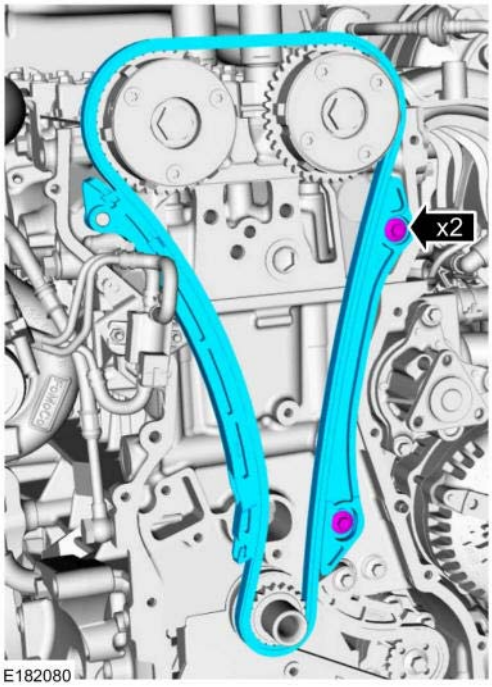


9.

Remove the timing chain tensioner arm.

Remove the timing chain.

Remove the bolts and the timing chain guide.



REMOVAL AND INSTALLATION > TIMING CHAIN > INSTALLATION

1.

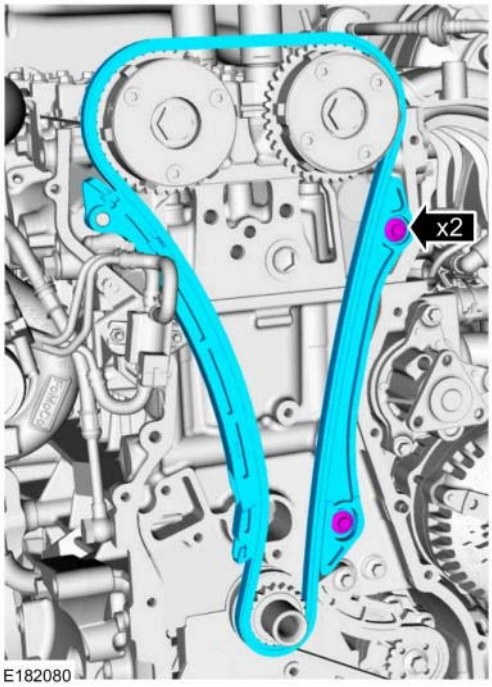
Install the timing chain guide and the bolts.

Torque

: 89 lb.in (10 Nm)

Install the timing chain.

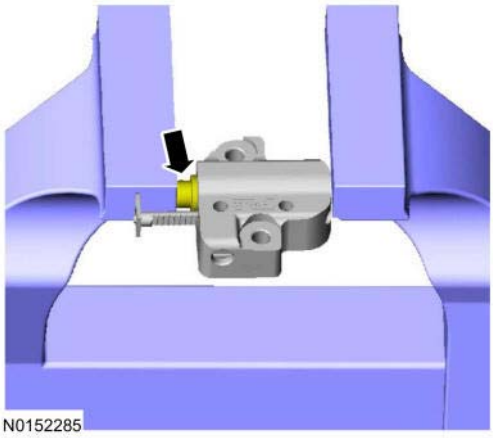
Install the timing chain tensioner arm.



NOTE: If the timing chain tensioner plunger and ratchet assembly are not pinned in the compressed position, follow the next 4 steps.

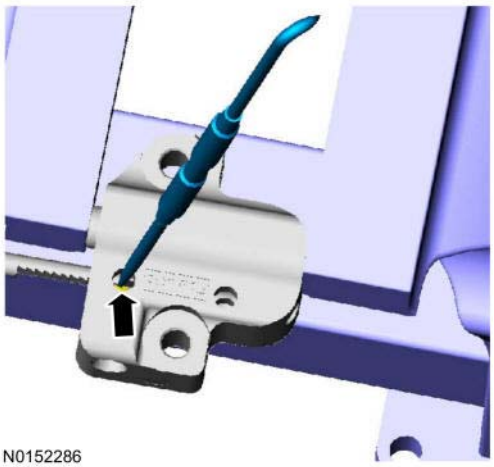
NOTE: Do not compress the ratchet assembly. This will damage the ratchet assembly.

2.
Using the edge of a vise, compress the timing chain tensioner plunger.



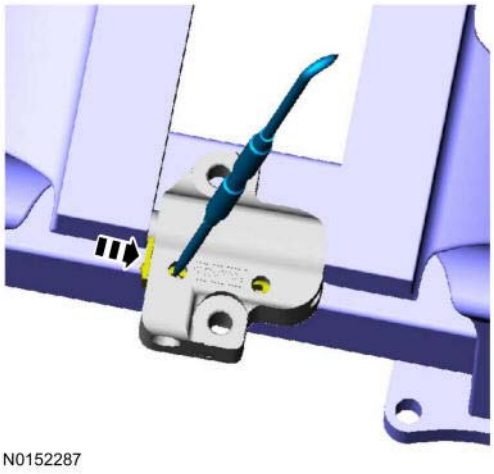
3.

Using a small pick, push back and hold the ratchet mechanism.



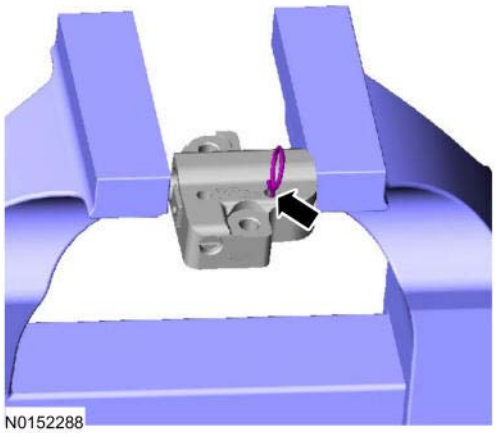
4.

While holding the ratchet mechanism, push the ratchet arm back into the tensioner housing.



5.

Install a holding pin into the hole in the tensioner housing to hold the ratchet assembly and the plunger in during installation.

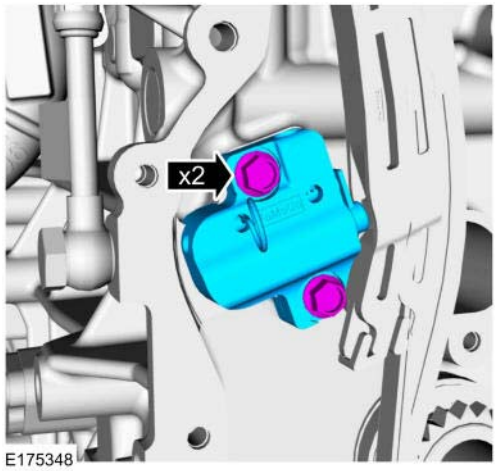


NOTE: Do not remove the holding pin until the tensioner bolts are tightened.

6.
Install the timing chain tensioner and the bolts.

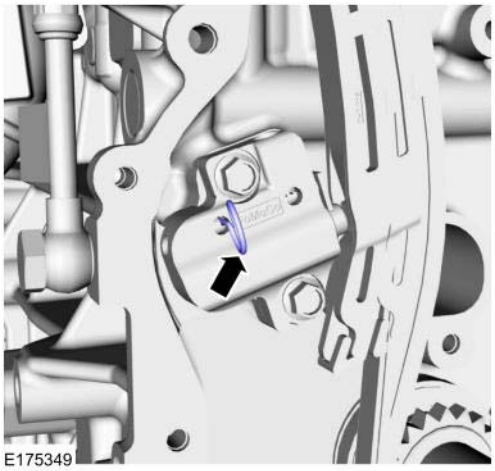
Torque

: 89 lb.in (10 Nm)



7.

Remove the holding pin.



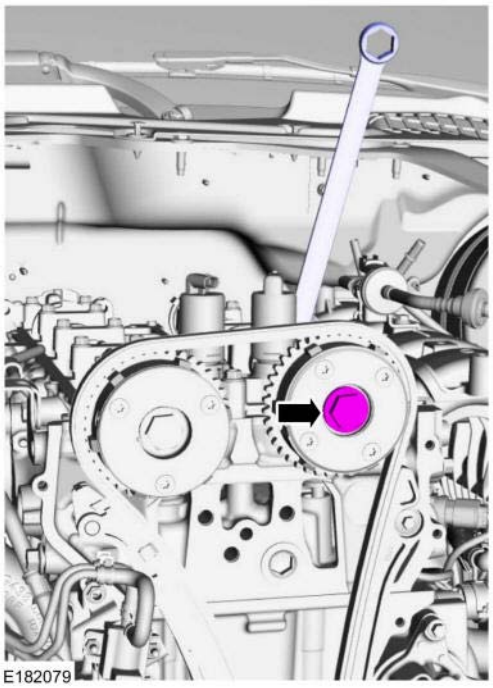
NOTE: Use an open-ended wrench to prevent the component from turning.

8.
Using an open-ended wrench, tighten the intake VCT unit bolt.

Torque:

Stage 1: 30 lb.ft (40 Nm)

Stage 2: 60°



NOTE: Use an open-ended wrench to prevent the component from turning.

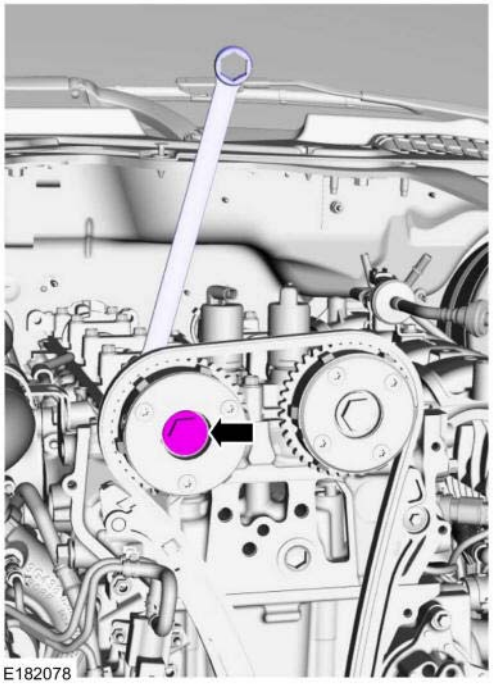
9.

Using an open-ended wrench, tighten the exhaust VCT unit bolt.

Torque:

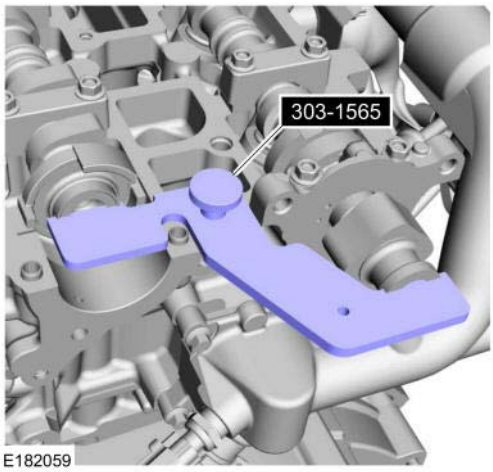
Stage 1: 30 lb.ft (40 Nm)

Stage 2: 60°



10.

Remove Special Service Tool: 303-1565 Alignment Tool, Camshaft.



11.

Install the engine front cover. Refer to: Engine Front Cover .

12.

Install the high-Pressure fuel pump drive unit. Refer to: HIGH-PRESSURE FUEL PUMP DRIVE UNIT - 2.3L EcoBoost (231kW/314PS).

REMOVAL AND INSTALLATION > VALVE COVER

Special Tool(s) / General Equipment

 E133913	205-153 (T80T-4000-W) Handle
 E175042	303-1247VCT Spark Plug Tube Seal Remover and Installer TKIT-2006UF-FLM TKIT-2006UF-ROW

Materials

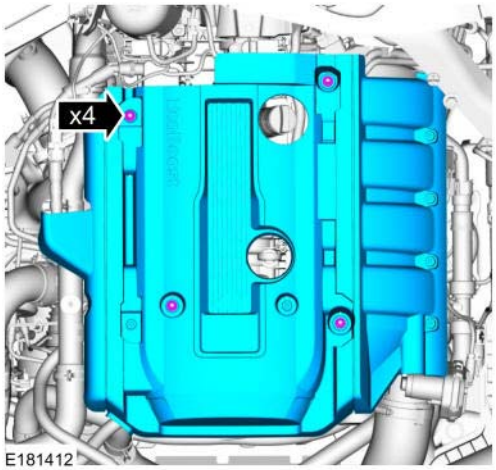
Name	Specification
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4

REMOVAL AND INSTALLATION > VALVE COVER > REMOVAL

NOTE: During engine repair procedures, cleanliness is extremely important. Any foreign material, including any material created while cleaning gasket surfaces, that enters the oil passages, coolant passages or the oil pan can cause engine failure.

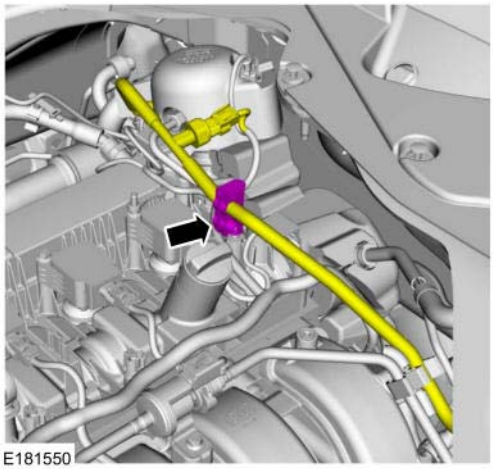
1.

Remove the nuts and the engine appearance cover.



2.

Detach the fuel supply tube retainer from the valve cover stud bolt.

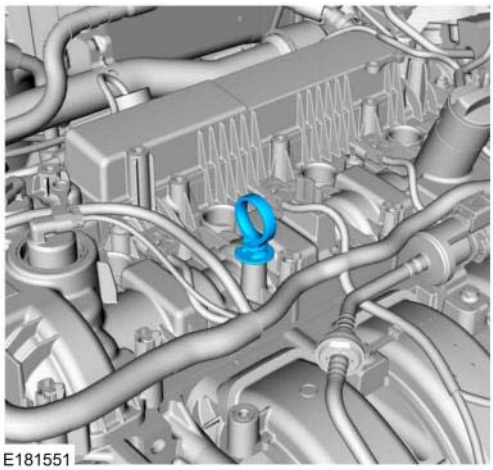


3.

Remove the ignition coil-on-plugs. Refer to: IGNITION COIL-ON-PLUG - 2.3L EcoBoost (231kW/314PS).

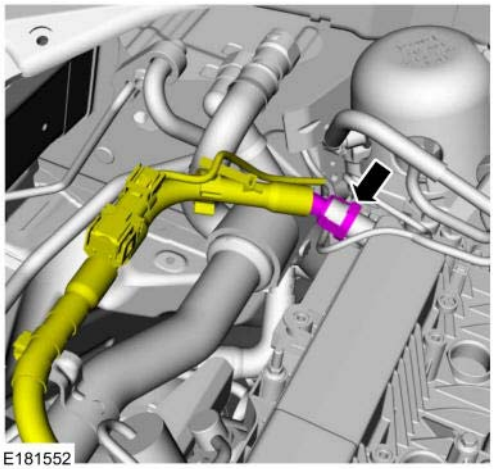
4.

Remove the oil level indicator.



5.

Disconnect the crankcase vent tube quick release connector from the valve cover.

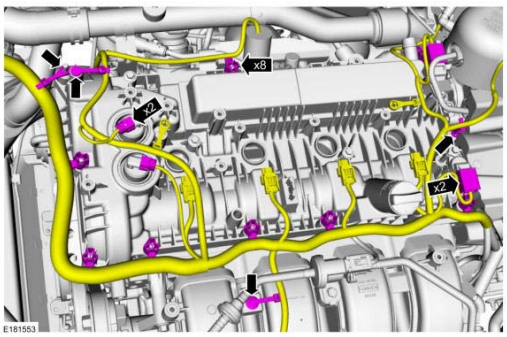


6.

Disconnect the VCT oil control solenoid electrical connectors.

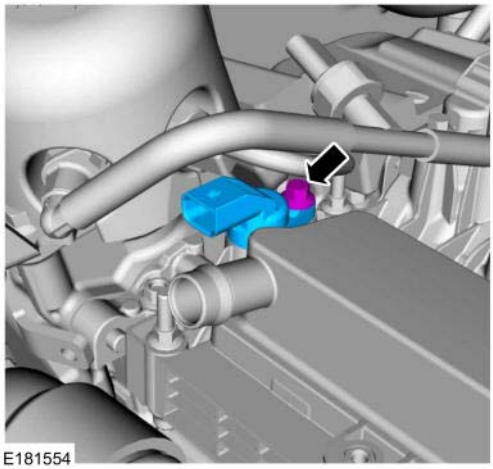
Disconnect the CMP sensor electrical connectors.

Detach the wiring harness retainers.



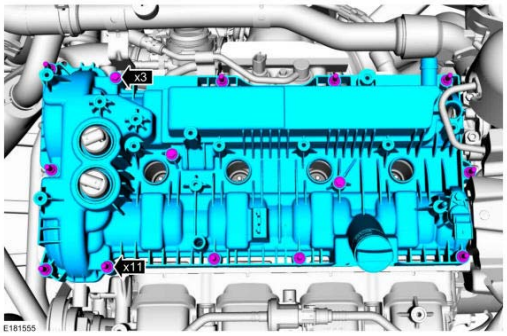
7.

Remove the bolt and the exhaust CMP sensor.



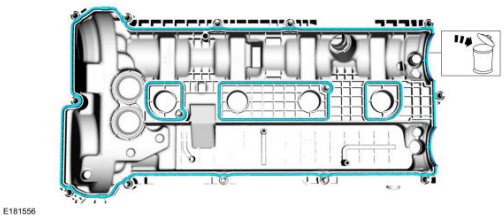
8.

Loosen the fasteners and remove the valve cover.



9.

Remove and discard the valve cover gasket.



10.

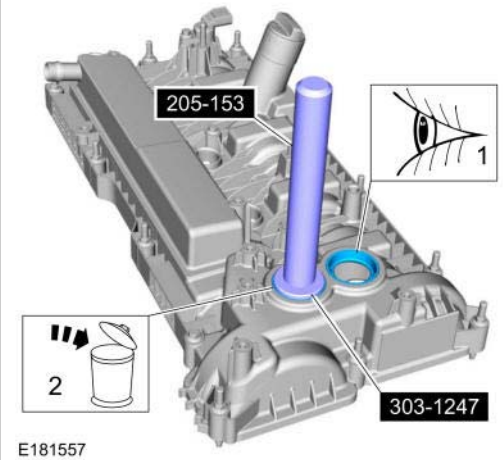
NOTE: The VCT oil control solenoid seals should only be replaced if they are damaged.

1.
Inspect the VCT oil control solenoid seals for damaged.

2.

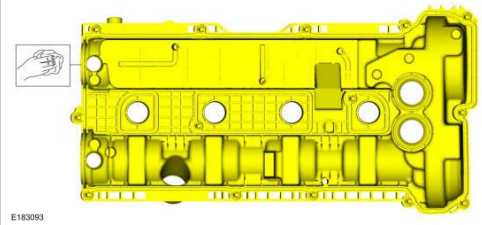
If damaged, using the special tools, remove the VCT oil control solenoid seals and discard.

Use Special Service Tool: 205-153 (T80T-4000-W) Handle, 303-1247 VCT Spark Plug Tube Seal Remover and Installer.



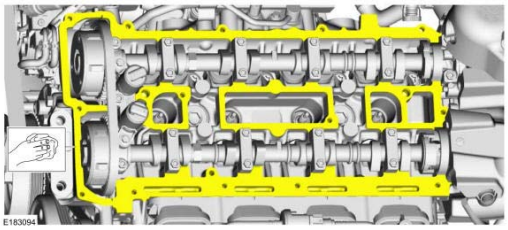
NOTE: Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges which make leak paths.

11.
Make sure that the mating faces are clean and free of foreign material.



NOTE: Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges which make leak paths.

12.
Make sure that the mating faces are clean and free of foreign material.

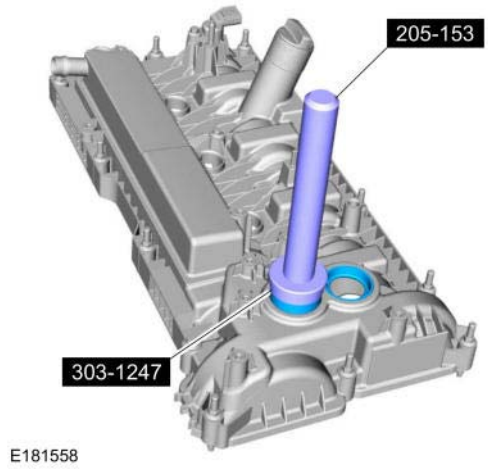


REMOVAL AND INSTALLATION > VALVE COVER > INSTALLATION

NOTE: Installation of new seals is only required if damaged seals were removed during valve cover removal.

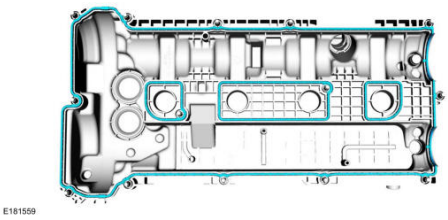
1.
If removed, using the special tools, install the VCT oil control solenoid seals.

Use Special Service Tool: 205-153 (T80T-4000-W) Handle, 303-1247 VCT Spark Plug Tube Seal Remover and Installer.



2.

Install a new valve cover gasket.

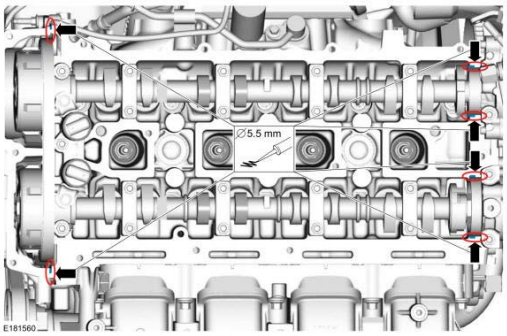


3.

Apply a 5.5 mm (0.22 in) bead of silicone sealant in the 6 places shown in illustration.

Material

: Silicone Gasket and Sealant / TA-30 (WSE-M4G323-A4)

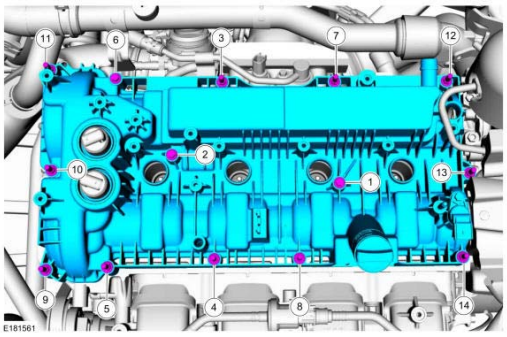


NOTE: The valve cover must be secured within 10 minutes of silicone gasket application. If the valve cover is not secured within 10 minutes, the sealant must be removed and the sealing area cleaned.

4.
Install the valve cover and tighten the fasteners.

Torque

: 89 lb.in (10 Nm)

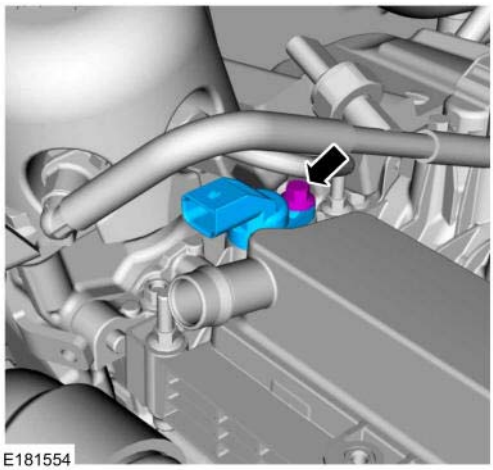


5.

Install the exhaust CMP senor and the bolt.

Torque

: 62 lb.in (7 Nm)

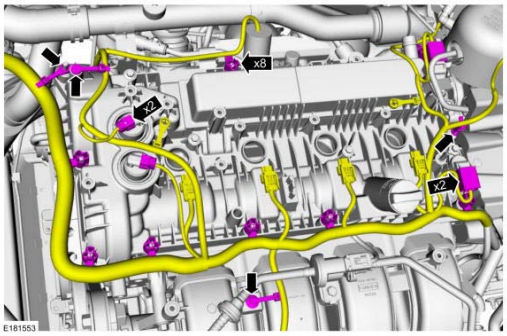


6.

Attach the wiring harness retainers.

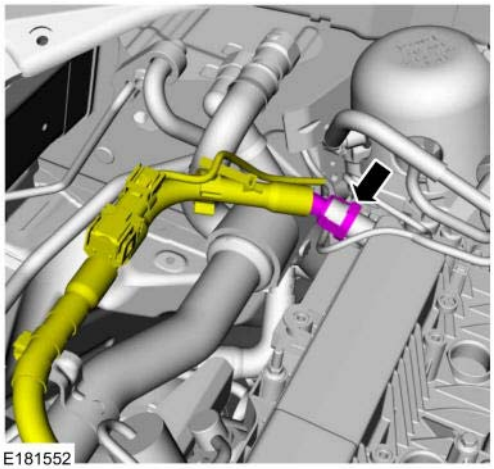
Connect the CMP sensor electrical connectors.

Connect the VCT oil control solenoid electrical connectors.



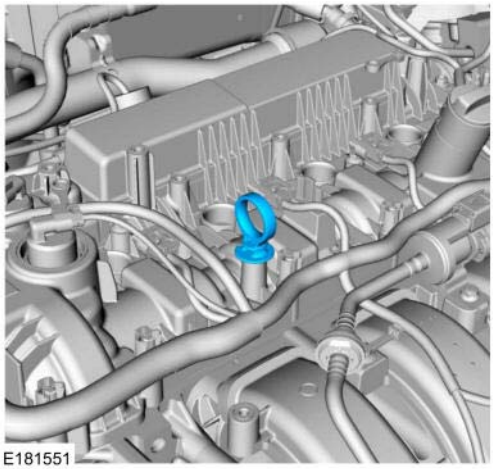
7.

Connect the crankcase vent tube quick release connector to the valve cover.



8.

Install the oil level indicator.

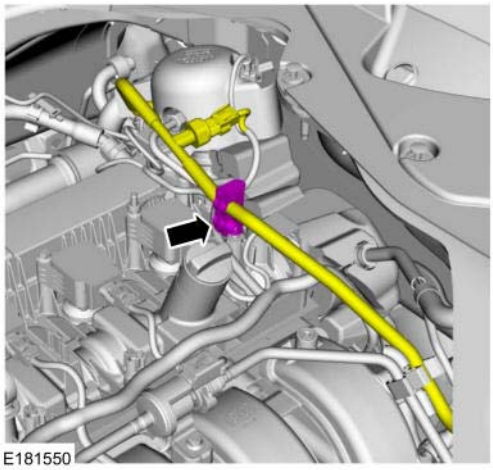


9.

Install the ignition coil-on-plugs. Refer to: IGNITION COIL-ON-PLUG - 2.3L EcoBoost (231kW/314PS).

10.

Attach the fuel supply tube retainer to the valve cover stud bolt.

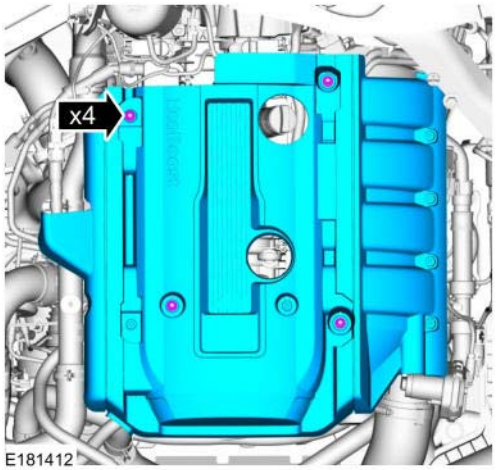


11.

Install the engine appearance cover and the nuts.

Torque

: 80 lb.in (9 Nm)



REMOVAL AND INSTALLATION > VARIABLE CAMSHAFT TIMING (VCT) UNIT > REMOVAL

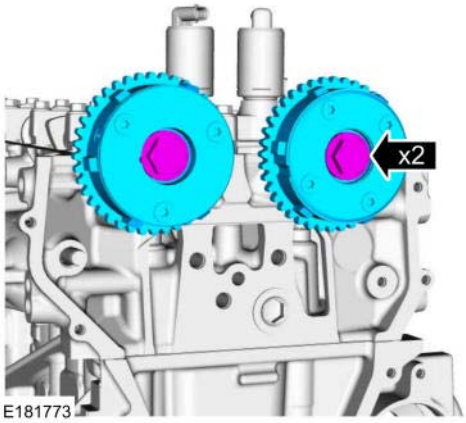
NOTE: During engine repair procedures, cleanliness is extremely important. Any foreign material, including any material created while cleaning gasket surfaces, that enters the oil passages, coolant passages or the oil pan can cause engine failure.

1.

Remove the timing chain. Refer to: Timing Chain .

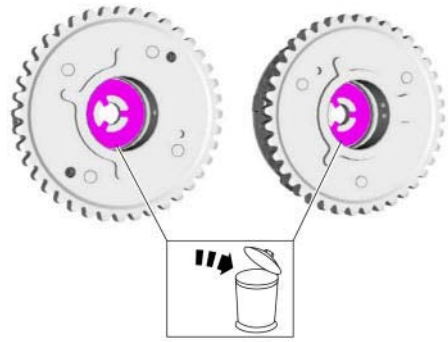
2.

Remove the bolts and the VCT units.



NOTE: Washers are not required for installation of the VCT units.

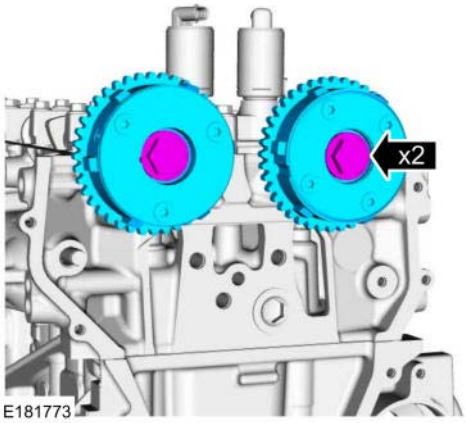
3.
If equipped, discard the washers.



REMOVAL AND INSTALLATION > VARIABLE CAMSHAFT TIMING (VCT) UNIT > INSTALLATION

NOTE: Do not tighten the bolts at this time. The bolts will be tightened during the timing chain installation procedure.

1.
Install the VCT units and the bolts.



2.

Install the timing chain. Refer to: Timing Chain .

REMOVAL > ENGINE

Special Tool(s) / General Equipment

 ST1341-A	300-OTC1819E 2, 200# Floor Crane, Fold Away
	303-050 (T70P-6000) Lifting Bracket, Engine
Magnetic Socket	
Oil Drain Equipment	
Trolley Jack	
Hose Clamp Remover/Installer	
Wooden Block	

6-Speed Automatic Transmission - 6R80/6-Speed Manual Transmission - MT82

1.

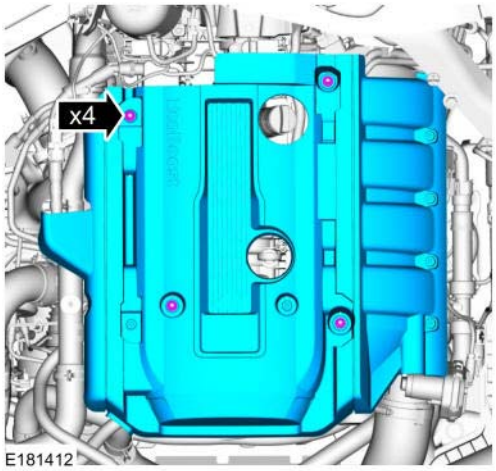
With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

2.

Release the fuel system pressure. Refer to: FUEL SYSTEM PRESSURE RELEASE - 2.3L EcoBoost (231kW/314PS).

3.

Remove the nuts and the engine appearance cover.



4.

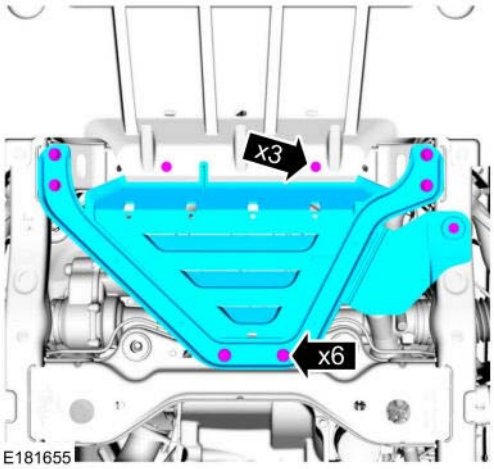
Disconnect the battery ground cable. Refer to: Battery Disconnect and Connect .

5.

Drain the cooling system. Refer to: COOLING SYSTEM DRAINING AND VACUUM FILLING .

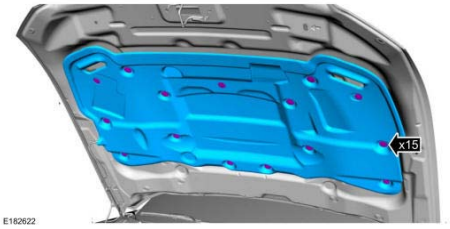
6.

Remove the screws, bolts and the underbody shield.



7.

Remove the pin-type retainers and the hood insulation.



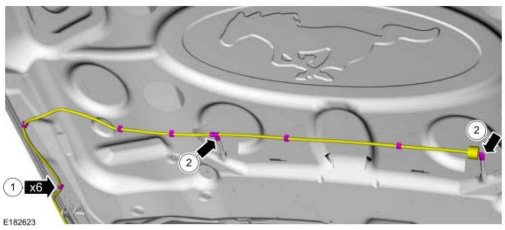
8.

1.

Detach the windshield washer hose retainers.

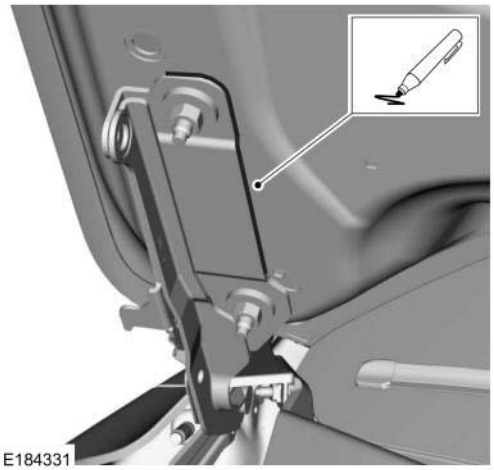
2.

Disconnect the windshield washer hose couplings. Refer to: Washer Hose Coupling .



NOTE: RH side shown in illustration, LH similar.

9.
Index-mark the hood hinge location to aid in hood installation.



10.

Remove the nuts and the hood.



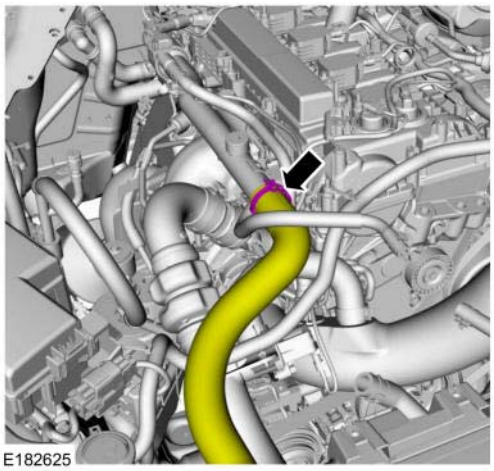
11.

Remove the degas bottle. Refer to: DEGAS BOTTLE .

12.

Remove the upper radiator hose from the coolant tube.

Use the General Equipment: Hose Clamp Remover/Installer



13.

Remove the following items:

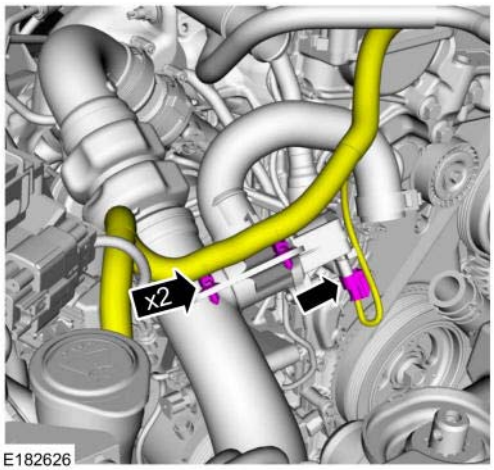
Refer to: AIR CLEANER OUTLET PIPE - 2.3L EcoBoost (231kW/314PS).

Refer to: AIR CLEANER - 2.3L EcoBoost (231kW/314PS).

Refer to: AIR CONDITIONING (A C) COMPRESSOR BELT .

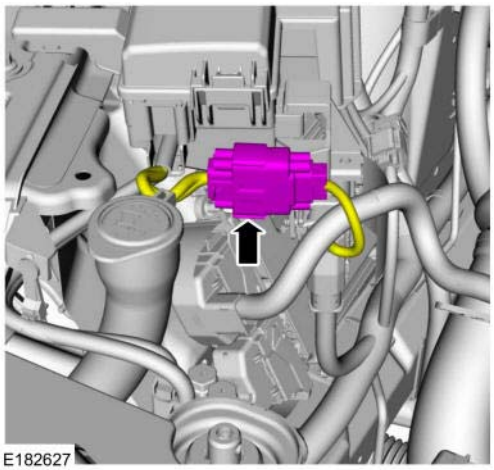
14.

Disconnect the CAC valve electrical connector and the retainers.



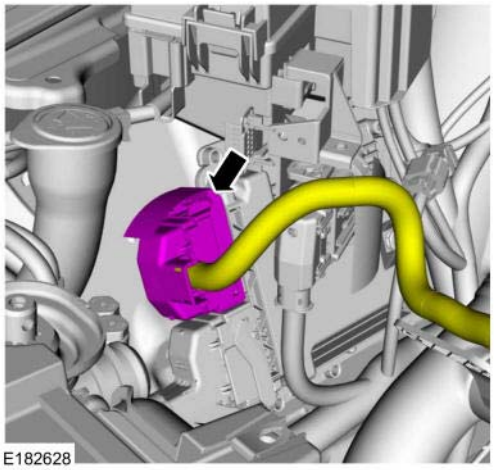
15.

Detach and disconnect the engine harness electrical connector.



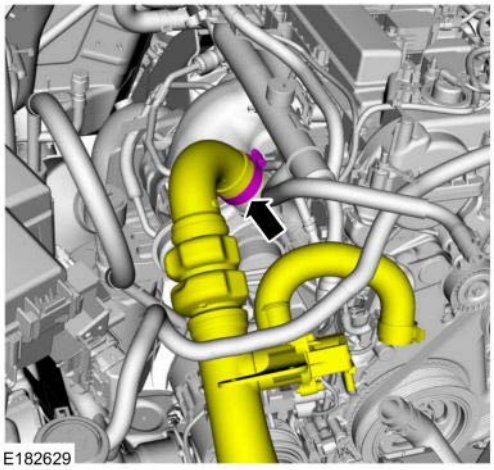
16.

Disconnect the upper PCM electrical connector.



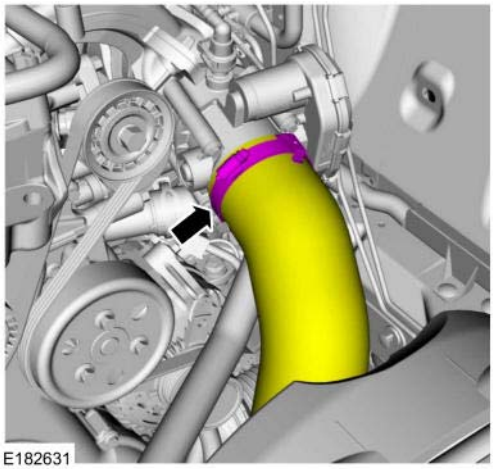
17.

Loosen the clamp and position aside the CAC inlet tube.



18.

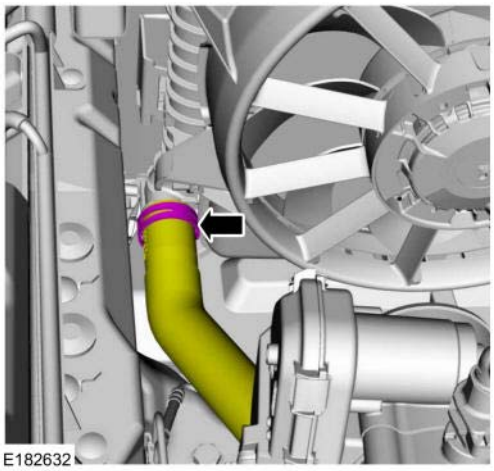
Loosen the clamp and position aside the CAC outlet tube.



19.

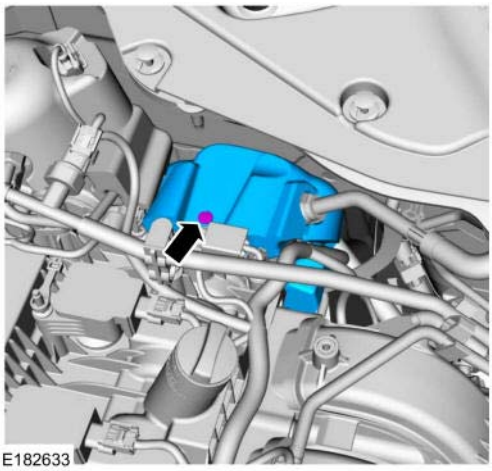
Remove the lower radiator hose from the radiator.

Use the General Equipment: Hose Clamp Remover/Installer



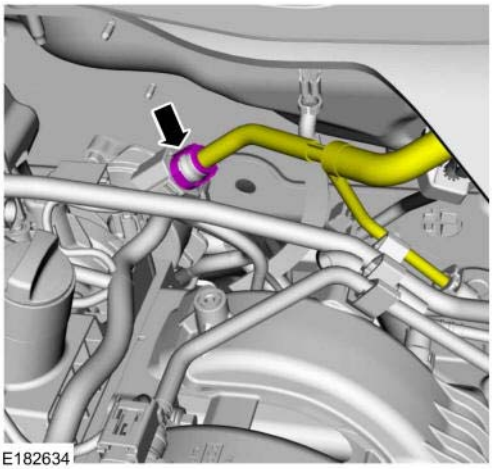
20.

Remove the retainer and the brake vacuum pump insulator cover.



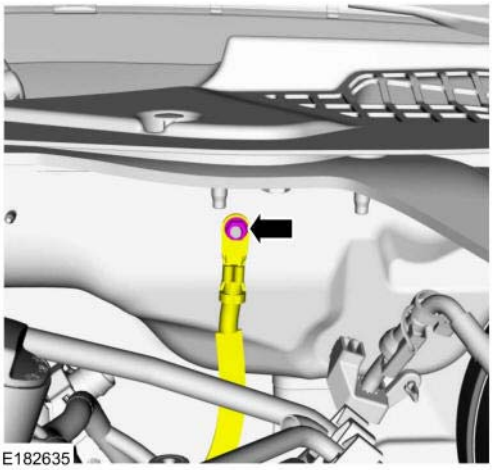
21.

Disconnect the vacuum hose from the brake vacuum pump.



22.

Remove the nut and the engine ground strap from the cowl.



NOTE: It is necessary to move fuel tube retainer for access for the use of fuel disconnect tool.

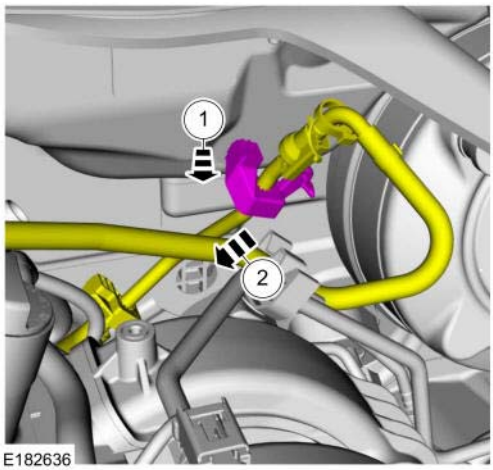
23.

1.

Detach the fuel supply tube retainer from the cowl.

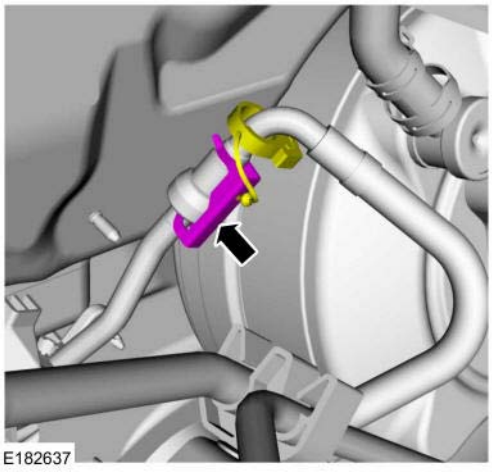
2.

Slide the retainer down the fuel supply tube.



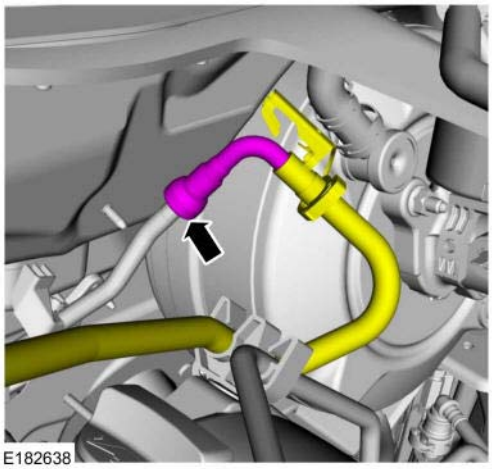
24.

Remove the fuel supply tube spring lock coupling retainer.



25.

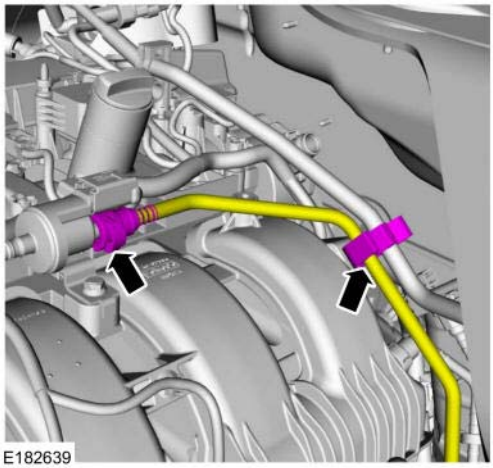
Disconnect the fuel supply tube. Refer to: SPRING LOCK COUPLINGS - 2.3L EcoBoost (231kW/314PS).



26.

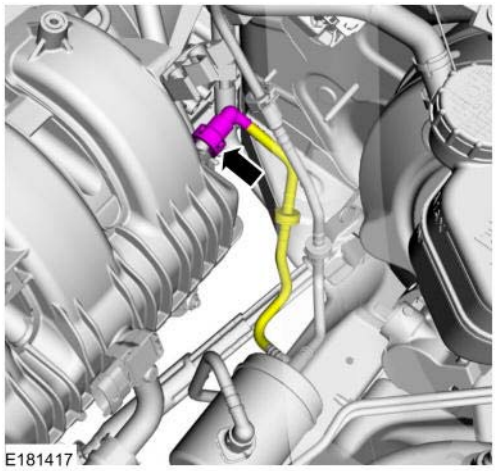
Disconnect the vacuum tube quick release coupling from the EVAP canister purge valve.

Detach the vacuum tube from the intake manifold retainer.



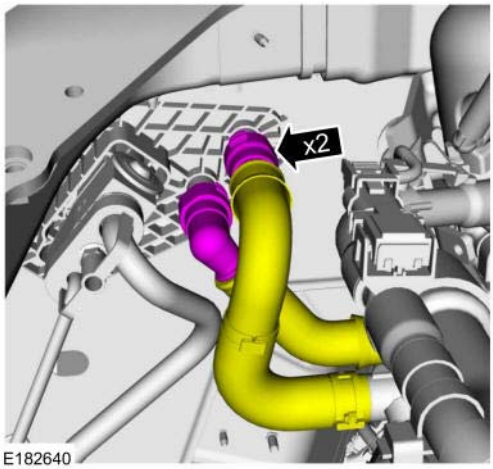
27.

Disconnect the vacuum tube quick release coupling at the rear of the intake manifold.



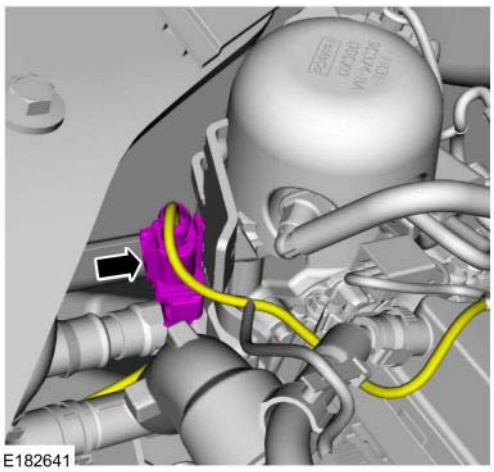
28.

Disconnect the coolant hoses from the heater core.



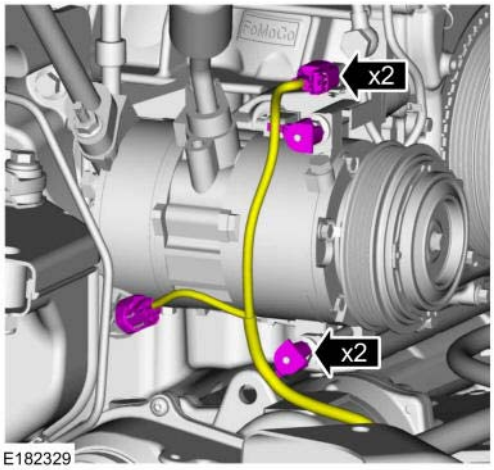
29.

Detach and disconnect the HO2S electrical connector.



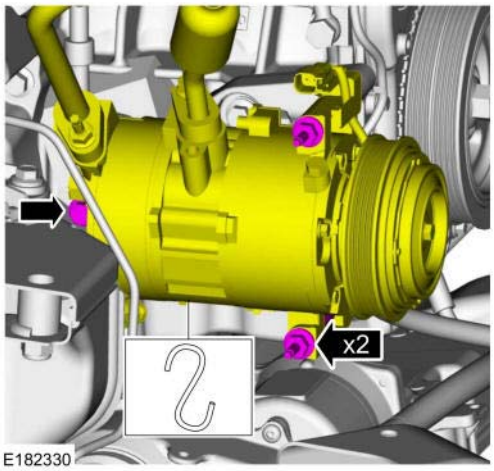
30.

Disconnect the A/C compressor electrical connectors and the wire harness retainers.



31.

Remove the bolts, position and support the A/C compressor aside.

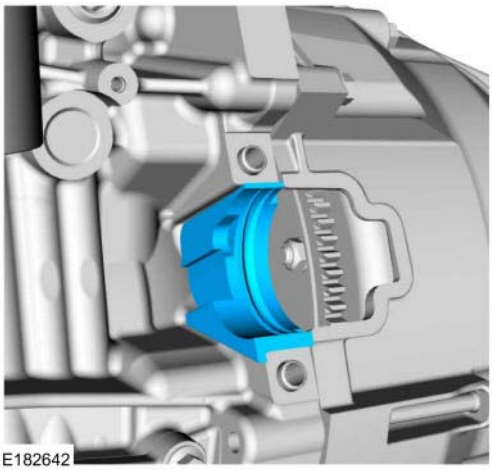


32.

Remove the starter motor. Refer to: STARTER MOTOR .

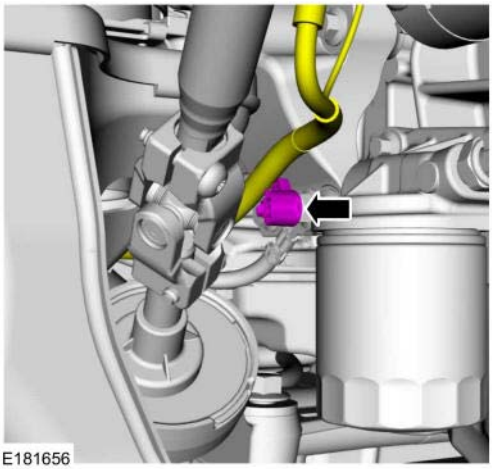
33.

Remove the starter motor insulator.



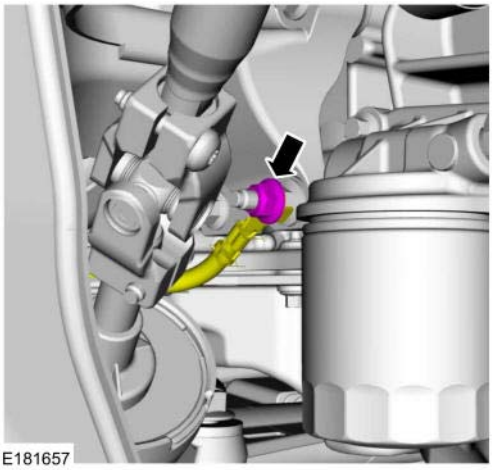
34.

Detach the wire harness retainer from the LH engine mount bracket stud bolt.



35.

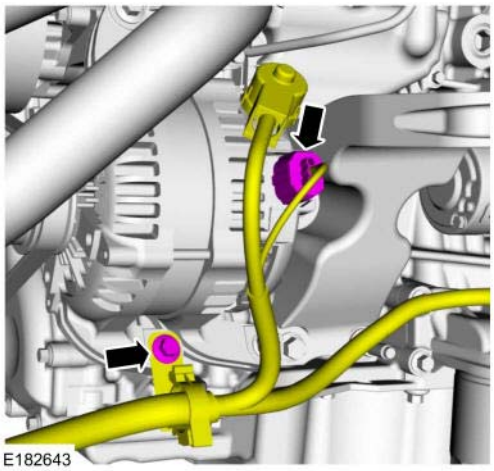
Remove the nut and ground wire from the LH engine mount bracket stud bolt.



36.

Remove the bolt and the wire harness retainer from the generator.

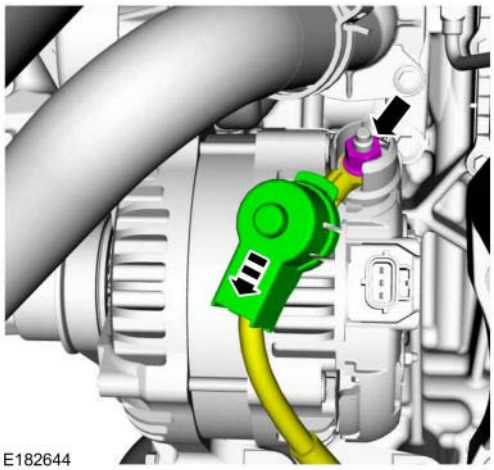
Disconnect the generator electrical connector.



37.

Position the protective cover aside.

Remove the nut and the B+ cable.



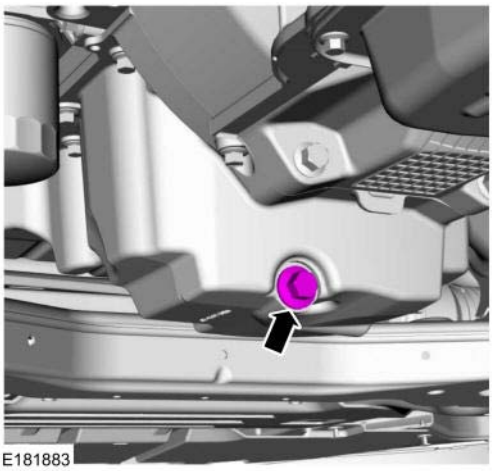
38.

Drain the engine oil and install drain plug.

Use the General Equipment: Oil Drain Equipment

Torque

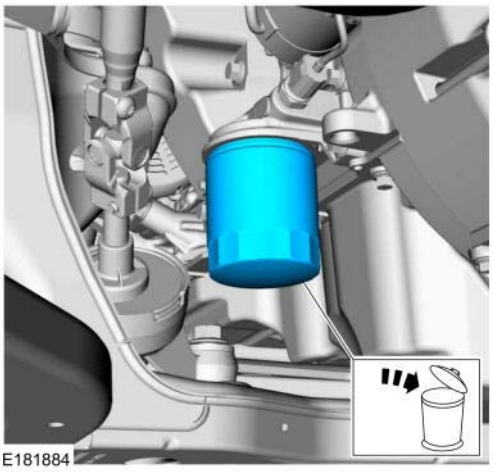
: 20 lb.ft (27 Nm)



39.

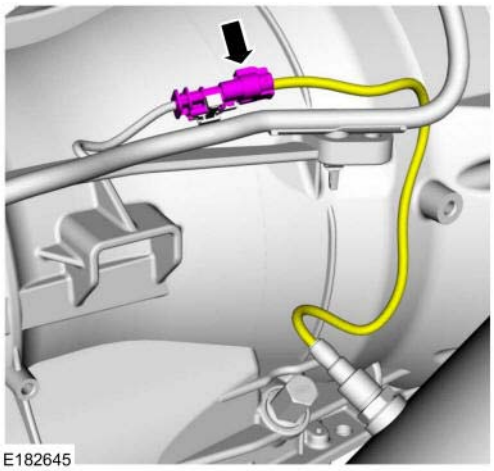
Remove and discard the engine oil filter.

Use the General Equipment: Oil Drain Equipment



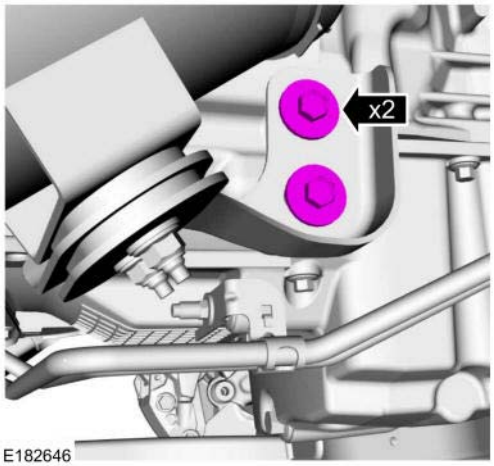
NOTE: Automatic transmission shown in illustration, manual transmission similar.

40.
Disconnect the catalyst monitor sensor (CMS) sensor electrical connector.



NOTE: Automatic transmission shown in illustration, manual transmission similar.

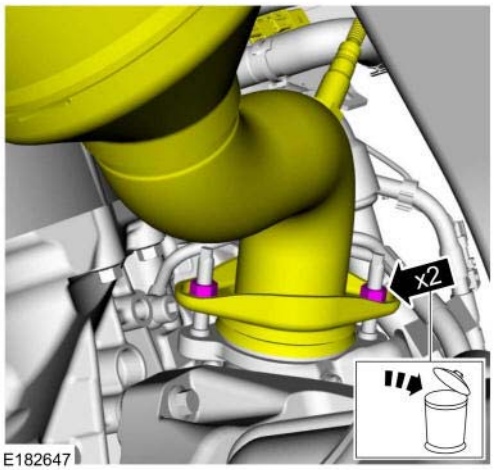
41.
Remove the bolts for the catalytic converter bracket.



42.

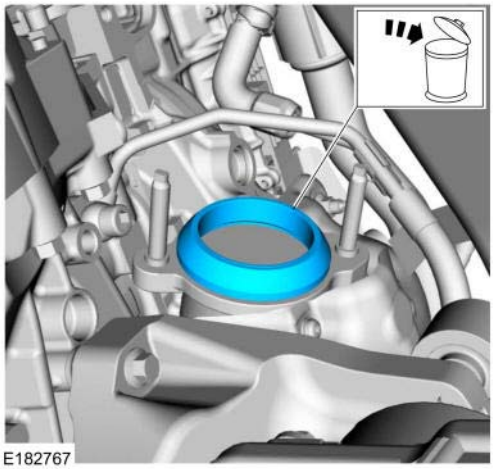
Remove the nuts and position the catalytic converter aside.

Discard the nuts.



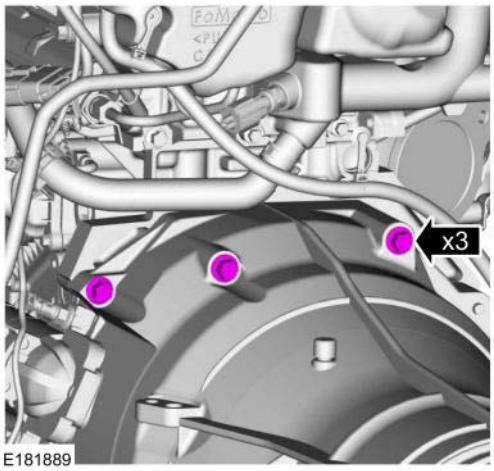
43.

Remove and discard the gasket.



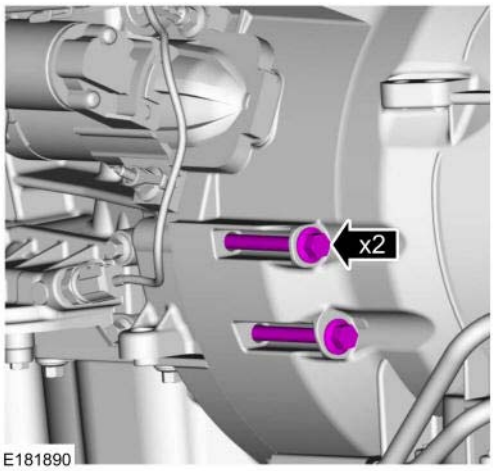
NOTE: Automatic transmission shown in illustration, manual transmission similar.

44.
Remove the transmission bolts.



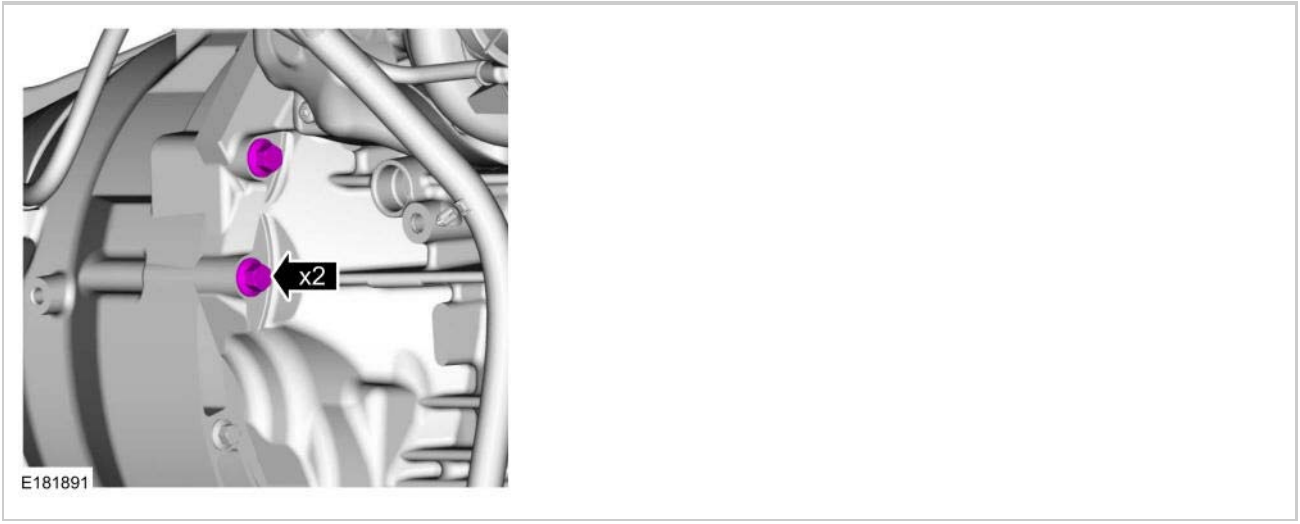
NOTE: Automatic transmission shown in illustration, manual transmission similar.

45.
Remove the transmission bolts.



NOTE: Automatic transmission shown in illustration, manual transmission similar.

46.
Remove the transmission bolts.



6-Speed Automatic Transmission - 6R80

47.

1.

Rotate the transmission electrical connector.

2.

Pull the transmission electrical connector out to disconnect.

Detach the retainers and position the wiring harness aside.

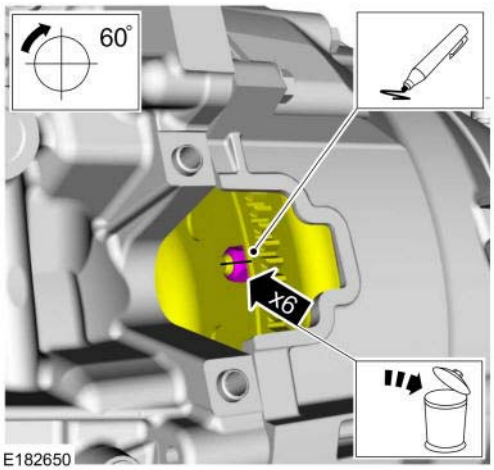


NOTE: Index mark one stud and the flexplate for assembly reference.

NOTE: Only rotate the crankshaft in a clockwise direction.

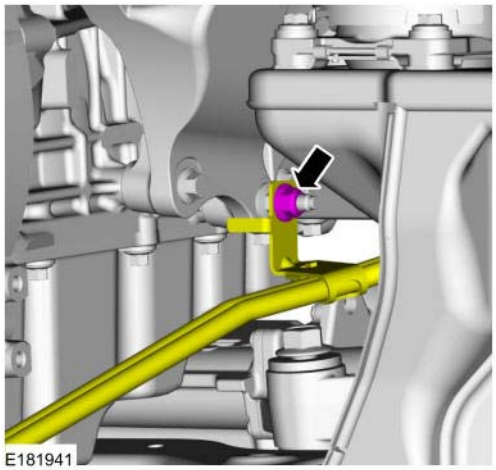
48.
Remove and discard the torque convertor nuts.

Use the General Equipment: Magnetic Socket



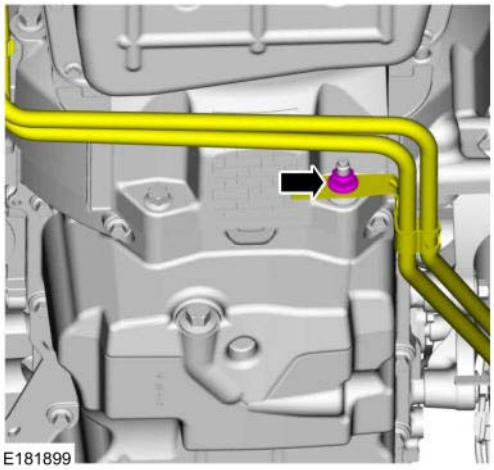
49.

Remove the nut from the RH engine mount bracket stud bolt for the transmission cooling tubes.



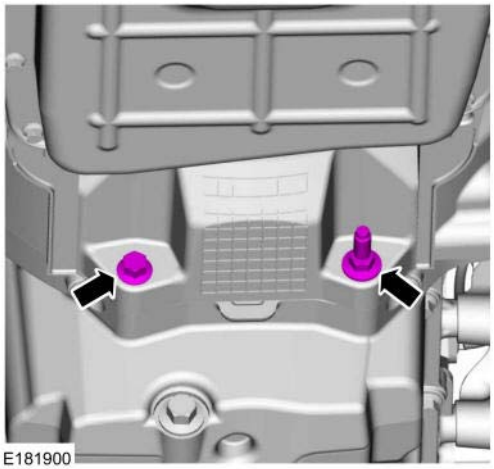
50.

Remove the transmission cooling tube bracket nut and position aside.



NOTE: Automatic transmission shown in illustration, manual transmission similar.

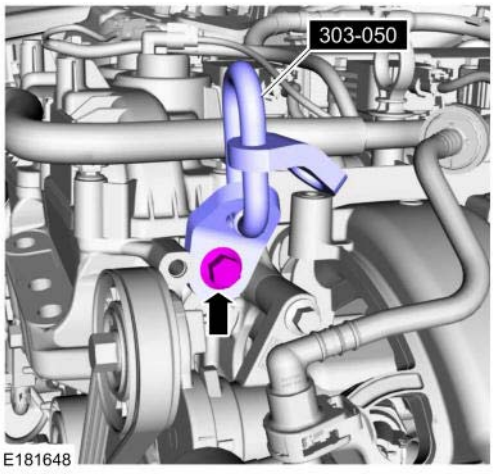
51.
Remove the oil pan bolts.



52.

Install the special tool on the LH side of the cylinder head.

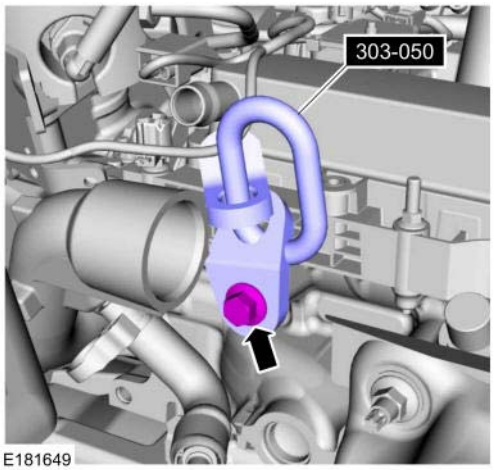
Install Special Service Tool: 303-050 (T70P-6000)Lifting Bracket, Engine.



NOTE: Coolant tube removed for clarity.

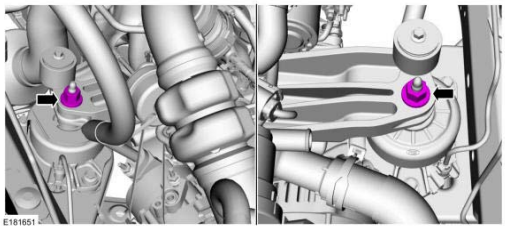
53.
Install the special tool on the RH side of the cylinder head.

Install Special Service Tool: 303-050 (T70P-6000) Lifting Bracket, Engine.



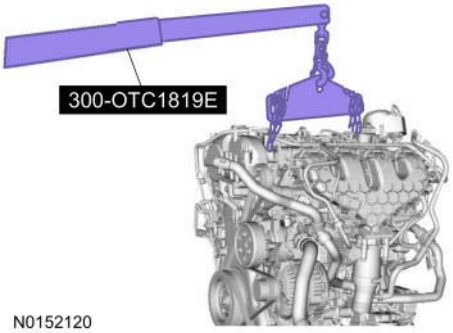
54.

Remove the RH and LH engine mount bracket nuts.



55.

Install Special Service Tool: 300-OTC1819E 2, 200# Floor Crane, Fold Away.

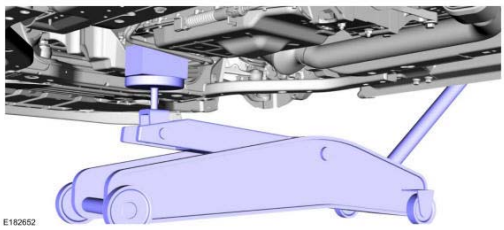


56.

Install a jack and wooden block under the transmission bell housing to support the transmission.

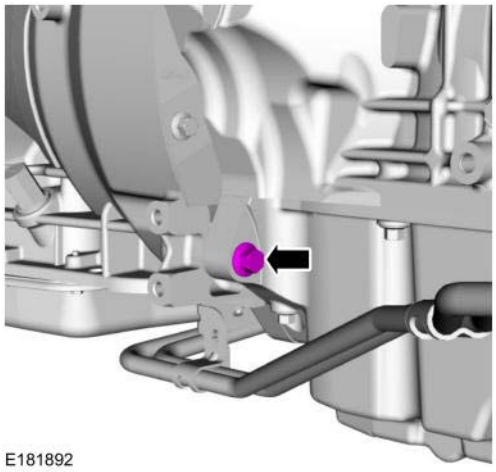
Use the General Equipment: Wooden Block

Use the General Equipment: Trolley Jack



NOTE: Automatic transmission shown in illustration, manual transmission similar.

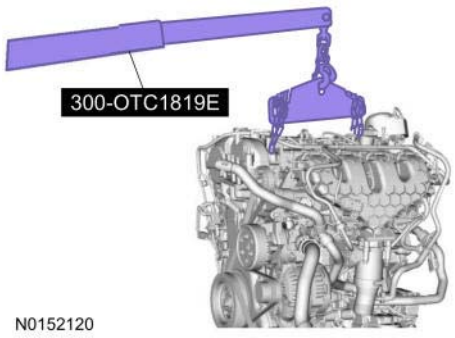
57.
Remove the oil pan bolt.



58.

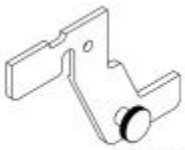
Using the special tool, remove the engine.

Use Special Service Tool: 300-OTC1819E 2, 200# Floor Crane, Fold Away.



DISASSEMBLY > ENGINE

Special Tool(s) / General Equipment

 E133913	205-153 (T80T-4000-W) Handle
 ST1341-A	300-OTC1819E2, 200# Floor Crane, Fold Away
 E222983	303-103 (T74P-6375-A) Holding Tool, Flywheel T74P-77000-A TKIT-2009TC-F
 E175042	303-1247VCT Spark Plug Tube Seal Remover and Installer TKIT-2006UF-FLM TKIT-2006UF-ROW
 E133912	303-1565 Alignment Tool, Camshaft TKIT-2010C-FLM
 E134603	303-409 (T92C-6700-CH) Remover, Crankshaft Seal TKIT-1992-FH/FMH/FLMH TKIT-1993-LMH/MH
 PZ21210	303-507 Timing Peg, Crankshaft TDC TKIT-2001N-FLM TKIT-2001N-ROW
 E222982	307-005 (T59L-100-B) Slide Hammer

 E168032	310-206 Remover, Fuel Injector TKIT-2009A-FLM
Strap Wrench	
Mounting Stand	
Plastic Scraper	
Hose Clamp Remover/Installer	

Materials

Name	Specification
Motorcraft® Silicone Gasket Remover ZC-30-A	-
Motorcraft® Metal Surface Prep ZC-31-B	-
Metal Brake Parts Cleaner (U.S.) PM-4-A, PM-4-B (U.S.)	-

NOTE: Do not loosen or remove the crankshaft pulley bolt without first installing the special tools as instructed in this procedure. The crankshaft pulley and the crankshaft timing sprocket are not keyed to the crankshaft. The crankshaft, the crankshaft sprocket and the pulley are fitted together by friction, using diamond washers between the flange faces on each part. For that reason, the crankshaft sprocket is also unfastened if the pulley bolt is loosened. Before any repair requiring loosening or removal of the crankshaft pulley bolt, the crankshaft and camshafts must be locked in place by the special service tools, otherwise severe engine damage can occur.

NOTE: During engine repair procedures, cleanliness is extremely important. Any foreign material (including any material created while cleaning gasket surfaces) that enters the oil passages, coolant passages or the oil pan, can cause engine failure.

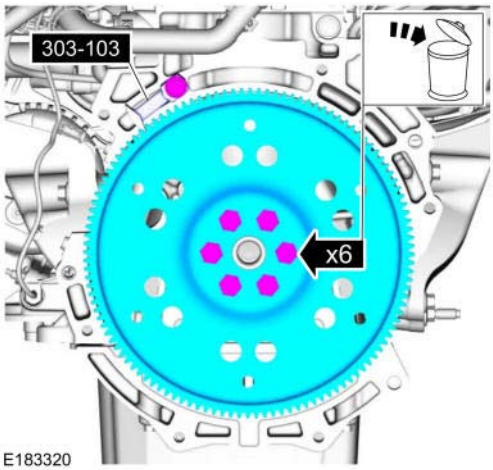
6-Speed Automatic Transmission - 6R80

1.

Install Special Service Tool: 303-103 (T74P-6375-A) Holding Tool, Flywheel.

Remove the bolts and the flexplate.

Discard the bolts.



6-Speed Manual Transmission - MT82

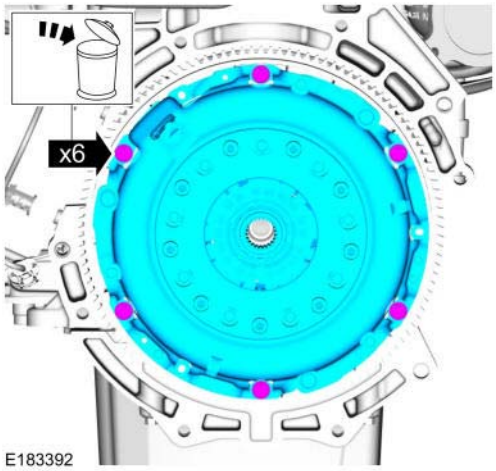
NOTE: Do not breathe dust or use compressed air to blow dust from storage containers or friction components. Remove dust using government-approved techniques. Friction component dust may be a cancer and lung disease hazard. Exposure to potentially hazardous components may occur if dusts are created during repair of friction components, such as brake pads and clutch discs. Exposure may also cause irritation to skin, eyes and respiratory tract, and may cause allergic reactions and/or may lead to other chronic health effects. If irritation persists, seek medical attention or advice. Failure to follow these instructions may result in serious personal injury.

2.

Loosen the clutch pressure plate-to-flywheel bolts evenly, by two turns at a time.

Remove the clutch.

Discard the bolts.

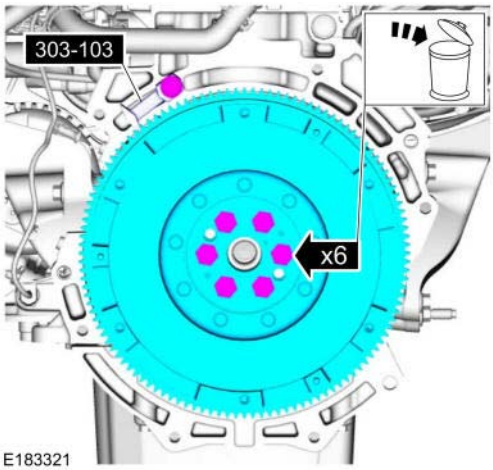


3.

Install Special Service Tool: 303-103 (T74P-6375-A) Holding Tool, Flywheel.

Remove the bolts and the flywheel.

Discard the bolts.

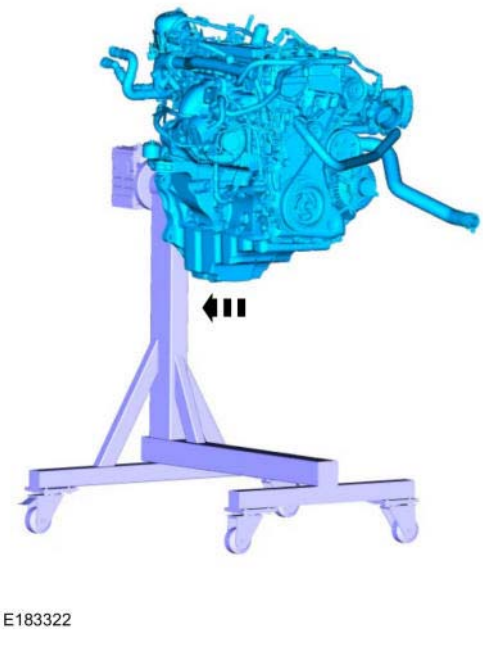


6-Speed Automatic Transmission - 6R80/6-Speed Manual Transmission - MT82

4.

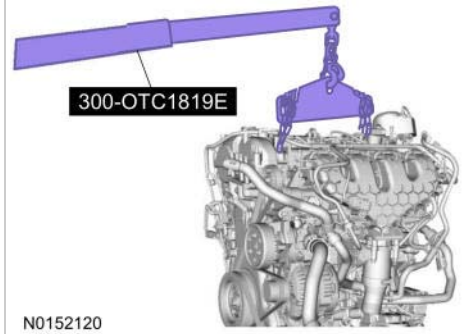
Install engine on the mounting stand.

Use the General Equipment: Mounting Stand



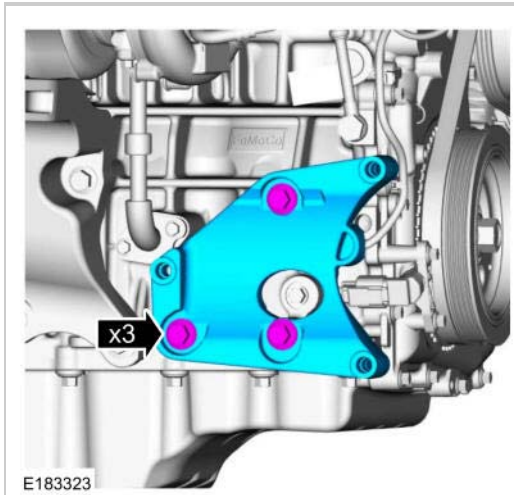
5.

Remove Special Service Tool: 300-OTC1819E 2, 200# Floor Crane, Fold Away.



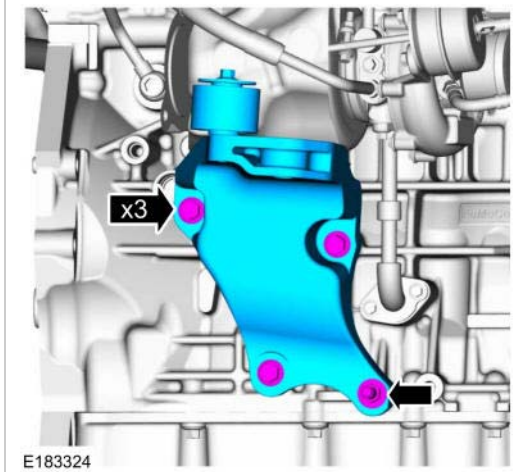
6.

Remove the bolts and the A/C compressor mounting bracket.



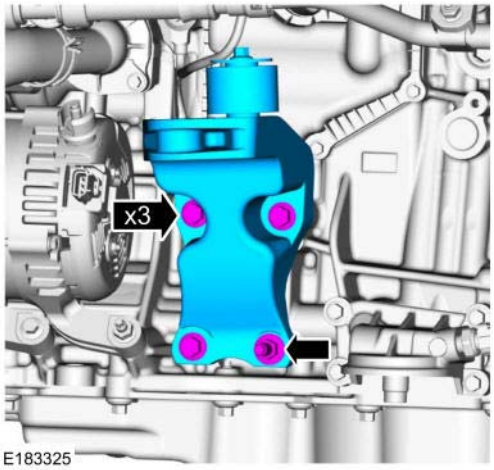
7.

Remove the bolts, stud bolt and the RH engine mount bracket.



8.

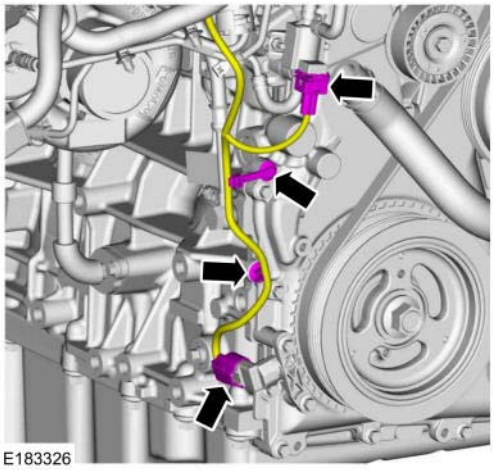
Remove the bolts, stud bolt and the LH engine mount bracket.



9.

Disconnect the CKP and vacuum valve electrical connectors.

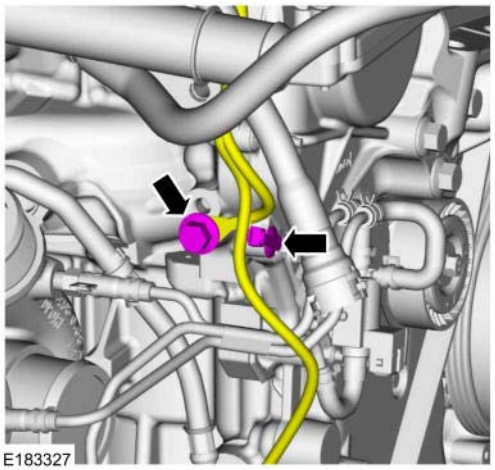
Detach the wiring harness retainers.



10.

Detach the wiring harness retainer.

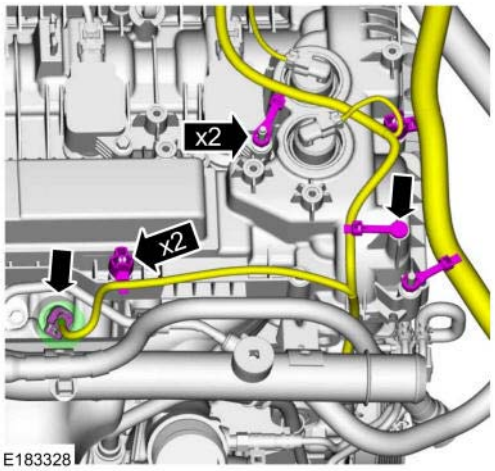
Remove the bolt and position the ground wire harness aside.



11.

Disconnect the CHT sensor electrical connector.

Detach the wiring harness retainers.

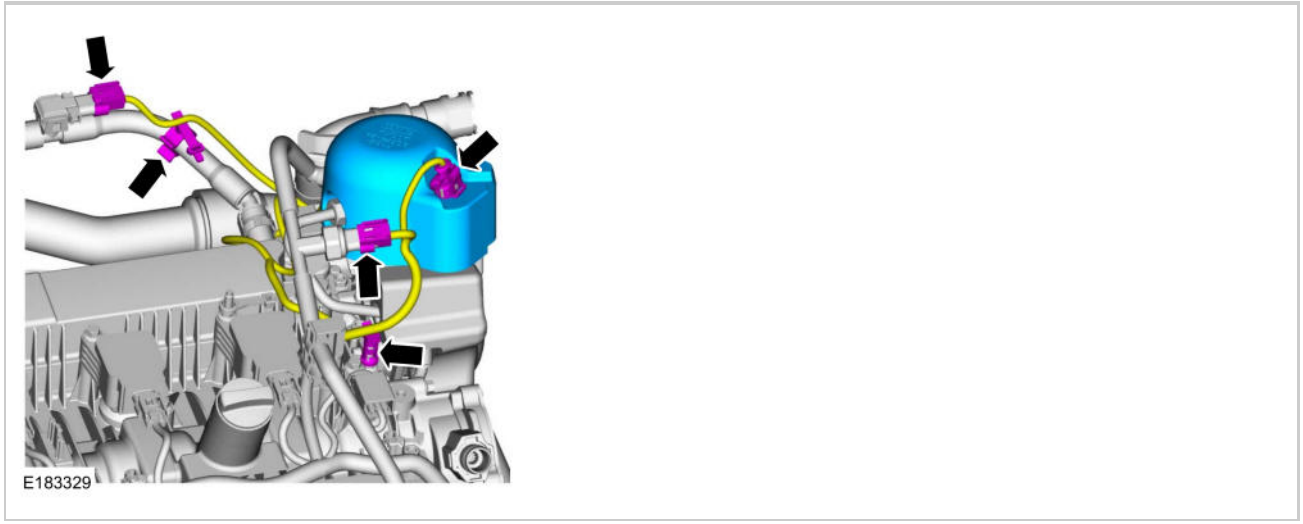


12.

Disconnect the high-pressure fuel pump, fuel supply tube pressure switch and crankcase vent tube electrical connectors.

Detach the wiring harness retainers.

Remove the high-pressure fuel pump cover.

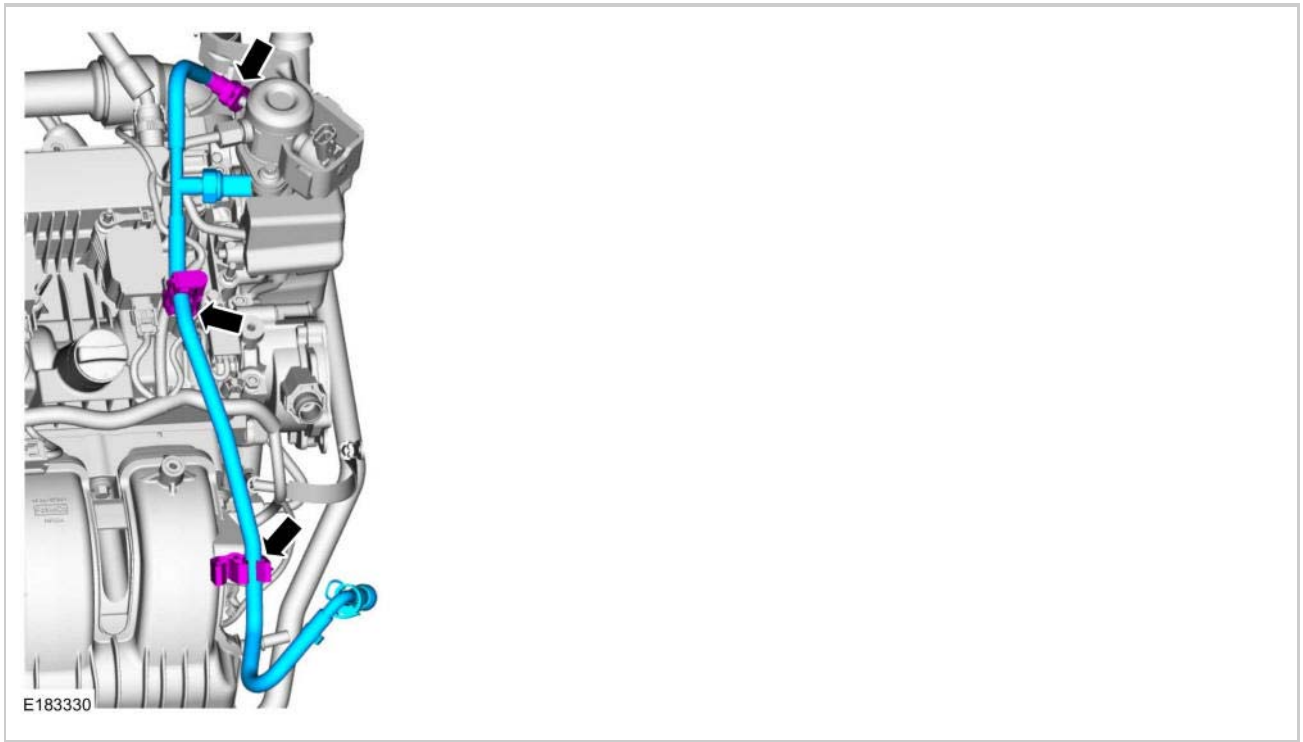


13.

Detach the fuel supply tube from the intake manifold retainer.

Disconnect the fuel supply tube quick release coupling from the high-pressure fuel pump. Refer to: QUICK RELEASE COUPLING - 2.3L EcoBoost (231kW/314PS).

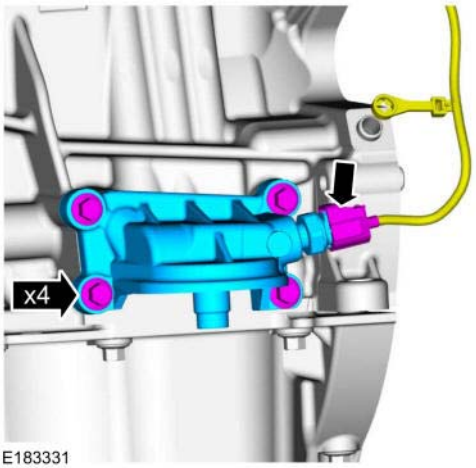
Detach the retainer and remove the fuel supply tube.



14.

Disconnect the oil pressure switch electrical connector.

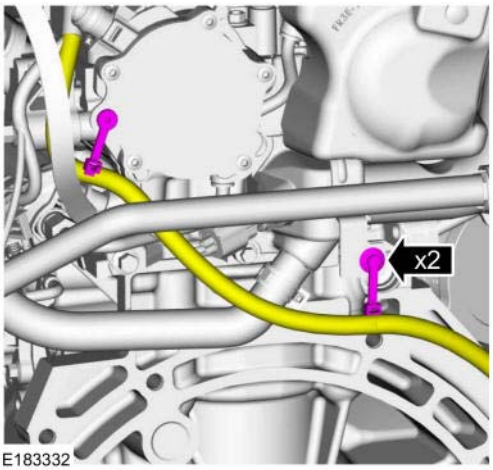
Remove the bolts and the oil filter adapter.



6-Speed Automatic Transmission - 6R80

15.

Detach the wiring harness retainers.



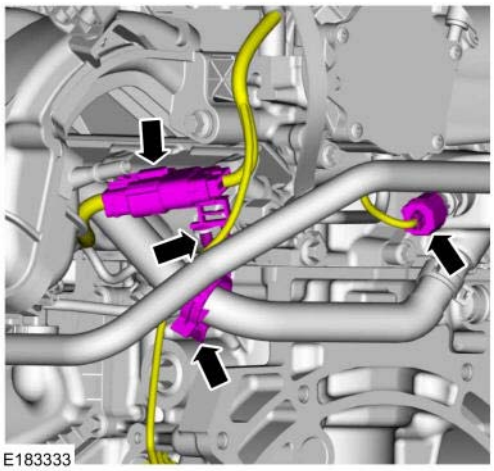
6-Speed Automatic Transmission - 6R80/6-Speed Manual Transmission - MT82

16.

Detach and disconnect the fuel injector harness electrical connector.

Disconnect the ECT harness electrical connector.

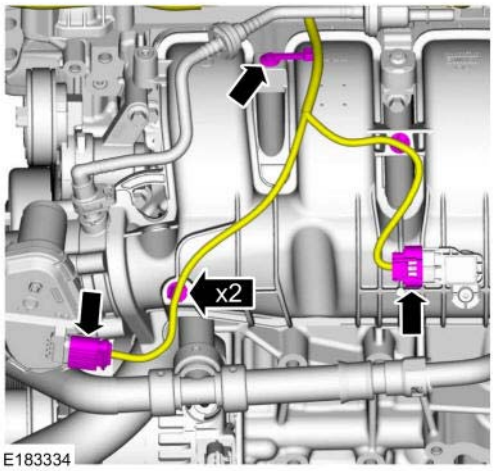
Detach the wiring harness retainer.



17.

Disconnect the throttle body and MAPT electrical connectors.

Detach the wiring harness retainers.

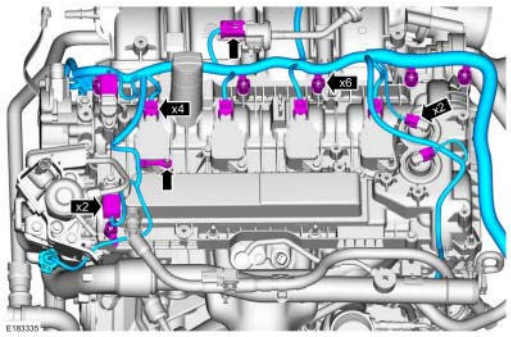


18.

Disconnect the CMP sensor and EVAP canister purge valve electrical connectors.

Disconnect the ignition coil-on-plugs and VCT oil control solenoid sensor electrical connectors.

Detach the wiring harness retainer and remove the engine wiring harness.

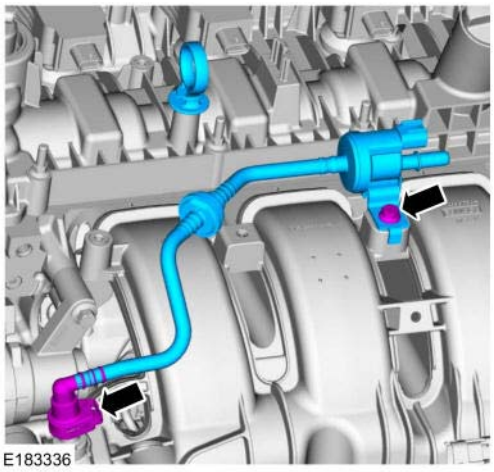


19.

Disconnect the EVAP canister purge valve quick release coupling.

Remove the bolt and the EVAP canister purge valve.

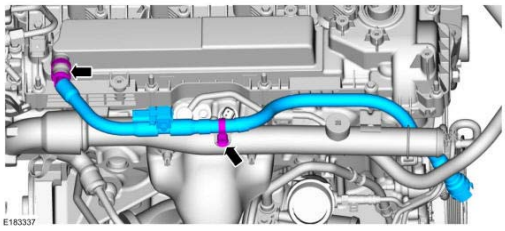
Remove the oil level indicator.



20.

Disconnect the crankcase vent tube from the valve cover.

Detach the crankcase vent tube retainer and remove.



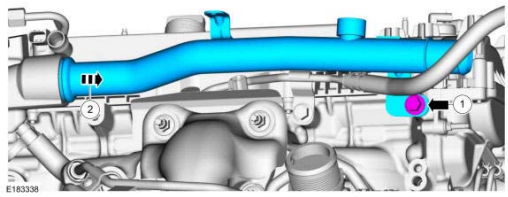
21.

1.

Remove the coolant tube bolt.

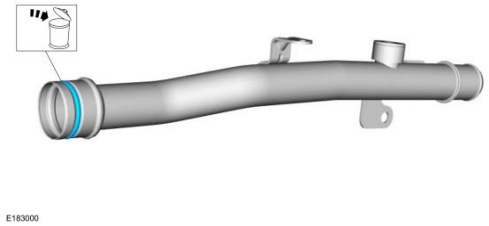
2.

Remove the coolant tube.



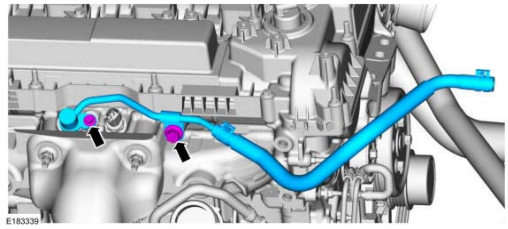
22.

Remove and discard the coolant tube O-ring seal.



23.

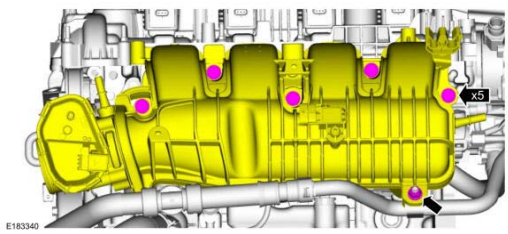
Remove the bolts and the coolant tube.



24.

Remove the nut for the coolant tube.

Remove the bolts and position intake manifold back.

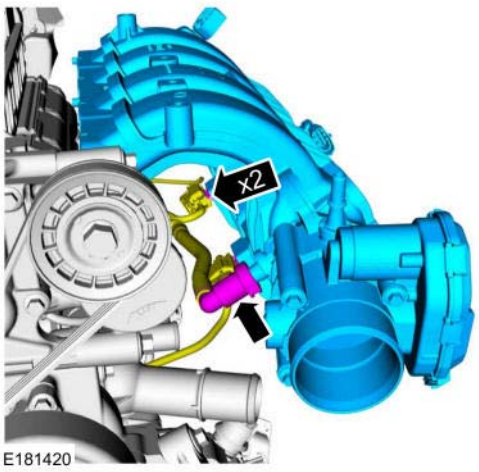


25.

Disconnect the PCV tube quick release coupling.

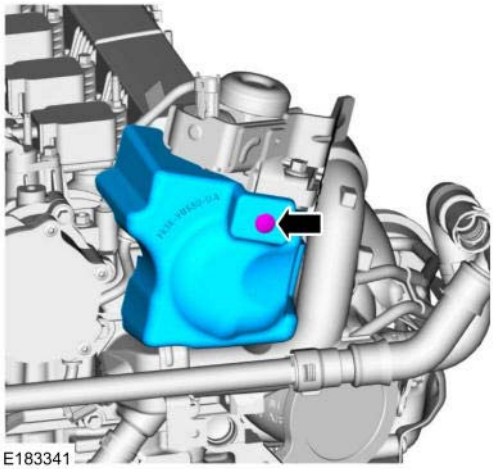
Detach the KS electrical connector retainers from the intake manifold.

Remove the intake manifold.



26.

Remove the retainer and the high-pressure fuel pump drive unit cover.

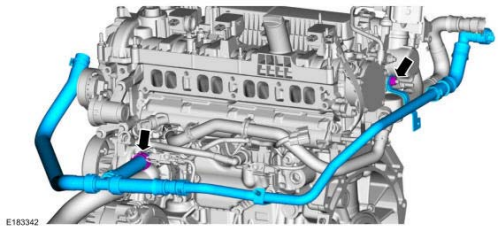


27.

Disconnect the coolant hose from thermostat housing.

Use the General Equipment: Hose Clamp Remover/Installer

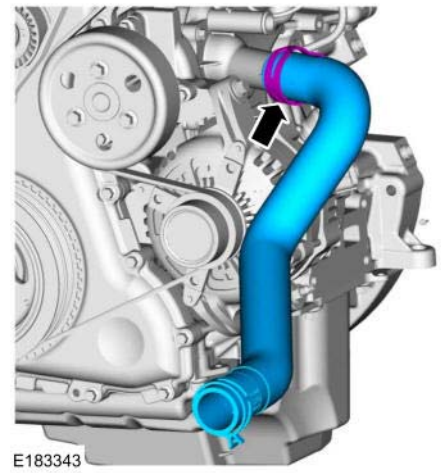
Remove the nut and the coolant hose.



28.

Disconnect the radiator hose from the thermostat housing.

Use the General Equipment: Hose Clamp Remover/Installer

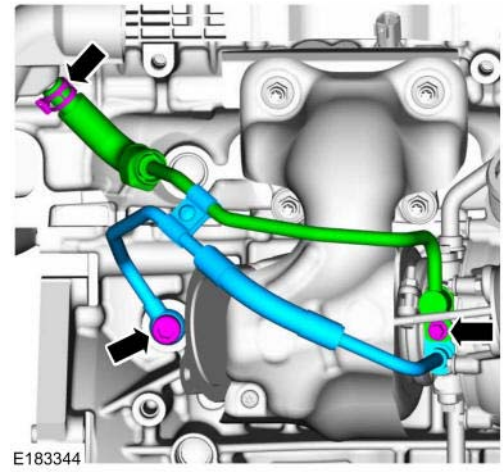


29.

Disconnect the turbocharger coolant hose from the coolant outlet.

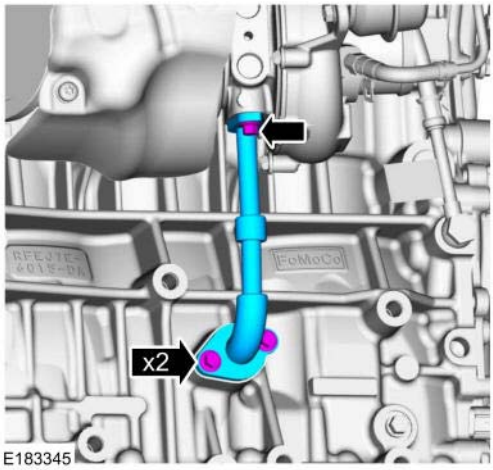
Use the General Equipment: Hose Clamp Remover/Installer

Remove the bolts and the turbocharger coolant tubes.



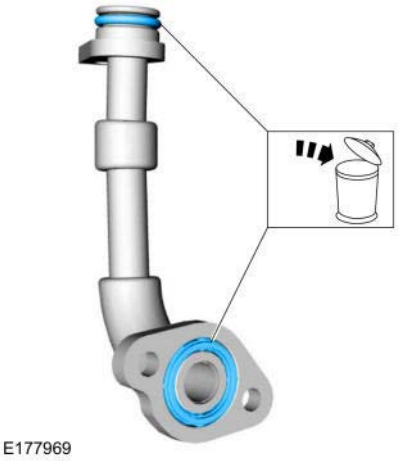
30.

Remove the bolts and the turbocharger-to-cylinder block oil return tube.



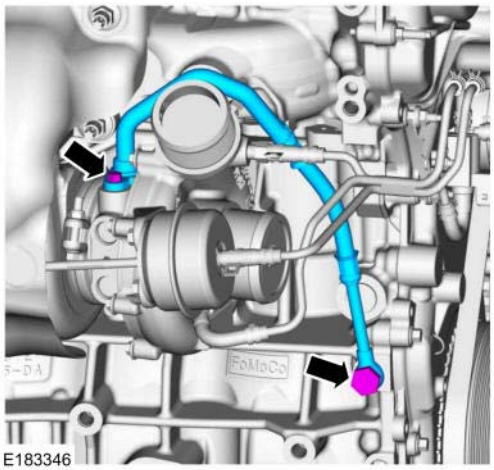
31.

Remove and discard the O-ring seal and gasket.



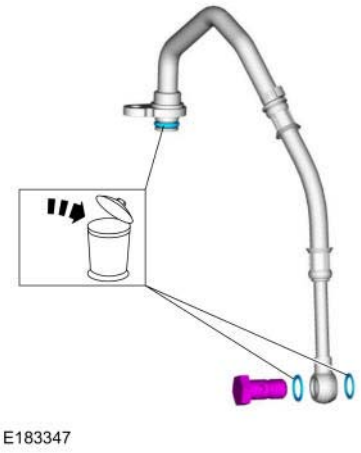
32.

Remove the bolts and the cylinder block-to-turbocharger oil supply tube.



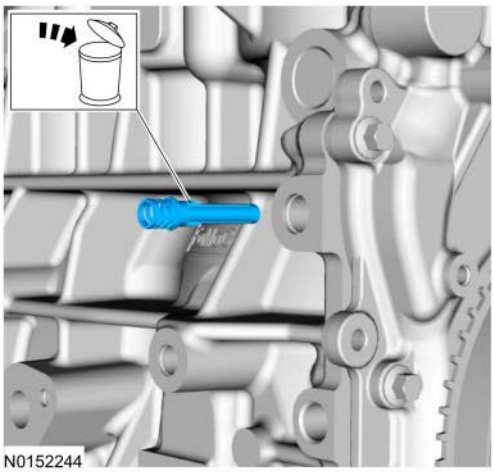
33.

Remove and discard the washers and O-ring seal.



34.

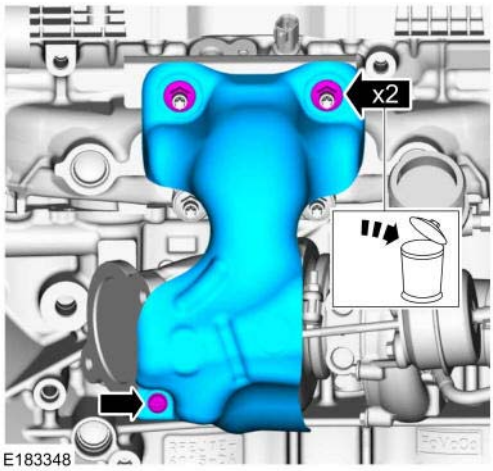
Remove and discard the oil supply filter.



35.

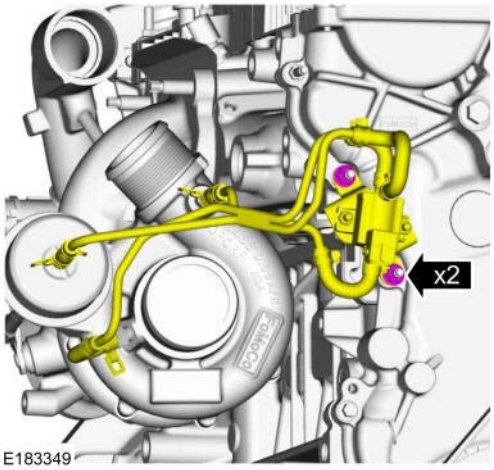
Remove the nuts, bolt and the heat shield.

Discard the nuts.



36.

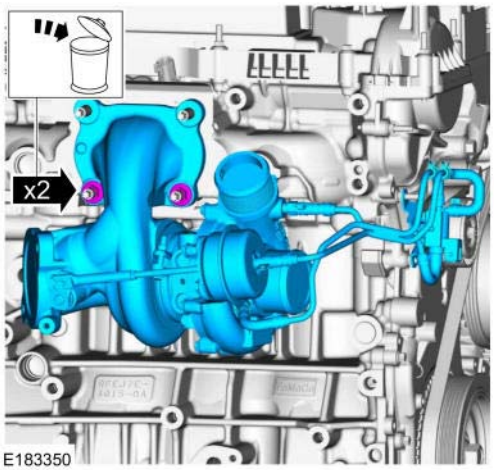
Remove the nuts, turbocharger vacuum valve and position aside.



37.

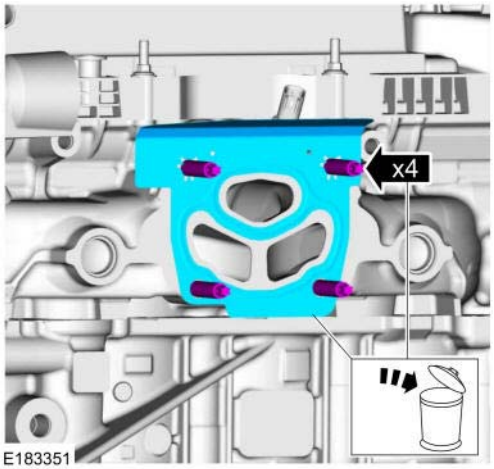
Remove the nuts and the turbocharger.

Discard the nuts.



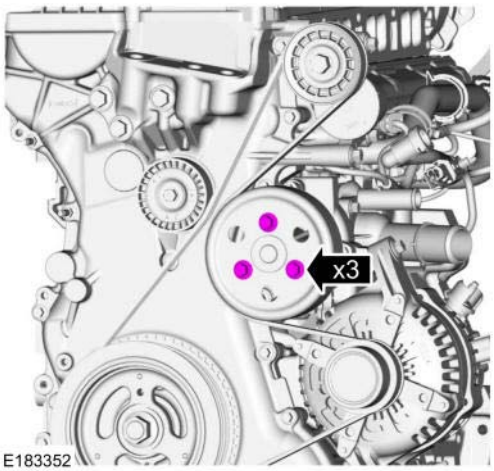
38.

Remove and discard the studs and gasket.



39.

Loosen the coolant pump pulley bolts.



40.

1.

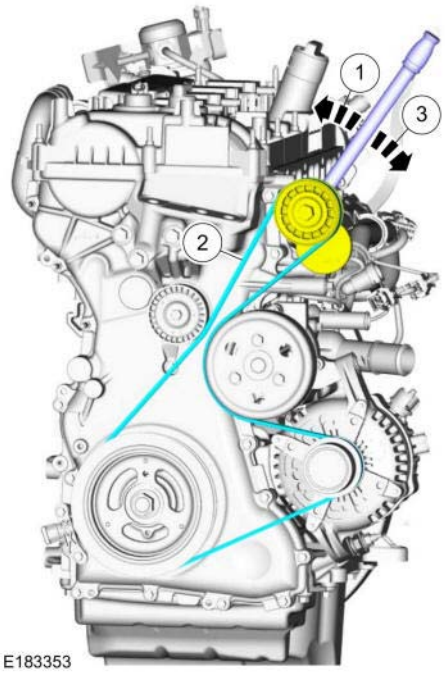
Install the tool and release the tension on the accessory drive belt tensioner.

2.

Remove the accessory drive belt.

3.

Release the tool and remove.

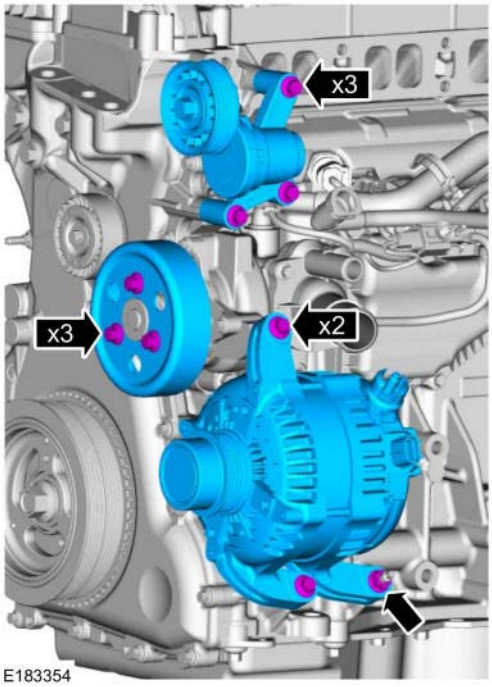


41.

Remove the bolts and the accessory drive belt tensioner.

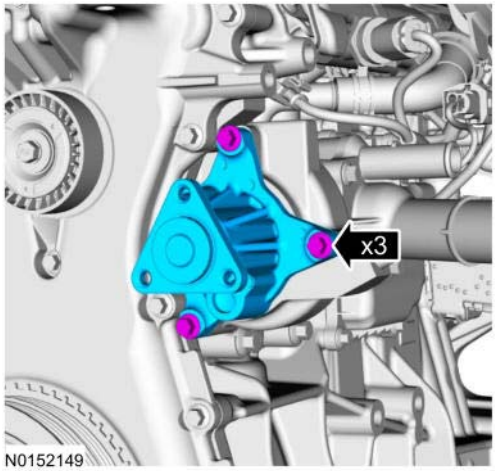
Remove the bolts and coolant pump pulley.

Remove the nut, bolts and the generator.



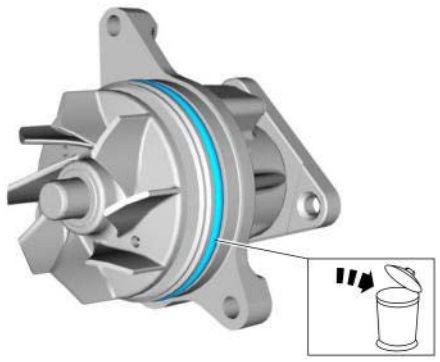
42.

Remove the bolts and the coolant pump.



43.

Remove and discard the coolant pump O-ring seal.

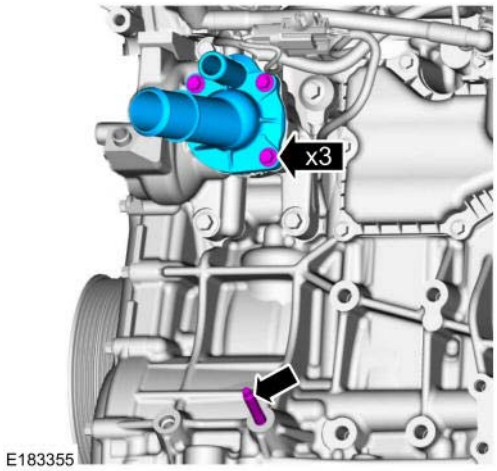


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44.

Remove the bolts and the thermostat housing.

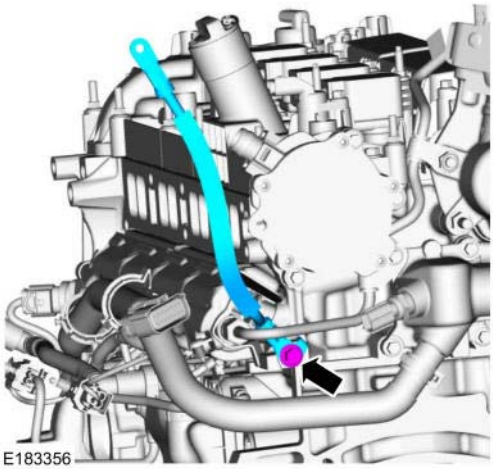
Remove the generator stud.



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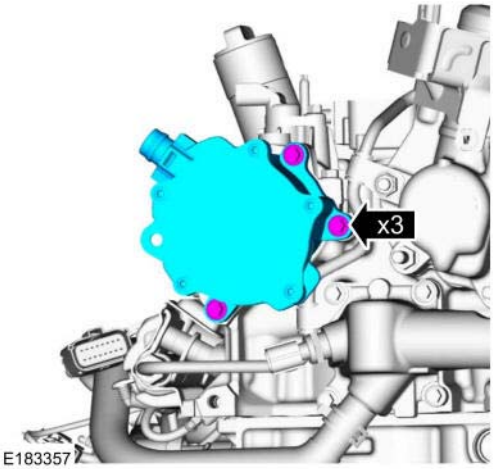
45.

Remove the bolt and the ground strap.



46.

Remove the bolts and the brake vacuum pump.

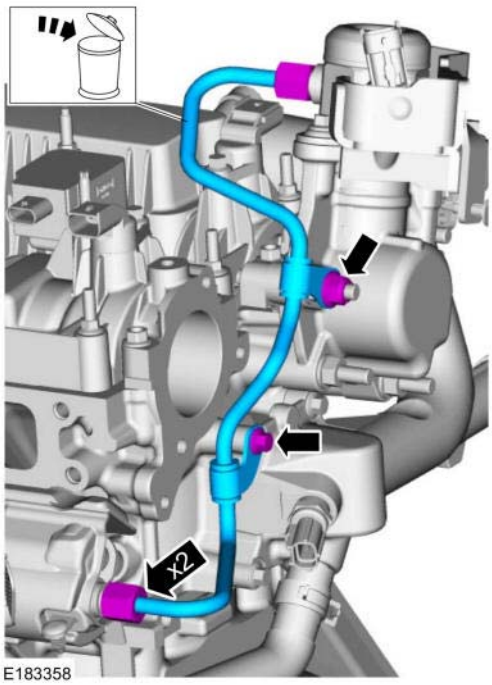


NOTE: To release the fuel pressure in the high pressure fuel tube, wrap the fuel injection pump flare nut with a shop towel to absorb any residual fuel pressure during the loosening of the fuel injection pump flare nut.

47.

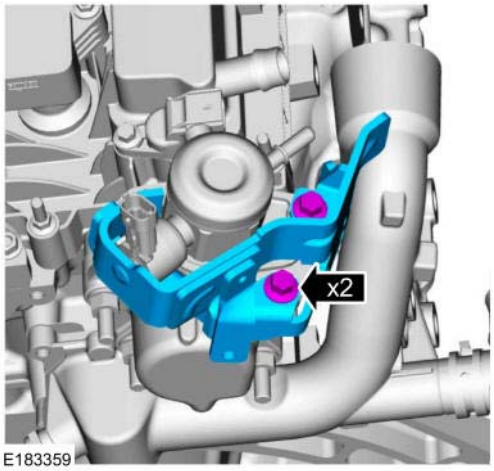
Remove the high pressure fuel tube nut and bolt.

Loosen the flare nuts and discard the fuel tube.



48.

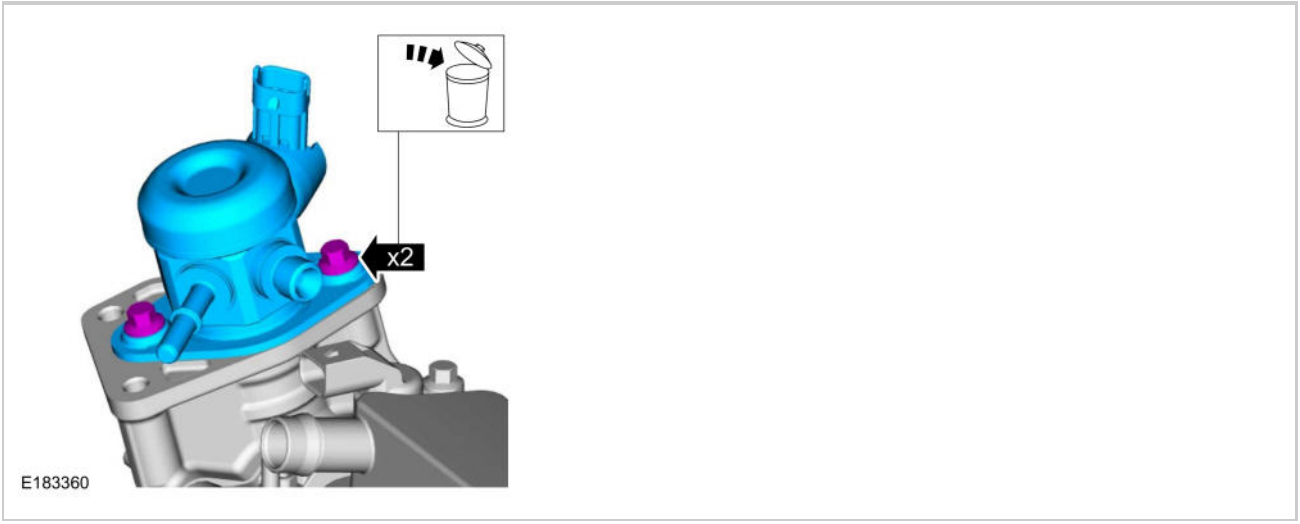
Remove the bolts and high-pressure fuel pump bracket.



49.

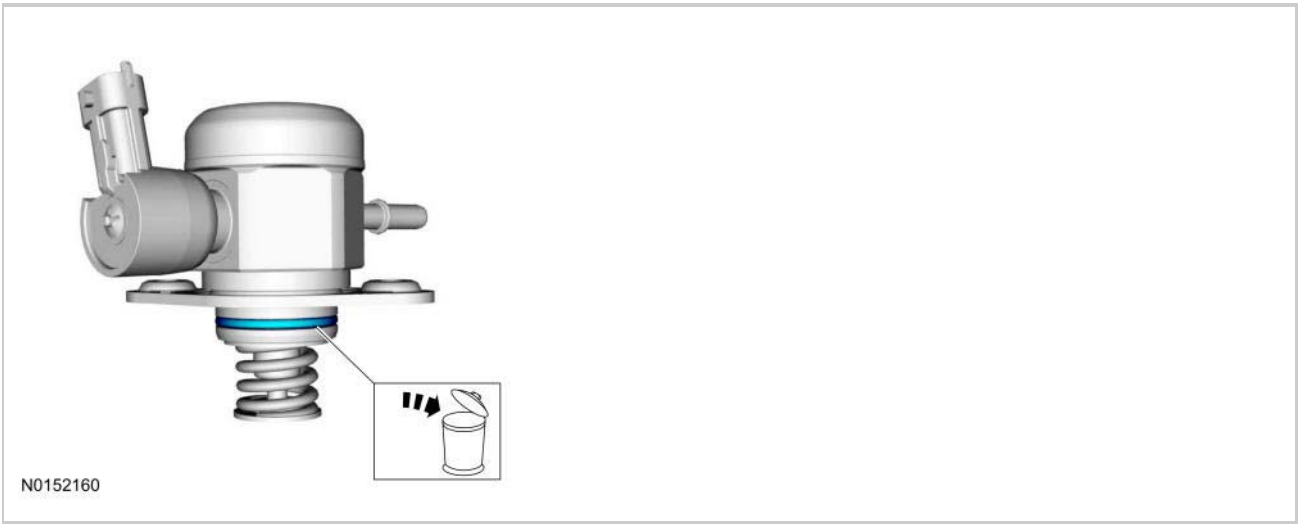
Remove the bolts and the high-pressure fuel pump.

Discard the bolts.



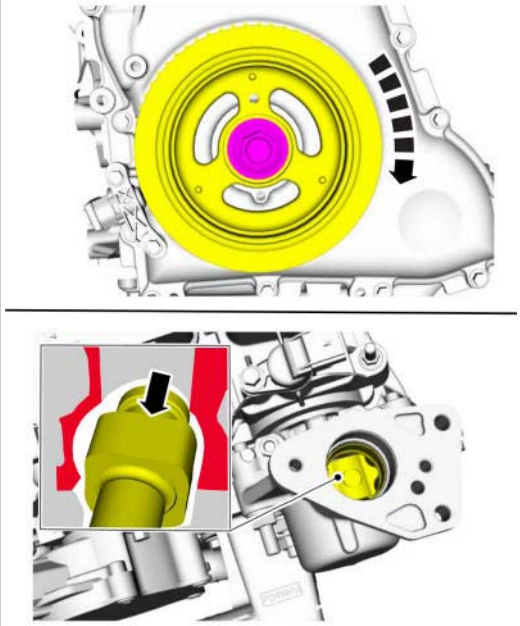
50.

Remove and discard the high-pressure fuel pump O-ring seal.



51.

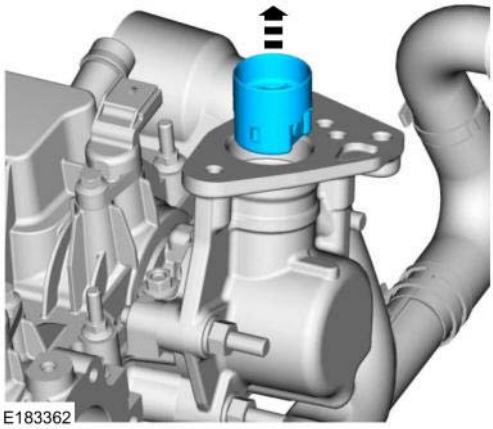
Rotate the crankshaft to position the camshaft at zero lift.



E183361

52.

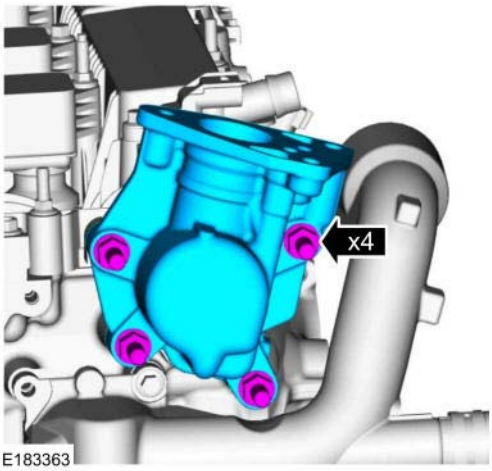
Remove the high-pressure fuel pump tappet.



E183362

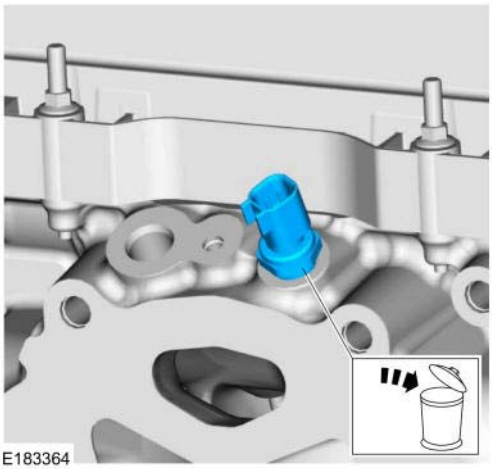
53.

Remove the stud bolts and the high-pressure fuel pump drive unit.



54.

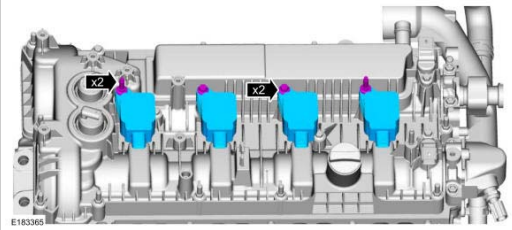
Remove and discard the CHT sensor.



NOTE: When removing the ignition coil-on-plugs, a slight twisting motion will break the seal and ease removal.

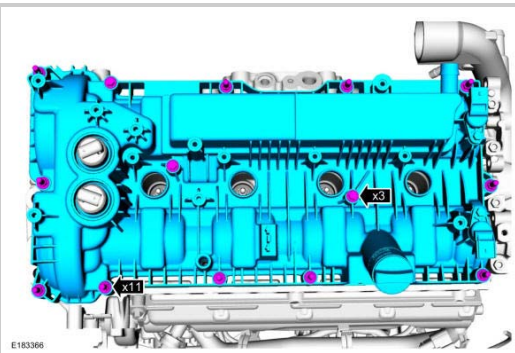
NOTE: Use compressed air to remove any foreign material from the ignition coil-on-plugs and surrounding area before removing the ignition coil-on-plugs.

55.
Remove the bolts, stud bolts and the ignition coil-on-plugs.



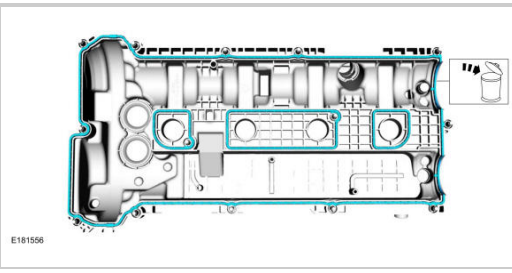
56.

Loosen the fasteners and remove the valve cover.



57.

Remove and discard the valve cover gasket.



58.

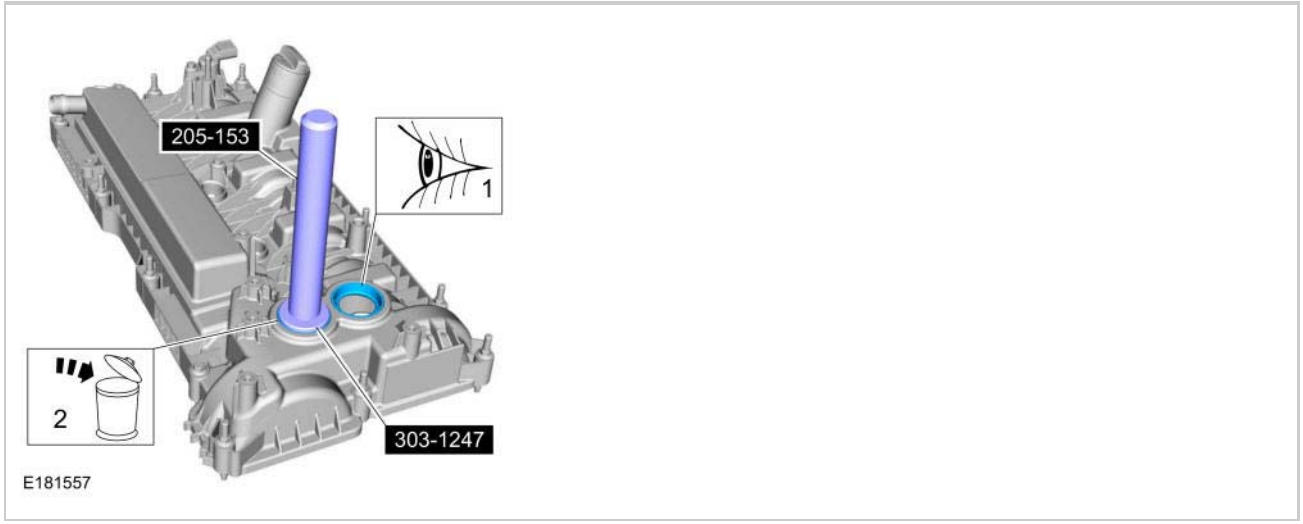
NOTE: The VCT oil control solenoid seals should only be replaced if they are damaged.

1.
Inspect the VCT oil control solenoid seals for damaged.

2.

If damaged, using the special tools, remove the VCT oil control solenoid seals and discard.

Use Special Service Tool: 205-153 (T80T-4000-W) Handle, 303-1247 VCT Spark Plug Tube Seal Remover and Installer.



NOTE: Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges which make leak paths.

59.
Make sure that the mating faces are clean and free of foreign material.



60.

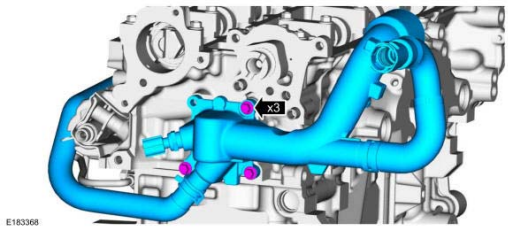
Disconnect the coolant tube and the retainers.

Use the General Equipment: Hose Clamp Remover/Installer



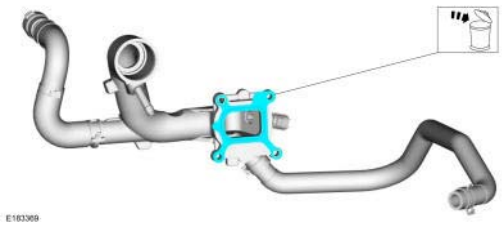
61.

Remove the bolts and the coolant outlet.



62.

Remove and discard the coolant outlet gasket.

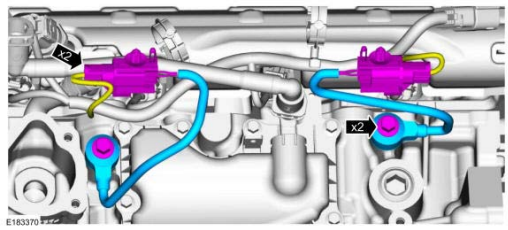


63.

Disconnect the KS electrical connectors.

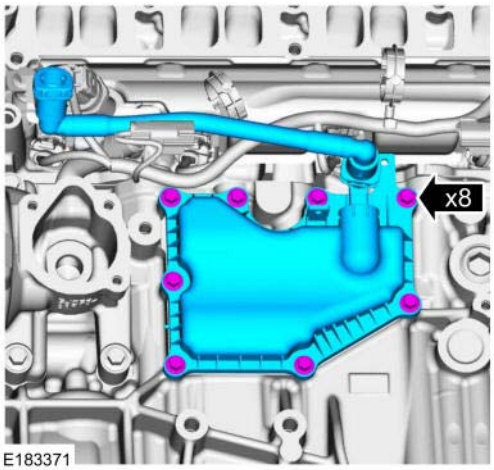
> *NOTE: Note the position of the KS for installation.*

Remove the bolts and the KS.



64.

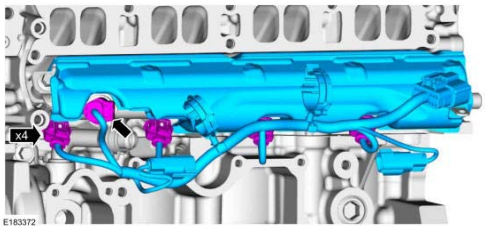
Remove the bolts and the crankcase vent separator.



65.

Remove the fuel rail shield.

Disconnect the fuel injectors and FRP sensor electrical connectors.



NOTE: Pull out the fuel rails in the direction of the fuel injector axis or damage may occur to the fuel injectors.

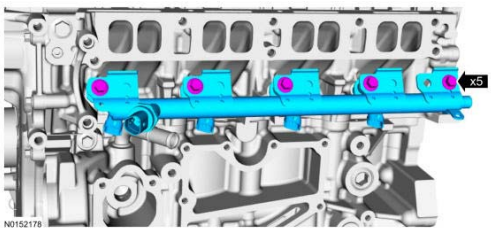
NOTE: Use compressed air and remove any dirt or foreign material from the cylinder head, block and general surrounding area of the fuel rail and injectors.

NOTE: When removing the fuel rails, the fuel injectors may remain in the fuel rails but normally remain in the cylinder head and require the use of a Fuel Injector Remover tool to extract.

66.

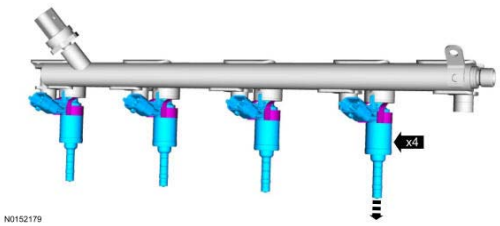
Remove the bolts and the fuel rail.

Discard the bolts.



67.

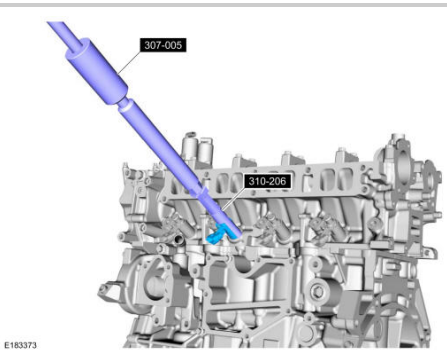
Remove any of the fuel injectors that remained in the fuel rail.



68.

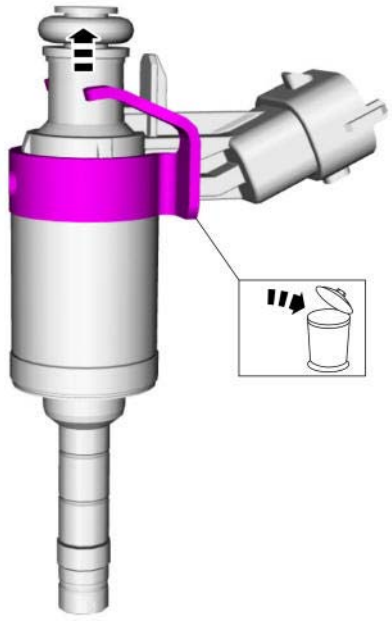
Remove any of the fuel injectors that remained in the cylinder head.

Use Special Service Tool: 307-005 (T59L-100-B) Slide Hammer, 310-206 Remover, Fuel Injector.



69.

Remove the fuel injector clip.



N0152181

NOTE: Do not attempt to cut the lower Teflon® seal without first pulling it away from the fuel injector or damage to the injector may occur.

NOTE: Be very careful when removing the lower Teflon® seals, not to scratch, nick or gouge the fuel injectors.

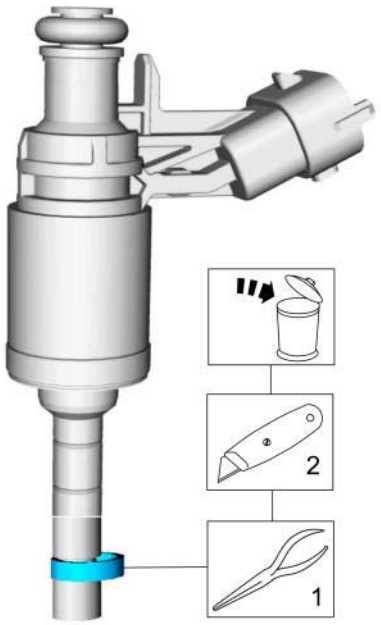
70.

1.

Pull the lower Teflon® seal away from the injector.

2.

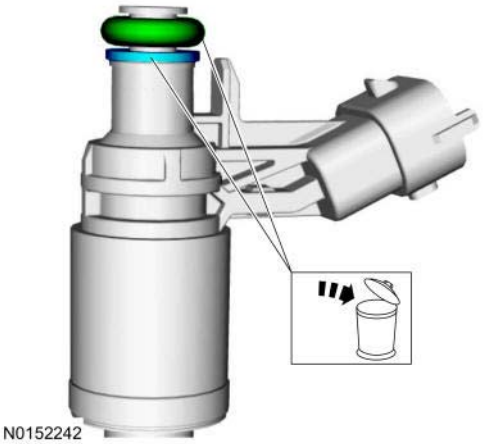
Carefully cut and discard the lower fuel injector Teflon® seals.



N0152241

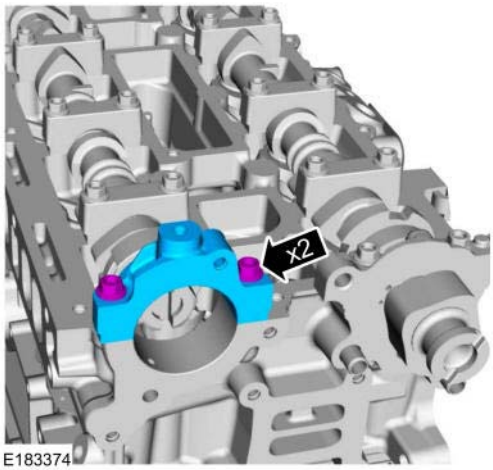
71.

Remove and discard the fuel injector seal and O-ring seal.


N0152242

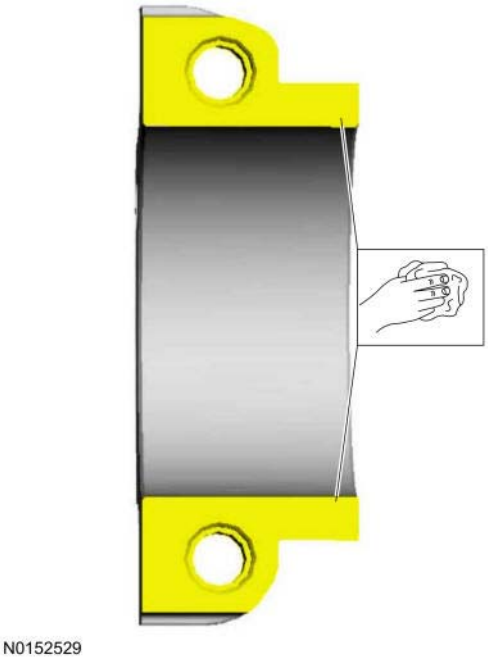
72.

Remove the bolts and camshaft rear bearing cap.



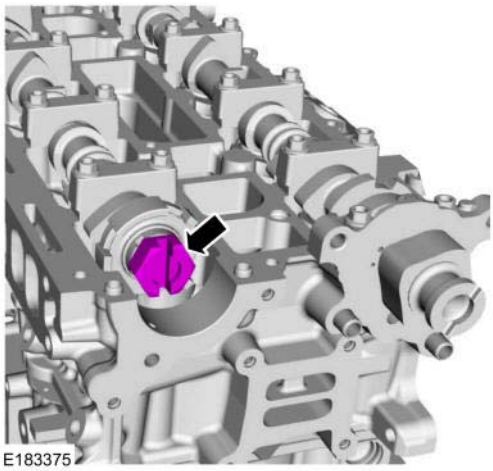
73.

Clean the camshaft rear bearing cap.



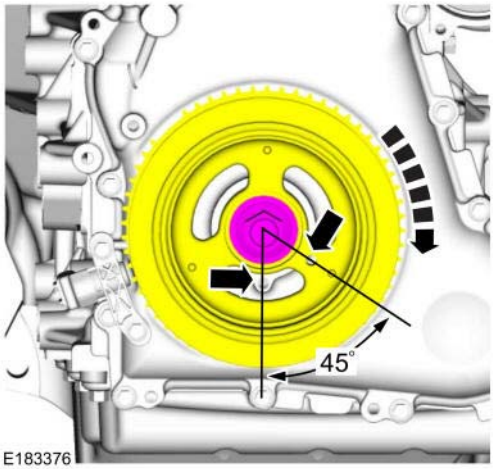
74.

Remove the camshaft drive adapter.



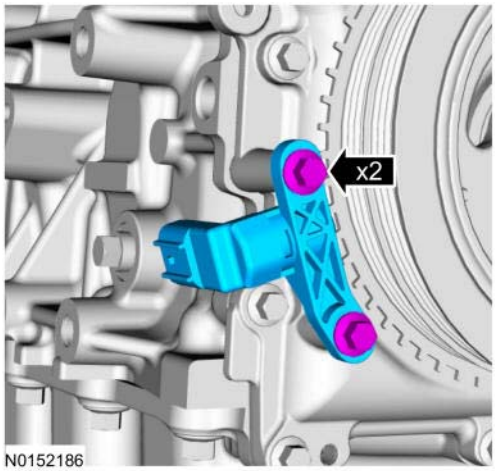
75.

Turn the crankshaft clockwise until the No. 1 piston is 45 degrees BTDC using the guide holes on the engine front cover and the crankshaft pulley.



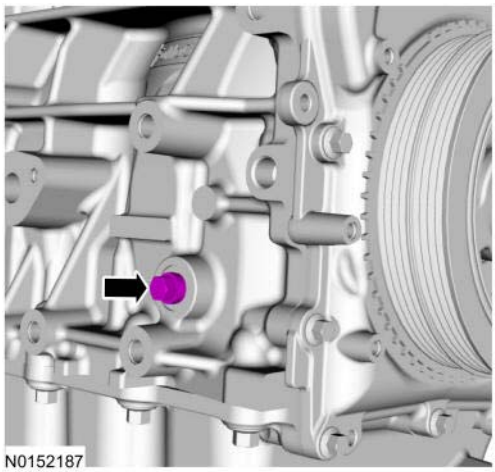
76.

Remove the bolts and the CKP sensor.



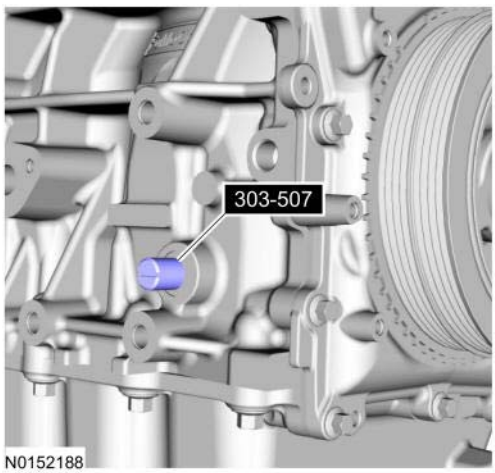
77.

Remove the engine plug bolt.



78.

Install Special Service Tool: 303-507 Timing Peg, Crankshaft TDC.

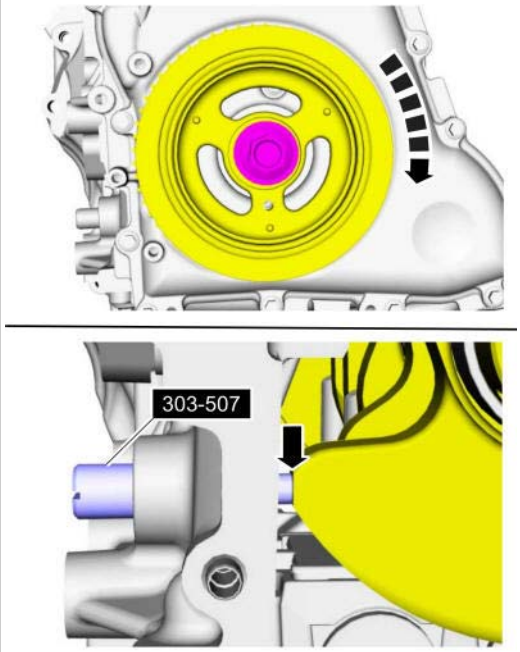


NOTE: The special tool will contact the crankshaft and prevent it from turning past TDC. However, the crankshaft can still be rotated in the counterclockwise direction. The crankshaft must remain at the TDC position during the crankshaft pulley removal and installation.

NOTE: The engine front cover is removed from graphic for clarity.

79.
Rotate the crankshaft clockwise until it contacts the special tool.

Use Special Service Tool: 303-507 Timing Peg, Crankshaft TDC.

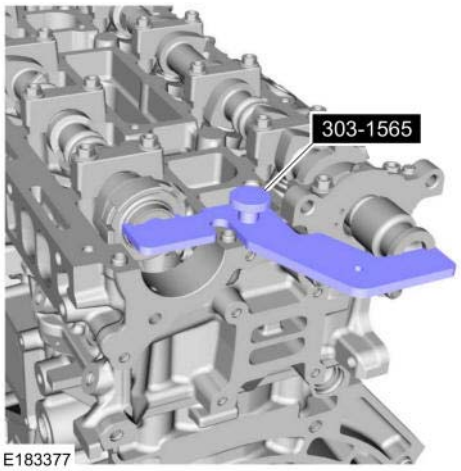


NOTE: The Camshaft Alignment Tool is for camshaft alignment only. Using this tool to prevent engine rotation can result in engine damage.

NOTE: The camshaft timing slots are offset. If the Camshaft Alignment Tool cannot be installed, remove the TDC Timing Peg and rotate the crankshaft three-fourths of a revolution clockwise and repeat the previous 2 steps of this procedure.

80.
Tighten the retainer

Install Special Service Tool: 303-1565 Alignment Tool, Camshaft.



NOTE: The crankshaft must remain in the TDC position during removal of the pulley bolt or damage to the engine can occur. Therefore, the crankshaft pulley must be held in place with the Strap Wrench and the bolt should be removed using an air impact wrench (1/2-in drive minimum).

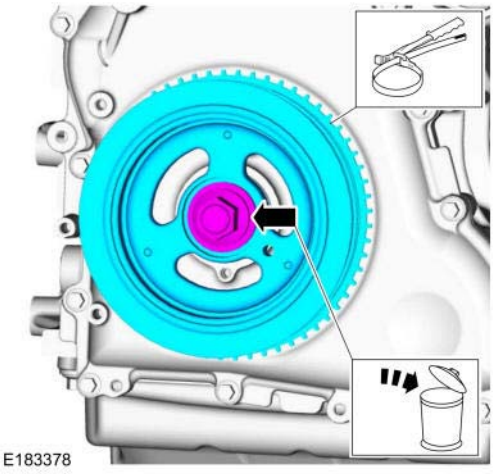
NOTE: The crankshaft sprocket diamond washer may come off with the crankshaft pulley.

81.

Using a strap wrench, remove the bolt and the crankshaft pulley.

Use the General Equipment: Strap Wrench

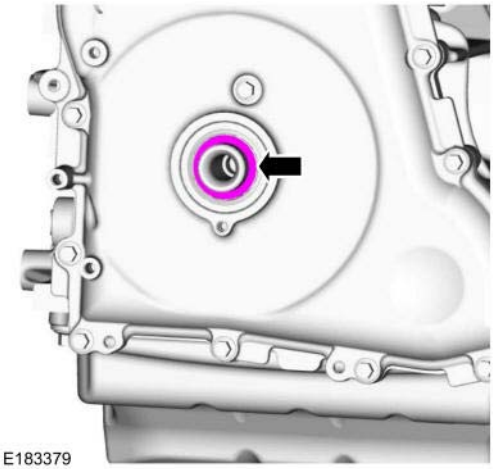
Discard the bolt and washer.



NOTE: The crankshaft sprocket diamond washer may come off with the crankshaft pulley. The diamond washer should be cleaned and inspected for any damage. If

damage is evident, replace the diamond washer. If no damage, the diamond washer is to be reused during installation. If the diamond washer is not installed, engine damage may occur.

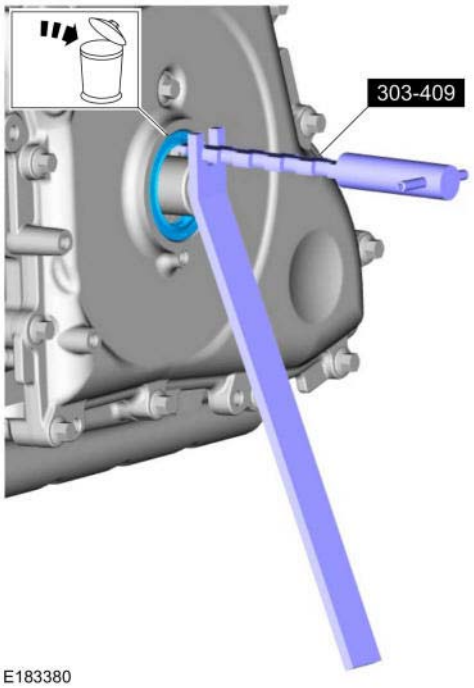
82.
If the diamond washer did not come off with the crankshaft pulley, remove the diamond washer.



NOTE: Use care not to damage the engine front cover or the crankshaft when removing the seal.

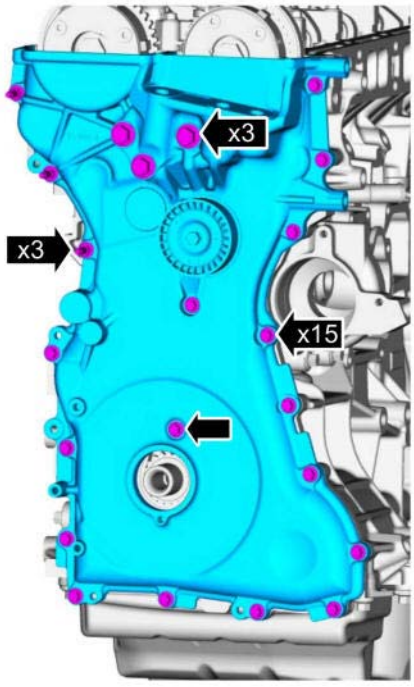
83.
Using the crankshaft seal remover, remove the crankshaft front seal and discard.

Use Special Service Tool: 303-409 (T92C-6700-CH) Remover, Crankshaft Seal.



84.

Remove the bolts and the engine front cover.



NOTE: Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges, which make leak paths. Use a plastic scraping tool to remove traces of silicone sealant.

85.
Make sure that the mating faces are clean and free of foreign material. Refer to: RTV Sealing Surface Cleaning and Preparation .

Use the General Equipment: Plastic Scraper

Material

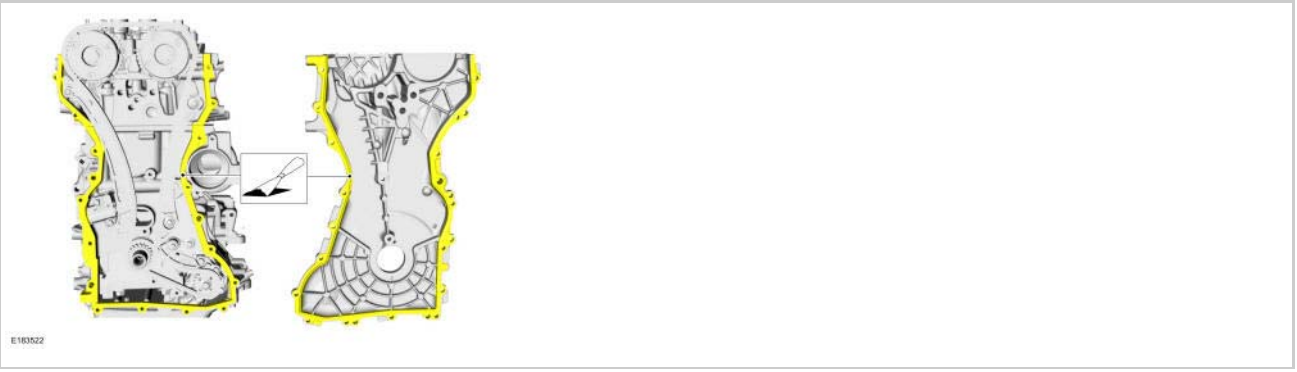
: Motorcraft® Silicone Gasket Remover / ZC-30-A

Material

: Metal Brake Parts Cleaner (U.S.) / PM-4-A, PM-4-B (U.S.)

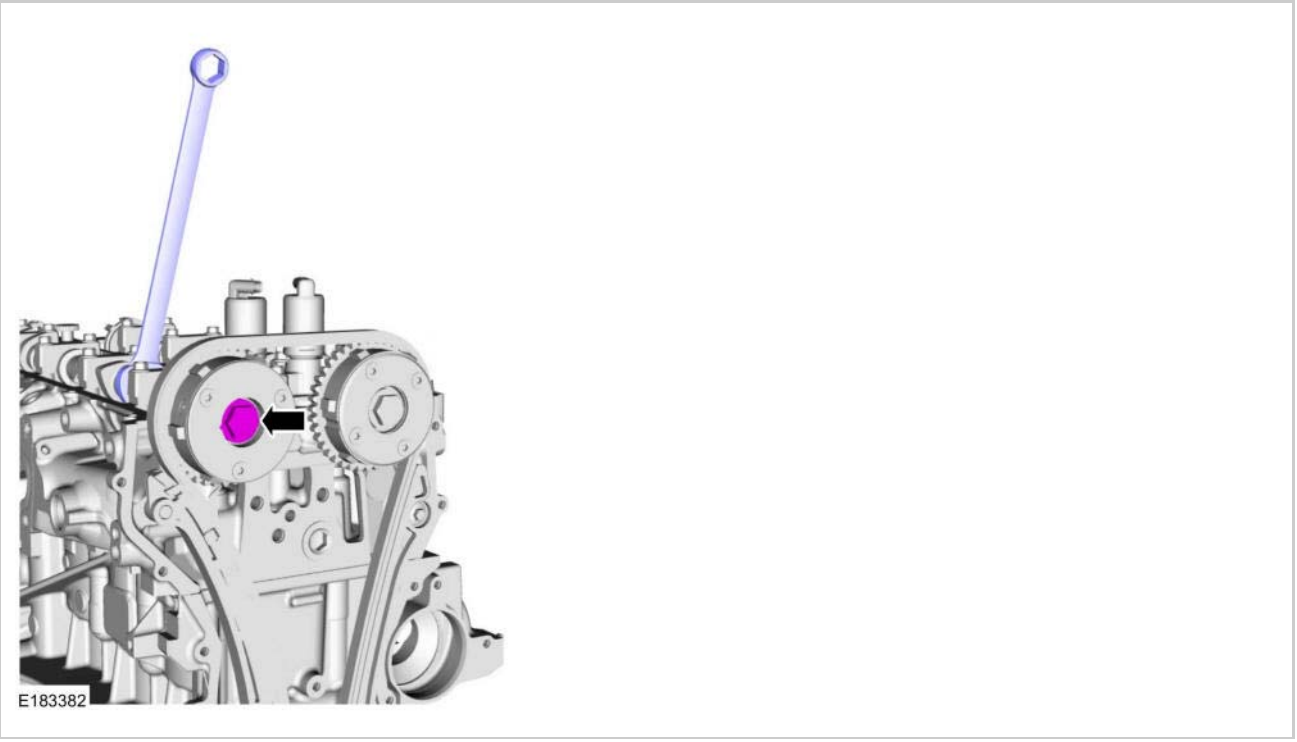
Material

: Motorcraft® Metal Surface Prep / ZC-31-B



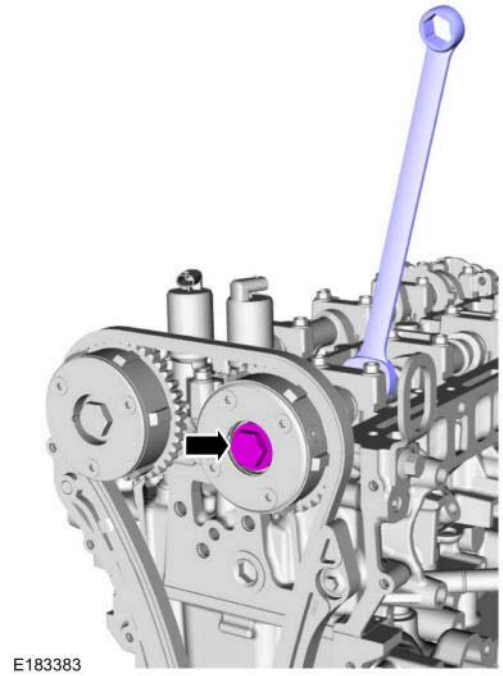
NOTE: Use an open-ended wrench to prevent the component from turning.

86.
Loosen the bolt for the exhaust VCT unit.



NOTE: Use an open-ended wrench to prevent the component from turning.

87.
Loosen the bolt for the intake VCT unit.



88.

1.

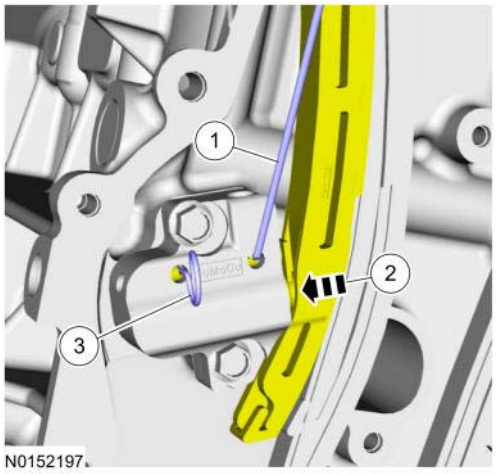
Using a small pick, release and hold the ratchet mechanism.

2.

While holding the ratchet mechanism in the released position, compress the tensioner by pushing the timing chain arm toward the tensioner.

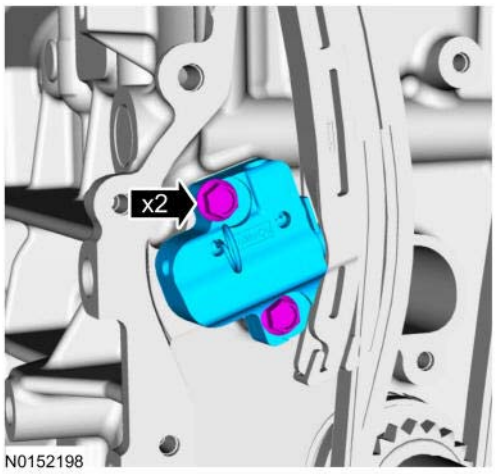
3.

Insert a holding pin into the hole to retain the tensioner.



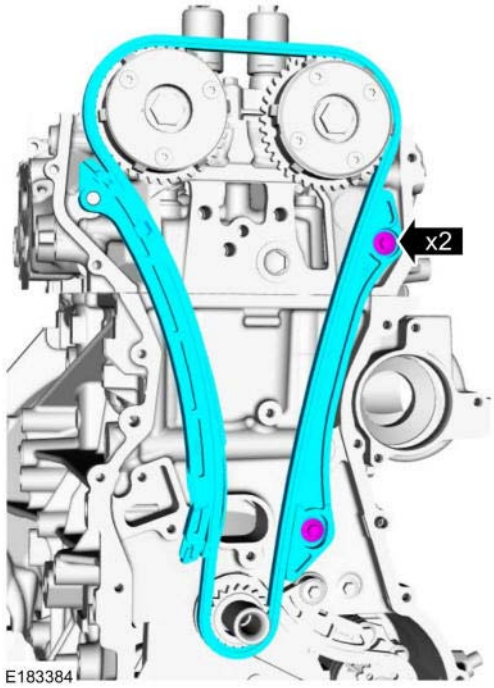
89.

Remove the bolts and the timing chain tensioner.



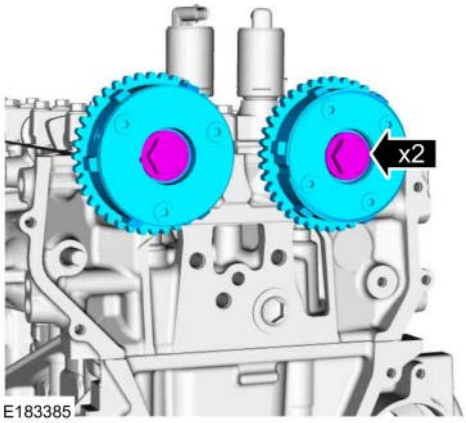
90.

Remove the bolts and the timing chain guide, timing chain and tensioner arm.



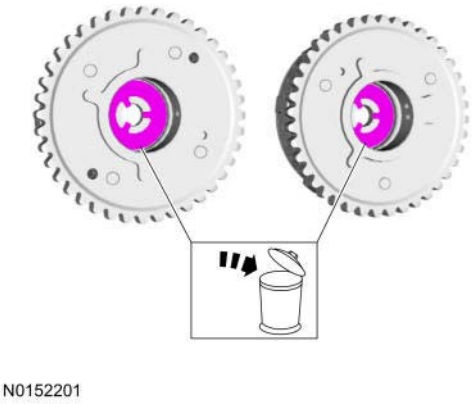
91.

Remove the bolts and the VCT units.



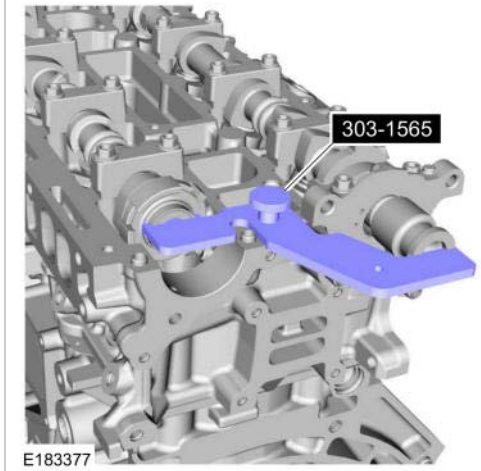
NOTE: Washers are not required for installation of the VCT units.

92.
If equipped, discard the washers.



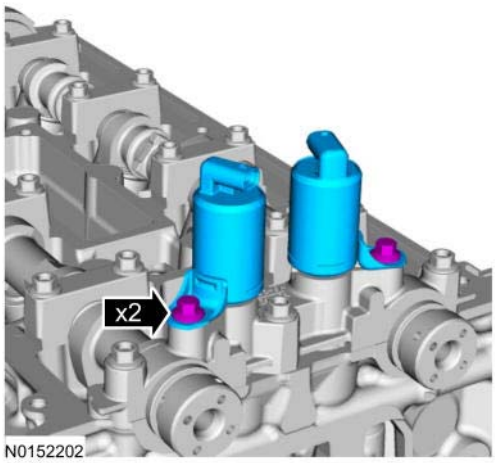
93.

Remove Special Service Tool: 303-1565 Alignment Tool, Camshaft.



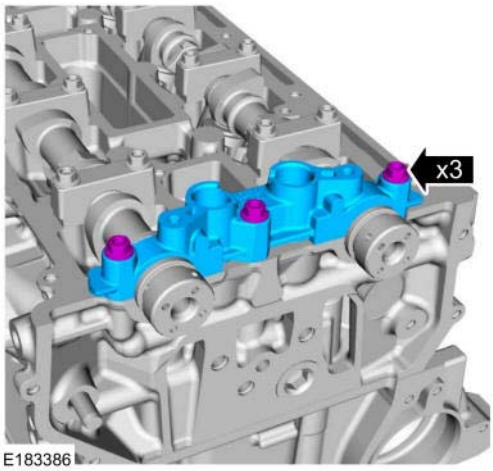
94.

Remove the bolts and the VCT oil control solenoids.



95.

Remove bolts and front camshaft bearing cap.

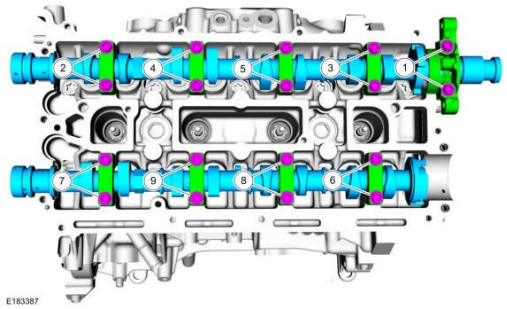


NOTE: Failure to follow the camshaft loosening procedure can result in damage to the camshafts.

NOTE: Note the location and orientation of each camshaft bearing cap and the position of the camshaft lobes on the No. 1 cylinder for installation reference.

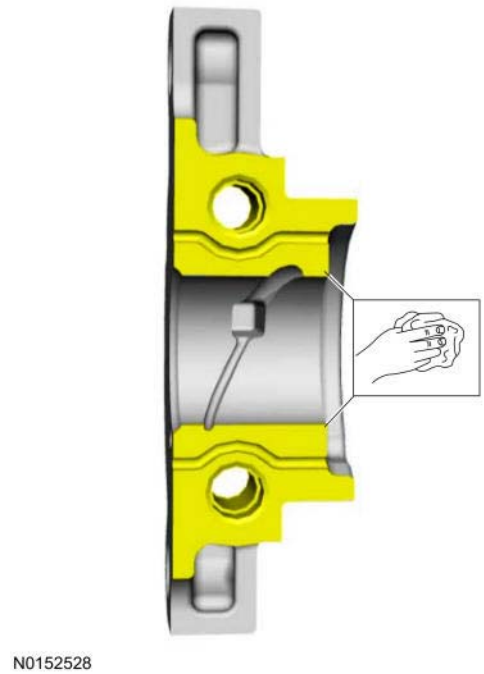
NOTE: Inspect the camshaft bores for any scratches that can be felt by hand.

96.
Loosen the camshaft bearing caps in sequence 2 turns at a time until all tension is released from the camshaft bearing caps and remove the camshaft bearing caps and camshafts.



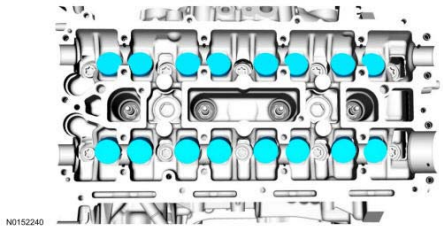
97.

Clean the rear camshaft cap.



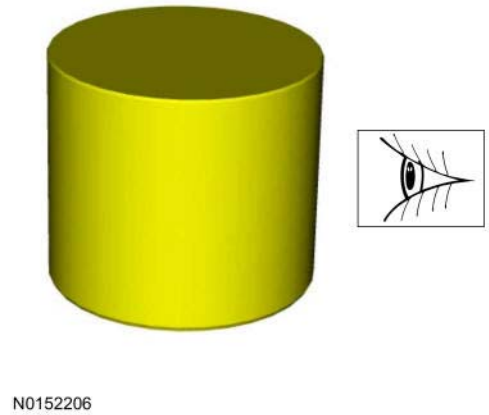
NOTE: If the camshafts and valve tappets are to be reused, mark the location of the valve tappets to make sure they are assembled in their original positions.

98.
Remove the valve tappets.



NOTE: The number on the valve tappets only reflects the digits that follow the decimal. For example, a tappet with the number 0.650 has the thickness of 3.650 mm.

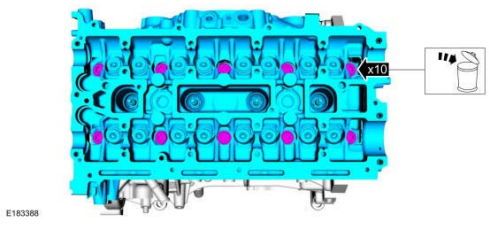
99.
Inspect the valve tappets.



100.

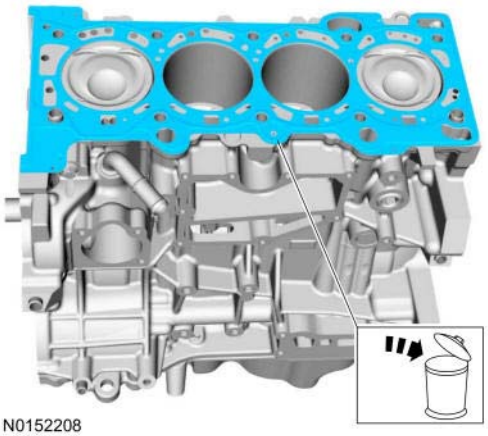
Remove the bolts and the cylinder head.

Discard the bolts.



101.

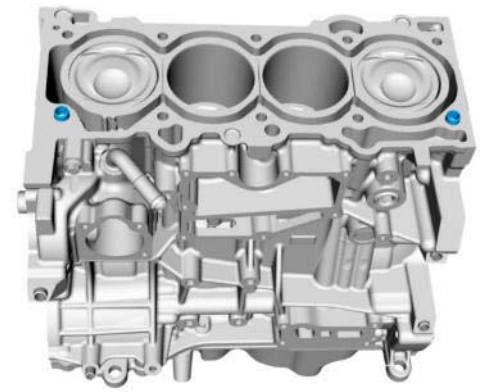
Remove and discard the cylinder head gasket.



N0152208

102.

Remove the cylinder block bushings.

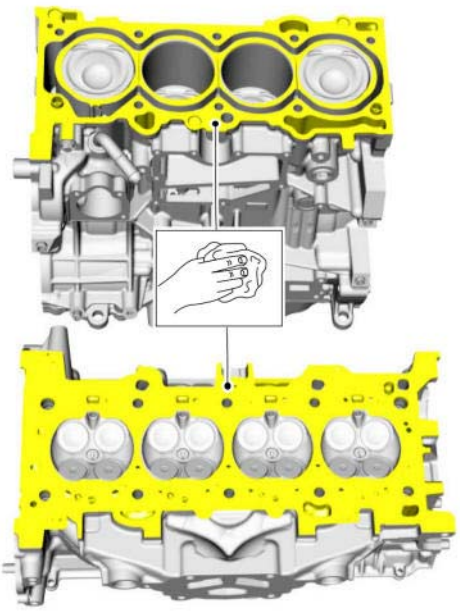


E175369

NOTE: Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges that make leak paths. Use a plastic scraping tool to remove all traces of the head gasket.

NOTE: Clean the cylinder head bolt holes in the cylinder block. Make sure all coolant, oil or other foreign material is removed.

103.
Make sure that the mating faces are clean and free of foreign material.



E183389

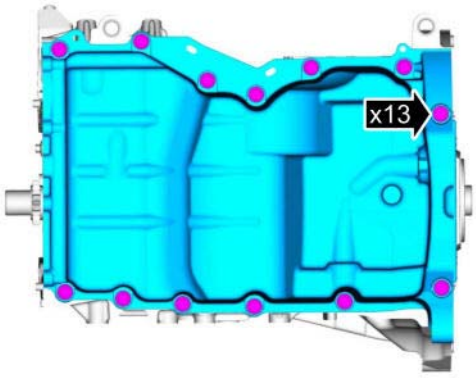
104.

Check the cylinder block distortion. Refer to: Cylinder Block Distortion .

Check the cylinder head distortion. Refer to: Cylinder Head Distortion .

105.

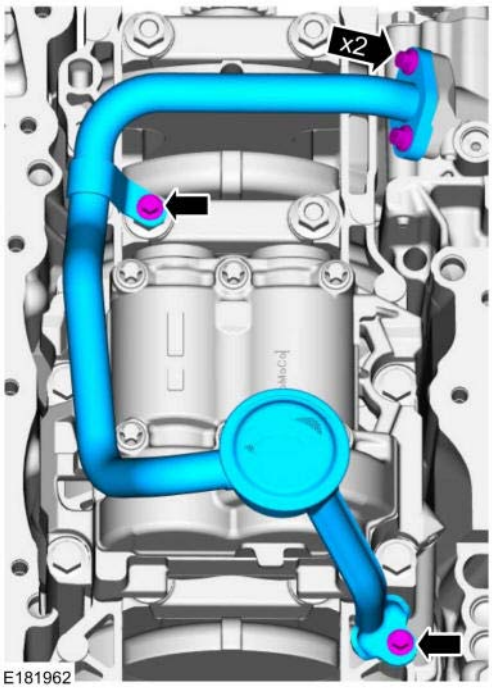
Remove the bolts and the oil pan.



E183390

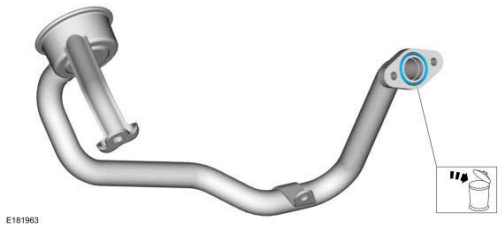
106.

Remove the bolts and the oil pump screen and pickup tube.



107.

Remove and discard the oil pump screen and pickup tube gasket.



NOTE: Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges, which make leak paths. Use a plastic scraping tool to remove traces of sealant.

108.
Make sure that the mating faces are clean and free of foreign material. Refer to: RTV Sealing Surface Cleaning and Preparation .

Use the General Equipment: Plastic Scraper

Material

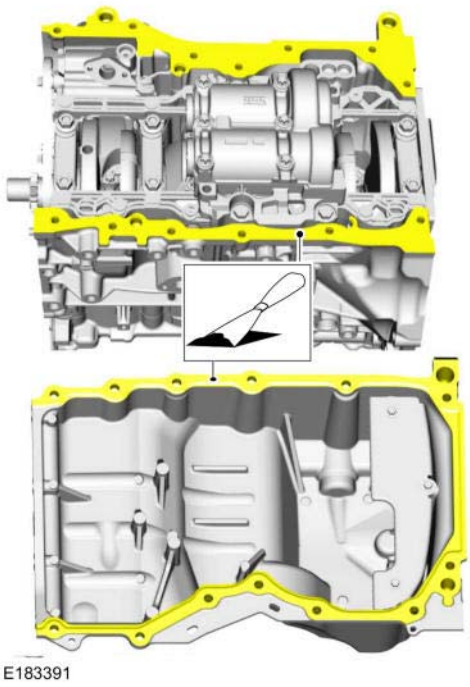
: Motorcraft® Silicone Gasket Remover / ZC-30-A

Material

: Metal Brake Parts Cleaner (U.S.) / PM-4-A, PM-4-B (U.S.)

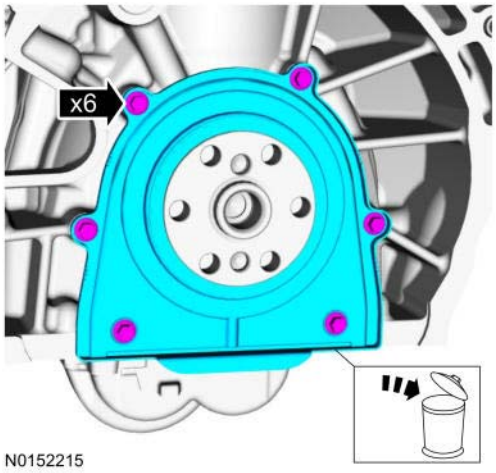
Material

: Motorcraft® Metal Surface Prep / ZC-31-B


E183391

109.

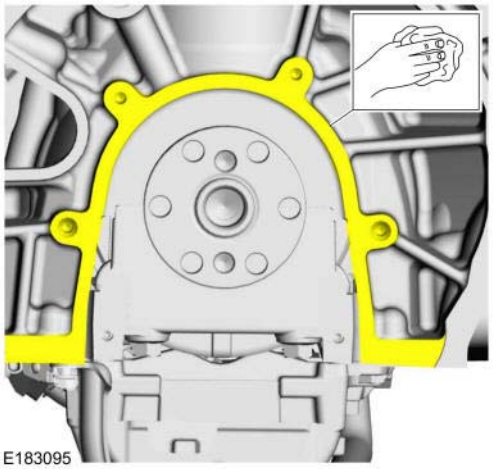
Remove the bolts and the crankshaft rear seal. Discard the crankshaft rear seal.



N0152215

NOTE: Do not use wire brushes, power abrasive discs or 3M™ Roloc® Bristle Disk (2-in white, part number 07528) to clean the sealing surfaces of the engine block. These tools cause scratches and gouges that make leak paths. They also cause contamination that causes premature engine failure. Remove all traces of the gasket.

110.
Make sure that the mating faces are clean and free of foreign material.



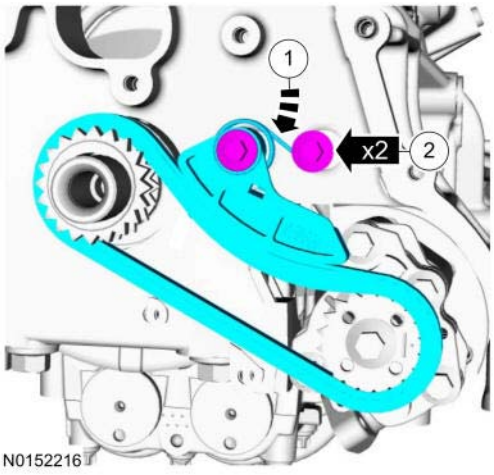
111.

1.

Release the tension on the tensioner spring.

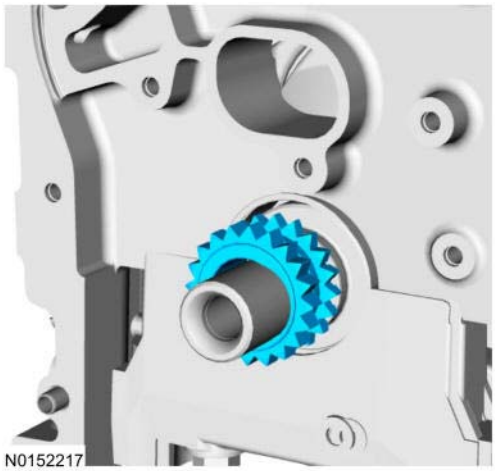
2.

Remove the shoulder bolts, tensioner and timing chain.



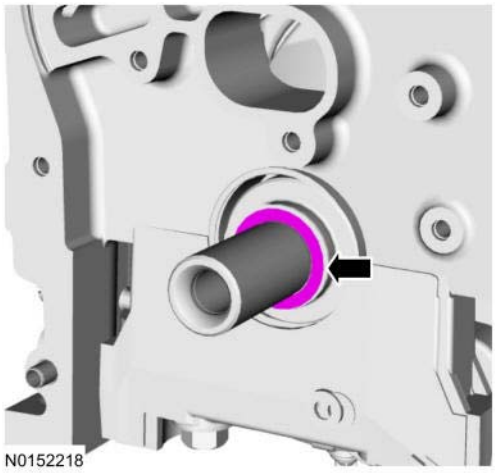
112.

Remove the crankshaft sprocket.



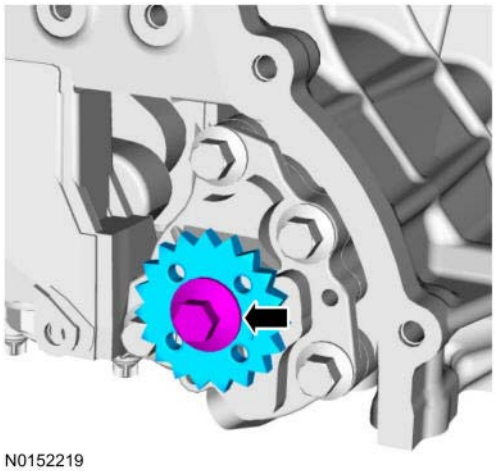
NOTE: The diamond washer should be cleaned and inspected for any damage. If damage is evident, replace the diamond washer. If no damage, the diamond washer is to be reused during installation. If the diamond washer is not installed, engine damage may occur.

113.
Remove the diamond washer.



114.

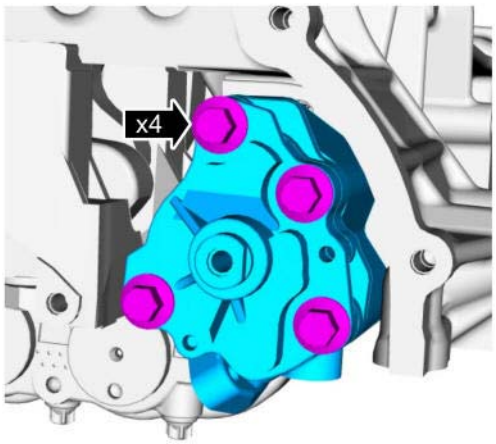
Remove the bolt and oil pump sprocket.



N0152219

115.

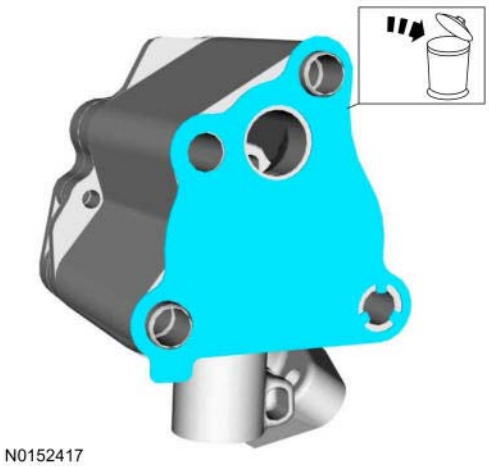
Remove the bolts and the oil pump.



N0152220

116.

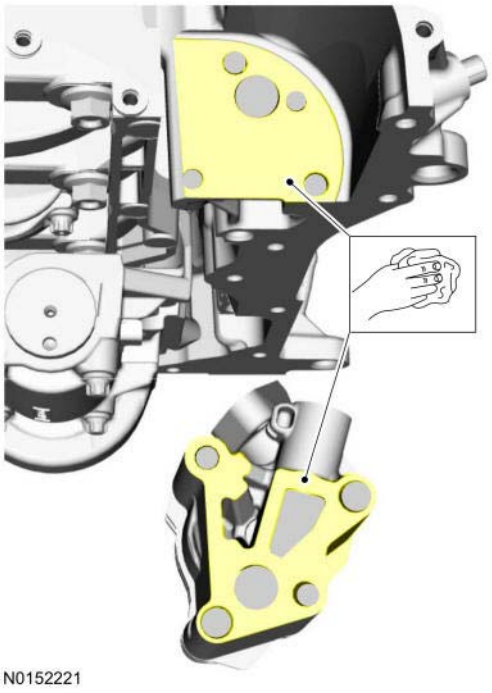
Remove and discard the oil pump gasket.



N0152417

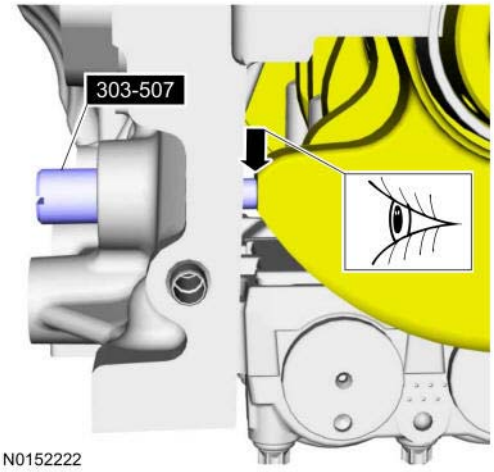
117.

Make sure that the mating faces are clean and free of foreign material.



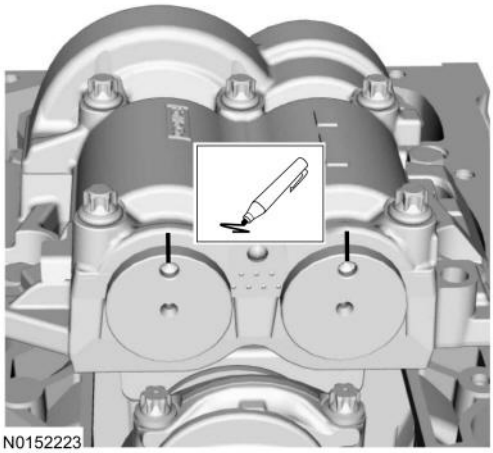
NOTE: Make sure the Crankshaft TDC Timing Peg is still installed and the engine is still at TDC.

118.
Rotate the crankshaft until it contacts the special tool.



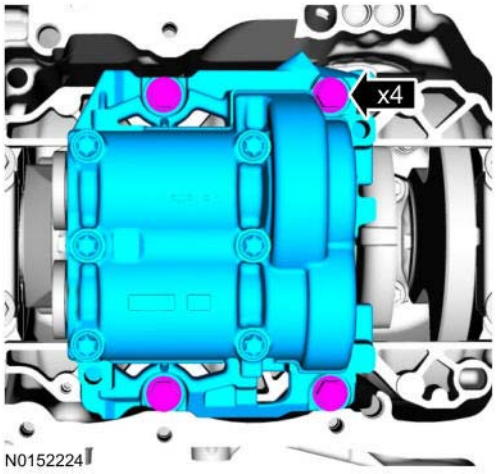
NOTE: Mark the balance shaft assembly front shafts on the top for reference that the balance shaft assembly is at TDC.

119.
Index-mark the balance shaft assembly.



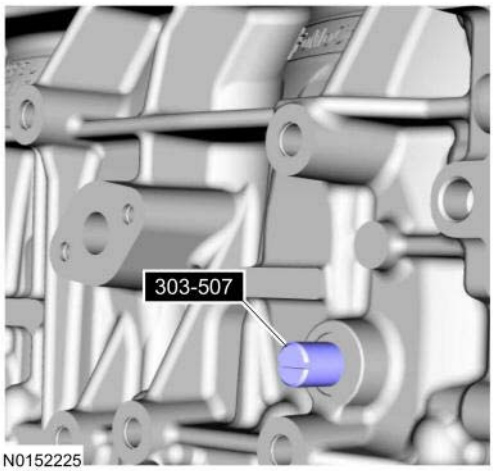
NOTE: Due to the precision interior construction of the balance shaft assembly, it should not be disassembled.

120.
Remove the bolts and the balance shaft assembly.



121.

Remove Special Service Tool: 303-507 Timing Peg, Crankshaft TDC.



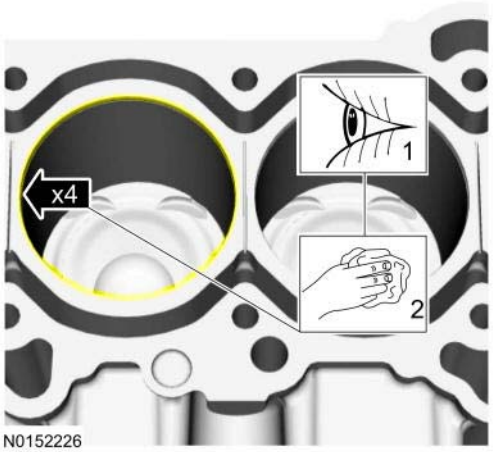
122.

1.

Inspect ridge.

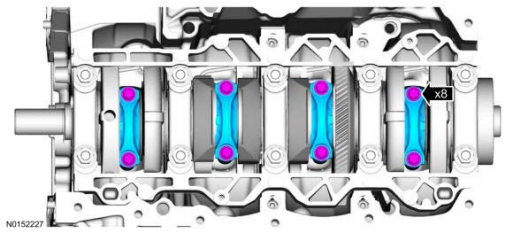
NOTE: Remove the carbon buildup, do not scratch the cylinder wall. Remove all debris from the cylinder.

2.
Clean with abrasive pad.



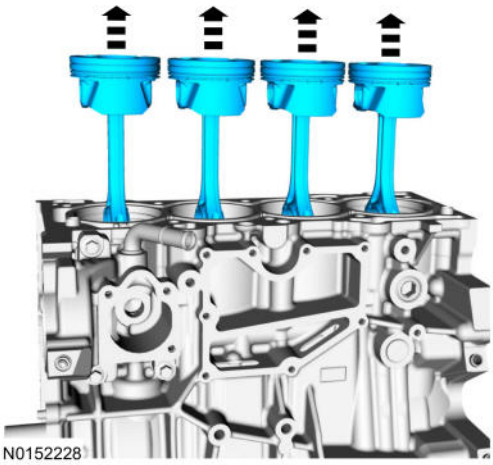
NOTE: Clearly mark the connecting rods, connecting rod caps and connecting rod bearings in numerical order for correct orientation for reassembly.

123.
Remove the bolts and the connecting rod caps.



NOTE: Do not scratch the cylinder walls or crankshaft journals with the connecting rod.

124.
Remove the pistons.



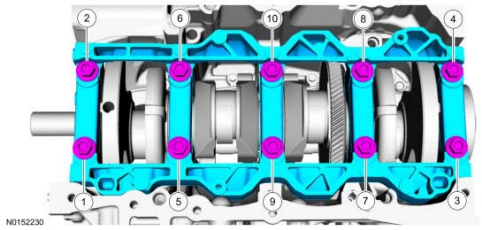
NOTE: Mark the position of the parts, so they can be installed in their original positions.

125.
Remove the connecting rod bearings. Refer to: Piston Inspection .



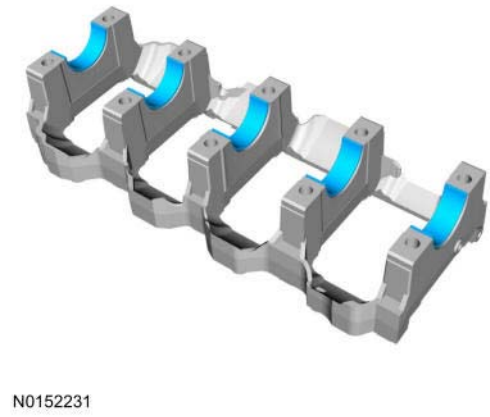
126.

Remove the bolts and the main bearing beam.



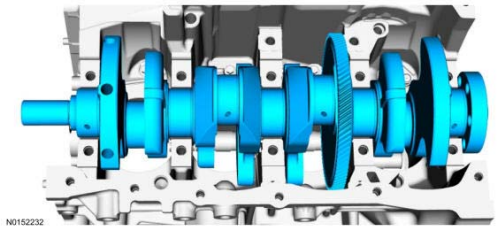
NOTE: If the main bearings are being reused, mark them in order for correct orientation and reassembly.

127.
Remove the main bearing beam bearings.



128.

Remove the crankshaft.

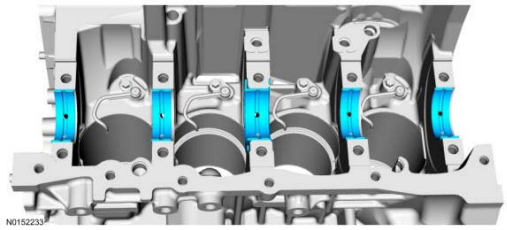


NOTE: The center bulkhead has the thrust bearing.

NOTE: If the main bearings are being reused, mark them in order for correct

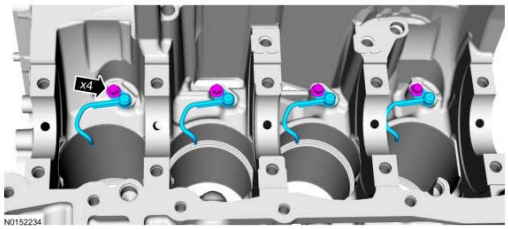
orientation and reassembly.

129.
Remove the crankshaft main bearings.



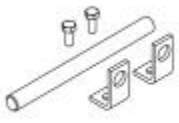
130.

Remove the bolts and the engine piston oil cooler valves.

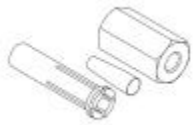


DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES > CYLINDER HEAD

Special Tool(s) / General Equipment

 E223048	303-1249 Valve Spring Compressor TKIT-2006UF-FLM TKIT-2006UF-ROW
 E222987	303-1567 Sizer, Teflon Seal TKIT-2010C-FLM
 E134677	303-300 (T87C-6565-A) Set, Valve Spring Compressor T88C-1000-ST TKIT-1988-FESTIVA TKIT-1988-TRACER TKIT-2009TC-F

 E134678	303-350 (T89P-6565-A) Compressor, Valve Spring TKIT-1989-F TKIT-1989-FLM TKIT-1989-FM TKIT-1990-LMH
 E223049	303-468 (T94P-6510-AH) Remover, Valve Stem Oil Seal TKIT-1994-FH/FMH/FLMH TKIT-1994-LMH/MH2
 E223050	303-470 (T94P-6510-CH) Installer, Valve Stem Oil Seal TKIT-1994-FH/FMH/FLMH TKIT-1994-LMH/MH2 TKIT-2009TC-F
 E134679	303-472 (T94P-6565-AH) Adapter, Valve Spring Compressor TKIT-1994-FH/FMH/FLMH TKIT-1994-LMH/MH2
 E222982	307-005 (T59L-100-B) Slide Hammer
 E223046	310-205 Fuel Injector Brush
 E168032	310-206 Remover, Fuel Injector TKIT-2009A-FLM

 E223047	310-207 Installer, Fuel Injector Seal Assembly TKIT-2009A-FLM
Knife	
Long Nose Pliers	

Materials

Name	Specification
Motorcraft® Multi-Purpose Grease SprayXL-5-A	ESB-M1C93-B
Motorcraft® SAE 5W-30 Premium Synthetic Blend Motor Oil (U.S.) XO-5W30-QSP (U.S.)	WSS-M2C946-A

DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES > CYLINDER HEAD > DISASSEMBLY

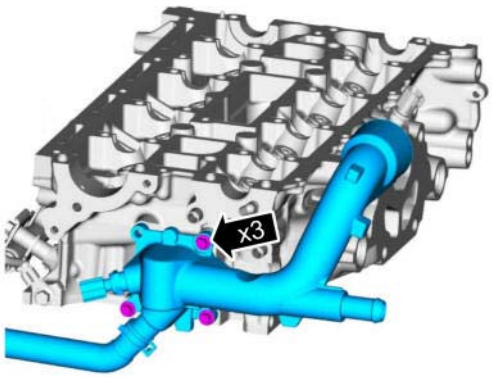
NOTE: During engine repair procedures, cleanliness is extremely important. Any foreign material, including any material created while cleaning gasket surfaces, that enters the oil passages, coolant passages or the oil pan can cause engine failure.

NOTE: Aluminum surfaces are soft and can be scratched easily. Never place the cylinder head gasket surface, unprotected, on a bench surface.

NOTE: If the components are to be reinstalled, mark the location of the components removed, they must be installed in the same location.

1.

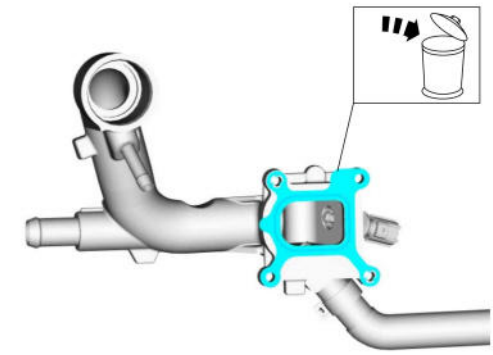
Remove the bolts and coolant outlet.



E182945

2.

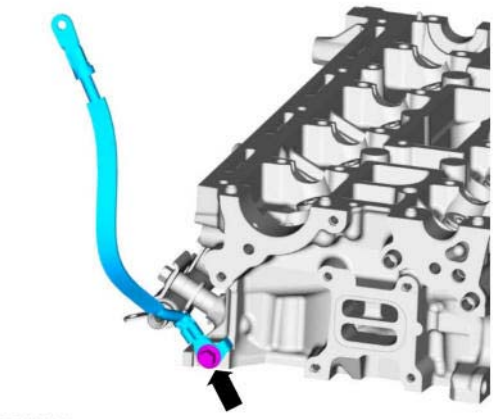
Remove and discard the coolant outlet gasket.



E182946

3.

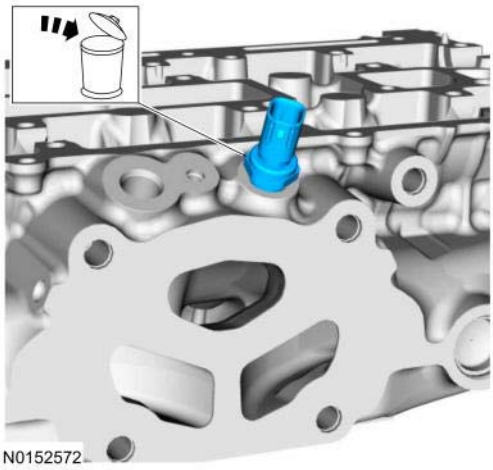
Remove the bolt and the ground wire.



E182947

4.

Remove and discard the CHT sensor.



NOTE: Pull out the fuel rails in the direction of the fuel injector axis or damage may occur to the fuel injectors.

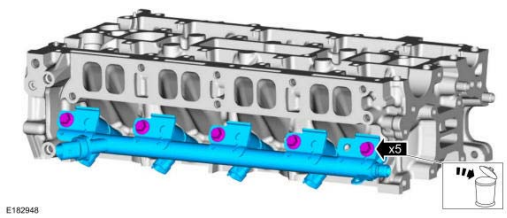
NOTE: Use compressed air and remove any dirt or foreign material from the cylinder head, block and general surrounding area of the fuel rail and injectors.

NOTE: When removing the fuel rails, the fuel injectors may remain in the fuel rails but normally remain in the cylinder head and require the use of a Fuel Injector Remover tool to extract.

5.

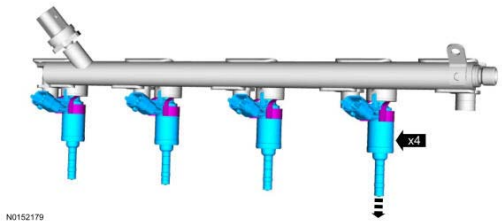
Remove the bolts and the fuel rail.

Discard the bolts.



6.

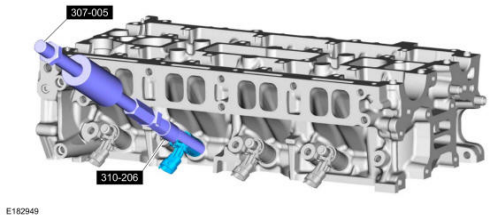
Remove any of the fuel injectors that remained in the fuel rail.



7.

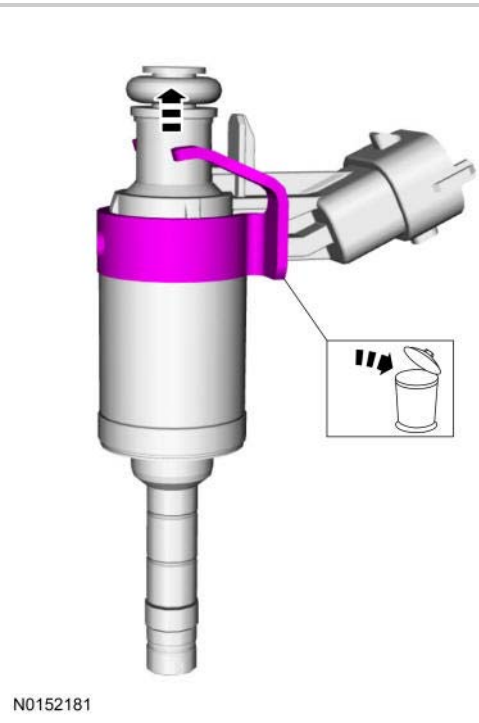
Remove any of the fuel injectors that remained in the cylinder head.

Use Special Service Tool: 310-206 Remover, Fuel Injector, 307-005 (T59L-100-B) Slide Hammer.



8.

Remove the fuel injector clip.



NOTE: Do not attempt to cut the lower Teflon® seal without first pulling it away from the fuel injector or damage to the injector may occur.

NOTE: Be very careful when removing the lower Teflon® seals, not to scratch, nick or gouge the fuel injectors.

9.

1.

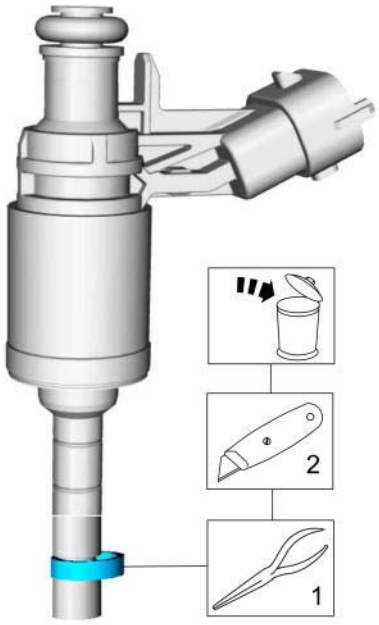
Pull the lower Teflon® seal away from the injector.

Use the General Equipment: Long Nose Pliers

2.

Carefully cut and discard the lower fuel injector Teflon® seals.

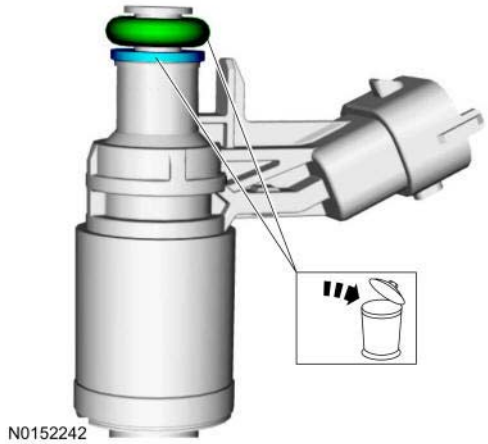
Use the General Equipment: Knife



N0152241

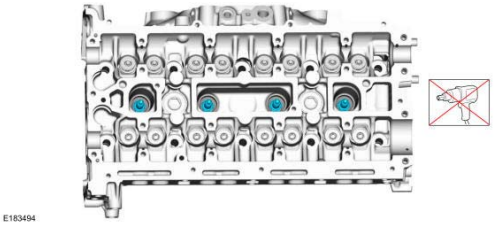
10.

Remove and discard the fuel injector seal and O-ring seal.



NOTE: Use compressed air to remove any foreign material in the spark plug well before removing the spark plugs.

11.
Remove the spark plugs.



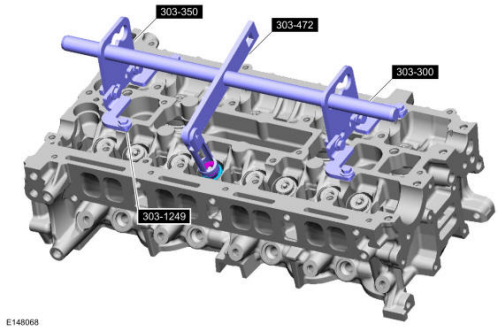
NOTE: Use a small screwdriver and multi-purpose grease to remove the valve collets.

12.
Using the special tools, remove the valve collet, valve spring retainer and the valve spring.

Use Special Service Tool: 303-300 (T87C-6565-A) Set, Valve Spring Compressor, 303-350 (T89P-6565-A) Compressor, Valve Spring, 303-472 (T94P-6565-AH) Adapter, Valve Spring Compressor, 303-1249 Valve Spring Compressor.

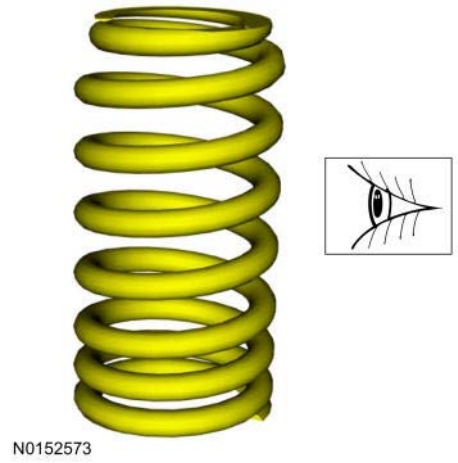
Material

: Motorcraft® Multi-Purpose Grease Spray / XL-5-A (ESB-M1C93-B)



13.

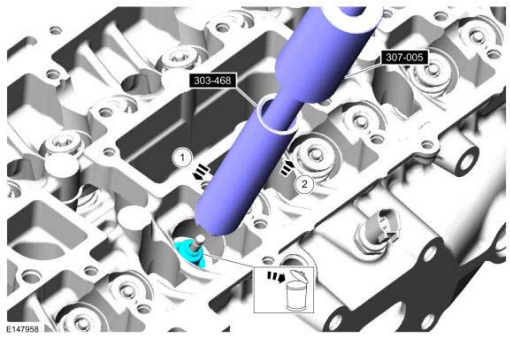
Inspect and install new parts, as necessary.



14.

Using the special tool, remove the valve seals.

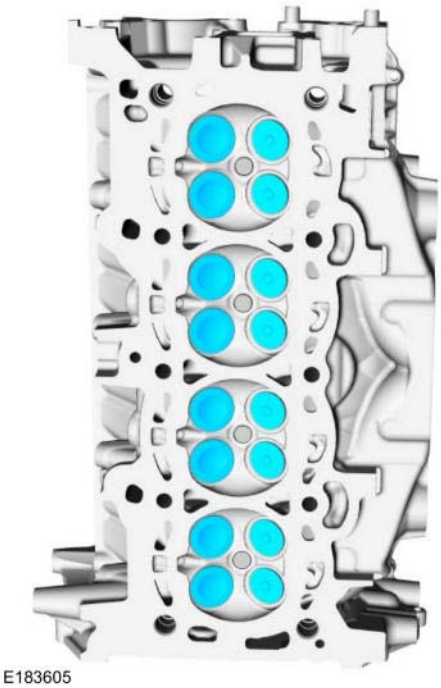
Use Special Service Tool: 303-468 (T94P-6510-AH) Remover, Valve Stem Oil Seal, 307-005 (T59L-100-B) Slide Hammer.



NOTE: Note the location of the valves if they are to be reused.

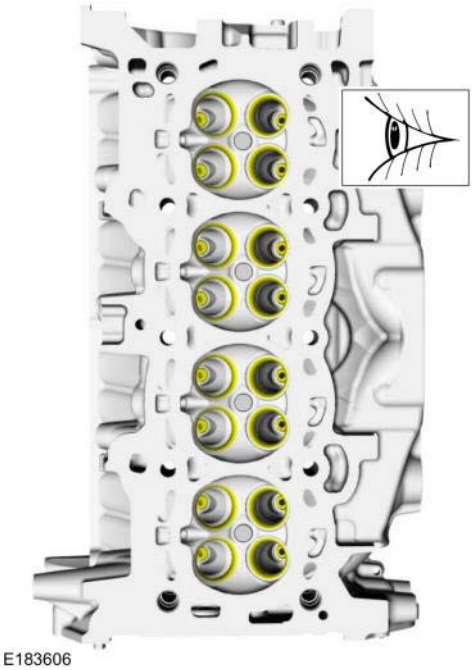
15.

Remove the intake and exhaust valves.


E183605

16.

Inspect the intake and exhaust valves seats.


E183606

NOTE: Install new parts, as necessary.

17.

1.

Inspect the end of the stem for grooves or scoring.

2.

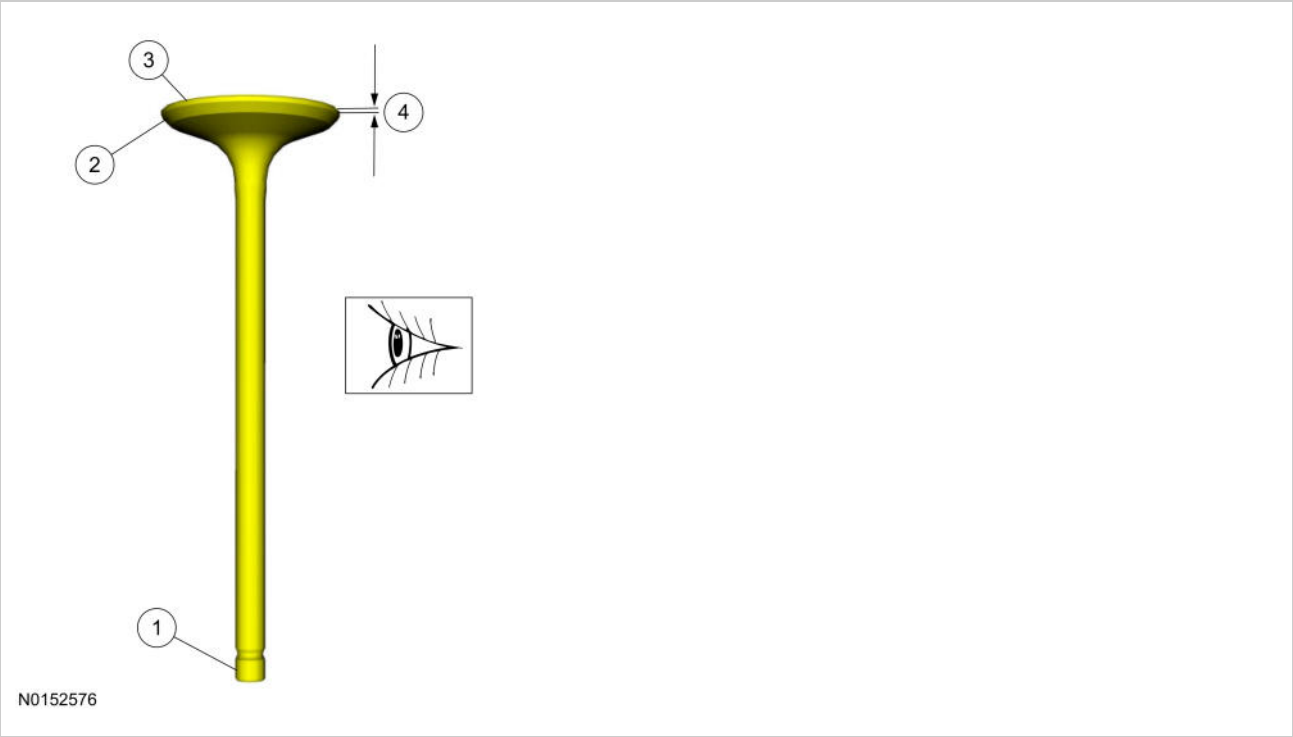
Inspect the valve face and the edge for pits, grooves or scores.

3.

Inspect the valve head for signs of burning, erosion, warpage and cracking.

4.

Inspect the valve margin for wear.



DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES > CYLINDER HEAD > ASSEMBLY

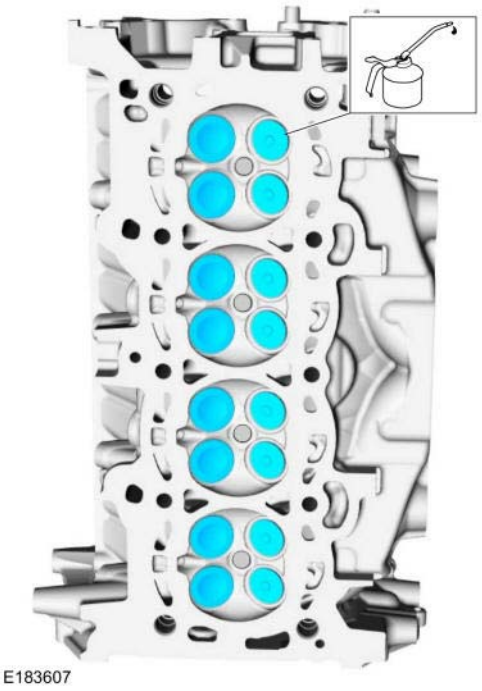
NOTE: If installing the original valves, make sure the valves are installed in the same position from which they were removed. Coat the valve stems with clean engine oil.

1.
Install the intake and exhaust valves.

Material

: Motorcraft® SAE 5W-30 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W30-QSP (U.S.)

(WSS-M2C946-A)



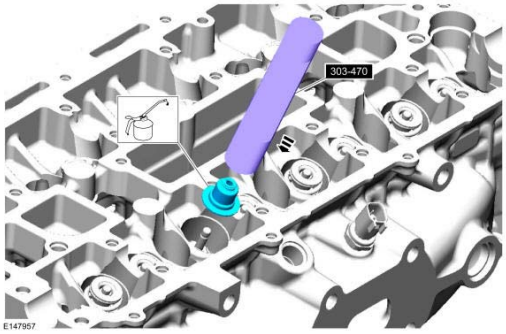
2.

Using the special tool, install the valve seals.

Use Special Service Tool: 303-470 (T94P-6510-CH) Installer, Valve Stem Oil Seal.

Material

: Motorcraft® SAE 5W-30 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W30-QSP (U.S.) (WSS-M2C946-A)



NOTE: Use a small screwdriver and multi-purpose grease to install the valve collets. Check the seating of the valve collet.

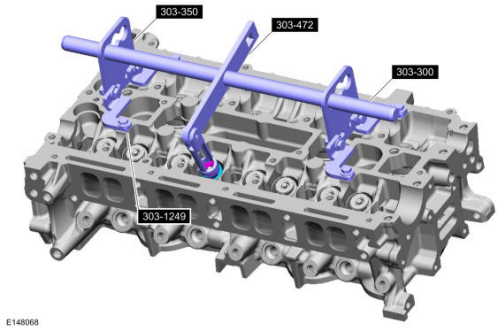
3.
Using the special tools, install the valve spring, valve spring retainer and the valve collet.

Use Special Service Tool: 303-300 (T87C-6565-A) Set, Valve Spring Compressor, 303-350

(T89P-6565-A) Compressor, Valve Spring, 303-472 (T94P-6565-AH) Adapter, Valve Spring Compressor, 303-1249 Valve Spring Compressor.

Material

: Motorcraft® Multi-Purpose Grease Spray / XL-5-A (ESB-M1C93-B)

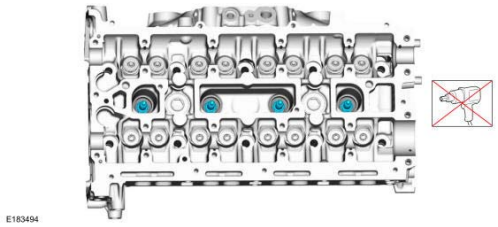


NOTE: If a spark plug is dropped, internal damage may result and the spark plug must be discarded. The use of a damaged spark plug may cause cylinder misfire resulting in engine damage.

4.
Install the spark plugs.

Torque

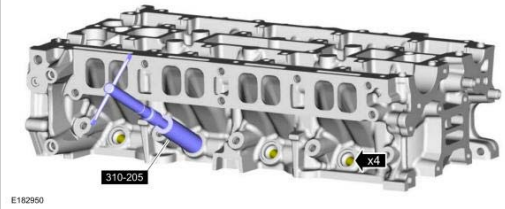
: 106 lb.in (12 Nm)



NOTE: Do not use compressed air or the Fuel Injector Brush to clean the tip of the fuel injectors. Failure to follow this instruction may result in damage to the fuel injectors.

NOTE: Make sure to thoroughly clean any residual fuel or foreign material from the cylinder head, block and the general surrounding area of the fuel rails and injectors.

5.
Using the special tool, clean the fuel injector bores. Use Special Service Tool: 310-205 Fuel Injector Brush.



NOTE: Do not lubricate the new lower Teflon® fuel injector seals.

6.

1.

Install the special tool. Use Special Service Tool: 310-207 Installer, Fuel Injector Seal Assembly.

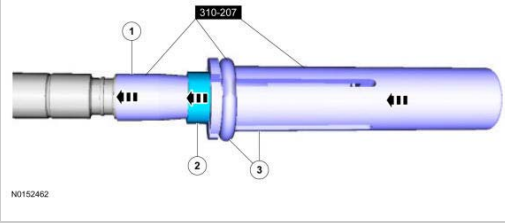
NOTE: Once the Teflon® seal is installed on the Teflon® Seal Guide, it should immediately be installed onto the fuel injector to avoid excessive expansion of the Teflon® seal.

2.
Make sure that new lower fuel injector Teflon® seals are installed.

Use Special Service Tool: 310-207 Installer, Fuel Injector Seal Assembly.

3.

Using the Pusher Tool, slide the Teflon® seals off of the Teflon® Seal Guide and into the groove on the fuel injectors.



NOTE: Install the fuel injectors into the cylinder head within 15 minutes of sizing the seals due to Teflon® seal expansion.

NOTE: Make sure the Teflon® seal is fully seated in the groove on the fuel injector before sizing the Teflon® seal.

7.

1.

Some massaging of the Teflon® seal with your fingers before the Teflon® seal sizer tool is installed will aid in installing the Teflon® seal sizer tool.

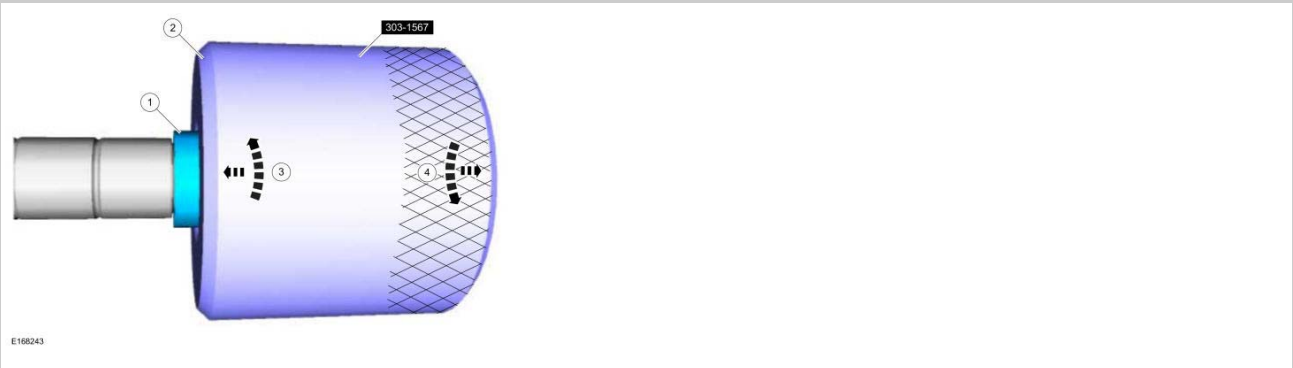
2.

Position the Teflon® seal sizer tool with the larger opening towards the Teflon® seal. Push while turning the Teflon® seal sizer tool 180 degrees.

Use Special Service Tool: 303-1567 Sizer, Teflon Seal.

3.

Once the Teflon® seal sizer tool is installed, check and make sure the Teflon® seal is in the sizing portion of the Teflon® seal sizer tool. After one minute, turn the Teflon® seal sizer tool back 180 degrees and remove.



NOTE: Do not lubricate the new lower Teflon® fuel injector seals.

NOTE: Use fuel injector O-ring seals that are made of special fuel-resistant material. The use of ordinary O-ring seals may cause the fuel system to leak. Do not reuse the O-ring seals.

8.

1.

Install the fuel injector seal.

2.

Lubricate with clean engine oil and install the fuel injector O-ring seal.

Material

: Motorcraft® SAE 5W-30 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W30-QSP (U.S.) (WSS-M2C946-A)

3.

Install the fuel injector clip.



NOTE: The FRP sensor must be replaced if it is removed from the fuel rail.

NOTE: The anti-rotation finger of the fuel injector clip must slip into the groove of the fuel rail cup.

9.
Install the fuel injectors in the fuel rail.



NOTE: Do not lubricate the new lower Teflon® fuel injector seals.

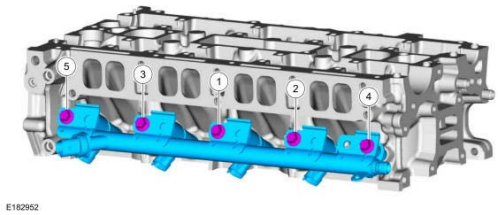
NOTE: Make sure that new fuel rail bolts are installed.

10.
Install the fuel rail by pushing down on the fuel rail above the injectors and install the bolts.

Torque:

Stage 1: 71 lb.in (8 Nm)

Stage 2: 26°

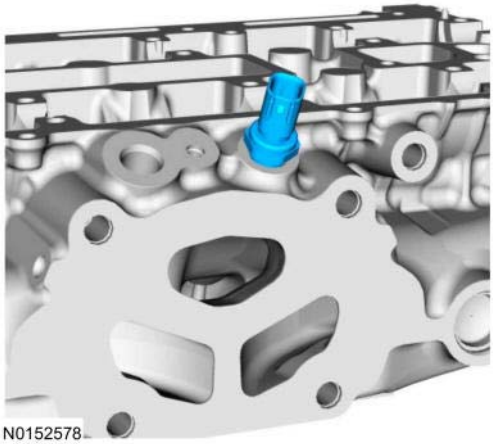


11.

Install a new CHT sensor.

Torque

: 97 lb.in (11 Nm)

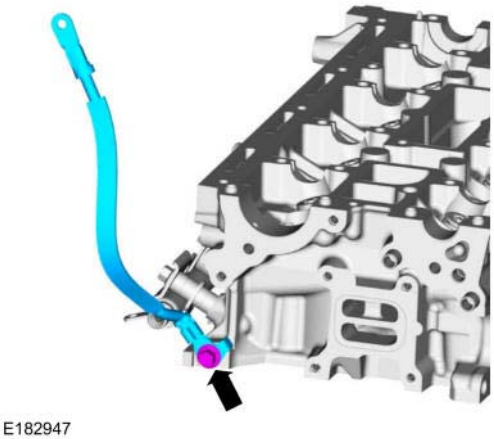


12.

Install the ground wire and the bolt.

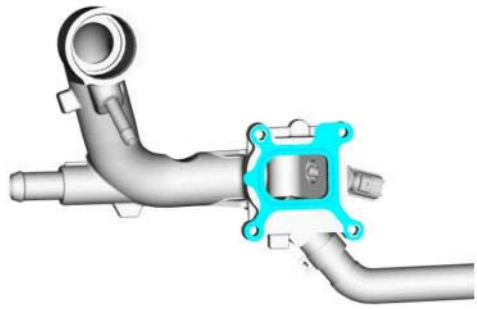
Torque

: 18 lb.ft (25 Nm)



13.

Install a new coolant outlet gasket.



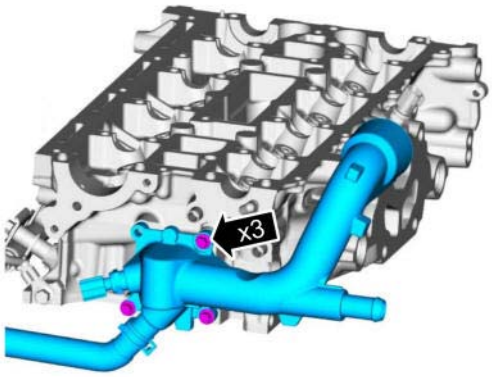
E182951

14.

Install the coolant outlet and the bolts.

Torque

: 89 lb.in (10 Nm)



E182945

DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES > PISTON

Materials

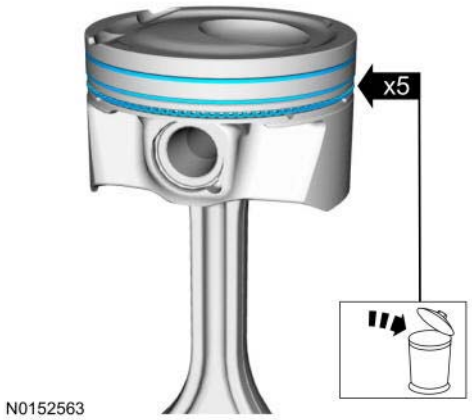
Name	Specification
Motorcraft® SAE 5W-30 Premium Synthetic Blend Motor Oil (U.S.) XO-5W30-QSP (U.S.)	WSS-M2C946-A

DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES > PISTON > DISASSEMBLY

NOTE: If the piston and connecting rod are to be reinstalled, they must be assembled in the same orientation. Mark the piston orientation to the connecting rod reassembly.

1.

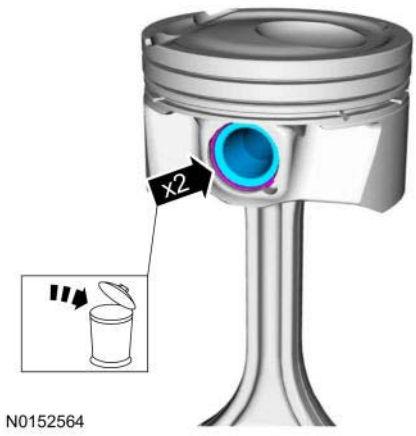
Remove the piston rings and discard.



2.

Remove the piston pin retainers and discard.

Remove the piston pin.



NOTE: If the piston and connecting rod are to be reinstalled, they must be

assembled in the same orientation. Mark the piston orientation to the connecting rod for reassembly.

3.
Remove the piston from the connecting rod. Refer to: Piston Inspection .



DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES > PISTON > ASSEMBLY

NOTE: Align the piston-to-connecting rod orientation marks made during disassembly.

1.
Install the piston to the connecting rod.



2.

Lubricate with clean engine oil and install the piston pin.

Material

: Motorcraft® SAE 5W-30 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W30-QSP (U.S.) (WSS-M2C946-A)



3.

Install the piston pin retainers.

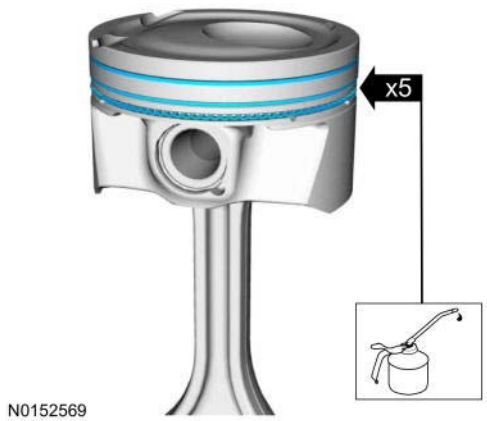


4.

Lubricate with clean engine oil and install the piston rings.

Material

: Motorcraft® SAE 5W-30 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W30-QSP (U.S.) (WSS-M2C946-A)



NOTE: Align the piston rings on the piston.

5.

1.

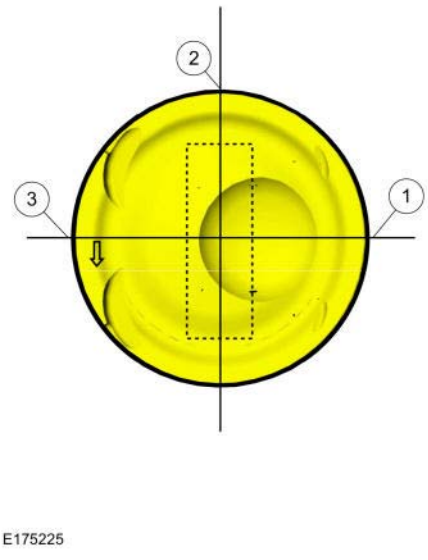
Upper oil control segment ring gap location.

2.

Oil control spacer gap location.

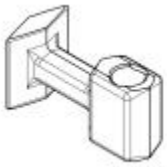
3.

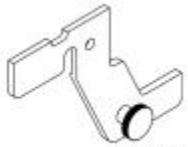
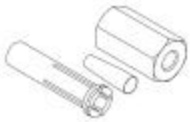
Lower oil control segment ring gap location.



ASSEMBLY > ENGINE

Special Tool(s) / General Equipment

 E139373	100-002 (TOOL-4201-C) Holding Fixture with Dial Indicator Gauge
 E133913	205-153 (T80T-4000-W) Handle
 ST1341-A	300-OTC1819E2, 200# Floor Crane, Fold Away
	303-096 (T74P-6150-A) Installer, Camshaft Front Oil Seal TKIT-2009TC-F
 E222983	303-103 (T74P-6375-A) Holding Tool, Flywheel T74P-77000-A TKIT-2009TC-F
 E175042	303-1247VCT Spark Plug Tube Seal Remover and Installer TKIT-2006UF-FLM TKIT-2006UF-ROW
 E121926	303-1521 Alignment Tool, Crankshaft Position Sensor TKIT-2010C-FLM

 E133912	303-1565 Alignment Tool, Camshaft TKIT-2010C-FLM
 E222987	303-1567 Sizer, Teflon Seal TKIT-2010C-FLM
 E134675	303-328 (T88P-6701-B1) Replacer, Rear Seal TKIT-1988-F TKIT-1988-FLM TKIT-1988-LM
 PZ21210	303-507 Timing Peg, Crankshaft TDC TKIT-2001N-FLM TKIT-2001N-ROW
 E223046	310-205 Fuel Injector Brush
 E223047	310-207 Installer, Fuel Injector Seal Assembly TKIT-2009A-FLM
Feeler Gauge	
Strap Wrench	
Mounting Stand	
Clutch Alignment Tool	
Hose Clamp Remover/Installer	
Round-Ended Steel Rule	
Piston Ring Compressor	
Vise	

Materials

Name	Specification
Motorcraft® SAE 5W-30 Premium Synthetic Blend Motor Oil (U.S.) XO-5W30-QSP (U.S.)	WSS-M2C946-A
Motorcraft® Metal Surface Prep ZC-31-B	-
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4
Gasket Maker TA-16	WSK-M2G348-A5
Motorcraft® Orange Antifreeze/Coolant Concentrated (U.S.) VC-3-B (U.S.)	WSS-M97B44-D
Silicone Brake Caliper Grease and Dielectric Compound XG-3-A	ESE-M1C171-A

NOTE: Do not loosen or remove the crankshaft pulley bolt without first installing the special tools as instructed in this procedure. The crankshaft pulley and the crankshaft timing sprocket are not keyed to the crankshaft. The crankshaft, the crankshaft sprocket and the pulley are fitted together by friction, using diamond washers between the flange faces on each part. For that reason, the crankshaft sprocket is also unfastened if the pulley bolt is loosened. Before any repair requiring loosening or removal of the crankshaft pulley bolt, the crankshaft and camshafts must be locked in place by the special service tools, otherwise severe engine damage can occur.

NOTE: During engine repair procedures, cleanliness is extremely important. All parts must be thoroughly cleaned and any foreign material, including any material created while cleaning gasket surfaces, that enters the oil passages, coolant passages or the oil pan, can cause engine failure.

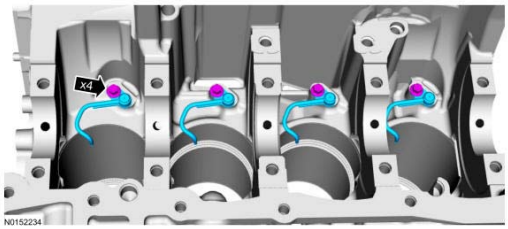
6-Speed Automatic Transmission - 6R80/6-Speed Manual Transmission - MT82

1.

Install the engine piston oil cooler valves and the bolts.

Torque

: 89 lb.in (10 Nm)



2.

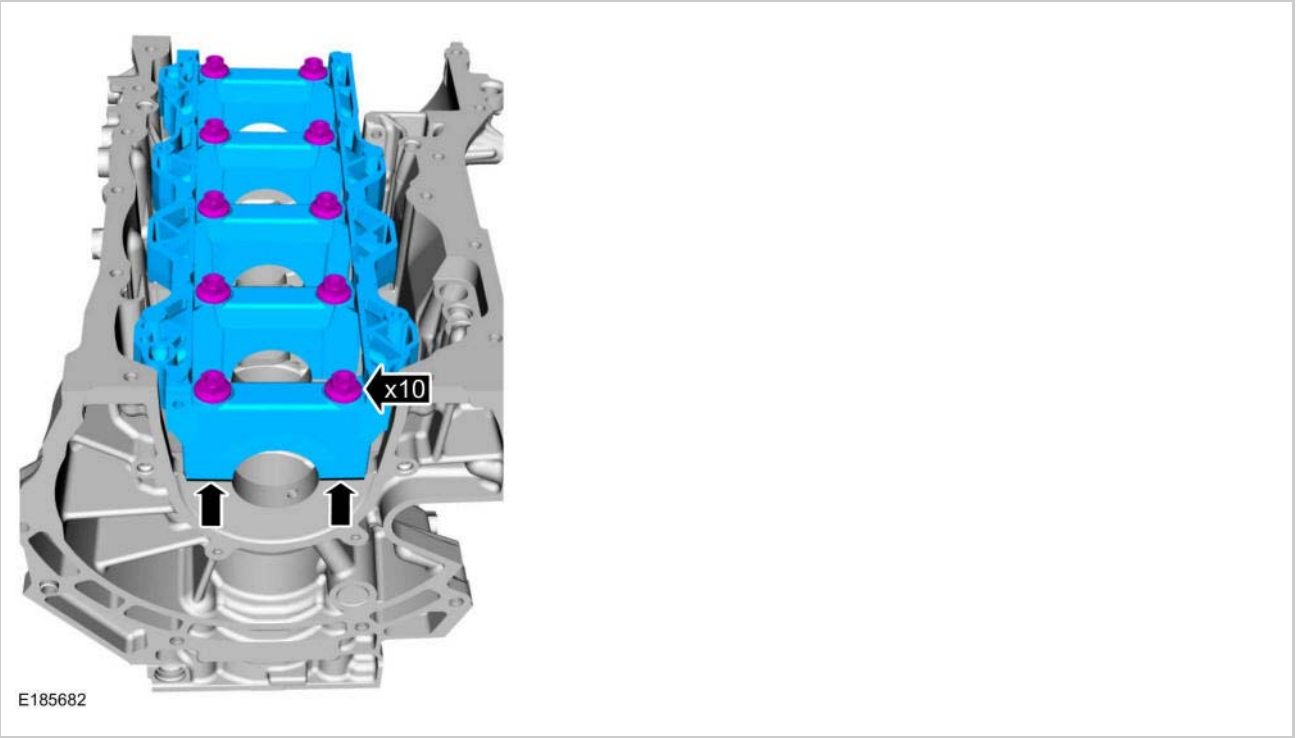
Measure the length or distance in two directions.

Record the smallest measurement for each crankshaft main bearing journal.



3.

Using the original bolts, mount the main bearing beam flush and install the bolts finger tight.



4.

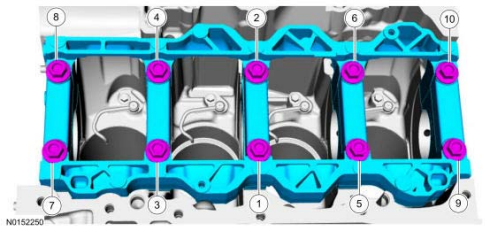
Tighten the bolts in sequence shown in illustration.

Torque:

Stage 1: 44 lb.in (5 Nm)

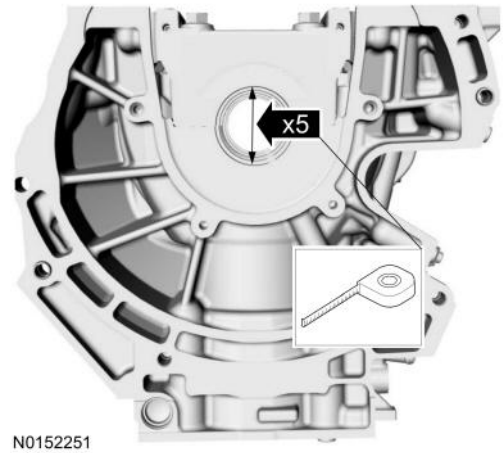
Stage 2: 18 lb.ft (25 Nm)

Stage 3: 90°



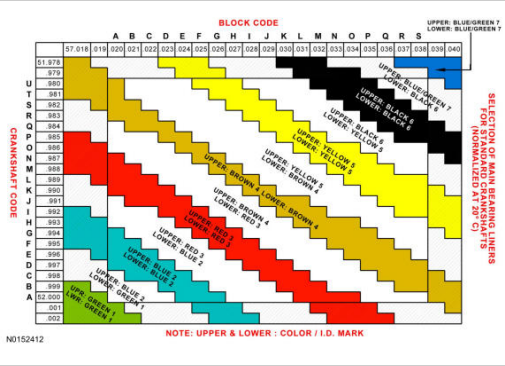
5.

Measure each crankshaft block main bearing bore diameter.



6.

Using the chart in illustration below, select the crankshaft main bearings.



7.

Using the original bolts, install the connecting rod caps.

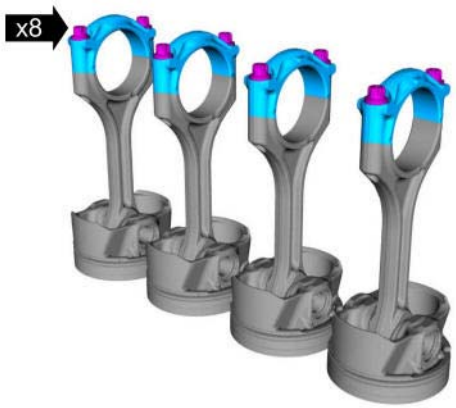
Torque:

Stage 1: 89 lb.in (10 Nm)

Stage 2: Loosen: 1 turn(s)

Stage 3: 21 lb.ft (29 Nm)

Stage 4: 90°

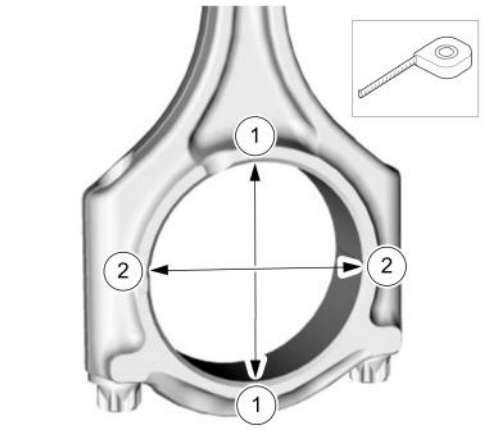


N0152252

8.

Measure the length or distance in two directions.

Record the smallest measurement for each connecting rod.

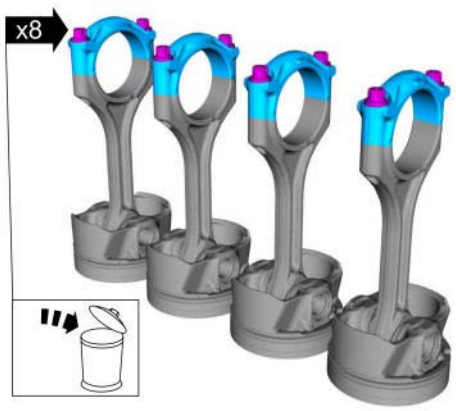


N0152253

9.

Remove the bolts and the connecting rod caps.

Discard the bolts.

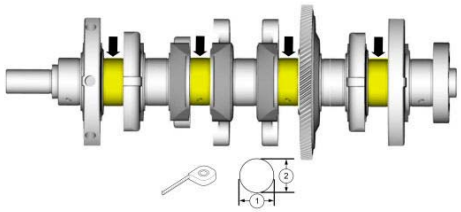


N0152254

10.

Measure the length or distance in two directions.

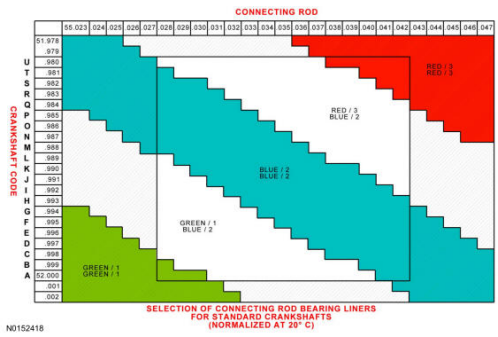
Record the smallest measurement for each connecting rod journal.



N0152255

11.

Using the chart in illustration below, select the correct connecting rod bearings for each crankshaft connecting rod journal.



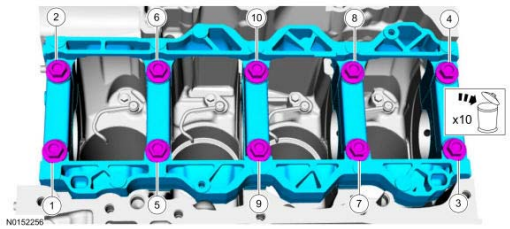
N0152418

12.

Remove the bolts in sequence shown in illustration.

Remove the main bearing beam.

Discard the bolts.



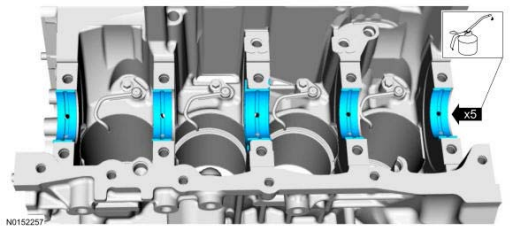
NOTE: Before assembling the cylinder block, all sealing surfaces must be free of chips, dirt, paint and foreign material. Also, make sure the coolant and oil passages are clear.

NOTE: If reusing the crankshaft main bearings, install them in their original positions and orientation as noted during disassembly.

13.
Lubricate with clean engine oil and install the crankshaft main bearings.

Material

: Motorcraft® SAE 5W-30 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W30-QSP (U.S.) (WSS-M2C946-A)

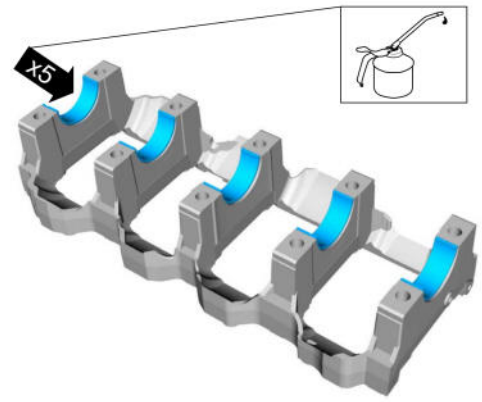


NOTE: If reusing the crankshaft main bearings, install them in their original positions and orientation as noted during disassembly.

14.
Lubricate with clean engine oil and install the main bearing beam bearings.

Material

: Motorcraft® SAE 5W-30 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W30-QSP (U.S.) (WSS-M2C946-A)



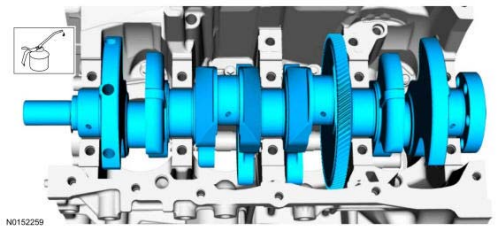
N0152258

15.

Lubricate with clean engine oil and install the crankshaft.

Material

: Motorcraft® SAE 5W-30 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W30-QSP (U.S.) (WSS-M2C946-A)



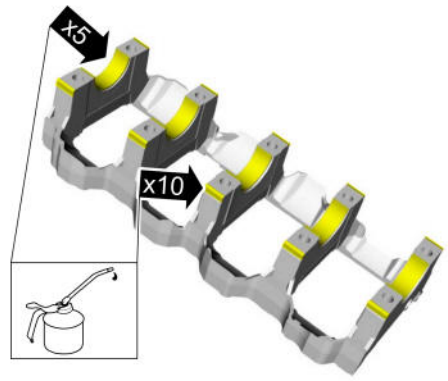
N0152259

16.

Lubricate with clean engine oil.

Material

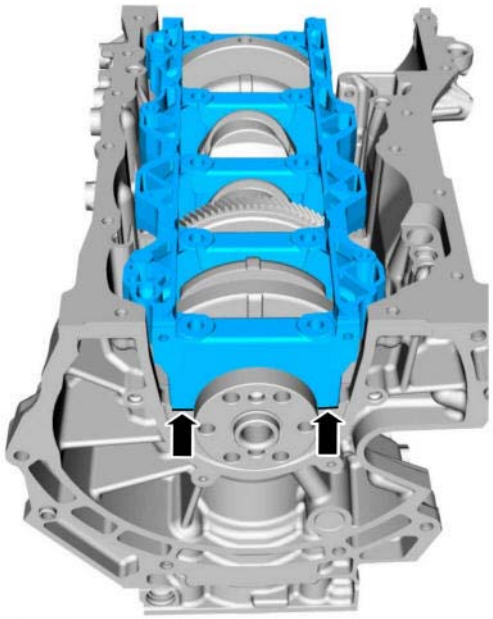
: Motorcraft® SAE 5W-30 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W30-QSP (U.S.) (WSS-M2C946-A)



N0152260

17.

Install the main bearing beam flush.


N0152261

NOTE: Lubricate the new main bearing beam bolts threads and under the bolt heads with clean engine oil.

NOTE: Position the crankshaft to the rear of the cylinder block, then position the crankshaft to the front of the cylinder block before tightening the main bearing beam bolts.

18.
Install the bolts and tighten in sequence shown in illustration.

Material

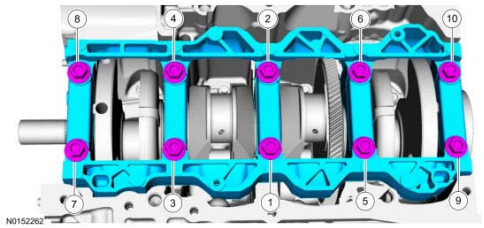
: Motorcraft® SAE 5W-30 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W30-QSP (U.S.) (WSS-M2C946-A)

Torque:

Stage 1: 44 lb.in (5 Nm)

Stage 2: 18 lb.ft (25 Nm)

Stage 3: 90°



19.

1.

Position the crankshaft to the rear of the cylinder block.

2.

Zero the Dial Indicator Gauge with Holding Fixture.

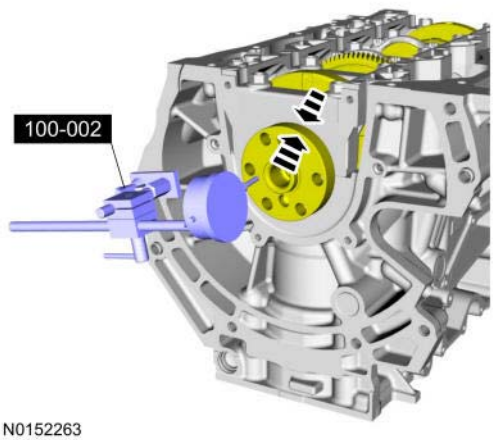
Use Special Service Tool: 100-002 (TOOL-4201-C) Holding Fixture with Dial Indicator Gauge.

3.

Move the crankshaft to the front of the cylinder block. Note and record the crankshaft end play.

4.

Acceptable crankshaft end play is 0.220-0.450 mm (0.0087-0.0177 in). If the crankshaft end play exceeds the specified range, install new parts as necessary.



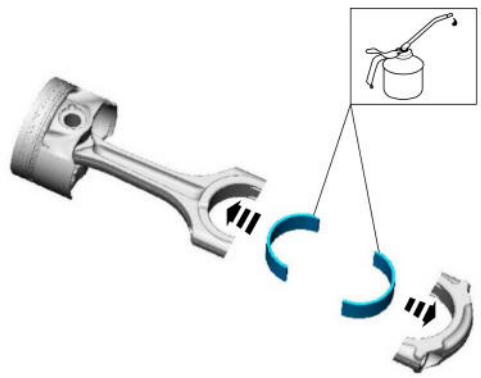
N0152263

NOTE: If reusing the connecting rod bearings, install them in their original positions and orientation as noted during disassembly.

20.
Lubricate with clean engine oil and install the connecting rod bearings.

Material

: Motorcraft® SAE 5W-30 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W30-QSP (U.S.) (WSS-M2C946-A)


N0152264

NOTE: Align the piston rings on the piston.

21.

1.

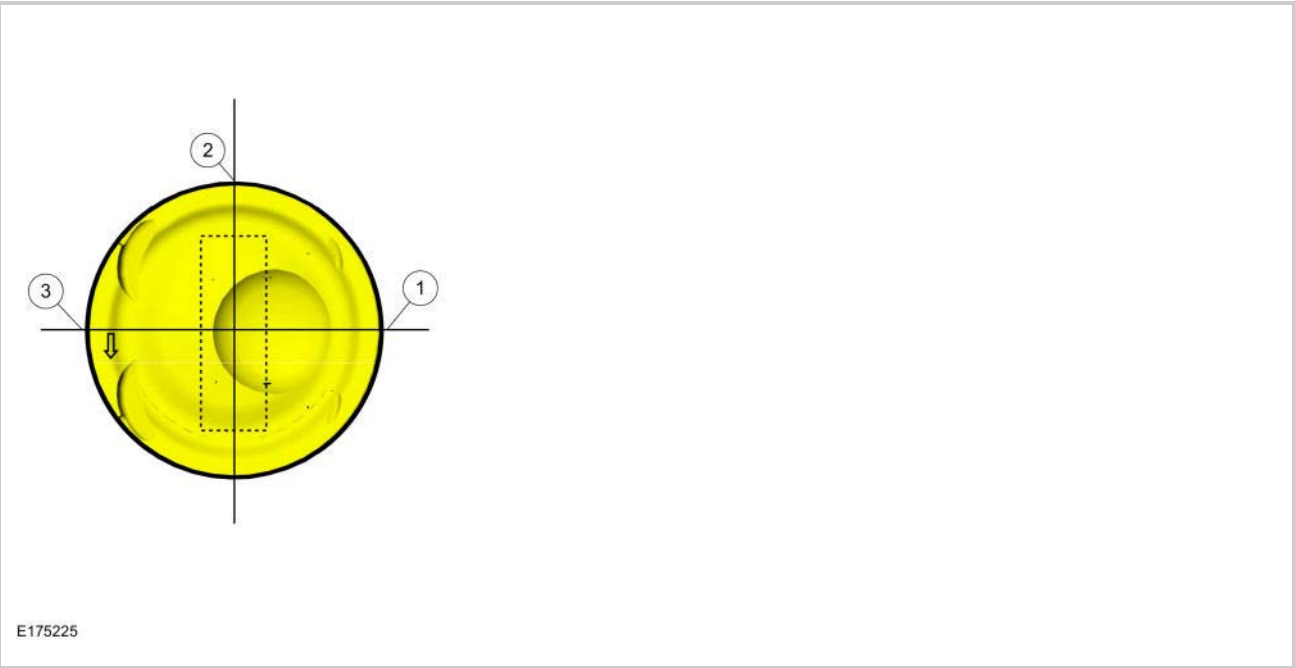
Upper oil control segment ring gap location.

2.

Oil control spacer gap location.

3.

Lower oil control segment ring gap location.



22.

Lubricate the pistons with clean engine oil.

Material

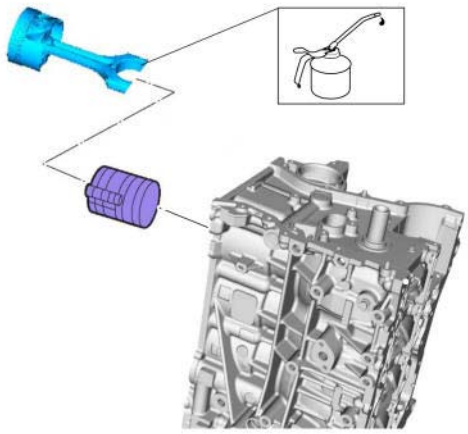
: Motorcraft® SAE 5W-30 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W30-QSP (U.S.) (WSS-M2C946-A)

NOTE: Make sure the piston arrow on top is facing toward the front of the engine.

NOTE: Be sure not to scratch the cylinder wall or crankshaft journal with the connecting rod. Push the piston down until the connecting rod bearing seats on the crankshaft journal.

Using a piston ring compressor, install the pistons.

Use the General Equipment: Piston Ring Compressor



N0152413

NOTE: The rod cap installation must keep the same orientation as marked during disassembly or engine damage may occur.

NOTE: After installation of each connecting rod cap, rotate the crankshaft to verify smooth operation.

23.
Install the connecting rod caps, bolts and tighten in 3 stages.

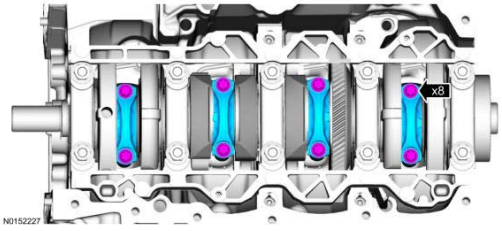
Torque:

Stage 1: 89 lb.in (10 Nm)

Stage 2: Loosen:: 1 turn(s)

Stage 3: 21 lb.ft (29 Nm)

Stage 4: 90°

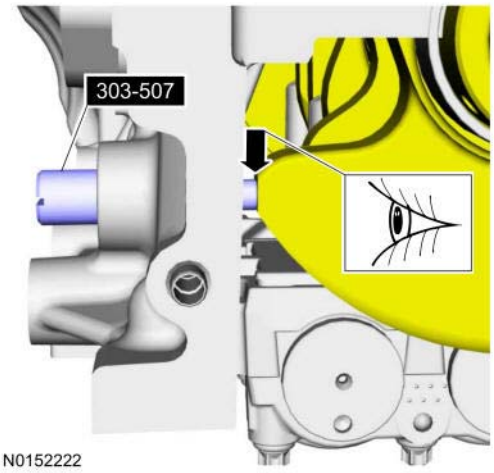


N0152227

24.

Install Special Service Tool: 303-507 Timing Peg, Crankshaft TDC.

Rotate the crankshaft slowly clockwise until the crankshaft balance weight is up against the special tool. The engine is now at TDC.

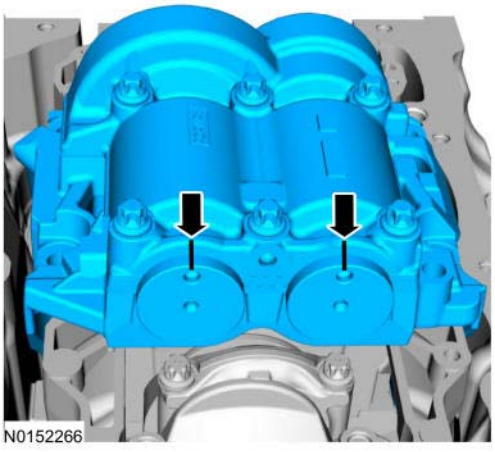


NOTE: Due to the precision interior construction of the balancer unit, it should not be disassembled.

NOTE: The original adjustment shims must be installed in their original positions.

NOTE: Confirm by visual inspection that there is no damage to the balancer unit gear and verify that the shaft turns smoothly. If there is any damage or malfunction, replace the balancer unit.

25.
Install the adjustment shims in their original positions on the seat faces of the balancer unit. With the balancer unit shaft marks in the TDC position, slowly install the balancer unit to the cylinder block to avoid interference between the crankshaft drive gear and the balancer unit driven gear.



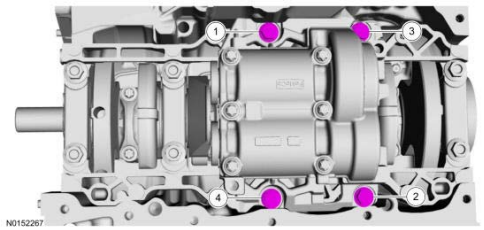
26.

Install the bolts and tighten in 2 stages.

Torque:

Stage 1: 18 lb.ft (25 Nm)

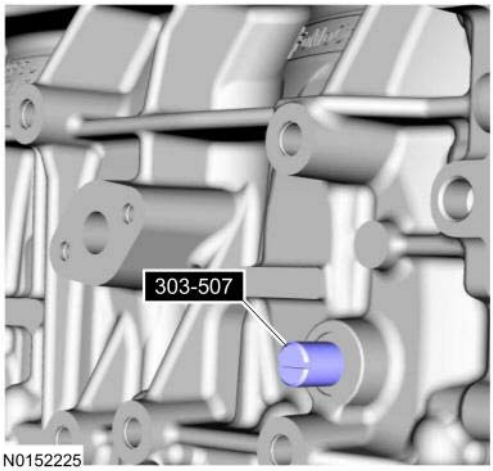
Stage 2: 31 lb.ft (42 Nm)



27.

Remove Special Service Tool: 303-507 Timing Peg, Crankshaft TDC.

Rotate the crankshaft to confirm that there are no meshing problems between the balancer unit gear and the crankshaft gear.



28.

1.

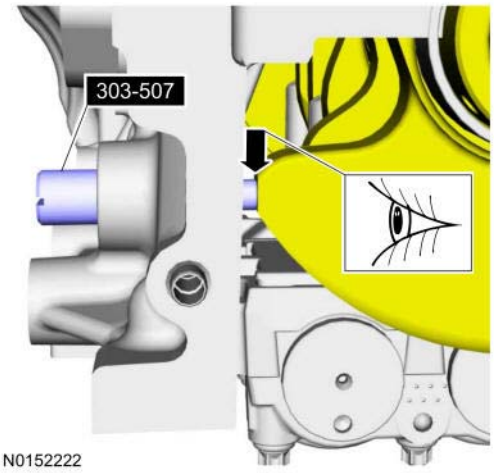
Install Special Service Tool: 303-507 Timing Peg, Crankshaft TDC.

2.

Rotate the crankshaft slowly clockwise until the crankshaft balance weight is up against the special tool. The engine is now at TDC.

3.

Remove Special Service Tool: 303-507 Timing Peg, Crankshaft TDC.



NOTE: Measure the backlash and verify that it is within specified range at all of the following 6 positions: 10 degrees, 30 degrees, 100 degrees, 190 degrees, 210 degrees and 280 degrees. It will be necessary to reset the measuring equipment between measurements.

NOTE: The measurement must be taken with the Dial Indicator Gauge with Holding Fixture, a 5-mm Allen wrench and worm clamp set up as shown in illustration. Mark the Allen wrench with a file 80 mm (3.149 in) above the driven gear shaft center. Make sure the worm clamp and Allen wrench are not touching the balance shaft housing.

NOTE: For an accurate measurement while measuring the gear backlash, insert a screwdriver as shown in illustration into the crankshaft No. 1 crankweight area and set both the rotation and the thrust direction with the screwdriver, using a prying action as shown in illustration.

NOTE: Position the Dial Indicator Gauge with Holding Fixture as shown in illustration. Measure the gear backlash.

29.

1.

Position the Dial Indicator Gauge with Holding Fixture (1) on the Allen wrench 80 mm (3.149 in) above the driven gear shaft center (2) on the balancer unit.

2.

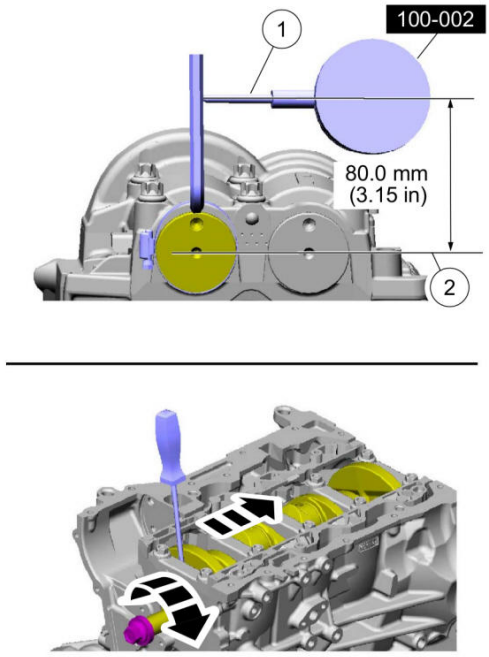
Rotate the crankshaft clockwise and measure the backlash at all of the following 6 positions: 10 degrees, 30 degrees, 100 degrees, 190 degrees, 210 degrees and 280 degrees.

3.

Backlash specifications are 0.040 to 0.140 mm (0.00157 to 0.0055 in).

4.

If the backlash exceeds the specified range, carry out the Balance Shaft Backlash procedure. Refer to: Balance Shaft Backlash .

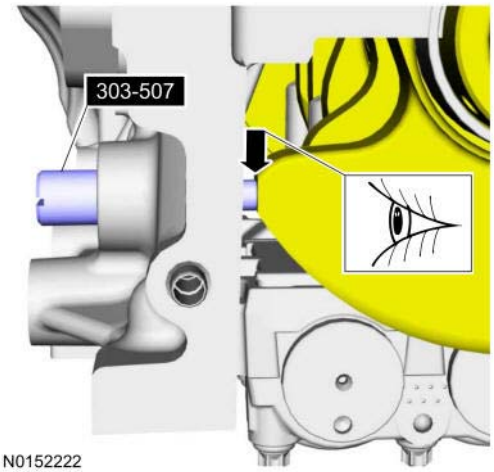


E148014

30.

Install the special tool and rotate the crankshaft slowly clockwise until the crankshaft balance weight is up against the special tool. The engine is now at TDC and must remain at the TDC position until the timing drive components and crankshaft pulley are installed.

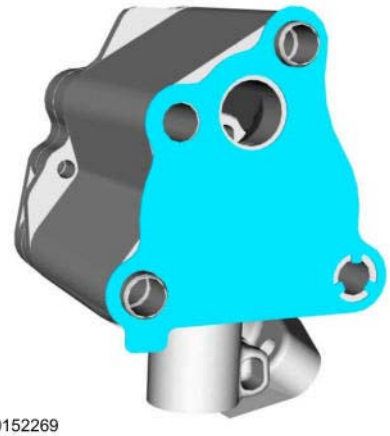
Use Special Service Tool: 303-507 Timing Peg, Crankshaft TDC.



N0152222

31.

Install the new oil pump gasket.



N0152269

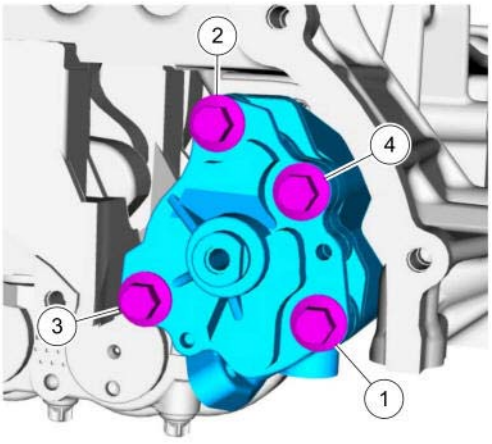
32.

Install the oil pump and the bolts and tighten in the sequence shown in illustration in 2 stages.

Torque:

Stage 1: 89 lb.in (10 Nm)

Stage 2: 177 lb.in (20 Nm)



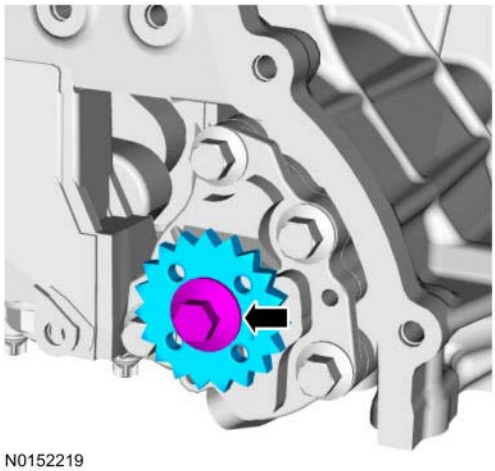
N0152268

33.

Install the oil pump sprocket and bolt.

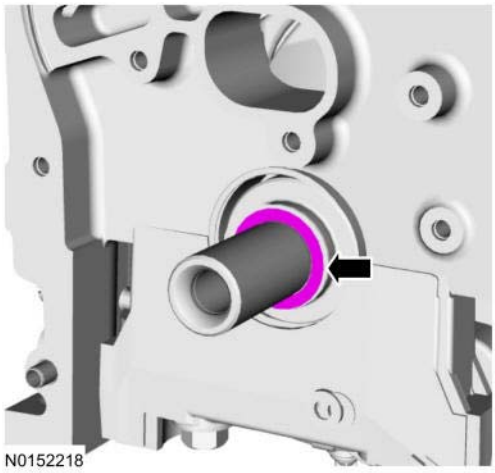
Torque

: 18 lb.ft (25 Nm)


N0152219

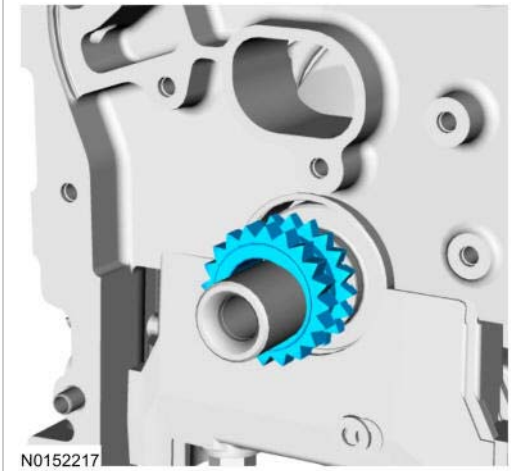
NOTE: Before installation, clean and inspect the diamond washer for any damage. If damaged is evident, replace the diamond washer. If no damage, the diamond washer is to be reused. If the diamond washer is not installed, engine damage may occur.

34.
Install the diamond washer.


N0152218

35.

Install the crankshaft sprocket.



36.

1.

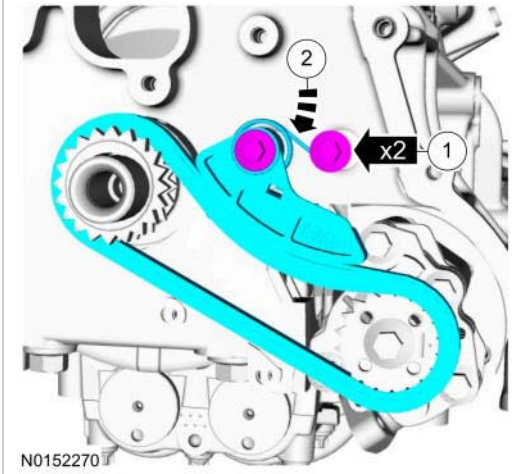
Install the timing chain, tensioner and the shoulder bolts.

Torque

: 89 lb.in (10 Nm)

2.

Push the tensioner spring down and position the spring under the shoulder bolt.



37.

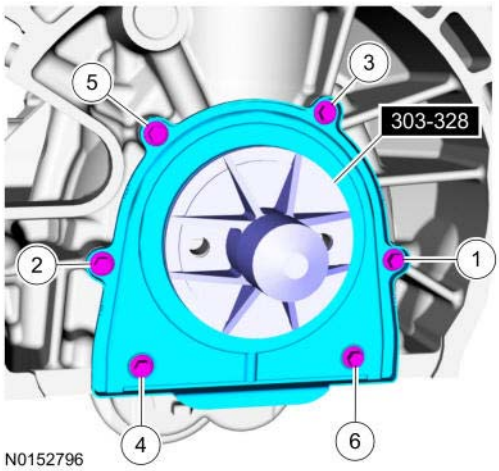
Using the special tool, position the crankshaft rear oil seal onto the crankshaft.

Use Special Service Tool: 303-328 (T88P-6701-B1) Replacer, Rear Seal.

Install the bolts and tighten in sequence shown in illustration.

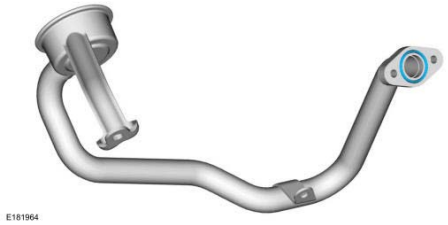
Torque

: 89 lb.in (10 Nm)



38.

Install the new oil pump screen and pickup tube gasket.

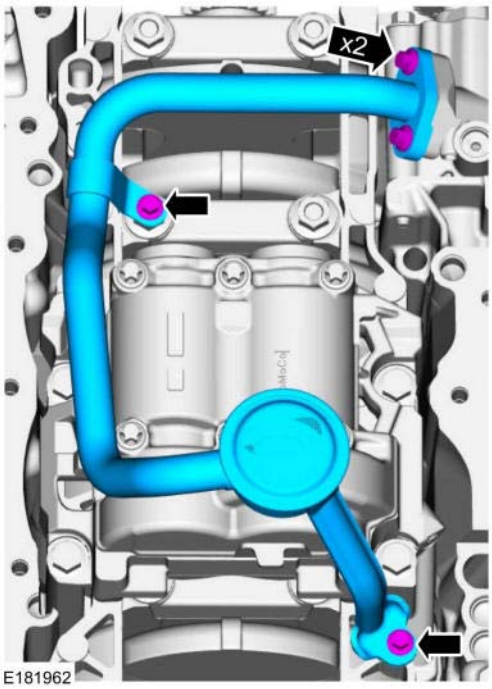


39.

Install the oil pickup and screen and the bolts.

Torque

: 89 lb.in (10 Nm)

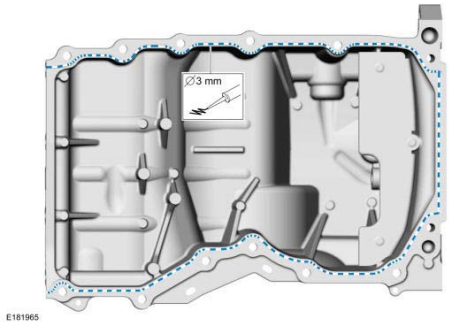


NOTE: If the oil pan is not secured within 10 minutes of silicone sealant application, the silicone sealant must be removed and the sealing area cleaned. Allow to dry until there is no sign of wetness, or 10 minutes, whichever is longer. Failure to follow this procedure can cause future oil leakage.

40.
Apply a 3 mm bead of silicone sealant.

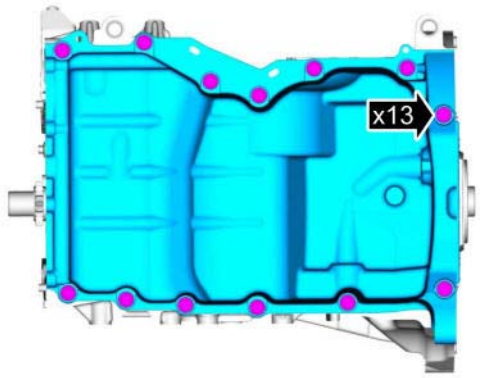
Material

: Silicone Gasket and Sealant / TA-30 (WSE-M4G323-A4)



41.

Install the oil pan and the bolts finger tight.

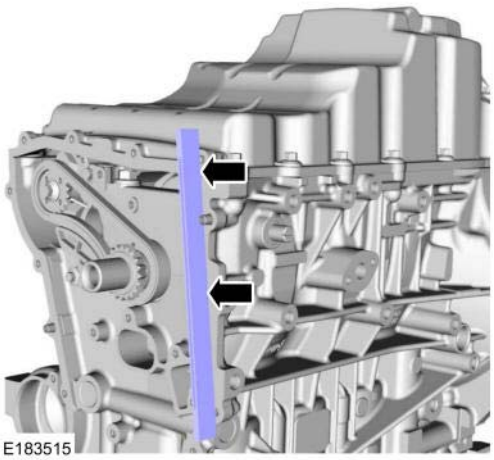


E183390

42.

Using a straight edge, align the front surface of the oil pan flush with the front surface of the engine block.

Use the General Equipment: Round-Ended Steel Rule

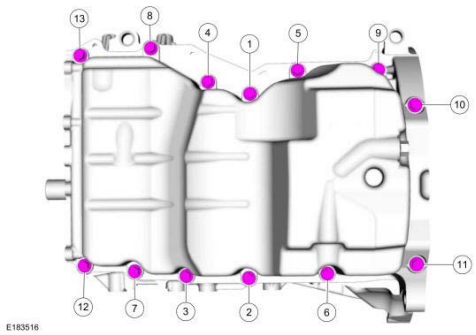

E183515

43.

Tighten the bolts in sequence shown in illustration.

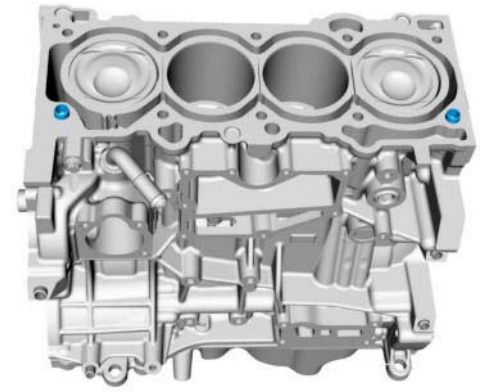
Torque

: 18 lb.ft (25 Nm)



44.

Install the cylinder block bushings.



45.

Install a new cylinder head gasket.



NOTE: The cylinder head bolts are torque-to-yield and must not be reused. New cylinder head bolts must be installed.

46.
Install the cylinder head, bolts and tighten in sequence shown in illustration in 5 stages.

Torque:

Stage 1: 62 lb.in (7 Nm)

Stage 2: 133 lb.in (15 Nm)

Stage 3: 41 lb.ft (55 Nm)

Stage 4: 90°

Stage 5: 90°



47.

Lubricate with clean engine oil and install the valve tappets.

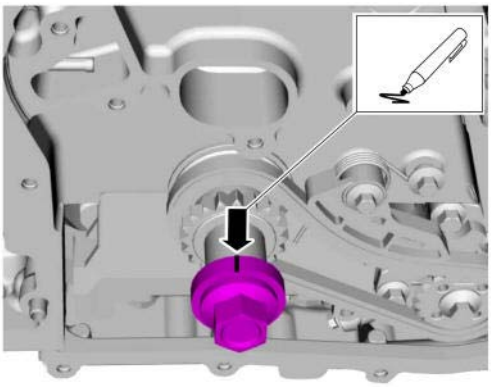
Material

: Motorcraft® SAE 5W-30 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W30-QSP (U.S.) (WSS-M2C946-A)



NOTE: If any new parts are being installed (cylinder head, valves, tappets, camshafts) it is necessary to check the valve clearance, follow the next 12 steps exactly or serious damage to the engine may occur. If the original parts are being installed it is not necessary to check the valve clearance so proceed to step 61.

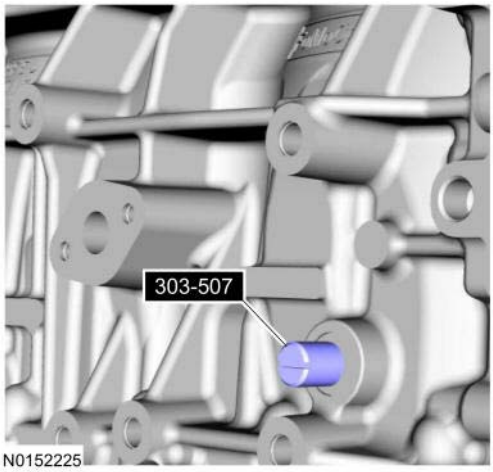
48.
Install the crankshaft bolt and place a paint mark on the crankshaft bolt at the 12 o'clock position.



E183518

49.

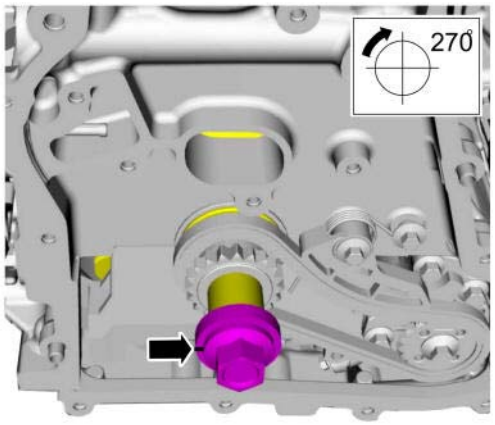
Remove Special Service Tool: 303-507 Timing Peg, Crankshaft TDC.



N0152225

NOTE: Rotating the crankshaft will position all of the pistons below the deck of the cylinder block and allow the camshafts to be installed and the valve clearance checked without the possibility of damage to the valves or pistons.

50.
Using the crankshaft bolt and washer, rotate the crankshaft clockwise 270 degrees until the paint mark is at the 9 o'clock position.



E183519

NOTE: Failure to follow the camshaft tightening procedure can result in damage to the camshafts.

NOTE: Lubricate the camshaft journals and camshaft bearing caps with clean engine oil.

51.

Lubricate the camshafts and caps with clean engine oil and install the camshafts, caps and bolts.

Material

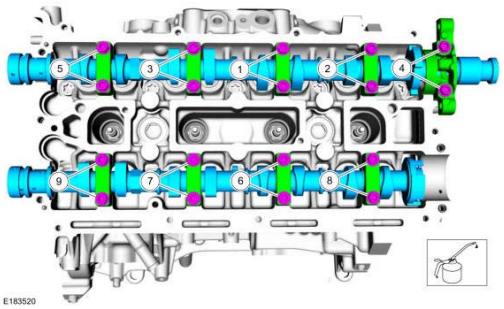
: Motorcraft® SAE 5W-30 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W30-QSP (U.S.) (WSS-M2C946-A)

Tighten 2 turns at a time in the sequence shown in illustration in 2 stages.

Torque:

Stage 1: 62 lb.in (7 Nm)

Stage 2: 142 lb.in (16 Nm)



E183520

52.

Lubricate the camshaft journals with clean engine oil and install the front camshaft bearing cap and bolts.

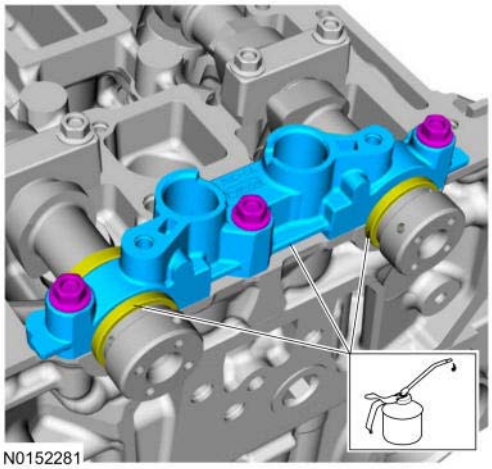
Material

: Motorcraft® SAE 5W-30 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W30-QSP (U.S.) (WSS-M2C946-A)

Torque:

Stage 1: 62 lb.in (7 Nm)

Stage 2: 142 lb.in (16 Nm)



53.

1.

Using the flats of the camshaft, rotate the camshaft to place the cam lobe at base circle, with the lobe pointed away from the tappet.

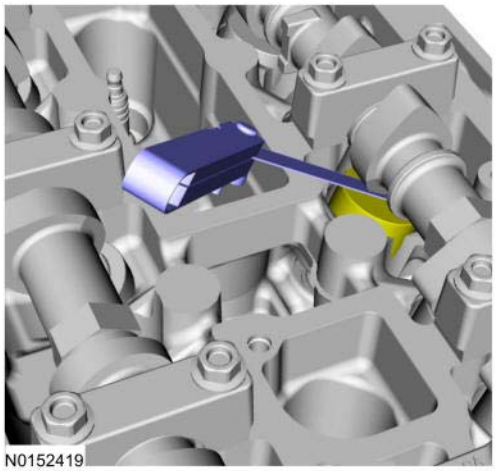
2.

Use a feeler gauge to measure the clearance of each valve and record its location.

Use the General Equipment: Feeler Gauge

3.

Repeat to measure all of the lobe/tappet clearances.



NOTE: The number on the valve tappet only reflects the digits that follow the decimal. For example, a tappet with the number 0.650 has the thickness of 3.650 mm.

NOTE: Select tappets using this formula: tappet thickness = measured clearance + the existing tappet thickness - nominal clearance.

NOTE: The nominal clearance is:

intake: 0.25 mm (0.0095 in).

exhaust: 0.36 mm (0.0142 in).

NOTE: The acceptable clearances after being fully installed are:

54.

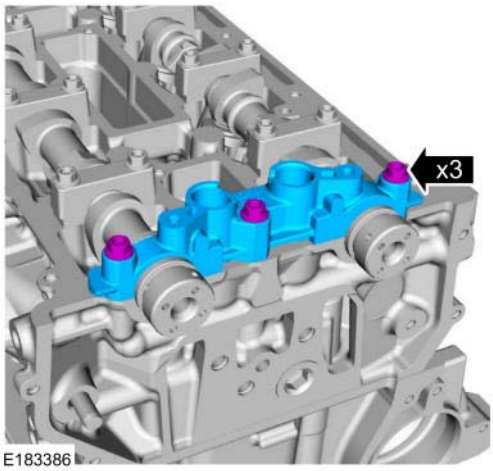
intake: 0.19-0.31 mm (0.007-0.012 in).

exhaust: 0.30-0.42 mm (0.012-0.017 in).

Select the closest tappet size to the ideal tappet thickness available and mark the installation location.

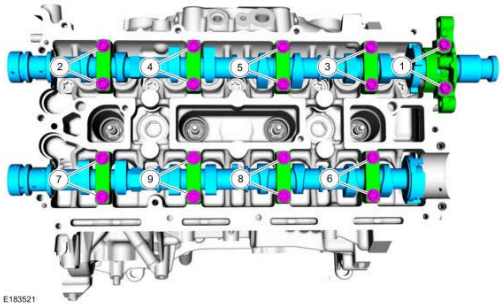
55.

Remove the bolts and the front camshaft bearing cap.



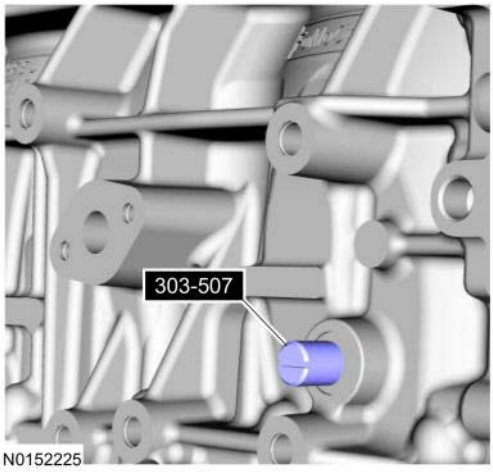
NOTE: Failure to follow the camshaft loosening procedure can result in damage to the camshafts.

56.
Loosen the camshaft bearing caps in sequence 2 turns at a time until all tension is released from the camshaft bearing caps and remove the bolts, caps and camshafts.



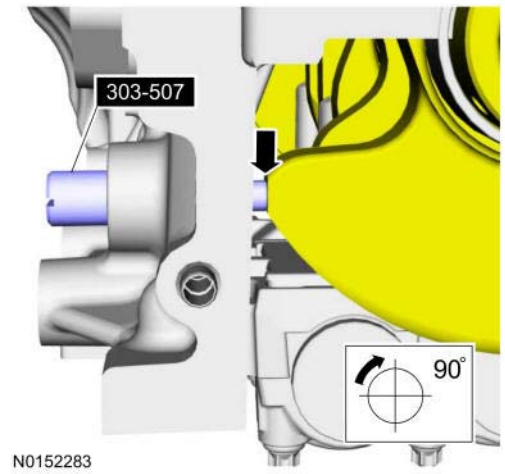
57.

Install Special Service Tool: 303-507 Timing Peg, Crankshaft TDC.



NOTE: Rotating the crankshaft will position the engine at TDC and allow you to install the camshafts in the same position as noted during the disassembly.

58.
Rotate the crankshaft clockwise 90 degrees so the crankshaft contacts the special tool.

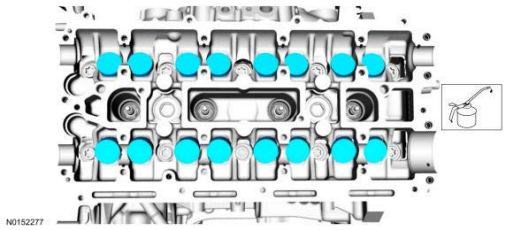


59.

If necessary, replace any tappets with the correct tappets selected during the valve clearance check and lubricate with clean engine oil.

Material

: Motorcraft® SAE 5W-30 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W30-QSP (U.S.) (WSS-M2C946-A)



NOTE: The exhaust camshaft rear bearing cap must be secured within 10 minutes of silicone sealant application. If the bearing cap is not secured within 10 minutes, the gasket maker must be removed and the sealing area cleaned.

NOTE: Do not allow gasket maker to enter the camshaft bearing journal. If gasket maker is applied to the camshaft bearing journal, the journal and sealing area must be cleaned.

60.

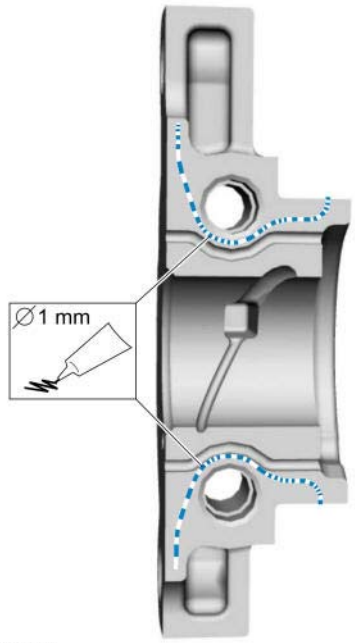
Apply a 1 mm bead of gasket maker.

Material

: Gasket Maker / TA-16 (WSK-M2G348-A5)

Material

: Motorcraft® Metal Surface Prep / ZC-31-B



NOTE: Install the camshafts with the alignment slots in the camshafts lined up so the Camshaft Alignment Plate can be installed without rotating the camshafts. Make sure the lobes on the No. 1 cylinder are in the same position as noted in the removal procedure. Rotating the camshafts when the timing chain is removed, or installing the camshafts 180 degrees out of position can cause severe damage to the valves and pistons.

NOTE: Failure to follow the camshaft tightening procedure can result in damage to the camshafts.

NOTE: Wipe off any excess sealant from the fuel injection pump housing sealing surface of the cylinder head and rear camshaft cap.

NOTE: Lubricate the camshaft journals and camshaft bearing caps with clean engine oil.

61.

Lubricate with clean engine oil and install the camshafts, caps and bolts.

Material

: Motorcraft® SAE 5W-30 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W30-QSP (U.S.) (WSS-M2C946-A)

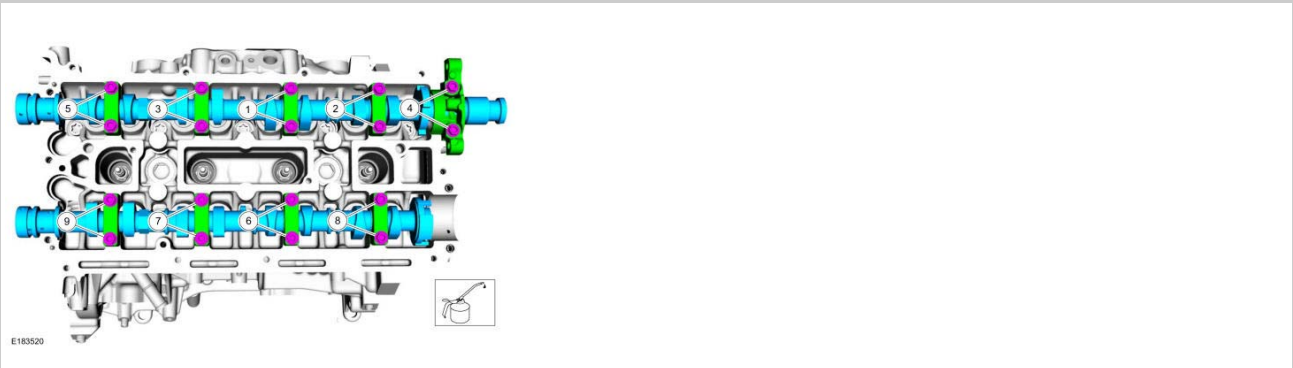
Tighten the camshaft bearing cap bolts one turn at a time, until finger-tight.

Tighten 2 turns at a time in the sequence shown in illustration in 2 stages.

Torque:

Stage 1: 62 lb.in (7 Nm)

Stage 2: 142 lb.in (16 Nm)



62.

Lubricate the camshaft journals with clean engine oil.

Material

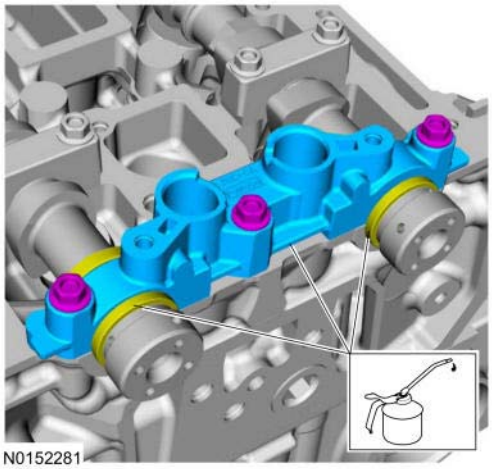
: Motorcraft® SAE 5W-30 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W30-QSP (U.S.) (WSS-M2C946-A)

Install the front camshaft bearing cap and the bolts and tighten in 2 stages.

Torque:

Stage 1: 62 lb.in (7 Nm)

Stage 2: 142 lb.in (16 Nm)

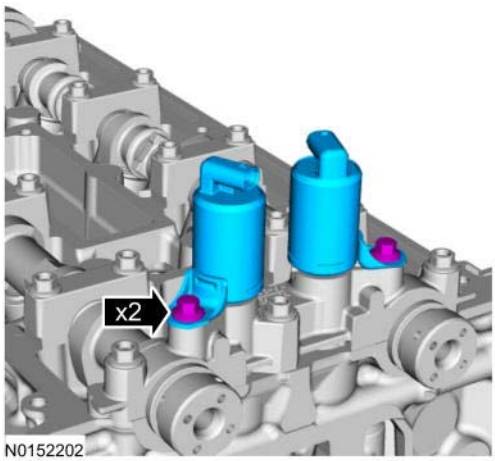


63.

Install the VCT oil control solenoids and the bolts.

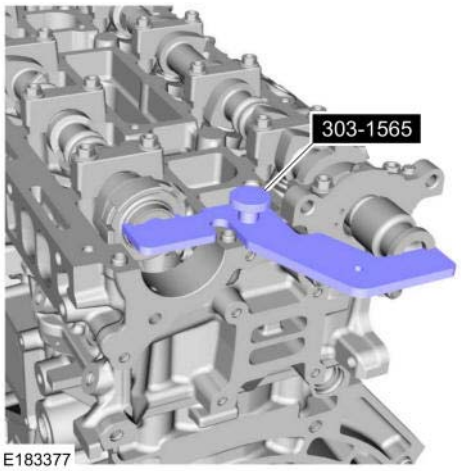
Torque

: 89 lb.in (10 Nm)



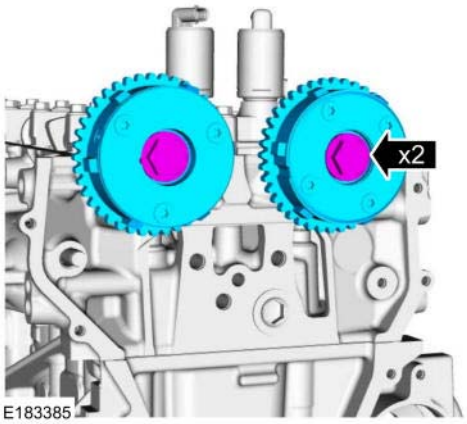
NOTE: The special tool is for camshaft alignment only. Using this tool to prevent engine rotation can result in engine damage.

64.
Install Special Service Tool: 303-1565 Alignment Tool, Camshaft.



NOTE: Do not tighten the VCT unit bolts at this time.

65.
Install the VCT units and the bolts finger-tight.

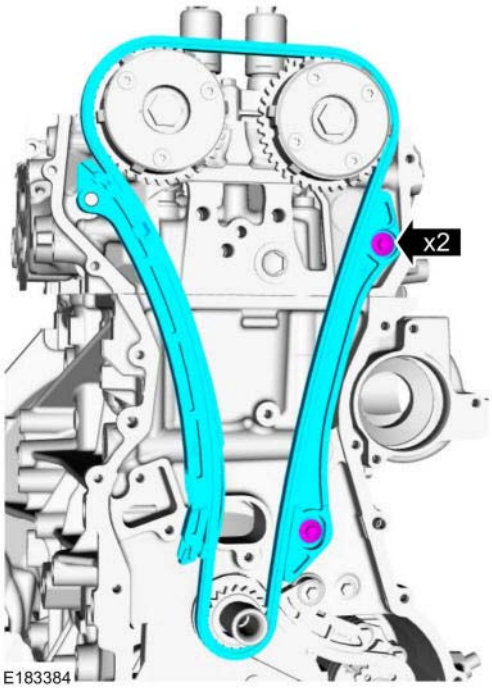


66.

Install the tensioner arm, timing chain, timing chain guide and the bolts.

Torque

: 89 lb.in (10 Nm)

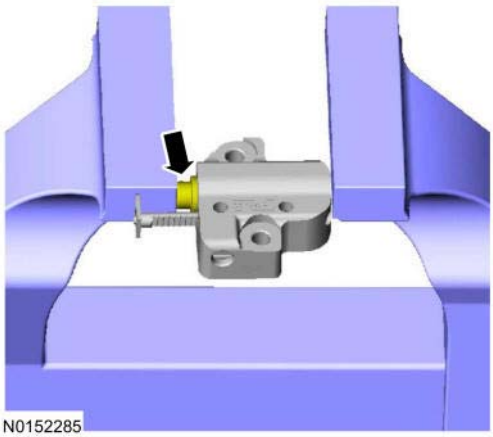


NOTE: If the timing chain tensioner plunger and ratchet assembly are not pinned in the compressed position, follow the next 4 steps.

NOTE: Do not compress the ratchet assembly. This will damage the ratchet assembly.

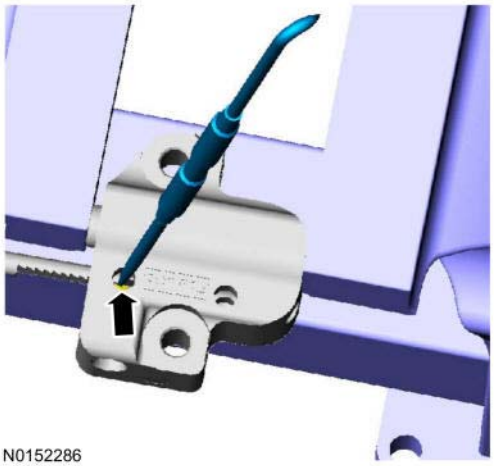
67.
Using the edge of a vise, compress the timing chain tensioner plunger.

Use the General Equipment: Vise



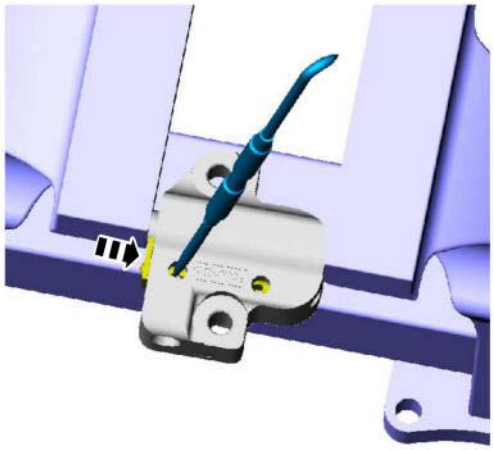
68.

Using a small pick, push back and hold the ratchet mechanism.



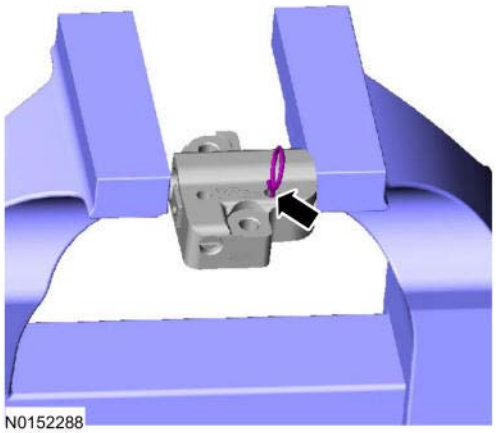
69.

While holding the ratchet mechanism, push the ratchet arm back into the tensioner housing.



70.

Install a holding pin into the hole in the tensioner housing to hold the ratchet assembly and the plunger in during installation.

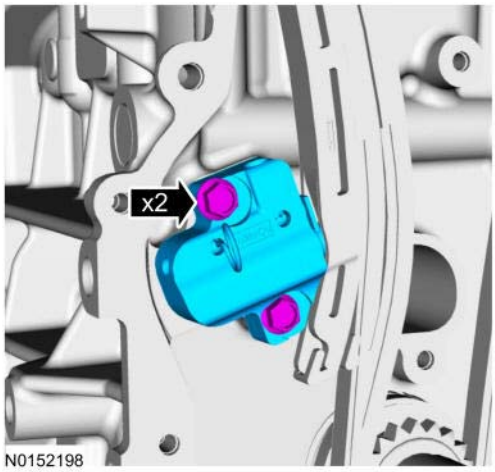


NOTE: Do not remove the holding pin until the tensioner bolts are tightened.

71.
Install the timing chain tensioner and the bolts.

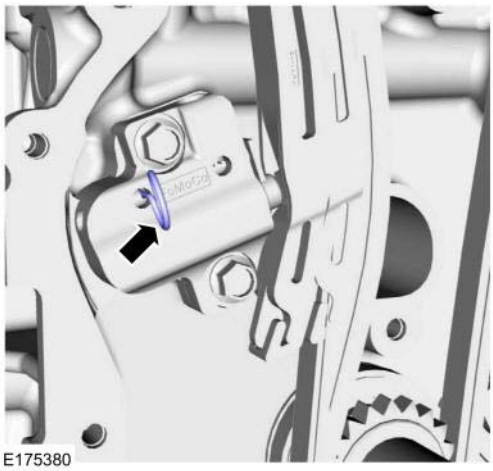
Torque

: 89 lb.in (10 Nm)



72.

Remove the holding pin.



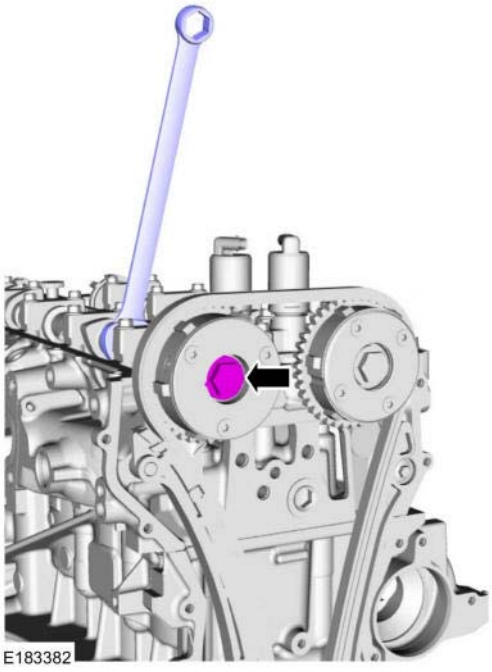
NOTE: Use an open-ended wrench to prevent the component from turning.

73.
Tighten the exhaust VCT unit bolt in 2 stages.

Torque:

Stage 1: 30 lb.ft (40 Nm)

Stage 2: 60°



NOTE: Use an open-ended wrench to prevent the component from turning.

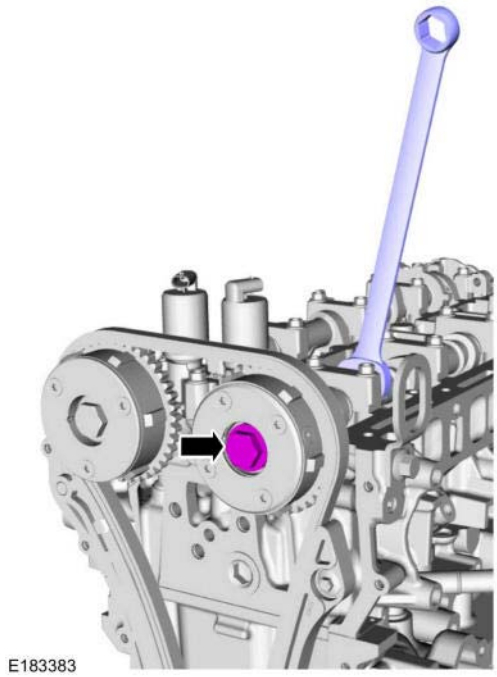
74.

Tighten the intake VCT unit bolt in 2 stages.

Torque:

Stage 1: 30 lb.ft (40 Nm)

Stage 2: 60°



NOTE: The engine front cover must be secured within 10 minutes of Silicone Gasket and Sealant application. If the valve cover is not secured within 10 minutes, the silicone sealant must be removed and the sealing area cleaned.

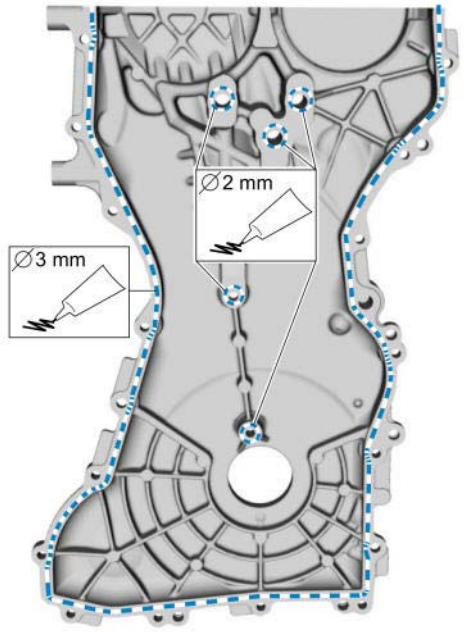
75.
Apply silicone sealant.

Material

: Silicone Gasket and Sealant / TA-30 (WSE-M4G323-A4)

Material

: Motorcraft® Metal Surface Prep / ZC-31-B



N0152289

NOTE: The engine front cover must be secured within 10 minutes of Silicone Gasket and Sealant application. If the engine front cover is not secured within 10 minutes, the silicone sealant must be removed and the sealing area cleaned.

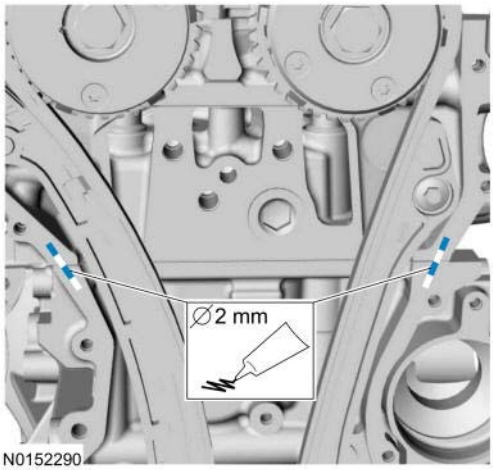
76.
Apply beads of silicone sealant that are 2 mm (0.078 in) in diameter and 5 mm (0.19 in) in length across the cylinder head and cylinder block joint areas.

Material

: Silicone Gasket and Sealant / TA-30 (WSE-M4G323-A4)

Material

: Motorcraft® Metal Surface Prep / ZC-31-B



N0152290

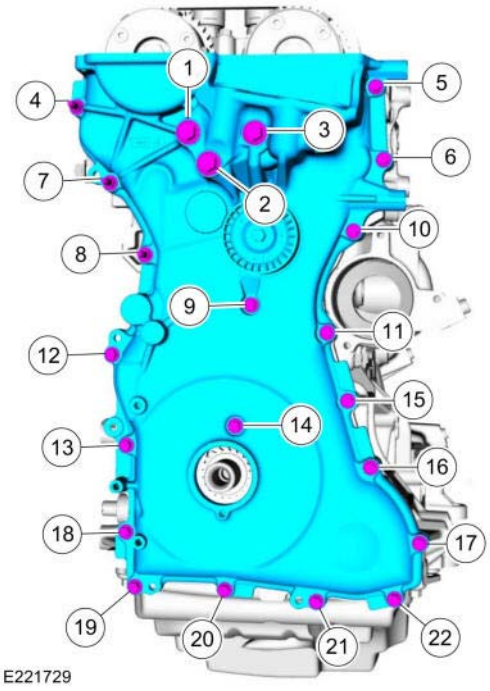
77.

Install the engine front cover and the fasteners and tighten in the sequence shown in illustration.

Torque:

Bolts 1 - 3: 35 lb.ft (48 Nm)

Bolts 4 - 22: 89 lb.in (10 Nm)



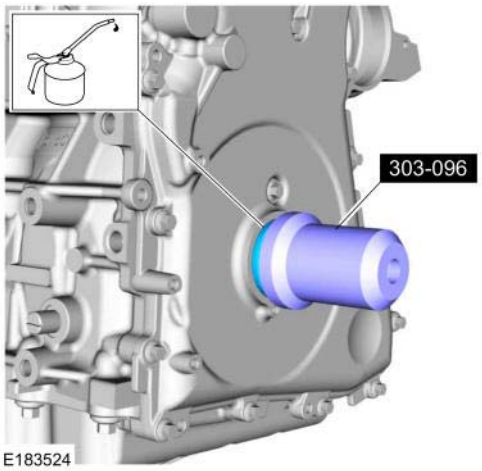
NOTE: Remove the through-bolt from the Camshaft Front Oil Seal Installer.

78.
Lubricate with clean engine oil and using the special tool, install the crankshaft front seal.

Use Special Service Tool: 303-096 (T74P-6150-A) Installer, Camshaft Front Oil Seal.

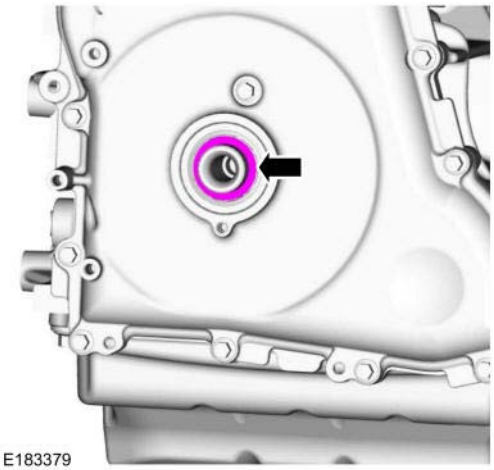
Material

: Motorcraft® SAE 5W-30 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W30-QSP (U.S.) (WSS-M2C946-A)



NOTE: Before installation, clean and inspect the diamond washer for any damage. If damaged is evident, replace the diamond washer. If no damage, the diamond washer is to be reused. If the diamond washer is not installed, engine damage may occur.

79.
Install the diamond washer onto the crankshaft.



80.

Lubricate the crankshaft pulley with clean engine oil.

Material

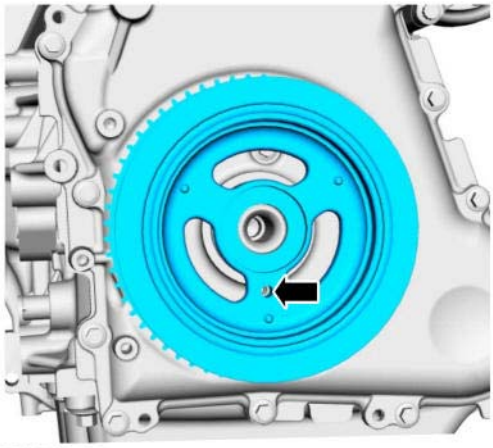
: Motorcraft® SAE 5W-30 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W30-QSP (U.S.) (WSS-M2C946-A)



N0152293

81.

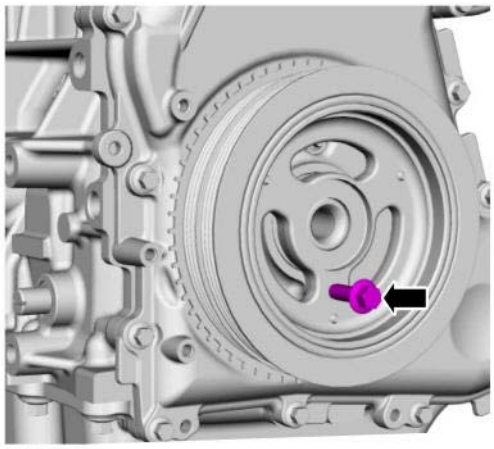
Install the crankshaft pulley.



E183525

NOTE: This step will correctly align the crankshaft pulley to the crankshaft.

82.
Install an M6 bolt.


E183526

NOTE: The crankshaft must remain in the TDC position during installation of the pulley bolt or damage to the engine can occur. Therefore, the crankshaft pulley must be held in place with the Strap Wrench and the bolt should be installed using hand tools only.

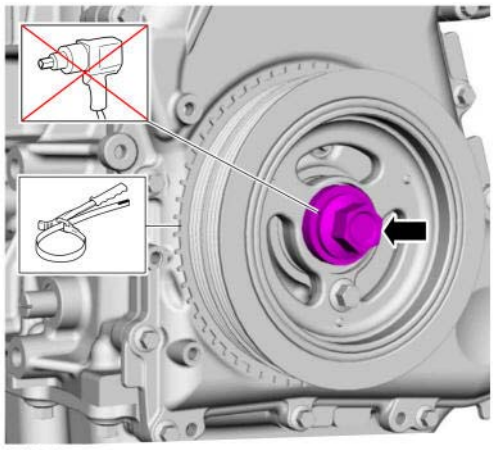
83.
Using a strap wrench, tighten the crankshaft pulley.

Use the General Equipment: Strap Wrench

Torque:

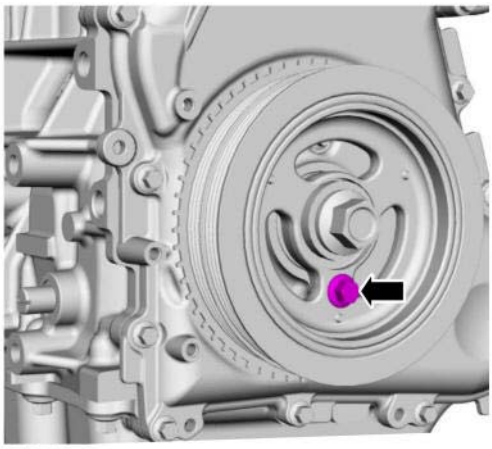
Stage 1: 74 lb.ft (100 Nm)

Stage 2: 90°


E183527

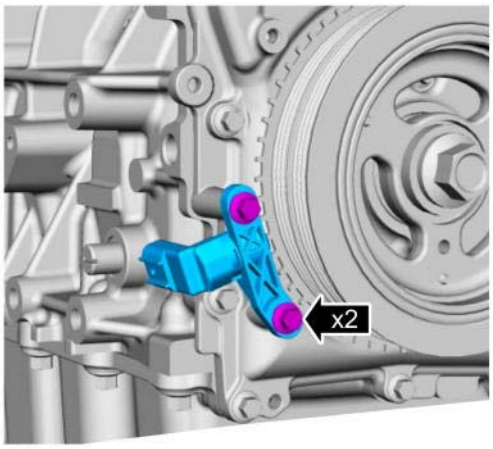
84.

Remove the M6 bolt.


E183528

NOTE: Do not tighten the CKP sensor bolts at this time.

85.
Install the CKP sensor and the bolts finger-tight.



E183529

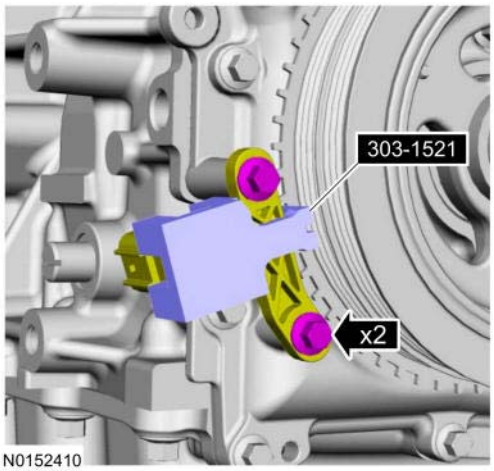
86.

Install the Special Tool onto the CKP sensor and the tooth of the crankshaft pulley trigger wheel.

Use Special Service Tool: 303-1521 Alignment Tool, Crankshaft Position Sensor.

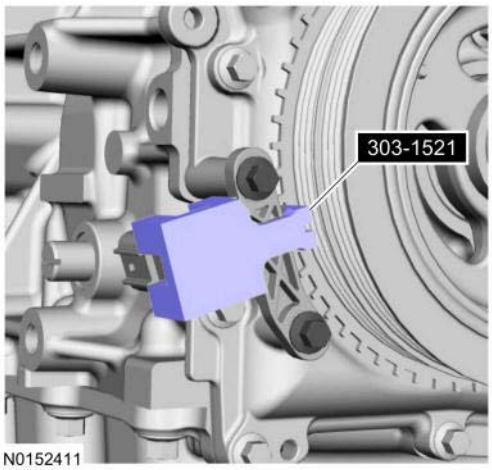
Torque

: 62 lb.in (7 Nm)



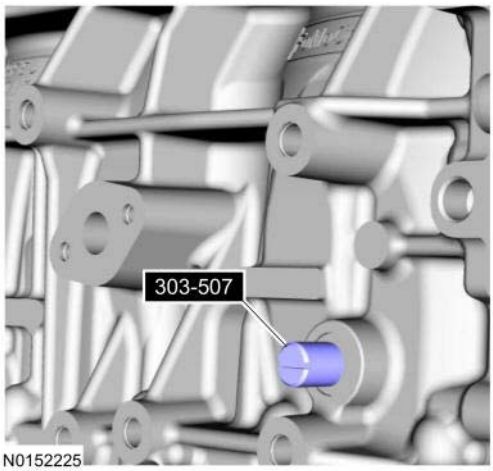
87.

Remove Special Service Tool: 303-1521 Alignment Tool, Crankshaft Position Sensor.



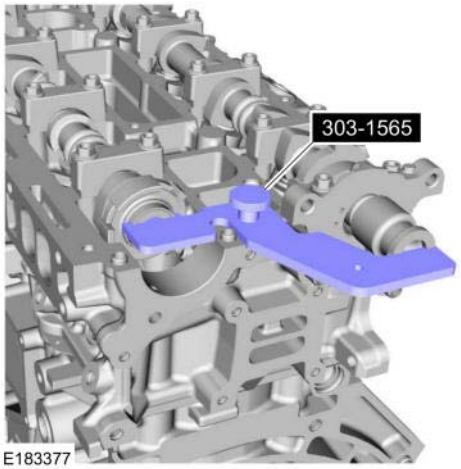
88.

Remove Special Service Tool: 303-507 Timing Peg, Crankshaft TDC.



89.

Remove Special Service Tool: 303-1565 Alignment Tool, Camshaft.

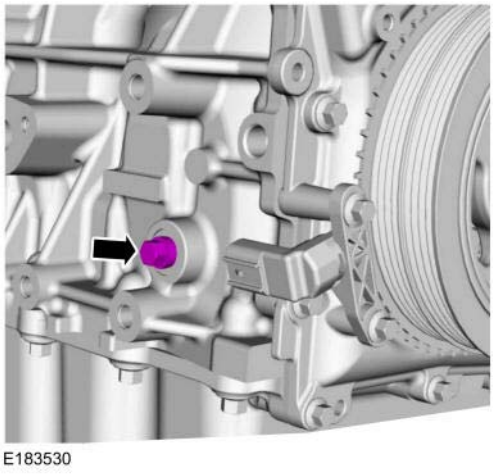


90.

Install the engine plug bolt.

Torque

: 177 lb.in (20 Nm)

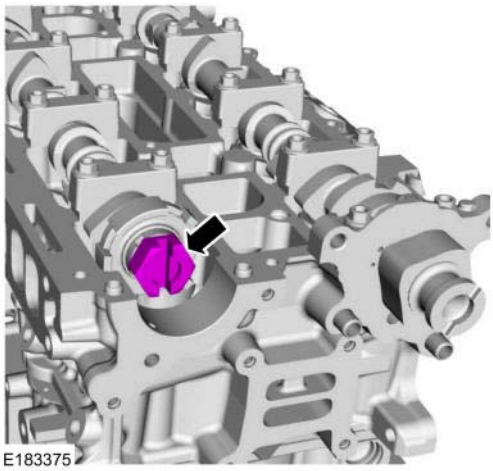


91.

Install the camshaft drive adapter.

Torque

: 46 lb.ft (63 Nm)



NOTE: The intake camshaft rear bearing cap must be secured within 10 minutes of gasket maker application. If the bearing cap is not secured within 10 minutes, the gasket maker must be removed and the sealing area cleaned.

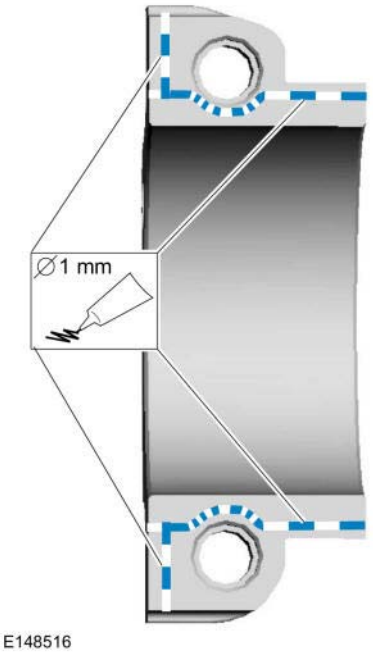
92.
Apply a 1 mm bead of gasket maker.

Material

: Gasket Maker / TA-16 (WSK-M2G348-A5)

Material

: Motorcraft® Metal Surface Prep / ZC-31-B



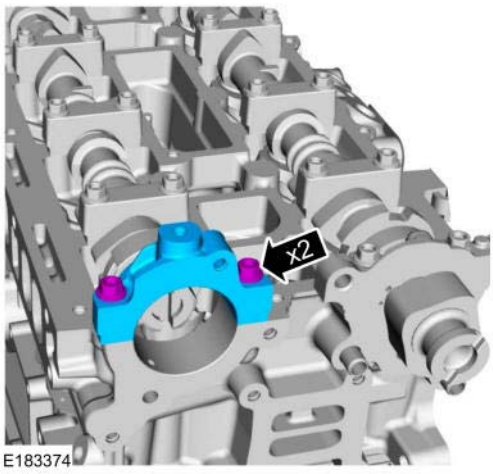
NOTE: Wipe off any excess gasket maker from the vacuum pump sealing surface of the cylinder head and camshaft cap.

93.
Install camshaft rear bearing cap and the bolts.

Torque:

Stage 1: 62 lb.in (7 Nm)

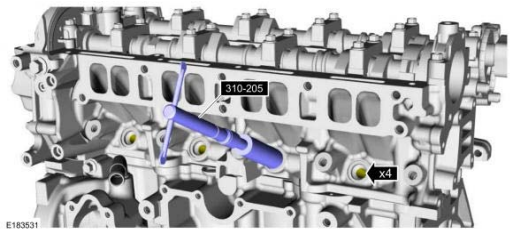
Stage 2: 142 lb.in (16 Nm)



NOTE: Make sure to thoroughly clean any residual fuel or foreign material from the cylinder head, block and the general surrounding area of the fuel rails and injectors.

NOTE: Do not use compressed air or the Fuel Injector Brush to clean the tip of the fuel injectors. Failure to follow this instruction may result in damage to the fuel injectors.

94.
Using the special tool, clean the fuel injector bores. Use Special Service Tool: 310-205 Fuel Injector Brush.



NOTE: Do not lubricate the new lower Teflon® fuel injector seals.

95.

1.

Use Special Service Tool: 310-207 Installer, Fuel Injector Seal Assembly.

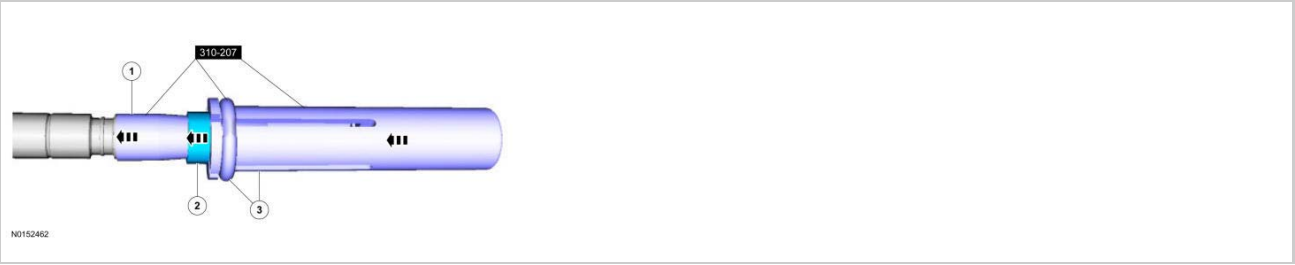
NOTE: Once the Teflon® seal is installed on the Teflon® Seal Guide, it should immediately be installed onto the fuel injector to avoid excessive expansion of the Teflon® seal.

2.
Make sure that new lower fuel injector Teflon® seals are installed.

Use Special Service Tool: 310-207 Installer, Fuel Injector Seal Assembly.

3.

Using the special tool, slide the Teflon® seals off of the Teflon® Seal Guide and into the groove on the fuel injectors.



NOTE: Make sure the Teflon® seal is fully seated in the groove on the fuel injector before sizing the Teflon® seal.

NOTE: Install the fuel injectors into the cylinder head within 15 minutes of sizing the seals due to Teflon® seal expansion.

96.

1.

Some massaging of the Teflon® seal with your fingers before the special tool is installed will aid in installing the special tool.

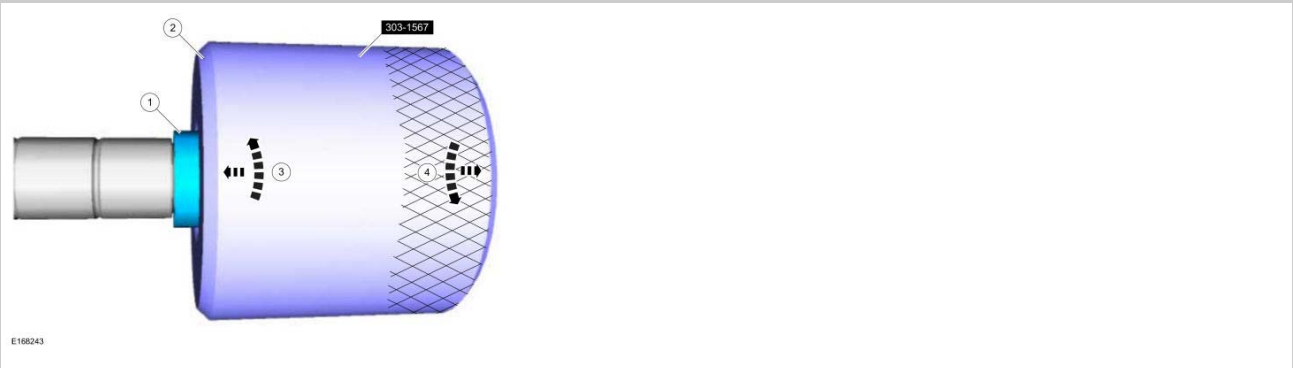
2.

Position the Teflon® seal sizer tool with the larger opening towards the Teflon® seal. Push while turning the Teflon® seal sizer tool 180 degrees.

Use Special Service Tool: 303-1567Sizer, Teflon Seal.

3.

Once the special tool is installed, check and make sure the Teflon® seal is in the sizing portion of the special tool. After one minute, turn the special tool back 180 degrees and remove.



NOTE: Use fuel injector O-ring seals that are made of special fuel-resistant material. The use of ordinary O-ring seals may cause the fuel system to leak. Do not reuse the O-ring seals.

NOTE: Do not lubricate the new lower Teflon® fuel injector seals.

97.

1.

Install the fuel injector seal.

2.

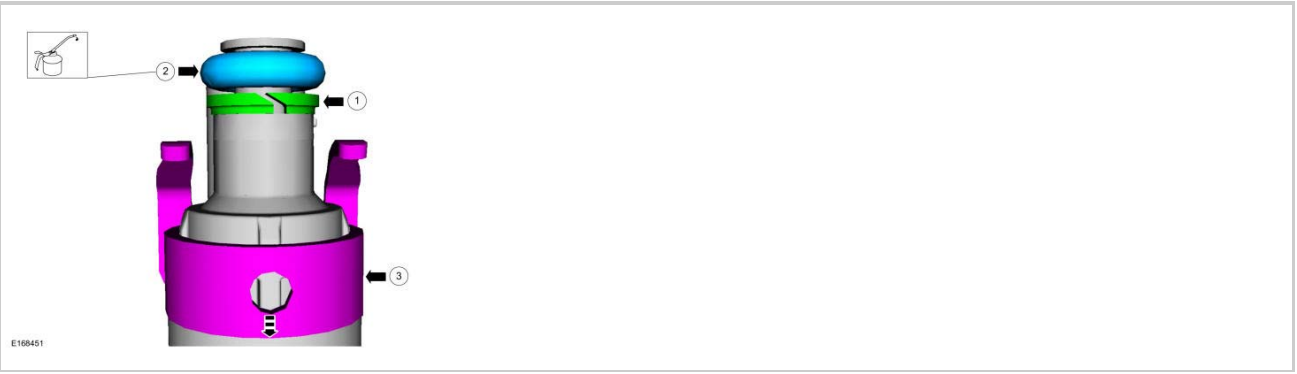
Lubricate with clean engine oil and install the fuel injector O-ring seal.

Material

: Motorcraft® SAE 5W-30 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W30-QSP (U.S.) (WSS-M2C946-A)

3.

Install the fuel injector seal.



NOTE: The FRP sensor must be replaced if it is removed from the fuel rail.

NOTE: The anti-rotation finger of the fuel injector clip must slip into the groove of the fuel rail cup.

98.
Install the fuel injectors in the fuel rail.



NOTE: Make sure that new fuel rail bolts are installed.

NOTE: Do not lubricate the new lower Teflon® fuel injector seals.

99.

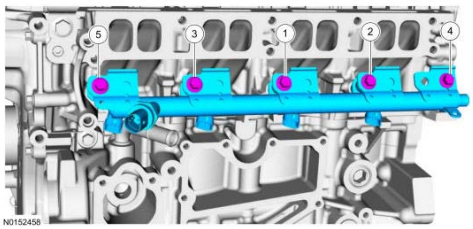
Install the fuel rail by push down on the fuel rail above the injectors.

Install the bolts and tighten in sequence shown in illustration in 2 stages.

Torque:

Stage 1: 71 lb.in (8 Nm)

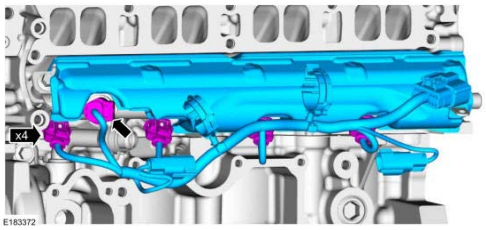
Stage 2: 26°



100.

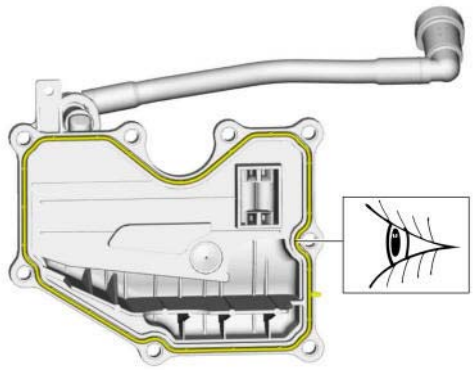
Connect the fuel injectors and FRP sensor electrical connectors.

Install the fuel rail shield.



101.

Inspect and replace the crankcase vent separator gasket, if damaged.

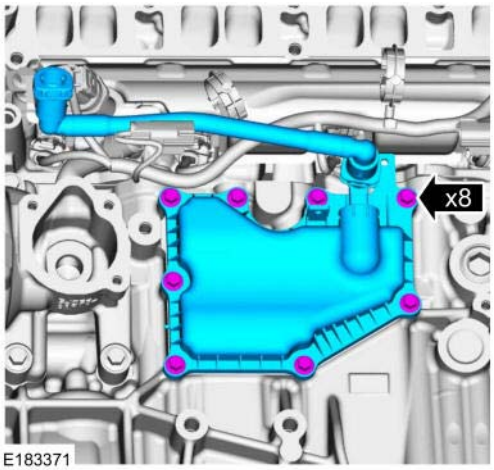


102.

Install the crankcase vent separator and the bolts.

Torque

: 89 lb.in (10 Nm)



103.

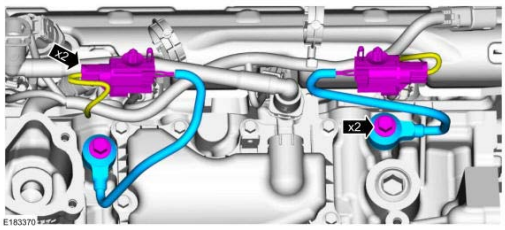
> *NOTE: The forward KS must be installed in the 6 o'clock position and the rearward KS must be installed in the 3 o'clock position as shown in illustration. Failure to follow these instructions may result in damage to the engine.*

Install the KS in their original position and install the bolts.

Torque

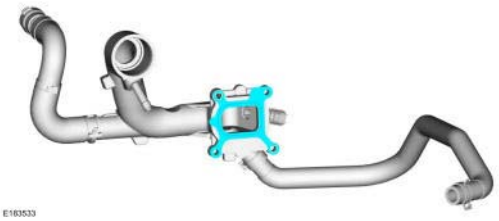
: 177 lb.in (20 Nm)

Connect the KS electrical connectors.



104.

Install a new coolant outlet gasket.

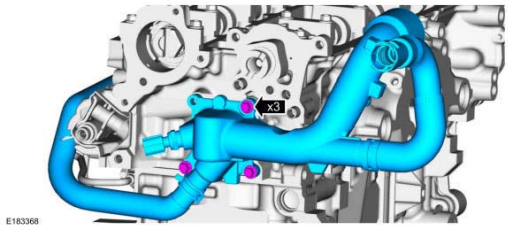


105.

Install the coolant outlet and the bolts.

Torque

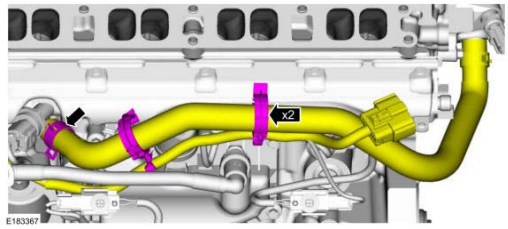
: 89 lb.in (10 Nm)



106.

Connect the coolant tube and the retainers.

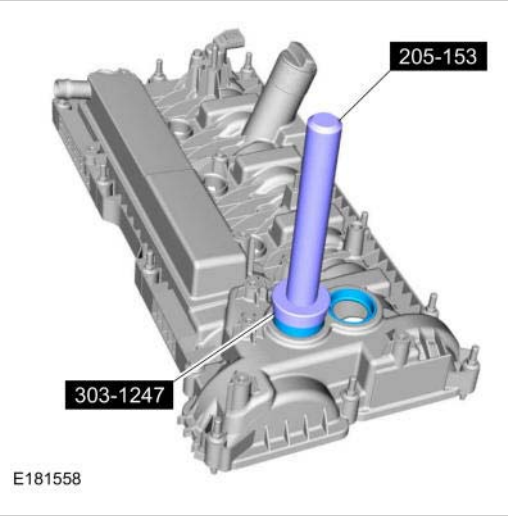
Use the General Equipment: Hose Clamp Remover/Installer



NOTE: Installation of new seals is only required if damaged seals were removed during valve cover removal.

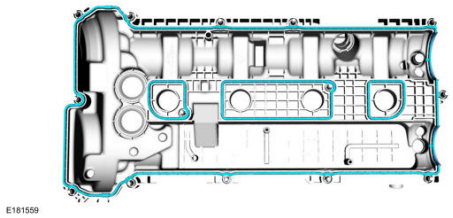
107.
If removed, using the special tools, install the VCT oil control solenoid seals.

Use Special Service Tool: 205-153 (T80T-4000-W) Handle, 303-1247 VCT Spark Plug Tube Seal Remover and Installer.



108.

Install a new valve cover gasket.

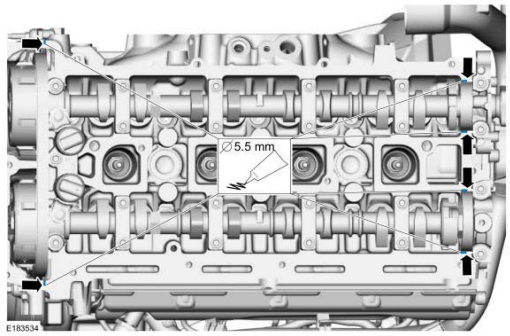


109.

Apply a 5.5 mm bead of silicone sealant.

Material

: Silicone Gasket and Sealant / TA-30 (WSE-M4G323-A4)

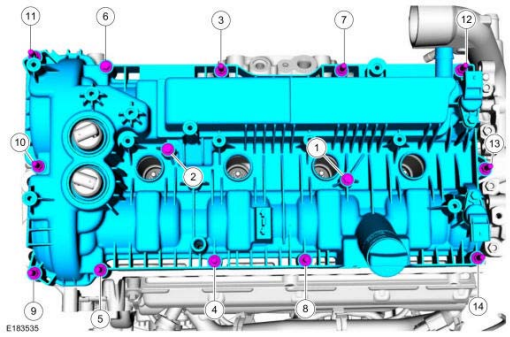


NOTE: The valve cover must be secured within 10 minutes of silicone gasket application. If the valve cover is not secured within 10 minutes, the silicone sealant must be removed and the sealing area cleaned.

110.
Install the valve cover and tighten the fasteners in the sequence shown in illustration.

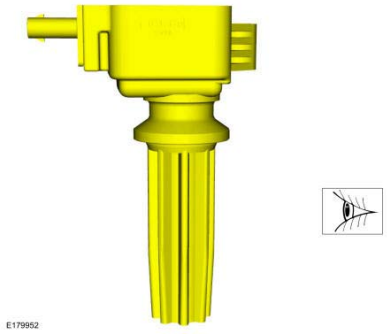
Torque

: 89 lb.in (10 Nm)



111.

Inspect the ignition coil-on-plug assembly for cracks, rips, or tears. Replace any damaged coil-on-plug assemblies.

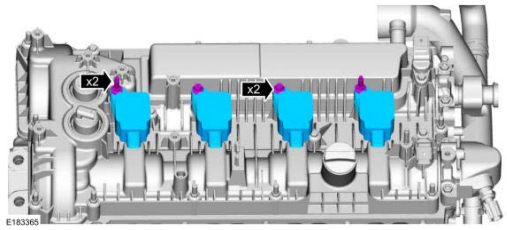


112.

Install the ignition coil-on-plugs and the fasteners.

Torque

: 53 lb.in (6 Nm)

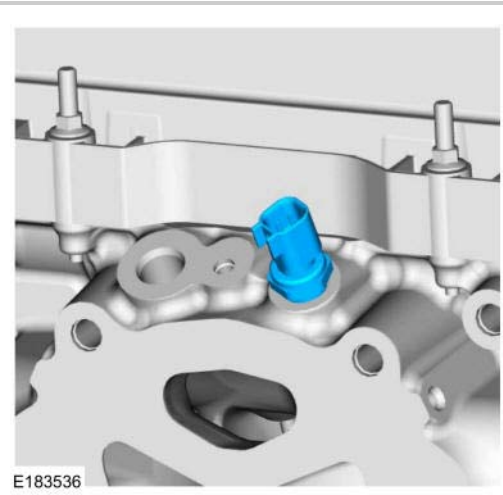


113

Install a new CHT sensor.

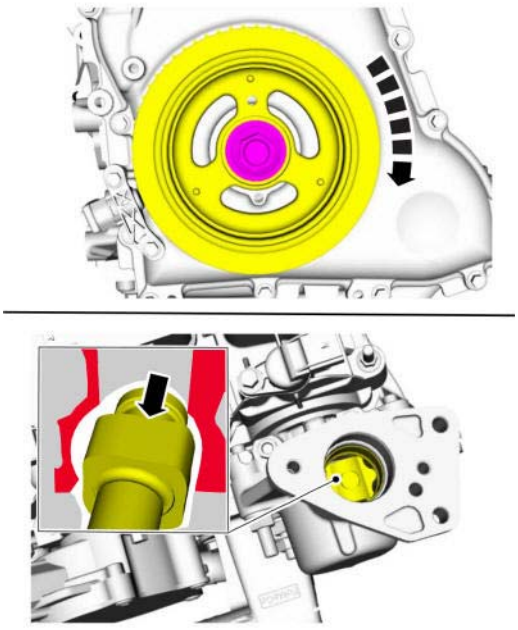
Torque

: 97 lb.in (11 Nm)



NOTE: The fuel injection cam lobe must be positioned at zero lift before installing the high-pressure fuel pump drive unit.

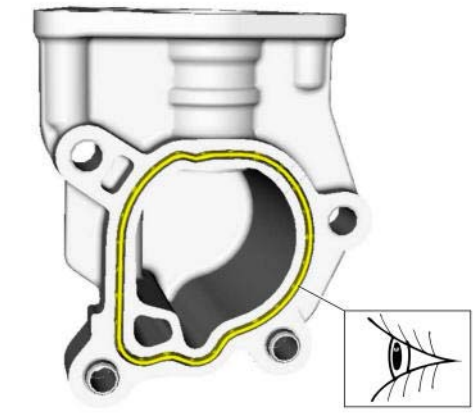
114.
Rotate the crankshaft to position the camshaft at zero lift.



E183361

115.

Inspect and replace the high-pressure fuel pump drive unit gasket, if damaged.



N0152074

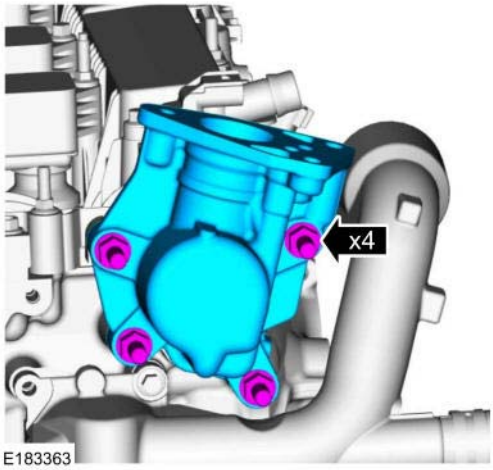
116.

Install the high-pressure fuel pump drive unit and the stud bolts and tighten in 2 stages.

Torque

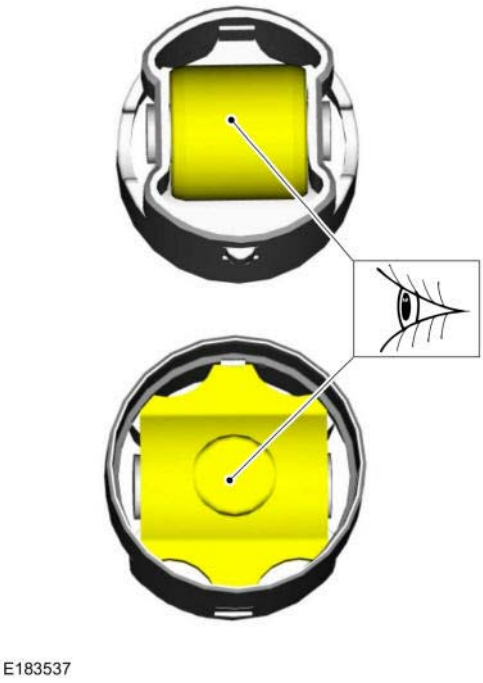
Stage 1: 133 lb.in (15 Nm)

Stage 2: 60°



117.

Inspect the high-pressure fuel pump tappet for flat spots or scoring, especially in the indicated areas. If any damage is found, inspect the high-pressure fuel pump and the high-pressure fuel pump tappet drive lobe. Install a new component as necessary.



118.

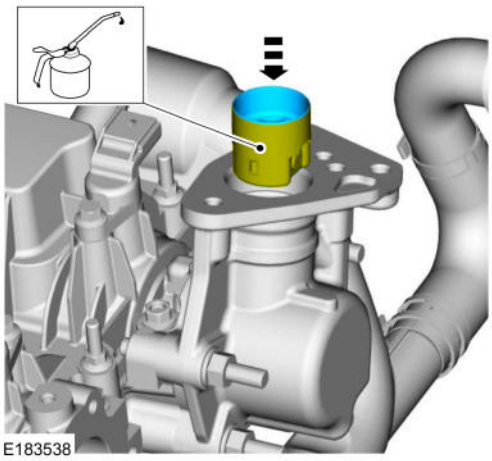
Lubricate the high-pressure fuel pump tappet with clean engine oil.

Material

: Motorcraft® SAE 5W-30 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W30-QSP (U.S.)

(WSS-M2C946-A)

Install the high-pressure fuel pump tappet.

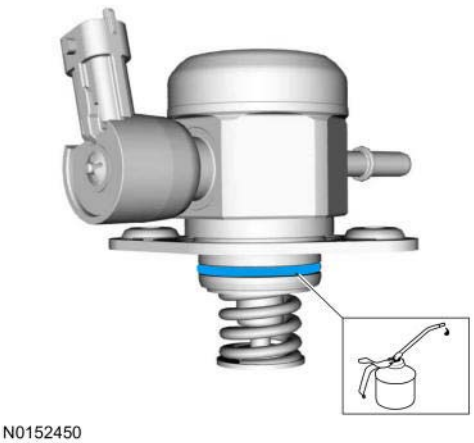


119.

Install a new fuel injection pump O-ring seal.

Material

: Motorcraft® SAE 5W-30 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W30-QSP (U.S.) (WSS-M2C946-A)



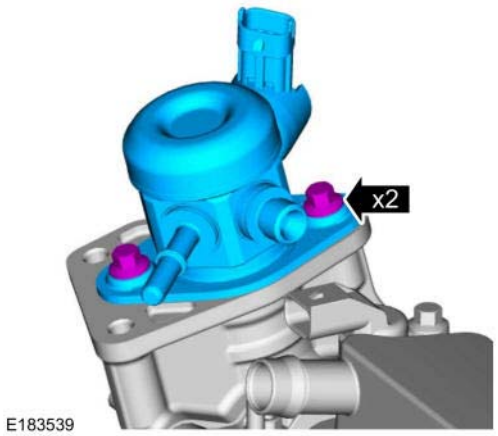
NOTE: Install new bolts.

120.
Install the fuel injection pump and alternately tighten each bolt one complete revolution until seated in 2 stages.

Torque:

Stage 1: 44 lb.in (5 Nm)

Stage 2: 55°

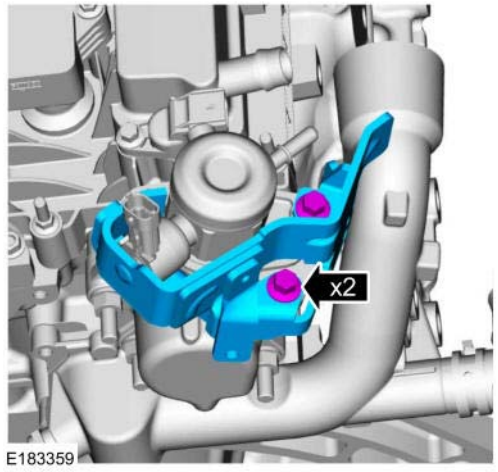


121.

Install the fuel injection pump bracket and the bolts.

Torque

: 150 lb.in (17 Nm)

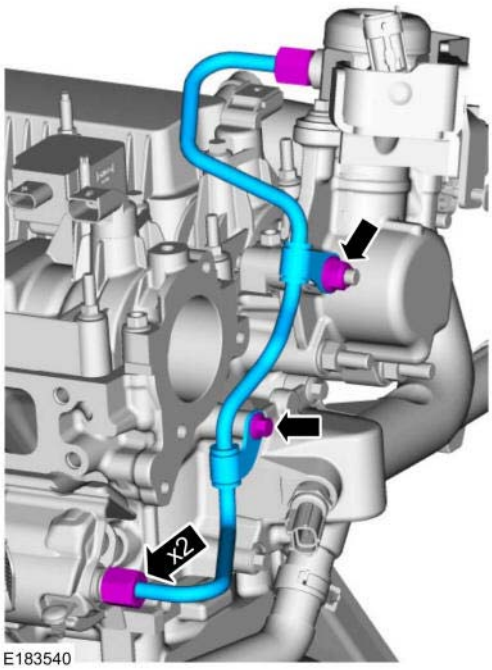


NOTE: Install a new fuel tube.

122.

Install the fuel tube, nut and the bolt finger-tight.

Install the flare nuts finger-tight.



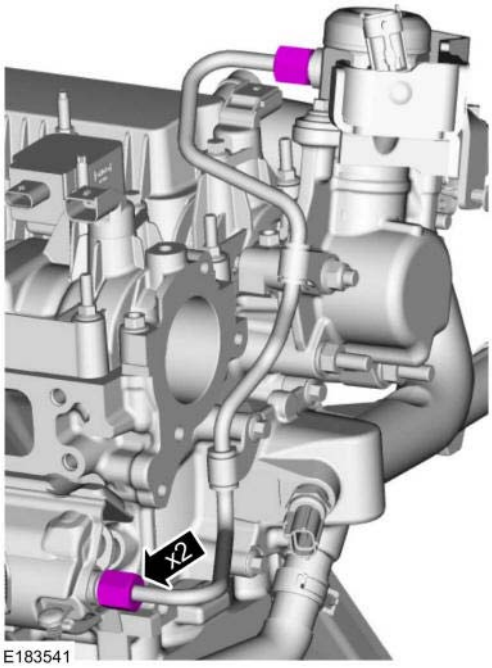
123.

Tighten the flare nuts in 2 stages.

Torque:

Stage 1: 133 lb.in (15 Nm)

Stage 2: 30°



124.

1.

Tighten the bolt.

Torque

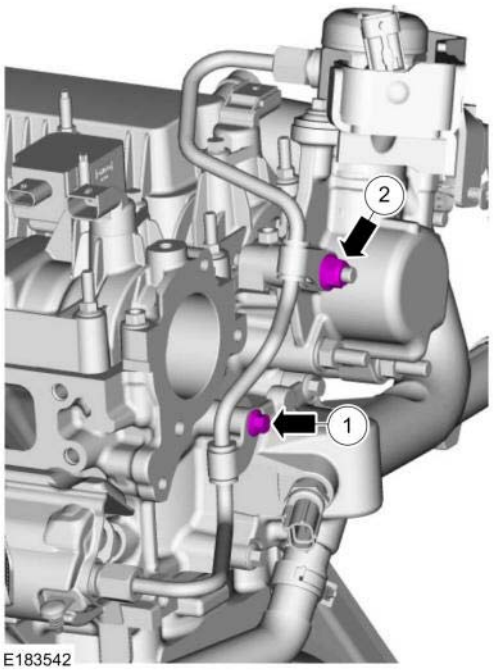
: 89 lb.in (10 Nm)

2.

Tighten the nut.

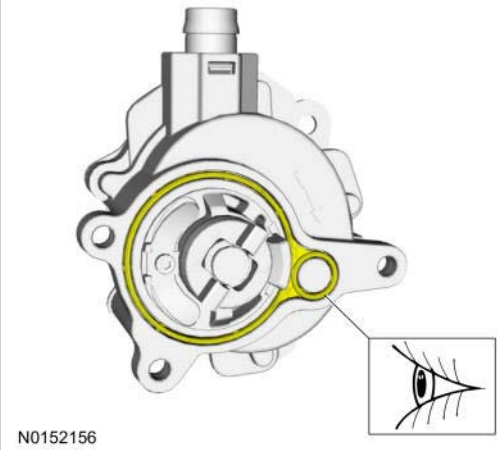
Torque

: 150 lb.in (17 Nm)



125.

Inspect and replace the brake vacuum pump gasket, if damaged.

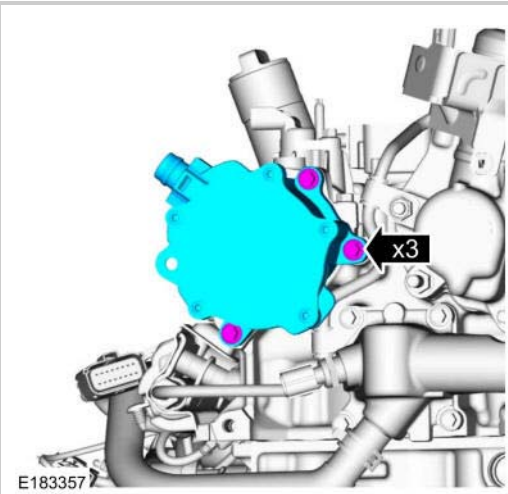


126.

Install the brake vacuum pump and the bolts.

Torque

: 89 lb.in (10 Nm)

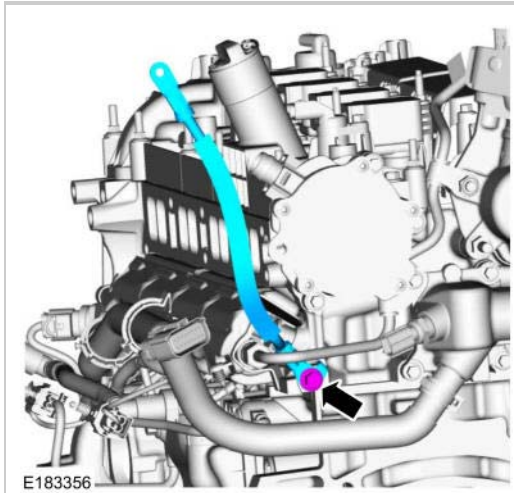


127.

Install the ground strap and the bolt.

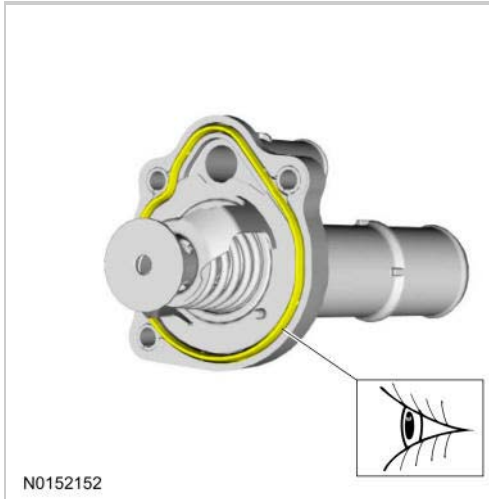
Torque

: 18 lb.ft (25 Nm)



128.

Inspect and replace the thermostat housing gasket, if damaged.



129.

1.

Install the thermostat housing the bolts.

Torque

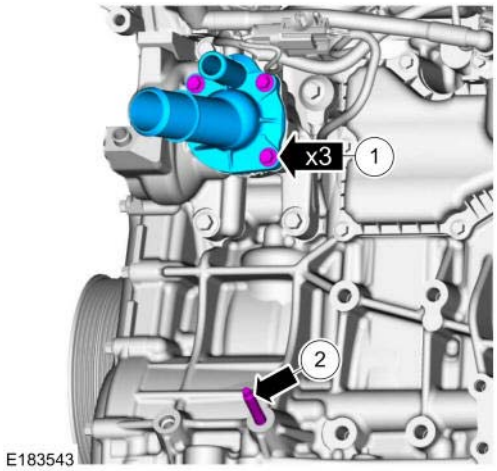
: 89 lb.in (10 Nm)

2.

Install the generator stud.

Torque

: 80 lb.in (9 Nm)

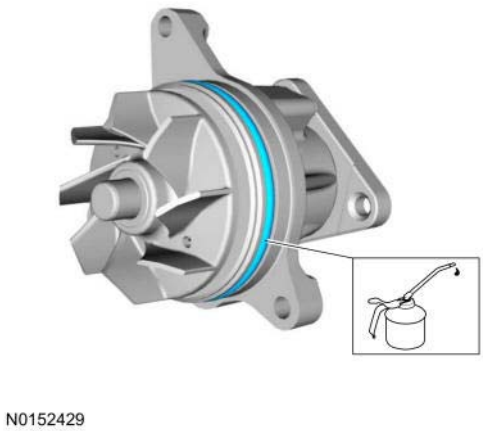


130.

Install and lubricate the coolant pump O-ring seal with clean engine coolant.

Material

: Motorcraft® Orange Antifreeze/Coolant Concentrated (U.S.) / VC-3-B (U.S.) (WSS-M97B44-D)

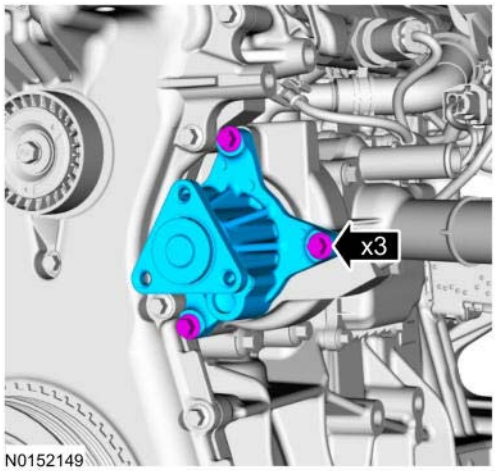


131.

Install the coolant pump and the bolts.

Torque

: 89 lb.in (10 Nm)



132.

1.

Install the coolant pump pulley and the bolts finger-tight.

2.

Install the accessory drive belt tensioner and the bolts.

Torque

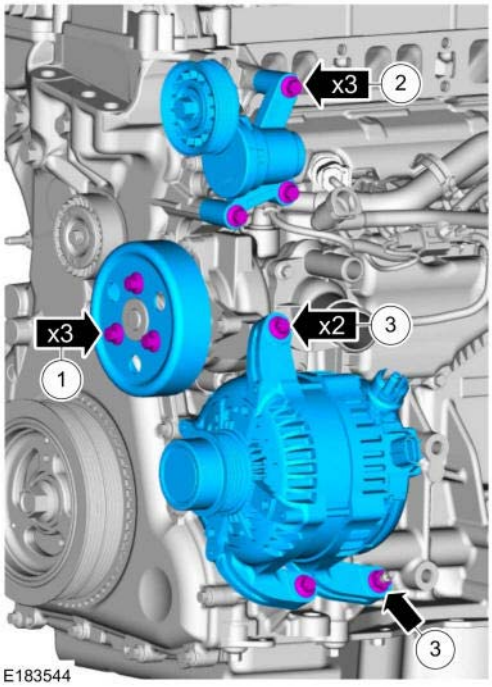
: 18 lb.ft (25 Nm)

3.

Install the generator, nut and the bolts.

Torque

: 18 lb.ft (25 Nm)



133.

1.

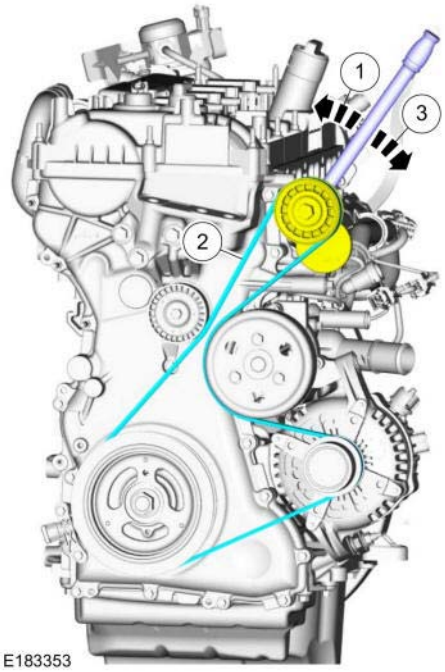
Install the tool and release the tension on the accessory drive belt tensioner.

2.

Install the accessory drive belt.

3.

Release the tool and remove.

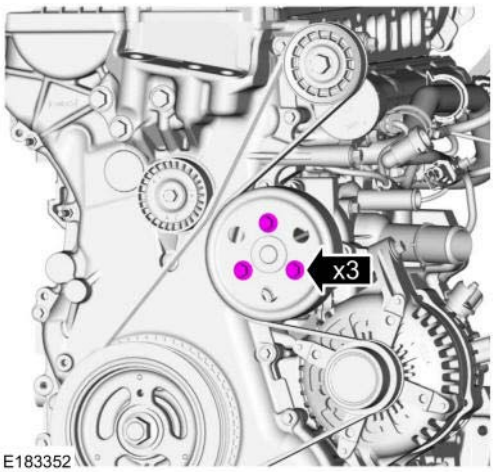


134.

Tighten the coolant pump pulley bolts.

Torque

: 177 lb.in (20 Nm)

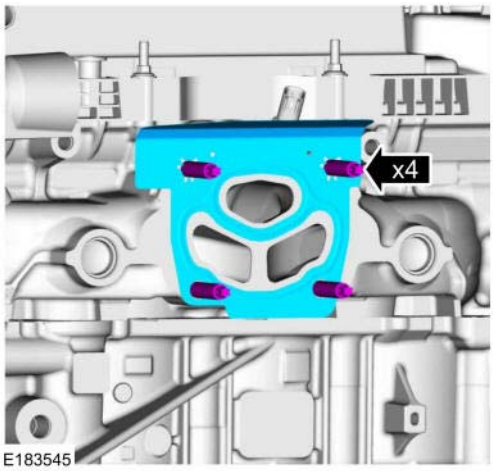


135.

Install the studs and the turbocharger gasket.

Torque

: 150 lb.in (17 Nm)

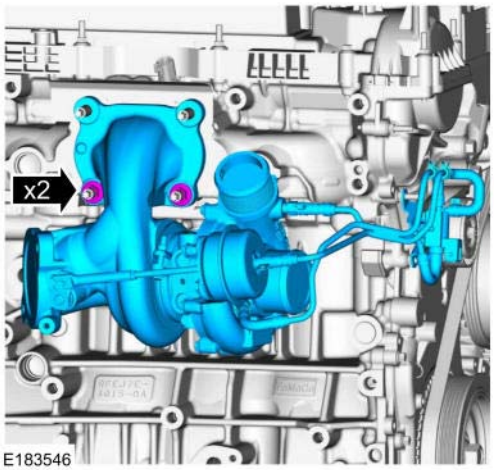


136.

Install the turbocharger and the nuts.

Torque

: 37 lb.ft (50 Nm)

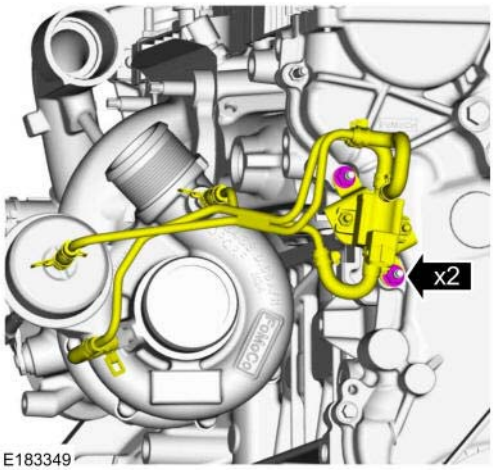


137.

Position the turbocharger vacuum valve and install the nuts.

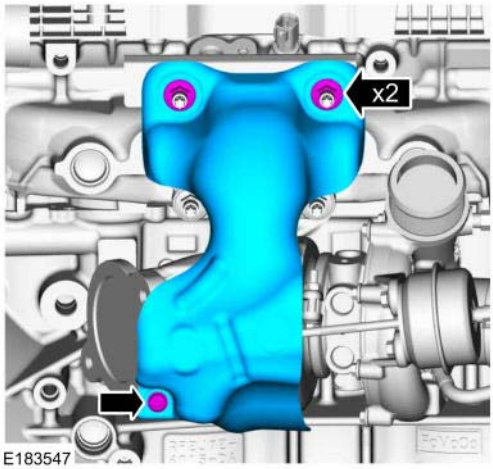
Torque

: 89 lb.in (10 Nm)



138.

Install the heat shield, nuts and the bolt finger-tight.



139.

1.

Tighten the nuts.

Torque

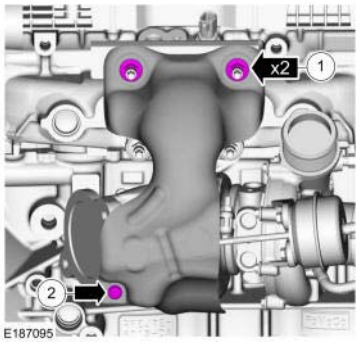
: 37 lb.ft (50 Nm)

2.

Tighten the bolt.

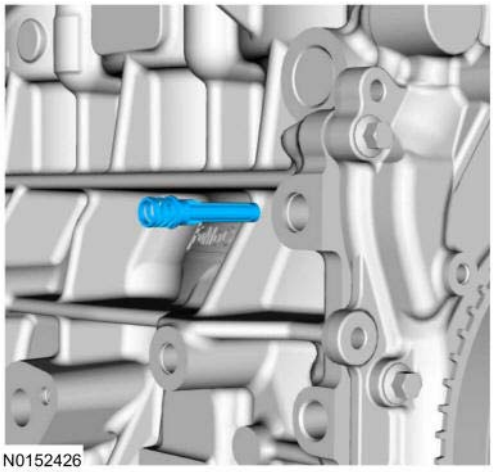
Torque

: 89 lb.in (10 Nm)



NOTE: Do not reuse the turbocharger oil filter, a new part must be installed.

140.
Install a new turbocharger oil supply filter.



141.

Install new sealing washers.

Lubricate and install the new turbocharger oil supply tube O-ring seal with clean engine oil.

Material

: Motorcraft® SAE 5W-30 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W30-QSP (U.S.) (WSS-M2C946-A)



E183549

NOTE: The oil feed hose must be fully seated prior to fastener rundown.

142.

1.

Install the turbocharger oil supply tube and the bolt.

Torque

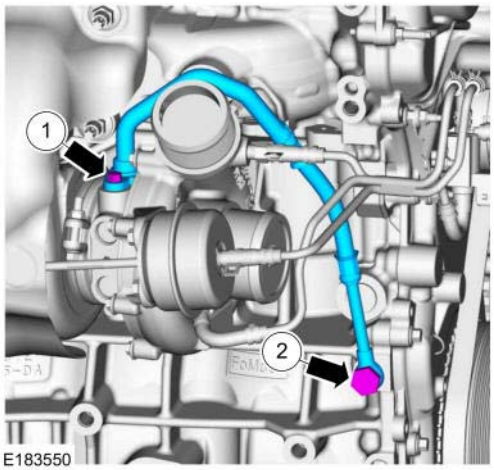
: 89 lb.in (10 Nm)

2.

Tighten the bolt.

Torque

: 18 lb.ft (25 Nm)



E183550

143.

Install a new turbocharger O-ring seal and lubricate with clean engine oil.

Material

: Motorcraft® SAE 5W-30 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W30-QSP (U.S.) (WSS-M2C946-A)

Install a new turbocharger gasket.

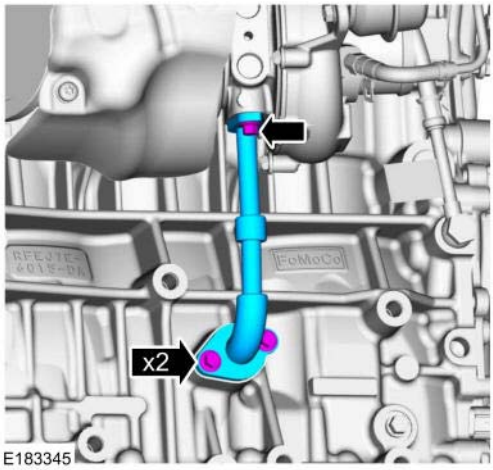


NOTE: The oil drain tube must be fully seated prior to fastener rundown.

144.
Install the turbocharger-to-cylinder block oil return tube and the bolts.

Torque

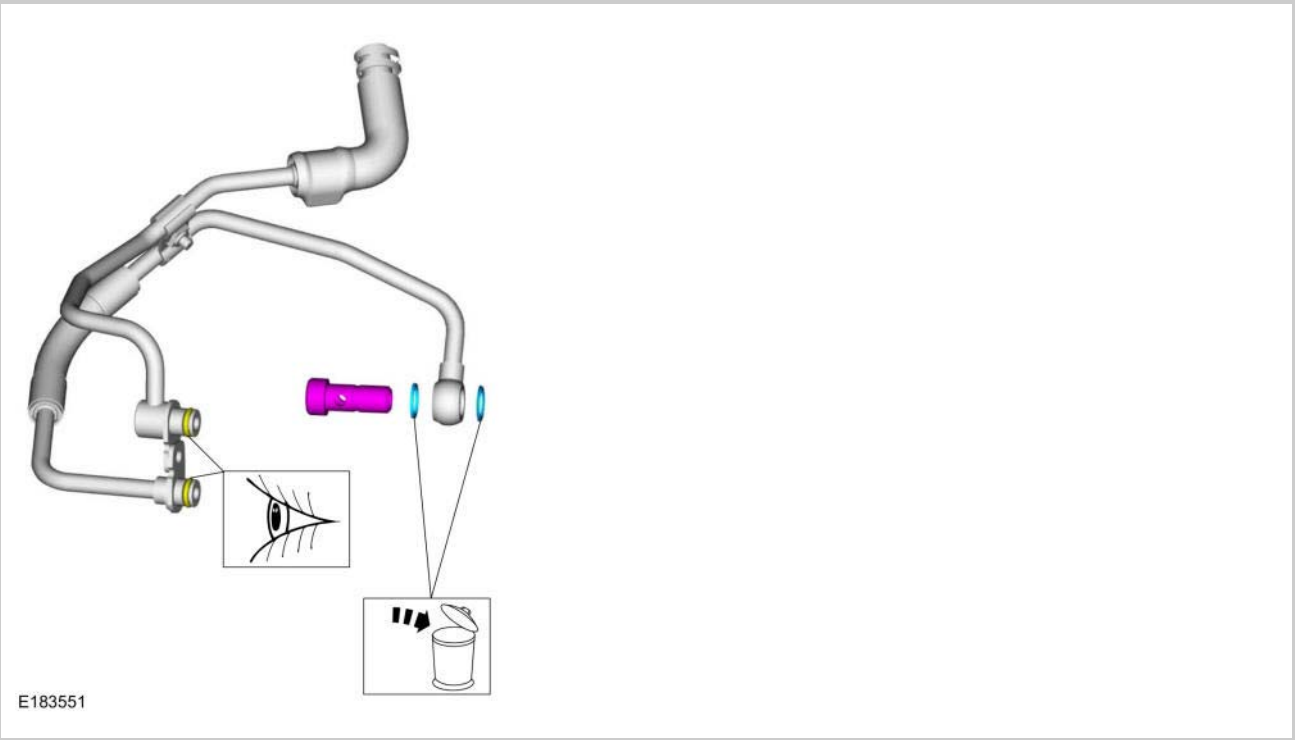
: 89 lb.in (10 Nm)



145.

Inspect a the O-ring seals, replace if damaged.

Discard the washers.



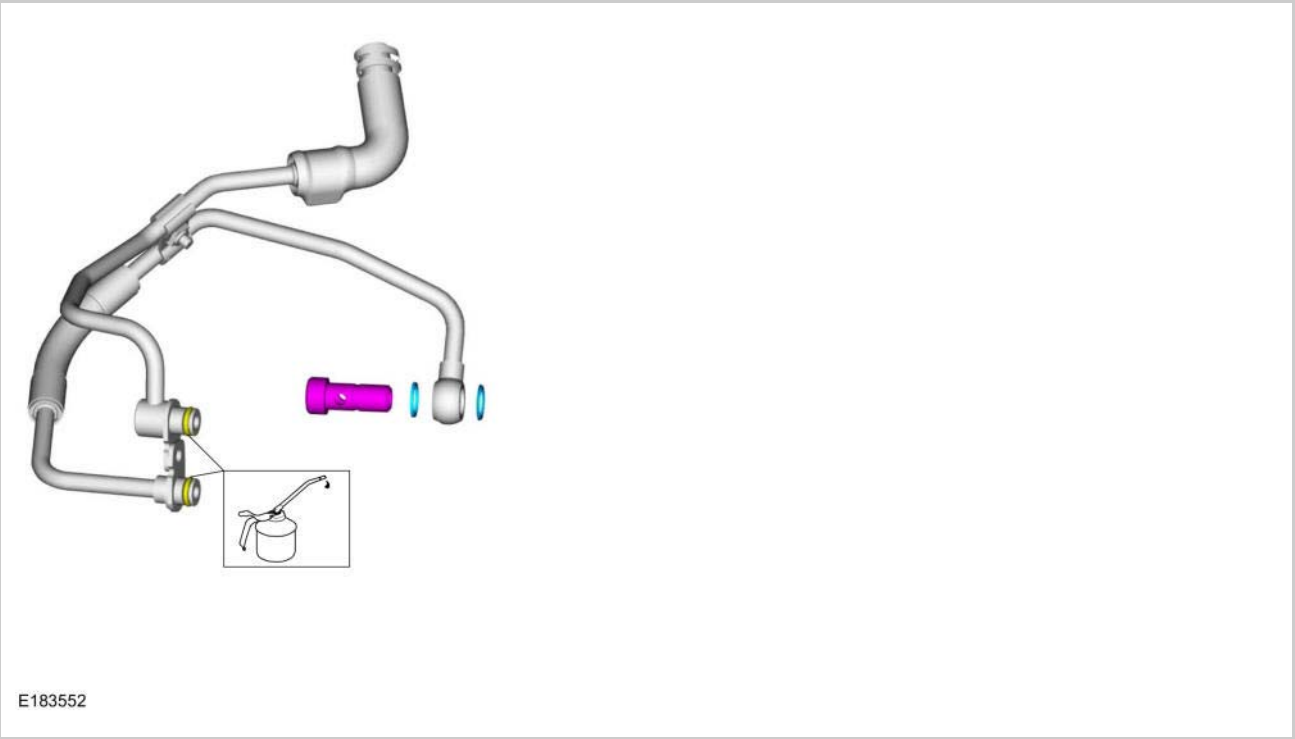
146.

Lubricate the O-ring seals with engine coolant.

Material

: Motorcraft® Orange Antifreeze/Coolant Concentrated (U.S.) / VC-3-B (U.S.) (WSS-M97B44-D)

Install new washers.



147.

1.

Fit the O-ring end of the turbocharger coolant tubes to the turbocharger. The lower coolant inlet tube goes into the turbocharger first. Install the bolt.

Torque

: 89 lb.in (10 Nm)

2.

Install the bolt for the turbocharger coolant inlet tube.

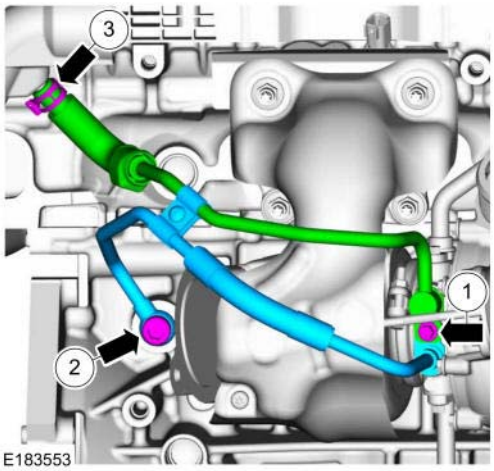
Torque

: 27 lb.ft (37 Nm)

3.

Connect the turbocharger coolant outlet tube to the coolant outlet.

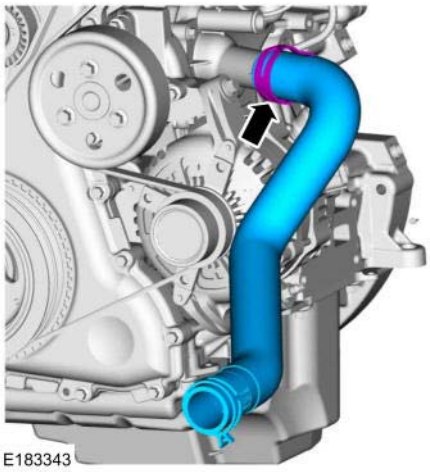
Use the General Equipment: Hose Clamp Remover/Installer



148.

Connect the radiator hose to the thermostat housing.

Use the General Equipment: Hose Clamp Remover/Installer



149.

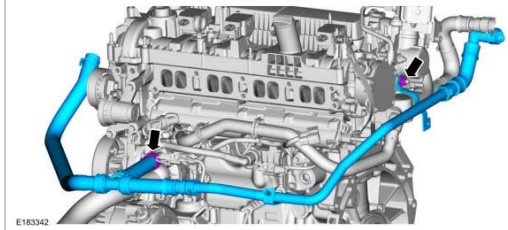
Install the coolant hose and the nut.

Torque

: 115 lb.in (13 Nm)

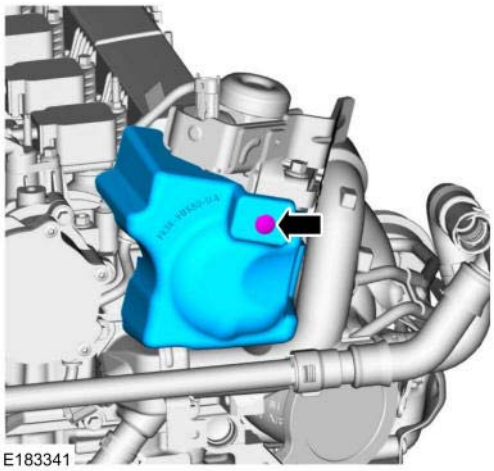
Connect the coolant hose to thermostat housing.

Use the General Equipment: Hose Clamp Remover/Installer



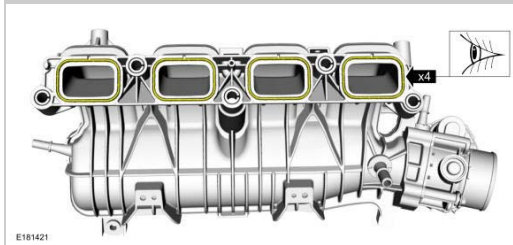
150.

Install the high-pressure fuel pump drive unit cover and the retainer.



NOTE: If the engine is repaired or replaced because of upper engine failure, typically including valve or piston damage, check the intake manifold for metal debris. If metal debris is found, install a new intake manifold. Failure to follow these instructions can result in engine damage.

151.
Visually inspect the intake manifold gaskets for nicks, cuts and abrasions. If these conditions are not present, the gaskets may be reused.

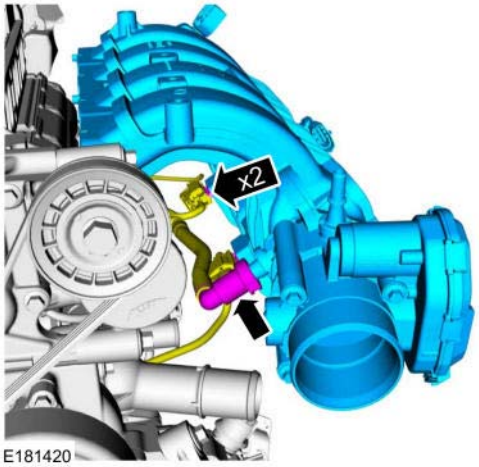


152.

Install the intake manifold.

Attach the KS electrical connector retainers to the intake manifold.

Connect the PCV tube quick release coupling.

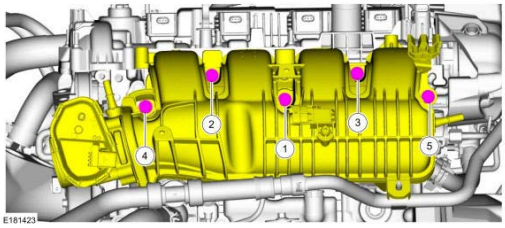


153.

Position the intake manifold and install the bolts.

Torque

: 177 lb.in (20 Nm)

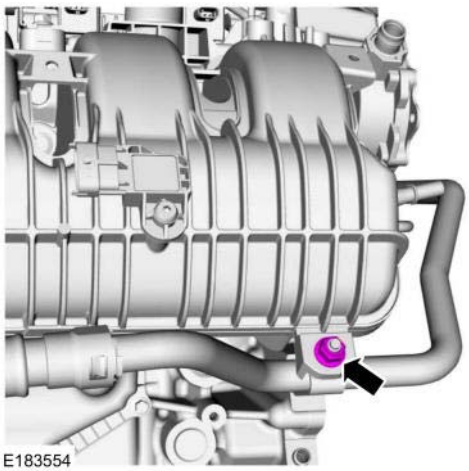


154.

Install the nut on the coolant tube stud.

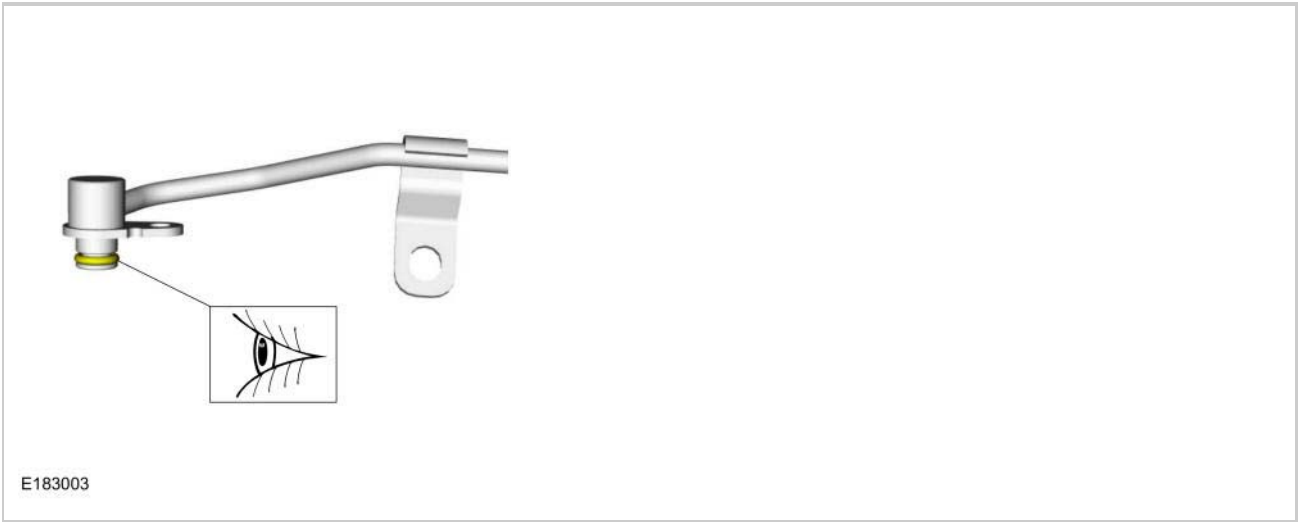
Torque

: 177 lb.in (20 Nm)



155.

Inspect the coolant tube O-ring seal and replace if necessary.



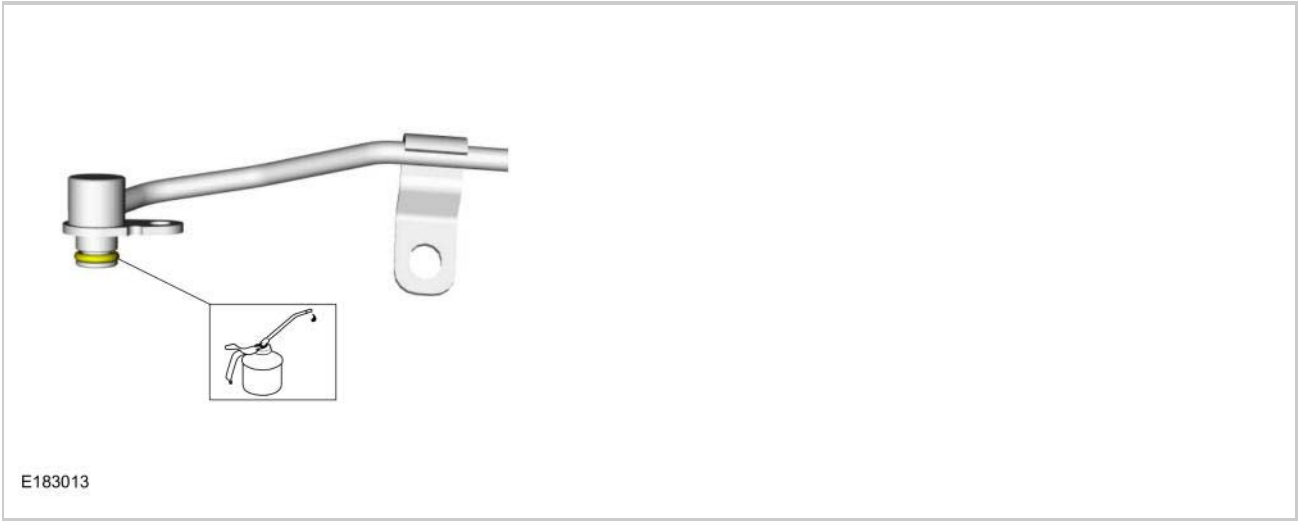
E183003

156.

Lubricate the coolant tube O-ring seal with clean engine coolant.

Material

: Motorcraft® Orange Antifreeze/Coolant Concentrated (U.S.) / VC-3-B (U.S.) (WSS-M97B44-D)



E183013

157.

NOTE: The coolant tube must be fully seated prior to tighten the bolt.

1.
Install the coolant tube and bolt.

Torque

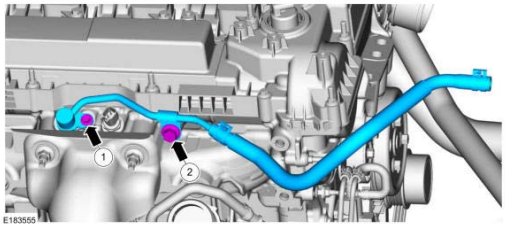
: 97 lb.in (11 Nm)

2.

Install the coolant tube bolt.

Torque

: 22 lb.ft (30 Nm)

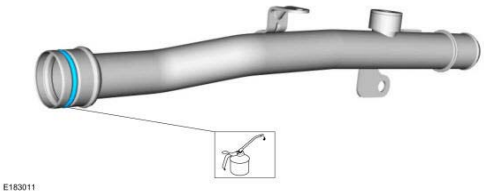


158.

Install a new O-ring seal and lubricate with clean engine coolant.

Material

: Motorcraft® Orange Antifreeze/Coolant Concentrated (U.S.) / VC-3-B (U.S.) (WSS-M97B44-D)



159.

1.

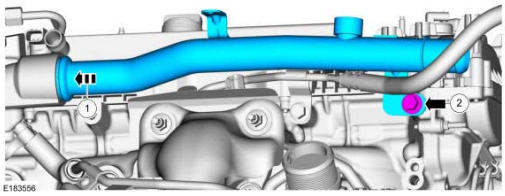
Install the coolant tube.

2.

Install the coolant tube bolt.

Torque

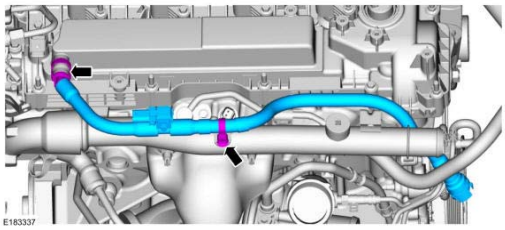
: 89 lb.in (10 Nm)



160.

Connect the crankcase vent tube to the valve cover.

Attach the crankcase vent tube retainer.



161.

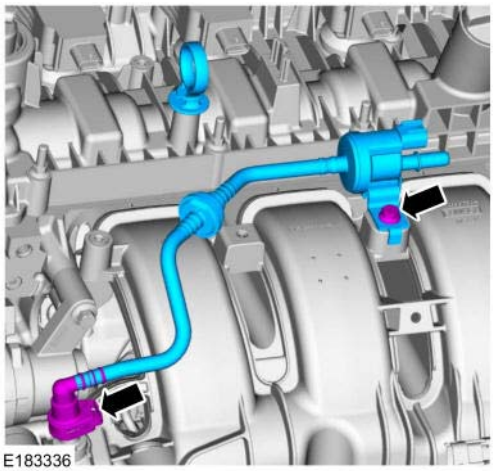
Install the oil level indicator.

Install the EVAP canister purge valve and the bolt.

Torque

: 71 lb.in (8 Nm)

Connect the EVAP canister purge valve quick release coupling.

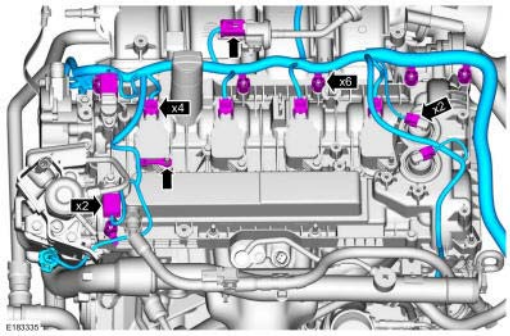


162.

Install the engine wiring harness and attach the wiring harness retainer.

Connect the ignition coil-on-plugs and VCT oil control solenoid sensor electrical connectors.

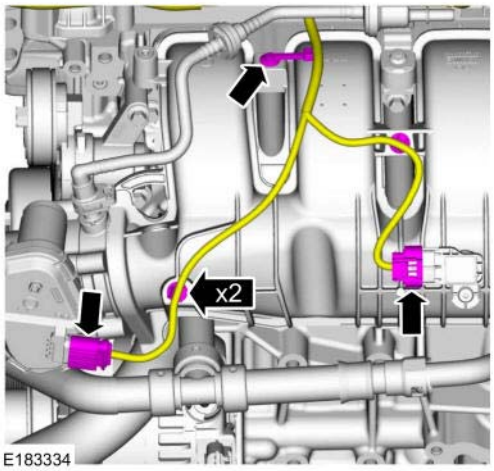
Connect the CMP sensor and EVAP canister purge valve electrical connectors.



163.

Attach the wiring harness retainers.

Connect the throttle body and MAPT electrical connectors.

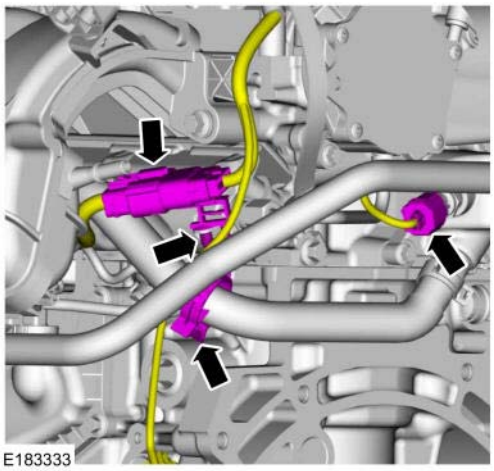


164.

Attach the wiring harness retainer.

Connect the ECT sensor electrical connector.

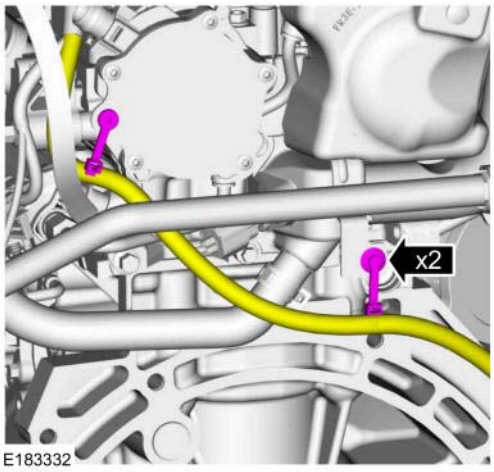
Connect and attach the fuel injector harness electrical connector.



6-Speed Automatic Transmission - 6R80

165.

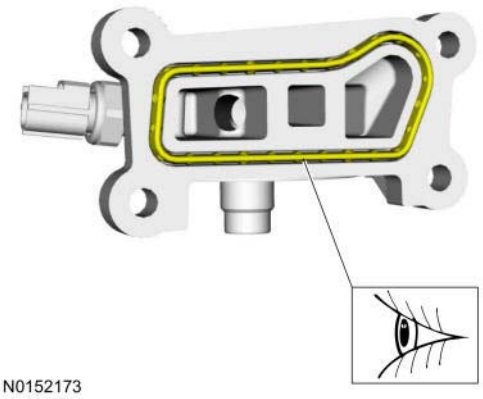
Attach the wiring harness retainers.



6-Speed Automatic Transmission - 6R80/6-Speed Manual Transmission - MT82

166.

Inspect and replace the oil filter adapter gasket, if damaged.



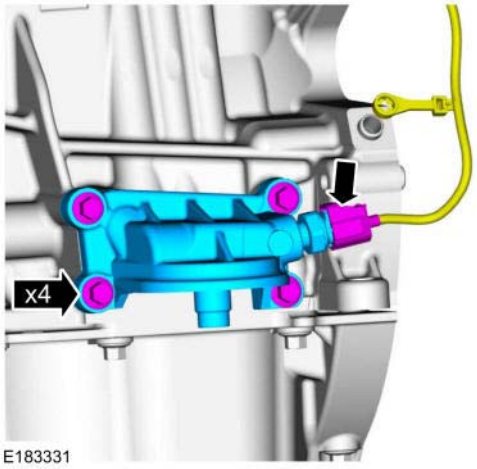
167.

Install the oil filter adapter and the bolts.

Torque

: 18 lb.ft (25 Nm)

Connect the oil pressure switch electrical connector.

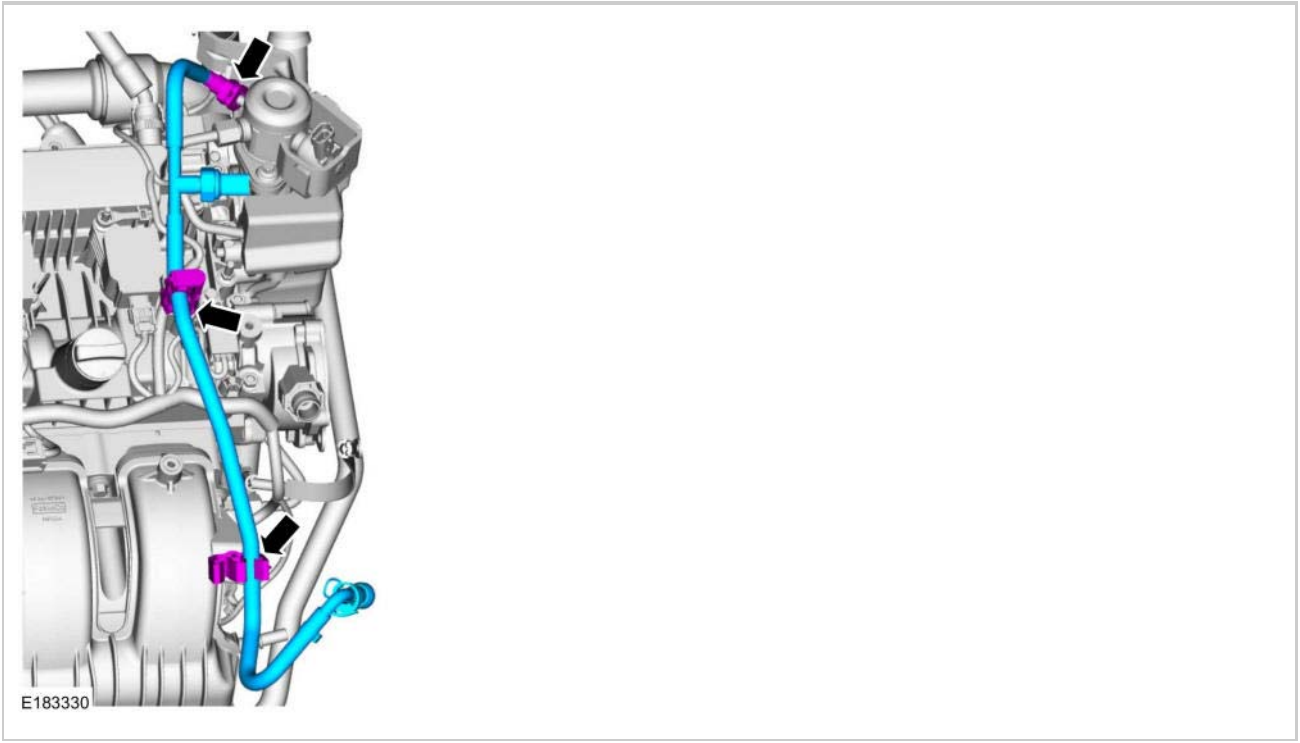


168.

Install the fuel supply tube and attach the retainer.

Connect the fuel supply tube quick release coupling to the high-pressure fuel pump. Refer to: QUICK RELEASE COUPLING - 2.3L EcoBoost (231kW/314PS).

Attach the fuel supply tube to the intake manifold retainer.

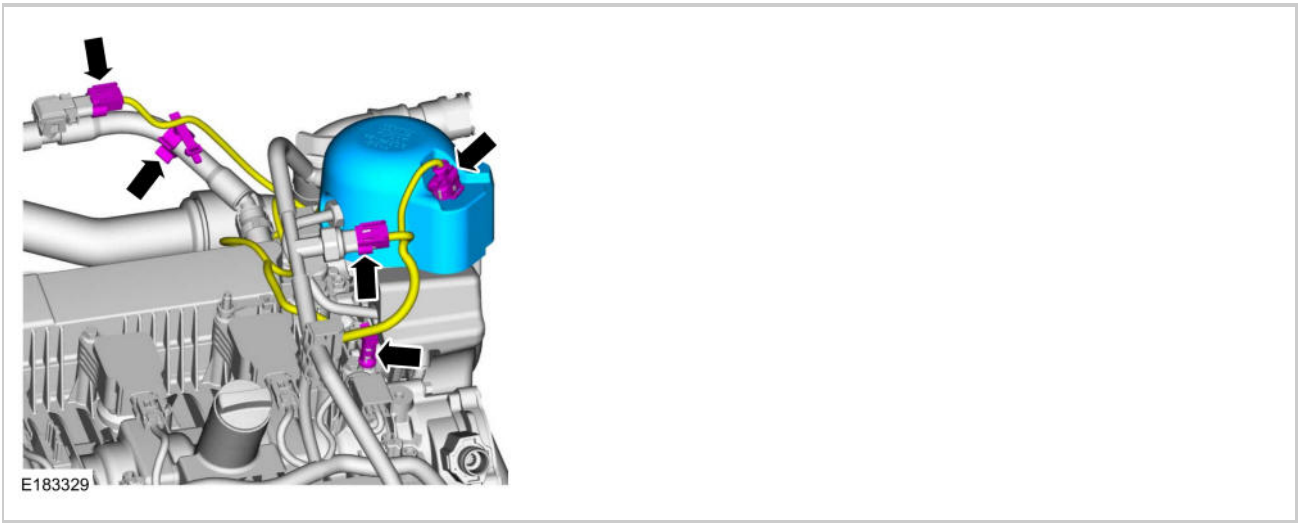


169.

Install the high-pressure fuel pump cover.

Attach the wiring harness retainers.

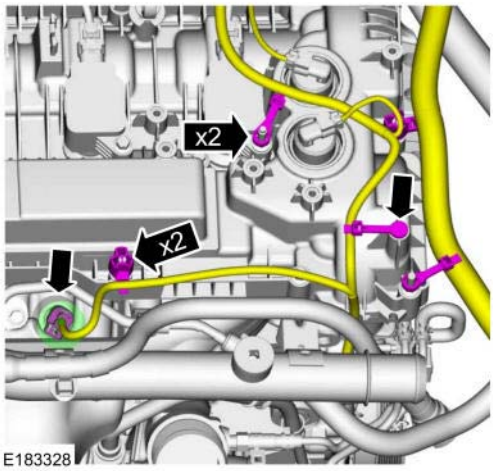
Connect the high-pressure fuel pump, fuel supply tube pressure switch and crankcase vent tube wiring harness electrical connectors.



170.

Attach the wiring harness retainers.

Connect the CHT sensor electrical connector.



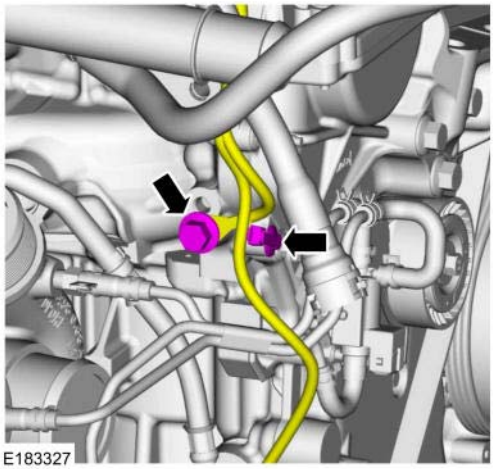
171.

Position the ground wire harness and install the bolt.

Torque

: 177 lb.in (20 Nm)

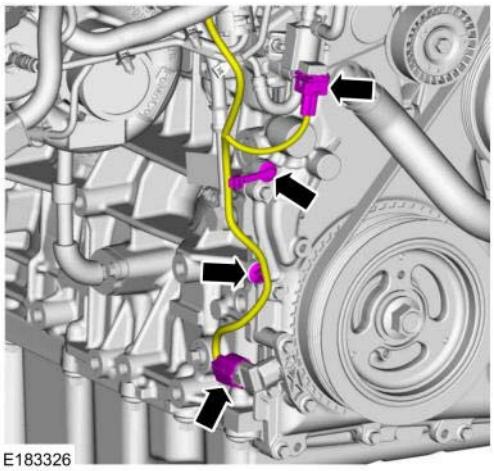
Attach the wiring harness retainer.



172.

Attach the wiring harness retainers.

Connect the CKP and vacuum valve electrical connectors.

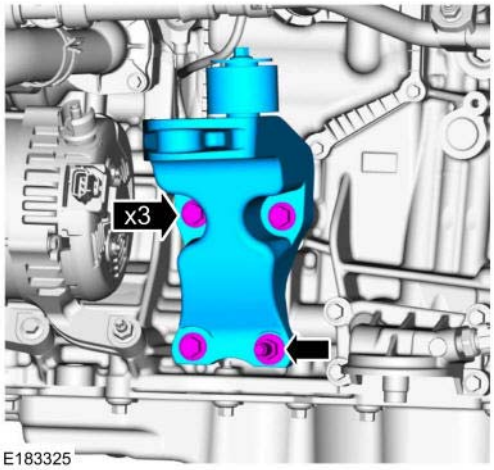


173.

Install the LH engine mount bracket, stud bolt and the bolts.

Torque

: 41 lb.ft (55 Nm)

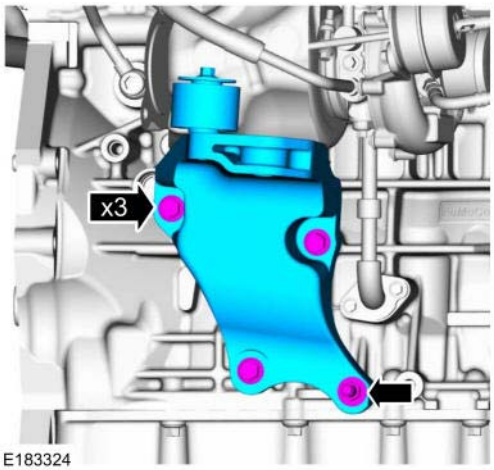


174.

Install the RH engine mount bracket, stud bolt and the bolts.

Torque

: 41 lb.ft (55 Nm)

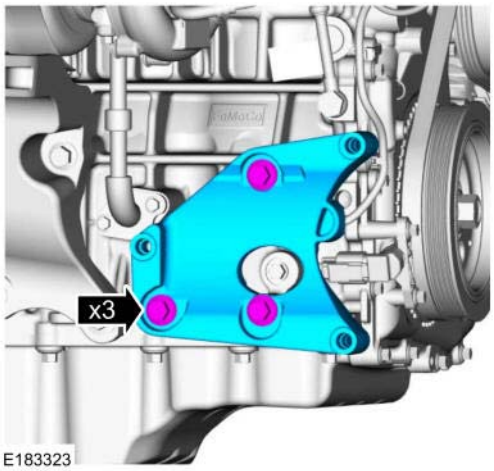


175.

Install the A/C compressor mounting bracket and the bolts.

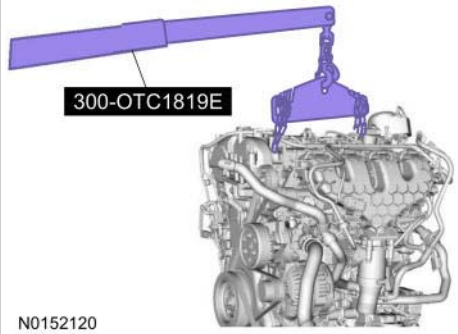
Torque

: 35 lb.ft (48 Nm)



176.

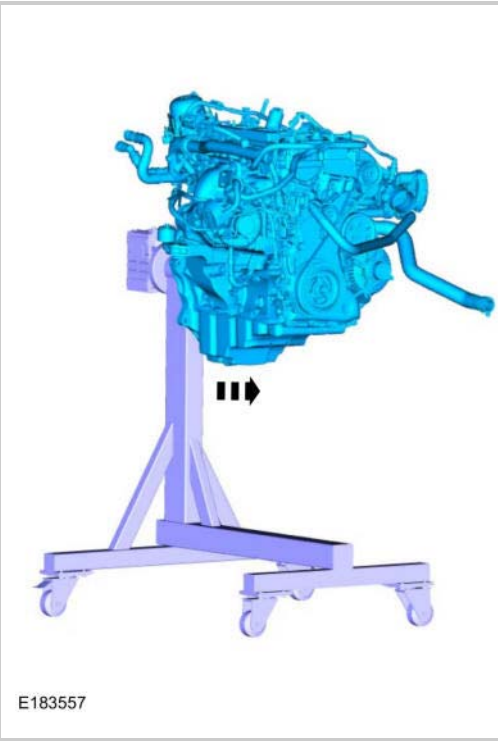
Install Special Service Tool: 300-OTC1819E 2, 200# Floor Crane, Fold Away.



177.

Remove engine from the mounting stand.

Use the General Equipment: Mounting Stand



6-Speed Manual Transmission - MT82

NOTE: Special bolts are used for installation. Do not use standard bolts.

178.

Install the flywheel and the new bolts finger-tight.

Install Special Service Tool: 303-103 (T74P-6375-A) Holding Tool, Flywheel.

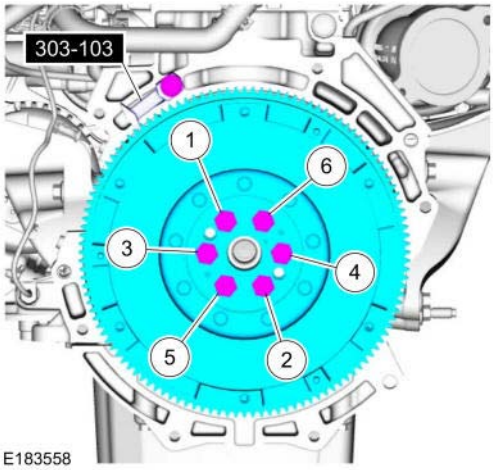
Tighten the bolts in sequence shown in illustration in 3 stages.

Torque:

Stage 1: 37 lb.ft (50 Nm)

Stage 2: 59 lb.ft (80 Nm)

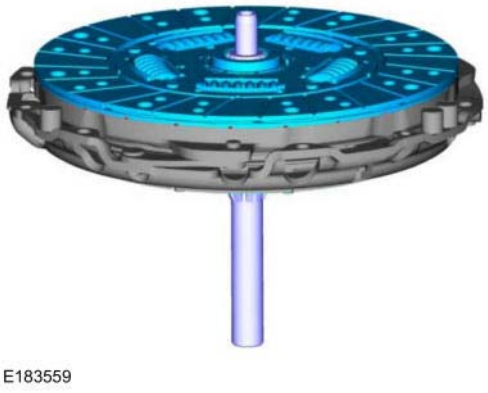
Stage 3: 83 lb.ft (112 Nm)



179.

Using the Clutch Alignment tool, position the clutch disc on the flywheel.

Use the General Equipment: Clutch Alignment Tool



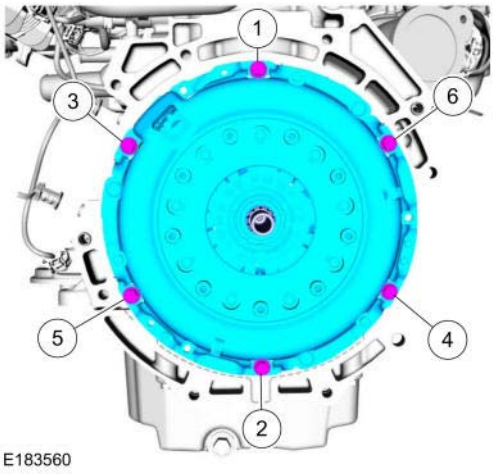
NOTE: Special bolts are used for installation. Do not use standard bolts.

180.
Using the Clutch Alignment tool, position the clutch pressure plate on the flywheel and install the clutch pressure plate bolts.

Use the General Equipment: Clutch Alignment Tool

Torque

: 26 lb.ft (35 Nm)



6-Speed Automatic Transmission - 6R80

181.

NOTE: Special bolts are used for installation. Do not use standard bolts.

Install the flexplate and the new bolts finger-tight.

Install Special Service Tool: 303-103 (T74P-6375-A) Holding Tool, Flywheel.

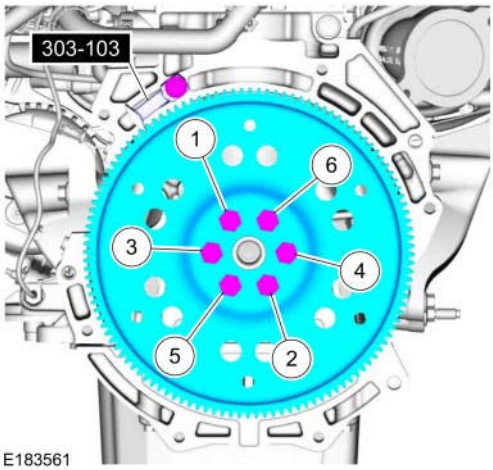
Tighten the bolts in sequence shown in illustration in 3 stages.

Torque:

Stage 1: 37 lb.ft (50 Nm)

Stage 2: 59 lb.ft (80 Nm)

Stage 3: 83 lb.ft (112 Nm)



INSTALLATION > ENGINE

Special Tool(s) / General Equipment

 ST1341-A	300-OTC1819E 2, 200# Floor Crane, Fold Away
	303-050 (T70P-6000) Lifting Bracket, Engine
Magnetic Socket	
Trolley Jack	
Hose Clamp Remover/Installer	
Wooden Block	

Materials

Name	Specification
Motorcraft® Multi-Purpose Grease Spray XL-5-A	ESB-M1C93-B
Motorcraft® SAE 5W-30 Premium Synthetic Blend Motor Oil (U.S.) XO-5W30-QSP (U.S.)	WSS-M2C946-A

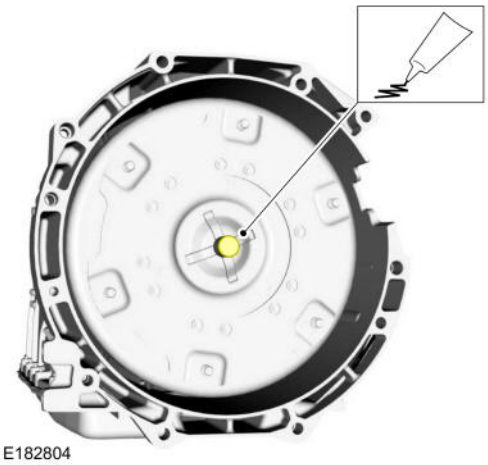
6-Speed Automatic Transmission - 6R80

1.

Lubricate the torque converter pilot hub with multi-purpose grease.

Material

: Motorcraft® Multi-Purpose Grease Spray / XL-5-A (ESB-M1C93-B)



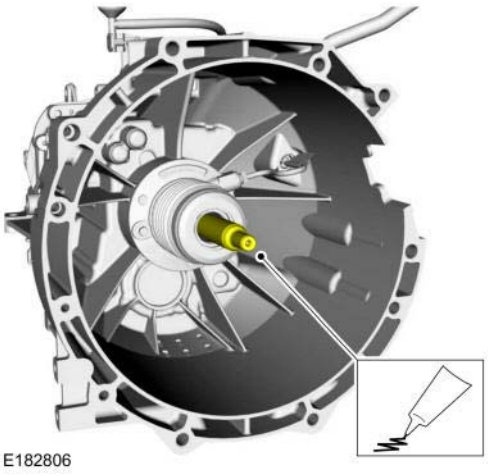
6-Speed Manual Transmission - MT82

2.

Lubricate the input shaft with multi-purpose grease.

Material

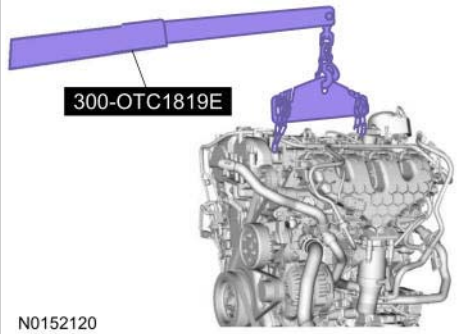
: Motorcraft® Multi-Purpose Grease Spray / XL-5-A (ESB-M1C93-B)



6-Speed Automatic Transmission - 6R80/6-Speed Manual Transmission - MT82

3.

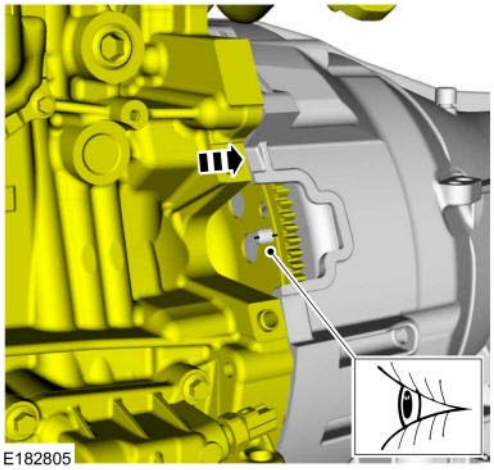
Using the special tool, install the engine. Use Special Service Tool: 300-OTC1819E 2, 200# Floor Crane, Fold Away.



6-Speed Automatic Transmission - 6R80

4.

Align the torque converter stud marked during removal with the flexplate.



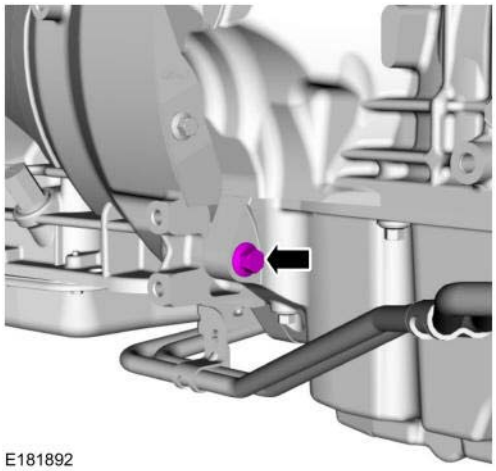
6-Speed Automatic Transmission - 6R80/6-Speed Manual Transmission - MT82

NOTE: Automatic transmission shown in illustration, manual transmission similar.

5.
Install the oil pan bolt.

Torque

: 35 lb.ft (48 Nm)

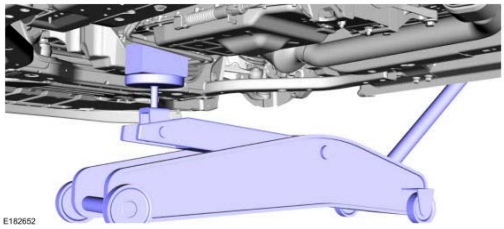


6.

Remove the jack and wooden block.

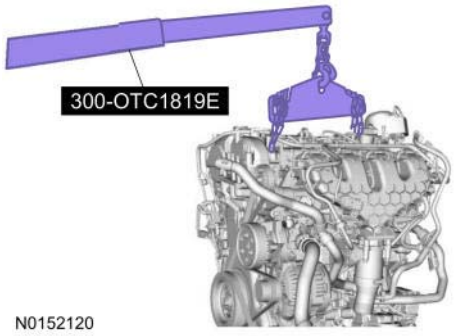
Use the General Equipment: Wooden Block

Use the General Equipment: Trolley Jack



7.

Remove Special Service Tool: 300-OTC1819E 2, 200# Floor Crane, Fold Away.

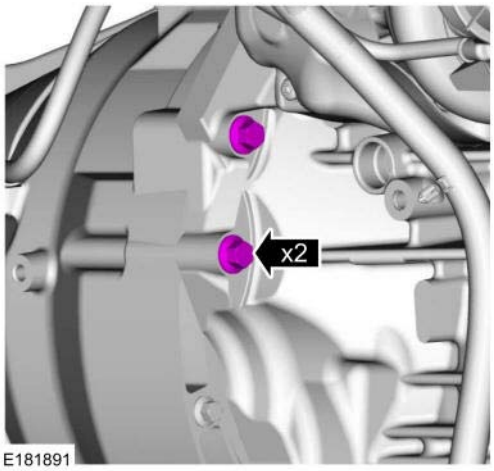


NOTE: Automatic transmission shown in illustration, manual transmission similar.

8.
Install the transmission bolts.

Torque

: 35 lb.ft (48 Nm)

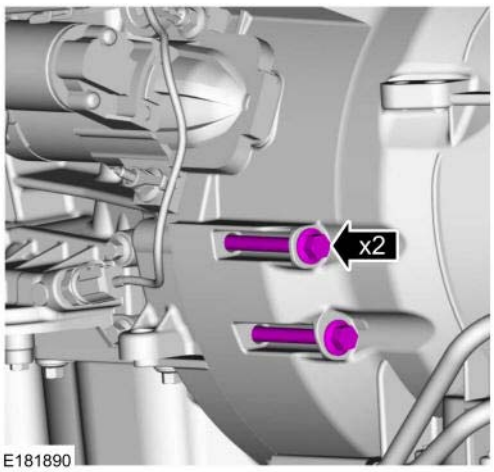


NOTE: Automatic transmission shown in illustration, manual transmission similar.

9.
Install the transmission bolts.

Torque

: 35 lb.ft (48 Nm)

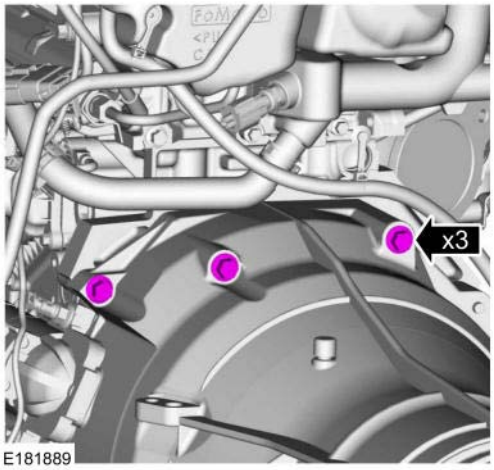


NOTE: Automatic transmission shown in illustration, manual transmission similar.

10.
Install the transmission bolts.

Torque

: 35 lb.ft (48 Nm)

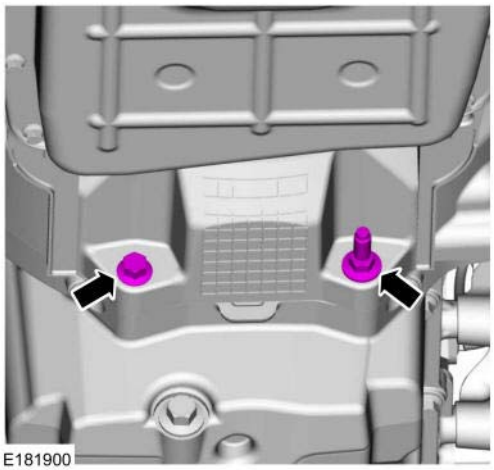


NOTE: Automatic transmission shown in illustration, manual transmission similar.

11.
Install the oil pan bolts.

Torque

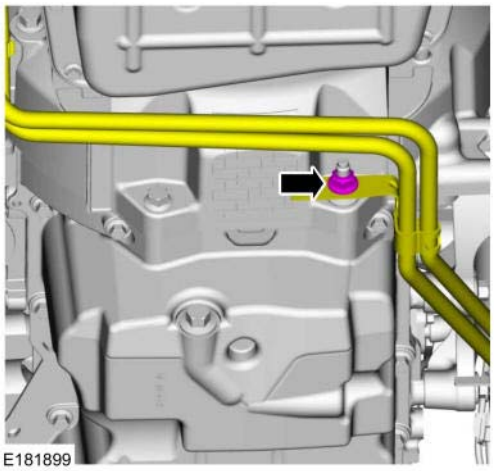
: 35 lb.ft (48 Nm)



6-Speed Automatic Transmission - 6R80

12.

Install the transmission cooling tube bracket and nut.

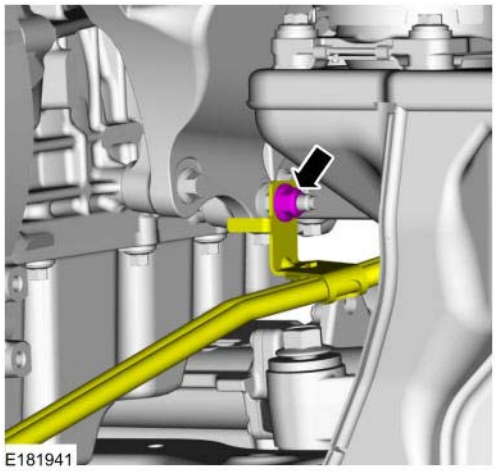


13.

Position the automatic transmission tube bracket and install the nut.

Torque

: 35 lb.ft (48 Nm)



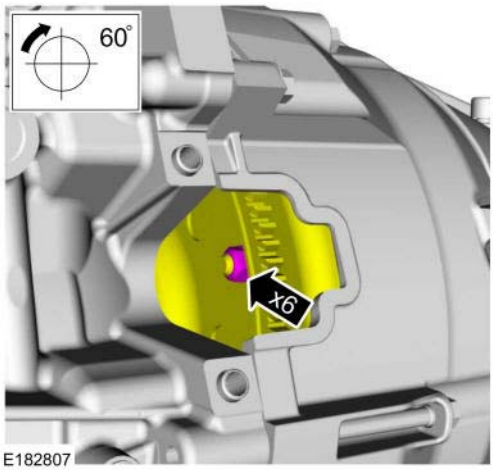
NOTE: Only rotate the crankshaft in a clockwise direction.

14.
Install the new torque convertor nuts.

Use the General Equipment: Magnetic Socket

Torque

: 30 lb.ft (40 Nm)



15.

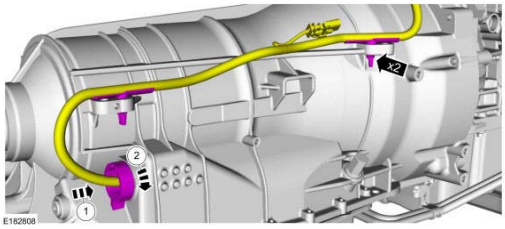
1.

Push the transmission electrical connector in to connect.

2.

Rotate the transmission electrical connector clockwise.

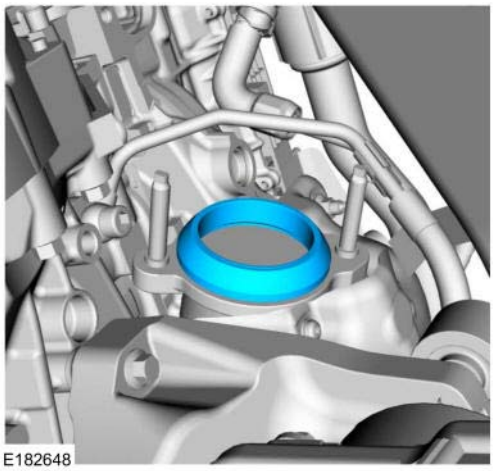
Attach the wiring harness retainers.



6-Speed Automatic Transmission - 6R80/6-Speed Manual Transmission - MT82

16.

Install a new gasket.

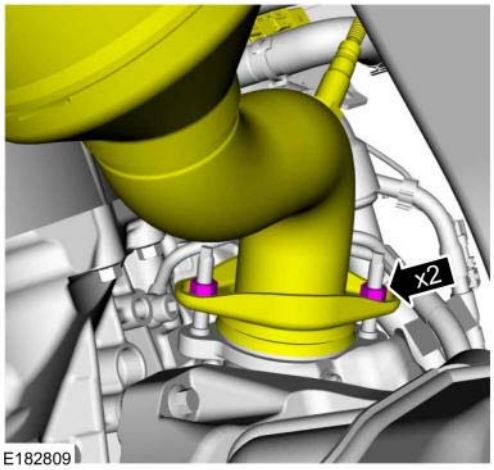


17.

Position the catalytic converter and install the new nuts.

Torque

: 30 lb.ft (40 Nm)

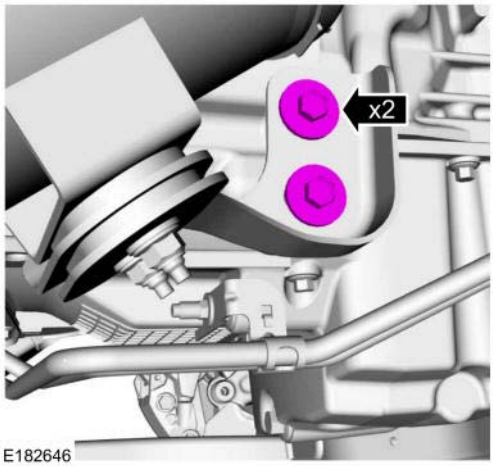


NOTE: Automatic transmission shown in illustration, manual transmission similar.

18.
Install the bolts for the catalytic converter bracket.

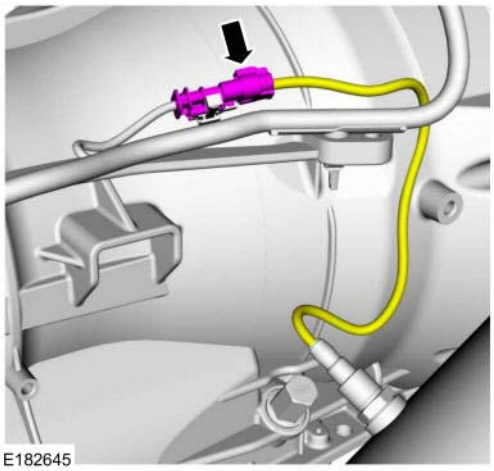
Torque

: 18 lb.ft (25 Nm)



NOTE: Automatic transmission shown in illustration, manual transmission similar.

19.
Connect the catalyst monitor sensor (CMS) sensor electrical connector.



NOTE: Lubricate the engine oil filter seal with clean engine oil.

20.
Install a new engine oil filter.

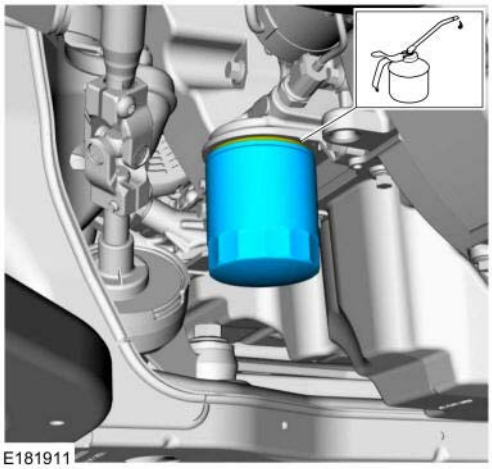
Material

: Motorcraft® SAE 5W-30 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W30-QSP (U.S.) (WSS-M2C946-A)

Torque:

Stage 1: 71 lb.in (8 Nm)

Stage 2: 180°



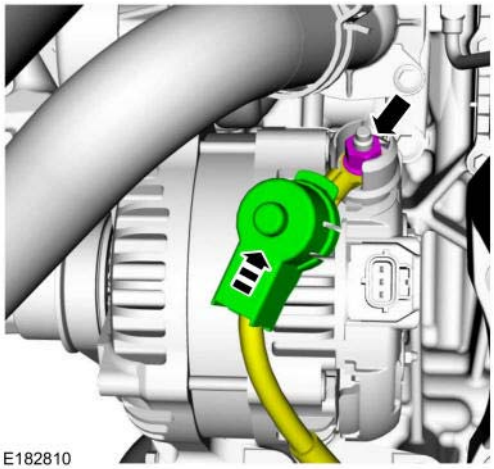
21.

Install the B+ cable and the nut.

Torque

: 150 lb.in (17 Nm)

Position the protective cover.



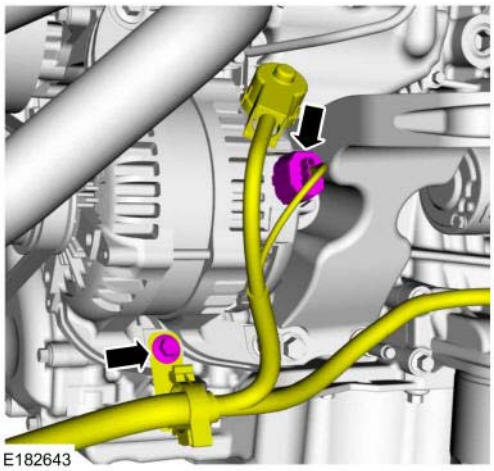
22.

Connect the generator electrical connector.

Position the wire harness retainer and install the bolt.

Torque

: 89 lb.in (10 Nm)

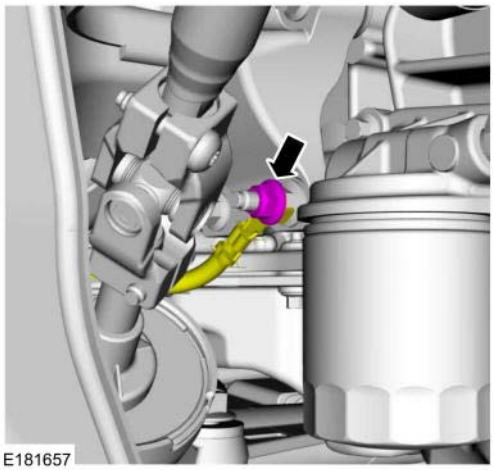


23.

Install the ground wire and nut to the engine mount bracket stud bolt.

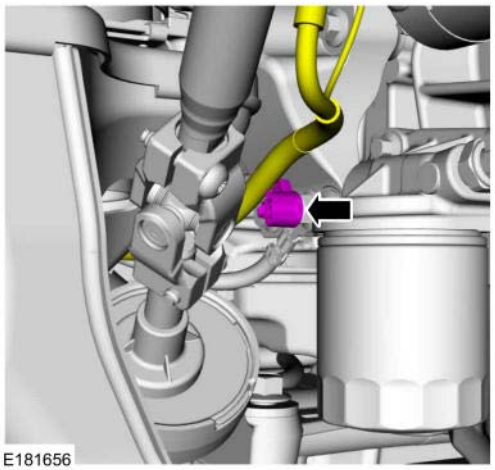
Torque

: 35 lb.ft (48 Nm)



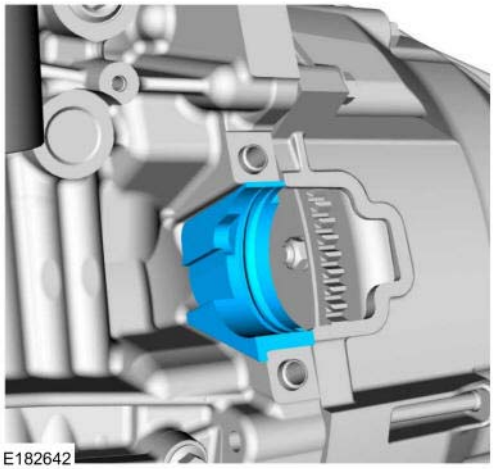
24.

Attach the wire harness retainer to the engine mount bracket stud bolt.



25.

Install the starter motor insulator.



26.

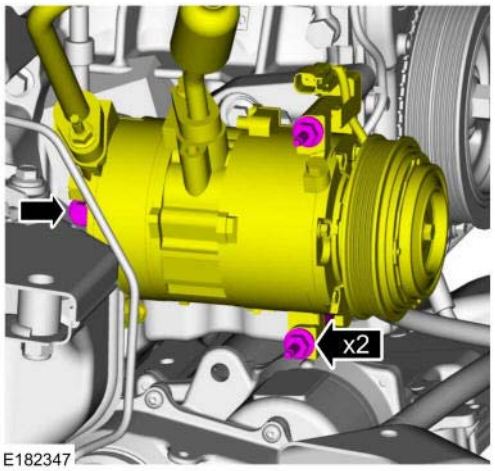
Install the starter motor. Refer to: STARTER MOTOR .

27.

Position the A/C compressor and install the bolts.

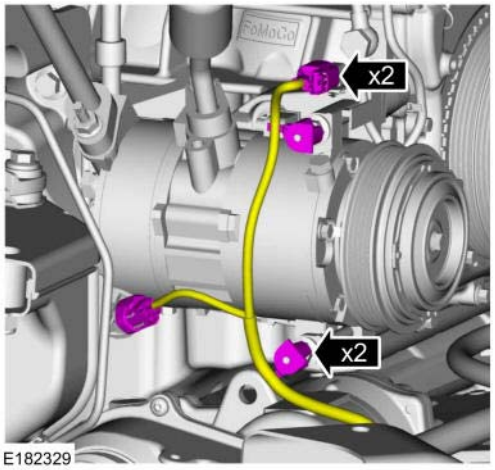
Torque

: 18 lb.ft (25 Nm)



28.

Connect the A/C compressor electrical connectors and the wire harness retainers.

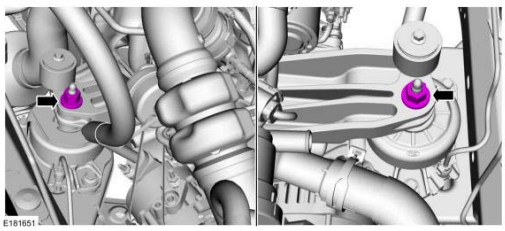


29.

Install the RH and LH engine mount bracket nuts.

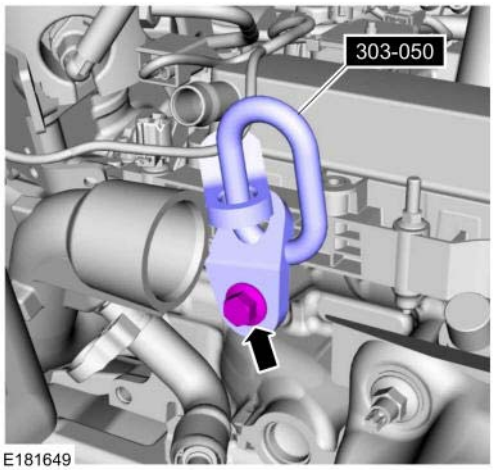
Torque

: 92 lb.ft (125 Nm)



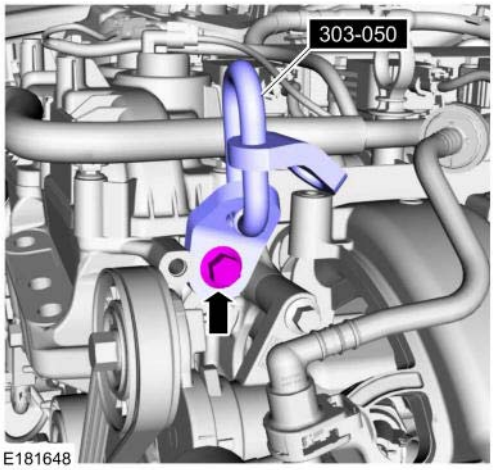
30.

Remove Special Service Tool: 303-050 (T70P-6000) Lifting Bracket, Engine.



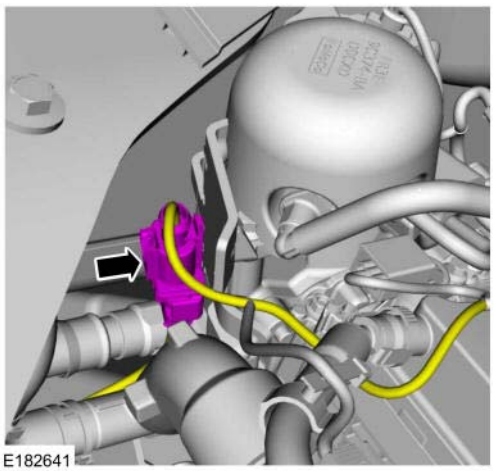
31.

Remove Special Service Tool: 303-050 (T70P-6000) Lifting Bracket, Engine.



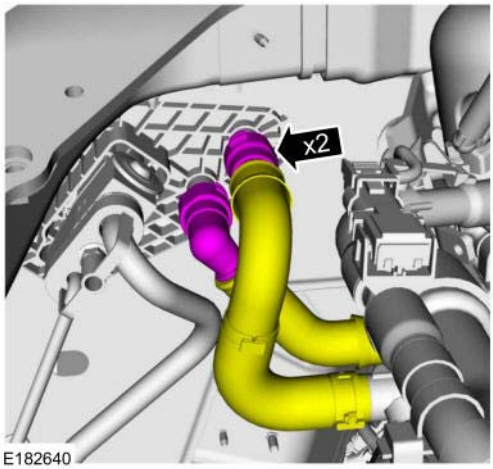
32.

Connect and attach the HO2S electrical connector.



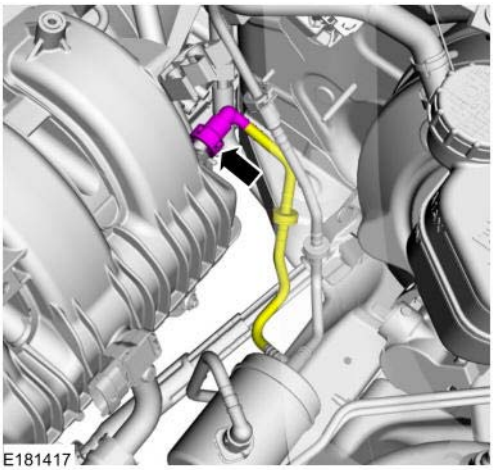
33.

Connect the coolant hoses to the heater core.



34.

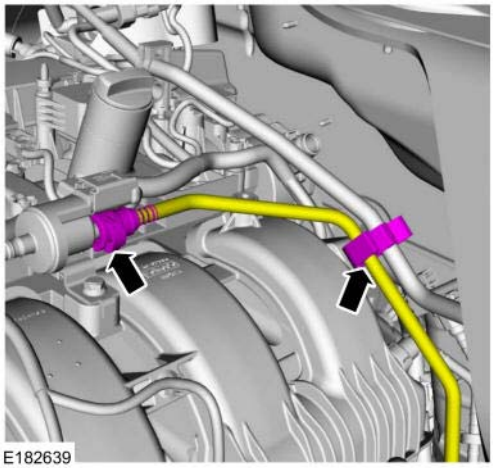
Connect the vacuum tube to the rear of the intake manifold.



35.

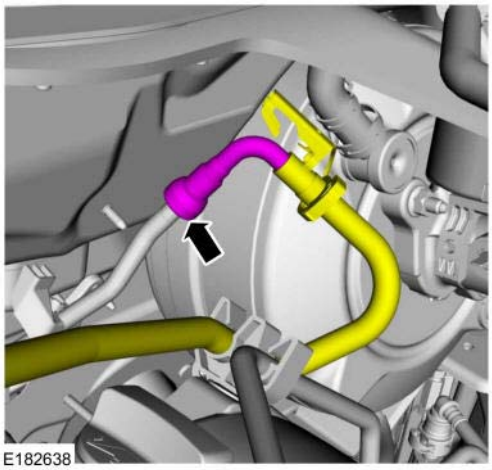
Attach the vacuum tube to the intake manifold retainer.

Connect the vacuum tube quick release coupling to the EVAP canister purge valve.



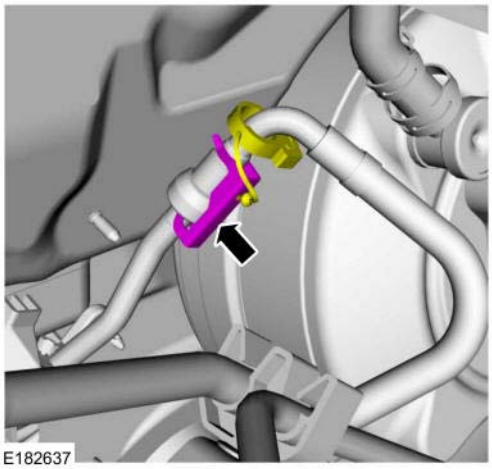
36.

Connect the fuel supply tube. Refer to: SPRING LOCK COUPLINGS - 2.3L EcoBoost (231kW/314PS).



37.

Install the fuel supply tube spring lock coupling retainer.



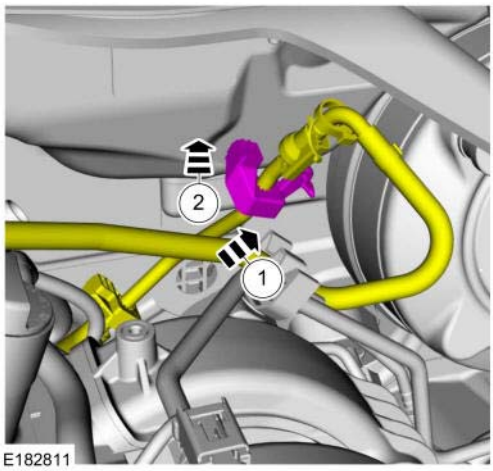
38.

1.

Slide the retainer up the fuel supply tube.

2.

Attach the fuel supply tube retainer to the cowl.

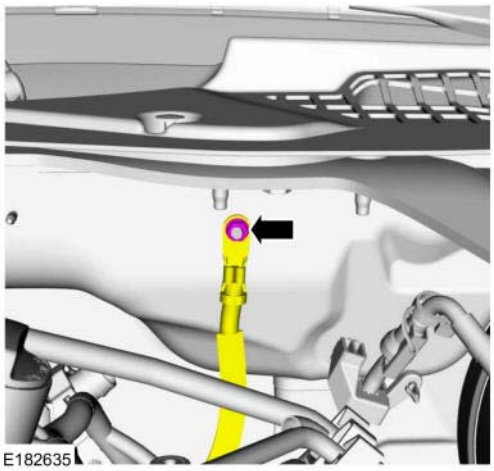


39.

Install the engine ground strap and nut to the cowl.

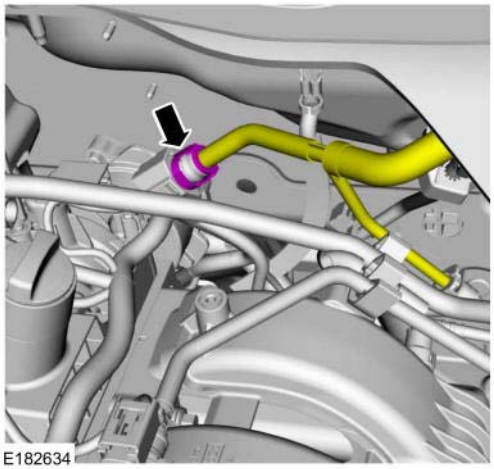
Torque

: 80 lb.in (9 Nm)



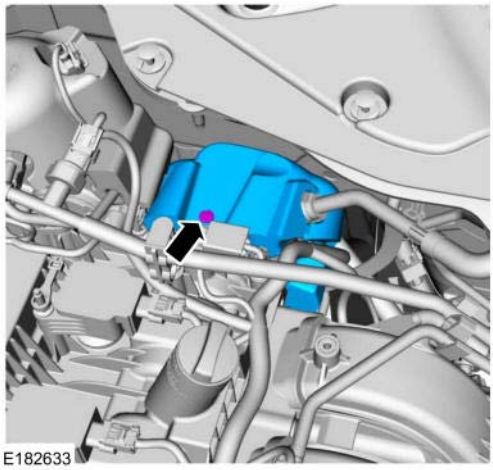
40.

Connect the vacuum hose to the brake vacuum pump.



41.

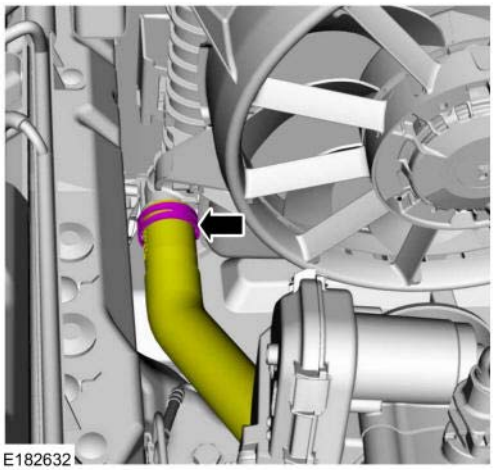
Install the brake vacuum pump insulator cover and the retainer.



42.

Install the lower radiator hose to the radiator.

Use the General Equipment: Hose Clamp Remover/Installer

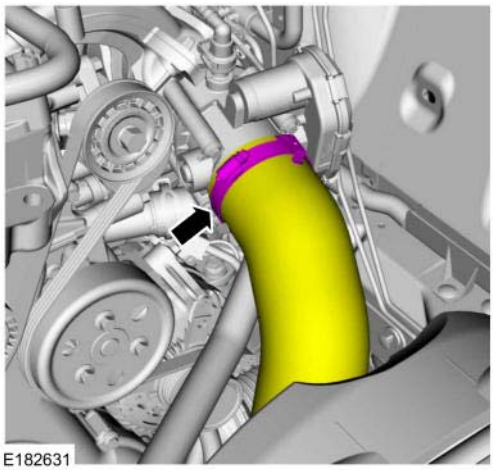


43.

Position the CAC outlet tube and tighten the clamp.

Torque

: 44 lb.in (5 Nm)

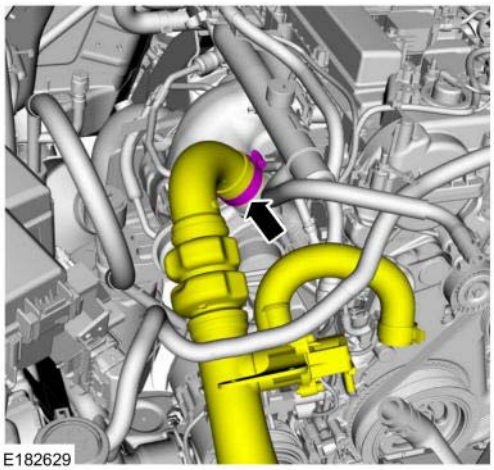


44.

Position the CAC inlet tube and tighten the clamp.

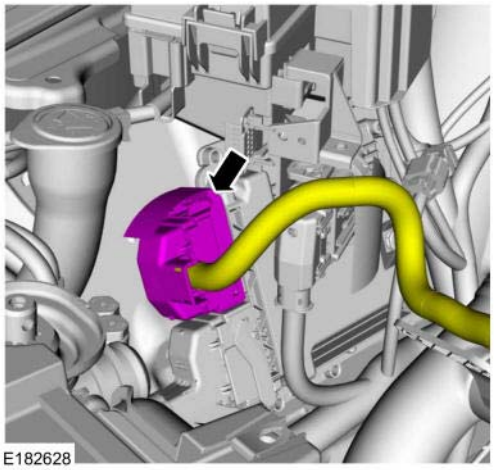
Torque

: 44 lb.in (5 Nm)



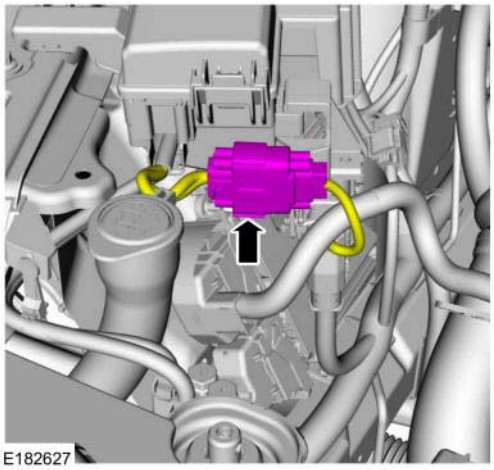
45.

Connect the upper PCM electrical connector.



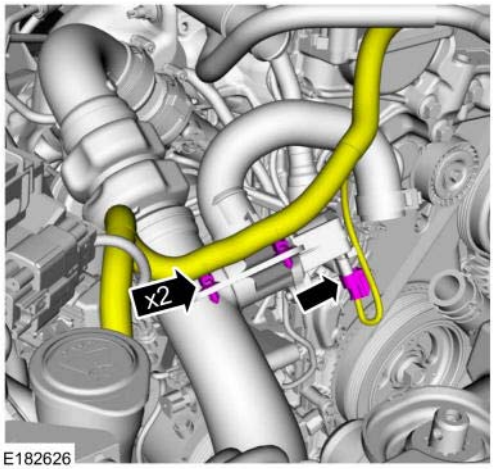
46.

Connect and attach the engine harness electrical connector.



47.

Connect the CAC valve electrical connector and the wire harness retainers.



48.

Install the following items:

Refer to: AIR CONDITIONING (A C) COMPRESSOR BELT .

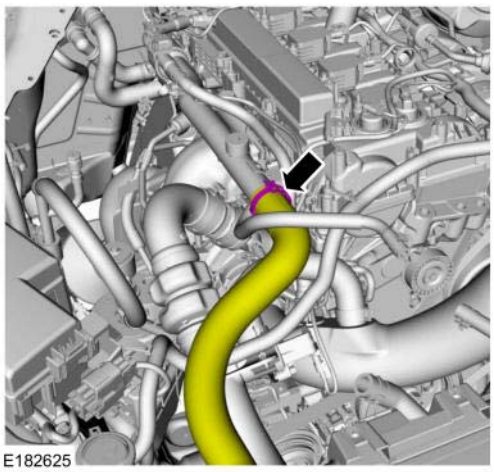
Refer to: AIR CLEANER - 2.3L EcoBoost (231kW/314PS).

Refer to: AIR CLEANER OUTLET PIPE - 2.3L EcoBoost (231kW/314PS).

49.

Install the upper radiator hose to the coolant tube.

Use the General Equipment: Hose Clamp Remover/Installer



50.

Install the degas bottle. Refer to: DEGAS BOTTLE .

NOTE: Use the index-mark for location to aid in hood installation.

51.
Install the hood and the 4 nuts.

Torque

: 17 lb.ft (23 Nm)



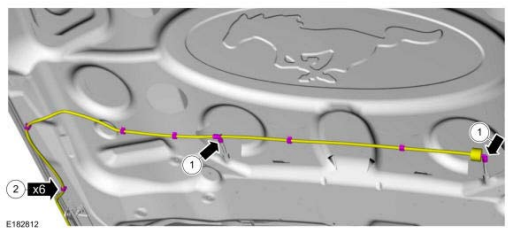
52.

1.

Connect the windshield washer hose couplings. Refer to: Washer Hose Coupling .

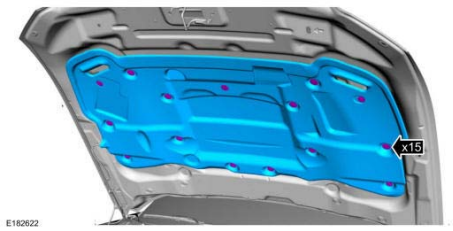
2.

Attach the windshield washer hose retainers.



53.

Install the hood insulation and the pin-type retainers.



54.

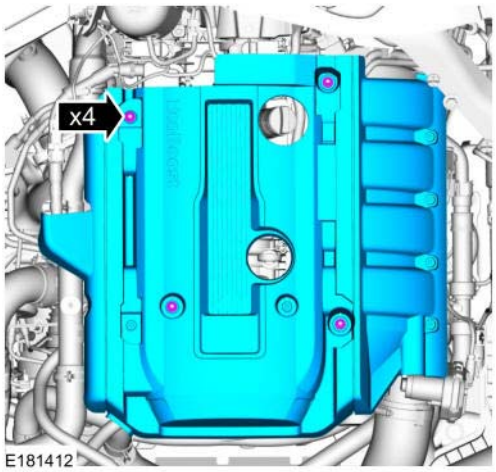
Connect the battery ground cable. Refer to: Battery Disconnect and Connect .

55.

Install the engine appearance cover and the nuts.

Torque

: 80 lb.in (9 Nm)

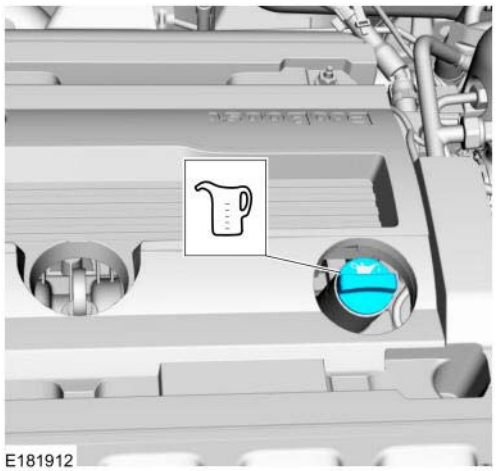


56.

Fill the engine with clean engine oil. Refer to: Specifications .

Material

: Motorcraft® SAE 5W-30 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W30-QSP (U.S.) (WSS-M2C946-A)



57.

Fill the cooling system. Refer to: COOLING SYSTEM DRAINING AND VACUUM FILLING .

58.

1.

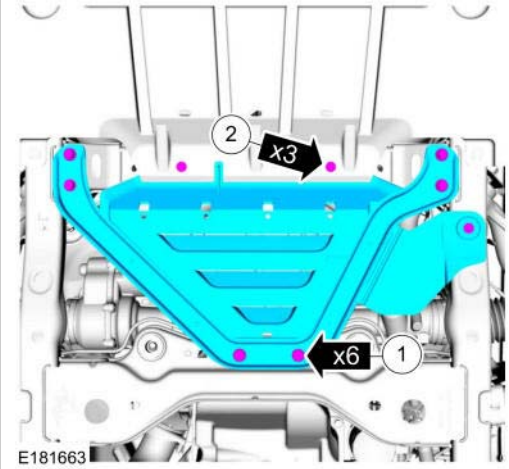
Install the underbody shield and the bolts.

Torque

: 46 lb.ft (63 Nm)

2.

Install the underbody shield screws.



59.

Start and check the exhaust system for leaks.

60.

Use the Powertrain Control Module (PCM) Misfire Monitor Profile Correction routine in the diagnostic scan tool.

Service Manual: ENGINE - 3.7L DURATEC (227KW/301PS)

SPECIFICATIONS > SPECIFICATIONS

ENGINE

Item	Specification
Displacement	3.7L (4V) (226 CID)
No. of cylinders	6
Bore/stroke	95.5/86.7 mm (3.759/3.413 in)
Firing order	1-4-2-5-3-6
Spark plug	12405
Spark plug gap	1.25-1.35 mm (0.049-0.053 in)
Compression ratio	10.5:1
Engine weight (without accessory drive components)	354.9 lb (161 kg)

LUBRICANTS

Item	Specification
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (US); Motorcraft® SAE 5W-20 Super Premium Motor Oil (Canada)	XO-5W20-QSP (US); CXO-5W20-LSP12 (Canada)

ENGINE OIL CAPACITY

Item	Specification
Service fill including oil filter	6.0 qt (5.7 L)

OIL PRESSURE

Item	Specification
Oil pressure @ 1, 500 rpm with engine at normal operating temperature	30.0 psi (206.8 kPa)

CYLINDER HEAD AND VALVE TRAIN

Item	Specification
Cylinder head gasket surface flatness	Flat within 0.08 mm (0.003 in) length end to end,

	area 150 mm (5.9 in) x 150 mm (5.9 in) (or full width) should be less than 0.05 mm (0.002 in)
Valve tappet clearance - intake	0.006-0.010 in (.15-.25 mm)
Valve tappet clearance - exhaust - Engine must be at room temperature before measuring	0.01-0.02 in (.36-.46 mm)
Valve guide bore inner diameter	0.217-0.218 in (5.519-5.549 mm)
Valve stem diameter - intake	0.2157-0.2164 in (5.479-5.497 mm)
Valve stem diameter - exhaust	0.2152-0.2159 in (5.466-5.484 mm)
Valve stem-to-guide clearance - intake	0.0009-0.0028 in (.022-.07 mm)
Valve stem-to-guide clearance - exhaust	0.0014-0.0033 in (.035-.083 mm)
Valve head diameter - intake	1.46 in (37 mm)
Valve head diameter - exhaust	1.22 in (31 mm)
Valve face runout	0.002 in (.05 mm)
Valve face angle	45.25-45.75°
Valve seat width - intake	0.051-0.059 in (1.3-1.5 mm)
Valve seat width - exhaust	0.067-0.079 in (1.7-2 mm)
Valve seat runout	0.002 in (.04 mm)
Valve seat angle	44.5-45.5°
Valve spring free length (approx.)	1.890 in (48 mm)
Valve spring compression pressure (N @ spec. length)	525 N @ 27.0 mm (114.7 lb @ 1.06 in)
Valve spring installed height	1.457 in (37 mm)
Valve spring installed height pressure (N @ spec. length)	235 N @ 37.0 mm (53 lb @ 1.45 in)
Valve spring installed pressure - service limit	10% force loss @ specified height

CAMSHAFT

Item	Specification
Theoretical valve lift (intake) @ 0 lash	0.394 in (10 mm)
Theoretical valve lift (exhaust) @ 0 lash	0.38 in (9.6798 mm)
Lobe lift - intake	0.394 in (10 mm)
Lobe lift - exhaust	0.38 in (9.6798 mm)
Allowable lobe lift loss	0.0024 in (.062 mm)

Camshaft journal bore inside diameter - 1st journal	1.537-1.538 in (39.0375-39.0625 mm)
Camshaft journal bore inside diameter - intermediate journals	1.023-1.024 in (25.9875-26.0125 mm)
Camshaft bearing outside diameter - 1st journal	1.535-1.536 in (38.99-39.01 mm)
Camshaft bearing outside diameter - intermediate journals	1.021-1.022 in (25.937-25.963 mm)
Camshaft journal-to-bearing clearance, 1st journal - service limit	0.0029 in (.0725 mm)
Camshaft journal-to-bearing clearance, intermediate journals - service limit	0.0030 in (.0755 mm)
Runout	0.0016 in (.04 mm)
End play - standard	0.0013-0.0067 in (.032-.17 mm)
End play - service limit	0.0075 in (.19 mm)

CYLINDER BLOCK

Item	Specification
Cylinder bore diameter	3.760-3.761 in (95.5-95.52 mm)
Cylinder bore roundness	0.0005 in (.013 mm)
Cylinder bore taper	0.0004 in (.01 mm)
Block main bore roundness	0.000 in (.008 mm)
Main bearing bore inside diameter	2.850-2.851 in (72.4-72.424 mm)
Head gasket surface flatness	Flat within 0.150 mm (0.005 in) overall 0.050 mm (0.001 in) per 150 mm (5.905 in) x 150 mm (5.905 in) 0.025 mm (0.0009 in) per 25 mm (0.98 in) x 25 mm (0.98 in)

CRANKSHAFT

Item	Specification
Main bearing journal diameter	2.657 in (67.5 mm)
Main bearing journal maximum taper	0.1575 in (.004 m)
Main bearing journal maximum out-of-round	0.0002 in (.006 mm)
Main bearing journal-to-main bearing clearance	0.0010-0.0016 in (.026-.041 mm)
Connecting rod journal diameter	2.204-2.205 in (55.983-56.003 mm)
Connecting rod journal maximum taper	0.0002 in (.004 mm)

Connecting rod journal maximum out-of-round	0.0002 in (.006 mm)
Crankshaft maximum end play	0.0020-0.0115 in (.051-.291 mm)

PISTON AND CONNECTING ROD

Item	Specification
Piston diameter - single grade	3.7594-3.7589 in (95.49-95.476 mm)
Piston-to-cylinder bore clearance	0.0004-0.0017 in (.01-.044 mm)
Piston ring end gap - compression (top, gauge diameter)	0.0067-0.0106 in (.17-.27 mm)
Piston ring end gap - compression (bottom, gauge diameter)	0.0118-0.0217 in (.3-.55 mm)
Piston ring end gap - oil ring (steel rail, gauge diameter)	0.0059-0.0177 in (.15-.45 mm)
Piston ring groove width - compression (top)	0.0484-0.0492 in (1.23-1.25 mm)
Piston ring groove width - compression (bottom)	0.0602-0.0610 in (1.53-1.55 mm)
Piston ring groove width - oil ring	0.0996-0.1004 in (2.53-2.55 mm)
Piston ring width - upper compression ring	0.0461-0.0469 in (1.17-1.19 mm)
Piston ring width - lower compression ring	0.0579-0.0587 in (1.47-1.49 mm)
Piston ring-to-groove clearance (upper and lower compression rings)	0.0016-0.0031 in (.04-.08 mm)
Piston pin bore diameter	0.9057-0.9058 in (23.004-23.008 mm)
Piston pin diameter	0.9054-0.9055 in (22.997-23 mm)
Piston pin length	2.204 in (55.975 mm)
Piston pin-to-piston fit	0.0002-0.0004 in (.004-.011 mm)
Piston-to-connecting rod clearance	0.1 in (2.7 mm)
Connecting rod-to-pin clearance - standard	0.0003-0.0009 in (.007-.022 mm)
Connecting rod pin bore diameter	0.9058-0.9063 in (23.007-23.019 mm)
Connecting rod length (center-to-center)	6.01 in (152.68 mm)
Connecting rod maximum allowed bend	0.0015 in (.038 mm)
Connecting rod maximum allowed twist	0.0020 in (.05 mm)
Connecting rod bearing bore diameter - grade 1	2.3569-2.3572 in (59.866-59.872 mm)
Connecting rod bearing bore diameter - grade 2	2.3572-2.3574 in (59.873-59.879 mm)
Connecting rod bearing bore diameter - grade 3	2.3575-2.3577 in (59.88-59.886 mm)
Connecting rod bearing-to-crankshaft clearance	0.0008-0.0021 in (.02-.054 mm)

Connecting rod side clearance (assembled to crank) - standard	0.0069-0.0167 in (.175-.425 mm)
Connecting rod side clearance (assembled to crank) - service limit	0.0069-0.0167 in (.175-.425 mm)

DESCRIPTION AND OPERATION > ENGINE - OVERVIEW > OVERVIEW

The 3.7L (4V) is a V-6 engine with the following features:

- Dual overhead camshafts
- Four valves per cylinder
- Sequential Multi-Port Fuel Injection (SFI)
- Composite upper and lower intake manifold
- Aluminum cylinder head
- An aluminum, 60-degree V-cylinder block
- Accessory dive belt driven coolant pump
- Twin independent variable cam timing (Ti-VCT)
- An electronic ignition system with 6 ignition coil-on-plugs

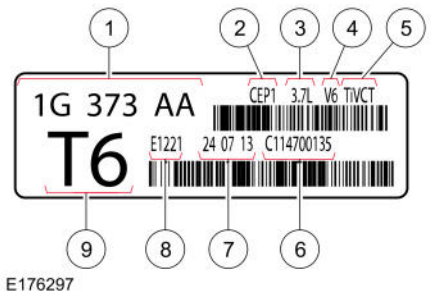
Engine Identification

For quick identification, refer to the safety certification decal.

The decal is located on the LH front door lock face panel.

Engine Code Information Label

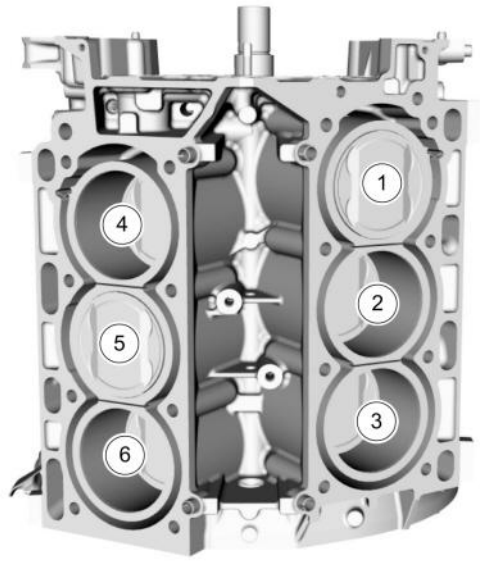
The engine code information label, located on the front side of the valve cover, contains the following:



Item	Description
1	Engine part number
2	Engine plant (Cleveland)

3	Engine displacement
4	Engine configuration
5	Twin independent VCT
6	Running number
7	Engine build date (DDMMYY)
8	Plant shift line
9	Derivative code

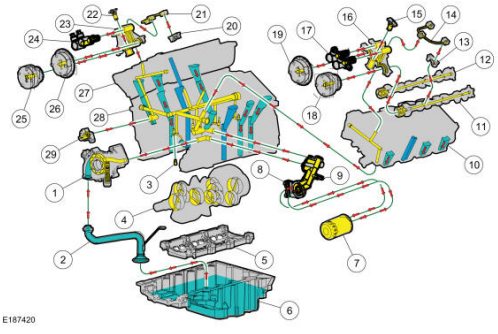
Engine Cylinder Identification



E176298

DESCRIPTION AND OPERATION > ENGINE - OVERVIEW > SYSTEM OPERATION

Lubrication System



E187420

Item	Description
1	Oil pump
2	Oil pump screen and pickup tube
3	Piston oil cool valve
4	Crankshaft
5	Engine main bearing cap support
6	Oil pan
7	Oil filter
8	Oil filter adapter
9	Oil pressure switch
10	LH cylinder head
11	Exhaust camshaft
12	Intake camshaft
13	LH camshaft cap
14	LH valve train oil feed tube
15	LH secondary timing chain tensioner
16	LH camshaft mega cap
17	LH intake and exhaust camshaft Variable Camshaft Timing (VCT) oil control solenoid
18	LH exhaust camshaft VCT
19	LH intake camshaft VCT
20	RH camshaft cap
21	RH valve train oil feed tube
22	RH secondary timing chain tensioner
23	RH camshaft mega cap
24	RH intake and exhaust camshaft VCT oil control solenoid
25	RH exhaust camshaft VCT
26	RH intake camshaft VCT
27	RH cylinder head
28	Cylinder block
29	Primary timing chain tensioner

Oil Pump

The engine lubrication system is of the force-feed type in which oil is supplied under full pressure to the crankshaft, connecting rod bearings, timing chain tensioners, piston oil cooling jets and VCT solenoids.

The flow of oil to the valve tappets and valve train is controlled by a restricting orifice located in the cylinder head, front camshaft cap.

The lubrication system is designed to provide optimum oil flow to critical components of the engine through its entire operating range.

The heart of the system is a positive displacement internal gear oil pump.

Generically, this design is known as a gerotor pump, which operates as follows:

- The oil pump is mounted on the front face of the cylinder block.
- The inner rotor is piloted on the crankshaft post and is driven through flats on the crankshaft.
- System pressure is limited by an integral, internally-vented relief valve which directs the bypassed oil back to the inlet side of the oil pump.
- Oil pump displacement has been selected to provide adequate volume to make sure of correct oil pressure both at hot idle and maximum speed.
- The relief valve calibration protects the system from excessive pressure during high-viscosity conditions.
- The relief valve is designed to provide adequate connecting rod bearing lubrication under high temperature and high-speed conditions.

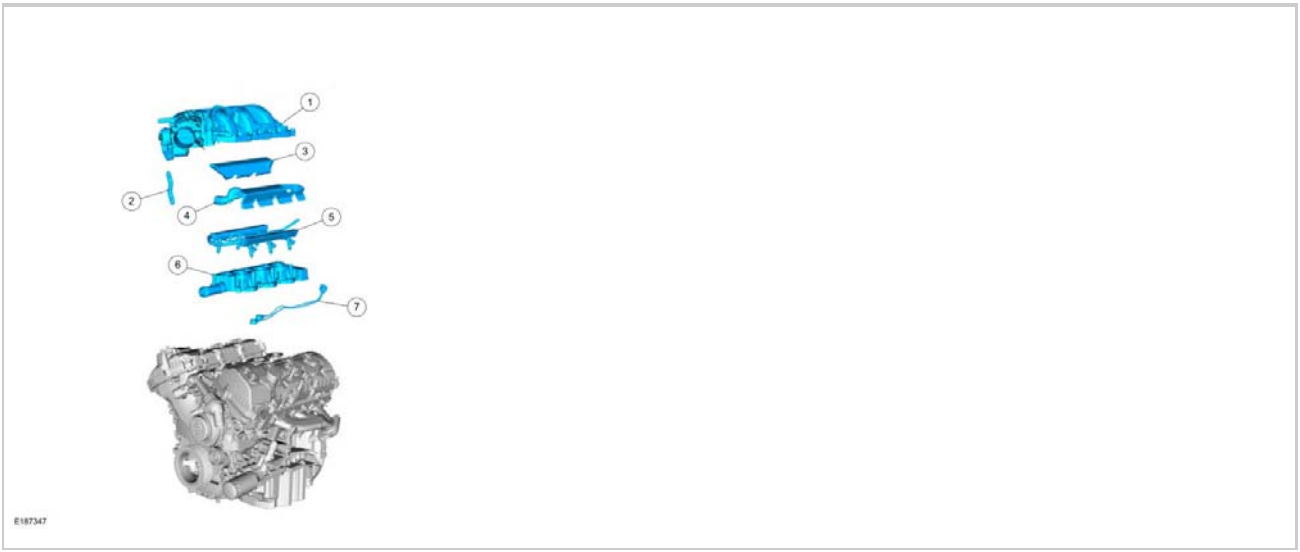
Valve Train

The valve train uses direct acting mechanical buckets (DAMB). The camshaft lobes are positioned directly above mechanical buckets which are positioned on top of the valves.

Twin Independent Variable Cam Timing (Ti-VCT)

DESCRIPTION AND OPERATION > ENGINE COMPONENT VIEW

Engine Upper



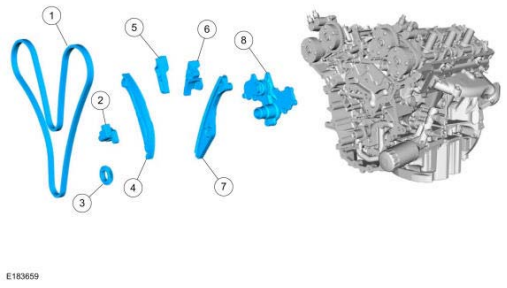
Item	Part Number	Description
1	9424	Upper intake manifold
2	9J444	Upper intake manifold support bracket
3	6P013	RH fuel rail noise shield insulator
4	6P013	LH fuel rail noise shield insulator
5	9F797	Fuel rail
6	9J447	Lower intake manifold
7	12A699	Knock Sensor (KS)

Engine Front



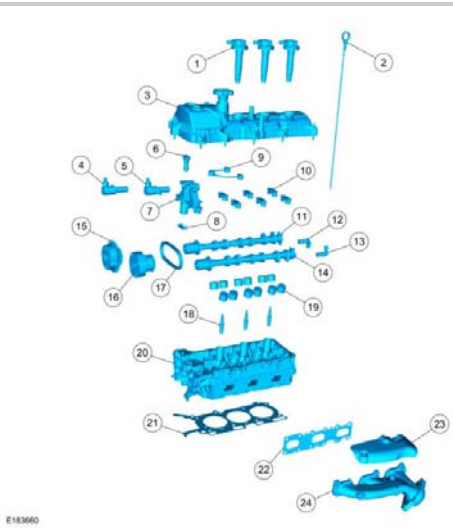
Item	Part Number	Description
1	W701512/N806165/N806165	Crankshaft pulley bolt and washer
2	6316	Crankshaft pulley
3	6700	Crankshaft front seal
4	8A586	Thermostat housing assembly
5	4E856	Thermostat housing assembly O-ring seal
6	8A571	Thermostat housing assembly O-ring seal
7	6B209	Accessory drive belt tensioner
8	8A528	Coolant pump pulley
9	8501	Coolant pump
10	6020	Front cover radial seal
11	6019	Engine front cover

Timing Drive Components



Item	Part Number	Description
1	6268	Timing chain
2	6L266	Primary timing chain tensioner
3	6306	Crankshaft timing sprocket
4	6K255	Primary timing chain tensioner arm
5	6K297	RH primary timing chain guide
6	6K297	LH upper primary timing chain guide
7	6B274	LH lower primary timing chain guide
8	8B593	Channel cover plate

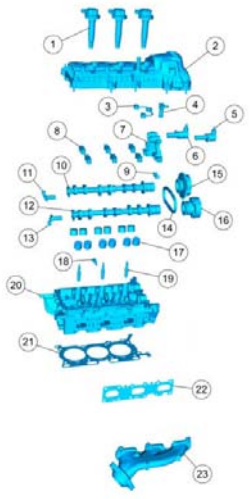
Engine Upper - LH Cylinder Head



Item	Part Number	Description
1	12A375	LH ignition coil-on-plugs (3 required)
2	6750	Oil level indicator
3	6K273	LH valve cover
4	6B297	Intake camshaft variable camshaft timing (VCT) oil control solenoid

5	6B297	Exhaust camshaft VCT oil control solenoid
6	6C270	LH secondary timing chain tensioner
7	6B280	Camshaft mega cap
8	6K297	LH secondary tensioner shoe
9	6K602	Valve train oil feed tube
10	6A258	LH camshaft cap (6 required)
11	6250	LH intake camshaft
12	6B288	LH intake camshaft position (CMP) sensor
13	6B288	LH exhaust CMP sensor
14	6250	LH exhaust camshaft
15	6C524	Intake camshaft variable valve timing (VVT) unit
16	6C525	Exhaust camshaft VVT Unit
17	6C256	LH secondary timing chain
18	12405	Spark plug (3 required)
19	6500	Valve tappet (12 required)
20	6050	LH cylinder head
21	6083	LH cylinder head gasket
22	9448	LH exhaust manifold gasket
23	9Y427	LH exhaust manifold heat shield
24	9431	LH exhaust manifold

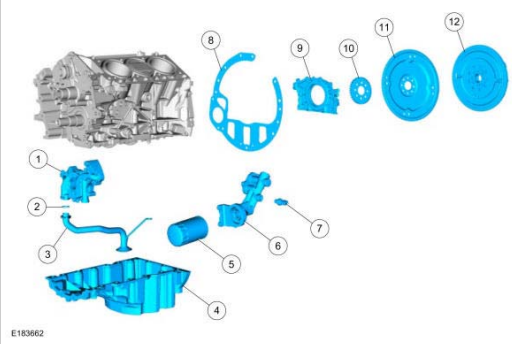
Engine Upper - RH Cylinder Head



Item	Part Number	Description

1	12A375	RH ignition coil-on-plugs (3 required)
2	6K271	RH valve cover
3	6K602	Valve train oil feed tube
4	6C270	RH secondary timing chain tensioner
5	6B297	Exhaust camshaft VCT oil control solenoid
6	6B297	Intake camshaft VCT oil control solenoid
7	6B280	Camshaft mega cap
8	6A258	RH camshaft cap (6 required)
9	6K297	RH secondary tensioner shoe
10	6250	RH intake camshaft
11	6B288	RH intake CMP sensor
12	6250	RH exhaust camshaft
13	6B288	RH exhaust CMP sensor
14	6C256	RH secondary timing chain
15	6C524	Intake camshaft VVT unit
16	6C525	Exhaust camshaft VVT unit
17	6500	Valve tappet (12 required)
18	6G004	Cylinder head temperature (CHT) sensor
19	12405	Spark plug (3 required)
20	6050	RH cylinder head
21	6083	RH cylinder head gasket
22	9448	RH exhaust manifold gasket
23	9430	RH exhaust manifold

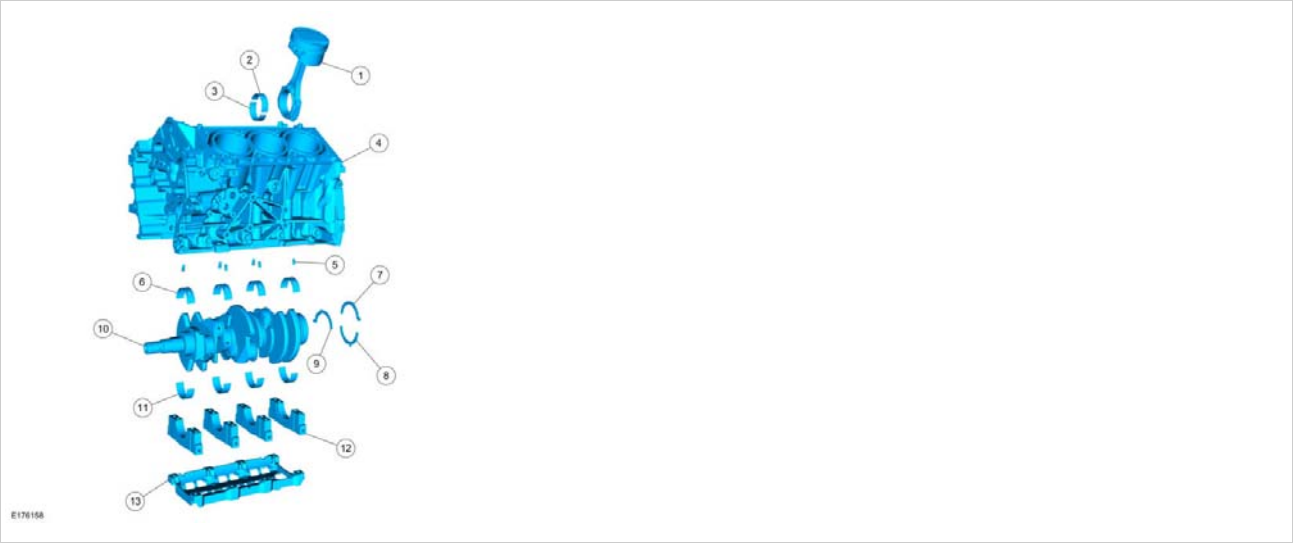
Lower Engine Block (View 1)



Item	Part Number	Description

1	6621	Oil pump
2	6625	Oil pump screen and pickup tube O-ring seal
3	6622	Oil pump screen and pickup tube
4	6675	Oil pan
5	6714	Engine oil filter
6	6881	Oil filter adapter
7	9278	Oil pressure switch
8	6A373	Engine-to-transmission spacer plate
9	6D327	Crankshaft rear seal retainer
10	12A227	Crankshaft sensor ring
11	6375	Flexplate
12	6477	Flywheel

Lower Engine Block (View 2)



Item	Part Number	Description
1	6110	Piston and connecting rod assembly (6 required)
2	6211	Connecting rod upper bearing (6 required)
3	6211	Connecting rod lower bearing (6 required)
4	6010	Cylinder block
5	6K868	Piston oil cool valve (6 required)
6	6333	Cylinder block crankshaft main bearing (4 required)
7	6A341	Crankshaft upper thrust outer washer
8	6K302	Crankshaft lower thrust washer

9	6A341	Crankshaft upper thrust inner washer
10	6303	Crankshaft
11	6A338	Lower crankshaft main bearings (4 required)
12	-	Lower crankshaft main bearing caps (4 required) (part of 6010)
13	6C364	Main bearing cap support brace

DIAGNOSIS AND TESTING > ENGINE

1.

For basic mechanical concerns. REFER to: ENGINE SYSTEM - GENERAL INFORMATION . For driveability concerns. Refer to ENGINE CONTROLS - INTRODUCTION (EXCEPT DIESEL & HYBRID) .

GENERAL PROCEDURES > VALVE CLEARANCE ADJUSTMENT

Special Tool(s) / General Equipment

Feeler Gauge

Check

1.

Remove the LH or RH valve cover. Refer to: Valve Cover LH . Refer to: Valve Cover RH .

NOTE: Engine must be at room temperature before measuring. The valve clearance must be measured with the camshaft at base circle. The engine will have to be rotated with the crankshaft pulley bolt to bring each valve to base circle.

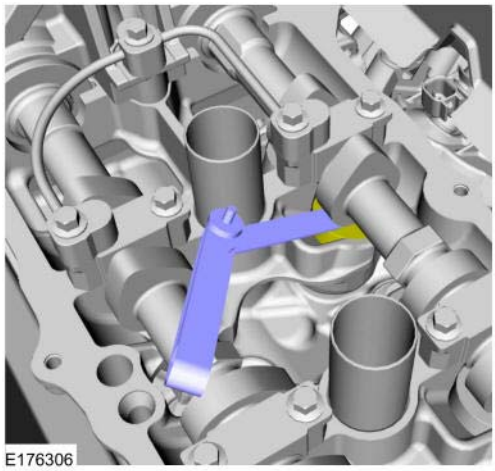
2.

Measure the clearance of each valve and record its location. A midrange clearance is the most desirable:

Use the General Equipment: Feeler Gauge

Intake: 0.15-0.25 mm (0.006-0.01 in)

Exhaust: 0.360-0.460 mm (0.0142-0.0181 in)



NOTE: The number on the valve tappet reflects the thickness of the valve tappet. For example, a tappet with the number 3.310 has the thickness of 3.31 mm (0.13 in).

3.
If any of the valve clearances are out of specification, select new tappets using this formula: tappet thickness = measured clearance + the base tappet thickness - most desirable thickness. Select the tappets and mark the installation location.

Adjustment

NOTE: The following step is only necessary if adjustment is required.

1.
Remove the camshafts. Refer to: Camshafts .

REMOVAL AND INSTALLATION > CAMSHAFTS

Special Tool(s) / General Equipment

	303-1248 Camshaft holding tools TKIT-2006UF-FLM TKIT-2006UF-ROW
	303-1530 Tool, Chain Tensioner Hold Down TKIT-2010A-F TKIT-2010A-LM TKIT-2010A-ROW

Feeler Gauge

Materials

Name	Specification
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) XO-5W20-QSP (U.S.)	WSS-M2C945-A

REMOVAL AND INSTALLATION > CAMSHAFTS > REMOVAL

NOTE: During engine repair procedures, cleanliness is extremely important. Any foreign material, including any material created while cleaning gasket surfaces that enters the oil passages, coolant passages or the oil pan, may cause engine failure.

All camshafts

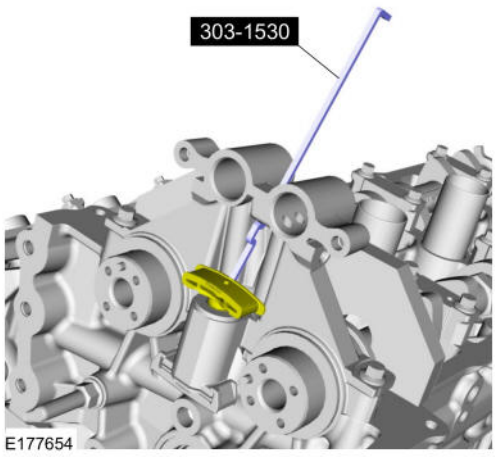
1.

Remove the LH or RH VCT unit. Refer to: Variable Camshaft Timing (VCT) Unit .

LH camshafts

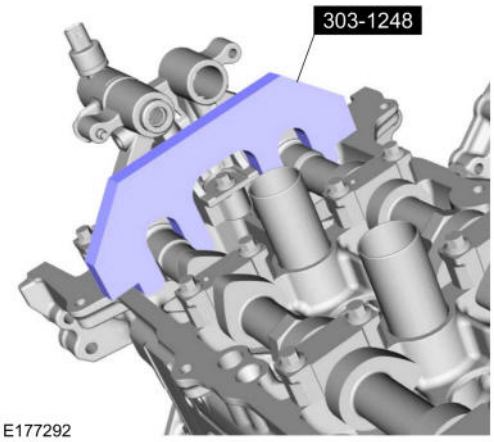
NOTE: The VCT oil control solenoids are removed for clarity.

2.
Remove Special Service Tool: 303-1530 Tool, Chain Tensioner Hold Down.



3.

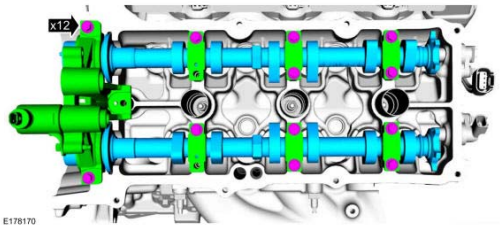
Remove Special Service Tool: 303-1248 Camshaft holding tools.



NOTE: Cylinder head camshaft bearing caps are numbered to verify that they are assembled in their original positions.

NOTE: Mark the exhaust and intake camshafts for installation into their original locations.

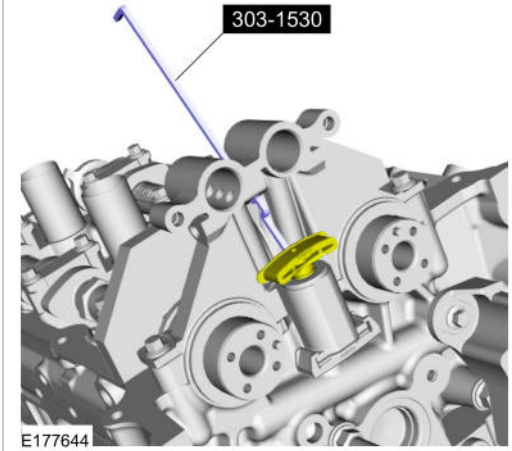
4.
Remove the bolts, camshaft caps and the camshafts.



RH camshafts

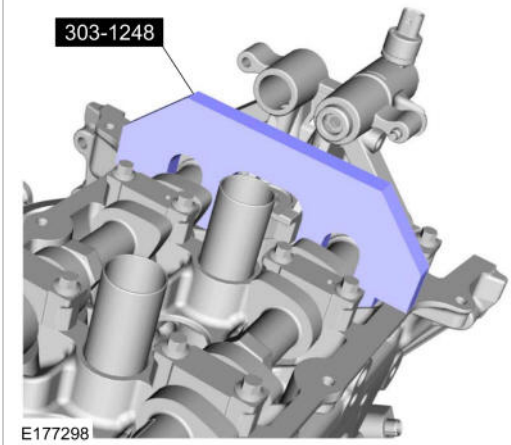
NOTE: The VCT oil control solenoids are removed for clarity.

5.
Remove Special Service Tool: 303-1530 Tool, Chain Tensioner Hold Down.



6.

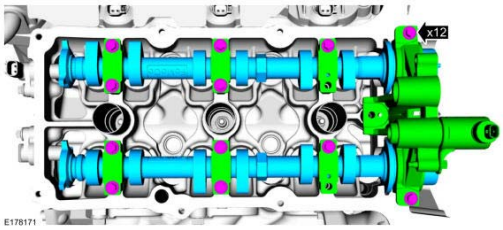
Remove Special Service Tool: 303-1248 Camshaft holding tools.



NOTE: Cylinder head camshaft bearing caps are numbered to verify that they are assembled in their original positions.

NOTE: Mark the exhaust and intake camshafts for installation into their original locations.

7.
Remove the bolts, camshaft caps and the camshafts.

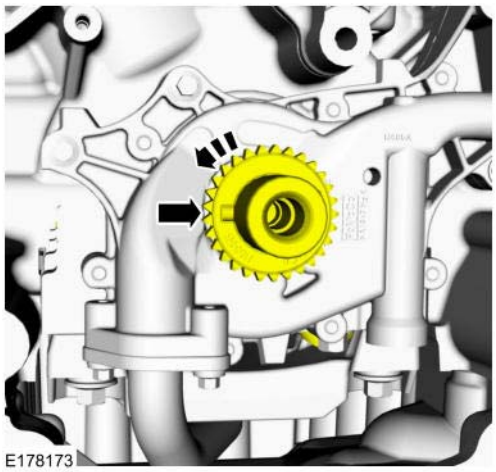


REMOVAL AND INSTALLATION > CAMSHAFTS > INSTALLATION

RH camshafts

> *NOTE: The crankshaft must remain in the freewheeling position (crankshaft dowel pin at 9 o'clock) until after the camshafts are installed and the valve clearance is checked/adjusted. Do not turn the crankshaft until instructed to do so. Failure to follow this process will result in severe engine damage.*

1.
Rotate counterclockwise to the 9 o'clock position.

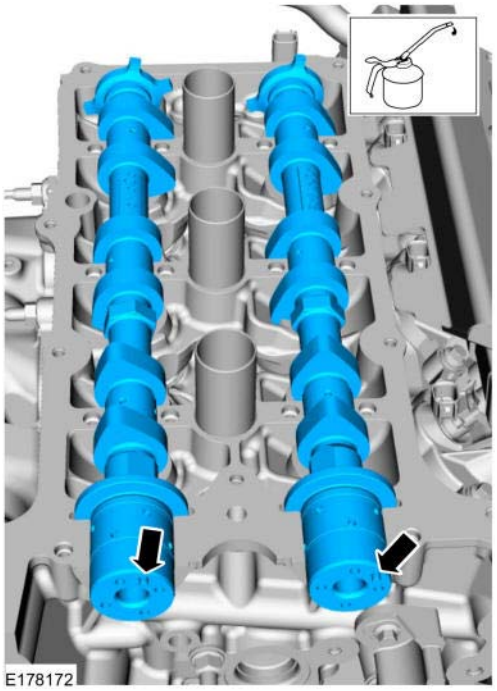


2.

Lubricate the camshafts with clean engine oil and position the camshafts onto the RH cylinder head in the neutral position as shown in illustration.

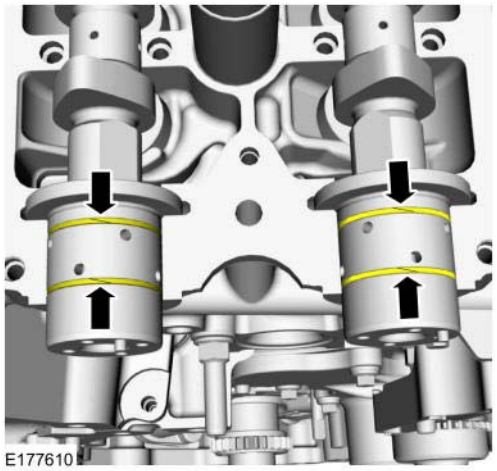
Material

: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W20-QSP (U.S.) (WSS-M2C945-A)



NOTE: The camshaft seal gaps must be at the 12 o'clock position or damage to the engine may occur.

3.
Position the camshaft seals gaps at 12 o'clock.



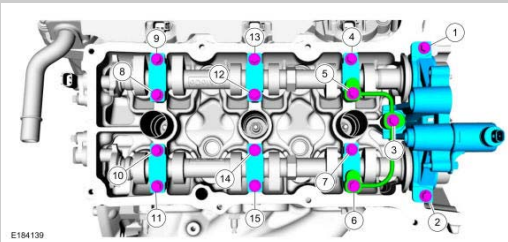
NOTE: Cylinder head camshaft bearing caps are numbered to verify that they are assembled in their original positions.

4.
Install the camshaft caps, oil tube and the bolts.

Torque:

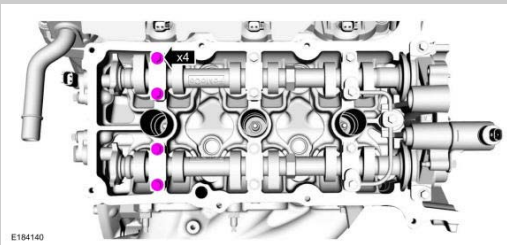
Stage 1: 71 lb.in (8 Nm)

Stage 2: 45°



5.

Loosen the camshaft cap bolts.



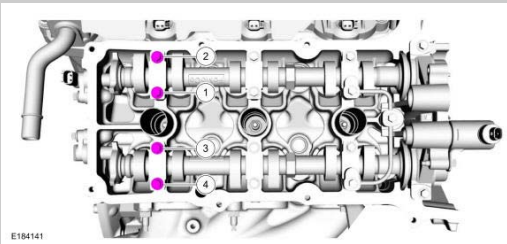
6.

Tighten the camshaft cap bolts.

Torque:

Stage 1: 71 lb.in (8 Nm)

Stage 2: 45°



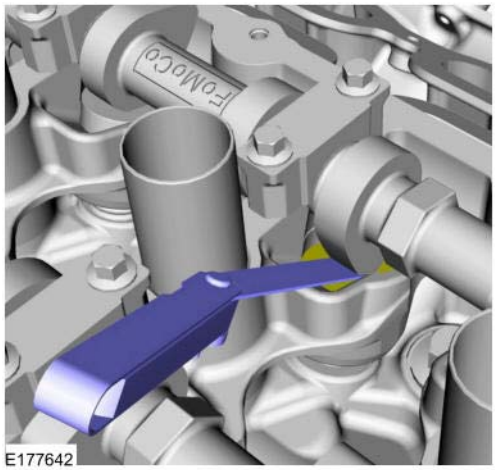
NOTE: If any components are installed new, the engine valve clearance must be checked/adjusted or engine damage may occur.

NOTE: Use a camshaft sprocket bolt to turn the camshafts.

7.
Confirm that the valve tappet clearances are within specification. If valve tappet clearances are not within specification, the clearance must be adjusted by installing new valve tappet(s) of the

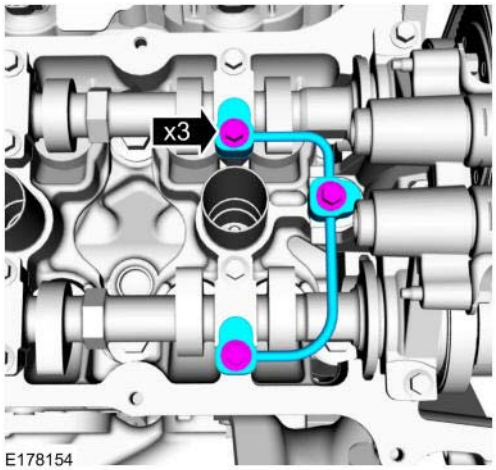
correct size. Refer to: Valve Clearance Adjustment .

Use the General Equipment: Feeler Gauge



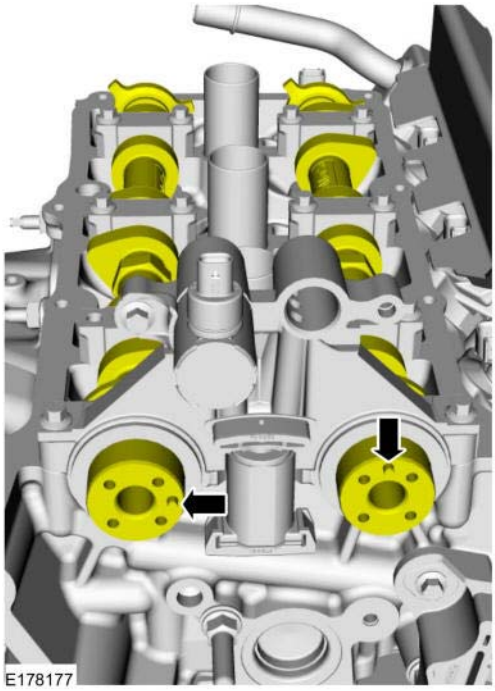
8.

Remove the bolts and the RH oil tube.



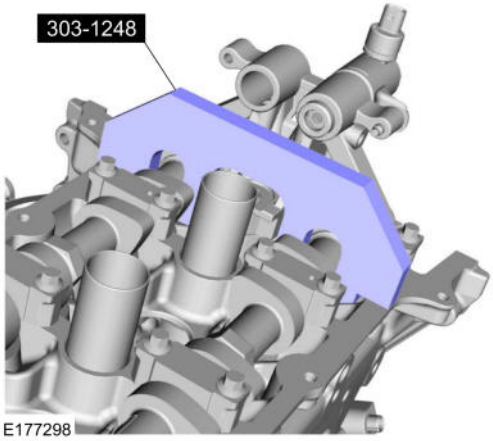
9.

Rotate the RH camshafts to the TDC.



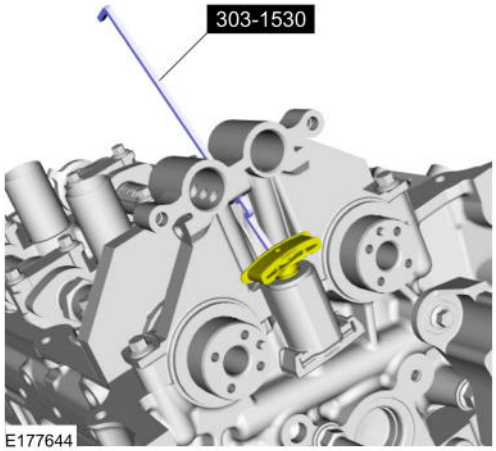
NOTE: The Camshaft Holding Tool will hold the camshafts in the TDC position.

10.
Install Special Service Tool: 303-1248 Camshaft holding tools.



NOTE: The VCT oil control solenoids are removed for clarity.

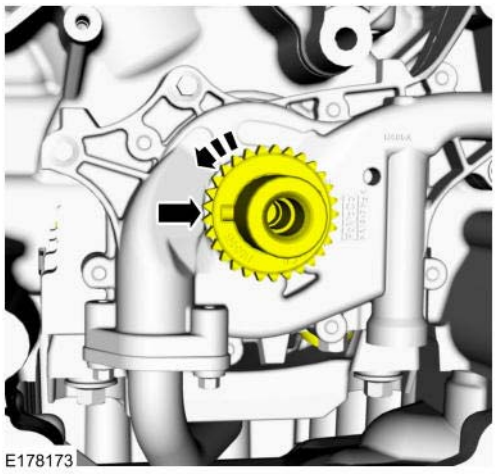
11.
Install Special Service Tool: 303-1530 Tool, Chain Tensioner Hold Down.



LH camshafts

> *NOTE: The crankshaft must remain in the freewheeling position (crankshaft dowel pin at 9 o'clock) until after the camshafts are installed and the valve clearance is checked/adjusted. Do not turn the crankshaft until instructed to do so. Failure to follow this process will result in severe engine damage.*

12.
Rotate counterclockwise to the 9 o'clock position.

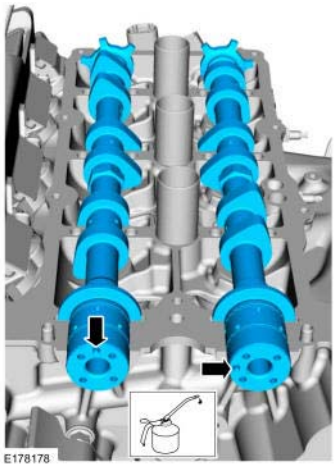


13.

Lubricate the camshafts with clean engine oil and position the camshafts onto the LH cylinder head in the neutral position as shown in illustration.

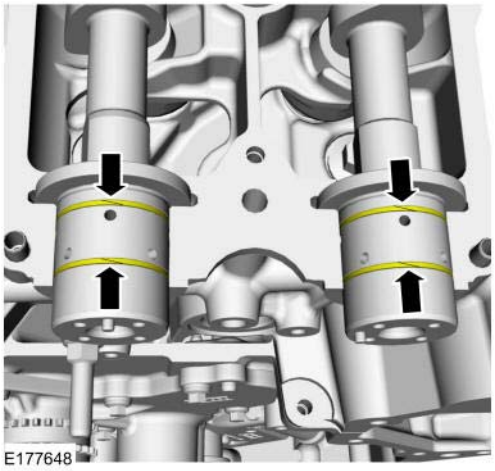
Material

: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W20-QSP (U.S.) (WSS-M2C945-A)



NOTE: The camshaft seal gaps must be at the 12 o'clock position or damage to the engine may occur.

14.
Position the camshaft seals gaps at 12 o'clock.



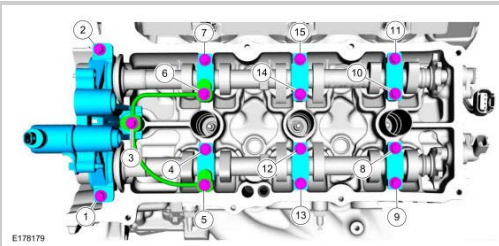
NOTE: Cylinder head camshaft bearing caps are numbered to verify that they are assembled in their original positions.

15.
Install the camshaft caps, oil tube and the bolts.

Torque:

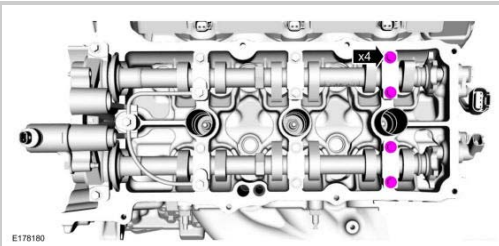
Stage 1: 71 lb.in (8 Nm)

Stage 2: 45°



16.

Loosen the camshaft cap bolts.



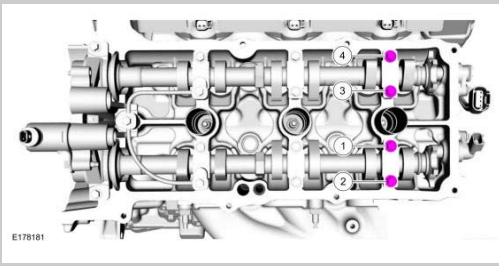
17.

Tighten the camshaft cap bolts.

Torque:

Stage 1: 71 lb.in (8 Nm)

Stage 2: 45°

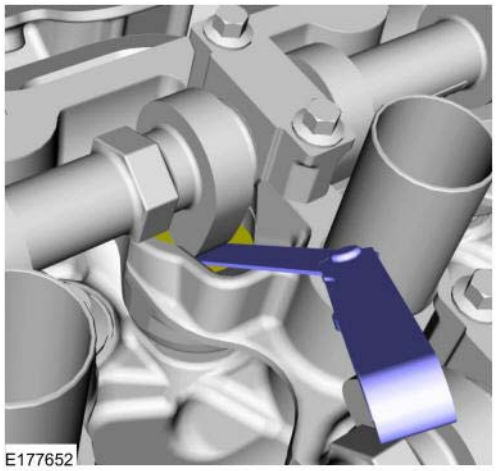


NOTE: If any components are installed new, the engine valve clearance must be checked/adjusted or engine damage may occur.

NOTE: Use a camshaft sprocket bolt to turn the camshafts.

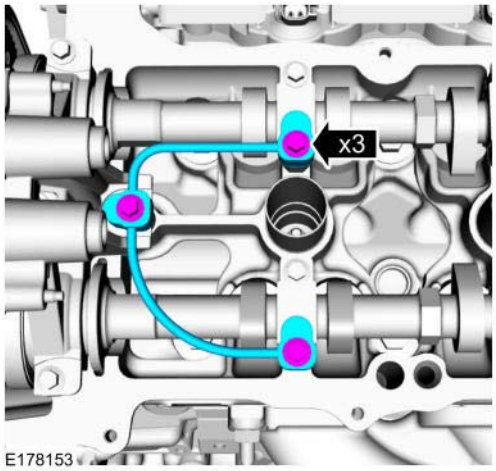
18.
Confirm that the valve tappet clearances are within specification. If valve tappet clearances are not within specification, the clearance must be adjusted by installing new valve tappet(s) of the correct size. Refer to: Valve Clearance Adjustment

.Use the General Equipment: Feeler Gauge



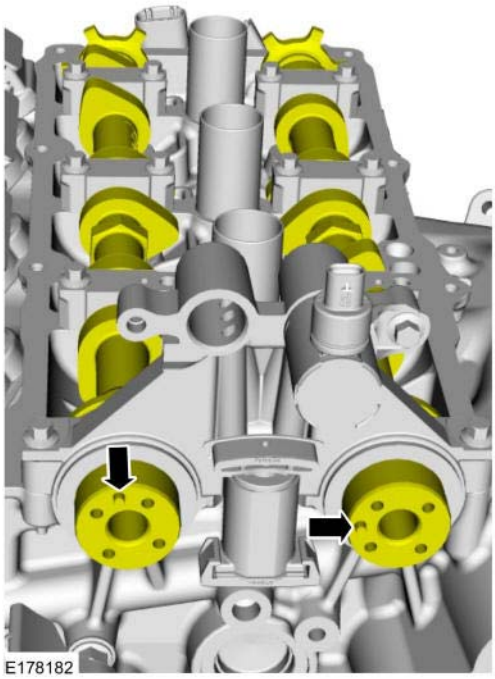
19.

Remove bolts and the LH oil tube.



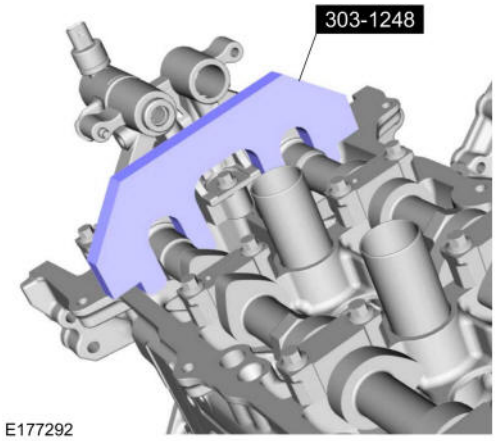
20.

Rotate the LH camshafts to the TDC.



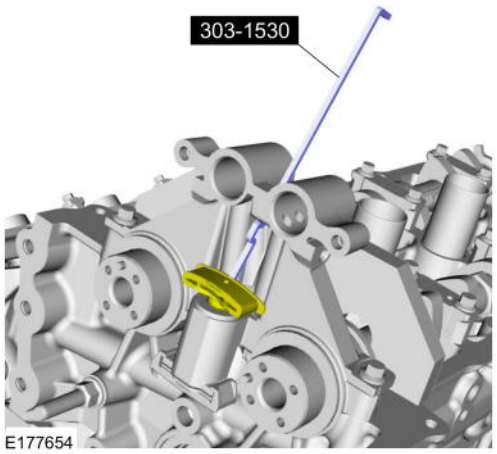
NOTE: The Camshaft Holding Tool will hold the camshafts in the TDC position.

21.
Install Special Service Tool: 303-1248 Camshaft holding tools.



NOTE: The VCT oil control solenoids are removed for clarity.

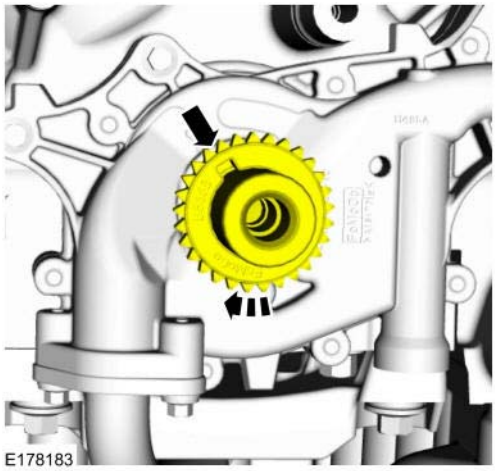
22.
Install Special Service Tool: 303-1530 Tool, Chain Tensioner Hold Down.



All camshafts

23.

Rotate the crankshaft clockwise 60 degrees to the TDC position (crankshaft dowel pin at 11 o'clock).



24.

Install the LH or RH VCT unit. Refer to: Variable Camshaft Timing (VCT) Unit .

REMOVAL AND INSTALLATION > CRANKSHAFT FRONT SEAL

Special Tool(s) / General Equipment

 303-102	303-102 Installer, Crankshaft Pulley

	303-1251 Installer, Front Seal TKIT-2006UF-FLM TKIT-2006UF-ROW
 E222985	303-335 (T88T-6701-A) Installer, Front Cover Oil Seal TKIT-1988-F TKIT-1988-FLM
 E134603	303-409 (T92C-6700-CH) Remover, Crankshaft Seal TKIT-1992-FH/FMH/FLMH TKIT-1993-LMH/MH
Strap Wrench	
Three Leg Puller	

Materials

Name	Specification
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) XO-5W20-QSP (U.S.)	WSS-M2C945-A

REMOVAL AND INSTALLATION > CRANKSHAFT FRONT SEAL > REMOVAL

NOTE: During engine repair procedures, cleanliness is extremely important. Any foreign material, including any material created while cleaning gasket surfaces, that enters the oil passages, coolant passages or the oil pan may cause engine failure.

1.

Remove the degas bottle. Refer to: DEGAS BOTTLE .

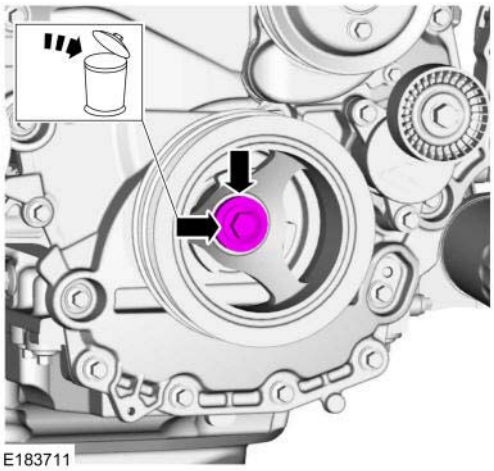
2.

Remove the A/C compressor belt. Refer to: AIR CONDITIONING (A C) COMPRESSOR BELT .

3.

Remove the crankshaft bolt and washer.

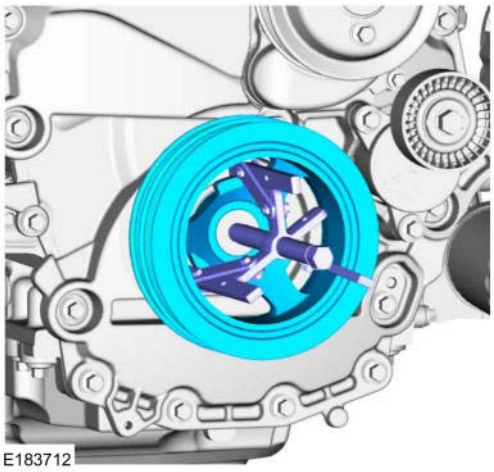
Discard the bolt.



4.

Using a three leg puller, remove the crankshaft pulley.

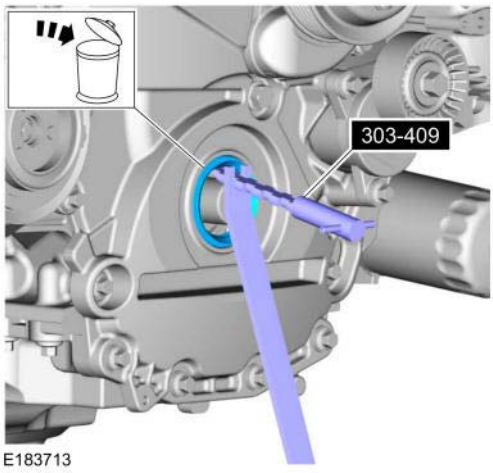
Use the General Equipment: Three Leg Puller



5.

Using the special tool, remove and discard the crankshaft front seal.

Use Special Service Tool: 303-409 (T92C-6700-CH) Remover, Crankshaft Seal.



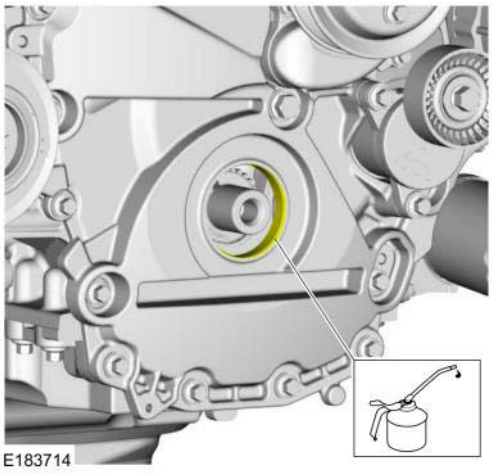
REMOVAL AND INSTALLATION > CRANKSHAFT FRONT SEAL > INSTALLATION

1.

Lubricate the crankshaft front seal bore with clean engine oil.

Material

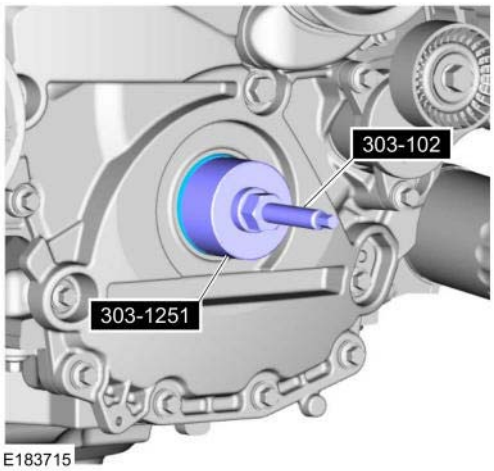
: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W20-QSP (U.S.) (WSS-M2C945-A)



2.

Using the special tools, install the crankshaft front seal.

Use Special Service Tool: 303-102 Installer, Crankshaft Pulley, 303-1251 Installer, Front Seal.

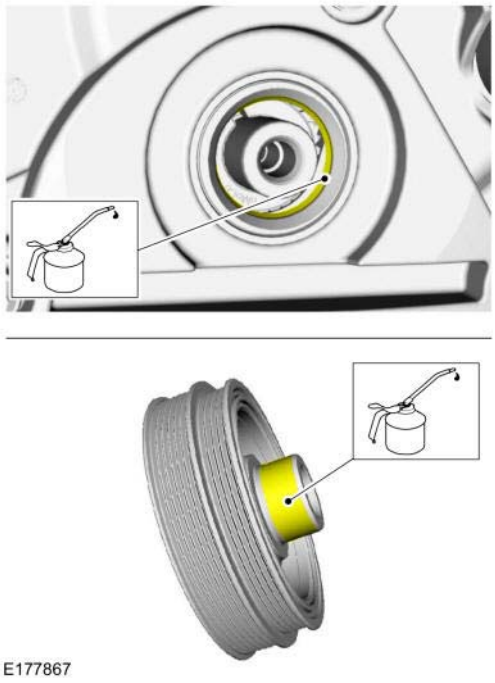


3.

Lubricate the crankshaft front seal and the crankshaft pulley with clean engine oil.

Material

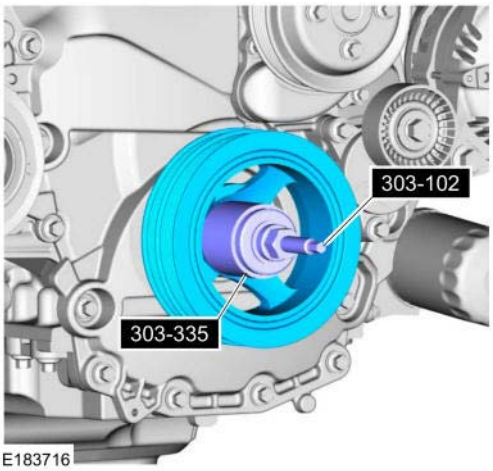
: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W20-QSP (U.S.) (WSS-M2C945-A)



4.

Using the special tools, install the crankshaft pulley.

Use Special Service Tool: 303-335 (T88T-6701-A) Installer, Front Cover Oil Seal, 303-102 Installer, Crankshaft Pulley.



5.

Using the strap wrench, install the new crankshaft bolt and the washer and tighten in 4 stages.

Use the General Equipment: Strap Wrench

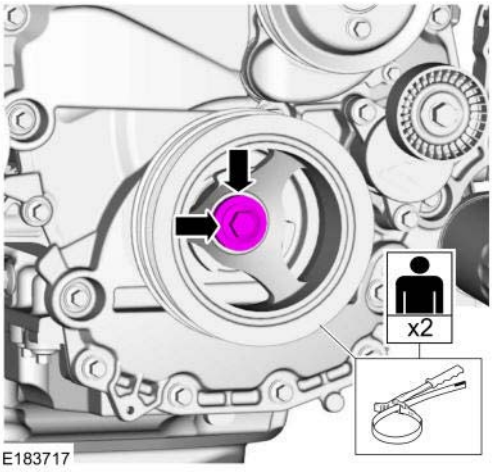
Torque:

Stage 1: 89 lb.ft (120 Nm)

Stage 2: Loosen: 1 turn(s)

Stage 3: 37 lb.ft (50 Nm)

Stage 4: 90°



6.

Install the A/C compressor belt. Refer to: AIR CONDITIONING (A C) COMPRESSOR BELT .

7.

Install the degas bottle. Refer to: DEGAS BOTTLE .

8.

After completing the repairs, perform the Misfire Monitor Neutral Profile Correction procedure using a diagnostic scan tool.

REMOVAL AND INSTALLATION > CRANKSHAFT REAR SEAL

Special Tool(s) / General Equipment

Plastic Scraper

Materials

Name	Specification
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) XO-5W20-QSP (U.S.)	WSS-M2C945-A
Motorcraft® High Performance Engine RTV Silicone TA-357	WSE-M4G323-A6
Motorcraft® Silicone Gasket Remover ZC-30-A	-
Motorcraft® Metal Surface Prep ZC-31-B	-
Metal Brake Parts Cleaner (U.S.) PM-4-A, PM-4-B (U.S.)	-

REMOVAL AND INSTALLATION > CRANKSHAFT REAR SEAL > REMOVAL

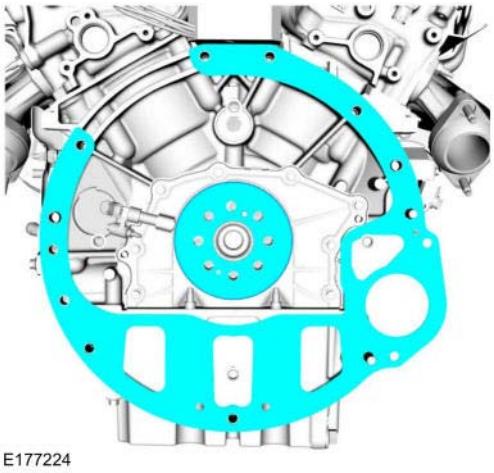
NOTE: During engine repair procedures, cleanliness is extremely important. Any foreign material, including any material created while cleaning gasket surfaces that enters the oil passages, coolant passages or the oil pan, may cause engine failure.

1.

Remove the flexplate or flywheel. Refer to: Flexplate . Refer to: Flywheel .

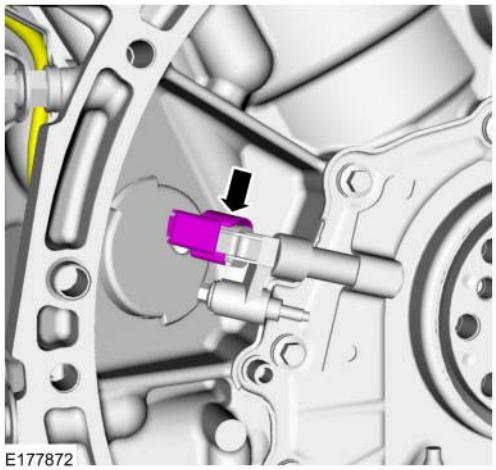
2.

Remove the crankshaft sensor ring and the engine-to-transmission spacer plate.


E177224

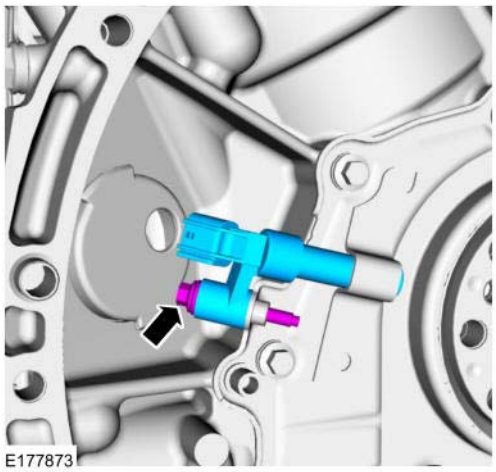
3.

Disconnect the CKP sensor electrical connector.


E177872

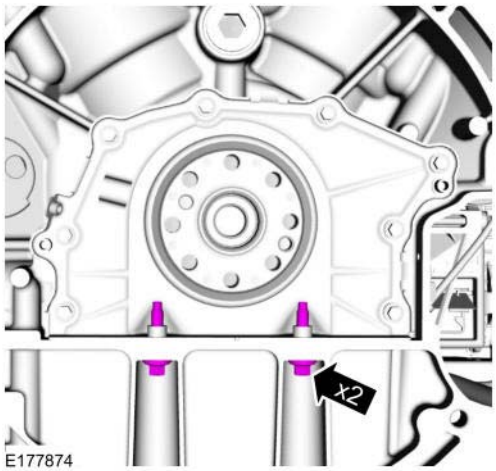
4.

Remove the bolt and the CKP sensor.


E177873

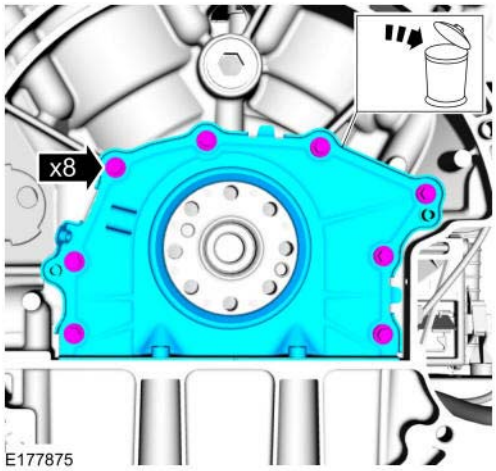
5.

Remove oil pan-to-crankshaft rear seal bolts.



6.

Remove the bolts and the crankshaft rear seal and discard the seal.



NOTE: Do not use wire brushes, power abrasive discs or 3M™ Roloc® Bristle Disk (2-in white, part number 07528) to clean the sealing surfaces of the engine block. These tools cause scratches and gouges that make leak paths. They also cause contamination that causes premature engine failure. Remove all traces of the gasket.

7.
Make sure that the mating faces are clean and free of foreign material. Refer to: RTV Sealing Surface Cleaning and Preparation .

Use the General Equipment: Plastic Scraper

Material

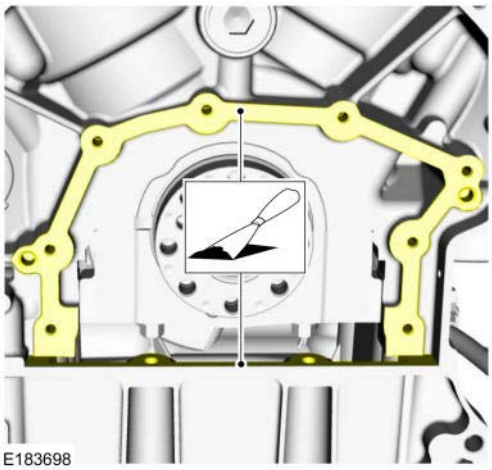
: Motorcraft® Silicone Gasket Remover / ZC-30-A

Material

: Metal Brake Parts Cleaner (U.S.) / PM-4-A, PM-4-B (U.S.)

Material

: Motorcraft® Metal Surface Prep / ZC-31-B



REMOVAL AND INSTALLATION > CRANKSHAFT REAR SEAL > INSTALLATION

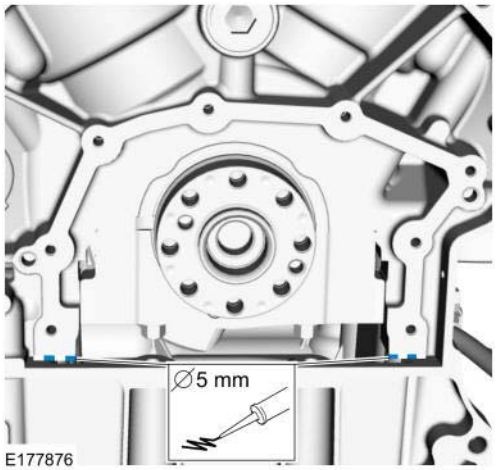
NOTE: The crankshaft rear seal retainer must be installed and the bolts tightened within 10 minutes of sealant application.

NOTE: Failure to use Motorcraft® High Performance Engine RTV Silicone may cause the engine oil to foam excessively and result in serious engine damage.

1.
Apply 5 mm (0.196 in) bead of silicone sealant.

Material

: Motorcraft® High Performance Engine RTV Silicone / TA-357 (WSE-M4G323-A6)



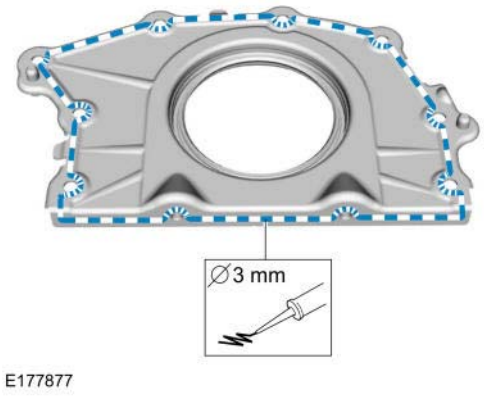
NOTE: Failure to use Motorcraft® High Performance Engine RTV Silicone may cause the engine oil to foam excessively and result in serious engine damage.

NOTE: The crankshaft rear seal retainer must be installed and the bolts tightened within 10 minutes of sealant application.

2.
Apply 3 mm (0.11 in) bead of silicone sealant.

Material

: Motorcraft® High Performance Engine RTV Silicone / TA-357 (WSE-M4G323-A6)



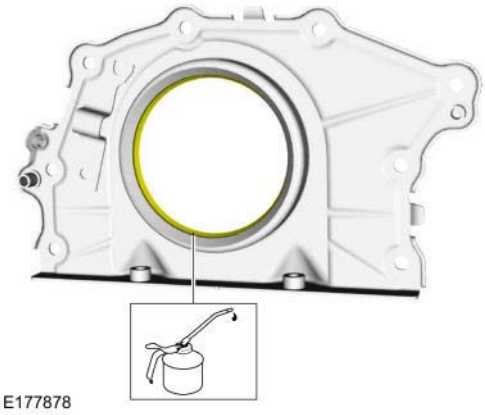
3.

Lubricate the crankshaft rear seal with clean engine oil.

Material

: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W20-QSP (U.S.)

(WSS-M2C945-A)



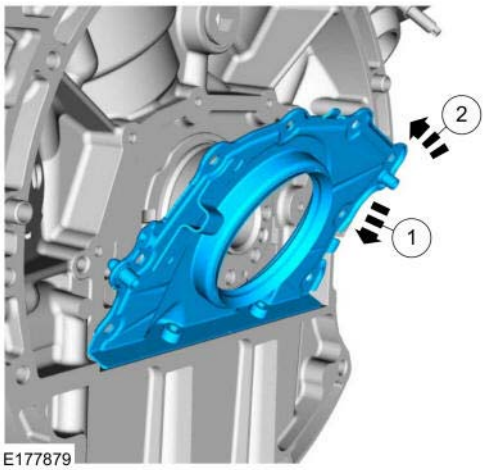
4.

1.

Install the crankshaft rear seal retainer at an angle above the oil pan flange to avoid scraping off the sealer.

2.

Tilt the seal retainer up and onto the rear of the cylinder block.



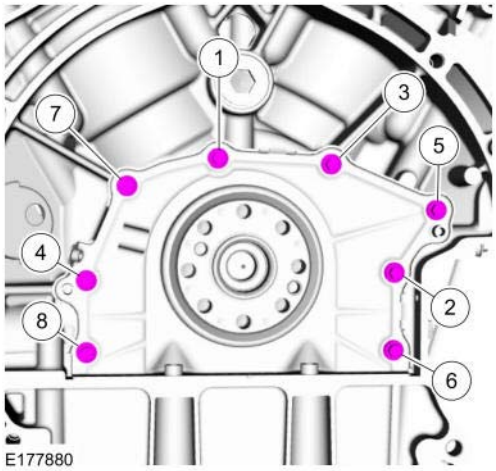
5.

Install the bolts and tighten in sequence shown in illustration.

Torque:

Stage 1: 89 lb.in (10 Nm)

Stage 2: 45°



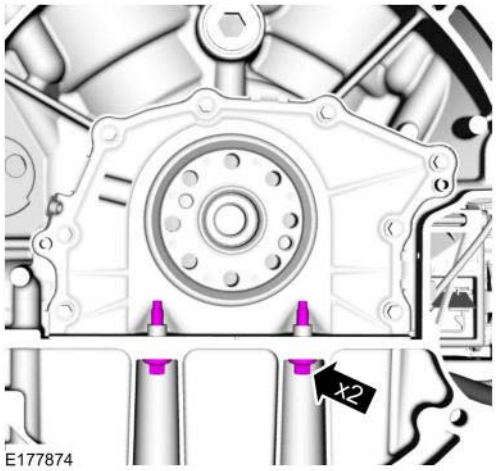
6.

Install oil pan-to-crankshaft rear seal bolts.

Torque:

Stage 1: 89 lb.in (10 Nm)

Stage 2: 45°

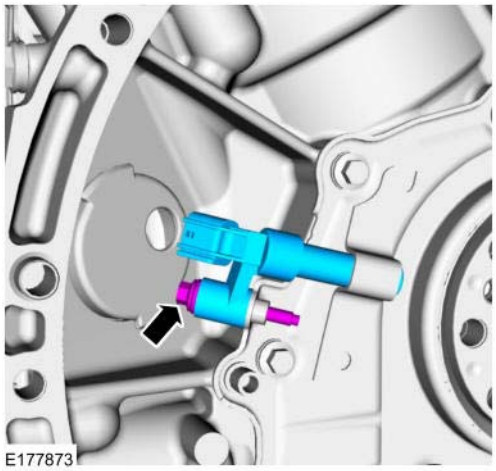


7.

Install the CKP sensor and the bolt.

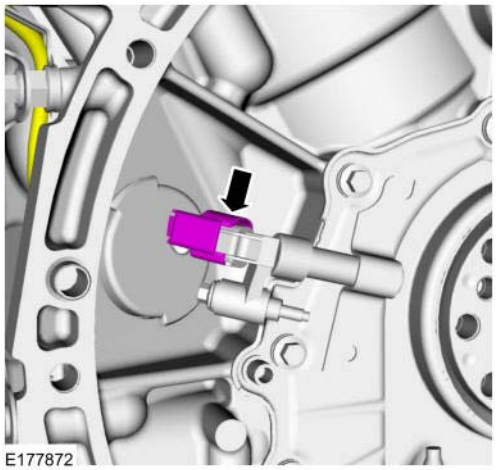
Torque

: 89 lb.in (10 Nm)



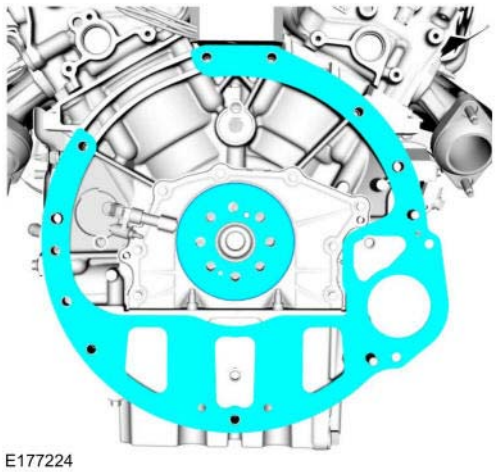
8.

Connect the CKP sensor electrical connector.



9.

Install the engine-to-transmission spacer plate and the crankshaft sensor ring.



10.

Install the flexplate or flywheel. Refer to: Flexplate . Refer to: Flywheel .

REMOVAL AND INSTALLATION > CYLINDER HEAD LH

Special Tool(s) / General Equipment

Oil Drain Equipment

Materials

Name	Specification
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) XO-5W20-QSP (U.S.)	WSS-M2C945-A

REMOVAL AND INSTALLATION > CYLINDER HEAD LH > REMOVAL

NOTE: During engine repair procedures, cleanliness is extremely important. Any foreign material, including any material created while cleaning gasket surfaces that enters the oil passages, coolant passages or the oil pan, can cause engine failure.

NOTE: If the cylinder head is replaced, a new secondary timing chain tensioner will need to be installed. Refer to Variable Camshaft Timing (VCT) Unit .

1.

With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

2.

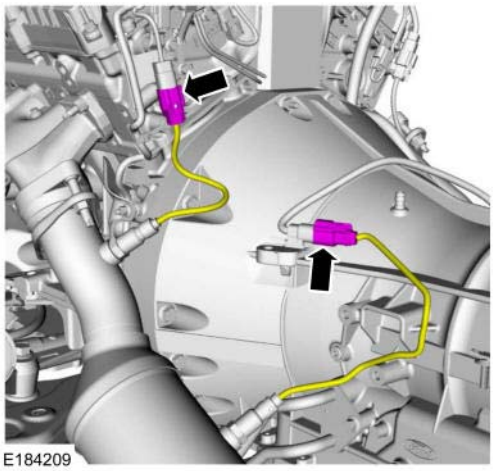
Release the fuel system pressure. Refer to: FUEL SYSTEM PRESSURE RELEASE .

3.

Disconnect the battery ground. Refer to: Battery Disconnect and Connect .

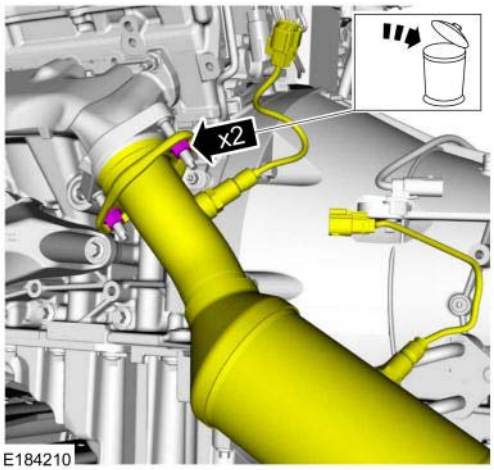
4.

Disconnect the LH HO2S and catalyst monitor sensor electrical connectors.



NOTE: Clean the catalytic converter-to-exhaust manifold sealing surfaces.

5.
Remove and discard the LH catalytic converter flange nuts.



6.

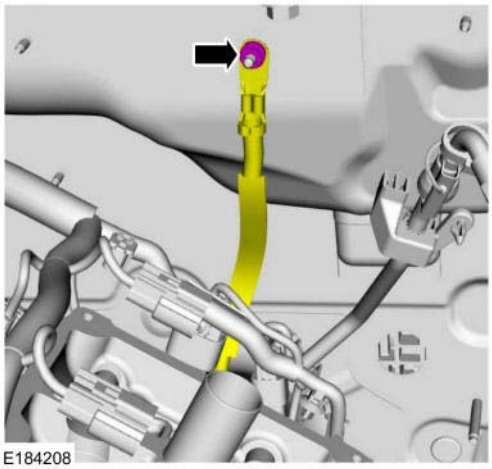
Remove the LH camshafts. Refer to: Camshafts .

7.

Remove the lower intake manifold. Refer to: Lower Intake Manifold .

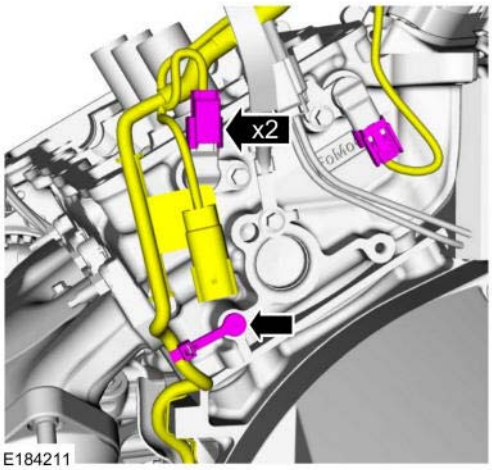
8.

Remove the nut and the ground strap.



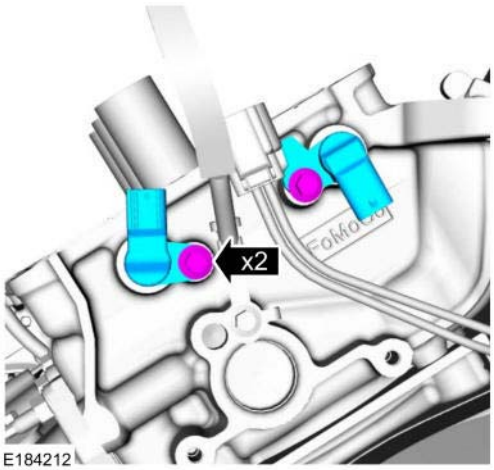
9.

Disconnect the CMP sensor electrical connectors and detach the wiring harness retainer.



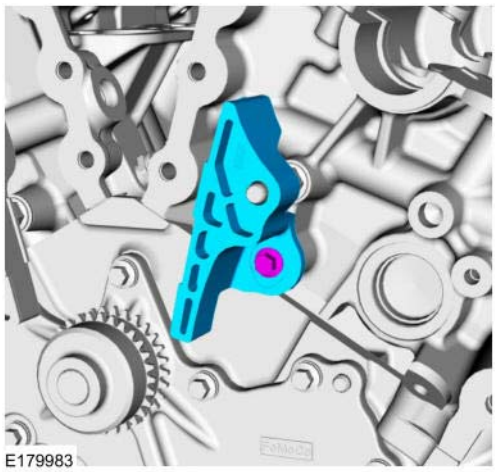
10.

Remove the bolts and the CMP sensors.



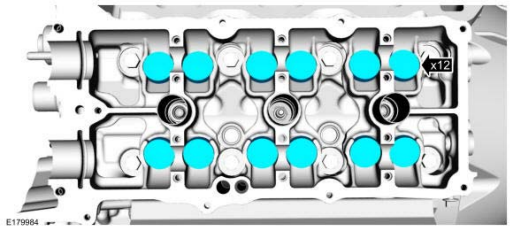
NOTE: Do not use power tools to remove the bolt or damage to the upper LH timing chain guide may occur.

11.
Remove the bolt and the upper LH timing chain guide.



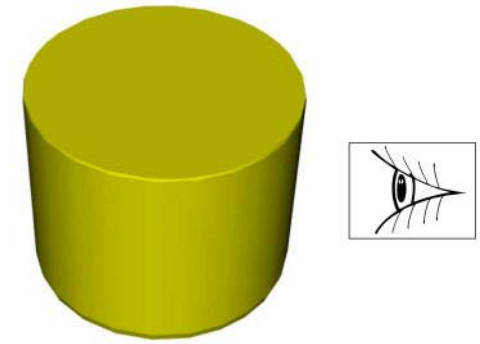
NOTE: If the components are to be reinstalled, they must be installed in the same positions. Mark the components for installation into their original locations.

12.
Remove the valve tappets.



13.

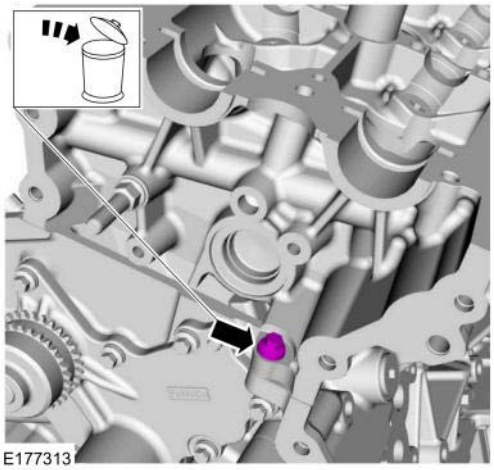
Inspect and install new components as necessary.



E177302

14.

Remove and discard the M6 bolt.



E177313

NOTE: Place clean shop towels over exposed engine cavities. Carefully remove the towels so foreign material is not dropped into the engine. Any foreign material (including any material created while cleaning gasket surfaces) that enters the oil passages or the oil pan, may cause engine failure.

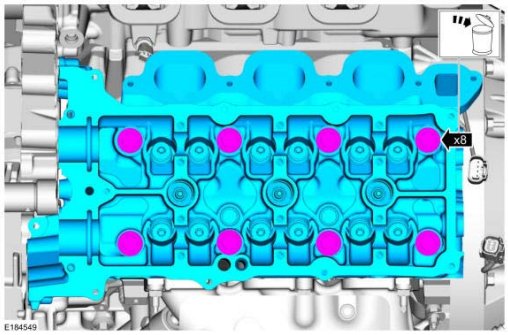
NOTE: Aluminum surfaces are soft and can be scratched easily. Never place the cylinder head gasket surface, unprotected, on a bench surface

NOTE: The cylinder head bolts must be discarded and new bolts must be installed. They are tighten-to-yield designed and cannot be reused.

15.

Remove and discard the bolts.

Remove the cylinder head.



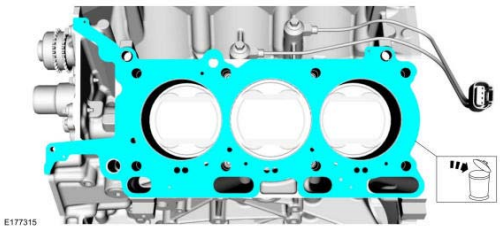
NOTE: Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges that make leak paths. Use a plastic scraping tool to remove all traces of the head gasket.

16.
Make sure that the mating faces are clean and free of foreign material.



17.

Remove and discard the cylinder head gasket.



NOTE: Place clean, lint-free shop towels over exposed engine cavities. Carefully remove the towels so foreign material is not dropped into the engine. Any foreign material (including any material created while cleaning gasket surfaces) that enters the oil passages or the oil pan, may cause engine failure.

NOTE: Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and

gouges that make leak paths. Use a plastic scraping tool to remove all traces of the head gasket.

18.
Make sure that the mating faces are clean and free of foreign material.



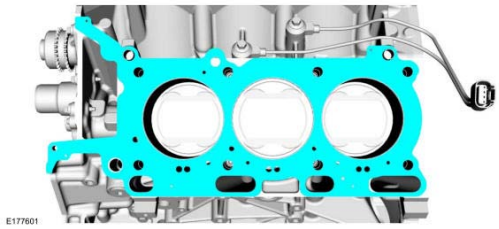
19.

Support the cylinder head on a bench with the head gasket side up. Check the cylinder head distortion and the cylinder block distortion. Refer to: Cylinder Head Distortion . Refer to: Cylinder Block Distortion .

REMOVAL AND INSTALLATION > CYLINDER HEAD LH > INSTALLATION

1.

Install the cylinder head gasket.



NOTE: If the cylinder head is replaced, a new secondary timing chain tensioner will need to be installed.

NOTE: Install new cylinder head bolts.

2.
Install the cylinder head and the new bolts.

Torque:

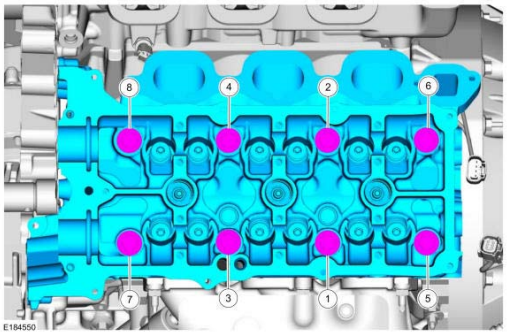
Stage 1: 177 lb.in (20 Nm)

Stage 2: 26 lb.ft (35 Nm)

Stage 3 : 90°

Stage 4: 90°

Stage 5: 45°

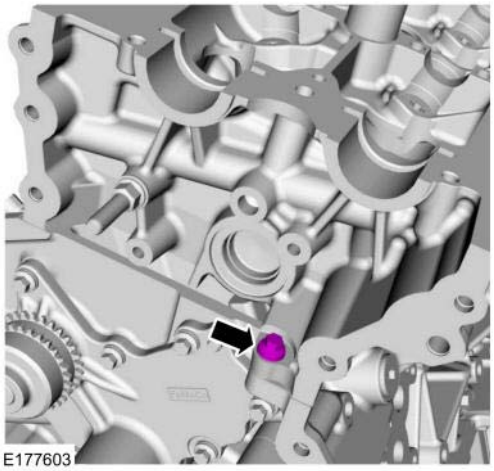


3.

Install the new M6 bolt.

Torque

: 89 lb.in (10 Nm)

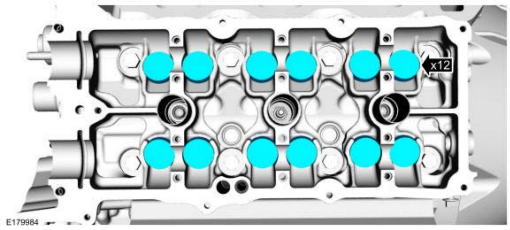


NOTE: The valve tappets must be installed in their original positions.

4.
Lubricate the valve tappets with clean engine oil and install.

Material

: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W20-QSP (U.S.) (WSS-M2C945-A)

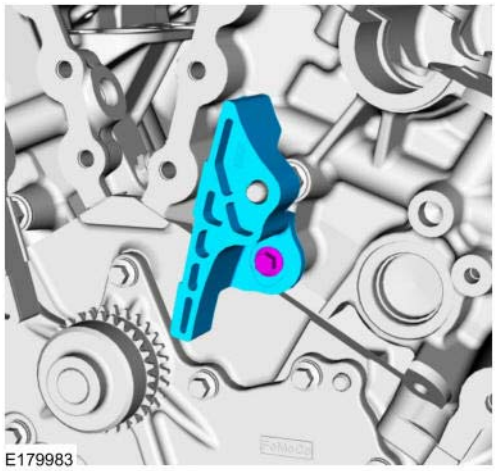


NOTE: Do not use power tools to install the bolt or damage to the upper LH timing chain guide may occur.

5.
Install the upper LH timing chain guide and the bolt.

Torque

: 89 lb.in (10 Nm)



NOTE: Lubricate the O-ring seals with clean engine oil.

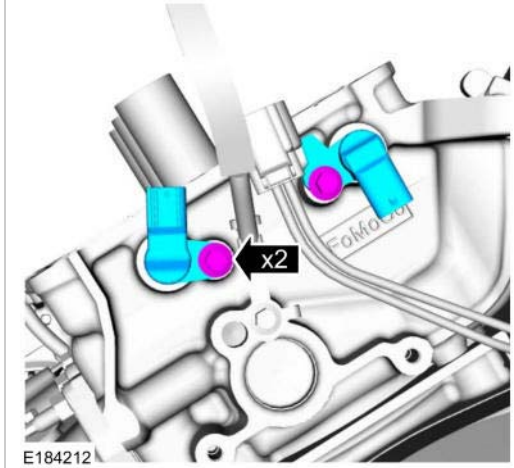
6.
Install the CMP sensors and the bolts.

Material

: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W20-QSP (U.S.) (WSS-M2C945-A)

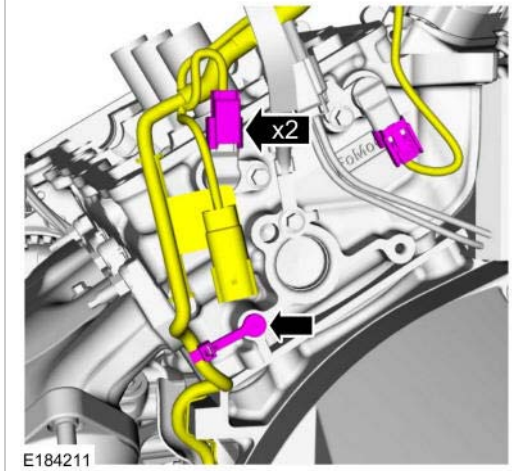
Torque

: 89 lb.in (10 Nm)



7.

Connect the CMP sensors electrical connectors and attach the wiring harness retainer.

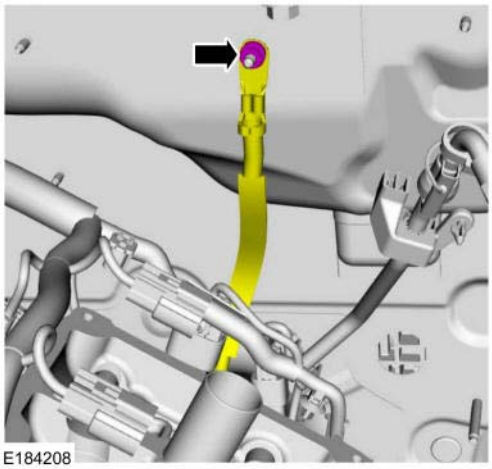


8.

Install the ground strap and the nut.

Torque

: 80 lb.in (9 Nm)



9.

Install the lower intake manifold. Refer to: Lower Intake Manifold .

10.

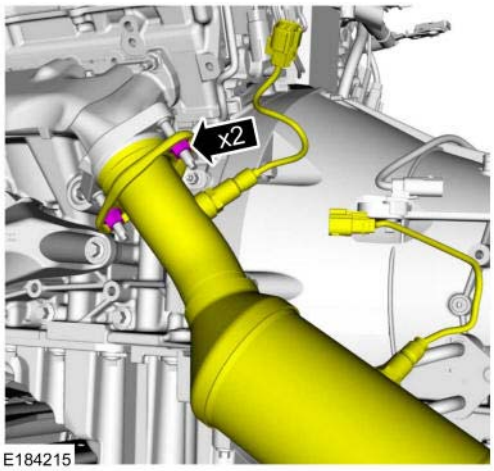
Install the LH camshafts. Refer to: Camshafts .

11.

Position the LH catalytic converter and install new flange nuts.

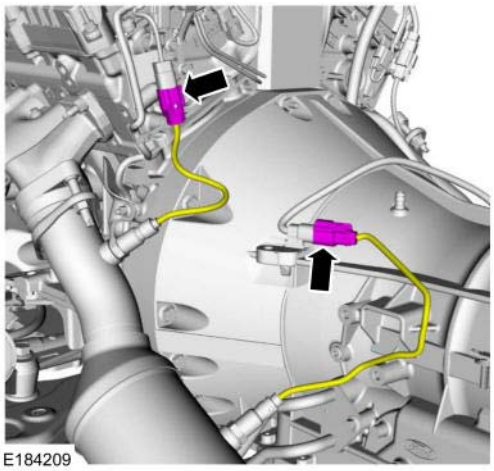
Torque

: 30 lb.ft (40 Nm)



12.

Connect the LH HO2S and catalyst monitor sensor electrical connectors.



13.

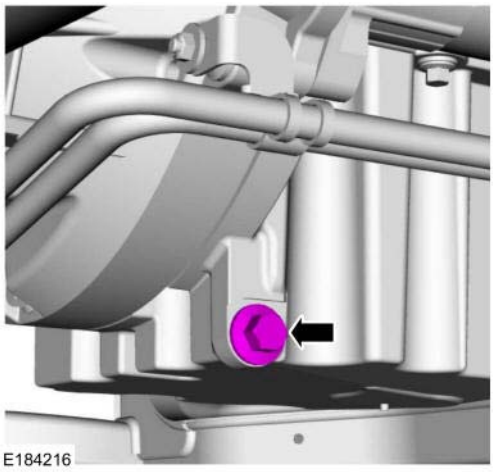
Remove the oil pan drain plug and drain the engine oil.

Use the General Equipment: Oil Drain Equipment

Install the oil pan drain plug.

Torque

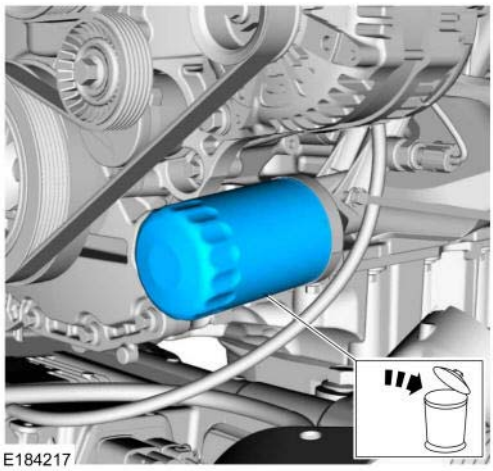
: 20 lb.ft (27 Nm)



14.

Remove and discard the engine oil filter.

Use the General Equipment: Oil Drain Equipment



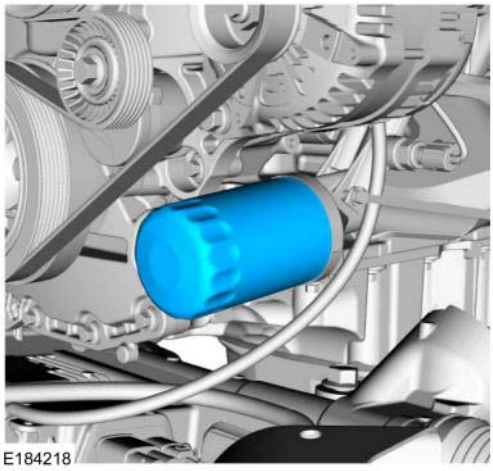
NOTE: Do not lubricate the engine oil filter seal.

15.
Install a new engine oil filter.

Torque:

Stage 1: 44 lb.in (5 Nm)

Stage 2: 180°

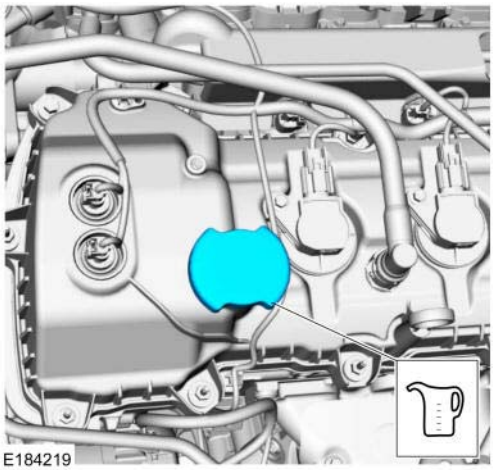


16.

Fill the engine with clean engine oil. Refer to: Specifications .

Material

: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W20-QSP (U.S.) (WSS-M2C945-A)



17.

Connect the battery ground. Refer to: Battery Disconnect and Connect .

18.

Start and check the exhaust system for leaks.

REMOVAL AND INSTALLATION > CYLINDER HEAD RH

Special Tool(s) / General Equipment

Oil Drain Equipment

Materials

Name	Specification
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) XO-5W20-QSP (U.S.)	WSS-M2C945-A

REMOVAL AND INSTALLATION > CYLINDER HEAD RH > REMOVAL

NOTE: During engine repair procedures, cleanliness is extremely important. Any foreign material, including any material created while cleaning gasket surfaces that enters the oil passages, coolant passages or the oil pan, can cause engine failure.

NOTE: If the cylinder head is replaced, a new secondary timing chain tensioner will need to be installed. Refer to Variable Camshaft Timing (VCT) Unit .

1.

With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

2.

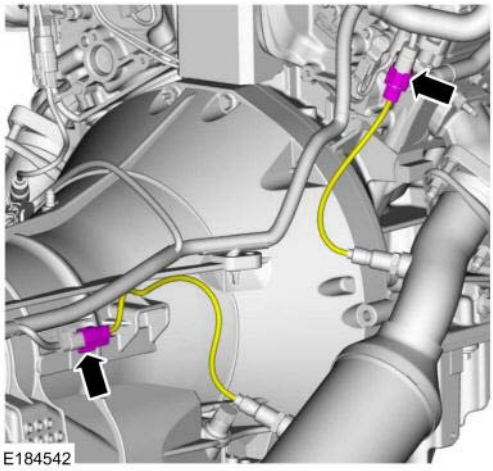
Release the fuel system pressure. Refer to: FUEL SYSTEM PRESSURE RELEASE .

3.

Disconnect the battery ground. Refer to: Battery Disconnect and Connect .

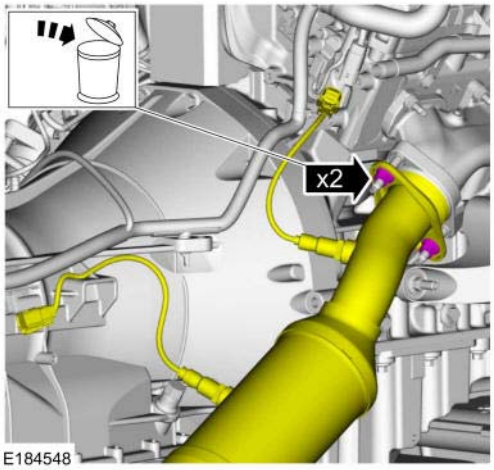
4.

Disconnect the RH HO2S and catalyst monitor sensor electrical connectors.



NOTE: Clean the catalytic converter-to-exhaust manifold sealing surfaces.

5.
Remove and discard the RH catalytic converter flange nuts.



6.

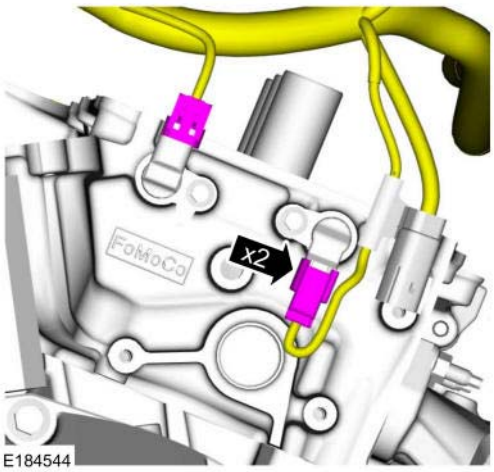
Remove the RH camshafts. Refer to: Camshafts .

7.

Remove the lower intake manifold. Refer to: Lower Intake Manifold .

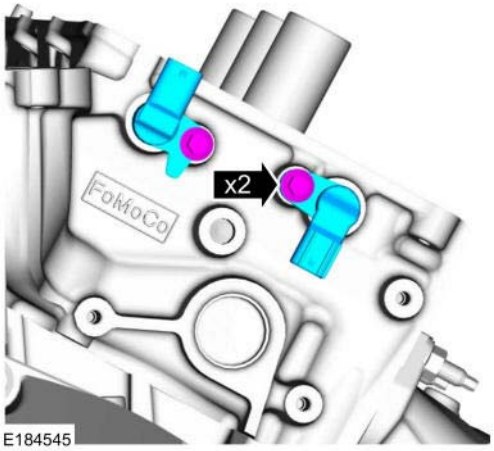
8.

Disconnect the RH CMP sensor electrical connectors.



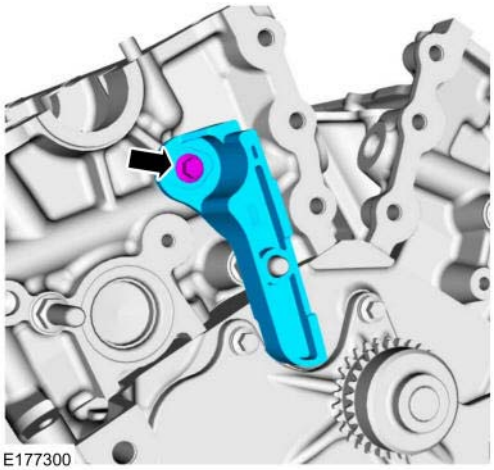
9.

Remove the bolts and the RH CMP sensors.



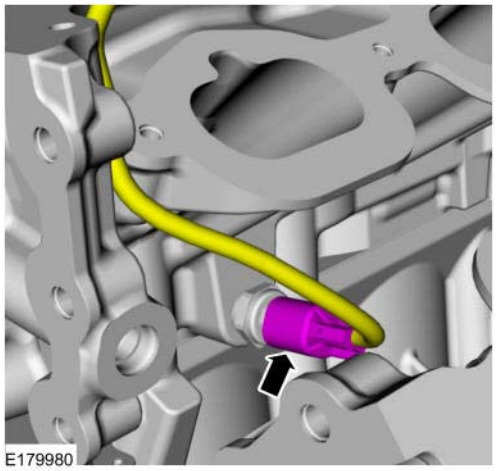
NOTE: Do not use power tools to remove the bolt or damage to the upper RH timing chain guide may occur.

10.
Remove the bolt and the RH timing chain guide.



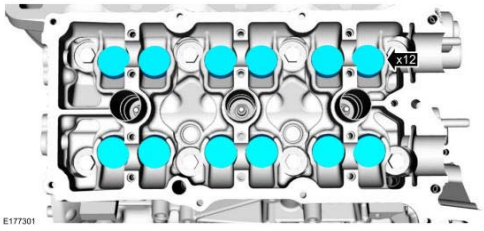
11.

Disconnect the CHT sensor electrical connector.



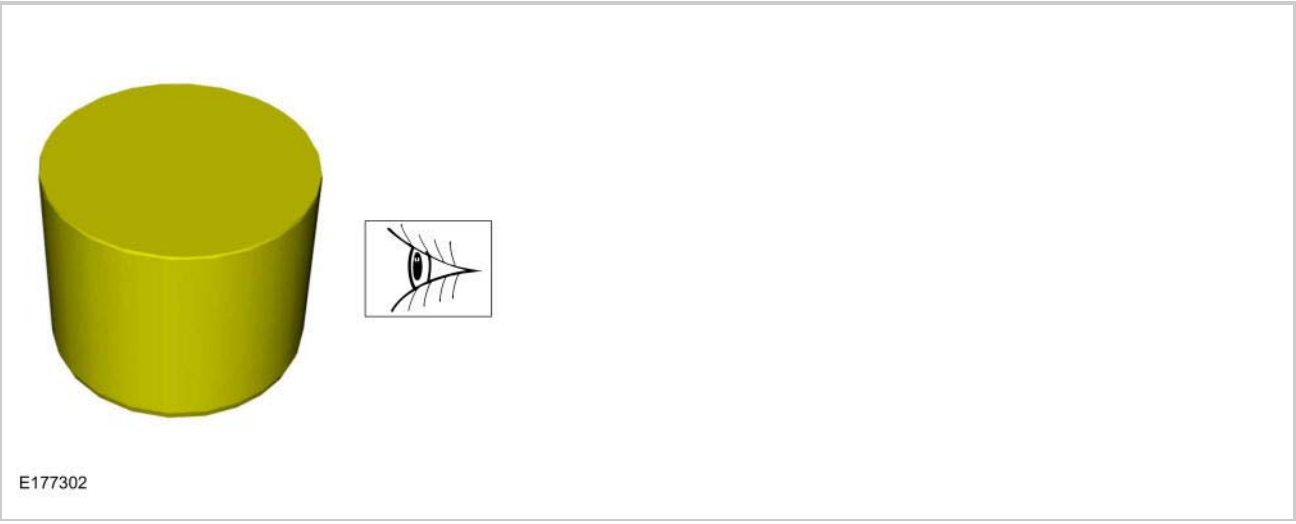
NOTE: If the components are to be reinstalled, they must be installed in the same positions. Mark the components for installation into their original locations.

12.
Remove the valve tappets.



13.

Inspect and install new components as necessary.



14.

Remove and discard the M6 bolt.



NOTE: Place clean shop towels over exposed engine cavities. Carefully remove the towels so foreign material is not dropped into the engine. Any foreign material (including any material created while cleaning gasket surfaces) that enters the oil passages or the oil pan, may cause engine failure.

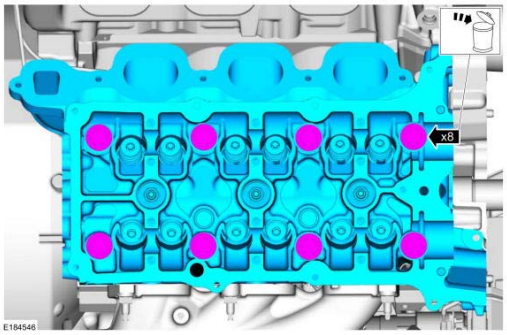
NOTE: Aluminum surfaces are soft and can be scratched easily. Never place the cylinder head gasket surface, unprotected, on a bench surface

NOTE: The cylinder head bolts must be discarded and new bolts must be installed. They are tighten-to-yield designed and cannot be reused.

15.

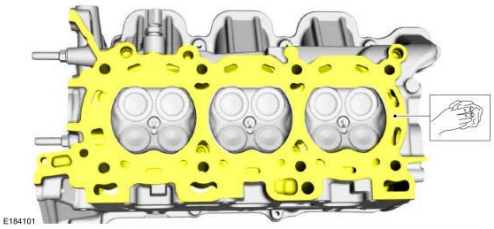
Remove and discard the bolts.

Remove the cylinder head.



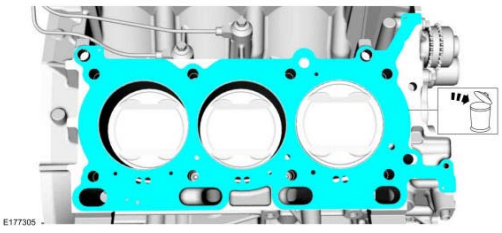
NOTE: Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges that make leak paths. Use a plastic scraping tool to remove all traces of the head gasket.

16.
Make sure that the mating faces of the cylinder head are clean and free of foreign material.



17.

Remove and discard the cylinder head gasket.



NOTE: Place clean, lint-free shop towels over exposed engine cavities. Carefully remove the towels so foreign material is not dropped into the engine. Any foreign material (including any material created while cleaning gasket surfaces) that enters the oil passages or the oil pan, may cause engine failure.

NOTE: Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and

gouges that make leak paths. Use a plastic scraping tool to remove all traces of the head gasket.

18.
Make sure that the mating faces of the engine block are clean and free of foreign material.



19.

Support the cylinder head on a bench with the head gasket side up. Check the cylinder head distortion and the cylinder block distortion. Refer to: Cylinder Head Distortion . Refer to: Cylinder Block Distortion .

REMOVAL AND INSTALLATION > CYLINDER HEAD RH > INSTALLATION

1.

Install the cylinder head gasket.



NOTE: Install new cylinder head bolts.

NOTE: If the cylinder head is replaced, a new secondary timing chain tensioner will need to be installed.

2.
Install the cylinder head and the new bolts.

Torque:

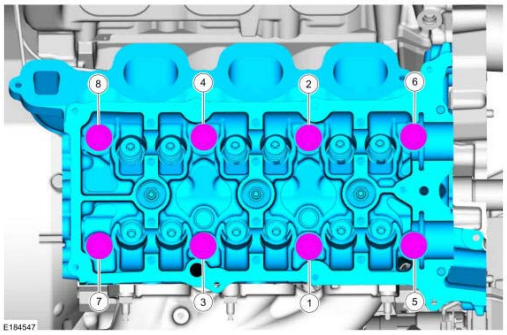
Stage 1: 177 lb.in (20 Nm)

Stage 2: 26 lb.ft (35 Nm)

Stage 3: 90°

Stage 4: 90°

Stage 5: 45°

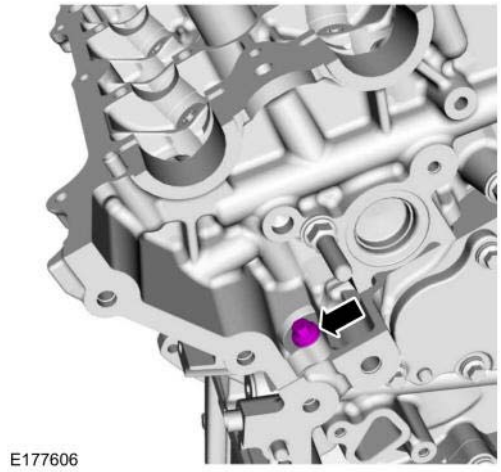


3.

Install the new M6 bolt.

Torque

: 89 lb.in (10 Nm)

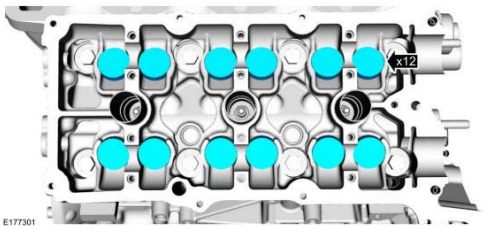


NOTE: The valve tappets must be installed in their original positions.

4.
Lubricate the valve tappets with clean engine oil and install.

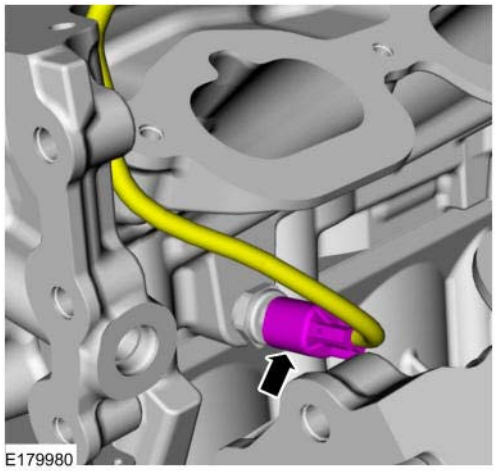
Material

: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W20-QSP (U.S.) (WSS-M2C945-A)



5.

Connect the CHT sensor electrical connector.

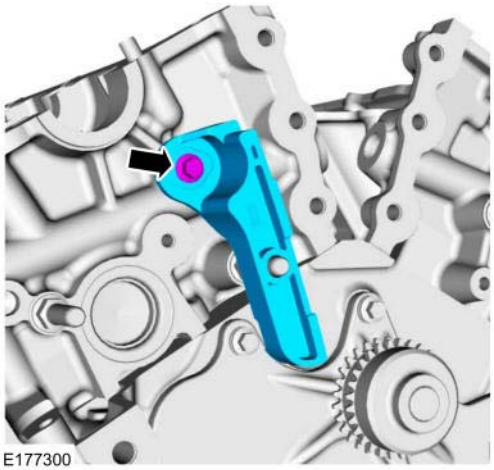


NOTE: Do not use power tools to remove the bolt or damage to the upper RH timing chain guide may occur.

6.
Install the RH timing chain guide and the bolt.

Torque

: 89 lb.in (10 Nm)



NOTE: Lubricate the O-ring seals with clean engine oil.

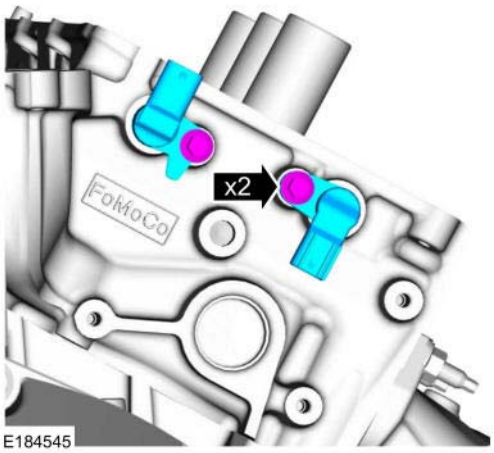
7.
Install the CMP sensors and the bolts.

Material

: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W20-QSP (U.S.) (WSS-M2C945-A)

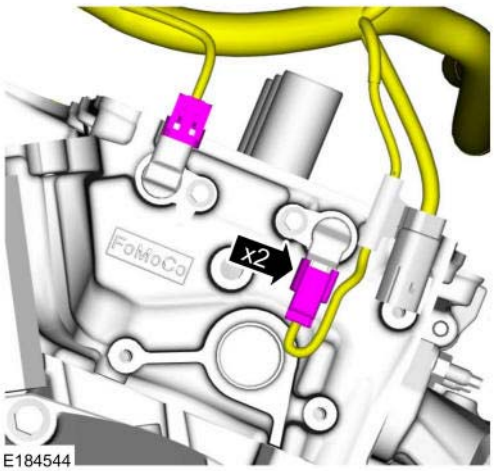
Torque

: 89 lb.in (10 Nm)



8.

Connect the RH CMP sensor electrical connectors.



9.

Install the lower intake manifold. Refer to: Lower Intake Manifold .

10.

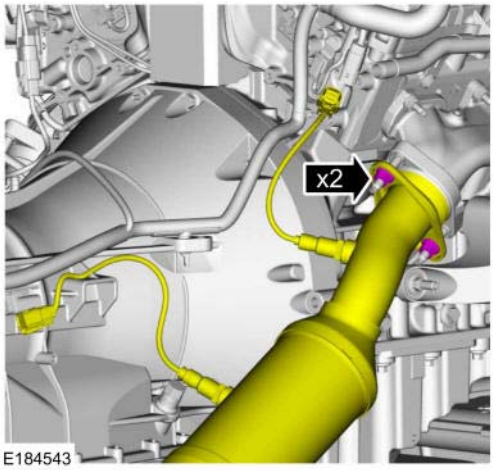
Install the RH camshafts. Refer to: Camshafts .

11.

Position the RH catalytic converter and install new flange nuts.

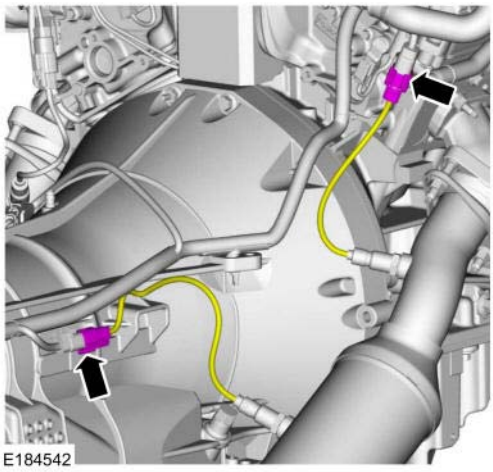
Torque

: 30 lb.ft (40 Nm)



12.

Connect the RH HO2S and catalyst monitor sensor electrical connectors.



13.

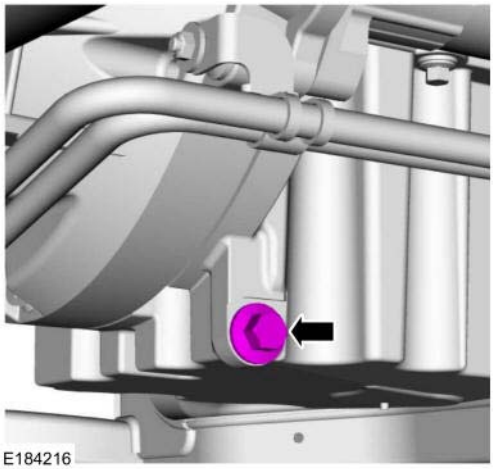
Remove the oil pan drain plug and drain the engine oil.

Use the General Equipment: Oil Drain Equipment

Install the oil pan drain plug.

Torque

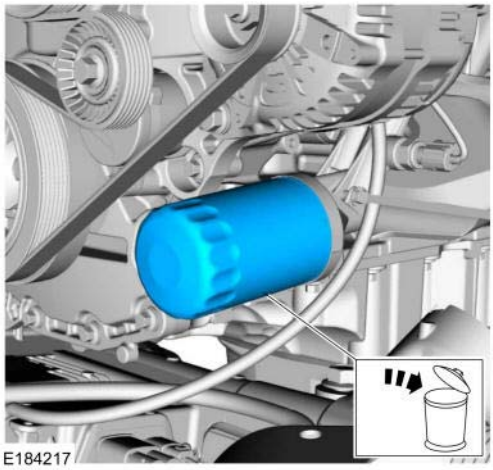
: 20 lb.ft (27 Nm)



14.

Remove and discard the engine oil filter.

Use the General Equipment: Oil Drain Equipment



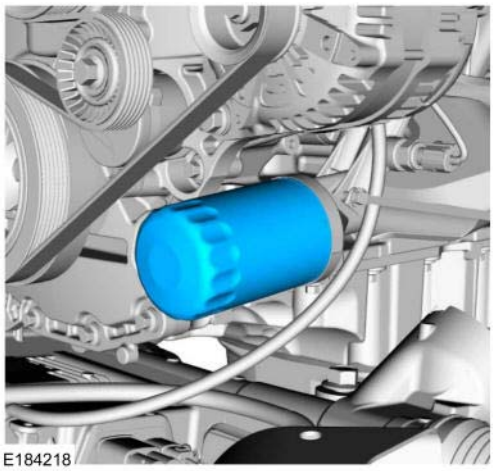
NOTE: Do not lubricate the engine oil filter seal.

15.
Install a new engine oil filter.

Torque:

Stage 1: 44 lb.in (5 Nm)

Stage 2: 180°

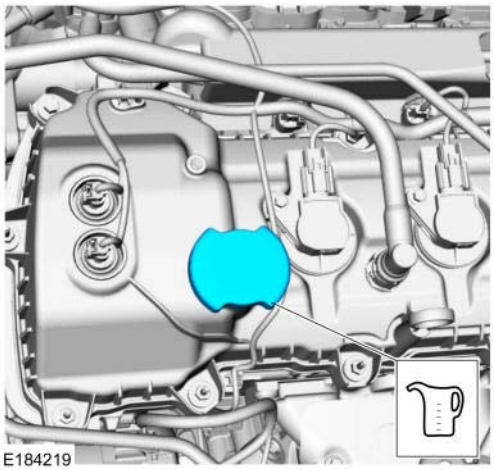


16.

Fill the engine with clean engine oil. Refer to: Specifications .

Material

: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W20-QSP (U.S.) (WSS-M2C945-A)



17.

Connect the battery ground. Refer to: Battery Disconnect and Connect .

18.

Start and check the exhaust system for leaks.

REMOVAL AND INSTALLATION > ENGINE FRONT COVER

Special Tool(s) / General Equipment

	205-150 (T80T-4000-S) Installer, Spindle Bearing
	205-153 (T80T-4000-W) Handle
	307-399 Alignment Pins, Transmission Fluid Pump TKIT-2000AP-FLM/LM TKIT-2002N-DEW
Plastic Scraper	
Oil Drain Equipment	

Materials

Name	Specification
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) XO-5W20-QSP (U.S.)	WSS-M2C945-A
Motorcraft® High Performance Engine RTV Silicone TA-357	WSE-M4G323-A6
Motorcraft® Silicone Gasket Remover ZC-30-A	-
Motorcraft® Metal Surface Prep ZC-31-B	-
Metal Brake Parts Cleaner (U.S.) PM-4-A, PM-4-B (U.S.)	-

REMOVAL AND INSTALLATION > ENGINE FRONT COVER > REMOVAL

NOTE: During engine repair procedures, cleanliness is extremely important. Any foreign material, including any material created while cleaning gasket surfaces that enters the oil passages, coolant passages or the oil pan, can cause engine failure.

1.

With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

NOTE: Vehicles are equipped with either an underbody shield or a subframe

bracket and underbody shield assembly.

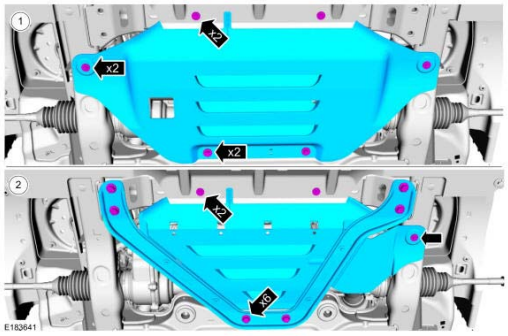
2.

1.

Remove the bolts and the underbody shield.

2.

Remove the bolts and the subframe bracket and underbody shield assembly.



3.

Drain the cooling system. Refer to: COOLING SYSTEM DRAINING AND VACUUM FILLING .

4.

Remove the following items:

Refer to: Valve Cover LH .

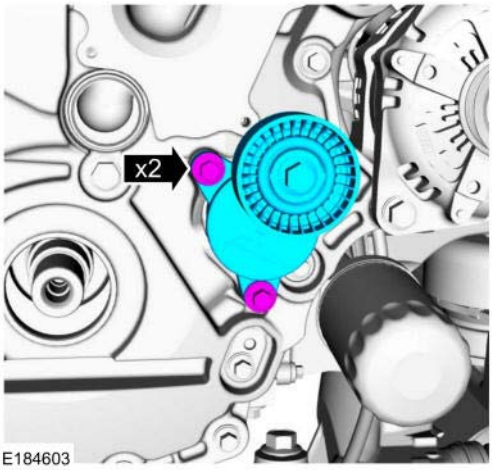
Refer to: Valve Cover RH .

Refer to: Crankshaft Front Seal .

Refer to: COOLANT PUMP .

5.

Remove the bolts and the accessory drive belt tensioner.



6.

1.

Remove the nut.

2.

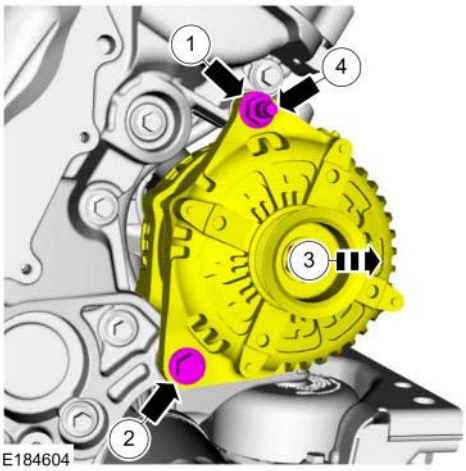
Remove the bolt.

3.

Position the generator aside.

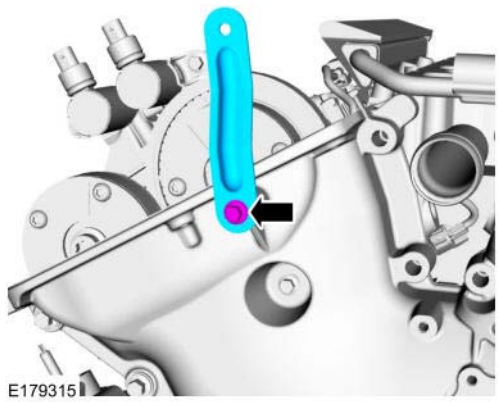
4.

Remove the stud bolt.



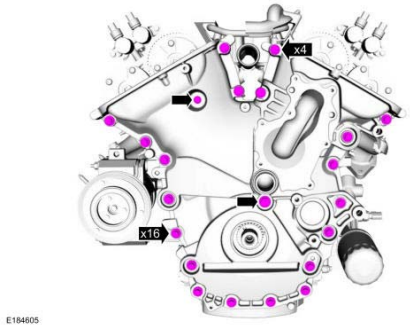
7.

Remove the bolt and the upper intake manifold support bracket.



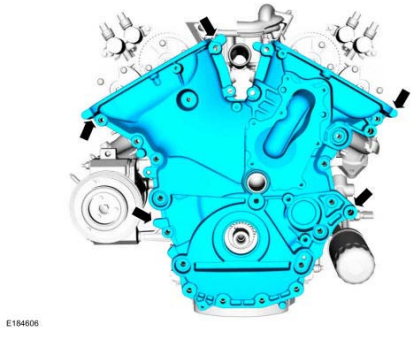
8.

Remove the engine front cover bolts.



9.

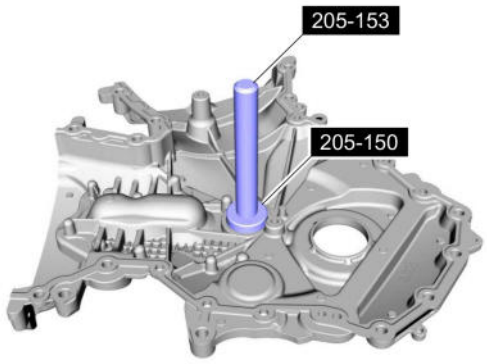
Using a pry tool, locate the pry pads shown in illustration and pry the engine front cover loose and remove.



10.

Using the special tools, remove the engine front cover to coolant pipe seal.

Use Special Service Tool: 205-150 (T80T-4000-S) Installer, Spindle Bearing, 205-153 (T80T-4000-W) Handle.



E177279

NOTE: Only use a 3M™ Roloc® Bristle Disk (2-in white, part number 07528) to clean the engine front cover. Do not use metal scrapers, wire brushes or any other power abrasive disk to clean front cover.

11.

Clean the engine front cover using a 3M™ Roloc® Bristle Disk (2-in white, part number 07528) in a suitable tool turning at the recommended speed of 15, 000 rpm. Refer to: RTV Sealing Surface Cleaning and Preparation .

Thoroughly wash the engine front cover to remove any foreign material, including any abrasive particles created during the cleaning process.

Material

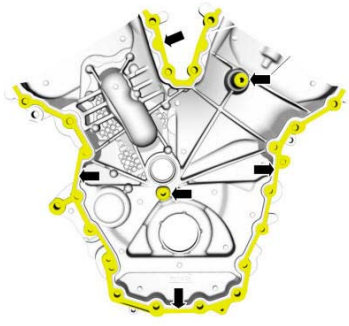
: Motorcraft® Silicone Gasket Remover / ZC-30-A

Material

: Metal Brake Parts Cleaner (U.S.) / PM-4-A, PM-4-B (U.S.)

Material

: Motorcraft® Metal Surface Prep / ZC-31-B



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NOTE: Place clean, lint-free shop towels over exposed engine cavities. Carefully

remove the towels so foreign material is not dropped into the engine. Any foreign material (including any material created while cleaning gasket surfaces) that enters the oil passages or the oil pan, may cause engine failure.

NOTE: Do not use wire brushes, power abrasive discs or 3M™ Roloc® Bristle Disk (2-in white part number 07528) to clean the sealing surfaces. These tools cause scratches and gouges that make leak paths. They also cause contamination that will cause premature engine failure. Remove all traces of the gasket.

12.
Make sure that the mating faces of the engine block and oil pan are clean and free of foreign material. Refer to: RTV Sealing Surface Cleaning and Preparation .

Material

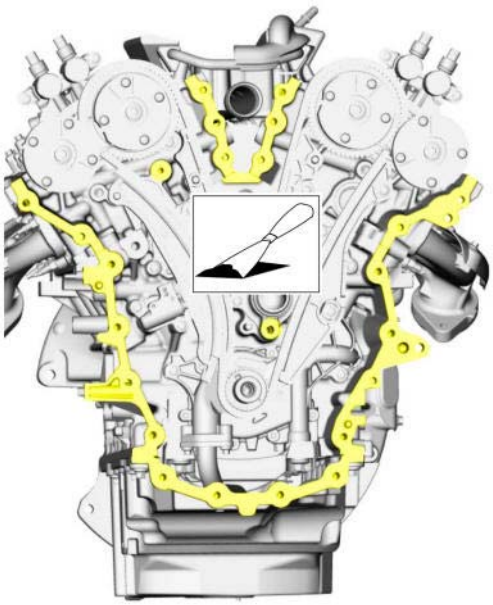
: Motorcraft® Silicone Gasket Remover / ZC-30-A

Material

: Metal Brake Parts Cleaner (U.S.) / PM-4-A, PM-4-B (U.S.)

Material

: Motorcraft® Metal Surface Prep / ZC-31-B



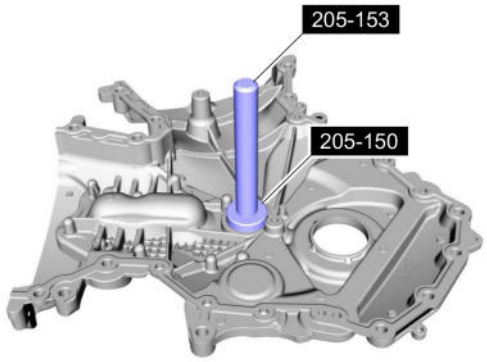
E183887

REMOVAL AND INSTALLATION > ENGINE FRONT COVER > INSTALLATION

1.

Using the special tools, install the engine front cover to coolant pipe seal.

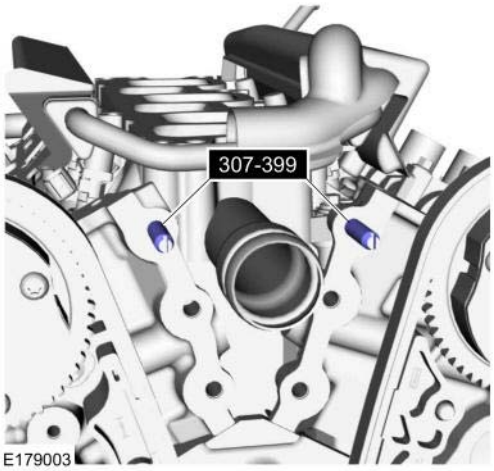
Use Special Service Tool: 205-150 (T80T-4000-S) Installer, Spindle Bearing, 205-153 (T80T-4000-W) Handle.



E177279

2.

Install Special Service Tool: 307-399 Alignment Pins, Transmission Fluid Pump.



E179003

3.

NOTE: Failure to use Motorcraft® High Performance Engine RTV Silicone may cause the engine oil to foam excessively and result in serious engine damage.

NOTE: The engine front cover and the bolts must be installed within 4 minutes of the initial sealant application. The remainder of the engine front cover bolts must be installed and tightened within 35 minutes of the initial sealant application. If the time limits are exceeded, the sealant must be removed, the sealing area cleaned and sealant reapplied. Failure to follow this procedure can cause future oil leakage.

Apply a 3.0 mm (0.11 in) bead of Motorcraft® High Performance Engine RTV Silicone to the engine front cover sealing surfaces including the inner bolt bosses.

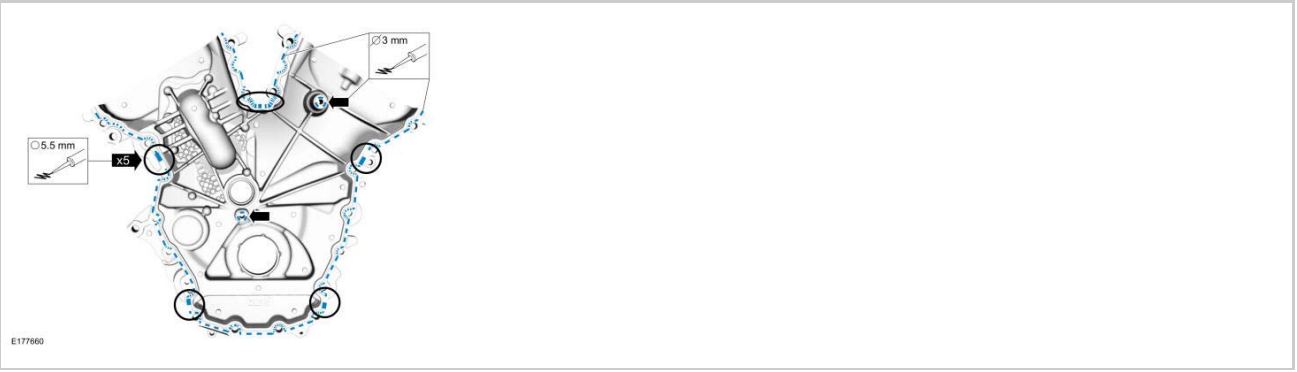
Material

: Motorcraft® High Performance Engine RTV Silicone / TA-357 (WSE-M4G323-A6)

Apply a 5.5 mm (0.21 in) bead of Motorcraft® High Performance Engine RTV Silicone to the oil pan-to-cylinder block joint and the cylinder head-to-cylinder block joint areas of the engine front cover in places as indicated.

Material

: Motorcraft® High Performance Engine RTV Silicone / TA-357 (WSE-M4G323-A6)

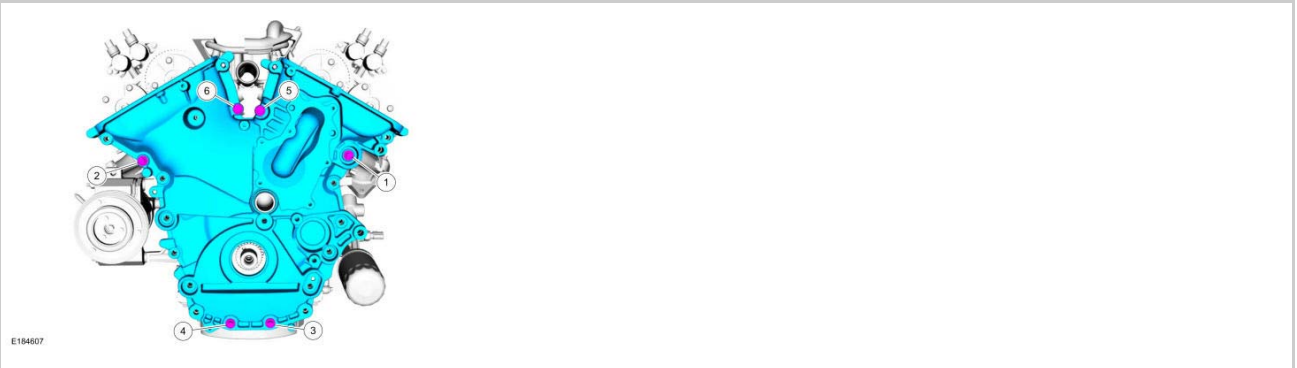


NOTE: Make sure the 2 locating dowel pins are seated correctly in the cylinder block.

4.
Install the engine front cover and the bolts.

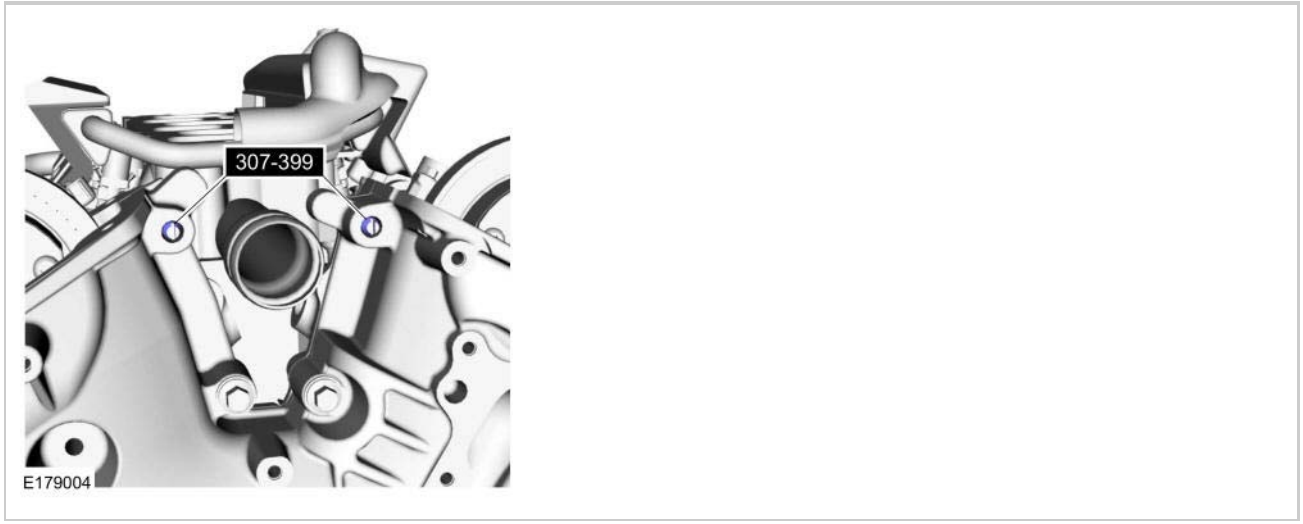
Torque

: 27 lb.in (3 Nm)



5.

Remove Special Service Tool: 307-399 Alignment Pins, Transmission Fluid Pump.



6.

Install the remaining engine front cover bolts.

Torque:

Stage 1: Tighten bolts 1 thru 21 to: 89 lb.in (10 Nm)

Stage 2: Tighten bolts 1 thru 20 to: 18 lb.ft (24 Nm)

Stage 3: Tighten bolt 21 to: 177 lb.in (20 Nm)

Stage 4: Tighten bolt 21 an additional: 90°

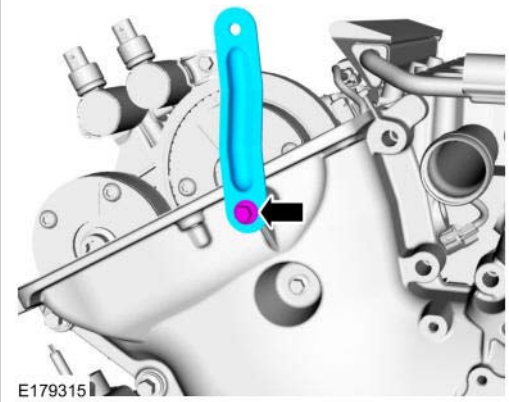
Stage 5: Tighten bolt 22 to: 89 lb.in (10 Nm)

Stage 6: Tighten bolt 22 an additional: 45°



7.

Install the upper intake manifold support bracket and the bolt finger-tight.



8.

1.

Install the stud bolt.

Torque

: 71 lb.in (8 Nm)

2.

Install the generator.

3.

Install the bolt.

Torque

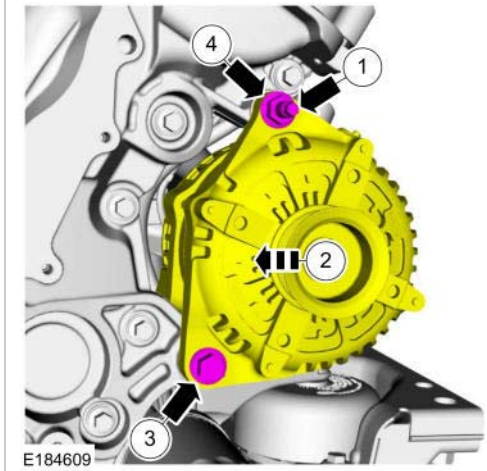
: 35 lb.ft (47 Nm)

4.

Install the nut.

Torque

: 35 lb.ft (47 Nm)

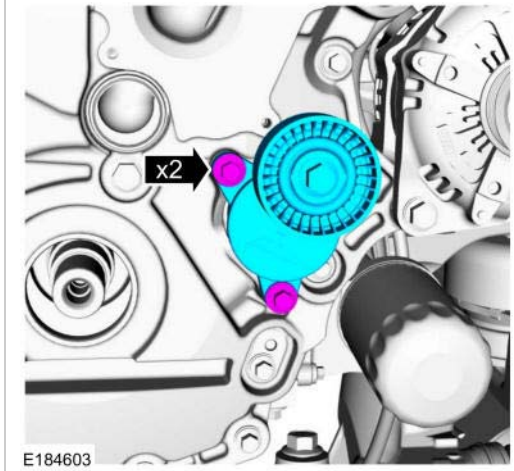


9.

Install the accessory drive belt tensioner and the bolts.

Torque

: 97 lb.in (11 Nm)



10.

Install the following items:

Refer to: COOLANT PUMP .

Refer to: Crankshaft Front Seal .

Refer to: Valve Cover RH .

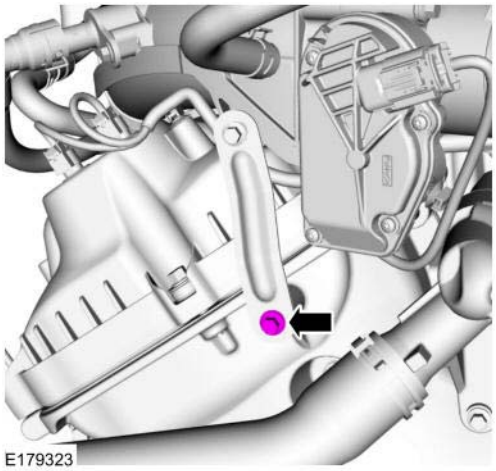
Refer to: Valve Cover LH .

11.

Tighten the bolt for the upper intake manifold support bracket.

Torque

: 89 lb.in (10 Nm)



12.

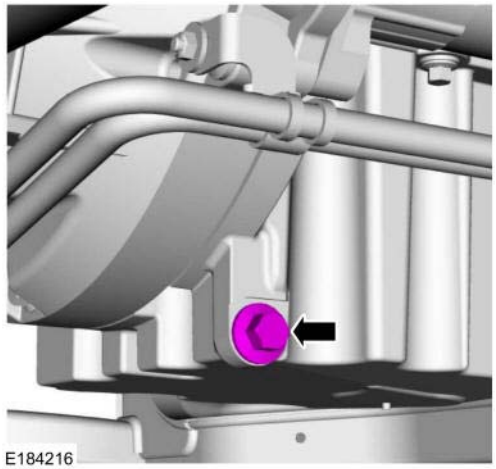
Remove the oil pan drain plug and drain the engine oil.

Use the General Equipment: Oil Drain Equipment

Install the oil pan drain plug.

Torque

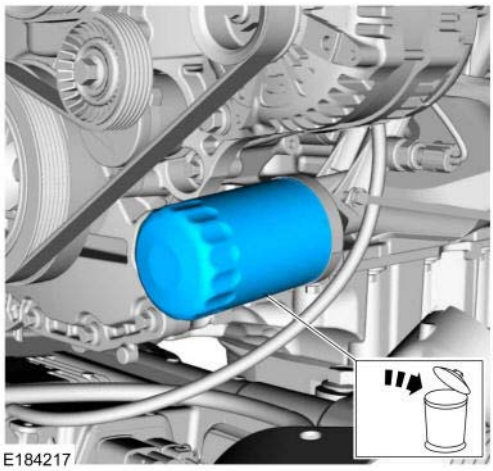
: 20 lb.ft (27 Nm)



13.

Remove and discard the engine oil filter.

Use the General Equipment: Oil Drain Equipment



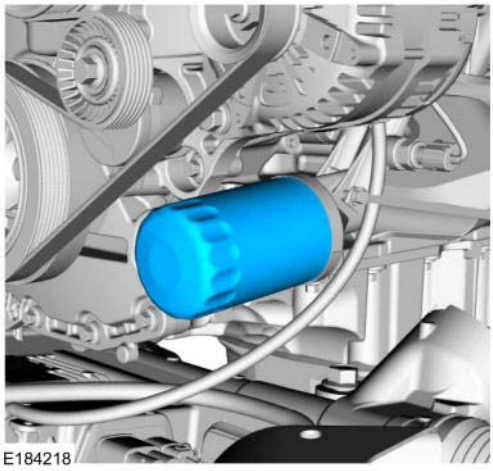
NOTE: Do not lubricate the engine oil filter seal.

14.
Install a new engine oil filter.

Torque:

Stage 1: 44 lb.in (5 Nm)

Stage 2: 180°



15.

1.

Install the underbody shield and the bolts.

Torque:

A: 97 lb.in (11 Nm)

B: 18 lb.in (2 Nm)

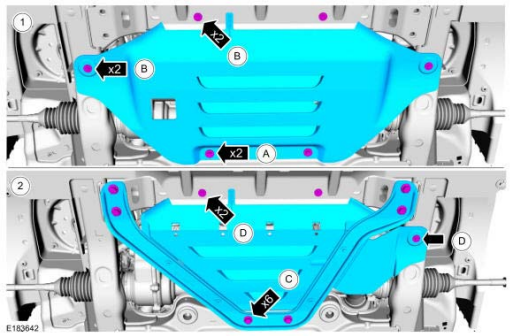
2.

Install the subframe bracket and underbody shield assembly and the bolts.

Torque:

C: 46 lb.ft (63 Nm)

D: 18 lb.in (2 Nm)

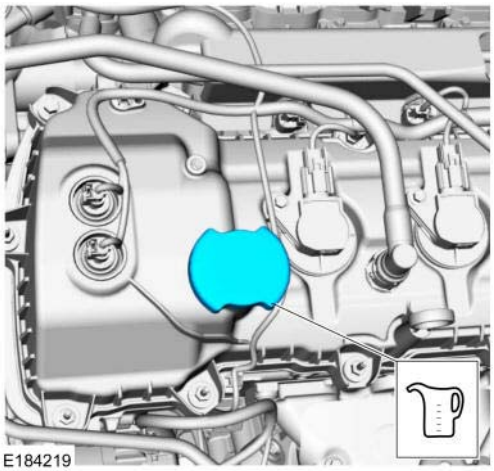


16.

Fill the engine with clean engine oil. Refer to: Specifications .

Material

: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W20-QSP (U.S.) (WSS-M2C945-A)



17.

Fill the cooling system. Refer to: COOLING SYSTEM DRAINING AND VACUUM FILLING .

18.

After completing the repairs, perform the Misfire Monitor Neutral Profile Correction procedure using a diagnostic scan tool.

REMOVAL AND INSTALLATION > ENGINE MOUNT LH

Special Tool(s) / General Equipment

	303-1245 Engine Lift Eye TKIT-2006UF-FLM TKIT-2006UF-ROW
	303-F072 Support Bar, Engine

REMOVAL AND INSTALLATION > ENGINE MOUNT LH > REMOVAL

Convertible/Coupe

1.

With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

2.

Remove the cowl panel grille. Refer to: Cowl Panel Grille .

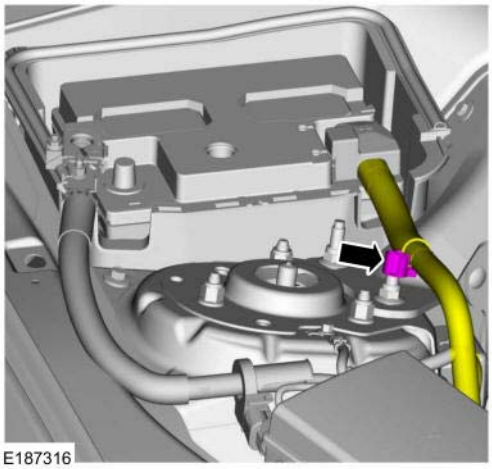
Convertible

3.

Disconnect the negative battery cable. Refer to: Battery Disconnect and Connect .

4.

Detach the battery cable retainer.



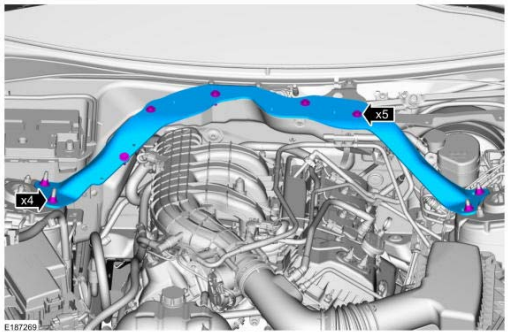
5.

Disconnect the positive battery cable. Refer to: Battery Disconnect and Connect .

6.

Remove the cowl extension nuts.

Remove the bolts and the cowl extension.



Convertible/Coupe

7.

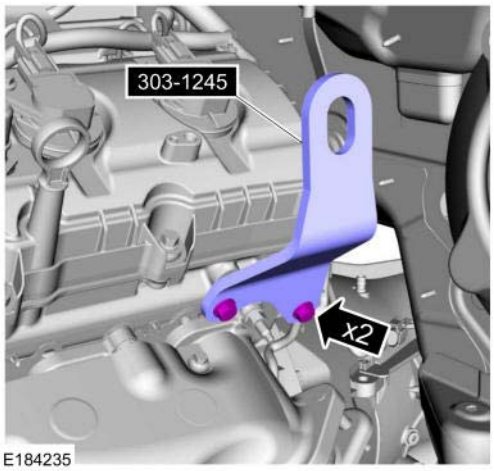
Remove the following items:

Refer to: AIR CLEANER OUTLET PIPE .

Refer to: AIR CLEANER - 3.7L Duratec (227kW/301PS).

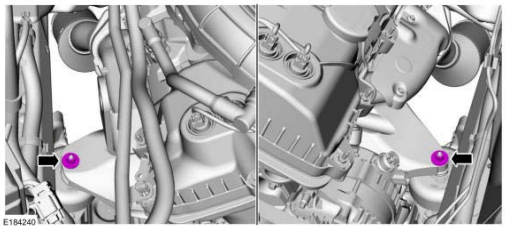
8.

Install Special Service Tool: 303-1245 Engine Lift Eye.



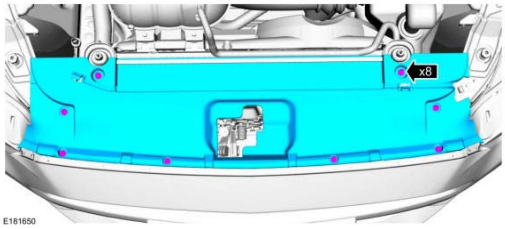
9.

Remove the RH and LH engine mount bracket nuts.



10.

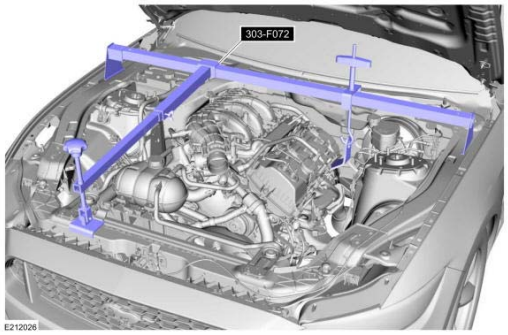
Remove the retainers and the radiator top shield.



11.

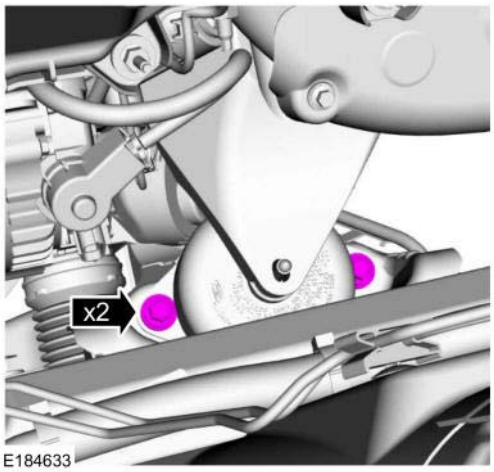
Install the special tool and raise the engine.

Install Special Service Tool: 303-F072 Support Bar, Engine.



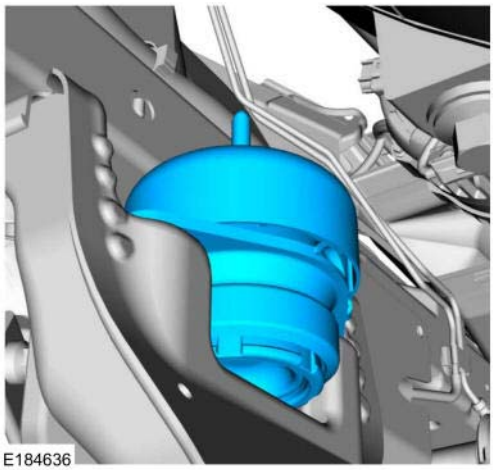
12.

Remove the bolts for the engine mount.



13.

Remove the engine mount.

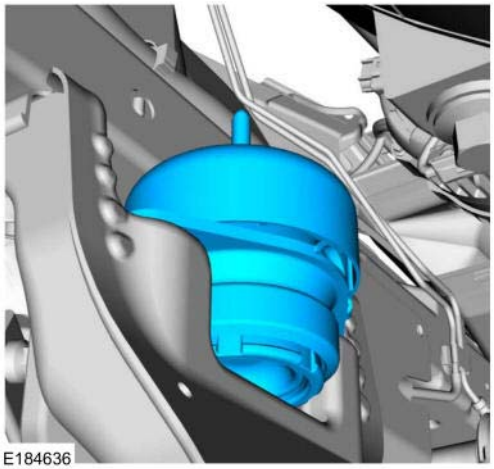


REMOVAL AND INSTALLATION > ENGINE MOUNT LH > INSTALLATION

Convertible/Coupe

NOTE: Do not install the bolts at this time.

1.
Install the engine mount.

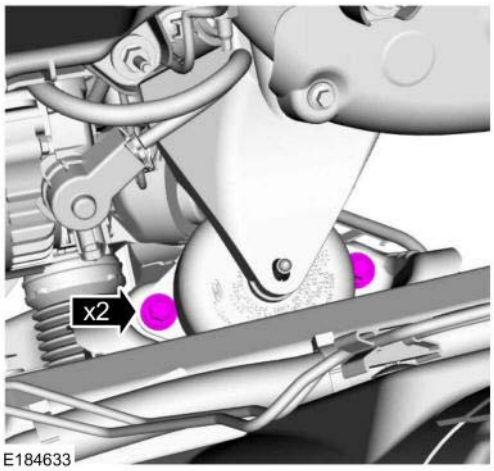


2.

Install the bolts for the engine mount.

Torque

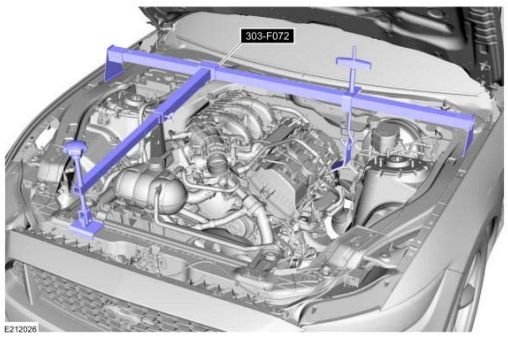
: 52 lb.ft (70 Nm)



3.

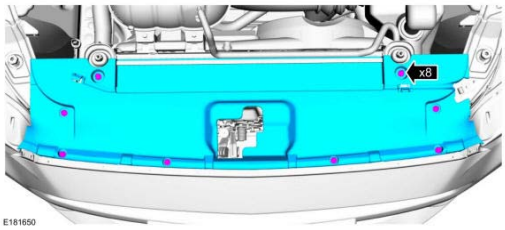
Lower the engine and remove the special tool.

Remove Special Service Tool: 303-F072 Support Bar, Engine.



4.

Install the radiator top shield and the retainers.

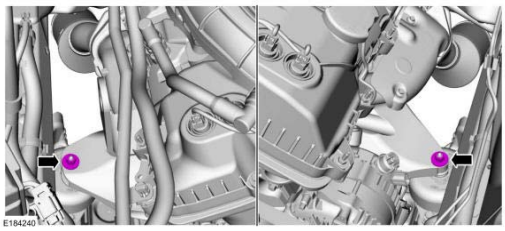


5.

Install the RH and LH engine mount nuts.

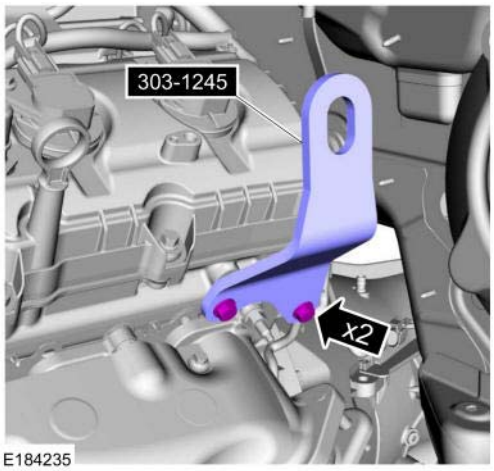
Torque

: 46 lb.ft (63 Nm)



6.

Remove Special Service Tool: 303-1245 Engine Lift Eye.



7.

Install the following items:

Refer to: AIR CLEANER - 3.7L Duratec (227kW/301PS).

Refer to: AIR CLEANER OUTLET PIPE .

Convertible

8.

Install the cowl extension and the bolts.

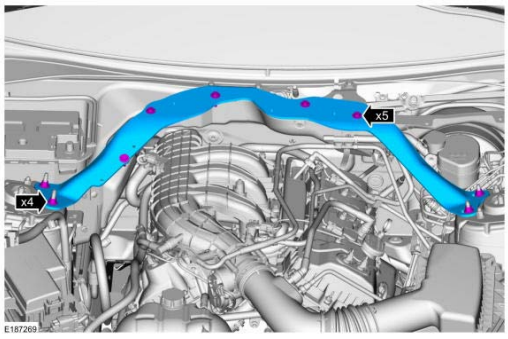
Torque

: 26 lb.ft (35 Nm)

Install the cowl extension nuts.

Torque

: 41 lb.ft (55 Nm)

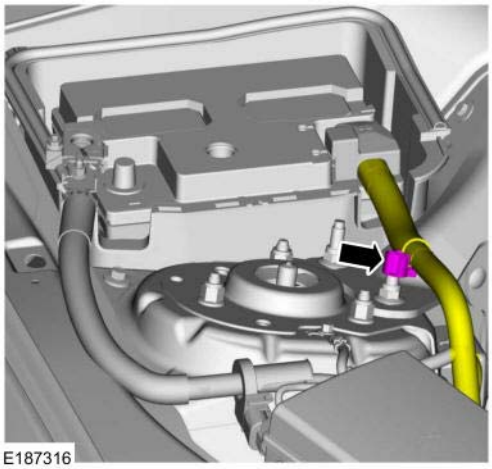


9.

Connect the positive battery cable. Refer to: Battery Disconnect and Connect .

10.

Attach the battery cable retainer.



11.

Connect the negative battery cable. Refer to: Battery Disconnect and Connect .

Convertible/Coupe

12.

Install the cowl panel grille. Refer to: Cowl Panel Grille .

REMOVAL AND INSTALLATION > ENGINE MOUNT RH

Special Tool(s) / General Equipment

	303-1529 Lift Eye, Engine TKIT-2010A-F TKIT-2010A-LM TKIT-2010A-ROW
	303-F072 Support Bar, Engine

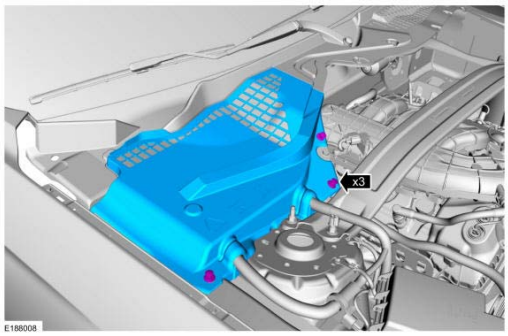
REMOVAL AND INSTALLATION > ENGINE MOUNT RH > REMOVAL

1.

With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

2.

Remove the retainers and the battery cover.



3.

Remove the following items:

Refer to: AIR CLEANER OUTLET PIPE .

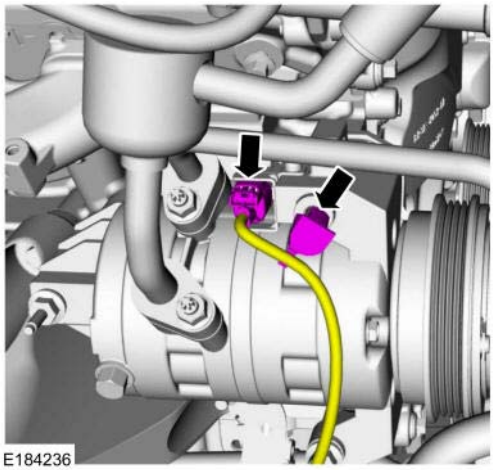
Refer to: AIR CLEANER - 3.7L Duratec (227kW/301PS).

4.

Remove the A/C compressor belt. Refer to: AIR CONDITIONING (A C) COMPRESSOR BELT .

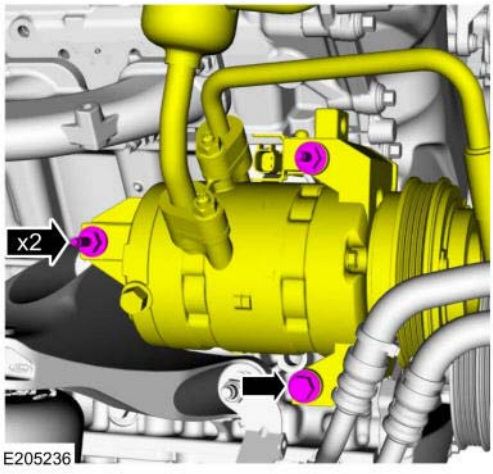
5.

Disconnect the A/C compressor electrical connector and the wire harness retainer.



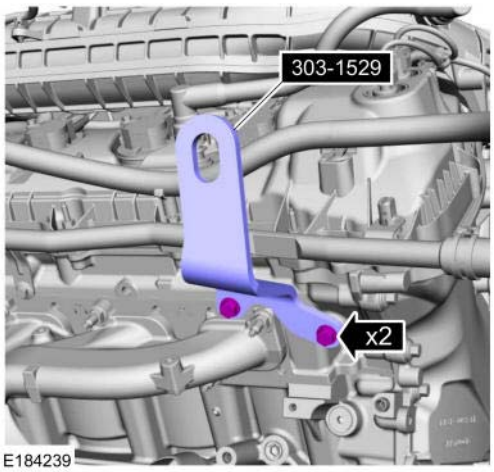
NOTE: The stud bolts and bolt will stay with the A/C compressor.

6.
Loosen the stud bolts, bolt and position the A/C compressor aside.



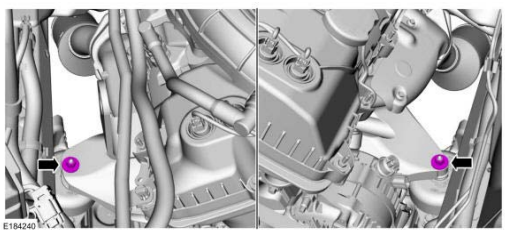
7.

Install Special Service Tool: 303-1529 Lift Eye, Engine.



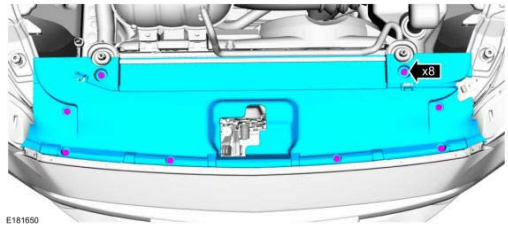
8.

Remove the RH and LH engine mount bracket nuts.



9.

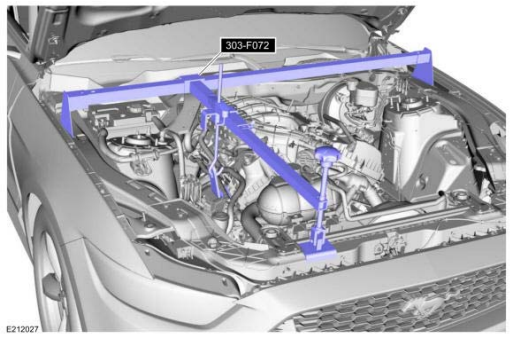
Remove the retainers and the radiator top shield.



10.

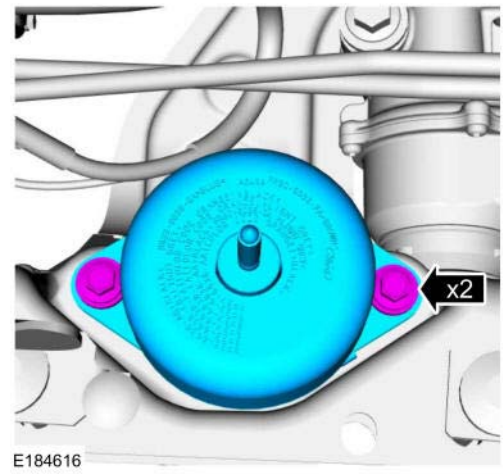
Install the special tool and raise the engine.

Install Special Service Tool: 303-F072 Support Bar, Engine.



11.

Remove the bolts and the engine mount.



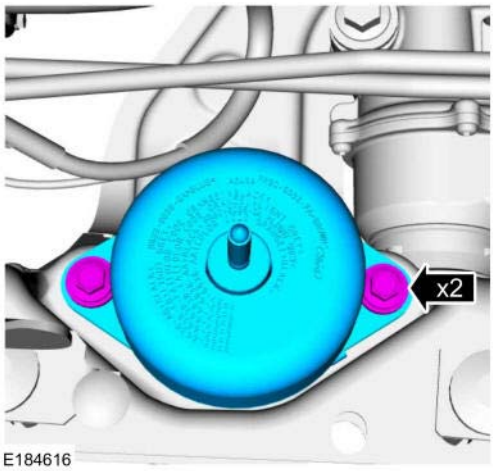
REMOVAL AND INSTALLATION > ENGINE MOUNT RH > INSTALLATION

1.

Install the engine mount and the bolts.

Torque

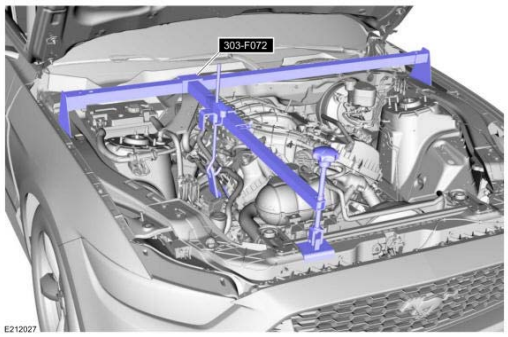
: 52 lb.ft (70 Nm)



2.

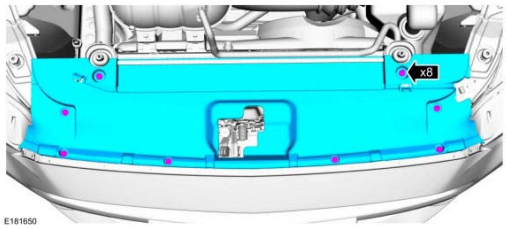
Lower the engine and remove the special tool.

Install Special Service Tool: 303-F072 Support Bar, Engine.



3.

Install the radiator top shield and the retainers.

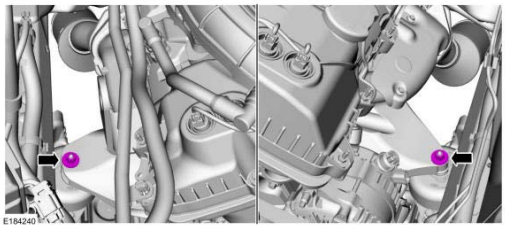


4.

Install the RH and LH engine mount nuts.

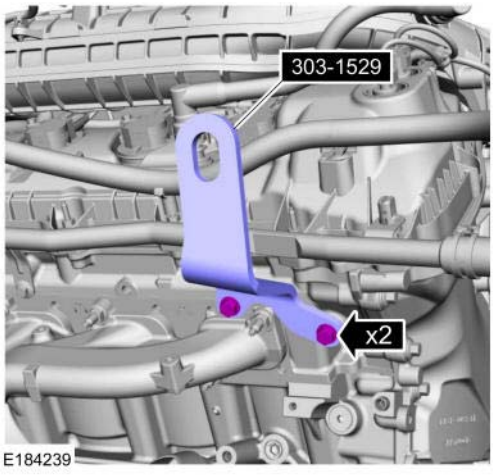
Torque

: 46 lb.ft (63 Nm)



5.

Remove Special Service Tool: 303-1529 Lift Eye, Engine.

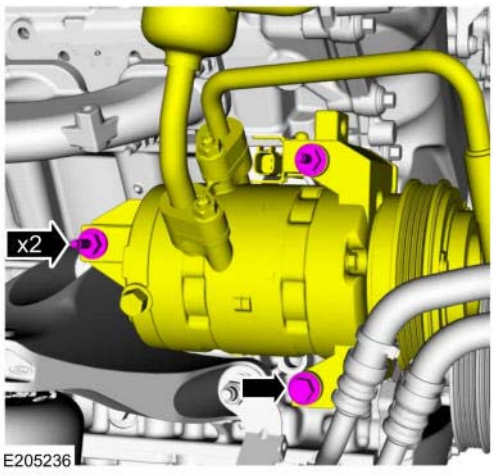


6.

Position the A/C compressor and install the stud bolts and bolt.

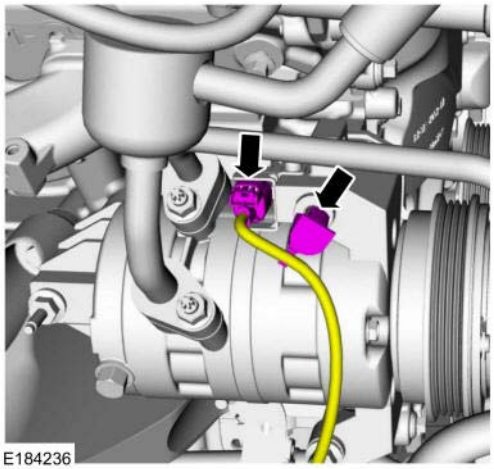
Torque

: 18 lb.ft (25 Nm)



7.

Connect the A/C compressor electrical connector and the wire harness retainer.



8.

Install the A/C compressor belt. Refer to: AIR CONDITIONING (A C) COMPRESSOR BELT .

9.

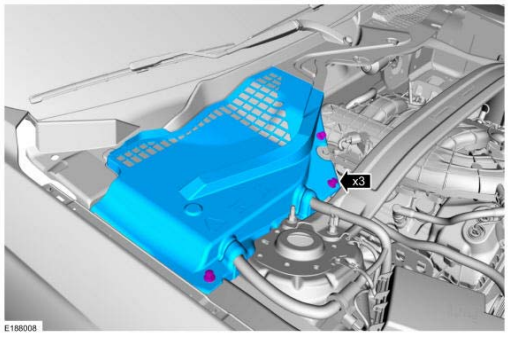
Install the following items:

Refer to: AIR CLEANER - 3.7L Duratec (227kW/301PS).

Refer to: AIR CLEANER OUTLET PIPE .

10.

Install the battery cover and the retainers.



REMOVAL AND INSTALLATION > EXHAUST MANIFOLD LH > REMOVAL

1.

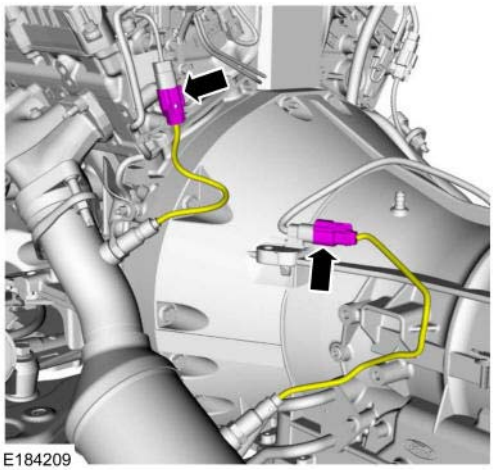
With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

2.

Remove the air cleaner. Refer to: AIR CLEANER - 3.7L Duratec (227kW/301PS).

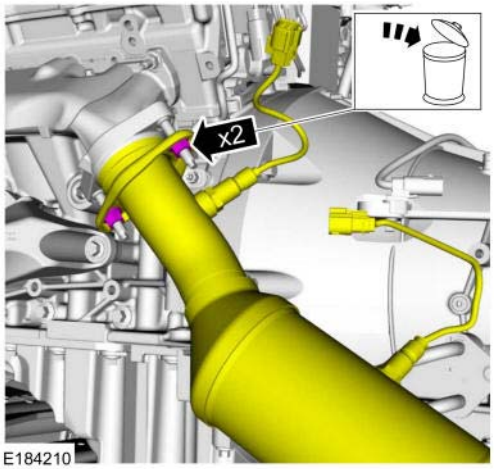
3.

Disconnect the LH HO2S and catalyst monitor sensor electrical connectors.



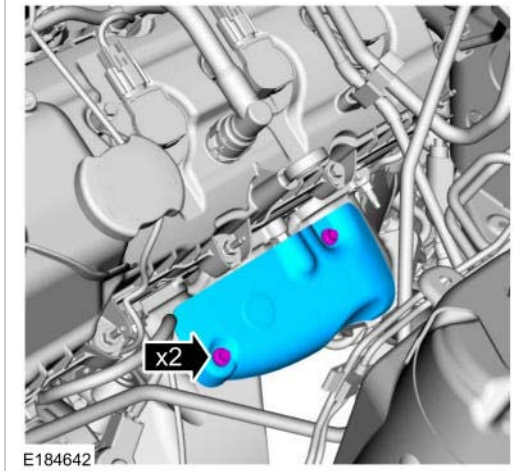
NOTE: Clean the catalytic converter-to-exhaust manifold sealing surfaces.

4.
Remove and discard the LH catalytic converter flange nuts.



5.

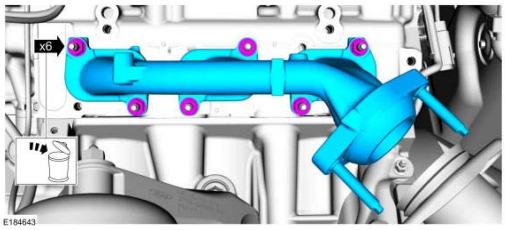
Remove the bolts and the exhaust manifold heat shield.



6.

Remove the nuts and the exhaust manifold.

Discard the nuts.



7.

Remove and discard the exhaust manifold gasket.

Remove and discard the exhaust manifold studs.



8.

Clean and inspect the exhaust manifold. Refer to: Exhaust Manifold Cleaning and Inspection .

REMOVAL AND INSTALLATION > EXHAUST MANIFOLD LH > INSTALLATION

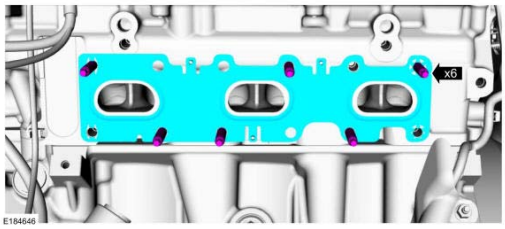
1.

Install the new exhaust manifold studs.

Torque

: 106 lb.in (12 Nm)

Install the new exhaust manifold gasket.



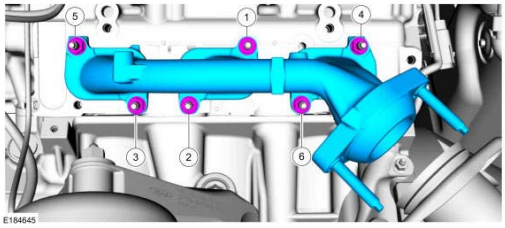
2.

Install the exhaust manifold and the new nuts.

Torque:

Stage 1: 168 lb.in (19 Nm)

Stage 2: 18 lb.ft (25 Nm)

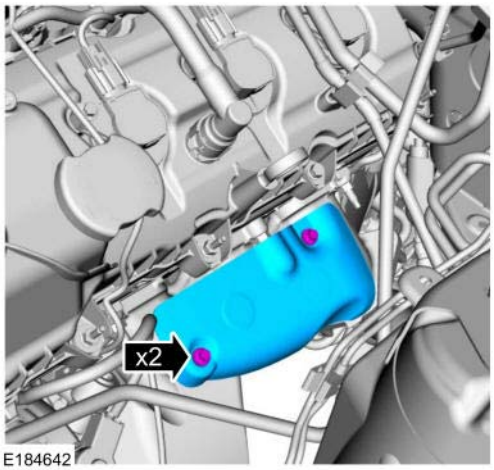


3.

Install the exhaust manifold heat shield and the bolts.

Torque

: 106 lb.in (12 Nm)

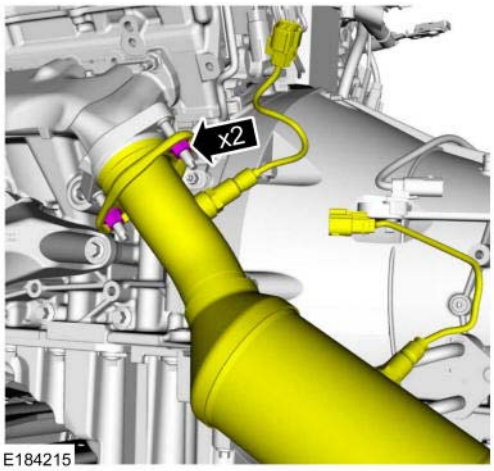


4.

Position the LH catalytic converter and install new flange nuts.

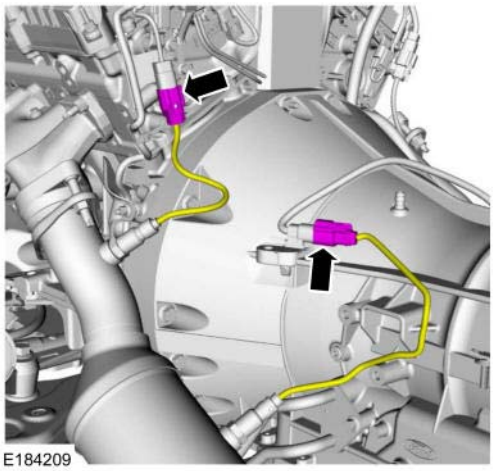
Torque

: 30 lb.ft (40 Nm)



5.

Connect the LH HO2S and catalyst monitor sensor electrical connectors.



6.

Install the air cleaner. Refer to: AIR CLEANER - 3.7L Duratec (227kW/301PS).

7.

Start and check the exhaust system for leaks.

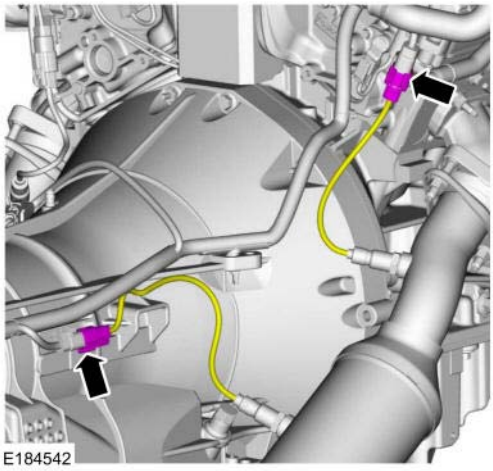
REMOVAL AND INSTALLATION > EXHAUST MANIFOLD RH > REMOVAL

1.

With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

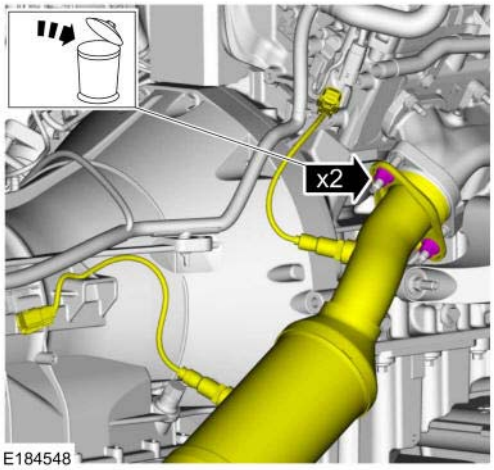
2.

Disconnect the RH HO2S and catalyst monitor sensor electrical connectors.



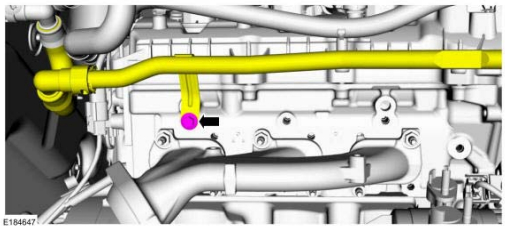
NOTE: Clean the catalytic converter-to-exhaust manifold sealing surfaces.

3.
Remove and discard the RH catalytic converter flange nuts.



4.

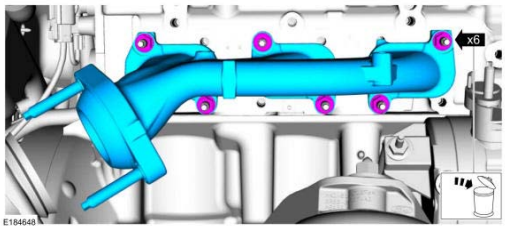
Remove the coolant tube bolt from the cylinder head.



5.

Remove the nuts and the exhaust manifold.

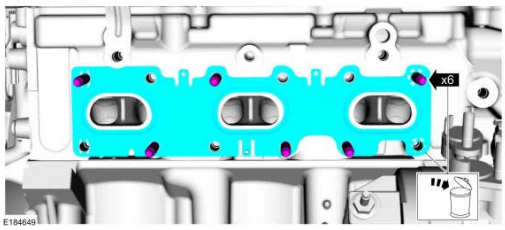
Discard the nuts.



6.

Remove and discard the exhaust manifold gasket.

Remove and discard the exhaust manifold studs.



7.

Clean and inspect the exhaust manifold. Refer to: Exhaust Manifold Cleaning and Inspection .

REMOVAL AND INSTALLATION > EXHAUST MANIFOLD RH > INSTALLATION

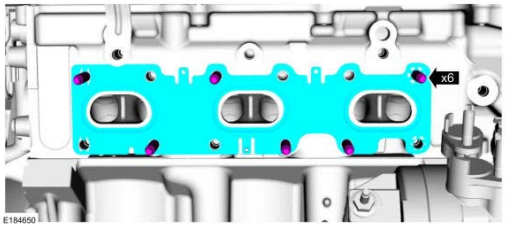
1.

Install the new exhaust manifold studs.

Torque

: 106 lb.in (12 Nm)

Install the new exhaust manifold gasket.



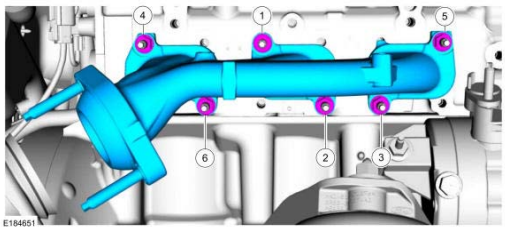
2.

Install the exhaust manifold and the new nuts.

Torque:

Stage 1: 68 lb.in (19 Nm)

Stage 2: 18 lb.ft (25 Nm)

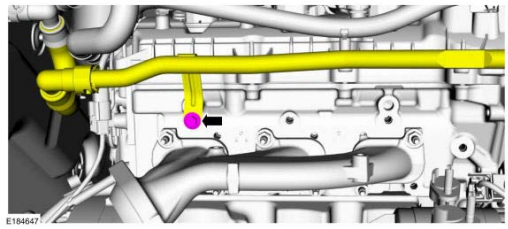


3.

Install the coolant tube bolt.

Torque

: 17 lb.ft (23 Nm)

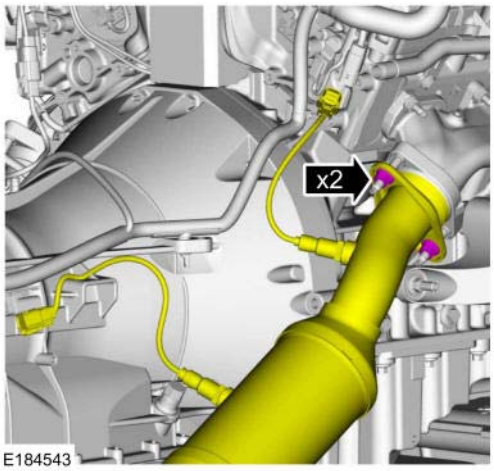


4.

Position the RH catalytic converter and install new flange nuts.

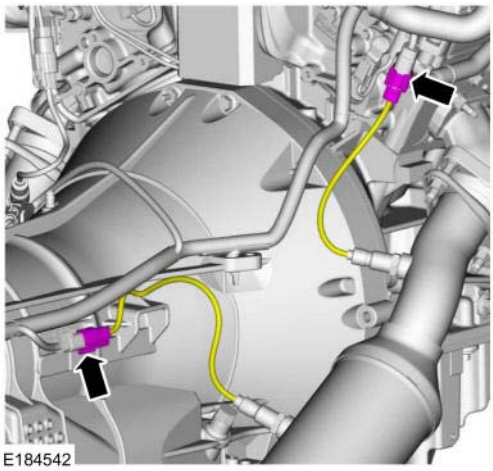
Torque

: 30 lb.ft (40 Nm)



5.

Connect the RH HO2S and catalyst monitor sensor electrical connectors.



6.

Start and check the exhaust system for leaks.

REMOVAL AND INSTALLATION > FLEXPLATE > REMOVAL

1.

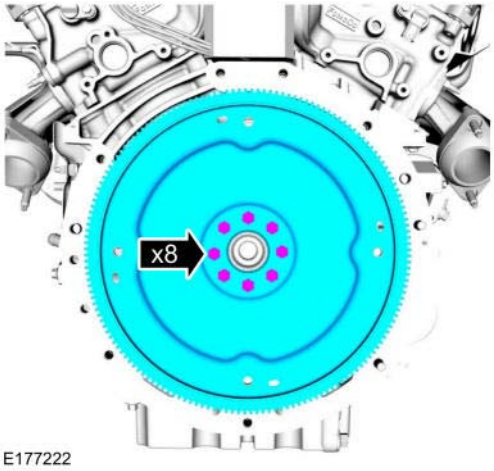
With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

2.

Remove the automatic transmission. Refer to: Transmission - 3.7L Duratec (227kW/301PS) .

3.

Remove the bolts and the flexplate.



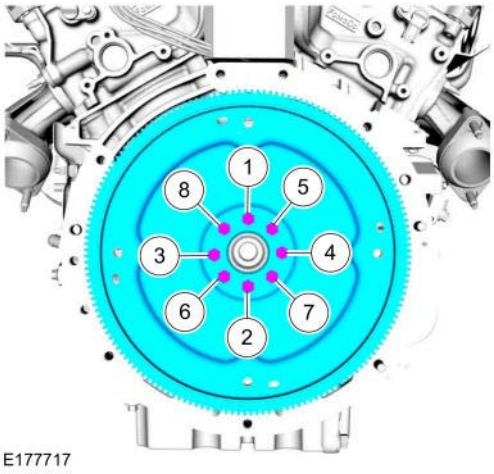
REMOVAL AND INSTALLATION > FLEXPLATE > INSTALLATION

NOTE: One of the flexplate holes are offset so the flexplate can only be installed in one position.

1.
Install the flexplate and the bolts and tighten in sequence shown in illustration.

Torque

: 59 lb.ft (80 Nm)



2.

Install the automatic transmission. Refer to: Transmission - 3.7L Duratec (227kW/301PS) .

3.

After completing the repairs, perform the Misfire Monitor Neutral Profile Correction procedure using a diagnostic scan tool.

REMOVAL AND INSTALLATION > FLYWHEEL > REMOVAL

1.

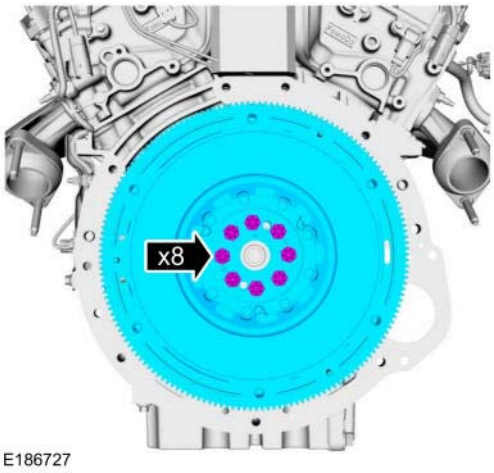
With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

2.

Remove the clutch. Refer to: Clutch Disc and Pressure Plate - 3.7L Duratec (227kW/301PS) .

3.

Remove the bolts and the flywheel.



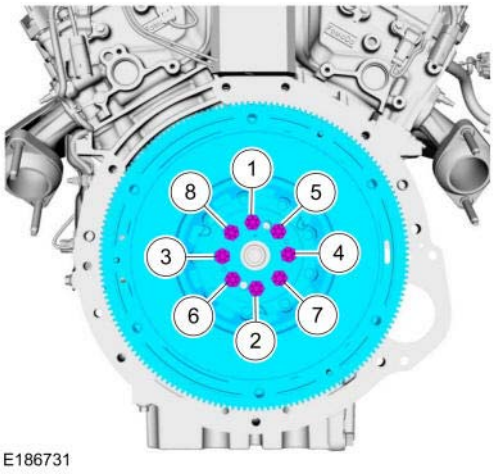
REMOVAL AND INSTALLATION > FLYWHEEL > INSTALLATION

NOTE: One of the 8 flywheel holes are offset so the flywheel can only be installed in one position.

1.
Install the flywheel and the bolts.

Torque

: 59 lb.ft (80 Nm)



2.

Install the clutch. Refer to: Clutch Disc and Pressure Plate - 3.7L Duratec (227kW/301PS) .

3.

After completing the repairs, perform the Misfire Monitor Neutral Profile Correction procedure using a diagnostic scan tool.

REMOVAL AND INSTALLATION > FRONT COVER TO COOLANT PIPE SEAL

Special Tool(s) / General Equipment

	303-1528 Remover/Installer, Water Tube Seal

REMOVAL AND INSTALLATION > FRONT COVER TO COOLANT PIPE SEAL > REMOVAL

NOTE: During engine repair procedures, cleanliness is extremely important. Any foreign material, including any material created while cleaning gasket surfaces that enters the oil passages, coolant passages or the oil pan, may cause engine failure.

1.

Remove the coolant pump. Refer to: COOLANT PUMP .

2.

Using the special tool, remove the front cover to coolant pipe seal.

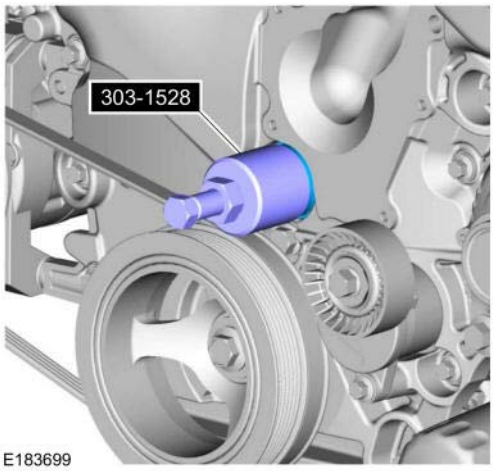
Reset the special tool center bolt to its retracted position.

Use Special Service Tool: 303-1528 Remover/Installer, Water Tube Seal.

Screw the special tool onto the front cover to coolant pipe seal until it bottoms out.

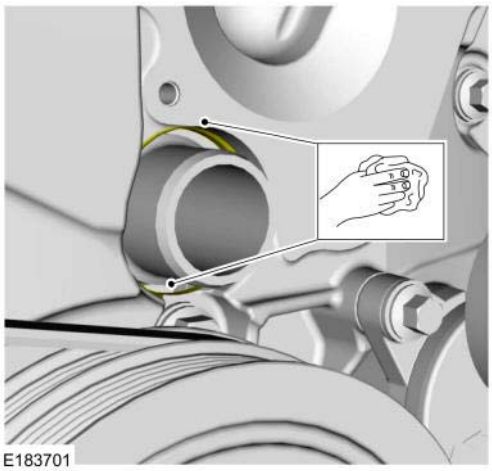
Using a brass hammer, give the special tool a slight tap inward to break front cover radial seal lose.

Turn the special tool center bolt clockwise and remove the front cover to coolant pipe seal.



3.

Clean the engine front cover to coolant pipe seal area.



REMOVAL AND INSTALLATION > FRONT COVER TO COOLANT PIPE SEAL > INSTALLATION

1.

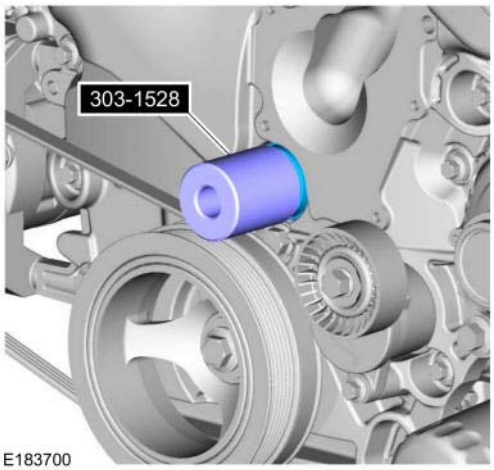
Using the special tool, install the front cover to coolant pipe seal.

Position the front cover to coolant pipe seal on the special tool.

Use Special Service Tool: 303-1528 Remover/Installer, Water Tube Seal.

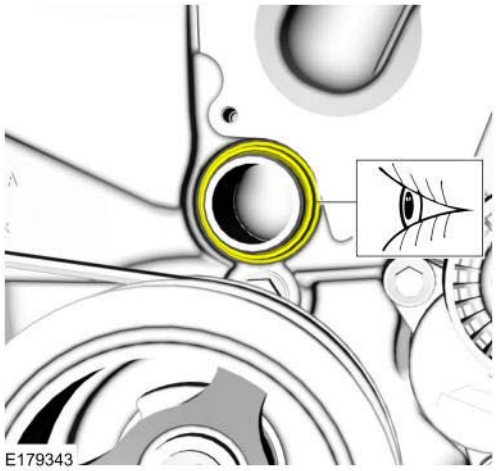
Position the special tool into the engine front cover.

Using a brass hammer, tap the special tool until the front cover to coolant pipe seal bottoms out.



2.

Inspect the front cover to coolant pipe seal for proper installation or damage.



3.

Install the coolant pump. Refer to: COOLANT PUMP .

REMOVAL AND INSTALLATION > LOWER INTAKE MANIFOLD > REMOVAL

NOTE: During engine repair procedures, cleanliness is extremely important. Any foreign material, including any material created while cleaning gasket surfaces that enters the oil passages, coolant passages or the oil pan, can cause engine failure.

NOTE: It is not necessary to remove the fuel rail from the intake manifold assembly.

1.

With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

2.

Release the fuel system pressure. Refer to: FUEL SYSTEM PRESSURE RELEASE .

3.

Disconnect the battery ground cable. Refer to: Battery Disconnect and Connect .

4.

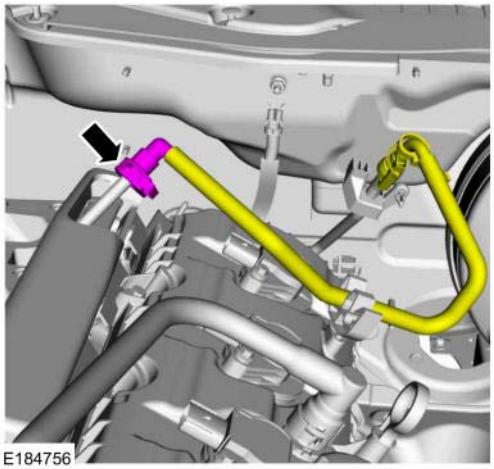
Drain the cooling system. Refer to: COOLING SYSTEM DRAINING AND VACUUM FILLING .

5.

Remove the upper intake manifold. Refer to: Upper Intake Manifold .

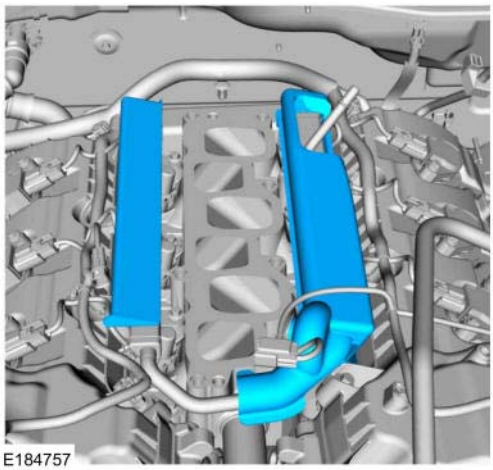
6.

Disconnect the fuel tube quick release coupling. Refer to: QUICK RELEASE COUPLING .



7.

Remove the fuel rail sound insulators.

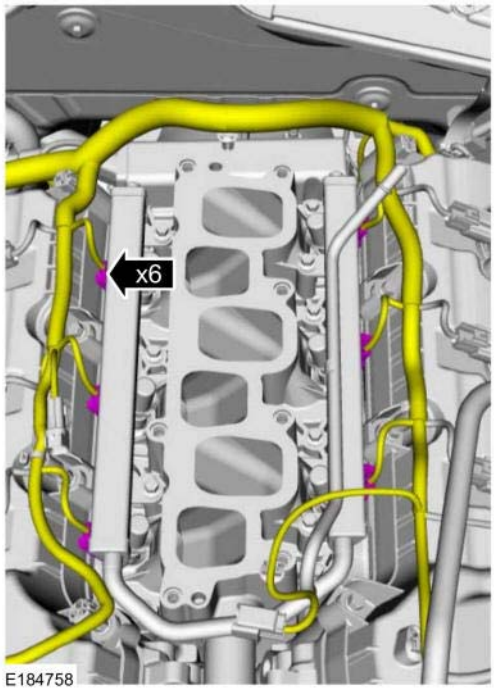


8.

Remove the thermostat housing. Refer to: THERMOSTAT HOUSING .

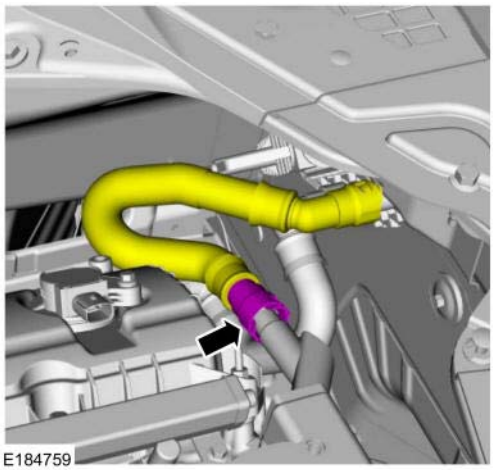
9.

Disconnect the fuel injector electrical connectors.



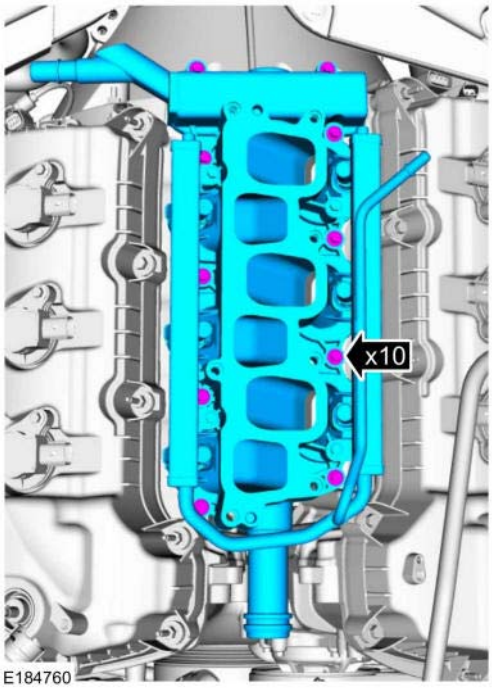
10.

Disconnect the coolant tube from the back of the lower intake manifold.



11.

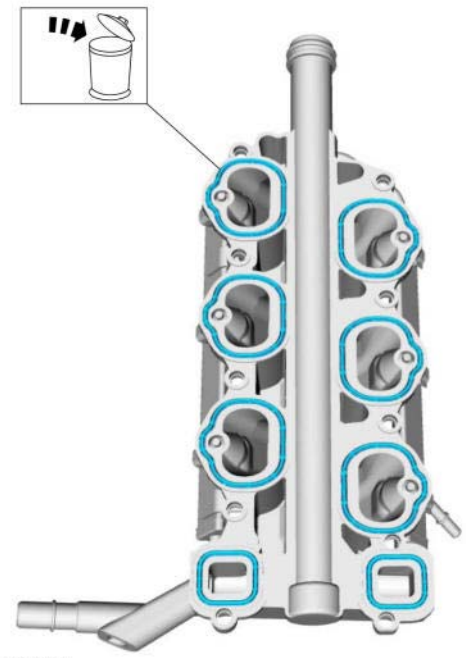
Remove the bolts and the lower intake manifold.



12.

Remove and discard the lower intake manifold gaskets.

Clean and inspect all sealing surfaces.

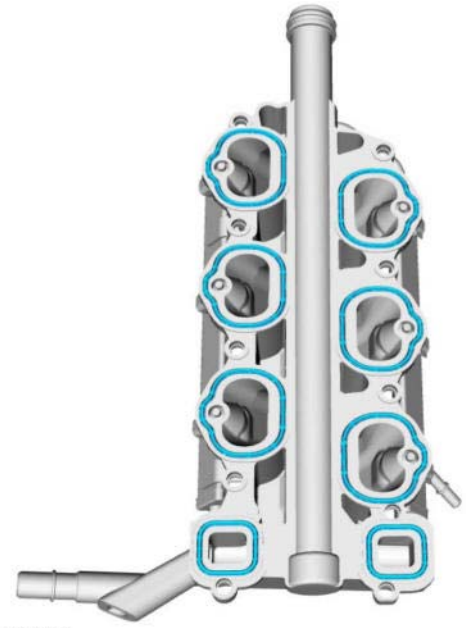


REMOVAL AND INSTALLATION > LOWER INTAKE MANIFOLD > INSTALLATION

NOTE: If the engine is repaired or replaced because of upper engine failure, typically including valve or piston damage, check the intake manifold for metal debris. If metal debris is found, install a new intake manifold. Failure to follow these instructions can result in engine damage.

1.

Install the new lower intake manifold gaskets.

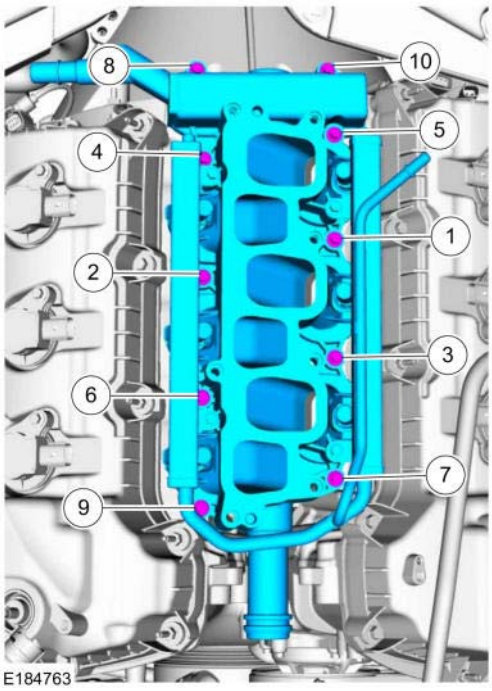

E184762

2.

Install the lower intake manifold and the bolts.

Torque

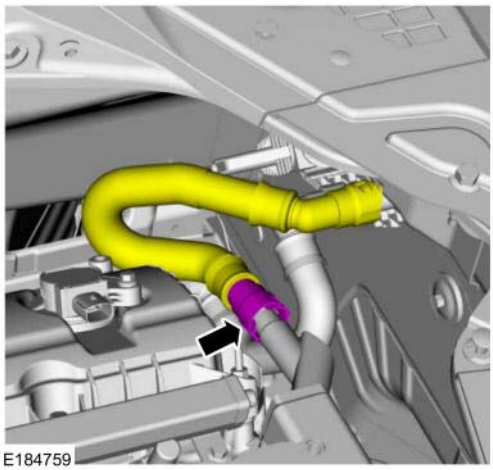
: 89 lb.in (10 Nm)



E184763

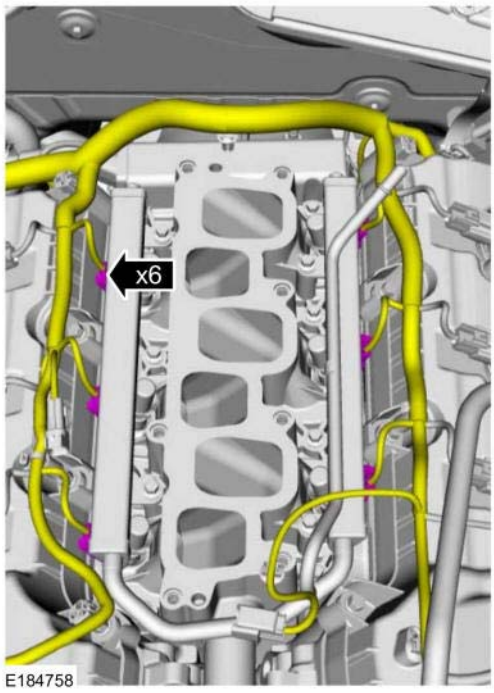
3.

Connect the coolant tube to the back of the lower intake manifold.



4.

Connect the fuel injector electrical connectors.

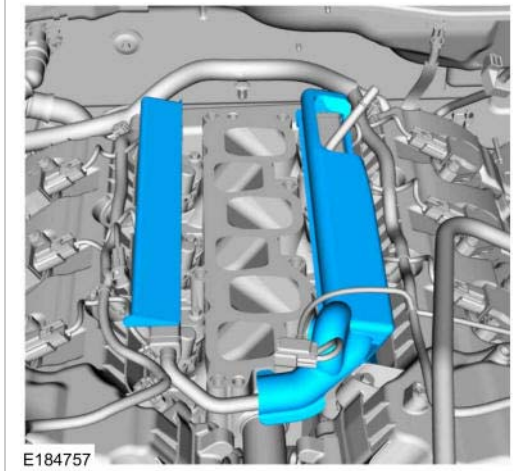


5.

Install the thermostat housing. Refer to: THERMOSTAT HOUSING .

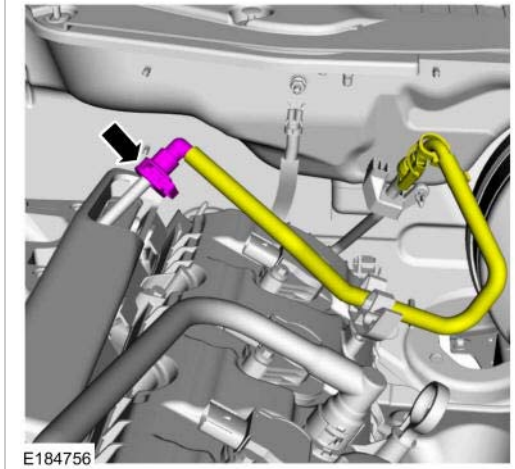
6.

Install the fuel rail sound insulators.



7.

Connect the fuel tube quick release coupling. Refer to: QUICK RELEASE COUPLING .



8.

Install the upper intake manifold. Refer to: Upper Intake Manifold .

9.

Connect the battery ground cable. Refer to: Battery Disconnect and Connect .

10.

Fill the cooling system. Refer to: COOLING SYSTEM DRAINING AND VACUUM FILLING .

REMOVAL AND INSTALLATION > OIL PAN

Special Tool(s) / General Equipment

	303-1245 Engine Lift Eye TKIT-2006UF-FLM TKIT-2006UF-ROW
	303-1529 Lift Eye, Engine TKIT-2010A-F TKIT-2010A-LM TKIT-2010A-ROW
	303-F072 Support Bar, Engine
Plastic Scraper	
Oil Drain Equipment	
Vehicle/Axle Stands	

Materials

Name	Specification
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) XO-5W20-QSP (U.S.)	WSS-M2C945-A
Motorcraft® High Performance Engine RTV Silicone TA-357	WSE-M4G323-A6
Motorcraft® Silicone Gasket Remover ZC-30-A	-
Motorcraft® Metal Surface Prep ZC-31-B	-
Metal Brake Parts Cleaner (U.S.) PM-4-A, PM-4-B (U.S.)	-

REMOVAL AND INSTALLATION > OIL PAN > REMOVAL

NOTE: During engine repair procedures, cleanliness is extremely important. Any foreign material, including any material created while cleaning gasket surfaces, that enters the oil passages, coolant passages or the oil pan, may cause engine failure.

6-Speed Automatic Transmission - 6R80/6-Speed Manual Transmission - MT82

1.

With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

2.

Disconnect the battery ground cable. Refer to: Battery Disconnect and Connect .

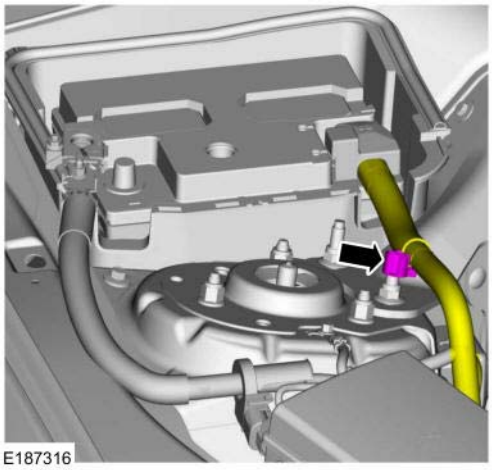
3.

Remove the cowl panel grille. Refer to: Cowl Panel Grille .

Convertible

4.

Detach the battery cable retainer.



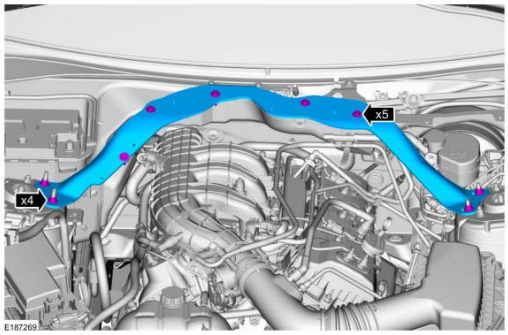
5.

Disconnect the positive battery cable. Refer to: Battery Disconnect and Connect .

6.

Remove the cowl extension nuts.

Remove the bolts and the cowl extension.



6-Speed Automatic Transmission - 6R80/6-Speed Manual Transmission - MT82

NOTE: Make sure to minimize damage to sealer foam and avoid pulling apart dash seal brackets from retainer pins. Excessive damage may allow engine noise, fumes, air or water to enter the passenger compartment.

7.

1.

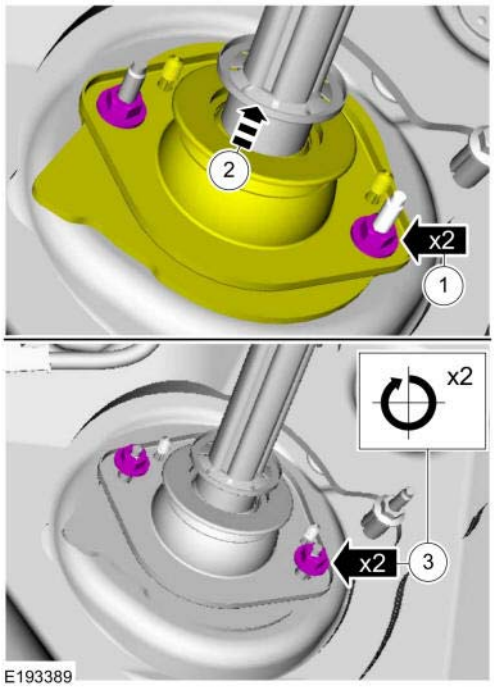
Remove the steering column dash seal nuts.

2.

Loosen the dash seal.

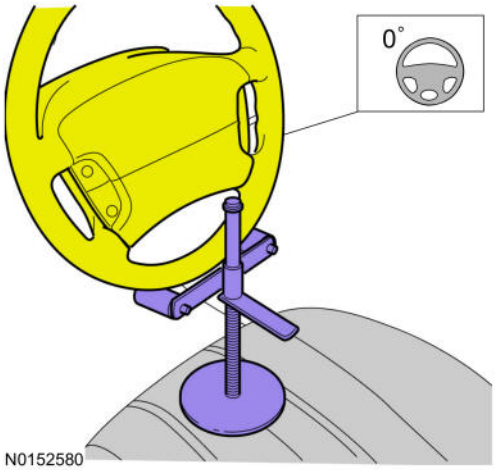
3.

Hand start the dash seal nuts.



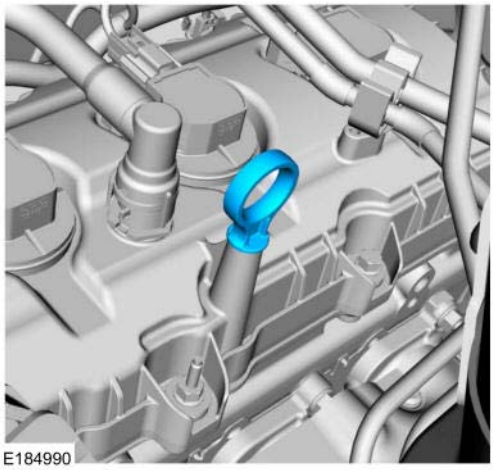
8.

Using a holding device, hold the steering wheel in the straight-ahead position.



9.

Remove the oil level indicator.

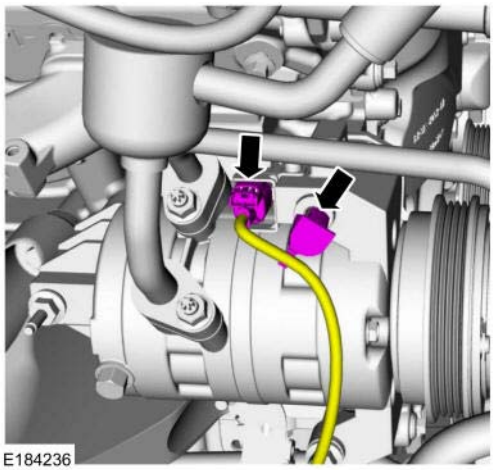


10.

Remove the A/C compressor belt. Refer to: AIR CONDITIONING (A C) COMPRESSOR BELT .

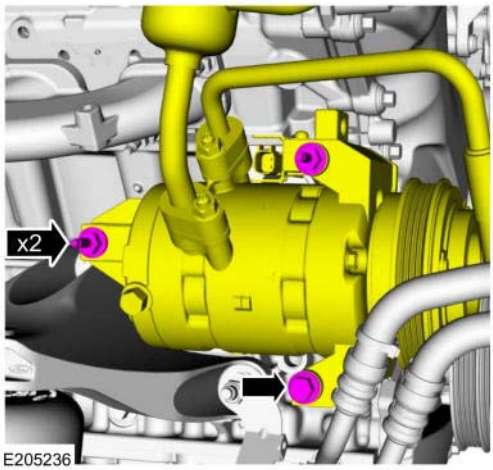
11.

Disconnect the A/C compressor electrical connector and the wire harness retainer.



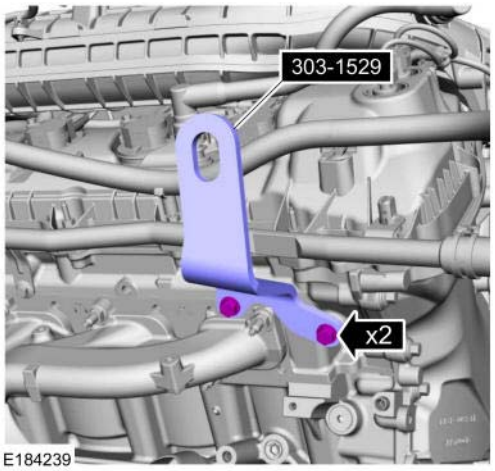
NOTE: The stud bolts and bolt will stay with the A/C compressor.

12.
Loosen the stud bolts, bolt and position the A/C compressor aside.



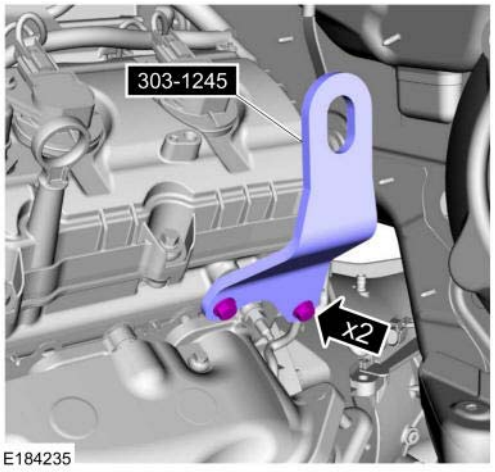
13.

Install Special Service Tool: 303-1529 Lift Eye, Engine.



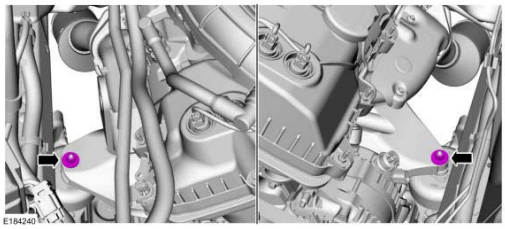
14.

Install Special Service Tool: 303-1245 Engine Lift Eye.



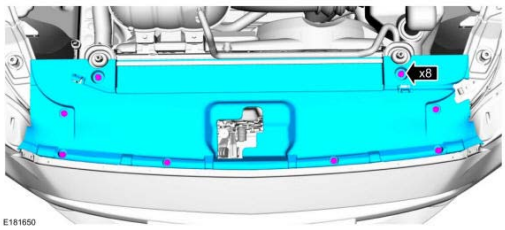
15.

Remove the RH and LH engine mount bracket nuts.



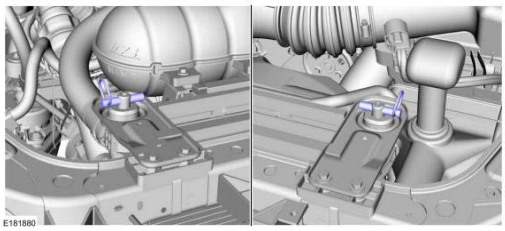
16.

Remove the retainers and the radiator top shield.



17.

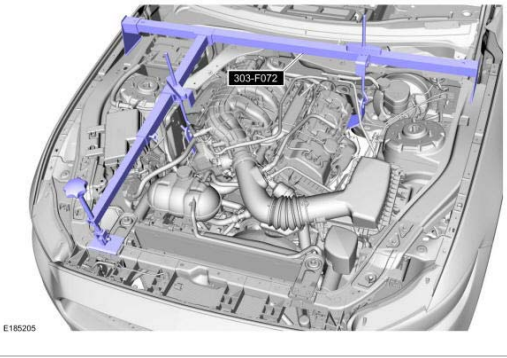
Install retaining pins to support cooling module.



18.

Install the special tool to support the engine.

Install Special Service Tool: 303-F072 Support Bar, Engine.



19.

Remove the front wheels and tires. Refer to: Wheel and Tire .

NOTE: Vehicles are equipped with either an underbody shield or a subframe bracket and underbody shield assembly.

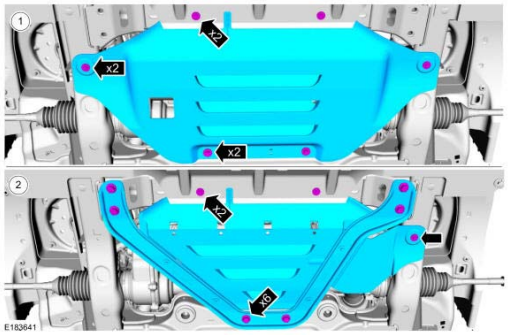
20.

1.

Remove the bolts and the underbody shield.

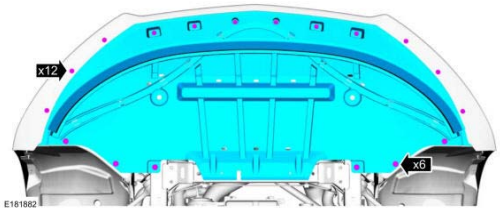
2.

Remove the bolts and the subframe bracket and underbody shield assembly.



21.

Remove the pin-type retainers, bolts and the underbody shield.



22.

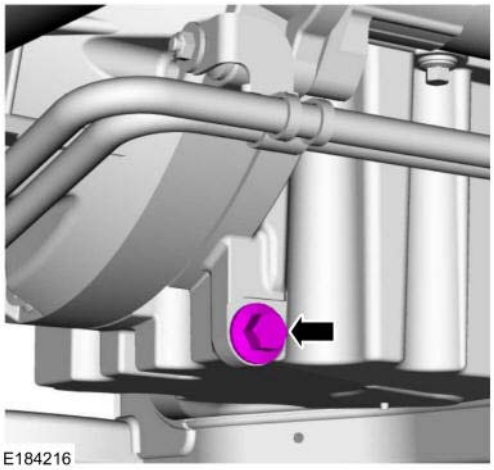
Remove the oil pan plug and drain the engine oil.

Use the General Equipment: Oil Drain Equipment

Install the oil pan drain plug.

Torque

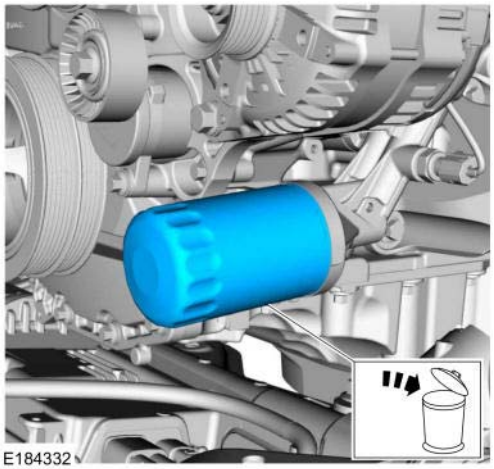
: 20 lb.ft (27 Nm)



23.

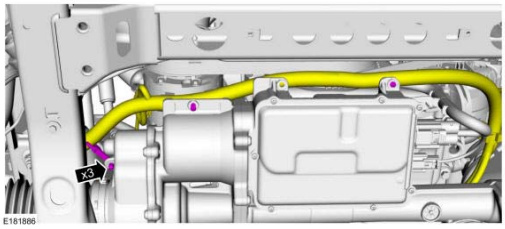
Remove and discard the engine oil filter.

Use the General Equipment: Oil Drain Equipment



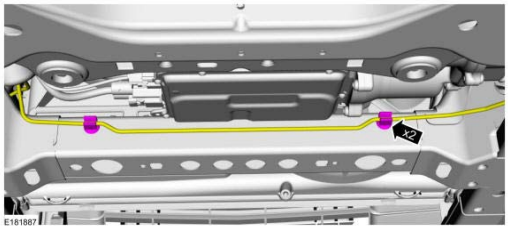
24.

Detach the EPAS wiring harness pin-type retainers.



25.

Detach the brake line retainers from the subframe.



26.

WARNING: Do not reuse steering column shaft bolts. This may result in fastener failure and steering column shaft detachment or loss of steering control. Failure to follow this instruction may result in serious injury to vehicle occupant(s).

WARNING: DO NOT hammer, pry or force steering column and column shafts during installation or removal. Failure to follow this instruction may cause damage to steering components that could lead to loss of steering control during vehicle operation and could result in serious personal injury or death.

WARNING: DO NOT attempt to remove or install the steering column lower u-joint at the steering gear without first loosening the steering column dash seal and fasteners. Failure to follow this instruction may cause damage to steering components that could lead to loss of steering control during vehicle operation and could result in serious personal injury or death.

Detach the steering column lower shaft from the lower coupling.

1.

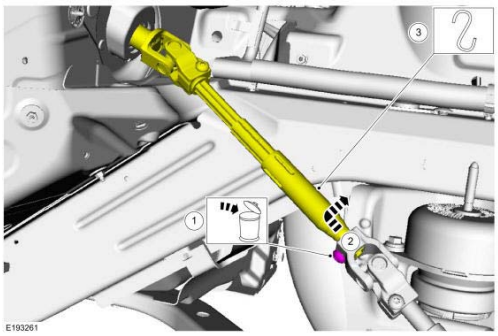
Remove and discard the steering column shaft bolt.

2.

Pull apart the steering column shaft from the coupling.

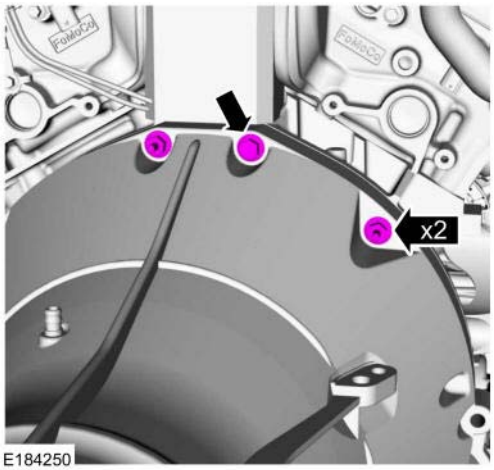
3.

Secure the lower shaft to the frame rail to avoid damaging it during subframe removal.



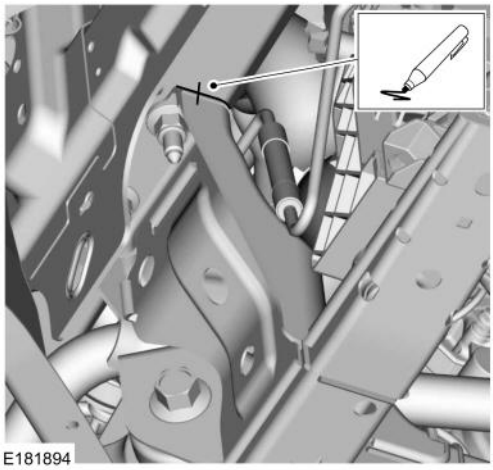
NOTE: To prevent damage to the transmission, do not loosen the transmission-to-engine fasteners more than 5 mm (0.19 in).

27.
Loosen the bellhousing bolts 5 mm (0.19 in).



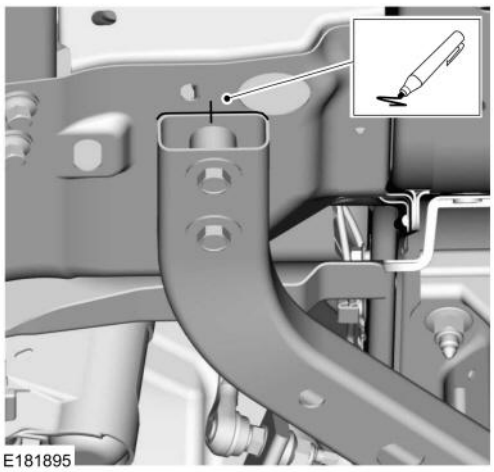
28.

Mark the position of the front subframe for reference during installation.



29.

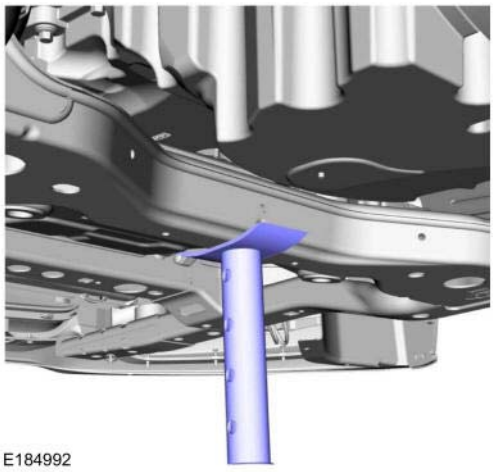
Mark the position of the rear subframe for reference during installation.



30.

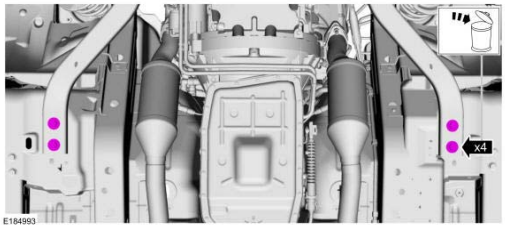
Using an adjustable stand, support the subframe.

Use the General Equipment: Vehicle/Axle Stands



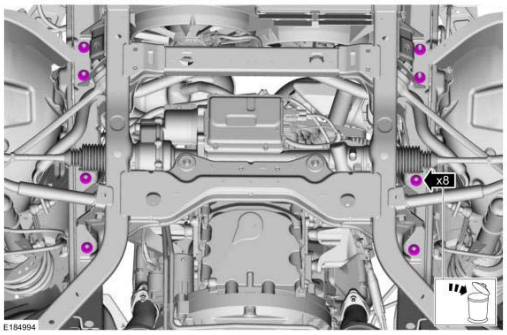
31.

Remove and discard the rear subframe bolts.



32.

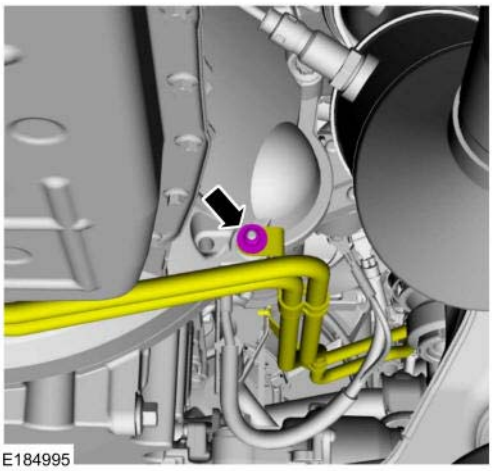
Remove and discard the front subframe nuts.



6-Speed Automatic Transmission - 6R80

33.

Remove the nut and position the transmission cooling tube bracket aside.

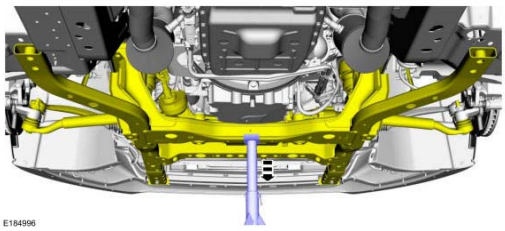


6-Speed Automatic Transmission - 6R80/6-Speed Manual Transmission - MT82

34.

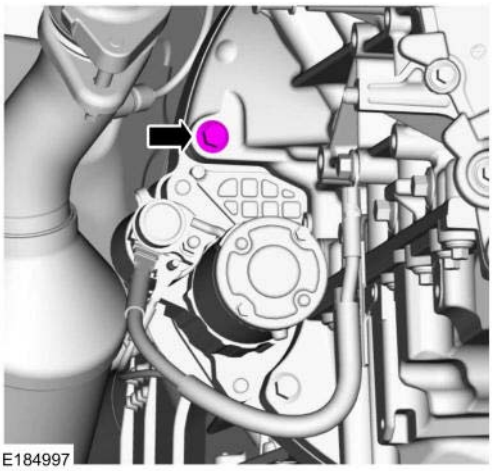
Using an adjustable stand, lower the subframe 102 mm (4.0 in).

Use the General Equipment: Vehicle/Axle Stands



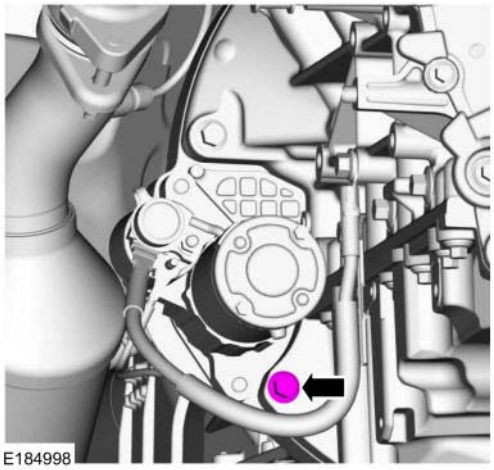
NOTE: To prevent damage to the transmission, do not loosen the transmission-to-engine fasteners more than 5 mm (0.19 in).

35.
Loosen the bellhousing bolt 5 mm (0.19 in).



36.

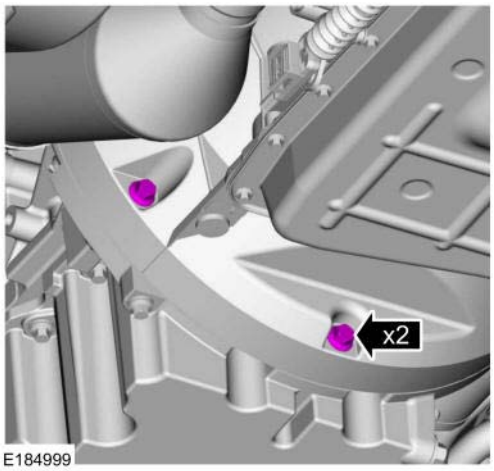
Remove the oil pan bolt.



NOTE: The automatic transmission has one more bottom bellhousing-to-oil pan bolt than the manual transmission.

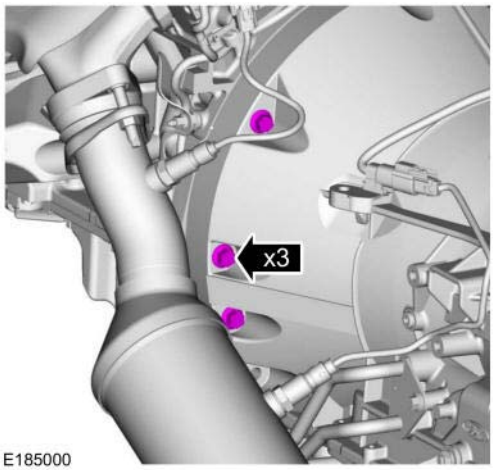
NOTE: Automatic transmission shown in illustration, manual transmission similar.

37.
Remove the oil pan bolts.



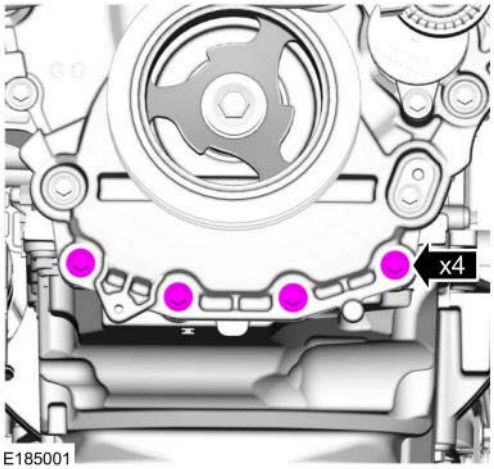
NOTE: To prevent damage to the transmission, do not loosen the transmission-to-engine fasteners more than 5 mm (0.19 in).

38.
Loosen the bellhousing bolts 5 mm (0.19 in).



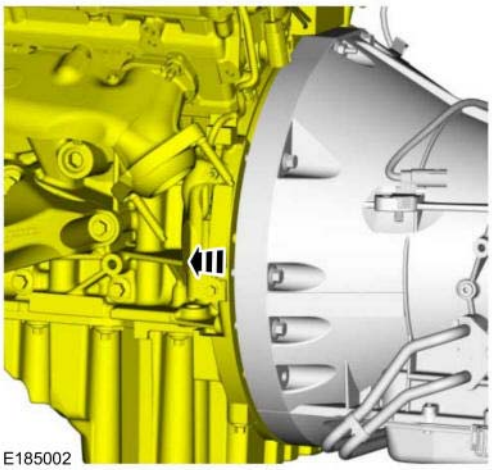
39.

Remove the engine front cover bolts.



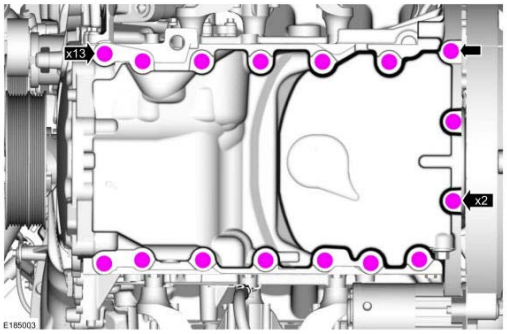
40.

Separate the engine and transmission 5 mm (0.19 in).



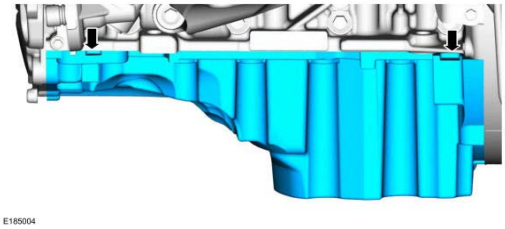
41.

Remove the oil pan bolts.



42.

Using a pry tool on the pry pads shown in illustration, remove the oil pan.



NOTE: Only use a 3M™ Roloc® Bristle Disk (2-in white, part number 07528) in a suitable tool turning at the recommended speed of 15, 000 rpm, to clean the oil pan. Do not use metal scrapers, wire brushes or any other power abrasive disk to clean. These tools cause scratches and gouges that make leak paths.

43.

Make sure that the mating faces of the oil pan are clean and free of foreign material. Refer to: RTV Sealing Surface Cleaning and Preparation .

Material

: Motorcraft® Silicone Gasket Remover / ZC-30-A

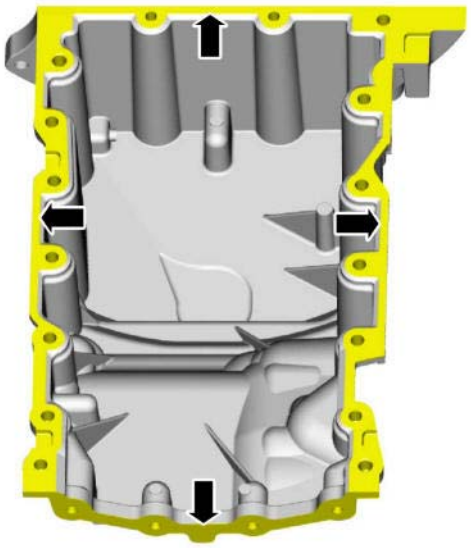
Material

: Metal Brake Parts Cleaner (U.S.) / PM-4-A, PM-4-B (U.S.)

Material

: Motorcraft® Metal Surface Prep / ZC-31-B

Thoroughly wash the oil pan to remove any foreign material, including any abrasive particles created during the cleaning process.



E183888

NOTE: Do not use wire brushes, power abrasive discs or 3M™ Roloc® Bristle Disk (2-in white, part number 07528) to clean the sealing surfaces of the engine block. These tools cause scratches and gouges that make leak paths. They also cause contamination that causes premature engine failure. Remove all traces of the gasket.

44.
Make sure that the mating faces of the engine block are clean and free of foreign material. Refer to: RTV Sealing Surface Cleaning and Preparation .

Use the General Equipment: Plastic Scraper

Material

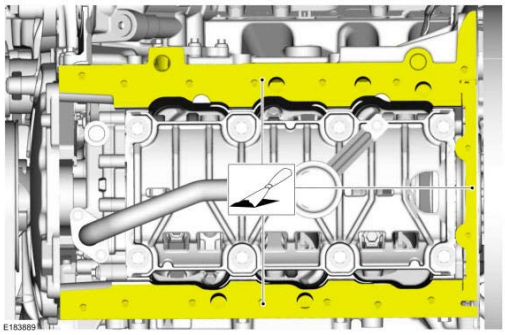
: Motorcraft® Silicone Gasket Remover / ZC-30-A

Material

: Metal Brake Parts Cleaner (U.S.) / PM-4-A, PM-4-B (U.S.)

Material

: Motorcraft® Metal Surface Prep / ZC-31-B



NOTE: Do not use wire brushes, power abrasive discs or 3M™ Roloc® Bristle Disk (2-in white, part number 07528) to clean the sealing surfaces of the engine block. These tools cause scratches and gouges that make leak paths. They also cause contamination that causes premature engine failure. Remove all traces of the gasket.

45.
Make sure that the mating faces of the engine front cover are clean and free of foreign material. Refer to: RTV Sealing Surface Cleaning and Preparation .

Use the General Equipment: Plastic Scraper

Material

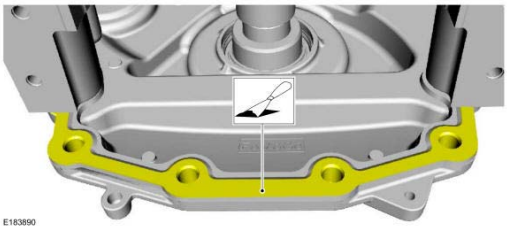
: Motorcraft® Silicone Gasket Remover / ZC-30-A

Material

: Metal Brake Parts Cleaner (U.S.) / PM-4-A, PM-4-B (U.S.)

Material

: Motorcraft® Metal Surface Prep / ZC-31-B



REMOVAL AND INSTALLATION > OIL PAN > INSTALLATION

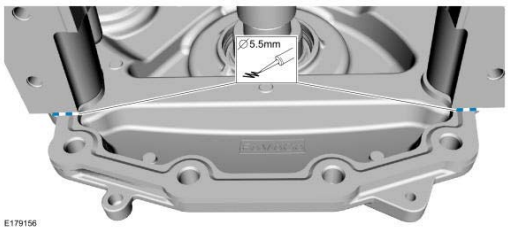
6-Speed Automatic Transmission - 6R80/6-Speed Manual Transmission - MT82

1.

Apply a 5.5 mm (0.21 in) bead of Motorcraft® High Performance Engine RTV Silicone to the 2 crankshaft engine front cover-to-cylinder block joint areas.

Material

: Motorcraft® High Performance Engine RTV Silicone / TA-357 (WSE-M4G323-A6)

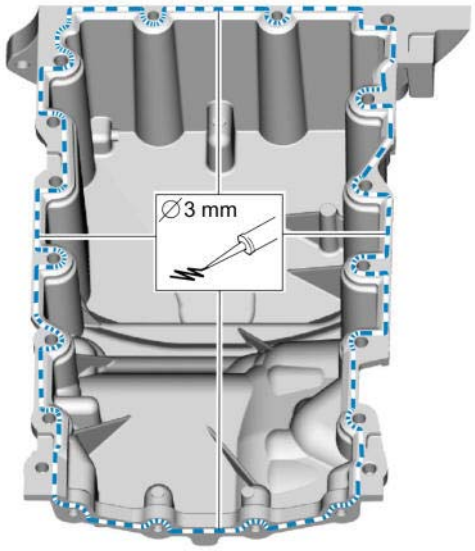


NOTE: The oil pan and the specified bolts must be installed and the oil pan aligned to the cylinder block within 4 minutes of sealant application. Final tightening of the oil pan bolts must be carried out within 60 minutes of sealant application.

2.
Apply a 3 mm (0.11 in) bead of Motorcraft® High Performance Engine RTV Silicone to the sealing surface of the oil pan.

Material

: Motorcraft® High Performance Engine RTV Silicone / TA-357 (WSE-M4G323-A6)

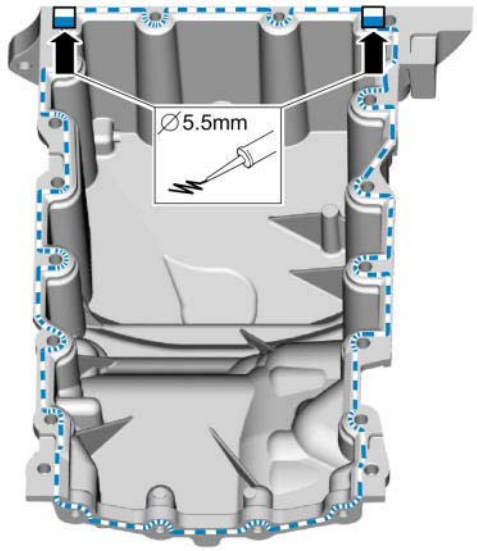


3.

Apply a 5.5 mm (0.21 in) bead of Motorcraft® High Performance Engine RTV Silicone to the 2 crankshaft seal retainer plate-to-cylinder block joint areas on the sealing surface of the oil pan.

Material

: Motorcraft® High Performance Engine RTV Silicone / TA-357 (WSE-M4G323-A6)

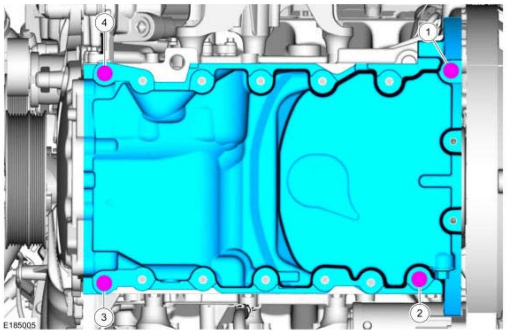


E179155

NOTE: The oil pan and the specified bolts must be installed within 4 minutes of the start of sealant application.

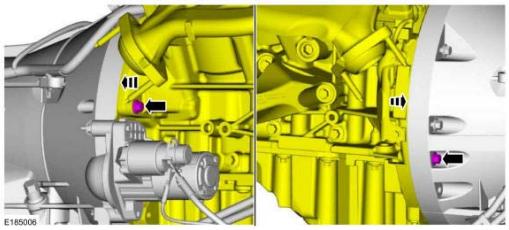
NOTE: Keep the oil pan as close as possible to the transmission while installing, then slide forward towards the engine front cover to prevent wiping off of the sealant.

4.
Install the bolts finger tight.



NOTE: Do not torque at this time.

5.
Draw the transmission and engine together using the bolts.

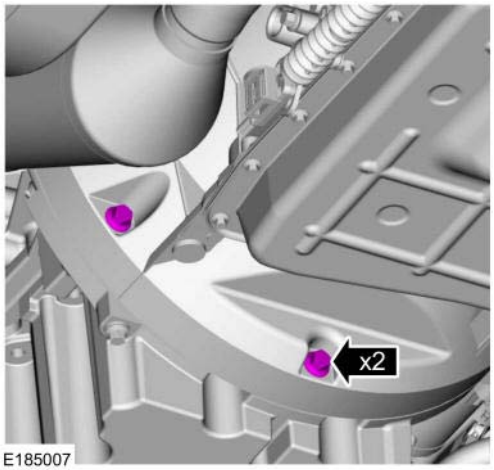


NOTE: The automatic transmission has one more bottom bellhousing-to-oil pan bolt than the manual transmission.

NOTE: Automatic transmission shown in illustration, manual transmission similar.

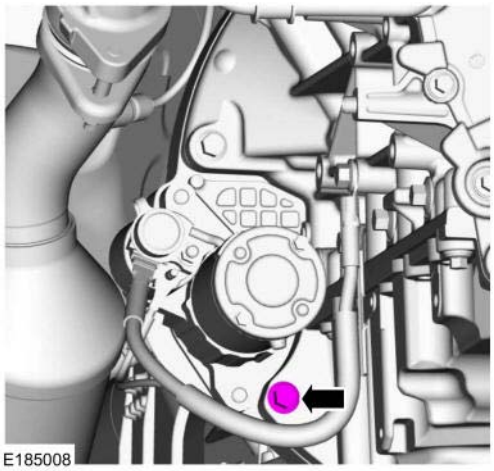
NOTE: Do not torque at this time.

6.
Install the oil pan bolts.



NOTE: Do not torque at this time.

7.
Install the oil pan bolt.

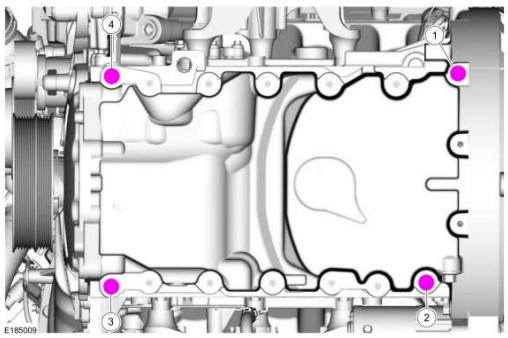


8.

Tighten the oil pan bolts in sequence.

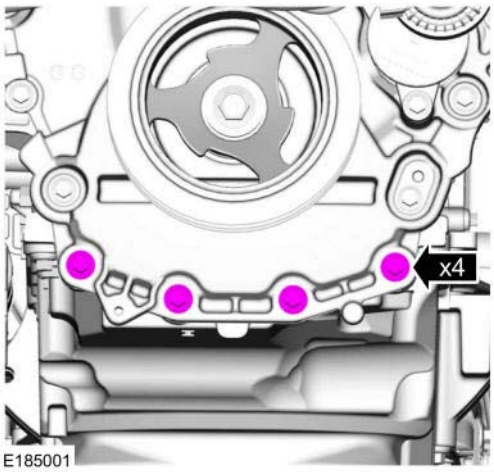
Torque

: 27 lb.in (3 Nm)



9.

Install the engine front cover bolts finger tight.



10.

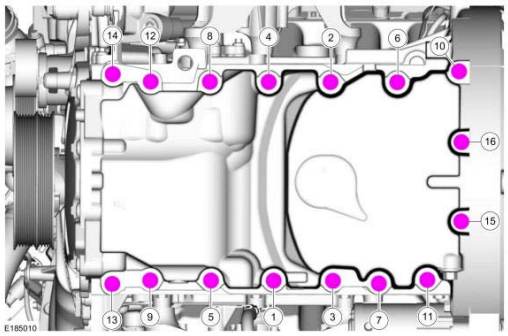
Install the remaining oil pan bolts and tighten in sequence shown in illustration.

Torque:

Stage 1: Tighten bolts 1 through 14 to: 18 lb.ft (24 Nm)

Stage 2: Tighten bolt 10 an additional: 90°

Stage 3: Tighten bolts 15 and 16 to: 89 lb.in (10 Nm)

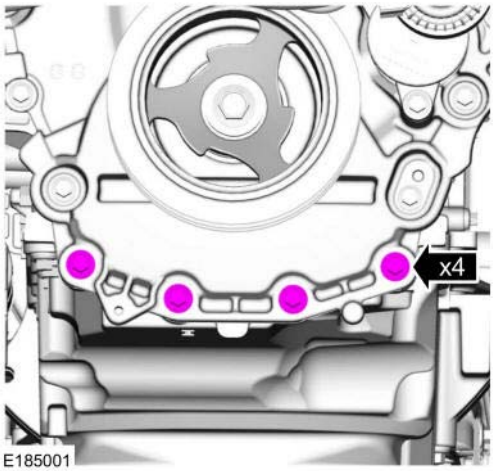


11.

Tighten the engine front cover bolts.

Torque

: 18 lb.ft (24 Nm)

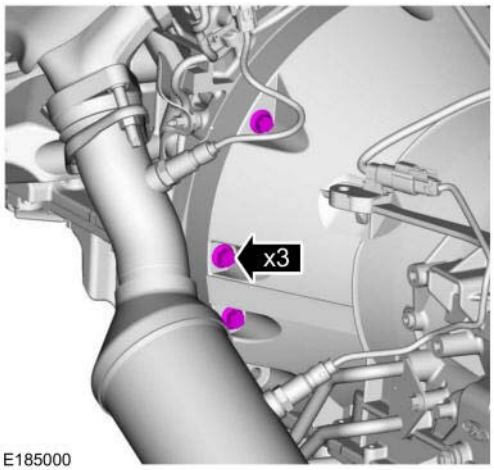


12.

Tighten the bellhousing bolts.

Torque

: 35 lb.ft (48 Nm)



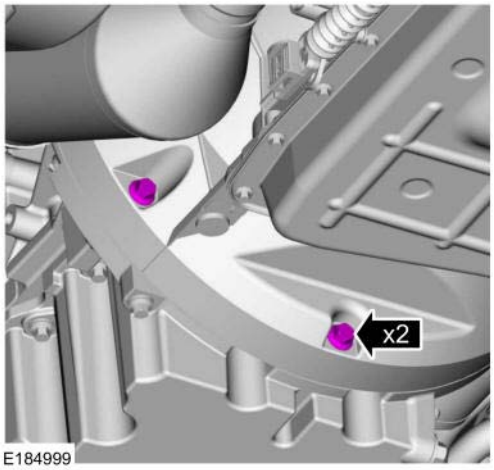
NOTE: The automatic transmission has one more bottom bellhousing-to-oil pan bolt than the manual transmission.

NOTE: Automatic transmission shown in illustration, manual transmission similar.

13.
Tighten the oil pan bolts.

Torque

: 35 lb.ft (48 Nm)

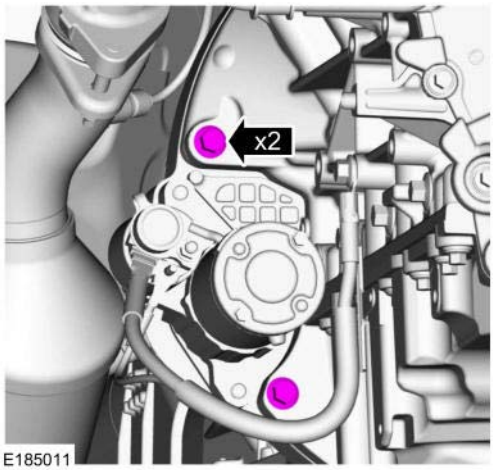


14.

Tighten the oil pan and bellhousing bolts.

Torque

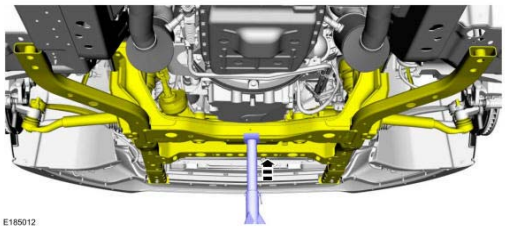
: 35 lb.ft (48 Nm)



15.

Using an adjustable stand, raise the subframe.

Use the General Equipment: Vehicle/Axle Stands



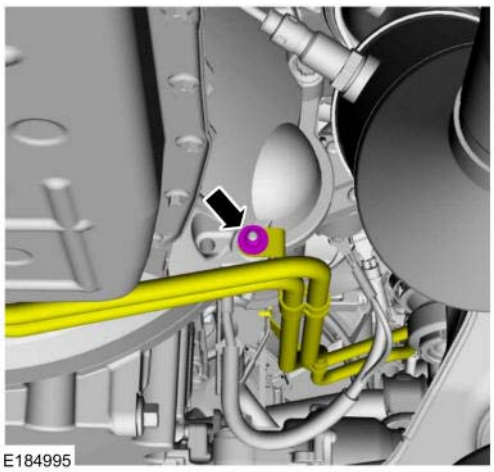
6-Speed Automatic Transmission - 6R80

16.

Position the transmission cooling tube bracket and install the nut.

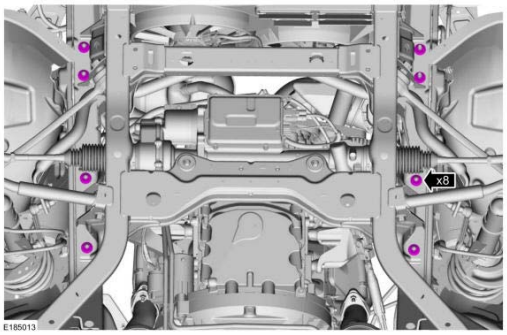
Torque

: 124 lb.in (14 Nm)



17.

Install the new front subframe nuts loosely.

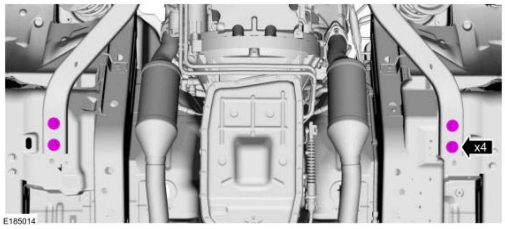


18.

Use a suitable alignment tool with a 15 mm (0.59 in) OD shaft that is long enough to go through the subframe and body.

Align the subframe to the alignment marks made during removal.

Install the new rear subframe bolts loosely.

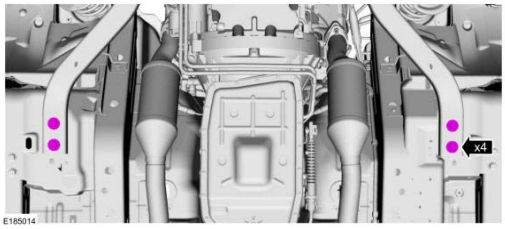


19.

Tighten the rear subframe bolts in a cross pattern.

Torque

: 85 lb.ft (115 Nm)

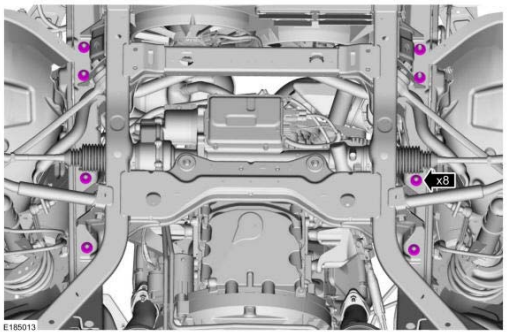


20.

Tighten the front subframe nuts in a cross pattern.

Torque

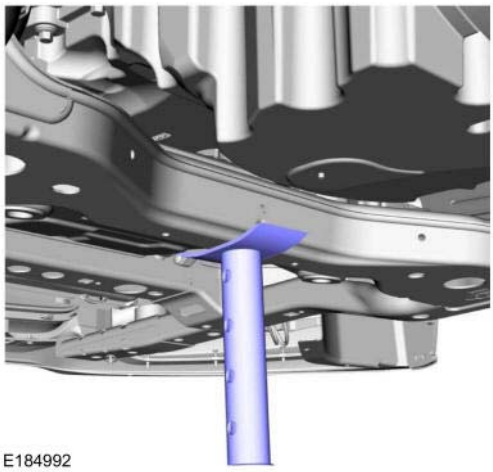
: 85 lb.ft (115 Nm)



21.

Remove the adjustable stand.

Use the General Equipment: Vehicle/Axle Stands

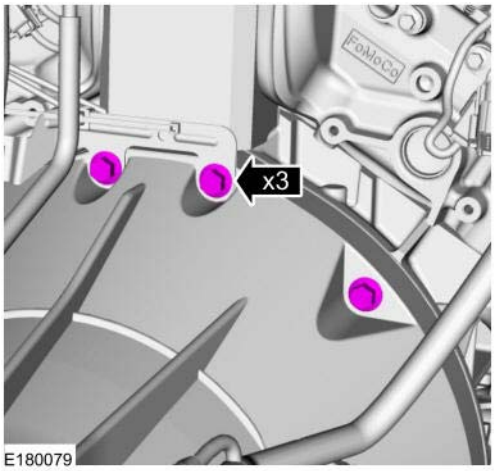


22.

Tighten the bellhousing bolts.

Torque

: 35 lb.ft (48 Nm)



23.

WARNING: DO NOT hammer, pry or force steering column and column shafts during installation or removal. Failure to follow this instruction may cause damage to steering components that could lead to loss of steering control during vehicle operation and could result in serious personal injury or death.

WARNING: DO NOT attempt to remove or install the steering column lower u-joint at the steering gear without first loosening the steering column dash seal and fasteners. Failure to follow this instruction may cause damage to steering components that could lead to loss of steering control during vehicle operation and could result in serious personal injury or death.

1.

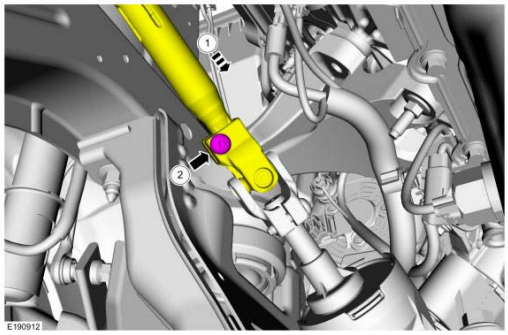
Connect the steering column shaft to the steering gear universal joint.

2.

Install the new steering column shaft bolt.

Torque

: 22 lb.ft (30 Nm)

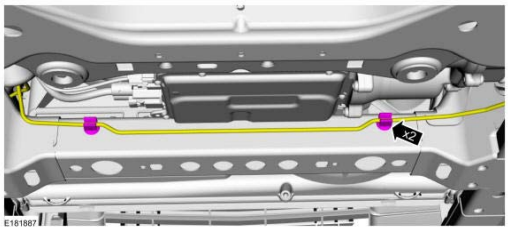


24.

Inspect the steering column lower shaft. Refer to: Steering Column Collapsed Check .

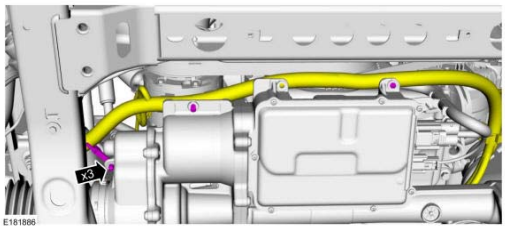
25.

Attach the brake line retainers to the subframe.



26.

Attach the EPAS wiring harness pin-type retainers.



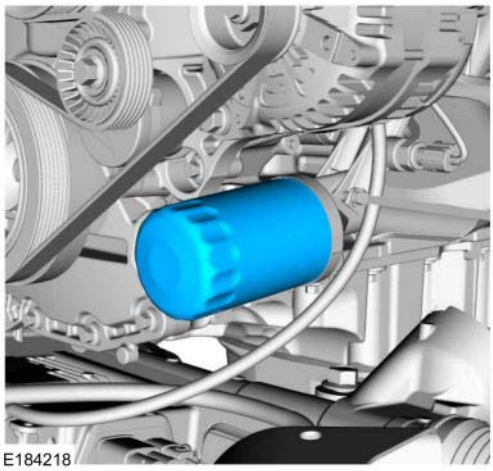
NOTE: Do not lubricate the engine oil filter gasket.

27.
Install a new engine oil filter.

Torque:

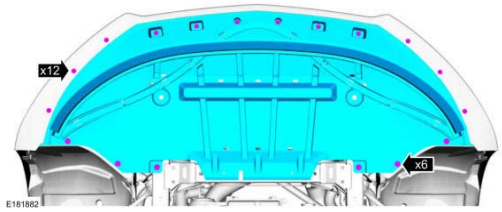
Stage 1: 44 lb.in (5 Nm)

Stage 2: 180°



28.

Install the underbody shield, bolts and the pin-type retainers.



29.

1.

Install the underbody shield and the bolts.

Torque:

A: 97 lb.in (11 Nm)

B: 18 lb.in (2 Nm)

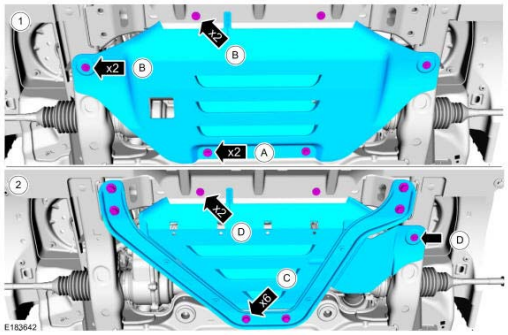
2.

Install the subframe bracket and underbody shield assembly and the bolts.

Torque:

C: 46 lb.ft (63 Nm)

D: 18 lb.in (2 Nm)

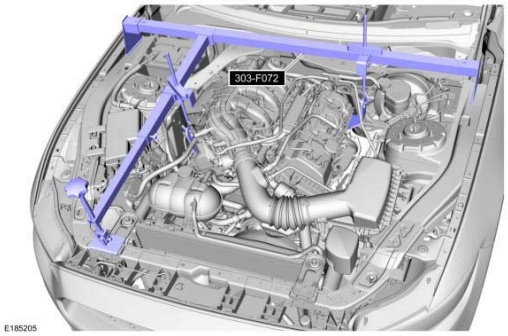


30.

Install the front wheels and tires. Refer to: Wheel and Tire .

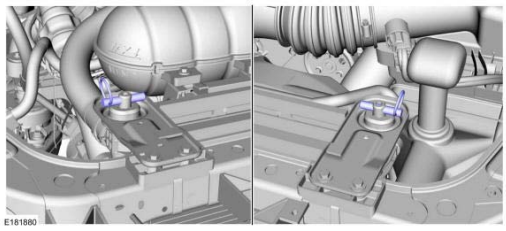
31.

Remove Special Service Tool: 303-F072 Support Bar, Engine.



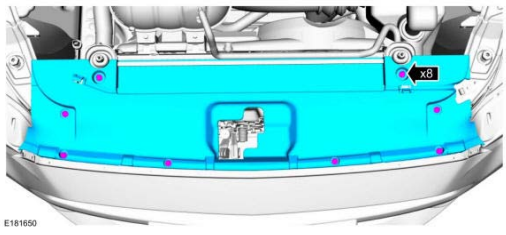
32.

Remove the retaining pins.



33.

Install the radiator top shield and the retainers.

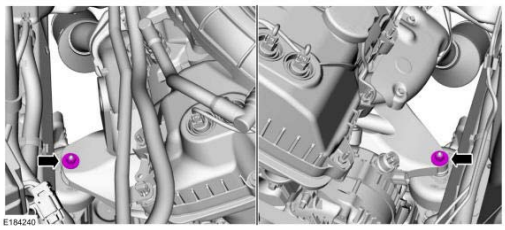


34.

Install the RH and LH engine mount nuts.

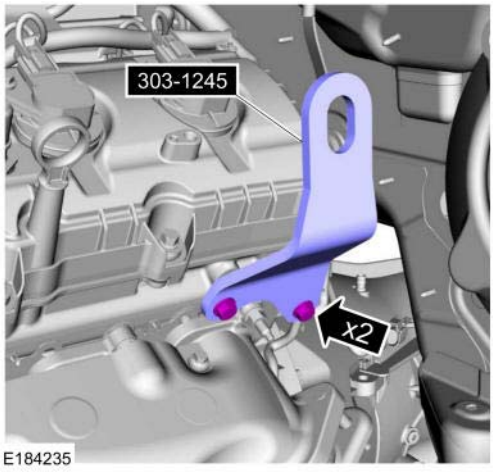
Torque

: 46 lb.ft (63 Nm)



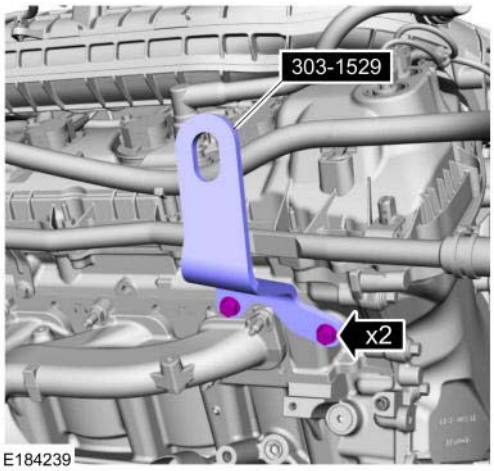
35.

Remove Special Service Tool: 303-1245 Engine Lift Eye.



36.

Remove Special Service Tool: 303-1529 Lift Eye, Engine.

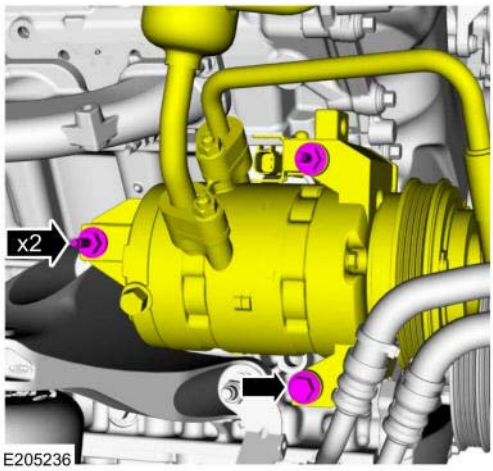


37.

Position the A/C compressor and install the stud bolts and bolt.

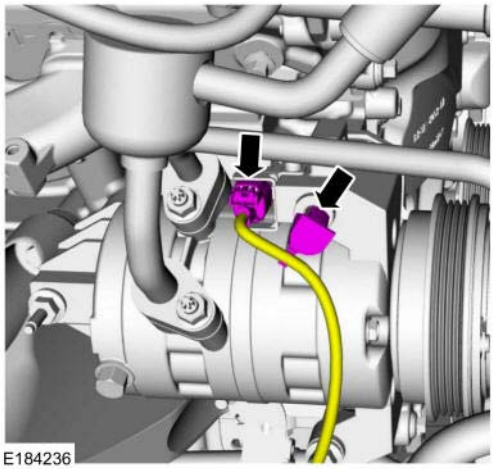
Torque

: 18 lb.ft (25 Nm)



38.

Connect the A/C compressor electrical connector and the wire harness retainer.

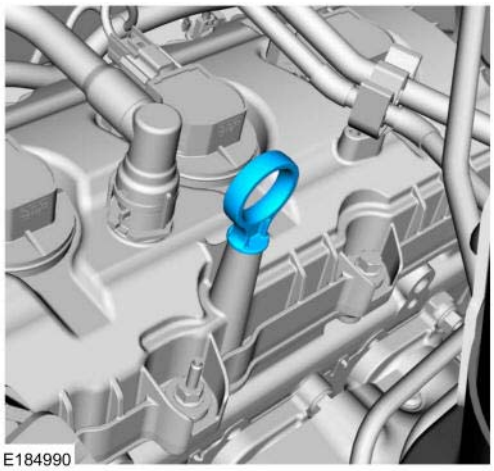


39.

Install the A/C compressor belt. Refer to: AIR CONDITIONING (A C) COMPRESSOR BELT .

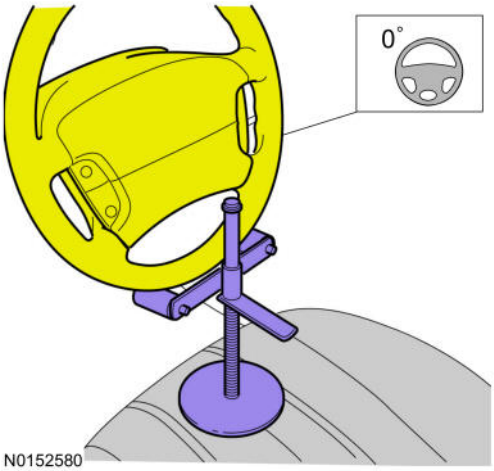
40.

Install the oil level indicator.



41.

Remove the holding device.



42.

1.

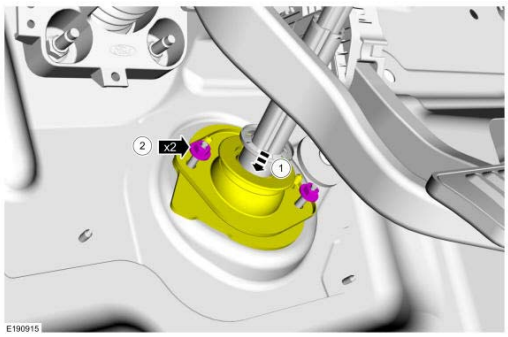
Position the steering column dash seal.

2.

Tighten the steering column dash seal nuts.

Torque

: 80 lb.in (9 Nm)



Convertible

43.

Install the cowl extension and the bolts.

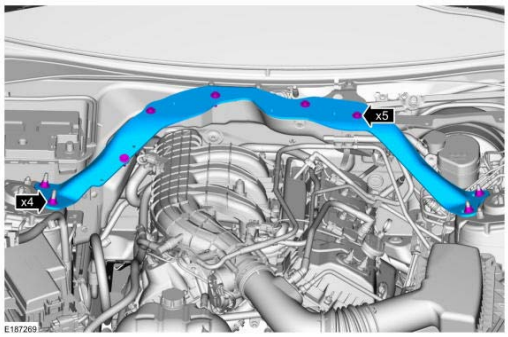
Torque

: 26 lb.ft (35 Nm)

Install the cowl extension nuts.

Torque

: 41 lb.ft (55 Nm)

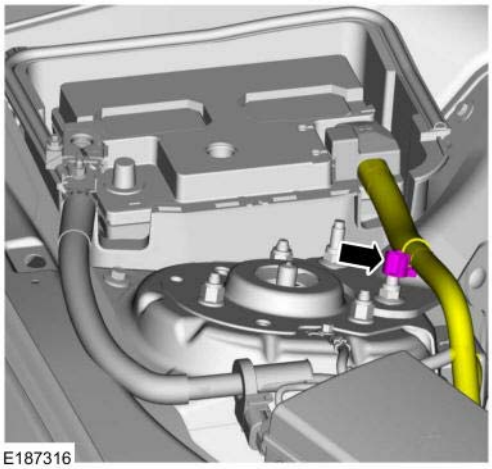


44.

Connect the positive battery cable. Refer to: Battery Disconnect and Connect .

45.

Attach the battery cable retainer.



6-Speed Automatic Transmission - 6R80/6-Speed Manual Transmission - MT82

46.

Install the cowl panel grille. Refer to: Cowl Panel Grille .

47.

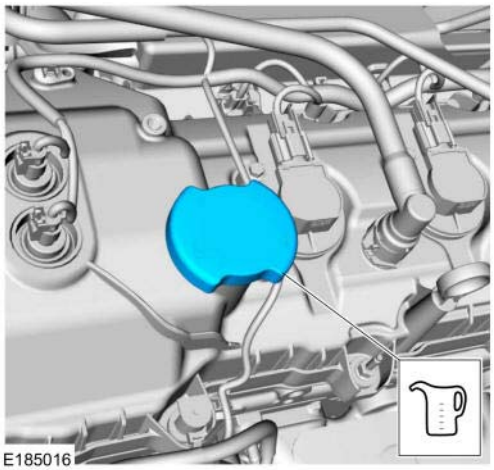
Connect the negative battery cable. Refer to: Battery Disconnect and Connect .

48.

Fill the engine with clean engine oil. Refer to: Specifications .

Material

: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W20-QSP (U.S.) (WSS-M2C945-A)



REMOVAL AND INSTALLATION > OIL PRESSURE SWITCH

Materials

Name	Specification
Thread Sealant with PTFETA-24-B	WSK-M2G350-A2

REMOVAL AND INSTALLATION > OIL PRESSURE SWITCH > REMOVAL

1.

With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

NOTE: Vehicles are equipped with either an underbody shield or a subframe bracket and underbody shield assembly.

2.

1.

Loosen the 2 front bolts, remove the remaining bolts and the underbody shield.

Torque:

A: 97 lb.in (11 Nm)

B: 18 lb.in (2 Nm)

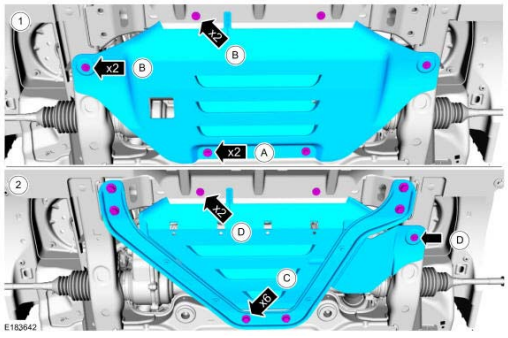
2.

Loosen the 2 front bolts, remove the remaining bolts and the subframe bracket and underbody shield assembly.

Torque:

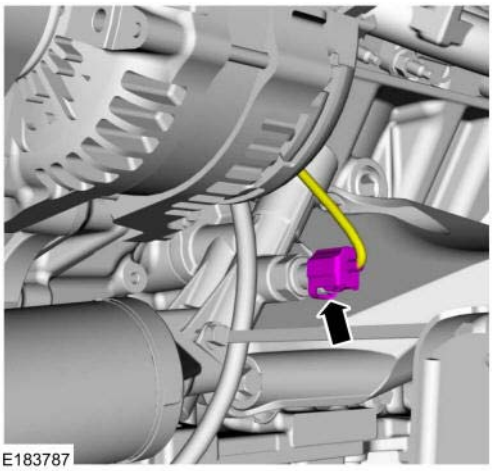
C: 46 lb.ft (63 Nm)

D: 18 lb.in (2 Nm)



3.

Disconnect oil pressure switch electrical connector.



NOTE: If the oil pressure switch is to be reused, apply thread sealant.

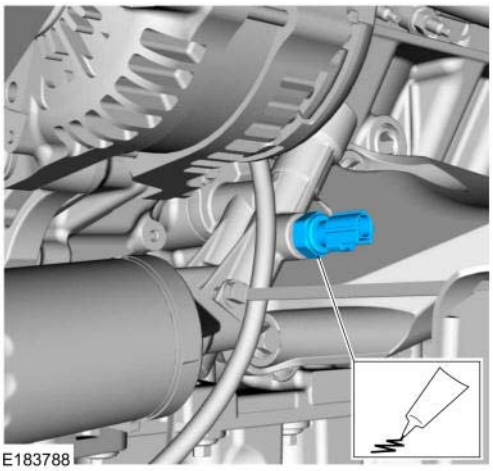
4.
Remove the oil pressure switch.

Material

: Thread Sealant with PTFE / TA-24-B (WSK-M2G350-A2)

Torque

: 159 lb.in (18 Nm)



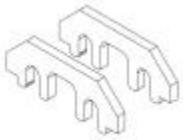
REMOVAL AND INSTALLATION > OIL PRESSURE SWITCH > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > OIL PUMP

Special Tool(s) / General Equipment

	303-1245 Engine Lift Eye TKIT-2006UF-FLM TKIT-2006UF-ROW
 E216421	303-1248 Camshaft holding tools TKIT-2006UF-FLM TKIT-2006UF-ROW
	303-1529 Lift Eye, Engine TKIT-2010A-F TKIT-2010A-LM TKIT-2010A-ROW
	303-F072 Support Bar, Engine
Plastic Scraper	
Oil Drain Equipment	
Vehicle/Axle Stands	

Materials

Name	Specification
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) XO-5W20-QSP (U.S.)	WSS-M2C945-A
Motorcraft® High Performance Engine RTV Silicone TA-357	WSE-M4G323-A6
Motorcraft® Silicone Gasket Remover ZC-30-A	-
Motorcraft® Metal Surface Prep ZC-31-B	-
Metal Brake Parts Cleaner (U.S.) PM-4-A, PM-4-B (U.S.)	-

REMOVAL AND INSTALLATION > OIL PUMP > REMOVAL

NOTE: During engine repair procedures, cleanliness is extremely important. Any foreign material, including any material created while cleaning gasket surfaces, that enters the oil passages, coolant passages or the oil pan may cause engine failure.

6-Speed Automatic Transmission - 6R80/6-Speed Manual Transmission - MT82

1.

With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

2.

Disconnect the battery ground cable. Refer to: Battery Disconnect and Connect .

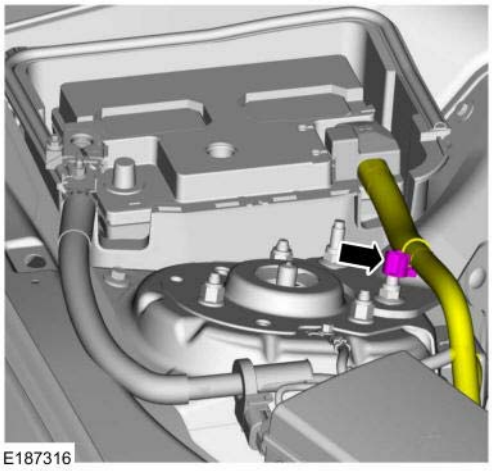
3.

Remove the cowl panel grille. Refer to: Cowl Panel Grille .

Convertible

4.

Detach the battery cable retainer.



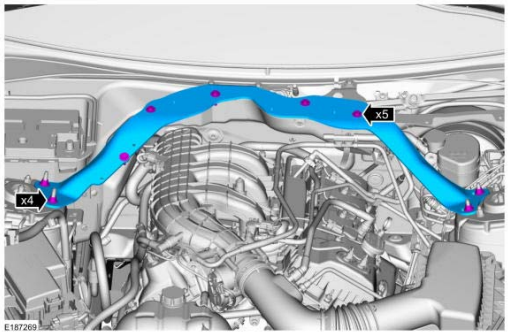
5.

Disconnect the positive battery cable. Refer to: Battery Disconnect and Connect .

6.

Remove the cowl extension nuts.

Remove the bolts and the cowl extension.



6-Speed Automatic Transmission - 6R80/6-Speed Manual Transmission - MT82

NOTE: Make sure to minimize damage to sealer foam and avoid pulling apart dash seal brackets from retainer pins. Excessive damage may allow engine noise, fumes, air or water to enter the passenger compartment.

7.

1.

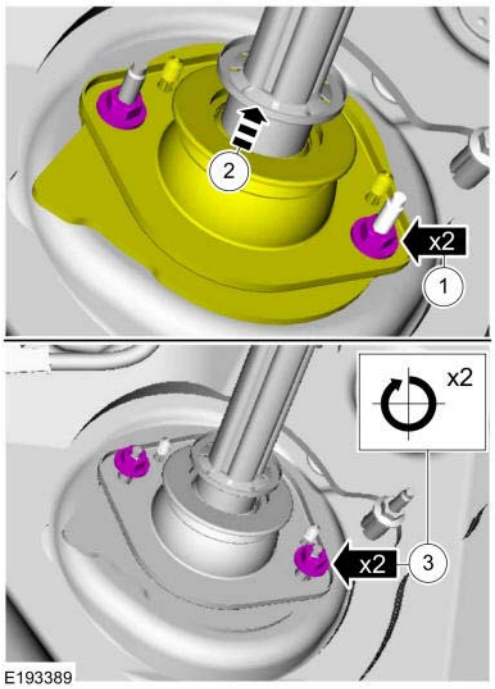
Remove the steering column dash seal nuts.

2.

Loosen the dash seal.

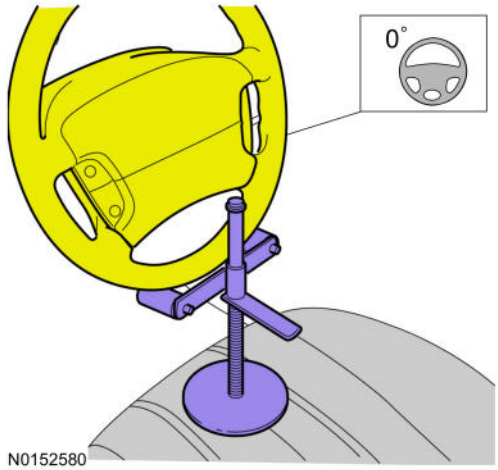
3.

Hand start the dash seal nuts.



8.

Using a holding device, hold the steering wheel in the straight-ahead position.

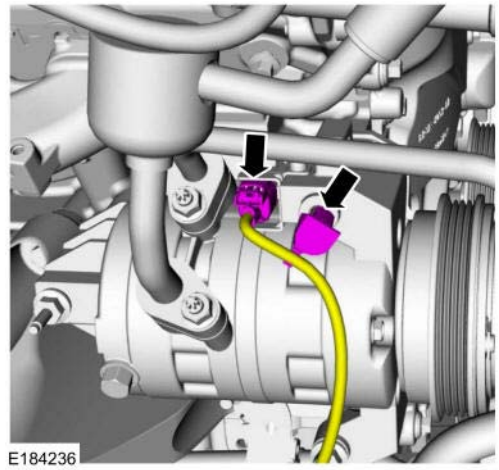


9.

Remove the A/C compressor belt. Refer to: AIR CONDITIONING (A C) COMPRESSOR BELT .

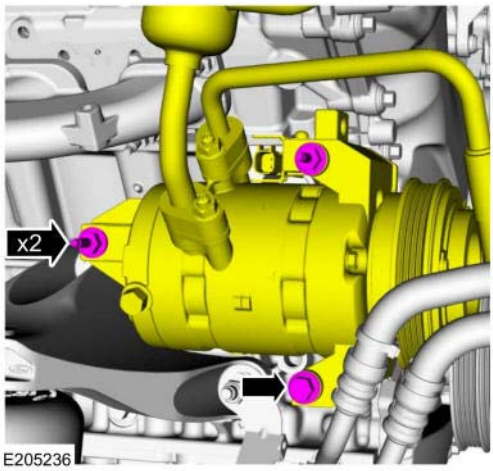
10.

Disconnect the A/C compressor electrical connector and the wire harness retainer.



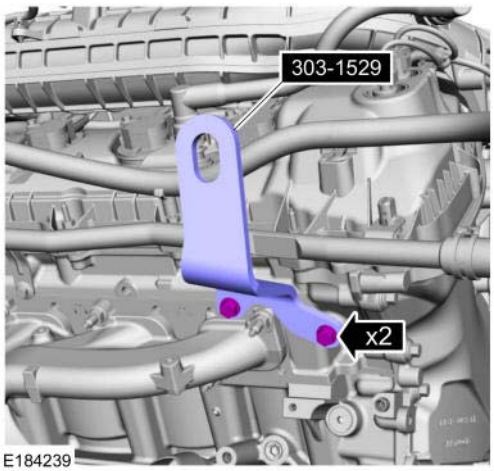
NOTE: The stud bolts and bolt will stay with the A/C compressor.

11.
Loosen the stud bolts, bolt and position the A/C compressor aside.



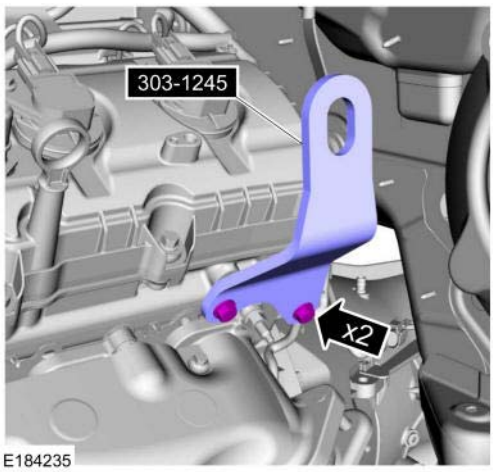
12.

Install Special Service Tool: 303-1529 Lift Eye, Engine.



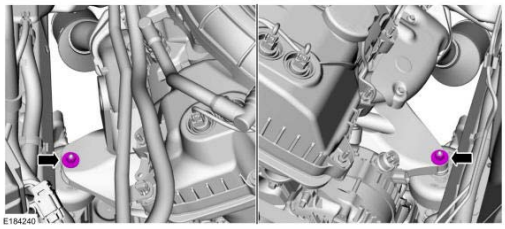
13.

Install Special Service Tool: 303-1245 Engine Lift Eye.



14.

Remove the RH and LH engine mount bracket nuts.

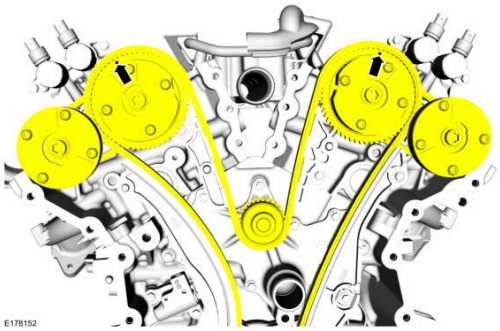


15.

Remove the engine front cover. Refer to: Engine Front Cover .

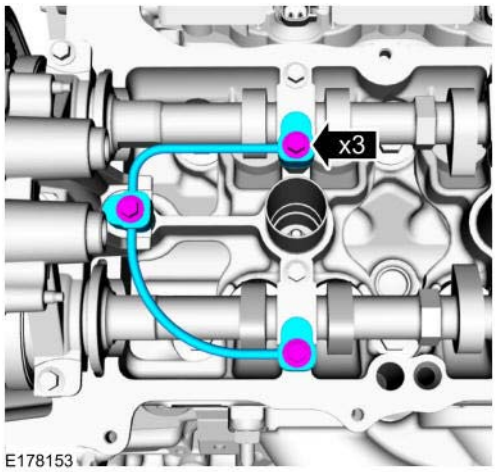
NOTE: Rotate the crankshaft in a clockwise direction only.

16.
Align the timing marks.



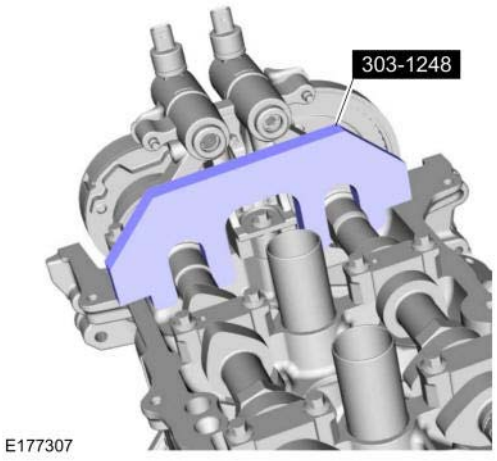
17.

Remove the bolts and the LH oil tube.



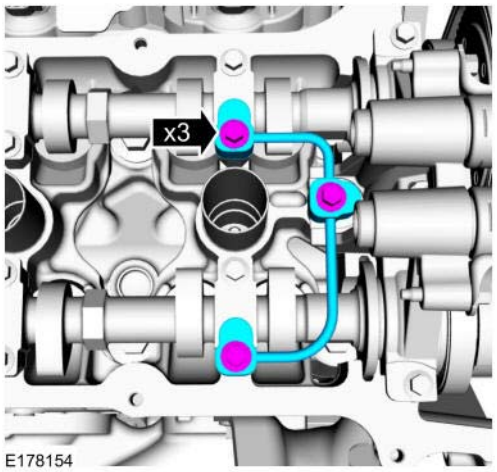
NOTE: The Camshaft Holding Tool will hold the camshafts in the TDC position.

18.
Install Special Service Tool: 303-1248 Camshaft holding tools.



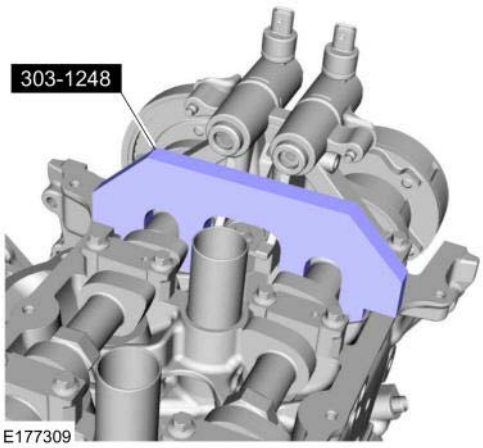
19.

Remove the bolts and the RH oil tube.



NOTE: The Camshaft Holding Tool will hold the camshafts in the TDC position.

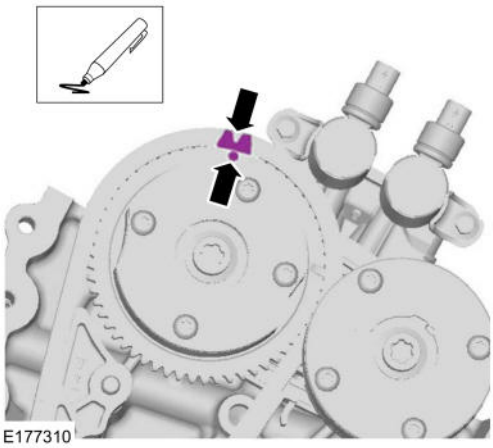
20.
Install Special Service Tool: 303-1248 Camshaft holding tools.



NOTE: ***The following 3 steps are for primary timing chains that the colored links are not visible.***

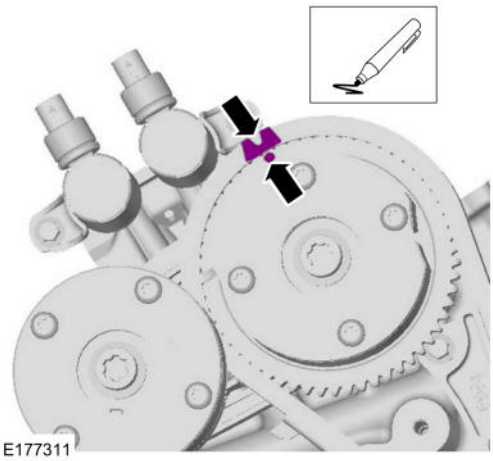
21.

Mark the timing chain link that aligns with the timing mark on the LH intake VCT unit as shown in illustration.



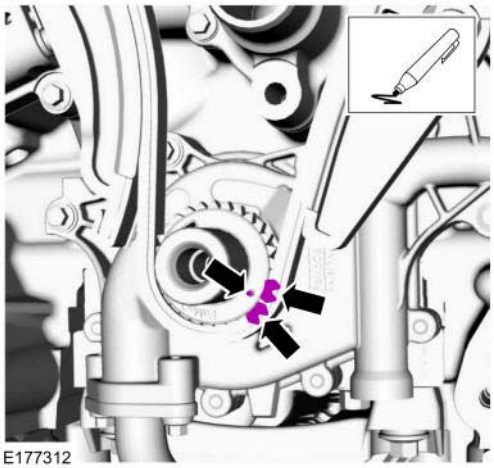
22.

Mark the timing chain link that aligns with the timing mark on the RH intake VCT unit as shown in illustration.



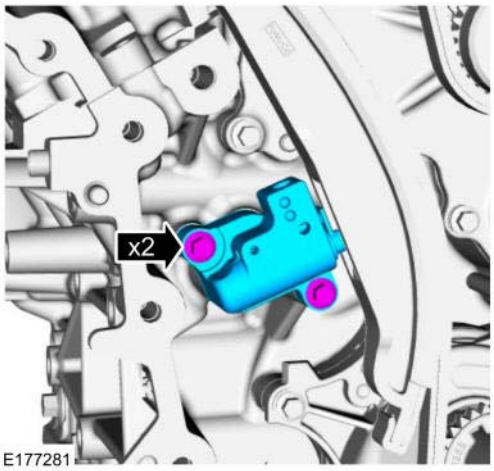
NOTE: The crankshaft sprocket timing mark should be between the 2 colored links.

23.
Mark the timing chain links that aligns with the timing mark on the crankshaft sprocket as shown in illustration.



24.

Remove the bolts and the timing chain tensioner.



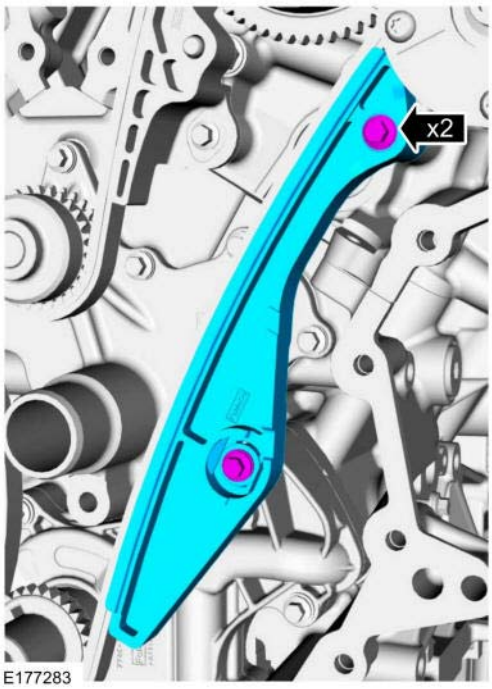
25.

Remove the timing chain tensioner arm.



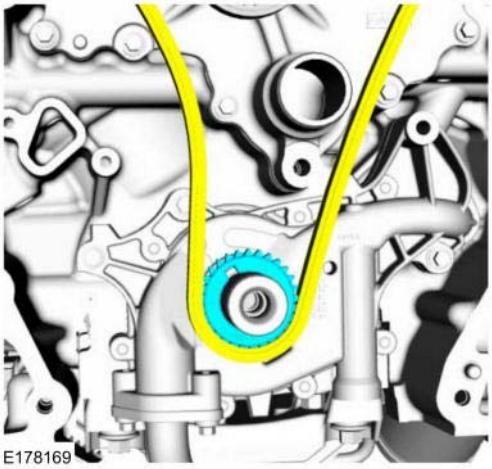
26.

Remove the bolts and the lower LH timing chain guide.



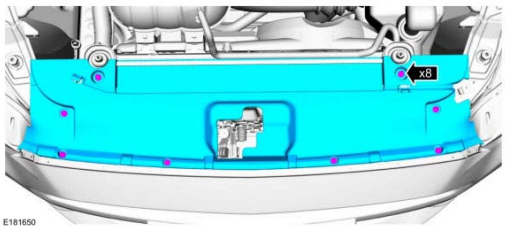
27.

Position the timing chain aside and remove the crankshaft sprocket.



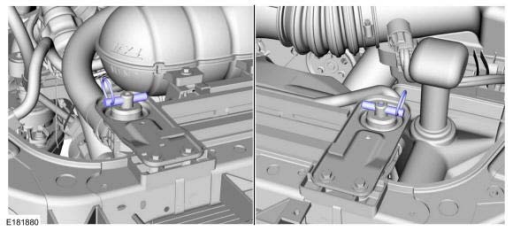
28.

Remove the retainers and the radiator top shield.



29.

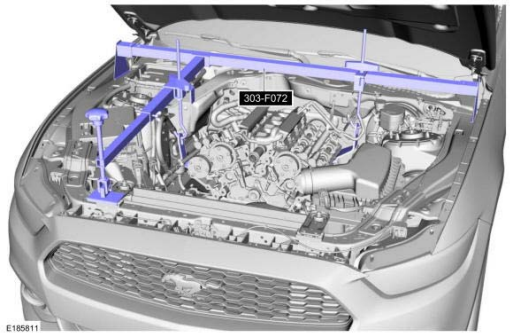
Install retaining pins to support cooling module.



30.

Install the special tool to support the engine.

Install Special Service Tool: 303-F072 Support Bar, Engine.



31.

Remove the front wheels and tires. Refer to: Wheel and Tire .

NOTE: Vehicles are equipped with either an underbody shield or a subframe bracket and underbody shield assembly.

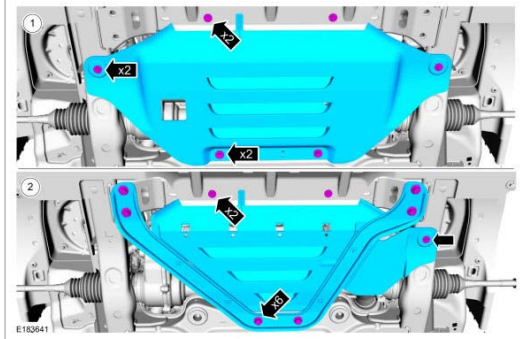
32.

1.

Remove the bolts and the underbody shield.

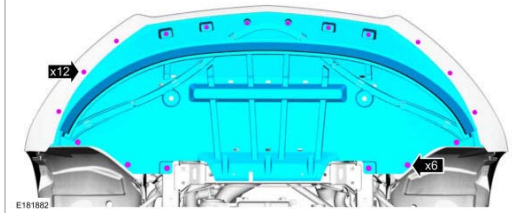
2.

Remove the bolts and the subframe bracket and underbody shield assembly.



33.

Remove the pin-type retainers, bolts and the underbody shield.



34.

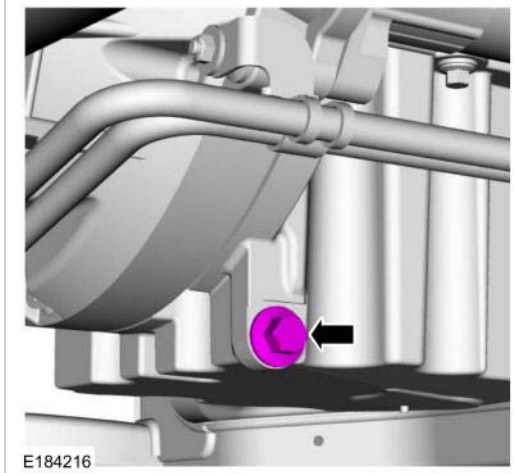
Remove the oil pan plug and drain the engine oil.

Use the General Equipment: Oil Drain Equipment

Install the oil pan drain plug.

Torque

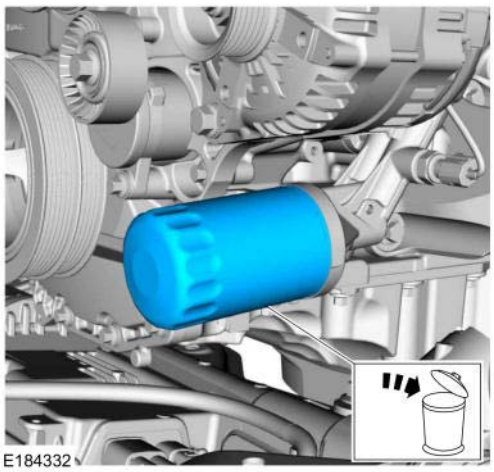
: 20 lb.ft (27 Nm)



35.

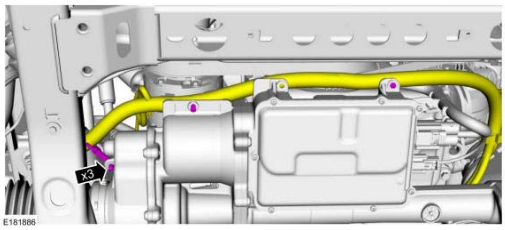
Remove and discard the engine oil filter.

Use the General Equipment: Oil Drain Equipment



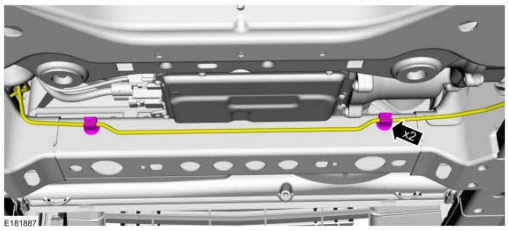
36.

Detach the EPAS wiring harness pin-type retainers.



37.

Detach the brake line retainers from the subframe.



38.

WARNING: Do not reuse steering column shaft bolts. This may result in fastener failure and steering column shaft detachment or loss of steering control. Failure to follow this instruction may result in serious injury to vehicle occupant(s).

WARNING: DO NOT hammer, pry or force steering column and column shafts

during installation or removal. Failure to follow this instruction may cause damage to steering components that could lead to loss of steering control during vehicle operation and could result in serious personal injury or death.

WARNING: DO NOT attempt to remove or install the steering column lower u-joint at the steering gear without first loosening the steering column dash seal and fasteners. Failure to follow this instruction may cause damage to steering components that could lead to loss of steering control during vehicle operation and could result in serious personal injury or death.

Detach the steering column lower shaft from the lower coupling.

1.

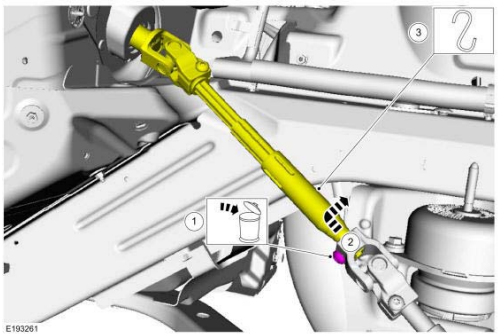
Remove and discard the steering column shaft bolt.

2.

Pull apart the steering column shaft from the coupling.

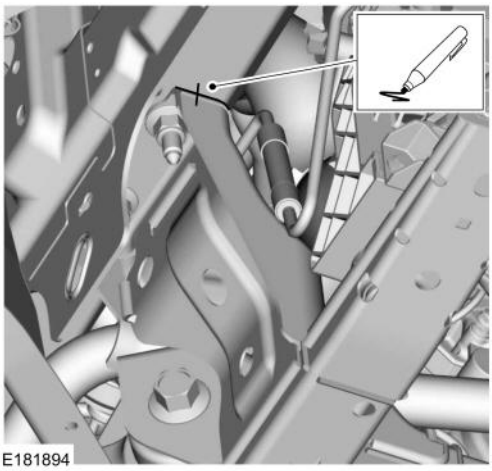
3.

Secure the lower shaft to the frame rail to avoid damaging it during subframe removal.



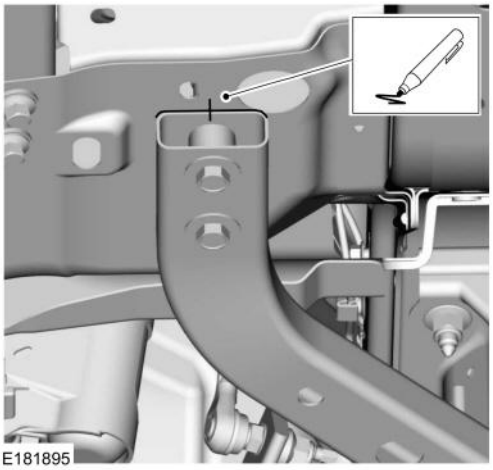
39.

Mark the position of the front subframe for reference during installation.



40.

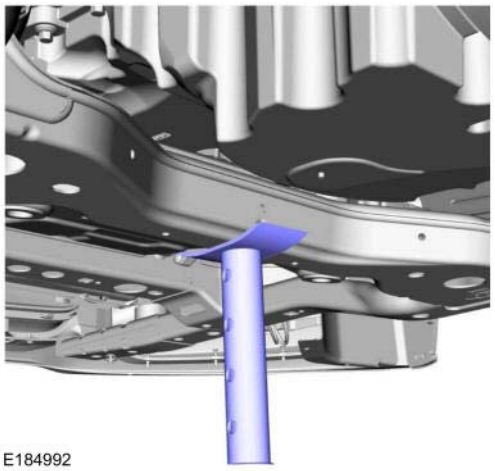
Mark the position of the rear subframe for reference during installation.



41.

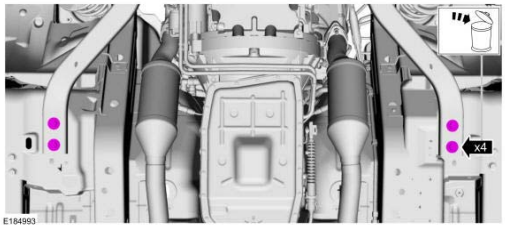
Using an adjustable stand, support the subframe.

Use the General Equipment: Vehicle/Axle Stands



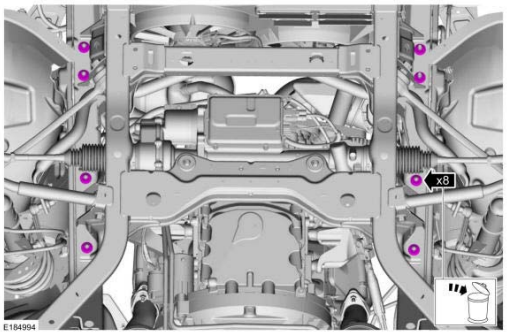
42.

Remove and discard the rear subframe bolts.



43.

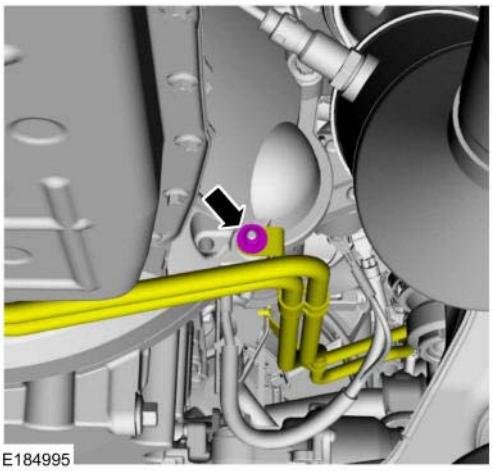
Remove and discard the front subframe nuts.



6-Speed Automatic Transmission - 6R80

44.

Remove the nut and position the transmission cooling tube bracket aside.

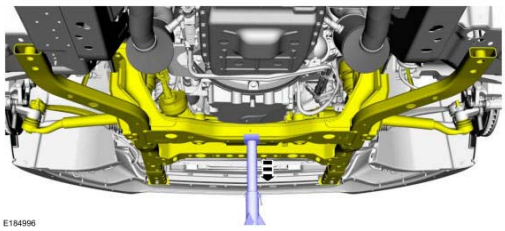


6-Speed Automatic Transmission - 6R80/6-Speed Manual Transmission - MT82

45.

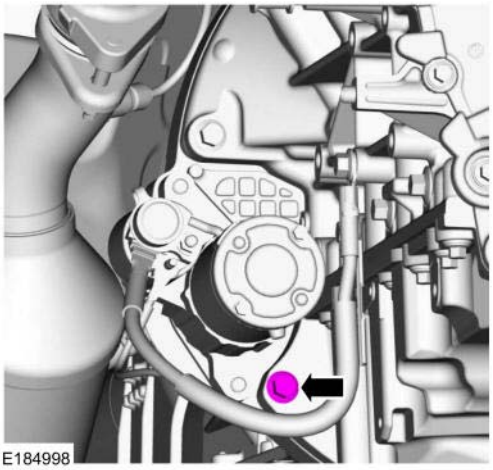
Using an adjustable stand, lower the subframe 102 mm (4.0 in).

Use the General Equipment: Vehicle/Axle Stands



46.

Remove the oil pan bolt.

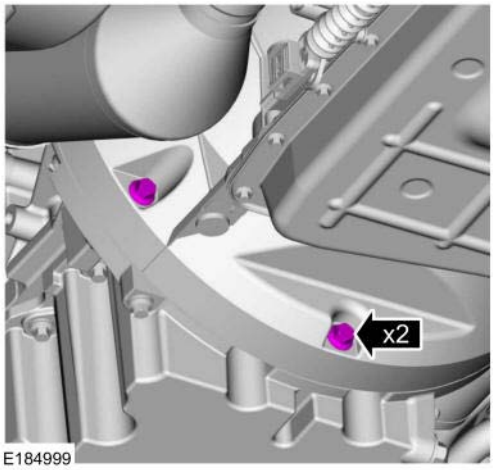


NOTE: The automatic transmission has one more bottom bellhousing-to-oil pan

bolt than the manual transmission.

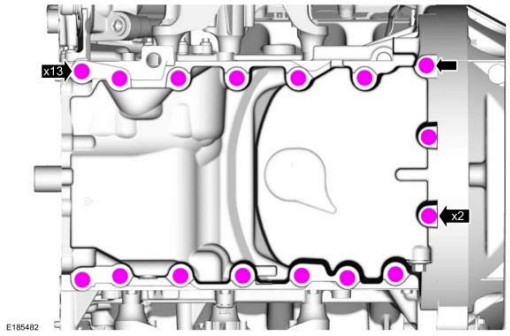
NOTE: Automatic transmission shown in illustration, manual transmission similar.

47.
Remove the oil pan bolts.



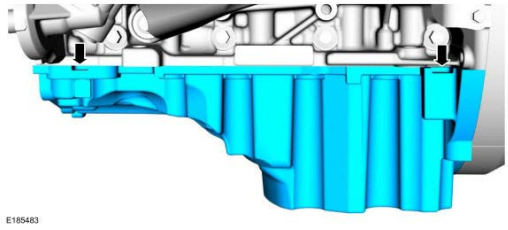
48.

Remove the oil pan bolts.



49.

Using a pry tool on the pry pads shown, remove the oil pan.



NOTE: Only use a 3M™ Roloc® Bristle Disk (2-in white, part number 07528) in a

suitable tool turning at the recommended speed of 15, 000 rpm, to clean the oil pan. Do not use metal scrapers, wire brushes or any other power abrasive disk to clean. These tools cause scratches and gouges that make leak paths.

50.

Make sure that the mating faces of the oil pan are clean and free of foreign material. Refer to: RTV Sealing Surface Cleaning and Preparation .

Material

: Motorcraft® Silicone Gasket Remover / ZC-30-A

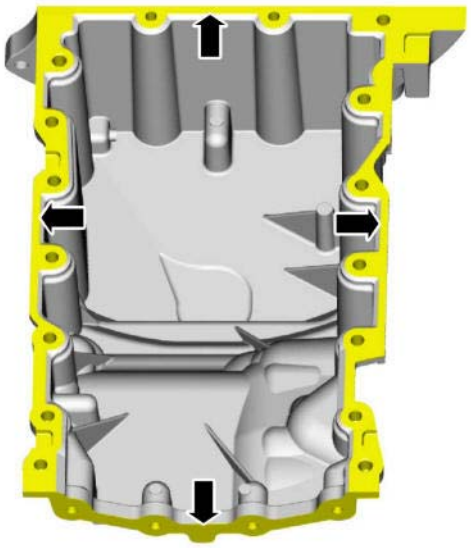
Material

: Metal Brake Parts Cleaner (U.S.) / PM-4-A, PM-4-B (U.S.)

Material

: Motorcraft® Metal Surface Prep / ZC-31-B

Thoroughly wash the oil pan to remove any foreign material, including any abrasive particles created during the cleaning process.



E183888

NOTE: Do not use wire brushes, power abrasive discs or 3M™ Roloc® Bristle Disk (2-in white, part number 07528) to clean the sealing surfaces of the engine block. These tools cause scratches and gouges that make leak paths. They also cause contamination that causes premature engine failure. Remove all traces of the gasket.

51.

Make sure that the mating faces of the engine block are clean and free of foreign material. Refer

to: RTV Sealing Surface Cleaning and Preparation .

Use the General Equipment: Plastic Scraper

Material

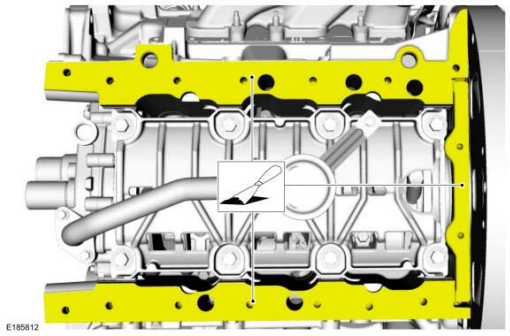
: Motorcraft® Silicone Gasket Remover / ZC-30-A

Material

: Metal Brake Parts Cleaner (U.S.) / PM-4-A, PM-4-B (U.S.)

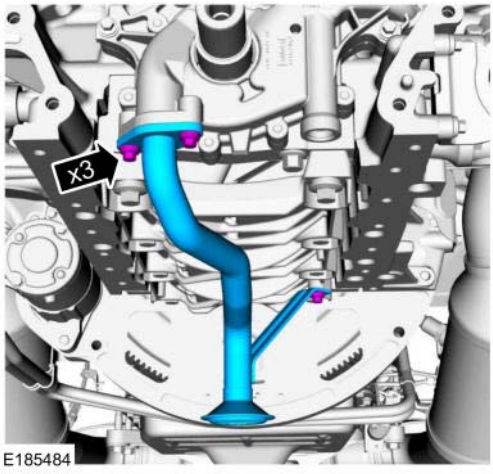
Material

: Motorcraft® Metal Surface Prep / ZC-31-B



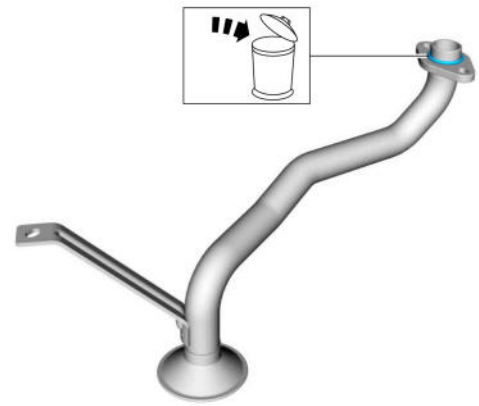
52.

Remove the bolts and oil pump screen and pickup tube.



53.

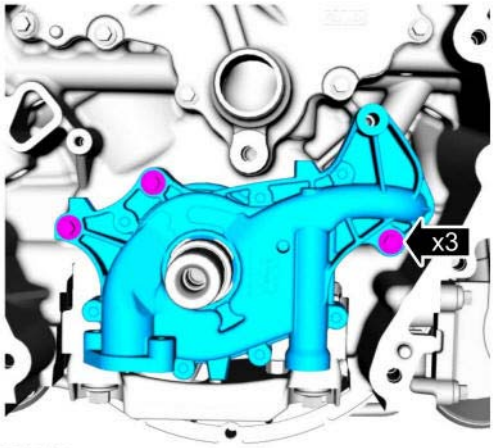
Remove and discard the oil pump screen and pickup tube O-ring seal.



E177322

54.

Remove the bolts and oil pump.



E185485

REMOVAL AND INSTALLATION > OIL PUMP > INSTALLATION

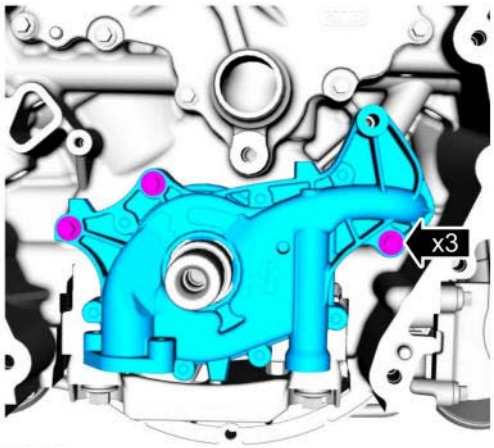
6-Speed Automatic Transmission - 6R80/6-Speed Manual Transmission - MT82

1.

Install the oil pump and the bolts.

Torque

: 89 lb.in (10 Nm)



E185485

2.

Install a new oil pump screen and pickup tube O-ring seal.

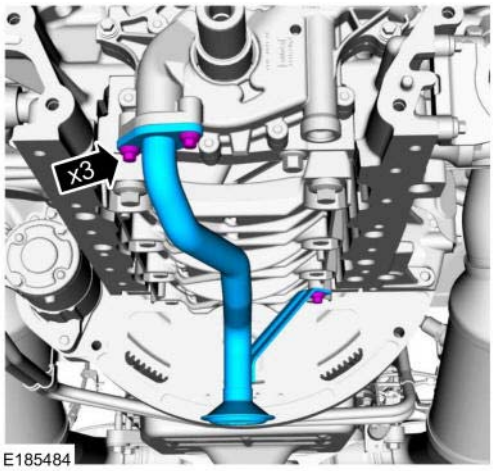

E177221

3.

Install the oil pump screen and pickup tube and the bolts.

Torque

: 89 lb.in (10 Nm)

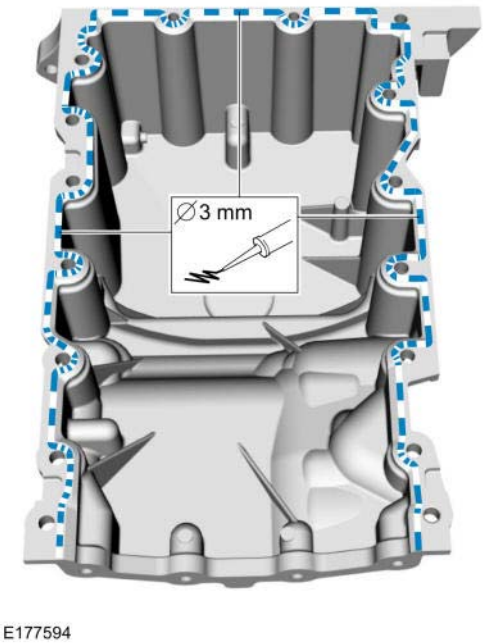


NOTE: The oil pan and the specified bolts must be installed and the oil pan aligned to the cylinder block within 4 minutes of sealant application. Final tightening of the oil pan bolts must be carried out within 60 minutes of sealant application.

4.
Apply a 3 mm (0.11 in) bead of Motorcraft® High Performance Engine RTV Silicone to the sealing surface of the oil pan.

Material

: Motorcraft® High Performance Engine RTV Silicone / TA-357 (WSE-M4G323-A6)



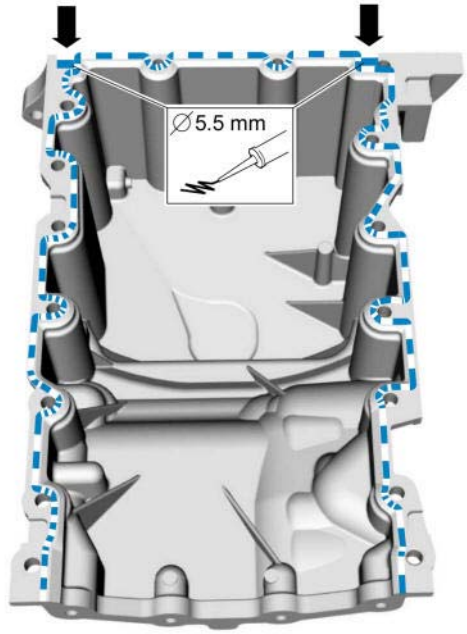
5.

Apply a 5.5 mm (0.21 in) bead of Motorcraft® High Performance Engine RTV Silicone to the 2

crankshaft seal retainer plate-to-cylinder block joint areas on the sealing surface of the oil pan.

Material

: Motorcraft® High Performance Engine RTV Silicone / TA-357 (WSE-M4G323-A6)

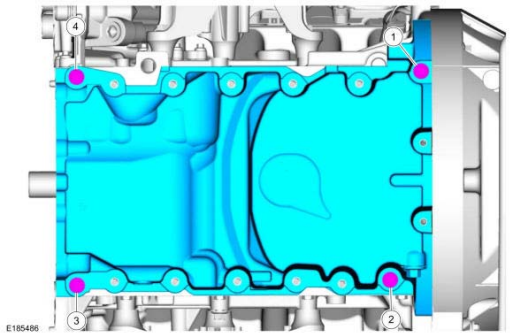


E177595

NOTE: The oil pan and the specified bolts must be installed within 4 minutes of the start of sealant application.

NOTE: Keep the oil pan as close as possible to the transmission while installing, then slide forward towards the engine front cover to prevent wiping off of the sealant.

6.
Install the bolts finger tight.



E185486

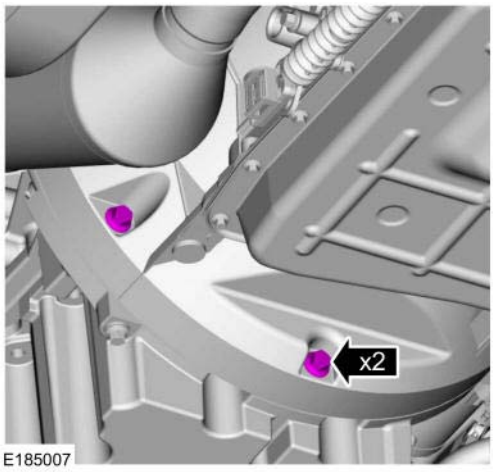
NOTE: The automatic transmission has one more bottom bellhousing-to-oil pan

bolt than the manual transmission.

NOTE: Automatic transmission shown in illustration, manual transmission similar.

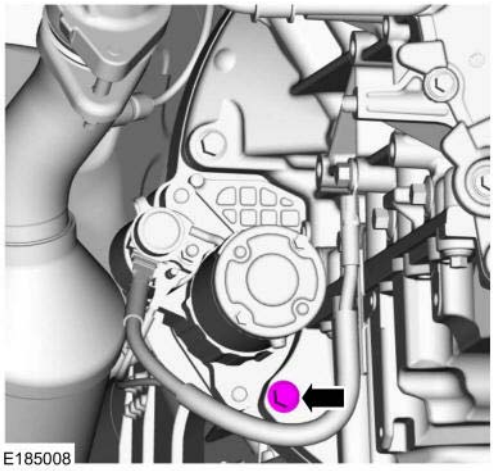
NOTE: Do not torque at this time.

7.
Install the oil pan bolts.



NOTE: Do not torque at this time.

8.
Install the oil pan bolt.

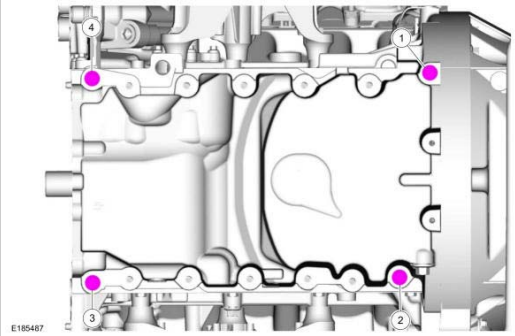


9.

Tighten the oil pan bolts in sequence.

Torque

: 27 lb.in (3 Nm)



10.

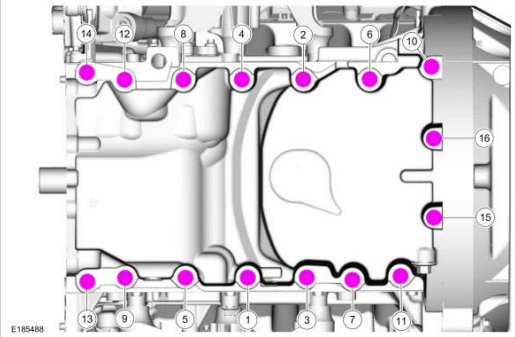
Install the remaining oil pan bolts and tighten in sequence shown in illustration.

Torque:

Stage 1: Tighten bolts 1 through 14 to: 18 lb.ft (24 Nm)

Stage 2: Tighten bolt 10 an additional: 90°

Stage 3: Tighten bolts 15 and 16 to: 89 lb.in (10 Nm)



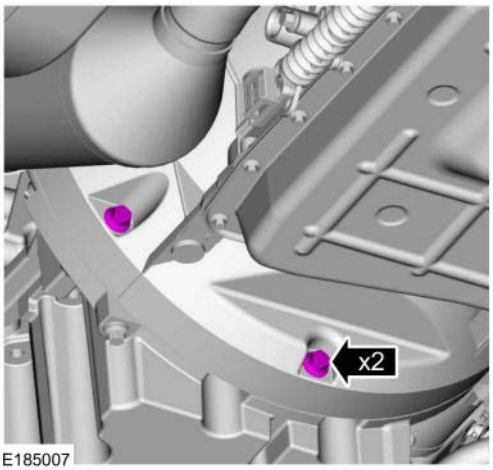
NOTE: The automatic transmission has one more bottom bellhousing-to-oil pan bolt than the manual transmission.

NOTE: Automatic transmission shown in illustration, manual transmission similar.

11.
Tighten the oil pan bolts.

Torque

: 35 lb.ft (48 Nm)

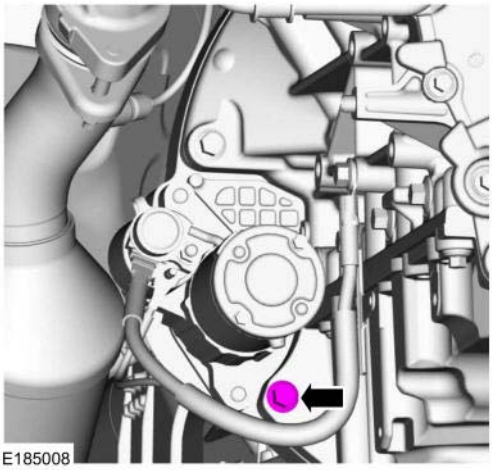


12.

Tighten the oil pan bolt.

Torque

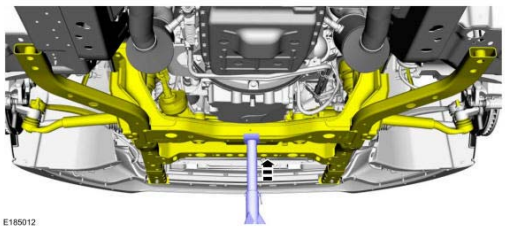
: 35 lb.ft (48 Nm)



13.

Using an adjustable stand, raise the subframe.

Use the General Equipment: Vehicle/Axle Stands



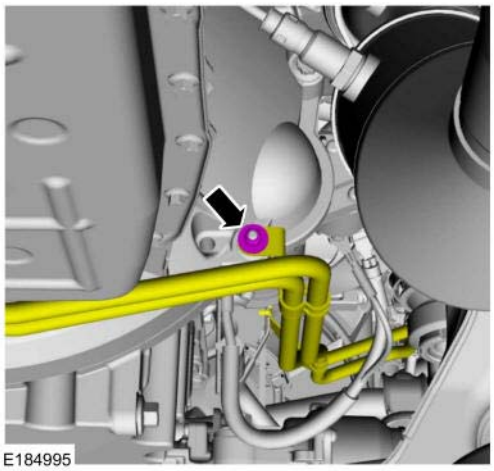
6-Speed Automatic Transmission - 6R80

14.

Position the transmission cooling tube bracket and install the nut.

Torque

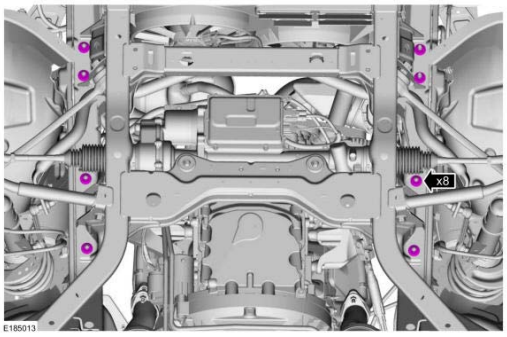
: 124 lb.in (14 Nm)



6-Speed Automatic Transmission - 6R80/6-Speed Manual Transmission - MT82

15.

Install the new front subframe nuts loosely.

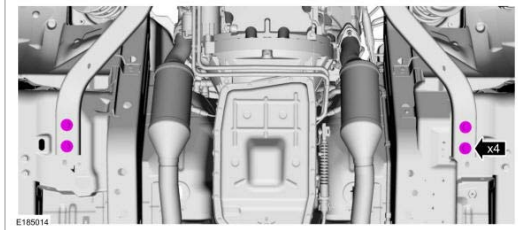


16.

Use a suitable alignment tool with a 15 mm (0.59 in) OD shaft that is long enough to go through the subframe and body.

Align the subframe to the alignment marks made during removal.

Install the new rear subframe bolts loosely.

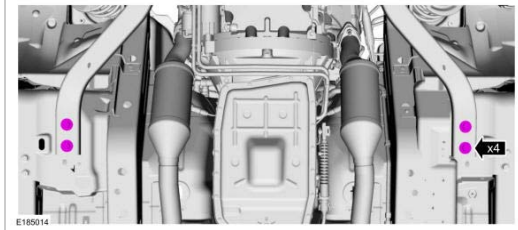


17.

Tighten the rear subframe bolts in a cross pattern.

Torque

: 85 lb.ft (115 Nm)

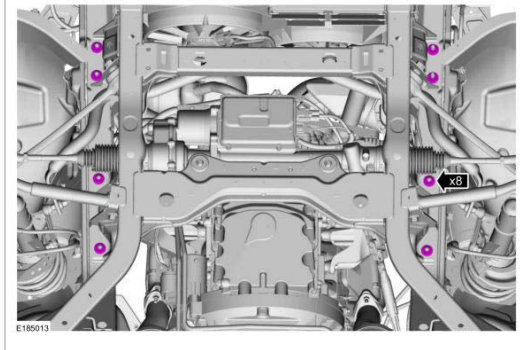


18.

Tighten the front subframe nuts in a cross pattern.

Torque

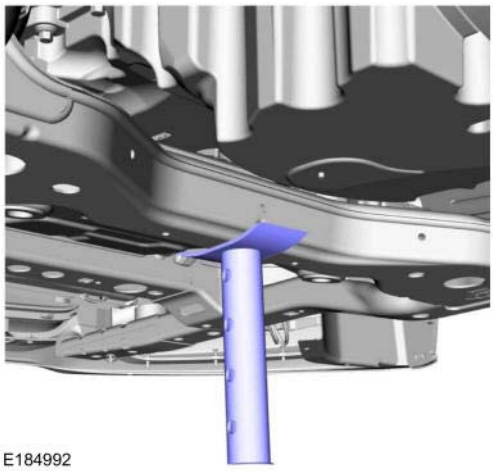
: 85 lb.ft (115 Nm)



19.

Remove the adjustable stand.

Use the General Equipment: Vehicle/Axle Stands



20.

WARNING: DO NOT hammer, pry or force steering column and column shafts during installation or removal. Failure to follow this instruction may cause damage to steering components that could lead to loss of steering control during vehicle operation and could result in serious personal injury or death.

WARNING: DO NOT attempt to remove or install the steering column lower u-joint at the steering gear without first loosening the steering column dash seal and fasteners. Failure to follow this instruction may cause damage to steering components that could lead to loss of steering control during vehicle operation and could result in serious personal injury or death.

1.

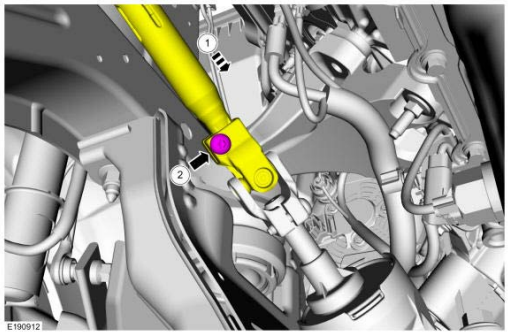
Connect the steering column shaft to the steering gear universal joint.

2.

Install the new steering column shaft bolt.

Torque

: 22 lb.ft (30 Nm)

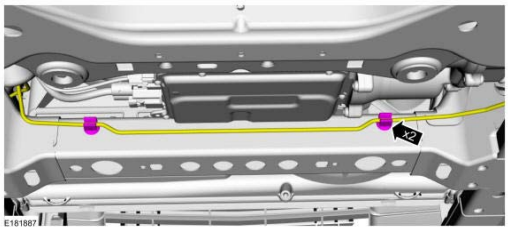


21.

Inspect the steering column lower shaft. Refer to: Steering Column Collapsed Check .

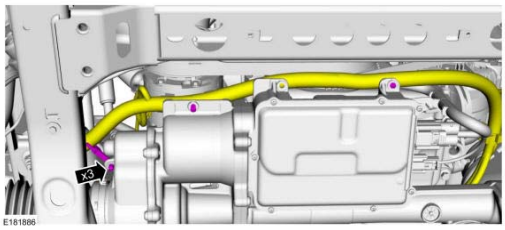
22.

Attach the brake line retainers to the subframe.



23.

Attach the EPAS wiring harness pin-type retainers.



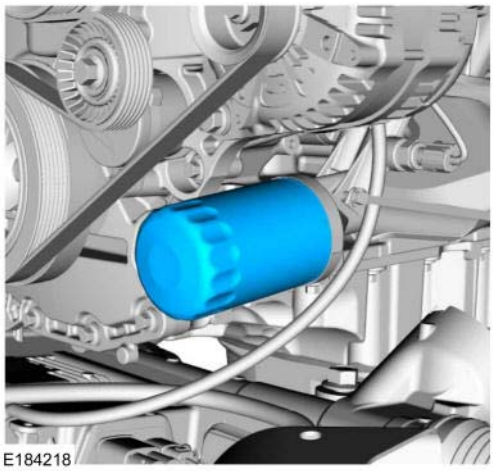
NOTE: Do not lubricate the engine oil filter gasket.

24.
Install a new oil filter.

Torque:

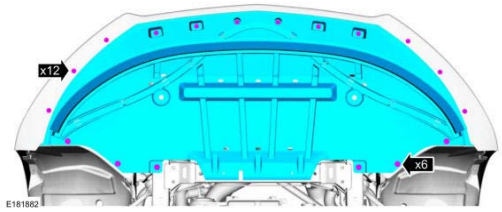
Stage 1: 44 lb.in (5 Nm)

Stage 2: 180°



25.

Install the underbody shield, bolts and the pin-type retainers.



26.

1.

Install the underbody shield and the bolts.

Torque:

A: 97 lb.in (11 Nm)

B: 18 lb.in (2 Nm)

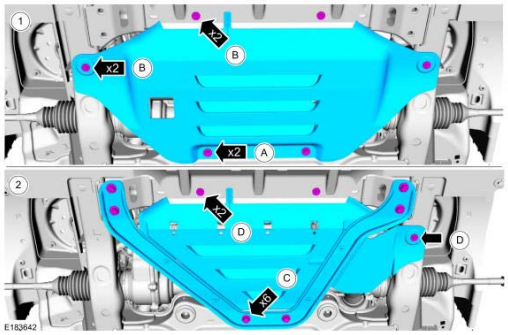
2.

Install the subframe bracket and underbody shield assembly and the bolts.

Torque:

C: 46 lb.ft (63 Nm)

D: 18 lb.in (2 Nm)

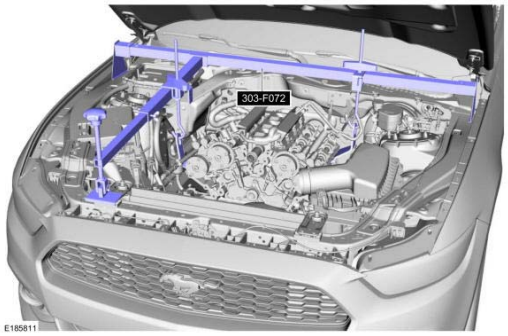


27.

Install the front wheels and tires. Refer to: Wheel and Tire .

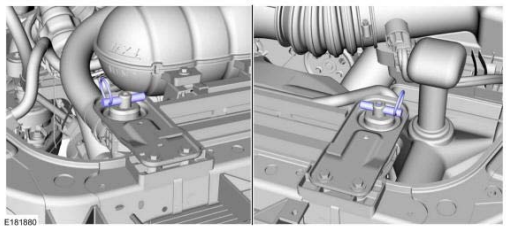
28.

Remove Special Service Tool: 303-F072 Support Bar, Engine.



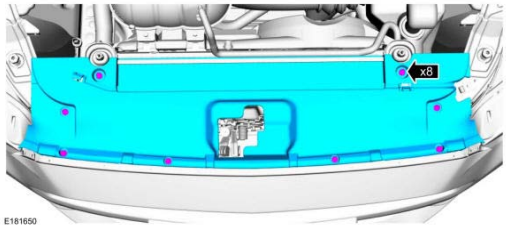
29.

Remove the retaining pins.



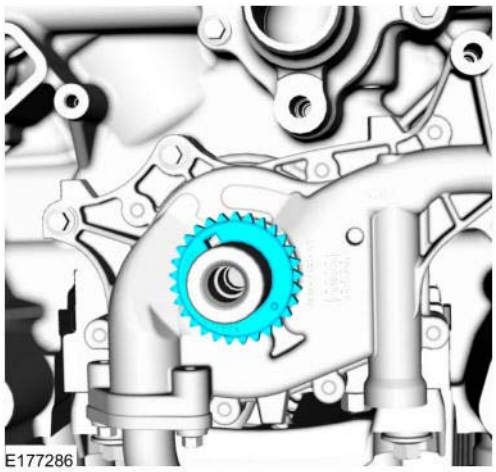
30.

Install the radiator top shield and the retainers.



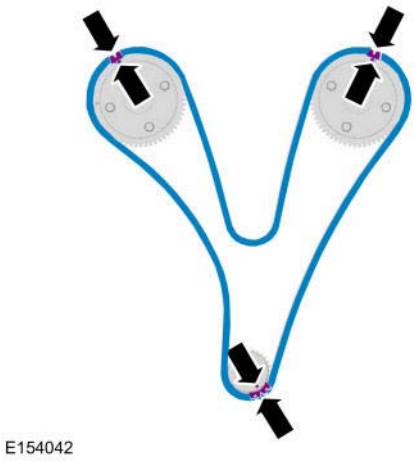
31.

Install the crankshaft sprocket with the timing dot mark out.



NOTE: It may be necessary to rotate the camshafts slightly, to align the timing marks.

32.
Install the timing chain with the colored links aligned with the timing marks on the VCT units and the crankshaft sprocket.

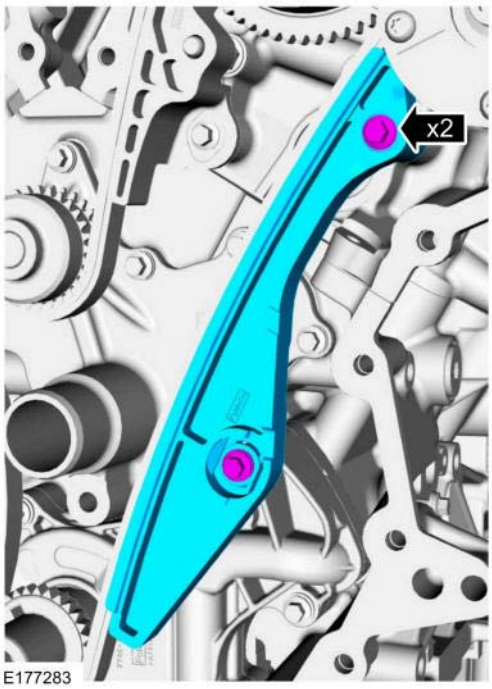


33.

Install the lower LH timing chain guide and the bolts.

Torque

: 89 lb.in (10 Nm)



34.

Install the timing chain tensioner arm.



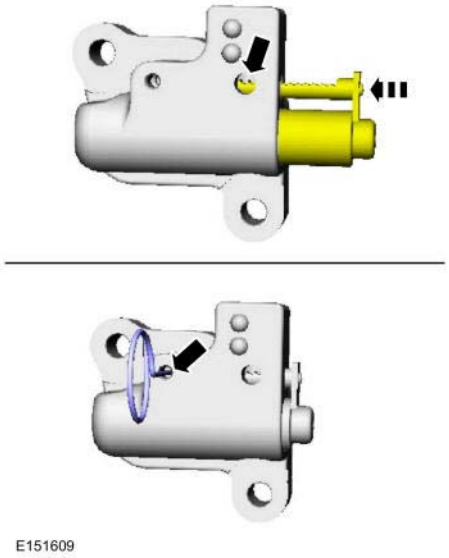
35.

Release the ratchet detent.

Using a soft-jawed vise, compress the ratchet plunger.

Align the hole in the ratchet plunger with the hole in the tensioner housing.

Install a lockpin.



NOTE: It may be necessary to rotate the camshafts slightly to remove slack from the timing chain to install the tensioner.

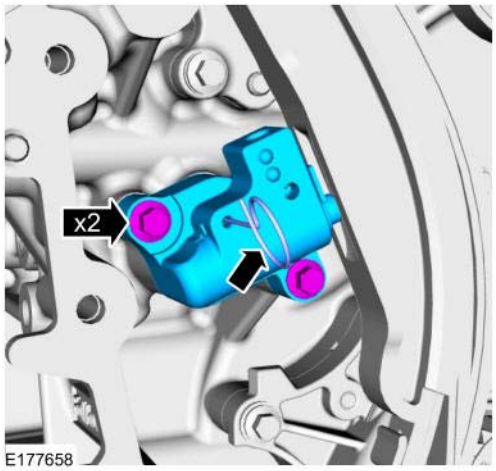
36.

Install the timing chain tensioner and the bolts.

Torque

: 89 lb.in (10 Nm)

Remove the lockpin.

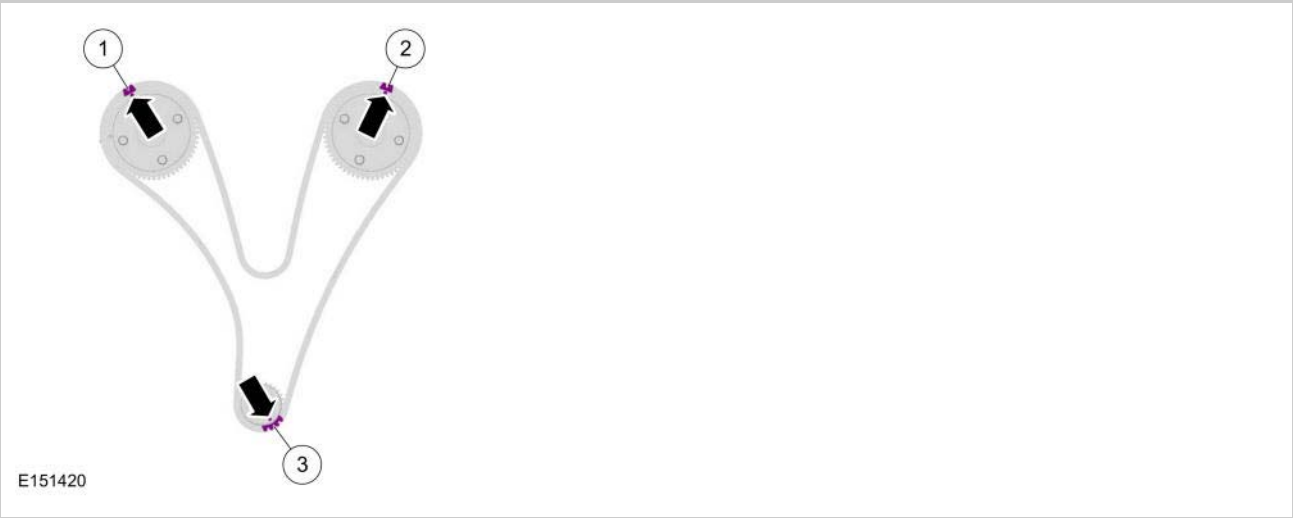


37.

As a post-check, verify correct alignment of all timing marks.

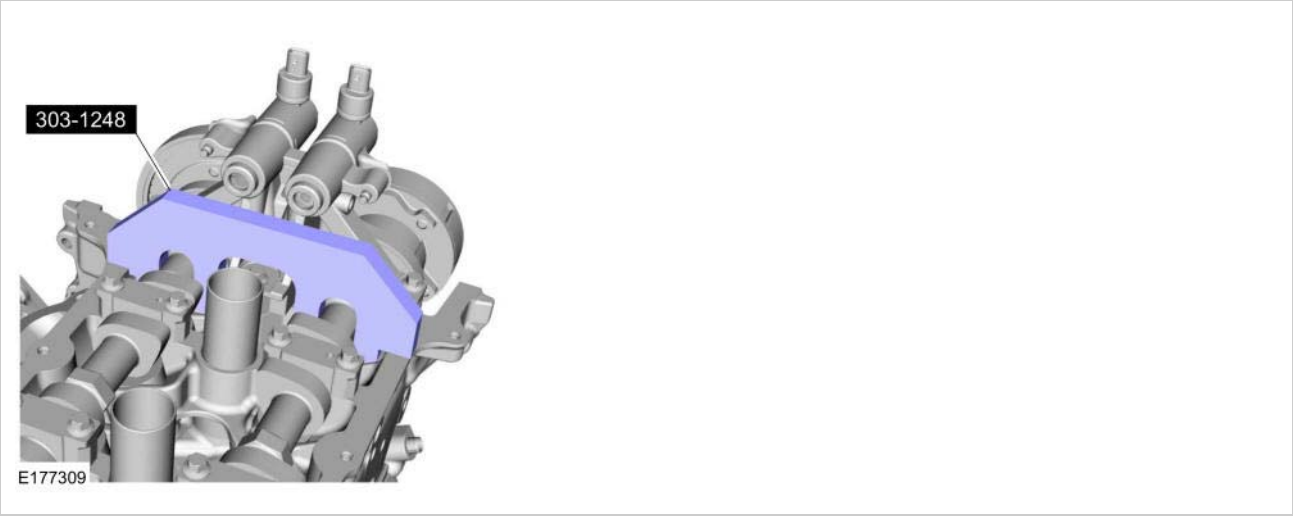
There are 48 links in between the RH intake VVT unit colored link (1) and the LH intake VVT unit colored link (2).

There are 35 links in between LH intake VVT unit colored link (2) and the crankshaft sprocket links (3).



38.

Remove Special Service Tool: 303-1248 Camshaft holding tools.



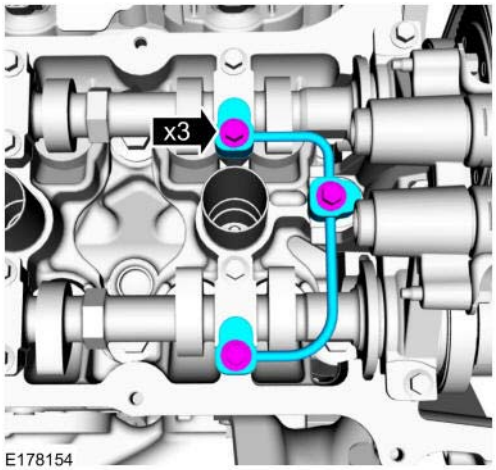
39.

Install the RH oil tube and the bolts.

Torque:

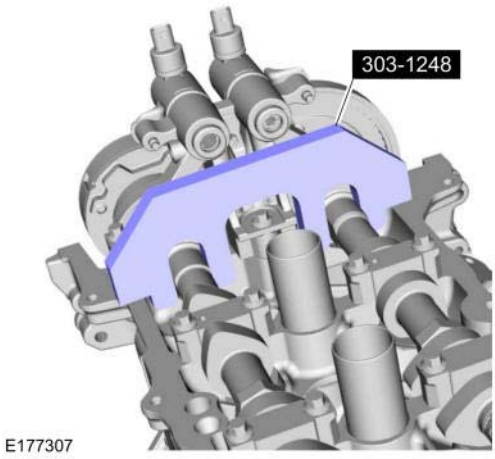
Stage 1: 71 lb.in (8 Nm)

Stage 2: 45°



40.

Remove Special Service Tool: 303-1248 Camshaft holding tools.



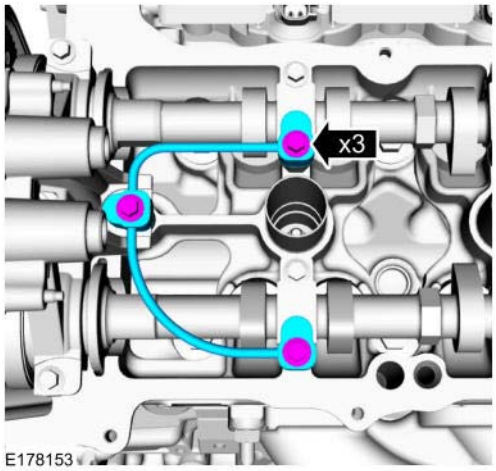
41.

Install the LH oil tube and the bolts.

Torque:

Stage 1: 71 lb.in (8 Nm)

Stage 2: 45°



42.

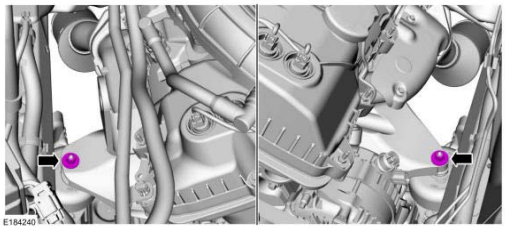
Install the engine front cover. Refer to: Engine Front Cover .

43.

Install the RH and LH engine mount nuts.

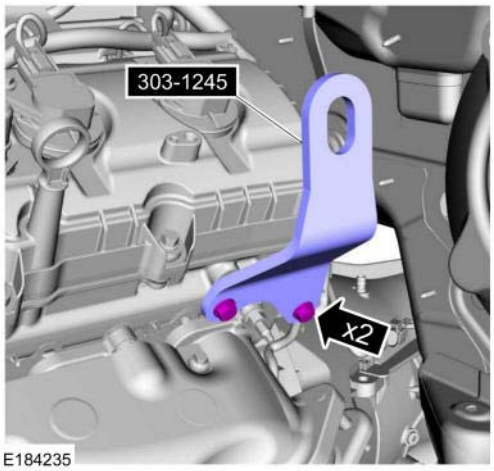
Torque

: 46 lb.ft (63 Nm)



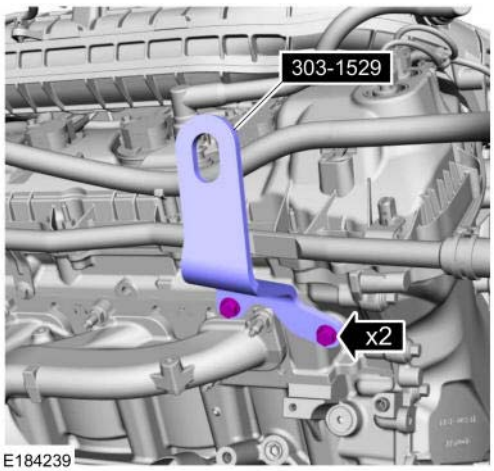
44.

Remove Special Service Tool: 303-1245 Engine Lift Eye.



45.

Remove Special Service Tool: 303-1529 Lift Eye, Engine.

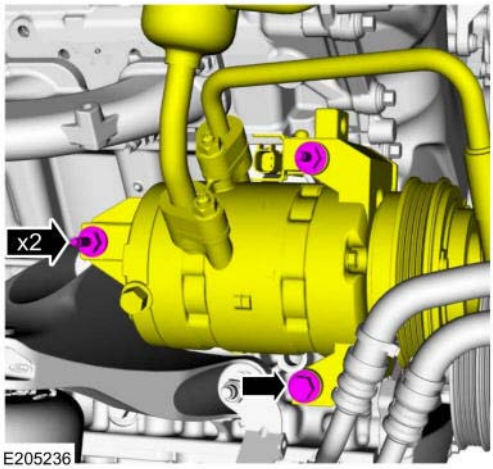


46.

Position the A/C compressor and install the stud bolts and bolt.

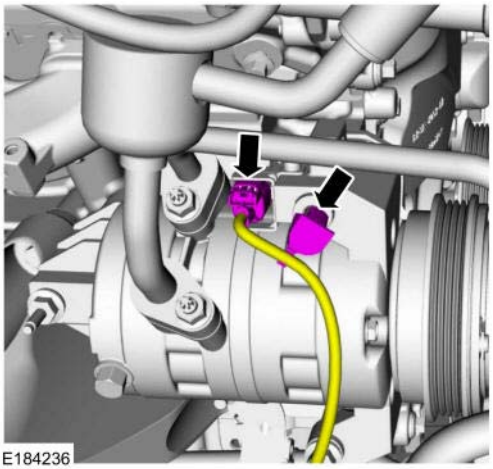
Torque

: 18 lb.ft (25 Nm)



47.

Connect the A/C compressor electrical connector and the wire harness retainer.

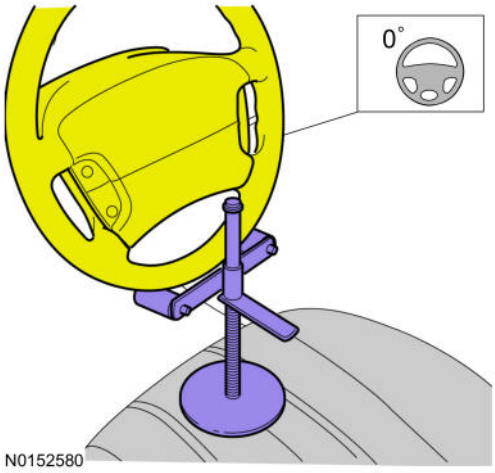


48.

Install the A/C compressor belt. Refer to: AIR CONDITIONING (A C) COMPRESSOR BELT .

49.

Remove the holding device.



50.

1.

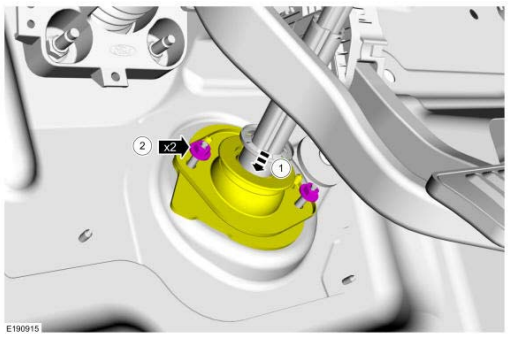
Position the steering column dash seal.

2.

Tighten the steering column dash seal nuts.

Torque

: 80 lb.in (9 Nm)



Convertible

51.

Install the cowl extension and the bolts.

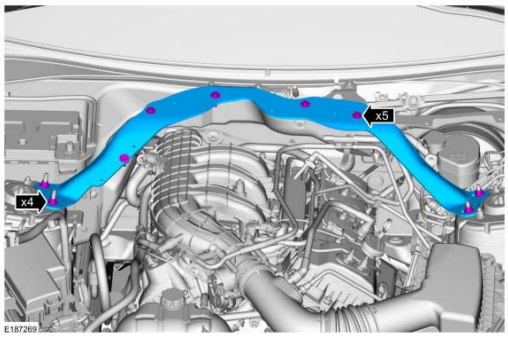
Torque

: 26 lb.ft (35 Nm)

Install the cowl extension nuts.

Torque

: 41 lb.ft (55 Nm)

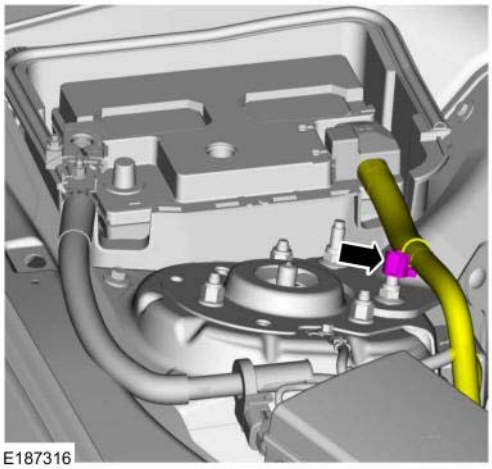


52.

Connect the positive battery cable. Refer to: Battery Disconnect and Connect .

53.

Attach the battery cable retainer.



6-Speed Automatic Transmission - 6R80/6-Speed Manual Transmission - MT82

54.

Install the cowl panel grille. Refer to: Cowl Panel Grille .

55.

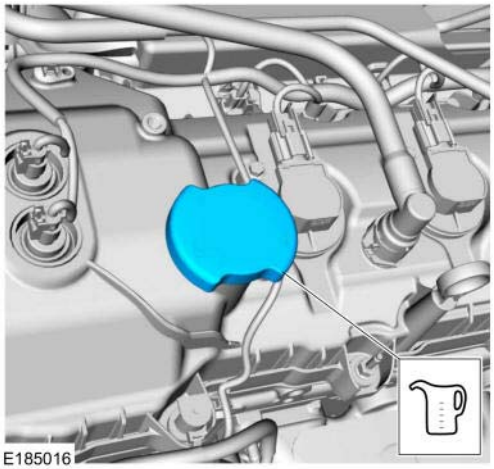
Connect the negative battery cable. Refer to: Battery Disconnect and Connect .

56.

Fill the engine with clean engine oil. Refer to: Specifications .

Material

: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W20-QSP (U.S.) (WSS-M2C945-A)



REMOVAL AND INSTALLATION > TIMING CHAIN

Special Tool(s) / General Equipment

 E216421	303-1248 Camshaft holding tools TKIT-2006UF-FLM TKIT-2006UF-ROW

REMOVAL AND INSTALLATION > TIMING CHAIN > REMOVAL

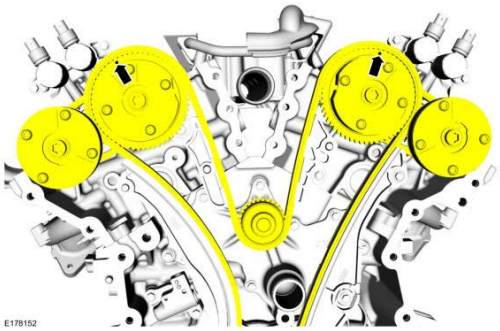
NOTE: During engine repair procedures, cleanliness is extremely important. Any foreign material, including any material created while cleaning gasket surfaces, that enters the oil passages, coolant passages or the oil pan may cause engine failure.

1.

Remove the engine front cover. Refer to: Engine Front Cover .

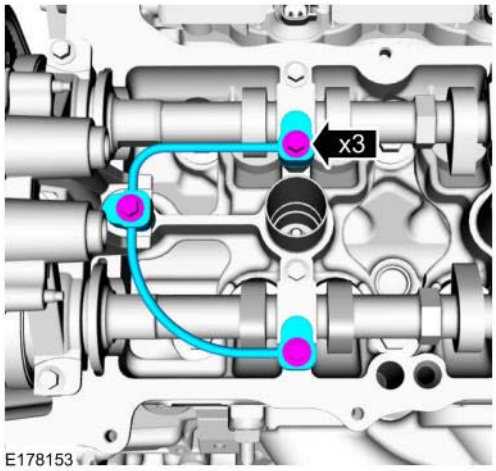
NOTE: Rotate the crankshaft in a clockwise direction only.

2.
Rotate the crankshaft clockwise and align the timing marks on the intake VCT units as shown in illustration.



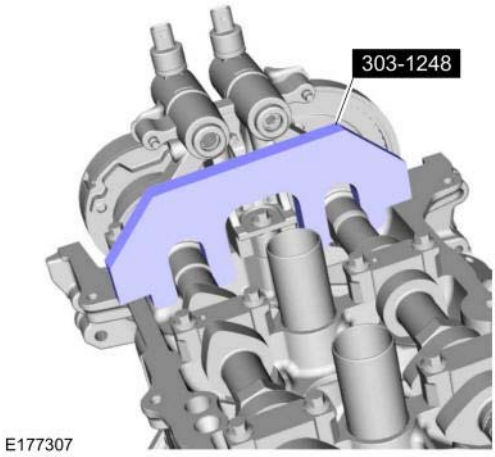
3.

Remove the bolts and the LH oil tube.



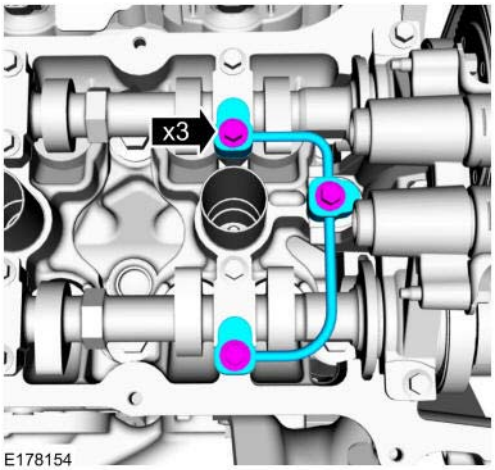
NOTE: The Camshaft Holding Tool will hold the camshafts in the TDC position.

4.
Install Special Service Tool: 303-1248 Camshaft holding tools.



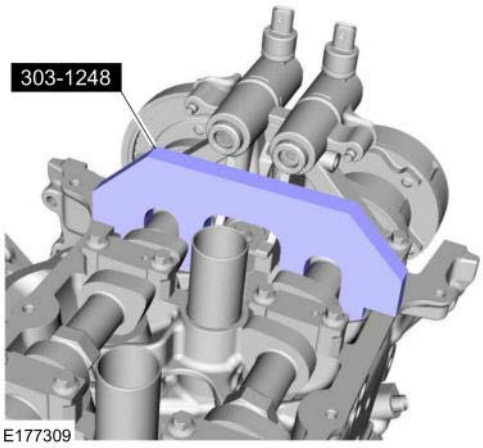
5.

Remove the bolts and the RH oil tube.



NOTE: The Camshaft Holding Tool will hold the camshafts in the TDC position.

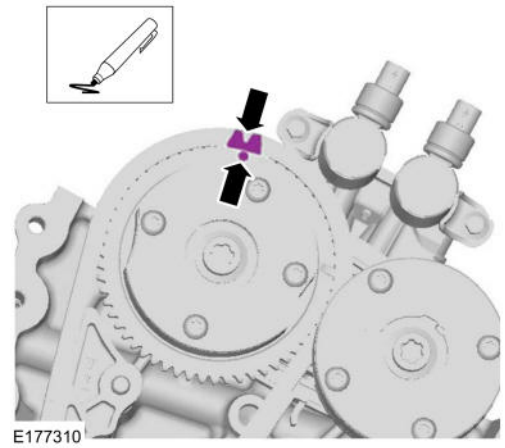
6.
Install Special Service Tool: 303-1248 Camshaft holding tools.



NOTE: ***The following 3 steps are for timing chains that the colored links are not visible.***

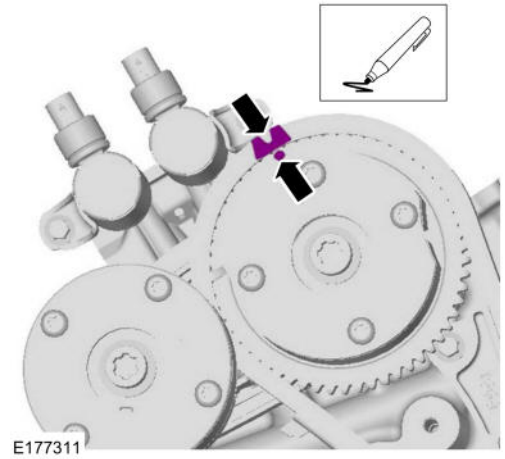
7.

Mark the timing chain link that aligns with the timing mark on the LH intake VCT unit as shown in illustration.



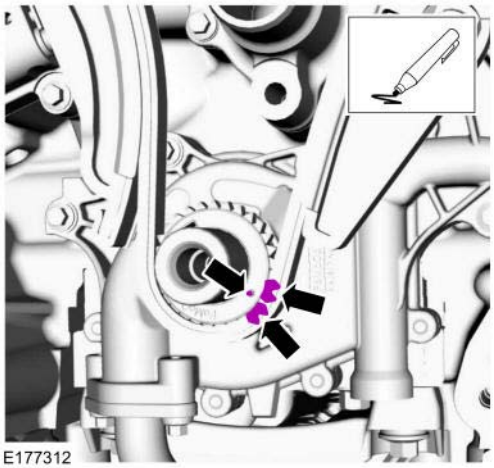
8.

Mark the timing chain link that aligns with the timing mark on the RH intake VCT unit as shown in illustration.



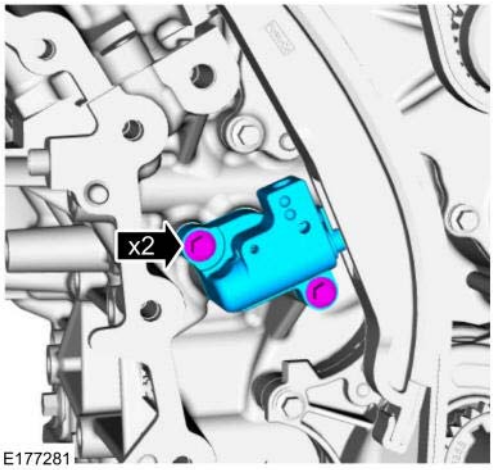
NOTE: The crankshaft sprocket timing mark should be between the colored links.

9.
Mark the timing chain links that aligns with the timing mark on the crankshaft sprocket as shown in illustration.



10.

Remove the bolts and the timing chain tensioner.



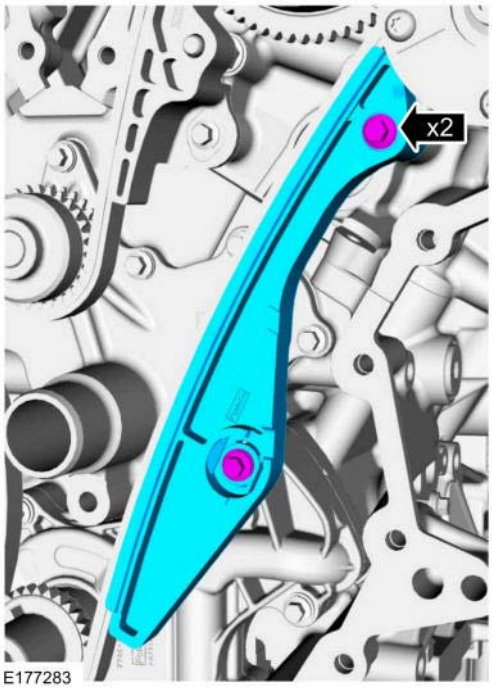
11.

Remove the timing chain tensioner arm.


E177282

12.

Remove the bolts and the lower LH timing chain guide.



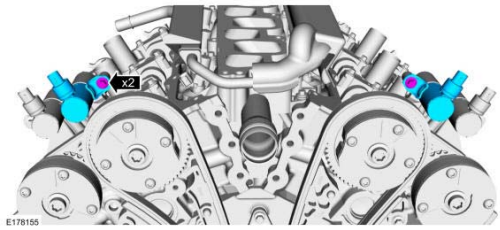
E177283

NOTE: Removal of the VCT oil control solenoid will aid in the removal of the timing chain.

NOTE: A slight twisting motion will aid in the removal of the VCT oil control solenoids.

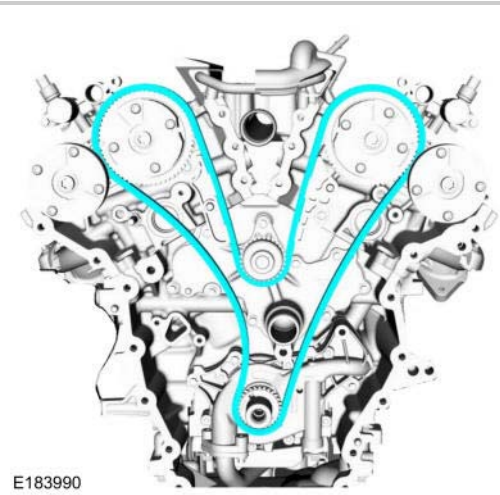
NOTE: Keep the VCT oil control solenoid clean of dirt and debris.

13.
Remove the bolts and the VCT oil control solenoids.



14.

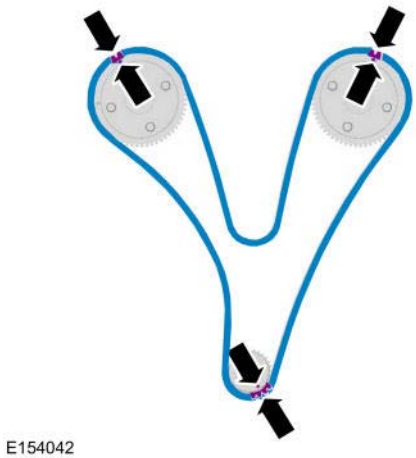
Remove the timing chain.



REMOVAL AND INSTALLATION > TIMING CHAIN > INSTALLATION

NOTE: It may be necessary to rotate the camshafts slightly, to align the timing marks.

1.
Install the timing chain with the colored links aligned with the timing marks on the VCT units and the crankshaft sprocket.

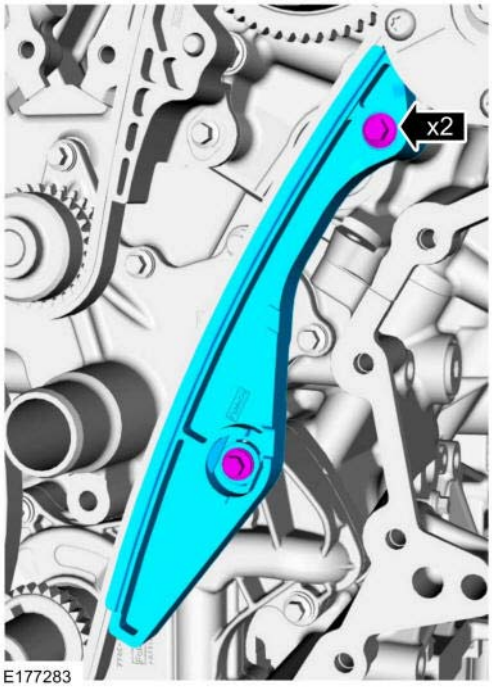


2.

Install the lower LH timing chain guide and the bolts.

Torque

: 89 lb.in (10 Nm)



3.

Install the timing chain tensioner arm.


E177282

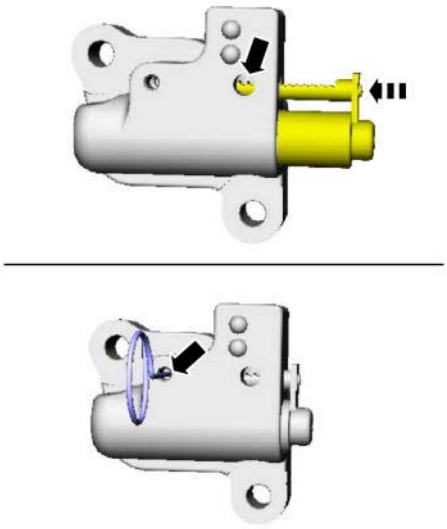
4.

Release the ratchet detent.

Using a soft-jawed vise, compress the ratchet plunger.

Align the hole in the ratchet plunger with the hole in the tensioner housing.

Install a lockpin.


E151609

NOTE: It may be necessary to rotate the camshafts slightly to remove slack from

the timing chain to install the tensioner.

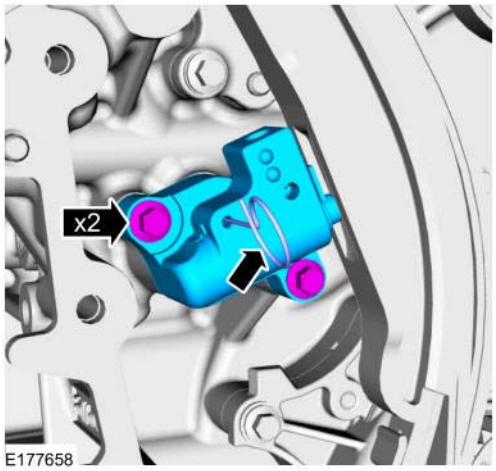
5.

Install the timing chain tensioner and the bolts.

Torque

: 89 lb.in (10 Nm)

Remove the lockpin.



6.

As a post-check, verify correct alignment of all timing marks.

There are 48 links in between the RH intake VCT unit colored link (1) and the LH intake VCT unit colored link (2).

There are 35 links in between LH intake VCT unit colored link (2) and the 2 crankshaft sprocket links (3).



NOTE: Do not use excessive force when installing the VCT oil control solenoid. Damage to the mega cap could cause the cylinder head to be inoperable. If difficult to install the VCT oil control solenoid, inspect the bore and VCT oil control solenoid to ensure there are no burrs, sharp edges or contaminants present on the mating surface. Only clean the external surfaces as necessary.

NOTE: A slight twisting motion will aid in the installation of the VCT oil control solenoid.

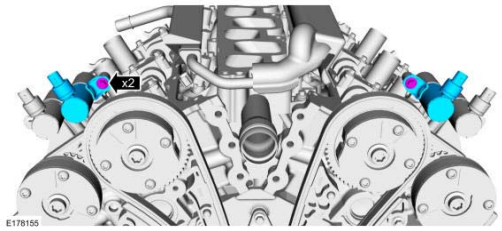
NOTE: Keep the VCT oil control solenoid clean of dirt and debris.

7.
Install the VCT oil control solenoids and the bolts.

Torque:

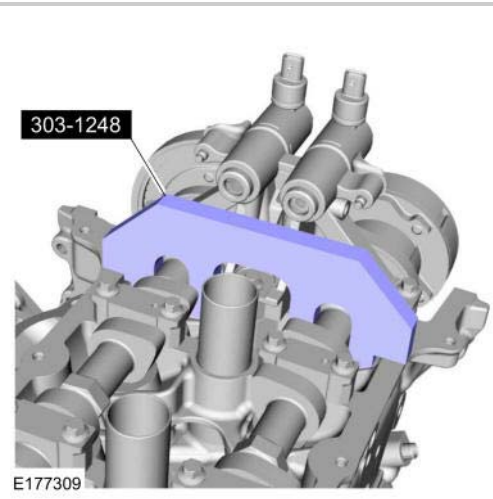
Stage 1: 71 lb.in (8 Nm)

Stage 2: 20°



8.

Remove Special Service Tool: 303-1248 Camshaft holding tools.



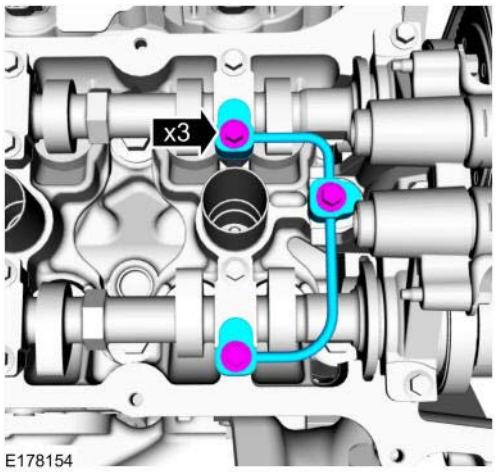
9.

Install the RH oil tube and the bolts.

Torque:

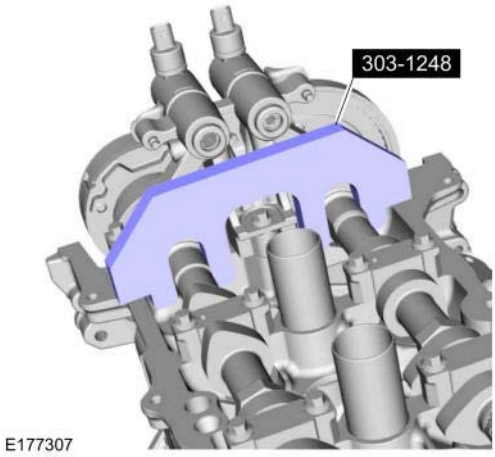
Stage 1: 71 lb.in (8 Nm)

Stage 2: 45°



10.

Remove Special Service Tool: 303-1248 Camshaft holding tools.



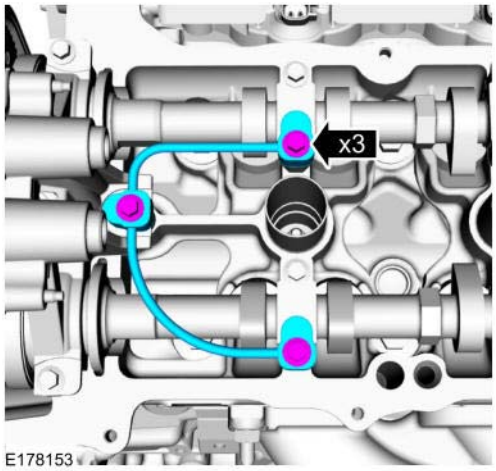
11.

Install the LH oil tube and the bolts.

Torque:

Stage 1: 71 lb.in (8 Nm)

Stage 2: 45°



12.

Install the engine front cover. Refer to: Engine Front Cover .

REMOVAL AND INSTALLATION > UPPER INTAKE MANIFOLD

Special Tool(s) / General Equipment

Hose Clamp Remover/Installer

REMOVAL AND INSTALLATION > UPPER INTAKE MANIFOLD > REMOVAL

NOTE: If the engine is repaired or replaced because of upper engine failure, typically including valve or piston damage, check the intake manifold for metal debris. If metal debris is found, install a new intake manifold. Failure to follow these instructions can result in engine damage.

1.

Remove the air cleaner outlet pipe. Refer to: AIR CLEANER OUTLET PIPE .

2.

1.

Disconnect the vacuum hose from the upper intake manifold.

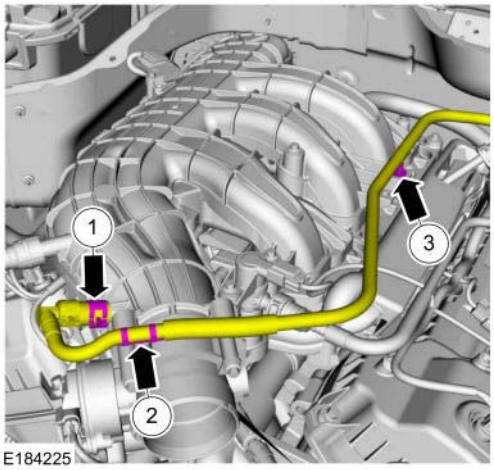
Use the General Equipment: Hose Clamp Remover/Installer

2.

Detach the vacuum hose retainer from the throttle body.

3.

Detach the vacuum hose retainer from the upper intake manifold.

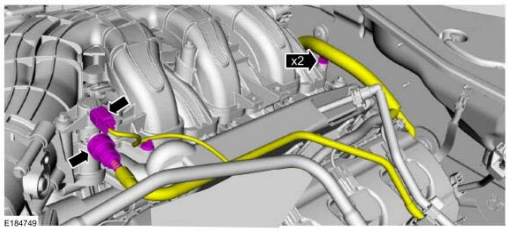


3.

Disconnect the EVAP purge valve electrical connector.

Detach the wiring harness retainers.

Disconnect the EVAP purge valve quick release coupling. Refer to: QUICK RELEASE COUPLING .



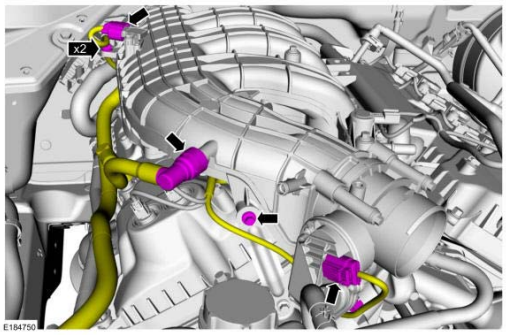
4.

Disconnect the PCV tube from the upper intake manifold and position aside.

Disconnect the throttle body and MAP sensor electrical connectors.

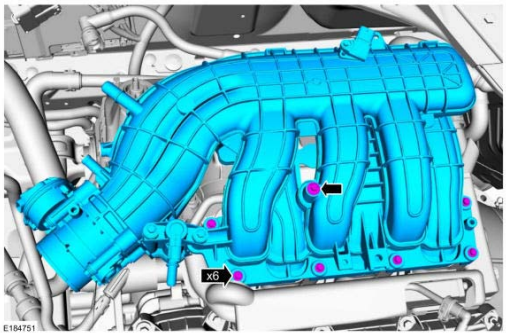
Disconnect the wiring harness retainers.

Remove the upper intake manifold support bolt.



5.

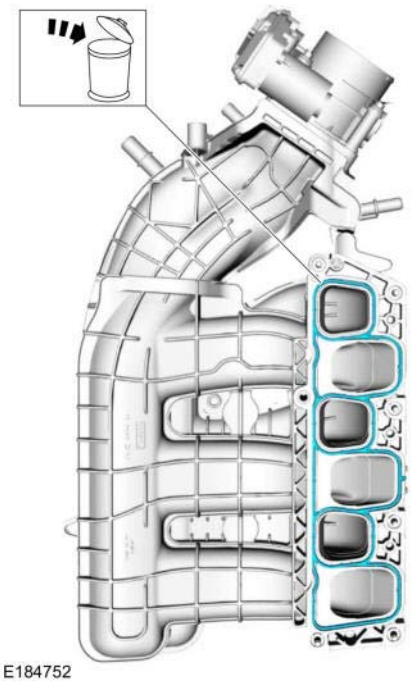
Remove the bolts and the upper intake manifold.



6.

Remove and discard the upper intake manifold gaskets.

Clean and inspect all of the sealing surfaces of the upper and lower intake manifold.

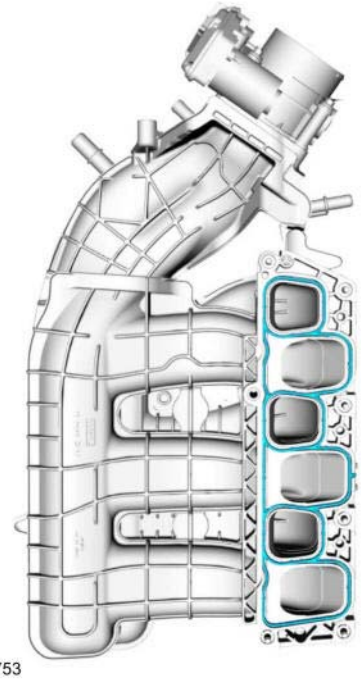


REMOVAL AND INSTALLATION > UPPER INTAKE MANIFOLD > INSTALLATION

NOTE: If the engine is repaired or replaced because of upper engine failure, typically including valve or piston damage, check the intake manifold for metal debris. If metal debris is found, install a new intake manifold. Failure to follow these instructions can result in engine damage.

1.

Install the new upper intake manifold gaskets.



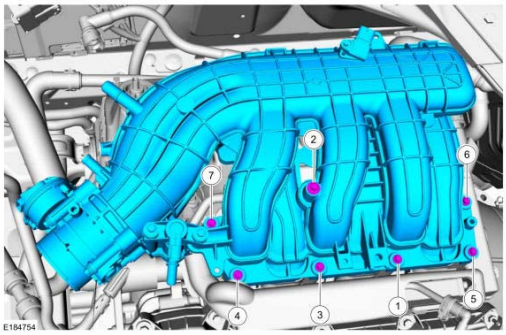
2.

Install the upper intake manifold and the bolts.

Torque:

Stage 1: 89 lb.in (10 Nm)

Stage 2: 45°



3.

Install the upper intake manifold support bolt.

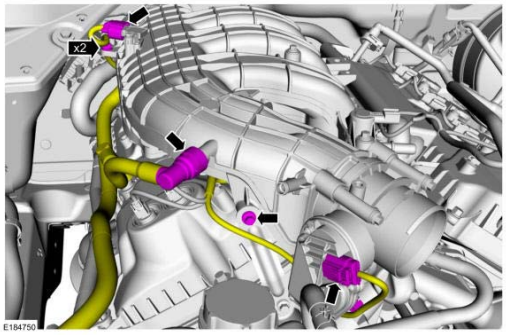
Torque

: 89 lb.in (10 Nm)

Connect the wiring harness retainers.

Connect the throttle body and MAP sensor electrical connectors.

Connect the PCV tube to the upper intake manifold.

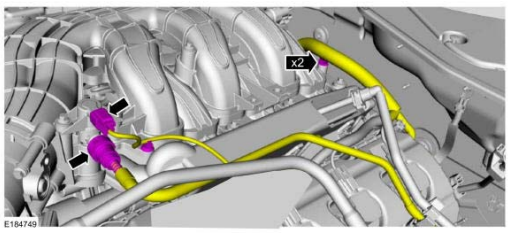


4.

Connect the EVAP purge valve quick release coupling. Refer to: QUICK RELEASE COUPLING .

Attach the wiring harness retainers.

Connect the EVAP purge valve electrical connector.



5.

1.

Connect the vacuum hose to the upper intake manifold.

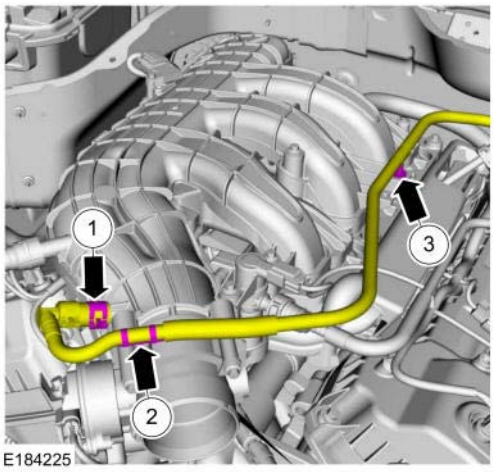
Use the General Equipment: Hose Clamp Remover/Installer

2.

Attach the vacuum hose retainer to the throttle body.

3.

Attach the vacuum hose retainer to the upper intake manifold.



6.

Install the air cleaner outlet pipe. Refer to: AIR CLEANER OUTLET PIPE .

REMOVAL AND INSTALLATION > VALVE COVER LH

Special Tool(s) / General Equipment

	205-142 (T80T-4000-J) Installer, Differential Bearing Cone
	205-153 (T80T-4000-W) Handle

 E175042	303-1247VCT Spark Plug Tube Seal Remover and Installer TKIT-2006UF-FLM TKIT-2006UF-ROW
Plastic Scraper	

Materials

Name	Specification
Motorcraft® High Performance Engine RTV Silicone TA-357	WSE-M4G323-A6
Motorcraft® Silicone Gasket Remover ZC-30-A	-
Motorcraft® Metal Surface Prep ZC-31-B	-
Metal Brake Parts Cleaner (U.S.)PM-4-A, PM-4-B (U.S.)	-

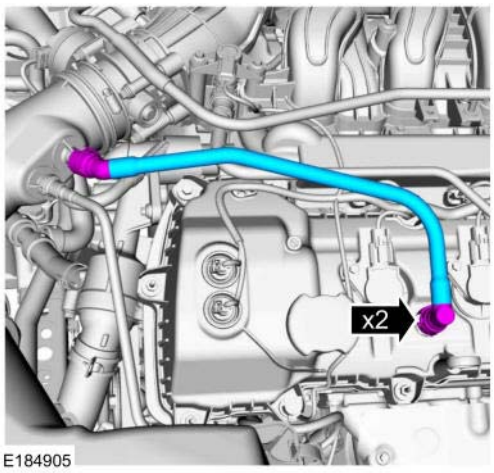
REMOVAL AND INSTALLATION > VALVE COVER LH > REMOVAL

NOTE: Installation of new spark plug seals or VCT seals is only required if seals are damaged.

NOTE: During engine repair procedures, cleanliness is extremely important. Any foreign material, including any material created while cleaning gasket surfaces that enters the oil passages, coolant passages or the oil pan, can cause engine failure.

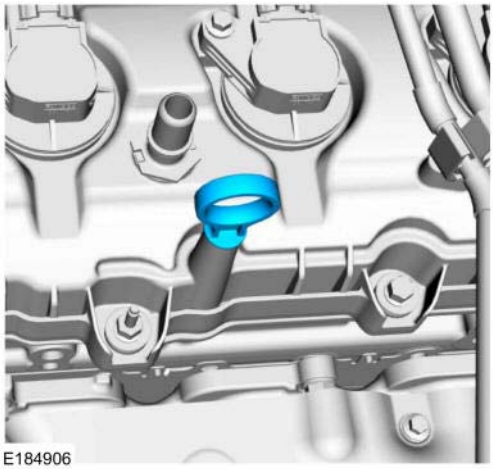
1.

Remove the crankcase vent tube.



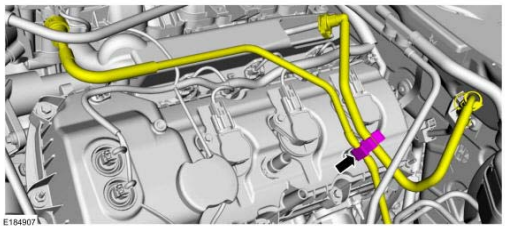
2.

Remove the oil level indicator.



3.

Detach the fuel supply tube and EVAP tube retainer from the LH valve cover.



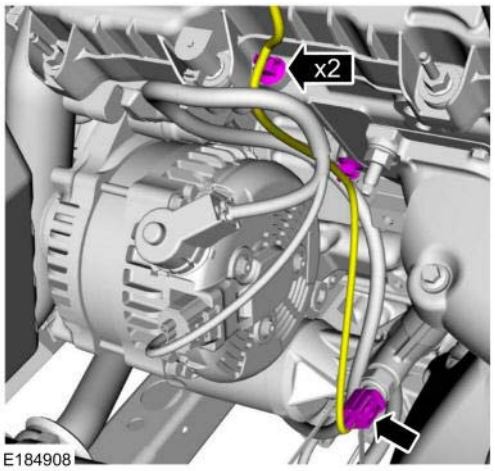
4.

Remove the LH ignition coil-on-plugs. Refer to: IGNITION COIL-ON-PLUG .

5.

Disconnect the oil pressure switch electrical connector.

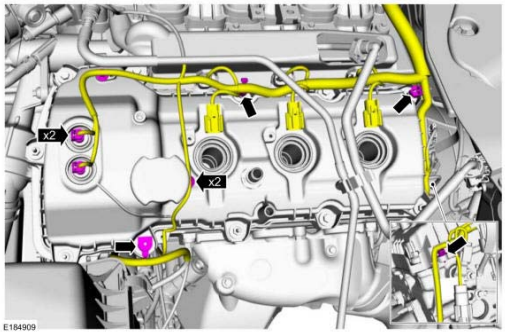
Detach the wiring harness retainers.



6.

Disconnect the VCT oil control solenoid electrical connectors.

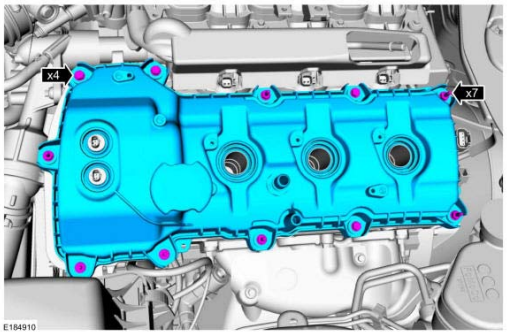
Detach the wiring harness retainers.



NOTE: While removing the valve cover do not apply excessive force to the VCT oil control solenoid or damage may occur.

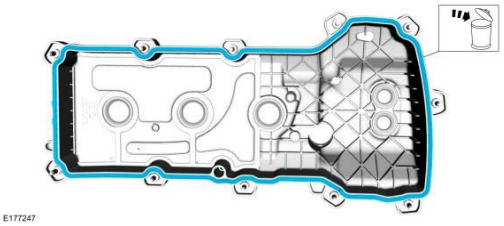
NOTE: If the VCT oil control solenoid sticks to the VCT seal, carefully wiggle the valve cover until the bond breaks free or damage to the VCT seal and VCT oil control solenoid may occur.

7.
Loosen the bolts and remove the valve cover.



8.

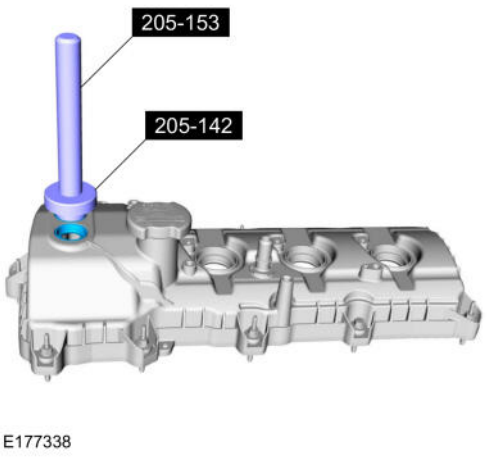
Remove and discard the valve cover gasket.



NOTE: Inspect the VCT oil control solenoid seals. Remove any damaged seals.

9.
If necessary, using the special tools, remove the VCT oil control solenoid seals.

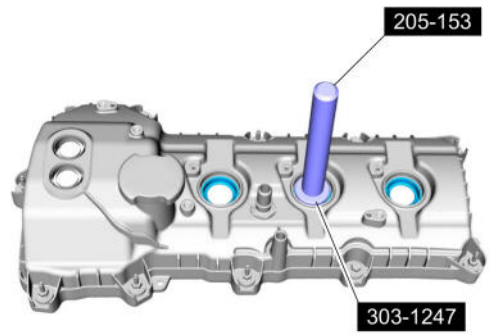
Use Special Service Tool: 205-142 (T80T-4000-J) Installer, Differential Bearing Cone, 205-153 (T80T-4000-W) Handle.



NOTE: Inspect the spark plug tube seals. Remove any damaged seals.

10.
If necessary, using the special tools, remove the spark plug tube seals.

Use Special Service Tool: 303-1247 VCT Spark Plug Tube Seal Remover and Installer, 205-153 (T80T-4000-W) Handle.



E177339

11.

Make sure that the mating faces are clean and free of foreign material. Refer to: RTV Sealing Surface Cleaning and Preparation .

Use the General Equipment: Plastic Scraper

Material

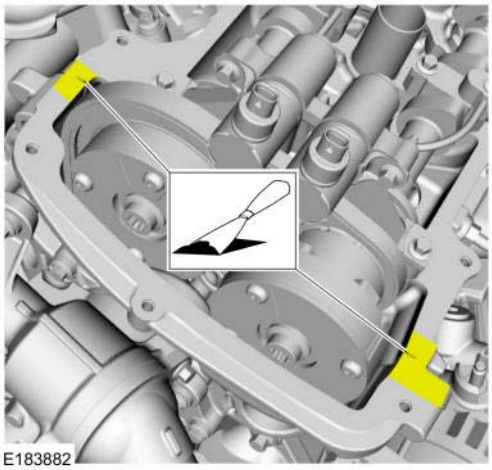
: Motorcraft® Silicone Gasket Remover / ZC-30-A

Material

: Metal Brake Parts Cleaner (U.S.) / PM-4-A, PM-4-B (U.S.)

Material

: Motorcraft® Metal Surface Prep / ZC-31-B



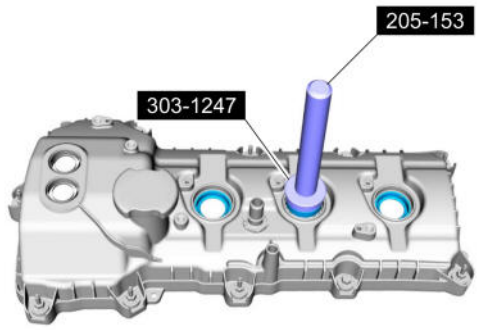
E183882

REMOVAL AND INSTALLATION > VALVE COVER LH > INSTALLATION

NOTE: Installation of new seals is only required if damaged seals were removed.

1.
If removed, using the special tools, install the spark plug tube seals.

Use Special Service Tool: 303-1247 VCT Spark Plug Tube Seal Remover and Installer, 205-153 (T80T-4000-W) Handle.

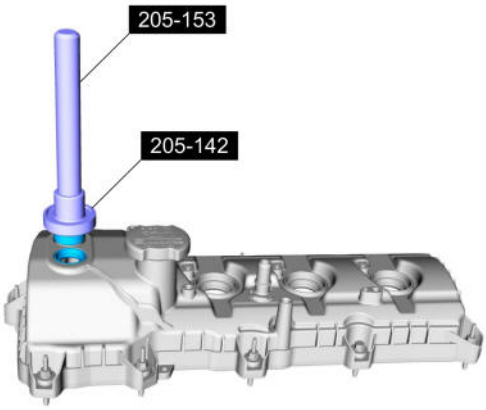


E177702

NOTE: Installation of new seals is only required if damaged seals were removed.

2.
If removed, using the special tools, install the VCT oil control solenoid seals.

Use Special Service Tool: 205-142 (T80T-4000-J) Installer, Differential Bearing Cone, 205-153 (T80T-4000-W) Handle.



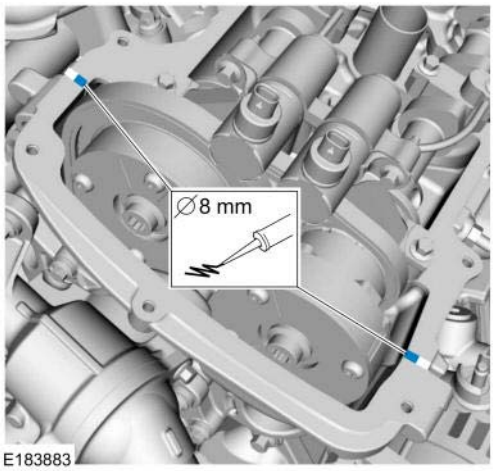
E177703

NOTE: If the valve cover is not installed and the fasteners tightened within 4 minutes, the sealant must be removed and the sealing area cleaned.

3.
Apply an 8 mm (0.31 in) bead of Motorcraft® High Performance Engine RTV Silicone to the engine front cover-to-cylinder head joints.

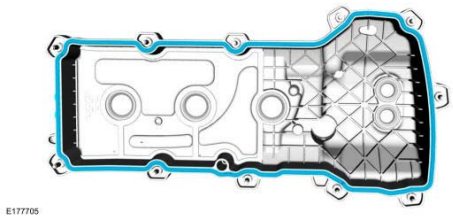
Material

: Motorcraft® High Performance Engine RTV Silicone / TA-357 (WSE-M4G323-A6)



4.

Install a new valve cover gasket.

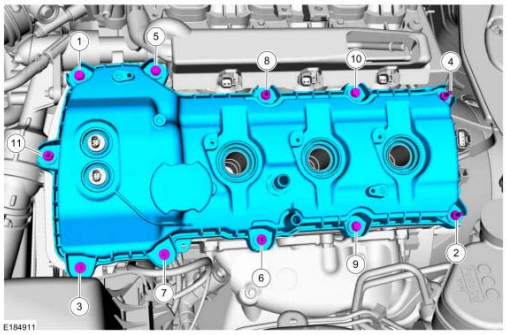


5.

Install the valve cover and tighten the bolts.

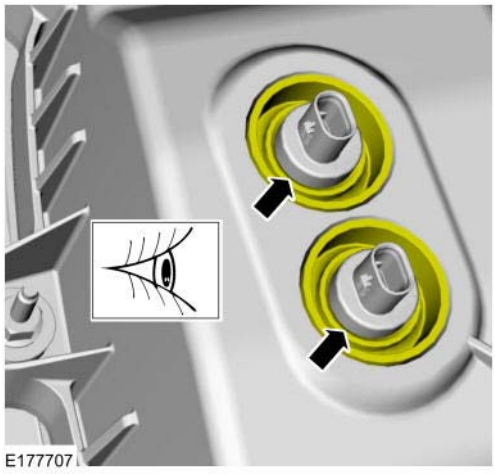
Torque

: 89 lb.in (10 Nm)



6.

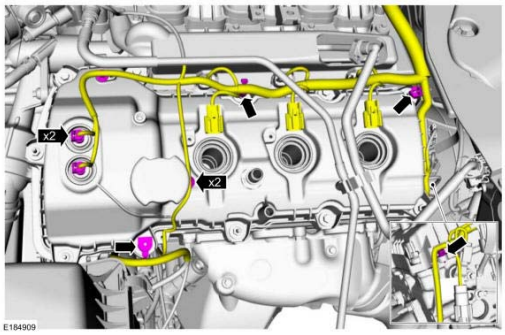
Make sure the VCT seals in the valve cover are below the top of the VCT oil control solenoid electrical connector or the VCT seal may leak oil.



7.

Attach the wiring harness retainers.

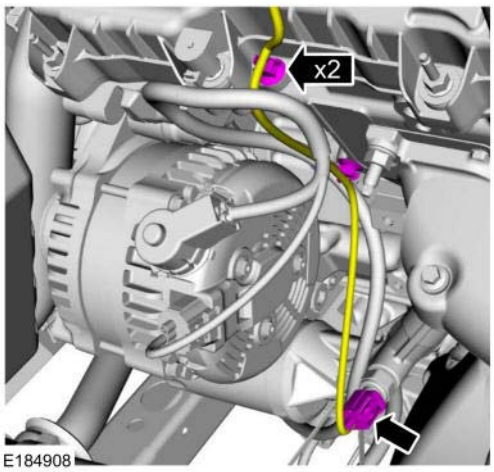
Connect the VCT oil control solenoid electrical connectors.



8.

Attach the wiring harness retainers.

Connect the oil pressure switch electrical connector.

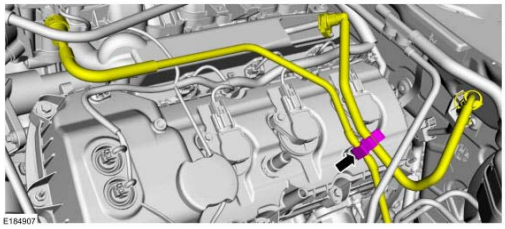


9.

Install the LH ignition coil-on-plugs. Refer to: IGNITION COIL-ON-PLUG .

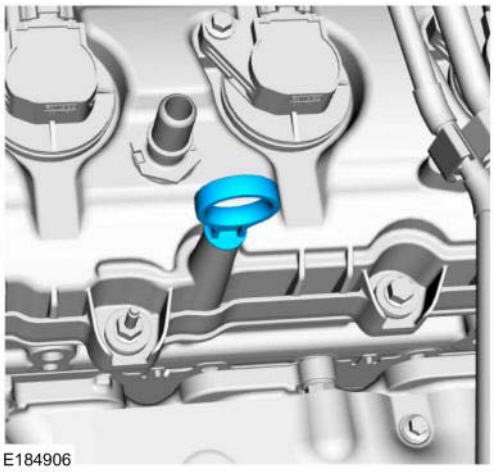
10.

Attach the fuel supply tube and EVAP tube retainer to the LH valve cover.



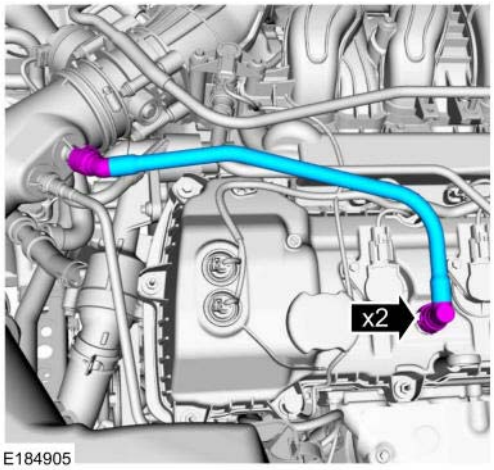
11.

Install the oil level indicator.



12.

Install the crankcase vent tube.



REMOVAL AND INSTALLATION > VALVE COVER RH

Special Tool(s) / General Equipment

	205-142 (T80T-4000-J) Installer, Differential Bearing Cone
	205-153 (T80T-4000-W) Handle
	303-1247VCT Spark Plug Tube Seal Remover and Installer TKIT-2006UF-FLM TKIT-2006UF-ROW
Plastic Scraper	

Materials

Name	Specification
Motorcraft® High Performance Engine RTV Silicone TA-357	WSE-M4G323-A6
Motorcraft® Silicone Gasket Remover ZC-30-A	-
Motorcraft® Metal Surface Prep ZC-31-B	-

Metal Brake Parts Cleaner (U.S.) PM-4-A, PM-4-B (U.S.)	-

REMOVAL AND INSTALLATION > VALVE COVER RH > REMOVAL

NOTE: During engine repair procedures, cleanliness is extremely important. Any foreign material, including any material created while cleaning gasket surfaces that enters the oil passages, coolant passages or the oil pan, can cause engine failure.

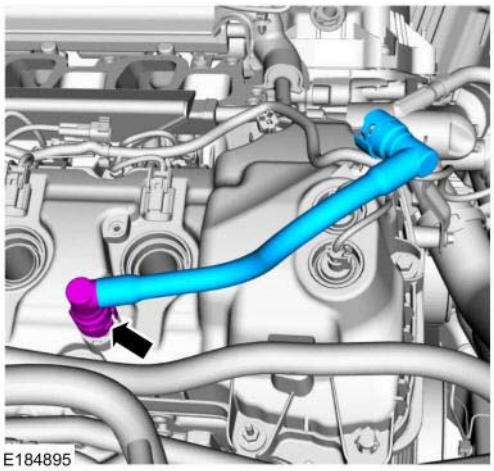
NOTE: Installation of new spark plug seals or VCT seals is only required if seals are damaged.

1.

Remove the RH ignition coil-on-plugs. Refer to: IGNITION COIL-ON-PLUG .

2.

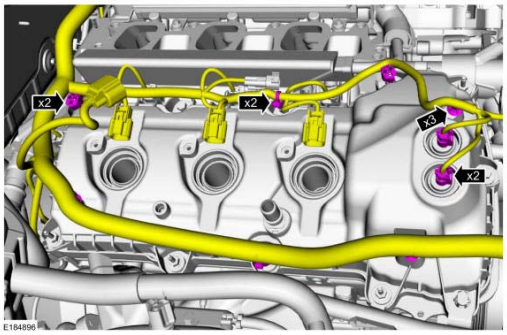
Remove the PCV tube.



3.

Disconnect the VCT oil control solenoid electrical connectors.

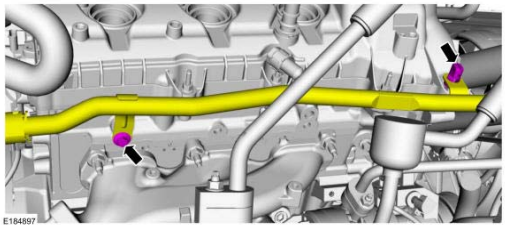
Detach the wiring harness retainers.



4.

Remove the heater tube bolt.

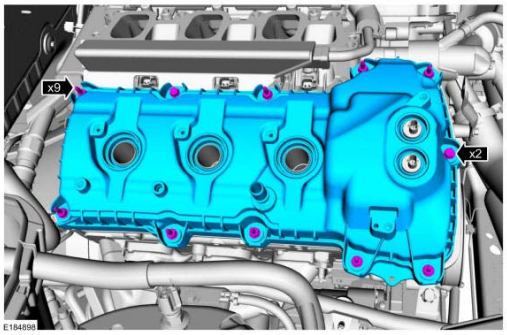
Detach the heater tube retainer from the RH valve cover stud bolt.



NOTE: While removing the valve cover do not apply excessive force to the VCT oil control solenoid or damage may occur.

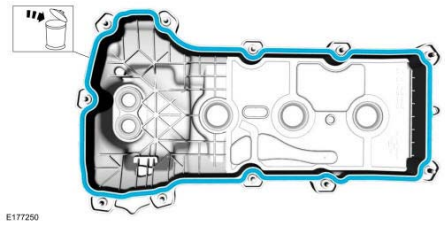
NOTE: If the VCT oil control solenoid sticks to the VCT seal, carefully wiggle the valve cover until the bond breaks free or damage to the VCT seal and VCT oil control solenoid may occur.

5.
Loosen the bolts and remove the valve cover.



6.

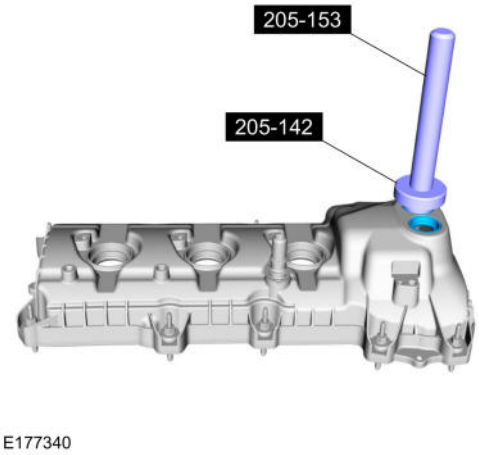
Remove and discard the valve cover gasket.



NOTE: Inspect the VCT solenoid seals. Remove any damaged seals.

7.
If necessary, using the special tools, remove the VCT oil control solenoid seals.

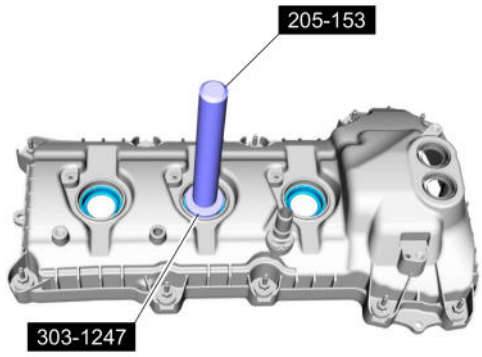
Use Special Service Tool: 205-142 (T80T-4000-J) Installer, Differential Bearing Cone, 205-153 (T80T-4000-W) Handle.



NOTE: Inspect the spark plug tube seals. Remove any damaged seals.

8.
If necessary, using the special tools, remove the spark plug tube seals.

Use Special Service Tool: 303-1247 VCT Spark Plug Tube Seal Remover and Installer, 205-153 (T80T-4000-W) Handle.



E177341

9.

Make sure that the mating faces are clean and free of foreign material. Refer to: RTV Sealing Surface Cleaning and Preparation .

Use the General Equipment: Plastic Scraper

Material

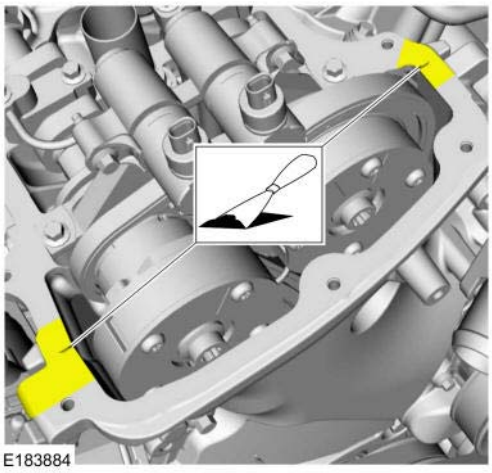
: Motorcraft® Silicone Gasket Remover / ZC-30-A

Material

: Metal Brake Parts Cleaner (U.S.) / PM-4-A, PM-4-B (U.S.)

Material

: Motorcraft® Metal Surface Prep / ZC-31-B



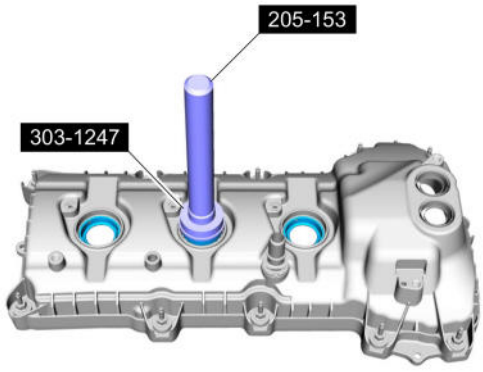
E183884

REMOVAL AND INSTALLATION > VALVE COVER RH > INSTALLATION

NOTE: Installation of new seals is only required if damaged seals were removed.

1.
If removed, using the special tools, install the spark plug tube seals.

Use Special Service Tool: 303-1247 VCT Spark Plug Tube Seal Remover and Installer, 205-153 (T80T-4000-W) Handle.

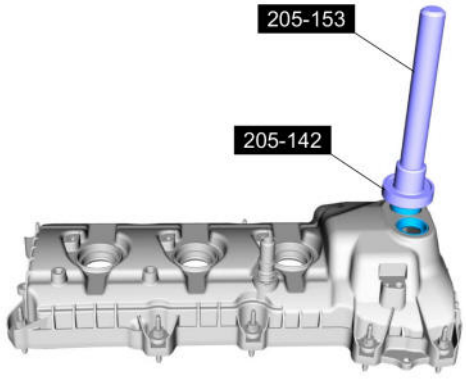


E177694

NOTE: Installation of new seals is only required if damaged seals were removed.

2.
If removed, using the special tools, install the VCT oil control solenoid seals.

Use Special Service Tool: 205-142 (T80T-4000-J) Installer, Differential Bearing Cone, 205-153 (T80T-4000-W) Handle.



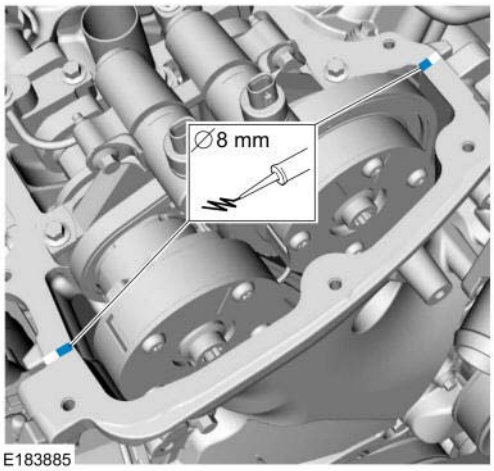
E177695

NOTE: If the valve cover is not installed and the fasteners tightened within 4 minutes, the sealant must be removed and the sealing area cleaned.

3.
Apply an 8 mm (0.31 in) bead of Motorcraft® High Performance Engine RTV Silicone to the engine front cover-to-cylinder head joints.

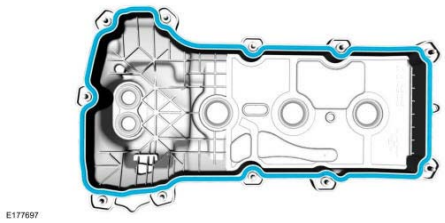
Material

: Motorcraft® High Performance Engine RTV Silicone / TA-357 (WSE-M4G323-A6)



4.

Install a new valve cover gasket.

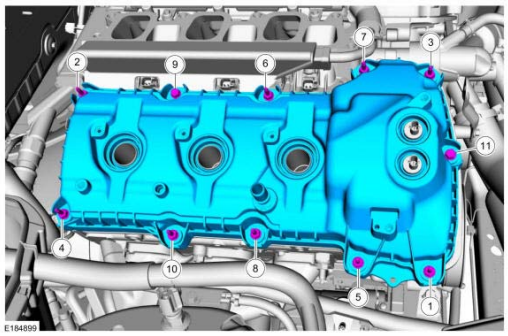


5.

Install the valve cover and tighten the bolts.

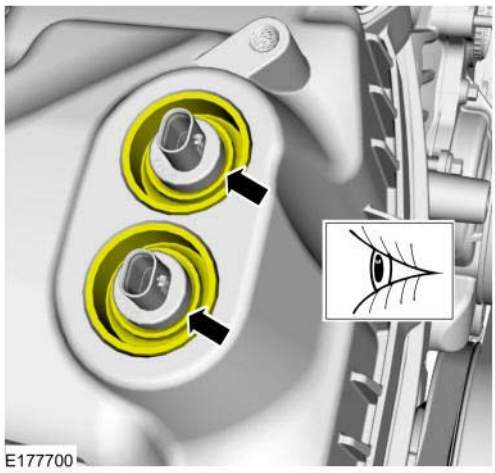
Torque

: 89 lb.in (10 Nm)



6.

Make sure the VCT seals in the valve cover are below the top of the VCT oil control solenoid electrical connector or the VCT seal may leak oil.



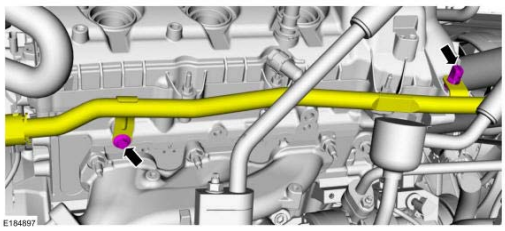
7.

Attach the heater tube retainer to the RH valve cover stud bolt.

Install the heater tube bolt.

Torque

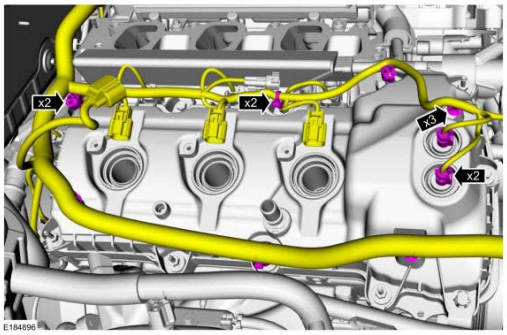
: 17 lb.ft (23 Nm)



8.

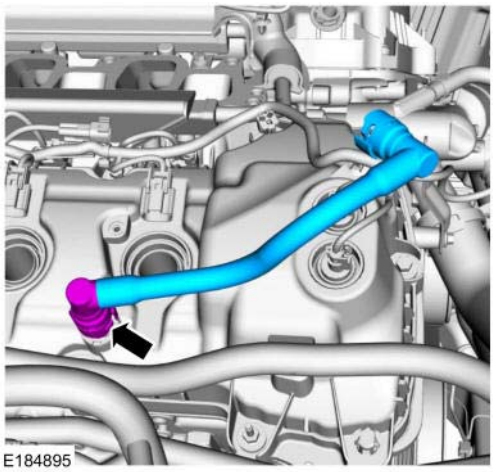
Attach the wiring harness retainers.

Connect the VCT oil control solenoid electrical connectors.



9.

Install the PCV tube.



10.

Install the RH ignition coil-on-plugs. Refer to: IGNITION COIL-ON-PLUG .

REMOVAL AND INSTALLATION > VARIABLE CAMSHAFT TIMING (VCT) UNIT

Special Tool(s) / General Equipment

	303-1530 Tool, Chain Tensioner Hold Down TKIT-2010A-F TKIT-2010A-LM TKIT-2010A-ROW

Materials

Name	Specification

Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) XO-5W20-QSP (U.S.)	WSS-M2C945-A

REMOVAL AND INSTALLATION > VARIABLE CAMSHAFT TIMING (VCT) UNIT > REMOVAL

NOTE: During engine repair procedures, cleanliness is extremely important. Any foreign material, including any material created while cleaning gasket surfaces, that enters the oil passages, coolant passages or the oil pan may cause engine failure.

All variable camshaft timing (VCT) unit

1.

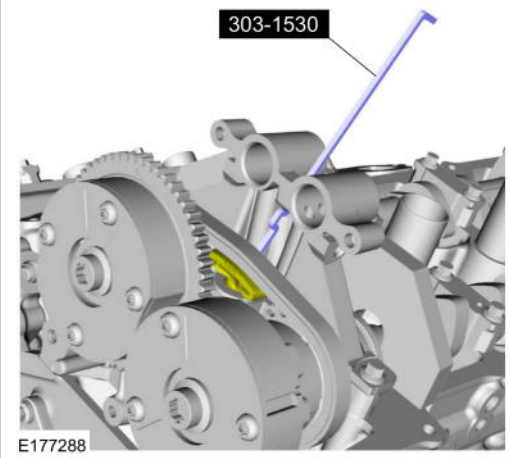
Remove the timing chain. Refer to: Timing Chain .

LH variable camshaft timing (VCT) unit

NOTE: The VCT oil control solenoids are removed for clarity.

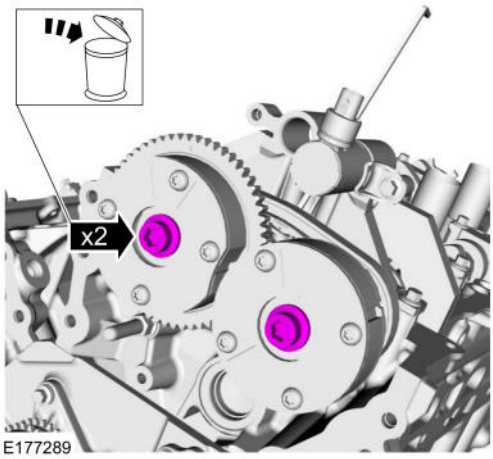
2.
Compress the LH secondary timing chain tensioner and install the special tool in the hole on the rear of the secondary timing chain tensioner guide and let it hold against the mega cap to retain the tensioner in the collapsed position.

Use Special Service Tool: 303-1530 Tool, Chain Tensioner Hold Down.



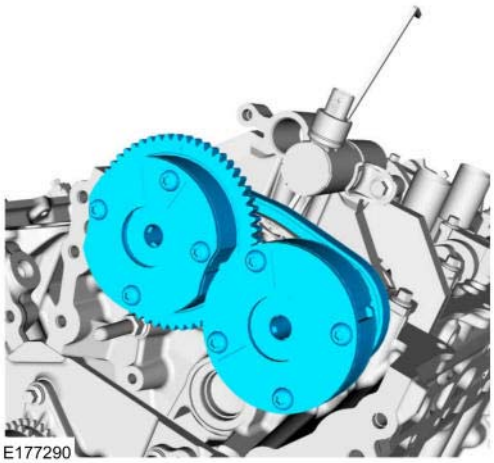
3.

Remove and discard the LH VCT unit bolts.



4.

Remove the LH VCT units.

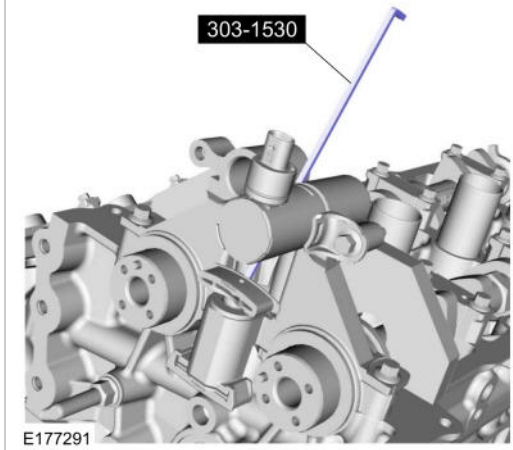


Replacement of the LH secondary timing chain tensioner

NOTE: The following 4 steps are only for the replacement of the secondary timing chain tensioner. Do not reuse the secondary timing chain tensioner if removed, or damage to the engine may occur.

5.

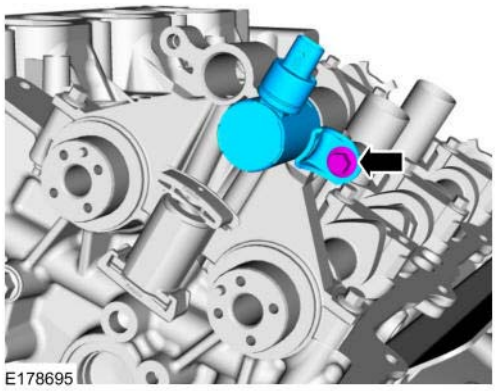
Remove Special Service Tool: 303-1530 Tool, Chain Tensioner Hold Down.



NOTE: A slight twisting motion will aid in the removal of the VCT oil control solenoid.

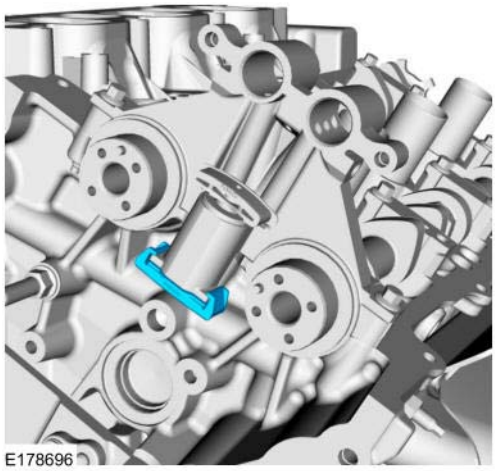
NOTE: Keep the VCT oil control solenoid clean of dirt and debris.

6.
Remove the bolt and the exhaust VCT oil control solenoid.



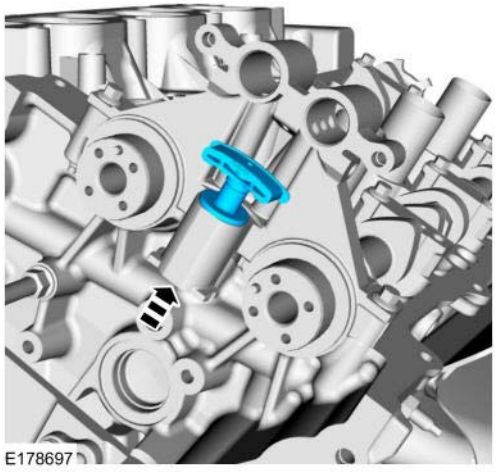
7.

Remove the LH secondary timing chain tensioner shoe.



8.

Remove the LH secondary timing chain tensioner by pushing up from the bottom.

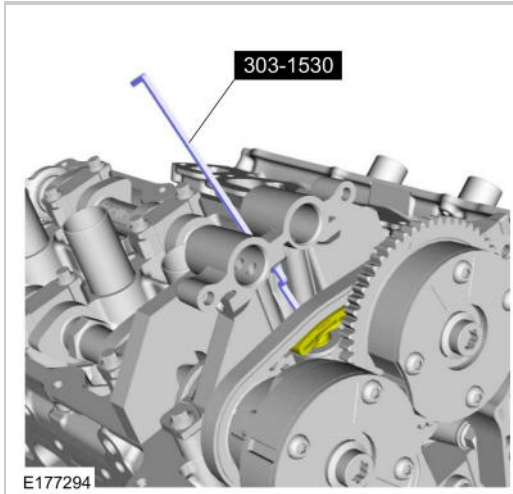


RH variable camshaft timing (VCT) unit

NOTE: The VCT oil control solenoids are removed for clarity.

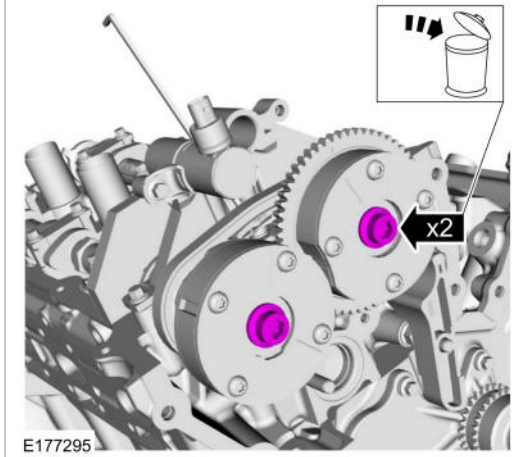
9.
Compress the RH secondary timing chain tensioner and install the special tool in the hole on the rear of the secondary timing chain tensioner guide and let it hold against the mega cap to retain the tensioner in the collapsed position.

Use Special Service Tool: 303-1530 Tool, Chain Tensioner Hold Down.



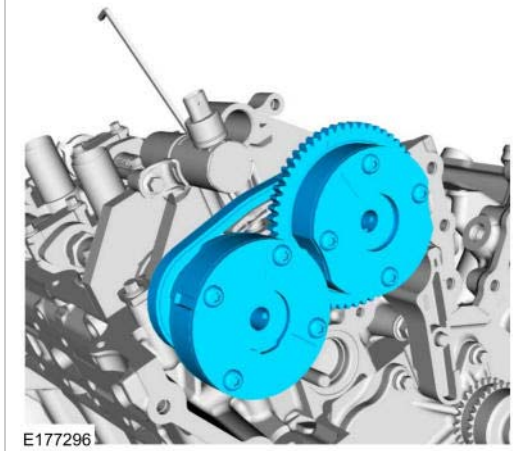
10.

Remove and discard the RH VCT unit bolts.



11.

Remove the RH VCT units.

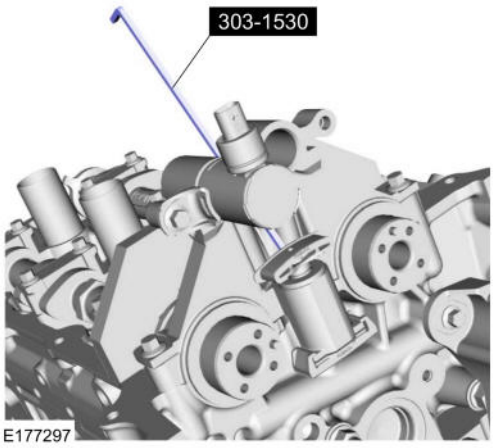


Replacement of the RH secondary timing chain tensioner

NOTE: The following 4 steps are only for the replacement of the secondary timing chain tensioners. Do not reuse the secondary timing chain tensioners if removed, or damage to the engine may occur.

12.

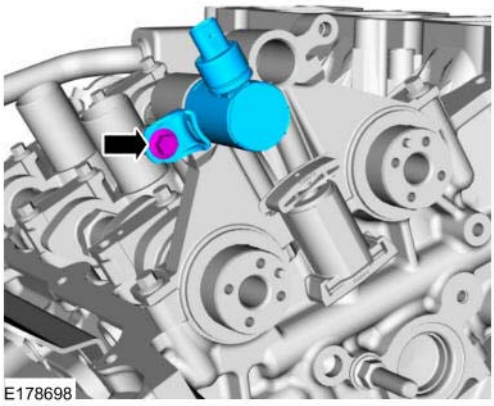
Remove Special Service Tool: 303-1530 Tool, Chain Tensioner Hold Down.



NOTE: A slight twisting motion will aid in the removal of the VCT oil control solenoid.

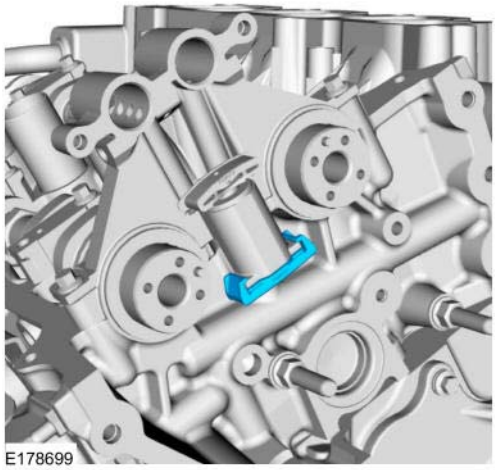
NOTE: Keep the VCT oil control solenoid clean of dirt and debris.

13.
Remove the bolt and the exhaust VCT oil control solenoid.



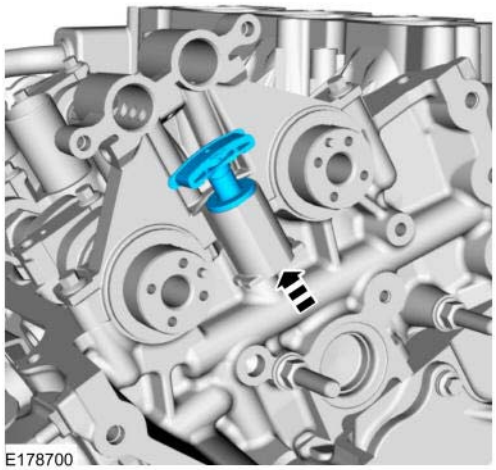
14.

Remove the RH secondary timing chain tensioner shoe.



15.

Remove the RH secondary timing chain tensioner by pushing up from the bottom.



REMOVAL AND INSTALLATION > VARIABLE CAMSHAFT TIMING (VCT) UNIT > INSTALLATION

Installation of the RH secondary timing chain tensioner

NOTE: The following 10 steps are only for the installation of the RH secondary timing chain tensioners. Do not reuse the secondary timing chain tensioners if removed, or damage to the engine may occur.

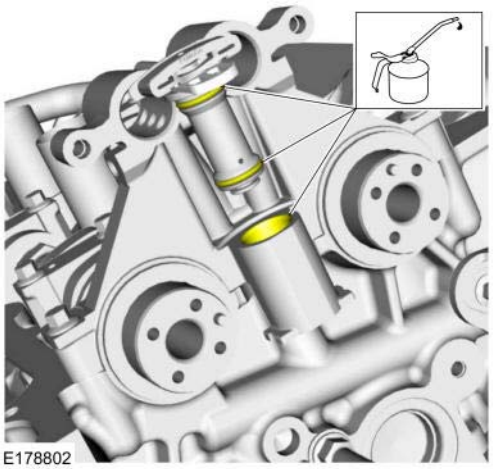
NOTE: Do not remove the secondary timing chain tensioner shipping clip, until

instructed to do so.

1.
Apply clean engine oil to the secondary timing chain tensioner O-ring seals and mega cap bore.

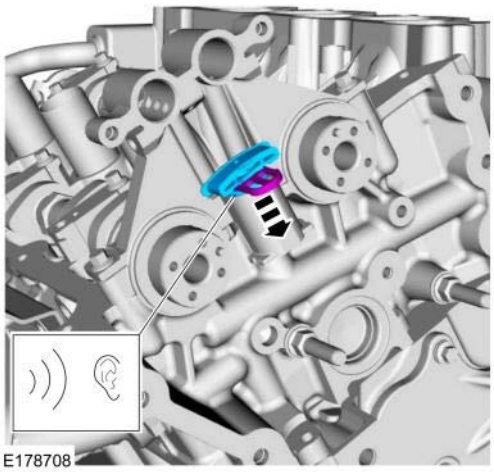
Material

: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W20-QSP (U.S.) (WSS-M2C945-A)



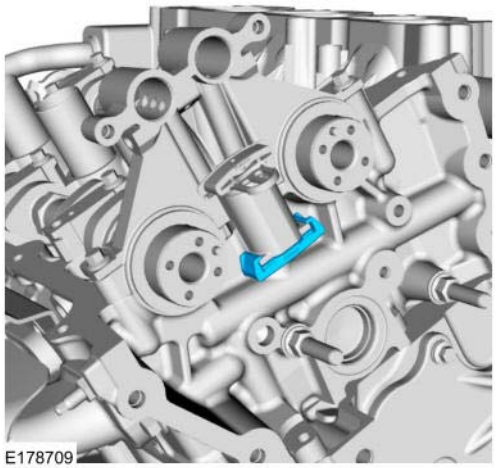
NOTE: Do not remove the secondary timing chain tensioner shipping clip, until instructed to do so.

2.
Install the RH secondary timing chain tensioner by pushing it down all the way until a snap is heard and the tensioner is seated all the way down the mega cap bore.



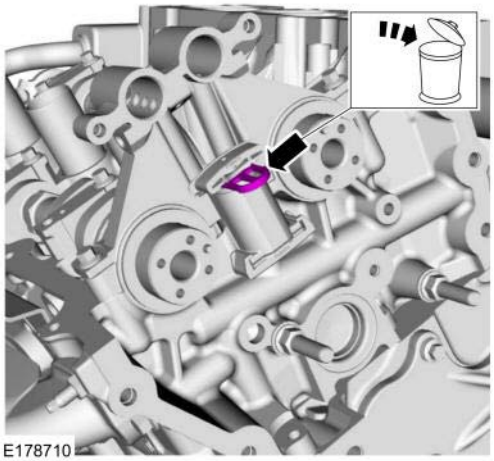
3.

Install the RH secondary timing chain tensioner shoe.



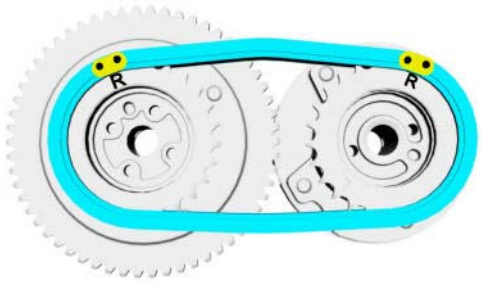
4.

Remove and discard the RH secondary timing chain tensioner shipping clip.



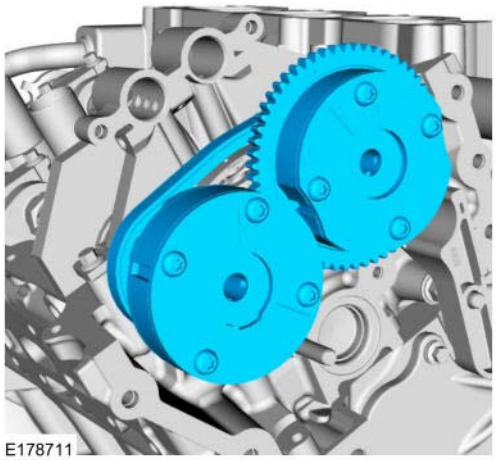
5.

Align the colored links with the timing marks and assemble the RH VCT units.



NOTE: It may be necessary to rotate the camshafts slightly, to install the RH secondary timing assembly.

6.
Position the RH VCT units and secondary timing chain onto the camshafts by aligning the holes in the VCT units with the dowel pins in the camshafts.



7.

Install the new RH VCT unit bolts and tighten in 4 stages.

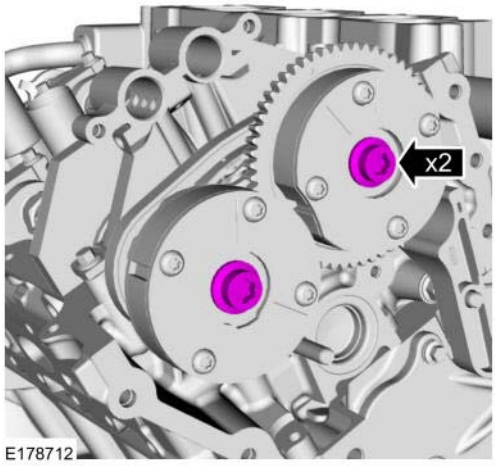
Torque:

Stage 1: 30 lb.ft (40 Nm)

Stage 2: Loosen: 1 turn(s)

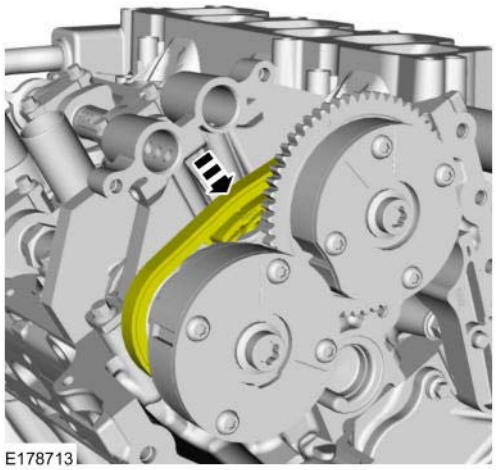
Stage 3: 18 lb.ft (25 Nm)

Stage 4: 180°



8.

Activate the RH secondary timing chain tensioner by pressing down on the secondary timing chain and tensioner top shoe until it bottoms out, let go of the tensioner and it will spring up putting tension on the chain.



NOTE: Do not use excessive force when installing the VCT oil control solenoid. Damage to the mega cap could cause the cylinder head to be inoperable. If difficult to install the VCT oil control solenoid, inspect the bore and VCT oil control solenoid to ensure there are no burrs, sharp edges or contaminants present on the mating surface. Only clean the external surfaces as necessary.

NOTE: A slight twisting motion will aid in the installation of the VCT oil control solenoid

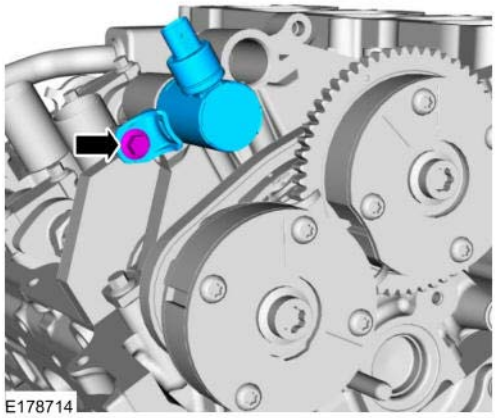
NOTE: Keep the VCT oil control solenoid clean of dirt and debris.

9.
Install the RH exhaust VCT oil control solenoid and the bolt.

Torque:

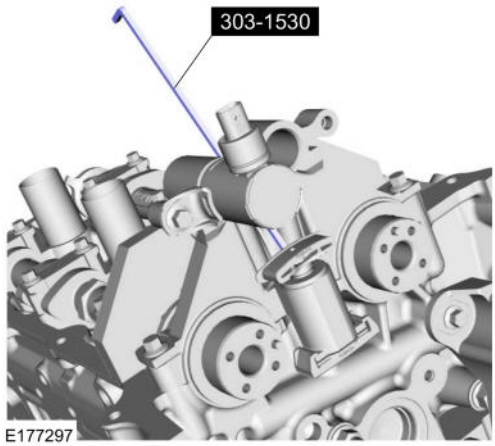
Stage 1: 71 lb.in (8 Nm)

Stage 2: 20°



10.

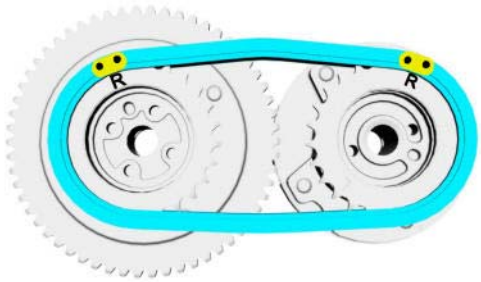
Install Special Service Tool: 303-1530 Tool, Chain Tensioner Hold Down.



RH variable camshaft timing (VCT) unit

11.

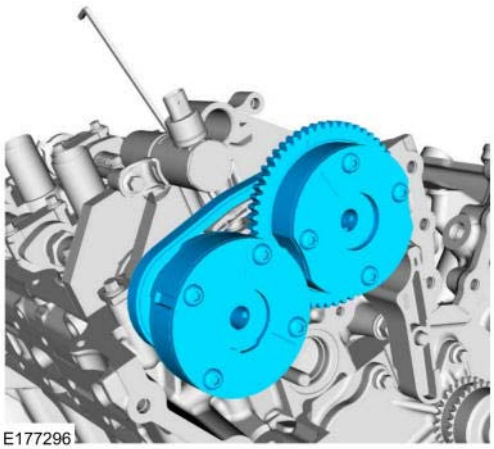
Align the colored links with the timing marks and assemble the RH VCT units.



E177645

NOTE: It may be necessary to rotate the camshafts slightly, to install the RH VCT units.

12.
Position the RH VCT units and secondary timing chain onto the camshafts by aligning the holes in the VCT units with the dowel pins in the camshafts.



E177296

13.

Install the new RH VCT unit bolts and tighten in 4 stages.

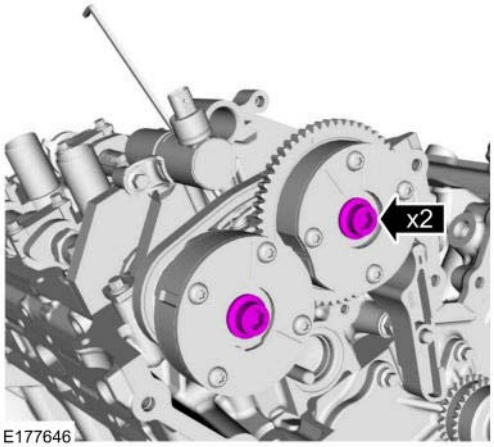
Torque:

Stage 1: 30 lb.ft (40 Nm)

Stage 2: Loosen: 1 turn(s)

Stage 3: 18 lb.ft (25 Nm)

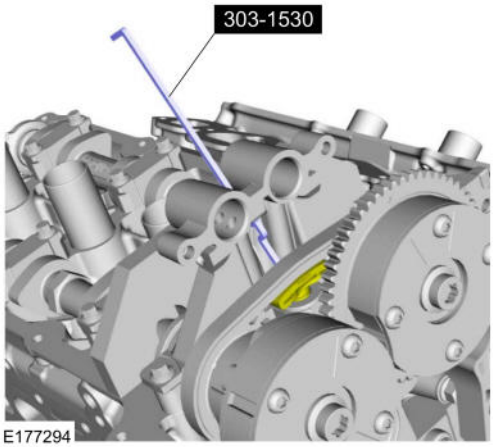
Stage 4: 180°



NOTE: Make sure the secondary timing chain is centered on the timing chain tensioner guides.

NOTE: The VCT oil control solenoids are removed for clarity.

14.
Remove Special Service Tool: 303-1530 Tool, Chain Tensioner Hold Down.



Installation of the LH secondary timing chain tensioner

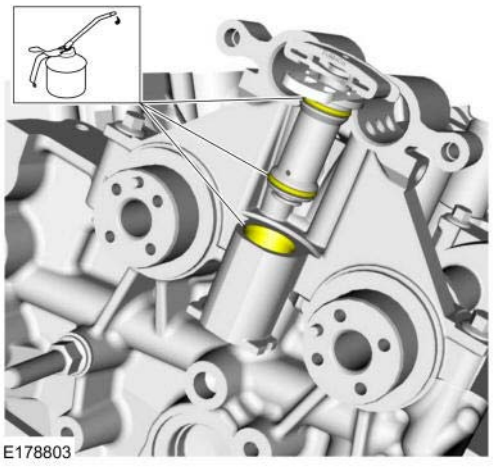
NOTE: The following 10 steps are only for the replacement of the secondary timing chain tensioners. Do not reuse the secondary timing chain tensioners if removed, or damage to the engine may occur.

NOTE: Do not remove the secondary timing chain tensioner shipping clip, until instructed to do so.

15.
Apply clean engine oil to the secondary timing chain tensioner O-ring seals and mega cap bore.

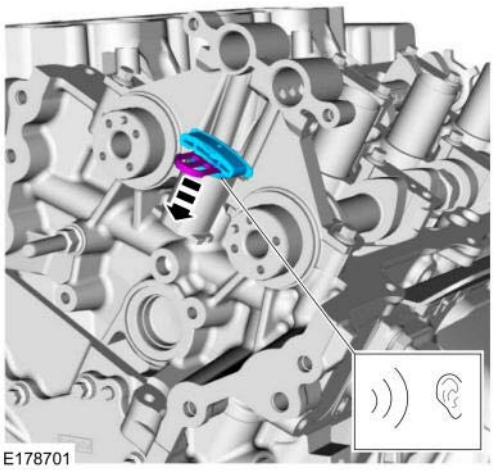
Material

: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W20-QSP (U.S.) (WSS-M2C945-A)



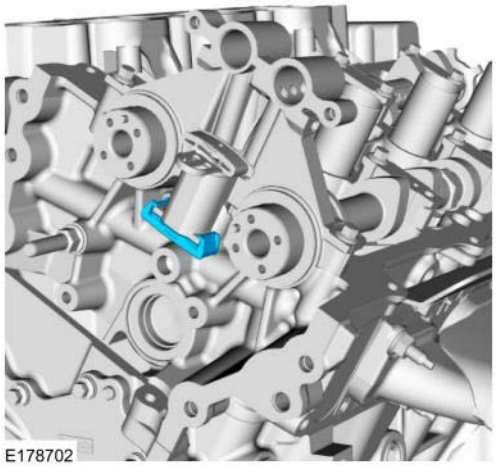
NOTE: Do not remove the secondary timing chain tensioner shipping clip, until instructed to do so.

16.
Install the LH secondary timing chain tensioner by pushing it down all the way until a snap is heard and the tensioner is seated all the way down the mega cap bore.



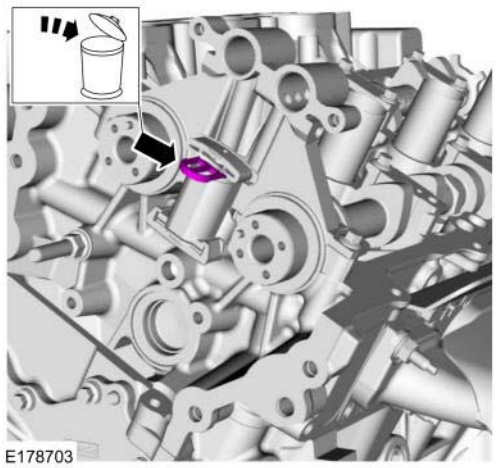
17.

Install the LH secondary timing chain tensioner shoe.



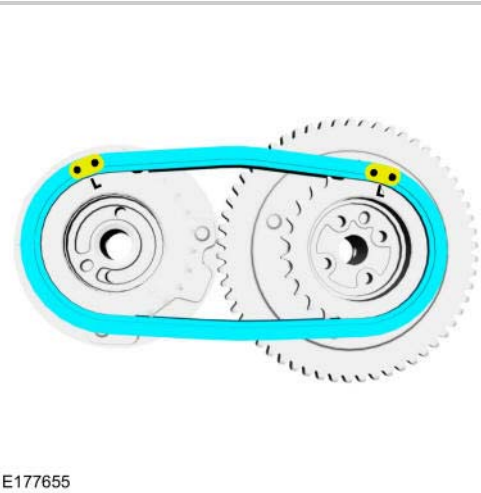
18.

Remove and discard the LH secondary timing chain tensioner shipping clip.



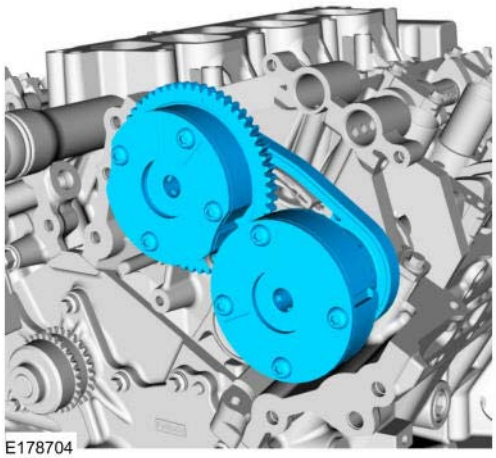
19.

Align the colored links with the timing marks and assemble the LH VCT units.



20.

Position the LH VCT units and secondary timing chain onto the camshafts by aligning the holes in the VCT units with the dowel pins in the camshafts.



21.

Install the new LH VCT unit bolts and tighten in 4 stages.

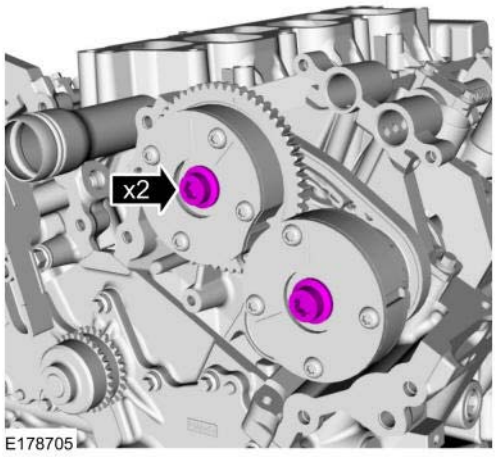
Torque:

Stage 1: 30 lb.ft (40 Nm)

Stage 2: Loosen: 1 turn(s)

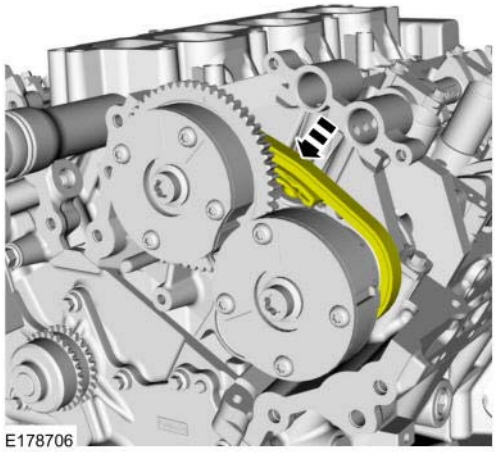
Stage 3: 18 lb.ft (25 Nm)

Stage 4: 180°



22.

Activate the LH secondary timing chain tensioner by pressing down on the secondary timing chain and tensioner top shoe until it bottoms out, let go of the tensioner and it will spring up putting tension on the chain.

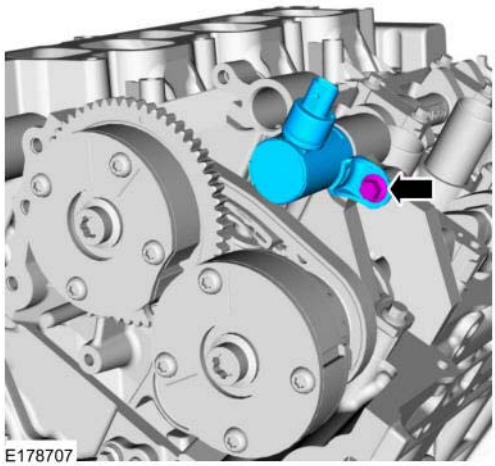


NOTE: Do not use excessive force when installing the VCT oil control solenoid. Damage to the mega cap could cause the cylinder head to be inoperable. If difficult to install the VCT oil control solenoid, inspect the bore and VCT oil control solenoid to ensure there are no burrs, sharp edges or contaminants present on the mating surface. Only clean the external surfaces as necessary.

NOTE: A slight twisting motion will aid in the installation of the VCT oil control solenoid

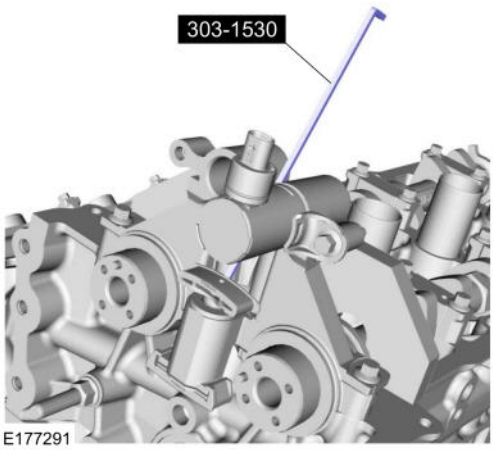
NOTE: Keep the VCT oil control solenoid clean of dirt and debris.

23.
Install the LH exhaust VCT oil control solenoid and the bolt.



24.

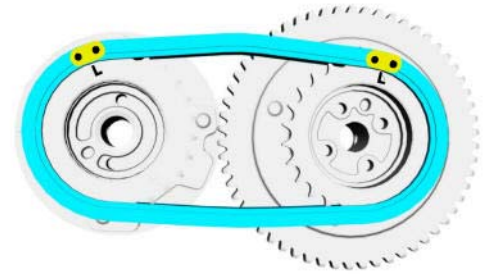
Install Special Service Tool: 303-1530 Tool, Chain Tensioner Hold Down.



LH variable camshaft timing (VCT) unit

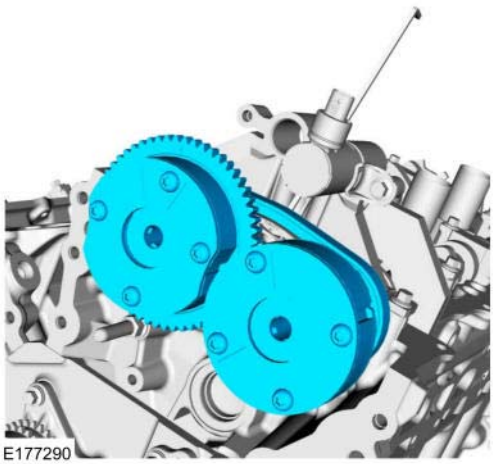
25.

Align the colored links with the timing marks on the LH VCT units.



NOTE: It may be necessary to rotate the camshafts slightly, to install the LH secondary timing assembly.

26.
Position the LH VCT units and secondary timing chain onto the camshafts by aligning the holes in the VCT units with the dowel pins in the camshafts.



27.

Install the new LH VCT unit bolts and tighten in 4 stages.

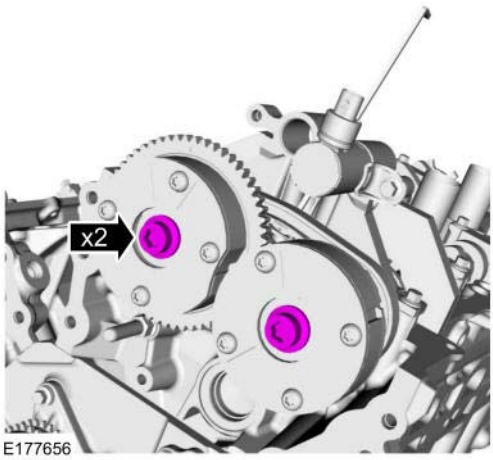
Torque:

Stage 1: 30 lb.ft (40 Nm)

Stage 2: Loosen: 1 turn(s)

Stage 3: 18 lb.ft (25 Nm)

Stage 4: 180°

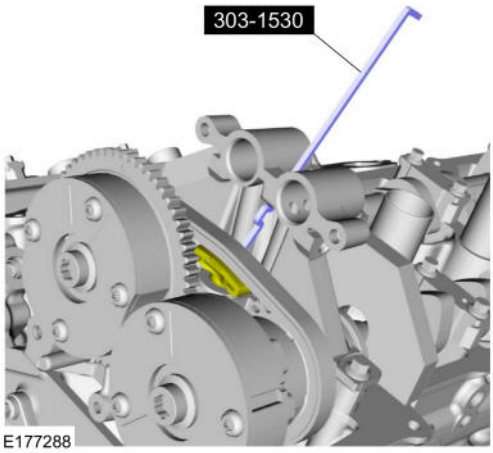


NOTE: Make sure the secondary timing chain is centered on the timing chain tensioner guides.

NOTE: The VCT oil control solenoids are removed for clarity.

28.

Remove Special Service Tool: 303-1530 Tool, Chain Tensioner Hold Down.



All variable camshaft timing (VCT) unit

29.

Install the timing chain. Refer to: Timing Chain .

REMOVAL > ENGINE

Special Tool(s) / General Equipment

	303-1245 Engine Lift Eye TKIT-2006UF-FLM TKIT-2006UF-ROW
	303-1529 Lift Eye, Engine TKIT-2010A-F TKIT-2010A-LM TKIT-2010A-ROW
Floor Crane	
Oil Drain Equipment	
Trolley Jack	
Hose Clamp Remover/Installer	
Wooden Block	

6-Speed Automatic Transmission - 6R80/6-Speed Manual Transmission - MT82

1.

With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

2.

Release the fuel system pressure. Refer to: FUEL SYSTEM PRESSURE RELEASE .

3.

Disconnect the battery ground. Refer to: Battery Disconnect and Connect .

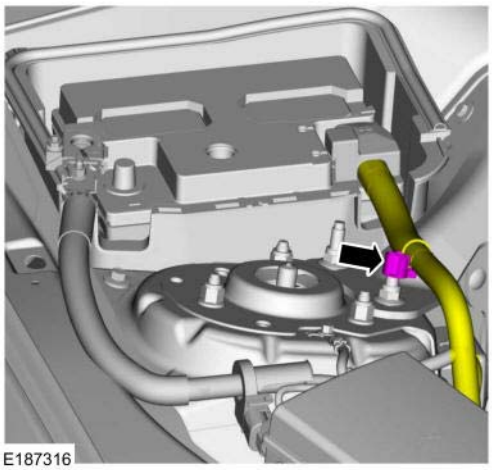
Convertible

4.

Remove the cowl panel grille. Refer to: Cowl Panel Grille .

5.

Detach the battery cable retainer.



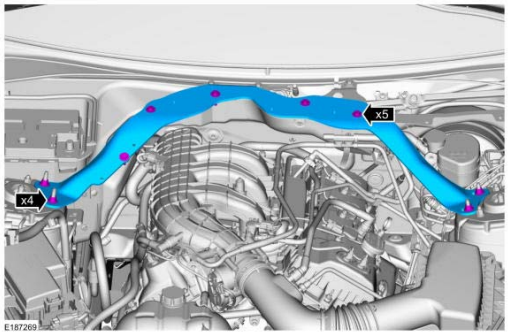
6.

Disconnect the positive battery cable. Refer to: Battery Disconnect and Connect .

7.

Remove the cowl extension nuts.

Remove the bolts and the cowl extension.



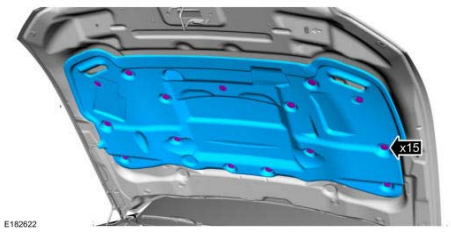
6-Speed Automatic Transmission - 6R80/6-Speed Manual Transmission - MT82

8.

Drain the cooling system. Refer to: COOLING SYSTEM DRAINING AND VACUUM FILLING .

9.

Remove the pin-type retainers and the hood insulation.



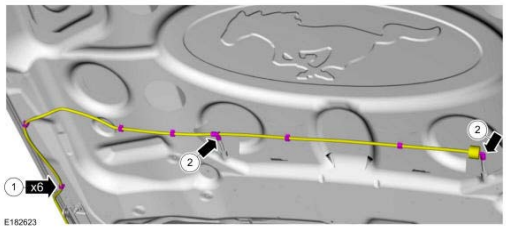
10.

1.

Detach the windshield washer hose retainers.

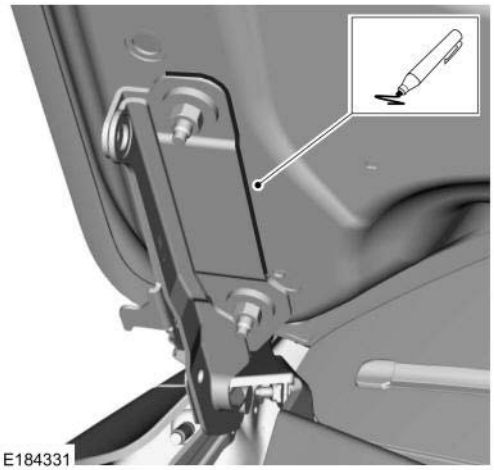
2.

Disconnect the windshield washer hose couplings. Refer to: Washer Hose Coupling .



NOTE: RH side shown in illustration, LH similar.

11.
Index-mark the hood hinges location to aid in hood installation.



12.

Remove the nuts and the hood.



13.

Remove the following items:

Refer to: DEGAS BOTTLE .

Refer to: AIR CLEANER OUTLET PIPE .

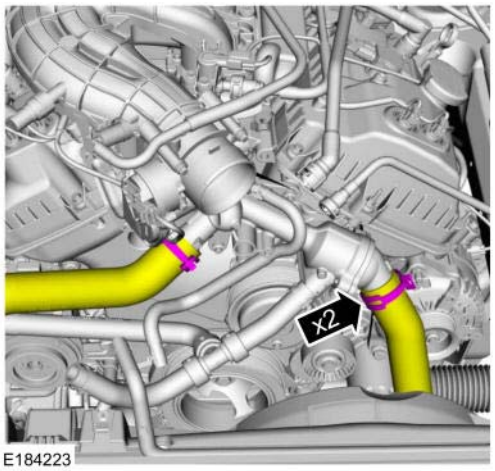
Refer to: AIR CLEANER - 3.7L Duratec (227kW/301PS).

Refer to: AIR CONDITIONING (A C) COMPRESSOR BELT .

14.

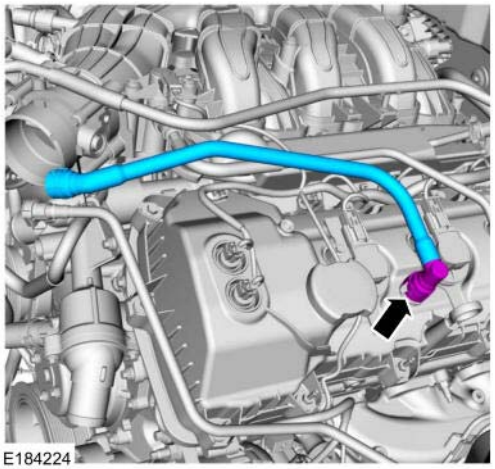
Disconnect the upper and lower radiator hoses from the thermostat housing.

Use the General Equipment: Hose Clamp Remover/Installer



15.

Remove the crankcase vent tube.



16.

1.

Disconnect the vacuum hose from the upper intake manifold.

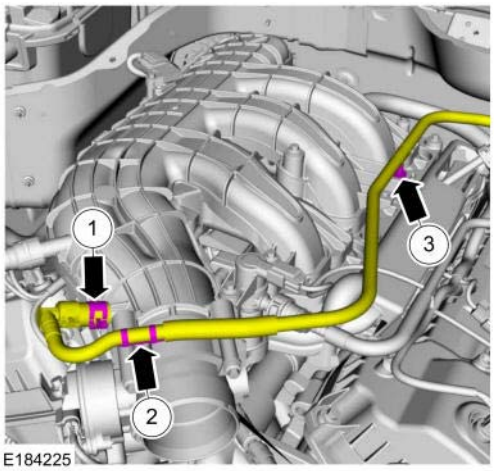
Use the General Equipment: Hose Clamp Remover/Installer

2.

Detach the vacuum hose retainer from the throttle body.

3.

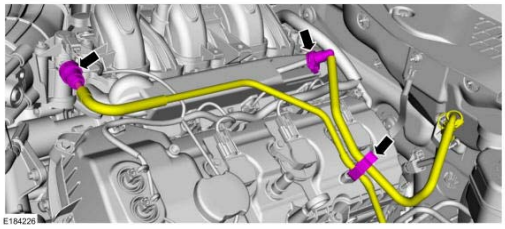
Detach the vacuum hose retainer from the intake manifold.



17.

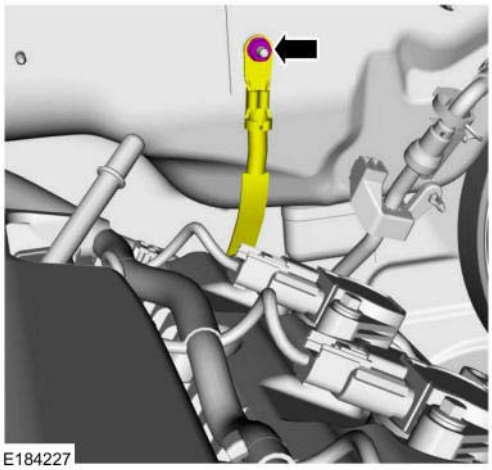
Disconnect the fuel tube and EVAP purge valve quick release coupling. Refer to: QUICK RELEASE COUPLING .

Remove the retainer from the LH valve cover.



18.

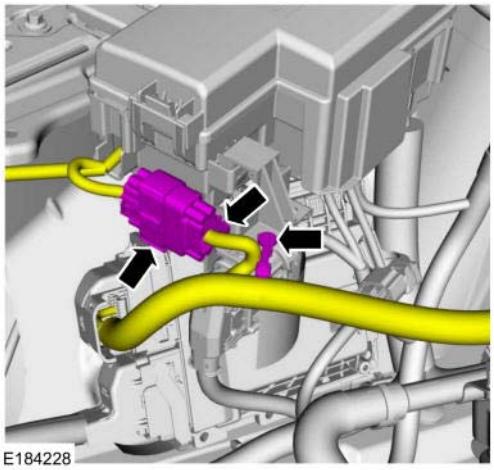
Remove the nut and the ground strap from the cowl.



19.

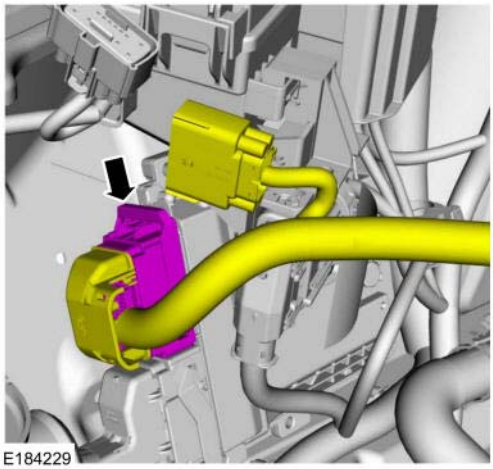
Detach and disconnect the engine harness electrical connector.

Detach the wiring harness retainer.



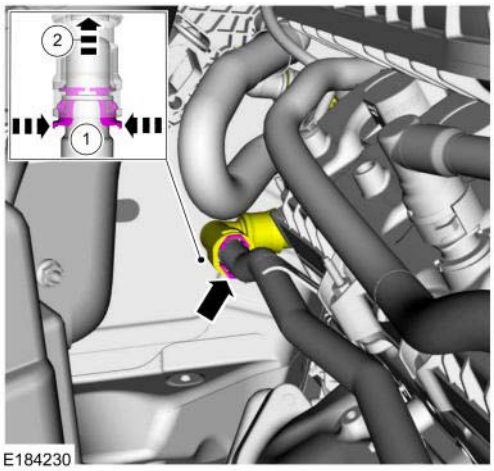
20.

Disconnect the upper PCM electrical connector.



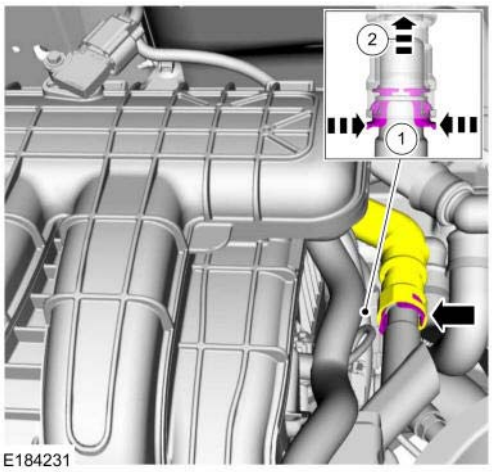
21.

Pinch the tabs and disconnect the heater hose from the coolant tube.



22.

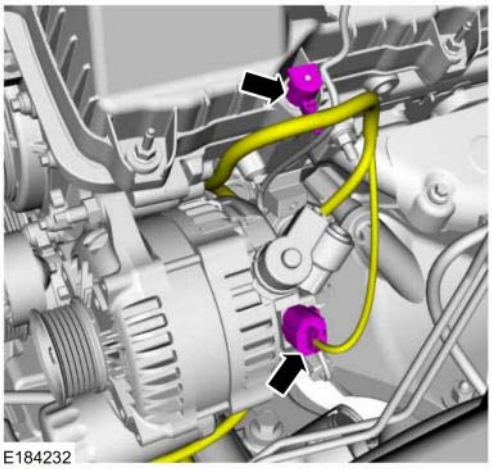
Pinch the tabs and disconnect the heater hose from the back of the lower intake manifold.



23.

Detach the wire harness retainer from the valve cover stud bolt.

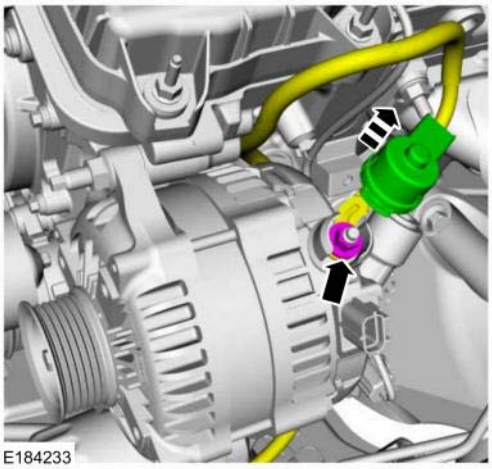
Disconnect the generator electrical connector.



24.

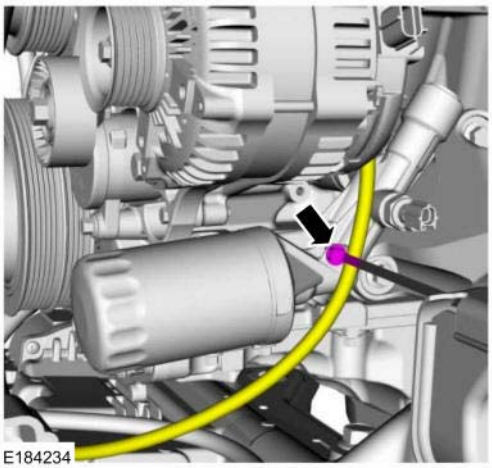
Position the protective cover aside.

Remove the nut and the generator B+ cable.



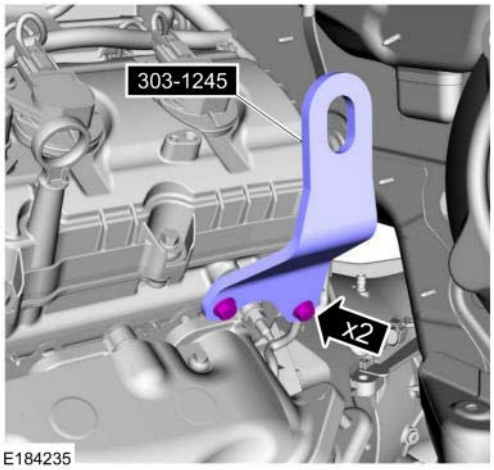
25.

Detach the generator wiring harness retainer from the oil filter adapter.



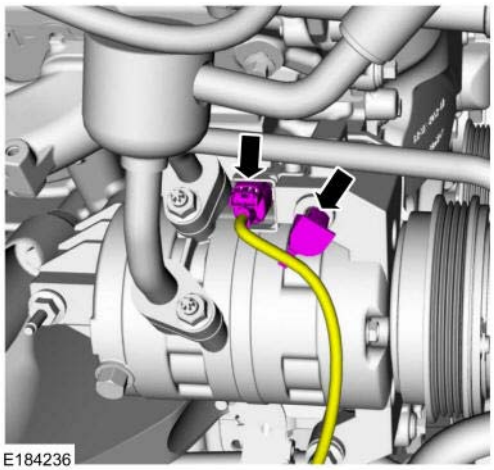
26.

Install Special Service Tool: 303-1245 Engine Lift Eye.



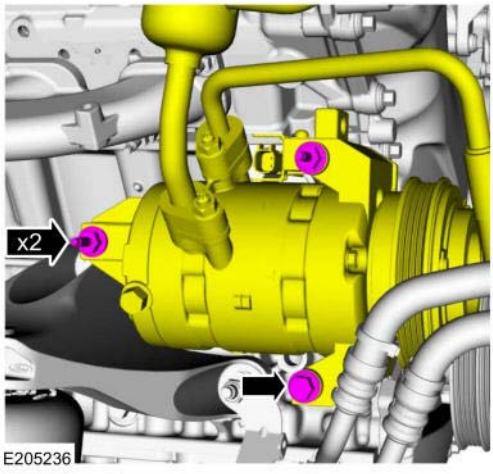
27.

Disconnect the A/C compressor electrical connector and the wire harness retainer.



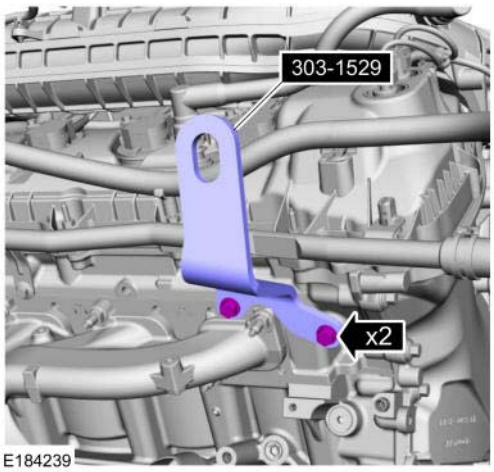
NOTE: The stud bolts and bolt will stay with the A/C compressor.

28.
Loosen the stud bolts, bolt and position the A/C compressor aside.



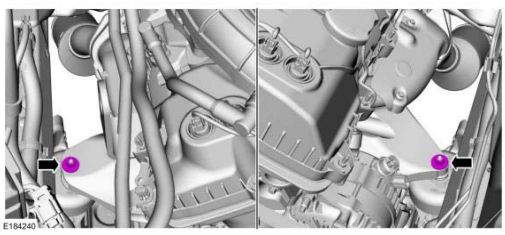
29.

Install Special Service Tool: 303-1529 Lift Eye, Engine.



30.

Remove the RH and LH engine mount bracket nuts.



31.

Remove the front wheels and tires. Refer to: Wheel and Tire .

NOTE: Vehicles are equipped with either an underbody shield or a subframe bracket and underbody shield assembly.

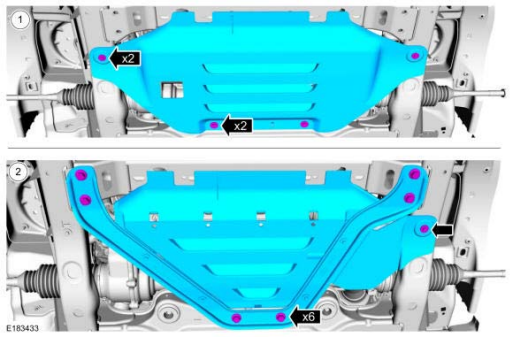
32.

1.

Remove the bolts and the underbody shield.

2.

Remove the bolts and the subframe bracket and underbody shield assembly.



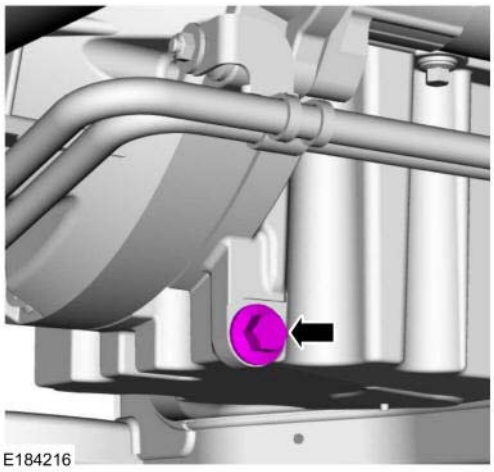
33.

Drain the engine oil and install drain plug.

Use the General Equipment: Oil Drain Equipment

Torque

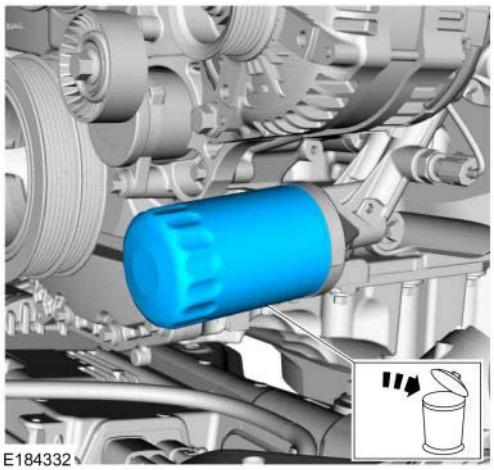
: 20 lb.ft (27 Nm)



34.

Remove and discard the engine oil filter.

Use the General Equipment: Oil Drain Equipment

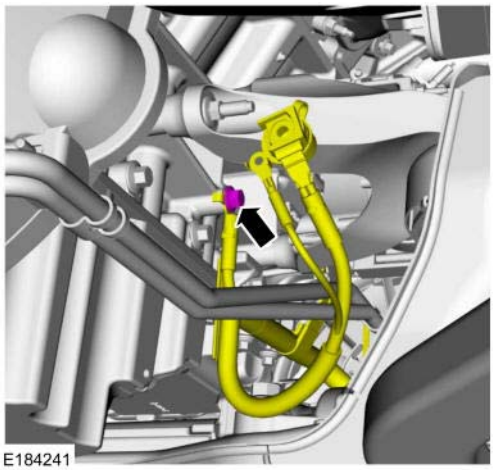


35.

Remove the starter motor. Refer to: STARTER MOTOR .

NOTE: Automatic transmission shown in illustration, manual transmission similar.

36.
Remove the bolt and ground wire from the RH side of the engine.



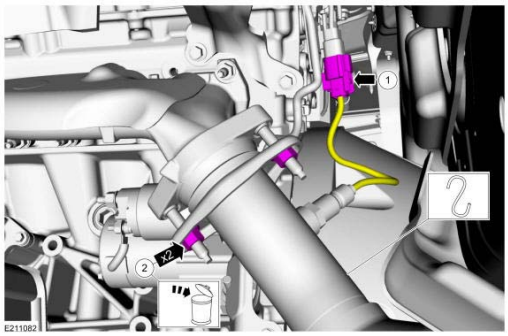
37.

NOTE: Make sure that the mating faces are clean and free of foreign material.

1.
Disconnect the LH HO2S electrical connector.

2.

Support the catalytic converter and remove and discard the nuts.



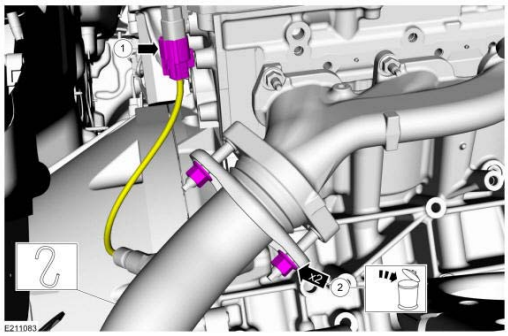
38.

NOTE: Make sure that the mating faces are clean and free of foreign material.

1.
Disconnect the RH HO2S electrical connector.

2.

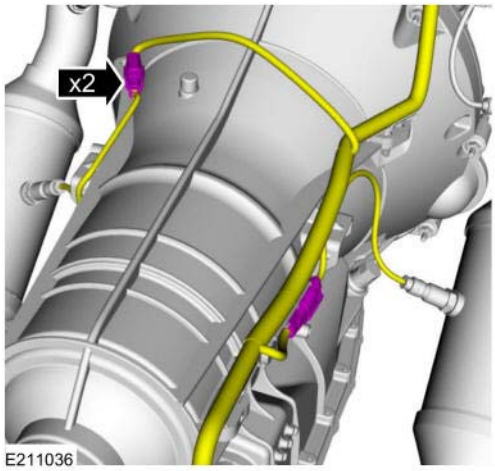
Support the catalytic converter and remove and discard the nuts.



6-Speed Automatic Transmission - 6R80

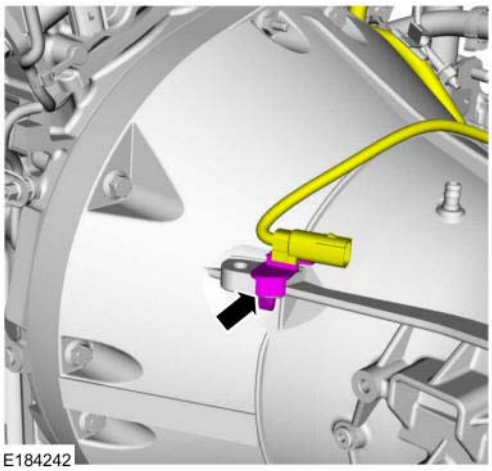
39.

Disconnect the catalyst monitor sensors.



40.

Detach the wiring harness retainer from the LH side of the transmission.



41.

1.

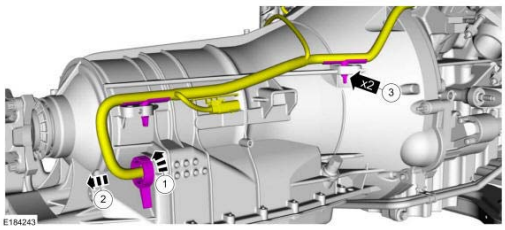
Rotate the transmission electrical connector.

2.

Pull the transmission electrical connector out to disconnect.

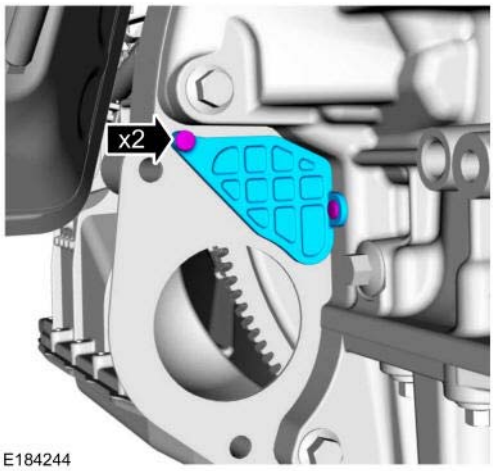
3.

Detach the wiring harness retainers and position the aside.



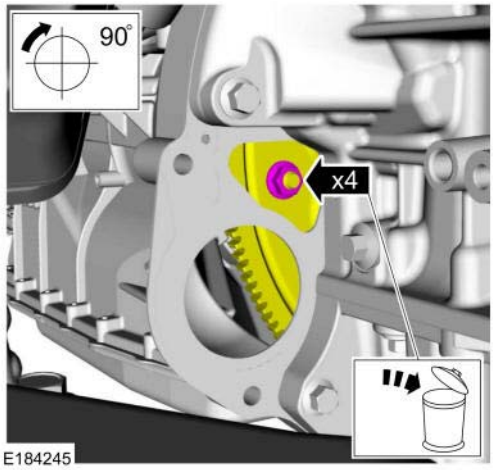
42.

Remove the retainers and the access cover.



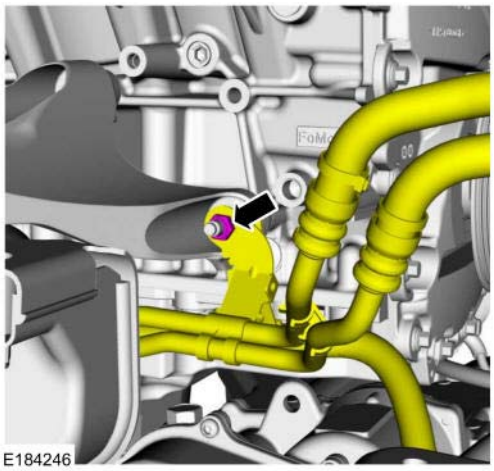
NOTE: Using the crankshaft pulley bolt, turn the engine clockwise.

43.
Remove and discard the torque converter nuts.



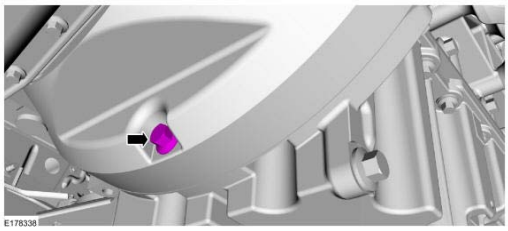
44.

Remove the nut from the front of the RH engine mount bracket stud bolt and position the brackets for the transmission cooling tubes and wiring harness aside.



45.

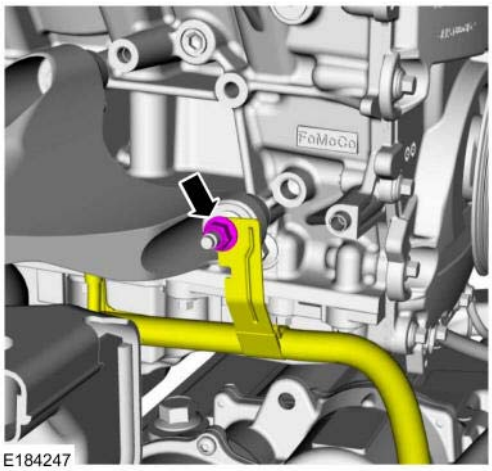
Remove the lower bellhousing bolt.



6-Speed Manual Transmission - MT82

46.

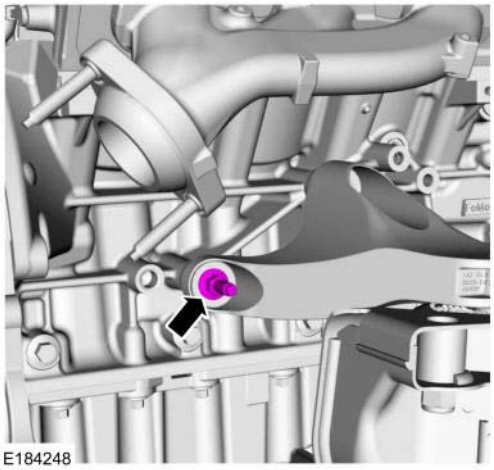
Remove the nut from the front of the RH engine mount bracket stud bolt and position the bracket for the wiring harness aside.



6-Speed Automatic Transmission - 6R80/6-Speed Manual Transmission - MT82

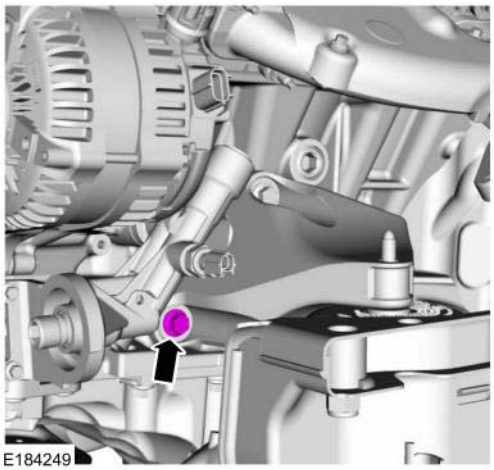
47.

Remove the rear stud bolt from the RH engine mount bracket.



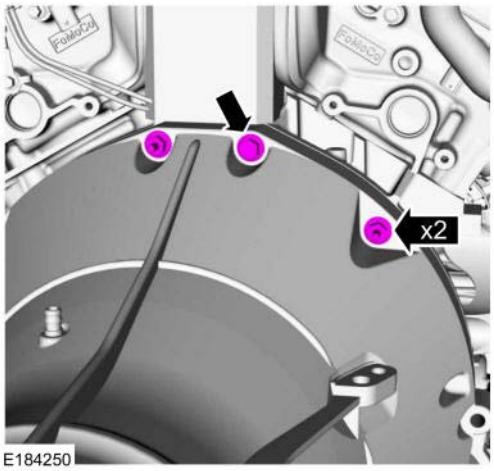
48.

Remove the front bolt from the LH engine mount bracket.



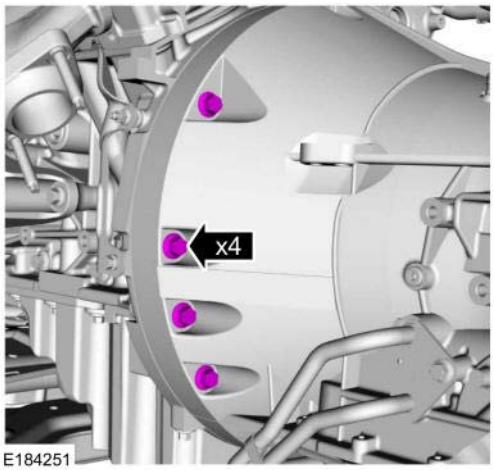
NOTE: Automatic transmission shown in illustration, manual transmission similar.

49.
Remove the upper bellhousing bolts.



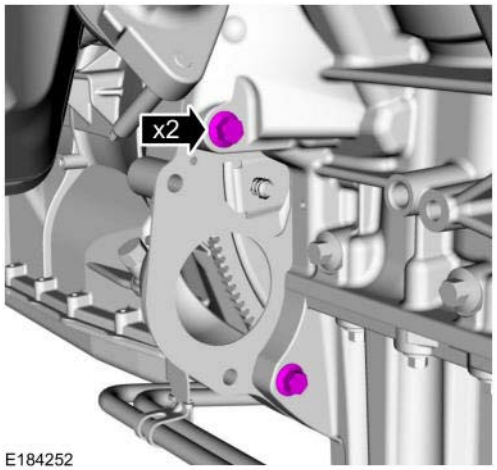
NOTE: Automatic transmission shown in illustration, manual transmission similar.

50.
Remove the LH side bellhousing bolts.



NOTE: Automatic transmission shown in illustration, manual transmission similar.

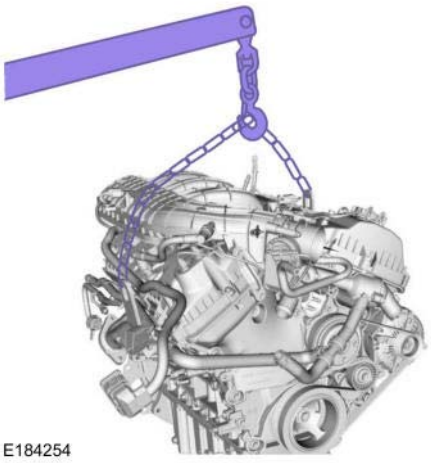
51.
Remove the RH side bellhousing bolts.



52.

Install the engine floor crane.

Use the General Equipment: Floor Crane



53.

Install a ratchet strap from the front of engine to the chain to keep the engine level.

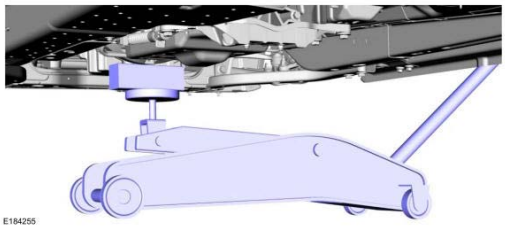


54.

Install a jack and wooden block under the transmission bellhousing to support the transmission.

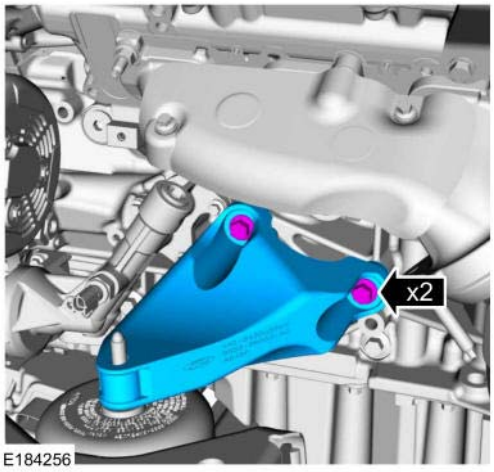
Use the General Equipment: Wooden Block

Use the General Equipment: Trolley Jack



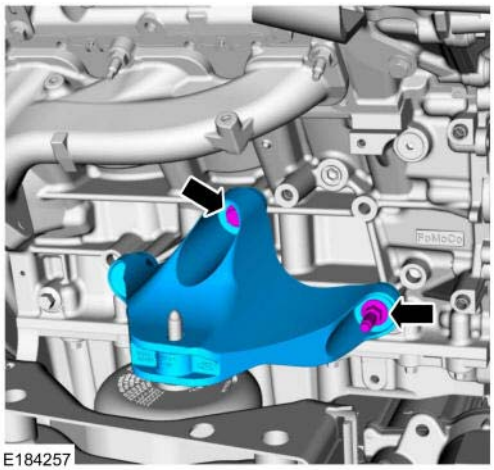
55.

Remove the bolts and the LH engine mount bracket.



56.

Remove the bolts and the RH engine mount bracket.



57.

Using the floor crane, remove the engine.

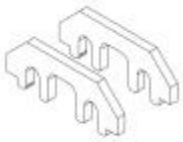
Use the General Equipment: Floor Crane



DISASSEMBLY > ENGINE

Special Tool(s) / General Equipment

	205-142 (T80T-4000-J) Installer, Differential Bearing Cone
	205-150 (T80T-4000-S) Installer, Spindle Bearing

 E133913	205-153 (T80T-4000-W) Handle
	303-1245 Engine Lift Eye TKIT-2006UF-FLM TKIT-2006UF-ROW
 E175042	303-1247 VCT Spark Plug Tube Seal Remover and Installer TKIT-2006UF-FLM TKIT-2006UF-ROW
 E216421	303-1248 Camshaft holding tools TKIT-2006UF-FLM TKIT-2006UF-ROW
	303-1529 Lift Eye, Engine TKIT-2010A-F TKIT-2010A-LM TKIT-2010A-ROW
	303-1530 Tool, Chain Tensioner Hold Down TKIT-2010A-F TKIT-2010A-LM TKIT-2010A-ROW
 E134603	303-409 (T92C-6700-CH) Remover, Crankshaft Seal TKIT-1992-FH/FMH/FLMH TKIT-1993-LMH/MH
Floor Crane	
Three Leg Puller	
Mounting Stand	
Plastic Scraper	

Hose Clamp Remover/Installer

Materials

Name	Specification
Motorcraft® Silicone Gasket Remover ZC-30-A	-
Motorcraft® Metal Surface Prep ZC-31-B	-
Metal Brake Parts Cleaner (U.S.) PM-4-A, PM-4-B (U.S.)	-

NOTE: During engine repair procedures, cleanliness is extremely important. Any foreign material, including any material created while cleaning gasket surfaces that enters the oil passages, coolant passages or the oil pan, can cause engine failure.

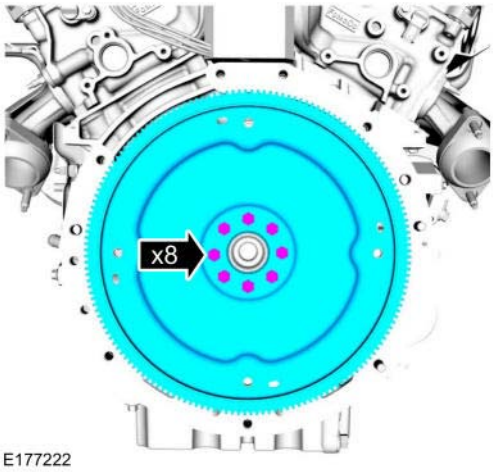
NOTE: If the cylinder head(s) is replaced, a new secondary timing chain tensioner will need to be installed.

NOTE: Refer to the exploded view under the Engine Component View .

6-Speed Automatic Transmission - 6R80

1.

Remove the bolts and the flexplate.



6-Speed Manual Transmission - MT82

NOTE: Loosen the bolts evenly to prevent clutch pressure plate damage.

NOTE: If the parts are to be reused, index-mark the pressure plate to the flywheel. Failure to install the pressure plate to the flywheel in the original position may result in a clutch system vibration.

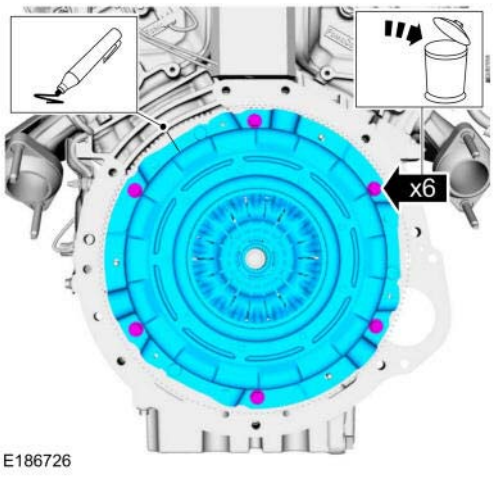
WARNING: Do not breathe dust or use compressed air to blow dust from storage containers or friction components. Remove dust using government-approved techniques. Friction component dust may be a cancer and lung disease hazard. Exposure to potentially hazardous components may occur if dusts are created during repair of friction components, such as brake pads and clutch discs. Exposure may also cause irritation to skin, eyes and respiratory tract, and may cause allergic reactions and/or may lead to other chronic health effects. If irritation persists, seek medical attention or advice. Failure to follow these instructions may result in serious personal injury.

2.

Remove the 6 pressure plate bolts by turning them 1 turn at a time in a star pattern until the clutch is fully released.

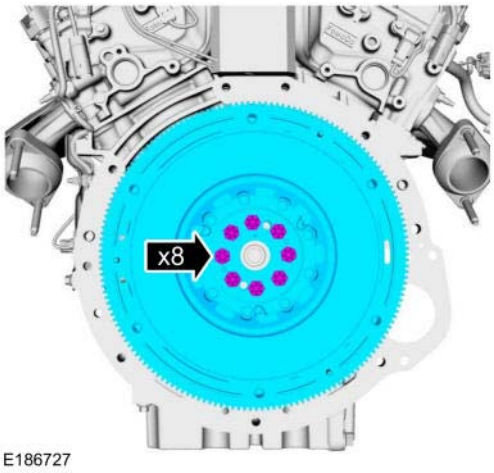
Remove the pressure plate and the clutch disc.

Discard the pressure plate bolts.



3.

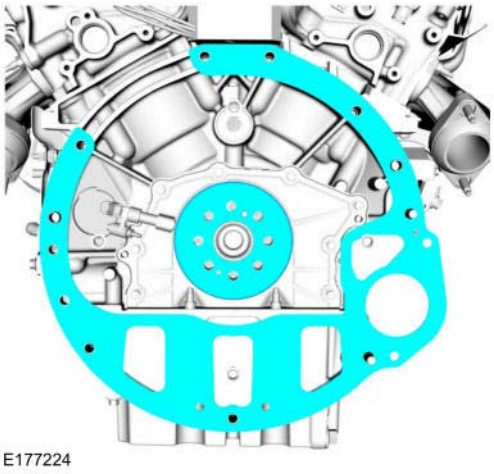
Remove the bolts and the flywheel.



6-Speed Automatic Transmission - 6R80/6-Speed Manual Transmission - MT82

4.

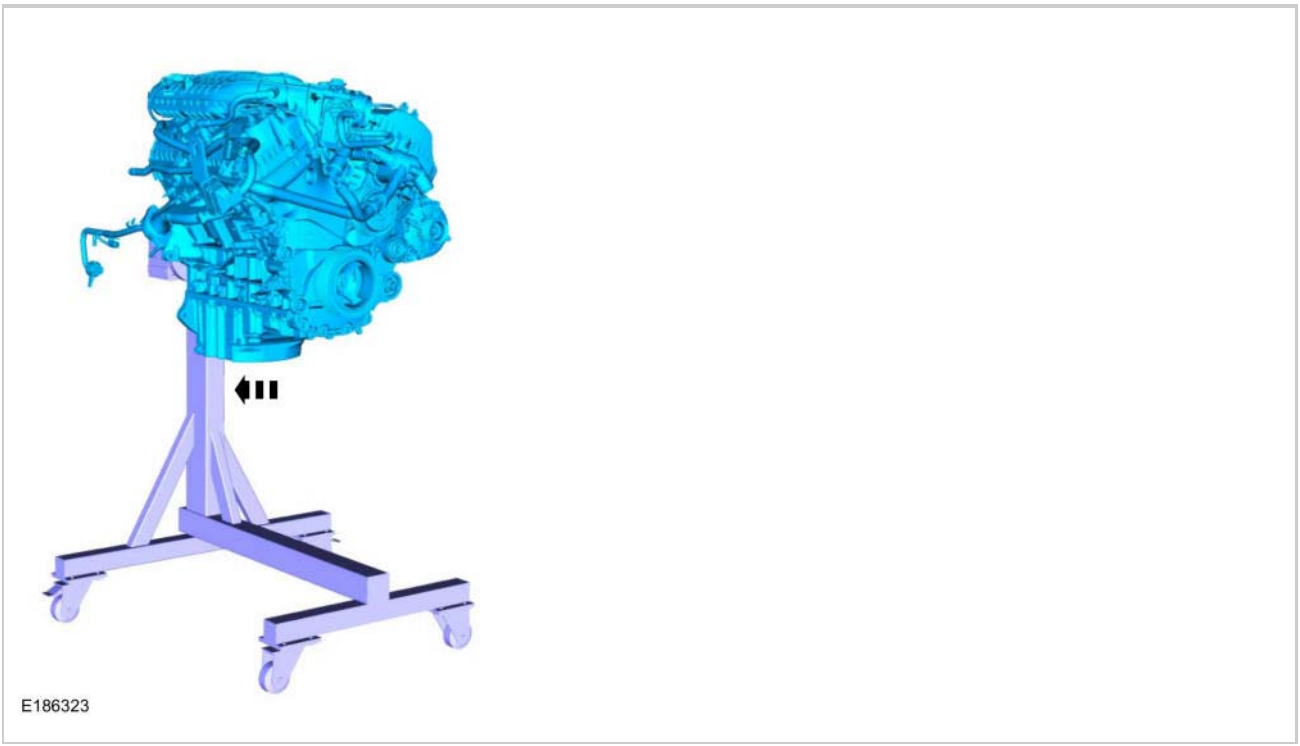
Remove the crankshaft sensor ring and the engine-to-transmission spacer plate.



NOTE: Install the engine stand bolts into the cylinder block only. Do not install the bolts into the oil pan.

5.
Mount the engine to the mounting stand.

Use the General Equipment: Mounting Stand



6.

Remove the ratchet strap.

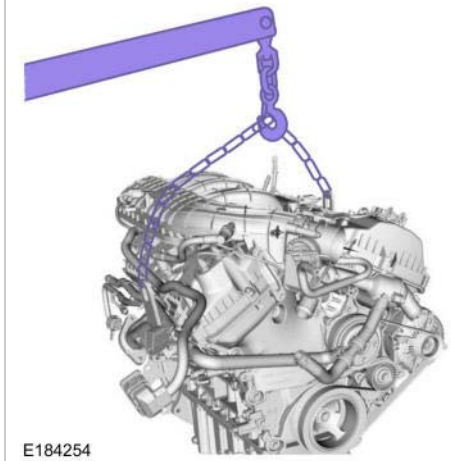
Use the General Equipment: Floor Crane



7.

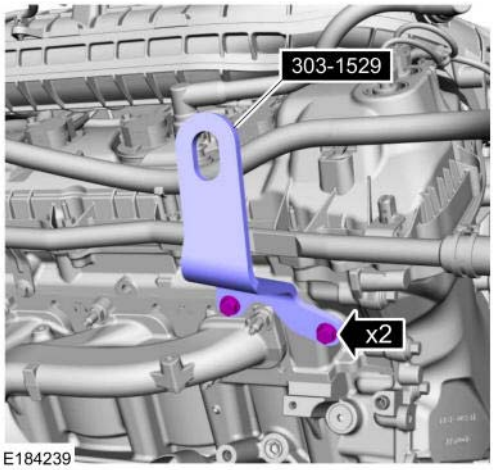
Remove the floor crane and chain.

Use the General Equipment: Floor Crane



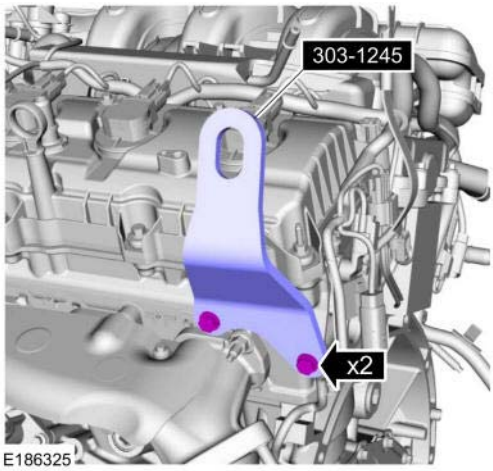
8.

Remove Special Service Tool: 303-1529 Lift Eye, Engine.



9.

Remove Special Service Tool: 303-1245 Engine Lift Eye.



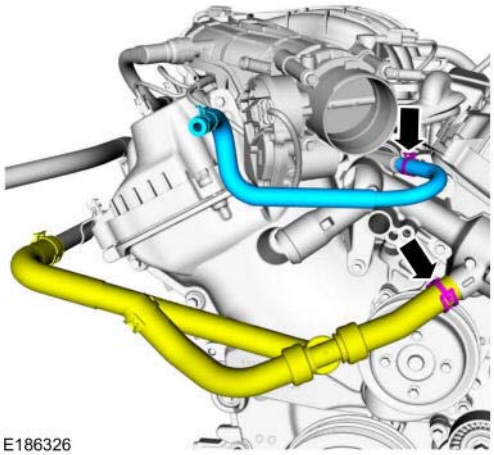
10.

Release the clamp and remove the coolant return hose.

Use the General Equipment: Hose Clamp Remover/Installer

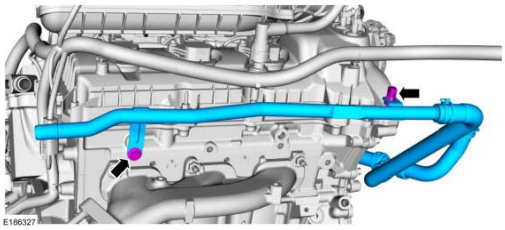
Release the clamp and position the coolant hose aside.

Use the General Equipment: Hose Clamp Remover/Installer



11.

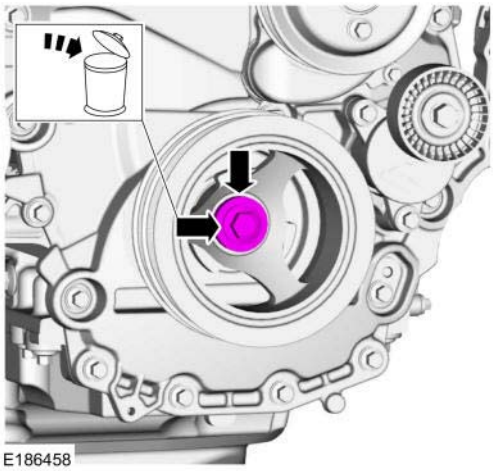
Remove the bolt, detach the coolant tube retainer and remove the coolant tube.



12.

Remove the crankshaft pulley bolt and washer.

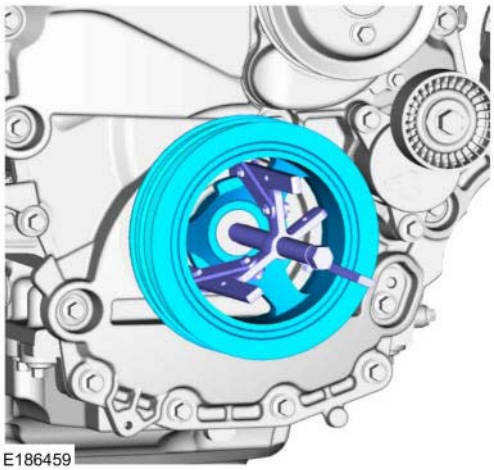
Discard the bolt.



13.

Using a three leg puller, remove the crankshaft pulley.

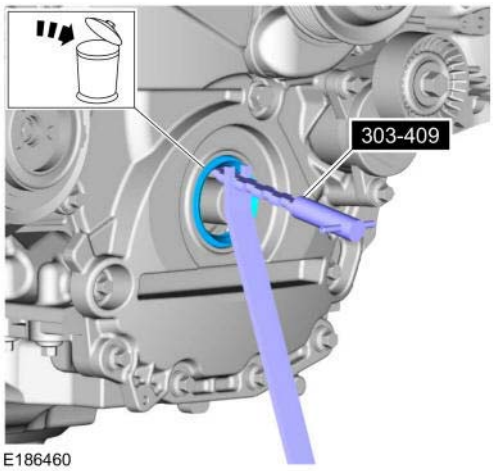
Use the General Equipment: Three Leg Puller



14.

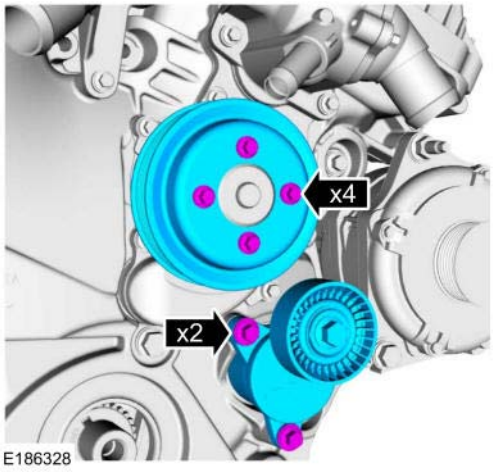
Using the special tool, remove and discard the crankshaft front seal.

Use Special Service Tool: 303-409 (T92C-6700-CH) Remover, Crankshaft Seal.



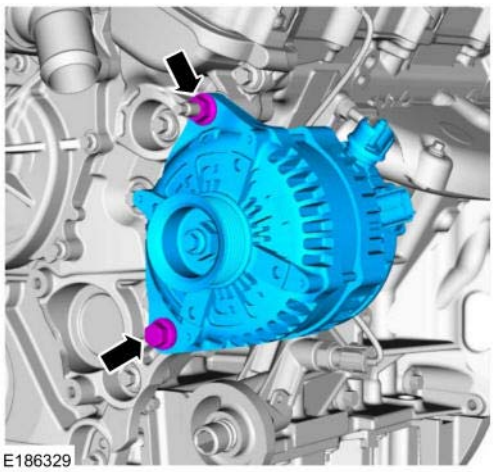
15.

Remove the bolts, coolant pump pulley and the accessory drive belt tensioner.



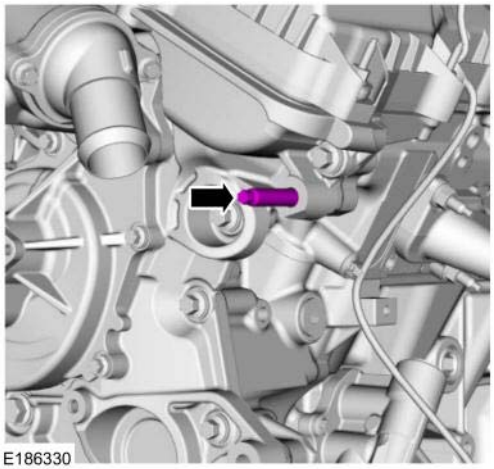
16.

Remove the nut, bolt and the generator.



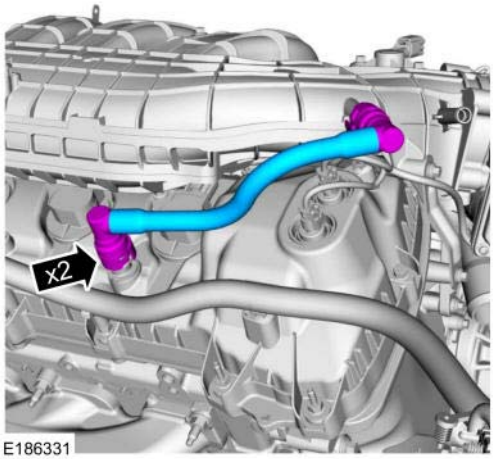
17.

Remove the generator stud.



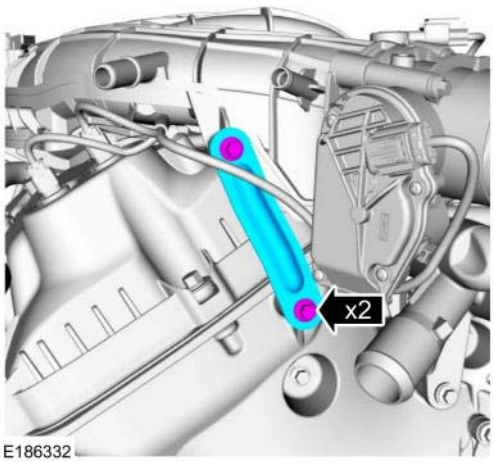
18.

Remove the PCV tube.



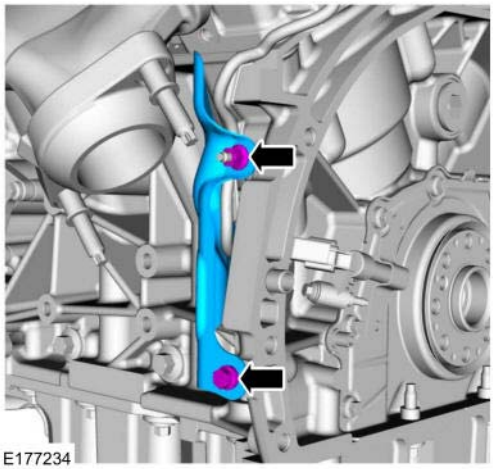
19.

Remove the bolts and the upper intake manifold support bracket.



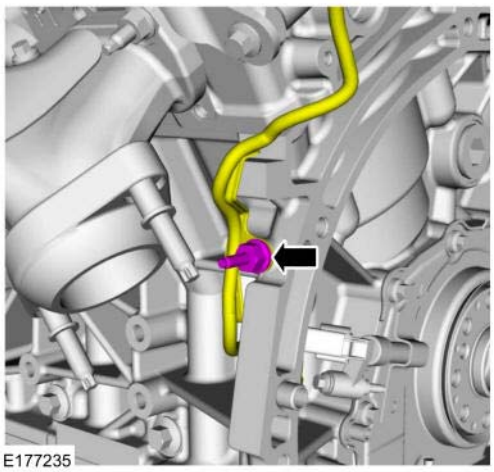
20.

Remove the nut, bolt and the heat shield.



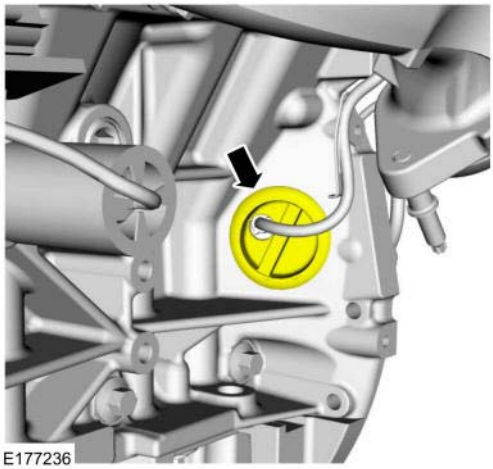
21.

Remove the wiring harness retainer stud bolt.



22.

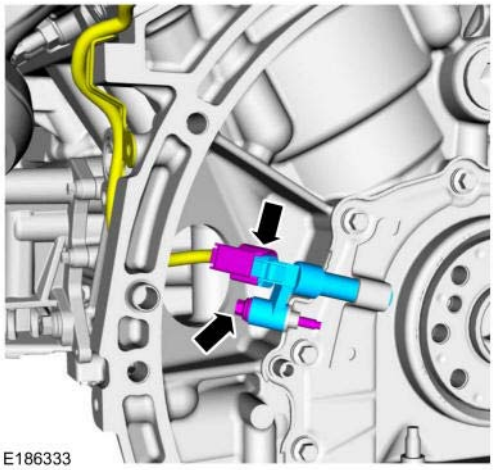
Remove the wiring harness grommet.



23.

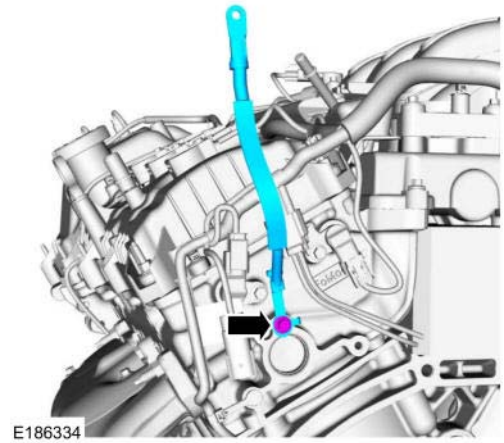
Disconnect the CKP sensor electrical connector.

Remove the bolt and the CKP sensor.



24.

Remove the bolt and the ground strap.

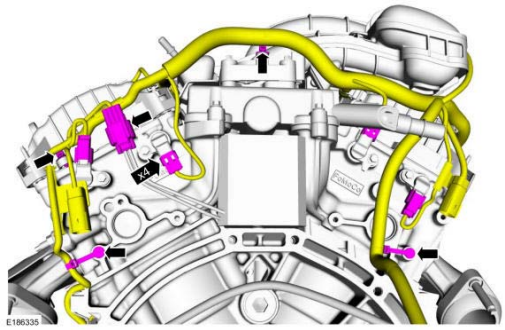


25.

Disconnect the KS sensor electrical connector.

Disconnect the CMP sensor electrical connectors.

Detach the wiring harness retainers.



26.

Disconnect the VCT oil control solenoids electrical connectors.

Disconnect the ignition coil-on-plug electrical connectors.

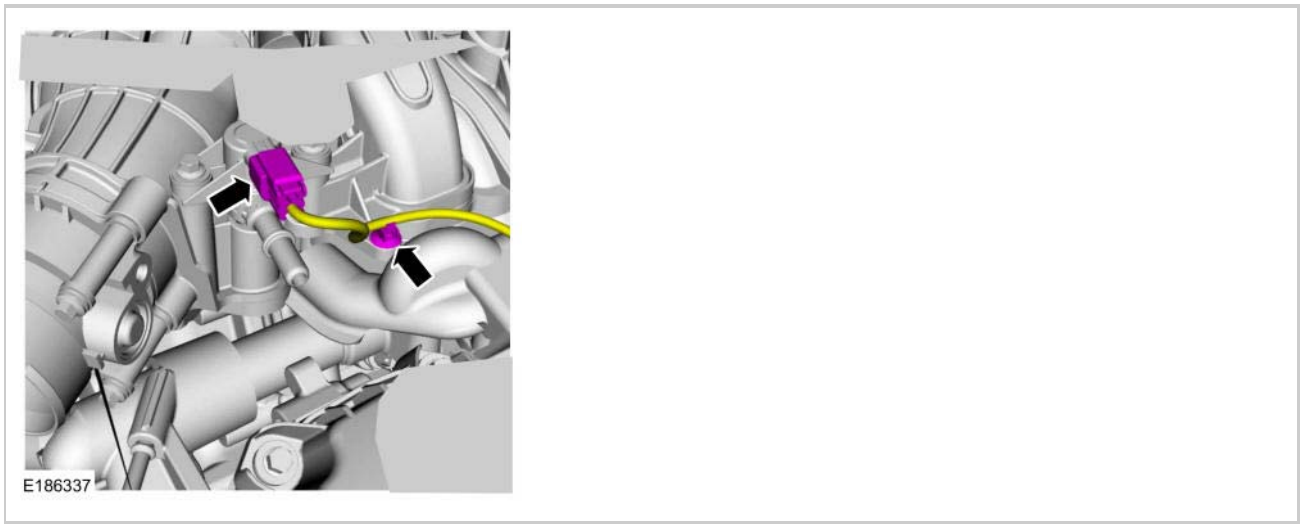
Disconnect the oil pressure switch electrical connector.

Detach the wiring harness retainers.



27.

Disconnect the EVAP canister purge valve electrical connector and wire retainer.



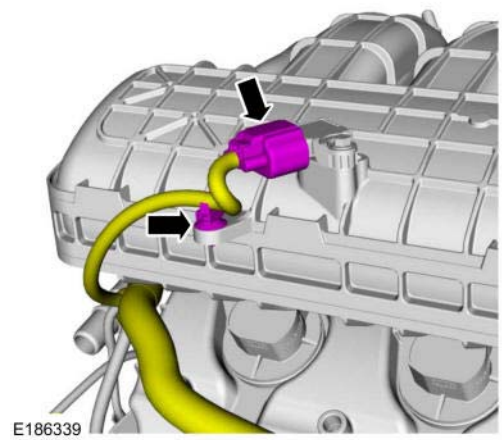
28.

Disconnect the throttle body electrical connector and wire retainer.



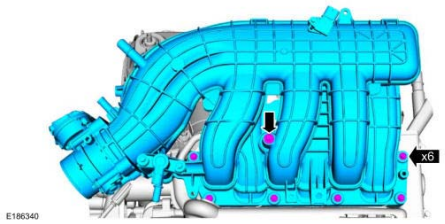
29.

Disconnect the MAPT sensor and wire retainer.



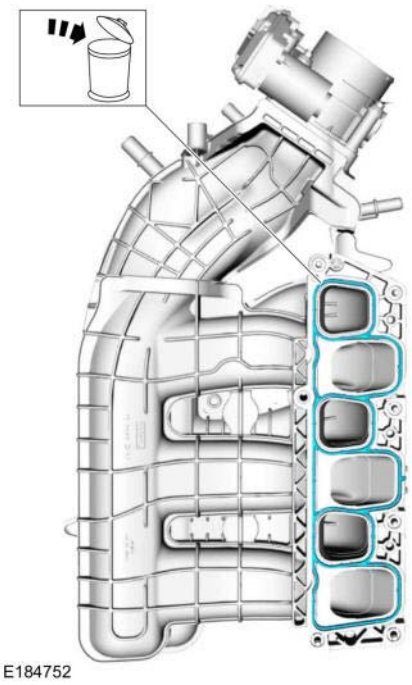
NOTE: If the engine is repaired or replaced because of upper engine failure, typically including valve or piston damage, check the intake manifold for metal debris. If metal debris is found, install a new intake manifold. Failure to follow these instructions can result in engine damage.

30.
Remove the bolts and the upper intake manifold.



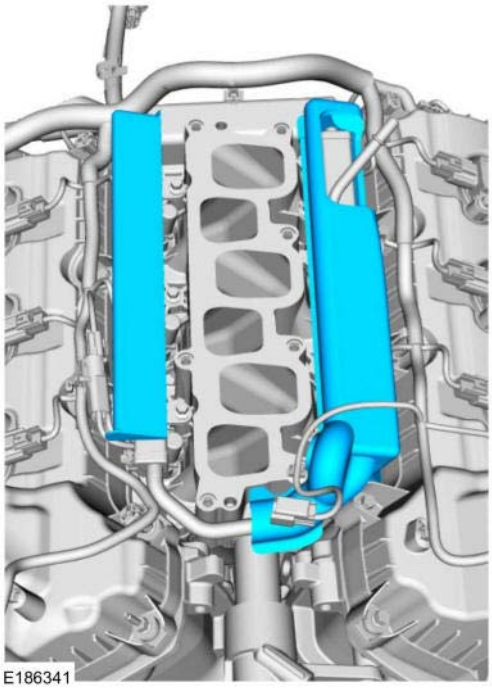
31.

Remove and discard the upper intake manifold gasket.



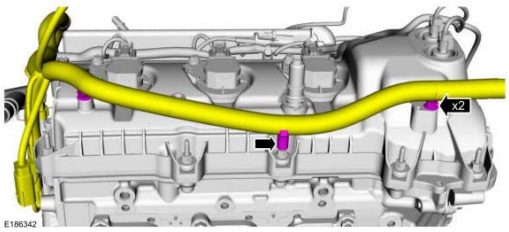
32.

Remove the fuel rail insulators.



33.

Detach the wiring harness retainers.



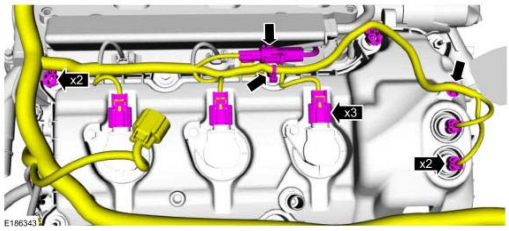
34.

Disconnect the VCT oil control solenoids electrical connectors.

Disconnect the ignition coil-on-plug electrical connectors.

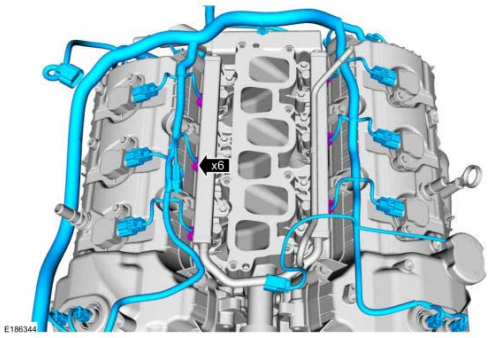
Disconnect the CHT sensor electrical connector.

Detach the wiring harness retainers.



35.

Disconnect the fuel injector electrical connectors and remove the engine wiring harness.



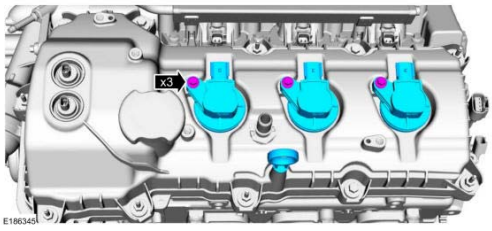
36.

NOTE: Use compressed air to remove any foreign material from the ignition coil-on-plugs and surrounding area before removing the ignition coil-on-plugs.

NOTE: When removing the ignition coil-on-plugs, a slight twisting motion will break the seal and ease removal.

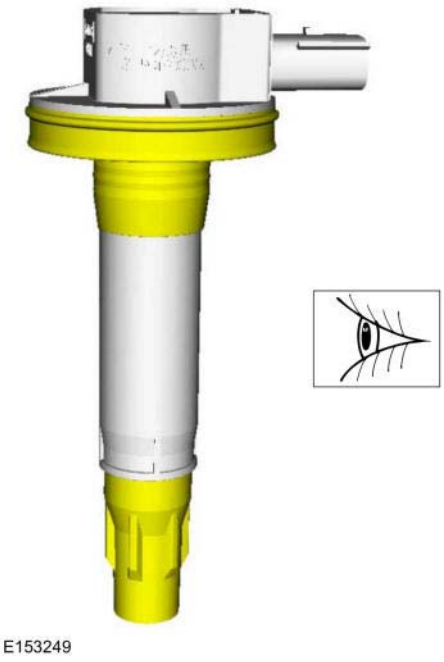
Remove the bolts and the ignition coil-on-plugs.

Remove the oil level indicator.



37.

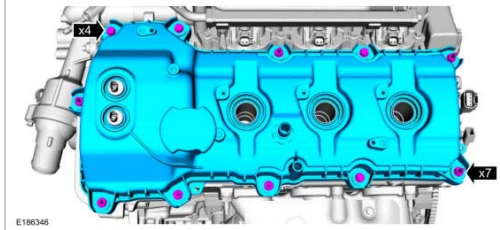
Inspect the coil seals for rips, nicks or tears and replace if necessary.



NOTE: If the VCT oil control solenoid sticks to the VCT seal, carefully wiggle the valve cover until the bond breaks free or damage to the VCT seal and VCT oil control solenoid may occur.

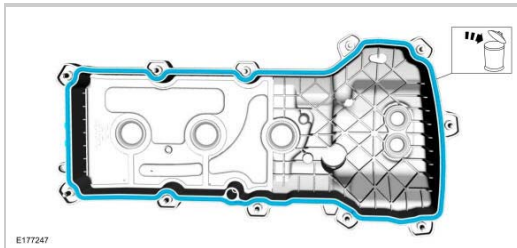
NOTE: While removing the valve cover do not apply excessive force to the VCT oil control solenoid or damage may occur.

38.
Loosen the bolts and the LH valve cover.



39.

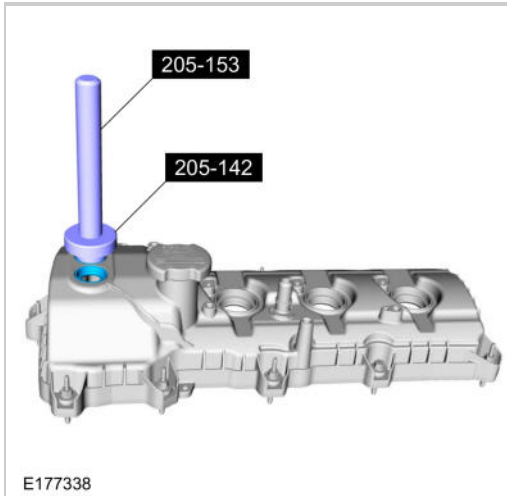
Discard the gasket.



NOTE: Inspect the VCT solenoid seals. Remove any damaged seals.

40.
Using the special tools, remove and discard the seal(s).

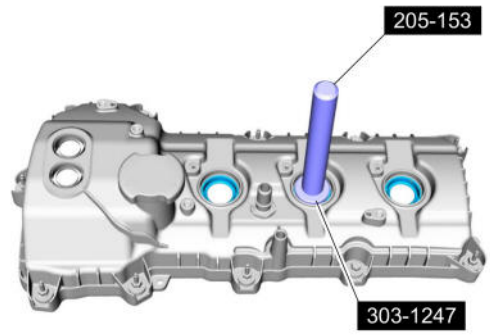
Use Special Service Tool: 205-142 (T80T-4000-J) Installer, Differential Bearing Cone, 205-153 (T80T-4000-W) Handle.



NOTE: Inspect the spark plug tube seals. Remove any damaged seals.

41.
Using the special tools, remove and discard the seal(s).

Use Special Service Tool: 205-153 (T80T-4000-W) Handle, 303-1247 VCT Spark Plug Tube Seal Remover and Installer.



E177339

42.

Make sure that the mating faces are clean and free of foreign material. Refer to: RTV Sealing Surface Cleaning and Preparation .

Use the General Equipment: Plastic Scraper

Material

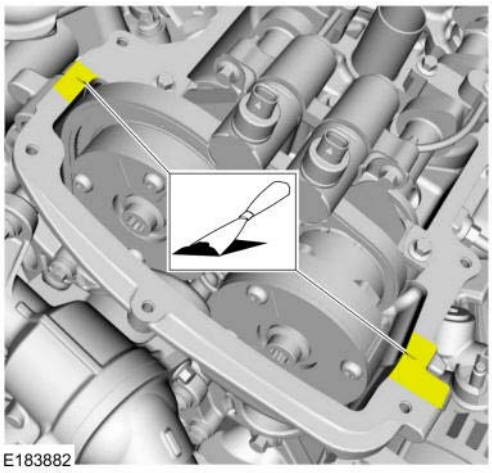
: Motorcraft® Silicone Gasket Remover / ZC-30-A

Material

: Metal Brake Parts Cleaner (U.S.) / PM-4-A, PM-4-B (U.S.)

Material

: Motorcraft® Metal Surface Prep / ZC-31-B

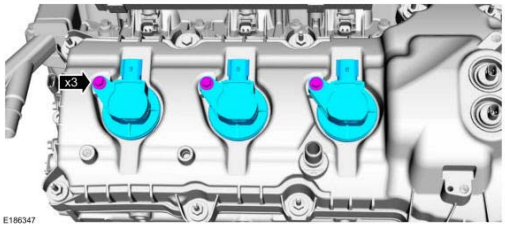


E183882

NOTE: Use compressed air to remove any foreign material from the ignition coil-on-plugs and surrounding area before removing the ignition coil-on-plugs.

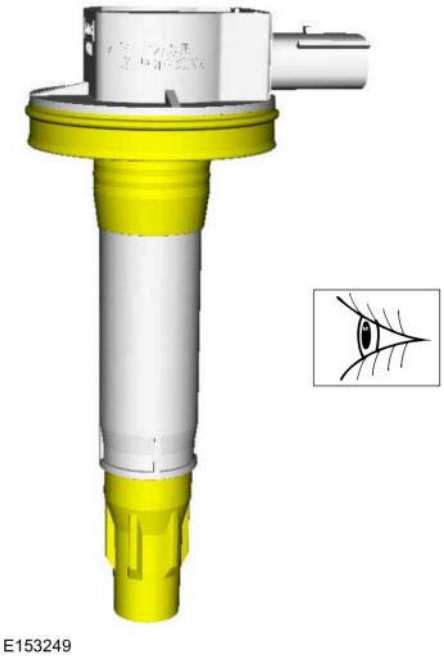
NOTE: When removing the ignition coil-on-plugs, a slight twisting motion will break the seal and ease removal.

43.
Remove the bolts and the ignition coil-on-plugs.



44.

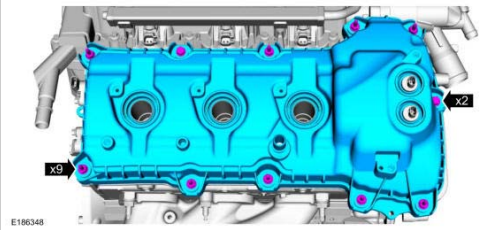
Inspect the coil seals for rips, nicks or tears and replace if necessary.



NOTE: If the VCT oil control solenoid sticks to the VCT seal, carefully wiggle the valve cover until the bond breaks free or damage to the VCT seal and VCT oil control solenoid may occur.

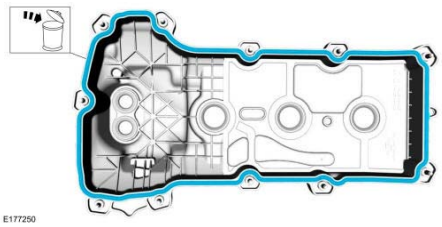
NOTE: While removing the valve cover do not apply excessive force to the VCT oil control solenoid or damage may occur.

45.
Loosen the bolts and remove the RH valve cover.



46.

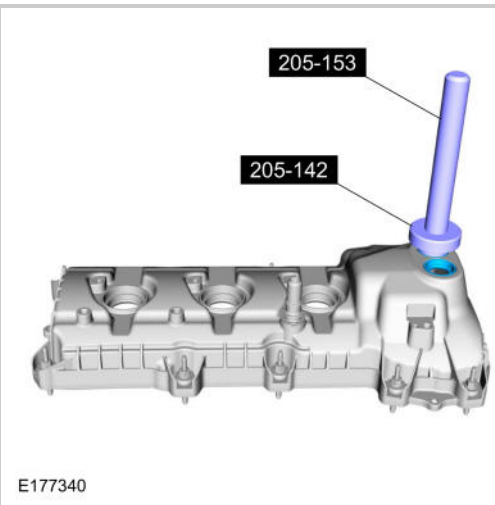
Discard the gasket.



NOTE: Inspect the VCT solenoid seals. Remove any damaged seals.

47.
Using the special tools, remove and discard the seal(s).

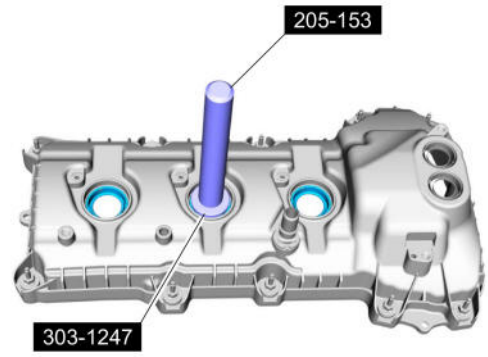
Use Special Service Tool: 205-142 (T80T-4000-J) Installer, Differential Bearing Cone, 205-153 (T80T-4000-W) Handle.



NOTE: Inspect the spark plug tube seals. Remove any damaged seals.

48.
Using the special tools, remove and discard the seal(s).

Use Special Service Tool: 205-153 (T80T-4000-W) Handle, 303-1247 VCT Spark Plug Tube Seal Remover and Installer.



E177341

49.

Make sure that the mating faces are clean and free of foreign material. Refer to: RTV Sealing Surface Cleaning and Preparation .

Use the General Equipment: Plastic Scraper

Material

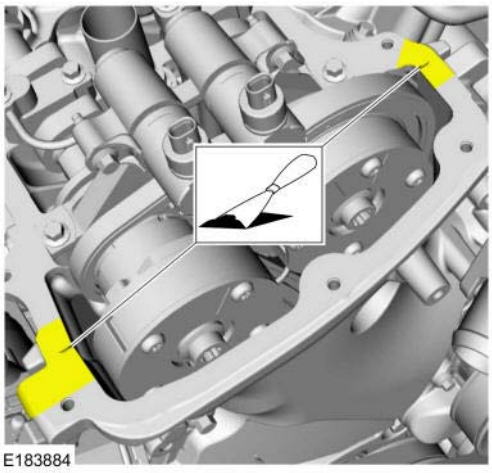
: Motorcraft® Silicone Gasket Remover / ZC-30-A

Material

: Metal Brake Parts Cleaner (U.S.) / PM-4-A, PM-4-B (U.S.)

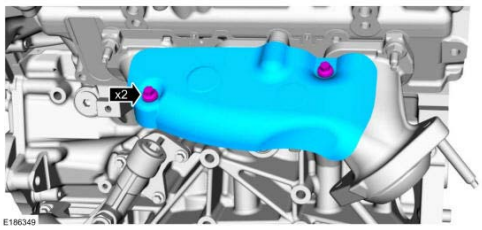
Material

: Motorcraft® Metal Surface Prep / ZC-31-B


E183884

50.

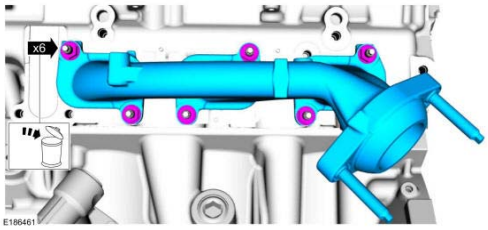
Remove the bolts and the LH exhaust manifold heat shield.



51.

Remove the nuts and the LH exhaust manifold.

Discard the nuts.

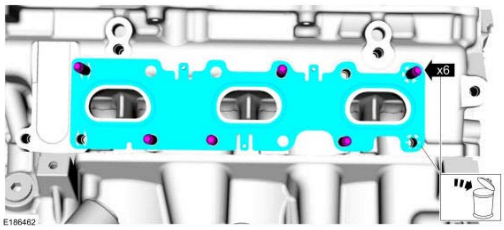


52.

Clean and inspect the catalytic converter flange. Refer to: Exhaust Manifold Cleaning and Inspection .

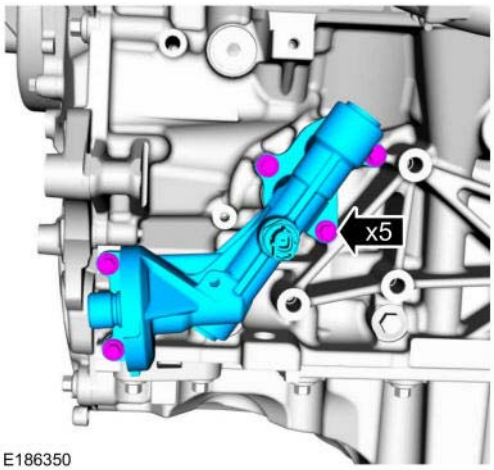
53.

Remove and discard the LH exhaust manifold gasket and studs.



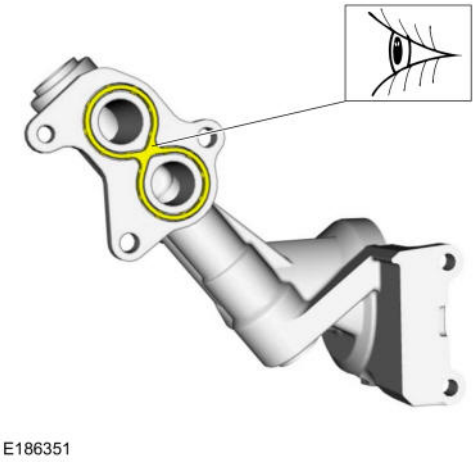
54.

Remove the bolts and the oil filter adapter.



55.

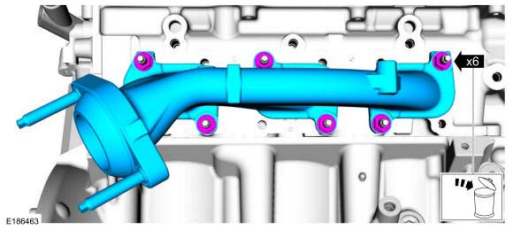
Inspect and replace if necessary.



56.

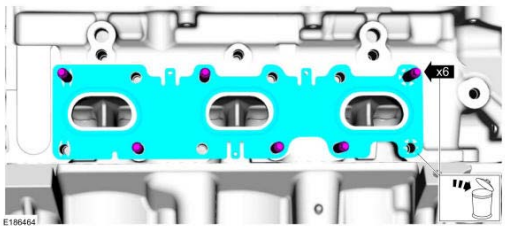
Remove the nuts and the RH exhaust manifold.

Discard the nuts.



57.

Remove and discard the RH exhaust manifold gasket and studs.

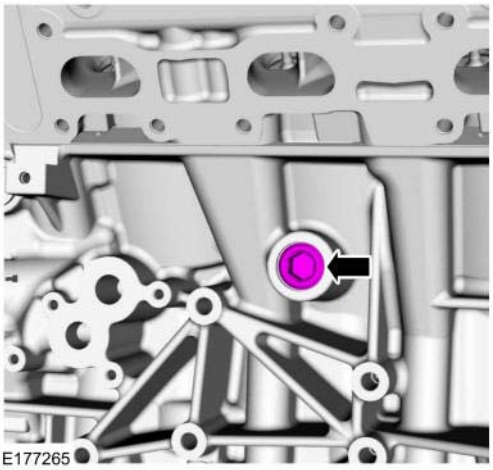


58.

Clean and inspect the catalytic converter flange. Refer to: Exhaust Manifold Cleaning and Inspection .

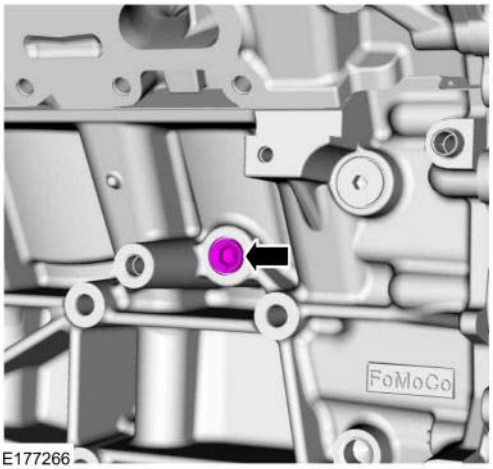
59.

Remove the LH block coolant drain plug and allow coolant to drain from the cylinder block.



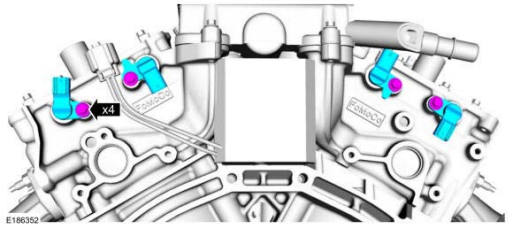
60.

Remove the RH block coolant drain plug and allow coolant to drain from the cylinder block.



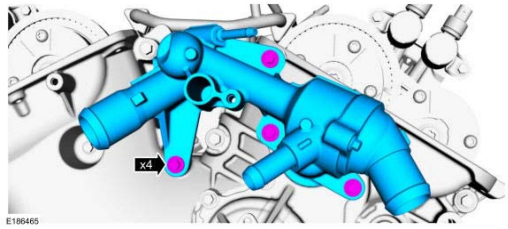
61.

Remove the bolts and the CMP sensors.



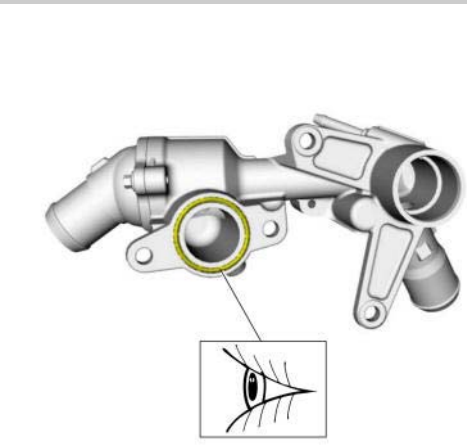
62.

Remove the bolts and the thermostat housing.



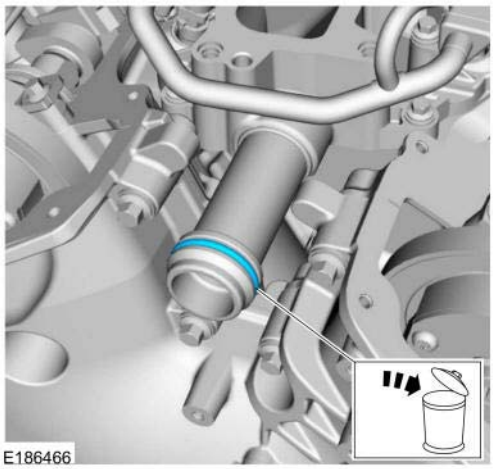
63.

Inspect and replace if necessary.



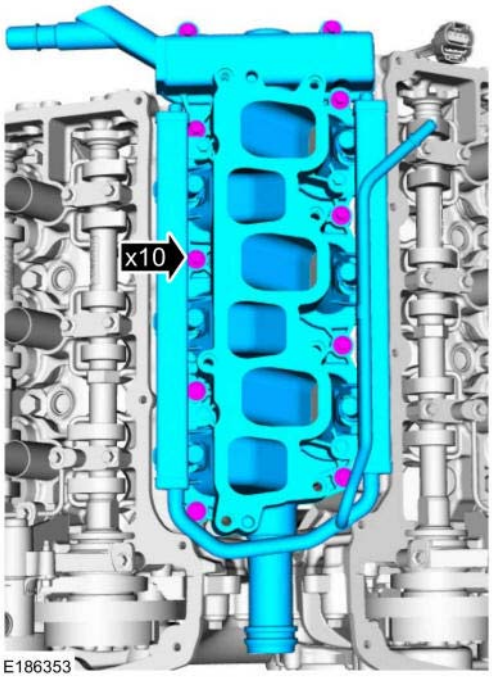
64.

Remove and discard the thermostat housing O-ring seal.



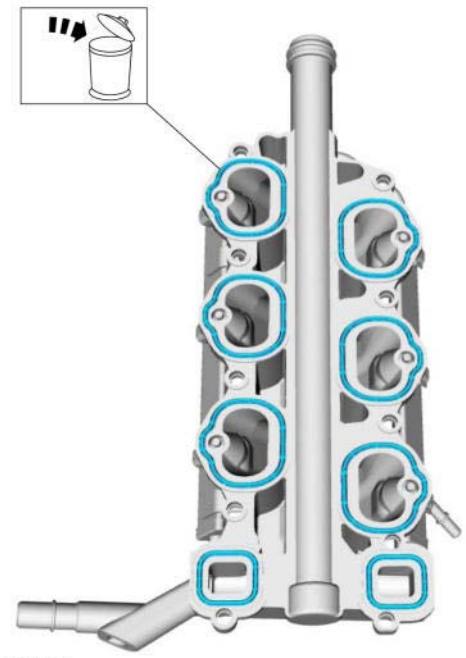
65.

Remove the bolts and the lower intake manifold.



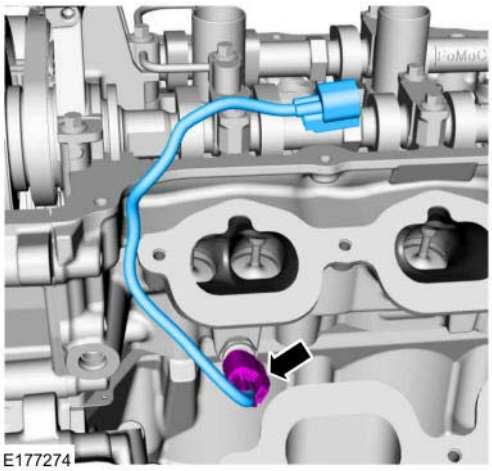
66.

Remove and discard the lower intake manifold gaskets.


E184761

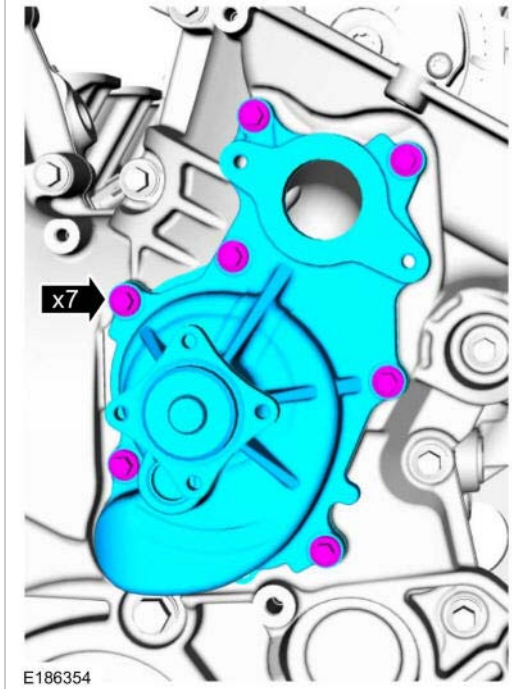
67.

Disconnect the CHT sensor electrical connector.


E177274

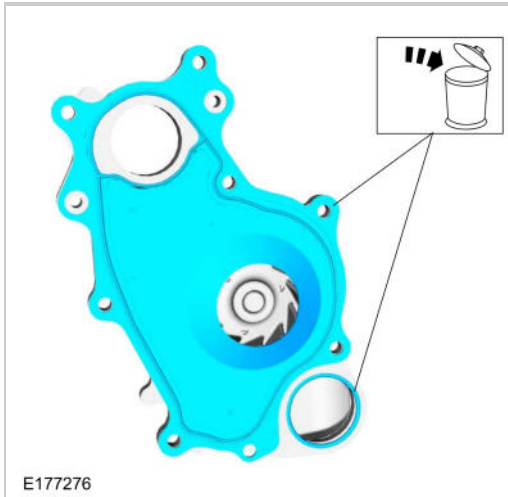
68.

Remove the bolts and the coolant pump.



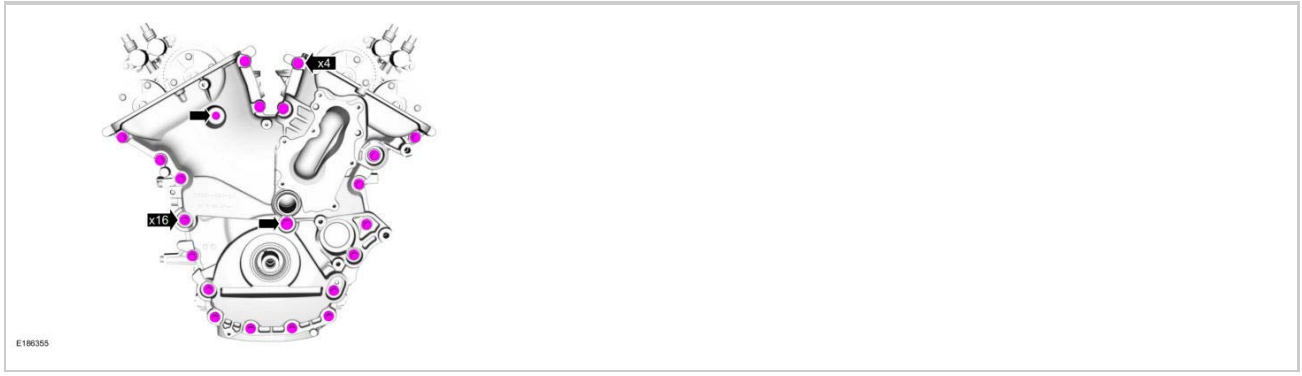
69.

Remove and discard the coolant pump gasket and O-ring seal.



70.

Remove the engine front cover bolts.



71.

Using a pry tool, locate the 5 pry pads shown in illustration and pry the engine front cover loose and remove.



72.

Using the special tools, remove the engine front cover to coolant pipe seal.

Use Special Service Tool: 205-150 (T80T-4000-S) Installer, Spindle Bearing, 205-153 (T80T-4000-W) Handle.



NOTE: Only use a 3M™ Roloc® Bristle Disk (2-in white, part number 07528) in a suitable tool turning at the recommended speed of 15, 000 rpm, to clean the engine

front cover. Do not use metal scrapers, wire brushes or any other power abrasive disk to clean front cover.

73.

Make sure that the mating faces of the front cover are clean and free of foreign material. Refer to: RTV Sealing Surface Cleaning and Preparation .

Material

: Motorcraft® Silicone Gasket Remover / ZC-30-A

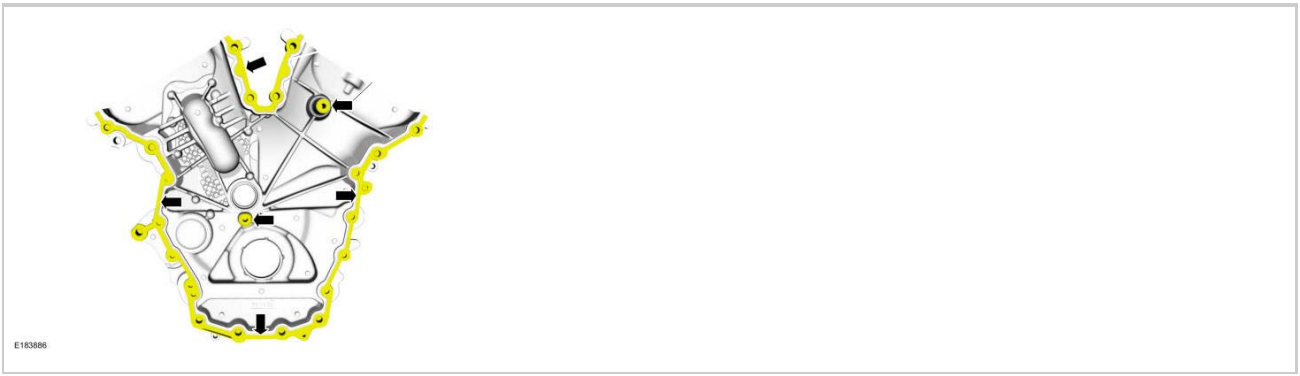
Material

: Metal Brake Parts Cleaner (U.S.) / PM-4-A, PM-4-B (U.S.)

Material

: Motorcraft® Metal Surface Prep / ZC-31-B

Thoroughly wash the engine front cover to remove any foreign material, including any abrasive particles created during the cleaning process.



NOTE: Do not use wire brushes, power abrasive discs or 3M™ Roloc® Bristle Disk (2-in white part number 07528) to clean the sealing surfaces. These tools cause scratches and gouges that make leak paths. They also cause contamination that will cause premature engine failure. Remove all traces of the gasket.

NOTE: Place clean, lint-free shop towels over exposed engine cavities. Carefully remove the towels so foreign material is not dropped into the engine. Any foreign material (including any material created while cleaning gasket surfaces) that enters the oil passages or the oil pan, may cause engine failure.

74.
Make sure that the mating faces of the engine block and oil pan are clean and free of foreign material. Refer to: RTV Sealing Surface Cleaning and Preparation .

Use the General Equipment: Plastic Scraper

Material

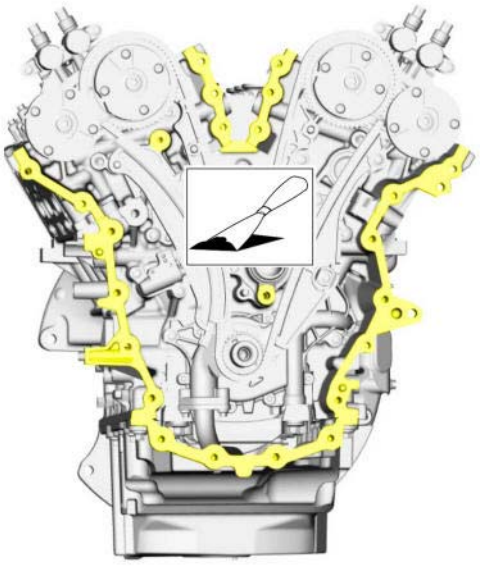
: Motorcraft® Silicone Gasket Remover / ZC-30-A

Material

: Metal Brake Parts Cleaner (U.S.) / PM-4-A, PM-4-B (U.S.)

Material

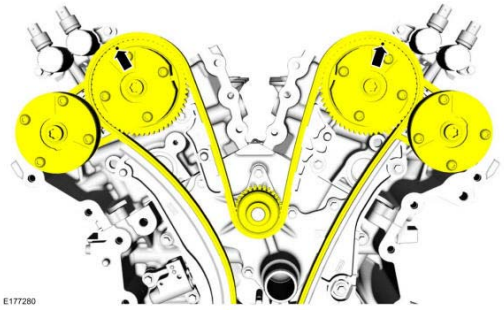
: Motorcraft® Metal Surface Prep / ZC-31-B



E184099

NOTE: Rotate the crankshaft in a clockwise direction only.

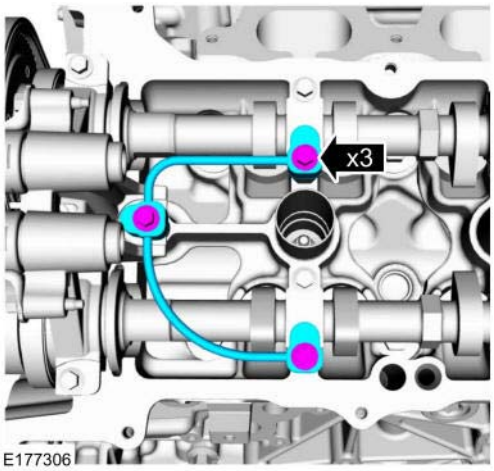
75.
Rotate the crankshaft clockwise and align the timing marks on the intake VCT units as shown in illustration.



E177280

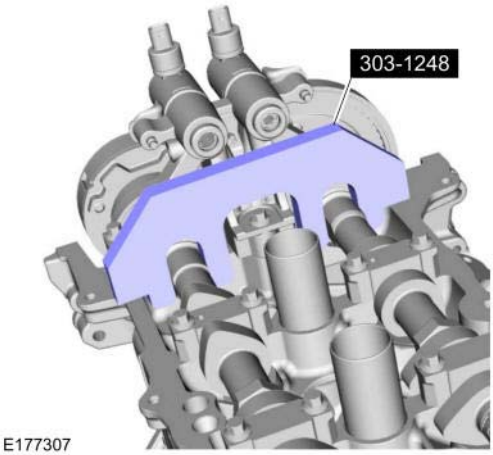
76.

Remove the bolts and the LH oil tube.



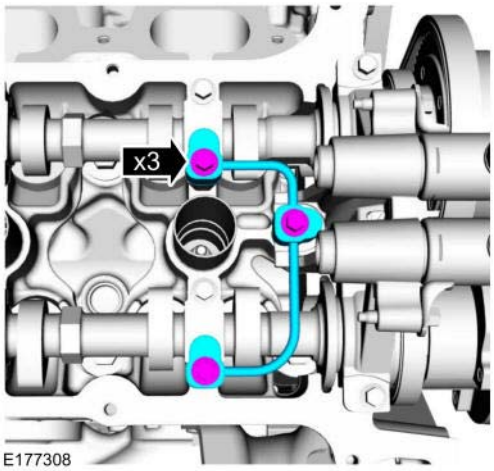
NOTE: The Camshaft Holding Tool will hold the camshafts in the TDC position.

77.
Install Special Service Tool: 303-1248 Camshaft holding tools.



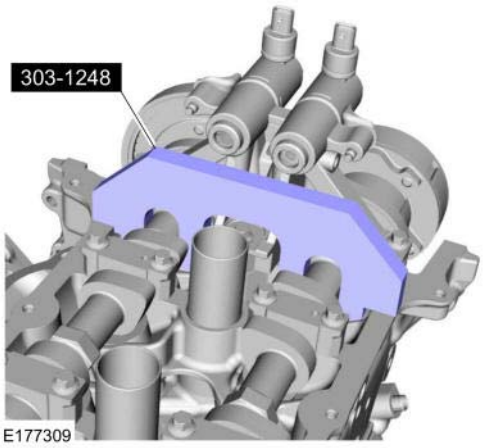
78.

Remove the bolts and the RH oil tube.



NOTE: The Camshaft Holding Tool will hold the camshafts in the TDC position.

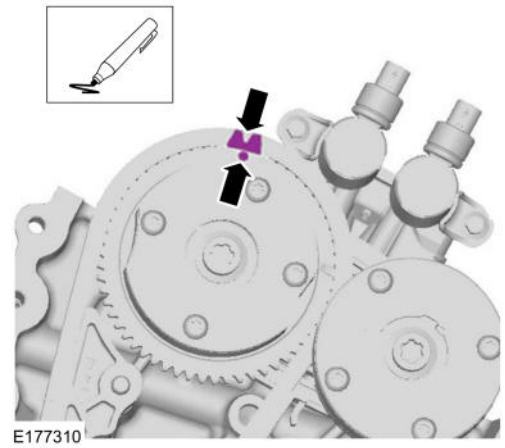
79.
Install Special Service Tool: 303-1248 Camshaft holding tools.



NOTE: ***The following 3 steps are for primary timing chains that the colored links are not visible.***

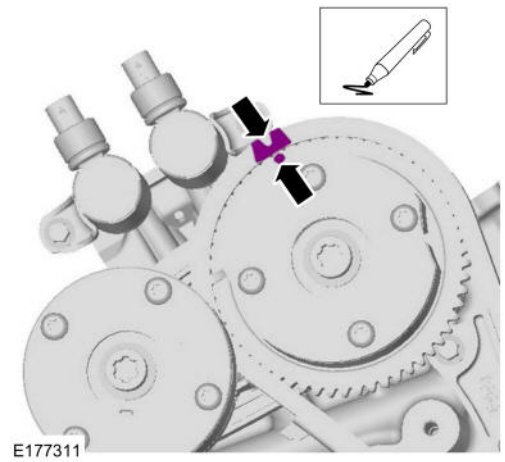
80.

Mark the timing chain link that aligns with the timing mark on the LH intake VCT unit as shown in illustration.



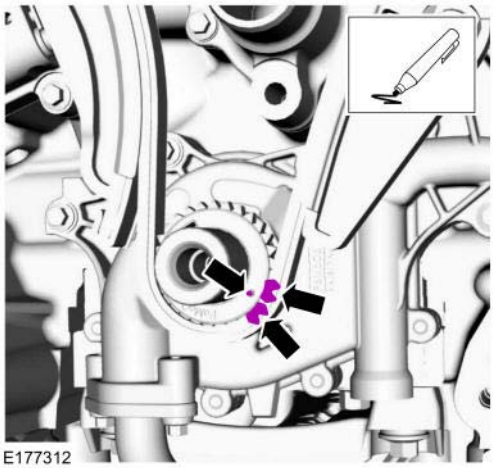
81.

Mark the timing chain link that aligns with the timing mark on the RH intake VCT unit as shown in illustration.



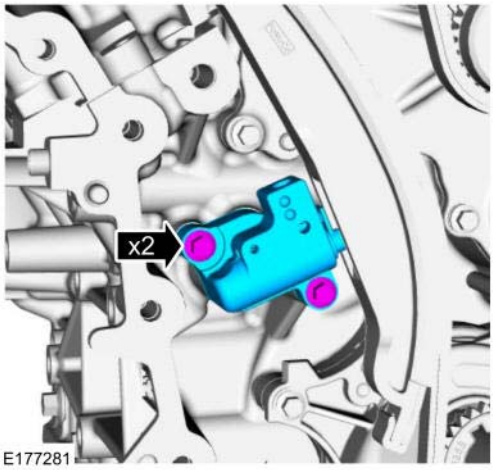
NOTE: The crankshaft sprocket timing mark should be between the colored links.

82.
Mark the timing chain links that aligns with the timing mark on the crankshaft sprocket as shown in illustration.



83.

Remove the bolts and the timing chain tensioner.



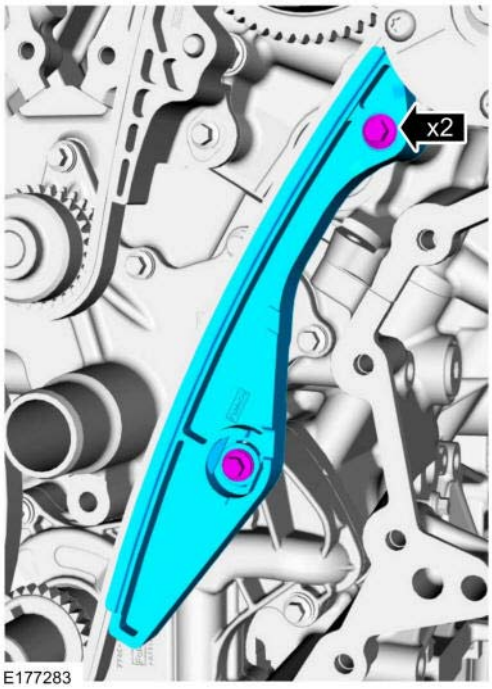
84.

Remove the timing chain tensioner arm.



85.

Remove the bolts and the lower LH timing chain guide.

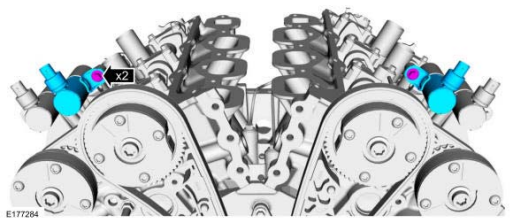


NOTE: Removal of the VCT oil control solenoid will aid in the removal of the timing chain.

NOTE: A slight twisting motion will aid in the removal of the VCT oil control solenoids.

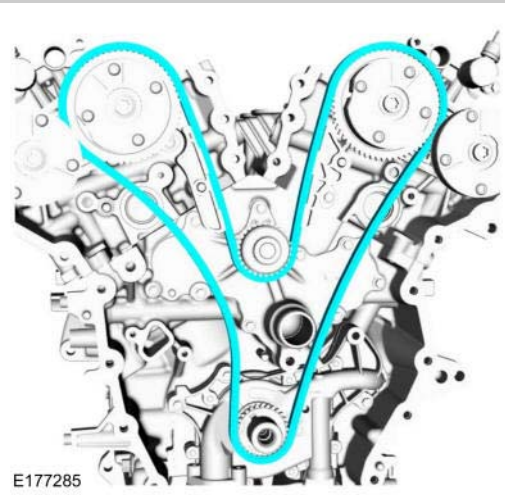
NOTE: Keep the VCT oil control solenoid clean of dirt and debris.

86.
Remove the bolts and the VCT oil control solenoids.



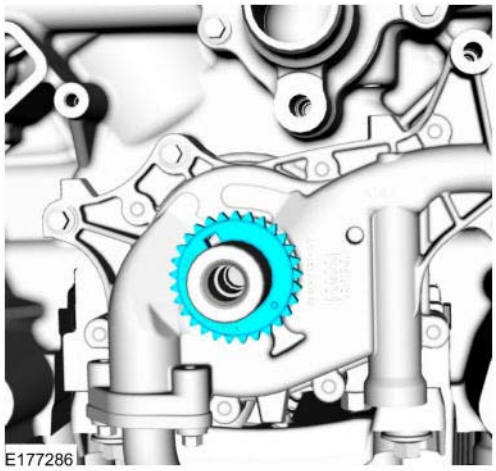
87.

Remove the timing chain.



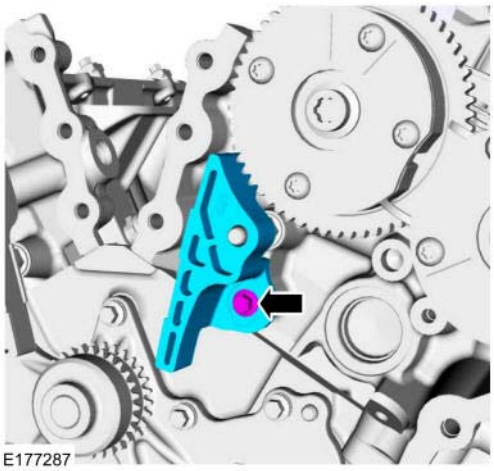
88.

Remove the crankshaft sprocket.



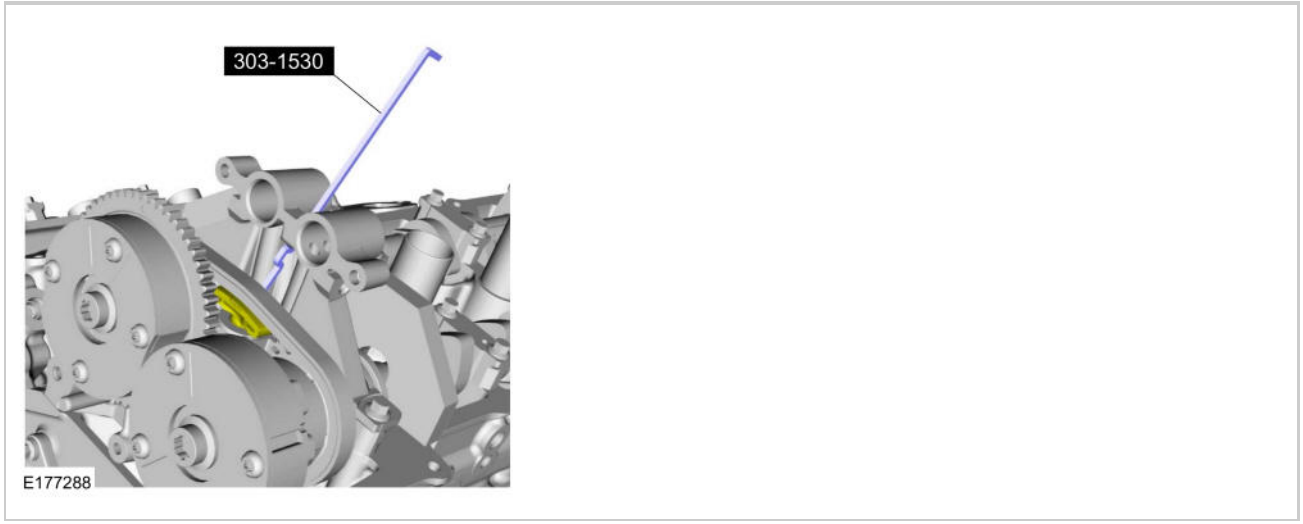
NOTE: Do not use power tools to remove the bolt or damage to the LH primary timing chain guide may occur.

89.
Remove the bolt and the upper LH timing chain guide.



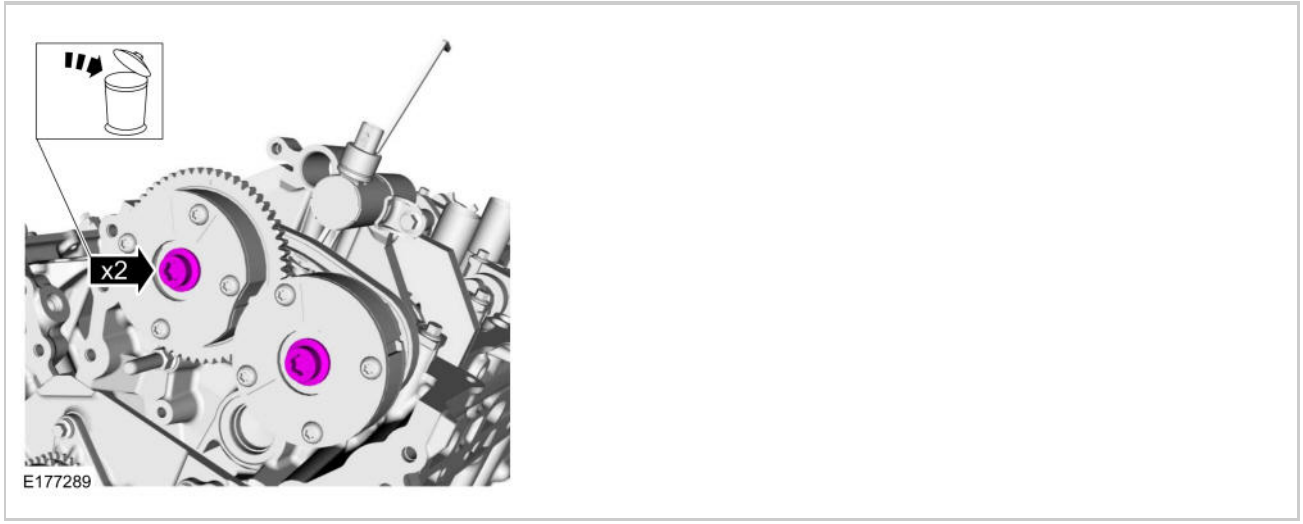
NOTE: The VCT oil control solenoids are removed for clarity.

90.
Install Special Service Tool: 303-1530 Tool, Chain Tensioner Hold Down.



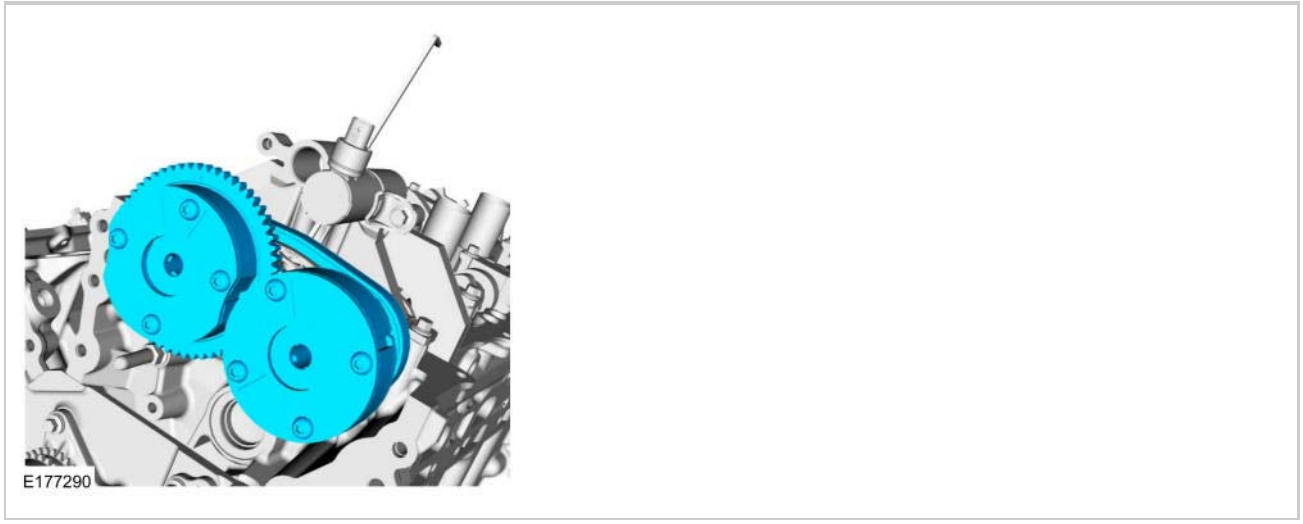
91.

Remove and discard the LH VCT unit bolts.



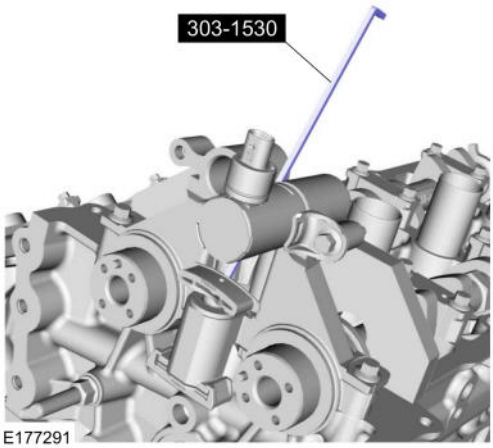
92.

Remove the LH VCT units and secondary timing chain.



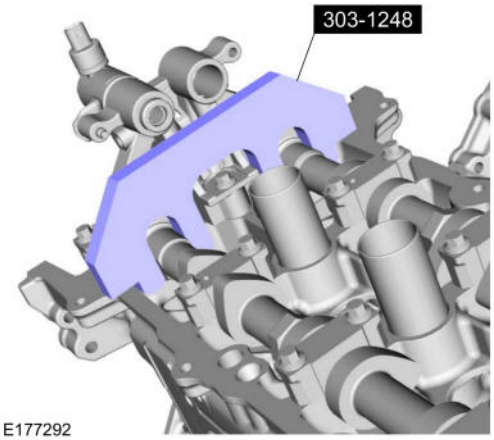
93.

Remove Special Service Tool: 303-1530 Tool, Chain Tensioner Hold Down.



94.

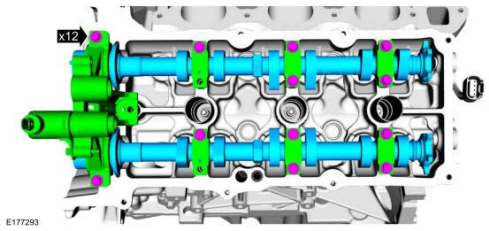
Remove Special Service Tool: 303-1248 Camshaft holding tools.



NOTE: Cylinder head camshaft bearing caps are numbered to verify that they are assembled in their original positions.

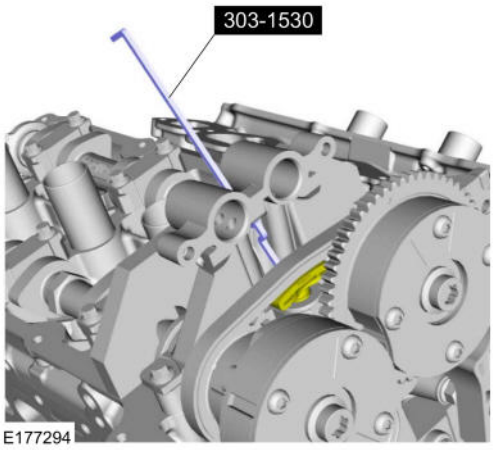
NOTE: Mark the exhaust and intake camshafts for installation into their original locations.

95.
Remove the bolts, camshaft caps and the camshafts.



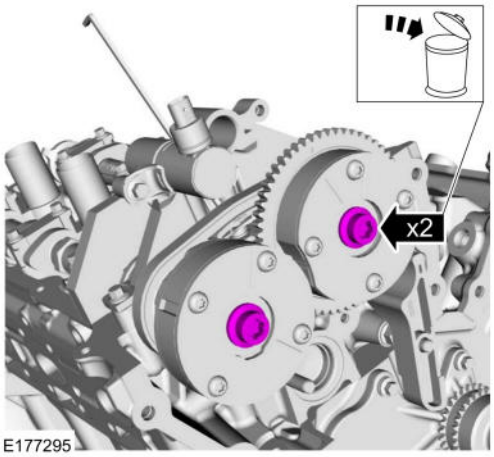
NOTE: The VCT oil control solenoids are removed for clarity.

96.
Install Special Service Tool: 303-1530 Tool, Chain Tensioner Hold Down.



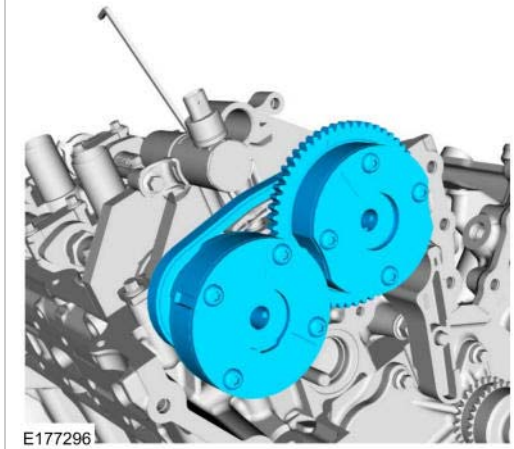
97.

Remove and discard the RH VCT unit bolts.



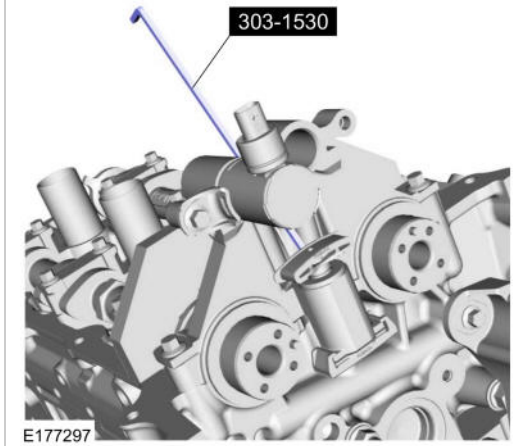
98.

Remove the RH VCT units and secondary timing chain.



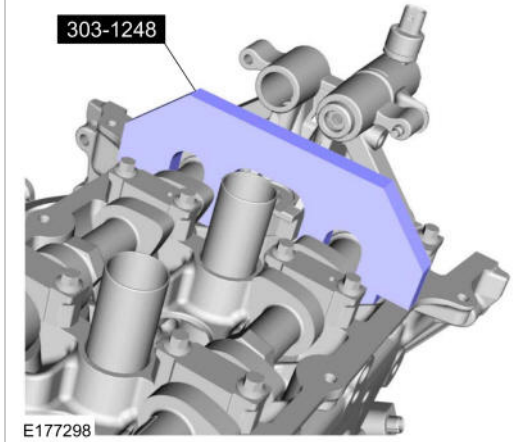
99.

Remove Special Service Tool: 303-1530 Tool, Chain Tensioner Hold Down.



100.

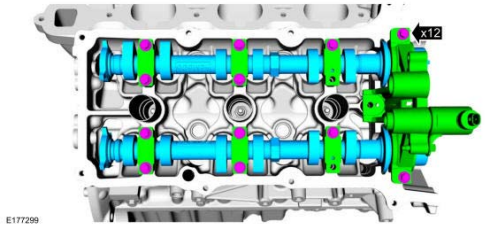
Remove Special Service Tool: 303-1248 Camshaft holding tools.



NOTE: Cylinder head camshaft bearing caps are numbered to verify that they are assembled in their original positions.

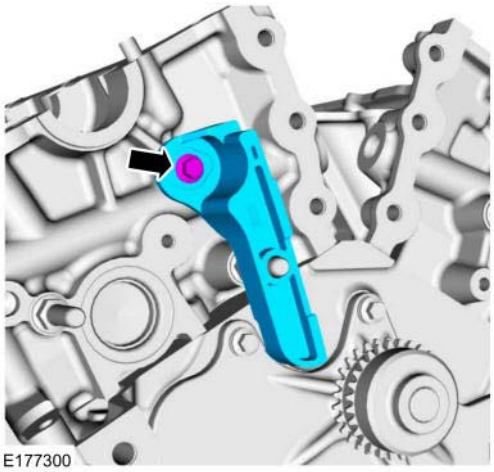
NOTE: Mark the exhaust and intake camshafts for installation into their original locations.

101.
Remove the bolts, camshaft caps and the camshafts.



NOTE: Do not use power tools to remove the bolt or damage to the RH primary timing chain guide may occur.

102.
Remove the bolt and the RH timing chain guide.

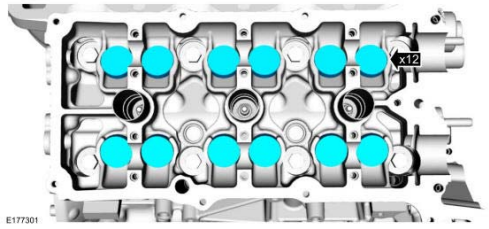


NOTE: If the components are to be reinstalled, they must be installed in the same positions. Mark the components for installation into their original locations.

NOTE: RH shown in illustration, LH similar.

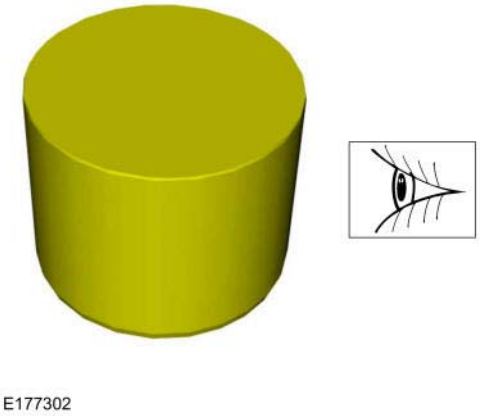
103.

Remove the valve tappets from the cylinder heads.



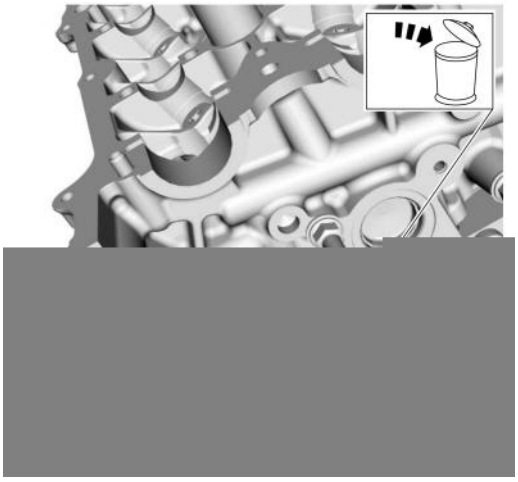
104.

Inspect and install new components as necessary.



105.

Remove and discard the M6 bolt.



NOTE: Place clean shop towels over exposed engine cavities. Carefully remove the towels so foreign material is not dropped into the engine. Any foreign material (including any material created while cleaning gasket surfaces) that enters the oil

passages or the oil pan, may cause engine failure.

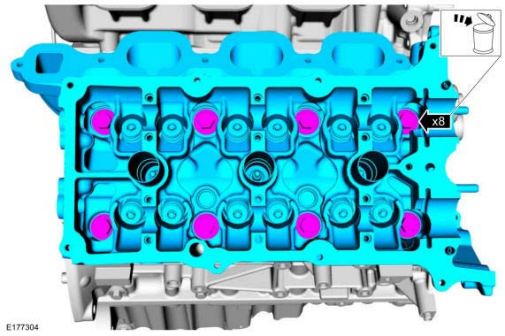
NOTE: Aluminum surfaces are soft and can be scratched easily. Never place the cylinder head gasket surface, unprotected, on a bench surface

NOTE: The cylinder head bolts must be discarded and new bolts must be installed. They are tighten-to-yield designed and cannot be reused.

106.

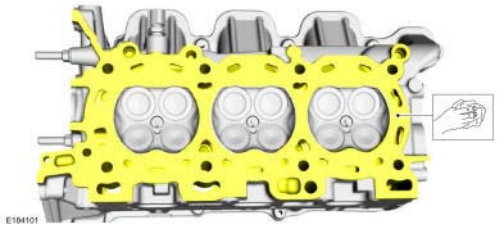
Remove and discard the bolts from the cylinder head.

Remove the cylinder head.



NOTE: Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges that make leak paths. Use a plastic scraping tool to remove all traces of the head gasket.

107.
Make sure that the mating faces of the cylinder head are clean and free of foreign material.



108.

Remove and discard the cylinder head gasket.



NOTE: Place clean, lint-free shop towels over exposed engine cavities. Carefully remove the towels so foreign material is not dropped into the engine. Any foreign material (including any material created while cleaning gasket surfaces) that enters the oil passages or the oil pan, may cause engine failure.

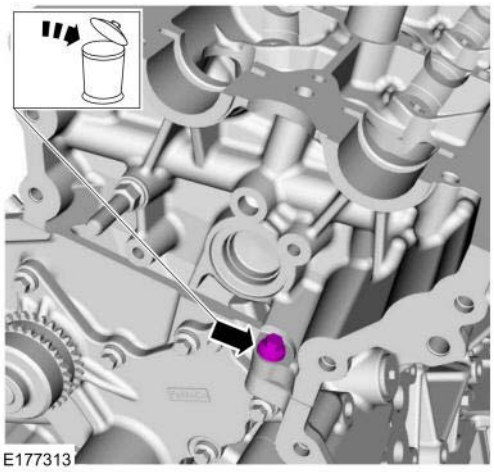
NOTE: Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges that make leak paths. Use a plastic scraping tool to remove all traces of the head gasket.

109.
Make sure that the mating faces of the engine block are clean and free of foreign material.



110.

Remove and discard the M6 bolt.



NOTE: Place clean shop towels over exposed engine cavities. Carefully remove the towels so foreign material is not dropped into the engine. Any foreign material (including any material created while cleaning gasket surfaces) that enters the oil passages or the oil pan, may cause engine failure.

NOTE: Aluminum surfaces are soft and can be scratched easily. Never place the cylinder head gasket surface, unprotected, on a bench surface

NOTE: The cylinder head bolts must be discarded and new bolts must be installed. They are tighten-to-yield designed and cannot be reused.

111.

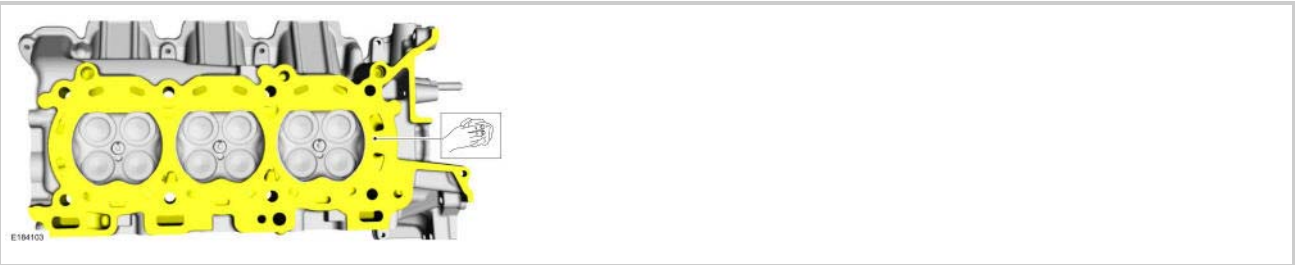
Remove and discard the bolts from the cylinder head.

Remove the cylinder head.



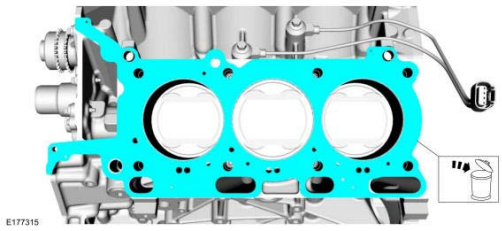
NOTE: Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges that make leak paths. Use a plastic scraping tool to remove all traces of the head gasket.

112.
Make sure that the mating faces of the cylinder head are clean and free of foreign material.



113.

Remove and discard the cylinder head gasket.



NOTE: Place clean, lint-free shop towels over exposed engine cavities. Carefully remove the towels so foreign material is not dropped into the engine. Any foreign material (including any material created while cleaning gasket surfaces) that enters the oil passages or the oil pan, may cause engine failure.

NOTE: Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges that make leak paths. Use a plastic scraping tool to remove all traces of the head gasket.

114.
Make sure that the mating faces of the engine block are clean and free of foreign material.

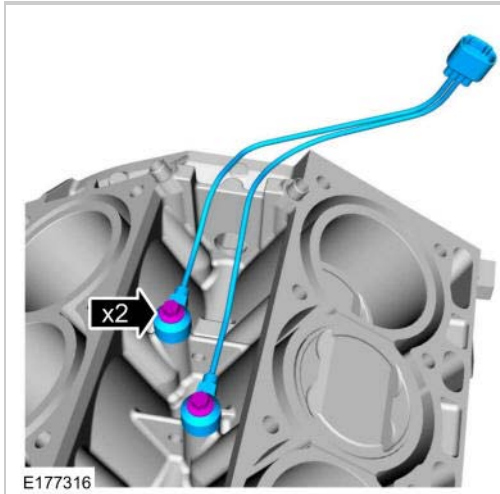


115.

Support the cylinder head on a bench with the head gasket side up. Check the cylinder head distortion. Refer to: Cylinder Head Distortion .

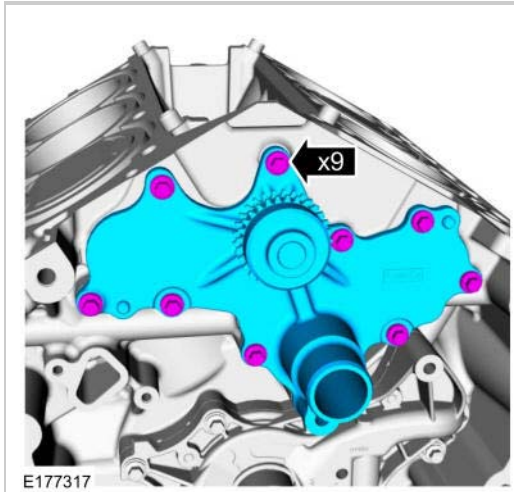
116.

Remove the bolts and the KS.



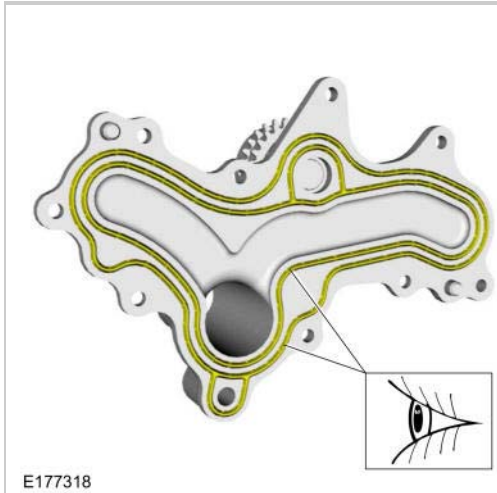
117.

Remove the bolts and the channel cover plate.



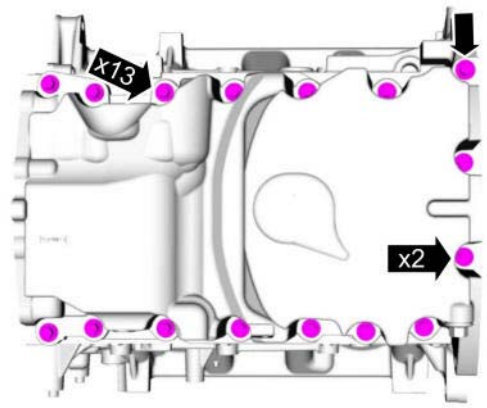
118.

Inspect and replace if necessary.



119.

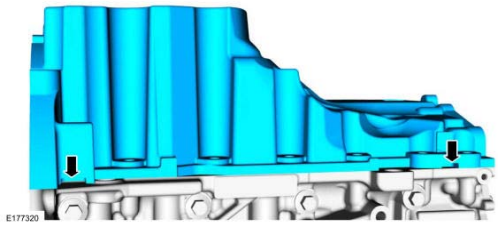
Remove the oil pan bolts.



E177319

120.

Using a pry tool, locate the pry pads at the LH and RH side of the oil pan and pry the oil pan loose and remove.


E177320

NOTE: Only use a 3M™ Roloc® Bristle Disk (2-in white, part number 07528) to clean the oil pan and engine front cover. Do not use metal scrapers, wire brushes or any other power abrasive disk to clean. These tools cause scratches and gouges that make leak paths.

121.

Make sure that the mating faces of the oil pan are clean and free of foreign material. Refer to: RTV Sealing Surface Cleaning and Preparation .

Material

: Motorcraft® Silicone Gasket Remover / ZC-30-A

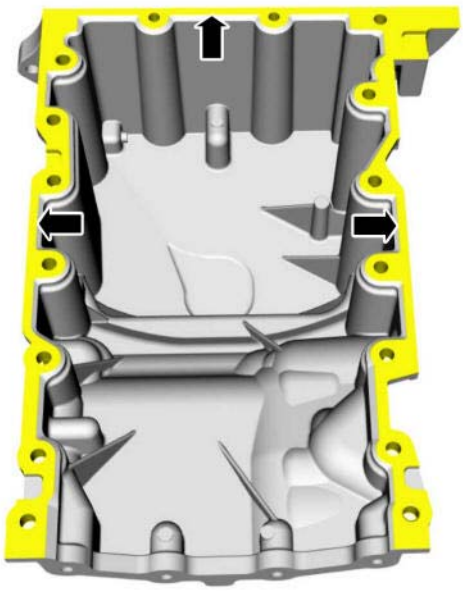
Material

: Metal Brake Parts Cleaner (U.S.) / PM-4-A, PM-4-B (U.S.)

Material

: Motorcraft® Metal Surface Prep / ZC-31-B

Thoroughly wash the oil pan to remove any foreign material, including any abrasive particles created during the cleaning process.



E183911

NOTE: Do not use wire brushes, power abrasive discs or 3M™ Roloc® Bristle Disk (2-in white, part number 07528) to clean the sealing surfaces of the engine block. These tools cause scratches and gouges that make leak paths. They also cause contamination that causes premature engine failure. Remove all traces of the gasket.

122.
Make sure that the mating faces of the engine block are clean and free of foreign material. Refer to: RTV Sealing Surface Cleaning and Preparation .

Use the General Equipment: Plastic Scraper

Material

: Motorcraft® Silicone Gasket Remover / ZC-30-A

Material

: Metal Brake Parts Cleaner (U.S.) / PM-4-A, PM-4-B (U.S.)

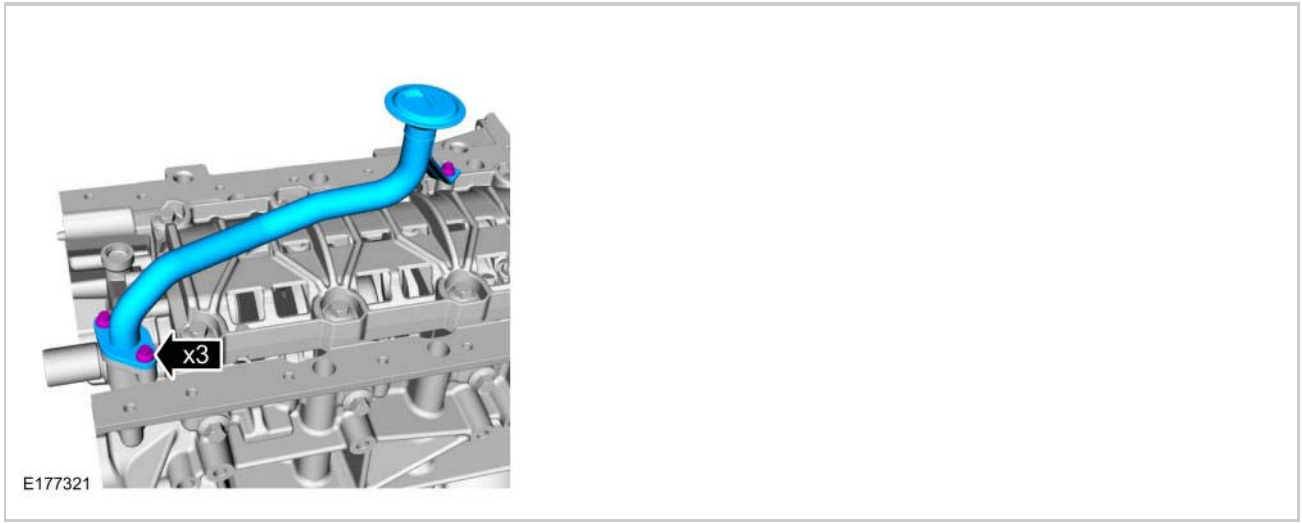
Material

: Motorcraft® Metal Surface Prep / ZC-31-B



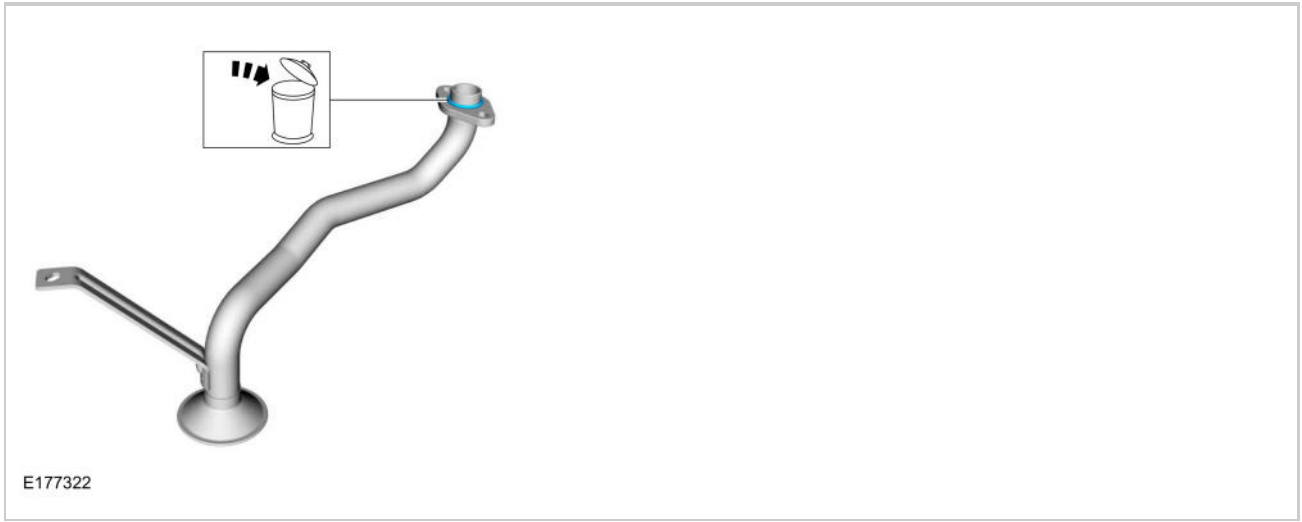
123.

Remove the bolts and the oil pump screen and pickup tube.



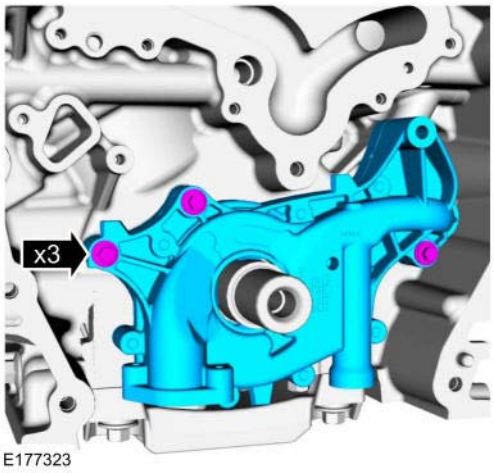
124.

Remove and discard the oil pump screen and pickup tube O-ring seal.



125.

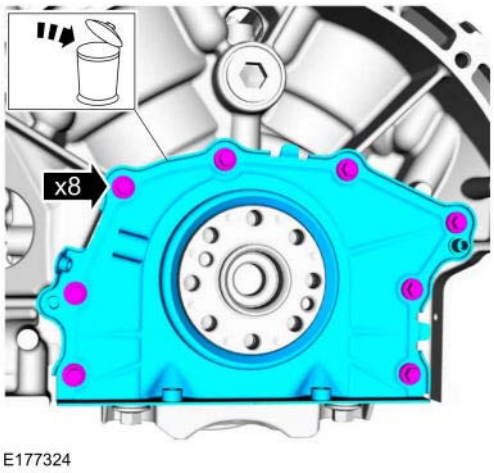
Remove the bolts and the oil pump.



126.

Remove the bolts and the crankshaft rear seal.

Discard the crankshaft rear seal.



NOTE: Do not use wire brushes, power abrasive discs or 3M™ Roloc® Bristle Disk (2-in white, part number 07528) to clean the sealing surfaces of the engine block. These tools cause scratches and gouges that make leak paths. They also cause contamination that causes premature engine failure. Remove all traces of the gasket.

127.
Make sure that the mating faces is clean and free of foreign material. Refer to: RTV Sealing Surface Cleaning and Preparation .

Use the General Equipment: Plastic Scraper

Material

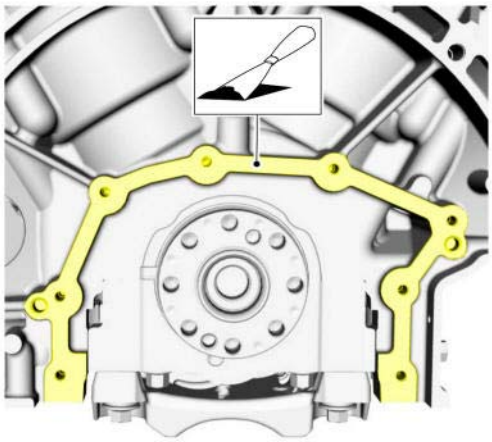
: Motorcraft® Silicone Gasket Remover / ZC-30-A

Material

: Metal Brake Parts Cleaner (U.S.) / PM-4-A, PM-4-B (U.S.)

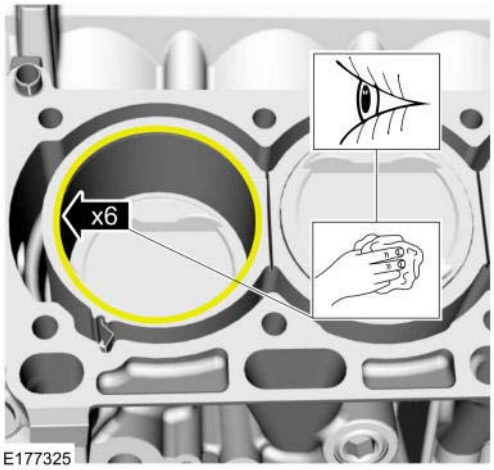
Material

: Motorcraft® Metal Surface Prep / ZC-31-B



128.

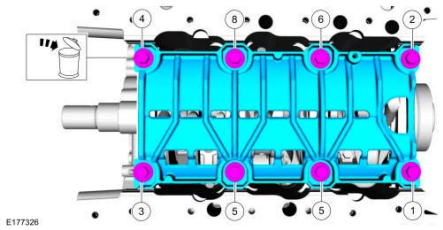
Inspect and clean the specified component with a abrasive pad.



129.

Remove and discard the bolts in the sequence shown in illustration.

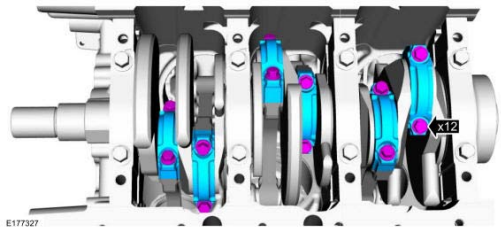
Remove the main bearing cap support brace.



NOTE: The connecting rod cap bolts are a torque-to-yield design. The original connecting rod cap bolts will be used when measuring the connecting rod large end bore during assembly. The connecting rod cap bolts will be discarded after measurement.

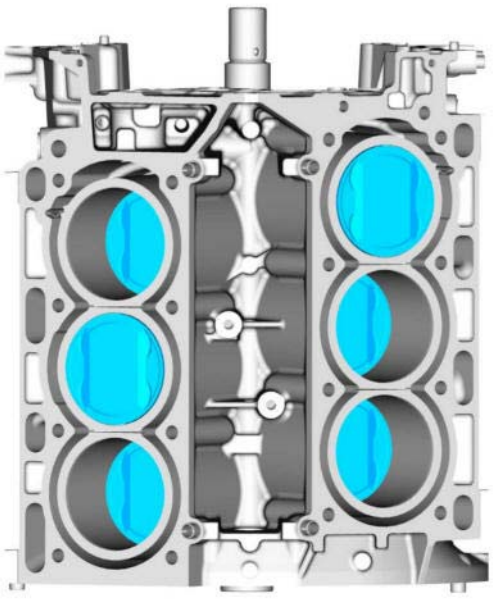
NOTE: Clearly mark the position and orientation of the connecting rods, connecting rod caps and connecting rod bearings for reassembly.

130.
Remove the connecting rod cap bolts and caps.



NOTE: Do not scratch the cylinder walls or crankshaft journals with the connecting rod while removing the pistons.

131.
Remove the piston/rod assembly from the engine block.



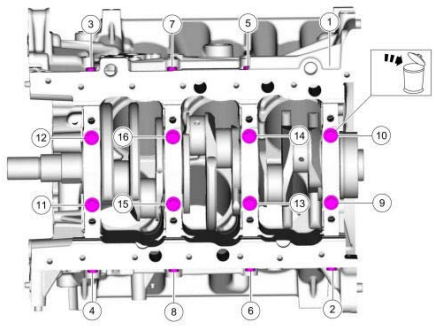
E177328

132.

Inspect the pistons. Refer to: Piston Inspection .

NOTE: Clearly mark the position and orientation of the main bearing caps for reassembly.

133.
Remove and discard the main bearing caps bolts in the sequence shown in illustration.

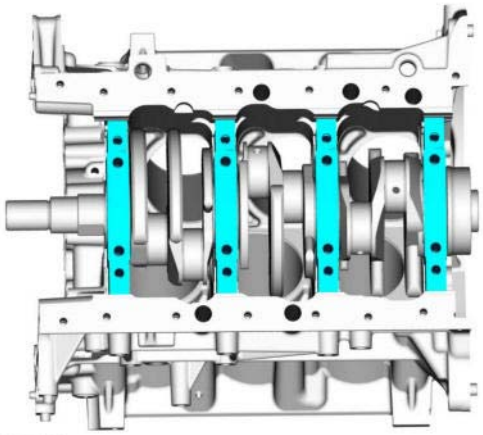


E177329

NOTE: If the main bearings are being reused, mark them for correct position and orientation for reassembly.

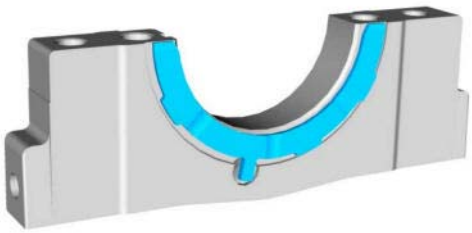
NOTE: Note the position of the thrust washer on the outside of the No. 4 rear main bearing cap.

134.
Remove the main bearing caps.


E177330

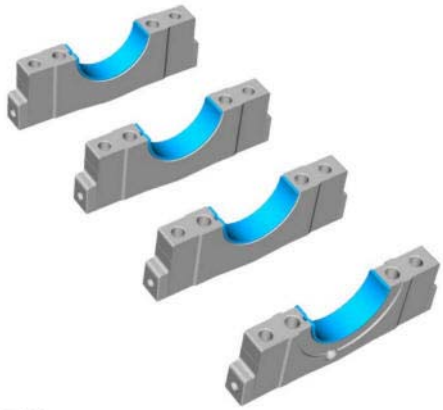
135.

Remove the lower crankshaft thrust washer from the back side of the No. 4 rear main bearing cap.


E177331

NOTE: If the main bearings are being reused, mark them for correct position and orientation for reassembly.

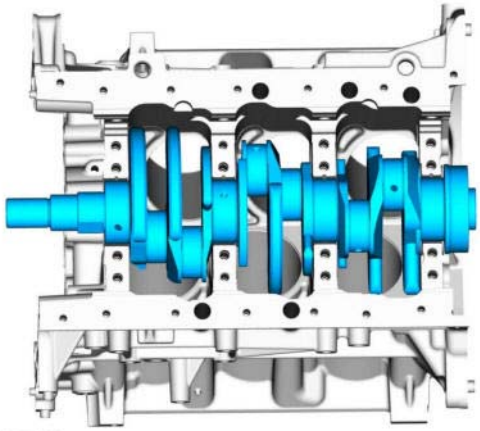
136.
Remove the crankshaft main bearings from the main bearing caps.



E177332

NOTE: Note the position of the 2 thrust washers on the inside and outside of the rear main bearing bulkhead.

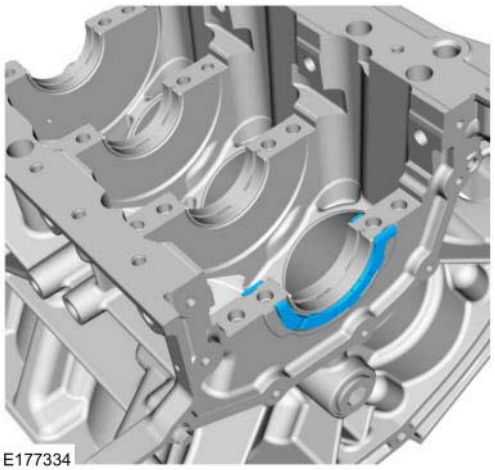
137.
Remove the crankshaft.



E177333

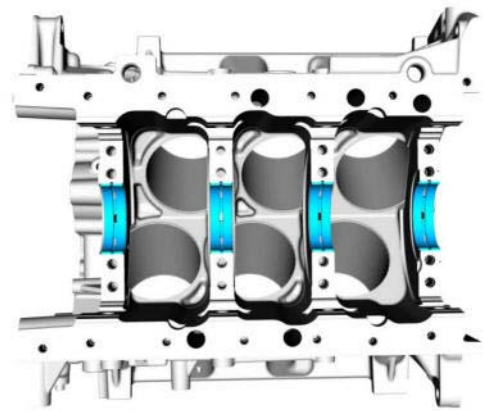
138.

Remove the crankshaft thrust bearings from the rear main bearing bulkhead.


E177334

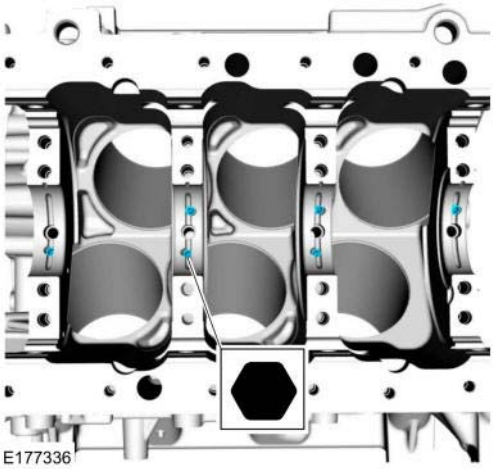
NOTE: If the main bearings are being reused, mark them for correct position and orientation for reassembly.

139.
Remove the crankshaft main bearings from the cylinder block.


E177335

140.

Using a hex bit, remove the piston oil cool valves.

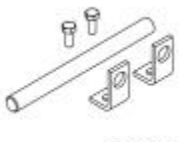


141.

Inspect the cylinder block distortion. Refer to: Cylinder Block Distortion .

DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES > CYLINDER HEAD

Special Tool(s) / General Equipment

	303-1249 Valve Spring Compressor TKIT-2006UF-FLM TKIT-2006UF-ROW
	303-300 (T87C-6565-A) Set, Valve Spring Compressor T88C-1000-ST TKIT-1988-FESTIVA TKIT-1988-TRACER TKIT-2009TC-F
	303-350 (T89P-6565-A) Compressor, Valve Spring TKIT-1989-F TKIT-1989-FLM TKIT-1989-FM TKIT-1990-LMH

 E223050	303-470 (T94P-6510-CH) Installer, Valve Stem Oil Seal TKIT-1994-FH/FMH/FLMH TKIT-1994-LMH/MH2 TKIT-2009TC-F

Materials

Name	Specification
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) XO-5W20-QSP (U.S.)	WSS-M2C945-A

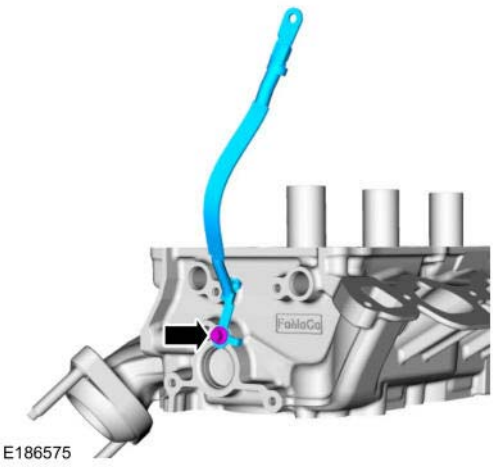
DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES > CYLINDER HEAD > DISASSEMBLY

NOTE: If replacing the cylinder head, do not reuse the secondary timing chain tensioners, they must be replaced or damage to the engine may occur. Refer to Variable Camshaft Timing (VCT) Unit .

LH cylinder head

1.

Remove the bolt and ground strap.


E186575

2.

Remove the bolts and the exhaust manifold heat shield.



3.

Remove the nuts and the exhaust manifold.

Discard the nuts.



4.

Clean and inspect the exhaust manifold. Refer to: Exhaust Manifold Cleaning and Inspection .

5.

Remove and discard the studs and the exhaust manifold gasket.



6.

Remove the timing chain guide pin.

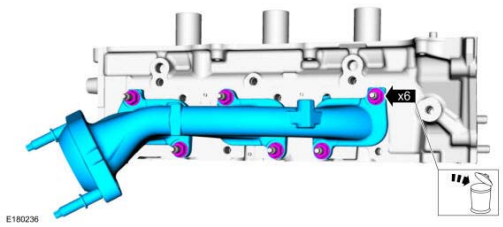


RH cylinder head

7.

Remove the nuts and the exhaust manifold.

Discard the nuts.

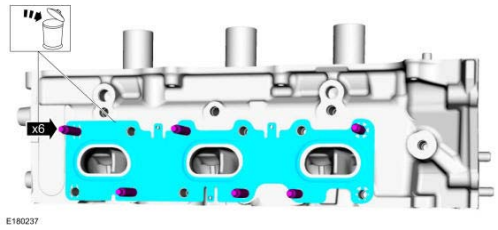


8.

Clean and inspect the exhaust manifold. Refer to: Exhaust Manifold Cleaning and Inspection .

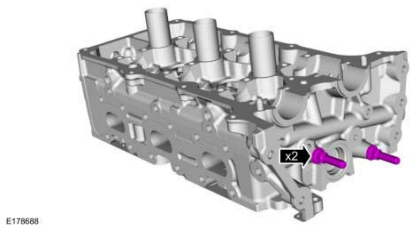
9.

Remove and discard the studs and the exhaust manifold gasket.



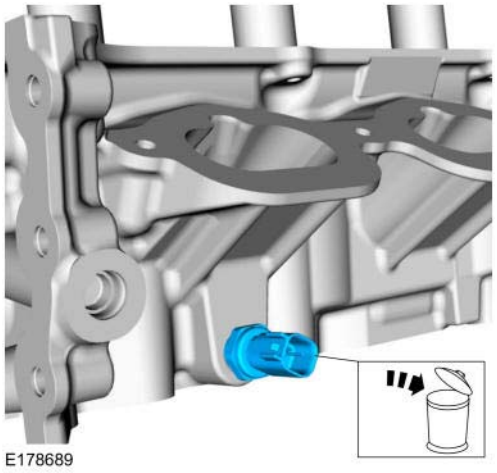
10.

Remove the timing chain tensioner arm and timing chain guide pins.



11.

Remove and discard the CHT sensor.



All cylinder heads

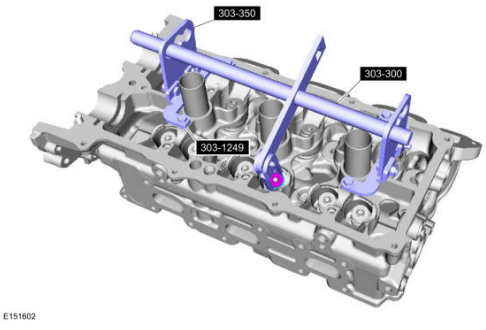
12.

Remove the spark plugs. Refer to: SPARK PLUGS .

NOTE: If the components are to be reinstalled, they must be installed in the same positions. Mark the components for installation into their original locations.

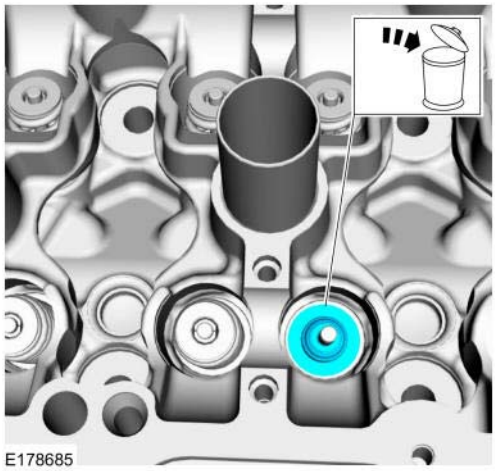
13.
Using the special tools, remove the valve collet, valve spring retainer and the valve spring.

Use Special Service Tool: 303-300 (T87C-6565-A) Set, Valve Spring Compressor, 303-350 (T89P-6565-A) Compressor, Valve Spring, 303-1249 Valve Spring Compressor.



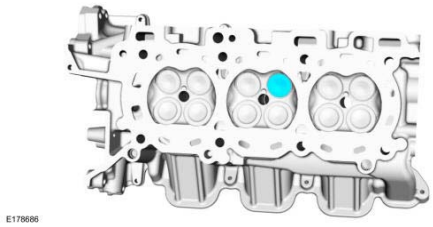
14.

Remove the valve stem seal.



15.

Remove the valve.



16.

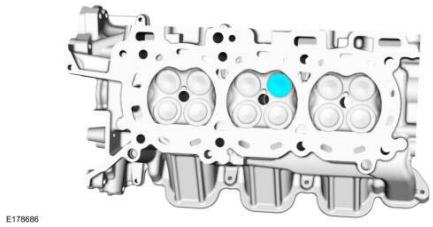
Repeat the previous 3 steps for each valve.

DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES > CYLINDER HEAD > ASSEMBLY

All cylinder heads

1.

Install the valve.



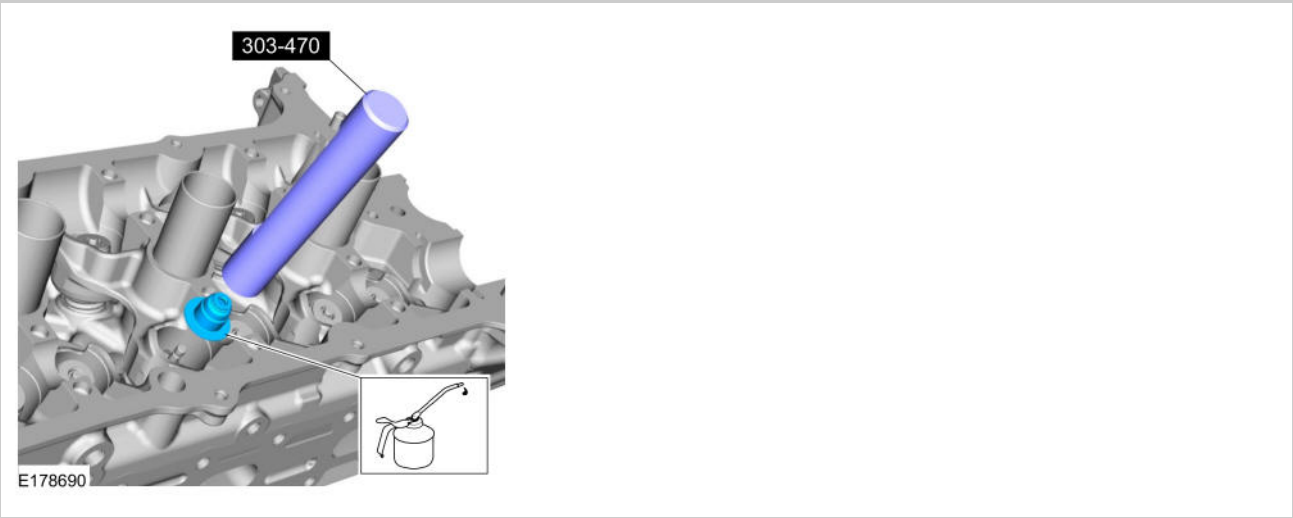
2.

Lubricate with clean engine oil and using the special tool, install the valve stem seal.

Use Special Service Tool: 303-470 (T94P-6510-CH) Installer, Valve Stem Oil Seal.

Material

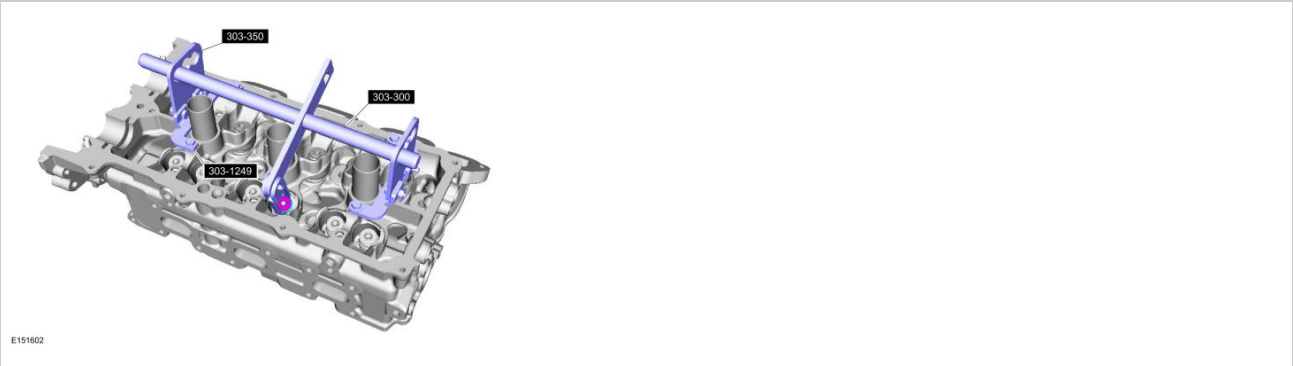
: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W20-QSP (U.S.) (WSS-M2C945-A)



3.

Using the special tools, install the valve spring, valve spring retainer and the valve collet.

Use Special Service Tool: 303-300 (T87C-6565-A) Set, Valve Spring Compressor, 303-350 (T89P-6565-A) Compressor, Valve Spring, 303-1249 Valve Spring Compressor.



4.

Repeat the previous 3 steps for each valve.

5.

Install the spark plugs. Refer to: SPARK PLUGS .

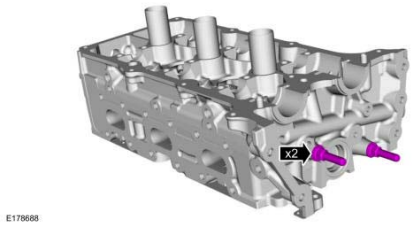
RH cylinder head

6.

Install the timing chain tensioner arm and timing chain guide pins.

Torque

: 89 lb.in (10 Nm)

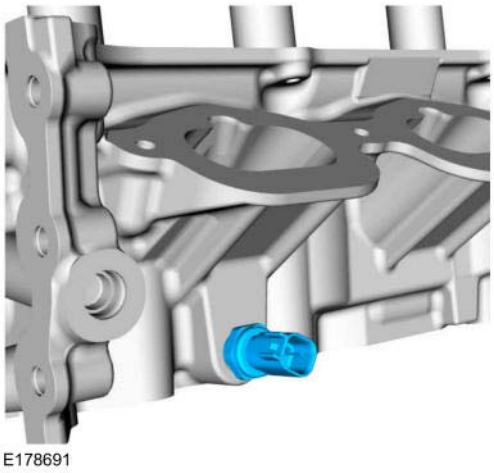


7.

Install a new CHT sensor.

Torque

: 89 lb.in (10 Nm)



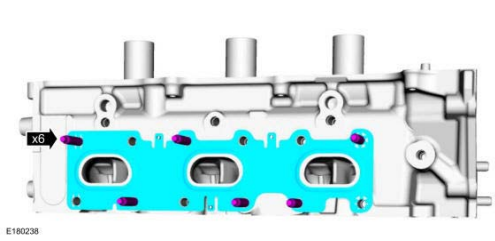
8.

Install the new the exhaust manifold studs.

Torque

: 106 lb.in (12 Nm)

Install a new exhaust manifold gasket.



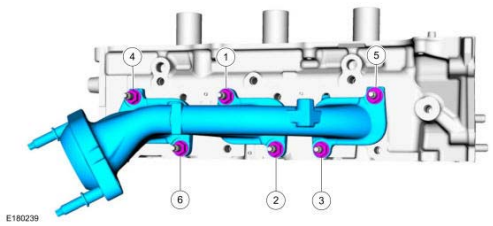
9.

Install the exhaust manifold and the new nuts.

Torque:

Stage 1: 168 lb.in (19 Nm)

Stage 2: 18 lb.ft (25 Nm)



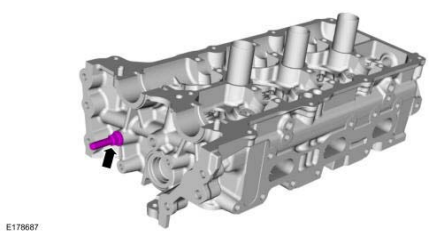
LH cylinder head

10.

Install the timing chain guide pin.

Torque

: 89 lb.in (10 Nm)



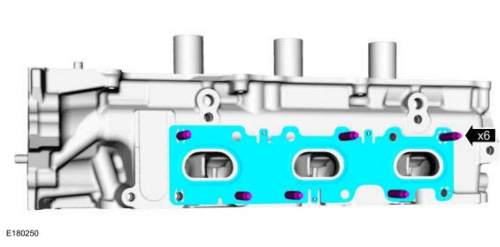
11.

Install the new the exhaust manifold studs.

Torque

: 106 lb.in (12 Nm)

Install a new exhaust manifold gasket.



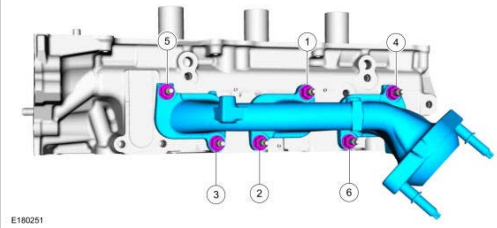
12.

Install the exhaust manifold and the new nuts.

Torque:

Stage 1: 168 lb.in (19 Nm)

Stage 2: 18 lb.ft (25 Nm)

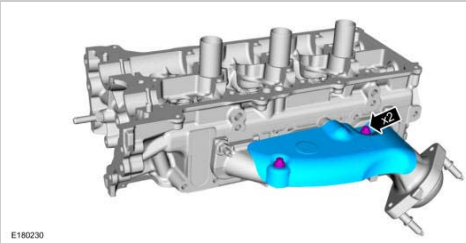


13.

Install the exhaust manifold heat shield and the bolts.

Torque

: 106 lb.in (12 Nm)

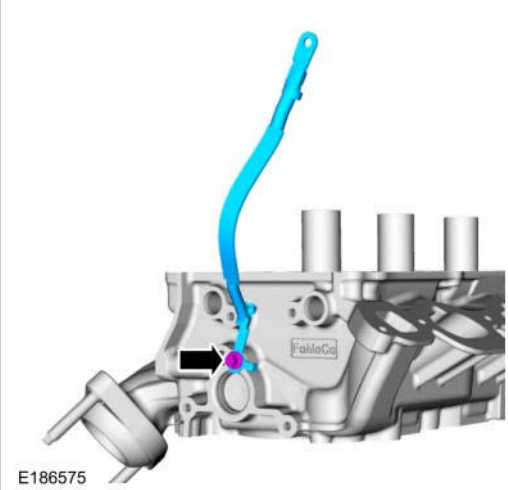


14.

Install ground strap and the bolt.

Torque

: 106 lb.in (12 Nm)



DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES > PISTON

Materials

Name	Specification
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) XO-5W20-QSP (U.S.)	WSS-M2C945-A

DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES > PISTON > DISASSEMBLY

1.

Remove the piston rings and discard.



2.

Remove the piston pin retainers and discard.

Remove the piston pin.



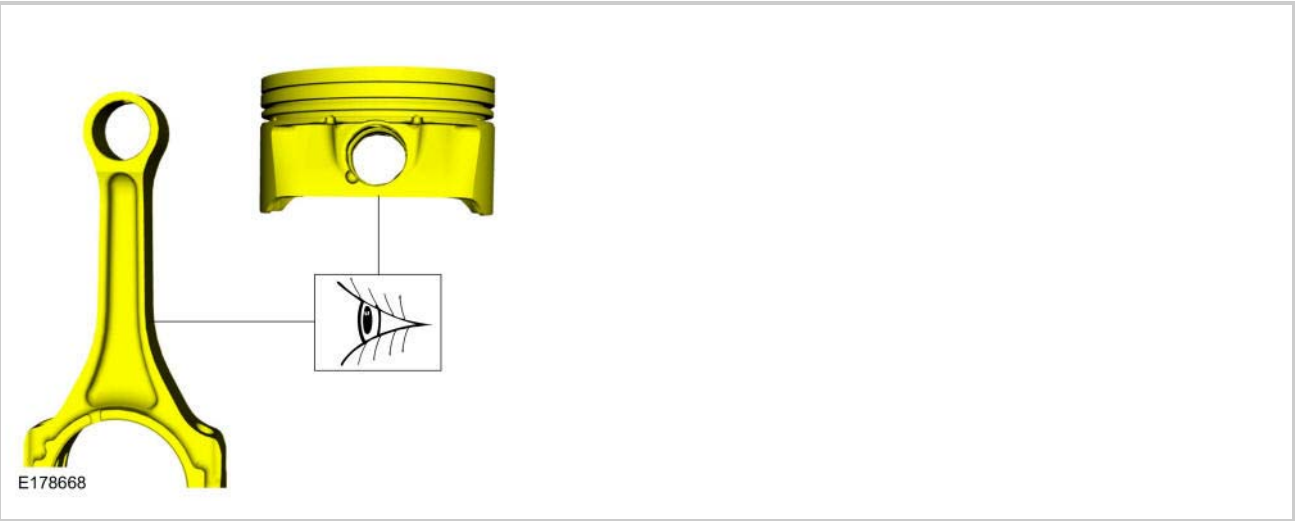
NOTE: If the piston and connecting rod are to be reinstalled, they must be assembled in the same orientation. Mark the piston orientation to the connecting rod for reassembly.

3.
Remove the piston from the connecting rod.



4.

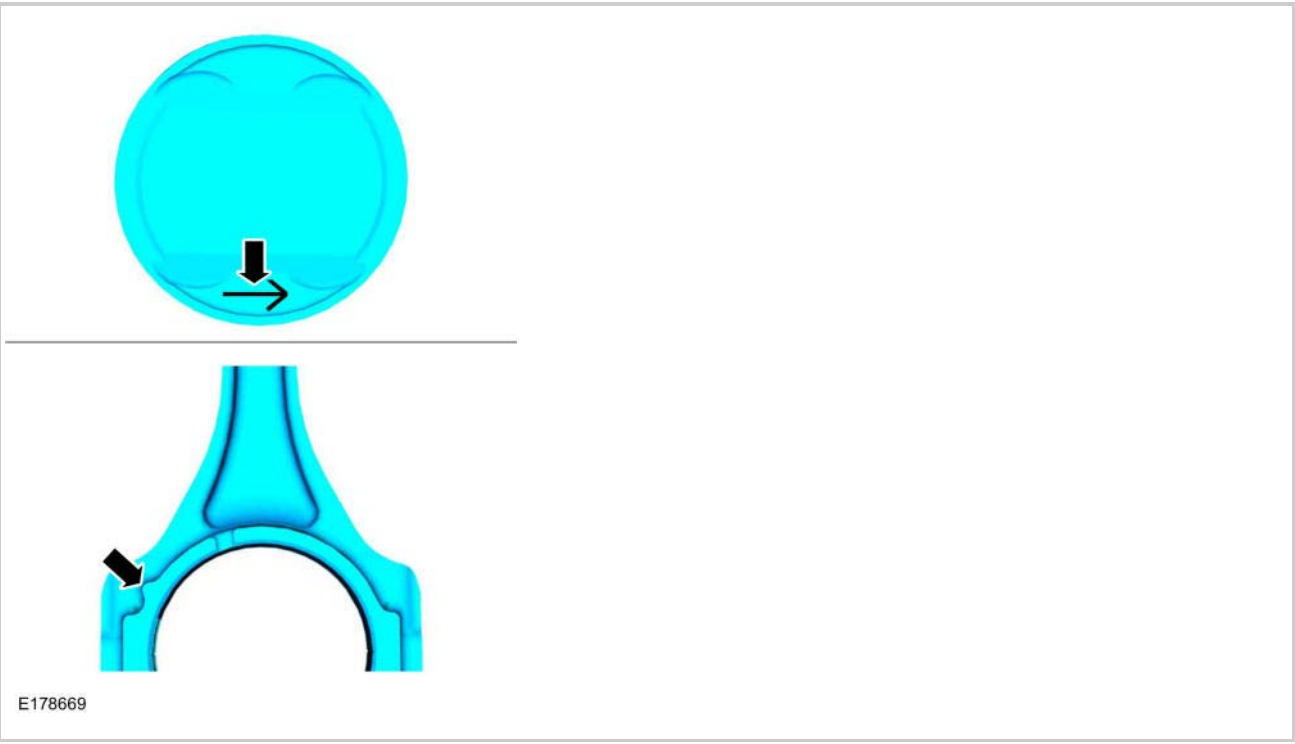
Inspect the piston and connecting rod. Refer to: Piston Inspection .



DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES > PISTON > ASSEMBLY

1.

If the piston and/or connecting rod are being installed new, the piston rod orientation marks and the arrow on the top of the dome of the piston should be facing toward the front of the engine block.



2.

Install the piston to the connecting rod.



3.

Lubricate with clean engine oil and install the piston pin.

Material

: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W20-QSP (U.S.) (WSS-M2C945-A)



NOTE: The piston pin retaining clip gap orientation must be toward the top or dome of piston.

4.
Install the piston pin retainers.



5.

Lubricate with clean engine oil and install the piston rings.

Material

: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W20-QSP (U.S.) (WSS-M2C945-A)



NOTE: The arrow on the top of the piston indicates the front of the engine.

NOTE: The piston compression upper and lower ring should be installed with the "O" mark on the ring face pointing up toward the top of the piston.

6.

1.

Center line of the piston parallel to the wrist pin bore.

2.

Upper compression ring gap location.

3.

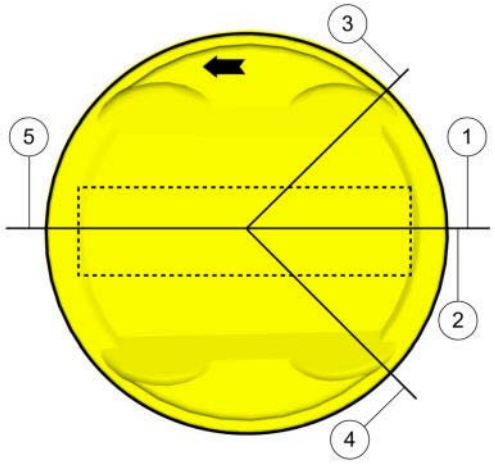
Upper oil control segment ring gap location.

4.

Lower oil control segment ring gap location.

5.

Expander ring and lower compression ring gap location.

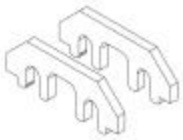


E176334

ASSEMBLY > ENGINE

Special Tool(s) / General Equipment

 E139373	100-002 (TOOL-4201-C) Holding Fixture with Dial Indicator Gauge

	205-142 (T80T-4000-J) Installer, Differential Bearing Cone
	205-150 (T80T-4000-S) Installer, Spindle Bearing
 E133913	205-153 (T80T-4000-W) Handle
 303-102	303-102 Installer, Crankshaft Pulley
	303-1245 Engine Lift Eye TKIT-2006UF-FLM TKIT-2006UF-ROW
 E175042	303-1247 VCT Spark Plug Tube Seal Remover and Installer TKIT-2006UF-FLM TKIT-2006UF-ROW
 E216421	303-1248 Camshaft holding tools TKIT-2006UF-FLM TKIT-2006UF-ROW
	303-1251 Installer, Front Seal TKIT-2006UF-FLM TKIT-2006UF-ROW

	303-1529 Lift Eye, Engine TKIT-2010A-F TKIT-2010A-LM TKIT-2010A-ROW
	303-1530 Tool, Chain Tensioner Hold Down TKIT-2010A-F TKIT-2010A-LM TKIT-2010A-ROW
 E222985	303-335 (T88T-6701-A) Installer, Front Cover Oil Seal TKIT-1988-F TKIT-1988-FLM
	307-399 Alignment Pins, Transmission Fluid Pump TKIT-2000AP-FLM/LM TKIT-2002N-DEW
Feeler Gauge	
Strap Wrench	
Floor Crane	
Mounting Stand	
Clutch Alignment Tool	
Hose Clamp Remover/Installer	
Round-Ended Steel Rule	
Piston Ring Compressor	

Materials

Name	Specification
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) XO-5W20-QSP (U.S.)	WSS-M2C945-A
Motorcraft® High Performance Engine RTV Silicone TA-357	WSE-M4G323-A6
Motorcraft® Silicone Gasket Remover ZC-30-A	-
Motorcraft® Metal Surface Prep ZC-31-B	-

NOTE: During engine repair procedures, cleanliness is extremely important. Any foreign material, including any material created while cleaning gasket surfaces that enters the oil passages, coolant passages or the oil pan, may cause engine failure.

NOTE: Assembly of the engine requires various inspections/measurements of the engine components. These inspections/measurements will aid in determining if the engine components will require replacement. Refer to ENGINE SYSTEM - GENERAL INFORMATION .

NOTE: If the cylinder head(s) is replaced, a new secondary timing chain tensioner will need to be installed. Refer to Variable Camshaft Timing (VCT) Unit .

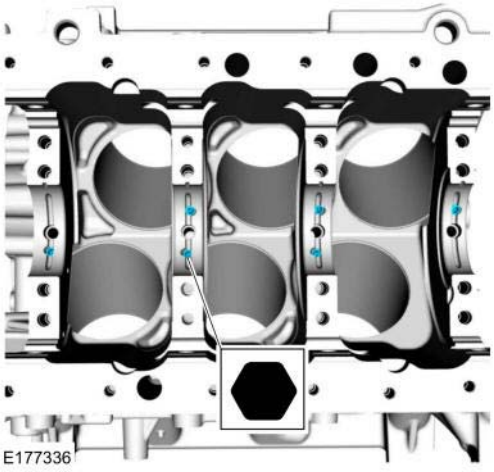
6-Speed Automatic Transmission - 6R80/6-Speed Manual Transmission - MT82

1.

Using a hex bit, install the piston oil cool valves.

Torque

: 35 lb.in (4 Nm)



NOTE: This step is for selecting the correct main bearings.

NOTE: The #1 main bearing is at the front of the engine block.

2.

Select the crankshaft main bearings for each crankshaft journal.

Record the code that is on the cylinder block face.

Record the code that is on the crankshaft flange.

The first letter is for main No. 1 and the next letters are for mains 2, 3 and 4.



NOTE: This chart is for selecting main bearings 1 and 4 only.

NOTE: This chart is continued in the next step.

3.

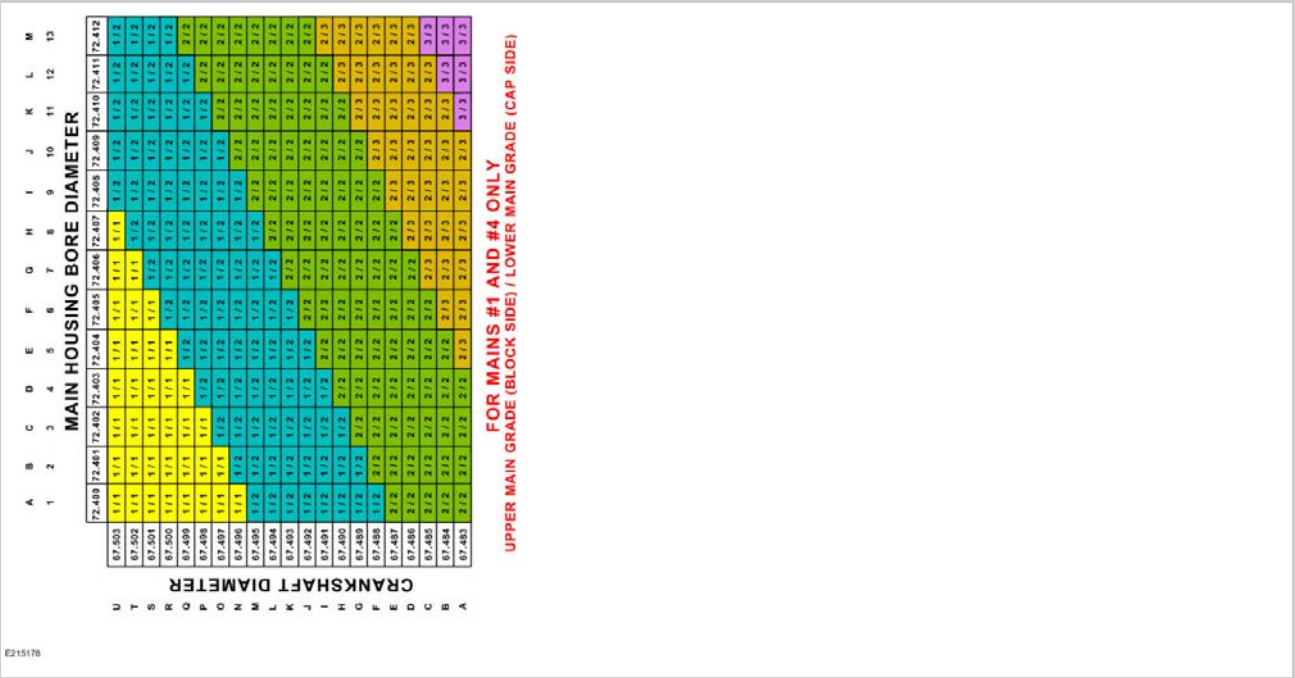
Using the data recorded earlier and the Bearing Select Fit Chart in the illustration below, Standard Bearings, determine the required bearing grade for main bearings 1 and 4.

Read the first letter of the engine block main bearing code and the first letter of the crankshaft main bearing code.

Read down the column below the engine block main bearing code letter and across the row next to the crankshaft main bearing code letter, until the 2 intersect. This is the required bearing grade(s) for the No. 1 crankshaft main bearing.

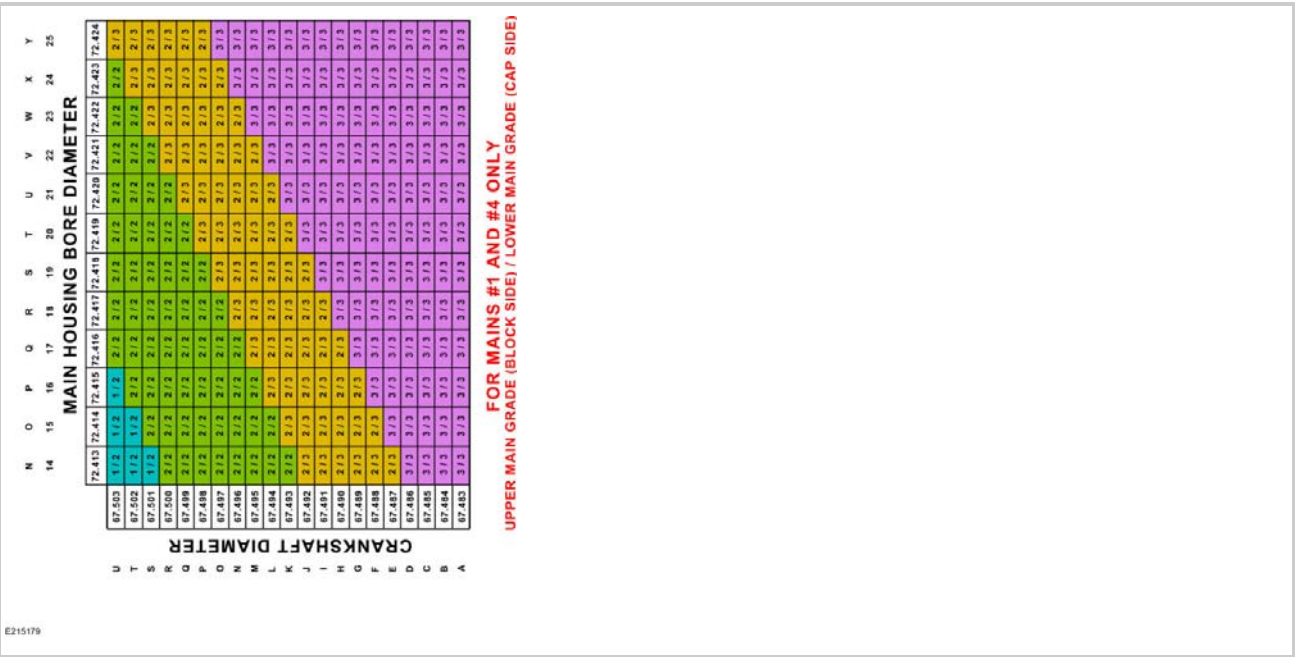
As an example, if the engine block code letter is "M" and the crankshaft code letter is "M", the correct bearing grade for this main bearing is a "2" for the upper bearing and a "2" for the lower bearing.

Repeat the above steps using the fourth letter of the block and crankshaft codes to select the No. 4 bearing.



NOTE: This chart in the illustration is for selecting main bearings 1 and 4 only.

4.



NOTE: This chart is continued in the next step.

NOTE: This chart is for selecting main bearings 2 and 3 only.

5.

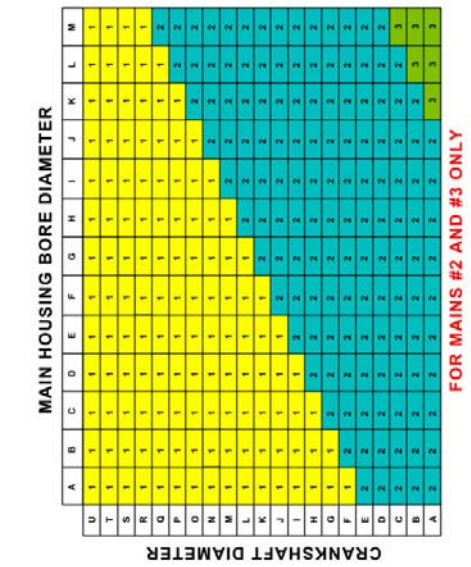
Using the data recorded earlier and the Bearing Select Fit Chart in the illustration below, Standard Bearings, determine the required bearing grade for main bearings 2 and 3.

Read the second letter of the engine block main bearing code and the second letter of the crankshaft main bearing code.

Read down the column below the engine block main bearing code letter and across the row next to the crankshaft main bearing code letter, until the 2 intersect. This is the required bearing grade for the No. 2 crankshaft main bearing.

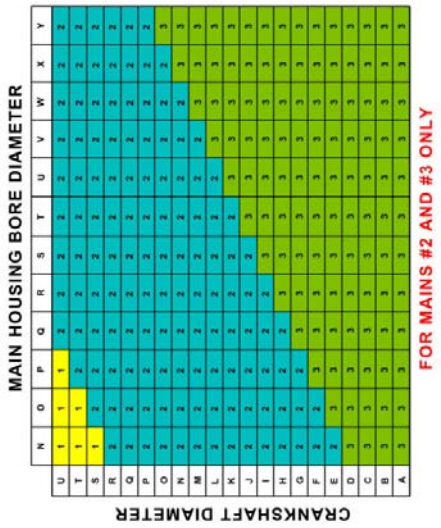
As an example, if the engine block code letter is "N" and the crankshaft code letter is "H", the correct bearing grade for this main bearing is "2".

Repeat the above steps using the third letter of the block and crankshaft codes to select the No. 3.



NOTE: This chart in the illustration is for selecting main bearings 2 and 3 only.

6.



E215181

NOTE: The rod cap installation must keep the same orientation as marked during disassembly or engine damage may occur.

7.
Using the original connecting rod cap bolts, install the connecting rod caps and bolts.

Torque:

Stage 1: 17 lb.ft (23 Nm)

Stage 2: 32 lb.ft (43 Nm)

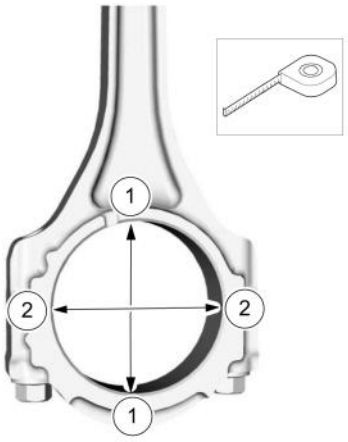
Stage 3: 90°



E177202

8.

Measure the connecting rod large end bore in 2 directions.

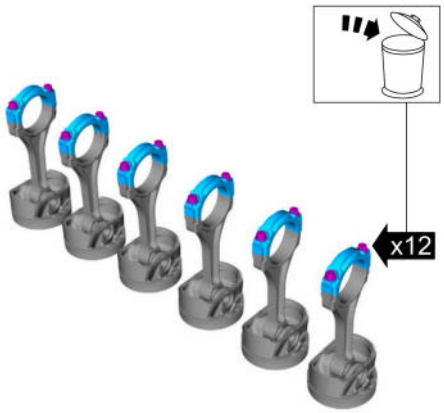


E177203

9.

Remove the bolts and the rod cap.

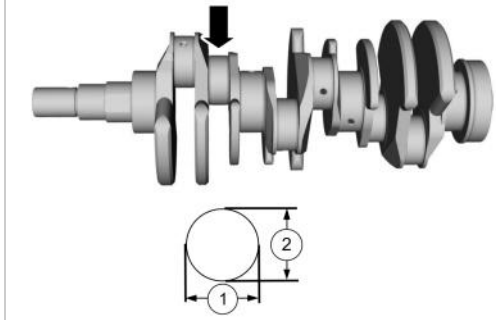
Discard the bolts.



E177204

10.

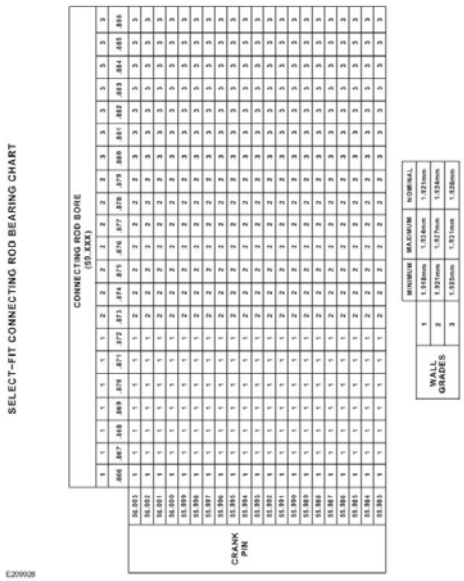
Measure each of the crankshaft connecting rod bearing journal diameters in at least 2 directions.



E177205

11.

Using the chart in illustration, select the correct connecting rod bearings for each crankshaft connecting rod journal.



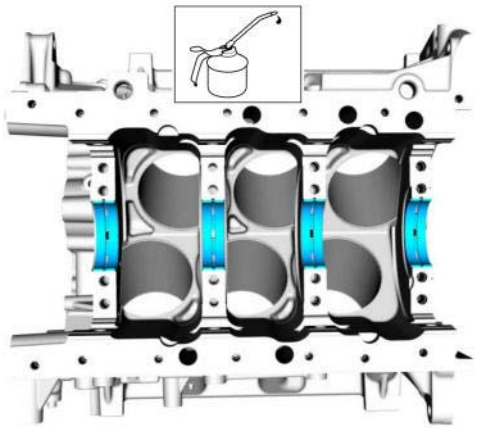
E209928

NOTE: Before assembling the cylinder block, all sealing surfaces must be free of chips, dirt, paint and foreign material. Also, make sure the coolant and oil passages are clear.

12.
Lubricate the upper crankshaft main bearings with clean engine oil and install in the cylinder block.

Material

: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W20-QSP (U.S.) (WSS-M2C945-A)



E177206

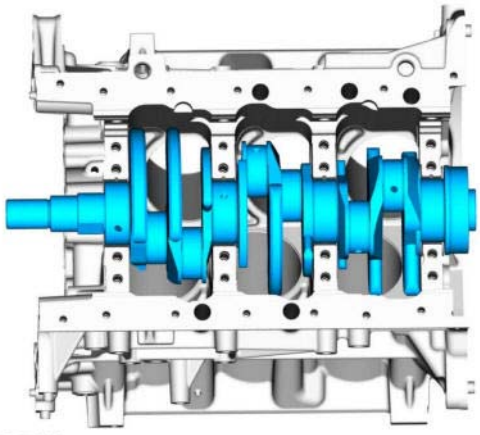
NOTE: Do not install the upper thrust bearings until the crankshaft is installed.

NOTE: Lubricate the thrust surfaces of the crankshaft with clean engine oil.

13.
Install the crankshaft.

Material

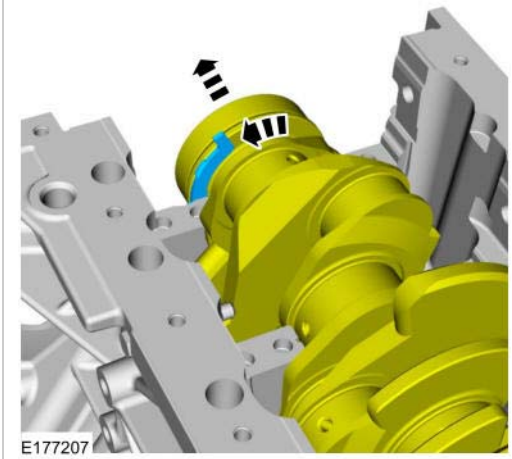
: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W20-QSP (U.S.) (WSS-M2C945-A)



E177333

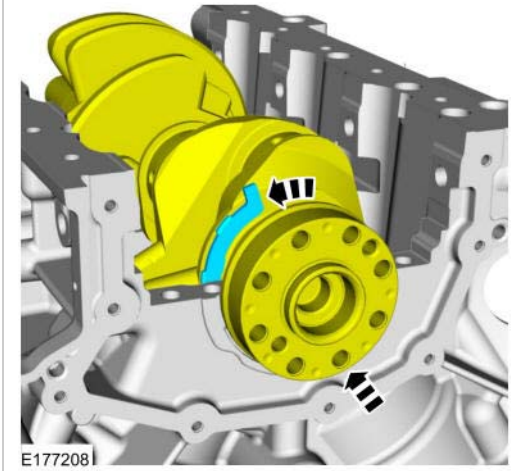
NOTE: Make sure the side of the thrust washer, with the wide oil grooves, faces the crankshaft thrust surface.

14.
Push the crankshaft rearward and install the rear crankshaft upper thrust washer at the back of the No. 4 rear bulkhead.



NOTE: Make sure the side of the thrust washer, with the wide oil grooves, faces the crankshaft thrust surface.

15.
Push the crankshaft forward and install the front crankshaft upper thrust washer at the front of the No. 4 rear bulkhead.

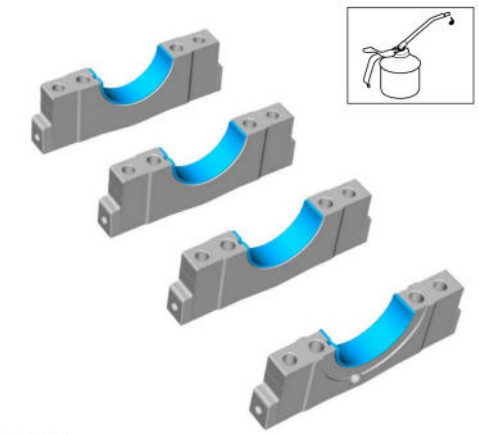


16.

Lubricate the crankshaft lower main bearings with clean engine oil and install them into the main bearing caps. Check seating and squareness of the bearings to make sure of proper seating in caps.

Material

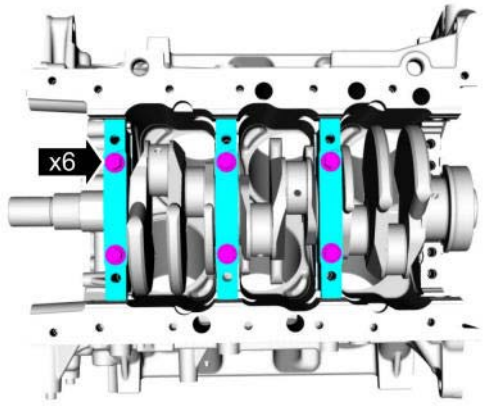
: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W20-QSP (U.S.) (WSS-M2C945-A)



E177209

17.

Position the No. 1, No. 2 and No. 3 main bearing caps on the cylinder block and, keeping the caps as square as possible, alternately draw the caps down evenly using the new bolts until the main bearing caps are seated.

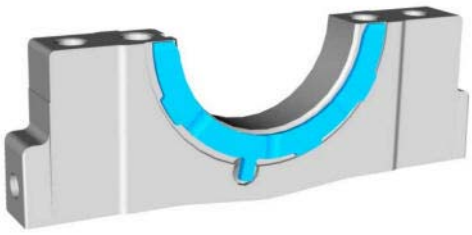


E177210

NOTE: Make sure the side of the thrust washer, with the wide oil grooves, faces the crankshaft thrust surface.

NOTE: To aid in assembly, apply petroleum jelly to the back of the crankshaft thrust washer.

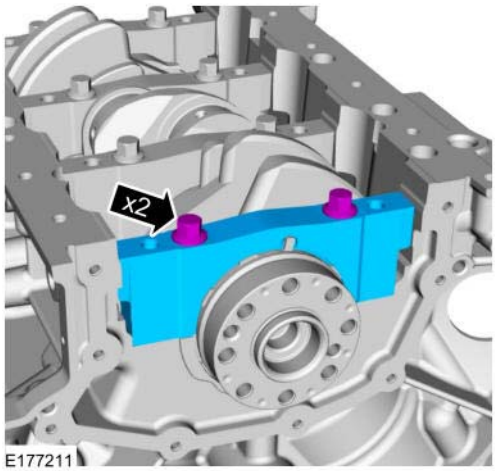
18.
Install the lower crankshaft thrust washer to the back side of the No. 4 rear main bearing cap, with the tab aligned with the cutout in the main bearing cap.



E177331

19.

Position main bearing cap No. 4 on the cylinder block and keeping the cap as square as possible, alternately draw the cap down evenly using the new bolts until the main bearing cap is seated.



E177211

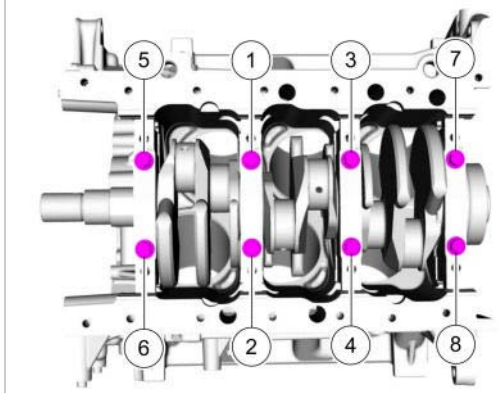
NOTE: While tightening the main bearing vertical bolts, push the crankshaft forward and the No. 4 main bearing cap rearward to seat the crankshaft thrust washers.

20.
Tighten the main bearing bolts.

Torque:

Stage 1: 24 lb.ft (33 Nm)

Stage 2: 135°



E177212

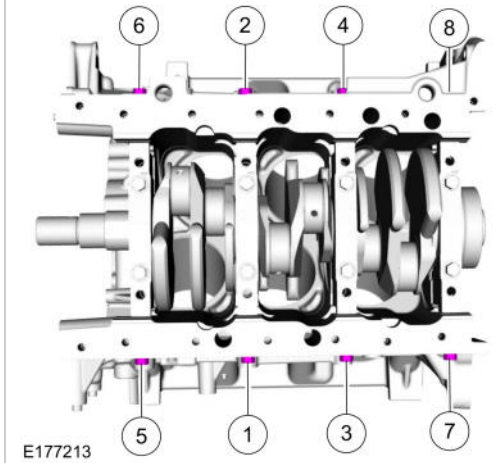
21.

Install the new main bearing cap side bolts.

Torque:

Stage 1: 33 lb.ft (45 Nm)

Stage 2: 90°



E177213

22.

1.

Position the crankshaft to the rear of the cylinder block.

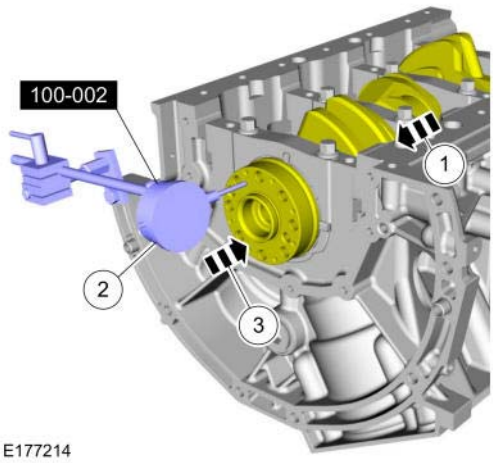
Use Special Service Tool: 100-002 (TOOL-4201-C) Holding Fixture with Dial Indicator Gauge.

2.

Zero the Dial Indicator Gauge.

3.

Move the crankshaft to the front of the cylinder block. Measure and record the crankshaft end play.



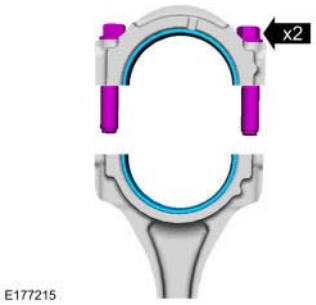
NOTE: The rod cap installation must keep the same orientation as marked during disassembly or engine damage may occur.

23.

Prepare the connecting rod and cap.

Insert the new bolts in the rod cap.

Insert the upper and lower rod bearings into the rod and cap.



NOTE: The arrow on the top of the piston indicates the front of the engine.

NOTE: The piston compression upper and lower ring should be installed with the "O" mark on the ring face pointing up toward the top of the piston.

24.

1.

Center line of the piston parallel to the wrist pin bore.

2.

Upper compression ring gap location.

3.

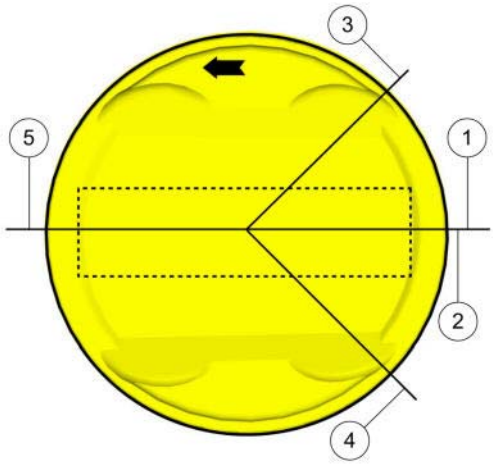
Upper oil control segment ring gap location.

4.

Lower oil control segment ring gap location.

5.

Expander ring and lower compression ring gap location.



E176334

NOTE: Be sure not to scratch the cylinder wall or crankshaft journal with the connecting rod. Push the piston down until the connecting rod bearing seats on the crankshaft journal.

NOTE: Lubricate the pistons, piston rings, connecting rod bearings and the entire cylinder bores with clean engine oil.

NOTE: Make sure the piston rings are positioned to specifications for installation.

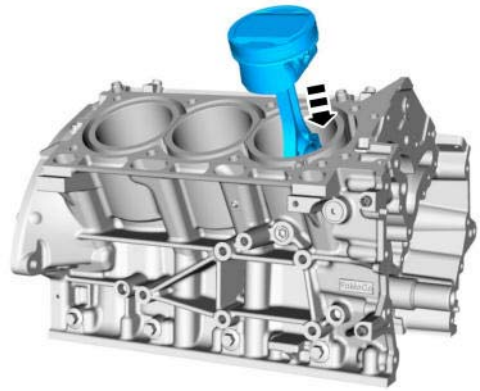
Refer to Piston .

NOTE: If the piston and or connecting rod are being installed new, the piston rod orientation marks and the arrow on the top of the dome of the piston should be facing toward the front of the engine block.

NOTE: If the piston and connecting rod are to be reinstalled, they must be installed in the same orientation as disassembled.

25.
Using the Piston Ring Compressor, install the piston and connecting rod assemblies. Repeat until all 6 piston assemblies are installed.

Use the General Equipment: Piston Ring Compressor



E177217

NOTE: The rod cap installation must keep the same orientation as marked during disassembly or engine damage may occur.

NOTE: After installation of each piston, connecting rod, rod cap and bolts, rotate the crankshaft to verify smooth operation.

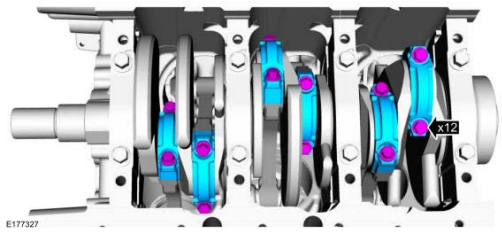
26.
Install the connecting rod cap and the new bolts.

Torque:

Stage 1: 17 lb.ft (23 Nm)

Stage 2: 32 lb.ft (43 Nm)

Stage 3: 90°



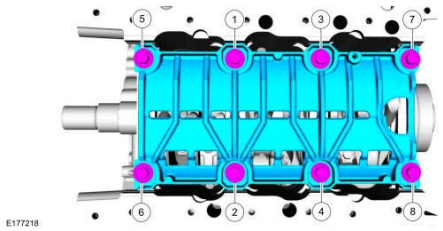
27.

Install the main bearing cap support brace and the new bolts.

Torque:

Stage 1: 18 lb.ft (24 Nm)

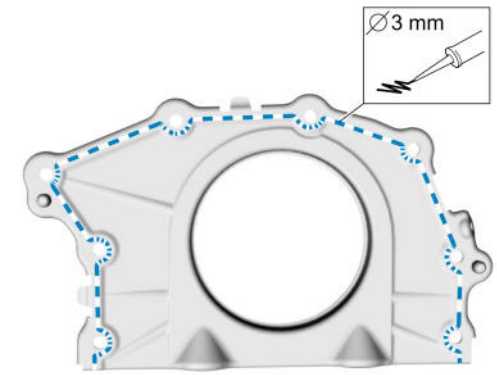
Stage 2: 180°



NOTE: The crankshaft rear seal retainer must be installed and the bolts tightened within 4 minutes of sealant application.

NOTE: Failure to use Motorcraft® High Performance Engine RTV Silicone may cause the engine oil to foam excessively and result in serious engine damage.

28.
Apply a 3 mm (0.11 in) bead of Motorcraft® High Performance Engine RTV Silicone to the sealing surface of the crankshaft rear seal retainer.

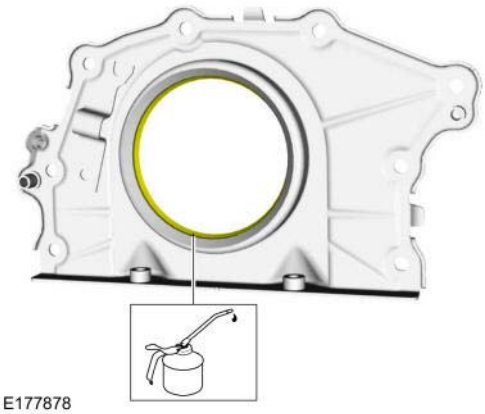


29.

Lubricate the crankshaft rear seal with clean engine oil.

Material

: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W20-QSP (U.S.) (WSS-M2C945-A)

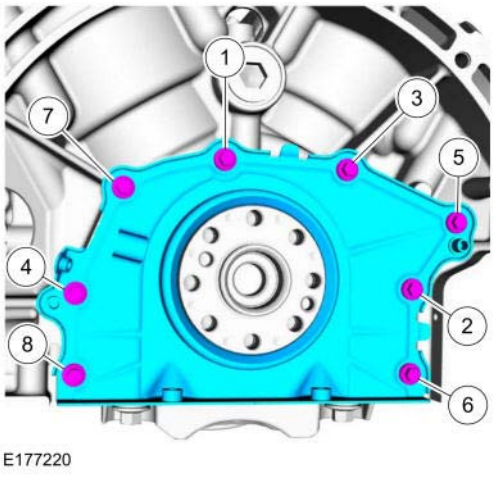


30.

Install the crankshaft rear seal and the bolts.

Torque

: 89 lb.in (10 Nm)

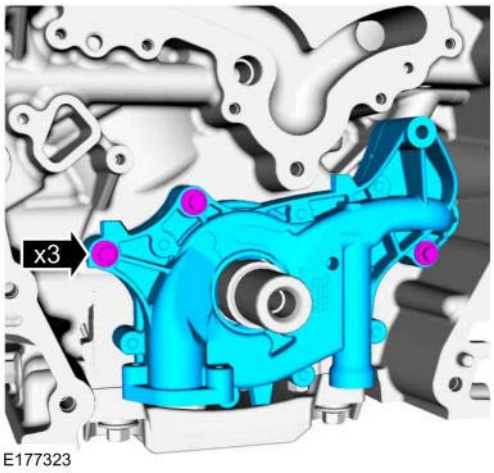


31.

Install the oil pump and the bolts.

Torque

: 89 lb.in (10 Nm)



E177323

32.

Install a new oil pump screen and pickup tube O-ring seal.

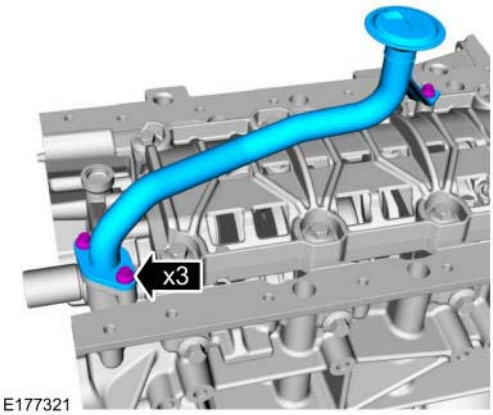

E177221

33.

Install the oil pump screen and pickup tube and the bolts.

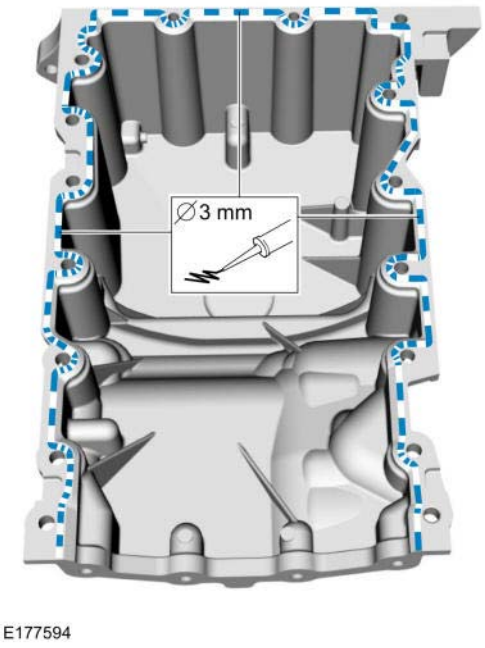
Torque

: 89 lb.in (10 Nm)



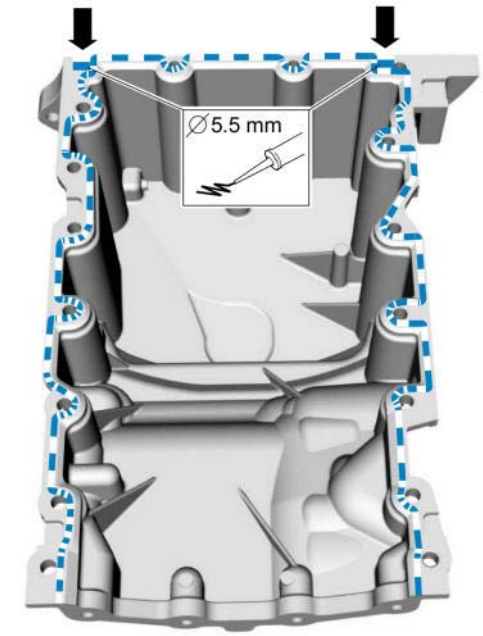
NOTE: Failure to use Motorcraft® High Performance Engine RTV Silicone may cause the engine oil to foam excessively and result in serious engine damage.

34.
Apply a 3 mm (0.11 in) bead of Motorcraft® High Performance Engine RTV Silicone to the sealing surface of the oil pan.



NOTE: Failure to use Motorcraft® High Performance Engine RTV Silicone may cause the engine oil to foam excessively and result in serious engine damage.

35.
Apply a 5.5 mm (0.21 in) bead of Motorcraft® High Performance Engine RTV Silicone to the 2 crankshaft seal retainer plate-to-cylinder block joint areas on the sealing surface of the oil pan.



E177595

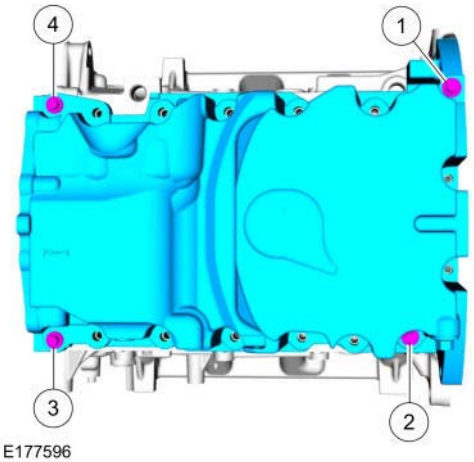
36.

Install the oil pan and bolts.

Torque:

Stage 1: 27 lb.in (3 Nm)

Stage 2: Loosen: 180°

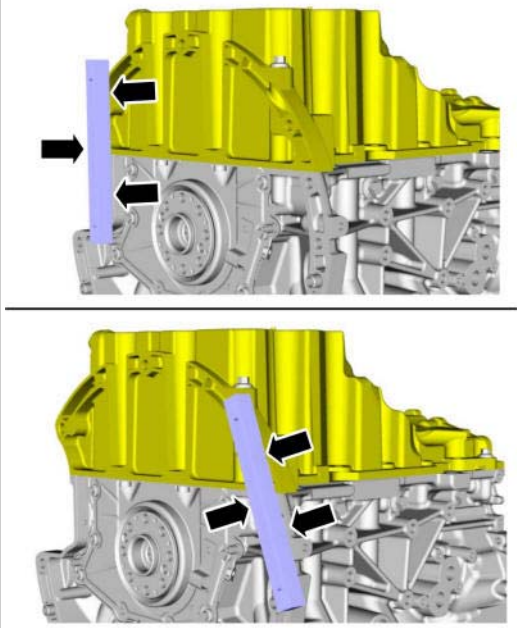


E177596

37.

Using a straight edge, align the oil pan flush with the rear of the cylinder block at the 2 areas shown in illustration.

Use the General Equipment: Round-Ended Steel Rule



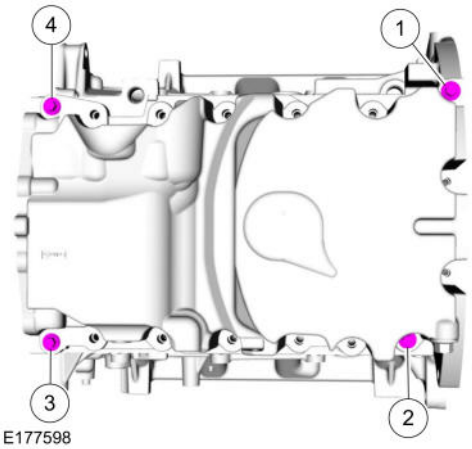
E177597

38.

Tighten the bolts in the sequence.

Torque

: 27 lb.in (3 Nm)



E177598

39.

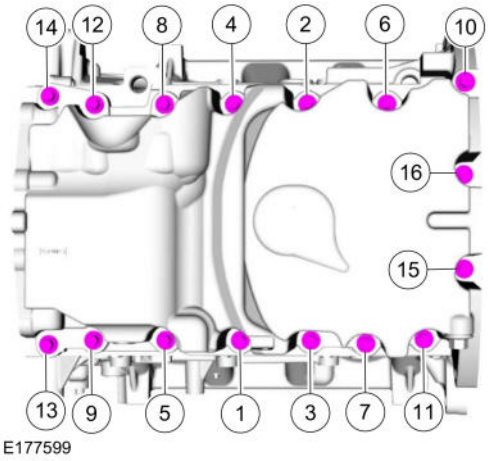
Install the remaining oil pan bolts.

Torque:

Stage 1: Tighten bolts 1 through 14 to: 18 lb.ft (24 Nm)

Stage 2: Tighten bolt 10 an additional: 90°

Stage 3: Tighten bolts 15 and 16 to: 89 lb.in (10 Nm)



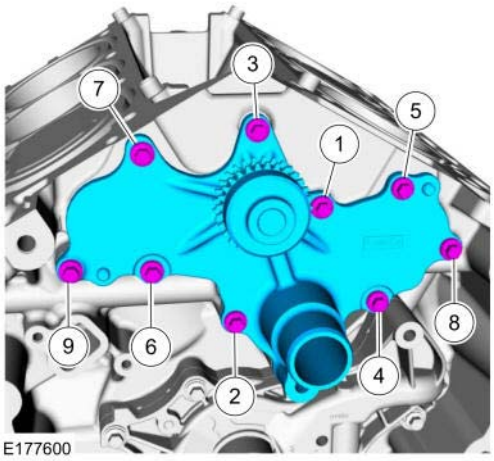
40.

Install the channel cover plate and the bolts.

Torque:

Stage 1: 89 lb.in (10 Nm)

Stage 2: 45°

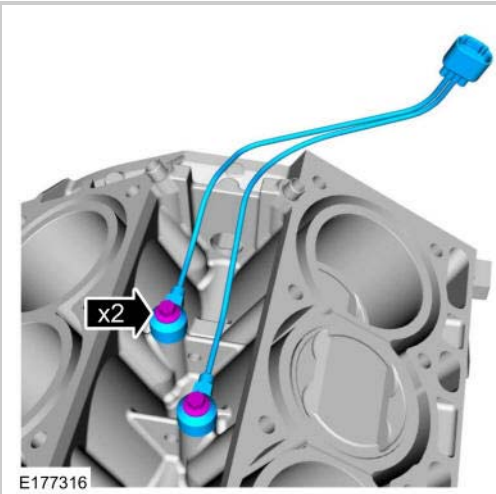


41.

Install the KS and the bolts.

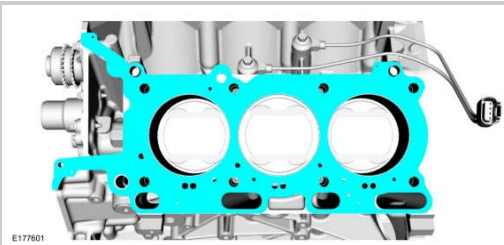
Torque

: 177 lb.in (20 Nm)



42.

Install the LH cylinder head gasket.



NOTE: If the cylinder head is replaced, a new secondary timing chain tensioner will need to be installed.

43.
Install the cylinder head and the new bolts.

Torque:

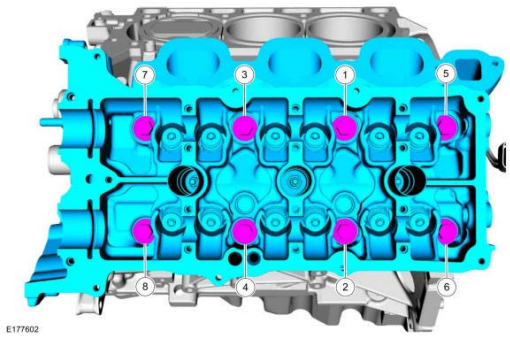
Stage 1: 177 lb.in (20 Nm)

Stage 2: 26 lb.ft (35 Nm)

Stage 3: 90°

Stage 4: 90°

Stage 5: 45°

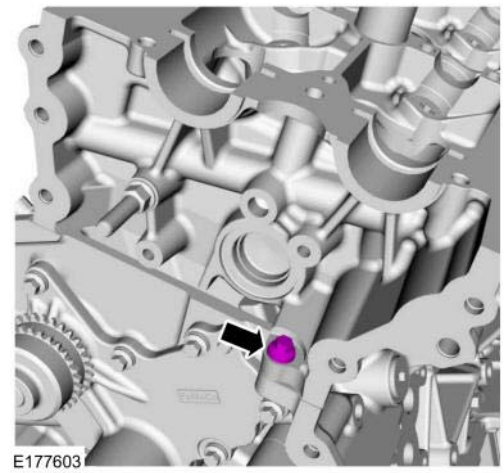


44.

Install the M6 bolt.

Torque

: 89 lb.in (10 Nm)



45.

Install the RH cylinder head gasket.



NOTE: If the cylinder head is replaced, a new secondary timing chain tensioner will need to be installed.

46.
Install the cylinder head and the new bolts.

Torque:

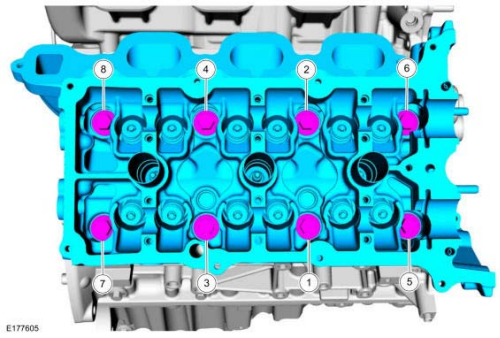
Stage 1: 177 lb.in (20 Nm)

Stage 2: 26 lb.ft (35 Nm)

Stage 3: 90°

Stage 4: 90°

Stage 5: 45°

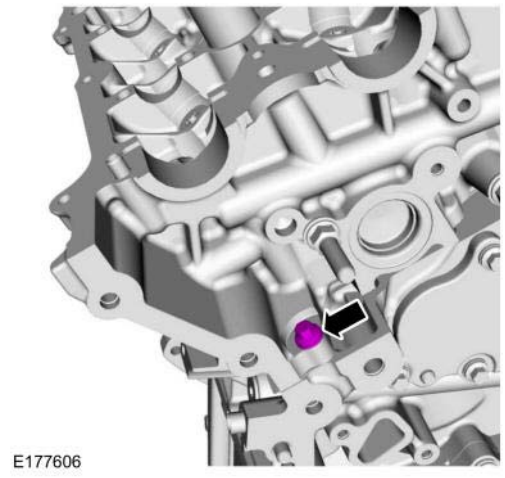


47.

Install the M6 bolt.

Torque

: 89 lb.in (10 Nm)



NOTE: The valve tappets must be installed in their original positions.

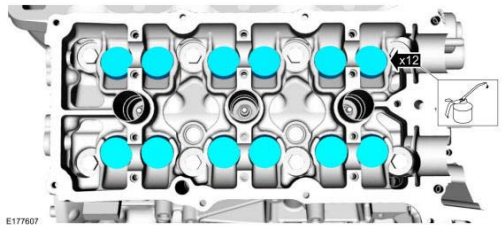
NOTE: Coat the valve tappets with clean engine oil prior to installation.

NOTE: RH shown in illustration, LH similar.

48.
Install the valve tappets.

Material

: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W20-QSP (U.S.) (WSS-M2C945-A)

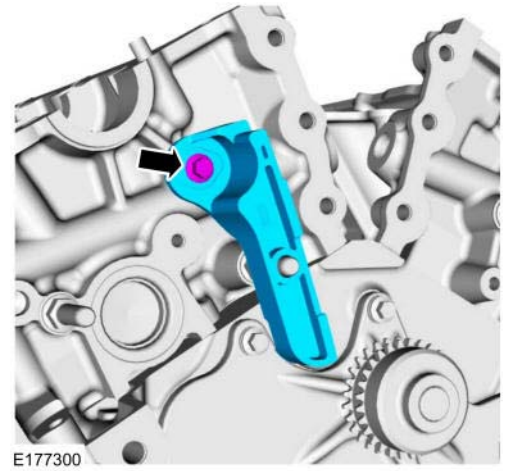


49.

Install the RH primary timing chain guide and the bolt.

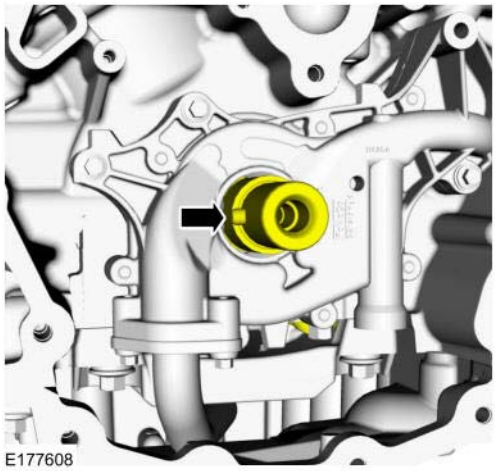
Torque

: 89 lb.in (10 Nm)



NOTE: The crankshaft must remain in the freewheeling position (crankshaft dowel pin at 9 o'clock) until after the camshafts are installed and the valve clearance is checked/adjusted. Do not turn the crankshaft until instructed to do so. Failure to follow this process will result in severe engine damage.

50.
Position the crankshaft dowel pin in the 9 o'clock position.

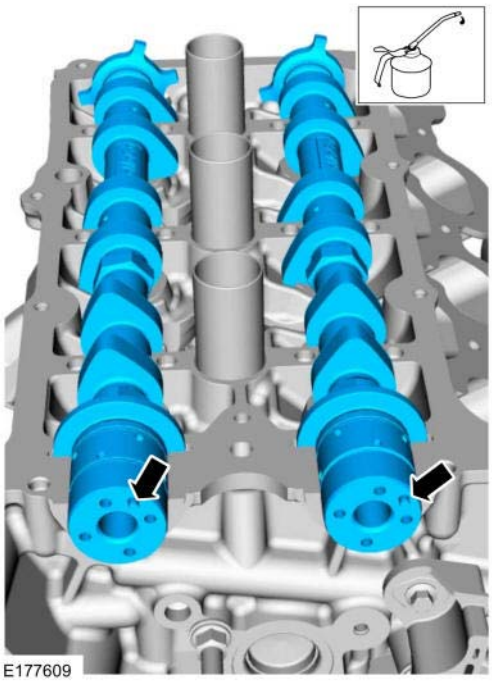


NOTE: Coat the camshafts with clean engine oil prior to installation.

51.
Lubricate the camshafts with clean engine oil and position the camshafts onto the RH cylinder head in the neutral position as shown in illustration.

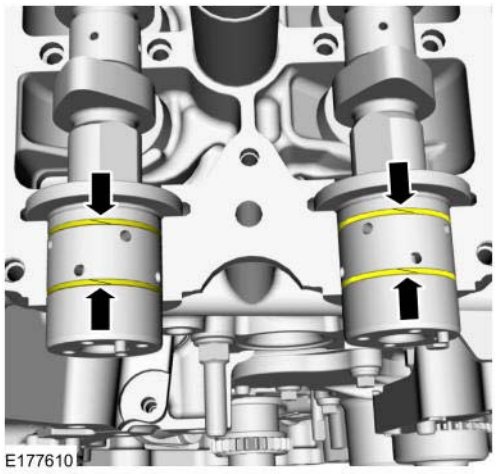
Material

: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W20-QSP (U.S.) (WSS-M2C945-A)



NOTE: The camshaft seal gaps must be at the 12 o'clock position or damage to the engine may occur.

52.
Position the RH camshaft seals gaps as shown in illustration.



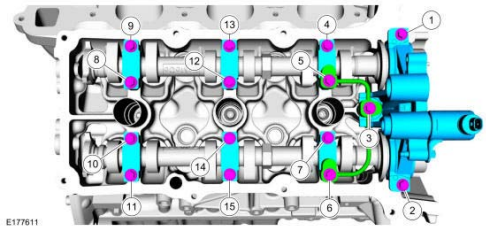
NOTE: Cylinder head camshaft bearing caps are numbered to verify that they are assembled in their original positions.

53.
Install the camshaft caps, oil tube and the bolts.

Torque:

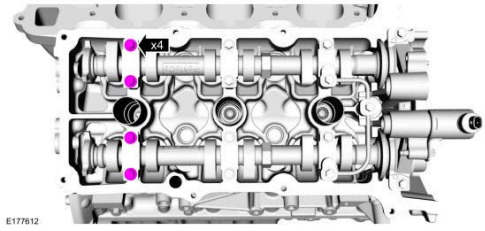
Stage 1: 71 lb.in (8 Nm)

Stage 2: 45°



54.

Loosen the camshaft cap bolts.



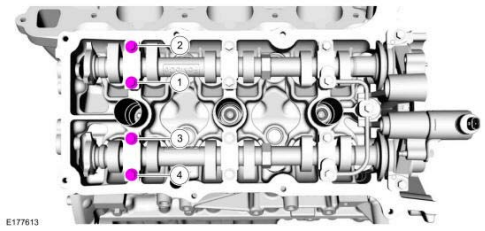
55.

Tighten the camshaft cap bolts.

Torque:

Stage 1: 71 lb.in (8 Nm)

Stage 2: 45°

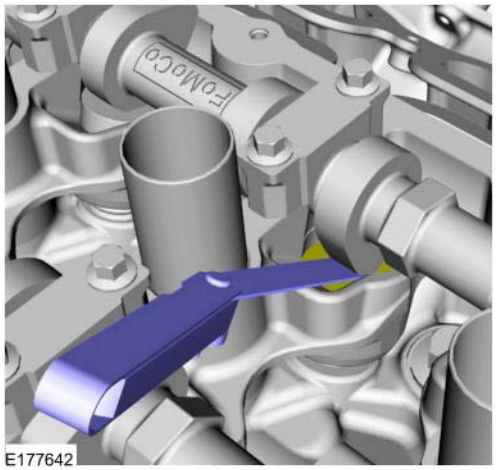


NOTE: If any components are installed new, the engine valve clearance must be checked/adjusted or engine damage may occur.

NOTE: Use a camshaft sprocket bolt to turn the camshafts.

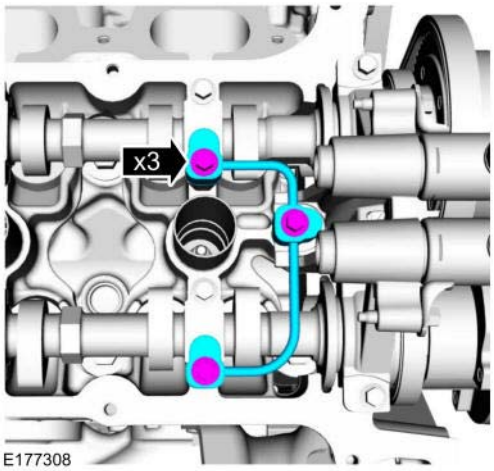
56.
Confirm that the valve tappet clearances are within specification. If valve tappet clearances are not within specification, the clearance must be adjusted by installing new valve tappet(s) of the correct size. Refer to: Valve Clearance Adjustment .

Use the General Equipment: Feeler Gauge



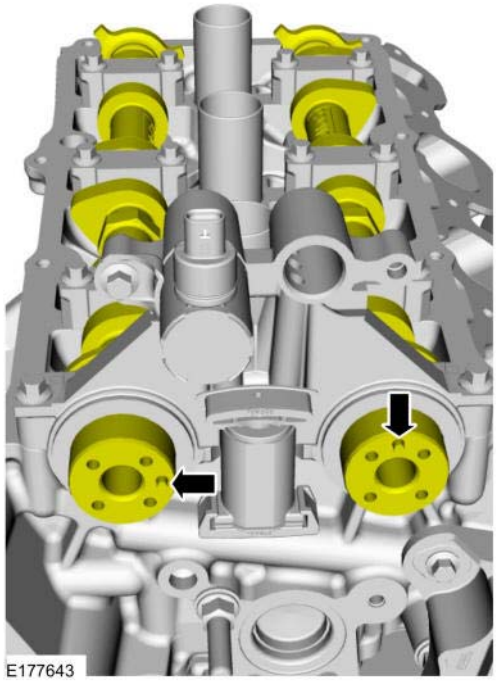
57.

Remove the bolts and the oil tube.



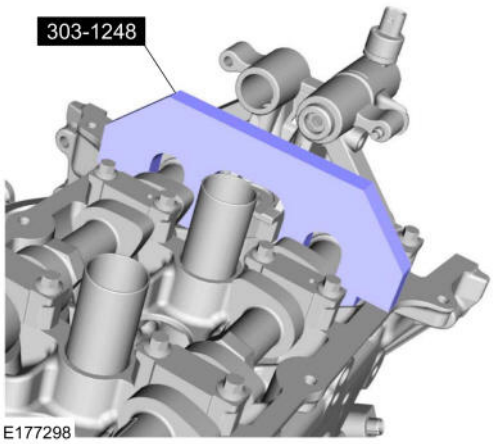
58.

Rotate the RH camshafts to TDC.



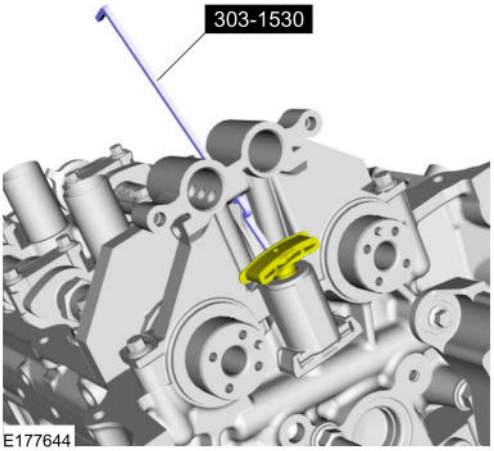
NOTE: The Camshaft Holding Tool will hold the camshafts in the TDC position.

59.
Install Special Service Tool: 303-1248 Camshaft holding tools.



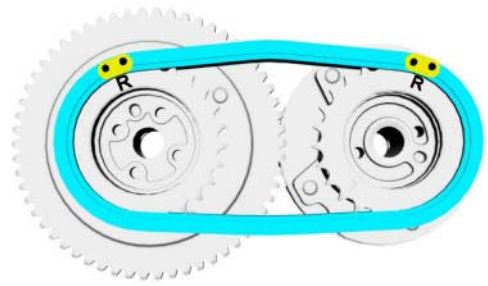
NOTE: The VCT oil control solenoids are removed for clarity.

60.
Install Special Service Tool: 303-1530 Tool, Chain Tensioner Hold Down.



61.

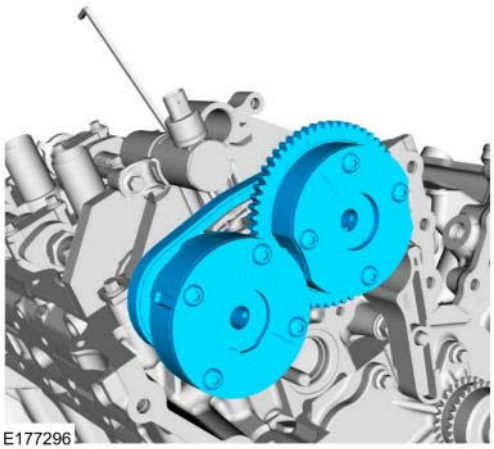
Align the colored links with the timing marks and assemble the RH VCT units.



E177645

NOTE: It may be necessary to rotate the camshafts slightly, to install the RH secondary timing assembly.

62.
Position the RH VCT units and secondary timing chain onto the camshafts by aligning the holes in the VCT units with the dowel pins in the camshafts.



E177296

63.

Install the new RH VCT unit bolts.

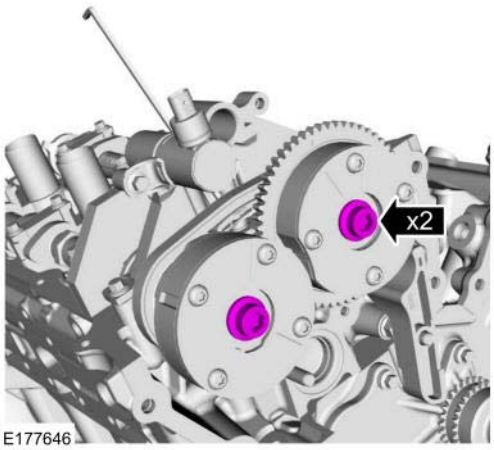
Torque:

Stage 1: 30 lb.ft (40 Nm)

Stage 2: Loosen: 1 turn(s)

Stage 3: 18 lb.ft (25 Nm)

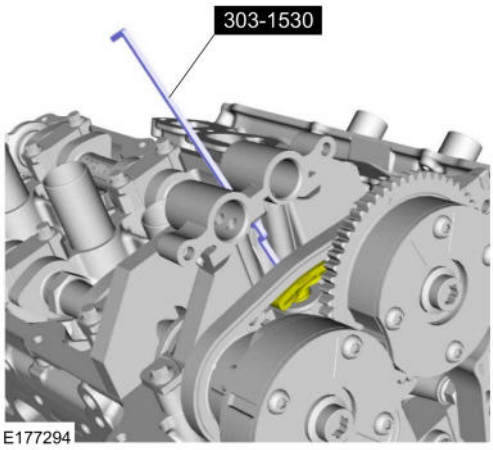
Stage 4: 180°



NOTE: Make sure the secondary timing chain is centered on the timing chain tensioner guides.

NOTE: The VCT oil control solenoids are removed for clarity.

64.
Remove Special Service Tool: 303-1530 Tool, Chain Tensioner Hold Down.

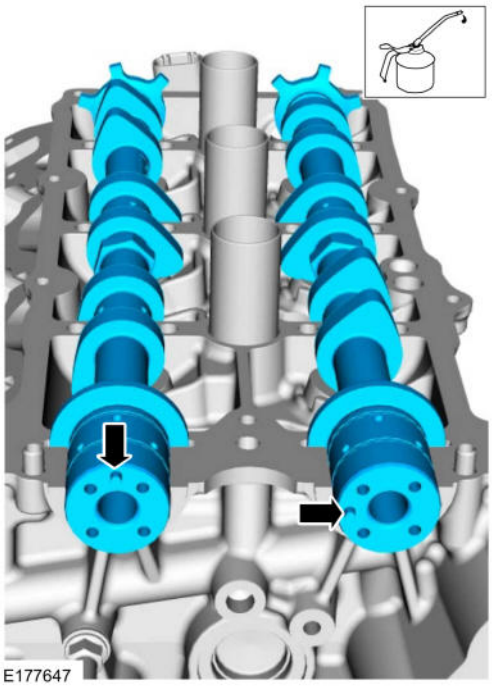


NOTE: Coat the camshafts with clean engine oil prior to installation.

65.
Lubricate the camshafts with clean engine oil and position the camshafts onto the LH cylinder head in the neutral position as shown in illustration.

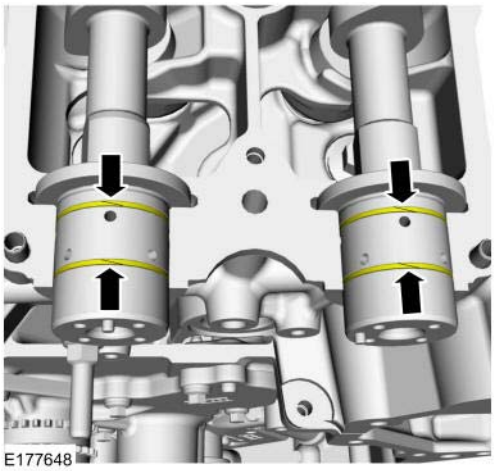
Material

: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W20-QSP (U.S.) (WSS-M2C945-A)



NOTE: The camshaft seal gaps must be at the 12 o'clock position or damage to the engine may occur.

66.
Position the LH camshaft seals gaps as shown in illustration.



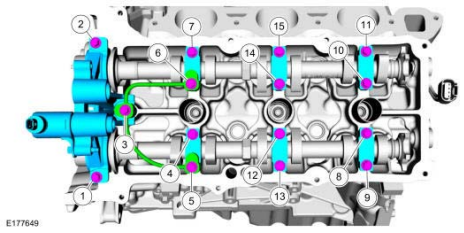
NOTE: Cylinder head camshaft bearing caps are numbered to verify that they are assembled in their original positions.

67.
Install the camshaft caps, oil tube and the bolts.

Torque:

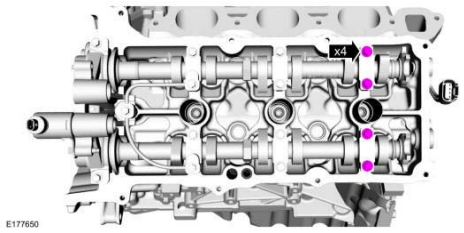
Stage 1: 71 lb.in (8 Nm)

Stage 2: 45°



68.

Loosen the camshaft cap bolts.



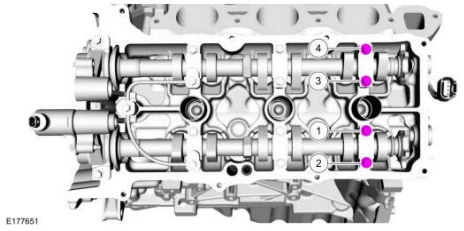
69.

Tighten the camshaft cap bolts.

Torque:

Stage 1: 71 lb.in (8 Nm)

Stage 2: 45°



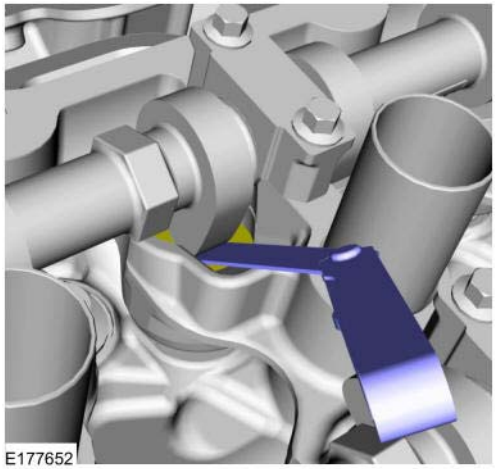
NOTE: If any components are installed new, the engine valve clearance must be checked/adjusted or engine damage may occur.

NOTE: Use a camshaft sprocket bolt to turn the camshafts.

70.
Confirm that the valve tappet clearances are within specification. If valve tappet clearances are not within specification, the clearance must be adjusted by installing new valve tappet(s) of the

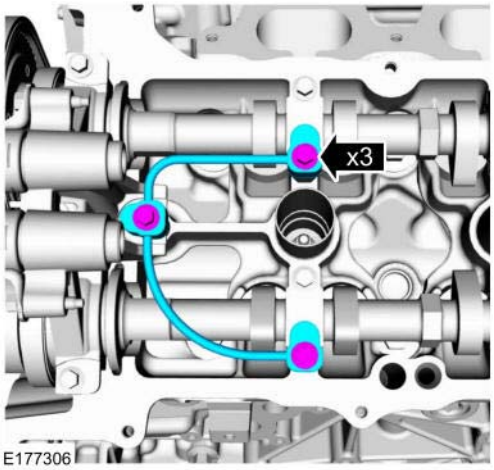
correct size. Refer to: Valve Clearance Adjustment .

Use the General Equipment: Feeler Gauge



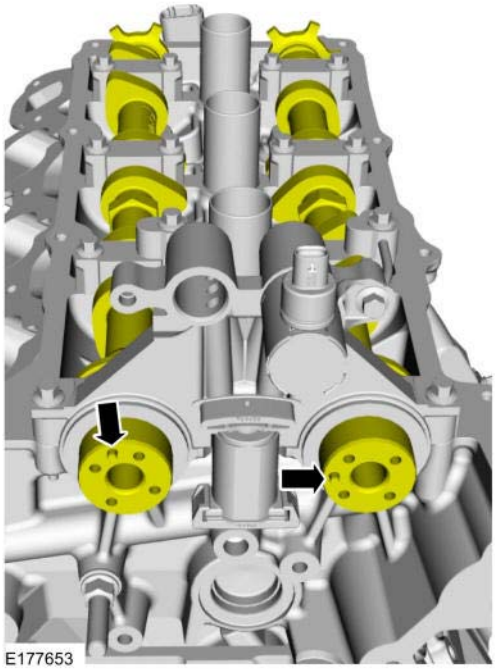
71.

Remove bolts and the oil tube.



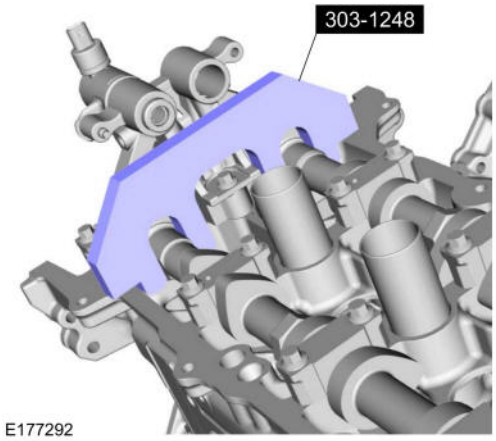
72.

Rotate the LH camshafts to TDC.



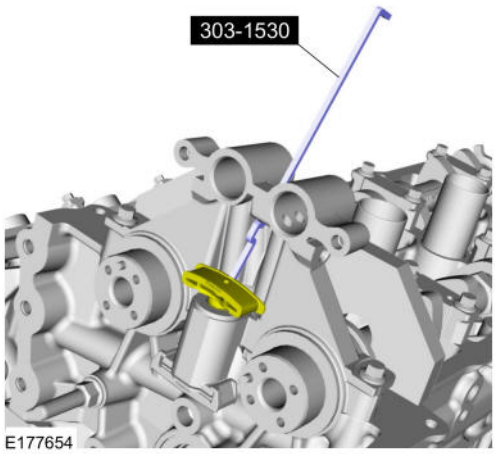
NOTE: The Camshaft Holding Tool will hold the camshafts in the TDC position.

73.
Install Special Service Tool: 303-1248 Camshaft holding tools.



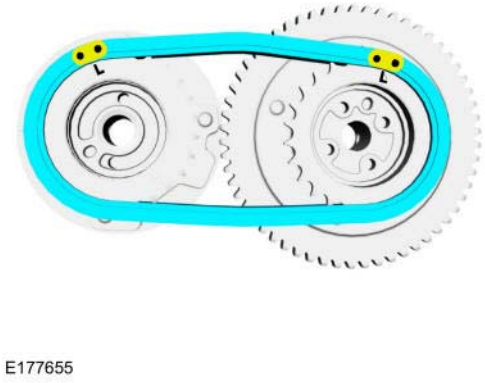
NOTE: The VCT oil control solenoids are removed for clarity.

74.
Install Special Service Tool: 303-1530 Tool, Chain Tensioner Hold Down.



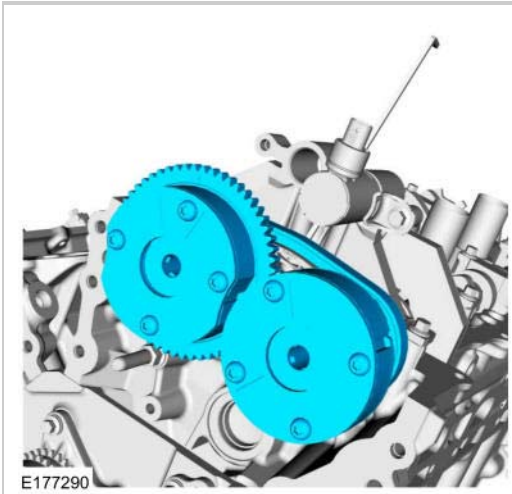
75.

Align the colored links with the timing marks and assemble the LH VCT units.



NOTE: It may be necessary to rotate the camshafts slightly, to install the LH secondary timing assembly.

76.
Position the LH VCT units and secondary timing chain onto the camshafts by aligning the holes in the VCT units with the dowel pins in the camshafts.



77.

Install the new LH VCT unit bolts.

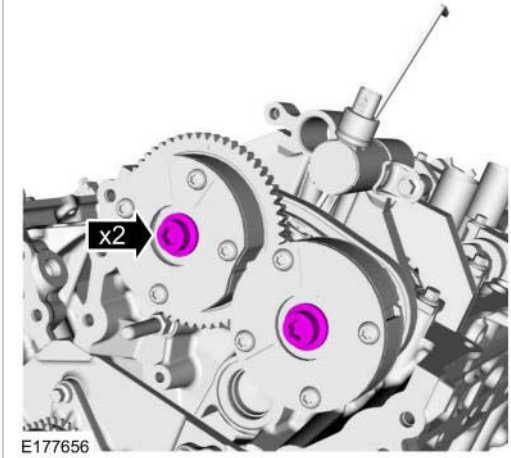
Torque:

Stage 1: 30 lb.ft (40 Nm)

Stage 2: Loosen: 1 turn(s)

Stage 3: 18 lb.ft (25 Nm)

Stage 4: 180°

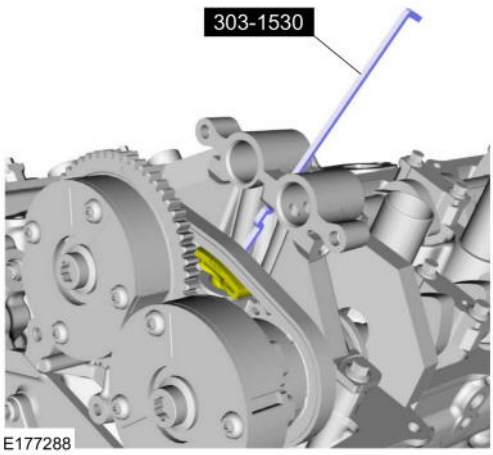


NOTE: Make sure the secondary timing chain is centered on the timing chain tensioner guides.

NOTE: The VCT oil control solenoids are removed for clarity.

78.

Remove Special Service Tool: 303-1530 Tool, Chain Tensioner Hold Down.

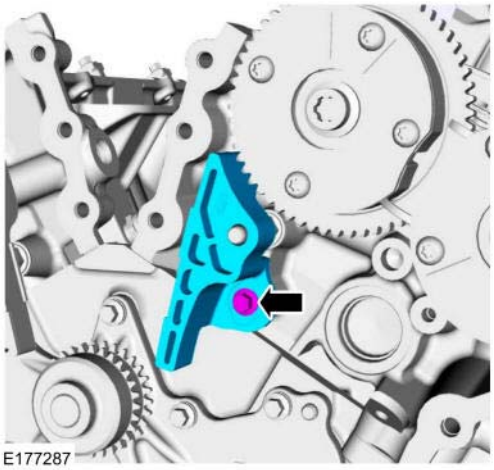


79.

Install the LH upper primary timing chain guide and the bolt.

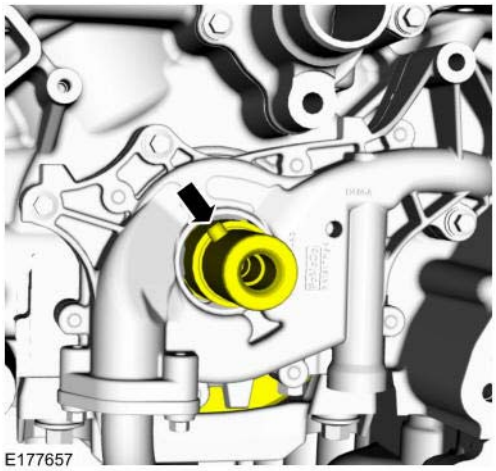
Torque

: 89 lb.in (10 Nm)



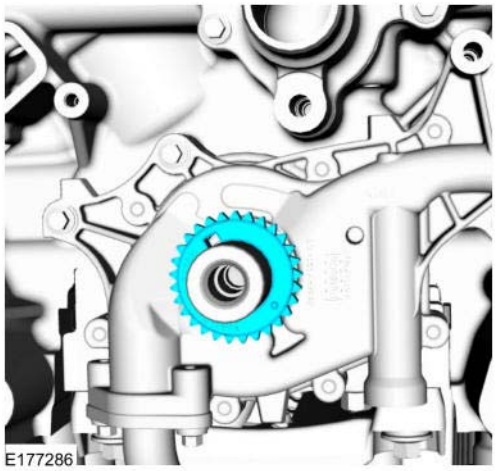
80.

Rotate the crankshaft clockwise 60 degrees to the TDC position (crankshaft dowel pin at 11 o'clock).



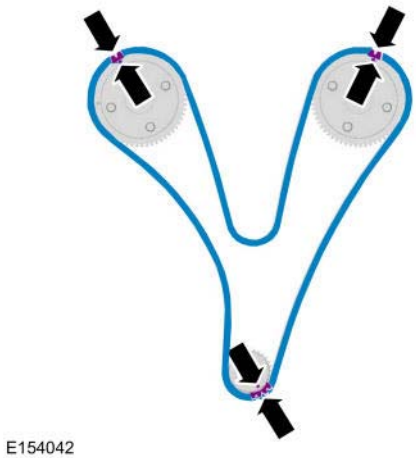
81.

Install the crankshaft sprocket.



NOTE: It may be necessary to rotate the camshafts slightly, to align the timing marks.

82.
Install the timing chain with the colored links aligned with the timing marks on the VCT units and the crankshaft sprocket.

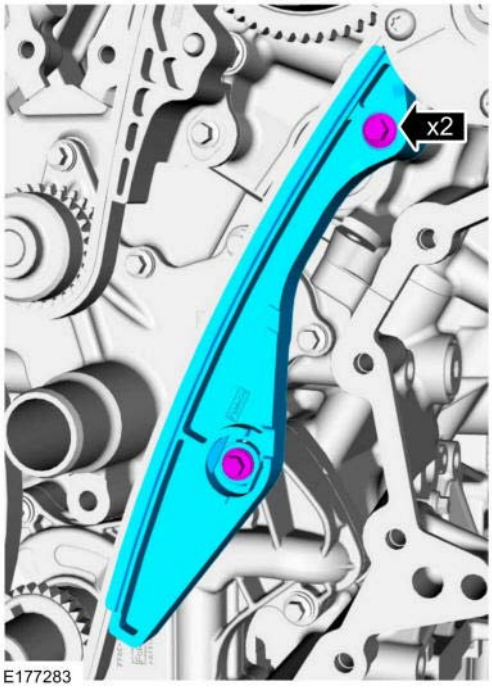


83.

Install the lower LH timing chain guide and the bolts.

Torque

: 89 lb.in (10 Nm)



84.

Install the timing chain tensioner arm.


E177282

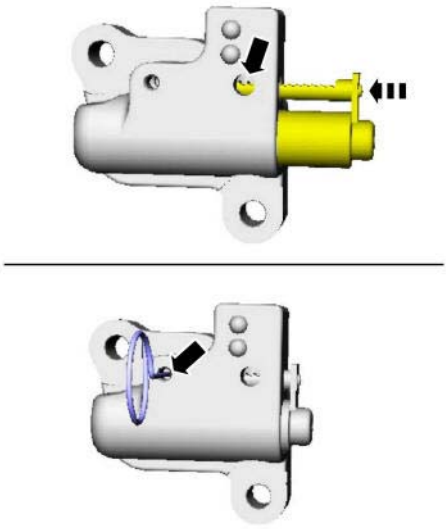
85.

Release the ratchet detent.

Using a soft-jawed vise, compress the ratchet plunger.

Align the hole in the ratchet plunger with the hole in the tensioner housing.

Install a lockpin.


E151609

NOTE: It may be necessary to rotate the camshafts slightly to remove slack from

the timing chain to install the tensioner.

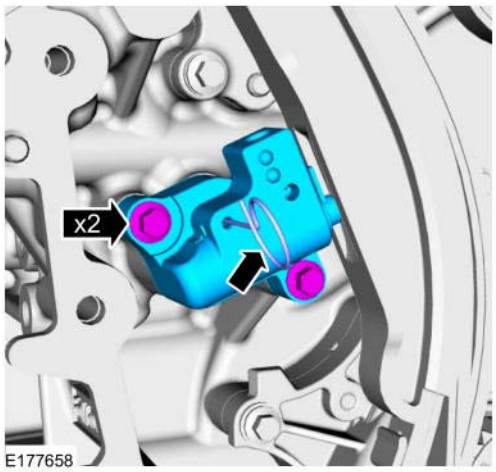
86.

Install the timing chain tensioner and the bolts.

Torque

: 89 lb.in (10 Nm)

Remove the lockpin.



87.

As a post-check, verify correct alignment of all timing marks.

There are 48 links in between the RH intake VCT unit colored link (1) and the LH intake VCT unit colored link (2).

There are 35 links in between LH intake VCT unit colored link (2) and the 2 crankshaft sprocket links (3).



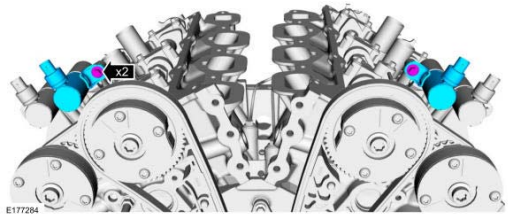
NOTE: Do not use excessive force when installing the VCT oil control solenoid. Damage to the mega cap could cause the cylinder head to be inoperable. If difficult to install the VCT oil control solenoid, inspect the bore and VCT oil control solenoid to ensure there are no burrs, sharp edges or contaminants present on the mating surface. Only clean the external surfaces as necessary.

88.
Install the VCT oil control solenoids and the bolts.

Torque:

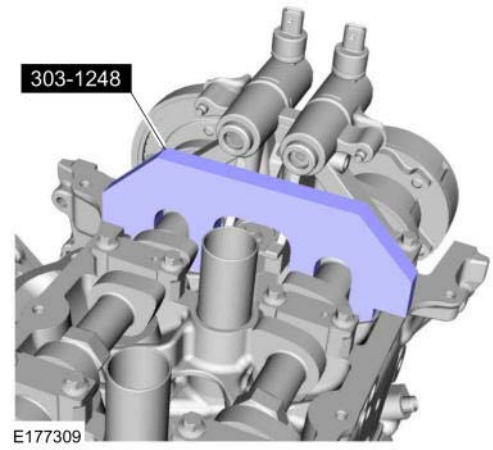
Stage 1: 71 lb.in (8 Nm)

Stage 2: 20°



89.

Remove Special Service Tool: 303-1248 Camshaft holding tools.



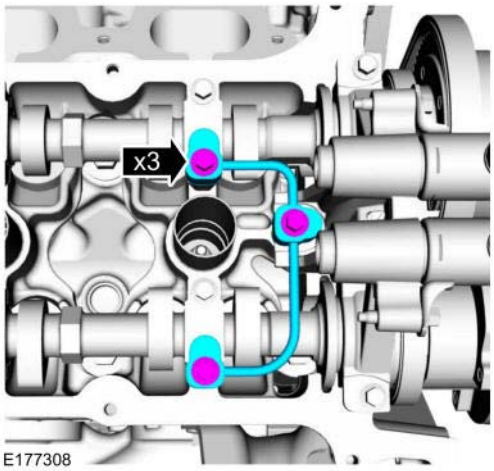
90.

Install the RH oil tube and the bolts.

Torque:

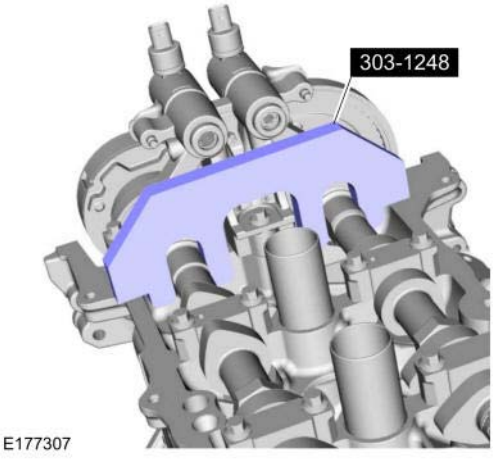
Stage 1: 71 lb.in (8 Nm)

Stage 2: 45°



91.

Remove Special Service Tool: 303-1248 Camshaft holding tools.



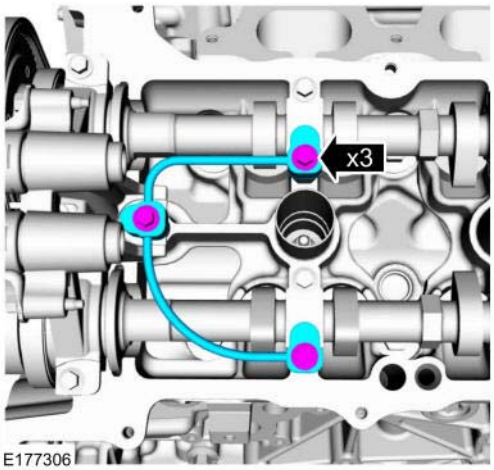
92.

Install the LH oil tube and the bolts.

Torque:

Stage 1: 71 lb.in (8 Nm)

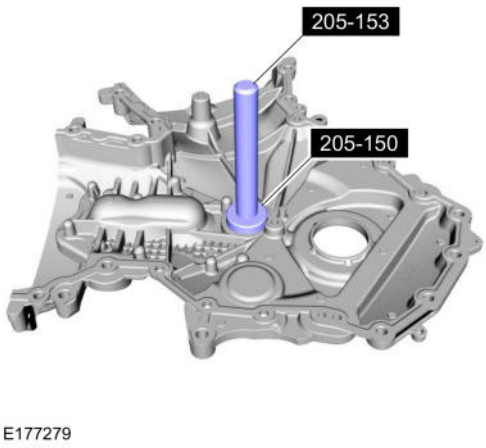
Stage 2: 45°



93.

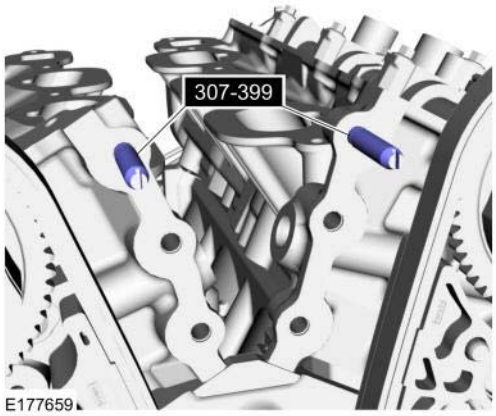
Using the special tools, install the front cover to coolant pipe seal.

Use Special Service Tool: 205-150 (T80T-4000-S) Installer, Spindle Bearing, 205-153 (T80T-4000-W) Handle.



94.

Install Special Service Tool: 307-399 Alignment Pins, Transmission Fluid Pump.



NOTE: Failure to use Motorcraft® High Performance Engine RTV Silicone may cause the engine oil to foam excessively and result in serious engine damage.

NOTE: The engine front cover and 6 bolts must be installed within 4 minutes of the initial sealant application. The remainder of the engine front cover bolts must be installed and tightened within 35 minutes of the initial sealant application. If the time limits are exceeded, the sealant must be removed, the sealing area cleaned and sealant reapplied. To clean the sealing area, use silicone gasket remover and metal surface prep. Failure to follow this procedure can cause future oil leakage.

95.

Apply a 3.0 mm (0.11 in) bead of Motorcraft® High Performance Engine RTV Silicone to the engine front cover sealing surfaces including the inner bolt bosses.

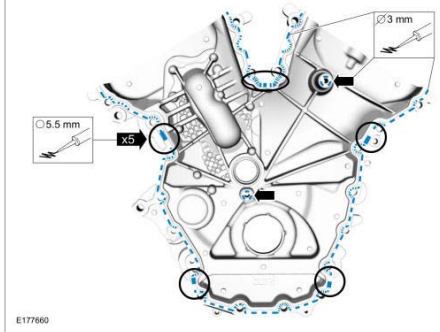
Material

: Motorcraft® High Performance Engine RTV Silicone / TA-357 (WSE-M4G323-A6)

Apply a 5.5 mm (0.21 in) bead of Motorcraft® High Performance Engine RTV Silicone to the oil pan-to-cylinder block joint and the cylinder head-to-cylinder block joint areas of the engine front cover in places as indicated.

Material

: Motorcraft® High Performance Engine RTV Silicone / TA-357 (WSE-M4G323-A6)

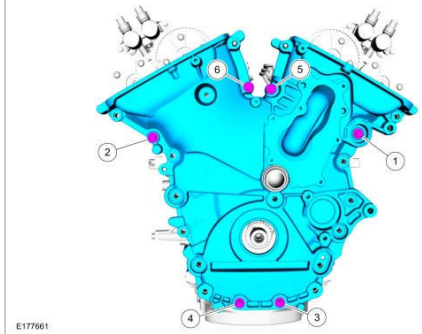


NOTE: Make sure the locating dowel pins are seated correctly in the cylinder block.

96.
Install the engine front cover and the bolts.

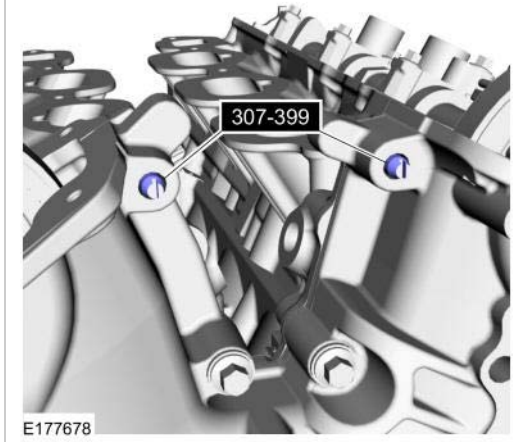
Torque

: 27 lb.in (3 Nm)



97.

Remove Special Service Tool: 307-399 Alignment Pins, Transmission Fluid Pump.



98.

Install the remaining engine front cover bolts.

Torque:

Stage 1: Tighten bolts 1 thru 21 to: 89 lb.in (10 Nm)

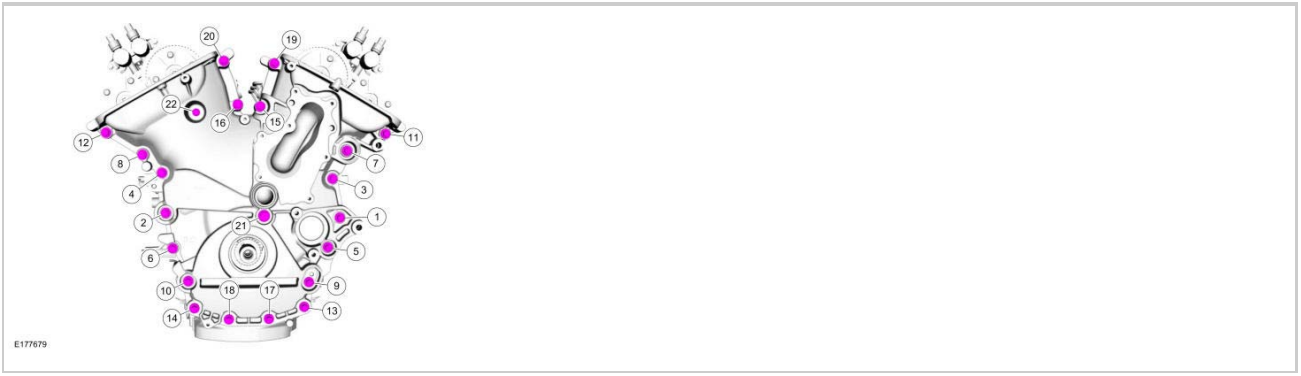
Stage 2: Tighten bolts 1 thru 20 to: 18 lb.ft (24 Nm)

Stage 3: Tighten bolt 21 to: 177 lb.in (20 Nm)

Stage 4: Tighten bolt 21 an additional: 90°

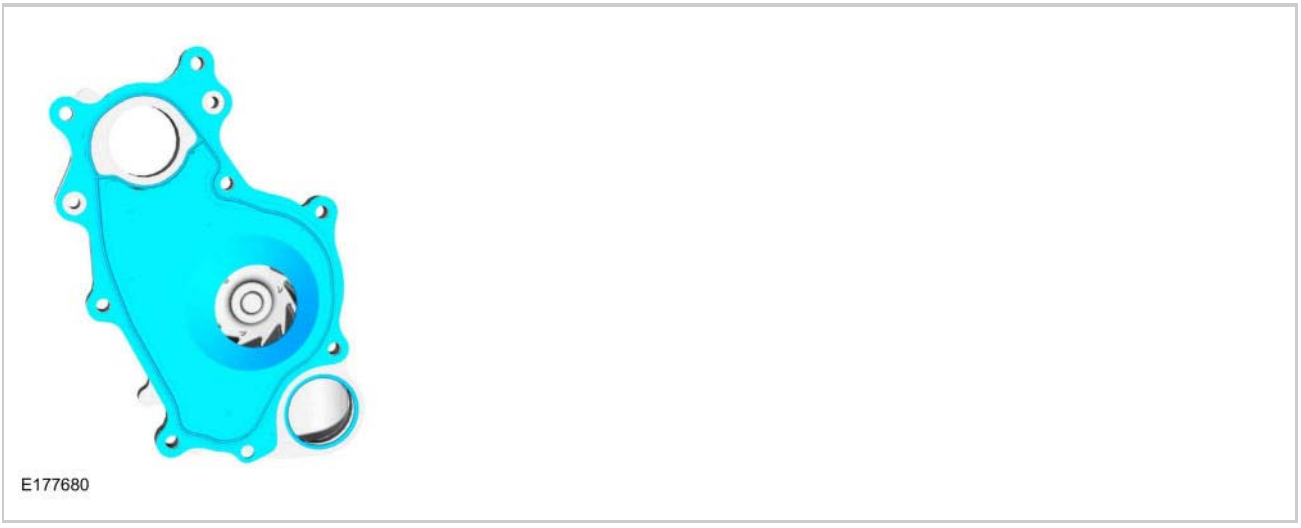
Stage 5: Tighten bolt 22 to: 89 lb.in (10 Nm)

Stage 6: Tighten bolt 22 an additional: 45°



99.

Install a new coolant pump gasket and O-ring seal.



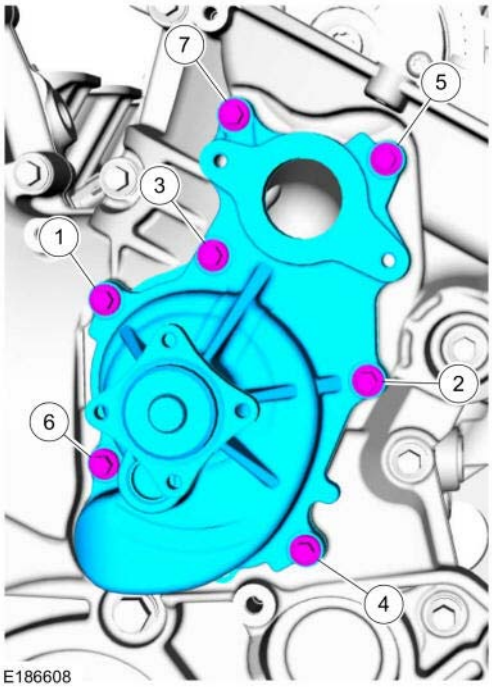
100.

Install the coolant pump and the bolts.

Torque:

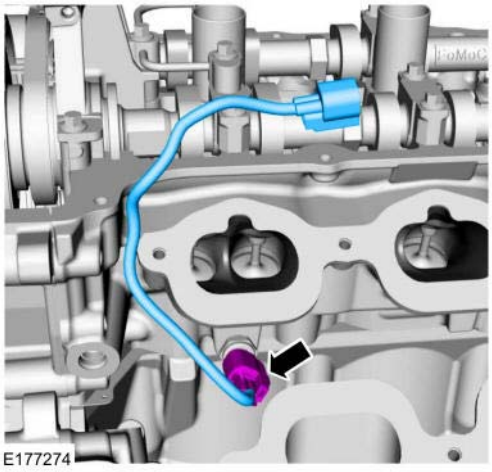
Stage 1: 89 lb.in (10 Nm)

Stage 2: 45°



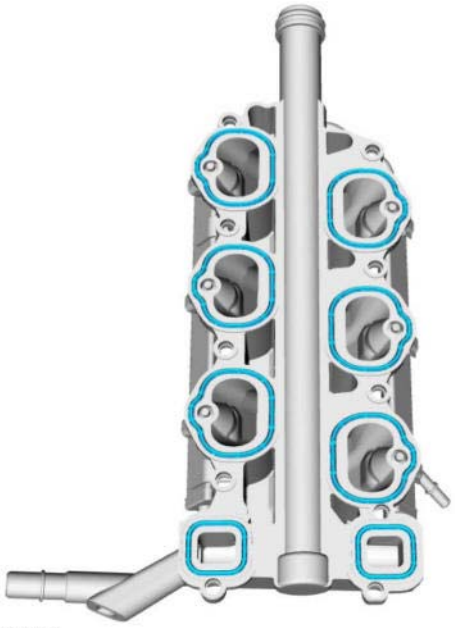
101.

Connect the CHT sensor electrical connector.



102.

Install the new lower intake manifold gaskets.



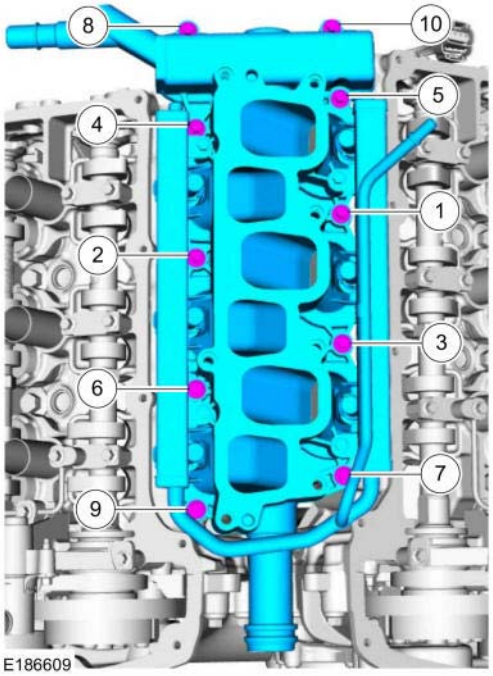
E184762

NOTE: If the engine is repaired or replaced because of upper engine failure, typically including valve or piston damage, check the intake manifold for metal debris. If metal debris is found, install a new intake manifold. Failure to follow these instructions can result in engine damage.

103.
Install the lower intake manifold and the bolts.

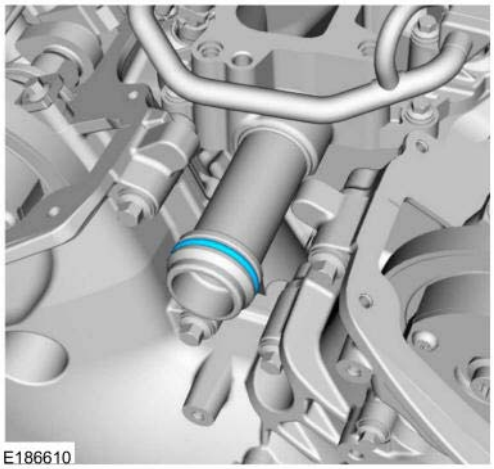
Torque

: 89 lb.in (10 Nm)



104.

Install a new thermostat housing O-ring seal.



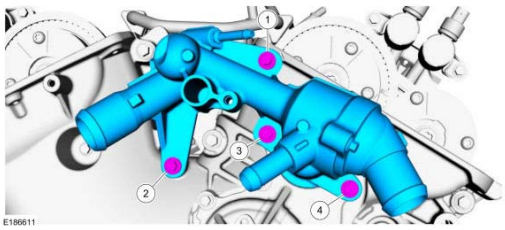
105.

Install the thermostat housing and the bolts.

Torque:

Stage 1: 71 lb.in (8 Nm)

Stage 2: 45°



NOTE: Apply clean engine oil to the CMP sensor O-ring seals.

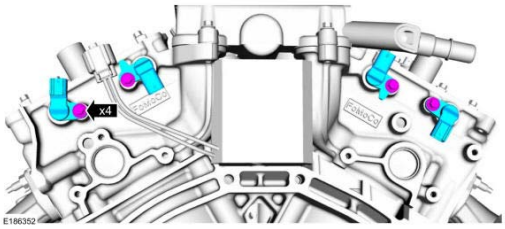
106.
Install the CMP sensors and the bolts.

Material

: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W20-QSP (U.S.) (WSS-M2C945-A)

Torque

: 89 lb.in (10 Nm)



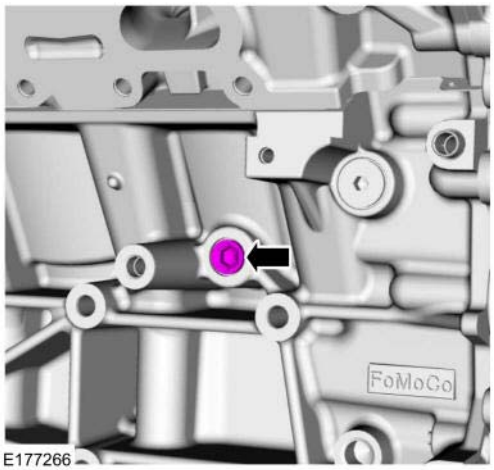
107.

Install the RH block coolant drain plug.

Torque:

Stage 1: 142 lb.in (16 Nm)

Stage 2: 180°

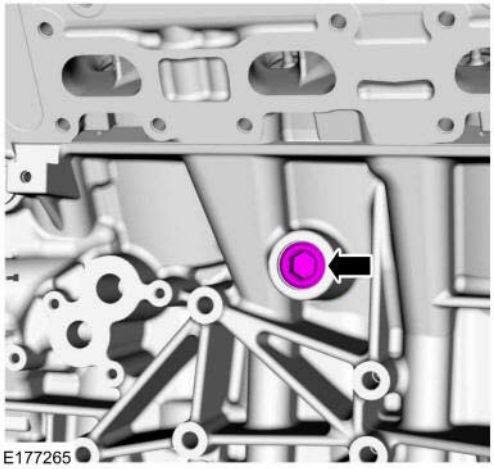


108.

Install the LH block coolant drain plug.

Torque

: 30 lb.ft (40 Nm)



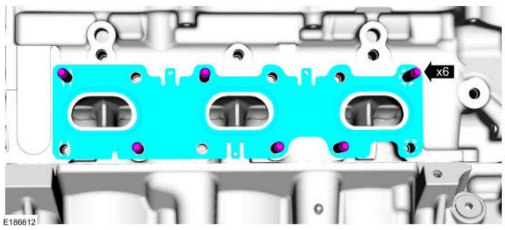
109.

Install the exhaust manifold studs.

Torque

: 106 lb.in (12 Nm)

Install the exhaust manifold gasket.



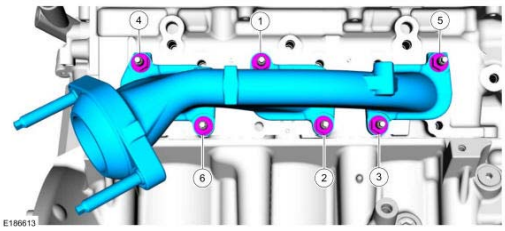
110.

Install the exhaust manifold and the new nuts.

Torque:

Stage 1: 168 lb.in (19 Nm)

Stage 2: 18 lb.ft (25 Nm)



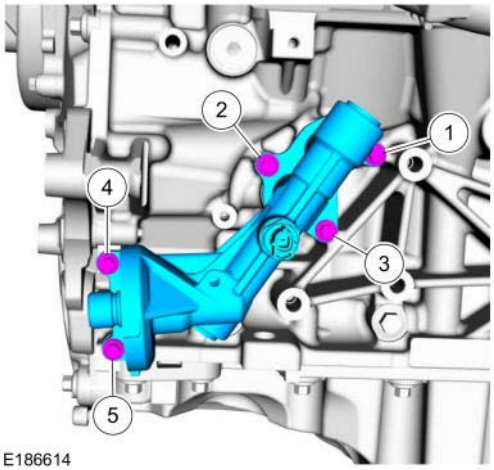
111.

Install the oil filter adapter and the bolts.

Torque:

Stage 1: 89 lb.in (10 Nm)

Stage 2: 45°



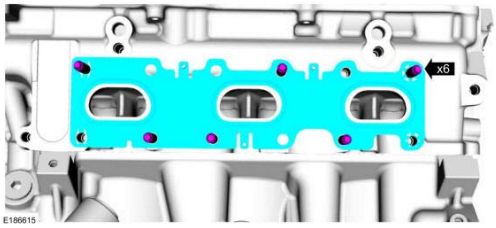
112.

Install the exhaust manifold studs.

Torque

: 106 lb.in (12 Nm)

Install the exhaust manifold gasket.

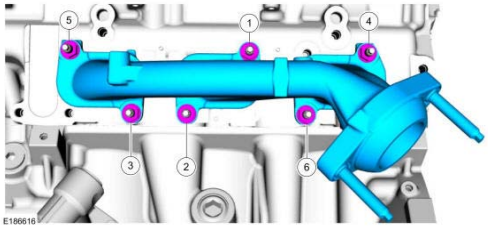


113.

Install the exhaust manifold and the new nuts.

Torque:

Stage 1: 168 lb.in (19 Nm)

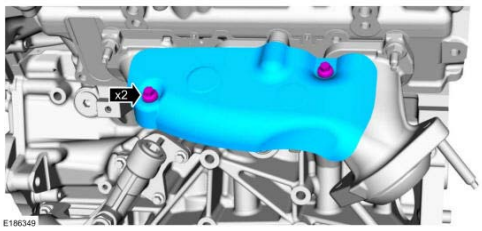


114.

Install the exhaust manifold heat shield and the bolts.

Torque

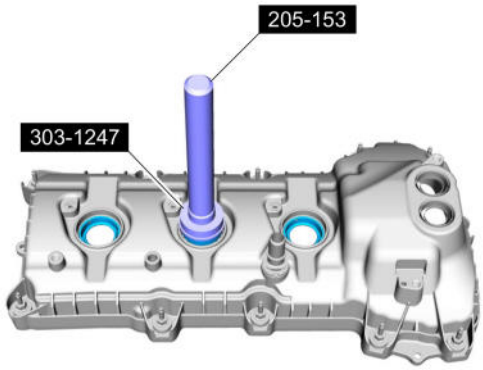
: 106 lb.in (12 Nm)



NOTE: Installation of new seals is only required if damaged seals were removed.

115.
If removed, using the special tools, install the spark plug tube seals.

Use Special Service Tool: 303-1247 VCT Spark Plug Tube Seal Remover and Installer, 205-153 (T80T-4000-W) Handle.

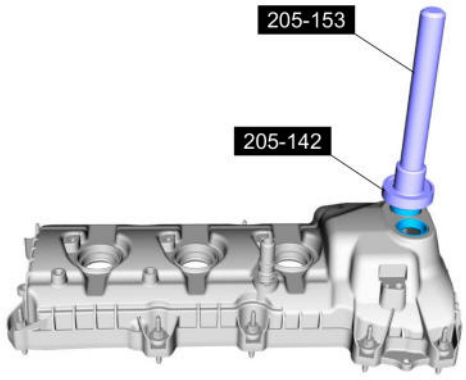


E177694

NOTE: Installation of new seals is only required if damaged seals were removed.

116.
If removed, using the special tools, install the VCT oil control solenoid seals.

Use Special Service Tool: 205-142 (T80T-4000-J) Installer, Differential Bearing Cone, 205-153 (T80T-4000-W) Handle.



E177695

NOTE: If the valve cover is not installed and the fasteners tightened within 4 minutes, the sealant must be removed and the sealing area cleaned. To clean the sealing area, use silicone gasket remover and metal surface prep. Failure to follow this procedure can cause future oil leakage.

117.
Apply an 8 mm (0.31 in) bead of Motorcraft® High Performance Engine RTV Silicone to the engine front cover-to-cylinder head joints.

Material

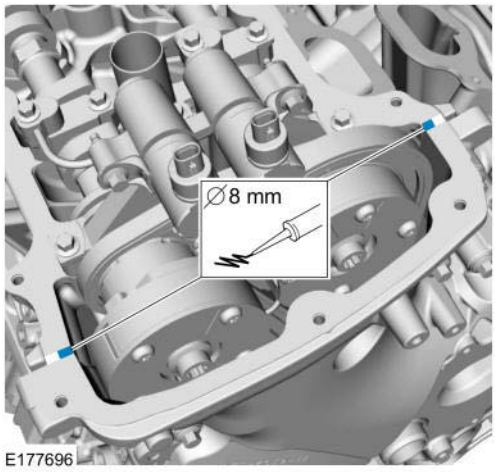
: Motorcraft® Metal Surface Prep / ZC-31-B

Material

: Motorcraft® Silicone Gasket Remover / ZC-30-A

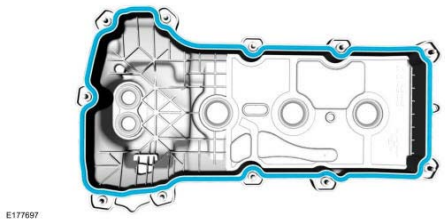
Material

: Motorcraft® High Performance Engine RTV Silicone / TA-357 (WSE-M4G323-A6)



118.

Install a new valve cover gasket.

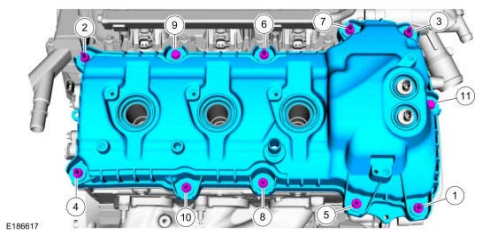


119.

Install the valve cover and tighten the bolts.

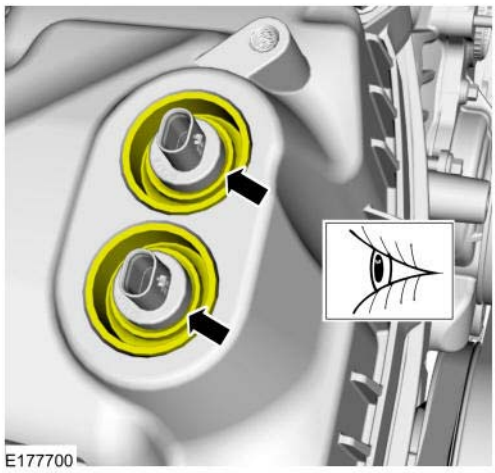
Torque

: 89 lb.in (10 Nm)



120.

Make sure the VCT seals in the valve cover are below the top of the VCT oil control solenoid electrical connector or the VCT seal may leak oil.

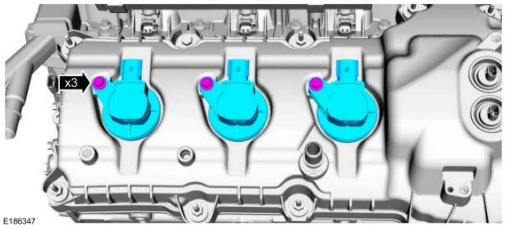


121.

Install the RH coil-on-plugs and the bolts.

Torque

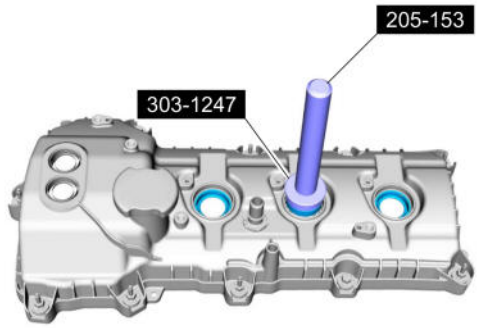
: 62 lb.in (7 Nm)



NOTE: Installation of new seals is only required if damaged seals were removed.

122.
If removed, using the special tools, install the spark plug tube seals.

Use Special Service Tool: 303-1247 VCT Spark Plug Tube Seal Remover and Installer, 205-153 (T80T-4000-W) Handle.

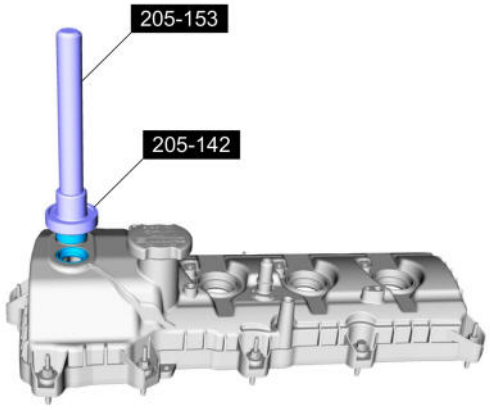


E177702

NOTE: Installation of new seals is only required if damaged seals were removed.

123.
If removed, using the special tools, install the VCT oil control solenoid seals.

Use Special Service Tool: 205-142 (T80T-4000-J) Installer, Differential Bearing Cone, 205-153 (T80T-4000-W) Handle.



E177703

NOTE: If the valve cover is not installed and the fasteners tightened within 4 minutes, the sealant must be removed and the sealing area cleaned. To clean the sealing area, use silicone gasket remover and metal surface prep. Failure to follow this procedure can cause future oil leakage.

124.
Apply an 8 mm (0.31 in) bead of Motorcraft® High Performance Engine RTV Silicone to the engine front cover-to-cylinder head joints.

Material

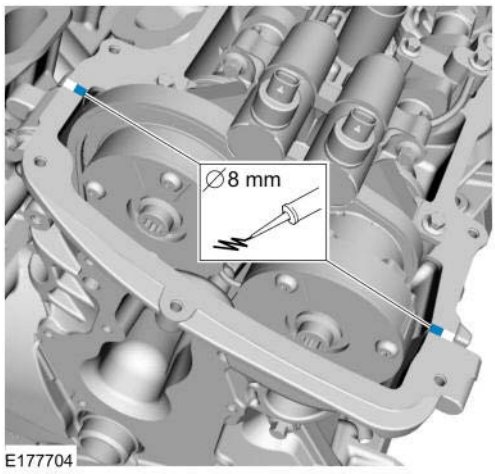
: Motorcraft® Metal Surface Prep / ZC-31-B

Material

: Motorcraft® Silicone Gasket Remover / ZC-30-A

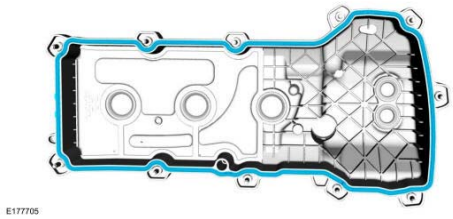
Material

: Motorcraft® High Performance Engine RTV Silicone / TA-357 (WSE-M4G323-A6)



125.

Install a new valve cover gasket.

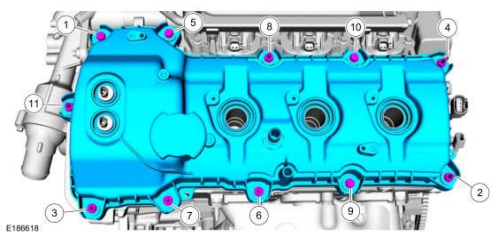


126.

Install the valve cover and tighten the bolts.

Torque

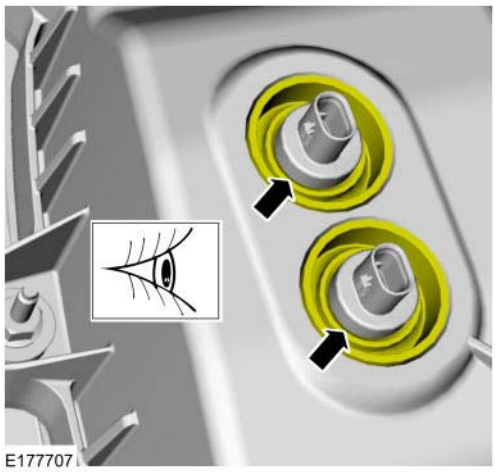
: 89 lb.in (10 Nm)



127.

Make sure the VCT seals in the valve cover are below the top of the VCT oil control solenoid

electrical connector or the VCT seal may leak oil.



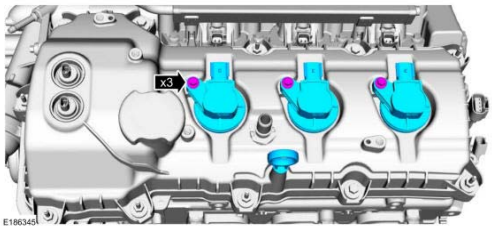
128.

Install the LH coil-on-plugs and the bolts.

Torque

: 62 lb.in (7 Nm)

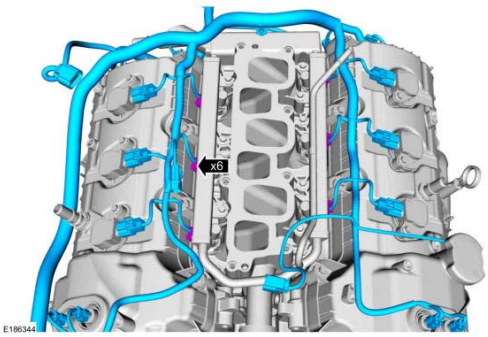
Install the oil level indicator.



129.

Install the engine wiring harness.

Connect the fuel injector electrical connectors.



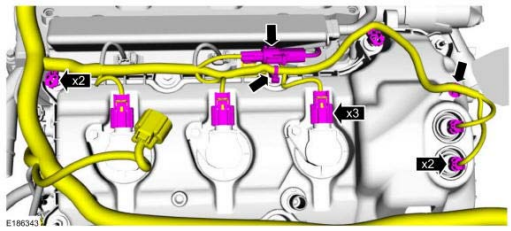
130.

Attach the wiring harness retainers.

Connect the CHT sensor electrical connector.

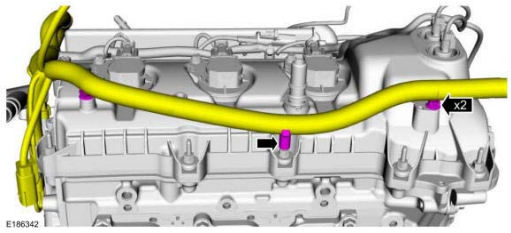
Connect the ignition coil-on-plug electrical connectors.

Connect the VCT oil control solenoids electrical connectors.



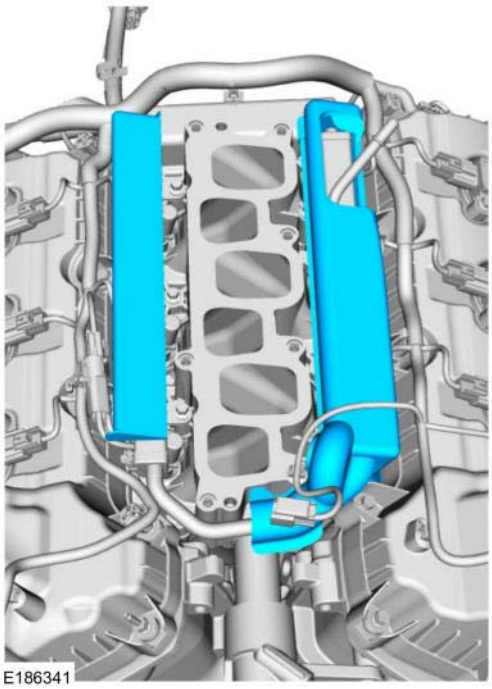
131.

Attach the wiring harness retainers.



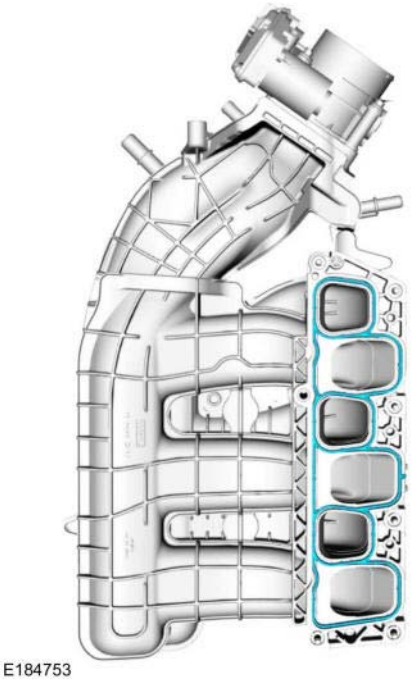
132.

Install the fuel rail sound insulators.


E186341

NOTE: If the engine is repaired or replaced because of upper engine failure, typically including valve or piston damage, check the intake manifold for metal debris. If metal debris is found, install a new intake manifold. Failure to follow these instructions can result in engine damage.

133.
Install the new upper intake manifold gasket.


E184753

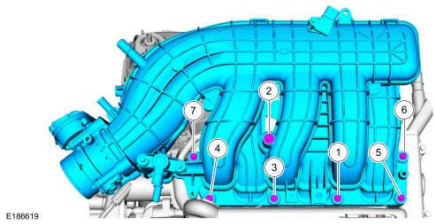
134.

Install the upper intake manifold and the bolts.

Torque:

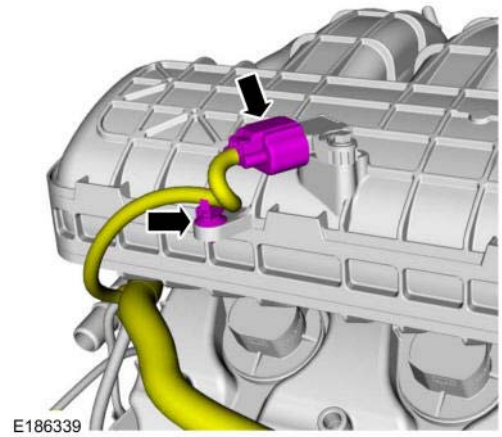
Stage 1: 89 lb.in (10 Nm)

Stage 2: 45°



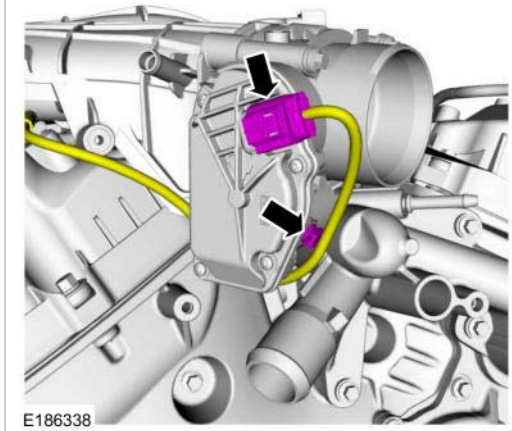
135.

Connect the MAPT sensor electrical connector and the wiring harness retainer.



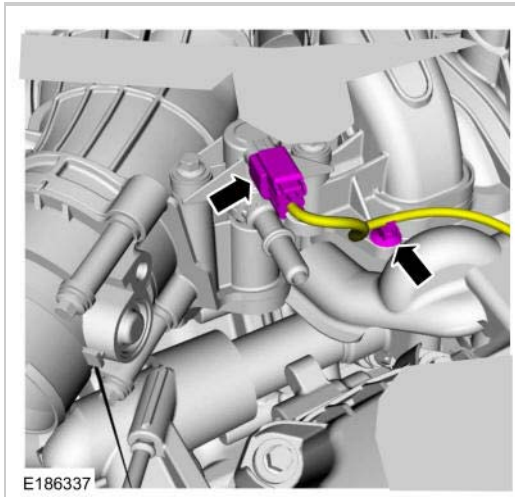
136.

Connect the throttle body electrical connector and the wiring harness retainer.



137.

Connect the EVAP canister purge valve electrical connector and the wiring harness retainer.



138.

Attach the wiring harness retainers.

Connect the oil pressure switch electrical connector.

Connect the ignition coil-on-plug electrical connectors.

Disconnect the VCT oil control solenoids electrical connectors.



139.

Attach the wiring harness retainers.

Connect the CMP sensor electrical connectors.

Connect the KS sensor electrical connector.



140.

Install the ground strap and the bolt.

Torque

: 106 lb.in (12 Nm)



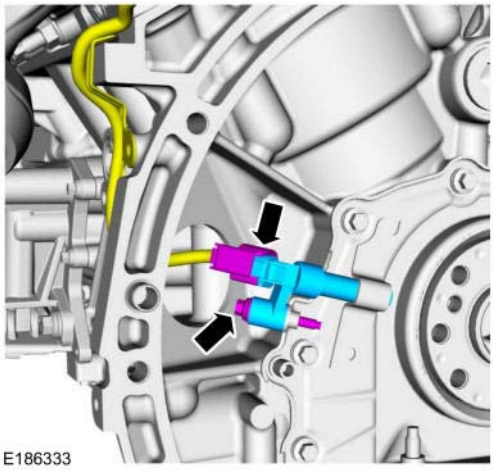
141.

Install the CKP sensor and the bolt.

Torque

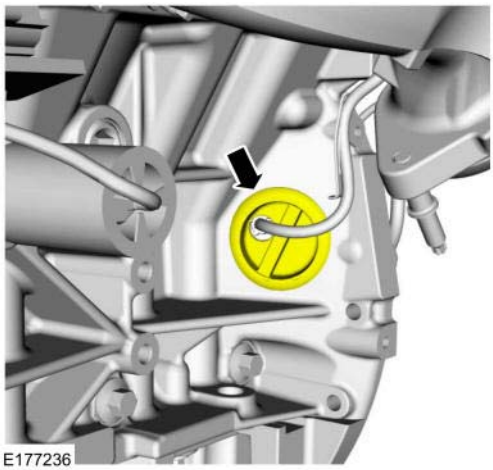
: 89 lb.in (10 Nm)

Connect the CKP sensor electrical connector.



142.

Install the wiring harness grommet.

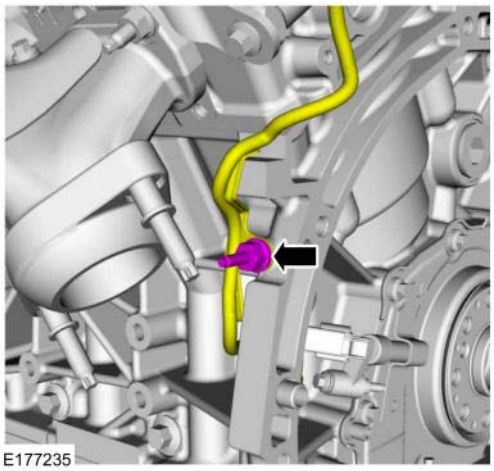


143.

Install the wiring harness retainer stud bolt.

Torque

: 89 lb.in (10 Nm)

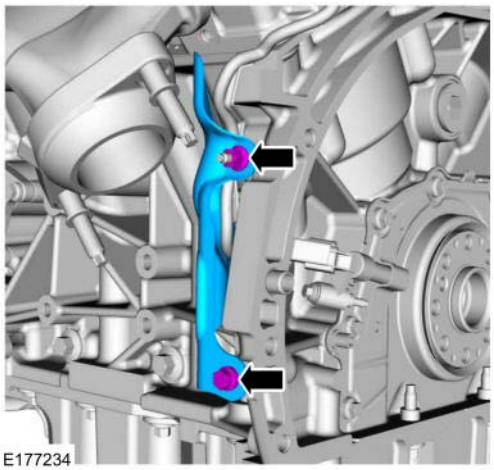


144.

Install the heat shield, nut and bolt.

Torque

: 89 lb.in (10 Nm)

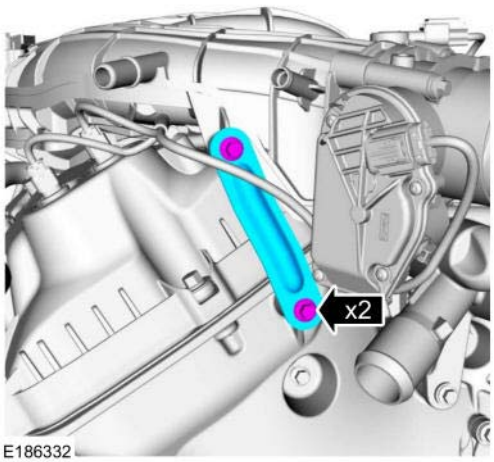


145.

Install the upper intake manifold support bracket and the bolt.

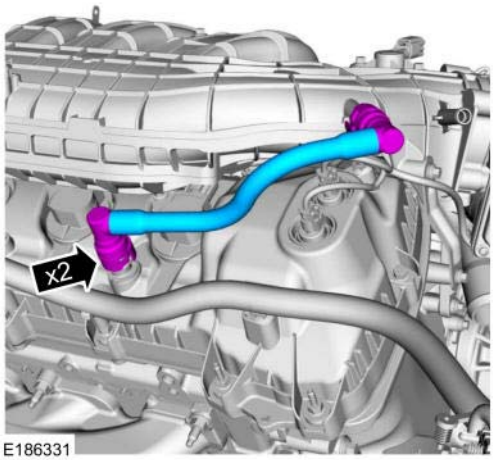
Torque

: 89 lb.in (10 Nm)



146.

Install the PCV tube.

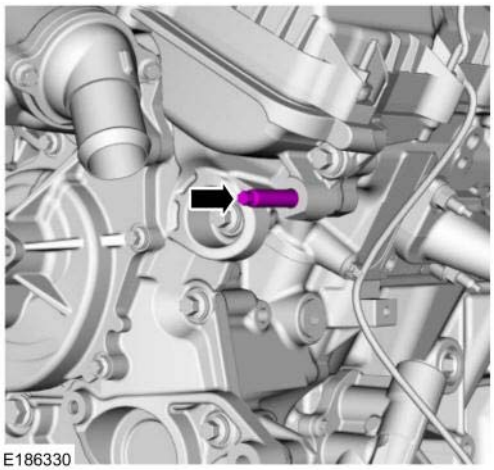


147.

Install the generator stud bolt.

Torque

: 71 lb.in (8 Nm)

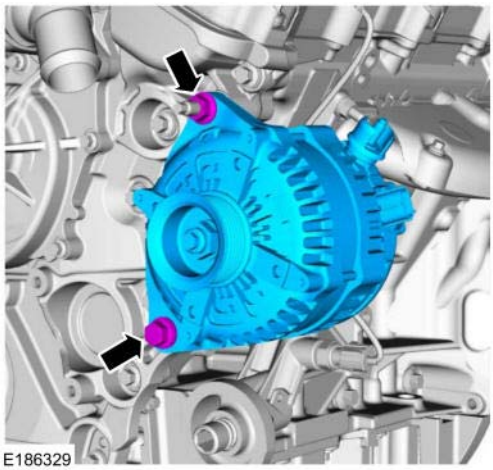


148.

Install the generator, nut and bolt.

Torque

: 35 lb.ft (47 Nm)



149.

1.

Install the coolant pump pulley and the bolts.

Torque

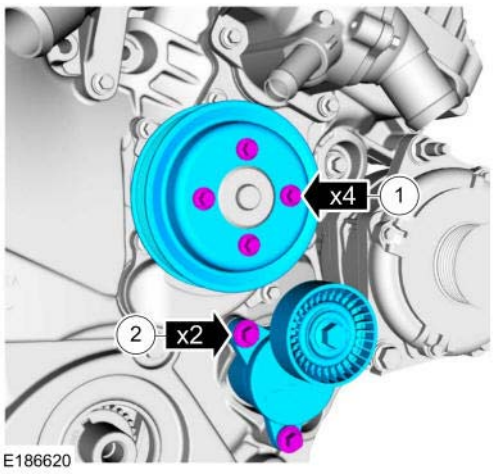
: 18 lb.ft (24 Nm)

2.

Install the accessory drive belt tensioner and the bolts.

Torque

: 18 lb.ft (25 Nm)

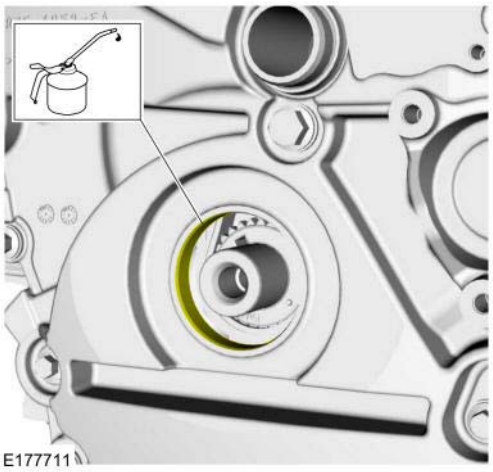


150.

Lubricate the crankshaft front seal bore with clean engine oil.

Material

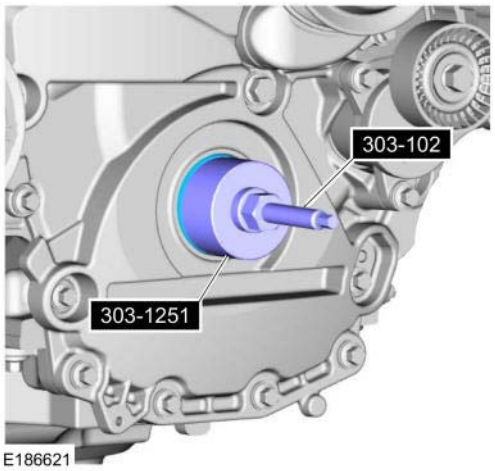
: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W20-QSP (U.S.) (WSS-M2C945-A)



151.

Using the special tools, install the crankshaft front seal.

Use Special Service Tool: 303-102 Installer, Crankshaft Pulley, 303-1251 Installer, Front Seal.

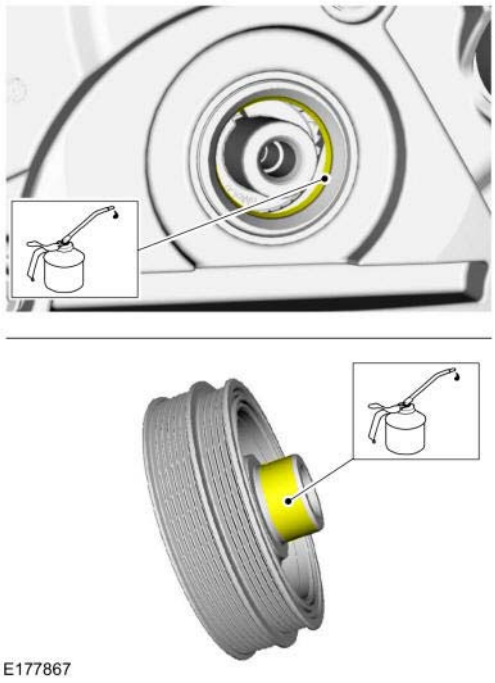


152.

Lubricate the crankshaft front seal and the crankshaft pulley with clean engine oil.

Material

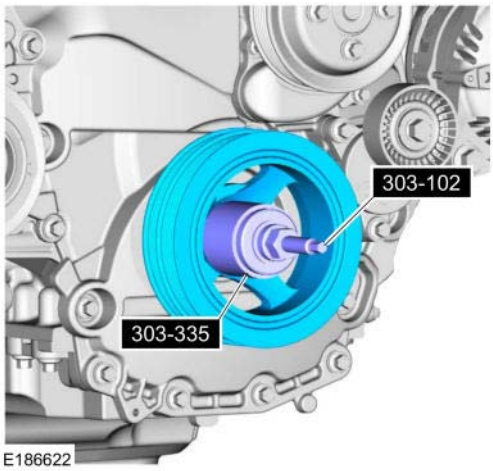
: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W20-QSP (U.S.) (WSS-M2C945-A)



153.

Using the special tools, install the crankshaft pulley.

Use Special Service Tool: 303-102 Installer, Crankshaft Pulley, 303-335 (T88T-6701-A) Installer, Front Cover Oil Seal.



154.

Install the new crankshaft bolt and the washer.

Use the General Equipment: Strap Wrench

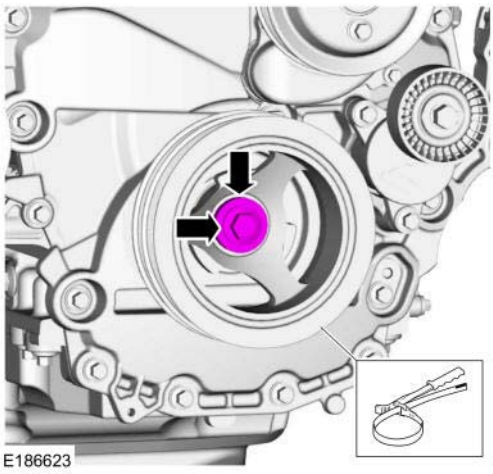
Torque:

Stage 1: 89 lb.ft (120 Nm)

Stage 2: Loosen: 1 turn(s)

Stage 3: 37 lb.ft (50 Nm)

Stage 4: 90°

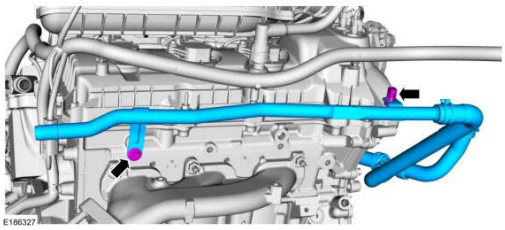


155.

Install the coolant tube, attach the retainer and install the bolt.

Torque

: 17 lb.ft (23 Nm)



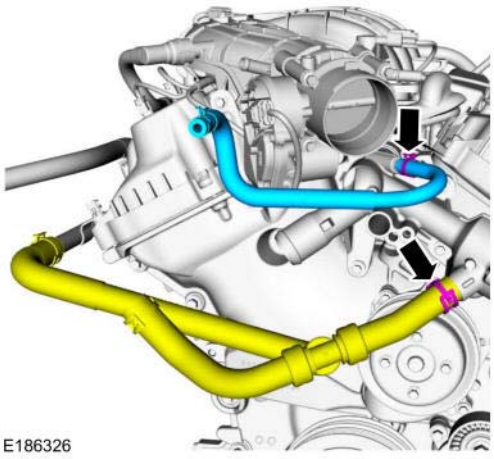
156.

Position the coolant hose and install clamp.

Use the General Equipment: Hose Clamp Remover/Installer

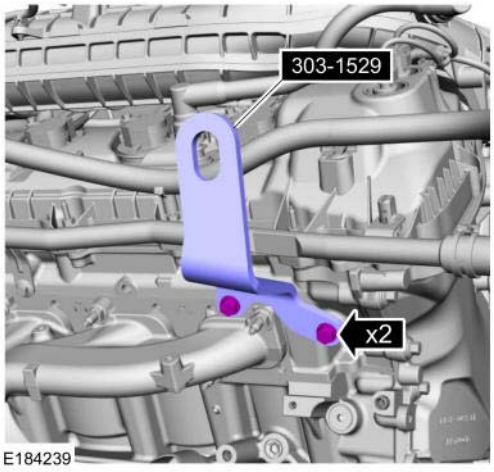
Install the coolant return hose and the clamp.

Use the General Equipment: Hose Clamp Remover/Installer



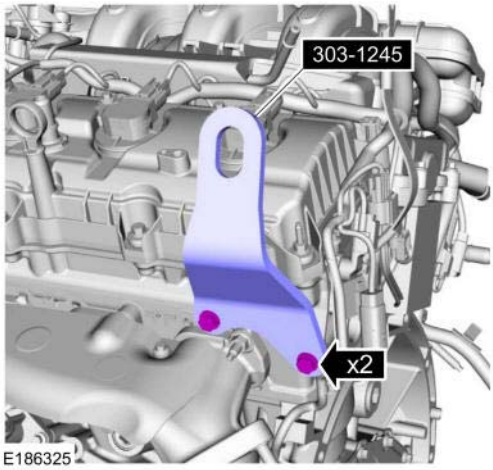
157.

Install Special Service Tool: 303-1529 Lift Eye, Engine.



158.

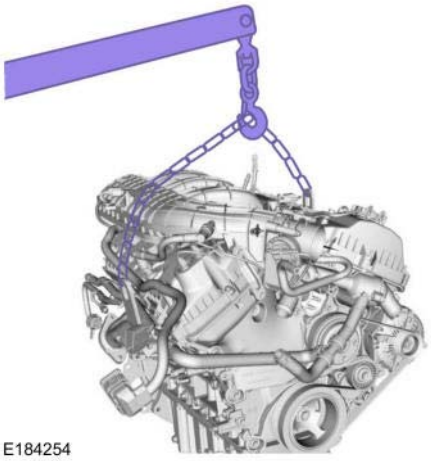
Install Special Service Tool: 303-1245 Engine Lift Eye.



159.

Install the floor crane.

Use the General Equipment: Floor Crane



160.

Install a ratchet strap from the front of engine to the chain to keep the engine level.

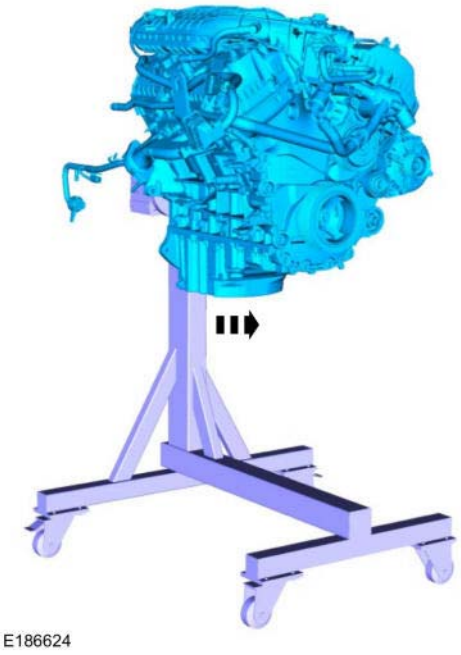
Use the General Equipment: Floor Crane



161.

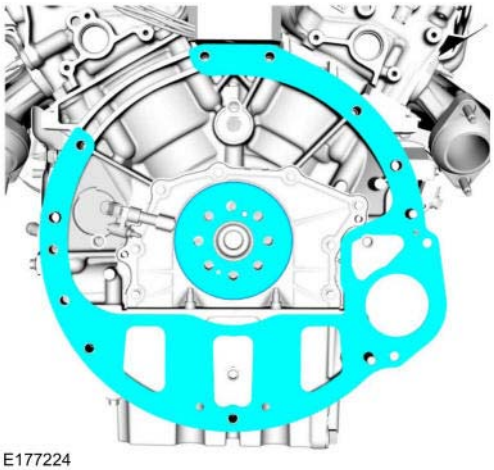
Remove the engine from the mounting stand.

Use the General Equipment: Mounting Stand



162.

Install the crankshaft sensor ring and the engine-to-transmission spacer plate.


E177224

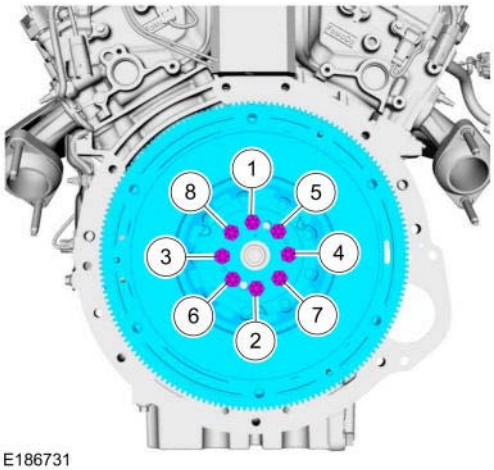
6-Speed Manual Transmission - MT82

> *NOTE: The dual mass flywheel has 7 degrees (3.25 ring gear teeth) of freeplay in the clockwise and counter clockwise direction, this is normal between the primary part of the flywheel (bolts-to-crankshaft) and the secondary part of the flywheel (clutch-to-ring gear).*

163.
Install the flywheel and the bolts.

Torque

: 59 lb.ft (80 Nm)

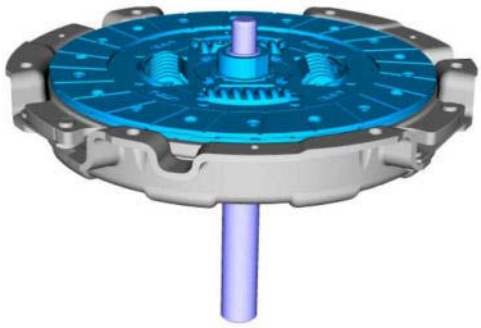


E186731

164.

Using the Clutch Alignment tool, position the clutch disc on the flywheel.

Use the General Equipment: Clutch Alignment Tool



E186732

NOTE: If installing the original pressure plate, align it using the index-marks made during removal or a clutch system vibration can occur.

NOTE: Special bolts are used for installation. Do not use standard bolts. Always install new pressure plate bolts.

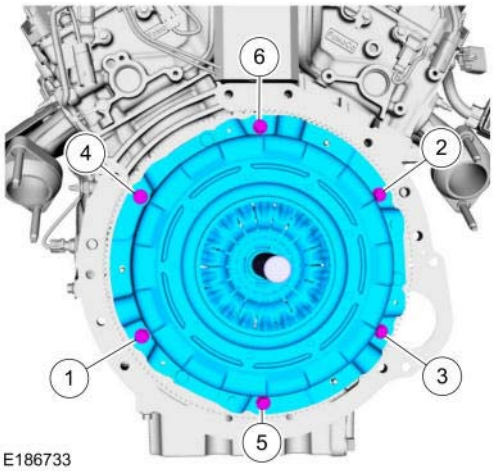
165.
Align the clutch pressure plate on the flywheel and install the clutch pressure plate bolts.

Use the General Equipment: Clutch Alignment Tool

Torque

Stage 1: 46 lb.ft (63 Nm)

Stage 2: 60°



E186733

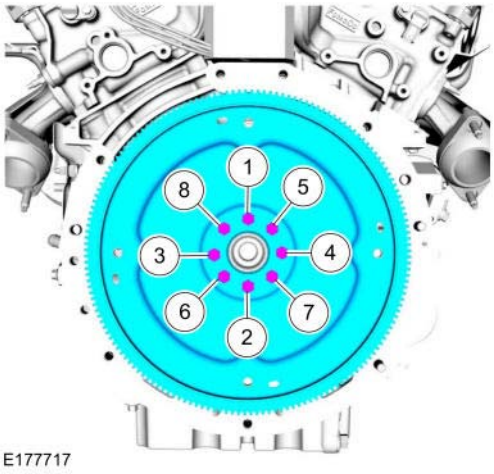
6-Speed Automatic Transmission - 6R80

NOTE: One of the 8 flexplate holes are offset so the flexplate can only be installed in one position.

166.
Install the flexplate and the bolts.

Torque

: 59 lb.ft (80 Nm)



INSTALLATION > ENGINE

Special Tool(s) / General Equipment

	303-1245 Engine Lift Eye TKIT-2006UF-FLM TKIT-2006UF-ROW
	303-1529 Lift Eye, Engine TKIT-2010A-F TKIT-2010A-LM TKIT-2010A-ROW
Floor Crane	
Trolley Jack	
Hose Clamp Remover/Installer	
Wooden Block	

Materials

Name	Specification
Motorcraft® Multi-Purpose Grease Spray XL-5-A	ESB-M1C93-B
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) XO-5W20-QSP (U.S.)	WSS-M2C945-A

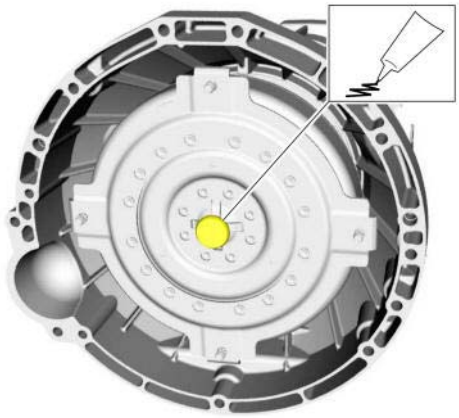
6-Speed Automatic Transmission - 6R80

1.

Lubricate the torque converter pilot hub with multi-purpose grease.

Material

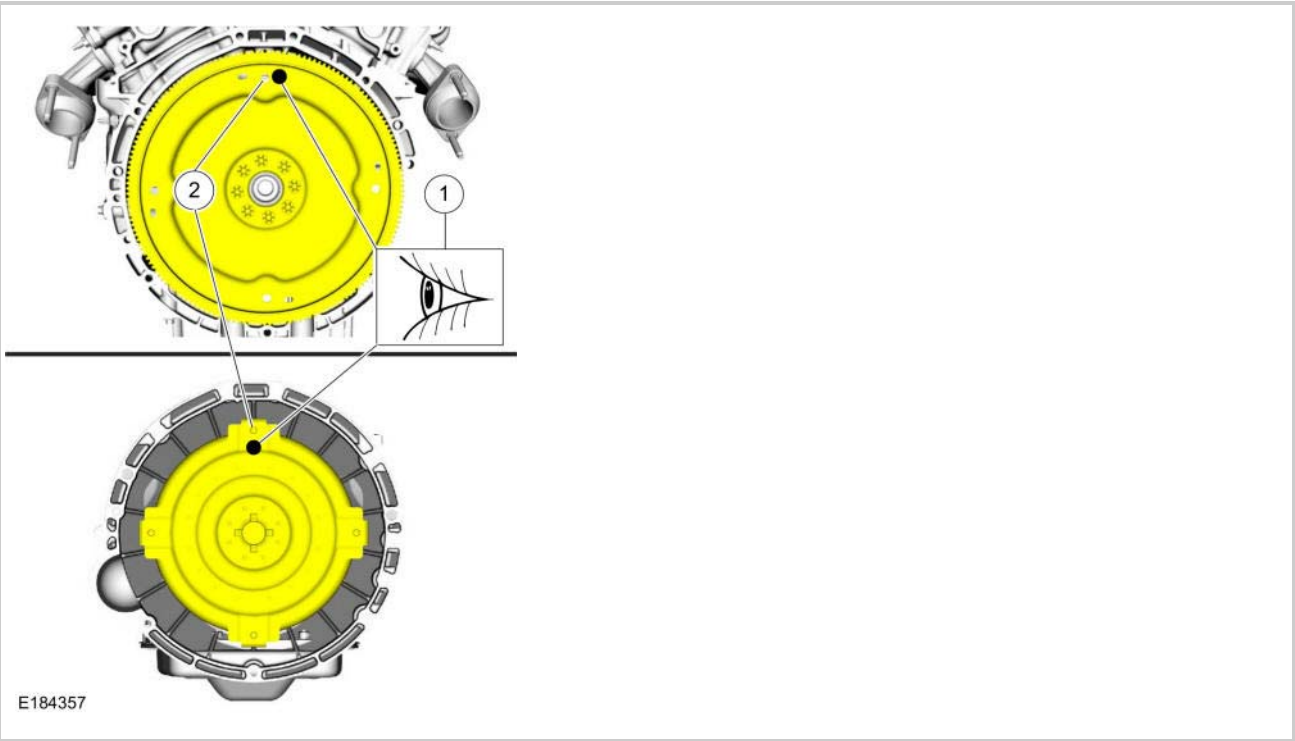
: Motorcraft® Multi-Purpose Grease Spray / XL-5-A (ESB-M1C93-B)



2.

Inspect the torque converter stud and flexplate for paint marks.

Align the torque converter stud and flexplate hole near the paint marks to the 12 o'clock position.



6-Speed Manual Transmission - MT82

3.

Lubricate the input shaft with multi-purpose grease.

Material

: Motorcraft® Multi-Purpose Grease Spray / XL-5-A (ESB-M1C93-B)



6-Speed Automatic Transmission - 6R80/6-Speed Manual Transmission - MT82

4.

Using the floor crane, install the engine.

Use the General Equipment: Floor Crane


E184258

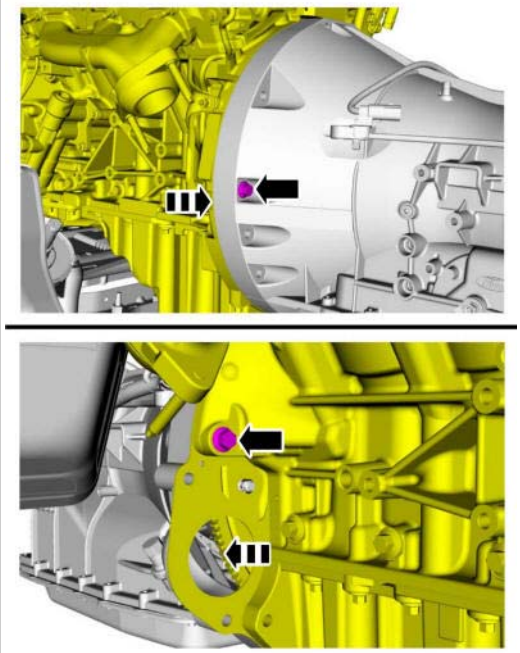
NOTE: When mating engine-to-transmission, make sure RH catalytic converter clears the exhaust manifold studs.

NOTE: Automatic transmission shown in illustration, manual transmission similar.

5.
Draw the engine to the transmission together using the bolts.

Torque

: 35 lb.ft (48 Nm)

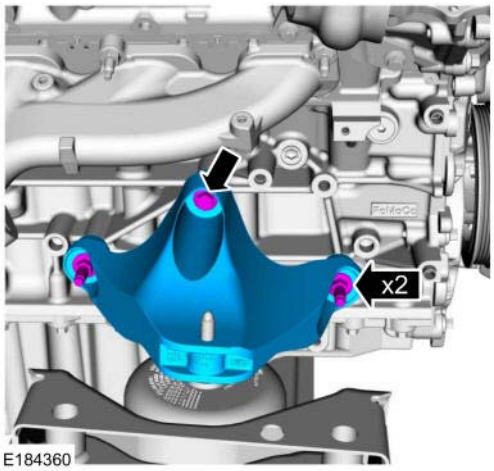

E184359

6.

Install the RH engine mount bracket and the bolts.

Torque

: 41 lb.ft (55 Nm)

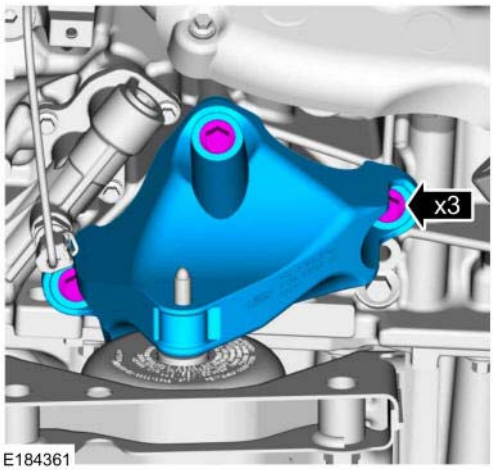


7.

Install the LH engine mount bracket and the bolts.

Torque

: 41 lb.ft (55 Nm)



8.

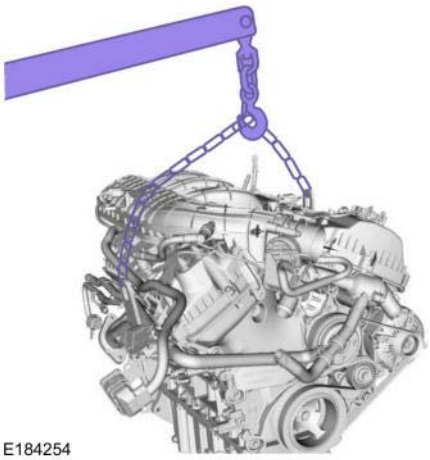
Remove the ratchet strap.



9.

Remove the floor crane.

Use the General Equipment: Floor Crane

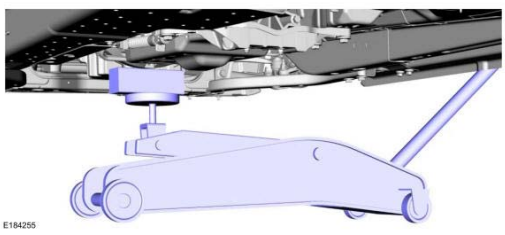


10.

Remove the jack and wooden block.

Use the General Equipment: Wooden Block

Use the General Equipment: Trolley Jack

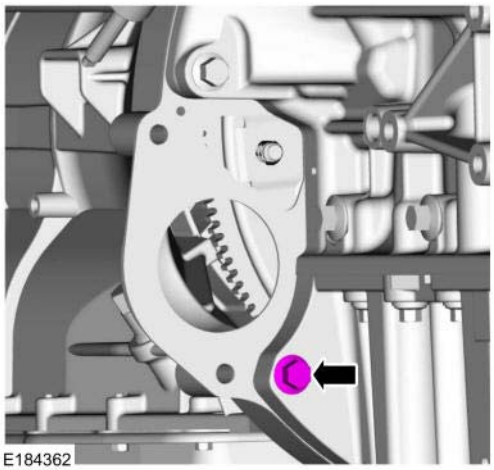


NOTE: Automatic transmission shown in illustration, manual transmission similar.

11.
Install the RH side bellhousing bolt.

Torque

: 35 lb.ft (48 Nm)

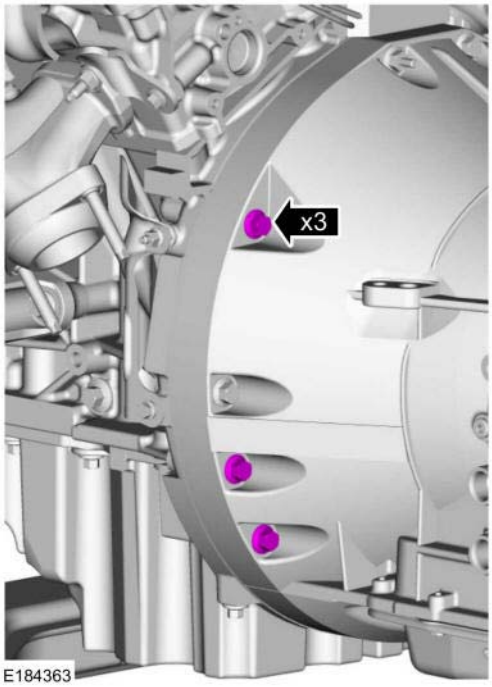


NOTE: Automatic transmission shown in illustration, manual transmission similar.

12.
Install the LH side bellhousing bolts.

Torque

: 35 lb.ft (48 Nm)

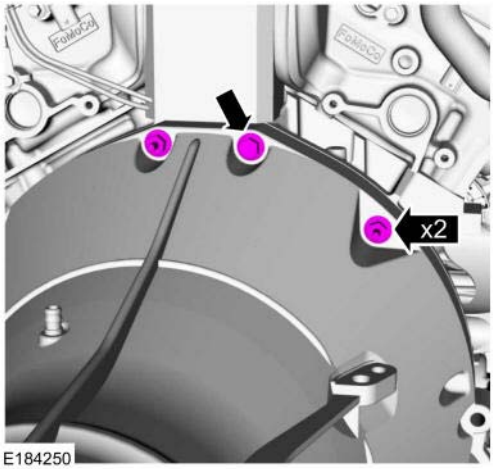


NOTE: Automatic transmission shown in illustration, manual transmission similar.

13.
Install the upper bellhousing bolts.

Torque

: 35 lb.ft (48 Nm)



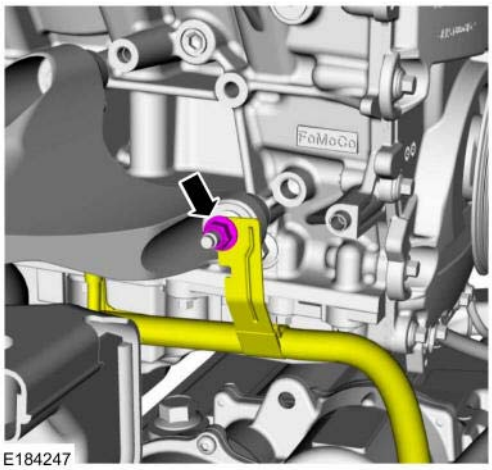
6-Speed Manual Transmission - MT82

14.

Position the bracket for the wiring harness on the RH engine mount bracket stud bolt and install the nut.

Torque

: 35 lb.ft (48 Nm)



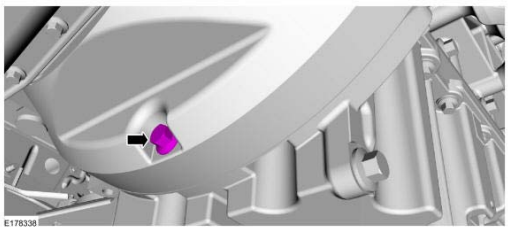
6-Speed Automatic Transmission - 6R80

15.

Install the lower bellhousing bolt.

Torque

: 35 lb.ft (48 Nm)

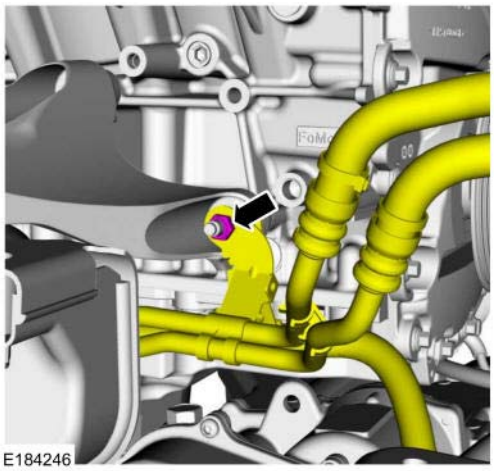


16.

Position the brackets for the transmission cooling tubes and wiring harness on the RH engine mount bracket and install the nut.

Torque

: 35 lb.ft (48 Nm)

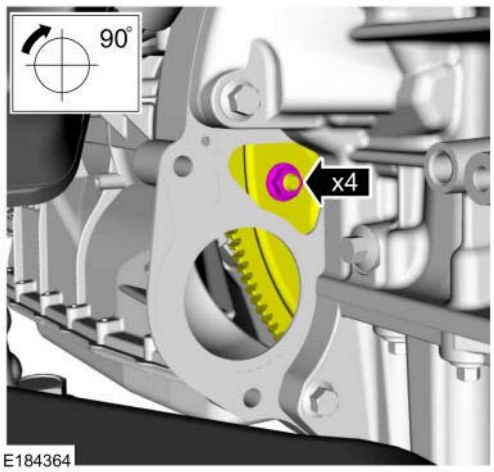


NOTE: Using the crankshaft pulley bolt, turn the engine clockwise.

17.
Install new torque converter nuts.

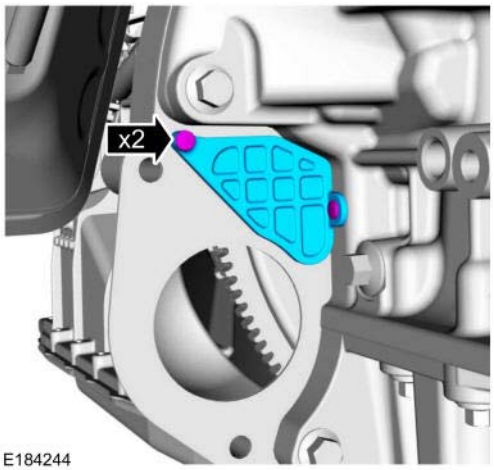
Torque

: 35 lb.ft (48 Nm)



18.

Install the access cover and the retainers.



19.

1.

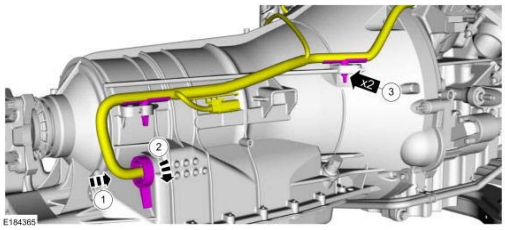
Push the transmission electrical connector in to connect.

2.

Rotate the transmission electrical connector clockwise.

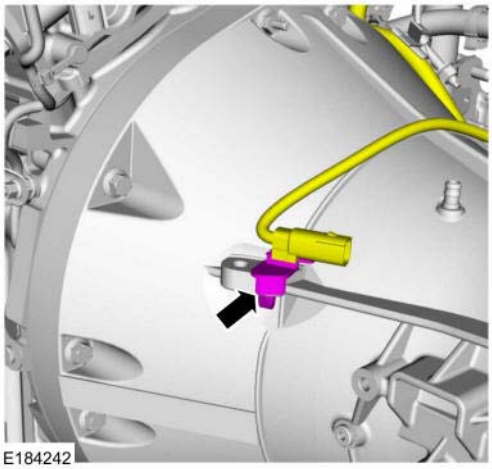
3.

Attach the wiring harness retainers.



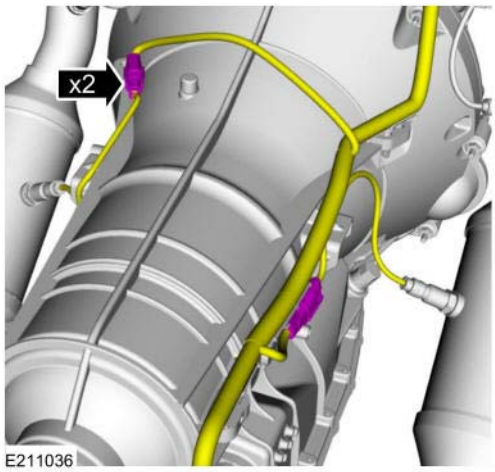
20.

Attach the wiring harness retainer to the LH of the transmission.



21.

Connect the catalyst monitor sensors.



6-Speed Automatic Transmission - 6R80/6-Speed Manual Transmission - MT82

22.

1.

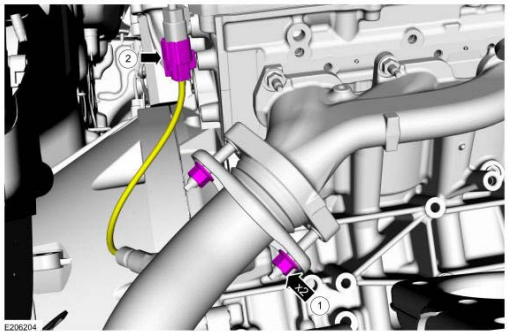
Install the new nuts and remove the support.

Torque

: 30 lb.ft (40 Nm)

2.

Connect the RH HO2S electrical connector.



23.

1.

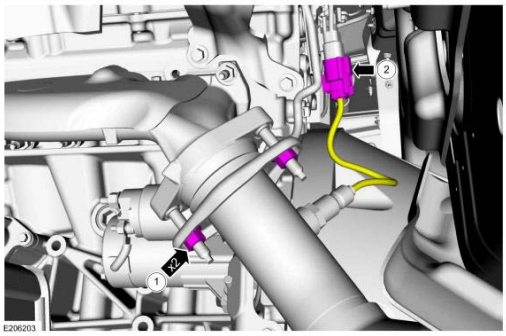
Install the new nuts and remove the support.

Torque

: 30 lb.ft (40 Nm)

2.

Connect the LH HO2S electrical connector.

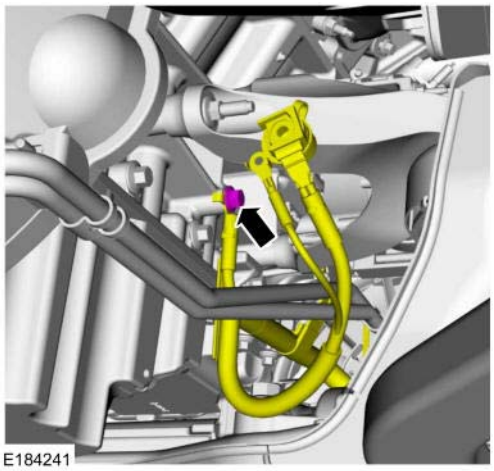


NOTE: Automatic transmission shown in illustration, manual transmission similar.

24.
Install ground wire to the RH side of the engine and install the bolt.

Torque

: 35 lb.ft (48 Nm)



25.

Install the starter motor. Refer to: STARTER MOTOR .

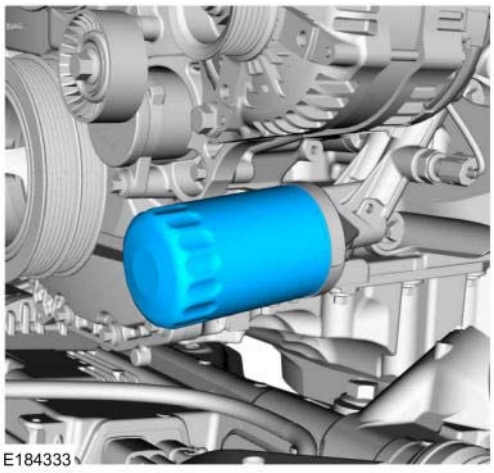
NOTE: Do not lubricate the engine oil filter gasket.

26.
Install a new engine oil filter.

Torque:

Stage 1: 44 lb.in (5 Nm)

Stage 2: 180°



NOTE: Vehicles are equipped with either an underbody shield or a subframe bracket and underbody shield assembly.

27.

1.

Install the underbody shield and the bolts.

Torque:

A: 97 lb.in (11 Nm)

B: 18 lb.in (2 Nm)

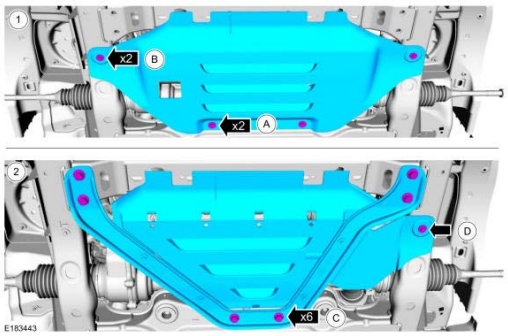
2.

Install the subframe bracket and underbody shield assembly and the bolts.

Torque:

C: 46 lb.ft (63 Nm)

D: 18 lb.in (2 Nm)



28.

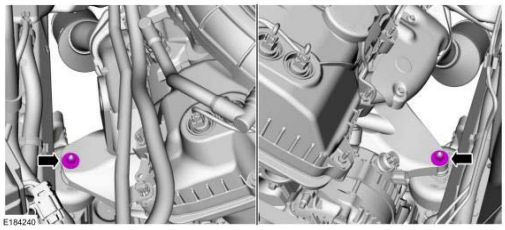
Install the front wheels and tires. Refer to: Wheel and Tire .

29.

Install the RH and LH engine mount bracket nuts.

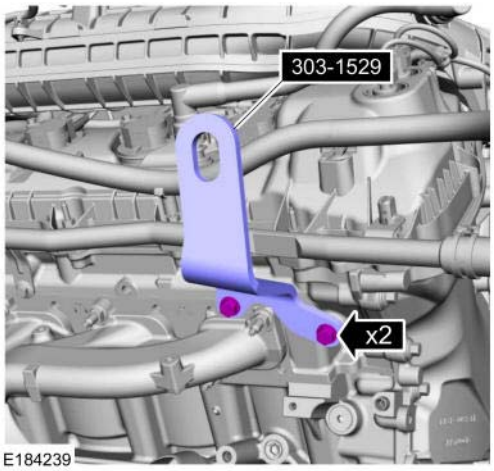
Torque

: 46 lb.ft (63 Nm)



30.

Remove Special Service Tool: 303-1529 Lift Eye, Engine.

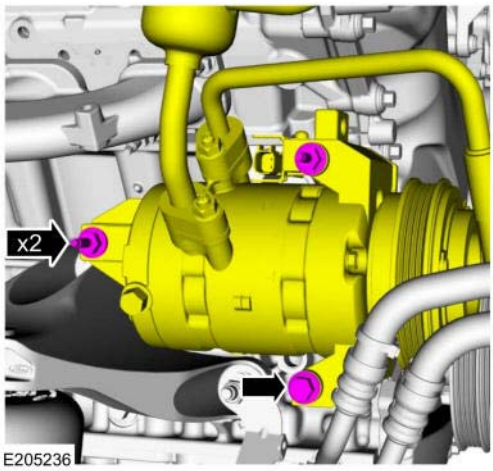


31.

Position the A/C compressor and install the stud bolts and bolt.

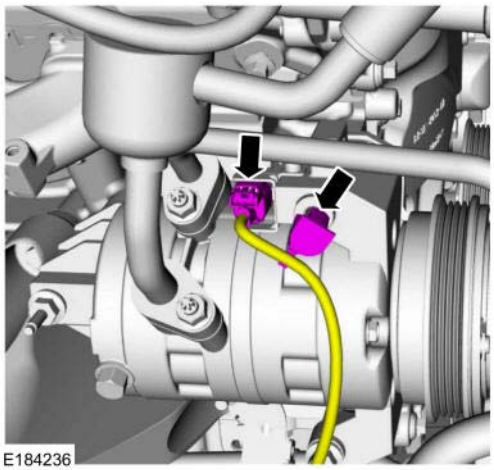
Torque

: 18 lb.ft (25 Nm)



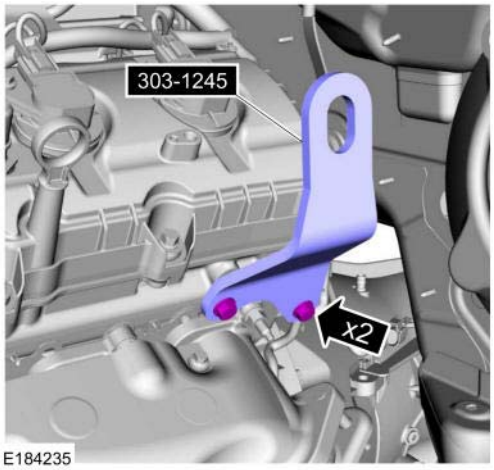
32.

Connect the A/C compressor electrical connector and the wire harness retainer.



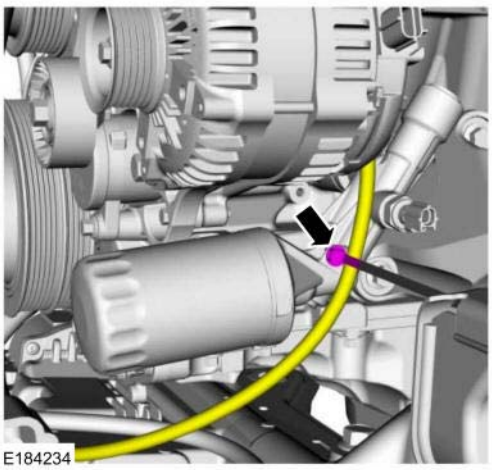
33.

Remove Special Service Tool: 303-1245 Engine Lift Eye.



34.

Attach the generator wiring harness retainer to the oil filter adapter.



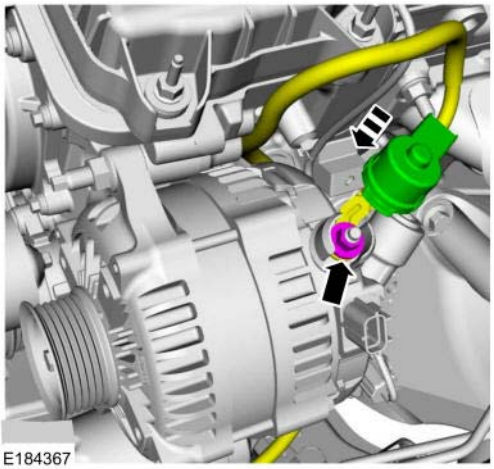
35.

Install the generator B+ cable and the nut.

Torque

: 142 lb.in (16 Nm)

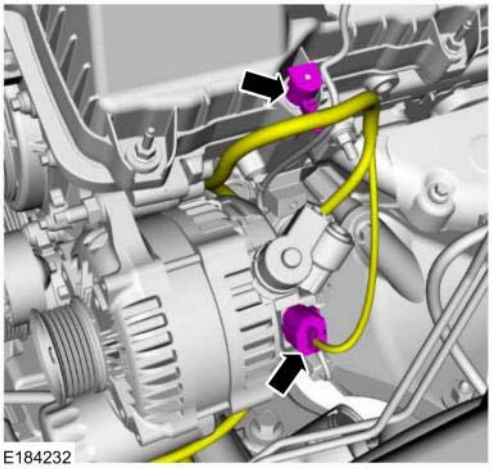
Position the protective cover.



36.

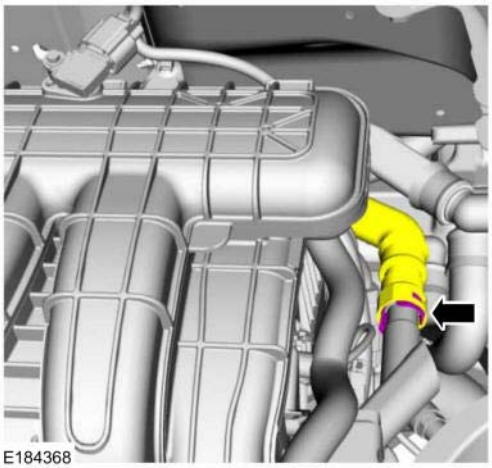
Connect the generator electrical connector.

Attach the wire harness retainer to the valve cover stud bolt.



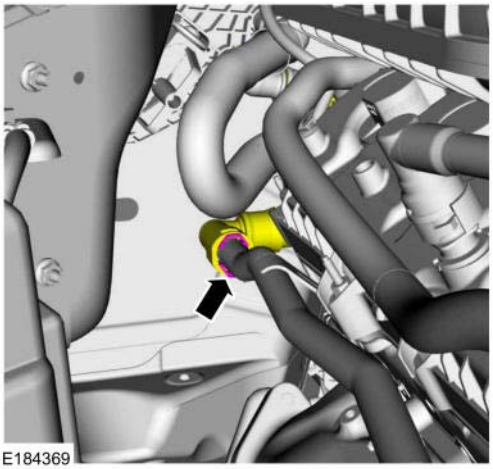
37.

Connect the heater hose to the back of the lower intake manifold.



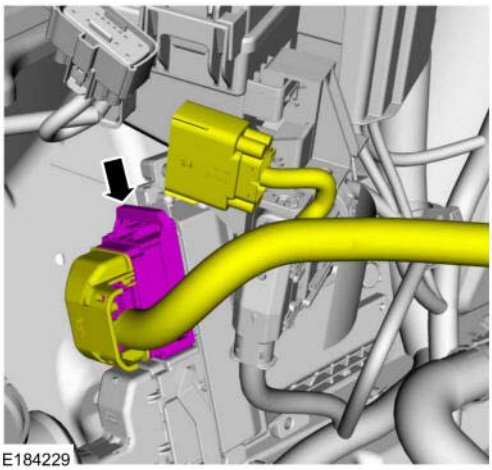
38.

Connect the heater hose to the coolant tube.



39.

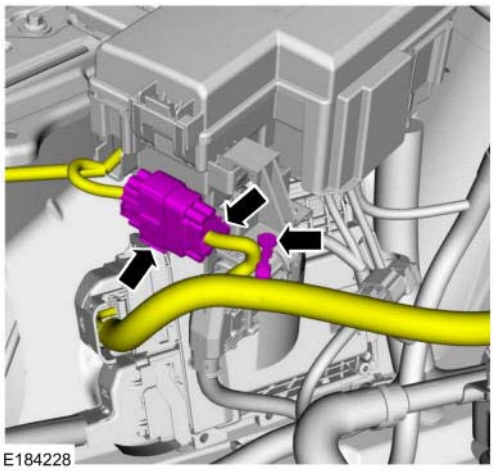
Connect the upper PCM electrical connector.



40.

Attach the wiring harness retainer.

Connect and attach the engine harness electrical connector.

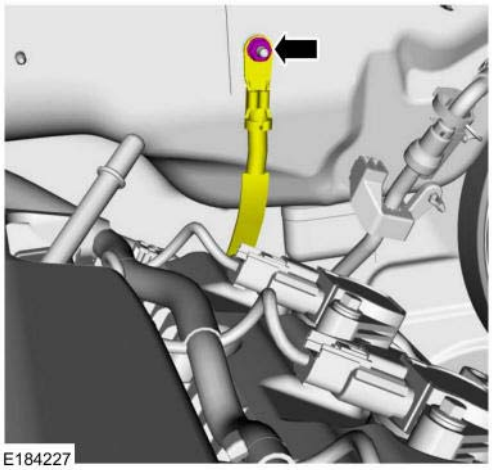


41.

Install the ground strap and the nut to the cowl.

Torque

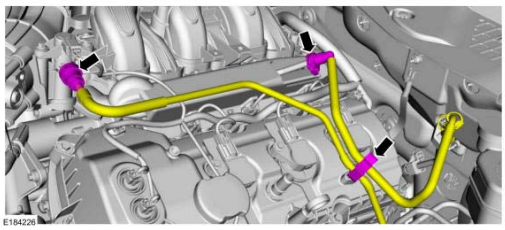
: 80 lb.in (9 Nm)



42.

Position and install the retainer to the LH valve cover.

Connect the fuel tube and EVAP purge valve quick release coupling. Refer to: QUICK RELEASE COUPLING .



43.

1.

Connect the vacuum hose to the upper intake manifold.

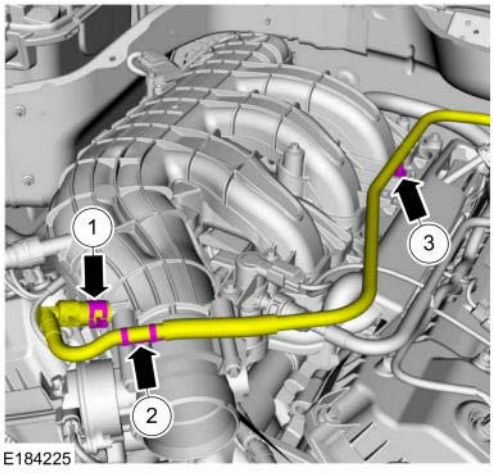
Use the General Equipment: Hose Clamp Remover/Installer

2.

Attach the vacuum hose retainer to the throttle body.

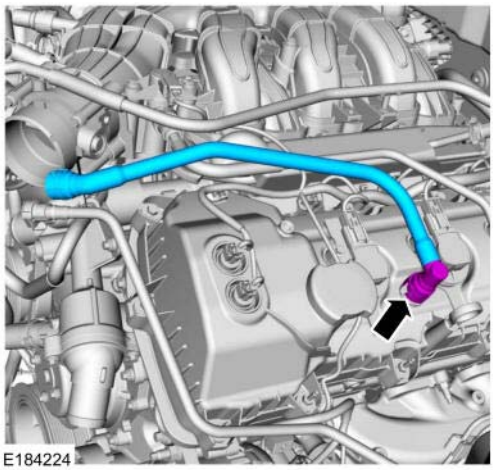
3.

Attach the vacuum hose retainer to the intake manifold.



44.

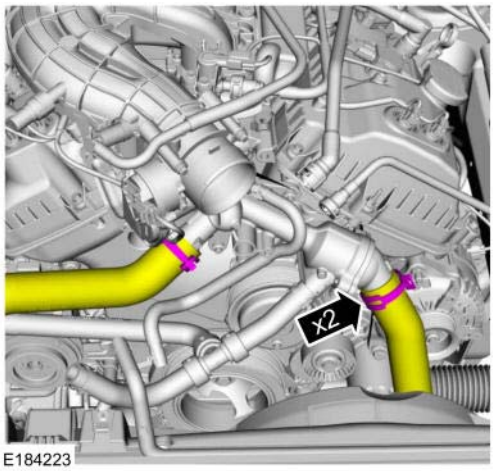
Install the crankcase vent tube.



45.

Connect the upper and lower radiator hoses to the thermostat housing.

Use the General Equipment: Hose Clamp Remover/Installer



46.

Install the following items:

Refer to: AIR CONDITIONING (A C) COMPRESSOR BELT .

Refer to: AIR CLEANER - 3.7L Duratec (227kW/301PS).

Refer to: AIR CLEANER OUTLET PIPE .

Refer to: DEGAS BOTTLE .

Convertible

47.

Install the cowl extension and the bolts.

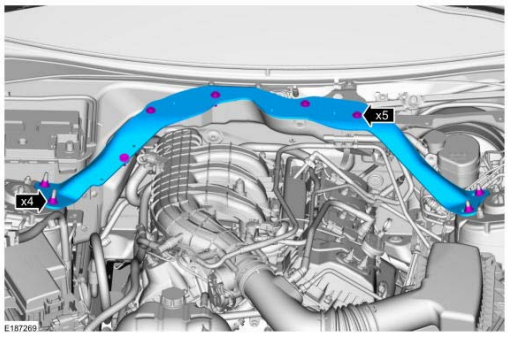
Torque

: 26 lb.ft (35 Nm)

Install the cowl extension nuts.

Torque

: 41 lb.ft (55 Nm)

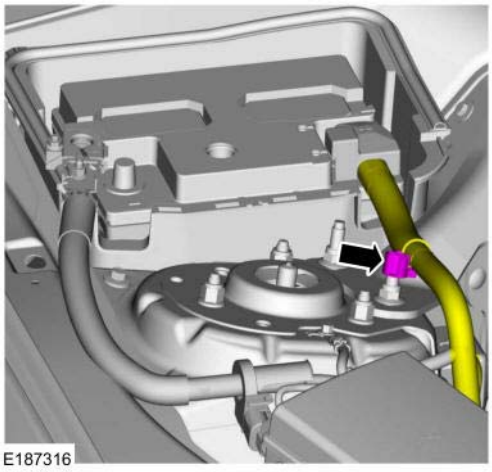


48.

Connect the positive battery cable. Refer to: Battery Disconnect and Connect .

49.

Attach the battery cable retainer.



50.

Install the cowl panel grille. Refer to: Cowl Panel Grille .

6-Speed Automatic Transmission - 6R80/6-Speed Manual Transmission - MT82

51.

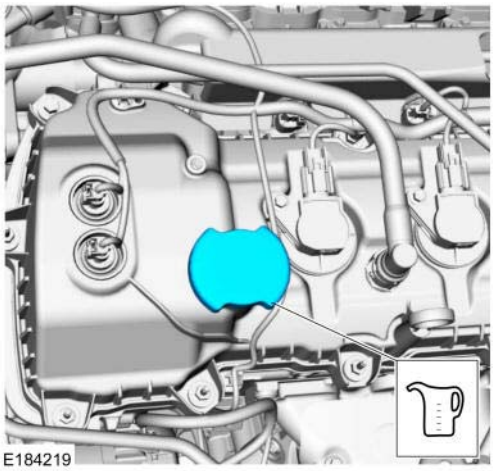
Connect the battery ground. Refer to: Battery Disconnect and Connect .

52.

Fill the engine with clean engine oil. Refer to: Specifications .

Material

: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W20-QSP (U.S.) (WSS-M2C945-A)



53.

Fill the cooling system. Refer to: COOLING SYSTEM DRAINING AND VACUUM FILLING .

NOTE: Use the index-mark for location to aid in hood installation.

54.
Install the hood and the 4 nuts.

Torque

: 17 lb.ft (23 Nm)



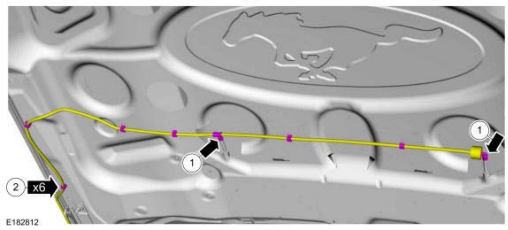
55.

1.

Connect the windshield washer hose C-Lock Couplers. Refer to: Washer Hose Coupling .

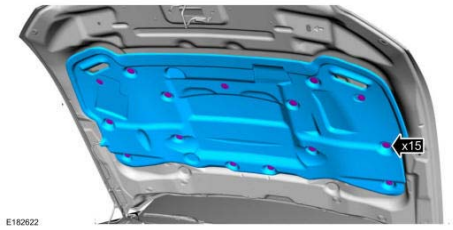
2.

Attach the windshield washer hose retainers.



56.

Install the hood insulation and the pin-type retainers.



57.

Start and check the exhaust system for leaks.

58.

After completing the repairs, perform the Misfire Monitor Neutral Profile Correction procedure using a diagnostic scan tool.

SPECIFICATIONS > SPECIFICATIONS

ENGINE

Item	Specification
Displacement	4.957 L (302 CID)
No. of cylinders	8
Bore	92.2 mm (3.629 in)
Stroke	92.7 mm (3.649 in)
Firing order	1-5-4-8-6-3-7-2
Spark plug	12405
Spark plug gap	1.25-1.35 mm (0.049-0.053 in)
Compression ratio	11.0:1
Engine weight (without accessory drive components)	431.0lb (195.5kg)

LUBRICANTS

Item	Specification
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (US); Motorcraft® SAE 5W-20 Super Premium Motor Oil (Canada)	XO-5W20-QSP (US); CXO-5W20-LSP12 (Canada)

ENGINE OIL CAPACITY

Item	Specification
Service fill including oil filter	8.0qt (7.6L)

OIL PRESSURE

Item	Specification
Oil pressure @ idle with engine at normal operating temperature	10-15psi (69-103kPa)
Oil pressure @ 2, 000 rpm with engine at normal operating temperature	30-40psi (207-276kPa)

CYLINDER HEAD AND VALVE TRAIN

Item	Specification
Combustion chamber volume	3.33-3.51in^3 (54.5-57.5cm^3)
Valve stem diameter - intake	0.2368-0.2380in (6.015-6.044mm)
Valve stem diameter - exhaust	0.2368-0.2380in (6.015-6.044mm)
Valve stem-to-guide clearance - intake	0.0008-0.0027in (.02-.069mm)
Valve stem-to-guide clearance - exhaust	0.0018-0.0037in (.045-.094mm)
Valve head diameter - intake	1.46in (37mm)
Valve head diameter - exhaust	1.22in (31mm)
Valve face runout	0.0020in (.05mm)
Valve face angle	3 angle
Valve seat width - intake	0.051-0.059in (1.3-1.5mm)
Valve seat width - exhaust	0.055-0.063in (1.4-1.6mm)
Valve seat runout	0.0016in (.04mm)
Valve seat angle	121/91/61 degrees
Valve spring free length - intake	2.020in (51.32mm)
Valve spring free length - exhaust	2.020in (51.32mm)
Valve spring perpendicularity - intake	0.118in (3mm)
Valve spring perpendicularity - exhaust	0.118in (3mm)
Valve spring compression force - intake	650 N
Valve spring compression force - exhaust	650 N
Valve spring installed height - intake	1.5748in (40mm)
Valve spring installed height - exhaust	1.5748in (40mm)
Valve spring installed force - intake	265 N
Valve spring installed force - exhaust	265 N
Roller follower ratio	2:1
Cylinder head gasket surface flatness	0.025 mm (0.001 in) in any 25 mm (1 in) x 25 mm (1 in) area; 0.050 mm (0.002 in) in any 150 mm (6 in) x 150 mm (6 in) area; 0.1 mm (0.004 in) overall

HYDRAULIC LASH ADJUSTER

Item	Specification
Diameter - intake	0.472in (12mm)

Diameter - exhaust	0.472in (12mm)
Clearance-to-bore	0.0007-0.0020in (.018-.05mm)
Hydraulic leakdown rate - intake	0.45-3 seconds a
Hydraulic leakdown rate - exhaust	0.45-3 seconds a
Collapsed lash adjuster gap	0.0138-0.0335in (.35-.85mm)

CAMSHAFT

Item	Specification
Lobe lift - intake	0.2348in (5.963mm)
Lobe lift - exhaust	0.2161in (5.488mm)
Journal diameter	1.1268in (28.62mm)
Journal bore inside diameter	1.1292-1.1282in (28.682-28.657mm)
Journal-to-bearing clearance	0.0010-0.0030in (.025-.075mm)
Runout	0.0016in (.04mm)
End play	0.0059in (.15mm)

CYLINDER BLOCK

Item	Specification
Cylinder bore diameter	3.6299-3.6307in (92.2-92.22mm)
Cylinder bore maximum taper	0.0005in (.013mm)
Cylinder bore maximum out-of-round	0.0004in (.01mm)
Main bearing bore inside diameter	2.850-2.851in (72.4-72.424mm)
Head gasket surface flatness	0.0254 mm (0.001 in) across any 38.1 mm (1.5 in) square

CRANKSHAFT

Item	Specification
Main bearing journal diameter	2.657-2.658in (67.481-67.505mm)
Main bearing journal maximum taper	0.0002in (.004mm)
Main bearing journal maximum out-of-round	0.0002in (.006mm)
Main bearing journal-to-main bearing clearance	0.0010-0.0018in (.025-.045mm)
Connecting rod journal diameter	2.086-2.087in (52.983-53.003mm)

Connecting rod journal maximum taper	0.0002in (.004mm)
Connecting rod journal maximum out-of-round	0.0002in (.006mm)
Crankshaft maximum end play	0.0110in (.28mm)

PISTON AND CONNECTING ROD

Item	Specification
Piston diameter - single grade	3.6284-3.6289in (92.161-92.175mm)
Piston-to-cylinder bore clearance (at grade size) b	0.0010-0.0023in (.025-.059mm)
Piston ring end gap - top	0.0059-0.0098in (.15-.25mm)
Piston ring end gap - intermediate	0.0118-0.0217in (.3-.55mm)
Piston ring end gap - oil control	0.0059-0.0177in (.15-.45mm)
Piston ring groove width - top	0.0480-0.0492in (1.22-1.25mm)
Piston ring groove width - intermediate	0.0480-0.0488in (1.22-1.24mm)
Piston ring groove width- oil control	0.0996-0.1004in (2.53-2.55mm)
Piston ring width - top	0.0461-0.0469in (1.17-1.19mm)
Piston ring width - intermediate	0.0461-0.0469in (1.17-1.19mm)
Piston ring-to-groove clearance - top	0.0012-0.0031in (.03-.08mm)
Piston ring-to-groove clearance - intermediate	0.0012-0.0028in (.03-.07mm)
Piston pin bore diameter	0.8663-0.8665in (22.004-22.01mm)
Piston pin diameter	0.8660-0.8661in (21.997-22mm)
Piston pin length	2.390-2.402in (60.7-61mm)
Piston pin-to-piston fit (clearance)	0.0002-0.0005in (.004-.013mm)
Connecting rod-to-pin clearance	0.0001-0.0007in (.003-.018mm)
Connecting rod pin bore diameter	0.8663-0.8667in (22.003-22.015mm)
Connecting rod length (center-to-center)	5.93in (150.7mm)
Connecting rod maximum allowed bend	0.0015in (.038mm)
Connecting rod maximum allowed twist	0.0020in (.05mm)
Connecting rod bearing-to-crankshaft clearance	0.0011-0.0027in (.028-.069mm)
Connecting rod side clearance (as assembled to crank) - standard play	0.0128in (.325mm)
Connecting rod side clearance (as assembled to crank) - max. play	0.0197in (.5mm)

a. Time required for the plunger to leak down 1.6 mm of travel with 222 N force and leakdown fluid

in the lash adjuster

b. Before Grafal coating.

DESCRIPTION AND OPERATION > ENGINE - OVERVIEW > OVERVIEW

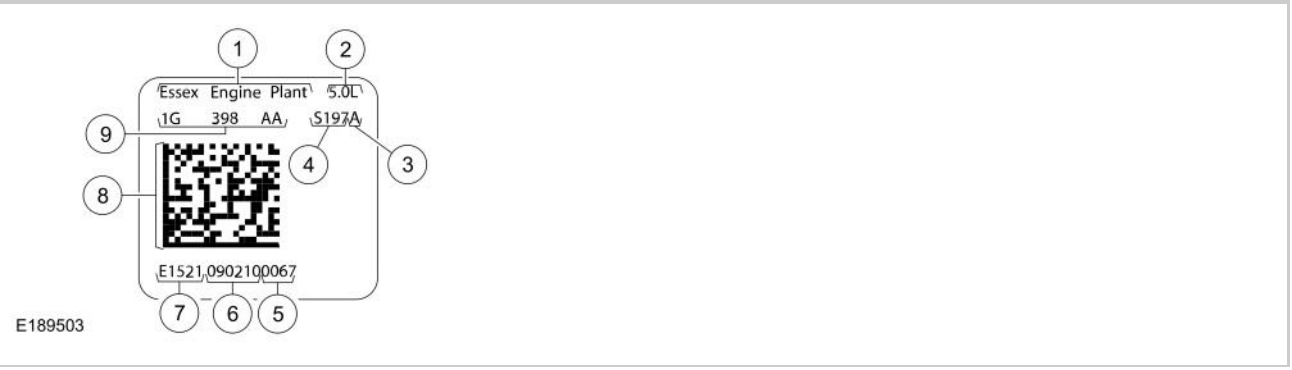
The 5.0L (302 CID) is a V-8 engine with the following features:

- Dual overhead camshafts
- Four valves per cylinder
- SFI
- Aluminum cylinder heads
- Aluminum, 90-degree V-cylinder block
- Twin independent VCT system
- Individually chain-driven camshafts with a hydraulic timing chain tensioner on each timing chain
- Electronic ignition system with 8 ignition coils

Engine Identification

Always refer to these labels when installation of new parts is necessary or when checking engine calibrations. The engine parts often differ within a CID family. Verification of the identification codes will make sure the correct parts are obtained. The codes contain all the pertinent information relating to the dates, optional equipment and revisions.

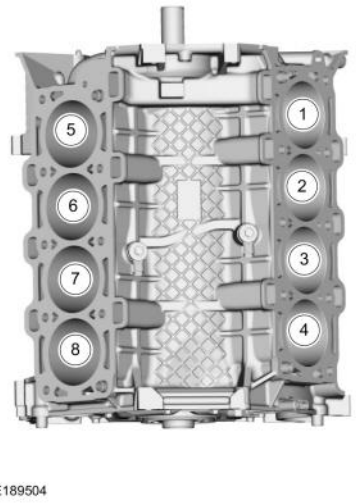
Engine Code Information Label



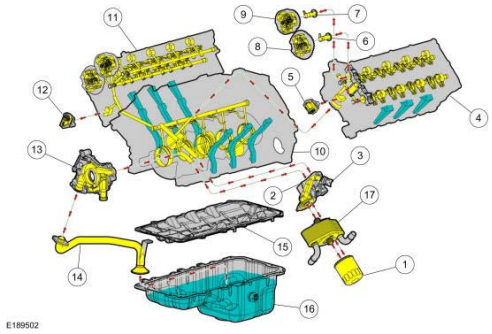
Item	Description
1	Essex engine plant
2	Engine displacement
3	Transmission
4	Vehicle line
5	Sequential number

6	Engine build date (DDMMYY)
7	Essex engine plant
8	Bar code
9	Engine part number

Engine Cylinder Identification



Engine Oil Flow Illustration



Item	Description
1	Oil filter
2	Oil filter adapter
3	EOP switch
4	Cylinder head - LH
5	Timing chain tensioner - LH
6	Exhaust camshaft
7	Intake camshaft

8	Exhaust VCT unit
9	Intake VCT unit
10	Cylinder block
11	Cylinder head - RH
12	Timing chain tensioner - RH
13	Oil pump
14	Oil pump screen and pickup tube
15	Oil pan baffle and gasket
16	Oil pan
17	Oil Cooler

Lubrication System

The engine lubrication system is of the force-feed type in which oil is supplied under full pressure to the:

- crankshaft main bearings.
- crankshaft thrust main bearing.
- connecting rod bearings.
- oil galleries.

All other parts are lubricated by splash of the oil.

The lubrication system of the 5.0L (4V) engine is designed to provide optimum oil flow to critical components of the engine through its entire operating range. The heart of the system is a positive displacement internal gear oil pump using top seal rotors.

The heart of the system is a positive displacement internal gear oil pump.

Generically, this design is known as a gerotor pump, which operates as follows:

- The oil pump is mounted on the front face of the cylinder block.
- The inner rotor is piloted on the crankshaft post and is driven through flats on the crankshaft.
- System pressure is limited by an integral, internally-vented relief valve which directs the bypassed oil back to the inlet side of the oil pump.
- Oil pump displacement has been selected to provide adequate volume to make sure of correct oil pressure both at hot idle and maximum speed.
- The relief valve calibration protects the system from excessive pressure during high viscosity conditions.
- The relief valve is designed to provide adequate connecting rod bearing lubrication under high-temperature and high-speed conditions.

Valve Train

The valves are actuated by a hydraulic lash adjuster and roller follower. The hydraulic lash adjusters and roller followers:

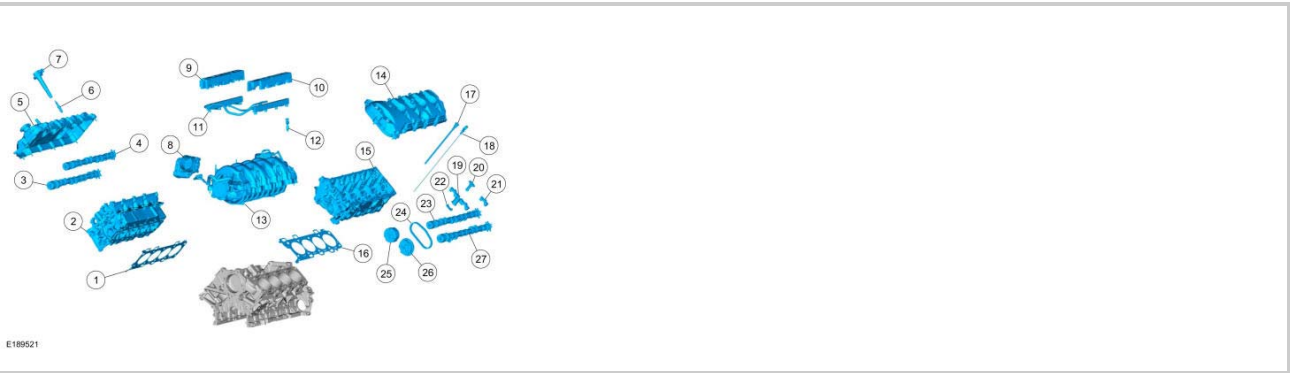
- provide hydraulic lash adjustment.
- ride on the camshaft lobes.

Twin Independent VCT System

The twin independent VCT system allows variable control of the valves which optimizes combustion at full load providing improved power and low speed torque (broadening the torque curve) which enables variable valve overlap which provides better fuel economy and emissions and provides optimized cold start operation with improved exhaust emissions.

DESCRIPTION AND OPERATION > ENGINE COMPONENT VIEW

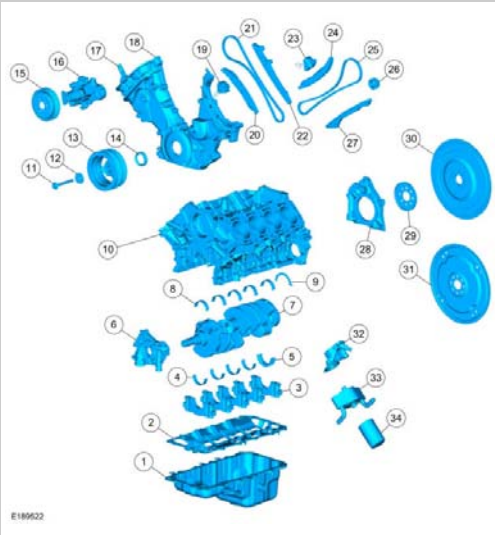
Engine - Upper Components



Item	Part Number	Description
1	6051	RH cylinder head gasket
2	6049	RH cylinder head
3	6250	RH exhaust camshaft
4	6250	RH intake camshaft
5	6582	RH valve cover
6	12405	Spark plug (8 required)
7	12029	Ignition coil on plug (8 required)
8	9F991	Throttle body
9	6P013	RH fuel injector insulator shield
10	6P013	LH fuel injector insulator shield
11	9F792	Fuel rail
12	9F593	Fuel injector (8 required)
13	9424	Intake manifold

14	6582	LH valve cover
15	6049	LH cylinder head
16	6051	LH cylinder head gasket
17	6754	Oil indicator tube
18	6750	Oil indicator
19	-	Camshaft bearing cap (part of 6049) (2 required)
20	6K254	Secondary tensioner (2 required)
21	-	Camshaft bearing cap (part of 6049) (16 required)
22	6K297	Secondary tensioner shoe (2 required)
23	6250	LH intake camshaft
24	6268	Secondary timing chain (2 required)
25	6256	Intake camshaft Variable Camshaft Timing (VCT) (2 required)
26	6256	Exhaust camshaft Variable Camshaft Timing (VCT) (2 required)
27	6250	LH exhaust camshaft

Engine - Lower Components



Item	Part Number	Description
1	6675	Oil pan

2	6C878	Oil pan baffle and gasket
3	-	Crankshaft main bearing cap (part of 6010) (5 required)
4	6A338	Crankshaft lower main bearing (4 required)
5	6A339	Crankshaft lower thrust main bearing
6	6600	Oil pump
7	6303	Crankshaft
8	6333	Crankshaft upper main bearing (5 required)
9	6A341	Thrust washer
10	6010	Cylinder block
11	6A340	Crankshaft pulley bolt
12	N807033	Crankshaft pulley washer
13	6316	Crankshaft pulley
14	6700	Crankshaft front oil seal
15	8509	Coolant pump pulley
16	8501	Coolant pump
17	6B297	Variable Camshaft Timing (VCT) variable force solenoid (4 required)
18	6019	Engine front cover
19	6L266	RH primary timing chain tensioner
20	6K255	RH timing chain tensioner arm
21	6268	RH primary timing chain
22	6M256	RH timing chain guide
23	6L266	LH primary timing chain tensioner
24	6K255	LH timing chain tensioner arm
25	6268	LH primary timing chain
26	6306	Crankshaft sprocket
27	6B274	LH timing chain guide
28	6K318	Crankshaft rear seal retainer plate
29	12A227	Crankshaft sensor ring

30	6375	Flywheel (manual transmission)
31	6375	Flexplate (automatic transmission)
32	6881	Oil filter adapter
33	6A642	Oil cooler
34	6731	Oil filter

DIAGNOSIS AND TESTING > ENGINE

1.

For basic mechanical concerns. REFER to: ENGINE SYSTEM - GENERAL INFORMATION . For driveability concerns. Refer to ENGINE CONTROLS - INTRODUCTION (EXCEPT DIESEL & HYBRID) .

REMOVAL AND INSTALLATION > CAMSHAFT LH

Materials

Name	Specification
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) XO-5W20-QSP (U.S.)	WSS-M2C945-A

REMOVAL AND INSTALLATION > CAMSHAFT LH > REMOVAL

NOTE: During engine repair procedures, cleanliness is extremely important. Any foreign material, including any material created while cleaning gasket surfaces, that enters the oil passages, coolant passages or the oil pan, can cause engine failure.

NOTE: If the RH camshafts are being serviced at the same time as the LH camshafts, remove the RH camshafts first. Refer to the appropriate procedure in this service information.

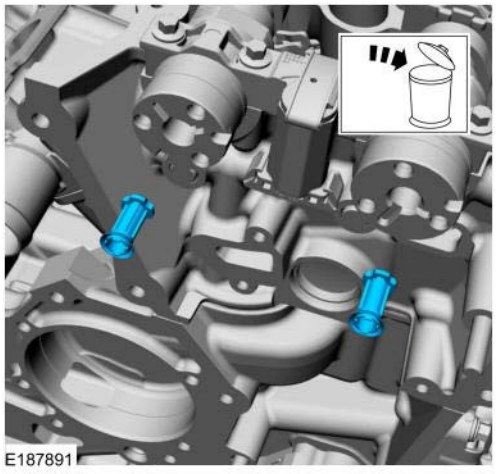
NOTE: If the components are to be reinstalled, they must be installed in their original locations.

1.

Remove the LHVCT units. Refer to: Variable Camshaft Timing (VCT) Unit .

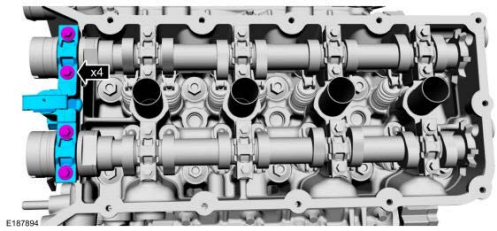
2.

Remove and discard the VCT system oil filters.



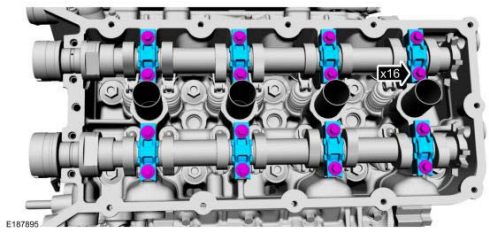
NOTE: The front camshaft bearing mega cap must be removed first and then the remaining camshaft bearing caps. Failure to follow this direction may result in damage to the engine.

3.
Remove the bolts and the front camshaft bearing mega cap.



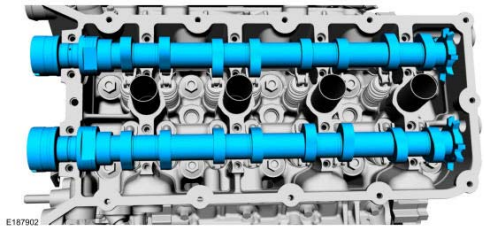
4.

Remove the bolts and the camshaft bearing caps.



5.

Remove the intake and exhaust camshafts.



6.

1.

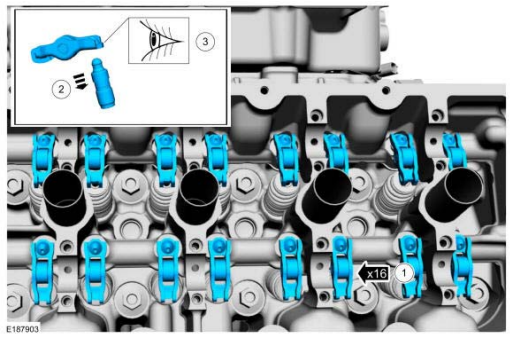
Remove the camshaft roller follower and hydraulic lash adjuster assemblies.

2.

Separate the hydraulic lash adjusters from the spring clips on the camshaft roller followers.

3.

Inspect the hydraulic lash adjuster and roller follower for damage. If any damage is found, inspect the camshaft lobes and valves for damage. Replace damaged components as necessary.



REMOVAL AND INSTALLATION > CAMSHAFT LH > INSTALLATION

NOTE: If the components are to be reinstalled, they must be installed in their original locations.

1.

1.

Assemble the hydraulic lash adjusters onto the spring clips on the camshaft roller followers.

2.

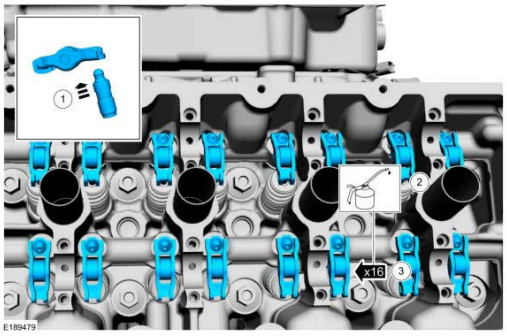
Lubricate the camshaft roller follower and hydraulic lash adjuster assemblies with clean engine oil.

Material

: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W20-QSP (U.S.) (WSS-M2C945-A)

3.

Install the camshaft roller follower and hydraulic lash adjuster assemblies.

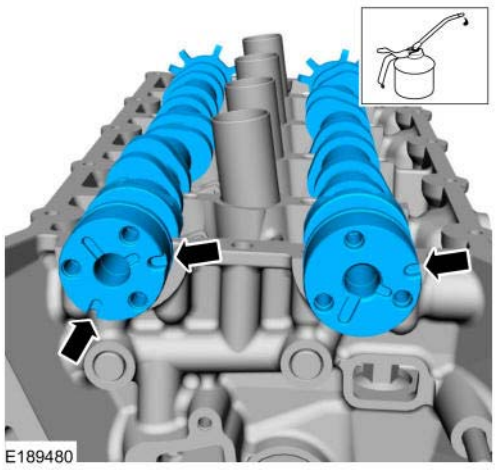


NOTE: Lubricate the camshafts with clean engine oil prior to installation.

2.
Install the intake and exhaust camshafts in the neutral position. Align the D-slots as shown in the illustration.

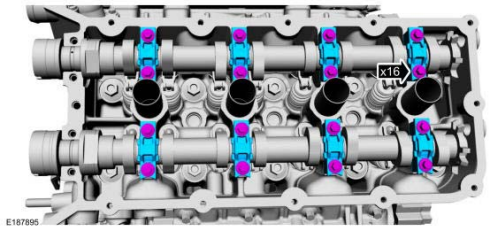
Material

: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W20-QSP (U.S.) (WSS-M2C945-A)



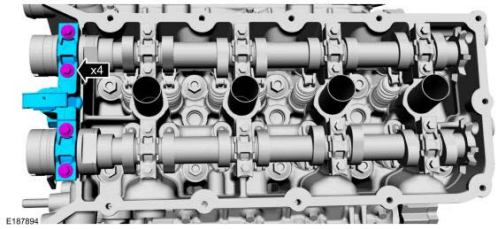
NOTE: Do not tighten at this time.

3.
Install the camshaft bearing caps and the bolts.



NOTE: Do not tighten at this time.

4.
Install the front camshaft bearing mega cap and the bolts.



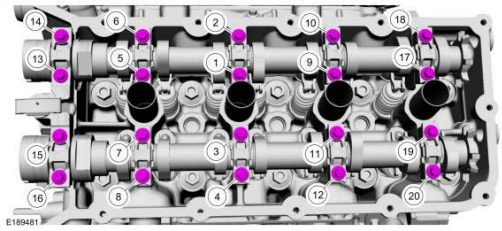
5.

Tighten the bolts.

Torque:

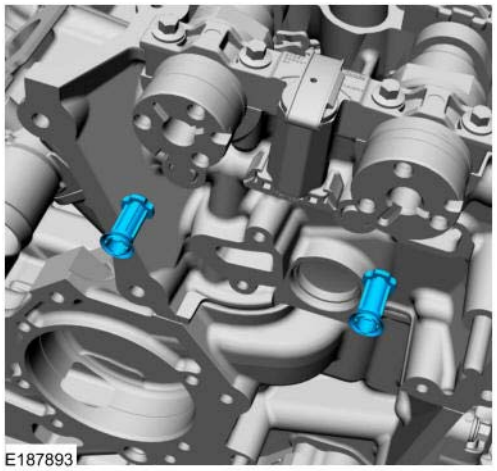
Stage 1: 53 lb.in (6 Nm)

Stage 2: 45°



6.

Install new VCT system oil filters into the camshafts.



7.

Install the LH VCT units. Refer to: Variable Camshaft Timing (VCT) Unit .

REMOVAL AND INSTALLATION > CAMSHAFT RH

Materials

Name	Specification
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) XO-5W20-QSP (U.S.)	WSS-M2C945-A

REMOVAL AND INSTALLATION > CAMSHAFT RH > REMOVAL

NOTE: During engine repair procedures, cleanliness is extremely important. Any foreign material, including any material created while cleaning gasket surfaces, that enters the oil passages, coolant passages or the oil pan, can cause engine failure.

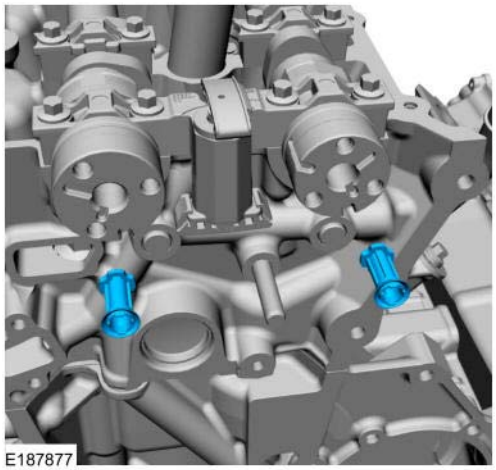
NOTE: If the components are to be reinstalled, they must be installed in their original locations.

1.

Remove the RH VCT units. Refer to: Variable Camshaft Timing (VCT) Unit .

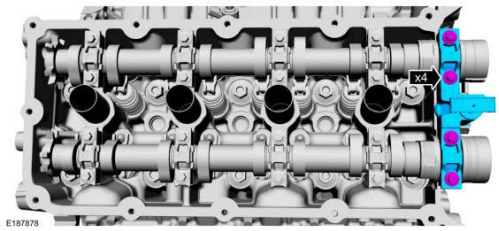
2.

Remove the VCT system oil filters from the camshafts.



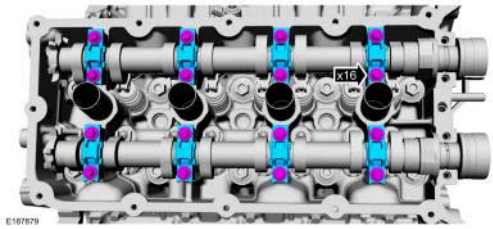
NOTE: The front camshaft bearing mega cap must be removed first and then the remaining camshaft bearing caps. Failure to follow this direction may result in damage to the engine.

3.
Remove the bolts and the front camshaft bearing mega cap.



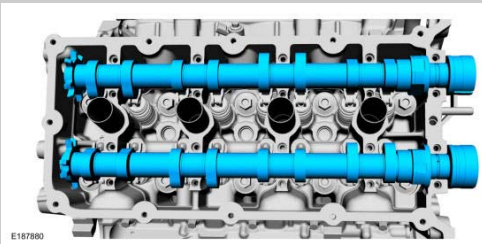
4.

Remove the bolts and the camshaft bearing caps.



5.

Remove the intake and exhaust camshafts.



6.

1.

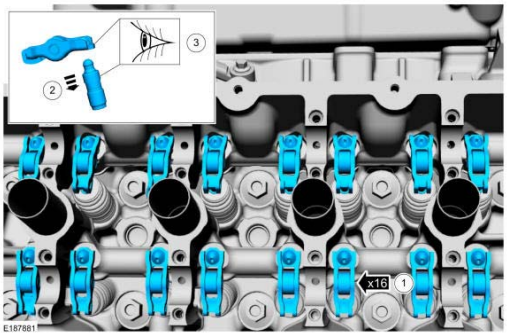
Remove the camshaft roller follower and hydraulic lash adjuster assemblies.

2.

Separate the hydraulic lash adjusters from the spring clips on the camshaft roller followers.

3.

Inspect the hydraulic lash adjuster and roller follower for damage. If any damage is found, inspect the camshaft lobes and valves for damage. Replace damaged components as necessary.



REMOVAL AND INSTALLATION > CAMSHAFT RH > INSTALLATION

NOTE: If the components are to be reinstalled, they must be installed in their original locations.

1.

1.

Assemble the hydraulic lash adjusters onto the spring clips on the camshaft roller followers.

2.

Lubricate the camshaft roller follower and hydraulic lash adjuster assemblies with clean

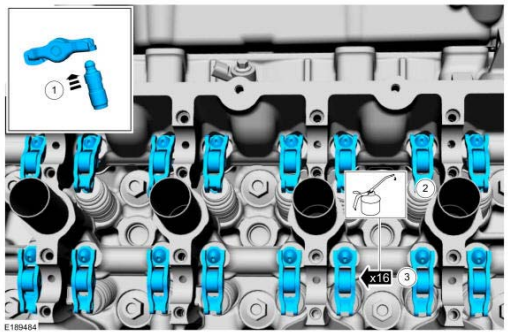
engine oil.

Material

: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W20-QSP (U.S.) (WSS-M2C945-A)

3.

Install the camshaft roller follower and hydraulic lash adjuster assemblies.

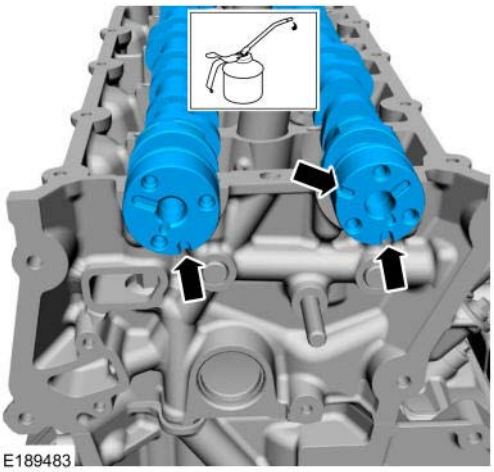


NOTE: Lubricate the camshafts with clean engine oil prior to installation.

2.
Install the intake and exhaust camshafts in the neutral position. Align the D-slots as shown in the illustration.

Material

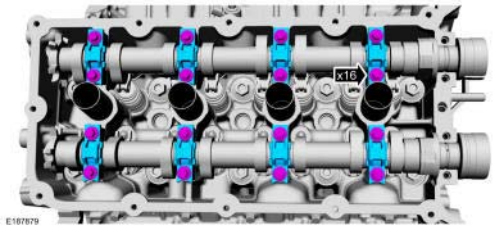
: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W20-QSP (U.S.) (WSS-M2C945-A)



NOTE: Do not tighten at this time.

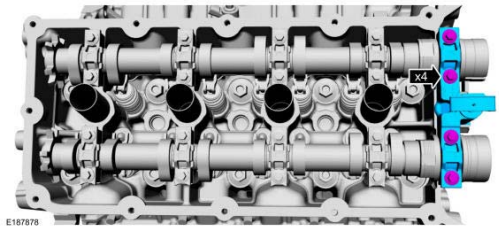
3.

Install the camshaft bearing caps and the bolts.



NOTE: Do not tighten at this time.

4.
Install the front camshaft bearing mega cap and the bolts.



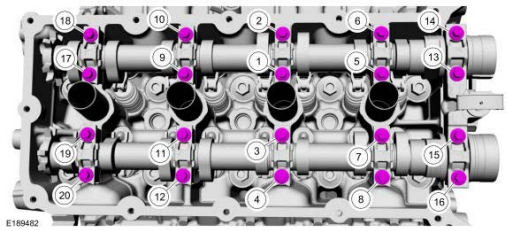
5.

Tighten the bolts.

Torque

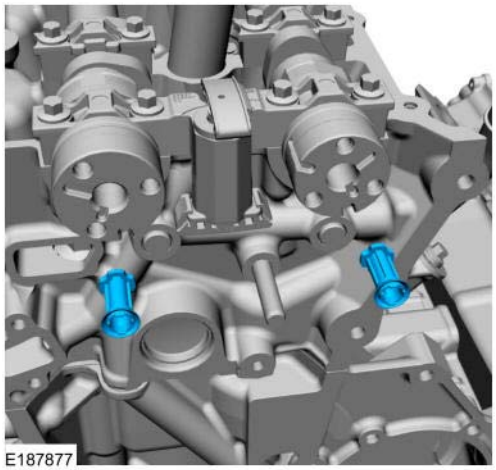
Stage 1: 53 lb.in (6 Nm)

Stage 2: 45°



6.

Install the VCT system oil filters into the camshafts.



7.

Install the RH VCT units. Refer to: Variable Camshaft Timing (VCT) Unit .

REMOVAL AND INSTALLATION > CRANKSHAFT FRONT SEAL

Special Tool(s) / General Equipment

	303-1531 Installer, Front Crank Seal and Damper
	303-335 (T88T-6701-A) Installer, Front Cover Oil Seal TKIT-1988-F TKIT-1988-FLM
	303-409 (T92C-6700-CH) Remover, Crankshaft Seal TKIT-1992-FH/FMH/FLMH TKIT-1993-LMH/MH
Strap Wrench	
Three Leg Puller	

Materials

Name	Specification

Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) XO-5W20-QSP (U.S.)	WSS-M2C945-A
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4

REMOVAL AND INSTALLATION > CRANKSHAFT FRONT SEAL > REMOVAL

1.

Remove the following items:

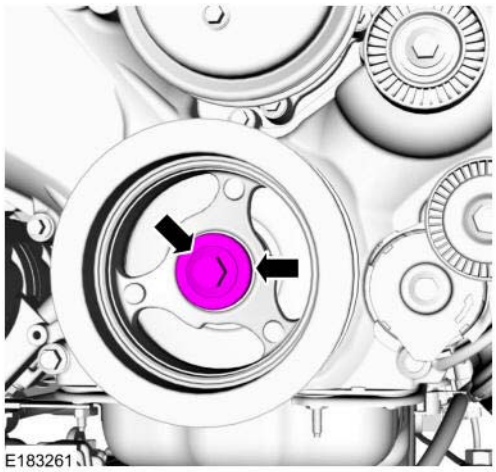
Refer to: COOLING FAN MOTOR AND SHROUD .

Refer to: ACCESSORY DRIVE BELT .

Refer to: AIR CONDITIONING (A C) COMPRESSOR BELT .

2.

Remove the crankshaft pulley bolt and washer.

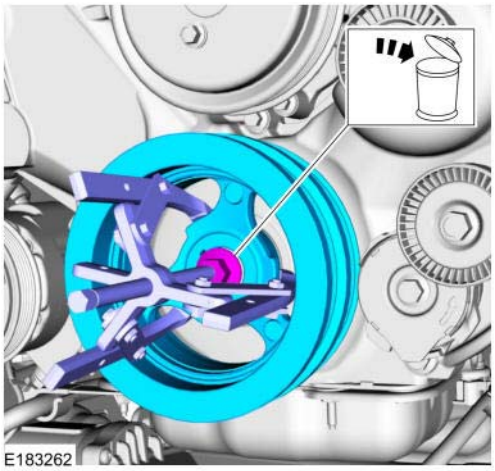


3.

Using the 3 Leg Puller and the crankshaft pulley bolt, remove the crankshaft pulley.

Use the General Equipment: Three Leg Puller

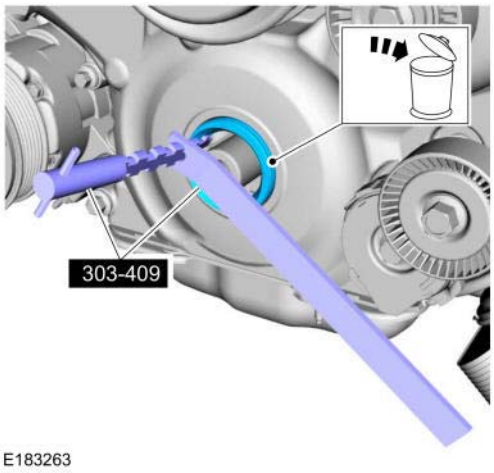
Discard the crankshaft pulley bolt.



NOTE: Use care not to damage the engine front cover or the crankshaft when removing the seal.

4.
Using the special tool, remove and discard the crankshaft front oil seal.

Use Special Service Tool: 303-409 (T92C-6700-CH) Remover, Crankshaft Seal.



REMOVAL AND INSTALLATION > CRANKSHAFT FRONT SEAL > INSTALLATION

1.

Lubricate the engine front cover bore and the crankshaft front oil seal inner lip with clean engine oil.

Material

: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W20-QSP (U.S.) (WSS-M2C945-A)

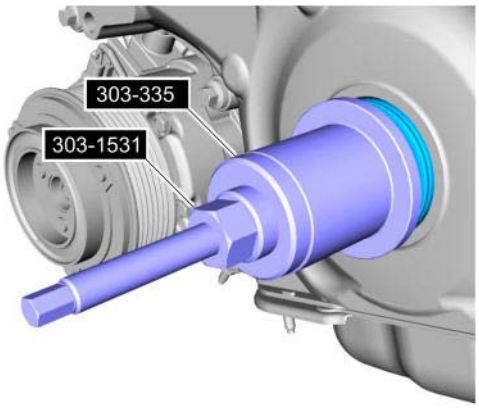


E183264

2.

Using the special tools, install the new crankshaft front oil seal.

Use Special Service Tool: 303-335 (T88T-6701-A) Installer, Front Cover Oil Seal, 303-1531 Installer, Front Crank Seal and Damper.



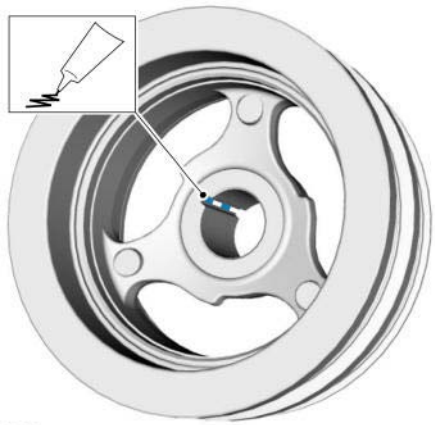
E183265

NOTE: If not secured within 5 minutes, the sealant must be removed and the sealing area cleaned. Failure to follow this procedure can cause future oil leakage.

3.
Apply silicone gasket and sealant to the Woodruff key slot in the crankshaft pulley.

Material

: Silicone Gasket and Sealant / TA-30 (WSE-M4G323-A4)



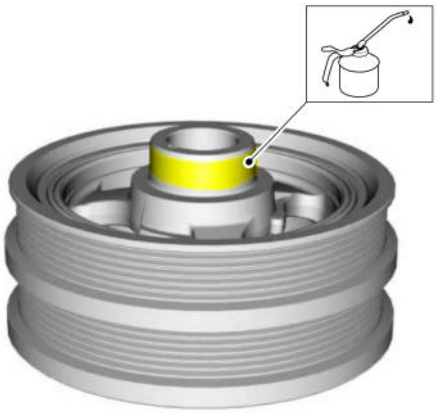
E183266

4.

Lubricate the crankshaft pulley sealing surface with clean engine oil prior to installation.

Material

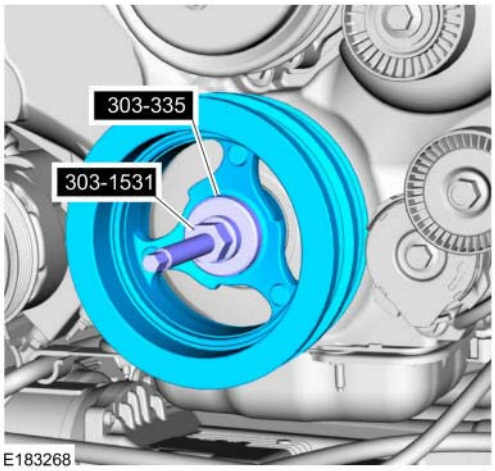
: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W20-QSP (U.S.) (WSS-M2C945-A)



E183267

5.

Using the special tools, install the crankshaft pulley. Use Special Service Tool: 303-335 (T88T-6701-A) Installer, Front Cover Oil Seal, 303-1531Installer, Front Crank Seal and Damper.



6.

Using the Strap Wrench, install a new crankshaft pulley bolt and the original washer.

Use the General Equipment: Strap Wrench

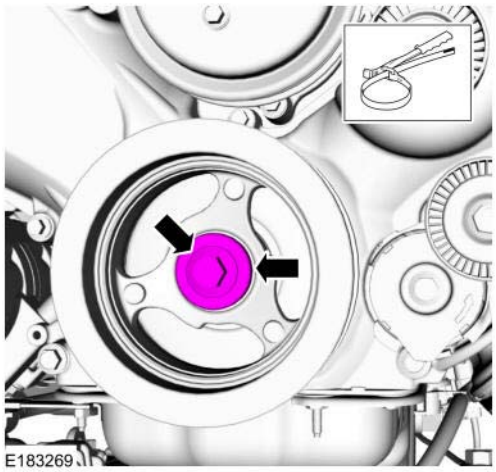
Torque:

Stage 1: 103 lb.ft (140 Nm)

Stage 2: Loosen: 360°

Stage 3: 74 lb.ft (100 Nm)

Stage 4: 90°



7.

Install the following items:

Refer to: AIR CONDITIONING (A C) COMPRESSOR BELT .

Refer to: ACCESSORY DRIVE BELT .

Refer to: COOLING FAN MOTOR AND SHROUD .

8.

After completing the repairs, perform the Misfire Monitor Neutral Profile Correction procedure using a diagnostic scan tool.

REMOVAL AND INSTALLATION > CRANKSHAFT REAR SEAL

Crankshaft Rear Seal

Special Tool(s) / General Equipment

 E129694	100-001 (T50T-100-A) Slide Hammer
 E133913	205-153 (T80T-4000-W) Handle
 ST2980-A	303-1250 Seal Installer, Rear Main TKIT-2006UFFLM
	303-519 (T95P-6701-EH) Remover, Crankshaft Rear Oil Seal TKIT-1995-FH/FLMH TKIT-1995-LMH/MH

Materials

Name	Specification
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) XO-5W20-QSP (U.S.)	WSS-M2C945-A

REMOVAL AND INSTALLATION > CRANKSHAFT REAR SEAL > REMOVAL

1.

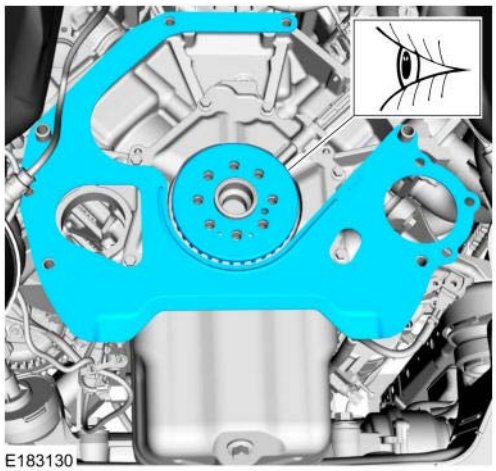
Remove the flexplate or flywheel. Refer to: Flexplate . Refer to: Flywheel .

NOTE: Automatic transmission spacer plate shown in illustration, manual transmission similar.

2.

Remove the crankshaft sensor ring and the engine-to-transmission spacer plate.

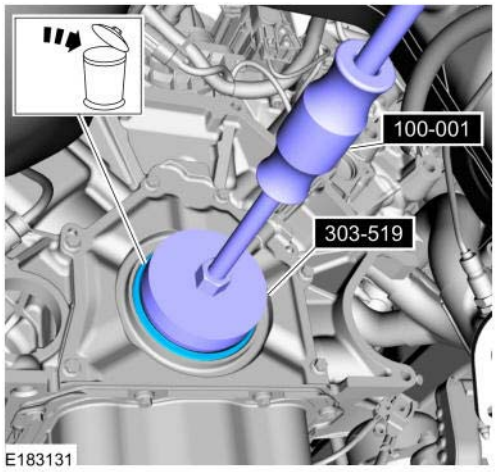
Inspect the crankshaft sensor ring for damage. If the crankshaft sensor ring has been dropped or has any visual damage, it must be discarded.



3.

Using the special tools, remove and discard the crankshaft rear seal.

Use Special Service Tool: 303-519 (T95P-6701-EH) Remover, Crankshaft Rear Oil Seal, 100-001 (T50T-100-A)Slide Hammer.



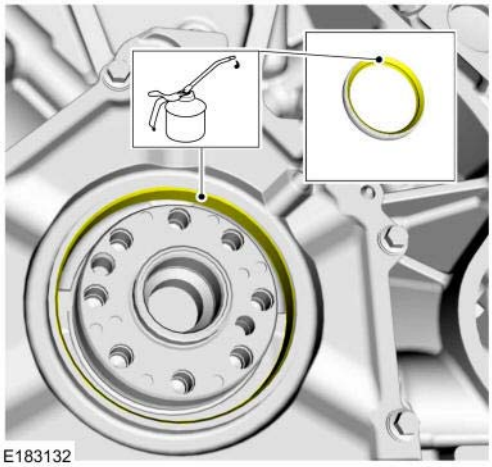
REMOVAL AND INSTALLATION > CRANKSHAFT REAR SEAL > INSTALLATION

1.

Lubricate the seal bore and the seal lips with clean engine oil.

Material

: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W20-QSP (U.S.) (WSS-M2C945-A)

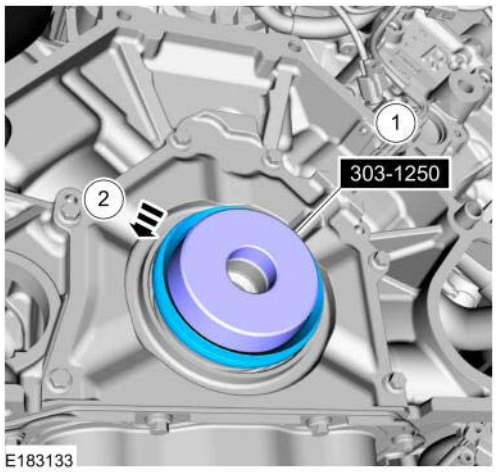


2.

Position the special tool onto the end of the crankshaft.

Use Special Service Tool: 303-1250 Seal Installer, Rear Main.

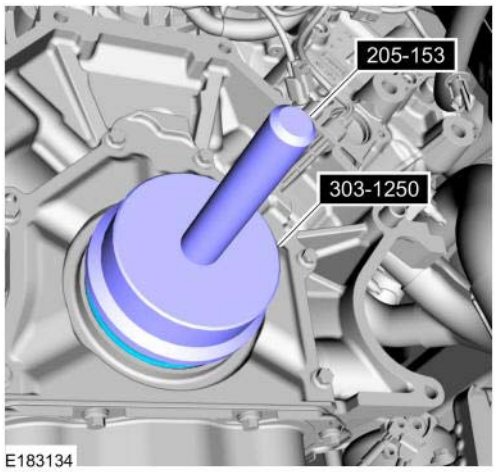
Slide the new crankshaft rear seal onto the tool.



3.

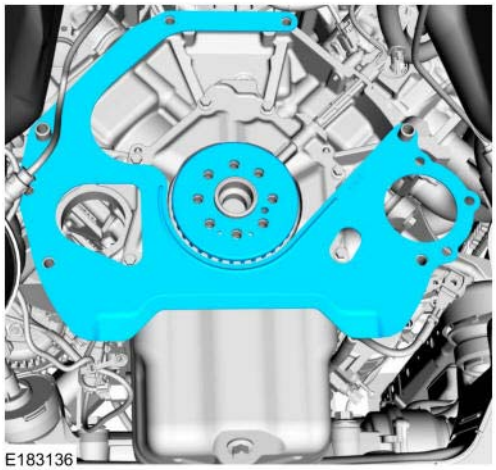
Using the special tools, install the crankshaft rear seal.

Use Special Service Tool: 205-153 (T80T-4000-W) Handle, 303-1250 Seal Installer, Rear Main.



NOTE: Automatic transmission spacer plate shown in illustration, manual transmission similar.

4.
Install the crankshaft sensor ring and the engine-to-transmission spacer plate.



5.

Install the flexplate or flywheel. Refer to: Flexplate . Refer to: Flywheel .

REMOVAL AND INSTALLATION > CRANKSHAFT REAR SEAL WITH RETAINER PLATE

Special Tool(s) / General Equipment

 E129694	100-001 (T50T-100-A) Slide Hammer
 E133913	205-153 (T80T-4000-W) Handle
 ST2980-A	303-1250 Seal Installer, Rear Main TKIT-2006UFFLM
	303-519 (T95P-6701-EH) Remover, Crankshaft Rear Oil Seal TKIT-1995-FH/FLMH TKIT-1995-LMH/MH
Plastic Scraper	

Materials

Name	Specification
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) XO-5W20-QSP (U.S.)	WSS-M2C945-A
Motorcraft® Silicone Gasket Remover ZC-30-A	-
Motorcraft® Metal Surface Prep ZC-31-B	-
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4
Metal Brake Parts Cleaner (U.S.) PM-4-A, PM-4-B (U.S.)	-

REMOVAL AND INSTALLATION > CRANKSHAFT REAR SEAL WITH RETAINER PLATE > REMOVAL

1.

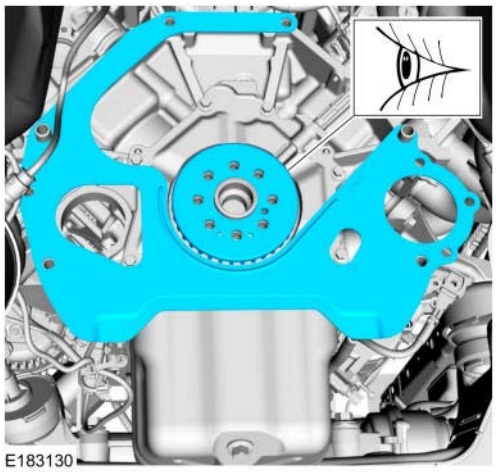
Remove the flexplate or flywheel. Refer to: Flexplate . Refer to: Flywheel .

NOTE: Automatic transmission spacer plate shown in illustration, manual transmission similar.

2.

Remove the crankshaft sensor ring and the engine-to-transmission spacer plate.

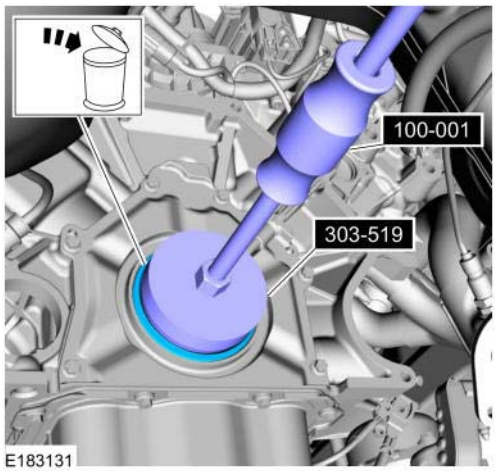
Inspect the crankshaft sensor ring for damage. If the crankshaft sensor ring has been dropped or has any visual damage, it must be discarded.



3.

Using the special tools, remove and discard the crankshaft rear seal.

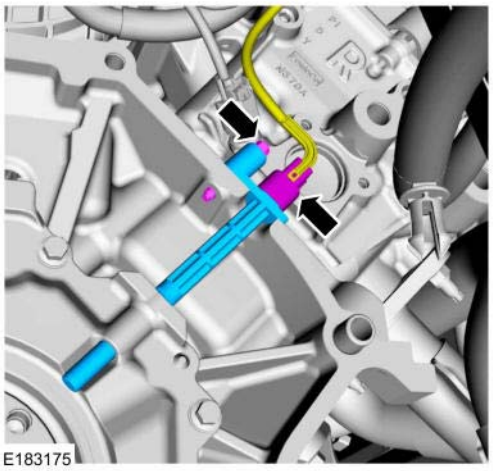
Use Special Service Tool: 303-519 (T95P-6701-EH) Remover, Crankshaft Rear Oil Seal, 100-001 (T50T-100-A) Slide Hammer.



4.

Disconnect the CKP sensor electrical connector.

Remove the bolt and the CKP sensor.

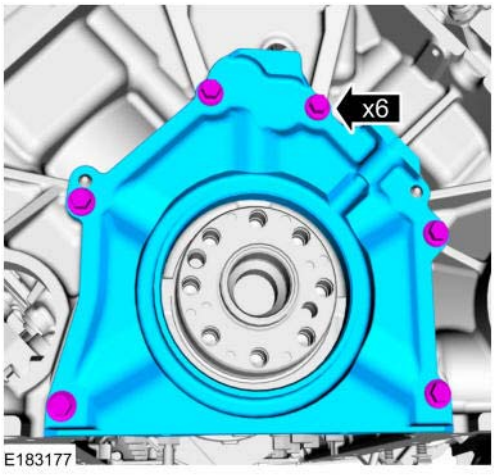


5.

Remove the oil pan. Refer to: Oil Pan .

6.

Remove the bolts and the crankshaft rear seal retainer plate.



NOTE: Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges which make leak paths. Use a plastic scraping tool to remove all traces of old sealant.

7.
Clean and inspect the mating surface. Refer to: RTV Sealing Surface Cleaning and Preparation .

Use the General Equipment: Plastic Scraper

Material

: Motorcraft® Silicone Gasket Remover / ZC-30-A

Material

: Metal Brake Parts Cleaner (U.S.) / PM-4-A, PM-4-B (U.S.)

Material

: Motorcraft® Metal Surface Prep / ZC-31-B



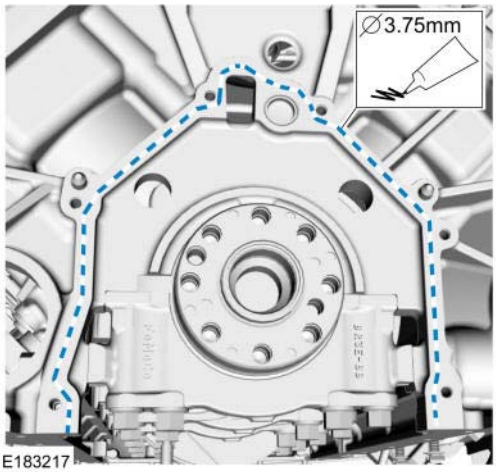
REMOVAL AND INSTALLATION > CRANKSHAFT REAR SEAL WITH RETAINER PLATE > INSTALLATION

NOTE: If the rear crankshaft seal retaining plate is not secured within 4 minutes, the sealant must be removed and the sealing area cleaned. Failure to follow this procedure may cause future oil leaks.

1.
Apply a 3.75 mm (0.147 in) bead of silicone gasket and sealant to the rear crankshaft seal retainer mating surface on the engine block.

Material

: Silicone Gasket and Sealant / TA-30 (WSE-M4G323-A4)



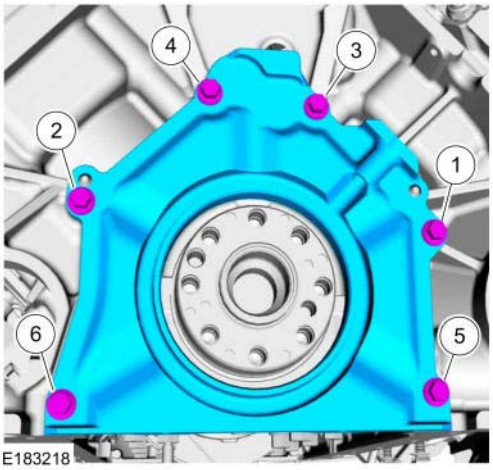
2.

Install the crankshaft rear seal retainer plate and the bolts.

Torque:

Stage 1: 89 lb.in (10 Nm)

Stage 2: 45°

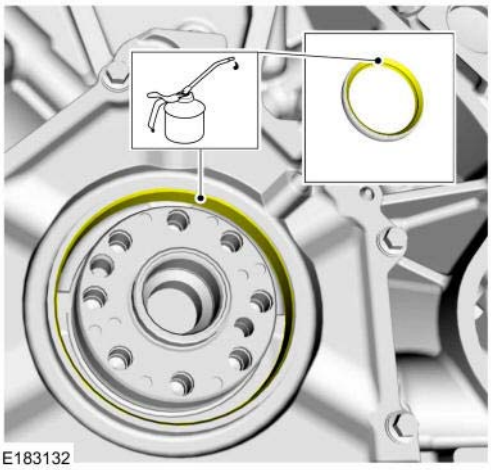


3.

Lubricate the crankshaft rear seal bore and the seal lips with clean engine oil.

Material

: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W20-QSP (U.S.) (WSS-M2C945-A)

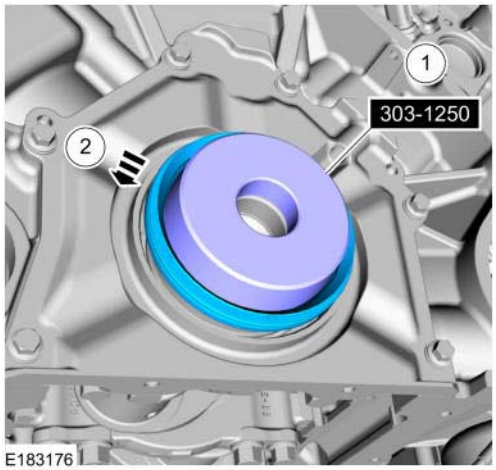


4.

Position the special tool onto the end of the crankshaft.

Use Special Service Tool: 303-1250 Seal Installer, Rear Main.

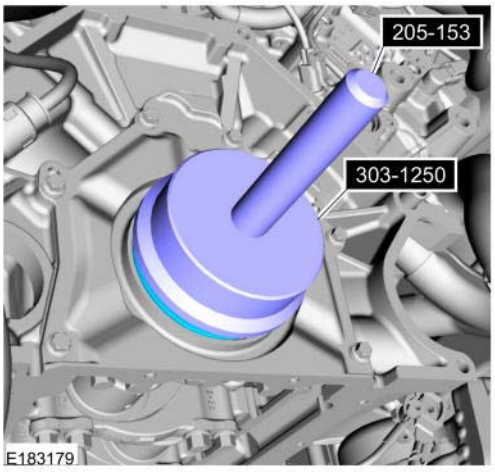
Slide the new crankshaft rear seal onto the tool.



5.

Using the special tools, install the crankshaft rear seal.

Use Special Service Tool: 205-153 (T80T-4000-W) Handle, 303-1250 Seal Installer, Rear Main.



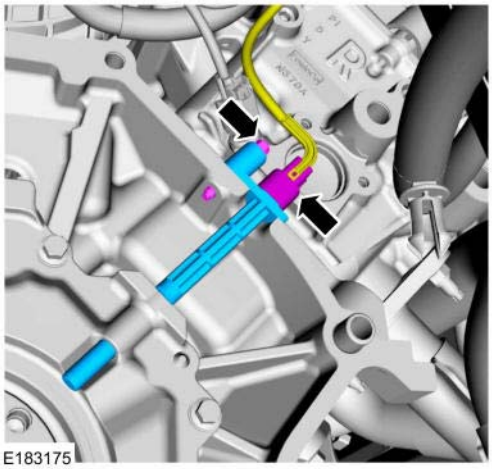
6.

Install the CKP sensor and the bolt.

Torque

: 89 lb.in (10 Nm)

Connect the CKP sensor electrical connector.

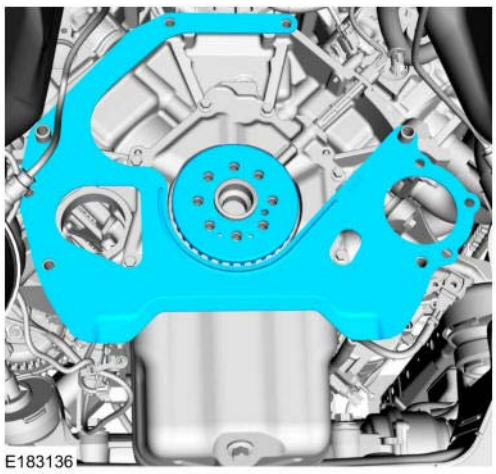


7.

Install the oil pan. Refer to: Oil Pan .

NOTE: Automatic transmission spacer plate shown in illustration, manual transmission similar.

8.
Install the crankshaft sensor ring and the engine-to-transmission spacer plate.



9.

Install the flexplate or flywheel. Refer to: Flexplate . Refer to: Flywheel .

REMOVAL AND INSTALLATION > CYLINDER HEAD LH

Special Tool(s) / General Equipment

	303-050 (T70P-6000) Lifting Bracket, Engine
	303-F072 Support Bar, Engine
Oil Drain Equipment	

Materials

Name	Specification
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) XO-5W20-QSP (U.S.)	WSS-M2C945-A

REMOVAL AND INSTALLATION > CYLINDER HEAD LH > REMOVAL

NOTE: During engine repair procedures, cleanliness is extremely important. Any foreign material, including any material created while cleaning gasket surfaces, that enters the oil passages, coolant passages or the oil pan, can cause engine failure.

1.

With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

2.

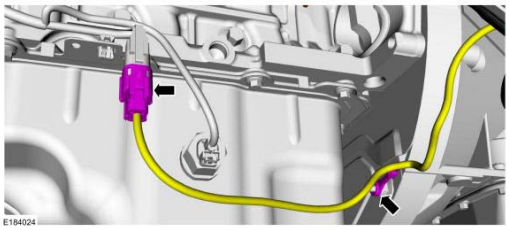
Release the fuel system pressure. Refer to: FUEL SYSTEM PRESSURE RELEASE - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS).

3.

Drain the engine cooling system. Refer to: COOLING SYSTEM DRAINING AND VACUUM FILLING .

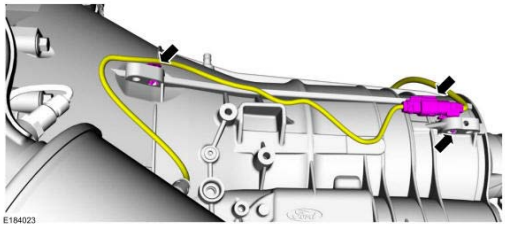
4.

Disconnect the LH HO2S electrical connector and detach the harness retainer.



NOTE: Automatic transmission shown in illustration, manual transmission similar.

5.
Disconnect the LH catalyst monitor sensor electrical connector and detach the harness retainers.



6.

Remove the following items:

Refer to: Intake Manifold .

Refer to: Camshaft LH .

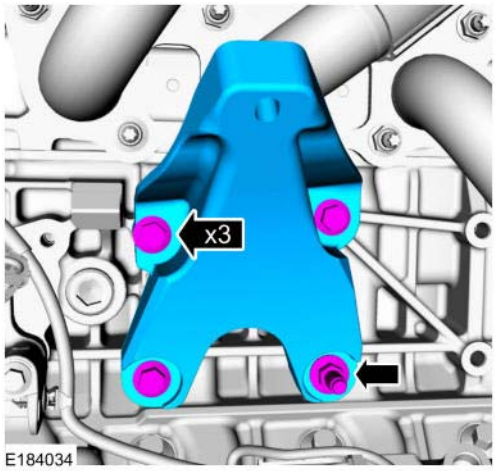
Refer to: CATALYTIC CONVERTER LH .

7.

Install the LH engine mount bracket, bolts and stud bolt.

Torque

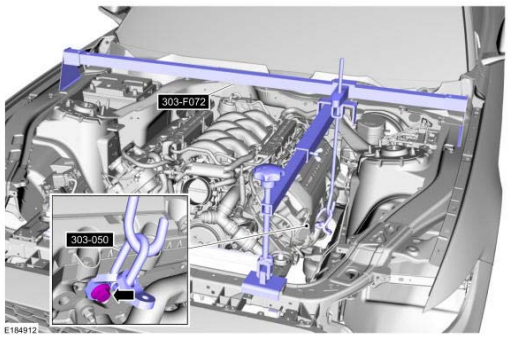
: 41 lb.ft (55 Nm)



8.

Using the special tools, lower the engine onto the LH engine mount.

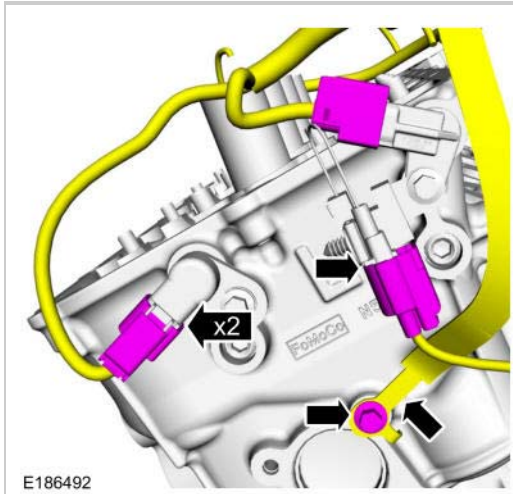
Remove Special Service Tool: 303-050 (T70P-6000) Lifting Bracket, Engine, 303-F072 Support Bar, Engine.



9.

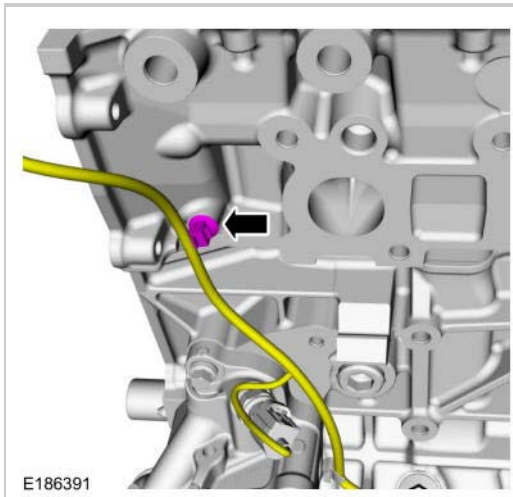
Disconnect the Camshaft Position (CMP) sensors and the ignition interference capacitor electrical connectors.

Remove the bolt and position the ground wire aside.



10.

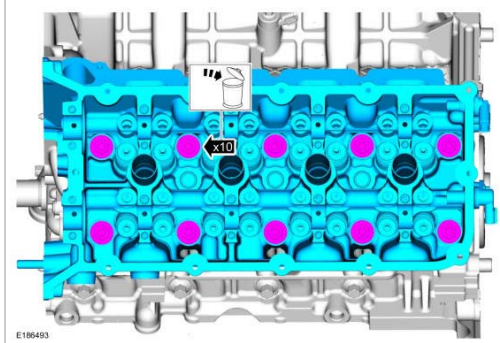
Detach the wiring harness retainer from the cylinder head.



11.

Remove and discard the bolts.

Remove the cylinder head.



12.

Discard the cylinder head gasket.



NOTE: Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges which make leak paths.

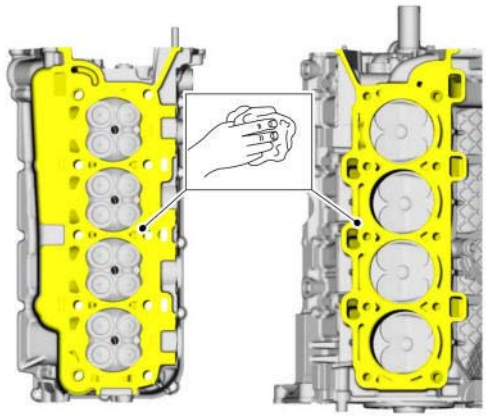
NOTE: Clean the cylinder head bolt holes in the cylinder block using compressed air. Make sure all coolant, oil or other foreign material is removed.

13.

Clean and inspect the cylinder head-to-cylinder block mating surfaces of both the cylinder head and the cylinder block

Refer to: Cylinder Head Distortion .

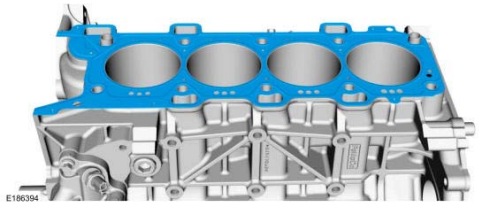
Refer to: Cylinder Block Distortion .



REMOVAL AND INSTALLATION > CYLINDER HEAD LH > INSTALLATION

1.

Install the cylinder head gasket.



NOTE: The cylinder head bolts are torque-to-yield and must not be reused. New cylinder head bolts must be installed.

2.
Install the cylinder head and the new bolts.

Torque:

Stage 1: 18 lb.ft (25 Nm)

Stage 2: 55 lb.ft (75 Nm)

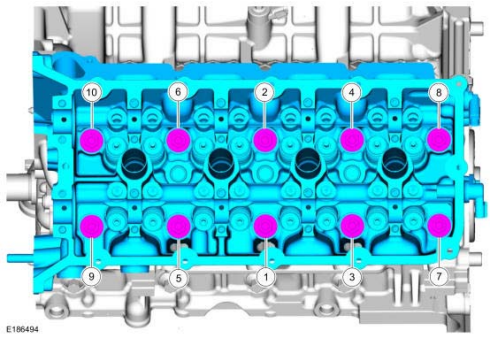
Stage 3: Loosen: 180°

Stage 4: 18 lb.ft (25 Nm)

Stage 5: 26 lb.ft (35 Nm)

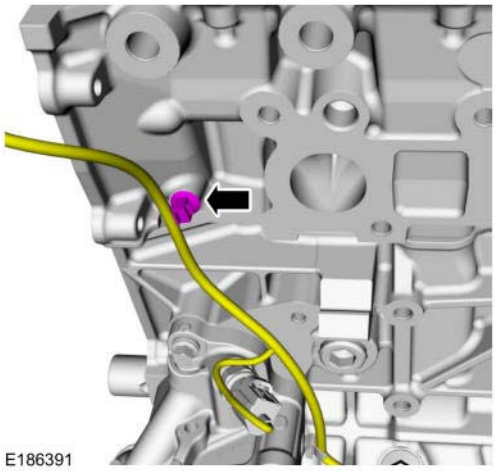
Stage 6: 90°

Stage 7: 90°



3.

Attach the wiring harness retainer to the cylinder head.



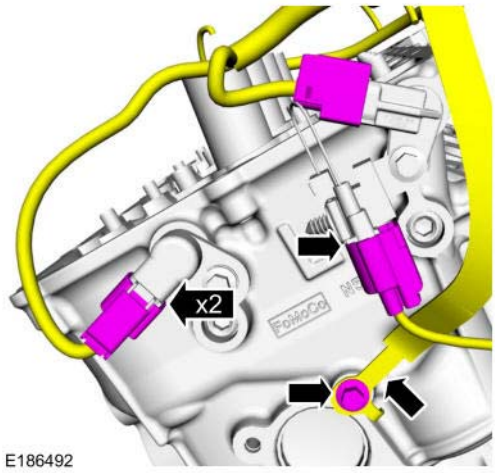
4.

Install the ground wire and bolt.

Torque

: 106 lb.in (12 Nm)

Connect the Camshaft Position (CMP) sensors and the ignition interference capacitor electrical connectors.

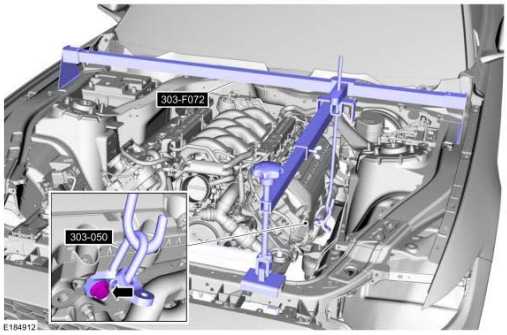


NOTE: Do not position the legs of the Engine Support Bar on the fenders. Instead, the legs should be positioned on the body structure. Failure to follow these instructions may result in body damage.

5.

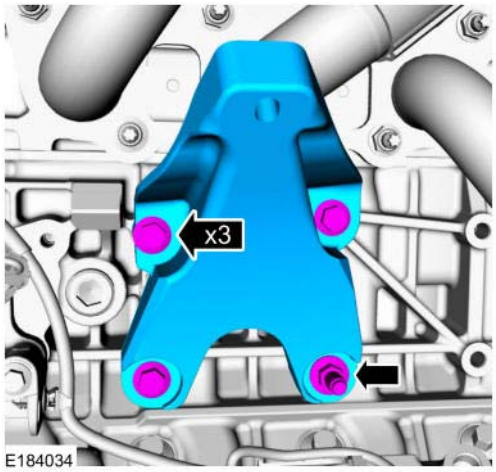
Install Special Service Tool: 303-050 (T70P-6000) Lifting Bracket, Engine, 303-F072 Support Bar, Engine.

Using the special tools raise the LH side of the engine 25 mm (1 inch).



6.

Remove the bolts, stud bolt and the LH engine mount bracket.



7.

Install the following items:

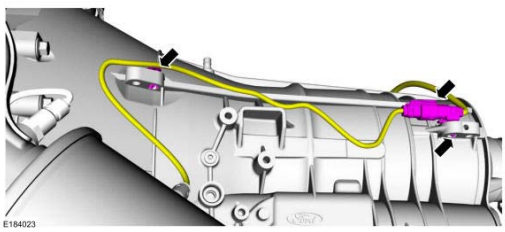
Refer to: CATALYTIC CONVERTER LH .

Refer to: Camshaft LH .

Refer to: Intake Manifold .

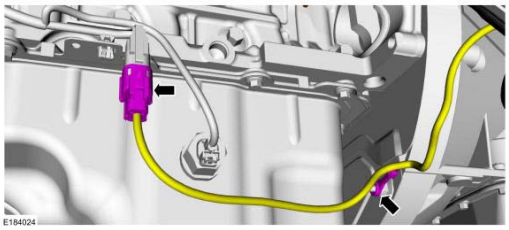
NOTE: Automatic transmission shown in illustration, manual transmission similar.

8.
Connect the LH catalyst monitor sensor electrical connector and attach the harness retainers.



9.

Connect the LH HO2S electrical connector and attach the harness retainer.



10.

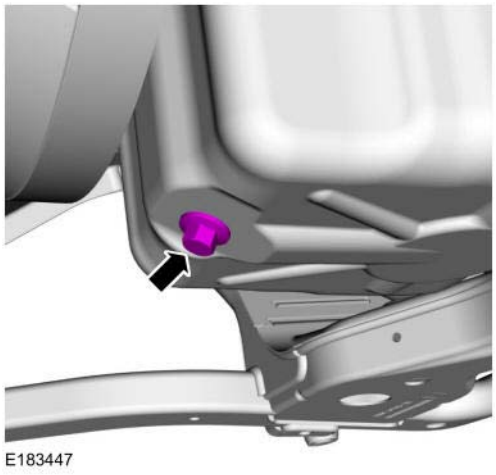
Remove the oil pan drain plug and drain the engine oil.

Use the General Equipment: Oil Drain Equipment

Install the oil pan drain plug.

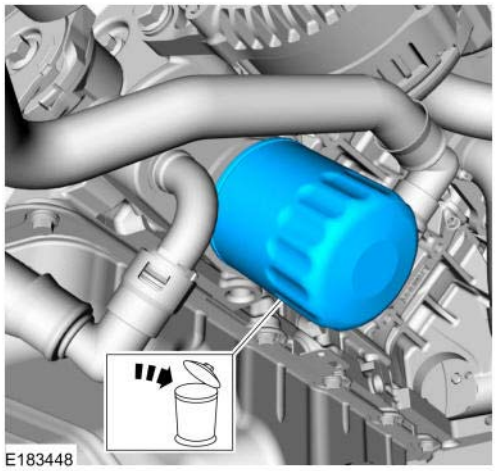
Torque

: 19 lb.ft (26 Nm)



11.

Remove and discard the engine oil filter.



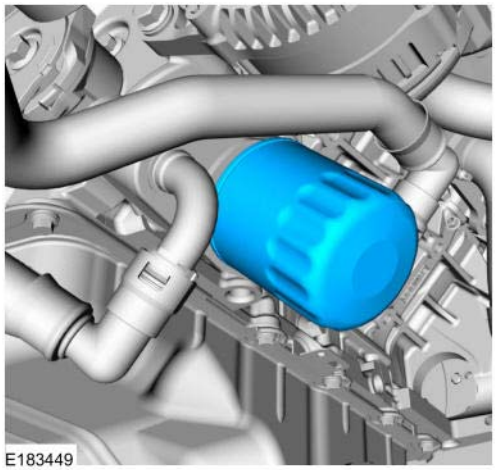
NOTE: Do not lubricate the O-ring seal.

12.
Install a new oil filter.

Torque:

Stage 1: 44 lb.in (5 Nm)

Stage 2: 180°

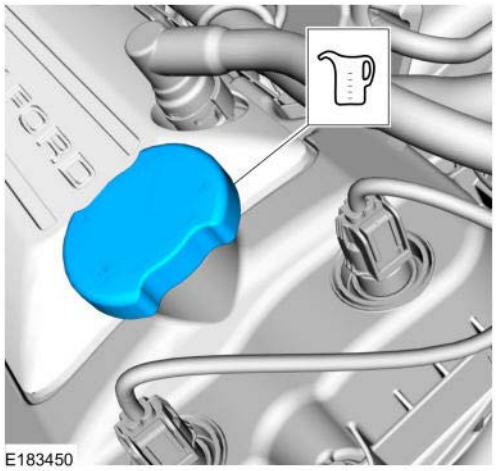


13.

Fill the engine with clean engine oil. Refer to: Specifications .

Material

: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W20-QSP (U.S.) (WSS-M2C945-A)



14.

Fill and bleed the engine cooling system. Refer to: COOLING SYSTEM DRAINING AND VACUUM FILLING .

REMOVAL AND INSTALLATION > CYLINDER HEAD RH

Special Tool(s) / General Equipment

	303-050 (T70P-6000) Lifting Bracket, Engine
	303-F072 Support Bar, Engine
Oil Drain Equipment	

Materials

Name	Specification
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) XO-5W20-QSP (U.S.)	WSS-M2C945-A

REMOVAL AND INSTALLATION > CYLINDER HEAD RH > REMOVAL

NOTE: During engine repair procedures, cleanliness is extremely important. Any foreign

material, including any material created while cleaning gasket surfaces, that enters the oil passages, coolant passages or the oil pan, can cause engine failure.

1.

With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

2.

Release the fuel system pressure. Refer to: FUEL SYSTEM PRESSURE RELEASE - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS).

3.

Drain the engine cooling system. Refer to: COOLING SYSTEM DRAINING AND VACUUM FILLING .

4.

Remove the following items:

Refer to: Intake Manifold .

Refer to: Camshaft RH .

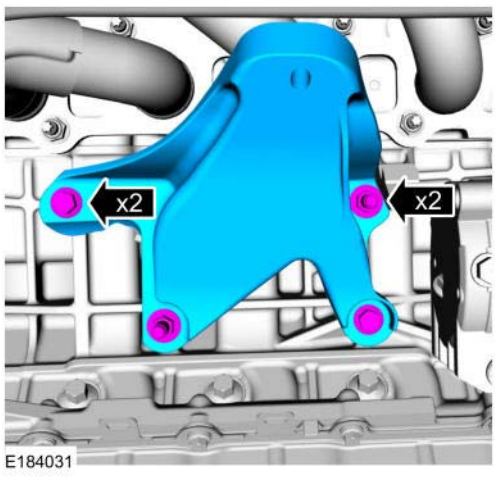
Refer to: Exhaust Manifold RH .

5.

Install the RH engine mount bracket, bolts and stud bolts.

Torque

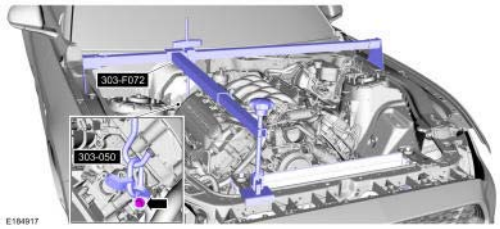
: 41 lb.ft (55 Nm)



6.

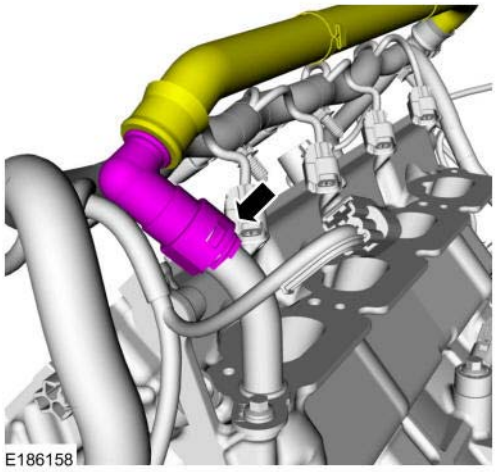
Using the special tools, lower the engine onto the RH engine mount.

Remove Special Service Tool: 303-050 (T70P-6000) Lifting Bracket, Engine, 303-F072 Support Bar, Engine.



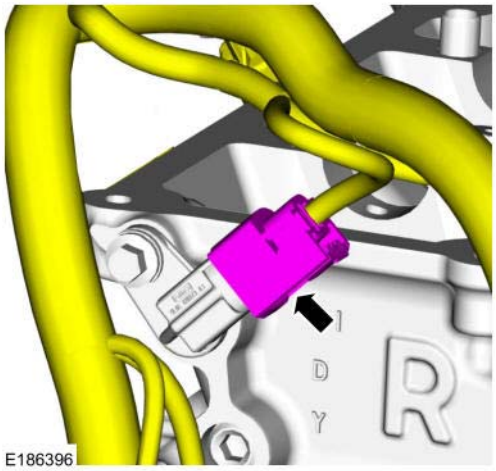
7.

Disconnect the heater hose.



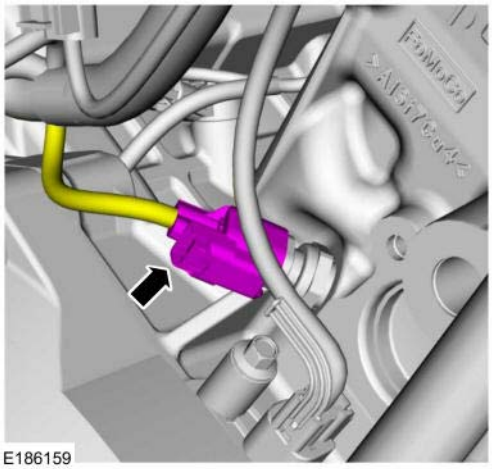
8.

Disconnect the camshaft position sensor electrical connector.



9.

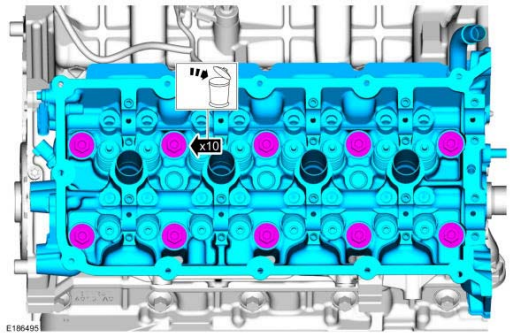
Disconnect the CHT electrical connector.



10.

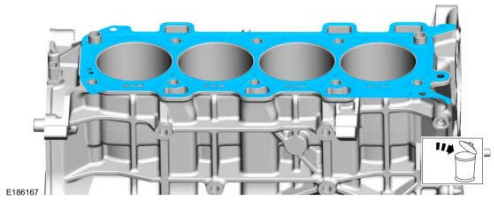
Remove and discard the bolts.

Remove the cylinder head.



11.

Remove and discard the cylinder head gasket.



NOTE: Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges which make leak paths.

NOTE: Clean the cylinder head bolt holes in the cylinder block using compressed

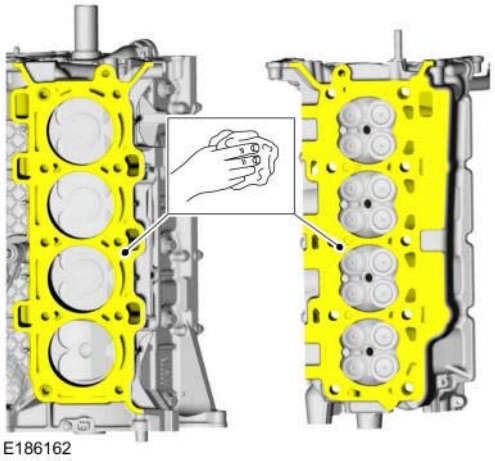
air. Make sure all coolant, oil or other foreign material is removed.

12.

Clean and inspect the cylinder head-to-cylinder block mating surfaces of both the cylinder head and the cylinder block

Refer to: Cylinder Head Distortion .

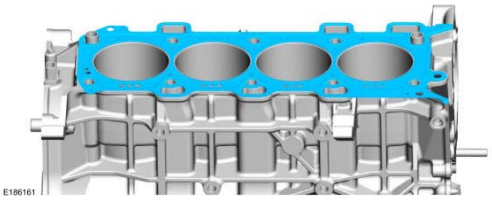
Refer to: Cylinder Block Distortion .


E186162

REMOVAL AND INSTALLATION > CYLINDER HEAD RH > INSTALLATION

1.

Install the new cylinder head gasket.


E186161

NOTE: The cylinder head bolts are torque-to-yield and must not be reused. New cylinder head bolts must be installed.

2.
Install the cylinder head and the new bolts.

Torque:

Stage 1: 18 lb.ft (25 Nm)

Stage 2: 55 lb.ft (75 Nm)

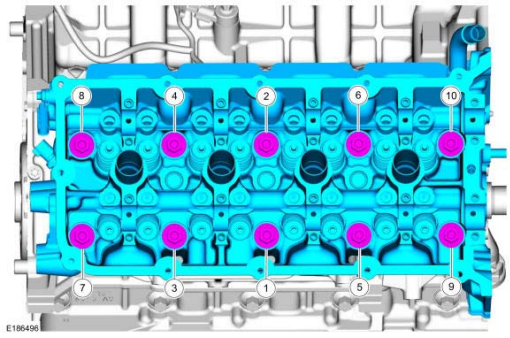
Stage 3: Loosen: 180°

Stage 4: 18 lb.ft (25 Nm)

Stage 5: 26 lb.ft (35 Nm)

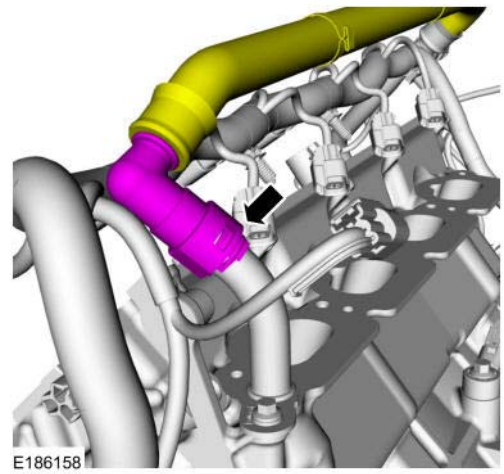
Stage 6: 90°

Stage 7: 90°



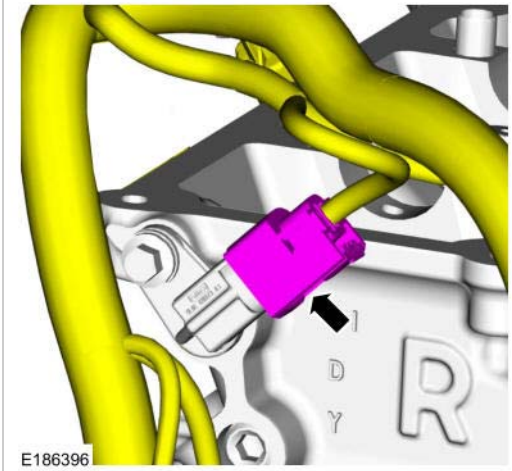
3.

Connect the heater hose.



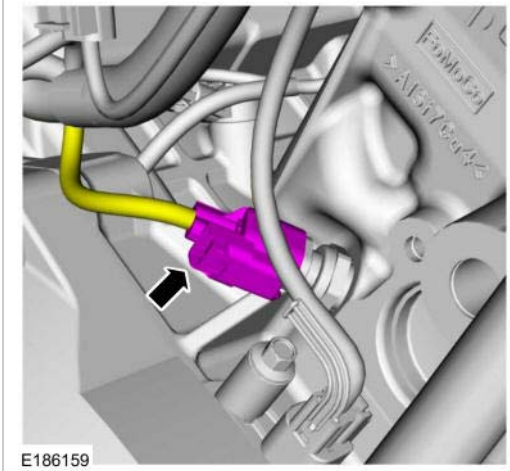
4.

Connect the camshaft position sensor electrical connector.



5.

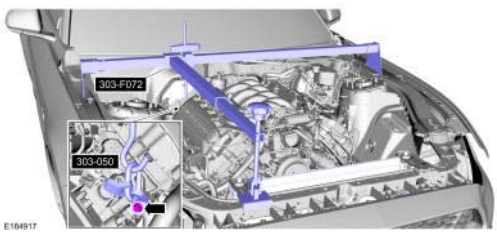
Connect the CHT electrical connector.



6.

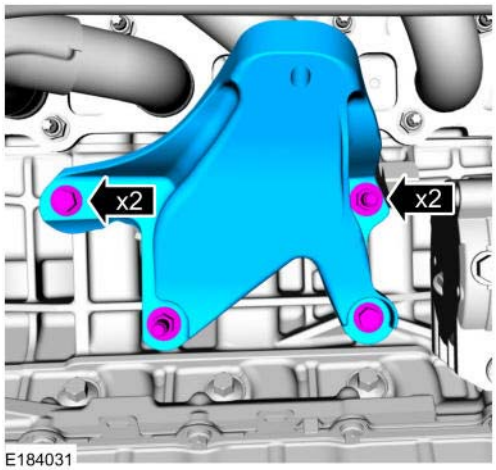
Install Special Service Tool: 303-050 (T70P-6000) Lifting Bracket, Engine, 303-F072 Support Bar, Engine.

Using the special tools raise the RH side of the engine 25 mm (1 inch).



7.

Remove the bolts, stud bolts and the RH engine mount bracket.



8.

Install the following items:

Refer to: Exhaust Manifold RH .

Refer to: Camshaft RH .

Refer to: Intake Manifold .

9.

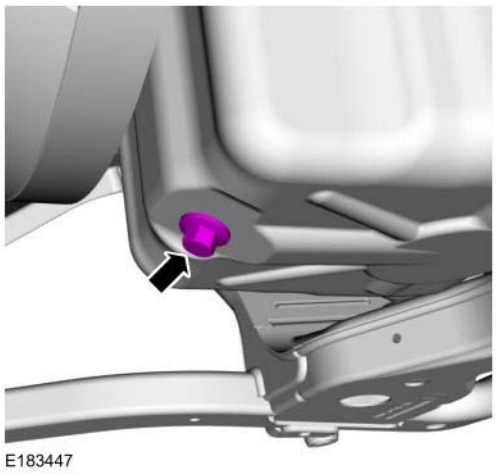
Remove the oil pan drain plug and drain the engine oil.

Use the General Equipment: Oil Drain Equipment

Install the oil pan drain plug.

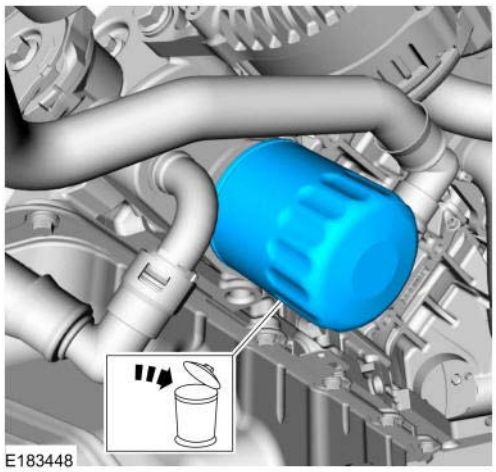
Torque

: 19 lb.ft (26 Nm)



10.

Remove and discard the engine oil filter.



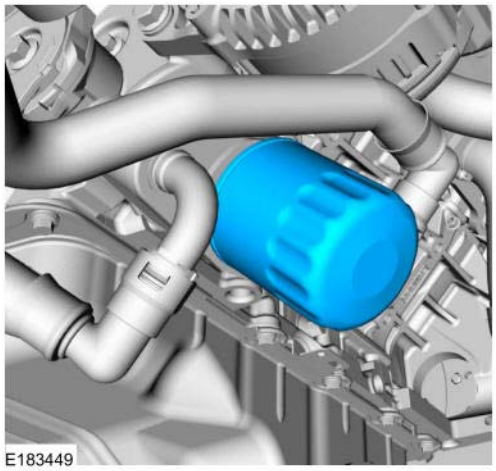
NOTE: Do not lubricate the O-ring seal.

11.
Install a new oil filter.

Torque:

Stage 1: 44 lb.in (5 Nm)

Stage 2: 180°

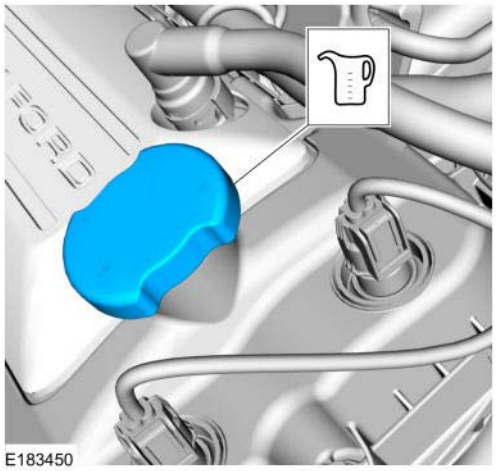


12.

Fill the engine with clean engine oil. Refer to: Specifications .

Material

: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W20-QSP (U.S.) (WSS-M2C945-A)



13.

Fill and bleed the engine cooling system. Refer to: COOLING SYSTEM DRAINING AND VACUUM FILLING .

REMOVAL AND INSTALLATION > ENGINE FRONT COVER

Special Tool(s) / General Equipment

Plastic Scraper
Oil Drain Equipment

Materials

Name	Specification
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) XO-5W20-QSP (U.S.)	WSS-M2C945-A
Motorcraft® Silicone Gasket Remover ZC-30-A	-
Motorcraft® Metal Surface Prep ZC-31-B	-
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4
Motorcraft® Orange Antifreeze/Coolant Concentrated (U.S.) VC-3-B (U.S.)	WSS-M97B44-D
Metal Brake Parts Cleaner (U.S.) PM-4-A, PM-4-B (U.S.)	-

REMOVAL AND INSTALLATION > ENGINE FRONT COVER > REMOVAL

NOTE: During engine repair procedures, cleanliness is extremely important. Any foreign

material, including any material created while cleaning gasket surfaces, that enters the oil passages, coolant passages or the oil pan, can cause engine failure.

1.

With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

2.

Release the fuel system pressure. Refer to: FUEL SYSTEM PRESSURE RELEASE - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS).

3.

Disconnect the battery ground and positive cables. Refer to: Battery Disconnect and Connect .

4.

Drain the engine cooling system. Refer to: COOLING SYSTEM DRAINING AND VACUUM FILLING .

5.

Remove the following items:

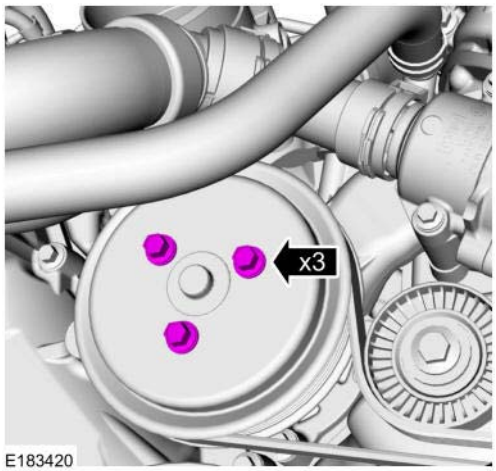
Refer to: DEGAS BOTTLE .

Refer to: AIR CLEANER OUTLET PIPE .

Refer to: AIR CLEANER - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS)

6.

Loosen the coolant pump pulley bolts.



7.

Remove the following items:

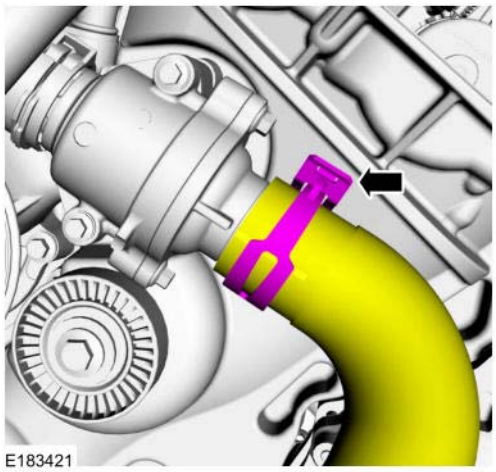
Refer to: Crankshaft Front Seal .

Refer to: Valve Cover RH .

Refer to: Valve Cover LH .

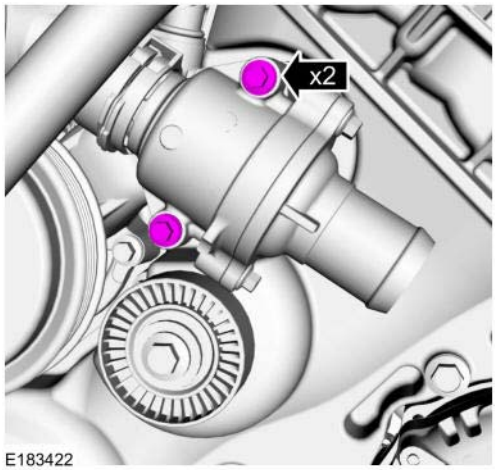
8.

Disconnect the lower radiator hose from the thermostat housing assembly.



9.

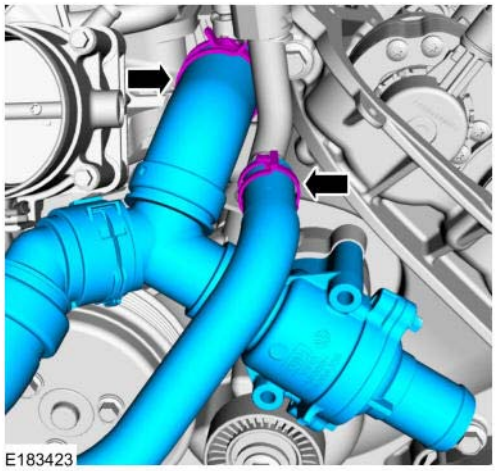
Remove the thermostat housing bolts.



10.

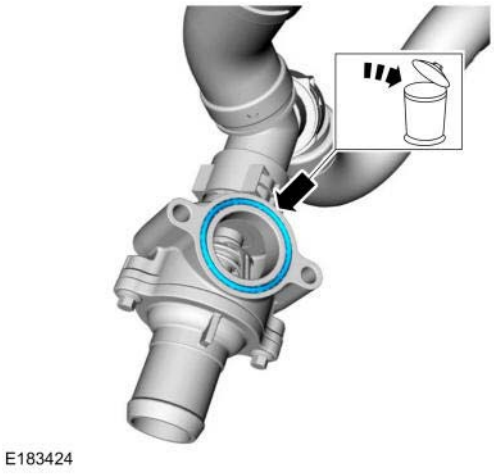
Release the clamp and remove the upper radiator hose T-connector/thermostat housing assembly.

Release the clamp and remove the degas bottle coolant hose.



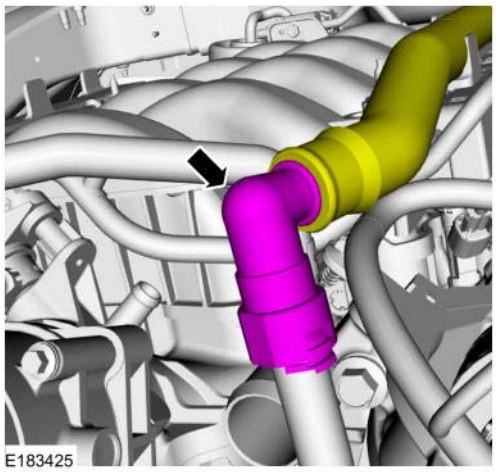
11.

Remove and discard the thermostat housing O-ring seal.



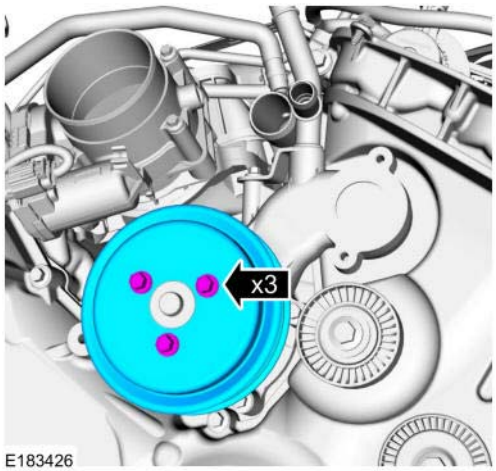
12.

Disconnect the heater hose.



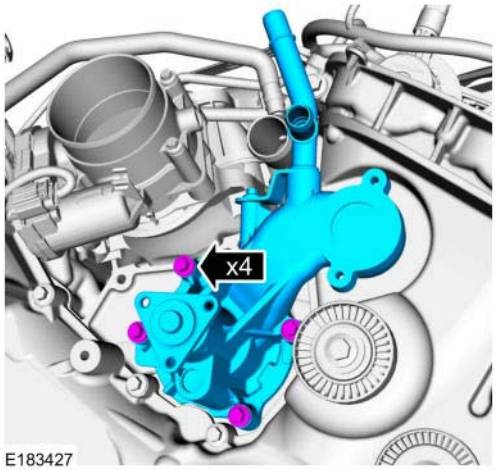
13.

Remove the bolts and the coolant pump pulley.



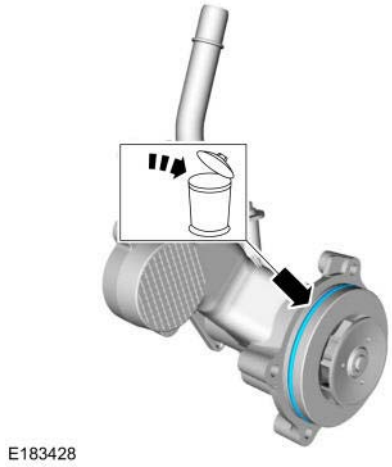
14.

Remove the bolts and the coolant pump.



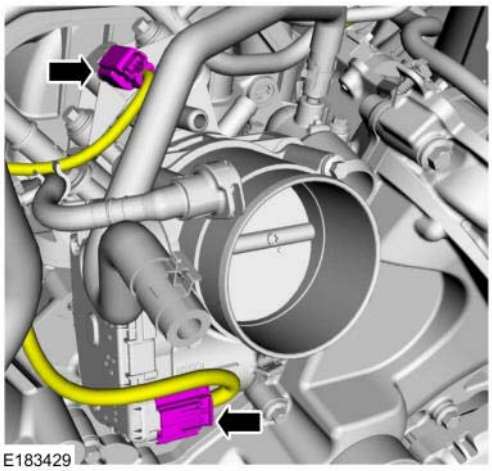
15.

Remove and discard the coolant pump O-ring seal.


E183428

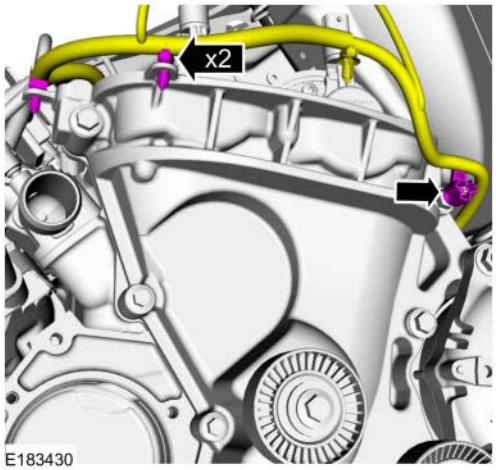
16.

Disconnect the throttle body and EVAP purge valve electrical connectors.


E183429

17.

Detach the wiring harness retainers from the engine front cover and stud bolt.

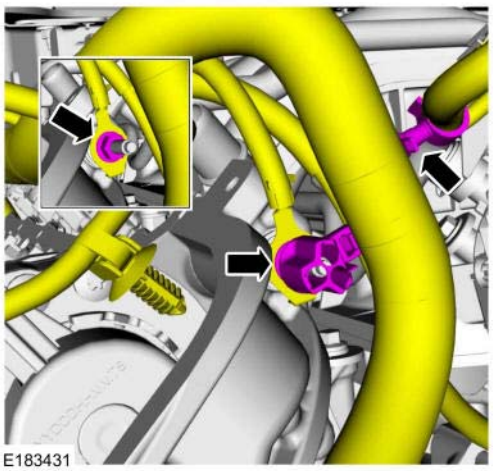


E183430

18.

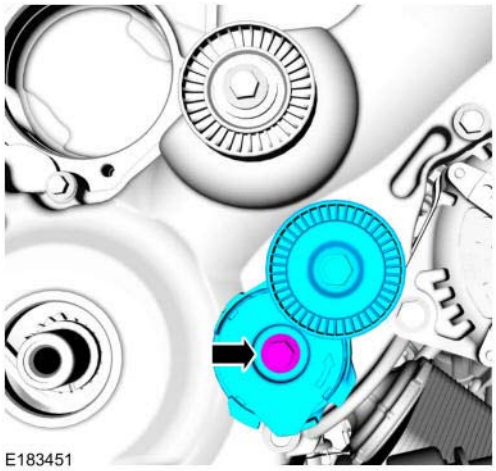
Remove the wiring harness retainers.

Remove the nut and ground wire.



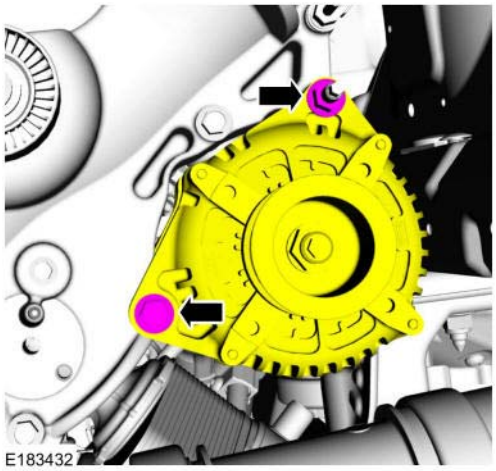
19.

Remove the bolt and the accessory drive belt tensioner.



20.

Remove the nut, the bolt and position the generator aside.



NOTE: Vehicles are equipped with either an underbody shield or a subframe bracket and underbody shield assembly.

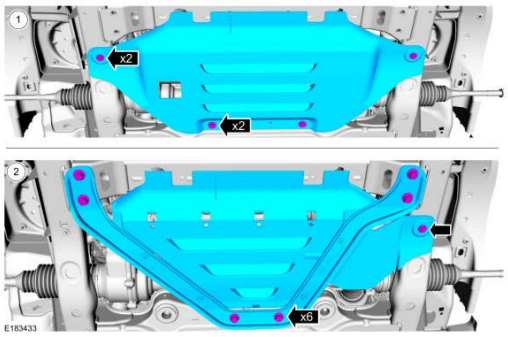
21.

1.

Remove the bolts and the underbody shield.

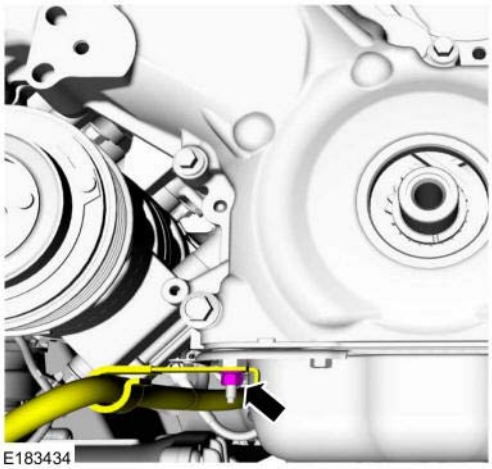
2.

Remove the bolts and the subframe bracket and underbody shield assembly.



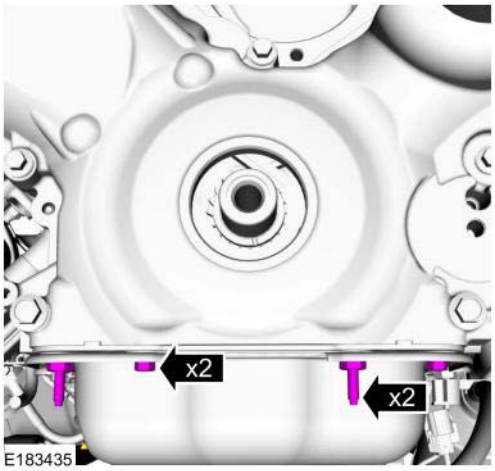
22.

Remove the nut and the wiring harness retainer.



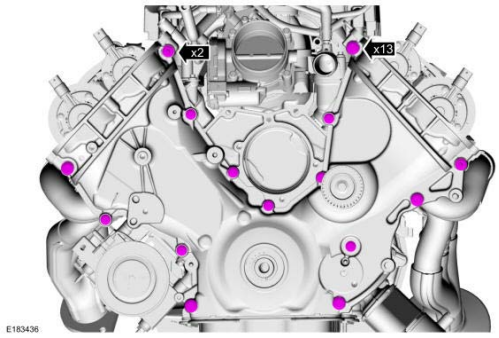
23.

Remove the bolts and stud bolts.



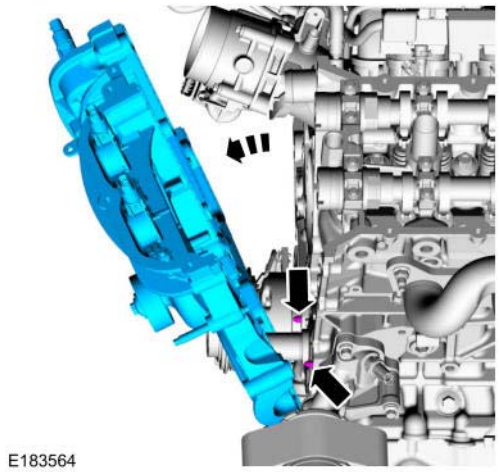
24.

Remove the bolts and stud bolts.



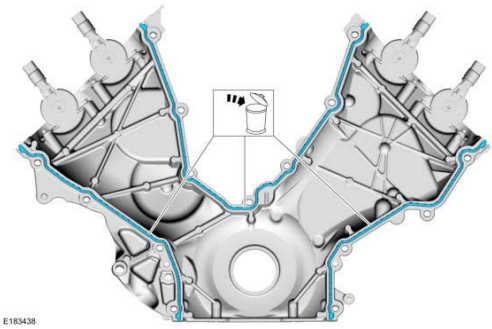
NOTE: Timing drive components removed from view for clarity.

25.
Remove the engine front cover from the front cover to cylinder block dowels.



26.

Remove and discard the gaskets.



NOTE: Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges which make leak paths. Use a plastic scraping tool to remove all traces of old sealant.

27.
Clean and inspect the mating surface. Refer to: RTV Sealing Surface Cleaning and Preparation .

Use the General Equipment: Plastic Scraper

Material

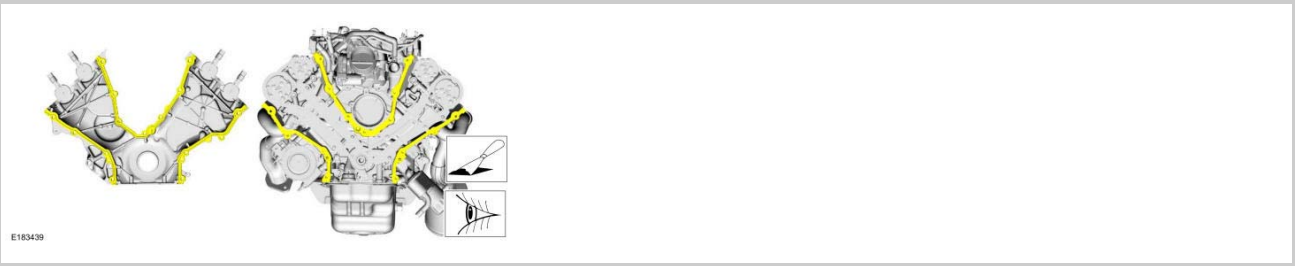
: Motorcraft® Silicone Gasket Remover / ZC-30-A

Material

: Metal Brake Parts Cleaner (U.S.) / PM-4-A, PM-4-B (U.S.)

Material

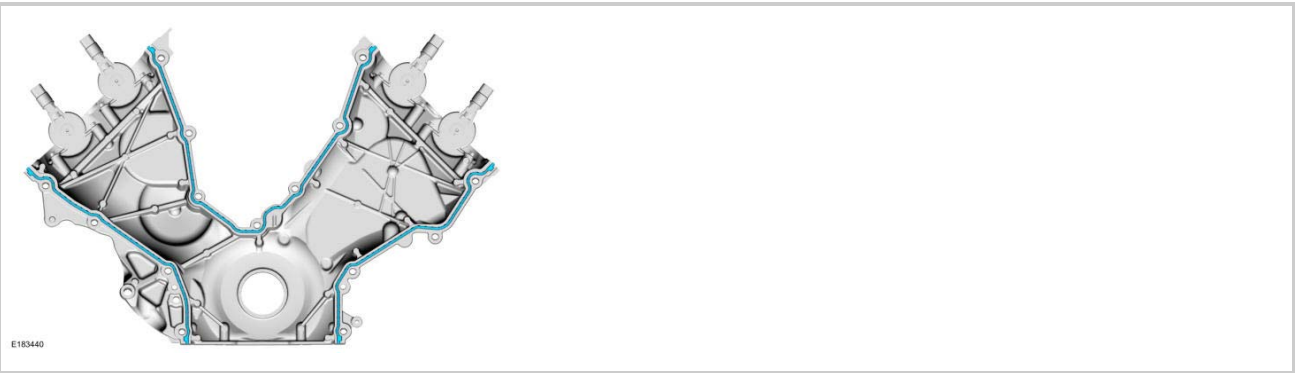
: Motorcraft® Metal Surface Prep / ZC-31-B



REMOVAL AND INSTALLATION > ENGINE FRONT COVER > INSTALLATION

1.

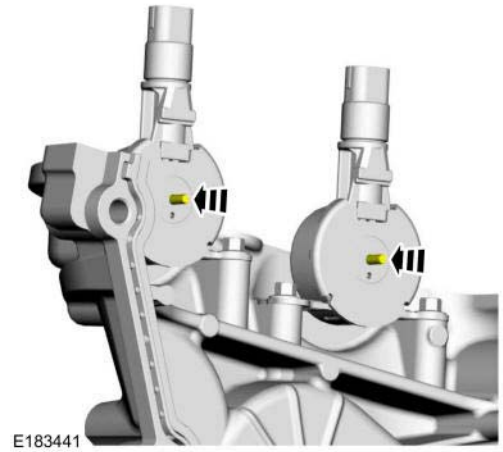
Install new gaskets on the engine front cover.



NOTE: RH shown in illustration, LH similar.

NOTE: The VCT variable force solenoid pins must be fully depressed to avoid interference with the VCT valve tips when installing the engine front cover. Failure to follow these instructions can result in damage to the engine.

2.
Fully depress the VCT variable force solenoid pins.

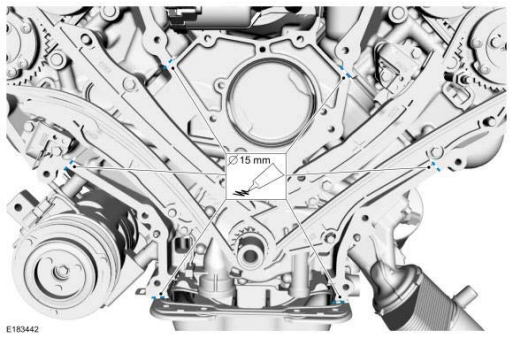


NOTE: The engine front cover must be installed and all fasteners final tightened within 5 minutes of applying the sealer. If this cannot be accomplished, install the engine front cover and tighten fasteners 6, 7, 8, 9, 10 and 11 to 8 Nm (71 lb-in) within 5 minutes of applying the sealer. All of the fasteners must then be final tightened within 1 hour of applying the sealer. If this time limit is exceeded, all sealant must be removed and the sealing area cleaned. Failure to follow this procedure can cause future oil leakage.

3.
Apply a 15 mm (0.59 in) diameter drop of silicone gasket and sealant to the cylinder head-to-cylinder block joints and the oil pan-to-cylinder block joints.

Material

: Silicone Gasket and Sealant / TA-30 (WSE-M4G323-A4)

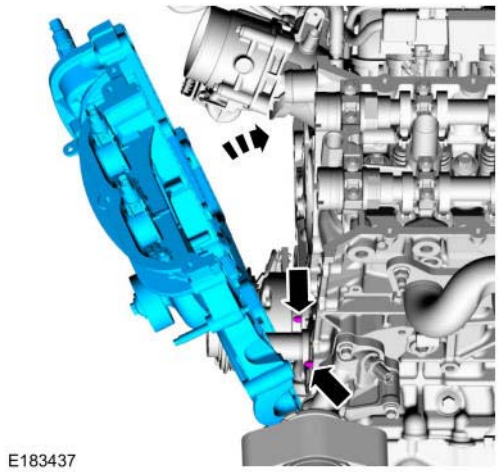


NOTE: Make sure that the engine front cover gaskets are in place on the engine front cover before installation.

NOTE: Timing drive components removed from view for clarity.

4.

Position the engine front cover onto the dowels.



NOTE: The engine front cover must be installed and all fasteners final tightened within 5 minutes of applying the sealer. If this cannot be accomplished, install the engine front cover and tighten fasteners 6, 7, 8, 9, 10 and 11 to 8 Nm (71 lb-in) within 5 minutes of applying the sealer. All of the fasteners must then be final tightened within 1 hour of applying the sealer. If this time limit is exceeded, all sealant must be removed and the sealing area cleaned. Failure to follow this procedure can cause future oil leakage.

5.
Install the bolts and stud bolts.

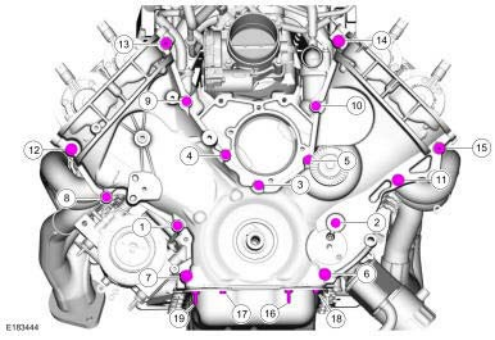
Torque:

Stage 1: Fasteners 1-15 : 18 lb.ft (25 Nm)

Stage 2: Fasteners 16-19 : 89 lb.in (10 Nm)

Stage 3: Fasteners 1-15 : 60°

Stage 4: Fasteners 16-19 : 45°

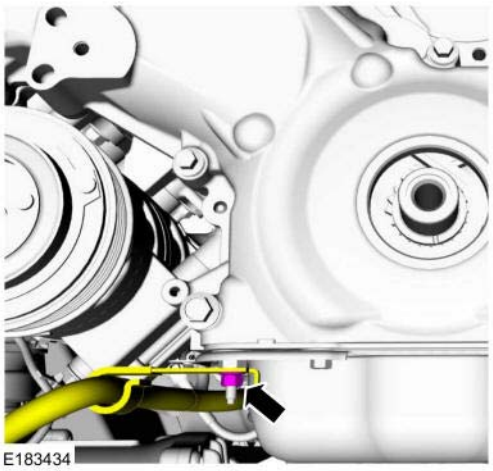


6.

Install the wiring harness retainer and the nut.

Torque

: 71 lb.in (8 Nm)

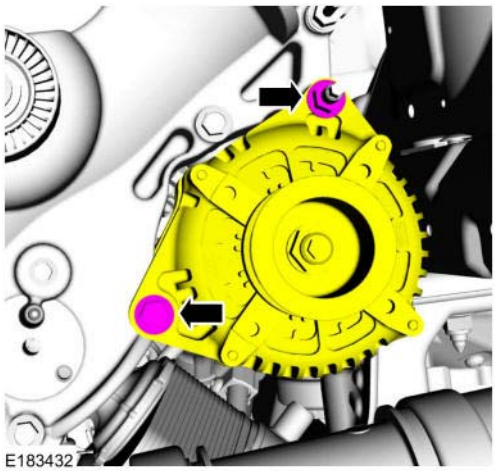


7.

Install the generator, the bolt and the nut.

Torque

: 35 lb.ft (48 Nm)

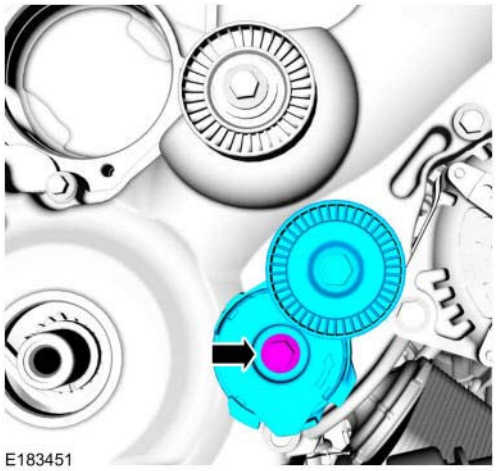


8.

Install the accessory drive belt tensioner and bolt.

Torque

: 35 lb.ft (48 Nm)



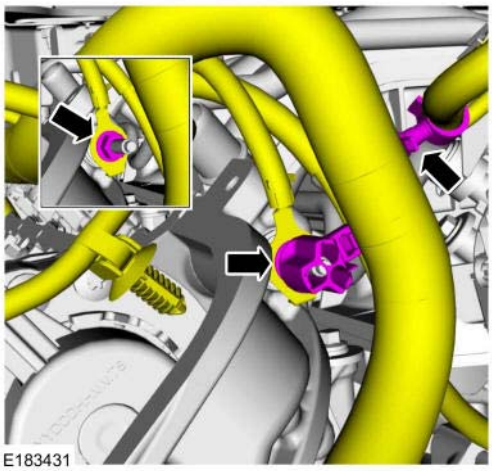
9.

Install the ground wire and nut.

Torque

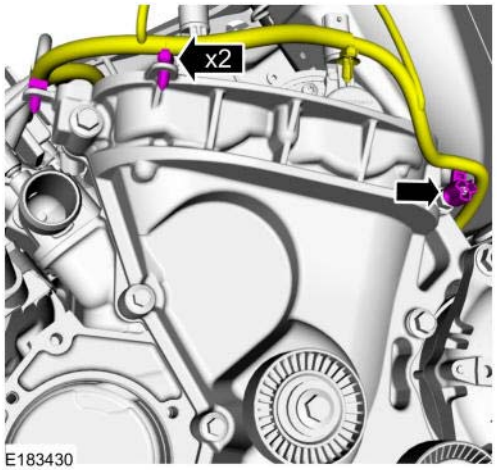
: 89 lb.in (10 Nm)

Install the wiring harness retainers.



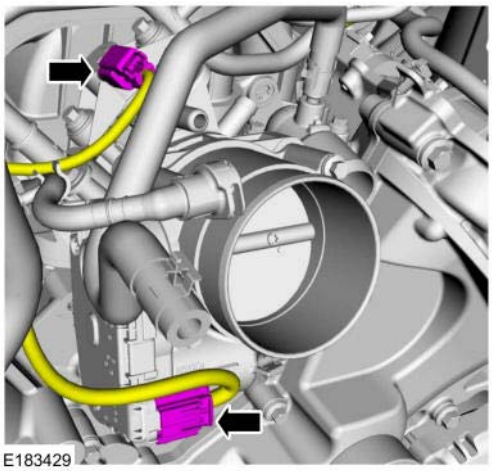
10.

Attach the wiring harness retainers to the engine front cover and stud bolt.



11.

Connect the throttle body and EVAP purge valve electrical connectors.

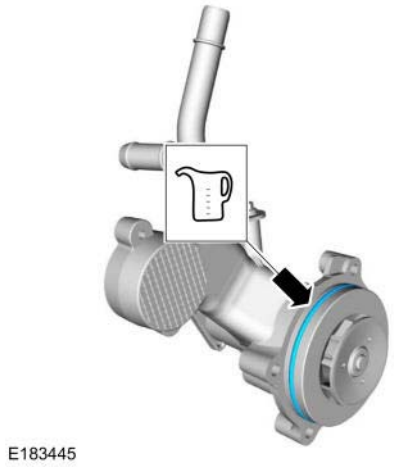


12.

Install a new coolant pump O-ring seal and lubricate with clean engine coolant.

Material

: Motorcraft® Orange Antifreeze/Coolant Concentrated (U.S.) / VC-3-B (U.S.) (WSS-M97B44-D)



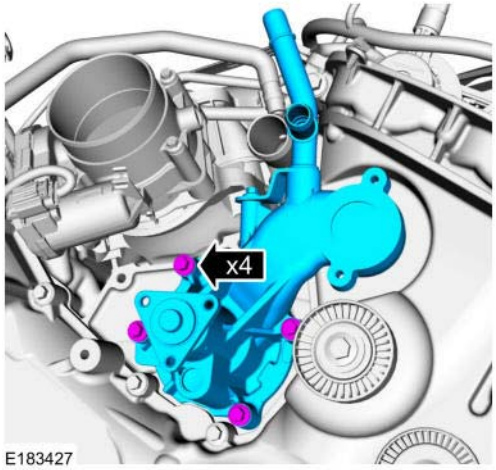
13.

Install the coolant pump and bolts.

Torque:

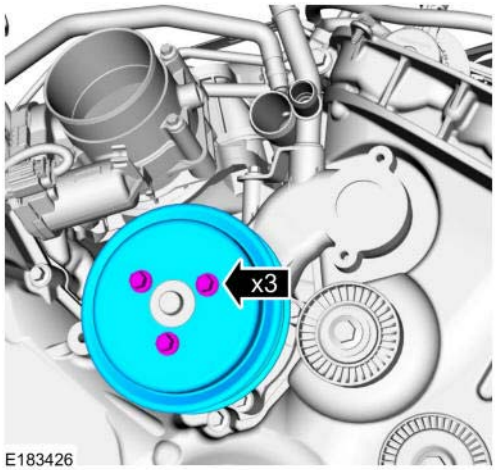
Stage 1: 177 lb.in (20 Nm)

Stage 2: 60°



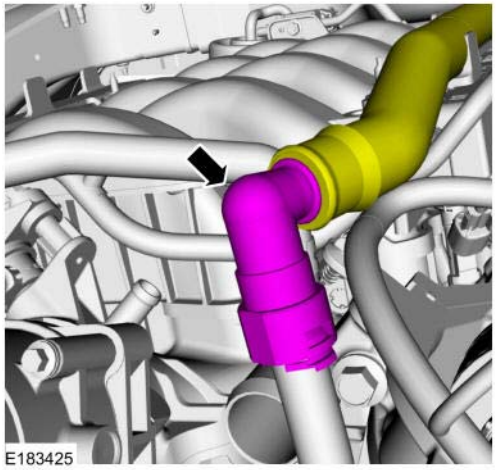
14.

Install the coolant pump pulley and the bolts.



15.

Connect the heater hose.

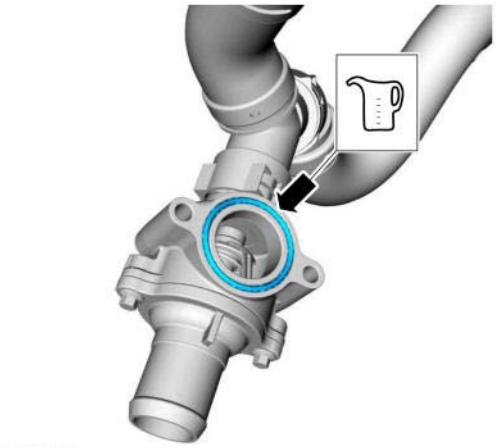


16.

Install a new thermostat housing O-ring seal and lubricate with clean engine coolant.

Material

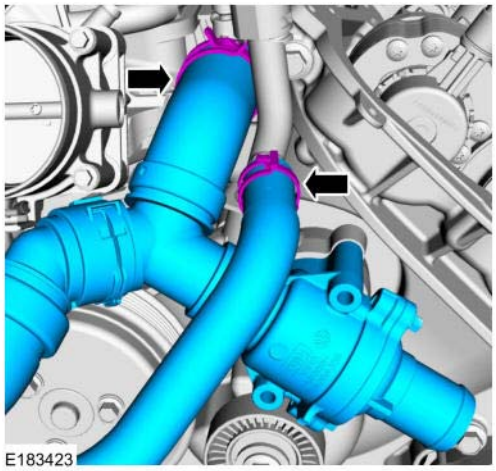
: Motorcraft® Orange Antifreeze/Coolant Concentrated (U.S.) / VC-3-B (U.S.) (WSS-M97B44-D)


E183446

17.

Install the upper radiator hose T-connector/thermostat housing assembly and clamp.

Install the degas bottle coolant hose and clamp.

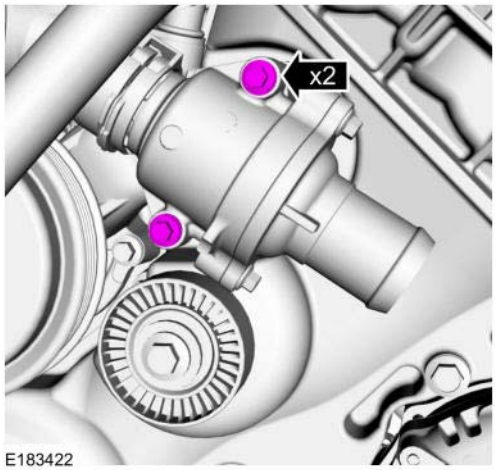

E183423

18.

Install the thermostat housing bolts.

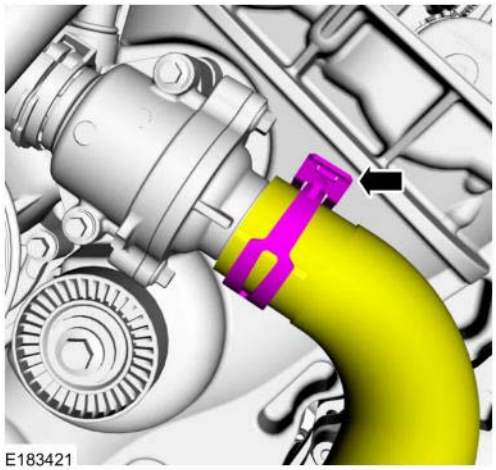
Torque

: 89 lb.in (10 Nm)



19.

Connect the lower radiator hose to the thermostat housing assembly.



20.

Install the following items:

Refer to: Valve Cover LH .

Refer to: Valve Cover RH .

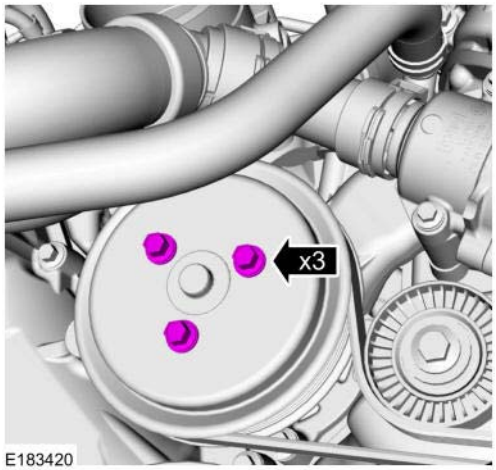
Refer to: Crankshaft Front Seal .

21.

Tighten.

Torque

: 18 lb.ft (25 Nm)



22.

Install the following items:

Refer to: AIR CLEANER - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS).

Refer to: AIR CLEANER OUTLET PIPE .

Refer to: DEGAS BOTTLE).

23.

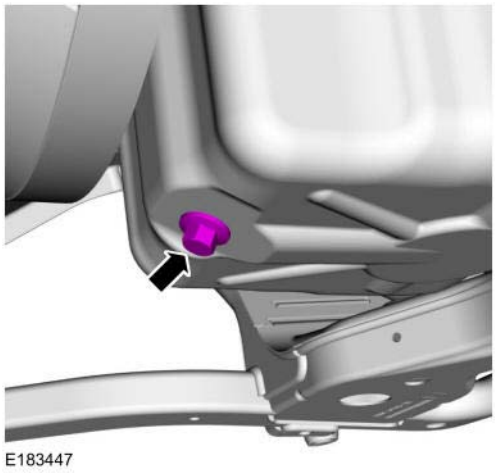
Remove the oil pan drain plug and drain the engine oil.

Use the General Equipment: Oil Drain Equipment

Install the oil pan drain plug.

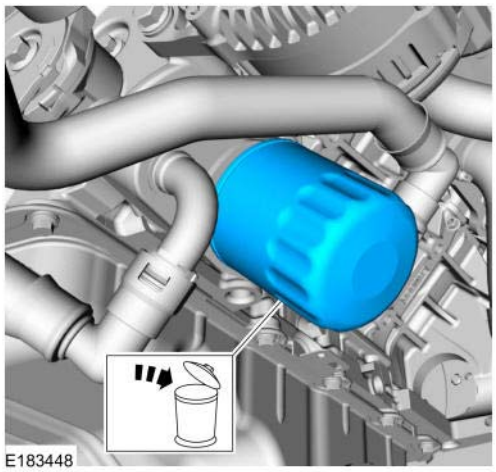
Torque

: 19 lb.ft (26 Nm)



24.

Remove and discard the engine oil filter.



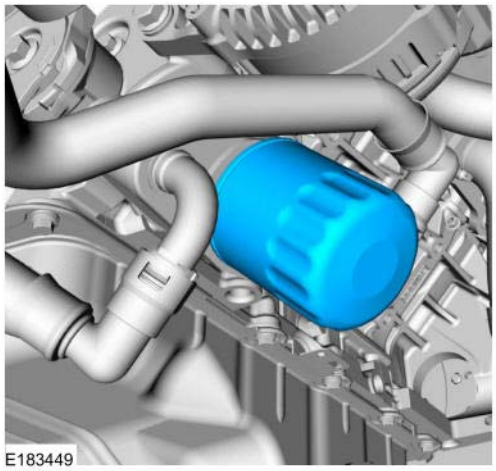
NOTE: Do not lubricate the O-ring seal.

25.
Install a new oil filter.

Torque:

Stage 1: 44 lb.in (5 Nm)

Stage 2: 180°



NOTE: Vehicles are equipped with either an underbody shield or a subframe bracket and underbody shield assembly.

26.

1.

Install the underbody shield and the bolts.

Torque:

A: 97 lb.in (11 Nm)

B: 18 lb.in (2 Nm)

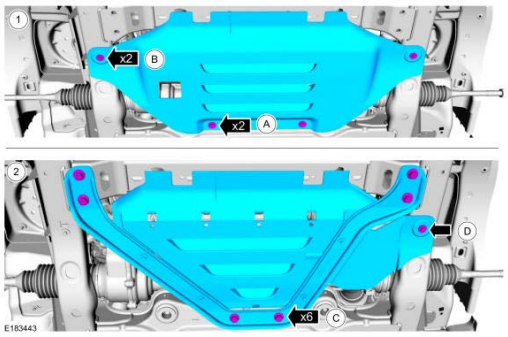
2.

Install the subframe bracket and underbody shield assembly and the bolts.

Torque

C: 46 lb.ft (63 Nm)

D: 18 lb.in (2 Nm)

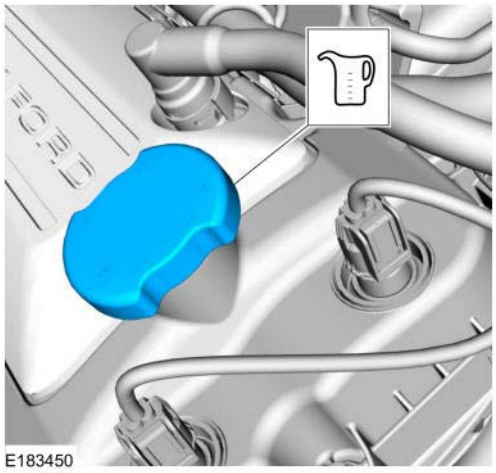


27.

Fill the engine with clean engine oil. Refer to: Specifications .

Material

: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W20-QSP (U.S.) (WSS-M2C945-A)



28.

Connect the battery positive and ground cables. Refer to: Battery Disconnect and Connect .

29.

Fill and bleed the engine cooling system. Refer to: COOLING SYSTEM DRAINING AND VACUUM FILLING .

30.

After completing the repairs, perform the Misfire Monitor Neutral Profile Correction procedure using a diagnostic scan tool.

REMOVAL AND INSTALLATION > ENGINE MOUNT LH

Special Tool(s) / General Equipment

	303-050 (T70P-6000) Lifting Bracket, Engine
	303-F072 Support Bar, Engine

REMOVAL AND INSTALLATION > ENGINE MOUNT LH > REMOVAL

1.

With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

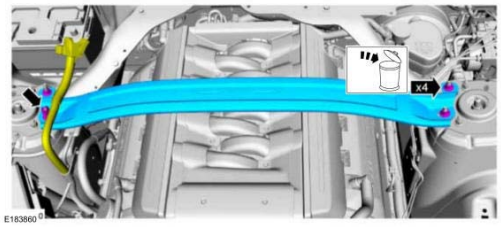
2.

Disconnect the battery ground and positive cables. Refer to: Battery Disconnect and Connect .

3.

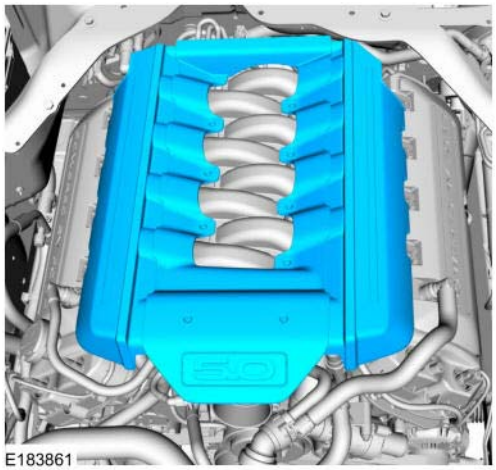
If equipped with a strut tower cross brace, detach the wiring harness retainer.

Remove the nuts and the strut tower cross brace.



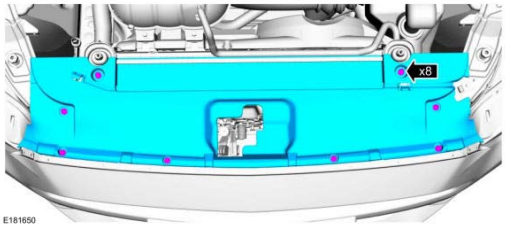
NOTE: The engine appearance cover rubber grommets may remain on the cover. If so, remove the grommets from the cover and install them on the intake manifold before installing the cover.

4.
Remove the engine appearance cover.



5.

Remove the retainers and the radiator top shield.



6.

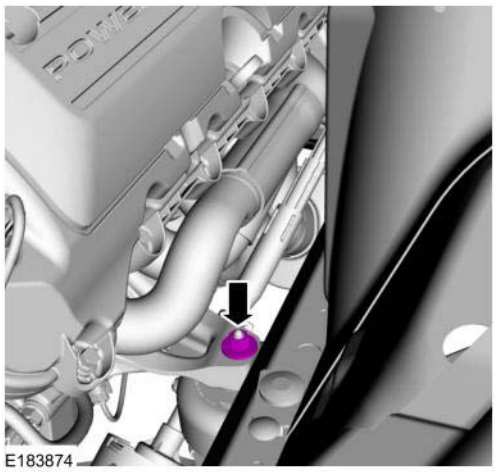
Remove the following items:

Refer to: AIR CLEANER OUTLET PIPE .

Refer to: AIR CLEANER - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS).

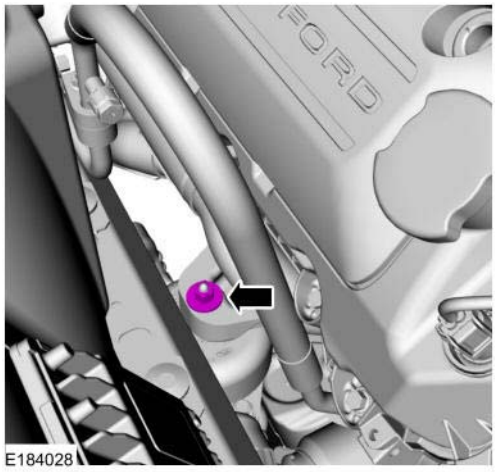
7.

Remove the LH engine mount nut.



8.

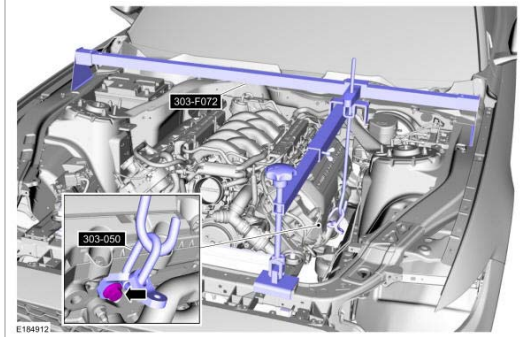
Remove the RH engine mount nut.



NOTE: Do not position the legs of the Engine Support Bar on the fenders. Instead, the legs should be positioned on the body structure. Failure to follow these instructions may result in body damage.

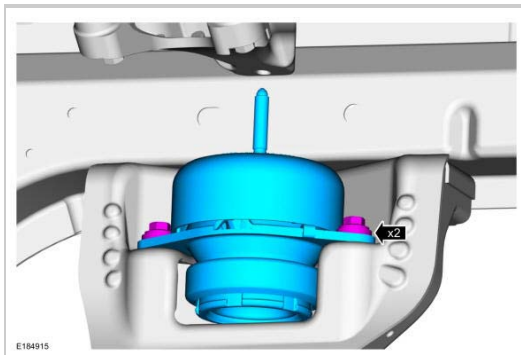
9.
Install the special tools and raise the engine 50 mm (2 inch).

Use Special Service Tool: 303-F072Support Bar, Engine, 303-050 (T70P-6000) Lifting Bracket, Engine.



10.

Remove the bolts and the engine mount.



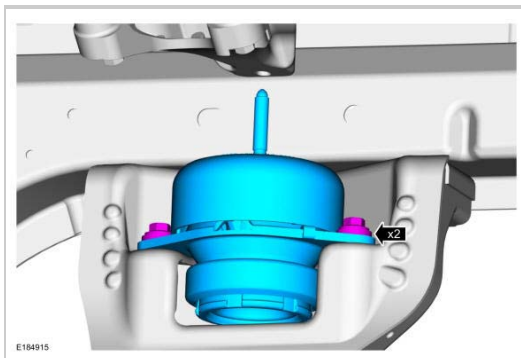
REMOVAL AND INSTALLATION > ENGINE MOUNT LH > INSTALLATION

1.

Install the engine mount and the bolts.

Torque

: 52 lb.ft (70 Nm)

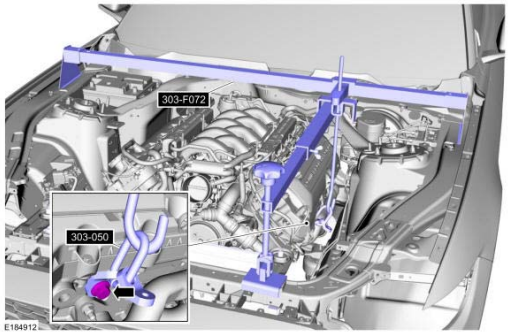


2.

Lower the engine onto the engine mounts and remove the special tools.

Use Special Service Tool: 303-F072 Support Bar, Engine, 303-050 (T70P-6000) Lifting Bracket,

Engine.

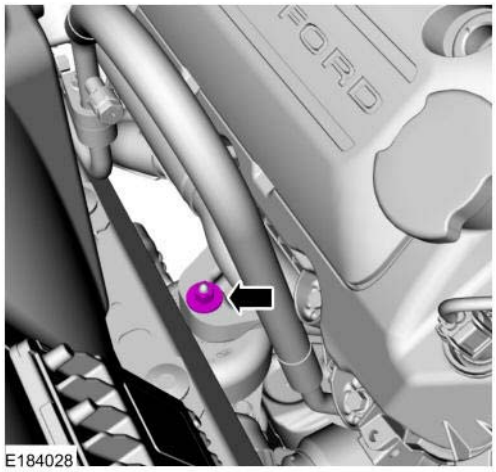


3.

Install the RH engine mount nut.

Torque

: 46 lb.ft (63 Nm)

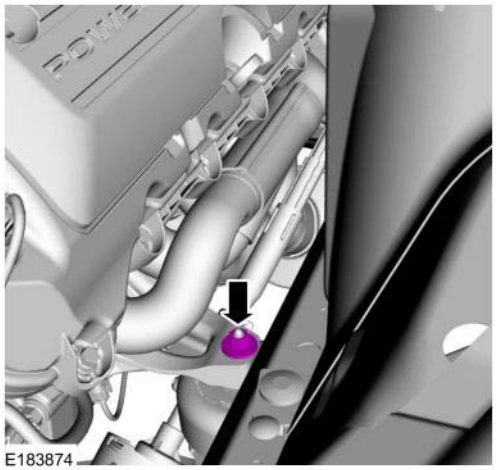


4.

Install the LH engine mount nut.

Torque

: 46 lb.ft (63 Nm)



5.

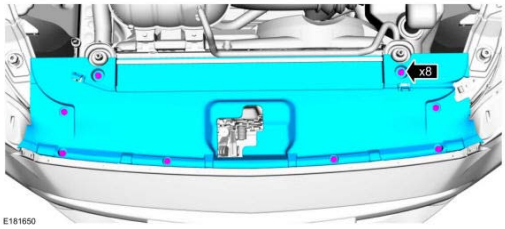
Install the following items:

Refer to: AIR CLEANER - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS).

Refer to: AIR CLEANER OUTLET PIPE .

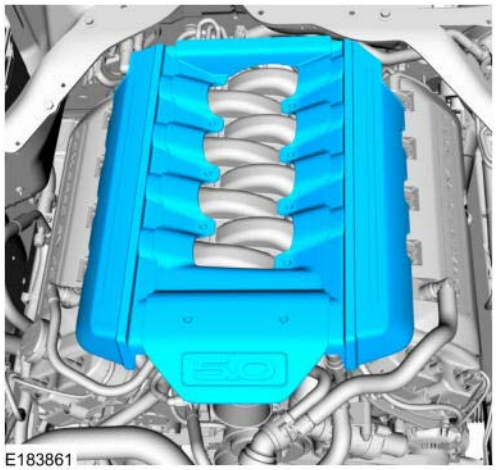
6.

Install the radiator top shield and the retainers.



NOTE: The engine appearance cover rubber grommets may remain on the cover. If so, remove the grommets from the cover and install them on the intake manifold before installing the cover.

7.
Install the engine appearance cover.



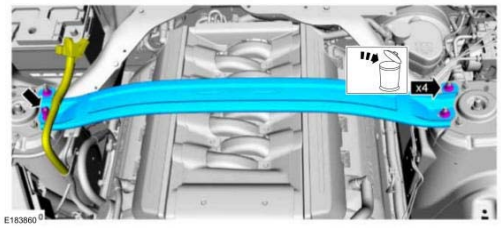
8.

If equipped, install the strut tower cross brace and nuts.

Torque

: 41 lb.ft (55 Nm)

Attach the wiring harness retainer.



9.

Connect the battery ground and positive cables. Refer to: Battery Disconnect and Connect .

REMOVAL AND INSTALLATION > ENGINE MOUNT RH

Special Tool(s) / General Equipment

	303-050 (T70P-6000) Lifting Bracket, Engine

	303-F072 Support Bar, Engine

REMOVAL AND INSTALLATION > ENGINE MOUNT RH > REMOVAL

1.

With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

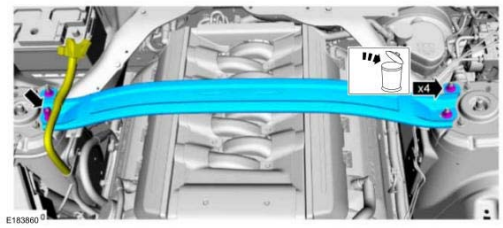
2.

Disconnect the battery ground and positive cables. Refer to: Battery Disconnect and Connect .

3.

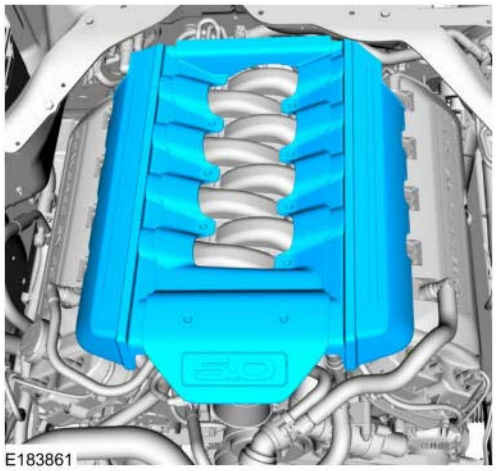
If equipped with a strut tower cross brace, detach the wiring harness retainer.

Remove the nuts and the strut tower cross brace.



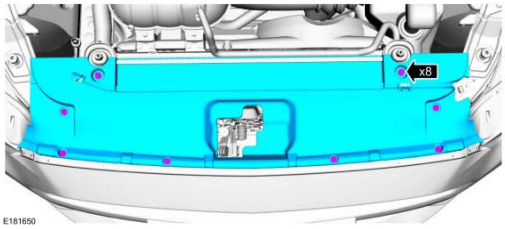
NOTE: The engine appearance cover rubber grommets may remain on the cover. If so, remove the grommets from the cover and install them on the intake manifold before installing the cover.

4.
Remove the engine appearance cover.



5.

Remove the retainers and the radiator top shield.



6.

Remove the following items:

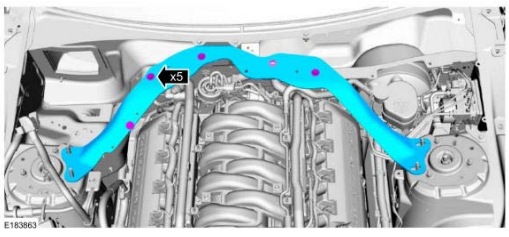
AIR CLEANER OUTLET PIPE .

Refer to: Cowl Panel Grille .

Refer to: Battery Tray .

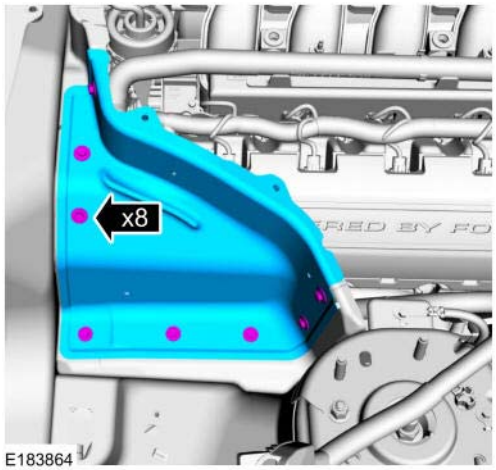
7.

Remove the fasteners and the cowl extension.



8.

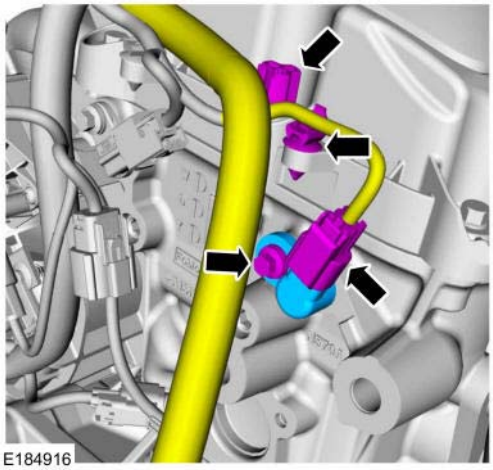
Remove the fasteners and the battery heat shield.



9.

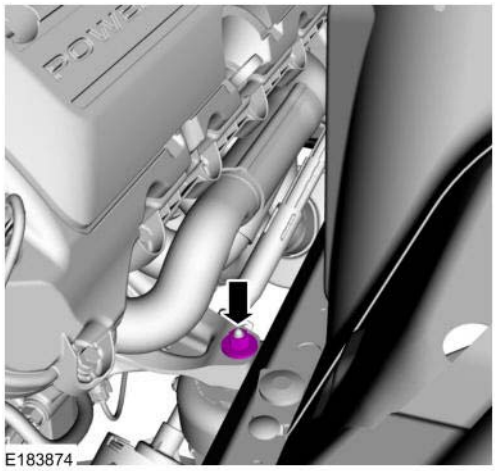
Disconnect the CMP sensor electrical connector, the wiring harness retainers and position the harness aside.

Remove the bolt and the CMP sensor.



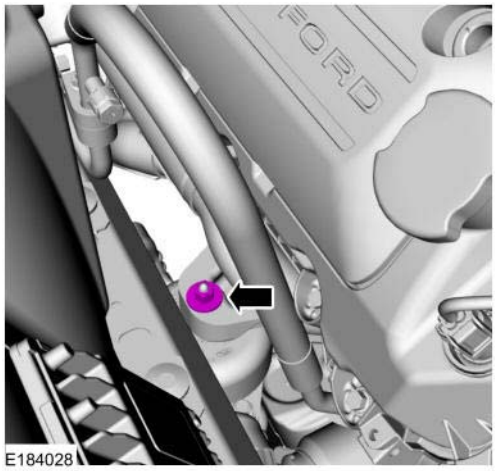
10.

Remove the LH engine mount nut.



11.

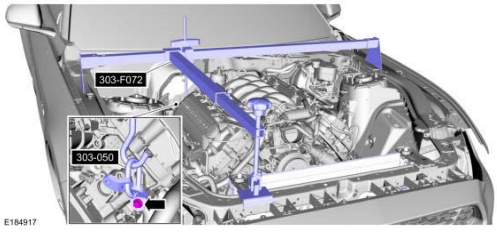
Remove the RH engine mount nut.



NOTE: Do not position the legs of the Engine Support Bar on the fenders. Instead, the legs should be positioned on the body structure. Failure to follow these instructions may result in body damage.

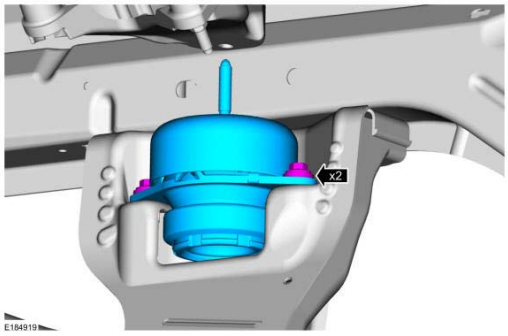
12.
Install the special tools and raise the engine 50 mm (2 inch).

Use Special Service Tool: 303-F072 Support Bar, Engine, 303-050 (T70P-6000) Lifting Bracket, Engine.



13.

Remove the bolts and the engine mount.



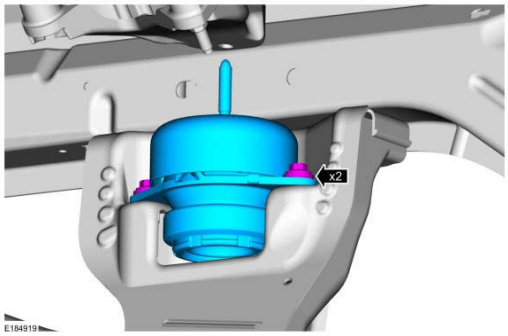
REMOVAL AND INSTALLATION > ENGINE MOUNT RH > INSTALLATION

1.

Install the engine mount and bolts.

Torque

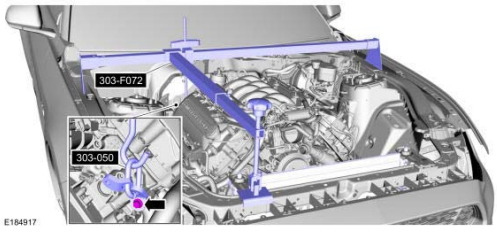
: 52 lb.ft (70 Nm)



2.

Lower the engine onto the engine mounts and remove the special tools.

Use Special Service Tool: 303-F072 Support Bar, Engine, 303-050 (T70P-6000) Lifting Bracket, Engine.

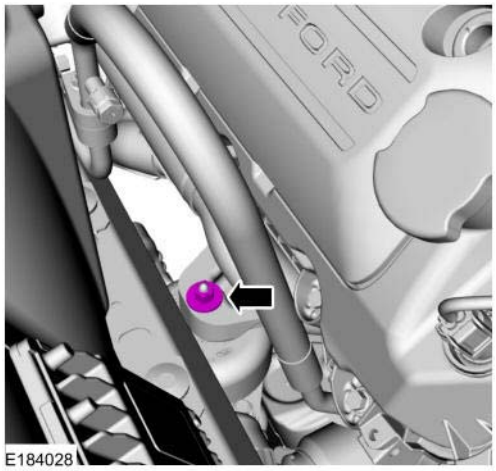


3.

Install the RH engine mount nut.

Torque

: 46 lb.ft (63 Nm)

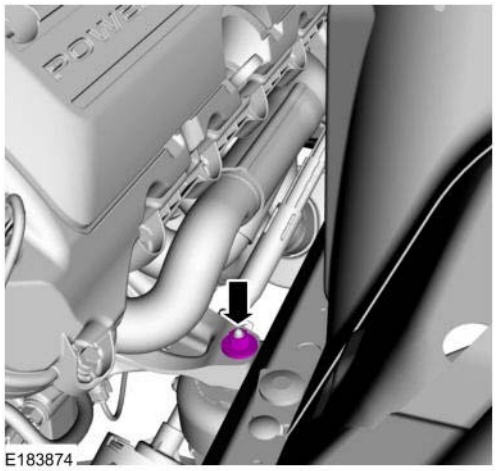


4.

Install the LH engine mount nut.

Torque

: 46 lb.ft (63 Nm)



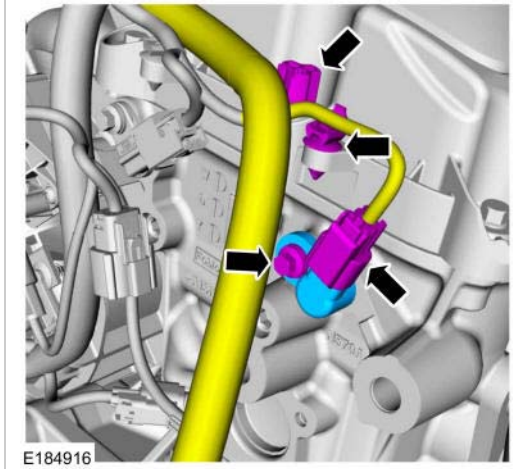
5.

Install the CMP sensor and the bolt.

Torque

: 89 lb.in (10 Nm)

Connect the CMP sensor electrical connector and the wiring harness retainers.

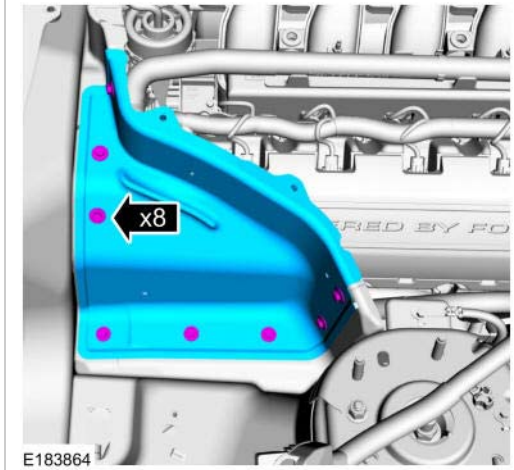


6.

Install the battery heat shield and fasteners.

Torque

: 80 lb.in (9 Nm)

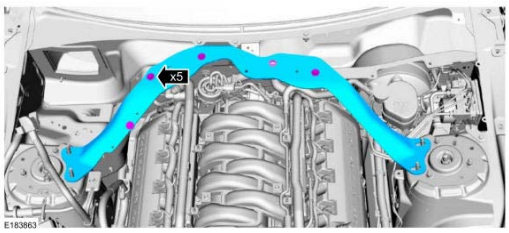


7.

Install the cowl extension and fasteners.

Torque

: 26 lb.ft (35 Nm)



8.

Install the following items:

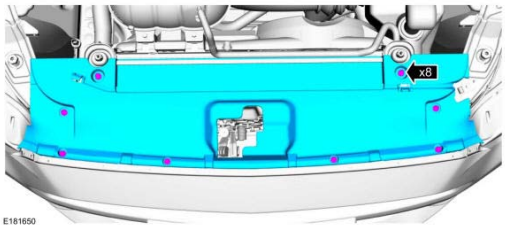
Refer to: Battery Tray .

Refer to: Cowl Panel Grille .

Refer to: AIR CLEANER OUTLET PIPE .

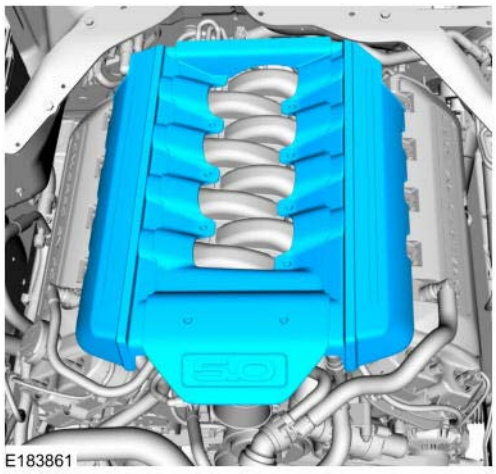
9.

Install the radiator top shield and the retainers.



NOTE: The engine appearance cover rubber grommets may remain on the cover. If so, remove the grommets from the cover and install them on the intake manifold before installing the cover.

10.
Install the engine appearance cover.



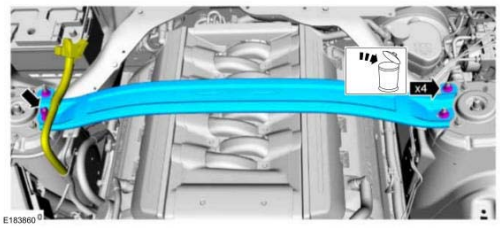
11.

If equipped, install the strut tower cross brace and nuts.

Torque

: 41 lb.ft (55 Nm)

Attach the wiring harness retainer.



12.

Connect the battery ground and positive cables. Refer to: Battery Disconnect and Connect .

REMOVAL AND INSTALLATION > EXHAUST MANIFOLD RH

Special Tool(s) / General Equipment

	303-050 (T70P-6000) Lifting Bracket, Engine
	303-F072 Support Bar, Engine

REMOVAL AND INSTALLATION > EXHAUST MANIFOLD RH > REMOVAL

6-Speed Automatic Transmission - 6R80/6-Speed Manual Transmission - MT82

1.

With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

2.

Recover the refrigerant. Refer to: Air Conditioning (A/C) System Recovery, Evacuation and Charging .

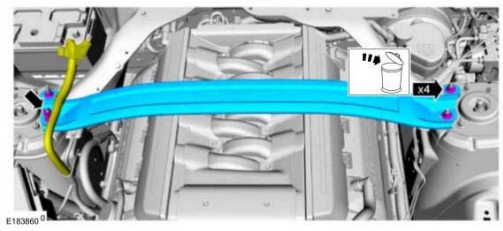
3.

Disconnect the battery ground and positive cables. Refer to: Battery Disconnect and Connect .

4.

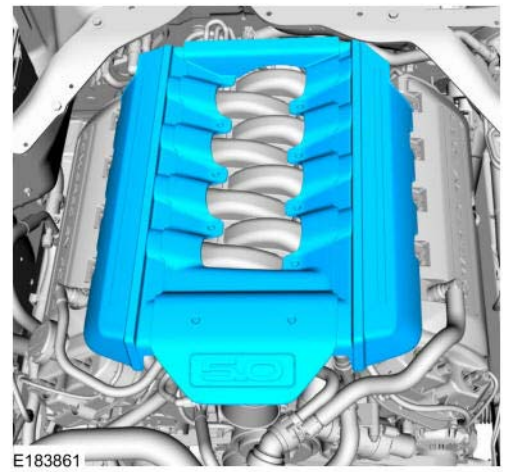
If equipped with a strut tower cross brace, detach the wiring harness retainer.

Remove the nuts and the strut tower cross brace.



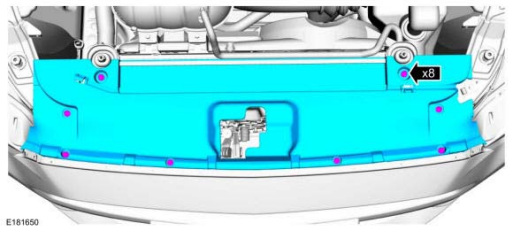
NOTE: The engine appearance cover rubber grommets may remain on the cover. If so, remove the grommets from the cover and install them on the intake manifold before installing the cover.

5.
Remove the engine appearance cover.



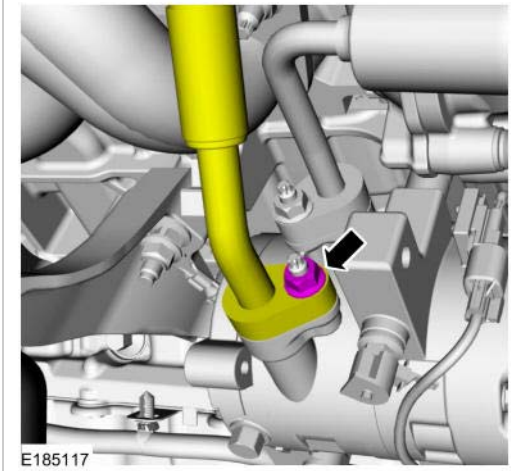
6.

Remove the retainers and the radiator top shield.



NOTE: Discard the O-ring seal and gasket.

7.
Remove the nut and disconnect the A/C compressor fitting.



8.

Remove the following items:

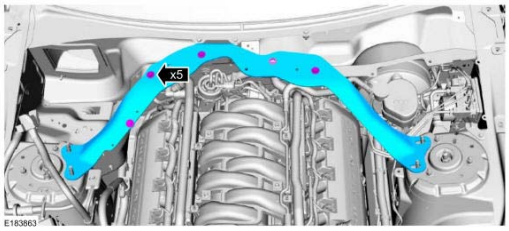
Refer to: AIR CLEANER OUTLET PIPE .

Refer to: Cowl Panel Grille .

Refer to: Battery Tray .

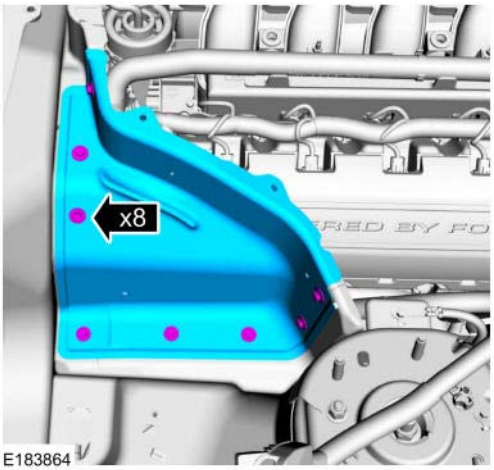
9.

Remove the fasteners and the cowl extension.



10.

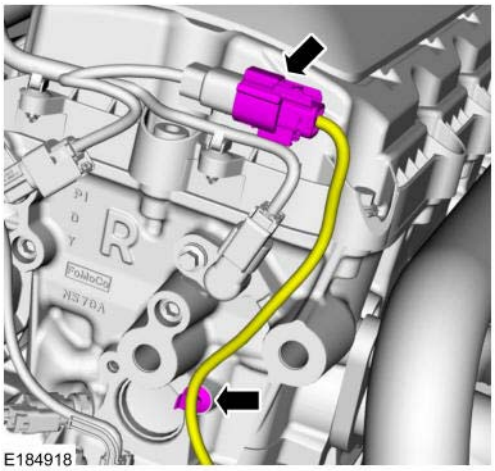
Remove the fasteners and the battery heat shield.



6-Speed Manual Transmission - MT82

11.

Disconnect the HO2S electrical connector and wiring harness retainer.

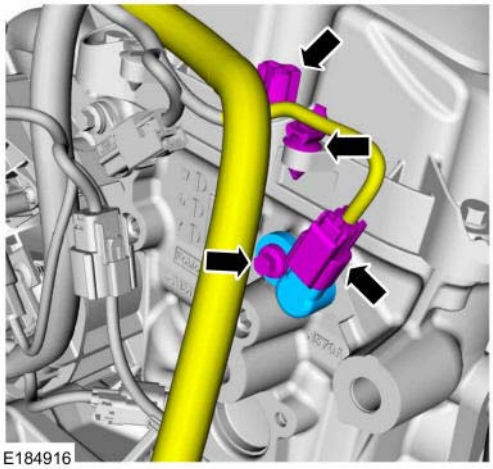


6-Speed Automatic Transmission - 6R80/6-Speed Manual Transmission - MT82

12.

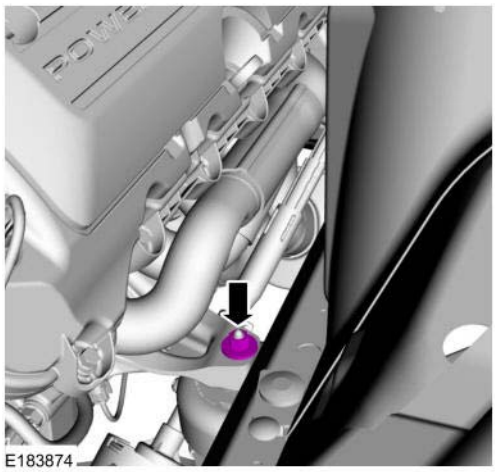
Disconnect the CMP sensor electrical connector, the wiring harness retainers and position the harness aside.

Remove the bolt and the CMP sensor.



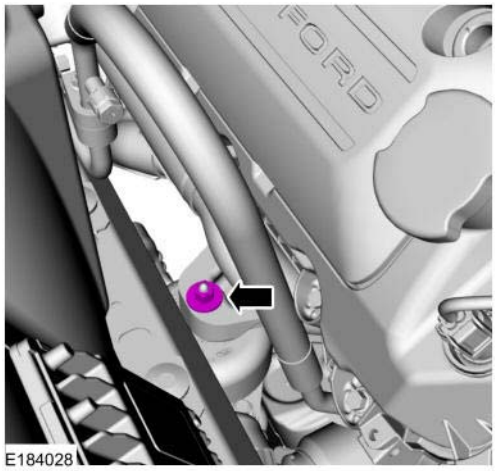
13.

Remove the LH engine mount nut.



14.

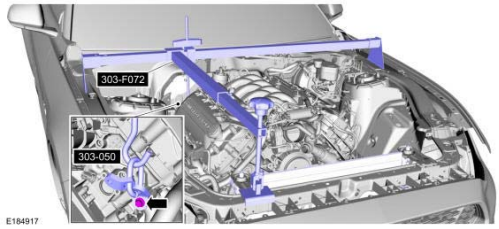
Remove the RH engine mount nut.



NOTE: Do not position the legs of the Engine Support Bar on the fenders. Instead, the legs should be positioned on the body structure. Failure to follow these instructions may result in body damage.

15.
Install the special tools and raise the engine 50 mm (2 inch).

Use Special Service Tool: 303-F072 Support Bar, Engine, 303-050 (T70P-6000) Lifting Bracket, Engine.



16.

Remove the following items:

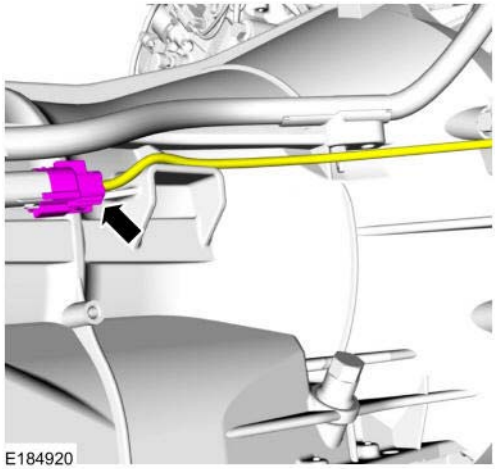
Refer to: CATALYTIC CONVERTER RH .

Refer to: STARTER MOTOR .

6-Speed Automatic Transmission - 6R80

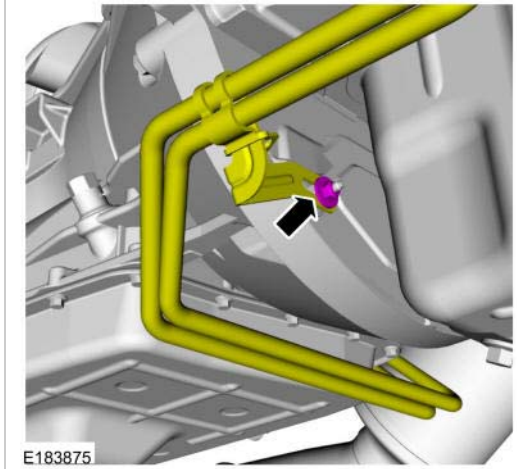
17.

Disconnect the HO2S electrical connector.



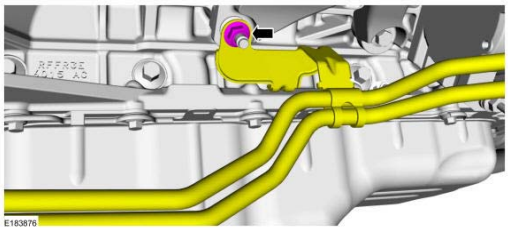
18.

Remove the transmission cooling tube nut and bracket from the flexplate inspection cover stud bolt.



19.

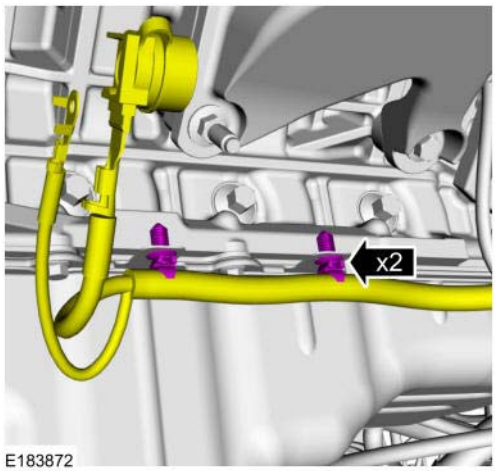
Remove the transmission cooling tube bracket nut and position the bracket and tubes aside.



6-Speed Automatic Transmission - 6R80/6-Speed Manual Transmission - MT82

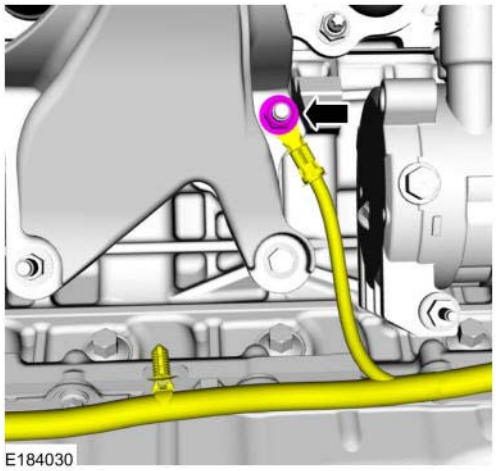
20.

Detach the wiring harness retainers from the oil pan.



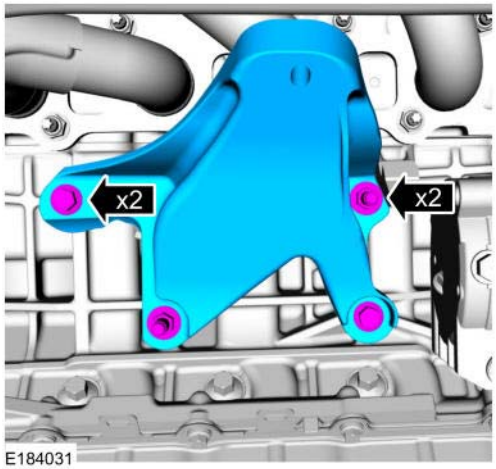
21.

Remove the nut and ground strap from the RH engine mount bracket stud bolt.



22.

Remove the bolts, the stud bolts and the RH engine mount bracket.

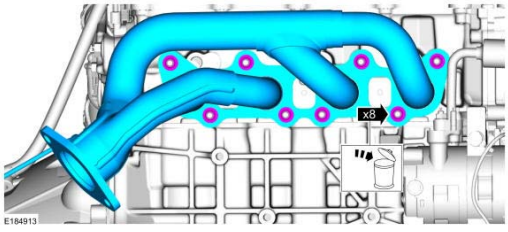


23.

Remove and discard the nuts.

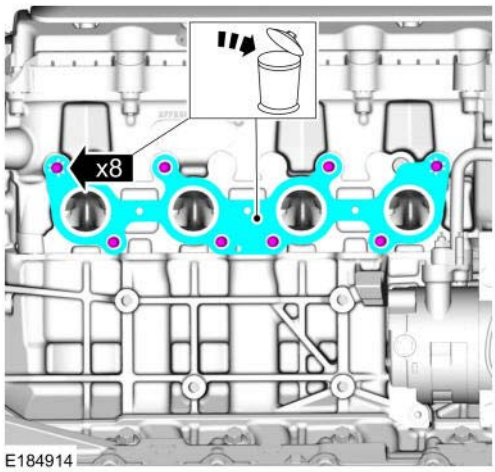
Remove the exhaust manifold.

Clean and inspect the exhaust manifold. Refer to: Exhaust Manifold Cleaning and Inspection .



24.

Remove and discard the gasket and studs.



REMOVAL AND INSTALLATION > EXHAUST MANIFOLD RH > INSTALLATION

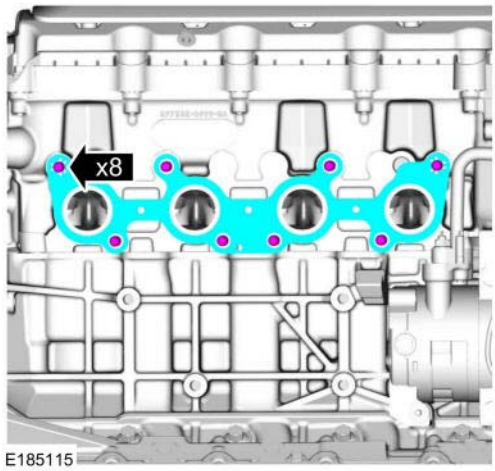
6-Speed Automatic Transmission - 6R80/6-Speed Manual Transmission - MT82

1.

Install new studs and new gasket.

Torque

: 18 lb.ft (25 Nm)



2.

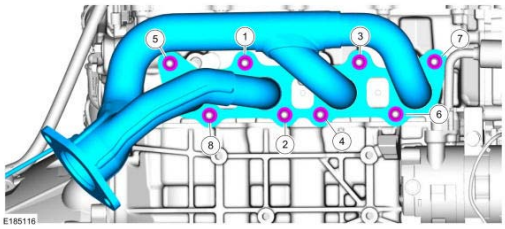
Install the exhaust manifold.

Install the new nuts.

Torque:

Stage 1: 18 lb.ft (24 Nm)

Stage 2: 24 lb.ft (32 Nm)

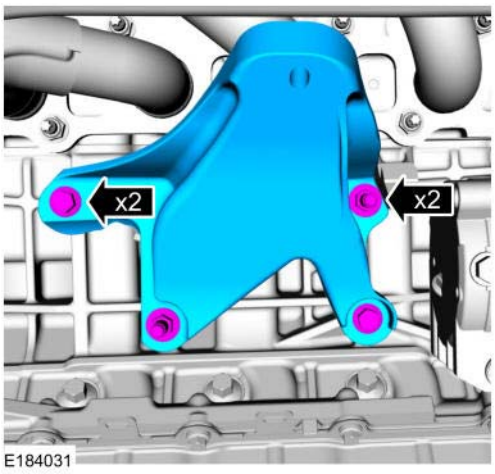


3.

Install the RH engine mount bracket, bolts and stud bolts.

Torque

: 41 lb.ft (55 Nm)

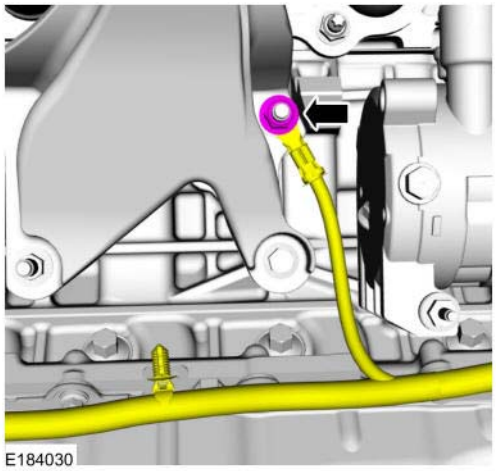


4.

Install the ground strap and nut onto the RH engine mount bracket stud bolt.

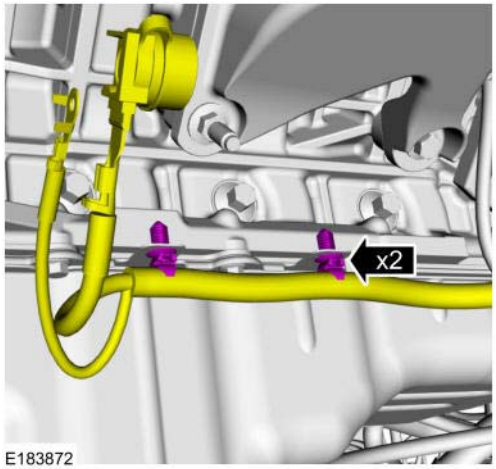
Torque

: 35 lb.ft (48 Nm)



5.

Attach the wiring harness retainers to the oil pan.



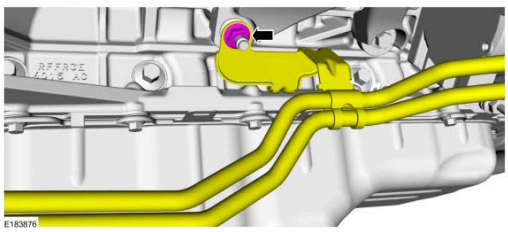
6-Speed Automatic Transmission - 6R80

6.

Install the transmission cooling tube bracket and nut.

Torque

: 35 lb.ft (48 Nm)

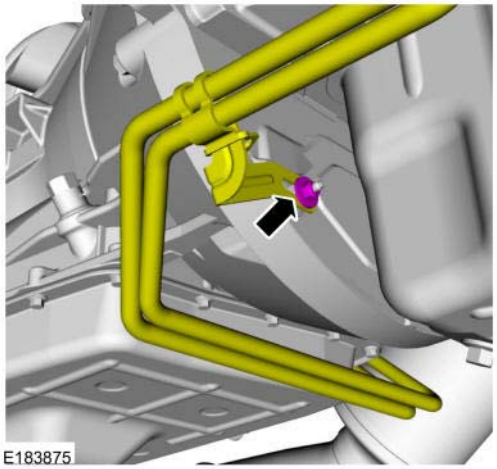


7.

Install the transmission cooling tube bracket and nut.

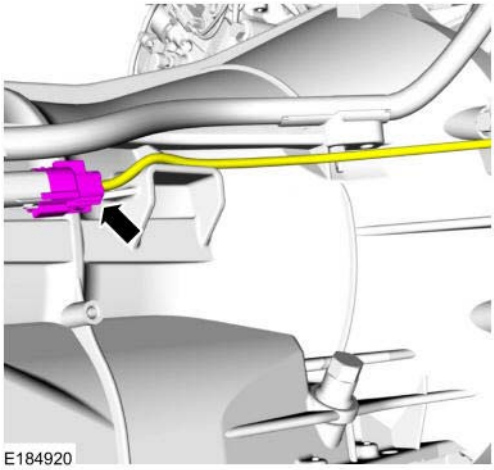
Torque

: 124 lb.in (14 Nm)



8.

Connect the HO2S electrical connector.



6-Speed Automatic Transmission - 6R80/6-Speed Manual Transmission - MT82

9.

Install the following items:

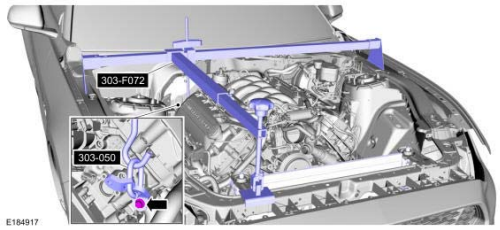
Refer to: STARTER MOTOR .

Refer to: CATALYTIC CONVERTER RH .

10.

Lower the engine onto the engine mounts and remove the special tools.

Use Special Service Tool: 303-F072 Support Bar, Engine, 303-050 (T70P-6000) Lifting Bracket, Engine.

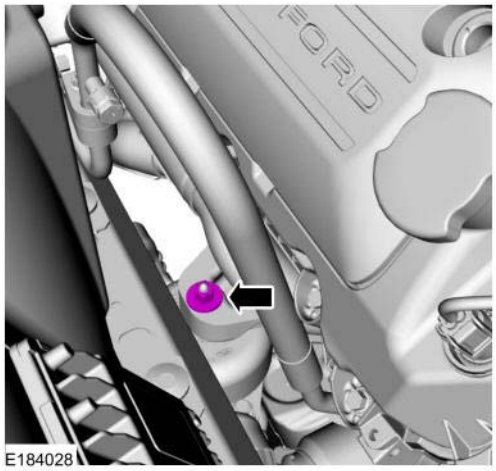


11.

Install the RH engine mount nut.

Torque

: 46 lb.ft (63 Nm)

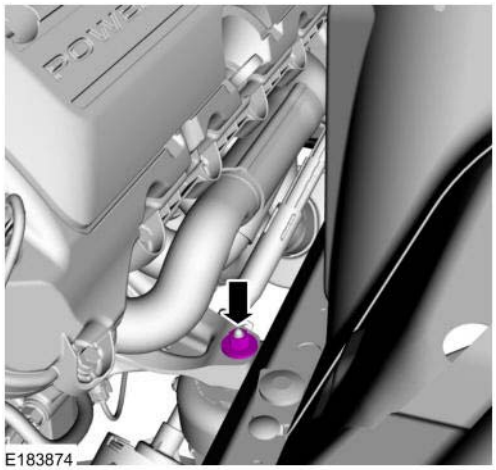


12.

Install the LH engine mount nut.

Torque

: 46 lb.ft (63 Nm)



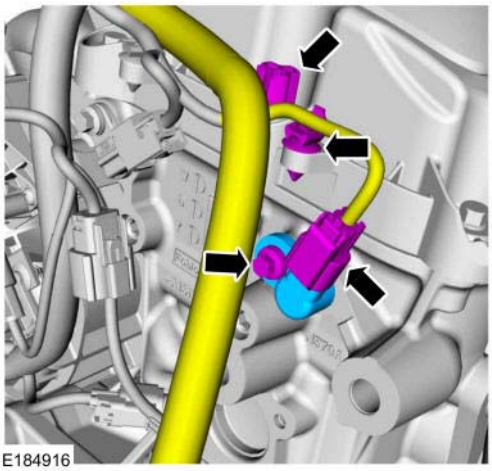
13.

Install the CMP sensor and the bolt.

Torque

: 89 lb.in (10 Nm)

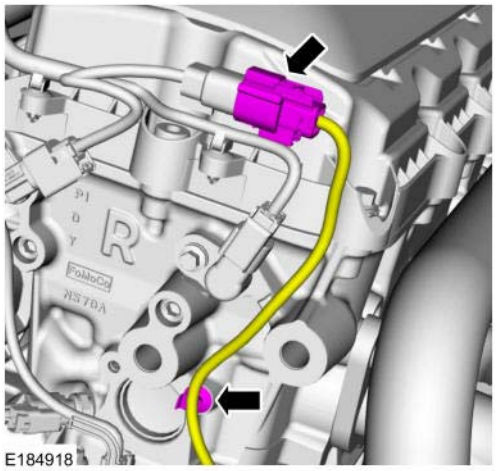
Connect the CMP sensor electrical connector and the wiring harness retainers.



6-Speed Manual Transmission - MT82

14.

Connect the HO2S electrical connector and wiring harness retainer.



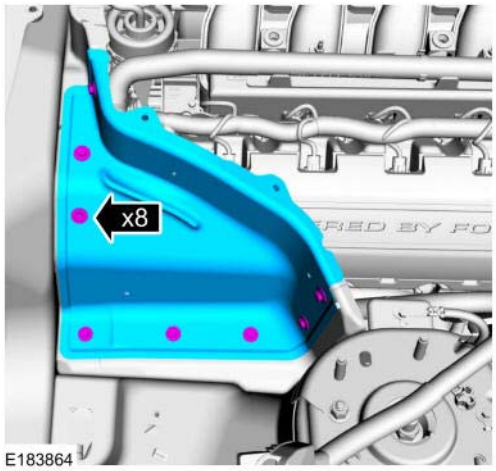
6-Speed Automatic Transmission - 6R80/6-Speed Manual Transmission - MT82

15.

Install the battery heat shield and fasteners.

Torque

: 80 lb.in (9 Nm)

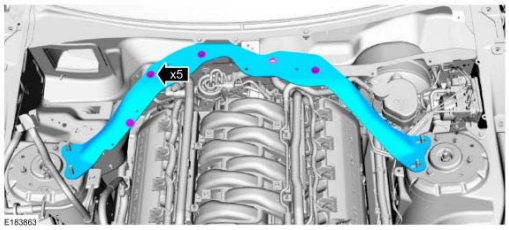


16.

Install the cowl extension and fasteners.

Torque

: 26 lb.ft (35 Nm)



17.

Install the following items:

Refer to: Battery Tray .

Refer to: Cowl Panel Grille .

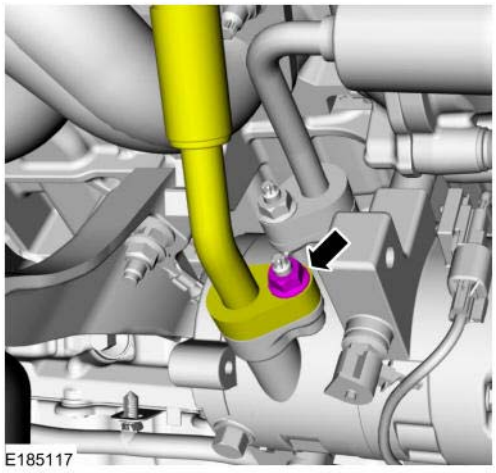
Refer to: AIR CLEANER OUTLET PIPE .

NOTE: Install a new O-ring seal and gasket.

18.
Connect the A/C compressor fitting and install the nut.

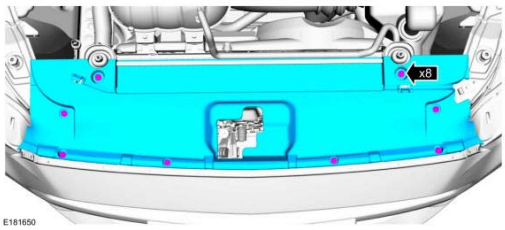
Torque

: 133 lb.in (15 Nm)



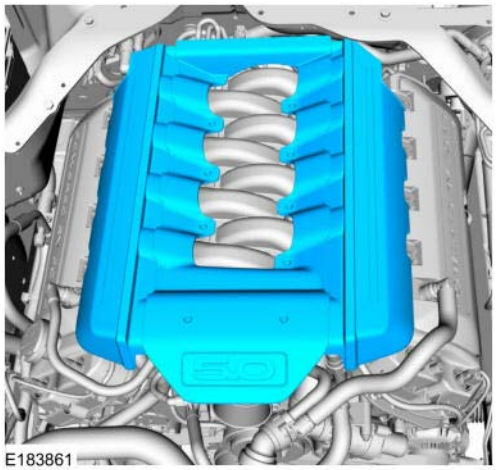
19.

Install the radiator top shield and the retainers.



NOTE: The engine appearance cover rubber grommets may remain on the cover. If so, remove the grommets from the cover and install them on the intake manifold before installing the cover.

20.
Install the engine appearance cover.



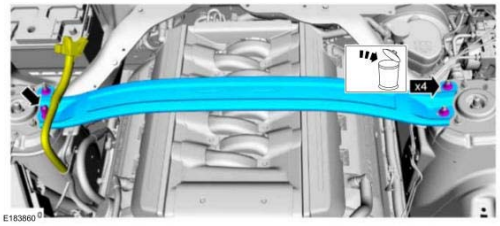
21.

If equipped, install the strut tower cross brace and nuts.

Torque

: 41 lb.ft (55 Nm)

Attach the wiring harness retainer.



22.

Connect the battery ground and positive cables. Refer to: Battery Disconnect and Connect .

23.

Recharge the A/C system. Refer to: Air Conditioning (A/C) System Recovery, Evacuation and Charging .

REMOVAL AND INSTALLATION > FLEXPLATE > REMOVAL

1.

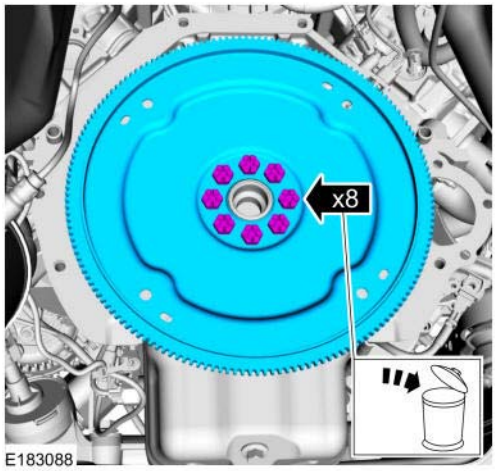
Remove the transmission. Refer to: Transmission - 5.0L 32V Ti-VCT .

NOTE: The flexplate bolts are torque-to-yield design and are not reusable.

2.

Remove and discard the bolts. Remove and discard the bolts.

Remove the flexplate.



REMOVAL AND INSTALLATION > FLEXPLATE > INSTALLATION

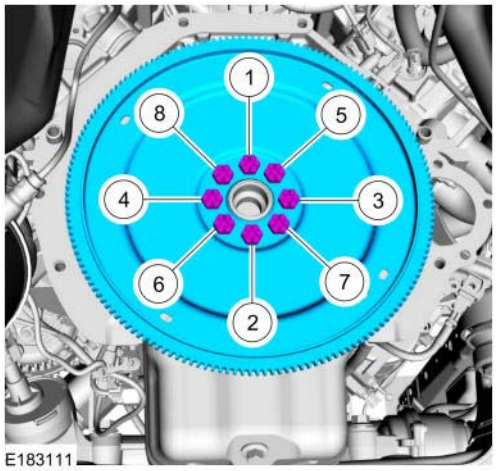
1.

Install the flexplate and the bolts.

Torque:

Stage 1: 177 lb.in (20 Nm)

Stage 2: 60°



2.

Install the transmission. Refer to: Transmission - 5.0L 32V Ti-VCT .

3.

After completing the repairs, perform the Misfire Monitor Neutral Profile Correction procedure using a diagnostic scan tool.

REMOVAL AND INSTALLATION > FLYWHEEL > REMOVAL

1.

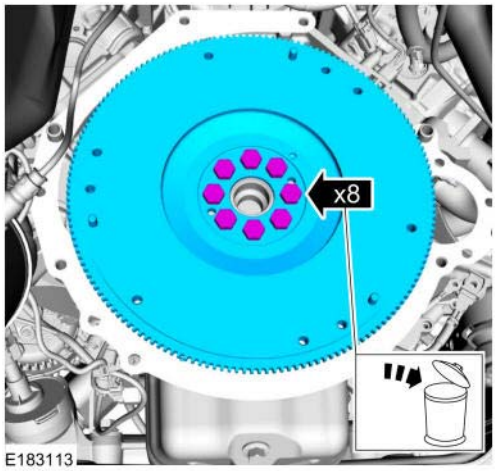
Remove the clutch disc. Refer to: Clutch Disc and Pressure Plate - 5.0L 32V Ti-VCT .

NOTE: The flywheel bolts are torque-to-yield design and are not reusable.

2.

Remove and discard the bolts.

Remove the flywheel.



REMOVAL AND INSTALLATION > FLYWHEEL > INSTALLATION

1.

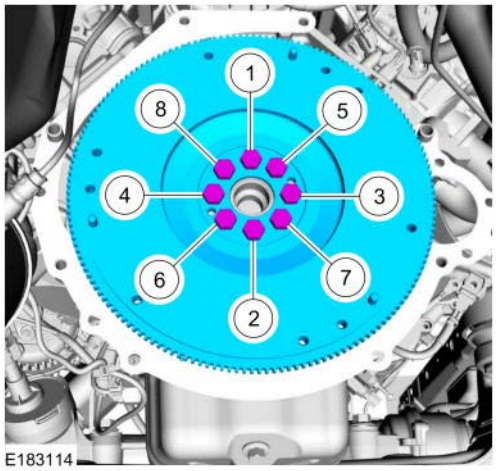
Install the flywheel and the bolts.

Torque:

Stage 1: 89 lb.in (10 Nm)

Stage 2: 177 lb.in (20 Nm)

Stage 3: 60°



2.

Install the clutch disc. Refer to: Clutch Disc and Pressure Plate - 5.0L 32V Ti-VCT .

3.

After completing the repairs, perform the Misfire Monitor Neutral Profile Correction procedure using a diagnostic scan tool.

REMOVAL AND INSTALLATION > INTAKE MANIFOLD > REMOVAL

NOTE: During engine repair procedures, cleanliness is extremely important. Any foreign material, including any material created while cleaning gasket surfaces, that enters the oil passages, coolant passages or the oil pan, can cause engine failure.

1.

Release the fuel system pressure. Refer to: FUEL SYSTEM PRESSURE RELEASE - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS).

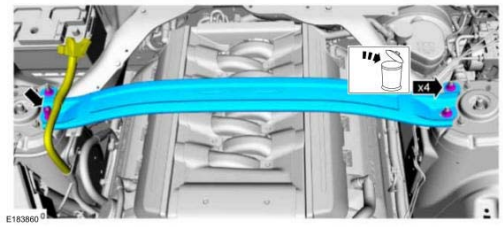
2.

Disconnect the battery ground and positive cables. Refer to: Battery Disconnect and Connect .

3.

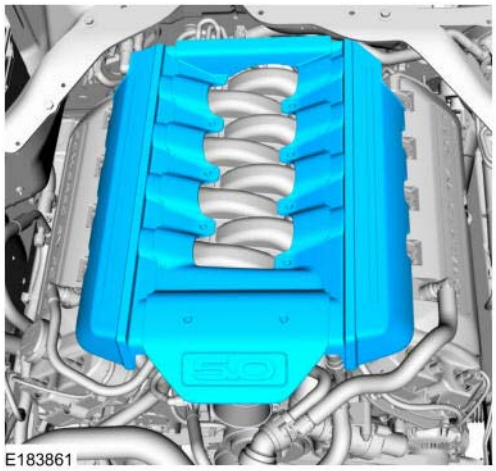
If equipped with a strut tower cross brace, detach the wiring harness retainer.

Remove the nuts and the strut tower cross brace.



NOTE: The engine appearance cover rubber grommets may remain on the cover. If so, remove the grommets from the cover and install them on the intake manifold before installing the cover.

4.
Remove the engine appearance cover.



5.

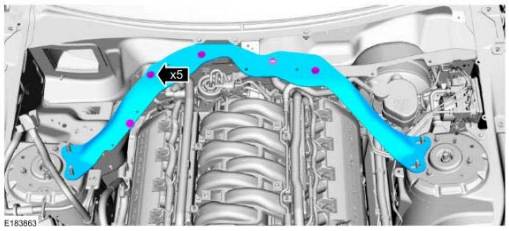
Remove the following items:

Refer to: AIR CLEANER OUTLET PIPE .

Refer to: Cowl Panel Grille .

6.

Remove the fasteners and the cowl extension.



7.

1.

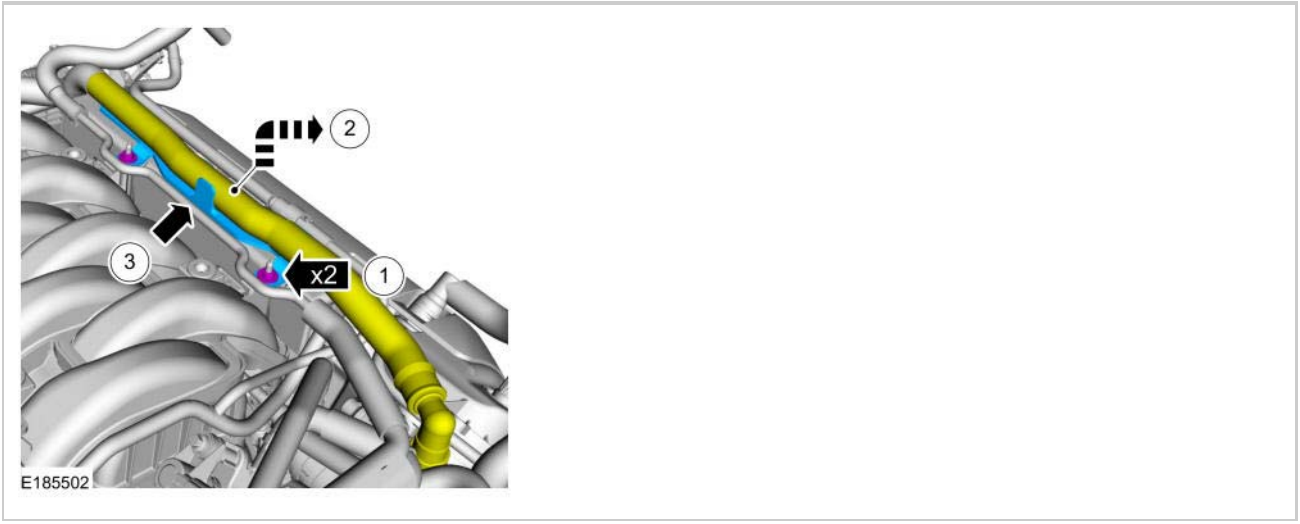
Remove the nuts.

2.

Position the heater hose aside.

3.

Remove the heater hose support.

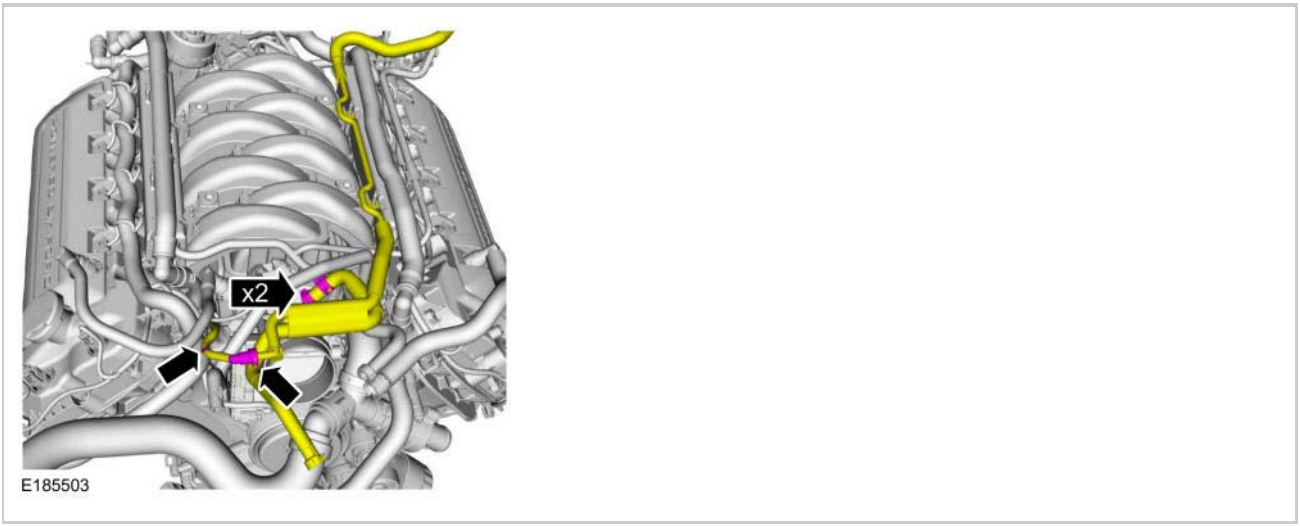


8.

Detach the vacuum tube retainer.

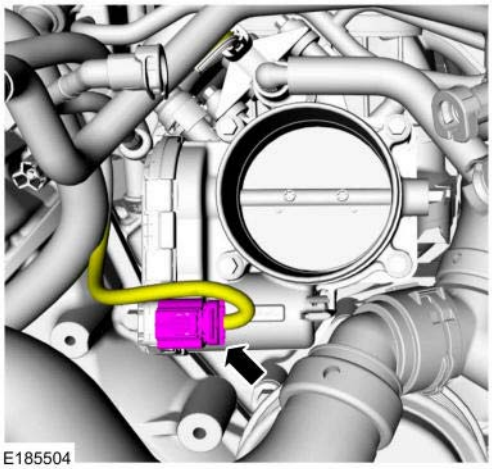
Disconnect the vacuum tube. Refer to: QUICK RELEASE COUPLING .

Release the clamps and position the vacuum tube aside.



9.

Disconnect the throttle body electrical connector.



10.

1.

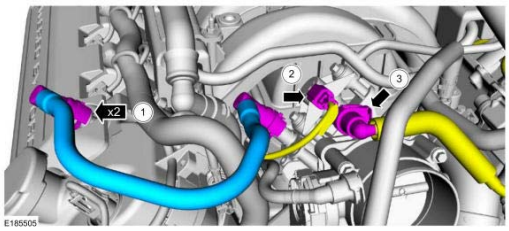
Disconnect the couplings and remove the crankcase vent tube. Refer to: QUICK RELEASE COUPLING .

2.

Disconnect the EVAP purge valve electrical connector.

3.

Disconnect the EVAP tube and position aside. Refer to: QUICK RELEASE COUPLING .



11.

1.

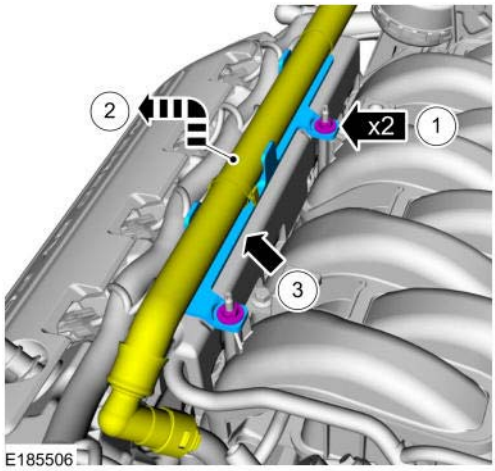
Remove the nuts.

2.

Position the heater hose aside.

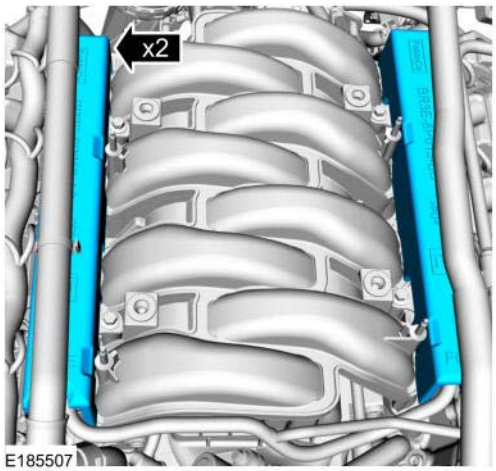
3.

Remove the heater hose support.



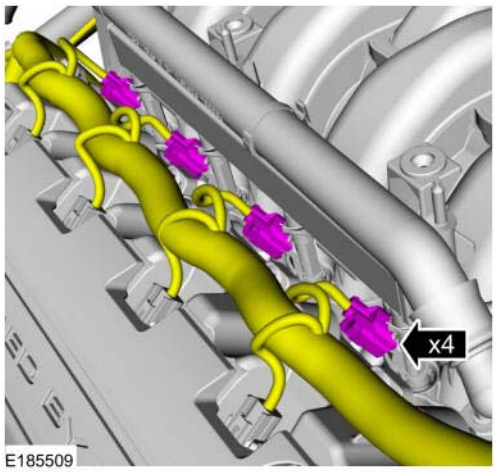
12.

Remove the fuel rail insulators.



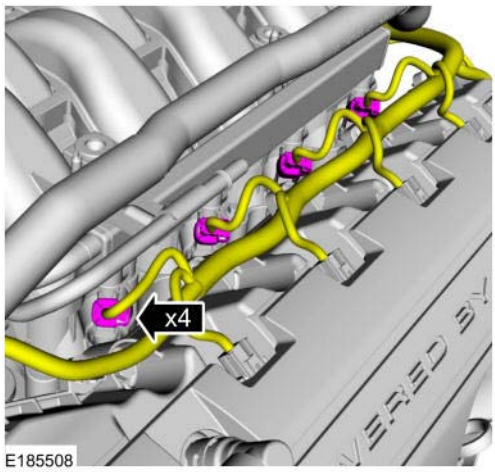
13.

Disconnect the RH fuel injector electrical connectors.



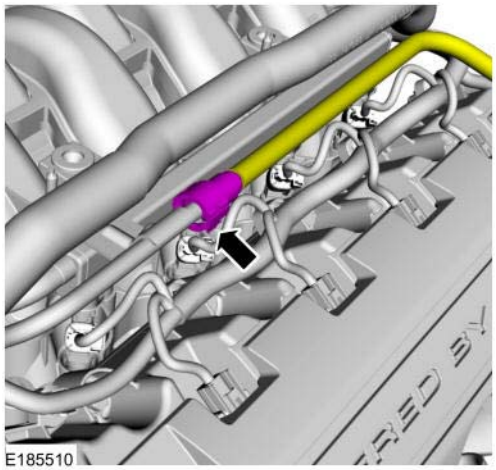
14.

Disconnect the LH fuel injector electrical connectors.



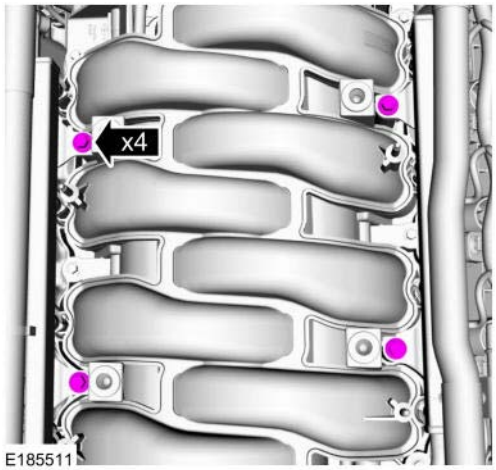
15.

Disconnect the fuel supply tube. Refer to: QUICK RELEASE COUPLING .



NOTE: It is not necessary to remove the fuel rail from the intake manifold assembly.

16.
Remove the fuel rail bolts.



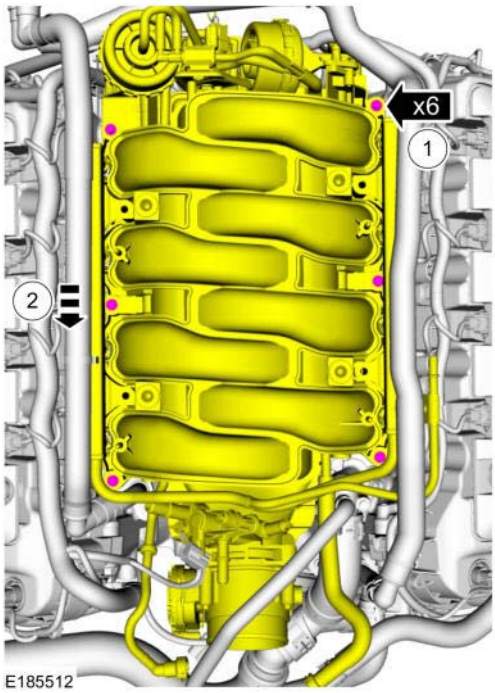
17.

1.

Loosen the intake manifold bolts.

2.

Position the manifold up and towards the front of the engine to access the rear of the manifold.

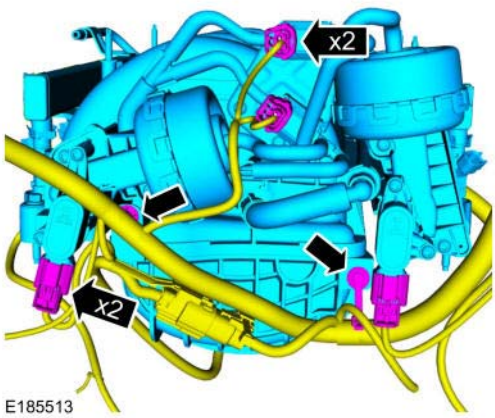


18.

Disconnect the wiring harness electrical connectors.

Detach the wiring harness retainers.

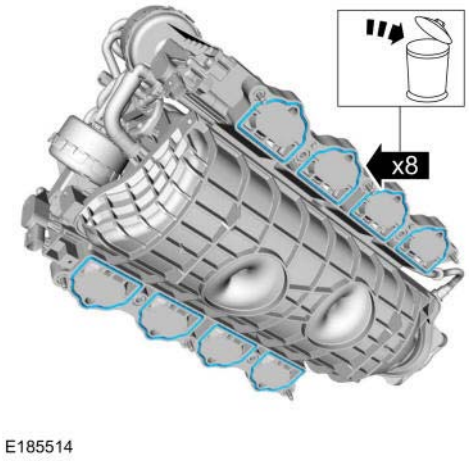
Remove the intake manifold.



19.

Remove and discard the gaskets.

Clean and inspect all sealing surfaces.

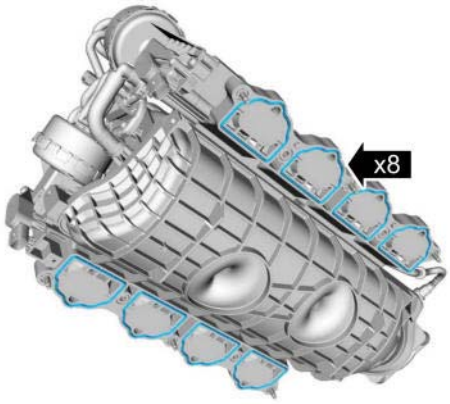


REMOVAL AND INSTALLATION > INTAKE MANIFOLD > INSTALLATION

NOTE: If the engine is repaired or replaced because of upper engine failure, typically including valve or piston damage, check the intake manifold for metal debris. If metal debris if found, install a new intake manifold. Failure to follow these instructions can result in engine damage.

1.

Install new gaskets.



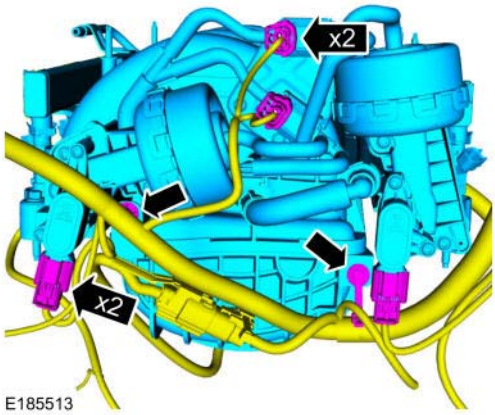
E185653

2.

Position the intake manifold onto the engine.

Attach the wiring harness retainers.

Connect the wiring harness electrical connectors.



E185513

3.

1.

Position the manifold to the installed position.

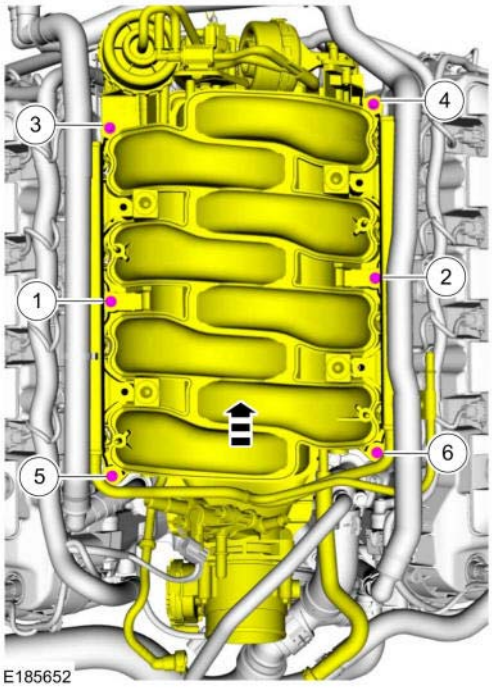
2.

Tighten the intake manifold bolts.

Torque:

Stage 1: 106 lb.in (12 Nm)

Stage 2: 35°



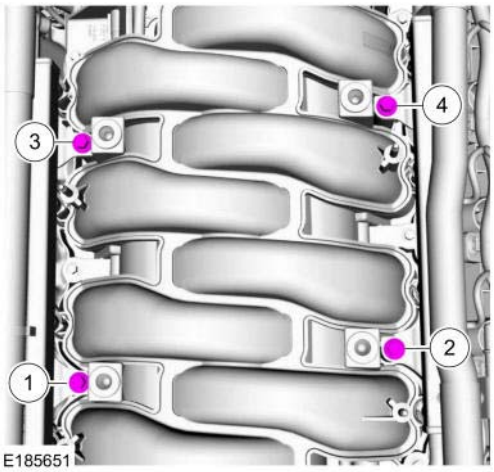
4.

Install the fuel rail bolts.

Torque

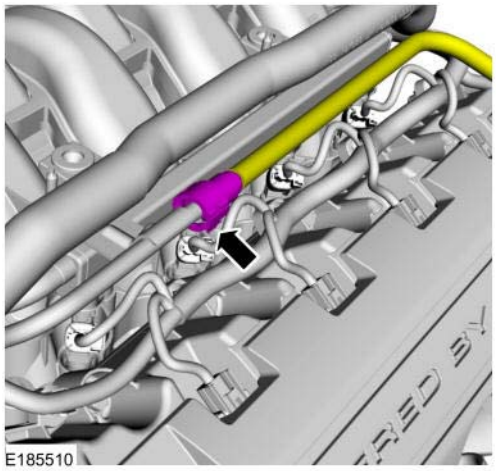
Stage 1: 89 lb.in (10 Nm)

Stage 2: 90°



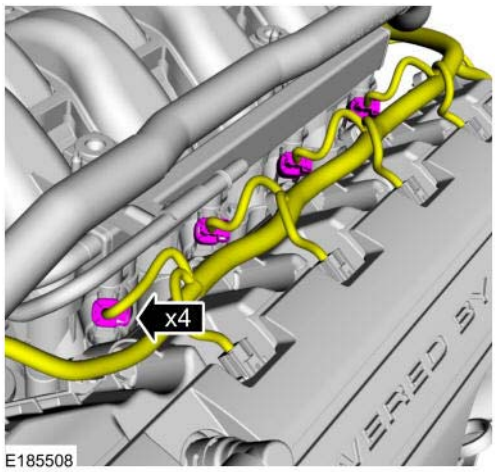
5.

Connect the fuel supply tube. Refer to: QUICK RELEASE COUPLING .



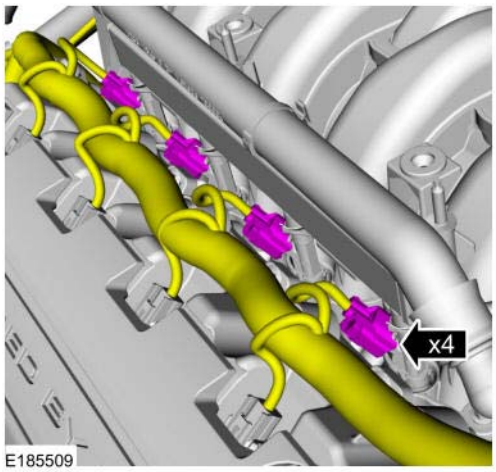
6.

Connect the LH fuel injector electrical connectors.



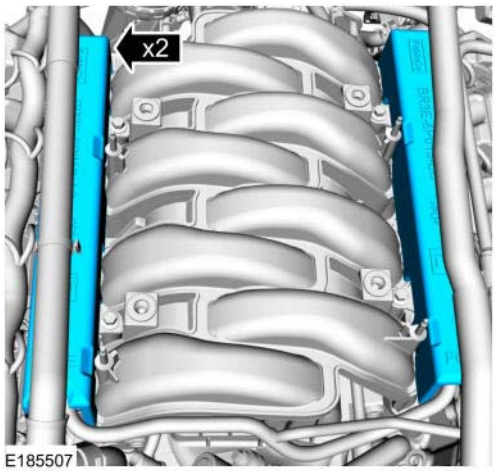
7.

Connect the RH fuel injector electrical connectors.



8.

Install the fuel rail insulators.



9.

1.

Install the heater hose support.

2.

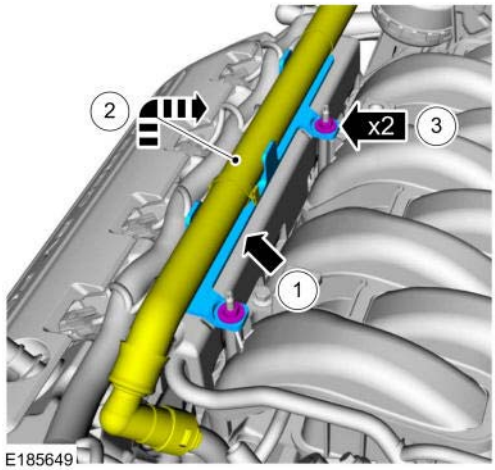
Position the heater hose.

3.

Install the nuts.

Torque

: 62 lb.in (7 Nm)



10.

1.

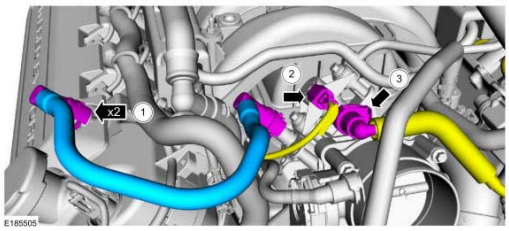
Install the crankcase vent tube and connect the couplings. Refer to: QUICK RELEASE COUPLING .

2.

Connect the EVAP purge valve electrical connector.

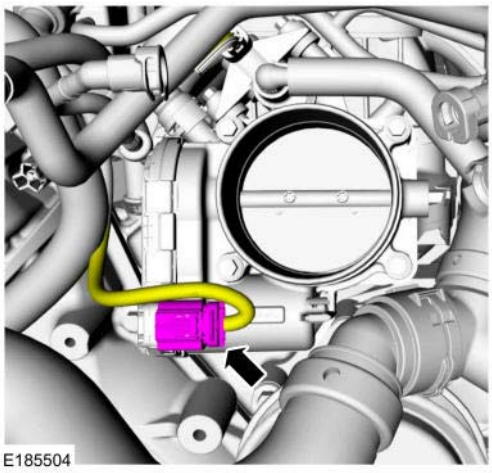
3.

Connect the EVAP tube. Refer to: QUICK RELEASE COUPLING .



11.

Connect the throttle body electrical connector.

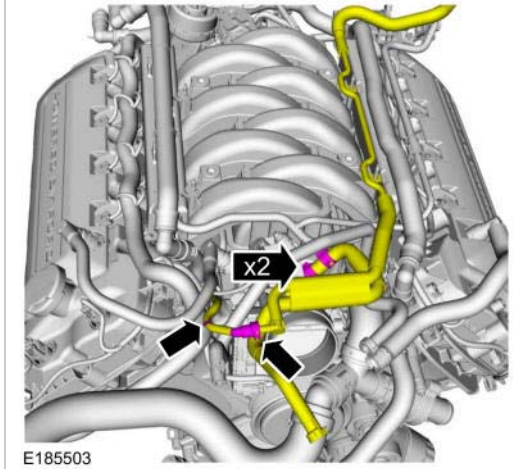


12.

Install the vacuum tube and clamps.

Connect the vacuum tube. Refer to: QUICK RELEASE COUPLING .

Attach the vacuum tube retainer.



13.

1.

Install the heater hose support.

2.

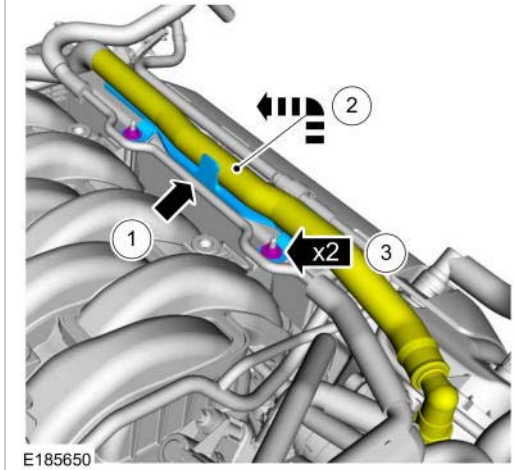
Position the heater hose.

3.

Install the nuts.

Torque

: 62 lb.in (7 Nm)

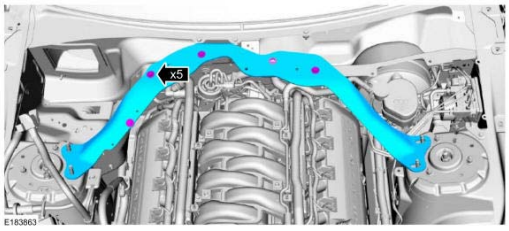


14.

Install the cowl extension and fasteners.

Torque

: 26 lb.ft (35 Nm)



15.

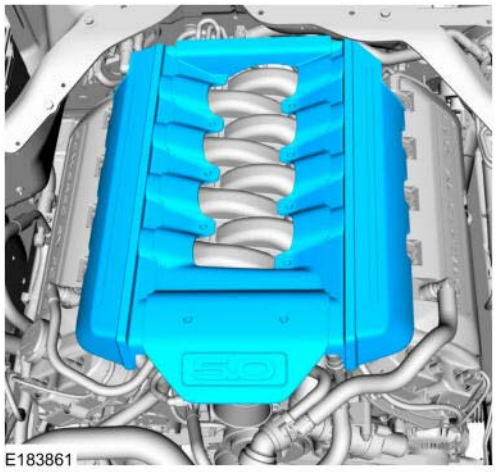
Install the following items:

Refer to: Cowl Panel Grille .

AIR CLEANER OUTLET PIPE .

NOTE: The engine appearance cover rubber grommets may remain on the cover. If so, remove the grommets from the cover and install them on the intake manifold before installing the cover.

16.
Install the engine appearance cover.



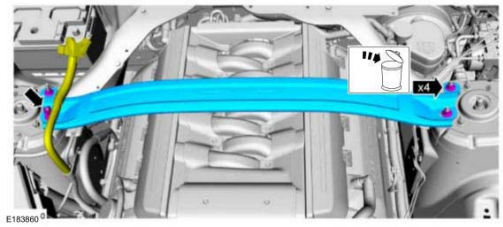
17.

If equipped, install the strut tower cross brace and nuts.

Torque

: 41 lb.ft (55 Nm)

Attach the wiring harness retainer.



18.

Connect the battery ground and positive cables. Refer to: Battery Disconnect and Connect .

REMOVAL AND INSTALLATION > OIL COOLER

Special Tool(s) / General Equipment

Locking Pliers

Materials

Name	Specification
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) XO-5W20-QSP (U.S.)	WSS-M2C945-A
Motorcraft® Orange Antifreeze/Coolant Concentrated (U.S.)VC-3-B (U.S.)	WSS-M97B44-D

REMOVAL AND INSTALLATION > OIL COOLER > REMOVAL

1.

With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

NOTE: Vehicles are equipped with either an underbody shield or a subframe bracket and underbody shield assembly.

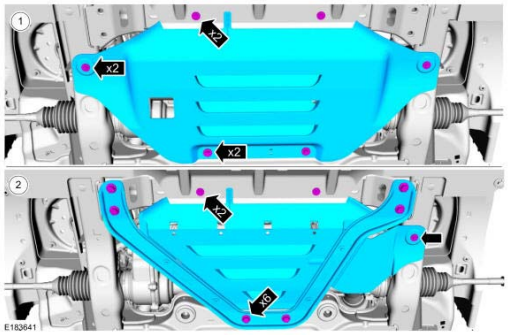
2.

1.

Loosen the 2 front bolts, remove the remaining bolts and the underbody shield.

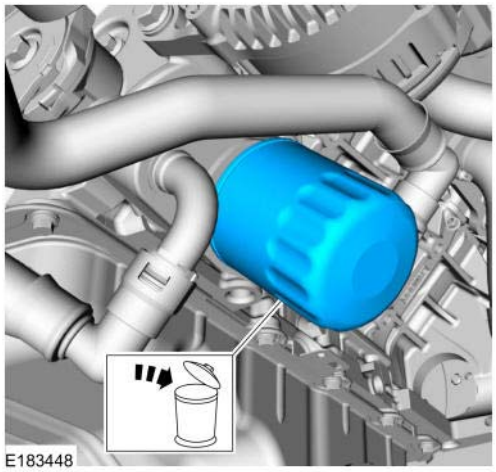
2.

Loosen the 2 front bolts, remove the remaining bolts and the subframe bracket and underbody shield assembly.



3.

Remove and discard the engine oil filter.

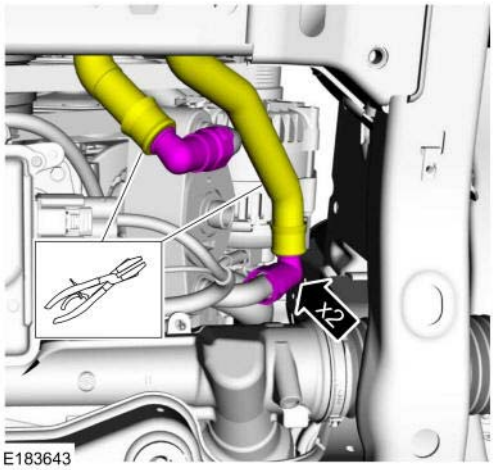


4.

Using hose locking pliers, clamp the oil cooler coolant hoses.

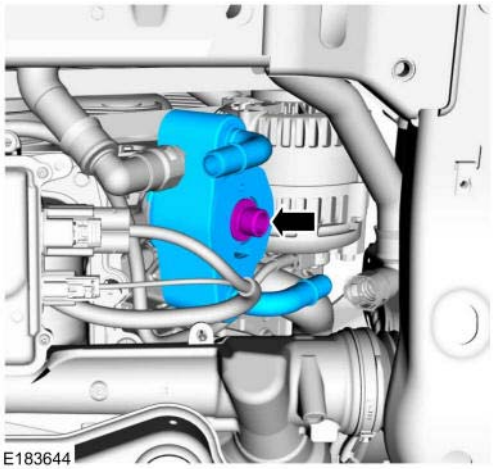
Use the General Equipment: Locking Pliers

Disconnect the coolant hoses.



5.

Remove the retainer and the oil cooler.

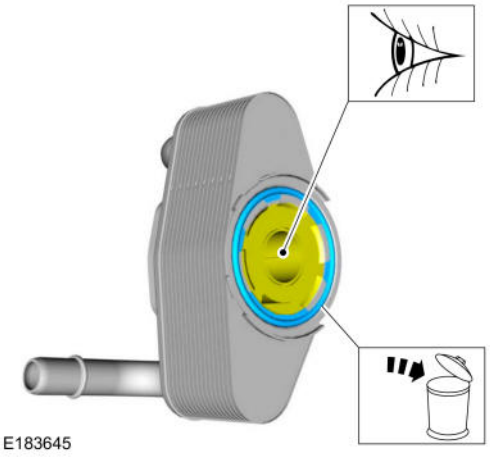


NOTE: If metal or aluminum material is present in the oil cooler, mechanical concerns exist. Failure to correct these concerns may cause engine failure. To diagnose mechanical concerns, refer to appropriate Engine article.

6.

Remove and discard the gasket.

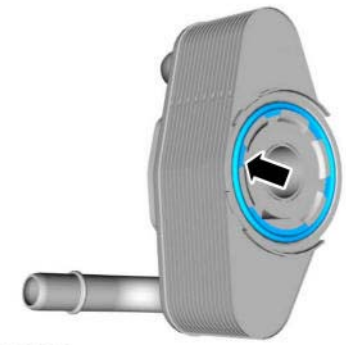
Inspect the oil cooler.



REMOVAL AND INSTALLATION > OIL COOLER > INSTALLATION

1.

Install a new gasket.

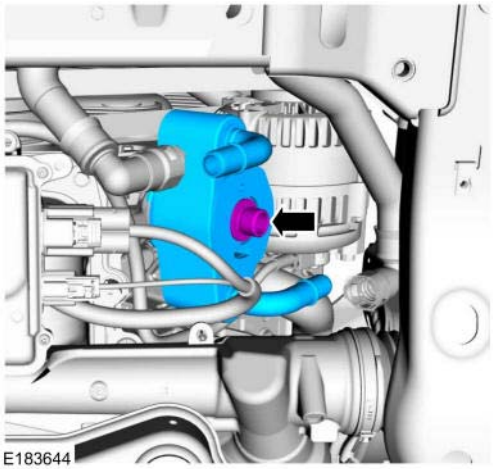

E183646

2.

Install the oil cooler and the retainer.

Torque

: 43 lb.ft (58 Nm)

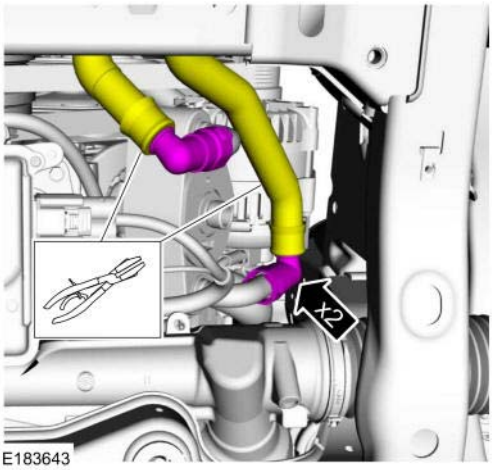

E183644

3.

Connect the coolant hoses.

Remove the hose locking pliers.

Use the General Equipment: Locking Pliers



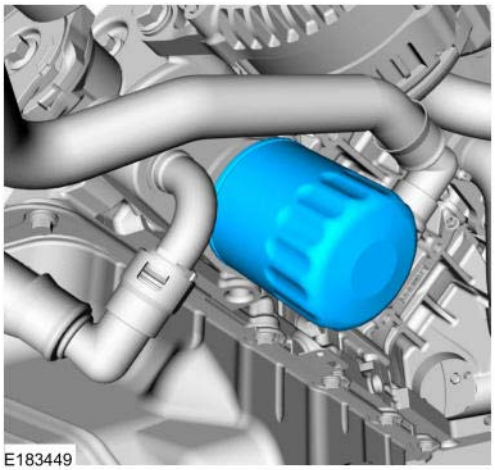
NOTE: Do not lubricate the O-ring seal.

4.
Install a new oil filter.

Torque

Stage 1: 44 lb.in (5 Nm)

Stage 2: 180°



NOTE: Vehicles are equipped with either an underbody shield or a subframe bracket and underbody shield assembly.

5.

1.

Install the underbody shield and the bolts.

Torque:

A: 97 lb.in (11 Nm)

B: 18 lb.in (2 Nm)

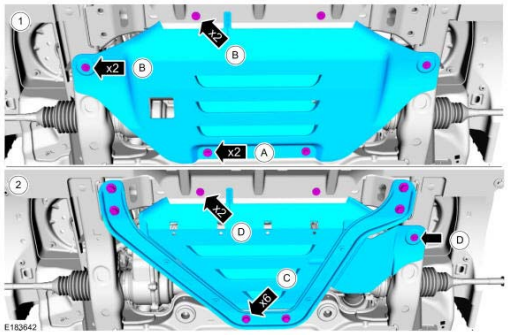
2.

Install the subframe bracket and underbody shield assembly and the bolts.

Torque:

C: 46 lb.ft (63 Nm)

D: 18 lb.in (2 Nm)



6.

Inspect and adjust the coolant level in the degas bottle

Material

: Motorcraft® Orange Antifreeze/Coolant Concentrated (U.S.) / VC-3-B (U.S.) (WSS-M97B44-D)

7.

Inspect and adjust the engine oil level.

Material

: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W20-QSP (U.S.) (WSS-M2C945-A)

REMOVAL AND INSTALLATION > OIL PAN

Special Tool(s) / General Equipment

	303-050 (T70P-6000) Lifting Bracket, Engine

	303-F072 Support Bar, Engine
Plastic Scraper	
Oil Drain Equipment	
Vehicle/Axle Stands	

Materials

Name	Specification
Motorcraft® Silicone Gasket Remover ZC-30-A	-
Engine Oil - 5W20	WSS-M2C948-B
Motorcraft® Metal Surface Prep ZC-31-B	-
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4
Metal Brake Parts Cleaner (U.S.) PM-4-A, PM-4-B (U.S.)	-

REMOVAL AND INSTALLATION > OIL PAN > REMOVAL

6-Speed Automatic Transmission - 6R80/6-Speed Manual Transmission - MT82

NOTE: During engine repair procedures, cleanliness is extremely important. Any foreign material, including any material created while cleaning gasket surfaces, that enters the oil passages, coolant passages or the oil pan, can cause engine failure.

1.

With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

2.

Disconnect the battery ground and positive cables. Refer to: Battery Disconnect and Connect .

NOTE: Make sure to minimize damage to sealer foam and avoid pulling apart dash seal brackets from retainer pins. Excessive damage may allow engine noise, fumes, air or water to enter the passenger compartment.

3.

1.

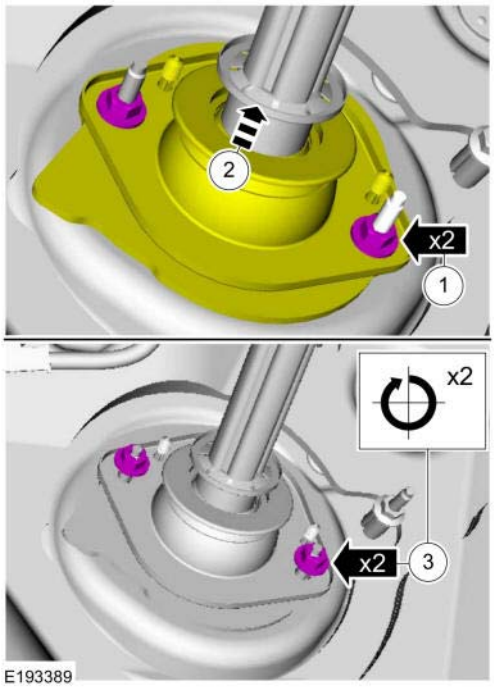
Remove the steering column dash seal nuts.

2.

Loosen the dash seal.

3.

Hand start the dash seal nuts.

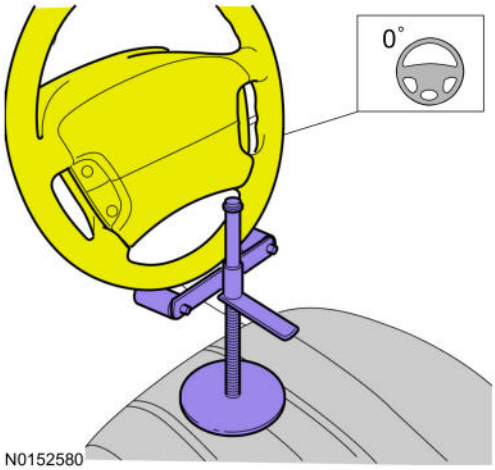


4.

Using a holding device, hold the steering wheel in the straight-ahead position.

Material

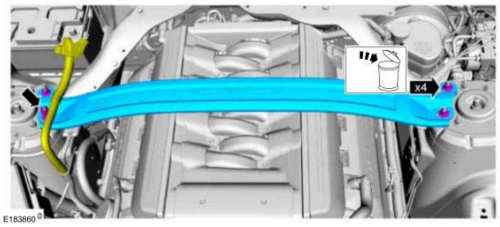
: Motorcraft® Silicone Gasket Remover / ZC-30-A



5.

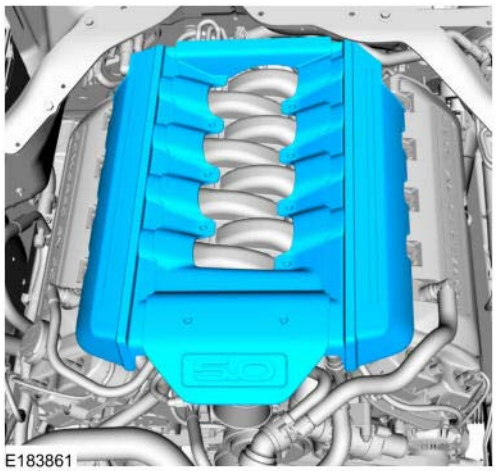
If equipped with a strut tower cross brace, detach the wiring harness retainer.

Remove the nuts and the strut tower cross brace.



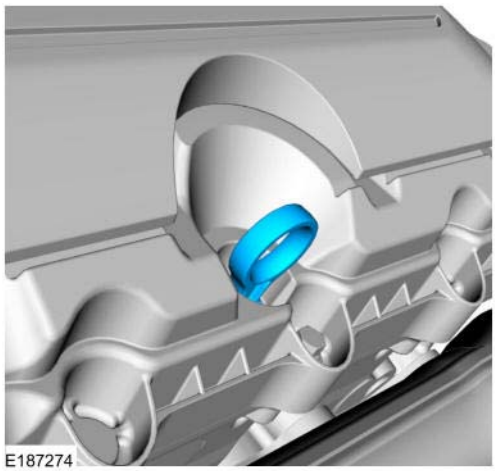
NOTE: The engine appearance cover rubber grommets may remain on the cover. If so, remove the grommets from the cover and install them on the intake manifold before installing the cover.

6.
Remove the engine appearance cover.



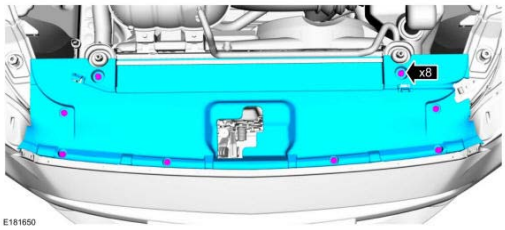
7.

Remove the oil level indicator.



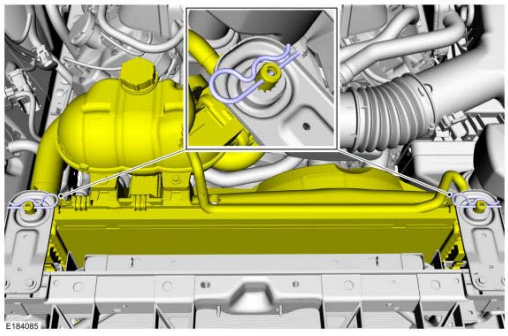
8.

Remove the retainers and the radiator top shield.



9.

Install clips to support the cooling module.



10.

Remove the following items:

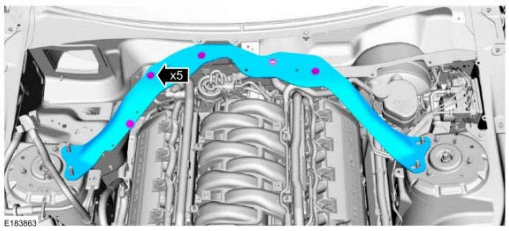
Refer to: AIR CLEANER OUTLET PIPE .

Refer to: Cowl Panel Grille .

Refer to: Battery Tray .

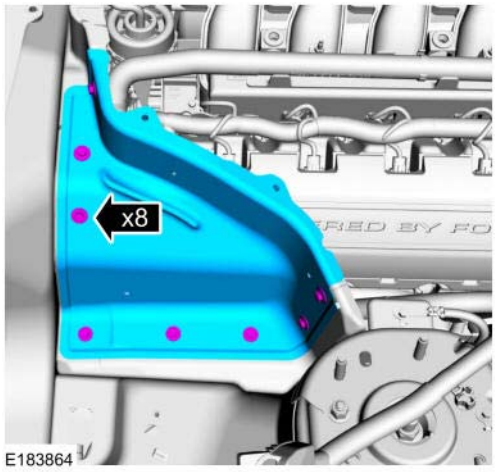
11.

Remove the fasteners and the cowl extension.



12.

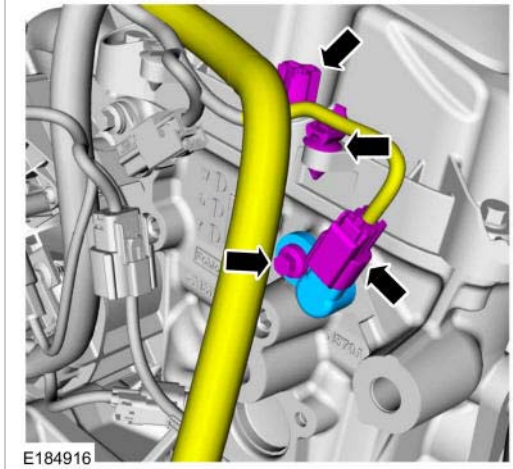
Remove the fasteners and the battery heat shield.



13.

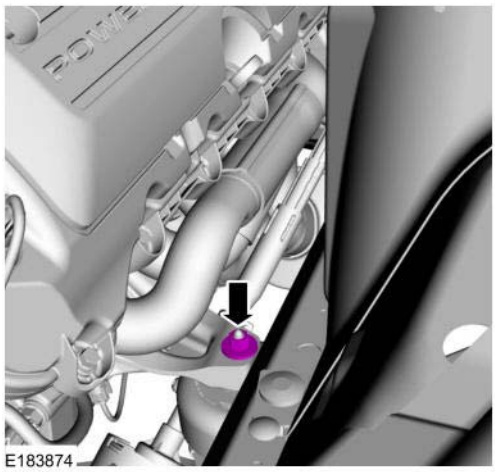
Disconnect the CMP sensor electrical connector, the wiring harness retainers and position the harness aside.

Remove the bolt and the CMP sensor.



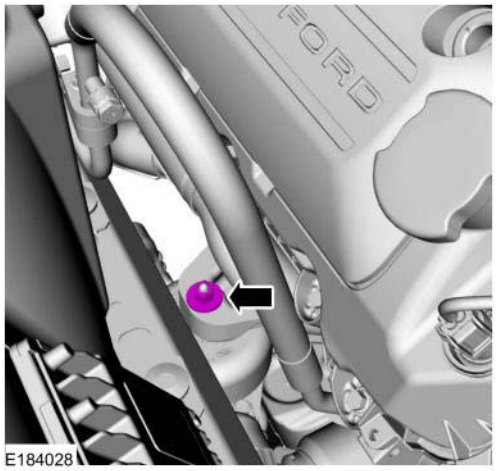
14.

Remove the LH engine mount nut.



15.

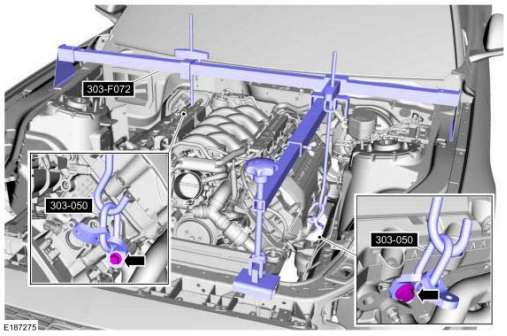
Remove the RH engine mount nut.



NOTE: Do not position the legs of the Engine Support Bar on the fenders. Instead, the legs should be positioned on the body structure. Failure to follow these instructions may result in body damage.

16.
Install the special tools and raise the engine 50 mm (2 inch).

Use Special Service Tool: 303-F072 Support Bar, Engine, 303-050 (T70P-6000) Lifting Bracket, Engine.



17.

Remove the front wheels and tires. Refer to: Wheel and Tire .

NOTE: Vehicles are equipped with either an underbody shield or a subframe bracket and underbody shield assembly.

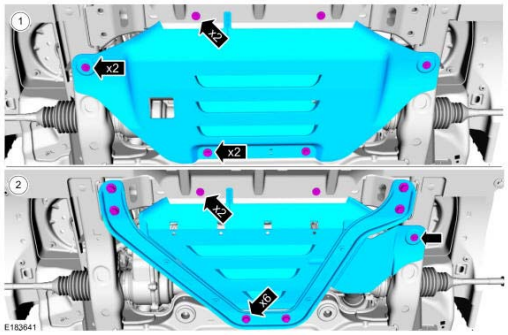
18.

1.

Remove the bolts and the underbody shield.

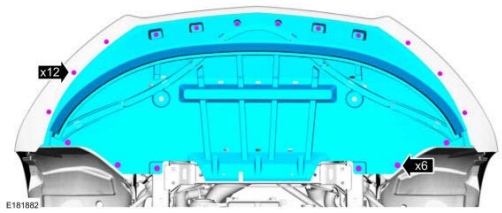
2.

Remove the bolts and the subframe bracket and underbody shield assembly.



19.

Remove the pin-type retainers, bolts and the underbody shield.



20.

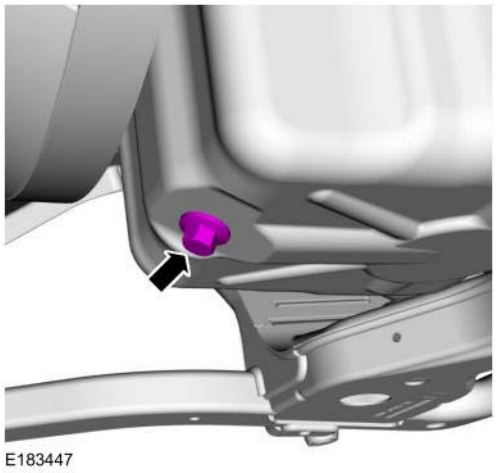
Remove the oil pan drain plug and drain the engine oil.

Use the General Equipment: Oil Drain Equipment

Install the oil pan drain plug.

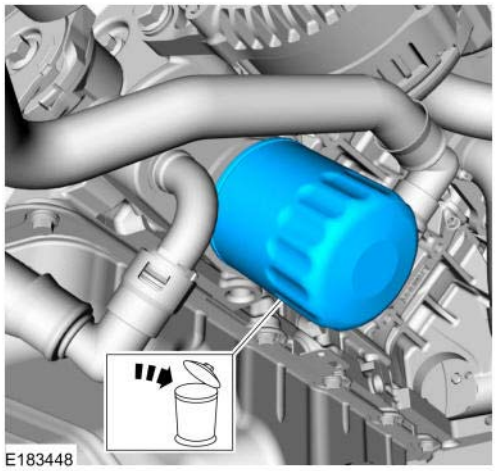
Torque

: 19 lb.ft (26 Nm)



21.

Remove and discard the engine oil filter.



22.

WARNING: Do not reuse steering column shaft bolts. This may result in fastener failure and steering column shaft detachment or loss of steering control. Failure to follow this instruction may result in serious injury to vehicle occupant(s).

WARNING: DO NOT hammer, pry or force steering column and column shafts during installation or removal. Failure to follow this instruction may cause damage to steering components that could lead to loss of steering control during vehicle operation and could result in serious personal injury or death.

WARNING: DO NOT attempt to remove or install the steering column lower u-joint at the steering gear without first loosening the steering column dash seal and fasteners. Failure to follow this instruction may cause damage to steering components that could lead to loss of steering control during vehicle operation and could result in serious personal injury or death.

Detach the steering column lower shaft from the lower coupling.

1.

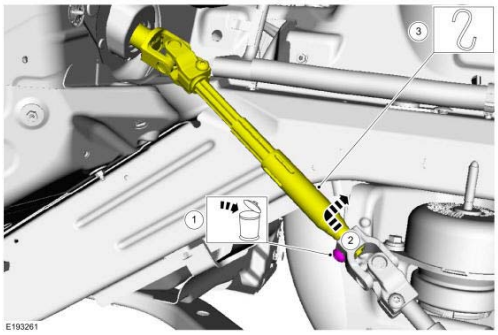
Remove and discard the steering column shaft bolt.

2.

Pull apart the steering column shaft from the coupling.

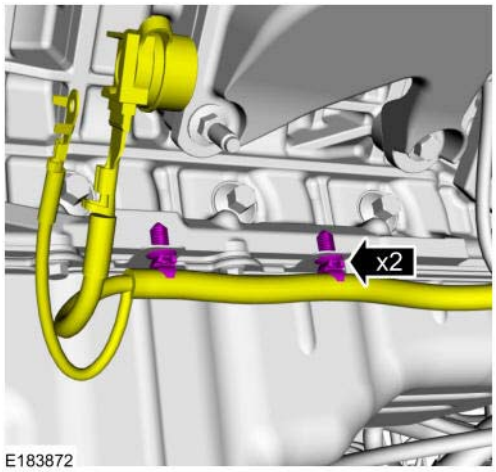
3.

Secure the lower shaft to the frame rail to avoid damage to the shaft.



23.

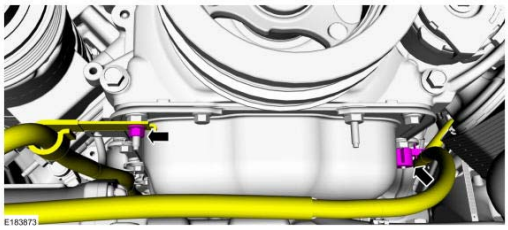
Detach the wiring harness retainers from the oil pan.



24.

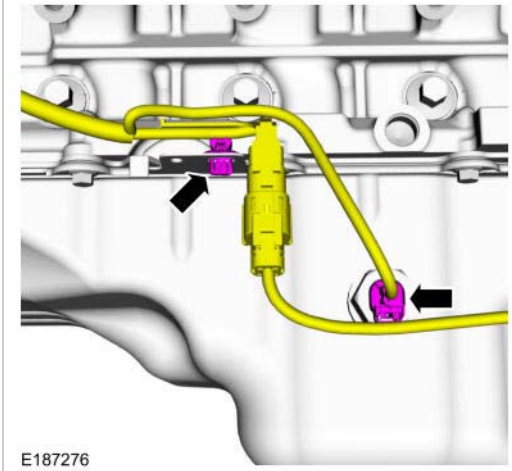
Remove the nut and the wiring harness retainer.

Detach the wiring harness retainer from the oil pan stud bolt.



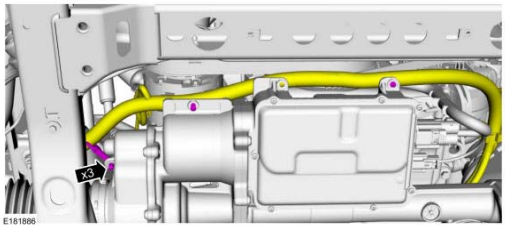
25.

Disconnect the oil level sensor electrical connector and wiring harness retainer.



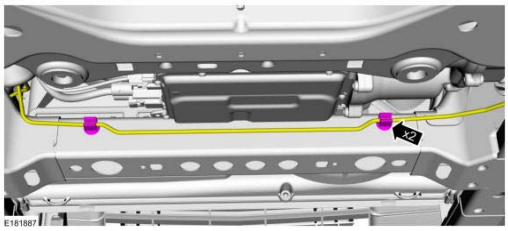
26.

Detach the wiring harness pin-type retainers.



27.

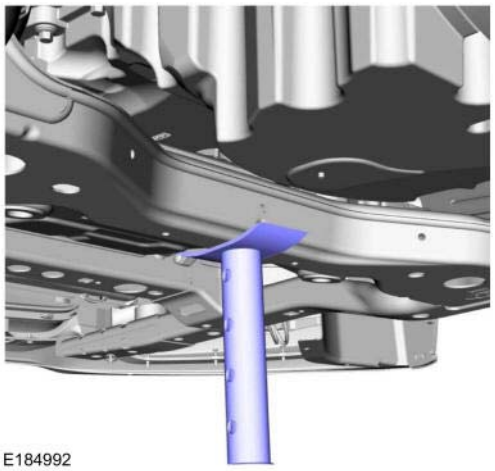
Detach the brake tube retainers from the subframe.



28.

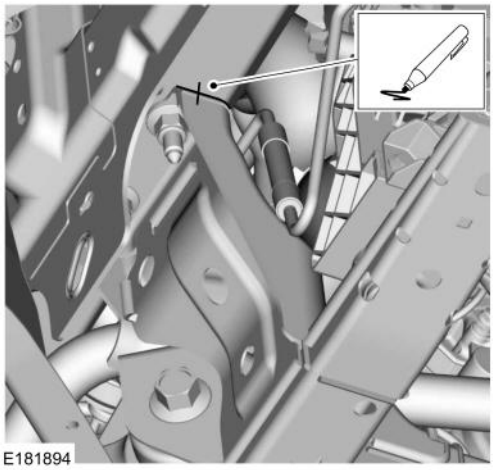
Using an adjustable stand, support the subframe.

Use the General Equipment: Vehicle/Axle Stands



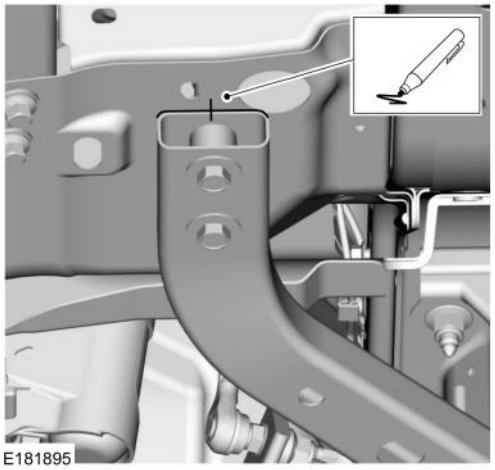
29.

Mark the position of the front subframe for reference during installation.



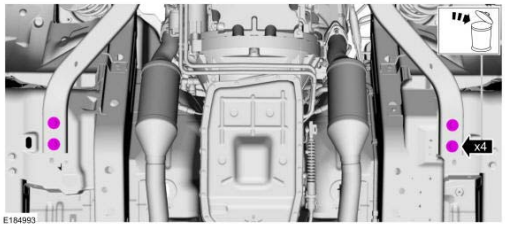
30.

Mark the position of the rear subframe for reference during installation.



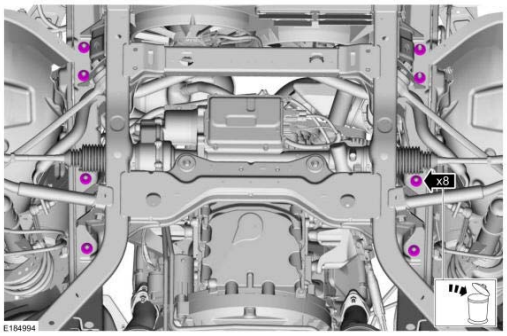
31.

Remove and discard the rear subframe bolts.



32.

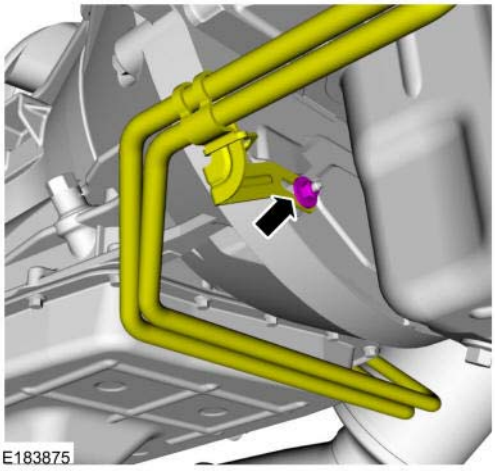
Remove and discard the front subframe nuts.



6-Speed Automatic Transmission - 6R80

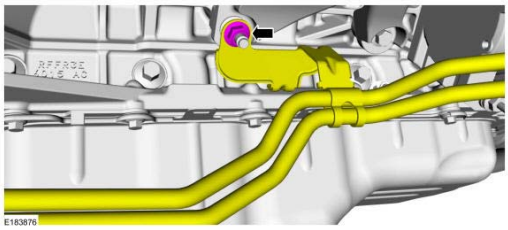
33.

Remove the transmission cooling tube nut and bracket from the flexplate inspection cover stud bolt.



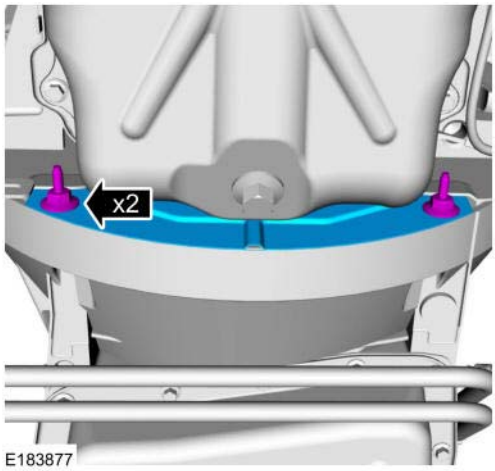
34.

Remove the transmission cooling tube bracket nut and position the bracket and tubes aside.



35.

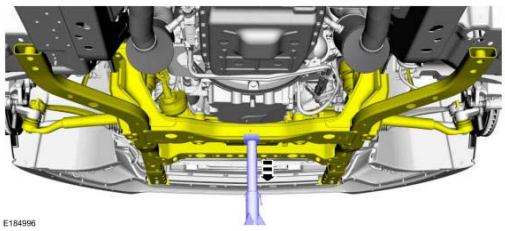
Remove the stud bolts and the flexplate inspection cover.



6-Speed Automatic Transmission - 6R80/6-Speed Manual Transmission - MT82

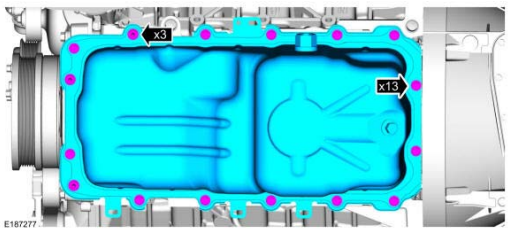
36.

Using an adjustable stand, lower the subframe 102 mm (4.0 in). Use the General Equipment: Vehicle/Axle Stands



37.

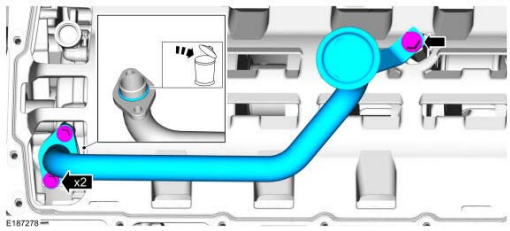
Remove the bolts, stud bolts and the oil pan.



38.

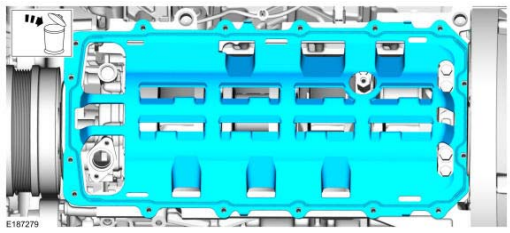
Remove the bolts and the oil pump screen and pickup tube.

Remove and discard the O-ring seal.



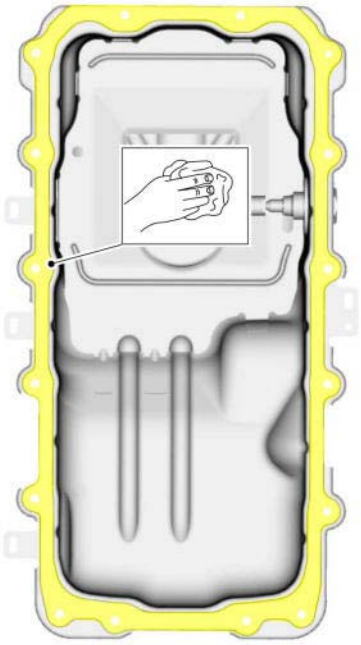
39.

Remove and discard the oil pan baffle and gasket.



NOTE: Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges, which make leak paths.

40.
Make sure that the mating faces are clean and free of foreign material.



E187280

NOTE: Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges, which make leak paths. Use a plastic scraping tool to remove traces of sealant.

41.
Make sure that the oil pan mating faces of the cylinder block, engine front cover and real seal retaining plate are clean and free of foreign material. Refer to: RTV Sealing Surface Cleaning and Preparation .

Material

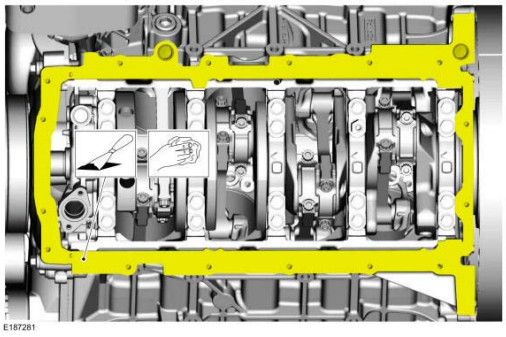
: Motorcraft® Silicone Gasket Remover / ZC-30-A

Material

: Metal Brake Parts Cleaner (U.S.) / PM-4-A, PM-4-B (U.S.)

Material

: Motorcraft® Metal Surface Prep / ZC-31-B



REMOVAL AND INSTALLATION > OIL PAN > INSTALLATION

6-Speed Automatic Transmission - 6R80/6-Speed Manual Transmission - MT82

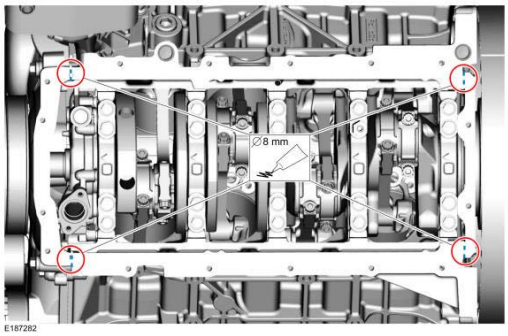
NOTE: If the oil pan is not installed and the fasteners tightened within 5 minutes, the sealant must be removed and the sealing area cleaned. Failure to follow this procedure can cause future oil leakage. If this timing cannot be met, tighten fasteners 7, 8, 9 and 10 to 8 Nm (71 lb-in) within 5 minutes of applying the sealer and final torque all of the fasteners within 1 hour of applying the sealer.

NOTE: If the engine front cover has been removed, it is only necessary to apply sealant to the crankshaft rear seal retainer plate-to-cylinder block sealing surfaces.

1.
Apply an 8 mm (0.31 in) bead of silicone gasket and sealant to the crankshaft rear seal retainer plate-to-cylinder block sealing surfaces and the engine front cover-to-cylinder block sealing surfaces.

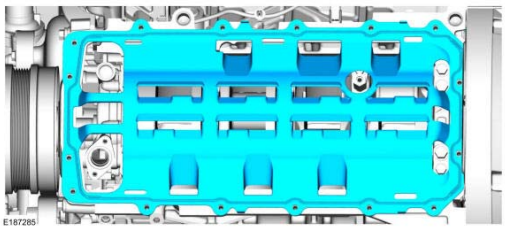
Material

: Silicone Gasket and Sealant / TA-30 (WSE-M4G323-A4)



2.

Install the new oil pan baffle and gasket.



3.

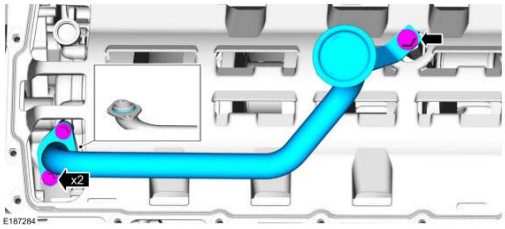
Using a new O-ring seal, install the oil pump screen and pickup tube and the bolts.

Torque

Oil pump screen and pickup tube-to-oil pump bolts:

Stage 1: 89 lb.in (10 Nm)

Stage 2: 45° Oil pump screen and pickup tube-to-spacer bolt : 18 lb.ft (25 Nm)



NOTE: Fastener locations 7, 13 and 16 are stud bolts.

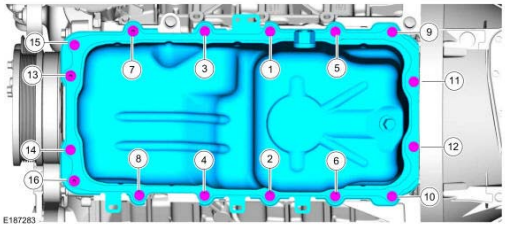
4.
Install the oil pan and the bolts.

Torque:

Stage 1: 18 lb.in (2 Nm)

Stage 2: 89 lb.in (10 Nm)

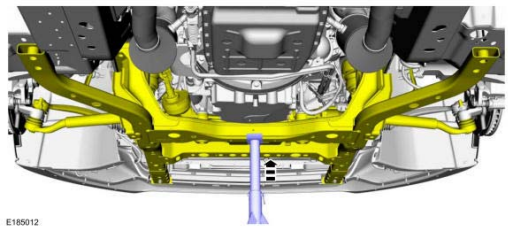
Stage 3: 45°



5.

Using an adjustable stand, raise the subframe.

Use the General Equipment: Vehicle/Axle Stands



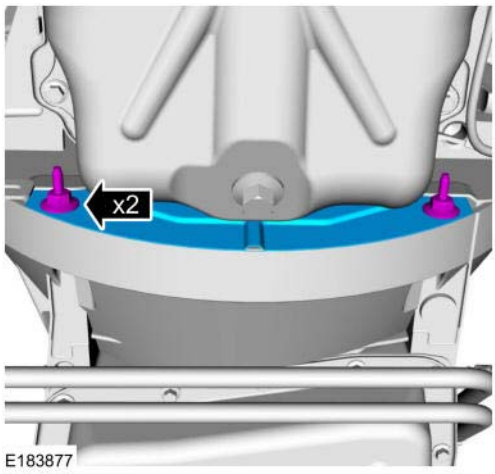
6-Speed Automatic Transmission - 6R80

6.

Install the flexplate inspection cover and the stud bolts.

Torque

: 35 lb.ft (48 Nm)

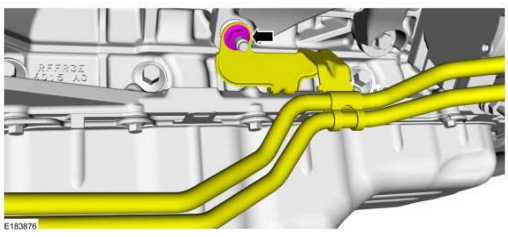


7.

Install the transmission cooling tube bracket and nut.

Torque

: 35 lb.ft (48 Nm)

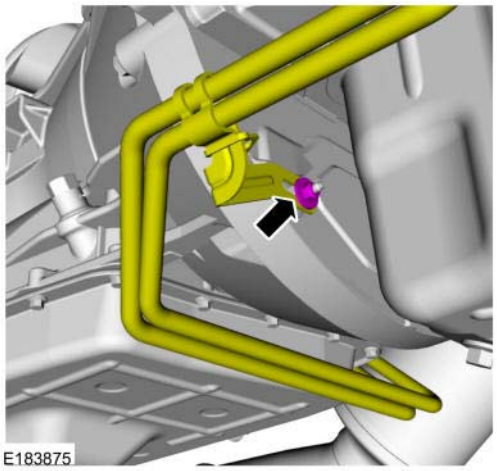


8.

Install the transmission cooling tube bracket and nut.

Torque

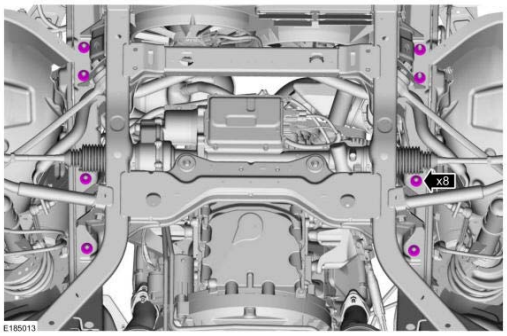
: 124 lb.in (14 Nm)



6-Speed Automatic Transmission - 6R80/6-Speed Manual Transmission - MT82

9.

Install the new front subframe nuts loosely.

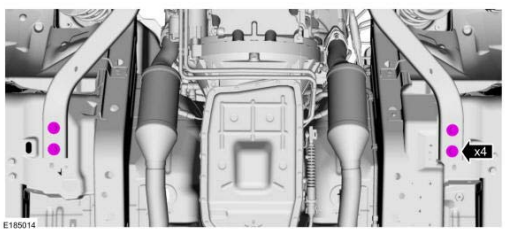


10.

Use a suitable alignment tool with a 15 mm (0.59 in) OD shaft that is long enough to go through the subframe and body.

Align the subframe to the alignment marks made during removal.

Install the new rear subframe bolts loosely.

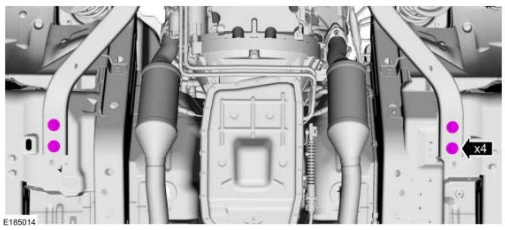


11.

Tighten the rear subframe bolts in a cross pattern.

Torque

: 85 lb.ft (115 Nm)

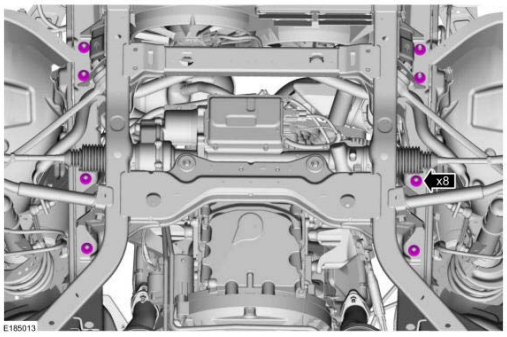


12.

Tighten the front subframe nuts in a cross pattern.

Torque

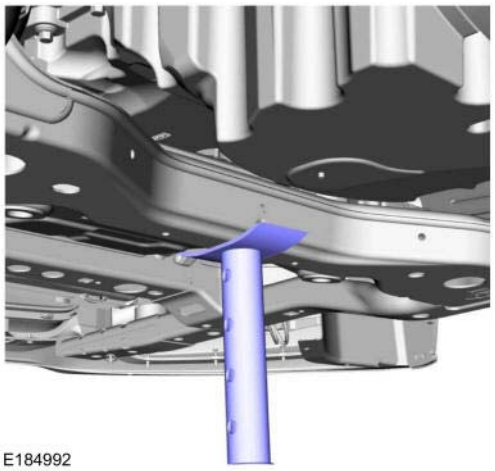
: 85 lb.ft (115 Nm)



13.

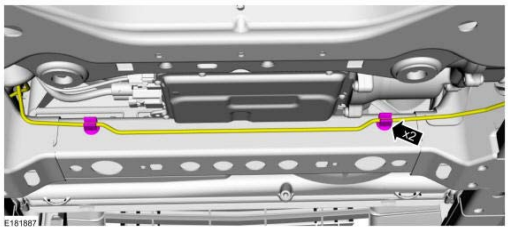
Remove the adjustable stand.

Use the General Equipment: Vehicle/Axle Stands



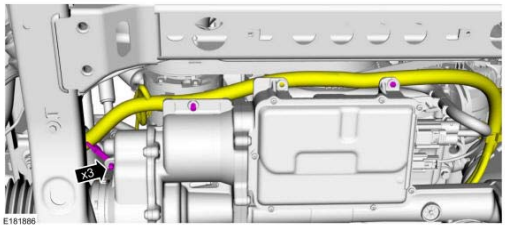
14.

Attach the brake line retainers to the subframe.



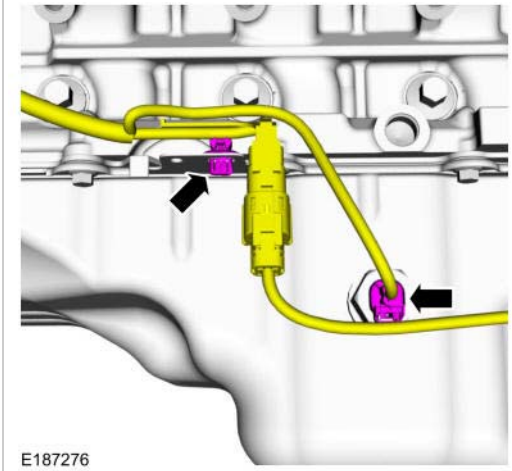
15.

Attach the EPAS wiring harness pin-type retainers.



16.

Connect the oil level sensor electrical connector and wiring harness retainer.



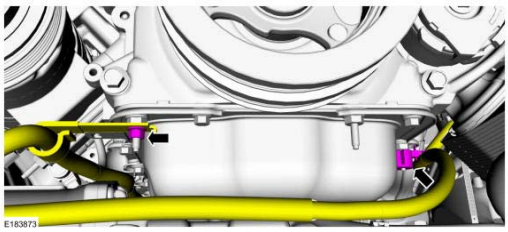
17.

Attach the wiring harness retainer to the oil pan stud bolt.

Install the wiring harness retainer and the nut.

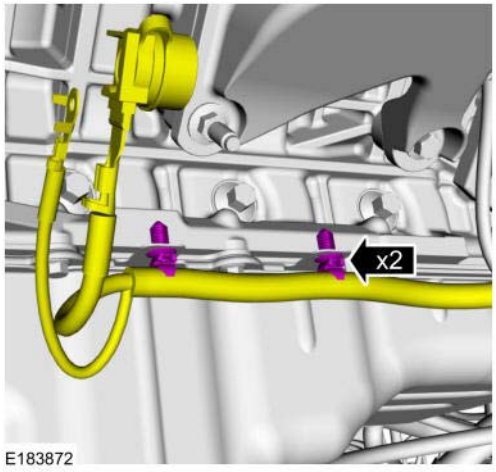
Torque

: 124 lb.in (14 Nm)



18.

Attach the wiring harness retainers to the oil pan.



19.

WARNING: DO NOT hammer, pry or force steering column and column shafts during installation or removal. Failure to follow this instruction may cause damage to steering components that could lead to loss of steering control during vehicle operation and could result in serious personal injury or death.

WARNING: DO NOT attempt to remove or install the steering column lower u-joint at the steering gear without first loosening the steering column dash seal and fasteners. Failure to follow this instruction may cause damage to steering components that could lead to loss of steering control during vehicle operation and could result in serious personal injury or death.

1.

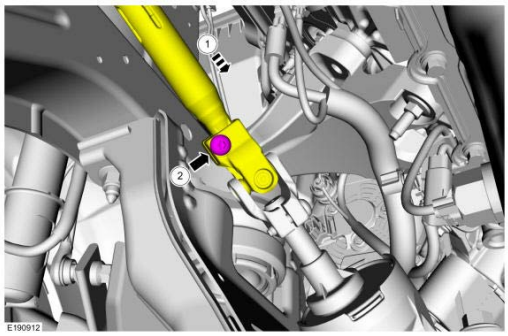
Connect the steering column shaft to the steering gear universal joint.

2.

Install the new steering column shaft bolt.

Torque

: 22 lb.ft (30 Nm)



20.

Inspect the steering column lower shaft. Refer to: Steering Column Collapsed Check .

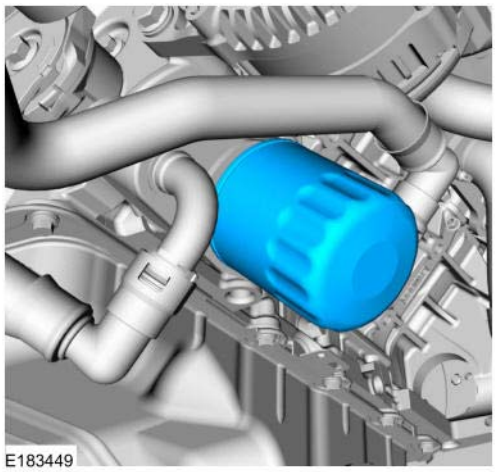
NOTE: Do not lubricate the O-ring seal.

21.
Install a new oil filter.

Torque:

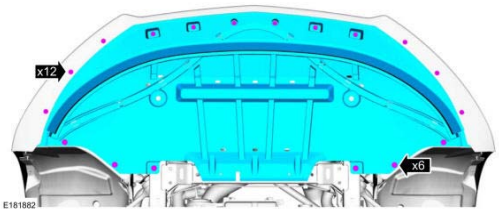
Stage 1: 44 lb.in (5 Nm)

Stage 2: 180°



22.

Install the underbody shield, bolts and the pin-type retainers.



NOTE: Vehicles are equipped with either an underbody shield or a subframe bracket and underbody shield assembly.

23.

1.

Install the underbody shield and the bolts.

Torque:

A: 97 lb.in (11 Nm)

B: 18 lb.in (2 Nm)

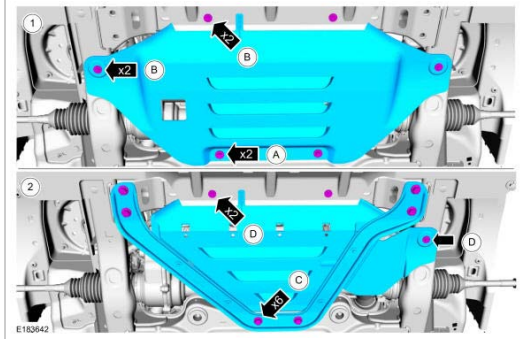
2.

Install the subframe bracket and underbody shield assembly and the bolts.

Torque:

C: 46 lb.ft (63 Nm)

D: 18 lb.in (2 Nm)



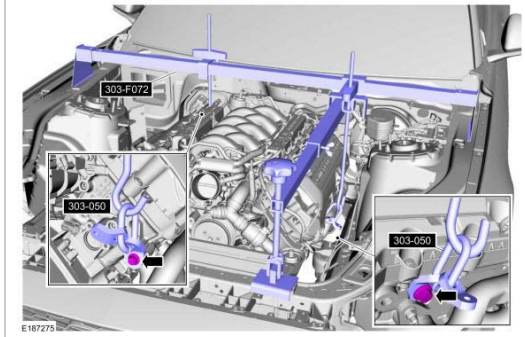
24.

Install the front wheels and tires. Refer to: Wheel and Tire .

25.

Lower the engine onto the engine mounts and remove the special tools.

Use Special Service Tool: 303-F072 Support Bar, Engine, 303-050 (T70P-6000) Lifting Bracket, Engine.

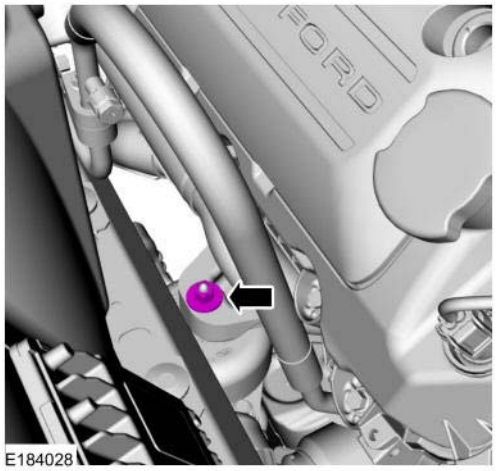


26.

Install the RH engine mount nut.

Torque

: 46 lb.ft (63 Nm)

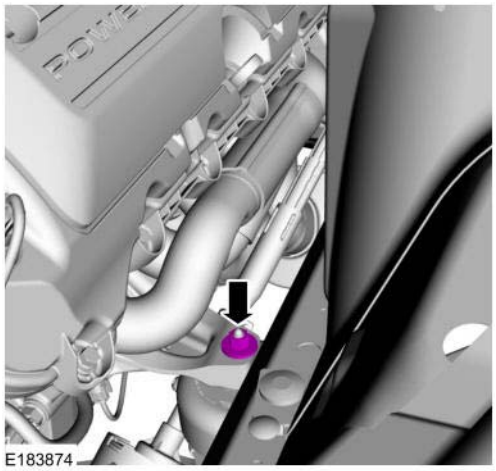


27.

Install the LH engine mount nut.

Torque

: 46 lb.ft (63 Nm)



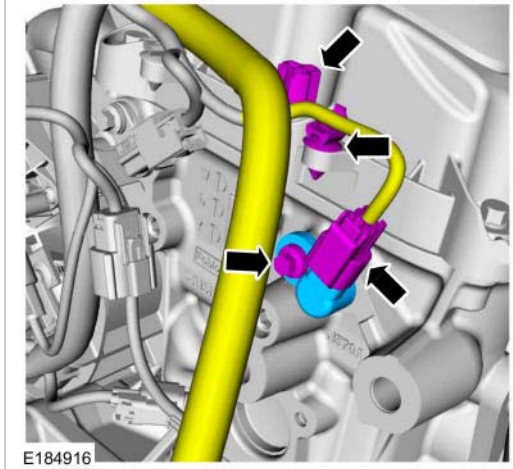
28.

Install the CMP sensor and the bolt.

Torque

: 89 lb.in (10 Nm)

Connect the CMP sensor electrical connector and the wiring harness retainers.

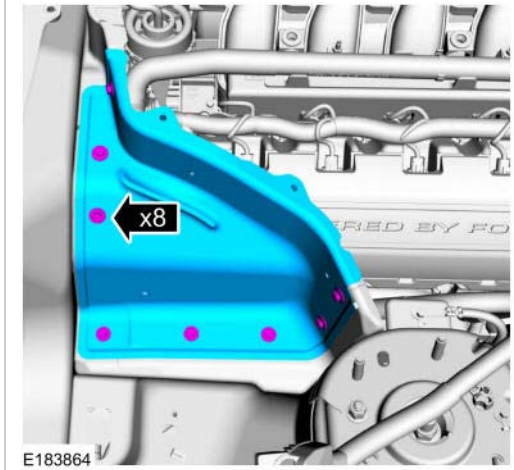


29.

Install the battery heat shield and fasteners.

Torque

: 80 lb.in (9 Nm)

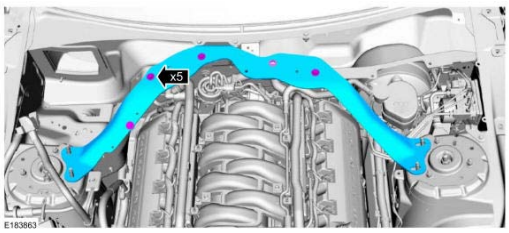


30.

Install the cowl extension and the fasteners.

Torque

: 26 lb.ft (35 Nm)



31.

Install the following items:

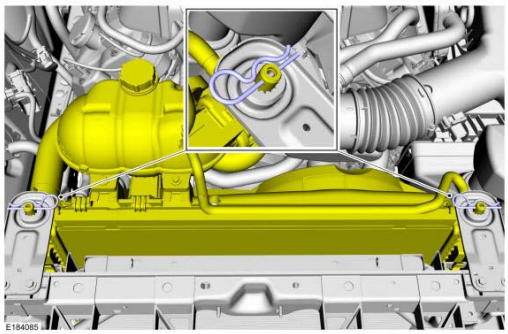
Refer to: Battery Tray .

Refer to: Cowl Panel Grille .

Refer to: AIR CLEANER OUTLET PIPE .

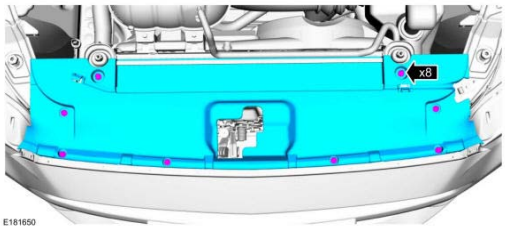
32.

Remove the clips.



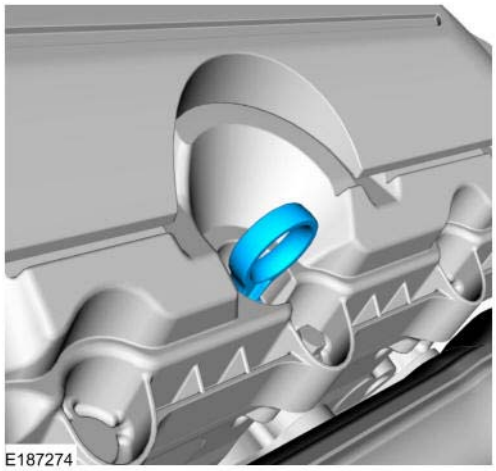
33.

Install the radiator top shield and the retainers.



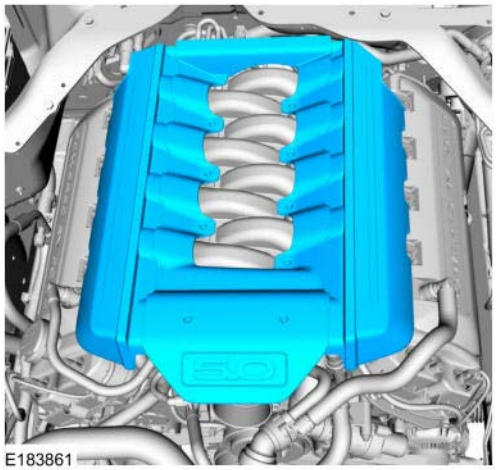
34.

Install the oil level indicator.



NOTE: The engine appearance cover rubber grommets may remain on the cover. If so, remove the grommets from the cover and install them on the intake manifold before installing the cover.

35.
Install the engine appearance cover.



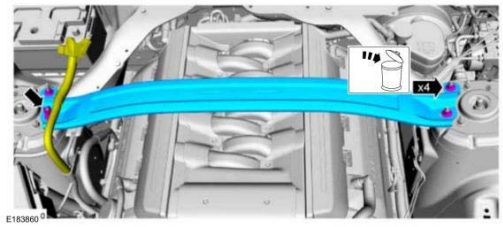
36.

If equipped, install the strut tower cross brace and nuts.

Torque

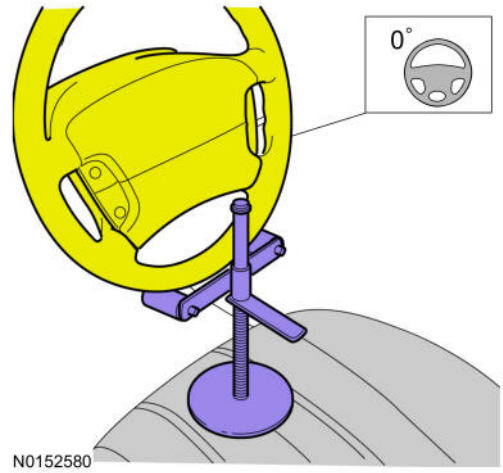
: 41 lb.ft (55 Nm)

Attach the wiring harness retainer.



37.

Remove the holding device.



38.

1.

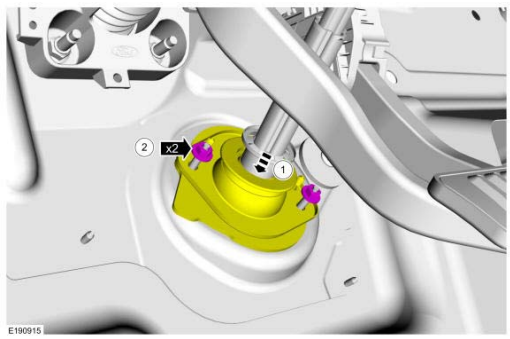
Position the steering column dash seal.

2.

Tighten the steering column dash seal nuts.

Torque

: 80 lb.in (9 Nm)

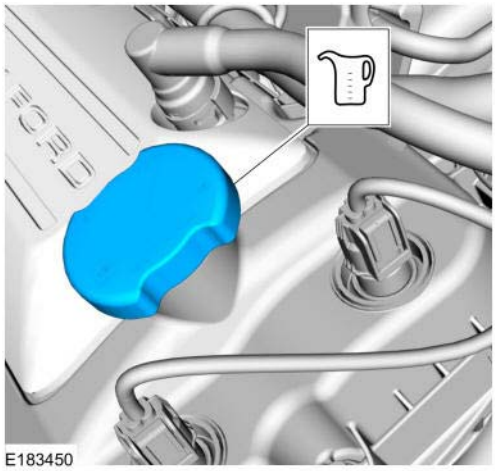


39.

Fill the engine with clean engine oil. Refer to: Specifications .

Material

: Engine Oil - 5W20 (WSS-M2C948-B)



40.

Connect the battery ground and positive cables. Refer to: Battery Disconnect and Connect .

REMOVAL AND INSTALLATION > OIL PRESSURE SWITCH

Materials

Name	Specification
Thread Sealant with PTFETA-24-B	WSK-M2G350-A2

REMOVAL AND INSTALLATION > OIL PRESSURE SWITCH > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

2.

Disconnect the EOP switch electrical connector.

NOTE: If the oil pressure switch is to be reused, apply thread sealant.

Remove the EOP switch.

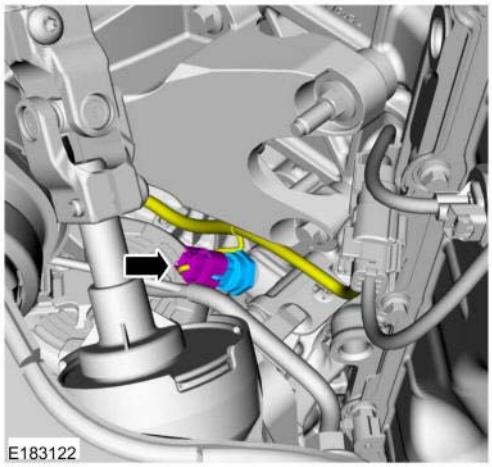
Material

: Thread Sealant with PTFE / TA-24-B (WSK-M2G350-A2)

Torque:

Stage 1: 124 lb.in (14 Nm)

Stage 2: 180°



REMOVAL AND INSTALLATION > OIL PRESSURE SWITCH > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > OIL PUMP > REMOVAL

1.

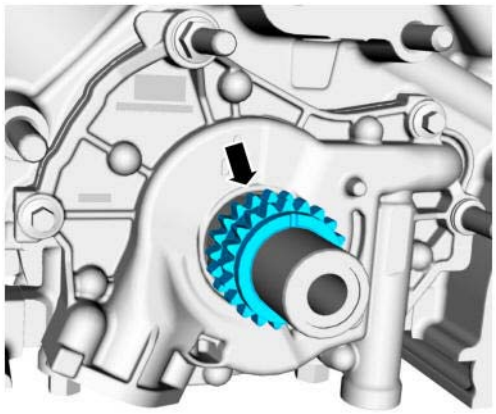
With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

2.

Remove the timing chains. Refer to: Timing Chain .

3.

Remove the crankshaft sprocket.



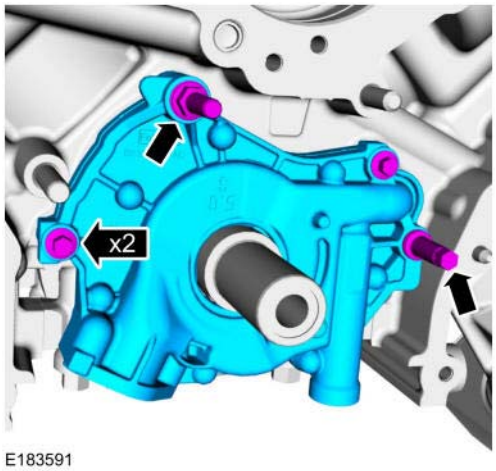
E183590

4.

Remove the oil pan. Refer to: Oil Pan .

5.

Remove the bolts, stud bolts and the oil pump.



E183591

REMOVAL AND INSTALLATION > OIL PUMP > INSTALLATION

NOTE: Oil pump must be held against the cylinder block until all bolts are tightened.

1.

Rotate the inner rotor of the oil pump assembly to align the flats on the crankshaft and slip the oil pump over the crankshaft until seated against the block.

Rotate the oil pump until the bolt holes are aligned to the block and install the fasteners hand tight.

Torque:

Stage 1: A: 89 lb.in (10 Nm)

Stage 2: B: 18 lb.ft (25 Nm)

Stage 3: C: 89 lb.in (10 Nm)

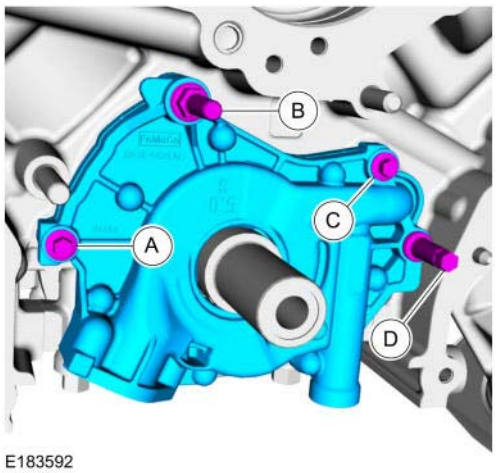
Stage 4: D: 177 lb.in (20 Nm)

Stage 5: A: 45°

Stage 6: B: 75°

Stage 7: C: 45°

Stage 8: D: 60°



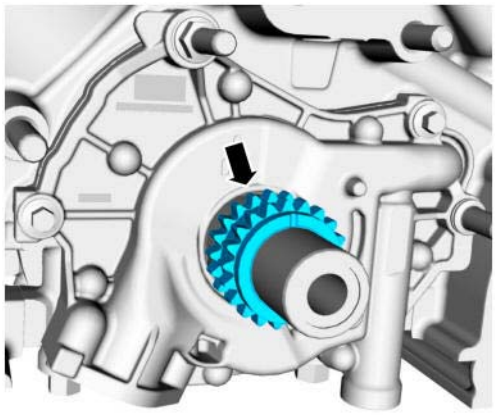
E183592

2.

Install the oil pan. Refer to: Oil Pan .

3.

Install the crankshaft sprocket.


E183590

4.

Install the timing chains. Refer to: Timing Chain .

REMOVAL AND INSTALLATION > TIMING CHAIN

Special Tool(s) / General Equipment

	303-448 (T93P-6303-A) Holding Tool, Crankshaft TKIT-1993-FLM TKIT-1993-LM

REMOVAL AND INSTALLATION > TIMING CHAIN > REMOVAL

NOTE: The timing chain procedure has changed from prior model year engines and must be followed exactly or damage to the engine will result.

NOTE: During engine repair procedures, cleanliness is extremely important. Any foreign material, including any material created while cleaning gasket surfaces, that enters the oil passages, coolant passages or the oil pan, can cause engine failure.

NOTE: In order to remove the LH timing chain, the RH timing chain must be removed first.

RH and LH timing chains

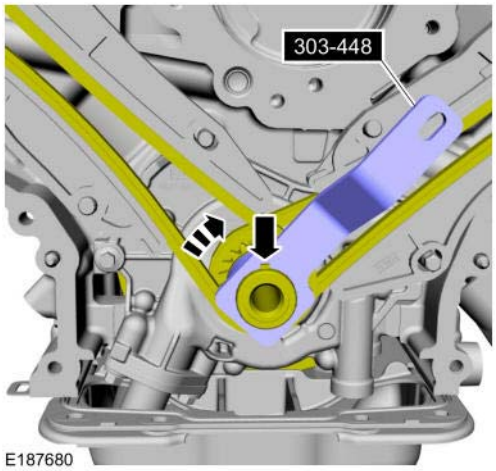
1.

Remove the engine front cover. Refer to: Engine Front Cover .

2.

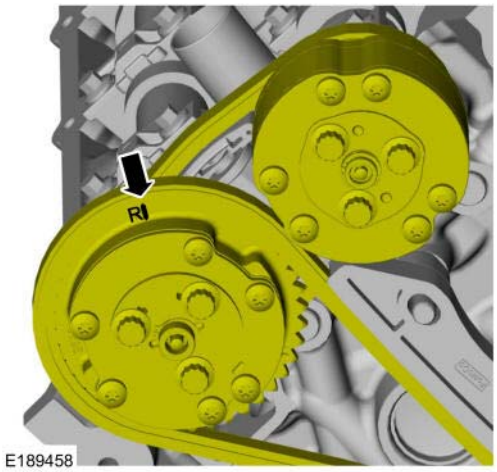
Using the special tool, rotate the crankshaft clockwise until the keyway is at the 12 o'clock position.

Use Special Service Tool: 303-448 (T93P-6303-A) Holding Tool, Crankshaft.



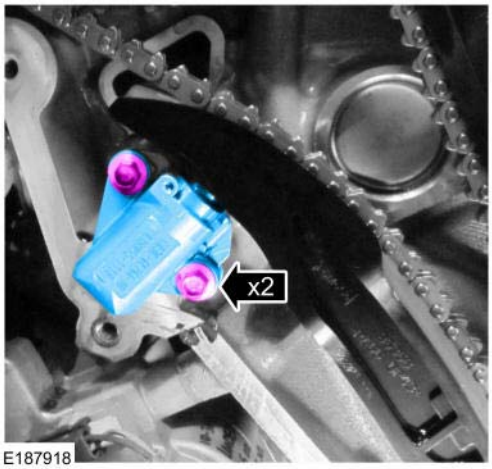
3.

Verify the timing mark on the RH VCT unit is on top, if not, rotate the crankshaft clockwise one complete revolution so the keyway is at the 12 o'clock position.



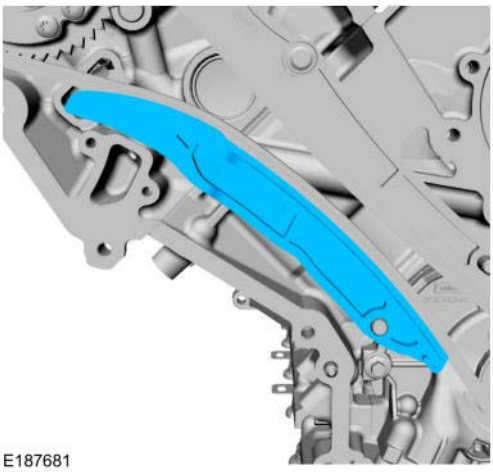
4.

Remove the bolts and the RH primary timing chain tensioner.



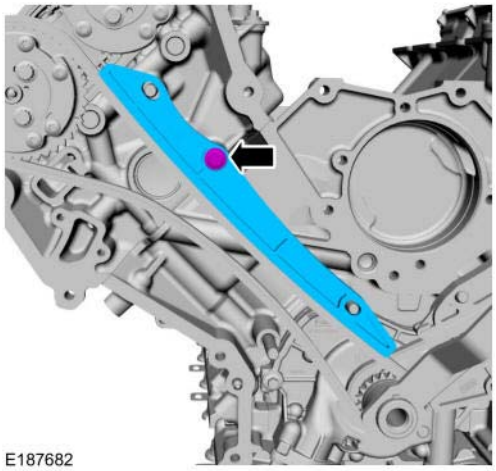
NOTE: It may be necessary to rotate the crankshaft slightly to provide enough slack in the chain to remove the RH timing chain tensioner arm. Return the crankshaft keyway to the 12 o'clock position after removing the RH timing chain tensioner arm.

5.
Remove the RH timing chain tensioner arm.



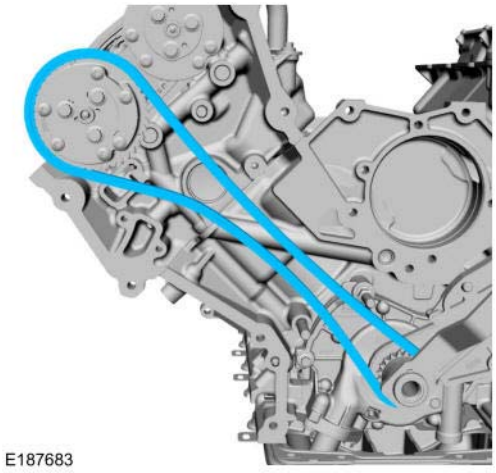
NOTE: It may be necessary to rotate the crankshaft slightly to provide enough slack in the chain to remove the RH timing chain guide. Return the crankshaft keyway to the 12 o'clock position after removing the RH timing chain guide.

6.
Remove the bolt and the RH timing chain guide.



7.

Remove the RH timing chain.

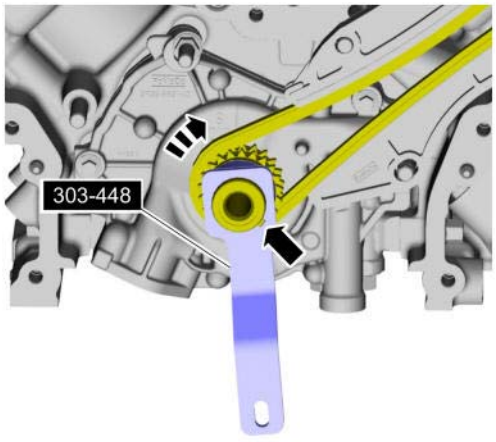


LH timing chain

8.

Using the special tool, rotate the crankshaft clockwise until the keyway is at the 5 o'clock position.

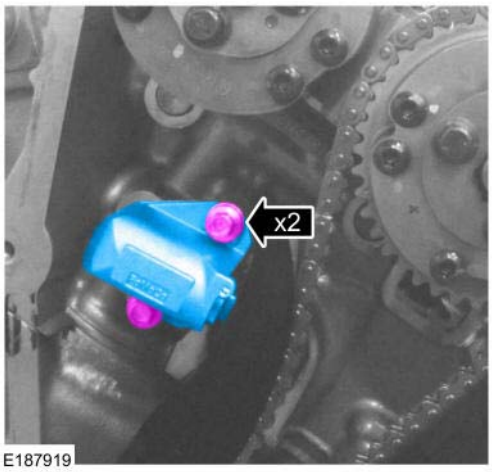
Use Special Service Tool: 303-448 (T93P-6303-A) Holding Tool, Crankshaft.



E187882

9.

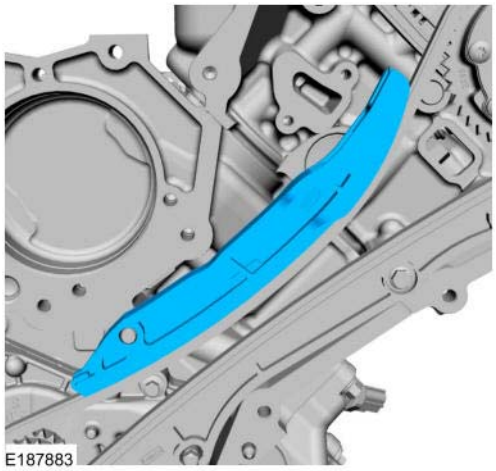
Remove the bolts and the LH primary timing chain tensioner.



E187919

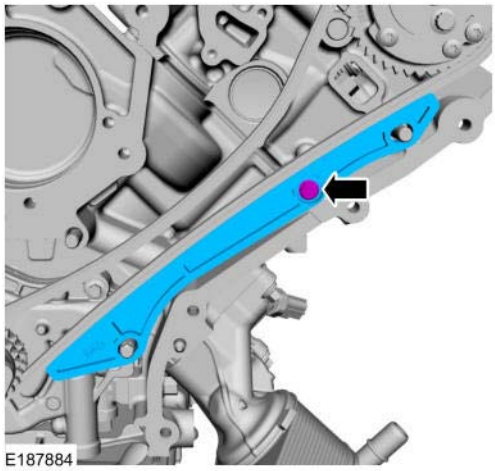
NOTE: It may be necessary to rotate the crankshaft slightly to provide enough slack in the chain to remove the LH timing chain tensioner arm. Return the crankshaft keyway to the 5 o'clock position after removing the LH timing chain tensioner arm.

10.
Remove the LH timing chain tensioner arm.



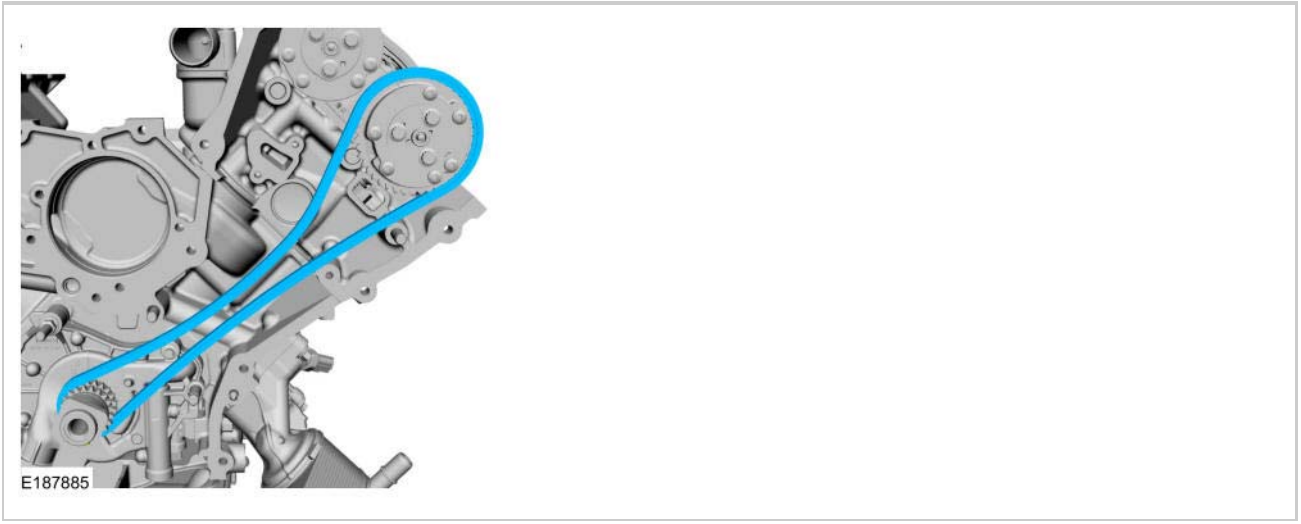
NOTE: It may be necessary to rotate the crankshaft slightly to provide enough slack in the chain to remove the LH timing chain guide. Return the crankshaft keyway to the 5 o'clock position after removing the LH timing chain guide.

11.
Remove the bolt and the LH timing chain guide.



12.

Remove the LH timing chain.



REMOVAL AND INSTALLATION > TIMING CHAIN > INSTALLATION

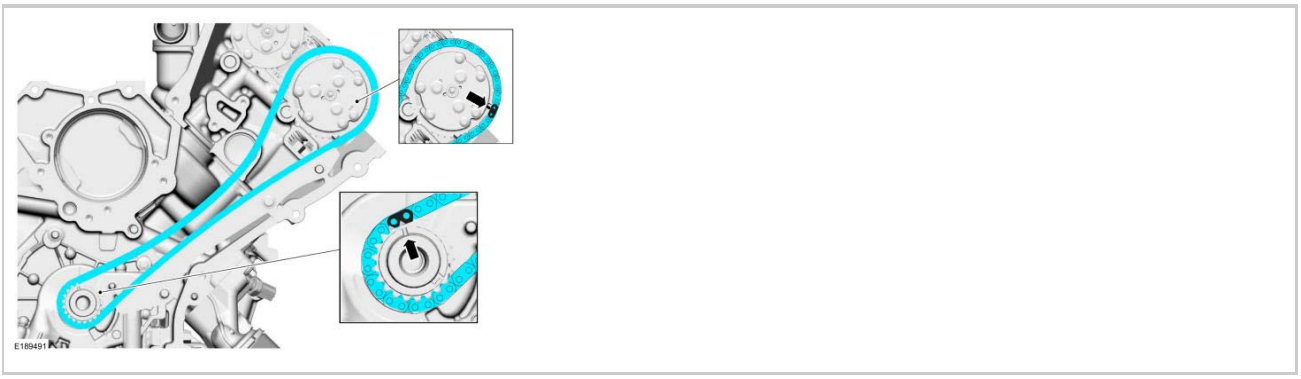
LH timing chain

1.

Install the LH timing chain.

Align the colored link on the timing chain with the timing mark on the LH VCT assembly.

Align the remaining colored link on the timing chain with the timing mark on the crankshaft sprocket.

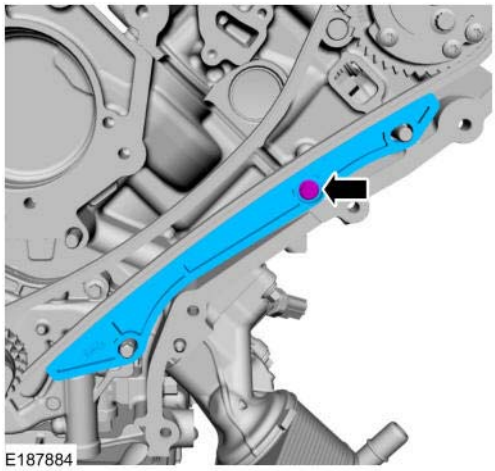


NOTE: It may be necessary to rotate the crankshaft slightly to provide enough slack in the chain to install the LH timing chain guide. Return the crankshaft keyway to the 5 o'clock position after installing the LH timing chain guide.

2.
Install the LH timing chain guide and bolt.

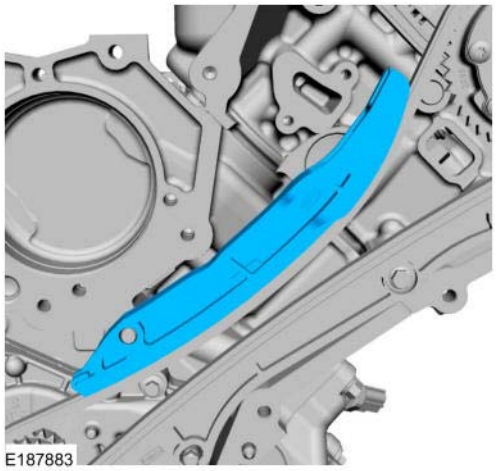
Torque

: 89 lb.in (10 Nm)



NOTE: It may be necessary to rotate the crankshaft slightly to provide enough slack in the chain to install the LH timing chain arm. Return the crankshaft keyway to the 5 o'clock position after installing the LH timing chain arm.

3.
Install the LH timing chain tensioner arm.



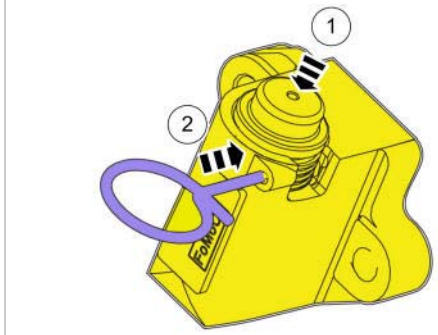
4.

1.

Compress the primary timing chain tensioner plunger, using an edge of a vise.

2.

Install a suitable pin into the hole of the tensioner housing to hold the plunger in place during installation.



5.

1.

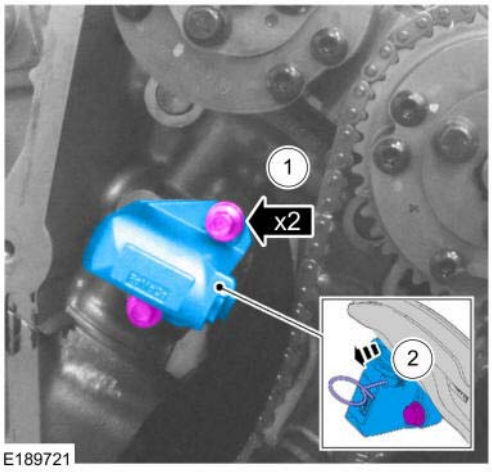
Install the LH primary timing chain tensioner and bolts.

Torque

: 89 lb.in (10 Nm)

2.

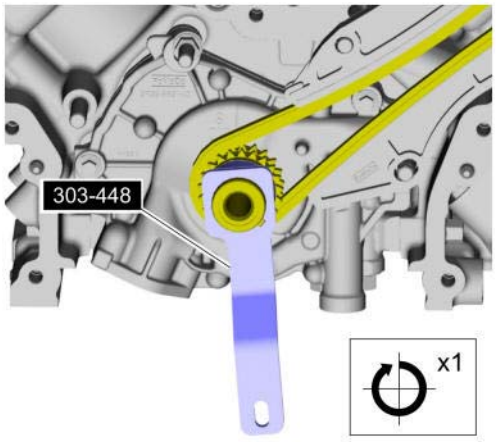
Remove the holding pin from the tensioner.



6.

Using the special tool, rotate the crankshaft clockwise one complete revolution.

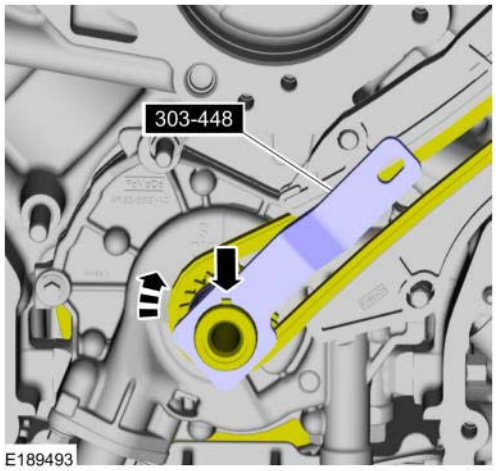
Use Special Service Tool: 303-448 (T93P-6303-A) Holding Tool, Crankshaft.



7.

Using the special tool, rotate the crankshaft clockwise until the keyway is at the 12 o'clock position.

Use Special Service Tool: 303-448 (T93P-6303-A) Holding Tool, Crankshaft.



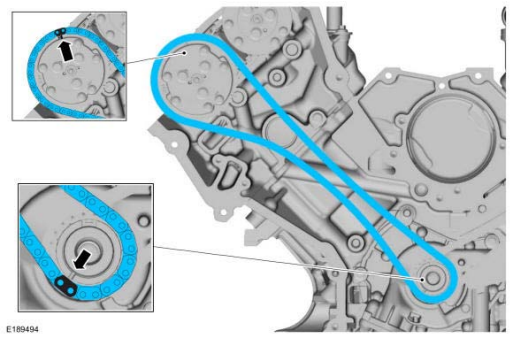
RH and LH timing chains

8.

Install the RH timing chain.

Align the colored link on the timing chain with the timing mark on the RH VCT assembly.

Align the remaining colored link on the timing chain with the timing mark on the crankshaft sprocket.

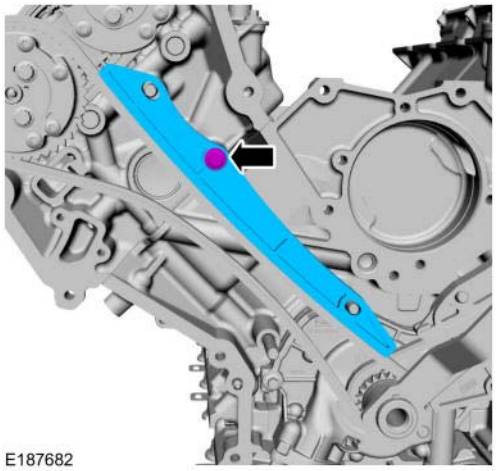


NOTE: It may be necessary to rotate the crankshaft slightly to provide enough slack in the chain to install the RH timing chain guide. Return the crankshaft keyway to the 12 o'clock position after installing the RH timing chain guide.

9.
Install the RH timing chain guide and bolt.

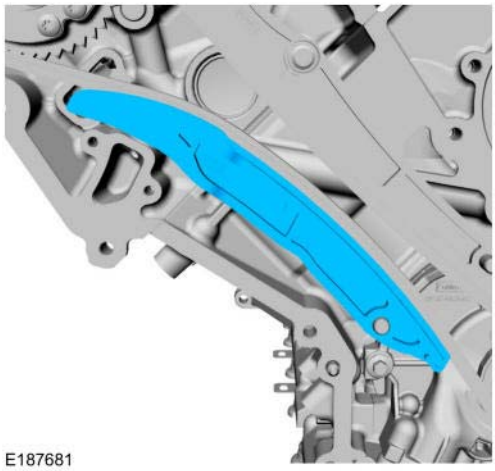
Torque

: 89 lb.in (10 Nm)



NOTE: It may be necessary to rotate the crankshaft slightly to provide enough slack in the chain to install the RH timing chain arm. Return the crankshaft keyway to the 12 o'clock position after installing the RH timing chain arm.

10.
Install the RH timing chain tensioner arm.


E187681

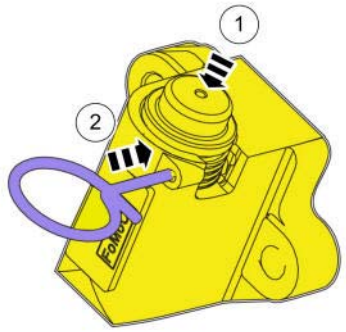
11.

1.

Compress the primary timing chain tensioner plunger, using an edge of a vise.

2.

Install a suitable pin into the hole of the tensioner housing to hold the plunger in place during installation.



E189722

12.

1.

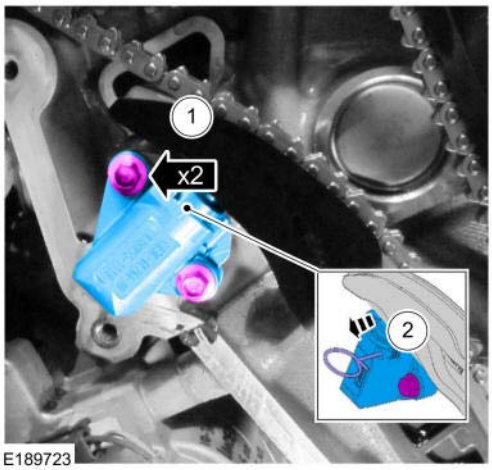
Install the RH primary timing chain tensioner and bolts.

Torque

: 89 lb.in (10 Nm)

2.

Remove the holding pin from the tensioner.



13.

Install the engine front cover. Refer to: Engine Front Cover .

REMOVAL AND INSTALLATION > VALVE COVER LH

Special Tool(s) / General Equipment

	205-142 (T80T-4000-J) Installer, Differential Bearing Cone
	205-153 (T80T-4000-W) Handle
	303-1247 VCT Spark Plug Tube Seal Remover and Installer TKIT-2006UF-FLM TKIT-2006UF-ROW
Plastic Scraper	

Materials

Name	Specification

Motorcraft® Silicone Gasket Remover ZC-30-A	-
Motorcraft® Metal Surface Prep ZC-31-B	-
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4
Metal Brake Parts Cleaner (U.S.) PM-4-A, PM-4-B (U.S.)	-

REMOVAL AND INSTALLATION > VALVE COVER LH > REMOVAL

NOTE: During engine repair procedures, cleanliness is extremely important. Any foreign material, including any material created while cleaning gasket surfaces, that enters the oil passages, coolant passages or the oil pan, can cause engine failure.

1.

Release the fuel system pressure. Refer to: FUEL SYSTEM PRESSURE RELEASE - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS)

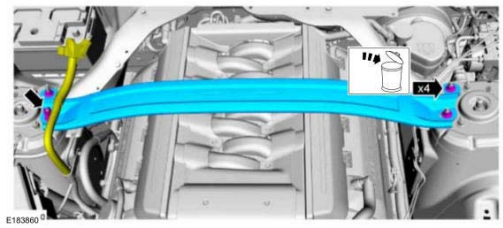
2.

Disconnect the battery ground and positive cables. Refer to: Battery Disconnect and Connect .

3.

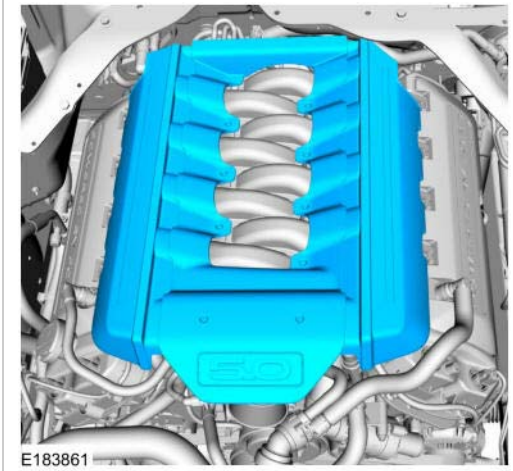
If equipped with a strut tower cross brace, detach the wiring harness retainer.

Remove the nuts and the strut tower cross brace.



NOTE: The engine appearance cover rubber grommets may remain on the cover. If so, remove the grommets from the cover and install them on the intake manifold before installing the cover.

4.
Remove the engine appearance cover.



5.

Remove the following items:

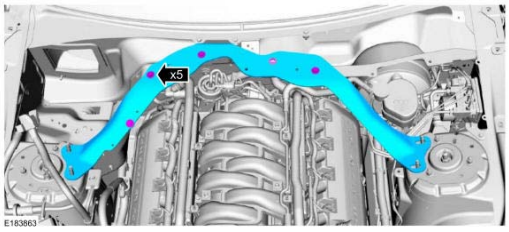
Refer to: AIR CLEANER OUTLET PIPE .

Refer to: AIR CLEANER - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS).

Refer to: Cowl Panel Grille .

6.

Remove the fasteners and the cowl extension.



7.

1.

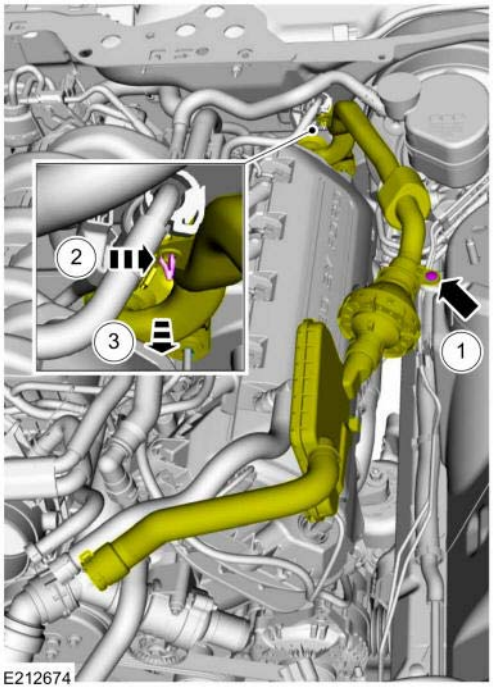
Remove the pin-type retainer.

2.

Depress the retainer.

3.

Position the sound enhancement pipe aside.



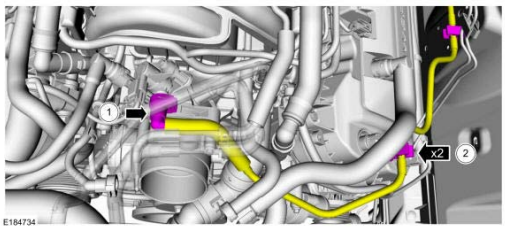
8.

1.

Disconnect the EVAP tube quick release coupling. Refer to: QUICK RELEASE COUPLING .

2.

Detach the EVAP tube from the retainers.



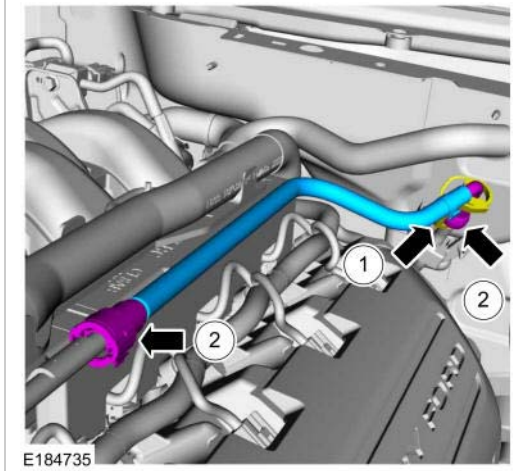
9.

1.

Position the safety clip aside.

2.

Disconnect the quick release couplings and remove the fuel tube. Refer to: QUICK RELEASE COUPLING .



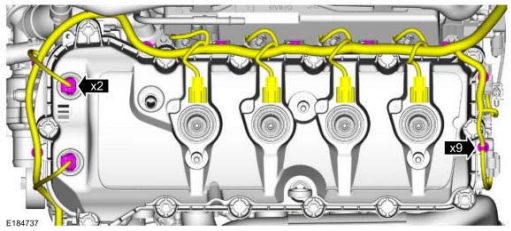
10.

Remove the LH ignition coils. Refer to: IGNITION COIL-ON-PLUG .

11.

Disconnect the VCT variable force solenoid electrical connectors.

Detach the wiring harness retainers.



12.

1.

Remove the oil level indicator.

2.

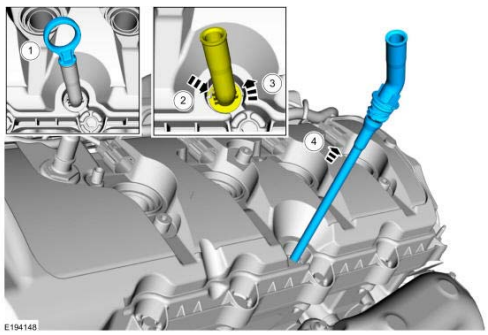
Depress the tab.

3.

Rotate the oil level indicator tube counterclockwise.

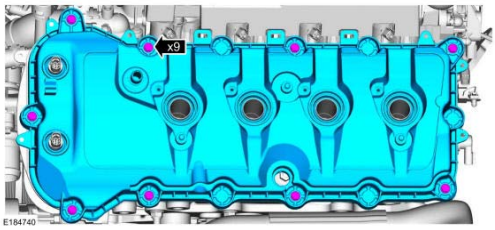
4.

Pull the oil level indicator tube from the engine.



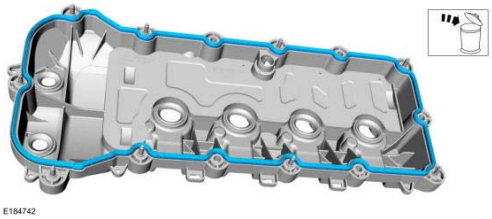
13.

Loosen the bolts and remove the valve cover.



NOTE: Clean the valve cover gasket groove with soap and water or a suitable solvent.

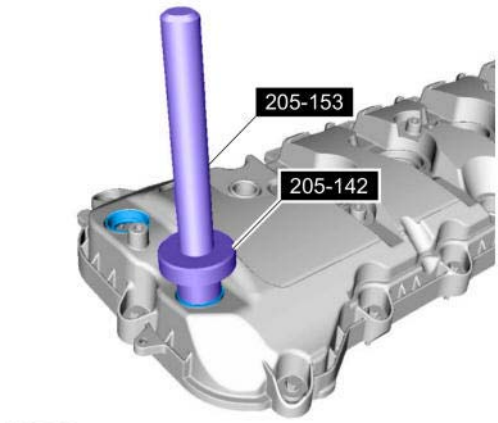
14.
Remove and discard the gasket.



15.

Inspect the VCT variable force solenoid seals. Remove and discard any damaged seals using the special tools.

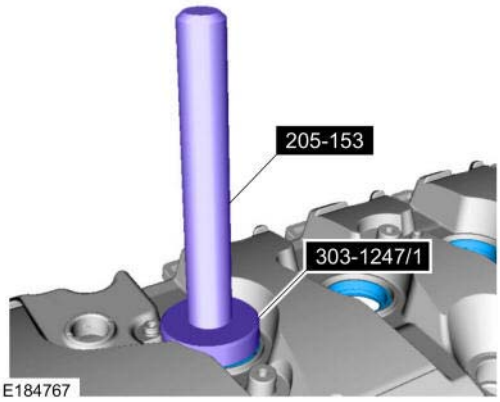
Use Special Service Tool: 205-153 (T80T-4000-W) Handle,205-142 (T80T-4000-J)Installer, Differential Bearing Cone.



16.

Inspect the spark plug seals. Remove and discard any damaged seals using the special tools.

Use Special Service Tool: 205-153 (T80T-4000-W) Handle, 303-1247 VCT Spark Plug Tube Seal Remover and Installer.



NOTE: Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges which make leak paths. Use a plastic scraping tool to remove all traces of old sealant.

17.
Clean the valve cover mating surface of the cylinder head and engine front cover. Refer to: RTV Sealing Surface Cleaning and Preparation .

Use the General Equipment: Plastic Scraper

Material

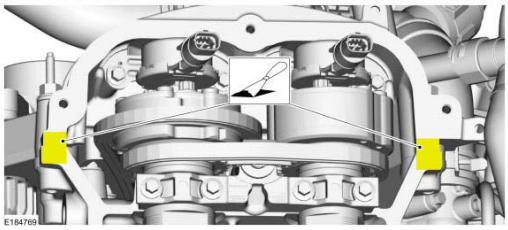
: Motorcraft® Silicone Gasket Remover / ZC-30-A

Material

: Motorcraft® Metal Surface Prep / ZC-31-B

Material

: Metal Brake Parts Cleaner (U.S.) / PM-4-A, PM-4-B (U.S.)

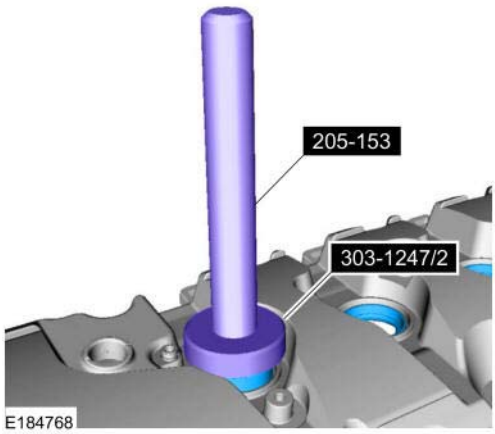


REMOVAL AND INSTALLATION > VALVE COVER LH > INSTALLATION

NOTE: Installation of new seals is only required if damaged seals were removed.

1.
Using the special tools, install new spark plug tube seals.

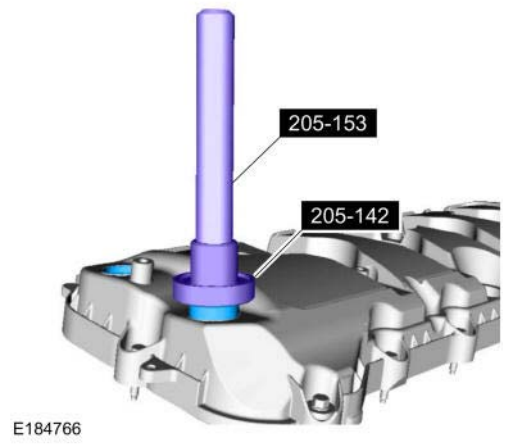
Use Special Service Tool: 205-153 (T80T-4000-W) Handle, 303-1247 VCT Spark Plug Tube Seal Remover and Installer.



NOTE: Installation of new seals is only required if damaged seals were removed.

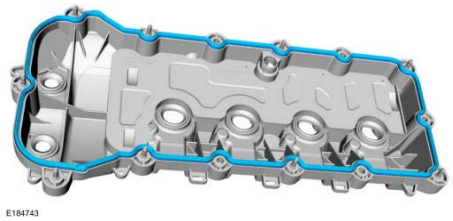
2.
Using the special tools, install new VCT variable force solenoid seals.

Use Special Service Tool: 205-153 (T80T-4000-W) Handle, 205-142 (T80T-4000-J) Installer, Differential Bearing Cone.



3.

Install a new gasket.

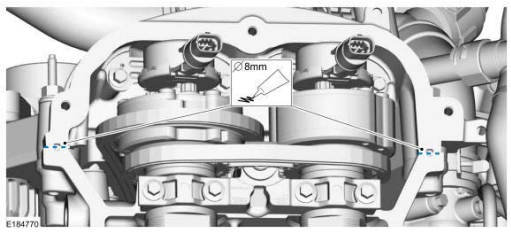


NOTE: If the valve cover is not installed and the fasteners tightened within 5 minutes, the sealant must be removed and the sealing area cleaned.

4.
Apply an 8 mm (0.31 in) bead of silicone gasket and sealant to the engine front cover-to-cylinder head joints.

Material

: Silicone Gasket and Sealant / TA-30 (WSE-M4G323-A4)

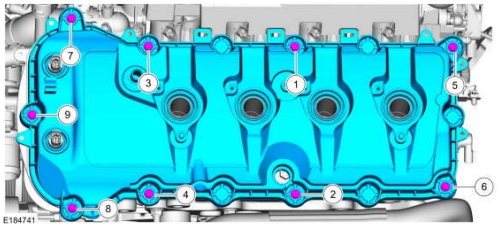


5.

Install the valve cover and tighten the bolts.

Torque

: 89 lb.in (10 Nm)



6.

1.

Push the oil level indicator tube into the engine.

2.

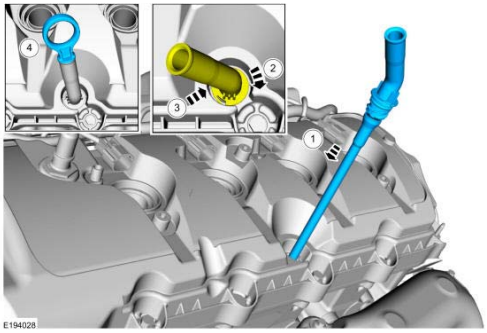
Rotate the oil level indicator tube clockwise.

3.

Verify the tab is locked in place.

4.

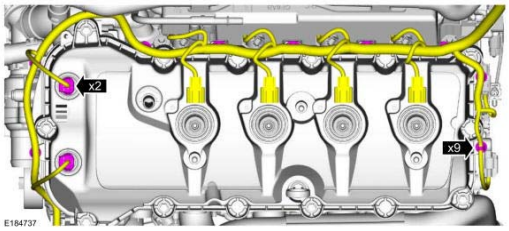
Install the oil level indicator.



7.

Attach the wiring harness retainers.

Connect the VCT variable force solenoid electrical connectors.



8.

Install the LH ignition coils. Refer to: IGNITION COIL-ON-PLUG .

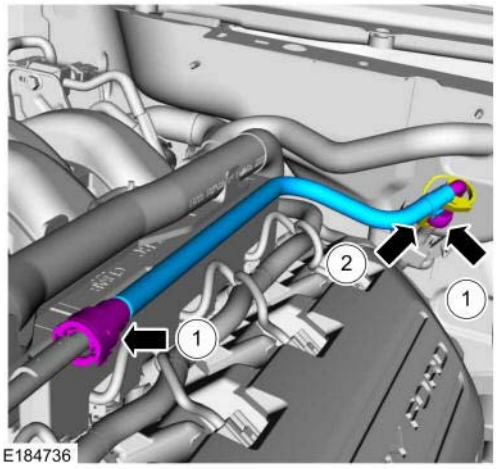
9.

1.

Position the fuel tube and connect the quick release couplings. Refer to: QUICK RELEASE COUPLING .

2.

Install the safety clip.



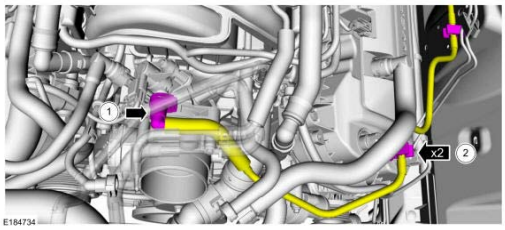
10.

1.

Connect the EVAP tube coupling. Refer to: QUICK RELEASE COUPLING .

2.

Attach the EVAP tube to the retainers.



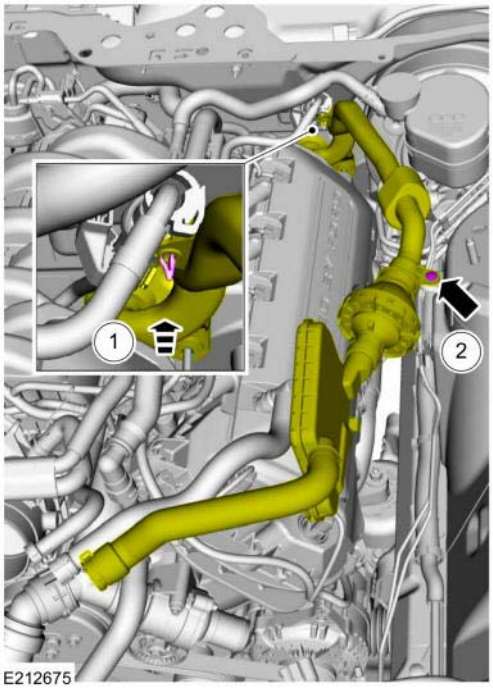
11.

1.

Position the sound enhancement pipe onto the retainer.

2.

Install the pin-type retainer.

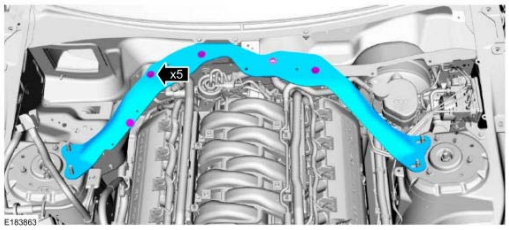


12.

Install the cowl extension and fasteners.

Torque

: 26 lb.ft (35 Nm)



13.

Install the following items:

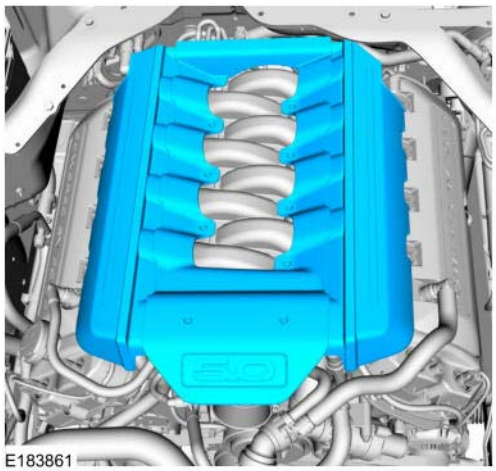
Refer to: Cowl Panel Grille .

Refer to: AIR CLEANER - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS).

Refer to: AIR CLEANER OUTLET PIPE .

NOTE: The engine appearance cover rubber grommets may remain on the cover. If so, remove the grommets from the cover and install them on the intake manifold before installing the cover.

14.
Install the engine appearance cover.



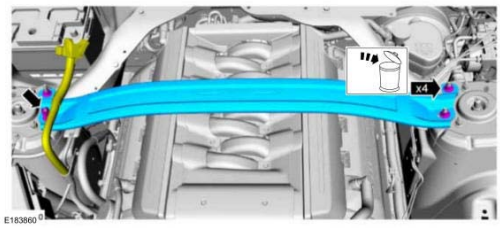
15.

If equipped, install the strut tower cross brace and nuts.

Torque

: 41 lb.ft (55 Nm)

Attach the wiring harness retainer.



16.

Connect the battery ground and positive cables. Refer to: Battery Disconnect and Connect .

REMOVAL AND INSTALLATION > VALVE COVER RH

Special Tool(s) / General Equipment

	205-142 (T80T-4000-J) Installer, Differential Bearing Cone
 E133913	205-153 (T80T-4000-W) Handle
 E175042	303-1247 VCT Spark Plug Tube Seal Remover and Installer TKIT-2006UF-FLM TKIT-2006UF-ROW
Plastic Scraper	

Materials

Name	Specification
Motorcraft® Silicone Gasket Remover ZC-30-A	-
Motorcraft® Metal Surface Prep ZC-31-B	-
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4
Metal Brake Parts Cleaner (U.S.) PM-4-A, PM-4-B (U.S.)	-

REMOVAL AND INSTALLATION > VALVE COVER RH > REMOVAL

NOTE: During engine repair procedures, cleanliness is extremely important. Any foreign material, including any material created while cleaning gasket surfaces, that enters the oil passages, coolant passages or the oil pan, can cause engine failure.

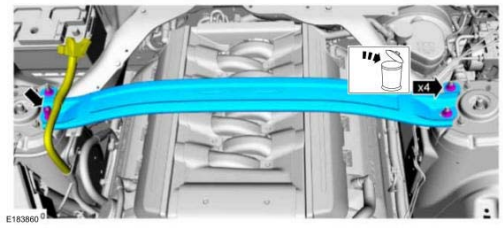
1.

Disconnect the battery ground and positive cables. Refer to: Battery Disconnect and Connect .

2.

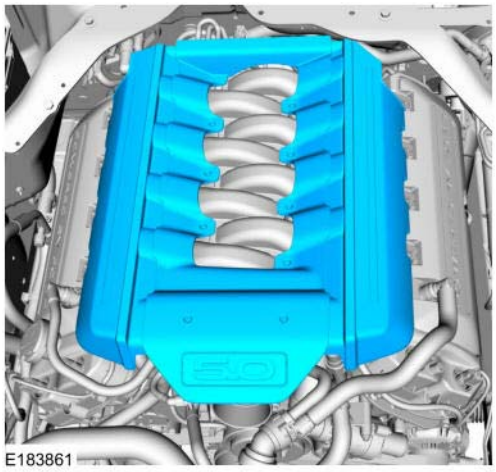
If equipped with a strut tower cross brace, detach the wiring harness retainer.

Remove the nuts and the strut tower cross brace.



NOTE: The engine appearance cover rubber grommets may remain on the cover. If so, remove the grommets from the cover and install them on the intake manifold before installing the cover.

3.
Remove the engine appearance cover. Remove the nuts and the strut tower cross brace.



4.

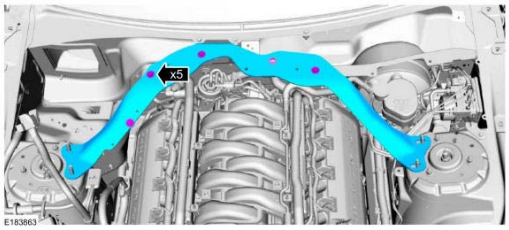
Remove the following items:

Refer to: Cowl Panel Grille .

Refer to: Battery Tray .

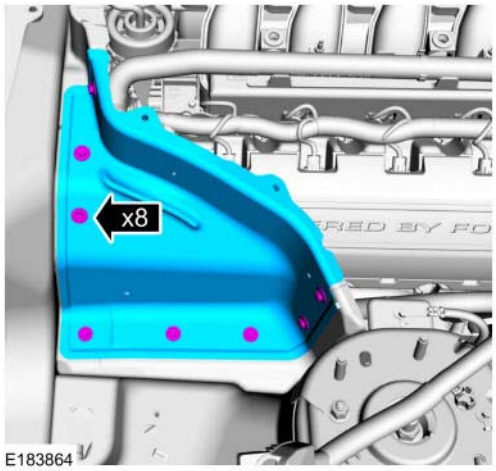
5.

Remove the fasteners and the cowl extension.



6.

Remove the fasteners and the battery heat shield.



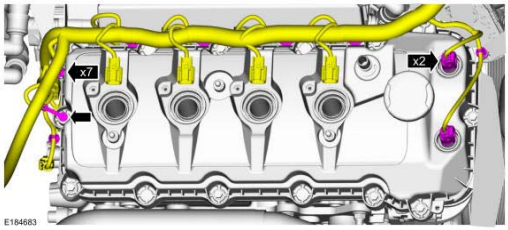
7.

Remove the RH ignition coils. Refer to: IGNITION COIL-ON-PLUG .

8.

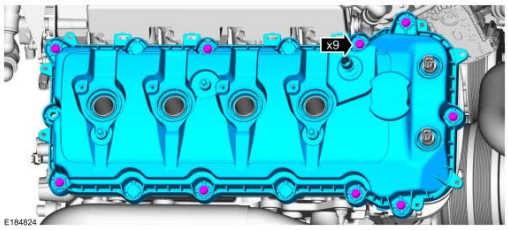
Disconnect the VCT variable force solenoid electrical connectors.

Detach the wiring harness retainers.



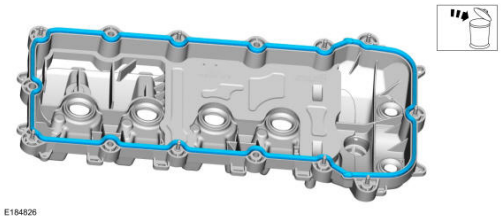
9.

Loosen the bolts and remove the valve cover.



NOTE: Clean the valve cover gasket groove with soap and water or a suitable solvent.

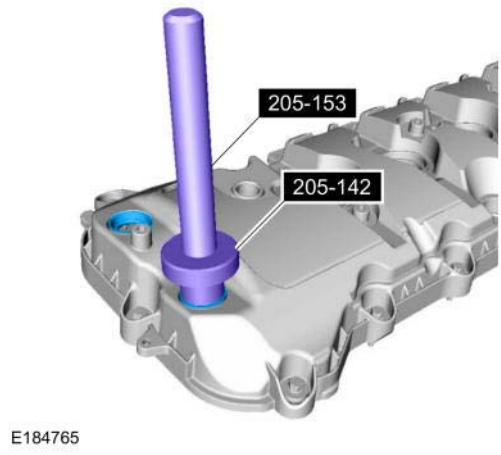
10.
Remove and discard the gasket.



11.

Inspect the VCT variable force solenoid seals. Remove any damaged seals using the special tools.

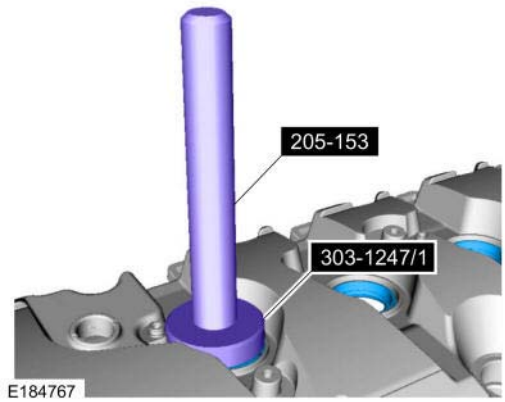
Use Special Service Tool: 205-153 (T80T-4000-W) Handle, 205-142 (T80T-4000-J) Installer, Differential Bearing Cone.



12.

Inspect the spark plug seals. Remove any damaged seals using the special tools.

Use Special Service Tool: 205-153 (T80T-4000-W) Handle, 303-1247 VCT Spark Plug Tube Seal Remover and Installer.



NOTE: Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges which make leak paths. Use a plastic scraping tool to remove all traces of old sealant.

13.
Clean the valve cover mating surface of the cylinder head and engine front cover. Refer to: RTV Sealing Surface Cleaning and Preparation .

Use the General Equipment: Plastic Scraper

Material

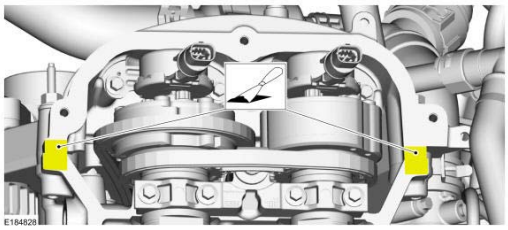
: Motorcraft® Silicone Gasket Remover / ZC-30-A

Material

: Motorcraft® Metal Surface Prep / ZC-31-B

Material

: Metal Brake Parts Cleaner (U.S.) / PM-4-A, PM-4-B (U.S.)

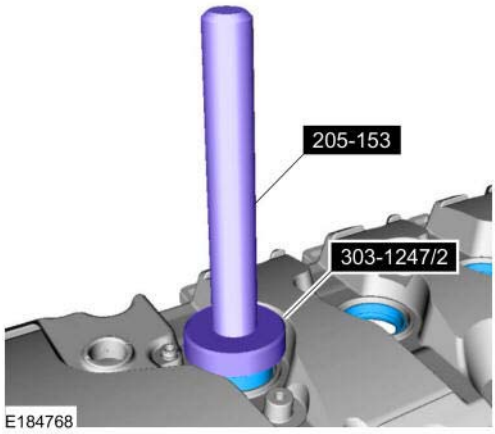


REMOVAL AND INSTALLATION > VALVE COVER RH > INSTALLATION

NOTE: Installation of new seals is only required if damaged seals were removed.

1.
Using the special tools, install new spark plug tube seals.

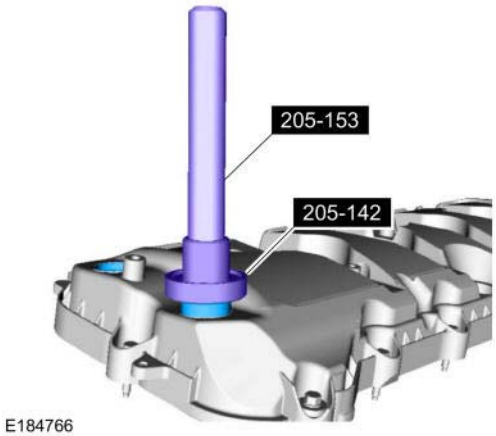
Use Special Service Tool: 205-153 (T80T-4000-W) Handle, 303-1247 VCT Spark Plug Tube Seal Remover and Installer.



NOTE: Installation of new seals is only required if damaged seals were removed.

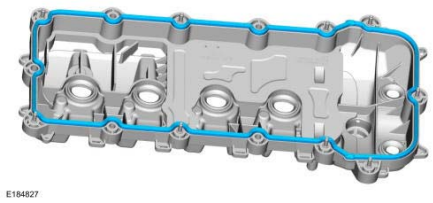
2.
Using the special tools, install new VCT variable force solenoid seals.

Use Special Service Tool: 205-153 (T80T-4000-W) Handle, 205-142 (T80T-4000-J) Installer, Differential Bearing Cone.



3.

Install a new gasket.

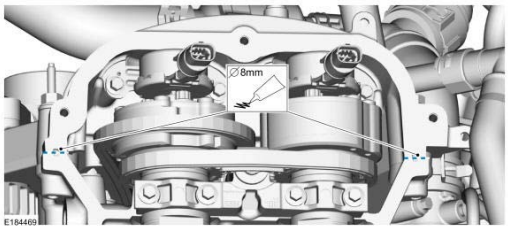


NOTE: If the valve cover is not installed and the fasteners tightened within 5 minutes, the sealant must be removed and the sealing area cleaned.

4.
Apply an 8 mm (0.31 in) bead of silicone gasket and sealant to the engine front cover-to-cylinder head joints.

Material

: Silicone Gasket and Sealant / TA-30 (WSE-M4G323-A4)

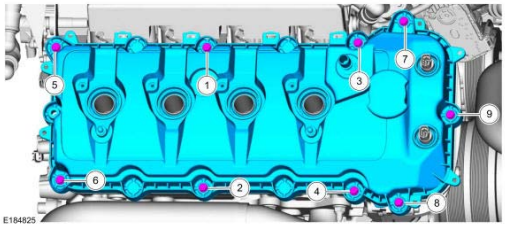


5.

Install the valve cover and tighten the bolts.

Torque

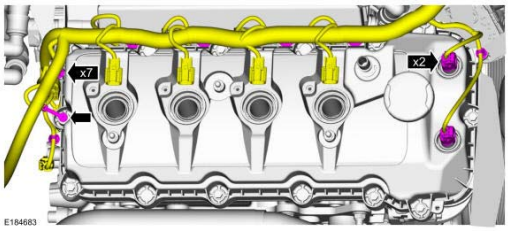
: 89 lb.in (10 Nm)



6.

Attach the wiring harness retainers.

Connect the VCT variable force solenoid electrical connectors.



7.

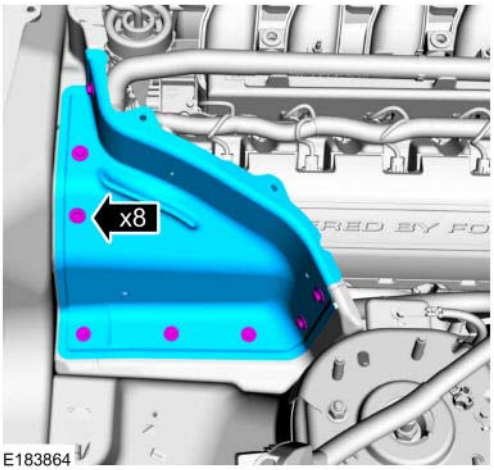
Install the RH ignition coils. Refer to: IGNITION COIL-ON-PLUG .

8.

Install the battery heat shield and fasteners.

Torque

: 80 lb.in (9 Nm)

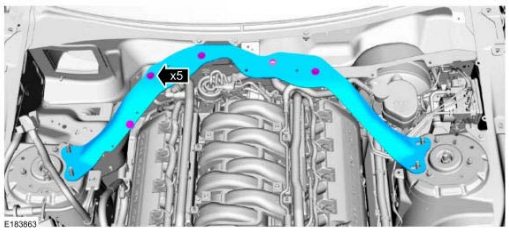


9.

Install the cowl extension and fasteners.

Torque

: 26 lb.ft (35 Nm)



10.

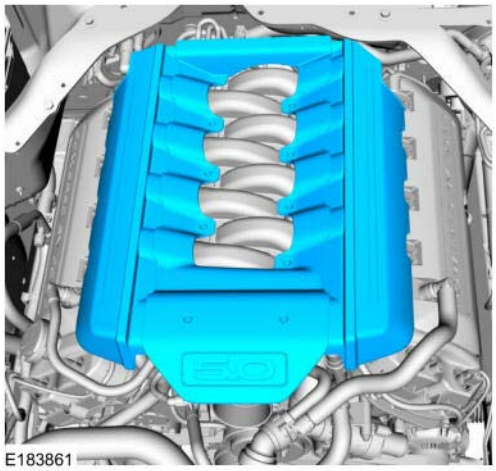
Install the following items:

Refer to: Battery Tray .

Refer to: Cowl Panel Grille .

NOTE: The engine appearance cover rubber grommets may remain on the cover. If so, remove the grommets from the cover and install them on the intake manifold before installing the cover.

11.
Install the engine appearance cover.



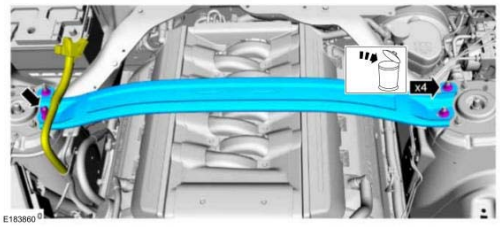
12.

If equipped, install the strut tower cross brace and nuts.

Torque

: 41 lb.ft (55 Nm)

Attach the wiring harness retainer.



13.

Connect the battery ground and positive cables. Refer to: Battery Disconnect and Connect .

REMOVAL AND INSTALLATION > VARIABLE CAMSHAFT TIMING (VCT) UNIT >

REMOVAL

NOTE: During engine repair procedures, cleanliness is extremely important. Any foreign material, including any material created while cleaning gasket surfaces, that enters the oil passages, coolant passages or the oil pan, can cause engine failure.

NOTE: If the RH VCT units are being serviced at the same time as the LH VCT units, remove the RH VCT units first.

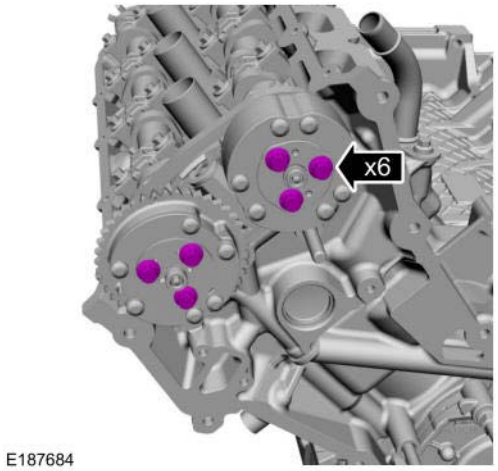
Right hand units

1.

Remove the RH timing chain. Refer to: Timing Chain .

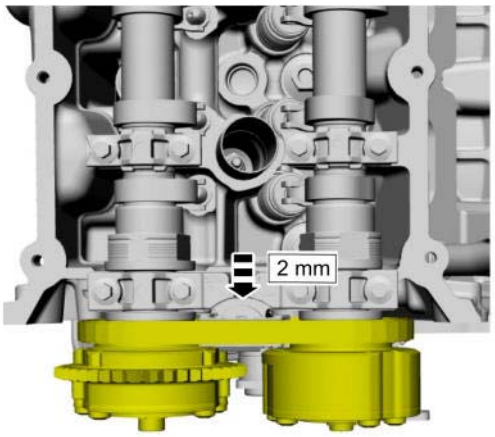
2.

Remove the intake and exhaust VCT assembly bolts.



3.

Slide the VCT assemblies and secondary timing chain forward 2 mm (0.078 in).



E187685

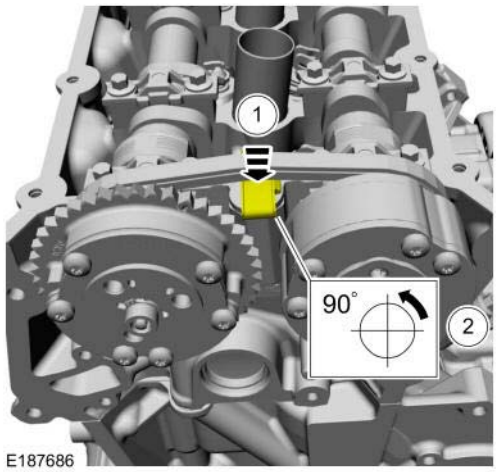
4.

1.

Depress the secondary timing chain tensioner.

2.

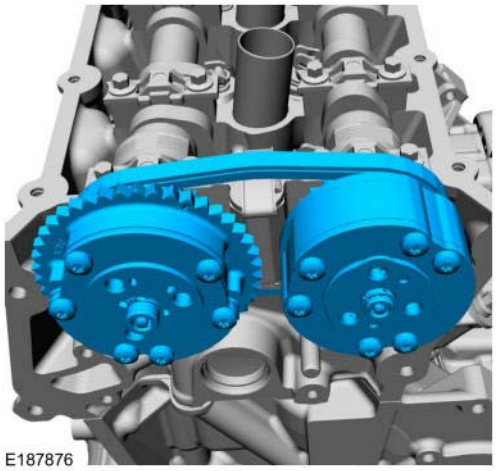
Turn the tensioner counterclockwise 90 degrees.



E187686

5.

Remove the VCT assemblies and the secondary timing chain.



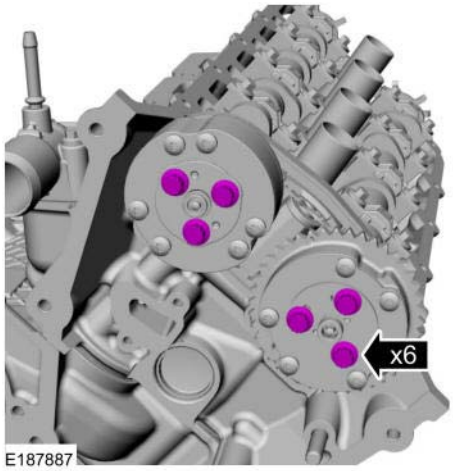
Left hand units

6.

Remove the LH timing chain. Refer to: Timing Chain .

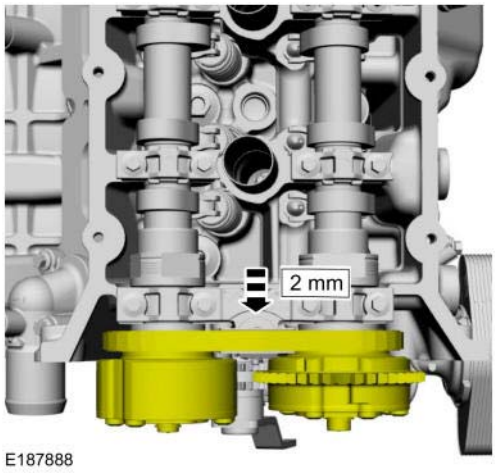
7.

Remove the intake and exhaust VCT assembly bolts.



8.

Slide the Variable Camshaft Timing VCT assemblies and secondary timing chain forward 2 mm (0.078 in).



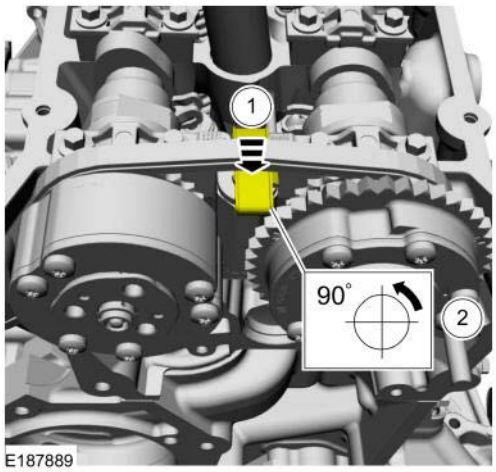
9.

1.

Depress the secondary timing chain tensioner.

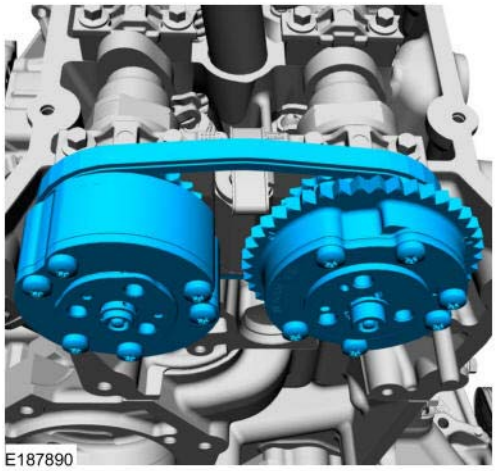
2.

Turn the tensioner counterclockwise 90 degrees.



10.

Remove the VCT assemblies and the secondary timing chain.


E187890

REMOVAL AND INSTALLATION > VARIABLE CAMSHAFT TIMING (VCT) UNIT > INSTALLATION

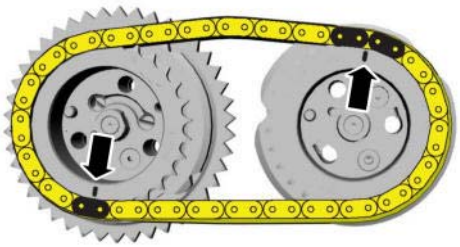
Left hand units

1.

Position the secondary timing chain onto the VCT assemblies. Align the colored links on the secondary timing chain with the timing marks on the VCT assemblies as shown in the illustration.

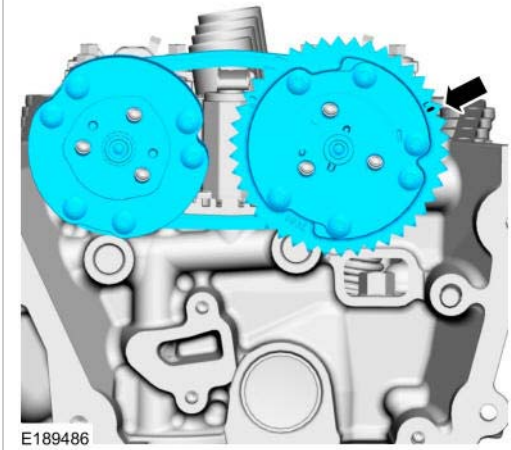
The timing mark on the intake VCT assembly should align between the 2 consecutive colored links.

The timing mark on the exhaust VCT assembly should align with the single colored link.


E189485

2.

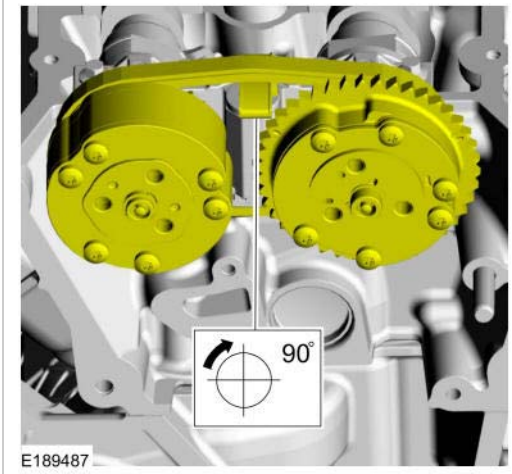
Install the VCT assemblies and the secondary timing chain onto the camshafts. The timing mark on the exhaust VCT assembly should be approximately in the 2 o'clock position.



NOTE: It may be necessary to rotate the exhaust camshaft slightly (using a wrench on the flats of the camshaft) to seat the VCT assemblies onto the camshafts.

3.
Rotate the secondary timing chain tensioner 90 degrees so the ramped area is facing forward and fully seat the VCT assemblies onto the camshafts.

If the secondary timing chain is not centered over the tensioner, reposition the VCT assemblies until they are fully seated on the camshafts.



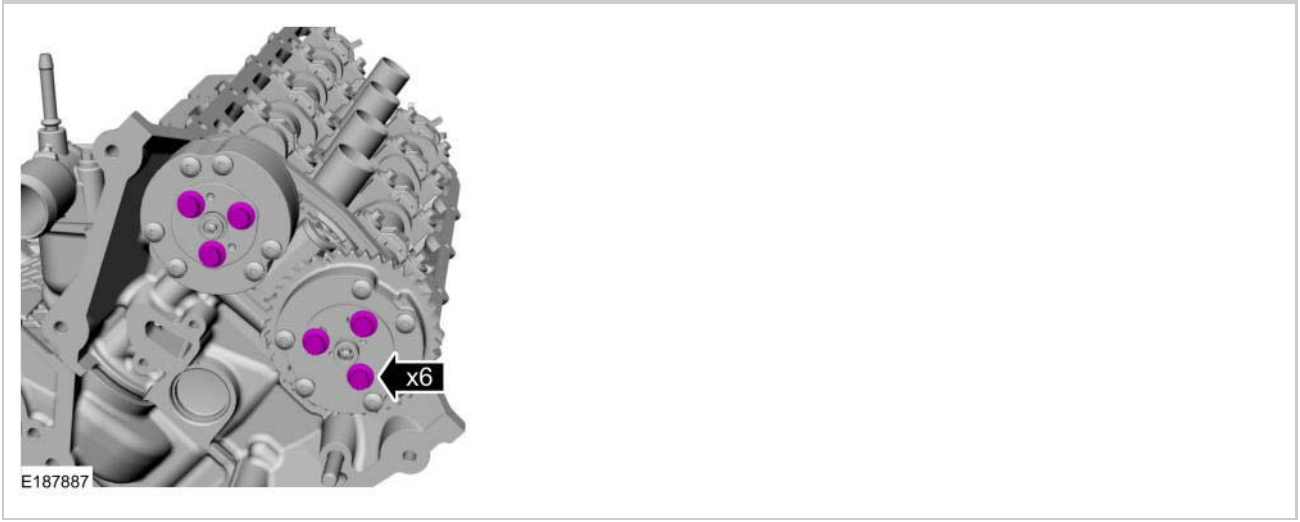
NOTE: Use a wrench on the flats of the camshaft to hold the camshafts while tightening the VCT assembly bolts.

4.
Install the intake and the exhaust VCT assembly bolts.

Torque:

Stage 1: 133 lb.in (15 Nm)

Stage 2: 90°



5.

Install the LH timing chain. Refer to: Timing Chain .

Right hand units

6.

Position the secondary timing chain onto the VCT assemblies. Align the colored links on the secondary timing chain with the timing marks on the VCT assemblies as shown in the illustration.

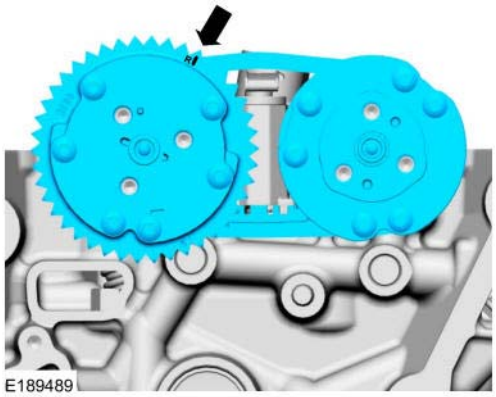
The timing mark on the intake VCT assembly should align between the 2 consecutive colored links.

The timing mark on the exhaust VCT assembly should align with the single colored link.



7.

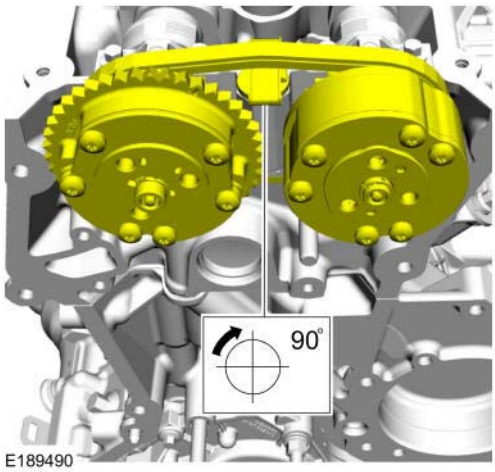
Install the VCT assemblies and the secondary timing chain onto the camshafts. The timing mark on the exhaust VCT assembly should be approximately in the 1 o'clock position.



NOTE: It may be necessary to rotate the exhaust camshaft slightly (using a wrench on the flats of the camshaft) to seat the VCT assemblies onto the camshafts.

8.
Rotate the secondary timing chain tensioner 90 degrees so the ramped area is facing forward and fully seat the VCT assemblies onto the camshafts.

If the secondary timing chain is not centered over the tensioner, reposition the VCT assemblies until they are fully seated on the camshafts.



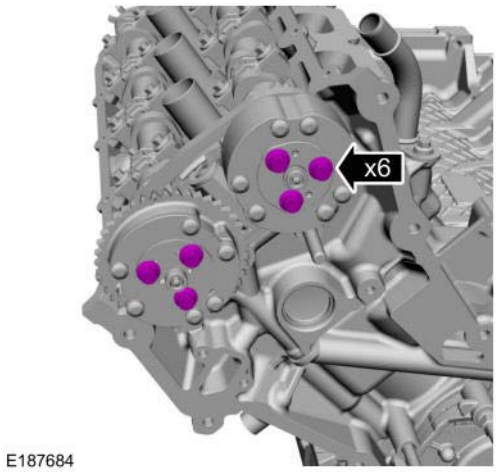
NOTE: Use a wrench on the flats of the camshaft to hold the camshafts while tightening the VCT assembly bolts.

9.
Install the intake and the exhaust VCT assembly bolts.

Torque:

Stage 1: 133 lb.in (15 Nm)

Stage 2: 90°



10.

Install the RH timing chain. Refer to: Timing Chain .

REMOVAL > ENGINE

Special Tool(s) / General Equipment

	303-F047 Lifting Bracket, Engine
	303-F072 Support Bar, Engine
Magnetic Socket	
Floor Crane	
Oil Drain Equipment	
Trolley Jack	
Wooden Block	

6-Speed Automatic Transmission - 6R80/6-Speed Manual Transmission - MT82

1.

With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

2.

Release the fuel system pressure. Refer to: FUEL SYSTEM PRESSURE RELEASE - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS).

3.

Disconnect the battery ground and positive cables. Refer to: Battery Disconnect and Connect .

4.

Drain the engine cooling system. Refer to: COOLING SYSTEM DRAINING AND VACUUM FILLING .

> *NOTE: Make sure to minimize damage to sealer foam and avoid pulling apart dash seal brackets from retainer pins. Excessive damage may allow engine noise, fumes, air or water to enter the passenger compartment.*

5.

1.

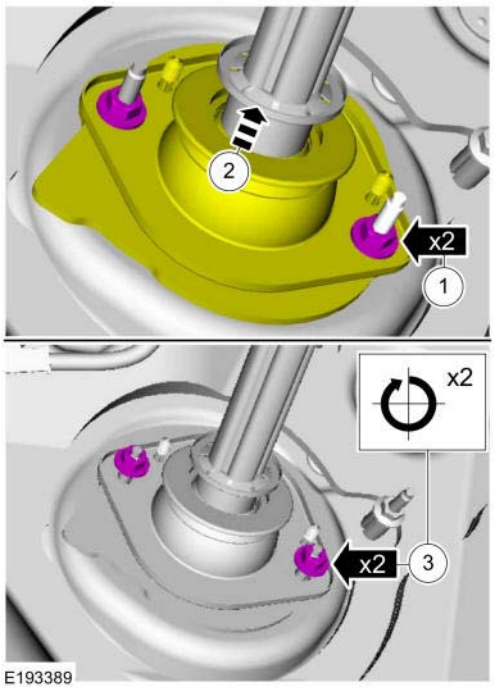
Remove the steering column dash seal nuts.

2.

Loosen the dash seal.

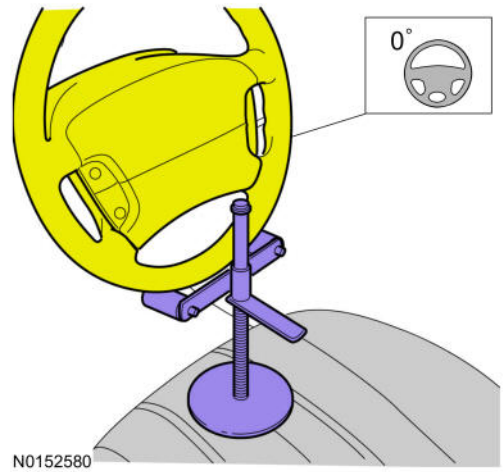
3.

Hand start the dash seal nuts.



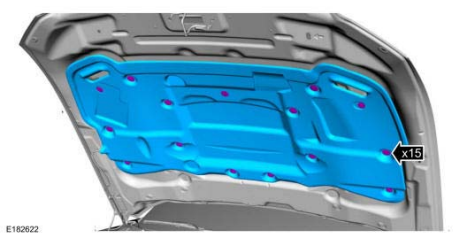
6.

Using a holding device, hold the steering wheel in the straight-ahead position.



7.

Remove the pin-type retainers and the hood insulation.



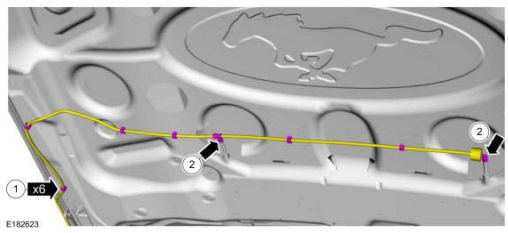
8.

1.

Detach the windshield washer hose retainers.

2.

Disconnect the windshield washer hose C-Lock Couplers.



NOTE: Index-mark the hood hinge location to aid in hood installation.

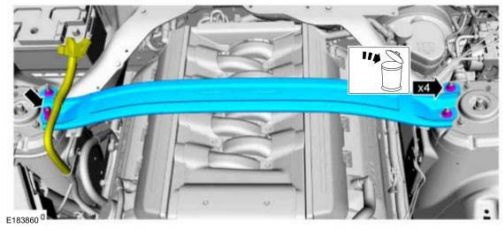
9.
Remove the nuts and the hood.



10.

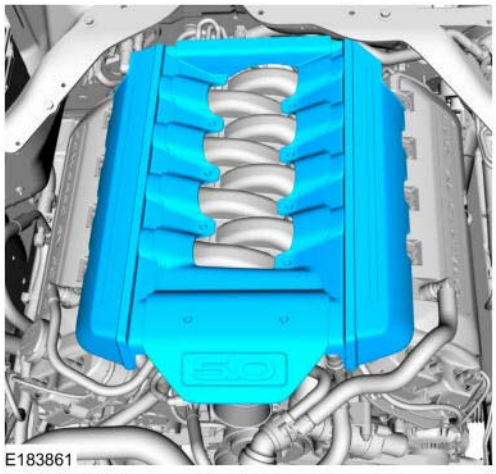
If equipped with a strut tower cross brace, detach the wiring harness retainer.

Remove the nuts and the strut tower cross brace.



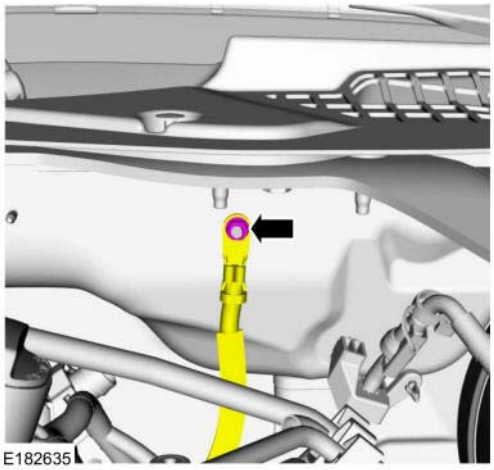
NOTE: The engine appearance cover rubber grommets may remain on the cover. If so, remove the grommets from the cover and install them on the intake manifold before installing the cover.

11.
Remove the engine appearance cover.



12.

Remove the nut and the engine ground wire from the cowl.



NOTE: It is not necessary to separate the air cleaner outlet pipe and the air cleaner, the 2 components can be removed as an assembly.

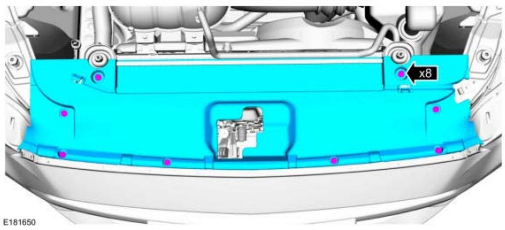
13.
Remove the following items:

Refer to: AIR CLEANER OUTLET PIPE .

Refer to: AIR CLEANER - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS)

14.

Remove the retainers and the radiator top shield.



15.

Remove the following items:

Refer to: DEGAS BOTTLE .

Refer to: COOLING FAN MOTOR AND SHROUD .

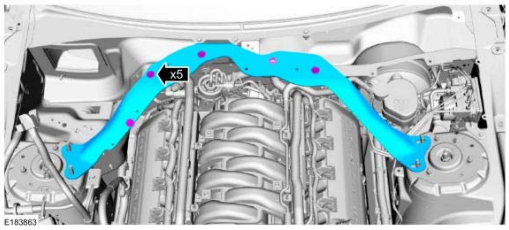
Refer to: AIR CONDITIONING (A C) COMPRESSOR BELT .

Refer to: Battery Tray .

Refer to: Cowl Panel Grille .

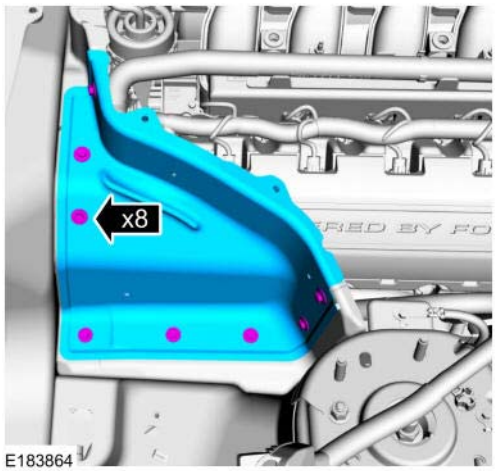
16.

Remove the fasteners and the cowl extension.



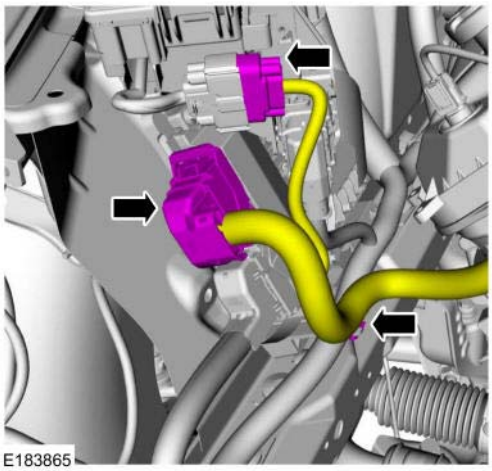
17.

Remove the fasteners and the battery heat shield.



18.

Disconnect the top PCM electrical connector, the 16 pin electrical connector and detach the wiring harness retainers from the PCM bracket.



19.

1.

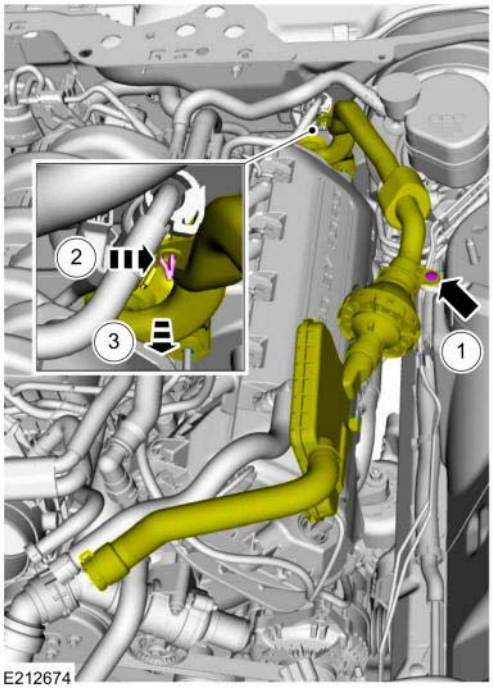
Remove the pin-type retainer.

2.

Depress the retainer.

3.

Position the sound enhancement pipe aside.



20.

1.

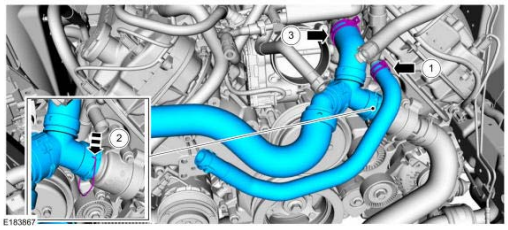
Release the clamp and remove the degas bottle hose.

2.

Slide the spring clip until it hits the stop on the hose fitting.

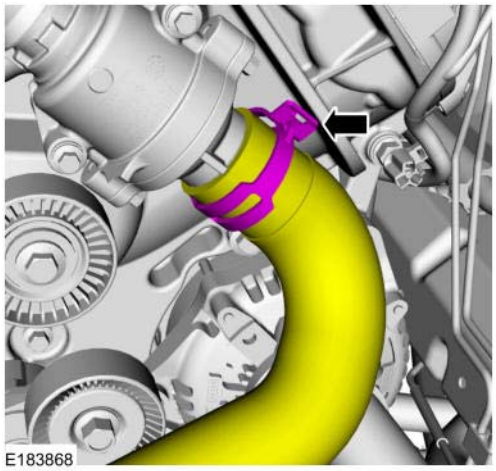
3.

Release the clamp and remove the coolant bypass T assembly from the engine.



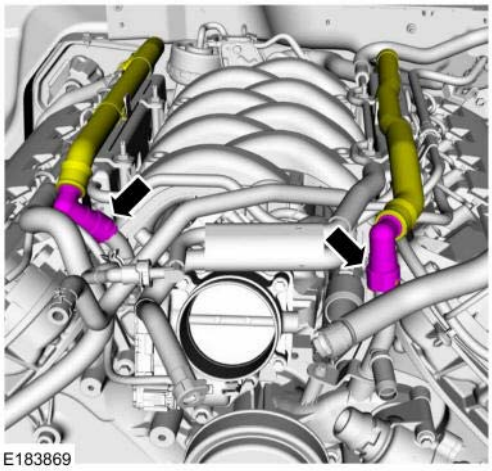
21.

Disconnect the lower radiator hose from the thermostat housing assembly.



22.

Disconnect the heater hose quick connect couplings.

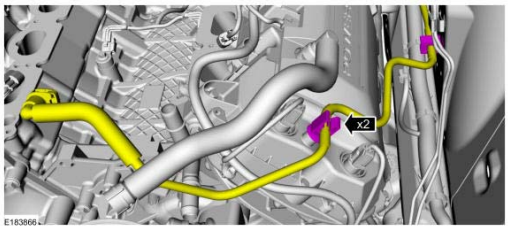


23.

Remove the intake manifold. Refer to: Intake Manifold .

24.

Detach the EVAP tube from the LH valve cover and the LH inner fender.



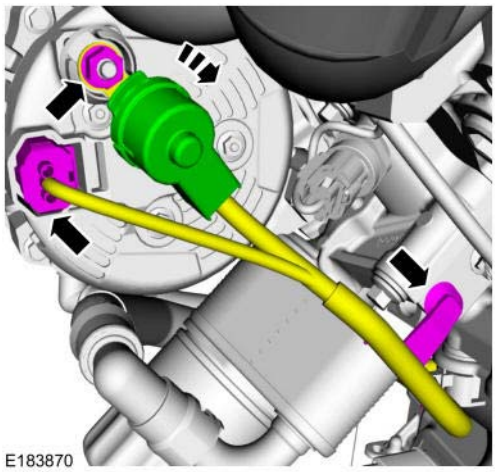
25.

Position the cover aside.

Remove the nut and disconnect the B+ cable.

Disconnect the wiring harness electrical connector.

Detach the harness retainer.



26.

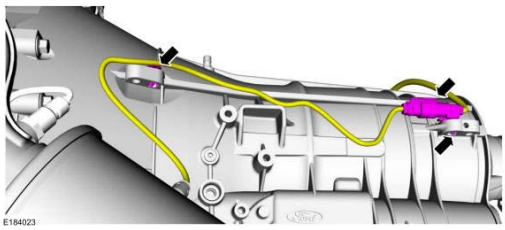
Remove the following items:

Refer to: CATALYTIC CONVERTER RH .

Refer to: STARTER MOTOR .

NOTE: Automatic transmission shown in illustration, manual transmission similar.

27.
Disconnect the LH catalyst monitor sensor electrical connector and detach the harness retainers.



NOTE: Vehicles are equipped with either an underbody shield or a subframe bracket and underbody shield assembly.

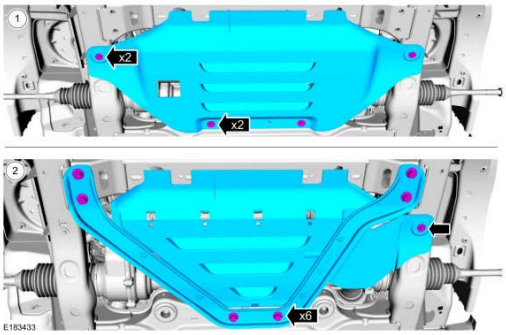
28.

1.

Remove the bolts and the underbody shield.

2.

Remove the bolts and the subframe bracket and underbody shield assembly.



29.

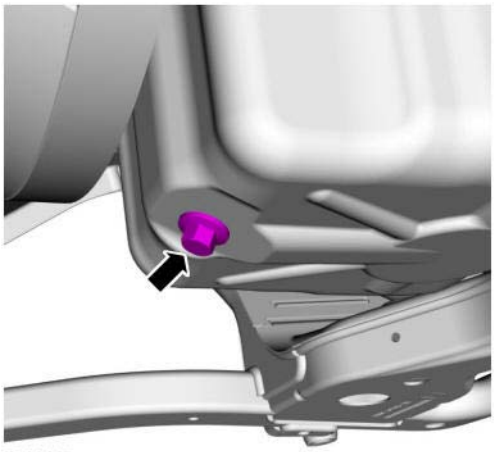
Remove the oil pan drain plug and drain the engine oil.

Use the General Equipment: Oil Drain Equipment

Install the oil pan drain plug.

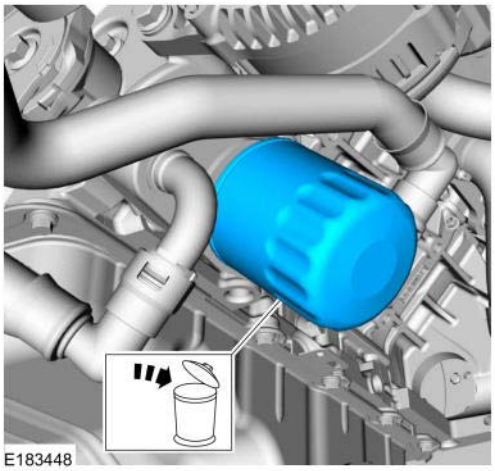
Torque

: 19 lb.ft (26 Nm)


E183447

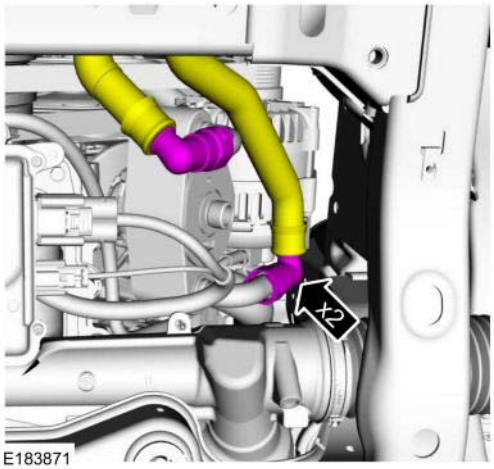
30.

Remove and discard the engine oil filter.


E183448

31.

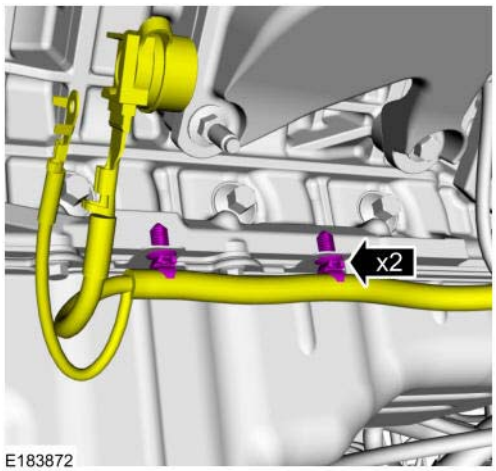
Disconnect the oil cooler hoses.



E183871

32.

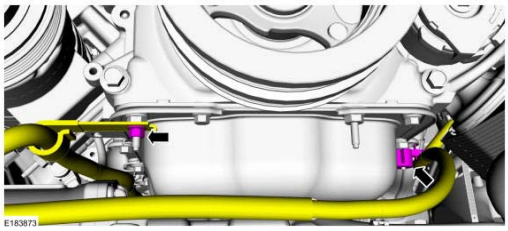
Detach the wiring harness retainers from the oil pan.



33.

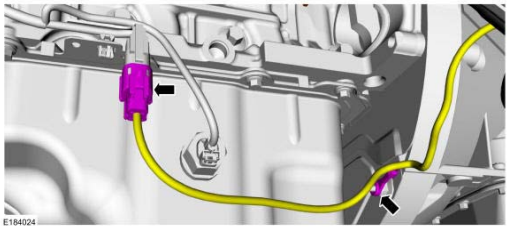
Remove the nut and the wiring harness retainer.

Detach the wiring harness retainer from the oil pan stud bolt.



34.

Disconnect the LH HO2S electrical connector and wiring harness retainer.



35.

WARNING: Do not reuse steering column shaft bolts. This may result in fastener failure and steering column shaft detachment or loss of steering control. Failure to follow this instruction may result in serious injury to vehicle occupant(s).

WARNING: DO NOT hammer, pry or force steering column and column shafts during installation or removal. Failure to follow this instruction may cause damage to steering components that could lead to loss of steering control during vehicle operation and could result in serious personal injury or death.

WARNING: DO NOT attempt to remove or install the steering column lower u-joint at the steering gear without first loosening the steering column dash seal and fasteners. Failure to follow this instruction may cause damage to steering components that could lead to loss of steering control during vehicle operation and could result in serious personal injury or death.

Detach the steering column lower shaft from the lower coupling.

1.

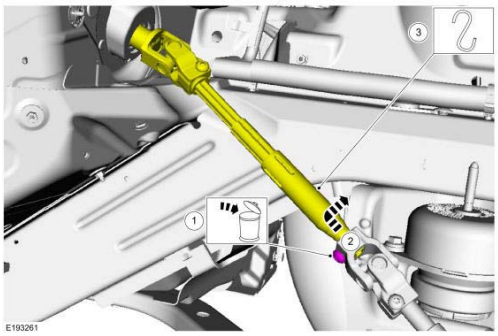
Remove and discard the steering column shaft bolt.

2.

Pull apart the steering column shaft from the coupling.

3.

Secure the lower shaft to the frame rail to avoid damage to the shaft.



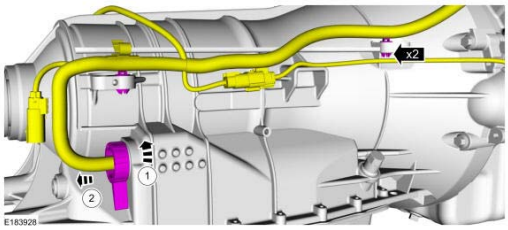
6-Speed Automatic Transmission - 6R80

36.

Rotate the transmission electrical connector.

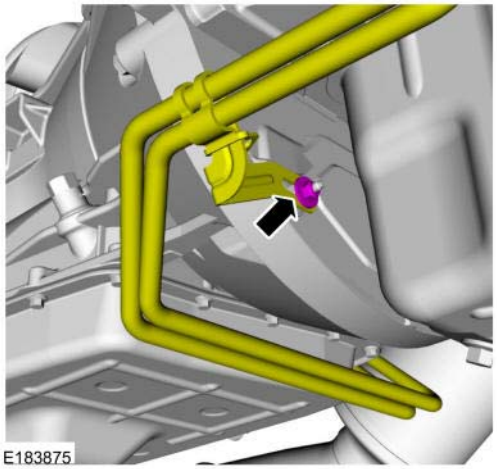
Pull the transmission electrical connector out to disconnect.

Detach the retainers and position the wiring harness aside.



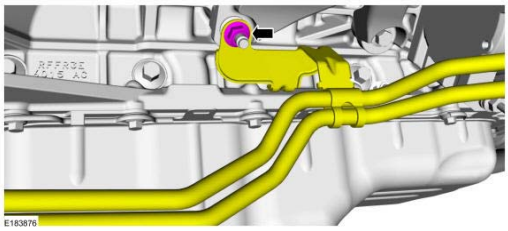
37.

Remove the transmission cooling tube nut and bracket from the flexplate inspection cover stud bolt.



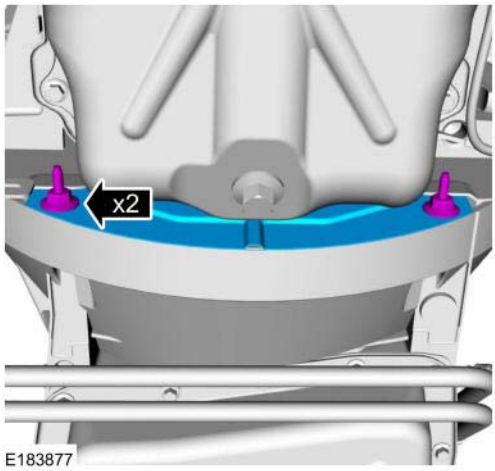
38.

Remove the transmission cooling tube bracket nut and position the bracket and tubes aside.



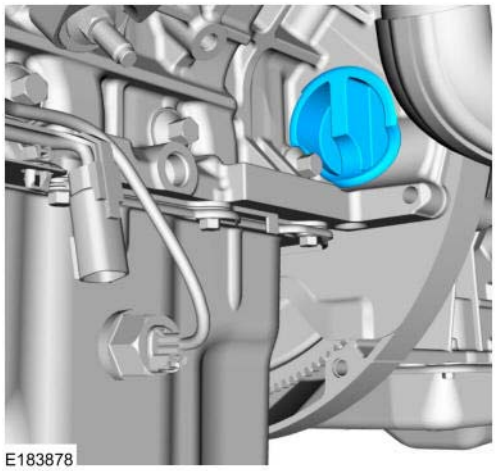
39.

Remove the stud bolts and the flexplate inspection cover.



40.

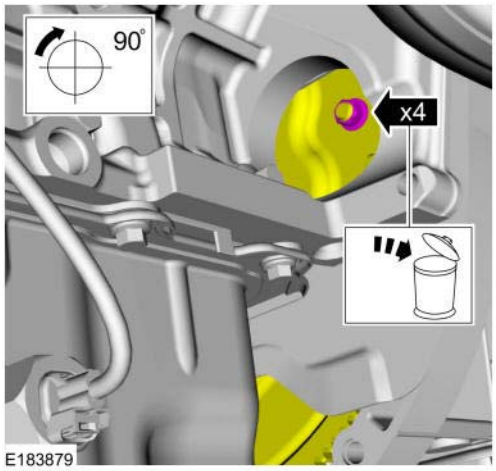
Remove the rubber access plug.



NOTE: Only rotate the crankshaft in a clockwise direction.

41.
Remove and discard the torque converter nuts.

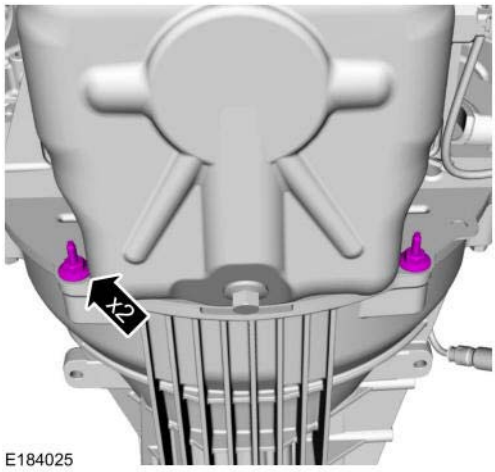
Use the General Equipment: Magnetic Socket



6-Speed Manual Transmission - MT82

42.

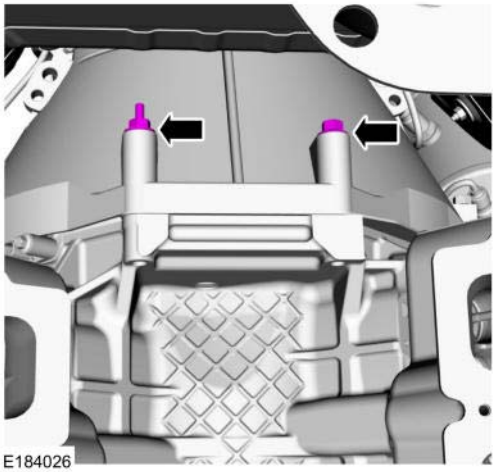
Remove the engine rear cover plate stud bolts.



6-Speed Automatic Transmission - 6R80/6-Speed Manual Transmission - MT82

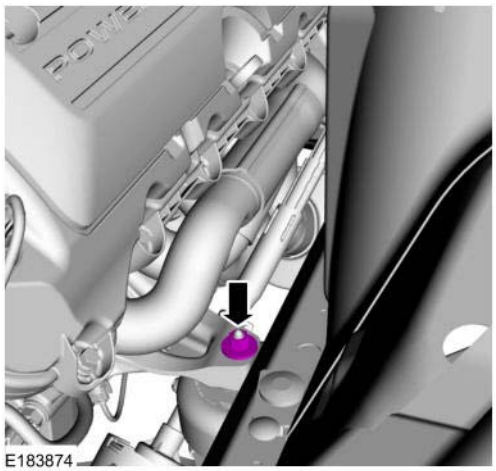
43.

Remove the top transmission-to-engine bolt and stud bolt.



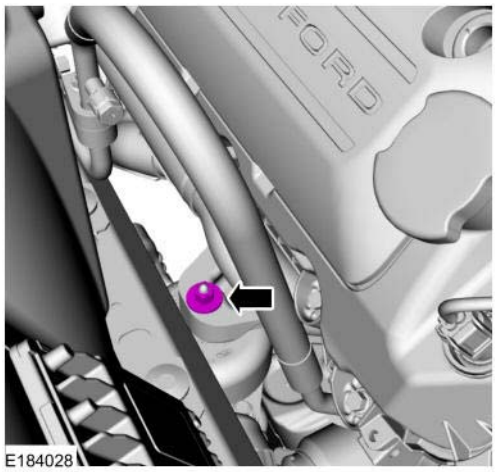
44.

Remove the LH engine mount nut.



45.

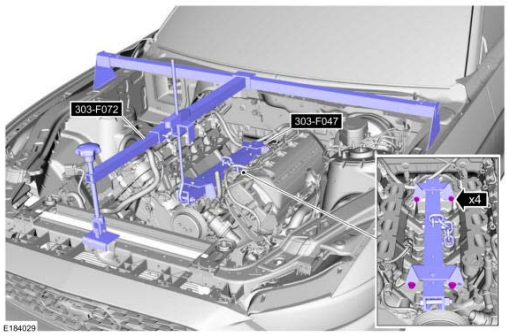
Remove the RH engine mount nut.



NOTE: Do not position the legs of the Engine Support Bar on the fenders. Instead, the legs should be positioned on the body structure. Failure to follow these instructions may result in body damage.

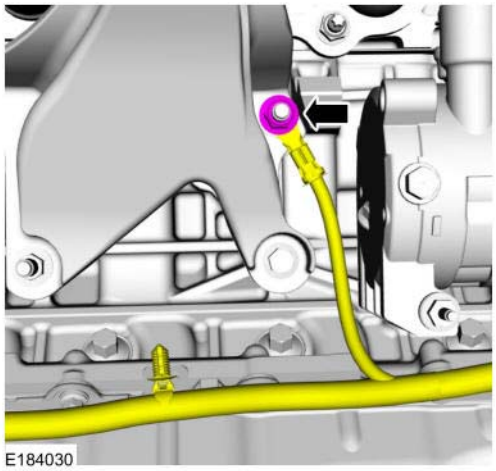
46.
Install the special tools and raise the engine 25 mm (1 inch).

Use Special Service Tool: 303-F072 Support Bar, Engine, 303-F047 Lifting Bracket, Engine.



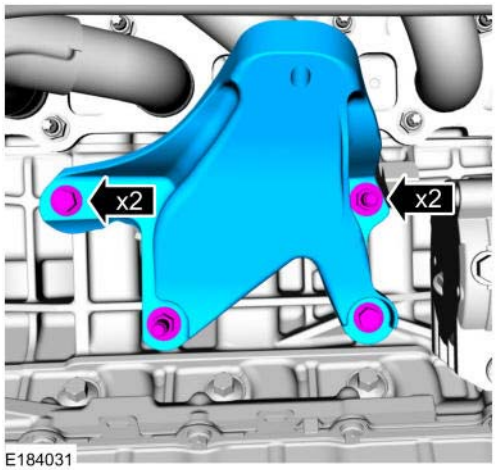
47.

Remove the nut and ground strap from the RH engine mount bracket stud bolt.



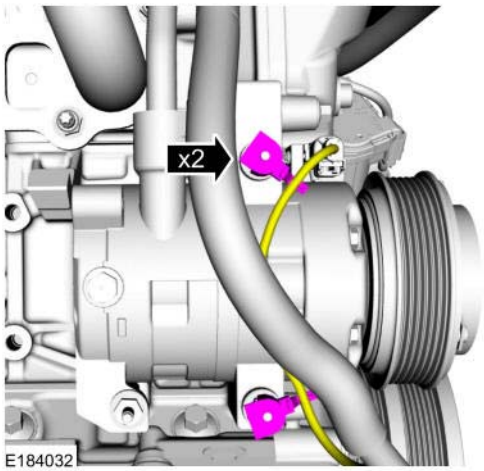
48.

Remove the bolts, the stud bolts and the RH engine mount bracket.



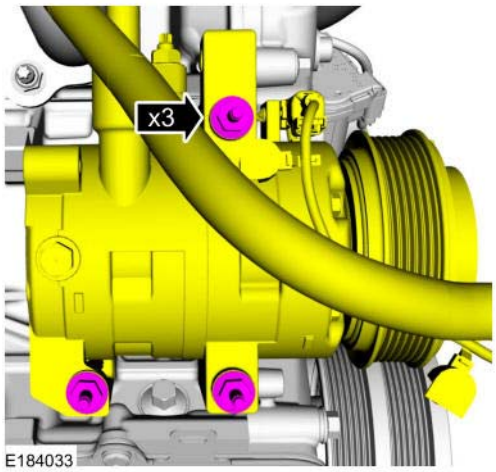
49.

Detach the wiring harness retainers from the A/C compressor stud bolts.



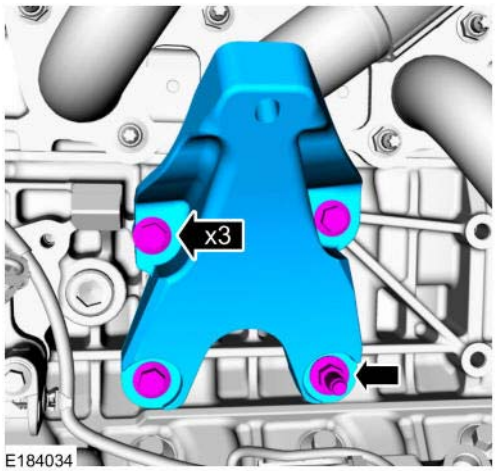
50.

Remove the stud bolts and position the A/C compressor aside.



51.

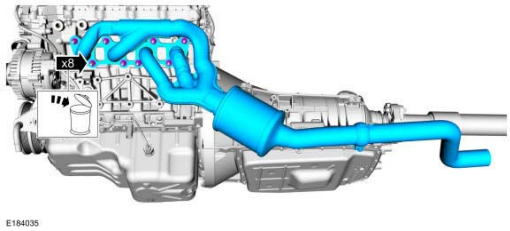
Remove the bolts, the stud bolt and the LH engine mount bracket.



52.

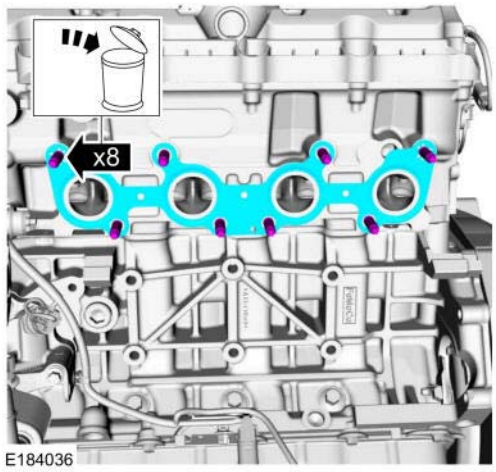
Remove and discard the nuts.

Remove the LH catalytic converter.



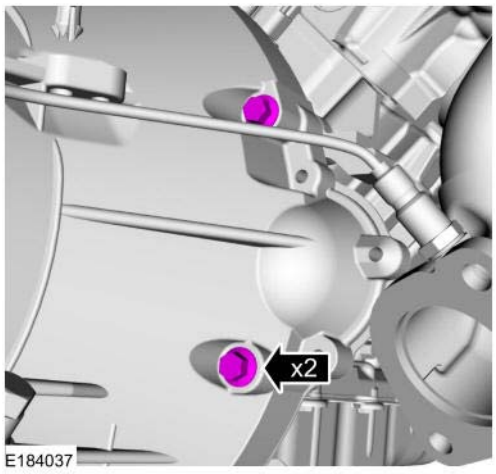
53.

Remove and discard the gasket and studs.



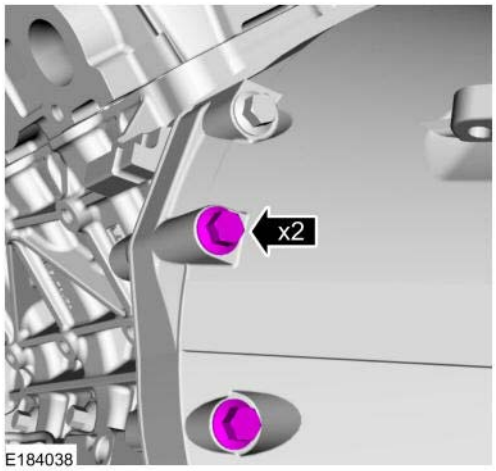
54.

Remove RH transmission-to-engine bolts.



55.

Remove LH transmission-to-engine bolts.



56.

1.

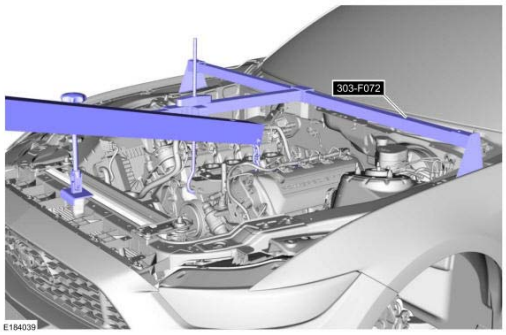
Attach the Floor Crane to the Engine Lifting Bracket

Use the General Equipment: Floor Crane

2.

Once the engine is supported by the Floor Crane, remove the special tools.

Use Special Service Tool: 303-F072 Support Bar, Engine.

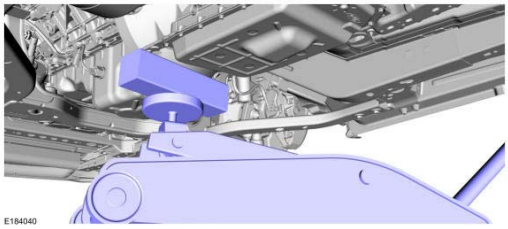


NOTE: Do not support the transmission by the fluid pan, failure to follow this instruction may result in serious damage to the transmission.

57.
Install a jack and wooden block under the transmission bell housing to support the transmission.

Use the General Equipment: Wooden Block

Use the General Equipment: Trolley Jack



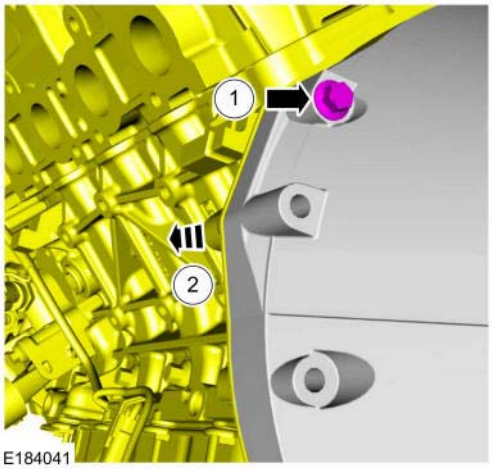
58.

1.

Remove the remaining transmission-to-engine bolt.

2.

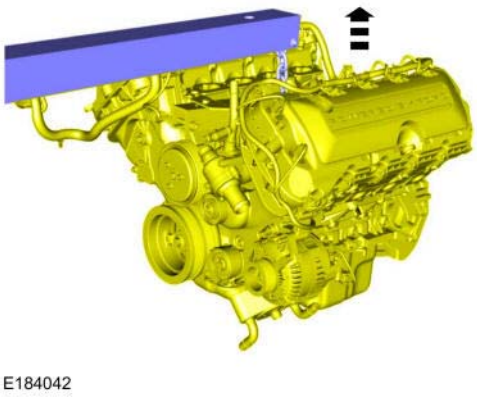
Separate the engine from the transmission.



59.

Using the Floor Crane lift the engine from the vehicle.

Use the General Equipment: Floor Crane



DISASSEMBLY > ENGINE

Special Tool(s) / General Equipment

	100-001 (T50T-100-A) Slide Hammer
	205-142 (T80T-4000-J) Installer, Differential Bearing Cone

 E133913	205-153 (T80T-4000-W) Handle
 E175042	303-1247 VCT Spark Plug Tube Seal Remover and Installer TKIT-2006UF-FLM TKIT-2006UF-ROW
 E134603	303-409 (T92C-6700-CH) Remover, Crankshaft Seal TKIT-1992-FH/FMH/FLMH TKIT-1993-LMH/MH
	303-448 (T93P-6303-A) Holding Tool, Crankshaft TKIT-1993-FLM TKIT-1993-LM
	303-519 (T95P-6701-EH) Remover, Crankshaft Rear Oil Seal TKIT-1995-FH/FLMH TKIT-1995-LMH/MH
	303-F047 Lifting Bracket, Engine
Floor Crane	
Three Leg Puller	
Mounting Stand	
Plastic Scraper	

Materials

Name	Specification
Motorcraft® Silicone Gasket Remover ZC-30-A	-
Motorcraft® Metal Surface Prep ZC-31-B	-
Metal Brake Parts Cleaner (U.S.) PM-4-A, PM-4-B (U.S.)	-

NOTE: During engine repair procedures, cleanliness is extremely important. Any foreign material, including any material created while cleaning gasket surfaces, that enters the oil passages, coolant passages or the oil pan, can cause engine failure.

NOTE: Remove the cylinder heads before removing the crankshaft. Failure to do so can result in engine damage.

NOTE: If the components are to be reinstalled, they must be installed in their original location. Mark the components for installation into their original location.

NOTE: Refer to the exploded view under the Engine Component View .

6-Speed Automatic Transmission - 6R80

NOTE: The flexplate bolts are torque-to-yield design and are not reusable

1.
Remove and discard the flexplate bolts.

Remove the flexplate.



6-Speed Manual Transmission - MT82

2.

WARNING: Do not breathe dust or use compressed air to blow dust from storage containers or friction components. Remove dust using government-approved

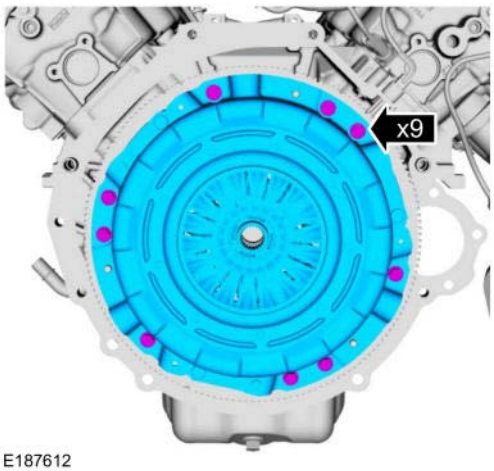
techniques. Friction component dust may be a cancer and lung disease hazard. Exposure to potentially hazardous components may occur if dusts are created during repair of friction components, such as brake pads and clutch discs. Exposure may also cause irritation to skin, eyes and respiratory tract, and may cause allergic reactions and/or may lead to other chronic health effects. If irritation persists, seek medical attention or advice. Failure to follow these instructions may result in serious personal injury.

NOTE: Loosen the bolts evenly to prevent clutch pressure plate damage.

NOTE: If the parts are to be reused, index-mark the pressure plate to the flywheel.

Remove and discard the pressure plate bolts.

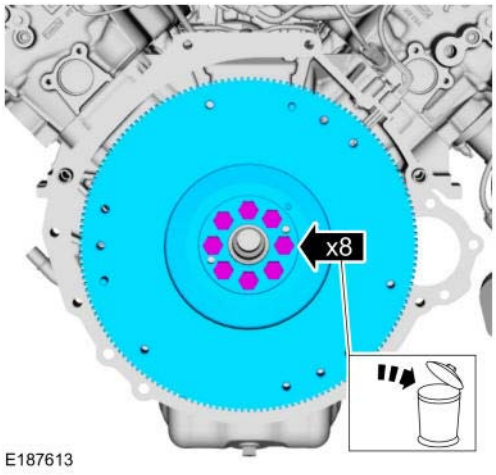
Remove the pressure plate and the clutch disc.



NOTE: The flywheel bolts are torque-to-yield design and are not reusable

3.
Remove and discard the flywheel bolts.

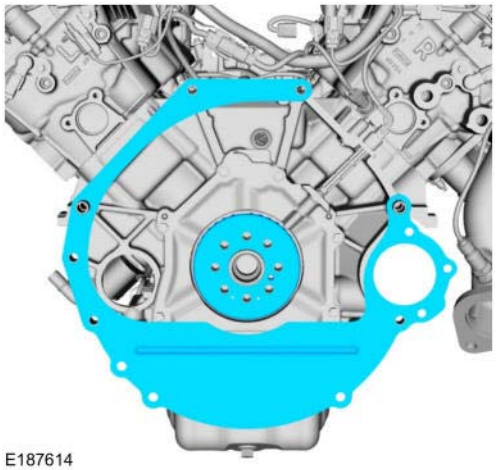
Remove the flywheel.



6-Speed Automatic Transmission - 6R80/6-Speed Manual Transmission - MT82

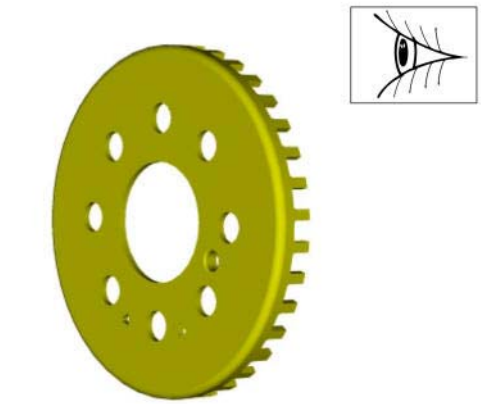
> *NOTE: Engine equipped with manual transmission shown in illustration, automatic transmission engine similar.*

4.
Remove the crankshaft sensor ring and the engine-to-transmission spacer plate.



5.

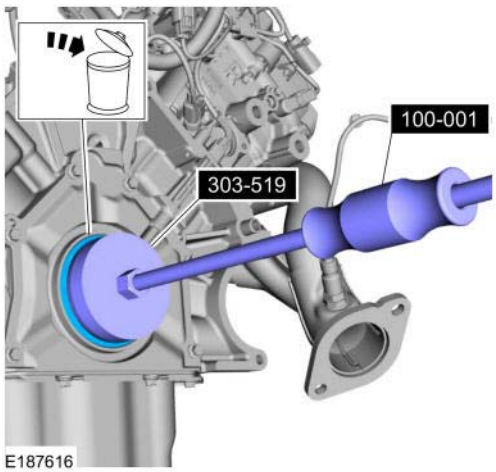
Inspect the crankshaft sensor ring for damage. If the crankshaft sensor ring has been dropped or has any visual damage, it must be replaced.


E187615

6.

Using the special tools, remove and discard the crankshaft rear seal.

Use Special Service Tool: 100-001 (T50T-100-A) Slide Hammer, 303-519 (T95P-6701-EH) Remover, Crankshaft Rear Oil Seal.



E187616

7.

Using a floor crane, install the engine on a mounting stand and remove the special tool.

Remove Special Service Tool: 303-F047 Lifting Bracket, Engine.

Use the General Equipment: Floor Crane

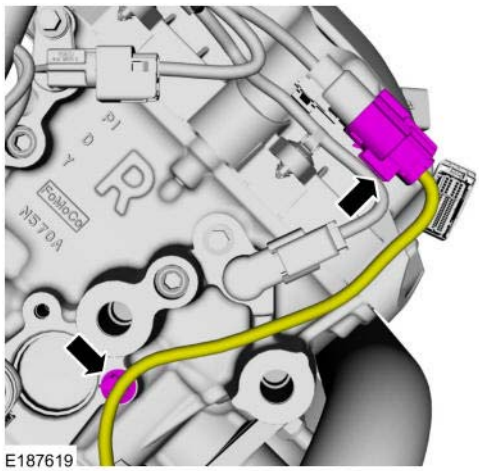
Use the General Equipment: Mounting Stand



E189975

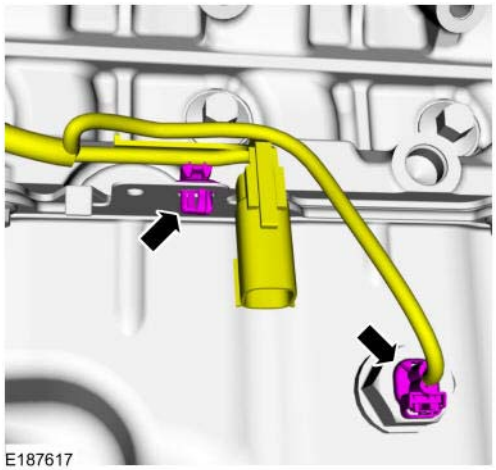
NOTE: Manual transmission engine shown in illustration, automatic transmission engine similar.

8.
Disconnect the RH HO2S electrical connector and wiring harness retainer.


E187619

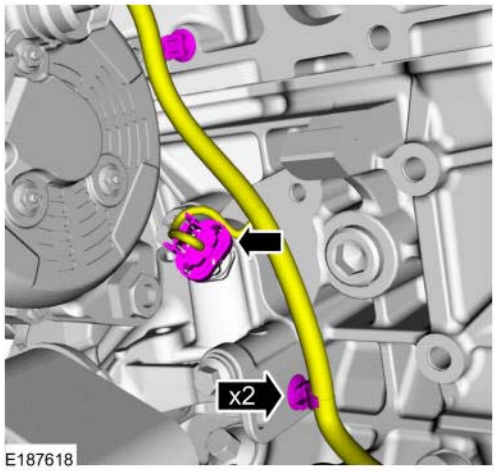
9.

Disconnect the engine oil level sensor electrical connector and the wiring harness retainer.



10.

Disconnect the EOP) switch electrical connector and the wiring harness retainers.

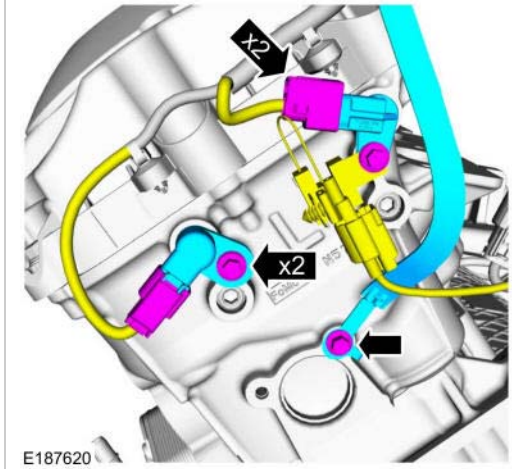


11.

Disconnect the LH camshaft position sensor electrical connectors.

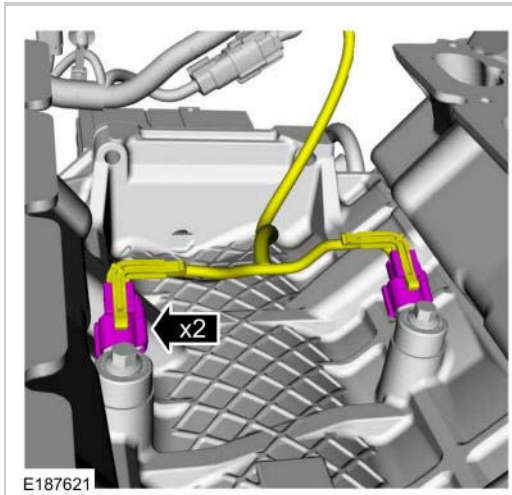
Remove the bolt and the ground wire.

Remove the bolts and the LH camshaft position sensors.



12.

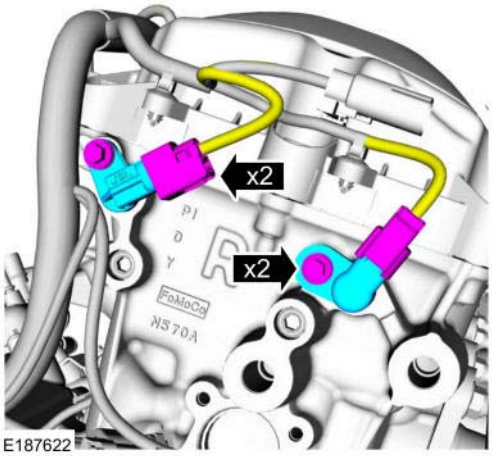
Disconnect the KS electrical connectors.



13.

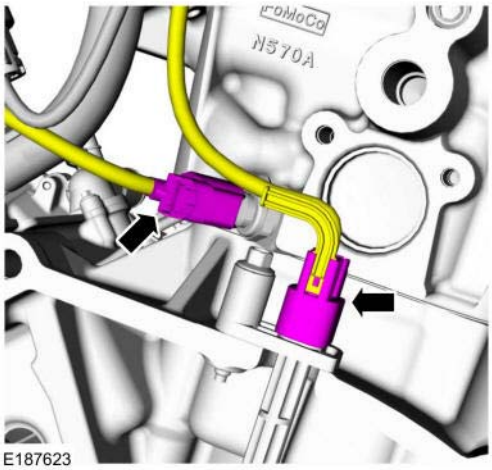
Disconnect the RH camshaft position sensor electrical connectors.

Remove the bolts and the RH camshaft position sensors.



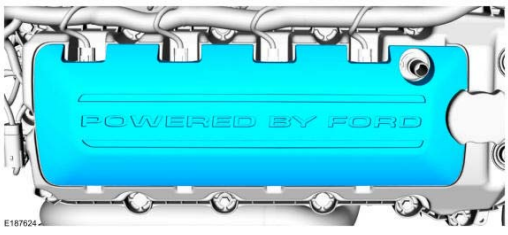
14.

Disconnect the CHT sensor and the CKP sensor electrical connectors.



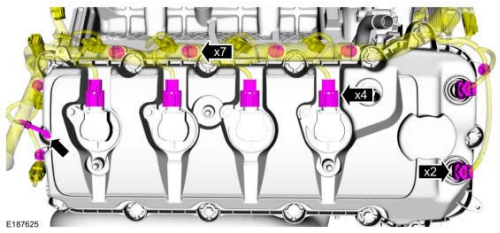
15.

Remove the RH spark plug cover.



NOTE: Engine equipped with automatic transmission shown in illustration, manual transmission engine similar.

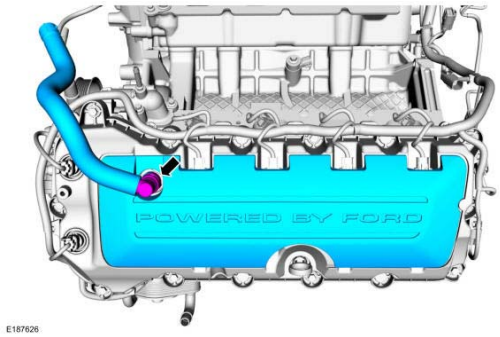
16.
Disconnect the wiring harness electrical connectors and retainers.



17.

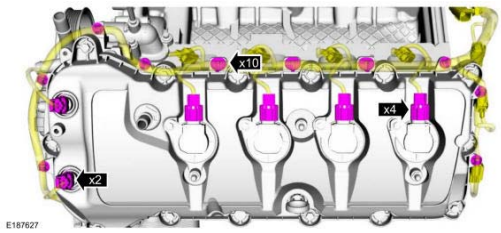
Remove the crankcase ventilation tube. Refer to: QUICK RELEASE COUPLING .

Remove the LH spark plug cover.



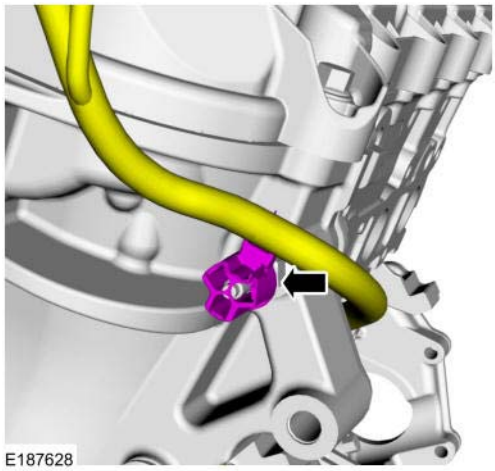
18.

Disconnect the wiring harness electrical connectors and retainers.



19.

Detach the wiring harness retainer from the engine front cover stud bolt.



20.

1.

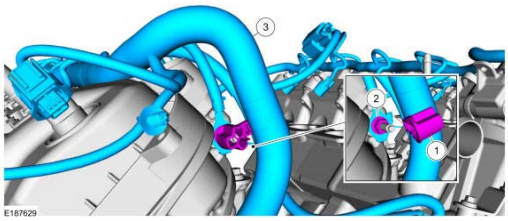
Detach the wiring harness retainer from the engine front cover stud bolt.

2.

Remove the nut and the ground wire.

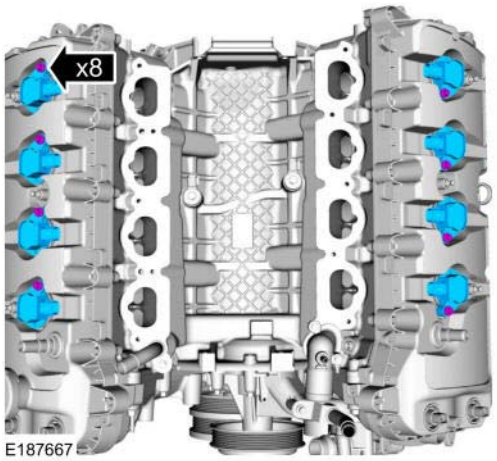
3.

Remove the wiring harness from the engine.



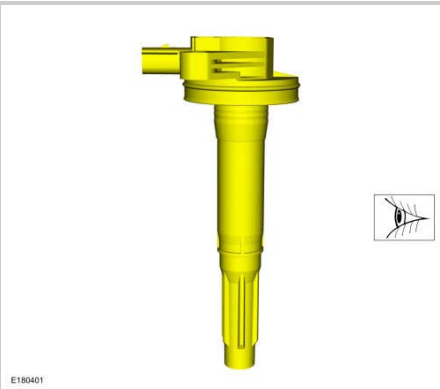
NOTE: When removing the ignition coils, a slight twisting motion will break the seal and ease removal.

21.
Remove the bolts and the ignition coils.



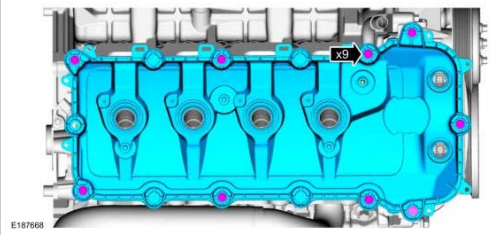
22.

Inspect the ignition coil-on-plug assembly for cracks, rips, or tears. Replace any damaged coil-on-plug assemblies.



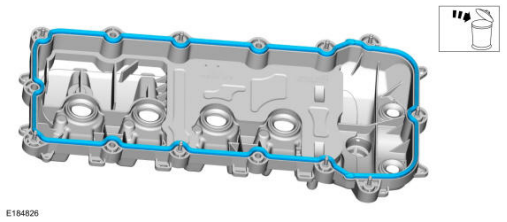
23.

Loosen the bolts and remove the RH valve cover.



NOTE: Clean the valve cover gasket groove with soap and water or a suitable solvent.

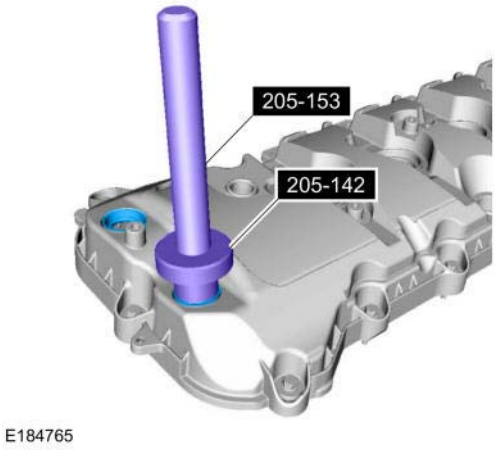
24.
Remove and discard the gasket.



25.

Inspect the VCT variable force solenoid seals. Remove any damaged seals using the special tools.

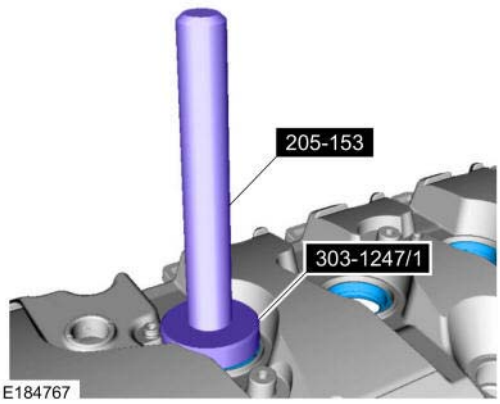
Use Special Service Tool: 205-153 (T80T-4000-W) Handle, 205-142 (T80T-4000-J) Installer, Differential Bearing Cone.



26.

Inspect the spark plug seals. Remove any damaged seals using the special tools.

Use Special Service Tool: 205-153 (T80T-4000-W) Handle, 303-1247 VCT Spark Plug Tube Seal Remover and Installer.



NOTE: Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges which make leak paths. Use a plastic scraping tool to remove all traces of old sealant.

27.
Clean the valve cover mating surface of the RH cylinder head and engine front cover. Refer to: RTV Sealing Surface Cleaning and Preparation .

Use the General Equipment: Plastic Scraper

Material

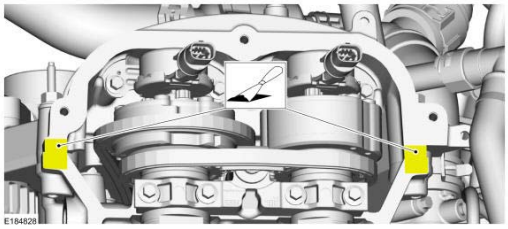
: Motorcraft® Silicone Gasket Remover / ZC-30-A

Material

: Motorcraft® Metal Surface Prep / ZC-31-B

Material

: Metal Brake Parts Cleaner (U.S.) / PM-4-A, PM-4-B (U.S.)



28.

1.

Remove the oil level indicator.

2.

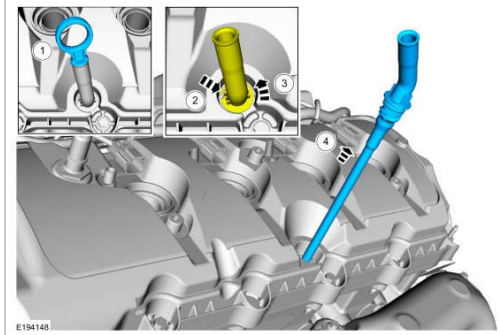
Depress the tab.

3.

Rotate the oil level indicator tube counterclockwise.

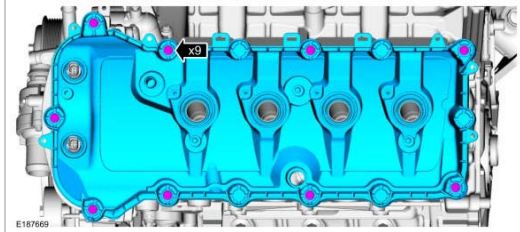
4.

Pull the oil level indicator tube from the engine.



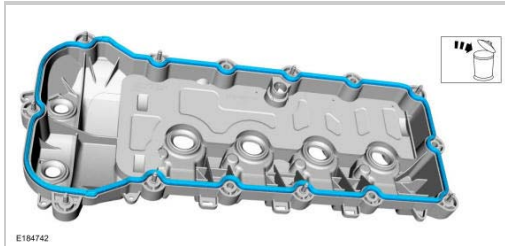
29.

Loosen the bolts and remove the LH valve cover.



NOTE: Clean the valve cover gasket groove with soap and water or a suitable solvent.

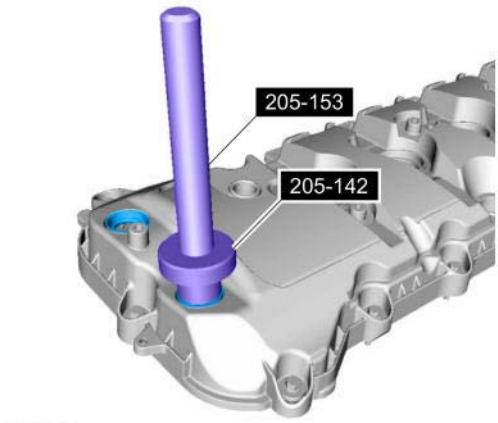
30.
Remove and discard the gasket.



31.

Inspect the VCT variable force solenoid seals. Remove any damaged seals using the special tools.

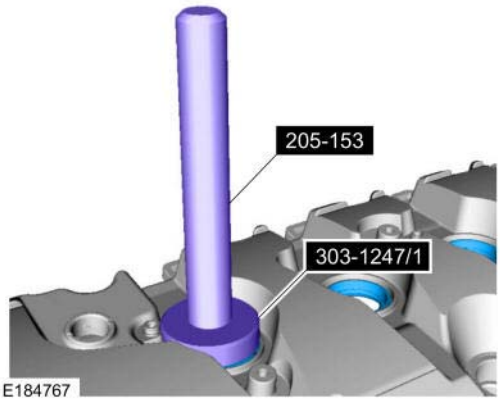
Use Special Service Tool: 205-153 (T80T-4000-W) Handle, 205-142 (T80T-4000-J) Installer, Differential Bearing Cone.



32.

Inspect the spark plug seals. Remove any damaged seals using the special tools.

Use Special Service Tool: 205-153 (T80T-4000-W) Handle, 303-1247 VCT Spark Plug Tube Seal Remover and Installer.



NOTE: Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges which make leak paths. Use a plastic scraping tool to remove all traces of old sealant.

33.
Clean the valve cover mating surface of the LH cylinder head and engine front cover. Refer to: RTV Sealing Surface Cleaning and Preparation .

Use the General Equipment: Plastic Scraper

Material

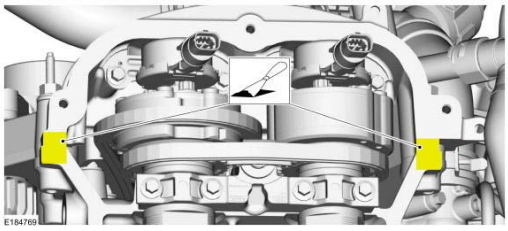
: Motorcraft® Silicone Gasket Remover / ZC-30-A

Material

: Motorcraft® Metal Surface Prep / ZC-31-B

Material

: Metal Brake Parts Cleaner (U.S.) / PM-4-A, PM-4-B (U.S.)

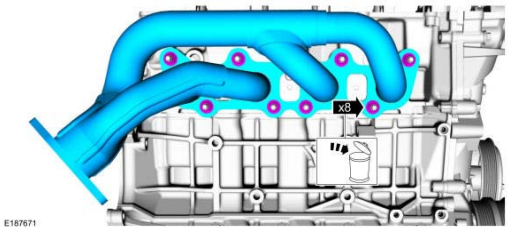


34.

Remove and discard the nuts.

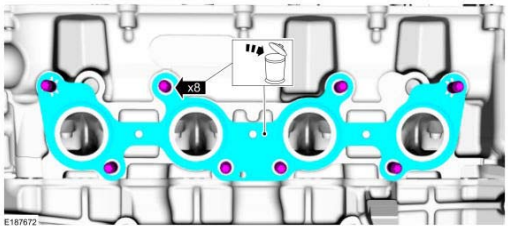
Remove the exhaust manifold.

Clean and inspect the exhaust manifold. Refer to: Exhaust Manifold Cleaning and Inspection .



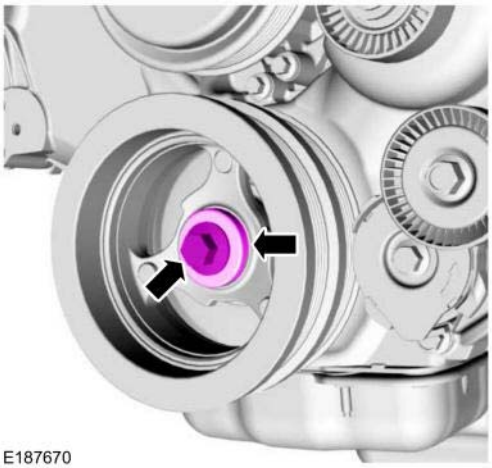
35.

Remove and discard the gasket and studs.



36.

Remove the crankshaft pulley bolt and washer.

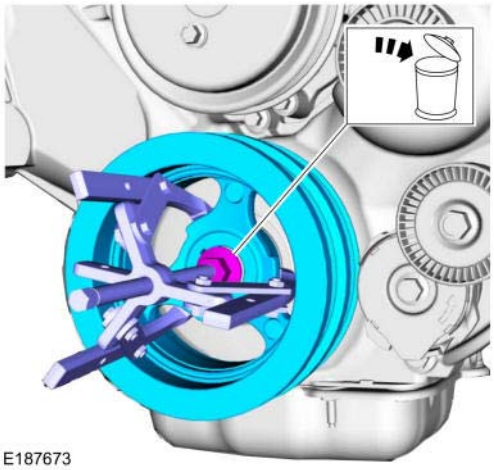


37.

Using the 3 Leg Puller and the crankshaft pulley bolt, remove the crankshaft pulley.

Use the General Equipment: Three Leg Puller

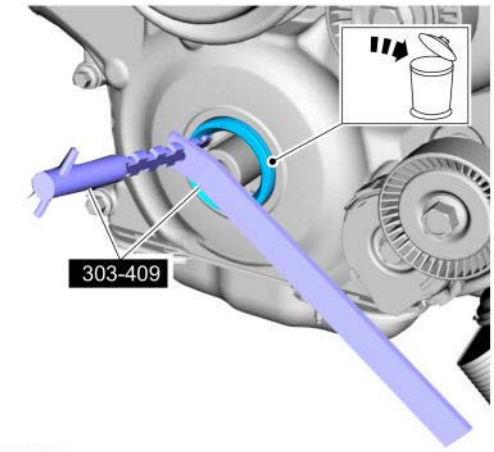
Discard the crankshaft pulley bolt.



NOTE: Use care not to damage the engine front cover or the crankshaft when removing the seal.

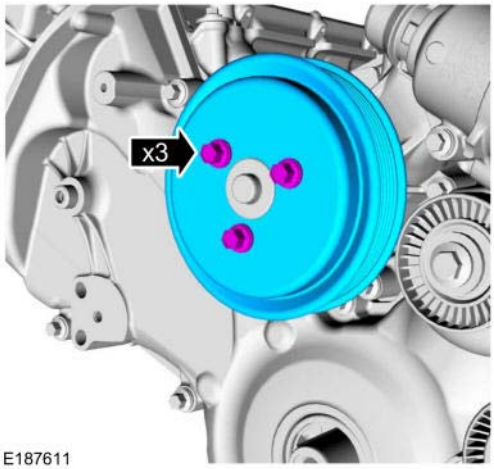
38.
Using the special tool, remove and discard the crankshaft front oil seal.

Use Special Service Tool: 303-409 (T92C-6700-CH) Remover, Crankshaft Seal.



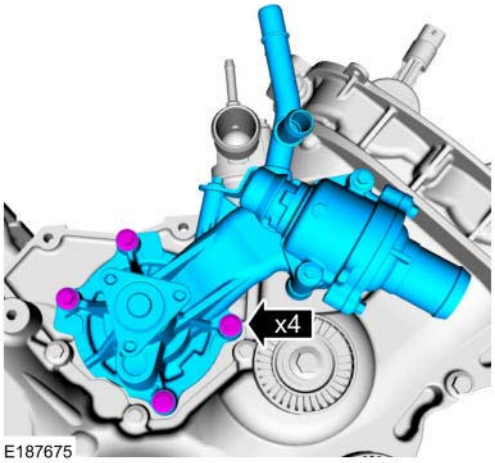
39.

Remove the bolts and the coolant pump pulley.



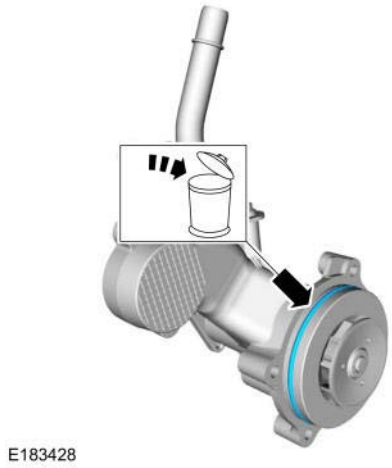
40.

Remove the bolts and the coolant pump.



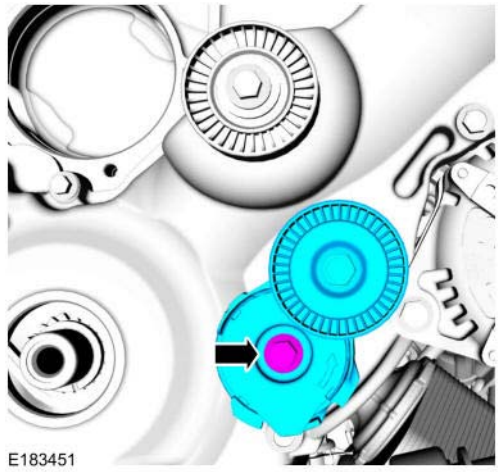
41.

Remove and discard the coolant pump O-ring seal.



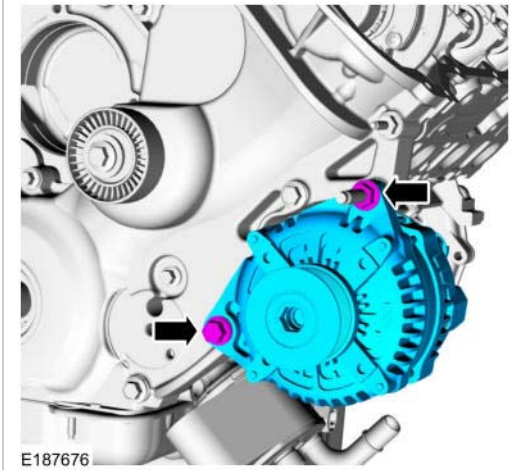
42.

Remove the bolt and the accessory drive belt tensioner.



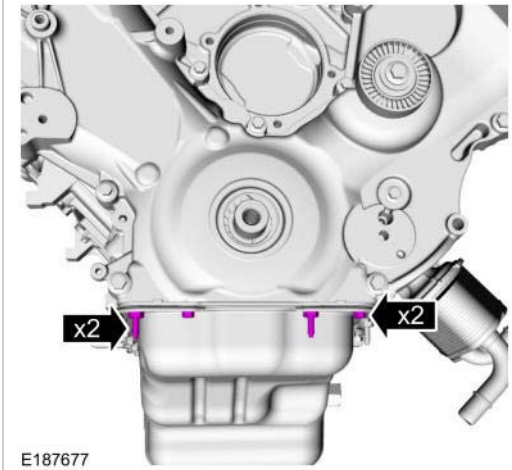
43.

Remove the nut, the bolt and the generator.



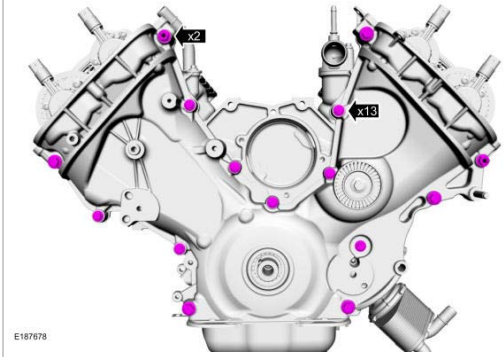
44.

Remove the bolts and stud bolts.



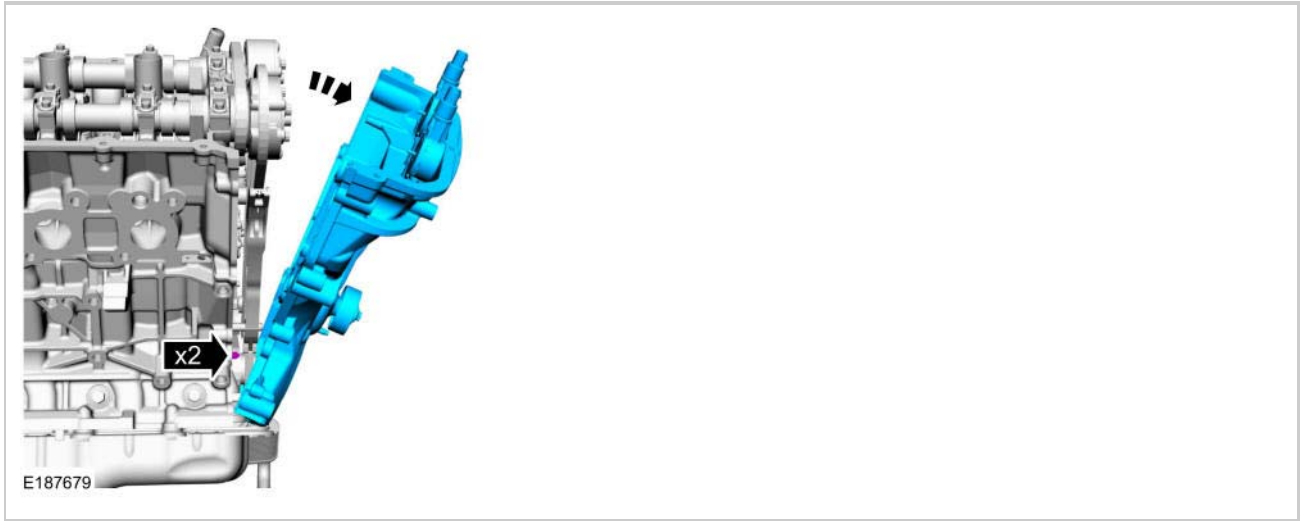
45.

Remove the bolts and stud bolts.



46.

Remove the engine front cover from the front cover to cylinder block dowels.



47.

Remove and discard the gaskets.



NOTE: Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges which make leak paths. Use a plastic scraping tool to remove all traces of old sealant.

48.
Clean and inspect the mating surface. Refer to: RTV Sealing Surface Cleaning and Preparation .

Use the General Equipment: Plastic Scraper

Material

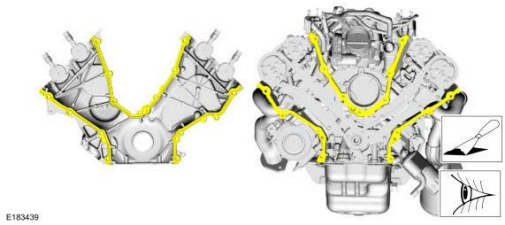
: Motorcraft® Silicone Gasket Remover / ZC-30-A

Material

: Metal Brake Parts Cleaner (U.S.) / PM-4-A, PM-4-B (U.S.)

Material

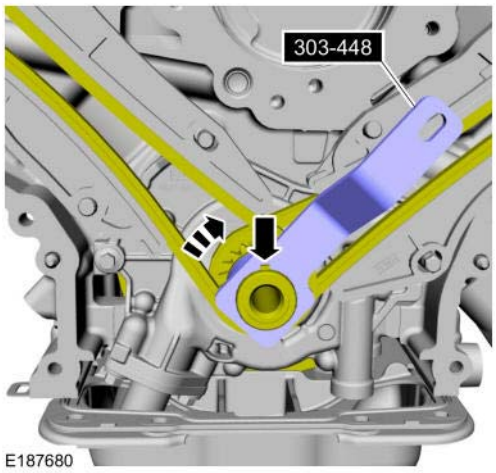
: Motorcraft® Metal Surface Prep / ZC-31-B



49.

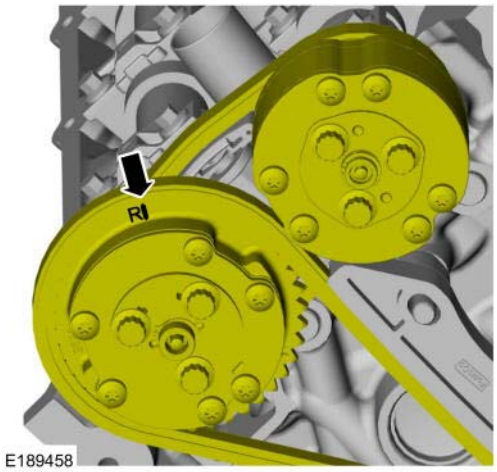
Using the special tool, rotate the crankshaft clockwise until the keyway is at the 12 o'clock position.

Use Special Service Tool: 303-448 (T93P-6303-A) Holding Tool, Crankshaft.



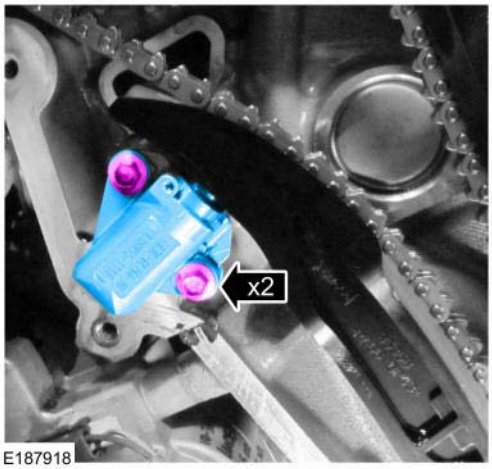
50.

Verify the timing mark on the RH VCT unit is on top, if not, rotate the crankshaft clockwise one complete revolution so the keyway is at the 12 o'clock position.



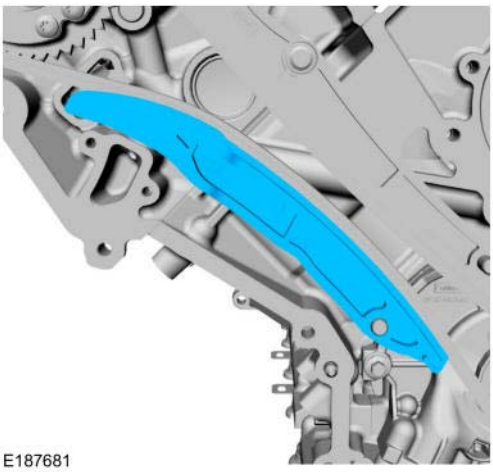
51.

Remove the bolts and the RH primary timing chain tensioner.



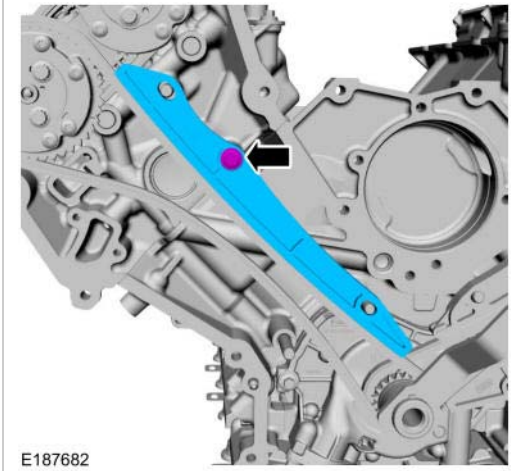
NOTE: It may be necessary to rotate the crankshaft slightly to provide enough slack in the chain to remove the RH timing chain tensioner arm. Return the crankshaft keyway to the 12 o'clock position after removing the RH timing chain tensioner arm.

52.
Remove the RH timing chain tensioner arm.



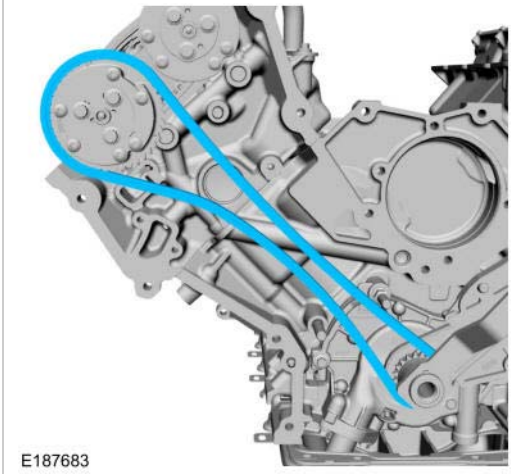
NOTE: It may be necessary to rotate the crankshaft slightly to provide enough slack in the chain to remove the RH timing chain guide. Return the crankshaft keyway to the 12 o'clock position after removing the RH timing chain guide.

53.
Remove the bolt and the RH timing chain guide.



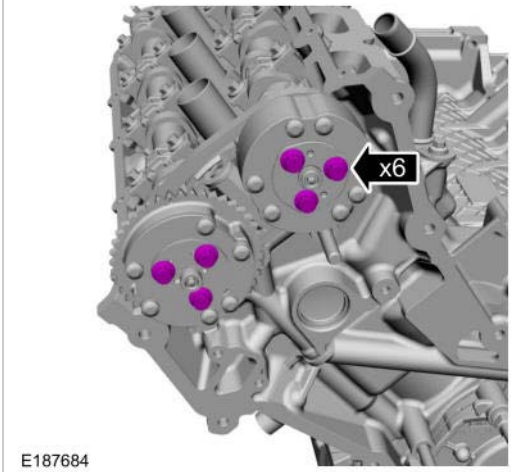
54.

Remove the RH timing chain.



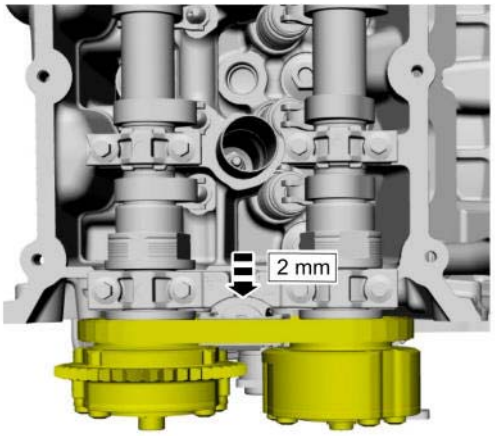
55.

Remove the intake and exhaust VCT assembly bolts.



56.

Slide the VCT assemblies and secondary timing chain forward 2 mm (0.078 in).



E187685

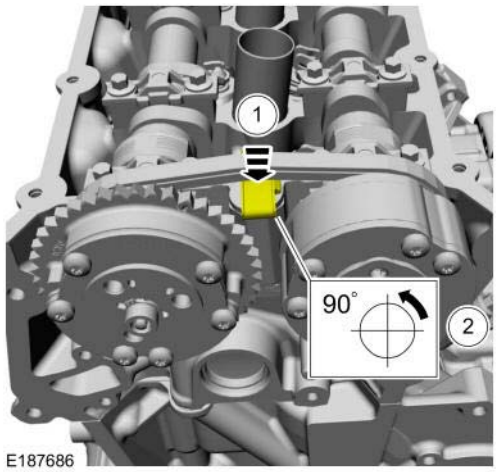
57.

1.

Depress the secondary timing chain tensioner.

2.

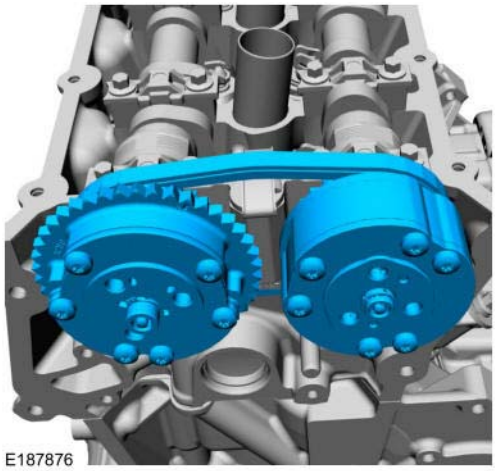
Turn the tensioner counterclockwise 90 degrees.



E187686

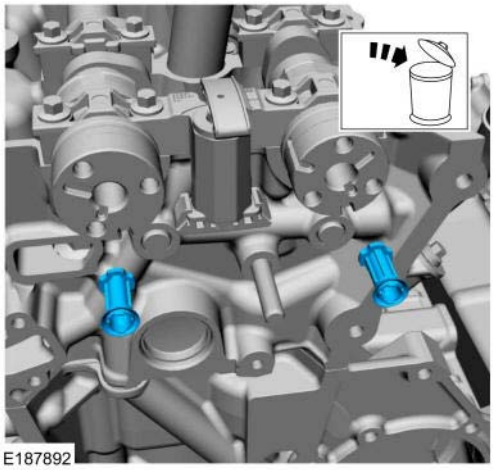
58.

Remove the VCT assemblies and the secondary timing chain.



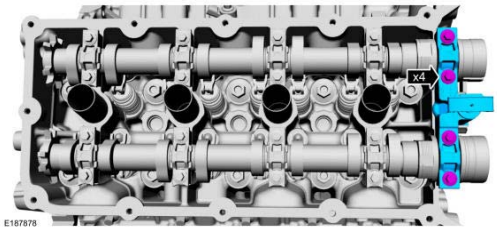
59.

Remove and discard the VCT system oil filters.



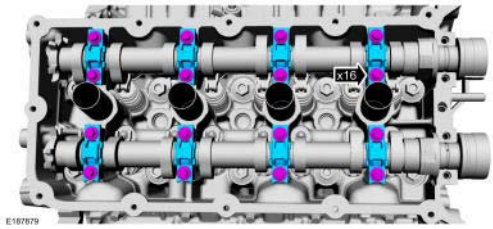
NOTE: The front camshaft bearing mega cap must be removed first and then the remaining camshaft bearing caps. Failure to follow this direction may result in damage to the engine.

60.
Remove the bolts and the front camshaft bearing mega cap.



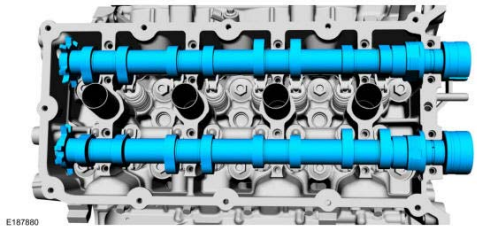
61.

Remove the bolts and the camshaft bearing caps.



62.

Remove the intake and exhaust camshafts.

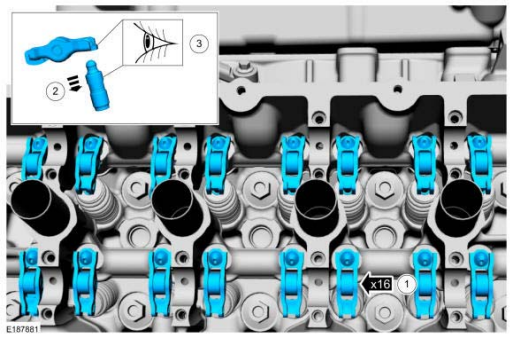


63.

Remove the camshaft roller follower and hydraulic lash adjuster assemblies.

Separate the hydraulic lash adjusters from the spring clips on the camshaft roller followers.

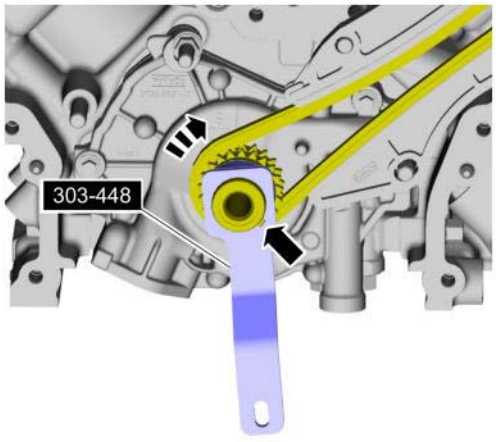
Inspect the hydraulic lash adjuster and roller follower for damage. If any damage is found, inspect the camshaft lobes and valves for damage. Replace damaged components as necessary.



64.

Using the special tool, rotate the crankshaft clockwise until the keyway is at the 5 o'clock position.

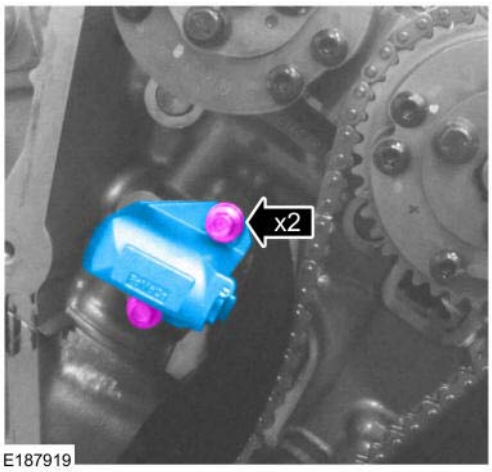
Use Special Service Tool: 303-448 (T93P-6303-A) Holding Tool, Crankshaft.



E187882

65.

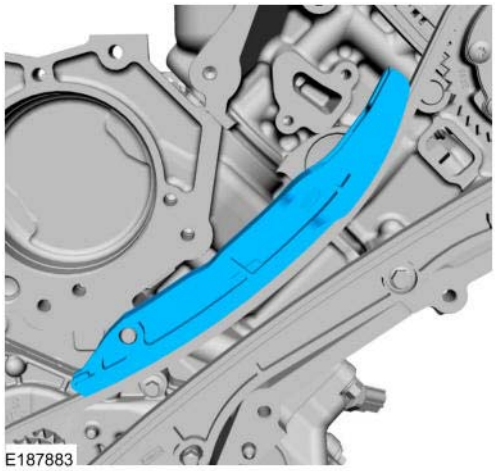
Remove the bolts and the LH primary timing chain tensioner.



E187919

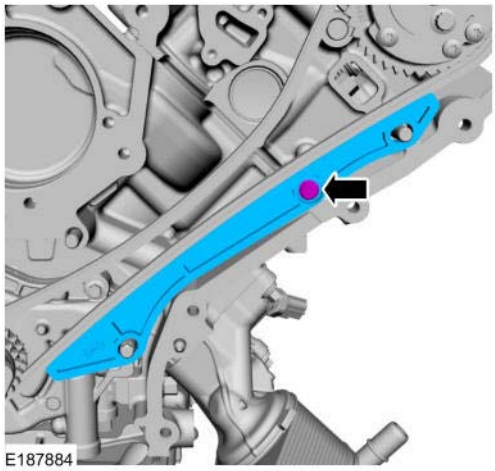
NOTE: It may be necessary to rotate the crankshaft slightly to provide enough slack in the chain to remove the LH timing chain tensioner arm. Return the crankshaft keyway to the 5 o'clock position after removing the LH timing chain tensioner arm.

66.
Remove the LH timing chain tensioner arm.



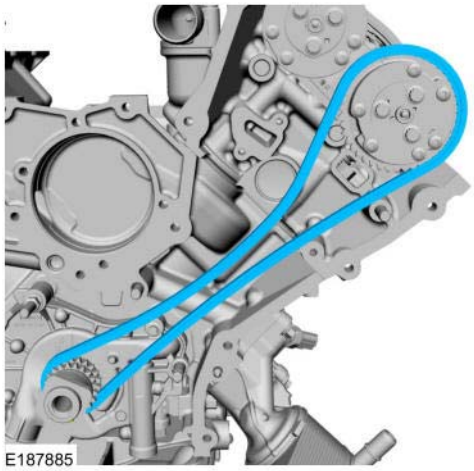
NOTE: It may be necessary to rotate the crankshaft slightly to provide enough slack in the chain to remove the LH timing chain guide. Return the crankshaft keyway to the 5 o'clock position after removing the LH timing chain guide.

67.
Remove the bolt and the LH timing chain guide.



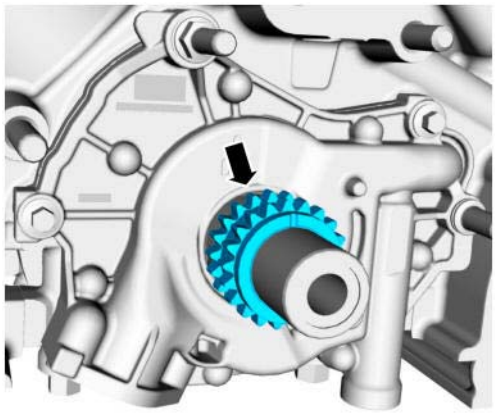
68.

Remove the LH timing chain.



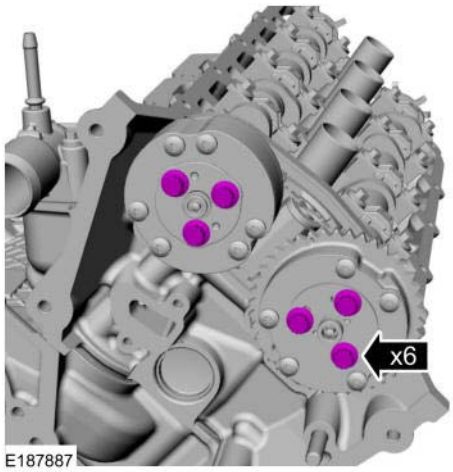
69.

Remove the crankshaft sprocket.



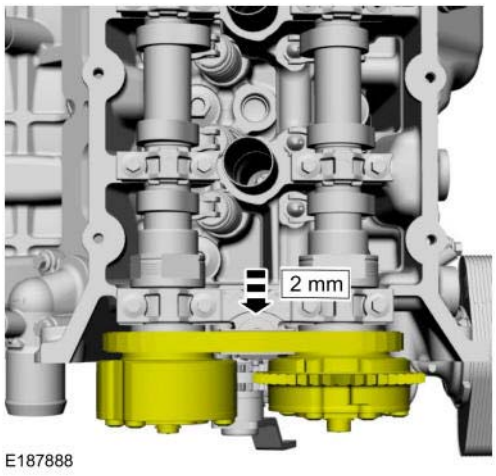
70.

Remove the intake and exhaust VCT assembly bolts.



71.

Slide the Variable Camshaft Timing VCT assemblies and secondary timing chain forward 2 mm (0.078 in).



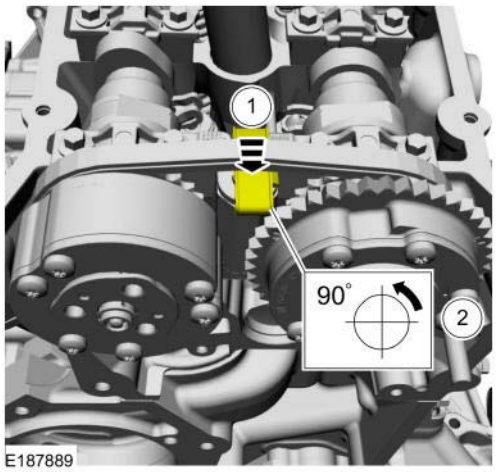
72.

1.

Depress the secondary timing chain tensioner.

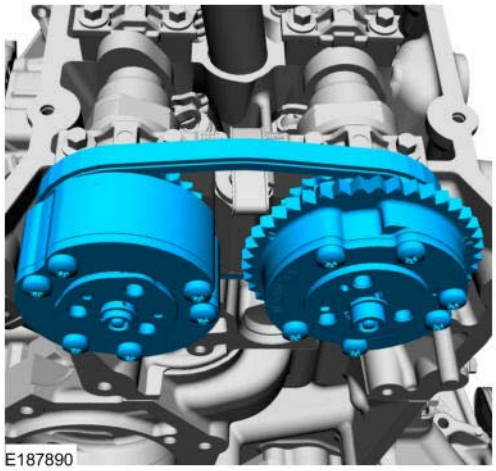
2.

Turn the tensioner counterclockwise 90 degrees.



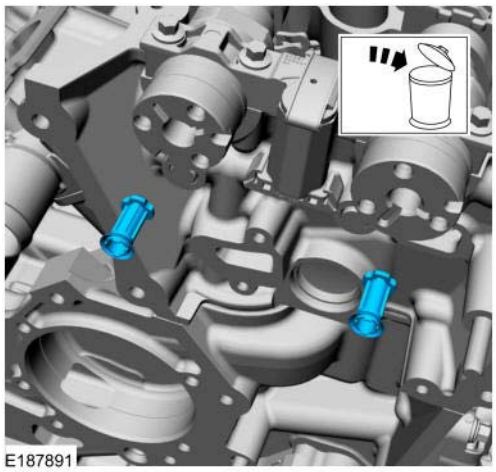
73.

Remove the VCT assemblies and the secondary timing chain.



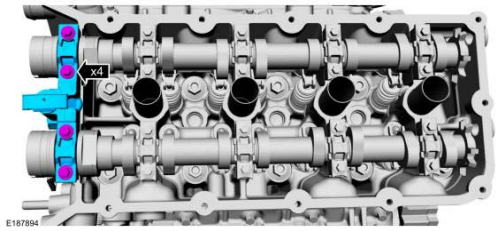
74.

Remove and discard the VCT system oil filters.



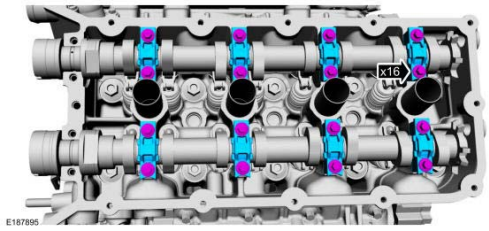
NOTE: The front camshaft bearing mega cap must be removed first and then the remaining camshaft bearing caps. Failure to follow this direction may result in damage to the engine.

75.
Remove the bolts and the front camshaft bearing mega cap.



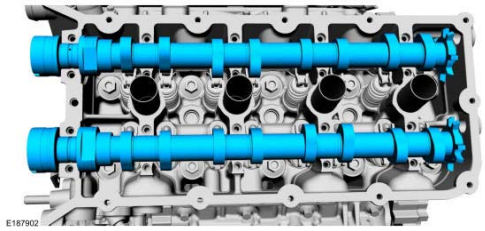
76.

Remove the bolts and the camshaft bearing caps.



77.

Remove the intake and exhaust camshafts.

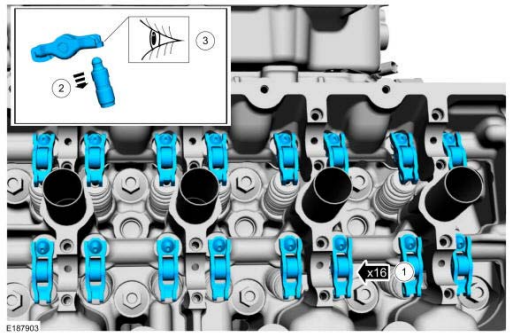


78.

Remove the camshaft roller follower and hydraulic lash adjuster assemblies.

Separate the hydraulic lash adjusters from the spring clips on the camshaft roller followers.

Inspect the hydraulic lash adjuster and roller follower for damage. If any damage is found, inspect the camshaft lobes and valves for damage. Replace damaged components as necessary.



NOTE: The cylinder head must be cool before removing it from the engine. Cylinder head warpage can result if a warm or hot cylinder head is removed.

NOTE: Place clean shop towels over exposed engine cavities. Carefully remove the towels so foreign material is not dropped into the engine.

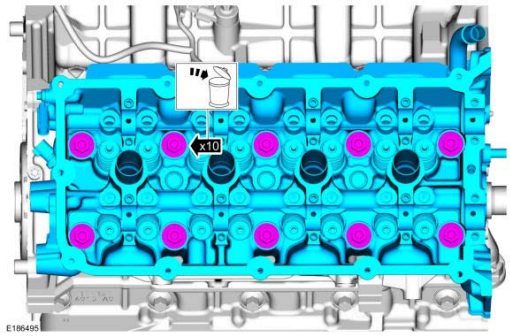
NOTE: Aluminum surfaces are soft and can be scratched easily. Never place the cylinder head gasket surface, unprotected, on a bench surface.

NOTE: The cylinder head bolts must be discarded and new bolts must be installed. They are a tighten-to-yield design and cannot be reused.

79.

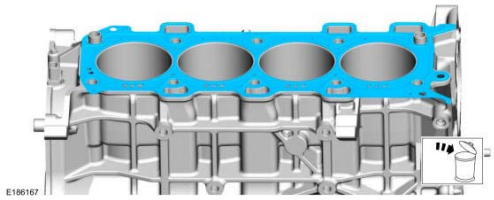
Remove and discard the bolts.

Remove the cylinder head.



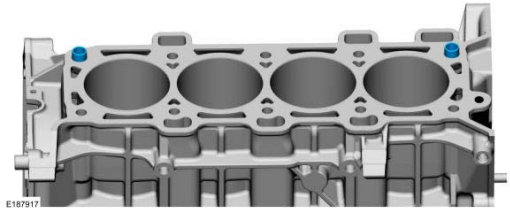
80.

Remove and discard the cylinder head gasket.



81.

Remove the dowels.



NOTE: Do not use metal scrapers, wire brushes, power abrasive discs or other

abrasive means to clean the sealing surfaces. These tools cause scratches and gouges which make leak paths.

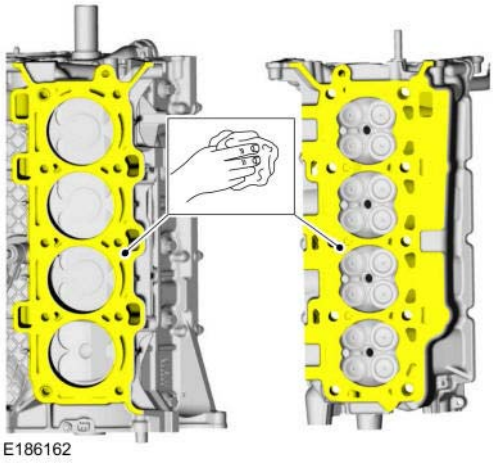
NOTE: Clean the cylinder head bolt holes in the cylinder block using compressed air. Make sure all coolant, oil or other foreign material is removed.

82.

Clean and inspect the cylinder head-to-cylinder block mating surfaces of both the cylinder head and the cylinder block.

Refer to: Cylinder Head Distortion .

Refer to: Cylinder Block Distortion .


E186162

NOTE: The cylinder head must be cool before removing it from the engine. Cylinder head warpage can result if a warm or hot cylinder head is removed.

NOTE: Place clean shop towels over exposed engine cavities. Carefully remove the towels so foreign material is not dropped into the engine.

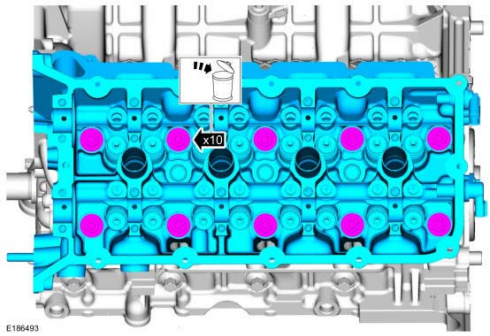
NOTE: Aluminum surfaces are soft and can be scratched easily. Never place the cylinder head gasket surface, unprotected, on a bench surface.

NOTE: The cylinder head bolts must be discarded and new bolts must be installed. They are a tighten-to-yield design and cannot be reused.

83.

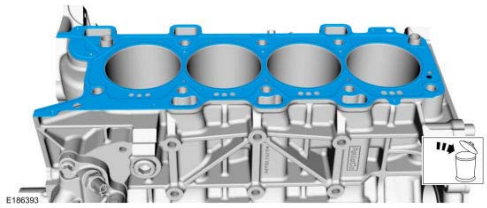
Remove and discard the bolts.

Remove the cylinder head.



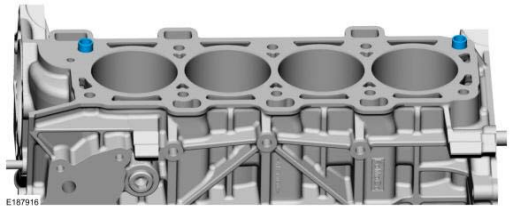
84.

Discard the cylinder head gasket.



85.

Remove the dowels.



NOTE: Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges which make leak paths.

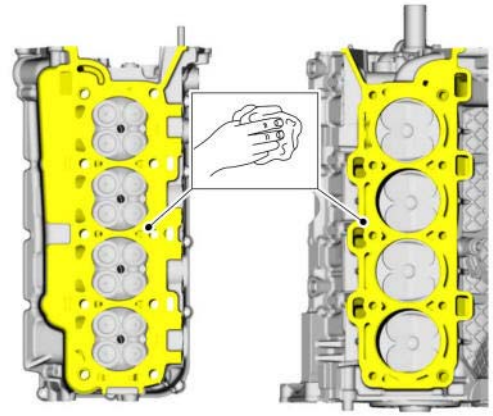
NOTE: Clean the cylinder head bolt holes in the cylinder block using compressed air. Make sure all coolant, oil or other foreign material is removed.

86.

Clean and inspect the cylinder head-to-cylinder block mating surfaces of both the cylinder head and the cylinder block.

Refer to: Cylinder Head Distortion .

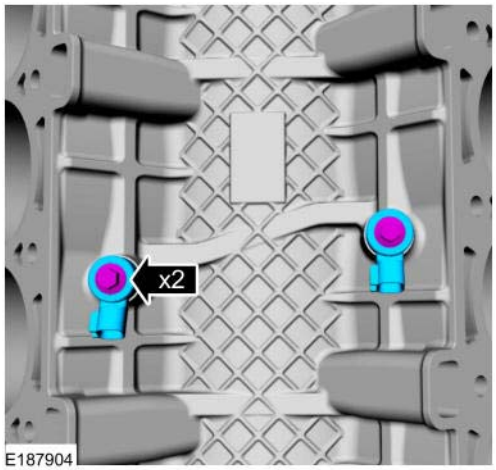
Refer to: Cylinder Block Distortion .



E186395

87.

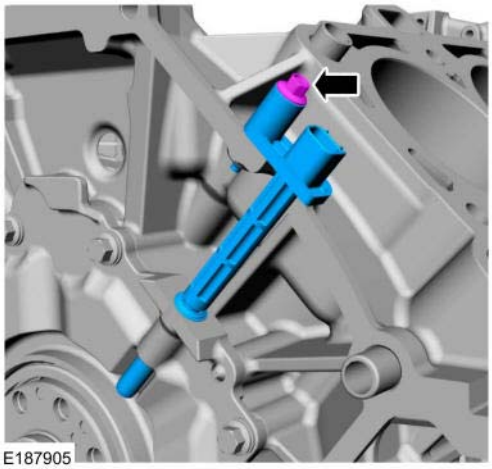
Remove the bolts and the KSs.



E187904

88.

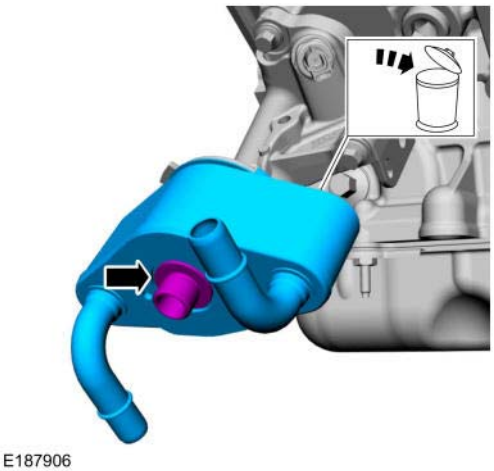
Remove the bolt and the CKP sensor.



NOTE: A new oil cooler must be installed or severe damage to the engine can occur.

89.
Remove the threaded fitting and the oil cooler.

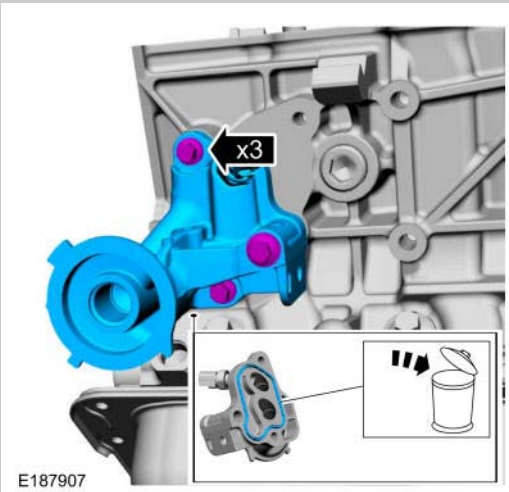
Discard the oil cooler.



90.

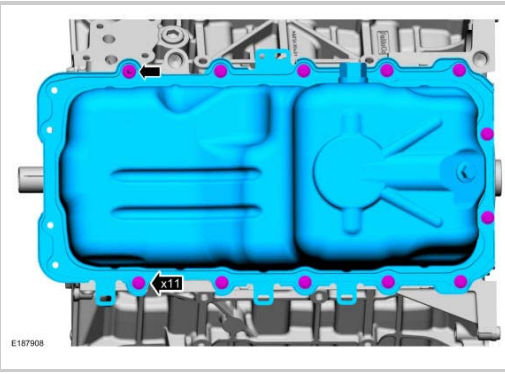
Remove the bolts and the oil filter adapter.

Discard the gasket.



91.

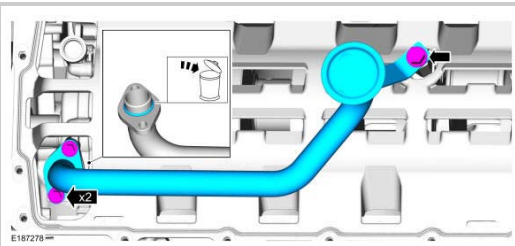
Remove the bolts and the oil pan.



92.

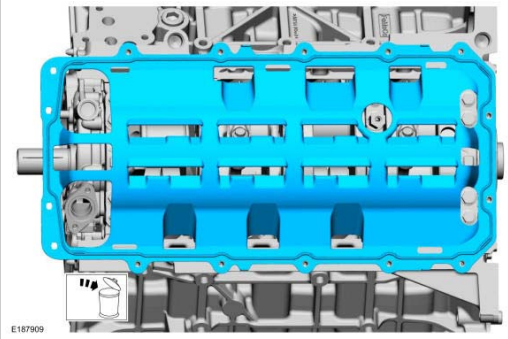
Remove the bolts and the oil pump screen and pickup tube.

Discard the O-ring seal.



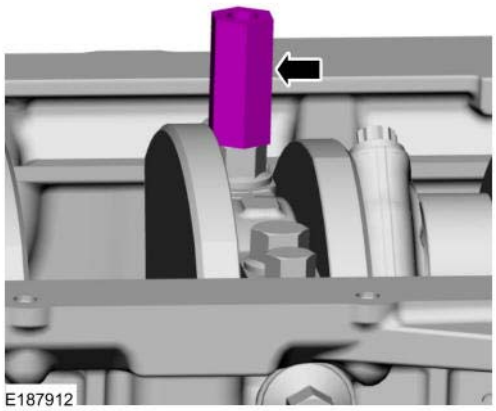
93.

Remove and discard the oil pan baffle and gasket.



94.

Remove the oil pump screen and pickup tube spacer.



NOTE: Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges which make leak paths. Use a plastic scraping tool to remove all traces of old sealant.

95.
Clean the mating surface of the cylinder block. Refer to: RTV Sealing Surface Cleaning and Preparation .

Use the General Equipment: Plastic Scraper

Material

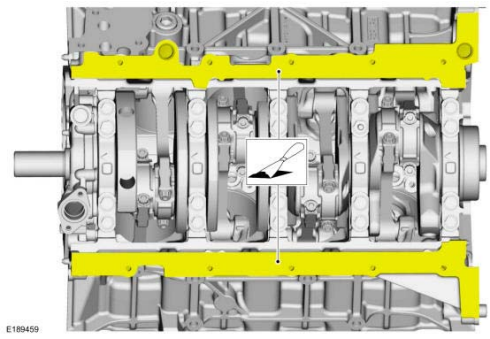
: Motorcraft® Silicone Gasket Remover / ZC-30-A

Material

: Motorcraft® Metal Surface Prep / ZC-31-B

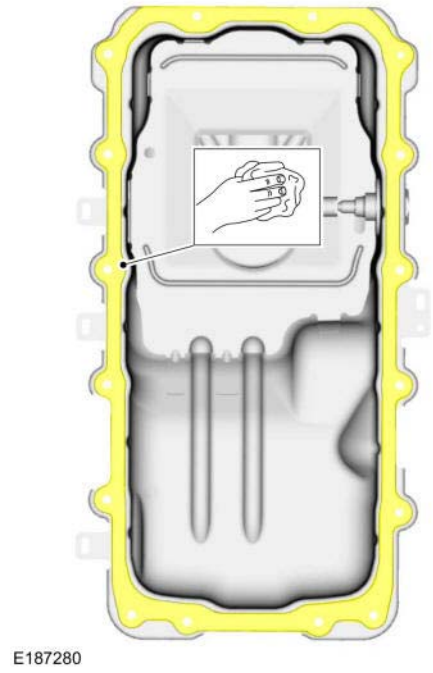
Material

: Metal Brake Parts Cleaner (U.S.) / PM-4-A, PM-4-B (U.S.)



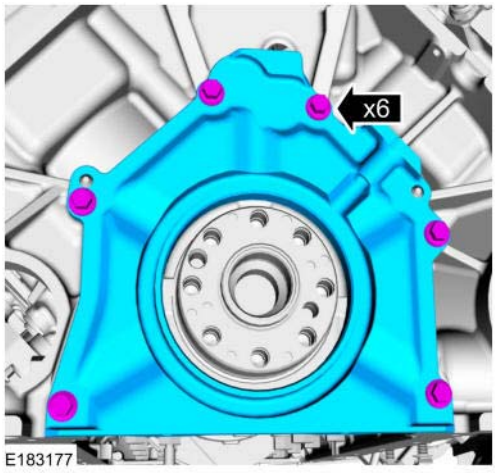
NOTE: Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges which make leak paths.

96.
Make sure that the mating faces are clean and free of foreign material.



97.

Remove the bolts and the crankshaft rear seal retainer plate.



NOTE: Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges which make leak paths. Use a plastic scraping tool to remove all traces of old sealant.

98.
Clean and inspect the mating surface. Refer to: RTV Sealing Surface Cleaning and Preparation .

Use the General Equipment: Plastic Scraper

Material

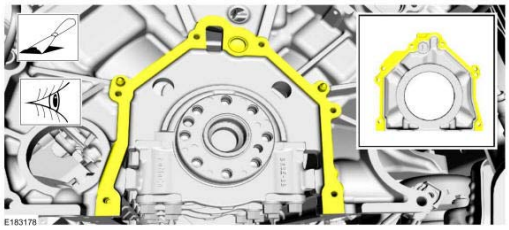
: Motorcraft® Silicone Gasket Remover / ZC-30-A

Material

: Metal Brake Parts Cleaner (U.S.) / PM-4-A, PM-4-B (U.S.)

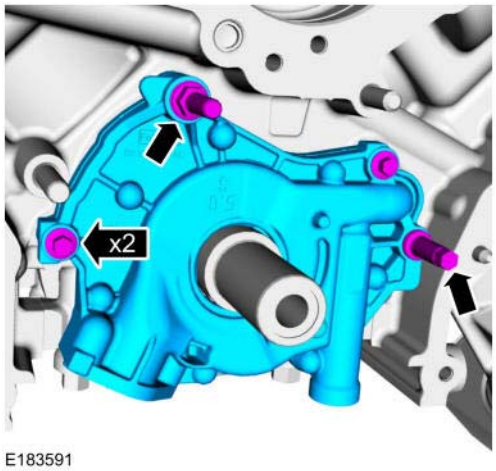
Material

: Motorcraft® Metal Surface Prep / ZC-31-B



99.

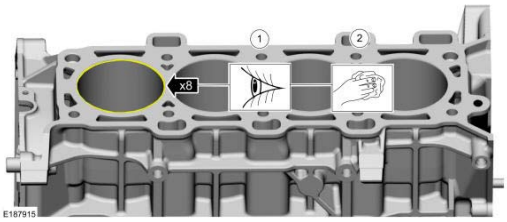
Remove the bolts, the stud bolts and the oil pump.



100.

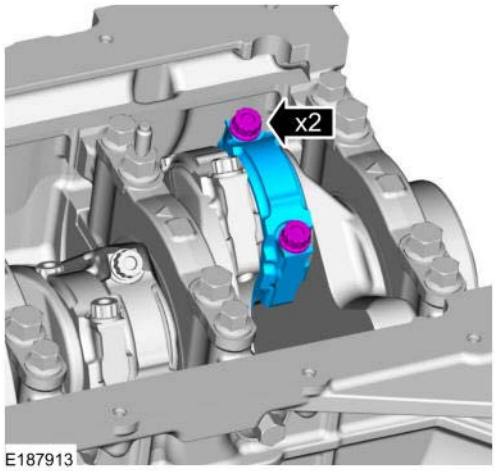
Before removing the pistons, inspect the top of the cylinder bores.

If necessary, remove the ridge or carbon deposits from each cylinder using an abrasive pad.



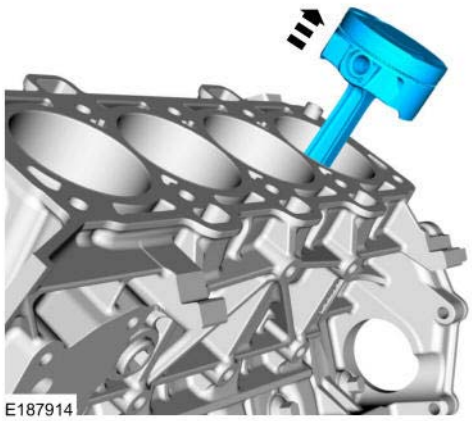
NOTE: Verify that the connecting rod and rod cap have orientation numbers cast into them. If not, number the connecting rod and rod cap for correct orientation. Failure to do so can result in engine damage.

101.
Remove the bolts and the connecting rod cap.



NOTE: Do not scratch the cylinder walls or crankshaft journals with the connecting rod or engine damage may occur.

102.
Remove the piston through the top of the cylinder block.



103.

Repeat the previous 2 steps for each of the remaining pistons.

104.

Disassemble the 8 pistons. Refer to: Piston .

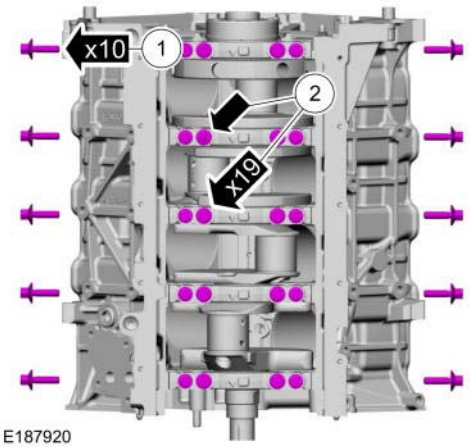
105.

1.

Remove and discard the cross-mounted main cap bolts.

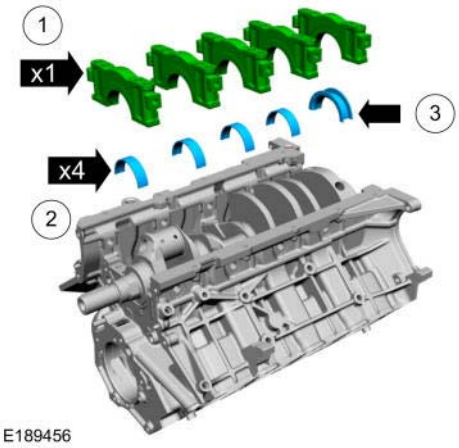
2.

Remove and discard the main bearing cap bolts and stud bolt.



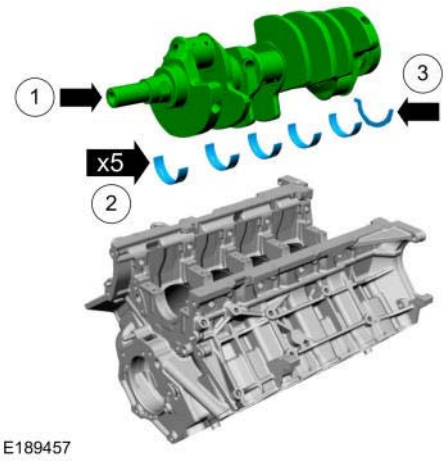
106.

Remove the main bearing caps (1), the lower crankshaft main bearings (2) and the lower thrust bearing (3).



107.

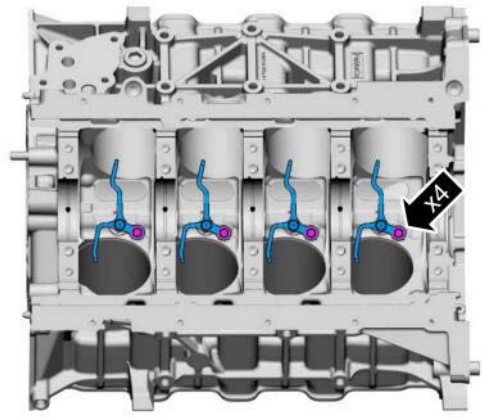
Remove the crankshaft (1), the upper crankshaft main bearings (2) and the upper thrust washer (3) from the cylinder block.



E189457

108.

Remove the bolts and the piston cooling jets from the cylinder block.

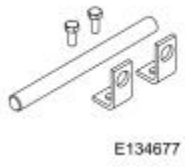


E187921

DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES > CYLINDER HEAD

Special Tool(s) / General Equipment

 E223048	303-1249 Valve Spring Compressor TKIT-2006UF-FLM TKIT-2006UF-ROW
	303-1418 Compressor, Valve Spring TKIT-2008ET-FLM

	TKIT-2008ET-ROW
 E134677	303-300 (T87C-6565-A) Set, Valve Spring Compressor T88C-1000-ST TKIT-1988-FESTIVA TKIT-1988-TRACER TKIT-2009TC-F
 E134678	303-350 (T89P-6565-A) Compressor, Valve Spring TKIT-1989-F TKIT-1989-FLM TKIT-1989-FM TKIT-1990-LMH

Materials

Name	Specification
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) XO-5W20-QSP (U.S.)	WSS-M2C945-A
Motorcraft® Orange Antifreeze/Coolant Concentrated (U.S.) VC-3-B (U.S.)	WSS-M97B44-D

DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES > CYLINDER HEAD > DISASSEMBLY

NOTE: During engine repair procedures, cleanliness is extremely important. Any foreign material, including any material created while cleaning gasket surfaces, that enters the oil passages, coolant passages or the oil pan, can cause engine failure.

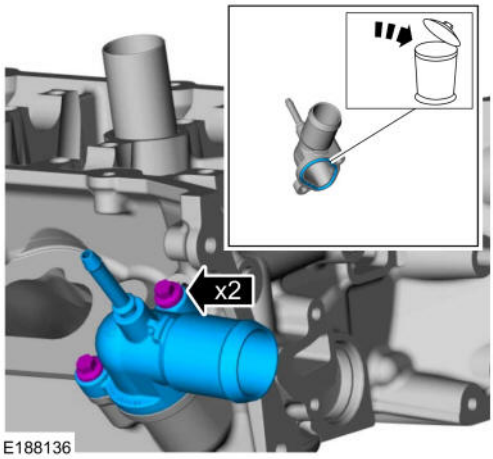
NOTE: If the components are to be reinstalled, they must be installed in their original locations. Mark the components for installation into their original locations.

LH cylinder heads

1.

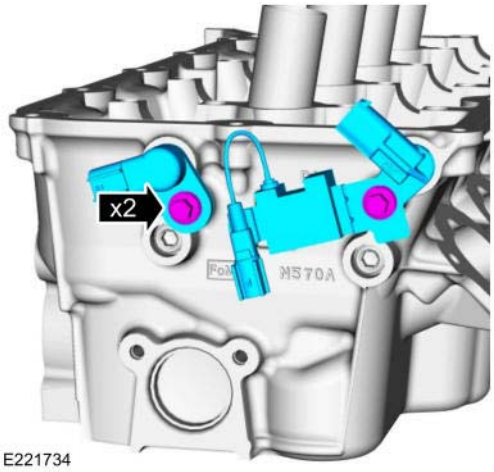
Remove the bolts and the coolant outlet.

Discard the gasket.



2.

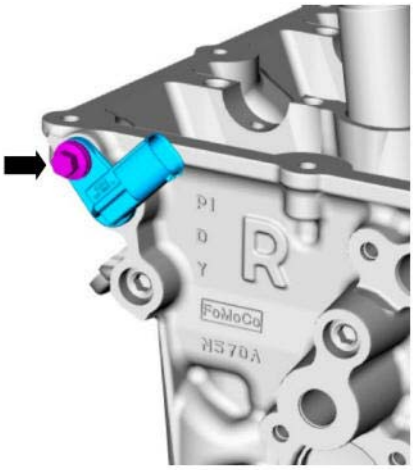
Remove the bolts, the CMP sensors and the radio interference capacitor.



RH cylinder heads

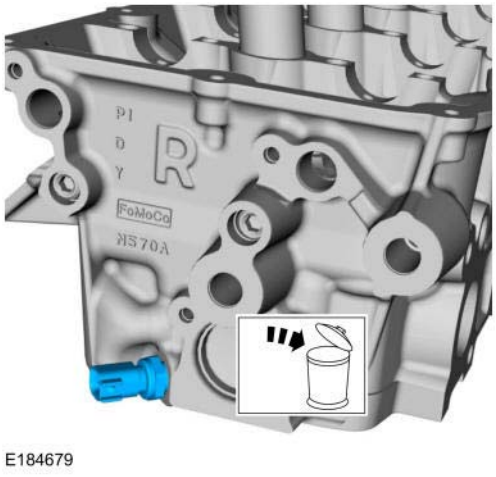
3.

Remove the bolt and the CMP sensor.



4.

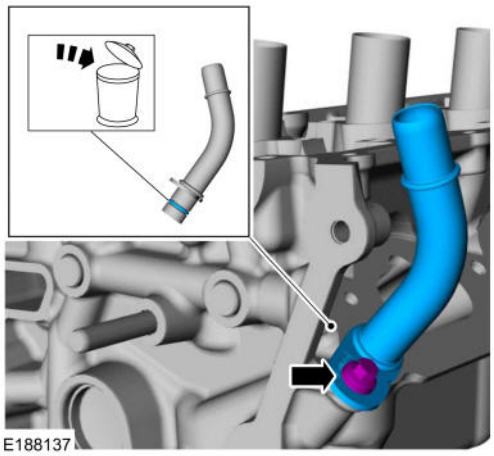
Remove and discard the CHT sensor.



5.

Remove the bolt and the coolant outlet.

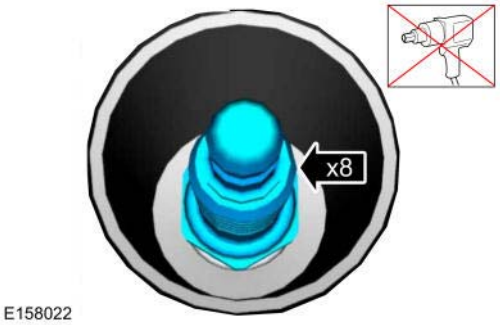
Discard the O-ring seal.



All cylinder heads

6.

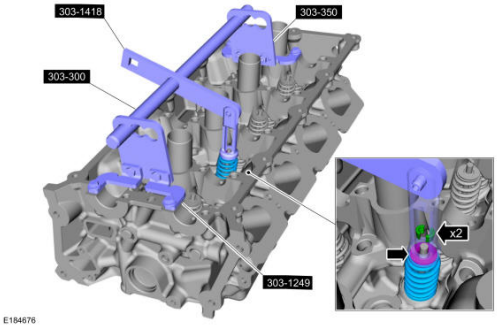
Remove the spark plugs.



7.

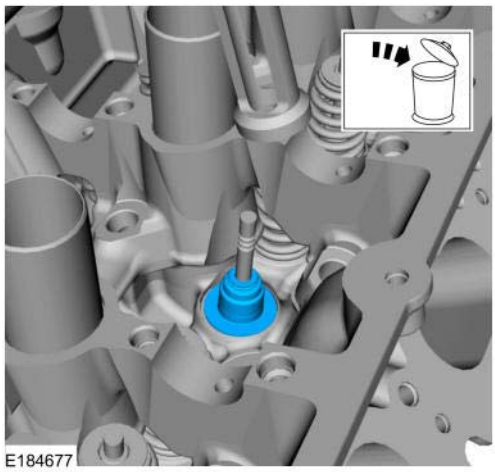
Using the special tools, remove the keys, retainer and spring.

Use Special Service Tool: 303-300 (T87C-6565-A) Set, Valve Spring Compressor, 303-350 (T89P-6565-A) Compressor, Valve Spring, 303-1249 Valve Spring Compressor, 303-1418 Compressor, Valve Spring.



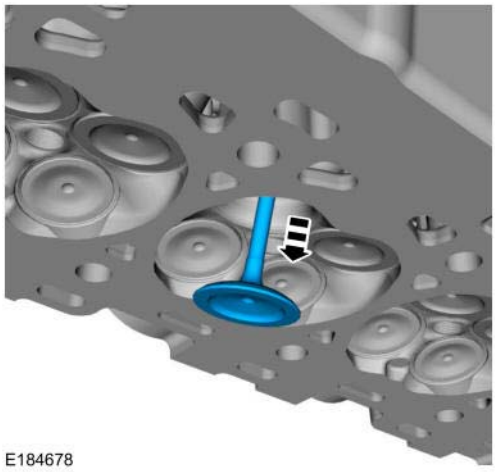
8.

Remove and discard the valve stem seal.



9.

Remove the valve from the cylinder head.



10.

Repeat the previous steps for each of the remaining valves.

DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES > CYLINDER HEAD > ASSEMBLY

All cylinder heads

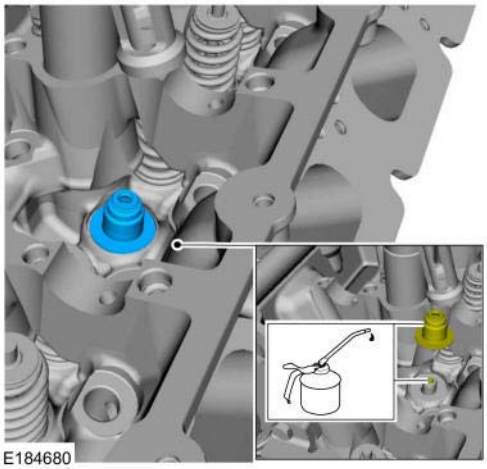
NOTE: Lubricate the new valve stem seal and valve guide bore with clean engine oil.

1.

Install the new valve stem seal.

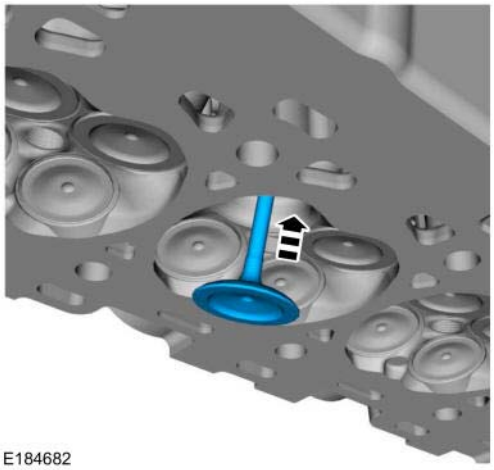
Material

: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W20-QSP (U.S.) (WSS-M2C945-A)



2.

Install the valve into the cylinder head.



3.

Using the special tools, install the spring, retainer and keys.

Use Special Service Tool: 303-300 (T87C-6565-A) Set, Valve Spring Compressor, 303-350 (T89P-6565-A) Compressor, Valve Spring, 303-1249 Valve Spring Compressor, 303-1418 Compressor, Valve Spring.



4.

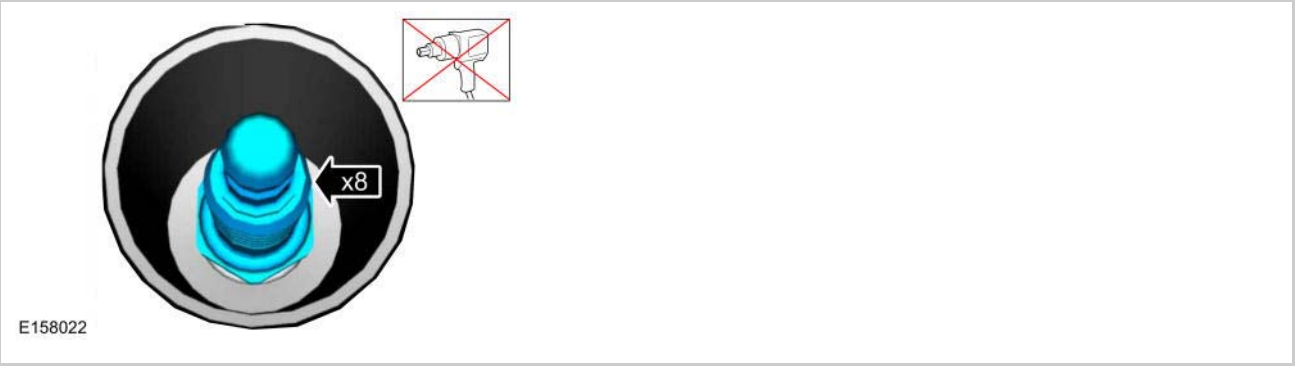
Repeat the previous steps for each of the remaining valves.

5.

Install the spark plugs.

Torque

: 133 lb.in (15 Nm)



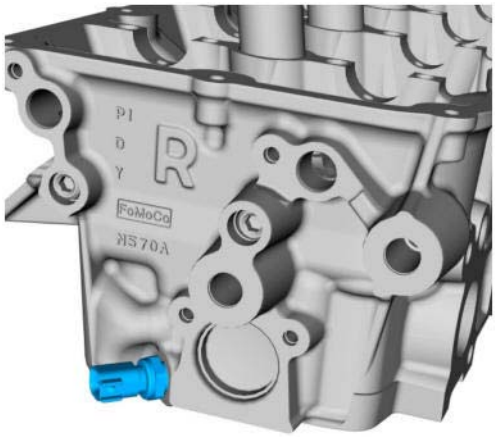
RH cylinder heads

6.

Install a new CHT sensor.

Torque

: 97 lb.in (11 Nm)



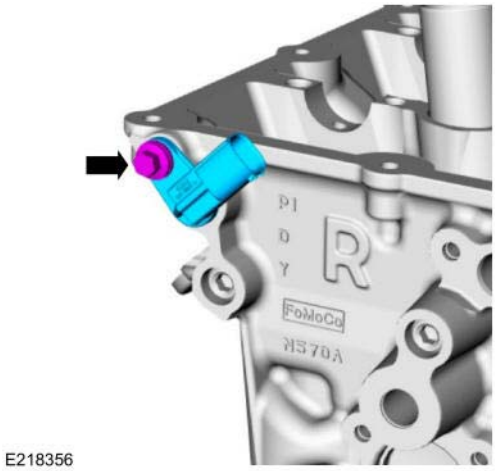
E184681

7.

Install the CMP sensor and bolt.

Torque

: 89 lb.in (10 Nm)



E218356

NOTE: Lubricate the O-ring seal with clean engine coolant prior to installing.

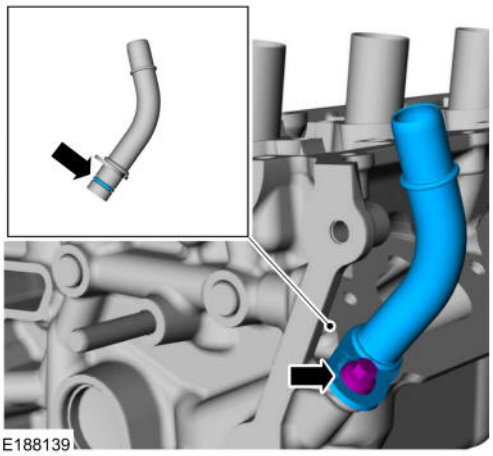
8.
Using a new O-ring seal, install the coolant outlet pipe.

Material

: Motorcraft® Orange Antifreeze/Coolant Concentrated (U.S.) / VC-3-B (U.S.) (WSS-M97B44-D)

Torque

: 89 lb.in (10 Nm)



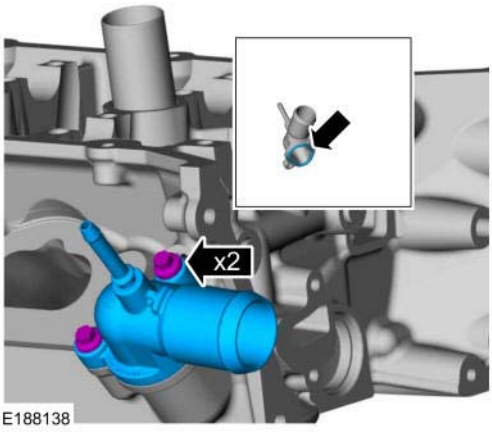
LH cylinder heads

9.

Using a new gasket, install the coolant outlet and the bolts.

Torque

: 89 lb.in (10 Nm)

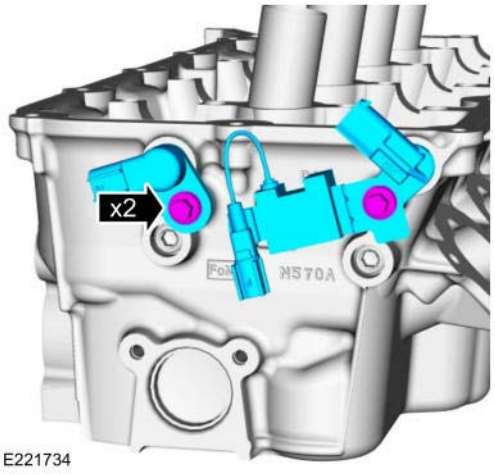


10.

Install the CMP sensors, the radio interference capacitor and the bolts.

Torque

: 89 lb.in (10 Nm)



DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES > PISTON

Materials

Name	Specification
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) XO-5W20-QSP (U.S.)	WSS-M2C945-A

DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES > PISTON > DISASSEMBLY

1.

Remove and discard the piston rings.



2.

Remove and discard the piston pin retainers.

Remove the piston pin.



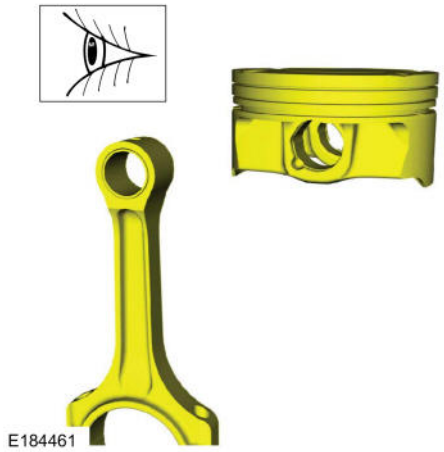
NOTE: If the piston and connecting rod are to be reinstalled, they must be assembled in the same orientation. Mark the piston orientation to the connecting rod for reassembly.

3.
Separate the piston from the connecting rod.



4.

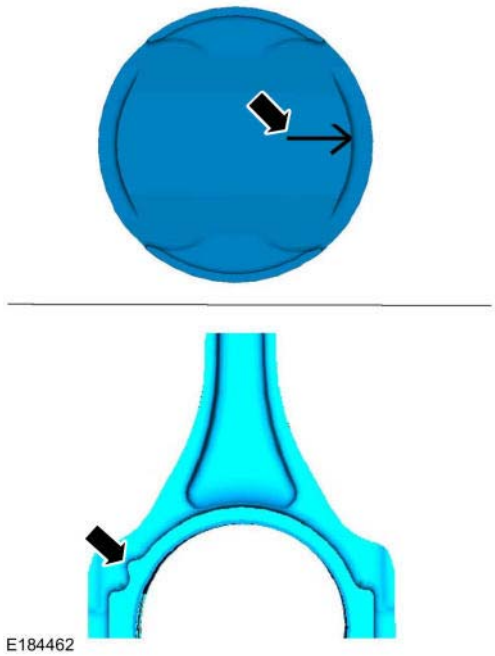
Clean and inspect the piston and connecting rod. Refer to: Piston Inspection .



DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES > PISTON > ASSEMBLY

1.

If the piston and/or connecting rod are being installed new, the connecting rod orientation marks and the arrow on the top of the dome of the piston should be facing toward the front of the engine block.



2.

Position the piston on the connecting rod.



3.

Lubricate and install the piston pin.

Material

: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W20-QSP (U.S.) (WSS-M2C945-A)



NOTE: The piston pin retainer gap orientation must be toward the top of the piston.

4.
Install the piston pin retainers.



5.

Lubricate and install the oil control rings.

1.

Upper oil control ring.

2.

Oil control expander ring.

3.

Lower oil control ring.

Material

: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W20-QSP (U.S.) (WSS-M2C945-A)



6.

Install the lower compression ring.

1.

The "O" mark on the ring pointing up toward the top of the piston.

2.

Hook feature will point down toward the bottom of piston.

Material

: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W20-QSP (U.S.) (WSS-M2C945-A)



7.

Install the upper compression ring.

1.

The "O" mark on the ring pointing up toward the top of the piston.

Material

: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W20-QSP (U.S.) (WSS-M2C945-A)



8.

Position the piston ring gaps.

1.

Center line of the piston parallel to the wrist pin bore.

2.

Upper compression ring gap.

3.

Upper oil control ring gap.

4.

Lower oil control ring gap.

5.

Oil control expander ring and lower compression ring gap.



ASSEMBLY > ENGINE

Special Tool(s) / General Equipment

	205-142 (T80T-4000-J) Installer, Differential Bearing Cone
 E133913	205-153 (T80T-4000-W) Handle
 E175042	303-1247VCT Spark Plug Tube Seal Remover and Installer TKIT-2006UF-FLM TKIT-2006UF-ROW
 ST2980-A	303-1250 Seal Installer, Rear Main TKIT-2006UFFLM
 E216458	303-1531r Installer, Front Crank Seal and Dampe
 E222985	303-335 (T88T-6701-A) Installer, Front Cover Oil Seal TKIT-1988-F TKIT-1988-FLM
	303-448 (T93P-6303-A) Holding Tool, Crankshaft TKIT-1993-FLM TKIT-1993-LM
	303-F047 Lifting Bracket, Engine
Strap Wrench	
Floor Crane	
Mounting Stand	

Clutch Alignment Tool
Piston Ring Compressor

Materials

Name	Specification
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) XO-5W20-QSP (U.S.)	WSS-M2C945-A
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4
Motorcraft® Orange Antifreeze/Coolant Concentrated (U.S.) VC-3-B (U.S.)	WSS-M97B44-D
Silicone Brake Caliper Grease and Dielectric Compound XG-3-A	ESE-M1C171-A

6-Speed Automatic Transmission - 6R80/6-Speed Manual Transmission - MT82

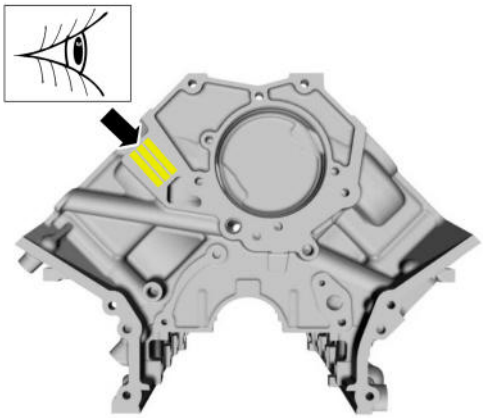
NOTE: The timing chain alignment procedure has changed from prior model year engines and must be followed exactly or damage to the engine will result.

NOTE: During engine repair procedures, cleanliness is extremely important. Any foreign material, including any material created while cleaning gasket surfaces, that enters the oil passages, coolant passages or the oil pan, can cause engine failure.

NOTE: During engine assembly it may become necessary to check bearing clearances and end play. Refer to appropriate Engine article.

1.

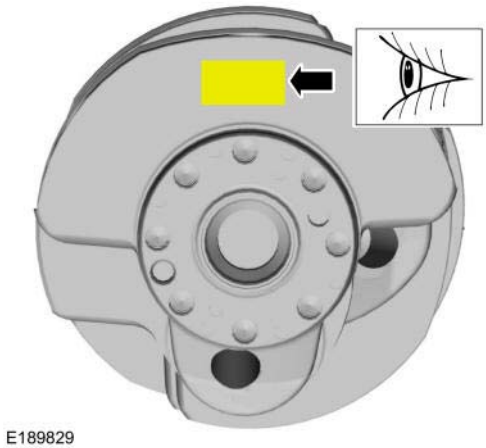
Record the main bearing code found on the front of the engine block.



E189828

2.

Record the main bearing code found on the rear of the crankshaft.



E189829

NOTE: This chart in the illustration is for selecting main bearings 1 and 5 only, the remaining bearings will be selected using a different chart in the next step.

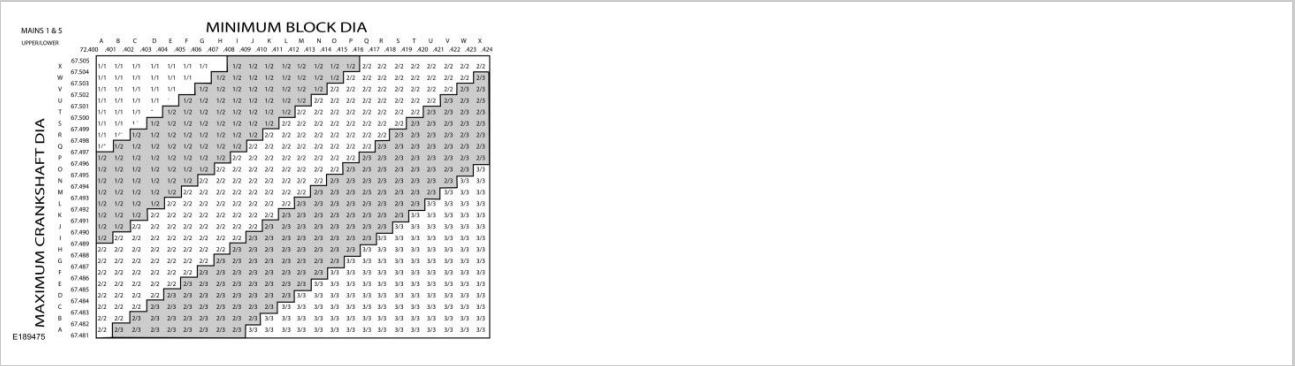
3.
Using the data recorded earlier and the Bearing Select Fit Chart, Standard Bearings, determine the required bearing grade for main bearings 1 and 5.

Read the first letter of the engine block main bearing code and the first letter of the crankshaft main bearing code.

Read down the column below the engine block main bearing code letter and across the row next to the crankshaft main bearing code letter, until the 2 intersect. This is the required bearing grade(s) for the No. 1 crankshaft main bearing.

As an example, if the engine block code letter is "F" and the crankshaft code letter is "P", the correct bearing grade for this main bearing is a "1" for the upper bearing and a "2" for the lower bearing.

Repeat the above steps using the fifth letter of the block and crankshaft codes to select the No. 5 bearing.



NOTE: This chart in the illustration is for selecting main bearings 2, 3 and 4 only.

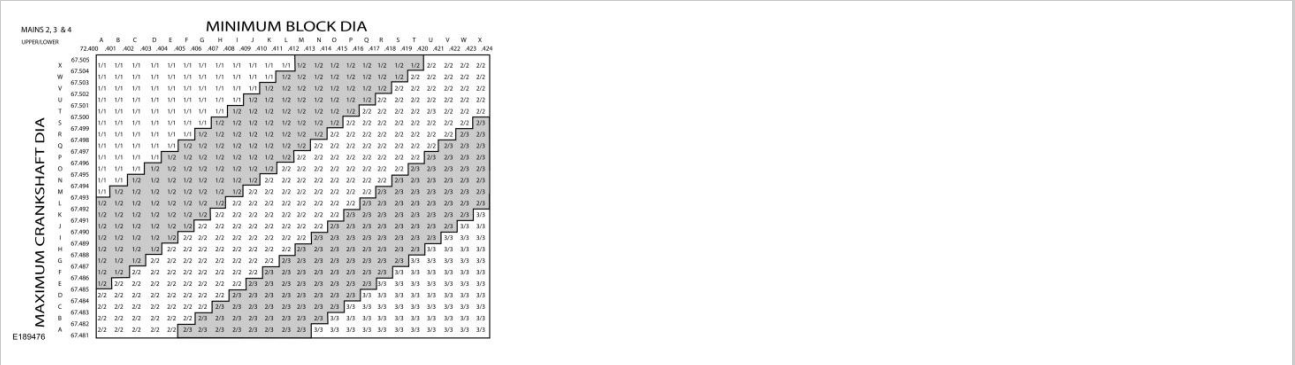
4.
Using the data recorded earlier and the Bearing Select Fit Chart, Standard Bearings, determine the required bearing grade for main bearings 2, 3 and 4.

Read the second letter of the engine block main bearing code and the second letter of the crankshaft main bearing code.

Read down the column below the engine block main bearing code letter and across the row next to the crankshaft main bearing code letter, until the 2 intersect. This is the required bearing grade(s) for the No. 2 crankshaft main bearing

As an example, if the engine block code letter is "F" and the crankshaft code letter is "P", the correct bearing grade for this main bearing is a "1" for the upper bearing and a "2" for the lower bearing.

Repeat the above steps using the third and fourth letters of the block and crankshaft codes to select the No. 3 and No. 4 bearings.



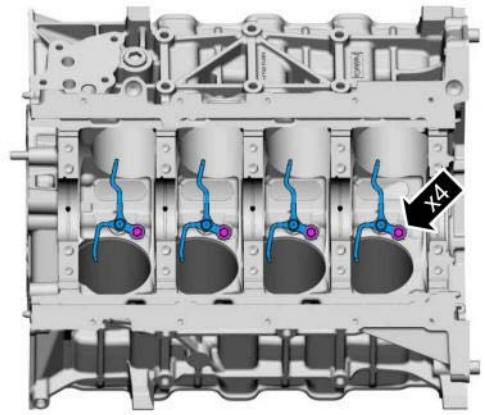
5.

Install the piston cooling jets and bolts.

Torque:

Stage 1: 89 lb.in (10 Nm)

Stage 2: 45°



E187921

6.

Install the crankshaft main bearings.

Install the crankshaft upper main bearings into the cylinder block.

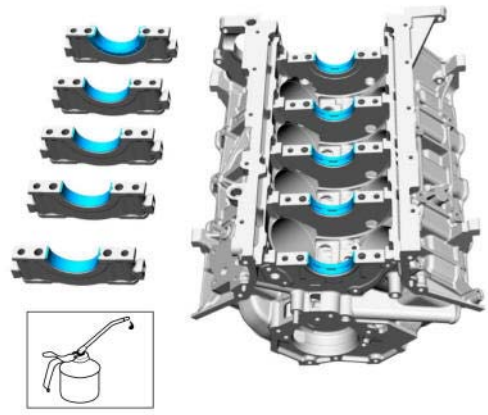
Install the crankshaft lower main bearings and thrust bearing into the bearing caps.

Make sure all oil passages are aligned.

Lubricate all main bearings with clean engine oil.

Material

: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W20-QSP (U.S.) (WSS-M2C945-A)


E189831

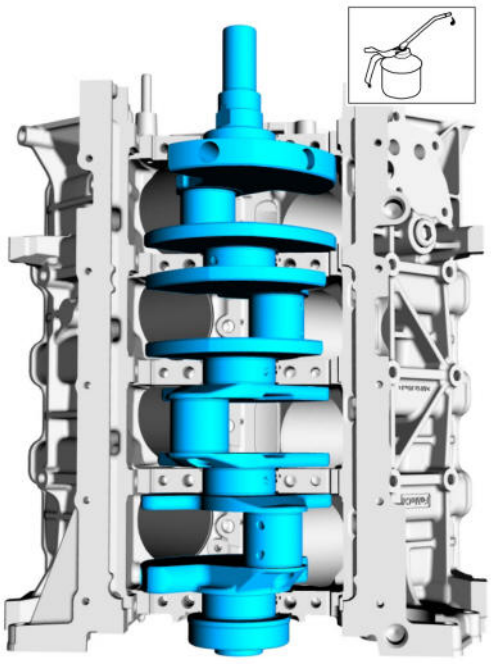
NOTE: Lubricate the crankshaft bearing journals with clean engine oil.

7.

Install the crankshaft into the cylinder block.

Material

: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W20-QSP (U.S.) (WSS-M2C945-A)



E189832

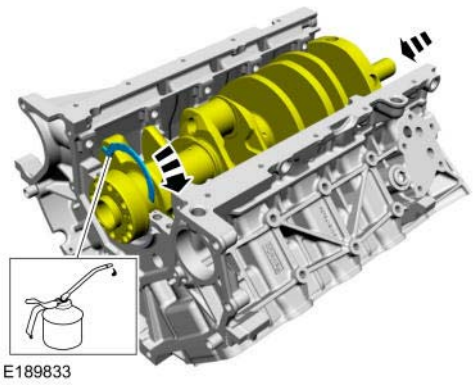
NOTE: The oil groove on the thrust washer must face toward the rear of the engine (against the crankshaft thrust surface).

NOTE: Lubricate the thrust washer with clean engine oil.

8.
Push the crankshaft rearward and install the rear crankshaft upper thrust washer at the back of the No. 5 main boss.

Material

: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W20-QSP (U.S.) (WSS-M2C945-A)

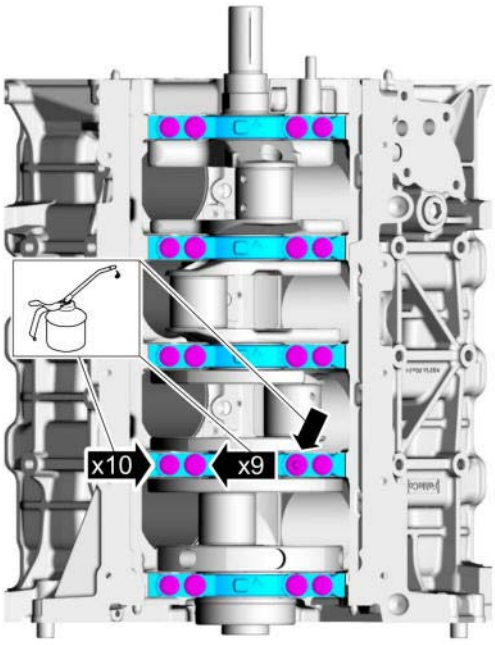

E189833

NOTE: Lubricate the fastener threads with clean engine oil.

9.
Install the main bearing caps and fasteners on the cylinder block and, keeping the caps as square as possible, alternately draw the caps down evenly using the cap fasteners.

Material

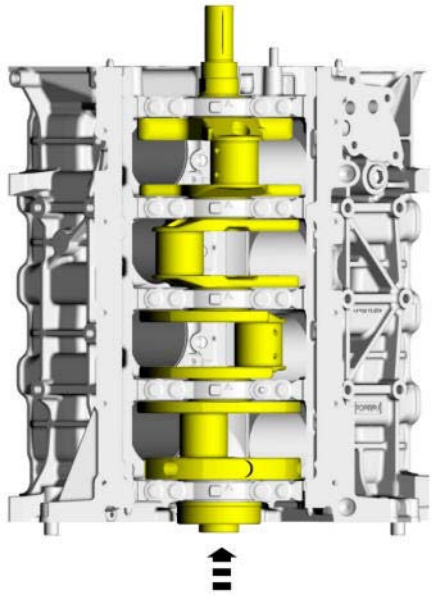
: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W20-QSP (U.S.) (WSS-M2C945-A)



E189834

10.

Push the crankshaft forward to seat the crankshaft thrust washer.



E189835

11.

Tighten the vertical main bearing cap fasteners.

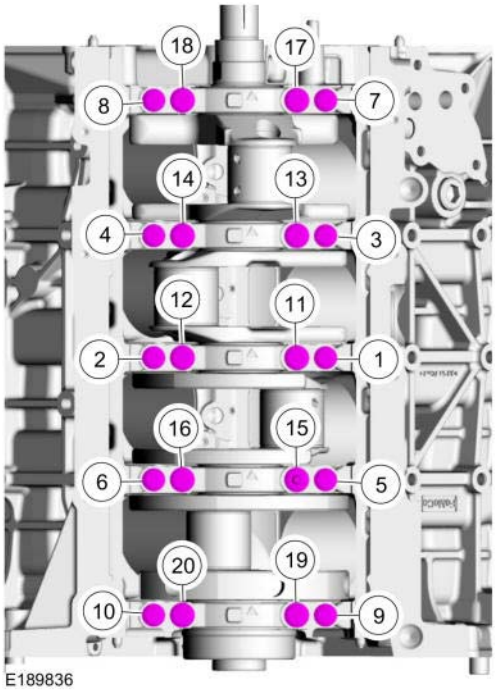
Torque:

Stage 1: 1 through 20: 177 lb.in (20 Nm)

Stage 2: 1 through 10: 30 lb.ft (40 Nm)

Stage 3: 11 through 20 : 48 lb.ft (65 Nm)

Stage 4: 1 through 20: 90°



12.

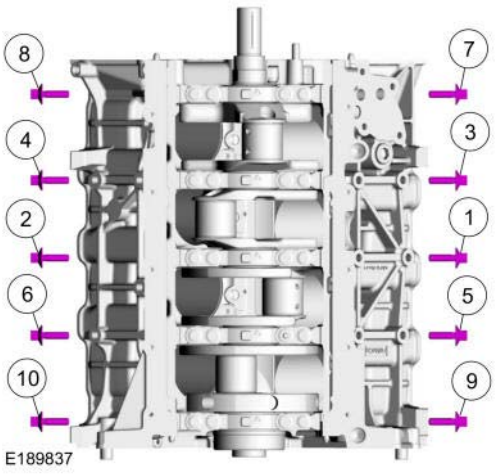
Install the cross-mounted main bearing cap fasteners.

Torque:

Stage 1: 89 lb.in (10 Nm)

Stage 2: 22 lb.ft (30 Nm)

Stage 3: 60°



13.

Check the crankshaft end play. Refer to: Specifications .

Check that crankshaft torque-to-turn does not exceed 6 Nm (53 lb-in).

Check the piston-to-cylinder block and piston ring clearances. Refer to: Specifications .

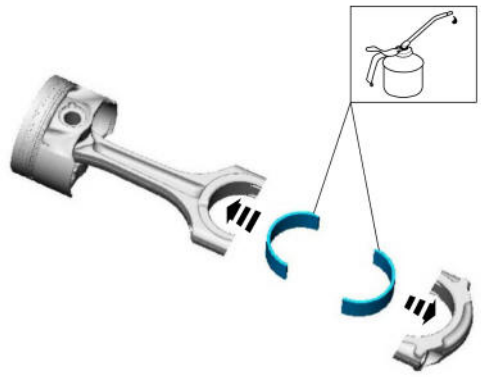
Assemble the pistons and position the piston ring gaps. Refer to: Piston .

14.

Lubricate with clean engine oil and install the connecting rod bearings.

Material

: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W20-QSP (U.S.) (WSS-M2C945-A)



N0152264

NOTE: Do not allow the piston connecting rods to come in contact with the piston cooling jets or engine damage may occur.

NOTE: Be sure not to scratch the cylinder wall or crankshaft journal with the connecting rod. Push the piston down until the connecting rod bearing seats on the crankshaft journal.

NOTE: Be sure not to scratch the cylinder wall or crankshaft journal with the connecting rod. Push the piston down until the connecting rod bearing seats on the crankshaft journal.

NOTE: Lubricate the piston with clean engine oil.

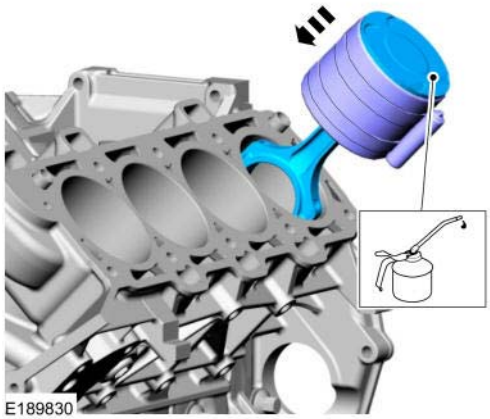
15.

Using a piston ring compressor, install the piston.

Use the General Equipment: Piston Ring Compressor

Material

: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W20-QSP (U.S.) (WSS-M2C945-A)

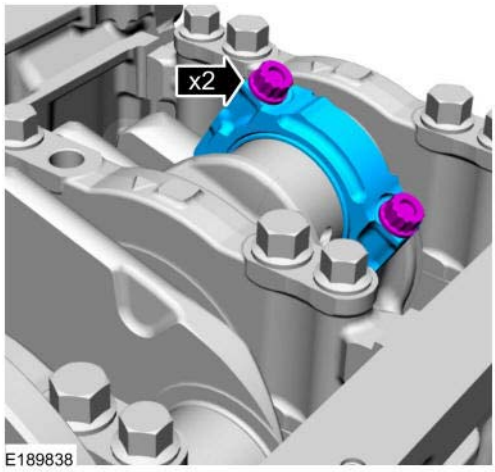


NOTE: The rod cap installation must keep the same orientation as marked during disassembly or engine damage may occur.

NOTE: The connecting rod caps are of the "cracked" design and must mate with the connecting rod ends. Excessive bearing clearance will result if not mated correctly.

16.
Install the connecting rod cap and bearing.

Install the new bolts hand tight.



17.

Repeat the previous 2 steps for each of the remaining pistons.

18.

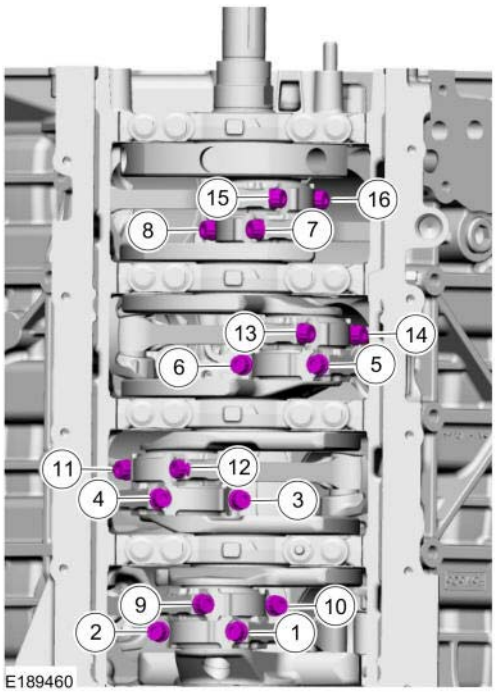
Tighten the connecting rod bolts.

Torque

Stage 1: 177 lb.in (20 Nm)

Stage 2: 28 lb.ft (38 Nm)

Stage 3: 105°



NOTE: Oil pump must be held against the cylinder block until all bolts are tightened.

19.

Rotate the inner rotor of the oil pump assembly to align the flats on the crankshaft and slip the oil pump over the crankshaft until seated against the block.

Rotate the oil pump until the bolt holes are aligned to the block and install the fasteners hand tight.

Torque

Stage 1: A: 89 lb.in (10 Nm)

Stage 2: B: 18 lb.ft (25 Nm)

Stage 3: C: 89 lb.in (10 Nm)

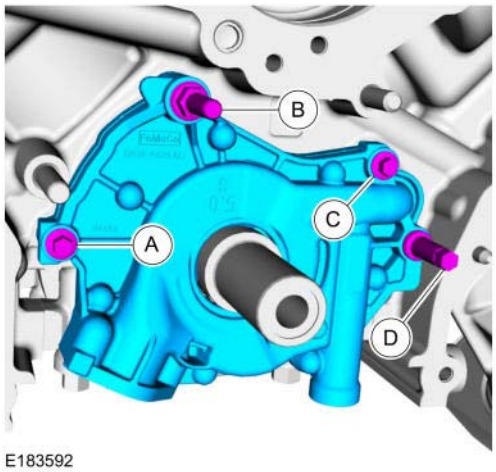
Stage 4: D: 177 lb.in (20 Nm)

Stage 5: A: 45°

Stage 6: B: 75°

Stage 7: C: 45°

Stage 8: D: 60°



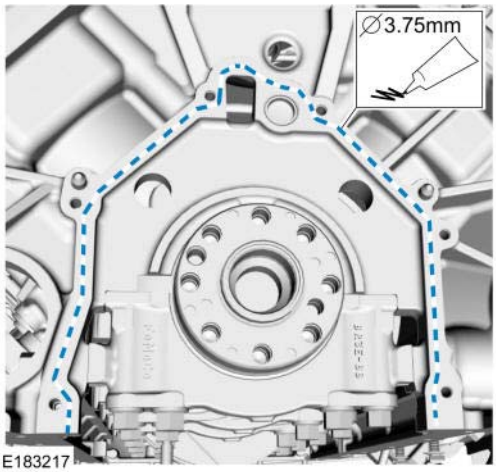
E183592

NOTE: If the rear crankshaft seal retaining plate is not secured within 4 minutes, the sealant must be removed and the sealing area cleaned. Failure to follow this procedure may cause future oil leaks.

20.
Apply a 3.75 mm (0.147 in) bead of silicone gasket and sealant to the rear crankshaft seal retainer mating surface on the engine block.

Material

: Silicone Gasket and Sealant / TA-30 (WSE-M4G323-A4)



E183217

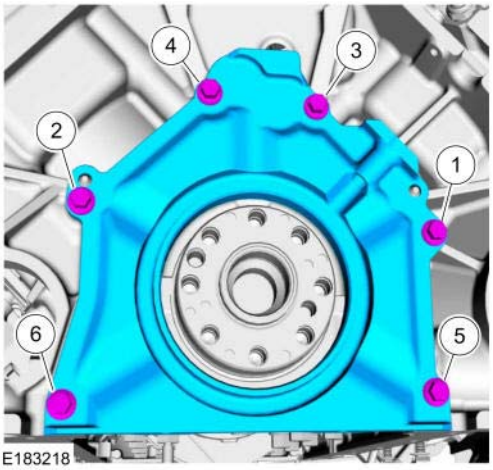
21.

Install the crankshaft rear seal retainer plate and the bolts.

Torque:

Stage 1: 89 lb.in (10 Nm)

Stage 2: 45°

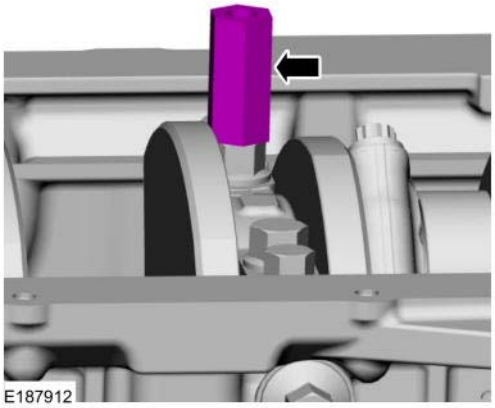


22.

Install the oil pump screen and pickup tube spacer.

Torque

: 18 lb.ft (25 Nm)



NOTE: If the oil pan is not installed and the fasteners tightened within 5 minutes, the sealant must be removed and the sealing area cleaned. To clean the sealing area, use silicone gasket remover and metal surface prep. Failure to follow this procedure can cause future oil leakage. If this timing cannot be met, tighten fasteners 7, 8, 9 and 10 to 8 Nm (71 lb-in) within 5 minutes of applying the sealer and final torque all of the fasteners within 1 hour of applying the sealer.

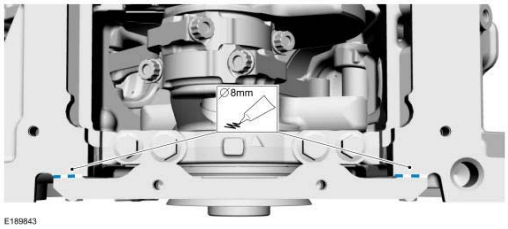
23.
Apply an 8 mm (0.31 in) bead of silicone gasket and sealant to the crankshaft rear seal retainer plate-to-cylinder block sealing surfaces.

Material

: Silicone Gasket and Sealant / TA-30 (WSE-M4G323-A4)

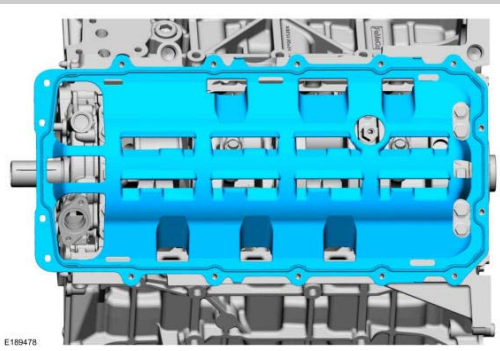
Torque

: 18 lb.ft (25 Nm)



24.

Install the oil pan baffle and gasket.



25.

Using a new O-ring seal, install the oil pump screen and pickup tube and the bolts.

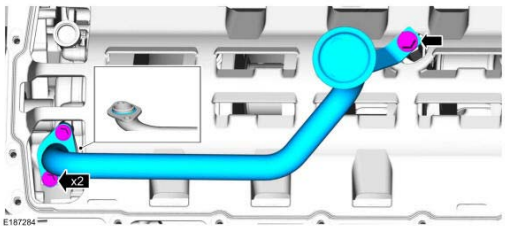
Torque:

Oil pump screen and pickup tube-to-oil pump bolts:

Stage 1: 89 lb.in (10 Nm)

Stage 2: 45°

Oil pump screen and pickup tube-to-spacer bolt : 18 lb.ft (25 Nm)



26.

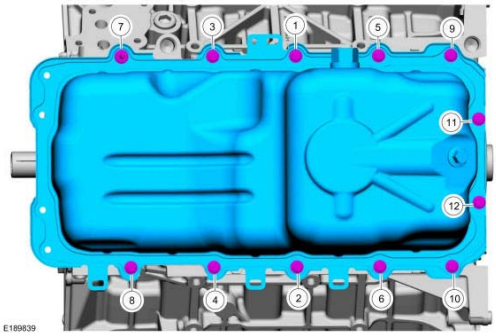
Install the oil pan and the fasteners.

Torque:

Stage 1: 18 lb.in (2 Nm)

Stage 2: 89 lb.in (10 Nm)

Stage 3: 45°



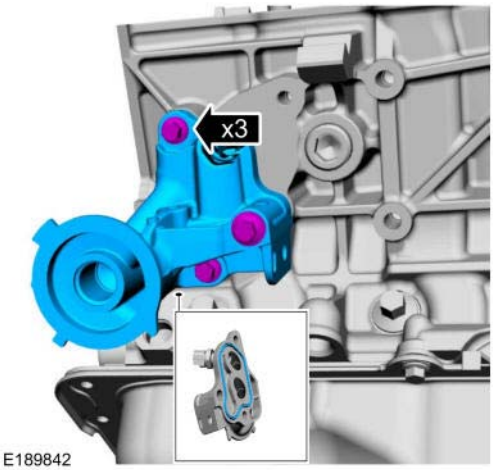
27.

Using a new gasket, install the oil filter adapter and the bolts.

Torque:

Stage 1: 177 lb.in (20 Nm)

Stage 2: 60°

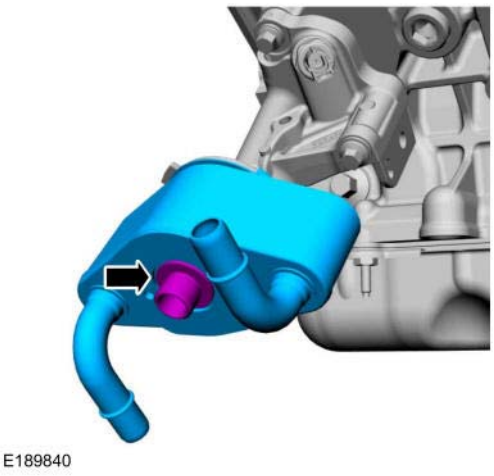


NOTE: A new oil cooler must be installed or severe damage to the engine can occur.

28.
Install a new oil cooler and the threaded fitting.

Torque

: 43 lb.ft (58 Nm)



NOTE: The CKP sensor must be positioned into the fitting on the crankshaft rear seal retainer plate and be flush against the boss on the engine block before the bolt is installed. If the CKP sensor is installed incorrectly, the CKP sensor can be damaged.

29.

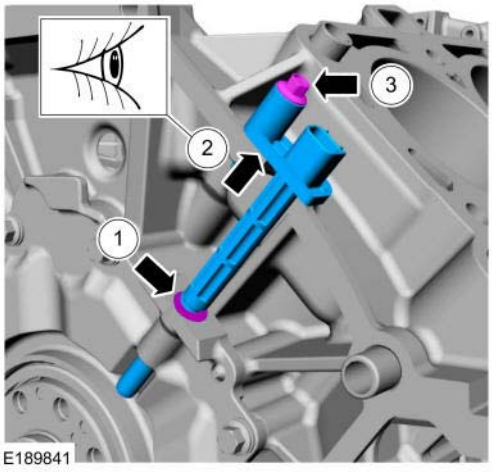
Install the CKP sensor must be positioned into the fitting on the crankshaft rear seal retainer plate.

Make sure the CKP sensor is flush with the engine block boss.

Install the bolt.

Torque

: 89 lb.in (10 Nm)

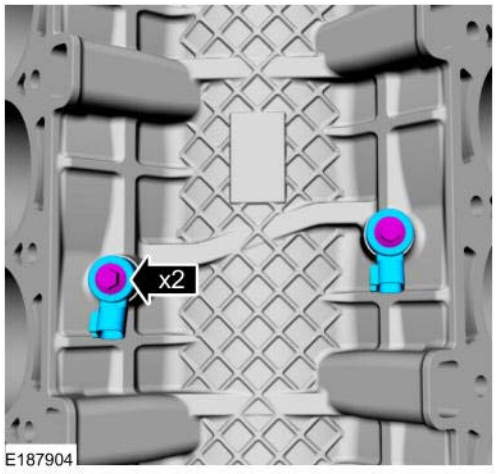


30.

Install the KSs and the bolts.

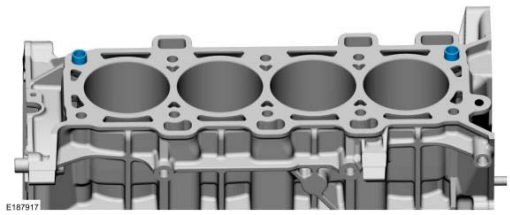
Torque

: 177 lb.in (20 Nm)



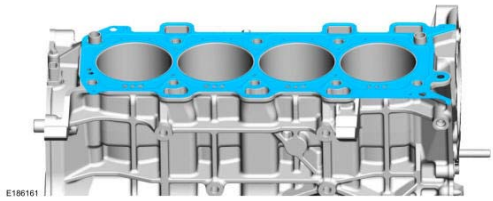
31.

Install the dowels on theRH bank of the cylinder block.



32.

Install a new RH cylinder head gasket.



NOTE: The cylinder head bolts are torque-to-yield and must not be reused. New cylinder head bolts must be installed.

33.
Install the RH cylinder head and the new bolts.

Torque:

Stage 1: 18 lb.ft (25 Nm)

Stage 2: 55 lb.ft (75 Nm)

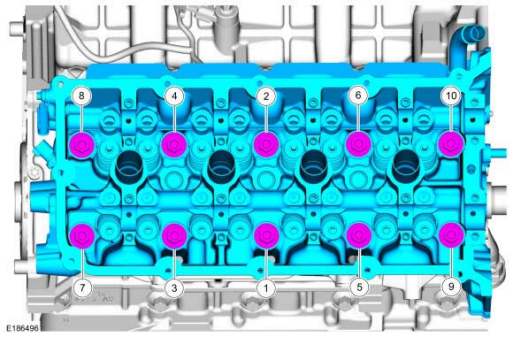
Stage 3 Loosen: 180°

Stage 4: 18 lb.ft (25 Nm)

Stage 5: 26 lb.ft (35 Nm)

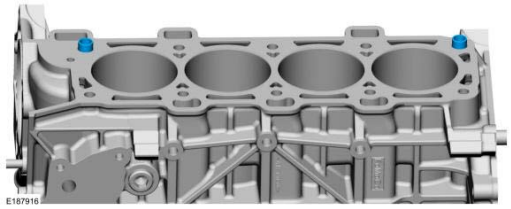
Stage 6: 90°

Stage 7: 90°



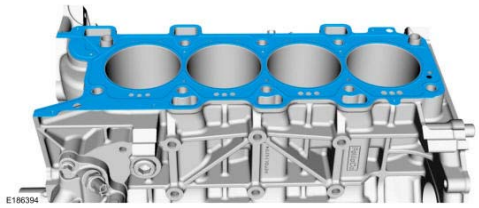
34.

Install the dowels on the LH bank of the cylinder block.



35.

Install a new LH cylinder head gasket.



NOTE: The cylinder head bolts are torque-to-yield and must not be reused. New cylinder head bolts must be installed.

36.
Install the LH cylinder head and the new bolts.

Torque:

Stage 1: 18 lb.ft (25 Nm)

Stage 2: 55 lb.ft (75 Nm)

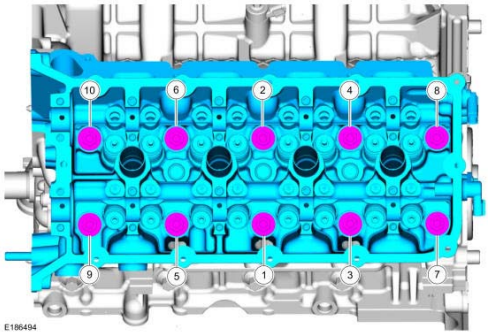
Stage 3: Loosen: 180°

Stage 4: 18 lb.ft (25 Nm)

Stage 5: 26 lb.ft (35 Nm)

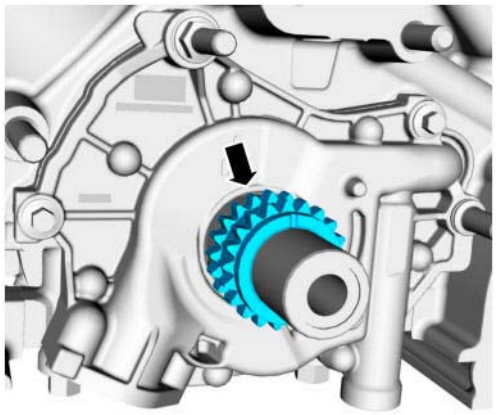
Stage 6: 90°

Stage 7: 90°



37.

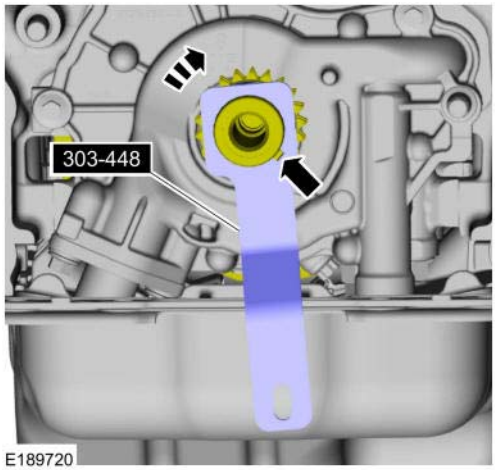
Install the crankshaft sprocket.



38.

Using the special tool, rotate the crankshaft clockwise until the keyway is at the 5 o'clock position.

Use Special Service Tool: 303-448 (T93P-6303-A) Holding Tool, Crankshaft.



NOTE: The LH camshafts, VCT units and timing chains must be installed first. Only turn

the crankshaft as instructed. Failure to do so may result in the camshafts installed out of phase and serious damage to the engine will result.

NOTE: If the components are to be reinstalled, they must be installed in their original locations.

39.

1.

Assemble the hydraulic lash adjusters onto the spring clips on the camshaft roller followers.

2.

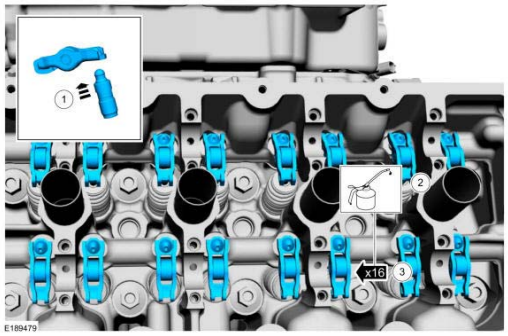
Lubricate the camshaft roller follower and hydraulic lash adjuster assemblies with clean engine oil.

Material

: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W20-QSP (U.S.) (WSS-M2C945-A)

3.

Install the camshaft roller follower and hydraulic lash adjuster assemblies.

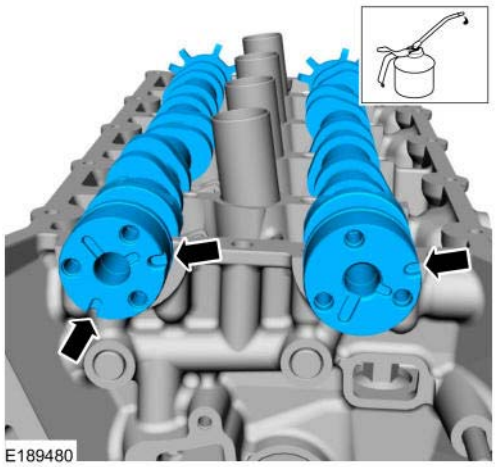


NOTE: Lubricate the camshafts with clean engine oil prior to installation.

40.
Install the LH intake and exhaust camshafts in the neutral position. Align the D-slots as shown in the illustration.

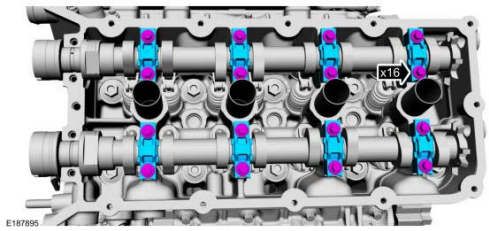
Material

: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W20-QSP (U.S.) (WSS-M2C945-A)



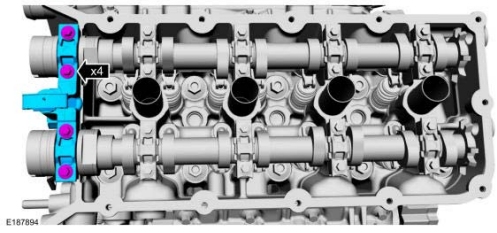
NOTE: Do not tighten at this time.

41.
Install the camshaft bearing caps and the bolts.



NOTE: Do not tighten at this time.

42.
Install the front camshaft bearing mega cap and the bolts.



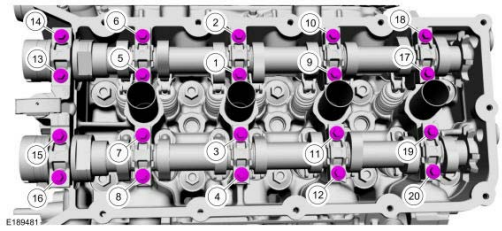
43.

Tighten the bolts.

Torque:

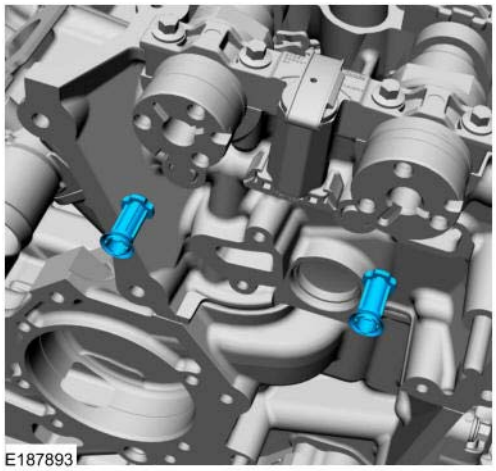
Stage 1: 53 lb.in (6 Nm)

Stage 2: 45°



44.

Install new VCT system oil filters into the camshafts.

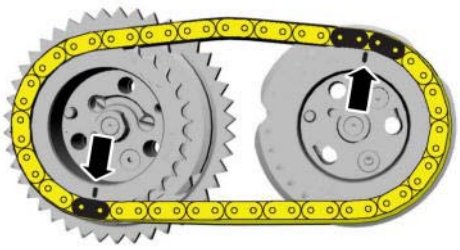


45.

Position the secondary timing chain onto the VCT assemblies. Align the colored links on the secondary timing chain with the timing marks on the VCT assemblies as shown in the illustration.

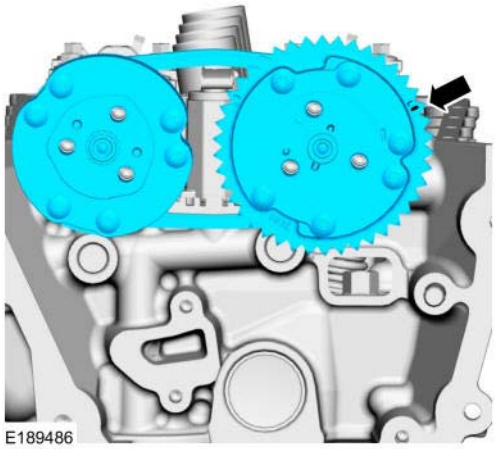
The timing mark on the intake VCT assembly should align between the 2 consecutive colored links.

The timing mark on the exhaust VCT assembly should align with the single colored link.



46.

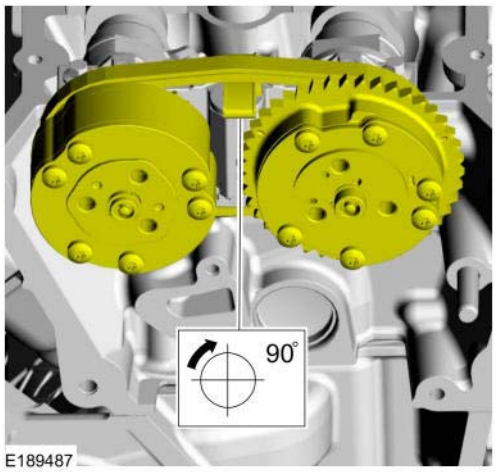
Install the VCT assemblies and the secondary timing chain onto the camshafts. The timing mark on the exhaust VCT assembly should be approximately in the 2 o'clock position.



NOTE: It may be necessary to rotate the exhaust camshaft slightly (using a wrench on the flats of the camshaft) to seat the VCT assemblies onto the camshafts.

47.
Rotate the secondary timing chain tensioner 90 degrees so the ramped area is facing forward and fully seat the VCT assemblies onto the camshafts.

If the secondary timing chain is not centered over the tensioner, reposition the VCT assemblies until they are fully seated on the camshafts.



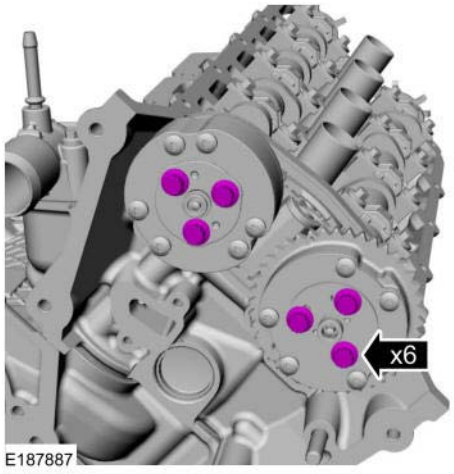
NOTE: Use a wrench on the flats of the camshaft to hold the camshafts while tightening the VCT assembly bolts.

48.
Install the intake and the exhaust VCT assembly bolts.

Torque:

Stage 1: 133 lb.in (15 Nm)

Stage 2: 90°

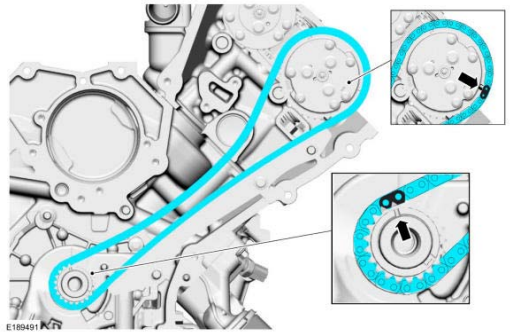


49.

Install the LH timing chain.

Align the colored link on the timing chain with the timing mark on the LH VCT assembly.

Align the remaining colored link on the timing chain with the timing mark on the crankshaft sprocket.

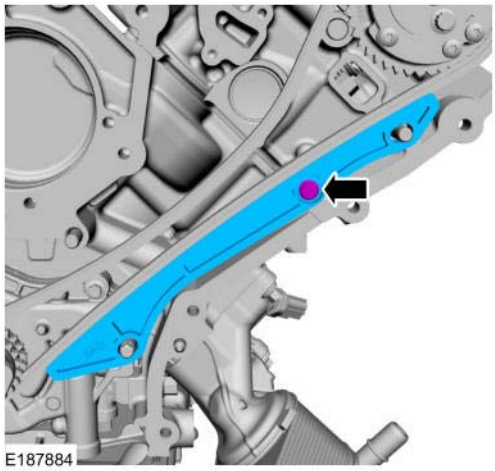


NOTE: It may be necessary to rotate the crankshaft slightly to provide enough slack in the chain to install the LH timing chain guide. Return the crankshaft keyway to the 5 o'clock position after installing the LH timing chain guide.

50.
Install the LH timing chain guide and bolt.

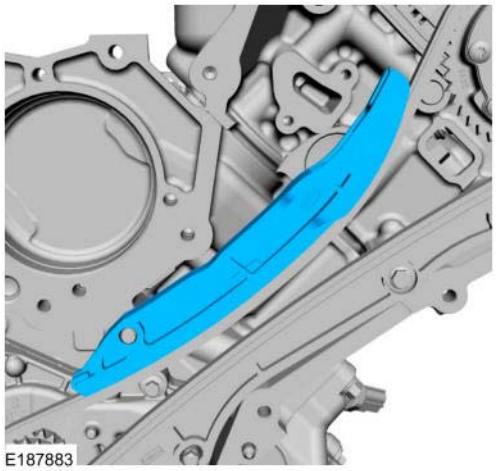
Torque

: 89 lb.in (10 Nm)



NOTE: It may be necessary to rotate the crankshaft slightly to provide enough slack in the chain to install the LH timing chain arm. Return the crankshaft keyway to the 5 o'clock position after installing the LH timing chain arm.

51.
Install the LH timing chain tensioner arm.



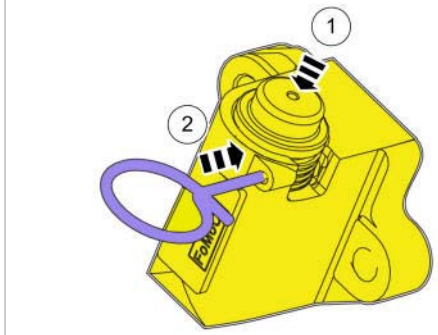
52.

1.

Compress the primary timing chain tensioner plunger, using an edge of a vise.

2.

Install a suitable pin into the hole of the tensioner housing to hold the plunger in place during installation.



53.

1.

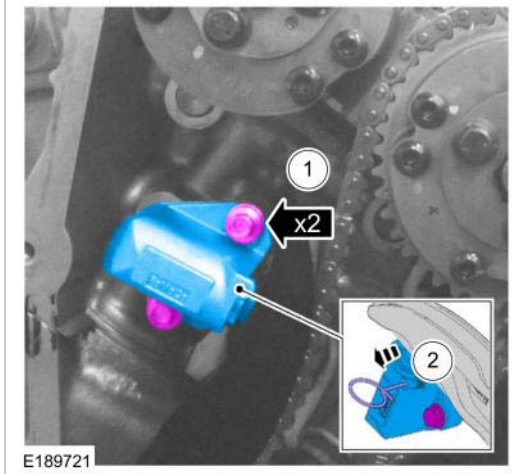
Install the LH primary timing chain tensioner and bolts.

Torque

: 89 lb.in (10 Nm)

2.

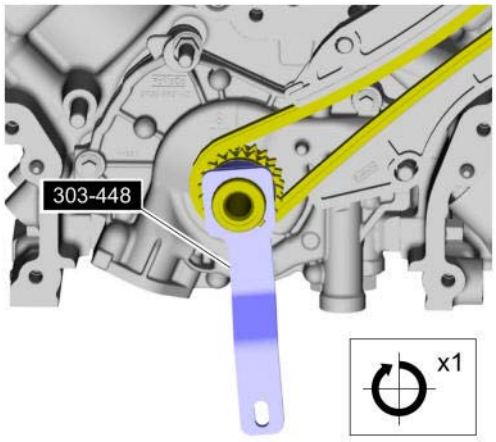
Remove the holding pin from the tensioner.



54.

Using the special tool, rotate the crankshaft clockwise one complete revolution.

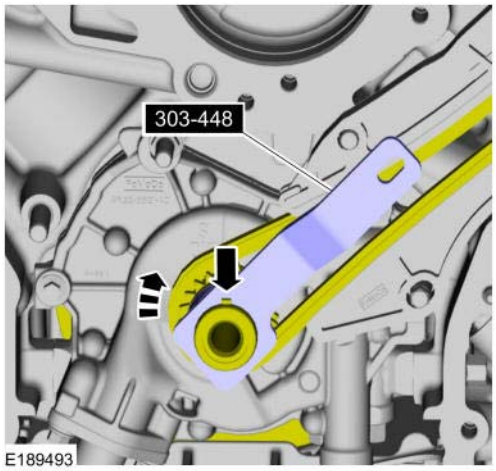
Use Special Service Tool: 303-448 (T93P-6303-A) Holding Tool, Crankshaft.



55.

Using the special tool, rotate the crankshaft clockwise until the keyway is at the 12 o'clock position.

Use Special Service Tool: 303-448 (T93P-6303-A) Holding Tool, Crankshaft.



NOTE: If the components are to be reinstalled, they must be installed in their original locations.

56.

1.

Assemble the hydraulic lash adjusters onto the spring clips on the camshaft roller followers.

2.

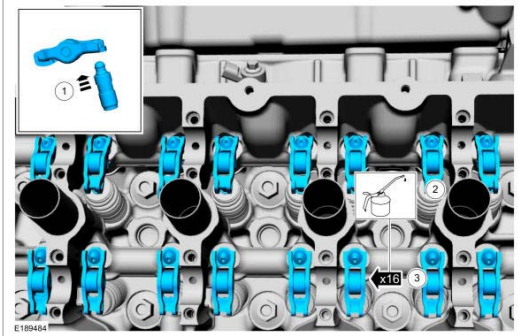
Lubricate the camshaft roller follower and hydraulic lash adjuster assemblies with clean engine oil.

Material

: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W20-QSP (U.S.) (WSS-M2C945-A)

3.

Install the camshaft roller follower and hydraulic lash adjuster assemblies.

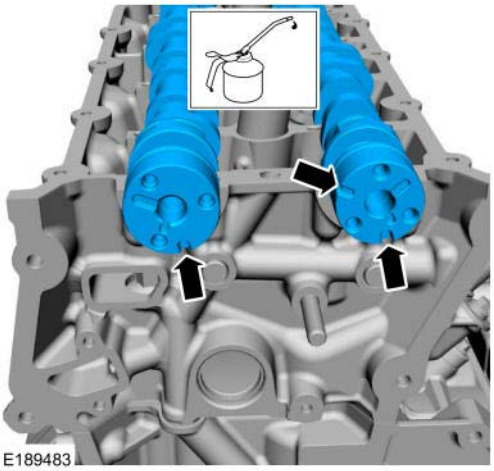


NOTE: Lubricate the camshafts with clean engine oil prior to installation.

57.
Install the RH intake and exhaust camshafts in the neutral position. Align the D-slots as shown in the illustration.

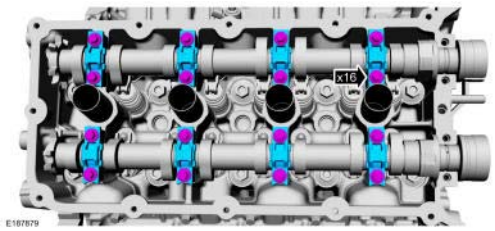
Material

: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W20-QSP (U.S.) (WSS-M2C945-A)



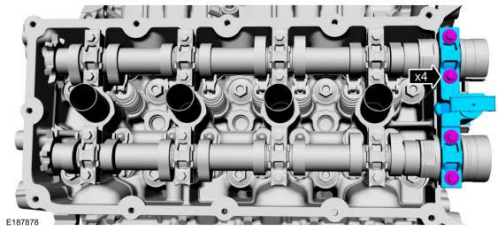
NOTE: Do not tighten at this time.

58.
Install the camshaft bearing caps and the bolts.



NOTE: Do not tighten at this time.

59.
Install the front camshaft bearing mega cap and the bolts.



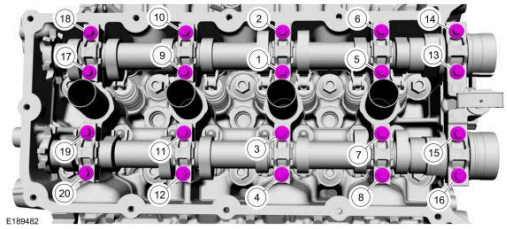
60.

Tighten the bolts.

Torque:

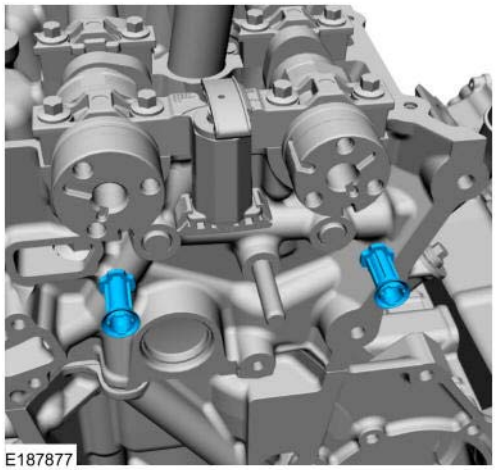
Stage 1: 53 lb.in (6 Nm)

Stage 2: 45°



61.

Install the VCT system oil filters into the camshafts.

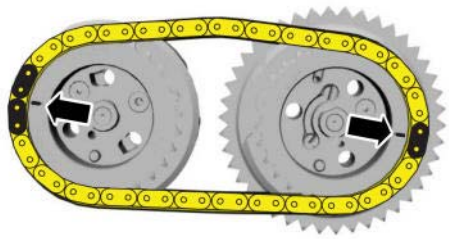


62.

Position the secondary timing chain onto the VCT assemblies. Align the colored links on the secondary timing chain with the timing marks on the VCT assemblies as shown in the illustration.

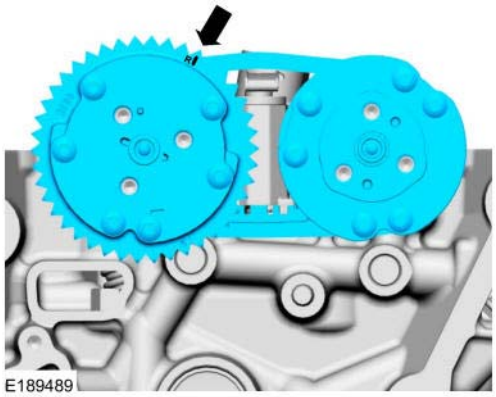
The timing mark on the intake VCT assembly should align between the 2 consecutive colored links.

The timing mark on the exhaust VCT assembly should align with the single colored link.



63.

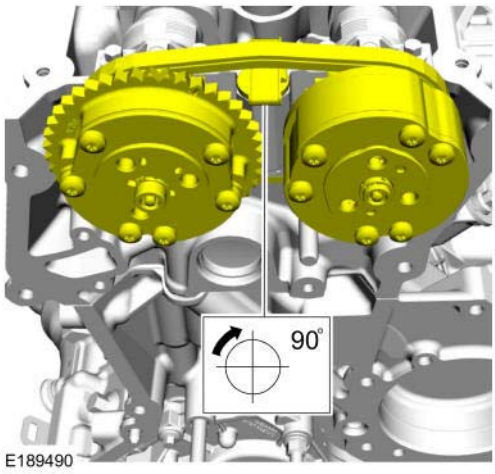
Install the VCT assemblies and the secondary timing chain onto the camshafts. The timing mark on the exhaust VCT assembly should be approximately in the 1 o'clock position.



NOTE: It may be necessary to rotate the exhaust camshaft slightly (using a wrench on the flats of the camshaft) to seat the VCT assemblies onto the camshafts.

64.
Rotate the secondary timing chain tensioner 90 degrees so the ramped area is facing forward and fully seat the VCT assemblies onto the camshafts.

If the secondary timing chain is not centered over the tensioner, reposition the VCT assemblies until they are fully seated on the camshafts.



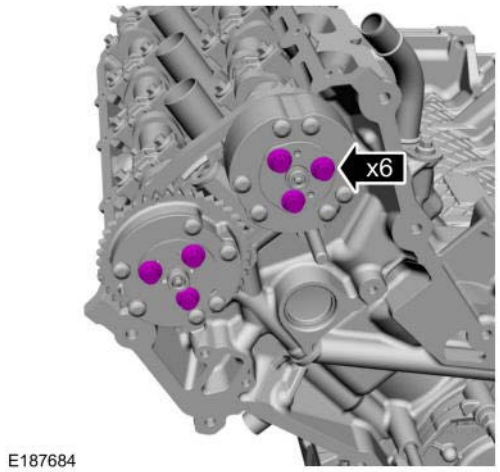
NOTE: Use a wrench on the flats of the camshaft to hold the camshafts while tightening the VCT assembly bolts.

65.
Install the intake and the exhaust VCT assembly bolts.

Torque:

Stage 1: 133 lb.in (15 Nm)

Stage 2: 90°



66.

Install the RH timing chain.

Align the colored link on the timing chain with the timing mark on the RH VCT assembly.

Align the remaining colored link on the timing chain with the timing mark on the crankshaft sprocket.

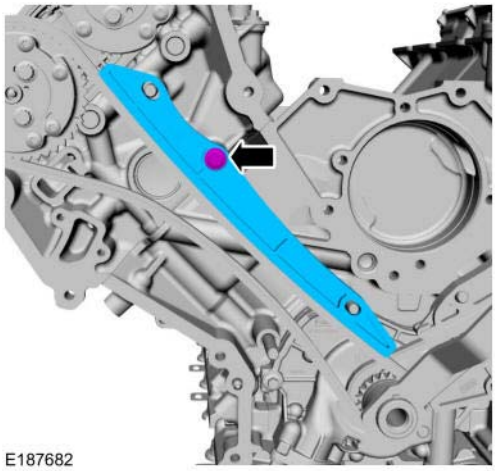


NOTE: It may be necessary to rotate the crankshaft slightly to provide enough slack in the chain to install the RH timing chain guide. Return the crankshaft keyway to the 12 o'clock position after installing the RH timing chain guide.

67.
Install the RH timing chain guide and bolt.

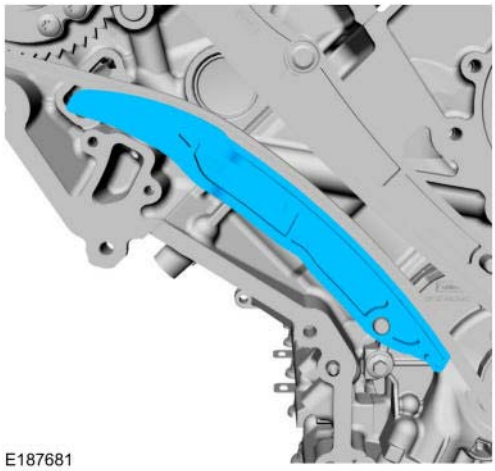
Torque

: 89 lb.in (10 Nm)



NOTE: It may be necessary to rotate the crankshaft slightly to provide enough slack in the chain to install the RH timing chain arm. Return the crankshaft keyway to the 12 o'clock position after installing the RH timing chain arm.

68.
Install the RH timing chain tensioner arm.



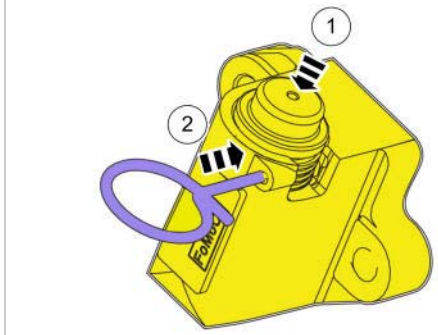
69.

1.

Compress the primary timing chain tensioner plunger, using an edge of a vise.

2.

Install a suitable pin into the hole of the tensioner housing to hold the plunger in place during installation.



70.

1.

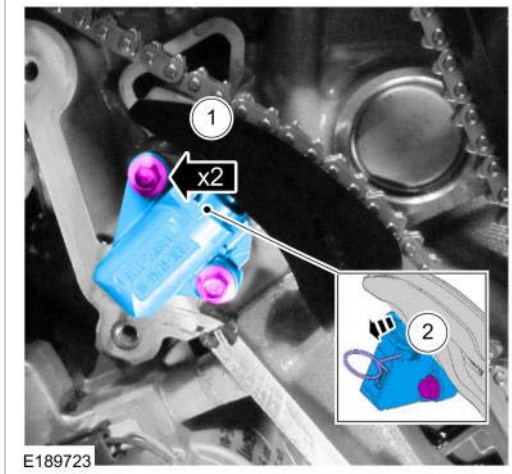
Install the RH primary timing chain tensioner and bolts.

Torque

: 89 lb.in (10 Nm)

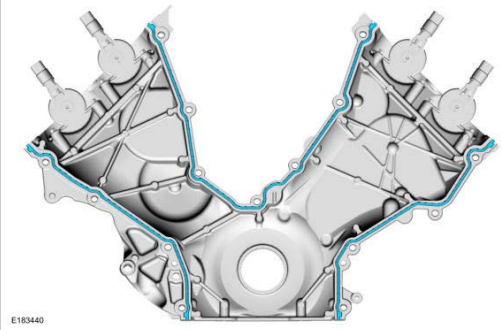
2.

Remove the holding pin from the tensioner.



71.

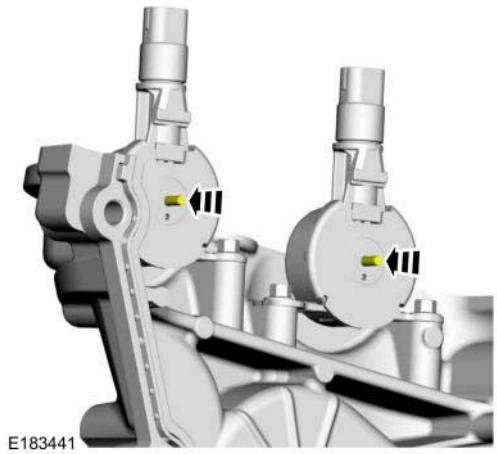
Install new gaskets on the engine front cover.



NOTE: The VCT variable force solenoid pins must be fully depressed to avoid interference with the VCT valve tips when installing the engine front cover. Failure to follow these instructions can result in damage to the engine.

NOTE: RH shown in illustration, LH similar.

72.
Fully depress the VCT variable force solenoid pins.

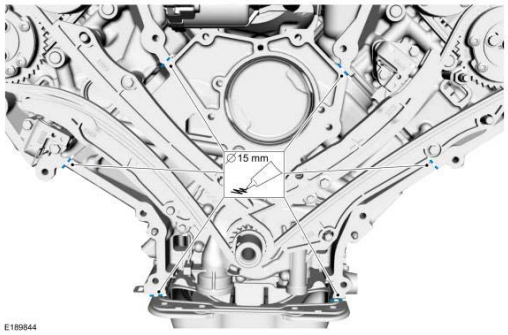


NOTE: The engine front cover must be installed and all fasteners final tightened within 5 minutes of applying the sealer. If this cannot be accomplished, install the engine front cover and tighten fasteners 6, 7, 8, 9, 10 and 11 to 8 Nm (71 lb-in) within 5 minutes of applying the sealer. All of the fasteners must then be final tightened within 1 hour of applying the sealer. If this time limit is exceeded, all sealant must be removed and the sealing area cleaned. Failure to follow this procedure can cause future oil leakage.

73.
Apply a 15 mm (0.59 in) diameter drop of silicone gasket and sealant to the cylinder head-to-cylinder block joints and the oil pan-to-cylinder block joints.

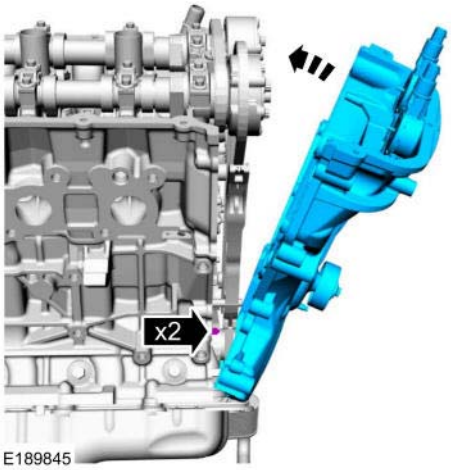
Material

: Silicone Gasket and Sealant / TA-30 (WSE-M4G323-A4)



NOTE: Make sure that the engine front cover gaskets are in place on the engine front cover before installation.

74.
Position the engine front cover onto the dowels.



NOTE: The engine front cover must be installed and all fasteners final tightened within 5 minutes of applying the sealer. If this cannot be accomplished, install the engine front cover and tighten fasteners 6, 7, 8, 9, 10 and 11 to 8 Nm (71 lb-in) within 5 minutes of applying the sealer. All of the fasteners must then be final tightened within 1 hour of applying the sealer. If this time limit is exceeded, all sealant must be removed and the sealing area cleaned. Failure to follow this procedure can cause future oil leakage.

75.
Install the bolts and stud bolts.

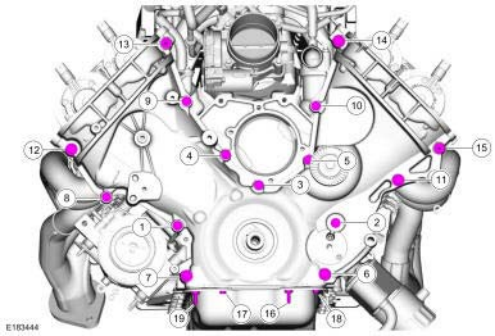
Torque:

Stage 1: Fasteners 1-15 : 18 lb.ft (25 Nm)

Stage 2: Fasteners 16-19 : 89 lb.in (10 Nm)

Stage 3: Fasteners 1-15 : 60°

Stage 4: Fasteners 16-19 : 45°

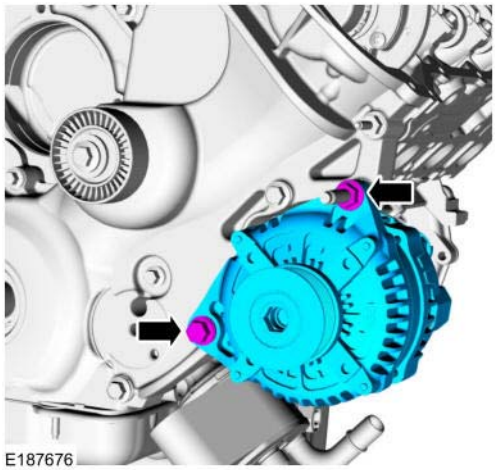


76.

Install the generator, the bolt and the nut.

Torque

: 35 lb.ft (48 Nm)

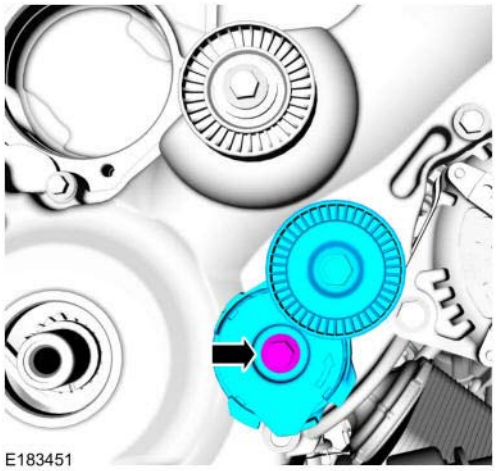


77.

Install the accessory drive belt tensioner and bolt.

Torque

: 35 lb.ft (48 Nm)

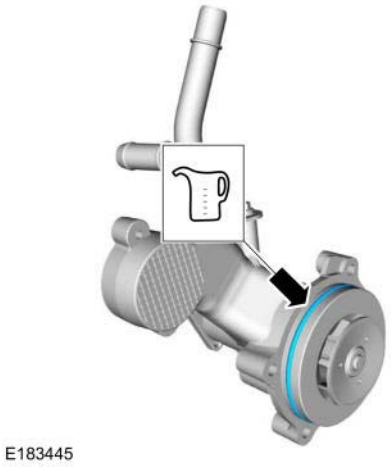


78.

Install a new coolant pump O-ring seal and lubricate with clean engine coolant.

Material

: Motorcraft® Orange Antifreeze/Coolant Concentrated (U.S.) / VC-3-B (U.S.) (WSS-M97B44-D)



79.

Install the coolant pump and bolts.

Torque:

Stage 1: 177 lb.in (20 Nm)

Stage 2: 60°

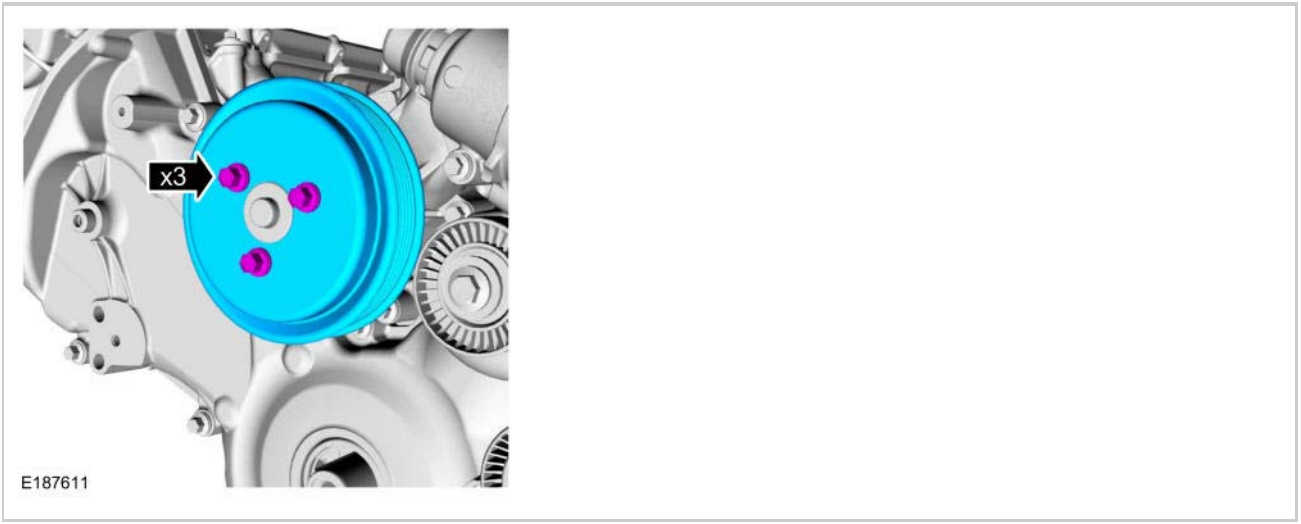


80.

Install the coolant pump pulley and the bolts.

Torque

: 18 lb.ft (25 Nm)



81.

Lubricate the engine front cover bore and the crankshaft front oil seal inner lip with clean engine oil.

Material

: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W20-QSP (U.S.) (WSS-M2C945-A)

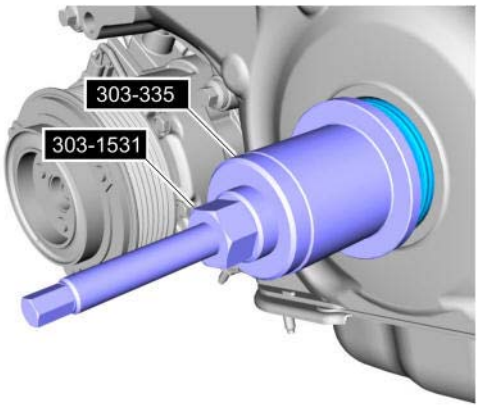


E183264

82.

Using the special tools, install the new crankshaft front oil seal.

Use Special Service Tool: 303-335 (T88T-6701-A) Installer, Front Cover Oil Seal, 303-1531 Installer, Front Crank Seal and Damper.



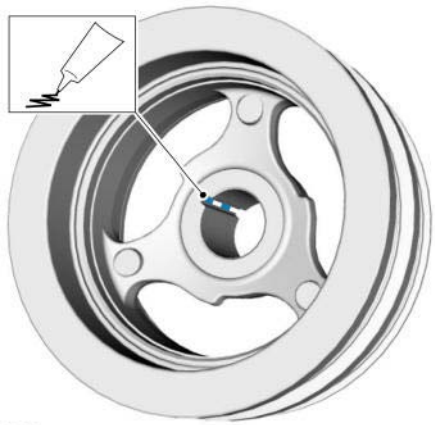
E183265

NOTE: If not secured within 5 minutes, the sealant must be removed and the sealing area cleaned. Failure to follow this procedure can cause future oil leakage.

83.
Apply silicone gasket and sealant to the Woodruff key slot in the crankshaft pulley.

Material

: Silicone Gasket and Sealant / TA-30 (WSE-M4G323-A4)



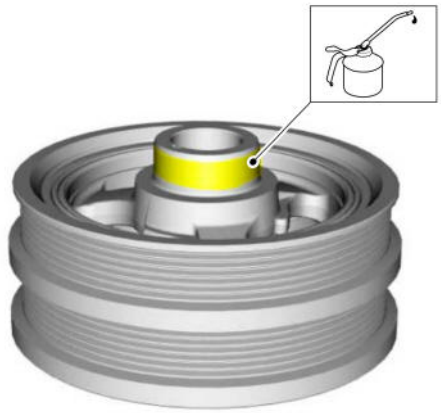
E183266

84.

Lubricate the crankshaft pulley sealing surface with clean engine oil prior to installation.

Material

: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W20-QSP (U.S.) (WSS-M2C945-A)

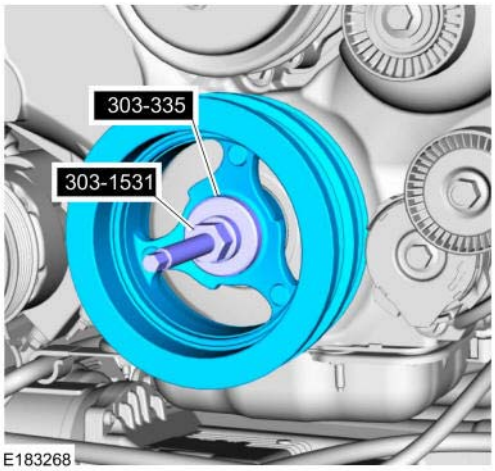


E183267

85.

Using the special tools, install the crankshaft pulley.

Use Special Service Tool: 303-335 (T88T-6701-A) Installer, Front Cover Oil Seal, 303-1531 Installer, Front Crank Seal and Damper.



86.

Using the Strap Wrench, install a new crankshaft pulley bolt and the original washer.

Use the General Equipment: Strap Wrench

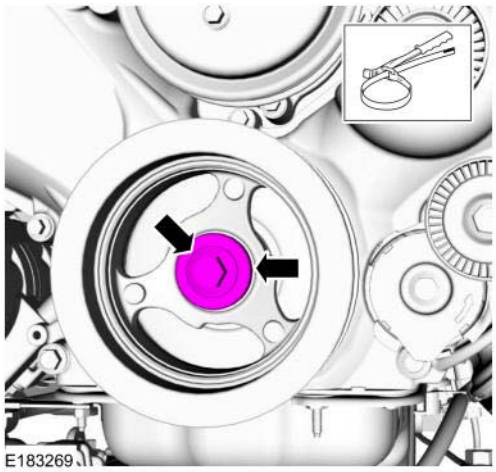
Torque:

Stage 1: 103 lb.ft (140 Nm)

Stage 2: Loosen: 360°

Stage 3: 74 lb.ft (100 Nm)

Stage 4: 90°

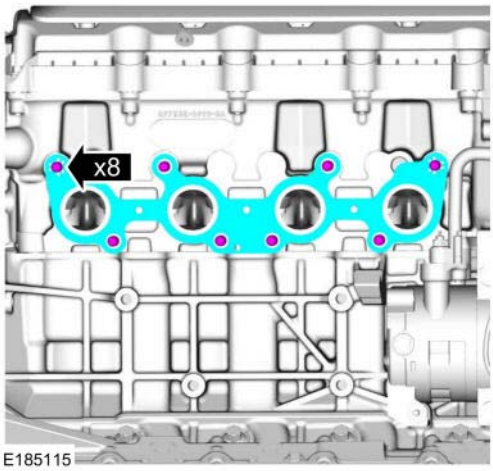


87.

Install new studs and new gasket.

Torque

: 159 lb.in (18 Nm)



88.

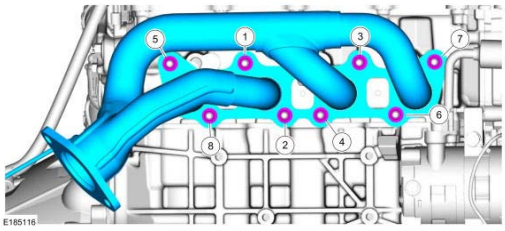
Install the exhaust manifold.

Install the new nuts.

Torque:

Stage 1: 159 lb.in (18 Nm)

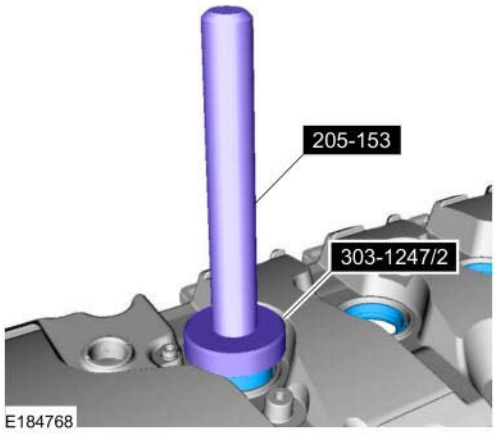
Stage 2: 18 lb.ft (24 Nm)



NOTE: Installation of new seals is only required if damaged seals were removed.

89.
Using the special tools, install new spark plug tube seals into the LH valve cover.

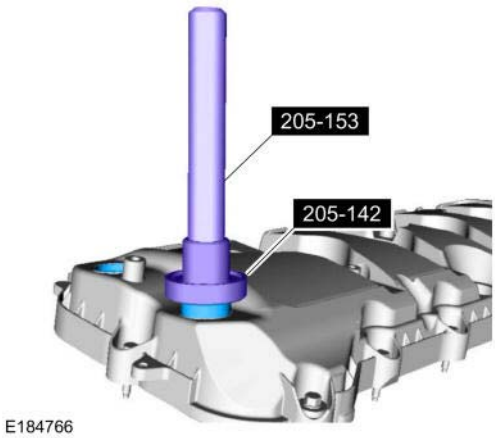
Use Special Service Tool: 205-153 (T80T-4000-W) Handle, 303-1247 VCT Spark Plug Tube Seal Remover and Installer.



NOTE: Installation of new seals is only required if damaged seals were removed.

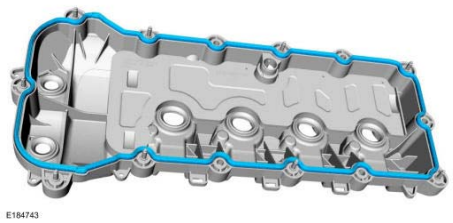
90.
Using the special tools, install new VCT variable force solenoid seals into the LH valve cover.

Use Special Service Tool: 205-153 (T80T-4000-W) Handle, 205-142 (T80T-4000-J) Installer, Differential Bearing Cone.



91.

Install a new gasket onto the LH valve cover.

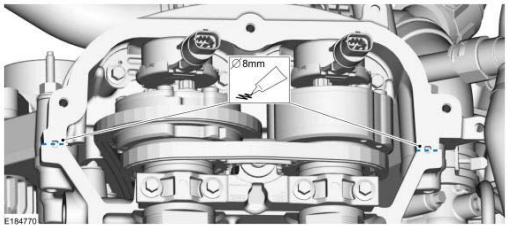


NOTE: If the valve cover is not installed and the fasteners tightened within 5 minutes, the sealant must be removed and the sealing area cleaned.

92.
Apply an 8 mm (0.31 in) bead of silicone gasket and sealant to the engine front cover-to-LH cylinder head joints.

Material

: Silicone Gasket and Sealant / TA-30 (WSE-M4G323-A4)

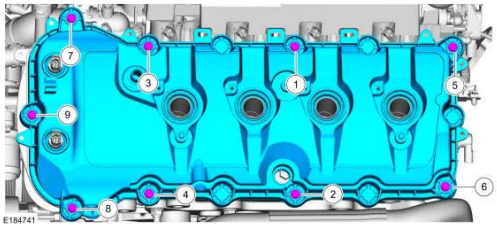


93.

Install the LH valve cover and tighten the bolts.

Torque

: 89 lb.in (10 Nm)



94.

1.

Push the oil level indicator tube into the engine.

2.

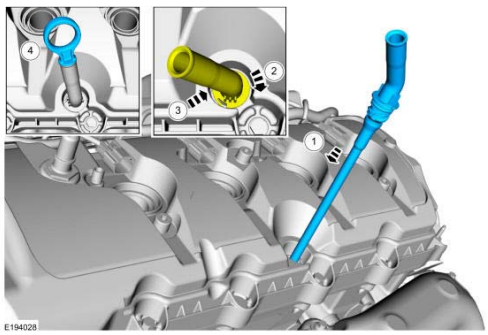
Rotate the oil level indicator tube clockwise.

3.

Verify the tab is locked in place.

4.

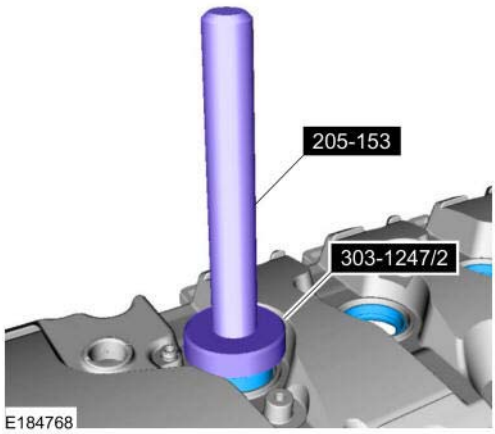
Install the oil level indicator.



NOTE: Installation of new seals is only required if damaged seals were removed.

95.
Using the special tools, install new spark plug tube seals into the RH valve cover.

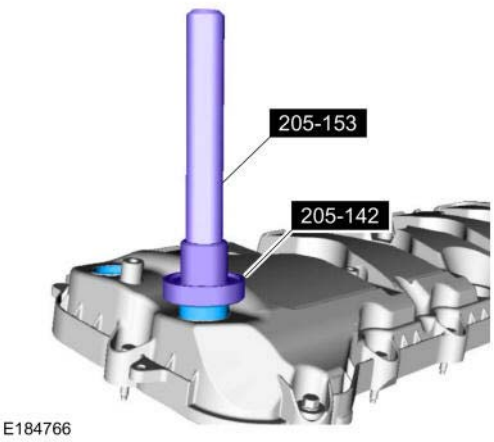
Use Special Service Tool: 205-153 (T80T-4000-W) Handle, 303-1247 VCT Spark Plug Tube Seal Remover and Installer.



NOTE: Installation of new seals is only required if damaged seals were removed.

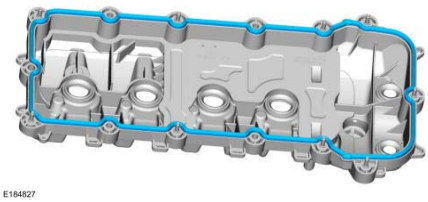
96.
Using the special tools, install new VCT variable force solenoid seals into the RH valve cover.

Use Special Service Tool: 205-153 (T80T-4000-W) Handle, 205-142 (T80T-4000-J)Installer, Differential Bearing Cone.



97.

Install a new gasket onto the RH valve cover.

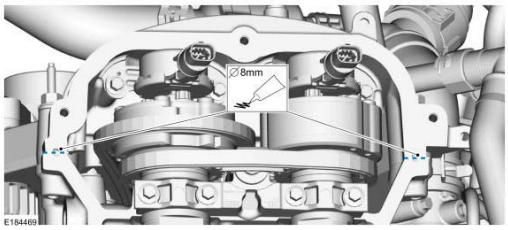


NOTE: If the valve cover is not installed and the fasteners tightened within 5 minutes, the sealant must be removed and the sealing area cleaned.

98.
Apply an 8 mm (0.31 in) bead of silicone gasket and sealant to the engine front cover-to-RH cylinder head joints.

Material

: Silicone Gasket and Sealant / TA-30 (WSE-M4G323-A4)

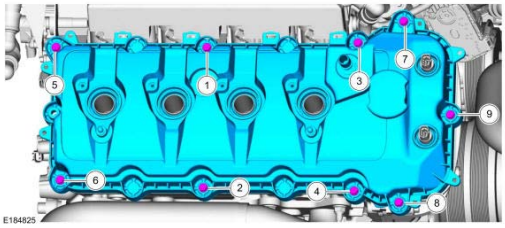


99.

Install the RH valve cover and tighten the bolts.

Torque

: 89 lb.in (10 Nm)



NOTE: When installing ignition coils, apply a small amount of silicone brake caliper grease and dielectric compound to the inside of the ignition coil boots before installation.

100.
Install the ignition coils and the bolts. Install the ignition coils and the bolts.

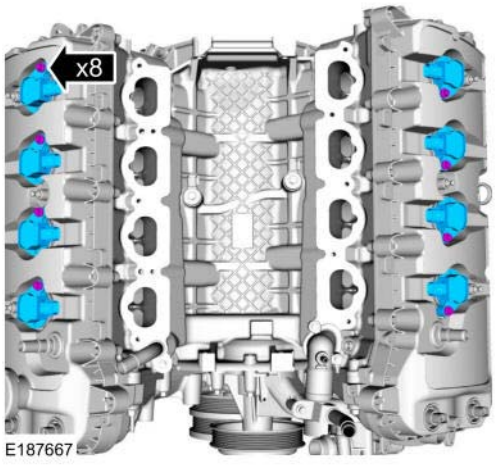
Material

: Silicone Brake Caliper Grease and Dielectric Compound / XG-3-A (ESE-M1C171-A)

Torque:

Stage 1: 62 lb.in (7 Nm)

Stage 2: 50°



101.

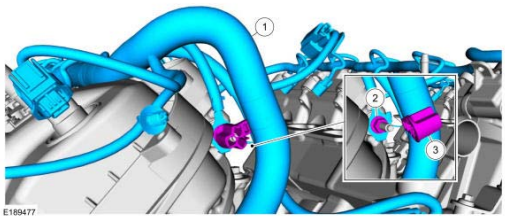
Position the wiring harness on the engine.

Install the ground wire and the nut.

Torque

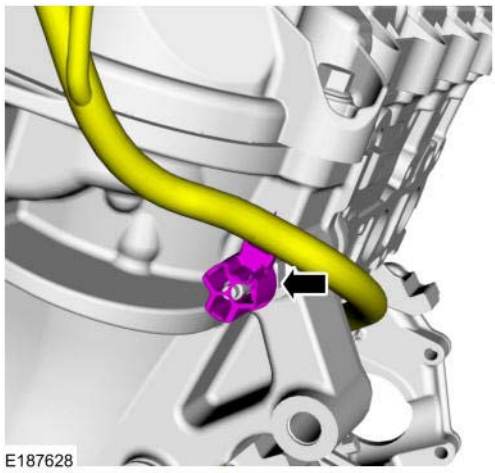
: 89 lb.in (10 Nm)

Attach the wiring harness retainer to the engine front cover stud bolt.



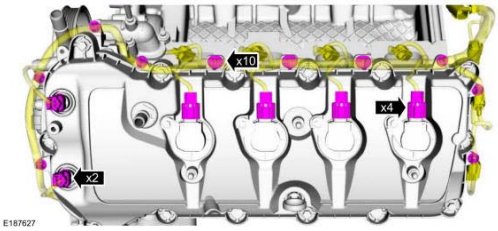
102.

Attach the wiring harness retainer to the engine front cover stud bolt.



103.

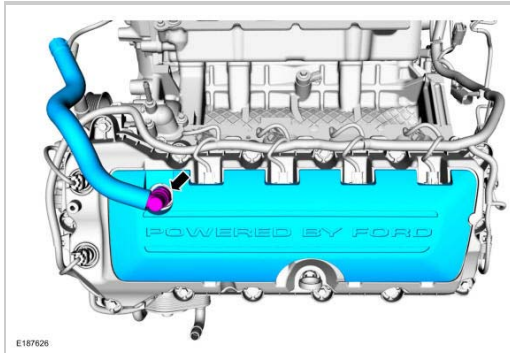
Connect the wiring harness electrical connectors and retainers.



104.

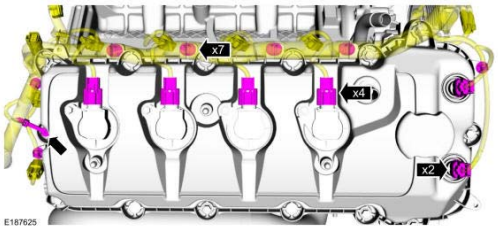
Install the LH spark plug cover.

Install the crankcase ventilation tube. Refer to: QUICK RELEASE COUPLING .



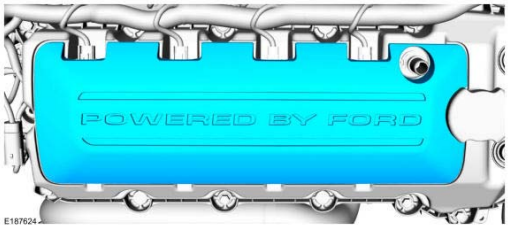
NOTE: Engine equipped with automatic transmission shown in illustration, manual transmission engine similar.

105.
Connect the wiring harness electrical connectors and retainers.



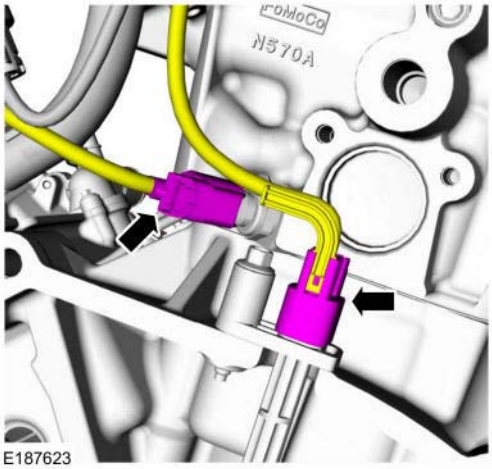
106.

Install the spark plug cover.



107.

Connect the CHT sensor and the CKP sensor electrical connectors.



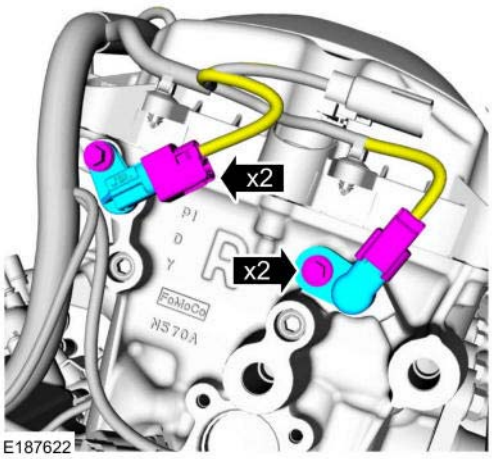
108.

Install the RH camshaft position sensors and the bolts.

Torque

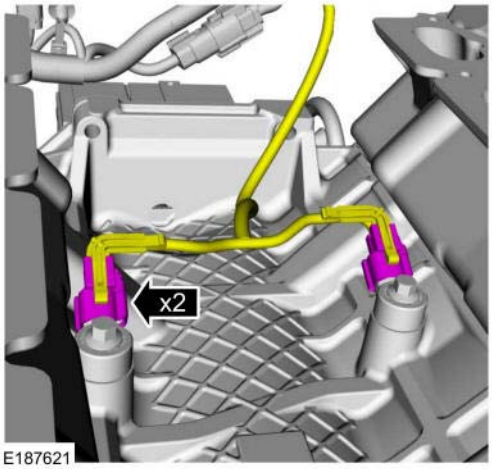
: 89 lb.in (10 Nm)

Connect the RH camshaft position sensor electrical connectors.



109.

Connect the KS electrical connectors.



110.

Install the LH camshaft position sensors and the bolts.

Torque

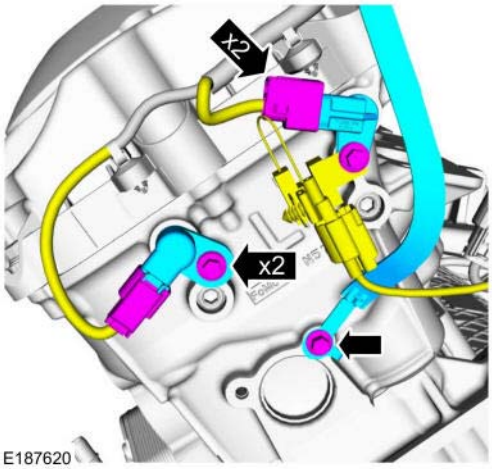
: 89 lb.in (10 Nm)

Position the ground wire and install the bolt.

Torque

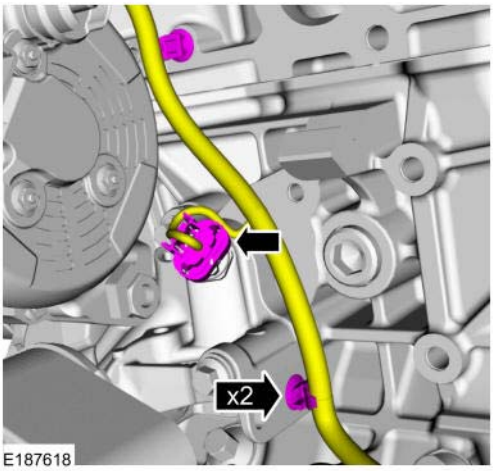
: 106 lb.in (12 Nm)

Connect the LH camshaft position sensor electrical connectors.



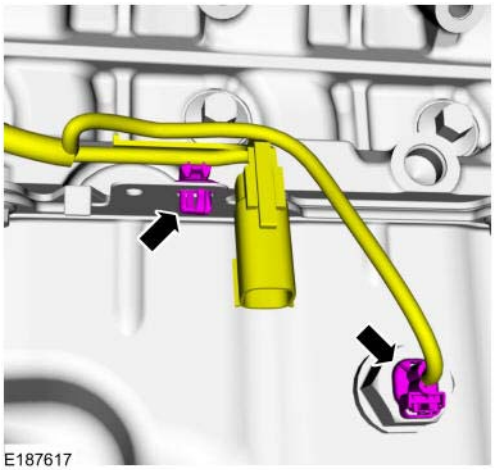
111.

Connect the EOP) switch electrical connector and the wiring harness retainers.



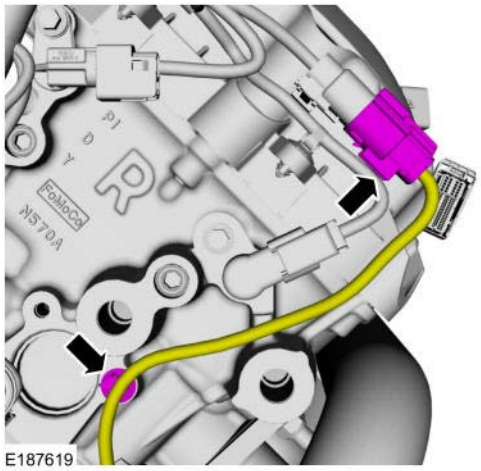
112.

Connect the engine oil level sensor electrical connector and the wiring harness retainer.



NOTE: Manual transmission engine shown in illustration, automatic transmission engine similar.

113.
Connect the RH HO2S electrical connector and wiring harness retainer.



114.

Install the special tool and remove the engine from the engine stand using a floor crane.

Install Special Service Tool: 303-F047 Lifting Bracket, Engine.

Use the General Equipment: Floor Crane

Use the General Equipment: Mounting Stand

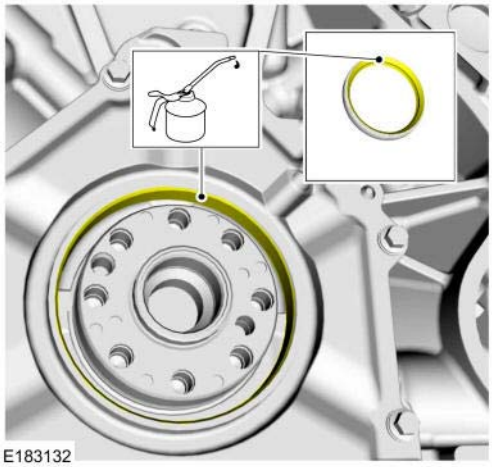


115.

Lubricate the seal bore and the seal lips with clean engine oil.

Material

: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W20-QSP (U.S.) (WSS-M2C945-A)

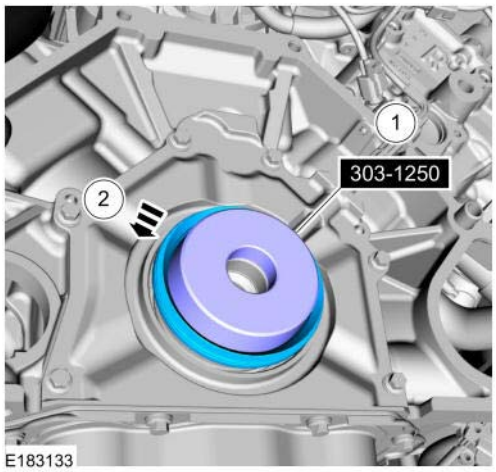


116.

Position the special tool onto the end of the crankshaft.

Use Special Service Tool: 303-1250 Seal Installer, Rear Main.

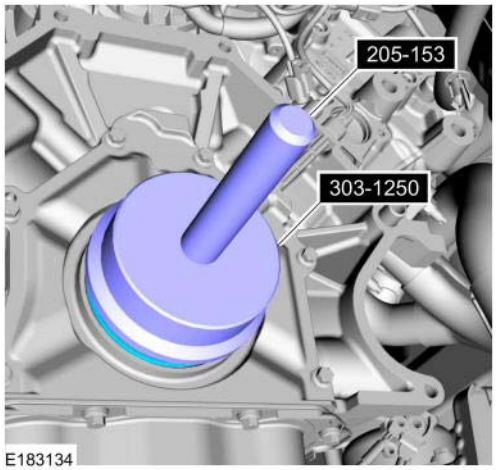
Slide the new crankshaft rear seal onto the tool.



117.

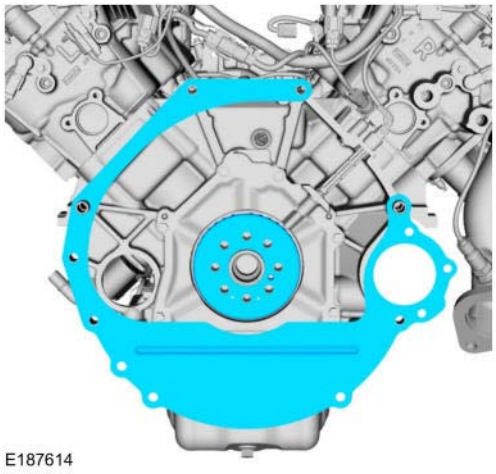
Using the special tools, install the crankshaft rear seal.

Use Special Service Tool: 205-153 (T80T-4000-W) Handle, 303-1250 Seal Installer, Rear Main.



NOTE: Engine equipped with manual transmission shown in illustration, automatic transmission engine similar.

118.
Install the engine-to-transmission spacer plate and the crankshaft sensor ring.



6-Speed Manual Transmission - MT82

119.

Install the flywheel and the bolts.

Torque:

Stage 1: 89 lb.in (10 Nm)

Stage 2: 177 lb.in (20 Nm)

Stage 3: 60°



NOTE: If installing a new pressure plate and/or flywheel, align the paint dot on the pressure plate as close as possible to the paint dot on the flywheel or a clutch system vibration can occur.

NOTE: If installing the original pressure plate, align it using the index-marks made during removal or a clutch system vibration can occur.

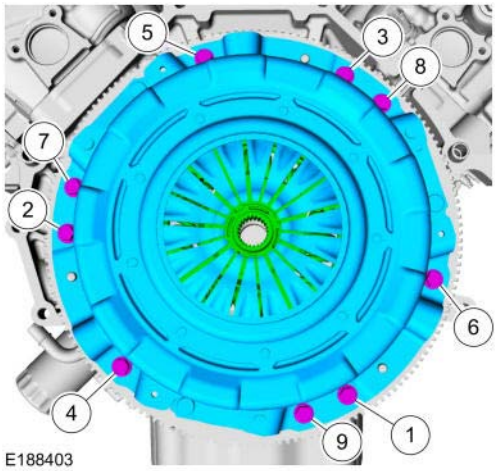
120.
Using a clutch aligner, position the clutch disc on the flywheel. If installing the original pressure plate, align the pressure plate to the flywheel using the index-marks made during removal. If installing a new pressure plate, align the pressure plate to the flywheel using the paint dots. Install new pressure plate bolts by turning the bolts 1 turn at a time in a star pattern until the clutch is fully secured.

Use the General Equipment: Clutch Alignment Tool

Torque:

Stage 1: 34 lb.ft (46 Nm)

Stage 2: 60°



6-Speed Automatic Transmission - 6R80

121.

Install the flexplate and the bolts.

Torque:

Stage 1: 177 lb.in (20 Nm)

Stage 2: 60°



INSTALLATION > ENGINE

Special Tool(s) / General Equipment

	303-F047 Lifting Bracket, Engine

	303-F072 Support Bar, Engine
Magnetic Socket	
Floor Crane	
Trolley Jack	
Wooden Block	

Materials

Name	Specification
Motorcraft® Multi-Purpose Grease Spray XL-5-A	ESB-M1C93-B
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) XO-5W20-QSP (U.S.)	WSS-M2C945-A

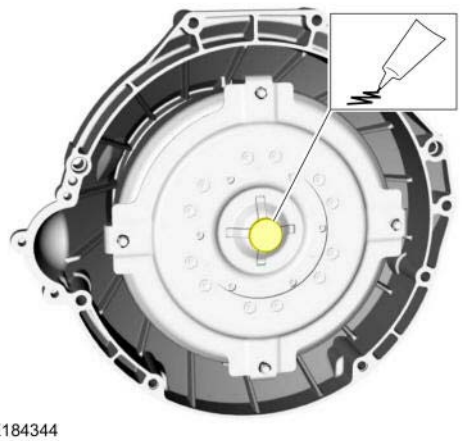
6-Speed Automatic Transmission - 6R80

NOTE: Prior to installation of the engine, the torque converter pilot hub must be lubricated with multi-purpose grease or damage to the torque converter or the engine crankshaft can occur.

1.
Lubricate the torque converter pilot hub with multi-purpose grease.

Material

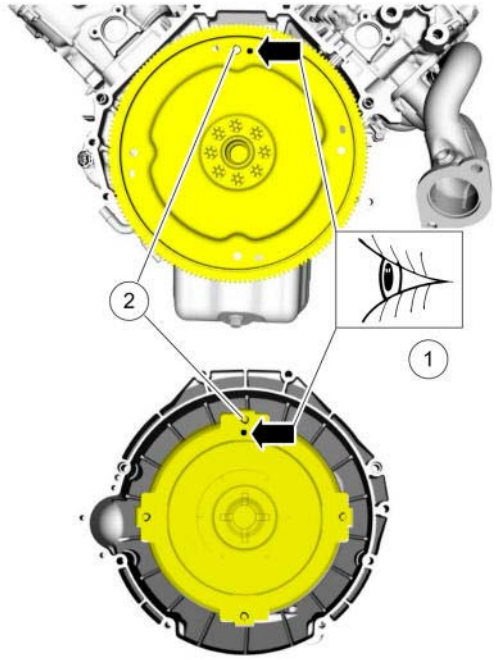
: Motorcraft® Multi-Purpose Grease Spray / XL-5-A (ESB-M1C93-B)



2.

Inspect the torque converter stud and flexplate for paint marks.

Align the torque converter stud and flexplate hole near the paint marks to the 12 o'clock position.



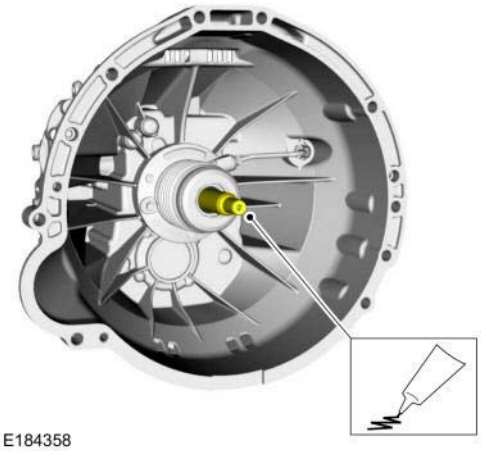
6-Speed Manual Transmission - MT82

3.

Lubricate the input shaft with multi-purpose grease.

Material

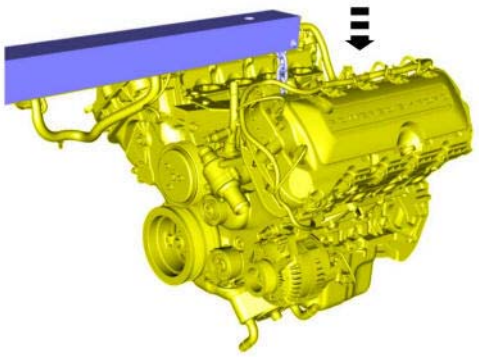
: Motorcraft® Multi-Purpose Grease Spray / XL-5-A (ESB-M1C93-B)



4.

With the aid of an assistant, use the Floor Crane to install the engine into the vehicle.

Use the General Equipment: Floor Crane


E184346

5.

1.

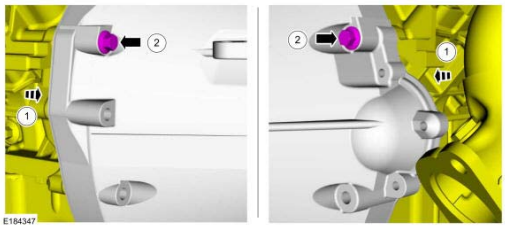
Align the engine to the transmission.

2.

Draw the engine and transmission together using the bolts.

Torque

: 35 lb.ft (48 Nm)


E184347

NOTE: Do not position the legs of the Engine Support Bar on the fenders. Instead, the legs should be positioned on the body structure. Failure to follow these instructions may result in body damage.

6.

1.

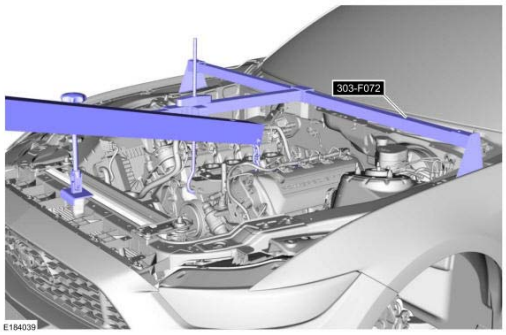
Install the special tools.

Use Special Service Tool: 303-F072 Support Bar, Engine.

2.

Once the engine is supported by the Engine Support Bar, remove the Floor Crane.

Use the General Equipment: Floor Crane

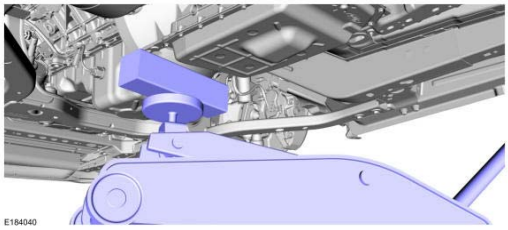


7.

Remove the jack and wooden block.

Use the General Equipment: Wooden Block

Use the General Equipment: Trolley Jack

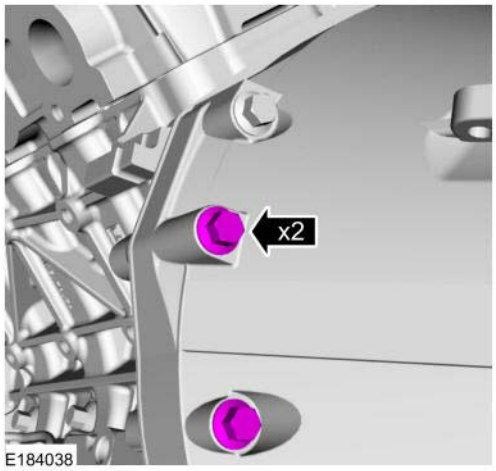


8.

Install LH transmission-to-engine bolts.

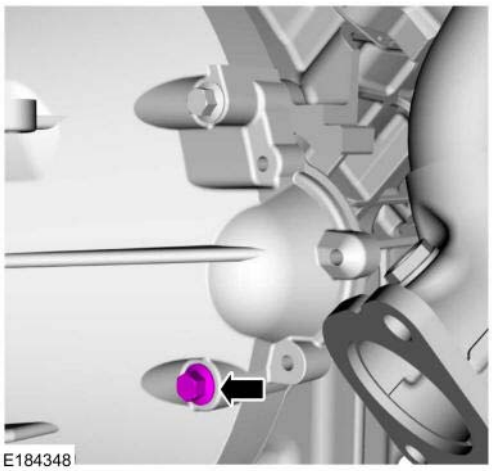
Torque

: 35 lb.ft (48 Nm)



9.

Install the RH transmission-to-engine bolt.

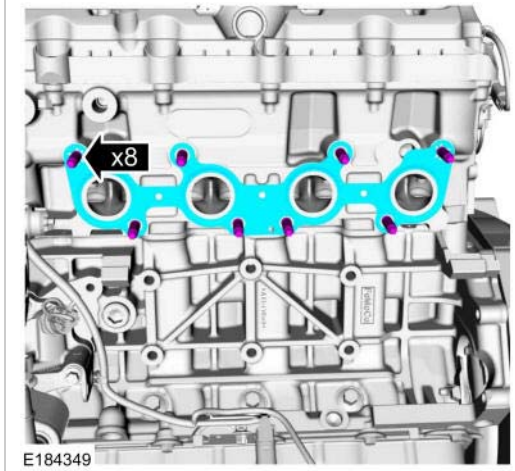


10.

Install new studs and new gasket.

Torque

: 18 lb.ft (25 Nm)



11.

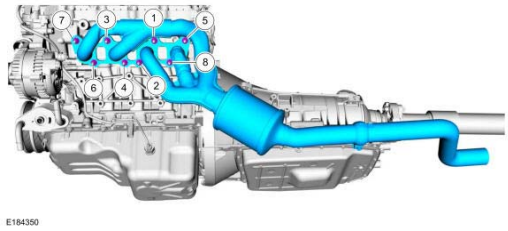
Install the LH catalytic converter.

Install the new nuts.

Torque:

Stage 1: 18 lb.ft (24 Nm)

Stage 2: 24 lb.ft (32 Nm)

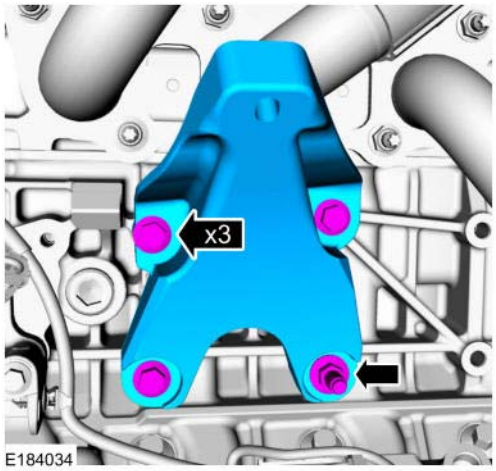


12.

Install the LH engine mount bracket, bolts and stud bolt.

Torque

: 41 lb.ft (55 Nm)

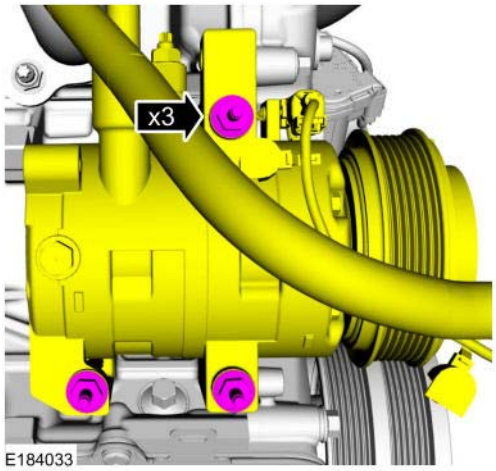


13.

Install the A/C compressor and the stud bolts.

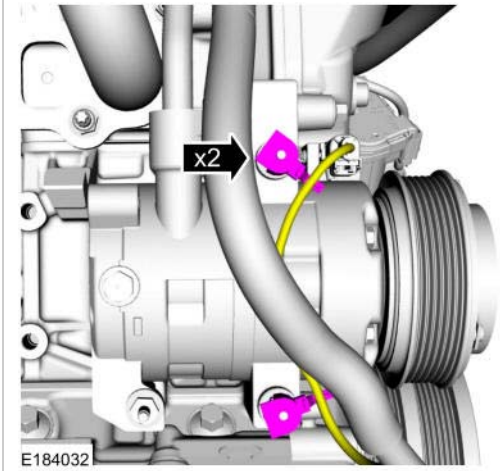
Torque

: 18 lb.ft (25 Nm)



14.

Attach the wiring harness retainers to the A/C compressor stud bolts.

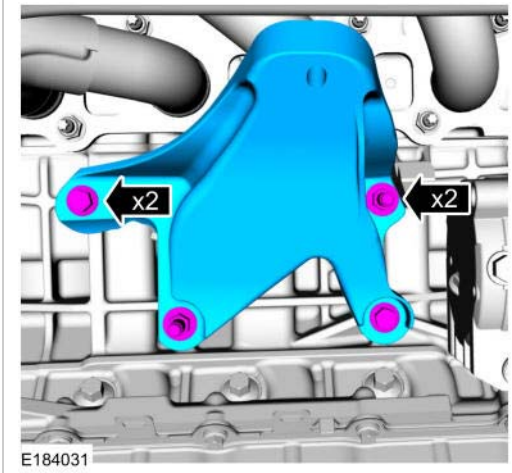


15.

Install the RH engine mount bracket, bolts and stud bolts.

Torque

: 41 lb.ft (55 Nm)

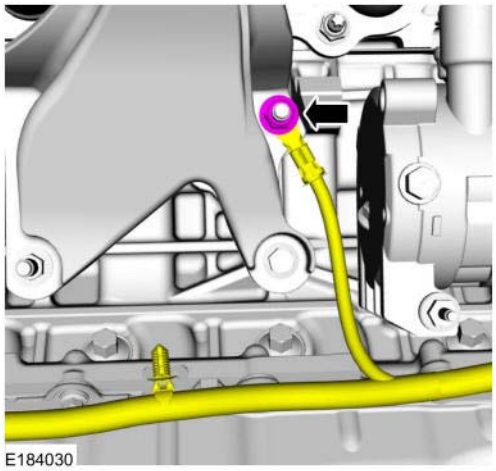


16.

Install the ground strap and nut onto the RH engine mount bracket stud bolt.

Torque

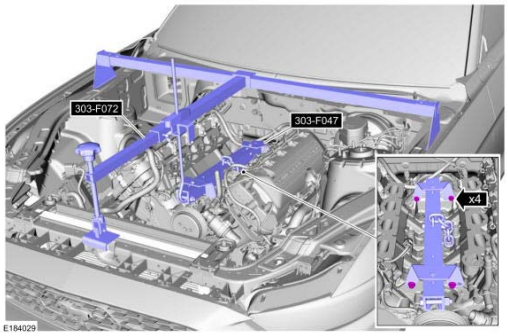
: 35 lb.ft (48 Nm)



17.

Lower the engine onto the engine mounts and remove the special tools

Use Special Service Tool: 303-F072 Support Bar, Engine, 303-F047 Lifting Bracket, Engine.

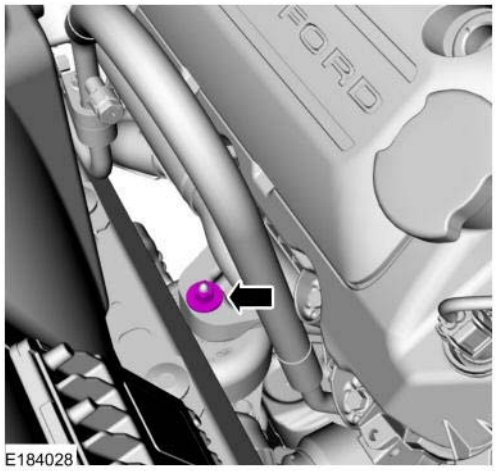


18.

Install the RH engine mount nut.

Torque

: 46 lb.ft (63 Nm)

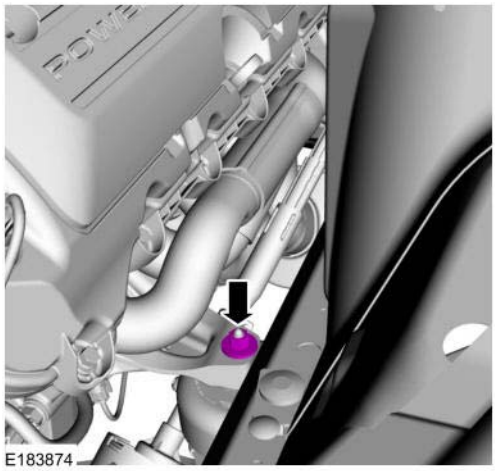


19.

Install the LH engine mount nut.

Torque

: 46 lb.ft (63 Nm)

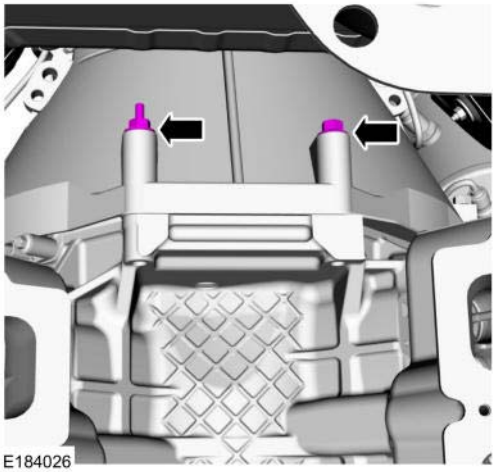


20.

Install the top transmission-to-engine bolt and stud bolt.

Torque

: 35 lb.ft (48 Nm)



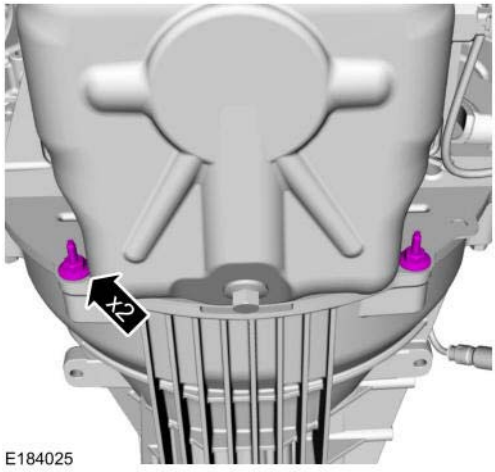
6-Speed Manual Transmission - MT82

21.

Install the engine rear cover plate stud bolts.

Torque

: 35 lb.ft (48 Nm)



6-Speed Automatic Transmission - 6R80

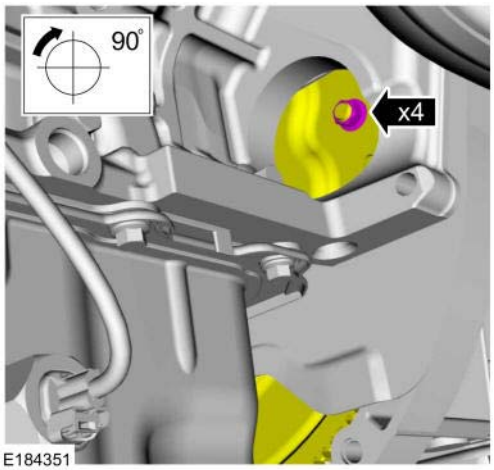
NOTE: Only rotate the crankshaft in a clockwise direction.

22.
Install the new torque converter nuts.

Use the General Equipment: Magnetic Socket

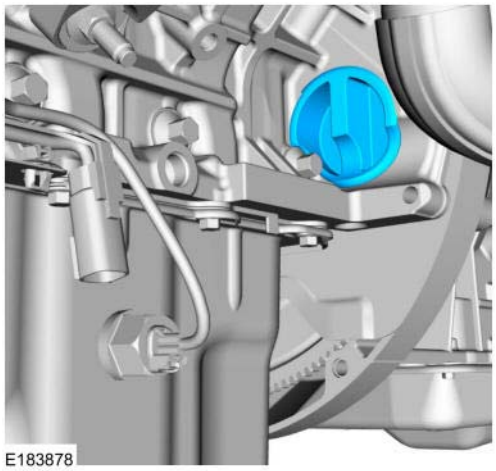
Torque

: 35 lb.ft (48 Nm)



23.

Install the rubber access plug.

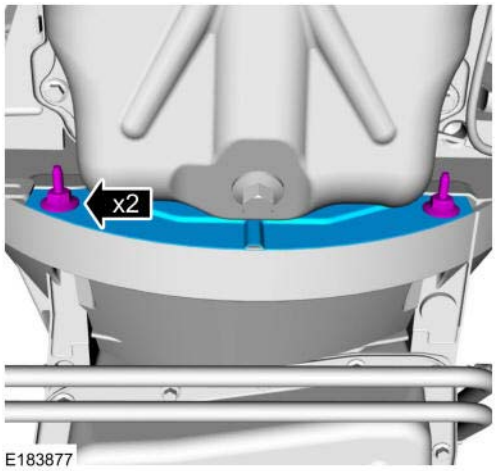


24.

Install the flexplate inspection cover and the stud bolts.

Torque

: 35 lb.ft (48 Nm)

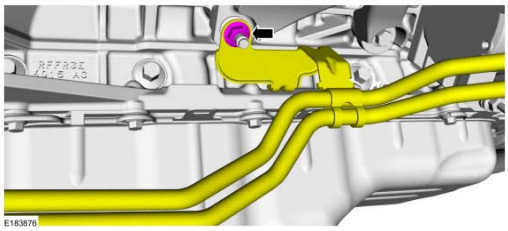


25.

Install the transmission cooling tube bracket and nut.

Torque

: 35 lb.ft (48 Nm)

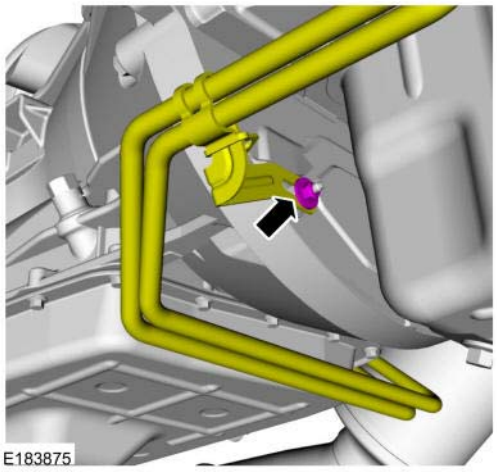


26.

Install the transmission cooling tube bracket and nut.

Torque

: 124 lb.in (14 Nm)

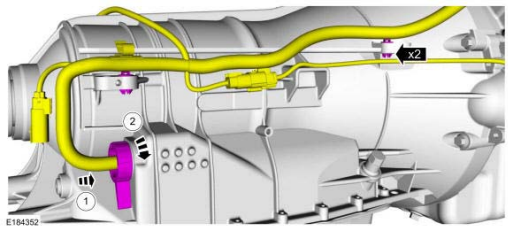


27.

Push the transmission electrical connector in to connect.

Rotate the transmission electrical connector.

Position the wiring harness and attach the retainers.



6-Speed Automatic Transmission - 6R80/6-Speed Manual Transmission - MT82

28.

WARNING: DO NOT hammer, pry or force steering column and column shafts during installation or removal. Failure to follow this instruction may cause damage to steering components that could lead to loss of steering control during vehicle operation and could result in serious personal injury or death.

WARNING: DO NOT attempt to remove or install the steering column lower u-joint at the steering gear without first loosening the steering column dash seal and fasteners. Failure to follow this instruction may cause damage to steering components that could lead to loss of steering control during vehicle operation and could result in serious personal injury or death.

1.

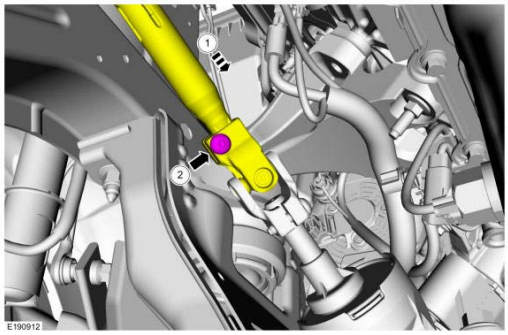
Connect the steering column shaft to the steering gear universal joint.

2.

Install the new steering column shaft bolt.

Torque

: 22 lb.ft (30 Nm)

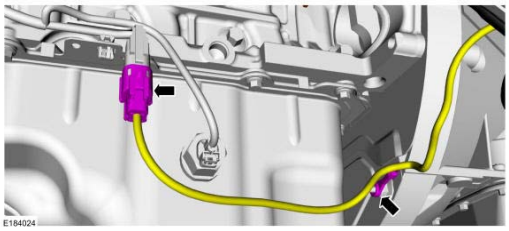


29.

Inspect the steering column lower shaft. Refer to: Steering Column Collapsed Check .

30.

Connect the LH HO2S electrical connector and wiring harness retainer.



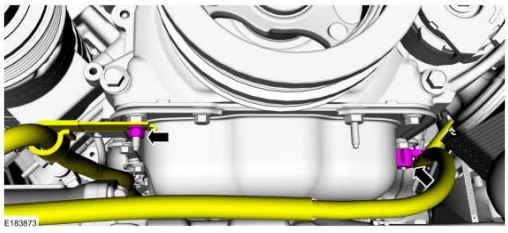
31.

Attach the wiring harness retainer to the oil pan stud bolt.

Install the wiring harness retainer and the nut.

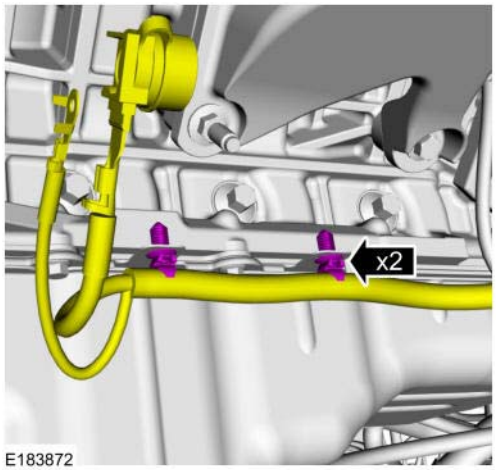
Torque

: 124 lb.in (14 Nm)



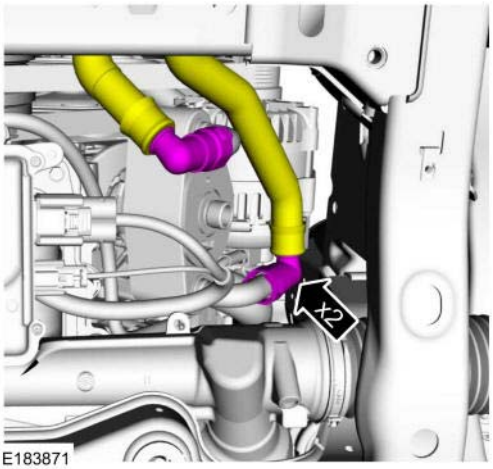
32.

Attach the wiring harness retainers to the oil pan.



33.

Connect the oil cooler hoses.



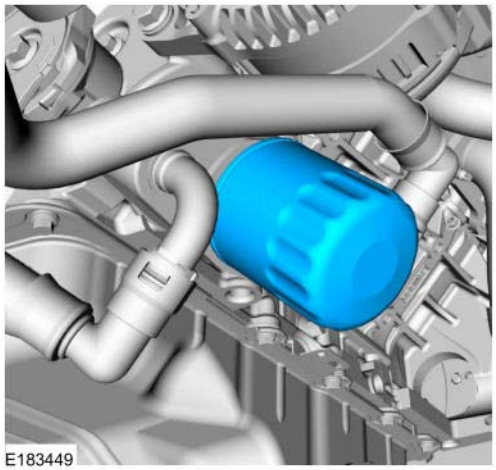
NOTE: Do not lubricate the O-ring seal.

34.
Install a new oil filter.

Torque:

Stage 1: 44 lb.in (5 Nm)

Stage 2: 180°



NOTE: Vehicles are equipped with either an underbody shield or a subframe bracket and underbody shield assembly.

35.

1.

Install the underbody shield and the bolts.

Torque:

A: 97 lb.in (11 Nm)

B: 18 lb.in (2 Nm)

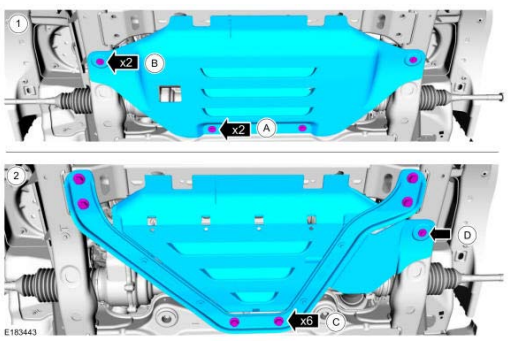
2.

Install the subframe bracket and underbody shield assembly and the bolts.

Torque:

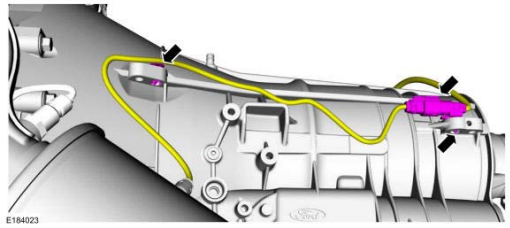
C: 46 lb.ft (63 Nm)

D: 18 lb.in (2 Nm)



NOTE: Automatic transmission shown in illustration, manual transmission similar.

36.
Connect the LH catalyst monitor sensor electrical connector and attach the wiring harness retainers.



37.

Install the following items:

Refer to: STARTER MOTOR .

Refer to: CATALYTIC CONVERTER RH .

38.

Attach the wiring harness retainer.

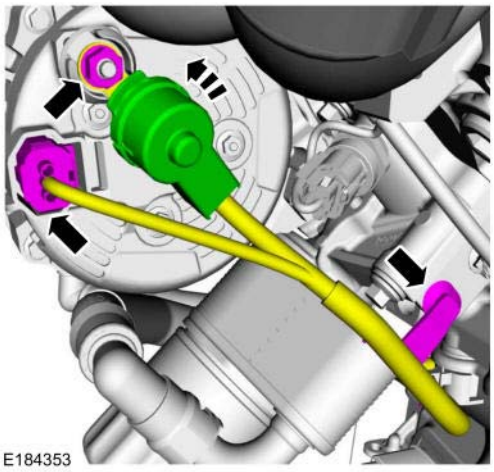
Connect the wiring harness electrical connector.

Connect the B+ cable and install the nut.

Torque

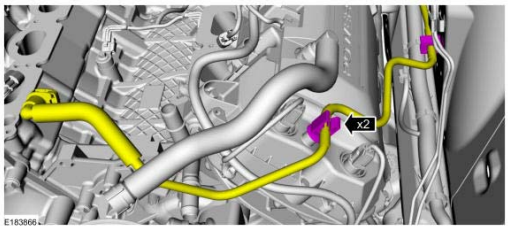
: 159 lb.in (18 Nm)

Position the cover.



39.

Attach the EVAP tube to the LH valve cover and the LH inner fender.

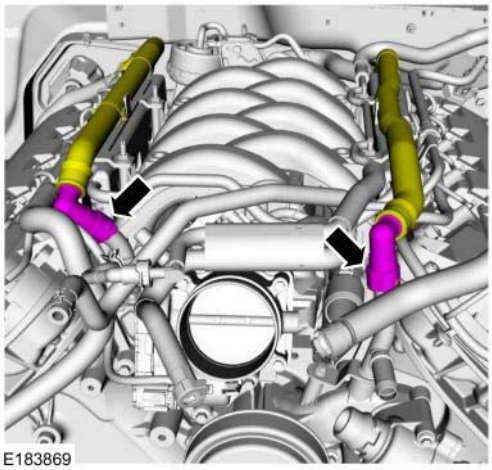


40.

Install the intake manifold. Refer to: Intake Manifold .

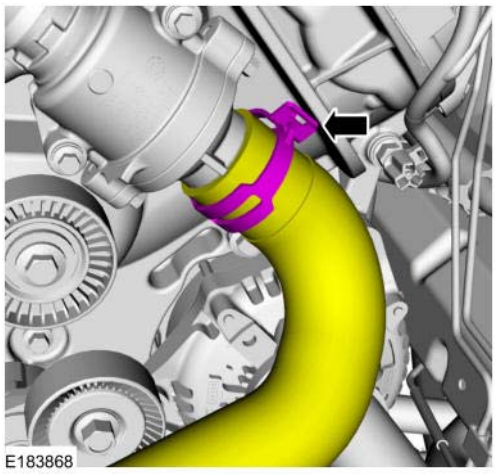
41.

Connect the heater hose quick connect couplings.



42.

Connect the lower radiator hose to the thermostat housing assembly.



43.

1.

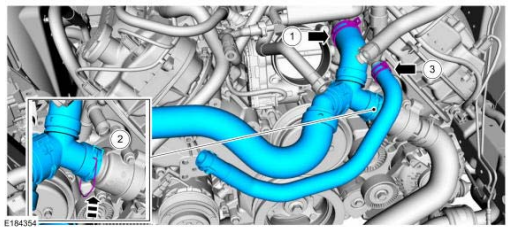
Install the coolant bypass T assembly and clamp onto the engine.

2.

Slide the spring clip until it hits the stop on the hose fitting.

3.

Install the degas bottle hose and clamp.



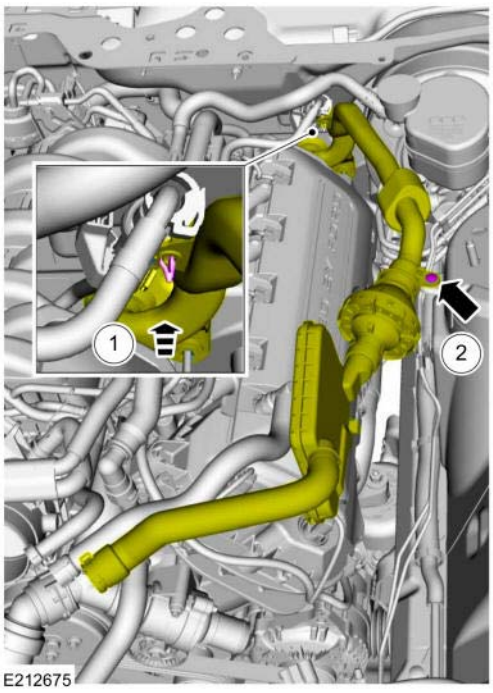
44.

1.

Position the sound enhancement pipe onto the retainer.

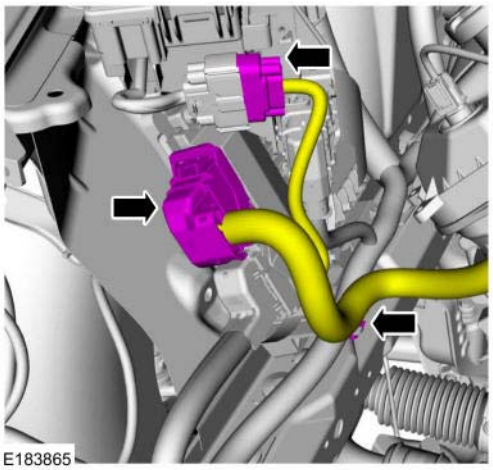
2.

Install the pin-type retainer.



45.

Connect the top PCM electrical connector, the 16 pin electrical connector and attach the wiring harness retainers to the PCM bracket.

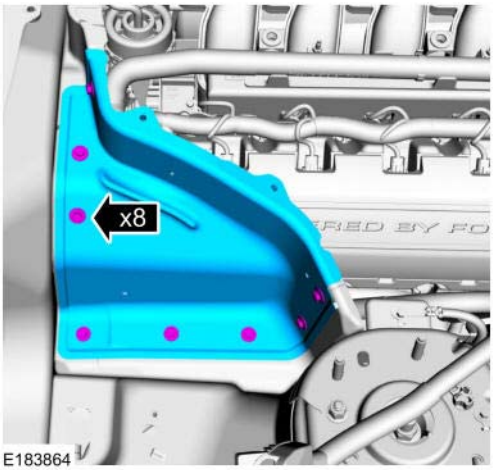


46.

Install the battery heat shield and fasteners.

Torque

: 80 lb.in (9 Nm)

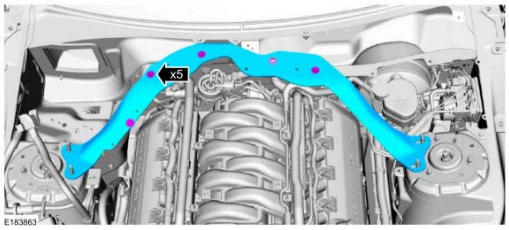


47.

Install the cowl extension and fasteners.

Torque

: 26 lb.ft (35 Nm)



48.

Install the following items:

Refer to: Cowl Panel Grille .

Refer to: Battery Tray .

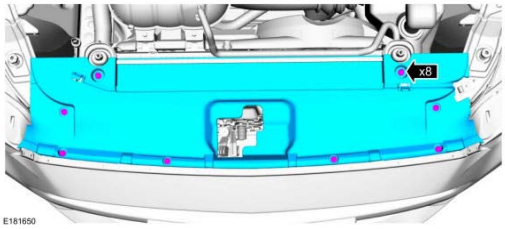
Refer to: AIR CONDITIONING (A C) COMPRESSOR BELT .

Refer to: COOLING FAN MOTOR AND SHROUD .

Refer to: DEGAS BOTTLE .

49.

Install the radiator top shield and the retainers.



50.

Install the following items:

Refer to: AIR CLEANER - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS).

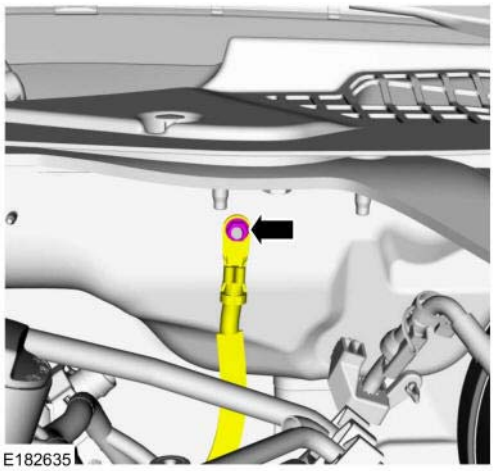
Refer to: AIR CLEANER OUTLET PIPE .

51.

Install the engine ground wire and nut.

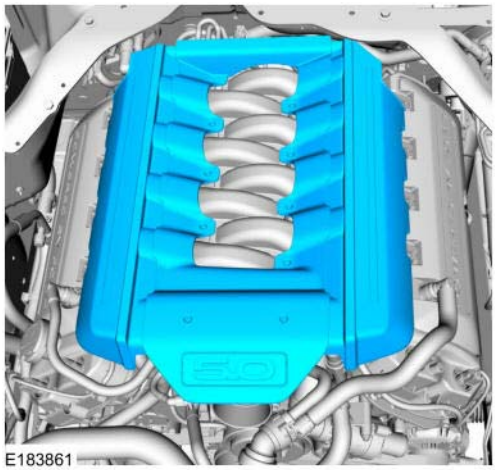
Torque

: 80 lb.in (9 Nm)



NOTE: The engine appearance cover rubber grommets may remain on the cover. If so, remove the grommets from the cover and install them on the intake manifold before installing the cover.

52.
Install the engine appearance cover.



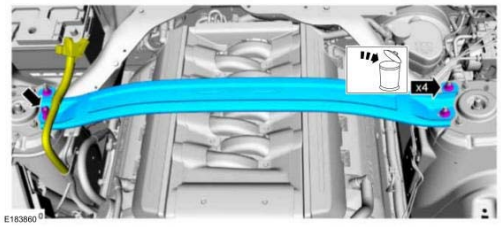
53.

If equipped, install the strut tower cross brace and nuts.

Torque

: 41 lb.ft (55 Nm)

Attach the wiring harness retainer.



NOTE: Use the index-mark for location to aid in hood installation.

54.
Install the hood and the nuts.

Torque

: 62 lb.in (7 Nm)



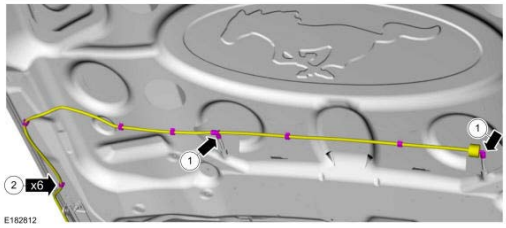
55.

1.

Connect the windshield washer hose C-Lock Couplers.

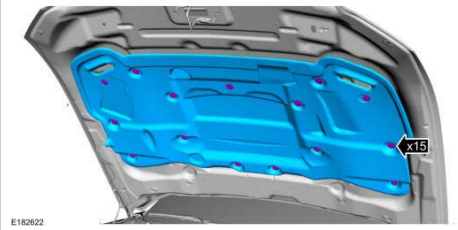
2.

Attach the windshield washer hose retainers.



56.

Install the hood insulation and the pin-type retainers.



57.

1.

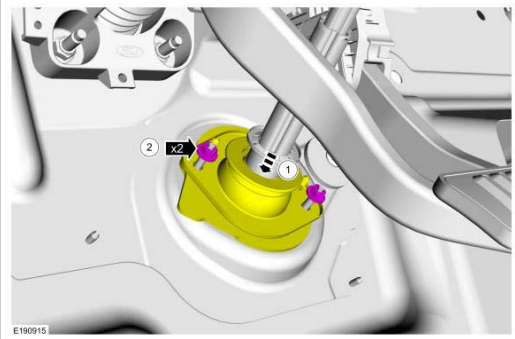
Position the steering column dash seal.

2.

Tighten the steering column dash seal nuts.

Torque

: 80 lb.in (9 Nm)

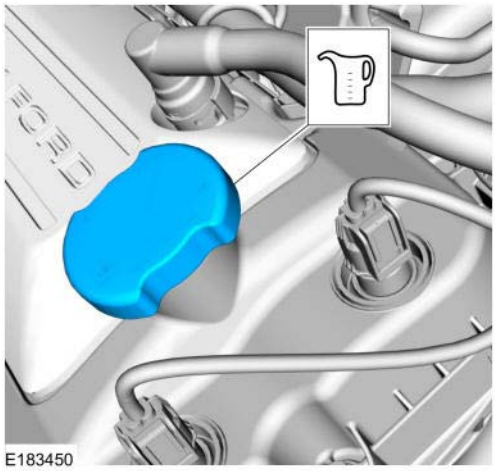


58.

Fill the engine with clean engine oil. Refer to: Specifications .

Material

: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W20-QSP (U.S.) (WSS-M2C945-A)



59.

Connect the battery ground and positive cables. Refer to: Battery Disconnect and Connect .

60.

Fill and bleed the engine cooling system. Refer to: COOLING SYSTEM DRAINING AND VACUUM FILLING .

61.

After completing the repairs, perform the Misfire Monitor Neutral Profile Correction procedure using a diagnostic scan tool.

SPECIFICATIONS > SPECIFICATIONS

Materials

Name	Specification
Motorcraft® Orange Prediluted Antifreeze/Coolant (U.S.) VC-3DIL-B (U.S.)	WSS-M97B44-D2
Motorcraft® Orange Concentrated Antifreeze/Coolant (U.S.) VC-3-B (U.S.)	WSS-M97B44-D

Materials

Material: Motorcraft® Orange Concentrated Antifreeze/Coolant (U.S.) / VC-3-B (U.S.) (WSS-M97B44-D)
Material: Motorcraft® Orange Prediluted Antifreeze/Coolant (U.S.) / VC-3DIL-B (U.S.) (WSS-M97B44-D2)

Cooling System Capacities

Description	Specification
Base engine with oil cooler	9.47 qt (8.96 L)

Cooling System Pressure

Complete cooling system maximum pressure	145 kPa (21 psi)
Pressure relief cap	145 kPa (21 psi)
Radiator pressure test (removed from the vehicle)	138 kPa (20 psi)

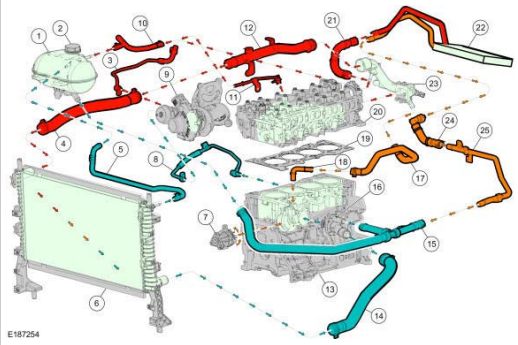
Thermostat Opening Temperatures

Starts to open	80°C-84°C (176°F-183.2°F)
Fully open	97°C (206.6°F)

DESCRIPTION AND OPERATION > ENGINE COOLING - COMPONENT LOCATION

NOTE: Coolant temperature will vary with ambient temperature and load. Temperatures

shown are for ambient temperature of 38°C (100°F). Red arrows indicate a temperature over 90°C (194°F), Orange arrows indicate a temperature of approximately 90°C (194°F), Blue arrows indicate a temperature below 90°C (194°F).



Item	Description
1	Degas bottle
2	Pressure relief cap
3	Turbocharger outlet tube
4	Upper radiator hose
5	Radiator-to-degas bottle hose
6	Radiator
7	Coolant pump
8	Turbocharger inlet tube
9	Turbocharger
10	Engine vent hose
11	Coolant outlet tube
12	Coolant outlet connector
13	Engine block
14	Lower radiator hose
15	Coolant return hose
16	Thermostat housing
17	Coolant bypass hose
18	Coolant bypass connector
19	Cylinder head gasket
20	Cylinder head
21	Heater core inlet hose
22	Heater core

23	Coolant outlet connector adapter assembly
24	Heater core outlet hose
25	Heater core outlet tube

DESCRIPTION AND OPERATION > ENGINE COOLING - SYSTEM OPERATION AND COMPONENT DESCRIPTION

Engine coolant flows primarily from the engine to the radiator circuit and back to the coolant pump. Coolant is sent from the coolant pump through the engine block and cylinder head. A separate circuit from the engine also feeds the heater core and turbocharger with coolant. The coolant pump, operated by engine rotation through the accessory drive belt, circulates the coolant. The coolant thermostat is a control valve actuated by coolant temperature. When the thermostat is closed, coolant flow bypasses the radiator circuit and returns to the coolant pump. When the thermostat is opened, coolant flows through the radiator circuit to transfer engine-generated heat to the outside air.

The engine uses a cold side thermostat. This means the thermostat is located at the lower radiator hose connection to the engine, where coolant enters the engine after being cooled by the radiator. During initial warm-up, the cooler coolant from the radiator quickly closes the thermostat after the warm coolant in the engine opens the thermostat slightly. The thermostat opens and closes several times before the coolant coming from the radiator is warm enough to allow the thermostat to remain open. The engine must run much longer than a vehicle with a hot side thermostat before the thermostat remains fully opened.

The degas bottle holds surplus coolant and removes air from the cooling system. It also allows for coolant expansion and system pressurization, replenishes coolant to the cooling system and serves as the location for service fill.

The thermostat monitor is a function of the PCM and is designed to verify correct thermostat operation. The monitor executes once per drive cycle and has a monitor run duration of 300-800 seconds. If a malfunction occurs, DTC P0125 or P0128 sets, and the MIL illuminates.

Fail Safe Cooling

A strategy called Fail Safe Cooling is built into the PCM that will control the engine if it starts to overheat.

Fail Safe Cooling has two modes: A 'Closed Loop' mode that relies on CHT sensor and an 'Open Loop' mode that relies on ECT sensor. When the engine starts to overheat, the decision to go into closed loop or open loop mode is made based on sensor availability and sensor failures. Closed loop mode takes priority over open loop. The reason is that a good CHT sensor is able to reliably track engine block temperature at all times, while the ECT sensor will fail to do so when the engine coolant is dumped.

Closed Loop Mode

Stage 1 of the strategy commences if the engine starts to overheat. The CHT sensor transmits a signal to the PCM, which moves the temperature gauge pointer into the red zone.

If the engine is not switched off and the temperature continues to rise, the Powertrain Check Lamp is illuminated. This indicates to the driver that the engine is approaching critical limits and should be stopped. At this point DTC P1285 is set in the PCM which can be retrieved using a scan tool.

Stage 2 of the strategy commences if the lamp and temperature gauge are ignored by the driver. The

PCM will start to control the engine by cutting out 2 cylinders and restricting load. The RPM will be limited below 3, 000 RPM initially then will slowly be ramped down with time to as low as 800 RPM. Simultaneously the MIL illuminates. This indicates that long term engine damage can occur and vehicle emissions will be affected. At this point DTC P1299 is set in the PCM which can be retrieved using a scan tool.

Air is drawn into the deactivated cylinders. This helps to control the temperature of the engine internal components. The deactivated cylinders are alternated to allow even cooling of all the cylinders.

> *NOTE: If the driver is using a high percentage of throttle travel (for example, an overtaking maneuver) when the PCM starts engine deactivation (Stage 2), the deactivation will be delayed for 10 seconds.*

> *NOTE: After 2-cylinder operation has begun, the engine will not revert to 4-cylinder operation, even if the temperature should fall, until the ignition is switched off and then on again.*

> *NOTE: The MIL can only be extinguished by using a scan tool after the fault has been rectified and the DTC cleared.*

Stage 3 of the strategy will commence if the engine temperature continues to rise. This results in the engine being totally disabled before major engine damage or seizure occurs. The Powertrain Check Lamp will begin to flash, indicating to the driver that the engine will be switched off after 30 seconds. This allows the driver time to choose a suitable parking place.

Open Loop Mode

This mode is entered when the ECT sensor indicates a high engine temperature that is rising at a dangerously high rate, much faster than expected based on current engine running conditions. This mode can also be entered when all sensors used in Fail Safe Cooling determination are failed.

When this mode is activated, the PCM will restrict load, and restrict engine speed to below 3000 RPM, then start ramping engine speed down slowly to as low as 800 RPM and hold the speed there.

At the same time, the PCM will also move the temperature gauge pointer into the red zone and the P1285 code is set.

If the engine is not switched off after a short period of time, the engine will be totally disabled before major engine damage or seizure occurs, The Powertrain Check Lamp will begin the flash, indicating to the driver that the engine will be switched off. The P1299 Code is set.

If the driver decides to restart the vehicle, it will be restarted but with the P1299 still set the engine speed is limited to 800 RPM. This mode can only be reset by clearing the DTC using a diagnostic scan tool.

DIAGNOSIS AND TESTING > ENGINE COOLING

Materials

Name	Specification
Motorcraft® Orange Antifreeze/Coolant Prediluted (U.S.) VC-3DIL-B (U.S.)	WSS-M97B44-D2
Motorcraft® Orange Antifreeze/Coolant Concentrated (U.S.) VC-3-B (U.S.)	WSS-M97B44-D

Special Tool(s)

 E144764	3-Way HD Antifreeze Coolant Test Kit 328-2050-62291 or equivalent
 E144765	Coolant/Battery Refractometer 300-ROB75240 or equivalent
 E144766	Radiator Tester 014-R1072 or equivalent
 E145674	UView® Combustion Leak Tester UVU560000-R

Material : Motorcraft® Orange Antifreeze/Coolant Concentrated (U.S.) / VC-3-B (U.S.) (WSS-M97B44-D)
Material : Motorcraft® Orange Antifreeze/Coolant Prediluted (U.S.) / VC-3DIL-B (U.S.) (WSS-M97B44-D2)

DIAGNOSIS AND TESTING > ENGINE COOLING > DTC CHART

WARNING: Before beginning any service procedure in this service information, refer to Safety Warnings in GENERAL INFORMATION . Failure to follow this instruction may result in

serious personal injury.

REFER to: Engine Cooling System Health and Safety Precautions .

Diagnostics in this service information assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

PCM DTC Chart

DTC	Description	Action
P0125	Insufficient Coolant Temp For Closed Loop Fuel Control	GO to Pinpoint Test C
P0128	Coolant Thermostat (Coolant Temp Below Thermostat Regulating Temperature)	GO to Pinpoint Test C
P0217	Engine Coolant Overtemperature Condition	GO to Pinpoint Test B
P0480	Fan 1 Control Circuit	Refer to ENGINE CONTROLS - INTRODUCTION (EXCEPT DIESEL & HYBRID) .
P0481	Fan 2 Control Circuit	Refer to ENGINE CONTROLS - INTRODUCTION (EXCEPT DIESEL & HYBRID) .
P1285	Cylinder Head Overtemperature Condition	Refer to ENGINE CONTROLS - INTRODUCTION (EXCEPT DIESEL & HYBRID) .
P1299	Cylinder Head Overtemperature Protection Active	GO to Pinpoint Test B
All Other PCM Diagnostic Trouble Codes (DTCs)	-	REFER to: ELECTRONIC ENGINE CONTROLS - 2.3L ECOBOOST (231KW/314PS).

DIAGNOSIS AND TESTING > ENGINE COOLING > INSPECTION AND VERIFICATION

NOTE: The engine cooling system is filled with Motorcraft® Orange Antifreeze/Coolant. Always fill the cooling system with the manufacturer's specified coolant. Chemically flush the cooling system if a non-specified coolant has been used. Failure to follow these instructions may damage the engine or cooling system.

NOTE: During normal vehicle operation, Motorcraft Orange Antifreeze/Coolant may change color from orange to pink or light red. As long as the engine coolant is clear and uncontaminated, this color change does not indicate the engine coolant has degraded nor

does it require the engine coolant to be drained, the system to be flushed, or the engine coolant to be replaced.

1.

Verify the customer concern.

2.

Visually check the engine coolant level at the degas bottle when the system is cold.

3.

Make sure the pressure relief cap is installed correctly.

4.

Record any cooling system Diagnostic Trouble Codes (DTCs) retrieved. Refer to the PCM DTC chart in DTC Chart for DTC descriptions.

NOTE: Take note of any coolant odor or steam coming from cooling system components.

5.
If the system coolant is filled correctly and no Diagnostic Trouble Codes (DTCs) associated with fail-safe cooling are retrieved, verify the customer concern by operating the engine to duplicate the condition.

6.

Visually inspect for obvious signs of any mechanical or electrical damage.

Visual Inspection Chart

Mechanical	Electrical
Leaks or weeps at: Hoses Tubes Clamp joints Gaskets O-rings Thermostat housing Radiator Pressure relief cap Coolant pump Heater core (wet floor or coolant odor in vehicle) Degas bottle Cylinder block core plugs Cylinder head core plugs Block heater (if equipped)	Inoperative or damaged: Electric cooling fan Wiring, connectors, relays or modules CHT sensor ECT sensor

Cracked or damaged: Hoses Tubes Hose clamps Thermostat housing Radiator Pressure relief cap Cooling fan Coolant pump Degas bottle Cylinder block core plugs Cylinder head core plugs Block heater (if equipped) Restricted airflow through the A/C condenser/radiator Drive belt loose, worn or installed incorrectly Broken or weak drive belt tensioner Excessive white or light gray exhaust smoke (may have burnt coolant odor) Coolant in engine oil Engine oil in coolant	

7.

If the inspection reveals an obvious concern that can be readily identified, repair it as necessary.

8.

Inspect the coolant condition.

1.

Inspect the coolant color.

Discoloration may indicate that incorrect coolant may have been added to the system. Use of incorrect (green or yellow in color) coolant degrades the corrosion protection of Motorcraft® Orange Antifreeze/Coolant. Addition of Motorcraft® Specialty Green Engine Coolant may cause the color to appear to be a murky green-brown color. The addition of Motorcraft® Gold Antifreeze/Coolant, however, may not change the color or appearance of the orange-colored coolant. Detection of contamination with Motorcraft® Gold Antifreeze/Coolant is determined by the presence of nitrite. If contamination with Motorcraft® Gold Antifreeze/Coolant is suspected, test the coolant with the 3-Way HD Antifreeze Coolant Test Kit. Follow the nitrite testing directions in the kit to determine if nitrite is present in the system. If nitrite is present, flush the system and refill with the correct mixture of distilled water and Orange Antifreeze/Coolant Concentrated. REFER to: Cooling System Draining and Vacuum Filling .

A darker orange with the presence of debris could indicate a commercially available stop leak may have been used and could result in loss of coolant flow to critical parts of the engine. If sediment is present, flush the system and refill with the correct mixture of distilled water and Orange Antifreeze/Coolant Concentrated. REFER to: Cooling System Draining and Vacuum Filling .

A light or reddish brown color indicates that rust may be present in the cooling system.

Flush the system and refill with the correct mixture of distilled water and Orange Antifreeze/Coolant Concentrated. REFER to: Cooling System Draining and Vacuum Filling .

An iridescent sheen on top of the coolant could indicate a trace of oil is entering the system. For engine diagnosis, REFER to: appropriate Engine article. Flush the system and refill with the correct mixture of distilled water and Orange Antifreeze/Coolant Concentrated. REFER to: Cooling System Draining and Vacuum Filling .

A milky brown color may indicate that engine oil is entering the cooling system. Pressure test the cooling system. Refer to Component Tests . If engine oil is suspected, the cause of the leak may be internal to the engine. For engine diagnosis, REFER to: appropriate Engine article. Flush the system and refill with the correct mixture of distilled water and Orange Antifreeze/Coolant Concentrated. REFER to: Cooling System Draining and Vacuum Filling .

2.

If the engine coolant appearance is acceptable, test the engine coolant freezing point range with the Coolant/Battery Refractometer. Maintain the coolant concentration within 48% to 50%, which equates to a freeze point between -34°C and -37°C (-30°F and -34°F). If the vehicle is driven in cold climates less than -37°C (-34°F), it may be necessary to increase the coolant concentration to get adequate freeze protection. Recommended coolant concentration is 48/52 to 50/50 (freeze protection -34°C to -37°C [-30°F to -34°F]) engine coolant to distilled water.

Maximum coolant concentration is 60/40 for cold weather areas.

Minimum coolant concentration is 40/60 for warm weather areas.

3.

Adjust coolant range and level if necessary:

If coolant is low, add specified coolant mixture only.

If the engine coolant tests too weak, remove some of the engine coolant and add Motorcraft® Orange Antifreeze/Coolant Concentrated until the readings are within acceptable levels.

If the engine coolant tests strong, remove some of the engine coolant and add distilled water until the readings are within acceptable levels.

9.

If an obvious cause for an observed or reported concern is found, correct the cause and test the system for normal operation before proceeding to the next step.

DIAGNOSIS AND TESTING > ENGINE COOLING > SYMPTOM CHART

Diagnostics in this service information assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

Condition	Possible Sources	Actions
Loss of coolant	Refer to the Pinpoint Test	GO to Pinpoint Test A
The engine overheats.	Refer to the Pinpoint Test	GO to Pinpoint Test B
The engine does not reach normal operating temperature.	Refer to the Pinpoint Test	GO to Pinpoint Test C
The block heater does not operate correctly.	Block heater power cable Block heater	CHECK continuity in all 3 power cable circuits. If any circuit measures more than 5 ohms, INSTALL a new power cable. CHECK the resistance of the block heater. If the resistance does not measure between 30 and 40 ohms, INSTALL a new block heater. REFER to: Block Heater .
The electric cooling fan is inoperative in one or more speeds or does not operate correctly.	Wiring Relays Fuses Cooling fan motor Cooling fan resistor	Refer to ENGINE CONTROLS - INTRODUCTION (EXCEPT DIESEL & HYBRID) .
The electric cooling fan stays on all the time.	Wiring Relays	Refer to ENGINE CONTROLS - INTRODUCTION (EXCEPT DIESEL & HYBRID) .
Noisy electric cooling fan operation.	Foreign material contamination Fan motor	REMOVE the foreign material from the cooling fan and shroud. TEST the system for normal operation. If still noisy, INSTALL a new cooling fan assembly. REFER to: Cooling Fan Motor and Shroud .
	Fan blade detached from fan motor	INSTALL a new cooling fan assembly. REFER to: Cooling Fan Motor and Shroud , Removal and Installation).

DIAGNOSIS AND TESTING > ENGINE COOLING > PINPOINT TESTS

Loss of Coolant

Normal operation and Fault Conditions

The engine cooling system is a closed system providing for coolant expansion and contraction as well as changes in pressure as coolant warms and cools with engine operation. Various gaskets, seals, hoses and clamps contain coolant within the cooling system and keep other fluids and contaminants from entering the cooling system.

Possible Sources

- Coolant hoses or tubes
- Hose clamps
- Thermostat O-ring seal or gasket
- Coolant pump O-ring seal or gasket
- Thermostat housing
- Radiator
- Pressure relief cap
- Coolant pump leaking from weep hole
- Heater core
- Engine gaskets (may leak internally or externally)
- Degas bottle
- Cylinder block core plugs
- Cylinder head core plugs
- Block heater (if equipped)

DIAGNOSIS AND TESTING > ENGINE COOLING > PINPOINT TESTS > PINPOINT TEST A : PINPOINT TEST > PINPOINT TEST A : PINPOINT TEST

WARNING: Always allow the engine to cool before opening the cooling system. Do not unscrew the coolant pressure relief cap when the engine is operating or the cooling system is hot. The cooling system is under pressure; steam and hot liquid can come out forcefully when the cap is loosened slightly. Failure to follow these instructions may result in serious personal injury.

A1 CARRY OUT INSPECTION AND VERIFICATION

Carry out Inspection and Verification .

Are any concerns present?

Yes	REPAIR as needed.

No	GO to A2

NOTE: Allow the engine to cool before checking the engine coolant level.

A2 CHECK THE ENGINE COOLANT LEVEL AND PRESSURE TEST THE ENGINE COOLING SYSTEM

Ignition OFF

Visually inspect the engine coolant level at the degas bottle and adjust as necessary. Pressure test the engine cooling system. Refer to Component Tests , Cooling System Pressure Test.

Does the engine cooling system leak externally?

Yes	REPAIR or INSTALL new components.

No	GO to A3

A3 CHECK THE ENGINE COOLANT FOR AN INTERNAL LEAK

Inspect the engine coolant in the degas bottle for signs of engine oil.

Is engine oil evident in the engine coolant?

Yes	REFER to: appropriate Engine article.

No	GO to A4

A4 CHECK THE ENGINE OIL FOR COOLANT

Remove the oil level indicator from the engine.

Is coolant evident in the oil?

Yes	REFER to: appropriate Engine article.

No	GO to A5

NOTE: Use UView® Combustion Leak Tester part number UVU560000-R or equivalent.

A5 CHECK THE COOLING SYSTEM FOR COMBUSTION GASES

Using a cooling system combustion gas leak tester, following the instructions supplied with the tester, check the coolant for combustion gases.

Are combustion gases present?

Yes	REFER to: appropriate Engine article.

No	The cooling system is operational.

DIAGNOSIS AND TESTING > ENGINE COOLING > PINPOINT TESTS > PINPOINT TEST B : PINPOINT TEST

The Engine Overheats

Normal operation and Fault Conditions

The engine cooling system maintains the engine temperature during operation. Correct coolant flow through the engine, radiator and remainder of cooling system passages and components is essential to maintaining a correct engine temperature.

Engine coolant flows primarily from the engine to the radiator circuit and back to the coolant pump. Coolant is sent from the coolant pump through the engine block and cylinder head. A separate circuit from the engine also feeds the heater core with coolant. The coolant pump circulates the coolant. The coolant thermostat is a control valve actuated by coolant temperature. When the thermostat is closed, coolant flow bypasses the radiator circuit and returns to the coolant pump. When the thermostat is opened, coolant flows through the radiator circuit to transfer engine-generated heat to the outside air.

Engine overheating generally occurs when there is a disruption in the ability to control either coolant flow at the correct rate, the inability to transfer heat from the engine through the coolant (including low coolant) or an inability to transfer engine-generated heat to the outside air through the radiator.

Possible Sources

- Low coolant level
- External engine coolant leak
- Airlock in system
- Pressure relief cap installation
- Restricted airflow through A/C condenser/radiator
- Active grill shutter stuck closed
- Internal engine coolant leak
- Turbocharger
- Coolant condition/concentration
- Non-OEM engine enhancement components
- Electric cooling fan
- CHT sensor
- ECT sensor
- Radiator

- Thermostat housing
- Coolant pump
- Coolant flow restriction

Diagnostic Trouble Code (DTC) Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
P0217	Engine Coolant Overtemperature Condition	Sets in the PCM when an engine overheat condition was sensed by the CHT sensor or the ECT sensor.
P1299	Cylinder Head Overtemperature Protection Active	Sets in the PCM when an engine overheat condition was sensed by the CHT sensor or the ECT sensor. A failure mode effects strategy called fail-safe cooling was activated to cool the engine.

DIAGNOSIS AND TESTING > ENGINE COOLING > PINPOINT TESTS > PINPOINT TEST B : PINPOINT TEST > PINPOINT TEST B : PINPOINT TEST

B1 CARRY OUT INSPECTION AND VERIFICATION

Carry out the Inspection and Verification .

Are any concerns present?

Yes	REPAIR as needed.

No	GO to B2

B2 CHECK FOR PCM (POWERTRAIN CONTROL MODULE) DTCS

Ignition ON.

Using a scan tool, perform PCM self-test.

Is DTC P0217 and/or P1299 present?

Yes	GO to B4

No	Actual engine overheating has not been verified. CHECK the engine coolant temperature gauge operation. REFER to: Instrumentation, Message Center and Warning Chimes . If any other PCM DTCs are retrieved, REFER to: ELECTRONIC ENGINE CONTROLS - 2.3L ECOBOOST (231KW/314PS).

B3 CHECK FOR ACTIVE GRILL SHUDDER DTCS

Review the PCM DTCs.

Are any active grill shudder DTCs present?

Yes	REFER to: Active Grille Shutter .

No	GO to B4

NOTE: Verify no vehicle front end damage is present.

Check the radiator or A/C condenser for an external obstruction such as leaves or cardboard and verify all air deflectors are present.

B4 CHECK FOR AN AIRFLOW OBSTRUCTION AND MISSING AIR DEFLECTORS

Is an airflow obstruction present or air deflectors missing?

Yes	REPAIR as necessary.

No	GO to B5

B5 CHECK THE ENGINE COOLANT LEVEL AND PRESSURE TEST THE COOLING SYSTEM

Ignition OFF.

Visually check the engine coolant level in the coolant expansion tank and adjust as necessary. Pressure test the cooling system.

Does the engine cooling system leak externally?

Yes	REPAIR or INSTALL new components.

No	GO to B6

B6 CHECK THE ENGINE COOLANT FOR AN INTERNAL LEAK

Inspect the engine coolant in the coolant expansion tank for signs of engine oil.

Is engine oil evident in the coolant?

Yes	REFER to: appropriate Engine article.

No	GO to B7

B7 CHECK THE ENGINE OIL FOR COOLANT

Remove the oil level indicator from the engine.

Is coolant evident in the oil?

Yes	REFER to: appropriate Engine article.

No	GO to B8

NOTE: Use UView® Combustion Leak Tester part number UVU560000-R or equivalent.

Using a cooling system combustion gas leak tester, following the instructions supplied with the tester, check the coolant for combustion gases.

B8 CHECK THE COOLING SYSTEM FOR COMBUSTION GASES

Are combustion gases present?

Yes	REFER to: appropriate Engine article.

No	GO to B9

B9 CHECK COOLANT CONDITION

Check the coolant for dirt, rust or contamination and check the coolant concentration.

Is the coolant condition OK?

Yes	GO to B10

No	FLUSH the engine cooling system. REFER to: Cooling System Flushing .

B10 CHECK THE ELECTRIC COOLING FAN OPERATION

Start the engine.

Place the climate control function selector in the MAX A/C position and the blower motor switch in the HI position.

Did the electric cooling fan operate?

Yes	GO to B11

No	DIAGNOSE the electric cooling fan operation. Refer to ENGINE CONTROLS - SYMPTOM CHARTS (EXCEPT DIESEL & HYBRID) .

B11 CHECK THE COOLANT PUMP OPERATION

Start the engine.

Allow the engine to run for 30 minutes. Place the climate control function selector in the MAX HEAT position. Feel the heater outlet hose.

Is the heater outlet hose hot?

Yes	GO to B12

No	INSTALL a new coolant pump. REFER to: Coolant Pump .

NOTE: This cooling system uses a cold side thermostat. The coolant in the radiator must reach full operating temperature for the thermostat to remain in an open state.

Start the engine.

Allow the engine to run for 30 minutes. Place the climate control function selector in the MAX HEAT position. Feel the lower radiator hose.

B12 CHECK THE THERMOSTAT OPERATION

Is the lower radiator hose hot?

Yes	CHECK the temperature gauge operation. REFER to: Instrumentation, Message Center and Warning Chimes .

No	GO to B13

B13 VISUALLY INSPECT THE THERMOSTAT

Carry out the Thermostat Visual Inspection in the Component Tests .

Is the thermostat damaged?

Yes	INSTALL a new thermostat housing. REFER to: Thermostat Housing .

No	INSTALL a new thermostat housing. REFER to: Thermostat Housing . If the engine still overheats, INSTALL a new radiator. REFER to: Radiator .

DIAGNOSIS AND TESTING > ENGINE COOLING > PINPOINT TESTS > PINPOINT TEST C : PINPOINT TEST

The Engine Does Not Reach Normal Operating Temperature

Normal operation and Fault Conditions

The engine cooling system maintains engine temperature during operation. Correct coolant flow through the engine, radiator and remainder of cooling system passages and components is essential to maintaining a correct engine temperature.

Engine coolant flows primarily from the engine to the radiator circuit and back to the coolant pump. Coolant is sent from the coolant pump through the engine block and cylinder head. A separate circuit from the engine also feeds the heater core with coolant. The coolant pump circulates the coolant. The coolant thermostat is a control valve actuated by coolant temperature. When the thermostat is closed, coolant flow bypasses the radiator circuit and returns to the coolant pump. When the thermostat is opened, coolant flows through the radiator circuit in order to transfer engine generated heat to the outside air.

Concerns of engine inability to reach normal operating temperature typically occur when the rate of coolant flow through some coolant circuits (radiator, heater core) is more than expected given the conditions. Heat is not allowed to build in the engine because a heat exchanger is removing too much heat, including the radiator, heater core and oil cooler. In addition, perceived concerns that the engine does not reach normal operating temperature can be related to a low coolant level or trapped air which does not allow for hot coolant to be available at the heater core, an inoperative climate control system, or for concerns perceived or related to an incorrect engine temperature gauge indication.

Possible Sources

- Low coolant level
- Thermostat housing
- Temperature gauge
- ECT
- CHT

Diagnostic Trouble Code (DTC) Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
P0125	Insufficient Coolant Temp for Closed Loop Fuel Control	Sets in the PCM when the CHT sensor or the ECT sensor has not achieved the required temperature level to enter closed loop operating conditions within a specified amount of time after starting the engine.
P0128	Coolant Thermostat (Coolant Temp Below Thermostat Regulating Temperature)	Sets in the PCM when the thermostat monitor has not achieved the required engine operating temperature within a specified amount of time after starting the engine.

DIAGNOSIS AND TESTING > ENGINE COOLING > PINPOINT TESTS > PINPOINT TEST C : PINPOINT TEST > PINPOINT TEST C : PINPOINT TEST

WARNING: Always allow the engine to cool before opening the cooling system. Do not unscrew the coolant pressure relief cap when the engine is operating or the cooling system is hot. The cooling system is under pressure; steam and hot liquid can come out forcefully when the cap is loosened slightly. Failure to follow these instructions may result in serious personal injury.

C1 CARRY OUT INSPECTION AND VERIFICATION

Carry out the Inspection and Verification .

Were any concerns found?

Yes	REPAIR as needed.

No	GO to C2

C2 CHECK FOR DTC P0125 OR P0128

Using a scan tool, perform the PCM self-test.

Is DTC P0125 or P0128 present?

Yes	GO to C3

No	The cooling system is operational. If an inoperative temperature gauge is suspected, CHECK the temperature gauge operation. REFER to: Instrumentation, Message Center and Warning Chimes . If an inoperative climate control system is suspected, CHECK the climate control system operation. For Dual Automatic Temperature Control (DATC), REFER to: Climate Control System - Vehicles With: Dual Automatic Temperature Control (DATC) . For Electronic Manual Temperature contro (EMTC), REFER to: Climate Control System - Vehicles With: Electronic Manual Temperature Control (EMTC) . If any other Diagnostic Trouble Codes (DTCs) are retrieved, REFER to: ELECTRONIC ENGINE CONTROLS - 2.3L ECOBOOST (231KW/314PS).

NOTE: Allow the engine to cool before checking the coolant expansion tank.

Visually check the engine coolant level in the coolant expansion tank

C3 CHECK THE COOLANT LEVEL

Is the engine coolant level within specification?

Yes	INSTALL a new thermostat housing. REFER to: Thermostat Housing . CLEAR Diagnostic

	Trouble Codes (DTCs). If the DTC returns check for correct CHT sensor and ECT sensor operation.

No	GO to Pinpoint Test A

DIAGNOSIS AND TESTING > ENGINE COOLING > COMPONENT TESTS

Cooling System Pressure Test

WARNING: Always allow the engine to cool before opening the cooling system. Do not unscrew the coolant pressure relief cap when the engine is operating or the cooling system is hot. The cooling system is under pressure; steam and hot liquid can come out forcefully when the cap is loosened slightly. Failure to follow these instructions may result in serious personal injury.

NOTE: Vehicles have a pressure relief cap on the degas bottle and no radiator cap.

1.

Turn the engine OFF.

2.

Check the engine coolant level and adjust as necessary.

3.

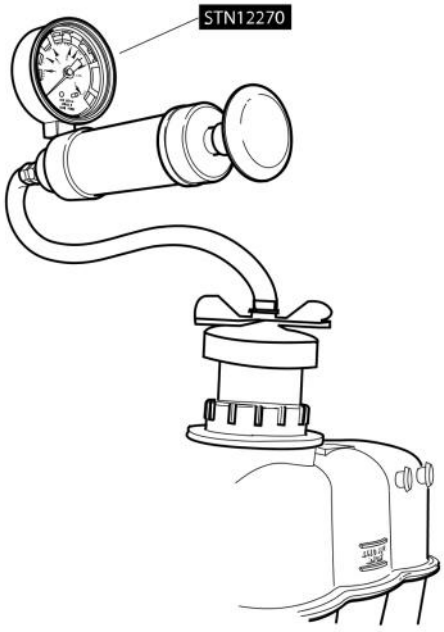
Remove the degas bottle cap. Inspect the degas bottle cap and degas bottle for any issues that would cause improper sealing, such as for cross-threading, burrs, damaged o-ring, etc. If any issues are found, INSTALL a new cap and/or degas bottle.

4.

Attach the Pressure Tester and adaptor (Snap-On TA53 or equivalent), to the degas bottle cap. The cap must hold pressure of 145 kPa +/- 21 kPa (21 PSI +/- 3 PSI). If any issues are found, INSTALL a new cap.

5.

Attach the Pressure Tester and adaptor (Snap-On TA52, AST ASSFZ-47, Redline RDL95-0750 or equivalent) to the degas bottle.



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NOTE: Do not pressurize the cooling system beyond the maximum pressure listed in the SPECIFICATIONS , or cooling system components can be damaged.

NOTE: If the plunger of the pressure tester is pressed too fast, an erroneous pressure reading will result.

6.

To pressurize the engine cooling system, slowly press the plunger of the pressure test pump and increase the pressure to between 124 - 138 kPa (18 - 20 PSI). Observe the gauge reading for approximately 2 minutes. Pressure should not drop during this time. If the pressure drops within this time, inspect for leaks and repair as necessary.

7.

If no leaks are found and the pressure drops, the leak may be internal to the engine. Inspect the coolant for engine oil and the engine oil for coolant. REFER to: appropriate Engine article.

8.

If the pressure does not drop remove the cooling system Pressure Tester and adaptor from degas bottle.

9.

Install the degas bottle cap until it contacts the hard stop.

Thermostat

Install a new thermostat only after at least one of the following tests and checks have been carried out:

- Pinpoint Test B or C
- Thermostat Visual Inspection

Thermostat Visual Inspection

1.

Remove the thermostat housing.

2.

Examine the thermostat for signs of damage including:

- Valve not fully seated (light visible through the valve)
- Foreign material lodged in the main valve
- Bent or broken frame or flange
- Bent or broken spring
- Wax leaking from wax reservoir or a bulge in the reservoir
- Any other damage or distortion

> *NOTE: If no damage is found during the inspection, do not attempt to open the thermostat using hot water or other heat sources. This method is not an accurate means to test the function of the thermostat and may damage the thermostat.*

3.
If damage is found during the inspection, remove any foreign material or broken pieces and install a new thermostat housing.

Radiator Leak Test, Removed From Vehicle

> *NOTE: Never leak test an aluminum radiator in the same water that copper/brass radiators are tested in. Flux and caustic cleaners may be present in the cleaning tank and they will damage aluminum radiators.*

> *NOTE: Clean the radiator before leak testing to avoid contamination of tank.*

1.

Leak test the radiator in clean water with air pressurized to the maximum pressure listed in the SPECIFICATIONS .

GENERAL PROCEDURES > COOLING SYSTEM DRAINING AND VACUUM FILLING

Special Tool(s) / General Equipment

 ST1720-A	ROB75240Coolant/Battery Refractometer (Fahrenheit)
Fluid Container	
Cooling System Vacuum Tester and Refiller	

Materials

Name	Specification
Motorcraft® Orange Antifreeze/Coolant Prediluted (U.S.) VC-3DIL-B (U.S.)	WSS-M97B44-D2
Motorcraft® Orange Antifreeze/Coolant Concentrated (U.S.) VC-3-B (U.S.)	WSS-M97B44-D

Draining

NOTE: The coolant must be recovered in a suitable, clean container for reuse. If the coolant is contaminated, it must be recycled or disposed of correctly. Using contaminated coolant may result in damage to the engine or cooling system components.

NOTE: The vehicle cooling system is filled with Motorcraft® Orange Antifreeze/Coolant. Do not mix coolant types. Mixing coolant types degrades the corrosion protection of the coolant. Failure to follow these instructions may damage the engine or cooling system.

NOTE: Always fill the cooling system with the manufacturer's specified coolant. Chemically flush the cooling system if a non-specified coolant has been used. Refer to Cooling System Flushing . Failure to follow these instructions may damage the engine or cooling system.

NOTE: During normal vehicle operation, Motorcraft® Orange Antifreeze/Coolant may change color from orange to pink or light red. As long as the engine coolant is clear and uncontaminated, this color change does not indicate the engine coolant has degraded nor does it require the engine coolant to be drained, the system to be flushed, or the engine coolant to be replaced.

NOTE: Less than 80% of coolant capacity can be recovered with the engine in the vehicle. Dirty, rusty or contaminated coolant requires replacement.

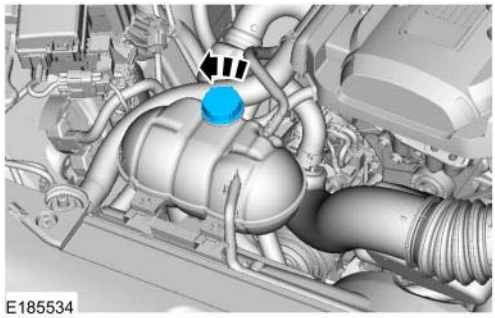
1.





WARNING: When releasing the cooling system pressure, cover the coolant expansion tank cap with a thick cloth.

Remove the pressure relief cap.

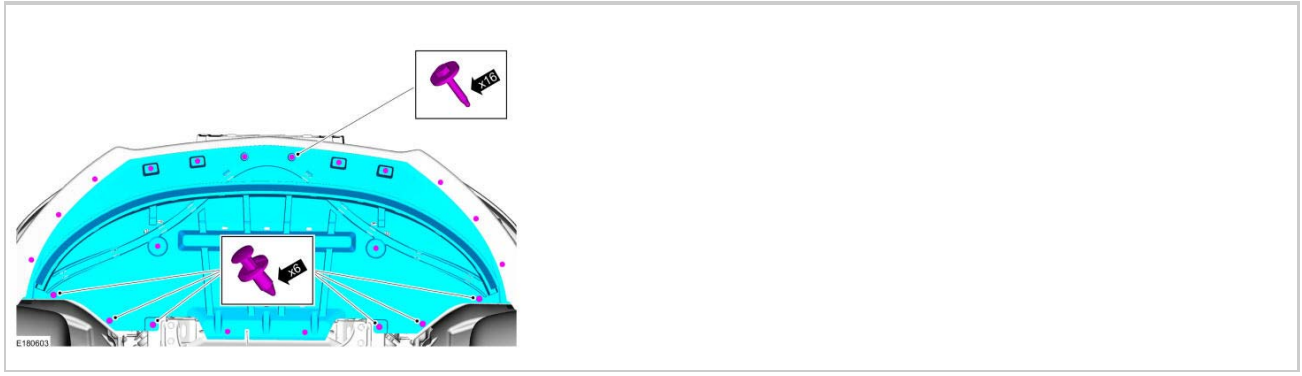


2.

With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

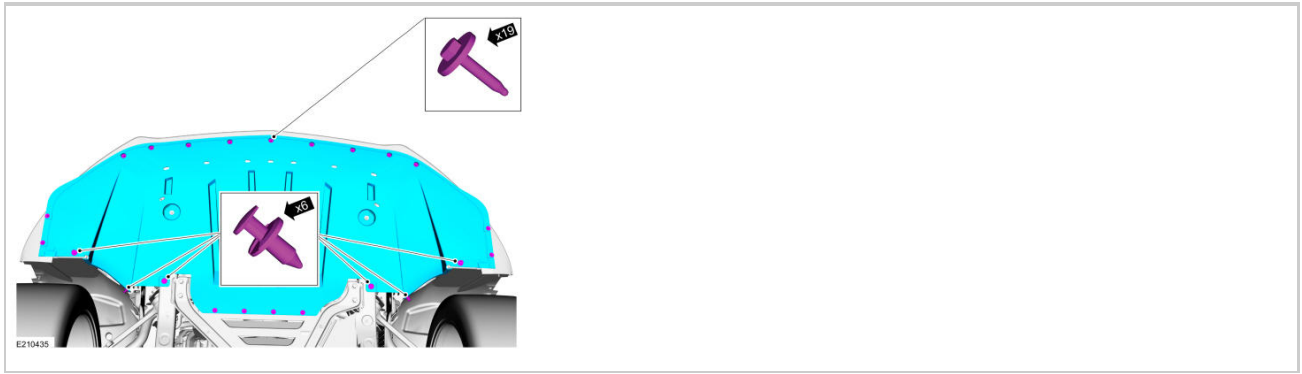
NOTE: If equipped.

3.
Remove the underbody shield.



NOTE: If equipped.

4.
Remove the underbody shield.



5.

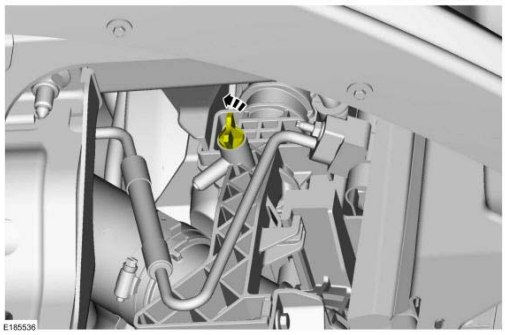


WARNING: Be prepared to collect escaping fluid.

Use a hose to drain the coolant.

Open the radiator drain valve and drain the engine coolant in a suitable, clean container.

Use the General Equipment: Fluid Container



Filling

Filling and Bleeding with a Vacuum Cooling System Filler

1.

NOTE: The cooling system is filled with Motorcraft® Orange Antifreeze/Coolant. Do not mix coolant types. Mixing coolant types degrades the corrosion protection of the coolant. Failure to follow these instructions may damage the engine or cooling system.

NOTE: Engine coolant provides boil protection, corrosion protection, freeze protection, and cooling efficiency to the engine and cooling components. In order to obtain these protections, maintain the engine coolant at the correct concentration and fluid level in the degas bottle.

NOTE: Add Motorcraft® Orange Antifreeze/Coolant or equivalent.

NOTE: Do not add or mix with any other type of engine coolant. Mixing coolants may degrade the coolant's corrosion protection.

NOTE: Do not add alcohol, methanol, or brine, or any engine coolants mixed with alcohol or methanol antifreeze. These can cause engine damage from overheating or freezing.

NOTE: Ford Motor Company does NOT recommend the use of recycled engine coolant in vehicles originally equipped with Motorcraft® Orange Antifreeze/Coolant since a Ford-approved recycling process is not yet available.

When adding or topping off the engine coolant:

Measure the coolant concentration in the vehicle.

Use Special Service Tool: ROB75240 Coolant/Battery Refractometer (Fahrenheit).

Determine the concentration desired based on the vehicle duty cycle of extreme hot or cold operating conditions.

Add, top-off or adjust the coolant as follows:

For concentrations measured 48/52 to 50/50 (freeze protection -34°C to -37°C [-30°F to -34°F]) use Motorcraft® Orange Antifreeze/Coolant Prediluted to maintain a coolant concentration in this same range.

Material

: Motorcraft® Orange Antifreeze/Coolant Prediluted (U.S.) / VC-3DIL-B (U.S.) (WSS-M97B44-D2)

For all other concentrations, use Motorcraft® Orange Antifreeze/Coolant Concentrated and/or distilled water to get to the desired concentration.

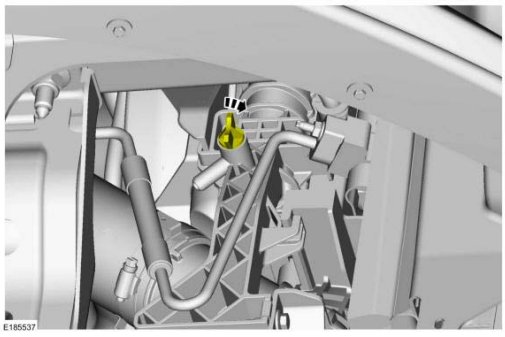
Material

: Motorcraft® Orange Antifreeze/Coolant Concentrated (U.S.) / VC-3-B (U.S.) (WSS-M97B44-D)

When refilling the engine coolant after a flush procedure, use a mixture of Motorcraft® Orange Antifreeze/Coolant Concentrated and distilled water to get to the desired concentration.

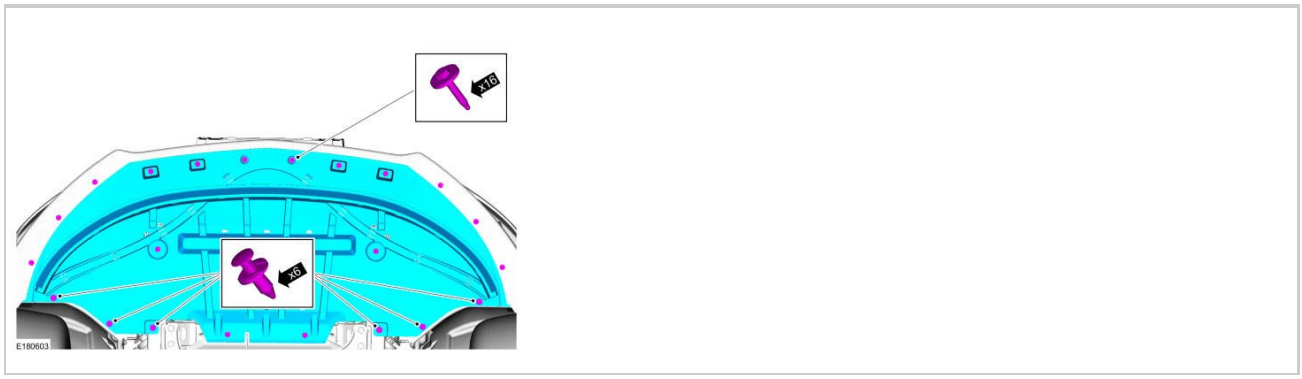
2.

Close the radiator drain valve.



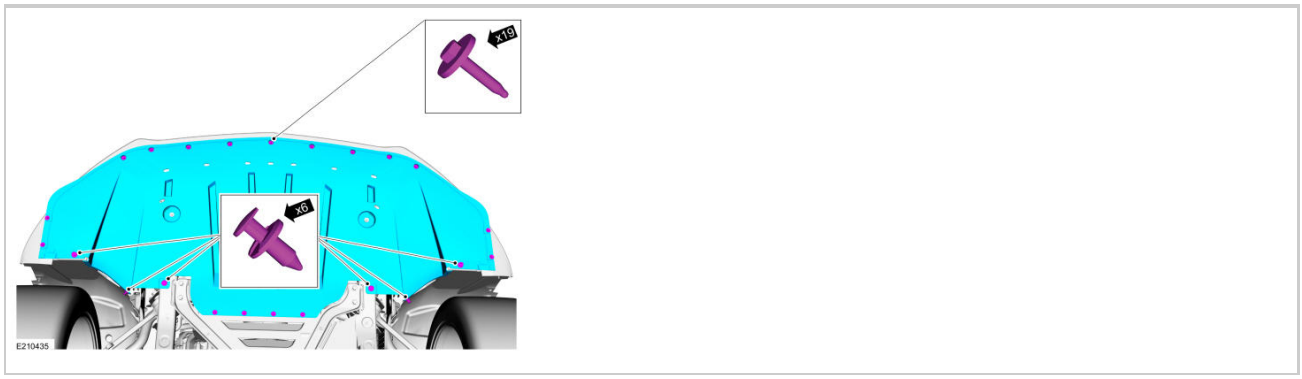
NOTE: If equipped.

3.
Install the underbody shield.



NOTE: If equipped.

4.
Install the underbody shield.



5.

Install the Airlift Cooling System Tester UVU550000 or equivalent and follow the manufacturer's instructions to fill and bleed the system.

Use the General Equipment: Cooling System Vacuum Tester and Refiller

6.

Recommended coolant concentration is 48/52 to 50/50 engine coolant to distilled water (freeze protection -34°C to -37°C [-30°F to -34°F]).

7.

For extremely cold climates (less than -37°C [-34°F]):

It may be necessary to increase the coolant concentration above 50%.

NEVER increase the coolant concentration above 60%.

Maximum coolant concentration is 60/40 for cold weather areas.

A coolant concentration of 60% provides freeze protection down to -50°C (-58°F)

Engine coolant concentrations above 60% will decrease the overheat protection

characteristics of the engine coolant and may damage the engine.

8.

For extremely hot climates:

It is still necessary to maintain the coolant concentration above 40%.

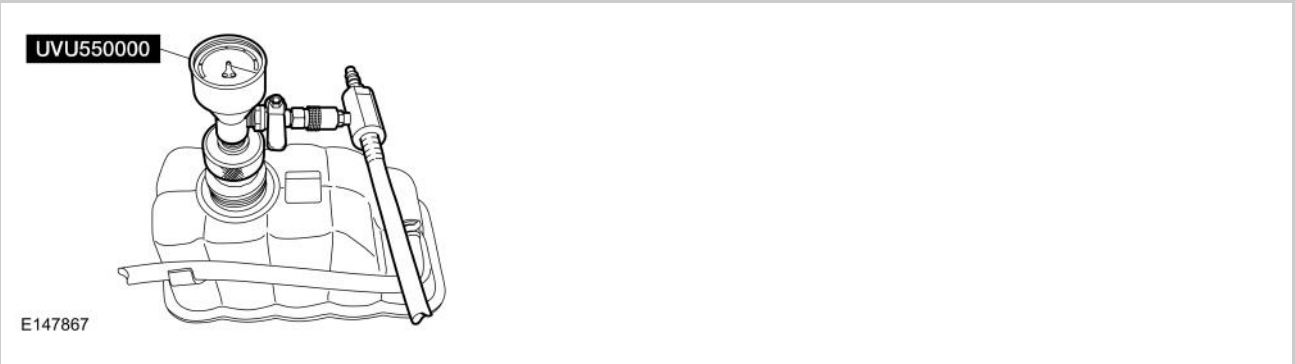
NEVER decrease the coolant concentration below 40%.

Minimum coolant concentration is 40/60 for warm weather areas.

Engine coolant concentrations below 40% will decrease the corrosion/freeze protection characteristics of the engine coolant and may damage the engine.

9.

Vehicles driven year-round in non-extreme climates should use a 48/52 to 50/50 (freeze protection -34°C to -37°C [-30°F to -34°F]) mixture of engine coolant and distilled water for optimum cooling system and engine protection.



Filling and Bleeding without a Vacuum Cooling System Filler

10.

NOTE: The cooling system is filled with Motorcraft® Orange Antifreeze/Coolant. Do not mix coolant types. Mixing coolant types degrades the corrosion protection of the coolant. Failure to follow these instructions may damage the engine or cooling system.

NOTE: Engine coolant provides boil protection, corrosion protection, freeze protection, and cooling efficiency to the engine and cooling components. In order to obtain these protections, maintain the engine coolant at the correct concentration and fluid level in the degas bottle.

NOTE: Add Motorcraft® Orange Antifreeze/Coolant or equivalent.

NOTE: Do not add or mix with any other type of engine coolant. Mixing coolants may degrade the coolant's corrosion protection.

NOTE: Do not add alcohol, methanol, or brine, or any engine coolants mixed with alcohol or methanol antifreeze. These can cause engine damage from overheating or freezing.

NOTE: Ford Motor Company does NOT recommend the use of recycled engine coolant in vehicles originally equipped with Motorcraft® Orange Antifreeze/Coolant since a Ford-approved recycling process is not yet available.

When adding or topping off the engine coolant:

Measure the coolant concentration in the vehicle.

Use Special Service Tool: ROB75240 Coolant/Battery Refractometer (Fahrenheit).

Determine the concentration desired based on the vehicle duty cycle of extreme hot or cold operating conditions.

Add, top-off or adjust the coolant as follows:

For concentrations measured 48/52 to 50/50 (freeze protection -34°C to -37°C [-30°F to -34°F]) use Motorcraft® Orange Antifreeze/Coolant Prediluted to maintain a coolant concentration in this same range.

Material

: Motorcraft® Orange Antifreeze/Coolant Prediluted (U.S.) / VC-3DIL-B (U.S.) (WSS-M97B44-D2)

For all other concentrations, use Motorcraft® Orange Antifreeze/Coolant Concentrated and/or distilled water to get to the desired concentration.

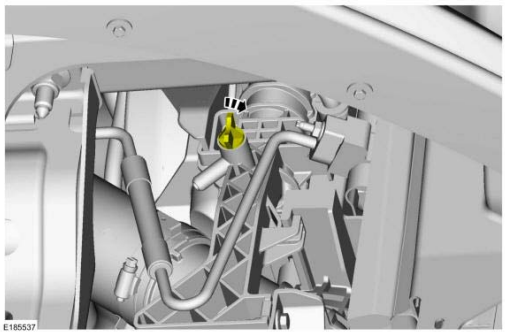
Material

: Motorcraft® Orange Antifreeze/Coolant Concentrated (U.S.) / VC-3-B (U.S.) (WSS-M97B44-D)

When refilling the engine coolant after a flush procedure, use a mixture of Motorcraft® Orange Antifreeze/Coolant Concentrated and distilled water to get to the desired concentration.

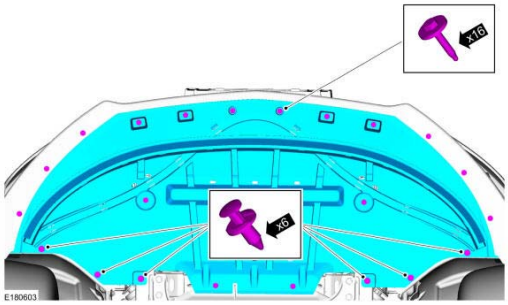
11.

Close the radiator drain valve.



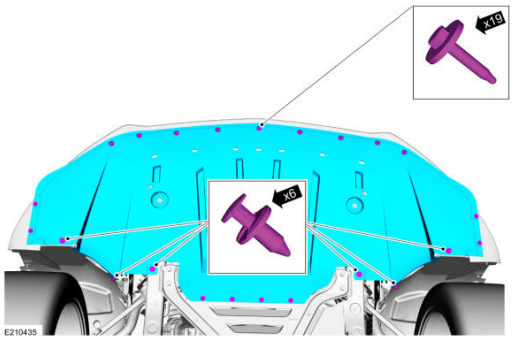
NOTE: If equipped.

12.
Install the underbody shield.



NOTE: If equipped.

13.
Install the underbody shield.



14.

Fill the degas bottle to the MAX FILL line.

15.

Recommended coolant concentration is 48/52 to 50/50 engine coolant to distilled water (freeze

protection -34°C to -37°C [-30°F to -34°F]).

16.

For extremely cold climates (less than -37°C [-34°F]):

It may be necessary to increase the coolant concentration above 50%.

NEVER increase the coolant concentration above 60%.

Maximum coolant concentration is 60/40 for cold weather areas.

A coolant concentration of 60% provides freeze protection down to -50°C (-58°F)

Engine coolant concentrations above 60% will decrease the overheat protection characteristics of the engine coolant and may damage the engine.

17.

For extremely hot climates:

It is still necessary to maintain the coolant concentration above 40%.

NEVER decrease the coolant concentration below 40%.

Minimum coolant concentration is 40/60 for warm weather areas.

Engine coolant concentrations below 40% will decrease the corrosion/freeze protection characteristics of the engine coolant and may damage the engine.

18.

Vehicles driven year-round in non-extreme climates should use a 48/52 to 50/50 (freeze protection -34°C to -37°C [-30°F to -34°F]) mixture of engine coolant and distilled water for optimum cooling system and engine protection.

19.

Install the degas bottle cap until it contacts the hard stop.

20.

Turn the climate control system off.

21.

Start the engine and increase the engine speed to 3, 500 rpm and hold for 30 seconds.

22.

Turn the engine off for and wait for 1 minute to purge any large air pockets from the cooling system.

23.

WARNING: Always allow the engine to cool before opening the cooling system. Do not unscrew the coolant pressure relief cap when the engine is operating or the cooling system is hot. The cooling system is under pressure; steam and hot liquid can come out forcefully when the cap is loosened slightly. Failure to follow these instructions may result in serious personal injury.

Check the engine coolant level in degas bottle and if necessary fill to the top of the MAX FILL line on the degas bottle if the engine is warm or to the top of the MIN FILL LEVEL if the engine is cold.

24.

Start the engine and let it idle until the engine reaches normal operating temperature and the thermostat is fully open. A fully open thermostat is verified by the cooling fan cycling on at least once.

25.

Increase the engine speed to 3, 500 rpm and hold for 30 seconds.

26.

Allow the engine to idle for 30 seconds.

27.

Turn the engine off for 1 minute.

28.

Repeat steps 25 through 27 a total of 5 times to remove any remaining air trapped in the system.

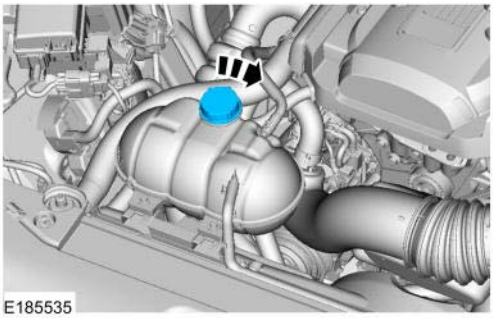
29.

WARNING: Always allow the engine to cool before opening the cooling system. Do not unscrew the coolant pressure relief cap when the engine is operating or the cooling system is hot. The cooling system is under pressure; steam and hot liquid can come out forcefully when the cap is loosened slightly. Failure to follow these instructions may result in serious personal injury.

Check the engine coolant level in degas bottle and if necessary fill to the top of the MAX FILL line on the degas bottle.

30.

Install the pressure relief cap.



GENERAL PROCEDURES > COOLING SYSTEM FLUSHING

Materials

Name	Specification
Motorcraft® Premium Cooling System Flush VC-1	ESR-M14P7-A

Flushing

WARNING: Always allow the engine to cool before opening the cooling system. Do not unscrew the coolant pressure relief cap when the engine is operating or the cooling system is hot. The cooling system is under pressure; steam and hot liquid can come out forcefully when the cap is loosened slightly. Failure to follow these instructions may result in serious personal injury.

NOTE: To remove rust, sludge and other foreign material from the cooling system, use cooling system flush that is safe for use with aluminum radiators. This cleaning restores cooling system efficiency and helps prevent overheating. A pulsating or reversed direction of flushing water will loosen sediment more quickly than a steady flow in the normal coolant flow direction. In severe cases where cleaning solvents will not clean the cooling system efficiently, it will be necessary to use the pressure flushing method using cooling system flusher. Dispose of old coolant and flushing water contaminated with antifreeze and cleaning chemicals in accordance with local, state, provincial, or federal laws.

1.

Add Premium Cooling System Flush to the cooling system and follow the directions on the package.

Material

: Motorcraft® Premium Cooling System Flush / VC-1 (ESR-M14P7-A)

2.

Drain the cooling system. Refer to: Cooling System Draining and Vacuum Filling .

3.

Remove the radiator. Refer to: Radiator .

NOTE: Radiator internal pressure must not exceed 138 kPa (20 psi). Damage to the radiator can result.

4.
Backflush the radiator with radiator turned so the upper radiator hose is at the top and with a high-pressure hose in the upper hose location.

NOTE: The thermostat and housing are serviced as an assembly.

5.
Remove the thermostat housing. Refer to: Thermostat Housing .

6.

Backflush the engine. Position the high-pressure water hose into the engine through the lower radiator hose and backflush the engine.

NOTE: The thermostat and housing are serviced as an assembly.

7.
Install the thermostat housing. Refer to: Thermostat Housing .

8.

Install the radiator. Refer to: Radiator .

9.

Fill and bleed the cooling system. Refer to: Cooling System Draining and Vacuum Filling .

GENERAL PROCEDURES > HEATER CORE BACKFLUSHING

Materials

Name	Specification
Motorcraft® Premium Cooling System FlushVC-1	ESR-M14P7-A

Flushing

WARNING: Always allow the engine to cool before opening the cooling system. Do not

unscrew the coolant pressure relief cap when the engine is operating or the cooling system is hot. The cooling system is under pressure; steam and hot liquid can come out forcefully when the cap is loosened slightly. Failure to follow these instructions may result in serious personal injury.

1.

Partially drain the cooling system. Refer to: Cooling System Draining and Vacuum Filling .

2.

Add Premium Cooling System Flush to backflush the heater core and follow the directions on the package. Flush with water thoroughly after using Premium Cooling System Flush prior to refilling the cooling system.

Material

: Motorcraft® Premium Cooling System Flush / VC-1 (ESR-M14P7-A)

3.

Fill and bleed the cooling system. Refer to: Cooling System Draining and Vacuum Filling .

REMOVAL AND INSTALLATION > BLOCK HEATER > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

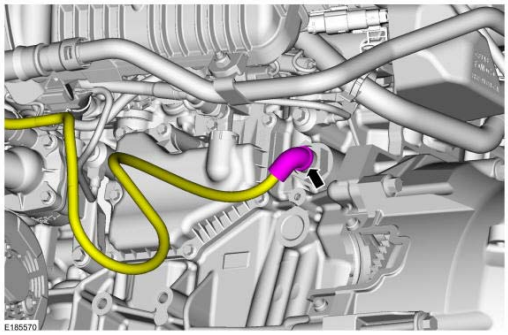
Drain the cooling system. Refer to: Cooling System Draining and Vacuum Filling .

2.

Remove the starter motor. Refer to: STARTER MOTOR - 2.3L EcoBoost (231kW/314PS).

NOTE: Make sure the block heater wiring is routed and secured away from rotating or hot components.

3.
Disconnect the block heater electrical connector.

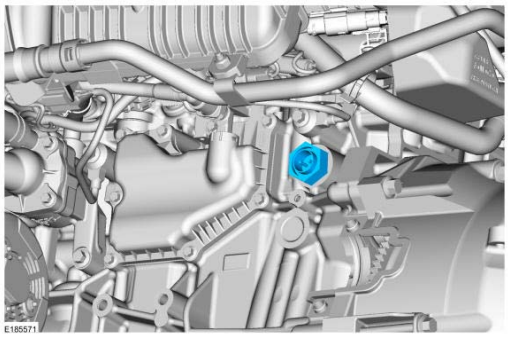


4.

Remove the block heater.

Torque

: 30 lb.ft (40 Nm)



REMOVAL AND INSTALLATION > BLOCK HEATER > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Fill and bleed the cooling system. Refer to: Cooling System Draining and Vacuum Filling .

REMOVAL AND INSTALLATION > COOLANT PUMP

Coolant Pump

Materials

Name	Specification
Motorcraft® Orange Antifreeze/Coolant Concentrated (U.S.) VC-3-B (U.S.)	WSS-M97B44-D

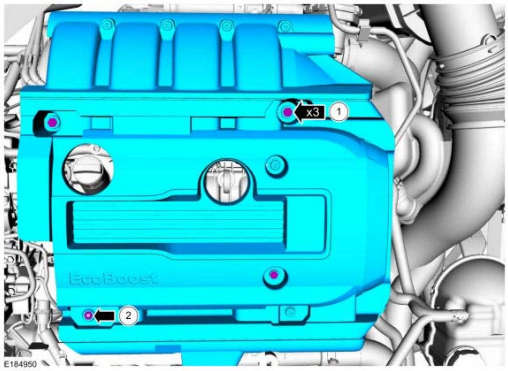
REMOVAL AND INSTALLATION > COOLANT PUMP > REMOVAL

1.

Drain the cooling system. Refer to: Cooling System Draining and Vacuum Filling .

2.

Remove the retainers and the engine appearance cover.

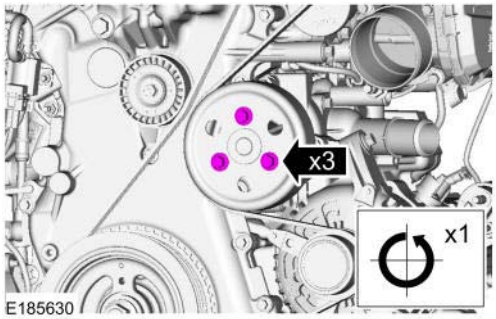


3.

Remove the air cleaner outlet pipe. Refer to: Air Cleaner Outlet Pipe .

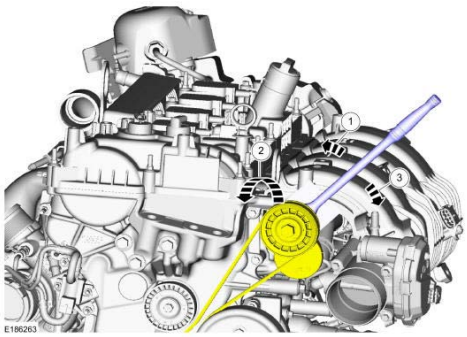
4.

Loosen the coolant pump pulley bolts.



NOTE: Make sure the accessory drive belt is positioned so coolant can not contaminate the belt.

5.
Rotate the accessory drive belt tensioner counter clockwise and position aside the accessory drive belt.

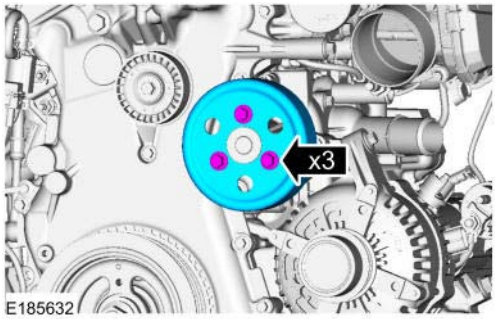


NOTE: Cover the accessory drive and A/C belts to prevent coolant contamination of the belts.

6.
Completely cover the accessory drive and A/C belts with waterproof plastic.

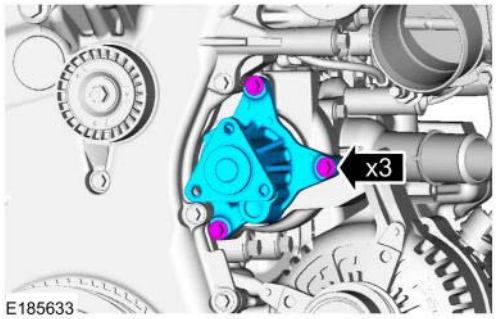
7.

Remove the bolts and the coolant pump pulley.



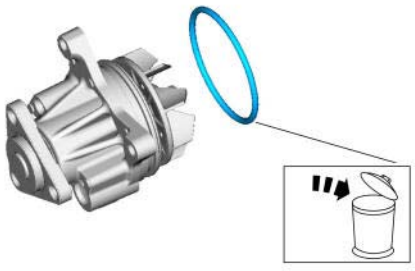
8.

Remove the bolts and the coolant pump.



9.

Remove and discard the coolant pump O-ring seal.



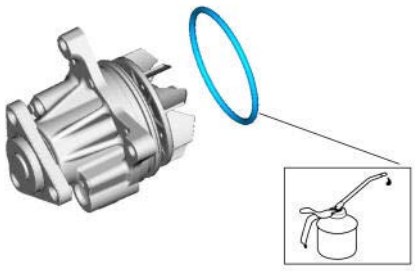
REMOVAL AND INSTALLATION > COOLANT PUMP > INSTALLATION

1.

Install a new coolant pump O-ring seal and lubricate it with clean engine coolant.

Material

: Motorcraft® Orange Antifreeze/Coolant Concentrated (U.S.) / VC-3-B (U.S.) (WSS-M97B44-D)

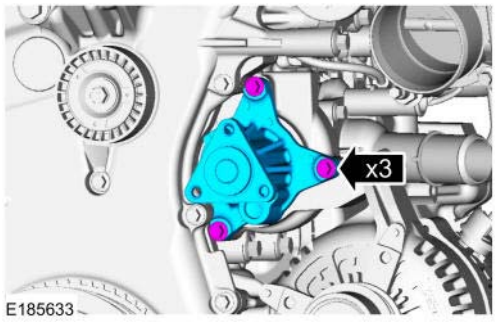


2.

Install the coolant pump and the bolts.

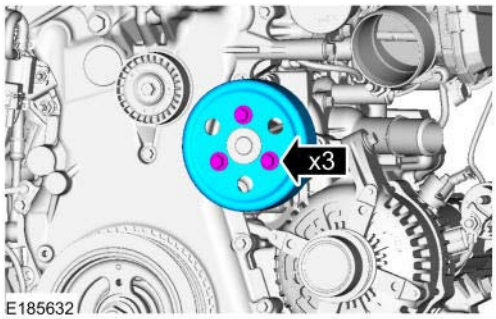
Torque

: 89 lb.in (10 Nm)



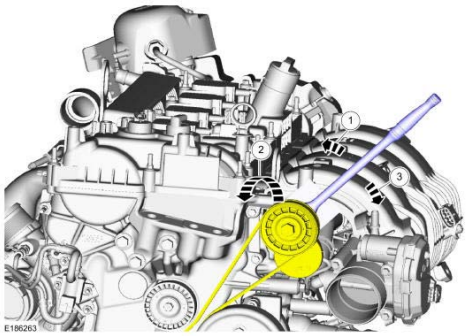
3.

Position the coolant pump pulley and install the bolts finger tight.



4.

Rotate the accessory drive belt tensioner counter clockwise and position back the accessory drive belt.

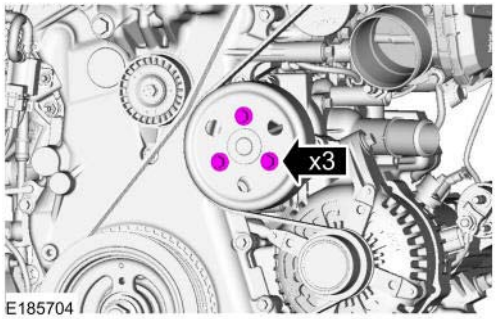


5.

Tighten the coolant pump pulley bolts.

Torque

: 177 lb.in (20 Nm)



6.

Install the air cleaner outlet pipe. Refer to: AIR CLEANER OUTLET PIPE - 2.3L EcoBoost (231kW/314PS).

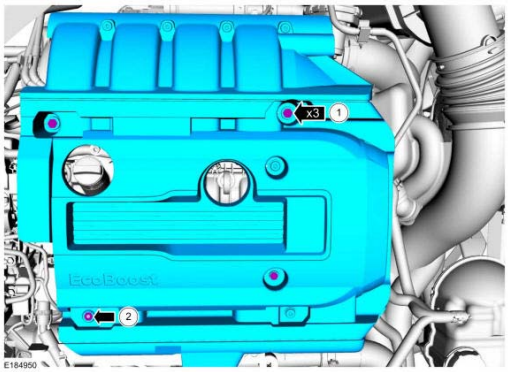
7.

Install the engine appearance cover and the retainers.

Torque:

1: 53 lb.in (6 Nm)

2: 89 lb.in (10 Nm)



8.

Fill and bleed the cooling system. Refer to: Cooling System Draining and Vacuum Filling .

REMOVAL AND INSTALLATION > COOLING FAN MOTOR AND SHROUD

Special Tool(s) / General Equipment

Hose Clamp Remover/Installer

REMOVAL AND INSTALLATION > COOLING FAN MOTOR AND SHROUD > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

Drain the cooling system. Refer to: Cooling System Draining and Vacuum Filling .

2.

Remove the air cleaner. Refer to: AIR CLEANER - 2.3L EcoBoost (231kW/314PS).

3.

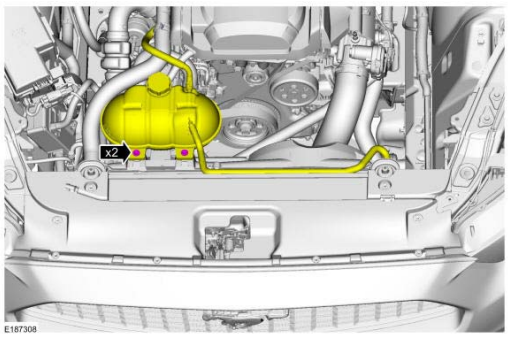
Remove the air cleaner outlet pipe. Refer to: AIR CLEANER OUTLET PIPE - 2.3L EcoBoost (231kW/314PS).

4.

Remove the bolts and position the degas bottle aside.

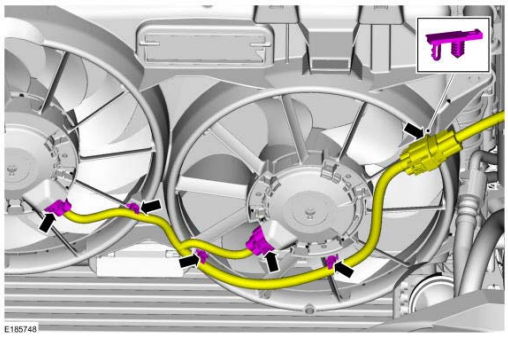
Torque

: 80 lb.in (9 Nm)



5.

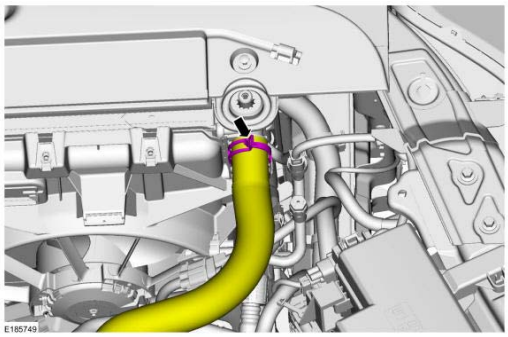
Disconnect the cooling fan electrical connectors and detach the wiring harness retainers.



6.

Release the clamp and disconnect the upper radiator hose.

Use the General Equipment: Hose Clamp Remover/Installer

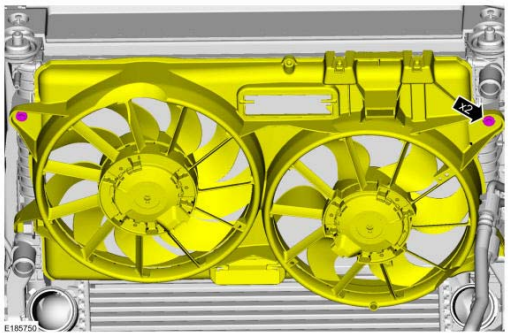


7.

Remove the bolts.

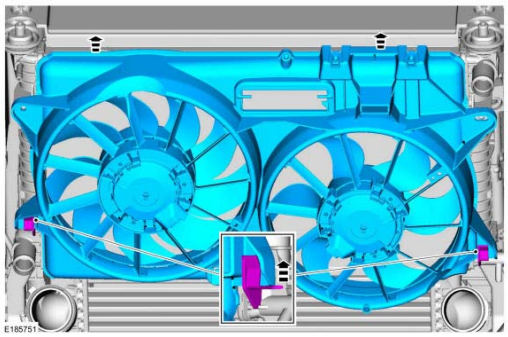
Torque

: 53 lb.in (6 Nm)



8.

Remove the cooling fan motor and shroud.



REMOVAL AND INSTALLATION > COOLING FAN MOTOR AND SHROUD > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Fill and bleed the cooling system. Refer to: Cooling System Draining and Vacuum Filling .

REMOVAL AND INSTALLATION > DEGAS BOTTLE

Degas Bottle

Special Tool(s) / General Equipment

Fluid Suction Gun
Hose Clamp Remover/Installer

Locking Pliers

Materials

Name	Specification
Motorcraft® Orange Antifreeze/Coolant Prediluted (U.S.) VC-3DIL-B (U.S.)	WSS-M97B44-D2
Motorcraft® Orange Antifreeze/Coolant Concentrated (U.S.) VC-3-B (U.S.)	WSS-M97B44-D

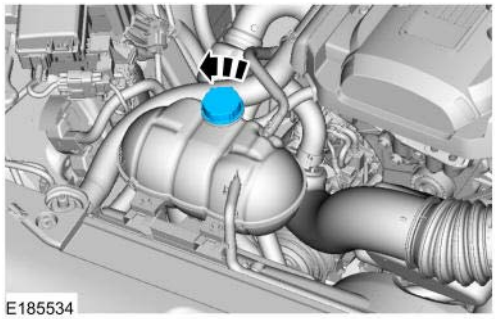
REMOVAL AND INSTALLATION > DEGAS BOTTLE > REMOVAL

WARNING: Always allow the engine to cool before opening the cooling system. Do not unscrew the coolant pressure relief cap when the engine is operating or the cooling system is hot. The cooling system is under pressure; steam and hot liquid can come out forcefully when the cap is loosened slightly. Failure to follow these instructions may result in serious personal injury.

NOTE: Removal steps in this procedure may contain installation details.

1.

Remove the pressure relief cap.

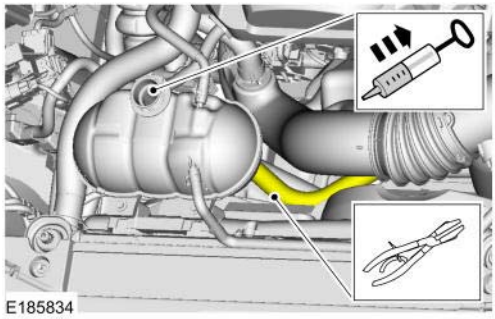


2.

Using general tools clamp the lower degas bottle hose and syphon the coolant from the degas bottle.

Use the General Equipment: Fluid Suction Gun

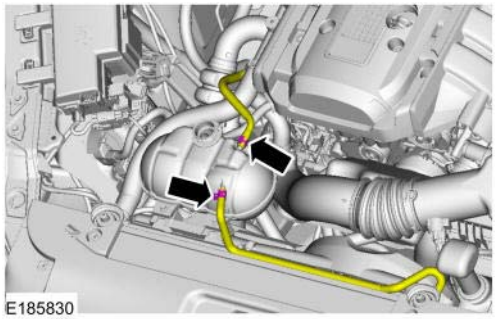
Use the General Equipment: Locking Pliers



3.

Release the clamps, disconnect the upper degas bottle coolant hoses.

Use the General Equipment: Hose Clamp Remover/Installer

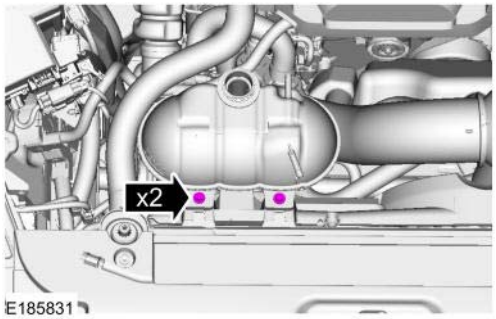


4.

Remove the bolts.

Torque

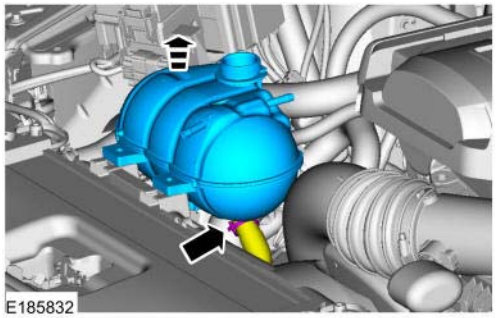
: 80 lb.in (9 Nm)



5.

Position the degas bottle and disconnect the lower coolant hose.

Use the General Equipment: Hose Clamp Remover/Installer



REMOVAL AND INSTALLATION > DEGAS BOTTLE > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Fill the degas bottle with the recommended coolant mixture and fill level.

Material

: Motorcraft® Orange Antifreeze/Coolant Concentrated (U.S.) / VC-3-B (U.S.) (WSS-M97B44-D)

Material

: Motorcraft® Orange Antifreeze/Coolant Prediluted (U.S.) / VC-3DIL-B (U.S.) (WSS-M97B44-D2)

REMOVAL AND INSTALLATION > RADIATOR

Special Tool(s) / General Equipment

Hose Clamp Remover/Installer

REMOVAL AND INSTALLATION > RADIATOR > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

Recover the refrigerant. Refer to: Air Conditioning (A/C) System Recovery, Evacuation and Charging .

2.

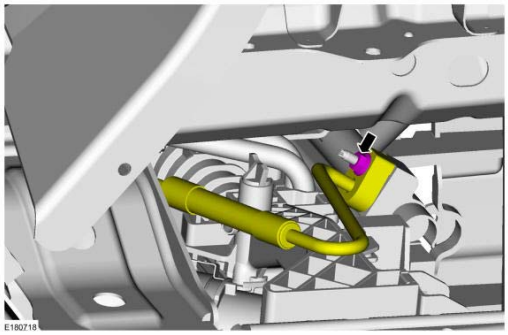
Drain the cooling system. Refer to: Cooling System Draining and Vacuum Filling .

NOTE: Make sure that all openings are sealed.

3.
Remove the nut and disconnect the A/C condenser outlet line.

Torque

: 80 lb.in (9 Nm)

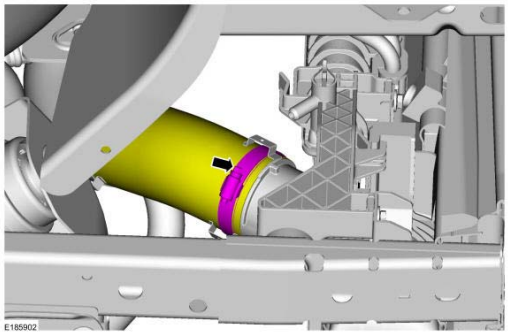


4.

Loosen the clamp and disconnect the CAC inlet tube.

Torque

: 44 lb.in (5 Nm)



5.

Disconnect the turbocharger boost pressure sensor connector.

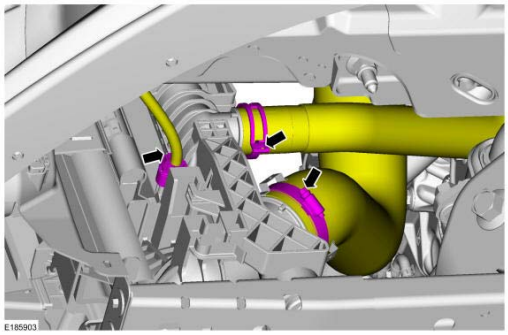
Release the clamp and disconnect the lower radiator hose.

Use the General Equipment: Hose Clamp Remover/Installer

Loosen the clamp and disconnect the CAC outlet tube.

Torque

: 44 lb.in (5 Nm)

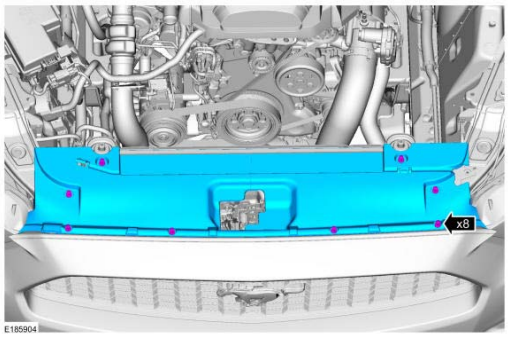


6.

Remove the cooling fan motor and shroud. Refer to: Cooling Fan Motor and Shroud .

7.

Remove the retainers and the radiator sight shield.

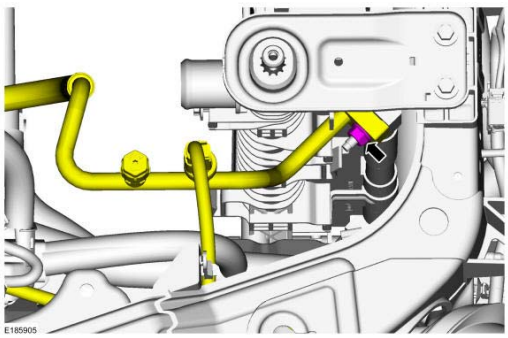


NOTE: Make sure that all openings are sealed.

8.
Remove the nut and disconnect the A/C compressor outlet line.

Torque

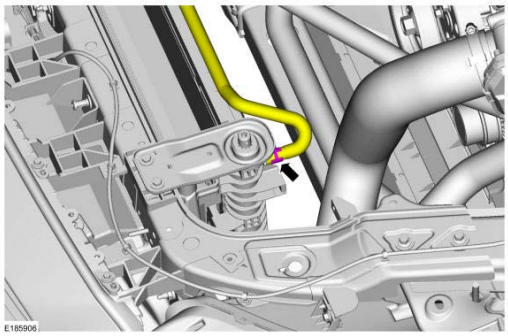
: 159 lb.in (18 Nm)



9.

Release the clamp and disconnect the upper coolant hose.

Use the General Equipment: Hose Clamp Remover/Installer

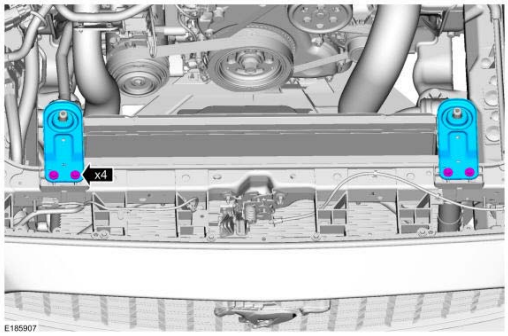


10.

Remove the bolts and the upper radiator brackets.

Torque

: 97 lb.in (11 Nm)



NOTE: Front bumper removed for clarity.

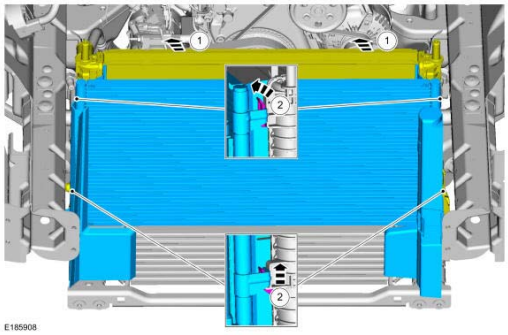
11.

1.

Position the radiator towards the engine.

2.

Release the upper tabs and remove the A/C condenser.



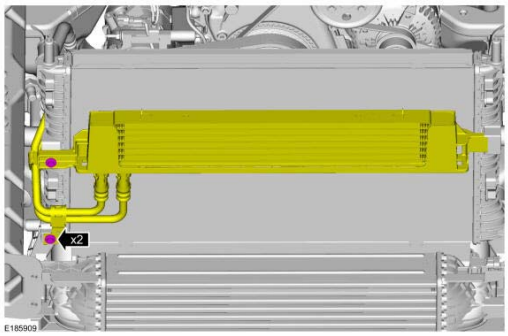
NOTE: Front bumper removed for clarity.

NOTE: If equipped.

12.
Remove the bolts and position aside the transmission fluid cooler.

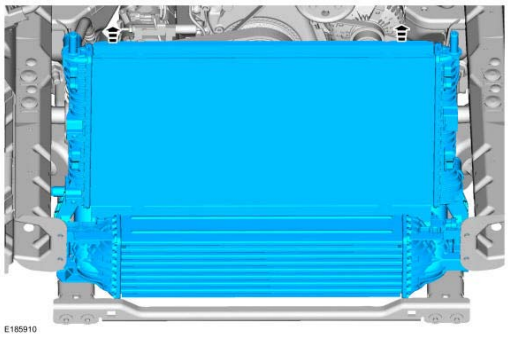
Torque

: 53 lb.in (6 Nm)



NOTE: Front bumper removed for clarity.

13.
Remove the radiator and the CAC.

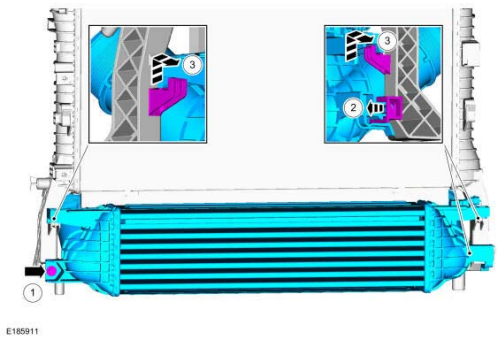


14.

Remove the bolt and separate the CAC from the radiator.

Torque

: 53 lb.in (6 Nm)



REMOVAL AND INSTALLATION > RADIATOR > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Fill and bleed the cooling system. Refer to: Cooling System Draining and Vacuum Filling .

REMOVAL AND INSTALLATION > THERMOSTAT HOUSING

Special Tool(s) / General Equipment

Hose Clamp Remover/Installer

REMOVAL AND INSTALLATION > THERMOSTAT HOUSING > REMOVAL

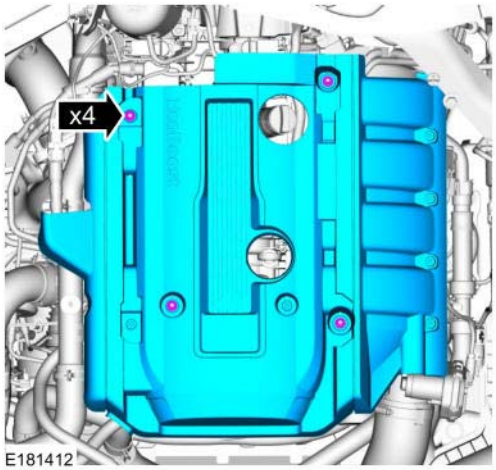
NOTE: Removal steps in this procedure may contain installation details.

1.

Drain the cooling system. Refer to: Cooling System Draining and Vacuum Filling .

2.

Remove the nuts and the engine appearance cover.

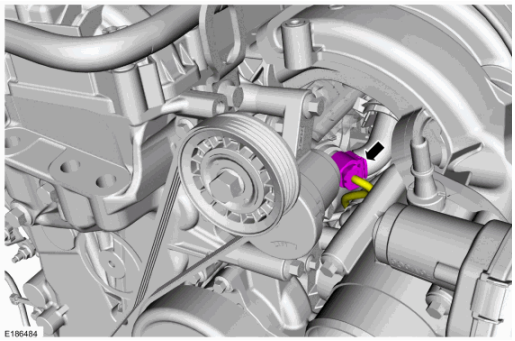


3.

Remove the air cleaner. Refer to: AIR CLEANER - 2.3L EcoBoost (231kW/314PS).

4.

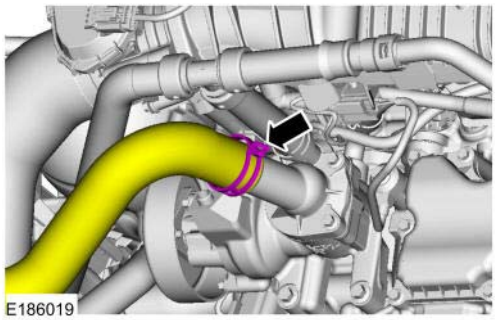
Disconnect the FRP electrical connector.



5.

Release the clamp and disconnect the lower radiator hose.

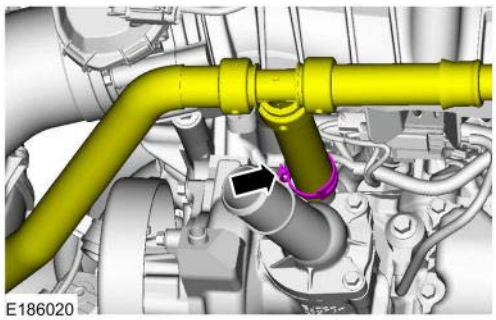
Use the General Equipment: Hose Clamp Remover/Installer



6.

Release the clamp and disconnect the coolant hose.

Use the General Equipment: Hose Clamp Remover/Installer

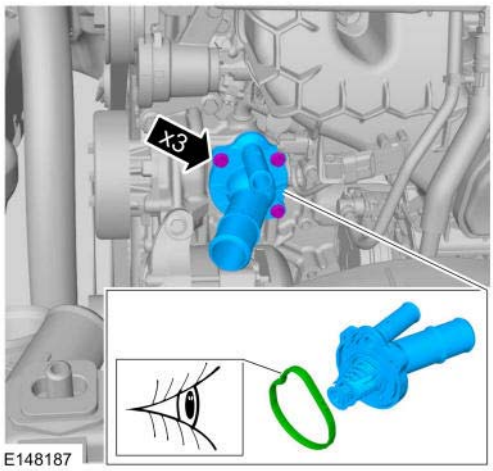


NOTE: Inspect the O-ring seal and replace if necessary.

7.
Remove the bolts and the thermostat housing.

Torque

: 89 lb.in (10 Nm)



REMOVAL AND INSTALLATION > THERMOSTAT HOUSING > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Fill and bleed the cooling system. Refer to: Cooling System Draining and Vacuum Filling .

SPECIFICATIONS > SPECIFICATIONS

Lubricants, Fluids, Sealants and Adhesives

Name	Specification	Fill Capacity
Motorcraft® Orange Antifreeze/Coolant Concentrated (U.S.)VC-3-B (U.S.)	WSS-M97B44-D	11.1 qt (10.5L)
Motorcraft® Orange Antifreeze/Coolant Prediluted (U.S.)VC-3DIL-B (U.S.)	WSS-M97B44-D2	11.1qt (10.5L)
Motorcraft® Premium Cooling System Flush VC-1	ESR-M14P7-A	-

Cooling System Pressure

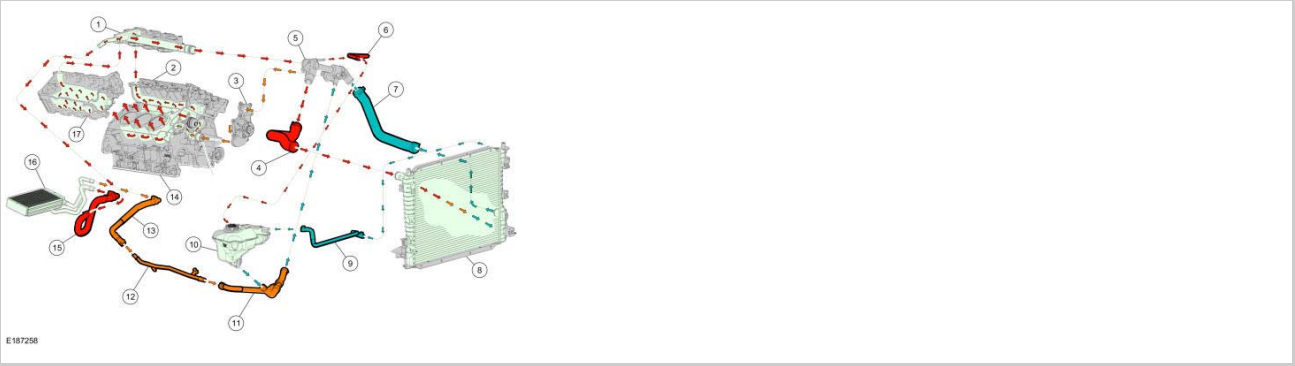
Complete cooling system maximum pressure	145 kPa (21 psi)
Pressure relief cap	145 kPa (21 psi)
Radiator pressure test (removed from the vehicle)	138 kPa (20 psi)

Thermostat Opening Temperatures

Starts to open	83.9°C-87.8°C (183°F-190°F)
Fully open	98.9°C (210°F)

DESCRIPTION AND OPERATION > ENGINE COOLING - COMPONENT LOCATION

NOTE: Coolant temperature will vary with ambient temperature and load. Temperatures shown are for ambient temperature of 38°C (100°F). Red arrows indicate a temperature over 90°C (194°F), Orange arrows indicate a temperature of approximately 90°C (194°F), Blue arrows indicate a temperature below 90°C (194°F).



Item	Description
1	Intake manifold
2	LH cylinder head
3	Coolant pump
4	Upper radiator hose
5	Thermostat housing
6	Thermostat housing-to-degas bottle hose
7	Lower radiator hose
8	Radiator
9	Radiator-to-degas bottle hose
10	Degas bottle
11	Coolant return hose
12	Heater outlet tube
13	Heater outlet hose
14	Cylinder block
15	Heater inlet hose
16	Heater core
17	RH cylinder head

DESCRIPTION AND OPERATION > ENGINE COOLING - SYSTEM OPERATION AND COMPONENT DESCRIPTION > SYSTEM OPERATION

Engine coolant flows primarily from the engine to the radiator circuit and back to the coolant pump. Coolant is sent from the coolant pump through the engine block and cylinder heads. A separate circuit from the engine also feeds the heater core with coolant. The coolant pump, operated by engine rotation through the accessory drive belt, circulates the coolant. The coolant thermostat is a control valve actuated by coolant temperature. When the thermostat is closed, coolant flow bypasses the radiator circuit and returns to the coolant pump. When the thermostat is opened, coolant flows through the radiator circuit to transfer engine-generated heat to the outside air.

On 3.7L engines, a channel cover plate is located behind the front cover. It contains a timing chain idler and press in place gaskets separating engine coolant and engine oil. A weep hole is provided on the front left side of the engine behind the generator. If oil or coolant is leaking from the weep hole, then a gasket has failed and the channel cover plate must be replaced. Refer to the appropriate Engine article.

The engine uses a cold side thermostat. This means the thermostat is located at the lower radiator hose connection to the engine, where coolant enters the engine after being cooled by the radiator. During initial warm-up, the cooler coolant from the radiator quickly closes the thermostat after the warm coolant in the engine opens the thermostat slightly. The thermostat opens and closes several times before the coolant coming from the radiator is warm enough to allow the thermostat to remain open. The engine must run much longer than a vehicle with a hot side thermostat before the thermostat remains fully opened.

The degas bottle holds surplus coolant and removes air from the cooling system. It also allows for coolant expansion and system pressurization, replenishes coolant to the cooling system and serves as the location for service fill.

The thermostat monitor is a function of the PCM and is designed to verify correct thermostat operation. The monitor executes once per drive cycle and has a monitor run duration of 300-800 seconds. If a malfunction occurs, DTC P0125 or P0128 sets, and the MIL illuminates.

DESCRIPTION AND OPERATION > ENGINE COOLING - SYSTEM OPERATION AND COMPONENT DESCRIPTION > SYSTEM OPERATION > FAIL SAFE COOLING

A strategy called Fail Safe Cooling is built into the PCM that will control the engine if it starts to overheat.

Stage 1 of the strategy commences if the engine starts to overheat. The CHT sensor transmits a signal to the PCM, which moves the temperature gauge pointer into the red zone.

If the engine is not switched off and the temperature continues to rise, the Powertrain Check Lamp is illuminated. This indicates to the driver that the engine is approaching critical limits and should be stopped. At this point DTC P1285 is set in the PCM which can be retrieved using a scan tool.

Stage 2 of the strategy commences if the lamp and temperature gauge are ignored by the driver. The PCM will start to control the engine by cutting out 3 cylinders and restricting engine speed below 3, 000 RPM. Simultaneously the MIL illuminates. This indicates that long term engine damage can occur and vehicle emissions will be affected. At this point DTC P1299 is set in the PCM which can be retrieved using a scan tool.

Air is drawn into the deactivated cylinders. This helps to control the temperature of the engine internal components. The deactivated cylinders are alternated to allow even cooling of all the cylinders.

> *NOTE: If the driver is using a high percentage of throttle travel (for example, an overtaking maneuver) when the PCM starts engine deactivation (Stage 2), the deactivation will be delayed for 10 seconds.*

> *NOTE: After 3-cylinder operation has begun, the engine will not revert to 6-cylinder operation, even if the temperature should fall, until the ignition is switched off and then on again.*

NOTE: The MIL can only be extinguished by using a scan tool after the fault has been rectified and the DTC cleared.

Stage 3 of the strategy will commence if the engine temperature continues to rise. This results in the engine being totally disabled before major engine damage or seizure occurs. The Powertrain Check Lamp will begin to flash, indicating to the driver that the engine will be switched off after 30 seconds. This allows the driver time to choose a suitable parking place.

DIAGNOSIS AND TESTING > ENGINE COOLING

Materials

Name	Specification
Motorcraft® Orange Antifreeze/Coolant Prediluted (U.S.)VC-3DIL-B (U.S.)	WSS-M97B44-D2
Motorcraft® Orange Antifreeze/Coolant Concentrated (U.S.)VC-3-B (U.S.)	WSS-M97B44-D

Special Tool(s)

 E144764	3-Way HD Antifreeze Coolant Test Kit 328-2050-62291 or equivalent
 E144765	Coolant/Battery Refractometer 300-ROB75240 or equivalent
 E144766	Radiator Tester 014-R1072 or equivalent
 E145674	UView® Combustion Leak TesterUVU560000-R

Material : Motorcraft® Orange Antifreeze/Coolant Concentrated (U.S.) / VC-3-B (U.S.) (WSS-M97B44-D)
Material : Motorcraft® Orange Antifreeze/Coolant Prediluted (U.S.) / VC-3DIL-B (U.S.) (WSS-M97B44-D2)

DIAGNOSIS AND TESTING > ENGINE COOLING > DTC CHART

WARNING: Before beginning any service procedure in this service information, refer to Safety Warnings in GENERAL INFORMATION . Failure to follow this instruction may result in serious personal injury.

REFER to: Engine Cooling System Health and Safety Precautions .

Diagnostics in this service information assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

PCM DTC Chart

DTC	Description	Action
P0125	Insufficient Coolant Temp For Closed Loop Fuel Control	GO to Pinpoint Test C
P0128	Coolant Thermostat (Coolant Temp Below Thermostat Regulating Temperature)	GO to Pinpoint Test C
P0217	Engine Coolant Overtemperature Condition	GO to Pinpoint Test B
P0480	Fan 1 Control Circuit	Refer to ENGINE CONTROLS - INTRODUCTION (EXCEPT DIESEL & HYBRID) .
P0481	Fan 2 Control Circuit	Refer to ENGINE CONTROLS - INTRODUCTION (EXCEPT DIESEL & HYBRID) .
P1285	Cylinder Head Overtemperature Condition	Refer to ENGINE CONTROLS - INTRODUCTION (EXCEPT DIESEL & HYBRID) .
P1299	Cylinder Head Overtemperature Protection Active	GO to Pinpoint Test B
All Other PCM Diagnostic Trouble Codes (DTCs)	-	REFER to: ELECTRONIC ENGINE CONTROLS - 3.7L DURATEC (227KW/301PS).

DIAGNOSIS AND TESTING > ENGINE COOLING > INSPECTION AND VERIFICATION

NOTE: The engine cooling system is filled with Motorcraft® Orange Antifreeze/Coolant. Always fill the cooling system with the manufacturer's specified coolant. Chemically flush the cooling system if a non-specified coolant has been used. Failure to follow these instructions may damage the engine or cooling system.

NOTE: During normal vehicle operation, Motorcraft Orange Antifreeze/Coolant may change color from orange to pink or light red. As long as the engine coolant is clear and uncontaminated, this color change does not indicate the engine coolant has degraded nor does it require the engine coolant to be drained, the system to be flushed, or the engine coolant to be replaced.

1.

Verify the customer concern.

2.

Visually check the engine coolant level at the degas bottle when the system is cold.

3.

Make sure the pressure relief cap is installed correctly.

4.

Record any cooling system Diagnostic Trouble Codes (DTCs) retrieved. Refer to the PCM DTC chart in DTC Chart for DTC descriptions.

NOTE: Take note of any coolant odor or steam coming from cooling system components.

5.
If the system coolant is filled correctly and no Diagnostic Trouble Codes (DTCs) associated with fail-safe cooling are retrieved, verify the customer concern by operating the engine to duplicate the condition.

6.

Visually inspect for obvious signs of any mechanical or electrical damage.

Visual Inspection Chart

Mechanical	Electrical
Leaks or weeps at: • Hoses	Inoperative or damaged: • Electric cooling fan

- Tubes
- Clamp joints
- Gaskets
- O-rings
- Thermostat housing
- Transmission fluid cooler
- Radiator
- Pressure relief cap
- Coolant pump
- Heater core (wet floor or coolant odor in vehicle)
- Lower intake manifold
- Degas bottle
- Cylinder block core plugs
- Cylinder head core plugs
- Block heater (if equipped)

Cracked or damaged:

- Hoses
- Tubes
- Hose clamps
- Thermostat housing
- Lower intake manifold
- Radiator
- Pressure relief cap
- Cooling fan
- Coolant pump
- Degas bottle
- Cylinder block core plugs
- Cylinder head core plugs

- Wiring, connectors, relays or modules
- CHT sensor

• Block heater (if equipped) Restricted airflow through the A/C condenser/radiator Drive belt loose, worn or installed incorrectly Broken or weak drive belt tensioner Excessive white or light gray exhaust smoke (may have burnt coolant odor) Coolant in engine oil Engine oil in coolant	

7.

If the inspection reveals an obvious concern that can be readily identified, repair it as necessary.

8.

Inspect the coolant condition.

1.

Inspect the coolant color.

Discoloration may indicate that incorrect coolant may have been added to the system. Use of incorrect (green or yellow in color) coolant degrades the corrosion protection of Motorcraft® Orange Antifreeze/Coolant. Addition of Motorcraft® Specialty Green Engine Coolant may cause the color to appear to be a murky green-brown color. The addition of Motorcraft® Gold Antifreeze/Coolant, however, may not change the color or appearance of the orange-colored coolant. Detection of contamination with Motorcraft® Gold Antifreeze/Coolant is determined by the presence of nitrite. If contamination with Motorcraft® Gold Antifreeze/Coolant is suspected, test the coolant with the 3-Way HD Antifreeze Coolant Test Kit. Follow the nitrite testing directions in the kit to determine if nitrite is present in the system. If nitrite is present, flush the system and refill with the correct mixture of distilled water and Motorcraft® Orange Antifreeze/Coolant Concentrated. REFER to: Cooling System Draining and Vacuum Filling .

A darker orange with the presence of debris could indicate a commercially available stop leak may have been used and could result in loss of coolant flow to critical parts of the engine. If sediment is present, flush the system and refill with the correct mixture of distilled water and Motorcraft® Orange Antifreeze/Coolant Concentrated. REFER to: Cooling System Draining and Vacuum Filling .

A light or reddish brown color indicates that rust may be present in the cooling system. Flush the system and refill with the correct mixture of distilled water and Motorcraft® Orange Antifreeze/Coolant Concentrated. REFER to: Cooling System Draining and Vacuum Filling .

An iridescent sheen on top of the coolant could indicate a trace of oil is entering the system. For engine diagnosis, REFER to: appropriate Engine article. Flush the system and refill with the correct mixture of distilled water and Motorcraft® Orange Antifreeze/Coolant Concentrated. REFER to: Cooling System Draining and Vacuum Filling .

A milky brown color may indicate that engine oil is entering the cooling system. Pressure test the cooling system. Refer to Component Tests . If engine oil is suspected, the cause of the leak may be internal to the engine. For engine diagnosis, REFER to: appropriate Engine article. Flush the system and refill with the correct mixture of distilled water and Motorcraft® Orange Antifreeze/Coolant Concentrated. REFER to: Cooling System Draining and Vacuum Filling .

2.

If the engine coolant appearance is acceptable, test the engine coolant freezing point range with the Coolant/Battery Refractometer. Maintain the coolant concentration within 48% to 50%, which equates to a freeze point between -34°C and - °C (-30°F and -34°F). If the vehicle is driven in cold climates less than -37°C (-34°F), it may be necessary to increase the coolant concentration to get adequate freeze protection. Recommended coolant concentration is 48/52 to 50/50 (freeze protection -34°C to -37°C [-30°F to -34°F]) engine coolant to distilled water.

Maximum coolant concentration is 60/40 for cold weather areas.

Minimum coolant concentration is 40/60 for warm weather areas.

3.

Adjust coolant range and level if necessary:

If coolant is low, add specified coolant mixture only.

If the engine coolant tests too weak, remove some of the engine coolant and add Motorcraft® Orange Antifreeze/Coolant Concentrated until the readings are within acceptable levels.

If the engine coolant tests strong, remove some of the engine coolant and add distilled water until the readings are within acceptable levels.

9.

If an obvious cause for an observed or reported concern is found, correct the cause and test the system for normal operation before proceeding to the next step.

DIAGNOSIS AND TESTING > ENGINE COOLING > SYMPTOM CHART

Diagnostics in this service information assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

Condition	Possible Sources	Actions
Loss of coolant	Refer to the Pinpoint Test	GO to Pinpoint Test A
The engine overheats.	Refer to the Pinpoint Test	GO to Pinpoint Test B
The engine does not reach normal operating temperature.	Refer to the Pinpoint Test	GO to Pinpoint Test C

The block heater does not operate correctly.	Block heater power cable Block heater	CHECK continuity in all 3 power cable circuits. If any circuit measures more than 5 ohms, INSTALL a new power cable. CHECK the resistance of the block heater. If the resistance does not measure between 30 and 40 ohms, INSTALL a new block heater. REFER to: Block Heater .
The electric cooling fan is inoperative in one or more speeds or does not operate correctly.	Wiring Relays Fuses Cooling fan motor Cooling fan resistor	Refer to ENGINE CONTROLS - INTRODUCTION (EXCEPT DIESEL & HYBRID) .
The electric cooling fan stays on all the time.	Wiring Relays	Refer to ENGINE CONTROLS - INTRODUCTION (EXCEPT DIESEL & HYBRID) .
Noisy electric cooling fan operation.	Foreign material contamination Fan motor	REMOVE the foreign material from the cooling fan and shroud. TEST the system for normal operation. If still noisy, INSTALL a new cooling fan assembly. REFER to: Cooling Fan Motor and Shroud .
	Fan blade detached from fan motor	INSTALL a new cooling fan assembly. REFER to: Cooling Fan Motor and Shroud .

DIAGNOSIS AND TESTING > ENGINE COOLING > PINPOINT TESTS

Loss of Coolant

Normal operation and Fault Conditions

The engine cooling system is a closed system providing for coolant expansion and contraction as well as changes in pressure as coolant warms and cools with engine operation. Various gaskets, seals, hoses and clamps contain coolant within the cooling system and keep other fluids and contaminants from entering the cooling system.

Possible Sources

- Coolant hoses or tubes
- Hose clamps
- Thermostat O-ring seal or gasket
- Coolant pump O-ring seal or gasket
- Thermostat housing

- Radiator
- Pressure relief cap
- Coolant pump leaking from weep hole
- Heater core
- Lower intake manifold
- Engine gaskets (may leak internally or externally)
- Degas bottle
- Cylinder block core plugs
- Cylinder head core plugs
- Block heater (if equipped)

DIAGNOSIS AND TESTING > ENGINE COOLING > PINPOINT TESTS > PINPOINT TEST A : PINPOINT TEST > PINPOINT TEST A : PINPOINT TEST

WARNING: Always allow the engine to cool before opening the cooling system. Do not unscrew the coolant pressure relief cap when the engine is operating or the cooling system is hot. The cooling system is under pressure; steam and hot liquid can come out forcefully when the cap is loosened slightly. Failure to follow these instructions may result in serious personal injury.

A1 CARRY OUT INSPECTION AND VERIFICATION

Carry out Inspection and Verification .

Are any concerns present?

Yes	REPAIR as needed.

No	GO to A2

NOTE: Allow the engine to cool before checking the engine coolant level.

A2 CHECK THE ENGINE COOLANT LEVEL AND PRESSURE TEST THE ENGINE COOLING SYSTEM

Ignition OFF

Visually inspect the engine coolant level at the degas bottle and adjust as necessary. Pressure test the engine cooling system. Refer to Component Tests , Cooling System

Pressure Test.

Does the engine cooling system leak externally?

Yes	REPAIR or INSTALL new components.

No	GO to A3

A3 CHECK THE ENGINE COOLANT FOR AN INTERNAL LEAK

Inspect the engine coolant in the degas bottle for signs of engine oil or transmission fluid.

Is engine oil evident in the coolant?

Yes	REFER to: appropriate Engine article.

No	GO to A4

A4 CHECK THE ENGINE OIL FOR COOLANT

Remove the oil level indicator from the engine.

Is coolant evident in the oil?

Yes	REFER to: appropriate Engine article.

No	GO to A5

NOTE: Use UView® Combustion Leak Tester part number UVU560000-R or equivalent.

A5 CHECK THE COOLING SYSTEM FOR COMBUSTION GASES

Using a cooling system combustion gas leak tester, following the instructions supplied with the tester, check the coolant for combustion gases.

Are combustion gases present?

Yes	REFER to: appropriate Engine article.

No	The cooling system is operational.

DIAGNOSIS AND TESTING > ENGINE COOLING > PINPOINT TESTS > PINPOINT TEST B : PINPOINT TEST

The Engine Overheats

Normal operation and Fault Conditions

The engine cooling system maintains the engine temperature during operation. Correct coolant flow through the engine, radiator and remainder of cooling system passages and components is essential to maintaining a correct engine temperature.

Engine coolant flows primarily from the engine to the radiator circuit and back to the coolant pump. Coolant is sent from the coolant pump through the engine block and cylinder head. A separate circuit from the engine also feeds the heater core with coolant. The coolant pump circulates the coolant. The coolant thermostat is a control valve actuated by coolant temperature. When the thermostat is closed, coolant flow bypasses the radiator circuit and returns to the coolant pump. When the thermostat is opened, coolant flows through the radiator circuit to transfer engine-generated heat to the outside air.

Engine overheating generally occurs when there is a disruption in the ability to control either coolant flow at the correct rate, the inability to transfer heat from the engine through the coolant (including low coolant) or an inability to transfer engine-generated heat to the outside air through the radiator.

Possible Sources

- Low coolant level
- External engine coolant leak
- Airlock in system
- Pressure relief cap installation
- Restricted airflow through A/C condenser/radiator
- Internal engine coolant leak
- Coolant condition/concentration
- Non-OEM engine enhancement components
- Electric cooling fan
- CHT sensor
- Radiator
- Thermostat
- Coolant pump
- Coolant flow restriction

Diagnostic Trouble Code (DTC) Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
P0217	Engine Coolant Overtemperature Condition	Sets in the PCM when an engine overheat condition was sensed by the CHT sensor.

P1299	Cylinder Head Overtemperature Protection Active	Sets in the PCM when an engine overheat condition was sensed by the CHT sensor.

DIAGNOSIS AND TESTING > ENGINE COOLING > PINPOINT TESTS > PINPOINT TEST B : PINPOINT TEST > PINPOINT TEST B : PINPOINT TEST

B1 CARRY OUT INSPECTION AND VERIFICATION

Carry out the Inspection and Verification .

Are any concerns present?

Yes	REPAIR as needed.

No	GO to B2

B2 CHECK FOR PCM (POWERTRAIN CONTROL MODULE) DTCS

Ignition ON.

Using a scan tool, perform PCM self-test.

Is DTC P0217 and/or P1299 present?

Yes	GO to B4

No	Actual engine overheating has not been verified. CHECK the engine coolant temperature gauge operation. REFER to: Instrumentation, Message Center and Warning Chimes . If any other PCM DTCs are retrieved, REFER to: ELECTRONIC ENGINE CONTROLS - 3.7L DURATEC (227KW/301PS).

B3 CHECK FOR ACTIVE GRILL SHUDDER DTCS

Review the PCM DTCs.

Are any active grill shudder DTCs present?

Yes	REFER to: Active Grille Shutter .

No	GO to B4

NOTE: Verify no vehicle front end damage is present.

B4 CHECK FOR AN AIRFLOW OBSTRUCTION AND MISSING AIR DEFLECTORS

Check the radiator or A/C condenser for an external obstruction such as leaves or cardboard and verify all air deflectors are present.

Is an airflow obstruction present or air deflectors missing?

Yes	REPAIR as necessary.

No	GO to B5

B5 CHECK THE ENGINE COOLANT LEVEL AND PRESSURE TEST THE COOLING SYSTEM

Ignition OFF.

Visually check the engine coolant level in the coolant expansion tank and adjust as necessary. Pressure test the cooling system.

Does the engine cooling system leak externally?

Yes	REPAIR or INSTALL new components.

No	GO to B6

B6 CHECK THE ENGINE COOLANT FOR AN INTERNAL LEAK

Inspect the engine coolant in the coolant expansion tank for signs of engine oil.

Is engine oil evident in the coolant?

Yes	REFER to: appropriate Engine article.

No	GO to B7

B7 CHECK THE ENGINE OIL FOR COOLANT

Remove the oil level indicator from the engine.

Is coolant evident in the oil?

Yes	REFER to: appropriate Engine article.

No	GO to B8

NOTE: Use UView® Combustion Leak Tester part number UVU560000-R or equivalent.

B8 CHECK THE COOLING SYSTEM FOR COMBUSTION GASES

Using a cooling system combustion gas leak tester, following the instructions supplied with the tester, check the coolant for combustion gases.

Are combustion gases present?

Yes	REFER to: appropriate Engine article.

No	GO to B9

B9 CHECK COOLANT CONDITION

Check the coolant for dirt, rust or contamination and check the coolant concentration.

Is the coolant condition OK?

Yes	GO to B10

No	FLUSH the engine cooling system. REFER to: Cooling System Flushing .

B10 CHECK THE ELECTRIC COOLING FAN OPERATION

Start the engine.

Place the climate control function selector in the MAX A/C position and the blower motor switch in the HI position.

Did the electric cooling fan operate?

Yes	GO to B11

No	DIAGNOSE the electric cooling fan operation. Refer to ENGINE CONTROLS - SYMPTOM CHARTS (EXCEPT DIESEL & HYBRID) .

B11 CHECK THE COOLANT PUMP OPERATION

Start the engine.

Allow the engine to run for 30 minutes. Place the climate control function selector in the MAX HEAT position. Feel the heater outlet hose.

Is the heater outlet hose hot?

Yes	GO to B12

No	INSTALL a new coolant pump. REFER to: Coolant Pump .

NOTE: This cooling system uses a cold side thermostat. The coolant in the radiator must reach full operating temperature for the thermostat to remain in an open state.

Start the engine.

Allow the engine to run for 30 minutes. Place the climate control function selector in the MAX HEAT position. Feel the lower radiator hose.

B12 CHECK THE THERMOSTAT OPERATION

Is the lower radiator hose hot?

Yes	CHECK the temperature gauge operation. REFER to: Instrumentation, Message Center and Warning Chimes .

No	GO to B13

B13 VISUALLY INSPECT THE THERMOSTAT

Carry out the Thermostat Visual Inspection in the Component Tests .

Is the thermostat damaged?

Yes	INSTALL a new thermostat. REFER to: Thermostat .

No	INSTALL a new thermostat. REFER to: Thermostat . If the engine still overheats, INSTALL a new radiator. REFER to: Radiator .

DIAGNOSIS AND TESTING > ENGINE COOLING > PINPOINT TESTS > PINPOINT TEST C : PINPOINT TEST

The Engine Does Not Reach Normal Operating Temperature

Normal operation and Fault Conditions

The engine cooling system maintains engine temperature during operation. Correct coolant flow through the engine, radiator and remainder of cooling system passages and components is essential to maintaining a correct engine temperature.

Engine coolant flows primarily from the engine to the radiator circuit and back to the coolant pump. Coolant is sent from the coolant pump through the engine block and cylinder head. A separate circuit from the engine also feeds the heater core with coolant. The coolant pump circulates the coolant. The coolant thermostat is a control valve actuated by coolant temperature. When the thermostat is closed, coolant flow bypasses the radiator circuit and returns to the coolant pump. When the thermostat is opened, coolant flows through the radiator circuit in order to transfer engine generated heat to the outside air.

Concerns of engine inability to reach normal operating temperature typically occur when the rate of coolant flow through some coolant circuits (radiator, heater core) is more than expected given the conditions. Heat is not allowed to build in the engine because a heat exchanger is removing too much heat, including the radiator, heater core and oil cooler. In addition, perceived concerns that the engine does not reach normal operating temperature can be related to a low coolant level or trapped air which does not allow for hot coolant to be available at the heater core, an inoperative climate control system, or for concerns perceived or related to an incorrect engine temperature gauge indication.

Possible Sources

- Low coolant level
- Thermostat
- Temperature gauge
- CHT

Diagnostic Trouble Code (DTC) Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
P0125	Insufficient Coolant Temp for Closed Loop Fuel Control	Sets in the PCM when the CHT sensor has not achieved the required temperature level to enter closed loop operating conditions within a specified amount of time after starting the engine.
P0128	Coolant Thermostat (Coolant Temp Below Thermostat Regulating Temperature)	Sets in the PCM when the thermostat monitor has not achieved the required engine operating temperature within a specified amount of time after starting the engine.

DIAGNOSIS AND TESTING > ENGINE COOLING > PINPOINT TESTS > PINPOINT TEST C : PINPOINT TEST > PINPOINT TEST C : PINPOINT TEST

WARNING: Always allow the engine to cool before opening the cooling system. Do not unscrew the coolant pressure relief cap when the engine is operating or the cooling system is hot. The cooling system is under pressure; steam and hot liquid can come out forcefully when the cap is loosened slightly. Failure to follow these instructions may result in serious personal injury.

C1 CARRY OUT INSPECTION AND VERIFICATION

Carry out the Inspection and Verification .

Were any concerns found?

Yes	REPAIR as needed.

No	GO to C2

C2 CHECK FOR DTC P0125 OR P0128

Using a scan tool, perform the PCM self-test.

Is DTC P0125 or P0128 present?

Yes	GO to C3

No	The cooling system is operational. If an inoperative temperature gauge is suspected, CHECK the temperature gauge operation. REFER to: Instrumentation, Message Center and Warning Chimes . If an inoperative climate control system is suspected, CHECK the climate control system operation. For Dual Automatic Temperature Control (DATC), REFER to: Climate Control System - Vehicles With: Dual Automatic Temperature Control (DATC) . For Electronic Manual Temperature contro (EMTC), REFER to: Climate Control System - Vehicles With: Electronic Manual Temperature Control (EMTC) . If any other Diagnostic Trouble Codes (DTCs) are retrieved, REFER to: ELECTRONIC ENGINE CONTROLS - 3.7L DURATEC (227KW/301PS).

NOTE: Allow the engine to cool before checking the coolant expansion tank.

Visually check the engine coolant level in the coolant expansion tank

C3 CHECK THE COOLANT LEVEL

Is the engine coolant level within specification?

Yes	INSTALL a new thermostat. REFER to: Thermostat . CLEAR Diagnostic Trouble Codes (DTCs). If the DTC returns check for correct CHT sensor operation.

No	GO to Pinpoint Test A

DIAGNOSIS AND TESTING > ENGINE COOLING > COMPONENT TESTS

Cooling System Pressure Test

WARNING: Always allow the engine to cool before opening the cooling system. Do not unscrew the coolant pressure relief cap when the engine is operating or the cooling system is hot. The cooling system is under pressure; steam and hot liquid can come out forcefully when the cap is loosened slightly. Failure to follow these instructions may result in serious personal injury.

NOTE: Vehicles have a pressure relief cap on the degas bottle and no radiator cap.

1.

Turn the engine OFF.

2.

Check the engine coolant level and adjust as necessary.

3.

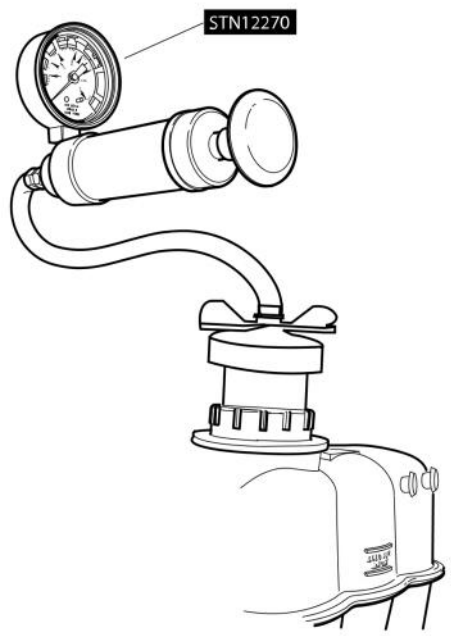
Remove the degas bottle cap. Inspect the degas bottle cap and degas bottle for any issues that would cause improper sealing, such as for cross-threading, burrs, damaged o-ring, etc. If any issues are found, INSTALL a new cap and/or degas bottle.

4.

Attach the Pressure Tester and adaptor (Snap-On TA53 or equivalent), to the degas bottle cap. The cap must hold pressure of 145 kPa +/- 21 kPa (21 PSI +/- 3 PSI). If any issues are found, INSTALL a new cap.

5.

Attach the Pressure Tester and adaptor (Snap-On TA52, AST ASSFZ-47, Redline RDL95-0750 or equivalent) to the degas bottle.



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NOTE: Do not pressurize the cooling system beyond the maximum pressure listed in the SPECIFICATIONS , or cooling system components can be damaged.

NOTE: If the plunger of the pressure tester is pressed too fast, an erroneous pressure reading will result.

6.

To pressurize the engine cooling system, slowly press the plunger of the pressure test pump and increase the pressure to between 124 - 138 kPa (18 - 20 PSI). Observe the gauge reading for approximately 2 minutes. Pressure should not drop during this time. If the pressure drops within this time, inspect for leaks and repair as necessary.

7.

If no leaks are found and the pressure drops, the leak may be internal to the engine. Inspect the coolant for engine oil and the engine oil for coolant. REFER to: appropriate Engine article.

8.

If the pressure does not drop remove the cooling system Pressure Tester and adaptor from degas bottle.

9.

Install the degas bottle cap until it contacts the hard stop.

Thermostat

Install a new thermostat only after at least one of the following tests and checks have been carried out:

- Pinpoint Test B or C
- Thermostat Visual Inspection

Thermostat Visual Inspection

1.

Remove the thermostat.

2.

Examine the thermostat for signs of damage including:

- Valve not fully seated (light visible through the valve)
- Foreign material lodged in the main valve
- Bent or broken frame or flange
- Bent or broken spring
- Wax leaking from wax reservoir or a bulge in the reservoir
- Any other damage or distortion

NOTE: If no damage is found during the inspection, do not attempt to open the thermostat using hot water or other heat sources. This method is not an accurate means to test the function of the thermostat and may damage the thermostat.

3.
If damage is found during the inspection, remove any foreign material or broken pieces and install a new thermostat.

Radiator Leak Test, Removed From Vehicle

NOTE: Never leak test an aluminum radiator in the same water that copper/brass radiators are tested in. Flux and caustic cleaners may be present in the cleaning tank and they will damage aluminum radiators.

NOTE: Clean the radiator before leak testing to avoid contamination of tank.

1.

Leak test the radiator in clean water with air pressurized to the maximum pressure listed in the SPECIFICATIONS .

GENERAL PROCEDURES > COOLING SYSTEM DRAINING AND VACUUM FILLING

Special Tool(s) / General Equipment

 ST1720-A	ROB75240 Coolant/Battery Refractometer (Fahrenheit)
Fluid Container	
Cooling System Vacuum Tester and Refiller	

Materials

Name	Specification
Motorcraft® Orange Antifreeze/Coolant Prediluted (U.S.) VC-3DIL-B (U.S.)	WSS-M97B44-D2
Motorcraft® Orange Antifreeze/Coolant Concentrated (U.S.) VC-3-B (U.S.)	WSS-M97B44-D

Draining

NOTE: The coolant must be recovered in a suitable, clean container for reuse. If the coolant is contaminated, it must be recycled or disposed of correctly. Using contaminated coolant may result in damage to the engine or cooling system components.

NOTE: The vehicle cooling system is filled with Motorcraft® Orange Antifreeze/Coolant. Do not mix coolant types. Mixing coolant types degrades the corrosion protection of the coolant. Failure to follow these instructions may damage the engine or cooling system.

NOTE: Always fill the cooling system with the manufacturer's specified coolant. Chemically flush the cooling system if a non-specified coolant has been used. Refer to Cooling System Flushing . Failure to follow these instructions may damage the engine or cooling system.

NOTE: During normal vehicle operation, Motorcraft® Orange Antifreeze/Coolant may change color from orange to pink or light red. As long as the engine coolant is clear and uncontaminated, this color change does not indicate the engine coolant has degraded nor does it require the engine coolant to be drained, the system to be flushed, or the engine coolant to be replaced.

NOTE: Less than 80% of coolant capacity can be recovered with the engine in the vehicle. Dirty, rusty or contaminated coolant requires replacement.

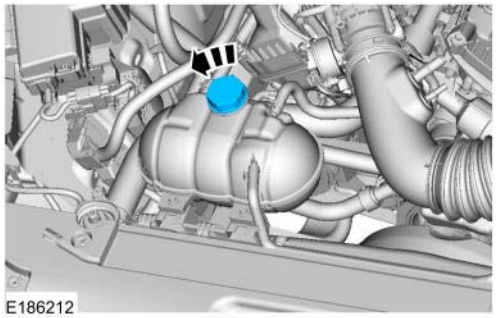
1.





WARNING: When releasing the cooling system pressure, cover the coolant expansion tank cap with a thick cloth.

Remove the pressure relief cap.

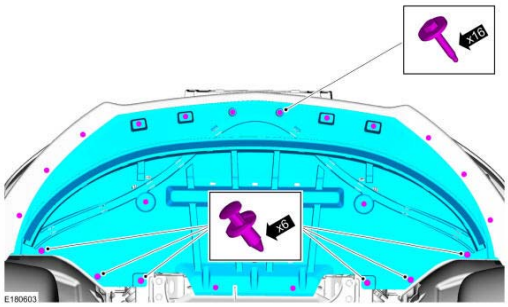


2.

With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

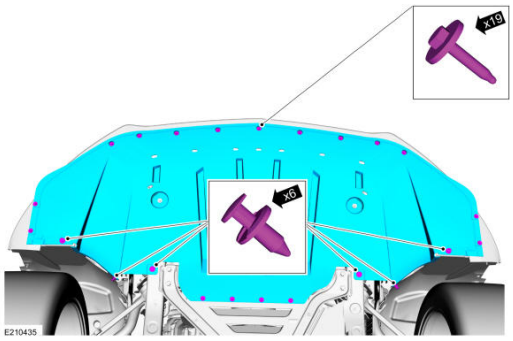
NOTE: If equipped.

3.
Remove the underbody shield.



NOTE: If equipped.

4.
Remove the underbody shield.



5.

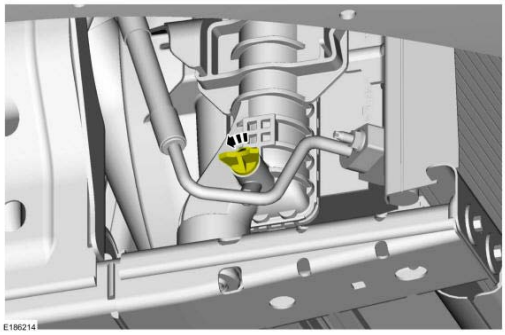


WARNING: Be prepared to collect escaping fluid.

Use a hose to drain the coolant.

Open the radiator drain valve and drain the engine coolant in a suitable, clean container.

Use the General Equipment: Fluid Container



Filling

Filling and Bleeding with a Vacuum Cooling System Filler

1.

NOTE: The cooling system is filled with Motorcraft® Orange Antifreeze/Coolant. Do not mix coolant types. Mixing coolant types degrades the corrosion protection of the coolant. Failure to follow these instructions may damage the engine or cooling system.

NOTE: Engine coolant provides boil protection, corrosion protection, freeze protection, and cooling efficiency to the engine and cooling components. In order to obtain these protections, maintain the engine coolant at the correct concentration and fluid level in the degas bottle.

NOTE: Add Motorcraft® Orange Antifreeze/Coolant or equivalent.

NOTE: Do not add or mix with any other type of engine coolant. Mixing coolants may degrade the coolant's corrosion protection.

NOTE: Do not add alcohol, methanol, or brine, or any engine coolants mixed with alcohol or methanol antifreeze. These can cause engine damage from overheating or freezing.

NOTE: Ford Motor Company does NOT recommend the use of recycled engine coolant in vehicles originally equipped with Motorcraft® Orange Antifreeze/Coolant since a Ford-approved recycling process is not yet available.

When adding or topping off the engine coolant:

Measure the coolant concentration in the vehicle.

Use Special Service Tool: ROB75240 Coolant/Battery Refractometer (Fahrenheit).

Determine the concentration desired based on the vehicle duty cycle of extreme hot or cold operating conditions.

Add, top-off or adjust the coolant as follows:

For concentrations measured 48/52 to 50/50 (freeze protection -34°C to -37°C [-30°F to -34°F]) use Motorcraft® Orange Antifreeze/Coolant Prediluted to maintain a coolant concentration in this same range.

Material

: Motorcraft® Orange Antifreeze/Coolant Prediluted (U.S.) / VC-3DIL-B (U.S.) (WSS-M97B44-D2)

For all other concentrations, use Motorcraft® Orange Antifreeze/Coolant Concentrated and/or distilled water to get to the desired concentration.

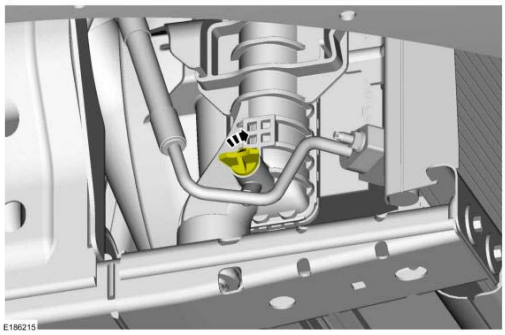
Material

: Motorcraft® Orange Antifreeze/Coolant Concentrated (U.S.) / VC-3-B (U.S.) (WSS-M97B44-D)

When refilling the engine coolant after a flush procedure, use a mixture of Motorcraft® Orange Antifreeze/Coolant Concentrated and distilled water to get to the desired concentration.

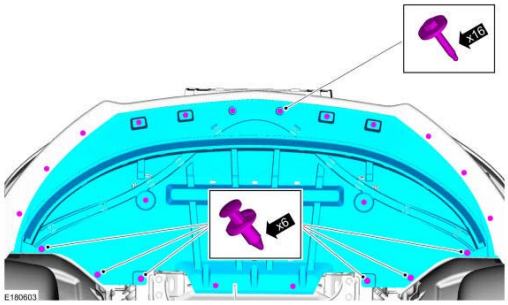
2.

Close the radiator drain valve.



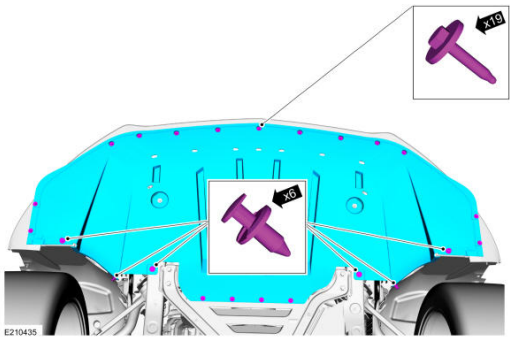
NOTE: If equipped.

3.
Install the underbody shield.



NOTE: If equipped.

4.
Install the underbody shield.



5.

Install the vacuum cooling system filler and follow the manufacturer's instructions to fill and bleed the system.

Use the General Equipment: Cooling System Vacuum Tester and Refiller

6.

Recommended coolant concentration is 48/52 to 50/50 engine coolant to distilled water (freeze protection -34°C to -37°C [-30°F to -34°F]).

7.

For extremely cold climates (less than -37?C [-34?F]):

It may be necessary to increase the coolant concentration above 50%.

NEVER increase the coolant concentration above 60%.

Maximum coolant concentration is 60/40 for cold weather areas.

A coolant concentration of 60% provides freeze protection down to -50?C (-58?F)

Engine coolant concentrations above 60% will decrease the overheat protection characteristics of the engine coolant and may damage the engine.

8.

For extremely hot climates:

It is still necessary to maintain the coolant concentration above 40%.

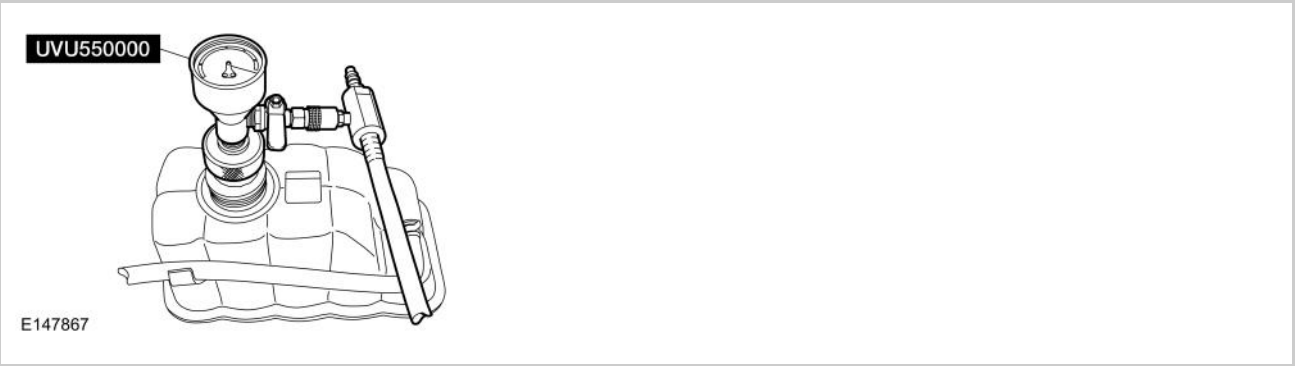
NEVER decrease the coolant concentration below 40%.

Minimum coolant concentration is 40/60 for warm weather areas.

Engine coolant concentrations below 40% will decrease the freeze and corrosion protection characteristics of the engine coolant and may damage the engine.

9.

Vehicles driven year-round in non-extreme climates should use a 48/52 to 50/50 (freeze protection -34°C to -37°C [-30°F to -34°F]) mixture of engine coolant and distilled water for optimum cooling system and engine protection.



Filling and Bleeding without a Vacuum Cooling System Filler

10.

NOTE: The cooling system is filled with Motorcraft® Orange Antifreeze/Coolant. Do not mix coolant types. Mixing coolant types degrades the corrosion protection of the coolant. Failure to follow these instructions may damage the engine or cooling system.

NOTE: Engine coolant provides boil protection, corrosion protection, freeze protection, and cooling efficiency to the engine and cooling components. In order to obtain these protections, maintain the engine coolant at the correct concentration and fluid level in the degas bottle.

NOTE: Add Motorcraft® Orange Antifreeze/Coolant or equivalent.

NOTE: Do not add or mix with any other type of engine coolant. Mixing coolants may degrade the coolant's corrosion protection.

NOTE: Do not add alcohol, methanol, or brine, or any engine coolants mixed with alcohol or methanol antifreeze. These can cause engine damage from overheating or freezing.

NOTE: Ford Motor Company does NOT recommend the use of recycled engine coolant in vehicles originally equipped with Motorcraft® Orange Antifreeze/Coolant since a Ford-approved recycling process is not yet available.

When adding or topping off the engine coolant:

Measure the coolant concentration in the vehicle.

Use Special Service Tool: ROB75240 Coolant/Battery Refractometer (Fahrenheit).

Determine the concentration desired based on the vehicle duty cycle of extreme hot or cold operating conditions.

Add, top-off or adjust the coolant as follows:

For concentrations measured 48/52 to 50/50 (freeze protection -34°C to -37°C [-30°F to -34°F]) use Motorcraft® Orange Antifreeze/Coolant Prediluted to maintain a coolant concentration in this same range.

Material

: Motorcraft® Orange Antifreeze/Coolant Prediluted (U.S.) / VC-3DIL-B (U.S.) (WSS-M97B44-D2)

For all other concentrations, use Motorcraft® Orange Antifreeze/Coolant Concentrated

and/or distilled water to get to the desired concentration.

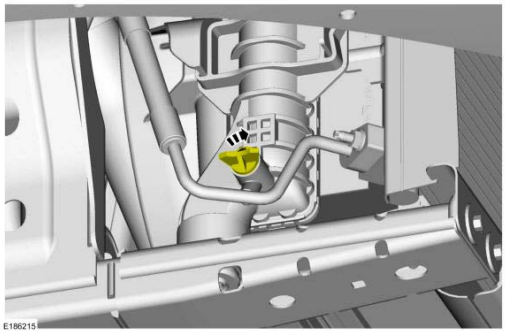
Material

: Motorcraft® Orange Antifreeze/Coolant Concentrated (U.S.) / VC-3-B (U.S.) (WSS-M97B44-D)

When refilling the engine coolant after a flush procedure, use a mixture of Motorcraft® Orange Antifreeze/Coolant Concentrated and distilled water to get to the desired concentration.

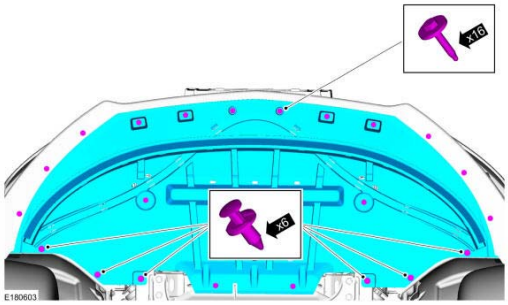
11.

Close the radiator drain valve.



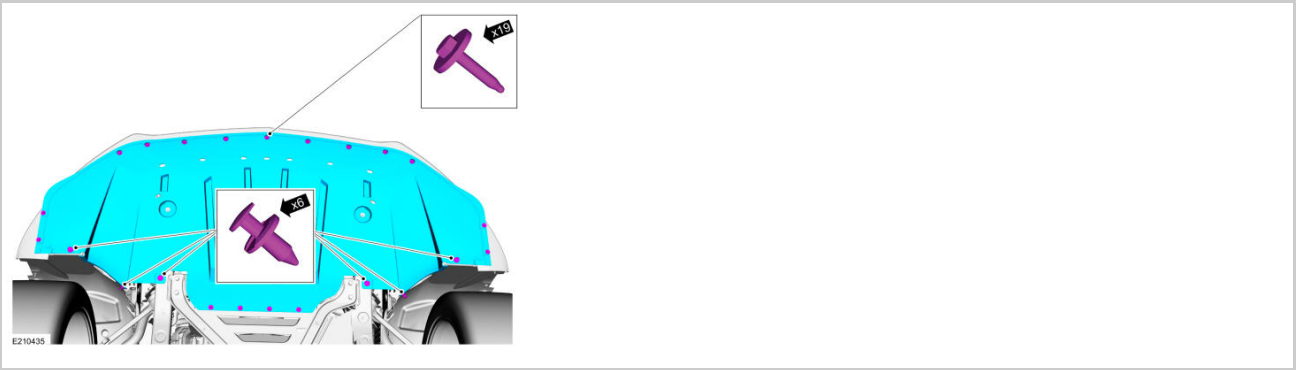
NOTE: If equipped.

12.
Install the underbody shield.



NOTE: If equipped.

13.
Install the underbody shield.



14.

Fill the degas bottle to the MAX FILL line.

15.

Recommended coolant concentration is 48/52 to 50/50 engine coolant to distilled water (freeze protection -34°C to -37?C [-30°F to -34°F]).

16.

For extremely cold climates (less than -37°C [-34°F]):

It may be necessary to increase the coolant concentration above 50%.

NEVER increase the coolant concentration above 60%.

Maximum coolant concentration is 60/40 for cold weather areas.

A coolant concentration of 60% provides freeze protection down to -50°C (-58°F)

Engine coolant concentrations above 60% will decrease the overheat protection characteristics of the engine coolant and may damage the engine.

17.

For extremely hot climates:

It is still necessary to maintain the coolant concentration above 40%.

NEVER decrease the coolant concentration below 40%.

Minimum coolant concentration is 40/60 for warm weather areas.

Engine coolant concentrations below 40% will decrease the freeze and corrosion protection characteristics of the engine coolant and may damage the engine.

18.

Vehicles driven year-round in non-extreme climates should use a 48/52 to 50/50 (freeze protection -34°C to -37°C [-30°F to -34°F]) mixture of engine coolant and distilled water for optimum cooling system and engine protection.

19.

Install the degas bottle cap until it contacts the hard stop.

20.

Turn the climate control system off.

21.

Start the engine and increase the engine speed to 3, 500 rpm and hold for 30 seconds.

22.

Turn the engine off for and wait for 1 minute to purge any large air pockets from the cooling system.

23.

> *WARNING: Always allow the engine to cool before opening the cooling system. Do not unscrew the coolant pressure relief cap when the engine is operating or the cooling system is hot. The cooling system is under pressure; steam and hot liquid can come out forcefully when the cap is loosened slightly. Failure to follow these instructions may result in serious personal injury.*

Check the engine coolant level in degas bottle and if necessary fill to the top of the MAX FILL line on the degas bottle if the engine is warm or to the top of the MIN FILL LEVEL if the engine is cold.

24.

Start the engine and let it idle until the engine reaches normal operating temperature and the thermostat is fully open. A fully open thermostat is verified by the cooling fan cycling on at least once.

25.

Increase the engine speed to 3, 500 rpm and hold for 30 seconds.

26.

Allow the engine to idle for 30 seconds.

27.

Turn the engine off for 1 minute.

28.

Repeat steps 25 through 27 a total of 5 times to remove any remaining air trapped in the system.

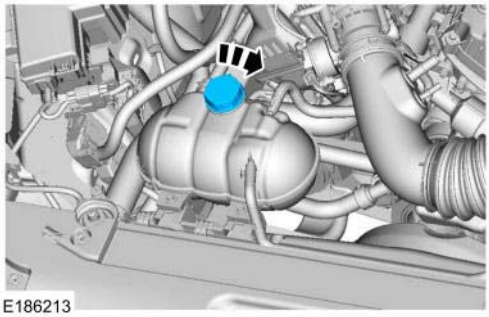
29.

WARNING: Always allow the engine to cool before opening the cooling system. Do not unscrew the coolant pressure relief cap when the engine is operating or the cooling system is hot. The cooling system is under pressure; steam and hot liquid can come out forcefully when the cap is loosened slightly. Failure to follow these instructions may result in serious personal injury.

Check the engine coolant level in degas bottle and if necessary fill to the top of the MAX FILL line on the degas bottle.

30.

Install the pressure relief cap.



GENERAL PROCEDURES > COOLING SYSTEM FLUSHING

Materials

Name	Specification
Motorcraft® Premium Cooling System Flush VC-1	ESR-M14P7-A

Flushing

WARNING: Always allow the engine to cool before opening the cooling system. Do not unscrew the coolant pressure relief cap when the engine is operating or the cooling system is hot. The cooling system is under pressure; steam and hot liquid can come out forcefully when the cap is loosened slightly. Failure to follow these instructions may result in serious personal injury.

NOTE: To remove rust, sludge and other foreign material from the cooling system, use cooling system flush that is safe for use with aluminum radiators. This cleaning restores cooling system efficiency and helps prevent overheating. A pulsating or reversed direction of flushing water will loosen sediment more quickly than a steady flow in the normal coolant flow direction. In severe cases where cleaning solvents will not clean the cooling system efficiently, it will be necessary to use the pressure flushing method using cooling system

flusher. Dispose of old coolant and flushing water contaminated with antifreeze and cleaning chemicals in accordance with local, state or federal laws.

1.

Add Motorcraft® Premium Cooling System Flush to the cooling system and follow the directions on the package.

Material

: Motorcraft® Premium Cooling System Flush / VC-1 (ESR-M14P7-A)

2.

Drain the cooling system. Refer to: Cooling System Draining and Vacuum Filling .

3.

Remove the radiator. Refer to: Radiator .

NOTE: Radiator internal pressure must not exceed 138 kPa (20 psi). Damage to the radiator can result.

4.
Backflush the radiator with radiator turned so the upper radiator hose is at the top and with a high-pressure hose in the upper hose location.

5.

Remove the thermostat. Refer to: Thermostat .

6.

Install the coolant inlet connection without the thermostat.

Torque

: 89 lb.in (10 Nm)

7.

Backflush the engine. Position the high-pressure water hose into the engine through the upper radiator hose and backflush the engine.

8.

Install the thermostat. Refer to: Thermostat .

9.

Install the radiator. Refer to: Radiator .

10.

Fill and bleed the cooling system. Refer to: Cooling System Draining and Vacuum Filling .

GENERAL PROCEDURES > HEATER CORE BACKFLUSHING

Materials

Name	Specification
Motorcraft® Premium Cooling System Flush VC-1	ESR-M14P7-A

Flushing

WARNING: Always allow the engine to cool before opening the cooling system. Do not unscrew the coolant pressure relief cap when the engine is operating or the cooling system is hot. The cooling system is under pressure; steam and hot liquid can come out forcefully when the cap is loosened slightly. Failure to follow these instructions may result in serious personal injury.

1.

Partially drain the cooling system. Refer to: Cooling System Draining and Vacuum Filling .

2.

Add Premium Cooling System Flush to backflush the heater core and follow the directions on the package. Flush with water thoroughly after using Premium Cooling System Flush prior to refilling the cooling system.

Material

: Motorcraft® Premium Cooling System Flush / VC-1 (ESR-M14P7-A)

3.

Fill and bleed the cooling system. Refer to: Cooling System Draining and Vacuum Filling

REMOVAL AND INSTALLATION > BLOCK HEATER > REMOVAL

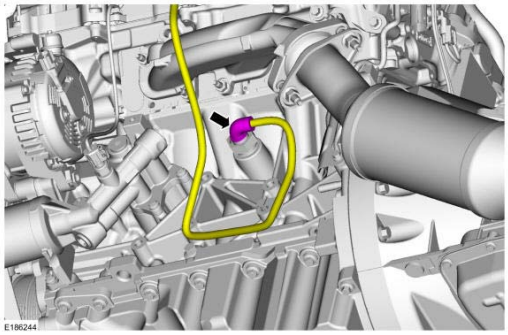
NOTE: Removal steps in this procedure may contain installation details.

1.

Drain the cooling system. Refer to: Cooling System Draining and Vacuum Filling .

NOTE: Make sure the block heater wiring is routed and secured away from rotating or hot components.

2.
Disconnect the block heater electrical connector.

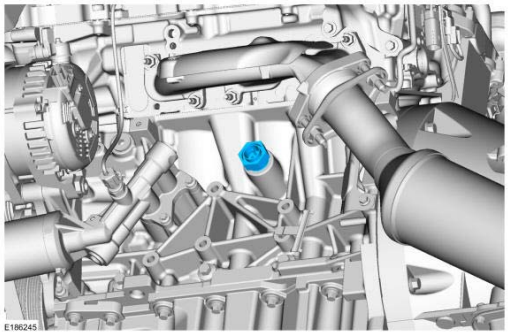


3.

Remove the block heater.

Torque

: 30 lb.ft (40 Nm)



REMOVAL AND INSTALLATION > BLOCK HEATER > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Fill and bleed the cooling system. Refer to: Cooling System Draining and Vacuum Filling .

REMOVAL AND INSTALLATION > COOLANT PUMP

Materials

Name	Specification
Motorcraft® Orange Antifreeze/Coolant Concentrated (U.S.) VC-3-B (U.S.)	WSS-M97B44-D

REMOVAL AND INSTALLATION > COOLANT PUMP > REMOVAL

1.

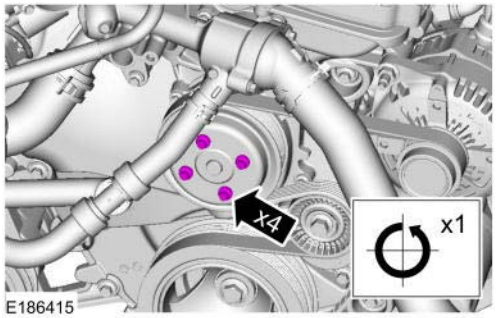
Drain the cooling system. Refer to: Cooling System Draining and Vacuum Filling .

2.

Remove the air cleaner outlet pipe. Refer to: AIR CLEANER OUTLET PIPE .

3.

Loosen the coolant pump pulley bolts.



4.

Remove the accessory drive belt. Refer to: ACCESSORY DRIVE BELT - 3.7L Duratec (227kW/301PS).

NOTE: Cover the A/C compressor belt to prevent coolant contamination of the belt.

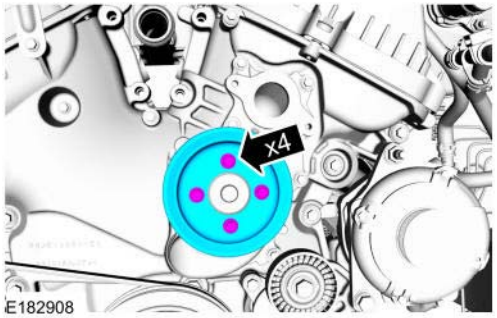
5.
Completely cover the A/C compressor belt with waterproof plastic.

6.

Remove the thermostat housing. Refer to: Thermostat Housing .

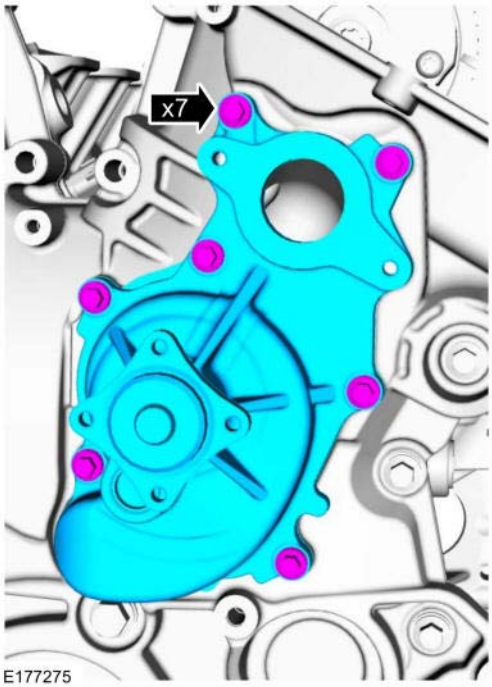
7.

Remove the bolts and the coolant pump pulley.



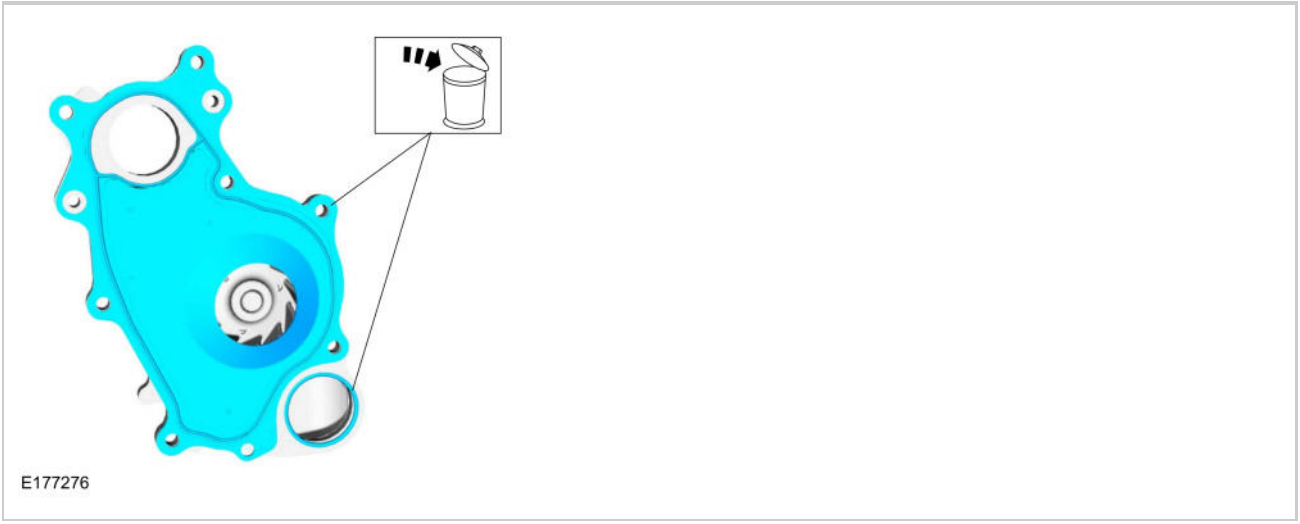
8.

Remove the bolts and the coolant pump.



9.

Remove and discard the coolant pump gasket and O-ring seal.



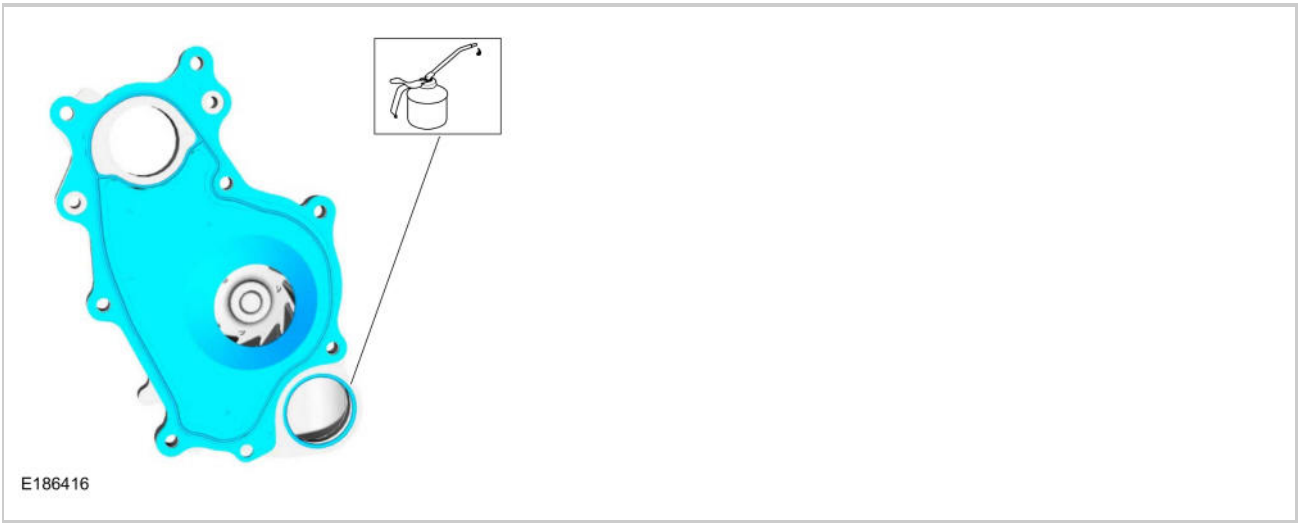
REMOVAL AND INSTALLATION > COOLANT PUMP > INSTALLATION

1.

Install a new coolant pump gasket and O-ring seal and lubricate the O-ring seal with clean engine coolant.

Material

: Motorcraft® Orange Antifreeze/Coolant Concentrated (U.S.) / VC-3-B (U.S.) (WSS-M97B44-D)



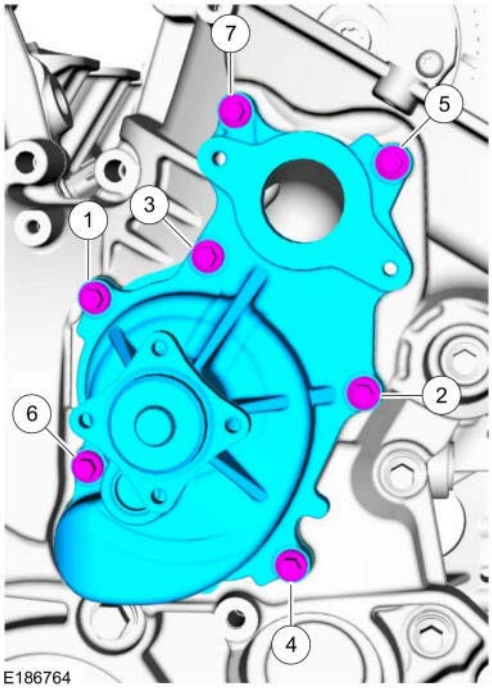
2.

Install the coolant pump, the 7 bolts and tighten in the sequence shown in 2 stages.

Torque:

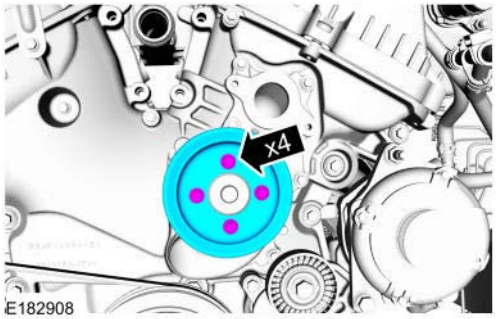
Stage 1: 89 lb.in (10 Nm)

Stage 2: 45°



NOTE: Only tighten the bolts finger tight at this stage.

3.
Position the coolant pump pulley and install the bolts finger tight.



4.

Install the thermostat housing. Refer to: Thermostat Housing .

5.

Remove the plastic from the A/C compressor belt.

6.

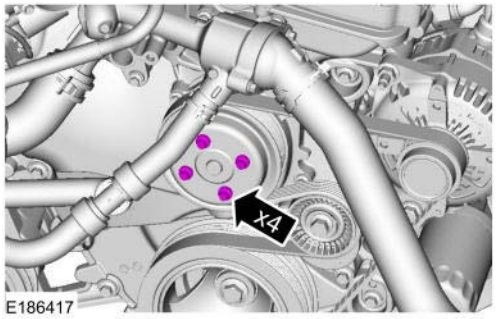
Install the accessory drive belt. Refer to: ACCESSORY DRIVE BELT - 3.7L Duratec (227kW/301PS).

7.

Tighten the coolant pump pulley bolts.

Torque

: 18 lb.ft (24 Nm)



8.

Install the air cleaner outlet pipe. Refer to: AIR CLEANER OUTLET PIPE .

9.

Fill and bleed the cooling system. Refer to: Cooling System Draining and Vacuum Filling .

REMOVAL AND INSTALLATION > COOLING FAN MOTOR AND SHROUD > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

Remove the air cleaner. Refer to: AIR CLEANER - 3.7L Duratec (227kW/301PS).

2.

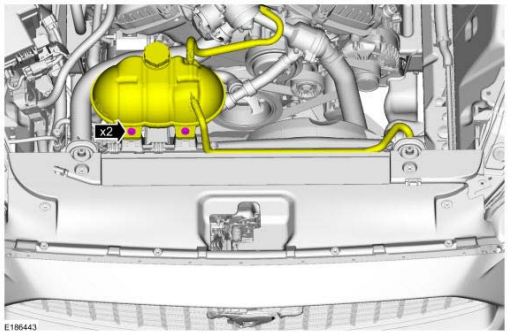
Remove the air cleaner outlet pipe. Refer to: AIR CLEANER OUTLET PIPE .

3.

Remove the bolts and position the degas bottle aside.

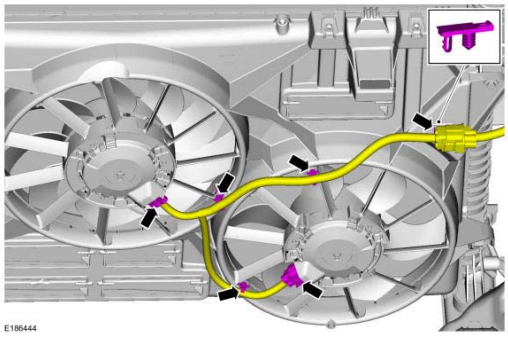
Torque

: 80 lb.in (9 Nm)



4.

Disconnect the cooling fan electrical connectors and detach the wiring harness retainers.

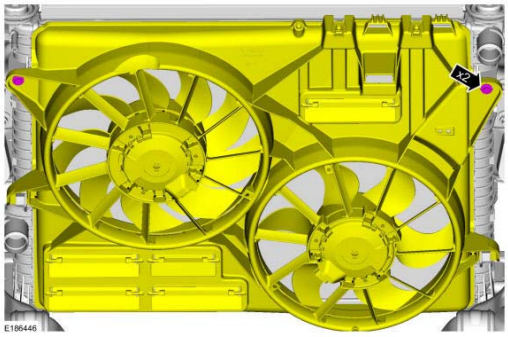


5.

Remove the bolts.

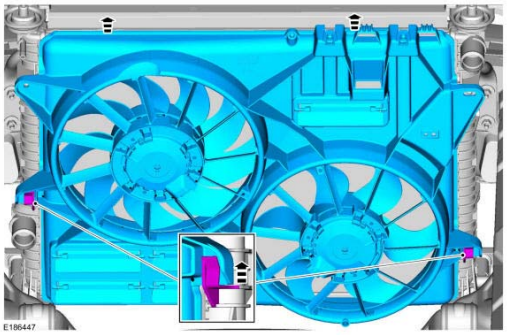
Torque

: 53 lb.in (6 Nm)



6.

Remove the cooling fan motor and shroud.



REMOVAL AND INSTALLATION > COOLING FAN MOTOR AND SHROUD > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > DEGAS BOTTLE

Special Tool(s) / General Equipment

Fluid Suction Gun
Hose Clamp Remover/Installer
Locking Pliers

Materials

Name	Specification
Motorcraft® Orange Antifreeze/Coolant Prediluted (U.S.) VC-3DIL-B (U.S.)	WSS-M97B44-D2
Motorcraft® Orange Antifreeze/Coolant Concentrated (U.S.) VC-3-B (U.S.)	WSS-M97B44-D

REMOVAL AND INSTALLATION > DEGAS BOTTLE > REMOVAL

WARNING: Always allow the engine to cool before opening the cooling system. Do not unscrew the coolant pressure relief cap when the engine is operating or the cooling system is hot. The cooling system is under pressure; steam and hot liquid can come out forcefully when the cap is loosened slightly. Failure to follow these instructions may result in serious personal injury.

NOTE: Removal steps in this procedure may contain installation details.

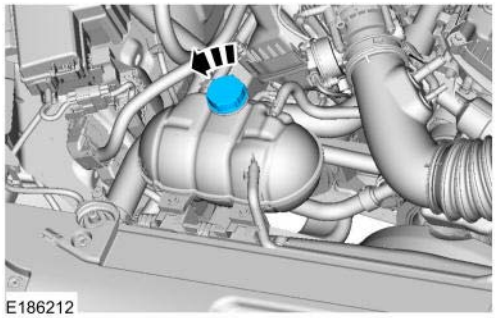
1.





WARNING: When releasing the cooling system pressure, cover the coolant expansion tank cap with a thick cloth.

Remove the pressure relief cap.

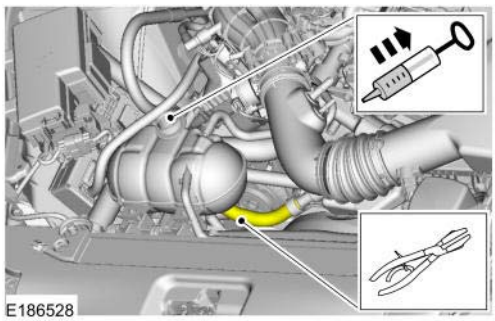


2.

Using general tools clamp the lower degas bottle hose and syphon the coolant from the degas bottle.

Use the General Equipment: Fluid Suction Gun

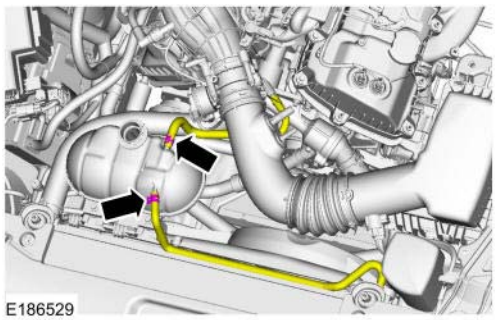
Use the General Equipment: Locking Pliers



3.

Release the clamps, disconnect the upper degas bottle hoses.

Use the General Equipment: Hose Clamp Remover/Installer

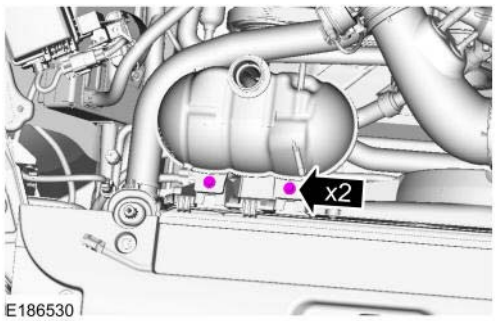


4.

Remove the bolts.

Torque

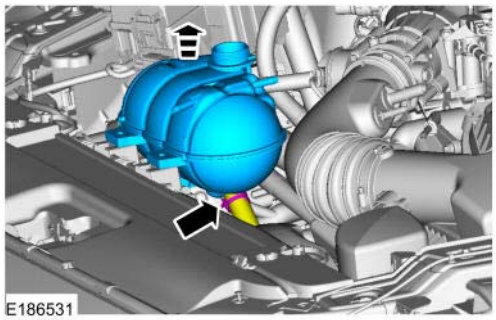
: 80 lb.in (9 Nm)



5.

Position the degas bottle and disconnect the lower coolant hose.

Use the General Equipment: Hose Clamp Remover/Installer



REMOVAL AND INSTALLATION > DEGAS BOTTLE > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Fill the degas bottle with the recommended coolant mixture and fill level.

Material

: Motorcraft® Orange Antifreeze/Coolant Concentrated (U.S.) / VC-3-B (U.S.) (WSS-M97B44-D)

Material

: Motorcraft® Orange Antifreeze/Coolant Prediluted (U.S.) / VC-3DIL-B (U.S.) (WSS-M97B44-D2)

REMOVAL AND INSTALLATION > RADIATOR

Special Tool(s) / General Equipment

Hose Clamp Remover/Installer

REMOVAL AND INSTALLATION > RADIATOR > REMOVAL

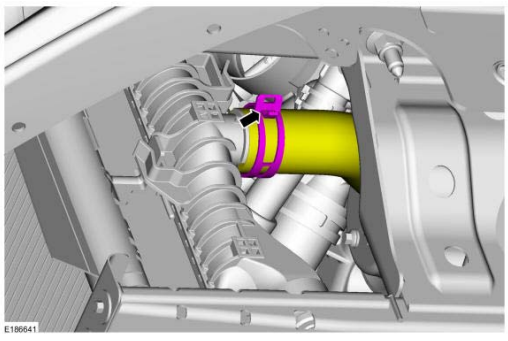
NOTE: Removal steps in this procedure may contain installation details.

1.

Drain the cooling system. Refer to: Cooling System Draining and Vacuum Filling .

2.

Release the clamp and disconnect the lower radiator hose.Use the General Equipment: Hose Clamp Remover/Installer

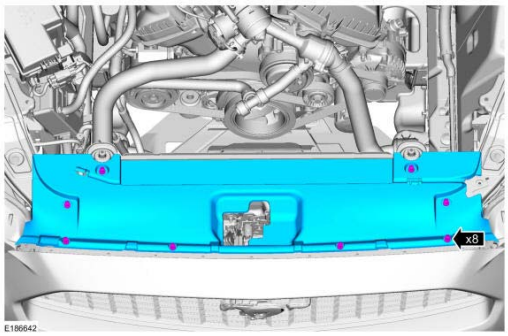


3.

Remove the cooling fan motor and shroud. Refer to: Cooling Fan Motor and Shroud .

4.

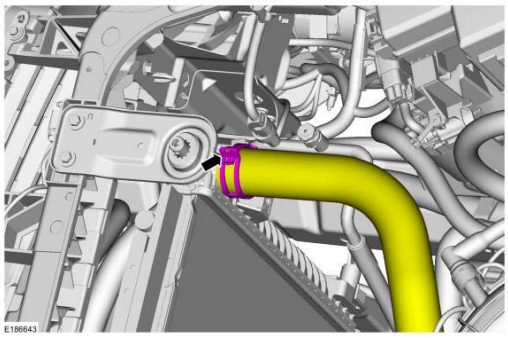
Remove the retainers and the radiator sight shield.



5.

Release the clamp and disconnect the upper radiator hose.

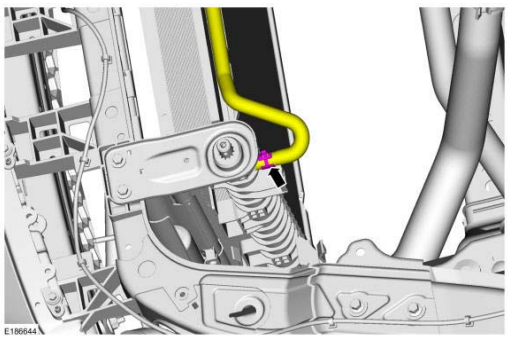
Use the General Equipment: Hose Clamp Remover/Installer



6.

Release the clamp and disconnect the upper coolant hose.

Use the General Equipment: Hose Clamp Remover/Installer

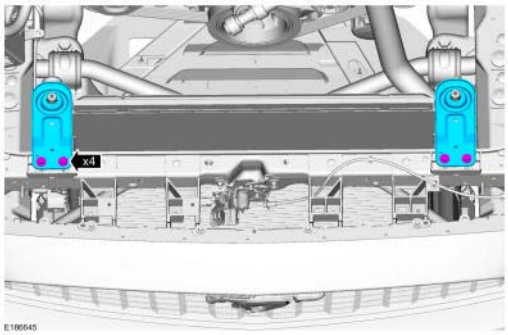


7.

Remove the bolts and the upper radiator support brackets.

Torque

: 97 lb.in (11 Nm)



NOTE: Front bumper removed for clarity.

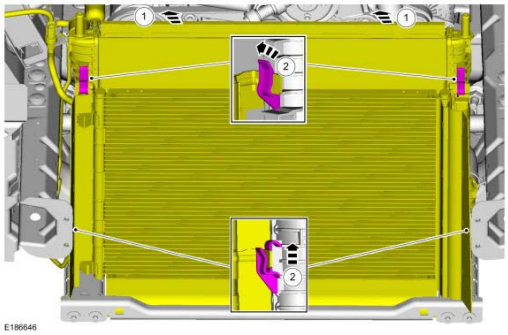
8.

1.

Position the radiator towards the engine.

2.

Release the upper tabs and position the A/C condenser aside.



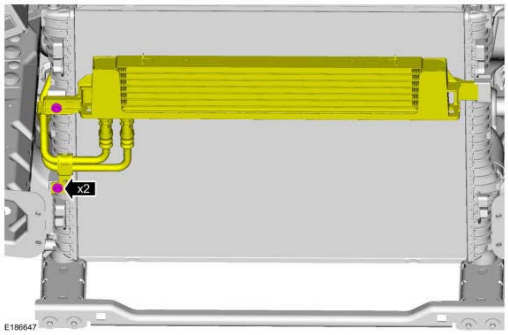
NOTE: If equipped.

NOTE: Front bumper removed for clarity.

9.
Remove the bolts and position aside the transmission fluid cooler.

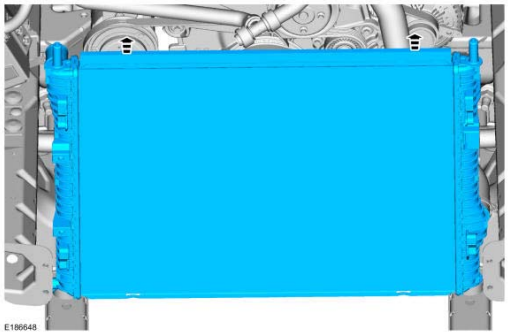
Torque

: 53 lb.in (6 Nm)



NOTE: Front bumper removed for clarity.

10.
Remove the radiator.



REMOVAL AND INSTALLATION > RADIATOR > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Fill and bleed the cooling system. Refer to: Cooling System Draining and Vacuum Filling .

REMOVAL AND INSTALLATION > THERMOSTAT

Materials

Name	Specification
Motorcraft® Orange Antifreeze/Coolant Concentrated (U.S.) VC-3-B (U.S.)	WSS-M97B44-D

REMOVAL AND INSTALLATION > THERMOSTAT > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

Drain the cooling system. Refer to: Cooling System Draining and Vacuum Filling .

2.

Remove the air cleaner outlet pipe. Refer to: AIR CLEANER OUTLET PIPE .

NOTE: Cover the accessory drive belts to prevent coolant contamination of the belts.

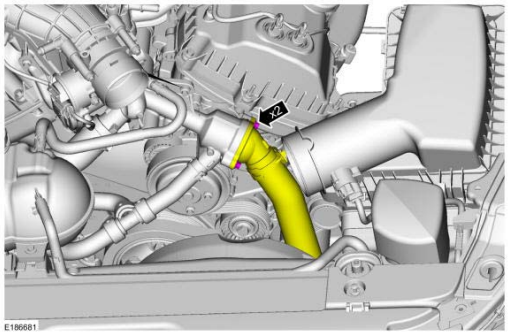
3.
Completely cover the accessory drive belts with waterproof plastic.

NOTE: During installation, make sure the coolant outlet connection is fully seated on the thermostat housing before tightening the bolts.

4.
Remove the bolts and detach the coolant inlet connector.

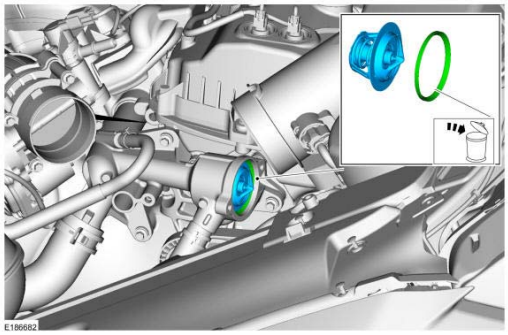
Torque

: 89 lb.in (10 Nm)



5.

Remove the thermostat and discard the O-ring seal.



REMOVAL AND INSTALLATION > THERMOSTAT > INSTALLATION

1.

1.

Install a new O-ring seal and lubricate it with clean engine coolant.

Material

: Motorcraft® Orange Antifreeze/Coolant Concentrated (U.S.) / VC-3-B (U.S.) (WSS-M97B44-D)

2.

To install, reverse the removal procedure.

2.

Fill and bleed the cooling system. Refer to: Cooling System Draining and Vacuum Filling .

REMOVAL AND INSTALLATION > THERMOSTAT HOUSING

Special Tool(s) / General Equipment

Hose Clamp Remover/Installer

Materials

Name	Specification
Motorcraft® Orange Antifreeze/Coolant Concentrated (U.S.) VC-3-B (U.S.)	WSS-M97B44-D

REMOVAL AND INSTALLATION > THERMOSTAT HOUSING > REMOVAL

1.

Drain the cooling system. Refer to: Cooling System Draining and Vacuum Filling .

2.

Remove the air cleaner outlet pipe. Refer to: AIR CLEANER OUTLET PIPE .

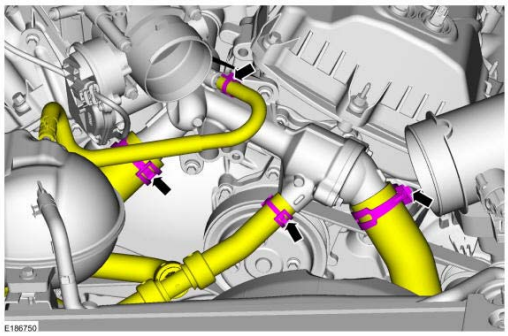
> *NOTE: Cover the accessory drive belts to prevent coolant contamination of the belts.*

3.
Completely cover the accessory drive belts with waterproof plastic.

4.

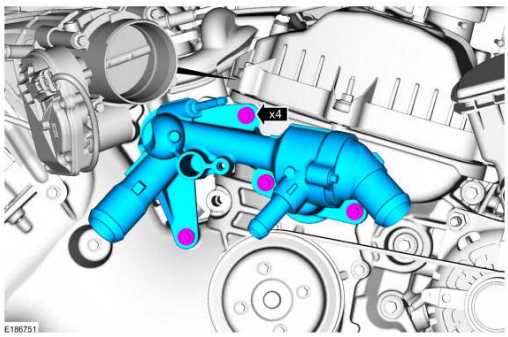
Release the clamps and disconnect the coolant hoses.

Use the General Equipment: Hose Clamp Remover/Installer



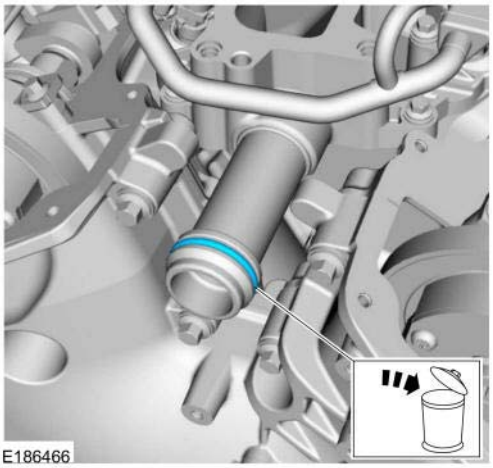
5.

Remove the bolts and the thermostat housing.



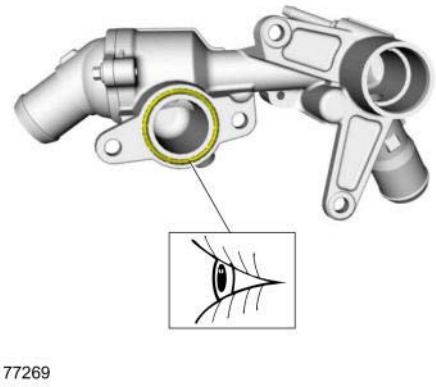
6.

Remove and discard the O-ring seal.



NOTE: Inspect the O-ring seal and replace if necessary.

7.



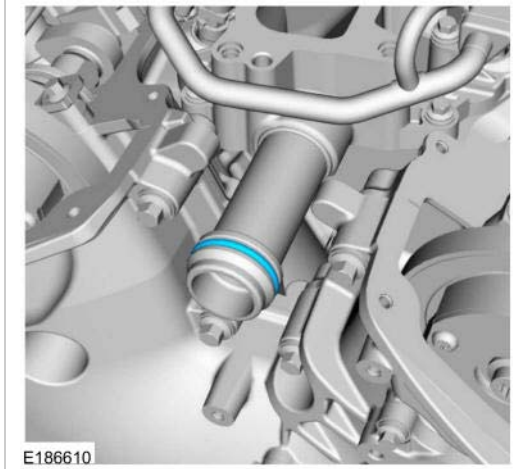
REMOVAL AND INSTALLATION > THERMOSTAT HOUSING > INSTALLATION

1.

Install an new O-ring seal and lubricate it with clean engine coolant.

Material

: Motorcraft® Orange Antifreeze/Coolant Concentrated (U.S.) / VC-3-B (U.S.) (WSS-M97B44-D)



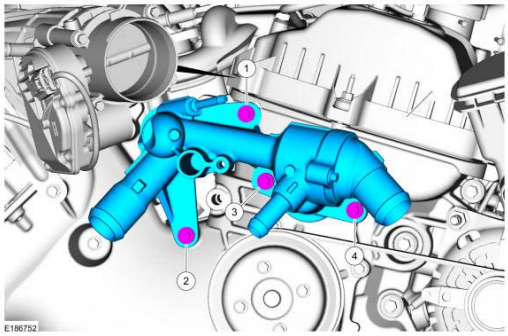
2.

Install the thermostat housing, the 4 bolts and tighten in the sequence shown in 2 stages.

Torque:

Stage 1: 71 lb.in (8 Nm)

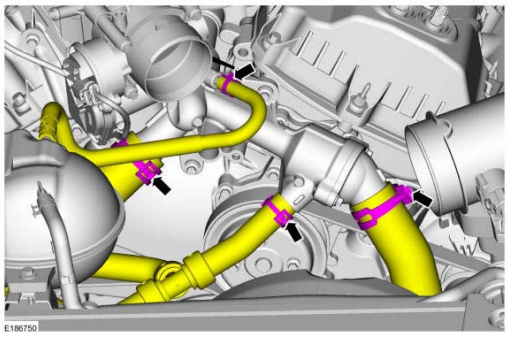
Stage 2: 45°



3.

Connect the coolant hoses.

Use the General Equipment: Hose Clamp Remover/Installer



4.

Remove the waterproof plastic from the accessory drive belts.

5.

Install the air cleaner outlet pipe. Refer to: AIR CLEANER OUTLET PIPE .

6.

Fill and bleed the cooling system. Refer to: Cooling System Draining and Vacuum Filling .

SPECIFICATIONS > SPECIFICATIONS

Materials

Description	Specification
Motorcraft® Orange Antifreeze/Coolant Concentrated VC-3-B	WSS-M97B44-D
Motorcraft® Orange Antifreeze/Coolant Prediluted VC-3DIL-B	WSS-M97B44-D2

Cooling System Capacities

Description	Specification
Base engine with oil cooler	13.6 qt (12.88L)
Performance Package engine with oil cooler	14.0 qt (13.28L)

Cooling System Pressure

Complete cooling system maximum pressure	145 kPa (21 psi)
Pressure relief cap	145 kPa (21 psi)
Radiator pressure test (removed from the vehicle)	138 kPa (20 psi)

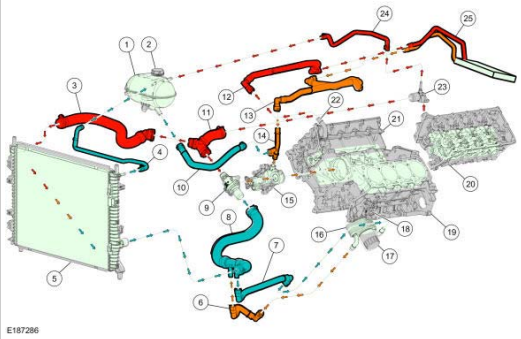
Thermostat Opening Temperatures

Starts to open	82.2°C (180°F)
Fully open	94.5°C (202°F)

DESCRIPTION AND OPERATION > ENGINE COOLING - COMPONENT LOCATION

Engine Cooling - Component Location

NOTE: Coolant temperature will vary with ambient temperature and load. Temperatures shown are for ambient temperature of 38°C (100°F). Red arrows indicate a temperature over 82.2°C (180°F), Orange arrows indicate a temperature of approximately 82.2°C (180°F), Blue arrows indicate a temperature below 82.2°C (180°F).



Item	Description
1	Degas bottle
2	Pressure relief cap
3	Upper radiator hose
4	Radiator-to-degas bottle hose
5	Radiator
6	Oil cooler outlet hose
7	Oil cooler inlet hose
8	Lower radiator hose
9	Thermostat housing
10	Degas bottle-to-engine hose
11	Coolant bypass T assembly
12	Heater inlet hose
13	Heater outlet hose
14	Heater outlet tube
15	Coolant pump
16	Oil cooler
17	Oil filter
18	Oil filter adapter
19	Cylinder block
20	Cylinder head LH
21	Cylinder head RH
22	Heater inlet tube
23	Coolant outlet connector
24	Coolant outlet connector-to-degas bottle hose
25	Heater core

DESCRIPTION AND OPERATION > ENGINE COOLING - SYSTEM OPERATION AND COMPONENT DESCRIPTION

Engine coolant flows primarily from the engine to the radiator circuit and back to the coolant pump. Coolant is sent from the coolant pump through the engine block and cylinder heads. A separate circuit from the engine also feeds the heater core with coolant. The coolant pump, operated by engine rotation through the accessory drive belt, circulates the coolant. The coolant thermostat is a control valve actuated by coolant temperature. When the thermostat is closed, coolant flow bypasses the radiator circuit and returns to the coolant pump. When the thermostat is opened, coolant flows through the radiator circuit to transfer engine-generated heat to the outside air.

The engine uses a cold side thermostat. This means the thermostat is located at the lower radiator hose connection to the engine, where coolant enters the engine after being cooled by the radiator. During initial warm-up, the cooler coolant from the radiator quickly closes the thermostat after the warm coolant in the engine opens the thermostat slightly. The thermostat opens and closes several times before the coolant coming from the radiator is warm enough to allow the thermostat to remain open. The engine must run much longer than a vehicle with a hot side thermostat before the thermostat remains fully opened.

The degas bottle holds surplus coolant and removes air from the cooling system. It also allows for coolant expansion and system pressurization, replenishes coolant to the cooling system and serves as the location for service fill.

The thermostat monitor is a function of the PCM and is designed to verify correct thermostat operation. The monitor executes once per drive cycle and has a monitor run duration of 300-800 seconds. If a malfunction occurs, DTC P0125 or P0128 sets, and the MIL illuminates.

DESCRIPTION AND OPERATION > ENGINE COOLING - SYSTEM OPERATION AND COMPONENT DESCRIPTION > FAIL SAFE COOLING

A strategy called Fail Safe Cooling is built into the PCM that will control the engine if it starts to overheat.

Stage 1 of the strategy commences if the engine starts to overheat. The CHT sensor transmits a signal to the PCM, which moves the temperature gauge pointer into the red zone.

If the engine is not switched off and the temperature continues to rise, the Powertrain Check Lamp is illuminated. This indicates to the driver that the engine is approaching critical limits and should be stopped. At this point DTC P1285 is set in the PCM which can be retrieved using a scan tool.

Stage 2 of the strategy commences if the lamp and temperature gauge are ignored by the driver. The PCM will start to control the engine by cutting out 4 cylinders and restricting engine speed below 3, 000 RPM. Simultaneously the MIL illuminates. This indicates that long term engine damage can occur and vehicle emissions will be affected. At this point DTC P1299 is set in the PCM which can be retrieved using a scan tool.

Air is drawn into the deactivated cylinders. This helps to control the temperature of the engine internal components. The deactivated cylinders are alternated to allow even cooling of all the cylinders.

NOTE: If the driver is using a high percentage of throttle travel (for example, an

overtaking maneuver) when the PCM starts engine deactivation (Stage 2), the deactivation will be delayed for 10 seconds.

NOTE: After 4-cylinder operation has begun, the engine will not revert to 8-cylinder operation, even if the temperature should fall, until the ignition is switched off and then on again.

NOTE: The MIL can only be extinguished by using a scan tool after the fault has been rectified and the DTC cleared.

Stage 3 of the strategy will commence if the engine temperature continues to rise. This results in the engine being totally disabled before major engine damage or seizure occurs. The Powertrain Check Lamp will begin to flash, indicating to the driver that the engine will be switched off after 30 seconds. This allows the driver time to choose a suitable parking place.

DIAGNOSIS AND TESTING > ENGINE COOLING

Materials

Name	Specification
Motorcraft® Orange Antifreeze/Coolant Prediluted (U.S.) VC-3DIL-B (U.S.)	WSS-M97B44-D2
Motorcraft® Orange Antifreeze/Coolant Concentrated (U.S.) VC-3-B (U.S.)	WSS-M97B44-D

Special Tool(s)

 E144764	3-Way HD Antifreeze Coolant Test Kit 328-2050-62291 or equivalent
 E144765	Coolant/Battery Refractometer 300-ROB75240 or equivalent

 E144766	Radiator Tester 014-R1072 or equivalent
 E145674	UView® Combustion Leak Tester UVU560000-R

Material : Motorcraft® Orange Antifreeze/Coolant Concentrated (U.S.) / VC-3-B (U.S.) (WSS-M97B44-D)
Material : Motorcraft® Orange Antifreeze/Coolant Prediluted (U.S.) / VC-3DIL-B (U.S.) (WSS-M97B44-D2)

DIAGNOSIS AND TESTING > ENGINE COOLING > DTC CHART

WARNING: Before beginning any service procedure in this service information, refer to Safety Warnings in GENERAL INFORMATION . Failure to follow this instruction may result in serious personal injury.

REFER to: Engine Cooling System Health and Safety Precautions .

Diagnostics in this service information assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

PCM DTC Chart

DTC	Description	Action
P0125	Insufficient Coolant Temp For Closed Loop Fuel Control	GO to Pinpoint Test C
P0128	Coolant Thermostat (Coolant Temp Below Thermostat Regulating Temperature)	GO to Pinpoint Test C
P0217	Engine Coolant Overtemperature Condition	GO to Pinpoint Test B
P0480	Fan 1 Control Circuit	Refer to ENGINE CONTROLS - INTRODUCTION (EXCEPT DIESEL & HYBRID) .
P0481	Fan 2 Control Circuit	Refer to ENGINE CONTROLS - INTRODUCTION (EXCEPT

		DIESEL & HYBRID) .
P1285	Cylinder Head Overtemperature Condition	Refer to ENGINE CONTROLS - INTRODUCTION (EXCEPT DIESEL & HYBRID) .
P1299	Cylinder Head Overtemperature Protection Active	GO to Pinpoint Test B
All Other PCM Diagnostic Trouble Codes (DTCs)	-	REFER to: ELECTRONIC ENGINE CONTROLS - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS).

DIAGNOSIS AND TESTING > ENGINE COOLING > INSPECTION AND VERIFICATION

NOTE: The engine cooling system is filled with Motorcraft® Orange Antifreeze/Coolant. Always fill the cooling system with the manufacturer's specified coolant. Chemically flush the cooling system if a non-specified coolant has been used. Failure to follow these instructions may damage the engine or cooling system.

NOTE: During normal vehicle operation, Motorcraft Orange Antifreeze/Coolant may change color from orange to pink or light red. As long as the engine coolant is clear and uncontaminated, this color change does not indicate the engine coolant has degraded nor does it require the engine coolant to be drained, the system to be flushed, or the engine coolant to be replaced.

1.

Verify the customer concern.

2.

Visually check the engine coolant level at the degas bottle when the system is cold.

3.

Make sure the pressure relief cap is installed correctly.

4.

Record any cooling system Diagnostic Trouble Codes (DTCs) retrieved. Refer to the PCM DTC chart in DTC Chart for DTC descriptions.

NOTE: Take note of any coolant odor or steam coming from cooling system components.

5.
If the system coolant is filled correctly and no Diagnostic Trouble Codes (DTCs) associated with fail-safe cooling are retrieved, verify the customer concern by operating the engine to duplicate the condition.

6.

Visually inspect for obvious signs of any mechanical or electrical damage.

Visual Inspection Chart

Mechanical	Electrical
Leaks or weeps at: • Hoses • Tubes • Clamp joints • • Gaskets • O-rings • Thermostat housing • Oil Cooler • Radiator • Pressure relief cap • Coolant pump • Heater core (wet floor or coolant odor in vehicle) • Lower intake manifold • Degas bottle • Cylinder block core plugs • Cylinder head core plugs • Block heater (if equipped) Cracked or damaged: • Hoses • Tubes • Hose clamps	Inoperative or damaged: Electric cooling fan Wiring, connectors, relays or modules CHT sensor

• Thermostat housing • Lower intake manifold • Oil cooler • Radiator • Pressure relief cap • Cooling fan • Coolant pump • Degas bottle • Cylinder block core plugs • Cylinder head core plugs • Block heater (if equipped)	
Restricted airflow through the A/C condenser/radiator Drive belt loose, worn or installed incorrectly Broken or weak drive belt tensioner Excessive white or light gray exhaust smoke (may have burnt coolant odor) Coolant in engine oil Engine oil in coolant	

7.

If the inspection reveals an obvious concern that can be readily identified, repair it as necessary.

8.

Inspect the coolant condition.

1.

Inspect the coolant color.

Discoloration may indicate that incorrect coolant may have been added to the system. Use of incorrect (green or yellow in color) coolant degrades the corrosion protection of Motorcraft® Orange Antifreeze/Coolant. Addition of Motorcraft® Specialty Green Engine Coolant may cause the color to appear to be a murky green-brown color. The addition of Motorcraft® Gold Antifreeze/Coolant, however, may not change the color or appearance of the orange-colored coolant. Detection of contamination with Motorcraft® Gold Antifreeze/Coolant is determined by the presence of nitrite. If contamination with Motorcraft® Gold Antifreeze/Coolant is suspected, test the coolant with the 3-Way HD Antifreeze Coolant Test Kit. Follow the nitrite testing directions in the kit to determine if nitrite is present in the system. If nitrite is present, flush the system and refill with the correct mixture of distilled water and Motorcraft® Orange Antifreeze/Coolant Concentrated. REFER to: Cooling System Draining and Vacuum Filling .

A darker orange with the presence of debris could indicate a commercially available stop leak may have been used and could result in loss of coolant flow to critical parts of the engine. If sediment is present, flush the system and refill with the correct mixture of distilled water and Motorcraft® Orange Antifreeze/Coolant Concentrated. REFER to: Cooling System Draining and Vacuum Filling .

A light or reddish brown color indicates that rust may be present in the cooling system. Flush the system and refill with the correct mixture of distilled water and Motorcraft® Orange Antifreeze/Coolant Concentrated. REFER to: Cooling System Draining and Vacuum Filling .

An iridescent sheen on top of the coolant could indicate a trace of oil is entering the system. For engine diagnosis, REFER to: ENGINE SYSTEM - GENERAL INFORMATION . Flush the system and refill with the correct mixture of distilled water and Motorcraft® Orange Antifreeze/Coolant Concentrated. REFER to: Cooling System Draining and Vacuum Filling .

A milky brown color may indicate that engine oil is entering the cooling system. Pressure test the cooling system. Refer to Component Tests . If engine oil is suspected, the cause of the leak may be internal to the engine. For engine diagnosis, REFER to: ENGINE SYSTEM - GENERAL INFORMATION . Flush the system and refill with the correct mixture of distilled water and Motorcraft® Orange Antifreeze/Coolant Concentrated. REFER to: Cooling System Draining and Vacuum Filling .

2.

If the engine coolant appearance is acceptable, test the engine coolant freezing point range with the Coolant/Battery Refractometer. Maintain the coolant concentration within 48% to 50%, which equates to a freeze point between -34°C and -37°C (-30°F and -34°F). If the vehicle is driven in cold climates less than -37°C (-34°F), it may be necessary to increase the coolant concentration to get adequate freeze protection. Recommended coolant concentration is 48/52 to 50/50 (freeze protection -34°C to -37°C [-30°F to -34°F]) engine coolant to distilled water.

Maximum coolant concentration is 60/40 for cold weather areas.

Minimum coolant concentration is 40/60 for warm weather areas.

3.

Adjust coolant range and level if necessary:

If coolant is low, add specified coolant mixture only.

If the engine coolant tests too weak, remove some of the engine coolant and add Motorcraft® Orange Antifreeze/Coolant Concentrated until the readings are within acceptable levels.

If the engine coolant tests strong, remove some of the engine coolant and add distilled water until the readings are within acceptable levels.

9.

If an obvious cause for an observed or reported concern is found, correct the cause and test the system for normal operation before proceeding to the next step.

DIAGNOSIS AND TESTING > ENGINE COOLING > SYMPTOM CHART

Diagnostics in this service information assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

Condition	Possible Sources	Actions
Loss of coolant	Refer to the Diagnostic Routine	GO to Pinpoint Test A
The engine overheats	Refer to the Diagnostic Routine	GO to Pinpoint Test B
The engine does not reach normal operating temperature	Refer to the Diagnostic Routine	GO to Pinpoint Test C
The block heater does not operate correctly	Block heater power cable Block heater	CHECK continuity in all 3 power cable circuits. If any circuit measures more than 5 ohms, INSTALL a new power cable. CHECK the resistance of the block heater. If the resistance does not measure between 30 and 40 ohms, INSTALL a new block heater. REFER to: Block Heater .
The electric cooling fan is inoperative in one or more speeds or does not operate correctly	Wiring Relays Fuses Cooling fan motor Cooling fan resistor	Refer to POWERTRAIN CONTROL MODULE (PCM) - 2.3L EcoBoost (231kW/314PS).
The electric cooling fan stays on all the time	Wiring Relays	Refer to POWERTRAIN CONTROL MODULE (PCM) - 2.3L EcoBoost (231kW/314PS).
Noisy electric cooling fan operation	Foreign material contamination Fan motor	REMOVE the foreign material from the cooling fan and shroud. TEST the system for normal operation. If still noisy, INSTALL a new cooling fan assembly. REFER to: Cooling Fan Motor and Shroud .
	Fan blade detached from fan motor	INSTALL a new cooling fan assembly. REFER to: Cooling Fan Motor and Shroud .

DIAGNOSIS AND TESTING > ENGINE COOLING > PINPOINT TESTS

Loss of Coolant

Normal operation and Fault Conditions

The engine cooling system is a closed system providing for coolant expansion and contraction as well

as changes in pressure as coolant warms and cools with engine operation. Various gaskets, seals, hoses and clamps contain coolant within the cooling system and keep other fluids and contaminants from entering the cooling system.

Possible Sources

- Coolant hoses or tubes
- Hose clamps
- Thermostat O-ring seal or gasket
- Coolant pump O-ring seal or gasket
- Thermostat housing
- Oil cooler (may leak internally or externally)
- Radiator
- Pressure relief cap
- Coolant pump leaking from weep hole
- Heater core
- Lower intake manifold
- Engine gaskets (may leak internally or externally)
- Degas bottle
- Cylinder block core plugs
- Cylinder head core plugs
- Block heater (if equipped)

DIAGNOSIS AND TESTING > ENGINE COOLING > PINPOINT TESTS > PINPOINT TEST A : PINPOINT TEST > PINPOINT TEST A : PINPOINT TEST

> ⛔ *WARNING: Always allow the engine to cool before opening the cooling system. Do not unscrew the coolant pressure relief cap when the engine is operating or the cooling system is hot. The cooling system is under pressure; steam and hot liquid can come out forcefully when the cap is loosened slightly. Failure to follow these instructions may result in serious personal injury.*

A1 CARRY OUT INSPECTION AND VERIFICATION

Carry out Inspection and Verification .

Are any concerns present?

Yes	REPAIR as needed.

No	GO to A2

NOTE: Allow the engine to cool before checking the engine coolant level.

A2 CHECK THE ENGINE COOLANT LEVEL AND PRESSURE TEST THE ENGINE COOLING SYSTEM

Ignition OFF

Visually inspect the engine coolant level at the degas bottle and adjust as necessary. Pressure test the engine cooling system. Refer to Component Tests , Cooling System Pressure Test.

Does the engine cooling system leak externally?

Yes	REPAIR or INSTALL new components.

No	GO to A3

A3 CHECK THE ENGINE COOLANT FOR AN INTERNAL LEAK

Inspect the engine coolant in the degas bottle for signs of engine oil or transmission fluid.

Is engine oil evident in the coolant?

Yes	REFER to: ENGINE SYSTEM - GENERAL INFORMATION .

No	GO to A4

A4 CHECK THE ENGINE OIL FOR COOLANT

Remove the oil level indicator from the engine.

Is coolant evident in the oil?

Yes	REFER to: ENGINE SYSTEM - GENERAL INFORMATION .

No	GO to A5

NOTE: Use UView® Combustion Leak Tester part number UVU560000-R or equivalent.

A5 CHECK THE COOLING SYSTEM FOR COMBUSTION GASES

Using a cooling system combustion gas leak tester, following the instructions supplied with the tester, check the coolant for combustion gases.

Are combustion gases present?

Yes	REFER to: ENGINE SYSTEM - GENERAL INFORMATION .

No	The cooling system is operational.

DIAGNOSIS AND TESTING > ENGINE COOLING > PINPOINT TESTS > PINPOINT TEST B : PINPOINT TEST

The Engine Overheats

Normal operation and Fault Conditions

The engine cooling system maintains the engine temperature during operation. Correct coolant flow through the engine, radiator and remainder of cooling system passages and components is essential to maintaining a correct engine temperature.

Engine coolant flows primarily from the engine to the radiator circuit and back to the coolant pump. Coolant is sent from the coolant pump through the engine block and cylinder head. A separate circuit from the engine also feeds the heater core with coolant. The coolant pump circulates the coolant. The coolant thermostat is a control valve actuated by coolant temperature. When the thermostat is closed, coolant flow bypasses the radiator circuit and returns to the coolant pump. When the thermostat is opened, coolant flows through the radiator circuit to transfer engine-generated heat to the outside air.

Engine overheating generally occurs when there is a disruption in the ability to control either coolant flow at the correct rate, the inability to transfer heat from the engine through the coolant (including low coolant) or an inability to transfer engine-generated heat to the outside air through the radiator.

Possible Sources

- Low coolant level
- External engine coolant leak
- Airlock in system
- Pressure relief cap installation
- Restricted airflow through A/C condenser/radiator
- Internal engine coolant leak
- Coolant condition/concentration
- Non-OEM engine enhancement components
- Electric cooling fan
- CHT sensor

- Radiator
- Thermostat
- Coolant pump
- Coolant flow restriction

Diagnostic Trouble Code (DTC) Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
P0217	Engine Coolant Overtemperature Condition	Sets in the PCM when an engine overheat condition was sensed by the CHT sensor.
P1299	Cylinder Head Overtemperature Protection Active	Sets in the PCM when an engine overheat condition was sensed by the CHT sensor.

DIAGNOSIS AND TESTING > ENGINE COOLING > PINPOINT TESTS > PINPOINT TEST B : PINPOINT TEST > PINPOINT TEST B : PINPOINT TEST

B1 CARRY OUT INSPECTION AND VERIFICATION

Carry out the Inspection and Verification .

Are any concerns present?

Yes	REPAIR as needed.

No	GO to B2

B2 CHECK FOR PCM (POWERTRAIN CONTROL MODULE) DTCS

Ignition ON.

Using a scan tool, perform PCM self-test.

Is DTC P0217 and/or P1299 present?

Yes	GO to B4

No	Actual engine overheating has not been verified. CHECK the engine coolant temperature gauge operation. REFER to: Instrumentation, Message Center and Warning Chimes . If any other PCM DTCs are retrieved, REFER to: ELECTRONIC ENGINE CONTROLS - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS).

B3 CHECK FOR ACTIVE GRILL SHUDDER DTCS

Review the PCM DTCs.

Are any active grill shudder DTCs present?

Yes	REFER to: Active Grille Shutter .

No	GO to B4

NOTE: Verify no vehicle front end damage is present.

B4 CHECK FOR AN AIRFLOW OBSTRUCTION AND MISSING AIR DEFLECTORS

Check the radiator or A/C condenser for an external obstruction such as leaves or cardboard and verify all air deflectors are present.

Is an airflow obstruction present or air deflectors missing?

Yes	REPAIR as necessary.

No	GO to B5

B5 CHECK THE ENGINE COOLANT LEVEL AND PRESSURE TEST THE COOLING SYSTEM

Ignition OFF.

Visually check the engine coolant level in the coolant expansion tank and adjust as necessary. Pressure test the cooling system.

Does the engine cooling system leak externally?

Yes	REPAIR or INSTALL new components.

No	GO to B6

B6 CHECK THE ENGINE COOLANT FOR AN INTERNAL LEAK

Inspect the engine coolant in the coolant expansion tank for signs of engine oil.

Is engine oil evident in the coolant?

Yes	REFER to: ENGINE SYSTEM - GENERAL INFORMATION .

No	GO to B7

B7 CHECK THE ENGINE OIL FOR COOLANT

Remove the oil level indicator from the engine.

Is coolant evident in the oil?

Yes	REFER to: ENGINE SYSTEM - GENERAL INFORMATION .

No	GO to B8

NOTE: Use UView® Combustion Leak Tester part number UVU560000-R or equivalent.

B8 CHECK THE COOLING SYSTEM FOR COMBUSTION GASES

Using a cooling system combustion gas leak tester, following the instructions supplied with the tester, check the coolant for combustion gases.

Are combustion gases present?

Yes	REFER to: ENGINE SYSTEM - GENERAL INFORMATION .

No	GO to B9

B9 CHECK COOLANT CONDITION

Check the coolant for dirt, rust or contamination and check the coolant concentration.

Is the coolant condition OK?

Yes	GO to B10

No	FLUSH the engine cooling system. REFER to: Cooling System Flushing .

B10 CHECK THE ELECTRIC COOLING FAN OPERATION

Start the engine.

Place the climate control function selector in the MAX A/C position and the blower motor switch in the HI position.

Did the electric cooling fan operate?

Yes	GO to B11

No	DIAGNOSE the electric cooling fan operation. Refer to ENGINE CONTROLS - SYMPTOM CHARTS (EXCEPT DIESEL & HYBRID) .

B11 CHECK THE COOLANT PUMP OPERATION

Start the engine.

Allow the engine to run for 30 minutes. Place the climate control function selector in the MAX HEAT position. Feel the heater outlet hose.

Is the heater outlet hose hot?

Yes	GO to B12

No	INSTALL a new coolant pump. REFER to: Coolant Pump .

NOTE: This cooling system uses a cold side thermostat. The coolant in the radiator must reach full operating temperature for the thermostat to remain in an open state.

B12 CHECK THE THERMOSTAT OPERATION

Start the engine.

Allow the engine to run for 30 minutes. Place the climate control function selector in the MAX HEAT position. Feel the lower radiator hose.

Is the lower radiator hose hot?

Yes	CHECK the temperature gauge operation. REFER to: Instrumentation, Message Center and Warning Chimes .

No	GO to B13

B13 VISUALLY INSPECT THE THERMOSTAT

Carry out the Thermostat Visual Inspection in Component Tests .

Is the thermostat damaged?

Yes	INSTALL a new thermostat. REFER to: Thermostat .

No	INSTALL a new thermostat. REFER to: Thermostat . If the engine still overheats, INSTALL a new radiator. REFER to: Radiator .

DIAGNOSIS AND TESTING > ENGINE COOLING > PINPOINT TESTS > PINPOINT TEST C : PINPOINT TEST

The Engine Does Not Reach Normal Operating Temperature

Normal operation and Fault Conditions

The engine cooling system maintains engine temperature during operation. Correct coolant flow through the engine, radiator and remainder of cooling system passages and components is essential to maintaining a correct engine temperature.

Engine coolant flows primarily from the engine to the radiator circuit and back to the coolant pump. Coolant is sent from the coolant pump through the engine block and cylinder head. A separate circuit from the engine also feeds the heater core with coolant. The coolant pump circulates the coolant. The coolant thermostat is a control valve actuated by coolant temperature. When the thermostat is closed, coolant flow bypasses the radiator circuit and returns to the coolant pump. When the thermostat is opened, coolant flows through the radiator circuit in order to transfer engine generated heat to the outside air.

Concerns of engine inability to reach normal operating temperature typically occur when the rate of coolant flow through some coolant circuits (radiator, heater core) is more than expected given the conditions. Heat is not allowed to build in the engine because a heat exchanger is removing too much heat, including the radiator, heater core and oil cooler. In addition, perceived concerns that the engine does not reach normal operating temperature can be related to a low coolant level or trapped air which does not allow for hot coolant to be available at the heater core, an inoperative climate control system, or for concerns perceived or related to an incorrect engine temperature gauge indication.

Possible Sources

- Low coolant level
- Thermostat
- Temperature gauge
- CHT

Diagnostic Trouble Code (DTC) Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
P0125	Insufficient Coolant Temp for Closed Loop Fuel Control	Sets in the PCM when the CHT sensor has not achieved the required temperature level to enter closed loop operating conditions within a specified amount of time after starting the engine.
P0128	Coolant Thermostat (Coolant Temp Below Thermostat Regulating Temperature)	Sets in the PCM when the thermostat monitor has not achieved the required engine operating temperature within a specified amount of time after starting the engine.

DIAGNOSIS AND TESTING > ENGINE COOLING > PINPOINT TESTS > PINPOINT TEST C : PINPOINT TEST > PINPOINT TEST C : PINPOINT TEST

WARNING: Always allow the engine to cool before opening the cooling system. Do not unscrew the coolant pressure relief cap when the engine is operating or the cooling system is hot. The cooling system is under pressure; steam and hot liquid can come out forcefully when the cap is loosened slightly. Failure to follow these instructions may result in serious personal injury.

C1 CARRY OUT INSPECTION AND VERIFICATION

Carry out the Inspection and Verification .

Were any concerns found?

Yes	REPAIR as needed.

No	GO to C2

C2 CHECK FOR DTC P0125 OR P0128

Using a scan tool, perform the PCM self-test.

Is DTC P0125 or P0128 present?

Yes	GO to C3

No	The cooling system is operational. If an inoperative temperature gauge is suspected, CHECK the temperature gauge operation. REFER to: Instrumentation, Message Center and Warning Chimes . If an inoperative climate control system is suspected, CHECK the climate control system operation. For Dual Automatic Temperature Control (DATC), REFER to: Climate Control System - Vehicles With: Dual Automatic Temperature Control (DATC) . For Electronic Manual Temperature control (EMTC), REFER to: Climate Control System - Vehicles With: Electronic Manual Temperature Control (EMTC) . If any other Diagnostic Trouble Codes (DTCs) are retrieved, REFER to: ELECTRONIC ENGINE CONTROLS - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS).

NOTE: Allow the engine to cool before checking the coolant expansion tank.

C3 CHECK THE COOLANT LEVEL

Visually check the engine coolant level in the coolant expansion tank

Is the engine coolant level within specification?

Yes	INSTALL a new thermostat. REFER to: Thermostat . CLEAR Diagnostic Trouble Codes (DTCs). If the DTC returns check for correct CHT sensor operation.

No	GO to Pinpoint Test A

DIAGNOSIS AND TESTING > ENGINE COOLING > COMPONENT TESTS

Cooling System Pressure Test

WARNING: Always allow the engine to cool before opening the cooling system. Do not unscrew the coolant pressure relief cap when the engine is operating or the cooling system is hot. The cooling system is under pressure; steam and hot liquid can come out forcefully when the cap is loosened slightly. Failure to follow these instructions may result in serious personal injury.

NOTE: Vehicles have a pressure relief cap on the degas bottle and no radiator cap.

1.

Turn the engine OFF.

2.

Check the engine coolant level and adjust as necessary.

3.

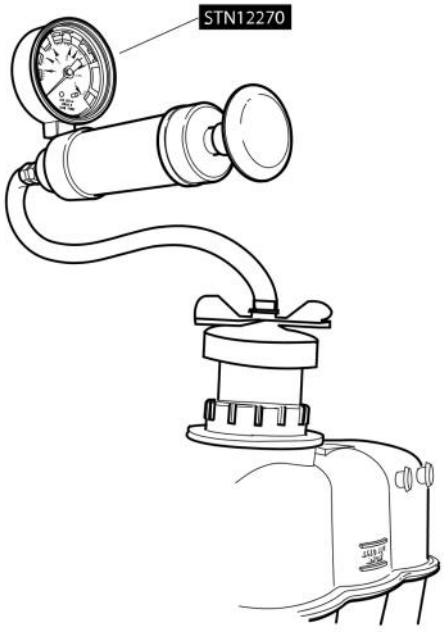
Remove the degas bottle cap. Inspect the degas bottle cap and degas bottle for any issues that would cause improper sealing, such as for cross-threading, burrs, damaged o-ring, etc. If any issues are found, INSTALL a new cap and/or degas bottle.

4.

Attach the Pressure Tester and adaptor (Snap-On TA53 or equivalent), to the degas bottle cap. The cap must hold pressure of 145 kPa +/- 21 kPa (21 PSI +/- 3 PSI). If any issues are found, INSTALL a new cap.

5.

Attach the Pressure Tester and adaptor (Snap-On TA52, AST ASSFZ-47, Redline RDL95-0750 or equivalent) to the degas bottle.



E164137

NOTE: Do not pressurize the cooling system beyond the maximum pressure listed in the SPECIFICATIONS , or cooling system components can be damaged.

NOTE: If the plunger of the pressure tester is pressed too fast, an erroneous pressure reading will result.

6.

To pressurize the engine cooling system, slowly press the plunger of the pressure test pump and increase the pressure to between 124 - 138 kPa (18 - 20 PSI). Observe the gauge reading for approximately 2 minutes. Pressure should not drop during this time. If the pressure drops within this time, inspect for leaks and repair as necessary.

7.

If no leaks are found and the pressure drops, the leak may be internal to the engine. Inspect the coolant for engine oil and the engine oil for coolant. REFER to: ENGINE SYSTEM - GENERAL INFORMATION .

8.

If the pressure does not drop remove the cooling system Pressure Tester and adaptor from degas bottle.

9.

Install the degas bottle cap until it contacts the hard stop.

Thermostat

Install a new thermostat only after at least one of the following tests and checks have been carried out:

- Pinpoint Test B or C
- Thermostat Visual Inspection

Thermostat Visual Inspection

1.

Remove the thermostat.

2.

Examine the thermostat for signs of damage including:

- Valve not fully seated (light visible through the valve)
- Foreign material lodged in the main valve
- Bent or broken frame or flange
- Bent or broken spring
- Wax leaking from wax reservoir or a bulge in the reservoir
- Any other damage or distortion

> *NOTE: If no damage is found during the inspection, do not attempt to open the thermostat using hot water or other heat sources. This method is not an accurate means to test the function of the thermostat and may damage the thermostat.*

3.
If damage is found during the inspection, remove any foreign material or broken pieces and install a new thermostat.

Radiator Leak Test, Removed From Vehicle

> *NOTE: Never leak test an aluminum radiator in the same water that copper/brass radiators are tested in. Flux and caustic cleaners may be present in the cleaning tank and they will damage aluminum radiators.*

> *NOTE: Clean the radiator before leak testing to avoid contamination of tank.*

1.

Leak test the radiator in clean water with air pressurized to the maximum pressure listed in the Specifications table.

GENERAL PROCEDURES > COOLING SYSTEM DRAINING AND VACUUM FILLING

Special Tool(s) / General Equipment

 ST1720-A	ROB75240Coolant/Battery Refractometer (Fahrenheit)
Fluid Container	
Cooling System Vacuum Tester and Refiller	

Materials

Name	Specification
Motorcraft® Orange Antifreeze/Coolant Prediluted (U.S.) VC-3DIL-B (U.S.)	WSS-M97B44-D2
Motorcraft® Orange Antifreeze/Coolant Concentrated (U.S.) VC-3-B (U.S.)	WSS-M97B44-D

Draining

NOTE: The coolant must be recovered in a suitable, clean container for reuse. If the coolant is contaminated, it must be recycled or disposed of correctly. Using contaminated coolant may result in damage to the engine or cooling system components.

NOTE: The vehicle cooling system is filled with Motorcraft® Orange Antifreeze/Coolant. Do not mix coolant types. Mixing coolant types degrades the corrosion protection of the coolant. Failure to follow these instructions may damage the engine or cooling system.

NOTE: Always fill the cooling system with the manufacturer's specified coolant. Chemically flush the cooling system if a non-specified coolant has been used. Refer to Cooling System Flushing . Failure to follow these instructions may damage the engine or cooling system.

NOTE: During normal vehicle operation, Motorcraft® Orange Antifreeze/Coolant may change color from orange to pink or light red. As long as the engine coolant is clear and uncontaminated, this color change does not indicate the engine coolant has degraded nor does it require the engine coolant to be drained, the system to be flushed, or the engine coolant to be replaced.

NOTE: Less than 80% of coolant capacity can be recovered with the engine in the vehicle. Dirty, rusty or contaminated coolant requires replacement.

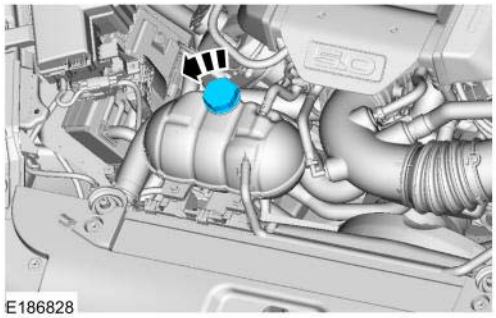
1.





WARNING: When releasing the cooling system pressure, cover the coolant expansion tank cap with a thick cloth.

Remove the pressure relief cap.

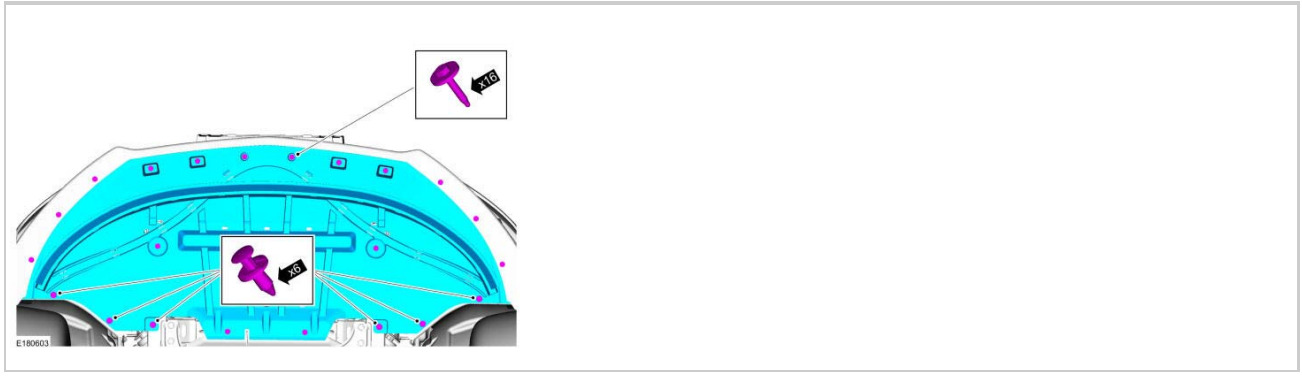


2.

With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

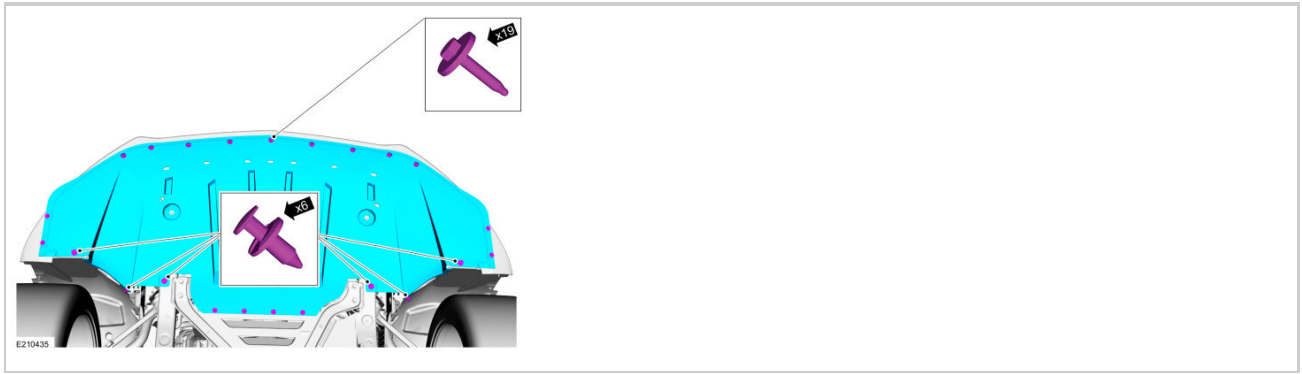
NOTE: If equipped.

3.
Remove the underbody shield.



NOTE: If equipped.

4.
Remove the underbody shield.



5.

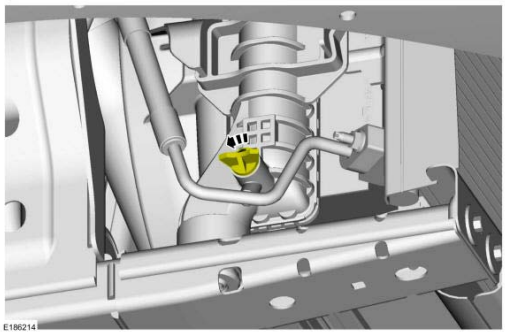


WARNING: Be prepared to collect escaping fluid.

Use a hose to drain the coolant.

Open the radiator drain valve and drain the engine coolant in a suitable, clean container.

Use the General Equipment: Fluid Container



Filling

Filling and Bleeding with a Vacuum Cooling System Filler

1.

NOTE: The cooling system is filled with Motorcraft® Orange Antifreeze/Coolant. Do not mix coolant types. Mixing coolant types degrades the corrosion protection of the coolant. Failure to follow these instructions may damage the engine or cooling system.

NOTE: Engine coolant provides boil protection, corrosion protection, freeze protection, and cooling efficiency to the engine and cooling components. In order to obtain these protections, maintain the engine coolant at the correct concentration and fluid level in the degas bottle.

NOTE: Add Motorcraft® Orange Antifreeze/Coolant or equivalent.

NOTE: Do not add or mix with any other type of engine coolant. Mixing coolants may degrade the coolant's corrosion protection.

NOTE: Do not add alcohol, methanol, or brine, or any engine coolants mixed with alcohol or methanol antifreeze. These can cause engine damage from overheating or freezing.

NOTE: Ford Motor Company does NOT recommend the use of recycled engine coolant in vehicles originally equipped with Motorcraft® Orange Antifreeze/Coolant since a Ford-approved recycling process is not yet available.

When adding or topping off the engine coolant:

Measure the coolant concentration in the vehicle.

Use Special Service Tool: ROB75240Coolant/Battery Refractometer (Fahrenheit).

Determine the concentration desired based on the vehicle duty cycle of extreme hot or cold operating conditions.

Add, top-off or adjust the coolant as follows:

For concentrations measured 48/52 to 50/50 (freeze protection -34°C to -37°C [-30°F to -34°F]) use Motorcraft® Orange Antifreeze/Coolant Prediluted to maintain a coolant concentration in this same range.

Material

: Motorcraft® Orange Antifreeze/Coolant Prediluted (U.S.) / VC-3DIL-B (U.S.) (WSS-M97B44-D2)

For all other concentrations, use Motorcraft® Orange Antifreeze/Coolant Concentrated and/or distilled water to get to the desired concentration.

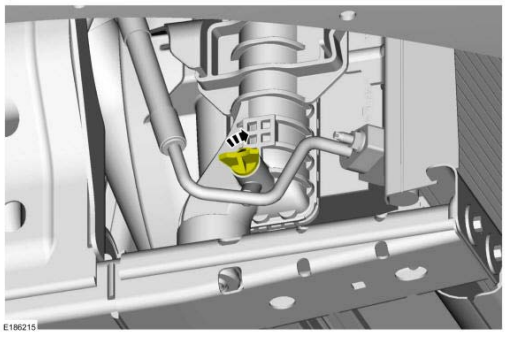
Material

: Motorcraft® Orange Antifreeze/Coolant Concentrated (U.S.) / VC-3-B (U.S.) (WSS-M97B44-D)

When refilling the engine coolant after a flush procedure, use a mixture of Motorcraft® Orange Antifreeze/Coolant Concentrated and distilled water to get to the desired concentration.

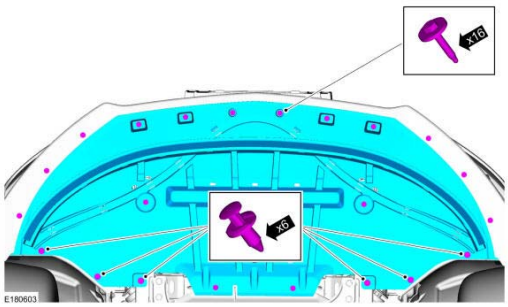
2.

Close the radiator drain valve.



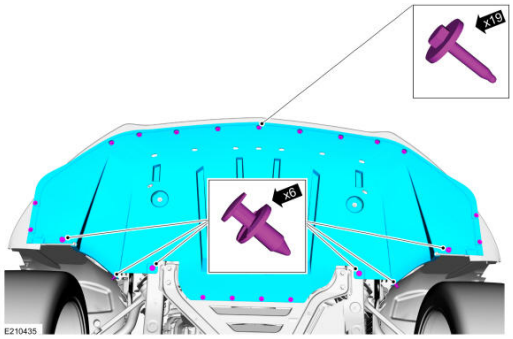
NOTE: If equipped.

3.
Install the underbody shield.



NOTE: If equipped.

4.
Install the underbody shield.



5.

Install the vacuum cooling system filler and follow the manufacturer's instructions to fill and bleed the system.

Use the General Equipment: Cooling System Vacuum Tester and Refiller

6.

Recommended coolant concentration is 48/52 to 50/50 engine coolant to distilled water (freeze protection -34°C to -37°C [-30°F to -34°F]).

7.

For extremely cold climates (less than -37°C [-34°F]):

It may be necessary to increase the coolant concentration above 50%.

NEVER increase the coolant concentration above 60%.

Maximum coolant concentration is 60/40 for cold weather areas.

A coolant concentration of 60% provides freeze protection down to -50°C (-58°F)

Engine coolant concentrations above 60% will decrease the overheat protection

characteristics of the engine coolant and may damage the engine.

8.

For extremely hot climates:

It is still necessary to maintain the coolant concentration above 40%.

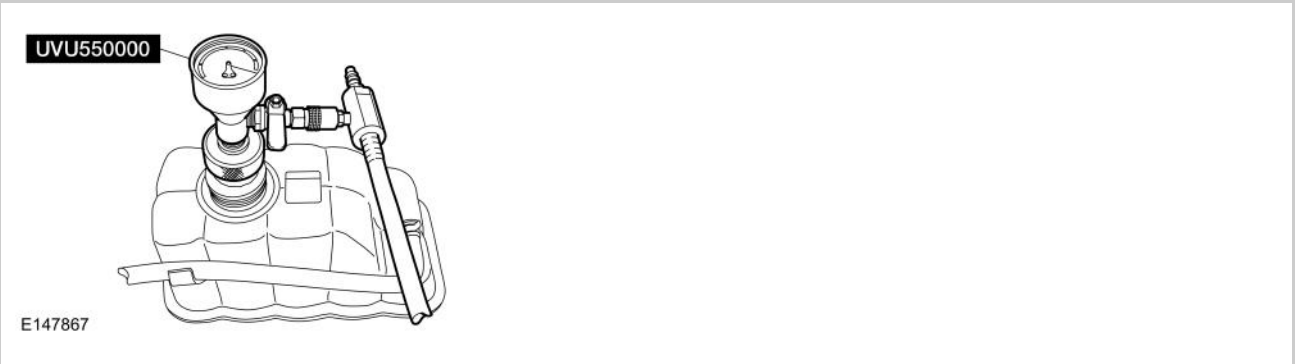
NEVER decrease the coolant concentration below 40%.

Minimum coolant concentration is 40/60 for warm weather areas.

Engine coolant concentrations below 40% will decrease the freeze and corrosion protection characteristics of the engine coolant and may damage the engine.

9.

Vehicles driven year-round in non-extreme climates should use a 48/52 to 50/50 (freeze protection -34°C to -37°C [-30°F to -34°F]) mixture of engine coolant and distilled water for optimum cooling system and engine protection.



Filling and Bleeding without a Vacuum Cooling System Filler

10.

NOTE: The cooling system is filled with Motorcraft® Orange Antifreeze/Coolant. Do not mix coolant types. Mixing coolant types degrades the corrosion protection of the coolant. Failure to follow these instructions may damage the engine or cooling system.

NOTE: Engine coolant provides boil protection, corrosion protection, freeze protection, and cooling efficiency to the engine and cooling components. In order to obtain these protections, maintain the engine coolant at the correct concentration and fluid level in the degas bottle.

NOTE: Add Motorcraft® Orange Antifreeze/Coolant or equivalent.

NOTE: Do not add or mix with any other type of engine coolant. Mixing coolants may degrade the coolant's corrosion protection.

NOTE: Do not add alcohol, methanol, or brine, or any engine coolants mixed with alcohol or methanol antifreeze. These can cause engine damage from overheating or freezing.

NOTE: Ford Motor Company does NOT recommend the use of recycled engine coolant in vehicles originally equipped with Motorcraft® Orange Antifreeze/Coolant since a Ford-approved recycling process is not yet available.

When adding or topping off the engine coolant:

Measure the coolant concentration in the vehicle.

Use Special Service Tool: ROB75240 Coolant/Battery Refractometer (Fahrenheit).

Determine the concentration desired based on the vehicle duty cycle of extreme hot or cold operating conditions.

Add, top-off or adjust the coolant as follows:

For concentrations measured 48/52 to 50/50 (freeze protection -34°C to -37°C [-30°F to -34°F]) use Motorcraft® Orange Antifreeze/Coolant Prediluted to maintain a coolant concentration in this same range.

Material

: Motorcraft® Orange Antifreeze/Coolant Prediluted (U.S.) / VC-3DIL-B (U.S.) (WSS-M97B44-D2)

For all other concentrations, use Motorcraft® Orange Antifreeze/Coolant Concentrated and/or distilled water to get to the desired concentration.

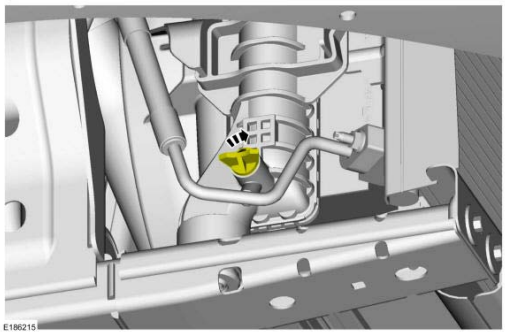
Material

: Motorcraft® Orange Antifreeze/Coolant Concentrated (U.S.) / VC-3-B (U.S.) (WSS-M97B44-D)

When refilling the engine coolant after a flush procedure, use a mixture of Motorcraft® Orange Antifreeze/Coolant Concentrated and distilled water to get to the desired concentration.

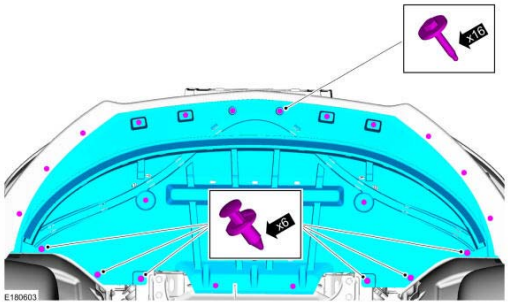
11.

Close the radiator drain valve.



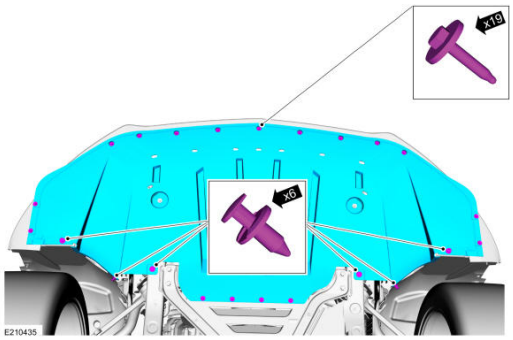
NOTE: If equipped.

12.
Install the underbody shield.



NOTE: If equipped.

13.
Remove the underbody shield.



14.

Fill the degas bottle to the MAX FILL line.

15.

Recommended coolant concentration is 48/52 to 50/50 engine coolant to distilled water (freeze

protection -34°C to -37°C [-30°F to -34°F]).

16.

For extremely cold climates (less than -37°C [-34°F]):

It may be necessary to increase the coolant concentration above 50%.

NEVER increase the coolant concentration above 60%.

Maximum coolant concentration is 60/40 for cold weather areas.

A coolant concentration of 60% provides freeze protection down to -50°C (-58°F)

Engine coolant concentrations above 60% will decrease the overheat protection characteristics of the engine coolant and may damage the engine.

17.

For extremely hot climates:

It is still necessary to maintain the coolant concentration above 40%.

NEVER decrease the coolant concentration below 40%.

Minimum coolant concentration is 40/60 for warm weather areas.

Engine coolant concentrations below 40% will decrease the freeze and corrosion protection characteristics of the engine coolant and may damage the engine.

18.

Vehicles driven year-round in non-extreme climates should use a 48/52 to 50/50 (freeze protection -34°C to -37°C [-30°F to -34°F]) mixture of engine coolant and distilled water for optimum cooling system and engine protection.

19.

Install the degas bottle cap until it contacts the hard stop.

20.

Turn the climate control system off.

21.

Start the engine and increase the engine speed to 3, 500 rpm and hold for 30 seconds.

22.

Turn the engine off for and wait for 1 minute to purge any large air pockets from the cooling system.

23.

WARNING: Always allow the engine to cool before opening the cooling system. Do not unscrew the coolant pressure relief cap when the engine is operating or the cooling system is hot. The cooling system is under pressure; steam and hot liquid can come out forcefully when the cap is loosened slightly. Failure to follow these instructions may result in serious personal injury.

Check the engine coolant level in degas bottle and if necessary fill to the top of the MAX FILL line on the degas bottle if the engine is warm or to the top of the MIN FILL LEVEL if the engine is cold.

24.

Start the engine and let it idle until the engine reaches normal operating temperature and the thermostat is fully open. A fully open thermostat is verified by the cooling fan cycling on at least once.

25.

Increase the engine speed to 3, 500 rpm and hold for 30 seconds.

26.

Allow the engine to idle for 30 seconds.

27.

Turn the engine off for 1 minute.

28.

Repeat steps 25 through 27 a total of 5 times to remove any remaining air trapped in the system.

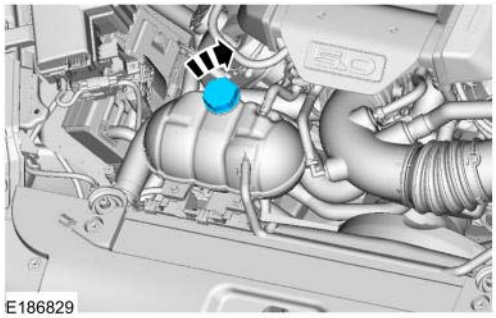
29.

WARNING: Always allow the engine to cool before opening the cooling system. Do not unscrew the coolant pressure relief cap when the engine is operating or the cooling system is hot. The cooling system is under pressure; steam and hot liquid can come out forcefully when the cap is loosened slightly. Failure to follow these instructions may result in serious personal injury.

Check the engine coolant level in degas bottle and if necessary fill to the top of the MAX FILL line on the degas bottle.

30.

Install the pressure relief cap.



GENERAL PROCEDURES > COOLING SYSTEM FLUSHING

Materials

Name	Specification
Motorcraft® Premium Cooling System Flush VC-1	ESR-M14P7-A

Flushing

WARNING: Always allow the engine to cool before opening the cooling system. Do not unscrew the coolant pressure relief cap when the engine is operating or the cooling system is hot. The cooling system is under pressure; steam and hot liquid can come out forcefully when the cap is loosened slightly. Failure to follow these instructions may result in serious personal injury.

NOTE: To remove rust, sludge and other foreign material from the cooling system, use cooling system flush that is safe for use with aluminum radiators. This cleaning restores cooling system efficiency and helps prevent overheating. A pulsating or reversed direction of flushing water will loosen sediment more quickly than a steady flow in the normal coolant flow direction. In severe cases where cleaning solvents will not clean the cooling system efficiently, it will be necessary to use the pressure flushing method using cooling system flusher. Dispose of old coolant and flushing water contaminated with antifreeze and cleaning chemicals in accordance with local, state or federal laws.

1.

Add Motorcraft® Premium Cooling System Flush to the cooling system and follow the directions on the package.

Material

: Motorcraft® Premium Cooling System Flush / VC-1 (ESR-M14P7-A)

2.

Drain the cooling system. Refer to: Cooling System Draining and Vacuum Filling .

3.

Remove the radiator. Refer to: Radiator .

NOTE: Radiator internal pressure must not exceed 138 kPa (20 psi). Damage to the radiator can result.

4.
Position the radiator upside down and with a high pressure hose in the lower radiator hose opening, backflush the radiator.

5.

Remove the thermostat. Refer to: Thermostat .

6.

Install the coolant inlet connection without the thermostat.

Torque

: 89 lb.in (10 Nm)

7.

Backflush the engine. Position the high-pressure water hose into the engine through the upper radiator hose and backflush the engine.

8.

Install the thermostat. Refer to: Thermostat .

9.

Install the radiator. Refer to: Radiator .

10.

Fill and bleed the cooling system. Refer to: Cooling System Draining and Vacuum Filling .

GENERAL PROCEDURES > HEATER CORE BACKFLUSHING

Materials

Name	Specification
Motorcraft® Premium Cooling System Flush VC-1	ESR-M14P7-A

Flushing

WARNING: Always allow the engine to cool before opening the cooling system. Do not unscrew the coolant pressure relief cap when the engine is operating or the cooling system is hot. The cooling system is under pressure; steam and hot liquid can come out forcefully when the cap is loosened slightly. Failure to follow these instructions may result in serious personal injury.

1.

Partially drain the cooling system. Refer to: Cooling System Draining and Vacuum Filling .

2.

Add Premium Cooling System Flush to backflush the heater core and follow the directions on the package. Flush with water thoroughly after using Premium Cooling System Flush prior to refilling the cooling system.

Material

: Motorcraft® Premium Cooling System Flush / VC-1 (ESR-M14P7-A)

3.

Fill and bleed the cooling system. Refer to: Cooling System Draining and Vacuum Filling .

REMOVAL AND INSTALLATION > BLOCK HEATER > REMOVAL

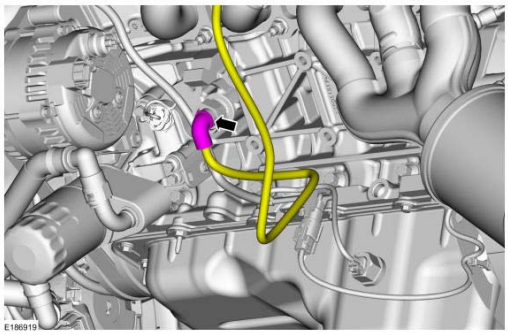
NOTE: Removal steps in this procedure may contain installation details.

1.

Drain the cooling system. Refer to: Cooling System Draining and Vacuum Filling .

NOTE: Make sure the block heater wiring is routed and secured away from rotating or hot components.

2.
Disconnect the block heater electrical connector.

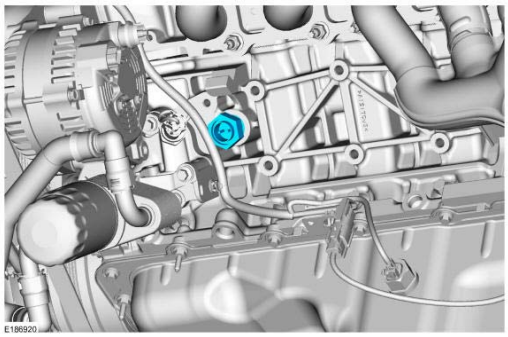


3.

Remove the block heater.

Torque

: 30 lb.ft (40 Nm)



REMOVAL AND INSTALLATION > BLOCK HEATER > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Fill and bleed the cooling system. Refer to: Cooling System Draining and Vacuum Filling .

REMOVAL AND INSTALLATION > COOLANT PUMP

Special Tool(s) / General Equipment

Hose Clamp Remover/Installer

Materials

Name	Specification

Motorcraft® Metal Surface PrepZC-31-B	-
Motorcraft® Orange Antifreeze/Coolant Concentrated (U.S.) VC-3-B (U.S.)	WSS-M97B44-D

REMOVAL AND INSTALLATION > COOLANT PUMP > REMOVAL

1.

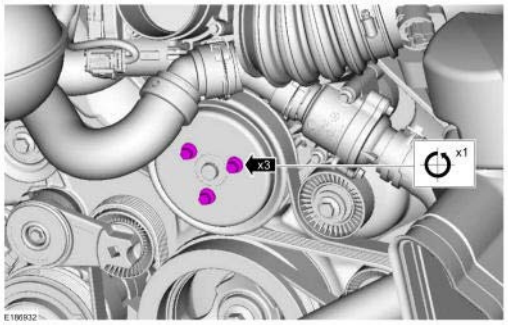
Drain the cooling system. Refer to: Cooling System Draining and Vacuum Filling .

2.

Remove the air cleaner outlet pipe. Refer to: AIR CLEANER OUTLET PIPE - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS).

3.

Loosen the coolant pump pulley bolts.



4.

Remove the accessory drive belt. Refer to: ACCESSORY DRIVE BELT - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS).

NOTE: Cover the A/C compressor belt to prevent coolant contamination of the belt.

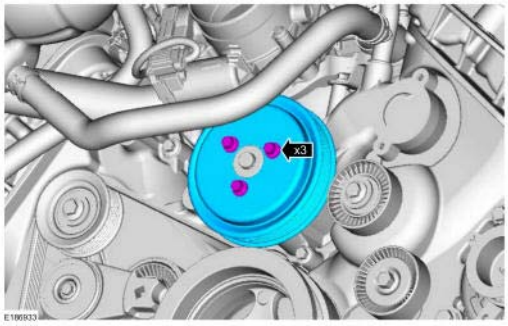
5.
Completely cover the A/C compressor belt with waterproof plastic.

6.

Remove the thermostat housing. Refer to: Thermostat Housing .

7.

Remove the bolts and the coolant pump pulley.

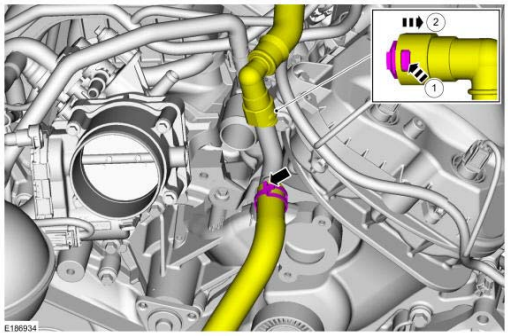


8.

Disconnect the heater outlet hose from the heater outlet tube.

Release the clamp and disconnect the lower degas bottle hose from the heater outlet tube.

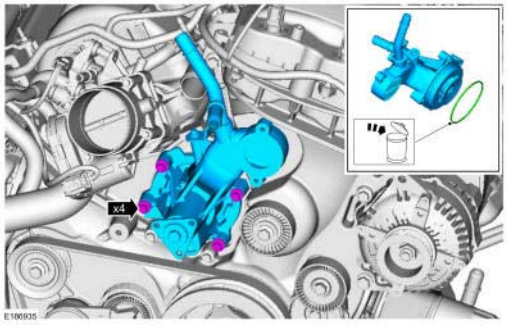
Use the General Equipment: Hose Clamp Remover/Installer



9.

Remove the bolts and the coolant pump.

Remove and discard the O-ring seal.

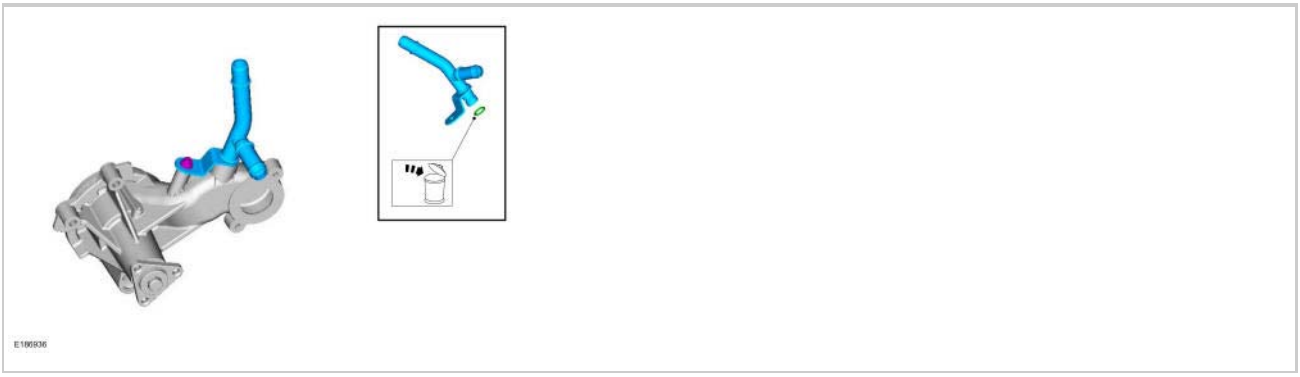


NOTE: This step is only necessary when installing a new component.

10.

Remove the bolt and the heater outlet tube.

Remove and discard the O-ring seal.



REMOVAL AND INSTALLATION > COOLANT PUMP > INSTALLATION

NOTE: This step is only necessary when installing a new component.

1.

Install a new O-ring seal on the heater outlet tube and lubricate it with clean engine coolant.

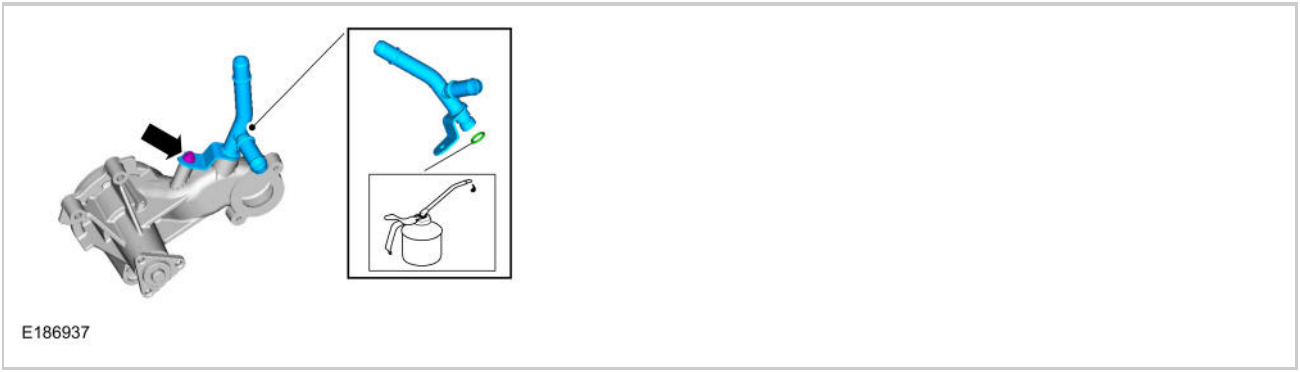
Material

: Motorcraft® Orange Antifreeze/Coolant Concentrated (U.S.) / VC-3-B (U.S.) (WSS-M97B44-D)

Install the heater outlet tube and the bolt.

Torque

: 89 lb.in (10 Nm)

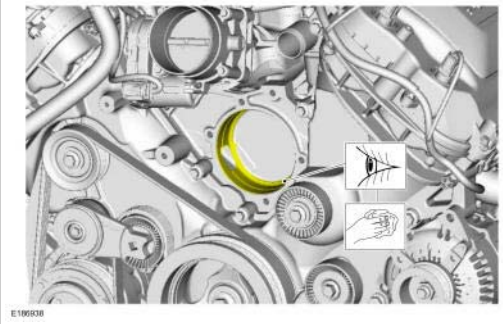


2.

Inspect the sealing surfaces and clean with metal surface prep wipes.

Material

: Motorcraft® Metal Surface Prep / ZC-31-B



NOTE: Align the bolt holes with the bosses prior to insertion of the coolant pump and insert the pump straight into the coolant pump cavity. Do not rotate the coolant pump once installed into the coolant pump cavity or the O-ring seal can be damaged, causing the coolant pump to leak.

3.

Install a new O-ring seal and lubricate it with clean engine coolant.

Material

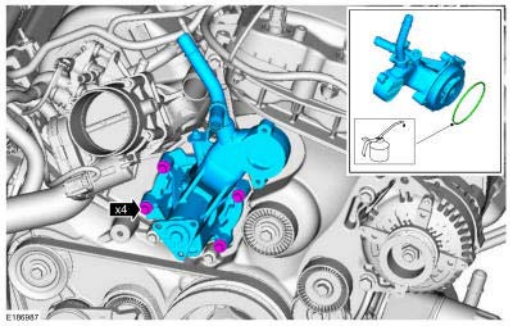
: Motorcraft® Orange Antifreeze/Coolant Concentrated (U.S.) / VC-3-B (U.S.) (WSS-M97B44-D)

Install the coolant pump and tighten the bolts in 2 stages.

Torque:

Stage 1: 177 lb.in (20 Nm)

Stage 2: 60°

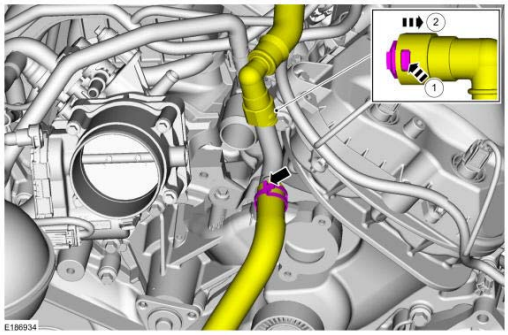


4.

Connect the lower degas bottle hose to the heater outlet tube and position the clamp.

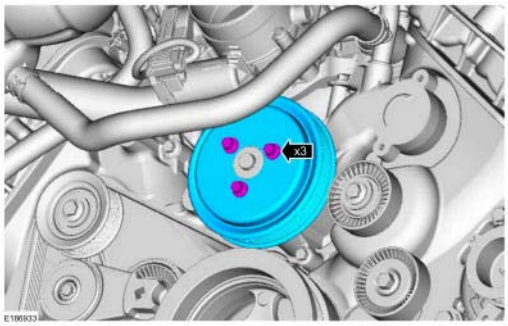
Use the General Equipment: Hose Clamp Remover/Installer

Connect the heater outlet hose to the heater outlet tube.



NOTE: Only tighten the bolts finger tight at this stage.

5.
Position the coolant pump pulley and install the bolts finger tight.



6.

Install the thermostat housing. Refer to: Thermostat Housing .

7.

Remove the plastic from the A/C compressor belt.

8.

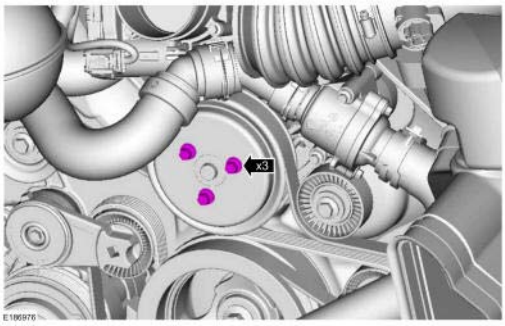
Install the accessory drive belt. Refer to: ACCESSORY DRIVE BELT - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS).

9.

Tighten the coolant pump pulley bolts.

Torque

: 18 lb.ft (25 Nm)



10.

Install the air cleaner outlet pipe. Refer to: AIR CLEANER OUTLET PIPE - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS).

11.

Fill and bleed the cooling system. Refer to: Cooling System Draining and Vacuum Filling .

REMOVAL AND INSTALLATION > COOLING FAN MOTOR AND SHROUD > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

Remove the air cleaner. Refer to: AIR CLEANER - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS).

2.

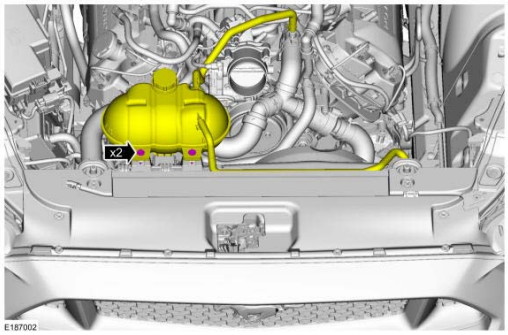
Remove the air cleaner outlet pipe. Refer to: AIR CLEANER OUTLET PIPE - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS).

3.

Remove the bolts and position the degas bottle aside.

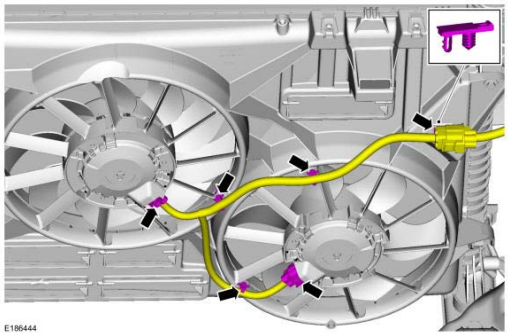
Torque

: 80 lb.in (9 Nm)



4.

Disconnect the cooling fan electrical connectors and detach the wiring harness retainers.

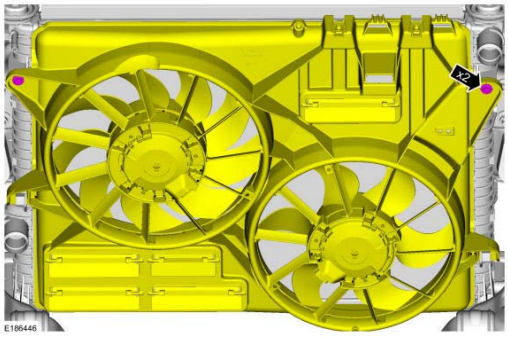


5.

Remove the bolts.

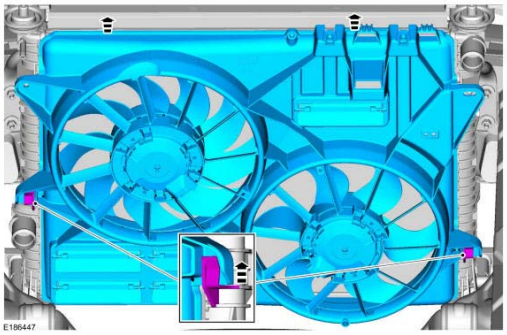
Torque

: 53 lb.in (6 Nm)



6.

Remove the cooling fan motor and shroud.



REMOVAL AND INSTALLATION > COOLING FAN MOTOR AND SHROUD > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > DEGAS BOTTLE

Special Tool(s) / General Equipment

Fluid Suction Gun
Fluid Suction Gun Hose Clamp Remover/Installer
Locking Pliers

Materials

Name	Specification
Motorcraft® Orange Antifreeze/Coolant Prediluted (U.S.) VC-3DIL-B (U.S.)	WSS-M97B44-D2
Motorcraft® Orange Antifreeze/Coolant Concentrated (U.S.) VC-3-B (U.S.)	WSS-M97B44-D

REMOVAL AND INSTALLATION > DEGAS BOTTLE > REMOVAL

WARNING: Always allow the engine to cool before opening the cooling system. Do not unscrew the coolant pressure relief cap when the engine is operating or the cooling system is hot. The cooling system is under pressure; steam and hot liquid can come out forcefully when the cap is loosened slightly. Failure to follow these instructions may result in serious personal injury.

NOTE: Removal steps in this procedure may contain installation details.

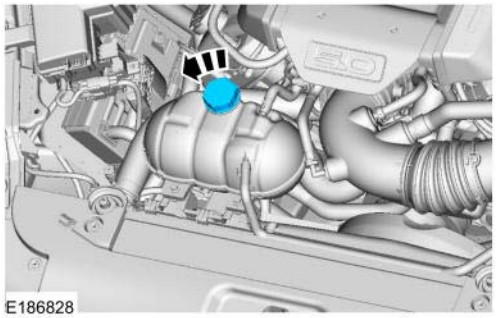
1.





WARNING: When releasing the cooling system pressure, cover the coolant expansion tank cap with a thick cloth.

Remove the pressure relief cap.

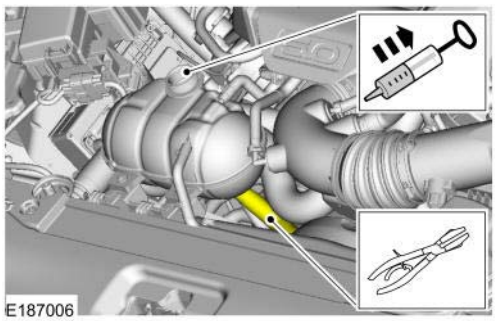


2.

Using general tools clamp the lower degas bottle hose and syphon the coolant from the degas bottle.

Use the General Equipment: Fluid Suction Gun

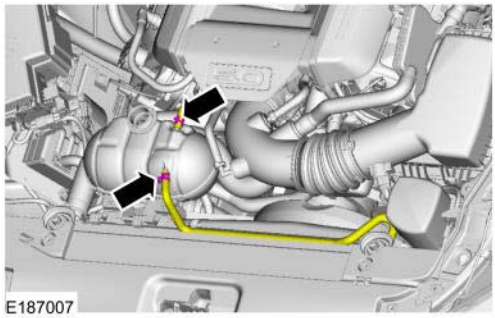
Use the General Equipment: Locking Pliers



3.

Release the clamps, disconnect the upper degas bottle coolant hoses.

Use the General Equipment: Hose Clamp Remover/Installer

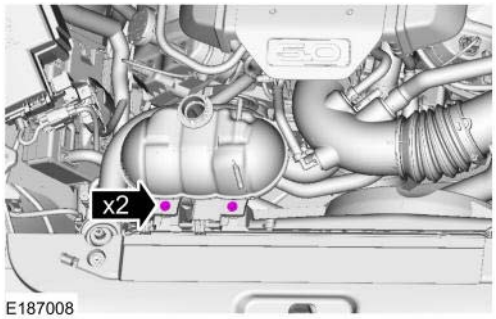


4.

Remove the bolts.

Torque

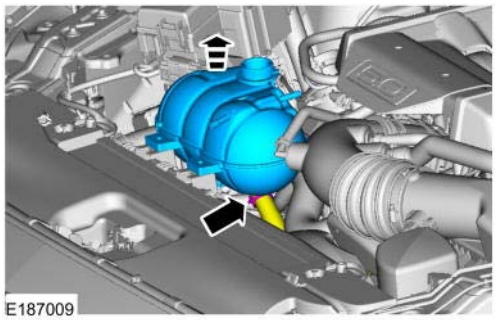
: 80 lb.in (9 Nm)



5.

Position the degas bottle and disconnect the lower coolant hose.

Use the General Equipment: Hose Clamp Remover/Installer



REMOVAL AND INSTALLATION > DEGAS BOTTLE > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Fill the degas bottle with the recommended coolant mixture and fill level.

Material

: Motorcraft® Orange Antifreeze/Coolant Concentrated (U.S.) / VC-3-B (U.S.) (WSS-M97B44-D)

Material

: Motorcraft® Orange Antifreeze/Coolant Prediluted (U.S.) / VC-3DIL-B (U.S.) (WSS-M97B44-D2)

REMOVAL AND INSTALLATION > RADIATOR

Special Tool(s) / General Equipment

Hose Clamp Remover/Installer

REMOVAL AND INSTALLATION > RADIATOR > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

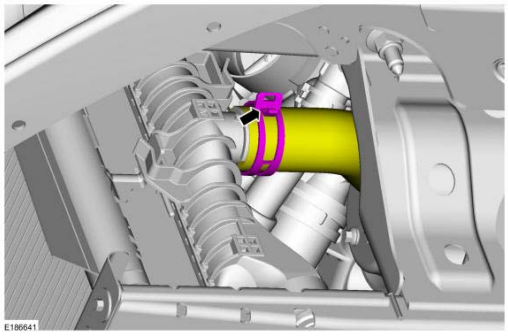
1.

Drain the cooling system. Refer to: Cooling System Draining and Vacuum Filling .

2.

Release the clamp and disconnect the lower radiator hose.

Use the General Equipment: Hose Clamp Remover/Installer

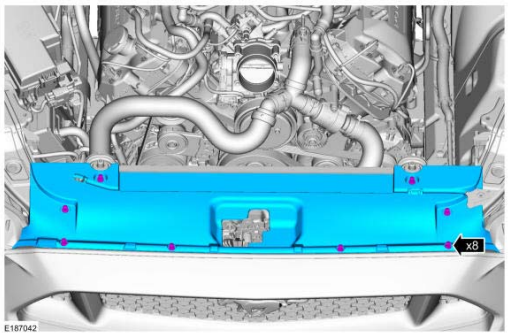


3.

Remove the cooling fan motor and shroud. Refer to: Cooling Fan Motor and Shroud .

4.

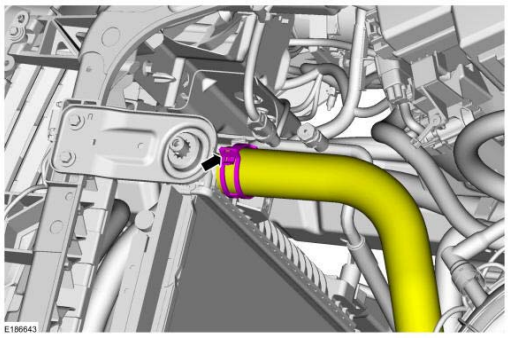
Remove the retainers and the radiator sight shield.



5.

Release the clamp and disconnect the upper radiator hose.

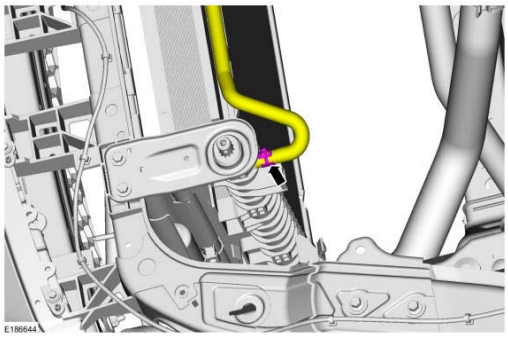
Use the General Equipment: Hose Clamp Remover/Installer



6.

Release the clamp and disconnect the upper coolant hose.

Use the General Equipment: Hose Clamp Remover/Installer

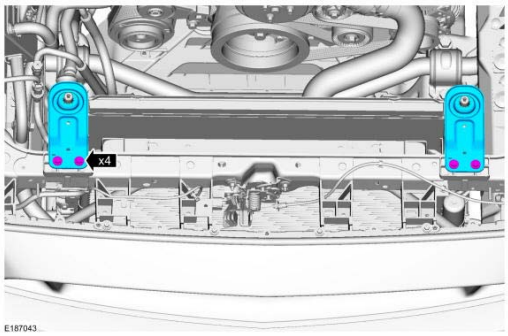


7.

Remove the bolts and the upper radiator support brackets.

Torque

: 97 lb.in (11 Nm)



NOTE: Front bumper removed for clarity.

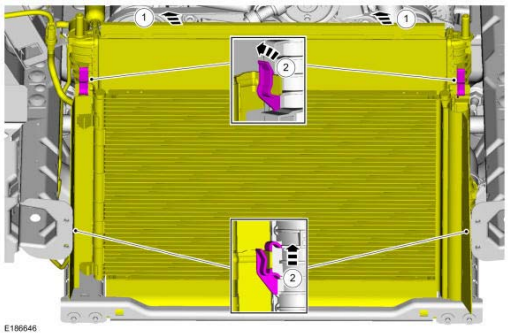
8.

1.

Position the radiator towards the engine.

2.

Release the upper tabs and position the A/C condenser aside.



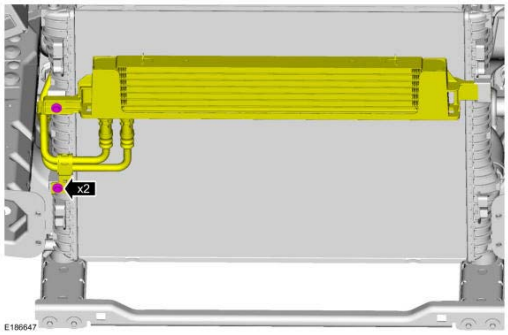
NOTE: If equipped.

NOTE: Front bumper removed for clarity.

9.
Remove the bolts and position aside the transmission fluid cooler.

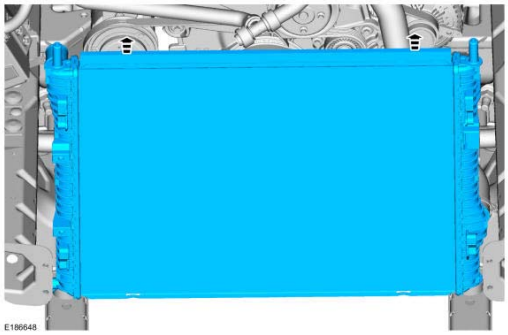
Torque

: 53 lb.in (6 Nm)



NOTE: Front bumper removed for clarity.

10.
Remove the radiator.



REMOVAL AND INSTALLATION > RADIATOR > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Fill and bleed the cooling system. Refer to: Cooling System Draining and Vacuum Filling .

REMOVAL AND INSTALLATION > THERMOSTAT

Materials

Name	Specification
Motorcraft® Orange Antifreeze/Coolant Concentrated (U.S.) VC-3-B (U.S.)	WSS-M97B44-D

REMOVAL AND INSTALLATION > THERMOSTAT > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

Drain the cooling system. Refer to: Cooling System Draining and Vacuum Filling .

2.

Remove the air cleaner outlet pipe. Refer to: AIR CLEANER OUTLET PIPE - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS).

NOTE: Cover the accessory drive belts to prevent coolant contamination of the belts.

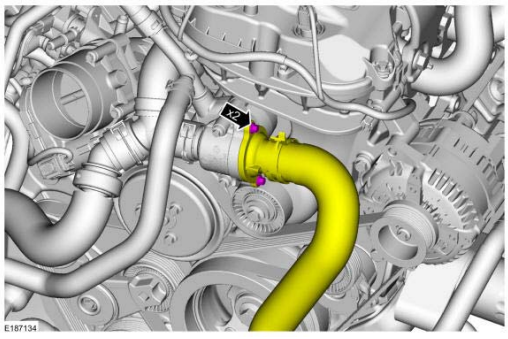
3.
Completely cover the accessory drive belts with waterproof plastic.

NOTE: During installation, make sure the coolant outlet connection is fully seated on the thermostat housing before tightening the bolts.

4.
Remove the bolts and detach the coolant inlet connector.

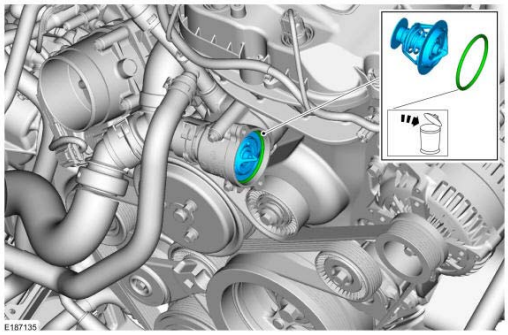
Torque

: 89 lb.in (10 Nm)



5.

Remove the thermostat and discard the O-ring seal.



REMOVAL AND INSTALLATION > THERMOSTAT > INSTALLATION

1.

1.

Install a new O-ring seal and lubricate it with clean engine coolant.

Material

: Motorcraft® Orange Antifreeze/Coolant Concentrated (U.S.) / VC-3-B (U.S.) (WSS-M97B44-D)

2.

To install, reverse the removal procedure.

2.

Fill and bleed the cooling system. Refer to: Cooling System Draining and Vacuum Filling .

REMOVAL AND INSTALLATION > THERMOSTAT HOUSING

Special Tool(s) / General Equipment

Hose Clamp Remover/Installer

REMOVAL AND INSTALLATION > THERMOSTAT HOUSING > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

Drain the cooling system. Refer to: Cooling System Draining and Vacuum Filling .

2.

Remove the air cleaner outlet pipe. Refer to: AIR CLEANER OUTLET PIPE - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS).

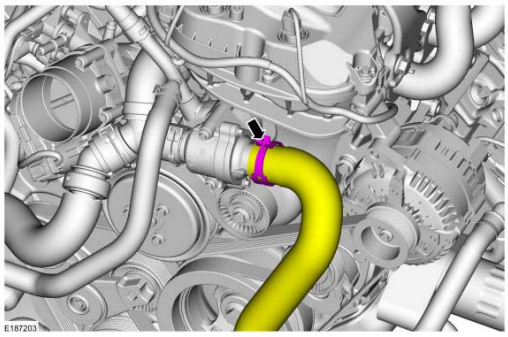
NOTE: Cover the accessory drive belts to prevent coolant contamination of the belts.

3.
Completely cover the accessory drive belts with waterproof plastic.

4.

Release the clamp and disconnect the lower radiator hose from the coolant inlet connection.

Use the General Equipment: Hose Clamp Remover/Installer

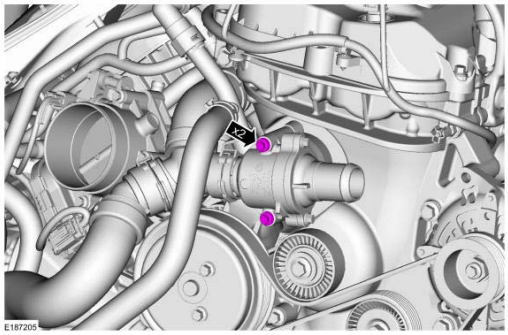


5.

Remove the thermostat housing bolts.

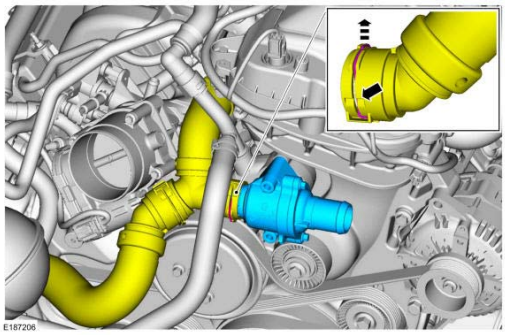
Torque

: 89 lb.in (10 Nm)



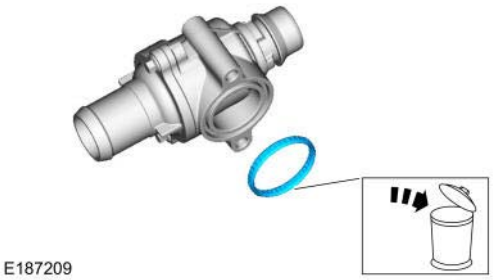
6.

Pull the upper radiator hose T-connector spring clip up until the end of the clip is in the detent on the quick connect coupling and remove the thermostat housing from the upper radiator hose T-connector.



7.

Remove and discard the thermostat housing gasket.



REMOVAL AND INSTALLATION > THERMOSTAT HOUSING > INSTALLATION

1.

Install a new thermostat housing gasket.

To install, reverse the removal procedure.

2.

Fill and bleed the cooling system. Refer to: Cooling System Draining and Vacuum Filling .

SPECIFICATIONS > SPECIFICATIONS

Materials

Item	Specification
Dye-Lite ® Gasoline Engine Oil Leak Detection Dye 164-R3700 (Rotunda)	-

DESCRIPTION AND OPERATION > ENGINE - OVERVIEW > ENGINE INFORMATION

NOTE: When repairing engines, all parts must be contamination free. If contamination/foreign material is present when repairing an engine, premature engine failure may occur.

NOTE: Specifications show the expected minimum or maximum condition. Refer to the appropriate article for the specifications.

NOTE: If a component fails to meet the specifications, it is necessary to refinish it or install a new component. Wear limits are provided as an aid to determine if the component can be refinished. A new component must be installed when any component fails to meet specifications and cannot be refinished.

NOTE: This article contains information, steps and procedures that may not be specific to this engine.

This article covers general procedures and diagnosis and testing of the engine system, except for exhaust emission control devices, which are covered in the Engine Controls article.

The engine incorporates the following features: Refer to the appropriate article for the procedure.

- Crankcase ventilation or breather system
- Exhaust emission control system
- EVAP

Some engines incorporate a fail-safe cooling system. Refer to the appropriate article for the procedure.

The engine, fuel system, ignition system, emissions system and exhaust system all affect exhaust emission levels and must be maintained according to the maintenance schedule. Refer to the Scheduled

Maintenance Guide.

Correct engine identification is required to order parts. Refer to the appropriate article for the procedure.

For complete vehicle and engine identification codes, Refer to: Identification Codes .

DIAGNOSIS AND TESTING > ENGINE > INSPECTION AND VERIFICATION - ENGINE PERFORMANCE

NOTE: There are 2 diagnostic paths that can be followed depending on the type of engine concern. Carry out Inspection and Verification - Engine Performance or Inspection and Verification - NVH.

1.

Verify the customer concern.

2.

Visually inspect for obvious signs of mechanical or electrical damage.

3.

If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.

NOTE: Make sure to use the latest scan tool software release.

4.
If the cause is not visually evident, connect the scan tool to the DLC.

NOTE: The VCM LED prove out confirms power and ground from the DLC are provided to the VCM.

5.
If the scan tool does not communicate with the VCM:

check the VCM connection to the vehicle.

check the scan tool connection to the VCM.

check for No Power To The Scan Tool, to diagnose no power to the scan tool, REFER to: MODULE COMMUNICATIONS NETWORK .

6.

If the scan tool does not communicate with the vehicle:

verify the ignition key is in the ON position.

verify the scan tool operation with a known good vehicle.

to diagnose no response from the PCM, REFER to: MODULE COMMUNICATIONS NETWORK .

7.

Carry out the network test.

If the scan tool responds with no communication for one or more modules, REFER to: MODULE COMMUNICATIONS NETWORK .

If the network test passes, retrieve and record continuous memory DTCs.

8.

Clear the continuous DTCs and carry out the self-test diagnostics for the PCM.

9.

If the DTCs retrieved are related to the concern, refer to the appropriate article.

10.

If no DTCs related to the concern are retrieved, GO to Symptom Chart - Engine Performance .

DIAGNOSIS AND TESTING > ENGINE > INSPECTION AND VERIFICATION - NVH

1.

NVH symptoms should be identified using the diagnostic tools and techniques that are available. For a list of these techniques, tools, an explanation of their uses and a glossary of common terms, REFER to: Noise, Vibration and Harshness (NVH) . Since it is possible that any one of multiple systems may be the cause of the symptom, it may be necessary to use a process of elimination type of diagnostic approach to pinpoint the responsible system.

2.

Verify the customer concern by operating the engine to duplicate the condition.

3.

Check the engine oil level and check the oil for contamination. Low engine oil level or contaminated oil are a common cause of engine noise. If the oil is contaminated, the source of the contamination must be identified and repaired as necessary.

4.

Visually inspect for obvious signs of mechanical damage.

5.

If the inspection reveals obvious concerns that can be readily identified, repair as necessary.

> *NOTE: Make sure to use the latest scan tool software release.*

6.
If the cause is not visually evident, connect the scan tool to the DLC.

> *NOTE: The VCM LED prove out confirms power and ground from the DLC are provided to the VCM.*

7.
If the scan tool does not communicate with the VCM:

check the VCM connection to the vehicle.

check the scan tool connection to the VCM.

check for No Power To The Scan Tool, to diagnose no power to the scan tool, REFER to: MODULE COMMUNICATIONS NETWORK .

8.

If the scan tool does not communicate with the vehicle:

verify the ignition key is in the ON position.

verify the scan tool operation with a known good vehicle.

to diagnose no response from the PCM, REFER to: MODULE COMMUNICATIONS NETWORK .

9.

Carry out the network test.

If the scan tool responds with no communication for one or more modules, REFER to: MODULE COMMUNICATIONS NETWORK .

If the network test passes, retrieve and record continuous memory DTCs.

10.

Clear the continuous DTCs and carry out the self-test diagnostics for the PCM.

11.

If the DTCs retrieved are related to the concern, go to the appropriate article.

12.

If no DTCs related to the concern are retrieved, continue the inspection and verification if a noise concern is related to the engine. For vibration concerns and noise concerns such as powertrain mounts, air intake system and starter GO to Symptom Chart - NVH .

In some cases, a noise may be a normal characteristic of that engine type. In other cases the noise may require further investigation. Comparing the noise to a similar year/model vehicle equipped with the same engine will aid in determining if the noise is normal or abnormal.

Once a customer concern has been identified as an abnormal engine noise, it is critical to determine the location of the specific noise. Use the EngineEAR/ChassisEAR or stethoscope (the noise will always be louder closer to the noise source) to isolate the location of the noise to one of the following areas.

- Fuel injector(s)
- Upper end of engine
- Lower end of engine
- Front of engine
- Rear of engine

Fuel injector noise

A common source of an engine ticking noise can be related to the fuel injection pump Gasoline Turbocharged Direct Injection (GTDI) engine or fuel injector(s). This is normal engine noise that can be verified by listening to another vehicle. If the injector noise is excessive or irregular, use the EngineEAR/ChassisEAR or stethoscope to isolate the noise to a specific fuel injector.

Upper end engine noise

A common source of upper end engine noise (ticking, knocking or rattle) include the camshaft(s) and valve train. Upper end engine noise can be determined using the EngineEAR/ChassisEAR or stethoscope on the valve cover bolts. If the noise is loudest from the valve cover bolts, then the noise is upper end. The EngineEAR/ChassisEAR or stethoscope can be used to further isolate the noise to the specific cylinder bank and cylinder. Removal of the valve covers will be required to pinpoint the source of the noise.

Lower end engine noise

A common source of lower end engine noise (ticking or knocking) include the crankshaft, connecting rod(s) and bearings. Lower end noises can be determined by using the oil pan or lower cylinder block. If the noise is loudest from these areas, then the noise is lower end. If an engine noise is isolated to the lower end, some disassembly of the engine may be required to inspect for damage or wear.

Front of engine noise

A common source of noise from the front of the engine (squeal, chirp, whine or hoot) is the FEAD components. To isolate FEAD noise, carry out the Engine Accessory Test, REFER to: Noise, Vibration and Harshness (NVH) .

Some other noises from the front of the engine (ticking, tapping or rattle) may be internal to the engine. Use the EngineEAR/ChassisEAR or stethoscope on the engine front cover to determine if the noise is internal to the engine. Removal of the engine front cover may be necessary to inspect internal engine components.

Rear of engine noise

A common source of noise from the rear of the engine (knocking) is the flywheel/flexplate. Inspection of the flywheel/flexplate will be necessary.

Some engines have timing drive components at the rear of the engine and may be the source of noise (ticking, knocking or rattle). Use the EngineEAR/ChassisEAR or stethoscope on the rear of the engine if the noise is suspected to be internal to the engine. Some disassembly of the engine may be required to inspect for damage or wear.

Turbocharger noise (Gasoline Turbocharged Direct Injection (GTDI) engine)

A common source of noise is the turbocharger. Some whine or air rush noise is an acceptable condition.

13.

After the noise is localized, note the characteristics of the noise, including type of noise, frequency and conditions when the noise occurs and GO to Symptom Chart - NVH .

DIAGNOSIS AND TESTING > ENGINE > SYMPTOM CHART - ENGINE PERFORMANCE

Symptom	Possible Sources	Action
Difficult starting	Inoperative or damaged ignition system Air or vacuum leak Inoperative or damaged fuel system Inoperative or damaged starting system	Refer to the appropriate article for the procedure. Refer to ENGINE CONTROLS - INTRODUCTION (EXCEPT DIESEL & HYBRID) .
Damaged charging system/battery		REFER to: Charging System - 2.3L EcoBoost (201kW/273PS) or REFER to: Charging System - 3.7L Duratec (227kW/301PS) or REFER to: Charging System - 5.0L 32V Ti-VCT .
Burnt valve		INSTALL a new cylinder head. TEST the system for normal operation after the repair.
Worn piston		INSTALL a new piston. TEST the system for normal operation after the repair.
Worn piston rings		INSTALL new piston rings. TEST the system for normal operation after the repair.
Worn cylinder		INSTALL a new cylinder block. TEST the system for normal operation after the repair.
Damaged head gasket		INSTALL a new cylinder head gasket. TEST the system for normal operation after the repair.

Inoperative or damaged cooling system		Refer to the appropriate article for the procedure.
Fail-safe cooling invoked (if equipped)		Refer to ENGINE CONTROLS - INTRODUCTION (EXCEPT DIESEL & HYBRID) .
Poor idling	Vacuum leaks Inoperative or damaged EGR system	Refer to the appropriate article for the procedure. Refer to ENGINE CONTROLS - INTRODUCTION (EXCEPT DIESEL & HYBRID) .
Inoperative or damaged ignition system		Refer to the appropriate article for the procedure.
Inoperative or damaged cooling system Inoperative or damaged fuel system		Refer to the appropriate article for the procedure.
Fail-safe cooling invoked (if equipped)		Refer to ENGINE CONTROLS - INTRODUCTION (EXCEPT DIESEL & HYBRID) .
Incorrect valve clearance		ADJUST valve clearance. Refer to the appropriate article for the procedure. TEST the system for normal operation after the repair.
Incorrect valve-to-valve seat contact		INSTALL a new cylinder head. TEST the system for normal operation after the repair.
Damaged head gasket		INSTALL a new cylinder head gasket. TEST the system for normal operation after the repair.
Engine runs rough	Inoperative or damaged fuel system Air or vacuum leaks EGR system fault Inoperative or damaged cooling system Inoperative or damaged ignition system	Refer to the appropriate article for the procedure.
Fail-safe cooling invoked (if equipped)		Refer to ENGINE CONTROLS - INTRODUCTION (EXCEPT DIESEL & HYBRID) .
Burnt or sticking valve		INSTALL a new valve. TEST the system for normal operation after the repair.
Weak or broken valve spring		INSTALL a new valve spring. TEST the system for normal operation after the repair.

Carbon accumulation in combustion chamber		ELIMINATE carbon buildup. TEST the system for normal operation after the repair.
Excessive oil consumption	Leaking oil	REPAIR oil leakage. TEST the system for normal operation after the repair.
Blocked or restricted turbocharger oil drain pipe		INSPECT the turbocharger drain pipe. REPAIR as necessary. TEST the system for normal operation after the repair.
Damaged or collapsed air intake hoses and tubes		Tighten hoses clamps. INSPECT for damage and REPAIR as necessary. TEST the system for normal operation after the repair.
Damaged exhaust or exhaust leaks at turbocharger housing or exhaust manifold.		INSPECT for leaks. Leaks can be detected audibility or visually, by a discoloration caused by escaping hot exhaust gases. REPAIR as necessary. TEST the system for normal operation after the repair.
Turbocharger oil seals leaking		REFER to Turbocharger Internal Oil Leak Test. REFER to: Turbocharger . TEST the system for normal operation after the repair.
Inoperative PCV system		REPAIR or INSTALL new components as necessary. TEST the system for normal operation after the repair.
Incorrect oil		CHANGE oil to correct specification. TEST the system for normal operation after the repair.
Worn valve stem seal		INSTALL a new valve stem seal. TEST the system for normal operation after the repair.
Worn valve stem or valve guide		INSTALL a new cylinder head. TEST the system for normal operation after the repair.
Sticking piston rings		INSTALL new piston rings. TEST the system for normal operation after the repair.
Worn piston ring groove		INSTALL a new piston and piston pin. TEST the system for normal operation after the repair.

Worn piston or cylinder		INSTALL a new piston or cylinder block. TEST the system for normal operation after the repair.
Oil in coolant	Leaking head gasket Damaged cylinder block Damaged cylinder head	INSPECT the engine components. INSTALL new engine components as necessary. Refer to the appropriate article for the procedure. TEST the system for normal operation after the repair.
Leaking oil cooler		INSPECT the oil cooler and seal for damage. INSTALL new components as necessary. Refer to the appropriate article for the procedure.
Coolant in oil	Leaking head gasket Damaged cylinder block Damaged cylinder head	INSPECT the engine components. INSTALL new engine components as necessary. Refer to the appropriate article for the procedure. TEST the system for normal operation after the repair.
Insufficient power	Inoperative or damaged ignition system Air intake system blockage Lubrication system blockage Inoperative or damaged fuel system	Refer to the appropriate article for the procedure. Refer to ENGINE CONTROLS - INTRODUCTION (EXCEPT DIESEL & HYBRID) .
Turbocharger turbine or compressor wheel damage		INSPECT the turbocharger. REFER to the Check for Free Rotation- Off Vehicle. REFER to: Turbocharger . TEST the system for normal operation after the repair.
Damaged exhaust or exhaust leaks at turbocharger housing or exhaust manifold		INSPECT for leaks. Leaks can be detected audibility or visually, by a discoloration caused by escaping hot exhaust gases. REPAIR as necessary. TEST the system for normal operation after the repair.
Malfunctioning turbocharger bypass valve		Refer to ENGINE CONTROLS - INTRODUCTION (EXCEPT DIESEL & HYBRID) .
Oil level too high		DRAIN oil to correct level.
Incorrect engine oil		INSTALL correct specification engine oil. TEST the system for normal operation after the repair.

Excessive accessory drive belt loading Inoperative or damaged cooling system	Refer to the appropriate article for the procedure.
Fail-safe cooling invoked (if equipped)	Refer to ENGINE CONTROLS - INTRODUCTION (EXCEPT DIESEL & HYBRID) .
Damaged or plugged exhaust system	INSPECT exhaust system. TEST the system for normal operation after the repair.
Incorrect tire size	REFER to: Suspension System .
Dragging brakes	REFER to: Brake System .
Slipping transmission	Refer to the appropriate article for the procedure.
Slipping clutch	Refer to the appropriate article for the procedure.
Incorrect valve clearance	ADJUST valve clearance. Refer to the appropriate article for the procedure. TEST the system for normal operation after the repair.
Worn or damaged valve tappet	INSTALL a new valve tappet. TEST the system for normal operation after the repair.
Damaged valve guide Compression leakage at valve seat Seized valve stem	INSTALL a new cylinder head assembly. TEST the system for normal operation after the repair.
Weak or broken valve spring	INSTALL a new valve spring. TEST the system for normal operation after the repair.
Worn or damaged cam	INSTALL a new camshaft. TEST the system for normal operation after the repair.
Damaged head gasket	INSTALL a new head gasket. TEST the system for normal operation after the repair.
Cracked or distorted cylinder head	INSTALL a new cylinder head assembly. TEST the system for normal operation after the repair.
Damaged, worn or sticking piston ring(s)	INSTALL a new piston ring(s). TEST the system for normal operation after the repair.
Worn or damaged piston	INSTALL a new piston and piston pin. TEST the system for normal operation after the repair.

Engine emits excessive black smoke (black/blue/white)	Clogged Air Cleaner (ACL) element	INSTALL a new ACL element. TEST the system for normal operation after the repair.
Incorrect type or grade of oil		DRAIN and FILL with specified oil.
Blocked or restricted turbocharger oil drain pipe		INSPECT the turbocharger oil drain pipe. REPAIR as necessary. TEST the system for normal operation after the repair.
Damaged/restricted or leaking turbocharger intake tube assembly		REPAIR or INSTALL a new tube as necessary. TEST the system for normal operation after the repair.
Engine wear (piston rings, valve guides)		REPAIR as necessary. TEST the system for normal operation after the repair.
Plugged crankcase ventilation system		Visually INSPECT the crankcase ventilation system.
Turbocharger oil seals leaking		REFER to Turbocharger Internal Oil Leak Test. REFER to: Turbocharger . TEST the system for normal operation after the repair.

DIAGNOSIS AND TESTING > ENGINE > SYMPTOM CHART - NVH

Symptom	Possible Sources	Action
Drone type noise	Powertrain mount(s)	CARRY OUT the Powertrain/Drivetrain Mount Neutralizing procedure. REFER to: Powertrain/Drivetrain Mount Neutralizing . TEST the system for normal operation after the repair.
Drumming noise - occurs inside the vehicle during idle or high idle, hot or cold. Very low-frequency drumming is very RPM dependent	Engine vibration excites the body resonances inducing interior noise	CARRY OUT the Powertrain/Drivetrain Mount Neutralizing procedure. REFER to: Powertrain/Drivetrain Mount Neutralizing . TEST the system for normal operation after the repair.
Engine drumming noise - accompanied by vibration	Powertrain mount(s)	CARRY OUT the Powertrain/Drivetrain Mount Neutralizing procedure. REFER to: Powertrain/Drivetrain Mount Neutralizing . TEST the system for normal operation after the repair.

Rattle - occurs at idle or at light acceleration from a stop	Powertrain mount(s)	CHECK the powertrain mounts for damage. INSTALL new mounts as necessary. For engine, Refer to the appropriate article for the procedure. For transaxle, Refer to the appropriate article for the procedure. TEST the system for normal operation after the repair.
Whine/moan type noise - pitch increases or changes with vehicle speed	Powertrain mount(s)	CHECK the powertrain mounts for damage. INSTALL new mounts as necessary. For engine, Refer to the appropriate article for the procedure. For transaxle, Refer to the appropriate article for the procedure. TEST the system for normal operation after the repair.
Clunk - occurs when shifting from PARK or between REVERSE and DRIVE	Powertrain mounts	CHECK the powertrain mounts for damage. INSTALL new mounts as necessary. For engine, Refer to the appropriate article for the procedure. For transaxle, Refer to the appropriate article for the procedure. TEST the system for normal operation after the repair.
Idle speed is too high		CHECK for the correct idle speed. TEST the system for normal operation after the repair.
Accessory drive bearing hoot - occurs at idle or high idle in cold temperatures of approximately 4 °C (40 °F) or colder at the first start of the day	Accessory drive idler or tensioner pulley bearing is experiencing stick/slip between ball bearings and the bearing race	CARRY OUT the Engine Cold Soak procedure. REFER to: Noise, Vibration and Harshness (NVH) . PLACE the EngineEAR probe directly on the idler/ tensioner center post or bolt to verify which bearing is making the noise. INSTALL new parts as necessary. Refer to the appropriate article for the procedure. TEST the system for normal operation after the repair.
Accessory drive belt noise, squeal or chirping	Defective/worn or incorrect accessory drive belt Misaligned pulley(s) Pulley runout Damaged or worn accessory drive component or idler Fluid contamination of the accessory drive belt or pulleys Damaged or worn accessory drive belt tensioner Damaged pulley grooves	CARRY OUT the Engine Accessory Test. REFER to: Noise, Vibration and Harshness (NVH) . INSPECT components and INSTALL new parts as necessary. Refer to the appropriate article for the procedure. TEST the system for normal operation after the repair.

Clunking noise	Coolant pump has excessive end play or imbalance	CHECK the coolant pump for excessive end play. INSPECT the coolant pump for imbalance with the drive belt off. INSTALL a new coolant pump as necessary. Refer to the appropriate article for the procedure. TEST the system for normal operation after the repair.
Whine/hum - occurs when unlocking the vehicle or opening the door with the engine off Gasoline Turbocharged Direct Injection (GTDI) only	Fuel pump module	Acceptable condition. Fuel pump module turns on before engine starts to prime the fuel system.
Whine or moaning noise	Air intake system	CHECK the air cleaner and ducts for correct fit. INSPECT the air intake system for leaks or damage. REPAIR as necessary. TEST the system for normal operation after the repair.
Whistling noise - normally accompanied with poor idle condition	Air intake system	CHECK the air intake ducts, air cleaner, throttle body and vacuum hoses for leaks and correct fit. REPAIR or ADJUST as necessary. TEST the system for normal operation after the repair.
Turbocharger intake tube assembly leaking		REPAIR or INSTALL a new tube as necessary. TEST the system for normal operation after the repair.
Loose connections or damage to air intake hoses and tubes		TIGHTEN hose clamps. INSPECT for damage and REPAIR as necessary. TEST the system for normal operation after the repair.
Air leaks at turbine housing, blown joints or damaged exhaust		INSPECT for leaks. Leaks can usually be detected audibility or visually, by a discoloration caused by escaping hot exhaust gases. REPAIR as necessary. TEST the system for normal operation after the repair.
Carbon build up in the turbine housing		INSPECT the turbocharger. REFER to the Check for Free Rotation - Off Vehicle. REFER to: Turbocharger . TEST the system for normal operation after the repair.

Turbocharger imbalance due to foreign object/damage		REPAIR as necessary. TEST the system for normal operation after the repair.
Turbine bearing failure		INSPECT the turbocharger. REFER to the Check for Free Rotation - Off Vehicle. REFER to: Turbocharger . TEST the system for normal operation after the repair.
Inoperative turbocharger bypass valve		Refer to ENGINE CONTROLS - INTRODUCTION (EXCEPT DIESEL & HYBRID) .
Whine or air rush type noise	Turbocharger	Acceptable condition. Some whine or air noise is common.
Chrip or whoosh sound	Turbocharger bypass valve	CHECK the turbocharger bypass valve. REPAIR as necessary. TEST the system for normal operation after the repair.
Hissing noise - occurs during idle or high idle that is apparent with the hood open	Vacuum leak	Use the Ultrasonic Leak Detector/EngineEAR to locate the source. Scan the air intake system from the inlet to each cylinder intake port. DISCARD the leaking parts, and INSTALL a new component. TEST the system for normal operation after the repair.
Vehicles with a plastic intake manifold		Acceptable condition. Some plastic manifolds exhibit this noise, which is the effect of the plastic manifold.
Grinding noise - occurs during engine cranking	Incorrect starter motor mounting	INSPECT the starter motor for correct mounting. REPAIR as necessary. Refer to the appropriate article for the procedure. TEST the system for normal operation after the repair.
Starter motor		CHECK the starter motor. INSTALL a new starter motor as necessary. Refer to the appropriate article for the procedure. TEST the system for normal operation after the repair.
Incorrect starter motor drive engagement		INSPECT the starter motor drive for wear or damage. INSTALL a new starter motor as necessary. Refer to the appropriate article for the procedure. TEST the

		system for normal operation after the repair. INSPECT the flywheel/flexplate for wear or damage. INSTALL a new flywheel/flexplate as necessary. Refer to the appropriate article for the procedure. TEST the system for normal operation after the repair.
Engine noise, front of engine - knocking noise from lower front of engine	Damaged or separated crankshaft pulley/damper	CHECK for obvious signs of damage or wobble during operation. INSTALL new as necessary. Refer to the appropriate article for the procedure. TEST the system for normal operation after the repair.
Engine noise, front of engine - ticking, tapping or rattling noise from the front of the engine	Timing drive components	REMOVE the accessory drive belt. Refer to the appropriate article for the procedure. USE the EngineEAR to isolate the noise to the engine front cover. REMOVE the engine front cover and INSPECT the timing drive components. INSTALL new parts as necessary. Refer to the appropriate article for the procedure. TEST the system for normal operation after the repair.
Engine noise, upper end - ticking noise near the fuel rail and intake manifold	Fuel rail clip Fuel injector	CHECK for loose or damaged fuel rail clip(s). REPAIR as necessary. USE the EngineEAR to isolate the noisy injector(s). INSTALL a new injector(s) as necessary. Refer to the appropriate article for the procedure. TEST the system for normal operation after the repair.
Fuel injection pump (GTDI only)		This is a normal engine noise that can be verified by listening to another vehicle. If noise is excessive, REPAIR as necessary. TEST the system for normal operation after the repair.
Engine noise, upper end - ticking, knocking or rattle noise that occurs during idle or high idle during the first cold start of the day and may disappear as the engine warms	Valve train noise (bled down lifter/lash adjuster)	CARRY OUT the Valve Train Analysis Component Test in this article. INSTALL new parts as necessary. Refer to the appropriate article for the procedure. TEST the system for normal operation after the repair.

Engine noise, upper end - occurs mostly with a warm engine at light/medium acceleration	Worn or damaged spark plugs	REMOVE the spark plugs. INSPECT and INSTALL new as necessary. Refer to the appropriate article for the procedure. TEST the system for normal operation after the repair.
Engine noise, upper end - rattling noise from the valve train. Worse when the engine is cold	Low oil level	CHECK the oil level. FILL as necessary.
Thin or diluted oil		INSPECT the oil for contamination. If the oil is contaminated, CHECK for the source. REPAIR as necessary. CHANGE the oil and filter. TEST the system for normal operation after the repair.
Low oil pressure		CARRY OUT the Oil Pressure Test in this article. If not within specifications, REMOVE the engine oil pan. Refer to the appropriate article for the procedure. INSPECT for a blocked oil pick up tube. TEST the system for normal operation after the repair.
Worn valve train components		CARRY OUT the Valve Train Analysis Component Test in this article. INSTALL new parts as necessary. Refer to the appropriate article for the procedure. TEST the system for normal operation after the repair.
Worn valve guides		CARRY OUT the Valve Guide Inner Diameter procedure. REFER to: Valve Guide Inner Diameter .
Excessive runout of the valve seats or the valve face		INSPECT for abnormalities on the valve face and valve seat. INSTALL a new cylinder head assembly if abnormalities are found.
Engine noise, upper end - pinging noise	Gasoline octane too low	VERIFY with customer the type of gasoline used. CORRECT as necessary. TEST the system for normal operation after the repair.
KS operation		CHECK the KS operation. INSTALL a new KS. Refer to the

		appropriate article for the procedure. TEST the system for normal operation after the repair.
Incorrect spark timing		CHECK the spark timing. REPAIR as necessary. TEST the system for normal operation after the repair.
High operating temperature		INSPECT the cooling system for leaks. CHECK the coolant level. REFILL as necessary. CHECK the coolant for the correct mix ratio. DRAIN and REFILL as needed. VERIFY the engine operating temperature is within specifications. REPAIR as necessary. TEST the system for normal operation after the repair.
Spark plug		CHECK the spark plugs. REPAIR or INSTALL new spark plugs as necessary. TEST the system for normal operation after the repair.
Catalytic converter		Compare with a similar vehicle for what is acceptable noise.
Engine noise, lower end - ticking or knocking noise near the oil filter adapter	Oil pump	USE the EngineEAR to verify the oil pump as the source of the noise at low RPM. REPAIR as necessary. Refer to the appropriate article for the procedure. TEST the system for normal operation after the repair.
Engine noise, lower end - light knocking noise, also described as piston slap. Noise is most noticeable when the engine is cold with light to medium acceleration. The noise disappears as the engine warms	Excessive clearance between the piston and the cylinder wall	CARRY OUT the Piston Diameter procedure. REFER to: Piston Diameter . Measure the cylinder bore diameter. Subtract the piston diameter from the cylinder bore diameter to find the piston-to-cylinder bore clearance. REFER to the appropriate article for specifications.
Engine noise, lower end - light double knock or sharp rap sound. Occurs mostly with a warm engine at idle or low speeds in drive. Increases in relation to engine load. Associated with a poor lubrication history	Excessive clearance between the piston and the piston pin	MEASURE the piston pin bore and the piston pin in 2 directions on each side. REFER to the appropriate article for specifications.

Engine noise, lower end - light knocking noise. The noise is most noticeable when the engine is warm. The noise tends to decrease when the vehicle is coasting or in neutral	Excessive clearance between the connecting rod bearings and the crankshaft	CARRY OUT the Connecting Rod Bearing Journal Clearance procedure. REFER to: Connecting Rod Bearing Journal Clearance .
Engine noise, lower end - deep knocking noise. The noise is most noticeable when the engine is warm, at lower RPM and under a light load and then at float	Worn or damaged crankshaft main bearings	CARRY OUT the Crankshaft Main Bearing Journal Clearance procedure. REFER to: Crankshaft Main Bearing Journal Clearance .
Engine noise, rear of engine - knocking noise at rear of engine	Damaged flywheel/flexplate	INSPECT the flywheel/flexplate for wear or damage. INSTALL a new flywheel/flexplate as necessary. Refer to the appropriate article for the procedure. TEST the system for normal operation after the repair.
Engine vibration - vibration felt at all times	Excessive engine pulley runout	CARRY OUT the Engine Accessory Test. REFER to: Noise, Vibration and Harshness (NVH) . INSTALL a new engine pulley as necessary. Refer to the appropriate article for the procedure. TEST the system for normal operation after the repair.
Damaged or worn accessory component		CARRY OUT the Engine Accessory Test. REFER to: Noise, Vibration and Harshness (NVH) . REPAIR or INSTALL a new component as necessary. TEST the system for normal operation after the repair.
Engine vibration - at idle, a low-frequency vibration (5-20 Hz) or mild shake that is felt through the seat/ floorpan	Cylinder misfire	Using the scan tool, CARRY OUT the cylinder power balance and the relative compression test. REPAIR as necessary. Refer to the appropriate article for the procedure. TEST the system for normal operation after the repair.
Engine or torque converter out of balance		VERIFY the torque converter to crankshaft pilot clearance is correct. REPAIR as necessary. RE-INDEX the torque converter on the flex plate by 120 degrees for a 3- bolt converter or 180 degrees for a 4-bolt converter. Refer to the appropriate article for the procedure. TEST the system for normal operation after

		the repair.
Engine vibration - is felt with increases and decreases in engine RPM	Powertrain mount(s)	CHECK the powertrain mounts for damage. INSTALL new mounts as necessary. For engine, Refer to the appropriate article for the procedure. For transaxle, Refer to the appropriate article for the procedure. TEST the system for normal operation after the repair.
Engine or transmission grounded to chassis		INSPECT the powertrain/ drivetrain for correct clearances. REPAIR as necessary. TEST the system for normal operation after the repair.
Engine vibration - increases intensity as the engine RPM is increased	Engine out-of-balance	CARRY OUT the NERU Test. REFER to: Noise, Vibration and Harshness (NVH) . ROTATE the torque converter, 120 degrees for 3-bolt or 180 degrees for 4- bolt. INSPECT the torque converter pilot outer diameter-to-crankshaft pilot inner diameter. REPAIR as necessary. Refer to the appropriate article for the procedure. TEST the system for normal operation after the repair.
Engine vibration - mostly at coast/neutral coast. Condition improves with vehicle acceleration	Combustion instability	CHECK the ignition system. INSTALL new components as necessary. Refer to the appropriate article for the procedure. TEST the system for normal operation after the repair.
Engine vibration or shudder - occurs with light to medium acceleration above 56 km/h (35 mph)	Worn or damaged spark plugs	INSPECT the spark plugs for cracks, high resistance or broken insulators. INSTALL a new spark plug(s) as necessary. Refer to the appropriate article for the procedure. TEST the system for normal operation after the repair.
Plugged fuel injector		REPAIR or INSTALL a new injector as necessary. Refer to the appropriate article for the procedure. TEST the system for normal operation after the repair.
Contaminated fuel		INSPECT the fuel for contamination. DRAIN the fuel system and refill. TEST the system for normal operation after

	the repair.

DIAGNOSIS AND TESTING > ENGINE > COMPONENT TESTS

The following component tests are used to diagnose engine concerns.

DIAGNOSIS AND TESTING > ENGINE > COMPONENT TESTS > ENGINE OIL LEAKS

NOTE: If an overnight drive is done, the fan air or road air blast can cause erroneous readings.

NOTE: When diagnosing engine oil leaks, the source and location of the leak must be positively identified prior to repair.

Prior to carrying out this procedure, clean the cylinder block, cylinder heads, valve covers, oil pan and flywheel/flexplate with a suitable solvent to remove all traces of oil.

DIAGNOSIS AND TESTING > ENGINE > COMPONENT TESTS > ENGINE OIL LEAKS - FLUORESCENT OIL ADDITIVE METHOD

Use the 12 Volt Master UV Diagnostic Inspection Kit to carry out the following procedure for oil leak diagnosis.

1.

Add 29.6 ml (1 oz.) of Dye-Lite ® Gasoline Engine Oil Leak Detection Dye to a minimum of 0.47L (1/2 qt) and a maximum of 0.95L (1 qt) engine oil and fill through the engine oil fill. Thoroughly premix the gasoline engine oil leak detection dye or it will not have enough time to reach the crankcase, oil galleries and seal surfaces during this particular 15 minute test. The additive must be mixed well with oil and added through the oil fill. Check the level on the oil level indicator to determine what amount of oil to premix. If it is in the middle of the crosshatch area or below the full mark, use 0.95L (1 qt). If it is at the full mark, use 0.47L (1/2 qt).

2.

Run the engine for 15 minutes. Stop the engine and inspect all seal and gasket areas for leaks using the UV Leak Detector Kit. A clear bright yellow or orange area will identify the leak. For extremely small leaks, several hours may be required for the leak to appear.

3.

At the end of test, make sure the oil level is within the upper and lower oil indicator marks. Remove oil as necessary if it registers above the full mark.

DIAGNOSIS AND TESTING > ENGINE > COMPONENT TESTS > LEAKAGE POINTS - UNDERHOOD

Examine the following areas for oil leakage:

- Valve cover gaskets
- Cylinder head gaskets
- Oil cooler, if equipped
- Oil filter adapter
- Engine front cover
- Oil filter adapter and filter body
- Oil level indicator tube connection
- Oil pressure switch or EOP sensor
- Turbocharger oil tubes

DIAGNOSIS AND TESTING > ENGINE > COMPONENT TESTS > LEAKAGE POINTS - UNDER ENGINE, WITH VEHICLE ON HOIST

Examine the following areas for oil leakage:

- Oil pan gaskets
- Oil pan sealer
- Engine front cover gasket
- Crankshaft front seal
- Crankshaft rear oil seal
- Oil filter adapter and filter body
- Oil cooler, if equipped
- Turbocharger oil tubes

DIAGNOSIS AND TESTING > ENGINE > COMPONENT TESTS > LEAKAGE POINTS - WITH TRANSMISSION AND FLYWHEEL/FLEXPLATE REMOVED

Examine the following areas for oil leakage:

- Crankshaft rear oil seal

- Rear main bearing cap parting line
- Flexplate mounting bolt holes (with flexplate installed)
- Pipe plugs at the end of oil passages

DIAGNOSIS AND TESTING > ENGINE > COMPRESSION TEST

1.

Make sure the oil in the crankcase is of the correct viscosity and at the correct level and that the battery is correctly charged. Operate the vehicle until the engine is at normal operating temperature. Turn the ignition switch to the OFF position, then remove all the spark plugs.

2.

Set the throttle plates in the wide-open position.

3.

Install a compression gauge in the No. 1 cylinder.

4.

Install an auxiliary starter switch in the starting circuit. With the ignition switch in the OFF position, and using the auxiliary starter switch, crank the engine a minimum of 5 compression strokes and record the highest reading. Note the approximate number of compression strokes necessary to obtain the highest reading.

5.

Repeat the test on each cylinder, cranking the engine approximately the same number of compression strokes.

Compression Test - Test Results

The indicated compression pressures are considered within specification if the lowest reading cylinder is at least 75% of the highest reading. Refer to the Compression Pressure Limit Chart.

Compression Pressure Limit Chart

Maximum Recorded Cylinder Pressure	Minimum Recorded Cylinder Pressure	Maximum Recorded Cylinder Pressure	Minimum Recorded Cylinder Pressure	Maximum Recorded Cylinder Pressure	Minimum Recorded Cylinder Pressure	Maximum Recorded Cylinder Pressure	Minimum Recorded Cylinder Pressure
924 kPa (134 psi)	696 kPa (101 psi)	1,131 kPa (164 psi)	848 kPa (123 psi)	1,338 kPa (194 psi)	1,000 kPa (145 psi)	1,544 kPa (224 psi)	1,158 kPa (168 psi)
938 kPa (136 psi)	703 kPa (102 psi)	1,145 kPa (166 psi)	855 kPa (124 psi)	1,351 kPa (196 psi)	1,014 kPa (147 psi)	1,558 kPa (226 psi)	1,165 kPa (169 psi)
952 kPa (138 psi)	717 kPa (104 psi)	1,158 kPa (168 psi)	869 kPa (126 psi)	1,365 kPa (198 psi)	1,020 kPa (148 psi)	1,572 kPa (228 psi)	1,179 kPa (171 psi)
965 kPa (140 psi)	724 kPa (105 psi)	1,172 kPa (170 psi)	876 kPa (127 psi)	1,379 kPa (200 psi)	1,034 kPa (150 psi)	1,586 kPa (230 psi)	1,186 kPa (172 psi)
979 kPa (142 psi)	738 kPa (107 psi)	1,186 kPa (172 psi)	889 kPa (129 psi)	1,303 kPa (189 psi)	1,041 kPa (151 psi)	1,600 kPa (232 psi)	1,200 kPa (174 psi)
993 kPa (135 psi)	745 kPa (108 psi)	1,200 kPa (174 psi)	903 kPa (131 psi)	1,407 kPa (204 psi)	1,055 kPa (153 psi)	1,055 kPa (153 psi)	1,207 kPa (175 psi)
1,007 kPa (146 psi)	758 kPa (110 psi)	1,214 kPa (176 psi)	910 kPa (132 psi)	1,420 kPa (206 psi)	1,062 kPa (154 psi)	1,627 kPa (236 psi)	1,220 kPa (177 psi)
1,020 kPa (148 psi)	765 kPa (111 psi)	1,227 kPa (178 psi)	917 kPa (133 psi)	1,434 kPa (208 psi)	1,075 kPa (156 psi)	1,641 kPa (238 psi)	1,227 kPa (178 psi)
1,034 kPa (150 psi)	779 kPa (113 psi)	1,241 kPa (180 psi)	931 kPa (135 psi)	1,448 kPa (210 psi)	1,083 kPa (157 psi)	1,655 kPa (240 psi)	1,241 kPa (180 psi)
1,048 kPa (152 psi)	786 kPa (114 psi)	1,255 kPa (182 psi)	936 kPa (136 psi)	1,462 kPa (212 psi)	1,089 kPa (158 psi)	1,669 kPa (242 psi)	1,248 kPa (181 psi)
1,062 kPa (154 psi)	793 kPa (115 psi)	1,269 kPa (184 psi)	952 kPa (138 psi)	1,476 kPa (214 psi)	1,103 kPa (160 psi)	1,682 kPa (244 psi)	1,262 kPa (183 psi)
1,076 kPa (156 psi)	807 kPa (117 psi)	1,282 kPa (186 psi)	965 kPa (140 psi)	1,489 kPa (216 psi)	1,117 kPa (162 psi)	1,696 kPa (246 psi)	1,269 kPa (184 psi)
1,089 kPa (158 psi)	814 kPa (118 psi)	1,296 kPa (188 psi)	972 kPa (141 psi)	1,503 kPa (218 psi)	1,124 kPa (163 psi)	1,710 kPa (248 psi)	1,202 kPa (174 psi)
1,103 kPa (160 psi)	827 kPa (120 psi)	1,310 kPa (190 psi)	979 kPa (142 psi)	1,517 kPa (220 psi)	1,138 kPa (165 psi)	1,724 kPa (250 psi)	1,289 kPa (187 psi)
1,110 kPa (161 psi)	834 kPa (121 psi)	1,324 kPa (192 psi)	993 kPa (144 psi)	1,631 kPa (237 psi)	1,145 kPa (166 psi)	–	–

E151691

If one or more cylinders reads low, squirt approximately one tablespoon of engine oil meeting Ford specification on top of the pistons in the low-reading cylinders. Repeat the compression pressure check on these cylinders.

Compression Test - Interpreting Compression Readings

1.

If compression improves considerably, piston rings are worn or damaged.

2.

If compression does not improve, valves are sticking or not seating correctly.

3.

If 2 adjacent cylinders indicate low compression pressures and squirting oil on each piston does not increase compression, the head gasket may be leaking between cylinders. Engine oil or coolant in cylinders could result from this condition. Use the Compression Pressure Limit Chart when checking cylinder compression so the lowest reading is within 75% of the highest reading.

DIAGNOSIS AND TESTING > ENGINE > CYLINDER LEAKAGE DETECTION

When a cylinder produces a low reading, use of a cylinder leakage tester will be helpful in pinpointing the exact cause.

The leakage tester is inserted in the spark plug hole, the piston is brought up to TDC on the compression stroke, and compressed air is admitted.

Once the combustion chamber is pressurized, the leakage tester gauge will read the percentage of leakage. Leakage exceeding 20% is excessive.

While the air pressure is retained in the cylinder, listen for the hiss of escaping air. A leak at the intake valve will be heard in the Throttle Body (TB). A leak at the exhaust valve can be heard at the tailpipe. Leakage past the piston rings will be audible at the PCV connection. If air is passing through a blown head gasket to an adjacent cylinder, the noise will be evident at the spark plug hole of the cylinder into which the air is leaking. Cracks in the cylinder block or gasket leakage into the cooling system may be

detected by a stream of bubbles in the radiator.

DIAGNOSIS AND TESTING > ENGINE > EXCESSIVE ENGINE OIL CONSUMPTION

Nearly all engines consume oil, which is essential for normal lubrication of the cylinder bore walls and pistons and rings. Determining the level of oil consumption may require testing by recording how much oil is being added over a given set of miles.

Customer driving habits greatly influence oil consumption. Mileage accumulated during towing or heavy loading generates extra heat. Frequent short trips, stop-and-go type traffic or extensive idling, prevent the engine from reaching normal operating temperature. This prevents component clearances from reaching specified operating ranges.

The following diagnostic procedure may be utilized to determine internal oil consumption. Make sure that the concern is related to internal oil consumption, and not external leakage, which also consumes oil. Verify there are no leaks before carrying out the test. Once verified, the rate of internal oil consumption can be tested.

A new engine may require extra oil in the early stages of operation. Internal piston-to-bore clearances and sealing characteristics improve as the engine breaks in. Engines are designed for close tolerances and do not require break-in oils or additives. Use the oil specified in the Owner's Literature. Ambient temperatures may determine the oil viscosity specification. Verify that the correct oil is being used for the vehicle in the geographic region in which it is driven.

Basic Pre-checks

1.

For persistent complaints of oil consumption, interview the customer to determine the oil consumption characteristics. If possible, determine the brand and grade of oil currently in the oil pan. Look at the oil filter or oil-change station tags to determine if Ford-recommended maintenance schedules have been followed. Make sure that the oil has been changed at the specified mileage intervals. If vehicle mileage is past the first recommended drain interval, the OEM (Original Equipment Manufacturer) production filter should have been changed.

2.

Ask how the most current mileage was accumulated. That is, determine whether the vehicle was driven under the following conditions:

Extended idling or curbside engine operation

Stop-and-go traffic or taxi operation

Towing a trailer or vehicle loaded heavily

Frequent short trips (engine not up to normal operating temperature)

Excessive throttling or high engine-rpm driving

3.

Verify that there are no external leaks. If necessary, review the diagnostic procedure under Engine Oil Leaks in the Diagnosis and Testing portion of this article.

4.

Inspect the crankcase ventilation system for:

disconnected hoses at the valve cover or TB.

loose or missing valve cover fill cap.

missing or incorrectly seated engine oil level indicator.

incorrect or dirty PCV valve.

a PCV valve grommet unseated in the valve cover (if so equipped).

5.

Inspect for signs of sludge. Sludge affects PCV performance and can plug or restrict cylinder head drainback wells. It can also increase oil pressure by restricting passages and reducing the drainback capability of piston oil control rings. Sludge can result from either excessive water ingestion in the crankcase or operation at extremely high crankcase temperatures.

6.

Inspect the air filter for dirt, sludge or damage. A hole in the filter element will allow unfiltered air to bypass into the air induction system. This can cause premature internal wear (engine dusting), allowing oil to escape past rings, pistons, valves and guides.

7.

If the engine is hot or was recently shut down, wait at least 10-minutes to allow the oil to drain back. Ask the customer if this requirement has been followed. Adding oil without this wait period can cause an overfill condition, leading to excessive oil consumption and foaming which may cause engine damage.

8.

Make sure the oil level indicator (dipstick) is correctly and fully seated in the indicator tube. Remove the oil level indicator and record the oil level.

Detailed Pre-checks

1.

Check the thermostat opening temperature to make sure that the cooling system is operating at the specified temperature. If it is low, internal engine parts are not running at specified internal operating clearances.

2.

Verify the spark plugs are not oil saturated. Oil leaking into one or more cylinders will appear as an oil soaked condition on the plug. If a plug is saturated, a compression check may be necessary at the conclusion of the oil consumption test.

Oil Consumption Test

NOTE: Once all of the previous conditions are met, carry out an oil consumption test.

1.
Drain the engine oil and remove the oil filter. Install a new manufacturer-specified oil filter. Make sure the vehicle is positioned on a level surface. Refill the oil pan to a level one liter (quart) less than the specified fill level, using manufacturer-specified oil.

2.

Run the engine for 3 minutes (if hot) or 10 minutes (if cold). Allow for a minimum 10-minute drainback period and then record the oil level shown on the oil level indicator. Place a mark on the backside of the oil level indicator noting the oil level location.

3.

Add the final one liter (quart) to complete the normal oil fill. Restart the engine and allow it to idle for 2 minutes. Shut the engine down.

4.

After a 10-minute drainback period, record the location of the oil level again. Mark the oil level indicator with the new oil level location.

NOTE: Both marks should be very close to the MIN-MAX upper and lower limits or the upper and lower holes on the oil level indicator. These marks will exactly measure the engine's use of oil, with a one quart differential between the new marks.

Demonstrate to the customer that the factory-calibrated marks on the oil level indicator are where the oil should fall after an oil change with the specified fill amount. Explain however, that this may vary slightly between MIN-MAX or the upper and lower holes on the oil level indicator.

5.

Record the vehicle mileage.

6.

Advise the customer that oil level indicator readings must be taken every 320 km (200 mi) or weekly, using the revised marks as drawn. Remind the customer that the engine needs a minimum 10-minute drainback for an accurate reading and that the oil level indicator must be firmly seated in the tube prior to taking the reading.

7.

When the subsequent indicator readings demonstrate a full liter (quart) has been used, record the vehicle mileage. The mileage driven should not be less than 4, 800 km (3, 000 mi). The drive cycle the vehicle has been operated under must be considered when making this calculation. It may be necessary to have the customer bring the vehicle in for a periodic oil level indicator reading to closely monitor oil usage.

Post Checks, Evaluation and Corrective Action

1.

If test results indicate excessive oil consumption, carry out a cylinder compression test. The cylinder compression test should be carried out with a fully charged battery and all spark plugs removed. See the Compression Test Chart in this article for pressure range limits.

2.

Compression should be consistent across all cylinders. Refer to the Compression Testing portion of this article. If compression tested within the specifications found in this article, the excessive oil consumption may be due to wear on the valve guides, valves or valve seals.

3.

A cylinder leak detection test can be carried out using a cylinder leakage detector. This can help identify valves, piston rings, or worn valve guides/valve stems, inoperative valve stem seals or other related areas as the source of oil consumption.

> *NOTE: An oil-soaked appearance on the porcelain tips of the spark plugs also indicates excessive oil use. A typical engine with normal oil consumption will exhibit a light tan to brown appearance. A single or adjoining, multiple cylinder leak can be traced by viewing the tips.*

4.
If an internal engine part is isolated as the root cause, determine if the repair will exceed cost limits and proceed with a repair strategy as required.

5.

Once corrective action to engine is complete and verifying that all pre-check items were eliminated in the original diagnosis, repeat the Oil Consumption Test as described above and verify consumption results.

DIAGNOSIS AND TESTING > ENGINE > INTAKE MANIFOLD VACUUM TEST

Bring the engine to normal operating temperature. Connect the Vacuum/Pressure Tester to the intake manifold. Run the engine at the specified idle speed.

The vacuum gauge should read between 51-74 kPa (15-22 in-Hg) depending upon the engine condition and the altitude at which the test is conducted. Subtract 4.0193 kPa (1 in-Hg) from the specified reading for every 304.8 m (1, 000 feet) of elevation above sea level.

The reading should be steady. If necessary, adjust the gauge damper control (where used) if the needle is fluttering rapidly. Adjust the damper until the needle moves easily without excessive flutter.

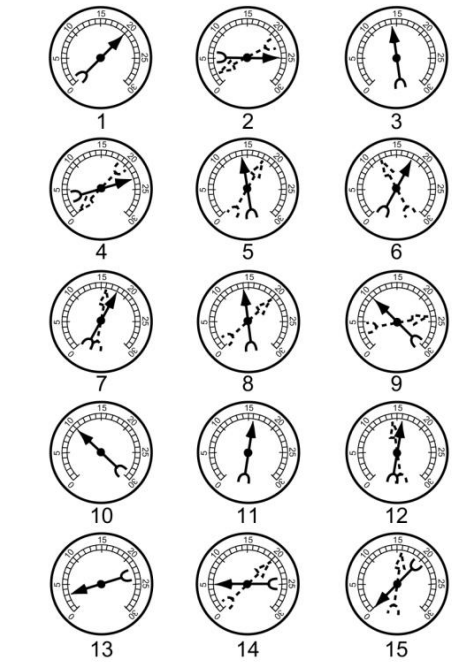
Intake Manifold Vacuum Test - Interpreting Vacuum Gauge Readings

A careful study of the vacuum gauge reading while the engine is idling will help pinpoint trouble areas. Always conduct other appropriate tests before arriving at a final diagnostic decision. Vacuum gauge

readings, although helpful, must be interpreted carefully.

Most vacuum gauges have a normal band indicated on the gauge face. The following are potential gauge readings. Some are normal; others should be investigated further.

The following are potential gauge readings. Some are normal; others should be investigated further.



E147860

1.

NORMAL READING: Needle between 51-74 kPa (15-22 in-Hg) and holding steady.

2.

NORMAL READING DURING RAPID ACCELERATION AND DECELERATION: When the engine is rapidly accelerated (dotted needle), the needle will drop to a low reading (not to zero). When the throttle is suddenly released, the needle will snap back up to a higher than normal figure.

3.

NORMAL FOR HIGH-LIFT CAMSHAFT WITH LARGE OVERLAP: The needle will register as low as 51 kPa (15 in-Hg) but will be relatively steady. Some oscillation is normal.

4.

WORN RINGS OR DILUTED OIL: When the engine is accelerated (dotted needle), the needle drops to 0 kPa (0 in-Hg). Upon deceleration, the needle runs slightly above 74 kPa (22 in-Hg).

5.

STICKING VALVES: When the needle (dotted) remains steady at a normal vacuum but occasionally flicks (sharp, fast movement) down and back about 13 kPa (4 in-Hg), one or more valves may be sticking.

6.

BURNED OR WARPED VALVES: A regular, evenly-spaced, downscale flicking of the needle indicates one or more burned or warped valves. Insufficient valve clearance will also cause this reaction.

7.

POOR VALVE SEATING: A small but regular downscale flicking can mean one or more valves are not seating.

8.

WORN VALVE GUIDES: When the needle oscillates over about a 13 kPa (4 in-Hg) range at idle speed, the valve guides could be worn. As engine speed increases, the needle will become steady if guides are responsible.

9.

WEAK VALVE SPRINGS: When the needle oscillation becomes more violent as engine RPM is increased, weak valve springs are indicated. The reading at idle could be relatively steady.

10.

LATE VALVE TIMING: A steady but low reading could be caused by late valve timing.

11.

IGNITION TIMING RETARDING: Retarded ignition timing will produce a steady but somewhat low reading.

12.

INSUFFICIENT SPARK PLUG GAP: When spark plugs are gapped too close, a regular, small pulsation of the needle can occur.

13.

INTAKE LEAK: A low, steady reading can be caused by an intake manifold or TB (Throttle Body) gasket leak.

14.

BLOWN HEAD GASKET: A regular drop of fair magnitude can be caused by a blown head gasket or warped cylinder head-to-cylinder block surface.

15.

RESTRICTED EXHAUST SYSTEM: When the engine is first started and is idled, the reading may be normal, but as the engine RPM is increased, the back pressure caused by a clogged muffler, kinked tailpipe or other concerns will cause the needle to slowly drop to 0 kPa (0 in-Hg). The needle then may slowly rise. Excessive exhaust clogging will cause the needle to drop to a low point even if the engine is only idling.

When vacuum leaks are indicated, search out and correct the cause. Excess air leaking into the system

will upset the fuel mixture and cause concerns such as rough idle, missing on acceleration or burned valves. If the leak exists in an accessory unit such as the power brake booster, the unit will not function correctly. Always fix vacuum leaks.

DIAGNOSIS AND TESTING > ENGINE > OIL PRESSURE TEST

1.

Disconnect and remove the oil pressure switch (refer to the appropriate article) or EOP sensor (refer to the appropriate article).

2.

Connect a commercially available oil pressure gauge to the oil pressure sender oil galley port.

3.

Run the engine until normal operating temperature is reached.

4.

Run the engine at the specified RPM and record the gauge reading.

5.

The oil pressure should be within specifications, refer to the specification chart in the appropriate article.

6.

If the pressure is not within specification, check the following possible sources:

- Insufficient oil
- Oil leakage
- Worn or damaged oil pump
- Oil pump screen cover and tube
- Excessive main bearing clearance
- Excessive connecting rod bearing clearance
- Chain tensioner leak

7.

Remove the commercially available oil pressure gauge.

8.

Install and connect the oil pressure switch (refer to the appropriate article) or EOP sensor (refer to the appropriate article).

DIAGNOSIS AND TESTING > ENGINE > VALVE TRAIN ANALYSIS 2.3L ECOBOOST / 3.7L DURATEC

The following component tests are used to diagnose valve train concerns.

Valve Train Analysis - Engine Off, Valve Cover Removed

Check for damaged or severely worn parts and correct assembly. Make sure correct parts are used with the static engine analysis as follows.

Valve Train Analysis - Camshafts and Valve Tappets

- Check for broken or damaged parts.
- Check for loose mounting bolts on camshaft caps.
- Check for worn or damaged valve tappets.

Valve Train Analysis - Valve Springs, Valve Tappets Removed

- Check for broken or damaged parts.

Valve Train Analysis - Valve Spring Retainer and Valve Spring Retainer Keys, Valve Tappets Removed

- Check for correct seating of the valve spring retainer key on the valve stem and in valve spring retainer.
- Check for correct seating on the valve stem.

Valve Train Analysis - Valves and Cylinder Head, Valve Tappets Removed

- Check for plugged oil drain back holes.
- Check for worn or damaged valve tips.

Valve Train Analysis - Camshaft Lobe Lift

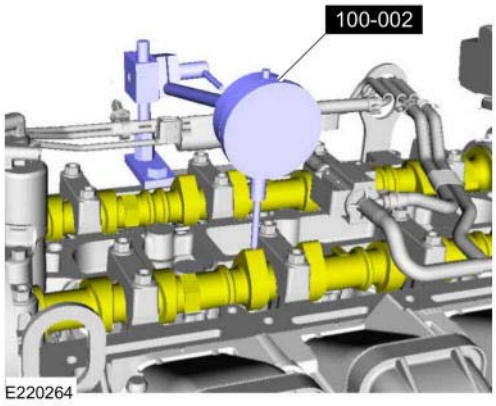
Check the lift of each camshaft lobe in consecutive order and make a note of the readings.

1.

Remove the spark plugs. Refer to the appropriate article.

2.

Install the Dial Indicator Gauge with Holding Fixture so the rounded tip of the dial indicator is on top of the camshaft lobe and on the same plane as the valve tappet.



NOTE: Only rotate the crankshaft clockwise. If the engine is rotated counterclockwise the valve train timing may slip resulting in the engine having to be retimed.

3.
Rotate the crankshaft using a breaker bar and socket attached to the crankshaft pulley retainer bolt. Rotate the crankshaft until the base circle of the camshaft lobe is reached.

4.

Zero the dial indicator. Continue to rotate the crankshaft until the high-lift point of the camshaft lobe is in the fully raised position (highest indicator reading).

5.

To check the accuracy of the original dial indicator reading, continue to rotate crankshaft until the base circle is reached. The indicator reading should be zero. If zero reading is not obtained, repeat Steps 2 through 5.

6.

If the lift on any lobe is below specified service limits, install a new camshaft and camshaft roller followers or valve tappets.

7.

Install the spark plugs. Refer to the appropriate article.

DIAGNOSIS AND TESTING > ENGINE > VALVE TRAIN ANALYSIS 5.0L 32V TI-VCT / 5.2L 32V TI-VCT

Valve Train Analysis - Engine Off, Valve Cover Removed

Check for damaged or severely worn parts and correct assembly.

Valve Train Analysis - Camshaft Lobe Lift

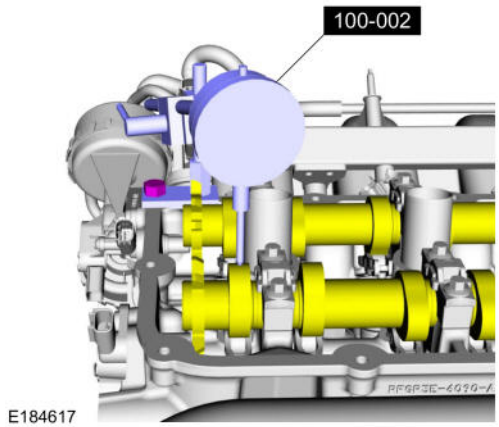
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If the lift on any lobe is below specified service limits, install a new camshaft and camshaft roller followers or valve tappets.

7.

Install the spark plugs. Refer to the appropriate article.

GENERAL PROCEDURES > BEARING INSPECTION

Inspection

1.

Cratering - fatigue failure

Spot glazing - incorrect seating

Scratching - dirty engine oil

Base exposed - poor lubrication

Both edges worn - journal damaged

One edge worn - journal tapered or bearing not seated



GENERAL PROCEDURES > CONNECTING ROD BEARING JOURNAL CLEARANCE

Check

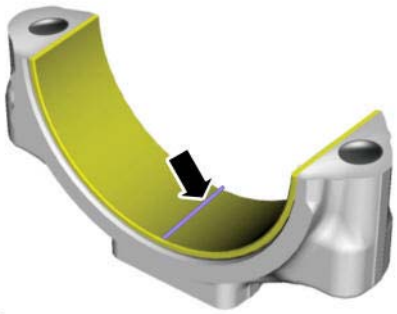
NOTE: Refer to the appropriate article for the specification.

NOTE: The crankshaft connecting rod journals must be within specifications to check the connecting rod bearing journal clearance.

1.
Remove the connecting rod bearing cap and connecting rod bearing.

2.

Position a piece of Plastigage across the bearing surface.

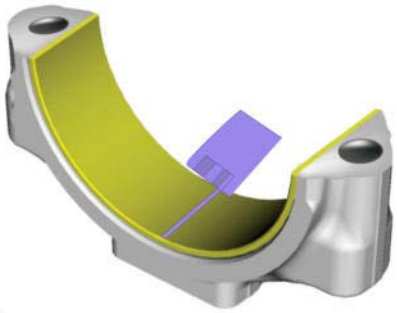

E148402

NOTE: Do not turn the crankshaft during this step.

3.
Install and tighten to specifications, then remove the connecting rod bearing cap.

4.

Measure the Plastigage to get the connecting rod bearing journal clearance. The Plastigage should be smooth and flat. A changing width indicates a tapered or damaged connecting rod or connecting rod bearing.


E148403

GENERAL PROCEDURES > CRANKSHAFT MAIN BEARING JOURNAL CLEARANCE

Check

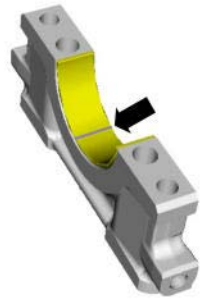
NOTE: Refer to the appropriate article for the specification.

NOTE: Crankshaft main bearing journals must be within specifications before checking journal clearance.

1.
Remove the crankshaft main bearing cap and crankshaft main bearing.

2.

Position a piece of Plastigage across the crankshaft main bearing surface.

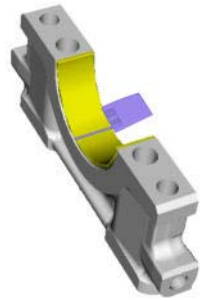

E148405

NOTE: Do not turn the crankshaft while carrying out this procedure.

3.
Install and tighten to specifications, then remove the crankshaft main bearing cap.

4.

Measure the Plastigage to get the crankshaft main bearing clearance. The Plastigage should be smooth and flat. A changing width indicates a tapered or damaged crankshaft or crankshaft bearing.


E148406

GENERAL PROCEDURES > CYLINDER BLOCK CORE PLUG REPLACEMENT

Special Tool(s) / General Equipment

 E129694	100-001 (T50T-100-A)Slide Hammer

Materials

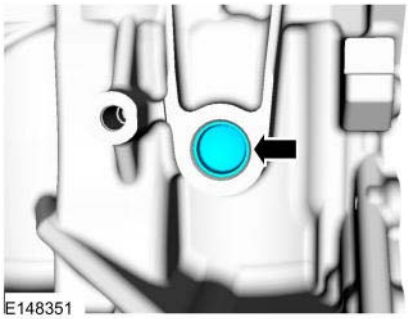
Name	Specification
Threadlock 262 TA-26	WSK-M2G351-A6

Repair

All core plugs

NOTE: Cylinder block core plug shown, cylinder head core plug similar.

1.
Using the Slide Hammer and a commercially available body dent puller attachment or commercially available freeze plug puller remove the core plug. Use Special Service Tool: 100-001 (T50T-100-A) Slide Hammer.



NOTE: Oversize plugs are identified by the OS stamped in the flat located on the cup side of the plug.

2.
Inspect the core plug bore for any damage that would interfere with the correct sealing of the plug. If the core plug bore is damaged, bore for the next oversize plug.

Cup-type

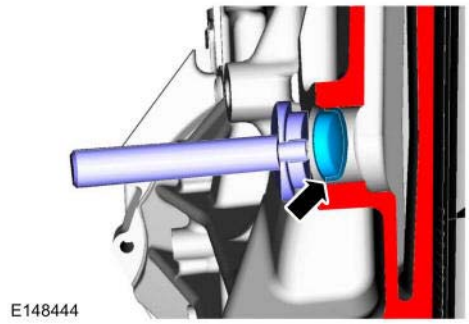
NOTE: When installed, the flanged edge must be below the chamfered edge of the bore to effectively seal the bore.

NOTE: Use care during this procedure so as not to disturb or distort the cup sealing surface.

3.
Coat the cup-type core plug and bore lightly with sealant and install the core plug using a freeze plug installer. Remove the excess sealant after installation.

Material

: Threadlock 262 / TA-26 (WSK-M2G351-A6)



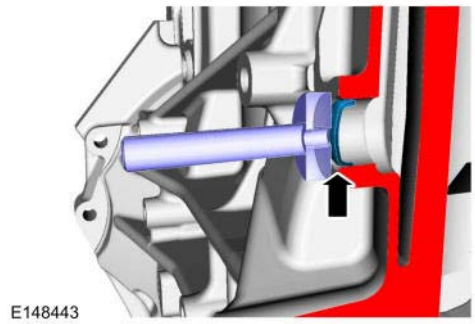
Expansion-type

NOTE: Do not contact the crown when installing an expansion-type core plug. This could expand the plug before seating and result in leakage.

4.
Coat the expansion-type core plug and bore lightly with sealant and install the core plug using a freeze plug installer. Remove the excess sealant after installation.

Material

: Threadlock 262 / TA-26 (WSK-M2G351-A6)



GENERAL PROCEDURES > CYLINDER BLOCK DISTORTION

Special Tool(s) / General Equipment

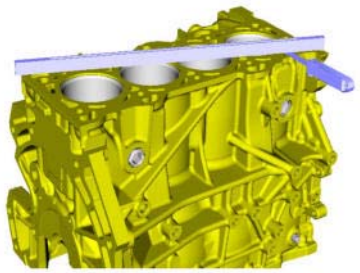
Feeler Gauge

Check

NOTE: Refer to the appropriate article for the specification.

NOTE: Use a Straightedge that is calibrated by the manufacturer to be flat within 0.005 mm (0.0002 in) per running foot of length, such as Snap-On ® GA438A or equivalent. For example, if the Straightedge is 61 cm (24 in) long, the machined edge must be flat within 0.010 mm (0.0004 in) from end to end.

1.
Use a Straightedge and a Feeler Gauge Set to inspect the cylinder block for flatness. Use the General Equipment: Feeler Gauge


E148368

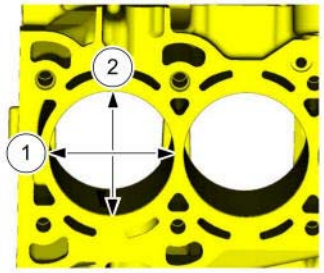
GENERAL PROCEDURES > CYLINDER BORE TAPER

Check

NOTE: Refer to the appropriate article for the specification.

1.

Measure the cylinder bore at the top, middle and bottom of piston ring travel in 2 directions as indicated. Verify the cylinder bore is within the wear limit. The difference indicates the cylinder bore taper. If the cylinder bore taper does not meet specification, bore the cylinder to the next oversize limit.



E148355

GENERAL PROCEDURES > CYLINDER HEAD DISTORTION

Special Tool(s) / General Equipment

Feeler Gauge

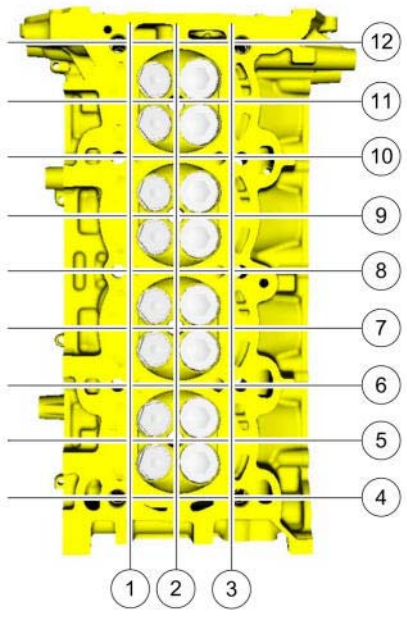
Check

NOTE: Refer to the appropriate article for the specification.

NOTE: Use a Straightedge that is calibrated by the manufacturer to be flat within 0.005 mm (0.0002 in) per running foot of length, such as Snap-On ® GA438A or equivalent. For example, if the Straightedge is 61 cm (24 in) long, the machined edge must be flat within 0.010 mm (0.0004 in) from end to end.

NOTE: Make sure all cylinder head surfaces are clear of any gasket material, silicone sealant, oil and coolant. The cylinder head surface must be clean and dry before running a flatness check.

1.
Using a Straightedge and a Feeler Gauge Set, inspect the cylinder head for flatness in the sequence shown below. Use the General Equipment: Feeler Gauge



E148404

GENERAL PROCEDURES > EXHAUST MANIFOLD CLEANING AND INSPECTION

Special Tool(s) / General Equipment

Feeler Gauge

Cleaning

1.

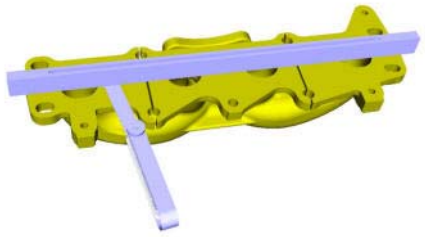
Clean the exhaust manifold using a suitable solvent. Use a plastic scraping tool to clean the gasket sealing surfaces.

Inspection

NOTE: Use a Straightedge that is calibrated by the manufacturer to be flat within 0.005 mm (0.0002 in) per running foot of length, such as Snap-On ® GA438A or equivalent. For example, if the Straightedge is 61 cm (24 in) long, the machined edge must be flat within 0.010 mm (0.0004 in) from end to end.

NOTE: New exhaust manifold gaskets, studs, nuts and/or bolts must be installed when an exhaust manifold is serviced.

1.
Using the Straightedge and a Feeler Gauge Set, check the exhaust manifold sealing surface for warpage. If the warpage is greater than 0.76 mm (0.0299 in), install a new exhaust manifold. Use the General Equipment: Feeler Gauge



GENERAL PROCEDURES > FLYWHEEL INSPECTION - 3.7L DURATEC (227KW 301PS)

Special Tool(s) / General Equipment

	100-002 (TOOL-4201-C) Holding Fixture with Dial Indicator Gauge

 E222983	303-103 (T74P-6375-A) Holding Tool, Flywheel T74P-77000-A TKIT-2009TC-F

Inspection

NOTE: Do not clean the dual mass flywheel with compressed air.

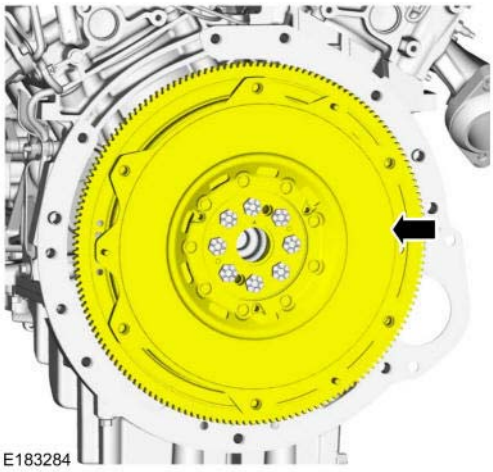
NOTE: Do not clean the dual mass flywheel with any kind of fluid, use a dry cloth only or damage to the dual mass flywheel may occur.

NOTE: Do not clean the gap between the primary and secondary mass. Only clean the bolt connection surface and the clutch surface or damage to the dual mass flywheel may occur.

NOTE: The dual mass flywheel normally has up to a total of 14 degrees (6.5 ring gear teeth) maximum rotational freeplay between the primary (bolted to crankshaft) and the secondary mass (clutch disc face).

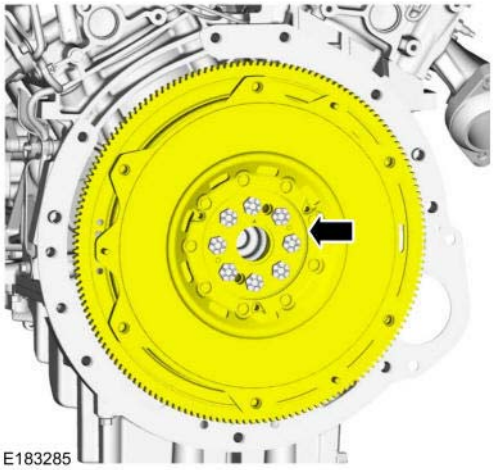
NOTE: The dual mass flywheel cannot be machined.

1.
With the dual mass flywheel installed on the engine, inspect the dual mass flywheel surface for scoring, cracks, discoloration or damage. Check for contamination from grease, oil or fuel. If any of these conditions exist, install a new dual mass flywheel.


E183284

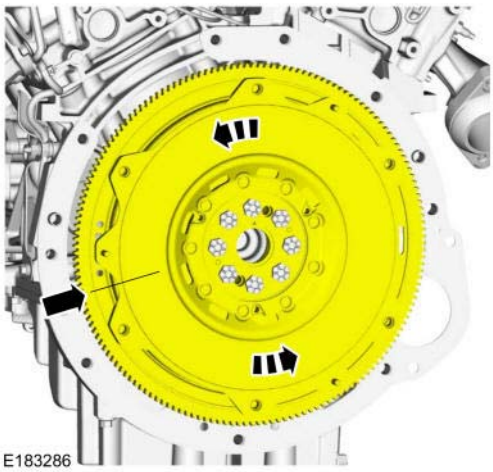
2.

Inspect the dual mass flywheel friction control plate plastic piece between the primary and secondary mass for damage or melting and install a new dual mass flywheel if necessary. Inspect the dual mass flywheel hub bushing for wear and install a new dual mass flywheel if necessary.



NOTE: The dual mass flywheel rotational freeplay inspection cannot be carried out if the friction control plate is damaged.

3.
Rotate the secondary mass counterclockwise and place a reference mark on the primary and secondary mass of the dual mass flywheel.



4.

Using light hand pressure, rotate the secondary mass clockwise to the end of the freeplay. Place a 2nd reference mark on the primary mass of the dual mass flywheel, in line with the reference mark on the secondary mass.



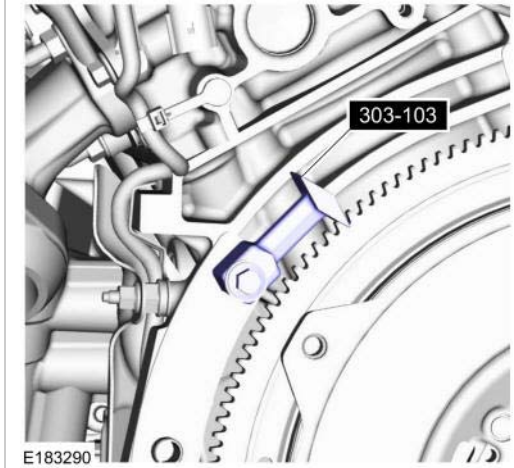
5.

Measure the rotational freeplay between the 2 reference marks on the primary mass of the dual mass flywheel. If the rotational freeplay exceeds 14 degrees (6.5 ring gear teeth), install a new dual mass flywheel.



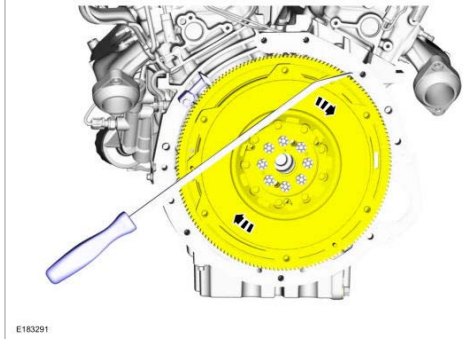
6.

Install Special Service Tool: 303-103 (T74P-6375-A) Holding Tool, Flywheel.



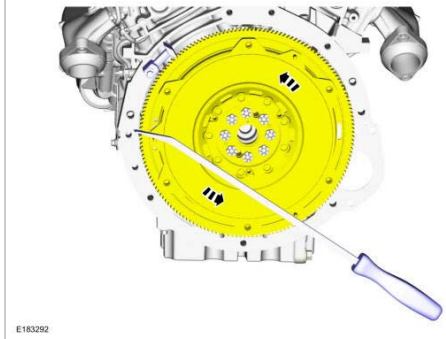
7.

Using a suitable long screwdriver or bar, firmly rotate the secondary mass clockwise. The secondary mass should begin to engage the internal spring past the freeplay movement of 14 degrees (6.5 ring gear teeth) maximum. The secondary mass should continue to rotate and engage the internal spring with increasing spring pressure. If the secondary mass does not rotate, install a new dual mass flywheel.



8.

Using a suitable long screwdriver or bar, firmly rotate the secondary mass counterclockwise. The secondary mass should begin to engage the internal spring past the freeplay movement of 14 degrees (6.5 ring gear teeth) maximum. The secondary mass should continue to rotate and engage the internal spring with increasing spring pressure. If the secondary mass does not rotate, install a new dual mass flywheel.



9.

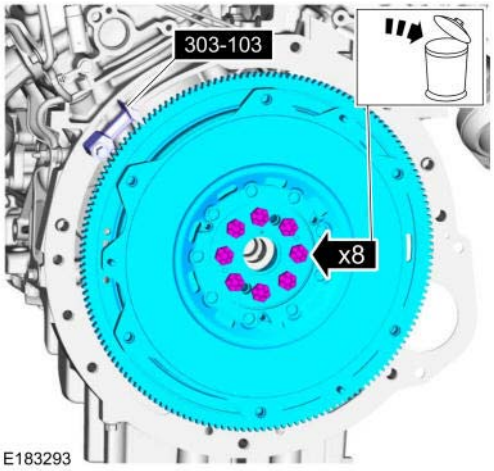
Remove the bolts and the dual mass flywheel. Discard the flywheel bolts.

Inspect the dual mass flywheel crankshaft mounting flange for residual thread locking compound or rust and clean as necessary.

NOTE: Blocks must be placed under the dual mass flywheel to make sure it is level and stable.

Place the flywheel on a firm and level surface.

Remove Special Service Tool: 303-103 (T74P-6375-A) Holding Tool, Flywheel.

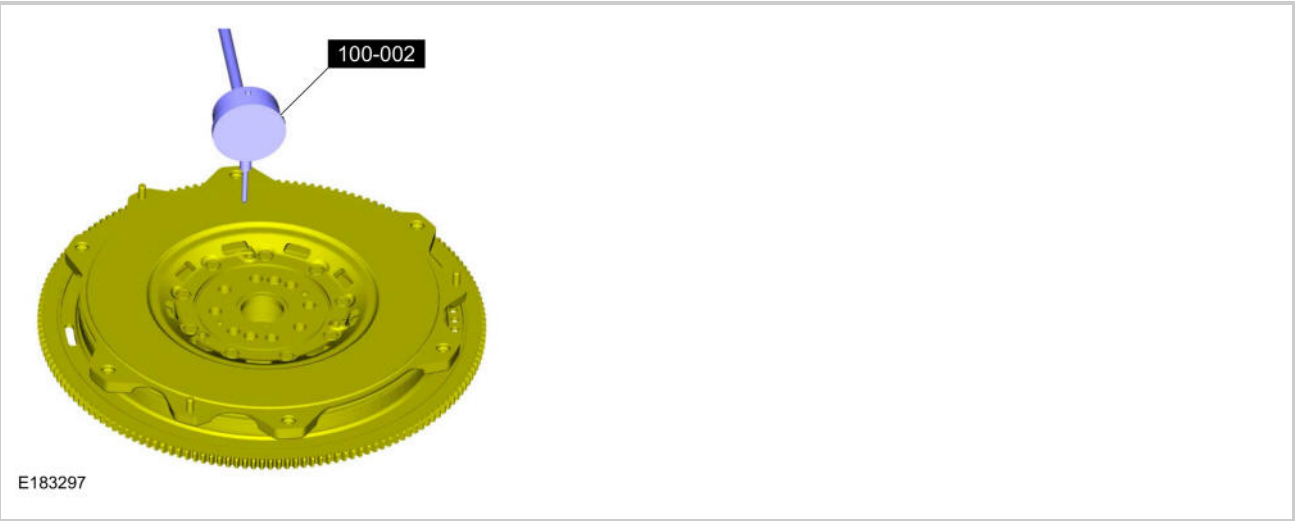


10.

Using the special tool, place a dial indicator gauge at a point on the outer upper surface of the secondary mass. Use Special Service Tool: 100-002 (TOOL-4201-C) Holding Fixture with Dial Indicator Gauge.

Using light hand pressure, press downward at the opposite point on the outer upper surface of the secondary mass and note the deflection on the dial indicator gauge.

Repeat this measurement at 45 degree intervals around the dual mass flywheel and note any deflection. Some axial movement of the secondary mass flywheel is normal, if the deflection exceeds 1.1 mm (0.043 in) at any point, install a new dual mass flywheel.



11.

1.

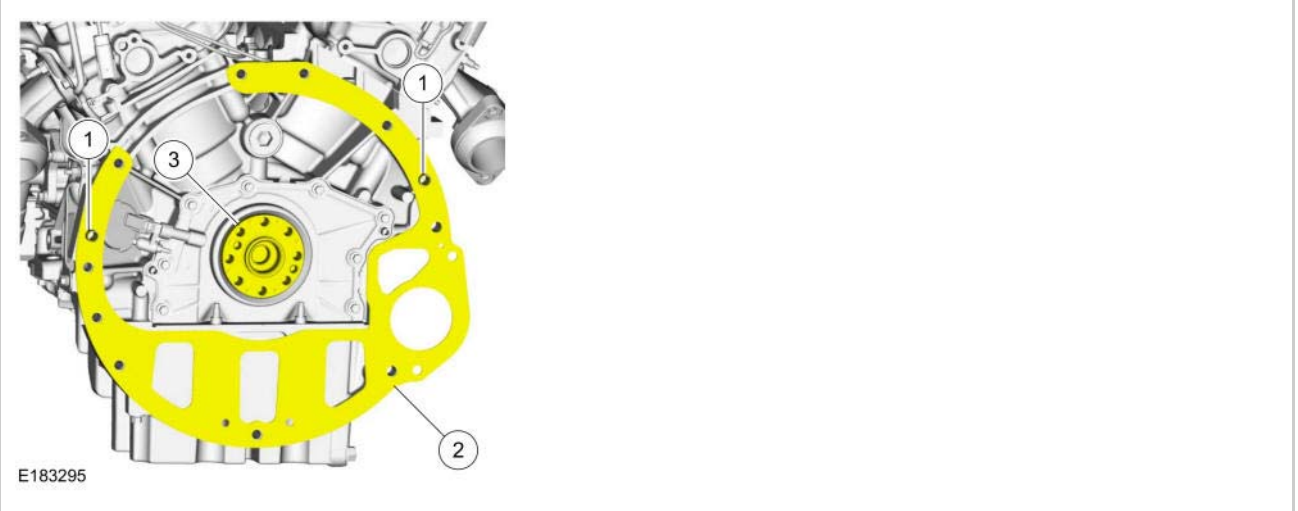
Inspect the rear face of the engine block. Make sure that the 2 engine dowel pins are correctly installed and are not damaged, install new dowel pins as necessary.

2.

Inspect the engine block rear spacer plate for damage or warping and install a new plate as necessary.

3.

Inspect the crankshaft flange for residual thread lock compound or rust, and clean as necessary.

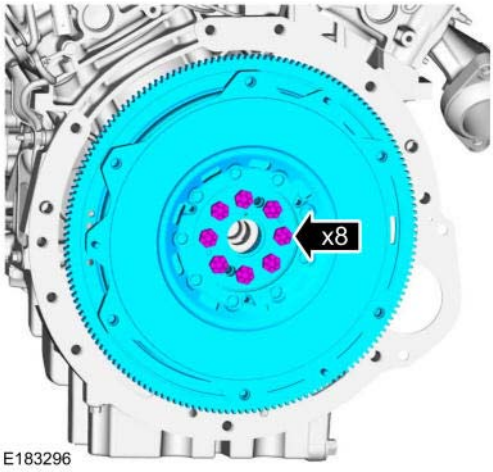


12.

Inspect the transmission mounting face. Inspect the 2 dowel pin holes so that they are not elongated or damaged.

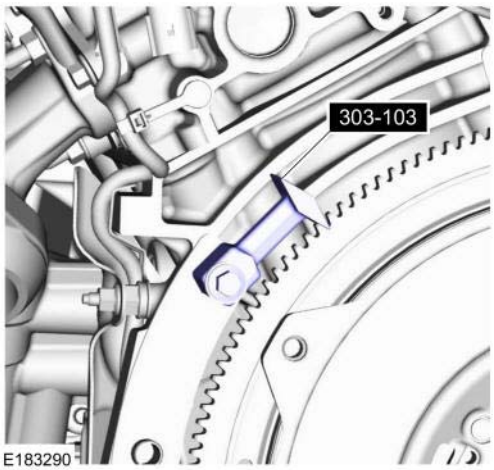
13.

Install the dual mass flywheel and new bolts finger tight.



14.

Install Special Service Tool: 303-103 (T74P-6375-A) Holding Tool, Flywheel.

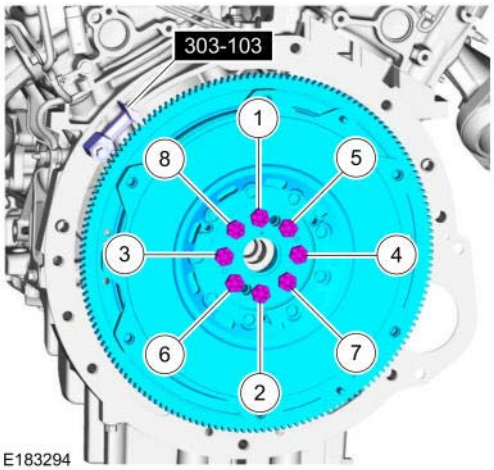


15.

Tighten the bolts in the sequence shown below.

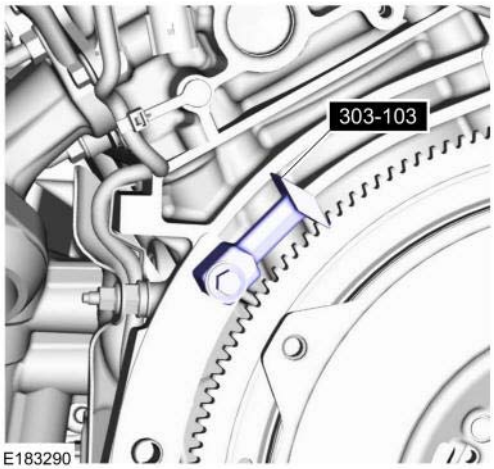
Torque

: 59 lb.ft (80 Nm)



16.

Remove Special Service Tool: 303-103 (T74P-6375-A) Holding Tool, Flywheel.



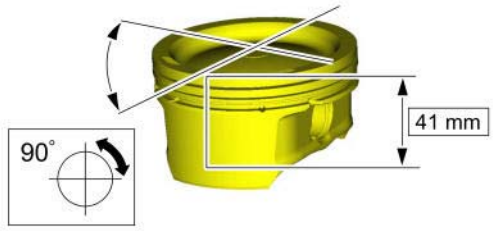
GENERAL PROCEDURES > PISTON DIAMETER

Check

NOTE: Refer to the appropriate article for the specification.

1.

Measure the piston diameter 90 degrees from the piston pin and 41 mm (1.61 in) down from the top of the piston at the point indicated.



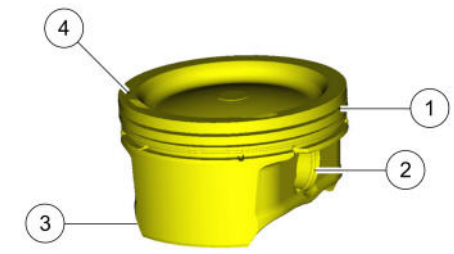
E148432

GENERAL PROCEDURES > PISTON INSPECTION

Inspection

NOTE: Do not use a caustic cleaning solution or a wire brush to clean the pistons or damage can occur.

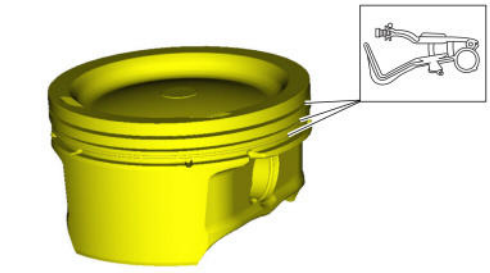
1.
Clean and inspect the (1) ring lands, (2) pin bosses, (3) skirts and the (4) tops of the pistons. If wear marks, scores or glazing is found on the piston skirt, check for a bent or twisted connecting rod.



E148354

NOTE: Make sure the oil ring holes are clean.

2.
Using a Piston Ring Groove Scraper, clean the piston ring grooves.


E148332

GENERAL PROCEDURES > PISTON RING END GAP

Special Tool(s) / General Equipment

Feeler Gauge

Check

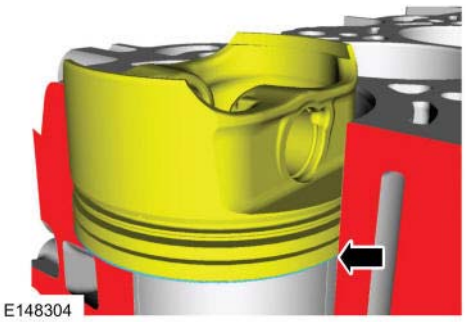
NOTE: Refer to the appropriate article for the specification.

NOTE: The cylinder bore must be within specification for taper and out-of-round.

NOTE: Piston rings should not be transferred from one piston to another.

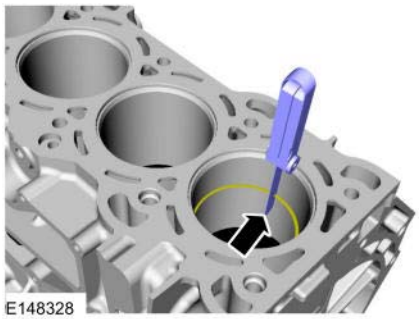
NOTE: Use care when fitting piston rings to avoid possible damage to the piston ring or the cylinder bore.

1.
Use a piston without rings to push a piston ring in a cylinder to the bottom of ring travel.


E148304

2.

Using the Feeler Gauge Set measure the top piston ring end gap and the second piston ring end gap Use the General Equipment: Feeler Gauge



GENERAL PROCEDURES > PISTON SELECTION

Check

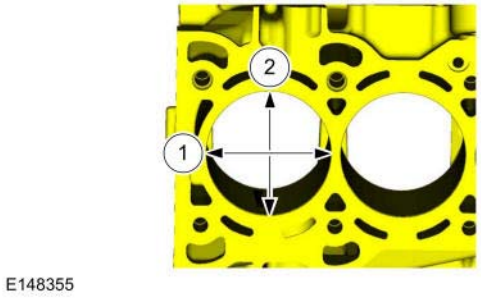
NOTE: Refer to the appropriate article for the specifications.

NOTE: The cylinder bore must be within the specifications for taper and out-of-round before fitting a piston.

1.

Measure the cylinder bore in 2 directions.

Select a piston size based on the cylinder bore.



NOTE: For precision fit, new pistons are divided into 3 categories within each size range based on their relative position within the range. A paint spot or specific size grade on a new piston indicates the position within the size range.

2.
Choose the piston with the correct paint color or specific size grade.

GENERAL PROCEDURES > POWERTRAIN DRIVETRAIN MOUNT NEUTRALIZING

Adjustment

NOTE: Refer to the appropriate article and procedure for special instructions on loosening and tightening mount fasteners.

1.

Loosen, but do not remove, the powertrain/drivetrain mount fasteners.

NOTE: Do not twist or strain the powertrain/drivetrain mounts or damage to the mounts may occur.

2.
Start the vehicle and move it in forward 0.6 m (1.97 ft) - 1.2 m (3.94 ft). Then move the vehicle in reverse the same distance.

3.

Tighten the powertrain/drivetrain mount fasteners.

4.

Test the system for normal operation.

GENERAL PROCEDURES > RTV SEALING SURFACE CLEANING AND PREPARATION

Special Tool(s) / General Equipment

Plastic Scraper

Materials

Name	Specification
Motorcraft ® Silicone Gasket Remover ZC-30-A	-
Motorcraft ® Metal Surface Prep ZC-31-B	-
Metal Brake Parts Cleaner (U.S.) PM-4-A, PM-4-B (U.S.)	-

Cleaning

NOTE: Place clean, lint-free towels over exposed cavities. Carefully remove the towels

so foreign material is not dropped into the cavities. Any foreign material (including any material created while cleaning surfaces) that enters the fluid passages, may cause failure.

NOTE: Do not use metal scrapers, wire brushes, power abrasive discs, or other abrasive means to clean sealing surfaces. These tools cause scratches and gouges which make leak paths.

1.

Remove loose sealant by hand or with the aid of a plastic scraper. Use the General Equipment: Plastic Scraper

2.

Apply Motorcraft ® Silicone Gasket Remover to surface. Allow to set for several minutes.

Material

: Motorcraft ® Silicone Gasket Remover / ZC-30-A

3.

Use a lint-free towel and plastic scraper to remove any remaining sealant. A second application of Silicone Gasket Remover may be required. Use the General Equipment: Plastic Scraper

Material

: Motorcraft ® Silicone Gasket Remover / ZC-30-A

4.

Clean the surface with Motorcraft ® Metal Brake Parts Cleaner to remove all residual sealant and oil.

Material

: Metal Brake Parts Cleaner (U.S.) / PM-4-A, PM-4-B (U.S.)

NOTE: Discard wipe after a single use.

NOTE: Motorcraft ® Metal Surface Prep Wipes is a pre-saturated disposable wipe to be used as a final step in surface preparation. It creates a conversion coating providing an improved base for RTV sealing. The wipe is a dry-in-place application and does not require rinsing.

5.
Prep the surface with Motorcraft ® Metal Surface Prep Wipes. All surfaces that are to be sealed with RTV are to be wiped. Make sure the surface is moistened with the fluid.

Material

: Motorcraft ® Metal Surface Prep / ZC-31-B

NOTE: Drying the surface with a towel will contaminate the surface and may cause oil leaks.

6.
Allow the surface to air dry. (Approximately 2 minutes.)

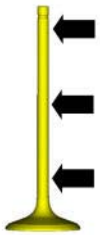
GENERAL PROCEDURES > VALVE STEM DIAMETER

Check

NOTE: Refer to the appropriate article for the specification.

1.

Measure the diameter of each intake and exhaust valve stem at the points shown below. Verify the diameter is within specification.



E148356

GENERAL PROCEDURES > VALVE GUIDE INNER DIAMETER

Check

NOTE: Refer to the appropriate article for the specification.

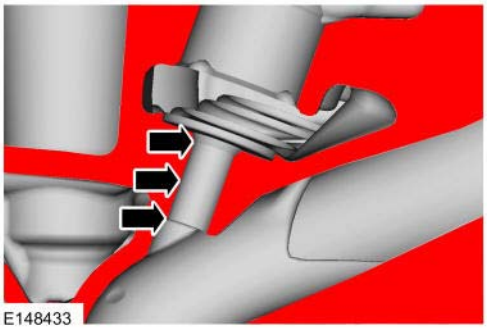
NOTE: Valve guides tend to wear in an hourglass pattern. The ball gauge can be inserted into the combustion chamber side of the valve guide, if necessary.

1.

Use a ball gauge to determine the inside diameter of the valve guides in 2 directions at the top, middle and bottom of the valve guide.

Measure the ball gauge with a micrometer.

If the valve guide is not within specifications, install a new cylinder head assembly.


E148433

DESCRIPTION AND OPERATION > EXHAUST SYSTEM > OVERVIEW

NOTE: Do not use leaded fuel in a vehicle equipped with a catalytic converter. In a vehicle that is continually misfueled, the lead in the fuel will be deposited in the catalytic converter and completely blanket the catalyst. Lead reacts with platinum to "poison" the catalyst. Continuous use of leaded fuel can destroy the catalyst and render the catalytic converter useless. The addition of lead to the catalytic converter can also solidify the catalyst, causing excessive back pressure in the exhaust system and possibly causing engine damage.

NOTE: Extremely high temperatures of 1,100°C (2,012°F) or above due to misfiring or an over-rich fuel/air mixture will cause the ceramic substrate to sinter or burn, destroying the catalytic converter. Do not continue to operate the vehicle if the engine is misfiring, there is a power loss or other unusual operating conditions, such as engine overheating and backfiring.

NOTE: Do not use oil or grease-based lubricants on the isolators. These lubricants may cause deterioration of the rubber. This can lead to separation of the isolator from the exhaust hanger bracket during vehicle operation.

The exhaust system provides an exit for exhaust gases and reduces engine noise by passing exhaust gases through the catalytic converters and a muffler assembly. The catalytic converters also play a major role in reducing air pollutants.

- a one-piece catalytic converter with exhaust flexible pipe that is mounted to the turbocharger outlet flange.
- a muffler and tailpipe assembly.
- isolators installed on the body and muffler hangers.

The catalytic converter plays a major role in the emission control system by operating as a gas reactor. Its function is to speed the heat-producing chemical reaction of components in the exhaust gases to reduce air pollutants.

The catalyst material inside the catalytic converter consists of a ceramic substrate.

The catalytic converter is designed to provide a long life. No maintenance is necessary.

Sound insulators and shields, attached to the underbody, protect the vehicle from exhaust system heat and should be inspected at regular intervals to make sure they are not dented or out of position. If a sound insulator and shield is damaged or shows evidence of deterioration, install a new insulator and shield. The sound insulators and shields for the muffler, muffler pipe and catalytic converter pipe are installed separately.

Some exhaust fasteners must be discarded and new ones installed as indicated in the procedures. Discard any damaged or heavily corroded fasteners and install new ones as necessary. Some exhaust fasteners are of a prevailing torque design. Use only new fasteners with the same part number as the original. Tighten the fasteners to the specified torque during reassembly to make sure of correct retention of exhaust components.

DIAGNOSIS AND TESTING > EXHAUST SYSTEM > SYMPTOM CHART(S)

Symptom Chart: Symptom Chart - Exhaust System

Verify the customer concern. Inspect the components of the exhaust system for obvious signs of damage or other mechanical concerns using the following chart.

Visual Inspection Chart - Mechanical

Mechanical
Exhaust pipe pinched or crushed Damaged muffler Broken or damaged exhaust hanger brackets Damaged catalytic converter Loose or damaged heat shields

Verify the exhaust system is installed correctly, with clamps correctly located and tightened to specifications. If the fault is not visually evident, determine the symptom. GO to Symptom Chart below.

Symptom Chart

Condition	Possible Sources	Actions
Vehicle has low or no power - vehicle performance complaint	Exhaust pipe pinched or crushed Damaged catalytic converter Loose obstruction in exhaust	REFER to the ENGINE CONTROLS - INTRODUCTION (EXCEPT DIESEL & HYBRID) .
	Restricted exhaust (possible frozen condensate in muffler)	CHECK drain holes for foreign material. PARK the vehicle inside to thaw. TEST the vehicle for normal operation. If the concern is still present, REFER to the ENGINE CONTROLS - INTRODUCTION (EXCEPT DIESEL & HYBRID) .
Burning smell - usually occurs at idle, with possible traces of smoke	Foreign material caught in exhaust system Missing heat shields	INSPECT the exhaust system for foreign material or missing heat shields. REPAIR or INSTALL new components as necessary.
Odor - described as a sulfur or rotten egg smell	Catalytic converter Excessive sulfur content in fuel	At times, a slight sulfur smell is normal for catalytic converters. The cause is the sulfur content in the gasoline being used. ADVISE

		the customer no repair is required.
	Rich fuel conditions Misfire conditions	REFER to the ENGINE CONTROLS - INTRODUCTION (EXCEPT DIESEL & HYBRID) .
Visible rust on surface of exhaust pipes	Catalytic converter/exhaust system	Surface rust is a characteristic of materials used on exhaust systems. Exposure to heat or road salt may result in surface rust. INSPECT for perforations. If there are no perforations, the condition is normal.

Symptom Chart: Symptom Chart - NVH

Symptom Chart

Condition	Possible Sources	Actions
Rattle, squeaks or buzz type noise - from the bottom of the vehicle	Loose or damaged heat shield	INSPECT the exhaust system for loose or missing heat shields or foreign material trapped between the heat shields and the exhaust system components. If any heat shields are loose, INSTALL worm gear clamp 7L5Z-5A231-AA and tighten to 7 Nm. If the heat shields are missing or a rattle, noise or buzz condition persists, INSTALL a new heat shield or component as necessary.
	Loose or damaged exhaust isolators	VERIFY the exhaust isolators are correctly installed. INSPECT the exhaust isolators for wear or damage. INSTALL new isolators as necessary.
	Damaged exhaust isolator hanger bracket	INSPECT the exhaust system components for damage or broken hangers. INSTALL new components as necessary. CHECK for loose or damaged exhaust hanger brackets or fasteners. TIGHTEN the bolts to specification or INSTALL new components as necessary.
	Loose or damaged catalytic converter or muffler	MOVE the exhaust system to simulate the bouncing action of the vehicle, checking for exhaust-to-body contact while moving the exhaust system. Using a rubber

		mallet, TAP on the exhaust components to duplicate the noise concern. Lightly TAP on the muffler, then the catalytic converter. DETERMINE if there are loose or broken baffles in the muffler or a loose or broken element in the catalytic converter. REPAIR or INSTALL new components as necessary.
	Exhaust grounded to chassis	INSPECT for signs of exhaust components-to-body contact. REPAIR or INSTALL new components as necessary.
Drone or clunk type noise - from the bottom of the vehicle	Loose or damaged exhaust isolators	INSPECT the exhaust isolators for wear or damage. INSTALL new isolators as necessary.
	Exhaust grounded to chassis	INSPECT for signs of exhaust components-to-body contact. REPAIR or INSTALL new components as necessary.
Whistles, boom, hum or ticking type noise - noise tends to change as the engine warms. The noises are often accompanied by exhaust fumes	Exhaust system leak	INSPECT the entire exhaust system for leaks. CHECK for punctures, loose or damaged clamps/fasteners, gaskets, sensors or broken welds. EXAMINE the chassis for grayish-white or black exhaust soot, which indicates exhaust leakage at that point. To magnify a small leak, have an assistant hold a shop towel over the tail pipe outlet while listening for a leak. REPAIR or INSTALL new components as necessary.
	Catalytic converter	MOVE the exhaust system to simulate the bouncing action of the vehicle, checking for exhaust-to-body contact while moving the exhaust system. Using a rubber mallet, TAP on the exhaust components to duplicate the noise concern. Lightly TAP on the muffler and the catalytic converter. DETERMINE if there are loose or broken baffles in the muffler, or a loose or broken element in the catalytic converter. REPAIR or INSTALL new components as

		necessary.
	Exhaust muffler/resonator drain hole enlarged due to corrosion	CONFIRM the drain holes are the noise source. INSTALL new components as necessary.
Hissing or rushing noise - high frequency sound and the vehicle performance is unaffected	Exhaust system Exhaust flow through pipes	CHECK the exhaust system for leaks. Using a rubber mallet, TAP on the exhaust components to duplicate the noise concern. Lightly TAP on the muffler and the catalytic converter. DETERMINE if there are loose or broken baffles in the muffler, or a loose or broken element in the catalytic converter. REPAIR or INSTALL new components as necessary.
Pinging noise - occurs when exhaust system is hot, engine turned off	Catalytic converter/exhaust system	Cool down pinging is a result of the exhaust system expanding and contracting during heating and cooling. This is a normal condition.
Vibration - occurs at idle and at low speeds. Also accompanied by a clunk or buzz type noise	Loose or damaged exhaust isolator	INSPECT the exhaust isolators for wear or damage. INSTALL new isolators as necessary.
	Loose or damaged exhaust isolator hanger brackets	INSPECT the exhaust isolator hanger brackets for wear or damage. INSTALL or REPAIR as necessary.
	Exhaust system grounded to chassis	REPAIR or INSTALL new components as necessary.
Engine drumming noise - normally accompanied by vibration	Damaged or misaligned exhaust system	INSPECT the exhaust system for loose or damaged fasteners or isolators. REPAIR or INSTALL new components as necessary.
Sputter type noise - noise worse when cold, lessens or disappears when the vehicle is at operating temperature	Damaged or worn exhaust system	INSPECT the exhaust system for leaks or damage. REPAIR as necessary.
Thumping noise - from the bottom of the vehicle, worse during acceleration	Misaligned exhaust system	CHECK the exhaust system to chassis clearance. CHECK the exhaust system isolators for damage. REPAIR as necessary.
Engine vibration - is felt with increases and decreases in engine rpm	Strain on exhaust system isolators	REPAIR or INSTALL new components as necessary.
Drumming noise - occurs inside the vehicle during idle or high idle, hot or cold. Very	Exhaust system vibration excites the body resonances inducing interior noise	REPAIR or INSTALL new components as necessary.

low-frequency drumming is very rpm dependent		

REMOVAL AND INSTALLATION > CATALYTIC CONVERTER > REMOVAL

NOTE: If the catalytic converter is not being replaced, the HO2S and the catalyst monitor sensor do not need to be removed from the catalytic converter. Disconnecting the electrical connectors is still necessary.

NOTE: Removal steps in this procedure may contain installation details.

NOTE: Clean all exhaust connections before reassembly.

1.

With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

2.

1.

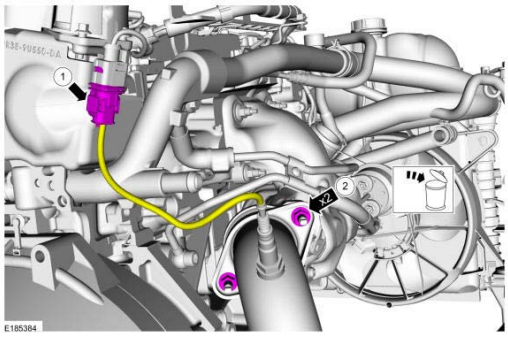
Disconnect the HO2S electrical connector.

2.

Remove and discard the nuts.

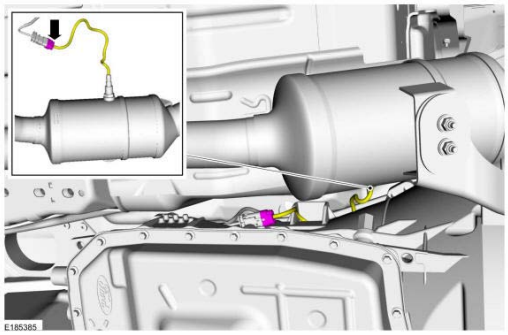
Torque

: 30 lb.ft (40 Nm)



3.

Disconnect the catalyst monitor sensor electrical connector.



4.

1.

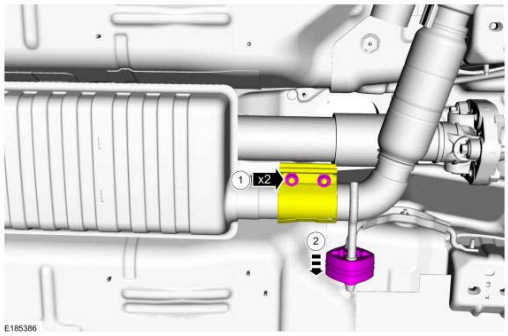
Loosen the clamp and release the tab and slide the clamp back on the muffler. Separate the muffler and tailpipe from the catalytic converter.

Torque

: 35 lb.ft (48 Nm)

2.

Detach the exhaust isolator.

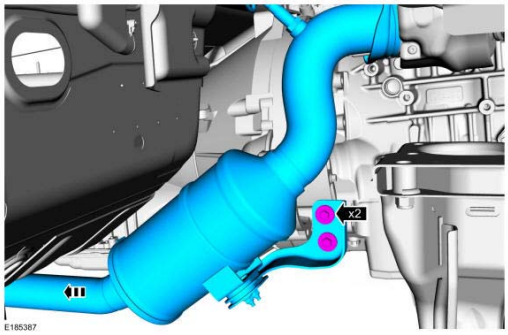


5.

Remove the bolts and the catalytic converter.

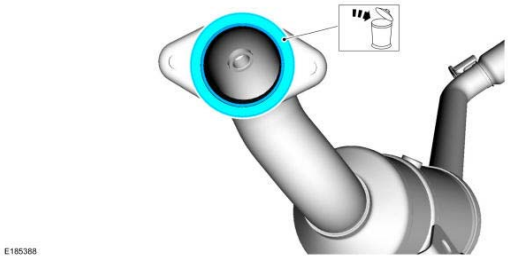
Torque

: 18 lb.ft (25 Nm)



6.

Remove and discard the gasket.



REMOVAL AND INSTALLATION > CATALYTIC CONVERTER > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Check the exhaust system for leaks.

REMOVAL AND INSTALLATION > MUFFLER AND TAILPIPE

Materials

Name	Specification
Threadlock and Sealer TA-25-B	-

REMOVAL AND INSTALLATION > MUFFLER AND TAILPIPE > REMOVAL

NOTE: Do not excessively bend, twist or allow the exhaust to hang from the flexible joint or damage to the exhaust system may occur.

NOTE: Do not use oil or grease-based lubricants on the isolators. They may cause deterioration of the rubber.

NOTE: Removal steps in this procedure may contain installation details.

NOTE: Clean all exhaust connections before reassembly.

1.

With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

2.

1.

Convertible top vehicles only, remove the retainers and the brace.

Torque

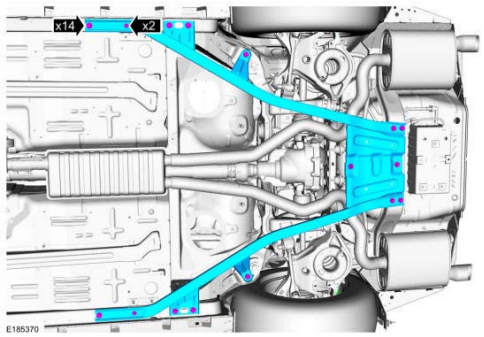
: 46 lb.ft (63 Nm)

2.

During assembly, clean the retainers and apply the thread lock.

Material

: Threadlock and Sealer / TA-25-B

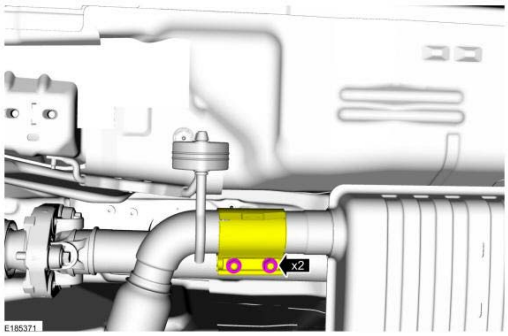


3.

Loosen the clamp and separate the muffler and tailpipe from the catalytic converter.

Torque

: 35 lb.ft (48 Nm)



4.

1.

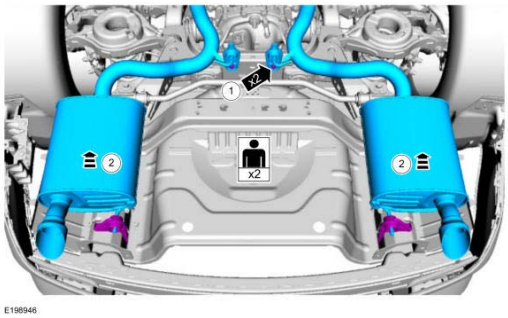
Remove the LH and RH rear exhaust hanger isolator bracket bolts from the rear subframe.

Torque

: 18 lb.ft (25 Nm)

2.

Unhook the rear exhaust hanger isolators and remove the muffler and tailpipe.



REMOVAL AND INSTALLATION > MUFFLER AND TAILPIPE > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Check the exhaust system for leaks.

DESCRIPTION AND OPERATION > EXHAUST SYSTEM > OVERVIEW

NOTE: Do not use leaded fuel in a vehicle equipped with a catalytic converter. In a vehicle that is continually misfueled, the lead in the fuel will be deposited in the catalytic converter and completely blanket the catalyst. Lead reacts with platinum to "poison" the catalyst. Continuous use of leaded fuel can destroy the catalyst and render the catalytic converter useless. The addition of lead to the catalytic converter can also solidify the catalyst, causing excessive back pressure in the exhaust system and possibly causing engine damage.

NOTE: Extremely high temperatures of 1, 100°C (2, 012°F) or above due to misfiring or an over-rich fuel/air mixture will cause the ceramic substrate to sinter or burn, destroying the catalytic converter. Do not continue to operate the vehicle if the engine is misfiring, there is a power loss or other unusual operating conditions, such as engine overheating and backfiring.

NOTE: Do not use oil or grease-based lubricants on the isolators. These lubricants may cause deterioration of the rubber. This can lead to separation of the isolator from the exhaust hanger bracket during vehicle operation.

The exhaust system provides an exit for exhaust gases and reduces engine noise by passing exhaust gases through the catalytic converters and a muffler assembly. The catalytic converters also play a major role in reducing air pollutants.

The exhaust system consists of:

- a LH one-piece catalytic converter manifold that is mounted to the LH exhaust manifold.
- a RH one-piece catalytic converter manifold that is mounted to the RH exhaust manifold.
- a underbody resonator which is part of the muffler and tailpipe assembly.
- a muffler and tailpipe assembly with isolators.

The catalytic converter plays a major role in the emission control system by operating as a gas reactor. Its function is to speed the heat-producing chemical reaction of components in the exhaust gases in order to reduce air pollutants.

The catalyst material inside the catalytic converter consists of a ceramic substrate.

The catalytic converter is designed to provide a long life. No maintenance is necessary.

Sound insulators and shields, attached to the underbody and exhaust system to protect the vehicle from exhaust system heat and should be inspected at regular intervals to make sure they are not dented or out of position. If a sound insulator and shield is damaged or shows evidence of deterioration, install a new insulator and shield. The sound insulators and shields for the muffler, muffler pipe, resonator and

catalytic converter pipe are installed separately.

Some exhaust fasteners must be discarded and new ones installed as indicated in the procedures. Discard any damaged or heavily corroded fasteners and install new ones as necessary. Some exhaust fasteners are of a prevailing torque design. Use only new fasteners with the same part number as the original. Tighten the fasteners to the specified torque during reassembly to make sure of correct retention of exhaust components.

DIAGNOSIS AND TESTING > EXHAUST SYSTEM > SYMPTOM CHART(S)

Symptom Chart: Symptom Chart - Exhaust System

Verify the customer concern. Inspect the components of the exhaust system for obvious signs of damage or other mechanical concerns using the following chart.

Visual Inspection Chart - Mechanical

Mechanical
Exhaust pipe pinched or crushed Damaged muffler and tailpipe Broken or damaged exhaust hanger brackets Damaged catalytic converters Loose or damaged heat shields

Verify the exhaust system is installed correctly, with clamps correctly located and tightened to specifications. If the fault is not visually evident, determine the symptom. GO to Symptom Chart below.

Symptom Chart

Condition	Possible Sources	Actions
Vehicle has low or no power - vehicle performance complaint	Exhaust pipe pinched or crushed Damaged catalytic converters Loose obstruction in exhaust	REFER to the ENGINE CONTROLS - INTRODUCTION (EXCEPT DIESEL & HYBRID) .
	Restricted exhaust (possible frozen condensate in muffler)	CHECK drain holes for foreign material. PARK the vehicle inside to thaw. TEST the vehicle for normal operation. If the concern is still present, REFER to the ENGINE CONTROLS - INTRODUCTION (EXCEPT DIESEL & HYBRID)
Burning smell - usually occurs at idle, with possible traces of smoke	Foreign material caught in exhaust system Missing heat shields	INSPECT the exhaust system for foreign material or missing heat shields. REPAIR or INSTALL new components as necessary.
Odor - described as a sulfur or rotten egg smell	Catalytic converters Excessive sulfur content in fuel	At times, a slight sulfur smell is normal for catalytic converters.

		The cause is the sulfur content in the gasoline being used. ADVISE the customer no repair is required.
	Rich fuel conditions Misfire conditions	REFER to the ENGINE CONTROLS - INTRODUCTION (EXCEPT DIESEL & HYBRID) .
Visible rust on surface of exhaust pipes	Catalytic converters/exhaust system	Surface rust is a characteristic of materials used on exhaust systems. Exposure to heat or road salt may result in surface rust. INSPECT for perforations. If there are no perforations, the condition is normal.

Symptom Chart: Symptom Chart - NVH

Symptom Chart

Condition	Possible Sources	Actions
Rattle, squeaks or buzz type noise - from the bottom of the vehicle	Loose or damaged heat shield	INSPECT the exhaust system for loose or missing heat shields or foreign material trapped between the heat shields and the exhaust system components. If any heat shields are loose, INSTALL worm gear clamp 7L5Z-5A231-AA and tighten to 7 Nm. If the heat shields are missing or a rattle, noise or buzz condition persists, INSTALL a new heat shield or component as necessary.
	Loose or damaged exhaust isolators	VERIFY the exhaust isolators are correctly installed. INSPECT the exhaust isolators for wear or damage. INSTALL new isolators as necessary.
	Damaged exhaust isolator hanger bracket	INSPECT the exhaust system components for damage or broken hangers. INSTALL new components as necessary. CHECK for loose or damaged exhaust hanger brackets or fasteners. TIGHTEN the bolts to specification or INSTALL new components as necessary.
	Loose or damaged catalytic converters or muffler	MOVE the exhaust system to simulate the bouncing action of

		the vehicle, checking for exhaust-to-body contact while moving the exhaust system. Using a rubber mallet, TAP on the exhaust components to duplicate the noise concern. Lightly TAP on the muffler, then the catalytic converter. DETERMINE if there are loose or broken baffles in the muffler or a loose or broken element in the catalytic converter. REPAIR or INSTALL new components as necessary.
	Exhaust grounded to chassis	INSPECT for signs of exhaust components-to-body contact. REPAIR or INSTALL new components as necessary.
Drone or clunk type noise - from the bottom of the vehicle	Loose or damaged exhaust isolators	INSPECT the exhaust isolators for wear or damage. INSTALL new isolators as necessary.
	Exhaust grounded to chassis	INSPECT for signs of exhaust components-to-body contact. REPAIR or INSTALL new components as necessary.
Whistles, boom, hum or ticking type noise - noise tends to change as the engine warms. The noises are often accompanied by exhaust fumes	Exhaust system leak	INSPECT the entire exhaust system for leaks. CHECK for punctures, loose or damaged clamps/fasteners, gaskets, sensors or broken welds. EXAMINE the chassis for grayish-white or black exhaust soot, which indicates exhaust leakage at that point. To magnify a small leak, have an assistant hold a shop towel over the tail pipe outlet while listening for a leak. REPAIR or INSTALL new components as necessary.
	Catalytic converters	MOVE the exhaust system to simulate the bouncing action of the vehicle, checking for exhaust-to-body contact while moving the exhaust system. Using a rubber mallet, TAP on the exhaust components to duplicate the noise concern. Lightly TAP on the muffler and the catalytic converters. DETERMINE if there are loose or broken baffles in the

		muffler, or a loose or broken element in the catalytic converter. REPAIR or INSTALL new components as necessary.
	Exhaust muffler/resonator drain hole enlarged due to corrosion	CONFIRM the drain holes are the noise source. INSTALL new components as necessary.
Hissing or rushing noise - high frequency sound and the vehicle performance is unaffected	Exhaust system Exhaust flow through pipes	CHECK the exhaust system for leaks. Using a rubber mallet, TAP on the exhaust components to duplicate the noise concern. Lightly TAP on the muffler and the catalytic converter. DETERMINE if there are loose or broken baffles in the muffler, or a loose or broken element in the catalytic converter. REPAIR or INSTALL new components as necessary.
Pinging noise - occurs when exhaust system is hot, engine turned off	Catalytic converters/exhaust system	Cool down pinging is a result of the exhaust system expanding and contracting during heating and cooling. This is a normal condition.
Vibration - occurs at idle and at low speeds. Also accompanied by a clunk or buzz type noise	Loose or damaged exhaust isolator	INSPECT the exhaust isolators for wear or damage. INSTALL new isolators as necessary.
	Loose or damaged exhaust isolator hanger brackets	INSPECT the exhaust isolator hanger brackets for wear or damage. INSTALL or REPAIR as necessary.
	Exhaust system grounded to chassis	REPAIR or INSTALL new components as necessary.
Engine drumming noise - normally accompanied by vibration	Damaged or misaligned exhaust system	INSPECT the exhaust system for loose or damaged fasteners or isolators. REPAIR or INSTALL new components as necessary.
Sputter type noise - noise worse when cold, lessens or disappears when the vehicle is at operating temperature	Damaged or worn exhaust system	INSPECT the exhaust system for leaks or damage. REPAIR as necessary.
Thumping noise - from the bottom of the vehicle, worse during acceleration	Misaligned exhaust system	CHECK the exhaust system to chassis clearance. CHECK the exhaust system isolators for damage. REPAIR as necessary.
Engine vibration - is felt with increases and decreases in engine rpm	Strain on exhaust system isolators	REPAIR or INSTALL new components as necessary.

Drumming noise - occurs inside the vehicle during idle or high idle, hot or cold. Very low-frequency drumming is very rpm dependent	Exhaust system vibration excites the body resonances inducing interior noise	REPAIR or INSTALL new components as necessary.

REMOVAL AND INSTALLATION > CATALYTIC CONVERTER LH > REMOVAL

NOTE: Clean all exhaust connections before reassembly.

NOTE: Removal steps in this procedure may contain installation details.

NOTE: If the catalytic converter is not being replaced, the HO2S and the catalyst monitor sensor do not need to be removed from the catalytic converter. Disconnecting the electrical connectors is still necessary.

1.

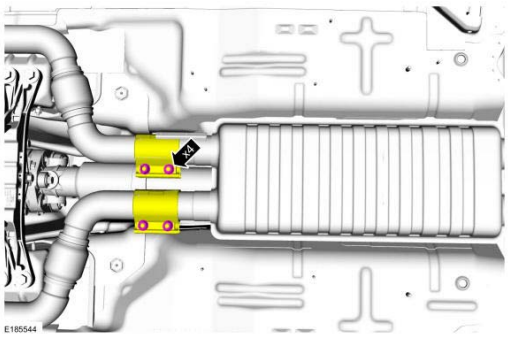
With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

2.

Loosen the clamps, release the tab and slide the clamps back on the muffler. Separate the muffler and tailpipe from the catalytic converters.

Torque

: 35 lb.ft (48 Nm)



3.

1.

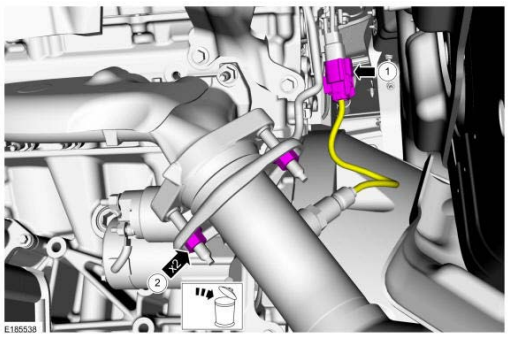
Disconnect the HO2S electrical connector.

2.

Remove and discard the nuts.

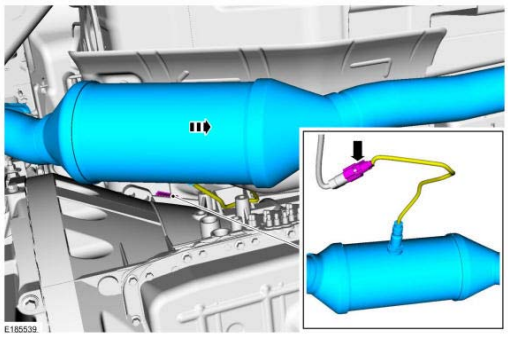
Torque

: 30 lb.ft (40 Nm)



4.

Disconnect the catalyst monitor sensor electrical connector and remove the catalytic convertor.



REMOVAL AND INSTALLATION > CATALYTIC CONVERTER LH > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Check the exhaust system for leaks.

REMOVAL AND INSTALLATION > CATALYTIC CONVERTER RH > REMOVAL

NOTE: If the catalytic converter is not being replaced, the HO2S and the catalyst monitor sensor do not need to be removed from the catalytic converter. Disconnecting the electrical

connectors is still necessary.

NOTE: Removal steps in this procedure may contain installation details.

NOTE: Clean all exhaust connections before reassembly.

1.

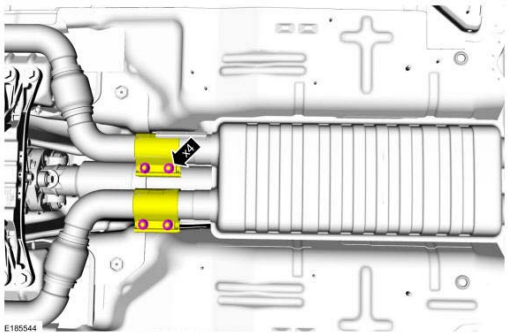
With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

2.

Loosen the clamps, release the tab and slide the clamps back on the muffler. Separate the muffler and tailpipe from the catalytic converters.

Torque

: 35 lb.ft (48 Nm)



3.

1.

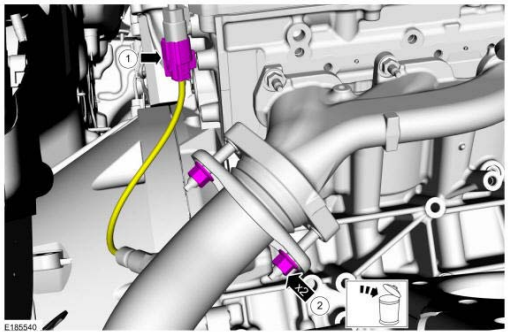
Disconnect the HO2S electrical connector.

2.

Remove and discard the nuts.

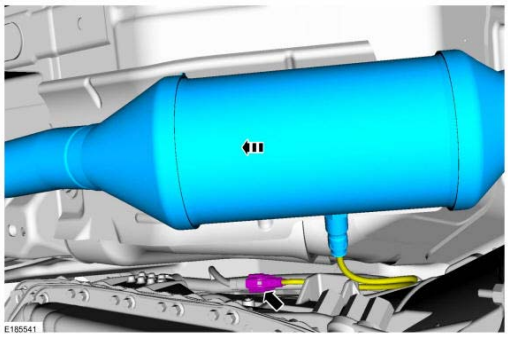
Torque

: 30 lb.ft (40 Nm)



4.

Disconnect the catalyst monitor sensor electrical connector and remove the catalytic convertor.



REMOVAL AND INSTALLATION > CATALYTIC CONVERTER RH > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Check the exhaust system for leaks.

REMOVAL AND INSTALLATION > MUFFLER AND TAILPIPE

Materials

Name	Specification
Threadlock and Sealer TA-25-B	-

REMOVAL AND INSTALLATION > MUFFLER AND TAILPIPE > REMOVAL

NOTE: Do not excessively bend, twist or allow the exhaust to hang from the flexible joint or damage to the exhaust system may occur.

NOTE: Do not use oil or grease-based lubricants on the isolators. They may cause deterioration of the rubber.

NOTE: Removal steps in this procedure may contain installation details.

NOTE: Clean all exhaust connections before reassembly.

1.

With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

2.

1.

Convertible top vehicles only, remove the retainers and the brace.

Torque

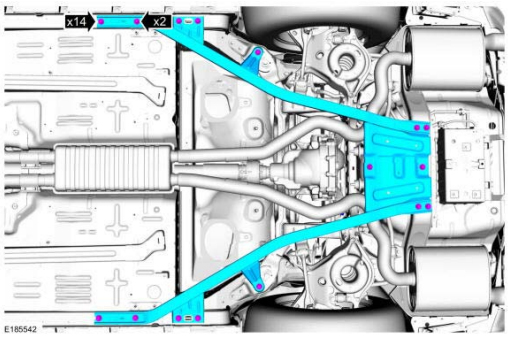
: 46 lb.ft (63 Nm)

2.

During assembly, clean the retainers and apply the thread lock.

Material

: Threadlock and Sealer / TA-25-B

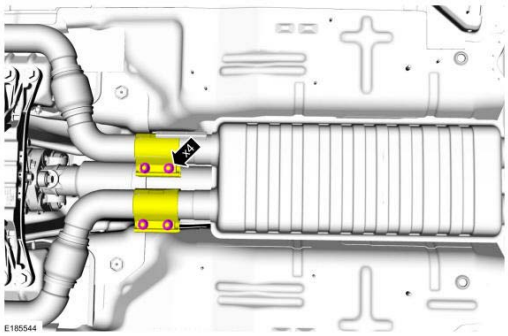


3.

Loosen the clamps and separate the muffler and tailpipe from the catalytic converters.

Torque

: 35 lb.ft (48 Nm)



4.

1.

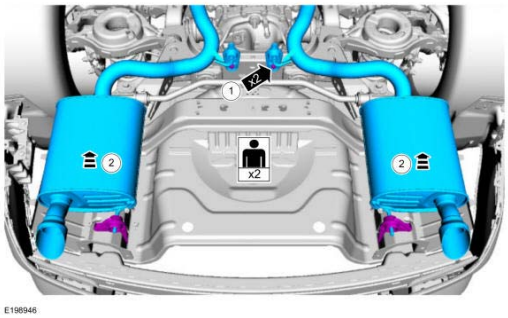
Remove the LH and RH rear exhaust hanger isolator bracket bolts from the rear subframe.

Torque

: 18 lb.ft (25 Nm)

2.

Unhook the rear exhaust hanger isolators and remove the muffler and tailpipe.



REMOVAL AND INSTALLATION > MUFFLER AND TAILPIPE > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Check the exhaust system for leaks.

DESCRIPTION AND OPERATION > EXHAUST SYSTEM > OVERVIEW

NOTE: Do not use leaded fuel in a vehicle equipped with a catalytic converter. In a vehicle that is continually misfueled, the lead in the fuel will be deposited in the catalytic converter and completely blanket the catalyst. Lead reacts with platinum to "poison" the catalyst. Continuous use of leaded fuel can destroy the catalyst and render the catalytic converter useless. The addition of lead to the catalytic converter can also solidify the catalyst, causing excessive back pressure in the exhaust system and possibly causing engine damage.

NOTE: Extremely high temperatures of 1, 100°C (2, 012°F) or above due to misfiring or an over-rich fuel/air mixture will cause the ceramic substrate to sinter or burn, destroying the catalytic converter. Do not continue to operate the vehicle if the engine is misfiring, there is a power loss or other unusual operating conditions, such as engine overheating and backfiring.

NOTE: Do not use oil or grease-based lubricants on the isolators. These lubricants may cause deterioration of the rubber. This can lead to separation of the isolator from the exhaust hanger bracket during vehicle operation.

The exhaust system provides an exit for exhaust gases and reduces engine noise by passing exhaust gases through the catalytic converters and a muffler assembly. The catalytic converters also play a major role in reducing air pollutants.

The exhaust system consists of:

- a LH one-piece catalytic converter manifold that is mounted to the LH cylinder head.
- a RH one-piece catalytic converter manifold that is mounted to the RH exhaust manifold.
- a muffler inlet pipe that is mounted to the LH catalytic converter to the muffler and tailpipe assembly.
- a underbody resonator which is part of the muffler and tailpipe assembly.
- a muffler and tailpipe assembly with isolators.

The catalytic converter plays a major role in the emission control system by operating as a gas reactor. Its function is to speed the heat-producing chemical reaction of components in the exhaust gases in order to reduce air pollutants.

The catalyst material inside the catalytic converter consists of a ceramic substrate.

The catalytic converter is designed to provide a long life. No maintenance is necessary.

Sound insulators and shields, attached to the underbody and exhaust system to protect the vehicle from

exhaust system heat and should be inspected at regular intervals to make sure they are not dented or out of position. If a sound insulator and shield is damaged or shows evidence of deterioration, install a new insulator and shield. The sound insulators and shields for the muffler, muffler pipe, resonator and catalytic converter pipe are installed separately.

Some exhaust fasteners must be discarded and new ones installed as indicated in the procedures. Discard any damaged or heavily corroded fasteners and install new ones as necessary. Some exhaust fasteners are of a prevailing torque design. Use only new fasteners with the same part number as the original. Tighten the fasteners to the specified torque during reassembly to make sure of correct retention of exhaust components.

DIAGNOSIS AND TESTING > EXHAUST SYSTEM > SYMPTOM CHART(S)

Symptom Chart: Symptom Chart - Exhaust System

Verify the customer concern. Inspect the components of the exhaust system for obvious signs of damage or other mechanical concerns using the following chart.

Visual Inspection Chart - Mechanical

Mechanical
Exhaust pipe pinched or crushed Damaged muffler and tailpipe Broken or damaged exhaust hanger brackets Damaged catalytic converters Loose or damaged heat shields

Verify the exhaust system is installed correctly, with clamps correctly located and tightened to specifications. If the fault is not visually evident, determine the symptom. GO to Symptom Chart below.

Symptom Chart

Condition	Possible Sources	Actions
Vehicle has low or no power - vehicle performance complaint	Exhaust pipe pinched or crushed Damaged catalytic converters Loose obstruction in exhaust	REFER to the ENGINE CONTROLS - INTRODUCTION (EXCEPT DIESEL & HYBRID) .
	Restricted exhaust (possible frozen condensate in muffler)	CHECK drain holes for foreign material. PARK the vehicle inside to thaw. TEST the vehicle for normal operation. If the concern is still present, REFER to the ENGINE CONTROLS - INTRODUCTION (EXCEPT DIESEL & HYBRID) .
Burning smell - usually occurs at idle, with possible traces of smoke	Foreign material caught in exhaust system Missing heat shields	INSPECT the exhaust system for foreign material or missing heat shields. REPAIR or INSTALL new components as necessary.

Odor - described as a sulfur or rotten egg smell	Catalytic converters Excessive sulfur content in fuel	At times, a slight sulfur smell is normal for catalytic converters. The cause is the sulfur content in the gasoline being used. ADVISE the customer no repair is required.
	Rich fuel conditions Misfire conditions	REFER to the ENGINE CONTROLS - INTRODUCTION (EXCEPT DIESEL & HYBRID) .
Visible rust on surface of exhaust pipes	Catalytic converters/exhaust system	Surface rust is a characteristic of materials used on exhaust systems. Exposure to heat or road salt may result in surface rust. INSPECT for perforations. If there are no perforations, the condition is normal.

Symptom Chart: Symptom Chart - NVH

Symptom Chart

Condition	Possible Sources	Actions
Rattle, squeaks or buzz type noise - from the bottom of the vehicle	Loose or damaged heat shield	INSPECT the exhaust system for loose or missing heat shields or foreign material trapped between the heat shields and the exhaust system components. If any heat shields are loose, INSTALL worm gear clamp 7L5Z-5A231-AA and tighten to 7 Nm. If the heat shields are missing or a rattle, noise or buzz condition persists, INSTALL a new heat shield or component as necessary.
	Loose or damaged exhaust isolators	VERIFY the exhaust isolators are correctly installed. INSPECT the exhaust isolators for wear or damage. INSTALL new isolators as necessary.
	Damaged exhaust isolator hanger bracket	INSPECT the exhaust system components for damage or broken hangers. INSTALL new components as necessary. CHECK for loose or damaged exhaust hanger brackets or fasteners. TIGHTEN the bolts to specification or INSTALL new components as necessary.

	Loose or damaged catalytic converters or muffler	MOVE the exhaust system to simulate the bouncing action of the vehicle, checking for exhaust-to-body contact while moving the exhaust system. Using a rubber mallet, TAP on the exhaust components to duplicate the noise concern. Lightly TAP on the muffler, then the catalytic converter. DETERMINE if there are loose or broken baffles in the muffler or a loose or broken element in the catalytic converter. REPAIR or INSTALL new components as necessary.
	Exhaust grounded to chassis	INSPECT for signs of exhaust components-to-body contact. REPAIR or INSTALL new components as necessary.
Drone or clunk type noise - from the bottom of the vehicle	Loose or damaged exhaust isolators	INSPECT the exhaust isolators for wear or damage. INSTALL new isolators as necessary.
	Exhaust grounded to chassis	INSPECT for signs of exhaust components-to-body contact. REPAIR or INSTALL new components as necessary.
Whistles, boom, hum or ticking type noise - noise tends to change as the engine warms. The noises are often accompanied by exhaust fumes	Exhaust system leak	INSPECT the entire exhaust system for leaks. CHECK for punctures, loose or damaged clamps/fasteners, gaskets, sensors or broken welds. EXAMINE the chassis for grayish-white or black exhaust soot, which indicates exhaust leakage at that point. To magnify a small leak, have an assistant hold a shop towel over the tail pipe outlet while listening for a leak. REPAIR or INSTALL new components as necessary.
	Catalytic converters	MOVE the exhaust system to simulate the bouncing action of the vehicle, checking for exhaust-to-body contact while moving the exhaust system. Using a rubber mallet, TAP on the exhaust components to duplicate the noise concern. Lightly TAP on the muffler and the catalytic

		converters. DETERMINE if there are loose or broken baffles in the muffler, or a loose or broken element in the catalytic converter. REPAIR or INSTALL new components as necessary.
	Exhaust muffler/resonator drain hole enlarged due to corrosion	CONFIRM the drain holes are the noise source. INSTALL new components as necessary.
Hissing or rushing noise - high frequency sound and the vehicle performance is unaffected	Exhaust system Exhaust flow through pipes	CHECK the exhaust system for leaks. Using a rubber mallet, TAP on the exhaust components to duplicate the noise concern. Lightly TAP on the muffler and the catalytic converter. DETERMINE if there are loose or broken baffles in the muffler, or a loose or broken element in the catalytic converter. REPAIR or INSTALL new components as necessary.
Pinging noise - occurs when exhaust system is hot, engine turned off	Catalytic converters/exhaust system	Cool down pinging is a result of the exhaust system expanding and contracting during heating and cooling. This is a normal condition.
Vibration - occurs at idle and at low speeds. Also accompanied by a clunk or buzz type noise	Loose or damaged exhaust isolator	INSPECT the exhaust isolators for wear or damage. INSTALL new isolators as necessary.
	Loose or damaged exhaust isolator hanger brackets	INSPECT the exhaust isolator hanger brackets for wear or damage. INSTALL or REPAIR as necessary.
	Exhaust system grounded to chassis	REPAIR or INSTALL new components as necessary.
Engine drumming noise - normally accompanied by vibration	Damaged or misaligned exhaust system	INSPECT the exhaust system for loose or damaged fasteners or isolators. REPAIR or INSTALL new components as necessary.
Sputter type noise - noise worse when cold, lessens or disappears when the vehicle is at operating temperature	Damaged or worn exhaust system	INSPECT the exhaust system for leaks or damage. REPAIR as necessary.
Thumping noise - from the bottom of the vehicle, worse during acceleration	Misaligned exhaust system	CHECK the exhaust system to chassis clearance. CHECK the exhaust system isolators for damage. REPAIR as necessary.

Engine vibration - is felt with increases and decreases in engine rpm	Strain on exhaust system isolators	REPAIR or INSTALL new components as necessary.
Drumming noise - occurs inside the vehicle during idle or high idle, hot or cold. Very low-frequency drumming is very rpm dependent	Exhaust system vibration excites the body resonances inducing interior noise	REPAIR or INSTALL new components as necessary.

REMOVAL AND INSTALLATION > CATALYTIC CONVERTER LH

Special Tool(s) / General Equipment

	303-050 (T70P-6000) Lifting Bracket, Engine
	303-F072 Support Bar, Engine

REMOVAL AND INSTALLATION > CATALYTIC CONVERTER LH > REMOVAL

NOTE: If the catalytic converter is not being replaced, the HO2S and the catalyst monitor sensor do not need to be removed from the catalytic converter. Disconnecting the electrical connectors is still necessary.

NOTE: Removal steps in this procedure may contain installation details.

NOTE: Clean all exhaust connections before reassembly.

1.

With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

2.

Disconnect the battery negative and positive cable. Refer to: Battery Disconnect and Connect .

NOTE: Make sure to minimize damage to the sealer foam and avoid pulling apart dash seal brackets from retainer pins. Excessive damage may allow engine noise, fumes, air or water to enter the passenger compartment.

3.
Loosen the dash seal.

1.

Remove the nuts.

Torque

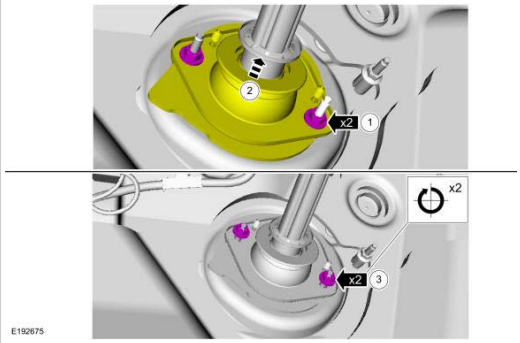
: 80 lb.in (9 Nm)

2.

Loosen the dash seal.

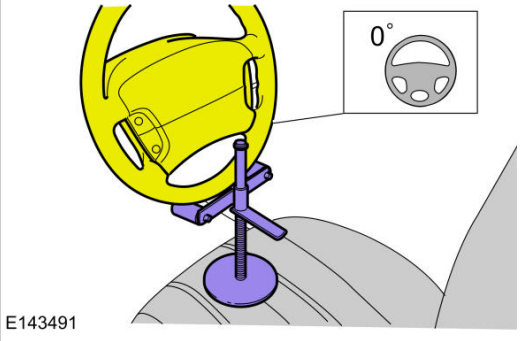
3.

Hand start the nuts.



4.

Steering wheel in straight ahead position.

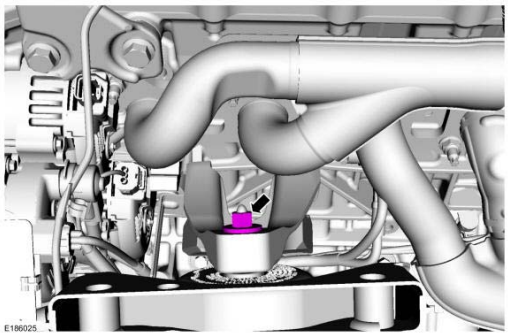


5.

Remove the LH motor mount nut.

Torque

: 46 lb.ft (63 Nm)

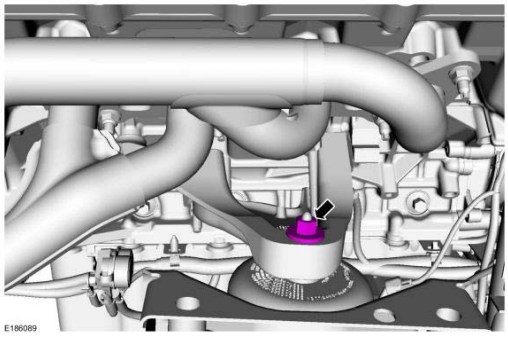


6.

Remove the RH motor mount nut.

Torque

: 46 lb.ft (63 Nm)



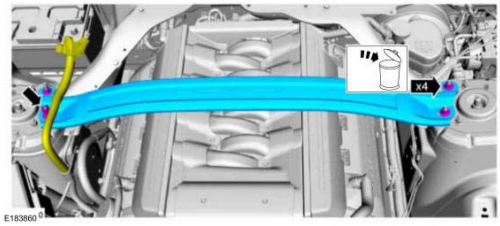
7.

If equipped with a strut tower cross brace, detach the wiring harness retainer.

Remove and discard the nuts, remove the strut tower cross brace.

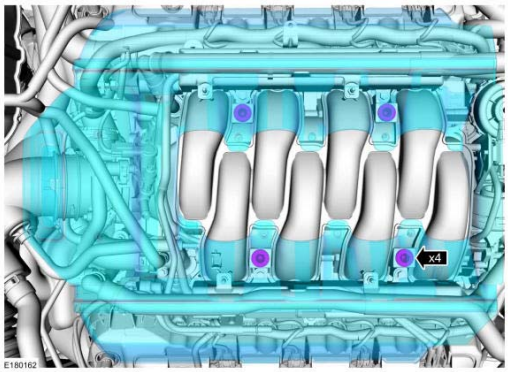
Torque

: 41 lb.ft (55 Nm)



8.

Remove the engine appearance cover.



9.

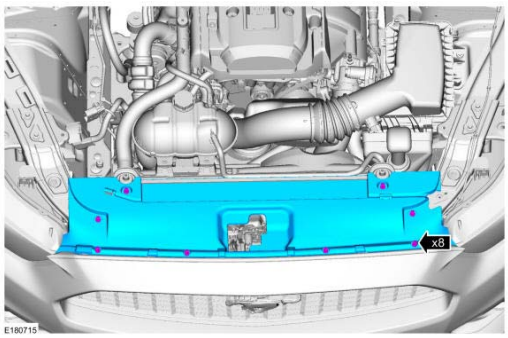
Remove the air cleaner outlet pipe. Refer to: AIR CLEANER OUTLET PIPE - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS).

10.

Remove the air cleaner. Refer to: AIR CLEANER - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS).

11.

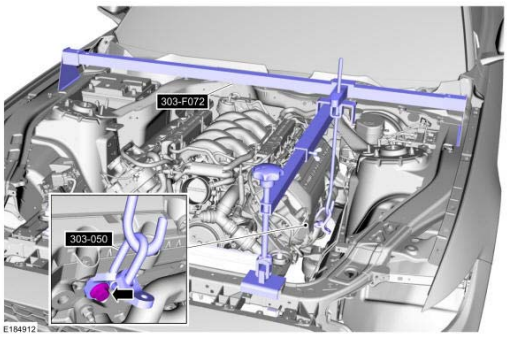
Remove the retainers and the radiator sight shield.



NOTE: Do not position the legs of the Engine Support Bar on the fenders. Instead, the legs should be positioned on the body structure. Failure to follow these instructions may result in body damage.

12.
Install the special tools and raise the engine 50 mm (2 inch).

Use Special Service Tool: 303-F072 Support Bar, Engine, 303-050 (T70P-6000) Lifting Bracket, Engine.



13.

Detach the steering column lower shaft from the coupling.

NOTE: Vehicles equipped with LHD.

WARNING: DO NOT hammer, pry or force steering column and column shafts during installation or removal. Failure to follow this instruction may cause damage to steering components that could lead to loss of steering control during vehicle operation and could result in serious personal injury or death.

WARNING: Do not reuse steering column shaft bolts. This may result in fastener failure and steering column shaft detachment or loss of steering control. Failure to follow this instruction may result in serious injury to vehicle occupant(s).

1.

Remove and discard the bolt.

Torque

: 22 lb.ft (30 Nm)

NOTE: Vehicles equipped with RHD.

2.
Remove and discard the bolt.

Torque

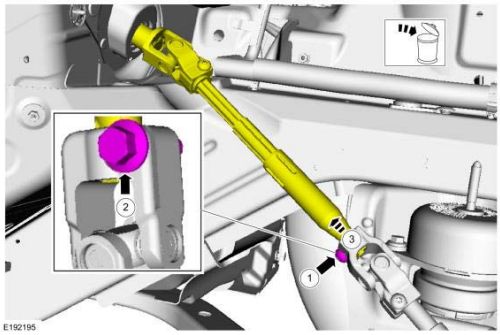
: 35 lb.ft (47.5 Nm)

3.

Pull apart the steering column lower shaft from the coupling.

4.

After reassembly, inspect the steering column lower shaft. Refer to: Steering Column Collapsed Check .



14.

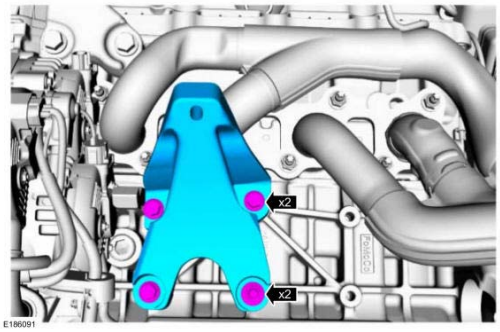
Remove the muffler inlet pipe. Refer to: Muffler Inlet Pipe .

15.

Remove the bolts and stud bolts and remove the LH motor mount bracket.

Torque

: 46 lb.ft (63 Nm)



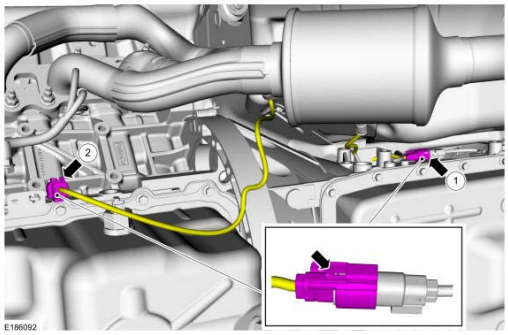
16.

1.

Disconnect the HO2S electrical connector.

2.

Disconnect the catalyst monitor sensor electrical connector.

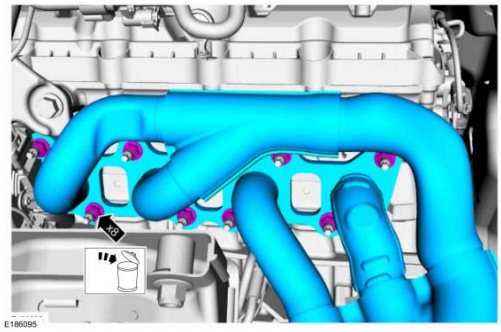


17.

Remove and discard the nuts, remove the LH catalytic converter.

Torque

: 24 lb.ft (32 Nm)

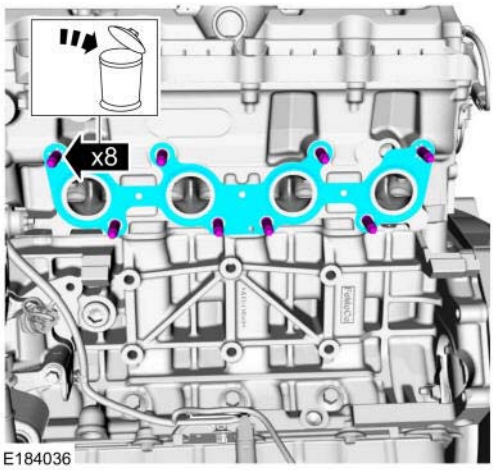


18.

Remove and discard the gasket and studs.

Torque

: 159 lb.in (18 Nm)



REMOVAL AND INSTALLATION > CATALYTIC CONVERTER LH > INSTALLATION

1.

To install, reverse the removal procedure.

2.

1.

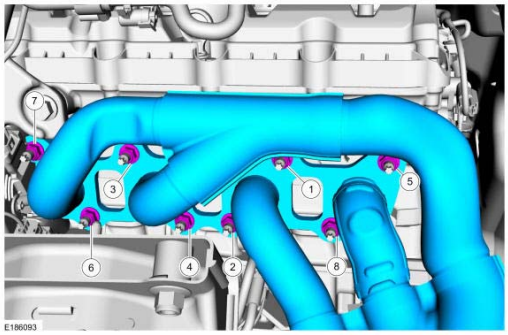
Position the catalytic converter onto the engine and finger-tight the nuts.

2.

Tighten the nuts in the sequence shown in illustration below.

Torque

: 24 lb.ft (32 Nm)



3.

Check the exhaust system for leaks.

REMOVAL AND INSTALLATION > CATALYTIC CONVERTER RH > REMOVAL

NOTE: If the catalytic converter is not being replaced, the HO2S and the catalyst monitor sensor do not need to be removed from the catalytic converter. Disconnecting the electrical connectors is still necessary.

NOTE: Removal steps in this procedure may contain installation details.

NOTE: Clean all exhaust connections before reassembly.

1.

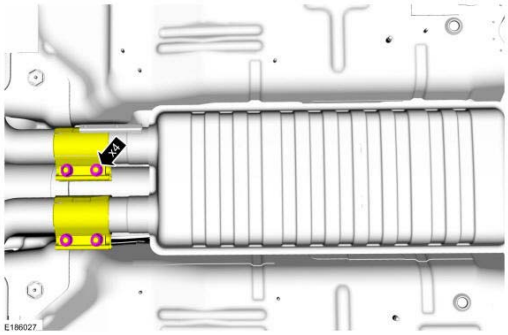
With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

2.

Loosen the clamps, release the tabs and slide the clamps back on the muffler. Separate the muffler and tailpipe from the RH catalytic converter and LH muffler inlet pipe.

Torque

: 35 lb.ft (48 Nm)



3.

1.

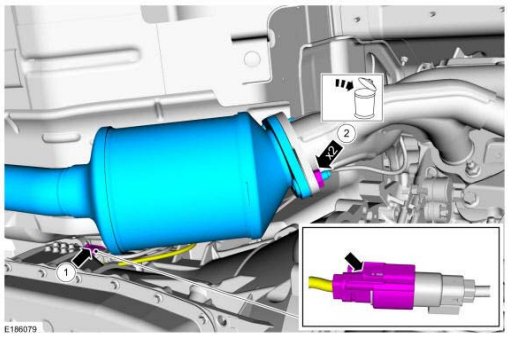
Disconnect the catalyst monitor sensor electrical connector.

2.

Remove and discard the nuts and remove the catalytic convertor.

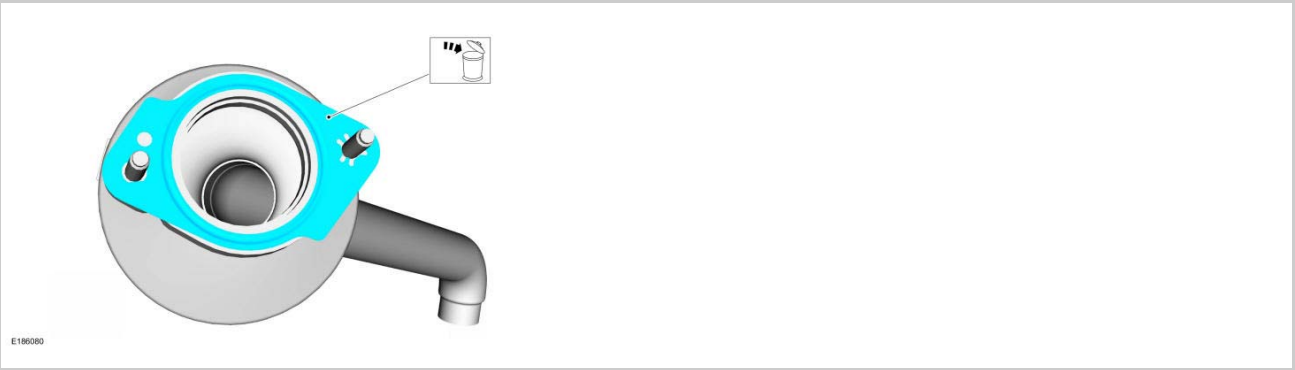
Torque

: 30 lb.ft (40 Nm)



4.

Remove and discard the gasket.



REMOVAL AND INSTALLATION > CATALYTIC CONVERTER RH > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Check the exhaust system for leaks.

REMOVAL AND INSTALLATION > MUFFLER AND TAILPIPE

Materials

Name	Specification
Threadlock and Sealer TA-25-B	-

REMOVAL AND INSTALLATION > MUFFLER AND TAILPIPE > REMOVAL

NOTE: Do not excessively bend, twist or allow the exhaust to hang from the flexible joint or damage to the exhaust system may occur.

NOTE: Do not use oil or grease-based lubricants on the isolators. They may cause deterioration of the rubber.

NOTE: Removal steps in this procedure may contain installation details.

NOTE: Clean all exhaust connections before reassembly.

1.

With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

2.

1.

Convertible top vehicles only, remove the retainers and the brace.

Torque

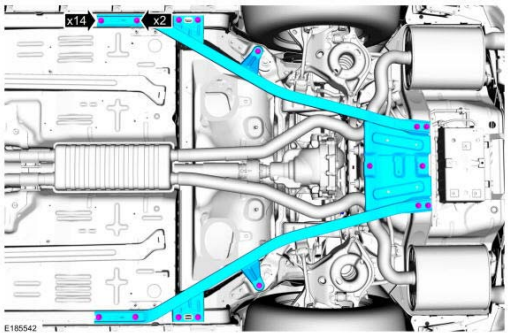
: 46 lb.ft (63 Nm)

2.

During assembly, clean the retainers and apply the thread lock.

Material

: Threadlock and Sealer / TA-25-B

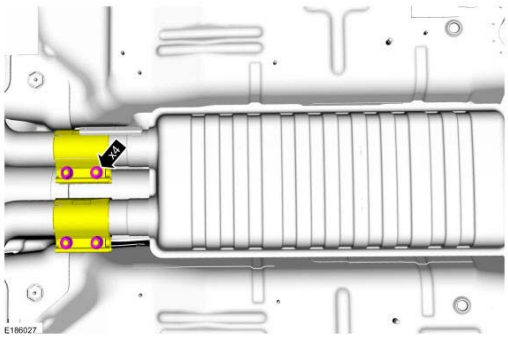


3.

Loosen the clamps and separate the muffler and tailpipe from the RH catalytic converter and LH muffler inlet pipe.

Torque

: 35 lb.ft (48 Nm)



4.

1.

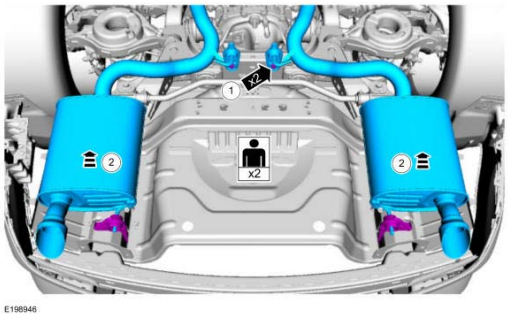
Remove the LH and RH rear exhaust hanger isolator bracket bolts from the rear subframe.

Torque

: 18 lb.ft (25 Nm)

2.

Unhook the rear exhaust hanger isolators and remove the muffler and tailpipe.



REMOVAL AND INSTALLATION > MUFFLER AND TAILPIPE > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Check the exhaust system for leaks.

REMOVAL AND INSTALLATION > MUFFLER INLET PIPE > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

NOTE: Clean all exhaust connections before reassembly.

1.

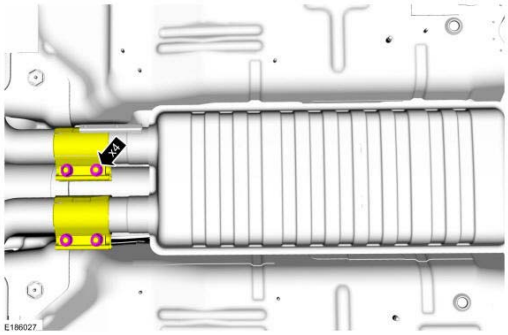
With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

2.

Loosen the clamps and separate the muffler and tailpipe from the RH catalytic converter and LH muffler inlet pipe.

Torque

: 35 lb.ft (48 Nm)

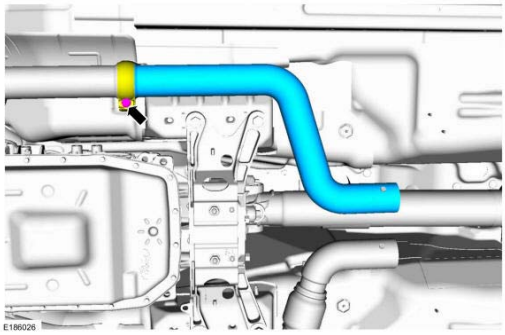


3.

Loosen the ball clamp, release the bracket tab and remove the muffler inlet pipe.

Torque

: 22 lb.ft (30 Nm)



REMOVAL AND INSTALLATION > MUFFLER INLET PIPE > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Check the exhaust system for leaks.

SPECIFICATIONS > GENERAL SPECIFICATIONS

Item	Specification
Fuel Pressure	
Engine running - 2.3L GTDi (Low pressure side)	50.8-75.4 psi (350-520 kPa)
Fuel Tank Capacity	
Fuel Tank Capacity - 2.3L GTDi	15.5 gal (58.67 L)

DESCRIPTION AND OPERATION > FUEL SYSTEM - OVERVIEW > OVERVIEW

The fuel system:

- is a Closed Loop Pressure Control Fuel System (CLPC)
- saddle-type fuel tank.
- has a Fuel Pump that operates on 6-12 volts depending on load, that supplies fuel under pressure to the high pressure Fuel Pump.
- has a lifetime fuel filter (serviced as part of the Fuel Pump and Sender Unit).
- has an Easy Fuel™ (capless) fuel tank filler pipe assembly, which cannot be modified in any way and is serviced only by the installation of a new fuel tank filler pipe assembly.
- has a supplemental refueling adapter located in the luggage compartment.
- has a high pressure Fuel Pump that supplies high pressure, low volume fuel pressure to the fuel rails.
- has a Fuel Pump Control Module located under the rear seat cushion LH side of the vehicle.
- has fuel tubes (liquid and vapor) mounted on the underside of the vehicle.
- uses separately controlled fuel injectors for each cylinder. The fuel injectors are mounted directly into the head.
- fuel injectors are supplied with pressurized fuel from the high pressure Fuel Pump to the fuel rail.
- has a Fuel Level Sensor
- has a serviceable Fuel Level Sender mounted on the Fuel Pump and Sender Unit.
- Fuel Pump and Sender Unit containing:
    - The electric Fuel Pump which provides pressurized fuel to the high pressure Fuel Pump (FP).

- The fuel level sender.
- A check valve which maintains system pressure after the pump is shut off.
- A pressure relief for overpressure protection in the event of restricted fluid flow.
- A lifetime fuel filter providing filtration to protect the fuel injectors from foreign material.

Fuel Pump Shut-off Feature

In the event of a moderate to severe collision, the vehicle is equipped with a Fuel Pump and Sender Unit Shut-off Feature that is initiated by the event notification signal.

The event notification signal is a signal provided by the RCM to the Fuel Pump Control Module. Signal communication between the RCM and the Fuel Pump Control Module allows the PCM to shut-off the Fuel Pump.

Should the vehicle shut off after a collision due to this feature, the vehicle may be restarted by first turning the ignition to the OFF position and then turn the ignition to the ON position. In some instances the vehicle may not start the first time and may take one additional ignition cycle.

DIAGNOSIS AND TESTING > FUEL SYSTEM > SYMPTOM CHART(S) > SYMPTOM CHART: FUEL SYSTEM

Diagnostics in this service information assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods . for information regarding Ford-specific diagnostic practices.

> *NOTE: The following procedure diagnoses a slow to fill concern only. For all other concerns, Refer to ENGINE CONTROLS - INTRODUCTION (EXCEPT DIESEL & HYBRID) .*

DIAGNOSIS AND TESTING > FUEL SYSTEM > SYMPTOM CHART(S) > SYMPTOM CHART

Condition	Possible Sources	Actions
Slow to fill	• Fuel tank filler pipe • Fuel tank filler pipe vent tube, if equipped • EVAP system • Fuel tank inlet check valve (part of the fuel tank) • Fuel level vent valve (part of the fuel tank)	GO to Pinpoint Test A

DIAGNOSIS AND TESTING > FUEL SYSTEM > PINPOINT TEST > PINPOINT TEST A: SLOW TO FILL > NORMAL OPERATION AND FAULT CONDITIONS

Under normal operation, fuel should flow at a steady rate through the fuel tank filler pipe into the fuel tank. As fuel enters the fuel tank air is vented through the filler pipe or the ORVR system.

DIAGNOSIS AND TESTING > FUEL SYSTEM > PINPOINT TEST > PINPOINT TEST A: SLOW TO FILL > PINPOINT TEST A: SLOW TO FILL

A1 CHECK COMPONENTS FOR SIGNS OF DAMAGE

Visually inspect the following components for signs of damage:

Fuel tank filler pipe

Fuel tank filler pipe vent tube, if equipped

EVAP system

Fuel level vent valve (part of the fuel tank)

Was the cause of the concern found?

Yes: REPAIR or INSTALL new components to correct the concern.

No: GO to A2

A2 CHECK THE SYSTEM FOR ANY EVAP (EVAPORATIVE EMISSION) DTC'S

Connect the scan tool.

Check the system for any EVAP DTC's.

Are any DTC's present?

Yes: Refer to ENGINE CONTROLS - INTRODUCTION (EXCEPT DIESEL & HYBRID) .

No: GO to A3

A3 MONITOR THE FTP WHILE FILLING THE FUEL TANK

NOTE: During normal fuel fill the Fuel Tank Pressure (FTP) Sensor value starts at 2.6 volts and will increase .3 to .7 of a volt from its starting point.

Monitor the Fuel Tank Pressure (FTP) reference value while filling the fuel tank.

Is FTP within specification?

Yes: GO to A5

No: GO to A4

A4 MONITOR THE FTP WHILE FILLING THE FUEL TANK WITH THE EVAP SYSTEM DISCONNECTED

Disconnect the fuel tank-to-EVAP canister quick connect coupling at the EVAP canister.

NOTE: During normal fuel fill the Fuel Tank Pressure (FTP) Sensor value starts at 2.6 volts and will increase .3 to .7 of a volt from its starting point.

Monitor the FTP reference value while filling the fuel tank. Refer to ENGINE CONTROLS - INTRODUCTION (EXCEPT DIESEL & HYBRID) .

Is FTP within specification?

Yes: INSPECT the EVAP system for blockage or restrictions. REPAIR the blockage or restriction. If the blockage or restriction cannot be repaired, INSTALL new EVAP system components.

No: GO to A5

A5 CHECK THE FUEL TANK FILLER PIPE ASSEMBLY FOR BLOCKAGE OR RESTRICTION

Remove the fuel tank filler pipe assembly. REFER to: FUEL TANK FILLER PIPE .

Inspect the fuel tank filler pipe and fuel tank filler pipe vent tube (if equipped) for a blockage or restriction.

Is the fuel tank filler pipe or fuel tank filler pipe vent tube (if equipped) blocked or restricted?

Yes: If possible, REPAIR the blockage or restriction. If the blockage or restriction cannot be repaired, INSTALL a new fuel tank filler pipe or fuel tank filler pipe vent tube.

No: GO to A6

A6 CHECK THE FUEL TANK INLET CHECK VALVE

Inspect the fuel tank inlet check valve for restriction or sticking.

Is the fuel tank inlet check valve restricted or sticking?

Yes: If possible, REPAIR the restriction. If the restriction cannot be repaired, INSTALL a new fuel tank. REFER to: FUEL TANK .

No: INSTALL a new fuel tank.

GENERAL PROCEDURES > FUEL SYSTEM PRESSURE CHECK

Special Tool(s) / General Equipment

	310-D009 (D95L-7211-A) Fuel Pressure Test Kit

Check

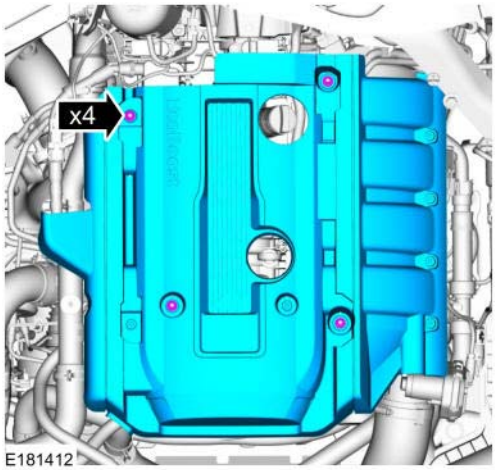
NOTE: This Fuel System Pressure Check is for the low pressure side of the system.

1.

Remove the nuts and the engine appearance cover.

Torque

: 80 lb.in (9 Nm)



2.

Release the fuel system pressure. Refer to: Fuel System Pressure Release .

3.

Disconnect the battery ground cable. Refer to: Battery Disconnect and Connect .

4.

Disconnect the fuel jumper tube-to-high pressure pump quick release coupling. Refer to: Quick Release Coupling .

5.

Install the Fuel Pressure Test Kit between the fuel jumper tube and the high pressure fuel pump.

Use Special Service Tool: 310-D009 (D95L-7211-A) Fuel Pressure Test Kit.



NOTE: The FPDM electrical connector was previously disconnected to release the fuel system pressure and must be reconnected to test the fuel system pressure.

6.
Reconnect the FPDM electrical connector.

7.

Connect the battery ground cable. Refer to: Battery Disconnect and Connect .

NOTE: Carry out a Key ON Engine OFF (KOEO) visual inspection for fuel leaks prior to completing the fuel system pressure test.

8.
Test the fuel system pressure to make sure it is within the specified range. For additional information, refer to SPECIFICATIONS .

9.

After completion of the fuel system pressure test, disconnect the battery ground cable, open the drain valve on the Fuel Pressure Test Kit and release any residual fluid into an appropriate container. Refer to: Battery Disconnect and Connect .

10.

Remove the Fuel Pressure Test Kit by reversing the installation steps.

GENERAL PROCEDURES > FUEL SYSTEM PRESSURE RELEASE

Fuel System Pressure Release

Pressure release

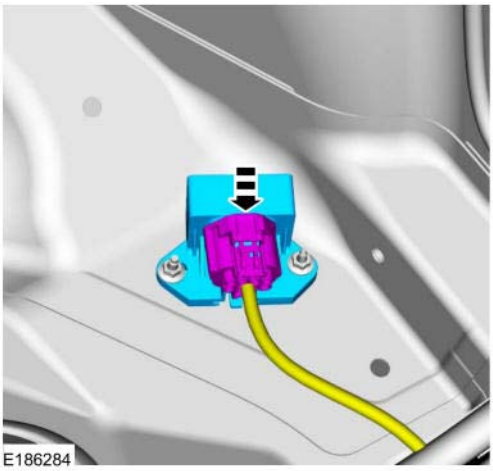
NOTE: The FPDM is located on the LH side, beneath the rear seat cushion.

1.

Remove the rear seat cushion. Refer to: Rear Seat Cushion .

NOTE: On vehicles equipped with Gasoline Turbocharged Direct Injection (GTDI), running the engine with the FPDM disconnected will remove most of the pressure from both the low and high pressure sides of the system.

2.
Disconnect the FPDM electrical connector.



3.

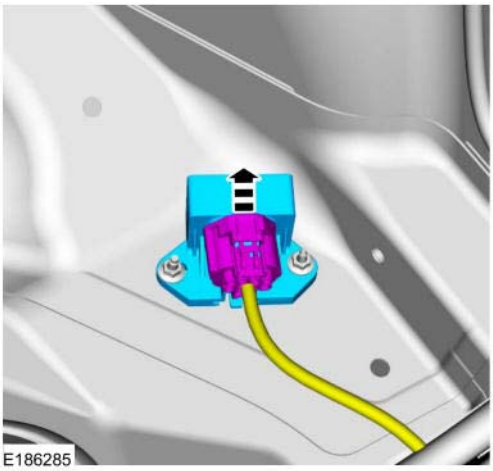
Start the engine and allow it to idle until the engine stalls.

4.

Turn the ignition switch to the off position.

5.

When the fuel system service is complete, reconnect the FPDM electrical connector.



6.

Install the rear seat cushion. Refer to: Rear Seat Cushion .

7.

Cycle the ignition key and wait 3 seconds to pressurize the fuel system. Check for leaks before starting the engine.

8.

When service on the fuel system is complete, start the engine and check for leaks.

GENERAL PROCEDURES > FUEL TANK DRAINING

Special Tool(s) / General Equipment

 ST1134A	292-00004 Fuel Tanker 100 GPM
	310-123 Locking Ring, Fuel Tank TKIT-2004J-F TKIT-2005U-LM

Draining

1.

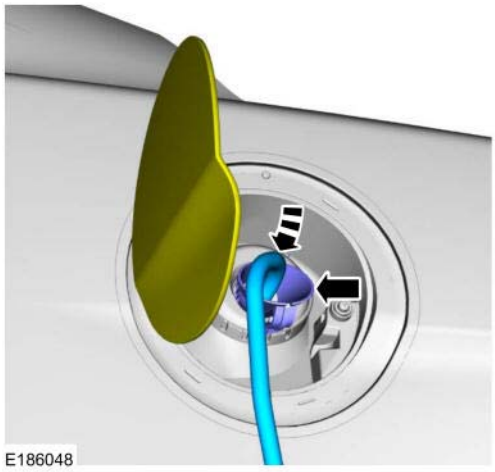
Release the fuel system pressure. Refer to: Fuel System Pressure Release .

2.

Disconnect the battery ground cable. Refer to: Battery Disconnect and Connect .

NOTE: The supplemental refueling adapter is located in the luggage compartment.

3.
Install the supplemental refueling adapter and a 6 ft. length of 5/8 in. semi-rigid fuel drain tube into the Easy Fuel™ (capless) fuel tank filler pipe until the tube enters the fuel tank.



NOTE: This step is to remove approximately 3/16 tank of the fuel (3 gallons) from a completely full fuel tank and the majority of any residual fuel in the fuel tank filler pipe, lowering the fuel level below the Fuel Pump and Sender Unit mounting flange.

4.
Attach the Fuel Storage Tanker to the fuel drain tube and remove as much fuel as possible from the tank.

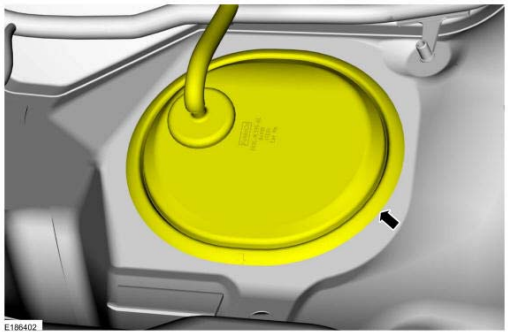
Use Special Service Tool: 292-00004 Fuel Tanker 100 GPM.

5.

Remove the rear seat cushion. Refer to: Rear Seat Cushion .

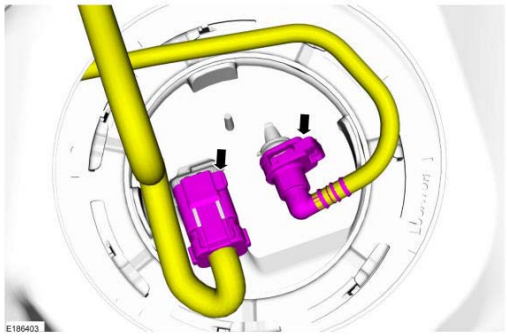
6.

Remove the access cover and position aside.



7.

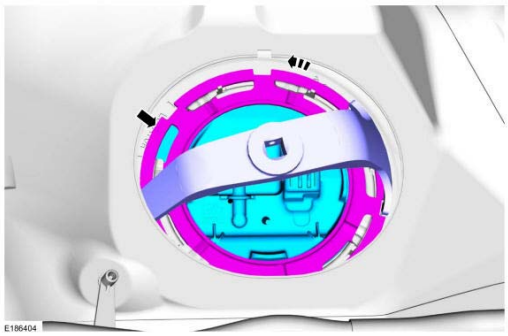
Disconnect electrical connector and fuel tube quick release coupling. Refer to: Quick Release Coupling .



NOTE: Carefully install the Fuel Tank Sender Unit lock ring wrench to avoid damage to the Fuel Pump and Sender Unit when removing the lock ring.

8.
Using the lock ring wrench remove the Fuel Pump and Sender Unit lock ring.

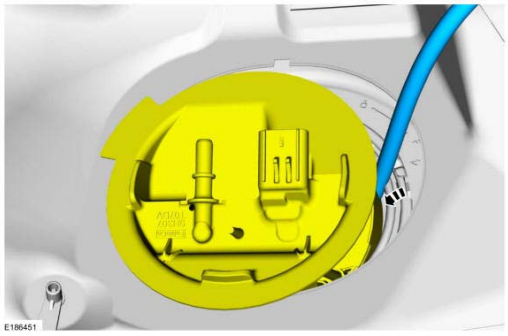
Use Special Service Tool: 310-123 Locking Ring, Fuel Tank.



NOTE: The Fuel Pump and Sender Unit must be handled carefully to avoid damage to the float arm.

9.

Position the Fuel Pump and Sender Unit aside. Using the Fuel Storage Tanker, completely drain the remaining fuel from the LH saddle of the fuel tank.



NOTE: Inspect the surfaces of the Fuel Pump and Sender Unit flange and fuel tank O-ring seal contact surfaces. Do not polish or adjust the O-ring seal contact area of the fuel tank flange or the fuel tank. Install a new Fuel Pump and Sender Unit or fuel tank if the O-ring seal contact area is bent, scratched or corroded.

10.
Remove and discard the Fuel Pump and Sender Unit O-ring seal.

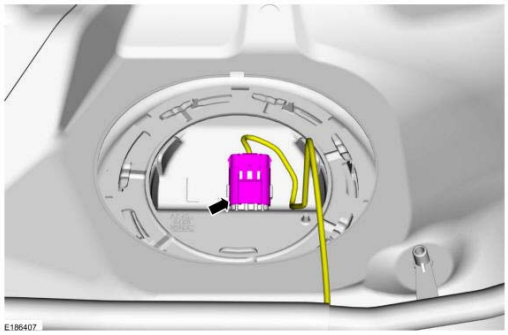
11.

Remove the access cover and position aside.



NOTE: Clean the fuel level sensor connections, flange surfaces and the immediate surrounding area of any dirt or foreign material.

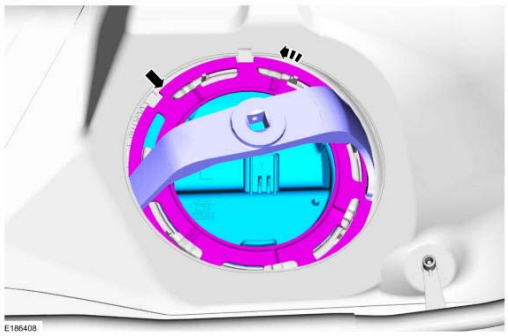
12.
Disconnect the electrical connector.



NOTE: Carefully install the Fuel Tank Sender Unit lock ring wrench to avoid damage to the fuel level sensor when removing the lock ring.

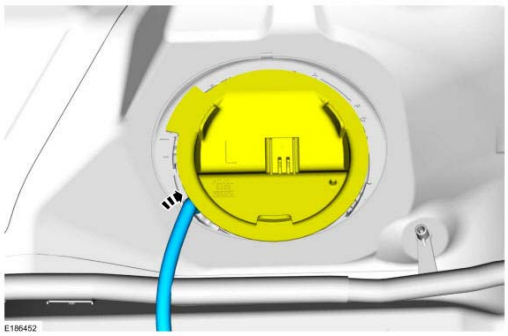
13.
Using the special tool remove the fuel level sensor lock ring.

Use Special Service Tool: 310-123 Locking Ring, Fuel Tank.



NOTE: The fuel level sensor must be handled carefully to avoid damage to the float arm.

14.
Position the fuel level sensor aside. Using the Fuel Storage Tanker, completely drain the RH saddle of the fuel tank.



NOTE: Inspect the surfaces of the Fuel Level Sensor flange and fuel tank O-ring

seal contact surfaces. Do not polish or adjust the O-ring seal contact area of the fuel tank flange or the fuel tank. Install a new Fuel Level Sensor or fuel tank if the O-ring seal contact area is bent, scratched or corroded.

15.
Remove and discard the O-ring seal.

GENERAL PROCEDURES > QUICK RELEASE COUPLING

Disconnect

NOTE: When reusing liquid or vapor tube connections, make sure to use compressed air to remove any foreign material from the connector retaining clip area before separating from the tube or damage to the tube or connector retaining clip may occur.

NOTE: Fuel injection equipment is manufactured to very precise tolerances and fine clearances. It is essential that absolute cleanliness is observed when working with these components or component damage may occur. Always install blanking plugs to any open orifices or tubes.

NOTE: Do not use any tools. The use of tools may cause a deformity in the clip components which may cause fuel leaks.

*NOTE: **Type 1***

1.

If servicing a liquid fuel tube quick connect coupling, release the fuel system pressure. Refer to: Fuel System Pressure Release .

2.

Disconnect the battery ground cable. Refer to: Battery Disconnect and Connect .

3.



4.



Connect

1.

Inspect and clean both quick coupling ends.



NOTE: Make sure the retainer clip is fully seated and locked onto the tube by pulling on the quick connect coupling.

2.
Press the retainer clip into the quick connect coupling body until flush and the tabs are locked in place.



3.

Connect the battery ground cable. Refer to: Battery Disconnect and Connect .

Disconnect

NOTE: When reusing liquid or vapor tube connections, make sure to use compressed air to remove any foreign material from the connector retaining clip area before separating from the tube or damage to the tube or connector retaining clip may occur.

NOTE: Fuel injection equipment is manufactured to very precise tolerances and fine clearances. It is essential that absolute cleanliness is observed when working with these components or component damage may occur. Always install blanking plugs to any open orifices or tubes.

NOTE: Do not use any tools. The use of tools may cause a deformity in the clip components which may cause fuel leaks.

NOTE: ***Type 2***

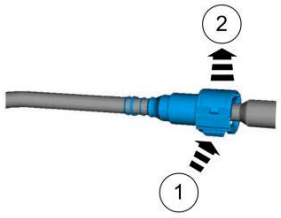
1.

If servicing a liquid fuel tube quick connect coupling, release the fuel system pressure. Refer to: Fuel System Pressure Release .

2.

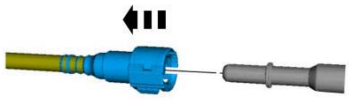
Disconnect the battery ground cable. Refer to: Battery Disconnect and Connect .

3.



E151704

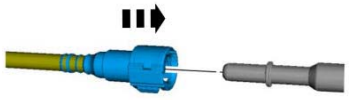
4.



E151705

Connect

1.



E151706

2.



E151715

3.

Connect the battery ground cable. Refer to: Battery Disconnect and Connect .

Disconnect

NOTE: When reusing liquid or vapor tube connections, make sure to use compressed air to remove any foreign material from the connector retaining clip area before separating from the tube or damage to the tube or connector retaining clip may occur.

NOTE: Fuel injection equipment is manufactured to very precise tolerances and fine clearances. It is essential that absolute cleanliness is observed when working with these components or component damage may occur. Always install blanking plugs to any open orifices or tubes.

NOTE: Do not use any tools. The use of tools may cause a deformity in the clip components which may cause fuel leaks.

NOTE: ***Type 3***

1.

If servicing a liquid fuel tube quick connect coupling, release the fuel system pressure. Refer to: Fuel System Pressure Release .

2.

Disconnect the battery ground cable. Refer to: Battery Disconnect and Connect .

3.



Connect

1.



2.



3.

Connect the battery ground cable. Refer to: Battery Disconnect and Connect .

Disconnect

NOTE: When reusing liquid or vapor tube connections, make sure to use compressed air to remove any foreign material from the connector retaining clip area before separating from the tube or damage to the tube or connector retaining clip may occur.

NOTE: Fuel injection equipment is manufactured to very precise tolerances and fine

clearances. It is essential that absolute cleanliness is observed when working with these components or component damage may occur. Always install blanking plugs to any open orifices or tubes.

NOTE: Do not use any tools. The use of tools may cause a deformity in the clip components which may cause fuel leaks.

NOTE: ***Type 4***

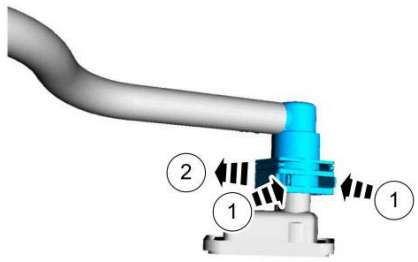
1.

If servicing a liquid fuel tube quick connect coupling, release the fuel system pressure. Refer to: Fuel System Pressure Release .

2.

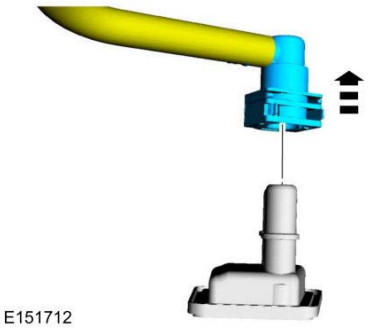
Disconnect the battery ground cable. Refer to: Battery Disconnect and Connect .

3.



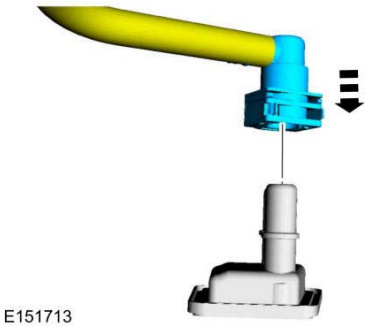
E151711

4.


E151712

Connect

1.



2.

Connect the battery ground cable. Refer to: Battery Disconnect and Connect .

Disconnect

NOTE: When reusing liquid tube connectors, make sure to use compressed air to remove any foreign material from the connector retaining clip area before separating from the tube or damage to the tube or connector retaining clip may occur.

NOTE: Fuel injection equipment is manufactured to very precise tolerances and fine clearances. It is essential that absolute cleanliness is observed when working with these components or component damage may occur. Always install blanking plugs to any open orifices or tubes.

NOTE: Do not use any tools. The use of tools may cause a deformity in the clip components which may cause fuel leaks.

NOTE: ***Type 5***

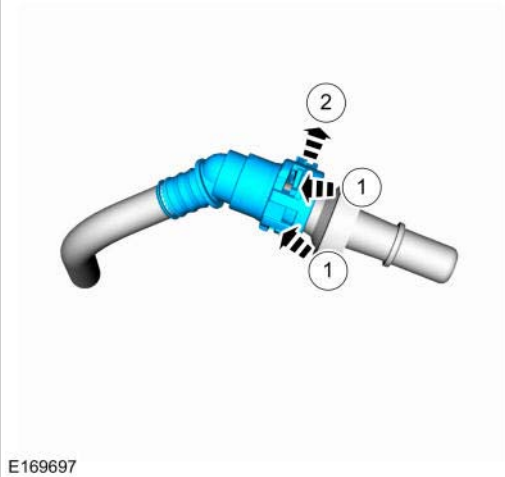
1.

If servicing a liquid fuel tube quick connect coupling, release the fuel system pressure. Refer to: Fuel System Pressure Release .

2.

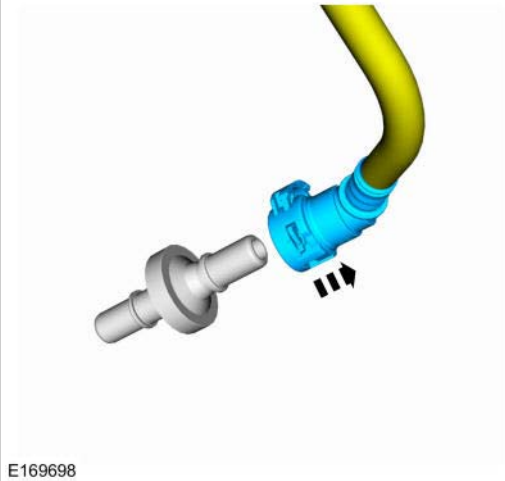
Disconnect the battery ground cable. Refer to: Battery Disconnect and Connect .

3.



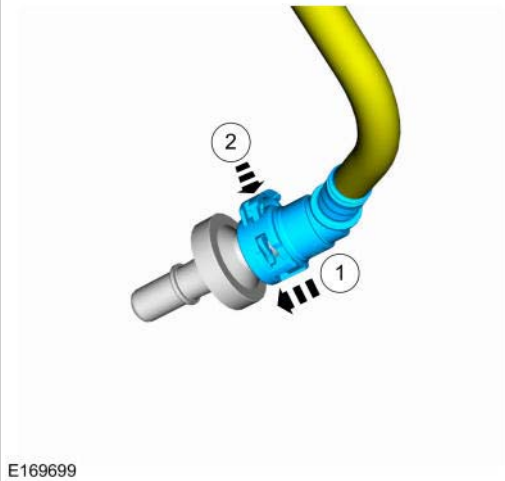
E169697

4.


E169698

Connect

1.



E169699

2.

Connect the battery ground cable. Refer to: Battery Disconnect and Connect .

Disconnect

NOTE: When reusing liquid tube connectors, make sure to use compressed air to remove any foreign material from the connector retaining clip area before separating from the tube or damage to the tube or connector retaining clip may occur.

NOTE: Fuel injection equipment is manufactured to very precise tolerances and fine clearances. It is essential that absolute cleanliness is observed when working with these components or component damage may occur. Always install blanking plugs to any open orifices or tubes.

NOTE: Do not use any tools. The use of tools may cause a deformity in the clip components which may cause fuel leaks.

*NOTE: **Type 8***

1.

If servicing a liquid fuel tube quick connect coupling, release the fuel system pressure. Refer to: Fuel System Pressure Release .

2.

Disconnect the battery ground cable. Refer to: Battery Disconnect and Connect .

3.

1.

Release the secondary locking tab.

2.

Depress the primary locking tab.

3.

Separate the quick release coupling from the tube.



Connect

1.

1.

Push the quick release coupling onto the tube.

> *NOTE: Pull on the quick release coupling and the fitting to make sure it is securely fastened.*

2.
Lock the secondary locking tab.



2.

Connect the battery ground cable. Refer to: Battery Disconnect and Connect .

GENERAL PROCEDURES > SPRING LOCK COUPLINGS

Special Tool(s) / General Equipment

	310-S039 (T90T-9550-S) Disconnect Tool, Spring Lock Coupling TKIT-1990-LMH

Disconnect

> *NOTE: When reusing liquid or vapor tube connectors, make sure to use compressed air*

to remove any foreign material from the connector retaining clip area before separating from the tube or damage to the tube or connector retaining clip can occur. Apply clean engine oil to the end of the tube before inserting the tube into the connector.

NOTE: Fuel injection equipment is manufactured to very precise tolerances and fine clearances. It is essential that absolute cleanliness is observed when working with these components or component damage can occur. Always install plugs to any open orifices or tubes.

1.

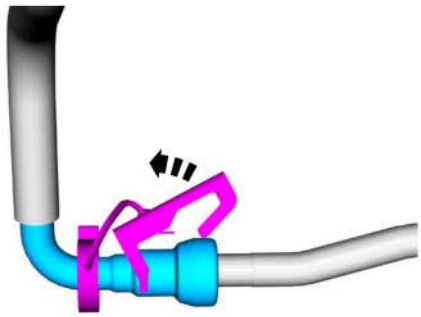
If servicing a liquid fuel tube spring lock coupling, release the fuel system pressure. Refer to: Fuel System Pressure Release .

2.

Disconnect the battery ground cable. Refer to: Battery Disconnect and Connect .

3.

If equipped, remove the fuel tube safety clip.

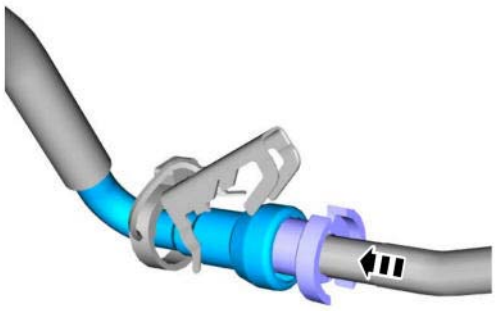


E186838

4.

Install the Spring Lock Coupling Disconnect Tool on the tube and push into the spring lock coupling to release.

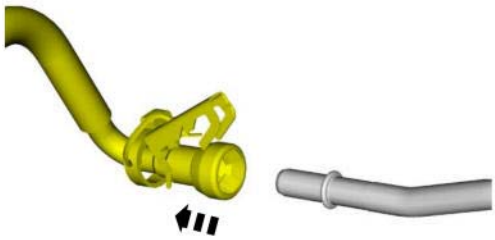
Use Special Service Tool: 310-S039 (T90T-9550-S) Disconnect Tool, Spring Lock Coupling.



E186839

5.

Separate the spring lock coupling from the tube.

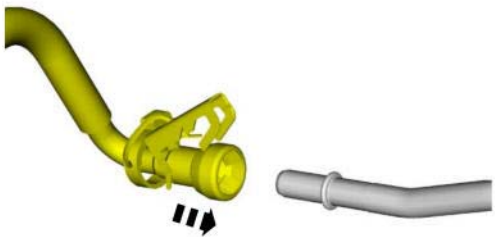


E186840

Connect

1.

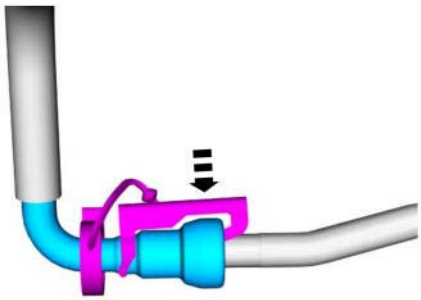
Align and push the spring lock coupling onto the tube until fully seated.



E186841

2.

If equipped, install the fuel tube safety clip.



E186842

3.

Pull on the coupling to make sure it is fully engaged.

4.

Connect the battery ground cable. Refer to: Battery Disconnect and Connect .

SPECIFICATIONS > GENERAL SPECIFICATIONS

Item	Specification
Fuel Pressure	
Engine running - 3.7L Duratec, 5.0L Ti-VCT	53.1-63.1 psi (366-435 kPa)
Fuel Tank Capacity	
Fuel Tank Capacity - 3.7L Duratec, 5.0L Ti-VCT	16.0 gal (60.55 L)

DESCRIPTION AND OPERATION > FUEL SYSTEM - OVERVIEW > OVERVIEW

The fuel system consists of the :

- saddle-type fuel tank.
- quick connect fuel and vapor tube couplings.
- has a supplemental refueling adapter located in the luggage compartment.
- fuel tank filler pipe assembly, which cannot be modified in any way, that also contains a restrictor plate to permit only unleaded fuel to be pumped into the tank.
- has an Easy Fuel™ (capless) fuel tank filler pipe assembly, which cannot be modified in any way and is serviced only by the installation of a new fuel tank filler pipe assembly.
- has a Fuel Pump Control Module located under the rear seat cushion LH side of the vehicle.
- fuel rail.
- fuel injectors.
- Fuel Tank Pressure (FTP) sensor (part of the fuel vapor tube assembly).
- Mechanical Returnless Fuel System (MRFS).
- Fuel Level Sensor
- Fuel Pump and Sender Unit containing:
    - The electric FP module which provides pressurized fuel to the high pressure Fuel Pump (FP).
    - The Fuel Level Sender.
    - A check valve which maintains system pressure after the pump is shut off.
    - A pressure relief for overpressure protection in the event of restricted fluid flow.
    - A lifetime fuel filter providing filtration to protect the fuel injectors from foreign material.

Fuel Pump Shut-off Feature

In the event of a moderate to severe collision, the vehicle is equipped with a Fuel Pump and Sender Unit Shut-off Feature that is initiated by the event notification signal.

The event notification signal is a signal provided by the RCM to the Fuel Pump Control Module. Signal communication between the RCM and the Fuel Pump Control Module allows the PCM to shut-off the Fuel Pump.

Should the vehicle shut off after a collision due to this feature, the vehicle may be restarted by first turning the ignition to the OFF position and then turn the ignition to the ON position. In some instances the vehicle may not start the first time and may take one additional ignition cycle.

DIAGNOSIS AND TESTING > FUEL SYSTEM > SYMPTOM CHART(S) > SYMPTOM CHART: FUEL SYSTEM

Diagnostics in this service information assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods for information regarding Ford-specific diagnostic practices.

> *NOTE: The following procedure diagnoses a slow to fill concern only. For all other concerns, refer to Refer to ENGINE CONTROLS - INTRODUCTION (EXCEPT DIESEL & HYBRID) .*

DIAGNOSIS AND TESTING > FUEL SYSTEM > SYMPTOM CHART(S) > SYMPTOM CHART

Condition	Possible Sources	Actions
Slow to fill	• Fuel tank filler pipe • Fuel tank filler pipe vent tube, if equipped • EVAP system • Fuel tank inlet check valve (part of the fuel tank) • Fuel level vent valve (part of the fuel tank)	Refer to GO to Pinpoint Test A
All other fuel system concerns	Fuel system components	Refer to ENGINE CONTROLS - INTRODUCTION (EXCEPT DIESEL & HYBRID) .

DIAGNOSIS AND TESTING > FUEL SYSTEM > PINPOINT TEST > PINPOINT TEST A: SLOW TO FILL > NORMAL OPERATION AND FAULT CONDITIONS

Under normal operation, fuel should flow at a steady rate through the fuel tank filler pipe into the fuel tank. As fuel enters the fuel tank air is vented through the filler pipe or the ORVR system.

DIAGNOSIS AND TESTING > FUEL SYSTEM > PINPOINT TEST > PINPOINT TEST A: SLOW TO FILL > PINPOINT TEST A : SLOW TO FILL

A1 CHECK COMPONENTS FOR SIGNS OF DAMAGE

Visually inspect the following components for signs of damage:

Fuel tank filler pipe

Fuel tank filler pipe Fuel tank filler pipe vent tube, if equipped

EVAP system

Fuel tank inlet check valve (part of the fuel tank)

Fuel level vent valve (part of the fuel tank)

Was the cause of the concern found?

Yes: REPAIR or INSTALL new components to correct the concern.

No: GO to A2

A2 CHECK THE SYSTEM FOR ANY EVAP (EVAPORATIVE EMISSION) DTC'S

Connect the scan tool.

Check the system for any EVAP DTC's.

Are any DTC's present?

Yes: Refer to ENGINE CONTROLS - INTRODUCTION (EXCEPT DIESEL & HYBRID) .

No: GO to A3

A3 MONITOR THE FTP WHILE FILLING THE FUEL TANK

NOTE: During normal fuel fill the Fuel Tank Pressure (FTP) Sensor value starts at 2.6 volts and will increase.3 to.7 of a volt from its starting point.

Monitor the Fuel Tank Pressure (FTP) reference value while filling the fuel tank. Refer to the ENGINE CONTROLS - REFERENCE VALUES (EXCEPT DIESEL & HYBRID) .

Is FTP within specification?

Yes: GO to A5

No: GO to A4

A4 MONITOR THE FTP WHILE FILLING THE FUEL TANK WITH THE EVAP SYSTEM DISCONNECTED

Disconnect the fuel tank-to-EVAP canister quick connect coupling at the EVAP canister.

NOTE: During normal fuel fill the Fuel Tank Pressure (FTP) Sensor value starts at 2.6 volts and will increase.3 to.7 of a volt from its starting point.

Monitor the FTP reference value while filling the fuel tank. Refer to ENGINE CONTROLS - INTRODUCTION (EXCEPT DIESEL & HYBRID) .

Is FTP within specification?

Yes: INSPECT the EVAP system for blockage or restrictions. REPAIR the blockage or restriction. If the blockage or restriction cannot be repaired, INSTALL new EVAP system components.

No: GO to A5

A5 CHECK THE FUEL TANK FILLER PIPE ASSEMBLY FOR BLOCKAGE OR RESTRICTION

Remove the fuel tank filler pipe assembly. REFER to: FUEL TANK FILLER PIPE - 3.7L Duratec (227kW/301PS).

Inspect the fuel tank filler pipe and fuel tank filler pipe vent tube (if equipped) for a blockage or restriction.

Is the fuel tank filler pipe or fuel tank filler pipe vent tube (if equipped) blocked or restricted?

Yes: If possible, REPAIR the blockage or restriction. If the blockage or restriction cannot be repaired, INSTALL a new fuel tank filler pipe or fuel tank filler pipe vent tube.

No: GO to A6

A6 CHECK THE FUEL TANK INLET CHECK VALVE

Inspect the fuel tank inlet check valve for restriction or sticking.

Is the fuel tank inlet check valve restricted or sticking?

Yes: If possible, REPAIR the restriction. If the restriction cannot be repaired, INSTALL a new fuel tank. REFER to: FUEL TANK .

No: INSTALL a new fuel tank.

GENERAL PROCEDURES > FUEL SYSTEM PRESSURE CHECK

Special Tool(s) / General Equipment

	310-D009 (D95L-7211-A) Fuel Pressure Test Kit

Check

NOTE: This Fuel System Pressure Check is for the low pressure side of the system.

1.

Release the fuel system pressure. Refer to: Fuel System Pressure Release .

2.

Disconnect the battery ground cable. Refer to: Battery Disconnect and Connect .

3.

Disconnect the fuel jumper tube-to-fuel rail quick release coupling. Refer to: Quick Release Coupling .

4.

Install the Fuel Pressure Test Kit between the fuel jumper tube and the fuel rail.

Use Special Service Tool: 310-D009 (D95L-7211-A) Fuel Pressure Test Kit.


E185940

NOTE: The FPDM electrical connector was previously disconnected to release the fuel system pressure and must be reconnected to test the fuel system pressure.

5.
Reconnect the FPDM electrical connector.

6.

Connect the battery ground cable. Refer to: Battery Disconnect and Connect .

> *NOTE: Carry out a Key ON Engine OFF (KOEO) visual inspection for fuel leaks prior to completing the fuel system pressure test.*

7.
Test the fuel system pressure to make sure it is within the specified range. For additional information, refer to SPECIFICATIONS .

8.

After completion of the fuel system pressure test, disconnect the battery ground cable, open the drain valve on the Fuel Pressure Test Kit and release any residual fluid into an appropriate container. Refer to: Battery Disconnect and Connect .

9.

Remove the Fuel Pressure Test Kit by reversing the installation steps.

GENERAL PROCEDURES > FUEL TANK DRAINING

Special Tool(s) / General Equipment

 ST1134A	292-00004 Fuel Tanker 100 GPM
 E80148	310-123 Locking Ring, Fuel Tank TKIT-2004J-F TKIT-2005U-LM

Draining

1.

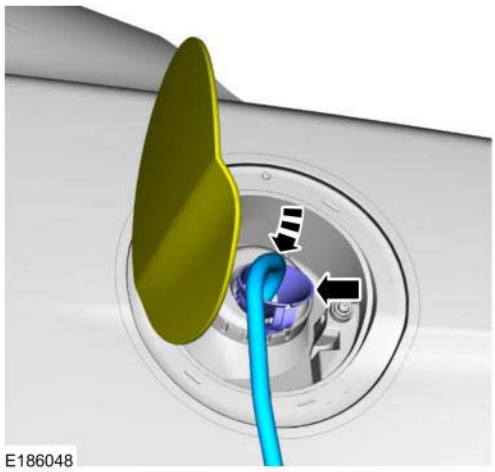
Release the fuel system pressure. Refer to: Fuel System Pressure Release .

2.

Disconnect the battery ground cable. Refer to: Battery Disconnect and Connect .

NOTE: The supplemental refueling adapter is located in the luggage compartment.

3.
Install the supplemental refueling adapter and a 6 ft. length of 5/8 in. semi-rigid fuel drain tube into the Easy Fuel™ (capless) fuel tank filler pipe until the tube enters the fuel tank.



NOTE: This step is to remove approximately 3/16 tank of the fuel (3 gallons) from a completely full fuel tank and the majority of any residual fuel in the fuel tank filler pipe, lowering the fuel level below the Fuel Pump and Sender Unit mounting flange.

4.
Attach the Fuel Storage Tanker to the fuel drain tube and remove as much fuel as possible from the tank.

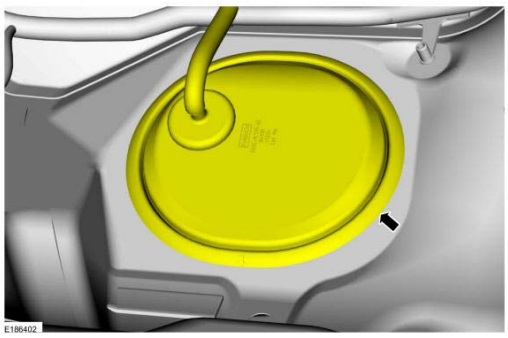
Use Special Service Tool: 292-00004 Fuel Tanker 100 GPM.

5.

Remove the rear seat cushion. Refer to: Rear Seat Cushion .

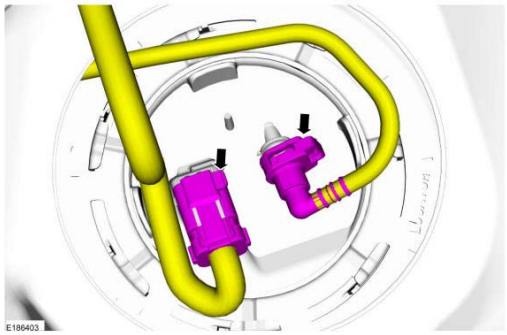
6.

Remove the Fuel Pump and Sender Unit access cover and position aside.



7.

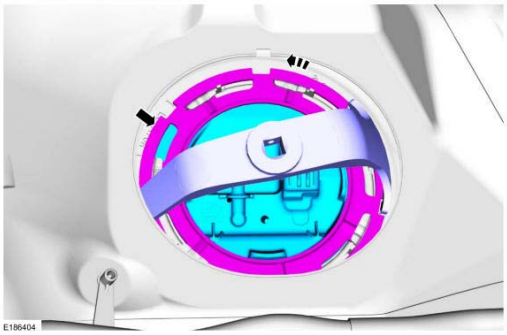
Disconnect electrical connector and fuel tube quick release coupling. Refer to: Quick Release Coupling .



NOTE: Carefully install the Fuel Tank Sender Unit lock ring wrench to avoid damage to the Fuel Pump and Sender Unit when removing the lock ring.

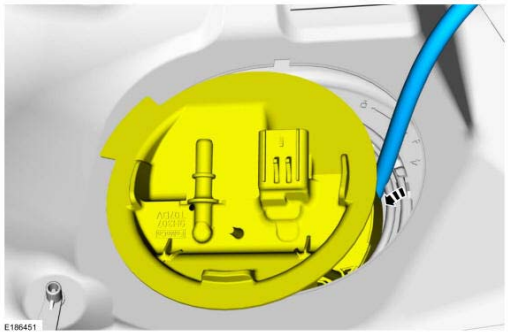
8.
Using the lock ring wrench remove the Fuel Pump and Sender Unit lock ring.

Use Special Service Tool: 310-123 Locking Ring, Fuel Tank.



NOTE: The Fuel Pump and Sender Unit must be handled carefully to avoid damage to the float arm.

9.
Position the Fuel Pump and Sender Unit aside. Using the Fuel Storage Tanker, completely drain the remaining fuel from the LH saddle of the fuel tank.



NOTE: Inspect the surfaces of the Fuel Pump and Sender Unit flange and fuel tank O-ring seal contact surfaces. Do not polish or adjust the O-ring seal contact area of the fuel tank flange or the fuel tank. Install a new Fuel Pump and Sender Unit or fuel tank if the O-ring seal contact area is bent, scratched or corroded.

10.
Remove and discard the Fuel Pump and Sender Unit O-ring seal.

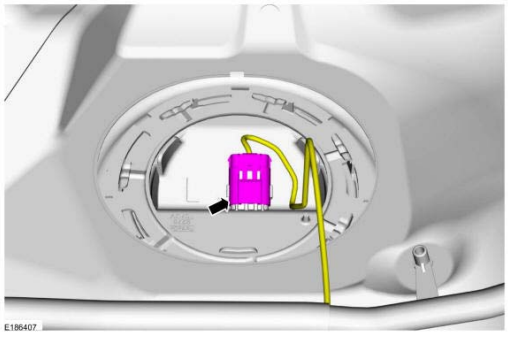
11.

Remove the Fuel Level Sensor access cover and position aside.



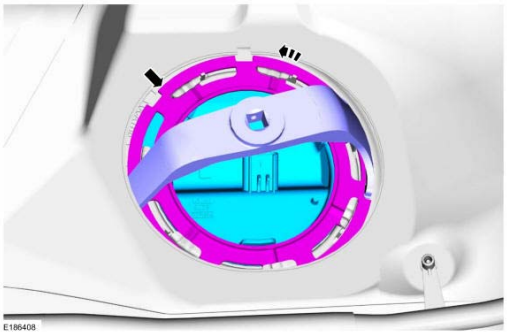
NOTE: Clean the fuel level sensor connections, flange surfaces and the immediate surrounding area of any dirt or foreign material.

12.
Disconnect the electrical connector.



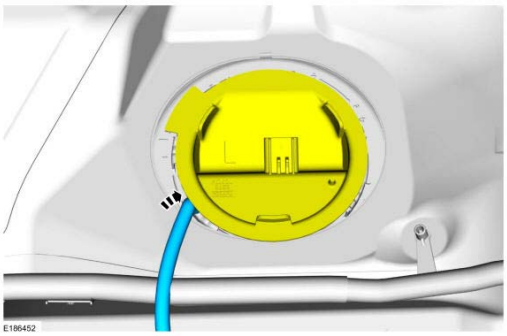
NOTE: Carefully install the Fuel Tank Sender Unit lock ring wrench to avoid damage to the fuel level sensor when removing the lock ring.

13.
Using the lock ring wrench remove the fuel level sensor lock ring.



NOTE: The fuel level sensor must be handled carefully to avoid damage to the float arm.

14.
Position the fuel level sensor aside. Using the Fuel Storage Tanker, completely drain the RH saddle of the fuel tank.



NOTE: Inspect the surfaces of the Fuel Level Sensor flange and fuel tank O-ring seal contact surfaces. Do not polish or adjust the O-ring seal contact area of the fuel tank flange or the fuel tank. Install a new Fuel Level Sensor or fuel tank if the O-ring seal contact area is bent, scratched or corroded.

15.
Remove and discard the Fuel Level Sensor O-ring seal.

GENERAL PROCEDURES > QUICK RELEASE COUPLING

Disconnect

NOTE: When reusing liquid or vapor tube connections, make sure to use compressed air to remove any foreign material from the connector retaining clip area before separating from the tube or damage to the tube or connector retaining clip may occur.

NOTE: Fuel injection equipment is manufactured to very precise tolerances and fine clearances. It is essential that absolute cleanliness is observed when working with these components or component damage may occur. Always install blanking plugs to any open orifices or tubes.

NOTE: Do not use any tools. The use of tools may cause a deformity in the clip components which may cause fuel leaks.

NOTE: ***Type 1***

1.

If servicing a liquid fuel tube quick connect coupling, release the fuel system pressure. Refer to: Fuel System Pressure Release .

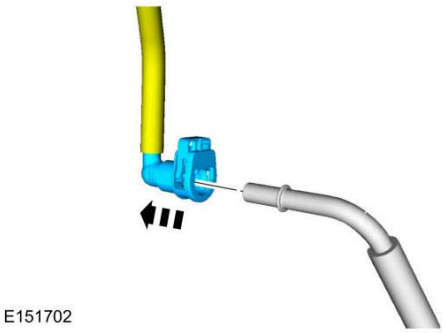
2.

Disconnect the battery ground cable. Refer to: Battery Disconnect and Connect .

3.



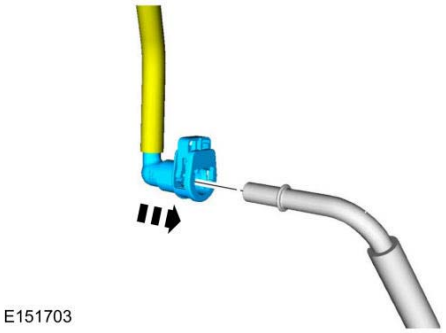
4.



Connect

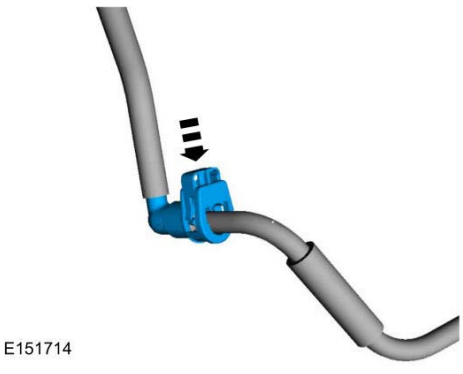
1.

Inspect and clean both quick coupling ends.



NOTE: Make sure the retainer clip is fully seated and locked onto the tube by pulling on the quick connect coupling.

2.
Press the retainer clip into the quick connect coupling body until flush and the tabs are locked in place.



3.

Connect the battery ground cable. Refer to: Battery Disconnect and Connect .

Disconnect

NOTE: When reusing liquid or vapor tube connections, make sure to use compressed air to remove any foreign material from the connector retaining clip area before separating from the tube or damage to the tube or connector retaining clip may occur.

NOTE: Fuel injection equipment is manufactured to very precise tolerances and fine clearances. It is essential that absolute cleanliness is observed when working with these components or component damage may occur. Always install blanking plugs to any open orifices or tubes.

NOTE: Do not use any tools. The use of tools may cause a deformity in the clip components which may cause fuel leaks.

NOTE: ***Type 2***

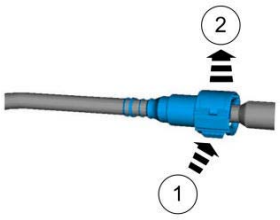
1.

If servicing a liquid fuel tube quick connect coupling, release the fuel system pressure. Refer to: Fuel System Pressure Release .

2.

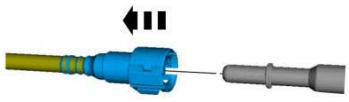
Disconnect the battery ground cable. Refer to: Battery Disconnect and Connect .

3.



E151704

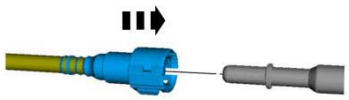
4.



E151705

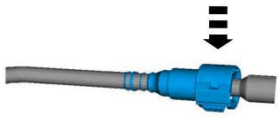
Connect

1.



E151706

2.



E151715

3.

Connect the battery ground cable. Refer to: Battery Disconnect and Connect .

Disconnect

NOTE: When reusing liquid or vapor tube connections, make sure to use compressed air to remove any foreign material from the connector retaining clip area before separating from the tube or damage to the tube or connector retaining clip may occur.

NOTE: Fuel injection equipment is manufactured to very precise tolerances and fine clearances. It is essential that absolute cleanliness is observed when working with these components or component damage may occur. Always install blanking plugs to any open orifices or tubes.

NOTE: Do not use any tools. The use of tools may cause a deformity in the clip components which may cause fuel leaks.

*NOTE: **Type 3***

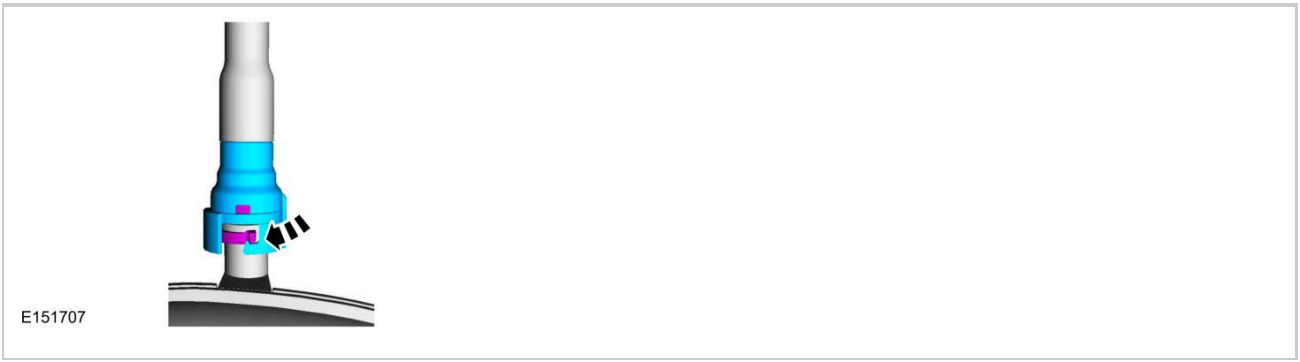
1.

If servicing a liquid fuel tube quick connect coupling, release the fuel system pressure. Refer to: Fuel System Pressure Release .

2.

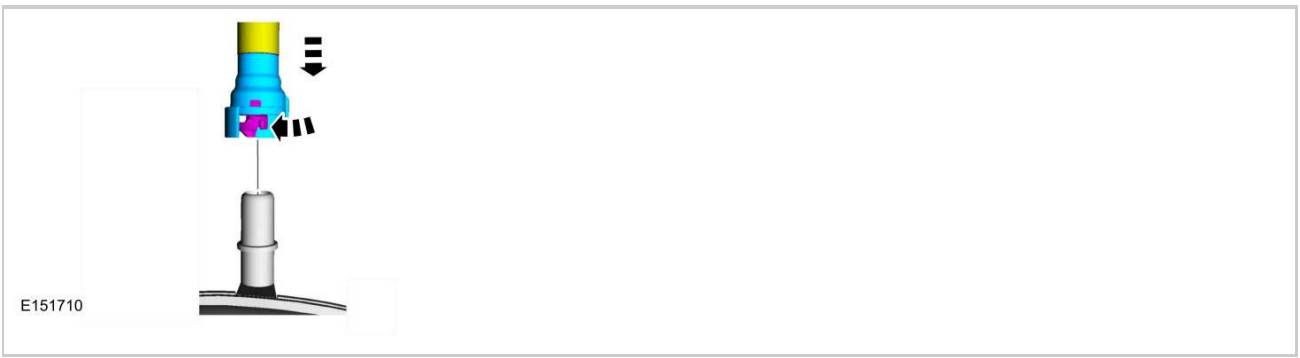
Disconnect the battery ground cable. Refer to: Battery Disconnect and Connect .

3.

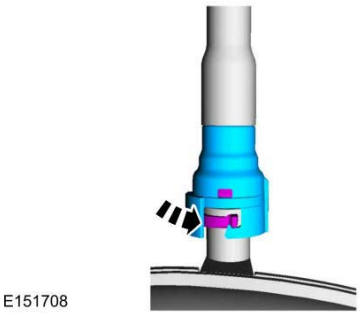


Connect

1.



2.



3.

Connect the battery ground cable. Refer to: Battery Disconnect and Connect .

Disconnect

NOTE: When reusing liquid or vapor tube connections, make sure to use compressed air to remove any foreign material from the connector retaining clip area before separating from the tube or damage to the tube or connector retaining clip may occur.

NOTE: Fuel injection equipment is manufactured to very precise tolerances and fine clearances. It is essential that absolute cleanliness is observed when working with these components or component damage may occur. Always install blanking plugs to any open orifices or tubes.

NOTE: Do not use any tools. The use of tools may cause a deformity in the clip components which may cause fuel leaks.

*NOTE: **Type 4***

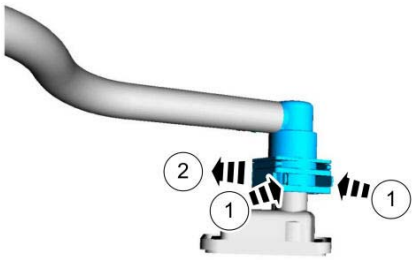
1.

If servicing a liquid fuel tube quick connect coupling, release the fuel system pressure. Refer to: Fuel System Pressure Release .

2.

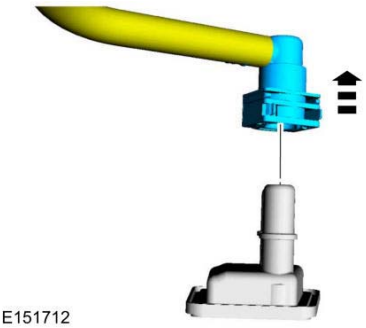
Disconnect the battery ground cable. Refer to: Battery Disconnect and Connect .

3.



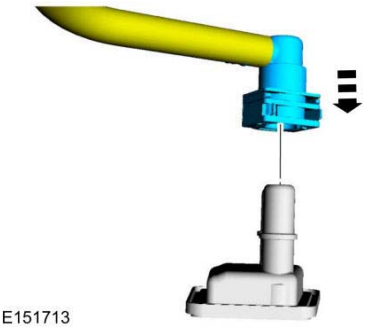
E151711

4.


E151712

Connect

1.


E151713

2.

Connect the battery ground cable. Refer to: Battery Disconnect and Connect .

Disconnect

NOTE: When reusing liquid tube connectors, make sure to use compressed air to remove any foreign material from the connector retaining clip area before separating from the tube or damage to the tube or connector retaining clip may occur.

NOTE: Fuel injection equipment is manufactured to very precise tolerances and fine clearances. It is essential that absolute cleanliness is observed when working with these components or component damage may occur. Always install blanking plugs to any open orifices or tubes.

NOTE: Do not use any tools. The use of tools may cause a deformity in the clip components which may cause fuel leaks.

NOTE: ***Type 5***

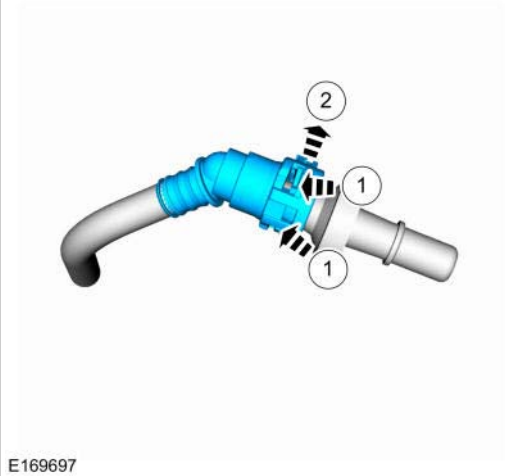
1.

If servicing a liquid fuel tube quick connect coupling, release the fuel system pressure. Refer to: Fuel System Pressure Release .

2.

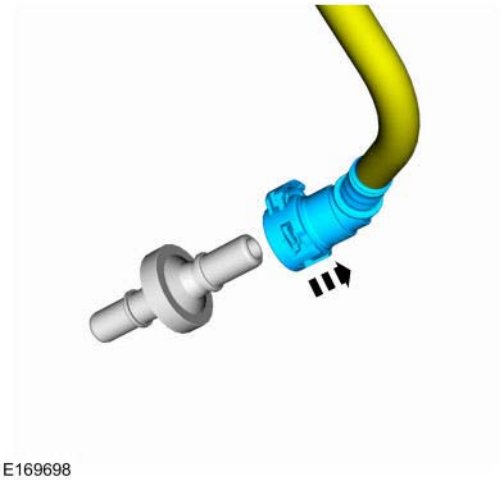
Disconnect the battery ground cable. Refer to: Battery Disconnect and Connect .

3.



E169697

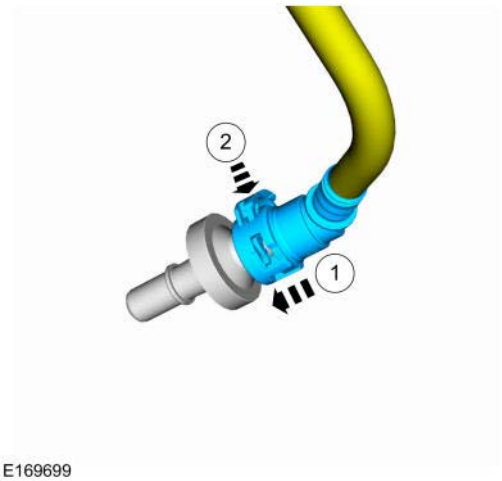
4.



E169698

Connect

1.



E169699

2.

Connect the battery ground cable. Refer to: Battery Disconnect and Connect .

Disconnect

NOTE: When reusing liquid tube connectors, make sure to use compressed air to remove any foreign material from the connector retaining clip area before separating from the tube or damage to the tube or connector retaining clip may occur.

NOTE: Fuel injection equipment is manufactured to very precise tolerances and fine clearances. It is essential that absolute cleanliness is observed when working with these components or component damage may occur. Always install blanking plugs to any open orifices or tubes.

NOTE: Do not use any tools. The use of tools may cause a deformity in the clip components which may cause fuel leaks.

NOTE: ***Type 8***

1.

If servicing a liquid fuel tube quick connect coupling, release the fuel system pressure. Refer to: Fuel System Pressure Release .

2.

Disconnect the battery ground cable. Refer to: Battery Disconnect and Connect .

3.

1.

Release the secondary locking tab.

2.

Depress the primary locking tab.

3.

Separate the quick release coupling from the tube.



Connect

1.

1.

Push the quick release coupling onto the tube.

NOTE: Pull on the quick release coupling and the fitting to make sure it is securely fastened.

2.
Lock the secondary locking tab.



2.

Connect the battery ground cable. Refer to: Battery Disconnect and Connect .

GENERAL PROCEDURES > SPRING LOCK COUPLINGS

Special Tool(s) / General Equipment

	310-S039 (T90T-9550-S) Disconnect Tool, Spring Lock Coupling TKIT-1990-LMH

Disconnect

NOTE: When reusing liquid or vapor tube connectors, make sure to use compressed air to remove any foreign material from the connector retaining clip area before separating from the tube or damage to the tube or connector retaining clip can occur. Apply clean engine oil to the end of the tube before inserting the tube into the connector.

NOTE: Fuel injection equipment is manufactured to very precise tolerances and fine clearances. It is essential that absolute cleanliness is observed when working with these components or component damage can occur. Always install plugs to any open orifices or tubes.

1.

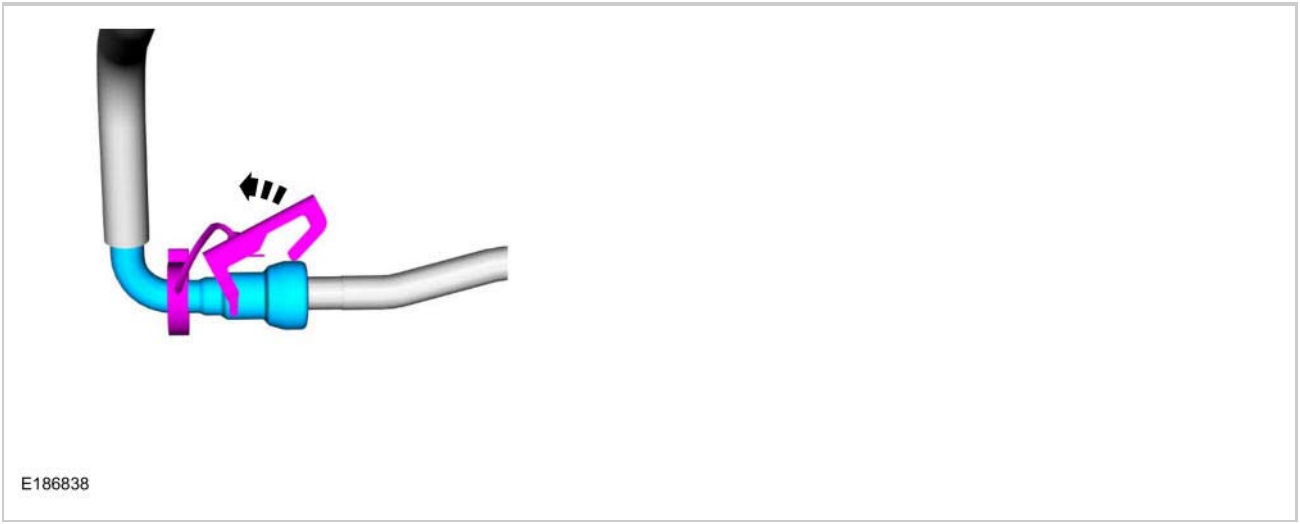
If servicing a liquid fuel tube spring lock coupling, release the fuel system pressure. Refer to: Fuel System Pressure Release .

2.

Disconnect the battery ground cable. Refer to: Battery Disconnect and Connect .

3.

If equipped, remove the fuel tube safety clip.



4.

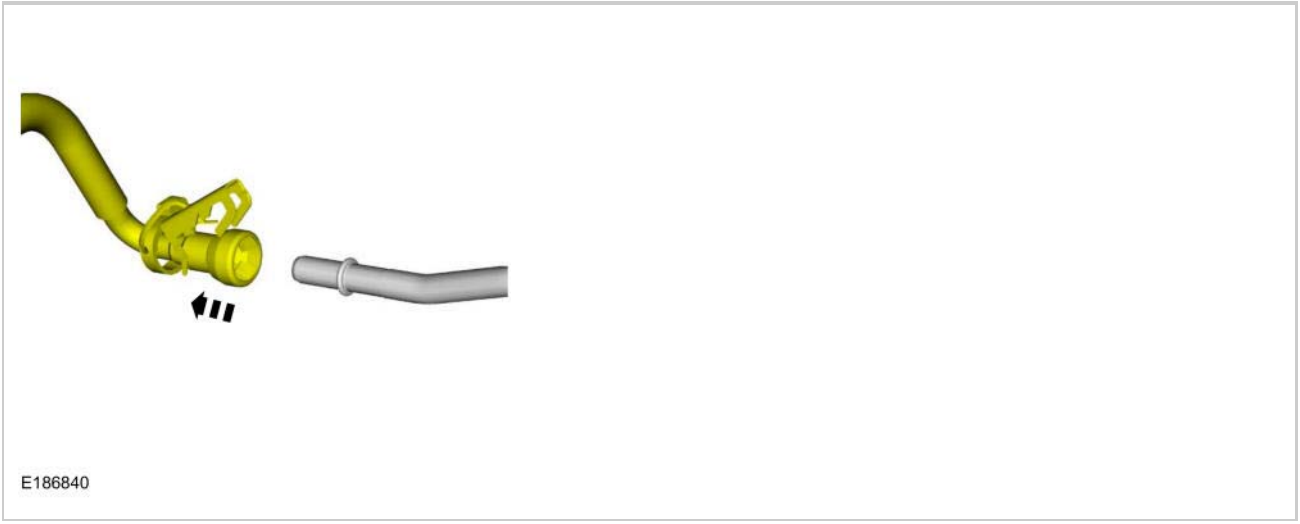
Install the Spring Lock Coupling Disconnect Tool on the tube and push into the spring lock coupling to release.

Use Special Service Tool: 310-S039 (T90T-9550-S) Disconnect Tool, Spring Lock Coupling.



5.

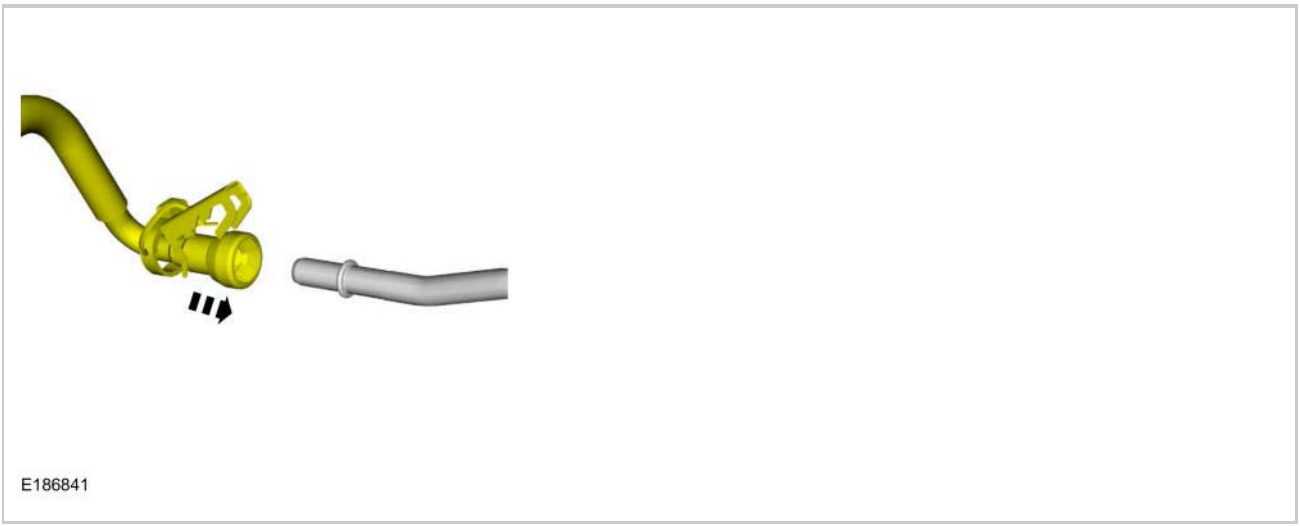
Separate the spring lock coupling from the tube.



Connect

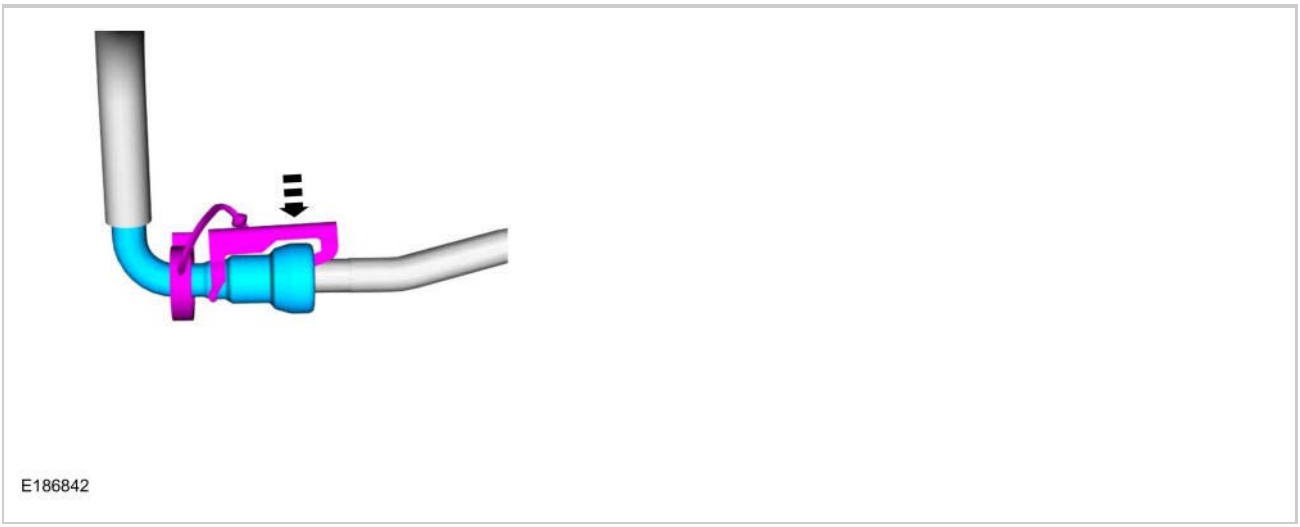
1.

Align and push the spring lock coupling onto the tube until fully seated.



2.

If equipped, install the fuel tube safety clip.



3.

Pull on the coupling to make sure it is fully engaged.

4.

Connect the battery ground cable. Refer to: Battery Disconnect and Connect .

GENERAL PROCEDURES > FUEL SYSTEM PRESSURE RELEASE

Pressure release

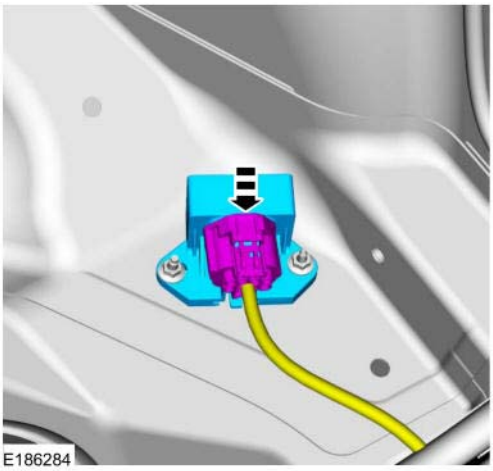
NOTE: The FPDM is located on the LH side, beneath the rear seat cushion.

1.

Remove the rear seat cushion. Refer to: Rear Seat Cushion .

NOTE: On vehicles equipped with Gasoline Turbocharged Direct Injection (GTDI), running the engine with the FPDM disconnected will remove most of the pressure from both the low and high pressure sides of the system.

2.
Disconnect the FPDM electrical connector.



3.

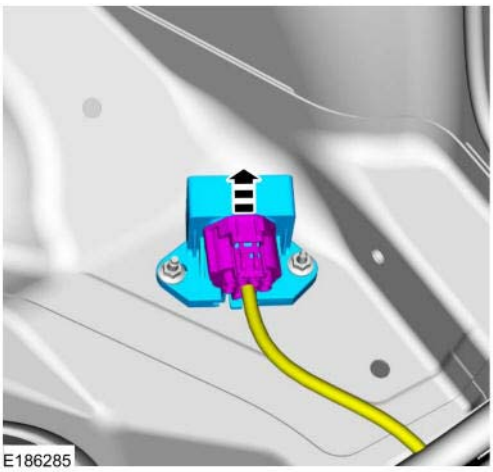
Start the engine and allow it to idle until the engine stalls.

4.

Turn the ignition switch to the off position.

5.

When the fuel system service is complete, reconnect the FPDM electrical connector.



6.

Install the rear seat cushion. Refer to: Rear Seat Cushion .

7.

Cycle the ignition key and wait 3 seconds to pressurize the fuel system. Check for leaks before starting the engine.

8.

When service on the fuel system is complete, start the engine and check for leaks.

SPECIFICATIONS > GENERAL SPECIFICATIONS

Item	Specification
Fuel Pressure	
Engine running - 3.7L Duratec, 5.0L Ti-VCT	53.1-63.1 psi (366-435 kPa)
Fuel Tank Capacity	
Fuel Tank Capacity - 3.7L Duratec, 5.0L Ti-VCT	16.0 gal (60.55 L)

DESCRIPTION AND OPERATION > FUEL SYSTEM - OVERVIEW > OVERVIEW

The fuel system consists of the :

- saddle-type fuel tank.
- quick connect fuel and vapor tube couplings.
- has a supplemental refueling adapter located in the luggage compartment.
- fuel tank filler pipe assembly, which cannot be modified in any way, that also contains a restrictor plate to permit only unleaded fuel to be pumped into the tank.
- has an Easy Fuel™ (capless) fuel tank filler pipe assembly, which cannot be modified in any way and is serviced only by the installation of a new fuel tank filler pipe assembly.
- has a Fuel Pump Control Module located under the rear seat cushion LH side of the vehicle.
- fuel rail.
- fuel injectors.
- Fuel Tank Pressure (FTP) sensor (part of the fuel vapor tube assembly).
- Mechanical Returnless Fuel System (MRFS).
- Fuel Level Sensor
- Fuel Pump (FP) module containing:
    - The electric FP module which provides pressurized fuel to the high pressure Fuel Pump (FP).
    - The Fuel Level Sender.
    - A check valve which maintains system pressure after the pump is shut off.
    - A pressure relief for overpressure protection in the event of restricted fluid flow.
    - A lifetime fuel filter providing filtration to protect the fuel injectors from foreign material.

Fuel Pump Shut-off Feature

In the event of a moderate to severe collision, the vehicle is equipped with a Fuel Pump and Sender Unit Shut-off Feature that is initiated by the event notification signal.

The event notification signal is a signal provided by the RCM to the Fuel Pump Control Module. Signal communication between the RCM and the Fuel Pump Control Module allows the PCM to shut-off the Fuel Pump.

Should the vehicle shut off after a collision due to this feature, the vehicle may be restarted by first turning the ignition to the OFF position and then turn the ignition to the ON position. In some instances the vehicle may not start the first time and may take one additional ignition cycle.

DIAGNOSIS AND TESTING > FUEL SYSTEM > SYMPTOM CHART(S) > SYMPTOM CHART: FUEL SYSTEM

Diagnostics in this service information assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods . for information regarding Ford-specific diagnostic practices.

> *NOTE: The following procedure diagnoses a slow to fill concern only. For all other concerns, refer to ENGINE CONTROLS - INTRODUCTION (EXCEPT DIESEL & HYBRID) .*

DIAGNOSIS AND TESTING > FUEL SYSTEM > SYMPTOM CHART(S) > SYMPTOM CHART

Condition	Possible Sources	Actions
Slow to fill	• Fuel tank filler pipe • Fuel tank filler pipe vent tube, if equipped • EVAPsystem • Fuel tank inlet check valve (part of the fuel tank) • Fuel level vent valve (part of the fuel tank)	GO to Pinpoint Test A
All other fuel system concerns	Fuel system components	Refer to ENGINE CONTROLS - INTRODUCTION (EXCEPT DIESEL & HYBRID) .

DIAGNOSIS AND TESTING > FUEL SYSTEM > PINPOINT TEST > PINPOINT TEST A: SLOW TO FILL > NORMAL OPERATION AND FAULT CONDITIONS

Under normal operation, fuel should flow at a steady rate through the fuel tank filler pipe into the fuel tank. As fuel enters the fuel tank air is vented through the filler pipe or the ORVR system.

DIAGNOSIS AND TESTING > FUEL SYSTEM > PINPOINT TEST > PINPOINT TEST A: SLOW TO FILL > PINPOINT TEST A : SLOW TO FILL

A1 CHECK COMPONENTS FOR SIGNS OF DAMAGE

Visually inspect the following components for signs of damage:

Fuel tank filler pipe

Fuel tank filler pipe vent tube, if equipped

EVAP system

Fuel tank inlet check valve (part of the fuel tank)

Fuel level vent valve (part of the fuel tank)

Was the cause of the concern found?

Yes: REPAIR or INSTALL new components to correct the concern.

No: GO to A2

A2 CHECK THE SYSTEM FOR ANY EVAP (EVAPORATIVE EMISSION) DTC'S

Connect the scan tool.

Check the system for any EVAP DTC's.

Are any DTC's present?

Yes: Refer to ENGINE CONTROLS - INTRODUCTION (EXCEPT DIESEL & HYBRID) .

No: GO to A3

A3 MONITOR THE FTP WHILE FILLING THE FUEL TANK

NOTE: During normal fuel fill the Fuel Tank Pressure (FTP) Sensor value starts at 2.6 volts and will increase .3 to .7 of a volt from its starting point. Monitor the Fuel Tank Pressure (FTP) reference value while filling the fuel tank. Refer to the ENGINE CONTROLS - REFERENCE VALUES (EXCEPT DIESEL & HYBRID) .

Is FTP within specification?

Yes: GO to A5

No: GO to A4

A4 MONITOR THE FTP WHILE FILLING THE FUEL TANK WITH THE EVAP SYSTEM DISCONNECTED

Disconnect the fuel tank-to-EVAP canister quick connect coupling at the EVAP canister.

NOTE: During normal fuel fill the Fuel Tank Pressure (FTP) Sensor value starts at 2.6 volts and will increase .3 to .7 of a volt from its starting point.

Monitor the FTP reference value while filling the fuel tank. Refer to ENGINE CONTROLS - INTRODUCTION (EXCEPT DIESEL & HYBRID) .

Is FTP within specification?

Yes: INSPECT the EVAP system for blockage or restrictions. REPAIR the blockage or restriction. If the blockage or restriction cannot be repaired, INSTALL new EVAP system components.

No: GO to A5

A5 CHECK THE FUEL TANK FILLER PIPE ASSEMBLY FOR BLOCKAGE OR RESTRICTION

Remove the fuel tank filler pipe assembly. REFER to: FUEL TANK FILLER PIPE .

Inspect the fuel tank filler pipe and fuel tank filler pipe vent tube (if equipped) for a blockage or restriction.

Is the fuel tank filler pipe or fuel tank filler pipe vent tube (if equipped) blocked or restricted?

Yes: If possible, REPAIR the blockage or restriction. If the blockage or restriction cannot be repaired, INSTALL a new fuel tank filler pipe or fuel tank filler pipe vent tube.

No: GO to A6

A6 CHECK THE FUEL TANK INLET CHECK VALVE

Inspect the fuel tank inlet check valve for restriction or sticking.

Is the fuel tank inlet check valve restricted or sticking?

Yes: If possible, REPAIR the restriction. If the restriction cannot be repaired, INSTALL a new fuel tank. REFER to: FUEL TANK .

No: INSTALL a new fuel tank.

GENERAL PROCEDURES > FUEL SYSTEM PRESSURE CHECK

Special Tool(s) / General Equipment

	310-D009 (D95L-7211-A) Fuel Pressure Test Kit

Check

NOTE: This Fuel System Pressure Check is for the low pressure side of the system.

1.

Release the fuel system pressure. Refer to: Fuel System Pressure Release .

2.

Disconnect the battery ground cable. Refer to: Battery Disconnect and Connect .

3.

Disconnect the fuel jumper tube-to-fuel rail quick release coupling. Refer to: Quick Release Coupling .

4.

Install the Fuel Pressure Test Kit between the fuel jumper tube and the fuel rail.

Use Special Service Tool: 310-D009 (D95L-7211-A) Fuel Pressure Test Kit.



NOTE: The FPDM electrical connector was previously disconnected to release the fuel system pressure and must be reconnected to test the fuel system pressure.

5.
Reconnect the FPDM electrical connector.

6.

Connect the battery ground cable. Refer to: Battery Disconnect and Connect .

NOTE: Carry out a Key ON Engine OFF (KOEO) visual inspection for fuel leaks prior to completing the fuel system pressure test.

7.
Test the fuel system pressure to make sure it is within the specified range. For additional information, refer to SPECIFICATIONS .

8.

After completion of the fuel system pressure test, disconnect the battery ground cable, open the drain valve on the Fuel Pressure Test Kit and release any residual fluid into an appropriate container. Refer to: Battery Disconnect and Connect .

9.

Remove the Fuel Pressure Test Kit by reversing the installation steps.

GENERAL PROCEDURES > FUEL TANK DRAINING

Special Tool(s) / General Equipment

 ST1134A	292-00004 Fuel Tanker 100 GPM
 E80148	310-123 Locking Ring, Fuel Tank TKIT-2004J-F TKIT-2005U-LM

Draining

1.

Release the fuel system pressure. Refer to: Fuel System Pressure Release .

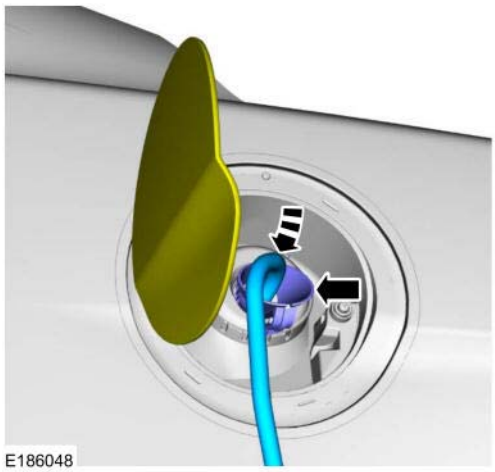
2.

Disconnect the battery ground cable. Refer to: Battery Disconnect and Connect .

NOTE: The supplemental refueling adapter is located in the luggage compartment.

3.
Install the supplemental refueling adapter and a 6 ft. length of 5/8 in. semi-rigid fuel drain tube into

the Easy Fuel™ (capless) fuel tank filler pipe until the tube enters the fuel tank.



NOTE: This step is to remove approximately 3/16 tank of the fuel (3 gallons) from a completely full fuel tank and the majority of any residual fuel in the fuel tank filler pipe, lowering the fuel level below the Fuel Pump and Sender Unit mounting flange.

4.
Attach the Fuel Storage Tanker to the fuel drain tube and remove as much fuel as possible from the tank.

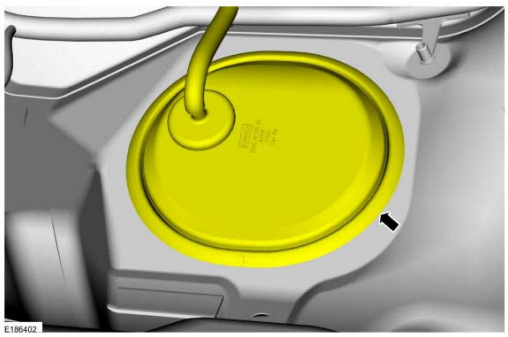
Use Special Service Tool: 292-00004 Fuel Tanker 100 GPM.

5.

Remove the rear seat cushion. Refer to: Rear Seat Cushion .

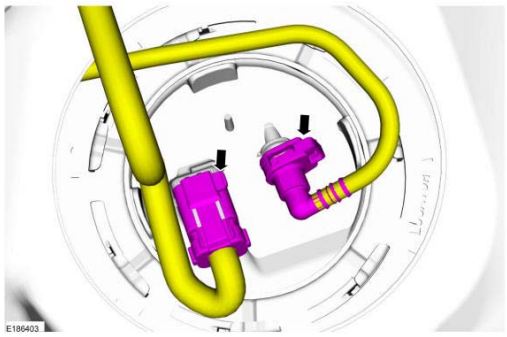
6.

Remove the access cover and position aside.



7.

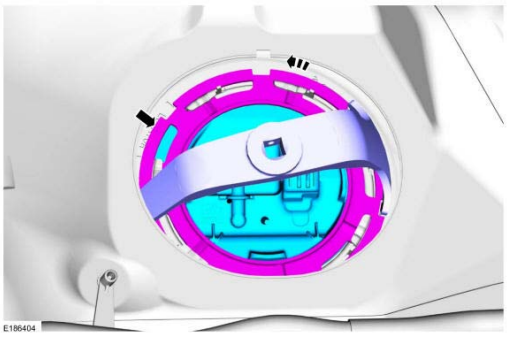
Disconnect electrical connector and fuel tube quick release coupling. Refer to: Quick Release Coupling .



NOTE: Carefully install the Fuel Tank Sender Unit lock ring wrench to avoid damage to the Fuel Pump and Sender Unit when removing the lock ring.

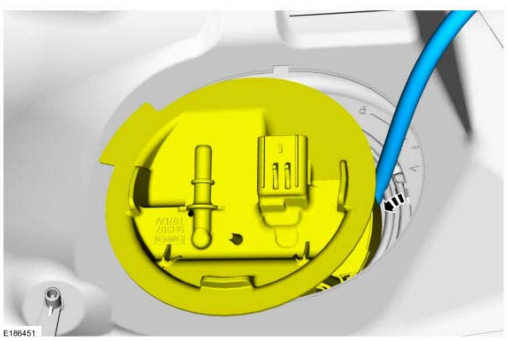
8.
Using the special tool remove the Fuel Pump and Sender Unit lock ring.

Use Special Service Tool: 310-123 Locking Ring, Fuel Tank.



NOTE: The Fuel Pump and Sender Unit must be handled carefully to avoid damage to the float arm.

9.
Position the Fuel Pump and Sender Unit aside. Using the Fuel Storage Tanker, completely drain the remaining fuel from the LH saddle of the fuel tank.



NOTE: Inspect the surfaces of the Fuel Pump and Sender Unit flange and fuel

tank O-ring seal contact surfaces. Do not polish or adjust the O-ring seal contact area of the fuel tank flange or the fuel tank. Install a new Fuel Pump and Sender Unit or fuel tank if the O-ring seal contact area is bent, scratched or corroded.

10.
Remove and discard the O-ring seal.

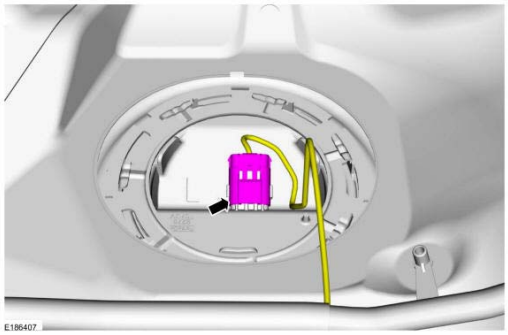
11.

Remove the access cover and position aside.



NOTE: Clean the fuel level sensor connections, flange surfaces and the immediate surrounding area of any dirt or foreign material.

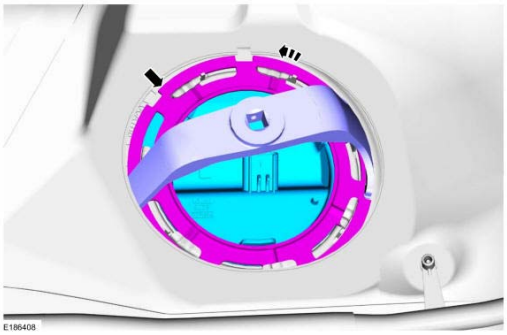
12.
Disconnect the electrical connector.



NOTE: Carefully install the Fuel Tank Sender Unit lock ring wrench to avoid damage to the fuel level sensor when removing the lock ring.

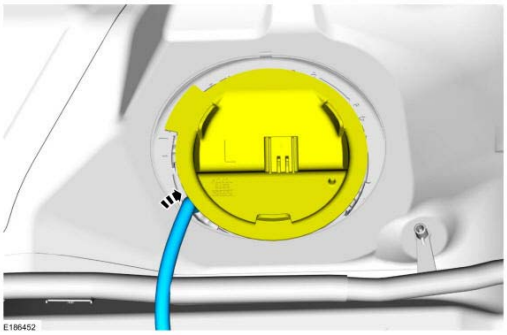
13.
Using the special tool remove the fuel level sensor lock ring.

Use Special Service Tool: 310-123 Locking Ring, Fuel Tank.



NOTE: The fuel level sensor must be handled carefully to avoid damage to the float arm.

14.
Position the fuel level sensor aside. Using the Fuel Storage Tanker, completely drain the RH saddle of the fuel tank.



NOTE: Inspect the surfaces of the Fuel Level Sensor flange and fuel tank O-ring seal contact surfaces. Do not polish or adjust the O-ring seal contact area of the fuel tank flange or the fuel tank. Install a new Fuel Level Sensor or fuel tank if the O-ring seal contact area is bent, scratched or corroded.

15.
Remove and discard the Fuel Level Sensor O-ring seal.

GENERAL PROCEDURES > QUICK RELEASE COUPLING

Disconnect

NOTE: When reusing liquid or vapor tube connections, make sure to use compressed air to remove any foreign material from the connector retaining clip area before separating from the tube or damage to the tube or connector retaining clip may occur.

NOTE: Fuel injection equipment is manufactured to very precise tolerances and fine clearances. It is essential that absolute cleanliness is observed when working with these components or component damage may occur. Always install blanking plugs to any open orifices or tubes.

NOTE: Do not use any tools. The use of tools may cause a deformity in the clip components which may cause fuel leaks.

NOTE: ***Type 1***

1.

If servicing a liquid fuel tube quick connect coupling, release the fuel system pressure. Refer to: Fuel System Pressure Release .

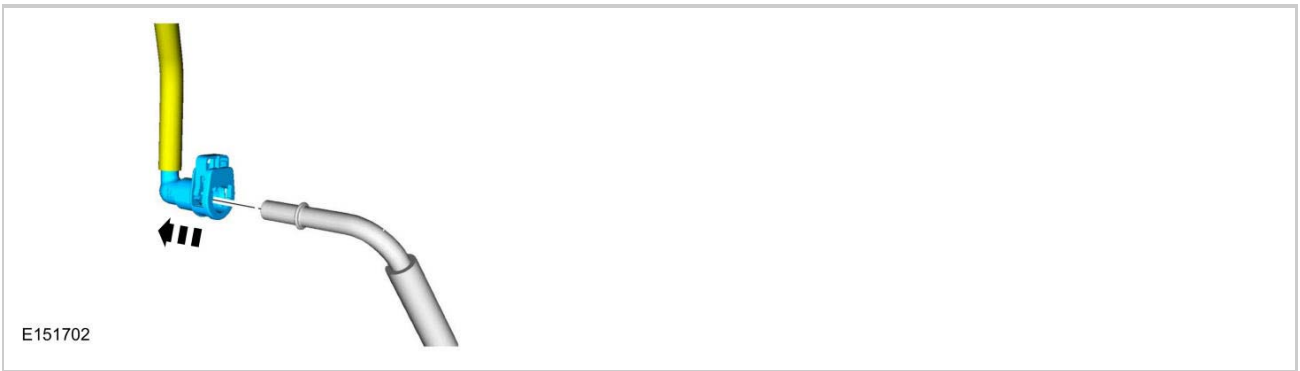
2.

Disconnect the battery ground cable. Refer to: Battery Disconnect and Connect .

3.



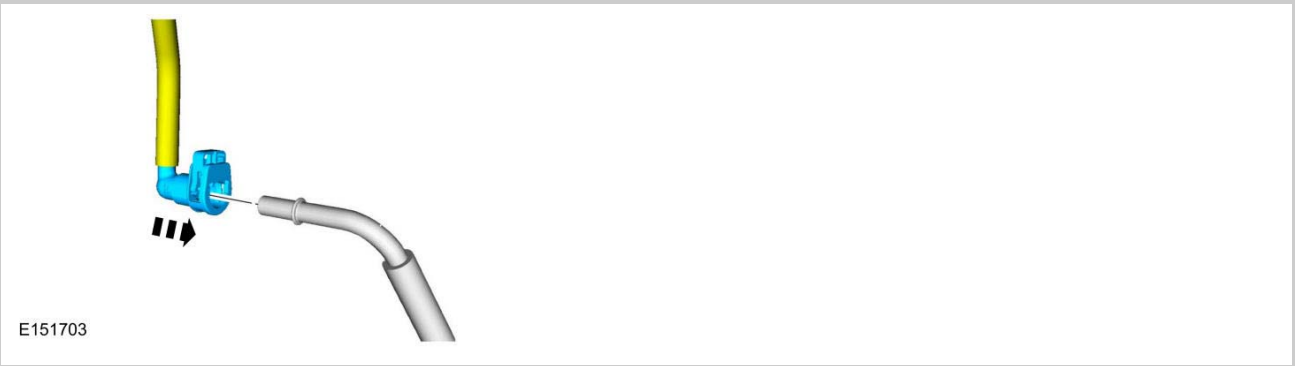
4.



Connect

1.

Inspect and clean both quick coupling ends.



NOTE: Make sure the retainer clip is fully seated and locked onto the tube by pulling on the quick connect coupling.

2.
Press the retainer clip into the quick connect coupling body until flush and the tabs are locked in place.



3.

Connect the battery ground cable. Refer to: Battery Disconnect and Connect .

Disconnect

NOTE: When reusing liquid or vapor tube connections, make sure to use compressed air to remove any foreign material from the connector retaining clip area before separating from the tube or damage to the tube or connector retaining clip may occur.

NOTE: Fuel injection equipment is manufactured to very precise tolerances and fine clearances. It is essential that absolute cleanliness is observed when working with these components or component damage may occur. Always install blanking plugs to any open orifices or tubes.

NOTE: Do not use any tools. The use of tools may cause a deformity in the clip components which may cause fuel leaks.

NOTE: ***Type 2***

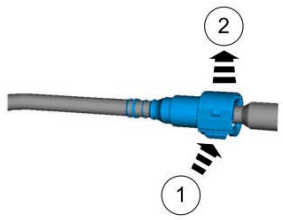
1.

If servicing a liquid fuel tube quick connect coupling, release the fuel system pressure. Refer to: Fuel System Pressure Release .

2.

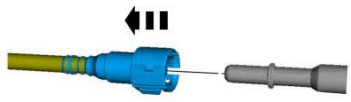
Disconnect the battery ground cable. Refer to: Battery Disconnect and Connect .

3.



E151704

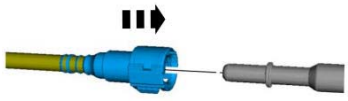
4.



E151705

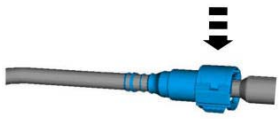
Connect

1.



E151706

2.



E151715

3.

Connect the battery ground cable. Refer to: Battery Disconnect and Connect .

Disconnect

NOTE: When reusing liquid or vapor tube connections, make sure to use compressed air to remove any foreign material from the connector retaining clip area before separating from the tube or damage to the tube or connector retaining clip may occur.

NOTE: Fuel injection equipment is manufactured to very precise tolerances and fine clearances. It is essential that absolute cleanliness is observed when working with these components or component damage may occur. Always install blanking plugs to any open orifices or tubes.

NOTE: Do not use any tools. The use of tools may cause a deformity in the clip components which may cause fuel leaks.

*NOTE: **Type 3***

1.

If servicing a liquid fuel tube quick connect coupling, release the fuel system pressure. Refer to: Fuel System Pressure Release .

2.

Disconnect the battery ground cable. Refer to: Battery Disconnect and Connect .

3.

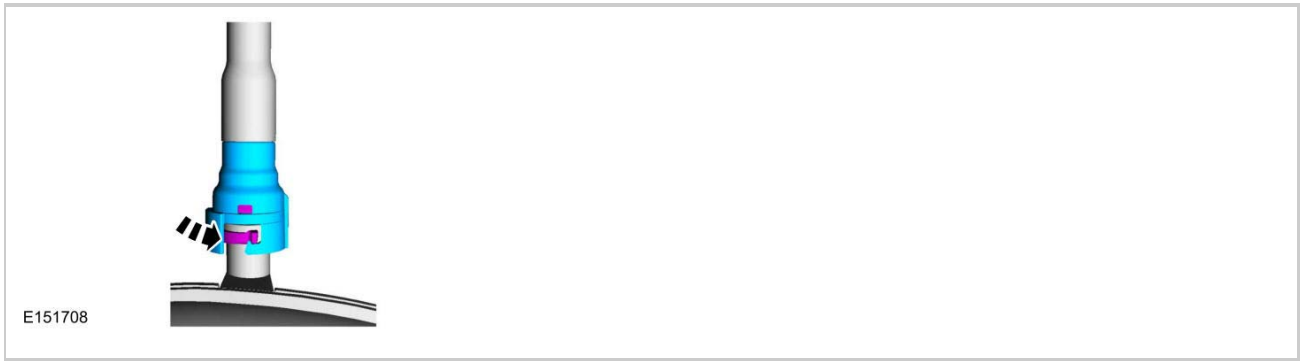


Connect

1.



2.



3.

Connect the battery ground cable. Refer to: Battery Disconnect and Connect .

Disconnect

NOTE: When reusing liquid or vapor tube connections, make sure to use compressed air to remove any foreign material from the connector retaining clip area before separating from the tube or damage to the tube or connector retaining clip may occur.

NOTE: Fuel injection equipment is manufactured to very precise tolerances and fine clearances. It is essential that absolute cleanliness is observed when working with these components or component damage may occur. Always install blanking plugs to any open orifices or tubes.

NOTE: Do not use any tools. The use of tools may cause a deformity in the clip components which may cause fuel leaks.

*NOTE: **Type 4***

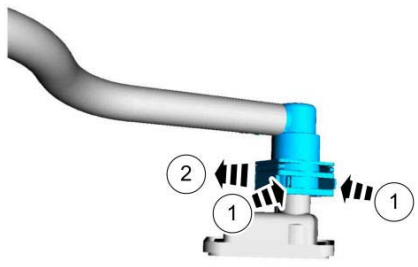
1.

If servicing a liquid fuel tube quick connect coupling, release the fuel system pressure. Refer to: Fuel System Pressure Release .

2.

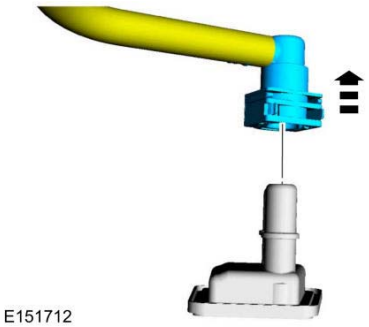
Disconnect the battery ground cable. Refer to: Battery Disconnect and Connect .

3.



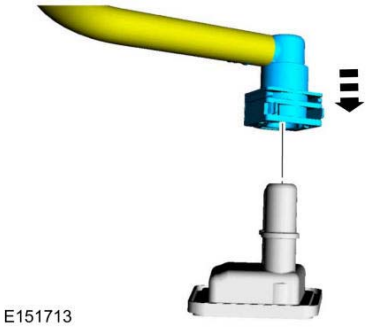
E151711

4.



Connect

1.



2.

Connect the battery ground cable. Refer to: Battery Disconnect and Connect

Disconnect

NOTE: When reusing liquid tube connectors, make sure to use compressed air to remove any foreign material from the connector retaining clip area before separating from the tube or damage to the tube or connector retaining clip may occur.

NOTE: Fuel injection equipment is manufactured to very precise tolerances and fine clearances. It is essential that absolute cleanliness is observed when working with these components or component damage may occur. Always install blanking plugs to any open orifices or tubes.

NOTE: Do not use any tools. The use of tools may cause a deformity in the clip components which may cause fuel leaks.

NOTE: ***Type 5***

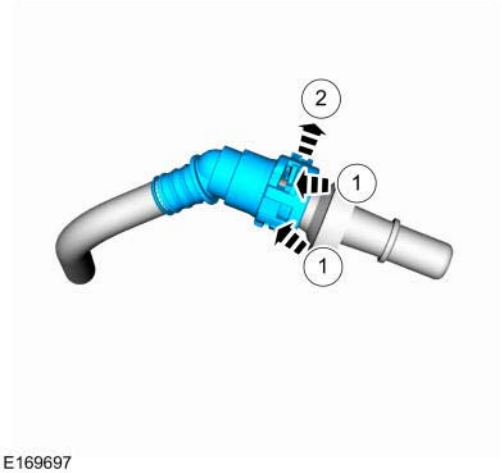
1.

If servicing a liquid fuel tube quick connect coupling, release the fuel system pressure. Refer to: Fuel System Pressure Release .

2.

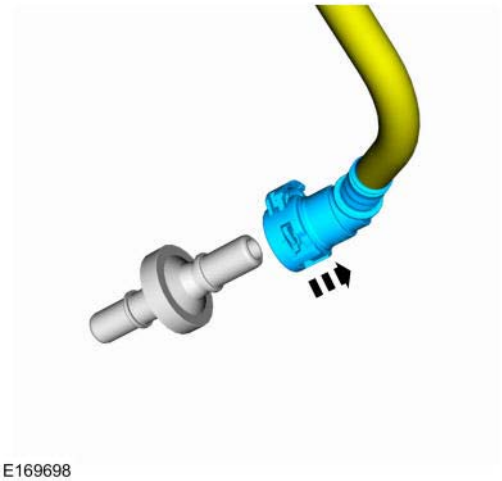
Disconnect the battery ground cable. Refer to: Battery Disconnect and Connect .

3.



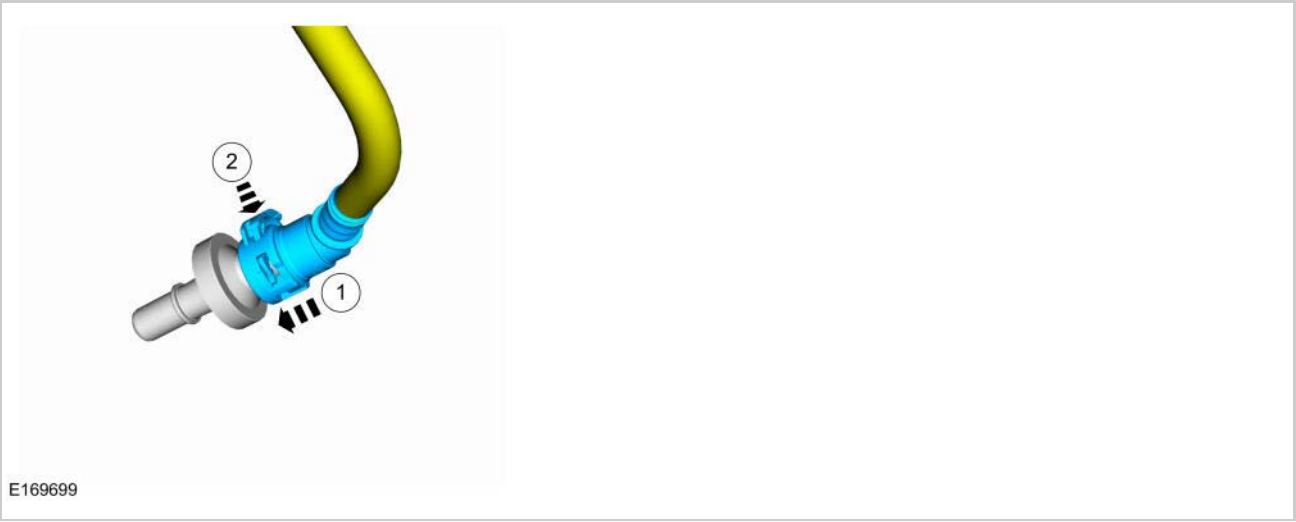
E169697

4.


E169698

Connect

1.



2.

Connect the battery ground cable. Refer to: Battery Disconnect and Connect .

Disconnect

NOTE: When reusing liquid tube connectors, make sure to use compressed air to remove any foreign material from the connector retaining clip area before separating from the tube or damage to the tube or connector retaining clip may occur.

NOTE: Fuel injection equipment is manufactured to very precise tolerances and fine clearances. It is essential that absolute cleanliness is observed when working with these components or component damage may occur. Always install blanking plugs to any open orifices or tubes.

NOTE: Do not use any tools. The use of tools may cause a deformity in the clip components which may cause fuel leaks.

*NOTE: **Type 8***

1.

If servicing a liquid fuel tube quick connect coupling, release the fuel system pressure. Refer to: Fuel System Pressure Release .

2.

Disconnect the battery ground cable. Refer to: Battery Disconnect and Connect .

3.

1.

Release the secondary locking tab.

2.

Depress the primary locking tab.

3.

Separate the quick release coupling from the tube.



Connect

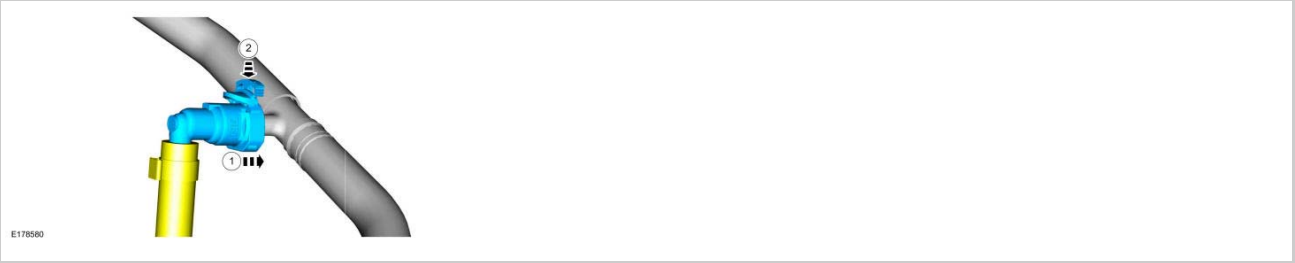
1.

1.

Push the quick release coupling onto the tube.

> *NOTE: Pull on the quick release coupling and the fitting to make sure it is securely fastened.*

2.
Lock the secondary locking tab.



2.

Connect the battery ground cable. Refer to: Battery Disconnect and Connect .

GENERAL PROCEDURES > SPRING LOCK COUPLINGS

Special Tool(s) / General Equipment

	310-S039 (T90T-9550-S) Disconnect Tool, Spring Lock Coupling TKIT-1990-LMH

Disconnect

NOTE: When reusing liquid or vapor tube connectors, make sure to use compressed air to remove any foreign material from the connector retaining clip area before separating from the tube or damage to the tube or connector retaining clip can occur. Apply clean engine oil to the end of the tube before inserting the tube into the connector.

NOTE: Fuel injection equipment is manufactured to very precise tolerances and fine clearances. It is essential that absolute cleanliness is observed when working with these components or component damage can occur. Always install plugs to any open orifices or tubes.

1.

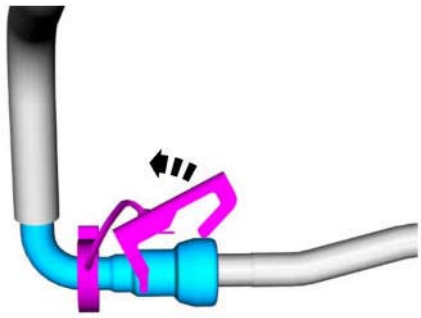
If servicing a liquid fuel tube spring lock coupling, release the fuel system pressure. Refer to: Fuel System Pressure Release .

2.

Disconnect the battery ground cable. Refer to: Battery Disconnect and Connect .

3.

If equipped, remove the fuel tube safety clip.



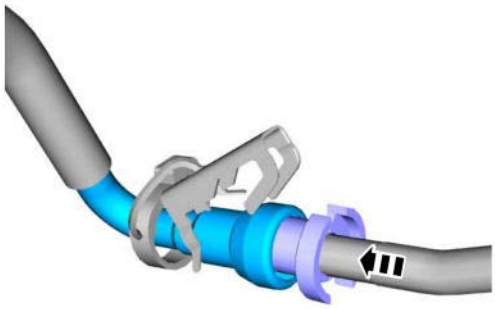
E186838

4.

Install the Spring Lock Coupling Disconnect Tool on the tube and push into the spring lock coupling

to release.

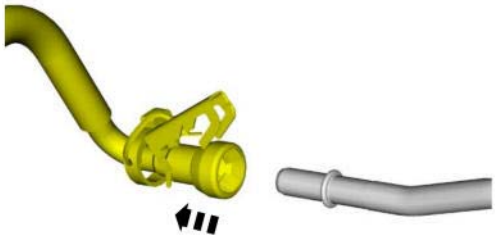
Use Special Service Tool: 310-S039 (T90T-9550-S) Disconnect Tool, Spring Lock Coupling.



E186839

5.

Separate the spring lock coupling from the tube.

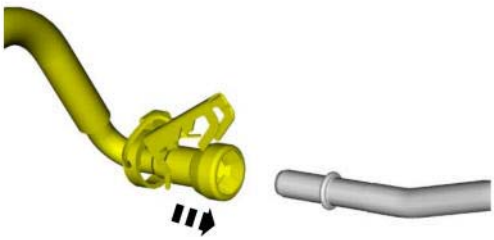


E186840

Connect

1.

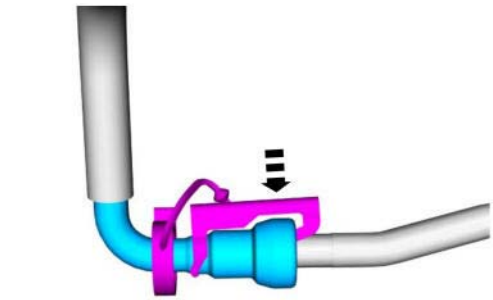
Align and push the spring lock coupling onto the tube until fully seated.



E186841

2.

If equipped, install the fuel tube safety clip.



E186842

3.

Pull on the coupling to make sure it is fully engaged.

4.

Connect the battery ground cable. Refer to: Battery Disconnect and Connect .

GENERAL PROCEDURES > FUEL SYSTEM PRESSURE RELEASE

Pressure release

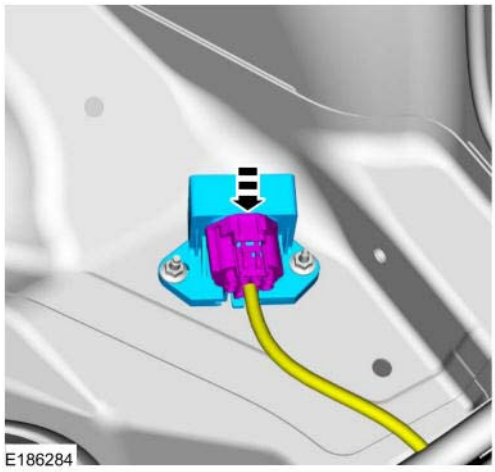
NOTE: The FPDM is located on the LH side, beneath the rear seat cushion.

1.

Remove the rear seat cushion. Refer to: Rear Seat Cushion .

NOTE: On vehicles equipped with Gasoline Turbocharged Direct Injection (GTDI), running the engine with the FPDM disconnected will remove most of the pressure from both the low and high pressure sides of the system.

2.
Disconnect the FPDM electrical connector.



3.

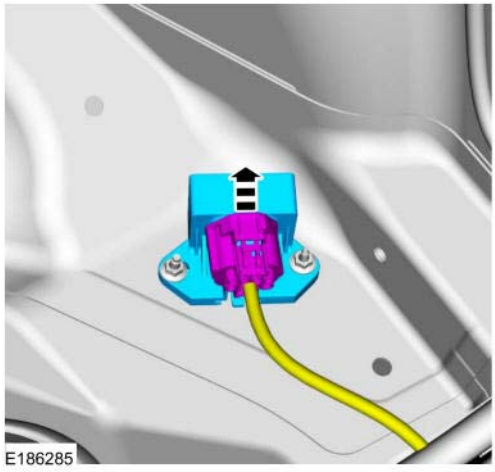
Start the engine and allow it to idle until the engine stalls.

4.

Turn the ignition switch to the off position.

5.

When the fuel system service is complete, reconnect the FPDM electrical connector.



6.

Install the rear seat cushion. Refer to: Rear Seat Cushion .

7.

Cycle the ignition key and wait 3 seconds to pressurize the fuel system. Check for leaks before starting the engine.

8.

When service on the fuel system is complete, start the engine and check for leaks.

SPECIFICATIONS > GENERAL SPECIFICATIONS

Item	Specification
Fuel Tank Capacity	
Fuel Tank Capacity - 2.3L GTDi	15.5 gal (58.67 L)

DESCRIPTION AND OPERATION > FUEL TANK AND LINES - OVERVIEW

The fuel system consists of the :

- saddle-type fuel tank.
- quick connect fuel and vapor tube couplings.
- fuel tank filler pipe assembly, which cannot be modified in any way, that also contains a restrictor plate to permit only unleaded fuel to be pumped into the tank.
- has an Easy Fuel™ (capless) fuel tank filler pipe assembly, which cannot be modified in any way and is serviced only by the installation of a new fuel tank filler pipe assembly.
- Fuel Pump Control Module (FPCM).
- fuel rail.
- fuel injectors.
- Fuel Tank Pressure (FTP) sensor (part of the fuel vapor tube assembly).
- is a Closed Loop Pressure Control (CLPC) system.
- Fuel Level Sensor
- Fuel Pump (FP) module containing:
    - The electric FP module which provides pressurized fuel to the high pressure Fuel Pump (FP).
    - The Fuel Level Sender.
    - A check valve which maintains system pressure after the pump is shut off.
    - A pressure relief for overpressure protection in the event of restricted fluid flow.
    - A lifetime fuel filter providing filtration to protect the fuel injectors from foreign material.

The vehicle:

- has a serviceable fuel level sender mounted on the fuel pump module.

- has a fuel tank filler pipe which contains a restrictor plate to permit only unleaded fuel to be pumped into the fuel tank.
- has an Easy Fuel (capless) fuel tank filler pipe assembly, which cannot be modified in any way.
- has a supplemental refueling adapter located in the luggage compartment.
- has a lifetime in tank fuel filter serviced as part of the fuel pump.
- has fuel tubes (liquid and vapor) combined in a bundle along with the brake tubes mounted on the underside of the floorpan and covered with a protective cover shield.
- has quick connect and spring lock fuel tube couplings.
- has a FPDM that shuts off fuel in the event of a collision.

DESCRIPTION AND OPERATION > FUEL TANK AND LINES - OVERVIEW > FUEL PUMP SHUT-OFF FEATURE

> *NOTE: Refer to the DESCRIPTION AND OPERATION to review the procedures for achieving the various ignition states (ignition OFF, ignition in ACCESSORY, ignition ON and ignition START) on vehicles with this feature.*

In the event of a moderate to severe collision, the vehicle is equipped with a Fuel Pump and Sender Shut-off Feature that is initiated by the event notification signal.

The event notification signal is a signal provided by the RCM to the FPDM. Signal communication between the RCM and the FPDM allows the PCM to shut-off the Fuel Pump.

Should the vehicle shut off after a collision due to this feature, the vehicle may be restarted by first turning the ignition to the OFF position and then turn the ignition to the ON position. In some instances the vehicle may not start the first time and may take one additional ignition cycle.

DIAGNOSIS AND TESTING > FUEL TANK AND LINES

Refer to ENGINE CONTROLS - INTRODUCTION (EXCEPT DIESEL & HYBRID) .

REMOVAL AND INSTALLATION > FUEL LEVEL SENDER

Fuel Level Sender

REMOVAL AND INSTALLATION > FUEL LEVEL SENDER > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

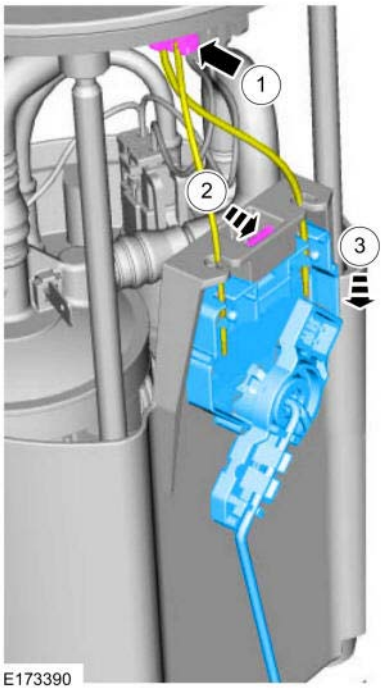
Remove the Fuel Pump and Sender Unit. Refer to: Fuel Pump and Sender Unit .

2.

Disconnect the electrical connector.

Release the locking tab.

Remove the fuel level sender.



REMOVAL AND INSTALLATION > FUEL LEVEL SENDER > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > FUEL LEVEL SENSOR

Fuel Level Sensor

Special Tool(s) / General Equipment

 ST1134A	292-00004 Fuel Tanker 100 GPM
 E80148	310-123 Locking Ring, Fuel Tank TKIT-2004J-F TKIT-2005U-LM

REMOVAL AND INSTALLATION > FUEL LEVEL SENSOR > REMOVAL

1.

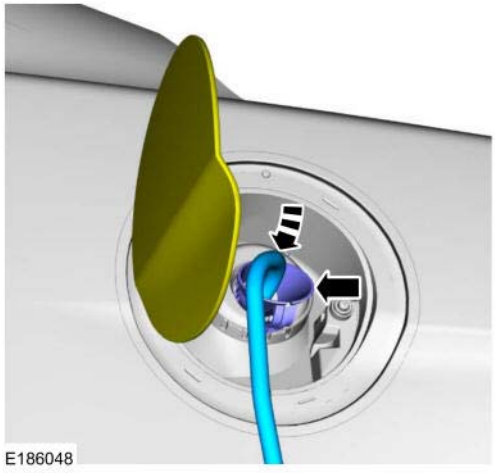
Release the fuel system pressure. Refer to: FUEL SYSTEM PRESSURE RELEASE - 2.3L EcoBoost (231kW/314PS).

2.

Disconnect the battery ground cable. Refer to: Battery Disconnect and Connect .

NOTE: The supplemental refueling adapter is located in the luggage compartment.

3.
Install the supplemental refueling adapter and a 6 ft. length of 5/8 in. semi-rigid fuel drain tube into the Easy Fuel™ (capless) fuel tank filler pipe until the tube enters the fuel tank.


E186048

NOTE: This step is to remove approximately 3/16 tank of the fuel (3 gallons) from a completely full fuel tank and the majority of any residual fuel in the fuel tank filler

pipe, lowering the fuel level below the Fuel Pump and Sender Unit mounting flange.

4.
Attach the Fuel Storage Tanker to the fuel drain tube and remove as much fuel as possible from the tank.

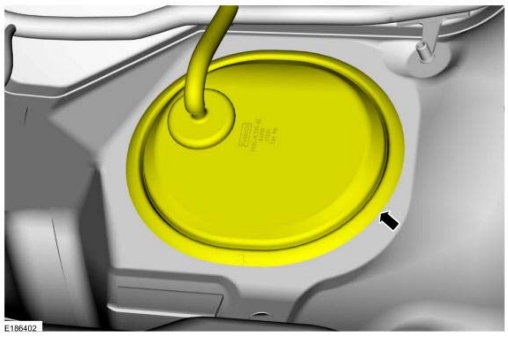
Use Special Service Tool: 292-00004 Fuel Tanker 100 GPM.

5.

Remove the rear seat cushion. Refer to: Rear Seat Cushion .

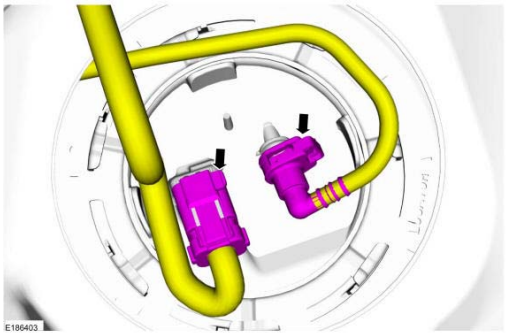
6.

Remove the access cover and position aside.



7.

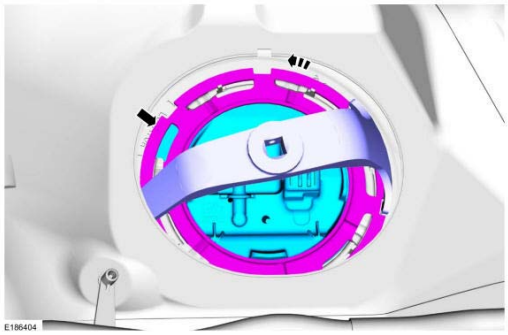
Disconnect electrical connector and fuel tube quick release coupling. Refer to: QUICK RELEASE COUPLING - 2.3L EcoBoost (231kW/314PS).



NOTE: Carefully install the Fuel Tank Sender Unit lock ring wrench to avoid damage to the Fuel Pump and Sender Unit when removing the lock ring.

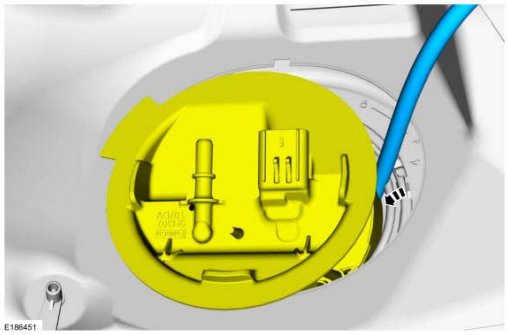
8.
Using the special tool remove the Fuel Pump and Sender Unit lock ring.

Use Special Service Tool: 310-123 Locking Ring, Fuel Tank.



NOTE: The Fuel Pump and Sender Unit must be handled carefully to avoid damage to the float arm.

9.
Position the Fuel Pump and Sender Unit aside. Using the Fuel Storage Tanker, completely drain the remaining fuel from the LH saddle of the fuel tank.



NOTE: Inspect the surfaces of the Fuel Pump and Sender Unit flange and fuel tank O-ring seal contact surfaces. Do not polish or adjust the O-ring seal contact area of the fuel tank flange or the fuel tank. Install a new Fuel Pump and Sender Unit or fuel tank if the O-ring seal contact area is bent, scratched or corroded.

10.
Remove and discard the O-ring seal.

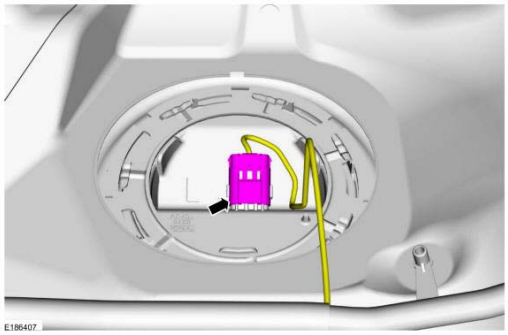
11.

Remove the Fuel Level Sensor access cover and position aside.



NOTE: Clean the fuel level sensor connections, flange surfaces and the immediate surrounding area of any dirt or foreign material.

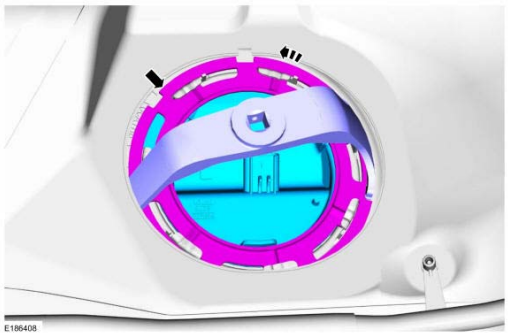
12.
Disconnect the electrical connector.



NOTE: Carefully install the Fuel Tank Sender Unit Socket to avoid damage to the fuel level sensor when removing the lock ring.

13.
Using the special tool remove the Fuel Level Sensor lock ring.

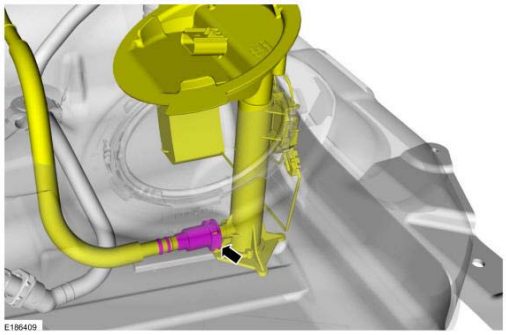
Use Special Service Tool: 310-123 Locking Ring, Fuel Tank.



14.

Disconnect the internal fuel tube-to-Fuel Level Sensor quick connect coupling. Refer to: QUICK

RELEASE COUPLING - 2.3L EcoBoost (231kW/314PS).



REMOVAL AND INSTALLATION > FUEL LEVEL SENSOR > INSTALLATION

NOTE: Make sure the alignment tabs on the Fuel Level Sensor and the fuel tank meet prior to tightening the Fuel Level Sensor lock ring.

NOTE: Make sure to install a new Fuel Level Sensor O-ring seal.

1.
To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > FUEL LINES > REMOVAL

1.

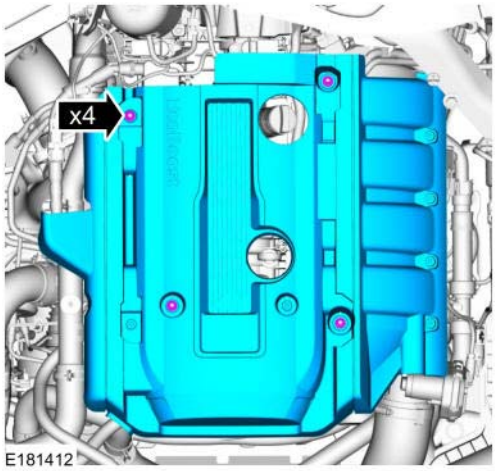
Remove the fuel tank. Refer to: Fuel Tank .

2.

Remove the nuts and the engine appearance cover.

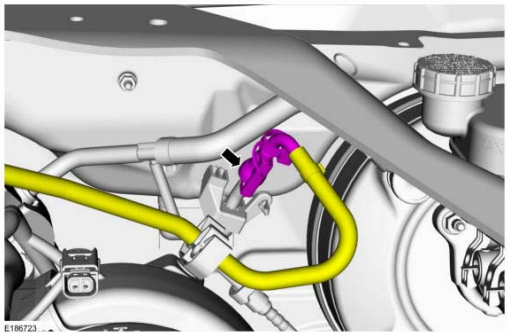
Torque

: 80 lb.in (9 Nm)



3.

Disconnect the fuel line-to-fuel rail spring lock coupling. Refer to: SPRING LOCK COUPLINGS - 2.3L EcoBoost (231kW/314PS).

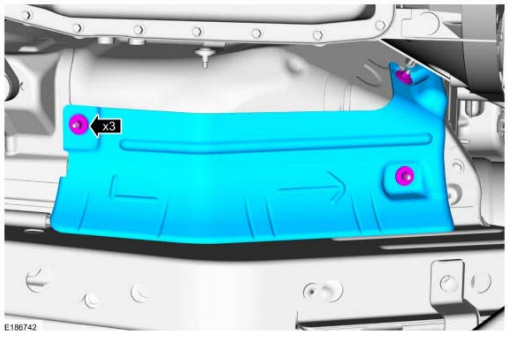


4.

Remove the nuts and the heat shield.

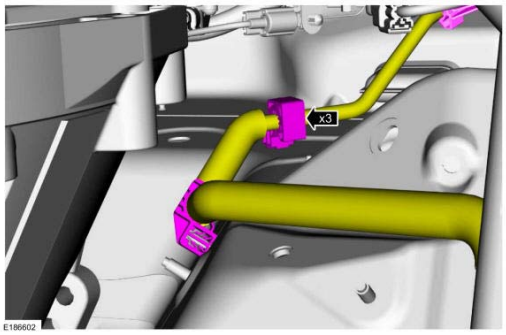
Torque

: 71 lb.in (8 Nm)



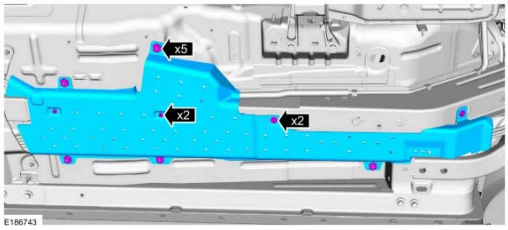
5.

Release the fuel line from the retainers.



6.

Remove the nuts, bolts, push-pins and splash shield.

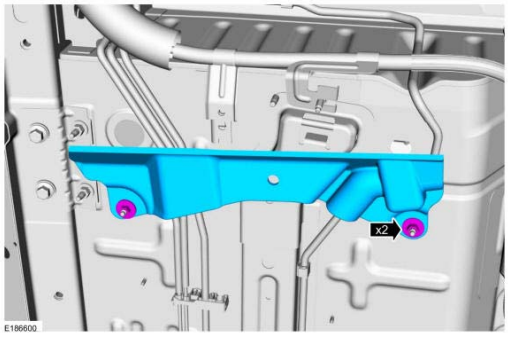


7.

Remove the nuts and the fuel tank deflector.

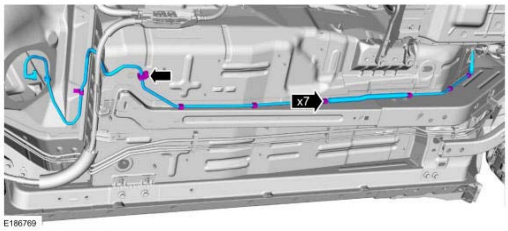
Torque

: 18 lb.ft (25 Nm)



8.

Release the retainers and remove the fuel line.



REMOVAL AND INSTALLATION > FUEL LINES > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > FUEL PUMP AND SENDER UNIT

Special Tool(s) / General Equipment

 ST1134A	292-00004 Fuel Tanker 100 GPM
 E80148	310-123 Locking Ring, Fuel Tank TKIT-2004J-F TKIT-2005U-LM

REMOVAL AND INSTALLATION > FUEL PUMP AND SENDER UNIT > REMOVAL

1.

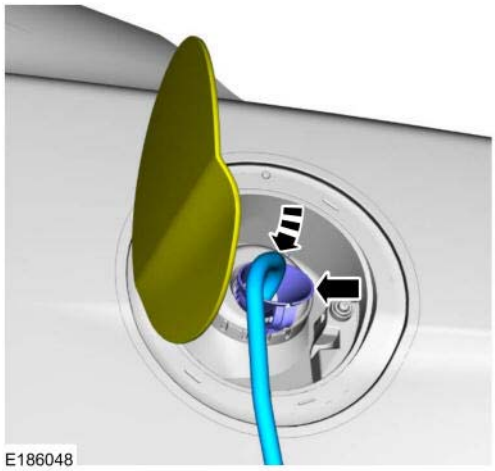
Release the fuel system pressure. Refer to: FUEL SYSTEM PRESSURE RELEASE - 2.3L EcoBoost (231kW/314PS).

2.

Disconnect the battery ground cable. Refer to: Battery Disconnect and Connect .

NOTE: The supplemental refueling adapter is located in the luggage compartment.

3.
Install the supplemental refueling adapter and a 6 ft. length of 5/8 in. semi-rigid fuel drain tube into the Easy Fuel™ (capless) fuel tank filler pipe until the tube enters the fuel tank.



NOTE: This step is to remove approximately 3/16 tank of the fuel (3 gallons) from a completely full fuel tank and the majority of any residual fuel in the fuel tank filler pipe, lowering the fuel level below the Fuel Pump and Sender Unit mounting flange.

4.
Attach the Fuel Storage Tanker to the fuel drain tube and remove as much fuel as possible from the tank.

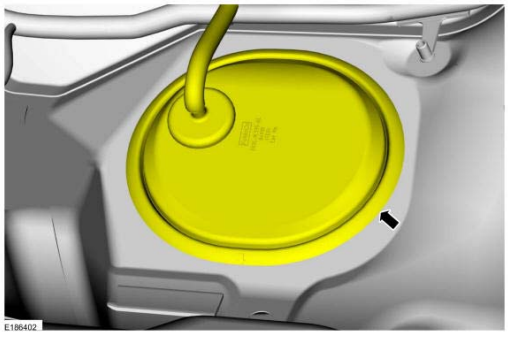
Use Special Service Tool: 292-00004 Fuel Tanker 100 GPM.

5.

Remove the rear seat cushion. Refer to: Rear Seat Cushion .

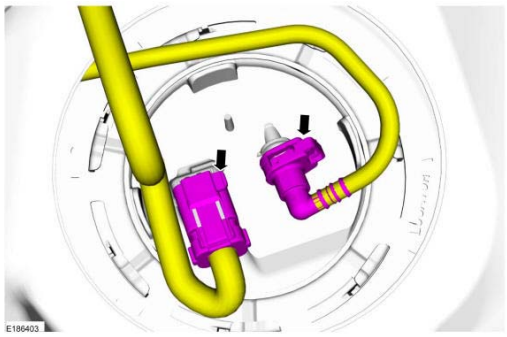
6.

Remove the Fuel Pump and Sender Unit access cover and position aside.



7.

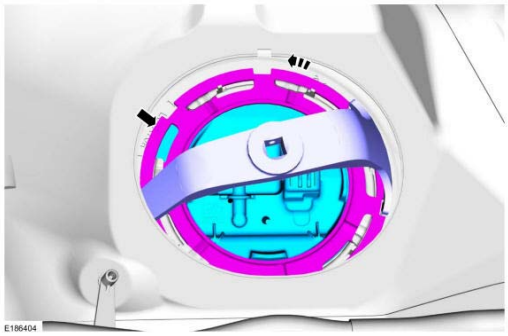
Disconnect electrical connector and fuel tube quick release coupling. Refer to: QUICK RELEASE COUPLING - 2.3L EcoBoost (231kW/314PS).



8.

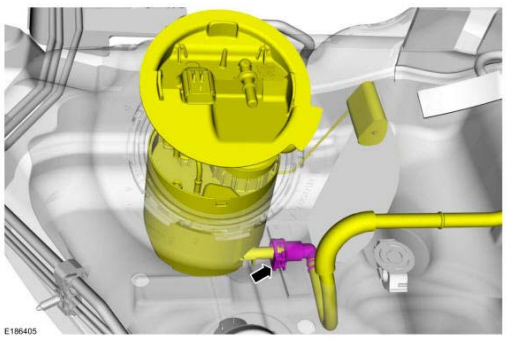
Using the special tool remove the Fuel Pump and Sender Unit lock ring.

Use Special Service Tool: 310-123 Locking Ring, Fuel Tank.



9.

Disconnect the internal fuel tube-to-Fuel Pump and Sender Unit quick connect coupling and remove the Fuel Pump and Sender Unit. Refer to: QUICK RELEASE COUPLING - 2.3L EcoBoost (231kW/314PS).



REMOVAL AND INSTALLATION > FUEL PUMP AND SENDER UNIT > INSTALLATION

NOTE: Make sure the alignment tabs on the Fuel Pump and Sender Unit and the fuel tank meet prior to tightening the Fuel Pump and Sender Unit lock ring.

NOTE: Make sure to install a new Fuel Pump and Sender Unit O-ring seal.

1.
To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > FUEL TANK

Special Tool(s) / General Equipment

	310-123 Locking Ring, Fuel Tank TKIT-2004J-F TKIT-2005U-LM
Flat Headed Screw Driver	

Materials

Name	Specification
Threadlock and Sealer TA-25-B	-

REMOVAL AND INSTALLATION > FUEL TANK > REMOVAL

NOTE: Removal steps in this procedure may contain installation steps.

1.

With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

2.

Disconnect the battery ground cable. Refer to: Battery Disconnect and Connect .

3.

Drain the fuel tank. Refer to: FUEL TANK DRAINING - 2.3L EcoBoost (231kW/314PS).

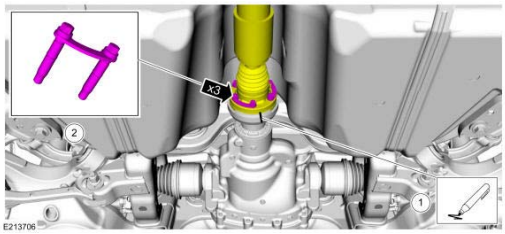
4.

Remove the muffler and tailpipe. Refer to: MUFFLER AND TAILPIPE - 2.3L EcoBoost (231kW/314PS).

5.

Index mark the driveshaft and pinion flange for reference during installation.

Remove the driveshaft to pinion flange bolts.



NOTE: Do not over articulate the driveshaft or damage may occur.

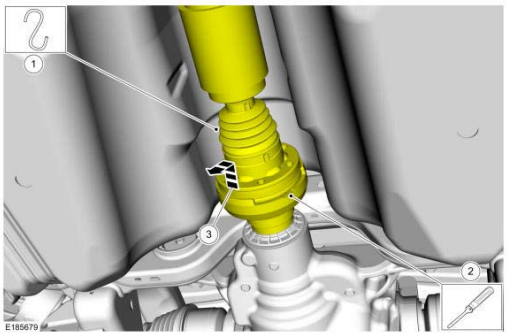
6.

Support the driveshaft.

Using a screwdriver inserted into the slot on the pinion flange, pry the driveshaft from the pinion flange.

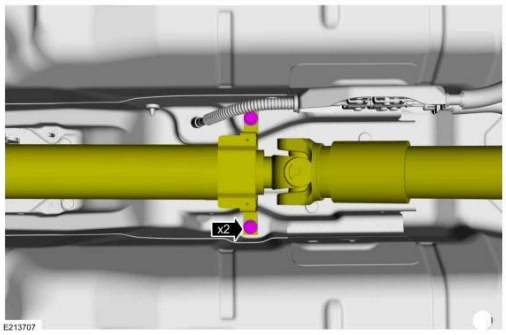
Use the General Equipment: Flat Headed Screw Driver

Separate the driveshaft from the pinion flange.



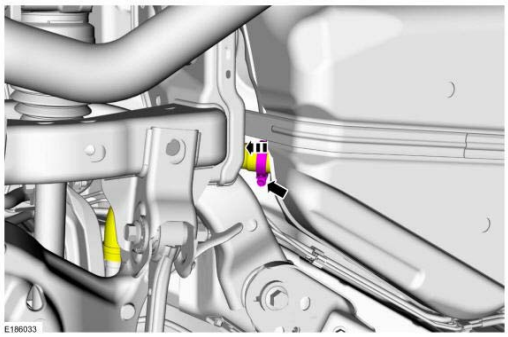
NOTE: Do not over articulate the driveshaft or damage may occur.

7.
Remove the driveshaft center support bearing bolts and lower the driveshaft away from the rear axle flange.



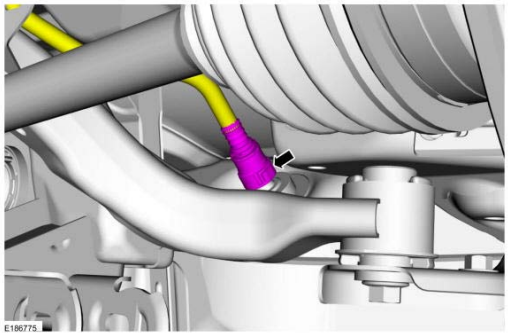
8.

Release the clamp and disconnect the fuel tank filler pipe from the fuel tank.



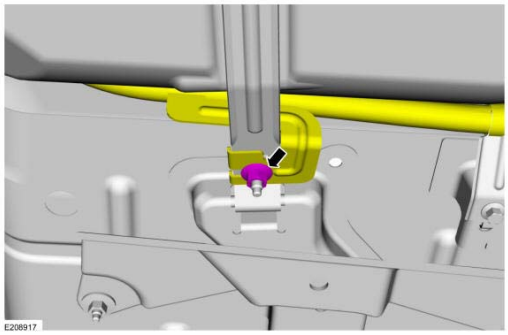
9.

Disconnect the fuel vapor tube assembly-to-fuel tank quick connect coupling. Refer to: QUICK RELEASE COUPLING - 2.3L EcoBoost (231kW/314PS).



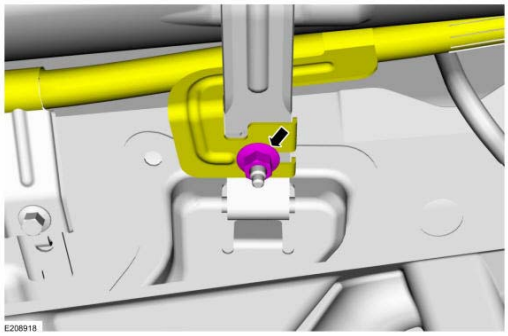
10.

Remove the nut and position the LH emergency brake cable bracket aside.



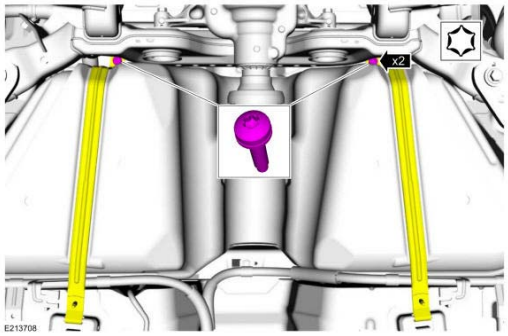
11.

Remove the nut and position the RH emergency brake cable bracket aside.



12.

Using an appropriate impact tool and a TP50 "Torx Plus" Socket Driver, remove the fuel tank strap bolts.



NOTE: Once the fuel tank is removed from the vehicle, reinstall the driveshaft center support bearing bolts by hand and support the rear of the driveshaft with a jackstand or mechanics wire.

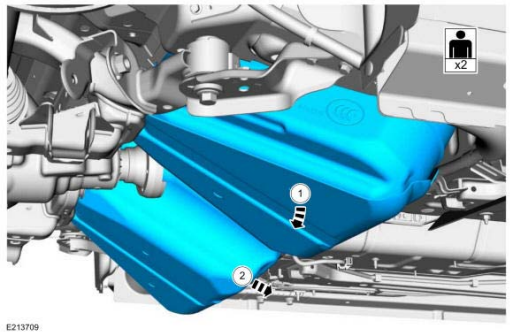
13.

1.

Lower the front of the fuel tank.

2.

Remove the fuel tank.



REMOVAL AND INSTALLATION > FUEL TANK > INSTALLATION

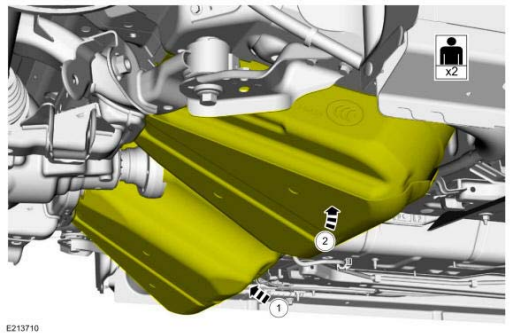
1.

1.

Position the fuel tank above the rear differential.

2.

Raise the fuel tank into position.



2.

Clean the bolts and weld nuts lightly with a wire brush.

Apply the thread locking sealant to the bolt threads.

Material

: Threadlock and Sealer / TA-25-B

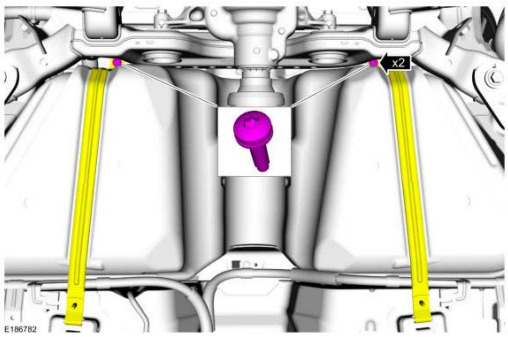
NOTE: To insure that the bolts are threaded in straight, start the bolts by hand

and turn several threads before tightening.

Position the fuel tank straps and install the bolts.

Torque

: 38 lb.ft (52 Nm)

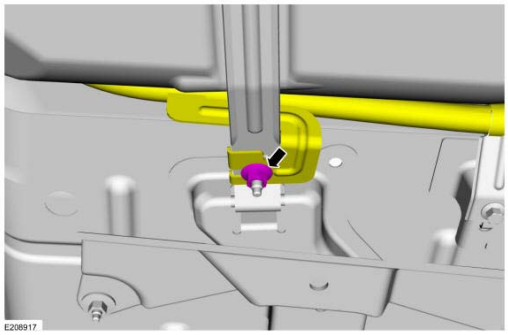


3.

Reposition the LH emergency brake cable bracket and install the nut.

Torque

: 18 lb.ft (25 Nm)

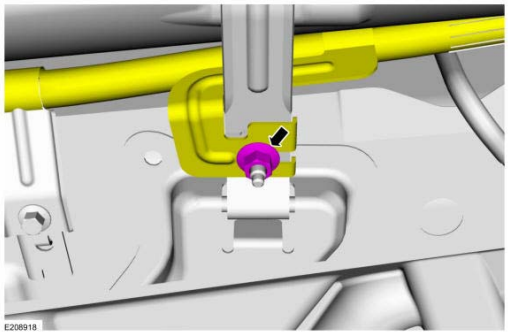


4.

Reposition the RH emergency brake cable bracket and install the nut.

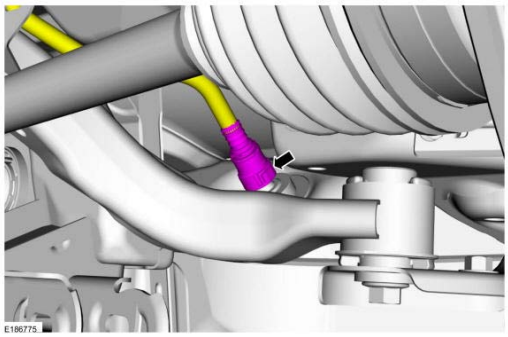
Torque

: 18 lb.ft (25 Nm)



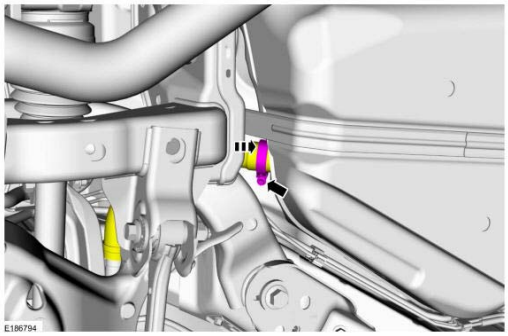
5.

Connect the fuel vapor tube assembly-to-fuel tank quick connect coupling. Refer to: QUICK RELEASE COUPLING - 2.3L EcoBoost (231kW/314PS).



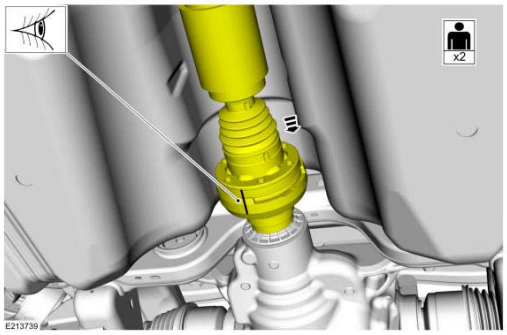
6.

Connect the hose to the fuel tank and tighten the clamp.



NOTE: The help of a assistant will be needed. Do not over articulate the driveshaft or damage may occur.

7.
Align the index marks on the driveshaft to the rear axle pinion flange.



8.

Clean the bolts.

Apply the thread locking sealant to the bolt threads.

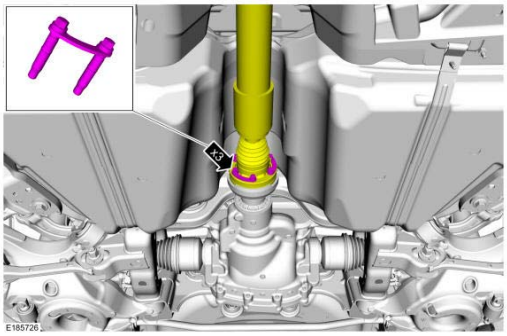
Material

: Threadlock and Sealer / TA-25-B

Install the bolts.

Torque

: 41 lb.ft (55 Nm)



9.

Clean the bolts.

Apply thread locking sealant to the bolt threads.

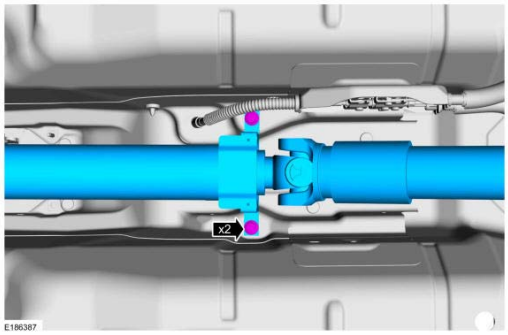
Material

: Threadlock and Sealer / TA-25-B

Install the bolts.

Torque

: 35 lb.ft (48 Nm)



10.

Install the muffler and tailpipe. Refer to: MUFFLER AND TAILPIPE - 2.3L EcoBoost (231kW/314PS).

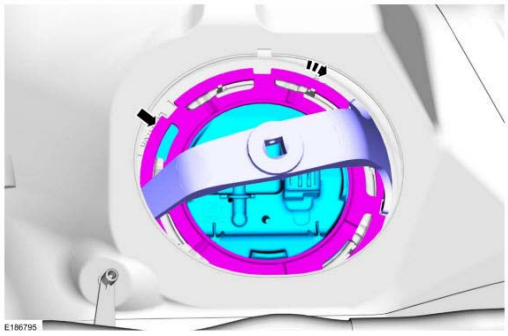
NOTE: Inspect the surfaces of the Fuel Pump and Sender Unit flange and fuel tank O-ring seal contact surfaces. Do not polish or adjust the O-ring seal contact area of the fuel tank flange or the fuel tank. Install a new Fuel Pump and Sender Unit or fuel tank if the O-ring seal contact area is bent, scratched or corroded.

11.
Install a new Fuel Pump and Sender Unit O-ring seal.

NOTE: Carefully install the Fuel Tank Sender Unit lock ring wrench to avoid damage to the Fuel Pump and Sender Unit when removing the lock ring.

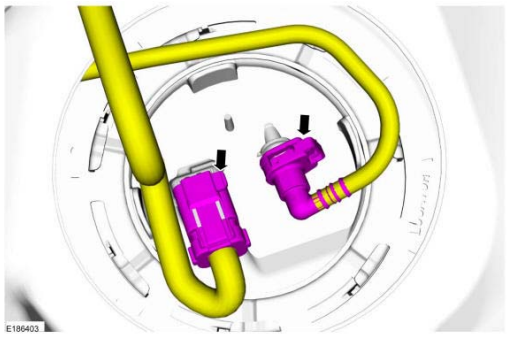
12.
Using the special tool install the Fuel Pump and Sender Unit lock ring.

Use Special Service Tool: 310-123 Locking Ring, Fuel Tank.



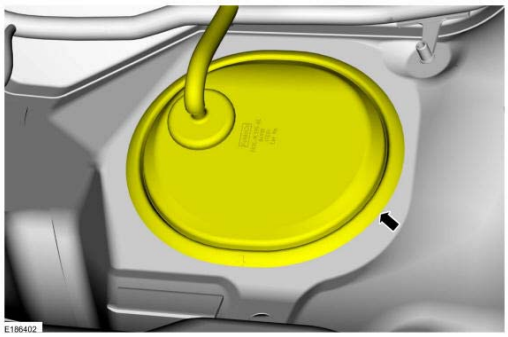
13.

Connect electrical connector and fuel tube quick release coupling. Refer to: QUICK RELEASE COUPLING - 2.3L EcoBoost (231kW/314PS).



14.

Install the access cover.



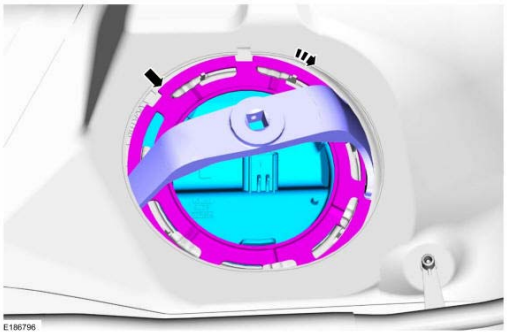
NOTE: Inspect the surfaces of the Fuel Pump and Sender Unit flange and fuel tank O-ring seal contact surfaces. Do not polish or adjust the O-ring seal contact area of the fuel tank flange or the fuel tank. Install a new Fuel Pump and Sender Unit or fuel tank if the O-ring seal contact area is bent, scratched or corroded.

15.
Install a new O-ring seal.

NOTE: Carefully install the Fuel Tank Sender Unit lock ring wrench to avoid damage to the fuel level sensor when removing the lock ring.

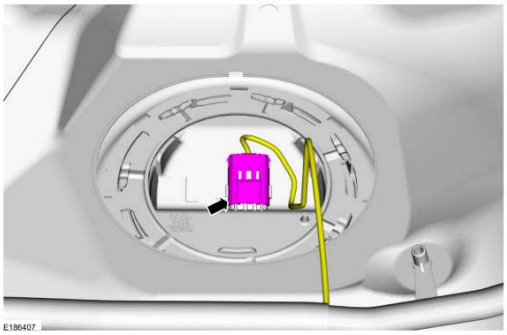
16.
Using the special tool install the fuel level sensor lock ring.

Use Special Service Tool: 310-123 Locking Ring, Fuel Tank.



NOTE: Clean the fuel level sensor connections, flange surfaces and the immediate surrounding area of any dirt or foreign material.

17.
Connect the electrical connector.



18.

Install the access cover.



19.

Install the rear seat cushion. Refer to: Rear Seat Cushion .

20.

Connect the battery ground cable. Refer to: Battery Disconnect and Connect .

REMOVAL AND INSTALLATION > FUEL TANK FILLER PIPE

Special Tool(s) / General Equipment

 ST1134A	292-00004 Fuel Tanker 100 GPM

REMOVAL AND INSTALLATION > FUEL TANK FILLER PIPE > REMOVAL

NOTE: Removal steps in this procedure may contain installation steps.

1.

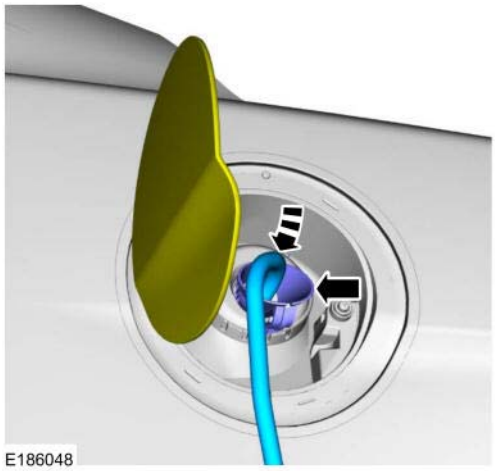
With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

2.

Disconnect the battery ground cable. Refer to: Battery Disconnect and Connect .

NOTE: The supplemental refueling adapter is located in the luggage compartment.

3.
Install the supplemental refueling adapter and a 6 ft. length of 5/8 in. semi-rigid fuel drain tube into the Easy Fuel™ (capless) fuel tank filler pipe until the tube enters the fuel tank.


E186048

NOTE: This step is to remove approximately one-eighth tank of the fuel from a

completely full fuel tank and the majority of any residual fuel in the fuel tank filler pipe, lowering the fuel level below the fuel tank filler pipe inlet.

4.
Attach the Fuel Storage Tanker to the fuel drain tube and remove approximately one-eighth (approximately 2 gallons) of fuel from the tank.

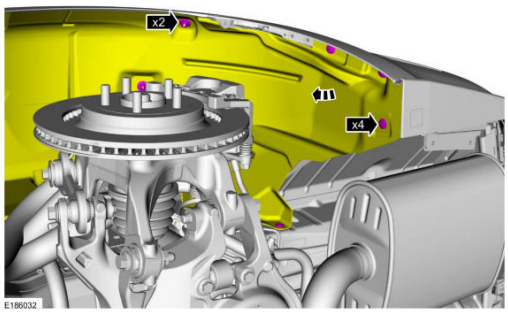
Use Special Service Tool: 292-00004 Fuel Tanker 100 GPM.

5.

Remove the rear wheel on the LH side. Refer to: Wheel and Tire .

6.

Remove the retainers and position aside LH rear wheel splash shield aside.

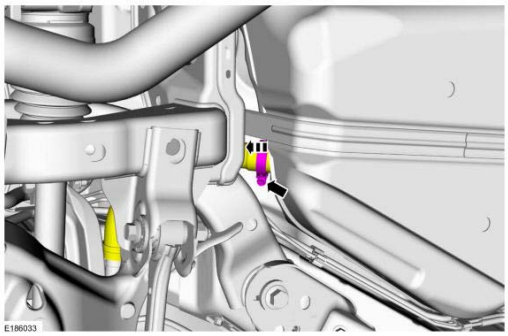


NOTE: Some fuel may remain in the fuel tank filler pipe after draining. Carefully disconnect the fuel tank filler pipe hose from the fuel tank and drain any residual fuel into a suitable container.

7.
Release the clamp and disconnect the fuel tank filler pipe from the fuel tank.

Torque

: 53 lb.in (6 Nm)



8.

1.

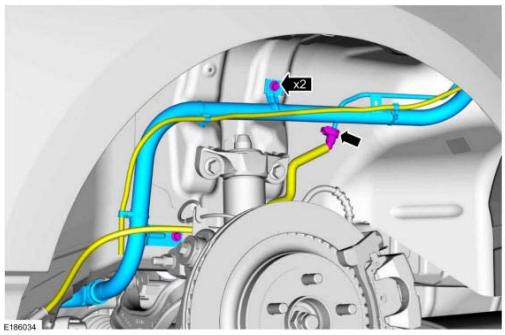
Disconnect the vapor tube Quick Release Coupling. Refer to: QUICK RELEASE COUPLING - 2.3L EcoBoost (231kW/314PS).

2.

Remove retainers and the Fuel Tank Filler Pipe.

Torque

: 18 lb.ft (25 Nm)



REMOVAL AND INSTALLATION > FUEL TANK FILLER PIPE > INSTALLATION

1.

To install, reverse the removal procedure.

SPECIFICATIONS > GENERAL SPECIFICATIONS

Item	Specification
Fuel Tank Capacity	
Fuel Tank Capacity - 3.7L Duratec, 5.0L Ti-VCT	16.0 gal (60.55 L)

DESCRIPTION AND OPERATION > FUEL TANK AND LINES - OVERVIEW

The fuel system consists of the :

- saddle-type fuel tank.
- quick connect fuel and vapor tube couplings.
- fuel tank filler pipe assembly, which cannot be modified in any way, that also contains a restrictor plate to permit only unleaded fuel to be pumped into the tank.
- has an Easy Fuel™ (capless) fuel tank filler pipe assembly, which cannot be modified in any way and is serviced only by the installation of a new fuel tank filler pipe assembly.
- Fuel Pump Control Module (FPCM).
- fuel rail.
- fuel injectors.
- Fuel Tank Pressure (FTP) sensor (part of the fuel vapor tube assembly).
- Mechanical Returnless Fuel System (MRFS).
- Fuel Level Sensor
- Fuel Pump (FP) module containing:
    - The electric FP module which provides pressurized fuel to the high pressure Fuel Pump (FP).
    - The Fuel Level Sender
    - A check valve which maintains system pressure after the pump is shut off.
    - A pressure relief for overpressure protection in the event of restricted fluid flow.
    - A lifetime fuel filter providing filtration to protect the fuel injectors from foreign material.

The vehicle:

- has a serviceable fuel level sender mounted on the fuel pump module.

- has a fuel tank filler pipe which contains a restrictor plate to permit only unleaded fuel to be pumped into the fuel tank.
- has an Easy Fuel (capless) fuel tank filler pipe assembly, which cannot be modified in any way.
- has a supplemental refueling adapter located in the luggage compartment.
- has a lifetime in tank fuel filter serviced as part of the fuel pump.
- has fuel tubes (liquid and vapor) combined in a bundle along with the brake tubes mounted on the underside of the floorpan and covered with a protective cover shield.
- has quick connect and spring lock fuel tube couplings.
- has a FPDM that shuts off fuel in the event of a collision.

DESCRIPTION AND OPERATION > FUEL TANK AND LINES - OVERVIEW > FUEL PUMP SHUT-OFF FEATURE

NOTE: Refer to the DESCRIPTION AND OPERATION to review the procedures for achieving the various ignition states (ignition OFF, ignition in ACCESSORY, ignition ON and ignition START) on vehicles with this feature.

In the event of a moderate to severe collision, the vehicle is equipped with a Fuel Pump and Sender Shut-off Feature that is initiated by the event notification signal.

The event notification signal is a signal provided by the RCM to the FPDM. Signal communication between the RCM and the FPDM allows the PCM to shut-off the Fuel Pump.

Should the vehicle shut off after a collision due to this feature, the vehicle may be restarted by first turning the ignition to the OFF position and then turn the ignition to the ON position. In some instances the vehicle may not start the first time and may take one additional ignition cycle.

DIAGNOSIS AND TESTING > FUEL TANK AND LINES

Refer to ENGINE CONTROLS - INTRODUCTION (EXCEPT DIESEL & HYBRID) .

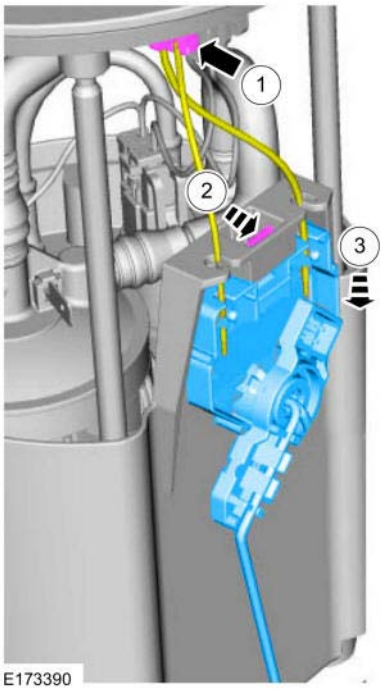
REMOVAL AND INSTALLATION > FUEL LEVEL SENDER > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

Remove the Fuel Pump and Sender Unit. Refer to: Fuel Pump and Sender Unit .

2.



REMOVAL AND INSTALLATION > FUEL LEVEL SENDER > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > FUEL LEVEL SENSOR

Special Tool(s) / General Equipment

 ST1134A	292-00004 Fuel Tanker 100 GPM
 310-123 E80148	310-123 Locking Ring, Fuel Tank TKIT-2004J-F TKIT-2005U-LM

REMOVAL AND INSTALLATION > FUEL LEVEL SENSOR > REMOVAL

1.

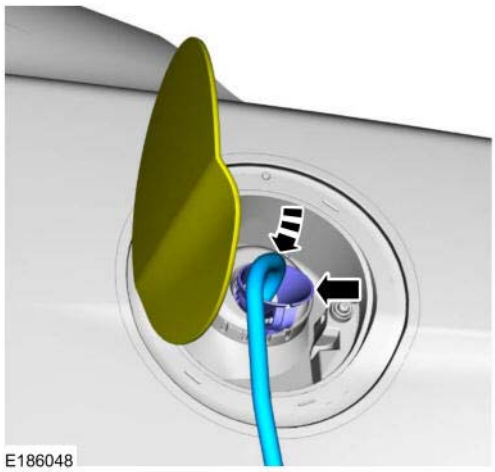
Release the fuel system pressure. Refer to: FUEL SYSTEM PRESSURE RELEASE - 3.7L Duratec (227kW/301PS).

2.

Disconnect the battery ground cable. Refer to: Battery Disconnect and Connect .

> *NOTE: The supplemental refueling adapter is located in the luggage compartment.*

3.
Install the supplemental refueling adapter and a 6 ft. length of 5/8 in. semi-rigid fuel drain tube into the Easy Fuel™ (capless) fuel tank filler pipe until the tube enters the fuel tank.



> *NOTE: This step is to remove approximately 3/16 tank of the fuel (3 gallons) from a completely full fuel tank and the majority of any residual fuel in the fuel tank filler pipe, lowering the fuel level below the Fuel Pump and Sender Unit mounting flange.*

4.
Attach the Fuel Storage Tanker to the fuel drain tube and remove as much fuel as possible from the tank.

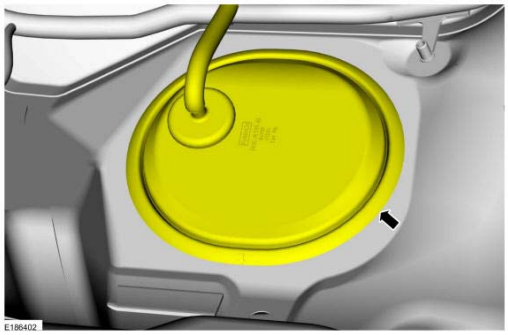
Use Special Service Tool: 292-00004Fuel Tanker 100 GPM.

5.

Remove the rear seat cushion. Refer to: Rear Seat Cushion .

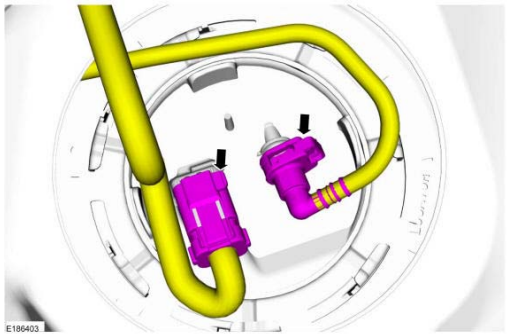
6.

Remove the access cover and position aside.



7.

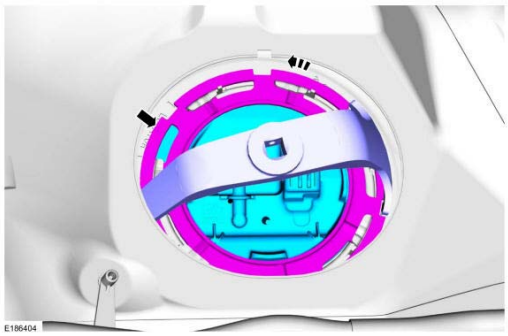
Disconnect electrical connector and fuel tube quick release coupling. Refer to: QUICK RELEASE COUPLING - 3.7L Duratec (227kW/301PS).



NOTE: Carefully install the Fuel Tank Sender Unit lock ring wrench to avoid damage to the Fuel Pump and Sender Unit when removing the lock ring.

8.
Using the special tool remove the Fuel Pump and Sender Unit lock ring.

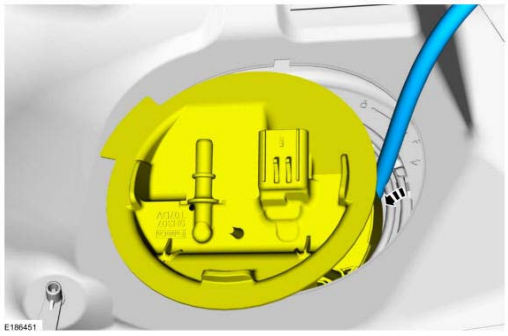
Use Special Service Tool: 310-123Locking Ring, Fuel Tank.



NOTE: The Fuel Pump and Sender Unit must be handled carefully to avoid damage to the float arm.

9.

Position the Fuel Pump and Sender Unit aside. Using the Fuel Storage Tanker, completely drain the remaining fuel from the LH saddle of the fuel tank.



NOTE: Inspect the surfaces of the Fuel Pump and Sender Unit flange and fuel tank O-ring seal contact surfaces. Do not polish or adjust the O-ring seal contact area of the fuel tank flange or the fuel tank. Install a new Fuel Pump and Sender Unit or fuel tank if the O-ring seal contact area is bent, scratched or corroded.

10.
Remove and discard the O-ring seal.

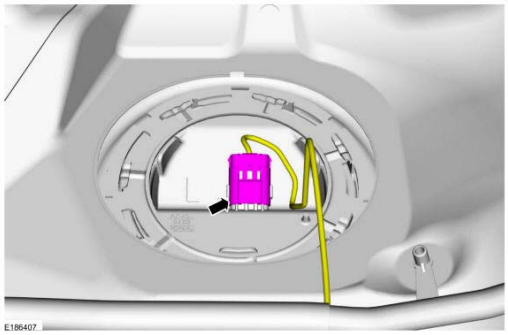
11.

Remove the Fuel Level Sensor access cover and position aside.



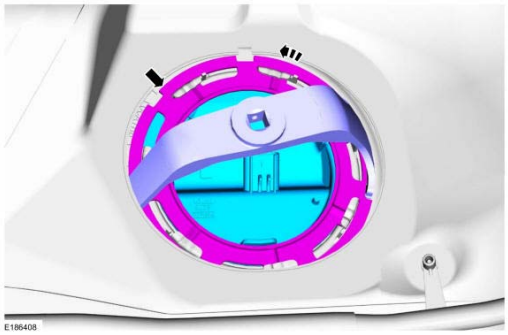
NOTE: Clean the fuel level sensor connections, flange surfaces and the immediate surrounding area of any dirt or foreign material.

12.
Disconnect the electrical connector.



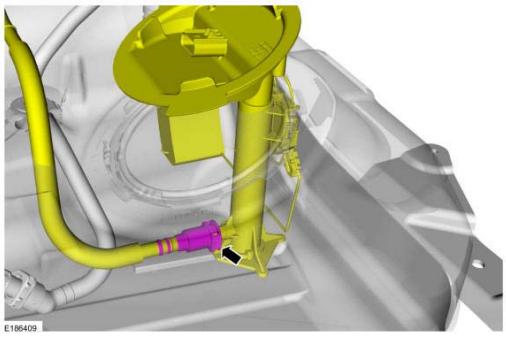
NOTE: Carefully install the Fuel Tank Sender Unit Socket to avoid damage to the fuel level sensor when removing the lock ring.

13.
Using the lock ring wrench remove the Fuel Level Sensor lock ring.



14.

Disconnect the internal fuel tube-to-Fuel Level Sensor quick connect coupling. Refer to: QUICK RELEASE COUPLING - 3.7L Duratec (227kW/301PS).



REMOVAL AND INSTALLATION > FUEL LEVEL SENSOR > INSTALLATION

NOTE: Make sure the alignment tabs on the Fuel Level Sensor and the fuel tank

meet prior to tightening the Fuel Level Sensor lock ring.

NOTE: Make sure to install a new Fuel Level Sensor O-ring seal.

1.
To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > FUEL PUMP AND SENDER UNIT

Special Tool(s) / General Equipment

 ST1134A	292-00004 Fuel Tanker 100 GPM
 310-123 E80148	310-123 Locking Ring, Fuel Tank TKIT-2004J-F TKIT-2005U-LM

REMOVAL AND INSTALLATION > FUEL PUMP AND SENDER UNIT > REMOVAL

1.

Release the fuel system pressure. Refer to: FUEL SYSTEM PRESSURE RELEASE - 3.7L Duratec (227kW/301PS).

2.

Disconnect the battery ground cable. Refer to: Battery Disconnect and Connect .

NOTE: The supplemental refueling adapter is located in the luggage compartment.

3.
Install the supplemental refueling adapter and a 6 ft. length of 5/8 in. semi-rigid fuel drain tube into the Easy Fuel™ (capless) fuel tank filler pipe until the tube enters the fuel tank.



NOTE: This step is to remove approximately 3/16 tank of the fuel (3 gallons) from a completely full fuel tank and the majority of any residual fuel in the fuel tank filler pipe, lowering the fuel level below the Fuel Pump and Sender Unit mounting flange.

4.
Attach the Fuel Storage Tanker to the fuel drain tube and remove as much fuel as possible from the tank.

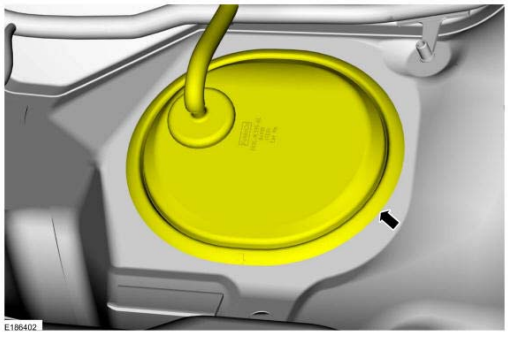
Use Special Service Tool: 292-00004 Fuel Tanker 100 GPM.

5.

Remove the rear seat cushion. Refer to: Rear Seat Cushion .

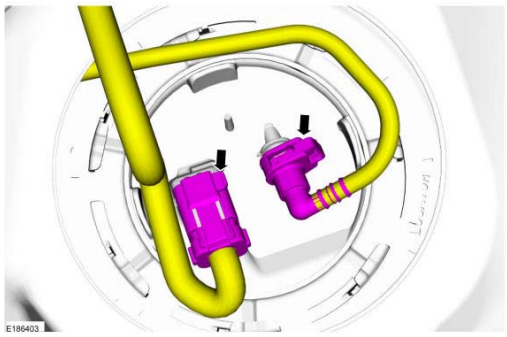
6.

Remove the Fuel Pump and Sender Unit access cover and position aside.



7.

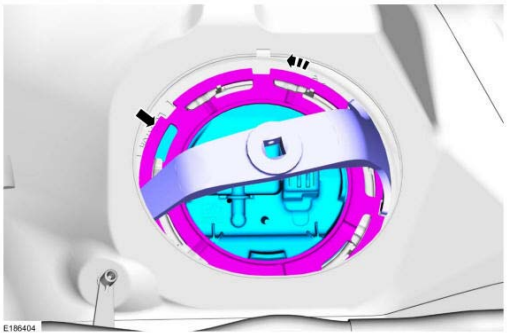
Disconnect electrical connector and fuel tube quick release coupling. Refer to: QUICK RELEASE COUPLING - 3.7L Duratec (227kW/301PS).



8.

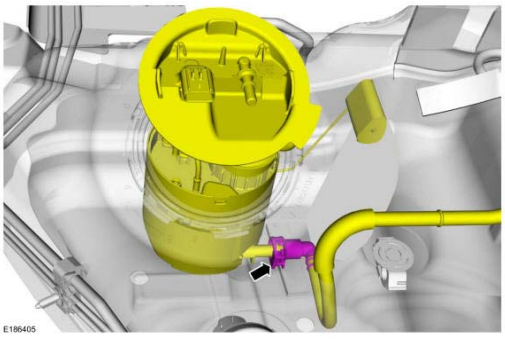
Using the lock ring wrench remove the Fuel Pump and Sender Unit lock ring.

Use Special Service Tool: 310-123 Locking Ring, Fuel Tank.



9.

Disconnect the internal fuel tube-to-Fuel Pump and Sender Unit quick connect coupling and remove the Fuel Pump and Sender Unit. Refer to: QUICK RELEASE COUPLING - 3.7L Duratec (227kW/301PS).



REMOVAL AND INSTALLATION > FUEL PUMP AND SENDER UNIT > INSTALLATION

NOTE: Make sure the alignment tabs on the Fuel Pump and Sender Unit and the fuel tank meet prior to tightening the Fuel Pump and Sender Unit lock ring.

NOTE: Make sure to install a new Fuel Pump and Sender Unit O-ring seal.

1.
To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > FUEL TANK

Special Tool(s) / General Equipment

Flat Headed Screw Driver

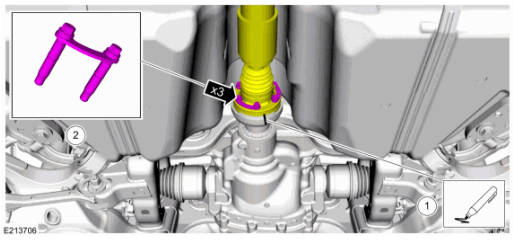
Materials

Name	Specification
Threadlock and Sealer TA-25-B	

REMOVAL AND INSTALLATION > FUEL TANK > REMOVAL

NOTE: Removal steps in this procedure may contain installation steps.

1. With the vehicle in NEUTRAL, position it on a hoist. Refer to: JACKING AND LIFTING - OVERVIEW .
2. Drain the fuel tank. Refer to: FUEL TANK DRAINING .
3. Remove the muffler and tailpipe. Refer to: MUFFLER AND TAILPIPE .
4. 1. Index mark the driveshaft and pinion flange for reference during installation.
   2. Remove the driveshaft to pinion flange bolts.



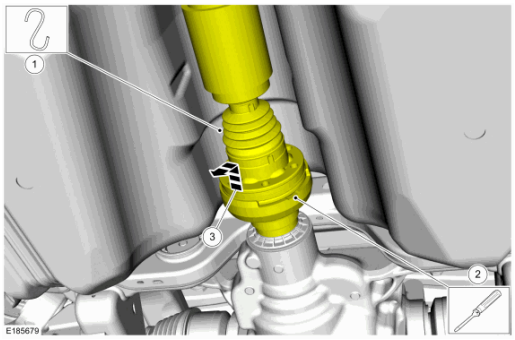
NOTE: Do not over articulate the driveshaft or damage may occur.

5. 1. Support the driveshaft.

2. Using a screwdriver inserted into the slot on the pinion flange, pry the driveshaft from the pinion flange.

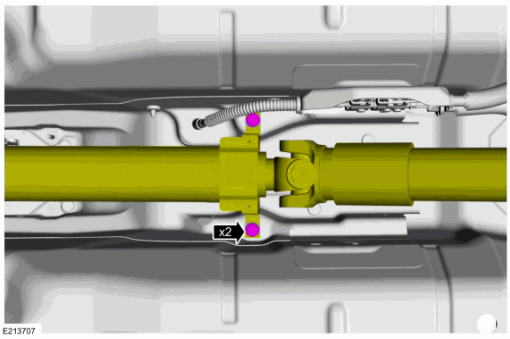
   Use the General Equipment: Flat Headed Screw Driver

3. Separate the driveshaft from the pinion flange.

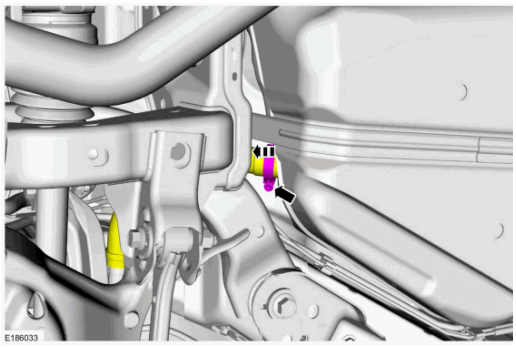


NOTE: Do not over articulate the driveshaft or damage may occur.

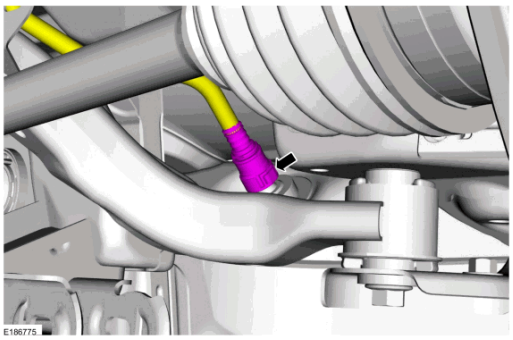
6. Remove the driveshaft center support bearing bolts and lower the driveshaft away from the rear axle flange.



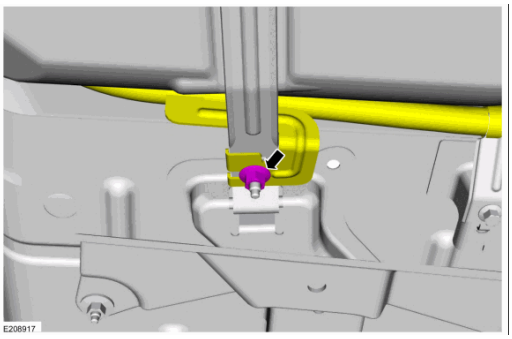
7. Release the clamp and disconnect the fuel tank filler pipe from the fuel tank.



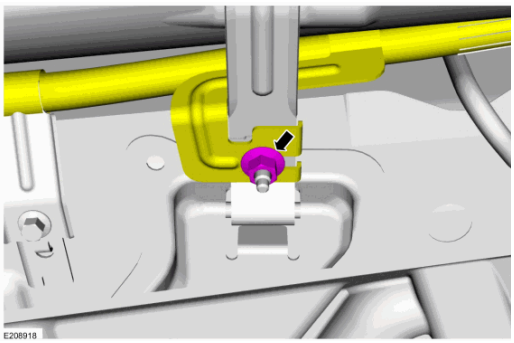
8. Disconnect the fuel vapor tube assembly-to-fuel tank quick connect coupling. Refer to: QUICK RELEASE COUPLING .



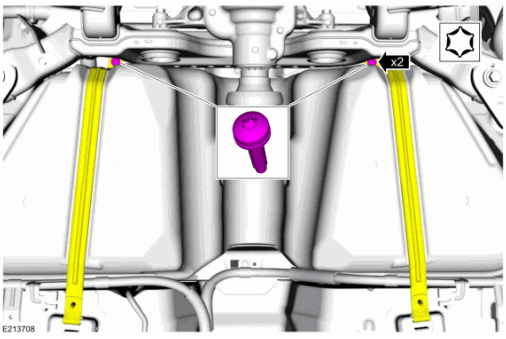
9. Remove the nut and position the LH emergency brake cable bracket aside.



10. Remove the nut and position the RH emergency brake cable bracket aside.



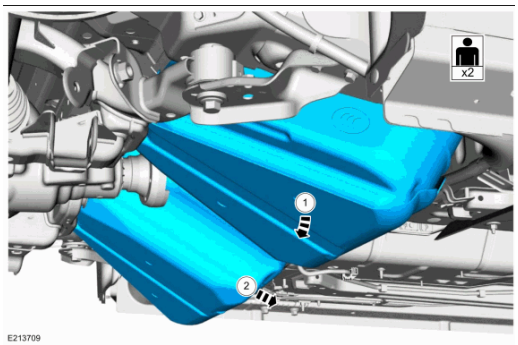
11. Using an appropriate impact tool and a TP50 "Torx Plus" Socket Driver, remove the fuel tank strap bolts.



NOTE: Once the fuel tank is removed from the vehicle, reinstall the driveshaft

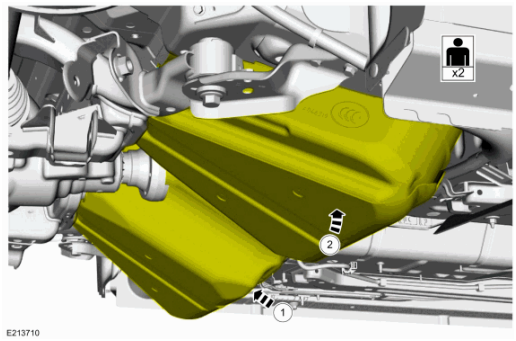
center support bearing bolts by hand and support the rear of the driveshaft with a jackstand or mechanics wire.

12. 1. Lower the front of the fuel tank.
    2. Remove the fuel tank.



REMOVAL AND INSTALLATION > FUEL TANK > INSTALLATION

1. 1. Position the fuel tank above the rear differential.
   2. Raise the fuel tank into position.



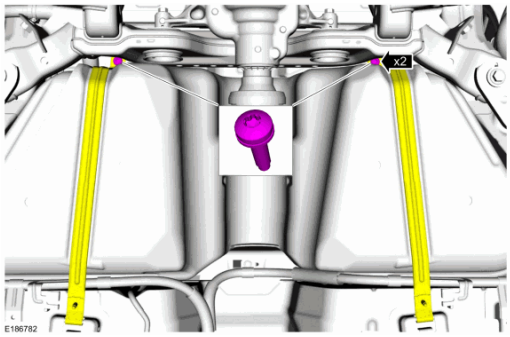
2. 1. Clean the bolts and weld nuts lightly with a wire brush.
   2. Apply the thread locking sealant to the bolt threads.

      Material: Threadlock and Sealer / TA-25-B

      NOTE: To insure that the bolts are threaded in straight, start the bolts by hand and turn several threads before tightening.

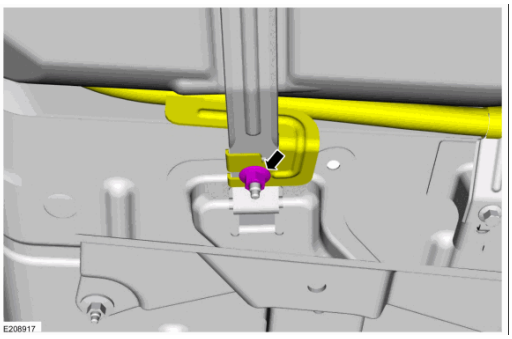
   3. Position the fuel tank straps and install the bolts.

      Torque: 38 lb.ft (52 Nm)



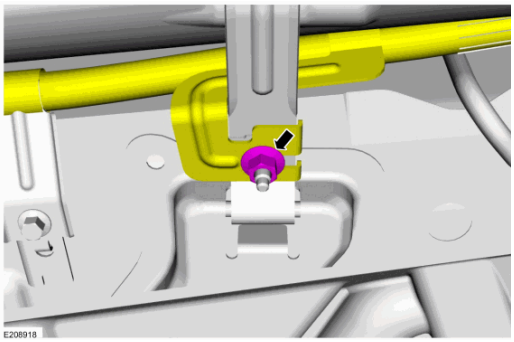
3. Reposition the LH emergency brake cable bracket and install the nut.

   Torque: 18 lb.ft (25 Nm)

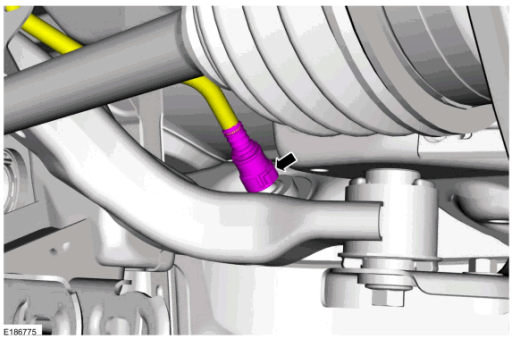


4. Reposition the RH emergency brake cable bracket and install the nut.

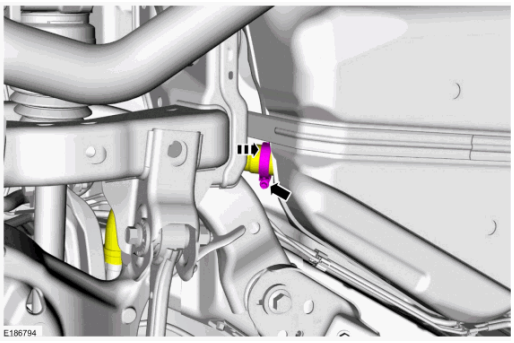
   Torque: 18 lb.ft (25 Nm)



5. Connect the fuel vapor tube assembly-to-fuel tank quick connect coupling. Refer to: QUICK RELEASE COUPLING .

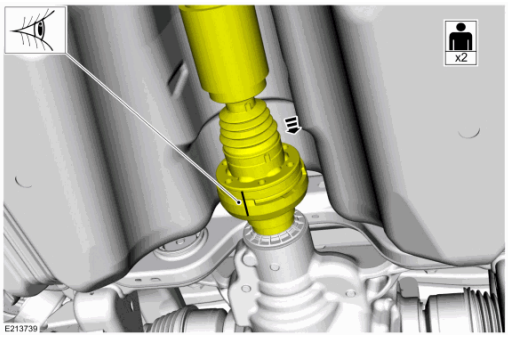


6. Connect the fuel tank filler pipe hose to the fuel tank and tighten the clamp.



NOTE: The help of a assistant will be needed. Do not over articulate the driveshaft or damage may occur.

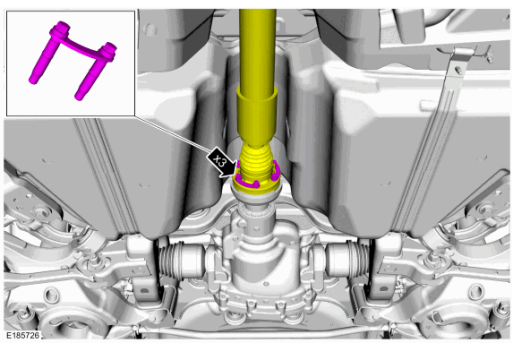
7. Align the index marks on the driveshaft to the rear axle pinion flange.



8. 1. Clean the bolts.
   2. Apply the thread locking sealant to the bolt threads.

      Material: Threadlock and Sealer / TA-25-B
   3. Install the bolts.

      Torque: 41 lb.ft (55 Nm)

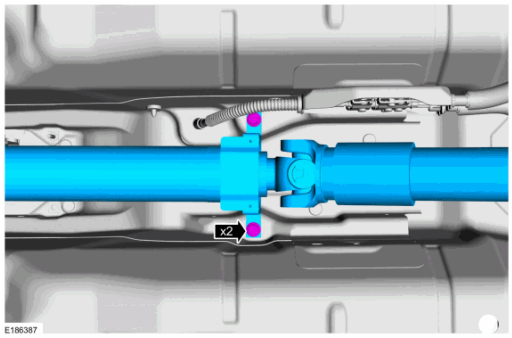


9. 1. Clean the bolts.
   2. Apply thread locking sealant to the bolt threads.

Material: Threadlock and Sealer / TA-25-B

3. Install the bolts.

   Torque: 35 lb.ft (48 Nm)



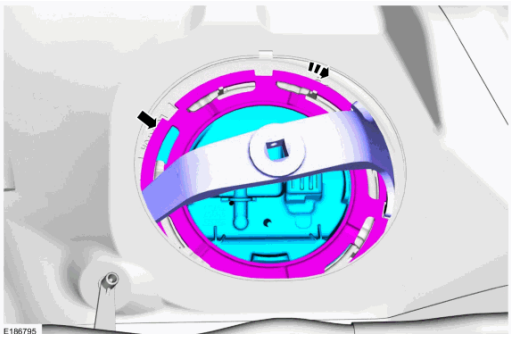
10. Install the muffler and tailpipe. Refer to: MUFFLER AND TAILPIPE .

> *NOTE: Inspect the surfaces of the Fuel Pump and Sender Unit flange and fuel tank O-ring seal contact surfaces. Do not polish or adjust the O-ring seal contact area of the fuel tank flange or the fuel tank. Install a new Fuel Pump and Sender Unit or fuel tank if the O-ring seal contact area is bent, scratched or corroded.*

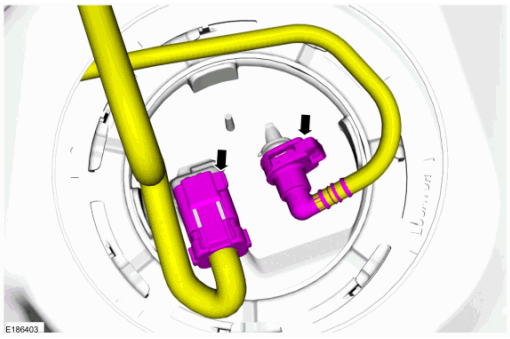
11. Install a new Fuel Pump and Sender Unit O-ring seal.

> *NOTE: Carefully install the Fuel Tank Sender Unit lock ring wrench to avoid damage to the Fuel Pump and Sender Unit when removing the lock ring. Using the lock ring wrench install the Fuel Pump and Sender Unit lock ring.*

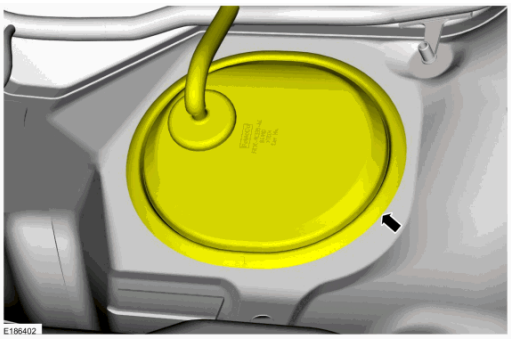
12. Using the lock ring wrench install the Fuel Pump and Sender Unit lock ring.



13. Connect electrical connector and fuel tube quick release coupling. Refer to: QUICK RELEASE COUPLING .



14. Install the Fuel Pump and Sender Unit access cover.

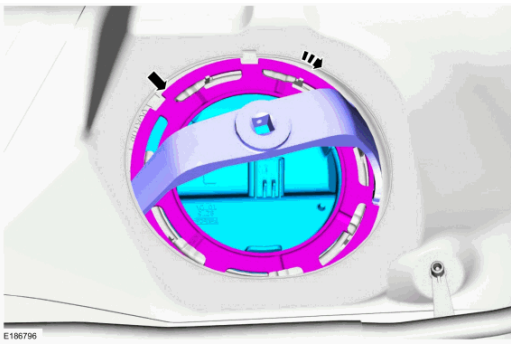


NOTE: Inspect the surfaces of the Fuel Pump and Sender Unit flange and fuel tank O-ring seal contact surfaces. Do not polish or adjust the O-ring seal contact area of the fuel tank flange or the fuel tank. Install a new Fuel Pump and Sender Unit or fuel tank if the O-ring seal contact area is bent, scratched or corroded.

15. Install a new Fuel Level Sensor O-ring seal.

NOTE: Carefully install the Fuel Tank Sender Unit lock ring wrench to avoid damage to the fuel level sensor when removing the lock ring.

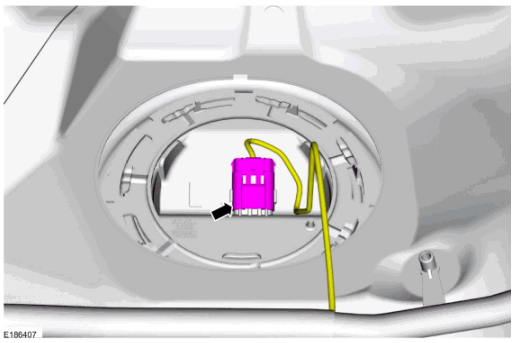
16. Using the lock ring wrench install the fuel level sensor lock ring.



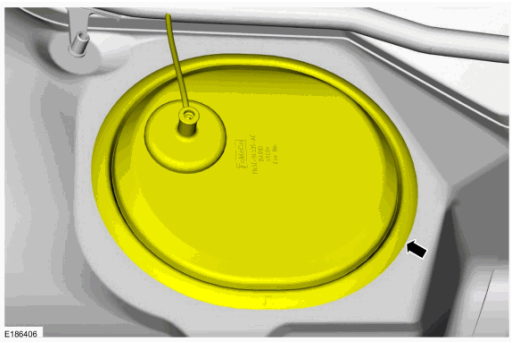
NOTE: Clean the fuel level sensor connections, flange surfaces and the

immediate surrounding area of any dirt or foreign material.

17. Connect the electrical connector.



18. Install the Fuel Level Sensor access cover.



19. Install the rear seat cushion. Refer to: REAR SEAT CUSHION .
20. Connect the battery ground cable. Refer to: BATTERY DISCONNECT AND CONNECT .

REMOVAL AND INSTALLATION > FUEL TANK FILLER PIPE

Special Tool(s) / General Equipment

 ST1134A	292-00004 Fuel Tanker 100 GPM

REMOVAL AND INSTALLATION > FUEL TANK FILLER PIPE > REMOVAL

NOTE: Removal steps in this procedure may contain installation steps.

1.

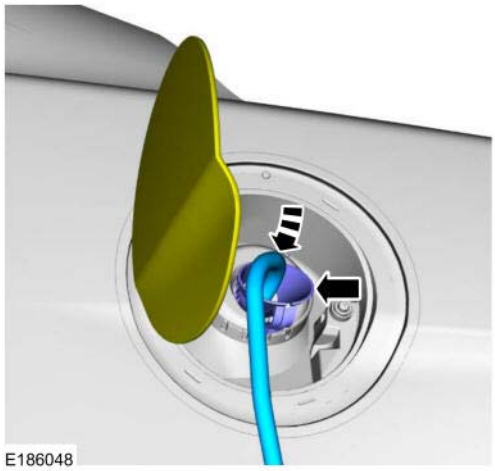
With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

2.

Disconnect the battery ground cable. Refer to: Battery Disconnect and Connect .

NOTE: The supplemental refueling adapter is located in the luggage compartment.

3.
Install the supplemental refueling adapter and a 6 ft. length of 5/8 in. semi-rigid fuel drain tube into the Easy Fuel™ (capless) fuel tank filler pipe until the tube enters the fuel tank.



NOTE: This step is to remove approximately one-eighth tank of the fuel from a completely full fuel tank and the majority of any residual fuel in the fuel tank filler pipe, lowering the fuel level below the fuel tank filler pipe inlet.

4.
Attach the Fuel Storage Tanker to the fuel drain tube and remove approximately one-eighth (approximately 2 gallons) of fuel from the tank.

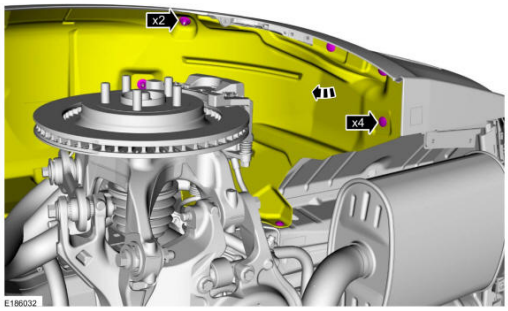
Use Special Service Tool: 292-00004 Fuel Tanker 100 GPM.

5.

Remove the rear wheel on the LH side. Refer to: Wheel and Tire .

6.

Remove the retainers and position aside LH rear wheel splash shield aside.

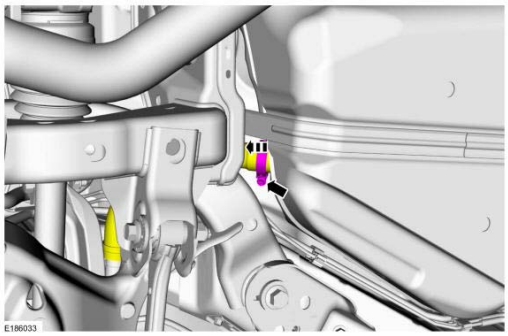


NOTE: Some fuel may remain in the fuel tank filler pipe after draining. Carefully disconnect the fuel tank filler pipe hose from the fuel tank and drain any residual fuel into a suitable container.

7.
Release the clamp and disconnect the fuel tank filler pipe from the fuel tank.

Torque

: 53 lb.in (6 Nm)



8.

1.

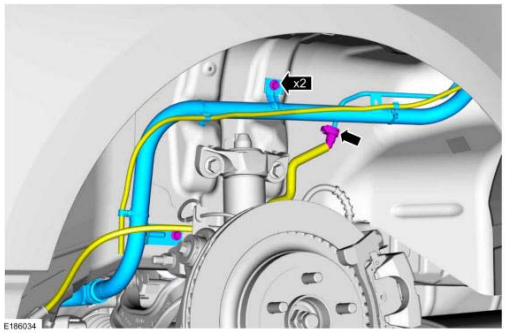
Disconnect the vapor tube Quick Release Coupling. Refer to: QUICK RELEASE COUPLING - 3.7L Duratec (227kW/301PS).

2.

Remove retainers and the Fuel Tank Filler Pipe.

Torque

: 18 lb.ft (25 Nm)



REMOVAL AND INSTALLATION > FUEL TANK FILLER PIPE > INSTALLATION

1.

To install, reverse the removal procedure.

Service Manual: FUEL TANK AND LINES - 5.0L 32V TI-VCT

SPECIFICATIONS > GENERAL SPECIFICATIONS

Item	Specification
Fuel Tank Capacity	
Fuel Tank Capacity - 3.7L Duratec, 5.0L Ti-VCT	16.0 gal (60.55 L)

DESCRIPTION AND OPERATION > FUEL TANK AND LINES - OVERVIEW

Fuel System

The fuel tank and lines consist of the:

- saddle-type fuel tank.
- Fuel, vapor and brake tubes in an integrated bundle assembly.
- Quick connect fuel and vapor tube couplings.
- Easy Fuel™ (capless) fuel tank filler pipe assembly, which cannot be modified in any way and is serviced only by the installation of a new fuel tank filler pipe assembly.
- A supplemental refueling adapter located in the spare tire compartment.
- A Fuel Pump Control Module (FPCM).
- FPDM
- A Mechanical Returnless Fuel System (MRFS).
- Fuel Level Sensor
- A Fuel Pump (FP) and Sender Unit containing:
    - The electric Fuel Pump (FP) and Sender Unit which provides pressurized fuel to the high pressure Fuel Pump (FP).
    - The Fuel Level Sender
    - A check valve which maintains system pressure after the pump is shut off.
    - A pressure relief for overpressure protection in the event of restricted fluid flow.
    - A lifetime fuel filter providing filtration to protect the fuel injectors from foreign material.

The vehicle:

- has a serviceable fuel level sender mounted on the fuel pump module.
- has a fuel tank filler pipe which contains a restrictor plate to permit only unleaded fuel to be pumped into the fuel tank.

- has an Easy Fuel™ (capless) fuel tank filler pipe assembly, which cannot be modified in any way.
- has a supplemental refueling adapter located in the luggage compartment.
- has a lifetime in tank fuel filter serviced as part of the fuel pump.
- has fuel tubes (liquid and vapor) combined in a bundle along with the brake tubes mounted on the underside of the floorpan and covered with a protective cover shield.
- has quick connect and spring lock fuel tube couplings.
- has a FPDM that shuts off fuel in the event of a collision.

Fuel Pump Shut-off Feature

NOTE: Refer to the DESCRIPTION AND OPERATION , Intelligent Access with Push Button Start to review the procedures for achieving the various ignition states (ignition OFF, ignition in ACCESSORY, ignition ON and ignition START) on vehicles with this feature.

In the event of a moderate to severe collision, the vehicle is equipped with a Fuel Pump and Sender Shut-off Feature that is initiated by the event notification signal.

The event notification signal is a signal provided by the RCM to the FPDM. Signal communication between the RCM and the FPDM allows the PCM to shut-off the Fuel Pump.

Should the vehicle shut off after a collision due to this feature, the vehicle may be restarted by first turning the ignition to the OFF position and then turn the ignition to the ON position. In some instances the vehicle may not start the first time and may take one additional ignition cycle.

DIAGNOSIS AND TESTING > FUEL TANK AND LINES

Refer to ENGINE CONTROLS - INTRODUCTION (EXCEPT DIESEL & HYBRID) .

REMOVAL AND INSTALLATION > FUEL LEVEL SENDER > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

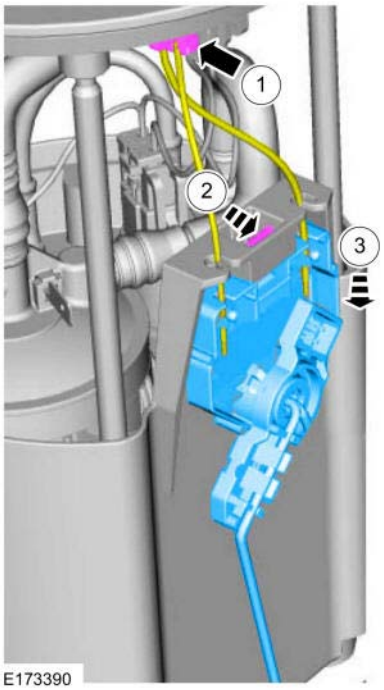
Remove the Fuel Pump and Sender Unit. Refer to: Fuel Pump and Sender Unit .

2.

Disconnect the electrical connector.

Release the locking tab.

Remove the Fuel Level Sender.



REMOVAL AND INSTALLATION > FUEL LEVEL SENDER > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > FUEL LEVEL SENSOR

Special Tool(s) / General Equipment

 ST1134A	292-00004 Fuel Tanker 100 GPM
 310-123 E80148	310-123 Locking Ring, Fuel Tank TKIT-2004J-F TKIT-2005U-LM

REMOVAL AND INSTALLATION > FUEL LEVEL SENSOR > REMOVAL

1.

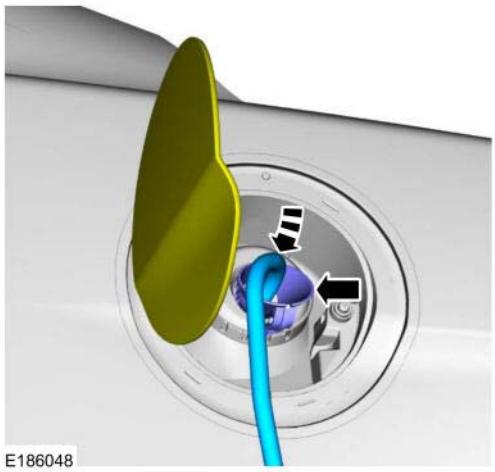
Release the fuel system pressure. Refer to: FUEL SYSTEM PRESSURE RELEASE - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS).

2.

Disconnect the battery ground cable. Refer to: Battery Disconnect and Connect .

NOTE: The supplemental refueling adapter is located in the luggage compartment.

3.
Install the supplemental refueling adapter and a 6 ft. length of 5/8 in. semi-rigid fuel drain tube into the Easy Fuel™ (capless) fuel tank filler pipe until the tube enters the fuel tank.



NOTE: This step is to remove approximately 3/16 tank of the fuel (3 gallons) from a completely full fuel tank and the majority of any residual fuel in the fuel tank filler pipe, lowering the fuel level below the Fuel Pump and Sender Unit mounting flange.

4.
Attach the Fuel Storage Tanker to the fuel drain tube and remove as much fuel as possible from the tank.

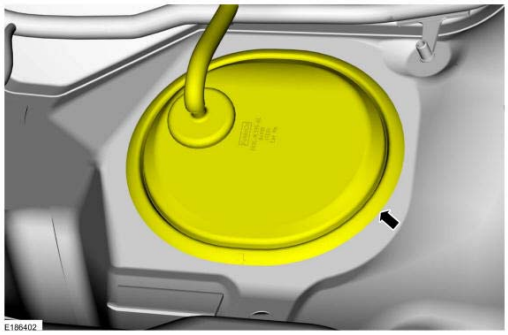
Use Special Service Tool: 292-00004 Fuel Tanker 100 GPM.

5.

Remove the rear seat cushion. Refer to: Rear Seat Cushion .

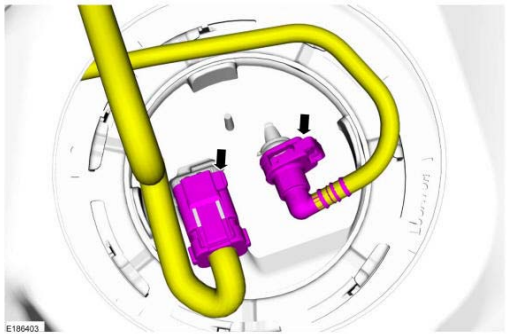
6.

Remove the access cover and position aside.



7.

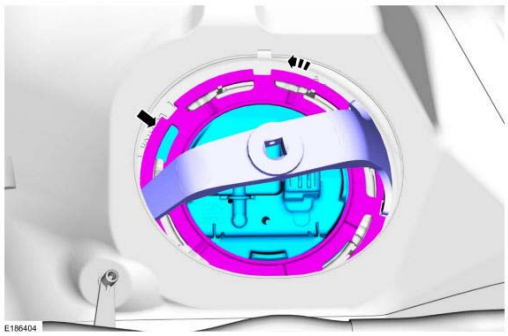
Disconnect electrical connector and fuel tube quick release coupling. Refer to: Quick Release Coupling - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS).



NOTE: Carefully install the Fuel Tank Sender Unit lock ring wrench to avoid damage to the Fuel Pump and Sender Unit when removing the lock ring.

8.
Using the special tool remove the Fuel Pump and Sender Unit lock ring.

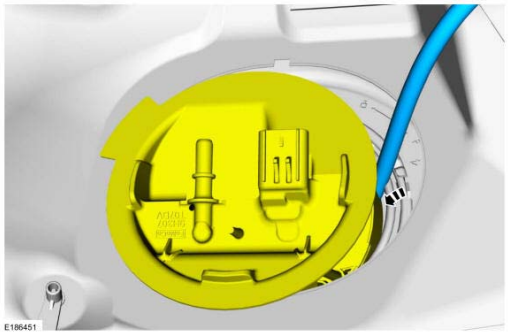
Use Special Service Tool: 310-123 Locking Ring, Fuel Tank.



NOTE: The Fuel Pump and Sender Unit must be handled carefully to avoid damage to the float arm.

9.

Position the Fuel Pump and Sender Unit aside. Using the Fuel Storage Tanker, completely drain the remaining fuel from the LH saddle of the fuel tank.



NOTE: Inspect the surfaces of the Fuel Pump and Sender Unit flange and fuel tank O-ring seal contact surfaces. Do not polish or adjust the O-ring seal contact area of the fuel tank flange or the fuel tank. Install a new Fuel Pump and Sender Unit or fuel tank if the O-ring seal contact area is bent, scratched or corroded.

10.
Remove and discard the O-ring seal.

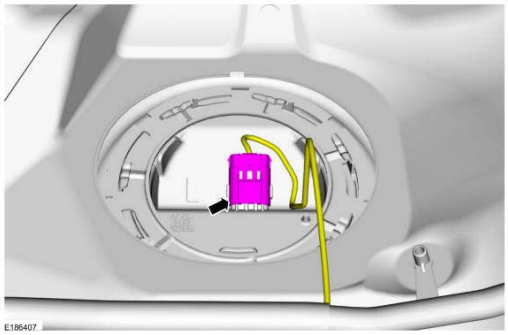
11.

Remove the access cover and position aside.



NOTE: Clean the fuel level sensor connections, flange surfaces and the immediate surrounding area of any dirt or foreign material.

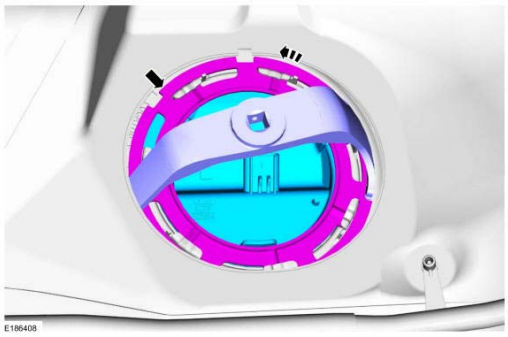
12.
Disconnect the electrical connector.



NOTE: Carefully install the Fuel Tank Sender Unit Socket to avoid damage to the fuel level sensor when removing the lock ring.

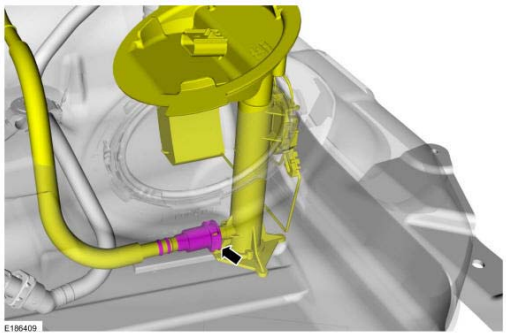
13.
Using the special tool remove the Fuel Level Sensor lock ring.

Use Special Service Tool: 310-123 Locking Ring, Fuel Tank.



14.

Disconnect the internal fuel tube-to-Fuel Level Sensor quick connect coupling. Refer to: Quick Release Coupling - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS).



REMOVAL AND INSTALLATION > FUEL LEVEL SENSOR > INSTALLATION

NOTE: Make sure to install a new Fuel Level Sensor O-ring seal.

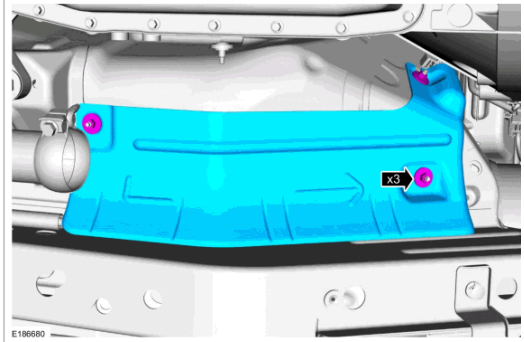
NOTE: Make sure the alignment tabs on the Fuel Level Sensor and the fuel tank meet prior to tightening the Fuel Level Sensor lock ring.

1.
To install, reverse the removal procedure.

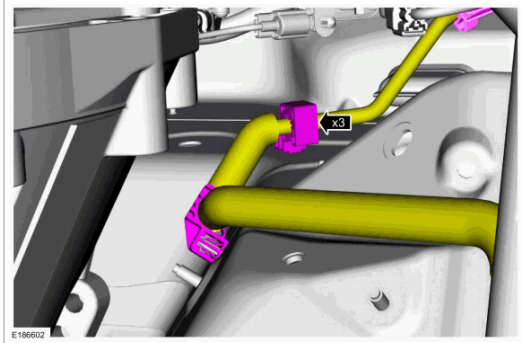
REMOVAL AND INSTALLATION > FUEL LINES > REMOVAL

1. Remove the fuel tank. Refer to: Fuel Tank .
2. Remove LH Catalytic Converter. Refer to: CATALYTIC CONVERTER LH .
3. Remove the nuts and the heat shield.

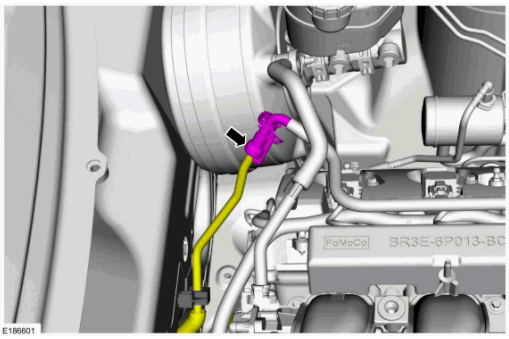
   Torque: 71 lb.in (8 Nm)



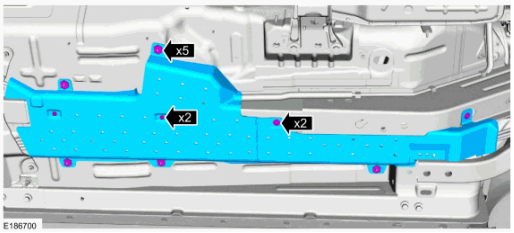
4. Release the fuel line from the retainers.



5. Disconnect the fuel line-to-fuel rail jumper tube spring lock coupling. Refer to: SPRING LOCK COUPLINGS .

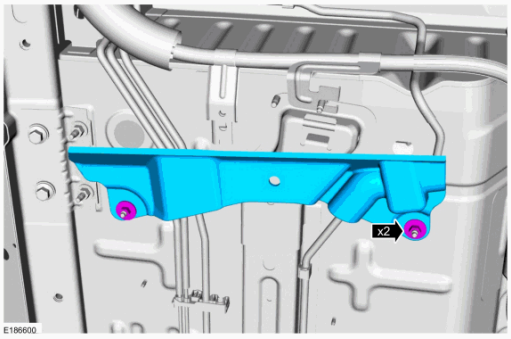


6. Remove the nuts, bolts, push-pins and splash shield.

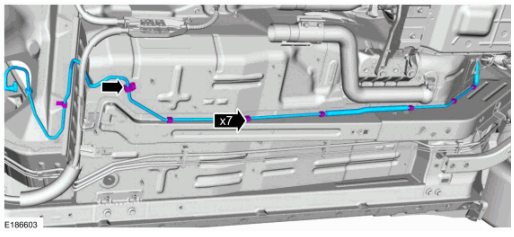


7. Remove the nuts and the fuel tank deflector.

   Torque: 18 lb.ft (25 Nm)



8. Release the retainers and remove the fuel line.



REMOVAL AND INSTALLATION > FUEL LINES > INSTALLATION

NOTE: Make sure the fuel tubes are completely seated and that the quick connect couplings are locked correctly in place. Pull on the tube to make sure it is

fully seated. Upon completion, pressurize the system and check for leaks.

1. To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > FUEL PUMP AND SENDER UNIT

Special Tool(s) / General Equipment

 ST1134A	292-00004 Fuel Tanker 100 GPM
 E80148	310-123 Locking Ring, Fuel Tank TKIT-2004J-F TKIT-2005U-LM

REMOVAL AND INSTALLATION > FUEL PUMP AND SENDER UNIT > REMOVAL

1.

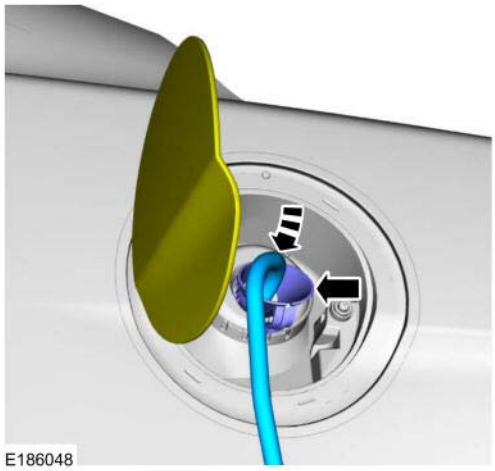
Release the fuel system pressure. Refer to: FUEL SYSTEM PRESSURE RELEASE - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS).

2.

Disconnect the battery ground cable. Refer to: Battery Disconnect and Connect .

NOTE: The supplemental refueling adapter is located in the luggage compartment.

3.
Install the supplemental refueling adapter and a 6 ft. length of 5/8 in. semi-rigid fuel drain tube into the Easy Fuel™ (capless) fuel tank filler pipe until the tube enters the fuel tank.



NOTE: This step is to remove approximately 3/16 tank of the fuel (3 gallons) from a completely full fuel tank and the majority of any residual fuel in the fuel tank filler pipe, lowering the fuel level below the Fuel Pump and Sender Unit mounting flange.

4.
Attach the Fuel Storage Tanker to the fuel drain tube and remove as much fuel as possible from the tank.

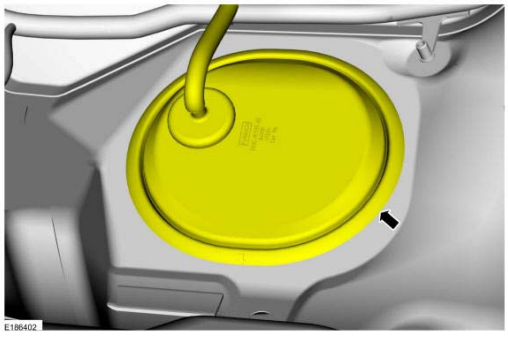
Use Special Service Tool: 292-00004 Fuel Tanker 100 GPM.

5.

Remove the rear seat cushion. Refer to: Rear Seat Cushion .

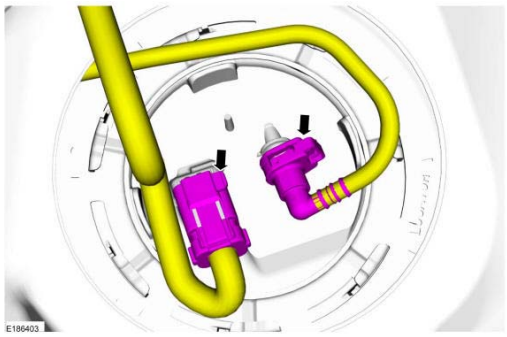
6.

Remove the access cover and position aside.



7.

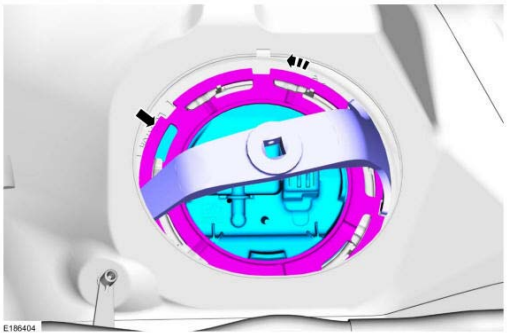
Disconnect electrical connector and fuel tube quick release coupling. Refer to: Quick Release Coupling - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS).



8.

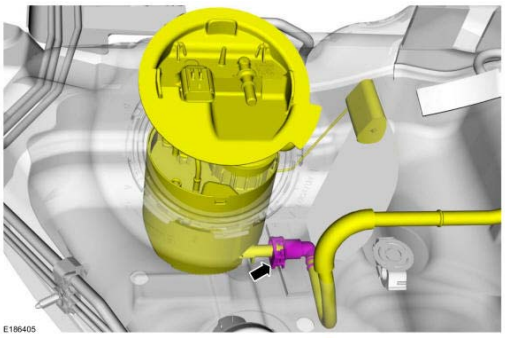
Using the lock ring wrench remove the Fuel Pump and Sender Unit lock ring.

Use Special Service Tool: 310-123 Locking Ring, Fuel Tank.



9.

Disconnect the internal fuel tube-to-Fuel Pump and Sender Unit quick connect coupling and remove the Fuel Pump and Sender Unit. Refer to: Quick Release Coupling - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS).



REMOVAL AND INSTALLATION > FUEL PUMP AND SENDER UNIT > INSTALLATION

NOTE: Make sure to install a new Fuel Pump and Sender Unit O-ring seal.

NOTE: Make sure the alignment tabs on the Fuel Pump and Sender Unit and the fuel tank meet prior to tightening the Fuel Pump and Sender Unit lock ring.

1.
To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > FUEL TANK

Special Tool(s) / General Equipment

	310-123 Locking Ring, Fuel Tank TKIT-2004J-F TKIT-2005U-LM
Flat Headed Screw Driver	

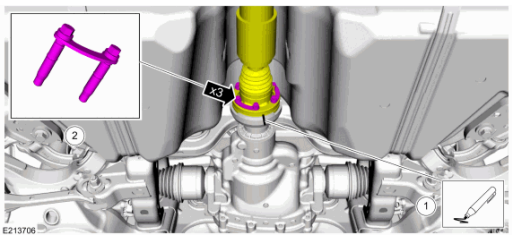
Materials

Name	Specification
Threadlock and Sealer TA-25-B	-

REMOVAL AND INSTALLATION > FUEL TANK > REMOVAL

NOTE: Removal steps in this procedure may contain installation steps.

1. With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .
2. Disconnect the battery ground cable. Refer to: Battery Disconnect and Connect .
3. Drain the fuel tank. Refer to: FUEL TANK DRAINING .
4. Remove the muffler and tailpipe. Refer to: MUFFLER AND TAILPIPE - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS).
5. 1. Index mark the driveshaft and pinion flange for reference during installation.
   2. Remove the driveshaft to pinion flange bolts.

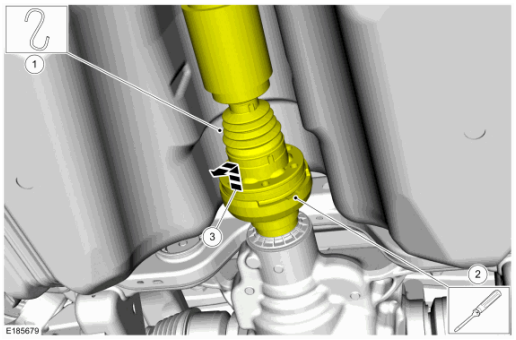


NOTE: Do not over articulate the driveshaft or damage may occur.

6. 1. Support the driveshaft.
   2. Using a screwdriver inserted into the slot on the pinion flange, pry the driveshaft from the pinion flange.

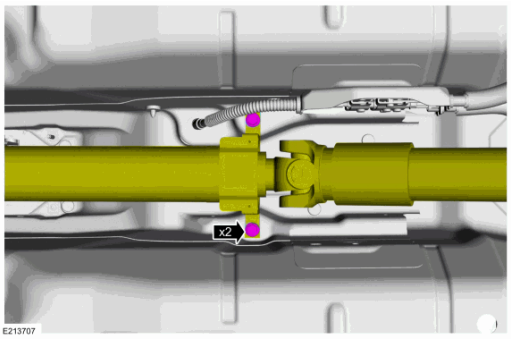
      Use the General Equipment: Flat Headed Screw Driver

   3. Separate the driveshaft from the pinion flange.

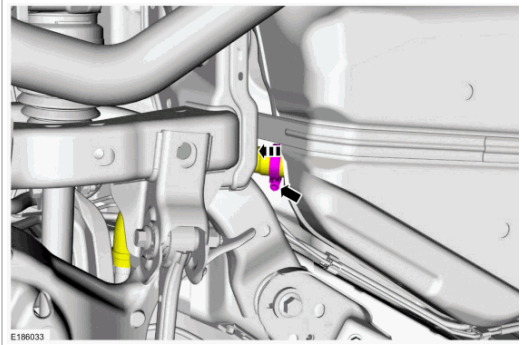


NOTE: Do not over articulate the driveshaft or damage may occur.

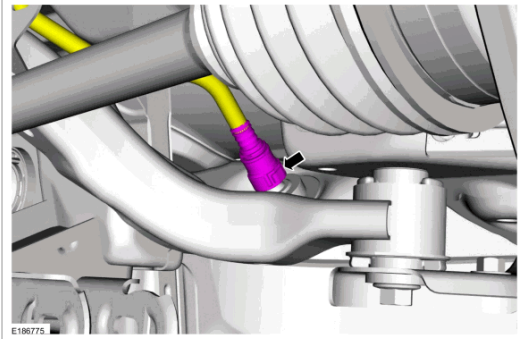
7. Remove the driveshaft center support bearing bolts and lower the driveshaft away from the rear axle flange.



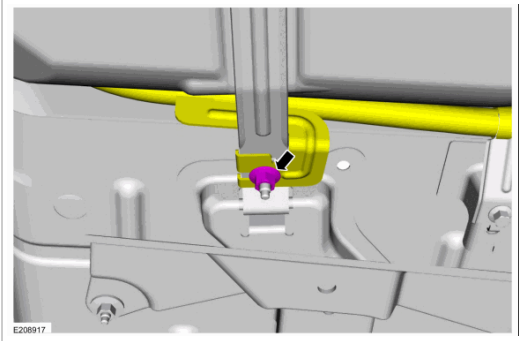
8. Release the clamp and disconnect the fuel tank filler pipe from the fuel tank.



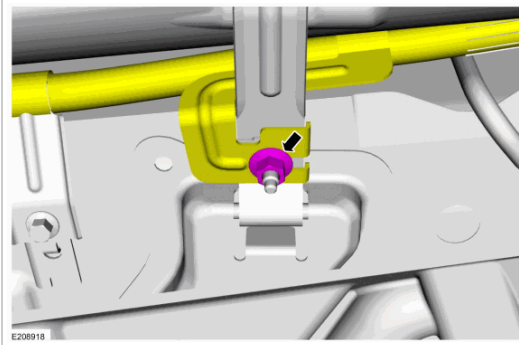
9. Disconnect the fuel vapor tube assembly-to-fuel tank quick connect coupling. Refer to: Quick Release Coupling - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS).



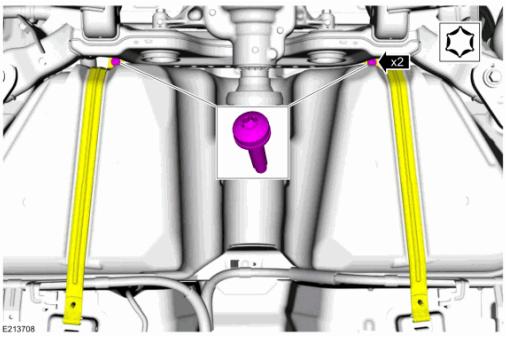
10. Remove the nut and position the LH emergency brake cable bracket aside



11. Remove the nut and position the RH emergency brake cable bracket aside.

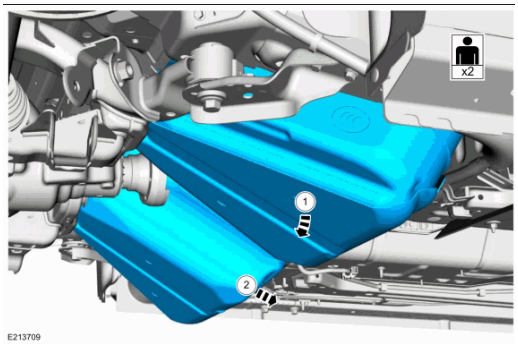


12. Using an appropriate impact tool and a TP50 "Torx Plus" Socket Driver, remove the fuel tank strap bolts.



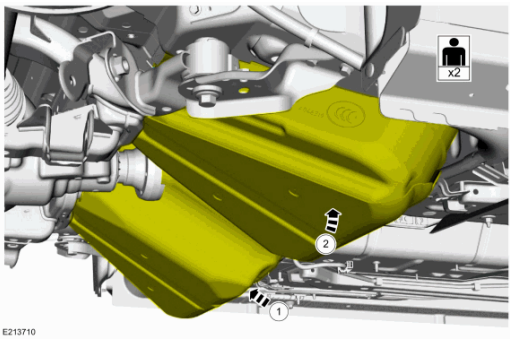
NOTE: Once the fuel tank is removed from the vehicle, reinstall the driveshaft center support bearing bolts by hand and support the rear of the driveshaft with a jackstand or mechanics wire.

13. 1. Lower the front of the fuel tank.
    2. Remove the fuel tank.



REMOVAL AND INSTALLATION > FUEL TANK > INSTALLATION

1. 1. Position the fuel tank above the rear differential.
   2. Raise the fuel tank into position.



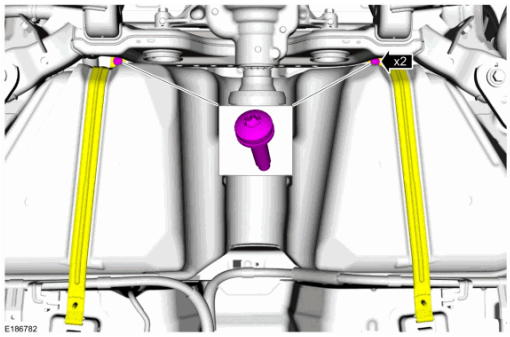
2. 1. Clean the bolts and weld nuts lightly with a wire brush.
   2. Apply the thread locking sealant to the bolt threads.

Material: Threadlock and Sealer / TA-25-B

> *NOTE: To insure that the bolts are threaded in straight, start the bolts by hand and turn several threads before tightening.*

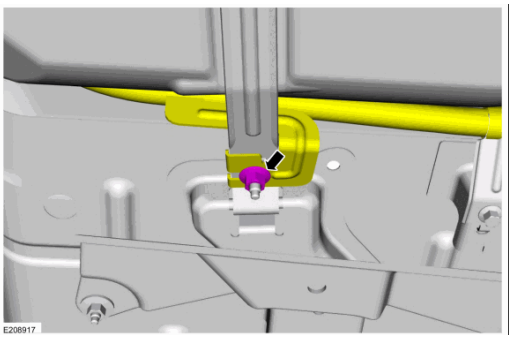
3. Position the fuel tank straps and install the bolts.

   Torque: 38 lb.ft (52 Nm)



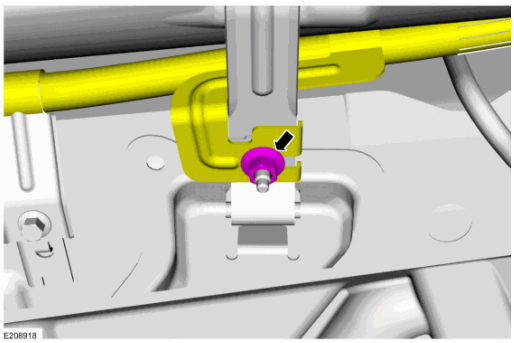
3. Reposition the LH emergency brake cable bracket and install the nut.

   Torque: 18 lb.ft (25 Nm)

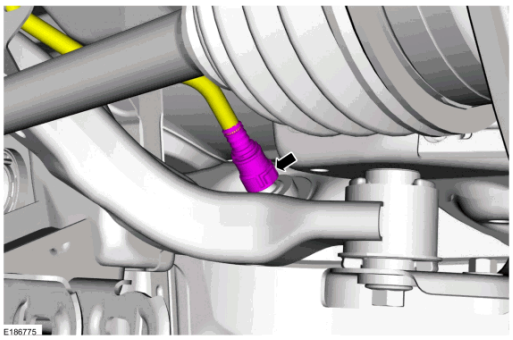


4. Reposition the RH emergency brake cable bracket and install the nut.

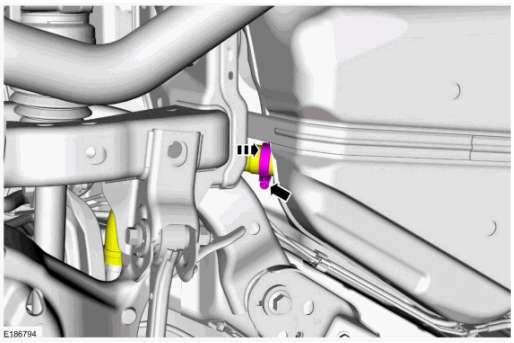
   Torque: 18 lb.ft (25 Nm)



5. Connect the fuel vapor tube assembly-to-fuel tank quick connect coupling. Refer to: Quick Release Coupling - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS).

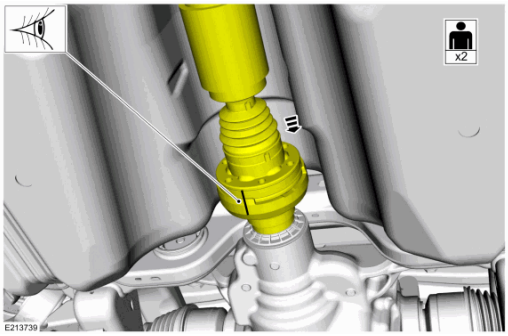


6. Connect the hose to the fuel tank and tighten the clamp.



NOTE: The help of a assistant will be needed. Do not over articulate the driveshaft or damage may occur.

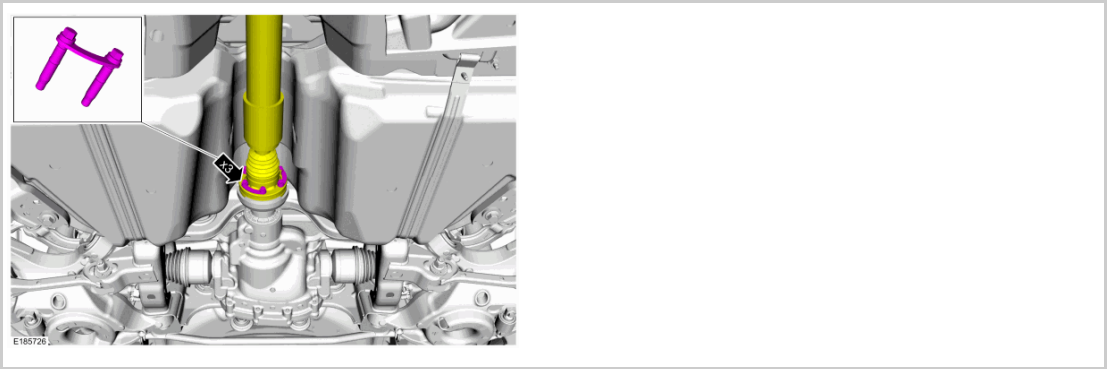
7. Align the index marks on the driveshaft to the rear axle pinion flange.



8. 1. Clean the bolts.
   2. Apply the thread locking sealant to the bolt threads.

      Material: Threadlock and Sealer / TA-25-B
   3. Install the bolts.

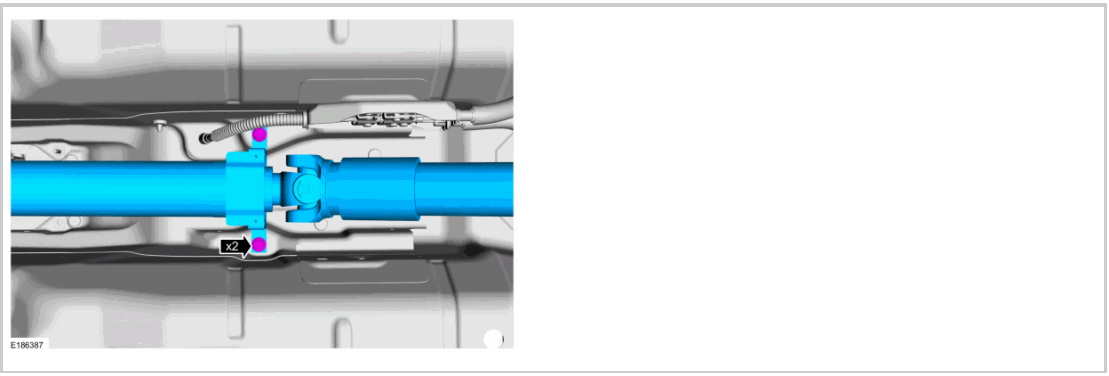
      Torque: 41 lb.ft (55 Nm)



9. 1. Clean the bolts
   2. Apply thread locking sealant to the bolt threads.

      Material: Threadlock and Sealer / TA-25-B
   3. Install the bolts.

      Torque: 35 lb.ft (48 Nm)



10. Install the muffler and tailpipe. Refer to: MUFFLER AND TAILPIPE - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS).

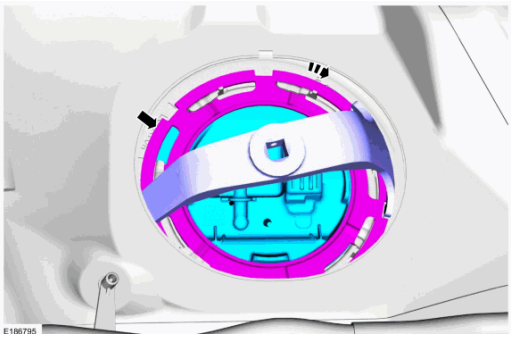
> *NOTE: Inspect the surfaces of the Fuel Pump and Sender Unit flange and fuel tank O-ring seal contact surfaces. Do not polish or adjust the O-ring seal contact area of the fuel tank flange or the fuel tank. Install a new Fuel Pump and Sender Unit or fuel tank if the O-ring seal contact area is bent, scratched or corroded.*

11. Install a new O-ring seal.

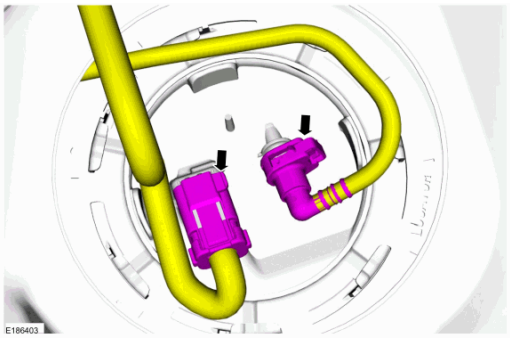
> *NOTE: Carefully install the Fuel Tank Sender Unit lock ring wrench to avoid damage to the Fuel Pump and Sender Unit when removing the lock ring.*

12. Using the special tool install the Fuel Pump and Sender Unit lock ring.

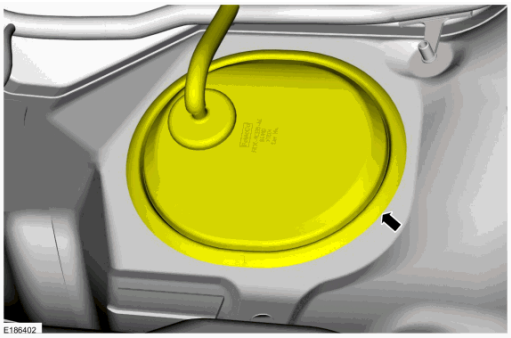
    Use Special Service Tool: 310-123 Locking Ring, Fuel Tank.



13. Connect electrical connector and fuel tube quick release coupling. Refer to: Quick Release Coupling - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS).



14. Install the access cover.



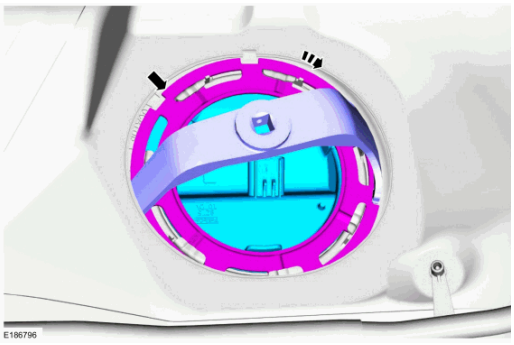
NOTE: Inspect the surfaces of the Fuel Pump and Sender Unit flange and fuel tank O-ring seal contact surfaces. Do not polish or adjust the O-ring seal contact area of the fuel tank flange or the fuel tank. Install a new Fuel Pump and Sender Unit or fuel tank if the O-ring seal contact area is bent, scratched or corroded.

15. Install a new Fuel Level Sensor O-ring seal.

NOTE: Carefully install the Fuel Tank Sender Unit lock ring wrench to avoid damage to the fuel level sensor when removing the lock ring.

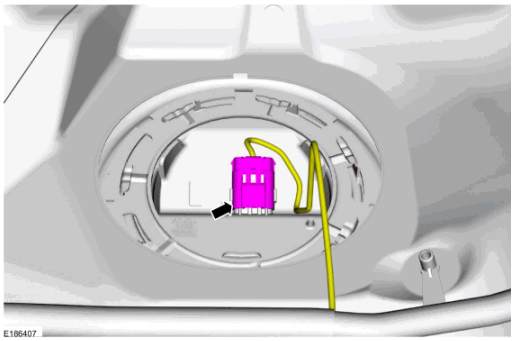
16. Using the special tool install the fuel level sensor lock ring.

    Use Special Service Tool: 310-123 Locking Ring, Fuel Tank.

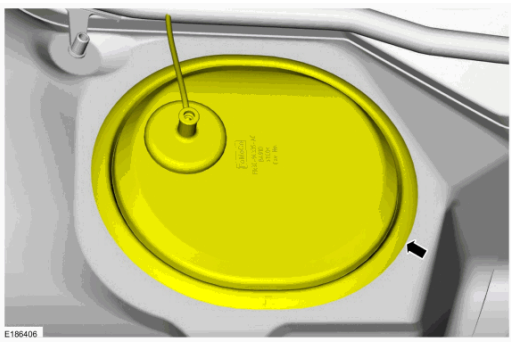


NOTE: Clean the fuel level sensor connections, flange surfaces and the immediate surrounding area of any dirt or foreign material.

17. Connect the electrical connector.



18. Install the access cover.



19. Install the rear seat cushion. Refer to: Rear Seat Cushion .
20. Connect the battery ground cable. Refer to: Battery Disconnect and Connect .

REMOVAL AND INSTALLATION > FUEL TANK FILLER PIPE

Special Tool(s) / General Equipment

 ST1134A	292-00004 Fuel Tanker 100 GPM

REMOVAL AND INSTALLATION > FUEL TANK FILLER PIPE > REMOVAL

NOTE: Removal steps in this procedure may contain installation steps.

1.

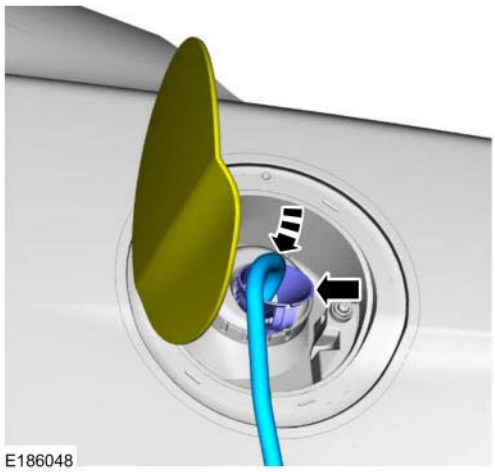
With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

2.

Disconnect the battery ground cable. Refer to: Battery Disconnect and Connect .

NOTE: The supplemental refueling adapter is located in the luggage compartment.

3.
Install the supplemental refueling adapter and a 6 ft. length of 5/8 in. semi-rigid fuel drain tube into the Easy Fuel™ (capless) fuel tank filler pipe until the tube enters the fuel tank.



NOTE: This step is to remove approximately one-eighth tank of the fuel from a completely full fuel tank and the majority of any residual fuel in the fuel tank filler pipe, lowering the fuel level below the fuel tank filler pipe inlet.

4.
Attach the Fuel Storage Tanker to the fuel drain tube and remove approximately one-eighth

(approximately 2 gallons) of fuel from the tank.

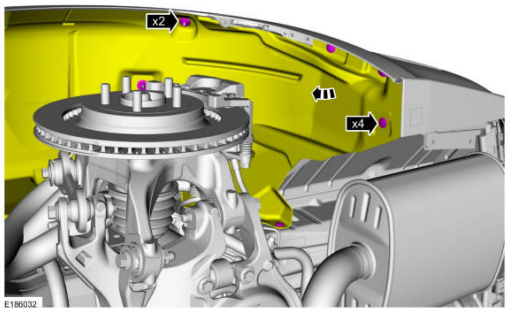
Use Special Service Tool: 292-00004 Fuel Tanker 100 GPM.

5.

Remove the rear wheel on the LH side. Refer to: Wheel and Tire .

6.

Remove the retainers and position aside LH rear wheel splash shield aside.

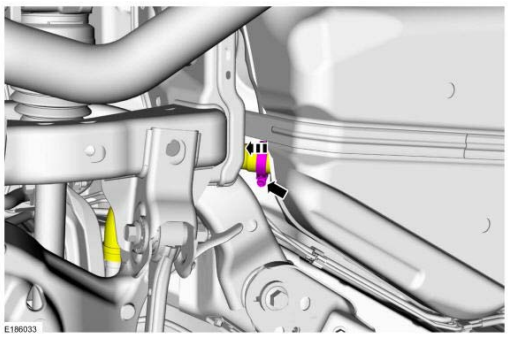


NOTE: Some fuel may remain in the fuel tank filler pipe after draining. Carefully disconnect the fuel tank filler pipe hose from the fuel tank and drain any residual fuel into a suitable container.

7.
Release the clamp and disconnect the Fuel Tank Filler Pipe from the fuel tank.

Torque

: 53 lb.in (6 Nm)



8.

1.

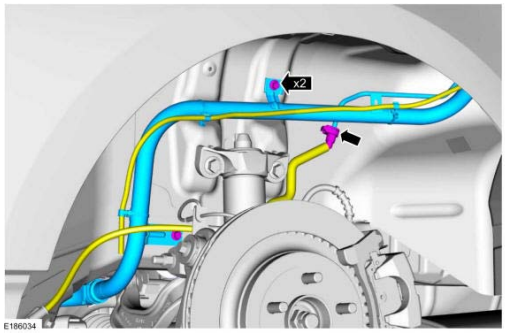
Disconnect the vapor tube Quick Release Coupling. Refer to: Quick Release Coupling - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS).

2.

Remove retainers and the Fuel Tank Filler Pipe.

Torque

: 18 lb.ft (25 Nm)



REMOVAL AND INSTALLATION > FUEL TANK FILLER PIPE > INSTALLATION

1.

To install, reverse the removal procedure.

DESCRIPTION AND OPERATION > INTAKE AIR DISTRIBUTION AND FILTERING > OVERVIEW

The air intake system cleans intake air with a replaceable, dry-type engine Air Cleaner (ACL) element made of treated, pleated paper. A new Air Cleaner (ACL) element must be installed periodically as scheduled. Engine performance and fuel economy are adversely affected when maximum restriction of the Air Cleaner (ACL) element is reached.

The Charge Air Cooler (CAC) subsystem cools and increases the density of the compressed turbocharged air.

The air intake system measures air temperature with the IAT sensor.

DIAGNOSIS AND TESTING > INTAKE AIR DISTRIBUTION AND FILTERING

Diagnostics in this service information assume a certain skill level and knowledge of Ford-specific diagnostic practices. For information about these, REFER to: Diagnostic Methods .

For PCM DTC, REFER to: ELECTRONIC ENGINE CONTROLS - 2.3L ECOBOOST.

For driveability symptoms without DTC, Refer to ENGINE CONTROLS - SYMPTOM CHARTS (EXCEPT DIESEL & HYBRID) .

GENERAL PROCEDURES > CHARGE AIR COOLER (CAC) CLEANING

Cleaning

1.

Remove the CAC. Refer to: Charge Air Cooler (CAC) .

2.

Remove the screw and the Turbocharger Boost Pressure Sensor from the CAC.

NOTE: Do not use a high-pressure power washer to clean the CAC or damage to the CAC may occur.

NOTE: Drain all contaminates such as coolant, fuel and oil prior to cleaning the CAC.

NOTE: Thoroughly clean the joint clamp areas as well as the turbocharger

connection, engine connection and the CAC connections, using metal brake parts cleaner.

3.
Lay the CAC flat with the inlet and outlet ports pointing up.

NOTE: Plug or cap the CAC openings prior to agitating.

4.
Add an appropriate amount of commercially available detergent cleaner such as Simple Green Pro HD, or equivalent to the CAC. Follow the manufacturer's directions for cleaning. Fill the CAC to 40% of its volume with water.

5.

Raise one end of the CAC and agitate it by hand for at least 5 minutes.

6.

Raise the opposite end of the CAC and agitate it by hand for at least 5 minutes.

7.

Drain the CAC.

8.

Flush the CAC thoroughly with clean water.

9.

Repeat Steps 3 through 8 until no contaminates are found in the flush water.

10.

Allow the CAC to air dry.

NOTE: The following leak test steps must be performed prior to installing the CAC.

11.
Install the Turbocharger Boost Pressure Sensor and the screw on the CAC.

Torque

: 44 lb.in (5 Nm)

NOTE: Use a commercially available kit, such as the Johnson Manufacturing Company Charge Air Cooler Test Set Part No. 351-CAS, or equivalent.

12.
Install the commercially available cooler tester on the CAC following the manufacturer's installation instructions.

13.

Tighten the clamps.

Torque

: 44 lb.in (5 Nm)

14.

> *WARNING: Never exceed the specified pressure. Excessive pressure may cause the test adapter to blow off or may damage the charge air cooler (CAC). Failure to follow this instruction may result in serious personal injury.*

Slowly apply air pressure.

Pressure

: 21.8psi (150kPa)

15.

Let the CAC stand for a few minutes and note any loss in pressure.

16.

Release the air pressure.

17.

Repeat Steps 14 through 16 as many times as necessary to verify the readings. The reading is considered verified when 3 consecutive tests show approximately the same pressure drop.

> *NOTE: If the pressure loss exceeds 10 kPa (1.5 psi) per minute, install a new CAC.*

18.
Install the CAC. Refer to: Charge Air Cooler (CAC) .

REMOVAL AND INSTALLATION > AIR CLEANER > REMOVAL

> *NOTE: Removal steps in this procedure may contain installation details.*

1.

1.

Loosen the clamp, position aside the air outlet pipe.

Torque

: 48 lb.in (5.4 Nm)

2.

Detach the wiring harness retainers and disconnect the IAT sensor electrical connectors.

3.

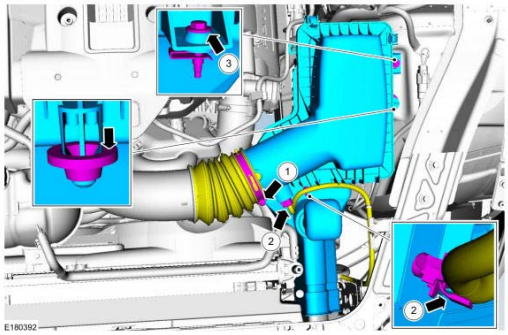
Remove the bolt.

Torque

: 71 lb.in (8 Nm)

4.

Remove the air cleaner assembly.



REMOVAL AND INSTALLATION > AIR CLEANER > INSTALLATION

1.

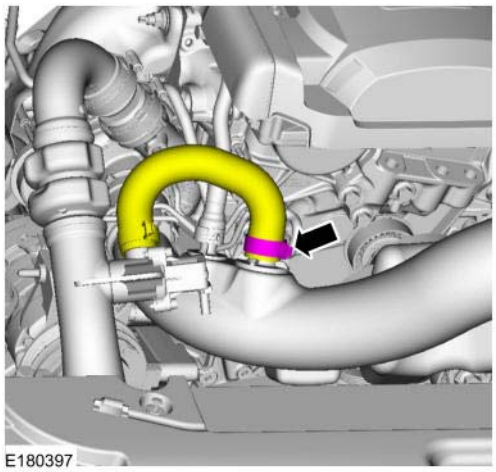
To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > AIR CLEANER OUTLET PIPE > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

Loosen the clamp, disconnect and position aside the CAC bypass valve inlet tube from the air cleaner outlet pipe.



2.

1.

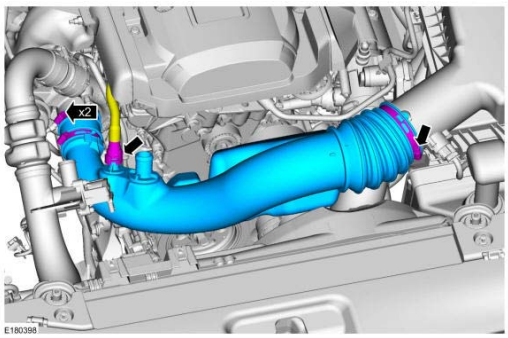
Disconnect and position aside the crankcase ventilation tube.

2.

Loosen the 3 clamps and remove the air cleaner outlet pipe.

Torque

: 48 lb.in (5.4 Nm)



REMOVAL AND INSTALLATION > AIR CLEANER OUTLET PIPE > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > CHARGE AIR COOLER (CAC) > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

2.

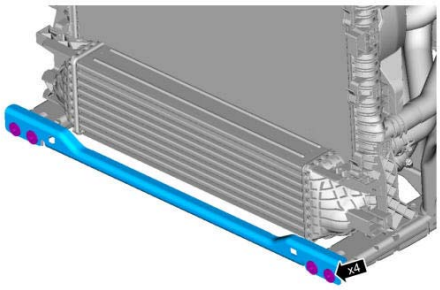
Remove the active grill shutter. Refer to: Active Grille Shutter .

3.

Remove the 4 bolts and the lower radiator support bracket.

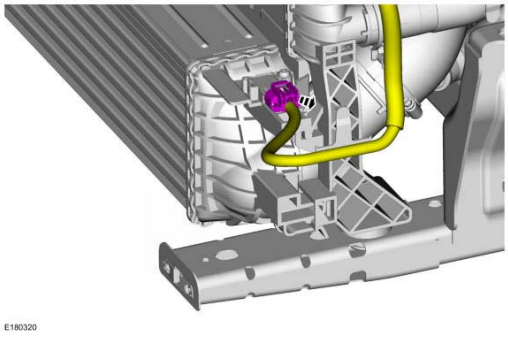
Torque

: 71 lb.in (8 Nm)



4.

Disconnect the turbocharger boost pressure sensor electrical connector from the CAC.

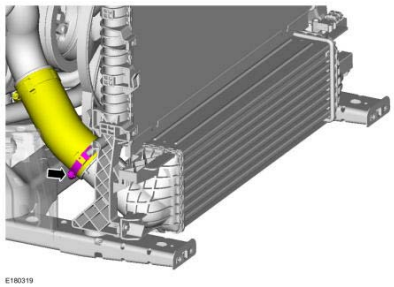


5.

Loosen the clamp and disconnect the CAC inlet tube.

Torque

: 48 lb.in (5.4 Nm)

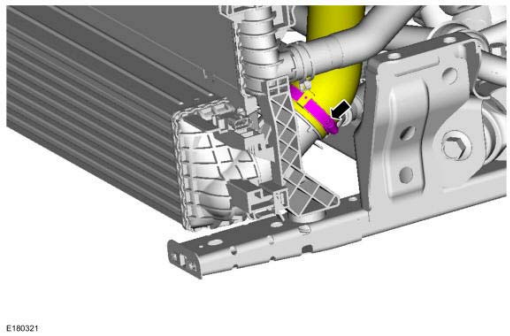


6.

Loosen the clamp and disconnect the CAC outlet tube.

Torque

: 48 lb.in (5.4 Nm)

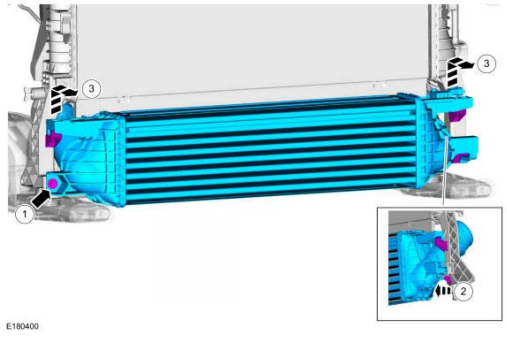


7.

Remove the bolt and CAC in a sequence as shown in illustration.

Torque

: 55 lb.in (6.2 Nm)



REMOVAL AND INSTALLATION > CHARGE AIR COOLER (CAC) > INSTALLATION

NOTE: When installing the CAC tubes, thoroughly clean the joint clamp areas using metal brake parts cleaner.

1.
To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > CHARGE AIR COOLER (CAC) INTAKE PIPE > REMOVAL

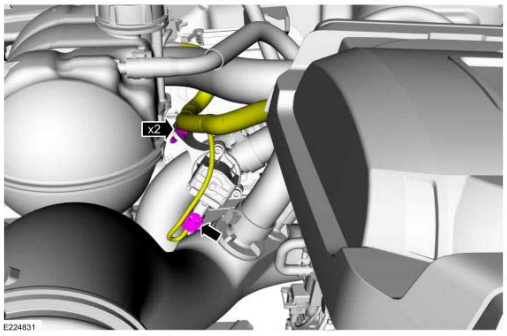
NOTE: When removing any turbocharger air intake system components, make sure to cover any open ports to prevent debris from entering the system. The turbocharger compressor vanes can be damaged by even the smallest particles. All components need to be inspected and cleaned prior to installation or reassembly.

NOTE: Removal steps in the procedure may contain installation details.

Charge Air Cooler (CAC) Intake Pipe - Upper

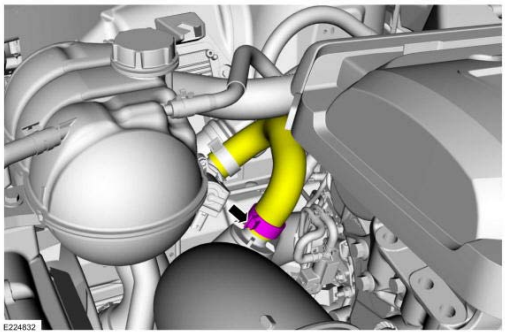
1.

Disconnect the electrical connector and detach the wire harness retainers.



2.

Disconnect and position aside the bypass tube.

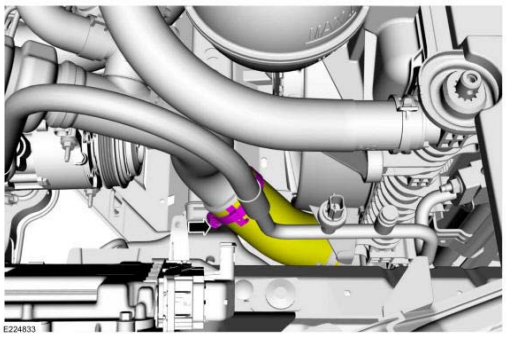


3.

Loosen the clamp and position aside the lower intake pipe.

Torque

: 44 lb.in (5 Nm)

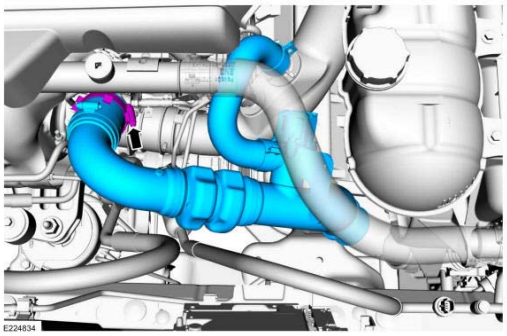


4.

Loosen the clamp and remove the upper intake pipe.

Torque

: 44 lb.in (5 Nm)



5.

Clean, inspect, and cover all open ports.

Charge Air Cooler (CAC) Intake Pipe - Lower

6.

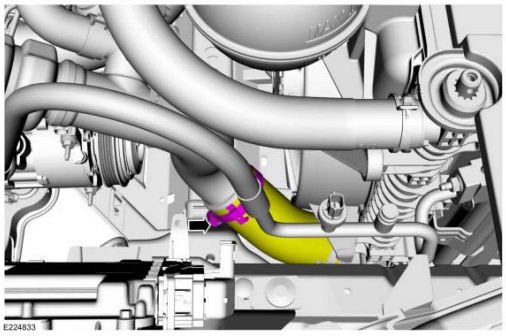
With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

7.

Loosen the clamp and position aside the lower intake pipe.

Torque

: 44 lb.in (5 Nm)

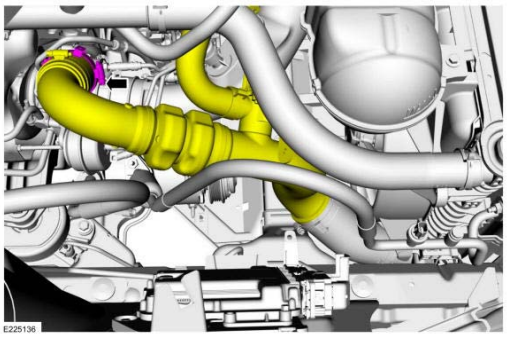


8.

Loosen the clamp and position aside the upper intake pipe.

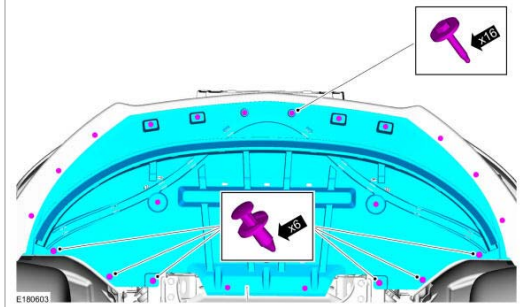
Torque

: 44 lb.in (5 Nm)



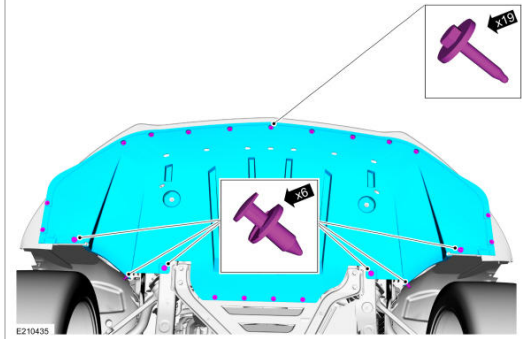
NOTE: If equipped.

9.
Remove the underbody shield.



NOTE: If equipped.

10.
Remove the underbody shield.

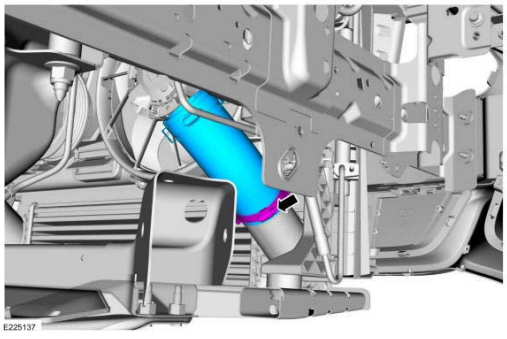


11.

Loosen the clamp and remove the lower intake pipe.

Torque

: 44 lb.in (5 Nm)



12.

Clean, inspect, and cover all open ports.

REMOVAL AND INSTALLATION > CHARGE AIR COOLER (CAC) INTAKE PIPE > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > CHARGE AIR COOLER (CAC) OUTLET PIPE > REMOVAL

NOTE: When removing any turbocharger air intake system components, make sure to cover any open ports to prevent debris from entering the system. The turbocharger compressor vanes can be damaged by even the smallest particles. All components need to be inspected and cleaned prior to installation or reassembly.

NOTE: Removal steps in the procedure may contain installation details.

1.

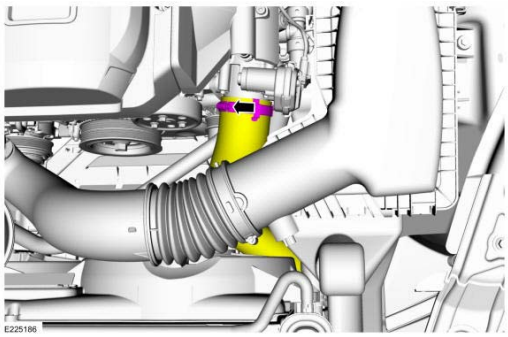
With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

2.

Loosen the clamp and disconnect the outlet pipe.

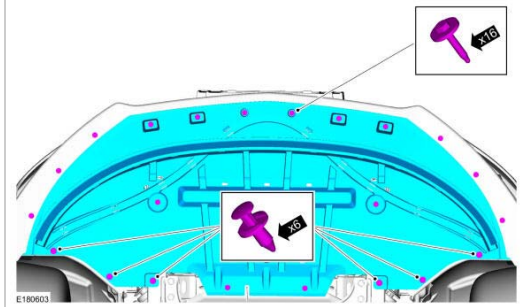
Torque

: 44 lb.in (5 Nm)



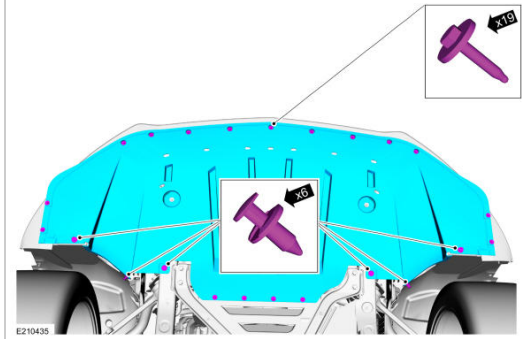
NOTE: If equipped.

3.
Remove the underbody shield.



NOTE: If equipped.

4.
Remove the underbody shield.

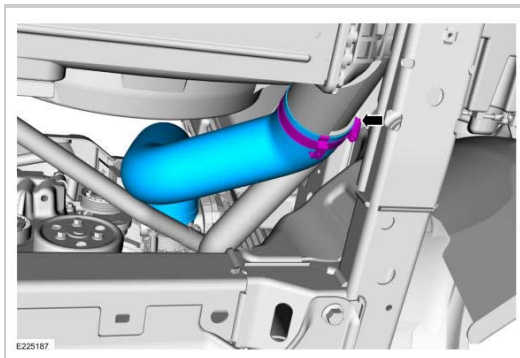


5.

Loosen the clamp and remove the outlet pipe.

Torque

: 44 lb.in (5 Nm)



6.

Clean, inspect, and cover all open ports.

REMOVAL AND INSTALLATION > CHARGE AIR COOLER (CAC) OUTLET PIPE > INSTALLATION

1.

To install, reverse the removal procedure.

DESCRIPTION AND OPERATION > INTAKE AIR DISTRIBUTION AND FILTERING - OVERVIEW > OVERVIEW

The air intake system cleans intake air with a replaceable, dry-type engine Air Cleaner (ACL) element made of treated, pleated paper. A new Air Cleaner (ACL) element must be installed periodically as scheduled. Engine performance and fuel economy are adversely affected when maximum restriction of the Air Cleaner (ACL) element is reached.

DIAGNOSIS AND TESTING > INTAKE AIR DISTRIBUTION AND FILTERING

Diagnostics in this service information assume a certain skill level and knowledge of Ford-specific diagnostic practices. For information about these, REFER to: Diagnostic Methods .

For PCM DTC,

REFER to: ELECTRONIC ENGINE CONTROLS - 3.7L DURATEC (227KW/301PS)

For driveability symptoms without DTC, Refer to ENGINE CONTROLS - SYMPTOM CHARTS (EXCEPT DIESEL & HYBRID) .

REMOVAL AND INSTALLATION > AIR CLEANER > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

1.

Loosen the clamp and position aside the air cleaner outlet pipe.

Torque: 48 lb.in (5.4 Nm)

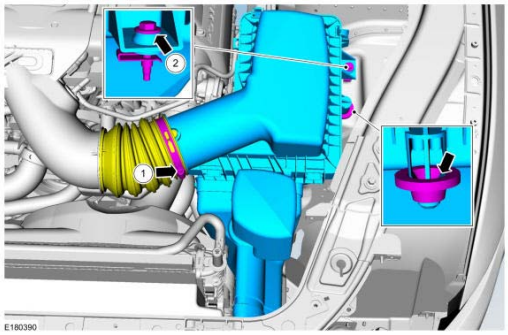
2.

Remove the bolt.

Torque: 71 lb.in (8 Nm)

3.

Remove the air cleaner assembly.



REMOVAL AND INSTALLATION > AIR CLEANER > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > AIR CLEANER OUTLET PIPE > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

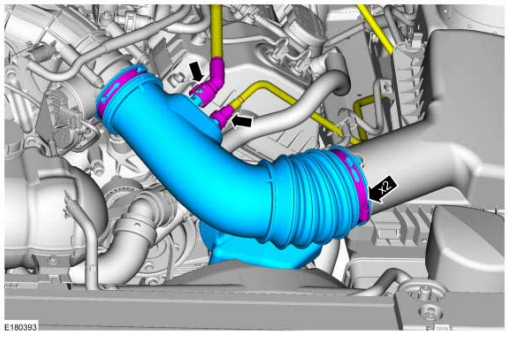
1.

Disconnect and position aside the brake booster tube & the crankcase ventilation tube.

2.

Loosen the 2 clamps and remove the air cleaner outlet pipe.

Torque: 48 lb.in (5.4 Nm)



REMOVAL AND INSTALLATION > AIR CLEANER OUTLET PIPE > INSTALLATION

1.

To install, reverse the removal procedure.

DESCRIPTION AND OPERATION > INTAKE AIR DISTRIBUTION AND FILTERING - OVERVIEW > OVERVIEW

The air intake system cleans intake air with a replaceable, dry-type engine Air Cleaner (ACL) element made of treated, pleated paper. A new Air Cleaner (ACL) element must be installed periodically as scheduled. Engine performance and fuel economy are adversely affected when maximum restriction of the Air Cleaner (ACL) element is reached.

The air intake system measures airflow with the MAF sensor.

DIAGNOSIS AND TESTING > INTAKE AIR DISTRIBUTION AND FILTERING

Diagnostics in this service information assume a certain skill level and knowledge of Ford-specific diagnostic practices. For information about these, REFER to: Diagnostic Methods .

For PCM DTC,

REFER to: ELECTRONIC ENGINE CONTROLS .

For driveability symptoms without DTC, Refer to ENGINE CONTROLS - SYMPTOM CHARTS (EXCEPT DIESEL & HYBRID) .

REMOVAL AND INSTALLATION > AIR CLEANER > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

1.

Loosen the clamp and position the air cleaner outlet pipe from the air cleaner.

Torque

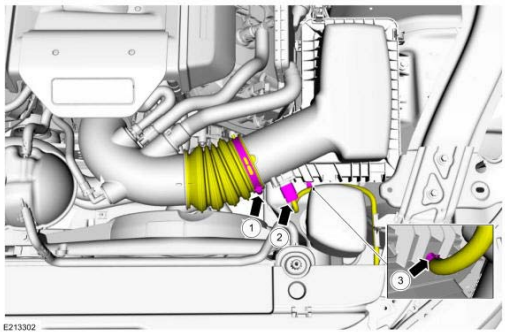
: 44 lb.in (5 Nm)

2.

Disconnect the MAF sensor electrical connector.

3.

Detach and position the wire harness from the air cleaner.



2.

1.

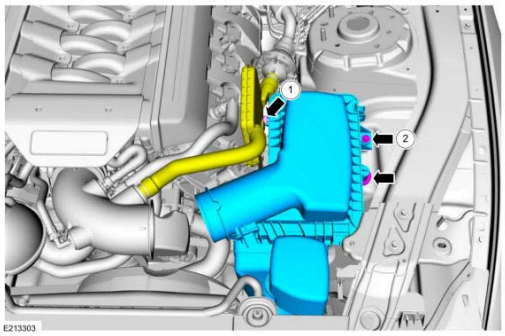
Detach and position the sound symposer from the air cleaner.

2.

Remove the bolt and the air cleaner.

Torque

: 71 lb.in (8 Nm)



REMOVAL AND INSTALLATION > AIR CLEANER > INSTALLATION

1.

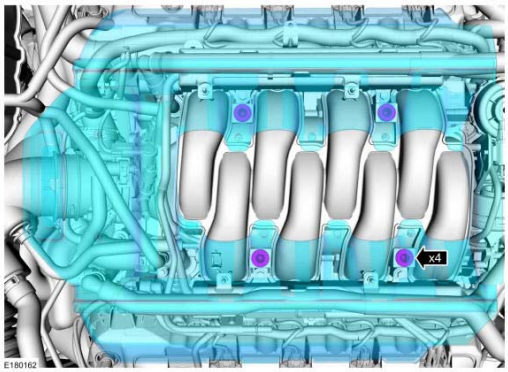
To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > AIR CLEANER OUTLET PIPE > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

Remove the engine appearance cover.



2.

1.

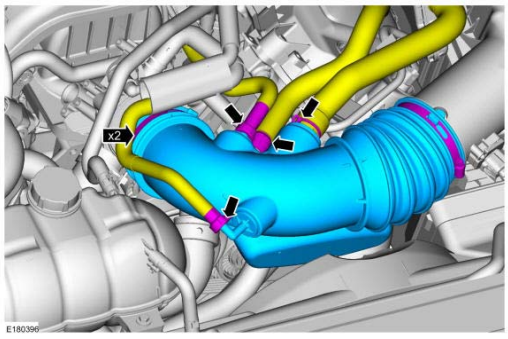
Disconnect and position aside the 2 brake booster tubes, crankcase ventilation tube and resonator air inlet tube.

2.

Loosen the 2 clamps and remove the air cleaner outlet pipe.

Torque

: 48 lb.in (5.4 Nm)



REMOVAL AND INSTALLATION > AIR CLEANER OUTLET PIPE > INSTALLATION

1.

To install, reverse the removal procedure.

SPECIFICATIONS > SPECIFICATIONS

General Specifications

Item	Specification
Normal engine cranking speed (Average)	200-250 RPM
Starting circuit maximum voltage drop (Engine at normal operating temperature) (Average)	0.5 volt
Starter motor maximum load current draw	800 amps
Starter motor no-load current draw (Average)	60-80 amps
Starter motor normal load current draw (Average)	130-190 amps

DESCRIPTION AND OPERATION > STARTING SYSTEM - OVERVIEW > STARTING SYSTEM

The starting system controls the cranking of the engine. When the PCM receives inputs from the ignition switch - push button start, transmission (with automatic transmission) or clutch pedal position switch (with manual transmission), run/start relay and the BCM it then energizes the BJB starter relay. When the starter relay is energized it applies power to the starter motor which cranks the engine.

DESCRIPTION AND OPERATION > STARTING SYSTEM - OVERVIEW > REMOTE START

Vehicles with automatic transmission are equipped with a remote start system. The remote start system allows the vehicle to be started from up to 30 meters (98 feet) away. For more information on the remote start system, refer to the owner's literature and Refer to: Handles, Locks, Latches and Entry Systems - System Operation and Component Description .

DESCRIPTION AND OPERATION > STARTING SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION

System Operation

DESCRIPTION AND OPERATION > STARTING SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION > NETWORK MESSAGE CHART

Module Network Input Messages Powertrain Control Module (PCM)

Broadcast Message	Originating Module	Message Purpose
Crank request	BCM	Provides the PCM with indication that the driver has commanded the engine to crank.
Power mode	BCM	Provides the PCM with ignition mode.
Ignition status	BCM	Provides the PCM with ignition mode.

Module Network Input Messages Body Control Module (BCM)

Broadcast Message	Originating Module	Message Purpose
Intelligent access system status	RFA module	The response from the BCM request for the RFA module ID. If the RFA module ID response is incorrect, then the PATS is disabled.

DESCRIPTION AND OPERATION > STARTING SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION > PUSH BUTTON START SYSTEM

This vehicle is equipped with a PATS that disables the engine from cranking if an unprogrammed PATS key is used or an invalid PCM ID is received. The PATS is controlled by the BCM. If there is a PATS concern that causes the engine to be disabled, the IPC displays the corresponding message in the message center. For additional information, Refer to: Passive Anti-Theft System (PATS) - System Operation and Component Description .

Ignition modes are controlled by the RFA module and the BCM. For additional information on the ignition switch - push button start modes, Refer to: Steering Wheel and Column Electrical Components - System Operation and Component Description .

The ignition switch - push button start is connected to the RFA module and the BCM as a backup in case of a failure. If there is a circuit failure to either module from the ignition switch - push button start, the modules communicate the ignition switch - push button start request to each other over the Medium Speed Controller Area Network (MS-CAN).

During a start event the ignition switch - push button start is pressed in combination with either the brake pedal (automatic transmission) or the clutch pedal (manual transmission) input. The RFA module, the BCM and the PCM receive a request to start the engine. The PCM recognizes the correct inputs and provides voltage and ground to energize the starter relay coil and close the starter relay contacts. The starter relay contacts close, providing voltage to the starter solenoid, allowing the starter motor to crank the engine. The PCM disengages the starter motor once an engine Revolutions Per Minute (RPM) threshold is reached, a set crank time is exceeded or the ignition switch - push button start is pressed indicating an engine shutdown.

DESCRIPTION AND OPERATION > STARTING SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION > REMOTE START

Vehicles with automatic transmission are equipped with a remote start system. The remote start feature allows the operator to remotely start the engine from up to 30 meters (98 feet) away and is activated using the Passive Key. Once started, the engine runs for 10 minutes. The run time can be extended by the operator. Refer to the Owner's Guide for more information. For more information on enabling the Remote start system Refer to: Handles, Locks, Latches and Entry Systems - System Operation and Component Description .

Component Description

Ignition Switch - Push Button Start

The ignition switch - push button start (Engine Start/Stop button) is a momentary contact switch that is hardwired to the BCM and the PCM. The ignition switch - push button start is used to obtain the OFF, ON or START ignition modes. The ignition switch - push button start is part of the FCIM and cannot be serviced separately. For more information, Refer to: Steering Wheel and Column Electrical Components - System Operation and Component Description .

BCM

Refer to: Module Controlled Functions - System Operation and Component Description .

PCM

The PCM provides power and ground to the starter relay to initiate cranking of the engine.

DIAGNOSIS AND TESTING > STARTING SYSTEM > INSPECTION AND VERIFICATION

Diagnostics in this service information assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

1.

Verify the customer concern.

2.

Check the battery for loose, damaged or corroded connections.

3.

Check the generator for loose, damaged or corroded connections.

4.

Check the battery condition and state of charge. REFER to: BATTERY .

5.

Remove the accessory drive belt. REFER to: ACCESSORY DRIVE BELT - 3.7L Duratec (227kW/301PS). Verify the crankshaft and each of the components driven by the accessory drive belt rotate and are not seized or damaged.

6.

If any aftermarket accessories have been added to the vehicle, make sure they are properly wired.

7.

If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding.

DIAGNOSIS AND TESTING > STARTING SYSTEM > DTC CHARTS

Diagnostics in this service information assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

PCM DTC Chart

DTC	Description	Action
P06E9	Engine Starter Performance	If the engine cranks, Refer to ENGINE CONTROLS - SYMPTOM CHARTS (EXCEPT DIESEL & HYBRID) . If the engine does not crank, GO to Pinpoint Test A
P0830	Clutch Pedal Switch "A" Circuit	GO to Pinpoint Test A
P1594	Forced Engine Shutdown - Remote Start System Fault, No Unattended Vehicle Timeout	REFER to: ELECTRONIC ENGINE CONTROLS - 3.7L DURATEC (227KW/301PS).
P1595	Forced Engine Shutdown - Remote Start System Fault, Transmission Range Not In Park Position	REFER to: ELECTRONIC ENGINE CONTROLS - 3.7L DURATEC (227KW/301PS).
P162F	Starter Motor Disabled - Engine Crank Time Too Long	Refer to ENGINE CONTROLS - SYMPTOM CHARTS (EXCEPT DIESEL & HYBRID) .
P2535	Ignition Switch Run/Start Position Circuit High	GO to Pinpoint Test D
All Other DTCs	-	Refer to ENGINE CONTROLS - SYMPTOM CHARTS (EXCEPT DIESEL & HYBRID) .

BCM DTC Chart

DTC	Description	Action
C113A:11	Wakeup Control: Circuit Short To Ground	GO to Pinpoint Test C
C113A:15	Wakeup Control: Circuit Short To Battery or Open	GO to Pinpoint Test C
P0830:11	Clutch Pedal Switch "A" Circuit: Circuit Short To Ground	GO to Pinpoint Test A
All Other DTCs	-	REFER to: Body Control Module (BCM) .

DIAGNOSIS AND TESTING > STARTING SYSTEM > SYMPTOM CHART(S)

Symptom Chart: Starting System

Diagnostics in this service information assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

Symptom Chart

Condition	Possible Sources	Actions
The engine does not crank	Refer to the Pinpoint Test	GO to Pinpoint Test A
The engine cranks slowly	Refer to the Pinpoint Test	PERFORM the starter system component test. REFER to Starter Motor - Positive Circuit Test in Component Test(s) .
The engine cranks but will not start	Fuses PCM Fuel pump Fuel pump relay Starter Wiring, terminals or connectors	Refer to ENGINE CONTROLS - SYMPTOM CHARTS (EXCEPT DIESEL & HYBRID) .
Unusual starter noise	Refer to the Pinpoint Test	GO to Pinpoint Test B
The starter spins but the engine does not crank	Starter motor	INSPECT the starter motor mounting and engagement. REPAIR as necessary.
	Damaged flexplate	INSPECT the flexplate for damaged, missing or worn teeth. REPAIR as necessary.
The starter does not disengage from the flexplate	Starter relay Wiring, terminals or connectors	REMOVE the starter relay. If the engine stops cranking, INSTALL a new relay. If the engine continues to crank, REPAIR circuit CDC25 (BN/GN) for a short to voltage.
The remote start is inoperative	Remote start feature not enabled Passive Key or battery PCM Wiring, terminals or connectors	REFER to: Locks, Latches and Entry Systems .
The remote start has poor range performance	Passive key or battery After market systems High power devices TV/radio transmission towers	REFER to: Locks, Latches and Entry Systems .

DIAGNOSIS AND TESTING > STARTING SYSTEM > PINPOINT TEST(S)

Engine Does Not Crank

Refer to Starting System for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Starting System - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
P06E9	Engine Starter Performance	The PCM sets this DTC when no engine rotation is detected during a crank event.
P0830:11	Clutch Pedal Switch "A" Circuit: Circuit Short To Ground	The BCM sets this DTC when a short to ground is detected on the clutch bottom of travel circuit during an on-demand self test.

Possible Sources

- Battery
- Battery cables
- IPC
- Starter motor
- BJB starter relay

Visual Inspection and Diagnostic Pre-checks

- Inspect the run/start relay.
- Inspect the high current BJB connections.
- Verify the BJB fuse 60 (5A).
- Verify the BJB fuse 30 (30A).
- Inspect the passive key.
- Inspect the CPP switch (manual transmission only).

DIAGNOSIS AND TESTING > STARTING SYSTEM > PINPOINT TEST(S) > PINPOINT TEST A : ENGINE DOES NOT CRANK > PINPOINT TEST A : ENGINE DOES NOT CRANK

A1 PERFORM INSPECTION AND VERIFICATION

NOTE: Make sure battery voltage is greater than 12.2 volts prior to and during this pinpoint test.

NOTE: If it is necessary to leave the battery charger connected during testing, do not leave it on its highest or boost setting. The highest settings can exceed 16 volts, resulting in false test results and setting of DTCs.

Perform Inspection and Verification .

Was an obvious cause for an observed or reported concern found?

Yes	CORRECT the cause as necessary.

No	GO to A2

A2 CHECK FOR NO KEY DETECTED MESSAGE IN THE MESSAGE CENTER

NOTE: There are certain areas inside the vehicle where the passive key may not be detected and the message center displays NO KEY DETECTED. If the passive key is in the far outside edges of the interior (like in a door map pocket or above a sun visor) it might not be detected. Move the passive key to a different location and try to start the vehicle again.

Check the message displayed in the message center while pressing the engine start/stop switch.

Is NO KEY DETECTED displayed?

Yes	DIAGNOSE the NO KEY DETECTED concern. REFER to: Passive Anti-Theft System (PATS) .

No	GO to A3

A3 VERIFY THE BCM (BODY CONTROL MODULE), IPC (INSTRUMENT PANEL CLUSTER) AND PCM (POWERTRAIN CONTROL MODULE) PASS THE NETWORK TEST

Ignition ON.

Using a diagnostic scan tool, perform the Network Test.

Did the BCM, IPC and PCM pass the Network Test?

Yes	GO to A4

No	REFER to: MODULE COMMUNICATIONS NETWORK .

A4 RETRIEVE BCM (BODY CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, perform BCM self-test.

Are any BCM Diagnostic Trouble Codes (DTCs) present?

Yes	For DTC P0830:11 GO to A26 For all BCM Diagnostic Trouble Codes (DTCs), REFER to the BCM DTC Chart in DTC Charts .

No	GO to A5

A5 RETRIEVE PCM (POWERTRAIN CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, perform PCM self-test.

Are any PCM Diagnostic Trouble Codes (DTCs) other than P06E9 present?

Yes	REFER to the PCM DTC Chart in DTC Charts .

No	With automatic transmission, GO to A6With manual transmission, GO to A11

A6 CHECK THE OPERATION OF THE STOPLAMPS

While observing the stoplamps, apply the brake pedal.

Do the stoplamps illuminate?

Yes	GO to A7

No	DIAGNOSE All the Stoplamps are inoperative. REFER to: Stoplamps .

A7 CHECK THE BRAKE PEDAL POSITION (BOO1) PID (PARAMETER IDENTIFICATION)

Using a diagnostic scan tool, view PCM Parameter Identifications (PIDs).

Monitor the PCM B001 PID while applying the brake pedal.

Does the PID read On?

Yes	GO to A9

No	GO to A8

A8 CHECK THE BPP (BRAKE PEDAL POSITION) SWITCH CIRCUIT FOR VOLTAGE AT THE PCM (POWERTRAIN CONTROL MODULE)

Ignition OFF.

Disconnect PCM C1381B .

While applying the brake pedal, measure:

Positive Lead	Measurement / Action	Negative Lead

C1381B-67		Ground

Is the voltage greater than 11 volts?

Yes	GO to A28

No	REPAIR the circuit.

A9 CHECK BCM (BODY CONTROL MODULE) IGN_SW_STATE PID (PARAMETER IDENTIFICATION)

Using a diagnostic scan tool, view the BCM Parameter Identifications (PIDs).

Make sure the transmission is in PARK or NEUTRAL.

Monitor the BCM PID IGN_SW_STATE while pressing the engine start/stop switch and the brake pedal.

Does the PID change from Off to Start when the ignition switch - push button start and brake pedal are pressed?

Yes	GO to A10

No	DIAGNOSE No power in ON. REFER to: Steering Wheel and Column Electrical Components .

A10 CHECK THE PCM (POWERTRAIN CONTROL MODULE) IN GEAR-TRANSMISSION IS APPLYING A LOAD TO ENGINE (IN_GEAR) PID (PARAMETER IDENTIFICATION)

Using a diagnostic scan tool, view the PCM Parameter Identifications (PIDs).

Monitor the PCM PID IN_GEAR, while placing the gear selector in PARK and then NEUTRAL.

Does the PID read No in both positions?

Yes	GO to A12

No	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .

A11 CHECK THE PCM (POWERTRAIN CONTROL MODULE) CLUTCH PEDAL AT OR NEAR BOTTOM OF TRAVEL (CPP_BOT) PID (PARAMETER IDENTIFICATION)

Using a diagnostic scan tool, while viewing the PCM PID CPP_BOT, fully apply the clutch pedal and release.

Does the PID change from NO to YES when the clutch pedal is fully applied?

Yes	GO to A12

No	GO to A23

A12 CHECK THE PCM (POWERTRAIN CONTROL MODULE) ENGINE CRANKING (ENG_CRANK) PID (PARAMETER IDENTIFICATION)

Make sure the transmission is in PARK or NEUTRAL.

Using a diagnostic scan tool, view the PCM Parameter Identifications (PIDs).

Monitor the PCM PID ENG_CRANK while pressing the engine start/stop switch and the brake pedal (with automatic transmission) or fully apply the clutch pedal (with manual transmission).

Does the PID change from Inactive to Active?

Yes	GO to A13

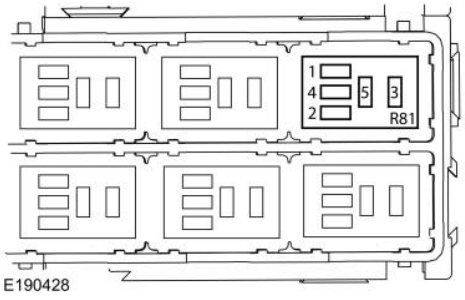
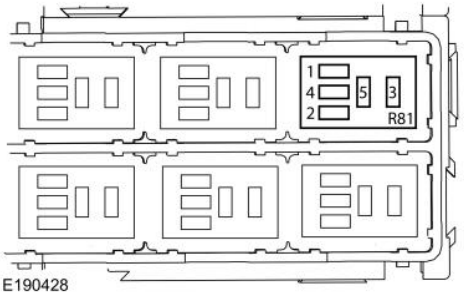
No	GO to A28

NOTE: The following step uses a test light to simulate normal circuit loads. To avoid connector terminal damage, use the Flex Probe Kit for the test light probe connection to the vehicle. Do not use the test light probe directly on any connector.

A13 CHECK THE STARTER RELAY CONTROL OPERATION

Remove the BJB starter relay.

Measure:

Positive Lead	Measurement / Action	Negative Lead
 BJB starter relay pin 1		 BJB starter relay pin 2

Make sure the transmission is in PARK or NEUTRAL.

While pressing the engine start/stop switch and the brake pedal, observe the test light.

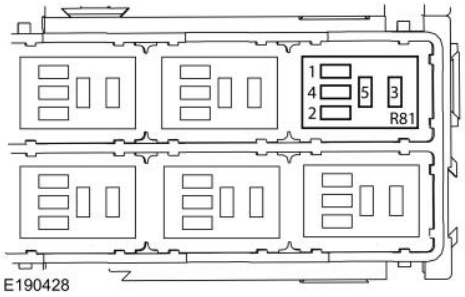
Does the test light illuminate when the engine start/stop switch is pressed?

Yes	GO to A14

No	GO to A21

A14 CHECK THE VOLTAGE TO THE STARTER RELAY

Measure:

Positive Lead	Measurement / Action	Negative Lead
 E190428 BJB starter relay pin 3		Ground

Is the voltage greater than 11 volts?

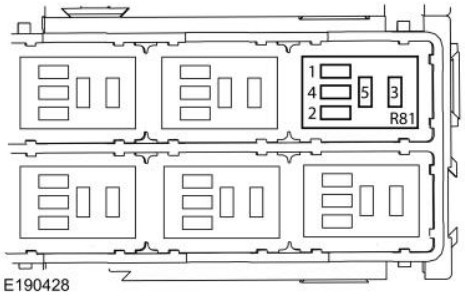
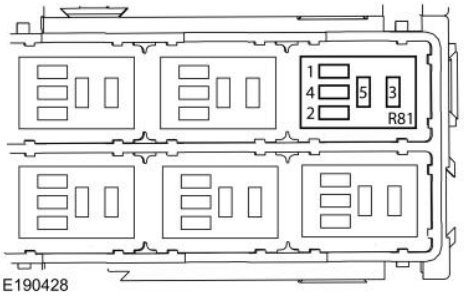
Yes	GO to A15

No	VERIFY BJB fuse 30 (30A) is OK. If OK, REPAIR the circuit for an open. If not OK, REFER to the SYSTEM WIRING DIAGRAMS article to identify the possible causes of the circuit short.

A15 CHECK THE STARTER MOTOR OPERATION AT THE STARTER RELAY

Ignition OFF.

With the transmission in PARK or NEUTRAL, momentarily connect a fused jumper wire:

Positive Lead	Measurement / Action	Negative Lead
 E190428 BJB starter relay pin 3		 E190428 BJB starter relay pin 5

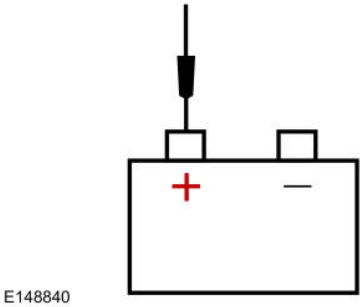
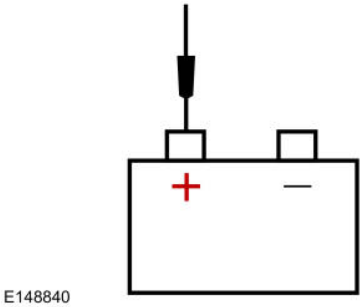
Did the starter engage and the engine crank?

Yes	INSTALL a new starter relay.

No	GO to A16

A16 CHECK THE BATTERY GROUND CABLES

Measure:

Positive Lead	Measurement / Action	Negative Lead
 E148840		Ground G106
 E148840		Ground G108

Are the voltages greater than 11 volts?

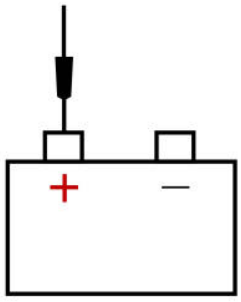
Yes	GO to A17

No	CLEAN or INSTALL new negative battery cables as necessary. REFER to: Battery Cables - 3.7L Duratec (227kW/301PS) .

A17 CHECK THE STARTER MOTOR GROUND

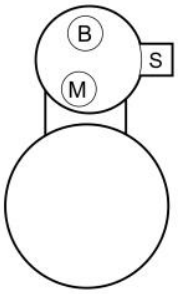
Measure:

Positive Lead	Measurement / Action	Negative Lead



E148840





E148837

Starter motor case

Is the voltage greater than 11 volts?

Yes	GO to A18

No	CLEAN the starter motor mounting flange and MAKE SURE the starter motor is correctly mounted. REFER to: Starter Motor .

A18 CHECK THE VOLTAGE TO THE STARTER MOTOR

Measure:

Positive Lead	Measurement / Action	Negative Lead
C197A-1 ("B" terminal)		Ground

Is the voltage greater than 11 volts?

Yes	GO to A19

No	INSTALL a new positive battery cable. REFER to: Battery Cables - 3.7L Duratec (227kW/301PS) .

A19 CHECK THE STARTER MOTOR FOR CORRECT OPERATION

Perform Starter Motor - Positive Circuit Test in Component Test(s) .

Was an obvious cause found?

Yes	Correct the cause as necessary.

No	GO to A20

A20 CHECK FOR START INPUT AT THE STARTER

Connect BJB starter relay.

Disconnect Starter solenoid C197A .

While holding the key in the START position, measure:

Positive Lead	Measurement / Action	Negative Lead
C197C-1 ("S" terminal)		Ground

Is the voltage greater than 11 volts?

Yes	CLEAN the starter solenoid "S" terminal and starter solenoid connector. CHECK the wiring and the starter motor for a loose or intermittent connection.

No	REPAIR the circuit for an open.

A21 CHECK THE PCM (POWERTRAIN CONTROL MODULE) STARTER RELAY CIRCUITS FOR A SHORT TO GROUND

Ignition OFF.

Disconnect BJB starter relay.

Disconnect PCM C1381B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1381B-1	Ω	Ground
C1381B-58	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to A22

No	REPAIR the affected circuit.

A22 CHECK THE PCM (POWERTRAIN CONTROL MODULE) STARTER RELAY CIRCUITS FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1381B-1	Ω	BJB starter relay pin 1
C1381B-58	Ω	BJB starter relay pin 2

Are the resistances less than 3 ohms?

Yes	GO to A28

No	REPAIR the affected circuit.

A23 CHECK THE CPP (CLUTCH PEDAL POSITION) SWITCH OPERATION

Ignition OFF.

Disconnect PCM C1381B .

While fully applying the clutch pedal, measure:

Positive Lead	Measurement / Action	Negative Lead
C1381B-9	Ω	Ground

Is the resistance less than 3 ohms?

Yes	GO to A28

No	GO to A24

A24 CHECK THE CPP (CLUTCH PEDAL POSITION) GROUND CIRCUIT FOR AN OPEN

Disconnect CPP switch C2353 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2353-2	Ω	Ground

Is the resistance less than 3 ohms?

Yes	GO to A25

No	REPAIR the circuit.

A25 CHECK THE CPP (CLUTCH PEDAL POSITION) SWITCH CIRCUIT FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1381B-9	Ω	C2353-1

Is the resistance less than 3 ohms?

Yes	INSTALL a new CPP switch. REFER to: CLUTCH PEDAL POSITION (CPP) SWITCH - 3.7L Duratec (227kW/301PS).

No	REPAIR the circuit.

A26 CHECK FOR DTC WITH CPP (CLUTCH PEDAL POSITION) SWITCH DISCONNECTED

Ignition OFF.

Disconnect CPP switch C2353 .

Ignition ON.

Using a diagnostic scan tool, perform BCM self-test.

Was DTC P0830:11 retrieved during on-demand self-test with the CPP switch disconnected?

Yes	GO to A27

No	INSTALL a new CPP switch. REFER to: CLUTCH PEDAL POSITION (CPP) SWITCH - 3.7L Duratec (227kW/301PS).

A27 CHECK THE CLUTCH BOTTOM OF TRAVEL CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Disconnect BCM C2280A .

Disconnect PCM C1381B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1381B-9	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to A29

No	REPAIR the circuit.

A28 CHECK FOR CORRECT PCM (POWERTRAIN CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all PCM connectors.

Repair:

corrosion (install new connectors or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the PCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PCM. REFER to: POWERTRAIN CONTROL MODULE (PCM) - 3.7L Duratec (227kW/301PS.

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

A29 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connectors or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > STARTING SYSTEM > PINPOINT TEST(S) > PINPOINT TEST B : UNUSUAL STARTER NOISE

Normal Operation and Fault Conditions

Correct starter operation relies on correct mounting of the starter to the engine, alignment of the starter ring gear to the flexplate and correct functioning of the starter assembly (internal gears, bearings).

Possible Sources

- Engine

- Starter motor
- Starter motor mounting

Visual Inspection and Diagnostic Pre-checks

- Inspect the starter motor.
- Inspect the starter motor mounting.

DIAGNOSIS AND TESTING > STARTING SYSTEM > PINPOINT TEST(S) > PINPOINT TEST B : UNUSUAL STARTER NOISE > PINPOINT TEST B : UNUSUAL STARTER NOISE

B1 CHECK THE STARTER MOUNTING

Inspect the starter mounting bolts for looseness.

Is the starter motor mounted correctly?

Yes	GO to B2

No	INSTALL the starter motor correctly. REFER to: Starter Motor .

B2 CHECK FOR STARTER NOISE

Ignition OFF.

Connect a remote starter switch between the starter solenoid C197A-1 ("B" terminal) and C197C-1 ("S" terminal).

Engage the starter and verify the noise is due to starter operation.

Is the noise due to the starter engagement?

Yes	REFER to: Starter Motor Drive Gear and Flywheel Ring Gear Inspection .

No	REFER to: ENGINE SYSTEM - GENERAL INFORMATION to continue diagnosis.

DIAGNOSIS AND TESTING > STARTING SYSTEM > PINPOINT TEST(S) > PINPOINT TEST C : C113A:11 OR C113A:15

Refer to Electronic Engine Controls - 3.7L for schematic and connector information.

Normal Operation and Fault Conditions

The wake-up control circuit wakes up the PCM prior to the engine cranking. The PCM needs to wake up prior to a crank request so it has time to go through its initialization. The wake-up control circuit is controlled by the BCM. The BCM activates the wake-up control circuit when the driver door is opened or when the ignition is in the ON or START position.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
C113A:11	PCM Wakeup Control: Circuit Short to Ground	This DTC is set by the BCM when a short to ground is detected on the wake-up control circuit.
C113A:15	PCM Wakeup Control: Circuit Short to Battery or Open	This DTC is set by the BCM when a short to voltage or an open is detected on the wake-up control circuit.

Possible Sources

- BCM
- PCM
- Wiring, terminals or connectors

DIAGNOSIS AND TESTING > STARTING SYSTEM > PINPOINT TEST(S) > PINPOINT TEST C : C113A:11 OR C113A:15 > PINPOINT TEST C : C113A:11 OR C113A:15

C1 CHECK FOR BCM (BODY CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition ON.

Using a diagnostic scan tool, perform the BCM self-test.

Is DTC C113A:11 present?

Yes	GO to C2

No	If DTC C113A:15 is present, GO to C4For all other BCM Diagnostic Trouble Codes (DTCs), REFER to: Body Control Module (BCM) .

C2 CHECK THE PCM (POWERTRAIN CONTROL MODULE) FOR A SHORT TO GROUND

Ignition OFF.

Disconnect PCM C1381B .

Ignition ON.

Using a diagnostic scan tool, clear the BCM Diagnostic Trouble Codes (DTCs).

Using a diagnostic scan tool, perform the BCM self-test.

Is BCM DTC C113A:11 present?

Yes	GO to C3

No	GO to C8

C3 CHECK THE PCM (POWERTRAIN CONTROL MODULE) WAKE-UP SIGNAL CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Disconnect BCM C2280F .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1381B-65	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to C7

No	REPAIR the circuit.

C4 CHECK THE PCM (POWERTRAIN CONTROL MODULE) FOR INTERNAL SHORT OR OPEN

Ignition OFF.

Disconnect PCM C1381B .

Ignition ON.

Using a diagnostic scan tool, clear the BCM Diagnostic Trouble Codes (DTCs).

Using a diagnostic scan tool, perform the BCM self-test.

Is BCM DTC C113A:15 present?

Yes	GO to C5

No	GO to C8

C5 CHECK THE PCM (POWERTRAIN CONTROL MODULE) WAKE-UP SIGNAL CIRCUIT FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect BCM C2280F .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead

C1381B-65		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to C6

C6 CHECK THE PCM (POWERTRAIN CONTROL MODULE) WAKE-UP SIGNAL CIRCUIT FOR AN OPEN

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1381B-65	Ω	C2280F-18

Is the resistance less than 3 ohms?

Yes	GO to C7

No	REPAIR the circuit.

C7 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connectors or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

C8 CHECK FOR CORRECT PCM (POWERTRAIN CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all PCM connectors.

Repair:

corrosion (install new connectors or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the PCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PCM. REFER to: POWERTRAIN CONTROL MODULE (PCM) - 3.7L Duratec (227kW/301PS.

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > STARTING SYSTEM > PINPOINT TEST(S) > PINPOINT TEST D : P2535

Refer to Electronic Engine Controls - 3.7L for schematic and connector information.

Normal Operation and Fault Conditions

When the ignition switch - push button start has been pressed, the PCM receives a voltage signal on the crank detect circuit. When the required inputs have been received, the PCM supplies voltage and ground to the starter relay coil. The ignition switch - push button start is part of the FCIM and cannot be serviced separately. For more information, REFER to: Starting System - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
P2535	Ignition Switch Run/Start Position Circuit High	The PCM sets this DTC when the PCM detects voltage on the crank detect circuit while engine is running.

Possible Sources

- Ignition switch - push button start

- BCM
- PCM
- Wiring, terminals or connectors

DIAGNOSIS AND TESTING > STARTING SYSTEM > PINPOINT TEST(S) > PINPOINT TEST D : P2535 > PINPOINT TEST D : P2535

D1 CHECK THE CRANK DETECT CIRCUIT FOR A SHORT TO VOLTAGE WITH THE PCM (POWERTRAIN CONTROL MODULE) DISCONNECTED

Ignition OFF.

Disconnect PCM C1381B .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1381B-42		Ground

Is any voltage present?

Yes	GO to D2

No	GO to D4

D2 CHECK THE CRANK DETECT CIRCUIT FOR A SHORT TO VOLTAGE WITH THE IGNITION SWITCH - PUSH BUTTON START DISCONNECTED

Ignition OFF.

Disconnect FCIM C2402A .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1381B-42		Ground

Is any voltage present?

Yes	GO to D3

No	Install a new ignition switch - push button start. REFER to: Front Controls Interface Module

	(FCIM) - Vehicles With: AM/FM/CD/SYNC (without touchscreen) or REFER to: Front Controls Interface Module (FCIM) - Vehicles With: Touchscreen Display

D3 CHECK THE CRANK DETECT CIRCUIT FOR A SHORT TO VOLTAGE WITH THE BCM (BODY CONTROL MODULE) DISCONNECTED

Ignition OFF.

Disconnect BCM C2280B .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1381B-42		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	

D4 CHECK FOR CORRECT PCM (POWERTRAIN CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all PCM connectors.

Repair:

corrosion (install new connectors or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the PCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PCM. REFER to: POWERTRAIN CONTROL MODULE (PCM) - 3.7L Duratec (227kW/301PS.

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > STARTING SYSTEM > COMPONENT TEST(S)

Starter Motor - Positive Circuit Test

NOTE: Always make the multimeter connection at the component terminal rather than at the wiring end of the connector. Making a connection at the wiring end of the connector could result in false readings because the meter will not pick up a high resistance between the wiring connector and component.

1.

Make sure the battery is fully charged. REFER to: BATTERY .

2.

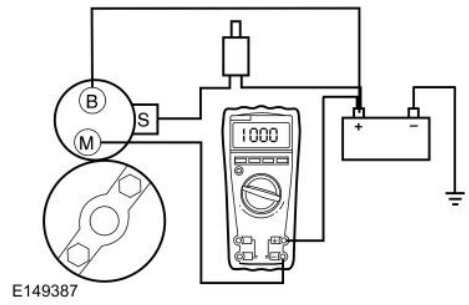
Perform a battery drain test. REFER to: Battery Drain Check .

3.

Connect a remote starter switch between starter solenoid "S" terminal and the battery positive terminal.

4.

Connect the multimeter positive lead to the battery positive post. Connect the negative lead to the starter solenoid "M" terminal.



5.

Place gear selector lever in Park or Neutral.

6.

Engage the remote starter switch. Read and record the voltage. The voltage reading should be 0.5 volt or less.

7.

If the voltage reading is 0.5 volt or less, perform Starter Motor - Ground Circuit Test in Component Test(s) .

8.

A voltage reading greater than 0.5 volt is an indication of excessive resistance in the connections, the positive battery cable or in the starter solenoid. Remove the cables from the solenoid "B", "S" and "M" terminals. Clean the cables and connections and reinstall the cables to the correct terminals. Repeat Steps 3 through 6.

9.

If the voltage reading is still greater than 0.5 volt when checked at the "M" terminal, move the multimeter negative lead to the starter solenoid "B" terminal.

10.

With the gear selector lever in Park or Neutral, engage the remote starter switch. Read and record the voltage.

11.

If the voltage reading at the "B" terminal is lower than 0.5 volt, the concern is in the connections at the starter solenoid or in the solenoid contacts. Install a new starter motor.REFER to: Starter Motor .

12.

If the voltage reading taken at the solenoid "B" terminal is greater than 0.5 volt after cleaning the cables and connections at the solenoid, the concern is in the positive battery cable connection or in the positive battery cable itself. Clean the positive battery cable connection. If this does not resolve the concern, install a new positive battery cable. REFER to: Battery Cables - 3.7L Duratec (227kW/301PS) .

Starter Motor - Ground Circuit Test

A slow cranking condition can be caused by resistance in the ground or return portion of the cranking circuit. This procedure checks the voltage drop in the ground circuit.

1.

Connect a remote starter switch between starter solenoid "S" terminal and the battery positive terminal.

2.

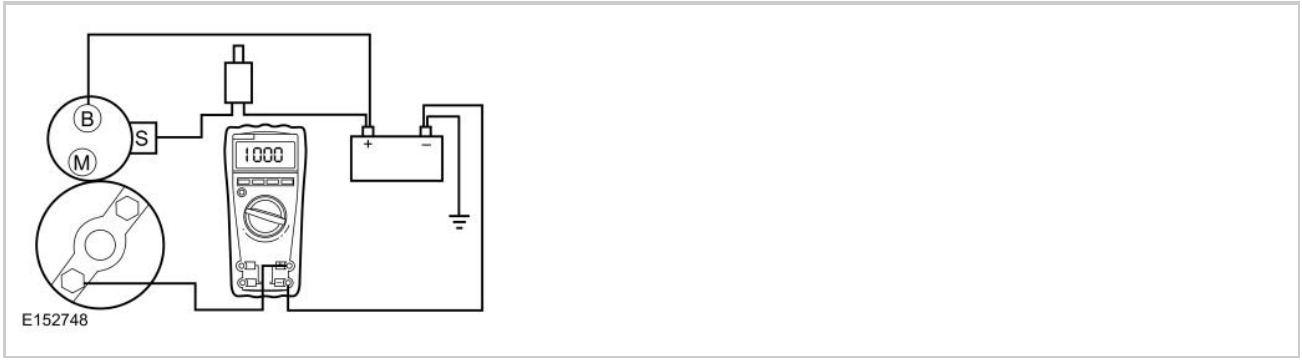
Connect the multimeter positive lead to the starter motor housing (the connection must be clean and free of rust or grease). Connect the negative lead to the negative battery terminal.

3.

Place gear selector lever in Park or Neutral.

4.

Engage the remote starter switch and crank the engine. Read and record the voltage reading. The reading should be 0.5 volt or less.



5.

If the voltage reading is greater than 0.5 volt, clean the negative cable connections at the battery, the body ground connections and the starter ground connection. Retest.

6.

If the voltage reading is greater than 0.5 volt, install a new negative battery cable.REFER to: Battery Cables - 3.7L Duratec (227kW/301PS) .

7.

If the voltage reading is less than 0.5 volt and the engine still cranks slowly, install a new starter motor.REFER to: Starter Motor .

GENERAL PROCEDURES > STARTER MOTOR DRIVE GEAR AND FLYWHEEL RING GEAR INSPECTION

Inspection

1.

Remove the starter motor. Refer to: Starter Motor .

2.

Check the wear patterns on the starter drive gear and the flywheel or flexplate ring gear. If the wear pattern is normal, then install the starter motor. Refer to: Starter Motor .



3.

If the starter motor drive gear and the flywheel or flexplate ring gear are not fully engaging and the starter motor drive gear is scored or damaged, then install a new starter motor.Refer to: Starter Motor .

4.

If the teeth on the flywheel or flexplate ring gear are scored or damaged, then install a new flywheel or flexplate. Refer to: FLEXPLATE - 3.7L Duratec (227kW/301PS). Refer to: FLYWHEEL - 3.7L Duratec (227kW/301PS).

REMOVAL AND INSTALLATION > STARTER MOTOR > REMOVAL

WARNING: Always disconnect the battery ground cable at the battery before disconnecting the starter motor battery terminal lead. If a tool is shorted at the starter motor battery terminal, the tool can quickly heat enough to cause a skin burn. Failure to follow this instruction may result in serious personal injury.

NOTE: Removal steps in this procedure may contain installation details.

All vehicles

1.

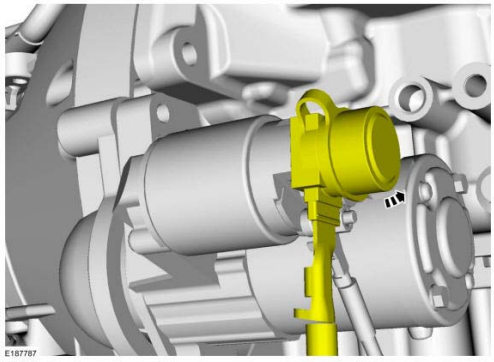
With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

2.

Disconnect the battery. Refer to: Battery Disconnect and Connect .

3.

Open the starter motor solenoid battery cable cover.



4.

1.

Remove the starter motor solenoid battery cable nut and then disconnect the starter motor solenoid battery cable.

Torque

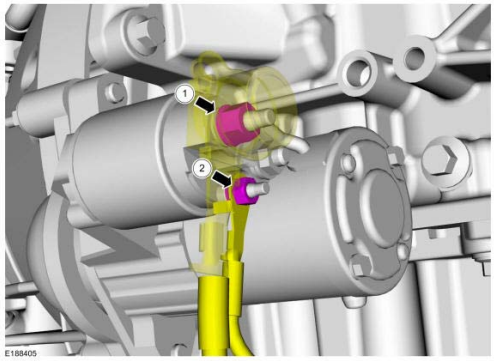
: 106 lb.in (12 Nm)

2.

Remove the starter motor solenoid wire nut and then disconnect starter motor solenoid wire.

Torque

: 53 lb.in (6 Nm)



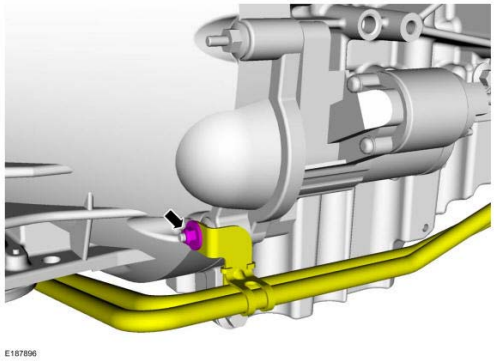
Automatic Transmission

5.

Remove the transmission cooling tube mounting bracket nut and then position the transmission cooling tube mounting bracket aside.

Torque

: 119 lb.in (13.5 Nm)



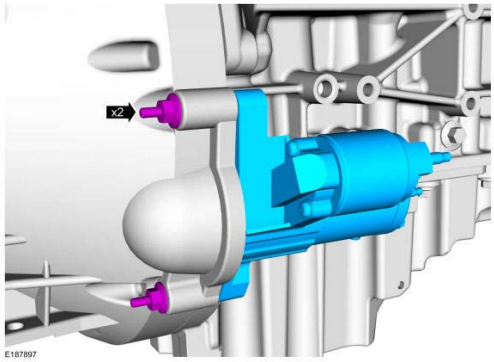
All vehicles

6.

Remove the starter motor mounting studbolts and then remove starter motor.

Torque

: 35 lb.ft (47.5 Nm)



7.

Inspect the starter motor drive gear and flywheel ring gear. Refer to: Starter Motor Drive Gear and Flywheel Ring Gear Inspection .

REMOVAL AND INSTALLATION > STARTER MOTOR > INSTALLATION

1.

To install, reverse the removal procedure.

SPECIFICATIONS > SPECIFICATIONS

General Specifications

Item	Specification
Normal engine cranking speed (Average)	200-250 RPM
Starting circuit maximum voltage drop (Engine at normal operating temperature) (Average)	0.5 volt
Starter motor maximum load current draw	800 amps
Starter motor no-load current draw (Average)	60-80 amps
Starter motor normal load current draw (Average)	130-190 amps

DESCRIPTION AND OPERATION > STARTING SYSTEM - OVERVIEW > STARTING SYSTEM

The starting system controls the cranking of the engine. When the PCM receives inputs from the ignition switch - push button start, transmission (with automatic transmission) or clutch pedal position switch (with manual transmission), run/start relay and the BCM it then energizes the BJB starter relay. When the starter relay is energized it applies power to the starter motor which cranks the engine.

DESCRIPTION AND OPERATION > STARTING SYSTEM - OVERVIEW > REMOTE START

Vehicles with automatic transmission are equipped with a remote start system. The remote start system allows the vehicle to be started from up to 30 meters (98 feet) away. For more information on the remote start system, refer to the owner's literature and Refer to: HANDLES, LOCKS, LATCHES AND ENTRY SYSTEMS .

DESCRIPTION AND OPERATION > STARTING SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION

System Operation

DESCRIPTION AND OPERATION > STARTING SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION > NETWORK MESSAGE CHART

Module Network Input Messages Powertrain Control Module (PCM)

Broadcast Message	Originating Module	Message Purpose
Crank request	BCM	Provides the PCM with indication that the driver has commanded the engine to crank.
Power mode	BCM	Provides the PCM with ignition mode.
Ignition status	BCM	Provides the PCM with ignition mode.

Module Network Input Messages Body Control Module (BCM)

Broadcast Message	Originating Module	Message Purpose
Intelligent access system status	RFA module	The response from the BCM request for the RFA module ID. If the RFA module ID response is incorrect, then the PATS is disabled.

DESCRIPTION AND OPERATION > STARTING SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION > PUSH BUTTON START SYSTEM

This vehicle is equipped with a PATS that disables the engine from cranking if an unprogrammed PATS key is used or an invalid PCM ID is received. The PATS is controlled by the BCM. If there is a PATS concern that causes the engine to be disabled, the IPC displays the corresponding message in the message center. For additional information, Refer to: Passive Anti-Theft System (PATS) - System Operation and Component Description .

Ignition modes are controlled by the RFA module and the BCM. For additional information on the ignition switch - push button start modes, Refer to: Steering Wheel and Column Electrical Components - System Operation and Component Description .

The ignition switch - push button start is connected to the RFA module and the BCM as a backup in case of a failure. If there is a circuit failure to either module from the ignition switch - push button start, the modules communicate the ignition switch - push button start request to each other over the Medium Speed Controller Area Network (MS-CAN).

During a start event the ignition switch - push button start is pressed in combination with either the brake pedal (automatic transmission) or the clutch pedal (manual transmission) input. The RFA module, the BCM and the PCM receive a request to start the engine. The PCM recognizes the correct inputs and provides voltage and ground to energize the starter relay coil and close the starter relay contacts. The starter relay contacts close, providing voltage to the starter solenoid, allowing the starter motor to crank the engine. The PCM disengages the starter motor once an engine Revolutions Per Minute (RPM) threshold is reached, a set crank time is exceeded or the ignition switch - push button start is pressed indicating an engine shutdown.

DESCRIPTION AND OPERATION > STARTING SYSTEM - SYSTEM OPERATION AND COMPONENT DESCRIPTION > REMOTE START

Vehicles with automatic transmission are equipped with a remote start system. The remote start feature allows the operator to remotely start the engine from up to 30 meters (98 feet) away and is activated using the Passive Key. Once started, the engine runs for 10 minutes. The run time can be extended by the operator. Refer to the Owner's Guide for more information. For more information on enabling the Remote start system refer to: Handles, Locks, Latches and Entry Systems - System Operation and Component Description and the Owner's Literature.

Component Description

Ignition Switch - Push Button Start

The ignition switch - push button start (Engine Start/Stop button) is a momentary contact switch that is hardwired to the BCM and the PCM. The ignition switch - push button start is used to obtain the OFF, ON or START ignition modes. The ignition switch - push button start is part of the FCIM and cannot be serviced separately. For more information, Refer to: Steering Wheel and Column Electrical Components - System Operation and Component Description .

BCM

Refer to: Module Controlled Functions - System Operation and Component Description .

PCM

The PCM provides power and ground to the starter relay to initiate cranking of the engine.

DIAGNOSIS AND TESTING > STARTING SYSTEM > INSPECTION AND VERIFICATION

Diagnostics in this service information assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

1.

Verify the customer concern.

2.

Check the battery for loose, damaged or corroded connections.

3.

Check the generator for loose, damaged or corroded connections.

4.

Check the battery condition and state of charge. BATTERY .

5.

Remove the accessory drive belt. REFER to: ACCESSORY DRIVE BELT - 2.3L EcoBoost (231kW/314PS). Verify the crankshaft and each of the components driven by the accessory drive belt rotate and are not seized or damaged.

6.

If any aftermarket accessories have been added to the vehicle, make sure they are properly wired.

7.

If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding.

DIAGNOSIS AND TESTING > STARTING SYSTEM > DTC CHARTS

Diagnostics in this service information assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

PCM DTC Chart

DTC	Description	Action
P06E4	Control Module Wake-up Circuit Performance	RETRIEVE and RECORD all CMDTCs. If BCM DTC C113A:11 or C113A:15 is found, GO to Pinpoint Test C Clear all Diagnostic Trouble Codes (DTCs). RERUN the PCM self-test. If the DTC returns, CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PCM. REFER to: POWERTRAIN CONTROL MODULE (PCM) - 2.3L EcoBoost (231kW/314PS).
P06E9	Engine Starter Performance	If the engine cranks, Refer to ENGINE CONTROLS - SYMPTOM CHARTS (EXCEPT DIESEL & HYBRID) . If the engine does not crank, GO to Pinpoint Test A
P0830	Clutch Pedal Switch "A" Circuit	GO to Pinpoint Test A
P1594	Forced Engine Shutdown - Remote Start System Fault, No Unattended Vehicle Timeout	REFER to: ELECTRONIC ENGINE CONTROLS - 2.3L ECOBOOST (231KW/314PS).
P1595	Forced Engine Shutdown - Remote Start System Fault, Transmission Range Not In Park Position	REFER to: ELECTRONIC ENGINE CONTROLS - 2.3L ECOBOOST (231KW/314PS).
P162F	Starter Motor Disabled - Engine Crank Time Too Long	Refer to ENGINE CONTROLS - SYMPTOM CHARTS (EXCEPT DIESEL & HYBRID) .
P2535	Ignition Switch Run/Start Position Circuit High	GO to Pinpoint Test D
All Other DTCs	-	Refer to ENGINE CONTROLS - SYMPTOM CHARTS (EXCEPT DIESEL & HYBRID) .

BCM DTC Chart

DTC	Description	Action
C113A:11	Wakeup Control: Circuit Short To Ground	GO to Pinpoint Test C
C113A:15	Wakeup Control: Circuit Short To Battery or Open	GO to Pinpoint Test C
P0830:11	Clutch Pedal Switch "A" Circuit: Circuit Short To Ground	GO to Pinpoint Test A
All Other DTCs	-	REFER to: Body Control Module (BCM) .

DIAGNOSIS AND TESTING > STARTING SYSTEM > SYMPTOM CHART(S)

Symptom Chart: Starting System

Diagnostics in this service information assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

Symptom Chart

Condition	Possible Sources	Actions
The engine does not crank	Refer to the Pinpoint Test	GO to Pinpoint Test A
The engine cranks slowly	Refer to the Pinpoint Test	PERFORM the starter system component test. REFER to Starter Motor - Positive Circuit Test in Component Test(s) .
The engine cranks but will not start	Fuses PCM Fuel pump Fuel pump relay Starter Wiring, terminals or connectors	Refer to ENGINE CONTROLS - SYMPTOM CHARTS (EXCEPT DIESEL & HYBRID) .
Unusual starter noise	Refer to the Pinpoint Test	GO to Pinpoint Test B
The starter spins but the engine does not crank	Starter motor	INSPECT the starter motor mounting and engagement. REPAIR as necessary.
	Damaged flexplate	INSPECT the flexplate for damaged, missing or worn teeth. REPAIR as necessary.
The starter does not disengage from the flexplate	Starter relay Wiring, terminals or connectors	REMOVE the starter relay. If the engine stops cranking, INSTALL a new relay. If the engine continues to crank, REPAIR circuit CDC25 (BN/GN) for a short to voltage.

The remote start is inoperative	Remote start feature not enabled Passive Key or battery PCM Wiring, terminals or connectors	REFER to: Locks, Latches and Entry Systems .
The remote start has poor range performance	Passive key or battery After market systems High power devices TV/radio transmission towers	REFER to: Locks, Latches and Entry Systems .

DIAGNOSIS AND TESTING > STARTING SYSTEM > PINPOINT TEST(S)

Engine Does Not Crank

Refer to Starting System for schematic and connector information.

Normal Operation and Fault Conditions

REFER to: Starting System - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
P06E9	Engine Starter Performance	The PCM sets this DTC when no engine rotation is detected during a crank event.
P0830	Clutch Pedal "A" Circuit	The PCM sets this DTC when the PCM receives vehicle speed input, indicating vehicle movement and does not detect the switching input from the clutch pedal position switch.
P0830:11	Clutch Pedal Switch "A" Circuit: Circuit Short To Ground	The BCM sets this DTC when a short to ground is detected on the clutch bottom of travel circuit during an on-demand self test.

Possible Sources

- Battery
- Battery cables
- IPC
- Starter motor
- BJB starter relay

Visual Inspection and Diagnostic Pre-checks

- Inspect the run/start relay.

- Inspect the high current BJB connections.
- Verify the BJB fuse 60 (5A).
- Verify the BJB fuse 30 (30A).
- Inspect the passive key.
- Inspect the CPP switch (manual transmission only).

DIAGNOSIS AND TESTING > STARTING SYSTEM > PINPOINT TEST(S) > PINPOINT TEST A : ENGINE DOES NOT CRANK > PINPOINT TEST A : ENGINE DOES NOT CRANK

A1 PERFORM INSPECTION AND VERIFICATION

> *NOTE: Make sure battery voltage is greater than 12.2 volts prior to and during this pinpoint test.*

> *NOTE: If it is necessary to leave the battery charger connected during testing, do not leave it on its highest or boost setting. The highest settings can exceed 16 volts, resulting in false test results and setting of DTCs.*

Perform Inspection and Verification .

Was an obvious cause for an observed or reported concern found?

Yes	CORRECT the cause as necessary.

No	GO to A2

A2 CHECK FOR NO KEY DETECTED MESSAGE IN THE MESSAGE CENTER

> *NOTE: There are certain areas inside the vehicle where the passive key may not be detected and the message center displays NO KEY DETECTED. If the passive key is in the far outside edges of the interior (like in a door map pocket or above a sun visor) it might not be detected. Move the passive key to a different location and try to start the vehicle again.*

Check the message displayed in the message center while pressing the engine start/stop switch.

Is NO KEY DETECTED displayed?

Yes	DIAGNOSE the NO KEY DETECTED concern. REFER to: Passive Anti-Theft System (PATS) .

No	GO to A3

A3 VERIFY THE BCM (BODY CONTROL MODULE), IPC (INSTRUMENT PANEL CLUSTER) AND PCM (POWERTRAIN CONTROL MODULE) PASS THE NETWORK TEST

Ignition ON.

Using a diagnostic scan tool, perform the Network Test.

Did the BCM, IPC and PCM pass the Network Test?

Yes	GO to A4

No	REFER to: MODULE COMMUNICATIONS NETWORK .

A4 RETRIEVE BCM (BODY CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, perform BCM self-test.

Are any BCM Diagnostic Trouble Codes (DTCs) present?

Yes	For DTC P0830:11 GO to A26 For all BCM Diagnostic Trouble Codes (DTCs), REFER to the BCM DTC Chart in DTC Charts .

No	GO to A5

A5 RETRIEVE PCM (POWERTRAIN CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, perform PCM self-test.

Are any PCM Diagnostic Trouble Codes (DTCs) other than P06E9 present?

Yes	REFER to the PCM DTC Chart in DTC Charts .

No	With automatic transmission, GO to A6 With manual transmission, GO to A11

A6 CHECK THE OPERATION OF THE STOPLAMPS

While observing the stoplamps, apply the brake pedal.

Do the stoplamps illuminate?

Yes	GO to A7

No	DIAGNOSE All the Stoplamps are inoperative. REFER to: Stoplamps .

A7 CHECK THE BRAKE PEDAL POSITION (BOO1) PID (PARAMETER IDENTIFICATION)

Using a diagnostic scan tool, view PCM Parameter Identifications (PIDs).

Monitor the PCM B001 PID while applying the brake pedal.

Does the PID read On?

Yes	GO to A9

No	GO to A8

A8 CHECK THE BPP (BRAKE PEDAL POSITION) SWITCH CIRCUIT FOR VOLTAGE AT THE PCM (POWERTRAIN CONTROL MODULE)

Ignition OFF.

Disconnect PCM C1551B .

While applying the brake pedal, measure:

Positive Lead	Measurement / Action	Negative Lead
C1551B-66		Ground

Is the voltage greater than 11 volts?

Yes	GO to A28

No	REPAIR the circuit.

A9 CHECK BCM (BODY CONTROL MODULE) IGN_SW_STATE PID (PARAMETER IDENTIFICATION)

Using a diagnostic scan tool, view the BCM Parameter Identifications (PIDs).

Make sure the transmission is in PARK or NEUTRAL.

Monitor the BCM PID IGN_SW_STATE while pressing the engine start/stop switch and the brake pedal.

Does the PID change from Off to Start when the ignition switch - push button start and brake pedal are pressed?

Yes	GO to A10

No	DIAGNOSE No power in ON. REFER to: Steering Wheel and Column Electrical Components .

A10 CHECK THE PCM (POWERTRAIN CONTROL MODULE) IN GEAR-TRANSMISSION IS APPLYING A LOAD TO ENGINE (IN_GEAR) PID (PARAMETER IDENTIFICATION)

Using a diagnostic scan tool, view the PCM Parameter Identifications (PIDs).

Monitor the PCM PID IN_GEAR, while placing the gear selector in PARK and then NEUTRAL.

Does the PID read No in both positions?

Yes	GO to A12

No	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 2.3L EcoBoost (201kW/273PS) .

A11 CHECK THE PCM (POWERTRAIN CONTROL MODULE) CLUTCH PEDAL AT OR NEAR BOTTOM OF TRAVEL (CPP_BOT) PID (PARAMETER IDENTIFICATION)

Using a diagnostic scan tool, while viewing the PCM PID CPP_BOT, fully apply the clutch pedal and release.

Does the PID change from NO to YES when the clutch pedal is fully applied?

Yes	GO to A12

No	GO to A23

A12 CHECK THE PCM (POWERTRAIN CONTROL MODULE) ENGINE CRANKING (ENG_CRANK) PID (PARAMETER IDENTIFICATION)

Make sure the transmission is in PARK or NEUTRAL.

Using a diagnostic scan tool, view the PCM Parameter Identifications (PIDs).

Monitor the PCM PID ENG_CRANK while pressing the engine start/stop switch and the brake pedal (with automatic transmission) or fully apply the clutch pedal (with manual transmission).

Does the PID change from Inactive to Active?

Yes	GO to A13

No	GO to A28

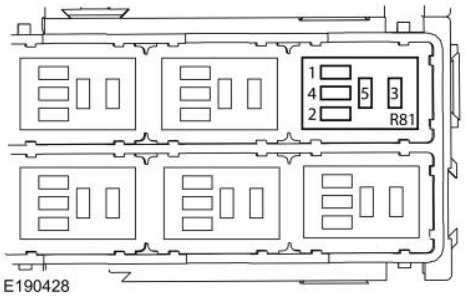
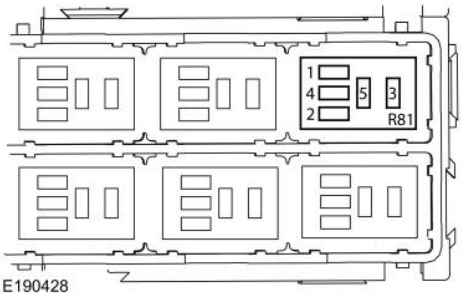
NOTE: The following step uses a test light to simulate normal circuit loads. To avoid connector terminal damage, use the Flex Probe Kit for the test light probe connection to the vehicle. Do not use the test light probe directly on any connector.

A13 CHECK THE STARTER RELAY CONTROL OPERATION

Remove the BJB starter relay.

Measure:

Positive Lead	Measurement / Action	Negative Lead

 BJB starter relay pin 1		 BJB starter relay pin 2

Make sure the transmission is in PARK or NEUTRAL.

While pressing the engine start/stop switch and the brake pedal, observe the test light.

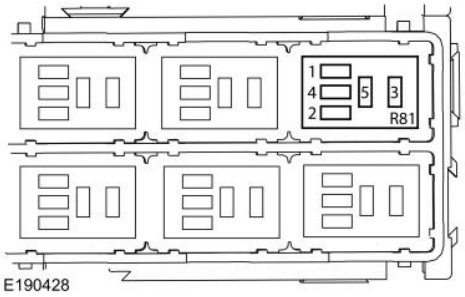
Does the test light illuminate when the engine start/stop switch is pressed?

Yes	GO to A14

No	GO to A21

A14 CHECK THE VOLTAGE TO THE STARTER RELAY

Measure:

Positive Lead	Measurement / Action	Negative Lead
 BJB starter relay pin 3		Ground

Is the voltage greater than 11 volts?

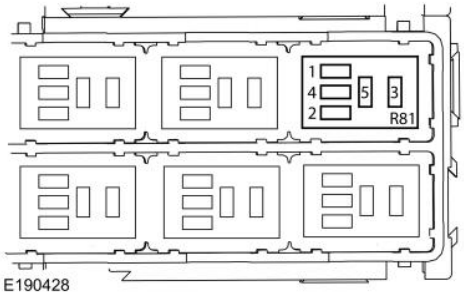
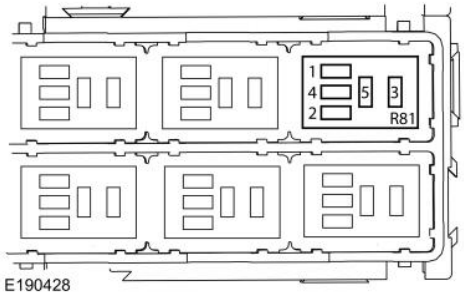
Yes	GO to A15

No	VERIFY BJB fuse 30 (30A) is OK. If OK, REPAIR the circuit for an open. If not OK, REFER to the SYSTEM WIRING DIAGRAMS to identify the possible causes of the circuit short.

A15 CHECK THE STARTER MOTOR OPERATION AT THE STARTER RELAY

Ignition OFF.

With the transmission in PARK or NEUTRAL, momentarily connect a fused jumper wire:

Positive Lead	Measurement / Action	Negative Lead
 BJB starter relay pin 3		 BJB starter relay pin 5

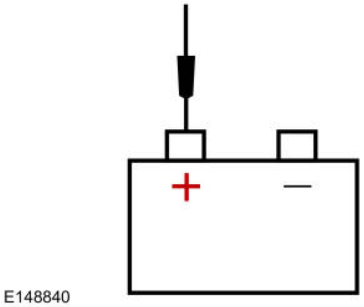
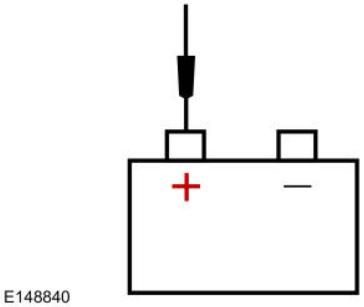
Did the starter engage and the engine crank?

Yes	INSTALL a new starter relay.

No	GO to A16

A16 CHECK THE BATTERY GROUND CABLES

Measure:

Positive Lead	Measurement / Action	Negative Lead
		Ground G106
		Ground G108

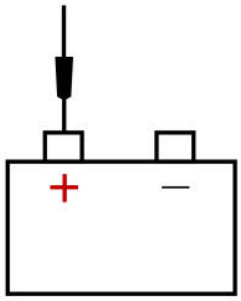
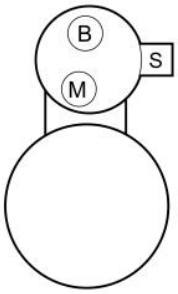
Are the voltages greater than 11 volts?

Yes	GO to A17

No	CLEAN or INSTALL new negative battery cables as necessary. REFER to: Battery Cables - 2.3L EcoBoost (201kW/273PS) .

A17 CHECK THE STARTER MOTOR GROUND

Measure:

Positive Lead	Measurement / Action	Negative Lead
 E148840		 E148837 Starter motor case

Is the voltage greater than 11 volts?

Yes	GO to A18

No	CLEAN the starter motor mounting flange and MAKE SURE the starter motor is correctly mounted. REFER to: Starter Motor .

A18 CHECK THE VOLTAGE TO THE STARTER MOTOR

Measure:

Positive Lead	Measurement / Action	Negative Lead
C197A-1 ("B" terminal)		Ground

Is the voltage greater than 11 volts?

Yes	GO to A19

No	INSTALL a new positive battery cable. REFER to: Battery Cables - 2.3L EcoBoost (201kW/273PS) .

A19 CHECK THE STARTER MOTOR FOR CORRECT OPERATION

Perform Starter Motor - Positive Circuit Test in Component Test(s) .

Was an obvious cause found?

Yes	Correct the cause as necessary.

No	GO to A20

A20 CHECK FOR START INPUT AT THE STARTER

Connect BJB starter relay.

Disconnect Starter solenoid C197A .

While holding the key in the START position, measure:

Positive Lead	Measurement / Action	Negative Lead
C197C-1 ("S" terminal)		Ground

Is the voltage greater than 11 volts?

Yes	CLEAN the starter solenoid "S" terminal and starter solenoid connector. CHECK the wiring and the starter motor for a loose or intermittent connection.

No	REPAIR the circuit for an open.

A21 CHECK THE PCM (POWERTRAIN CONTROL MODULE) STARTER RELAY CIRCUITS FOR A SHORT TO GROUND

Ignition OFF.

Disconnect BJB starter relay.

Disconnect PCM C1551B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1551B-43	Ω	Ground
C1551B-62	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to A22

No	REPAIR the affected circuit.

A22 CHECK THE PCM (POWERTRAIN CONTROL MODULE) STARTER RELAY CIRCUITS FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1551B-43	Ω	BJB starter relay pin 2
C1551B-62	Ω	BJB starter relay pin 1

Are the resistances less than 3 ohms?

Yes	GO to A28

No	REPAIR the affected circuit.

A23 CHECK THE CPP (CLUTCH PEDAL POSITION) SWITCH OPERATION

Ignition OFF.

Disconnect PCM C1551B .

While fully applying the clutch pedal, measure:

Positive Lead	Measurement / Action	Negative Lead
C1551B-30	Ω	Ground

Is the resistance less than 3 ohms?

Yes	GO to A28

No	GO to A24

A24 CHECK THE CPP (CLUTCH PEDAL POSITION) GROUND CIRCUIT FOR AN OPEN

Disconnect CPP switch C2353 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2353-2	Ω	Ground

Is the resistance less than 3 ohms?

Yes	GO to A25

No	REPAIR the circuit.

A25 CHECK THE CPP (CLUTCH PEDAL POSITION) SWITCH CIRCUIT FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1551B-30	Ω	C2353-1

Is the resistance less than 3 ohms?

Yes	INSTALL a new CPP switch. REFER to: CLUTCH PEDAL POSITION (CPP) SWITCH - 2.3L EcoBoost (231kW/314PS).

No	REPAIR the circuit.

A26 CHECK FOR DTC WITH CPP (CLUTCH PEDAL POSITION) SWITCH DISCONNECTED

Ignition OFF.

Disconnect CPP switch C2353 .

Ignition ON.

Using a diagnostic scan tool, perform BCM self-test.

Was DTC P0830:11 retrieved during on-demand self-test with the CPP switch disconnected?

Yes	GO to A27

No	INSTALL a new CPP switch. REFER to: CLUTCH PEDAL POSITION (CPP) SWITCH - 2.3L EcoBoost (231kW/314PS).

A27 CHECK THE CLUTCH BOTTOM OF TRAVEL CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Disconnect BCM C2280A .

Disconnect PCM C1551B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1551B-30	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to A29

No	REPAIR the circuit.

A28 CHECK FOR CORRECT PCM (POWERTRAIN CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all PCM connectors.

Repair:

corrosion (install new connectors or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the PCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PCM. REFER to: POWERTRAIN CONTROL MODULE (PCM) - 2.3L EcoBoost (231kW/314PS).

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

A29 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connectors or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > STARTING SYSTEM > PINPOINT TEST(S) > PINPOINT TEST B : UNUSUAL STARTER NOISE

Unusual Starter Noise

Normal Operation and Fault Conditions

Correct starter operation relies on correct mounting of the starter to the engine, alignment of the starter ring gear to the flexplate and correct functioning of the starter assembly (internal gears, bearings).

Possible Sources

- Engine
- Starter motor
- Starter motor mounting

Visual Inspection and Diagnostic Pre-checks

- Inspect the starter motor.
- Inspect the starter motor mounting.

DIAGNOSIS AND TESTING > STARTING SYSTEM > PINPOINT TEST(S) > PINPOINT TEST B : UNUSUAL STARTER NOISE > PINPOINT TEST B : UNUSUAL STARTER NOISE

B1 CHECK THE STARTER MOUNTING

Inspect the starter mounting bolts for looseness.

Is the starter motor mounted correctly?

Yes	GO to B2

No	INSTALL the starter motor correctly. REFER to: Starter Motor .

B2 CHECK FOR STARTER NOISE

Ignition OFF.

Connect a remote starter switch between the starter solenoid C197A-1 ("B" terminal) and C197C-1 ("S" terminal).

Engage the starter and verify the noise is due to starter operation.

Is the noise due to the starter engagement?

Yes	REFER to: Starter Motor Drive Gear and Flywheel Ring Gear Inspection .

No	REFER to: ENGINE to continue diagnosis.

DIAGNOSIS AND TESTING > STARTING SYSTEM > PINPOINT TEST(S) > PINPOINT TEST C : C113A:11 OR C113A:15

C113A:11 or C113A:15

Refer to Electronic Engine Controls - 2.3L for schematic and connector information.

Normal Operation and Fault Conditions

The wake-up control circuit wakes up the PCM prior to the engine cranking. The PCM needs to wake up prior to a crank request so it has time to go through its initialization. The wake-up control circuit is controlled by the BCM. The BCM activates the wake-up control circuit when the driver door is opened or when the ignition is in the ON or START position.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
C113A:11	PCM Wakeup Control: Circuit Short to Ground	This DTC is set by the BCM when a short to ground is detected on the wake-up control circuit.
C113A:15	PCM Wakeup Control: Circuit Short to Battery or Open	This DTC is set by the BCM when a short to voltage or an open is detected on the wake-up control circuit.

Possible Sources

- BCM
- PCM
- Wiring, terminals or connectors

DIAGNOSIS AND TESTING > STARTING SYSTEM > PINPOINT TEST(S) > PINPOINT TEST C : C113A:11 OR C113A:15 > PINPOINT TEST C : C113A:11 OR C113A:15

C1 CHECK FOR BCM (BODY CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition ON.

Using a diagnostic scan tool, perform the BCM self-test.

Is DTC C113A:11 present?

Yes	GO to C2

No	If DTC C113A:15 is present, GO to C4 For all other BCM Diagnostic Trouble Codes (DTCs), REFER to: Body Control Module (BCM) .

C2 CHECK THE PCM (POWERTRAIN CONTROL MODULE) FOR A SHORT TO GROUND

Ignition OFF.

Disconnect PCM C1551B .

Ignition ON.

Using a diagnostic scan tool, clear the BCM Diagnostic Trouble Codes (DTCs).

Using a diagnostic scan tool, perform the BCM self-test.

Is BCM DTC C113A:11 present?

Yes	GO to C3

No	GO to C8

C3 CHECK THE PCM (POWERTRAIN CONTROL MODULE) WAKE-UP SIGNAL CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Disconnect BCM C2280F .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1551B-28	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to C7

No	REPAIR the circuit.

C4 CHECK THE PCM (POWERTRAIN CONTROL MODULE) FOR INTERNAL SHORT OR OPEN

Ignition OFF.

Disconnect PCM C1551B .

Ignition ON.

Using a diagnostic scan tool, clear the BCM Diagnostic Trouble Codes (DTCs).

Using a diagnostic scan tool, perform the BCM self-test.

Is BCM DTC C113A:15 present?

Yes	GO to C5

No	GO to C8

C5 CHECK THE PCM (POWERTRAIN CONTROL MODULE) WAKE-UP SIGNAL CIRCUIT FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect BCM C2280F .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1551B-28		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to C6

C6 CHECK THE PCM (POWERTRAIN CONTROL MODULE) WAKE-UP SIGNAL CIRCUIT FOR AN OPEN

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1551B-28	Ω	C2280F-18

Is the resistance less than 3 ohms?

Yes	GO to C7

No	REPAIR the circuit.

C7 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connectors or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

C8 CHECK FOR CORRECT PCM (POWERTRAIN CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all PCM connectors.

Repair:

corrosion (install new connectors or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the PCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new REFER to: POWERTRAIN CONTROL MODULE (PCM) - 2.3L EcoBoost (231kW/314PS).

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > STARTING SYSTEM > PINPOINT TEST(S) > PINPOINT TEST D : P2535

P2535

Refer to Starting System for schematic and connector information.

Normal Operation and Fault Conditions

When the ignition switch - push button start has been pressed, the PCM receives a voltage signal on the

crank detect circuit. When the required inputs have been received, the PCM supplies voltage and ground to the starter relay coil. The ignition switch - push button start is part of the FCIM and cannot be serviced separately. For more information, REFER to: Starting System - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
P2535	Ignition Switch Run/Start Position Circuit High	The PCM sets this DTC when the PCM detects voltage on the crank detect circuit while engine is running.

Possible Sources

- Ignition switch - push button start
- BCM
- PCM
- Wiring, terminals or connectors

DIAGNOSIS AND TESTING > STARTING SYSTEM > PINPOINT TEST(S) > PINPOINT TEST D : P2535 > PINPOINT TEST D : P2535

D1 CHECK THE CRANK DETECT CIRCUIT FOR A SHORT TO VOLTAGE WITH THE PCM (POWERTRAIN CONTROL MODULE) DISCONNECTED

Ignition OFF.

Disconnect PCM C1551B .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1551B-47		Ground

Is any voltage present?

Yes	GO to D2

No	GO to D4

D2 CHECK THE CRANK DETECT CIRCUIT FOR A SHORT TO VOLTAGE WITH THE IGNITION SWITCH - PUSH BUTTON START DISCONNECTED

Ignition OFF.

Disconnect FCIM C2402A .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1551B-47		Ground

Is any voltage present?

Yes	GO to D3

No	Install a new ignition switch - push button start. REFER to: Front Controls Interface Module (FCIM) - Vehicles With: AM/FM/CD/SYNC (without touchscreen) or REFER to: Front Controls Interface Module (FCIM) - Vehicles With: Touchscreen Display.

D3 CHECK THE CRANK DETECT CIRCUIT FOR A SHORT TO VOLTAGE WITH THE BCM (BODY CONTROL MODULE) DISCONNECTED

Ignition OFF.

Disconnect BCM C2280B .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1551B-47		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	

D4 CHECK FOR CORRECT PCM (POWERTRAIN CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all PCM connectors.

Repair:

corrosion (install new connectors or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the PCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PCM. REFER to: POWERTRAIN CONTROL MODULE (PCM) - 2.3L EcoBoost (231kW/314PS).

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > STARTING SYSTEM > COMPONENT TEST(S)

Starter Motor - Positive Circuit Test

NOTE: Always make the multimeter connection at the component terminal rather than at the wiring end of the connector. Making a connection at the wiring end of the connector could result in false readings because the meter will not pick up a high resistance between the wiring connector and component.

1.

Make sure the battery is fully charged. REFER to: BATTERY .

2.

Perform a battery drain test. REFER to: Battery Drain Check .

3.

Connect a remote starter switch between starter solenoid "S" terminal and the battery positive terminal.

4.

Connect the multimeter positive lead to the battery positive post. Connect the negative lead to the starter solenoid "M" terminal.



5.

Place gear selector lever in Park or Neutral.

6.

Engage the remote starter switch. Read and record the voltage. The voltage reading should be 0.5 volt or less.

7.

If the voltage reading is 0.5 volt or less, perform Starter Motor - Ground Circuit Test below.

8.

A voltage reading greater than 0.5 volt is an indication of excessive resistance in the connections, the positive battery cable or in the starter solenoid. Remove the cables from the solenoid "B", "S" and "M" terminals. Clean the cables and connections and reinstall the cables to the correct terminals. Repeat Steps 3 through 6.

9.

If the voltage reading is still greater than 0.5 volt when checked at the "M" terminal, move the multimeter negative lead to the starter solenoid "B" terminal.

10.

With the gear selector lever in Park or Neutral, engage the remote starter switch. Read and record the voltage.

11.

If the voltage reading at the "B" terminal is lower than 0.5 volt, the concern is in the connections at the starter solenoid or in the solenoid contacts. Install a new starter motor. REFER to: Starter Motor .

12.

If the voltage reading taken at the solenoid "B" terminal is greater than 0.5 volt after cleaning the cables and connections at the solenoid, the concern is in the positive battery cable connection or in the positive battery cable itself. Clean the positive battery cable connection. If this does not resolve the concern, install a new positive battery cable. REFER to: Battery Cables - 2.3L EcoBoost (201kW/273PS) .

Starter Motor - Ground Circuit Test

A slow cranking condition can be caused by resistance in the ground or return portion of the cranking circuit. This procedure checks the voltage drop in the ground circuit.

1.

Connect a remote starter switch between starter solenoid "S" terminal and the battery positive terminal.

2.

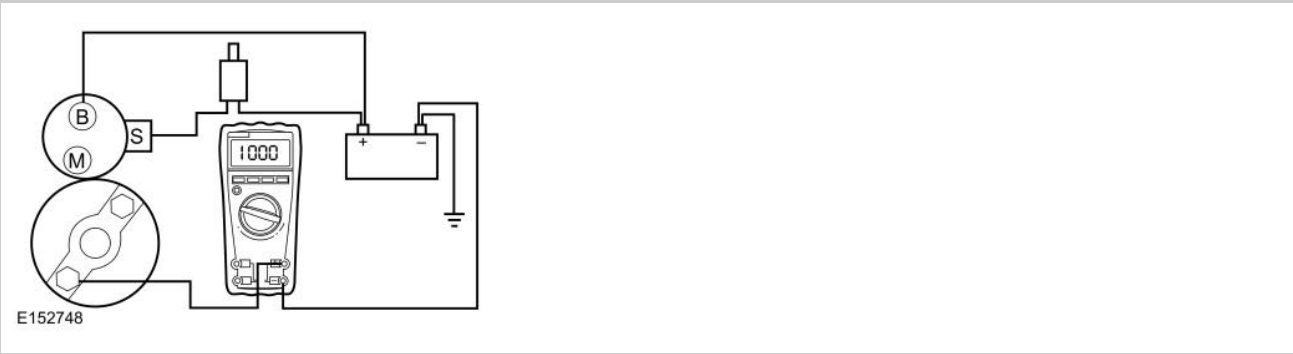
Connect the multimeter positive lead to the starter motor housing (the connection must be clean and free of rust or grease). Connect the negative lead to the negative battery terminal.

3.

Place gear selector lever in Park or Neutral.

4.

Engage the remote starter switch and crank the engine. Read and record the voltage reading. The reading should be 0.5 volt or less.



5.

If the voltage reading is greater than 0.5 volt, clean the negative cable connections at the battery, the body ground connections and the starter ground connection. Retest.

6.

If the voltage reading is greater than 0.5 volt, install a new negative battery cable. REFER to: Battery Cables - 2.3L EcoBoost (201kW/273PS) .

7.

If the voltage reading is less than 0.5 volt and the engine still cranks slowly, install a new starter motor. REFER to: Starter Motor .

GENERAL PROCEDURES > STARTER MOTOR DRIVE GEAR AND FLYWHEEL RING GEAR INSPECTION

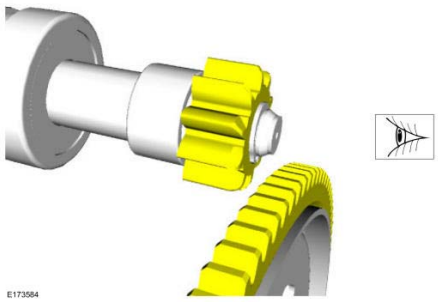
Inspection

1.

Remove the starter motor. Refer to: Starter Motor .

2.

Check the wear patterns on the starter drive gear and the flywheel or flexplate ring gear. If the wear pattern is normal, then install the starter motor. Refer to: Starter Motor .



3.

If the starter motor drive gear and the flywheel or flexplate ring gear are not fully engaging and the starter motor drive gear is scored or damaged, then install a new starter motor. Refer to: Starter Motor .

4.

If the teeth on the flywheel or flexplate ring gear are scored or damaged, then install a new flywheel or flexplate. Refer to: FLEXPLATE - 2.3L EcoBoost (231kW/314PS). Refer to: FLYWHEEL - 2.3L EcoBoost (231kW/314PS).

REMOVAL AND INSTALLATION > STARTER MOTOR > REMOVAL

WARNING: Always disconnect the battery ground cable at the battery before disconnecting the starter motor battery terminal lead. If a tool is shorted at the starter motor battery terminal, the tool can quickly heat enough to cause a skin burn. Failure to follow this instruction may result in serious personal injury.

NOTE: Removal steps in this procedure may contain installation details.

1.

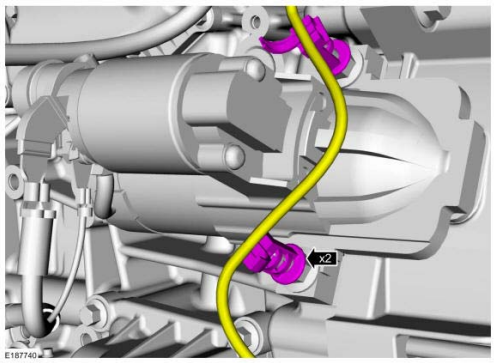
With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

2.

Disconnect the battery. Refer to: Battery Disconnect and Connect .

3.

Disconnect the wire harness retainers from the starter motor mounting studbolts and position the wire harness aside.

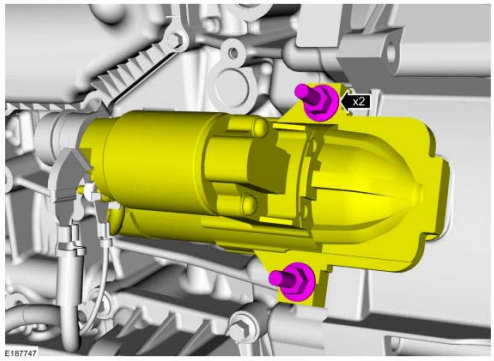


4.

Remove the starter motor mounting studbolts and then position starter motor aside.

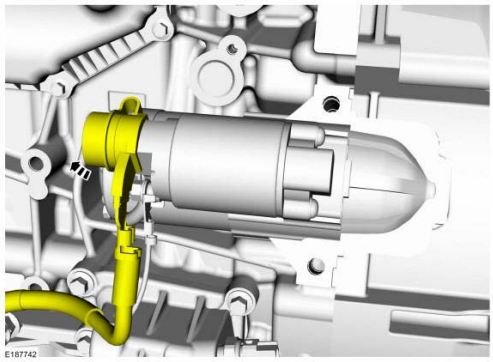
Torque

: 35 lb.ft (47.5 Nm)



5.

Open the starter motor solenoid battery cable cover.



6.

1.

Remove the starter motor solenoid battery cable nut and then disconnect the starter motor solenoid battery cable.

Torque

: 106 lb.in (12 Nm)

2.

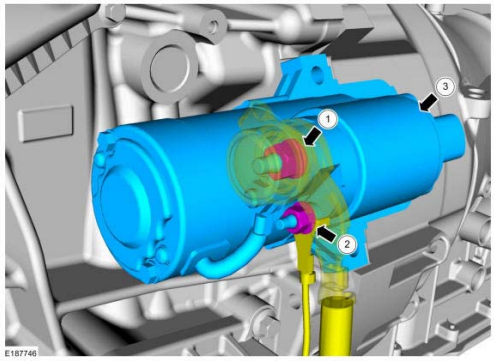
Remove the starter motor solenoid wire nut and then disconnect the starter solenoid wire.

Torque

: 53 lb.in (6 Nm)

3.

Remove the starter motor.



7.

Inspect the starter motor drive gear and flywheel ring gear. Refer to: Starter Motor Drive Gear and Flywheel Ring Gear Inspection .

REMOVAL AND INSTALLATION > STARTER MOTOR > INSTALLATION

1.

To install, reverse the removal procedure.

Service Manual: ACCELERATION CONTROL

DESCRIPTION AND OPERATION > ACCELERATION CONTROL - OVERVIEW > OVERVIEW

The acceleration controls consist of the accelerator pedal and sensor assembly.

The throttle is controlled by an APP sensor on the accelerator pedal assembly. The APP sensor sends a signal to the PCM in response to throttle pedal movements initiated by the driver. The PCM sends a signal to the electronic throttle control which increases and decreases throttle position.

The engine management system electronically operates the throttle of the engine in response to throttle pedal movements initiated by the driver. In the event of a system failure, the engine management system provides a "limp home" mode which allows the car to be driven with limited performance.

DIAGNOSIS AND TESTING > ACCELERATION CONTROL > SYMPTOM CHART(S)

REFER to ENGINE CONTROLS - INTRODUCTION (EXCEPT DIESEL & HYBRID) . See ENGINE CONTROLS - SYMPTOM CHARTS (EXCEPT DIESEL & HYBRID) .

REMOVAL AND INSTALLATION > ACCELERATOR PEDAL > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

NOTE: To prevent setting Diagnostic Trouble Codes (DTCs), make sure the ignition switch is in the OFF position prior to disconnecting the accelerator pedal electrical connector.

WARNING: Before beginning any service procedure in this service information, refer to Safety Warnings in GENERAL INFORMATION . Failure to follow this instruction may result in serious personal injury.

1. Refer to: HEALTH AND SAFETY PRECAUTIONS .
2. Disconnect the accelerator pedal sensor electrical connector. Remove the 3 nuts and the accelerator pedal and sensor assembly.

   Torque: 80 lb.in (9 Nm)

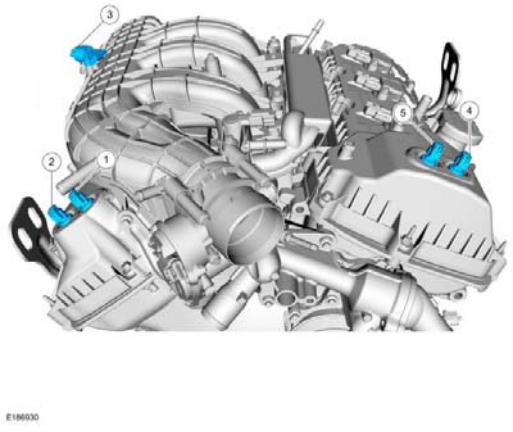


REMOVAL AND INSTALLATION > ACCELERATOR PEDAL > INSTALLATION

1. To install, reverse the removal procedure.

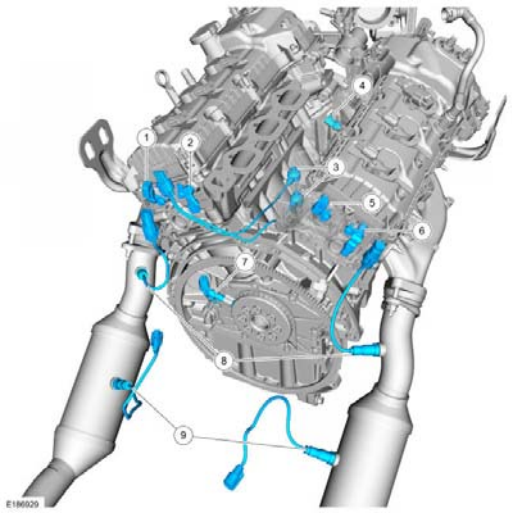
DESCRIPTION AND OPERATION > ELECTRONIC ENGINE CONTROLS - COMPONENT LOCATION

Electronic Engine Controls- Front



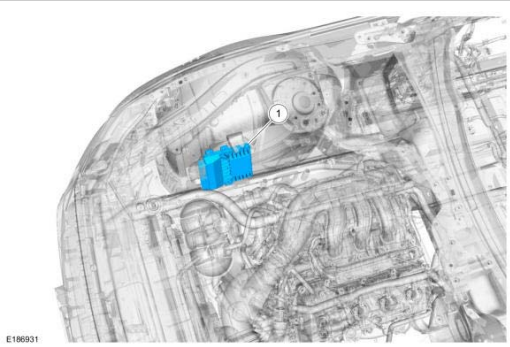
Item	Description
1	RH intake VCT oil control solenoid
2	RH exhaust VCT oil control solenoid
3	MAPT sensor
4	LH exhaust VCT oil control solenoid
5	LH intake VCT oil control solenoid

Electronic Engine Controls - Rear



Item	Description
1	LH exhaust CMP sensor
2	LH intake CMP sensor
3	KS
4	CHT sensor
5	RH intake CMP sensor
6	RH exhaust CMP sensor
7	CKP sensor
8	HO2S
9	Catalyst monitor sensor

Powertrain Control Module (PCM)



Item	Description
1	PCM

DESCRIPTION AND OPERATION > ELECTRONIC ENGINE CONTROLS - OVERVIEW

Authoring Template

DESCRIPTION AND OPERATION > ELECTRONIC ENGINE CONTROLS - OVERVIEW > OVERVIEW

The EEC system provides optimum control of the engine through the enhanced capability of the PCM. The EEC system also has an OBD monitoring system with features and functions to meet federal regulations on exhaust emissions.

The EEC system has two major divisions: hardware and software. The hardware includes the PCM, sensors, switches, actuators, solenoids, and interconnecting terminals. The software in the PCM provides the strategy control for outputs (engine hardware) based on the values of the inputs to the PCM.

The PCM receives information from a variety of sensor and switch inputs. Based on the strategy and calibration stored within the PCM, the PCM generates the appropriate output. The system is designed to minimize emissions and optimize fuel economy and driveability. The software strategy controls the basic operation of the engine, provides the OBD strategy, controls the MIL, communicates to the scan tool over the DLC, allows for flash EEPROM, provides idle air and fuel trim, and controls failure mode effects management (FMEM).

DESCRIPTION AND OPERATION > ELECTRONIC ENGINE CONTROLS - SYSTEM OPERATION AND COMPONENT DESCRIPTION > SYSTEM OPERATION

Refer to the ENGINE CONTROLS - DESCRIPTION & OPERATION (EXCEPT DIESEL & HYBRID) .

DIAGNOSIS AND TESTING > ELECTRONIC ENGINE CONTROLS > DTC CHART: POWERTRAIN CONTROL MODULE (PCM)

Diagnostics in this service information assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

Powertrain Control Module (PCM) DTC Chart

DTC	Description	Action
P0128	Coolant Thermostat (Coolant Temp Below Thermostat Regulating Temperature)	REFER to: ENGINE COOLING - 3.7L Duratec (227kW/301PS).
P0217	Engine Coolant Overtemperature Condition	REFER to: ENGINE COOLING - 3.7L Duratec (227kW/301PS).
P0218	Transmission Fluid Temperature Sensor "A" Over Temperature Condition	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P0461	Fuel Level Sensor A Circuit Range/Performance	First, Refer to ENGINE CONTROLS - INTRODUCTION (EXCEPT DIESEL & HYBRID) . If sent here from the ENGINE CONTROLS - INTRODUCTION (EXCEPT DIESEL & HYBRID) , REFER to: Instrumentation, Message Center and Warning Chimes .
P0462	Fuel Level Sensor A Circuit Low	First, Refer to ENGINE CONTROLS - INTRODUCTION (EXCEPT DIESEL & HYBRID) . If sent here from the ENGINE CONTROLS - INTRODUCTION (EXCEPT DIESEL & HYBRID) , REFER to: Instrumentation, Message Center and Warning Chimes .

P0463	Fuel Level Sensor A Circuit High	First, Refer to ENGINE CONTROLS - INTRODUCTION (EXCEPT DIESEL & HYBRID) . If sent here from the ENGINE CONTROLS - INTRODUCTION (EXCEPT DIESEL & HYBRID) , REFER to: Instrumentation, Message Center and Warning Chimes .
P0504	Brake Switch A / B Correlation	Without adaptive cruise control, REFER to: Cruise Control . With adaptive cruise control, REFER to: Cruise Control - Vehicles With: Adaptive Cruise Control.
P0532	A/C Refrigerant Pressure Sensor "A" Circuit Low	With DATC, REFER to: Climate Control System - Vehicles With: Dual Automatic Temperature Control (DATC) . With EMTC, REFER to: Climate Control System - Vehicles With: Electronic Manual Temperature Control (EMTC) .
P0533	A/C Refrigerant Pressure Sensor "A" Circuit High	With DATC, REFER to: Climate Control System - Vehicles With: Dual Automatic Temperature Control (DATC) . With EMTC, REFER to: Climate Control System - Vehicles With: Electronic Manual Temperature Control (EMTC) .
P0562	System Voltage Low	REFER to: Charging System - 3.7L Duratec (227kW/301PS) .
P0563	System Voltage High	REFER to: Charging System - 3.7L Duratec (227kW/301PS) .
P0572	Brake Switch A Circuit Low	Without adaptive cruise control, REFER to: Cruise Control . With adaptive cruise control, REFER to: Cruise Control - Vehicles With: Adaptive Cruise Control.
P0573	Brake Switch A Circuit High	Without adaptive cruise control, REFER to: Cruise Control . With adaptive cruise control, REFER to: Cruise Control - Vehicles With: Adaptive Cruise Control.
P0620	Generator Control Circuit	REFER to: Charging System - 3.7L Duratec (227kW/301PS) .
P0625	Generator Field Terminal Circuit Low	REFER to: Charging System - 3.7L Duratec (227kW/301PS) .

P0626	Generator Field Terminal Circuit High	REFER to: Charging System - 3.7L Duratec (227kW/301PS) .
P0645	A/C Clutch Relay Control Circuit	With DATC, REFER to: Climate Control System - Vehicles With: Dual Automatic Temperature Control (DATC) . With EMTC, REFER to: Climate Control System - Vehicles With: Electronic Manual Temperature Control (EMTC) .
P0657	Actuator Supply Voltage "A" Circuit/Open	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P065B	Generator Control Circuit Range/Performance	REFER to: Charging System - 3.7L Duratec (227kW/301PS) .
P06E9	No engine rotation detected during crank event	REFER to: STARTING SYSTEM .
P0701	Transmission Control System Range/Performance	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P0702	Transmission Control System Electrical	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P0705	Transmission Range Sensor "A" Circuit (PRNDL Input)	.
P0706	Transmission Range Sensor "A" Circuit Range/Performance	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P0707	Transmission Range Sensor "A" Circuit Low	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P0708	Transmission Range Sensor "A" Circuit High	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P0709	Transmission Range Sensor "A" Circuit Intermittent	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P0710	Transmission Fluid Temperature Sensor "A" Circuit	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P0711	Transmission Fluid Temperature Sensor "A" Circuit Range/Performance	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS)

P0712	Transmission Fluid Temperature Sensor "A" Circuit Low	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS)
P0713	Transmission Fluid Temperature Sensor "A" Circuit High	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS)
P0715	Turbine/Input Shaft Speed Sensor "A" Circuit	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS)
P0717	Turbine/Input Shaft Speed Sensor "A" Circuit No Signal	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS)
P0718	Turbine/Input Shaft Speed Sensor "A" Circuit Intermittent	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS)
P0720	Output Shaft Speed Sensor Circuit	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P0721	Output Shaft Speed Sensor Circuit Range/Performance	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P0722	Output Shaft Speed Sensor Circuit No Signal	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P0729	Gear 6 Incorrect Ratio	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P0731	Gear 1 Incorrect Ratio	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P0732	Gear 2 Incorrect Ratio	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P0733	Gear 3 Incorrect Ratio	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P0734	Gear 4 Incorrect Ratio	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P0735	Gear 5 Incorrect Ratio	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .

P0740	Torque Converter Clutch Solenoid Circuit/Open	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P0741	Torque Converter Clutch Solenoid Circuit Performance/Stuck Off	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P0742	Torque Converter Clutch Solenoid Circuit Stuck On	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P0743	Torque Converter Clutch Solenoid Circuit Electrical	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P0744	Torque Converter Clutch Solenoid Circuit Intermittent	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P0748	Pressure Control Solenoid "A" Electrical	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P0750	Shift Solenoid "A"	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P0751	Shift Solenoid "A" Performance/Stuck Off	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P0752	Shift Solenoid "A" Stuck On	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P0753	Shift Solenoid "A" Electrical	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P0754	Shift Solenoid "A" Intermittent	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P0755	Shift Solenoid "B"	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P0756	Shift Solenoid "B" Performance/Stuck Off	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P0757	Shift Solenoid "B" Stuck On	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .

P0758	Shift Solenoid "B" Electrical	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P0759	Shift Solenoid "B" Intermittent	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P0760	Shift Solenoid "C"	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P0761	Shift Solenoid "C" Performance/Stuck Off	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P0762	Shift Solenoid "C" Stuck On	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P0763	Shift Solenoid "C" Electrical	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P0764	Shift Solenoid "C" Intermittent	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P0765	Shift Solenoid "D"	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P0766	Shift Solenoid "D" Performance/Stuck Off	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P0767	Shift Solenoid "D" Stuck On	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P0768	Shift Solenoid "D" Electrical	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P0769	Shift Solenoid "D" Intermittent	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P0770	Shift Solenoid "E"	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P0771	Shift Solenoid "E" Performance/Stuck Off	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .

P0772	Shift Solenoid "E" Stuck On	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P0773	Shift Solenoid "E" Electrical	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P0774	Shift Solenoid "E" Intermittent	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P07A8	Transmission Friction Element "D" Stuck Off	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P07A9	Transmission Friction Element "D" Stuck On	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P07AA	Transmission Friction Element "E" Stuck Off	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P0812	Reverse Input Circuit	REFER to: Reversing Lamps .
P0830	Clutch Pedal Switch "A" Circuit	REFER to: STARTING SYSTEM .
P0833	Clutch Pedal Switch "B" Circuit	Without adaptive cruise control, REFER to: Cruise Control . With adaptive cruise control, REFER to: Cruise Control - Vehicles With: Adaptive Cruise Control.
P0882	TCM Power Input Signal Low	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P0883	TCM Power Input Signal High	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P0960	Line Pressure Control (LPC) A Control Circuit/Open	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P0961	Pressure Control Solenoid "A" Control Circuit/Open	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P0962	Pressure Control Solenoid "A" Control Circuit Low	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P0963	Pressure Control Solenoid "A" Control Circuit High	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .

P0973	Shift Solenoid "A" Control Circuit Low	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P0974	Shift Solenoid "A" Control Circuit High	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P0976	Shift Solenoid "B" Control Circuit Low	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P0977	Shift Solenoid "B" Control Circuit High	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P0979	Shift Solenoid "C" Control Circuit Low	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P0980	Shift Solenoid "C" Control Circuit High	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P0982	Shift Solenoid "D" Control Circuit Low	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P0983	Shift Solenoid "D" Control Circuit High	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P0984	Shift Solenoid "E" Range/Performance	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P0A5A	Generator Current Sensor Circuit Range/Performance	REFER to: Charging System - 3.7L Duratec (227kW/301PS) .
P0A5B	Generator Current Sensor Circuit Low	REFER to: Charging System - 3.7L Duratec (227kW/301PS) .
P0A5C	Generator Current Sensor Circuit High	REFER to: Charging System - 3.7L Duratec (227kW/301PS) .
P1001	KOEO Not Able to Complete, KOER Aborted	RETRIEVE and RECORD all Diagnostic Trouble Codes (DTCs). REPAIR any self-test or Continuous Memory Diagnostic Trouble Codes (CMDTCs) first. CLEAR the DTC. RERUN the KOER self-test. If the DTC returns, REPROGRAM the PCM with the latest software. REFER to: MODULE CONFIGURATION . RERUN the KOER self-test. If the DTC returns, INSTALL a new PCM, REFER to:

		Powertrain Control Module (PCM) . After installing the new PCM PROGRAM it with the latest software.
P1299	Cylinder Head Overtemperature Protection Active	REFER to: ENGINE COOLING - 3.7L Duratec (227kW/301PS).
P1397	System Voltage Out Of Self Test Range	REFER to: Charging System - 3.7L Duratec (227kW/301PS) .
P1464	A/C Demand Out Of Self Test Range	With DATC, REFER to: Climate Control System - Vehicles With: Dual Automatic Temperature Control (DATC) . With EMTC, REFER to: Climate Control System - Vehicles With: Electronic Manual Temperature Control (EMTC) .
P1501	Vehicle Speed Sensor Out Of Self Test Range	REFER to: Anti-Lock Brake System (ABS) and Stability Control .
P1594	Forced engine shutdown - remote start system fault, No unattended vehicle timeout	REFER to: Locks, Latches and Entry Systems .
P1595	Forced engine shutdown - remote start system fault, transmission range not in park	REFER to: Locks, Latches and Entry Systems .
P161A	Incorrect Response from Immobilizer Control Module	REFER to: Passive Anti-Theft System (PATS) .
P1636	Inductive Signature Chip Communication Error	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P163E	Transmission Control Module Programming Error	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P163F	Transmission ID Block Corrupted, Not Programmed	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P1700	Transmission Indeterminate Failure (Failed to Neutral)	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P1702	Transmission Range Sensor Circuit Intermittent	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P1703	Brake Switch Out Of Self-Test Range	Without adaptive cruise control, REFER to: Cruise Control . With adaptive cruise control, REFER to: Cruise Control - Vehicles With:

		Adaptive Cruise Control.
P1705	Transmission Range Circuit Not Indicating Park/Neutral During Self Test	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P170A	Clutch Switch Out Of Self Test Range	Without adaptive cruise control, REFER to: REFER to: Cruise Control . With adaptive cruise control, REFER to: Cruise Control - Vehicles With: Adaptive Cruise Control.
P1711	Transmission Fluid Temperature Sensor Out Of Self Test Range	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P1744	Torque Converter Clutch Solenoid Circuit	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P177F	Unable to Fully Engage Neutral	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P1783	Transmission Overtemperature Condition	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P1921	Transmission Range Signal	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P193E	A/C Clutch Request Signal	With DATC, REFER to: Climate Control System - Vehicles With: Dual Automatic Temperature Control (DATC) . With EMTC, REFER to: Climate Control System - Vehicles With: Electronic Manual Temperature Control (EMTC) .
P2066	Fuel Level Sensor "B" Circuit Range/Performance	REFER to: Instrumentation, Message Center and Warning Chimes .
P2067	Fuel Level Sensor "B" Circuit Low	REFER to: Instrumentation, Message Center and Warning Chimes .
P2068	Fuel Level Sensor "B" Circuit High	REFER to: Instrumentation, Message Center and Warning Chimes .
P2535	Ignition Switch Run/Start Position Circuit High	REFER to: STARTING SYSTEM .

P25B0	Fuel Level Sensor "A" Stuck	REFER to: Instrumentation, Message Center and Warning Chimes .
P25B1	Fuel Level Sensor "B" Stuck	REFER to: Instrumentation, Message Center and Warning Chimes .
P25B2	Fuel Level Sensor "A" or "B" Stuck	REFER to: Instrumentation, Message Center and Warning Chimes .
P2700	Transmission Friction Element "A" Apply Time Range/Performance	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P2701	Transmission Friction Element "B" Apply Time Range/Performance	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P2702	Transmission Friction Element "C" Apply Time Range/Performance	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P2703	Transmission Friction Element "D" Apply Time Range/Performance	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P2704	Transmission Friction Element "E" Apply Time Range/Performance	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P2705	Transmission Friction Element "F" Apply Time Range/Performance	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P2758	Torque Converter Clutch Pressure Control Solenoid Stuck On	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
P2760	Torque Converter Clutch Pressure Control Solenoid Intermittent	REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) .
U0104	Lost Communication With Cruise Control Module	Without adaptive cruise control, REFER to: Cruise Control . With adaptive cruise control, REFER to: Cruise Control - Vehicles With: Adaptive Cruise Control.
U0121	Lost Communication With Anti-Lock Brake System (ABS) Control Module	GO to Pinpoint Test A
U0164	Lost Communication With HVAC Control Module	GO to Pinpoint Test C
U0212	Lost Communication With Steering Column Control Module	GO to Pinpoint Test B

All Other DTCs	-	Refer to ENGINE CONTROLS - SYMPTOM CHARTS (EXCEPT DIESEL & HYBRID) .

DIAGNOSIS AND TESTING > ELECTRONIC ENGINE CONTROLS > PINPOINT TESTS > PINPOINT TEST A : U0121

DTC Fault Trigger Condition-PCM

DTC	Description	Fault Trigger Conditions
U0121	Lost Communication With Anti-Lock Brake System (ABS) Control Module	The PCM sets this DTC if data messages received from the ABS module over the High Speed Controller Area Network (HS-CAN) are missing.

Normal Operation and Fault Conditions

REFER to: MODULE COMMUNICATIONS NETWORK .

Possible Sources

- ABS module
- BCM
- PCM

DIAGNOSIS AND TESTING > ELECTRONIC ENGINE CONTROLS > PINPOINT TESTS > PINPOINT TEST A : U0121 > PINPOINT TEST A : U0121

A1 VERIFY THE CUSTOMER CONCERN

Ignition ON.

Verify there is an observable symptom present.

Is an observable symptom present?

Yes	GO to A2

No	The system is operating normally at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

A2 CHECK THE COMMUNICATION NETWORK

Using a diagnostic scan tool, perform a network test.

Does the ABS module pass the network test?

Yes	GO to A3

No	REFER to: MODULE COMMUNICATIONS NETWORK .

A3 PERFORM ABS (ANTI-LOCK BRAKE SYSTEM) MODULE SELF-TEST

Using a diagnostic scan tool, perform a ABS module self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: Anti-Lock Brake System (ABS) and Stability Control .

No	GO to A4

A4 CHECK THE BCM (BODY CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, retrieve the BCM Diagnostic Trouble Codes (DTCs).

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: Body Control Module (BCM) .

No	GO to A5

A5 PERFORM THE PCM (POWERTRAIN CONTROL MODULE) SELF-TEST

Using a diagnostic scan tool, perform the PCM self-test.

Is DTC P0562 or DTC P0563 recorded?

Yes	REFER to DTC Chart: Powertrain Control Module (PCM) .

No	GO to A6

NOTE: If new modules were installed prior to the DTC being set, the module configuration may be incorrectly set during the PMI, or the PMI may not have been carried out.

A6 RECHECK THE PCM (POWERTRAIN CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs).

Wait 10 seconds.

Repeat the PCM self-test.

Is DTC U0121 still present?

Yes	GO to A7

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

A7 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0121 SET IN OTHER MODULES

Using a diagnostic scan tool, clear all Diagnostic Trouble Codes (DTCs).

Ignition OFF.

Ignition ON.

Wait 10 seconds.

Using a diagnostic scan tool, retrieve **all** Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U0121 set in any other module?

Yes	GO to A8

No	GO to A9

A8 CHECK FOR CORRECT ABS (ANTI-LOCK BRAKE SYSTEM) MODULE OPERATION

Ignition OFF.

Disconnect and inspect all ABS MODULE connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect all the ABS MODULE connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical

	Service Bulletins (TSBs) address this concern, INSTALL a new ABS MODULE. REFER to: Anti-Lock Brake System (ABS) Module .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

A9 CHECK FOR CORRECT PCM (POWERTRAIN CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect PCM connector.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the PCM connector. Make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PCM. REFER to: Powertrain Control Module (PCM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > ELECTRONIC ENGINE CONTROLS > PINPOINT TESTS > PINPOINT TEST B : U0212

DTC Fault Trigger Condition-PCM

DTC	Description	Fault Trigger Conditions
U0212	Lost Communication With Steering Column Control Module	The PCM sets this DTC if data messages received from the SCCM over the High Speed Controller Area Network (HS-CAN) are missing.

Normal Operation and Fault Conditions

REFER to: MODULE COMMUNICATIONS NETWORK .

Possible Sources

- SCCM
- BCM
- PCM

DIAGNOSIS AND TESTING > ELECTRONIC ENGINE CONTROLS > PINPOINT TESTS > PINPOINT TEST B : U0212 > PINPOINT TEST B : U0212

B1 VERIFY THE CUSTOMER CONCERN

Ignition ON.

Verify there is an observable symptom present.

Is an observable symptom present?

Yes	GO to B2

No	The system is operating normally at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

B2 CHECK THE COMMUNICATION NETWORK

Using a diagnostic scan tool, perform a network test.

Does the SCCM module pass the network test?

Yes	GO to B3

No	REFER to: MODULE COMMUNICATIONS NETWORK .

B3 PERFORM SCCM (STEERING COLUMN CONTROL MODULE) MODULE SELF-TEST

Using a diagnostic scan tool, perform a SCCM module self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: Steering Wheel and Column Electrical Components .

No	GO to B4

B4 CHECK THE BCM (BODY CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, retrieve the BCM Diagnostic Trouble Codes (DTCs).

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: Body Control Module (BCM) .

No	GO to B5

B5 PERFORM THE PCM (POWERTRAIN CONTROL MODULE) SELF-TEST

Using a diagnostic scan tool, perform the PCM self-test.

Is DTC P0562 or DTC P0563 recorded?

Yes	REFER to DTC Chart: Powertrain Control Module (PCM) .

No	GO to B6

NOTE: If new modules were installed prior to the DTC being set, the module configuration may be incorrectly set during the PMI, or the PMI may not have been carried out.

B6 RECHECK THE PCM (POWERTRAIN CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs).

Wait 10 seconds.

Repeat the PCM self-test.

Is DTC U0212 still present?

Yes	GO to B7

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

B7 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0212 SET IN OTHER MODULES

Using a diagnostic scan tool, clear all Diagnostic Trouble Codes (DTCs).

Ignition OFF.

Ignition ON.

Wait 10 seconds.

Using a diagnostic scan tool, retrieve **all** Continuous Memory Diagnostic Trouble Codes

(CMDTCs).

Is DTC U0212 set in any other module?

Yes	GO to B8

No	GO to B9

B8 CHECK FOR CORRECT SCCM (STEERING COLUMN CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all SCCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect all the SCCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new SCCM MODULE.REFER to: Steering Column Control Module (SCCM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

B9 CHECK FOR CORRECT PCM (POWERTRAIN CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect PCM connector.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the PCM connector. Make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PCM.REFER to: Powertrain Control Module (PCM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > ELECTRONIC ENGINE CONTROLS > PINPOINT TESTS > PINPOINT TEST C : U0164

DTC Fault Trigger Condition-PCM

DTC	Description	Fault Trigger Conditions
U0164	Lost Communication With HVAC Control Module	The PCM sets this DTC if data messages received from the FCIM through the GWM are missing.

Normal Operation and Fault Conditions

The HVAC control module is housed in the FCIM. REFER to: MODULE COMMUNICATIONS NETWORK .

Possible Sources

- FCIM module
- BCM
- PCM

DIAGNOSIS AND TESTING > ELECTRONIC ENGINE CONTROLS > PINPOINT TESTS > PINPOINT TEST C : U0164 > PINPOINT TEST C : U0164

C1 VERIFY THE CUSTOMER CONCERN

Ignition ON.

Verify there is an observable symptom present.

Is an observable symptom present?

Yes	GO to C2

No	The system is operating normally at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

C2 CHECK THE COMMUNICATION NETWORK

Using a diagnostic scan tool, perform a network test.

Does the FCIM module pass the network test?

Yes	GO to C3

No	REFER to: MODULE COMMUNICATIONS NETWORK .

C3 PERFORM FCIM (FRONT CONTROLS INTERFACE MODULE) MODULE SELF-TEST

Using a diagnostic scan tool, perform a FCIM module self-test.

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	Without touchscreen, REFER to: Information and Entertainment System - Vehicles With: AM/FM/CD/SYNC. With touchscreen, REFER to: Information and Entertainment System - Vehicles With: Touchscreen Display.

No	GO to C4

C4 CHECK THE BCM (BODY CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, retrieve the BCM Diagnostic Trouble Codes (DTCs).

Are any Diagnostic Trouble Codes (DTCs) recorded?

Yes	REFER to: Body Control Module (BCM) .

No	GO to C5

C5 PERFORM THE PCM (POWERTRAIN CONTROL MODULE) SELF-TEST

Using a diagnostic scan tool, perform the PCM self-test.

Is DTC P0562 or DTC P0563 recorded?

Yes	REFER to DTC Chart: Powertrain Control Module (PCM) .

No	GO to C6

NOTE: If new modules were installed prior to the DTC being set, the module configuration may be incorrectly set during the PMI, or the PMI may not have been carried out.

C6 RECHECK THE PCM (POWERTRAIN CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, clear the Diagnostic Trouble Codes (DTCs).

Wait 10 seconds.

Repeat the PCM self-test.

Is DTC U0164 still present?

Yes	GO to C7

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

C7 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0164 SET IN OTHER MODULES

Using a diagnostic scan tool, clear all Diagnostic Trouble Codes (DTCs).

Ignition OFF.

Ignition ON.

Wait 10 seconds.

Using a diagnostic scan tool, retrieve **all** Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC U0164 set in any other module?

Yes	GO to C8

No	GO to C9

C8 CHECK FOR CORRECT FCIM (FRONT CONTROLS INTERFACE MODULE) MODULE OPERATION

Ignition OFF.

Disconnect and inspect all FCIM MODULE connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect all the FCIM MODULE connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new FCIM MODULE.Without touchscreen, REFER to: FRONT CONTROLS INTERFACE MODULE (FCIM) - Vehicles With: AM/FM/CD/SYNC. With touchscreen, REFER to: FRONT CONTROLS INTERFACE MODULE (FCIM) - Vehicles With: Touchscreen Display.

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

C9 CHECK FOR CORRECT PCM (POWERTRAIN CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect PCM connector.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the PCM connector. Make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PCM. REFER to: Powertrain Control Module (PCM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

REMOVAL AND INSTALLATION > CAMSHAFT POSITION (CMP) SENSOR

Materials

Name	Specification
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) XO-5W20-QSP (U.S.)	WSS-M2C945-A

REMOVAL AND INSTALLATION > CAMSHAFT POSITION (CMP) SENSOR > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

RH (right-hand) Camshaft Position (CMP) Sensors

1.

Remove the upper intake manifold. Refer to: UPPER INTAKE MANIFOLD - 3.7L Duratec (227kW/301PS).

2.

1.

Disconnect the intake CMP sensor electrical connector and remove the retainer and the CMP sensor.

Material

: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W20-QSP (U.S.) (WSS-M2C945-A)

Torque

: 89 lb.in (10 Nm)

2.

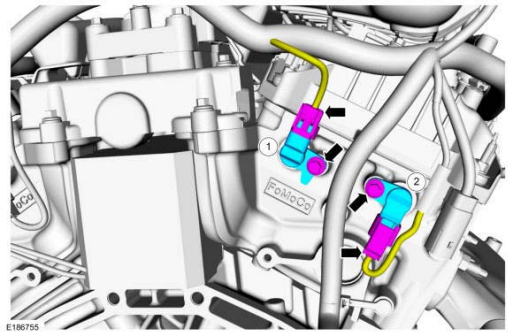
Disconnect the exhaust CMP sensor electrical connector and remove the retainer and the CMP sensor.

Material

: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W20-QSP (U.S.) (WSS-M2C945-A)

Torque

: 89 lb.in (10 Nm)



LH (left-hand) Camshaft Position (CMP) Sensors

3.

1.

Disconnect the exhaust CMP sensor electrical connector and remove the retainer and the CMP sensor.

Material

: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W20-QSP (U.S.) (WSS-M2C945-A)

Torque

: 89 lb.in (10 Nm)

2.

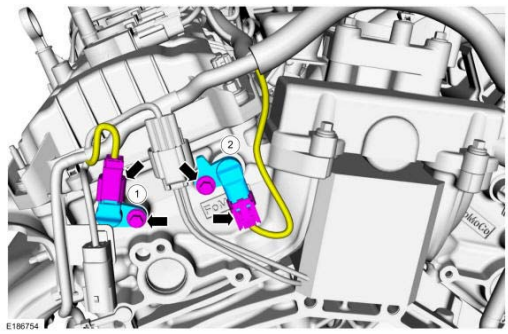
Disconnect the intake CMP sensor electrical connector and remove the retainer and the CMP sensor.

Material

: Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W20-QSP (U.S.) (WSS-M2C945-A)

Torque

: 89 lb.in (10 Nm)



REMOVAL AND INSTALLATION > CAMSHAFT POSITION (CMP) SENSOR > INSTALLATION

NOTE: Before installation, lubricate the CMP sensor O-ring seal with clean engine oil.

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > CATALYST MONITOR SENSOR

Special Tool(s) / General Equipment

 E172696	303-476 (T94P-9472-A) Socket, Exhaust Gas Oxygen Sensor TKIT-1994-F TKIT-1994-FLM/FM TKIT-1994-LM/M

Materials

Name	Specification
High Temperature Nickel Anti-Seize Lubricant XL-2	-
Penetrating and Lock Lubricant XL-1	-

REMOVAL AND INSTALLATION > CATALYST MONITOR SENSOR > REMOVAL

All sensors

1.

With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

Right hand (RH) Catalyst monitor sensor

2.

1.

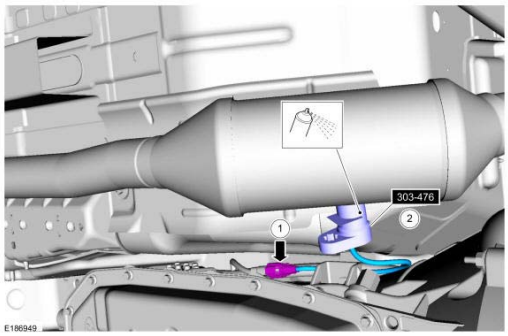
Disconnect the catalyst monitor sensor electrical connector.

2.

Use Special Service Tool: 303-476 (T94P-9472-A) Socket, Exhaust Gas Oxygen Sensor.

Material

: Penetrating and Lock Lubricant / XL-1



Left hand (LH) Catalyst monitor sensor

3.

1.

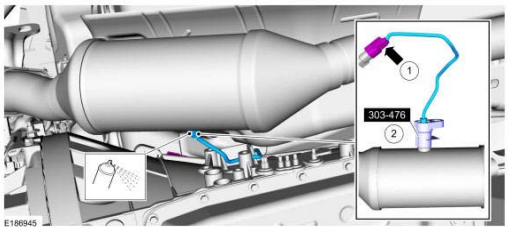
Disconnect the catalyst monitor sensor electrical connector.

2.

Use Special Service Tool: 303-476 (T94P-9472-A) Socket, Exhaust Gas Oxygen Sensor.

Material

: Penetrating and Lock Lubricant / XL-1



REMOVAL AND INSTALLATION > CATALYST MONITOR SENSOR > INSTALLATION

Left hand (LH) Catalyst monitor sensor

1.

1.

Calculate the correct torque wrench setting for the following torque. Refer to Torque Wrench Adapter Formula in the illustration below.

Use Special Service Tool: 303-476 (T94P-9472-A) Socket, Exhaust Gas Oxygen Sensor.

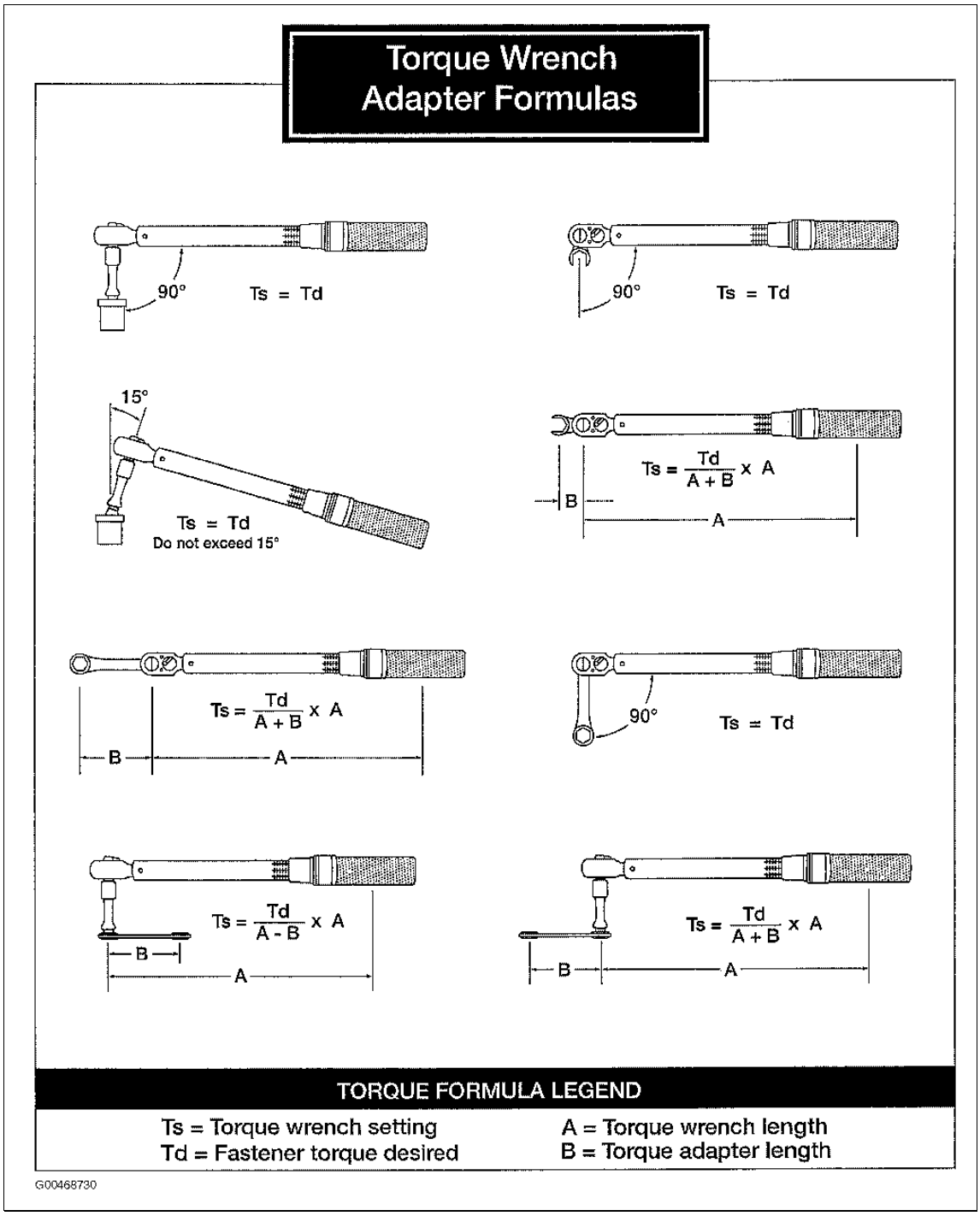
Material

: High Temperature Nickel Anti-Seize Lubricant / XL-2

Torque

: 35 lb.ft (48 Nm)

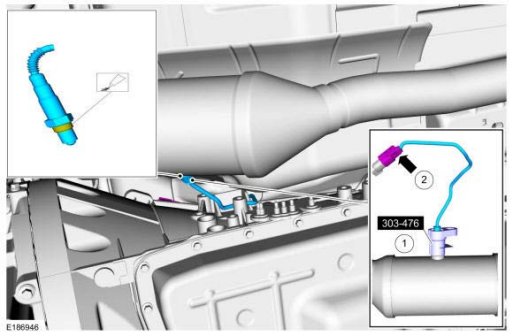
Fig 1: Torque Wrench Adapter Formulas



Courtesy of FORD MOTOR CO.

2.

Connect the catalyst monitor sensor electrical connector.



Right hand (RH) Catalyst monitor sensor

2.

1.

Calculate the correct torque wrench setting for the following torque. Refer to Torque Wrench Adapter Formula in the illustration below.

Use Special Service Tool: 303-476 (T94P-9472-A) Socket, Exhaust Gas Oxygen Sensor.

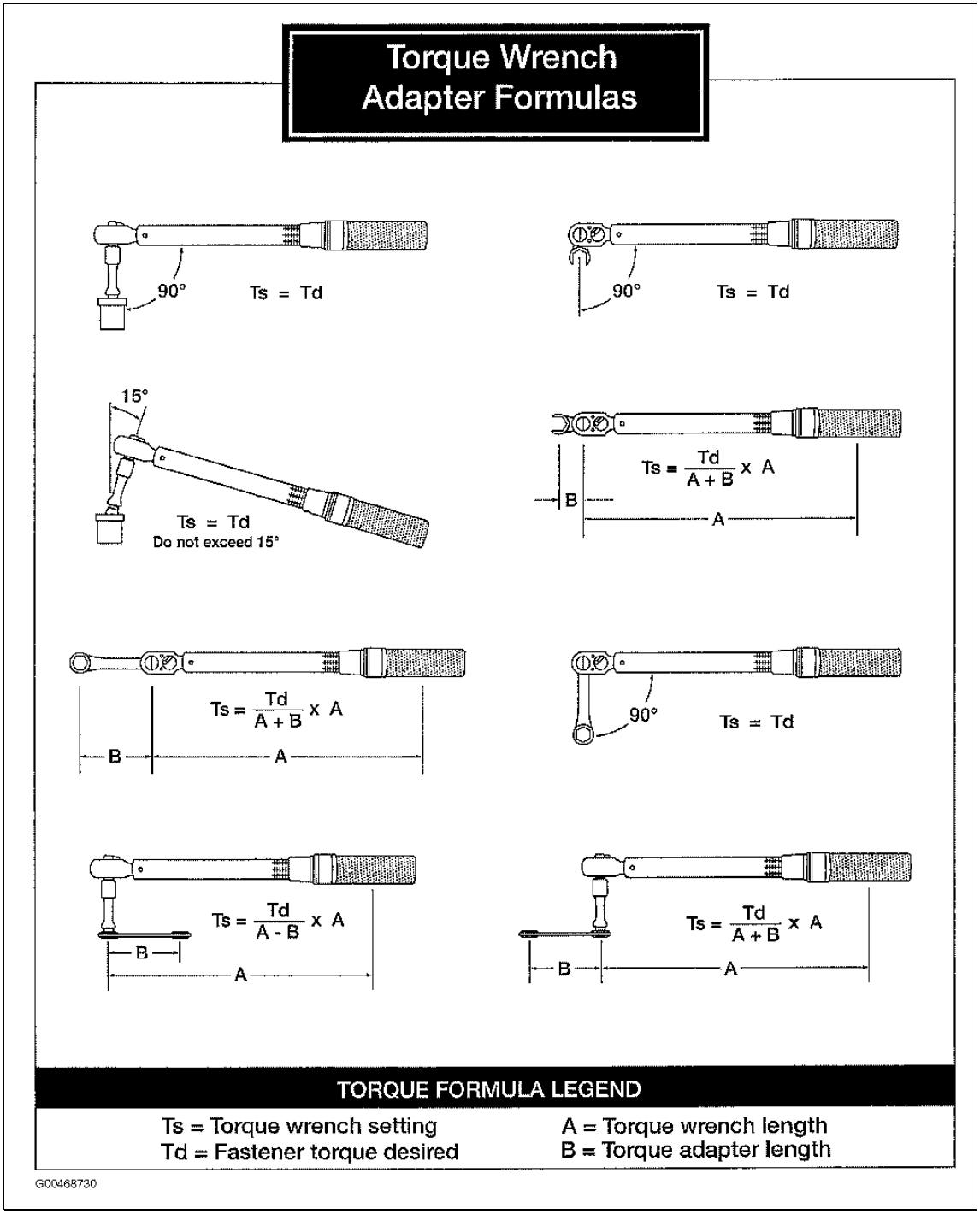
Material

: High Temperature Nickel Anti-Seize Lubricant / XL-2

Torque

: 35 lb.ft (48 Nm)

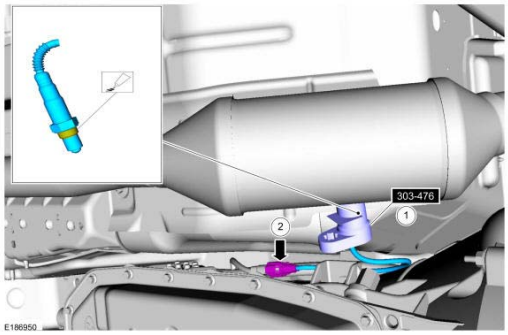
Fig 2: Torque Wrench Adapter Formulas



Courtesy of FORD MOTOR CO.

2.

Connect the catalyst monitor sensor electrical connector.

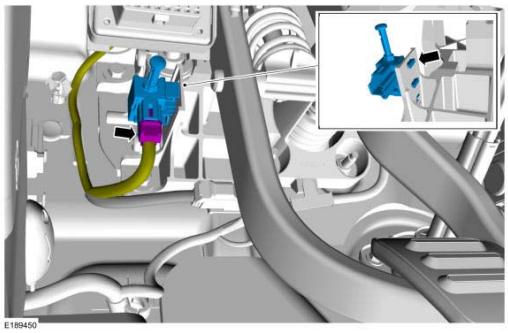


REMOVAL AND INSTALLATION > CLUTCH PEDAL POSITION (CPP) SWITCH > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

Disconnect the electrical connector and remove CPP switch from the bracket.



REMOVAL AND INSTALLATION > CLUTCH PEDAL POSITION (CPP) SWITCH > INSTALLATION

1.

To install, reverse the removal procedure.

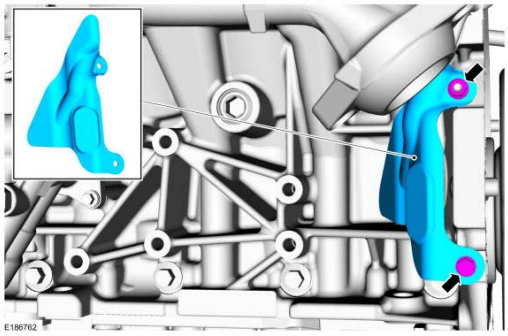
REMOVAL AND INSTALLATION > CRANKSHAFT POSITION (CKP) SENSOR > REMOVAL

1.

With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

2.

Remove the nut, bolt and the heat shield.



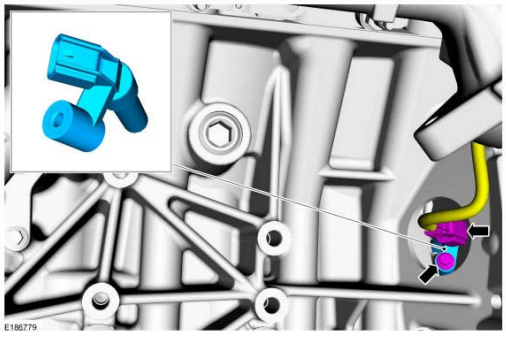
3.

Position aside the CKP sensor access plug.



NOTE: Remove the bolt and the CKP sensor from the bell housing before disconnecting the electrical connector to prevent the CKP sensor from falling in the bell housing.

4.
Remove the bolt, disconnect the CKP sensor electrical connector and the sensor.



REMOVAL AND INSTALLATION > CRANKSHAFT POSITION (CKP) SENSOR >

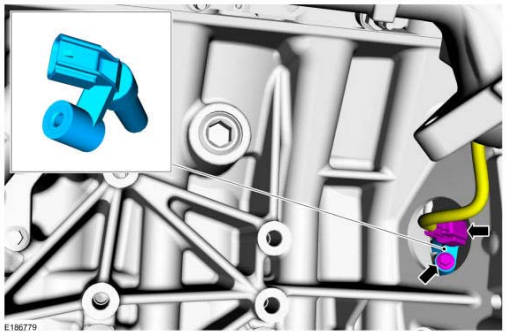
INSTALLATION

1.

Connect the CKP sensor electrical connector, install the sensor and the bolt.

Torque

: 89 lb.in (10 Nm)



2.

Position back the CKP sensor access plug.

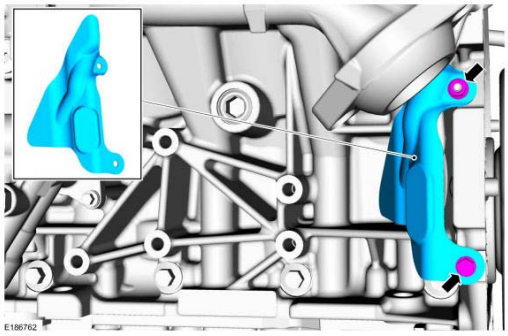


3.

Install the heat shield, nut and bolt.

Torque

: 97 lb.in (11 Nm)



4.

Using the scan tool, perform the Misfire Monitor Neutral Profile Correction procedure, following the on-screen instructions.

REMOVAL AND INSTALLATION > CYLINDER HEAD TEMPERATURE (CHT) SENSOR > REMOVAL

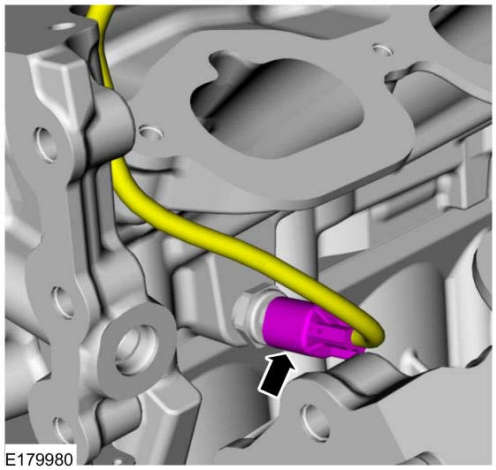
NOTE: Removal steps in this procedure may contain installation details.

1.

Remove the lower intake manifold. Refer to: LOWER INTAKE MANIFOLD .

2.

Disconnect the CHT sensor electrical connector.

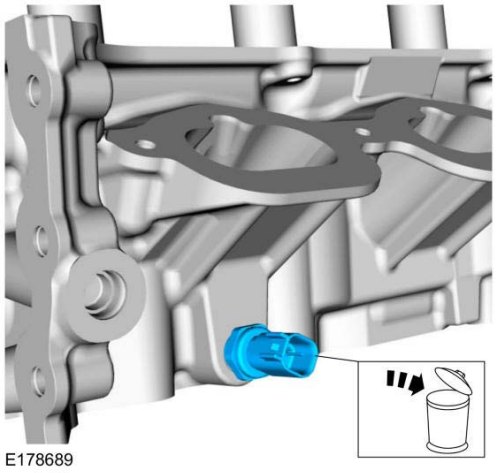


NOTE: Do not reuse the CHT sensor, install a new sensor.

3.
Remove and discard the CHT sensor.

Torque

: 89 lb.in (10 Nm)


E178689

REMOVAL AND INSTALLATION > CYLINDER HEAD TEMPERATURE (CHT) SENSOR > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > HEATED OXYGEN SENSOR (HO2S)

Special Tool(s) / General Equipment

 E172696	303-476 (T94P-9472-A) Socket, Exhaust Gas Oxygen Sensor TKIT-1994-F TKIT-1994-FLM/FM TKIT-1994-LM/M

Materials

Name	Specification
High Temperature Nickel Anti-Seize Lubricant XL-2	-
Penetrating and Lock Lubricant XL-1	-

REMOVAL AND INSTALLATION > HEATED OXYGEN SENSOR (HO2S) > REMOVAL

All sensors

1.

With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

RH (right-hand) Heated Oxygen Sensor (HO2S)

2.

1.

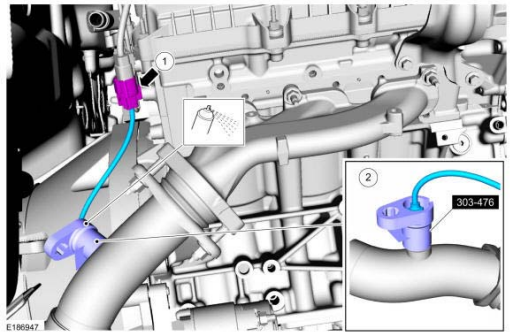
Disconnect the HO2S electrical connector.

2.

Use Special Service Tool: 303-476 (T94P-9472-A) Socket, Exhaust Gas Oxygen Sensor.

Material

: Penetrating and Lock Lubricant / XL-1



LH (left-hand) Heated Oxygen Sensor (HO2S)

3.

1.

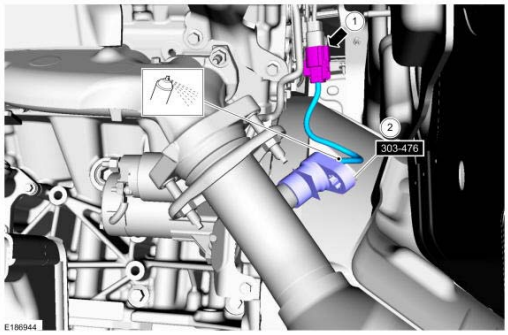
Disconnect the HO2S electrical connector.

2.

Use Special Service Tool: 303-476 (T94P-9472-A) Socket, Exhaust Gas Oxygen Sensor.

Material

: Penetrating and Lock Lubricant / XL-1



REMOVAL AND INSTALLATION > HEATED OXYGEN SENSOR (HO2S) > INSTALLATION

LH (left-hand) Heated Oxygen Sensor (HO2S)

1.

1.

Calculate the correct torque wrench setting for the following torque. Refer to Torque Wrench Adapter Formula in the illustration below.

Use Special Service Tool: 303-476 (T94P-9472-A)Socket, Exhaust Gas Oxygen Sensor.

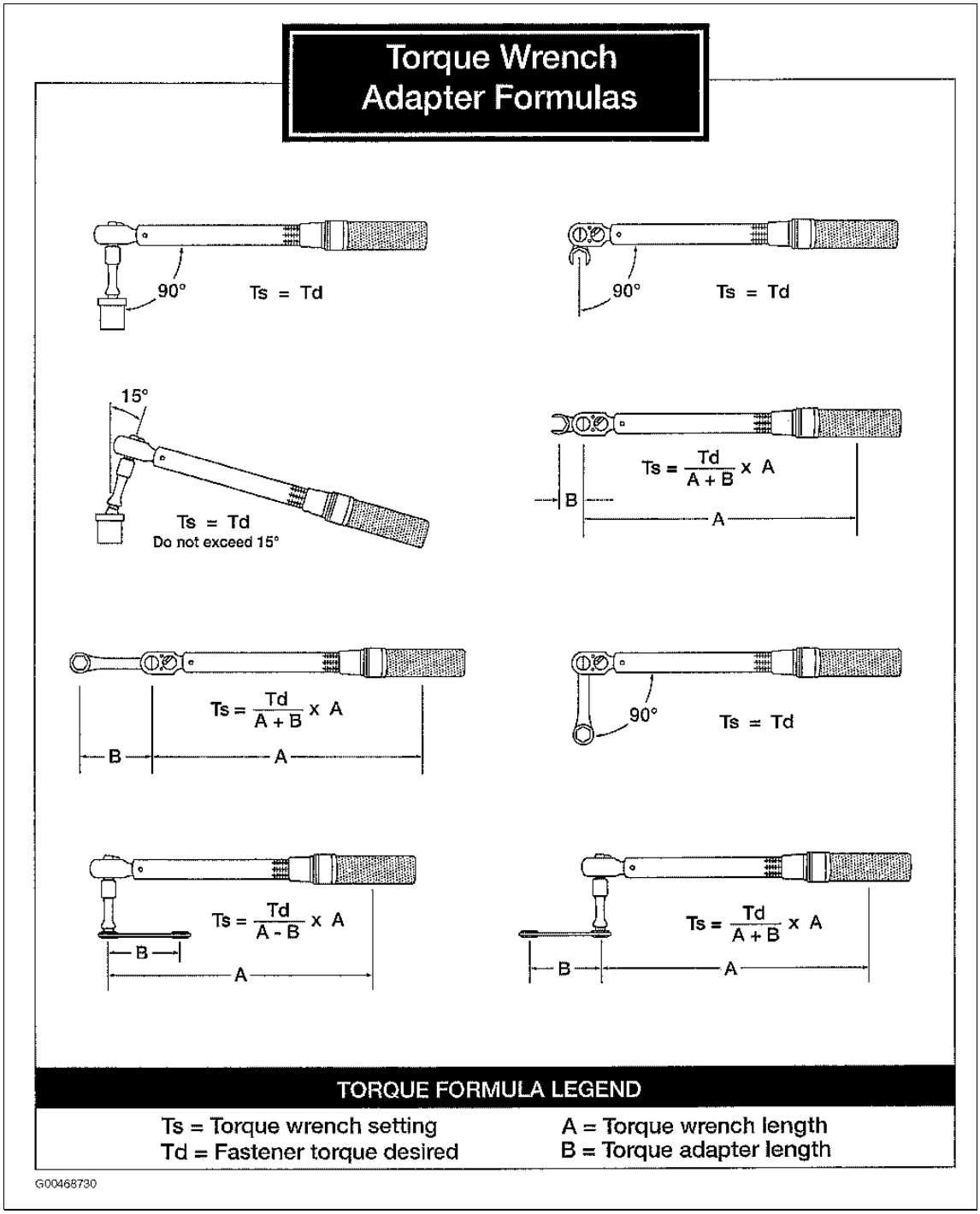
Material

: High Temperature Nickel Anti-Seize Lubricant / XL-2

Torque

: 35 lb.ft (48 Nm)

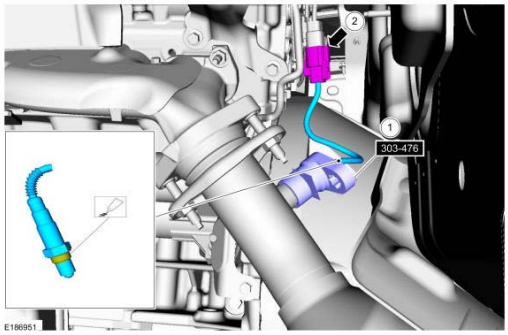
Fig 1: Torque Wrench Adapter Formulas



Courtesy of FORD MOTOR CO.

2.

Connect the HO2S electrical connector.



RH (right-hand) Heated Oxygen Sensor (HO2S)

2.

1.

Calculate the correct torque wrench setting for the following torque. Refer to Torque Wrench Adapter Formula in the illustration below.

Use Special Service Tool: 303-476 (T94P-9472-A) Socket, Exhaust Gas Oxygen Sensor.

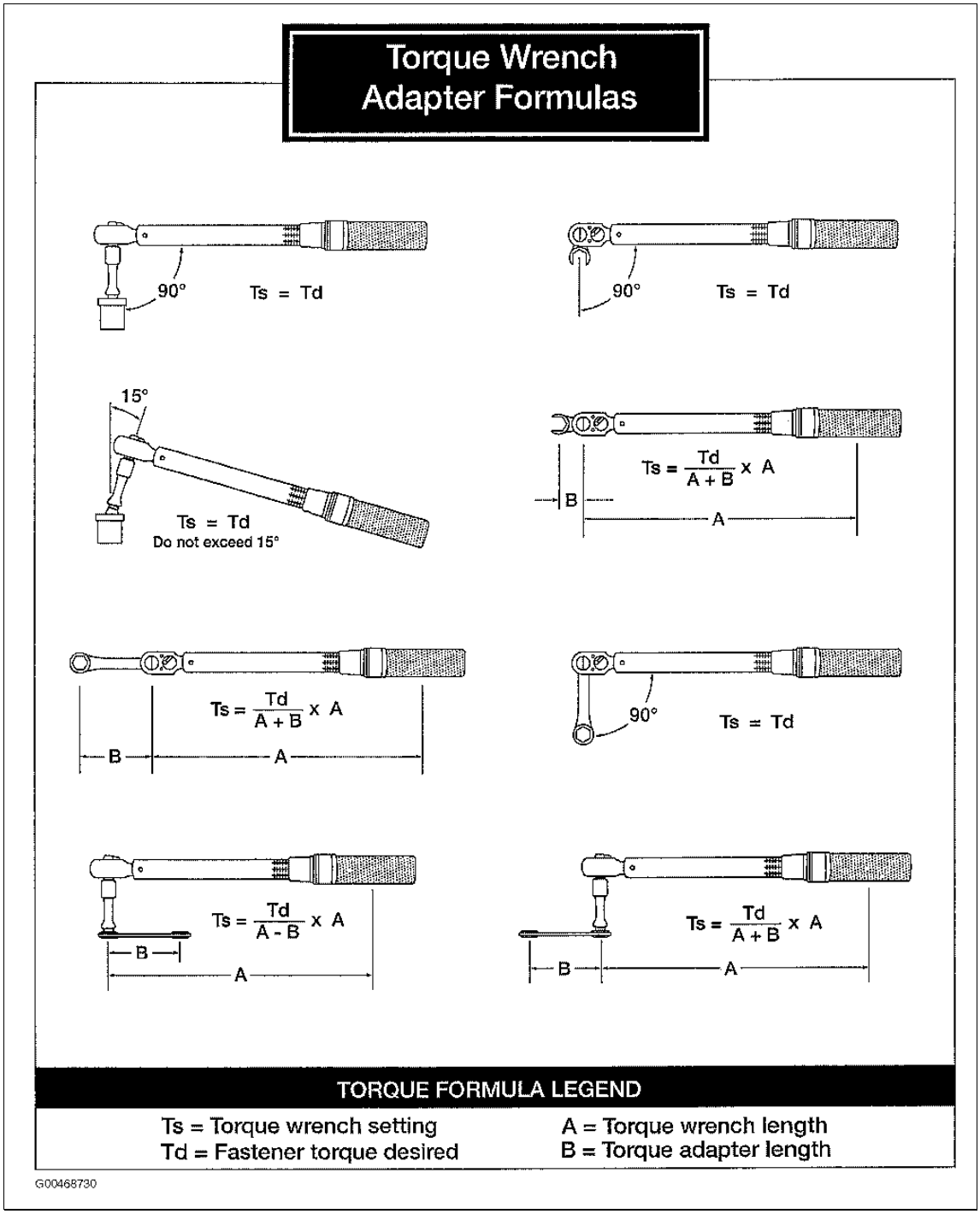
Material

: High Temperature Nickel Anti-Seize Lubricant / XL-2

Torque

: 35 lb.ft (48 Nm)

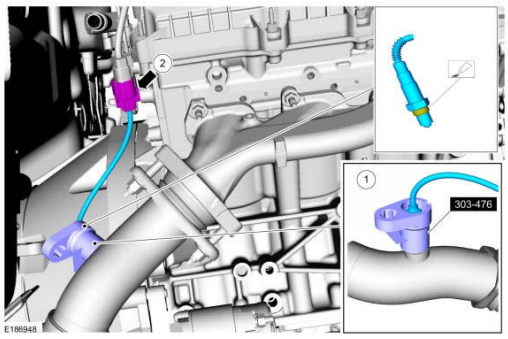
Fig 2: Torque Wrench Adapter Formulas



Courtesy of FORD MOTOR CO.

2.

Connect the HO2S electrical connector.

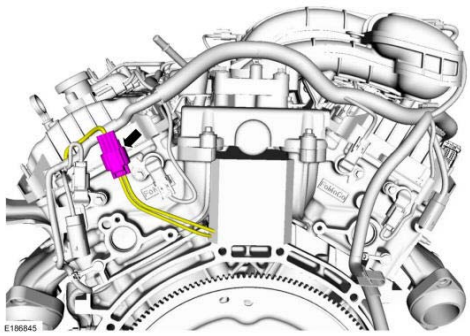


REMOVAL AND INSTALLATION > KNOCK SENSOR (KS) > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

Disconnect the KS electrical connector.



2.

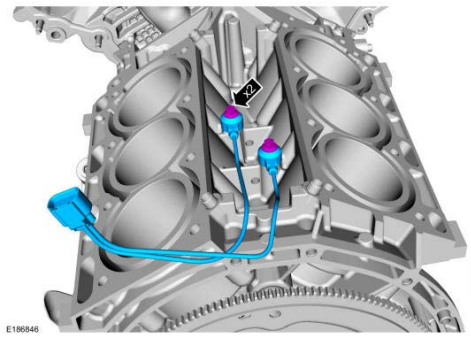
Remove the lower intake manifold. Refer to: LOWER INTAKE MANIFOLD .

NOTE: The cylinder heads are removed for clarity.

3.
Remove the bolts and the KS.

Torque

: 177 lb.in (20 Nm)



REMOVAL AND INSTALLATION > KNOCK SENSOR (KS) > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > MANIFOLD ABSOLUTE PRESSURE AND TEMPERATURE (MAPT) SENSOR > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

1.

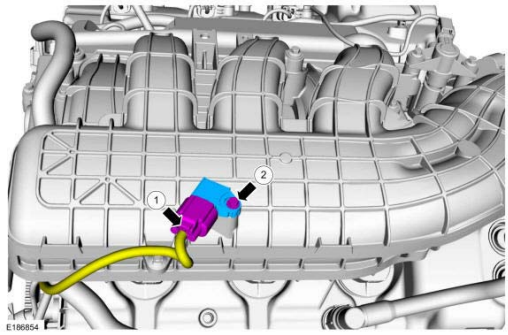
Disconnect the MAPT sensor electrical connector.

2.

Remove the retainer and the MAPT sensor.

Torque

: 35 lb.in (4 Nm)



REMOVAL AND INSTALLATION > MANIFOLD ABSOLUTE PRESSURE AND TEMPERATURE (MAPT) SENSOR > INSTALLATION

NOTE: Second fastener hole available for use during re-install if needed.

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > POWERTRAIN CONTROL MODULE (PCM) > REMOVAL

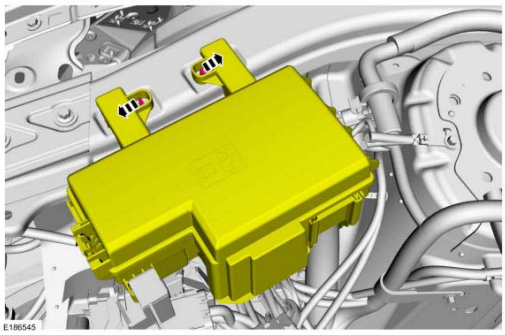
NOTE: This step is only necessary when installing a new component.

NOTE: PCM installation DOES NOT require new keys or programming of keys, only a Parameter Reset of the PATS.

1.
Download the module information to the diagnostic tool using the PMI routine. Refer to: MODULE CONFIGURATION .

2.

Unclip and position aside the BJB.



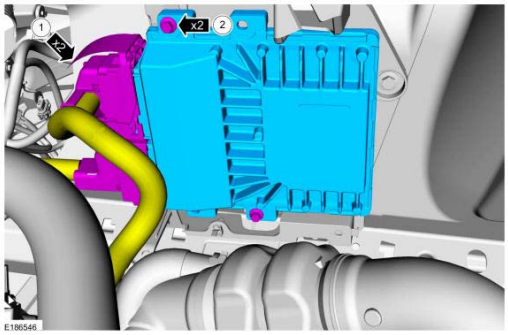
3.

1.

Disconnect the PCM electrical connectors.

2.

Remove the retainers and the PCM.



REMOVAL AND INSTALLATION > POWERTRAIN CONTROL MODULE (PCM) > INSTALLATION

1.

1.

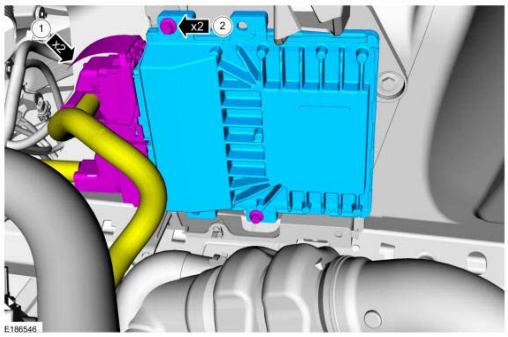
Connect the PCM electrical connectors.

2.

Install the PCM and the retainers.

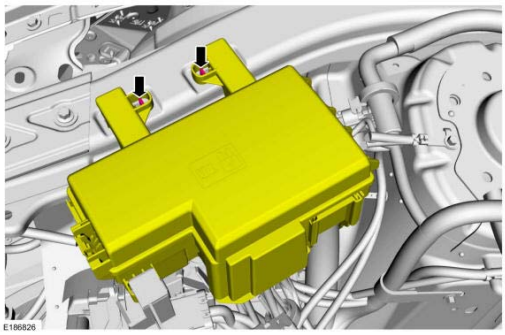
Torque

: 62 lb.in (7 Nm)



2.

Position back the BJB.



NOTE: This step is only necessary when installing a new component.

3.
Upload the module information from the diagnostic tool using the Programmable Modules Installation routine. Refer to: MODULE CONFIGURATION .

4.

Carry out the Parameter Reset procedure. Refer to: Anti-Theft Security Access .

5.

Using the scan tool, perform the Misfire Monitor Neutral Profile Correction procedure, following the on-screen instructions.

REMOVAL AND INSTALLATION > VARIABLE CAMSHAFT TIMING (VCT) OIL CONTROL SOLENOID > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

RH (right-hand) Variable Camshaft Timing (VCT) Oil Control Solenoids

1.

Remove the RH valve cover. Refer to: VALVE COVER RH - 3.7L Duratec (227kW/301PS).

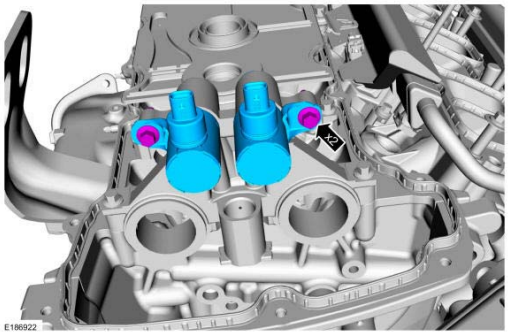
2.

Remove the bolts and the RHVCT oil control solenoids.

Torque:

Stage 1: 71 lb.in (8 Nm)

Stage 2: 20°



LH (left-hand) Variable Camshaft Timing (VCT) Oil Control Solenoids

3.

Remove the LH valve cover. Refer to: VALVE COVER LH .

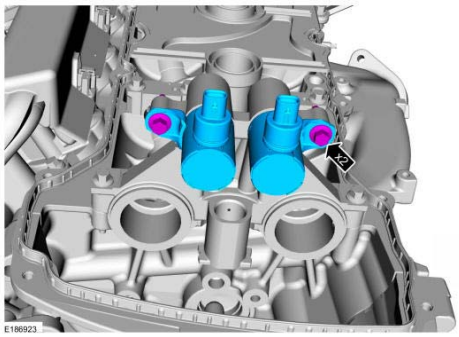
4.

Remove the bolts and the LHVCT oil control solenoids.

Torque:

Stage 1: 71 lb.in (8 Nm)

Stage 2: 20°



REMOVAL AND INSTALLATION > VARIABLE CAMSHAFT TIMING (VCT) OIL CONTROL SOLENOID > INSTALLATION

1.

To install, reverse the removal procedure.

Service Manual: EMISSION APPLICATIONS

EMISSION APPLICATIONS

2015 Mustang

Engine & Fuel System	(1) Emission Control Systems & Devices	EGR Test No.
2.3L (140") 4-Cyl Turbo DI	**PCV, EVAP, TWC, SPK, (2) HO2S, CEC, MIL,** EVAP-CVS, EVAP-FTPS, EVAP-FVCV, EVAP-VC	...
3.7L (227") V6 SFI	**PCV, EVAP, (2) TWC, FR, SPK, (3) HO2S, CEC, MIL,** EVAP-CPV, EVAP-CVS, EVAP-FTPS, EVAP-FVCV, EVAP-VC, SPK-CC	...
5.0L (302") V8 SFI	**PCV, EVAP, (2) TWC, FR, SPK, (3) HO2S, CEC, MIL,** EVAP-CPV, EVAP-CVS, EVAP-FTPS, EVAP-FVCV, EVAP-VC, SPK-CC	...

(1)	Major emission control systems and devices are listed in bold type; components and other related devices are listed in light type.
(2)	Equipped with 2.
(3)	Equipped with 4.

Service Manual: EMISSION CONTROL ABBREVIATIONS

"A"

A/C

Air Conditioning

A/C-ISUS

A/C Idle Speed-Up Solenoid

A/F

Air/Fuel

AAI

Air Assist Injector

ACL

Air Cleaner (Thermostatic Air Cleaner)

ACL-BMS

ACL Bimetallic Sensor

ACL-CKV

ACL Check Valve

ACL-DV

ACL Delay Valve

ACL-PVS

ACL Ported Vacuum Switch

ACL-RDV

ACL Reverse Delay Valve

ACL-RDVS

ACL Reverse Delay Valve (Single)

ACL-TCV

ACL Thermal Control Valve

ACL-TS

ACL Temperature Sensor

ACL-TSOV

ACL Temperature Sensor Override Valve

ACL-TVS

ACL Thermal Vacuum Switch

ACL-TVV

ACL Thermal Vacuum Valve

ACL-VCDV

ACL Vacuum Control Delay Valve

ACL-VCV

ACL Vacuum Control Valve

ACL-VM

ACL Vacuum Motor

ACL-WP

ACL Wax Pellet Type Motor

ADS

Anti-Dieseling Solenoid

AFR

Air/Fuel Ratio Sensor

AFS

Air/Fuel Ratio Sensor

AIH

Air Intake Heaters

AIH-TS

AIH Temperature Sensor

AIR

Air Injection System

AIS

Air Injection System

AIS-ACV

AIS Air Control Valve

AIS-AF

Air Injection System Air Filter

AIS-AMV

AIS Air Management Valve

AIS-ASV

AIS Air Switching Valve

AIS-BPV

AIS By-Pass Valve

AIS-CC

AIS Computer Controlled

AIS-CKV

AIS Check Valve

AIS-CSV

AIS Control Solenoid Valve

AIS-CV

AIS Combination Valve

AIS-DV

AIS Diverter Valve

AIS-IMCV

AIS Intake Manifold Change-Over Valve

AIS-MCV

AIS Manifold Change-Over Valve

AIS-PAF

AIS Pulse Air Feeder

AIS-PM

AIS Pump Motor

AIS-PV

AIS Pneumatic Valve

AIS-RV

AIS Relief Valve

AIS-SAV

AIS Secondary Air Valve

AIS-SOL

AIS Solenoid

AIS-SV

AIS Solenoid Valve

AIS-VCV

AIS Vacuum Control Valve

AIS-VSV

AIS Vacuum Switching Valve

AIS-VT

AIS Vacuum Tank

AIS-VCV

AIS Vacuum Control Valve

AIS-VSV

AIS Vacuum Switching Valve

AIV

Air Injection Valve

AIV-SOL

Air Injection Valve Solenoid

ALVW

Adjusted Loaded Vehicle Weight

AMV

Air Management Valve

AP

Air Pump Injection System

AP-ACV

AP Air Control Valve

AP-AMV

AP Air Management Valve

AP-ASRV

AP Air Switching Relief Valve

AP-ASS

AP Air Switching Solenoid

AP-ASV

AP Air Switching Valve

AP-BPV

AP By-Pass Valve

AP-CKV

AP Check Valve

AP-CS

AP Control Solenoid

AP-CV

AIR Cut-Off Valve

AP-DCTO

AP Dual Coolant Temperature Override

AP-DLY

AP Delay Valve

AP-DV

AP Diverter Valve

AP-EADV

AP Electric Air Control Diverter Valve

AP-EAMR

AP Electric Air Management Relay

AP-EAMS

AP Electric Air Management Solenoid

AP-EAP

AP Electric Air Pump

AP-EC

AP Electromagnetic Clutch

AP-ERLY

AP Electric Air Pump Relay

AP-RDV

AP Reed Valve

AP-RV

AP Relief Valve

AP-SOL

AP Solenoid

AP-SOV

AP Shut-Off Valve

AP-SV

AP Solenoid Valve

AP-SWV

AP Switchover Valve

AP-TV

AP Transmitting Valve

AP-VCS

AP Vacuum Control Solenoid

AP-VCSV

AP Vacuum Controlled Air Shut-Off Valve

AP-VCV

AP Vacuum Control Valve

AP-VSV

AP Vacuum Switching Valve

A/T

Automatic Transmission

ATCV

Air Temperature Control Valve

"B"

BP/EGR

Backpressure EGR System

BP/EGR-BPS

BP/EGR Backpressure Sensor

BP/EGR-BPT

BP/EGR Backpressure Transducer

BP/EGR-BPV

BP/EGR Backpressure Valve

BP/EGR-BS

BP/EGR Bleed Solenoid

BP/EGR-BVSV

BP/EGR Bimetallic Vacuum Switching Valve

BP/EGR-C

BP/EGR Controller

BP/EGR-CLR

BP/EGR Cooler

BP/EGR-CS

BP/EGR Control Solenoid

BP/EGR-CTO

BP/EGR Coolant Temperature Override

BP/EGR-CV

BP/EGR Control Valve

BP/EGR-DCTO

BP/EGR Dual Coolant Temperature Override

BP/EGR-DS

BP/EGR Diagnostic Solenoid

BP/EGR-DSOL

BP/EGR Duty Solenoid

BP/EGR-DTVSW

BP/EGR Distributor Thermal Vacuum Switch

BP/EGR-DV

BP/EGR Delay Valve

BP/EGR-EET

BP/EGR Electric Transducer

BP/EGR-EPV

BP/EGR External Pressure Valve

BP/EGR-FDV

BP/EGR Forward Delay Valve

BP/EGR-LC

BP/EGR Load Control Valve

BP/EGR-PS

BP/EGR Position Sensor

BP/EGR-PT

BP/EGR Pressure Tranducer

BP/EGR-PVS

BP/EGR Ported Vacuum Switch

BP/EGR-RES

BP/EGR Reservoir

BP/EGR-RST

BP/EGR Restrictor

BP/EGR-SOL

BP/EGR Solenoid

BP/EGR-TCTVS

BP/EGR Torque Converter Thermal Vacuum Switch

BP/EGR-TCV

BP/EGR Thermal Control Valve

BP/EGR-TCVLV

BP/EGR Temperature Control Valve

BP/EGR-TS

BP/EGR Temperature Sensor

BP/EGR-TVS

BP/EGR Thermal Vacuum Switch

BP/EGR-TVV

BP/EGR Thermal Vacuum Valve

BP/EGR-VCV

BP/EGR Vacuum Control Valve

BP/EGR-VM

BP/EGR Vacuum Modulator

BP/EGR-VRV

BP/EGR Vacuum Regulator Valve

BP/EGR-VS

BP/EGR Vacuum Switch

BP/EGR-VSOL

BP/EGR Vent Solenoid

BP/EGR-VSV

BP/EGR Vacuum Switching Valve

"C"

C-4

Computer Controlled Catalytic Converter

CAC

Charge Air Cooler

CAS

Clean Air System

CB

Crankcase Breather

CB-VC

Crankcase Breather-Vapor Canister

CBPS

Coasting By-Pass System

CBVC

Crankcase Breather Vapor Canister

CCIEV

Coolant Controlled Idle Enrichment Valve

CCS

Controlled Combustion System

CCV

Closed Crankcase Ventilation

CD-REGVLV

Crankcase Depression Regulator Valve

CDRV

Crankcase Depression Relief Valve

CEAB

Cold Engine Air Bleed

CEAB-TVS

CEAB Thermal Vacuum Switch

CEAB-TVV

CEAB Thermal Vacuum Valve

CEC

Computerized Engine Controls

CESS

Cold Engine Sensor Switch

CETS

Cold Engine Temperature Switch

CFI

Continuous Fuel Injection

CMH

Cold Mixture Heater

CNG

Compressed Natural Gas

CO

Carbon Monoxide

CO2

Carbon Dioxide

CPI

Central Port Injection

CRV

Coasting Richer Valve

CSI

Central Sequential Injection

CTAVS

Cold Temperature Activated Vacuum System

CTOX

Continous Trap Oxidizer

"D"

DCLV

Deceleration Valve

DCS

Deceleration Control System

DDI

Direct Diesel Injection

DFI

Direct Diesel Injection

DI

Direct Injection

DKV

Deceleration Kick Valve

DMCV

Deceleration Mixture Control Valve

DMS

Dual Manifold System

DOC

Diesel Oxidation Catalyst

DOHC

Dual Overhead Cam

DPF

Diesel Particulate Filter

DPF/TWC

Combination Diesel Particulate Filter and Three Way Catalyst

DPFE

Differential Pressure Feedback EGR Valve

DPFEGR

Differential Pressure Feedback EGR Valve

DTM

Deceleration Throttle Modulator

"E"

EAIR

Electric Air Injection System

EAIR-DV

EAIR Diverter Valve

ECM

Electronic Control Module

ECU

Electronic Control Unit

EDC

Electronic Diesel Control

EDS

Electronic Diesel System

EEC

Electronic Engine Control

EFE

Early Fuel Evaporation

EFE-CKV

EFE Check Valve

EFE-CV

EFE Control Valve

EFE-DTVS

EFE Delay Thermal Vacuum Switch

EFE-HTR

EFE Heater

EFE-HCV

EFE Heat Control Valve

EFE-OTS

EFE Oil Temperature Switch

EFE-PTC

EFE Positive Temperature Coefficient (Intake Heater Grid)

EFE-PVS

EFE Ported Vacuum Switch

EFE-SOL

EFE Solenoid

EFE-TVS

EFE Thermal Vacuum Switch

EFE-TVV

EFE Thermal Vacuum Valve

EFE-VSV

EFE Vacuum Switching Valve

EFI

Electronic Fuel Injection

EFI-MA

EFI Mass Airflow Sensor

EFI-MAF

EFI Mass Airflow Sensor

EGR

Exhaust Gas Recirculation System

EGR-BCS

EGR Boost Check Solenoid

EGR-BPBV

EGR By-Pass Backpressure Valve

EGR-BPT

EGR Backpressure Transducer

EGR-BPV

EGR By-Pass Valve

EGR-BS

EGR Bleed Solenoid

EGR-BSSV

EGR Boost Sensor Solenoid Valve

EGR-BV

EGR Bypass Valve

EGR-BVSV

EGR Bimetallic Vacuum Switching Valve

EGR-C

EGR Controller

EGR-CC

EGR Coolant Controlled

EGR-CLR

EGR Cooler

EGR-VSOL

EGR Vacuum Solenoid

EGR-CKV

EGR Check Valve

EGR-CS

EGR Control Solenoid

EGR-CSOL

EGR Cut-Off Solenoid

EGR-CSV

EGR Control Solenoid

EGR-CTO

EGR Coolant Temperature Override

EGR-CTS

EGR Charge Temperature Sensor

EGR-CTSW

EGR Charge Temperature Switch

EGR-CTTS

EGR Coolant Temperature Thermoswitch

EGR-CV

EGR Control Valve

EGR-CVCV

EGR Constant Vacuum Control Valve

EGR-CVS

EGR Control Vent Solenoid

EGR-DC

EGR Digital Control

EGR-DCTO

EGR Dual Coolant Temperature Override

EGR-DPFE

Differential Pressure Feedback EGR Sensor

EGR-DPFS

EGR Differential Pressure Feedback Sensor

EGR-DS

EGR Diagnostic Solenoid

EGR-DSOL

EGR Duty Solenoid

EGR-DTVS

EGR Delay Thermal Vacuum Switch

EGR-DTVSW

EGR Distributor Thermal Vacuum Switch

EGR-DV

EGR Delay Valve

EGR-EPRS

EGR Exhaust Pressure Regulator Solenoid

EGR-EPRV

EGR Exhaust Pressure Regulator Valve

EGR-EPV

EGR External Pressure Valve

EGR/EVAP-CSV

EGR/EVAP Control Solenoid Valve

EGR-EVR

EGR Vacuum Regulator

EGR-EVRV

EGR Electronic Vacuum Regulator Valve

EGR-FDV

EGR Forward Delay Valve

EGR-FJS

EGR Floor Jet System

EGR-FPS

EGR Feedback Pressure Sensor

EGR-LCV

EGR Load Control Valve

EGR-MAP

EGR Manifold Absolute Pressure Sensor

EGR-PFE

EGR-PFE Sensor

EGR-PS

EGR Position Sensor

EGR-PSW

EGR Pulse Switch

EGR-PVS

EGR Ported Vacuum Switch

EGR-REG

EGR Regulator

EGR-RES

EGR Reservoir

EGR-RST

EGR Restrictor

EGR-SC

EGR Signal Converter

EGR-SEC

EGR, Secondary

EGR-SEN

EGR Sensor

EGR-SOL

EGR Solenoid

EGR-SU

EGR Switchover Valve

EGR-SUB

Sub-EGR Valve

EGR-SVV

EGR Solenoid Vacuum Valve

EGR-T

EGR Temperature Sensor

EGR-TC

EGR Transmission Controlled

EGR-TCTVS

EGR Torque Converter Thermal Vacuum Switch

EGR-TCV

EGR Thermal Control Valve

EGR-TCVLV

EGR Temperature Control Valve

EGR-TRANS

EGR Transducer

EGR-TS

EGR Temperature Sensor

EGR-TSW

EGR Temperature Switch

EGR-TVD

EGR Throttle Valve Diaphragm

EGR-TVS

EGR Thermal Vacuum Switch

EGR-TVSOL

EGR Throttle Valve Solenoid

EGR-TVV

EGR Thermal Vacuum Valve

EGR-VA

EGR Vacuum Amplifier

EGR-VCV

EGR Vacuum Control Valve

EGR-VM

EGR Vacuum Modulator

EGR-VR

EGR Vacuum Regulator

EGR-VRS

EGR Vacuum Regulator Solenoid

EGR-VRSV

EGR Vacuum Regulator Solenoid Valve

EGR-VRV

EGR Vacuum Regulator Valve

EGR-VS

EGR Vacuum Switch

EGR-VSDV

EGR Vacuum Switch Dump Valve

EGR-VSEN

EGR Vacuum Sensor

EGR-VSOL

EGR Vent Solenoid

EGR-VSS

EGR Vacuum Switching Solenoid

EGR-VST

EGR Vacuum Surge Tank

EGR-VSV

EGR Vacuum Switching Valve

EGR-VVCS

EGR Venturi Vacuum Control System

EGRB

EGR Boost Sensor

EGRC

EGR Control Solenoid

EGRC-BPT

EGR Control Backpressure Transducer

EGRC-SV

EGR Control Solenoid Valve

EHOC

Electronically Heated Oxidation Catalyst

EHTWC

Electronically Heated Three-Way Catalyst

EI

Electronic Ignition System

EIS

Electronic Ignition System

ELB

Electronic Lean Burn

EPR

Exhaust Pressure Regulator

EPR-SOL

EPR Solenoid

ESA

Electronic Spark Advance

ESIM

Evaporative System Integrity Monitor

EVAP

Fuel Evaporative System

EVAP-AAC

EVAP Auxiliary Air Control

EVAP-BPSV

EVAP By-Pass Solenoid Valve

EVAP-BVSV

EVAP Bimetallic Vacuum Switching Valve

EVAP-CAV

EVAP Canister Air Valve

EVAP-CCV

EVAP Control Canister Close Valve

EVAP-CCVSV

EVAP Control Canister Vent Shut Valve

EVAP-CCVVSV

EVAP Closed Canister Valve Vacuum Switching Valve

EVAP-CDCV

EVAP Canister Drain Cut Valve

EVAP-CKV

EVAP Check Valve

EVAP-CPCS

EVAP Canister Purge Control Solenoid

EVAP-CPCSV

EVAP Canister Purge Control Solenoid Valve

EVAP-CPCV

EVAP Canister Purge Control Valve

EVAP-CPRV

EVAP Canister Purge Regulator Valve

EVAP-CPSV

EVAP Canister Vent Shut Valve

EVAP-CPT

EVAP Canister Purge Timer

EVAP-CPTVS

EVAP Canister Purge Thermal Vacuum Switch

EVAP-CPV

EVAP Canister Vent Valve

EVAP-CPVCSV

EVAP Canister Purge Volume Control

EVAP-CPVCV

EVAP Canister Purge Volume Control Valve

EVAP-CPVDV

EVAP Canister Purge Vacuum Delay Valve

EVAP-CPVR

EVAP Canister Purge Valve Resonator

EVAP-CS

EVAP Control Solenoid

EVAP-CSPS

EVAP Control System Pressure Sensor

EVAP-CST

EVAP Canister Surge Tank

EVAP-CT

EVAP Catch Tank

EVAP-CVCS

EVAP Canister Vent Control Solenoid

EVAP-CVCV

EVAP Canister Vent Control Valve

EVAP-CVS

EVAP Canister Vent Solenoid

EVAP-CVSV

EVAP Carburetor Vent Switching Valve

EVAP-CVV

EVAP Canister Vent Valve

EVAP-DCTO

EVAP Dual Coolant Temperature Override

EVAP-DF

EVAP Drain Filter

EVAP-DPS

EVAP Differential Pressure Sensor

EVAP-DV

EVAP-Drain Valve

EVAP-EV

EVAP Emission Valve

EVAP-FBVV

EVAP Fuel Bowl Vent Valve

EVAP-FBVS

EVAP Fuel Bowl Vent Solenoid

EVAP-FCV

EVAP Fuel Cut Valve

EVAP-FLS

EVAP Fuel Level Sensor

EVAP-FOLV

EVAP Fuel Overflow Limiter Valve

EVAP-FS

EVAP Flow Switch

EVAP-FSV

EVAP Flow Switchover Valve<

EVAP-FTEV

EVAP Fuel Tank EVAP Valve

EVAP-FTPCSV

EVAP Fuel Tank Pressure Control Solenoid Valve

EVAP-FTPS

EVAP Fuel Tank Pressure Sensor

EVAP-FTS

EVAP Fuel Temperature Sensor

EVAP-FVCV

EVAP Fuel Vapor Control Valve

EVAP-FVS

EVAP Fuel Vapor Separator

EVAP-FVTS

EVAP Fuel Vapor Temperature Sensor

EVAP-FVV

EVAP Fuel Vent Valve

EVAP-FVVV

EVAP Fuel Vapor Vent Valve

EVAP-IVS

EVAP Inner Vent Solenoid

EVAP-LDP

EVAP Leak Detection Pump

EVAP-LDPAF

EVAP Leak Detection Pump Air Filter

EVAP-LDPF

EVAP Leak Detection Pump Filter

EVAP-LDPVV

EVAP Leak Detection Pump Vent Valve

EVAP-LSEP

EVAP Liquid Separator

EVAP-NVLD

EVAP Natural Vacuum Leak Detection

EVAP-ORVR

Evaporative On-Board Refueling Vapor Recovery System

EVAP-ORVRCV

Evaporative On-Board Refueling Vapor Recovery Check Valve

EVAP-ORVRFTVRV

EVAP-ORVR Fuel Tank Vapor Recirculation

EVAP-OVCV

EVAP Outer Vent Control Valve

EVAP-OWV

EVAP One-Way Valve

EVAP-PCDV

EVAP Purge Control Diaphram Valve

EVAP-PCSV

EVAP Purge Cut-Off Solenoid Valve

EVAP-PFS

EVAP Purge Flow Sensor

EVAP-PFSVVSV

EVAP Purge Flow Switching Valve Vacuum Switching Valve

EVAP-PRRV

EVAP Pressure Relief Rollover Valve

EVAP-PSVVSV

EVAP Pressure Switching Valve Vacuum Switching Valve

EVAP-PSOL

EVAP Purge Solenoid

EVAP-PSSV

EVAP Pressure Switching Solenoid

EVAP-PSVVSV

EVAP Pressure Switching Valve Vacuum Switching Valve

EVAP-PV

EVAP Purge (Frequency) Valve

EVAP-PVS

EVAP Ported Vacuum Switch

EVAP-RV

EVAP Rollover Valve

EVAP-RV/FTPS

EVAP Rollover Valve/Fuel Tank

EVAP-RVSV

EVAP Rollover Vapor Separator Valve

EVAP-SNR

EVAP Canister Sensor

EVAP-SOL

EVAP Solenoid

EVAP-SOV

EVAP Shutoff Valve

EVAP-SSV

EVAP Shut-Off Solenoid Valve

EVAP-SV

EVAP Solenoid Valve

EVAP-TC

EVAP Trap Canister

EVAP-TS

EVAP Temperature Switch

EVAP-TPBPV

EVAP Tank Pressure By-Pass Valve

EVAP-TPCS

EVAP Tank Pressure Control Solenoid

EVAP-TPCV

EVAP Tank Pressure Control Valve

EVAP-TRWV

EVAP Tree-Way Valve

EVAP-TV

EVAP Thermal Valve

EVAP-TVS

EVAP Thermal Vacuum Switch

EVAP-TVV

EVAP Thermal Vacuum Valve

EVAP-TWV

EVAP Two-Way Valve

EVAP-VC

EVAP Vapor Canister

EVAP-VCAT

EVAP Vapor Canister Air Tank

EVAP-VCF

EVAP Vapor Canister Filter

EVAP-VCSV

EVAP Vapor Canister Shut-off Valve

EVAP-VCTV

EVAP Vacuum Control Valve

EVAP-VCV

EVAP Vacuum Canister Valve

EVAP-VCVS

EVAP Vapor Canister Vent Solenoid

EVAP-VM

EVAP Vacuum Motor

EVAP-VPS

EVAP Vapor Pressure Sensor

EVAP-VPSVSV

EVAP Vapor Pressure Sensor Vacuum Switching Valve

EVAP-VS

EVAP Vacuum Sensor

EVAP-VSOL

EVAP Ventilation Solenoid

EVAP-VSOL/LDP

EVAP Ventilation Solenoid/Leak Detection Pump

EVAP-VST

EVAP Vacuum Surge Tank

EVAP-VSV

EVAP Vacuum Switching Valve

EVAP-VV

EVAP Ventilation Valve

EVRS

EGR Vacuum Regulator Solenoid

"F"

FBC

Feedback Carburetor

FCOV

Fuel Change Over Valve

FF

Flex Fuel

FF-CKV

Fuel Fill Check Valve

FF-FCV

Fuel Tank Fuel Cut-Off Valve

FF-FLVV

Fuel Tank Fill Limit Vent Valve

FGOV

Fuel Gravity/Overflow Valve

FGVV

Fuel Gravity Vent Valve

FI

Fuel Injected

FICD

Fast Idle Control Device

FISR

Fast Idle Solenoid Relay

FLV

Fill Limit Valve

FLVV

Fill Limiting Vent Valve

FP-CKV

Fill Pipe Check Valve

FP-RV

Fill Pipe Rollover Valve

FR

Fill Pipe Restrictor

FT-FLVV

Fuel Tank Fill Limit Vent Valve

FT-GVV

Fuel Tank Grade Vent Valve

FT-OPRV

Fuel Tank Over Pressure Vent Valve

FT-PCV

Fuel Tank Pressure Control Valve

FT-VCV

Fuel Tank Vapor Control Valve

FT-VRV

Fuel Tank Vapor Recirculation Valve

FTCV

Fuel Tank Check Valve

FTDPS

Fuel Tank Differential Pressure Sensor

FTEV

Fuel Tank EVAP Valve

FTPS

Fuel Tank Pressure Sensor

FTT

Fuel Tank Temperature Sensor

FTTS

Fuel Tank Temperature Sensor

FTV/LSV

Fuel Tank Vapor/Liquid Seperation Valve

FTVCV

Fuel Tank Vapor Control Valve

FTVPRV

Fuel Tank Ventilation Pressure Retention Valve

FVPS

Fuel Vapor Pressure Sensor

FTVV

Fuel Tank Vent Valve

FVV

Fuel Vapor Valve

"G"

GVWR

Gross Vehicle Weight Rating

"H"

HAC

High Altitude Compensator

HAFS

Heated Air Fuel Ratio Sensor

HAI

Hot Air Intake

HAS

High Altitude System

HC

Hydrocarbons

HCAC-VSV

Hydrocarbon Absorber Catalyst Vacuum Switching Valve

HDC

Heavy Duty Cooling

HDC-CTO

HDC Coolant Temperature Override

HFM-SFI

Hot Film Engine Management SFI

HIC

Hot Idle Compensator

HIM

Heated Intake Manifold

HO

High Output

HO2S

Heated Oxygen Sensor

HP

High Performance

HP

Horsepower

HPCA

Housing Pressure Cold Advance

HSC

High Swirl Combustion

"I"

IAC

Idle Air Control Valve

IACV-SW

IACV Switch

ICOM

Idle Compensator

IDI

Indirect Diesel Injection

IES

Idle Enrichment System

IMCO

Improved Combustion System

"K"

KS

Knock Sensor

"L"

LH-SFI

Hot Wire Sequential Multiport Fuel Injection

LVFD

Liquid/Vapor Fuel Discriminator

LVW

Loaded Vehicle Weight

"M"

MD-TICS

Timing & Injection rate Control System

MDP

Manifold Differential Pressure sensor

ME-SFI

Motor Electronics Sequential Fuel Injection

MFI

Multiport Fuel Injection

MFI-MAF

MFI Mass Airflow Sensor

MFLS

Main Fuel Level Sensor

MI

Mechanical Fuel Injection

MIL

Malfunction Indicator Light

M/T

Manual Transmission

"N"

NAC

Nitrogen Oxides (NOx) Adsorbing Catalyst

NLV

Non-Linear Valve

NOS

NOx Sensor

NOx

NOx Emission Control

NOxC

Nitrogen Oxide Catalyst

NOxS

Nitrogen Oxide Sensor

NOxTWC

NOx adsorptive TWC

NSC

Nitrogen Oxides (NOx) Storage Catalyst

"O"

OBD

On-Board Diagnostic System

PBD (F)/(P)

Full/Partial On-Board Diagnostic

OC

Oxidation Catalytic Converter

OHC

Overhead Cam

ORVR

On-Board Refueling Vapor Recovery

ORVR-COV

ORVR Cut-Off Valve

ORVR-CV

ORVR Control Valve

ORVR-FMV

ORVR Flow Management Valve

ORVR-FTVCV

ORVR Fuel Tank Vapor Control Valve

ORVR-FTVRV

ORVR Fuel Tank Vapor Recirculation Valve

ORVR-LV

ORVR Leveling Valve

ORVR-OCKV

ORVR Overfill Check Valve

ORVR-RCV

ORVR Refueling Control Valve

ORVR-VCV

ORVR Vapor Cut Valve

ORVR-VRV

ORVR Vapor Recirculating Valve

ORVR-VSV

ORVR Vent Shut Valve

ORVR-VV

ORVR Vent Valve

OVCV

Outer Vent Control Valve

O2S

Oxygen Sensor

"P"

PAIR

Pulsed Secondary Air Injection

PAIR-ABV

PAIR Anti-Backfire Valve

PAIR-ACOV

PAIR Air Cut-Off Valve

PAIR-ACS

PAIR Air Control Solenoid

PAIR-ACV

PAIR Air Control Valve

PAIR-AIV

PAIR Air Injection Valve

PAIR-ASCS

PAIR Air Suction Control Solenoid

PAIR-ASOV

PAIR Air Shutoff Valve

PAIR-ASS

PAIR Air Switching Solenoid

PAIR-ASV

PAIR Air Switching Valve

PAIR-ASVL

PAIR Air Suction Valve

PAIR-AVCS

PAIR Air Valve Control Solenoid

PAIR-CSV

PAIR Control Solenoid Valve

PAIR-CKV

PAIR Check Valve

PAIR-DV

PAIR Diverter Valve

PAIR-PAF

PAIR Pulse Air Feeder

PAIR-PAV

PAIR Pulse Air Valve

PAIR-RES

PAIR Resonator

PAIR-RV

PAIR Reed Valve

PAIR-SCSV

PAIR Swirl Control Solenoid Valve

PAIR-SCV

PAIR Swirl Control Valve

PAIR-SOL

PAIR Solenoid

PAIR-VSV

PAIR Vacuum Switching Valve

PCM

Powertrain Control Module

PCV

Positive Crankcase Ventilation

PCV-DOV

PCV Dual Orifice Valve

PCV-HCB

PCV Heated Crankcase Breather

PCV-HE

PCV Heating Element

PCV-PRV

PCV Pressure Regulator Valve

PCV-SOL

PCV Solenoid

PEVR

Power Enrichment Vacuum Regulator

PPM

Parts Per Million

PTOX

Periodic Trap Oxidizer

PURCV

Purge Crankcase Ventilation

PVCS

Ported Valve Control System

PVCS-A

PVCS Actuator

PVCS-CS

PVCS Control Solenoid

PVLCS

Power Valve Control System

"R"

RC

NOx Reduction Catalyst

ROV

Rollover Valve

"S"

SAI-SV

Secondary Air Injection Shutoff Valve

SAIR-CV

Secondary Air Injection Control Valve

SC

Supercharged or Super Charger

SC MFI

Supercharged Multiport Fuel Injection

SCR

Selective Catalytic Reduction

SCSV

Swirl Control Solenoid Valve

SCV

Swirl Control Valve

SCV-A

SCV Actuator

SFI

Sequential Multiport Fuel Injection

SFI-MAF

SFI Mass Airflow Sensor

SFLS

Sub-Fuel Level Sensor

SOHC

Single Overhead Cam

SPK

Spark Controls

SPK-AVM

SPK Advance Vacuum Modulator

SPK-BVSV

SPK Bimetal Vacuum Switching Valve

SPK-CC

SPK Computer Controlled

SPK-CKV

SPK Check Valve

SPK-CSSA

SPK Cold Start Spark Advance System

SPK-CSSH

SPK Cold Start Spark Hold System

SPK-CTO

SPK Coolant Temperature Override

SPK-DAVS

SPK Distributor Vacuum Advance Solenoid

SPK-DCKV

SPK Distributor Check Valve

SPK-DCTO

SPK Dual Coolant Temperature Override

SPK-DDD

SPK Dual Diaphragm Distributor

SPK-DMV

SPK Distributor Modulator Valve

SPK-DPD

SPK Dual Point Distributor

SPK-DPVS

SPK Distributor Ported Vacuum Switch

SPK-DRCV

SPK Distributor Retard Control Valve

SPK-DRS

SPK Distributor Retard Solenoid

SPK-DSVMV

SPK Distributor Spark Vacuum Modulator Valve

SPK-DTVS

SPK Distributor Thermal Vacuum Switch

SPK-DTVV

SPK Distributor Thermal Vacuum Valve

SPK-DV

SPK Delay Valve

SPK-DVA

SPK Distributor Vacuum Advance

SPK-DVAS

SPK Distributor Vacuum Advance Solenoid

SPK-DVCS

SPK Distributor Vacuum Control Solenoid

SPK-DVCSW

SPK Distributor Vacuum Controlled Switch

SPK-DVCV

SPK Distributor Vacuum Control Valve

SPK-DVDV

SPK Distributor Vacuum Delay Valve

SPK-DVRS

SPK Distributor Vacuum Retard Switch

SPK-DVRV

SPK Distributor Vacuum Regulating Valve

SPK-DVVV

SPK Distributor Vacuum Vent Valve

SPK-EAVS

SPK Electronically Actuated Vacuum Switch

SPK-EDM

SPK Electronic Distributor Modulator

SPK-EI

SPK Electronic Ignition

SPK-ESA

SPK Electronic Spark Advance

SPK-ESC

SPK Electronic Spark Control (Retard)

SPK-ESS

SPK Electronic Spark Selection

SPK-EST

SPK Electronic Spark Timing

SPK-FDV

SPK Forward Delay Valve

SPK-HPCA

SPK Housing Pressure Cold Advance

SPK-ITCS

SPK Ignition Timing Control System

SPK-ITVS

SPK Ignition Timing Vacuum Switch

SPK-NLVR

SPK Non-Linear Vacuum Regulator

SPK-OSAC

SPK Orifice Spark Advance Control

SPK-PVA

SPK Ported Vacuum Advance

SPK-PVS

SPK Ported Vacuum Switch

SPK-RDO

SPK Retard Delay Orifice

SPK-RDV

SPK Reverse Delay Valve

SPK-RDVD

SPK Reverse Delay Valve (Dual)

SPK-RDVLV

SPK Retard Delay Valve

SPK-RDVS

SPK Reverse Delay Valve (Single)

SPK-RETS

SPK Retard Switch

SPK-SC

SPK Speed Controlled

SPK-SOL

SPK Solenoid

SPK-SRRV

SPK Spark Relay Regulator Valve

SPK-TAVIA

SPK Temperature Activated Vacuum Ignition Advance

SPK-TCS

SPK Transmission Controlled Spark

SPK-TCSYS

SPK Timing Control System

SPK-TIDC

SPK Thermostatic Ignition Distributor Control

SPK-TV

SPK Thermal Valve

SPK-TVS

SPK Thermal Vacuum Switch

SPK-VACTO

SPK Vacuum Advance Coolant Temperature Override

SPK-VAS

SPK Vacuum Advance Solenoid

SPK-VAV

SPK Vacuum Advance Valve

SPK-VR

SPK Vacuum Retard

SPK-VRSW

SPK Vacuum Retard Switch

SPK-VSV

SPK Vacuum Switching Valve

SPK-VTCS

SPK Vacuum Timing Control System

SPL

Smoke Puff Limiter

SRI

Service Reminder Indicator

SSCA

Stepped Speed Control Actuator

SSCS

Stepped Speed Control Solenoid

STS

Service Throttle Soon Light

STVS

Secondary Throttle Valve System

SUB-HO2S

Sub-Heated Oxygen Sensor (after CAT)

SUB-O2S

Sub-Oxygen Sensor

SUB-TWC

Sub Three-Way Catalytic Converter

"T"

TAA

Turbo Air-To-Air

TAA

Throttle Actuator Assembly

TAB

Thermactor Air By-Pass

TAD

Thermactor Air Diverter

TAC

Thermostatic Air Cleaner

TBI

Throttle Body Injection

TBPCS

Throttle By-Pass Control System

TC

Turbo Charger

TCC

Torque Converter Clutch

TCCL

Torque Converter Control

TCD

Throttle Closing Dashpot

TC-DV

TC Delay Valve

TC-TVC

TC Thermal Vacuum Switch

TC-VS

TC Vacuum Switch

TD

Thermactor Diverter

TFT

Tank Fuel Temperature Sensor

THOS2

Third Heated Oxygen Sensor

TICV

Thermal Ignition Control Valve

TIV

Thermal Idle Valve

TK

Throttle Kicker

TLUC

Transmission Lock-Up Converter

TLUC-TVS

TLUC Thermal Vacuum Switch

TLUC-VS

TLUC Vacuum Switch

TM

Throttle Modulator

TOS

Throttle Opener System

TP

Throttle Positioner

TPI

Tuned Port Fuel Injection

TPV

Throttle Poppet Valve

TR

Thermal Reactor

TRC

Throttle Return Control

TRCS

Throttle Return Control Solenoid

TRCTL

Throttle Return Control Throttle Lever Actuator

TRSCV

Throttle Return Solenoid Control Valve

TRTVV

Temperature Regulator Thermal Vacuum Valve

TRVV

Transmission Vacuum Valve

TSOL

Throttle Solenoid

TVISD

Throttle Vacuum Idle Speed Diaphragm

TVM

Transmission Vacuum Modulator

TWC

Three-Way Catalytic Converter

TWC+OC

Three-Way + Oxidation Catalytic Converter

"V"

VA

Vacuum Advance Unit

VAC-AMP

Vacuum Amplifier

VA-CTO

VA Coolant Temperature Override

VCV

Vacuum Cut Valve

VCV-BV

VCV By-Pass Valve

VLFR

Vent Line Flow Restrictor/Anti-Trickle Fill Valve

"W"

WU

Warm-Up Catalyst

WU-OC

Warm-Up Oxidation Converter

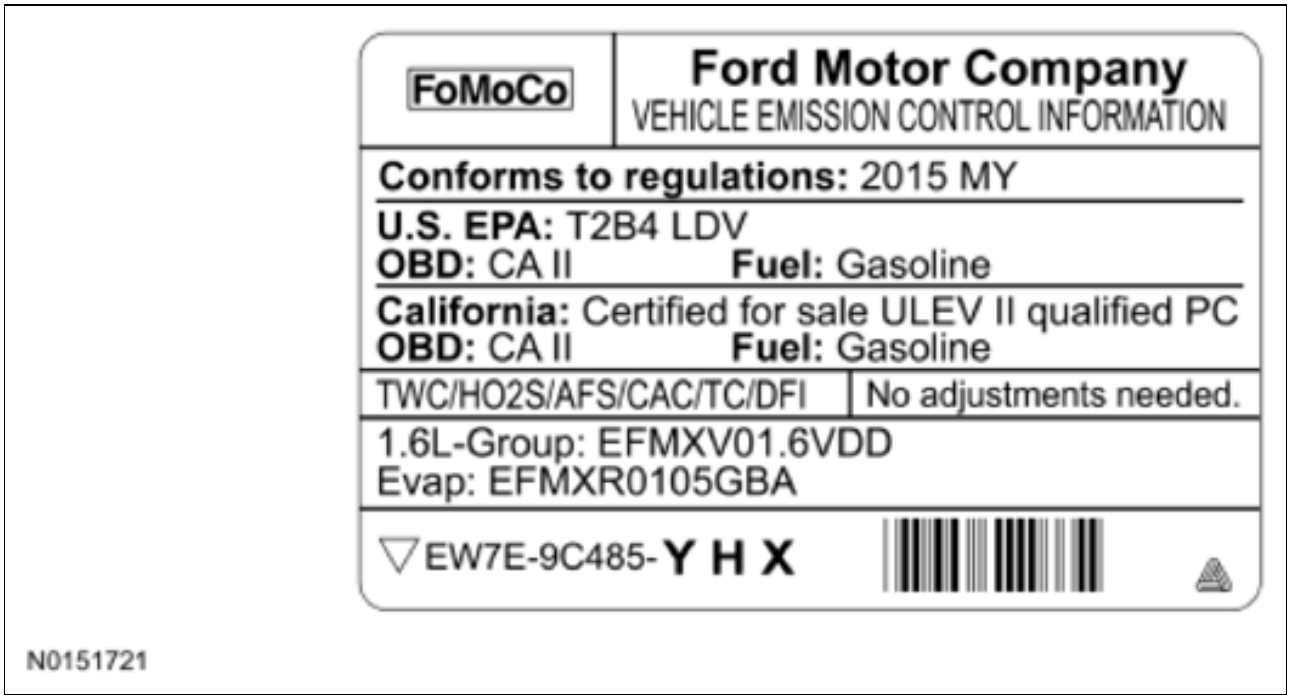
WU-TWC

Warm-Up Three-Way Catalytic Converter

VEHICLE EMISSION CONTROL INFORMATION (VECI) > VECI DECAL

Each vehicle has a VECI decal containing emission control information that applies specifically to the vehicle and engine. The specifications on the decal are critical to repairing the emissions systems.

Fig 1: VECI Decal Location



Courtesy of FORD MOTOR CO.

VEHICLE EMISSION CONTROL INFORMATION (VECI) > VECI DECAL LOCATION

The decal is typically located on the underside of the hood or on the radiator support sight shield.

VEHICLE EMISSION CONTROL INFORMATION (VECI) > ENGINE/EVAPORATIVE EMISSION (EVAP) SYSTEM INFORMATION

Manufacturers must use a standardized system for identifying their individual engine families. The system described below was developed by the Environmental Protection Agency (EPA) in 1991 to meet new regulatory requirements for 1994 and later model years.

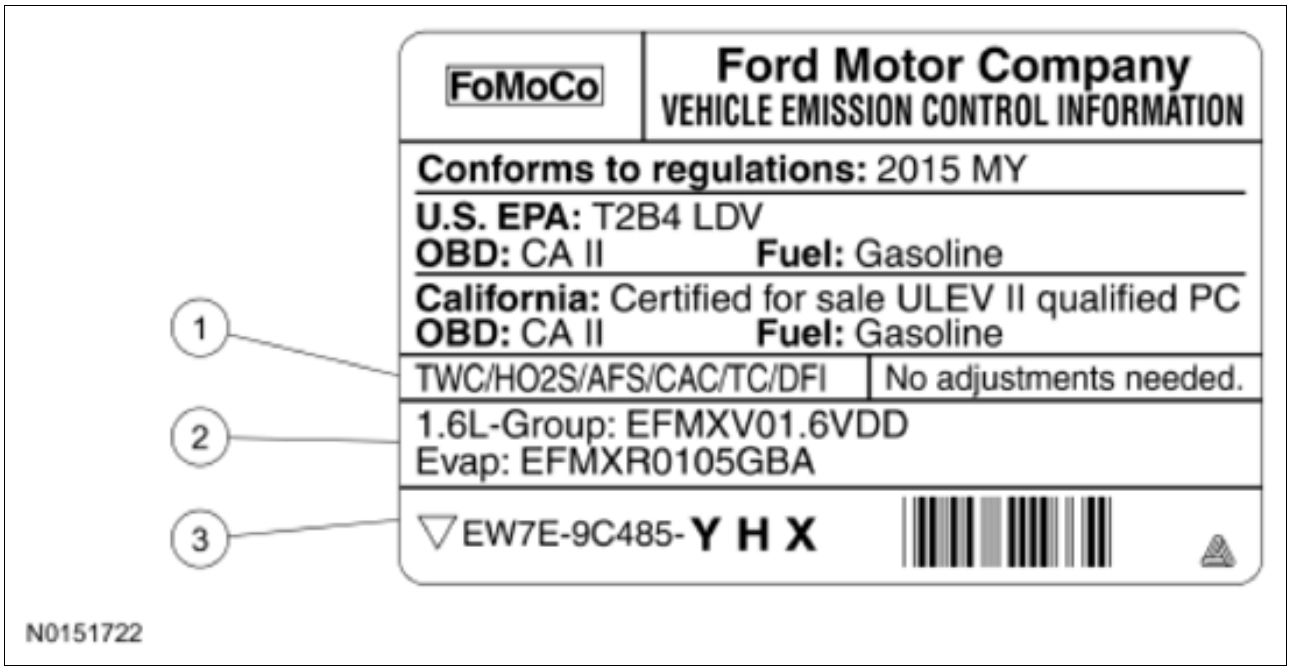
The engine family group and evaporative family name consist of 12 characters each.

Both the engine family group and the evaporative family name are listed in the box on the emission decal in the area marked as engine evaporative family information. The first line contains engine size and the 12 - character engine family group. The second line contains the 12-character evaporative family name

information. Both the engine family group and the evaporative family name are specific to the vehicle. Refer to the Engine Family Group and the Evaporative Family Name worksheet for decoding information.

VEHICLE EMISSION CONTROL INFORMATION (VECI) > ENGINE/EVAPORATIVE EMISSION (EVAP) SYSTEM INFORMATION > TYPICAL VECI DECAL

Fig 1: VECI Decal Location



Courtesy of FORD MOTOR CO.

Item	Number	Description
1	-	Exhaust Emission Control System
2	-	Engine Evaporative Family Information
3	-	Label Part Number

Fig 2: Engine Family Group Work Sheet

ENGINE FAMILY GROUP WORK SHEET

	Year		Manufacturer			Type		Displacement				Wild Card		
	1					5								
Char	Code	Year	2	3	4	Code	Description	6	7	8	9	10	11	12
	A	2010	F	M	X	N	Marine	0	1 to 9	•	0 to 9	Alpha/Numeric		
	B	2011				V	Light Duty Vehicle							
	C	2012				T	Light Duty Truck							
	D	2013				C	Motorcycle							
	E	2014				A	Calif Medium Duty Truck							
	F	2015				H	Heavy Duty Engine							
	G	2016				S	Small Nonroad							
	H	2017				L	Large Nonroad							
	J	2018				M	Marine							
Family Name			F	M	X			0	1 to 9	•	0 to 9			

N0073147

Courtesy of FORD MOTOR CO.

Fig 3: Evaporative Family Name Work Sheet

Evaporative Family Name Work Sheet

Char	Year		Manufacturer			Type		Canister Working Capacity				Wild Card		
	1		2	3	4	5		6	7	8	9	10	11	12
	Code	Year				Code	Description							
	A	2010	F	M	X	F	Evaporative (Use for Heavy Duty)	a	a	a	a	alpha/numeric		
	B	2011				R	Evaporative/ Refueling (Use for ORVR, Light Duty)							
	C	2012				U	Evaporative (Use for Motorcycle)							
	D	2013												
	E	2014												
	F	2015												
	G	2016												
	H	2017												
	J	2018												
Family Name			F	M	X									

a Total grams in all canisters (Use 0 for each character not used for capacity starting with character 6)

N0073148

Courtesy of FORD MOTOR CO.

VEHICLE EMISSION CONTROL INFORMATION (VECI) ACRONYM DEFINITIONS

CAC: Charge Air Cooler

CARB: California Air Resource Board

CARB LEV: Low Emission Vehicle

CARB SULEV: Super Ultra Low Emission Vehicle

CARB TLEV: Transitional Low Emission Vehicle

CARB ULEV: Ultra Low Emission Vehicle

CARB ZEV: Zero Emission Vehicle

CI: Cylinder Injection

DGI: Direct Gas Injection

EPA: Environmental Protection Agency

EVAP: Evaporative Emission

GVW: Gross Vehicle Weight

GVWR: Gross Vehicle Weight Rating, curb weight plus payload.

HHDDE: Heavy Heavy Duty Diesel Engine

HHDE: Heavy Heavy Duty Engine

HO2S: Heated Oxygen Sensor

ILEV: Inherently Low Emission Vehicle

LDDT: Light Duty Diesel Truck categories

LDT: Light Duty Truck (gasoline) categories based on weight as defined in the table.

LDV: Light Duty Vehicle, generally passenger cars and light trucks under 2, 721.55 Kg (6, 000 lb) GVWR.

LEV: Low Emission Vehicle

LEV-II: California regulations beginning in the 2004 model year.

LHDE: Light Heavy Duty Engine (several weight categories).

LVW: Loaded Vehicle Weight, curb weight plus 136.08 Kg (300 lb).

MDPV: Medium Duty Passenger Vehicle

MDT: Medium Duty Truck categories based on weight as defined in the table.

MDV: Medium Duty Vehicle

MHDDE: Medium Heavy Duty Diesel Engine

MHDE: Medium Heavy Duty Engine

MPI: Multi-Port Injection

MY: Model Year

NCP: Non-Compliance Penalty

OBD: On Board Diagnostics

ORVR: On Board Refueling Vapor Recovery

PC: Passenger Car

PZEV: Partial Zero Emission Vehicle

SFI: Sequential Multiport Fuel Injection

SI: Sequential Injection

SULEV: Super Ultra Low Emission Vehicle

TC: Turbocharged

Tier 0: California and Federal regulations effective prior to Tier 1 phase in dates.

Tier 1: California regulations beginning in 1993 model year and Federal regulations beginning in 1994 model year.

Tier 2: Federal regulations beginning in the 2004 model year.

TWC: Three Way Catalytic Converter

ULEV: Ultra Low Emission Vehicle

ZEV: Zero Emission Vehicle

ENGINE CONTROL COMPONENTS

> *NOTE: Transmission inputs which are not described in this service information are discussed in the applicable transmission service information.*

ENGINE CONTROL COMPONENTS > ACCELERATOR PEDAL POSITION (APP) SENSOR

The APP sensor is an input to the PCM and determines the amount of torque requested by the operator.

ENGINE CONTROL COMPONENTS > ACCELERATOR PEDAL POSITION (APP) SENSOR > FIESTA

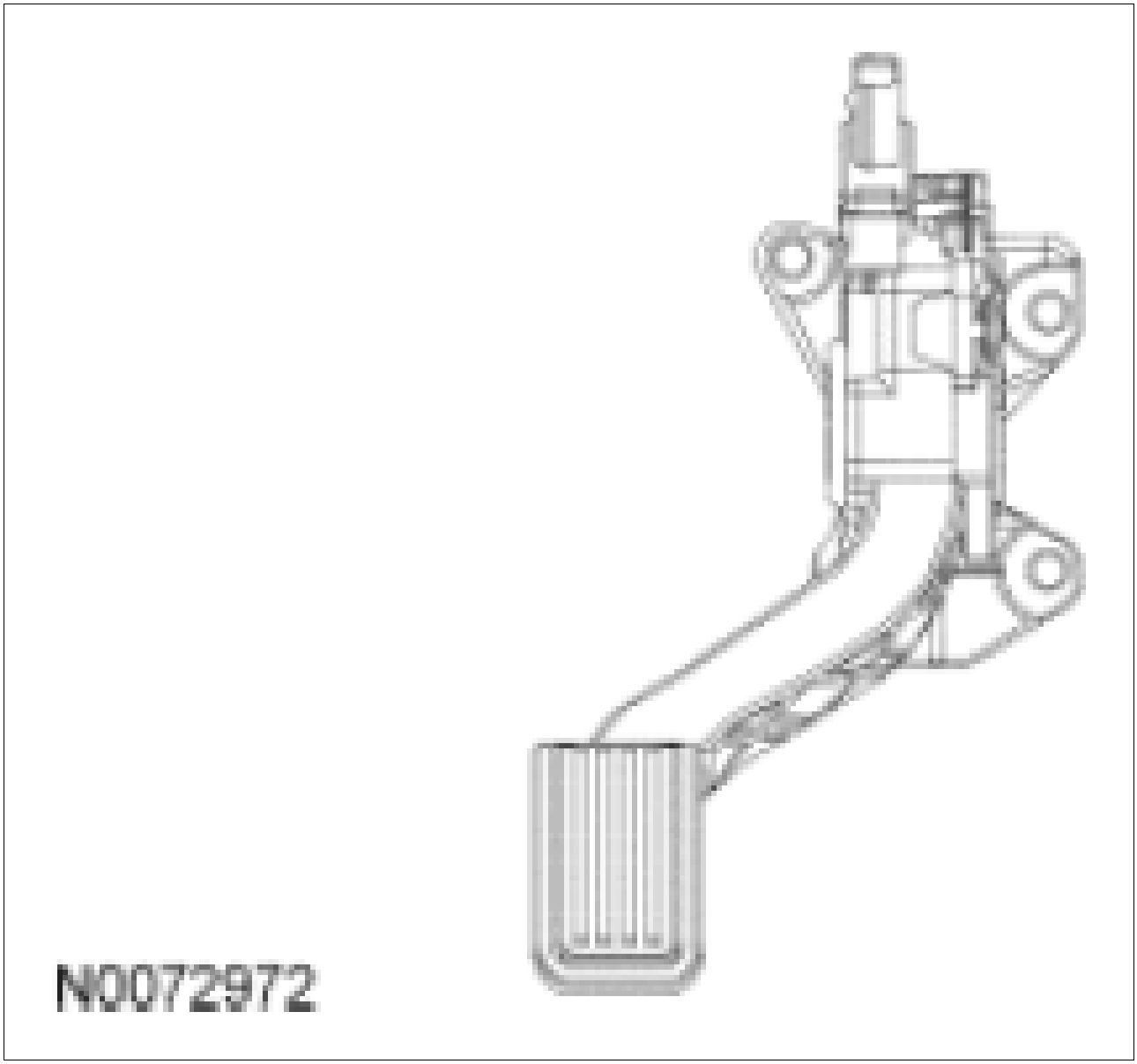
There are 2 separate pedal position sensors in the accelerator pedal. The APP1 sensor signal generates a pulse width modulated (PWM) signal to the PCM. The APP1 sensor uses a VPWR circuit, a ground circuit and a signal circuit. Only the APP1 signal circuit is connected to the PCM. The APP2 sensor signal has a positive slope (increasing angle, increasing voltage) and is a class 2 message from the instrument panel cluster (IPC) to the PCM. The APP2 sensor uses a reference voltage circuit, a signal return circuit, and a signal circuit between the IPC and the APP sensor assembly. The two pedal position signals make sure the PCM receives a correct input even if one of the signals has a concern. The PCM determines if a signal is incorrect by calculating an expected position, inferred from the other signals. If a concern is present with one of the circuits the other input is used. The pedal position signal is converted to pedal travel degrees (rotary angle) by the PCM. The software converts these degrees to counts, which is the input to the torque based strategy. For additional information, refer to TORQUE BASED ELECTRONIC THROTTLE CONTROL (ETC) in this service information

ENGINE CONTROL COMPONENTS > ACCELERATOR PEDAL POSITION (APP) SENSOR > ALL OTHERS

There are 2 pedal position signals in the sensor. Both signals, APP1 and APP2, have a positive slope

(increasing angle, increasing voltage), but are offset and increase at different rates. The 2 pedal position signals make sure the PCM receives a correct input even if one of the signals has a concern. The PCM determines if a signal is incorrect by calculating where it should be, inferred from the other signals. If a concern is present with one of the circuits the other input is used. There are 2 reference voltage circuits, 2 signal return circuits, and 2 signal circuits (a total of 6 circuits and pins) between the PCM and the APP sensor assembly. The pedal position signal is converted to pedal travel degrees (rotary angle) by the PCM. The software converts these degrees to counts, which is the input to the torque based strategy. For additional information, refer to TORQUE BASED ELECTRONIC THROTTLE CONTROL (ETC) in this service information.

Fig 1: Identifying APP Sensor



Courtesy of FORD MOTOR CO.

ENGINE CONTROL COMPONENTS > AMBIENT AIR TEMPERATURE (AAT) SENSOR

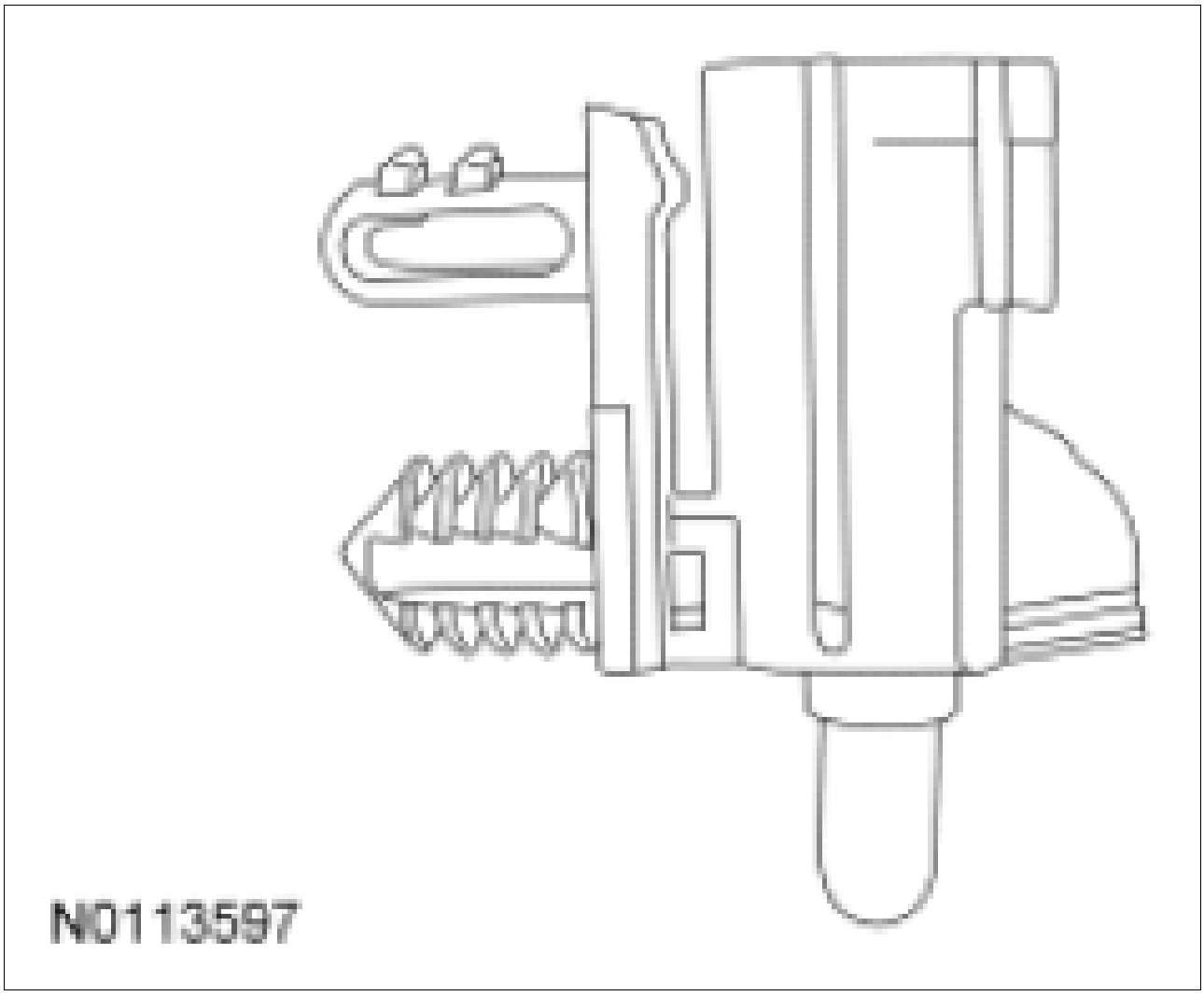
The AAT sensor is a thermistor device in which resistance changes with temperature. The resistance of

a thermistor decreases as the temperature increases, and the resistance increases as the temperature decreases. The varying resistance affects the voltage drop across the sensor terminals and provides electrical signals to the PCM corresponding to temperature.

Thermistor-type sensors are considered passive sensors. A passive sensor is connected to a voltage divider network so that varying the resistance of the passive sensor causes a variation in total current flow. Voltage that is dropped across a fixed resistor in series with the sensor resistor determines the voltage signal at the PCM. This voltage signal is equal to the reference voltage minus the voltage drop across the fixed resistor.

The AAT sensor provides ambient air temperature information to the PCM for the temperature sensor correlation tests. The PCM also communicates the AAT sensor information to all other modules on the controller area network (CAN).

Fig 1: Identifying AAT Sensor



Courtesy of FORD MOTOR CO.

ENGINE CONTROL COMPONENTS > BAROMETRIC PRESSURE (BARO) SENSOR

The BARO sensor measures barometric pressure to estimate the exhaust back pressure.

For vehicles with a turbocharger intake pressure and temperature (TCIPT) sensor, the BARO value is inferred by comparing the TCIPT sensor, manifold absolute pressure (MAP) sensor, and turbocharger boost pressure (TCBP) sensor values at key on, engine off (KOEO). While driving, the BARO is updated by monitoring the TCIPT sensor when air flow volume is below 2 parts per million.

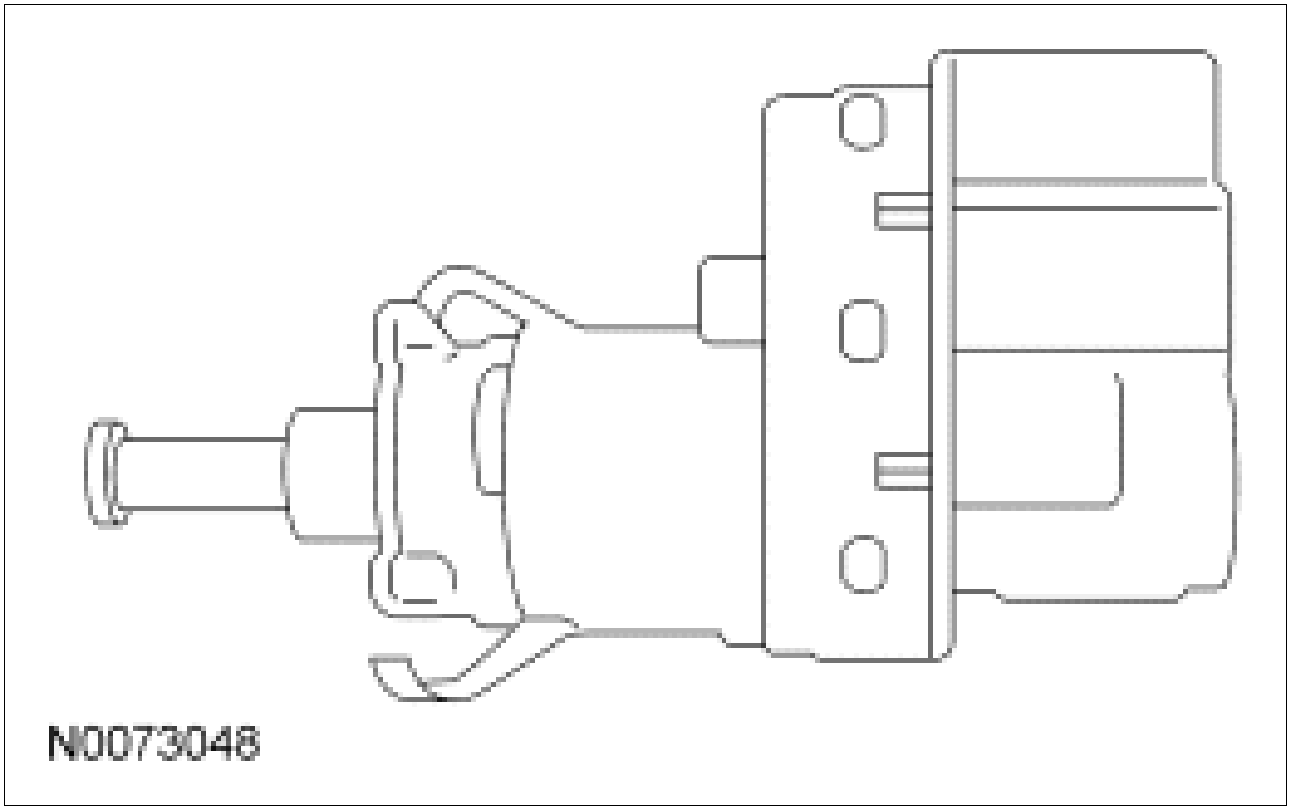
For direct injection vehicles, a BARO sensor is mounted internally to the PCM. The BARO sensor measures the barometric pressure to estimate the exhaust back pressure.

For all other vehicles without a BARO sensor, the BARO value is inferred by the PCM based on the volumetric efficiency of the engine, comparing the mass air flow (MAF) sensor and the ambient temperature values. The actual MAF value is used to calculate an inferred MAP value based on operating conditions and volumetric efficiency. At or near wide open throttle, the BARO value is calculated to be slightly higher than the inferred MAP value, with the difference calculated by the pressure drop across the throttle plate.

ENGINE CONTROL COMPONENTS > BRAKE PEDAL POSITION (BPP) SWITCH

The BPP switch is sometimes referred to as the stoplamp switch. The BPP switch provides a signal to the PCM indicating the brakes are applied. The BPP switch is normally open and mounted on the brake pedal support. The BPP switch supplies battery positive (B+) voltage to the PCM when the brake pedal is applied.

Fig 1: Identifying BPP Switch



Courtesy of FORD MOTOR CO.

ENGINE CONTROL COMPONENTS > BRAKE PRESSURE SWITCH

The brake pressure switch is used for cruise control deactivation. The brake pressure switch is a normally closed switch and is typically mounted on the brake pedal support. When the brake pedal is applied, the normally closed switch opens.

On some applications the normally closed brake pressure switch, along with the normally open BPP switch, are used for a brake rationality test within the PCM. The PCM misfire monitor profile learn function may be disabled if a brake switch concern occurs. If one or both brake pedal inputs to the PCM is not changing states as expected, a DTC is set by the PCM strategy.

ENGINE CONTROL COMPONENTS > CAMSHAFT POSITION (CMP) SENSOR

The CMP sensor detects the position of the camshaft. The CMP sensor identifies when piston number 1 is on its compression stroke. A signal is then sent to the PCM and used for synchronizing the sequential firing of the fuel injectors. Coil on plug (COP) ignition applications use the CMP sensor signal to select the correct ignition coil to fire.

Inline engines with 2 camshafts and with variable camshaft timing (VCT) are equipped with 2 CMP sensors. The second sensor identifies the exhaust camshaft position.

The 2 sensor system on inline engines use the following CMP sensor signal circuit names:

- CMP11 - bank 1, sensor 1 (intake camshaft)
- CMP12 - bank 1, sensor 2 (exhaust camshaft)

Engines with 1 camshaft per bank and with VCT are equipped with 2 CMP sensors. The second sensor identifies the camshaft position on bank 2.

The 2 sensor system on engines with 1 camshaft per bank and with VCT use the following CMP sensor signal circuit names:

- CMP11 - bank 1, sensor 1 (intake camshaft)
- CMP21 - bank 2, sensor 1 (exhaust camshaft)

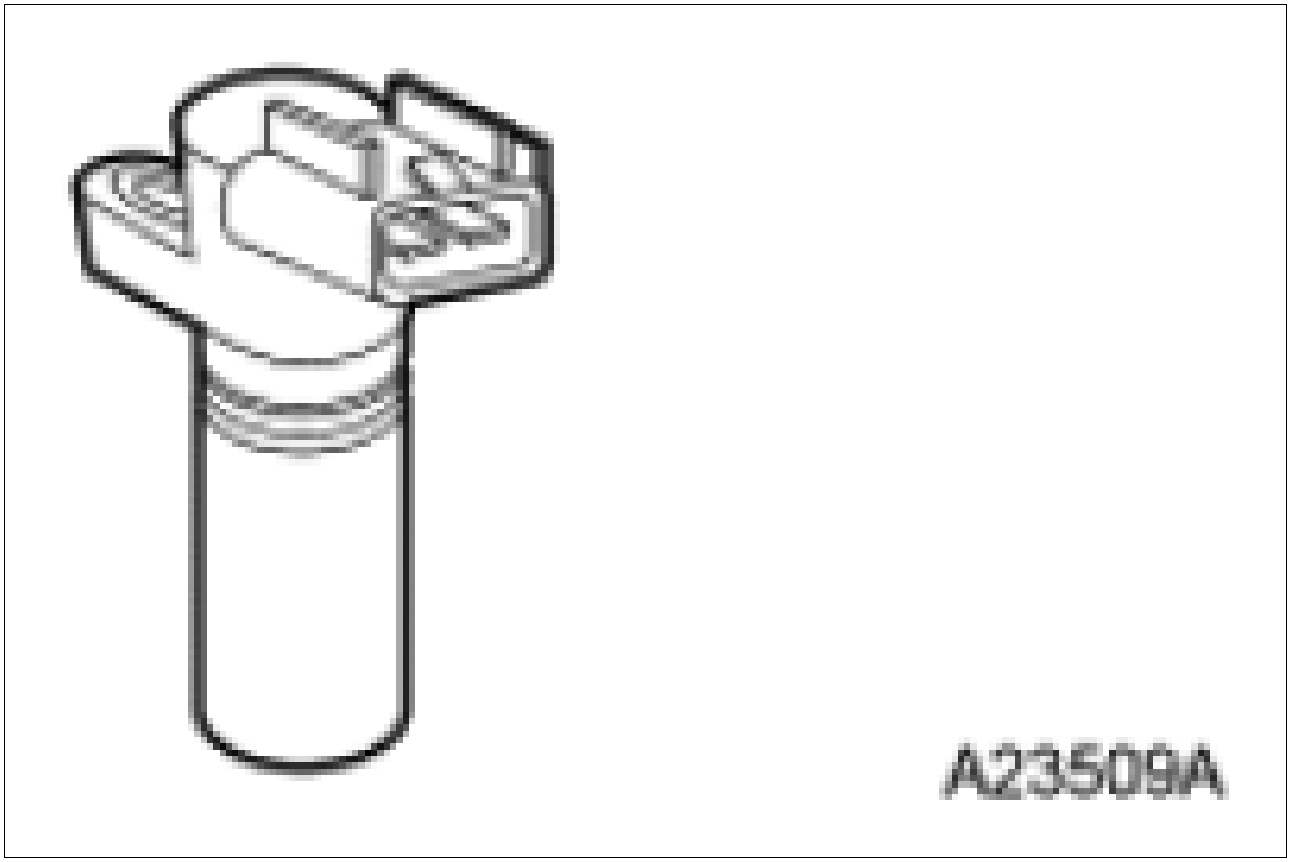
Engines with 4 camshafts and with VCT are equipped with 4 CMP sensors. The 4 sensors identify the position of each camshaft.

The 4 sensor system uses the following CMP sensor signal circuit names:

- CMP11 - bank 1, sensor 1 (intake camshaft)
- CMP12 - bank 1, sensor 2 (exhaust camshaft)
- CMP21 - bank 2, sensor 1 (intake camshaft)
- CMP22 - bank 2, sensor 2 (exhaust camshaft)

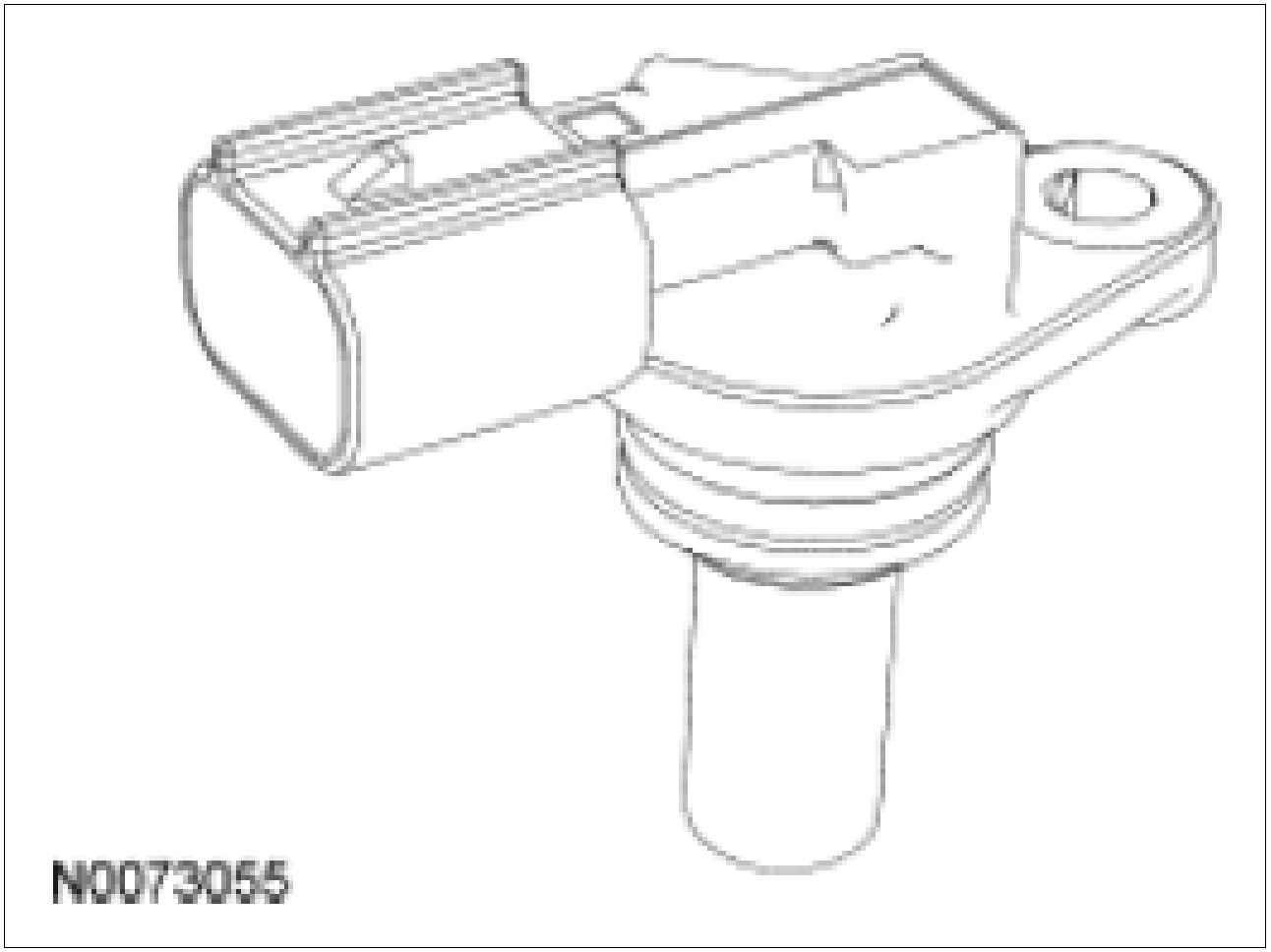
There are the 2 types of CMP sensors used. The 2 pin variable reluctance sensor and the 3 pin Hall effect sensor.

Fig 1: Identifying Variable Reluctance CMP Sensor



Courtesy of FORD MOTOR CO.

Fig 2: Identifying Hall Effect CMP Sensor

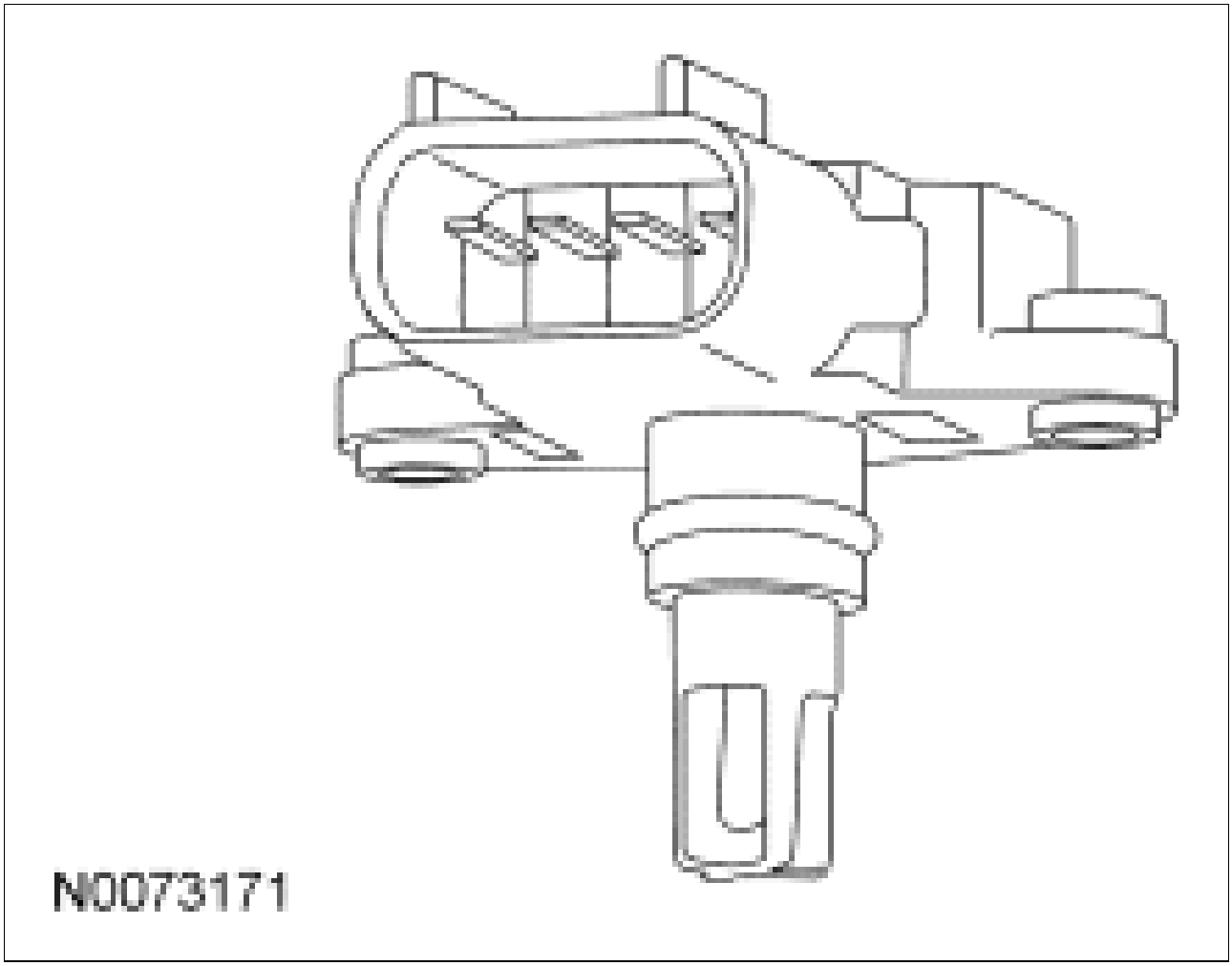


Courtesy of FORD MOTOR CO.

ENGINE CONTROL COMPONENTS > CHARGE AIR COOLER TEMPERATURE (CACT) SENSOR

The CACT sensor is located in the intake air path between the charge air cooler (CAC) and the cylinder head. The CACT sensor measures the air temperature after the CAC. The CACT sensor may be integrated with a turbocharger boost pressure (TCBP) sensor or a manifold absolute pressure and temperature (MAPT) sensor.

Fig 1: Identifying CACT Sensor Integrated With TCBP Sensor



Courtesy of FORD MOTOR CO.

ENGINE CONTROL COMPONENTS > CHARGE AIR COOLER (CAC) COOLING FAN

The PCM monitors certain parameters (such as manifold pressure, charge air temperature, and engine coolant temperature) to determine CAC cooling fan needs. The CAC cooling fan is relay controlled by the PCM. The PCM controls the CAC cooling fan operation with the CACCF circuit through the CAC cooling fan relay.

ENGINE CONTROL COMPONENTS > CHARGE AIR COOLER (CAC) COOLANT TEMPERATURE SENSOR

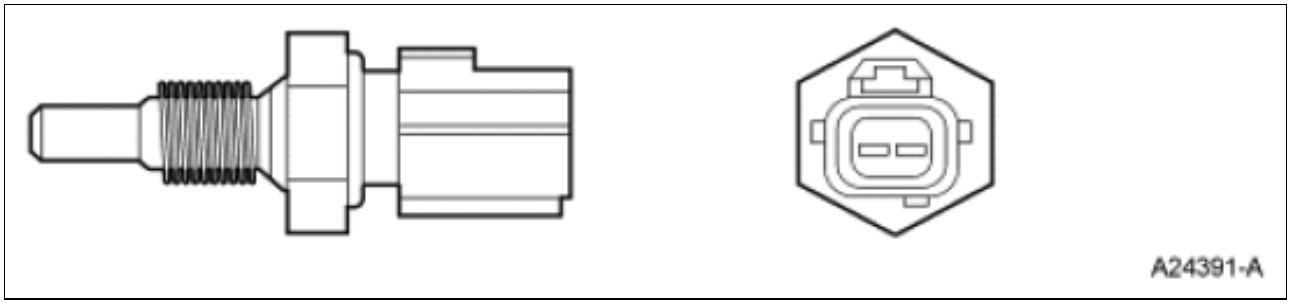
The CAC coolant temperature sensor is a thermistor device in which resistance changes with the temperature. The resistance of a thermistor decreases as temperature increases, and the resistance increases as the temperature decreases. The varying resistance affects the voltage drop across the sensor terminals and provides electrical signals to the PCM corresponding to temperature.

Thermistor-type sensors are considered passive sensors. A passive sensor is connected to a voltage

divider network so varying the resistance of the passive sensor causes a variation in total current flow. Voltage that is dropped across a fixed resistor (pull-up resistor) in series with the sensor resistor determines the voltage signal at the PCM. This voltage signal is equal to the reference voltage minus the voltage drop across the fixed resistor.

The CAC coolant temperature sensor is installed in the side of the CAC radiator and measures the CAC system coolant temperature. The PCM uses the CAC coolant temperature sensor to determine desired operating condition of the CAC coolant pump.

Fig 1: Identifying CAC Coolant Temperature Sensor



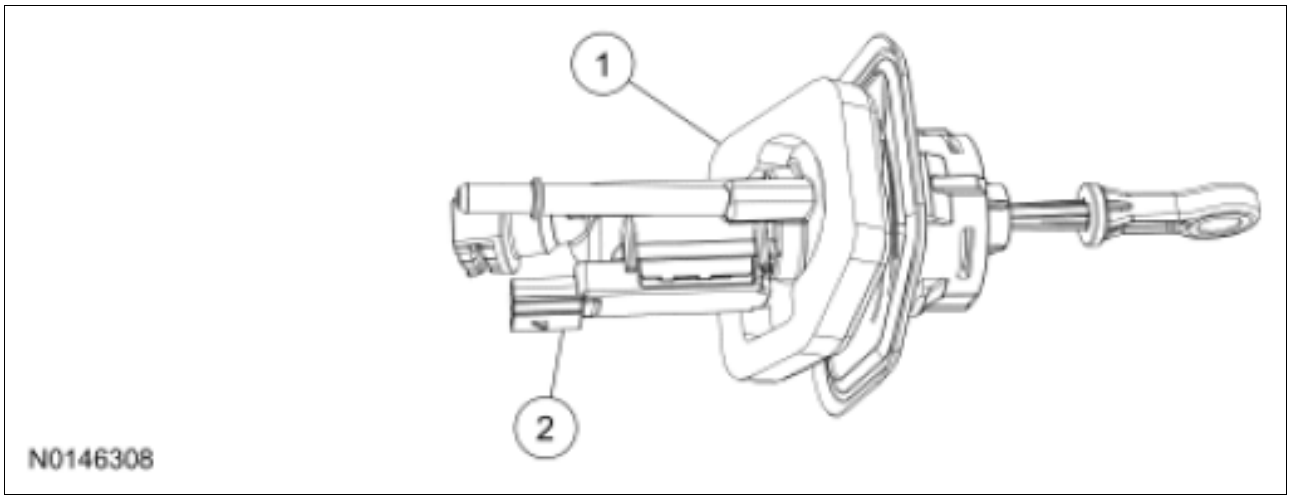
Courtesy of FORD MOTOR CO.

ENGINE CONTROL COMPONENTS > CLUTCH PEDAL POSITION (CPP) SENSOR

The CPP signal is converted to percent of pedal travel by the PCM. During normal operation, the CPP is used as the indication of the clutch pedal position by the PCM strategy.

There is 1 reference voltage circuit, 1 signal return circuit, and 1 signal circuit between the PCM and the CPP sensor. The CPP sensor is typically mounted on the clutch master cylinder or pedal assembly.

Fig 1: Identifying Clutch Pedal Position (CPP) Sensor



Courtesy of FORD MOTOR CO.

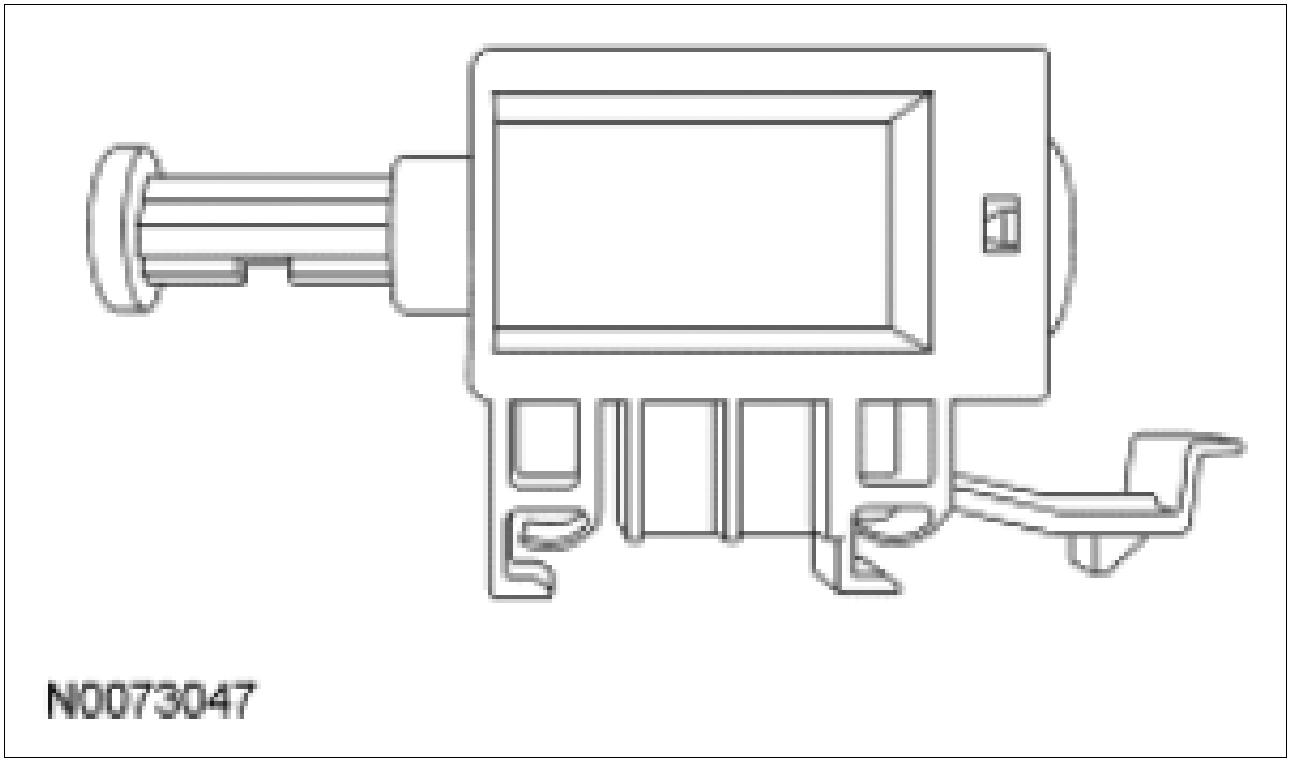
Item	Number	Description

1	-	Clutch Master Cylinder
2	-	CPP Sensor Assembly

ENGINE CONTROL COMPONENTS > CLUTCH PEDAL POSITION (CPP) SWITCH

The CPP switch is an input to the PCM indicating the clutch pedal position. The PCM provides a low current voltage on the CPP circuit. When the CPP switch is closed, this voltage is pulled low through the signal return (SIGRTN) circuit. The CPP input to the PCM is used to detect a reduction in engine load. The PCM uses the load information for mass airflow and fuel calculations.

Fig 1: Identifying Clutch Pedal Position (CPP) Switch

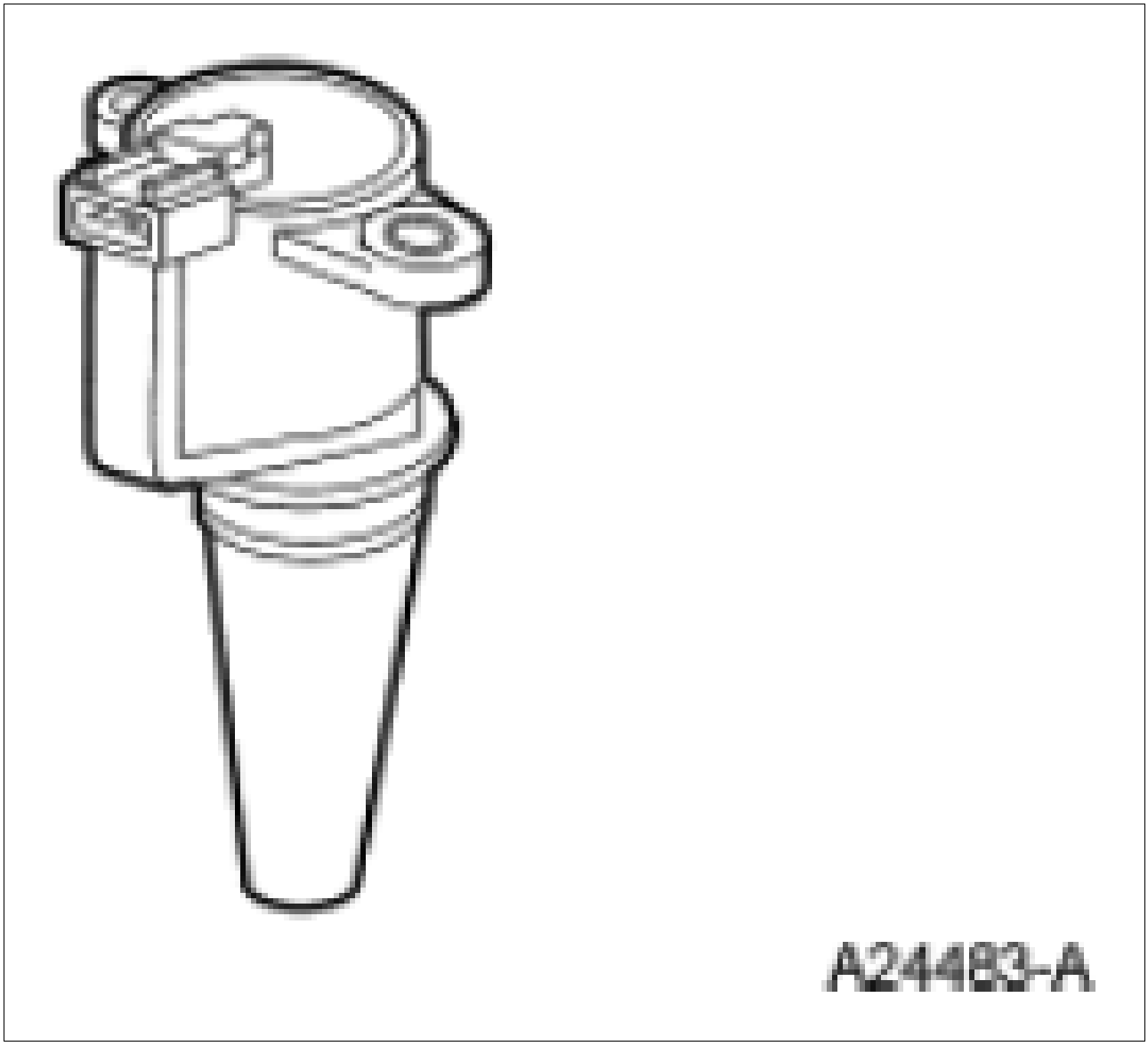


Courtesy of FORD MOTOR CO.

ENGINE CONTROL COMPONENTS > COIL ON PLUG (COP)

The COP ignition operates similar to a standard coil pack ignition except each plug has 1 coil per plug. The COP operates in engine crank, engine running and camshaft position failure mode effects management (FMEM) modes. The COP eliminates the need for secondary spark plug wires which improves reliability. Currently there are two types of COP in use today. The first type is a 2 circuit system that consists of the coil and boot that is installed directly on top of the spark plug which is fired by a driver located in the PCM. The second type is a 3 circuit system with the driver integrated in the COP assembly that is triggered when the PCM supplies the signal to fire. This configuration eliminates the need for high current lines from the PCM to the COP. For additional information, refer to IGNITION SYSTEMS in this service information.

Fig 1: Identifying Coil On Plug (COP)



Courtesy of FORD MOTOR CO.

Fig 2: Identifying Coil On Plug (COP) With Integrated Driver



Courtesy of FORD MOTOR CO.

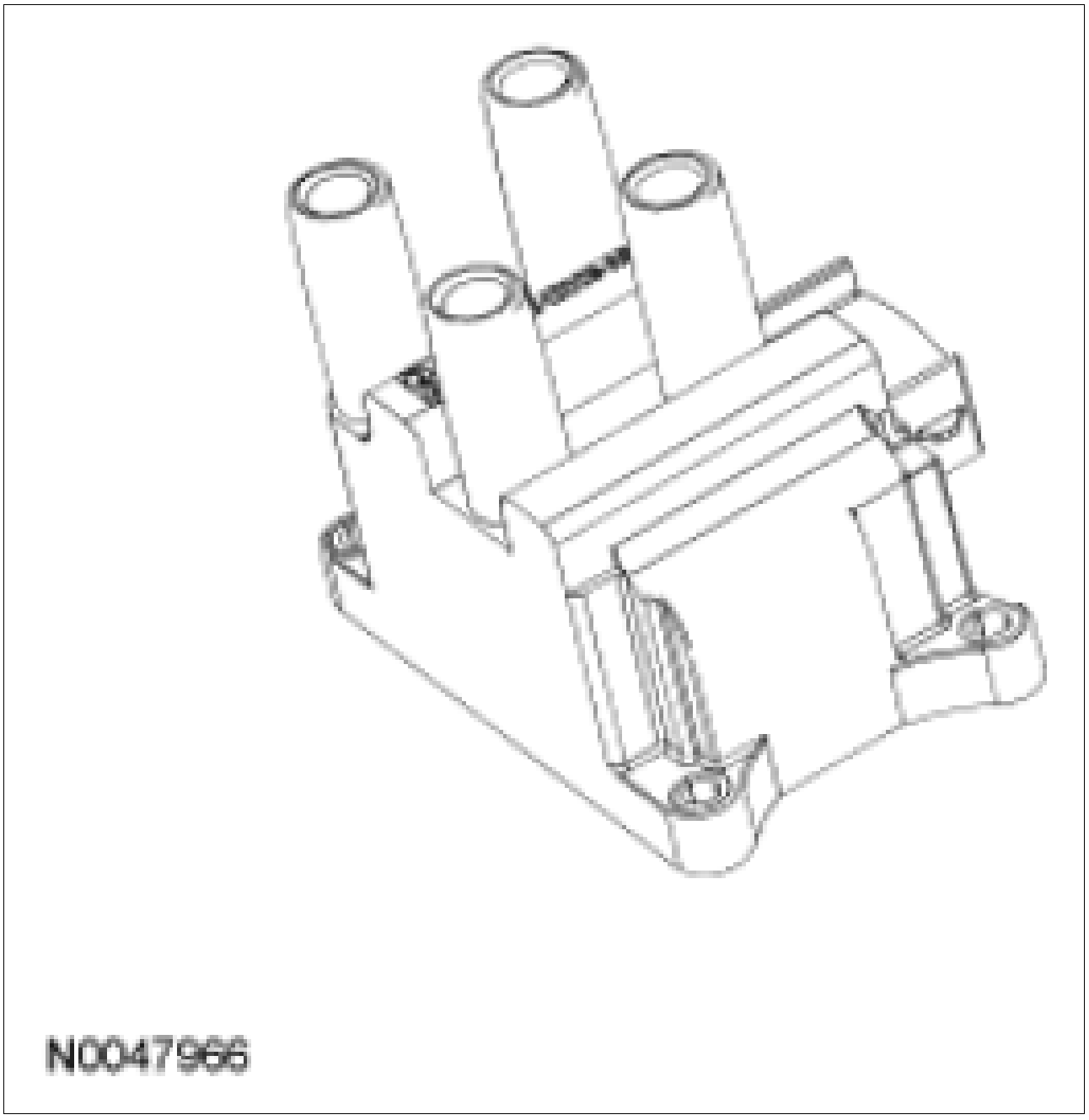
ENGINE CONTROL COMPONENTS > COIL PACK

The PCM provides a grounding switch for the coil primary circuit. When the switch is closed, voltage is applied to the coil primary circuit. This creates a magnetic field around the primary coil. The PCM opens the switch, causing the magnetic field to collapse, inducing the high voltage in the secondary coil windings and firing the spark plug. The spark plugs are paired so that as 1 spark plug fires on the compression stroke, the other spark plug fires on the exhaust stroke. The next time the coil is fired the order is reversed. The next pair of spark plugs fire according to the engine firing order.

Two adjacent coil towers share a common coil and are called a matched pair, the matched pairs are 1 and 4 and 2 and 3.

When the coil is fired by the PCM, spark is delivered through the matched pair towers to their respective spark plugs. The spark plugs are fired simultaneously and are paired so that as one fires on the compression stroke, the other spark plug fires on the exhaust stroke. The next time the coil is fired, the situation is reversed. The next pair of spark plugs fire according to the engine firing order.

Fig 1: Identifying Tower Coil Pack



Courtesy of FORD MOTOR CO.

ENGINE CONTROL COMPONENTS > COOLING FAN

The PCM monitors certain parameters (such as engine coolant temperature, vehicle speed, A/C ON/OFF status, A/C pressure) to determine engine cooling fan needs.

For Variable Speed Electric Fans:

The PCM controls the fan speed and operation using a duty cycle output on the FCV circuit. The fan controller (located at or integral to the engine cooling fan assembly) receives the FCV command and operates the cooling fan at the speed requested (by varying the power applied to the fan motor).

The fan controller is able to detect certain failure modes within the fan motors. Under certain failure modes, such as a motor that is drawing excessive current, the fan controller shuts the fans off. Fan motor concerns may not set a specific DTC. With the fan motor disconnected from the fan controller, voltage may not be present at the fan controller.

For Relay Controlled Fans:

The PCM controls the fan operation through the fan control LFC (single speed applications), and LFC (low speed), MFC (medium speed), HFC (high speed) for multiple speed applications. Some applications have the xFC circuit wired to 2 separate relays.

For 2 speed fans, although the PCM output circuits are called LFC and HFC, cooling fan speed is controlled by a combination of these outputs.

For 3 speed fans, although the PCM output circuits are called LFC, MFC, and HFC, cooling fan speed is controlled by a combination of these outputs.

ENGINE CONTROL COMPONENTS > COOLING FAN CLUTCH

The cooling fan clutch is an electrically actuated viscous clutch that consists of 3 main elements:

- a working chamber
- a reservoir chamber
- a cooling fan clutch actuator valve and a fan speed sensor (FSS)

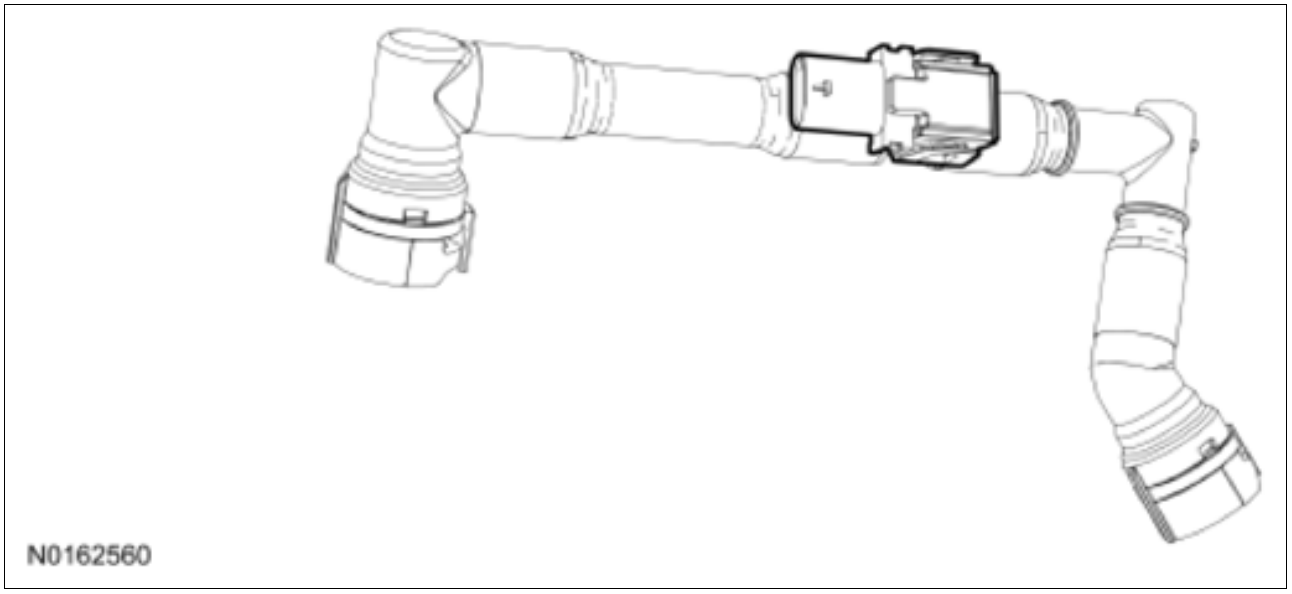
The cooling fan clutch actuator valve controls the fluid flow from the reservoir into the working chamber. Once viscous fluid is in the working chamber, shearing of the fluid results in fan rotation. The cooling fan clutch actuator valve is activated with a pulse width modulated (PWM) output signal from the PCM. By opening and closing the fluid port valve, the PCM can control the cooling fan speed. The cooling fan speed is measured by a Hall effect sensor and monitored by the PCM during closed loop operation.

The PCM optimizes fan speed based on engine coolant temperature, engine oil temperature, transmission fluid temperature, intake air temperature, or air conditioning requirements. When an increased demand for fan speed is requested for vehicle cooling, the PCM monitors the fan speed through the Hall effect sensor. If a fan speed increase is required, the PCM outputs the PWM signal to the fluid port, providing the required fan speed increase.

ENGINE CONTROL COMPONENTS > CRANKCASE PRESSURE SENSOR

The crankcase pressure sensor measures the vacuum in the positive crankcase ventilation (PCV) system. A change in the PCV system vacuum greater than a calibrated threshold indicates the PCV system is disconnected and will set a DTC. The crankcase pressure sensor is located in the PCV system hose between the intake air system air cleaner and the engine crankcase PCV inlet.

Fig 1: Identifying Crankcase Pressure Sensor Integrated With Crankcase Ventilation Tube



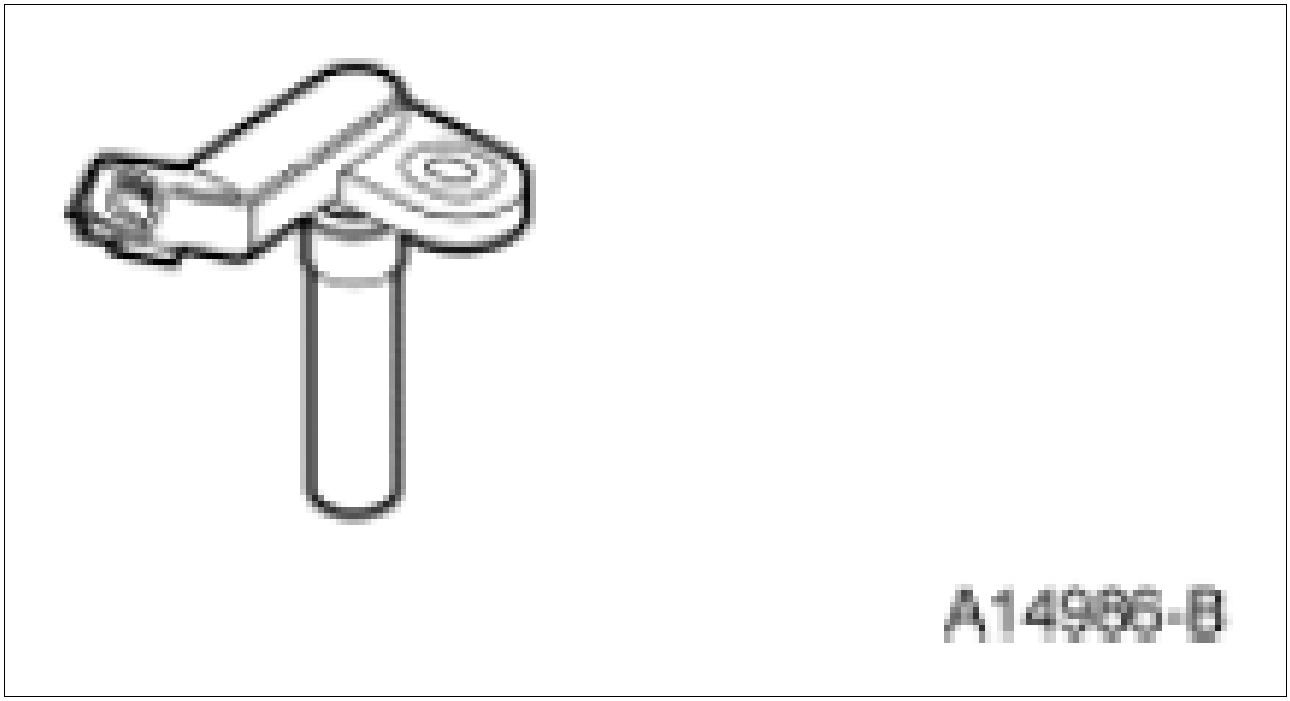
Courtesy of FORD MOTOR CO.

ENGINE CONTROL COMPONENTS > CRANKSHAFT POSITION (CKP) SENSOR

The CKP sensor is a magnetic transducer mounted on the engine block adjacent to a pulse wheel located on the crankshaft. By monitoring the crankshaft mounted pulse wheel, the CKP sensor is the primary sensor for ignition information to the PCM. The pulse wheel for some V6 and V8 engines have a total of 35 teeth spaced 10 degrees apart with 1 empty space for a missing tooth. The pulse wheel for some 4 cylinder engines and some V6 engines have a total of 58 teeth spaced 6 degrees apart with 2 empty spaces. The 6.8L 10 cylinder pulse wheel has 39 teeth spaced 9 degrees apart and one 9 degree empty space for a missing tooth. By monitoring the pulse wheel, the CKP sensor signal indicates crankshaft position and speed information to the PCM. By monitoring the missing tooth, the CKP sensor is able to identify piston travel in order to synchronize the ignition system and provide a way of tracking the angular position of the crankshaft relative to a fixed reference for the CKP sensor configuration. The PCM also uses the CKP sensor signal to determine if a misfire has occurred by measuring rapid decelerations between teeth.

There are 2 types of CKP sensors used. The 2 pin variable reluctance sensor and the 3 pin Hall effect sensor.

Fig 1: Identifying CKP Sensor



Courtesy of FORD MOTOR CO.

ENGINE CONTROL COMPONENTS > CYLINDER HEAD TEMPERATURE (CHT) SENSOR

NOTE: If the CHT sensor is removed from the cylinder head for any reason it must be replaced with a new sensor.

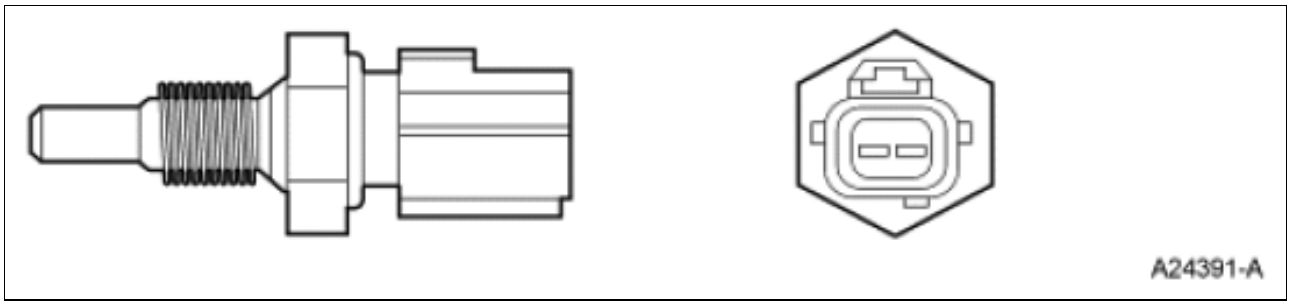
The CHT sensor is a thermistor device in which resistance changes with the temperature. The resistance of a thermistor decreases as temperature increases, and the resistance increases as the temperature decreases. The varying resistance affects the voltage drop across the sensor terminals and provides electrical signals to the PCM corresponding to temperature.

Thermistor-type sensors are considered passive sensors. A passive sensor is connected to a voltage divider network so varying the resistance of the passive sensor causes a variation in total current flow. Voltage that is dropped across a fixed resistor (pull-up resistor) in series with the sensor resistor determines the voltage signal at the PCM. This voltage signal is equal to the reference voltage minus the voltage drop across the fixed resistor.

On a typical vehicle, the CHT sensor is located in the cylinder head and the CHT2 sensor is located in the exhaust manifold. The CHT sensor provides complete engine temperature information and is used to infer coolant temperature. If the CHT sensor conveys an overheating condition to the PCM, the PCM initiates a fail-safe cooling strategy based on information from the CHT sensor. A cooling system concern, such as low coolant or coolant loss, could cause an overheating condition. As a result, damage to major engine components could occur. Using both the CHT sensor and fail-safe cooling strategy, the PCM prevents damage by allowing air cooling of the engine and limp home capability. For additional information, refer to POWERTRAIN CONTROL SOFTWARE for Fail-Safe Cooling Strategy in this

service information.

Fig 1: Identifying CHT Sensor

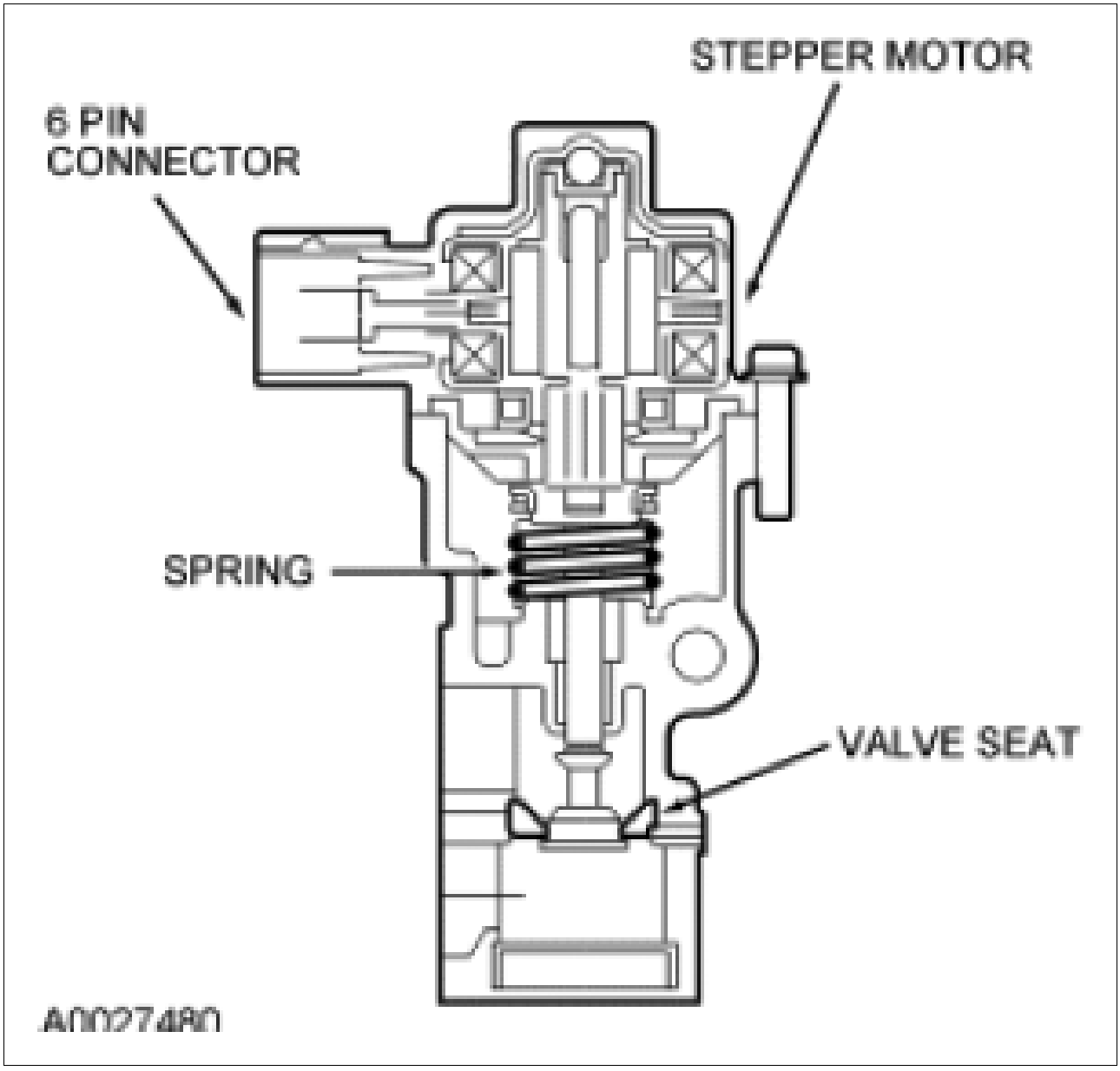


Courtesy of FORD MOTOR CO.

ENGINE CONTROL COMPONENTS > ELECTRIC EXHAUST GAS RECIRCULATION (EEGR) VALVE

Depending on the application, the EEGR valve is either a water cooled or an air cooled motor/valve assembly. The motor is commanded to move in 52 discrete steps as it acts directly on the EEGR valve. The position of the valve determines the rate of EGR. The built-in spring works to close the valve against the motor opening force.

Fig 1: Identifying EEGR Motor/Valve Assembly



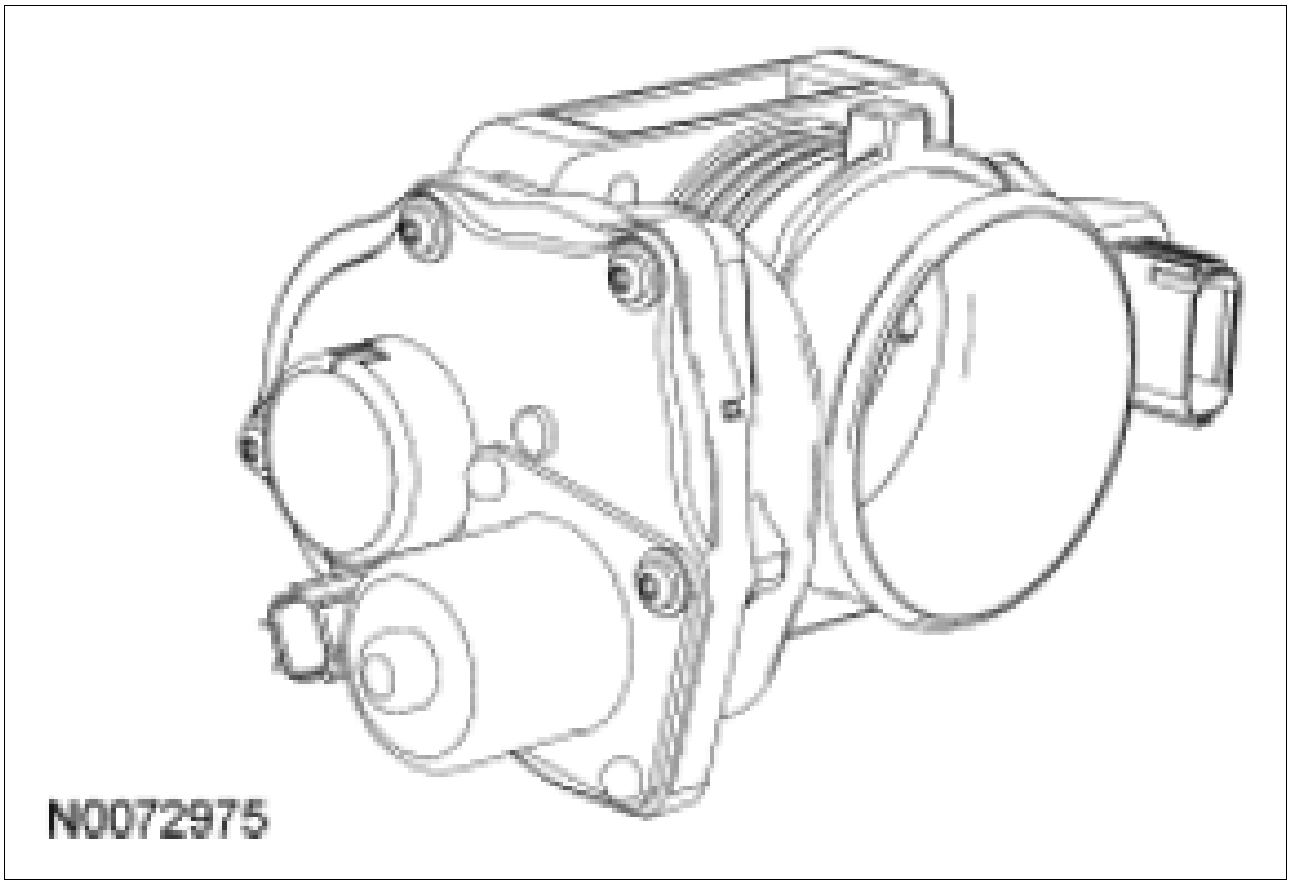
Courtesy of FORD MOTOR CO.

ENGINE CONTROL COMPONENTS > ELECTRONIC THROTTLE BODY THROTTLE ACTUATOR CONTROL (TAC)

The electronic throttle body TAC is a DC motor controlled by the PCM. There are 2 designs for the electronic throttle body TAC, parallel and inline. The parallel design has the motor under the bore parallel to the plate shaft. The motor housing is integrated into the main housing. The inline design has a separate motor housing. Both designs use an internal spring to return the throttle plate to a default position. The default position is typically a throttle angle of 7 to 8 degrees from the hard stop angle. The closed throttle plate hard stop prevents the throttle from binding in the bore. This hard stop setting is not adjustable and is set to result in less airflow than the minimum engine airflow required at idle. For additional information, refer to TORQUE BASED ELECTRONIC THROTTLE CONTROL (ETC) in this

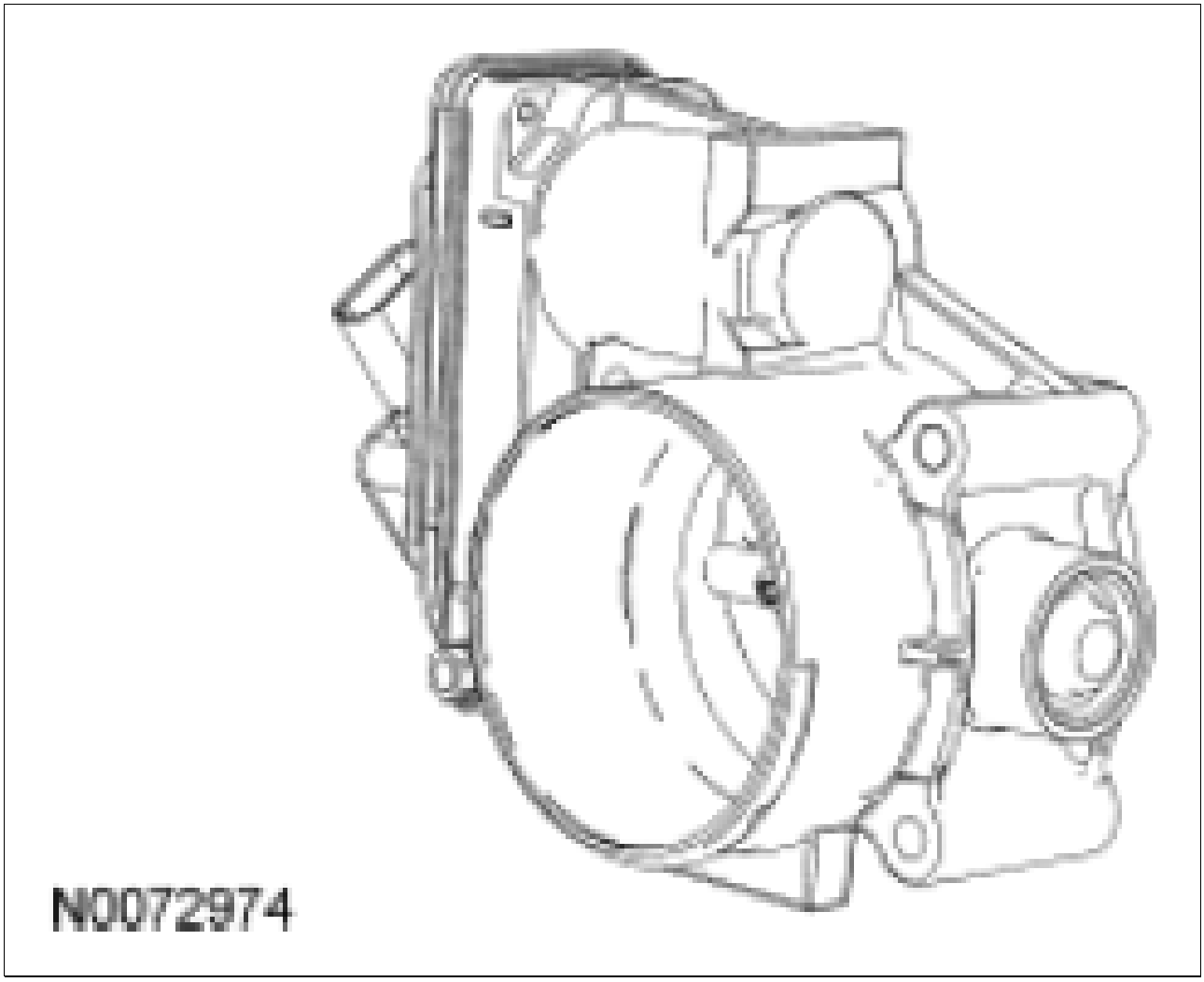
service information.

Fig 1: Identifying Inline Electronic Throttle Body TAC Design



Courtesy of FORD MOTOR CO.

Fig 2: Identifying Parallel Electronic Throttle Body TAC Design



Courtesy of FORD MOTOR CO.

ENGINE CONTROL COMPONENTS > ELECTRONIC THROTTLE BODY THROTTLE POSITION SENSOR (ETBTPS)

The ETBTPS has two signal circuits in the sensor for redundancy. The redundant ETBTPS signals are required for increased monitoring. The first ETBTPS signal (TP1) has a negative slope (increasing angle, decreasing voltage) and the second signal (TP2) has a positive slope (increasing angle, increasing voltage). The two ETBTPS signals make sure the PCM receives a correct input even if one signal has a concern. For Fiesta, there is one reference voltage circuit (ETCREF) and one signal return circuit (ETCRTN) for the sensor dedicated to the ETBTPS. For all others, there is one reference voltage circuit (ETCREF) and one signal return circuit (ETCRTN) for the sensor shared with the reference voltage circuits (APPVREF1 and APPVREF2) and signal return circuits (APPRTN1 and APPRTN2) used by the APP sensor. For additional information, refer to TORQUE BASED ELECTRONIC THROTTLE CONTROL (ETC) in this service information.

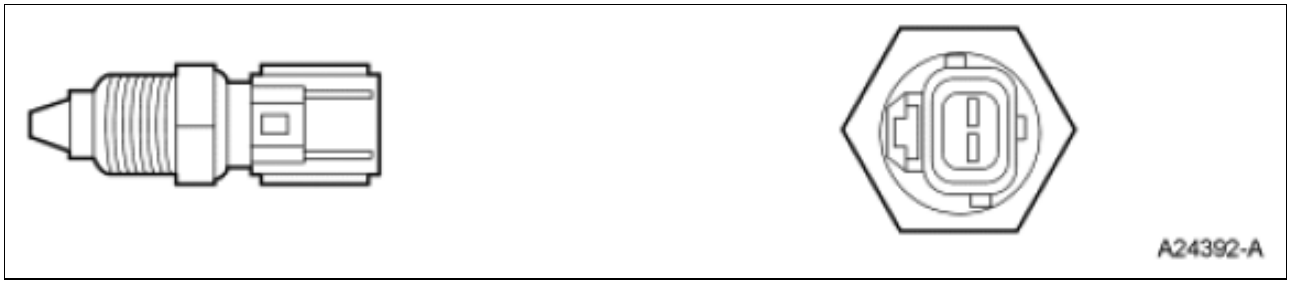
ENGINE CONTROL COMPONENTS > ENGINE COOLANT TEMPERATURE (ECT) SENSOR

The ECT sensor is a thermistor device in which resistance changes with temperature. The resistance of a thermistor decreases as the temperature increases, and the resistance increases as the temperature decreases. The varying resistance changes the voltage drop across the sensor terminals and provides electrical signals to the PCM corresponding to temperature.

Thermistor-type sensors are considered passive sensors. A passive sensor is connected to a voltage divider network so varying the resistance of the passive sensor causes a variation in total current flow. Voltage that is dropped across a fixed resistor (pull-up resister) in series with the sensor resistor determines the voltage signal at the PCM. This voltage signal is equal to the reference voltage minus the voltage drop across the fixed resistor.

The ECT sensor is located in an engine coolant passage and measures the engine coolant temperature. The PCM uses the engine coolant temperature input for fuel control and for cooling fan control. The ECT sensor can be a threaded or twist lock type.

Fig 1: Identifying Threaded ECT Sensor

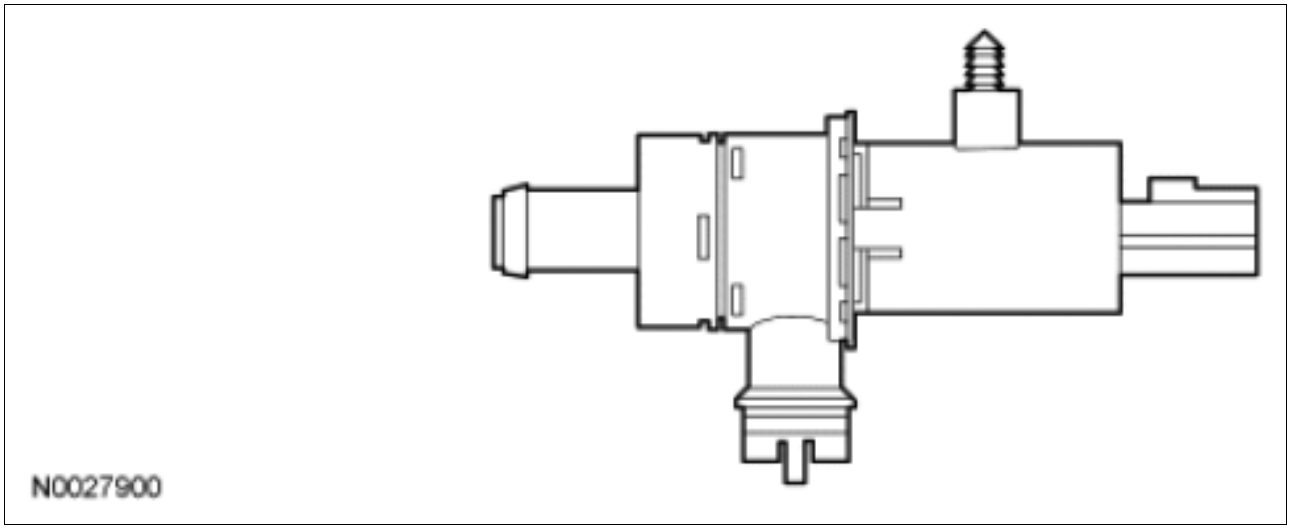


Courtesy of FORD MOTOR CO.

ENGINE CONTROL COMPONENTS > EVAPORATIVE EMISSION (EVAP) CANISTER VENT VALVE

The EVAP canister vent valve (located near the EVAP canister) is part of the enhanced EVAP system controlled by the PCM. During the EVAP leak check monitor, the EVAP canister vent valve seals the EVAP canister from the atmospheric pressure. This allows the EVAP purge valve to achieve the target vacuum in the fuel tank during the EVAP leak check monitor.

Fig 1: Identifying EVAP Canister Vent Valve



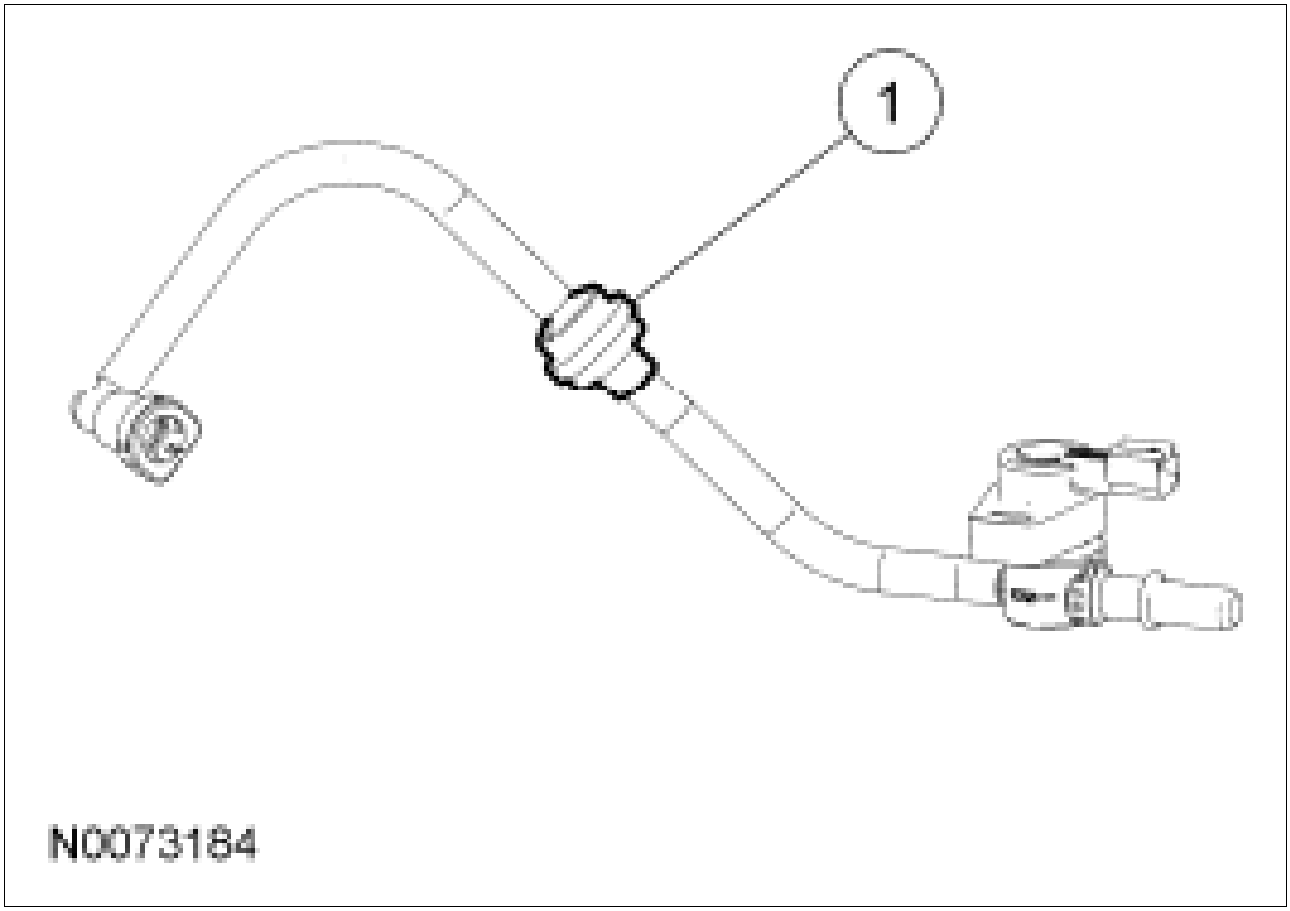
Courtesy of FORD MOTOR CO.

ENGINE CONTROL COMPONENTS > EVAPORATIVE EMISSION (EVAP) CHECK VALVE > EVAP CHECK VALVE

The EVAP check valve is used on turbocharged engines to prevent boost pressure from forcing open the EVAP purge valve and entering the EVAP system. The valve is open under normal engine vacuum. The valve closes during boost conditions to prevent the fuel tank from being pressurized and hydrocarbons forced out of the EVAP system into the atmosphere through the EVAP canister vent valve. When the engine is OFF, or at atmospheric pressure, the EVAP check valve is in an indeterminate state. The EVAP check valve is an integral part of the EVAP purge valve assembly.

ENGINE CONTROL COMPONENTS > EVAPORATIVE EMISSION (EVAP) CHECK VALVE > TYPICAL EVAP CHECK VALVE

Fig 1: Identifying EVAP Check Valve



Courtesy of FORD MOTOR CO.

Item	Number	Description
1	-	EVAP Check Valve

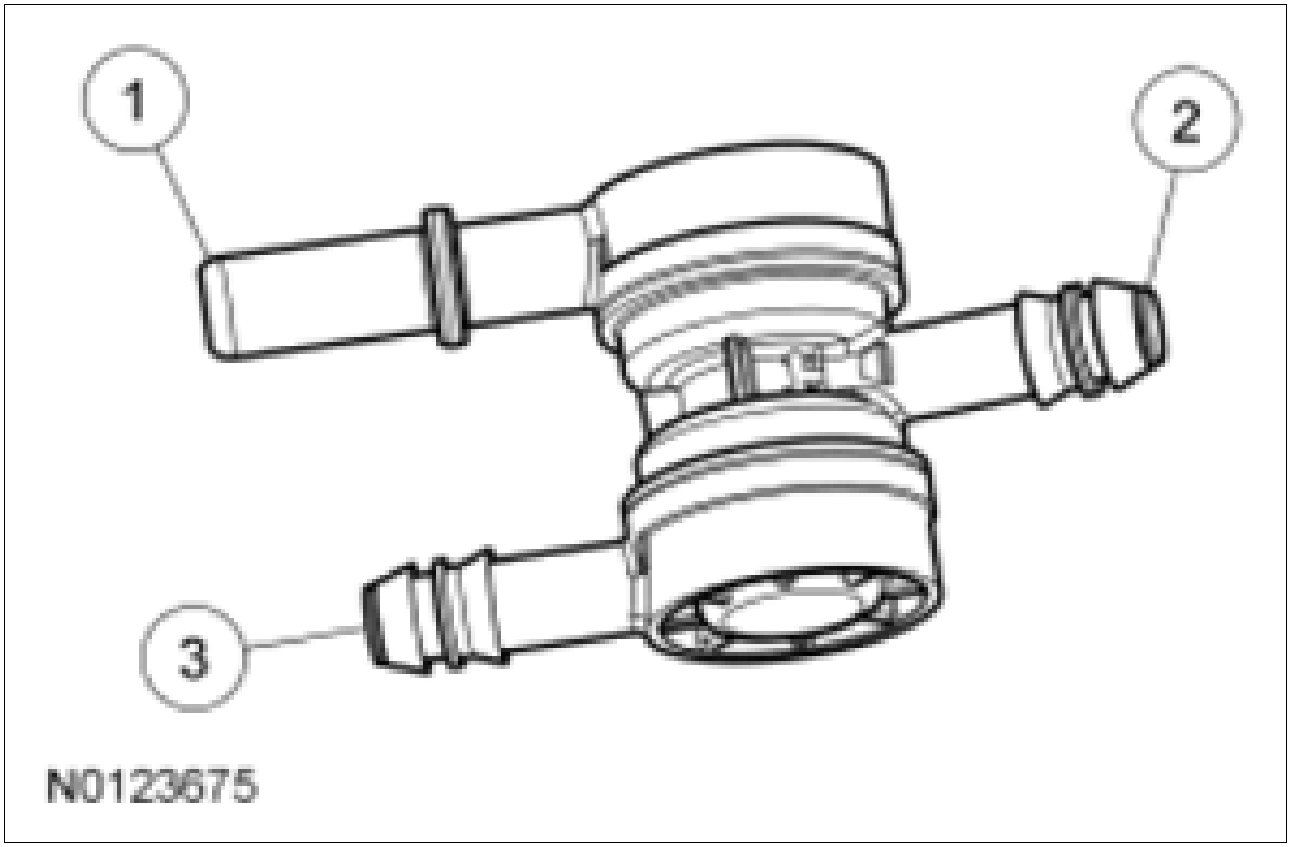
ENGINE CONTROL COMPONENTS > EVAPORATIVE EMISSION (EVAP) CHECK VALVE > EVAP DUAL CHECK VALVE

The EVAP dual check valve allows purge flow during boost conditions. Fuel vapors flow through the EVAP dual check valve to the intake air system upstream of the turbocharger before entering the intake manifold. When the engine is OFF, or at atmospheric pressure, the EVAP dual check valve is in an indeterminate state.

There are 2 types of EVAP dual check valves on turbocharged engines. One type has the check valves integrated in a single housing assembly. The second type has separate check valves connected to a hose assembly with the EVAP ejector integrated with one of the check valves.

ENGINE CONTROL COMPONENTS > EVAPORATIVE EMISSION (EVAP) CHECK VALVE > TYPICAL EVAP DUAL CHECK VALVES

Fig 1: Identifying EVAP Dual Check Valves

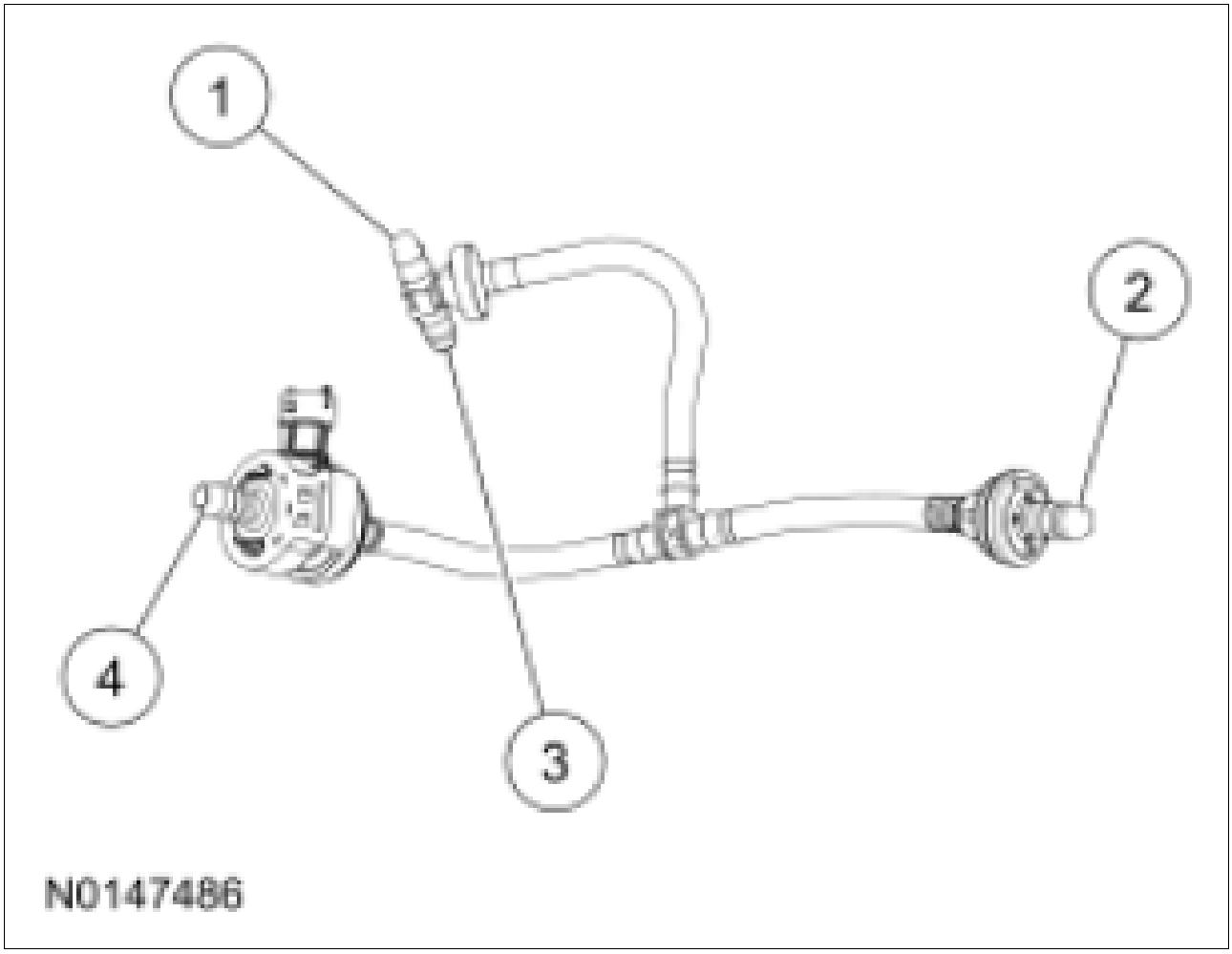


Courtesy of FORD MOTOR CO.

Item	Number	Description
1	-	Purge Flow To The Intake Air Inlet System To The Turbocharger
2	-	Purge Flow From The EVAP Purge Valve
3	-	Purge Flow To The Intake Manifold

ENGINE CONTROL COMPONENTS > EVAPORATIVE EMISSION (EVAP) CHECK VALVE > TYPICAL EVAP DUAL CHECK VALVE ASSEMBLY

Fig 1: Identifying EVAP Dual Check Valve Assembly



Courtesy of FORD MOTOR CO.

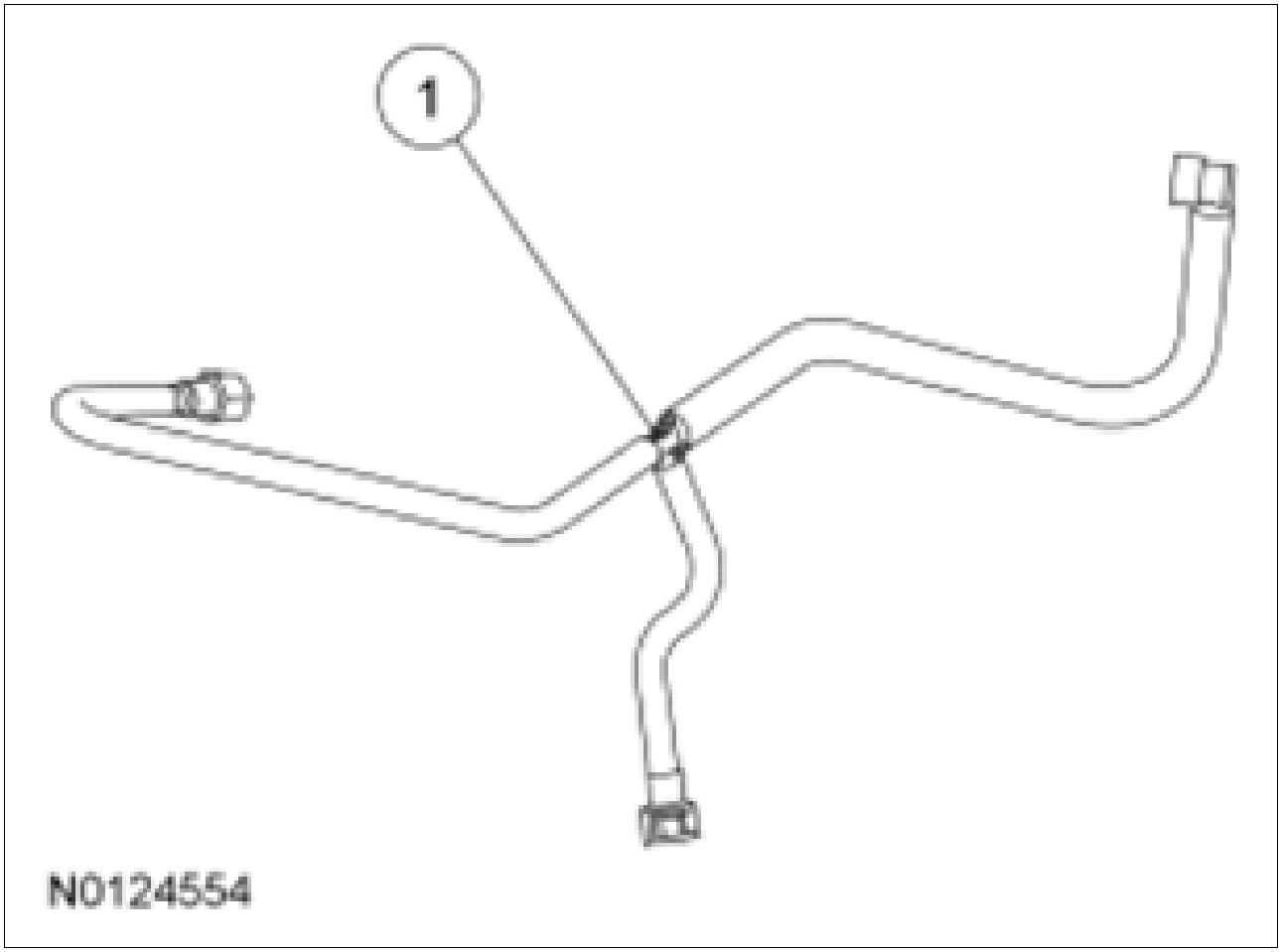
Item	Number	Description
1	-	Purge Flow To The Intake Air Inlet System To The Turbocharger From The Check Valve And EVAP Ejector
2	-	Purge Flow To The Intake Manifold
3	-	Turbocharger Boost Pressure From The Charge Air Cooler (CAC)
4	-	Purge Flow From The Fuel Tank

ENGINE CONTROL COMPONENTS > EVAPORATIVE EMISSION (EVAP) EJECTOR

The EVAP ejector is used on turbocharged engines to create a vacuum in the EVAP purge line from the EVAP purge valve to the intake air system. During boost conditions, boost pressure flows through a venturi inside the EVAP ejector creating a vacuum in the EVAP purge line to the intake air inlet to the turbocharger. When the second EVAP check valve is open, the purge vapor is drawn through the EVAP ejector into the intake air tube, through the turbocharger and charge air cooler, to the intake manifold.

ENGINE CONTROL COMPONENTS > EVAPORATIVE EMISSION (EVAP) EJECTOR > TYPICAL EVAP EJECTOR

Fig 1: Identifying EVAP Ejector



Courtesy of FORD MOTOR CO.

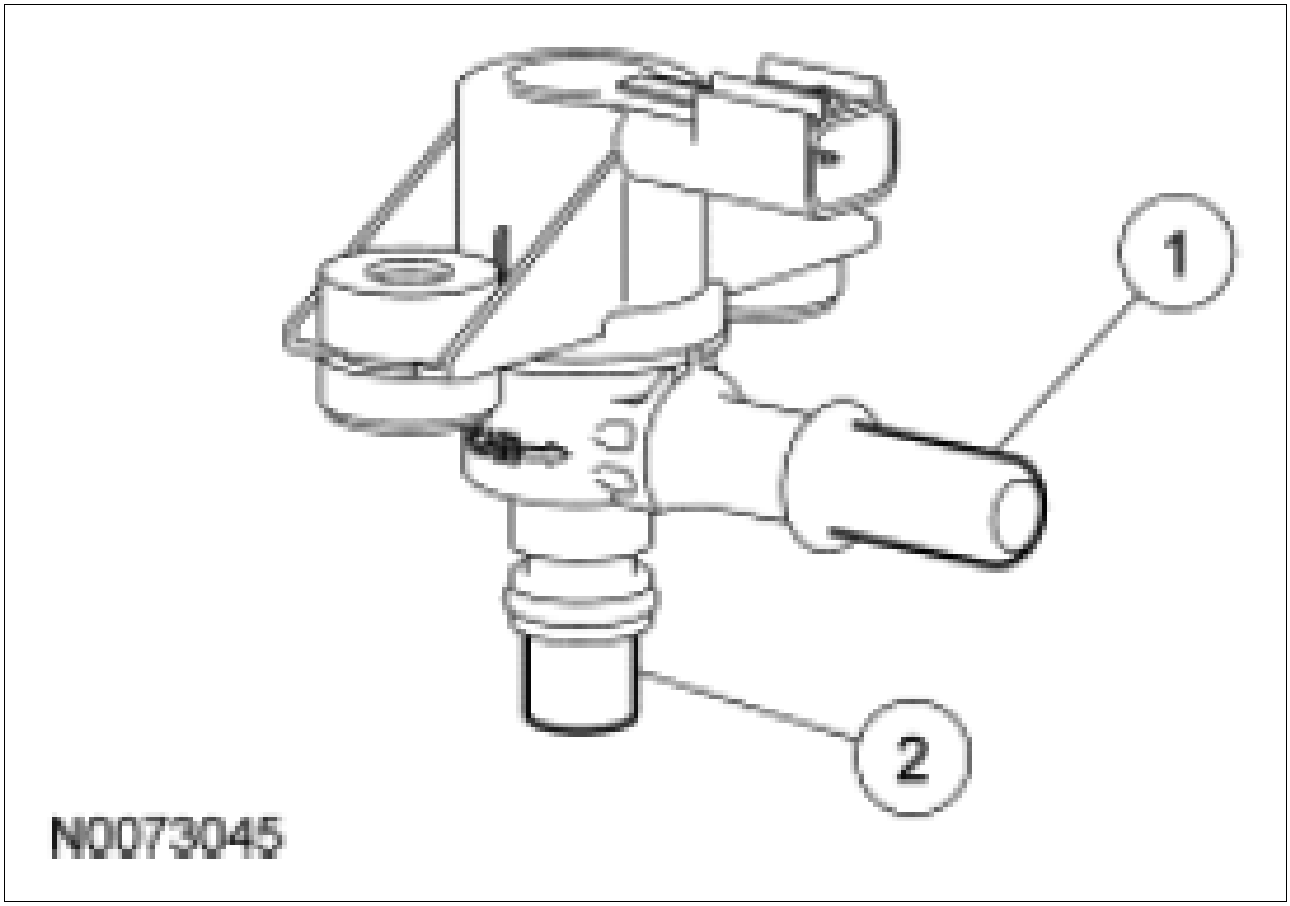
Item	Number	Description
1	-	EVAP Ejector

ENGINE CONTROL COMPONENTS > EVAPORATIVE EMISSION (EVAP) PURGE VALVE

The EVAP purge valve (located near the engine) is part of the enhanced EVAP system controlled by the PCM. This valve controls the flow of vapors (purging) from the EVAP canister to the intake manifold during various engine operating modes. The EVAP purge valve is a normally closed valve. The PCM outputs a duty cycle between 0% and 100% to control the EVAP purge valve.

ENGINE CONTROL COMPONENTS > EVAPORATIVE EMISSION (EVAP) PURGE VALVE > TYPICAL EVAP PURGE VALVE

Fig 1: Identifying EVAP Purge Valve



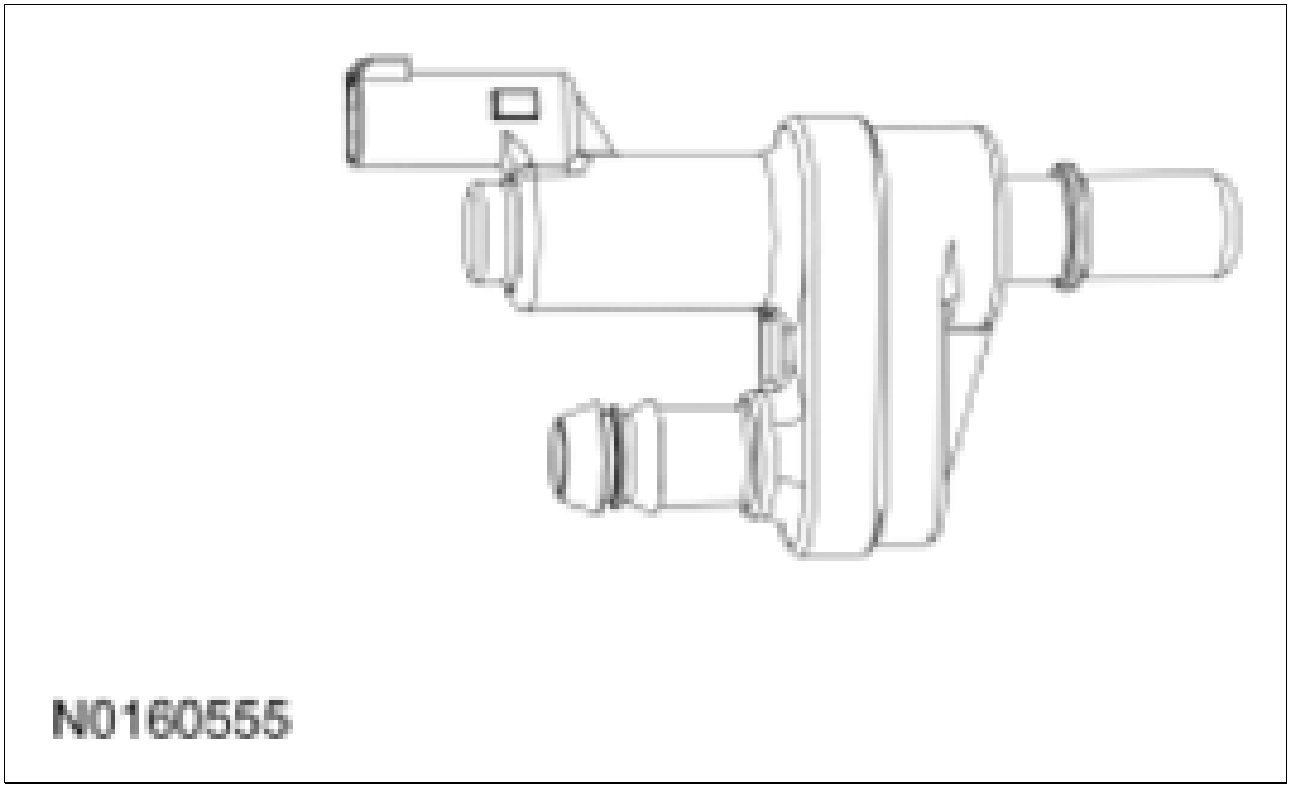
Courtesy of FORD MOTOR CO.

Item	Number	Description
1	-	Fuel Vapor To EVAP Canister
2	-	Fuel Vapor To Intake Manifold

ENGINE CONTROL COMPONENTS > EVAPORATIVE EMISSION (EVAP) VAPOR BLOCKING VALVE

The EVAP vapor blocking valve is a normally open valve, electrically closed by the PCM, to isolate the fuel tank from the rest of the EVAP system. This prevents the canister from becoming saturated causing hydrocarbons (HC) to be released into the atmosphere in a situation where the engine is OFF, and the ignition is ON during a drive cycle. The EVAP vapor blocking valve will automatically open to relieve excess pressure or vacuum, in the fuel tank, if the pressure or vacuum reaches a maximum calibrated value. The EVAP vapor blocking valve is located near the EVAP canister.

Fig 1: Identifying EVAP Vapor Blocking Valve



Courtesy of FORD MOTOR CO.

ENGINE CONTROL COMPONENTS > FAN SPEED SENSOR (FSS)

The FSS is a Hall effect sensor that measures the cooling fan clutch speed by generating a waveform with a frequency proportional to the fan speed. If the cooling fan clutch is moving at a relatively low speed, the sensor produces a signal with a low frequency. As the cooling fan clutch speed increases, the sensor generates a signal with a higher frequency. The PCM uses the frequency signal generated by the FSS as a feedback for closed loop control of the cooling fan clutch. For additional information on the cooling fan clutch, refer to COOLING FAN CLUTCH in this service information.

ENGINE CONTROL COMPONENTS > FUEL INJECTION PUMP

NOTE: Do not apply battery positive (B+) voltage directly to the fuel volume regulator solenoid electrical connector terminals. Internal damage to the solenoid may occur in a matter of seconds.

The engine driven fuel injection pump increases fuel rail pressure to the desired level to support fuel injection requirements. Unlike conventional port fuel injection systems, with direct injection the desired fuel rail pressure ranges widely over operating conditions. The pump receives fuel from the fuel pump (FP) assembly, increases the fuel pressure from approximately 448 kPa (65 psi) to a variable pressure up to 20 MPa (2900 psi), and delivers it to the fuel rails. The fuel injection pump is driven by a dedicated

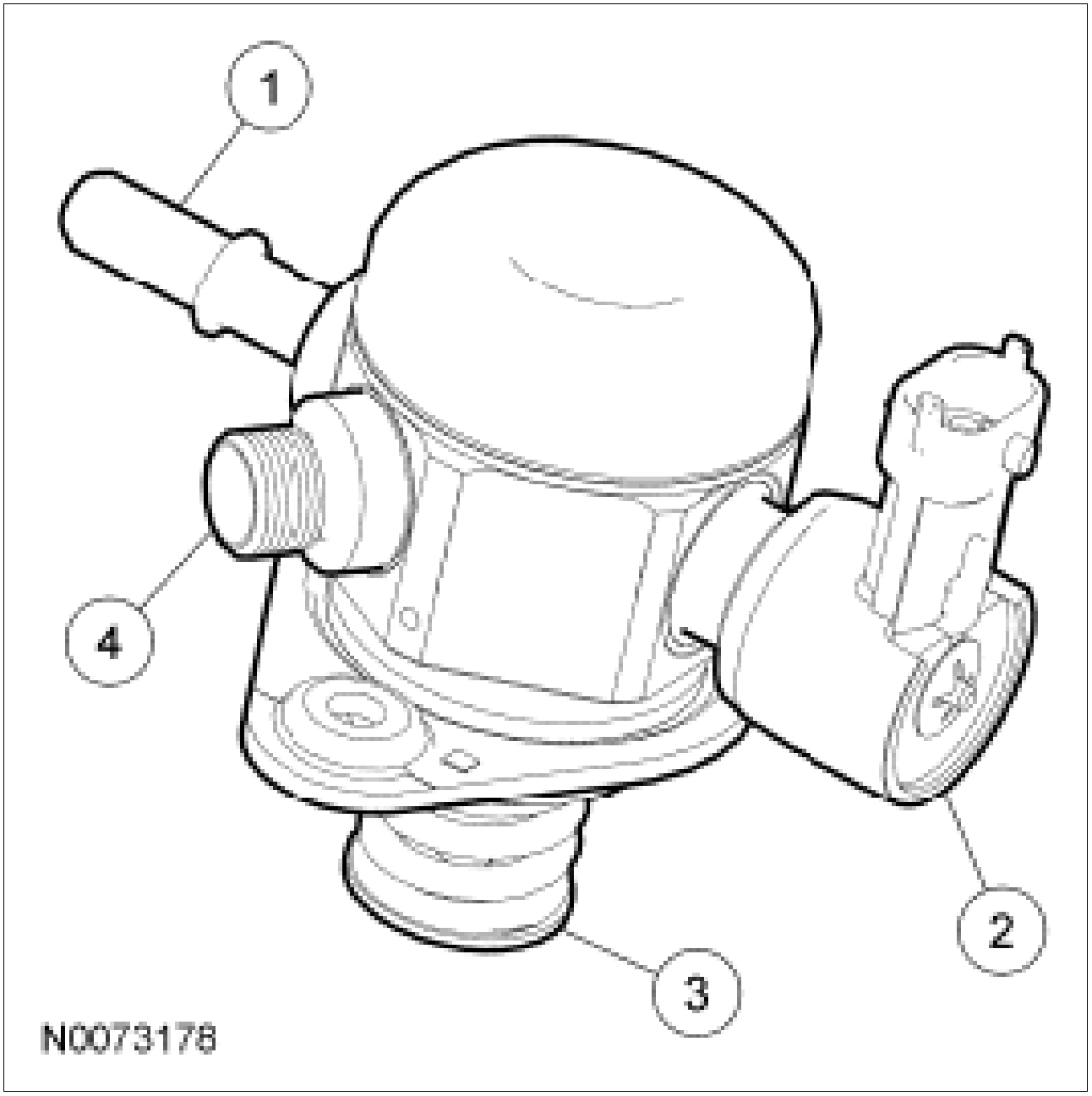
intake camshaft lobe and is located on top of the engine.

The fuel volume regulator is a solenoid valve permanently mounted to the pump assembly. The PCM commands the fuel volume regulator to meter in a specified fuel volume with each pump stroke. The PCM regulates the fuel volume entering the rail to achieve the desired fuel rail pressure.

The fuel volume regulator control is synchronous to the cam position on which the pump is mounted. The fuel volume regulator control takes into account that camshaft phasing varies during engine operation for purposes of valve control.

ENGINE CONTROL COMPONENTS > FUEL INJECTION PUMP > FUEL INJECTION PUMP

Fig 1: Identifying Fuel Injection Pump



Courtesy of FORD MOTOR CO.

Item	Number	Description
1	-	Low Pressure Fuel Inlet
2	-	Fuel Volume Regulator Solenoid
3	-	Pump Piston Follower
4	-	High Pressure Fuel Outlet

ENGINE CONTROL COMPONENTS > FUEL INJECTORS

NOTE: Do not apply battery positive (B+) voltage directly to the fuel injector electrical connector terminals. Internal damage to the solenoid may occur in a matter of seconds.

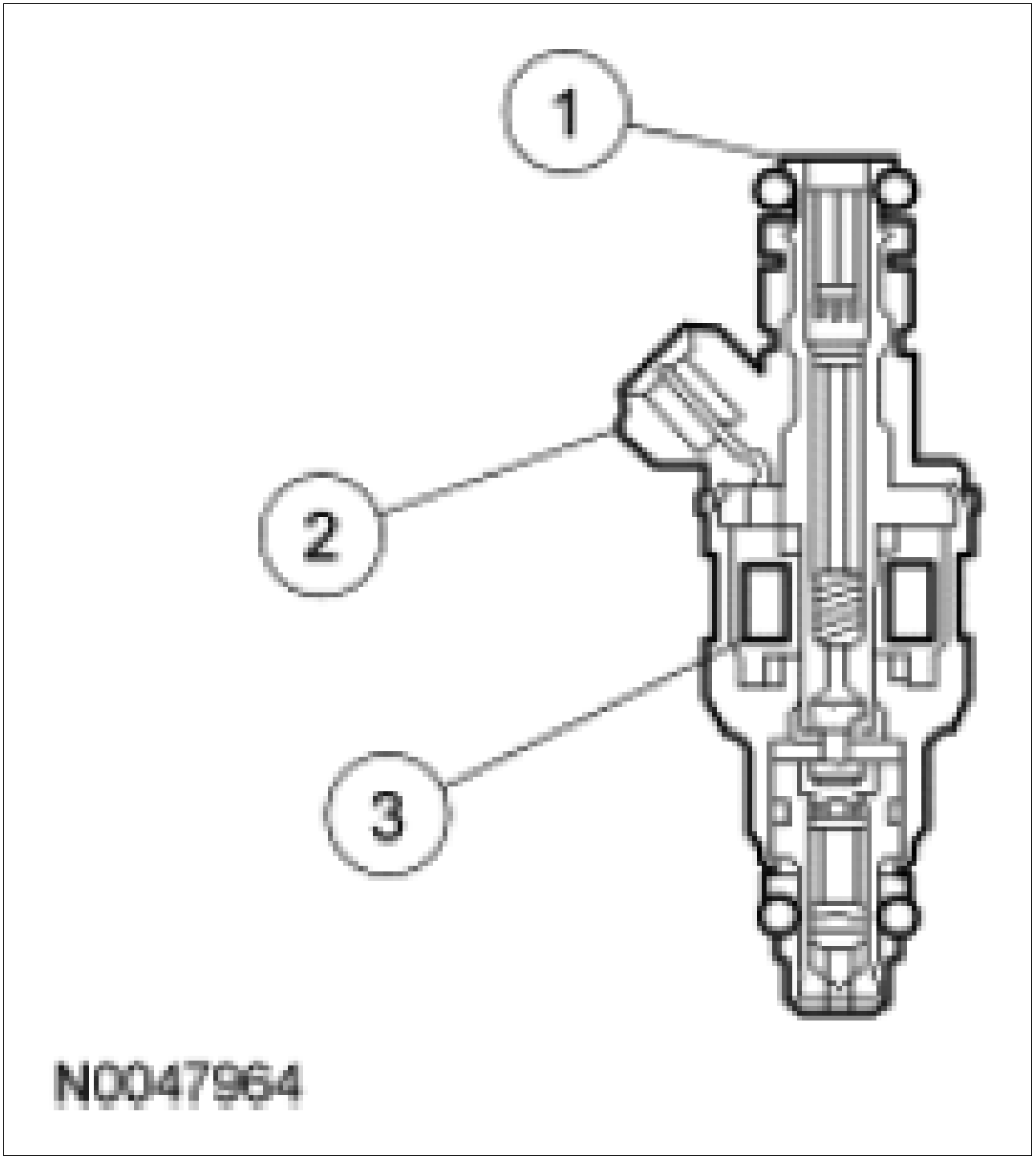
The fuel injector is a solenoid operated valve that meters fuel flow to the engine. The fuel injector opens and closes a constant number of times per crankshaft revolution. The amount of fuel is controlled by the length of time the fuel injector is held open.

The fuel injector is normally closed and is operated by a 12 volt source from either the PCM power relay or fuel pump relay. The ground signal is controlled by the PCM.

The fuel injector is a deposit resistant injector (DRI) type and does not have to be cleaned. Install a new fuel injector if the flow is checked and found to be out of specification.

ENGINE CONTROL COMPONENTS > FUEL INJECTORS > TYPICAL FUEL INJECTOR

Fig 1: Identifying Fuel Injector



Courtesy of FORD MOTOR CO.

Item	Number	Description
1	-	Fuel Filter Screen
2	-	Connector
3	-	Solenoid Coil

ENGINE CONTROL COMPONENTS > FUEL INJECTORS - DIRECT INJECTION

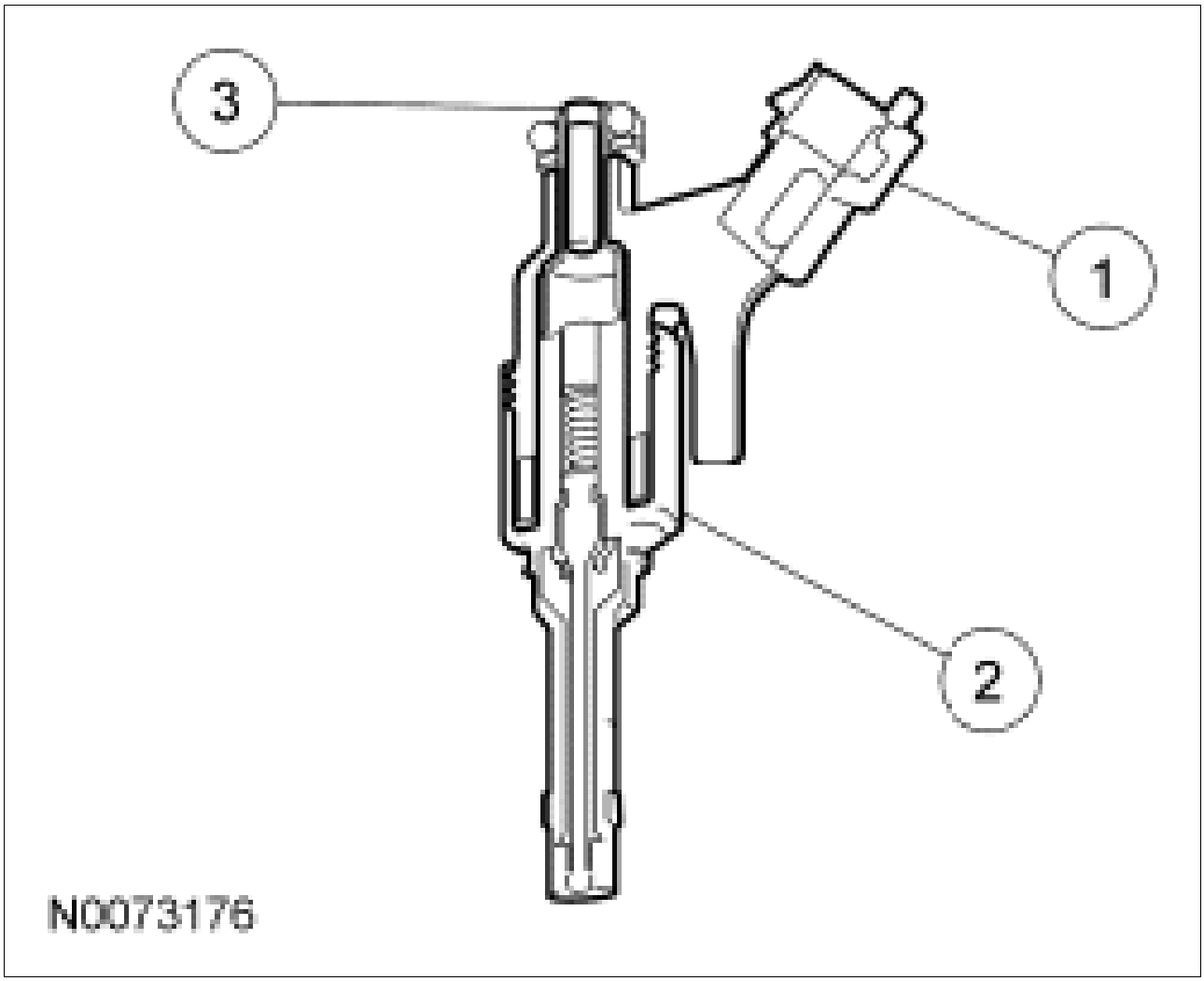
The gasoline direct fuel injection fuel injector delivers fuel directly into the cylinder under high pressure. Each injector is controlled by 2 circuits from the PCM.

A boosted voltage supply, up to 65 volts, is generated in the PCM and used to initially open the injector. The injector driver controls three transistor switches that apply the boost voltage to open the injector and then modulates the current to hold the injector open. If boost voltage is unavailable, the correct injector opening current may not be generated in the time required.

The PCM contains a smart driver that monitors and compares high side and low side injector currents to diagnose numerous concerns. Each fuel injector high side circuit is paired inside the PCM with another fuel injector high side circuit. All injector concerns are reported with a single DTC per injector.

ENGINE CONTROL COMPONENTS > FUEL INJECTORS - DIRECT INJECTION > TYPICAL DIRECT FUEL INJECTION FUEL INJECTOR

Fig 1: Identifying Direct Fuel Injection Fuel Injector



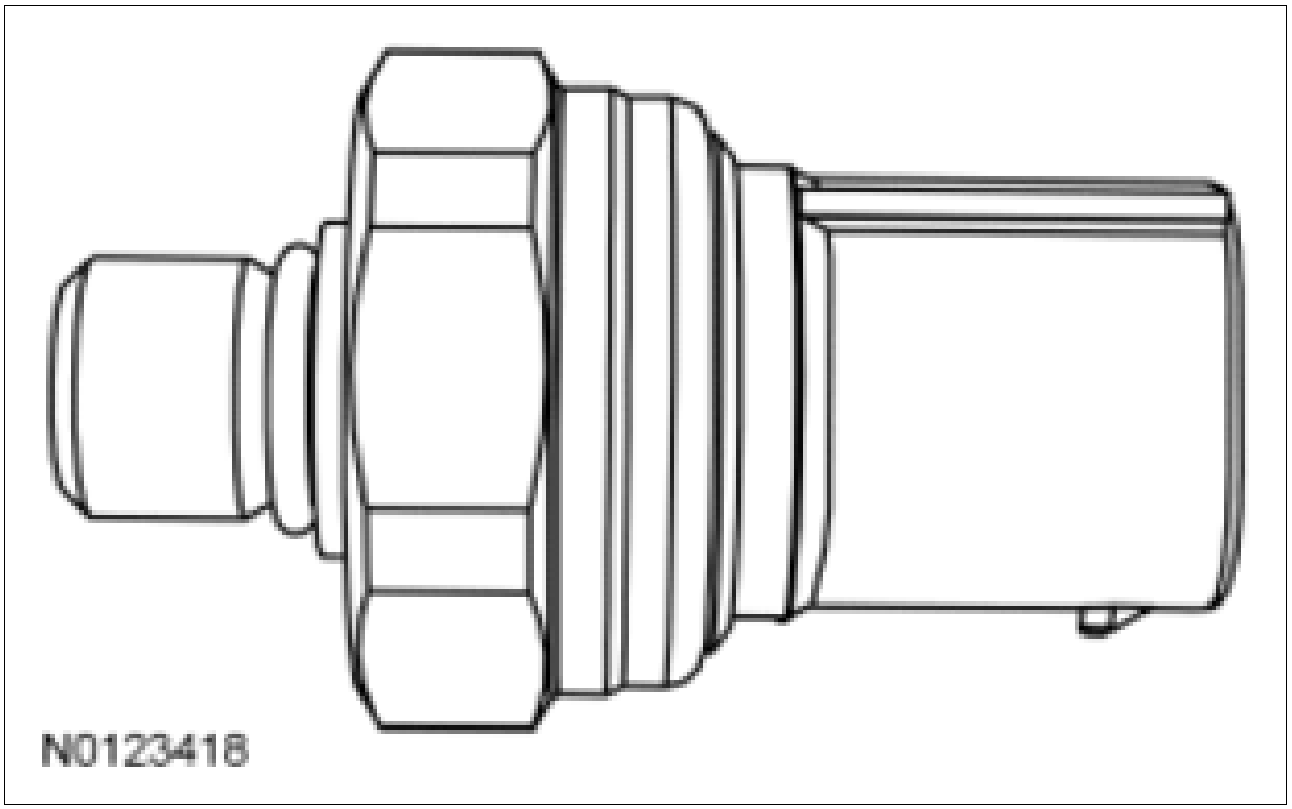
Courtesy of FORD MOTOR CO.

Item	Number	Description
1	-	Connector
2	-	Solenoid Coil
3	-	Fuel Filter Screen

ENGINE CONTROL COMPONENTS > FUEL PRESSURE SENSOR

The fuel pressure sensor (located in the fuel line either near the fuel tank or near the engine) provides a pressure feedback signal for the low pressure fuel system to the PCM. The PCM uses the FLP signal to determine correct operation of the low pressure fuel system.

Fig 1: Identifying Fuel Pressure Sensor

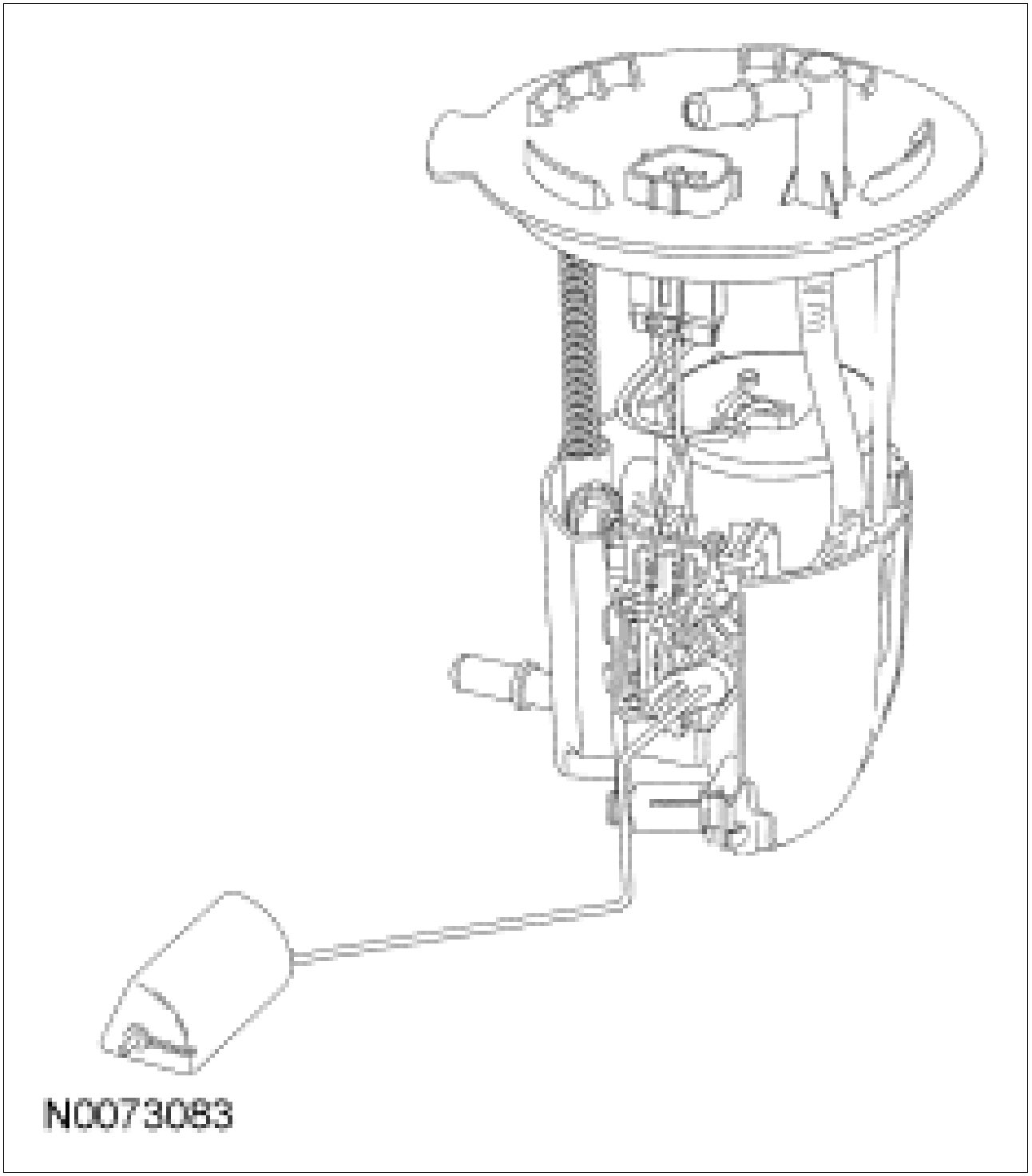


Courtesy of FORD MOTOR CO.

ENGINE CONTROL COMPONENTS > FUEL PUMP (FP) ASSEMBLY

The FP assembly contains the fuel pump and sender assembly. The fuel pump is located inside the FP assembly reservoir and supplies fuel through the FP assembly manifold to the engine and FP assembly jet pump. The jet pump continuously refills the reservoir with fuel, and a check valve located in the manifold outlet maintains system pressure when the fuel pump is not energized. A flapper valve located in the bottom of the reservoir allows fuel to enter the reservoir and prime the fuel pump during the initial fill.

Fig 1: Identifying Mechanical Returnless FP Assembly



Courtesy of FORD MOTOR CO.

ENGINE CONTROL COMPONENTS > FUEL PUMP (FP) ASSEMBLY AND RESERVOIR

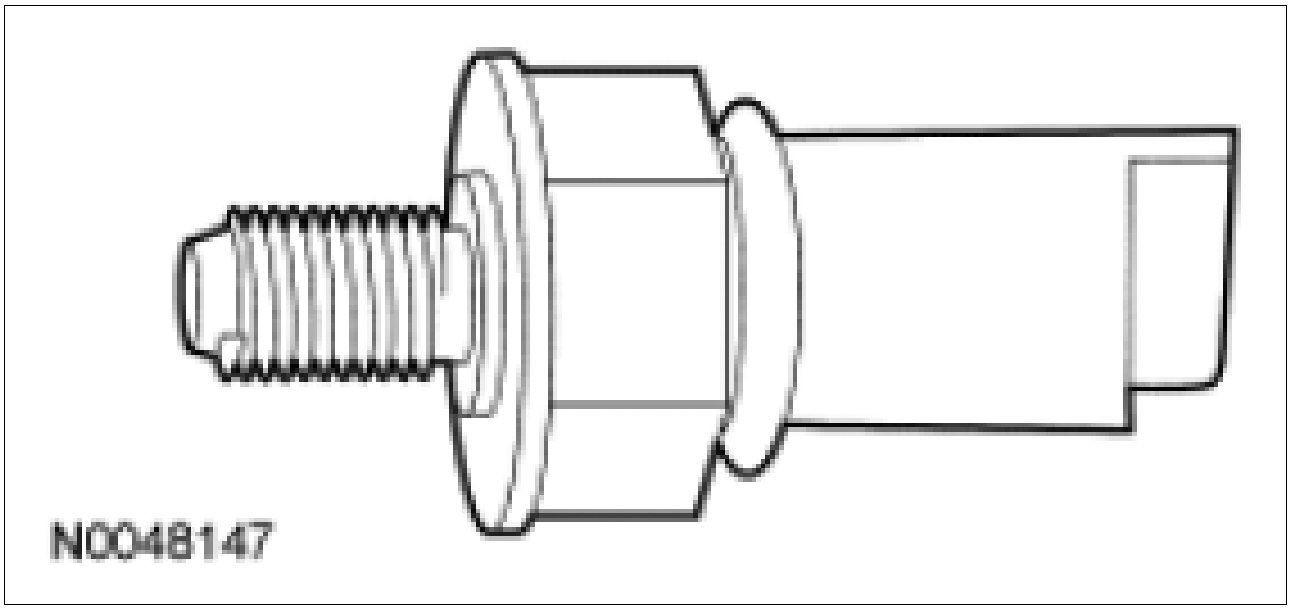
The FP assembly is mounted inside the fuel tank in a reservoir. The pump has a discharge check valve that maintains the system pressure after the ignition has been turned OFF to minimize starting concerns. The reservoir prevents fuel flow interruptions during extreme vehicle maneuvers with low tank fill levels.

ENGINE CONTROL COMPONENTS > FUEL RAIL PRESSURE (FRP) SENSOR

The FRP sensor is a diaphragm strain gauge device. The FRP sensor measures the pressure difference between the fuel rail and atmospheric pressure. The FRP sensor nominal output varies between 0.5 and 4.5 volts, with 0.5 volts corresponding to 0 MPa (0 psi) gauge and 4.5 volts corresponding to 26 MPa (3771 psi) gauge. The sensor can read vacuum and may lower the output voltage to slightly below 0.5 volts. This condition is normal and is usually the case after several hours of cold soak before the vehicle dome light is turned ON. The FP assembly is energized at the same time the dome light is commanded ON. A disabled or malfunctioning dome light does not affect the FP assembly control.

The FRP sensor is located on the fuel rail and provides a feedback signal to indicate the fuel rail pressure to the PCM. The PCM uses the FRP signal to command the correct injector timing and pulse width for correct fuel delivery at all speed and load conditions. The FRP sensor, along with the fuel volume regulator (part of the fuel injection pump), form a closed loop fuel pressure control system. An electrically faulted FRP sensor results in the deactivation of the fuel injection pump. Fuel pressure to injectors is then provided only by the FP assembly. When the fuel injection pump is de-energized and the injectors are active, the fuel rail pressure is approximately 70 kPa (10 psi) lower than FP assembly pressure due to the pressure drop across the fuel injection pump. Thus, if the FP assembly pressure is 448 kPa (65 psi), then the fuel rail pressure would be approximately 379 kPa (55 psi) if the injectors are active.

Fig 1: Identifying Fuel Rail Pressure (FRP) Sensor

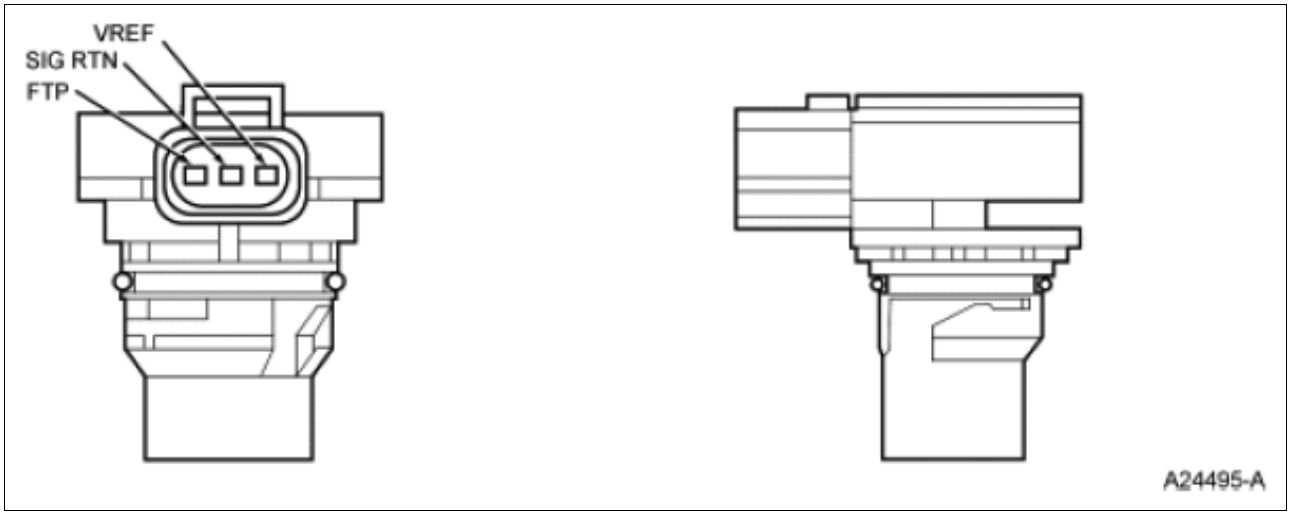


Courtesy of FORD MOTOR CO.

ENGINE CONTROL COMPONENTS > FUEL TANK PRESSURE (FTP) SENSOR

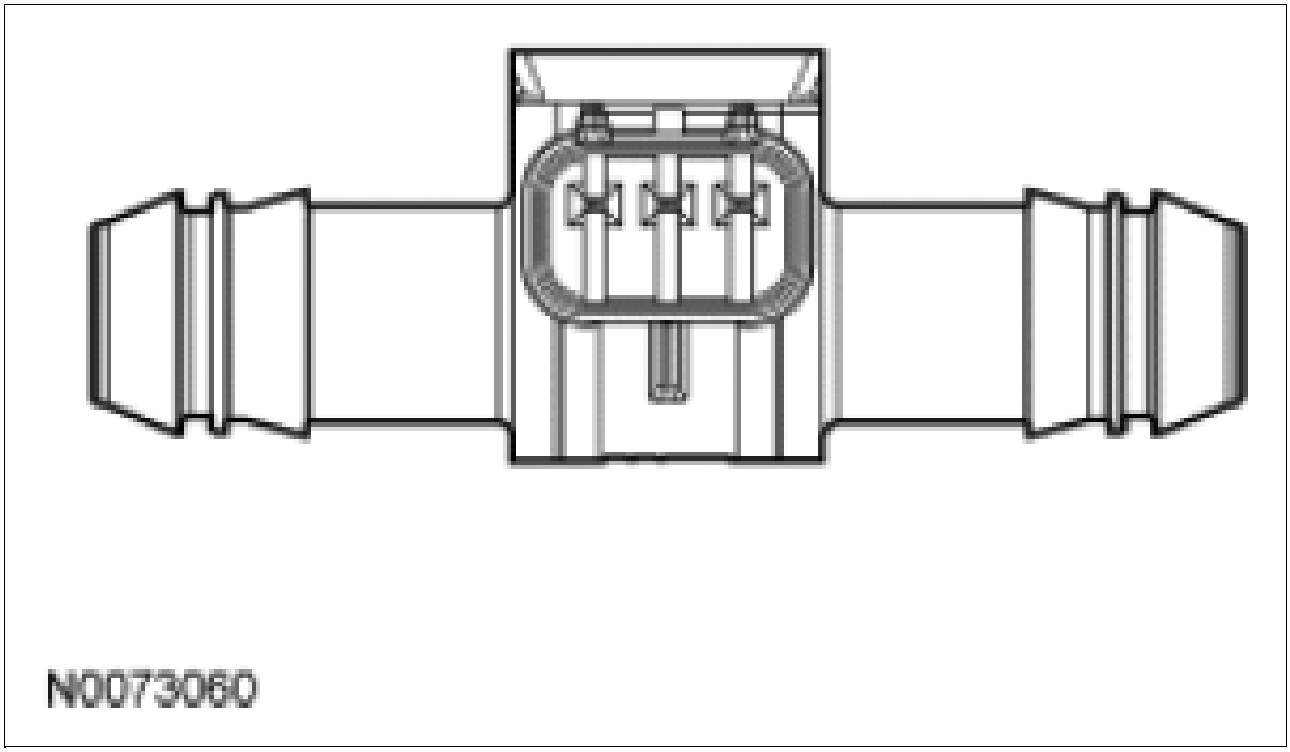
The in tank FTP sensor or the inline FTP sensor measures the fuel tank pressure.

Fig 1: Identifying Tank FTP Sensor



Courtesy of FORD MOTOR CO.

Fig 2: Identifying Inline FTP Sensor



Courtesy of FORD MOTOR CO.

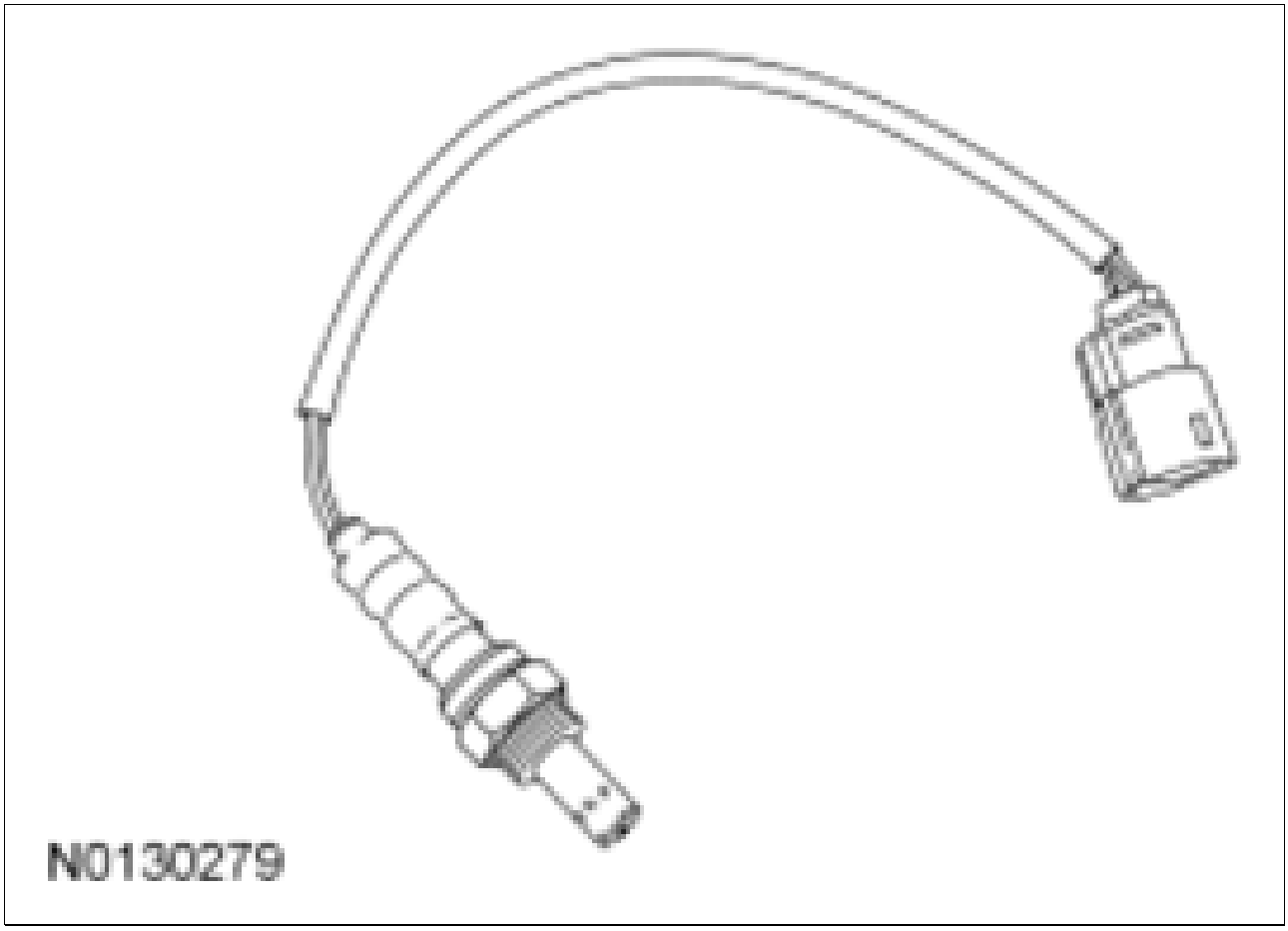
ENGINE CONTROL COMPONENTS > HEATED OXYGEN SENSOR (HO2S)

The HO2S detects the presence of oxygen in the exhaust and produces a variable voltage according to the amount of oxygen detected. A high concentration of oxygen (lean air to fuel ratio) in the exhaust produces a voltage signal less than 0.4 volt. A low concentration of oxygen (rich air to fuel ratio) produces a voltage signal greater than 0.6 volt. The HO2S provides feedback to the PCM indicating air

to fuel ratio in order to achieve a near stoichiometric air to fuel ratio of 14.7:1 during closed loop engine operation. The HO2S generates a voltage between 0.0 and 1.1 volts.

The HO2S heater is embedded with the sensing element. The heating element heats the sensor to a temperature of 800°C (1, 472°F). At approximately 300°C (572°F) the engine enters closed loop operation. The VPWR circuit supplies voltage to the heater. The PCM turns the heater ON by providing the ground when the correct conditions occur. The heater allows the engine to enter closed loop operation sooner. The use of this heater requires the HO2S heater control to be duty cycled, to prevent damage to the heater.

Fig 1: Identifying Heated Oxygen Sensor (HO2S)



Courtesy of FORD MOTOR CO.

ENGINE CONTROL COMPONENTS > INERTIA FUEL SHUTOFF (IFS) SWITCH

The IFS switch is used in conjunction with the electric fuel pump. The IFS switch shuts off the fuel pump if a collision occurs. It consists of an inverted pendulum mass that is retained in a conical cone through a set of linear springs. When a sharp impact occurs, the pendulum shifts out of the conical cone, opens the circuit and shuts off the electric fuel pump. Once the switch is open, it must be manually reset before restarting the vehicle.

Fig 1: Identifying IFS Switch



Courtesy of FORD MOTOR CO.

ENGINE CONTROL COMPONENTS > INTAKE AIR TEMPERATURE (IAT) SENSOR

The IAT sensor is a thermistor device in which resistance changes with temperature. The resistance of a thermistor decreases as the temperature increases, and the resistance increases as the temperature decreases. The varying resistance affects the voltage drop across the sensor terminals and provides electrical signals to the PCM corresponding to temperature.

Thermistor-type sensors are considered passive sensors. A passive sensor is connected to a voltage divider network so that varying the resistance of the passive sensor causes a variation in total current flow. Voltage that is dropped across a fixed resistor in a series with the sensor resistor determines the voltage signal at the PCM. This voltage signal is equal to the reference voltage minus the voltage drop across the fixed resistor.

The IAT sensor provides air temperature information to the PCM. The PCM uses the air temperature information as a correction factor in the calculation of fuel, spark, and airflow.

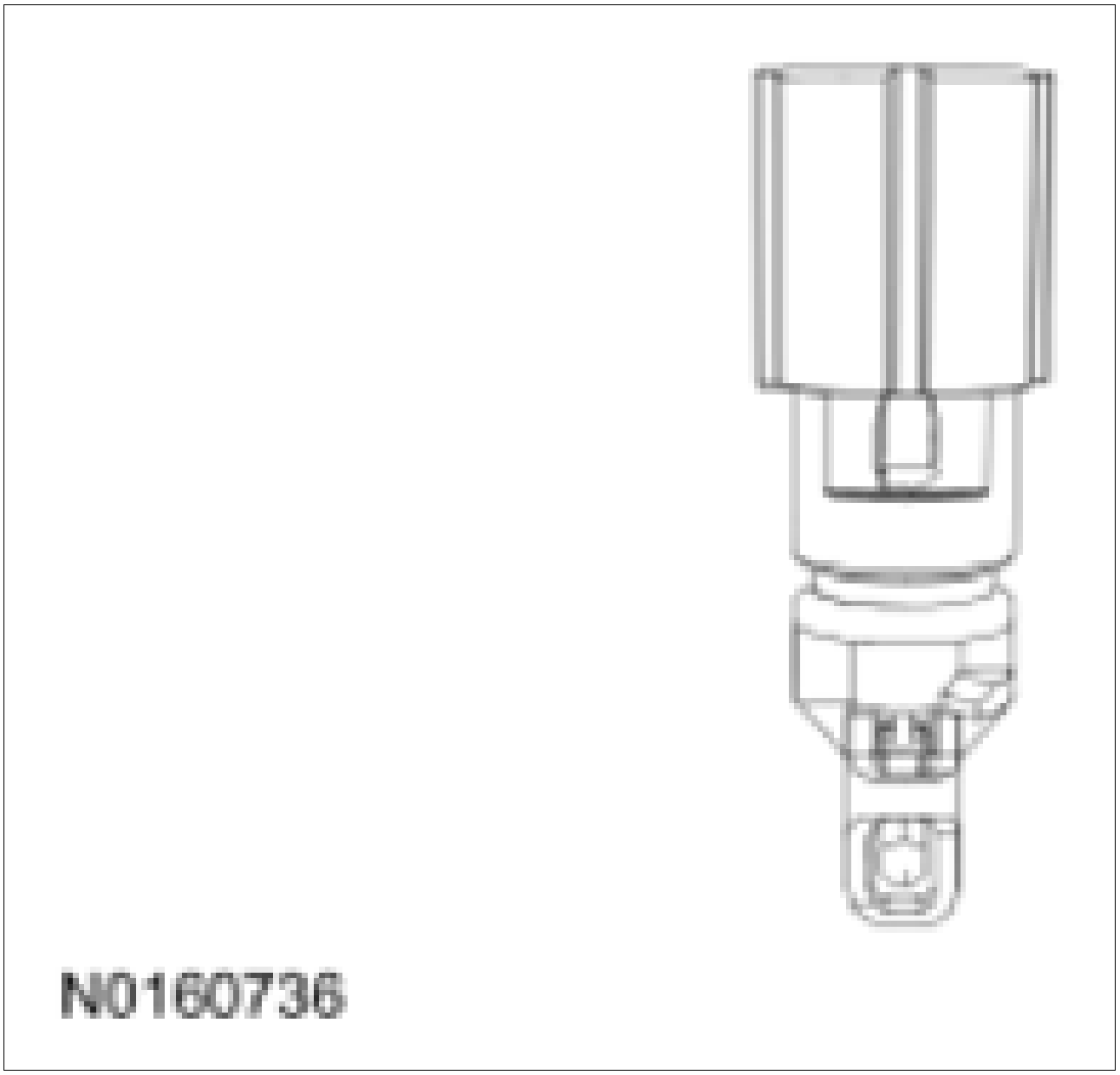
The IAT sensor provides a quicker temperature change response time than the ECT or CHT sensor.

Currently there are 2 types of IAT sensors used, a stand alone and an integrated type. Both types function the same, however the integrated type is incorporated into the mass airflow (MAF) sensor or the turbocharger intake pressure and temperature (TCIPT) sensor instead of being a stand alone sensor.

The IAT2 sensor is centrally located on the intake manifold and is used to measure the intake manifold

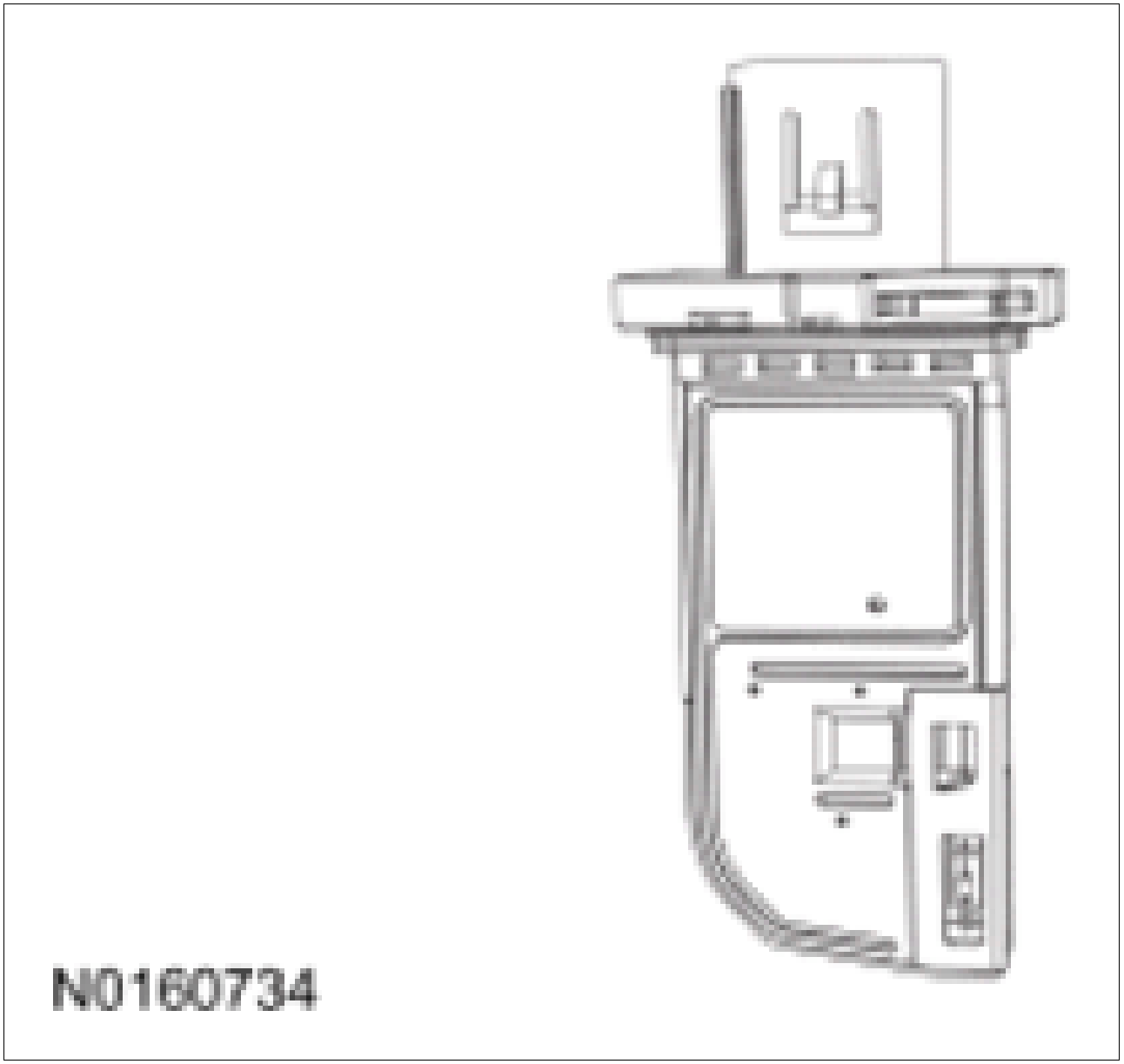
temperature. The PCM uses this information to determine the air charge and provide input for various engine control functions. The IAT2 sensor is integrated with the manifold absolute pressure (MAP) sensor.

Fig 1: Identifying Stand Alone IAT Sensor



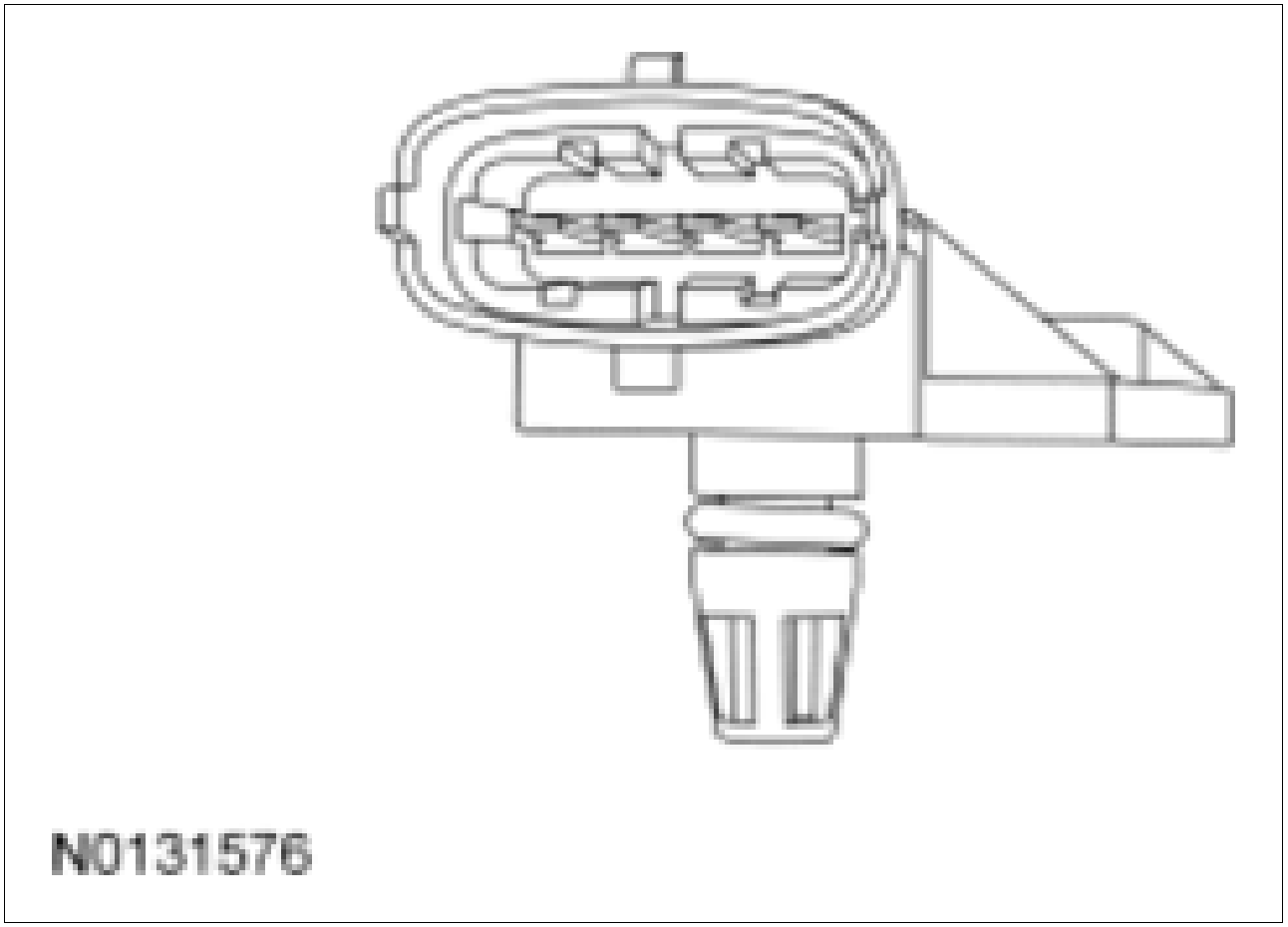
Courtesy of FORD MOTOR CO.

Fig 2: Identifying IAT Sensor Integrated With MAF Sensor



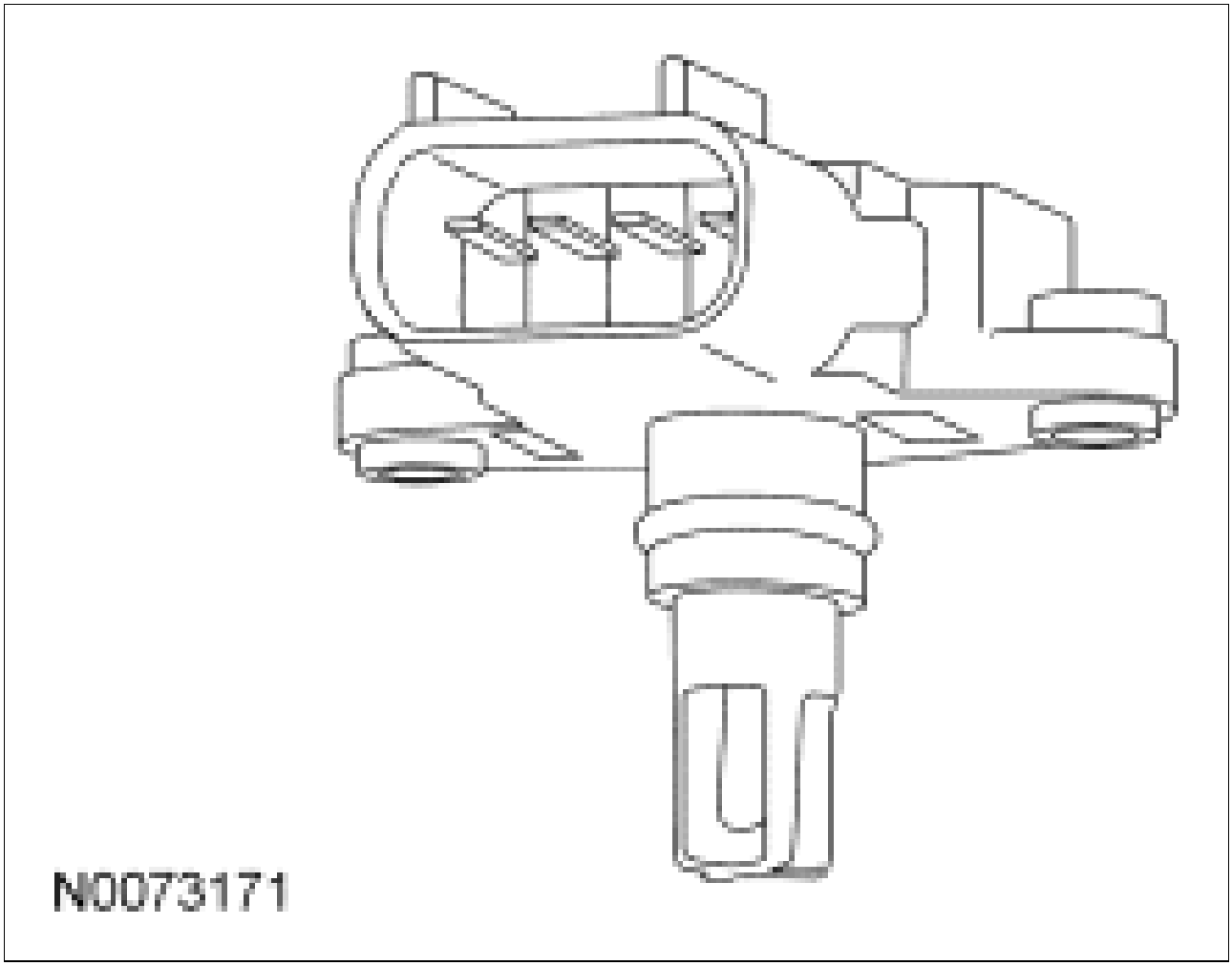
Courtesy of FORD MOTOR CO.

Fig 3: Identifying IAT Sensor Integrated With TCIPT Sensor



Courtesy of FORD MOTOR CO.

Fig 4: Identifying IAT2 Sensor Integrated With MAP Sensor



Courtesy of FORD MOTOR CO.

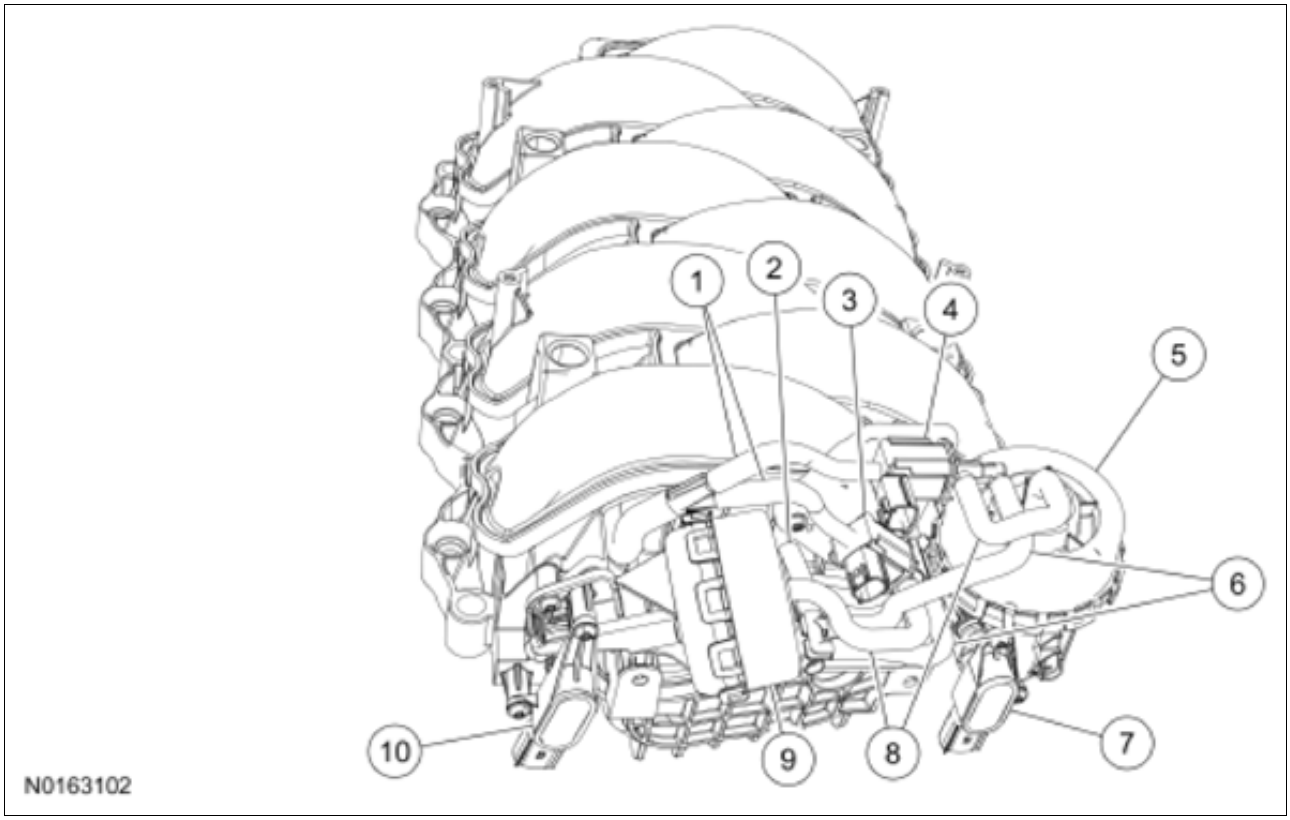
ENGINE CONTROL COMPONENTS > INTAKE MANIFOLD RUNNER CONTROL (IMRC)

WARNING: SUBSTANTIAL OPENING AND CLOSING TORQUE IS APPLIED BY THIS SYSTEM. TO PREVENT INJURY, BE CAREFUL TO KEEP FINGERS AWAY FROM LEVER MECHANISMS WHEN ACTUATED. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN PERSONAL INJURY.

The IMRC is a vacuum actuated system with a PCM controlled electric solenoid and manifold mounted vacuum actuators for bank 1 and bank 2. The IMRC solenoid controls each vacuum actuator to activate a shutter device attached to the actuator shaft. There is an intake manifold runner control sensor mounted to each actuator shaft to provide the shutter position to the PCM.

The IMRC shutters are in the closed position below 3, 000 RPM to create air flow turbulence for better charge mixing in the cylinder. The IMRC shutters are in the open position above 3, 000 RPM to reduce air flow restriction.

Fig 1: Identifying Intake Manifold Runner Control (IMRC)



Courtesy of FORD MOTOR CO.

Intake Air System	Component
1	Vent Lines To The Intake Air Tube
2	Manifold Vacuum Supply Port
3	Intake Manifold Runner Control Bank 2 (IMRC2) Solenoid
4	Intake Manifold Runner Control Bank 1 (IMRC1) Solenoid
5	Vacuum Actuator Bank 1
6	Manifold Vacuum Supply Lines
7	Intake Manifold Runner Control Bank 1 (IMRC1) Sensor
8	Vacuum Lines From IMRC Solenoid To Vacuum Actuator
9	Vacuum Actuator Bank 2
10	Intake Manifold Runner Control Bank 2 (IMRC2) Sensor

ENGINE CONTROL COMPONENTS > INTAKE MANIFOLD TUNING VALVE (IMTV)

WARNING: SUBSTANTIAL OPENING AND CLOSING TORQUE IS APPLIED BY THIS

SYSTEM. TO PREVENT INJURY, BE CAREFUL TO KEEP FINGERS AWAY FROM LEVER MECHANISMS WHEN ACTUATED. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN PERSONAL INJURY.

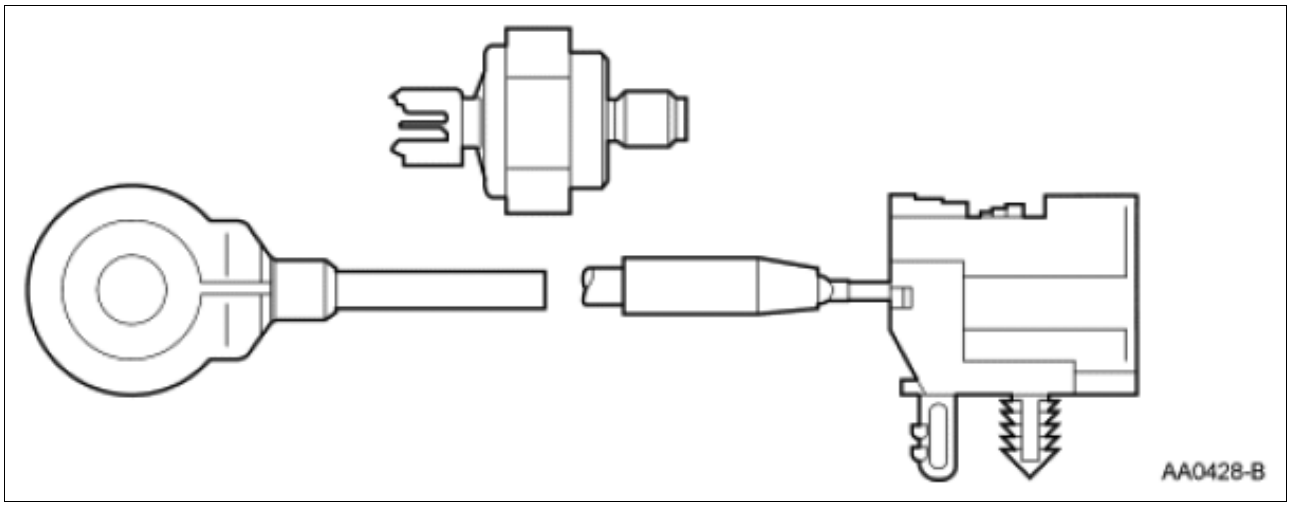
The IMTV is a motorized actuated unit mounted directly to the intake manifold. The IMTV actuator controls a shutter device attached to the actuator shaft. There is no monitor input to the PCM with this system to indicate shutter position.

The motorized IMTV unit is not energized below a calibrated RPM. The shutter is in the closed position to prevent airflow blend from occurring in the intake manifold. The motorized unit is energized above a calibrated RPM. The motorized unit is commanded ON by the PCM initially at a 100 percent duty cycle to move the shutter to the open position, and then falling to approximately 50 percent to continue to hold the shutter open.

ENGINE CONTROL COMPONENTS > KNOCK SENSOR (KS)

The KS is a tuned accelerometer on the engine which converts engine vibration to an electrical signal. The PCM uses this signal to determine the presence of engine knock and to retard spark timing.

Fig 1: Identifying Knock Sensor (KS)

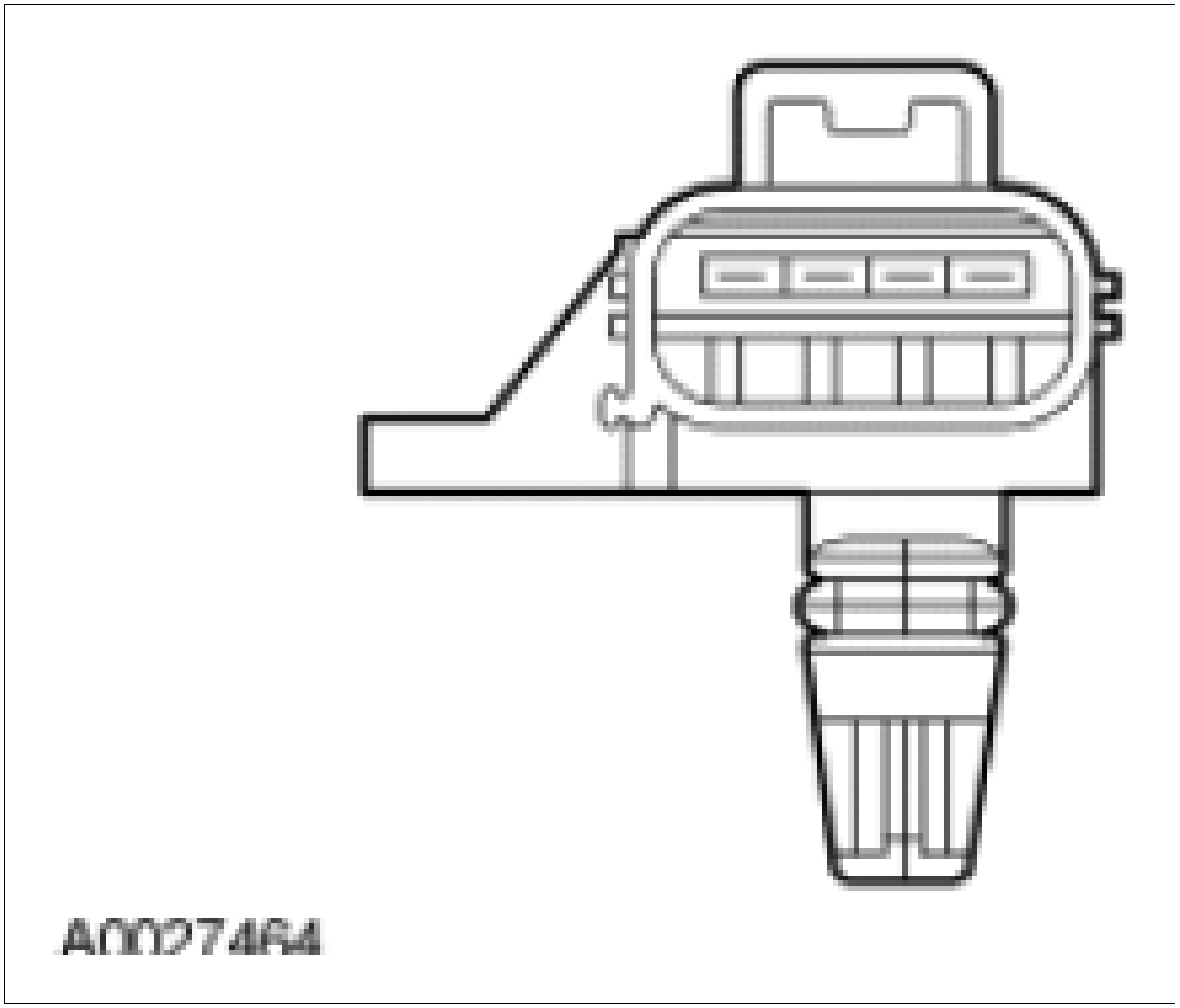


Courtesy of FORD MOTOR CO.

ENGINE CONTROL COMPONENTS > MANIFOLD ABSOLUTE PRESSURE (MAP) SENSOR

The MAP sensor is located on the intake manifold and measures the intake manifold pressure. The PCM uses this information to determine the air charge and to provide the input for various engine control functions. The MAP sensor may be integrated with an intake air temperature (IAT) sensor.

Fig 1: Identifying MAP Sensor

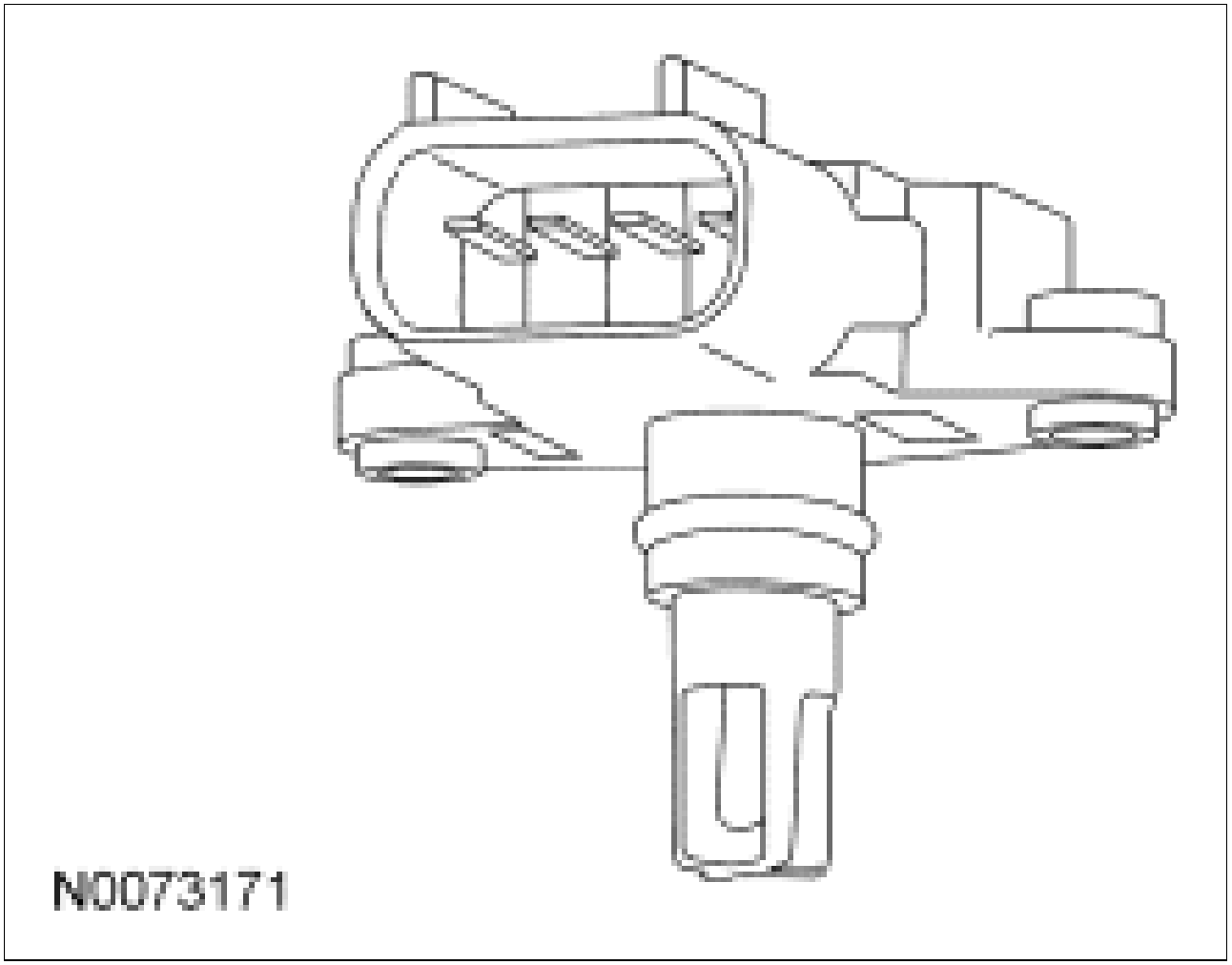


Courtesy of FORD MOTOR CO.

ENGINE CONTROL COMPONENTS > MANIFOLD ABSOLUTE PRESSURE TEMPERATURE (MAPT) SENSOR

The MAPT sensor is located on the intake manifold and may be integrated with an intake air temperature (IAT) sensor or a charge air cooler temperature (CACT) sensor.

Fig 1: Identifying MAPT Sensor



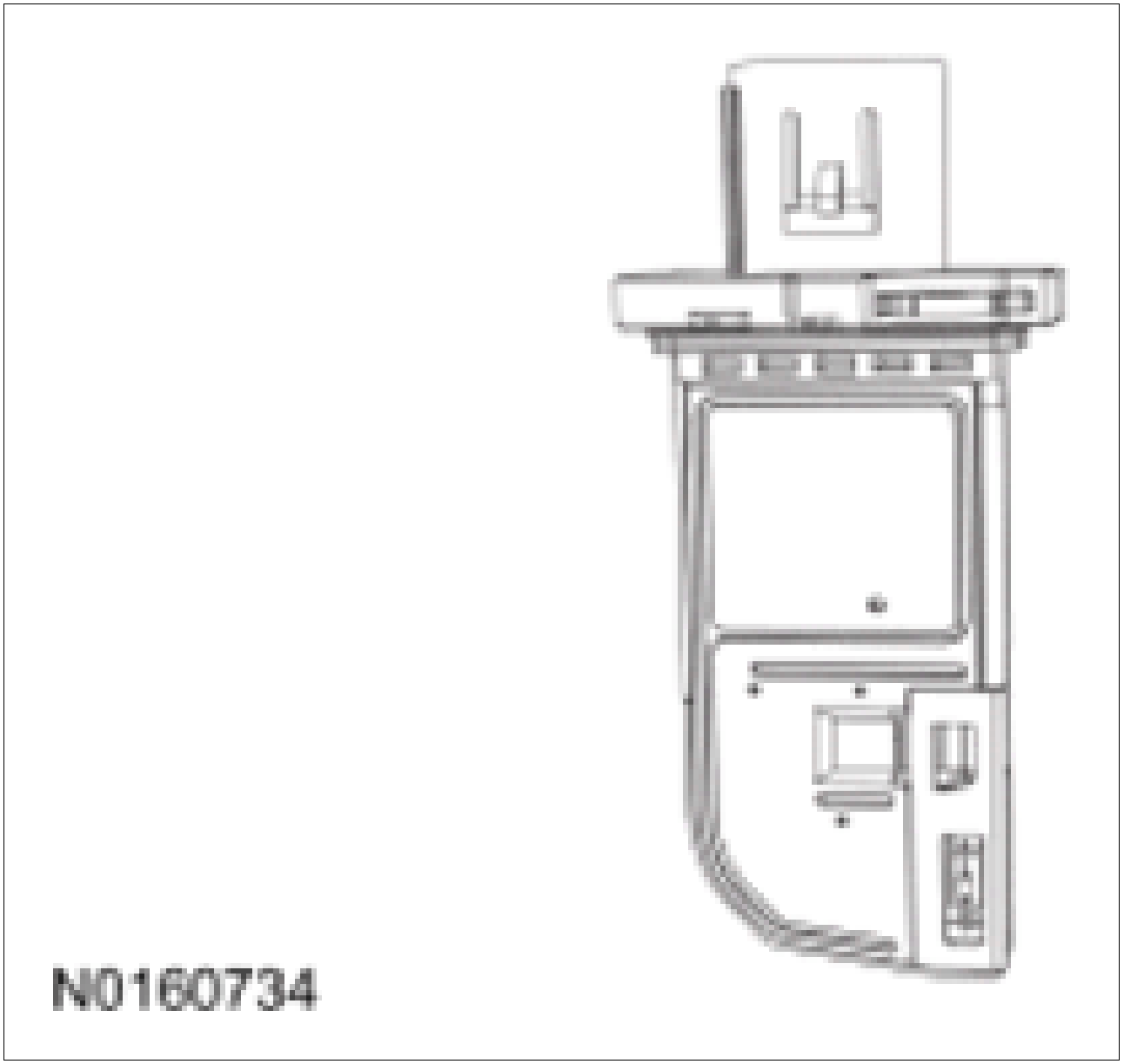
Courtesy of FORD MOTOR CO.

ENGINE CONTROL COMPONENTS > MASS AIRFLOW (MAF) SENSOR

The MAF sensor uses a hot wire sensing element to measure the amount of air entering the engine. Air passing over the hot wire causes it to cool. This hot wire is maintained at 200°C (392°F) above the ambient temperature as measured by a constant cold wire. The current required to maintain the temperature of the hot wire is proportional to the mass airflow. The MAF sensor then outputs a signal to the PCM proportional to the intake air mass. The PCM calculates the required fuel injector pulse width in order to provide the desired air to fuel ratio. This input is also used in determining transmission electronic pressure control (EPC), shift, and torque converter clutch (TCC) scheduling.

The MAF sensor is located near the air cleaner assembly. Most MAF sensors have an integrated IAT sensor.

Fig 1: Identifying MAF Sensor



Courtesy of FORD MOTOR CO.

ENGINE CONTROL COMPONENTS > OUTPUT SHAFT SPEED (OSS) SENSOR

The OSS sensor provides the PCM with the source of vehicle speed. The sensor may be physically located in different places on the vehicle, depending upon the specific application. The design of each speed sensor is unique and depends on which powertrain control feature uses the information that is generated.

ENGINE CONTROL COMPONENTS > POWER TAKE OFF (PTO) SWITCH AND CIRCUITS

The PTO circuit is used by the PCM to disable some of the OBD monitors during PTO operation. The PTO switch is normally open. When the PTO unit is activated, the PTO switch is closed and battery voltage is supplied to the PTO input circuit. This indicates to the PCM that an additional load is being applied to the engine. The PTO indicator lamp illuminates when the PTO system is functioning correctly and flashes when the PTO system is damaged.

When the PTO unit is activated, the PCM disables some OBD monitors which may not function reliably during PTO operation. Without the PTO circuit information to the PCM, false DTCs may be set during PTO operation. Prior to an inspection/maintenance (I/M) test, operate the vehicle with the PTO disengaged long enough to successfully complete the OBD monitors.

ENGINE CONTROL COMPONENTS > POWER TAKE OFF (PTO) SWITCH AND CIRCUITS > PTO CIRCUITS DESCRIPTION

The 3 PTO input circuits are PTO mode, PTO engage, and PTO RPM.

The PTO engage circuit is used when the operator is requesting the PCM to check the needed inputs required to initiate the PTO engagement.

The PTO RPM circuit is used when the operator is requesting additional engine RPM for PTO operation.

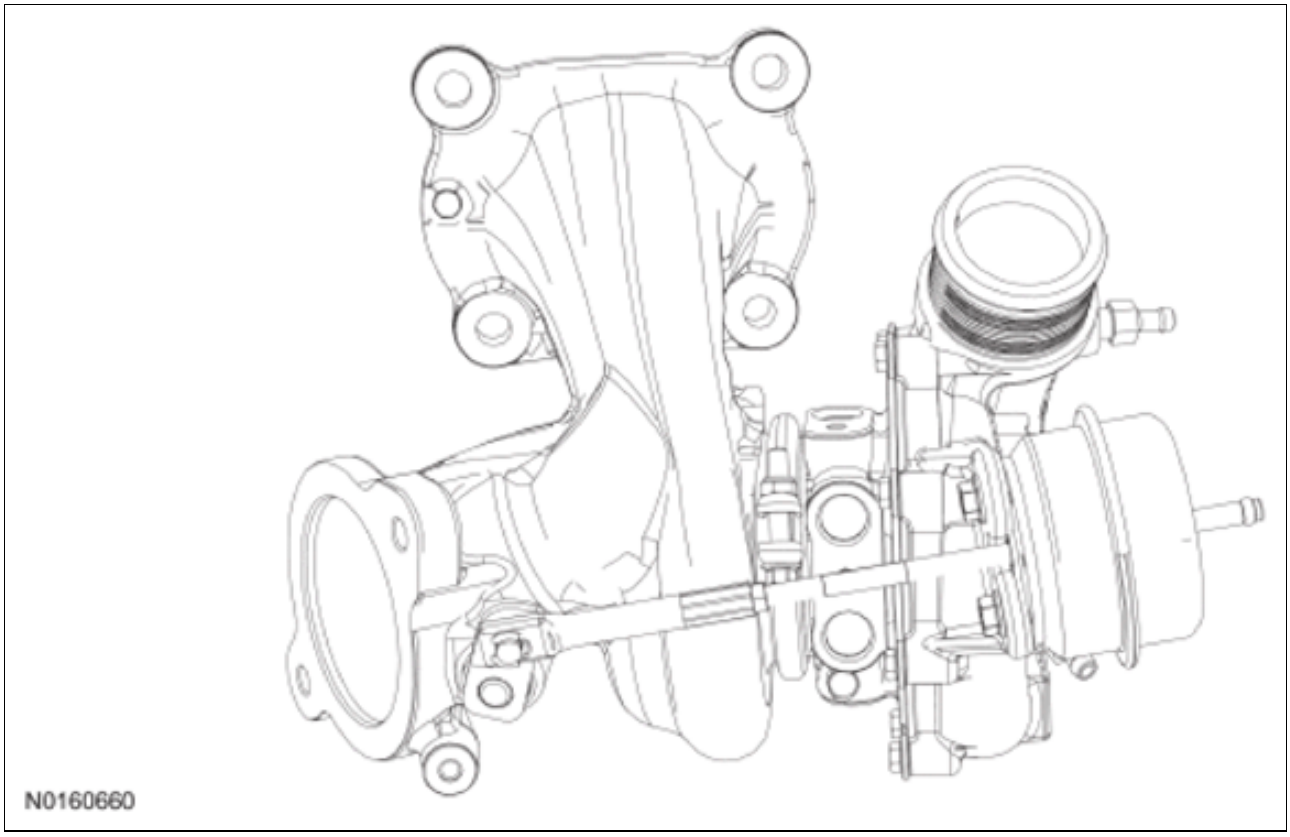
ENGINE CONTROL COMPONENTS > TURBOCHARGER

The turbocharger assembly is an exhaust driven centrifugal compressor. Expanding exhaust gases drive the turbine shaft assembly to speeds over 100, 000 RPM. The turbocharger increases the power output of an engine by increasing the mass of air entering the engine.

Two types of turbocharger are currently being used.

The first type of turbocharger has an integrated wastegate and a remote bypass valve.

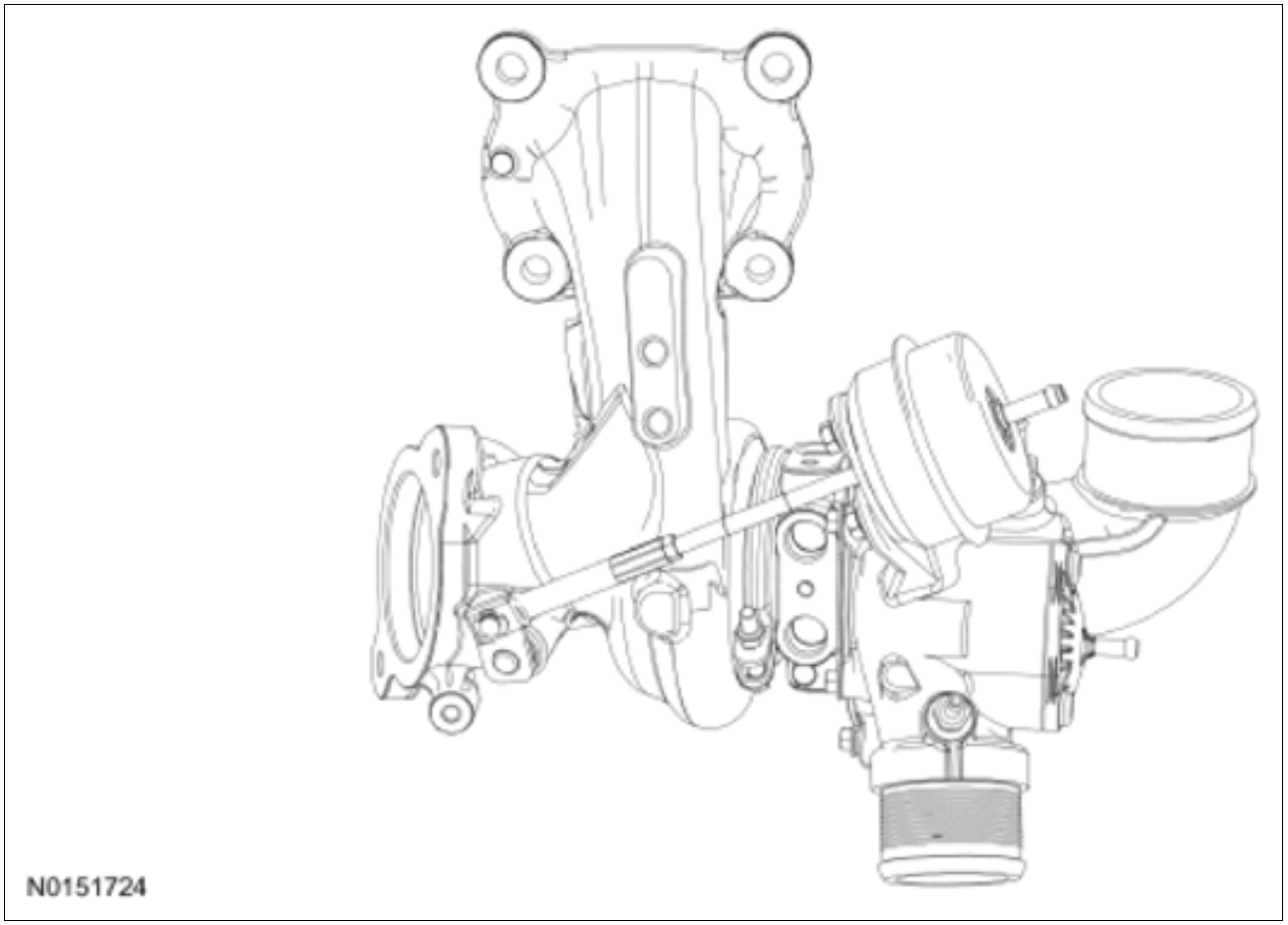
Fig 1: Identifying Turbocharger With Integrated Wastegate And Remote Bypass Valve



Courtesy of FORD MOTOR CO.

The second type of turbocharger has an integrated wastegate and an integrated bypass valve in the turbocharger housing.

Fig 2: Identifying Turbocharger With Integrated Wastegate And Integrated Bypass Valve

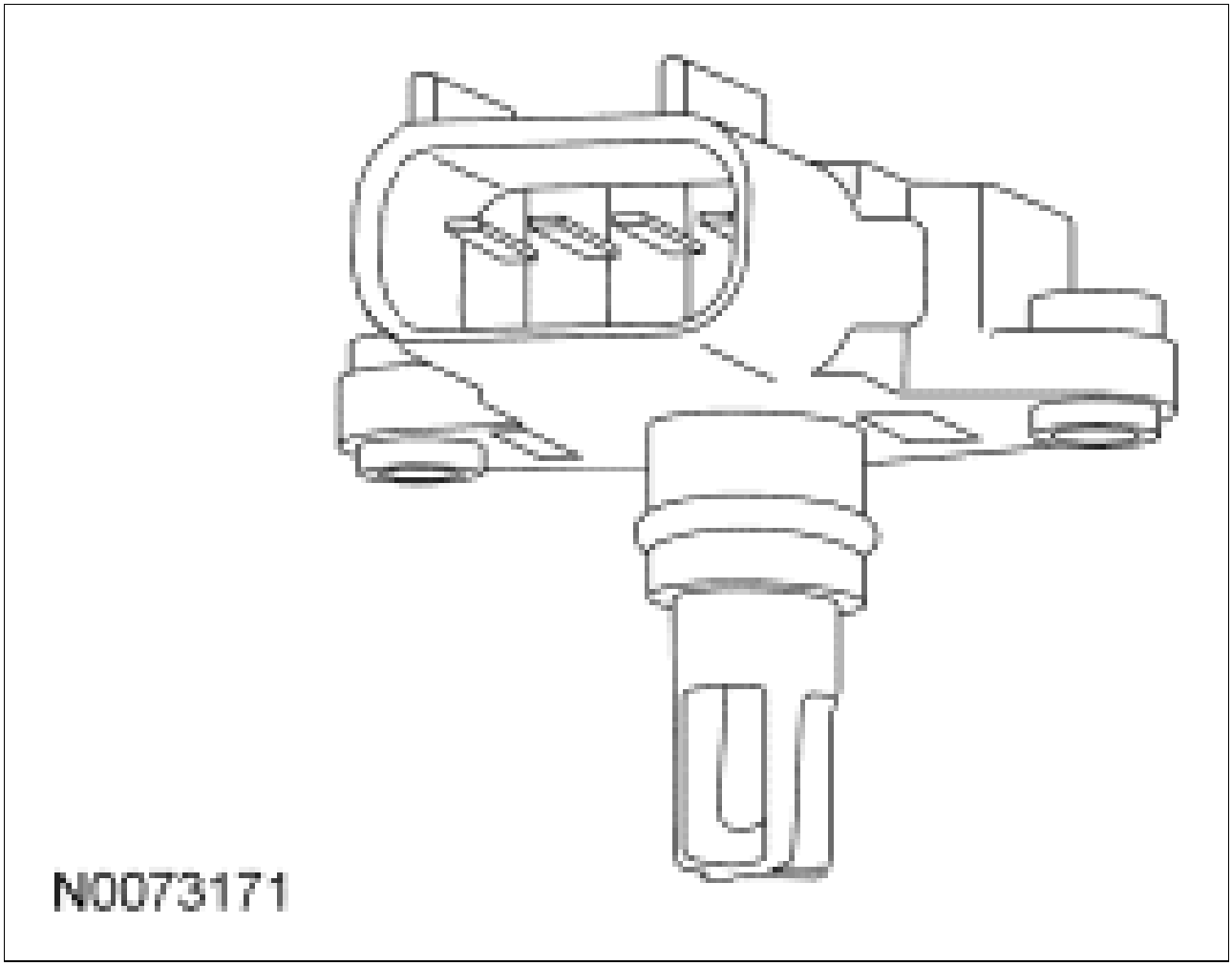


Courtesy of FORD MOTOR CO.

ENGINE CONTROL COMPONENTS > TURBOCHARGER BOOST PRESSURE (TCBP) SENSOR

The TCBP sensor is located in the intake air tube between the turbocharger and the charge air cooler (CAC). The TCBP sensor measures the throttle inlet pressure. The PCM uses the information from the TCBP sensor to refine the estimate of the airflow rate through the throttle and to determine the desired boost pressure. The TCBP sensor may be integrated with a charge air cooler temperature (CACT) sensor.

Fig 1: Identifying TCBP Sensor Integrated With CACT Sensor



Courtesy of FORD MOTOR CO.

ENGINE CONTROL COMPONENTS > TURBOCHARGER BYPASS VALVE

The turbocharger bypass valve prevents back flow through the turbocharger when the throttle is rapidly closed to avoid undesirable noise. The high pressure downstream of the turbocharger is vented back to the intake air upstream when the turbocharger bypass valve is open reducing pressure in the system.

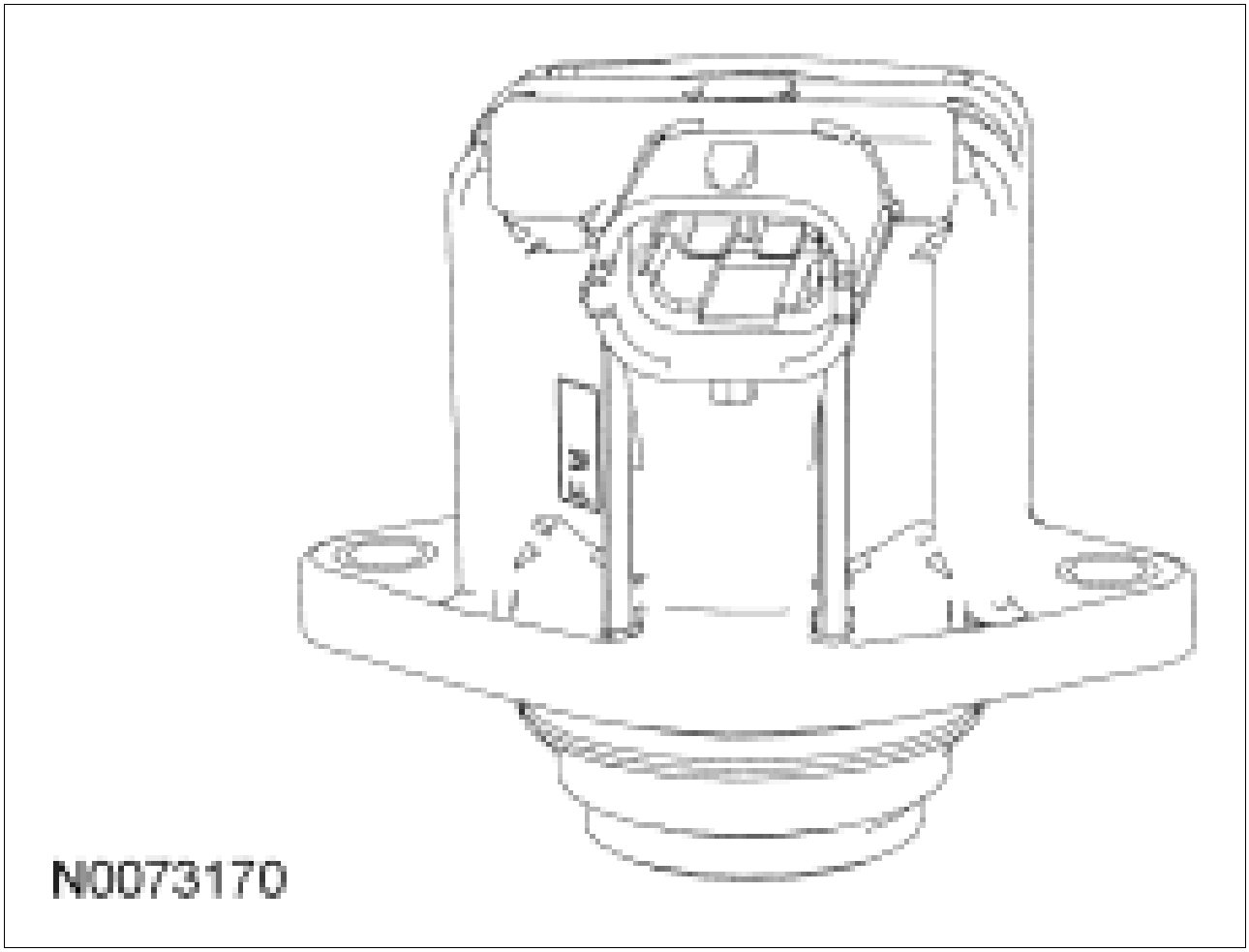
There are three types of turbocharger bypass valves currently in use.

The first type of turbocharger bypass valve is solenoid controlled and located between the turbocharger intake and the turbocharger boost pressure output to the charge air cooler (CAC).

The second type of turbocharger bypass valve is solenoid controlled and is integrated in the turbocharger housing. The operation of the turbocharger bypass valves that are solenoid controlled is similar.

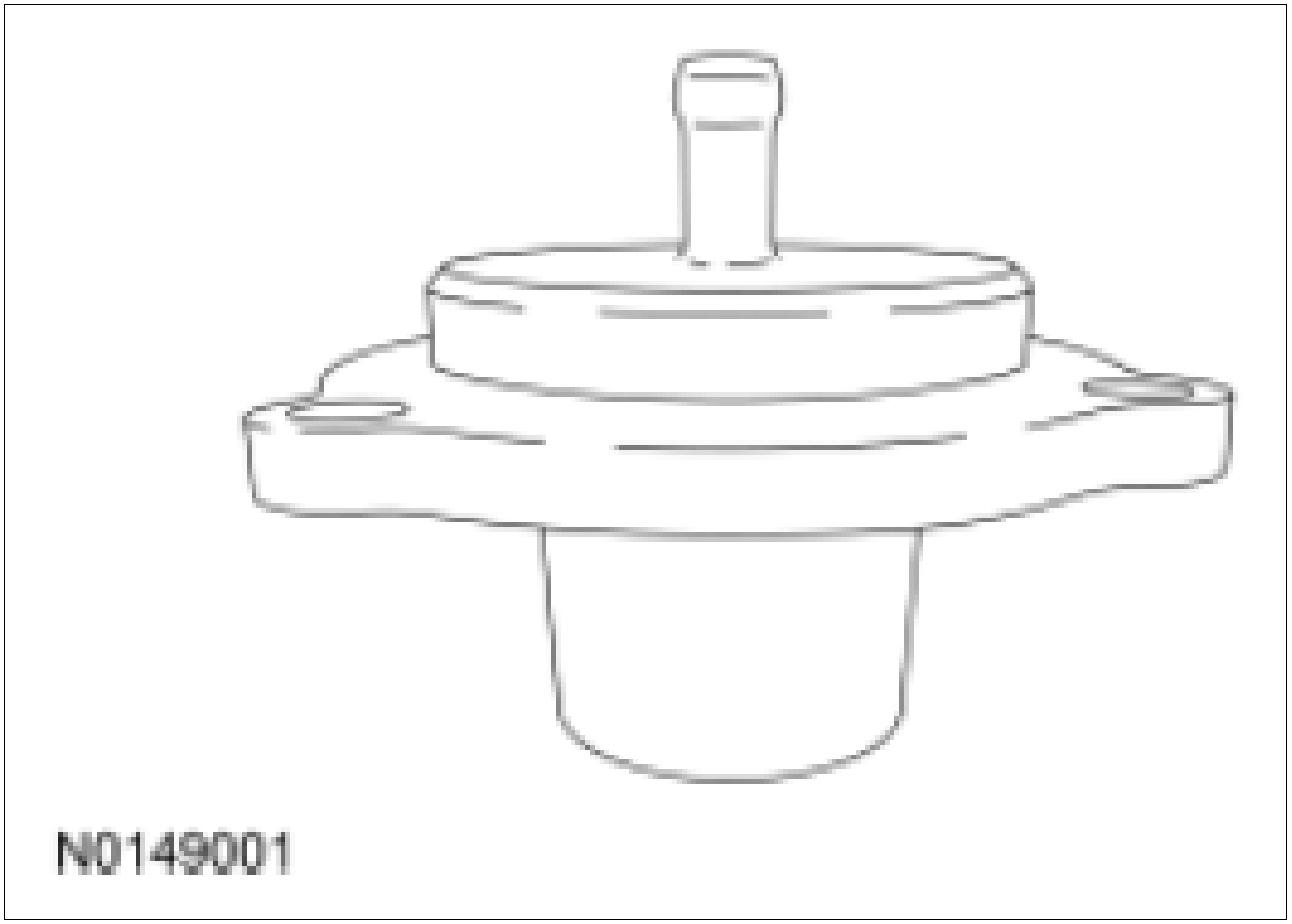
The third type of turbocharger bypass valve is an electropneumatically controlled system, integrated in the turbocharger housing, that consists of a pneumatically controlled turbocharger bypass, a vacuum source from the vacuum pump, a control solenoid for vacuum and pressure, and the tubing.

Fig 1: Identifying Turbocharger Bypass Valve (Integrated Solenoid)



Courtesy of FORD MOTOR CO.

Fig 2: Identifying Turbocharger Bypass Valve (Pneumatic Control)

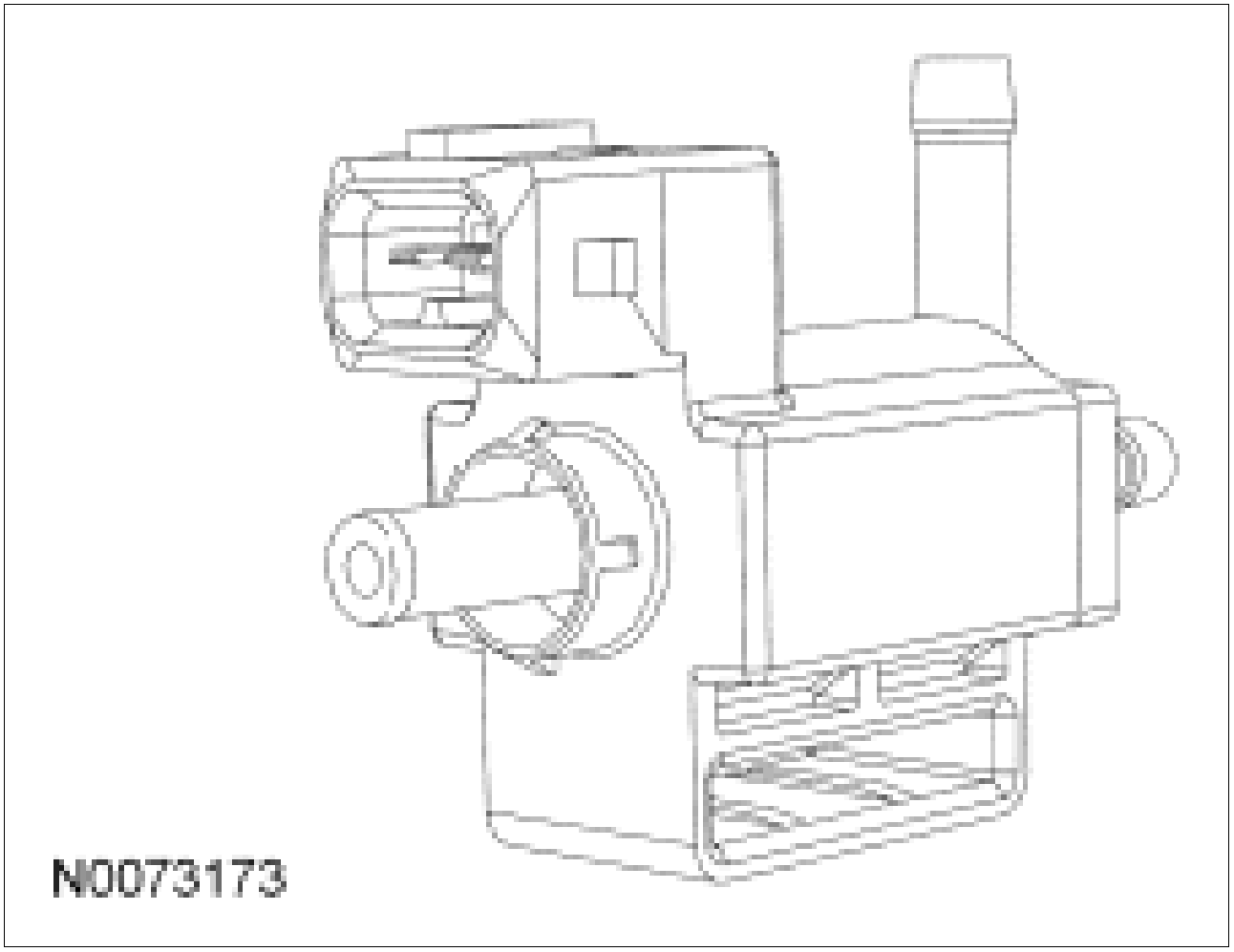


Courtesy of FORD MOTOR CO.

ENGINE CONTROL COMPONENTS > TURBOCHARGER BYPASS VALVE SOLENOID

The turbocharger bypass valve solenoid is pulse width modulated (PWM) by the PCM to control the pneumatically actuated turbocharger bypass valve. The turbocharger bypass valve solenoid supplies or vents vacuum to the pneumatically controlled turbocharger bypass valve to open or close the turbocharger bypass valve.

Fig 1: Identifying Turbocharger Bypass Valve Solenoid (Remote Solenoid)

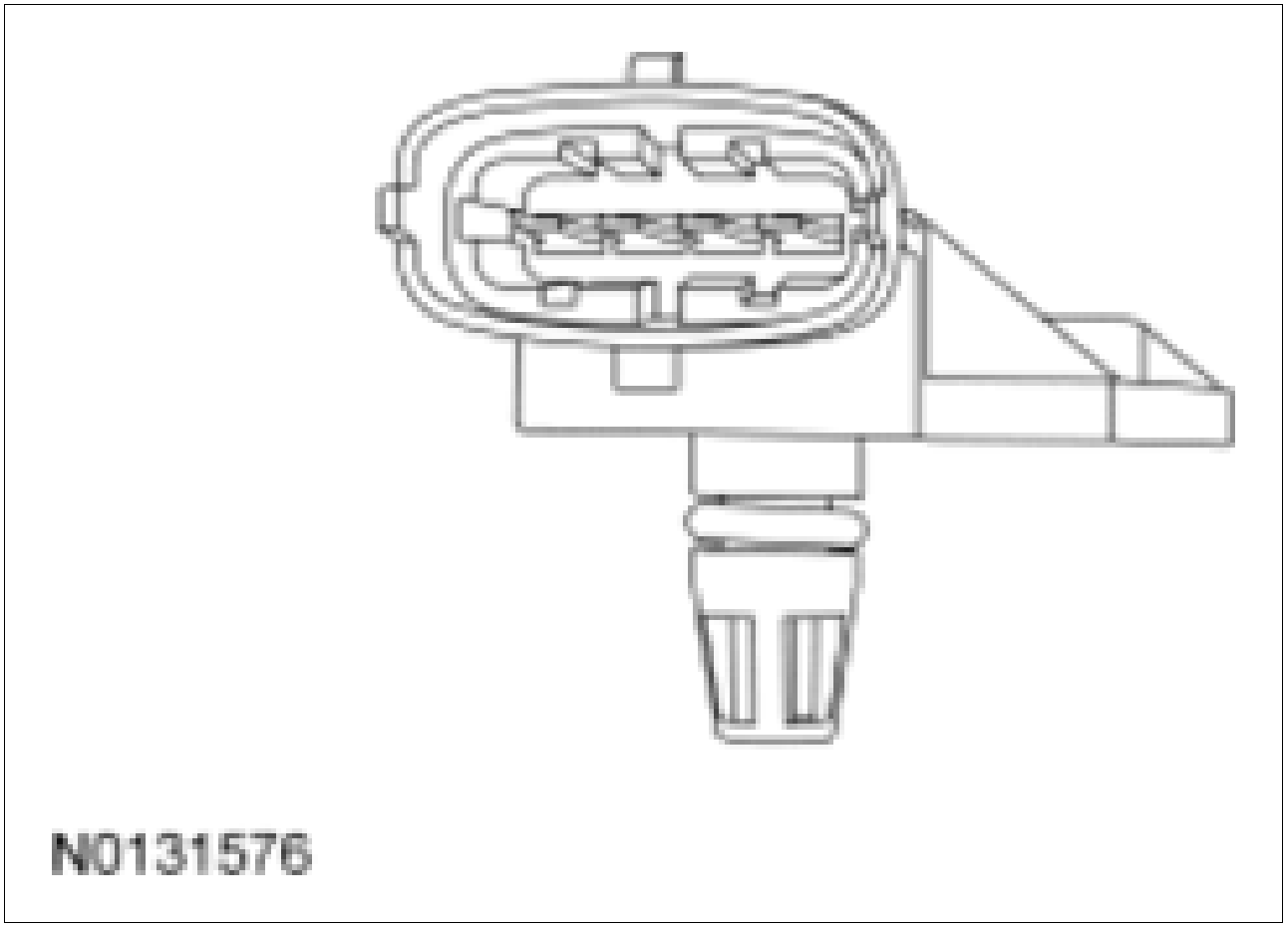


Courtesy of FORD MOTOR CO.

ENGINE CONTROL COMPONENTS > TURBOCHARGER INTAKE PRESSURE AND TEMPERATURE (TCIPT) SENSOR

The TCIPT sensor is located in the intake air tube between the air filter assembly and the turbocharger. The TCIPT sensor measures the turbocharger intake pressure and temperature. The PCM uses the information from the TCIPT sensor to determine if the airflow to the turbocharger is being restricted by a clogged air filter or other debris. An IAT sensor is integrated with the TCIPT sensor.

Fig 1: Identifying TCIPT Sensor



Courtesy of FORD MOTOR CO.

ENGINE CONTROL COMPONENTS > TURBOCHARGER WASTEGATE REGULATING VALVE SOLENOID

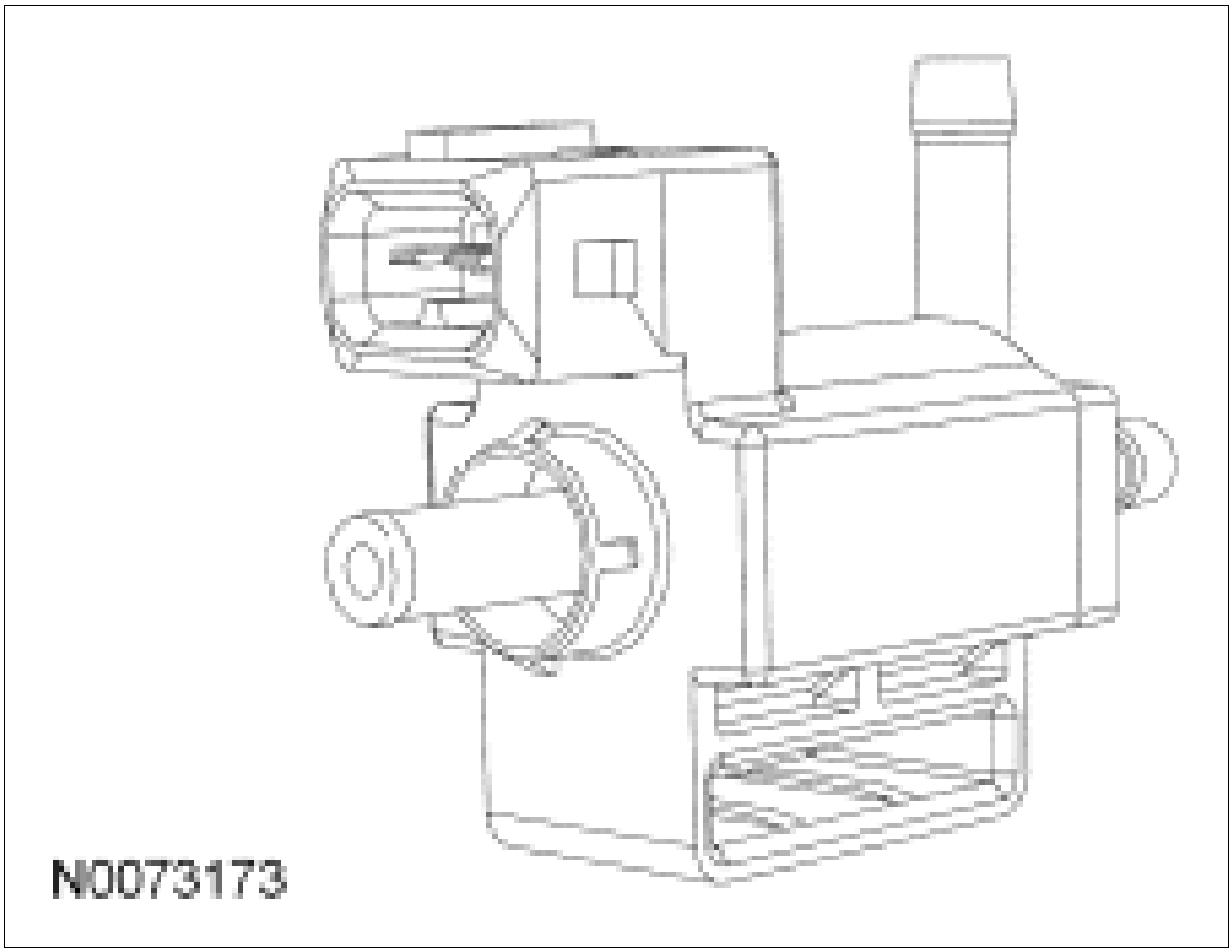
The turbocharger wastegate regulating valve solenoid allows the PCM to control the turbocharger wastegate position. The turbocharger wastegate regulating valve solenoid controls the pressure or vacuum supplied to the pneumatically actuated wastegate diaphragm in order to control the boost pressure limit. When the compressor outlet pressure increases, a pneumatically powered actuator opens the turbocharger wastegate and limits the compressor outlet pressure. The turbocharger wastegate regulating valve solenoid supplies pressure or vacuum to the pneumatically actuated wastegate canister diaphragm, which regulates the boost pressure to the desired value.

For the pressure actuated turbocharger wastegate, the turbocharger wastegate regulating valve solenoid controls the pressure applied to the turbocharger wastegate actuator. The amount of pressure vented from the pneumatic turbocharger wastegate actuator allows the PCM to control boost pressure. To generate maximum boost pressure, the PCM controls the turbocharger wastegate regulating valve solenoid to completely vent the pressure being applied to the turbocharger wastegate actuator. If a concern is present, the spring pressure in the pneumatic turbocharger wastegate actuator defaults the turbocharger wastegate to a fully closed position.

For the vacuum actuated turbocharger wastegate, the turbocharger wastegate regulating valve solenoid

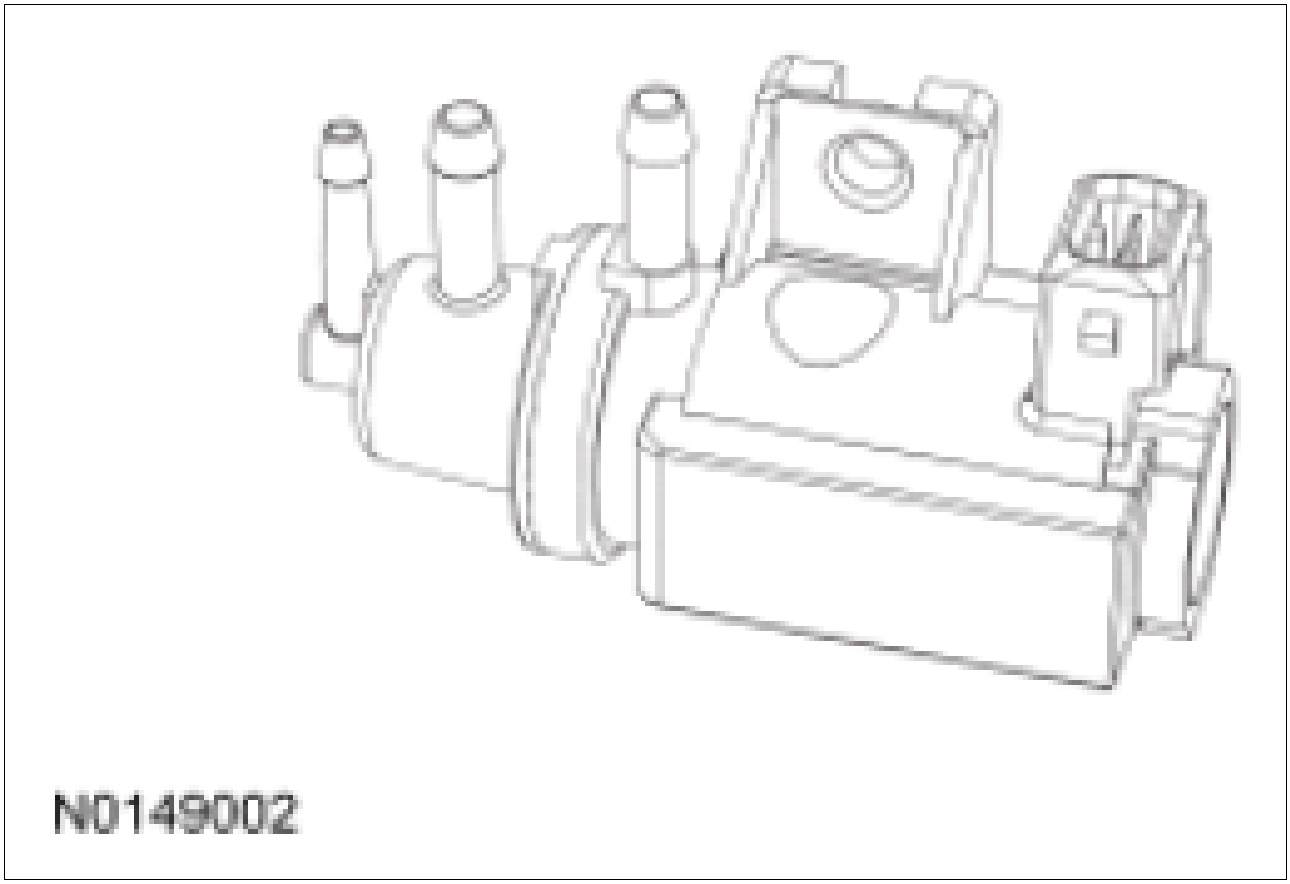
controls vacuum applied to the turbocharger wastegate actuator. The amount of vacuum applied to the turbocharger wastegate actuator allows the PCM to control the boost pressure. To generate maximum boost pressure, the PCM controls the turbocharger wastegate regulating valve solenoid to apply full vacuum to the turbocharger wastegate actuator. If a concern is present, the spring pressure in the pneumatic turbocharger wastegate actuator defaults the turbocharger wastegate to a fully open position.

Fig 1: Identifying Turbocharger Wastegate Regulating Valve Solenoid (Pressure Actuated Wastegate)



Courtesy of FORD MOTOR CO.

Fig 2: Identifying Turbocharger Wastegate Regulating Valve Solenoid (Vacuum Actuated Wastegate)



Courtesy of FORD MOTOR CO.

ENGINE CONTROL COMPONENTS > UNIVERSAL HEATED OXYGEN SENSOR (HO2S)

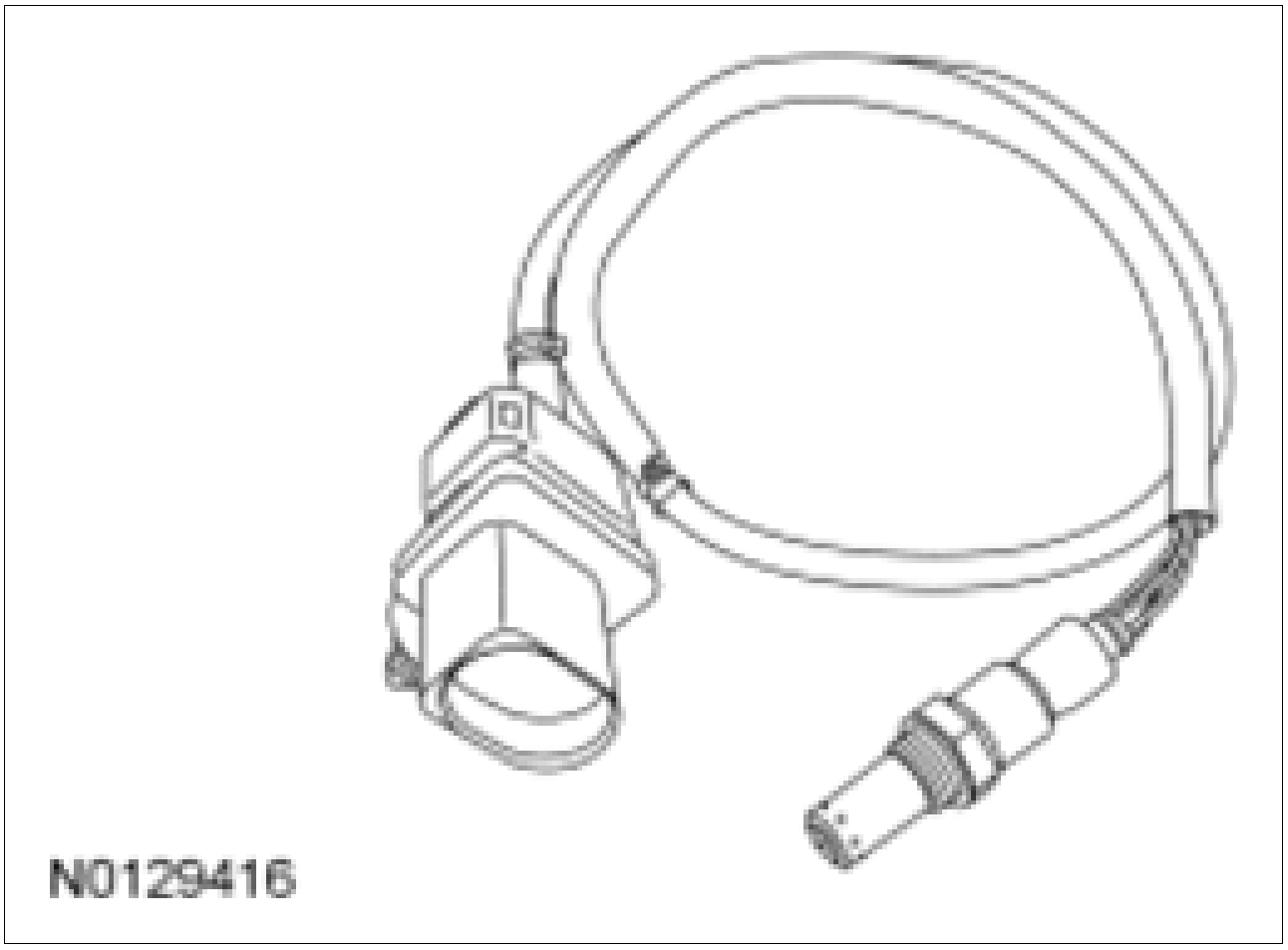
The universal HO2S, sometimes referred to as a wideband oxygen sensor, uses the typical HO2S combined with a current controller in the PCM to infer an air to fuel ratio relative to the stoichiometric air to fuel ratio. This is accomplished by balancing the amount of oxygen ions pumped in or out of a measurement chamber within the sensor. The typical HO2S within the universal HO2S detects the oxygen content of the exhaust gas in the measurement chamber. The oxygen content inside the measurement chamber is maintained at the stoichiometric air to fuel ratio by pumping oxygen ions in and out of the measurement chamber. As the exhaust gasses get richer or leaner, the amount of oxygen that must be pumped in or out to maintain a stoichiometric air to fuel ratio in the measurement chamber varies in proportion to the air to fuel ratio. The amount of current required to pump the oxygen ions in or out of the measurement chamber is used to measure the air to fuel ratio. The measured air to fuel ratio is actually the output from the current controller in the PCM and not a signal that comes directly from the sensor.

The universal HO2S also uses a self contained reference chamber to make sure an oxygen differential is always present. The oxygen for the reference chamber is supplied by pumping small amounts of oxygen ions from the measurement chamber into the reference chamber. The universal HO2S does not need access to outside air.

Part to part variance is compensated for by placing a resistor in the connector. This resistor trims the current measured by the current controller in the PCM.

The universal HO2S heater is embedded with the sensing element allowing the engine to enter closed loop operation sooner. The heating element heats the sensor to a temperature of 780°C to 830°C (1, 436°F to 1, 526°F). The VPWR circuit supplies voltage to the heater. The PCM controls the heater ON and OFF by providing the ground to maintain the sensor at the correct temperature for maximum accuracy.

Fig 1: Identifying Universal HO2S

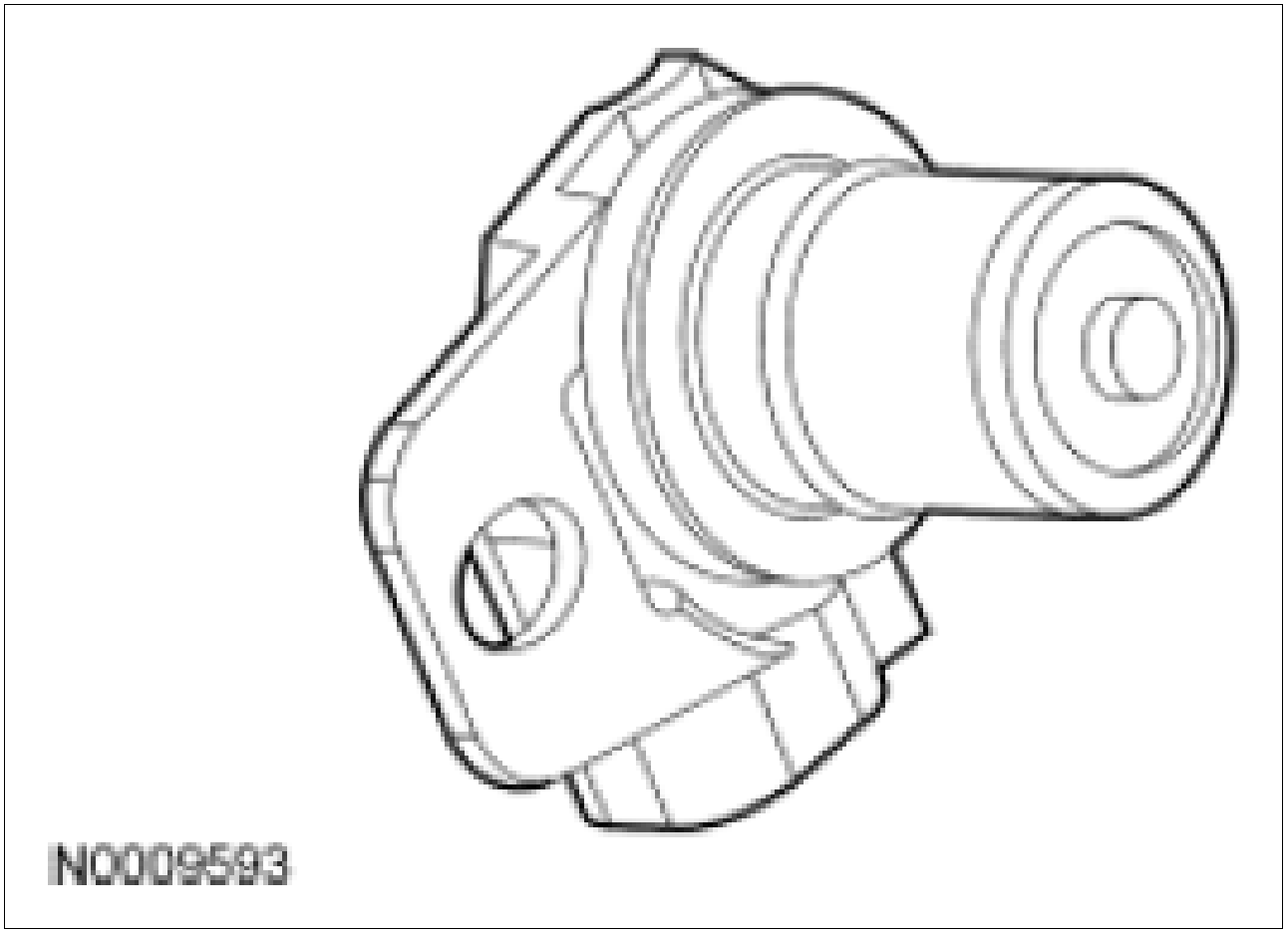


Courtesy of FORD MOTOR CO.

ENGINE CONTROL COMPONENTS > VEHICLE SPEED SENSOR (VSS)

The VSS is a variable reluctance or Hall effect sensor that generates a waveform with a frequency that is proportional to the speed of the vehicle. If the vehicle is moving at a relatively low speed, the sensor produces a signal with a low frequency. As the vehicle velocity increases, the sensor generates a signal with a higher frequency. The PCM uses the frequency signal generated by the VSS (and other inputs) to control such parameters as fuel injection, ignition control, transmission shift scheduling, and TCC scheduling.

Fig 1: Identifying Vehicle Speed Sensor (VSS)

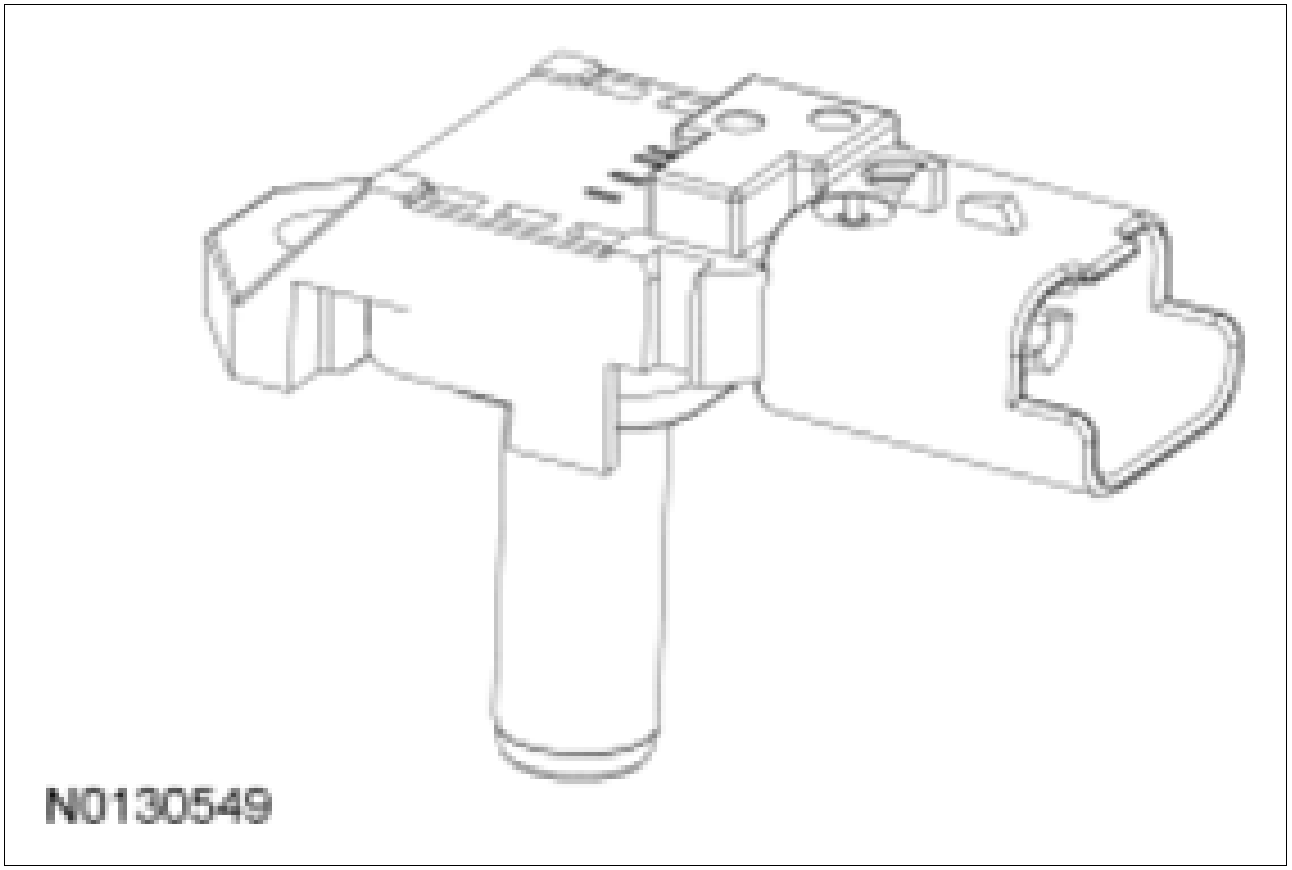


Courtesy of FORD MOTOR CO.

ENGINE CONTROL COMPONENTS > WASTEGATE VACUUM SENSOR

The wastegate vacuum sensor is an absolute pressure sensor that provides the PCM an analog voltage output that is proportional to the applied vacuum. The wastegate vacuum sensor is located near the turbocharger and the turbocharger wastegate regulating valve solenoid. The wastegate vacuum sensor measures the vacuum supplied by the turbocharger wastegate regulating valve solenoid to the wastegate actuator. The PCM uses the information from the wastegate vacuum sensor to determine the amount of vacuum being applied to the wastegate actuator.

Fig 1: Identifying Wastegate Vacuum Sensor



Courtesy of FORD MOTOR CO.

POWERTRAIN CONTROL HARDWARE > POWERTRAIN CONTROL MODULE (PCM)

The center of the engine control (EC) system is a microprocessor called the PCM. The PCM receives input from sensors and other electronic components (switches, relays). Based on the information received and programmed into its memory, the PCM generates output signals to control various relays, solenoids and actuators. There are several different types of PCMs in use for this model year. Refer to the VEHICLE PCM APPLICATION TABLE below for PCM types and their applications.

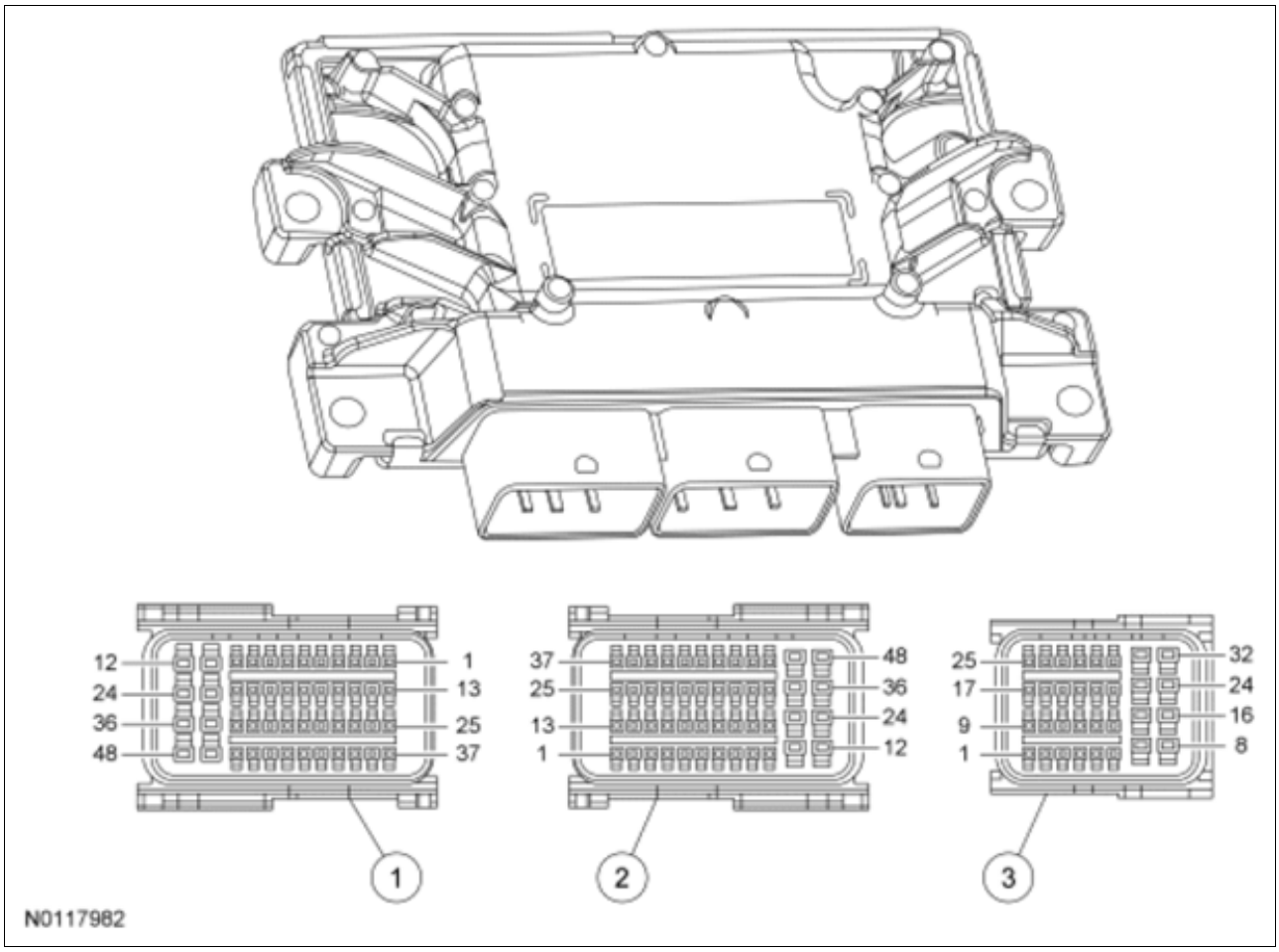
VEHICLE PCM APPLICATION LIST

PCM Type	Applications
128 Pin	Fiesta (1.6L TIVCT)
154 Pin	Explorer (2.0L)
190 Pin	E-Series, Escape (2.5L), Explorer (3.5L TIVCT, 3.7L), F-650/F-750, F-Series Super Duty, Flex (3.5L TIVCT), Fusion (2.5L), MKS (3.7L), MKT (3.7L), MKX, MKZ (3.7L), Taurus (3.5L TIVCT, 3.7L), Transit (3.7L TiVCT), Transit Connect (2.5L)

198 Pin	Edge, Escape (1.6L, 2.0L), Expedition, Explorer (3.5L GTDI), F-150, Fiesta (1.0L, 1.6L GTDI), Flex (3.5L GTDI), Focus, Fusion (1.5L, 2.0L), MKC, MKS (3.5L), MKT (2.0L, 3.5L), MKZ (2.0L), Mustang, Navigator, Taurus (2.0L, 3.5L GTDI), Transit (3.5L GTDI), Transit Connect (1.6L)

128 Pin PCM

Fig 1: 128 Pin PCM Connector

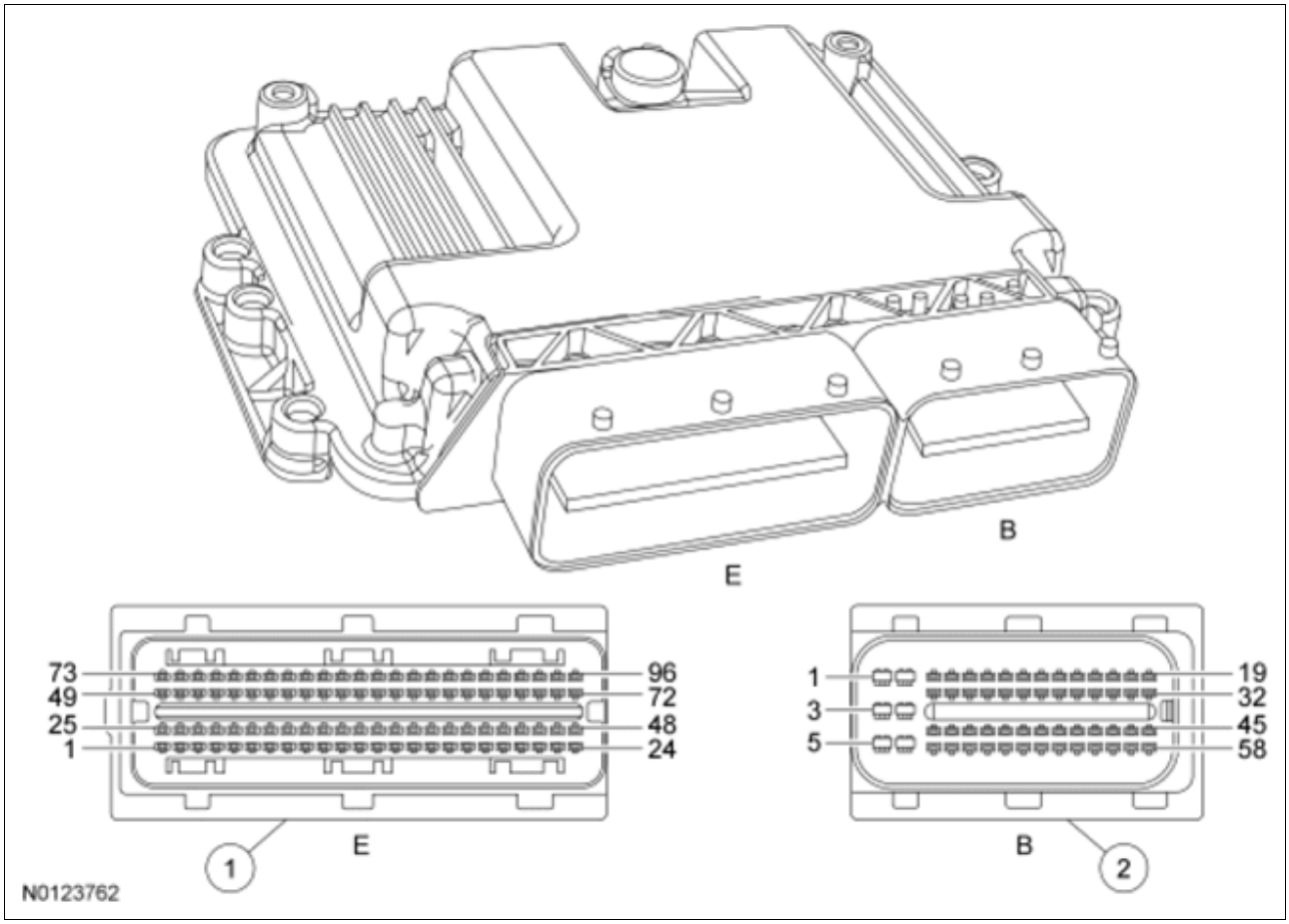


Courtesy of FORD MOTOR CO.

Item	Number	Description
1	-	E Connector
2	-	B Connector
3	-	T Connector

154 Pin PCM

Fig 2: 154 Pin PCM Connector

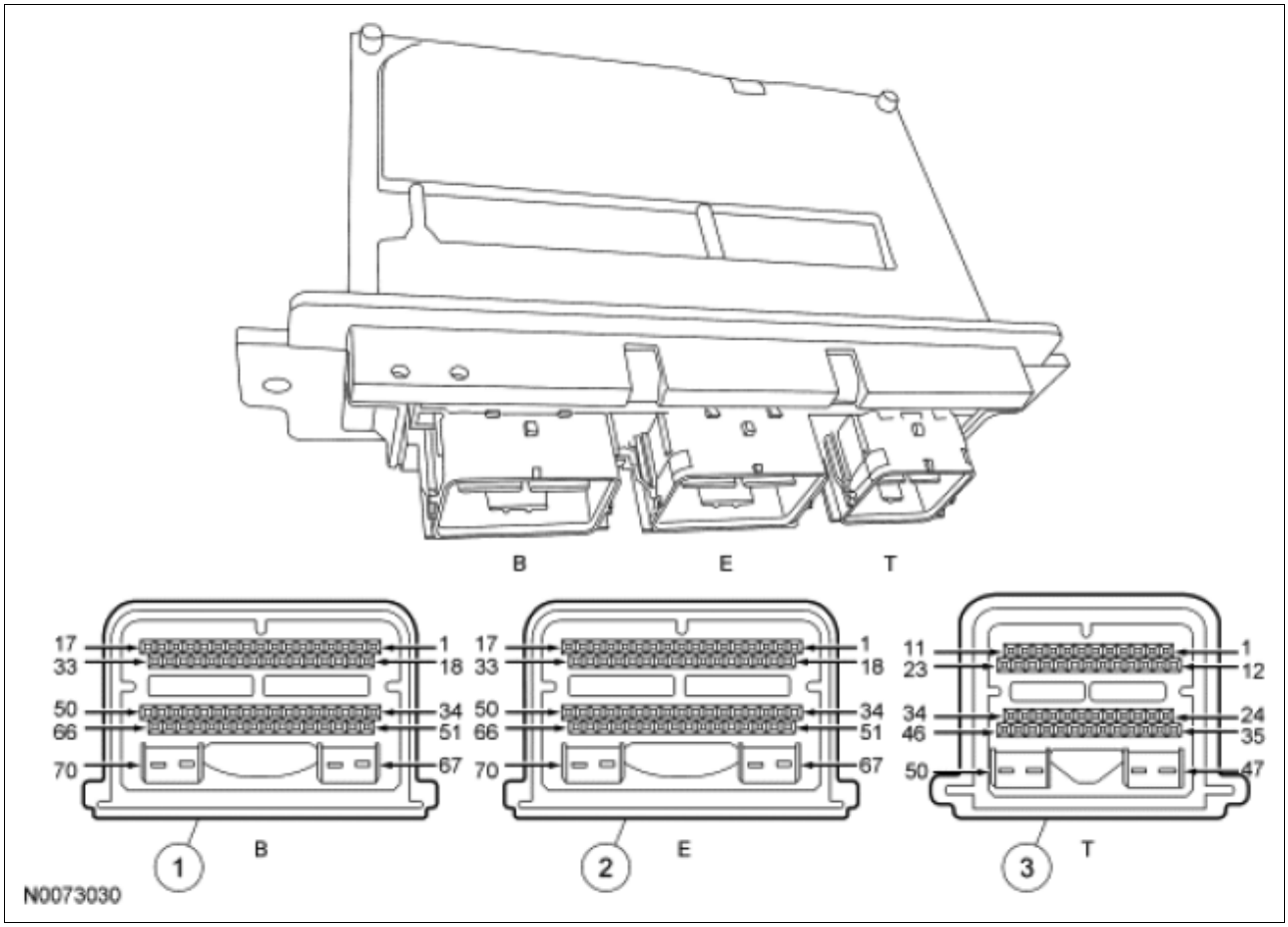


Courtesy of FORD MOTOR CO.

Item	Number	Description
1	-	E Connector
2	-	B Connector

190 Pin PCM

Fig 3: 190 Pin PCM Connector

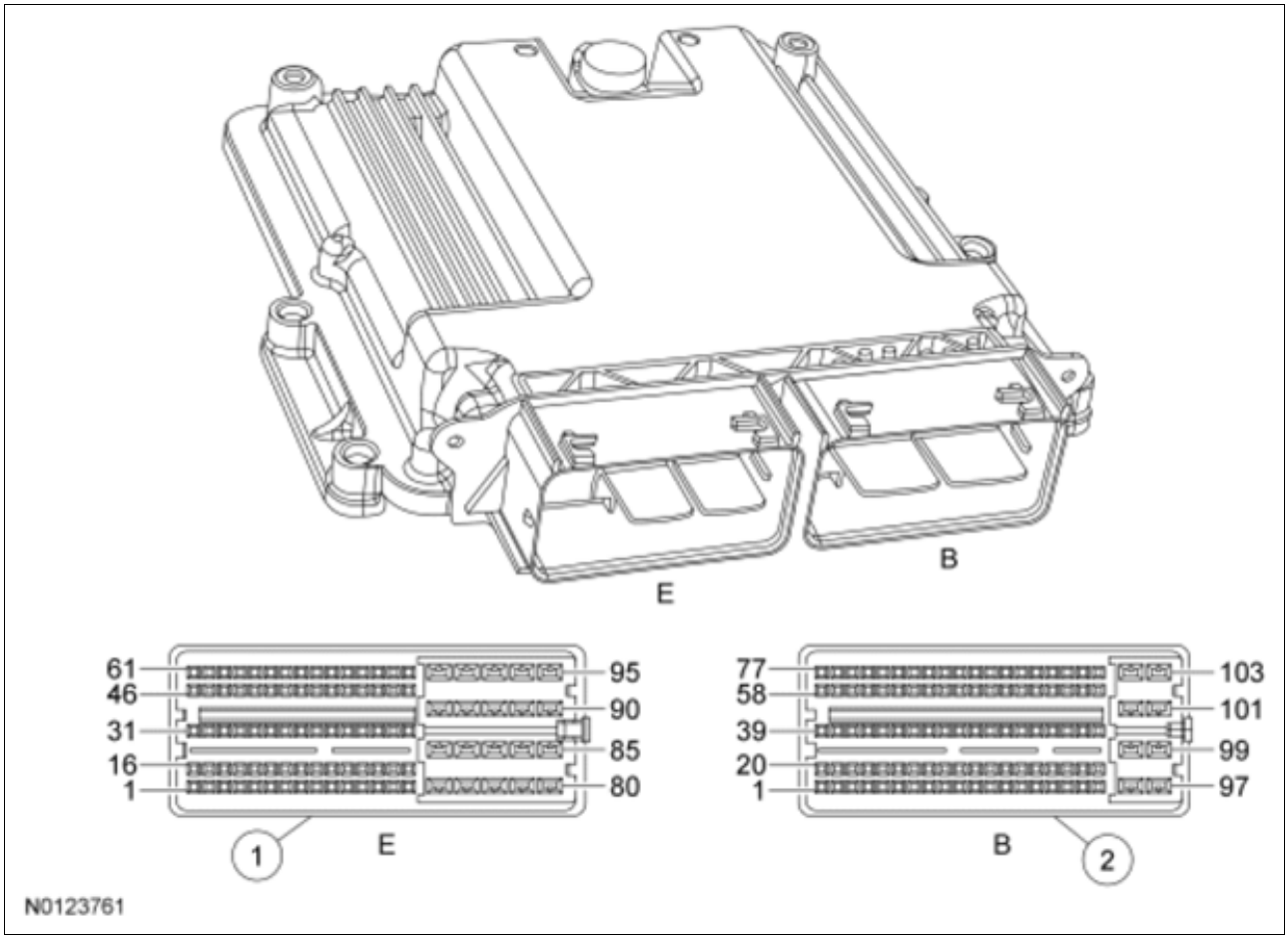


Courtesy of FORD MOTOR CO.

Item	Number	Description
1	-	B Connector
2	-	E Connector
3	-	T Connector

198 Pin PCM

Fig 4: 198 Pin PCM Connector



Courtesy of FORD MOTOR CO.

Item	Number	Description
1	-	E Connector
2	-	B Connector

PCM Locations

For PCM location, removal and installation procedures, refer to the service information , Electronic Engine Controls.

POWERTRAIN CONTROL HARDWARE > FUEL PUMP CONTROL MODULE

The fuel pump control module receives a duty cycle signal from the PCM and controls the fuel pump operation in relation to this duty cycle. The PCM requests low or high speed fuel pump operation depending on engine fuel demand. The fuel pump control module controls the fuel pump by switching the fuel pump power circuit ON and OFF at the required duty cycle. The fuel pump control module sends diagnostic information to the PCM on the FPM circuit. For additional information on the fuel pump control and the fuel pump monitor, refer to FUEL SYSTEMS in this service information.

On vehicles with gasoline direct fuel injection, the high pressure fuel system may be under vacuum after several hours of cold soak. Fuel vapor may collect at the fuel injection pump, causing a long start condition. To prevent this, the fuel pump relay is energized for 1 or 2 seconds, depending on application, as soon as the dome light is commanded ON. This causes the fuel pump control module and the fuel pump to cycle for 1 or 2 seconds and purge any trapped air or fuel vapor from the high pressure fuel system.

POWERTRAIN CONTROL HARDWARE > KEEP ALIVE MEMORY (KAM)

The PCM stores information about vehicle operating conditions in the KAM (a memory integrated circuit chip) and then uses this information to compensate for component variability. The KAM remains powered when the ignition is in the OFF position so the information is not lost.

POWERTRAIN CONTROL HARDWARE > POWER AND GROUND SIGNALS > ACCELERATOR PEDAL POSITION REFERENCE VOLTAGE (APPVREF)

The APPVREF is a consistent positive voltage (5 volts plus or minus 0.5 volt) circuit.

POWERTRAIN CONTROL HARDWARE > POWER AND GROUND SIGNALS > ACCELERATOR PEDAL POSITION RETURN (APPRTN)

The APPRTN is a return path for APPVREF circuit.

POWERTRAIN CONTROL HARDWARE > POWER AND GROUND SIGNALS > ELECTRONIC THROTTLE CONTROL REFERENCE VOLTAGE (ETCREF)

The ETCREF is a consistent positive voltage (5 volts plus or minus 0.5 volt) circuit.

POWERTRAIN CONTROL HARDWARE > POWER AND GROUND SIGNALS > ELECTRONIC THROTTLE CONTROL RETURN (ETCRTN)

The ETCRTN is a return path for ETCREF circuit.

POWERTRAIN CONTROL HARDWARE > POWER AND GROUND SIGNALS > GOLD PLATED PINS

Some engine control hardware has gold plated pins within the connectors and mating harness connectors to improve electrical stability for low current draw circuits and to enhance corrosion resistance. The engine control (EC) components equipped with gold plated terminals vary by vehicle application. Only replace gold plated terminals with new gold plated terminals.

POWERTRAIN CONTROL HARDWARE > POWER AND GROUND SIGNALS > KEEP ALIVE POWER (KAPWR)

The KAPWR provides a constant voltage input independent of ignition switch state to the PCM. This voltage is used by the PCM to maintain the KAM.

POWERTRAIN CONTROL HARDWARE > POWER AND GROUND SIGNALS > MASS AIRFLOW RETURN (MAFRTN)

The MAFRTN is a signal return circuit from the mass airflow (MAF) sensor.

POWERTRAIN CONTROL HARDWARE > POWER AND GROUND SIGNALS > POWER GROUND (PWRGND)

The PWRGND circuits provides a return path for the PCM vehicle power (VPWR) circuits.

POWERTRAIN CONTROL HARDWARE > POWER AND GROUND SIGNALS > SIGNAL RETURN (SIGRTN)

The SIGRTN is a dedicated return path for VREF applied components.

POWERTRAIN CONTROL HARDWARE > POWER AND GROUND SIGNALS > STARTER MOTOR REQUEST (SMR) CIRCUIT

The SMR circuit provides the PCM with a signal from the ignition switch to the PCM. The input is pulled high when the ignition is in the START position and the transmission range (TR) sensor ignition lockout circuit allows the starter to engage.

POWERTRAIN CONTROL HARDWARE > POWER AND GROUND SIGNALS > VARIABLE RELUCTANCE SENSOR RETURN (VRSRTN)

The VRSRTN circuit is a dedicated return path for variable reluctance (VR) type sensors.

POWERTRAIN CONTROL HARDWARE > POWER AND GROUND SIGNALS > VEHICLE BUFFERED POWER (VBPWR)

The VBPWR is a regulated voltage supplied by the PCM to vehicle sensors. These sensors require a

constant 12 volts for operation and cannot withstand VPWR voltage variations. VBPWR is regulated to VPWR minus 1.5 volts and is also current limited to protect the sensors.

POWERTRAIN CONTROL HARDWARE > POWER AND GROUND SIGNALS > VEHICLE POWER (VPWR)

The VPWR is the primary source of PCM power. VPWR is switched through the PCM power relay.

POWERTRAIN CONTROL HARDWARE > POWER AND GROUND SIGNALS > VEHICLE REFERENCE VOLTAGE (VREF)

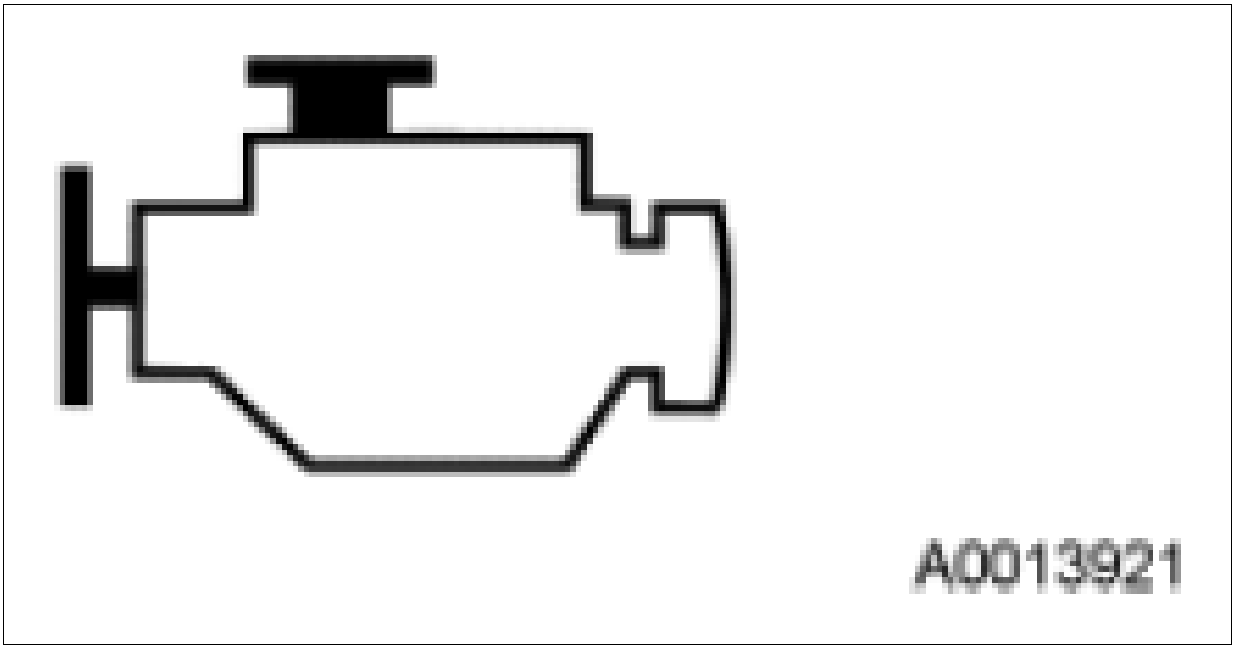
The VREF is a consistent positive voltage (5 volts plus or minus 0.5 volt) provided by the PCM. VREF is typically used by 3-wire sensors and some digital input signals.

MALFUNCTION INDICATOR LAMP (MIL)

The MIL notifies the driver the PCM has confirmed an on board diagnostic (OBD) emission related component or system concern. When this occurs, an OBD DTC sets.

- The MIL is located in the instrument panel cluster (IPC) and is labeled CHECK ENGINE, SERVICE ENGINE SOON or the international standards organization (ISO) standard engine symbol.
- The MIL is illuminated with the ignition ON, engine OFF, until the engine is cranked for starting. The MIL will turn OFF after engine start if no concerns are present.
- The MIL may flash after 17 seconds with the ignition ON, engine OFF, unless the OBD inspection/maintenance (I/M) readiness indicators indicate all of the OBD monitors have completed since the last keep alive memory (KAM) reset or since the PCM DTCs have been cleared with a reset command from the scan tool.
- The MIL will remain illuminated after engine start if a confirmed emission related concern or an OBD DTC exists.
- If the MIL flashes at a steady rate, after engine start, a severe misfire condition may exist.
- The MIL will remain OFF with the ignition ON, engine OFF, if a MIL indicator or IPC concern is present.
- To turn OFF the MIL after a repair, a reset command from the scan tool must be sent, or 3 consecutive drive cycles must be completed without a concern.
- If the MIL flashes erratically, a low battery voltage concern may be present causing the PCM to reset during cranking.
- For all MIL concerns, go to SYMPTOM CHARTS .

Fig 1: Identifying Malfunction Indicator Lamp



Courtesy of FORD MOTOR CO.

IGNITION SYSTEMS > OVERVIEW

The ignition system is designed to ignite the compressed air to fuel mixture in an internal combustion engine by a high voltage spark delivered from an ignition coil controlled by the powertrain control module (PCM).

IGNITION SYSTEMS > INTEGRATED ELECTRONIC IGNITION SYSTEM

NOTE: Electronic ignition engine timing is controlled entirely by the PCM. Electronic ignition engine timing is not adjustable. Do not attempt to check base timing. You will receive false readings.

The integrated electronic ignition system consists of a crankshaft position (CKP) sensor, coil pack or coil on plug (COP), connecting wiring, and a PCM. For additional information on the ignition system components, refer to ENGINE CONTROL COMPONENTS in this service information. The COP integrated electronic ignition system uses a separate coil per spark plug, and each coil is mounted directly onto the plug. The COP integrated electronic ignition system eliminates the need for spark plug wires, but does require input from the camshaft position (CMP) sensor. Operation of the components are as follows:

1. The CKP sensor indicates the crankshaft position and speed by sensing a missing tooth on a pulse wheel mounted to the crankshaft. The COP integrated electronic ignition system uses the CMP sensor to identify the compression stroke of cylinder 1, and to synchronize the firing of the individual coils.

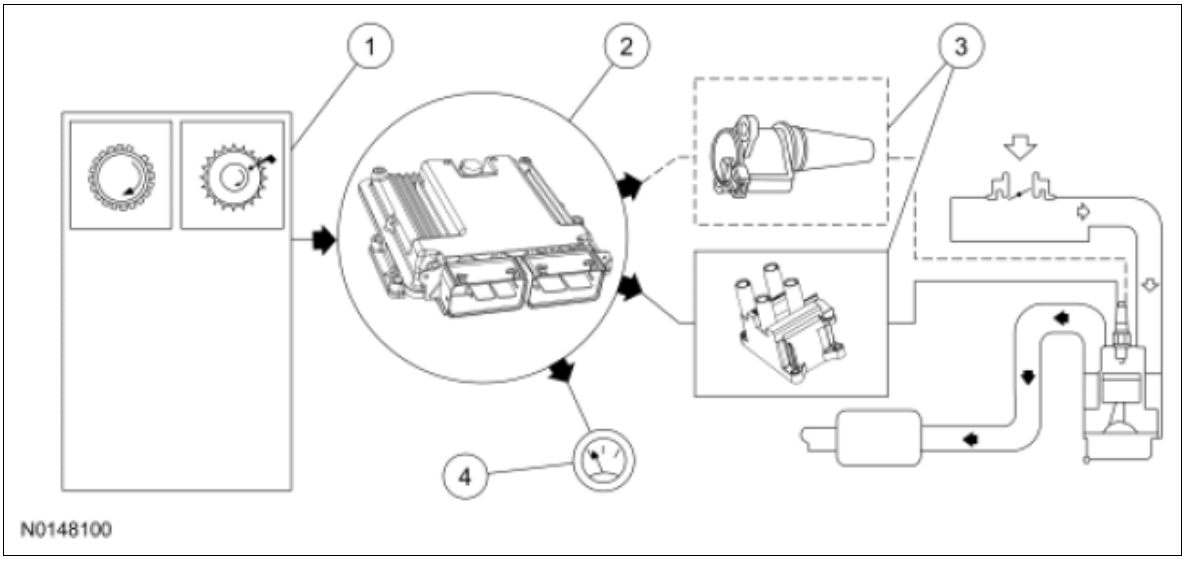
2. The PCM uses the CKP sensor signal to calculate a spark target and then fires the coil pack or COP to that target illustrate. The PCM uses the CMP sensor signal to identify the compression stroke of cylinder 1, and to synchronize the firing of the individual coils.

3. The PCM controls the ignition coils after it calculates the spark target. The COP system fires only one spark plug per coil upon synchronization during the compression stroke. For the coil pack ignition system, each coil within a pack fires 2 spark plugs at the same time. The plugs are paired so that as one fires during the compression stroke the other fires during the exhaust stroke.

   The current flow, or dwell, through the primary ignition coil is controlled by the PCM by providing a switched ground path through the ignition coil driver to ground. When the ignition coil driver is switched ON, current rapidly builds up to a maximum value, determined by the coil inductance and resistance. When the current is switched OFF, the magnetic field collapses which induces a secondary high voltage surge and the spark plug is fired. This high voltage surge creates a flyback voltage which the PCM uses as a feedback during the ignition diagnostics. The PCM uses the charge current dwell time characteristics to carry out the ignition diagnostics.

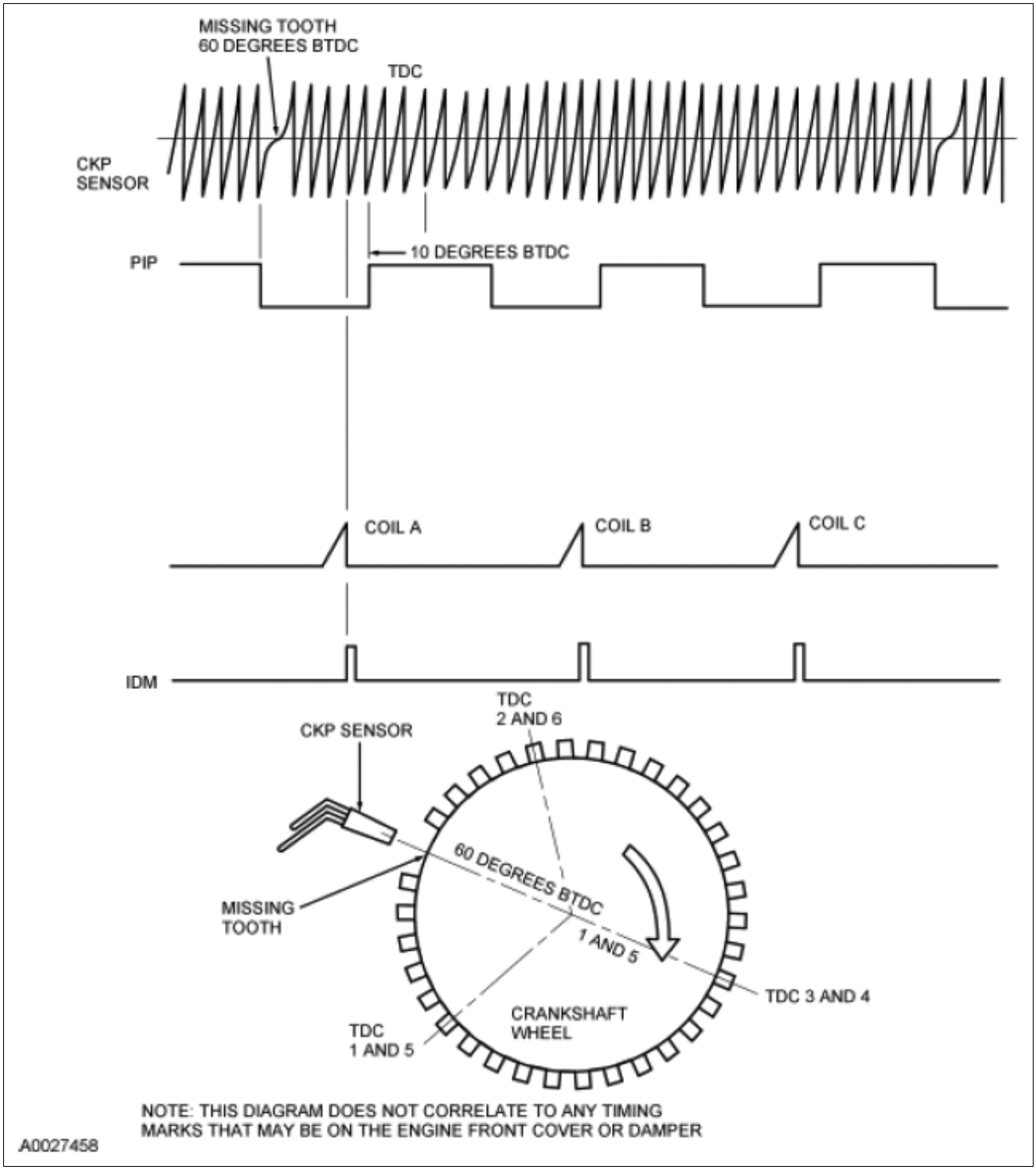
4. The PCM processes the CKP sensor signal and uses it to drive the tachometer as the clean tach output (CTO) signal.

Fig 1: Integrated Electronic Ignition System Flow Diagram



Courtesy of FORD MOTOR CO.

Fig 2: Six Cylinder Integrated Electronic Ignition Waveforms



Courtesy of FORD MOTOR CO.

IGNITION SYSTEMS > ENGINE CRANK/ENGINE RUNNING

During engine crank the PCM fires 2 spark plugs simultaneously. Of the 2 spark plugs fired, one is under compression while the other is on the exhaust stroke. Both spark plugs fire until camshaft position is identified by a successful CMP sensor signal. Once camshaft position is identified only the cylinder

under compression is fired.

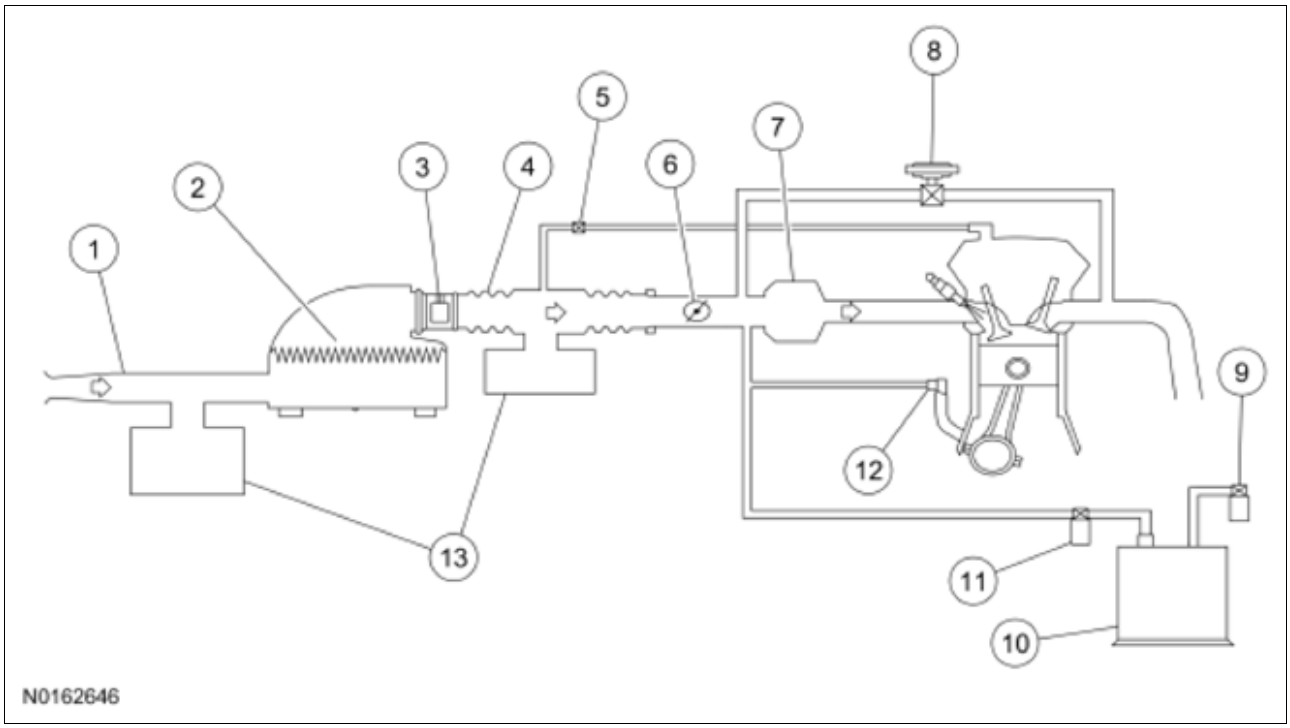
IGNITION SYSTEMS > CAMSHAFT POSITION FAILURE MODE EFFECTS MANAGEMENT (FMEM)

During camshaft position FMEM the COP ignition works the same as during engine crank. This allows the engine to operate without the PCM knowing if cylinder 1 is under compression or exhaust.

INTAKE AIR SYSTEMS > OVERVIEW

The intake air system provides clean air to the engine, optimizes airflow, and reduces unwanted induction noise. The intake air system consists of an air cleaner assembly, resonator assemblies, and hoses. Some vehicles use a hydrocarbon filter trap to help reduce emissions by preventing fuel vapor from escaping into the atmosphere from the intake when the engine is OFF. It is typically located inside the intake air system. The mass airflow (MAF) sensor is attached to the air cleaner assembly and measures the volume of air delivered to the engine. The hydrocarbon trap is part of the evaporative emission (EVAP) system. For more information on the EVAP system, refer to EVAPORATIVE EMISSION (EVAP) SYSTEMS in this service information. The MAF sensor can be replaced as an individual component. The intake air system also contains a sensor that measures the intake air temperature, which is integrated with the MAF sensor. For additional information on the intake air system components, refer to ENGINE CONTROL COMPONENTS in this service information. Intake air components can be separate components or part of the intake air housing. The function of a resonator is to reduce induction noise. The intake air components are connected to each other and to the throttle body assembly with hoses.

Fig 1: Intake Air System Diagram



Courtesy of FORD MOTOR CO.

Intake Air System	Component
1	Air Cleaner Inlet
2	Air Cleaner Element
3	Mass Airflow/Intake Air Temperature Sensor
4	Air Cleaner Outlet
5	Crankcase Pressure Sensor (If Equipped)
6	Throttle Body
7	Upper Intake Manifold
8	Exhaust Gas Recirculation (EGR)
9	EVAP Canister Vent Valve
10	EVAP Canister
11	EVAP Purge Valve
12	Positive Crankcase Ventilation (PCV)
13	Intake Air Resonator

INTAKE AIR SYSTEMS > THROTTLE BODY SYSTEM OVERVIEW

The throttle body system meters air to the engine during idle, part throttle, and wide open throttle (WOT) conditions. The throttle body system consists of single or dual bores with butterfly valve throttle plates and a throttle position (TP) sensor. The airflow is measured by the MAF sensor.

The major components of the throttle body assembly include the TP sensor and the throttle body housing assembly. For additional information on the intake air system components, refer to ENGINE CONTROL COMPONENTS in this service information.

INTAKE AIR SYSTEMS > FEATURES OF THE THROTTLE BODY ASSEMBLY INCLUDE

1. A preset stop to locate the WOT position.
2. A throttle body mounted TP sensor.
3. A coating sealant on the throttle bore and throttle plate makes the throttle body airflow tolerant to engine intake sludge accumulation. Some vehicles have a decal advising not to clean.
4. A non adjustable stop screw for close plate idle airflow.

INTAKE AIR SYSTEMS > INTAKE MANIFOLD RUNNER CONTROL (IMRC) AND INTAKE MANIFOLD TUNING VALVE (IMTV)

WARNING: SUBSTANTIAL OPENING AND CLOSING TORQUE IS APPLIED BY THIS SYSTEM. TO PREVENT INJURY, BE CAREFUL TO KEEP FINGERS AWAY FROM LEVER MECHANISMS WHEN ACTUATED. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN PERSONAL INJURY.

There are 2 basic types of intake air subsystems:

- IMRC
- IMTV

There are several different styles of hardware used to control airflow within the engine air intake system. In general, the devices are defined based on whether they control charge motion or manifold tuning.

The IMRC modifies the air charge motion in the intake manifold. The IMRC is located at the rear of the intake manifold. The IMRC system must have a monitor feedback system in order to meet OBD II regulations.

The IMTV modifies the airflow volume of the manifold by connecting multiple plenums or inlets within the intake manifold. The IMTV control valve is located in the center of the intake manifold. The IMTV system does not have to be monitored for OBD II regulations.

These subsystems provide increased intake airflow to improve torque, emissions and performance. The overall volume of air metered to the engine is controlled by the throttle body.

INTAKE AIR SYSTEMS > INTAKE MANIFOLD RUNNER CONTROL (IMRC) SYSTEM

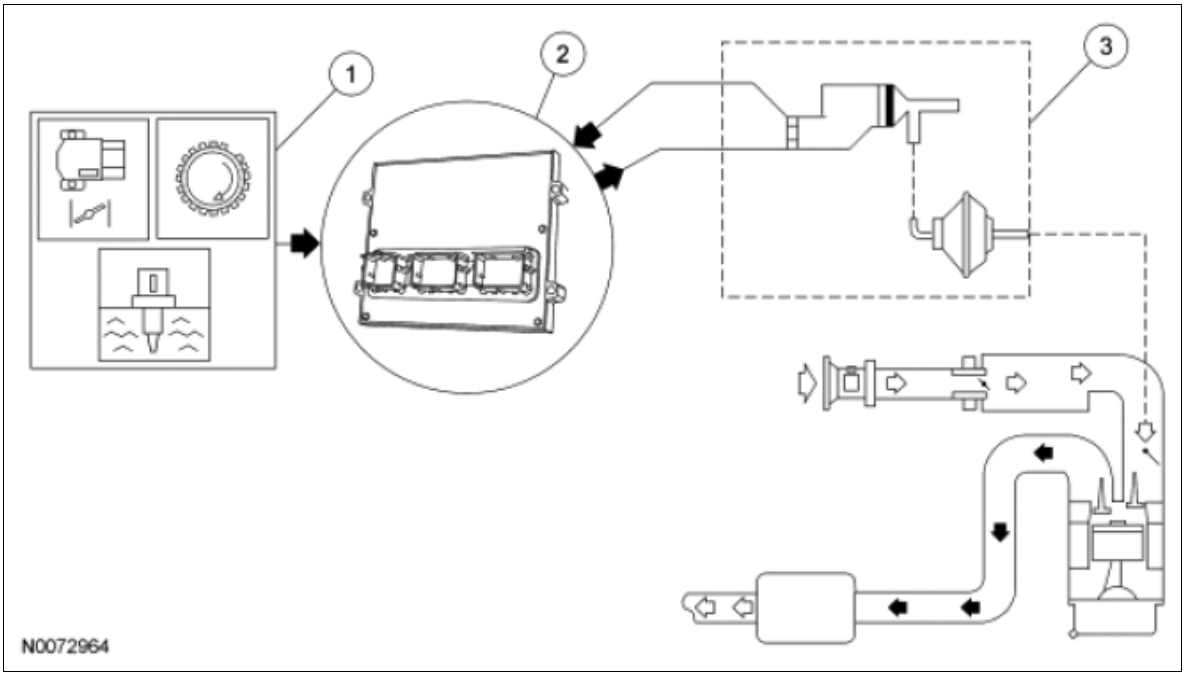
WARNING: SUBSTANTIAL OPENING AND CLOSING TORQUE IS APPLIED BY THIS SYSTEM. TO PREVENT INJURY, BE CAREFUL TO KEEP FINGERS AWAY FROM LEVER MECHANISMS WHEN ACTUATED. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN PERSONAL INJURY.

The IMRC system consists of a manifold mounted vacuum actuator and a PCM controlled electric solenoid. For additional information on IMRC vacuum actuated components, refer to ENGINE CONTROL COMPONENTS in this service information. The linkage from the actuator attaches to the manifold plate lever. The IMRC vacuum actuator and manifold has a single intake air passage for each cylinder. The passage has a valve plate that blocks a large percentage of the opening when actuated, leaving the top of the passage open to generate turbulence. The housing uses a return spring to hold the valve plates open. The IMRC sensors provide feedback to the PCM indicating the valve plate position.

1. The PCM monitors the TP sensor, cylinder head temperature (CHT) sensor, and CKP sensor signals to determine activation of the IMRC system. There must be a positive change in voltage from the TP sensor along with the increase in RPM at the correct engine temperature to open the IMRC valve plates.
2. The PCM uses the information from the input signals to control the IMRC solenoid based upon changes in the throttle position, the engine temperature, and the RPM.
3. The PCM energizes the IMRC solenoid with the ignition ON and the engine running. Vacuum is

then applied to the actuator to pull the valve plates closed.

Fig 1: IMRC Vacuum Actuated System Flow Diagram



Courtesy of FORD MOTOR CO.

INTAKE AIR SYSTEMS > INTAKE MANIFOLD TUNING VALVE (IMTV) SYSTEM

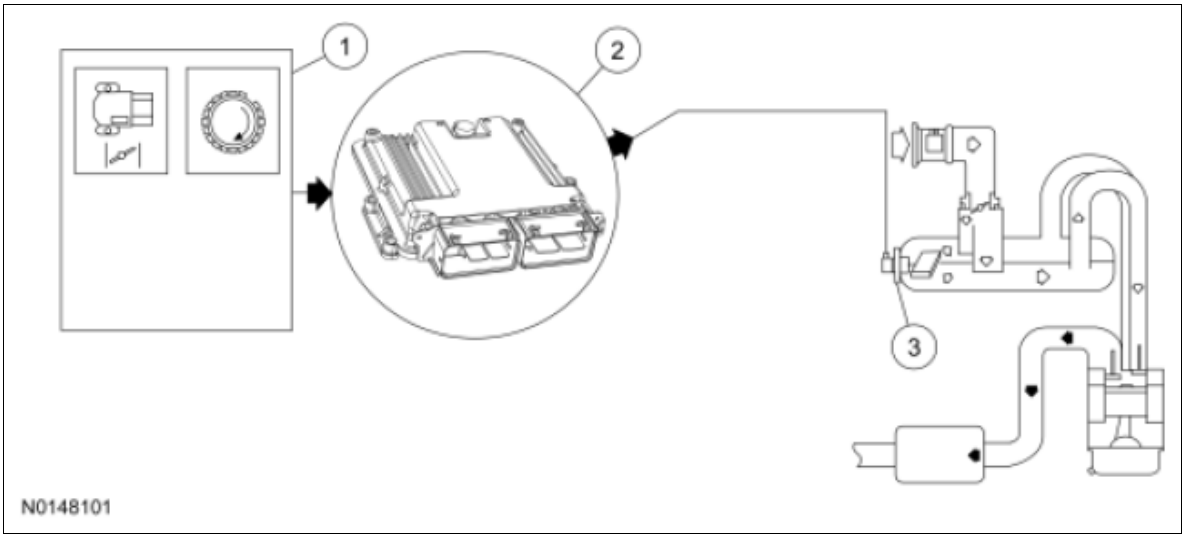
WARNING: SUBSTANTIAL OPENING AND CLOSING TORQUE IS APPLIED BY THIS SYSTEM. TO PREVENT INJURY, BE CAREFUL TO KEEP FINGERS AWAY FROM LEVER MECHANISMS WHEN ACTUATED. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN PERSONAL INJURY.

The IMTV is a motorized actuated unit mounted directly to the intake manifold. For additional information on IMTV components, refer to ENGINE CONTROL COMPONENTS in this service information.

The motorized IMTV unit is disabled below a calibrated RPM. The shutter is in the closed position preventing airflow blend in the intake manifold. Above a calibrated RPM the motorized unit is enabled. The motorized unit is initially commanded ON by the PCM at a 100 percent duty cycle to move the shutter to the open position, and then falling to approximately 50 percent to continue to hold the shutter open.

1. The PCM uses the TP sensor and CKP sensor signals to determine activation of the IMTV system. There must be a positive change in voltage from the TP sensor along with the increase in RPM to open the shutter.
2. The PCM uses the information from the input signals to control the IMTV.
3. When commanded ON by the PCM, the motorized actuator shutter opens up the end of the vertical separating wall at high engine speeds to allow both sides of the manifold to blend together.

Fig 1: IMTV System Flow Diagram



Courtesy of FORD MOTOR CO.

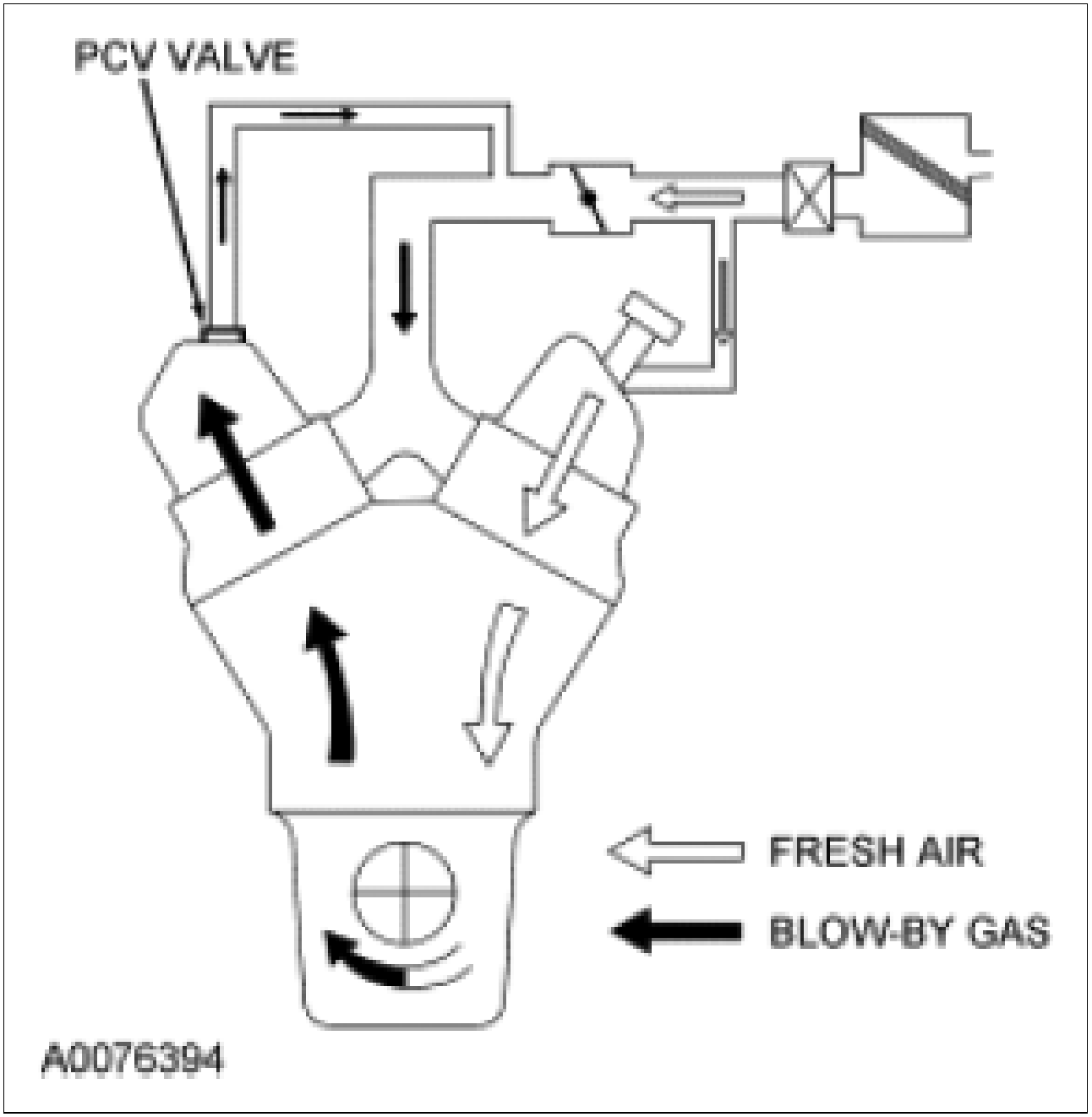
POSITIVE CRANKCASE VENTILATION (PCV) SYSTEM > OVERVIEW

The PCV system circulates crankcase gases through the intake air system into the engine where they are burned. The PCV system regulates the amount of ventilated air and blowby gases to the intake manifold.

The PCV system on some vehicles will include a crankcase pressure sensor to detect a disconnection of the fresh air hose.

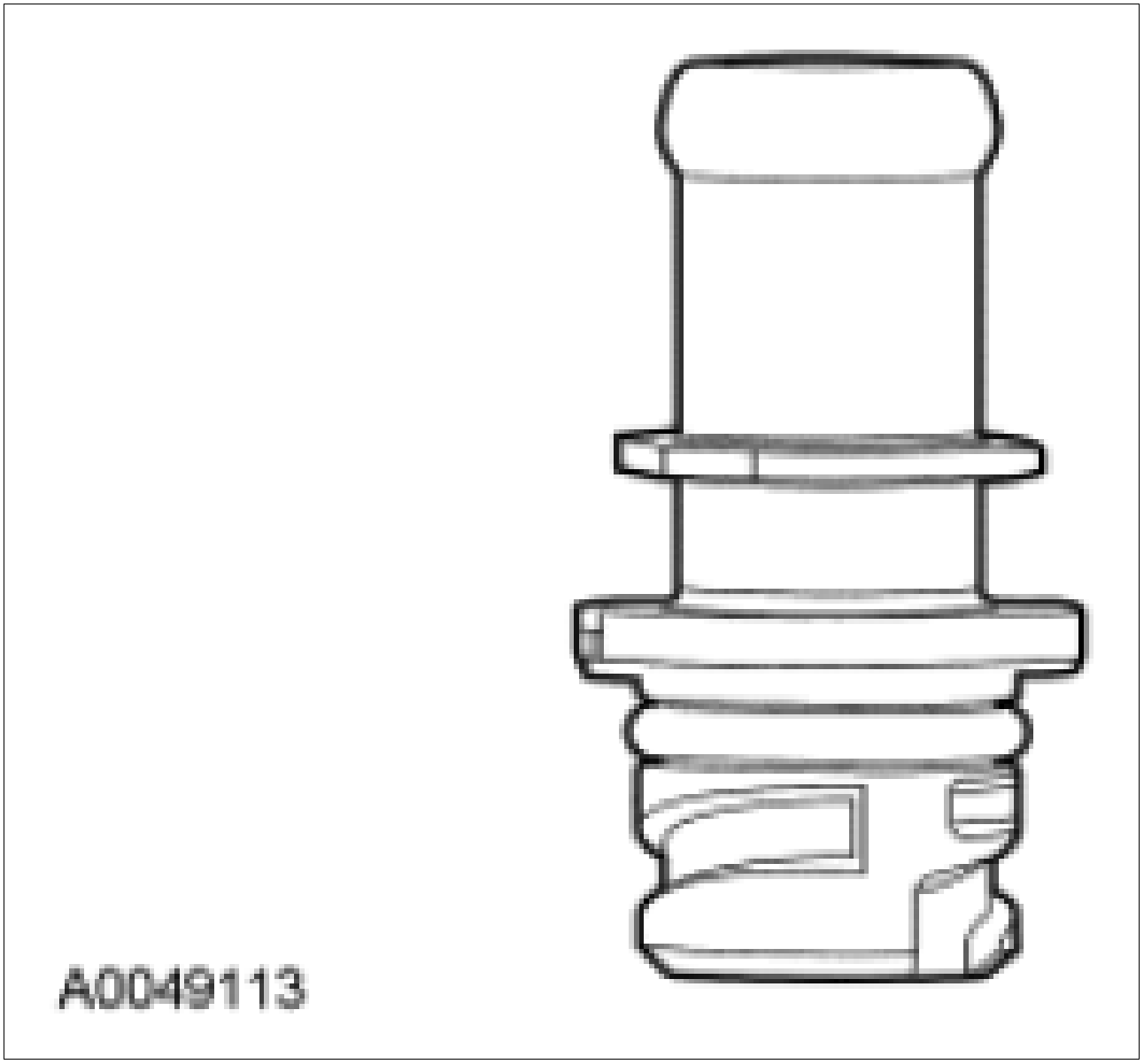
The PCV systems comply with on board diagnostics (OBD) PCV monitoring requirements to prevent accidental disconnection from the valve cover. For more information about the PCV monitor and crankcase pressure sensor, refer to POSITIVE CRANKCASE VENTILATION (PCV) SYSTEM MONITOR in this service informationn.

Fig 1: PCV System Flow Diagram (V-Engine)



Courtesy of FORD MOTOR CO.

Fig 2: Identifying Quarter Turn Cam Lock Design PCV



Courtesy of FORD MOTOR CO.

(TORQUE BASED) ELECTRONIC THROTTLE CONTROL (ETC) > OVERVIEW

The torque based ETC is a hardware and software strategy that delivers an engine output torque (via throttle angle) based on driver demand (pedal position). It uses an electronic throttle body throttle actuator control (TAC), the PCM, and an accelerator pedal assembly to control the throttle opening and engine torque.

Torque based ETC enables aggressive automatic transmission shift schedules (earlier upshifts and later downshifts). This is possible by adjusting the throttle angle to achieve the same wheel torque during shifts, and by calculating this desired torque, the system prevents engine lugging (low RPM and low manifold vacuum) while still delivering the performance and torque requested by the driver. It also enables many fuel economy/emission improvement technologies such as variable camshaft timing (VCT), which delivers same torque during transitions.

The torque based ETC system illuminates a powertrain malfunction indicator (wrench) on the instrument panel cluster (IPC) when a concern is present. Concerns are accompanied by diagnostic trouble codes (DTCs) and may also illuminate the malfunction indicator lamp (MIL).

(TORQUE BASED) ELECTRONIC THROTTLE CONTROL (ETC) > ELECTRONIC THROTTLE BODY THROTTLE ACTUATOR CONTROL (TAC)

For additional information on the electronic throttle body TAC, refer to ENGINE CONTROL COMPONENTS in this service information.

(TORQUE BASED) ELECTRONIC THROTTLE CONTROL (ETC) > ELECTRONIC THROTTLE BODY THROTTLE POSTION SENSOR

There is one reference voltage and one signal return circuit between the PCM and the electronic throttle body throttle position sensor. The reference voltage and the signal return circuits are shared with the reference voltage and signal return circuits used by the accelerator pedal position (APP) sensor. There are also 2 throttle position (TP) signal circuits for redundancy. The redundant TP signals are required for increased monitoring reasons. The first TP signal (TP1) has a negative slope (increasing angle, decreasing voltage) and the second TP signal (TP2) has a positive slope (increasing angle, increasing voltage). The TP2 signal reaches a limit of approximately 4.5 volts at approximately 45 degrees of throttle angle.

For additional information on the electronic throttle body throttle position sensor, refer to ENGINE CONTROL COMPONENTS in this service information.

(TORQUE BASED) ELECTRONIC THROTTLE CONTROL (ETC) > ACCELERATOR PEDAL POSITION (APP) SENSOR

For additional information on the APP sensor, refer to ENGINE CONTROL COMPONENTS in this service information.

(TORQUE BASED) ELECTRONIC THROTTLE CONTROL (ETC) > ELECTRONIC THROTTLE CONTROL (ETC) SYSTEM STRATEGY

The ETC strategy was developed to improve fuel economy and to accommodate variable camshaft timing. This is possible by not coupling the throttle angle to the driver pedal position. Uncoupling the throttle angle (produce engine torque) from the pedal position (driver demand) allows the powertrain control strategy to optimize fuel control and transmission shift schedules while delivering the requested wheel torque.

The ETC monitor system is distributed across 2 processors within the PCM: the main powertrain control processor unit (CPU) and a separate monitoring processor. The primary monitoring function is carried out by the independent plausibility checker software, which resides on the main processor. It is responsible for determining the driver demanded torque and comparing it to an estimate of the actual

torque delivered. If the generated torque exceeds driver demand by a specified amount, appropriate corrective action is taken.

ETC SYSTEM FAILURE MODE AND EFFECTS MANAGEMENT

Effect	Failure Mode
No Effect On Driveability	A loss of redundancy or loss of a non critical input could result in a concern that does not affect driveability. The powertrain malfunction indicator (wrench) illuminates, but the MIL does not illuminate in this mode. However, cruise control and power take off (PTO) may be disabled. A DTC sets to indicate the component or circuit with the concern.
Delayed APP Sensor Response With Brake Override	This mode is caused by the loss of one APP sensor input due to sensor, wiring, or PCM concerns. The system is unable to verify the APP sensor input and driver demand. The throttle plate response to the APP sensor input is delayed as the accelerator pedal is applied. The engine returns to idle RPM whenever the brake pedal is applied. The powertrain malfunction indicator (wrench) illuminates, but the MIL does not illuminate in this mode. An APP sensor related DTC sets.
Time Based Driver Demand With Brake Override	This mode is caused by the loss of one brake pedal position (BPP) and one APP sensor input or both APP sensor inputs due to sensor, wiring, or PCM concerns. The system is unable to determine driver demand. There is no response when the accelerator pedal is applied. The engine returns to idle RPM whenever the brake pedal is applied. When the brake pedal is released, the PCM slowly increases the APP signal to a fixed value. The powertrain malfunction indicator (wrench) illuminates, but the MIL does not illuminate in this mode. An APP or BPP sensor related DTC sets.
RPM Guard With Pedal Follower	In this mode, torque control is disabled due to the loss of a critical sensor or PCM concern. The throttle is controlled in pedal follower mode as a function of the APP sensor input only. A maximum allowed RPM is determined based on the position of the accelerator pedal (RPM Guard). If the actual RPM exceeds this limit, spark and fuel are used to bring the RPM below the limit. The powertrain malfunction indicator (wrench) and the MIL illuminate in this mode and a DTC for an ETC related component sets. The EGR and VCT outputs are set to default values and cruise control is disabled.
RPM Guard With Default Throttle	In this mode, the throttle plate control is disabled due to the loss of both TP sensor inputs, loss of throttle plate control, stuck throttle plate, significant processor concerns, or other major electronic throttle body concern. The spring returns the throttle plate to the default (limp home) position. A maximum allowed RPM is determined based on the position of the accelerator pedal (RPM Guard). If the actual RPM exceeds this limit, spark and fuel are used to bring the RPM below the limit. The powertrain malfunction indicator (wrench) and the MIL illuminate in this mode and a DTC for an ETC related component sets. The EGR and VCT outputs are set to default values and cruise control is disabled.

TURBOCHARGER AND CHARGE AIR COOLER (CAC) SYSTEMS > TURBOCHARGER SYSTEM

A turbocharger is an exhaust gas driven device used to increase the power output of an engine by the turbocharger compressor increasing the pressure of the air entering the engine. The turbocharger uses

exhaust gas energy to drive the turbine connected to the compressor. Compressing the air causes the temperature to increase. The CAC lowers the temperature of compressed air which increases the density of the air before entering the cylinder.

The 6 cylinder engine uses 2 turbochargers in a parallel arrangement with 1 turbine connected to the exhaust of each cylinder bank. This configuration improves engine responsiveness due to the reduced inertia of 2 small rotating assemblies in the place of 1 large rotating assembly while pumping adequate air to achieve the rated power. Emission compliance is achieved by mounting the catalysts very close to the turbo outlet.

The turbocharger bypass valve is used to create a path from the high pressure compressor outlet to the low pressure compressor inlet. This path recirculates airflow to reduce turbocharger lag and prevent unwanted air rush noise from the turbocharger on heavy throttle releases. The wastegate on the turbocharger turbine side is opened to reduce exhaust gas flow through the turbine when boost pressure is not needed. A pneumatic actuator controls the wastegate valve opening. The turbocharger wastegate is controlled by the PCM through a pulse width modulated (PWM) turbocharger wastegate regulating valve solenoid. The turbocharger wastegate regulating valve solenoid supplies pressure to the wastegate actuator to open the poppet style wastegate valve. The wastegate may be pressure or vacuum actuated, and the poppet style wastegate valve could be normally opened or normally closed at idle or low engine airflow conditions depending on vehicle configuration and requirements such as fuel economy and boost performance. The 6 cylinder wastegates are coupled by having one control output from the turbocharger wastegate regulating valve solenoid that drives both turbocharger wastegate actuators.

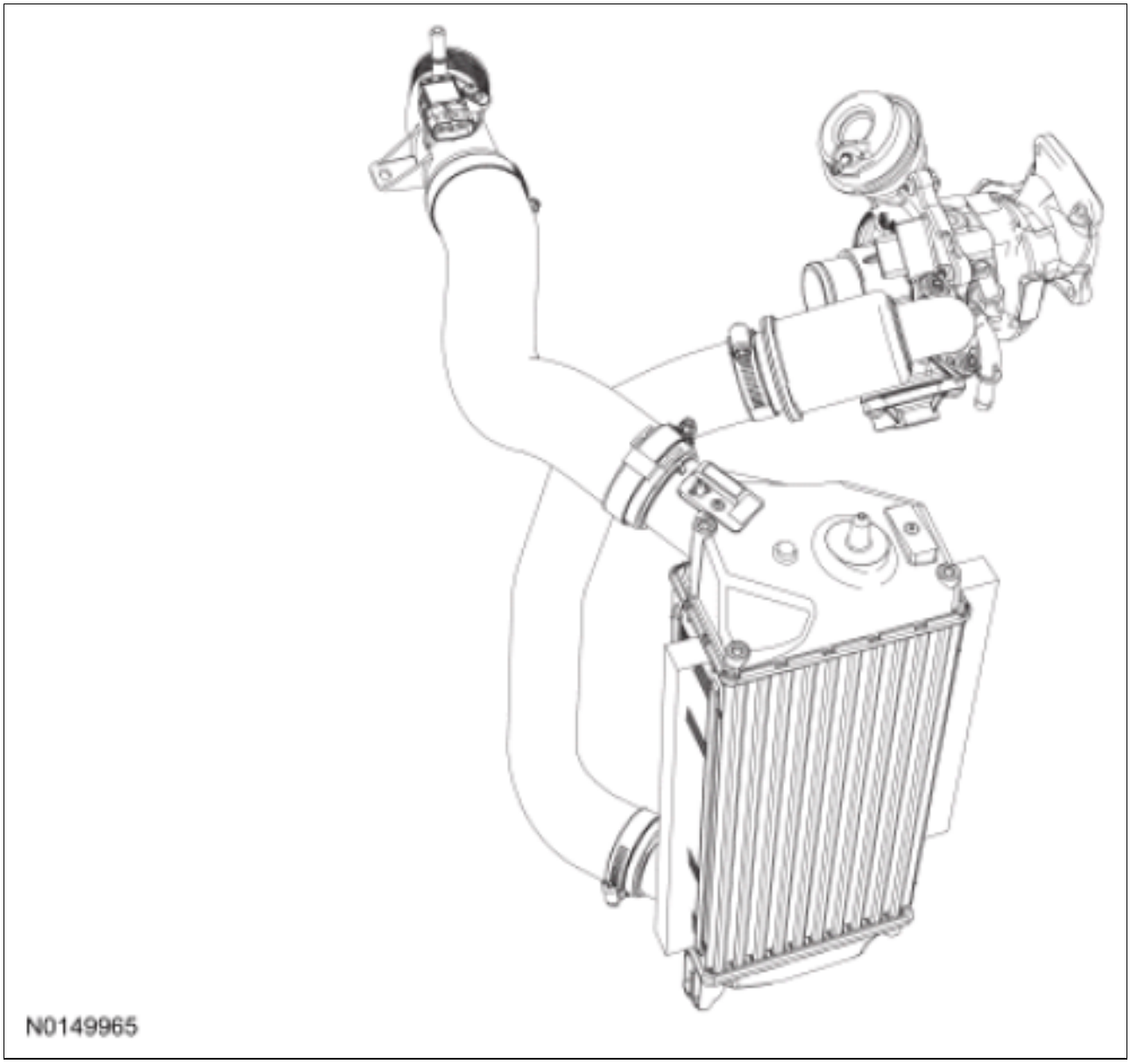
The 4 cylinder system uses only 1 turbocharger, 1 turbocharger wastegate and 1 turbocharger bypass valve. The turbocharger bypass valve can be electric or pneumatic and may be mounted in the intake air system or in the turbocharger housing.

The 3 cylinder system uses only 1 turbocharger, 1 turbocharger wastegate and 1 turbocharger bypass valve. The turbocharger bypass valve is mounted in the turbocharger housing and is PCM controlled.

TURBOCHARGER AND CHARGE AIR COOLER (CAC) SYSTEMS > TURBOCHARGER SYSTEM > CHARGE AIR COOLER (CAC) SYSTEM - AIR TO AIR COOLED

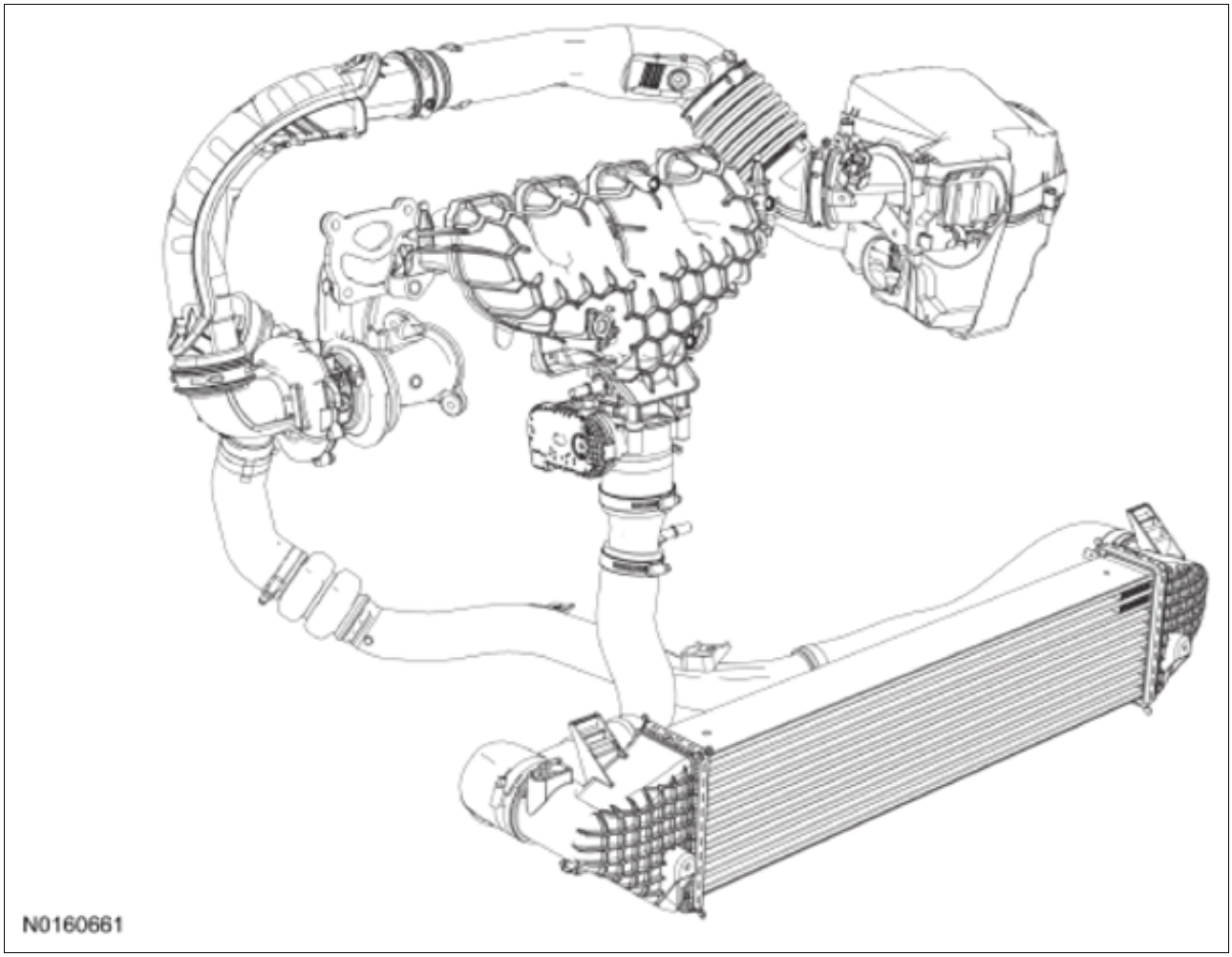
The CAC system cools the intake air which has been heated by the turbocharger. The removal of heat from the pressurized air going into the CAC increases the air density which improves combustion efficiency, engine horsepower, and torque. The system consists of a CAC radiator in the grille and tubing to interconnect these components. The CAC is positioned after the turbocharger directly in the flow of the intake air. As the heated air flows through the CAC, it is cooled by the airflow through the grille. The PCM maintains a desirable intake air temperature by monitoring the TCBP/CACT (located at the throttle body) and the MAP/IAT2 (located at the intake manifold) sensors.

Fig 1: Identifying 3 Cylinder Turbocharger System - Air To Air Cooled



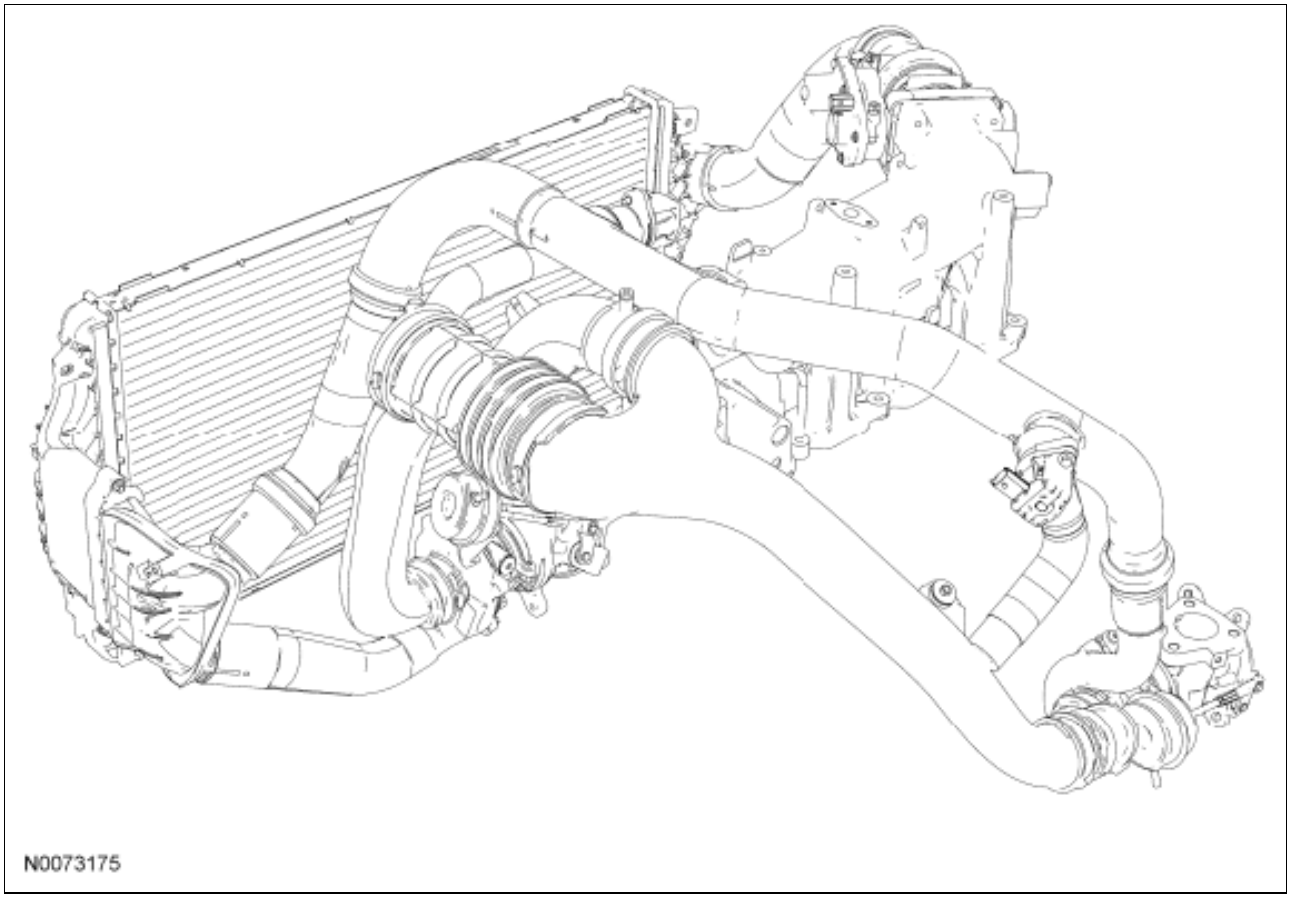
Courtesy of FORD MOTOR CO.

Fig 2: Identifying 4 Cylinder Turbocharger System - Air To Air Cooled



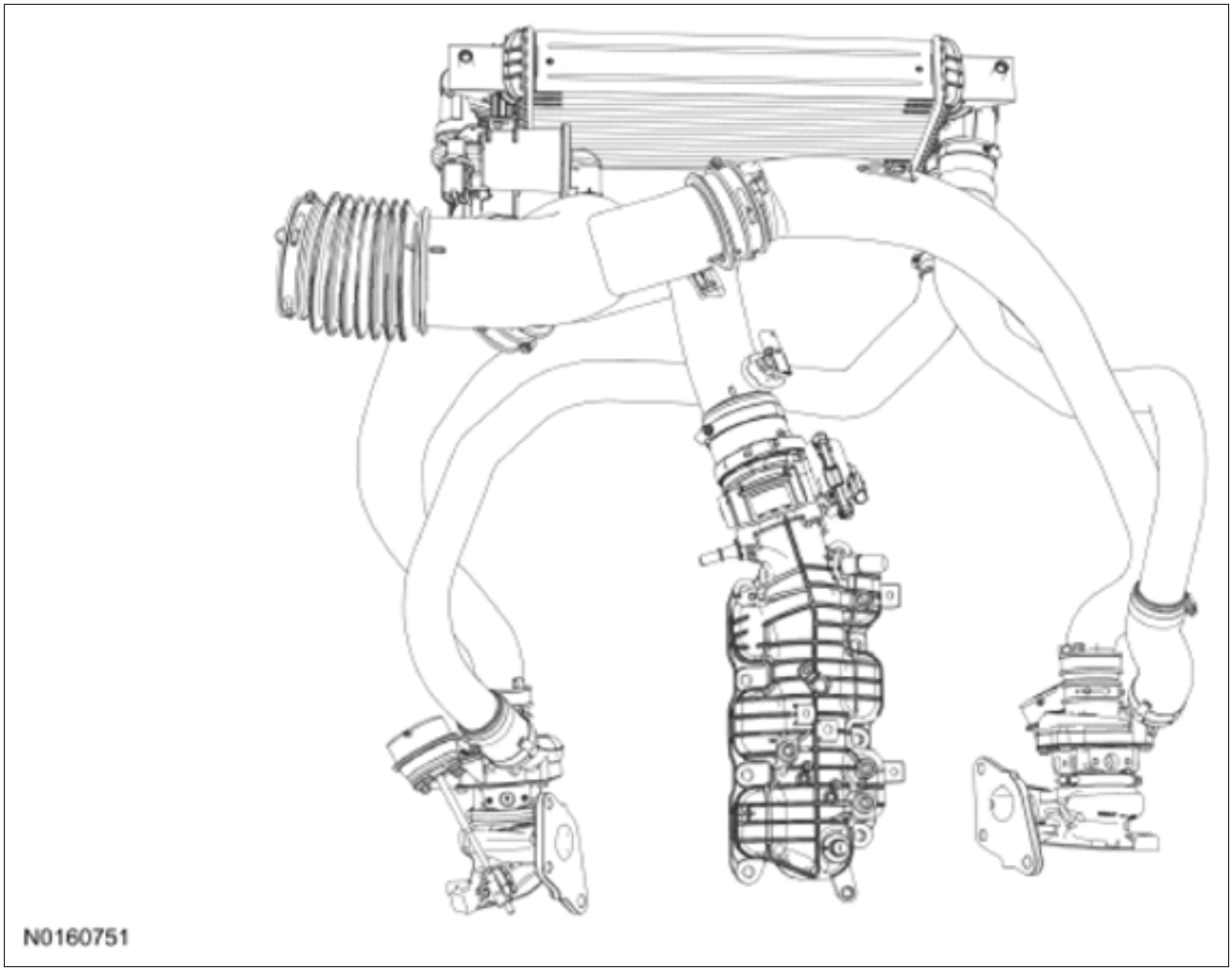
Courtesy of FORD MOTOR CO.

Fig 3: Identifying 6 Cylinder Turbocharger System - Air To Air Cooled (FWD And AWD)



Courtesy of FORD MOTOR CO.

Fig 4: Identifying 6 Cylinder Turbocharger System - Air To Air Cooled (RWD And 4WD)

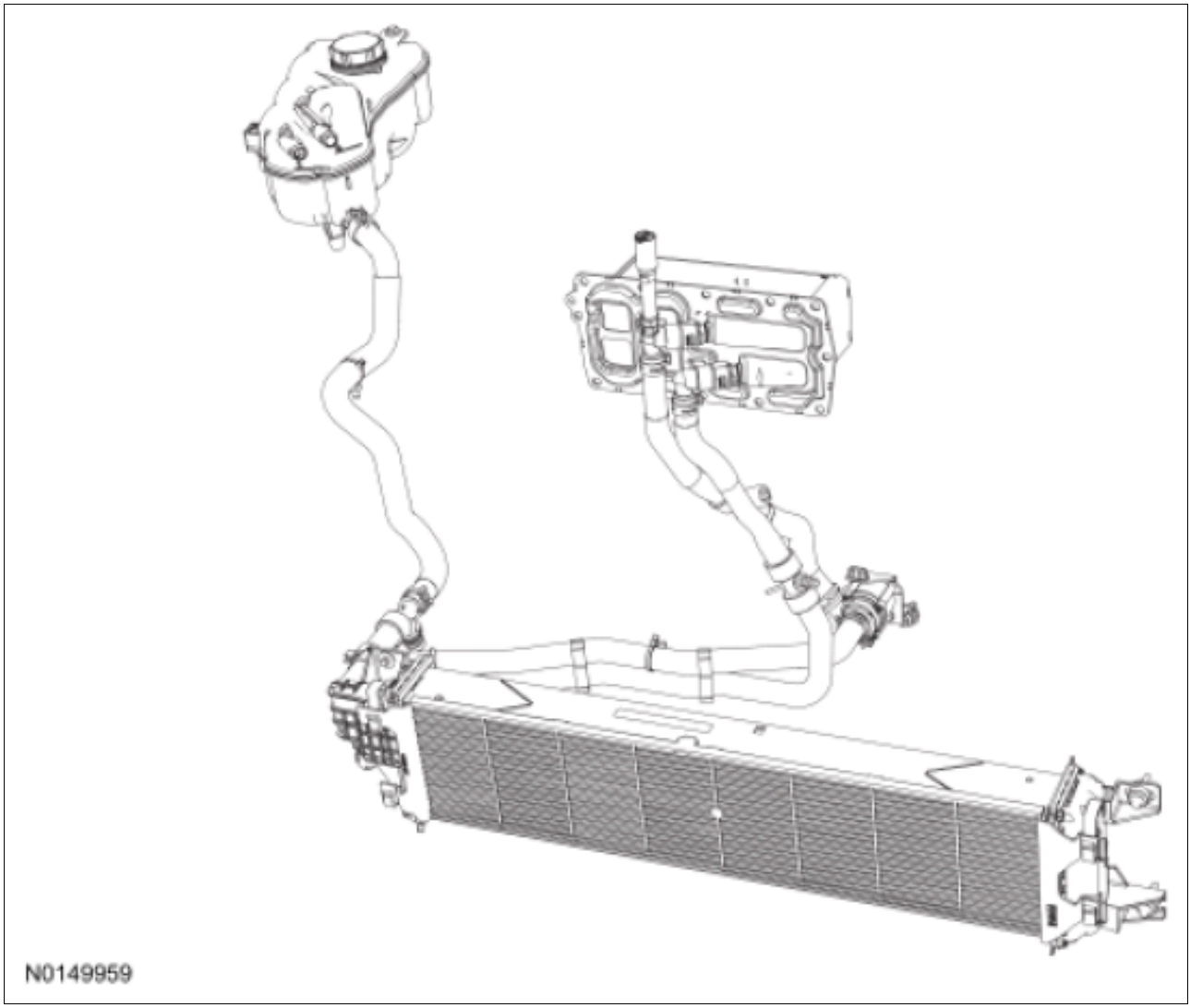


Courtesy of FORD MOTOR CO.

TURBOCHARGER AND CHARGE AIR COOLER (CAC) SYSTEMS > TURBOCHARGER SYSTEM > CHARGE AIR COOLER (CAC) SYSTEM - AIR TO LIQUID COOLED

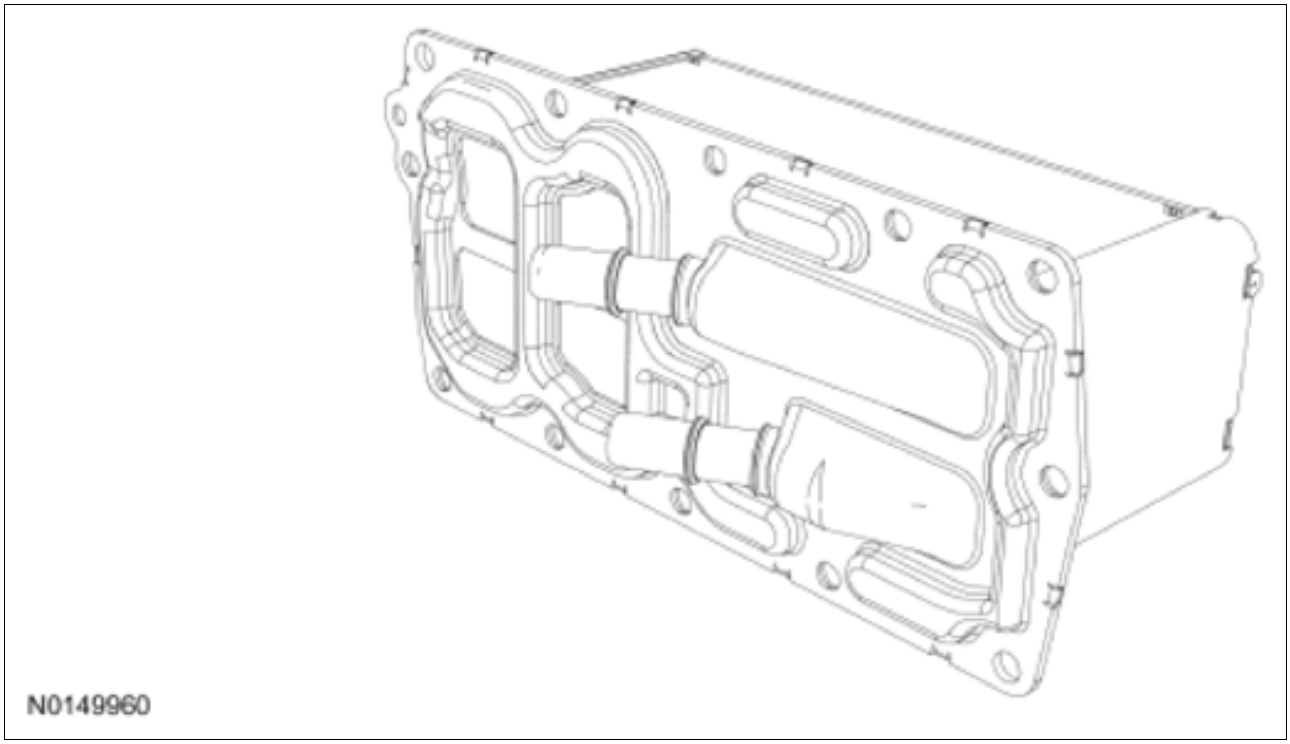
The CAC system cools the intake air which has been heated by the turbocharger. The removal of heat from the pressurized air going into the CAC increases the air density which improves combustion efficiency, engine horsepower, and torque. The system consists of an additional CAC radiator in the grille, a reservoir, an electric water pump, the CAC located in the intake manifold, and tubing to interconnect these components. The CAC is positioned after the turbocharger directly in the flow of the intake air. As the heated air flows through the CAC, heat is transferred to the coolant which is circulated back to the CAC radiator to be cooled by the airflow through the grille. The CAC pump is controlled by PCM. The PCM maintains a desirable intake air temperature by monitoring the CAC coolant temperature sensor in the CAC radiator.

Fig 1: Identifying CAC System - Air To Liquid Cooled



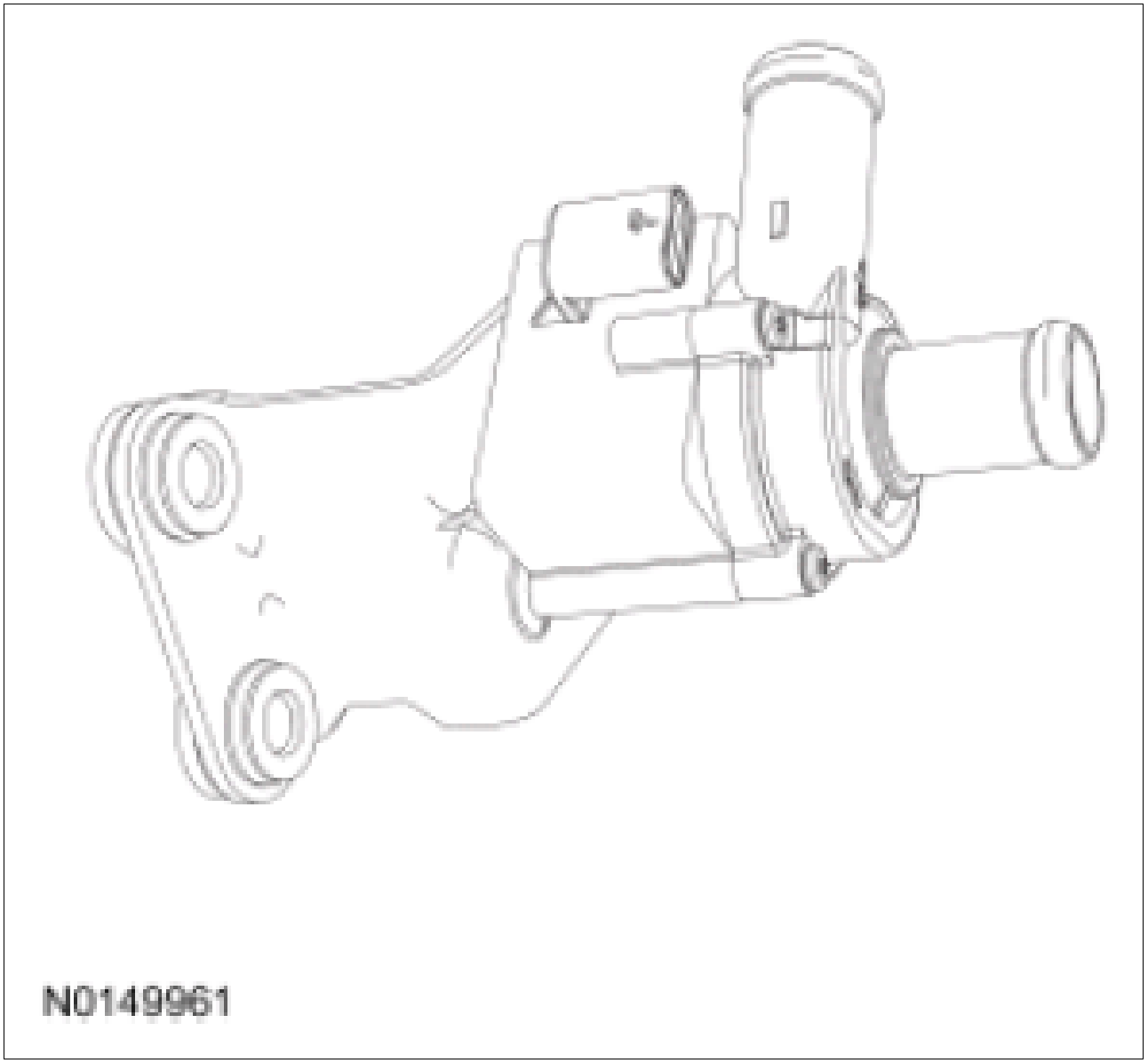
Courtesy of FORD MOTOR CO.

Fig 2: Identifying CAC - Air To Liquid Cooled



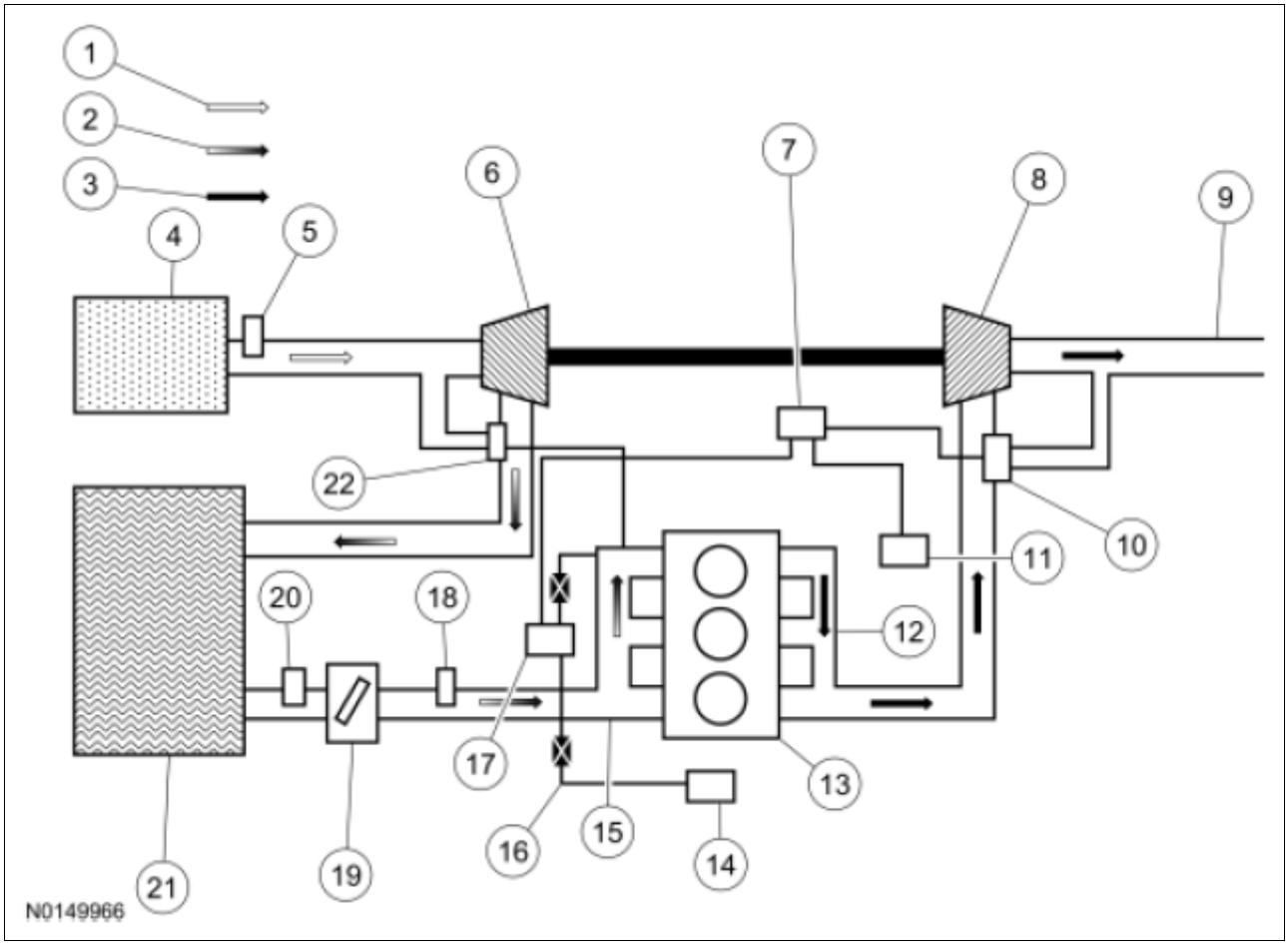
Courtesy of FORD MOTOR CO.

Fig 3: Identifying CAC Pump - Air To Liquid Cooled



Courtesy of FORD MOTOR CO.

Fig 4: 3 Cylinder Turbocharger Airflow Diagram - Vacuum Actuated Wastegate

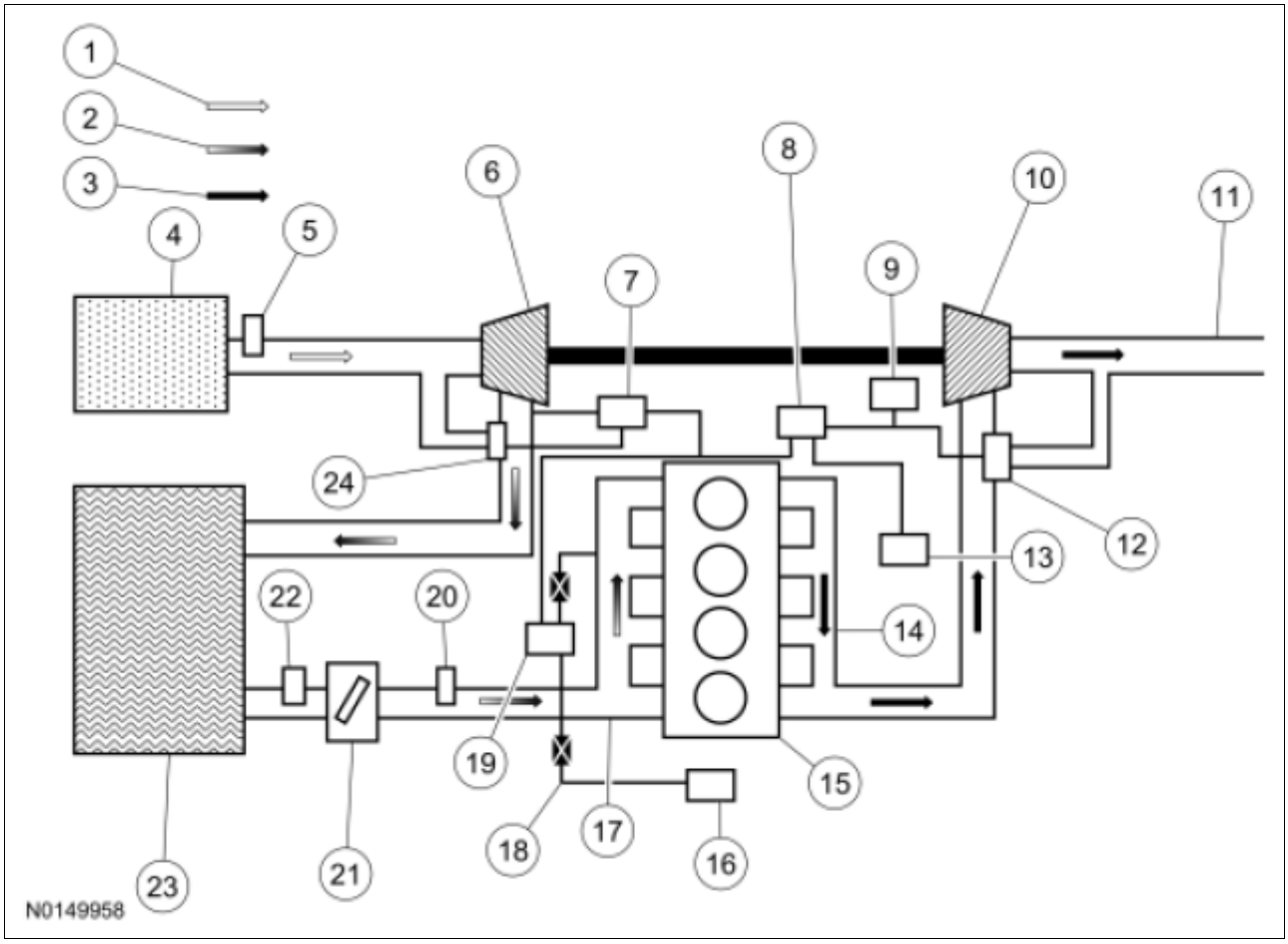


Courtesy of FORD MOTOR CO.

Turbocharger System	Component
1	Intake Air
2	Compressed Air
3	Exhaust Air
4	Air Filter
5	MAF/IAT Sensor
6	Turbocharger Intake Compressor
7	Turbocharger Wastegate Regulating Valve Solenoid
8	Turbocharger Exhaust Turbine
9	Outlet To Exhaust System
10	Turbocharger Wastegate
11	Turbocharger Wastegate Regulating Valve Solenoid Vent

12	Exhaust Manifold
13	Cylinder Head
14	Vacuum Pump
15	Intake Manifold
16	Vacuum Supply
17	Vacuum Reservoir
18	MAP Sensor
19	Intake Throttle Assembly
20	Turbocharger Boost Pressure/Charger Air Cooler Temperature (TCBP/CACT) Sensor
21	CAC
22	Turbocharger Bypass Valve

Fig 5: 4 Cylinder Turbocharger Airflow Diagram - Vacuum Actuated Wastegate

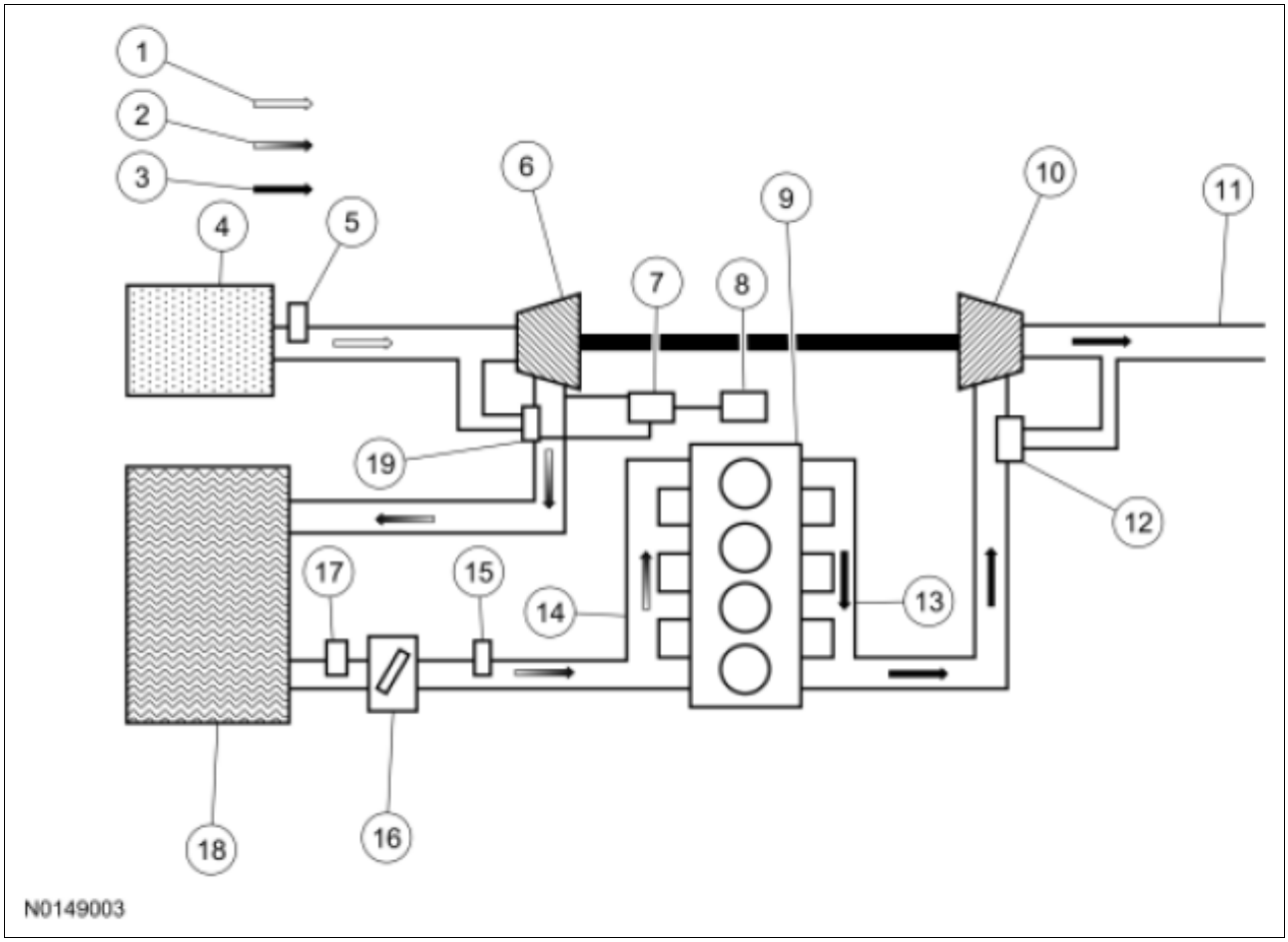


Courtesy of FORD MOTOR CO.

Turbocharger	Component

System	
1	Intake Air
2	Compressed Air
3	Exhaust Air
4	Air Filter
5	IAT Sensor
6	Turbocharger Intake Compressor
7	Turbocharger Bypass Valve Solenoid
8	Turbocharger Wastegate Regulating Valve Solenoid
9	Wastegate Vacuum Sensor
10	Turbocharger Exhaust Turbine
11	Outlet To Exhaust System
12	Turbocharger Wastegate
13	Turbocharger Wastegate Regulating Valve Solenoid Vent
14	Exhaust Manifold
15	Cylinder Head
16	Vacuum Pump
17	Intake Manifold
18	Vacuum Supply
19	Vacuum Reservoir
20	MAP Sensor
21	Intake Throttle Assembly
22	Turbocharger Boost Pressure/Charger Air Cooler Temperature (TCBP/CACT) Sensor
23	CAC
24	Turbocharger Bypass Valve

Fig 6: 4 Cylinder Turbocharger Airflow Diagram - Pressure Actuated Wastegate

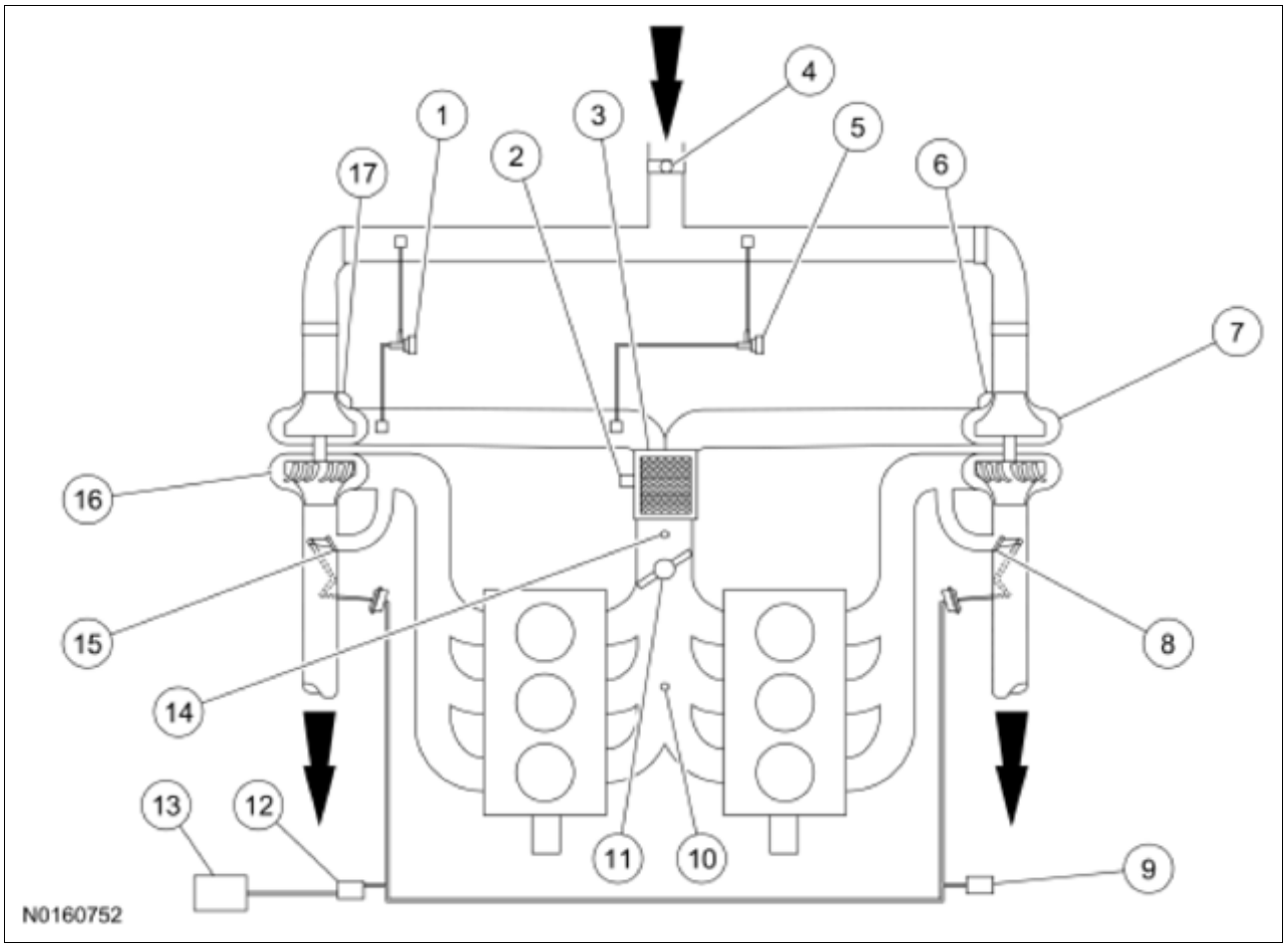


Courtesy of FORD MOTOR CO.

Turbocharger System	Component
1	Intake Air
2	Compressed Air
3	Exhaust Air
4	Air Filter
5	MAF/IAT Sensor (MAF Not Used)
6	Turbocharger Intake Compressor
7	Turbocharger Bypass Valve Solenoid
8	Vacuum Pump
9	Cylinder Head
10	Turbocharger Exhaust Turbine
11	Outlet To Exhaust System

12	Turbocharger Wastegate
13	Exhaust Manifold
14	Intake Manifold
15	MAP Sensor
16	Intake Throttle Assembly
17	Turbocharger Boost Pressure/Charger Air Cooler Temperature (TCBP/CACT) Sensor
18	CAC
19	Turbocharger Bypass Valve

Fig 7: 6 Cylinder Turbocharger Airflow Diagram



Courtesy of FORD MOTOR CO.

Turbocharger System	Component
1	Turbocharger Bypass Valve Left Bank (Bank 2) (If Equipped)
2	Turbocharger Bypass Valve (Integrated in Charge Air Cooler) (If Equipped)

3	Charge Air Cooler (CAC)
4	Turbocharger Intake Pressure And Temperature (TCIPT) Sensor (If Equipped)
5	Turbocharger Bypass Valve Right Bank (Bank 1) (If Equipped)
6	Turbocharger Bypass Valve Right Bank (Bank 1) (Integrated In Turbocharger) (If Equipped)
7	Turbocharger Right Bank (Bank 1)
8	Wastegate Right Bank (Bank 1)
9	Wastegate Vacuum Sensor (WVS)
10	Manifold Absolute Pressure/Intake Air Temperature 2 (MAP/IAT2) Sensor
11	Throttle Body
12	Turbocharger Wastegate Regulating Valve Solenoid (TCWRVS)
13	Vacuum Pump
14	Turbocharger Boost Pressure/Charger Air Cooler Temperature (TCBP/CACT) Sensor
15	Wastegate Left Bank (Bank 2)
16	Turbocharger Left Bank (Bank 2)
17	Turbocharger Bypass Valve Left Bank (Bank 2) (Integrated In Turbocharger) (If Equipped)

VARIABLE CAMSHAFT TIMING (VCT) SYSTEM > OVERVIEW

The VCT system enables rotation of the camshafts relative to the crankshaft rotation as a function of engine operating conditions. There are 4 types of VCT systems.

- Exhaust phase shifting (EPS) - the exhaust cam is the active cam being retarded.
- Intake phase shifting (IPS) - the intake cam is the active cam being advanced.
- Dual equal phase shifting (DEPS) - both intake and exhaust cams are phase shifted and equally advanced or retarded.
- Twin independent phase shifting - where both the intake and exhaust cams are shifted independently.

All systems have 4 operational modes: idle, part throttle, wide open throttle (WOT), and default mode. At idle and low engine speeds with closed throttle, the powertrain control module (PCM) determines the phase angle based on airflow, engine oil temperature and engine coolant temperature. At part and wide open throttle the PCM determines the phase angle based on engine RPM, load, and throttle position. VCT systems provide reduced emissions and enhanced engine power, fuel economy and idle quality. IPS systems also have the added benefit of improved torque. In addition, some VCT system applications can eliminate the need for an external exhaust gas recirculation (EGR) system. The elimination of the EGR system is accomplished by controlling the overlap time between the intake valve opening and exhaust valve closing.

The VCT system knocking and noise concerns are diagnosed in the service information. For additional information, refer to the service information , Engine System - General Information. Verification of incorrect VCT phasing on a warm engine operating below 1500 RPM can be isolated using a stethoscope and by monitoring the PIDs using a scan tool. If the VCT phaser does not maintain correct valve timing, low oil pressure or oil flow restrictions are primary possible causes. Verify correct oil pressure and flow, refer to the service information , Engine System - General Information.

PID	Description
VCTADV, VCTADV2, VCT_INT_ACT1, VCT_EXH_ACT1, VCT_INT_ACT2 and VCT_EXH_ACT2	Monitors the VCT advance and displays the advance angle in degrees. The actual camshaft position is measured using the camshaft position (CMP) sensor.
VCT1_F, VCT2_F, VCT1_INTK_F, VCT1_EXH_F, VCT2_INTK_F and VCT2_EXH_F	Displays FAULT or NO FAULT to indicate a VCT related concern is detected. The CMP circuit DTCs cause the VCT advance to default to 0. Correct any CMP DTCs prior to diagnosing engine timing or VCT DTCs.
VCTADVERR, VCTADVERR2, VCT_INTK_DIFF1, VCT_EXH_DIFF1, VCT_INTK_DIFF2 and VCT_EXH_DIFF2	Displays the error in VCT advance. The CMP signal is used to determine the difference between the actual camshaft position and the camshaft advance requested. The difference is displayed as a percentage that ranges from -5 to +5%. When the accelerator pedal is cycled this may range as high as 20%.
VCTDC, VCTDC2, VCT_INTK_DC1, VCT_EXH_DC1, VCT_INTK_DC2 and VCT_EXH_DC2	Variable camshaft timing duty cycle ranges from 0 to 100%. The PCM controls the VCT solenoid operation through the duty cycled ground.
VCTSYS	Variable camshaft timing system displays whether the engine is in open or closed loop. In open loop, the PCM defaults the VCT system to OFF (0% duty cycle). In closed loop, the PCM turns the VCT system to ON (varies the VCT duty cycle). If a VCT DTC is detected, the VCT system defaults to open loop operation.

VARIABLE CAMSHAFT TIMING (VCT) SYSTEM > VCT SYSTEM

The VCT system consists of an electric hydraulic positioning control solenoid, a camshaft position (CMP) sensor, and a trigger wheel. The CMP sensor trigger wheel indicates the camshaft position signal for that bank. A crankshaft position (CKP) sensor provides the PCM with crankshaft positioning information in 10 degree increments.

1. The PCM receives input signals from the intake air temperature (IAT), engine coolant temperature (ECT), CMP, throttle position (TP), mass airflow (MAF), and CKP sensors to determine the operating conditions of the engine. At idle and low engine speeds with closed throttle, the PCM controls the camshaft position based on engine coolant temperature, engine oil temperature, intake air temperature, and mass airflow. During part and wide open throttle, the camshaft position is determined by engine RPM, load and throttle position. The VCT system does not operate until the engine is at normal operating temperature.
2. The VCT system is enabled by the PCM when the correct conditions are met.

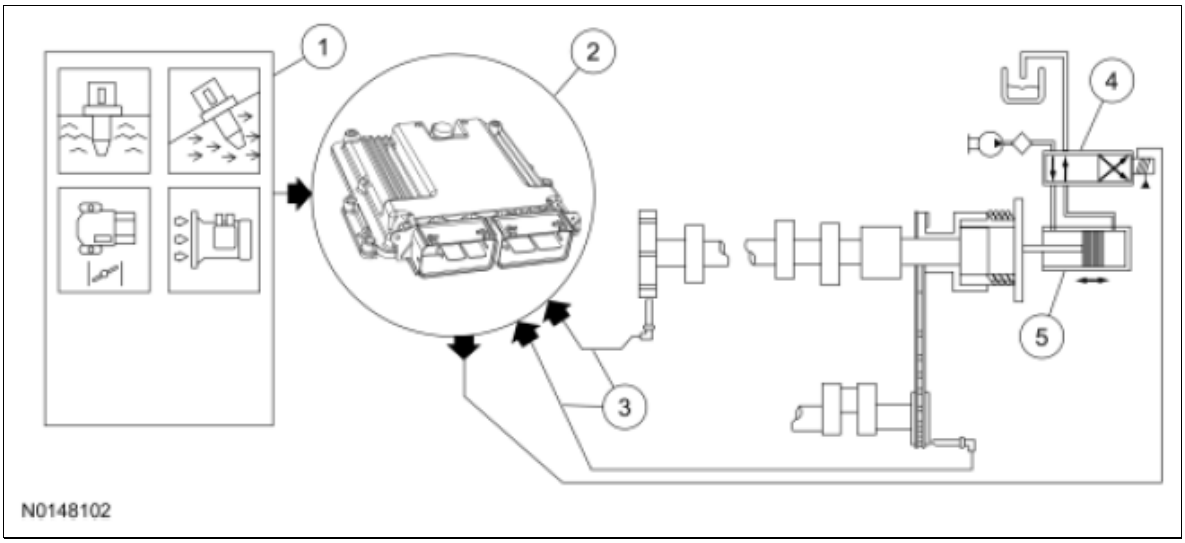
3. The CKP signal is used as a reference for camshaft positioning.

4. The VCT solenoid valve is an integral part of the VCT system. The solenoid valve controls the flow of engine oil in the VCT actuator assembly. As the PCM controls the duty cycle of the solenoid valve, oil pressure/flow advances or retards the cam timing. Duty cycles near 0% or 100% represent rapid movement of the camshaft. Retaining a fixed camshaft position is accomplished by dithering (oscillating) the solenoid valve duty cycle.

   The PCM calculates and determines the desired camshaft position. It continually updates the VCT solenoid duty cycle until the desired position is achieved. A difference between the desired and actual camshaft position represents a position error in the PCM VCT control loop. The PCM disables the VCT and places the camshaft in a default position if a concern is detected. A related DTC also sets when the concern is detected.

5. When the VCT solenoid is energized, engine oil is allowed to flow to the VCT actuator assembly which advances or retards the camshaft timing. One half of the VCT actuator is coupled to the camshaft and the other half is connected to the timing chain. Oil chambers between the 2 halves couple the camshaft to the timing chain. When the flow of oil is shifted from one side of the chamber to the other, the differential change in oil pressure forces the camshaft to rotate in either an advance or retard position depending on the oil flow.

   Fig 1: VCT System Diagram



Courtesy of FORD MOTOR CO.

ON BOARD DIAGNOSTICS (OBD) MONITORS > OBD I, OBD II AND ENGINE MANUFACTURER DIAGNOSTICS (EMD) OVERVIEW

The California Air Resources Board (CARB) began regulating OBD systems for vehicles sold in California beginning with the 1988 model year. The initial requirements, known as OBD I, required identifying the likely area of concern with regard to the fuel metering system, exhaust gas recirculation (EGR) system, emission related components and the PCM. A malfunction indicator lamp (MIL) was required to illuminate and alert the driver of the concern and the need to repair the emission control system. A DTC was required to assist in identifying the system or component associated with the concern.

Starting with the 1994 model year, both CARB and the Environmental Protection Agency (EPA) mandated enhanced OBD systems, commonly known as OBD II. The objectives of the OBD II system are to improve air quality by reducing high in-use emissions caused by emission related concerns, reducing the time between the occurrence of a concern and its detection and repair, and assisting in the diagnosis and repair of emission related problems.

ON BOARD DIAGNOSTICS (OBD) MONITORS > OBD I, OBD II AND ENGINE MANUFACTURER DIAGNOSTICS (EMD) OVERVIEW > OBD I SYSTEMS

OBD I vehicles use the same PCM, controller area network (CAN) serial data communication link, J1962 Data Link Connector, and PCM software as the corresponding OBD II vehicle. The only difference is the possible removal of the rear oxygen sensors, fuel tank pressure (FTP) sensor, EVAP canister vent valve, and a different PCM calibration. Starting in the 2006 model year, all Federal vehicles from 8, 500 to 14, 000 lbs. Gross Vehicle Weight Rating (GVWR) will have been phased into OBD II and OBD I systems will no longer be utilized in vehicles up to 14, 000 lbs. GVWR.

ON BOARD DIAGNOSTICS (OBD) MONITORS > OBD I, OBD II AND ENGINE MANUFACTURER DIAGNOSTICS (EMD) OVERVIEW > OBD II SYSTEMS

The OBD II system monitors virtually all emission control systems and components that can affect tailpipe or evaporative emissions. In most cases, concerns must be detected before emissions exceed 1.5 times the applicable 120, 000 or 150, 000 mile emission standards. Partial zero emission vehicles (PZEV) and super ultra low emission vehicles (SULEV-II) can use 2.5 times the standard in place of the 1.5 times the standard. If a system or component exceeds emission thresholds or does not operate within a manufacturer's specifications, a DTC is stored and the MIL is illuminated within 2 drive cycles.

The OBD II system monitors for concerns either continuously (regardless of driving mode) or non-continuously (once per drive cycle during specific drive modes). A pending DTC is stored in the PCM keep alive memory (KAM) when a concern is initially detected. Pending DTCs are displayed as long as the concern is present. OBD regulations require a complete concern free monitoring cycle to occur before erasing a pending DTC. This means that a pending DTC is erased on the next power up after a concern free monitoring cycle. However, if the concern is still present after 2 consecutive drive cycles, the MIL is illuminated. Once the MIL is illuminated, 3 consecutive drive cycles without a concern being detected are required to extinguish the MIL. The DTC is erased after 40 engine warm-up cycles once the MIL is extinguished.

In addition to specifying and standardizing much of the diagnostics and MIL operation, OBD requires the use of a standard data link connector (DLC), standard communication links and messages, standardized DTCs and terminology. Examples of standard diagnostic information are freeze frame data and inspection/maintenance (I/M) readiness indicators.

Freeze frame data describes data stored in KAM at the point the concern is initially detected and the pending DTC is stored. Freeze frame data consists of parameters such as engine RPM, engine load, vehicle speed or throttle position. Freeze frame data is updated when the concern is detected again on a subsequent drive cycle and a confirmed DTC is stored; however, a previously stored freeze frame is overwritten if a higher priority fuel or misfire concern is detected. This data is accessible with the scan tool to allow duplicating the conditions when the concern occurred in order to assist in repairing the vehicle.

OBD I/M readiness indicators show whether all of the OBD monitors have been completed since the last time the KAM or the PCM DTCs have been cleared. Ford vehicles blink the MIL after 15 seconds of ignition ON engine OFF time to indicate that some monitors have not completed. In some states, it may be necessary to carry out an OBD check in order to renew a vehicle registration. The I/M readiness indicators must show that all monitors have been completed prior to the OBD check.

Starting in the 1996 model year, OBD II was required on all California and California State gasoline engine vehicles up to 14, 000 lbs. GVWR. Starting in the 1997 model year, diesel engine vehicles up to 14, 000 lbs. GVWR required OBD II.

California states are ones that have adopted California emission regulations, starting in the 1998 model year. For example, Connecticut, Maine, Massachusetts, New Jersey, New York, Oregon, Pennsylvania, Rhode Island, Vermont and Washington have adopted California's emission regulations. These states receive California-certified vehicles for passenger cars, light trucks, and medium-duty vehicles up to 14, 000 lbs GVWR.

Starting in the 1996 model year, OBD II was also required on all Federal gasoline engine vehicles up to 8, 500 lbs. GVWR. Starting in the 1997 model year, diesel engine vehicles up to 8, 500 lbs. GVWR required OBD II.

Starting in the 2004 model year, Federal vehicles over 8, 500 lbs. are required to phase in OBD II. Starting in the 2004 model year, gasoline fueled medium duty passenger vehicles (MDPVs) are required to have OBD II. By the 2006 model year, all Federal vehicles from 8, 500 to 14, 000 lbs. GVWR will have been phased into OBD II.

ON BOARD DIAGNOSTICS (OBD) MONITORS > OBD I, OBD II AND ENGINE MANUFACTURER DIAGNOSTICS (EMD) OVERVIEW > HEAVY DUTY (HD) OBD II SYSTEMS

Starting in the 2010 model year, California and Federal gasoline fueled and diesel fueled on road heavy duty engines used in vehicles over 14, 000 lbs. GVWR are required to phase into HD OBD II. All vehicles over 14, 000 lbs. GVWR must comply for the 2013 model year. Vehicles that do not comply with HD OBD II during the phase in period must comply with EMD+.

ON BOARD DIAGNOSTICS (OBD) MONITORS > OBD I, OBD II AND ENGINE MANUFACTURER DIAGNOSTICS (EMD) OVERVIEW > EMD SYSTEMS

EMD was required on all 2007 model year and beyond California gasoline and diesel fueled on road heavy duty engines used in vehicles over 14, 000 lbs GVWR. EMD systems are required to functionally monitor the fuel delivery system, exhaust gas recirculation (EGR) system, particulate matter trap, as well as emission related PCM inputs for circuit continuity and rationality, and emission related outputs for circuit continuity and functionality. For gasoline engines which have no particulate matter trap, EMD requirements are very similar to current OBD I system requirements. As such, OBD I system philosophy is employed, the only change being the addition of some comprehensive component monitor (CCM) rationality and functionality checks.

The EMD vehicles use the same PCM, CAN, serial data communication link, J1962 DLC, and PCM software as the corresponding OBD II vehicle. The only difference is the possible removal of the rear oxygen sensors, FTP sensor, EVAP canister vent valve, and a different PCM calibration.

Starting in the 2010 model year, EMD requires functional monitoring of the NO_X aftertreatment system on gasoline engines. This requirement is commonly known as EMD+.

The following list indicates what monitors and functions have been altered from OBD II for gasoline engine EMD calibrations:

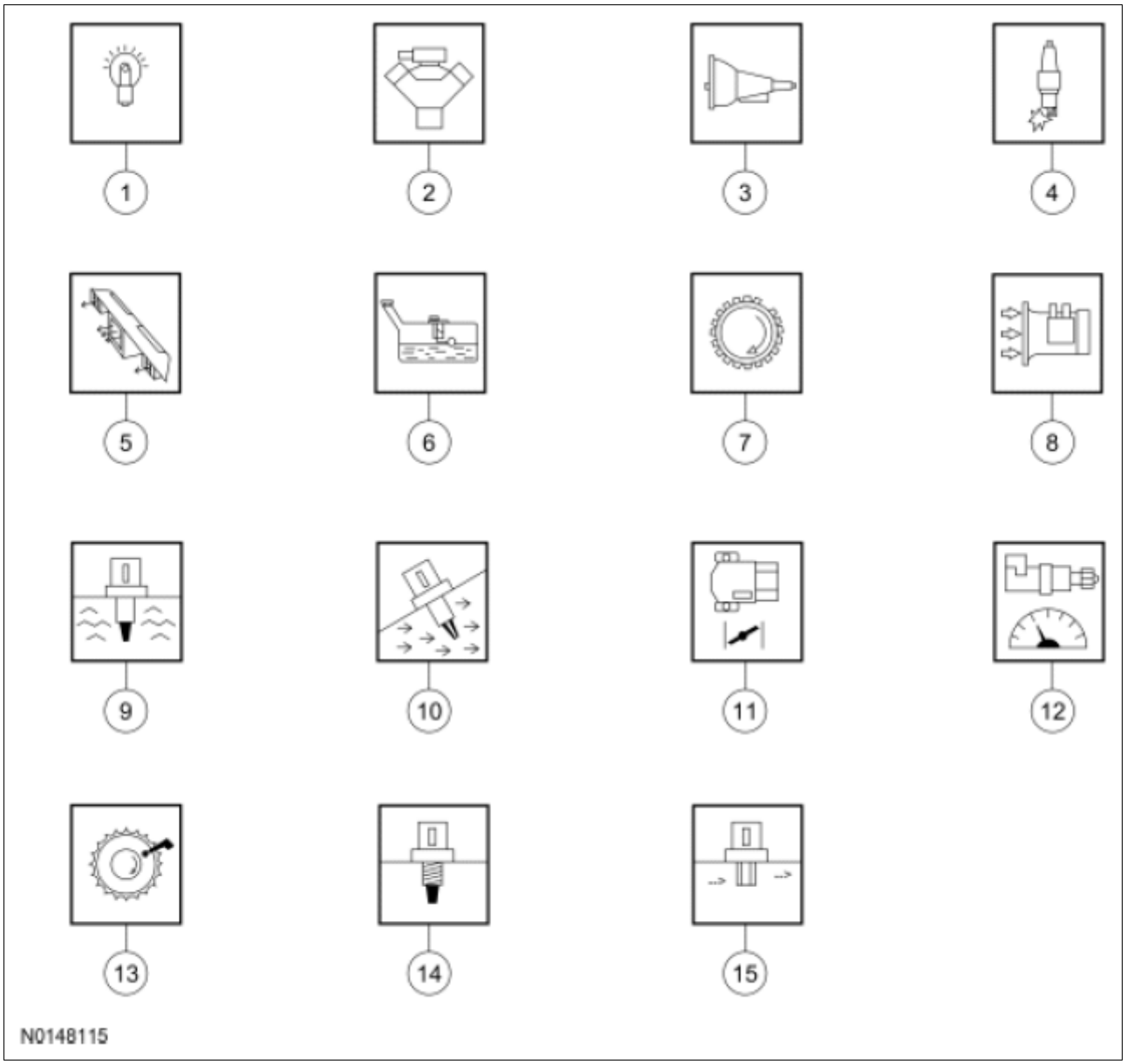
Monitor/Feature	Calibration for Gasoline Engines
Catalyst Monitor	Functional catalyst monitor required starting in the 2010 model year.
Misfire Monitor	Calibrated in for repair, all DTCs are non-MIL. Catalyst damage misfire criteria calibrated out, emission threshold criteria set to 4%, enabled between 66°C (150°F) and 104°C (220°F), 254 second startup delay.
Oxygen Sensor Monitor	Front O2 sensor lack of switching tests and all circuit and heater tests calibrated in, response or delay test calibrated out. Rear O2 sensor functional tests and all circuit and heater tests calibrated in, response or delay test calibrated out.
EGR or VCT Monitor	Same as OBD II calibration except that DTC P0402 test uses a higher threshold.
Fuel System Monitor	Fuel system monitor and fore aft oxygen sensor (FAOS) monitor same as OBD II calibration, Air Fuel Ratio Imbalance monitor calibrated out.
Evaporative Emission (EVAP) System Monitor	EVAP system leak check calibrated out, fuel level input circuit checks retained as non-MIL. Fuel tank pressure sensor and EVAP canister vent valve may be deleted.
PCV Monitor	Same hardware and function as OBD II.
Thermostat Monitor	Thermostat monitor calibrated out.
Comprehensive Component Monitor (CCM)	All circuit checks, rationality and functional tests are the same as OBD II.
Communication Protocol and DLC	Same as OBD II, all generic and enhanced scan tool modes work the same as OBD II, but reflect the EMD calibration that contains fewer supported monitors. OBD supported PID indicates EMD.
MIL Control	Same as OBD II, it takes 2 drive cycles to illuminate the MIL.

The following monitor descriptions provide a general description of each OBD monitor. In these descriptions the monitor strategy, hardware, testing requirements, and methods are presented to provide an overall understanding of monitor operation. An illustration of each monitor may also be provided. These illustrations should be used as typical examples and are not intended to represent all possible vehicle configurations.

Each illustration depicts the PCM as the main focus with primary inputs and outputs for each monitor. The icons to the left of the PCM represent the inputs used by each of the monitor strategies to enable or activate the monitor. The components and subsystems to the right of the PCM represent the hardware and signals used while carrying out the tests and the systems being tested. The CCM illustration has numerous components and signals involved which are illustrate generically. When referring to the illustrations, match the numbers to the corresponding numbers in the monitor descriptions for a better understanding of the monitor and associated DTCs.

These icons are used in the illustrations of the OBD monitors and throughout this service information.

Fig 1: OBD Monitors Icons



Courtesy of FORD MOTOR CO.

Item	Number	Description
1	-	Malfunction Indicator Lamp (MIL)
2	-	Base Engine Components
3	-	Transmission
4	-	Ignition System
5	-	A/C Or Heater System
6	-	Fuel Level Input (FLI)

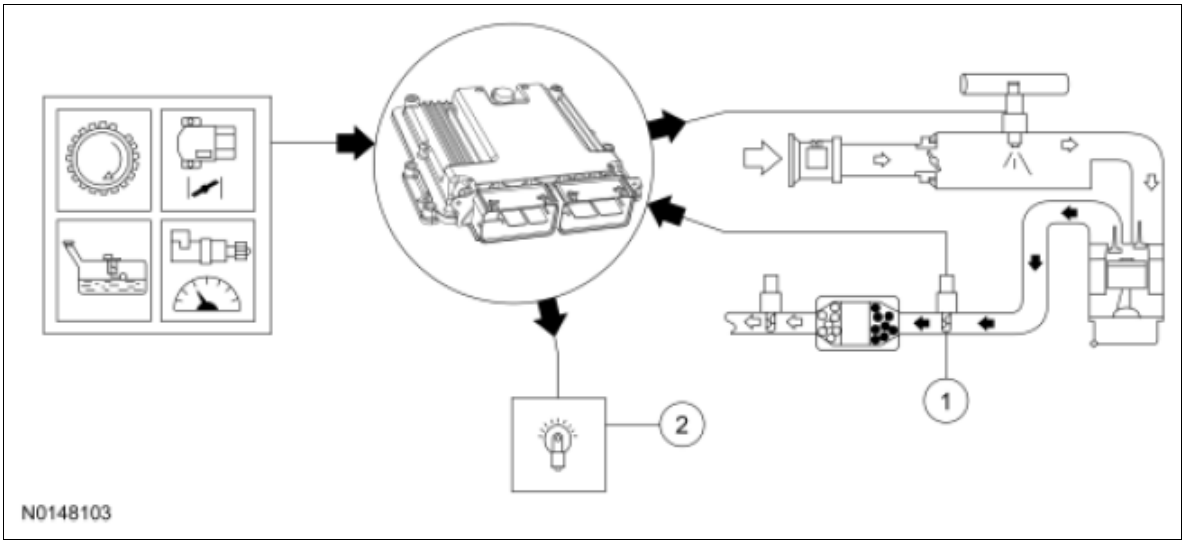
7	-	RPM
8	-	Mass Airflow (MAF)
9	-	Engine Coolant Temperature (ECT)
10	-	Intake Air Temperature (IAT)
11	-	Throttle Position (TP)
12	-	Vehicle Speed
13	-	Camshaft Position (CMP)
14	-	Cylinder Head Temperature (CHT)
15	-	Manifold Absolute Pressure (MAP)

AIR FUEL RATIO IMBALANCE MONITOR

The air fuel ratio imbalance monitor is an on board diagnostic strategy designed to monitor the cylinder to cylinder air fuel ratio per engine bank.

1. The air fuel ratio imbalance monitor estimates the cylinder to cylinder difference using the universal heated oxygen sensor (HO2S) high frequency signal. The difference between two consecutive universal HO2S signals is continuously monitored and a differential signal value is calculated. If the difference between two consecutive samples exceeds a calibrated threshold, a cylinder to cylinder deviation is estimated and the differential signal accumulation is calculated. The differential signal accumulation is calculated continuously after vehicle startup and during closed loop fuel conditions during a short calibrated RPM window. Typically the window has over 50 engine revolutions. The differential signal accumulation is then compared to a calibrated signal threshold. The counter is incremented if the threshold is exceeded. At the same time, the total RPM window counter calculates number of completed RPM windows. When the monitor completes a calibrated number of total RPM windows, the air fuel ratio imbalance index is calculated. The monitor index is a ratio of failed RPM windows over total RPM windows required to complete the monitor. If the monitor index exceeds the threshold value the test fails.
2. The malfunction indicator lamp (MIL) is activated after a concern is detected on 2 consecutive drive cycles.

Fig 1: Air Fuel Ratio Imbalance Monitor Flow Diagram



Courtesy of FORD MOTOR CO.

CATALYST EFFICIENCY MONITOR

The catalyst efficiency monitor uses an oxygen sensor before and after the catalyst to infer the hydrocarbon (HC) efficiency based on the oxygen storage capacity of the catalyst. Under normal closed loop fuel conditions, high efficiency catalysts have significant oxygen storage. This makes the switching frequency of the rear heated oxygen sensor (HO2S) very slow and reduces the amplitude, which provides for a shorter signal length. As the catalyst efficiency deteriorates due to thermal and chemical deterioration, the catalyst ability to store oxygen declines. The post catalyst or downstream HO2S signal begins to switch more rapidly with increasing amplitude and signal length. The predominant failure mode for high mileage catalysts is chemical deterioration (phosphorus deposits on the front brick of the catalyst), not thermal deterioration.

The catalyst monitor calculates the rear HO2S signal lengths for 10 to 20 seconds during part throttle, closed loop fuel conditions after the engine is warmed up, the inferred catalyst temperature is within limits, and fuel tank vapor purge is disabled. The catalyst monitor is enabled for 10 to 20 seconds per drive cycle. When the catalyst monitor is active, the PCM commands a fixed fuel control routine. During monitor operation the rear HO2S signal lengths are continually calculated. The calculated rear HO2S signal length is then divided by a calibrated signal length, which has compensation for mass airflow. The calibrated signal length is based on the signal length of an HO2S placed after a catalyst without a washcoat. An index ratio near 0.0 indicates high oxygen storage capacity and high HC efficiency. An index ratio near 1.0 indicates low oxygen storage capacity and low HC efficiency. If the actual index ratio exceeds the threshold index ratio, the catalyst is considered failed.

Inputs from engine coolant temperature (ECT) or cylinder head temperature (CHT), intake air temperature (IAT), mass airflow (MAF), crankshaft position (CKP), throttle position (TP), and vehicle speed sensors are required to enable the catalyst efficiency monitor.

Typical Monitor Entry Conditions:

- Minimum 330 seconds since start up at 21°C (70°F)
- Engine coolant temperature is between 76.6°C - 110°C (170°F - 230°F)

- Intake air temperature is between -7°C - 82°C (20°F - 180°F)
- Time since entering closed loop is 30 seconds
- Inferred rear HO2S temperature of 482°C (900°F)
- EGR is between 1% and 12%
- Part throttle, maximum rate of change is 0.2 volts/0.050 sec
- Vehicle speed is between 8 and 112 km/h (5 and 70 MPH)
- Fuel level is greater than 15%
- First Airflow Cell

  Engine RPM 1, 000 to 1, 300 RPM

  Engine load 15 to 35%

  Inferred catalyst temperature 454°C - 649°C (850°F - 1, 200°F)

  Number of universal HO2S switches is 50
- Second Airflow Cell

  Engine RPM 1, 200 to 1, 500 RPM

  Engine load 20 to 35%

  Inferred catalyst temperature 482°C - 677°C (900°F - 1, 250°F)

  Number of universal HO2S switches is 70
- Third Airflow Cell

  Engine RPM 1, 300 to 1, 600 RPM

  Engine load 20 to 40%

  Inferred catalyst temperature 510°C - 704°C (950°F - 1, 300°F)

  Number of universal HO2S switches is 30

Six drive cycles may be required to illuminate the malfunction indicator lamp (MIL) during normal customer driving, because an exponentially weighted moving average algorithm is used to determine a concern. If the keep alive memory (KAM) is reset, a concern illuminates the MIL in 2 drive cycles.

CATALYST EFFICIENCY MONITOR > GENERAL CATALYST MONITOR OPERATION

The catalyst monitor duration is 12 seconds, once per drive cycle. If the catalyst monitor conditions are met, the catalyst monitor may run and complete after all of the upstream HO2S functional tests are complete and the EVAP system is functional, with no stored DTCs; however, the catalyst monitor may run and complete before the downstream HO2S deceleration fuel shut off test is complete. In this case, the catalyst monitor inspection maintenance (I/M) readiness flag may indicate complete before the O2S I/M readiness flag indicates complete. If the catalyst monitor does not complete during a particular

driving cycle, the already accumulated switch/signal data is retained in the KAM and is used during the next driving cycle to allow the catalyst monitor a better opportunity to complete.

Some vehicles that are part of the low emission vehicle (LEV) catalyst monitor phase in, monitor less than 100% of the catalyst volume. Often this is the first catalyst brick of the catalyst system. Partial volume monitoring is done on LEV and ultra low emission vehicle (ULEV) vehicles in order to meet the 1.75 emission standard. The rationale for this strategy is the catalyst nearest the engine deteriorates first, allowing the catalyst monitor to be more sensitive and illuminate the MIL correctly at lower emission standards.

Some applications use partial volume monitoring, where the rear HO2S is located after the first light off catalyst can or after the second catalyst can in a three can per bank system (a few applications placed the HO2S in the middle of the catalyst can, between the first and second bricks). For additional HO2S information, refer to the HEATED OXYGEN SENSOR (HO2S) MONITOR in this service information.

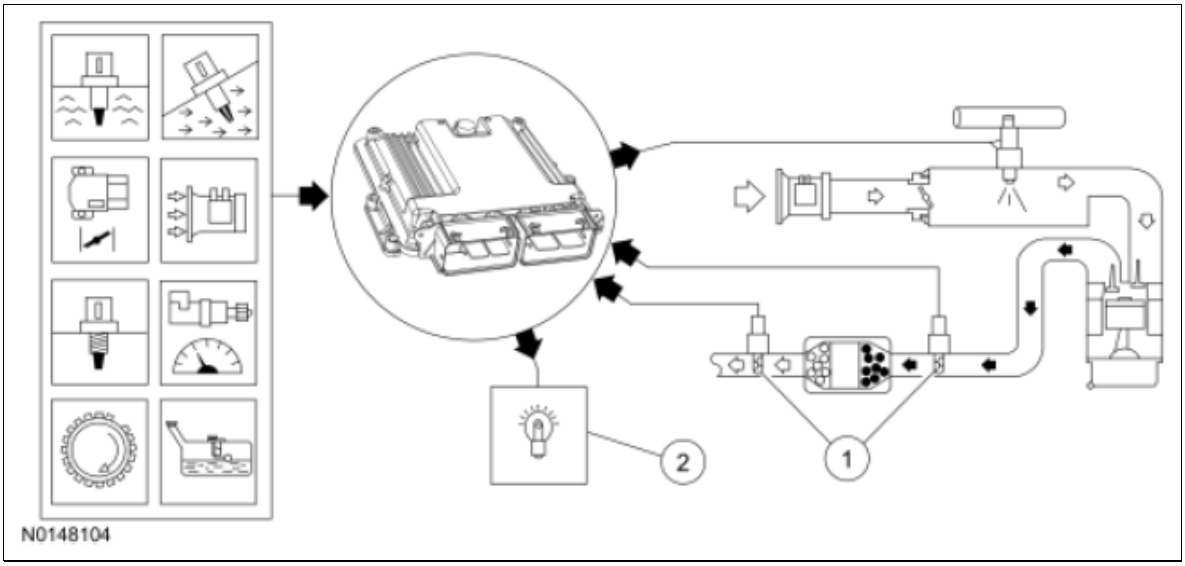
Index ratios for ethanol (flex fuel) vehicles vary based on the changing concentration of alcohol in the fuel. The threshold to determine a concern typically increases as the percent of alcohol increases. For example, a threshold of 0.5 may be used at E10 (10% ethanol) and 0.9 may be used at E85 (85% ethanol). The thresholds are adjusted based on the percentage of alcohol in the fuel. Standard fuel may contain up to 10% ethanol.

The PCM calibration prevents the catalyst monitor from running on a new vehicle until 60 minutes of time has accumulated with the catalyst temperature greater than 426°C (800°F) or 483 km (300 miles) have accumulated. A replacement PCM or updated calibration does not prevent the catalyst monitor from running.

1. The HO2S can be located in various configurations to monitor different kinds of exhaust systems. Inline engines and many V engines are monitored by their individual bank. A rear HO2S is used along with the front, fuel control universal HO2S for each bank. Two sensors are used on an inline engine and 4 sensors are used on a V engine. Some V engines have exhaust banks that combine into a single underbody catalyst. These systems are referred to as Y pipe systems. They use only one rear HO2S along with the 2 front, fuel control universal HO2S. The Y pipe system uses 3 sensors in all. For Y piped systems, the 2 front universal HO2S signals are combined by the PCM software to infer what the exhaust oxygen content would have been in front of the monitored catalyst. The inferred front exhaust oxygen content and the rear HO2S signal is then used to calculate the index ratio.

2. The malfunction indicator lamp (MIL) is activated after a concern is detected on 2 consecutive drive cycles.

Fig 1: Catalyst Efficiency Monitor Flow Diagram



Courtesy of FORD MOTOR CO.

CATALYST EFFICIENCY MONITOR > INTEGRATED AIR FUEL CATALYST MONITOR

The integrated air fuel catalyst monitor is an on board strategy designed to monitor the oxygen storage capacity of the catalyst after a deceleration fuel shut off (DFSO) event. The monitor determines the amount of fuel needed to drive the catalyst to a rich condition when starting from an oxygen saturated, lean condition. The monitor is a measure of how much fuel is required to force the catalyst from a lean to a rich condition. The monitor runs during fuel reactivation following a DFSO event. The monitor completes after a calibrated number of DFSO monitoring events have occurred.

COLD START EMISSION REDUCTION MONITOR > OVERVIEW

The cold start emission reduction monitor is an on board strategy designed for vehicles that meet the low emissions vehicle-II (LEV-II) emissions standards. The monitor works by detecting the lack of catalyst warm up resulting from a failure to apply sufficient cold start emission reduction during a cold start. There are 2 types of monitors:

- cold start emission reduction component monitor
- cold start emission reduction system monitor

COLD START EMISSION REDUCTION MONITOR > COLD START EMISSION REDUCTION COMPONENT MONITOR

The engine speed monitor and the spark timing monitor are carried out during the cold start emission reduction component monitor. The engine speed monitor checks the average difference between the actual and desired engine speeds. The spark timing monitor compares the average difference between desired and commanded spark to a calibrated threshold.

COLD START EMISSION REDUCTION MONITOR > COLD START EMISSION REDUCTION COMPONENT MONITOR > ENGINE SPEED AND SPARK TIMING MONITOR

The system monitor and component monitor share the same entry conditions and monitor flow. During the first 15 seconds of a cold start, the monitor checks the entry conditions, counts time in idle, observes catalyst temperature, calculates the average difference between desired and actual engine speed, and calculates the average difference between desired and commanded spark.

If the expected change in catalyst temperature is large enough, the monitor then begins a waiting period of 300 seconds after engine start. This waiting period allows time to diagnose other components and systems that affect the validity of the test. During this waiting period, there are no constraints on drive cycle and the monitor cannot be disabled without turning OFF the ignition.

If the system monitor result falls below its threshold and all of the component monitor results are below their respective thresholds, the monitor determines if the idle time was sufficient. If the idle time was sufficient the test is considered to be a pass and the monitor is complete. If idle time was not sufficient, the monitor will not make a pass call and does not complete. This prevents tip-ins from resulting in false passes.

COLD START EMISSION REDUCTION MONITOR > COLD START EMISSION REDUCTION COMPONENT MONITOR > COLD START ENGINE SPEED MONITOR OPERATION

Once the waiting period is complete, the monitor compares the average difference between desired and commanded spark to a calibrated threshold that is a function of the engine coolant temperature at start. If the difference exceeds the calibrated threshold, a DTC sets.

- DTC: P050A Cold start idle air control system performance
- Monitor execution: Once per driving cycle, during the first 15 seconds of a cold start
- Monitor sequence: None
- Monitoring duration: Data gathering occurs during the first 15 seconds of a cold start. The decision to set P050A is made 300 seconds after start. This delay gives time for other diagnostics (for example, misfire monitor) to determine if another DTC should set instead of P050A.

COLD START EMISSION REDUCTION MONITOR > COLD START EMISSION REDUCTION COMPONENT MONITOR > ENGINE SPEED MONITOR ENTRY CONDITIONS

- Barometric pressure of 76.2 kPa (22.5 in-Hg) or greater
- Engine coolant temperature at start is between -17.8°C (35°F) and 37.8°C (100°F)
- Catalyst temperature at start is between -17.8°C (35°F) and 51.7°C (125°F)

- Fuel level is above 15%
- Injector cutout torque reduction is inactive
- Power take off (PTO) operation is disabled

COLD START EMISSION REDUCTION MONITOR > COLD START EMISSION REDUCTION COMPONENT MONITOR > COLD START SPARK TIMING MONITOR OPERATION

Once the waiting period is complete, the monitor compares the average difference between desired and commanded spark to a calibrated threshold that is a function of the engine coolant temperature at start. If the difference exceeds the calibrated threshold, a DTC is set.

- DTC: P050B Cold start ignition timing performance
- Monitor execution: Once per driving cycle, during the first 15 seconds of a cold start
- Monitor sequence: None
- Monitoring duration: Data gathering occurs during the first 15 seconds of a cold start. The decision to set P050B is made 300 seconds after start. This delay gives time for other diagnostics (for example, misfire monitor) to determine if another DTC should set instead of P050B.

COLD START EMISSION REDUCTION MONITOR > COLD START EMISSION REDUCTION COMPONENT MONITOR > SPARK TIMING MONITOR ENTRY CONDITIONS

- Barometric pressure of 76.2 kPa (22.5 in-Hg) or greater
- Engine coolant temperature at start is between -17.8°C (35°F) and 37.8°C (100°F)
- Catalyst temperature at start is between -17.8°C (35°F) and 51.7°C (125°F)
- Fuel level is above 15%
- Injector cutout torque reduction is inactive
- PTO operation is disabled

COLD START EMISSION REDUCTION MONITOR > COLD START EMISSION REDUCTION COMPONENT MONITOR > COLD START VARIABLE CAM TIMING (VCT) MONITOR

If the VCT cam phasing is used during a cold start to improve catalyst heating, the VCT system checks the functionality by monitoring the closed loop cam position error correction. If the correct cam position cannot be maintained and the system has an advance or retard error greater than the malfunction threshold, a cold start emission reduction VCT control malfunction is indicated.

- DTC: P052A Cold start camshaft position timing over-advanced (Bank 1)
- DTC: P052B Cold start camshaft timing over-retarded (Bank 1)
- DTC: P052C Cold start camshaft timing over-advanced (Bank 2)
- DTC: P052D Cold start camshaft timing over-retarded (Bank 2)
- Monitor execution: Continuous
- Monitor sequence: None
- Monitoring duration: 5 seconds

COLD START EMISSION REDUCTION MONITOR > COLD START EMISSION REDUCTION SYSTEM MONITOR

The PCM uses the cold start emission reduction system monitor to calculate the actual catalyst warm up temperature during a cold start. The actual catalyst warm up temperature calculation uses measured engine speed, measured air mass and commanded spark timing inputs to the PCM. The PCM then compares the actual temperature to the expected catalyst temperature. The expected catalyst temperature calculation uses desired engine speed, desired air mass and desired spark timing inputs to the PCM. The difference between the actual and expected temperatures is reflected in a ratio. This ratio is a measure of how much loss of catalyst heating occurred over the period of time and when compared with a calibrated threshold it helps the PCM to determine if the cold start emission reduction system is working correctly. This ratio correlates to tailpipe emissions, and a malfunction indicator lamp (MIL) illuminates and a DTC sets when the calibrated threshold is exceeded. The monitor is disabled if a concern is present in any of the sensors or systems used for expected catalyst temperature model calculation.

COLD START EMISSION REDUCTION MONITOR > COLD START EMISSION REDUCTION SYSTEM MONITOR > COLD START EMISSION REDUCTION SYSTEM MONITOR OPERATION

- DTC: P050E Cold start engine exhaust temperature too low
- Monitor execution: Once per driving cycle, during the first 15 seconds of a cold start
- Monitor sequence: None
- Monitoring duration: Data gathering occurs during the first 15 seconds of a cold start. The decision to set P050E is made 300 seconds after start. This delay gives time for other diagnostics (for example, misfire monitor) to determine if another DTC should set instead of P050E.

COLD START EMISSION REDUCTION MONITOR > COLD START EMISSION REDUCTION SYSTEM MONITOR > COLD START EMISSION REDUCTION SYSTEM MONITOR ENTRY CONDITIONS

- Barometric pressure is above 74.5 kPa (22 in-Hg)
- Engine coolant temperature at the start of the monitor is between 1.67°C (35°F) and 37.78°C (100°F)
- Catalyst temperature at the start of the monitor is between 1.67°C (35°F) and 51.67°C (125°F)
- Fuel level is above 15%
- Injector cutout torque reduction is inactive
- PTO operation is disabled

COMPREHENSIVE COMPONENT MONITOR (CCM)

The CCM checks for concerns in any powertrain electronic component or circuit that provides input or output signals to the PCM that can affect emissions and is not monitored by another on board diagnostics (OBD) monitor. Inputs and outputs are, at a minimum, monitored for circuit continuity or correct range of values. Where feasible, inputs are checked for rationality and outputs are checked for correct functionality.

The CCM covers many components and circuits and tests them in various ways depending on the hardware, function, and type of signal. For example, analog inputs such as throttle position or engine coolant temperature are typically checked for opens, shorts, and out of range values. This type of monitoring is carried out continuously. Some digital inputs like brake switch or crankshaft position rely on rationality checks that are checking to see if the input value makes sense at the current engine operating conditions. These types of tests may require monitoring several components and can only be carried out under the appropriate test conditions.

Outputs such as coil drivers are checked for opens and shorts by monitoring a feedback circuit or smart driver associated with the output. Other outputs, such as relays, require additional feedback circuits to monitor the secondary side of the relay. Some outputs are also monitored for correct function by observing the reaction of the control system to a given change in the output command. An idle air control solenoid can be functionally tested by monitoring the idle RPM relative to the target idle RPM. Some tests can only be carried out under the appropriate test conditions. For example, the transmission shift solenoids can only be tested when the PCM commands a shift.

The following is an example of some of the input and output components monitored by the CCM. The component monitor may belong to the engine, ignition, transmission, air conditioning, or any other PCM supported subsystem.

1. Inputs:

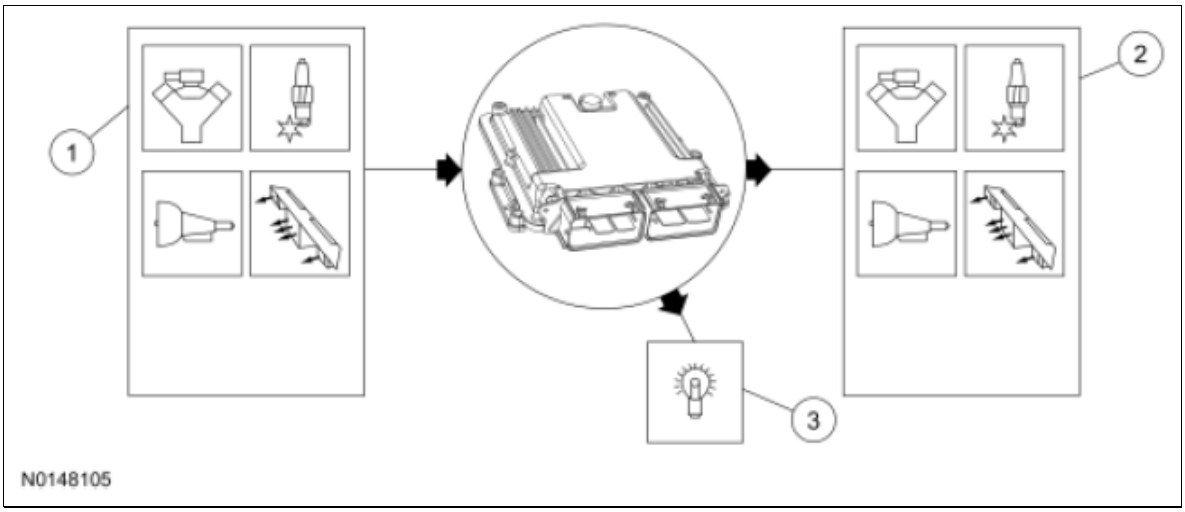
   Air conditioning pressure (ACP) transducer sensor, camshaft position (CMP) sensor, crankshaft position (CKP) sensor, engine coolant temperature (ECT) sensor, fuel rail pressure temperature (FRPT) sensor, fuel tank pressure (FTP) sensor, intake air temperature (IAT) sensor, mass airflow (MAF) sensor (if equipped), throttle position (TP) sensor.

2. Outputs:

   EVAP purge valve, EVAP canister vent valve, fuel injector, fuel pump (FP), shift solenoid, torque converter clutch (TCC) solenoid, variable camshaft timing (VCT) actuator, wide open throttle A/C cutout (WAC).

3. The CCM is enabled after the engine starts and is running. A DTC is stored in keep alive memory (KAM) and the malfunction indicator lamp (MIL) is illuminated after 2 driving cycles when a concern is detected. Many of the CCM tests are also carried out during an on demand self-test.

Fig 1: CCM Flow Diagram



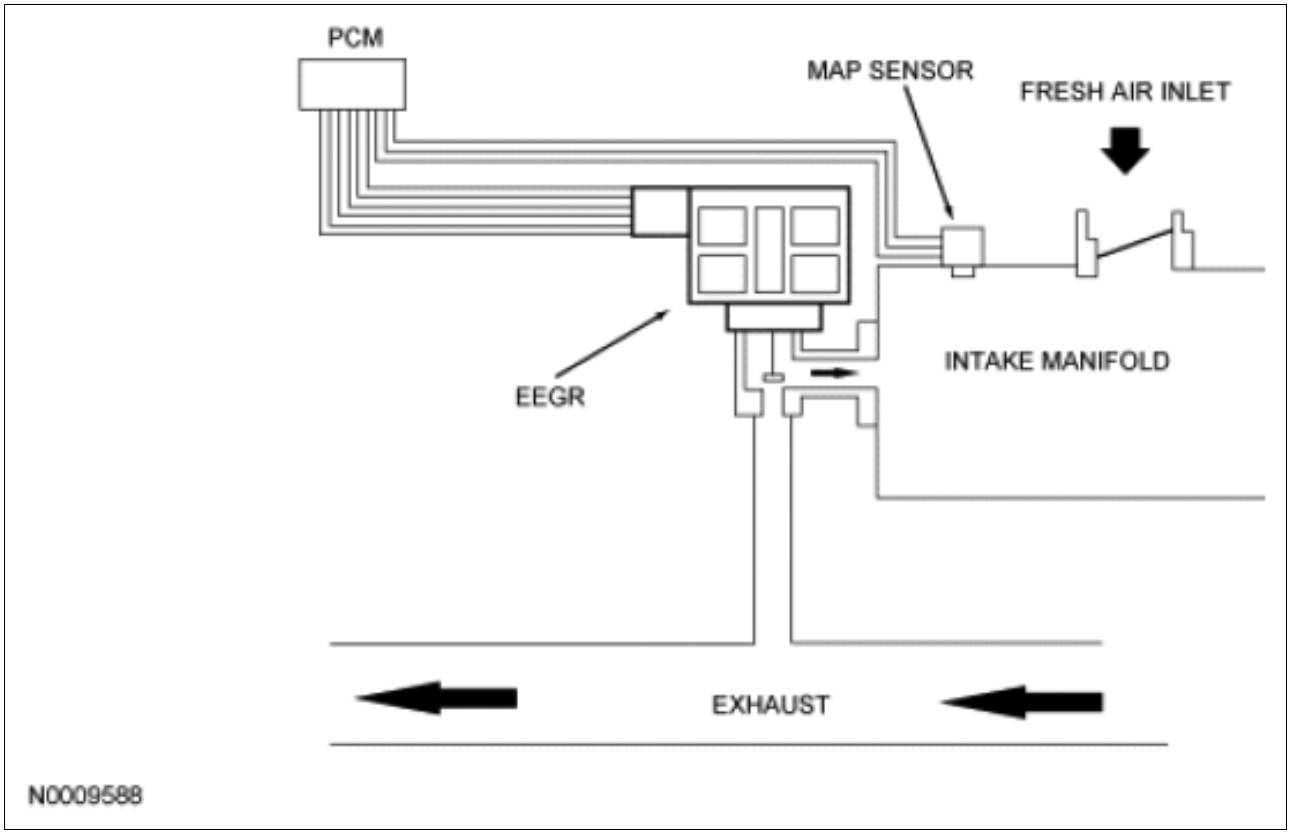
Courtesy of FORD MOTOR CO.

ELECTRIC EXHAUST GAS RECIRCULATION (EEGR) SYSTEM MONITOR

The EEGR system monitor is an on board strategy designed to test the integrity and flow characteristics of the EGR system. The EEGR system monitor consists of an electrical and functional test that checks the stepper motor and the EEGR system for correct flow. The powertrain control module (PCM) controls the EEGR valve by commanding from 0 to 52 discrete increments or steps to get the valve from the fully closed position to the fully open position. The stepper motor electrical test is a continuous check of the 4 electric stepper motor coils and circuits to the PCM. A concern is indicated if an open circuit, short to voltage, or short to ground has occurred in one or more of the stepper motor coils or circuits for a calibrated period of time. If a concern has been detected, the EEGR system is disabled, setting a diagnostic trouble code (DTC). Additional monitoring is suspended for the remainder of the drive cycle, or until the next engine start.

The intake manifold pressure is higher when EGR is flowing than when it is not flowing. Therefore, when the exhaust gas is delivered into the intake manifold, the manifold absolute pressure (MAP) sensor reading increases. The detection of EGR flow occurs by monitoring this increase in pressure. If the difference in the pressure between EGR commanded ON versus commanded OFF is below a minimum threshold, then an EGR valve concern has occurred.

Fig 1: EEGR System Monitor Flow Diagram



Courtesy of FORD MOTOR CO.

ENGINE OFF TIMER MONITOR

The engine off time is obtained from the powertrain control module (PCM) or the body control module (BCM). If the engine off time is obtained from the BCM, the PCM expects to receive a message with the engine off time from the BCM shortly after engine start up. If the message is not available on the controller area network (CAN) or a battery disconnect has occurred, a communication DTC sets.

There are two parts to this test.

The first part determines if the timer is incrementing during engine OFF. The PCM determines the timer is incrementing during engine OFF by comparing the engine coolant temperature value prior to shut down, to the engine coolant temperature value at ignition ON to determine if an engine OFF soak has occurred. For an engine OFF soak to occur, the engine coolant temperature value must be greater than 71°C (160 °F) while the engine is running. The timer starts at ignition OFF and the engine coolant temperature value must decrease by greater than 17°C (30 °F) before the next ignition ON signal. If the engine off timer indicates a value less than 30 seconds, a DTC sets.

The second part checks the accuracy of the engine off timer. The PCM determines the accuracy of the engine off timer by comparing time in the BCM with the time in the PCM. The timer in the BCM is allowed to count up for 5 minutes and compared to a different clock in the PCM. If the two timers differ by more than 15 seconds, a DTC sets.

ENHANCED THERMOSTAT MONITOR

The enhanced thermostat monitor helps to reduce the time it takes to identify a thermostat concern. This monitor is executed once per drive cycle during a cold start and has a run duration of 300 seconds.

During a cold start, when the thermostat should be closed, the enhanced thermostat monitor uses intake air temperature, engine speed, and engine load to predict the engine coolant temperature. Once the predicted temperature has exceeded a target temperature for a length of time, the actual engine coolant temperature is compared to its required threshold. This threshold is 11°C (20°F) below the thermostat regulating temperature. If the engine coolant temperature exceeds this threshold, the thermostat is functioning correctly. If the engine coolant temperature is too low, the thermostat may be stuck open and DTC P0128 sets.

EVAPORATIVE EMISSION (EVAP) LEAK CHECK MONITOR

The EVAP leak check monitor is an on board strategy designed to detect a leak from an opening equal to or greater than 0.508 mm (0.020 inch) in the enhanced EVAP system. The correct function of the individual components of the enhanced EVAP system, as well as its ability to flow fuel vapor to the engine, is also examined. The EVAP leak check monitor relies on the individual components of the enhanced EVAP system to either allow a natural vacuum to occur in the fuel tank or apply engine vacuum to the fuel tank and then seal the entire enhanced EVAP system from the atmosphere. The fuel tank pressure is then monitored to determine the total vacuum lost (bleed up) for a calibrated period of time. Inputs from the engine coolant temperature (ECT) sensor or cylinder head temperature (CHT) sensor (if equipped), intake air temperature (IAT) sensor, mass airflow (MAF) sensor (if equipped), vehicle speed, fuel level input (FLI) and fuel tank pressure (FTP) sensor, are required to enable the EVAP leak check monitor.

During the EVAP leak check monitor repair verification drive cycle, clearing the continuous diagnostic trouble codes (DTCs) and resetting the emission monitors information in the PCM, bypasses the minimum soak time required to complete the monitor. The EVAP leak check monitor does not run if the ignition is turned OFF after clearing the continuous DTCs and resetting the emission monitors information in the PCM. The EVAP leak check monitor does not initiate until the heated oxygen sensor (HO2S) monitor is complete.

If the vapor generation is high on some vehicle enhanced EVAP systems, where the monitor does not pass, the result is treated as a no test. Therefore, the test is complete for the day.

Some vehicle applications have an engine OFF natural vacuum (EONV) check as part of the EVAP leak check monitor.

EVAPORATIVE EMISSION (EVAP) LEAK CHECK MONITOR > ENGINE ON EVAP LEAK CHECK MONITOR

The engine on EVAP leak check monitor is executed by the individual components of the enhanced EVAP system as follows:

1. The EVAP purge valve controls the flow of vacuum from the engine and creates a target vacuum on the fuel tank.
2. The EVAP canister vent valve seals the EVAP system from the atmosphere. It is closed by the

PCM (100% duty cycle) to allow the EVAP purge valve to achieve the target vacuum on the fuel tank.

3. The FTP sensor is used by the engine on EVAP leak check monitor to determine if the target vacuum necessary to carry out the leak check on the fuel tank is reached. Some vehicle applications with the engine on EVAP leak check monitor use a remote inline FTP sensor. Once the target vacuum on the fuel tank is achieved, the change in fuel tank vacuum over a calibrated period of time determines if a leak exists.

4. If the initial target vacuum cannot be reached, DTC P0455 (gross leak detected) sets. The engine on EVAP leak check monitor aborts and does not continue with the leak check portion of the test.

   For some vehicle applications, if the initial target vacuum cannot be reached after a refueling event and the purge vapor flow is excessive, DTC P0457 (fuel cap off) sets.

   If the initial target vacuum is exceeded, a system flow concern exists and DTC P1450 (unable to bleed up fuel tank vacuum) is set. The engine on EVAP leak check monitor aborts and does not continue with the leak check portion of the test.

   If the vacuum increase is quicker than expected, a blocked fuel vapor tube is suspected and if confirmed after an intrusive test, DTC P144A sets.

   If the target vacuum is achieved on the fuel tank, the change in the fuel tank vacuum (bleed up) is calculated for a calibrated period of time. The calculated change in fuel tank vacuum is compared to a calibrated threshold for a leak from an opening of 1.016 mm (0.040 inch) in the enhanced EVAP system. If the calculated bleed up is less than the calibrated threshold, the enhanced EVAP system passes. If the calibrated bleed up exceeds the calibrated threshold, the test aborts. The test can be repeated up to 3 times.

   If the bleed up threshold is still being exceeded after 3 tests, a vapor generation test is carried out before DTC P0442 (small leak detected) sets. This is accomplished by returning the enhanced EVAP system to atmospheric pressure by closing the EVAP purge valve and opening the EVAP canister vent valve. Once the FTP sensor observes the fuel tank is at atmospheric pressure, the EVAP canister vent valve closes and seals the enhanced EVAP system.

   The fuel tank pressure build up over a calibrated period of time is compared to a calibrated threshold for pressure build up due to vapor generation.

   If the fuel tank pressure build up exceeds the threshold, the leak test results are invalid due to vapor generation. The engine on EVAP leak check monitor attempts to repeat the test again.

   If the fuel tank pressure build up does not exceed the threshold, the leak test results are valid and DTC P0442 sets.

5. If the 1.016 mm (0.040 inch) test passes, the test time is extended to allow the 0.508 mm (0.020 inch) test to run.

   The calculated change in fuel vacuum over the extended time is compared to a calibrated threshold for a leak from a 0.508 mm (0.020 inch) opening.

   If the calculated bleed up exceeds the calibrated threshold, the vapor generation test is run. If the vapor generation test passes (no vapor generation), an internal flag sets in the PCM to run a 0.508 mm (0.020 inch) test at idle (vehicle stopped).

   On the next start following a long engine OFF period, the enhanced EVAP system is sealed

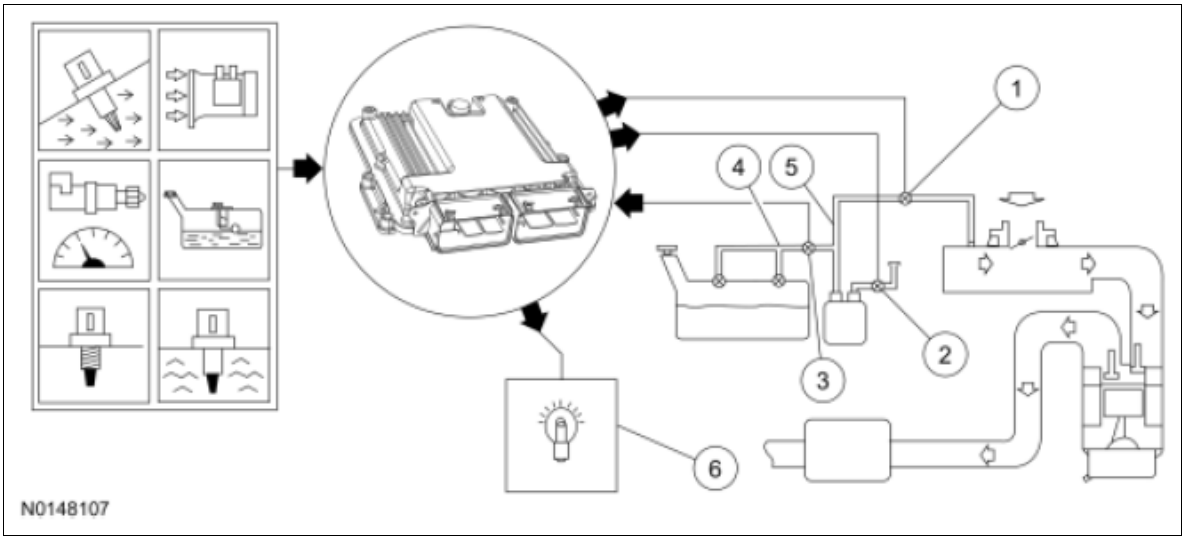
and evacuated for the first 10 minutes of operation.

If the appropriate conditions are met, a 0.508 mm (0.020 inch) leak check is conducted at idle.

If the test at idle fails, DTC P0456 sets. There is no vapor generation test with the idle test.

6. The malfunction indicator lamp (MIL) is activated any enhanced EVAP system component DTCs.

Fig 1: Evaporative Emission (EVAP) Leak Check Monitor Flow Diagram



Courtesy of FORD MOTOR CO.

EVAPORATIVE EMISSION (EVAP) LEAK CHECK MONITOR > ENGINE OFF NATURAL VACUUM (EONV) EVAP LEAK CHECK MONITOR

The EONV EVAP leak check monitor is executed during ignition OFF, after the engine on EVAP leak check monitor is completed. The EONV EVAP leak check monitor determines a leak is present when the naturally occurring change in fuel tank pressure or vacuum does not exceed a calibrated limit during a calibrated amount of time. A separate, low power consuming, microprocessor in the PCM manages the EONV leak check. The engine OFF EVAP leak check monitor is executed by the individual components of the enhanced EVAP system as follows:

1. The EVAP purge valve is normally closed at ignition OFF.

2. The normally open EVAP canister vent valve remains open for a calibrated amount of time to allow the fuel tank pressure to stabilize with the atmosphere. During this time period the FTP sensor is monitored for an increase in pressure. If pressure remains below a calibrated limit the EVAP canister vent valve is closed by the PCM (100% duty cycle) and seals the EVAP system from the atmosphere.

3. The EONV EVAP leak check monitor uses the FTP sensor to determine if the target pressure or vacuum necessary to complete the EONV EVAP leak check monitor on the fuel tank is reached. Some vehicle applications with the EONV EVAP leak check monitor use a remote inline FTP sensor. If the target pressure or vacuum on the fuel tank is achieved within the calibrated amount of time, the test is complete.

4. The EONV EVAP leak check monitor uses the naturally occurring change in fuel tank pressure as a means to detect a leak in the EVAP system. At ignition OFF, a target pressure and vacuum is determined by the PCM. These target values are based on the fuel level and the ambient temperature at ignition OFF. As the fuel tank temperature increases, the pressure in the tank increases and as the temperature decreases a vacuum develops. If a leak is present in the EVAP system the fuel tank pressure or vacuum does not exceed the target value during the testing time period. The EONV EVAP leak check monitor begins at ignition OFF. After ignition OFF the normally open EVAP canister vent valve remains open for a calibrated amount of time to allow the fuel tank pressure to stabilize with the atmosphere. During this time period the FTP sensor is monitored for an increase in pressure. If pressure remains below a calibrated limit the EVAP canister vent valve is closed by the PCM (100% duty cycle) and seals the EVAP system from the atmosphere.

   If the pressure on the fuel tank decreases after the EVAP system is sealed, the EONV EVAP leak check monitor begins to monitor the fuel tank pressure. When the target vacuum is exceeded within the calibrated amount of time the test completes and the fuel tank pressure and time since ignition OFF information is stored. If the target vacuum is not reached in the calibrated amount of time, a leak is suspected and the fuel tank pressure and time since ignition OFF information is stored.

   If the pressure on the fuel tank increases after the EVAP system is sealed, but does not exceed the target pressure within a calibrated amount of time, the EVAP canister vent valve is opened to allow the fuel tank pressure to again stabilize with the atmosphere. After a calibrated amount of time the EVAP canister vent valve is closed by the PCM and seals the EVAP system. When the fuel tank pressure exceeds either the target pressure or vacuum within the calibrated amount of time, the test completes and the fuel tank pressure and time since ignition OFF information is stored. If the target pressure or vacuum is not reached in the calibrated amount of time, a leak is suspected and the fuel tank pressure and time since ignition OFF information is stored.

   On ISO 14229 vehicles, a fast initial response occurs during the first 4 tests after the battery is disconnected or the DTCs are cleared. The PCM processes unfiltered data to quickly indicate a fault is present. The MIL illuminates if the PCM suspects a leak within 2 consecutive trips after a DTC clear or a battery disconnect using the fast initial response logic.

   A step change logic becomes active after the 4th EONV monitor test. The step change logic detects an abrupt change from a no leak condition to a suspected leak condition. The MIL illuminates if the PCM suspects a leak within 2 consecutive trips using the step change logic.

   During the EONV monitor test the PCM uses an exponentially weighted moving average to filter test data. The PCM uses this average after the fourth EONV test and illuminates the MIL on the first trip when the exponentially weighted moving average is greater than a calibrated threshold.

   When a leak is suspected a DTC sets and the MIL is illuminated.

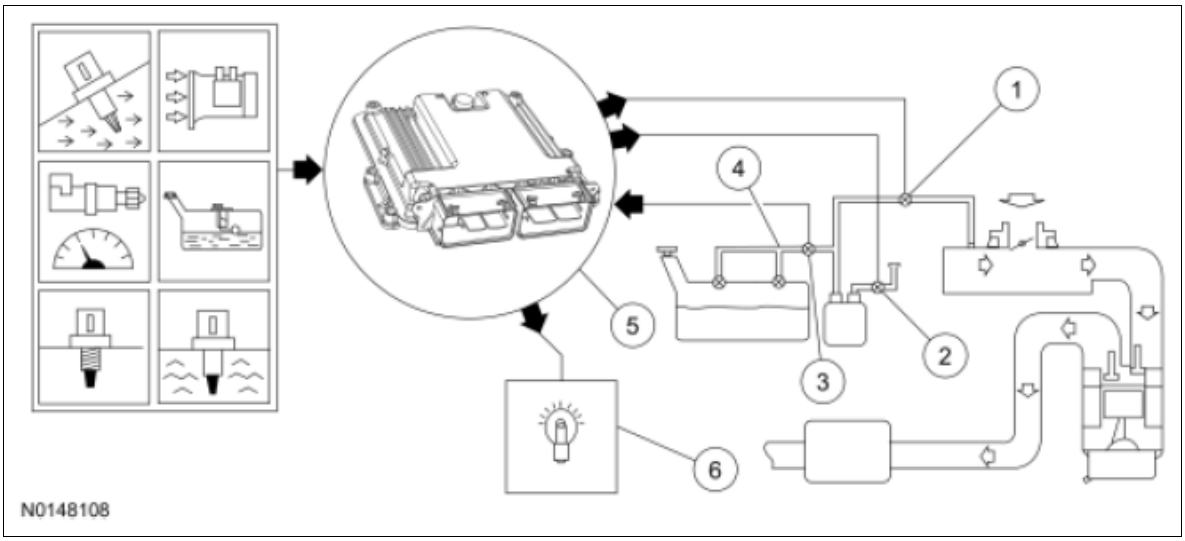
   On non ISO 14229 vehicles, when a leak is suspected, the PCM uses the stored fuel tank pressure and time since ignition OFF information from an average run of 4 tests to suspect a leak. Some vehicles use an alternative method of a single run of 5 tests to determine the presence of a leak. If a leak is still suspected after 2 consecutive runs of 4 tests, (8 total tests) or one run of 5 tests, a DTC sets and the MIL is illuminated.

5. The EONV EVAP leak check monitor is controlled by a separate low power consuming microprocessor inside the PCM. The fuel level input, fuel tank pressure, and battery voltage are inputs to the microprocessor. The microprocessor outputs are the EVAP canister vent

valve and the stored test information. If the separate microprocessor is unable to control the EVAP canister vent valve or communicate with other processors a DTC sets.

6. The MIL is activated for any enhanced EVAP system component DTCs.

Fig 1: EONV EVAP Leak Check Monitor Flow Diagram



Courtesy of FORD MOTOR CO.

FUEL SYSTEM MONITOR

The fuel system monitor is an on board strategy designed to monitor the fuel control system. The fuel control system uses fuel trim tables stored in the PCM keep alive memory (KAM) to compensate for the variability that occurs in fuel system components due to normal wear and aging. Fuel trim tables are based on air mass. During closed loop fuel control, the fuel trim strategy learns the corrections needed to correct a biased rich or lean fuel system. The correction is stored in the fuel trim tables. The fuel trim has 2 means of adapting: long term fuel trim and a short term fuel trim. Refer to POWERTRAIN CONTROL SOFTWARE , FUEL TRIM in this service information. Long term fuel trim relies on the fuel trim tables and short term fuel trim refers to the desired air to fuel ratio parameter called LAMBSE. LAMBSE is calculated by the PCM from the universal heated oxygen sensor (HO2S) inputs and helps maintain a 14.7:1 air to fuel ratio during closed loop operation. Short term fuel trim and long term fuel trim work together. If the universal HO2S indicates the engine is running rich, the PCM corrects the rich condition by moving the short term fuel trim into the negative range, less fuel to correct for a rich combustion. If after a certain amount of time the short term fuel trim is still compensating for a rich condition, the PCM learns this and moves the long term fuel trim into the negative range to compensate and allow the short term fuel trim to return to a value near 0%. Inputs from the engine coolant temperature (ECT) sensor or cylinder head temperature (CHT) sensor (if equipped), the intake air temperature (IAT) sensor and the mass airflow (MAF) sensor (if equipped) are required to activate the fuel trim system, which in turn activates the fuel system monitor. Once activated, the fuel system monitor looks for the fuel trim tables to reach the adaptive clip (adaptive limit) and LAMBSE to exceed a calibrated limit. The fuel system monitor stores the appropriate DTC when a concern is detected as described below.

1. The universal HO2S detects the presence of oxygen in the exhaust and provides the PCM with feedback indicating air to fuel ratio.

2. A correction factor is added to the fuel injector pulse width calculation and the mass airflow

calculation, according to the long and short term fuel trims as needed to compensate for variations in the fuel system.

3. When deviation in the LAMBSE parameter increases, air to fuel control suffers and emissions increase. When LAMBSE exceeds a calibrated limit and the fuel trim table has clipped, the fuel system monitor sets a DTC as follows:

   The DTCs associated with the monitor detecting a lean shift in fuel system operation are P0171 (Bank 1) and P0174 (Bank 2).

   The DTCs associated with the monitor detecting a rich shift in fuel system operation are P0172 (Bank 1) and P0175 (Bank 2).

4. The malfunction indicator lamp (MIL) is activated after a concern is detected on 2 consecutive drive cycles.

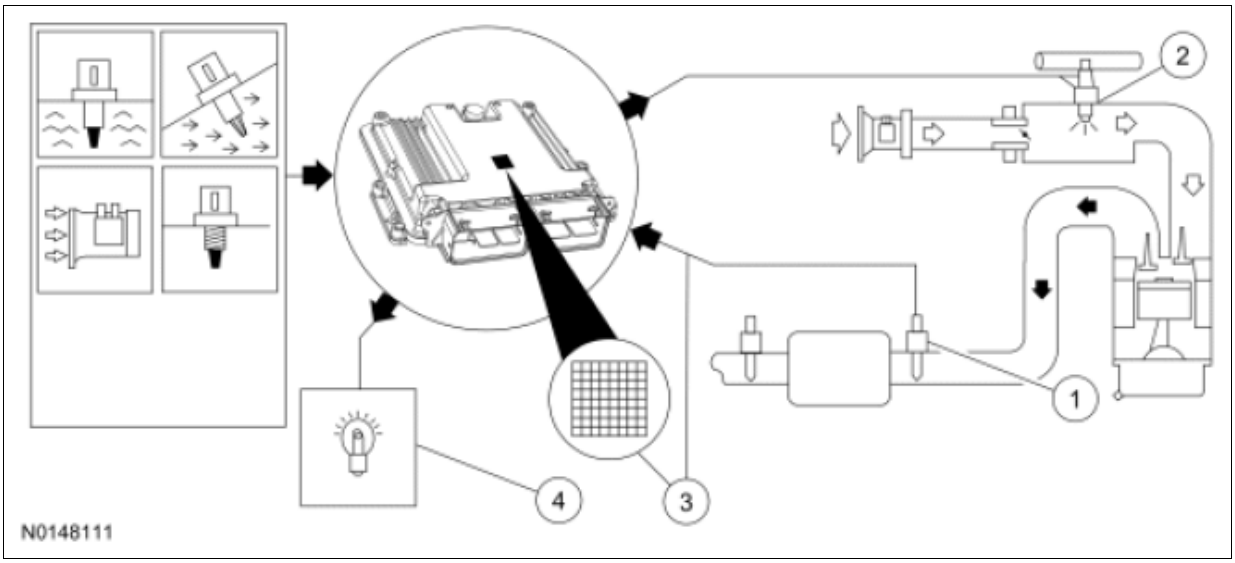
Typical fuel system monitor entry conditions:

- Air mass range greater than 5.67 g/sec (0.75 lb/min)
- Purge duty cycle of 0%
- Engine coolant temperature is between 65.5° C to 110° C (150° F to 230° F)
- Engine load greater than 12%
- Intake air temperature -34° C to 65° C (-30° F to 150° F)

Typical fuel monitor thresholds:

- Lean Condition Concern: LONGFT greater than 25%, SHRTFT greater than 5%
- Rich Condition Concern: LONGFT less than 25%, SHRTFT less than 10%

Fig 1: Fuel System Monitor Flow Diagram



Courtesy of FORD MOTOR CO.

HEATED OXYGEN SENSOR (HO2S) MONITOR

The HO2S monitor is an on board strategy designed to monitor the heated oxygen sensors for concerns or deterioration which can affect emissions. The fuel control or stream 1 HO2S are checked for correct output voltage and response rate. Response rate is the time it takes to switch from lean to rich or rich to lean. The rear or stream 2 HO2S is monitored for correct output voltage and is used for catalyst monitoring and fore aft oxygen sensor (FAOS) control. Input is required from the camshaft position (CMP) sensor, the crankshaft position (CKP) sensor, the engine coolant temperature (ECT) sensor or the cylinder head temperature (CHT) sensor (if equipped), the fuel rail pressure temperature (FRPT) sensor, the fuel tank pressure (FTP) sensor, the intake air temperature (IAT) sensor, the mass airflow (MAF) sensor (if equipped), the manifold absolute pressure (MAP) sensor, the throttle position (TP) sensor and vehicle speed to activate the HO2S monitor. The fuel system monitor and misfire detection monitor must also have completed successfully before the HO2S monitor is enabled.

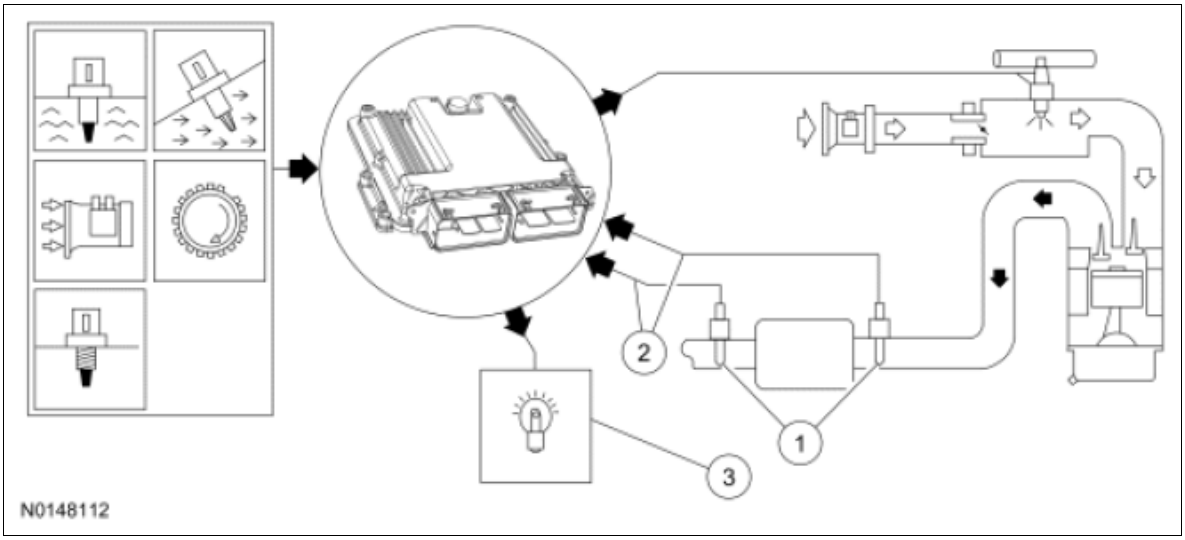
1. The HO2S senses the oxygen content in the exhaust flow. The typical HO2S outputs a voltage between 0 and 1.0 volt. Lean of stoichiometric, air to fuel ratio of approximately 14.7:1, the HO2S generates a voltage between 0 and 0.45 volt. Rich of stoichiometric, the HO2S generates a voltage between 0.45 and 1.0 volt. The current required to maintain the universal HO2S at 0.45 volt is used by the PCM to calculate the air to fuel ratio. The HO2S monitor evaluates the HO2S for correct function.

2. The time between HO2S switches is monitored after vehicle startup and during closed loop fuel conditions. Excessive time between switches or no switches since startup indicates a concern. Since lack of switching concerns can be caused by HO2S concerns or by shifts in the fuel system, DTCs are stored that provide additional information for the lack of switching concern. Different DTCs indicate whether the sensor always indicates lean, rich, or disconnected. The HO2S signal is also monitored for high voltage, in excess of 1.1 volts. An over voltage condition is caused by a HO2S heater or battery power short to the HO2S signal line.

   A functional test of the rear HO2S is done during normal vehicle operation. The peak rich and lean voltages are continuously monitored. Voltages that exceed the calibrated rich and lean thresholds indicate a functional sensor. If the voltages have not exceeded the thresholds after a long period of vehicle operation, the air to fuel ratio may be forced rich or lean in an attempt to get the rear sensor to switch. This situation normally occurs only with a green, less than 804.7 km (500 miles), catalyst. If the sensor does not exceed the rich and lean peak thresholds, a concern is indicated. Also, a deceleration fuel shut off rear HO2S response test is done during a deceleration fuel shut off (DFSO) event. Carrying out the HO2S response test during a DFSO event helps to isolate a sensor concern from a catalyst concern. The response test monitors how quickly the sensor switches from a rich to lean voltage. It also monitors if there is a delay in the response to the rich or lean condition. If the sensor responds very slowly to the rich to lean voltage switch or is never greater than a rich voltage threshold or less than a lean voltage threshold, a concern is indicated.

3. The malfunction indicator lamp (MIL) is activated after a concern is detected on 2 consecutive drive cycles.

Fig 1: HO2S Monitor Flow Diagram



Courtesy of FORD MOTOR CO.

MISFIRE DETECTION MONITOR

The misfire detection monitor is an on board strategy designed to monitor engine misfire and identify the specific cylinder in which the misfire has occurred. Misfire is defined as lack of combustion in a cylinder due to absence of spark, poor fuel metering, poor compression, or any other cause. The misfire detection monitor is enabled only when certain base engine conditions are first satisfied. Input from the engine coolant temperature (ECT) or cylinder head temperature (CHT), intake air temperature (IAT), and mass airflow (MAF) sensors is required to enable the monitor. The misfire detection monitor is also carried out during an on-demand self-test.

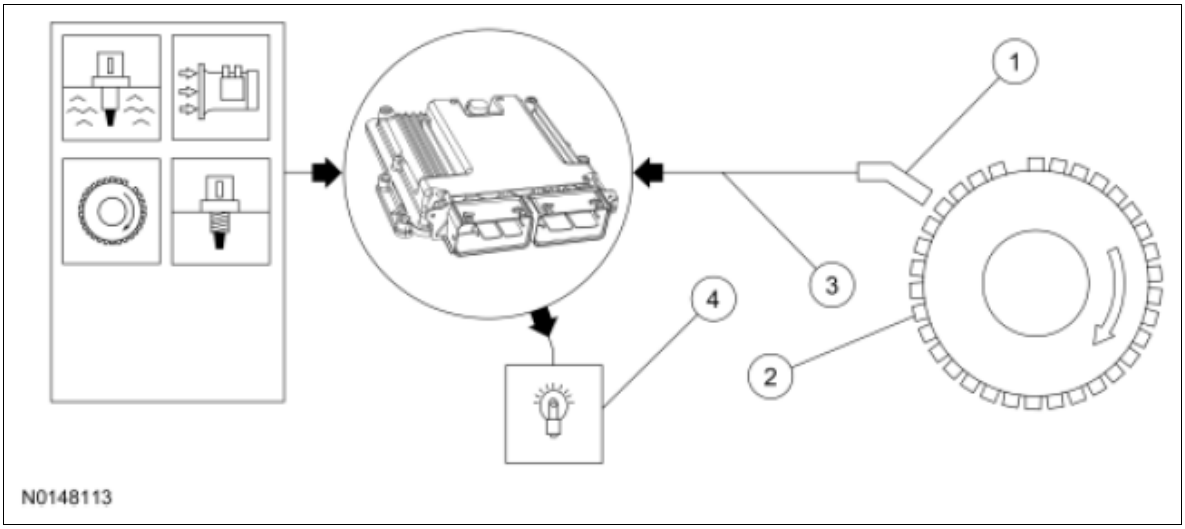
1. The PCM synchronized ignition spark is based on information received from the crankshaft position (CKP) sensor. The CKP sensor signal generated is also the main input used in determining cylinder misfire.

2. The input signal generated by the CKP sensor is derived by sensing the passage of teeth from the crankshaft position wheel mounted on the end of the crankshaft.

3. The input signal to the PCM is then used to calculate the time between CKP sensor signal edges and the crankshaft rotational velocity and acceleration. By comparing the accelerations of each cylinder event, the power loss of each cylinder is determined. When the power loss of a particular cylinder is sufficiently less than a calibrated value and other criteria are met, then the suspect cylinder is determined to have misfired.

4. The malfunction indicator lamp (MIL) is activated after one of the above tests fail on 2 consecutive drive cycles.

Fig 1: Misfire Detection Monitor Flow Diagram



Courtesy of FORD MOTOR CO.

MISFIRE DETECTION MONITOR > MISFIRE MONITOR OPERATION

The signal from the crankshaft position sensor and timing wheel is processed by the PCM into individual tooth period measurements and provided to the misfire monitor. The misfire monitor uses the tooth period measurements to calculate crankshaft acceleration signals for misfire detection.

A low data rate (LDR) and high data rate (HDR) are the 2 different types of misfire monitoring systems used. The LDR system is capable of meeting the federal test procedure monitoring requirements on most engines and is capable of meeting the full range of misfire monitoring requirements on 3 and 4 cylinder engines. It is also used on 6 cylinder engines with rear mounted crank sensors. The HDR system is capable of meeting the full range of misfire monitoring requirements on 8 cylinder and 10 cylinder engines. The HDR system on these engines meets the full range of misfire phase-in requirements specified in the on board diagnostic (OBD) regulations. The PCM software allows for detection of any misfires that occur 6 engine revolutions after initially cranking the engine. This meets the OBD requirement to identify misfires within 2 engine revolutions after exceeding the warm drive, idle RPM.

The monitor includes a diagnostic check on the crank sensor input that checks the number of tooth period measurements received on each cylinder event. If the monitor receives an invalid number of tooth period measurements, DTC P1336 will set. This DTC indicates that noise is present on the crank sensor input or there is a lack of synchronization between the camshaft and crankshaft sensors.

MISFIRE DETECTION MONITOR > LOW DATA RATE (LDR) SYSTEM

The LDR misfire monitor uses a low data rate CKP sensor signal which indicates one time measurement signal for each cylinder event. The PCM uses the CKP sensor signal to calculate the crankshaft speed and acceleration for each cylinder. The crankshaft acceleration is then processed to detect a sporadic, single-cylinder misfire patterns or multi-cylinder misfire patterns. The changes in overall engine RPM are removed by subtracting the median engine acceleration over a complete engine cycle. The crankshaft acceleration is then processed by three algorithms. The first algorithm, called pattern cancellation, is optimized for detection of sporadic patterns of misfire. The algorithm learns the normal pattern of cylinder

accelerations from the mostly good firing events and is then able to accurately detect deviations from that pattern. The second algorithm, called pattern cancellation by opposing engine revolution, is optimized for single cylinder patterns. The algorithm compares the acceleration of a cylinder to its opposite cylinder on the opposing engine revolution. The algorithm learns the normal patterns that repeat every engine revolution and is then able to accurately detect deviations between the paired cylinders. The third algorithm is a non filtered acceleration signal that is a general purpose signal for all patterns including multi cylinder patterns. The resulting deviant cylinder acceleration values are used in evaluating misfire. Refer to the GENERAL MISFIRE PROCESSING in this service information for more information.

MISFIRE DETECTION MONITOR > HIGH DATA RATE (HDR) SYSTEM

The HDR misfire monitor uses a high data rate CKP sensor signal which indicates 36 position references per crankshaft revolution. This high resolution signal is processed with a digital low pass filter. The low pass filter filters the high resolution crankshaft velocity signal to remove some of the crankshaft torsional vibrations that degrade signal to noise. Two low pass filters are used to enhance detection capability: a base filter and a more aggressive filter to enhance single cylinder capability at higher RPM. This significantly improves detection capability for continuous misfires on single cylinders up to red line. The changes in overall engine rpm are removed by subtracting the median engine acceleration over a complete engine cycle. The crankshaft acceleration is then processed by three algorithms similar to the LDR system. The final stage is to decimate the high resolution signals by selecting the peak acceleration values from within a window location for each cylinder. The resulting deviant cylinder acceleration values are used in evaluating misfire. Refer to the GENERAL MISFIRE PROCESSING in this service information for more information.

MISFIRE DETECTION MONITOR > GENERAL MISFIRE PROCESSING

The acceleration that a piston undergoes during a normal firing event is directly related to the amount of torque that cylinder produces. The calculated piston and cylinder acceleration values are compared to a misfire threshold that is continuously adjusted based on inferred engine torque. Deviant accelerations exceeding the threshold are conditionally labeled as misfires. The cold start emission reduction (CSER) monitor uses a threshold multiplier during startup to compensate for the reduction in the signal amplitude during ignition spark retard conditions. The threshold adjustments may also be applied to compensate for torque reduction during gear shift events, and to compensate for changes in driveline coupling with torque convertor lock status.

The calculated deviant acceleration values are also evaluated for noise. Normally, misfire results in a nonsymmetrical loss of cylinder acceleration. Mechanical noise, such as rough roads or crankshaft oscillations at low rpm or high load conditions, will produce symmetrical positive acceleration variations. Noise limits are calculated by applying a negative multiplier to the misfire threshold. If the noise limits are exceeded, a noisy signal condition is inferred and the misfire monitor is suspended for a brief interval. Noise free deviant acceleration exceeding a given threshold is labeled a misfire.

The number of misfires are counted over a continuous 200 revolution and 1, 000 revolution period. The revolution counters are not reset if the misfire monitor is temporarily disabled such as for negative torque mode. At the end of the evaluation period, the total misfire rate and the misfire rate for each individual cylinder is computed. The misfire rate is evaluated every 200 revolution period (Type A) and compared to a threshold value achieved from an engine speed and load table. This misfire threshold is designed to prevent damage to the catalyst due to sustained excessive temperature 899°C (1, 650°F) for Pt/Pd/Rh advanced washcoat and 982°C (1, 800°F) for Pd-only high tech washcoat. If the misfire

threshold is exceeded and the catalyst temperature model calculates a catalyst mid-bed temperature that exceeds the catalyst damage threshold, the MIL blinks at a 1 Hz rate while the misfire is present. If the threshold is again exceeded on a subsequent driving cycle, the MIL is illuminated.

At high engine speed and load operating conditions the monitor continuously evaluates the misfire rate during each 200 revolution period. If a calibrated number of misfire events have been accumulated within a 200 revolution block such that the misfire threshold is already exceeded before the end of the block has been reached, the monitor will declare a fault immediately rather than wait for the end of the block. This improves the capability of the monitor to prevent damage to the catalyst.

If a single cylinder is determined to be consistently misfiring in excess of the catalyst damage criteria, the monitor will initiate failure mode effects management (FMEM) to prevent catalyst damage. The fuel injector to that cylinder is disabled for a calibrated period of time, typically 30 to 60 seconds. Up to 2 cylinders may be disabled at the same time on 6, 8 and 10 cylinder engines and 1 cylinder on 3 and 4 cylinder engines. The fuel control will go open loop and target lambda as slightly lean. The software may also use the throttle to limit the airflow (limit boost) on GTDI engines for additional exhaust component protection. After the calibrated period of time, typically 30 seconds, the injector is enabled and the system returns to normal operation. On some vehicles, the software may continue FMEM beyond 30 seconds if the engine is operating at high speed or load at the end of the 30 second period. The software will wait for a low airflow condition to exit from FMEM. This protects the catalyst should the misfire fault still be present when the fuel injector is turned back on. If a misfire is detected on that cylinder again after 200 revolutions (about 5 to 10 seconds), the fuel injector is disabled again and the process repeats until the misfire is no longer present. Note that ignition coil primary circuit failures trigger the same type of fuel injector disablement. For additional information, refer to COMPREHENSIVE COMPONENT MONITOR (CCM) in this service information.

If fuel level is below 15%, the misfire monitor continues to evaluate misfire over every 200 revolution period to determine if catalyst damaging misfire is present so that the fuel shut off FMEM can be utilized to control catalyst temperatures. When a misfire occurs at low fuel levels, DTC P0313 will set in place of DTCs P0300 to P0310.

The misfire rate is also evaluated every 1, 000 revolution period and compared to a single (type B) threshold value to indicate an emission threshold concern, which can be either a single 1, 000 over revolution event from startup or 4 subsequent 1, 000 over revolution events on a drive cycle after startup. Many vehicles set DTC P0316 if the type B threshold is exceeded during the first 1, 000 revolutions after engine startup. This DTC P0316 is stored in addition to the normal P03xx DTC that indicates the misfiring cylinder. If the misfire is detected but it can not be attributed to a specific cylinder, DTC P0300 is stored.

MISFIRE DETECTION MONITOR > ROUGH ROAD DETECTION

The misfire detection monitor may include a rough road detection system to eliminate false misfire indications due to rough road conditions. The rough road detection system uses data from the anti-lock brake system (ABS) wheel speed sensors for estimating the severity of rough road conditions. This is a more direct measurement of rough road over other methods which are based on drive line feedback via crankshaft velocity measurements. It improves accuracy over these other methods since it eliminates interactions with actual misfire.

In the event of a rough road detection system failure, the rough road detection output is ignored and the misfire detection monitor remains active. A rough road detection system failure could be caused by a failure in any of the input signals to the algorithm. This includes the ABS wheel speed sensors, brake pedal position (BPP) switch, or controller area network (CAN) hardware concerns. Specific DTCs

indicate the source of these component concerns.

A redundant check is also carried out on the rough road detection system to verify it is not stuck high due to other unforeseen causes. If the rough road detection system indicates rough road during low vehicle speed conditions where it is not expected, the rough road detection output is ignored and the misfire monitor remains active.

MISFIRE DETECTION MONITOR > PROFILE CORRECTION

Profile correction software is used to learn and correct for mechanical inaccuracies in the crankshaft position wheel tooth spacing. Since the sum of all the angles between the crankshaft teeth must equal 360 degrees, a correction factor can be calculated for each misfire sample interval that makes all the angles between individual teeth equal. The LDR system learns one profile correction factor per cylinder (that is, 3 correction factors for a 3 cylinder engine or 4 correction factors for a 4 cylinder engine), while the HDR system learns 36, 40 or 60 correction factors depending on the number of crankshaft wheel teeth (that is, 35 for some V6 and V8 engines, 39 for V10 engines and 58 for some I4 and V6 engines).

The corrections are calculated from several engine cycles of misfire sample interval data. The correction factors are the average of a selected number of samples. In order to assure the accuracy of these corrections, a tolerance is placed on the incoming values such that an individual correction factor must be repeatable within the tolerance during learning. This is to reduce the possibility of learning incorrect corrections due to crankshaft velocity disturbances.

Since inaccuracies in the wheel tooth spacing can produce a false indication of misfire, the misfire monitor is not active until the corrections are learned.

Two methods of learning profile correction are used. The first is neutral profile correction and non volatile memory and the second is customer drive cycle for profile correction 97 to 64 km/h (60 to 40 MPH deceleration).

MISFIRE DETECTION MONITOR > NEUTRAL PROFILE CORRECTION AND NON VOLATILE MEMORY

Neutral profile learning is used at end of line to learn profile correction through a series of one or more neutral engine RPM throttle snaps. This allows the misfire monitor to be activated at the assembly plant. A scan tool command is required to enable neutral profile correction learning. Learning profile correction factors at high speed (3, 000 RPM) neutral conditions versus during 97 to 64 km/h (60 to 40 MPH) decelerations optimizes correction factors for higher RPMs where they are most needed and eliminates driveline or transmission and road noise effects. This improves signal to noise characteristics which means improved detection capability.

The profile correction factors learned at the assembly plant are stored into non volatile memory. This eliminates the need for specific customer drive cycles. However, misfire profiles may need to be relearned using a scan tool procedure if major engine work is done or a new PCM is installed. Relearning is not required for a reflash.

On selected vehicles, the neutral profile correction strategy is the only method used for profile correction learning. In the event of a loss of non volatile memory content (new PCM installed), the correction factors are lost and must be relearned. The P0315 DTC is set until the misfire profile is relearned using a scan tool procedure.

MISFIRE DETECTION MONITOR > CUSTOMER DRIVE CYCLE FOR PROFILE CORRECTION (60 TO 40 MPH DECELERATION)

To prevent any fueling or combustion differences from affecting the correction factors, learning is done during deceleration fuel shut off (DFSO). This can be done during closed throttle, nonbraking, defueled decelerations in the 97 to 64 km/h (60 to 40 MPH) range after exceeding 97 km/h (60 MPH) (likely to correspond to a freeway exit condition). In order to minimize the learning time for the correction factors, a more aggressive DFSO strategy may be used when the conditions for learning are present. The corrections are typically learned in a single 97 to 64 km/h (60 to 40 MPH) deceleration, but may take up to 3 decelerations or a greater number of shorter decelerations.

If the software is unable to learn a profile after three, 97 to 64 km/h (60 to 40 MPH) deceleration cycles, DTC P0315 is set.

MISFIRE DETECTION MONITOR > MISFIRE DETECTION MONITOR SPECIFICATIONS

Misfire detection monitor operation: DTCs P0300 to P0310 (random and specific cylinder misfire), P1336 (noisy crank sensor, no crankshaft and camshaft sensor synchronization), P0315 (crankshaft position system variation not learned), P0316 (misfire detected on startup [first 1000 revolutions]), P0313 (misfire detect with low fuel level). The monitor execution is continuous, misfire rate calculated every 200 or 1, 000 revolutions. The monitor does not have a specific sequence. The CKP, CMP, MAF, and ECT or CHT sensors have to be operating correctly to run the monitor. The monitoring duration is the entire driving cycle (see disablement conditions below).

Typical misfire detection monitor entry conditions: Minimum to maximum time since engine startup is 0 seconds, engine coolant temperature is -7°C to 121°C (20°F to 250°F), RPM range is (full-range misfire certified, with 2 revolution delay) 2 revolutions after exceeding 150 RPM below drive idle RPM to red line on tach or fuel cutoff, profile correction factors are learned in KAM, and the fuel tank level is greater than 15%.

Typical misfire temporary disablement conditions: Closed throttle deceleration (negative torque, engine being driven), Fuel shut off due to vehicle speed limiting or engine RPM limiting mode, a high rate of change of torque (heavy throttle tip-in or tip out) and rough road conditions.

The profile learning operation includes DTC P0315 if the profile correction factors are not learned. On selected vehicles, DTC P0315 is set immediately after a new PCM is installed until the scan tool procedure for neutral profile correction is completed. On all other vehicles, DTC P0315 is set if profile learning does not complete during the customer drive cycle for profile correction. The monitoring duration for the customer drive cycle is 10 cumulative seconds in conditions (a maximum of three, 97 to 64 km/h (60 to 40 MPH) defueled decelerations). The monitor execution is once per profile learning sequence. The monitor sequence: profile must be learned before the misfire monitor is active, the CKP and CMP sensors are required to be operating correctly; and the CKP and CMP signals must be synchronized.

Assembly plant or repair facility typical profile learning entry conditions from minimum to maximum: The engine in deceleration fuel shut off (DFSO) mode for 4 engine cycles with the vehicle in PARK or NEUTRAL gear. The engine RPM is 2, 000 to 3, 000 RPM. The learning tolerance is 1%.

Customer drive cycle typical profile learning entry conditions from minimum to maximum: The engine in deceleration fuel shut off mode for 4 engine cycles. The brakes are not applied. The engine RPM is 1, 300 to 3, 700 RPM and the change is less than 600 RPM. The vehicle speed is 48 to 121 km/h (30 to

75 MPH). The learning tolerance is 1%.

POSITIVE CRANKCASE VENTILATION (PCV) SYSTEM MONITOR

The PCV system monitor consists of a modified PCV system design. The PCV system is designed to prevent accidental disconnection. High retention force molded plastic lines are used from the valve cover to the intake manifold. The diameter of the lines and the intake manifold entry fitting are increased so that disconnection of the lines may cause an engine to stall. In the event the vehicle does not stall if the line between the intake manifold and PCV system is disconnected, the vehicle has a large vacuum leak that causes the vehicle to run lean at idle. The lean condition illuminates the malfunction indicator lamp (MIL) and stores a lean bank 1 or bank 2 DTC.

The PCV monitor sets a DTC if the PCV vacuum hose is disconnected, or if a large air leak between the throttle body and intake valves is present. An idle speed symptom may be present when the DTC is set.

The PCV system on some vehicles will include a crankcase pressure sensor to detect a disconnection of the fresh air hose. A disconnection of the fresh air hose would allow the discharge of crankcase vapor into the atmosphere while the engine was under boost.

For additional PCV information, refer to POSITIVE CRANKCASE VENTILATION (PCV) SYSTEM in this service information.

THERMOSTAT MONITOR

The thermostat monitor is designed to verify correct thermostat operation. This monitor is executed once per drive cycle and has a monitor run duration of 300-800 seconds. If a concern is present, DTC P0125 or P0128 is set and the malfunction indicator lamp (MIL) is illuminated.

A timer is initialized while the engine is at moderate load and the vehicle speed is above a calibrated limit. The target timer value is based on ambient air temperature at startup. If the timer exceeds the target time and engine coolant temperature or cylinder head temperature has not warmed up to the target temperature, a concern is indicated. The test runs if the startup intake air temperature from the intake air temperature (IAT) sensor is at or below the target temperature. A 2 hour engine OFF soak time is also required to enable the monitor and to prevent erasing of any pending DTCs during a hot soak. This soak time feature also prevents false passes of the monitor when the engine coolant temperature rises after the engine is turned OFF during a short engine OFF soak period.

The target temperature is calibrated to within 11°C (20°F) less than the thermostat regulating temperature. For a typical 90°C (195°F) thermostat, the target temperature would be calibrated to 79°C (175°F). Some vehicle calibrations may lower the target temperature to less than 27°C (50°F) for vehicles that do not warm-up to thermostat regulating temperatures in the 11°C (20°F) to 27°C (50°F) ambient temperature range.

1. Inputs: ECT or CHT, IAT, engine LOAD from mass airflow (MAF) sensor and vehicle speed input.

   Typical monitor entry conditions:

   1. vehicle speed greater than 24 km/h (15 MPH)

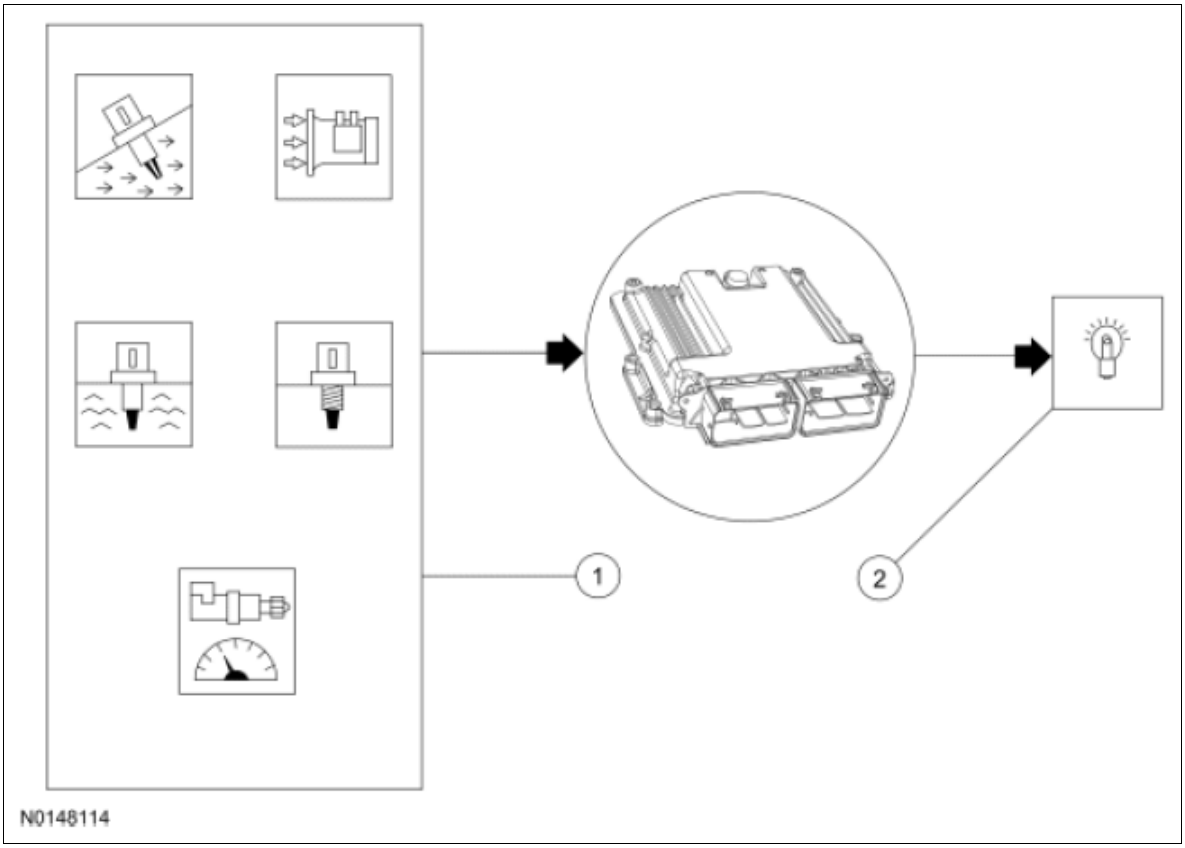
   2. intake air temperature at startup is between -7°C (20°F) and target thermostat

temperature

3. engine load greater than 30%
4. engine OFF (soak) time greater than 2 hours

2. Output: MIL.

Fig 1: Thermostat Monitor Flow Diagram



Courtesy of FORD MOTOR CO.

VARIABLE CAMSHAFT TIMING (VCT) MONITOR

The VCT output driver in the powertrain control module (PCM) is checked electrically for opens or shorts. The VCT system is checked functionally by monitoring the closed loop camshaft position error correction. If the correct camshaft position cannot be maintained and the system has an advance or retard error greater than the calibrated threshold, a VCT control concern is indicated.

For additional information, refer to VARIABLE CAMSHAFT TIMING (VCT) SYSTEM in this service information.

DIAGNOSTIC METHODS > OVERVIEW

When following powertrain diagnostics on vehicles with on board diagnostic (OBD), the system may be checked by an off-board tester referred to as a scan tool. This section contains information for carrying out diagnostics with a scan tool. A scan tool has certain generic capabilities that are standard across the automotive industry in the United States and Canada. All functions are selected from a menu. Refer to the service information provided by the tool manufacturer.

DIAGNOSTIC TOOLS

Below is an equipment list with corresponding part numbers:

REQUIRED EQUIPMENT:

- Vehicle Communication Module (VCM) and Integrated Diagnostic System (IDS) software with appropriate hardware, or equivalent scan tool with functionality described in SCAN TOOL SETUP AND FUNCTIONALITY service information.
- Rotunda Smoke Machine, Fuel Evaporative Emission System Tester 218-00001 (522) or equivalent.

RECOMMENDED EQUIPMENT:

- Rotunda Vacuum/Pressure Tester 164-R0253 or equivalent. Range 0-101.3 kPa (0-30 in-Hg.) Resolution 3.4 kPa (1 in-Hg.)
- Fuel Pressure Test Kit 310-D009 (D95L-7211A) or equivalent.
- Fuel Pressure Test Adapter 310-180 or equivalent.
- Digital Multimeter (DMM) FLU77-4 or equivalent.
- Adjustable Ignition Spark Tester THX458 or equivalent.
- Non-powered test lamp.
- Fuel Pressure T Adapter (5/16") 310-D251 or equivalent
- Deluxe Noid Lite and Signal Test Light Set AST7898 or equivalent.

SCAN TOOL SETUP AND FUNCTIONALITY

Connect the scan tool to the data link connector (DLC) for communication with the vehicle.

The DLC is located on the driver side of the vehicle under the steering column. It is attached to the instrument panel and accessible from the driver seat.

The DLC is rectangular in design and capable of accommodating up to 16 terminals. The connector has

keying features to allow easy connection.

The required scan tool functions are described below:

- monitor, record, and playback of parameter identification (PID)
- freeze frame PID data
- diagnostic test modes; self-test, clear diagnostic trouble codes (DTCs)
- output state control (OSC)
- resetting keep alive memory (KAM)
- diagnostic monitoring test results (mode 6) for on board diagnostic (OBD) monitors
- on board system readiness (OBD monitor completion status)

Some of these functions are described in this service information. Refer to the scan tool manufacturer's instruction manual for specific information on scan tool setup and operation.

SCAN TOOL SETUP AND FUNCTIONALITY > INTERNATIONAL STANDARDS ORGANIZATION (ISO) 14229 DTC DESCRIPTIONS

The ISO 14229 DTC is a set of common requirements for diagnostic systems. The scan tool displays a failure type and a status type with the DTC. The types display additional information on the scan tool for the condition that set the DTC. For a list of failure type descriptions, refer to POWERTRAIN CONTROL SOFTWARE , International Standards Organization (ISO) 14229 Diagnostic Trouble Code (DTC) Descriptions.

VEHICLE CHECK AND PREPARATION

Before using the scan tool to carry out any test, refer to the important Safety Notice located at the beginning of this manual and the necessary visual checks listed below.

VEHICLE CHECK AND PREPARATION > VISUAL CHECKS

- Inspect the air cleaner and inlet duct.
- Check all engine vacuum hoses for damage, leaks, cracks, kinks, and proper routing.
- Check the electronic engine control (EEC) system wiring harness for proper connections, bent or broken pins, corrosion, loose wires, and proper routing.
- Check the PCM, sensors, and actuators for physical damage.
- Check the engine coolant for proper level and mixture.
- Check the transmission fluid level and quality.

- Make all necessary repairs before continuing with the quick test. For additional information, refer to QUICK TEST DESCRIPTION in this service information.

VEHICLE CHECK AND PREPARATION > VEHICLE PREPARATION

- Carry out all safety steps required to start and run vehicle tests. Apply the parking brake, place the gear selector lever firmly into the PARK position on automatic transmission vehicles or NEUTRAL on manual transmission vehicles, and block the drive wheels.
- Turn off all electrical loads such as radios, lamps, A/C, blower, and fans.
- Start the engine (if the engine runs) and bring it up to the normal operating temperature before running the quick test.

QUICK TEST DESCRIPTION > QUICK TEST

The quick test is divided into 3 specialized tests:

1. Key On Engine Off (KOEO) On Demand Self-Test
2. Key On Engine Running (KOER) On Demand Self-Test
3. Continuous Memory Self-Test

The quick test checks the integrity and function of the electronic engine control (EEC) system and outputs the test results when requested by the scan tool. The quick test also provides a quick check of the powertrain control system, and is usually carried out at the start of each diagnostic procedure with all accessories off. The quick test is also carried out at the end of most pinpoint tests for verification of the repair and to make sure no other concerns are incurred while repairing a previous concern. A system pass is displayed when no diagnostic trouble codes (DTCs) are output and a scan tool communication error does not exist. System pass means that hardware monitored by the PCM is functioning within the normal operating limits. Only a system pass, a DTC, or an incomplete on board diagnostic (OBD) drive cycle is displayed.

For applications that use a stand alone transmission control module (TCM) the PCM does not output TCM DTCs. For TCM self-test and diagnostics, refer to the service information Automatic Transmission.

QUICK TEST DESCRIPTION > KEY ON ENGINE OFF (KOEO) ON DEMAND SELF-TEST

The KOEO on demand self-test is a functional test of the PCM carried out on demand with the ignition ON and the engine OFF. This test carries out checks on certain sensor and actuator circuits. A concern must be present at the time of testing for the KOEO self-test to detect the concern. When a concern is detected, a DTC is output on the data link at the end of the test as requested by the scan tool.

QUICK TEST DESCRIPTION > KEY ON ENGINE RUNNING (KOER) ON DEMAND SELF-TEST

The KOER on demand self-test is a functional test of the PCM carried out on demand with the ignition ON, the engine running and the vehicle stopped. A check of certain inputs and outputs is made during operating conditions and at a normal operating temperature. The brake pedal position, transmission control, and the power steering tests are part of the KOER on demand self-test and must be carried out during this operation if applicable. These are described below. A concern must be present at the time of testing for the KOER on demand self-test to detect the concern. When a concern is detected, a DTC is output on the data link at the end of the test as requested by the scan tool.

QUICK TEST DESCRIPTION > BRAKE PEDAL POSITION (BPP) TEST

The BPP test checks the ability of the EEC system to detect a change of state in the BPP switch. The brake pedal is briefly applied and released on all vehicles equipped with a BPP input. This is done during a KOER on demand self-test.

QUICK TEST DESCRIPTION > CONTINUOUS MEMORY SELF-TEST

The continuous memory self-test is a functional test of the PCM carried out under any condition (engine running or OFF) with the ignition ON. Unlike the KOEO and KOER self-tests, which can only be activated on demand, the continuous memory self-test is always active. A concern does not need to be present when accessing continuous memory self-test DTCs, making the test valuable when diagnosing intermittent concerns. The vehicle may need to be driven or the OBD drive cycle completed to allow the PCM to detect a concern. Refer to ON BOARD DIAGNOSTIC (OBD) DRIVE CYCLE in this service information for more information. When a concern is stored in memory, a DTC is output on the data link when requested by the scan tool.

There are two types of continuous DTCs. The first type is an emission related code which illuminates the malfunction indicator lamp (MIL) in the instrument cluster. The second is a non emission related, non-MIL DTC which does not illuminate the instrument cluster indicator.

For emission related MIL DTCs, the PCM stores the DTC in continuous memory when a concern is detected for the first time. At this point the DTC does not illuminate the MIL and is considered a pending code. The purpose of pending codes is to assist in repair verification by reporting a pending DTC after one drive cycle. If the same concern is detected after the next drive cycle, the emission related MIL DTC illuminates the MIL and sets both a confirmed MIL DTC and a permanent DTC. The MIL remains illuminated even if the concern is intermittent. A permanent DTC is stored until three consecutive passing drive cycles have been completed after a repair and the MIL turns off, or after a request to clear DTCs has been made using the scan tool and the next monitoring cycle has completed and passed for that DTC.

Confirmed emission related MIL DTCs and any non-emission related, non-MIL DTCs are erased approximately 40 vehicle warm-up cycles after the concern was last detected, or if the DTCs are cleared by the scan tool.

Pending emission related MIL DTCs that never detect a concern on a second consecutive drive cycle (and never illuminate the MIL) are not stored in memory for any number of vehicle warm-up cycles; they are immediately cleared when the next monitoring cycle has completed and passed for that DTC, or until a request to clear DTCs has been made by the scan tool.

Any scan tool that meets OBD requirements can access the continuous memory to retrieve emission related MIL DTCs. However, not all scan tools access pending and non-emission related, non-MIL DTCs

in the same way.

During most diagnostic procedures in this service information, it is required that all DTCs be retrieved and cleared. Permanent DTCs cannot be directly cleared by the scan tool. When a scan tool clears DTCs, pending and confirmed DTCs are immediately cleared. Permanent DTCs will not clear until the next monitoring cycle has completed and passed for that DTC. For additional information, refer to POWERTRAIN CONTROL SOFTWARE , Permanent Diagnostic Trouble Code (DTC).

CLEAR THE CONTINUOUS DIAGNOSTIC TROUBLE CODES (DTCS) AND RESET THE EMISSION MONITORS INFORMATION IN THE POWERTRAIN CONTROL MODULE (PCM) > DESCRIPTION

All on board diagnostic (OBD) scan tools support the clearing of continuous DTCs and resetting of emission monitors information in the PCM.

The clearing of the continuous DTCs allows the scan tool to command the PCM to clear and reset all emission related diagnostic information.

The following events occur when the continuous DTCs and the emission monitors information is cleared from the PCM:

- the number of DTCs is reset
- the DTCs are cleared (on vehicles with permanent DTCs, additional vehicle operation is required to complete and pass the appropriate monitors to complete the clearing of permanent DTCs)
- the freeze frame data is cleared
- the diagnostic monitoring test results are reset
- the status of the OBD system monitors is reset

RESETTING THE KEEP ALIVE MEMORY (KAM) > DESCRIPTION

Resetting the KAM returns the PCM memory to its default setting. Adaptive learning contents such as adaptive airflow, idle speed, refueling event, and fuel trim are included. Clearing the continuous diagnostic trouble codes (DTCs) and resetting the emission monitors information in the PCM, is part of a KAM reset. Refer to CLEAR THE CONTINUOUS DIAGNOSTIC TROUBLE CODES (DTCS) AND RESET THE EMISSION MONITORS INFORMATION IN THE POWERTRAIN CONTROL MODULE (PCM) service information. Both can be useful in post-repair testing.

After the KAM has been reset, the vehicle may exhibit certain driveability concerns. It is necessary to allow the engine to idle at normal operating temperature with the A/C off for 2 minutes. Then drive the vehicle to allow the PCM to learn the values for optimum driveability and performance.

This function may not be supported by all scan tools. Refer to the scan tool manufacturer's instruction manual.

ON BOARD SYSTEM READINESS (OSR) TEST > DESCRIPTION

All on board diagnostic (OBD) scan tools display the OSR test. The OSR displays the supported monitors on the vehicle and the status of all monitors (complete or not complete) at that time. Fuel, misfire, and comprehensive component monitors (CCMs) run continuously and always display a YES status. Clearing the continuous diagnostic trouble codes (DTCs) and resetting the emission monitors information in the PCM, or resetting the keep alive memory (KAM) causes the non-continuous monitors to change to a NO status.

A detailed description of completing the OBD monitors is found service information. Refer to ON BOARD DIAGNOSTIC (OBD) DRIVE CYCLE .

PARAMETER IDENTIFICATION (PID) > DESCRIPTION

The PID mode allows access to PCM information. This includes analog and digital signal inputs and outputs along with calculated values and the system status. There are two types of PID lists available and both are used throughout this service information. The first is the generic (J1979) OBD PID list. This is a standard set of PIDs that all scan tools must be able to access. The second is a Ford specific (J2190) list which can be accessed by an appropriate scan tool. When accessing any of these PIDs, the values are continuously updated. The generic or Ford PID list provides definitions and values in appropriate units.

PARAMETER IDENTIFICATION (PID) > GENERIC OBD PID LIST

An X in the Freeze Frame column denotes both a mode 1 and mode 2 PID (real time and freeze frame).

Freeze Frame	Acronym	Description	Measurement Units
X	APP_D	Accelerator Pedal Position D	%
X	APP_E	Accelerator Pedal Position E	%
X	BARO	Barometric Pressure	kPa
X	CATEMP11	Catalyst Temperature Bank 1, Sensor 1	Degrees
X	CATEMP12	Catalyst Temperature Bank 1, Sensor 2	Degrees
X	CATEMP21	Catalyst Temperature Bank 2, Sensor 1	Degrees
X	CATEMP22	Catalyst Temperature Bank 2, Sensor 2	Degrees
X	CLRDIST	Distance Since Codes Cleared	Km/mi
X	CLRWRMUP	Number Of Warm Ups Since DTCs Cleared	Units
X	ECT	Engine Coolant Temperature	Degrees
X	EGRPCT	Commanded EGR	%
X	EGR_ERR	EGR Error	%
X	EVAP_VP	Evaporative System Vapor Pressure	kPa
X	EQ_RAT	Commanded Equivalence Ratio	Unit

X	FLI	Fuel Level Input	%
X	FRP	Fuel Rail Pressure	kPa
X	FUEL SYS1	Fuel System Feedback Control Status Bank 1	Open Loop/Closed Loop
X	FUEL SYS2	Fuel System Feedback Control Status Bank 2	Open Loop/Closed Loop
X	IAT	Intake Air Temperature	Degrees
X	LOAD	Calculated Engine Load	%
X	LOAD_ABS	Absolute Load Value	%
X	LONGFT1	Current Bank 1 Fuel Trim Adjustment (kamref1) From Stoichiometry Which Is Considered Long Term	%
X	LONGFT2	Current Bank 2 Fuel Trim Adjustment (kamref2) From Stoichiometry Which Is Considered Long Term	%
X	MAF	Mass Airflow Rate	g/s-lb/min
X	MAP	Manifold Absolute Pressure	Volts/kPa/ PSI/in-Hg
X	MIL_DIST	Distance Traveled with MIL ON	Kilometer
X	O2S11	Bank 1 Upstream Oxygen Sensor (11)	Volts
X	O2S12	Bank 1 Downstream Oxygen Sensor (12)	Volts
X	O2S13	Bank 1 Downstream Oxygen Sensor (13)	Volts
X	O2S21	Bank 2 Upstream Oxygen Sensor (21)	Volts
X	O2S22	Bank 2 Downstream Oxygen Sensor (22)	Volts
X	O2S23	Bank 2 Downstream Oxygen Sensor (23)	Volts
	OBDSUP	On Board Diagnostic System	OBD II OBD I OBD Combination of or None
X	PTO	Power Take Off Status	On/Off
X	RPM	Revolutions Per Minute	RPM
X	RUNTM	Run Time	Seconds
X	SHRTFT1	Current Bank Fuel Trim Adjustment (lambse1) From Stoichiometry Which Is Considered Short Term	%
X	SHRTFT2	Current Bank 2 Fuel Trim Adjustment (lambse1) From Stoichiometry Which Is Considered Short Term	%
X	SPARKADV	Spark Advance Requested	Degrees
X	TAC_PCT	Commanded Throttle Actuator	%

X	TP	Throttle Position	%
X	TP	REL Relative Throttle Position	%
	VSS	Vehicle Speed Sensor	km/h-mph

PARAMETER IDENTIFICATION (PID) > FORD PID LIST

NOTE: This is not a complete list of Ford PIDs available. This is a list of Ford PIDs in this service information.

PID	Description	Ford Units
AAT	Ambient Air Temperature	Degrees
AAT_V	Ambient Air Temperature Voltage	Volts
AEIS_ACTION	Number Of Drive Cycles Where Automatic Engine Idle Shutdown Occurred	Count
AEIS_POSS	Number Of Drive Cycles Where Automatic Engine Idle Shutdown Possible	Count
APP	Accelerator Pedal Position	Percent
APP1	Accelerator Pedal Position 1	Volts
APP2	Accelerator Pedal Position 2	Volts
APP_MAXDIFF	Maximum Difference Between APP1 And APP2	Degrees
APP_MODE	Accelerator Pedal Position Mode	Pedal Position
AXLE	Axle Ratio	Ratio
B+	Battery Voltage	Volts
BARO	Barometric Pressure Sensor	Frequency/Pressure
BOO	Brake Pedal Position (BPP) Switch	On/Off
BOO1	Brake Pedal Position (BPP) Switch	On/Off
BOO2	Brake Pressure Applied	On/Off
BPP/BOO	Brake Pedal Position (BPP) Switch	On/Off
BRKOVRD_POSS	Number Of Drive Cycles In Which Brake Override Accelerator Action Possible	Numeric Value
BRKOVR_ACTION	Number Of Drive Cycles Where Brake Override Accelerator Action Occurred	Numeric Value
CAC_T	Charge Air Cooler Temperature	Degrees F
CAC_V	Charge Air Cooler Voltage	Volts

CACC_FANSTAT	Charge Air Cooler Cooling Fan Output Status	Status
CACCT	Charge Air Cooler (CAC) Coolant Temperature Sensor	Degrees F
CACCT_V	Charge Air Cooler (CAC) Coolant Temperature Sensor Voltage	Volts
CAT_EVAL	Catalyst Evaluated	Yes/No
CHT	Cylinder Head Temperature Input	Volt/Degrees F
CHT2	Cylinder Head Temperature 2	Degrees F
CHT2_V	Cylinder Head Temperature 2 Voltage	Volt
CLRDIST	Distance Since DTCs Cleared	Miles
CLRWRMUP	Number Of Warm-Ups Since DTCs Cleared	Count
CPP_BOT	Clutch Pedal At Or Near Bottom Of Travel	Yes/No
CPP	Clutch Pedal Position Switch Input	On/Off
CPP/PNP	Clutch Pedal Position/Park Neutral Position Switch Input	Neutral/Drive
CRNKAS_PRS	Crankcase Pressure (Gauge) Measured	Pressure
CRNKAS_P_V	Crankcase Pressure Sensor Circuit Input Voltage	Volts
DECHOKE	Crank Fueling Disabled	Yes/No
DIST_AEIS	Distance Since Automatic Engine Idle Shutdown Occurred	Miles
DIST_BRKOVRD	Distance Since Brake Override Accelerator Action Occurred	Miles
ECT	Engine Coolant Temperature Input	Volts/Degrees F
EGRMC1F	EGR Motor Control Fault	Fault/No Fault
EGRMC2F	EGR Motor Control Fault	Fault/No Fault
EGRMC3F	EGR Motor Control Fault	Fault/No Fault
EGRMC4F	EGR Motor Control Fault	Fault/No Fault
EGRMDSD	Electric EGR Motor Commanded In Steps	On/Off
EGRPCT	Commanded EGR	Percent
EGR_EVAL	EGR Evaluated	Yes/No
EGR_STEP	EGR Valve Motor Position	Position
EONV_RDY	EVAP Monitor Test Ready At Next Key Off	Ready/Not Ready
EQ_RAT11	Equivalence Ratio Lambda Bank 1, Sensor 1	Ratio
EQ_RAT21	Equivalence Ratio Lambda Bank 2, Sensor 1	Ratio
ETC_ACT	Electronic Throttle Control Actual	Degrees
ETC_DSD	Electronic Throttle Control Desired	Degrees

ETC_TRIM	Electronic Throttle Control Trim	Degrees
EVAP020C	Evaporative Emissions Monitor	Yes/No
EVAP020D	Evaporative Emissions Monitor	Allow/Disallow
EVAP020R	Evaporative Emissions Monitor	Ready/Not Ready
EVAPCP	Evaporative Emissions Canister Purge Valve	Percent/On/Off
EVAPCV	Evaporative Emissions Canister Purge Vent Control	Percent/On/Off
EVAPCV_F	Evaporative Emissions Canister Purge Vent Fault	Fault/No Fault
EVAPSOAK	Evaporative Emissions Monitor Soak Conditions Are Met	Yes/No
EVAPSTA	Evaporative Emissions Monitor Completed Cycle	Status
EVAP_ACTIVE	Evaporative Emissions Activation Switch Position At Start Detection	Yes/No
EVAP_EVAL	Evaporative Emissions Monitor Evaluated	Yes/No
EVAP_SWITCH	Evaporative Emissions Actual Switch	Open/Closed
EVMV	Electronic Vapor Management Valve Commanded Current	Current
FAN	Engine Cooling Fan Operation	On/Off
FANDC	Variable Speed Fan Duty Cycle	Percent
FAN_DSD	Fan Speed Desired	Percent
FANSS	Fan Speed Sensor Signal	RPM
FANVAR	Variable Speed Fan Output	Percent
FANVAR_F	Variable Speed Fan Output Fault	Fault/No Fault
FCIL	Fuel Cap Indicator Light	On/Off
FF_INF	Inferred Flex Fuel Percentage	Percent
FF_LRND	Inferred Flex Fuel Learned	Yes/No
FLI	Fuel Level Indicator Input	Percent
FLP	Low Side Fuel Pressure	Pressure
FP	Fuel Pump	Percent/On/Off
FPM	Fuel Pump Secondary Monitor	Percent/On/Off
FPM2	Fuel Pump Secondary 2 Monitor	Percent/On/Off
FPM_STAT	Fuel Pump Monitor Status	Fault/No Fault
FRP	Fuel Rail Pressure Input	Volts/Pressure
FRP_DSD	Fuel Rail Pressure Desired	Pressure
FRT	Fuel Rail Temperature	Degrees F/Volts

FTP	Fuel Tank Pressure Input	Volts/Pressure
FTP_H2O	Fuel Tank Pressure Input	Pressure
FTP_INF	Inferred Fuel Tank Pressure	Pressure
FUELPW1	Injector Pulse Width Bank 1	Time
FUELPW2	Injector Pulse Width Bank 2	Time
FUELSYS	Fuel System Status	Open Loop/ Closed Loop
F_VCV	Fuel Volume Control Valve	Percent
GEAR	Transmission Gear Status	Gear
HFC	High Speed Fan Control	On/Off
HTR11	Bank 1 Sensor 1 HO2S Heater Control	On/Off
HTR11F	Bank 1 Sensor 1 HO2S Heater Circuit Fault	Fault/No Fault
HTR12	Bank 1 Sensor 2 HO2S Heater Control	On/Off
HTR12F	Bank 1 Sensor 2 HO2S Heater Circuit Fault	Fault/No Fault
HTR21	Bank 2 Sensor 1 HO2S Heater Control	On/Off
HTR21F	Bank 2 Sensor 1 HO2S Heater Circuit Fault	Fault/No Fault
HTR22	Bank 2 Sensor 2 HO2S Heater Control	On/Off
HTR22F	Bank 2 Sensor 2 HO2S Heater Circuit Fault	Fault/No Fault
HTRCM11	Bank 1 Sensor 1 O2S Heater Circuit Current	Current
HTRCM12	Bank 1 Sensor 2 O2S Heater Circuit Current	Current
HTRCM21	Bank 2 Sensor 1 O2S Heater Circuit Current	Current
HTRCM22	Bank 2 Sensor 2 O2S Heater Circuit Current	Current
HTRX1	HO2S Sensor 1 (Upstream) Heater Control	On/Off
HTRX2	HO2S Sensor 2 (Downstream) Heater Control	On/Off
HO2S11	Bank 1 Sensor 1 HO2S Input	Volts
HO2S12	Bank 1 Sensor 2 HO2S Input	Volts
HO2S21	Bank 2 Sensor 1 HO2S Input	Volts
HO2S22	Bank 2 Sensor 2 HO2S Input	Volts
IAC	Idle Air Control	Percent
IACTRIM	Short Term Airflow Trim	Numeric Value
IAT	Intake Air Temperature Input	Degrees F/Volts
IAT2	Intake Air Temperature Sensor 2 Input	Degrees F/Volts
IGN_R/S	Ignition Switch Run/Start	On/Off

IMRC	Intake Manifold Runner Control	On/Off
IMRC_F	Intake Manifold Runner Control Fault	Fault/No Fault
IMRC1M	Intake Manifold Runner Control Bank 1 Monitor	Volts
IMRC2M	Intake Manifold Runner Control Bank 2 Monitor	Volts
IMTV	Intake Manifold Tuning Valve Control	Percent
INJ1F-8F	Fuel Injector Primary Fault (Cylinders 1-8)	Fault/No Fault
INJ9F-10F	Fuel Injector Primary Fault (Cylinders 9 and 10)	Fault/No Fault
INJPWR_M	Injectors Circuit Voltage Monitor	Volts
KNOCK1	Knock Sensor 1 Signal	Count
KNOCK2	Knock Sensor 2 Signal	Count
LFC	Low Speed Fan Control	On/Off
LOAD	Calculated Engine Load	Percent
LONGFT1	Long Term Fuel Trim Bank 1	Percent
LONGFT2	Long Term Fuel Trim Bank 2	Percent
MAF	Mass Airflow Rate Input	Frequency/Volts/Mass Flow
MAP	Intake Manifold Absolute Pressure	Frequency/Volts /Pressure
MAP_DMD	Manifold Absolute Pressure Demanded	Pressure
MFC	Medium Speed Fan Control	On/Off
MIL	Malfunction Indicator Lamp Control	On/Off
MIL_DIS	Distance Since MIL Was Activated	Miles
MISFIRE	Misfire Status	Yes/No
MP_LRN	Learned Misfire Correction Profile	Yes/No
NM	Number Of Misfires	Count
NUM	Misfire Events During Latest Misfire Cycle	Count
O2BANK1	Bank 1 O2S Status	Rich/Lean
O2BANK2	Bank 2 O2S Status	Rich/Lean
O2S11	Bank 1 Sensor 1 O2S Input	Volts
O2_DS_DISBL	Downstream Oxygen Sensor Fuel Control Disabled	Yes/No
O2_DS1_ERR	Downstream Closed Loop Input Error Bank 1	Volts
O2_DS2_ERR	Downstream Closed Loop Input Error Bank 2	Volts
O2S11_CUR	Bank 1 Sensor 1 Current	Current

O2S11_HTR	Commanded Duty Cycle For The O2S11 Heater Output	Percentage
O2S11_IMPED	O2S11 Sensor Impedance	Volts
O2S11_READY	O2S11 Is Warm And Ready To Operate	Yes/No
O2S11_STAT	O2S11 Status	Fault/No Fault
O2S11_TR	O2 Sensor Trim Circuit Resistance 11	Resistance
O2S12	Bank 1 Sensor 2 O2S Input	Volts
O2S21	Bank 2 Sensor 1 O2S Input	Volts
O2S21_CUR	Bank 2 Sensor 1 Current	Current
O2S21_HTR	Commanded Duty Cycle For The O2S21 Heater Output	Percentage
O2S21_IMPED	O2S21 Sensor Impedance	Volts
O2S21_READY	O2S21 Is Warm And Ready To Operate	Yes/No
O2S21_STAT	O2S21 Status	Fault/No Fault
O2S21_TR	O2 Sensor Trim Circuit Resistance 21	Resistance
O2S22	Bank 2 Sensor 2 O2S Input	Volts
O2S_EVAL	Oxygen Sensor Circuits Evaluated	Yes/No
O2SHTR_EVAL	Oxygen Sensor Heater Circuits Evaluated	Yes/No
OSS	Output Shaft Speed	RPM
PTO	Power Take Off Status Input	On/Off
PTOLOAD	Power Take Off Engage Input	Yes/No
PTOIR_V	Power Take Off RPM Select Input	Volts
PTOIL	Power Take Off Indicator Lamp Output	On/Off
RO2FT1	Rear O2 Fuel Trim - Bank 1	Percentage
RO2FT2	Rear O2 Fuel Trim - Bank 2	Percentage
RPM	Engine Speed Based Upon CKP Input	RPM
RPMDSD	RPM Desired	RPM
SCBC	Supercharger Bypass Control	On/Off
SCIP_V	Supercharger Inlet Pressure	Volts
SHRTFT	Short Term Fuel Trim	Percent
SHRTFT1	Short Term Fuel Trim Bank 1	Percent
SHRTFT2	Short Term Fuel Trim Bank 2	Percent
SPARK_ACTUAL	Spark Advance Actual	Degrees
SPARKADV	Spark Advance	Degrees
SPKDUR_1-8	Spark Duration (Cylinders 1-8)	Time

SS_OUTOP	Stop Start Coordination Out Of Operation	Status
SS_START_ERR	Stop Start Coordination Start Error	Status
SS_STOP_ERR	Stop Start Coordination Stop Error	Status
STARTER_CNTS	Starter Motor Activation Counter	Count
STRT_RLY	Starter Relay	Enabled/Disabled
SYNC	CMP And CKP Synchronized	Yes/No
	Measured Boost At Throttle Inlet Pressure Sensor	Pressure
TCBP_V	Throttle Inlet Pressure Sensor Voltage	Volts
THROTTLE_CMD	Commanded Throttle Actuator Control	Percent
TORQUE	Net Torque Into Torque Converter	Torque
TP	Throttle Position Input	Volts/Percent
TPCT	Lowest Closed Throttle Voltage	Volts
TP_MAXDIFF	Maximum Angle Difference Between TP1 And TP2	Degrees
TPMODE	Throttle Position	Closed/Part/ Wide Open Throttle
TP1	Throttle Position 1 Voltage	Volts
TP2	Throttle Position 2 Voltage	Volts
TP_B	Absolute Throttle Position B	Percent
TP1_ADP_CLSD	Throttle Position 1 Adaption Voltage Closed Stop	Volts
TP1_ADP_LIMP	Throttle Position 1 Adaption Voltage At Limp Home	Volts
TP1_ADP_MINAIR	Throttle Position 1 Adaption Volt Minimum Airflow	Volts
TP2_ADP_CLSD	Throttle Position 2 Adaption Voltage Closed Stop	Volts
TP2_ADP_LIMP	Throttle Position 2 Adaption Voltage At Limp Home	Volts
TQ_CNTRL	Torque Fuel/Spark Limiting Status	Status
TRIP	CNT OBD II Trips Completed	Count
TURBO_BP1_STAT	Turbocharger Bypass 1 Status	Fault/No Fault
TURBO_BP2_STAT	Turbocharger Bypass 2 Status	Fault/No Fault
TURBO_BPASS	Turbocharger Bypass Valve	Percent
TURBO_BPASS_2	Turbocharger Bypass Valve 2	Percent
TURBO_OVER	Turbocharger Overboost Condition	Fault/No Fault
TURBO_UNDER	Turbocharger Underboost Condition	Fault/No Fault
TURBO_WGATE	Turbocharger Wastegate	Percent
TWGATE_STAT	Turbocharger Wastegate Status	Fault/No Fault

VCTADV	Variable Cam Timing Advance	Degrees
VCTADV2	Variable Cam Timing Advance 2	Degrees
VCTADVERR	Variable Cam Timing Advance Error	Degrees
VCTADVERR2	Variable Cam Timing Advance 2 Error	Degrees
VCTDC	Variable Cam Timing Advance Duty Cycle	Percent
VCTDC2	Variable Cam Timing Advance Duty Cycle	Percent
VCT_EXH_ACT1	Actual Exhaust B Camshaft Position Bank 1	Degrees
VCT_EXH_ACT2	Actual Exhaust B Camshaft Position Bank 2	Degrees
VCT_EXH_DC1	Exhaust B Camshaft Position Duty Cycle Bank 1	Percent
VCT_EXH_DC2	Exhaust B Camshaft Position Duty Cycle Bank 2	Percent
VCT_EXH_DIF1	Exhaust B Camshaft Desired Minus Actual Bank 1	Degrees
VCT_EXH_DIF2	Exhaust B Camshaft Desired Minus Actual Bank 2	Degrees
VCT_EXH_DSD	VCT Exhaust Angle Desired	Degrees
VCT_EXH_DSD1	VCT Exhaust Angle Desired Bank 1	Degrees
VCT_INT_ACT1	Actual Intake A Camshaft Position Bank 1	Degrees
VCT_INT_ACT2	Actual Intake A Camshaft Position Bank 2	Degrees
VCT_INT_DC1	Intake A Camshaft Position Duty Cycle Bank 1	Percent
VCT_INT_DC2	Intake A Camshaft Position Duty Cycle Bank 2	Percent
VCT_INT_DIF1	Intake A Camshaft Desired Minus Actual Bank 1	Degrees
VCT_INT_DIF2	Intake A Camshaft Desired Minus Actual Bank 2	Degrees
VCT_INTK_DSD	VCT Intake Angle Desired	Degrees
VCT_INTK_DSD1	VCT Intake Angle Desired Bank 1	Degrees
VCTSYS	Variable Cam Timing System Status	Open/Closed
VCT1_F	Variable Cam Timing Fault	Fault/No Fault
VCT2_F	Variable Cam Timing 2 Fault	Fault/No Fault
VPWR	Vehicle Power Voltage	Volts
VREF	Vehicle Reference Voltage	Volts
VSS	Vehicle Speed	Speed
WGATE_PRES	Wastegate Control Absolute Pressure Sensor	Pressure
WGATE_PRES_F	Wastegate Control Pressure Sensor Status	Fault/No Fault
WGATE_V	Wastegate Control Pressure Sensor Voltage	Volts
WGATE_VAC_DSD	Desired Wastegate Control Vacuum	Pressure
WGATE_VAC_INF	Wastegate Control Vacuum Inferred	Pressure

FREEZE FRAME DATA > OBDII FREEZE FRAME DATA

Freeze frame data allows access to emission related values from specific generic parameter identification (PID). These values are stored when an emission related diagnostic trouble code (DTC) is stored in continuous memory. This provides a snapshot of the conditions that were present when the DTC was stored. Once one set of freeze frame data is stored, this data remains in memory even if another emission related DTC is stored, with the exception of misfire or fuel system DTCs. Once freeze frame data for a misfire or fuel system DTC is stored it overwrites any previous data, and freeze frame data is no longer overwritten. When a DTC associated with the freeze frame data is erased or the DTCs are cleared, new freeze frame data can be stored again. In the event of multiple emission related DTCs in memory, always note the DTC for the freeze frame data.

FREEZE FRAME DATA REFERENCE

Acronym	Description	Measurement Units
APP_D	Accelerator Pedal Position D	%
APP_E	Accelerator Pedal Position E	%
BARO	Barometric Pressure	kPa
CATTEMP11	Catalyst Temperature Bank 1, Sensor 1	Degrees
CATTEMP21	Catalyst Temperature Bank 2, Sensor 1	Degrees
CLRDIST	Distance Since Codes Cleared	Km/mi
ECT	Engine Coolant Temperature	Degrees
EQ_RAT	Commanded Equivalence Ratio	Unit
EQ_RAT11	Lambda Value Bank 1, Sensor 1	Unit
EQ_RAT21	Lambda Value Bank 2, Sensor 1	Unit
EVAPPCT	Commanded Evaporative Purge	%
FLI	Fuel Level Input	%
FRP	Fuel Rail Pressure	kPa
FUELSYS1	Open/Closed Loop 1	OL/CL/OL DRIVE/OL FAULT/CL FAULT
FUELSYS2	Open/Closed Loop 2	OL/CL/OL DRIVE/OL FAULT/CL FAULT
IAT	Intake Air Temperature	Degrees
LFT1	Long Term Fuel Bank 1	%
LFT2	Long Term Fuel Bank 2	%
LOAD	Calculated Load Value	%
MAF	Mass Airflow Rate	g/s
MAP	Manifold Absolute Pressure	Volts/kPa/ PSI/in-Hg

O2S11	Bank 1 Upstream Oxygen Sensor (11)	Volts/mA
O2S12	Bank 1 Downstream Oxygen Sensor (12)	Volts
O2S21	Bank 2 Upstream Oxygen Sensor (21)	Volts/mA
O2S22	Bank 2 Downstream Oxygen Sensor (22)	Volts
RPM	Engine RPM	RPM
RUNTM	Run Time	Seconds
SFT1	Short Term Fuel Bank 1	%
SFT2	Short Term Fuel Bank 2	%
SPARKADV	Spark Advance	Degrees
TAC_	PCT Commanded Throttle Actuator	%
TP	Absolute Throttle Position	%
TP_REL	Relative Throttle Position	%
VS	Vehicle Speed	km/h-mph
WARMUPS	Number Of Warmups Since Code Cleared	Units

Some unique PIDs are stored in the keep alive memory (KAM) of the PCM to help in diagnosing the root cause of misfires. These PIDs are collectively called misfire freeze frame (MFF) data. These parameters are separate from the generic freeze frame data stored for every MIL code and are used for misfire diagnosis only. The MFF data could be more useful for misfire diagnosis than the generic freeze frame data. It is captured at the time of the highest misfire rate, not when the DTC is stored at the end of a 200 or 1, 000 revolution block (generic freeze frame data for misfire can be stored minutes after the misfire actually occurred).

The MFF PIDs are supported on all vehicles, but may not be available on all scan tools because enhanced PID access may vary by scan tool manufacturer.

MISFIRE FREEZE FRAME PIDS DESCRIPTION

PID Name	Description	Measurement Units
MFF_EGR	EGR DPFE Sensor At The Time Of Misfire	Volts
MFF_IAT	Intake Air Temperature At The Time Of Misfire	Degrees
MFF_INGEAR	Transmission In Gear At The Time Of Misfire	Yes/No
MFF_LOAD	Engine Load At The Time Of Misfire	%
MFF_PNP	Park/Neutral Position At The Time Of Misfire	Mode
MFF_RNTM	Engine Running Time At The Time Of Misfire	Time
MFF_RPM	Engine RPM At The Time Of Misfire	RPM
MFF_RUN	Engine Running Time At The Time Of Misfire	Time
MFF_SOAK	Engine Off Soak Time At The Time Of Misfire	Time

MFF_TCC_ LOCK	Torque Converter Clutch At The Time Of Misfire	Yes/No
MFF_THR_ ANG	Throttle Angle At The Time Of Misfire	%
MFF_TP	Throttle Position At The Time Of Misfire	Volts
MFF_TRIP	Number Of Driving Cycles At The Time Of Misfire (At Least One 1, 000 Rev Block)	Number of Trips
MFF_VSS	Vehicle Speed At The Time Of Misfire	km/h-mph
MP_ LRN	Learned Misfire Correction Profile	Yes/No

FREEZE FRAME DATA > OBDII FREEZE FRAME DATA > MANUFACTURER SPECIFIC FREEZE FRAME

The manufacturer specific freeze frame data is DTC snapshot data that allows a manufacturer to store vehicle condition information when a DTC sets. This is similar to the OBDII freeze frame functionality that already exists in the PCM. The manufacturer defines the snapshot data to provide the conditions at the time when a fault occurred. Each snapshot is about 40 - 50 PIDs with up to 5 snapshots available for up to 5 different DTCs. The PCM reports the most recent fault conditions for the DTC, and refreshes a maximum of once per operation cycle.

MANUFACTURER SPECIFIC FREEZE FRAME PIDS DESCRIPTION

PID Name	Description	Measurement Units
APP1	Accelerator Pedal Position 1	Volts
APP2	Accelerator Pedal Position 2	Volts
APP_FLT	Accelerator Pedal Position Status	Fault/No Fault
BARO	Barometric Pressure	Pressure/in H20
CHT_F	Cylinder Head Temperature Status	Fault/No Fault
CHTIL	Cylinder Head Temperature Indicator Lamp	On/Off
ECT	Engine Coolant Temperature	Degrees
ECT_F	Engine Coolant Temperature Status	Fault/No Fault
EGR_F	Exhaust Gas Recirculation Status	Fault/No Fault
EGRPCT	Commanded EGR	Percent
ETC [TAC_PCT]	Commanded Throttle Actuator Control	Percent
ETC_TRIM_LRN	Throttle Angle Trim Value Has Learned	Yes/No
FF_LRND	Flex Fuel Learned	Yes/No
FLI	Fuel Level	Percent

FTP_H2O	Fuel Tank Pressure Input	Pressure
FUELSYS	Fuel System Status	Open Loop/Closed Loop
GEAR	Transmission Gear Status	Gear
IAT	Intake Air Temperature	Degrees
IAT_F	Inlet Air Temperature Status	Fault/No Fault
LOAD	Calculated Engine Load	Percent
LONGFT1	Long Term Fuel Trim Bank 1	Percent
LONGFT2	Long Term Fuel Trim Bank 2	Percent
MAF	Mass Airflow Rate	g/s
MAF_F	Mass Airflow Status	Fault/No Fault
MAP	Manifold Absolute Pressure	kPa/PSI/in-Hg
MAP_F	Manifold Absolute Pressure Sensor Status	Fault/No Fault
MISFIRE	Misfire Malfunction Detection	Yes/No
MP_LRN	Learned Misfire Correction Profile	Yes/No
O2S11	Bank 1 Upstream Oxygen Sensor (11)	Volts
O2S12	Bank 1 Downstream Oxygen Sensor (12)	Volts
O2S21	Bank 2 Upstream Oxygen Sensor (21)	Volts
O2S22	Bank 2 Downstream Oxygen Sensor (22)	Volts
OSS_SRC	Output Shaft Speed	RPM
RPM	Engine RPM	RPM
RPMDSD	RPM Desired	RPM
RUNTM	Run Time	Seconds
SHRTFT1	Short Term Fuel Trim Bank 1	Percent
SPARKADV	Spark Advance	Degrees
TCC	Torque Converter Clutch	Percent
TP1	Throttle Position 1 Voltage	Volts
TP2	Throttle Position 2 Voltage	Volts
TP_F	Throttle Position Sensor Status	Fault/No Fault
TP_REL	Relative Throttle Position	%
TQ_CNTRL	Torque Fuel Spark Limiting Status	Status
VPWR	Vehicle Power Voltage	Volts

FLASH ELECTRICALLY ERASABLE PROGRAMMABLE READ ONLY MEMORY (EEPROM) > DESCRIPTION

The flash EEPROM is contained in an integrated circuit internal to the PCM. The flash EEPROM contains the vehicle strategy including calibration information specific to the vehicle, and is capable of being programmed or flashed repeatedly.

As part of the calibration there is an area referred to as the vehicle identification (VID) block. The VID block is programmed when installing a new PCM as described under Programming the VID Block for a Replacement PCM. Failure to carry out this procedure may generate DTC P1635 or P1639. The VID block in an existing PCM can also be programmed to accommodate various hardware or parameter changes made to the vehicle since production. Failure to carry out this procedure correctly may generate DTC P1635, Tire or Axle Ratio out of Acceptable Range. An incorrect tire or axle ratio is one of the main causes for DTC P1635. This is described under Making Changes to the VID Block and also under Making Changes to the PCM Calibration. The VID block contains many items used by the strategy for a variety of functions. Some of these items include the vehicle identification number (VIN), octane adjust, fuel octane, fuel type, vehicle speed limit, tire size, axle ratio, the presence of speed control, and 4 wheel drive electronic shift on the fly (ESOF) versus manual shift on the fly (MSOF). Only items applicable to the vehicle hardware and supported by the VID block are displayed on the scan tool.

When changing items in the VID block, the strategy places range limits on certain items such as tire and axle ratio. The number of times the VID block may be reconfigured is limited. When this limit is reached, the scan tool displays a message indicating the need to flash the PCM again to reset the VID block.

Some vehicles must have the engine serial number programmed. The DTC P264F Engine Serial Number Not Programmed Or Incompatible may set if the procedure is not carried out.

For Fiesta, the instrument panel cluster (IPC) communicates the VIN to the PCM. When a new PCM is installed, the PCM obtains the VIN the first time the ignition is turned to the ON position. If there is a concern with the VIN not being received or being invalid, DTC P0630 is set.

On some vehicles, the VIN, tire size, axle ratio, and cruise control configuration are communicated to the PCM from the body control module (BCM). If a new PCM is installed, the new PCM obtains this data the first time the ignition is turned to the ON position. If the data is not received, DTCs U0140 and U0422 set and DTC P0630 may set. If the data is received but the values are invalid or not configured, DTC U0422 sets and DTC P0630 may set. If the data received is valid but the proper learning command has not been received from the diagnostic tool, DTC P160A sets. There are associated PIDs to indicate the status of each data item.

On vehicles equipped with permanent DTC reporting capabilities, neutral profile correction should be learned after a PCM replacement in order to activate the misfire monitor. This is accomplished using the Misfire Monitor Neutral Profile Learn function on the scan tool. Refer to the scan tool manufacturer's instruction manual for details.

FLASH ELECTRICALLY ERASABLE PROGRAMMABLE READ ONLY MEMORY (EEPROM) > NEUTRAL PROFILE CORRECTION

In order for the misfire detection system to function correctly, any mechanical inaccuracies in the crankshaft position (CKP) sensor must be learned by the PCM. This information is stored in non-volatile memory (NVM) in the PCM. It is not cleared when the keep alive memory (KAM) is reset.

Neutral profile learning is accomplished using the scan tool any time a PCM is replaced. It should also be

relearned any time the CKP sensor or the crankshaft pulse wheel is replaced or major engine repairs have been completed.

To determine if the neutral profile learning has been completed, check the MP_LRN parameter identification (PID) using the scan tool. The PID should read YES if the neutral profile learning has been completed. If the PID reads NO, complete the neutral profile learning prior to diagnosing any misfire DTCs.

FLASH ELECTRICALLY ERASABLE PROGRAMMABLE READ ONLY MEMORY (EEPROM) > NEUTRAL PROFILE CORRECTION > PROGRAMMING THE VID BLOCK FOR A REPLACEMENT PCM

The VID block on a replacement PCM is blank and requires programming. There are two procedures available. The first is an automatic data transfer from the old PCM to the new PCM, the second is service information data entry into the new PCM.

Automatic data transfer is carried out if the old PCM is capable of communicating. This is done by using a scan tool to retrieve data from the old PCM before removing it from the vehicle. The stored data can be downloaded to the new PCM after it has been installed.

For Fiesta, the instrument panel cluster (IPC) communicates the vehicle identification number (VIN) to the PCM. When a new PCM is installed, the PCM obtains the VIN the first time the ignition is turned to the ON position. If there is a concern with the VIN not being received or being invalid, DTC P0630 is set.

On some vehicles, the VIN, tire size, axle ratio, and cruise control configuration are communicated to the PCM from the body control module (BCM). If a new PCM is installed, the new PCM obtains this data the first time the ignition is turned to the ON position. If the data is not received DTCs U0140 and U0422 set and DTC P0630 may set. If the data is received but the values are invalid or not configured, DTC U0422 sets and DTC P0630 may set. If the data received is valid but the proper learning command has not been received from the diagnostic tool, DTC P160A sets. There are associated PIDs to indicate the status of each data item.

Carry out manual data entry if the old PCM is damaged or incapable of communicating. Remove and install a new PCM. Using a compatible scan tool, select and carry out the module/parameter programming, referring to the scan tool manufacturer's instruction manual. Make certain that all parameters are included. Failure to correctly program tire size in revolutions per mile, (rev/mile equals 63, 360 divided by the tire circumference in inches), axle ratio, 4x4 or 4x2, or MSOF and ESOF may result in DTCs P1635 and P1639. You may be instructed to contact the As-Built Data Center for the information needed to manually update the VID block with the scan tool. Contact the center only if the old PCM cannot be used or the data is corrupt. For Ford and Lincoln technicians, contact your National Hotline or the Professional Technician Society (PTS) web site for As-Built data listed under the Service Publications Index. Non-Ford technicians use the Motorcraft® web site at www.motorcraft.com. From the Motorcraft® home page, use the search function to find the Module Programming or As-Built Data.

For Ford and Lincoln technicians, check the Programmable Module Installation link on the PTS web site for quick Programmable Module data information by vehicle.

FLASH ELECTRICALLY ERASABLE PROGRAMMABLE READ ONLY MEMORY (EEPROM) > NEUTRAL PROFILE CORRECTION > PROGRAMMING THE ENGINE

SERIAL NUMBER FOR A REPLACEMENT PCM

The engine serial number on a replacement PCM is blank and requires programming. Manual data entry is required. If the old PCM is capable of communicating, the engine serial number is available using a compatible scan tool. Refer to the scan tool manufacturers manual for instructions.

FLASH ELECTRICALLY ERASABLE PROGRAMMABLE READ ONLY MEMORY (EEPROM) > NEUTRAL PROFILE CORRECTION > MAKING CHANGES TO THE VID BLOCK

A programmed PCM may require changes to be made to certain VID information to accommodate the vehicle hardware. Refer to Module Reprogramming on the scan tool.

FLASH ELECTRICALLY ERASABLE PROGRAMMABLE READ ONLY MEMORY (EEPROM) > NEUTRAL PROFILE CORRECTION > MAKING CHANGES TO THE PCM CALIBRATION

At certain times, the EEPROM needs to be completely reprogrammed. This is due to changes made to the strategy or calibration after production or the need to reset the VID block because it has reached its limit. Refer to PCM or Module Reprogramming on the scan tool.

DIAGNOSTIC MONITORING TEST RESULTS MODE 6

Mode 6 allows access to the results of on board diagnostic (OBD) monitor diagnostic test results. The test values are stored at the time of the particular monitor completion. Refer to mode 6 on the scan tool for test information.

ON BOARD DIAGNOSTIC (OBD) DRIVE CYCLE > DESCRIPTION OF ON BOARD DIAGNOSTIC (OBD) DRIVE CYCLE

The following procedure is designed to execute and complete the OBD monitors. To complete a specific monitor for repair verification, follow steps 1 through 4, then continue with the step described by the appropriate monitor found under the OBD Monitor Exercised column. For the evaporative emissions (EVAP) monitor to run, the ambient air temperature must be between 4.4 to 37.8°C (40 to 100°F), and the altitude below 2, 438 meters (8, 000 feet). If the OBD monitors must be completed in these conditions, the PCM must detect them once (twice on some applications) before the EVAP monitor can be bypassed and OBD monitors readied. The EVAP bypassing procedure is described in the following drive cycle.

Use a scan tool to carry out the OBD drive cycle. Refer to the scan tool manufacturer's instruction manual for each described function.

A detailed description for clearing the continuous diagnostic trouble codes (DTCs) is found in this service information. Refer to CLEAR THE CONTINUOUS DIAGNOSTIC TROUBLE CODES (DTCS) AND

RESET THE EMISSION MONITORS INFORMATION IN THE POWERTRAIN CONTROL MODULE (PCM) .

ON BOARD DIAGNOSTIC (OBD) DRIVE CYCLE > DRIVE CYCLE RECOMMENDATIONS

WARNING: STRICT OBSERVANCE OF POSTED SPEED LIMITS AND ATTENTION TO DRIVING CONDITIONS ARE MANDATORY WHEN PROCEEDING THROUGH THE FOLLOWING DRIVE CYCLES. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN PERSONAL INJURY.

1. Most OBD monitors complete more readily using a steady foot driving style during cruise or acceleration modes. Operating the throttle in a smooth fashion minimizes the time required for monitor completion.
2. The fuel tank level should be between 1/2 and 3/4 full with 3/4 full being the most desirable.
3. The evaporative monitor can operate only during the first 30 minutes of engine operation. When executing the procedure for this monitor, stay in part throttle mode and drive in a smooth fashion to minimize fuel slosh.
4. When bypassing the EVAP engine soak times, the PCM must remain powered (ignition ON) after clearing the continuous DTCs and relearning emission diagnostic information.

For best results, follow each of the following steps as accurately as possible:

OBD Monitor Exercised	Drive Cycle Procedure	Purpose of Drive Cycle Procedure
Drive Cycle Preparation	*NOTE: To bypass the EVAP soak timer (normally 6 hours), the PCM must remain powered after clearing the continuous DTCs and resetting the emission monitors information in the PCM.* 1. Install the scan tool. Turn the ignition ON with the engine OFF. Cycle the ignition OFF, then ON. If needed, select the appropriate vehicle and engine qualifier. Clear the continuous DTCs and reset the emission monitors information in the PCM.	Bypasses the engine soak timer. Resets the OBD monitor status.
	2. Begin to monitor the following PIDs (if available): AAT, ECT, EVAPDC, FLI, IAT and TP MODE. Start the vehicle without returning the ignition to the OFF position. 3. Idle the vehicle for 15 seconds. Drive at 77 to 104 km/h (48 to 65 mph) until the engine coolant temperature is at least 76.7°C (170°F).	
Prep for Monitor Entry	4. Is the intake air temperature between 4.4 and 37.8°C (40 and 100°F)? If not, complete the following steps, but	Engine warm-up and provides intake air

	note that step 14 is required to bypass the EVAP monitor and complete the OBD drive cycle.	temperature input to the PCM.
HO2S	5. Cruise at 77 to 104 km/h (48 to 65 mph) for greater than 5 minutes.	Executes the HO2S monitor.
EVAP	6. Cruise at 77 to 104 km/h (48 to 65 mph) for 10 minutes (avoid sharp turns and hills). NOTE: To initiate the monitor, the throttle should be at part throttle, EVAPDC must be greater than 75%, and FLI must be between 15 and 85%, and for fuel tanks over 25 gallons FLI must be between 30 and 85%.	Executes the EVAP monitor if the intake air temperature is between 4.4 to 37.8°C (40 to 100°F).
Catalyst	7. Drive in stop and go traffic conditions. Include 5 different constant cruise speeds, ranging from 40 to 72 km/h (25 to 45 mph) over a 10 minute period.	Executes the catalyst monitor.
EGR	8. From a stop, idle for 30 seconds, accelerate to 72 km/h (45 mph) at 1/2 to 3/4 throttle, cruise at steady throttle for 1 minute. Repeat idle, acceleration and cruise 3 times.	Executes the exhaust gas recirculation (EGR) monitor.
CCM (Engine)	9. Bring the vehicle to a stop. Idle with the transmission in drive (neutral for M/T) for 2 minutes.	Executes the idle air control portion of the comprehensive component monitor (CCM).
CCM (Transmission)	10. For M/T, accelerate from 0 to 80 km/h (0 to 50 mph), and continue to step 11. For A/T, from a stop and in overdrive, moderately accelerate to 80 km/h (50 mph) and cruise for greater than 15 seconds. Stop the vehicle and repeat without overdrive to 64 km/h (40 mph) cruising for greater than 30 seconds. While at 64 km/h (40 mph), activate the overdrive, accelerate to 80 km/h (50 mph) and cruise for greater than 15 seconds. Stop for at least 20 seconds and repeat step 10 five times.	Executes the transmission portion of the CCM.
Misfire, Fuel And Deceleration Fuel Shut Off Rear HO2S Monitors	11. From a stop, accelerate to 104 km/h (65 mph), hold steady throttle for 5 seconds, then decelerate at closed throttle to 64 km/h (40 mph) (no brakes), accelerate from 64 km/h (40 mph) to 104 km/h (65 mph), hold steady throttle for 5 seconds, repeat deceleration 5 times.	Allows learning for the misfire monitor, and completion of the deceleration fuel shut off rear HO2S monitor.
Readiness Check	12. Access the On Board System Readiness (OBD monitor status) function on the scan tool. Determine whether all non-continuous monitors have completed. If not, go to step 13.	Determines if any monitor has not completed.
Pending Code Check And EVAP Monitor Bypass Check	13. With the scan tool, check for pending codes. Conduct the normal repair procedures for any pending code concern. Otherwise, repeat any incomplete monitor. If the EVAP monitor is not complete and the intake air temperature was out of the 4.4 to 37.8°C (40 to 100°F) temperature range in step 4, or the altitude is over 2438 m (8000 ft.), the EVAP bypass procedure must be followed. Go to Step 14.	Determines if a pending code is preventing the completion of the OBD drive cycle.

EVAP Monitor Bypass	14. Park the vehicle for a minimum of 8 hours. Repeat steps 2 through 11. Do not repeat step 1.	Allows the bypass counter to increment to 2.

INTERMITTENT DIAGNOSTIC TECHNIQUES

Intermittent diagnostic techniques help find and isolate the root cause of intermittent concerns associated with the electronic engine control (EEC) system. The information is organized to help find the concern and carry out the repair. The process of finding and isolating an intermittent concern starts with recreating a fault symptom, accumulating PCM data, and comparing that data to typical values, then analyzing the results. Refer to the scan tool manufacturer's instruction manual for the functions described below.

Before proceeding, be sure that:

- Customary mechanical system tests and inspections do not reveal a concern. Mechanical component conditions can make a PCM system react abnormally.
- Technical Service Bulletins (TSBs) and Online Automotive Service Information System (OASIS) messages, if available, are reviewed.
- Quick Test and associated diagnostic subroutines have been completed without finding a concern, and the symptom is still present.

INTERMITTENT DIAGNOSTIC TECHNIQUES > RECREATING THE FAULT

Recreating the concern is the first step in isolating the cause of the intermittent symptom. A thorough investigation should start with the customer information worksheet located in the back of this manual. If freeze frame data is available, it may help in recreating the conditions at the time of a malfunction indicator lamp diagnostic trouble code (MIL DTC). Listed below are some of the conditions for recreating the concern:

ENGINE FAULT CONDITIONS

Engine Type Conditions	Non-Engine Type Conditions
Engine Temperature	Ambient Temperature
Engine RPM	Moisture Conditions
Engine Load	Road Conditions (Smooth-Bumpy)
Engine Idle/Accel/Deceleration	

INTERMITTENT DIAGNOSTIC TECHNIQUES > ACCUMULATING PCM DATA

PCM data can be accumulated in a number of ways. This includes circuit measurements with a digital multimeter (DMM) or scan tool parameter identification (PID) data. Acquisition of PCM PID data using a

scan tool is one of the easiest ways to gather information. Gather as much data as possible when the concern is occurring to prevent improper diagnosis. Data should be accumulated during different operating conditions and based on the customer description of the intermittent concern. Compare this data with the known good data values. Refer to TYPICAL DIAGNOSTIC REFERENCE VALUES . This requires recording data in four conditions for comparison: 1) KOEO, 2) Hot Idle, 3) 48 km/h (30 mph), and 4) 89 km/h (55 mph).

INTERMITTENT DIAGNOSTIC TECHNIQUES > PERIPHERAL INPUTS

Some signals may require certain peripherals or auxiliary tools for diagnosis. In some cases, these devices can be inserted into the measurement jacks of the scan tool or DMM. For example, connecting an electronic fuel pressure gauge to monitor and record the fuel pressure voltage reading and capturing the data would help find the fault.

INTERMITTENT DIAGNOSTIC TECHNIQUES > COMPARING PCM DATA

After the PCM values are acquired, it is necessary to determine the concern area. This typically requires the comparison of the actual values from the vehicle to the typical values from Section 6. Refer to TYPICAL DIAGNOSTIC REFERENCE VALUES . The charts apply to different vehicle applications (engine, model, transmission).

INTERMITTENT DIAGNOSTIC TECHNIQUES > COMPARING PCM DATA > ANALYZING PCM DATA

Look for abnormal events or values that are clearly incorrect. Inspect the signals for abrupt or unexpected changes. For example, during a steady cruise most of the sensor values should be relatively stable. Sensors such as throttle position (TP) and mass airflow (MAF), as well as an RPM that changes abruptly when the vehicle is traveling at a constant speed, are clues to a possible concern area.

Look for an agreement in related signals. For example, if the APP1 or APP2 changes during acceleration, a corresponding change should occur in RPM and SPARK ADV PID.

Make sure the signals act in proper sequence. An increase in RPM after the TP1 and TP2 increases is expected. If the RPM increases without a TP1 and TP2 change, a concern may exist.

The PID values are not always captured from the same execution loop. Depending on the number of PIDs acquired, the sample rate may be 60 ms or longer. For example, the ETC_ACT reading will always lag behind the ETC_DSD reading due to the physical time to move the throttle plate. This is an expected difference between ETC_ACT and ETC_DSD during these events.

Scroll through the PID data while analyzing the information. Look for sudden drops or spikes in the values.

ADAPTIVE FUEL DIAGNOSTIC TROUBLE CODE (DTC) DIAGNOSTIC TECHNIQUES

The Adaptive Fuel DTC Diagnostic Techniques help isolate the root cause of the adaptive fuel concern.

Before proceeding, attempt to verify if any driveability concerns are present. These diagnostic aids are meant as a supplement to the pinpoint test steps in Section 5. For a description of fuel trim, refer to POWERTRAIN CONTROL SOFTWARE , Fuel Trim.

ADAPTIVE FUEL DIAGNOSTIC TROUBLE CODE (DTC) DIAGNOSTIC TECHNIQUES > OBTAIN FREEZE FRAME DATA

Freeze frame data is helpful in duplicating and diagnosing adaptive fuel concerns. The data (a snapshot of certain PID values recorded at the time the DTC is stored in continuous memory) is helpful to determine how the vehicle was being driven when the concern occurred, and is especially useful on intermittent concerns. Freeze frame data, in many cases, helps isolate possible areas of concern as well as rule out others. Refer to FREEZE FRAME DATA in this service information for a more detailed description of this data.

ADAPTIVE FUEL DIAGNOSTIC TROUBLE CODE (DTC) DIAGNOSTIC TECHNIQUES > USING THE LONGFT1 AND LONGFT2 (DUAL BANK ENGINES) PIDS

The LONGFT1 and LONGFT2 PIDs are useful for diagnosing fuel trim concerns. A negative PID value indicates fuel is being reduced to compensate for a rich condition. A positive PID value indicates fuel is being increased to compensate for a lean condition. It is important to know there is a separate LONGFT value used for each RPM and load point of engine operation. When viewing the LONGFT1 and LONGFT2 PIDs, the values may change a great deal as the engine is operating at different RPM and load points. This is because the fuel system may have learned corrections for fuel delivery concerns that can change as a function of engine RPM and load. The LONGFT1 and LONGFT2 PIDs display the fuel trim currently being used at that RPM and load point. Observing the changes in LONGFT1 and LONGFT2 can help when diagnosing fuel system concerns. For example:

- A contaminated mass airflow (MAF) sensor results in matching LONGFT1 and LONGFT2 correction values that are negative at idle (reducing fuel), but positive (adding fuel) at higher RPM and loads.
- LONGFT1 values that differ greatly from LONGFT2 values rule out concerns that are common for both banks (for example, fuel pressure concerns, MAF sensor, etc. can be ruled out).
- Vacuum leaks result in large rich corrections (positive LONGFT1 and LONGFT2 values) at idle, but little or no correction at higher RPM and loads.
- A plugged fuel filter results in no correction at idle, but large rich corrections (positive LONGFT1 and LONGFT2 values) at high RPM and load.

ADAPTIVE FUEL DIAGNOSTIC TROUBLE CODE (DTC) DIAGNOSTIC TECHNIQUES > RESETTING LONG TERM FUEL TRIMS

Long term fuel trim corrections are reset by resetting the keep alive memory (KAM). Refer to RESETTING THE KEEP ALIVE MEMORY (KAM) in this service information. After making a fuel system repair, reset the KAM. For example, if dirty or plugged injectors cause the engine to run lean and generate rich long term corrections, installing new injectors and not resetting the KAM causes the engine

to run very rich. The rich correction eventually leans out during closed loop operation, but the vehicle may have poor driveability and high carbon monoxide (CO) emissions while it is learning.

ADAPTIVE FUEL DIAGNOSTIC TROUBLE CODE (DTC) DIAGNOSTIC TECHNIQUES > DTCS P0171 AND P0174 SYSTEM TOO LEAN DIAGNOSTIC AIDS

> *NOTE: If the system is lean at certain conditions, then the LONGFT PID would be a positive value at those conditions, indicating that increased fuel is needed.*

The ability to identify the type of lean condition causing the concern is crucial to diagnosis.

ADAPTIVE FUEL DIAGNOSTIC TROUBLE CODE (DTC) DIAGNOSTIC TECHNIQUES > AIR MEASUREMENT SYSTEM

With this condition, the engine runs rich or lean of stoichiometry (14.7:1 air to fuel ratio) if the PCM is not able to compensate enough to correct for the condition.

For example, the MAF sensor measurement is inaccurate due to a corroded connector, contaminated or dirty connector. A contaminated MAF sensor typically results in a rich system at low airflows (PCM reduces fuel) and a lean system at high airflows (PCM increases fuel).

ADAPTIVE FUEL DIAGNOSTIC TROUBLE CODE (DTC) DIAGNOSTIC TECHNIQUES > VACUUM LEAKS AND UNMETERED AIR

With this condition, the engine may actually run lean of stoichiometry (14.7:1 air to fuel ratio) if the PCM is not able to compensate enough to correct for the condition. This condition can be caused by unmetered air entering the engine. Vacuum leaks normally are most apparent when high manifold vacuum is present (for example, during idle or light throttle). If freeze frame data indicates the fault occurred at idle, a check for vacuum leaks and unmetered air might be the best starting point.

For example, loose, leaking or disconnected vacuum lines, intake manifold gaskets or O-rings, throttle body gaskets, brake booster, air inlet tube or unseated engine oil dipstick.

ADAPTIVE FUEL DIAGNOSTIC TROUBLE CODE (DTC) DIAGNOSTIC TECHNIQUES > INSUFFICIENT FUELING

With this condition, the engine runs lean of stoichiometry (14.7:1 air to fuel ratio) if the PCM is not able to compensate enough to correct for the condition. This condition is caused by a fuel delivery system concern that restricts or limits the amount of fuel being delivered to the engine. This condition is normally apparent as the engine is under a heavy load and at high RPM, when a higher volume of fuel is required. If the freeze frame data indicates the concern occurs under a heavy load and at higher RPM, a check of the fuel delivery system (checking fuel pressure with engine under a load) is the best starting point.

Examples of this include:

- low fuel pressure (fuel pump, fuel filter, fuel leaks, restricted fuel supply lines)
- fuel injector concerns

ADAPTIVE FUEL DIAGNOSTIC TROUBLE CODE (DTC) DIAGNOSTIC TECHNIQUES > EXHAUST SYSTEM LEAKS

In this type of condition, the engine runs rich of stoichiometry (14.7:1 air to fuel ratio) because the fuel control system is adding fuel to compensate for a perceived (not actual) lean condition. This condition is caused by the heated oxygen sensor (HO2S) sensing the oxygen (air) entering the exhaust system from an external source. The PCM reacts to this exhaust leak by increasing fuel delivery. This condition causes the exhaust gas mixture from the cylinder to be rich.

Examples of this include:

- exhaust system leaks upstream or near the HO2S
- cracked or leaking HO2S boss

ADAPTIVE FUEL DIAGNOSTIC TROUBLE CODE (DTC) DIAGNOSTIC TECHNIQUES > DTCS P0172 AND P0175 SYSTEM TOO RICH DIAGNOSTIC AIDS

NOTE: If the system is rich at certain conditions, then the LONGFT PID would be a negative value at that airflow, indicating that decreased fuel is needed.

System rich concerns are caused by fuel system concerns, although the MAF sensor and base engine (for example, engine oil contaminated with fuel) should also be checked.

ADAPTIVE FUEL DIAGNOSTIC TROUBLE CODE (DTC) DIAGNOSTIC TECHNIQUES > AIR MEASUREMENT SYSTEM

With this condition, the engine runs rich or lean of stoichiometry (14.7:1 air to fuel ratio) if the PCM is not able to compensate enough to correct for the condition.

ADAPTIVE FUEL DIAGNOSTIC TROUBLE CODE (DTC) DIAGNOSTIC TECHNIQUES > FUEL SYSTEM

With this condition, the engine runs rich of stoichiometry (14.7:1 air to fuel ratio), if the PCM is not able to compensate enough to correct for the condition. This situation causes a fuel delivery system that is delivering excessive fuel to the engine.

Examples of this include:

- fuel pressure regulator (mechanical returnless fuel systems) causes excessive fuel pressure (system rich at all airflows), fuel pressure is intermittent, going to pump deadhead pressure, then returning to normal after the engine is turned off and restarted.
- fuel injector leaks (injector delivers extra fuel).
- evaporative emission (EVAP) purge valve leak (introduces extra fuel).
- fuel rail pressure (FRP) sensor (electronic returnless fuel systems) concern causes the sensor to indicate a lower pressure than actual. The PCM commands a higher duty cycle to the fuel pump control module, causing high fuel pressure (system rich at all airflows).

ADAPTIVE FUEL DIAGNOSTIC TROUBLE CODE (DTC) DIAGNOSTIC TECHNIQUES > INTAKE AIR SYSTEM

A restriction within any of the intake air system components may be significant enough to affect the ability of the PCM adaptive fuel control.

ADAPTIVE FUEL DIAGNOSTIC TROUBLE CODE (DTC) DIAGNOSTIC TECHNIQUES > BASE ENGINE

Engine oil contaminated with fuel can contribute to a rich running engine.

INTRODUCTION

NOTE: The descriptions and specifications contained in this service information were in effect at the time this service information was approved for publication. Ford Motor Company reserves the right to discontinue models at any time, or change specifications or design without notice and without incurring obligation.

INTRODUCTION > REPAIR TECHNIQUES

Appropriate service methods and procedures are essential for the safe, reliable operation of all motor vehicles as well as the personal safety of the individual doing the work. This service information provides general directions for performing service with tested, effective techniques. Following them will help assure reliability.

There are numerous variations in procedure, techniques, tools and parts for servicing vehicles, as well as in the skill of the individual doing the work. This service information cannot possibly anticipate all such variations and provide advice or cautions as to each. Accordingly, anyone who departs from the instructions provided in this service information must first establish that they compromise neither their personal safety nor the vehicle integrity by their choice of methods, tools or parts.

INTRODUCTION > REPAIR TECHNIQUES > NOTE, NOTICE, CAUTION AND WARNING

As you read through this service information, you may come across a NOTE, NOTICE, CAUTION or WARNING. Each one is there for a specific purpose. A NOTE calls attention to unique, additional or essential information related to the subject procedure. A NOTICE identifies a hazard that could damage the vehicle or property. A CAUTION identifies a hazard that could result in minor personal injury to yourself or others. A WARNING identifies a hazard that could result in severe personal injury or death to yourself or others. Some general WARNINGS that you should follow when you work on a vehicle are listed below.

- ALWAYS WEAR SAFETY GLASSES FOR EYE PROTECTION.
- KEEP SOLVENTS AWAY FROM IGNITION SOURCES. SOLVENTS MAY BE FLAMMABLE AND COULD IGNITE OR EXPLODE IF NOT HANDLED CORRECTLY.
- USE SAFETY STANDS WHENEVER A PROCEDURE REQUIRES YOU TO BE UNDER THE VEHICLE.
- MAKE SURE THAT THE IGNITION SWITCH IS ALWAYS IN THE OFF POSITION, UNLESS OTHERWISE REQUIRED BY THE PROCEDURE.
- SET THE PARKING BRAKE WHEN WORKING ON THE VEHICLE. IF YOU HAVE AN AUTOMATIC TRANSMISSION, SET IN PARK UNLESS INSTRUCTED OTHERWISE FOR A SPECIFIC OPERATION. IF YOU HAVE A MANUAL TRANSMISSION, IT SHOULD BE IN REVERSE (ENGINE

OFF) OR NEUTRAL (ENGINE ON) UNLESS INSTRUCTED OTHERWISE FOR A SPECIFIC OPERATION. PLACE WOOD BLOCKS (4" X 4" OR LARGER) OR WHEEL CHOCKS AGAINST THE FRONT AND REAR SURFACES OF THE TIRES TO HELP PREVENT THE VEHICLE FROM MOVING.

- OPERATE THE ENGINE ONLY IN A WELL-VENTILATED AREA TO AVOID THE DANGER OF CARBON MONOXIDE POISONING.
- KEEP YOURSELF AND YOUR CLOTHING AWAY FROM MOVING PARTS WHEN THE ENGINE IS RUNNING, ESPECIALLY THE DRIVE BELTS.
- TO PREVENT SERIOUS BURNS, AVOID CONTACT WITH HOT METAL PARTS SUCH AS THE RADIATOR, EXHAUST MANIFOLD, TAIL PIPE, THREE WAY CATALYTIC CONVERTER AND MUFFLER.
- DO NOT SMOKE WHILE WORKING ON A VEHICLE.
- TO AVOID INJURY, ALWAYS REMOVE RINGS, WATCHES, LOOSE HANGING JEWELRY AND LOOSE CLOTHING BEFORE BEGINNING TO WORK ON A VEHICLE.
- WHEN IT IS NECESSARY TO WORK UNDER THE HOOD, KEEP HANDS AND OTHER OBJECTS CLEAR OF THE COOLING FAN BLADES!

INTRODUCTION > PREFACE

This service information provides a step-by-step approach for diagnosing driveability, emission, and powertrain control system symptoms. Before beginning diagnosis, it may be helpful to refer to any Technical Service Bulletins (TSBs) or On-line Automotive Service Information System (OASIS) information when this is available. The TSB and OASIS information is available on either the Professional Technician Society (PTS) or Motorcraft® website.

This service information is used in conjunction with the Wiring Diagrams. The service information provide additional diagnostic or component removal and installation information. The Wiring Diagrams provide vehicle specific wiring information, component, connector, and splice locations.

The following is a description contained in this service information.

INTRODUCTION > PREFACE > DESCRIPTION AND OPERATION

This contains description and operation information on powertrain control systems and components and provides the technician with a general knowledge of the powertrain control system. Use this when general information about the powertrain control system is desired.

INTRODUCTION > PREFACE > DIAGNOSTIC METHODS

This contains information on specific diagnostic tasks that are used during diagnosis. Descriptions of specific diagnostic methods are included, as well as detailed instructions on how to access or carry out the task.

INTRODUCTION > PREFACE > SYMPTOM CHARTS

All diagnosis begins in SYMPTOM CHARTS with QT Powertrain Control Module (PCM) Quick Test. If the PCM Quick Test is completed and no diagnostic trouble codes (DTCs) have been retrieved, the technician is directed to the NO DIAGNOSTIC TROUBLE CODES (DTCS) PRESENT SYMPTOM CHART INDEX The No Diagnostic Trouble Codes (DTCs) Present Symptom Chart Index contains the list of symptoms addressed in this service information, and directs the technician to the appropriate chart in the NO DIAGNOSTIC TROUBLE CODES (DTCS) PRESENT SYMPTOM CHARTS . If no PCM DTCs are present and the vehicle symptom is not listed in the No Diagnostic Trouble Codes (DTCs) Present Symptom Chart Index, the technician should go to the appropriate service information to continue diagnosis.

INTRODUCTION > PREFACE > POWERTRAIN DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS

This section contains the Diagnostic Trouble Code (DTC) Charts and Descriptions. These charts and descriptions are referenced if a DTC is retrieved in SYMPTOM CHARTS . Also included in this service information is the list of possible causes and diagnostic aids.

INTRODUCTION > PREFACE > PINPOINT TESTS

All pinpoint tests are included in this service information. Never enter a pinpoint test unless directed there. When directed to a pinpoint test, always read the information included at the beginning of the pinpoint test.

INTRODUCTION > PREFACE > REFERENCE VALUES

This contains the Typical Diagnostic Reference Values charts. The technician is directed to these charts from Pinpoint Test Z in Section 5.

INTRODUCTION > HOW TO USE THE DIAGNOSTIC PROCEDURES

- Use the information about the vehicle driveability or emission concerns to attempt to verify/recreate the symptom. Look for any vehicle modifications or aftermarket items that may contribute to the symptom. A check of any applicable TSBs or OASIS messages may be useful if this information is available.
- Go to QT1 Powertrain Control Module (PCM) Quick Test. Carry out the PCM quick test steps. Follow any notes as directed.
- If the PCM quick test is completed, no DTCs were retrieved, and no special notes applied, go to the NO DIAGNOSTIC TROUBLE CODES (DTCS) PRESENT SYMPTOM CHART INDEX .
- Select the symptom that best describes the vehicle symptom (for multiple symptoms select the one

that is most evident). Go to the NO DIAGNOSTIC TROUBLE CODES (DTCS) PRESENT SYMPTOM CHARTS as indicated. If no PCM DTCs are present and the vehicle symptom is not listed in the No Diagnostic Trouble Codes (DTCs) Present Symptom Chart Index, go to the appropriate service information to continue diagnosis.

- The No Diagnostic Trouble Codes (DTCs) Present Symptom Charts contain areas to be tested for diagnosis of the vehicle symptom. The chart is arranged to place the higher probability or easiest to test items toward the top of the chart. However, the technician is not required to follow this order due to reasons such as variations in vehicle type, vehicle repair history, or technician experience.
    - The System/Component column indicates the areas that are tested. This column may also contain a quick system/component test.
    - The Reference column indicates where to go for the System/Component testing. All references are to the beginning of a pinpoint test in PINPOINT TEST of this service information unless noted otherwise. If referred to a pinpoint test in this service information go to the procedures. Follow the directions given in those procedures, including directions to other tests or service information. If a damaged part is found, repair as directed. If no concern is found, and diagnosis in that area is complete, return to the NO DIAGNOSTIC TROUBLE CODES (DTCS) PRESENT SYMPTOM CHARTS to continue to the next item.
    - If a quick system/component test is in the System/Component column, the Reference column indicates where to go if the test failed.
- During diagnosis, if directed to test a system/component that is not contained on that vehicle, go to the next step.
- If the No Diagnostic Trouble Codes (DTCs) Present Symptom Chart for the vehicle symptom is completed and no concern is found, return to the NO DIAGNOSTIC TROUBLE CODES (DTCS) PRESENT SYMPTOM CHART INDEX to address the next most prominent symptom. If all diagnosis is complete and no concern is found, it may be helpful to GO to Pinpoint Test Z service information to continue diagnosis.
- The installation of any new component that affects the PCM adaptive learning strategies (adaptive airflow, idle speed, refueling event, or fuel trim) requires the reset of keep alive memory (KAM). Refer to RESETTING THE KEEP ALIVE MEMORY (KAM) to reset the KAM.
- After any repair, reconnect any components and remove any test equipment. Verify the vehicle is operating correctly and the original complaint is no longer present. If a DTC was present, clear the DTCs and repeat the self-test to verify the repair.
- If a symptom is determined to be intermittent, a careful visual and physical underhood inspection of connectors, wiring harnesses, vacuum lines, and components is required. The Customer Information Worksheet may contain more detailed symptom information. Before an in-depth diagnosis begins, start the engine and wiggle wires, tap on components while listening for an indication of a concern (such as a RPM change or a relay clicking).

Information about engine conditions is stored when a DTC that illuminates the malfunction indicator lamp (MIL) is set. This information is called freeze frame data and may be helpful in diagnosing intermittent concerns. Refer to FREEZE FRAME DATA for additional information.

INTRODUCTION > WHAT'S NEW IN THIS MANUAL

The following is a list of changes to this service information for 2015:

- The all new Edge with a 2.0L GTDI engine, a new 2.7L GTDI engine with a new crankcase pressure sensor, and a 3.5L TIVCT engine.
- The Expedition with a new 3.5L GTDI engine with a new crankcase pressure sensor and a new 198 pin PCM.
- The all new F-150 with a new 2.7L GTDI engine with a new crankcase pressure sensor, a 3.5L TIVCT engine, a 3.5L GTDI engine with a new 198 pin PCM, and a 5.0L TIVCT engine including a dual bank intake manifold runner control (IMRC).
- The Focus with a new 1.0L GTDI engine with a new crankcase pressure sensor and a new charge air cooler (CAC) fan.
- The Fusion 1.5L GTDI engine with a new CHT sensor.
- The all new MKC with a 2.0L GTDI engine, a new 2.3L GTDI engine, engine coolant temperature (ECT) sensor, a 198 pin PCM, and an optional 5 relay three speed engine cooling fan system.
- The all new Mustang with a new 2.3L GTDI engine with a new crankcase pressure sensor and the 5.0L TIVCT engine with a new dual bank intake manifold runner control (IMRC) system.
- The Navigator with a new 3.5L GTDI engine with a new crankcase pressure sensor and a new 198 pin PCM.
- The all new Transit with a 3.5L GTDI engine and a 3.7L TIVCT engine.

ACRONYMS AND DEFINITIONS

> *NOTE: This acronyms and definitions listing contains technical terms applicable to Ford Motor Company products. It is not intended to be an all-inclusive dictionary of components and their functions. If a detailed description of a particular system or component is desired, refer to the applicable service information within this PC/ED service information or refer to the additional service information regarding the specific vehicle being repaired.*

AAT: Ambient Air Temperature

APP: Accelerator Pedal Position

A/T: Automatic Transmission

AWD: All Wheel Drive

BARO: Barometric Pressure

BPP: Brake Pedal Position

BTDC: Before Top Dead Center

CAC: Charge Air Cooler

CAN: Controller Area Network

CCM: Comprehensive Component Monitor

CF: Cooling Fan

CHT: Cylinder Head Temperature

CKP: Crankshaft Position

CL: Closed Loop

CMP: Camshaft Position

CO: Carbon Monoxide

CO 2: Carbon Dioxide

COP: Coil On Plug

CPP: Clutch Pedal Position

CPU: Central Processing Unit

CTO: Clean Tach Output

DC: 1. Direct Current 2. Duty Cycle

DFI: Direct Fuel Injection

DFSO: Deceleration Fuel Shut Off

DLC: Data Link Connector

DTC: Diagnostic Trouble Code

E10: Fuel containing 10% ethanol

E85: Fuel containing 85% ethanol

ECT: Engine Coolant Temperature

EEC: Electronic Engine Control

EEGR: Electric Exhaust Gas Recirculation

EEPROM: Electrically Erasable Programmable Read-Only Memory

EGR: Exhaust Gas Recirculation

EI: Electronic Ignition

EMD: Engine Manufacturers Diagnostics

EMI: Electromagnetic Interference

EONV: Engine Off Natural Vacuum

EOT: Engine Oil Temperature

EPS: Exhaust Phase Shifting

ERFS: Electronic Returnless Fuel System

ESOF: Electronic Shift-on-the-Fly

ETB: Electronic Throttle Body

ETBTACM: Electronic Throttle Body Throttle Actuator Control Motor

ETBTPS: Electronic Throttle Body Throttle Position Sensor

ETC: Electronic Throttle Control

EVAP: Evaporative Emission

EVAPCP: Evaporative Emission Canister Purge Valve

FAOS: Fore-Aft Oxygen Sensor

FEPS: Flash EEPROM Programming Signal

FFV: Flexible Fuel Vehicle

FLI: Fuel Level Input

FMEM: Failure Mode Effects Management

FP: Fuel Pump

FPDM: Fuel Pump Driver Module

FPM: Fuel Pump Monitor

FRP: Fuel Rail Pressure

FRPT: Fuel Rail Pressure Temperature

FSS: Fan Speed Sensor

FTP: Fuel Tank Pressure

FWD: Front Wheel Drive

GPM: 1. Grams per Mile 2. Gallons per Minute

GTDI: Gasoline Turbocharged Direct Injection

H: Hydrogen

HC: 1. Hydrocarbon 2. High Compression

HDR: High Data Rate

HO2S: Heated Oxygen Sensor

IAC: Idle Air Control

IAT: Intake Air Temperature

IFS: Inertia Fuel Shutoff

I/M: Inspection/Maintenance

IMRC: Intake Manifold Runner Control

IMTV: Intake Manifold Tuning Valve

IPC: Independent Plausibility Checker

IPS: Intake Phase Shifting

ISO: International Standards Organization

KAM: Keep Alive Memory

KOEO: Key On Engine Off

KOER: Key On Engine Running

KS: Knock Sensor

LDR: Low Data Rate

LONGFT: Long-Term Fuel Trim

MAF: Mass Airflow

MAP: Manifold Absolute Pressure

MAP/IAT2: Manifold Absolute Pressure/Intake Air Temperature 2

MFF: Misfire Freeze Frame

MIL: Malfunction Indicator Lamp

MRFS: Mechanical Returnless Fuel System

MSOF: Manual Shift-on-the-Fly

M/T: Manual Transmission

NO_X : Nitrogen Oxides

NVM: Non-Volatile Memory

NVRAM: Non-Volatile Random Access Memory

OASIS: On-line Automotive Service Information System

OBD: On Board Diagnostic

OL: Open Loop

ORVR: On Board Refueling Vapor Recovery

OSC: Output State Control

OSR: On Board System Readiness

OSS: Output Shaft Speed

PATS: Passive Anti-Theft System

PCM: Powertrain Control Module

PCV: Positive Crankcase Ventilation

Pd: Palladium

PID: Parameter Identification

PIP: Profile Ignition Pickup

PPM: Parts per Million

PSP: Power Steering Pressure

Pt: Platinum

PTS: Professional Technician Society

PWM: Pulse Width Modulation

PZEV: Partial Zero Emission Vehicle

RAM: Random Access Memory

Rh: Rhodium

ROM: Read-Only Memory

RPM: Revolutions Per Minute

RWD: Rear Wheel Drive

SAE: Society of Automotive Engineers

SCB: Supercharger Bypass

SFI: Sequential Multiport Fuel Injection

SHRTFT: Short-Term Fuel Trim

TAC: Throttle Actuator Control

TACM: Throttle Actuator Control Motor

TC: Turbocharger

TCBP/CACT: Turbocharger Boost Pressure/Charge Air Cooler Temperature

TCBY: Turbocharger Bypass

TCIPT: Turbocharger Intake Pressure And Temperature

TCM: Transmission Control Module

TCS: Transmission Control Switch

TDC: Top Dead Center

TIVCT: Twin Independent Variable Camshaft Timing

TP: Throttle Position

TPPC: Throttle Plate Position Controller

TR: Transmission Range

TSB: Technical Service Bulletin

TWC: Three Way Catalytic Converter

VCT: Variable Camshaft Timing

VECI: Vehicle Emission Control Information

VID: Vehicle Identification

VIN: Vehicle Identification Number

VR: Variable Reluctance

VSS: Vehicle Speed Sensor

WOT: Wide Open Throttle

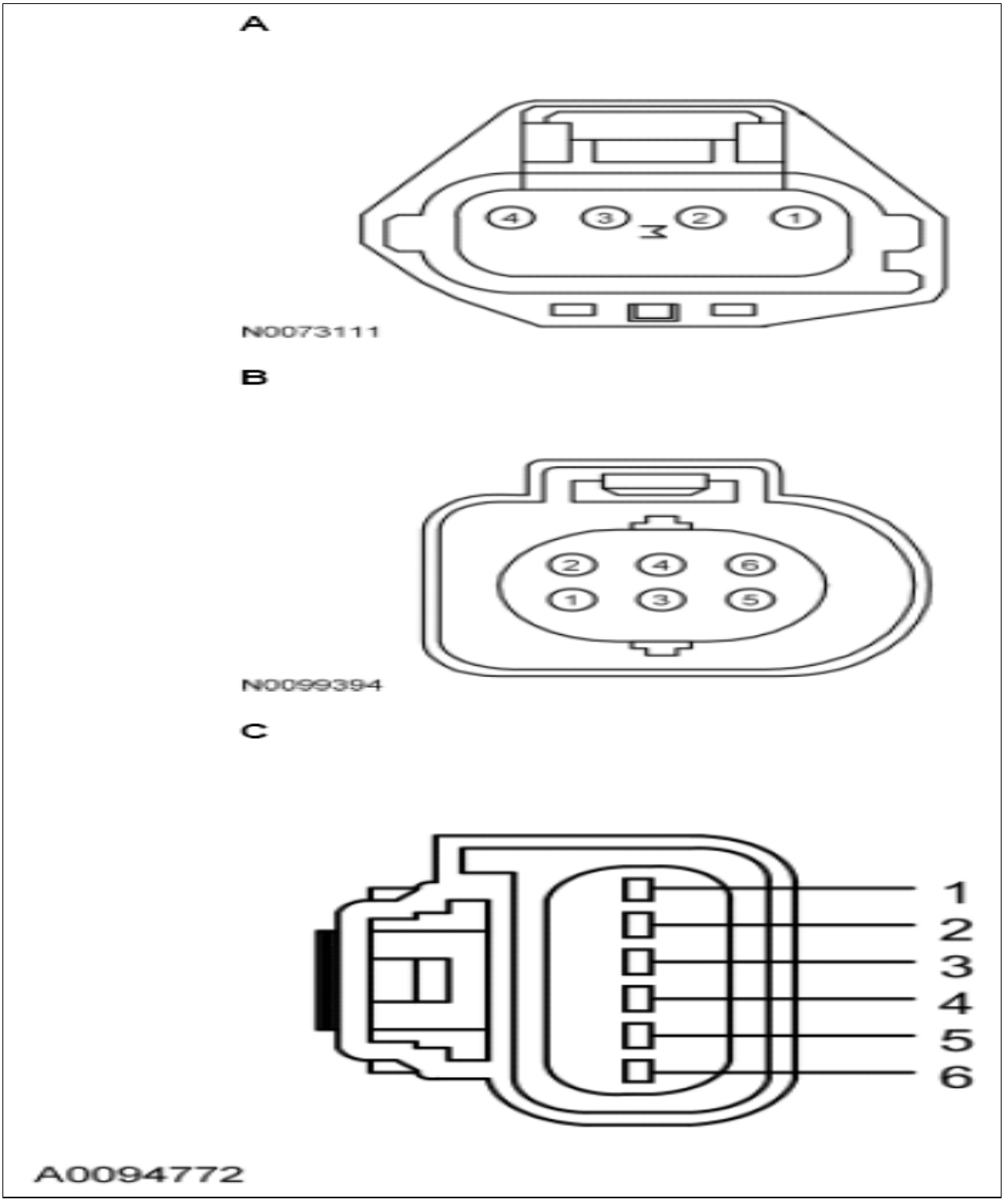
PINPOINT TEST A: NO START > INTRODUCTION

> *WARNING: STOP THIS TEST AT THIS TEST AT THE FIRST SIGN OF A FUEL LEAK AND REPAIR AS REQUIRED.*
> *NO OPEN FLAME. NO SMOKING DURING FUEL DELIVERY CHECKS.*
> *FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN PERSONAL INJURY.*

This pinpoint test is intended to diagnose the following:

- spark (as related to electronic engine control)
- PCM (12A650)

Fig 1: Identifying Electronic Throttle Body Throttle Position Sensor (ETBTPS) Connector

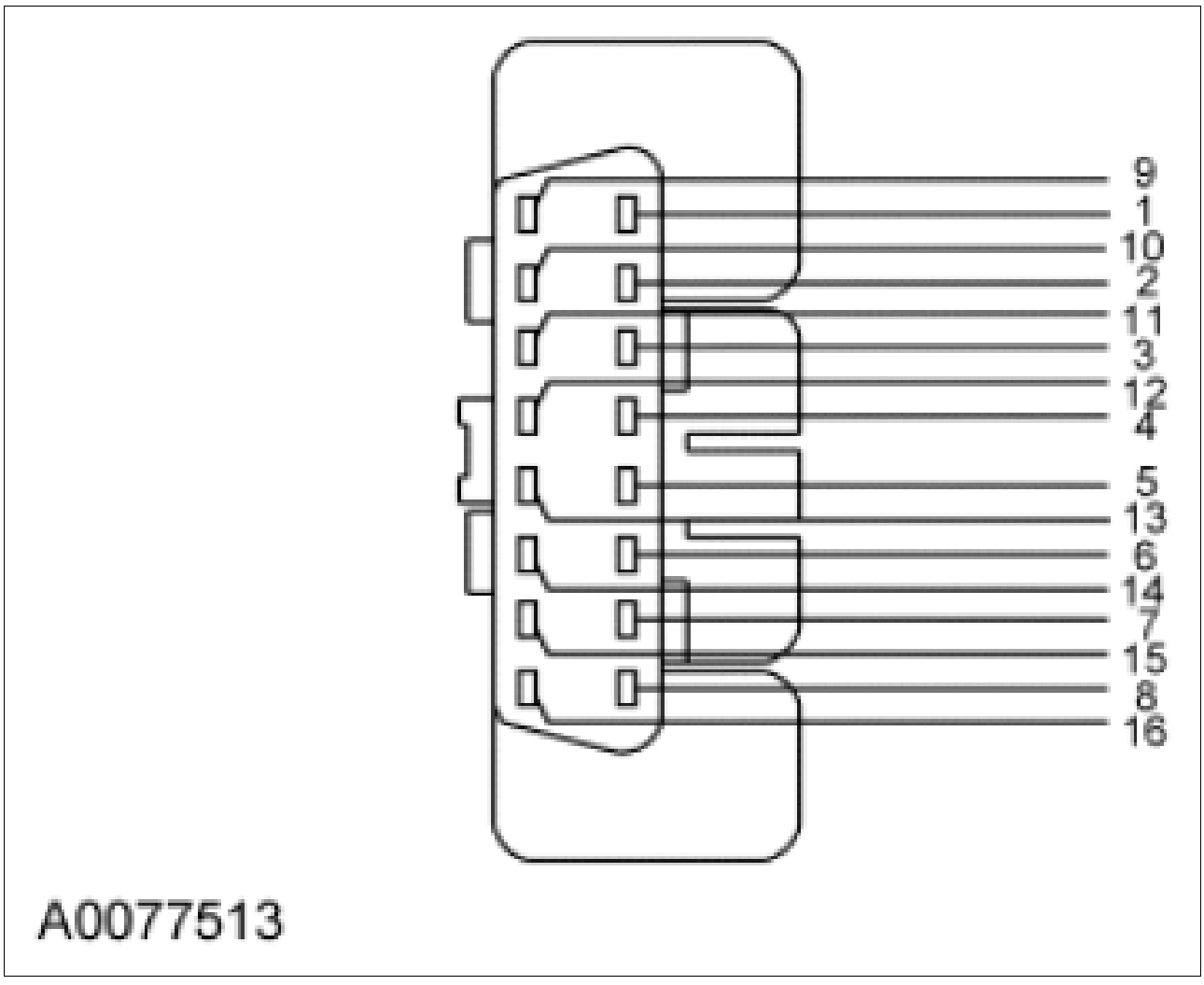


Courtesy of FORD MOTOR CO.

Vehicle	Connector	Pin	Circuit
E-Series, Explorer GTDI 3.5L, F-Series Super Duty 6.8L, Flex GTDI 3.5L,	A	3 2	ETCRTN ETCREF

MKS 3.5L, MKT 3.5L, Motorhome/Stripped Chassis/Step Van, Taurus GTDI 3.5L			
Escape/Kuga 1.6L, Fiesta 1.6L, Fusion 1.6L, Transit Connect 1.6L	B	2 6	ETCRTN ETCREF
Fiesta 1.0L, Focus 1.0L, Fusion 1.5L	B	3 1	ETCRTN ETCREF
All other vehicles	C	4 5	ETCRTN ETCREF

Fig 2: Identifying Data Link Connector (DLC)



Courtesy of FORD MOTOR CO.

Pin	Circuit

13	FEPS (Flash EEPROM Programming Signal)

PINPOINT TEST A: NO START > TEST PROCEDURE

A1 ATTEMPT TO CRANK THE ENGINE

NOTE: Verify the inertia fuel shutoff (IFS) switch is set (button pushed in). Refer to the Owner's Literature for location.

Does the engine crank?

Yes	No
GO to **A2** .	REFER to the service information, Starting System, and DIAGNOSE the engine does not crank symptom.

A2 IDENTIFY THE TYPE OF NO START

NOTE: The purpose of this test step is to identify intermittent no starts in order to determine the correct repair procedure.

Does the vehicle start?

Yes	No
The vehicle has an intermittent no start. GO to PINPOINT TEST Z .	For DTCs P0320 or P0322, GO to PINPOINT TEST JD . For all others, GO to **A3** .

A3 CHECK VREF VOLTAGE TO THE ETBTPS

Ignition OFF.

ETBTPS connector disconnected.

Ignition ON, engine OFF.

Measure the voltage between:

(+) ETBTPS Connector, Harness Side	(-) ETBTPS Connector, Harness Side
ETCREF	ETCRTN

Is the voltage between 4.5 - 5.5 V?

Yes	No

GO to **A4** .	GO to PINPOINT TEST C .

A4 CHECK THE FLASH EEPROM PROGRAMMING SIGNAL (FEPS) CIRCUIT FOR A SHORT TO VOLTAGE

NOTE: For vehicles without a FEPS circuit, follow the Yes answer.

Ignition OFF.

ETBTPS connector connected.

Ignition ON, engine OFF.

Measure the voltage between:

(+) DLC, Harness Side	(-) Vehicle Battery
FEPS - Pin 13	Negative terminal

Is the voltage less than 9 V?

Yes	No
GO to **A5** .	REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.

A5 CHECK THE RPM IN THE PCM

NOTE: Connect the scan tool to a voltage source that is powered with the ignition in the START position (such as directly to the vehicle battery). Also verify that the vehicle battery is fully charged.

NOTE: Normal engine cranking speed is between 150 RPM and 350 RPM.

Access the PCM and monitor the RPM (RPM) PID.

Crank the engine while viewing the RPM PID.

Is the RPM between 150 RPM - 350 RPM?

Yes	No
GO to **A6** .	For base engine concerns, REFER to the service information , Engine System - General Information, and DIAGNOSE difficult starting symptom. For all others, GO to JD2.

A6 CHECK FOR CRANKSHAFT POSITION (CKP) AND CAMSHAFT POSITION (CMP) SYNCHRONIZATION

Access the PCM and monitor the SYNC (MODE) PID.

Crank the engine while viewing the SYNC PID.

Does the SYNC PID read YES?

Yes	No
GO to **A7** .	GO to PINPOINT TEST JD .

A7 CHECK FOR SPARK AT THE CYLINDERS

Ignition OFF.

Remove the fuel pump fuse to disable the fuel pump.

Disconnect the ignition coils from the spark plugs on half of the number of cylinders on the engine.

Connect the Adjustable Ignition Spark Tester THX458 or equivalent to a spark plug boot and repeat for half the number of cylinders on the engine.

Observe the spark tester while cranking the engine.

Is a bluish-white spark present for each tested cylinder?

Yes	No
GO to **A8** .	For Fiesta 1.6L TiVCT, GO to PINPOINT TEST JE . For all others, GO to PINPOINT TEST JF .

A8 CHECK THE FUEL PRESSURE

WARNING: THE FUEL SYSTEM REMAINS PRESSURIZED WHEN THE ENGINE IS NOT RUNNING. TO PREVENT INJURY OR FIRE, USE CAUTION WHEN WORKING ON THE FUEL SYSTEM.
REFER TO THE FUEL SYSTEM WARNING INFORMATION AT THE BEGINNING OF PINPOINT TEST HC.
FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN PERSONAL INJURY.

NOTE: While activating the fuel pump on an electronic returnless fuel system a brief pressure spike may occur.

Ignition OFF.

Relieve the fuel pressure. Refer to the service information , Fuel System for the Fuel System Pressure Release procedure.

Connect the fuel pressure gauge using the appropriate fuel pressure test hose and adaptor.

Ignition ON, engine OFF.

Access the PCM and control the FP (MODE) PID.

Activate the fuel pump to obtain maximum fuel pressure.

Is the fuel pressure within specification (refer to the FUEL PRESSURE CHART in Pinpoint Test HC)?

Yes	No
GO to **A9** .	GO to PINPOINT TEST HC .

A9 CHECK THE FUEL PRESSURE LEAKDOWN

Ignition ON, engine OFF.

Access the PCM and control the FP (MODE) PID.

Activate the fuel pump to obtain maximum fuel pressure.

Monitor the FRP.

Verify the fuel pressure remains within 34 kPa (5 psi) of the maximum pressure for 1 minute after turning the pump off.

Does fuel pressure remain within 34 kPa (5 psi)?

Yes	No
For Edge 2.0L, Edge 2.7L, Escape/Kuga 1.6L, Escape/Kuga 2.0L, Expedition, Explorer 2.0L, Explorer 3.5L GTDI, F-150 2.7L, F-150 3.5L GTDI, Fiesta 1.0L, Fiesta 1.6L GTDI, Flex 3.5L GTDI, Focus, Fusion 1.5L, Fusion 1.6L, Fusion 2.0L, MKC, MKS 3.5L, MKT 2.0L, MKT 3.5L, MKZ 2.0L, Mustang 2.3L, Navigator, Taurus 2.0L, Taurus 3.5L GTDI, Transit 3.5L, and	GO to PINPOINT TEST HC .

Transit Connect 1.6L, GO to A11. For all others, GO to **A10** .	

A10 CHECK THE FUEL INJECTORS FOR VOLTAGE

NOTE: A no start condition typically exists only if greater than half of the fuel injectors are without voltage. Check at least 2 fuel injectors, 1 on each bank on V type engines.

Ignition OFF.

Disconnect 2 fuel injectors.

Ignition ON, engine OFF.

Measure the VPWR voltage at each fuel injector harness connector.

Is the voltage greater than 10.5 V?

Yes	No
GO to **A11** .	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

A11 CHECK THE FUEL INJECTORS' ABILITY TO DELIVER FUEL

Cycle the ignition several times to charge the fuel system.

Disable the fuel pump.

Monitor the fuel pressure gauge while cranking the engine for at least 5 seconds.

Is there a pressure drop greater than 34 kPa (5 psi) while cranking the engine?

Yes	No
For Edge 2.0L, Edge 2.7L, Escape/Kuga 1.6L, Escape/Kuga 2.0L, Expedition, Explorer 2.0L, Explorer 3.5L GTDI, F-150 2.7L, F-150 3.5L GTDI, Fiesta 1.0L, Fiesta 1.6L GTDI, Flex 3.5L GTDI, Focus, Fusion 1.5L, Fusion 1.6L, Fusion 2.0L, MKC,	GO to **A12** .

MKS 3.5L, MKT 2.0L, MKT 3.5L, MKZ 2.0L, Mustang 2.3L, Navigator, Taurus 2.0L, Taurus 3.5L GTDI, Transit 3.5L, and Transit Connect 1.6L, GO to PINPOINT TEST DI . For all others, The electronic engine control (EEC) system is not the cause of the no start. RETURN to SYMPTOM CHARTS for further direction.	

A12 CHECK FOR CORRECT PCM OPERATION

Disconnect all the PCM connectors.

Visually inspect for:

pushed out pins

corrosion

Connect all the PCM connectors and make sure they seat correctly.

Carry out the PCM self-test.

Verify the concern is still present.

Is the concern still present?

Yes	No
INSTALL a new PCM. REFER to FLASH ELECTRICALLY ERASABLE PROGRAMMABLE READ ONLY MEMORY (EEPROM) , Programming the VID Block for a Replacement PCM.	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.

PINPOINT TEST C: REFERENCE VOLTAGE (VREF) > INTRODUCTION

NOTE: The APPVREF1/APPVREF2/ETCREF circuits and the APPRTN1/APPRTN2 /ETCRTN circuits are internally bussed within the PCM and are dedicated circuits for the APP sensor and the ETBTPS only.

This pinpoint test is intended to diagnose the following:

- harness circuits: APPVREF1, APPVREF2, APPRTN1, APPRTN2, ETCREF, ETCRTN, SIGRTN and VREF
- accelerator pedal position (APP) sensor (9F836)

- air conditioning pressure (ACP) transducer sensor (19D594)
- crankcase pressure sensor (6758)
- crankshaft position (CKP) sensor (6C315)
- camshaft position (CMP) sensor (6B288)
- electronic throttle body throttle position sensor (ETBTPS) (9E928)
- fuel pressure sensor (9F972)
- fuel rail pressure (FRP) sensor (6B288)
- fuel tank pressure (FTP) sensor (9C052)
- generator current sensor (14B357)
- intake manifold runner control bank 1 (IMRC1) sensor (9J559)
- intake manifold runner control bank 2 (IMRC2) sensor (9J559)
- manifold absolute pressure (MAP) sensor (9F479)
- manifold absolute pressure temperature (MAPT) sensor (9F479)
- manifold absolute pressure (MAP)/charge air cooler temperature (CACT) sensor (9F479)
- manifold absolute pressure (MAP)/intake air temperature 2 (IAT2) sensor (9F479)
- turbocharger boost pressure (TCBP) sensor (9F479)
- turbocharger boost pressure (TCBP)/charge air cooler temperature (CACT) sensor (9F479)
- turbocharger intake pressure and temperature (TCIPT) sensor (9F479)
- wastegate vacuum sensor (9F479)
- PCM (12A650)

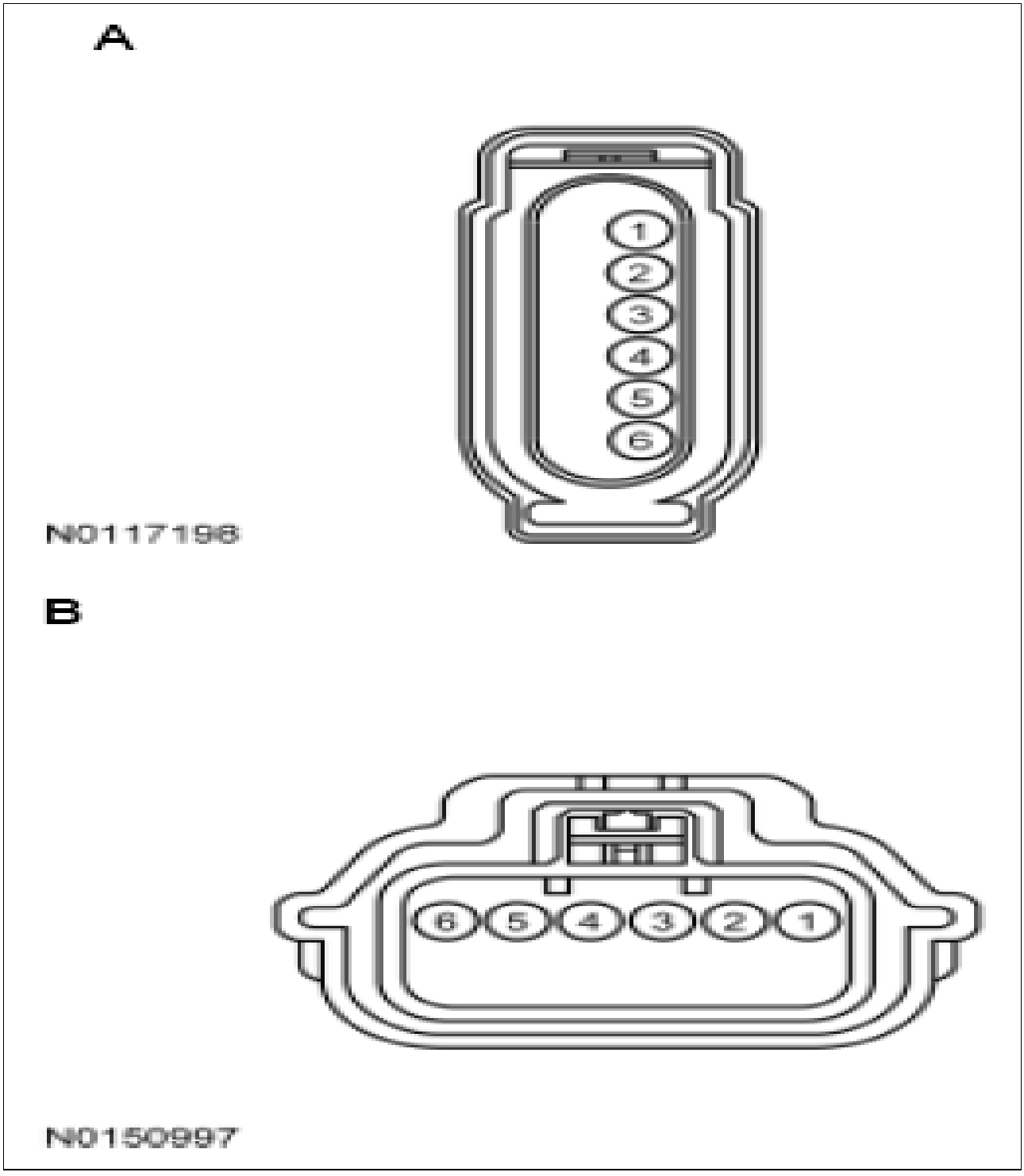
SENSORS VOLTAGE REFERENCE

Applications	APP or FTP or ACP	Fuel Pressure Sensor or FRP	MAP or MAPT or TCBP or TCBP/CACT or MAP/CACT or MAP/IAT2	CKP or CMP	WVS or TCIPT	CPP	Generator Current Sensor	IMRC	Crankcase Pressure Sensor
Escape 2.5L, Fiesta 1.6L TiVCT, Transit Connect 2.5L	X		X						

Focus 2.0L GDI	X	X		X					
Escape 1.6L, Escape 2.0L, Fiesta 1.0L, Fiesta 1.6L GTDI, Transit Connect 1.6L	X	X	X	X					
Edge 2.0L, Edge 2.7L, Explorer 2.0L, F-150 2.7L, F-150 3.5L GTDI, Transit 3.5L	X	X	X	X	X		X		
E-Series 5.4L, E-Series 6.8L, F-650/F-750, F-Series Super Duty 6.8L, Mustang 3.7L	X								
F-Series Super Duty 6.2L	X			X					
Focus 1.0L	X	X	X	X		X			X
Fusion 2.5L	X		X				X		
Explorer 3.5L GTDI, Flex 3.5L GTDI, Fusion 1.5L, Fusion 2.0L, MKC, MKS 3.5L, MKT 2.0L, MKT 3.5L, MKZ 2.0L, Taurus 2.0L, Taurus 3.5L GTDI	X	X	X	X			X		
Edge 3.5L, Explorer 3.5L TiVCT, Explorer 3.7L, F-150 3.5L TiVCT, F-150 5.0L, Flex 3.5L TiVCT,	X						X		

MKS 3.7L, MKT 3.7L, MKX, MKZ 3.7L, Taurus 3.5L TiVCT, Taurus 3.7L, Transit 3.7L									
Mustang 5.0L	X							X	
Focus 2.0L GTDI, Mustang 2.3L	X	X	X	X					X
Expedition, Navigator	X	X	X	X			X		X

Fig 1: Identifying Accelerator Pedal Position (APP) Sensor Connector

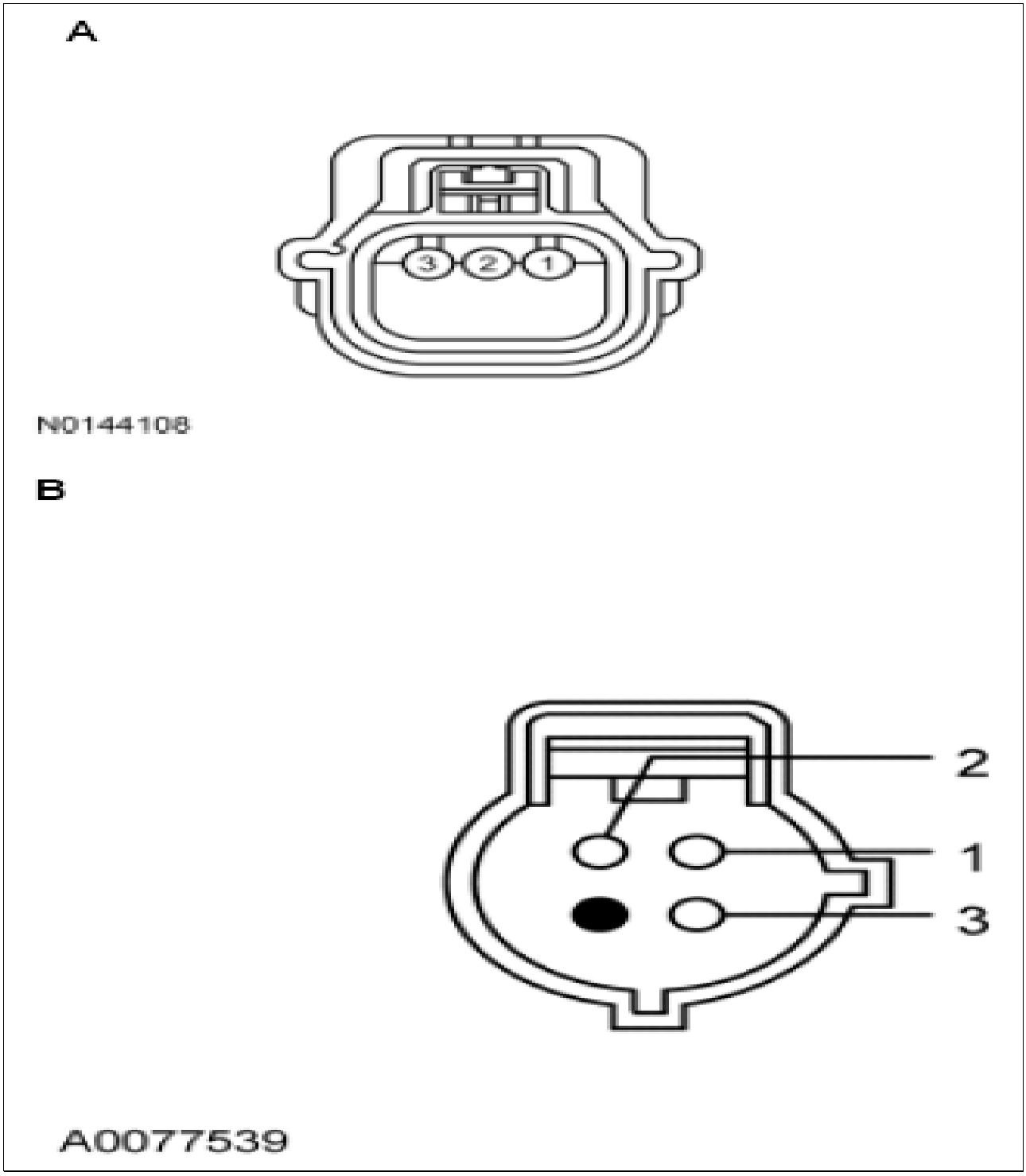


Courtesy of FORD MOTOR CO.

Vehicle	Connector	Pin	Circuit
Fiesta	A	3 1	APPRTN2 APPVREF2

All other vehicles	B	4 6 3 1	APPRTN2 APPVREF2 APPRTN1 APPVREF1

Fig 2: Identifying Air Conditioning Pressure (ACP) Transducer Sensor Connector

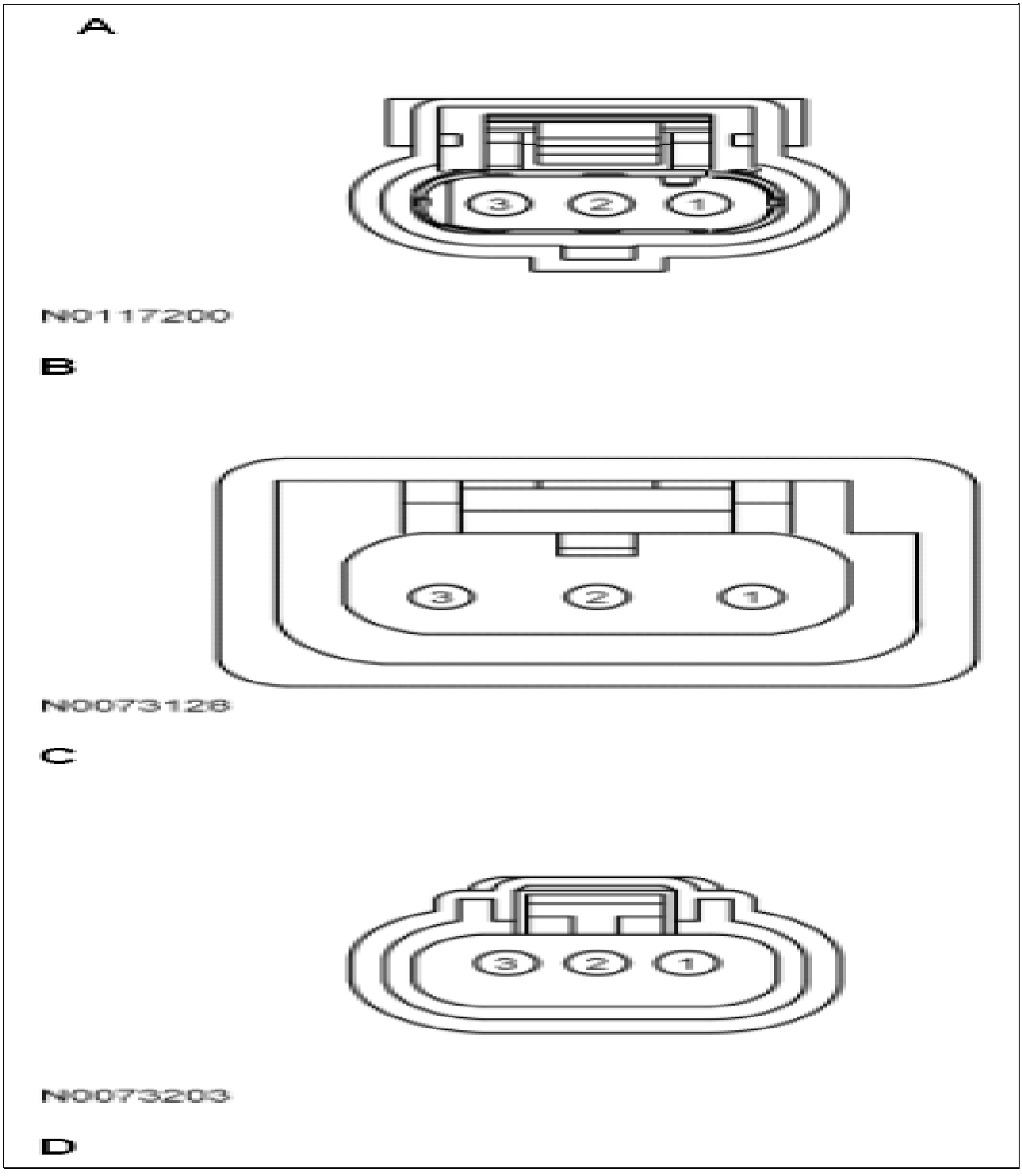


Courtesy of FORD MOTOR CO.

Vehicle	Connector	Pin	Circuit

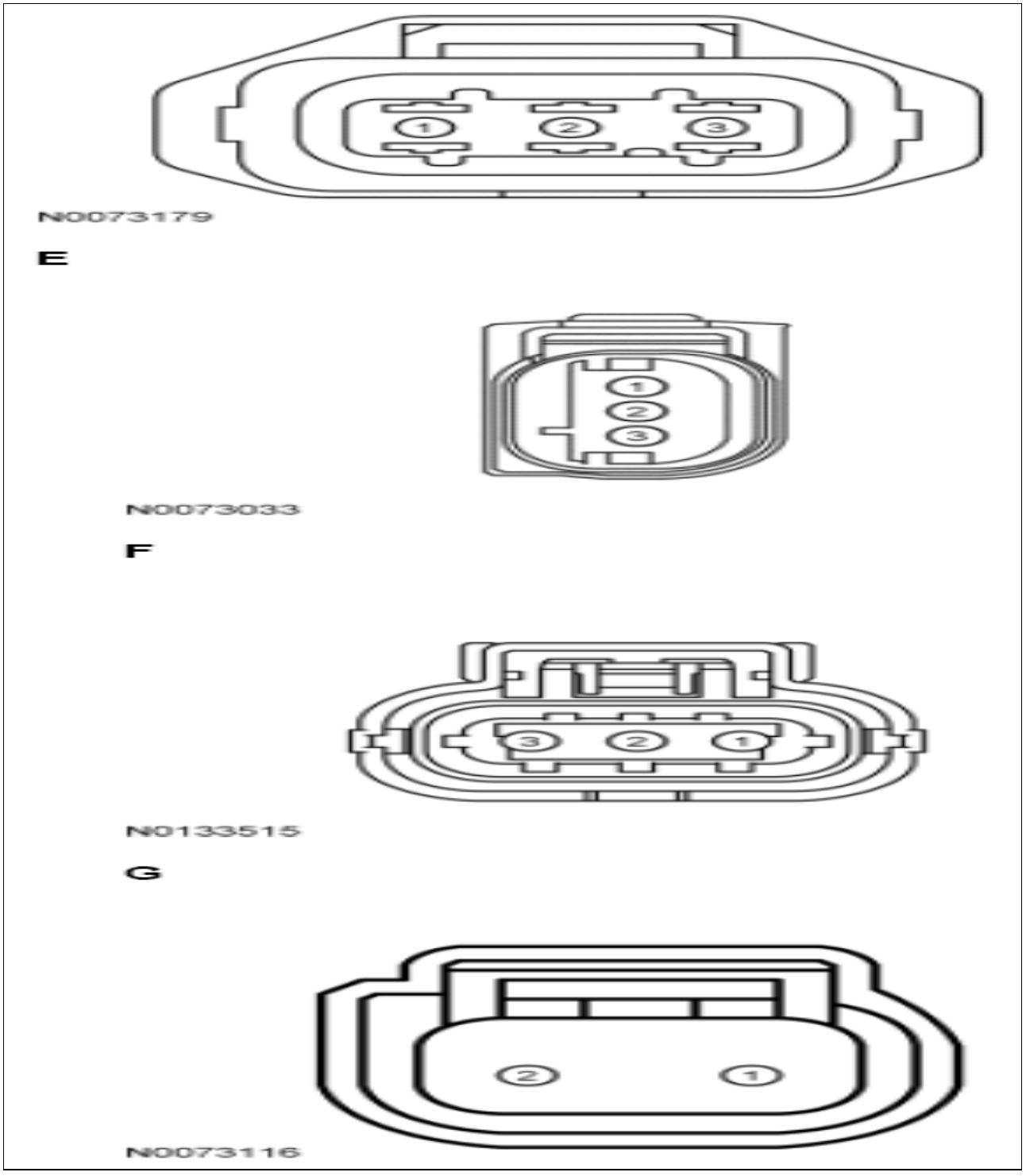
Expedition, Navigator	A	1 2	SIGRTN VREF
Fiesta	B	1 2	SIGRTN VREF
All other vehicles	A	1 3	SIGRTN VREF

Fig 3: Identifying Camshaft Position Bank 1 Sensor 1 (CMP11) Sensor Connector (1 Of 2)



Courtesy of FORD MOTOR CO.

Fig 4: Identifying Camshaft Position Bank 1 Sensor 1 (CMP11) Sensor Connector (2 Of 2)

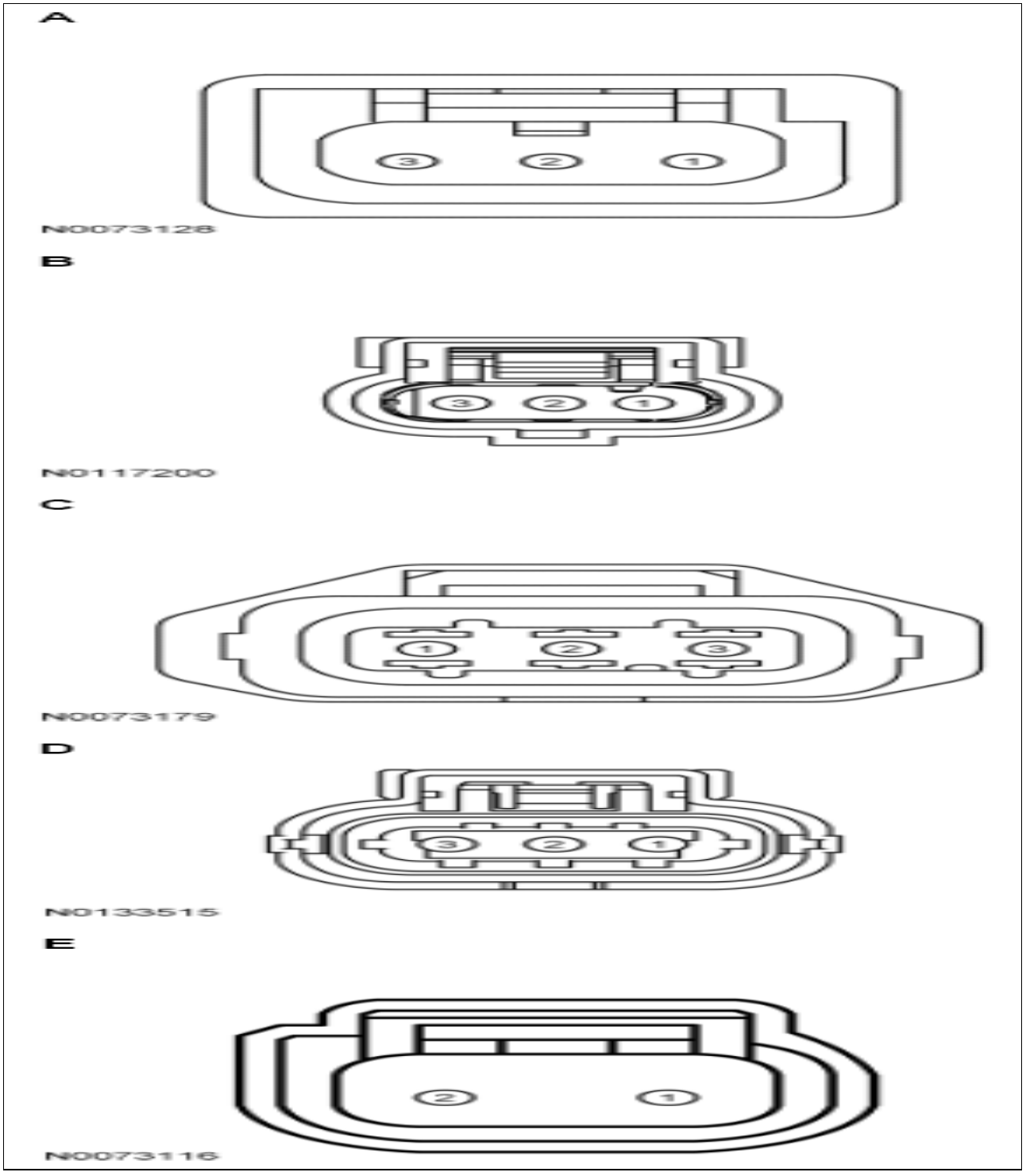


Courtesy of FORD MOTOR CO.

Vehicle	Connector	Pin	Circuit
Edge 2.7L, Edge 3.5L, Expedition, Explorer GTDI 3.5L,	A	2	SIGRTN

F-150 GTDI 3.5L, F-150 2.7L, Flex GTDI 3.5L, MKS 3.5L, MKT 3.5L, Mustang 3.7L, Navigator, Taurus GTDI 3.5L, Transit 3.5L			
Edge 2.0L, Escape/Kuga 2.0L, Explorer 2.0L, Focus 2.0L, Fusion 2.0L, MKC, MKT 2.0L, MKZ 2.0L, Mustang 2.3L, Taurus 2.0L	B	2 1	SIGRTN VREF
Escape/Kuga 2.5L, Fusion 2.5L, Transit Connect 2.5L	C	3	SIGRTN
Escape/Kuga 1.6L, Fiesta GTDI 1.6L, Fusion 1.5L, Fusion 1.6L	D	1 3	SIGRTN VREF
F-150 5.0L, Mustang 5.0L	E	3	SIGRTN
F-Series Super Duty 6.2L	E	2	SIGRTN
Fiesta TiVCT 1.6L, Focus 1.0L	A	3 1	SIGRTN VREF
Fiesta 1.0L	F	3 1	SIGRTN VREF
Transit Connect 1.6L	F	1 3	SIGRTN VREF
All other vehicles	G	1	SIGRTN

Fig 5: Identifying Camshaft Position Bank 1 Sensor 2 (CMP12) Sensor Connector

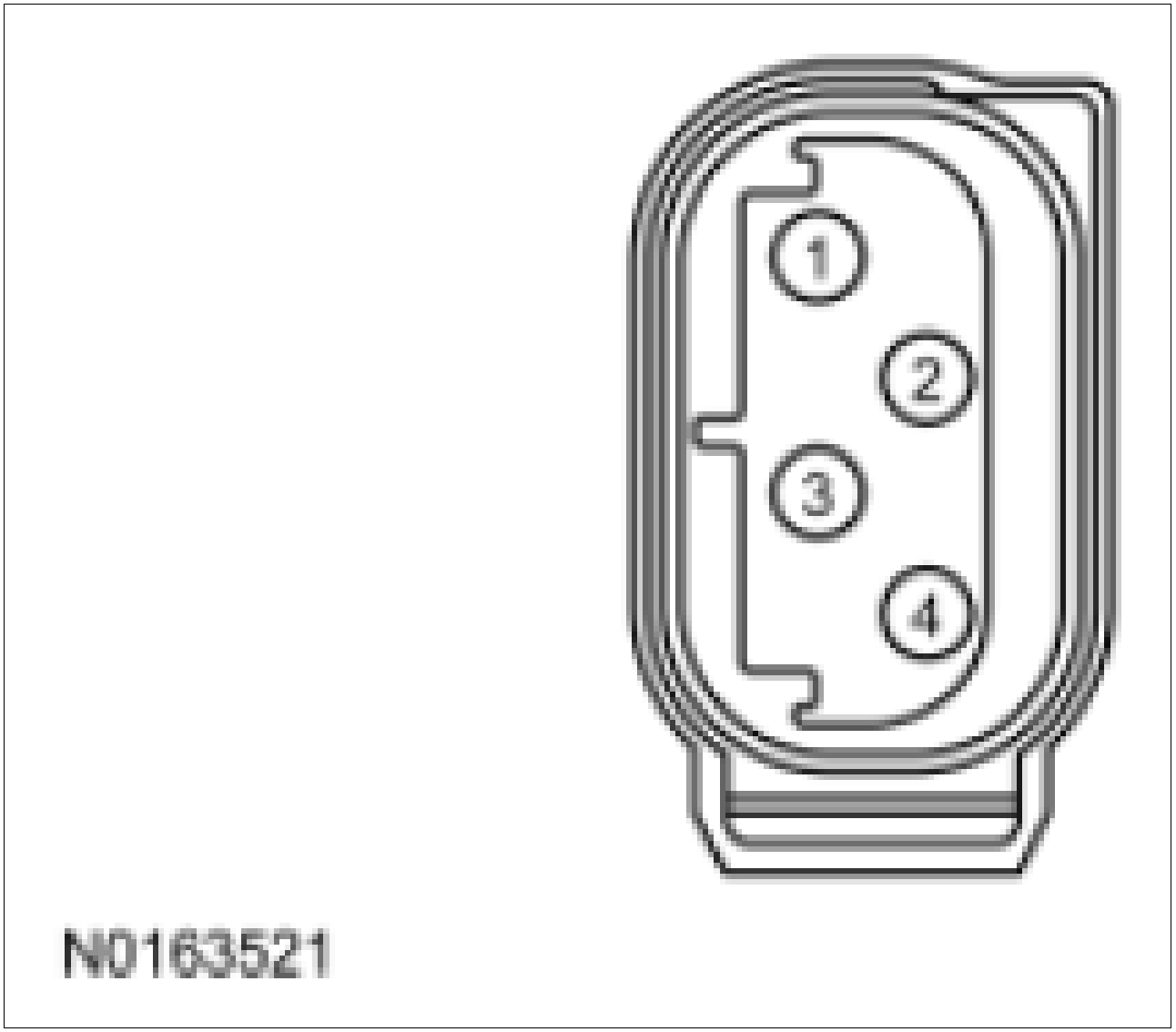


Courtesy of FORD MOTOR CO.

Vehicle	Connector	Pin	Circuit
Escape/Kuga 2.0L, Edge 2.0L, Explorer 2.0L, Focus 2.0L,	A	1 2	VREF SIGRTN

Fusion 2.0L, MKC, MKT 2.0L, MKZ 2.0L, Mustang 2.3L, Taurus 2.0L			
Edge 2.7L, Expedition, F-150 GTDI 3.5L, F-150 2.7L, Navigator, Transit 3.5L	B	2	SIGRTN
Escape/Kuga 1.6L, Fiesta GTDI 1.6L, Fusion 1.5L, Fusion 1.6L	C	3 1	VREF SIGRTN
Fiesta TiVCT 1.6L, Focus 1.0L	B	1 3	VREF SIGRTN
Fiesta 1.0L	D	1 3	VREF SIGRTN
Transit Connect	D	3 1	VREF SIGRTN
All other vehicles	E	1	SIGRTN

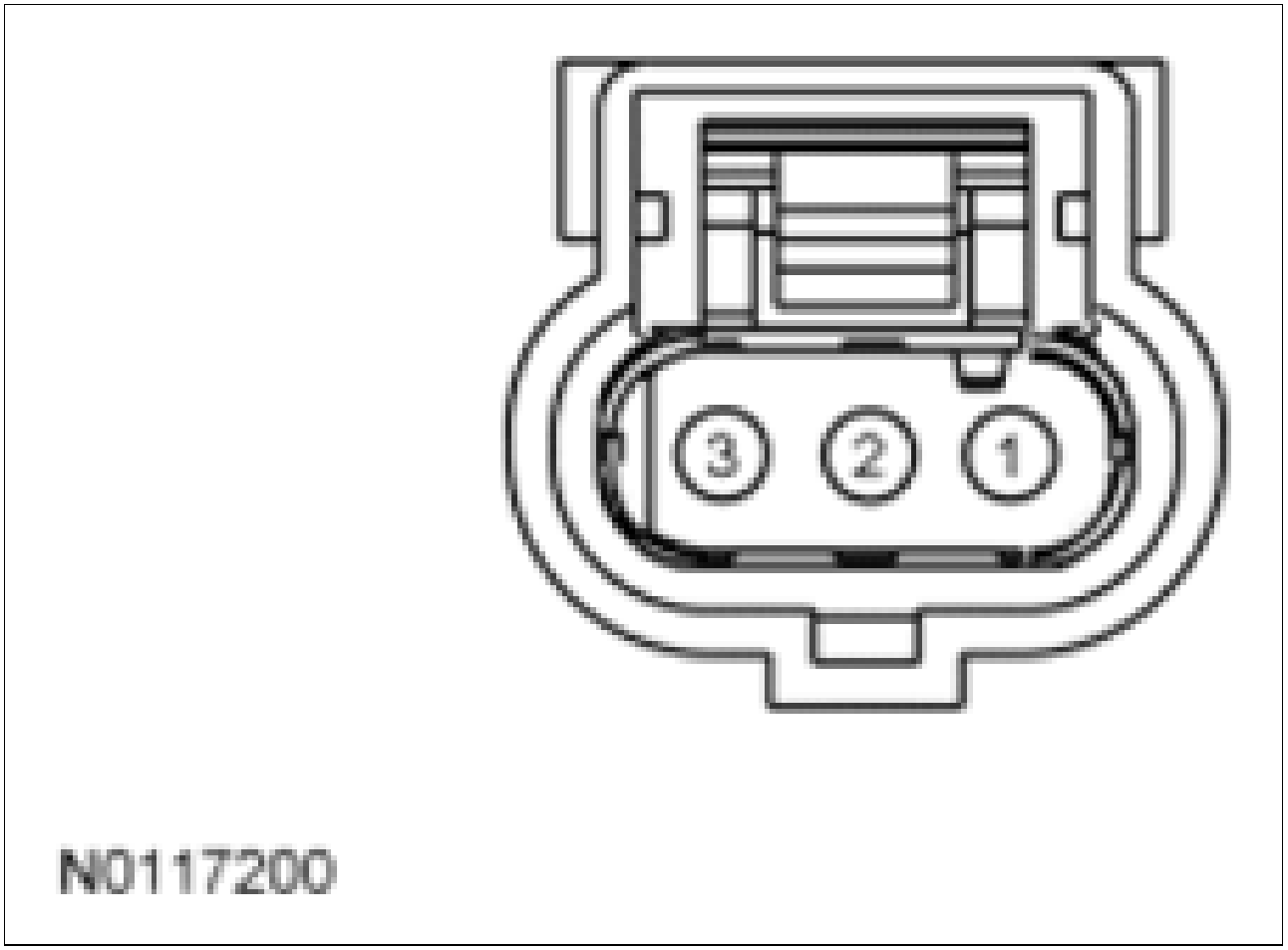
Fig 6: Identifying Clutch Pedal Position (CPP) Sensor Connector



Courtesy of FORD MOTOR CO.

Pin	Circuit
1	SIGRTN (Signal Return)
3	VREF (Reference Voltage)

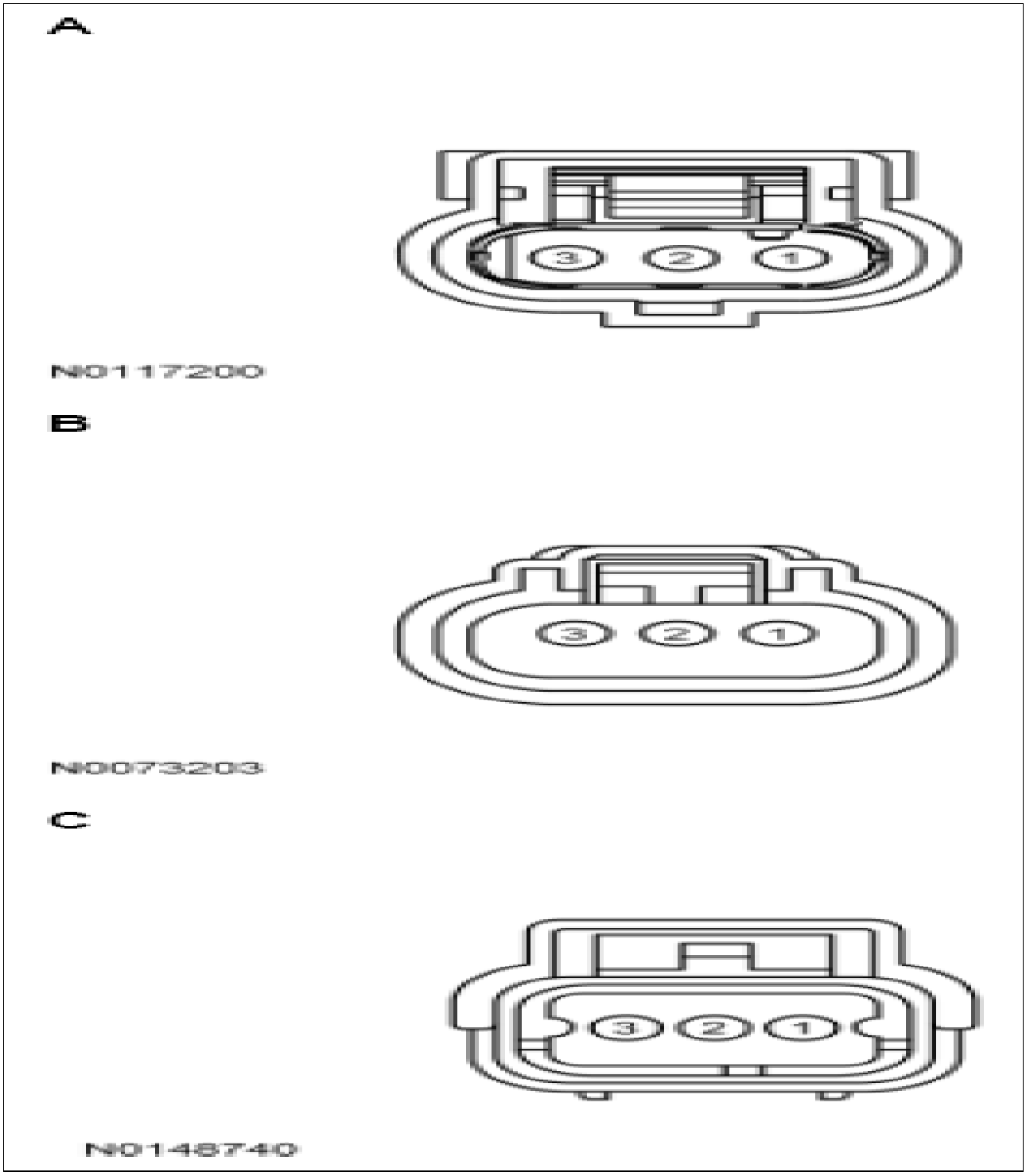
Fig 7: Identifying Crankcase Pressure Sensor Connector



Courtesy of FORD MOTOR CO.

Pin	Circuit
2	SIGRTN (Signal Return)
3	VREF (Reference Voltage)

Fig 8: Identifying Crankshaft Position (CKP) Sensor Connector

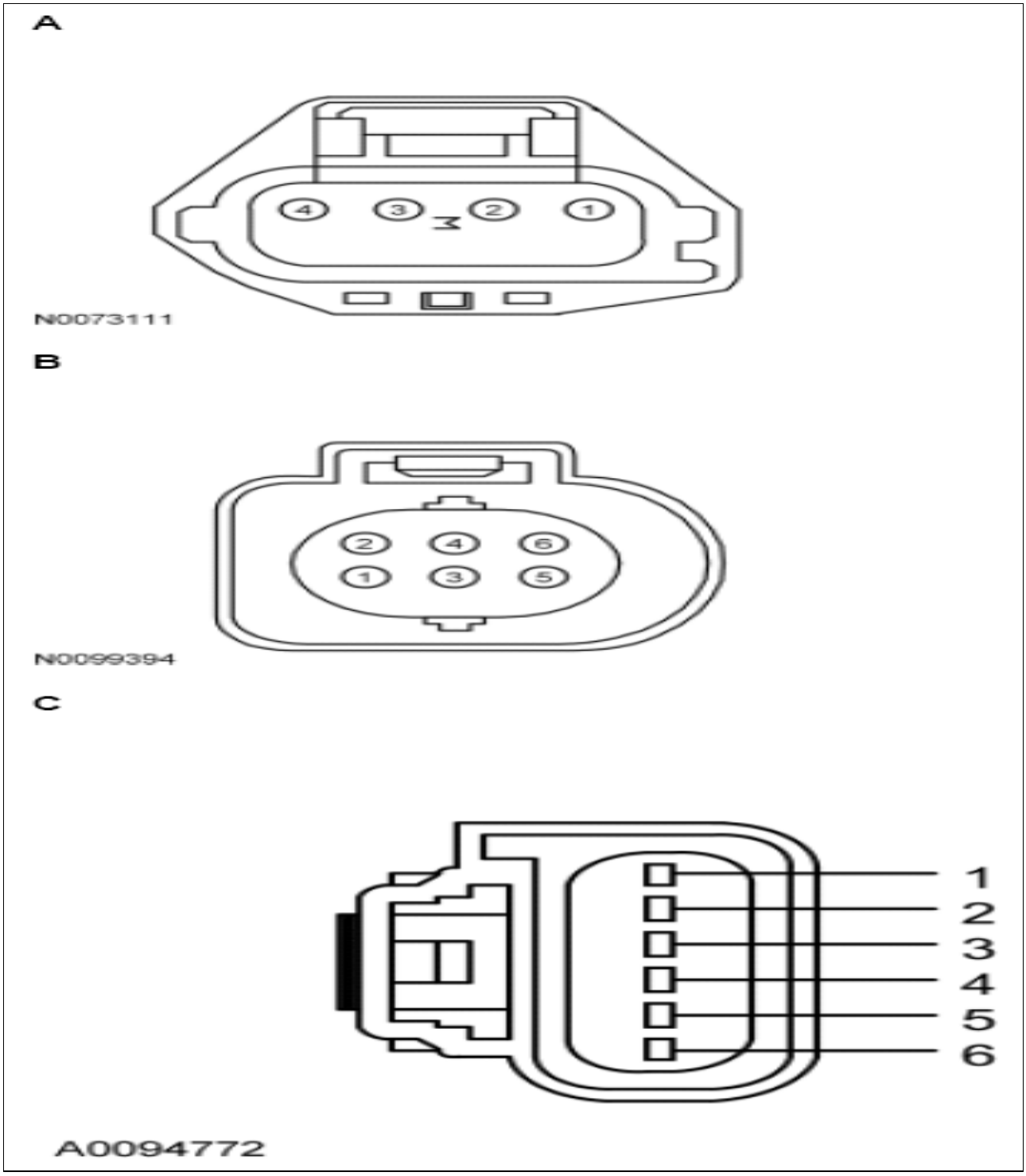


Courtesy of FORD MOTOR CO.

Vehicle	Connector	Pin	Circuit
Edge 2.0L, Focus GTDI 2.0L, Fusion 2.0L, MKZ	A	3 1	SIGRTN VREF

Edge 2.7L, F-150 2.7L	A	1 3	SIGRTN VREF
Escape/Kuga 1.6L	B	2 1	SIGRTN VREF
Escape/Kuga 2.0L, Explorer 2.0L, Focus GDI 2.0L, MKC, MKT 2.0L, Mustang, Taurus 2.0L	B	3 1	SIGRTN VREF
Fiesta, Focus 1.0L, Fusion 1.5L, Fusion 1.6L, Transit Connect	C	2 1	SIGRTN VREF
All other vehicles	A	2 3	SIGRTN VREF

Fig 9: Identifying Electronic Throttle Body Throttle Position Sensor (ETBTPS) Connector

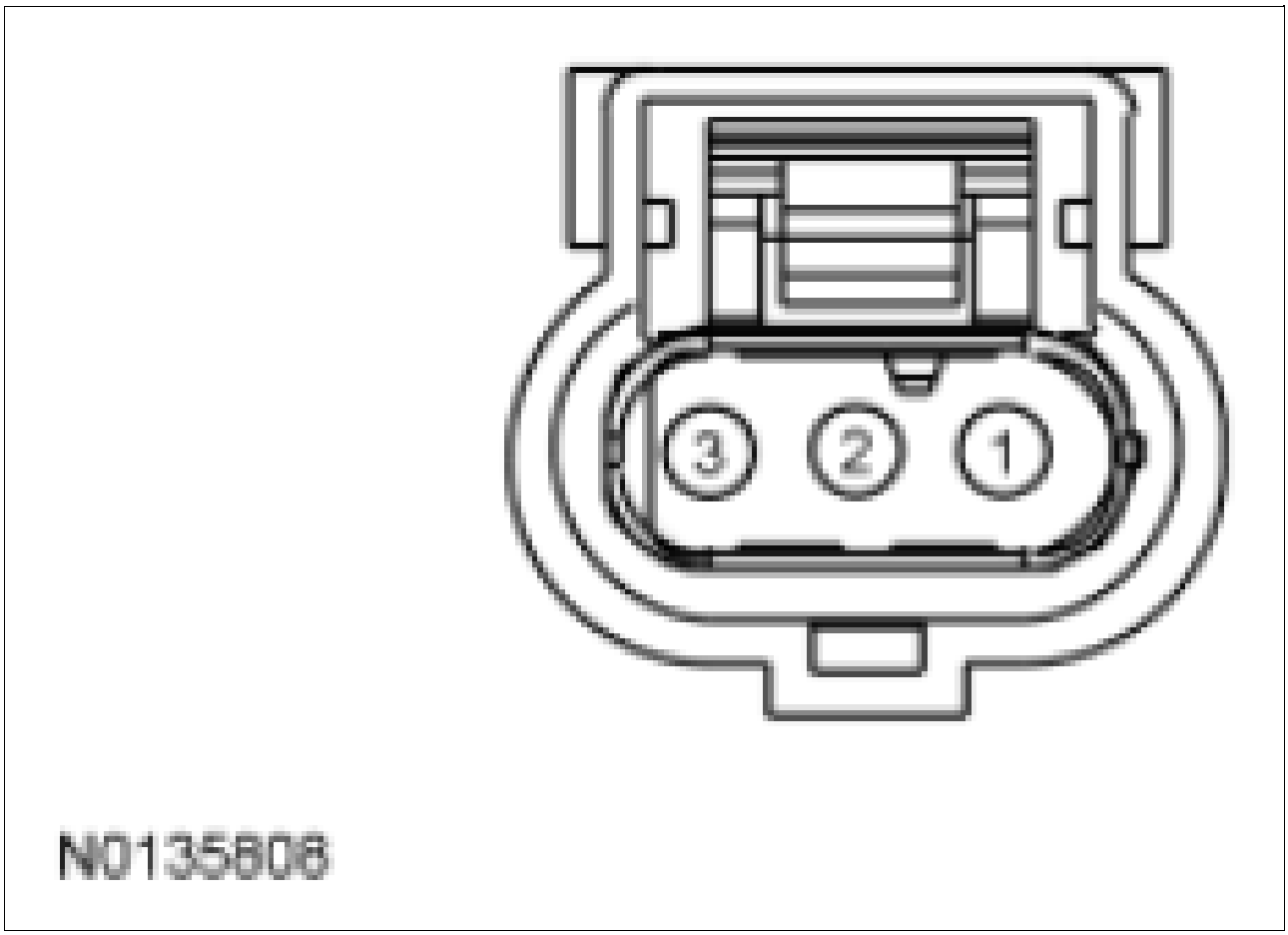


Courtesy of FORD MOTOR CO.

Vehicle	Connector	Pin	Circuit
E-Series, Explorer GTDI 3.5L, F-Series Super Duty 6.8L, Flex GTDI 3.5L,	A	3 2	ETCRTN ETCREF

MKS 3.5L, MKT 3.5L, Motorhome/Stripped Chassis/Step Van, Taurus GTDI 3.5L			
Escape/Kuga 1.6L, Fiesta 1.6L, Fusion 1.6L, Transit Connect 1.6L	B	2 6	ETCRTN ETCREF
Fiesta 1.0L, Focus 1.0L, Fusion 1.5L	B	3 1	ETCRTN ETCREF
All other vehicles	C	4 5	ETCRTN ETCREF

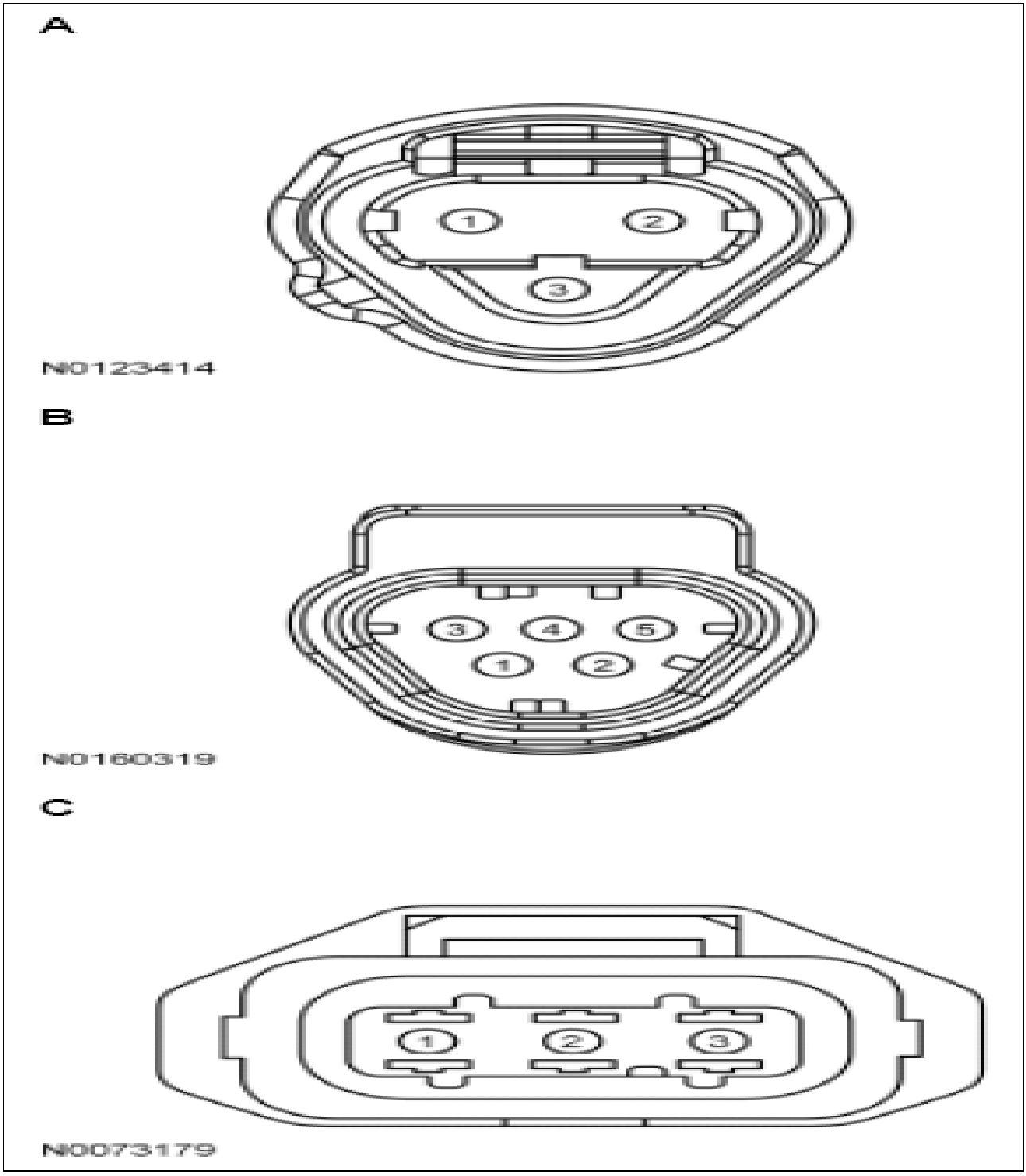
Fig 10: Identifying Fuel Pressure Sensor Connector



Courtesy of FORD MOTOR CO.

Pin	Circuit
2	SIGRTN (Signal Return)
3	VREF (Reference Voltage)

Fig 11: Identifying Fuel Rail Pressure (FRP) Sensor Connector

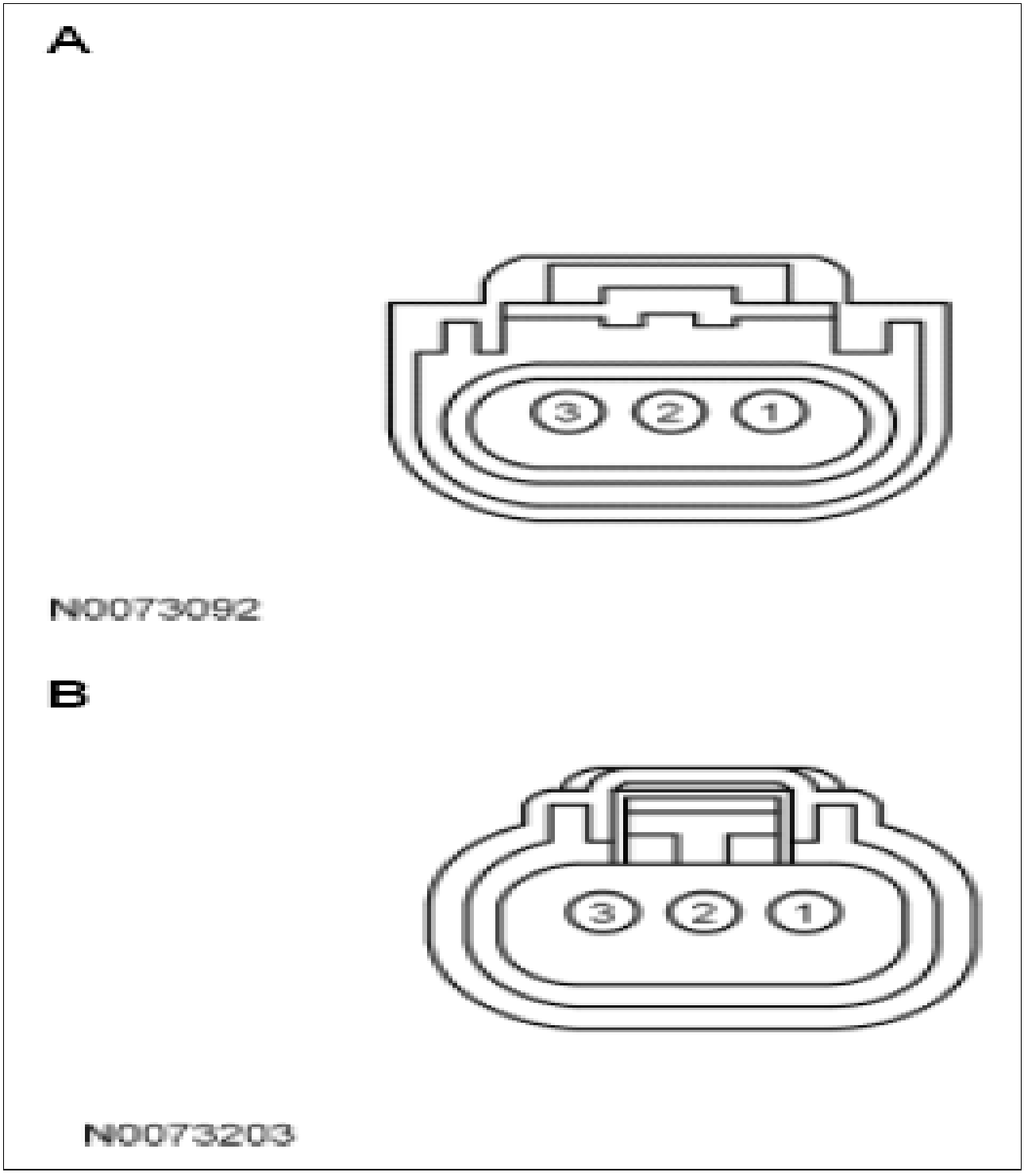


Courtesy of FORD MOTOR CO.

Vehicle	Connector	Pin	Circuit
Edge 2.7L, Expedition, F-150, Focus GDI 2.0L,	A	3 1	SIGRTN VREF

Navigator, Transit			
Edge 2.0L, MKC 2.3L, Mustang	B	3 5	SIGRTN VREF
Fusion 1.5L	C	2 1	SIGRTN VREF
All other vehicles	C	1 3	SIGRTN VREF

Fig 12: Identifying Fuel Tank Pressure (FTP) Sensor Connector

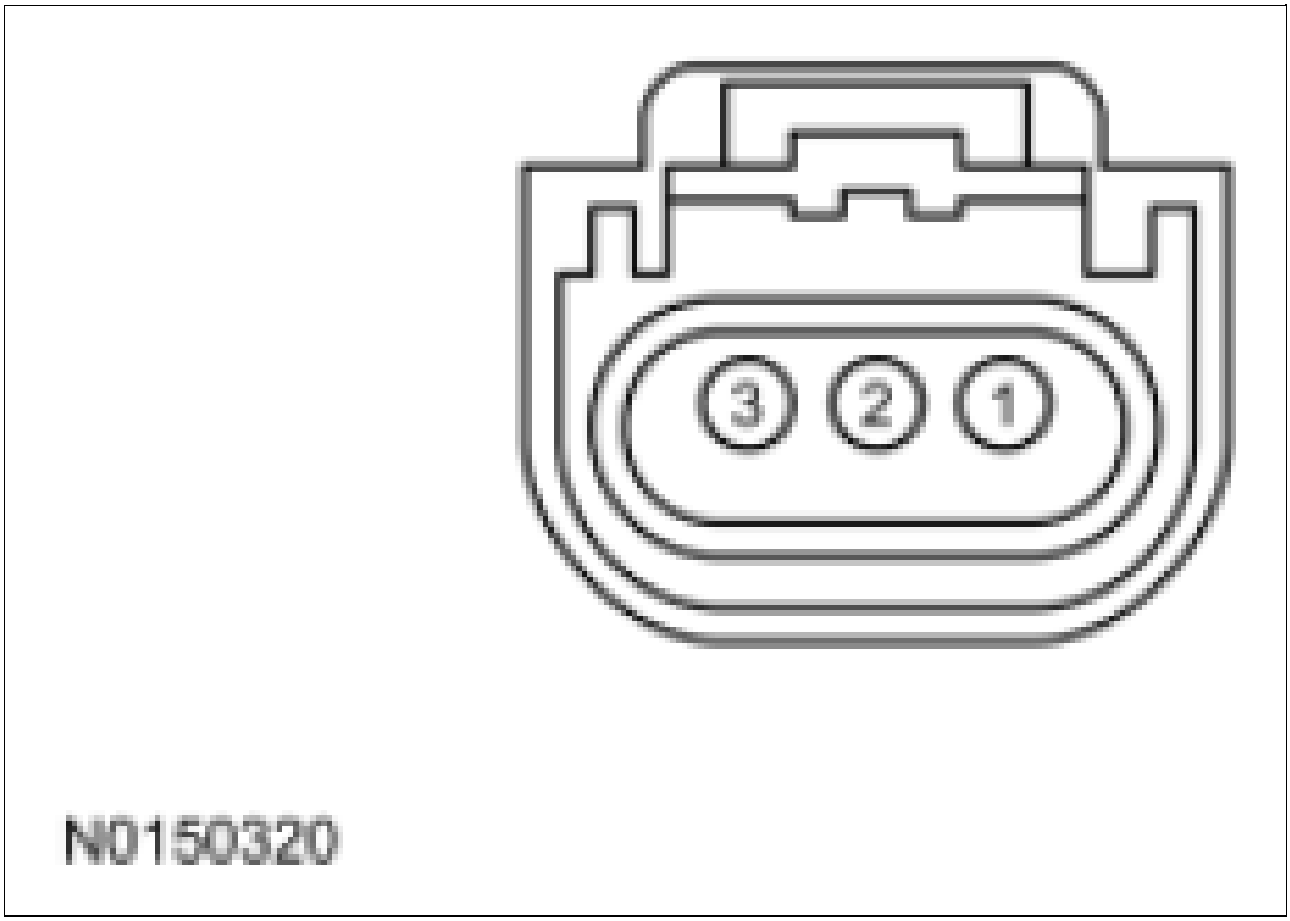


Courtesy of FORD MOTOR CO.

Vehicle	Connector	Pin	Circuit
E-Series, F-650/F-750, Motorhome/Stripped Chassis/Step Van	A	3 2	VREF SIGRTN

All other vehicles	B	3 2	VREF SIGRTN

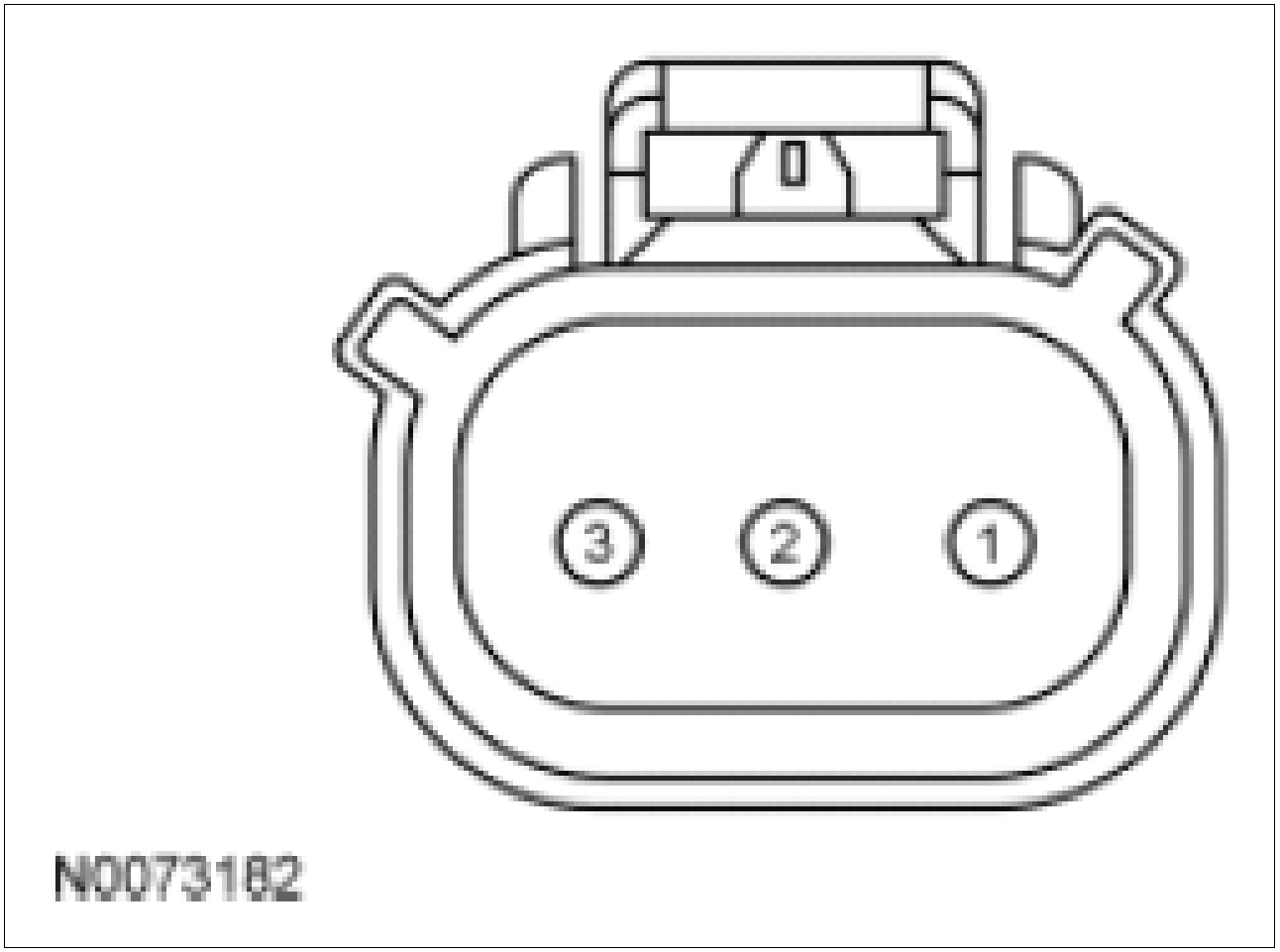
Fig 13: Identifying Generator Current Sensor Connector



Courtesy of FORD MOTOR CO.

Pin	Circuit
2	SIGRTN (Signal Return)
1	VREF (Reference Voltage)

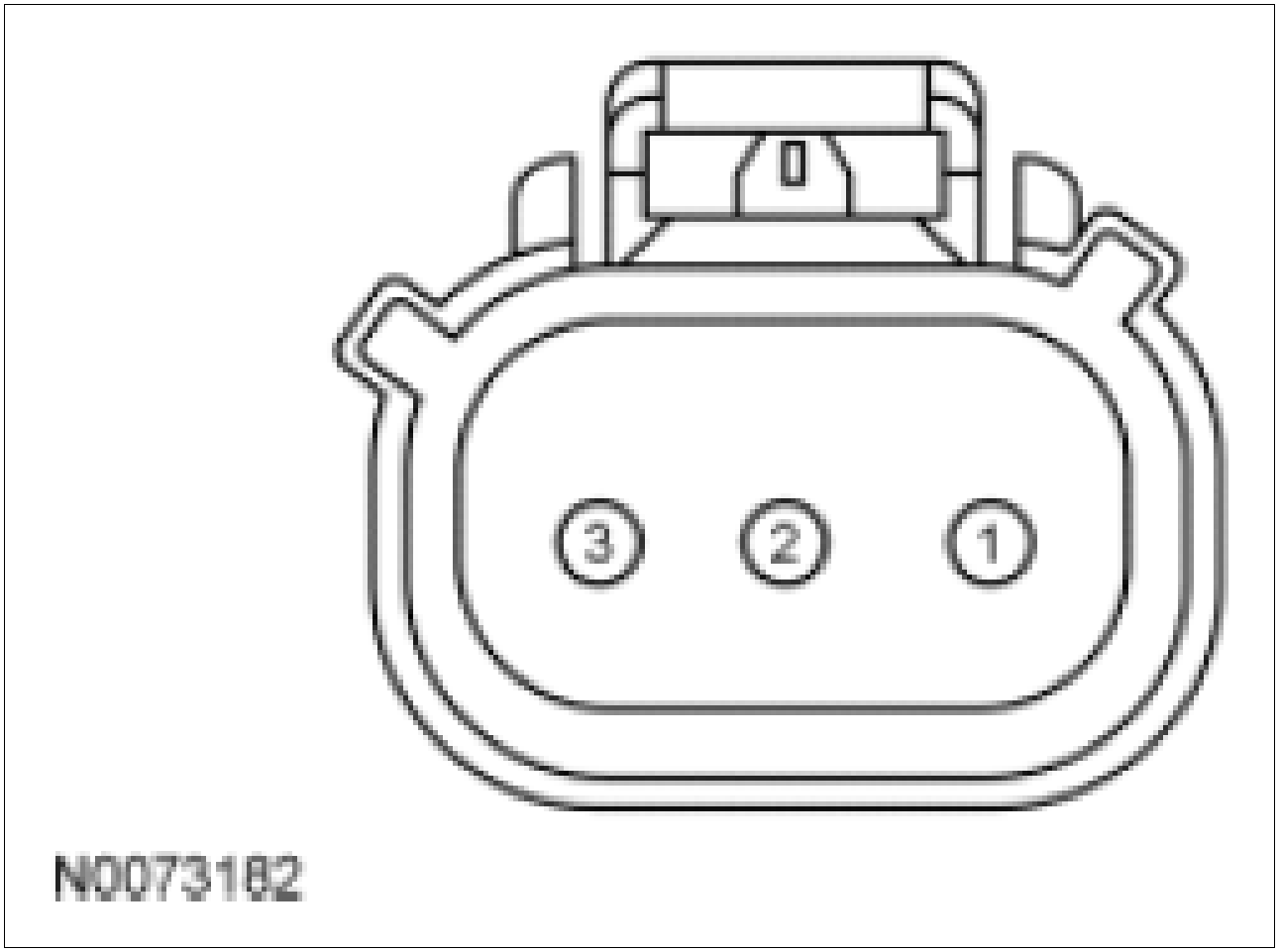
Fig 14: Identifying Intake Manifold Runner Control Bank 1 (IMRC1) Sensor Connector



Courtesy of FORD MOTOR CO.

Pin	Circuit
3	SIGRTN (Signal Return)
2	VREF (Reference Voltage)

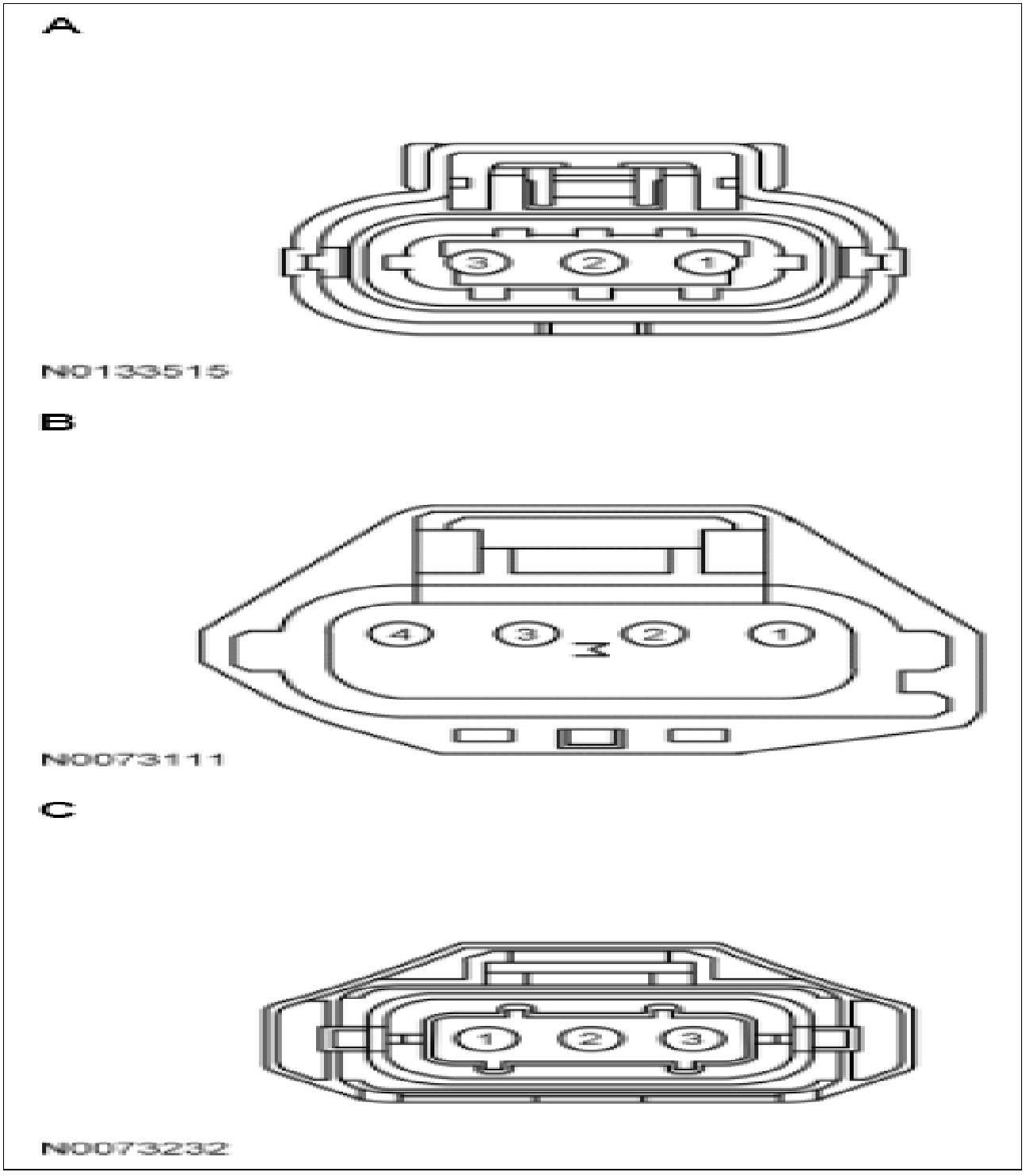
Fig 15: Identifying Intake Manifold Runner Control Bank 2 (IMRC2) Sensor Connector



Courtesy of FORD MOTOR CO.

Pin	Circuit
3	SIGRTN (Signal Return)
2	VREF (Reference Voltage)

Fig 16: Identifying Manifold Absolute Pressure (MAP) Sensor Connector

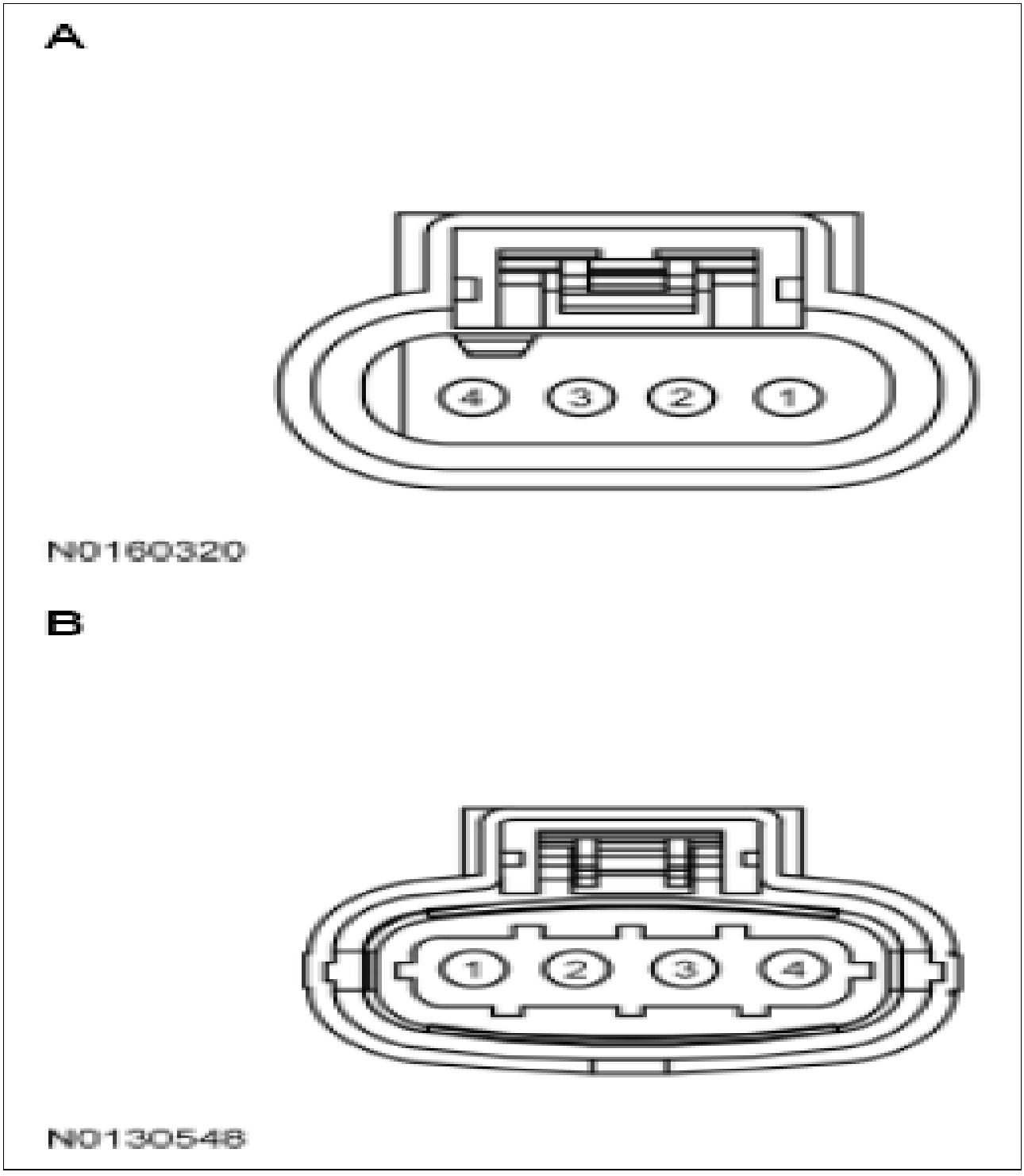


Courtesy of FORD MOTOR CO.

Vehicle	Connector	Pin	Circuit
Escape/Kuga 1.6L, Escape/Kuga 2.0L, Explorer, Fiesta,	A	2 3	SIGRTN VREF

Focus, MKC, MKT, Taurus, Transit Connect 1.6L			
Fusion 2.0L, MKZ	C	2 1	SIGRTN VREF
All other vehicles	B	4 2	SIGRTN VREF

Fig 17: Identifying Manifold Absolute Pressure Temperature (MAPT) Sensor Connector

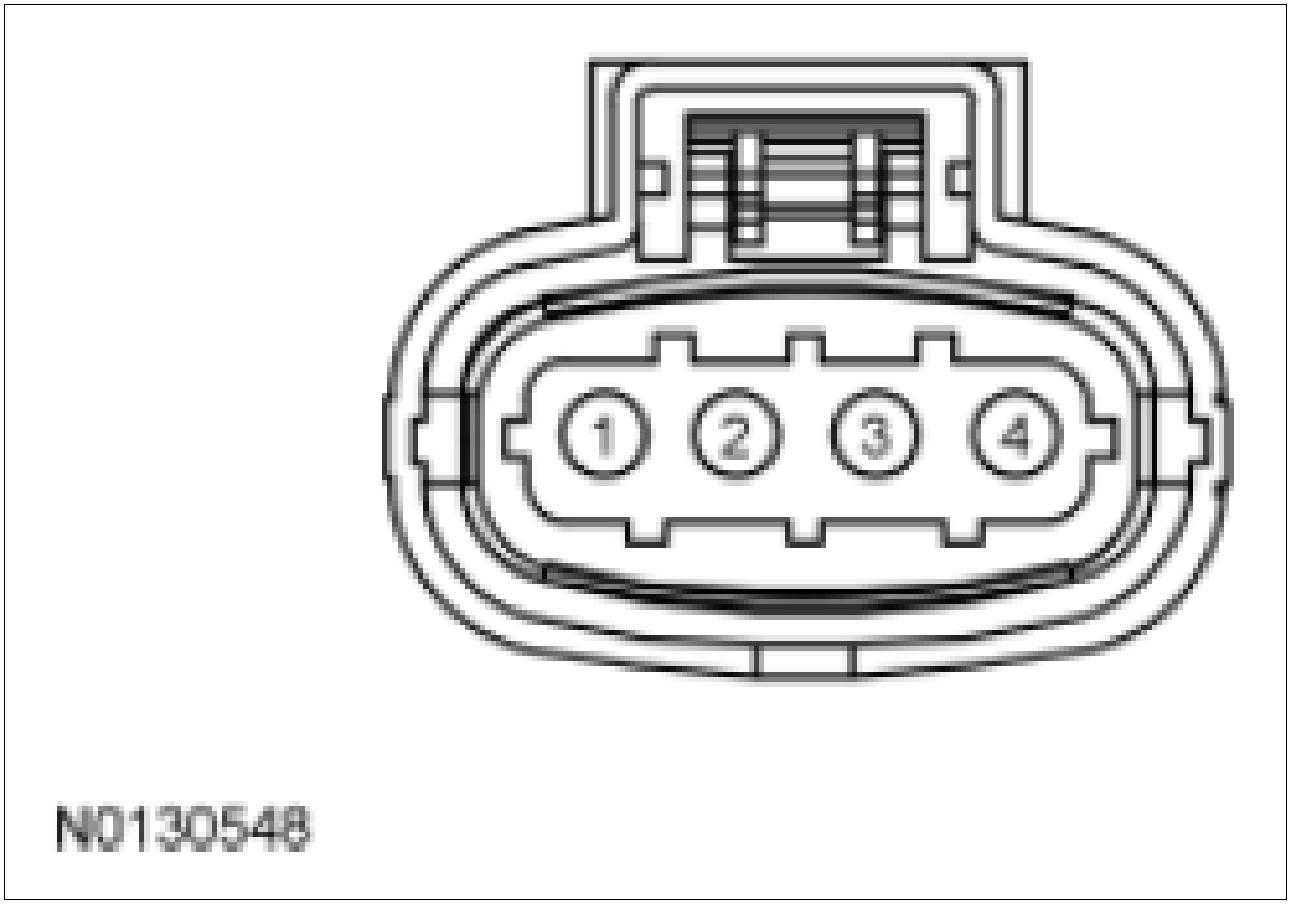


Courtesy of FORD MOTOR CO.

Vehicle	Connector	Pin	Circuit
Edge 3.5L, F-150 3.5L, Mustang	A	4 2	SIGRTN VREF

All other vehicles	B	1 3	SIGRTN VREF

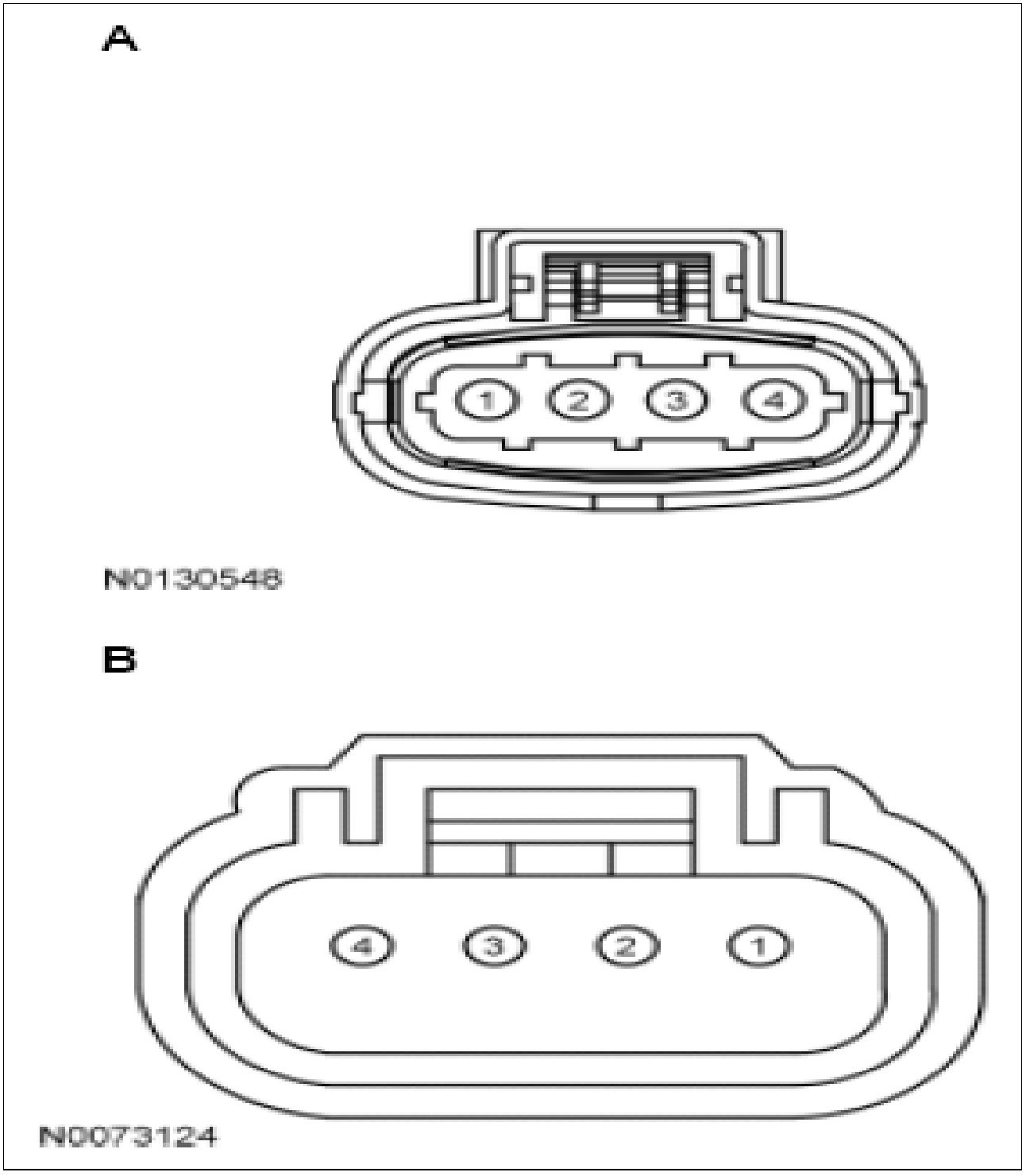
Fig 18: Identifying Manifold Absolute Pressure/Charge Air Cooler Temperature (MAP/CACT) Sensor Connector



Courtesy of FORD MOTOR CO.

Pin	Circuit
1	SIGRTN (Signal Return)
3	VREF (Reference Voltage)

Fig 19: Identifying Manifold Absolute Pressure/Intake Air Temperature 2 (MAP/IAT2) Sensor Connector

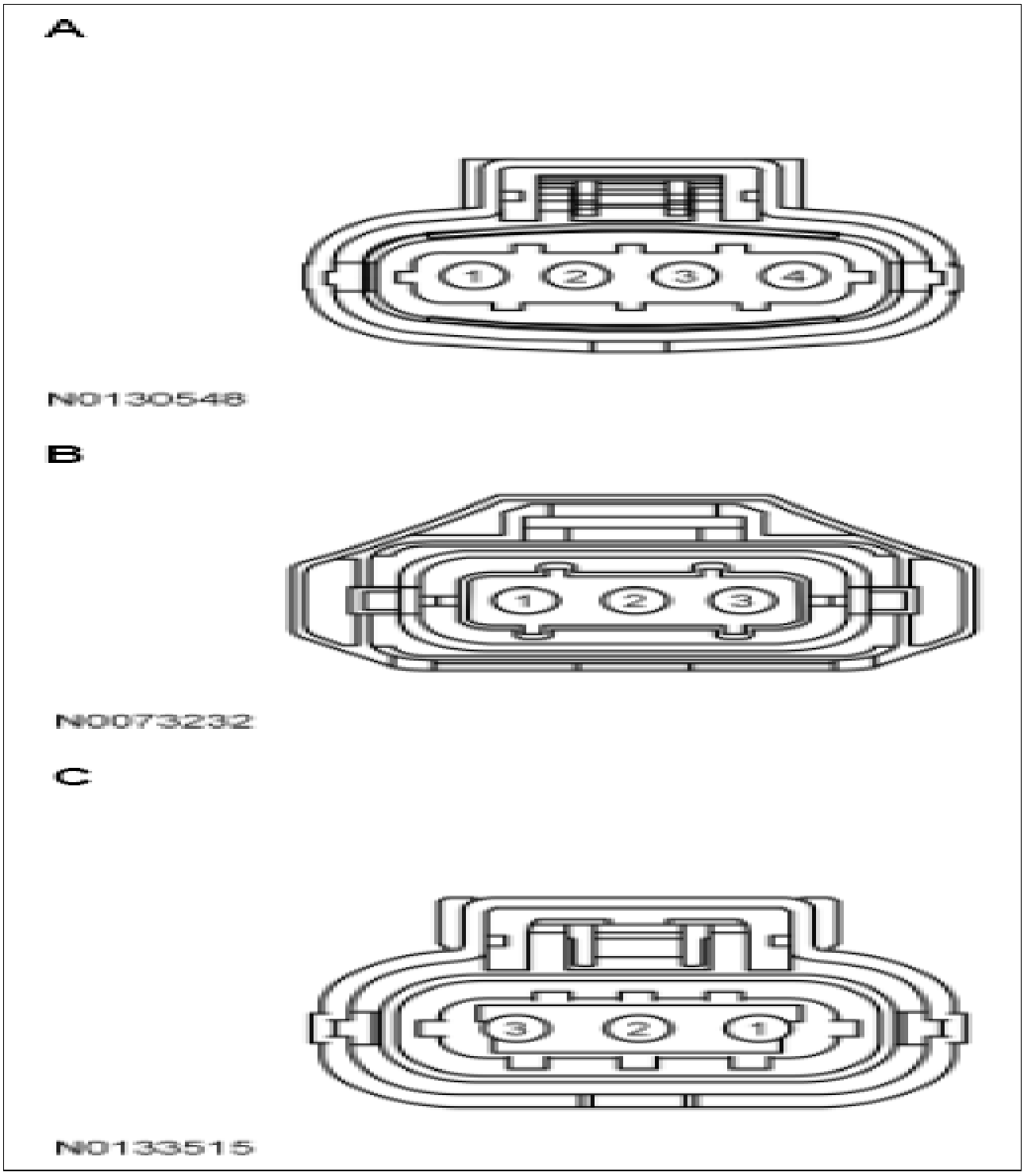


Courtesy of FORD MOTOR CO.

Vehicle	Connector	Pin	Circuit
Edge 2.0L	A	4 2	SIGRTN VREF

Fiesta, MKC, Mustang	A	1 3	SIGRTN VREF
All other vehicles	B	4 2	SIGRTN VREF

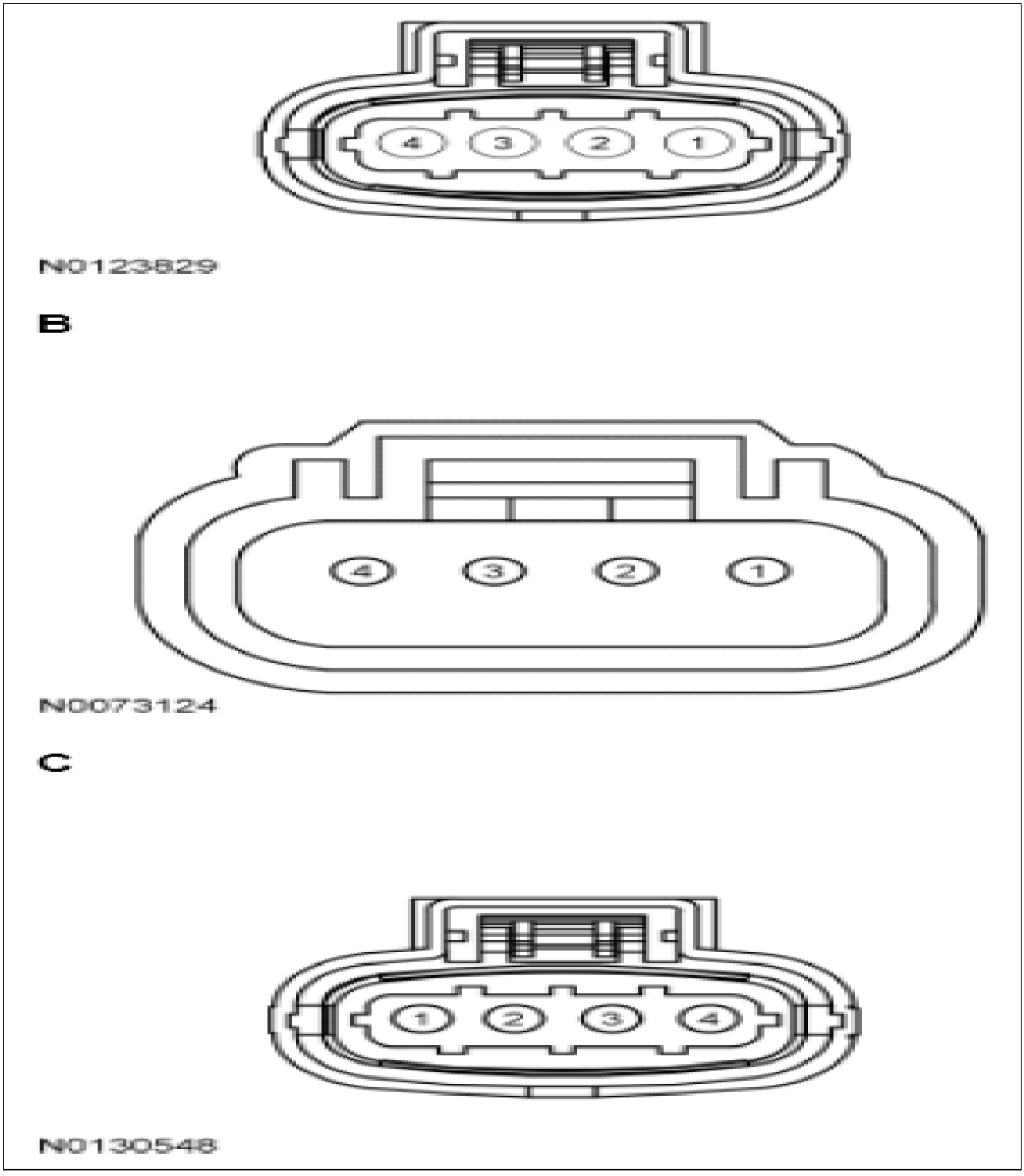
Fig 20: Identifying Turbocharger Boost Pressure (TCBP) Sensor Connector



Courtesy of FORD MOTOR CO.

Vehicle	Connector	Pin	Circuit
MKC, Fiesta 1.0L	A	1 3	SIGRTN VREF
Edge 2.0L, Fusion 1.5L	B	2 1	SIGRTN VREF
Mustang	C	2 3	SIGRTN VREF

Fig 21: Identifying Turbocharger Boost Pressure/Charge Air Cooler Temperature (TCBP/CACT) Sensor Connector

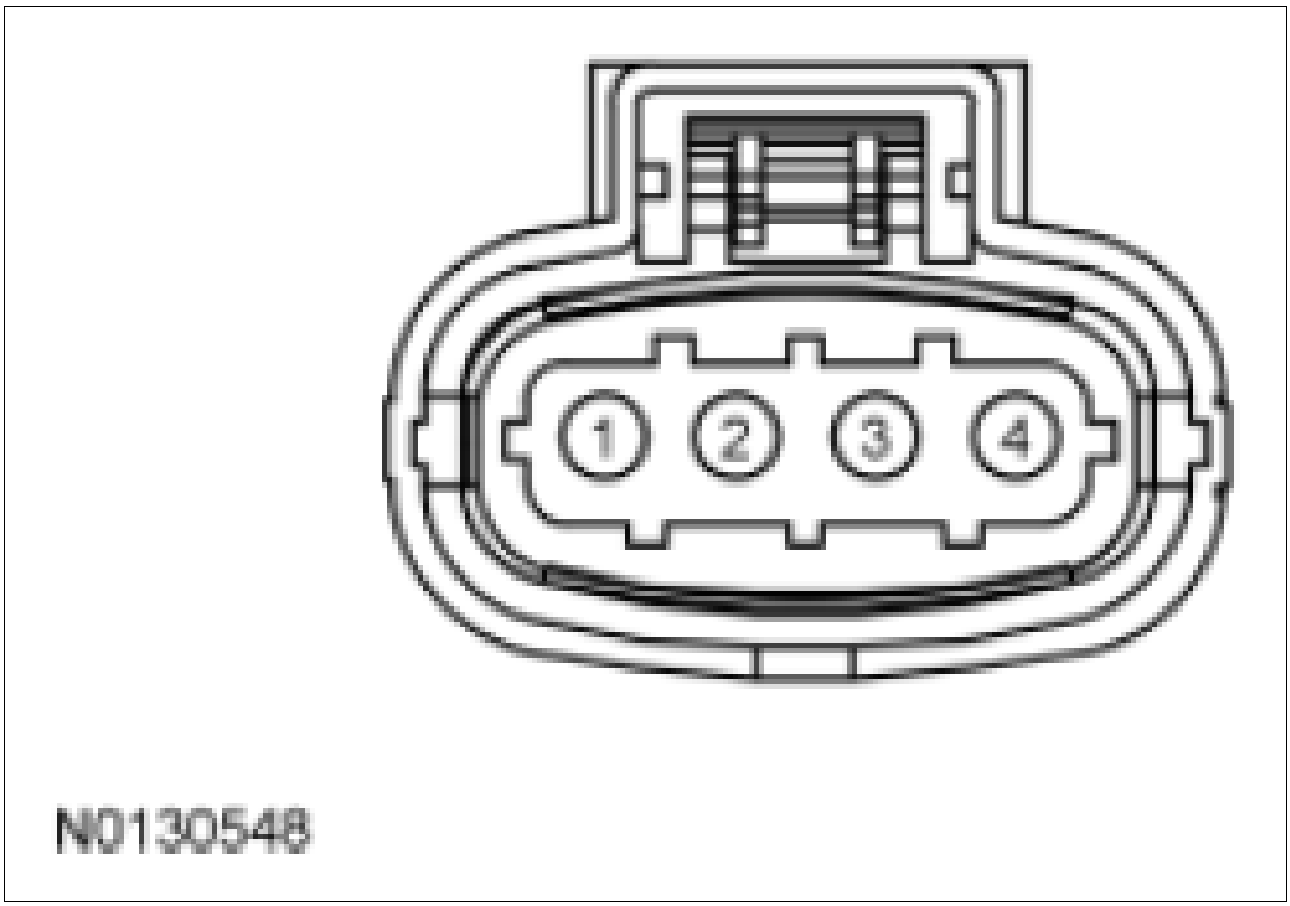


Courtesy of FORD MOTOR CO.

Vehicle	Connector	Pin	Circuit
Escape/Kuga, Explorer 2.0L, Focus,	A	1 3	SIGRTN VREF

MKT 2.0L			
Expedition, Navigator	B	1 3	SIGRTN VREF
Fiesta, Fusion, MKC, MKZ, Taurus 2.0L, Transit Connect	C	1 3	SIGRTN VREF
All other vehicles	B	4 2	SIGRTN VREF

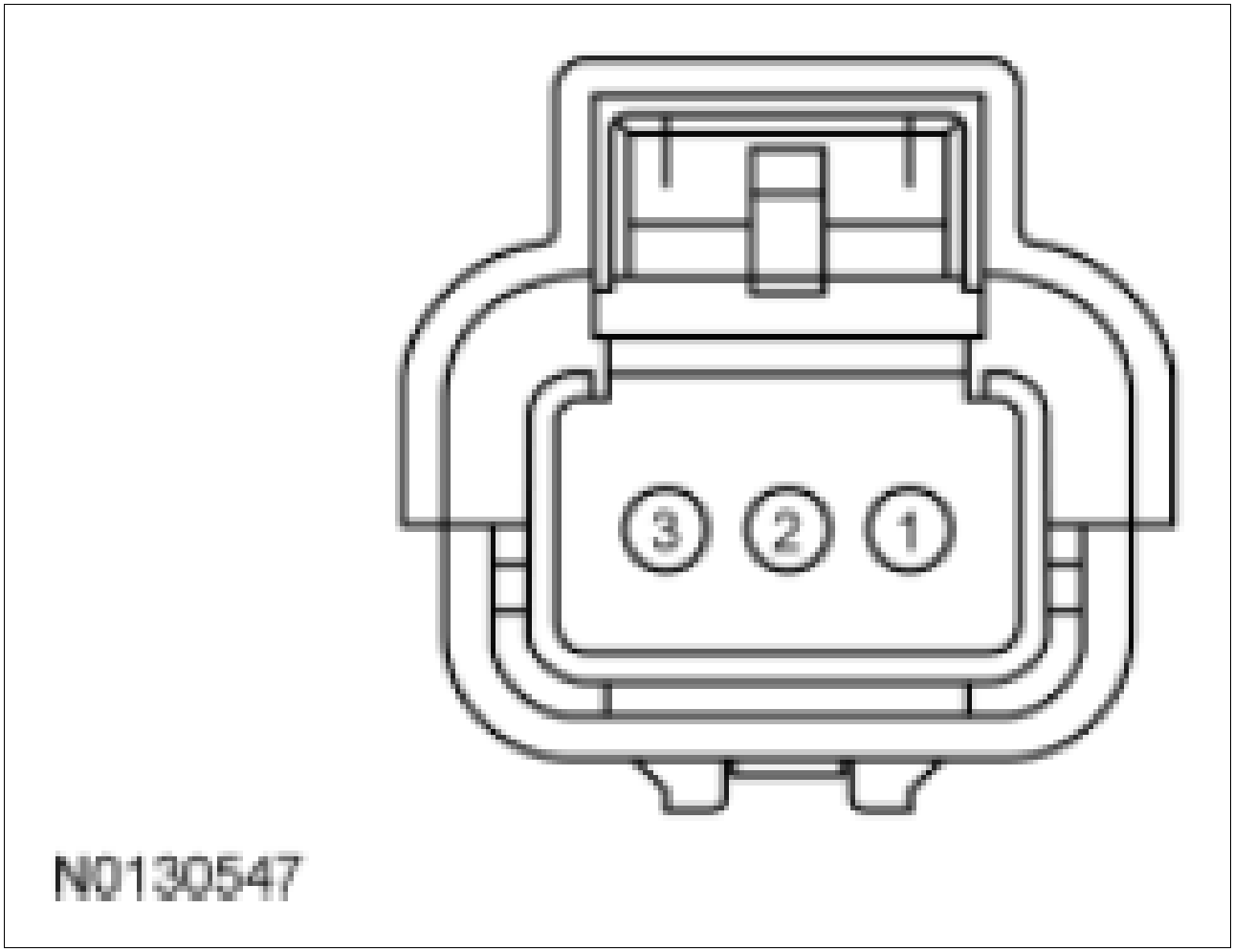
Fig 22: Identifying Turbocharger Intake Pressure And Temperature (TCIPT) Sensor Connector



Courtesy of FORD MOTOR CO.

Pin	Circuit
1	SIGRTN (Signal Return)
3	VREF (Reference Voltage)

Fig 23: Identifying Wastegate Vacuum Sensor Connector



Courtesy of FORD MOTOR CO.

Pin	Circuit
2	SIGRTN (Signal Return)
1	VREF (Reference Voltage)

PINPOINT TEST C: REFERENCE VOLTAGE (VREF) > INTRODUCTION > POWERTRAIN CONTROL MODULE (PCM) CONNECTOR

For PCM connector views or reference values, refer to REFERENCE VALUES .

Vehicle	Connector	Pin	Circuit
E-Series 6.8L	190-PIN	B67, B68 B2, B56, E32, E58, T26 B60 B44 E8	VPWR SIGRTN APPRTN2 APPRTN1 ETCRTN

		B40, B66, E57 B61 B45 E9	VREF APPVREF2 APPVREF1 ETCREF
E-Series 5.4L	190-PIN	B30, B67, B68 B58, E64, T40 B60 B44 E60 B52, B66, E63 B61 B45 E59	VPWR SIGRTN APPRTN2 APPRTN1 ETCRTN VREF APPVREF2 APPVREF1 ETCREF
Edge 2.0L, Edge 2.7L	198 PIN	B101, B102, B103 B16, B18, B19, E20, E53 B35 B36 E31 B11, B13, E6, E8 B10 B12 E7	VPWR SIGRTN APPRTN2 APPRTN1 ETCRTN VREF APPVREF2 APPVREF1 ETCREF
Edge 3.5L	198 PIN	B97, B99 B2, B51, B90, E29, E40, E49, E54, E71 B59 B35 E23 B52, B66, E34 B40 B36 E8	VPWR SIGRTN APPRTN2 APPRTN1 ETCRTN VREF APPVREF2 APPVREF1 ETCREF
Escape/Kuga 1.6L, Transit Connect 1.6L	198 PIN	B101, B102, B103 B16, B17, B18, B19, E20, E53 B35 B36 E31 B11, B13, B14, E6, E8 B10 B12 E7	VPWR SIGRTN APPRTN2 APPRTN1 ETCRTN VREF APPVREF2 APPVREF1 ETCREF
Escape/Kuga 2.0L	198 PIN	B101, B102, B103 B16, B17, B18, B19, B34, E20, E53 B35 B36 E31 B11, B13, E6, E8 B10 B12 E7	VPWR SIGRTN APPRTN2 APPRTN1 ETCRTN VREF APPVREF2 APPVREF1 ETCREF

Escape/Kuga 2.5L, Transit Connect 2.5L	190-PIN	B67, B68 B56, E49 B60 B44 E61 B52, B66, E35 B61 B45 E57	VPWR SIGRTN APPRTN2 APPRTN1 ETCRTN VREF APPVREF2 APPVREF1 ETCREF
Expedition, Navigator	198 PIN	B101, B102, B103 B16, B18, B37, B38, B94, E20, E53 B35 B36 E31 B11, B13, E22, E6, E8 B10 B12 E7	VPWR SIGRTN APPRTN2 APPRTN1 ETCRTN VREF APPVREF2 APPVREF1 ETCREF
Explorer 2.0L	154 PIN	B5, B6 B21, E34, E46 B38 B36 E58 B31, B7, E15, E18 B46 B53 E19	VPWR SIGRTN APPRTN2 APPRTN1 ETCRTN VREF APPVREF2 APPVREF1 ETCREF
Explorer GTDI 3.5L	198 PIN	B101, B102, B103 B16, B18, E20, E53 B35 B36 E31 B11, B13, E8 B10 B12 E7	VPWR SIGRTN APPRTN2 APPRTN1 ETCRTN VREF APPVREF2 APPVREF1 ETCREF
F-150 2.7L, F-150 GTDI 3.5L	198 PIN	B101, B102, B103 B16, B17, B18, B34, B37, B38, E20, E32, E53 B35 B36 E31 B11, B13, E6, E8 B10 B12 E7	VPWR SIGRTN APPRTN2 APPRTN1 ETCRTN VREF APPVREF2 APPVREF1 ETCREF
F-150 TiVCT 3.5L, F-150 5.0L	198 PIN	B97, B99 B51, B56, E29, E40, E49, E54 B59	VPWR SIGRTN APPRTN2

		B35 E23 B52, B66, E34 B40 B36 E8	APPRTN1 ETCRTN VREF APPVREF2 APPVREF1 ETCREF
F-650/F-750, F-Series Super Duty, Motorhome/Stripped Chassis/Step Van	190-PIN	B67, B68 B56, E32, T26 B60 B44 E8 B52, B66 B61 B45 E9	VPWR SIGRTN APPRTN2 APPRTN1 ETCRTN VREF APPVREF2 APPVREF1 ETCREF
Fiesta GTDI 1.6L, Fiesta 1.0L	198 PIN	B101, B102, B103 B16, B17, B19, B37, B40, B9, E1, E10, E19, E20, E22, E54 E18 B13, B14, E3, E7 E5	VPWR SIGRTN ETCRTN VREF ETCREF
Fiesta TiVCT 1.6L	128 PIN	B11, B12, E13, E37 B38, B40, E3, E6, E9, T27, T29 E4 B14, B16, E30, T11, T13 E28	VPWR SIGRTN ETCRTN VREF ETCREF
Flex GTDI 3.5L, MKS 3.5L, MKT 3.5L, Taurus GTDI 3.5L	198 PIN	B101, B102, B103 B18, E20, E53 B35 B36 E31 B11, B13, E8 B10 B12 E7	VPWR SIGRTN APPRTN2 APPRTN1 ETCRTN VREF APPVREF2 APPVREF1 ETCREF
Focus 1.0L	198 PIN	B101, B102, B103 B16, B17, B18, B19, B37, B40, B9, E1, E10, E19, E20, E22, E54 B35 B36 E18 B13, B14, E3, E7 B10 B12 E5	VPWR SIGRTN APPRTN2 APPRTN1 ETCRTN VREF APPVREF2 APPVREF1 ETCREF
Focus GDI 2.0L	154 PIN	B5, B6 B21, B34, E10, E32, E33, E34, E44, E46, E47 B38	VPWR SIGRTN APPRTN2 APPRTN1

		B36 E58 B31, B7, E15, E16, E18, E23 B46 B53 E19	ETCRTN VREF APPVREF2 APPVREF1 ETCREF
Focus GTDI 2.0L	198 PIN	B101, B102, B103 B18, B19, B37, E20, E36, E53 B35 B36 E31 B11, E6, E8 B10 B12 E7	VPWR SIGRTN APPRTN2 APPRTN1 ETCRTN VREF APPVREF2 APPVREF1 ETCREF
Fusion 2.5L	190-PIN	B67, B68 B41, B56, E49, T41 B60 B44 E61 B66, E35 B61 B45 E57	VPWR SIGRTN APPRTN2 APPRTN1 ETCRTN VREF APPVREF2 APPVREF1 ETCREF
Fusion 2.0L, Fusion 1.5L, MKZ 2.0L	198 PIN	B101, B102, B103 B16, B18, B19, B38, E20, E53 B35 B36 E31 B11, B13, E6, E8 B10 B12 E7	VPWR SIGRTN APPRTN2 APPRTN1 ETCRTN VREF APPVREF2 APPVREF1 ETCREF
Fusion 1.6L	198 PIN	B101, B102, B103 B16, B18, B19, B37, E10, E17, E19, E20, E22, E34, E54 B35 B36 E18 B13, B14, E3, E7 B10 B12 E5	VPWR SIGRTN APPRTN2 APPRTN1 ETCRTN VREF APPVREF2 APPVREF1 ETCREF
MKC	198 PIN	B101, B102, B103 B18, B19, B37, E20, E53 B35 B36 E31 B11, E6, E8	VPWR SIGRTN APPRTN2 APPRTN1 ETCRTN VREF

		B10 B12 E7	APPVREF2 APPVREF1 ETCREF
MKT 2.0L, Taurus 2.0L	198 PIN	B101, B102, B103 B16, B18, E20, E53 B35 B36 E31 B11, B13, E6, E8 B10 B12 E7	VPWR SIGRTN APPRTN2 APPRTN1 ETCRTN VREF APPVREF2 APPVREF1 ETCREF
MKZ 3.7L	190-PIN	B67, B68 B41, B56, E49, T41 B60 B44 E61 B66 B61 B45 E57	VPWR SIGRTN APPRTN2 APPRTN1 ETCRTN VREF APPVREF2 APPVREF1 ETCREF
Mustang 2.3L	198 PIN	B101, B102, B103 B18, B19, B37, E20, E32, E53 B35 B36 E31 B11, E5, E6, E8 B10 B12 E7	VPWR SIGRTN APPRTN2 APPRTN1 ETCRTN VREF APPVREF2 APPVREF1 ETCREF
Mustang 3.7L	198 PIN	B97, B99 B51, B56, E22, E29, E40, E49, E54 B59 B35 E23 B52, B66, E34 B40 B36 E8	VPWR SIGRTN APPRTN2 APPRTN1 ETCRTN VREF APPVREF2 APPVREF1 ETCREF
Mustang 5.0L	198 PIN	B97, B99 B51, B56, E22, E32, E40, E49, E54 B59 B35 E23 B52, B66, E34 B40 B36 E8	VPWR SIGRTN APPRTN2 APPRTN1 ETCRTN VREF APPVREF2 APPVREF1 ETCREF

Taurus 3.7L	190-PIN	B67, B68 B56, E49, T41 B60 B44 E61 B52, B61, B66, E35, E57 B61 B45 E57	VPWR SIGRTN APPRTN2 APPRTN1 ETCRTN VREF APPVREF2 APPVREF1 ETCREF
Transit 3.5L	198 PIN	B101, B102, B103 B18, E20, E53 B35 B36 E31 B11, E8 B10 B12 E7	VPWR SIGRTN APPRTN2 APPRTN1 ETCRTN VREF APPVREF2 APPVREF1 ETCREF
Transit 3.7L	190-PIN	B67, B68 B41, B56, E49 B60 B44 E61 B11 B61 B45 E57	VPWR SIGRTN APPRTN2 APPRTN1 ETCRTN VREF APPVREF2 APPVREF1 ETCREF
All other vehicles	190-PIN	B67, B68 B56, E49 B60 B44 E61 B52, B66 B61 B45 E57	VPWR SIGRTN APPRTN2 APPRTN1 ETCRTN VREF APPVREF2 APPVREF1 ETCREF

PINPOINT TEST C: REFERENCE VOLTAGE (VREF) > TEST PROCEDURE

C1 CHECK THE REFERENCE VOLTAGE TO SIGNAL RETURN

NOTE: Diagnostic trouble codes (DTCs) P0642, P0643, P06A6, P06A7 and P06A8 are set due to VREF circuit concerns only. DTCs P0652 and P0653 are set due to ETCREF circuit concerns only. When diagnosing DTC P0642, P0643, P06A6, P06A7 or P06A8, follow the path for VREF concerns. When diagnosing DTC P0652 or P0653, follow the path for ETCREF concerns.

Ignition OFF.

Suspect Sensor connector disconnected.

Ignition ON, engine OFF.

For ETCREF concerns.

Measure the voltage between:

(+) ETBTPS Connector, Harness Side	(-) ETBTPS Connector, Harness Side
ETCREF	ETCRTN

For APPVREF concerns.

Measure the voltage between:

(+) APP Sensor Connector, Harness Side	(-) APP Sensor Connector, Harness Side
APPVREF1	APPRTN1
APPVREF2	APPRTN2

For VREF concerns.

Measure the voltage between:

(+) Suspect Sensor Connector, Harness Side	(-) Suspect Sensor Connector, Harness Side
VREF	SIGRTN

Is the voltage between 4.5 - 5.5 V?

Yes	No
GO to C30.	GO to **C2** .

C2 CHECK THE REFERENCE VOLTAGE TO GROUND

For ETCREF concerns.

Measure the voltage between:

(+) ETBTPS Connector, Harness Side	(-)
ETCREF	Ground

For APPVREF concerns.

Measure the voltage between:

(+) APP Sensor Connector, Harness Side	(-)

APPVREF1	Ground
APPVREF2	Ground

For VREF concerns.

Measure the voltage between:

(+) Suspect Sensor Connector, Harness Side	(-)
VREF	Ground

Is the voltage between 4.5 - 5.5 V?

Yes	No
GO to C29.	GO to **C3** .

C3 CHECK THE REFERENCE VOLTAGE WITH ALL SENSORS DISCONNECTED

NOTE: Refer to the Sensors Connected To Reference Voltage Chart at the beginning of this pinpoint test and the Wiring Diagrams Manual Electronic Engine Controls Cell to identify the sensors connected to VREF, ETCREF and APPVREF.

Ignition OFF.

Disconnect all of the sensors connected to the reference voltage circuits.

Ignition ON, engine OFF.

Measure the voltage at the sensor disconnected in C1.

For ETCREF concerns.

Measure the voltage between:

(+) ETBTPS Connector, Harness Side	(-)
ETCREF	Ground

For APPVREF concerns.

Measure the voltage between:

(+) APP Sensor Connector, Harness Side	(-)
APPVREF1	Ground
APPVREF2	Ground

For VREF concerns.

Measure the voltage between:

(+) Suspect Sensor Connector, Harness Side	(-)
VREF	Ground

Is the voltage between 4.5 - 5.5 V?

Yes	No
For APPVREF or ETCREF circuit concerns, GO to C8. For all other VREF concerns, GO to C10.	GO to **C4** .

C4 CHECK THE REFERENCE VOLTAGE CIRCUIT FOR AN

Ignition OFF.

PCM connector disconnected.

For ETCREF concerns.

Measure the resistance between:

(+) ETBTPS Connector, Harness Side	(-) PCM Connector, Harness Side
ETCREF	ETCREF

For APPVREF concerns.

Measure the resistance between:

(+) APP Sensor Connector, Harness Side	(-) PCM Connector, Harness Side
APPVREF1	APPVREF1
APPVREF2	APPVREF2

For VREF concerns.

Measure the resistance between:

(+) Suspect Sensor Connector, Harness Side	(-) PCM Connector, Harness Side
VREF	VREF

Is the resistance less than 5 ohms?

Yes	No
GO to **C5** .	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

C5 CHECK THE REFERENCE VOLTAGE CIRCUIT FOR A SHORT TO GROUND

For APPVREF or ETCREF concerns.

Measure the resistance between:

(+) PCM Connector, Harness Side	(-) PCM Connector, Harness Side
ETCREF	ETCRTN
APPVREF1	APPRTN1
APPVREF2	APPRTN2
APPVREF1	APPRTN2
APPVREF2	APPRTN1

Measure the resistance between:

(+) PCM Connector, Harness Side	(-)
ETCREF	Ground
APPVREF1	Ground
APPVREF2	Ground

For VREF concerns.

Measure the resistance between:

(+) PCM Connector, Harness Side	(-) PCM Connector, Harness Side
VREF	SIGRTN

Measure the resistance between:

(+) PCM Connector, Harness Side	(-)
VREF	Ground

Are the resistances greater than 10K ohms?

Yes	No
GO to **C6** .	REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.

C6 CHECK THE REFERENCE VOLTAGE CIRCUIT FOR A SHORT TO VPWR

For ETCREF concerns.

Measure the resistance between:

(+) PCM Connector, Harness Side	(-) PCM Connector, Harness Side
ETCREF	VPWR

For APPVREF concerns.

Measure the resistance between:

(+) PCM Connector, Harness Side	(-) PCM Connector, Harness Side
APPVREF1	VPWR
APPVREF2	VPWR

For VREF concerns.

Measure the resistance between:

(+) PCM Connector, Harness Side	(-) PCM Connector, Harness Side
VREF	VPWR

Is the resistance greater than 10K ohms?

Yes	No
GO to **C7** .	REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.

C7 CHECK THE REFERENCE VOLTAGE CIRCUIT FOR A SHORT TO VOLTAGE

Ignition ON, engine OFF.

For ETCREF concerns.

Measure the voltage between:

(+) PCM Connector, Harness Side	(-)
ETCREF	Ground

For APPVREF concerns.

Measure the voltage between:

(+) PCM Connector, Harness Side	(-)
APPVREF1	Ground
APPVREF2	Ground

For VREF concerns.

Measure the voltage between:

(+) PCM Connector, Harness Side	(-)
VREF	Ground

Is any voltage present?

Yes	No
REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.	GO to C31.

C8 CHECK THE REFERENCE VOLTAGE WITH THE ETBTPS CONNECTED

*NOTE: If this sensor was used for the measurement in C3, GO to **C9** .*

Ignition OFF.

ETBTPS connector connected.

Ignition ON, engine OFF.

Measure the voltage between:

(+) APP Sensor Connector, Harness Side	(-)
APPVREF1	Ground
APPVREF2	Ground

Are the voltages between 4.5 - 5.5 V?

Yes	No
The concern is intermittent. GO to PINPOINT TEST Z .	INSTALL a new ETBTPS. REFER to the service information , Fuel Charging and Controls or Section 303-14, Electronic Engine Controls. Clear the PCM DTCs. REPEAT the self-test.

C9 CHECK THE REFERENCE VOLTAGE WITH THE APP SENSOR CONNECTED

Ignition OFF.

APP Sensor connector connected.

Ignition ON, engine OFF.

Measure the voltage between:

(+) ETBTPS Connector, Harness Side	(-)
ETCREF	Ground

Is the voltage between 4.5 - 5.5 V?

Yes	No
The concern is intermittent.	INSTALL a new APP sensor. REFER to the service information , Acceleration Control.

GO to PINPOINT TEST Z .	Clear the PCM DTCs. REPEAT the self-test.

C10 CHECK THE REFERENCE VOLTAGE WITH THE MAP SENSOR CONNECTED

*NOTE: If the vehicle is not equipped with a MAP sensor or if this sensor was used for the VREF measurement in C3, GO to **C11** .*

Ignition OFF.

MAP Sensor connector connected.

Ignition ON, engine OFF.

Measure the voltage between:

(+) Suspect Sensor Connector, Harness Side	(-)
VREF	Ground

Is the voltage between 4.5 - 5.5 V?

Yes	No
For additional sensors disconnected, GO to **C11** . For no additional sensors disconnected, GO to PINPOINT TEST Z .	INSTALL a new MAP sensor. REFER to the service information , Electronic Engine Controls. Clear the PCM DTCs. REPEAT the self-test.

C11 CHECK THE REFERENCE VOLTAGE WITH THE TCBP/CACT SENSOR CONNECTED

*NOTE: If the vehicle is not equipped with a TCBP/CACT sensor or if this sensor was used for the VREF measurement in C3, GO to **C12** .*

Ignition OFF.

TCBP/CACT Sensor connector connected.

Ignition ON, engine OFF.

Measure the voltage between:

(+) Suspect Sensor Connector, Harness Side	(-)
VREF	Ground

Is the voltage between 4.5 - 5.5 V?

Yes	No

For additional sensors disconnected, GO to **C12** . For no additional sensors disconnected, GO to PINPOINT TEST Z .	INSTALL a new TCBP/CACT sensor. REFER to the service information , Electronic Engine Controls. Clear the PCM DTCs. REPEAT the self-test.

C12 CHECK THE REFERENCE VOLTAGE WITH THE MAP/IAT2 SENSOR CONNECTED

*NOTE: If the vehicle is not equipped with a MAP/IAT2 sensor or if this sensor was used for the VREF measurement in C3, GO to **C13** .*

Ignition OFF.

MAP/IAT2 Sensor connector connected.

Ignition ON, engine OFF.

Measure the voltage between:

(+) Suspect Sensor Connector, Harness Side	(-)
VREF	Ground

Is the voltage between 4.5 - 5.5 V?

Yes	No
For additional sensors disconnected, GO to **C13** . For no additional sensors disconnected, GO to PINPOINT TEST Z .	INSTALL a new MAP/IAT2 sensor. REFER to the service information , Electronic Engine Controls. Clear the PCM DTCs. REPEAT the self-test.

C13 CHECK THE REFERENCE VOLTAGE WITH THE FRP SENSOR CONNECTED

*NOTE: If the vehicle is not equipped with a FRP sensor or if this sensor was used for the VREF measurement in C3, GO to **C14** .*

Ignition OFF.

FRP Sensor connector connected.

Ignition ON, engine OFF.

Measure the voltage between:

(+) Suspect Sensor Connector, Harness Side	(-)
VREF	Ground

Is the voltage between 4.5 - 5.5 V?

Yes	No
For additional sensors disconnected, GO to **C14** . For no additional sensors disconnected, GO to PINPOINT TEST Z .	INSTALL a new FRP sensor. REFER to the service information , Electronic Engine Controls. Clear the PCM DTCs. REPEAT the self-test.

C14 CHECK THE REFERENCE VOLTAGE WITH THE CRANKCASE PRESSURE SENSOR CONNECTED

*NOTE: If the vehicle is not equipped with a crankcase pressure sensor or if this sensor was used for the VREF measurement in C3, GO to **C15** .*

Ignition OFF.

Crankcase Pressure Sensor connector connected.

Ignition ON, engine OFF.

Measure the voltage between:

(+) Suspect Sensor Connector, Harness Side	(-)
VREF	Ground

Is the voltage between 4.5 - 5.5 V?

Yes	No
For additional sensors disconnected, GO to **C15** . For no additional sensors disconnected, GO to PINPOINT TEST Z .	INSTALL a new Crankcase Pressure sensor. REFER to the service information , Engine Emission Control. Clear the PCM DTCs. REPEAT the self-test.

C15 CHECK THE REFERENCE VOLTAGE WITH THE IMRC1 SENSOR CONNECTED

*NOTE: If the vehicle is not equipped with an IMRC1 sensor or if this sensor was used for the VREF measurement in C3, GO to **C16** .*

Ignition OFF.

IMRC1 Sensor connector connected.

Ignition ON, engine OFF.

Measure the voltage between:

(+) Suspect Sensor Connector, Harness Side	(-)
VREF	Ground

Is the voltage between 4.5 - 5.5 V?

Yes	No
For additional sensors disconnected, GO to **C16** . For no additional sensors disconnected, GO to PINPOINT TEST Z .	INSTALL a new IMRC1 sensor. REFER to the service information , Engine. Clear the PCM DTCs. REPEAT the self-test.

C16 CHECK THE REFERENCE VOLTAGE WITH THE IMRC2 SENSOR CONNECTED

*NOTE: If the vehicle is not equipped with an IMRC2 sensor or if this sensor was used for the VREF measurement in C3, GO to **C17** .*

Ignition OFF.

IMRC2 Sensor connector connected.

Ignition ON, engine OFF.

Measure the voltage between:

(+) Suspect Sensor Connector, Harness Side	(-)
VREF	Ground

Is the voltage between 4.5 - 5.5 V?

Yes	No
For additional sensors disconnected, GO to **C17** . For no additional sensors disconnected, GO to PINPOINT TEST Z .	INSTALL a new IMRC2 sensor. REFER to the service information , Engine. Clear the PCM DTCs. REPEAT the self-test.

C17 CHECK THE REFERENCE VOLTAGE WITH THE CPP SENSOR CONNECTED

*NOTE: If the vehicle is not equipped with a CPP sensor or if this sensor was used for the VREF measurement in C3, GO to **C18** .*

Ignition OFF.

CPP Sensor connector connected.

Ignition ON, engine OFF.

Measure the voltage between:

(+) Suspect Sensor Connector, Harness Side	(-)
VREF	Ground

Is the voltage between 4.5 - 5.5 V?

Yes	No
For additional sensors disconnected, GO to **C18** . For no additional sensors disconnected, GO to PINPOINT TEST Z .	INSTALL a new CPP sensor. REFER to the service information , Electronic Engine Controls. Clear the PCM DTCs. REPEAT the self-test.

C18 CHECK THE REFERENCE VOLTAGE WITH THE ACP TRANSDUCER SENSOR CONNECTED

*NOTE: If the vehicle is not equipped with an ACP transducer sensor or if this sensor was used for the VREF measurement in C3, GO to **C19** .*

Ignition OFF.

Air Conditioning Pressure (ACP) Transducer Sensor connector connected.

Ignition ON, engine OFF.

Measure the voltage between:

(+) Suspect Sensor Connector, Harness Side	(-)
VREF	Ground

Is the voltage between 4.5 - 5.5 V?

Yes	No
For additional sensors disconnected, GO to **C19** . For no additional sensors disconnected, GO to PINPOINT TEST Z .	INSTALL a new Air Conditioning Pressure (ACP) Transducer Sensor. Clear the PCM DTCs. REPEAT the self-test.

C19 CHECK THE REFERENCE VOLTAGE WITH THE FUEL PRESSURE SENSOR CONNECTED

*NOTE: If the vehicle is not equipped with a fuel pressure sensor or if this sensor was used for the VREF measurement in C3, GO to **C20** .*

Ignition OFF.

Fuel Pressure Sensor connector connected.

Ignition ON, engine OFF.

Measure the voltage between:

(+) Suspect Sensor Connector, Harness Side	(-)
VREF	Ground

Is the voltage between 4.5 - 5.5 V?

Yes	No
For additional sensors disconnected, GO to **C20** . For no additional sensors disconnected, GO to PINPOINT TEST Z .	INSTALL a new Fuel Pressure Sensor. REFER to the service information , Fuel Tank and Lines. Clear the PCM DTCs. REPEAT the self-test.

C20 CHECK THE REFERENCE VOLTAGE WITH THE CKP SENSOR CONNECTED

*NOTE: If the vehicle is not equipped with a CKP sensor or if this sensor was used for the VREF measurement in C3, GO to **C21** .*

Ignition OFF.

CKP Sensor connector connected.

Ignition ON, engine OFF.

Measure the voltage between:

(+) Suspect Sensor Connector, Harness Side	(-)
VREF	Ground

Is the voltage between 4.5 - 5.5 V?

Yes	No
For additional sensors disconnected, GO to **C21** . For no additional sensors disconnected, GO to PINPOINT TEST Z .	INSTALL a new CKP sensor. REFER to the service information , Electronic Engine Controls. Clear the PCM DTCs. REPEAT the self-test.

C21 CHECK THE REFERENCE VOLTAGE WITH THE CMP SENSOR CONNECTED

*NOTE: If the vehicle is not equipped with a CMP sensor or if this sensor was used for the VREF measurement in C3, GO to **C22** .*

NOTE: Only measure the circuits that apply to the vehicle being diagnosed.

Ignition OFF.

CMP Sensor connector connected.

Ignition ON, engine OFF.

Measure the voltage between:

(+) Suspect Sensor Connector, Harness Side	(-)
VREF	Ground

Is the voltage between 4.5 - 5.5 V?

Yes	No
For additional sensors disconnected, GO to **C22** . For no additional sensors disconnected, GO to PINPOINT TEST Z .	INSTALL a new CMP sensor. REFER to the service information , Electronic Engine Controls. Clear the PCM DTCs. REPEAT the self-test.

C22 CHECK THE REFERENCE VOLTAGE WITH THE TCIPT SENSOR CONNECTED

*NOTE: If the vehicle is not equipped with a TCIPT sensor or if this sensor was used for the VREF measurement in C3, GO to **C23** .*

NOTE: Only measure the circuits that apply to the vehicle being diagnosed.

Ignition OFF.

TCIPT Sensor connector connected.

Ignition ON, engine OFF.

Measure the voltage between:

(+) Suspect Sensor Connector, Harness Side	(-)
VREF	Ground

Is the voltage between 4.5 - 5.5 V?

Yes	No
For additional sensors disconnected, GO to **C23** .	INSTALL a new TCIPT sensor. REFER to the service information , Electronic Engine Controls.

For no additional sensors disconnected, GO to PINPOINT TEST Z .	Clear the PCM DTCs. REPEAT the self-test.

C23 CHECK THE REFERENCE VOLTAGE WITH THE WASTEGATE VACUUM SENSOR CONNECTED

*NOTE: If the vehicle is not equipped with a wastegate vacuum sensor or if this sensor was used for the VREF measurement in C3, GO to **C24** .*

NOTE: Only measure the circuits that apply to the vehicle being diagnosed.

Ignition OFF.

Wastegate Vacuum Sensor connector connected.

Ignition ON, engine OFF.

Measure the voltage between:

(+) Suspect Sensor Connector, Harness Side	(-)
VREF	Ground

Is the voltage between 4.5 - 5.5 V?

Yes	No
For additional sensors disconnected, GO to **C24** . For no additional sensors disconnected, GO to PINPOINT TEST Z .	INSTALL a new Wastegate Vacuum Sensor. REFER to the service information , Electronic Engine Controls. Clear the PCM DTCs. REPEAT the self-test.

C24 CHECK THE REFERENCE VOLTAGE WITH THE MAPT SENSOR CONNECTED

*NOTE: If the vehicle is not equipped with a MAPT sensor or if this sensor was used for the VREF measurement in C3, GO to **C25** .*

NOTE: Only measure the circuits that apply to the vehicle being diagnosed.

Ignition OFF.

MAPT Sensor connector connected.

Ignition ON, engine OFF.

Measure the voltage between:

(+) Suspect Sensor Connector, Harness Side	(-)
VREF	Ground

Is the voltage between 4.5 - 5.5 V?

Yes	No
For additional sensors disconnected, GO to **C25** . For no additional sensors disconnected, GO to PINPOINT TEST Z .	INSTALL a new MAPT sensor. REFER to the service information , Electronic Engine Controls. Clear the PCM DTCs. REPEAT the self-test.

C25 CHECK THE REFERENCE VOLTAGE WITH THE GENERATOR CURRENT SENSOR CONNECTED

*NOTE: If the vehicle is not equipped with a generator current sensor or if this sensor was used for the VREF measurement in C3, GO to **C26** .*

NOTE: Only measure the circuits that apply to the vehicle being diagnosed.

Ignition OFF.

Generator Current Sensor connector connected.

Ignition ON, engine OFF.

Measure the voltage between:

(+) Suspect Sensor Connector, Harness Side	(-)
VREF	Ground

Is the voltage between 4.5 - 5.5 V?

Yes	No
For additional sensors disconnected, GO to **C26** . For no additional sensors disconnected, GO to PINPOINT TEST Z .	INSTALL a new Generator Current sensor. REFER to the service information , Battery, Mounting and Cables. Clear the PCM DTCs. REPEAT the self-test.

C26 CHECK THE REFERENCE VOLTAGE WITH THE MAP/CACT SENSOR CONNECTED

*NOTE: If the vehicle is not equipped with a MAP/CACT sensor or if this sensor was used for the VREF measurement in C3, GO to **C27** .*

NOTE: Only measure the circuits that apply to the vehicle being diagnosed.

Ignition OFF.

MAP/CACT Sensor connector connected.

Ignition ON, engine OFF.

Measure the voltage between:

(+) Suspect Sensor Connector, Harness Side	(-)
VREF	Ground

Is the voltage between 4.5 - 5.5 V?

Yes	No
For additional sensors disconnected, GO to **C27** . For no additional sensors disconnected, GO to PINPOINT TEST Z .	INSTALL a new MAP/CACT sensor. REFER to the service information , Electronic Engine Controls. Clear the PCM DTCs. REPEAT the self-test.

C27 CHECK THE REFERENCE VOLTAGE WITH THE TCBP SENSOR CONNECTED

*NOTE: If the vehicle is not equipped with a TCBP sensor or if this sensor was used for the VREF measurement in C3, GO to **C28** .*

NOTE: Only measure the circuits that apply to the vehicle being diagnosed.

Ignition OFF.

TCBP Sensor connector connected.

Ignition ON, engine OFF.

Measure the voltage between:

(+) Suspect Sensor Connector, Harness Side	(-)
VREF	Ground

Is the voltage between 4.5 - 5.5 V?

Yes	No
For additional sensors disconnected, GO to	INSTALL a new TCBP sensor. Clear the PCM

C28 . For no additional sensors disconnected, GO to PINPOINT TEST Z .	DTCs. REPEAT the self-test.

C28 CHECK THE REFERENCE VOLTAGE WITH THE FTP SENSOR CONNECTED

Ignition OFF.

FTP Sensor connector connected.

Ignition ON, engine OFF.

Measure the voltage between:

(+) Suspect Sensor Connector, Harness Side	(-)
VREF	Ground

Is the voltage between 4.5 - 5.5 V?

Yes	No
The concern is intermittent. GO to PINPOINT TEST Z .	INSTALL a new FTP sensor. REFER to the service information , Evaporative Emissions. Clear the PCM DTCs. REPEAT the self-test.

C29 CHECK THE SIGRTN OR ETCRTN CIRCUIT(S) FOR AN OPEN

Ignition OFF.

Disconnect the PCM.

For ETCRTN concerns.

Measure the resistance between:

(+) ETBTPS Connector, Harness Side	(-) PCM Connector, Harness Side
ETCRTN	ETCRTN

For APPRTN concerns.

Measure the resistance between:

(+) APP Sensor Connector, Harness Side	(-) PCM Connector, Harness Side
APPRTN1	APPRTN1
APPRTN2	APPRTN2

For SIGRTN concerns.

Measure the resistance between:

(+) Suspect Sensor Connector, Harness Side	(-) PCM Connector, Harness Side
SIGRTN	SIGRTN

Is the resistance less than 5 ohms?

Yes	No
GO to C31.	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

C30 CHECK THE SUSPECT SENSOR FOR AN INTERNAL SHORT

Clear the KOEO, KOER, and continuous DTCs.

Ignition OFF.

Connect the suspect sensor.

Ignition ON, engine OFF.

Carry out the PCM self-test.

Is the concern still present?

Yes	No
INSTALL a new sensor for the sensor in question. Clear the PCM DTCs. REPEAT the self-test.	The concern is intermittent. GO to PINPOINT TEST Z .

C31 CHECK FOR CORRECT PCM OPERATION

Disconnect all the PCM connectors.

Visually inspect for:

pushed out pins

corrosion

Connect all the PCM connectors and make sure they seat correctly.

Carry out the PCM self-test.

Verify the concern is still present.

Is the concern still present?

Yes	No
INSTALL a new PCM. REFER to FLASH ELECTRICALLY ERASABLE PROGRAMMABLE READ ONLY MEMORY (EEPROM) , Programming the VID Block for a Replacement PCM.	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.

PINPOINT TEST DD: FUEL PRESSURE AND FUEL RAIL PRESSURE (FRP) SENSORS > INTRODUCTION

WARNING: VEHICLE FUEL SYSTEMS ARE PRESSURIZED EVEN WHEN THE ENGINE IS NOT RUNNING. TO AVOID FIRE OR PERSONAL INJURY, DISABLE THE FUEL DELIVERY SYSTEM AND RELIEVE FUEL SYSTEM PRESSURE BEFORE REMOVING ANY FUEL SYSTEM COMPONENT. REFER TO THE FUEL SYSTEM INFORMATION AT THE BEGINNING OF PINPOINT HC. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN PERSONAL INJURY.

NOTE: With the engine running, the FRP PID value may be 48-70 kPa (7-10 psi) higher than a fuel pressure reading taken with a mechanical gauge.

This pinpoint test is intended to diagnose the following:

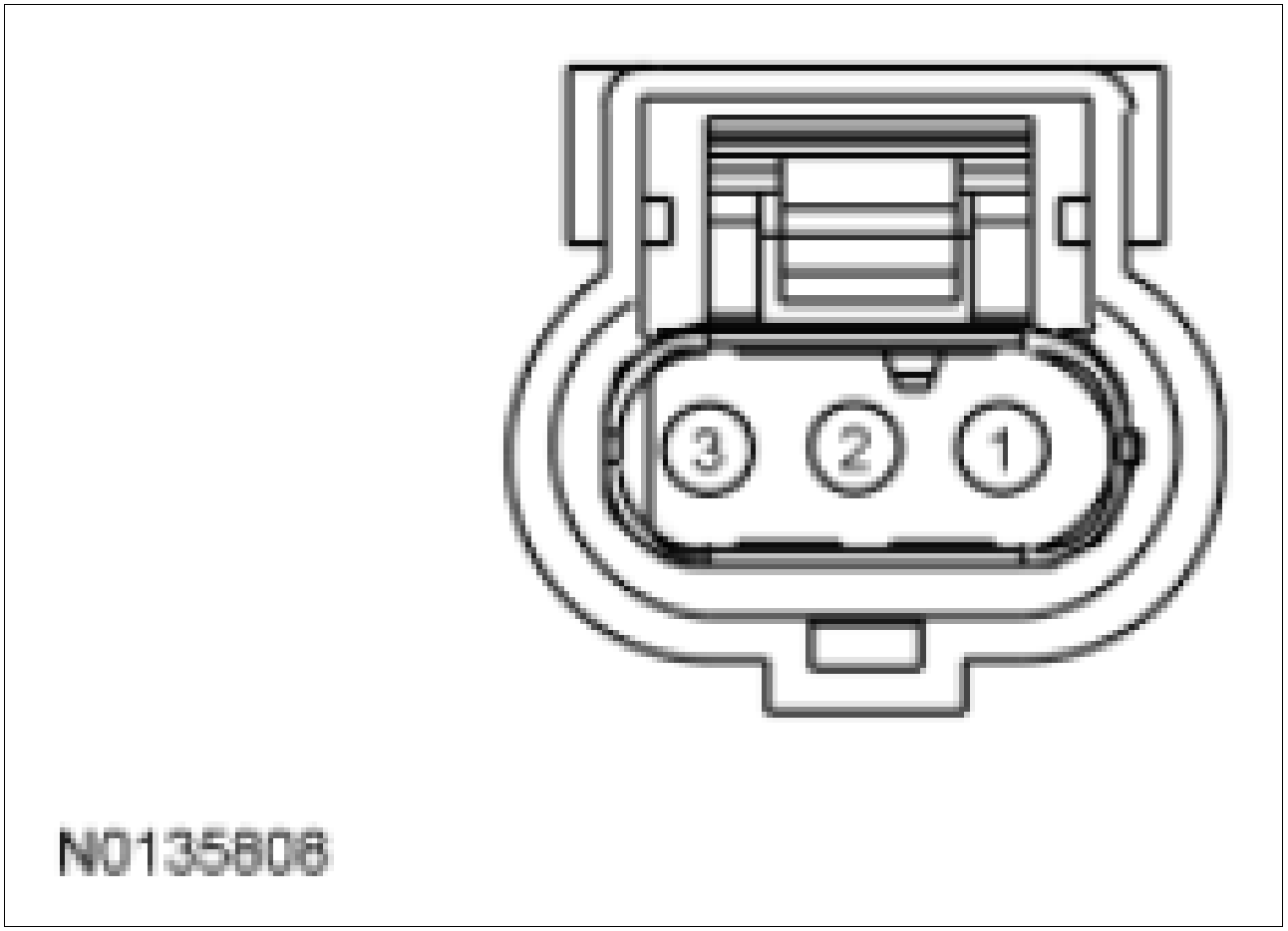
- fuel pressure sensor (9F972)
- fuel rail pressure (FRP) sensor (6B288)
- harness circuits: FLP and FRP
- PCM (12A650)

Tables and Graphs

FRP SENSOR VOLTAGE AND PRESSURE SPECIFICATIONS

Voltage	Pressure, MPa (gauge)	Pressure, psi (gauge)
4.80	27.95	4054
4.50	26	3771
3.50	19.5	2828
2.50	13.0	1885
1.50	6.5	943
0.50	0	0
0.20	-1.95	-283

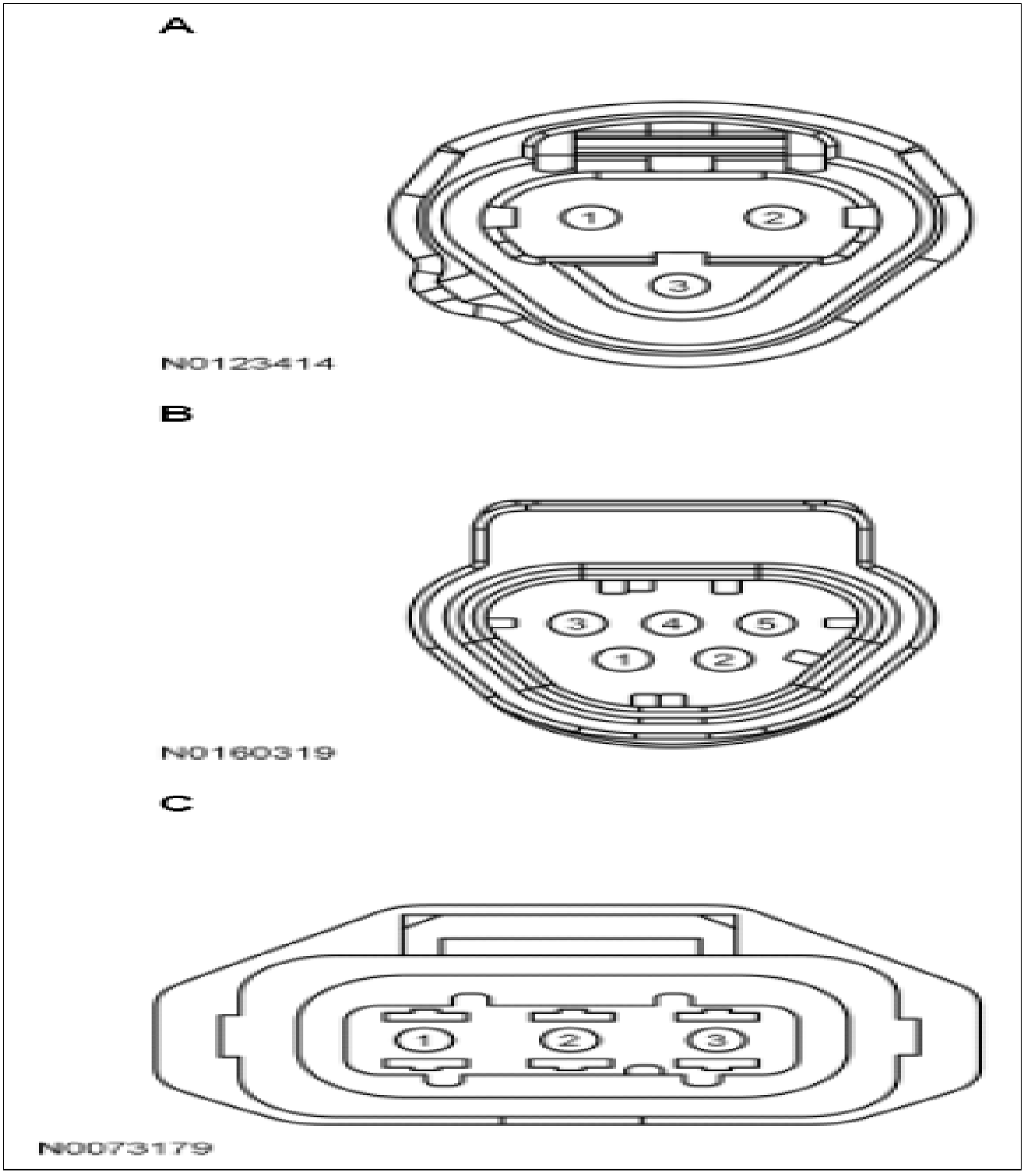
Fig 1: Identifying Fuel Pressure Sensor Connector



Courtesy of FORD MOTOR CO.

Pin	Circuit
1	FLP (Fuel Low Pressure)
2	SIGRTN (Signal Return)
3	VREF (Reference Voltage)

Fig 2: Identifying Fuel Rail Pressure (FRP) Sensor Connector



Courtesy of FORD MOTOR CO.

Vehicle	Connector	Pin	Circuit
Edge 2.7L, Expedition, F-150, Focus GDI 2.0L,	A	2 3 1	FRP SIGRTN VREF

Navigator, Transit			
Edge 2.0L, MKC 2.3L, Mustang	B	4 3 5	FRP SIGRTN VREF
Fusion 1.5L	C	3 2 1	FRP SIGRTN VREF
All other vehicles	C	2 1 3	FRP SIGRTN VREF

PINPOINT TEST DD: FUEL PRESSURE AND FUEL RAIL PRESSURE (FRP) SENSORS > INTRODUCTION > POWERTRAIN CONTROL MODULE (PCM) CONNECTOR

For PCM connector views or reference values, refer to REFERENCE VALUES .

Vehicle	Connector	Pin	Circuit
Edge 2.7L, Expedition, F-150, Navigator	198 PIN	E35 B71	FRP FLP
Explorer 2.0L	154 PIN	E9 E7	FRP FLP
Fiesta, Focus 1.0L, Fusion 1.6L	198 PIN	E38 B71	FRP FLP
Focus GDI 2.0L	198 PIN	E9 E7	FRP FLP
Transit	198 PIN	E35	FRP
All other vehicles	198 PIN	E37 B71	FRP FLP

PINPOINT TEST DD: FUEL PRESSURE AND FUEL RAIL PRESSURE (FRP) SENSORS > TEST PROCEDURE

DD1 CHECK FOR DIAGNOSTIC TROUBLE CODES (DTCS)

Are DTCs P018C, P018D, P0192 or P0193 present?

Yes	No

For DTCs P018C or P018D, GO to **DD2** . For all others, GO to DD7.	RETURN to SYMPTOM CHARTS for further direction.

DD2 CHECK THE VREF AND SIGRTN CIRCUITS FOR AN OPEN

Ignition OFF.

Fuel Pressure Sensor connector disconnected.

Ignition ON, engine OFF.

Measure the voltage between:

(+) Fuel Pressure Sensor Connector, Harness Side	(-) Fuel Pressure Sensor Connector, Harness Side
VREF - Pin 3	SIGRTN - Pin 2

Is the voltage between 4.5 - 5.5 V?

Yes	No
GO to **DD3** .	GO to PINPOINT TEST C .

DD3 CHECK THE FLP CIRCUIT FOR AN OPEN

Ignition OFF.

PCM connector disconnected.

Measure the resistance between:

(+) Fuel Pressure Sensor Connector, Harness Side	(-) PCM Connector, Harness Side
FLP - Pin 1	FLP

Is the resistance less than 5 ohms?

Yes	No
GO to **DD4** .	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

DD4 CHECK THE FLP CIRCUIT FOR A SHORT TO GROUND

Measure the resistance between:

(+) Fuel Pressure Sensor Connector, Harness Side	(-)
FLP - Pin 1	Ground

Is the resistance greater than 10K ohms?

Yes	No
GO to **DD5** .	REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.

DD5 CHECK THE FLP CIRCUIT FOR A SHORT TO VOLTAGE

Ignition ON, engine OFF.

Measure the voltage between:

(+) Fuel Pressure Sensor Connector, Harness Side	(-)
FLP - Pin 1	Ground

Is any voltage present?

Yes	No
REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.	GO to **DD6** .

DD6 CHECK THE FLP CIRCUIT FOR AN INTERMITTENT CONCERN

Ignition OFF.

Fuel Pressure Sensor connector connected.

PCM connector connected.

Ignition ON, engine OFF.

Access the PCM and monitor the FLP_V (VOLT) PID.

While observing the PID, carry out the following:

Tap on the sensor to simulate road shock

Wiggle the sensor connector

Wiggle, shake, and bend small sections of the wiring harness while working from the sensor to the PCM

Check the connector for damage or corrosion.

Is a concern present?

Yes	No
REPAIR as necessary. Clear the PCM DTCs. REPEAT the self-test.	INSTALL a new Fuel Pressure Sensor. REFER to the fuel system WARNING information at the beginning of Pinpoint Test HC. GO to PINPOINT TEST HC . REFER to the service information , Fuel Tank and Lines. Clear the PCM DTCs. REPEAT the self-test.

DD7 CHECK THE VREF AND SIGRTN CIRCUITS FOR AN OPEN

Ignition OFF.

FRP Sensor connector disconnected.

Ignition ON, engine OFF.

Measure the voltage between:

(+) FRP Sensor Connector, Harness Side	(-) FRP Sensor Connector, Harness Side
VREF	SIGRTN

Is the voltage between 4.5 - 5.5 V?

Yes	No
GO to **DD8** .	GO to PINPOINT TEST C .

DD8 CHECK THE FRP CIRCUIT FOR AN OPEN

Ignition OFF.

PCM connector disconnected.

Measure the resistance between:

(+) FRP Sensor Connector, Harness Side	(-) PCM Connector, Harness Side
FRP	FRP

Is the resistance less than 5 ohms?

Yes	No
GO to **DD9** .	REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.

DD9 CHECK THE FRP CIRCUIT FOR A SHORT TO GROUND

Measure the resistance between:

(+) FRP Sensor Connector, Harness Side	(-)
FRP	Ground

Is the resistance greater than 10K ohms?

Yes	No
GO to **DD10** .	REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.

DD10 CHECK THE FRP CIRCUIT FOR A SHORT TO VOLTAGE

Ignition ON, engine OFF.

Measure the voltage between:

(+) FRP Sensor Connector, Harness Side	(-)
FRP	Ground

Is any voltage present?

Yes	No
REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.	GO to **DD11** .

DD11 CHECK THE FRP CIRCUIT FOR AN INTERMITTENT CONCERN

Ignition OFF.

PCM connector connected.

Fuel Pressure Sensor connector connected.

Ignition ON, engine OFF.

Access the PCM and monitor the FRP (VOLT) PID.

While observing the PID, carry out the following:

Tap on the sensor to simulate road shock

Wiggle the sensor connector

Wiggle, shake, and bend small sections of the wiring harness while working from the sensor to the PCM

Check the connector for damage or corrosion.

Is a concern present?

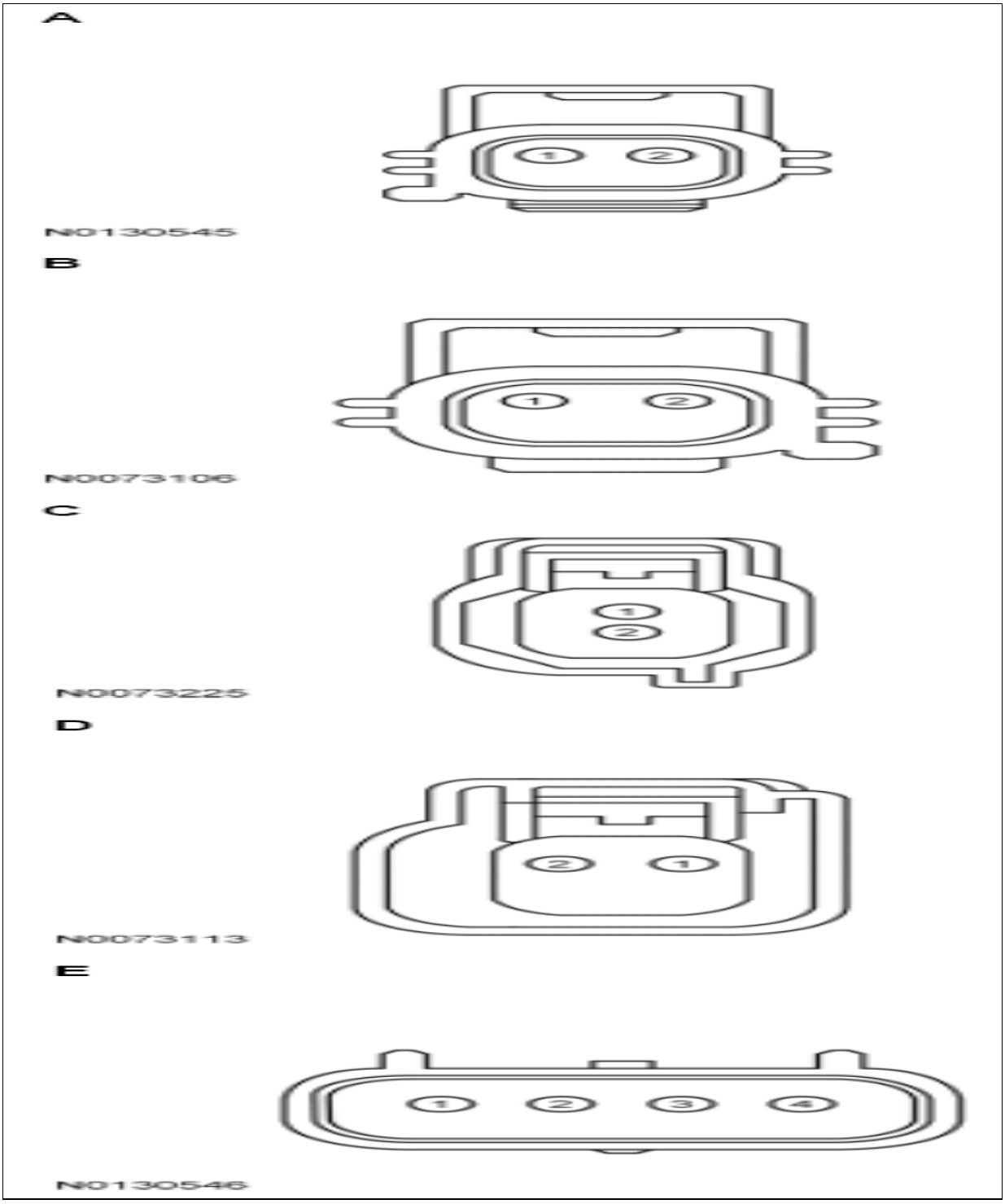
Yes	No
REPAIR as necessary. Clear the PCM DTCs. REPEAT the self-test.	INSTALL a new FRP sensor. REFER to the fuel system WARNING information at the beginning of Pinpoint Test HC. GO to PINPOINT TEST HC . REFER to the service information , Electronic Engine Controls. Clear the PCM DTCs. REPEAT the self-test.

PINPOINT TEST DG: KNOCK SENSOR (KS) > INTRODUCTION

This pinpoint test is intended to diagnose the following:

- KS1 and KS2 (12A699)
- harness circuits: KS1+, KS1-, KS2+, and KS2-
- PCM (12A650)

Fig 1: Identifying Knock Sensor 1 (KS1) Connector

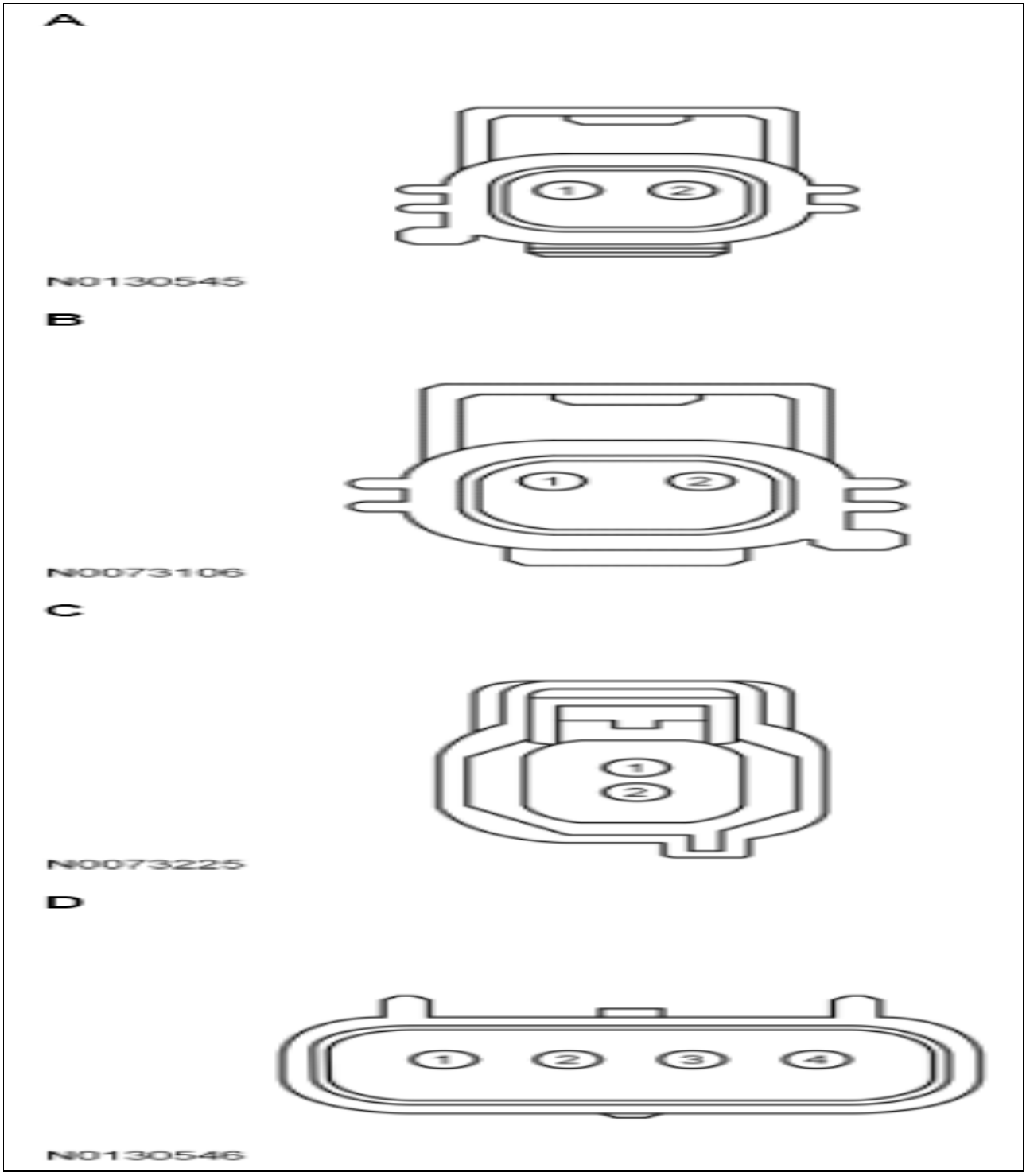


Courtesy of FORD MOTOR CO.

Vehicle	Connector	Pin	Circuit

E-Series, Escape/Kuga 1.6L, Transit Connect 1.6L	A	2 1	KS1+ KS1-
Edge 2.0L, Escape/Kuga 2.0L, Escape/Kuga 2.5L, Explorer 2.0L, Focus 2.0L, Fusion 2.0L, Fusion 2.5L, MKC, MKT 2.0L, MKZ 2.0L, Mustang 2.3L, Taurus 2.0L, Transit Connect 2.5L	B	2 1	KS1+ KS1-
Edge 2.7L, F-150 2.7L, F-150 5.0L, F-650/F-750, F-Series Super Duty, Motorhome/Stripped Chassis/Step Van, Mustang 5.0L	C	1 2	KS1+ KS1-
Fiesta 1.0L, Focus 1.0L	D	1 2	KS1+ KS1-
Fiesta GTDI 1.6L, Fusion 1.5L, Fusion 1.6L	A	1 2	KS1+ KS1-
All other vehicles	E	1 2	KS1+ KS1-

Fig 2: Identifying Knock Sensor 2 (KS2) Connector



Courtesy of FORD MOTOR CO.

Vehicle	Connector	Pin	Circuit
Escape/Kuga 1.6L, Transit Connect	A	2 1	KS2+ KS2-

Edge 2.0L, Escape/Kuga 2.0L, Explorer 2.0L, Focus, Fusion 2.0L, MKC, MKT 2.0L, MKZ 2.0L, Mustang 2.3L, Taurus 2.0L	B	2 1	KS2+ KS2-
Edge 2.7L, F-150 2.7L, F-150 5.0L, F-650/F-750, F-Series Super Duty 6.2L, Motorhome/Stripped Chassis/Step Van, Mustang 5.0L	C	1 2	KS2+ KS2-
F-Series Super Duty 6.8L	D	1 2	KS2+ KS2-
Fiesta, Fusion 1.5L, Fusion 1.6L	A	1 2	KS2+ KS2-
All other vehicles	D	3 4	KS2+ KS2-

PINPOINT TEST DG: KNOCK SENSOR (KS) > INTRODUCTION > POWERTRAIN CONTROL MODULE (PCM) CONNECTOR

For PCM connector views or reference values, refer to REFERENCE VALUES .

Vehicle	Connector	Pin	Circuit
E-Series	190-PIN	B30 E46 E47	VPWR KS1+ KS1-
Edge 3.5L, F-150 TiVCT 3.5L, F-150 5.0L, Mustang 3.7L, Mustang 5.0L	198 PIN	B97 E68 E67 E53 E52	VPWR KS2+ KS2- KS1+ KS1-
Escape/Kuga 2.5L, Fusion 2.5L, Transit Connect 2.5L	190-PIN	B67 E43 E42	VPWR KS1+ KS1-
Explorer 2.0L, Focus GDI 2.0L	154 PIN	B5 E85 E61	VPWR KS2+ KS2-

		E84 E60	KS1+ KS1-
Explorer 3.7L, Explorer TiVCT 3.5L, Flex TiVCT 3.5L, MKS 3.7L, MKX, MKZ 3.7L, Taurus TiVCT 3.5L, Taurus 3.7L, Transit 3.7L	190-PIN	B67 E60 E59 E43 E42	VPWR KS2+ KS2- KS1+ KS1-
F-650/F-750, F-Series Super Duty, Motorhome/Stripped Chassis/Step Van	190-PIN	B67 E45 E44 E7 E6	VPWR KS2+ KS2- KS1+ KS1-
Fiesta GTDI 1.6L, Fiesta 1.0L, Fusion 1.6L	198 PIN	B101 E57 E58 E59 E60	VPWR KS2+ KS2- KS1+ KS1-
Fiesta TiVCT 1.6L	128 PIN	B11 T20 T28 T17 T25	VPWR KS2+ KS2- KS1+ KS1-
Focus 1.0L	198 PIN	B101 E59 E60	VPWR KS1+ KS1-
MKT 3.7L	190-PIN	B67 E60 E30 E43 E42	VPWR KS2+ KS2- KS1+ KS1-
All other vehicles	198 PIN	B101 E50 E51 E65 E66	VPWR KS2+ KS2- KS1+ KS1-

PINPOINT TEST DG: KNOCK SENSOR (KS) > TEST PROCEDURE

DG1 CHECK FOR DIAGNOSTIC TROUBLE CODES (DTCS)

NOTE: Verify the KS is correctly installed before continuing diagnosis. Refer to

the service information , Electronic Engine Controls.

Are DTCs P0325, P0326, P0327, P0328, P0330, P0331, P0332, P0333 or P130D present?

Yes	No
For DTC P130D, GO to DG6. For all others, GO to **DG2** .	RETURN to SYMPTOM CHARTS for further direction.

DG2 CHECK THE KS CIRCUIT FOR AN OPEN

Ignition OFF.

KS connector disconnected.

PCM connector disconnected.

Measure the resistance between:

(+) KS Connector, Harness Side	(-) PCM Connector, Harness Side
Suspect KS+	Suspect KS+
Suspect KS-	Suspect KS-

Are the resistances less than 5 ohms?

Yes	No
GO to **DG3** .	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

DG3 CHECK THE KS CIRCUIT FOR A SHORT TO GROUND

Measure the resistance between:

(+) KS Connector, Harness Side	(-)
Suspect KS+	Ground
Suspect KS-	Ground

Are the resistances greater than 10K ohms?

Yes	No
GO to **DG4** .	REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.

DG4 CHECK THE KS CIRCUIT FOR A SHORT TO VOLTAGE

Ignition ON, engine OFF.

Measure the voltage between:

(+) KS Connector, Harness Side	(-)
Suspect KS+	Ground
Suspect KS-	Ground

Is any voltage present?

Yes	No
REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.	GO to **DG5** .

DG5 CHECK THE KS CIRCUIT FOR INTERMITTENT CONCERNS

While observing the resistance, wiggle, shake, and bend small sections of the wiring harness working from the sensor to the PCM.

Measure the resistance between:

(+) KS Connector, Harness Side	(-) PCM Connector, Harness Side
Suspect KS+	Suspect KS+
Suspect KS-	Suspect KS-

Are the resistances less than 5 ohms?

Yes	No
For Edge 2.0L, Edge 2.7L, Escape/Kuga, Expedition, Explorer 2.0L, Explorer 3.5L GTDI, F-150 2.7L, F-150 3.5L GTDI, Fiesta, Flex 3.5L GTDI, Focus 1.0L, Focus 2.0L GTDI, Fusion, MKC, MKS 3.5L, MKT 2.0L, MKT 3.5L, MKZ 2.0L, Mustang 2.3L, Navigator, Taurus 2.0L, Taurus 3.5L GTDI, Transit 3.5L, and	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

Transit Connect, GO to **DG6** . For all others, GO to DG7.	

DG6 IDENTIFY THE TYPE OF KNOCK

> *NOTE: Knock counts on a single cylinder may indicate a concern with the ignition or fuel components for the suspect cylinder. Knock counts distributed among multiple cylinders may indicate a fuel quality concern.*

Ignition ON, engine running.

Access the PCM and monitor the KNK_CNTR_CYL1 (MODE), KNK_CNTR_CYL2 (MODE), KNK_CNTR_CYL3 (MODE), KNK_CNTR_CYL4 (MODE), KNK_CNTR_CYL5 (MODE) and KNK_CNTR_CYL6 (MODE) PIDs.

Are the majority of the knock counts on a single cylinder?

Yes	No
DIAGNOSE ignition coil and fuel injection components for the suspect cylinder. REPAIR or INSTALL a new component as necessary. Clear the PCM DTCs. REPEAT the self-test.	GO to **DG7** .

DG7 CHECK THE LEARNED OCTANE ADJUSTMENT

Access the PCM and monitor the OCTADJ_R_LRND (PER) PID.

Does the OCTADJ_R_LRND PID read less than 15%?

Yes	No
DRAIN and CLEAN the fuel system, REFILL with correct grade fuel. Clear the PCM DTCs. REPEAT the self-test.	INSTALL a new KS. REFER to the service information , Electronic Engine Controls. CLEAR the DTCs. REPEAT the self-test.

PINPOINT TEST DL: CYLINDER HEAD TEMPERATURE (CHT) SENSOR > INTRODUCTION

> *NOTE: On a typical vehicle, the CHT sensor is located in the cylinder head and the CHT2 sensor is located in the exhaust manifold.*

This pinpoint test is intended to diagnose the following:

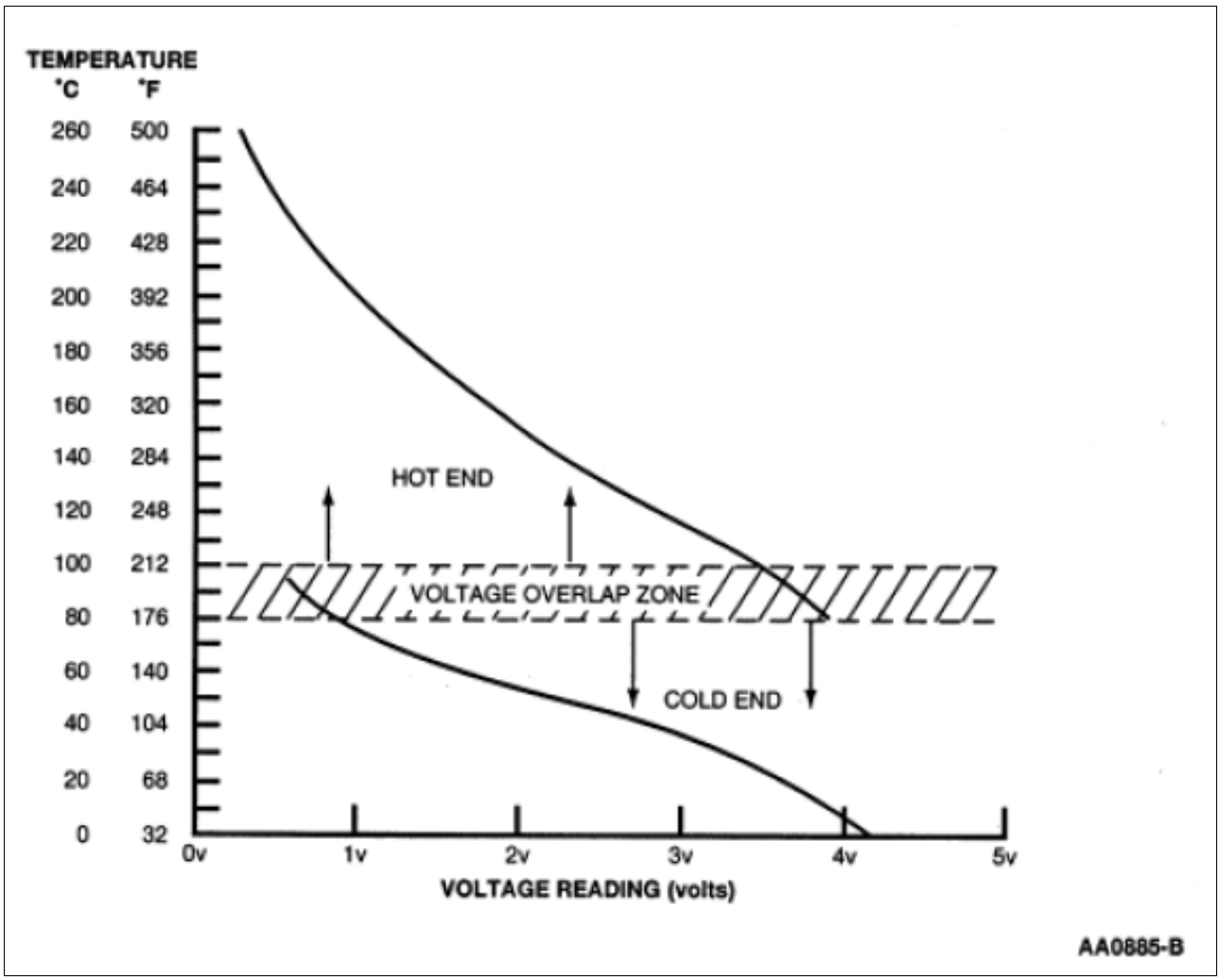
- cylinder head temperature (CHT) sensor (6G004)
- cylinder head temperature 2 (CHT2) sensor (6G004)

- harness circuits: CHT, CHT2, and SIGRTN
- PCM (12A650)

On applications that do not use an engine coolant temperature (ECT) sensor, the CHT sensor is used to determine the engine coolant temperature. To cover the entire temperature range of both the CHT and ECT sensors, the PCM has a dual switching resistor circuit on the CHT input. A graph showing the temperature switching from the COLD END line to the HOT END line, with increasing temperature and back with decreasing temperature is included. Note the temperature to voltage overlap zone. Within this zone it is possible to have either a COLD END or HOT END voltage at the same temperature. For example, at 90°C (194°F) the voltage could read either 0.60 volt or 3.71 volts. On applications with a CHT2 sensor, the PCM has a single resistor circuit on the CHT2 input. Refer to the table for the temperature to voltage expected values.

Voltage values calculated for VREF = 5 volts. These values can vary by 15% due to sensor and VREF variations.

Fig 1: Cylinder Head Temperature (CHT) Sensor Voltage Graph



Courtesy of FORD MOTOR CO.

CYLINDER HEAD TEMPERATURE (CHT) SENSOR EXPECTED VALUES SPECIFICATIONS

Temperature		CHT Sensor Values		
°C	°F	Cold End (volts)	Hot End (volts)	Resistance (K ohms)
-40	-40	4.89	-	965.808
-30	-22	4.81	-	513.019
-20	-4	4.67	-	283.664
-10	14	4.45	-	162.584
0	32	4.14	-	96.255
10	50	3.73	-	59.175
20	68	3.26	-	37.387
30	86	2.74	-	24.215
40	104	2.23	-	16.043
50	122	1.76	-	10.85
60	140	1.36	-	7.487
70	158	1.04	-	5.268
80	176	0.79	3.99	3.775
85	185	0.69	3.86	3.215
90	194	0.60	3.71	2.75
95	203	0.53	3.56	2.361
100	212	0.46	3.41	2.034
110	230	-	3.07	1.523
120	248	-	2.74	1.155
130	266	-	2.41	0.8866
140	284	-	2.10	0.6891
150	302	-	1.81	0.5417
160	320	-	1.55	0.4301
170	338	-	1.33	0.3449
180	356	-	1.13	0.2791
190	374	-	0.96	0.2278
200	392	-	0.82	0.1875
210	410	-	0.70	0.155
220	428	-	0.60	0.130
230	446	-	0.51	0.109

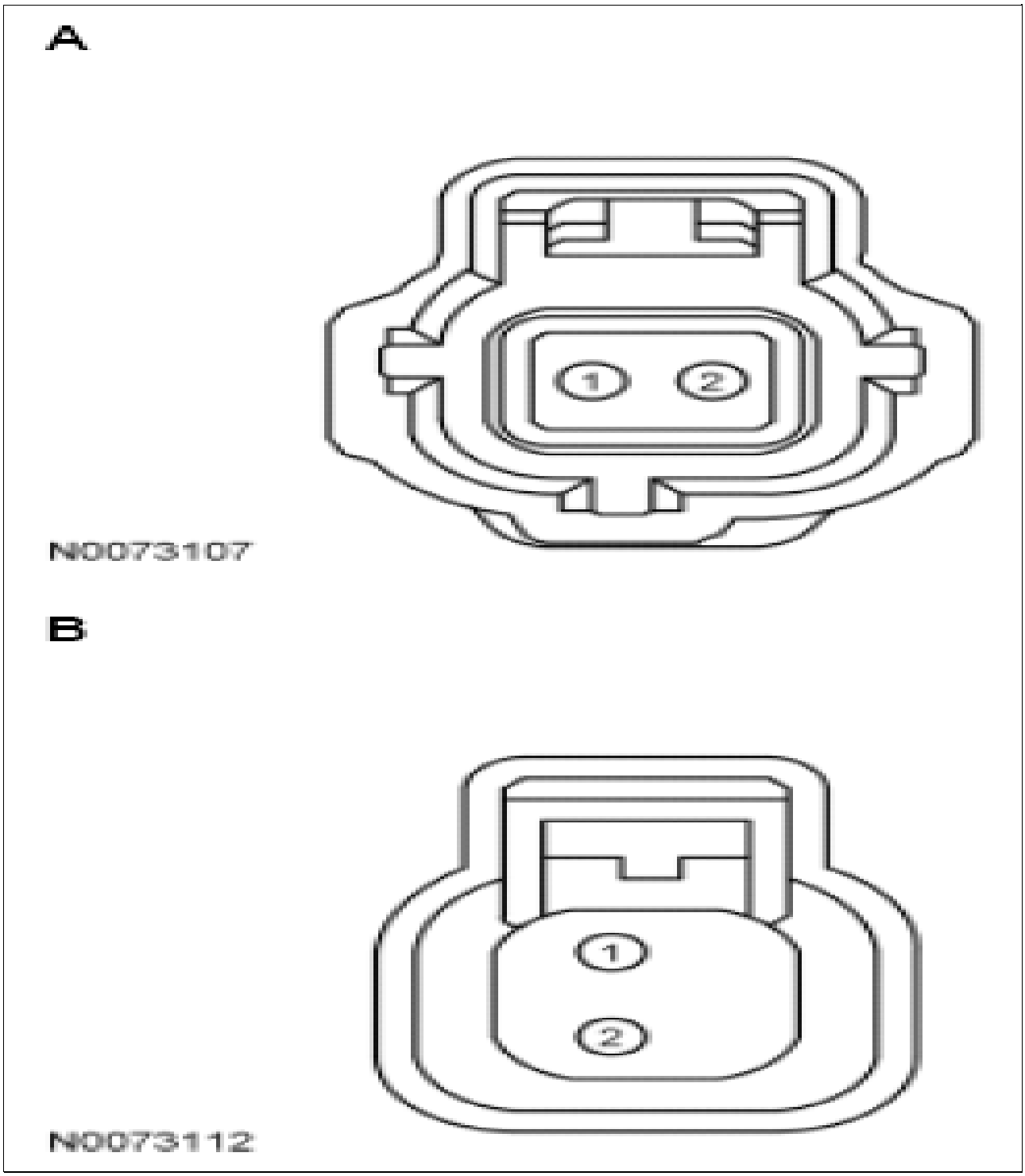
240	464	-	0.44	0.092
250	482		0.35	0.078
260	500		0.33	0.067

CYLINDER HEAD TEMPERATURE 2 (CHT2) SENSOR EXPECTED VALUES SPECIFICATIONS

Temperature		CHT2 Sensor Values	
°C	°F	Volts	Resistance (K ohms)
-40	-40	4.995	965.808
-30	-22	4.990	512.947
-20	-4	4.969	283.651
-10	14	4.949	162.585
0	32	4.917	96.248
10	50	4.870	59.173
20	68	4.839	37.387
30	86	4.802	24.216
40	104	4.707	16.043
50	122	4.578	10.851
60	140	4.411	7.487
70	158	4.202	5.269
80	176	3.953	3.775
90	194	3.667	2.750
100	212	3.354	2.038
110	230	3.018	1.523
120	248	2.680	1.155
130	266	2.350	0.8868
140	284	2.040	0.6893
150	302	1.757	0.5418
160	320	1.504	0.4301
170	338	1.282	0.3449
180	356	1.091	0.2791
190	374	0.928	0.2278
200	392	0.789	0.1875

210	410	0.672	0.1554
220	428	0.574	0.1297
230	446	0.491	0.1090
240	464	0.422	0.0921
250	482	0.363	0.0783

Fig 2: Identifying Cylinder Head Temperature (CHT) Sensor Connector



Courtesy of FORD MOTOR CO.

Vehicle	Connector	Pin	Circuit
Transit Connect	A	2 1	SIGRTN CHT
All other vehicles	B	2 1	SIGRTN CHT

Fig 3: Identifying Cylinder Head Temperature 2 (CHT2) Sensor Connector



Courtesy of FORD MOTOR CO.

Pin	Circuit
2	SIGRTN (Signal Return)
1	CHT2 (Cylinder Head Temperature 2)

PINPOINT TEST DL: CYLINDER HEAD TEMPERATURE (CHT) SENSOR >

INTRODUCTION > POWERTRAIN CONTROL MODULE (PCM) CONNECTOR

For PCM connector views or reference values, refer to REFERENCE VALUES .

Vehicle	Connector	Pin	Circuit
E-Series 6.8L, F-650/F-750, F-Series Super Duty, Motorhome/Stripped Chassis/Step Van	190-PIN	E30 E32	CHT SIGRTN
E-Series 5.4L	190-PIN	E15 E64	CHT SIGRTN
Edge 2.0L, Edge 2.7L, F-150 2.7L	198 PIN	E20 E36	SIGRTN CHT2
Edge 3.5L, F-150 TiVCT 3.5L, F-150 5.0L, Mustang 3.7L, Mustang 5.0L	198 PIN	E47 E49	CHT SIGRTN
Escape/Kuga 1.6L, Escape/Kuga 2.0L, Focus GTDI 2.0L, Fusion 2.0L, Fusion 1.5L, MKC, MKT 2.0L, MKZ 2.0L, Mustang 2.3L, Taurus 2.0L	198 PIN	E20 E46	SIGRTN CHT2
Expedition, Explorer GTDI 3.5L, F-150 GTDI 3.5L, Flex GTDI 3.5L, MKS 3.5L, MKT 3.5L, Navigator, Taurus GTDI 3.5L, Transit 3.5L	198 PIN	E36 E20	CHT SIGRTN
Explorer 2.0L	154 PIN	E34 E56	SIGRTN CHT2
Focus 1.0L	198 PIN	E10 E13	SIGRTN CHT2
Focus GDI 2.0L	154 PIN	E56 E33	CHT SIGRTN
Fusion 1.6L	198 PIN	E46 E20	CHT SIGRTN

Transit Connect 1.6L	198 PIN	E53 E46	SIGRTN CHT2
All other vehicles	190-PIN	E39 E49	CHT SIGRTN

PINPOINT TEST DL: CYLINDER HEAD TEMPERATURE (CHT) SENSOR > TEST PROCEDURE

DL1 CHECK FOR DTCS

Are DTCs P0116, P0119, P0125, P0128, P017C, P017D, P017E, P101F, P1021, P1022, P1023, P1024, P1025, P1026, P1285, P1288, P1289, P128A, or P1290 present?

Yes	No
GO to **DL2** .	For temperature warning indicator lamp or gauge (applications with CHT sensor only) symptom, GO to DL12. For all others, RETURN to SYMPTOM CHARTS for further direction.

DL2 CHECK THE COOLING SYSTEM

WARNING: TO AVOID PERSONAL INJURY DO NOT UNSCREW THE COOLANT PRESSURE RELIEF CAP WHILE THE ENGINE IS OPERATING OR HOT. THE COOLING SYSTEM IS UNDER PRESSURE. STEAM AND HOT LIQUID CAN COME OUT FORCEFULLY WHEN THE CAP IS LOOSENED SLIGHTLY. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN PERSONAL INJURY.

NOTE: DTC P0125 or P0128 indicates the engine coolant temperature has not achieved the required engine operation temperature level, since start-up within a specified amount of time.

Check the cooling system for:

correct coolant level

internal or external coolant leaks

blockage of the radiator

cooling fan operation

Is the cooling system OK?

Yes	No
For DTCs P0125 or P0128,	REFER to the service information , Engine Cooling to

GO to DL11. For all others, GO to **DL3** .	diagnose a cooling system concern. REPAIR as necessary. CLEAR the DTCs. REPEAT the self-test.

DL3 CHECK THE RESISTANCE OF THE CHT SENSOR WITH THE ENGINE OFF

NOTE: Refer to the chart at the beginning of this test for the resistance specifications.

Ignition OFF.

For the CHT2 sensor,

CHT2 Sensor connector disconnected.

Measure the resistance between:

(+) CHT2 Sensor Connector, Component Side	(-) CHT2 Sensor Connector, Component Side
CHT2 - Pin 1	SIGRTN - Pin 2

For all others,

CHT Sensor connector disconnected.

Measure the resistance between:

(+) CHT Sensor Connector, Component Side	(-) CHT Sensor Connector, Component Side
CHT	SIGRTN

Is the resistance within specification?

Yes	No
GO to **DL4** .	INSTALL a new CHT sensor. REFER to the service information , Electronic Engine Controls. CLEAR the DTCs. REPEAT the self-test.

DL4 CHECK FOR AN OPEN CIRCUIT

Ignition OFF.

PCM connector disconnected.

For the CHT2 sensor,

Measure the resistance between:

(+) PCM Connector, Harness Side	(-) CHT2 Sensor Connector, Harness Side

CHT2	CHT2 - Pin 1
SIGRTN	SIGRTN - Pin 2

For all others,

Measure the resistance between:

(+) PCM Connector, Harness Side	(-) CHT Sensor Connector, Harness Side
CHT	CHT
SIGRTN	SIGRTN

Are the resistances less than 5 ohms?

Yes	No
GO to **DL5** .	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

DL5 CHECK FOR A SHORT TO GROUND

For the CHT2 sensor,

Measure the resistance between:

(+) CHT2 Sensor Connector, Harness Side	(-)
CHT2 - Pin 1	Ground

For all others,

Measure the resistance between:

(+) CHT Sensor Connector, Harness Side	(-)
CHT	Ground

Are the resistances greater than 10K ohms?

Yes	No
GO to **DL6** .	REPAIR the short circuit. CLEAR the DTCs. REPEAT the self-test.

DL6 CHECK FOR A SHORT TO VOLTAGE

Ignition ON, engine OFF.

For the CHT2 sensor,

Measure the voltage between:

(+) CHT2 Sensor Connector, Harness Side	(-)
CHT2 - Pin 1	Ground

For all others,

Measure the voltage between:

(+) CHT Sensor Connector, Harness Side	(-)
CHT	Ground

Is any voltage present?

Yes	No
REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.	GO to **DL7** .

DL7 CHECK THE RESISTANCE OF THE CHT SENSOR

NOTE: Refer to the chart at the beginning of this test for the resistance specifications.

Ignition OFF.

CHT Sensor connector connected.

CHT2 Sensor connector connected.

PCM connector connected.

Run the engine until the engine temperature stabilizes.

Ignition OFF.

For the CHT2 sensor,

CHT2 Sensor connector disconnected.

Measure the resistance between:

(+) CHT2 Sensor Connector, Component Side	(-) CHT2 Sensor Connector, Component Side
CHT2 - Pin 1	SIGRTN - Pin 2

For all others,

CHT Sensor connector disconnected.

Measure the resistance between:

(+) CHT Sensor Connector, Component Side	(-) CHT Sensor Connector, Component Side
CHT	SIGRTN

Is the resistance within specification?

Yes	No
For the CHT2 sensor, GO to **DL8** . For all others, GO to DL9.	INSTALL a new CHT sensor. REFER to the service information , Electronic Engine Controls. CLEAR the DTCs. REPEAT the self-test.

DL8 CHECK THE CHT2 SENSOR

Ignition ON, engine OFF.

Measure the voltage between:

(+) CHT2 Sensor Connector, Harness Side	(-) CHT2 Sensor Connector, Harness Side
CHT2 - Pin 1	SIGRTN - Pin 2

Observe the digital multi meter (DMM) for an indication of a concern while shaking, wiggling, and bending the CHT2 circuit between the CHT2 and the PCM. Note that voltage changes suddenly when a concern is detected.

Is a concern present?

Yes	No
REPAIR as necessary. Clear the PCM DTCs. REPEAT the self-test.	Unable to duplicate or identify the concern at this time. GO to PINPOINT TEST Z .

DL9 INTERMITTENT CHECK

Ignition OFF.

CHT Sensor connector connected.

Ignition ON, engine OFF.

Access the PCM and monitor the CHT (TEMP) PID.

While observing the PID, carry out the following:

Tap on the sensor to simulate road shock

Wiggle the sensor connector

Is there a large change in the PID value?

Yes	No
REPAIR as necessary. Clear the PCM DTCs. REPEAT the self-test.	For DTC P1285, GO to **DL10** . For all others, Unable to duplicate or identify the concern at this time. GO to PINPOINT TEST Z .

DL10 CHECK THE CHT SENSOR OPERATION

NOTE: The engine temperature warning indicator (gauge or lamp) is a warning system that gives the driver information during an engine overheating condition. The PCM monitors the CHT sensor and determines if fail-safe cooling mode is needed. If fail-safe cooling mode is needed, the PCM sends a controller area network (CAN) message to the instrument cluster to signal an overheating condition. This causes the instrument cluster indicator to illuminate and forces the temperature gauge to the H (hot) zone. DTC P1285 is stored in the PCM.

Run the engine until the engine temperature stabilizes.

Verify the radiator hoses are hot and the cooling system is pressurized.

Carry out the PCM self-test.

Is DTC P1285 present?

Yes	No
REFER to the service information , Engine Cooling to diagnose the cooling system concern. Clear the PCM DTCs. REPEAT the self-test.	The system is operating correctly at this time. REPAIR any other DTCs as necessary. Clear the PCM DTCs. REPEAT the self-test.

DL11 CHECK THE SENSOR OPERATION

Run the engine until the engine temperature stabilizes.

Verify the radiator hoses are hot and the cooling system is pressurized.

Access the PCM and monitor the CHT (TEMP) PID.

Record the PID value.

Is the PID temperature greater than 77 C (170.6 F)?

Yes	No
The system is operating correctly at this time. CLEAR the DTCs. REPEAT the self-test.	REFER to the service information , Engine Cooling, to diagnose the engine not reaching normal operating temperature. REPAIR as necessary. CLEAR the DTCs. REPEAT the self-test.

DL12 ENGINE TEMPERATURE INDICATOR LAMP ON OR TEMPERATURE GAUGE

INDICATES HOT WITH NO DTCS

NOTE: For Engine Temperature Warning Indicator system problems, refer to the service information , Instrument Cluster.

PCM connector disconnected.

Ignition ON, engine OFF.

Does the engine temperature warning indicator lamp turn OFF (prove out) and\or the temperature gauge return to the normal zone with the PCM disconnected?

Yes	No
GO to **DL13** .	REFER to the service information , Instrument Cluster to diagnose the incorrect temperature gauge. REPAIR as necessary. CLEAR the DTCs. REPEAT the self-test.

DL13 ENGINE OVERHEAT CONDITION INDICATED

WARNING: TO AVOID PERSONAL INJURY DO NOT UNSCREW THE COOLANT PRESSURE RELIEF CAP WHILE THE ENGINE IS OPERATING OR HOT. THE COOLING SYSTEM IS UNDER PRESSURE. STEAM AND HOT LIQUID CAN COME OUT FORCEFULLY WHEN THE CAP IS LOOSENED SLIGHTLY. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN PERSONAL INJURY.

Check the engine coolant level.

Is the engine coolant fill level correct?

Yes	No
REFER to the service information , Engine Cooling, to diagnose the engine overheating symptom. REPAIR as necessary. CLEAR the DTCs. REPEAT the self-test.	REFER to the service information , Engine Cooling to diagnose the loss of coolant. REPAIR as necessary. CLEAR the DTCs. REPEAT the self-test.

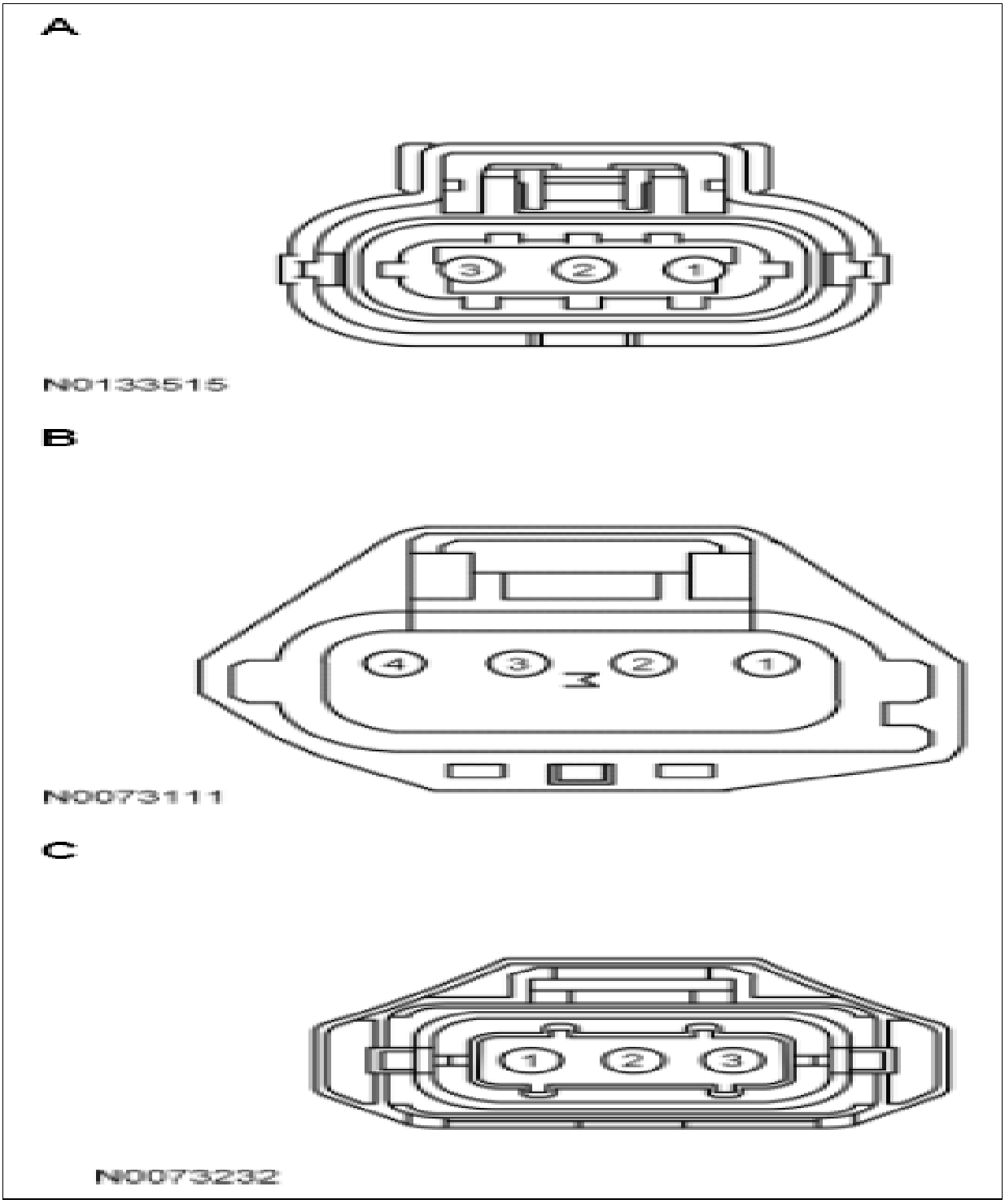
PINPOINT TEST DM: MANIFOLD PRESSURE SENSORS > INTRODUCTION

This pinpoint test is intended to diagnose the following:

- manifold absolute pressure (MAP) sensor (9F479)
- manifold absolute pressure (MAP)/charge air cooler temperature (CACT) sensor (9F479)
- manifold absolute pressure and temperature (MAPT) sensor (9F479)
- turbocharger boost pressure (TCBP) sensor (9F479)

- turbocharger boost pressure (TCBP)/charge air cooler temperature (CACT) sensor (9F479)
- turbocharger inlet pressure and temperature (TCIPT) sensor (9F479)
- harness circuits: MAP, TCBP, TCIP, SIGRTN, and VREF
- PCM (12A650)

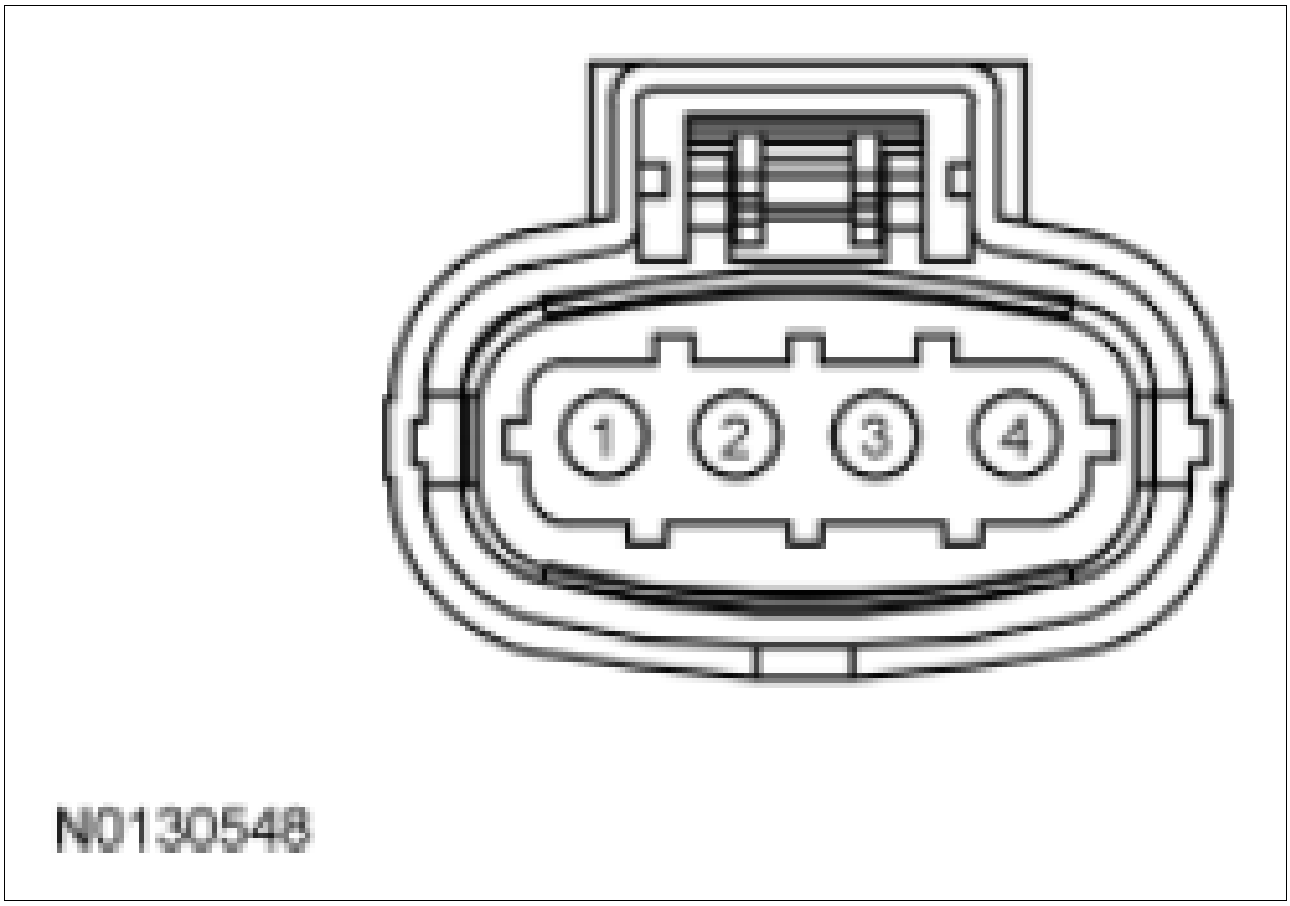
Fig 1: Identifying Manifold Absolute Pressure (MAP) Sensor Connector



Courtesy of FORD MOTOR CO.

Vehicle	Connector	Pin	Circuit
Escape/Kuga 1.6L, Escape/Kuga 2.0L, Explorer, Fiesta, Focus, MKC, MKT, Taurus, Transit Connect 1.6L	A	1 2 3	MAP SIGRTN VREF
Fusion 2.0L, MKZ	C	3 2 1	MAP SIGRTN VREF
All other vehicles	B	1 4 2	MAP SIGRTN VREF

Fig 2: Identifying Manifold Absolute Pressure/Charge Air Cooler Temperature (MAP/CACT) Sensor Connector

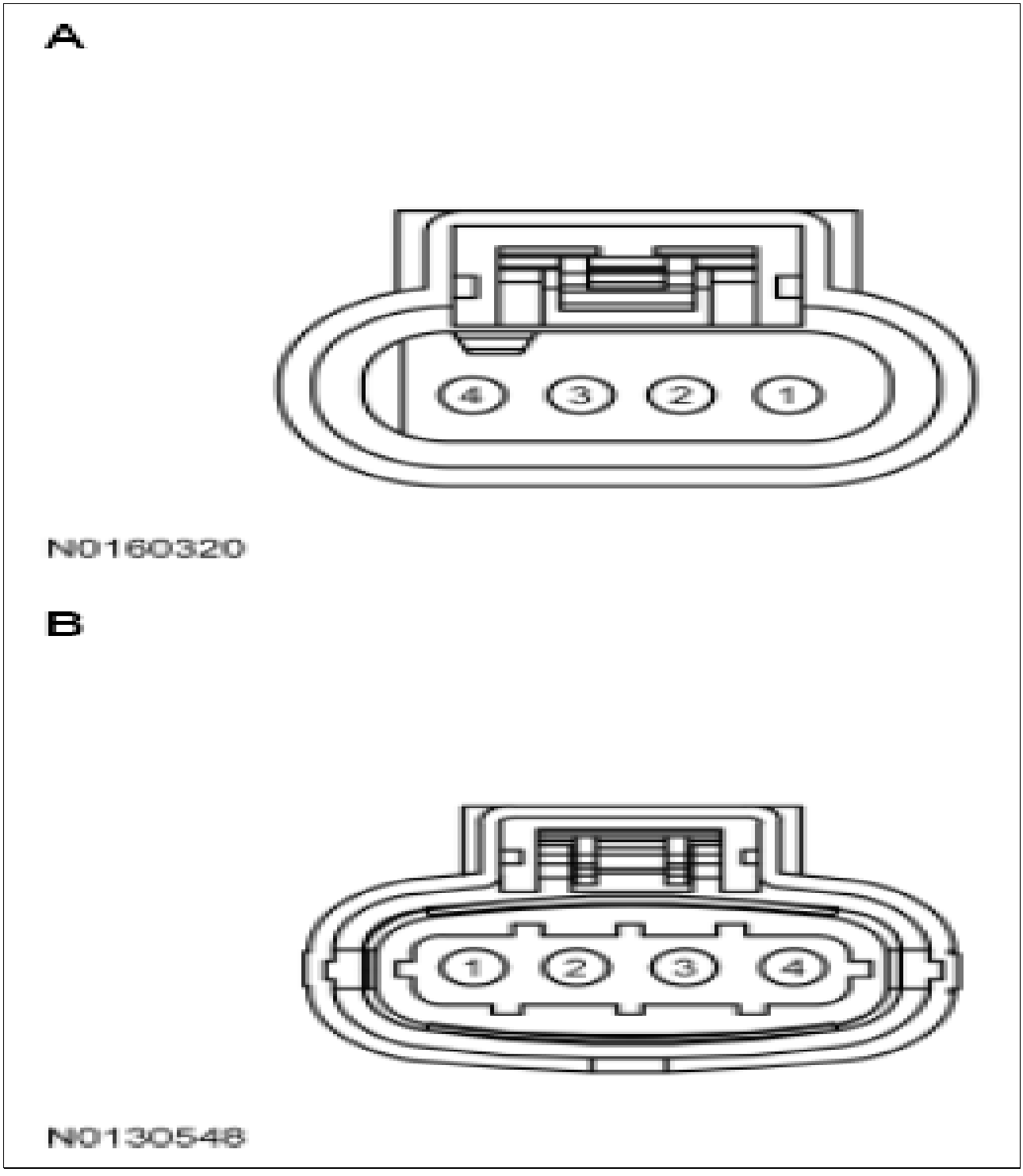


Courtesy of FORD MOTOR CO.

Pin	Circuit

4	MAP (Manifold Absolute Pressure)
1	SIGRTN (Signal Return)
3	VREF (Reference Voltage)

Fig 3: Identifying Manifold Absolute Pressure Temperature (MAPT) Sensor Connector

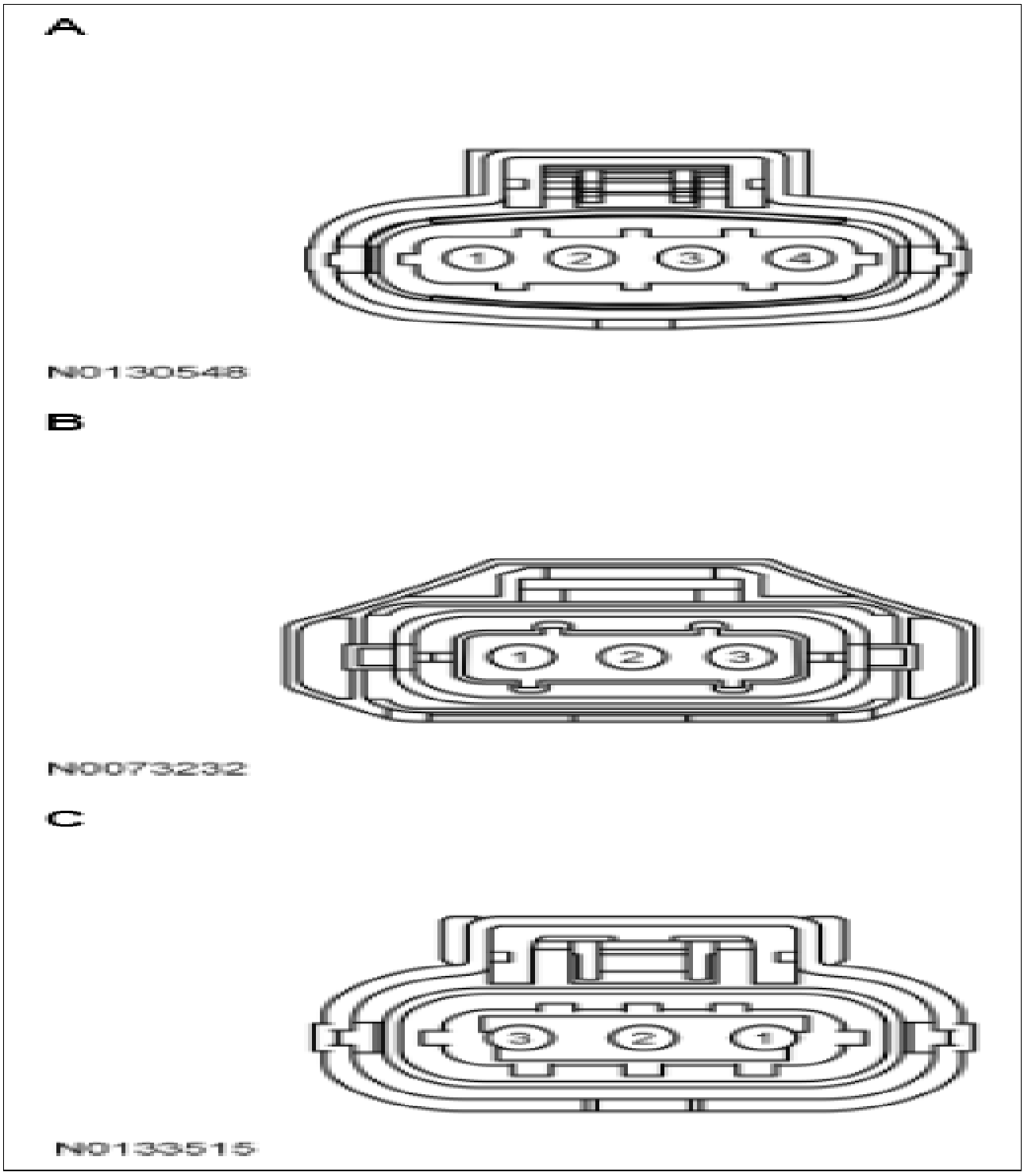


Courtesy of FORD MOTOR CO.

Vehicle	Connector	Pin	Circuit

Edge 3.5L, F-150 3.5L, Mustang	A	1 4 2	MAP SIGRTN VREF
All other vehicles	B	4 1 3	MAP SIGRTN VREF

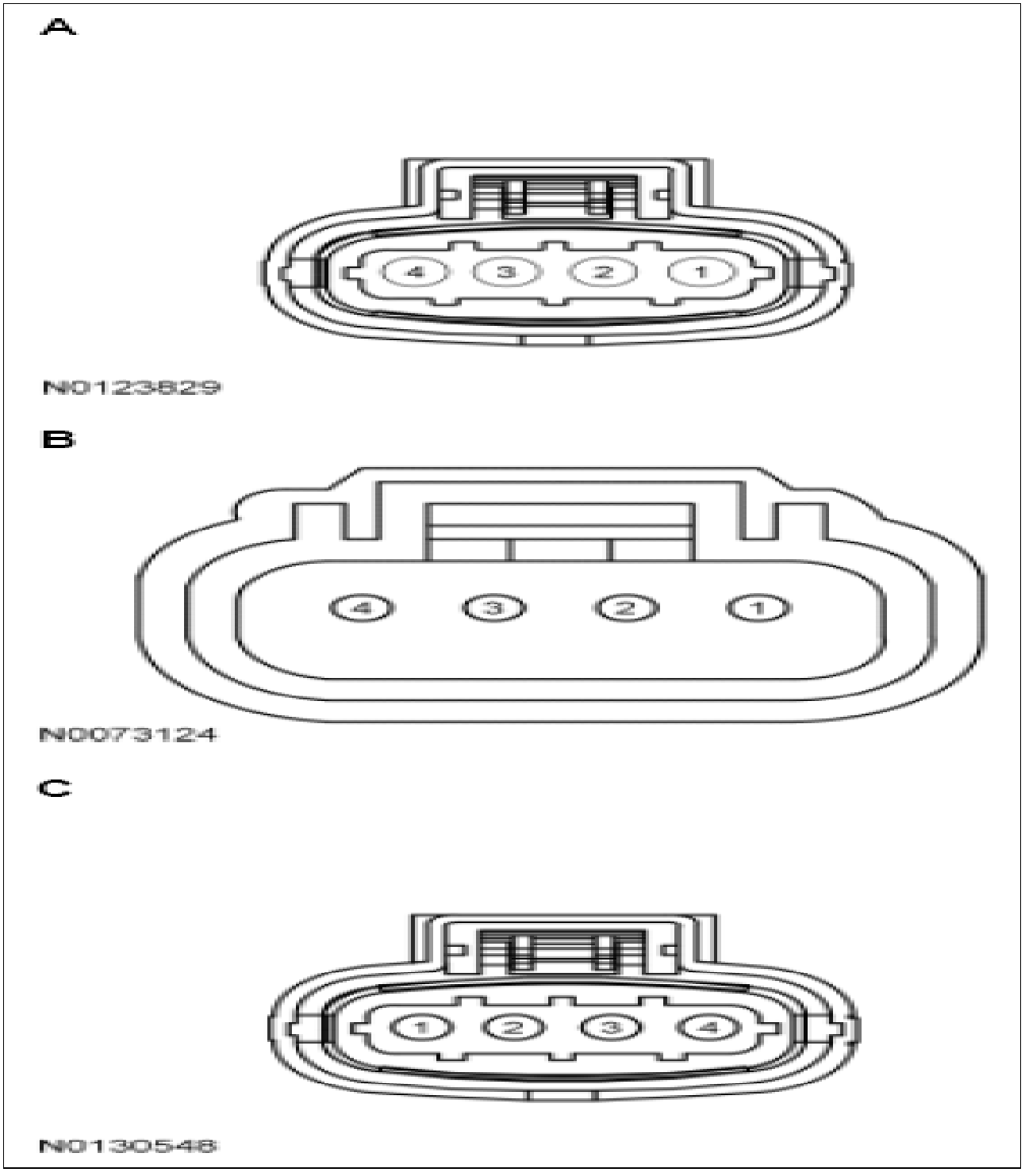
Fig 4: Identifying Turbocharger Boost Pressure (TCBP) Sensor Connector



Courtesy of FORD MOTOR CO.

Vehicle	Connector	Pin	Circuit
MKC, Fiesta 1.0L	A	4 1 3	TCBP SIGRTN VREF
Edge 2.0L, Fusion 1.5L	B	3 2 1	TCBP SIGRTN VREF
Mustang	C	1 2 3	TCBP SIGRTN VREF

Fig 5: Identifying Turbocharger Boost Pressure/Charge Air Cooler Temperature (TCBP/CACT) Sensor Connector

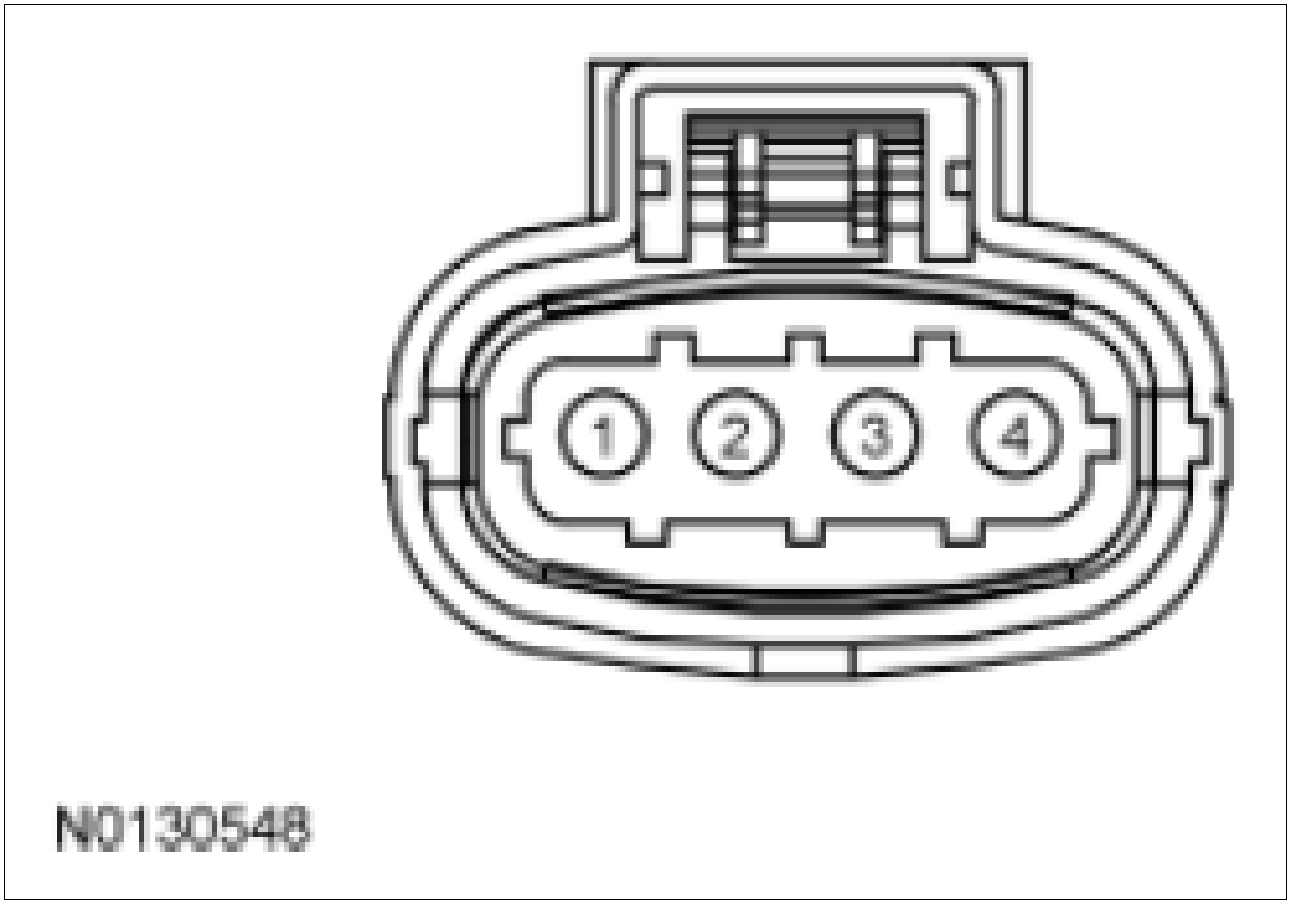


Courtesy of FORD MOTOR CO.

Vehicle	Connector	Pin	Circuit
Escape/Kuga, Explorer 2.0L, Focus,	A	4 1 3	TCBP SIGRTN VREF

MKT 2.0L			
Expedition, Navigator	B	4 1 3	TCBP SIGRTN VREF
Fiesta, Fusion, MKC, MKZ, Taurus 2.0L, Transit Connect	C	4 1 3	TCBP SIGRTN VREF
All other vehicles	B	1 4 2	TCBP SIGRTN VREF

Fig 6: Identifying Turbocharger Intake Pressure And Temperature (TCIPT) Sensor Connector



Courtesy of FORD MOTOR CO.

Pin	Circuit
4	TCIP (Turbocharger Intake Pressure)
1	SIGRTN (Signal Return)
3	VREF (Reference Voltage)

PINPOINT TEST DM: MANIFOLD PRESSURE SENSORS > INTRODUCTION > POWERTRAIN CONTROL MODULE (PCM) CONNECTOR

For PCM connector views or reference values, refer to REFERENCE VALUES .

Vehicle	Connector	Pin	Circuit
Edge 3.5L, F-150 TiVCT 3.5L, F-150 5.0L, Mustang 3.7L	198 PIN	E29 E32	SIGRTN MAP
Escape/Kuga 1.6L, Escape/Kuga 2.0L, Fusion 2.0L, MKZ, Transit Connect 1.6L	198 PIN	B19 B74 E20 E33	SIGRTN TCBP SIGRTN MAP
Escape/Kuga 2.5L, Fusion 2.5L, Transit Connect 2.5L	190-PIN	E49 E40	SIGRTN MAP
Explorer 2.0L	154 PIN	B21 E8 E34 E83	SIGRTN TCBP SIGRTN MAP
Fiesta GTDI 1.6L, Fiesta 1.0L, Focus 1.0L, Fusion 1.6L	198 PIN	B19 B74 E19 E35	SIGRTN TCBP SIGRTN MAP
Fiesta TiVCT 1.6L	128 PIN	B38 B26	SIGRTN MAP
Focus GTDI 2.0L, MKC 2.0L, MKT 2.0L, Taurus 2.0L	198 PIN	B18 B74 E20 E33	SIGRTN TCBP SIGRTN MAP
Fusion 1.5L	198 PIN	E20 B74 E20 E33	SIGRTN TCBP SIGRTN MAP
Transit	198 PIN	B18 B72 B18 B74	SIGRTN TCIP SIGRTN TCBP
All other vehicles	198 PIN	B18 B74	SIGRTN TCBP

PINPOINT TEST DM: MANIFOLD PRESSURE SENSORS > TEST PROCEDURE

DM1 CHECK FOR DTCS

NOTE: This pinpoint test is designed to diagnose multiple components in the same test steps, only measure the circuits that apply to the vehicle and the component being diagnosed.

NOTE: Diagnose circuit concerns before range or performance concerns.

Are DTCs P0106, P0107, P0108, P0109, P012B, P012C, P012D, P012E, P0236, P0237, P0238, or P025E present?

Yes	No
GO to **DM2** .	For symptoms without DTCs, GO to **DM2** . For all others, RETURN to SYMPTOM CHARTS for further direction.

DM2 MONITOR THE MAP PID

Ignition ON, engine OFF.

For the TCIPT sensor.

Access the PCM and monitor the TURBO_INLET_V (VOLT) PID.

For the TCBP or TCBP/CACT sensor,

Access the PCM and monitor the TCBP_V (VOLT) PID.

For all others,

Access the PCM and monitor the MAP (VOLT) PID.

Is the voltage between 0.05 - 4.95 V?

Yes	No
For DTCs P0106, P012B or P0236, GO to DM9. For all others, GO to DM8.	GO to **DM3** .

DM3 CHECK THE VOLTAGE BETWEEN THE VREF AND SIGRTN CIRCUITS

Ignition OFF.

For the MAP sensor,

MAP Sensor connector disconnected.

Measure the voltage between:

(+) MAP Sensor Connector, Harness Side	(-) MAP Sensor Connector, Harness Side
VREF	SIGRTN

For the MAP/CACT sensor,

MAP/CACT Sensor connector disconnected.

Measure the voltage between:

(+) MAP/CACT Sensor Connector, Harness Side	(-) MAP/CACT Sensor Connector, Harness Side
VREF - Pin 3	SIGRTN - Pin 1

For the MAPT sensor,

MAPT Sensor connector disconnected.

Measure the voltage between:

(+) MAPT Sensor Connector, Harness Side	(-) MAPT Sensor Connector, Harness Side
VREF	SIGRTN

For the TCBP sensor,

TCBP Sensor connector disconnected.

Measure the voltage between:

(+) TCBP Sensor Connector, Harness Side	(-) TCBP Sensor Connector, Harness Side
VREF	SIGRTN

For the TCBP/CACT sensor,

TCBP/CACT Sensor connector disconnected.

Measure the voltage between:

(+) TCBP/CACT Sensor Connector, Harness Side	(-) TCBP/CACT Sensor Connector, Harness Side
VREF	SIGRTN

For the TCIPT sensor,

TCIPT Sensor connector disconnected.

Measure the voltage between:

(+) TCIPT Sensor Connector, Harness Side	(-) TCIPT Sensor Connector, Harness Side
VREF - Pin 3	SIGRTN - Pin 1

Ignition ON, engine OFF.

Is the voltage between 4.5 - 5.5 V?

Yes	No
GO to **DM4** .	GO to PINPOINT TEST C .

DM4 CHECK FOR AN OPEN

Ignition OFF.

PCM connector disconnected.

For the MAP sensor,

Measure the resistance between:

(+) MAP Sensor Connector, Harness Side	(-) PCM Connector, Harness Side
MAP	MAP
SIGRTN	SIGRTN

For the MAP/CACT sensor,

Measure the resistance between:

(+) MAP/CACT Sensor Connector, Harness Side	(-) PCM Connector, Harness Side
MAP - Pin 4	MAP
SIGRTN - Pin 1	SIGRTN

For the MAPT sensor,

Measure the resistance between:

(+) MAPT Sensor Connector, Harness Side	(-) PCM Connector, Harness Side
MAP	SIGRTN
SIGRTN	SIGRTN

For the TCBP sensor,

Measure the resistance between:

(+) TCBP Sensor Connector, Harness Side	(-) PCM Connector, Harness Side

TCBP	TCBP
SIGRTN	SIGRTN

For the TCBP/CACT sensor,

Measure the resistance between:

(+) TCBP/CACT Sensor Connector, Harness Side	(-) PCM Connector, Harness Side
TCBP	TCBP
SIGRTN	SIGRTN

For the TCIPT sensor,

Measure the resistance between:

(+) TCIPT Sensor Connector, Harness Side	(-) PCM Connector, Harness Side
TCIP - Pin 4	TCIP
SIGRTN - Pin 1	SIGRTN

Are the resistances less than 5 ohms?

Yes	No
GO to **DM5** .	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

DM5 CHECK FOR A SHORT TO SIGRTN OR GROUND

For the MAP sensor,

Measure the resistance between:

(+) MAP Sensor Connector, Harness Side	(-)
MAP	Ground

Measure the resistance between:

(+) MAP Sensor Connector, Harness Side	(-) MAP Sensor Connector, Harness Side
MAP	SIGRTN

For the MAP/CACT sensor,

Measure the resistance between:

(+) MAP/CACT Sensor Connector, Harness Side	(-)
MAP - Pin 4	Ground

Measure the resistance between:

(+) MAP/CACT Sensor Connector, Harness Side	(-) MAP/CACT Sensor Connector, Harness Side
MAP - Pin 4	SIGRTN - Pin 1

For the MAPT sensor,

Measure the resistance between:

(+) MAPT Sensor Connector, Harness Side	(-)
MAP	Ground

Measure the resistance between:

(+) MAPT Sensor Connector, Harness Side	(-) MAPT Sensor Connector, Harness Side
MAP	SIGRTN

For the TCBP sensor,

Measure the resistance between:

(+) TCBP Sensor Connector, Harness Side	(-)
TCBP	Ground

Measure the resistance between:

(+) TCBP Sensor Connector, Harness Side	(-) TCBP Sensor Connector, Harness Side
TCBP	SIGRTN

For the TCBP/CACT sensor,

Measure the resistance between:

(+) TCBP/CACT Sensor Connector, Harness Side	(-)
TCBP	Ground

Measure the resistance between:

(+) TCBP/CACT Sensor Connector, Harness Side	(-) TCBP/CACT Sensor Connector, Harness Side
TCBP	SIGRTN

For the TCIPT sensor,

Measure the resistance between:

(+) TCIPT Sensor Connector, Harness Side	(-)
TCIP - Pin 4	Ground

Measure the resistance between:

(+) TCIPT Sensor Connector, Harness Side	(-) TCIPT Sensor Connector, Harness Side
TCIP - Pin 4	SIGRTN - Pin 1

Are the resistances greater than 10K ohms?

Yes	No
GO to **DM6** .	REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.

DM6 CHECK FOR A SHORT TO VOLTAGE

Ignition ON, engine OFF.

For the MAP sensor,

Measure the voltage between:

(+) MAP Sensor Connector, Harness Side	(-)
MAP	Ground

For the MAP/CACT sensor,

Measure the voltage between:

(+) MAP/CACT Sensor Connector, Harness Side	(-)
MAP - Pin 4	Ground

For the MAPT sensor,

Measure the voltage between:

(+) MAPT Sensor Connector, Harness Side	(-)
MAP	Ground

For the TCBP sensor,

Measure the voltage between:

(+) TCBP Sensor Connector, Harness Side	(-)

TCBP	Ground

For the TCBP/CACT sensor,

Measure the voltage between:

(+) TCBP/CACT Sensor Connector, Harness Side	(-)
TCBP	Ground

For the TCIPT sensor,

Measure the voltage between:

(+) TCIPT Sensor Connector, Harness Side	(-)
TCIP - Pin 4	Ground

Is any voltage present?

Yes	No
REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.	GO to **DM7** .

DM7 INDUCE THE OPPOSITE VOLTAGE

Ignition OFF.

PCM connector connected.

For the MAP sensor,

Connect a 5 amp fused jumper wire between the following:

Point A MAP Sensor Connector, Harness Side	Point B MAP Sensor Connector, Harness Side
MAP	SIGRTN

For the MAP/CACT sensor,

Connect a 5 amp fused jumper wire between the following:

Point A MAP/CACT Sensor Connector, Harness Side	Point B MAP/CACT Sensor Connector, Harness Side
MAP - Pin 4	SIGRTN - Pin 1

For the MAPT sensor,

Connect a 5 amp fused jumper wire between the following:

Point A MAPT Sensor Connector, Harness Side	Point B MAPT Sensor Connector, Harness Side
MAP	SIGRTN

Access the PCM and monitor the MAP (VOLT) PID.

For the TCBP sensor,

Connect a 5 amp fused jumper wire between the following:

Point A TCBP Sensor Connector, Harness Side	Point B TCBP Sensor Connector, Harness Side
TCBP	SIGRTN

For the TCBP/CACT sensor,

Connect a 5 amp fused jumper wire between the following:

Point A TCBP/CACT Sensor Connector, Harness Side	Point B TCBP/CACT Sensor Connector, Harness Side
TCBP	SIGRTN

Access the PCM and monitor the TCBP_V (VOLT) PID.

For the TCIPT sensor,

Connect a 5 amp fused jumper wire between the following:

Point A TCIPT Sensor Connector, Harness Side	Point B TCIPT Sensor Connector, Harness Side
TCIP - Pin 4	SIGRTN - Pin 1

Access the PCM and monitor the TURBO_INLET_V (VOLT) PID.

Ignition ON, engine OFF.

Is the voltage less than 4.6V?

Yes	No
INSTALL a new sensor in question. REFER to the service information , Electronic Engine Controls. Clear the PCM DTCs. REPEAT the self-test.	GO to DM11.

DM8 CHECK THE CIRCUITS FOR INTERMITTENT CONCERNS

Ignition ON, engine OFF.

For the MAP, MAP/CACT, or MAPT sensor,

Access the PCM and monitor the MAP (VOLT) PID.

For the TCBP or TCBP/CACT sensor,

Access the PCM and monitor the TCBP_V (VOLT) PID.

For the TCIPT sensor.

Access the PCM and monitor the TURBO_INLET_V (VOLT) PID.

Lightly tap on the sensor in question and wiggle the harness connector to simulate road shock.

Does a sudden change in voltage occur while monitoring the PID?

Yes	No
REPAIR as necessary. Clear the PCM DTCs. REPEAT the self-test.	Unable to duplicate or identify the concern at this time. GO to PINPOINT TEST Z .

DM9 MAP VOLTAGE

Ignition ON, engine OFF.

Access the PCM and monitor the MAP (VOLT) PID.

Record the PID value.

Ignition ON, engine running.

Record the PID value.

Does the PID value change?

Yes	No
For Escape 2.5L, Fiesta 1.6L TIVCT, Fusion 2.5L, and Transit Connect 2.5L, Unable to duplicate or identify the concern at this time. GO to PINPOINT TEST Z . For all others, GO to **DM10** .	INSTALL a new sensor in question. REFER to the service information , Electronic Engine Controls. Clear the PCM DTCs. REPEAT the self-test.

DM10 CHECK FOR KOEO BARO, MAP, TCBP VALUE CORRELATIONS

NOTE: All PIDS may not be available on all vehicles.

Ignition ON, engine OFF.

Access the PCM and monitor the BARO (PRESS), MAP (PRESS), TCBP (PRESS) and TURBO_INLET (PRESS) PIDs.

Is the suspect sensor PID reading within 10.35 kPa (1.5 psi) of the other sensors?

Yes	No
GO to **DM11** .	For the BARO sensor, GO to PINPOINT TEST DO . For all others, CHECK the sensor in question for contamination or obstructions. REPAIR as necessary. If no concerns are present, INSTALL a new sensor in question. REFER to the service information , Electronic Engine Controls. Clear the PCM DTCs. REPEAT the self-test.

DM11 CHECK FOR CORRECT PCM OPERATION

Disconnect all the PCM connectors.

Visually inspect for:

pushed out pins

corrosion

Connect all the PCM connectors and make sure they seat correctly.

Carry out the PCM self-test.

Verify the concern is still present.

Is the concern still present?

Yes	No
INSTALL a new PCM. REFER to FLASH ELECTRICALLY ERASABLE PROGRAMMABLE READ ONLY MEMORY (EEPROM) , Programming the VID Block for a Replacement PCM.	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.

PINPOINT TEST DO: BAROMETRIC PRESSURE (BARO) SENSOR > INTRODUCTION

This pinpoint test is intended to diagnose the following:

- BARO sensor
- PCM (12A650)

BARO SENSOR TRANSFER SPECIFICATIONS

Volts	Pressure in kPa	Pressure in psi	Pressure in in-Hg
0.3	7.6	1.1	2.2
0.5	12.7	1.84	3.8
2.64	60	8.7	17.7

4.54	115	16.68	34
4.75	120.3	17.45	35.5
4.8	121.6	17.66	35.9

PINPOINT TEST DO: BAROMETRIC PRESSURE (BARO) SENSOR > TEST PROCEDURE

DO1 CHECK FOR DIAGNOSTIC TROUBLE CODES (DTCS)

Are DTCs P2227, P2228, P2229, or P2230 present?

Yes	No
GO to **DO2** .	RETURN to SYMPTOM CHARTS for further direction.

DO2 CHECK BARO SENSOR OPERATION

NOTE: Most local weather reports include a barometric pressure that is corrected to factor in sea level. However, the BARO PID indicates the barometric pressure for the actual vehicle altitude. Local weather conditions (high or low pressure) may change the local barometric pressure by several inches of mercury.

Ignition ON, engine OFF.

Access the PCM and monitor the BARO (PRESS) PID.

Record the BARO PID value.

Verify that the BARO PID value is approximately the same as the daily barometric pressure from your local weather report.

Does the BARO PID value compare with the reported barometric pressure?

Yes	No
The system is operating correctly at this time. Clear the PCM DTCs. REPEAT the self-test.	GO to **DO3** .

DO3 CHECK FOR CORRECT PCM OPERATION

Disconnect all the PCM connectors.

Visually inspect for:

pushed out pins

corrosion

Connect all the PCM connectors and make sure they seat correctly.

Carry out the PCM self-test.

Verify the concern is still present.

Is the concern still present?

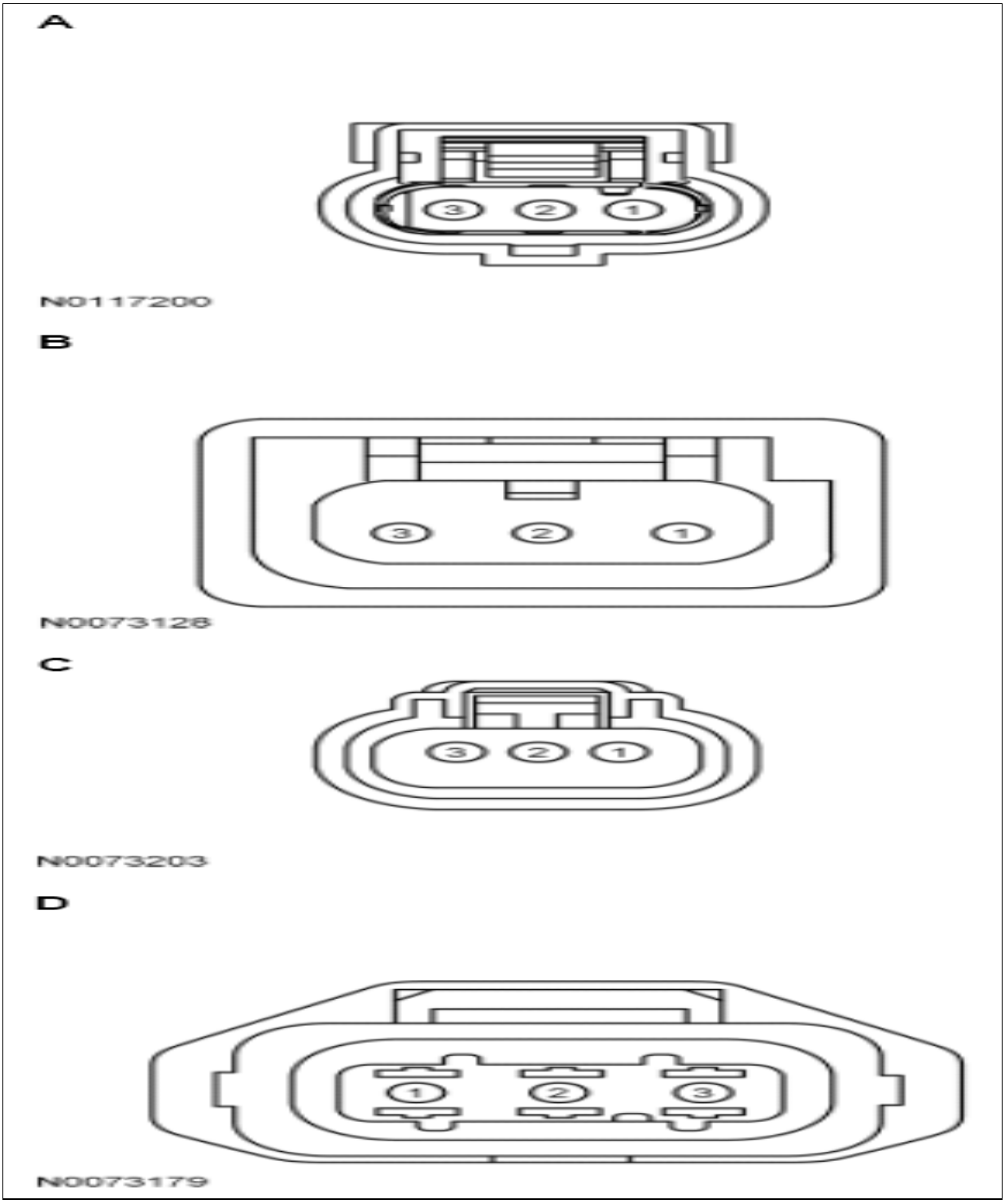
Yes	No
INSTALL a new PCM. REFER to FLASH ELECTRICALLY ERASABLE PROGRAMMABLE READ ONLY MEMORY (EEPROM) , Programming the VID Block for a Replacement PCM.	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.

PINPOINT TEST DR: CAMSHAFT POSITION (CMP) SENSOR > INTRODUCTION

This pinpoint test is intended to diagnose the following:

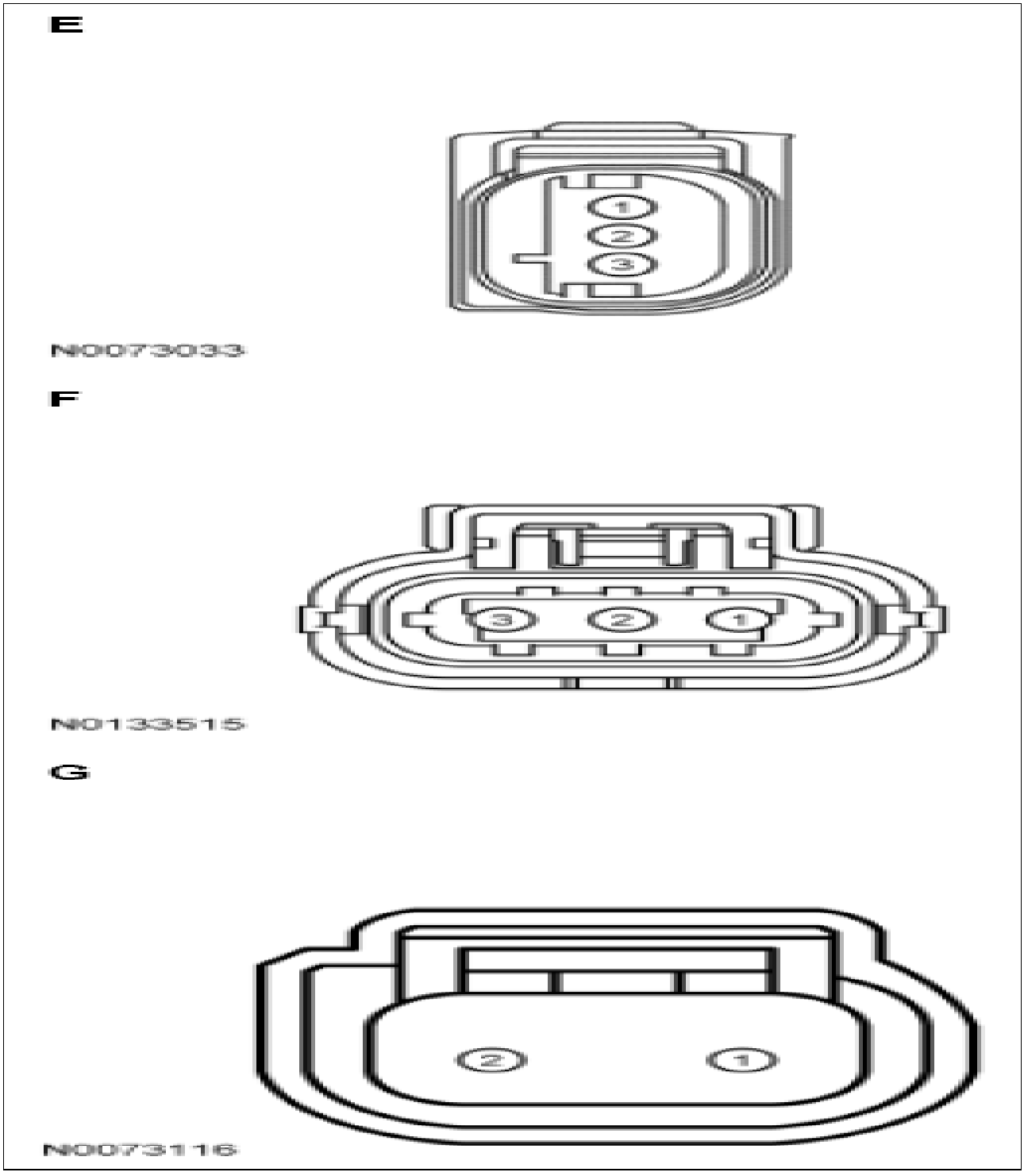
- CMP sensor (6B288 or 12K073)
- harness circuits: CMP, SIGRTN, VBPWR or VREF
- PCM (12A650)

Fig 1: Identifying Camshaft Position Bank 1 Sensor 1 (CMP11) Sensor Connector (1 Of 2)



Courtesy of FORD MOTOR CO.

Fig 2: Identifying Camshaft Position Bank 1 Sensor 1 (CMP11) Sensor Connector (2 Of 2)

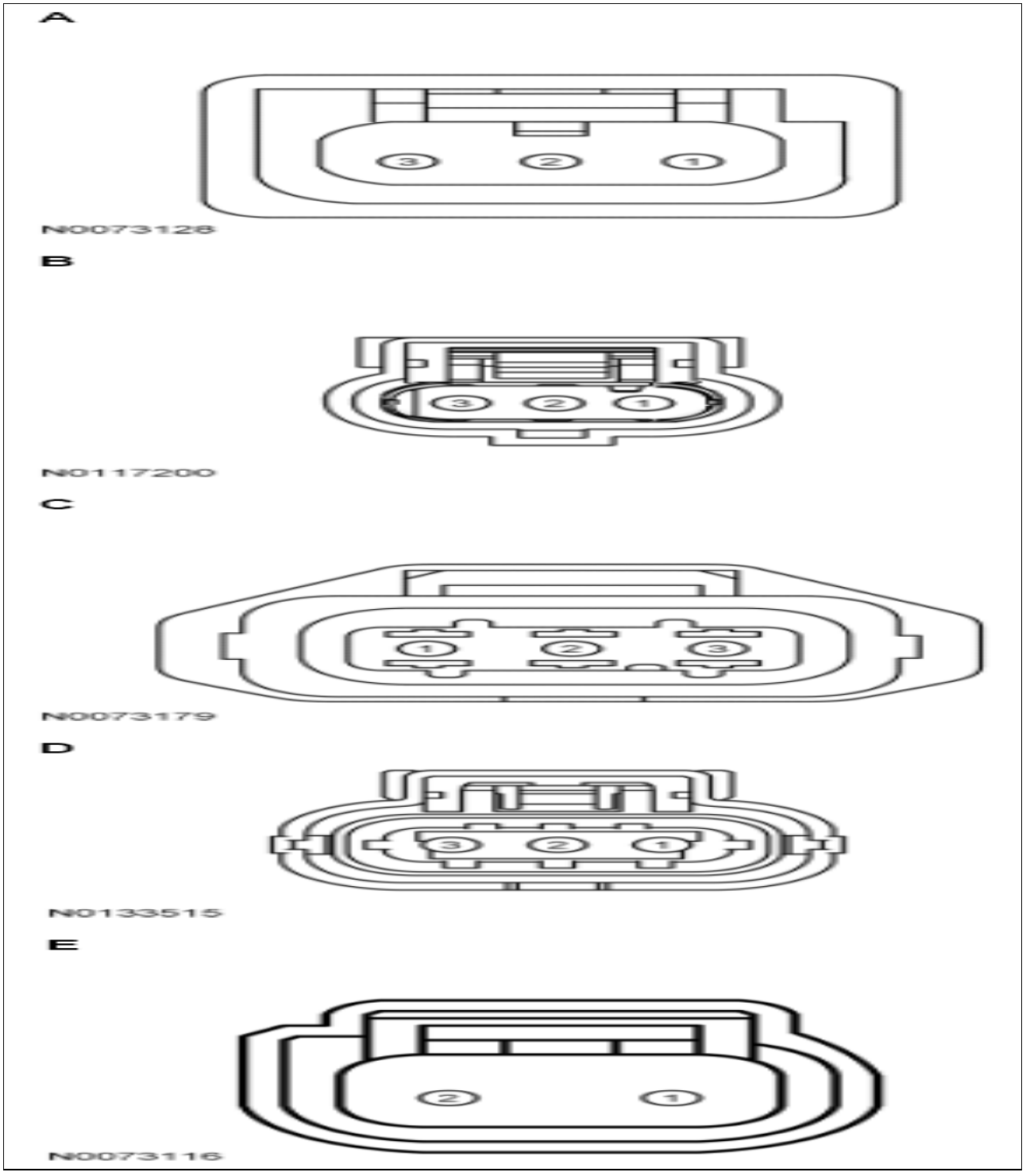


Courtesy of FORD MOTOR CO.

Vehicle	Connector	Pin	Circuit
Edge 2.7L, Edge 3.5L, Expedition, Explorer GTDI 3.5L,	A	3 2 1	VBPWR SIGRTN CMP11

F-150 GTDI 3.5L, F-150 2.7L, Flex GTDI 3.5L, MKS 3.5L, MKT 3.5L, Mustang 3.7L, Navigator, Taurus GTDI 3.5L, Transit 3.5L			
Edge 2.0L, Escape/Kuga 2.0L, Explorer 2.0L, Focus 2.0L, Fusion 2.0L, MKC, MKT 2.0L, MKZ 2.0L, Mustang 2.3L, Taurus 2.0L	B	1 2 3	VREF SIGRTN CMP11
Escape/Kuga 2.5L, Fusion 2.5L, Transit Connect 2.5L	C	1 3 2	VBPWR SIGRTN CMP11
Escape/Kuga 1.6L, Fiesta GTDI 1.6L, Fusion 1.5L, Fusion 1.6L	D	3 1 2	VREF SIGRTN CMP11
F-150 5.0L, Mustang 5.0L	E	1 3 2	VBPWR SIGRTN CMP11
F-Series Super Duty 6.2L	E	3 2 1	VBPWR SIGRTN CMP11
Fiesta TiVCT 1.6L, Focus 1.0L	A	1 3 2	VREF SIGRTN CMP11
Fiesta 1.0L	F	1 3 2	VREF SIGRTN CMP11
Transit Connect 1.6L	F	3 1 2	VREF SIGRTN CMP11
All other vehicles	G	1 2	SIGRTN CMP11

Fig 3: Identifying Camshaft Position Bank 1 Sensor 2 (CMP12) Sensor Connector

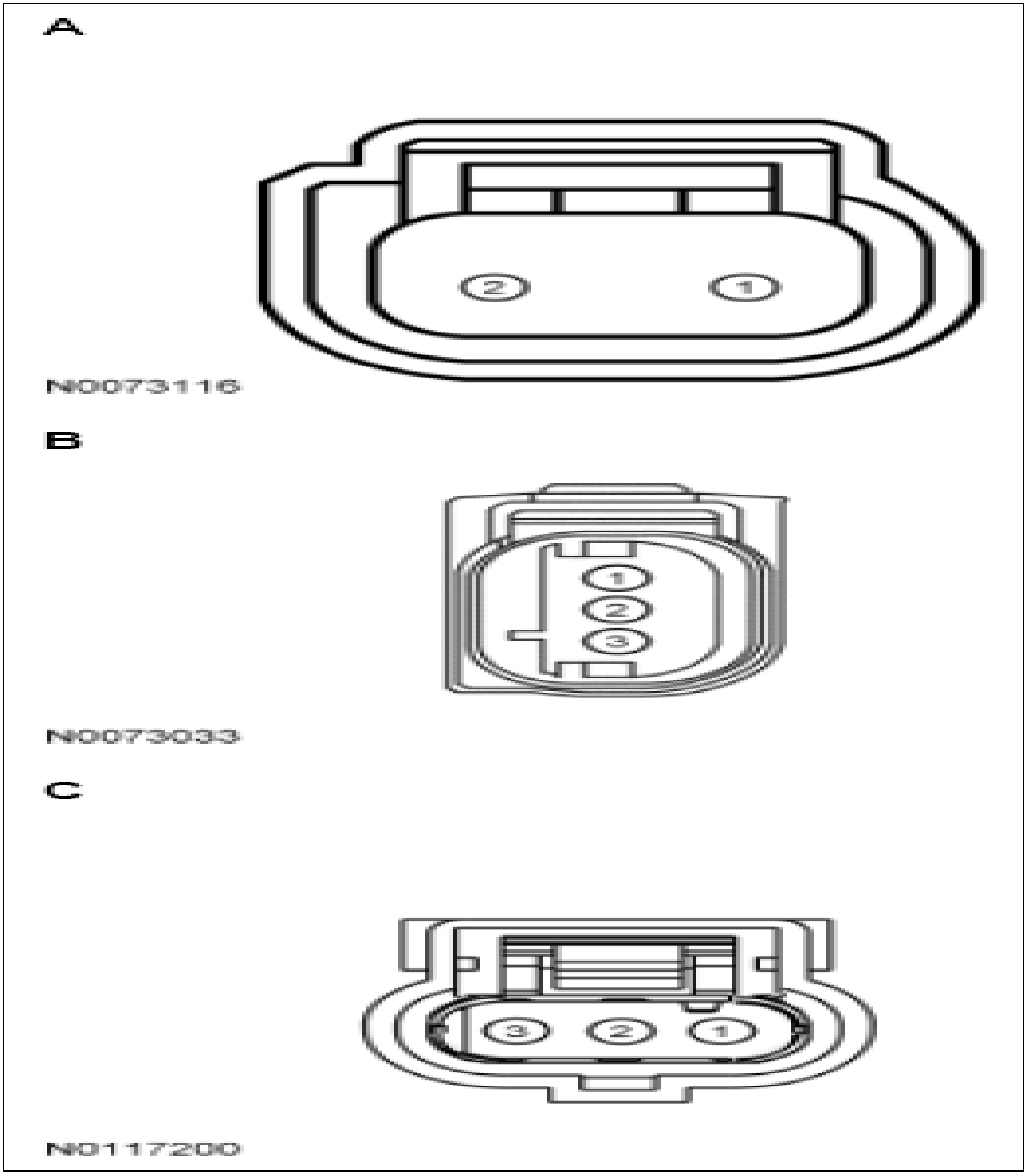


Courtesy of FORD MOTOR CO.

Vehicle	Connector	Pin	Circuit
Escape/Kuga 2.0L, Edge 2.0L, Explorer 2.0L, Focus 2.0L,	A	1 2 3	VREF SIGRTN CMP12

Fusion 2.0L, MKC, MKT 2.0L, MKZ 2.0L, Mustang 2.3L, Taurus 2.0L			
Edge 2.7L, Expedition, F-150 GTDI 3.5L, F-150 2.7L, Navigator, Transit 3.5L	B	3 2 1	VBPWR SIGRTN CMP12
Escape/Kuga 1.6L, Fiesta GTDI 1.6L, Fusion 1.5L, Fusion 1.6L	C	3 1 2	VREF SIGRTN CMP12
Fiesta TiVCT 1.6L, Focus 1.0L	B	1 3 2	VREF SIGRTN CMP12
Fiesta 1.0L	D	1 3 2	VREF SIGRTN CMP12
Transit Connect	D	3 1 2	VREF SIGRTN CMP12
All other vehicles	E	1 2	SIGRTN CMP12

Fig 4: Identifying Camshaft Position Bank 2 Sensor 1 (CMP21) Sensor Connector

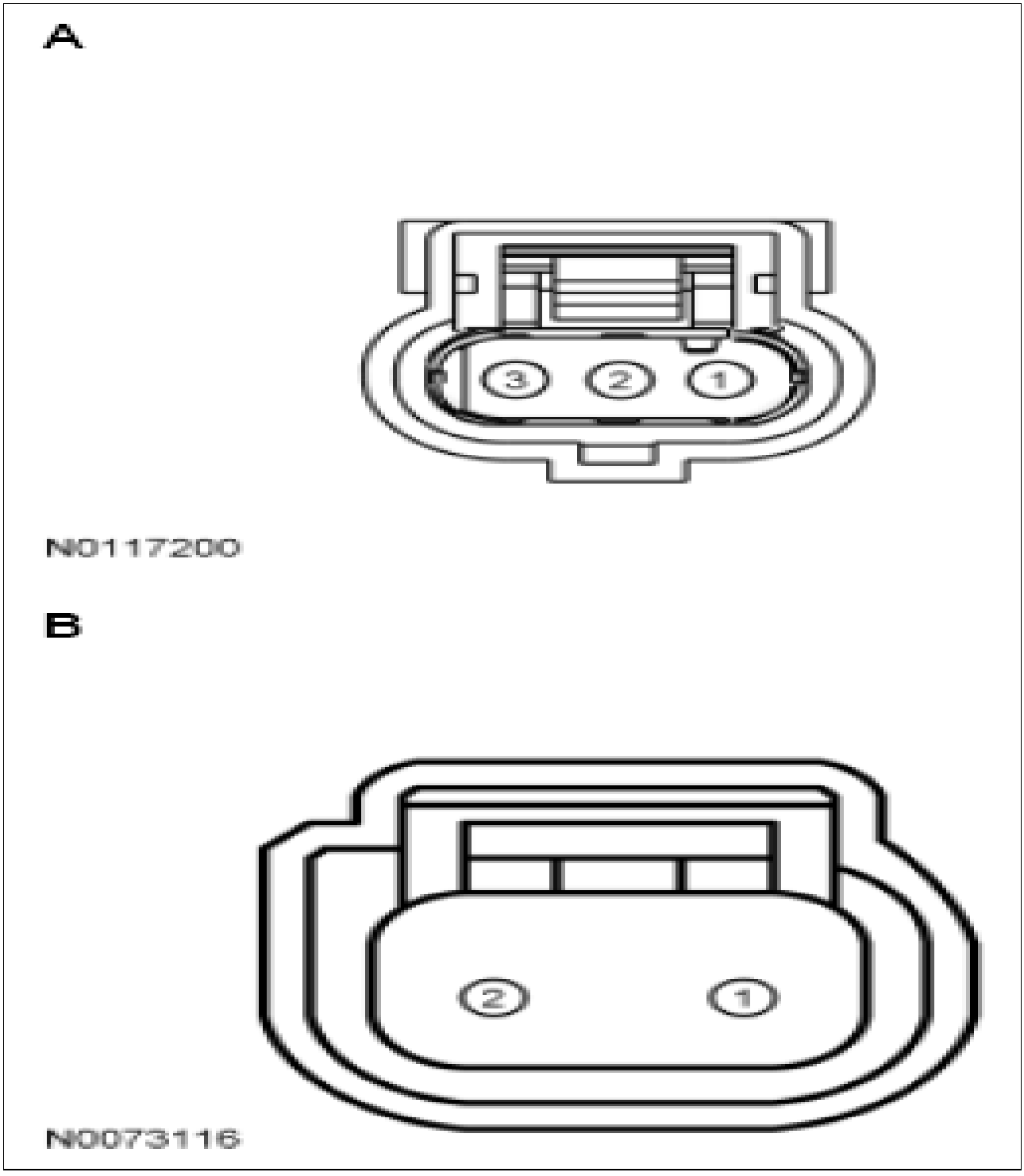


Courtesy of FORD MOTOR CO.

Vehicle	Connector	Pin	Circuit
Explorer 3.7L, Explorer TiVCT 3.5L, Flex TiVCT 3.5L, MKS 3.7L,	A	1 2	SIGRTN CMP21

MKT 3.7L, MKX, MKZ, Taurus TiVCT 3.5L, Taurus 3.7L, Transit 3.7L			
F-150 5.0L, Mustang 5.0L	B	1 3 2	VBPWR SIGRTN CMP21
F-Series Super Duty	B	3 2 1	VBPWR SIGRTN CMP21
All other vehicles	C	3 2 1	VBPWR SIGRTN CMP21

Fig 5: Identifying Camshaft Position Bank 2 Sensor 2 (CMP22) Sensor Connector



Courtesy of FORD MOTOR CO.

Vehicle	Connector	Pin	Circuit
Edge 2.7L, Expedition, F-150 GTDI 3.5L, F-150 2.7L,	A	3 2 1	VBPWR SIGRTN CMP22

Navigator, Transit 3.5L			
All other vehicles	B	1 2	SIGRTN CMP22

PINPOINT TEST DR: CAMSHAFT POSITION (CMP) SENSOR > INTRODUCTION > POWERTRAIN CONTROL MODULE (PCM) CONNECTOR

For PCM connector views or reference values, refer to REFERENCE VALUES .

Vehicle	Connector	Pin	Circuit
E-Series 6.8L, F-650/F-750, F-Series Super Duty 6.8L, Motorhome/Stripped Chassis/Step Van	190-PIN	E46 E29	CMP11 SIGRTN
E-Series 5.4L	190-PIN	E27 E41	CMP11 SIGRTN
Edge 2.0L, Focus GTDI 2.0L, Fusion 2.0L, Fusion 1.5L, MKC, MKZ 2.0L, Taurus 2.0L, Transit Connect 1.6L	198 PIN	E6 E54 E28 E53	VREF CMP12 CMP11 SIGRTN
Edge 2.7L, Expedition, F-150 2.7L, F-150 GTDI 3.5L, Navigator, Transit 3.5L	198 PIN	E22 E70 E26 E54 E28 E53	VBPWR CMP22 CMP21 CMP12 CMP11 SIGRTN
Edge 3.5L, F-150 TiVCT 3.5L, F-150 5.0L, Mustang 3.7L, Mustang 5.0L	198 PIN	E17 E41 E42 E55 E56 E40, E49, E54	VBPWR CMP22 CMP21 CMP12 CMP11 SIGRTN
Escape/Kuga 1.6L, Escape/Kuga 2.0L, MKT 2.0L	198 PIN	E54 E28 E53	CMP12 CMP11 SIGRTN
Escape/Kuga 2.5L, Fusion 2.5L, Transit Connect 2.5L	190-PIN	E36 E11 E49	VBPWR CMP11 SIGRTN

Explorer 2.0L	154 PIN	E15 E79 E80 E46	VREF CMP12 CMP11 SIGRTN
Explorer GTDI 3.5L, Flex GTDI 3.5L, MKS 3.5L, MKT 3.5L, Taurus GTDI 3.5L	198 PIN	E22 E26 E28 E53	VBPWR CMP21 CMP11 SIGRTN
F-Series Super Duty 6.2L	190-PIN	E36 E38 E37 E32	VBPWR CMP21 CMP11 SIGRTN
Fiesta GTDI 1.6L, Fiesta 1.0L, Focus 1.0L	198 PIN	E7 E37 E36 E20	VREF CMP12 CMP11 SIGRTN
Fiesta TiVCT 1.6L	128 PIN	T19 T21 T27, T29	CMP12 CMP11 SIGRTN
Focus GDI 2.0L	198 PIN	E15, E16 E79 E80 E44, E47	VREF CMP12 CMP11 SIGRTN
Fusion 1.6L	198 PIN	E7 E37 E36 E54	VREF CMP12 CMP11 SIGRTN
Mustang 2.3L	198 PIN	E6 E54 E28 E53 B72	VREF CMP12 CMP11 SIGRTN CMP
All other vehicles	190-PIN	E48 E46 E47 E45 E28, E44	CMP22 CMP21 CMP12 CMP11 SIGRTN

PINPOINT TEST DR: CAMSHAFT POSITION (CMP) SENSOR > TEST PROCEDURE

DR1 CHECK FOR DTCS

Are DTCs P0340, P0341, P0344, P0345, P0346, P0349, P0365, P0366, P0369, P0390, P0391, or P0394 present?

Yes	No
For vehicles with DTCs and a no crank or no start symptom, GO to DR5. For all others, GO to **DR2** .	For symptoms without DTCs, GO to **DR2** . For all others, RETURN to SYMPTOM CHARTS for further direction.

DR2 INSPECT THE HARNESS

Ignition OFF.

Check the harness for routing, alterations, incorrect shielding, or electrical interference from other systems.

Check the CMP connector for damage or corrosion.

Is a concern present?

Yes	No
REPAIR as necessary. Clear the PCM DTCs. REPEAT the self-test.	GO to **DR3** .

DR3 CLEAR AND ATTEMPT TO RETRIEVE THE DTC

NOTE: Consider the ignition system, alternator noise, radio frequency interference and crankshaft position (CKP) sensor concerns if DTCs P0340, P0341, P0344, P0345, P0346, P0349, P0365, P0366, P0369, P0390, P0391, or P0394 are present.

NOTE: For vehicles with variable camshaft timing (VCT), concerns with the engine oil level, oil filter, oil contamination, or the VCT system may cause camshaft positioning errors.

Ignition ON, engine OFF.

Clear the PCM DTCs.

Ignition ON, engine running.

Increase engine speed to greater than 1, 500 RPM for 10 seconds. Repeat this 3 times.

Carry out the PCM self-test.

Are DTCs P0340, P0341, P0344, P0345, P0346, P0349, P0365, P0366, P0369, P0390, P0391 or P0394 present?

Yes	No
GO to **DR4** .	For symptoms without DTCs, RETURN to SYMPTOM CHARTS for further direction.

	For all others, GO to PINPOINT TEST Z .

DR4 CHECK THE GENERATOR FOR EXCESSIVE ELECTRICAL NOISE

NOTE: If the generator/regulator is electrically noisy, the noise decreases when the B+ connector is disconnected.

Ignition ON, engine running.

Monitor the generator for an audible electric noise.

Ignition OFF.

Generator/regulator B+ connector disconnected.

Ignition ON, engine running.

With the engine running, determine if the generator noise remains steady, decreases or increases in volume.

Does the generator noise remain steady when the B+ connector is disconnected?

Yes	No
CONNECT the generator/regulator B+ connector. GO to **DR5** .	REFER to the service information , Charging System, to DIAGNOSE the generator is noisy symptom.

DR5 CHECK THE VOLTAGE TO THE CMP SENSOR

*NOTE: Diagnose the suspect CMP sensor indicated by the DTC. For 2 pin VR type CMP sensor DTCs, GO to **DR6** .*

CMP Sensor connector disconnected.

Ignition ON, engine OFF.

For VBPWR CMP sensors,

Measure the voltage between:

(+) CMP Sensor Connector, Harness Side	(-)
VBPWR	Ground

For VREF CMP sensors,

Measure the voltage between:

(+) CMP Sensor Connector, Harness Side	(-) CMP Sensor Connector, Harness Side

VREF	SIGRTN

Is the voltage greater than 10.5 V on the VBPWR circuit or between 4.5 and 5.5 V on the VREF circuit?

Yes	No
GO to **DR6** .	For Edge 2.0L, Escape/Kuga 1.6L, Escape/Kuga 2.0L, Explorer 2.0L, Fiesta, Focus, Fusion 1.5L, Fusion 1.6L, Fusion 2.0L, MKC, MKT 2.0L, MKZ 2.0L, Mustang 2.3L, Taurus 2.0L, and Transit Connect 1.6L, GO to PINPOINT TEST C . For all others, REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

DR6 CHECK THE CMP SENSOR RESISTANCE

NOTE: Diagnose the suspect CMP sensor indicated by the DTC.

Ignition OFF.

CMP Sensor connector disconnected.

Measure the resistance between:

(+) CMP Sensor Connector, Component Side	(-) CMP Sensor Connector, Component Side
CMP	SIGRTN

Vehicle	Minimum Resistance (ohms)	Maximum Resistance (ohms)
Edge, F-150 5.0L, MKX, MKZ 3.7L	586	2, 033
All others	250	1, 000

Is the resistance within specification?

Yes	No
GO to **DR7** .	INSTALL a new CMP sensor. REFER to the service information , Electronic Engine Controls. Clear the PCM DTCs. REPEAT the self-test.

DR7 CHECK THE CMP SENSOR CIRCUITS FOR AN OPEN

PCM connector disconnected.

Measure the resistance between:

(+) CMP Sensor Connector, Harness Side	(-) PCM Connector, Harness Side

CMP	CMP
SIGRTN	SIGRTN

Are the resistances less than 5 ohms?

Yes	No
GO to **DR8** .	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

DR8 CHECK THE CMP CIRCUIT FOR A SHORT

Measure the resistance between:

(+) CMP Sensor Connector, Harness Side	(-) CMP Sensor Connector, Harness Side
CMP	SIGRTN

Measure the resistance between:

(+) CMP Sensor Connector, Harness Side	(-)
CMP	Ground

Are the resistances greater than 10K ohms?

Yes	No
GO to **DR9** .	REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.

DR9 CHECK THE CMP CIRCUIT FOR A SHORT TO VOLTAGE

Ignition ON, engine OFF.

Measure the voltage between:

(+) CMP Sensor Connector, Harness Side	(-)
CMP	Ground

Is any voltage present?

Yes	No
REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.	For E-Series, F-650/F-750, F-Series Super Duty 6.8L, and Motorhome/Stripped Chassis/Step Van, GO to DR11. For all others, GO to **DR10** .

DR10 CHECK FOR VARIABLE CAMSHAFT TIMING (VCT) CONCERNS

NOTE: Only diagnose the bank indicated by the DTC.

CMP Sensor connector connected.

PCM connector connected.

Check the VCT system for correct operation.

Is a concern present?

Yes	No
REPAIR as necessary. Clear the PCM DTCs. REPEAT the self-test.	GO to **DR11** .

DR11 CHECK THE CMP SENSOR OPERATION

Ignition OFF.

CMP Sensor connector connected.

PCM connector disconnected.

Ignition ON, engine running.

Access the PCM and monitor the SYNC (MODE) PID.

Does the engine start and does the SYNC PID read YES?

Yes	No
GO to **DR12** .	INSTALL a new CMP sensor. REFER to the service information , Electronic Engine Controls. Clear the PCM DTCs. REPEAT the self-test.

DR12 CHECK FOR DTCS

Carry out the PCM self-test.

Are any DTCs present?

Yes	No
INSTALL a new CMP sensor. REFER to the service information , Electronic Engine Controls. Clear the PCM DTCs. REPEAT the self-test.	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. Clear the PCM DTCs. REPEAT the self-test.

PINPOINT TEST DW: HEATED OXYGEN SENSOR (HO2S) > INTRODUCTION

WARNING: WHILE CONDUCTING TESTS ON A HOT ENGINE TAKE ALL SAFETY PRECAUTIONS TO PREVENT SKIN CONTACT WITH HOT ENGINE COMPONENTS. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN PERSONAL INJURY.

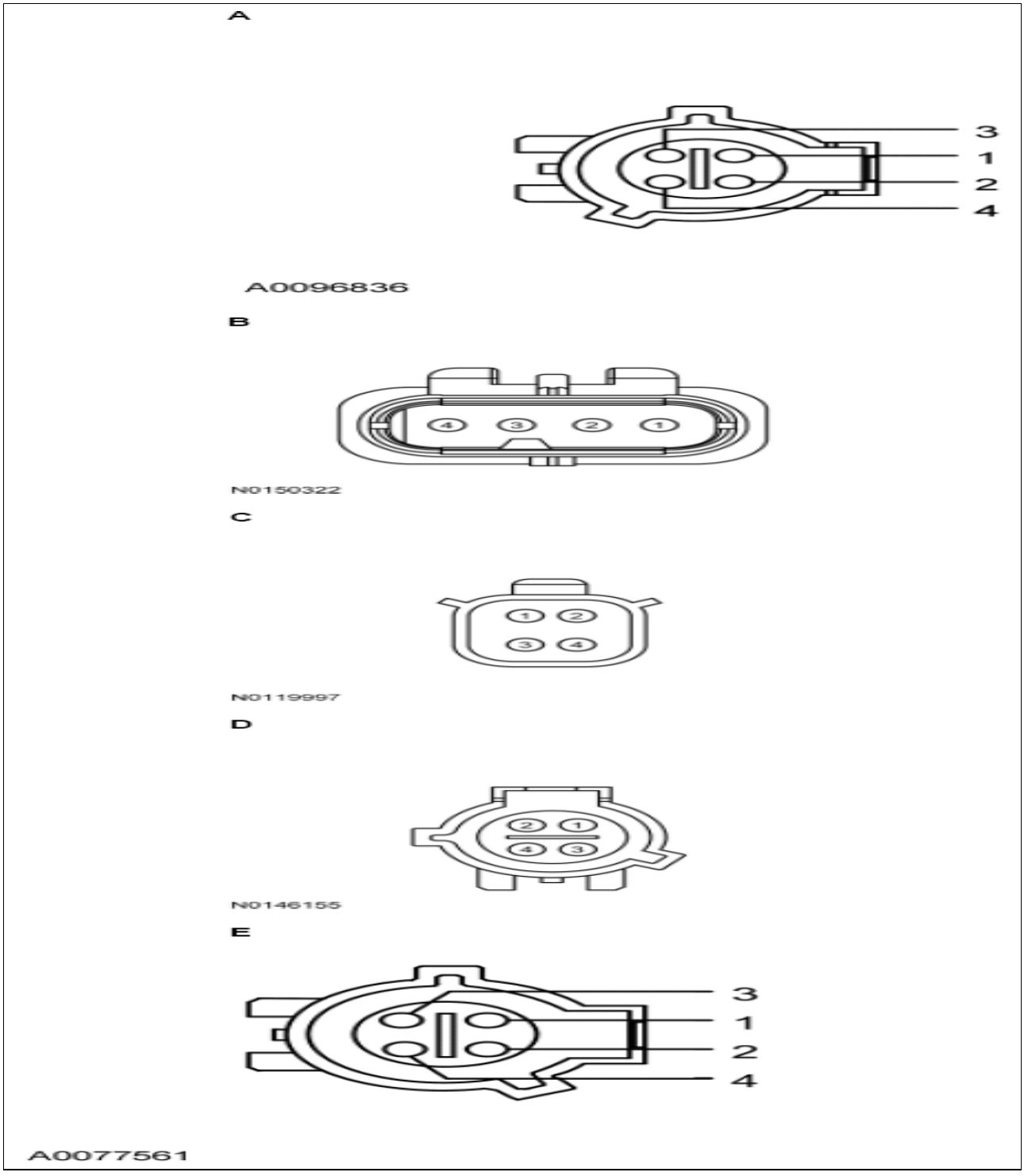
This pinpoint test is intended to diagnose the following:

- HO2S (9G444)
- harness circuits: HO2S12, HO2S22, HTR12, HTR22, VPWR and SIGRTN
- PCM (12A650)

Heated Oxygen Sensor Bank 1, Sensor 2 (HO2S12) Connector

The pin numbering for the connector is in reference to the connector lock tab. Not all connector key combinations are shown.

Fig 1: Identifying Heated Oxygen Sensor Bank 1, Sensor 2 (HO2S12) Connector



Courtesy of FORD MOTOR CO.

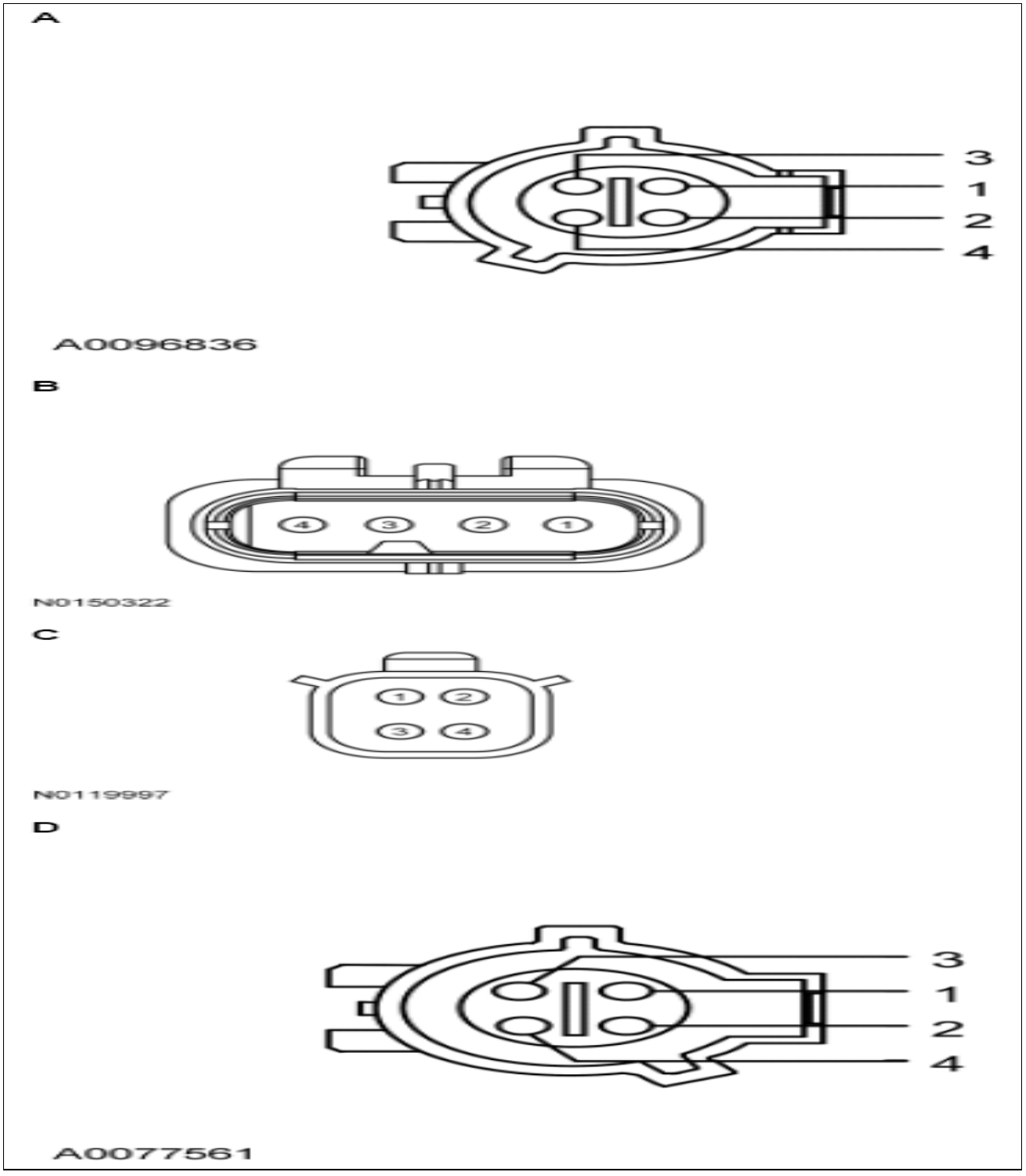
Vehicle	Connector	Pin	Circuit
E-Series, Fiesta TiVCT 1.6L, Motorhome/Stripped Chassis/Step Van	A	1 2 4 3	HTR12 VPWR SIGRTN HO2S12

Edge 2.0L, Expedition, F-150 GTDI 3.5L, Fusion 1.5L, Mustang 2.3L, Navigator	B	2 1 3 4	HTR12 VPWR SIGRTN HO2S12
Escape/Kuga 1.6L, Fiesta GTDI 1.6L, Transit Connect 1.6L	D	2 1 3 4	HTR12 VPWR SIGRTN HO2S12
F-650/F-750	E	1 2 4 3	HTR12 VPWR SIGRTN HO2S12
All other vehicles	C	2 1 3 4	HTR12 VPWR SIGRTN HO2S12

Heated Oxygen Sensor Bank 2, Sensor 2 (HO2S22) Connector

The pin numbering for the connector is in reference to the connector lock tab. Not all connector key combinations are shown.

Fig 2: Identifying Heated Oxygen Sensor Bank 2, Sensor 2 (HO2S22) Connector



Courtesy of FORD MOTOR CO.

Vehicle	Connector	Pin	Circuit
E-Series	A	1 2 4 3	HTR22 VPWR SIGRTN HO2S22

Expedition, F-150 GTDI 3.5L, Navigator	B	2 1 3 4	HTR22 VPWR SIGRTN HO2S22
F-650/F-750	D	1 2 4 3	HTR22 VPWR SIGRTN HO2S22
All other vehicles	C	2 1 3 4	HTR22 VPWR SIGRTN HO2S22

PINPOINT TEST DW: HEATED OXYGEN SENSOR (HO2S) > INTRODUCTION > POWERTRAIN CONTROL MODULE (PCM) CONNECTOR

For PCM connector views or reference values, refer to REFERENCE VALUES .

Vehicle	Connector	Pin	Circuit
E-Series 6.8L	190-PIN	T49 T48 T27 B56 T30	HTR22 HTR12 HO2S22 SIGRTN HO2S12
E-Series 5.4L	190-PIN	T48 T18 B58 T20 B58 T16	HTR22 HTR12 SIGRTN HO2S22 SIGRTN HO2S12
Edge 2.0L, Focus GTDI 2.0L, MKC	198 PIN	B1 B37 B56	HTR12 SIGRTN HO2S12
Edge 3.5L, F-150 TiVCT 3.5L, F-150 5.0L, Mustang 3.7L, Mustang 5.0L	198 PIN	E83 E78 B90 B91 B71 B72	HTR22 HTR12 SIGRTN HO2S22 SIGRTN HO2S12
Escape/Kuga 1.6L, Escape/Kuga 2.0L, Fusion 2.0L, Fusion 1.5L, MKT 2.0L, MKZ 2.0L,	198 PIN	B1 B38 B57	HTR12 SIGRTN HO2S12

Mustang 2.3L, Taurus 2.0L, Transit Connect 1.6L			
Escape/Kuga 2.5L, Fusion 2.5L, Transit Connect 2.5L	190-PIN	T49 T41 T29	HTR12 SIGRTN HO2S12
Explorer 2.0L, Focus GDI 2.0L	154 PIN	B20 B21 B48	HTR12 SIGRTN HO2S12
Explorer 3.7L, Explorer TiVCT 3.5L, Flex TiVCT 3.5L, MKS 3.7L, MKT 3.7L, MKX, MKZ 3.7L, Taurus TiVCT 3.5L, Taurus 3.7L, Transit 3.7L	190-PIN	T48 T49 E49 T40 E49 T29	HTR22 HTR12 SIGRTN HO2S22 SIGRTN HO2S12
F-650/F-750, F-Series Super Duty 6.8L, Motorhome/Stripped Chassis/Step Van	190-PIN	T48 T26 T26 T30	HTR12 SIGRTN SIGRTN HO2S12
F-Series Super Duty 6.2L	190-PIN	T49 T47 T26 T27 T26 T18	HTR22 HTR12 SIGRTN HO2S22 SIGRTN HO2S12
Fiesta GTDI 1.6L, Fiesta 1.0L, Focus 1.0L, Fusion 1.6L	198 PIN	B1 B37 B57	HTR12 SIGRTN HO2S12
Fiesta TiVCT 1.6L	128 PIN	E35 E9 E21	HTR12 SIGRTN HO2S12
All other vehicles	198 PIN	B61 B1 B37 B56 B38 B57	HTR22 HTR12 SIGRTN HO2S22 SIGRTN HO2S12

PINPOINT TEST DW: HEATED OXYGEN SENSOR (HO2S) > TEST PROCEDURE

DW1 CHECK FOR DTCS

Are DTCs P0036, P0037, P0038, P0041, P0054, P0056, P0060, P00D2, P0136, P0137, P0138, P0139, P013A, P013B, P013C, P013E, P0140, P0141, P014A, P0157, P0158, P0159, P0161, P2A01 or P2A04 present?

Yes	No
GO to **DW2** .	RETURN to SYMPTOM CHARTS for further direction.

DW2 VISUALLY INSPECT THE HO2S HARNESS

Ignition OFF.

Verify the HO2S connectors are connected to the correct engine bank.

Visually inspect for:

crossed sensor wires

pinched, shorted, and corroded wiring and pins

oil or water contamination

damaged HO2S

Is a concern present?

Yes	No
REPAIR as necessary. Clear the PCM DTCs. REPEAT the self-test.	For DTC P0041, GO to **DW3** . For DTCs P013A, P013C, P013E or P014A, GO to DW6. For DTCs P0036, P0037, P0038, P0054, P0056, P0060, P0141 or P0161, GO to DW12. For all others, GO to DW5.

DW3 CARRY OUT THE KOER SELF-TEST

Engine at normal operating temperature.

Carry out the PCM KOER self-test.

Is DTC P0041 present?

Yes	No
GO to DW8.	GO to **DW4** .

DW4 CHECK FOR A SOURCE OF POTENTIAL HO2S CONTAMINATION

Investigate the following items as potential sources of HO2S contamination:

use of unapproved silicon sealers

fuel contaminated by silicon additives

excessive oil consumption

glycol leaking internally in the engine

contaminated fuel

short drive cycles in cold weather

use of unapproved cleaning agents

Is a concern present?

Yes	No
REPAIR the source of the contamination. CHANGE the engine oil and oil filter. RESET the keep alive memory (KAM). REFER to RESETTING THE KEEP ALIVE MEMORY (KAM) . REPEAT the self-test.	GO to **DW5** .

DW5 CHECK FOR UNMETERED AIR LEAKS

NOTE: Fuel calculations can be affected by unmetered air leaks.

Carefully inspect the following areas for potential air leaks:

hoses connecting to the mass air flow (MAF) sensor assembly

hoses connecting to the throttle body

intake manifold gasket leaks

positive crankcase ventilation (PCV) system

the vacuum lines are disconnected

incorrectly seated engine oil dipstick, tube or oil fill cap

Are any air leaks present?

Yes	No
REPAIR the source of the air leak. RESET the keep alive memory (KAM). REFER to RESETTING THE KEEP ALIVE MEMORY (KAM) . REPEAT the self-test.	GO to **DW6** .

DW6 CHECK FOR EXHAUST SYSTEM CONCERNS

NOTE: Pressure above 241 kPa (35 psi) can cause damage to system components. Regulate the shop air to 34.4 kPa (5 psi) before connecting to the system.

Pressurize the exhaust system at the exhaust pipe outlet with 34.4 kPa (5 psi) regulated shop air.

Check the exhaust system for leaks using a soap and water solution.

Apply the soap and water solution to the following areas:

exhaust flanges and gaskets

universal HO2S and mounting surface

downstream HO2S and mounting surface

Is a concern present?

Yes	No
For DTCs P013A, P013C, P013E or P014A, REPAIR as necessary. CARRY OUT the HO2S and Catalyst OBD Monitor Drive Cycle Procedures. REFER to ON BOARD DIAGNOSTIC (OBD) DRIVE CYCLE . Clear the PCM DTCs. REPEAT the self-test. For all others, REPAIR as necessary. Clear the PCM DTCs. REPEAT the self-test.	For DTCs P013A, P013C, P013E or P014A, INSTALL a new HO2S. REFER to the service information , Electronic Engine Controls. CARRY OUT the HO2S and Catalyst OBD Monitor Drive Cycle Procedures. REFER to ON BOARD DIAGNOSTIC (OBD) DRIVE CYCLE . Clear the PCM DTCs. REPEAT the self-test. For all others, GO to **DW7** .

DW7 CHECK FOR FUEL SELECTION CONCERNS

Verify with the customer that flex fuel is not being used on a non-flex fuel vehicle.

Is a concern present?

Yes	No
REPAIR as necessary. Clear the PCM DTCs. REPEAT the self-test.	GO to **DW8** .

DW8 CHECK THE HO2S CIRCUITS FOR AN OPEN

NOTE: Check both halves the HO2S connector for any water contamination.

Ignition OFF.

PCM connector disconnected.

For HO2S12,

HO2S12 connector disconnected.

Measure the resistance between:

(+) HO2S12 Connector, Harness Side	(-) PCM Connector, Harness Side
HO2S12	HO2S12

SIGRTN	SIGRTN

For HO2S22,

HO2S22 connector disconnected.

Measure the resistance between:

(+) HO2S22 Connector, Harness Side	(-) PCM Connector, Harness Side
HO2S22	HO2S22
SIGRTN	SIGRTN

Are the resistances less than 5 ohms?

Yes	No
GO to **DW9** .	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

DW9 CHECK THE HO2S CIRCUIT FOR A SHORT

For HO2S12,

Measure the resistance between:

(+) HO2S12 Connector, Harness Side	(-) HO2S12 Connector, Harness Side
HO2S12	SIGRTN
HO2S12	VPWR

Measure the resistance between:

(+) HO2S12 Connector, Harness Side	(-)
HO2S12	Ground

For HO2S22,

Measure the resistance between:

(+) HO2S22 Connector, Harness Side	(-) HO2S22 Connector, Harness Side
HO2S22	SIGRTN
HO2S22	VPWR

Measure the resistance between:

(+) HO2S22 Connector, Harness Side	(-)
HO2S22	Ground

Are the resistances greater than 10K ohms?

Yes	No
GO to **DW10** .	REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.

DW10 CHECK THE HO2S CIRCUIT FOR A SHORT TO VOLTAGE

Ignition ON, engine OFF.

For HO2S12,

Measure the voltage between:

(+) HO2S12 Connector, Harness Side	(-)
HO2S12	Ground

For HO2S22,

Measure the voltage between:

(+) HO2S22 Connector, Harness Side	(-)
HO2S22	Ground

Is any voltage present?

Yes	No
REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.	GO to **DW11** .

DW11 CARRY OUT A THOROUGH WIGGLE TEST ON THE HO2S HARNESS

Ignition OFF.

PCM connector connected.

For HO2S12,

HO2S12 connector connected.

Ignition ON, engine OFF.

Access the PCM and monitor the O2S12 (VOLT) PID.

Carry out a thorough wiggle test on the HO2S12 harness.

For HO2S22,

HO2S22 connector connected.

Ignition ON, engine OFF.

Access the PCM and monitor the O2S22 (VOLT) PID.

Carry out a thorough wiggle test on the HO2S22 harness.

Does the voltage change during the wiggle test?

Yes	No
REPAIR as necessary. Clear the PCM DTCs. REPEAT the self-test.	For DTC P00D2, GO to **DW12** . For all others, INSTALL a new HO2S. REFER to the service information , Electronic Engine Controls. CLEAR the DTCs. REPEAT the self-test.

DW12 CHECK FOR VPWR

NOTE: Diagnose the suspect sensor indicated by the DTC.

Ignition OFF.

For HO2S12,

HO2S12 connector disconnected.

Ignition ON, engine OFF.

Measure the voltage between:

(+) HO2S12 Connector, Harness Side	(-)
VPWR	Ground

For HO2S22,

HO2S22 connector disconnected.

Ignition ON, engine OFF.

Measure the voltage between:

(+) HO2S22 Connector, Harness Side	(-)
VPWR	Ground

Is the voltage greater than 10.5 V?

Yes	No
GO to **DW13** .	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

DW13 CHECK THE HO2S HEATER CIRCUIT FOR AN OPEN

Ignition OFF.

PCM connector disconnected.

For HO2S12,

Measure the resistance between:

(+) HO2S12 Connector, Harness Side	(-) PCM Connector, Harness Side
HTR12	HTR12

For HO2S22,

Measure the resistance between:

(+) HO2S22 Connector, Harness Side	(-) PCM Connector, Harness Side
HTR22	HTR22

Is the resistance less than 5 ohms?

Yes	No
GO to **DW14** .	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

DW14 CHECK THE HO2S HEATER FOR SHORT CIRCUITS

For HO2S12,

Measure the resistance between:

(+) HO2S12 Connector, Harness Side	(-)
HTR12	Ground

Measure the resistance between:

(+) HO2S12 Connector, Harness Side	(-) HO2S12 Connector, Harness Side
HTR12	VPWR
HTR12	SIGRTN
HTR12	HO2S12

For HO2S22,

Measure the resistance between:

(+) HO2S22 Connector, Harness Side	(-)
HTR22	Ground

Measure the resistance between:

(+) HO2S22 Connector, Harness Side	(-) HO2S22 Connector, Harness Side
HTR22	VPWR
HTR22	SIGRTN
HTR22	HO2S22

Are the resistances greater than 10K ohms?

Yes	No
GO to **DW15** .	REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.

DW15 CHECK THE INTERNAL RESISTANCE OF THE HO2S HEATER

For HO2S12,

Measure the resistance between:

(+) HO2S12 Connector, Component Side	(-) HO2S12 Connector, Component Side
HTR12	VPWR

For HO2S22,

Measure the resistance between:

(+) HO2S22 Connector, Component Side	(-) HO2S22 Connector, Component Side
HTR22	VPWR

Is the resistance between 2 - 30 ohms?

Yes	No
GO to **DW16** .	INSTALL a new HO2S. REFER to the service information , Electronic Engine Controls. RESET the keep alive memory (KAM). REFER to RESETTING THE KEEP ALIVE MEMORY (KAM) . REPEAT the self-test.

DW16 CHECK THE HEATER CIRCUIT FOR AN INTERNAL SHORT TO GROUND

For HO2S12,

Measure the resistance between:

(+) HO2S12 Connector, Component Side	(-) HO2S12 Connector, Component Side
HTR12	SIGRTN

Measure the resistance between:

(+) HO2S12 Connector, Component Side	(-)
HTR12	Ground

For HO2S22,

Measure the resistance between:

(+) HO2S22 Connector, Component Side	(-) HO2S22 Connector, Component Side
HTR22	SIGRTN

Measure the resistance between:

(+) HO2S22 Connector, Component Side	(-)
HTR22	Ground

Is the resistance greater than 10K ohms?

Yes	No
GO to **DW17** .	INSTALL a new HO2S. REFER to the service information , Electronic Engine Controls. RESET the keep alive memory (KAM). REFER to RESETTING THE KEEP ALIVE MEMORY (KAM) . REPEAT the self-test.

DW17 CHECK FOR CORRECT PCM OPERATION

Ignition OFF.

Disconnect all the PCM connectors.

Visually inspect for:

pushed out pins

corrosion

Connect all the PCM connectors and make sure they seat correctly.

Carry out the PCM self-test.

Verify the concern is still present.

Is the concern still present?

Yes	No
INSTALL a new PCM. REFER to FLASH ELECTRICALLY ERASABLE PROGRAMMABLE READ ONLY MEMORY (EEPROM) , Programming the VID Block for a Replacement PCM.	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.

PINPOINT TEST DY: ENGINE OIL TEMPERATURE (EOT) SENSOR > INTRODUCTION

This pinpoint test is intended to diagnose the following:

- engine overheating concerns
- vehicle driving conditions

PINPOINT TEST DY: ENGINE OIL TEMPERATURE (EOT) SENSOR > TEST PROCEDURE

DY1 CHECK FOR DIAGNOSTIC TROUBLE CODES (DTCS)

Is DTC P0298 present?

Yes	No
GO to **DY2** .	RETURN to SYMPTOM CHARTS for further direction.

DY2 ENGINE OIL OVER TEMPERATURE CONDITION

NOTE: The engine oil temperature protection strategy in the PCM has been activated. This protects the engine against mechanical damage due to overheating.

Check for an overheating condition and base engine concerns.

Are there any overheating or base engine concerns?

Yes	No
ISOLATE the concern. REPAIR as necessary. REFER to the service information , Engine Cooling to diagnose the overheat symptom. Clear the PCM DTCs. REPEAT the self-test.	GO to **DY3** .

DY3 IDENTIFY THE CUSTOMER'S DRIVING HABITS

Identify the customer's driving habits.

Access the freeze frame data (if available) and record the DTC concern conditions.

Does the vehicle appear to have been driven in an incorrect transmission gear or at high RPM for an extended period?

Yes	No
ADVISE the customer that incorrect transmission gear selection and high RPM for an extended period initializes the engine protection strategy. Clear the PCM DTCs. REPEAT the self-test.	GO to **DY4** .

DY4 TYPE OF ENGINE COOLANT SENSOR

NOTE: The PCM uses an oil algorithm to infer actual temperature based on input from the engine temperature sensor.

Is the vehicle equipped with a cylinder head temperature (CHT) sensor?

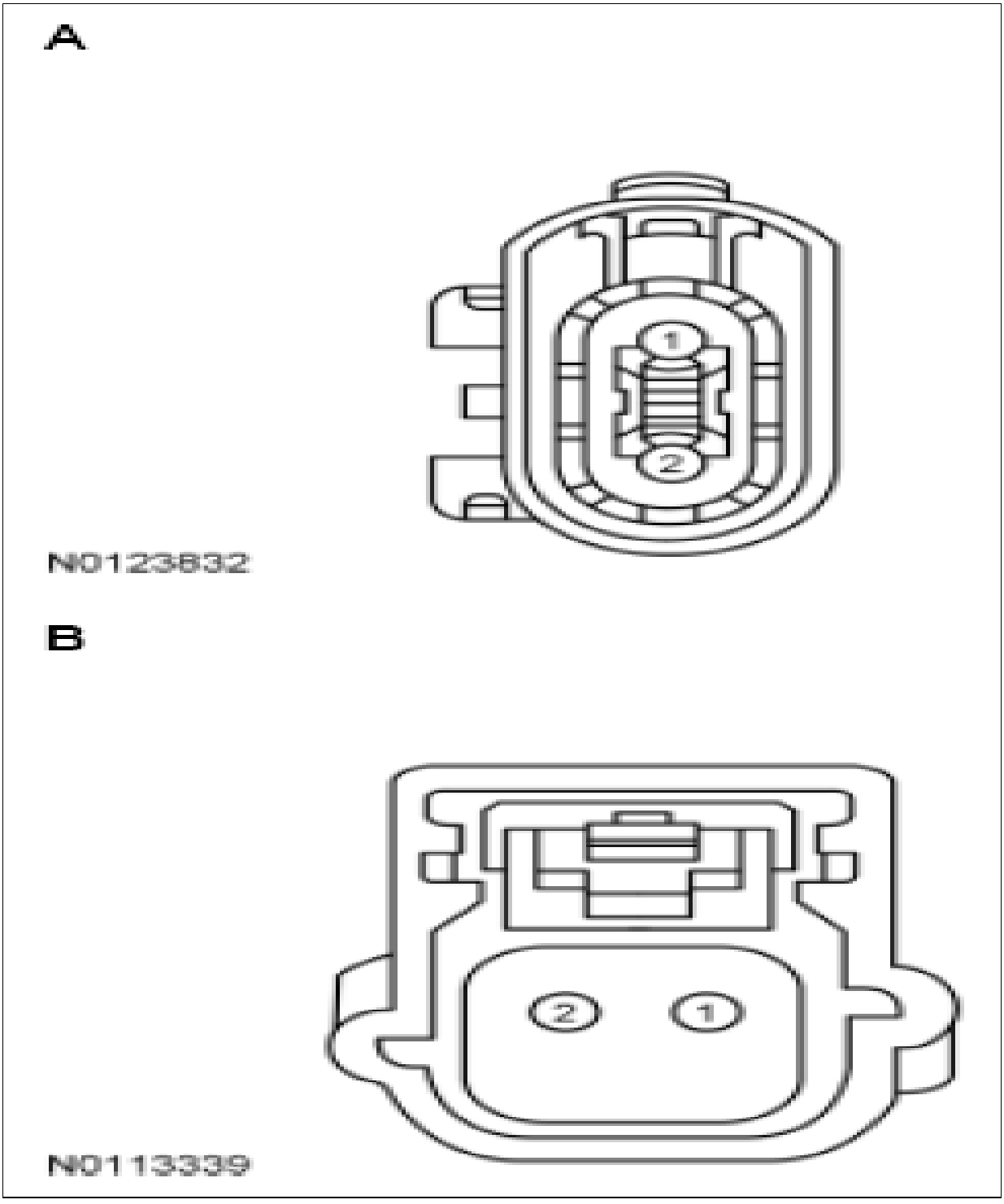
Yes	No
GO to PINPOINT TEST DL .	GO to PINPOINT TEST DX .

PINPOINT TEST FA: AMBIENT AIR TEMPERATURE (AAT) SENSOR > INTRODUCTION

This pinpoint test is intended to diagnose the following:

- AAT sensor
- harness circuits: AAT and SIGRTN
- PCM (12A650)

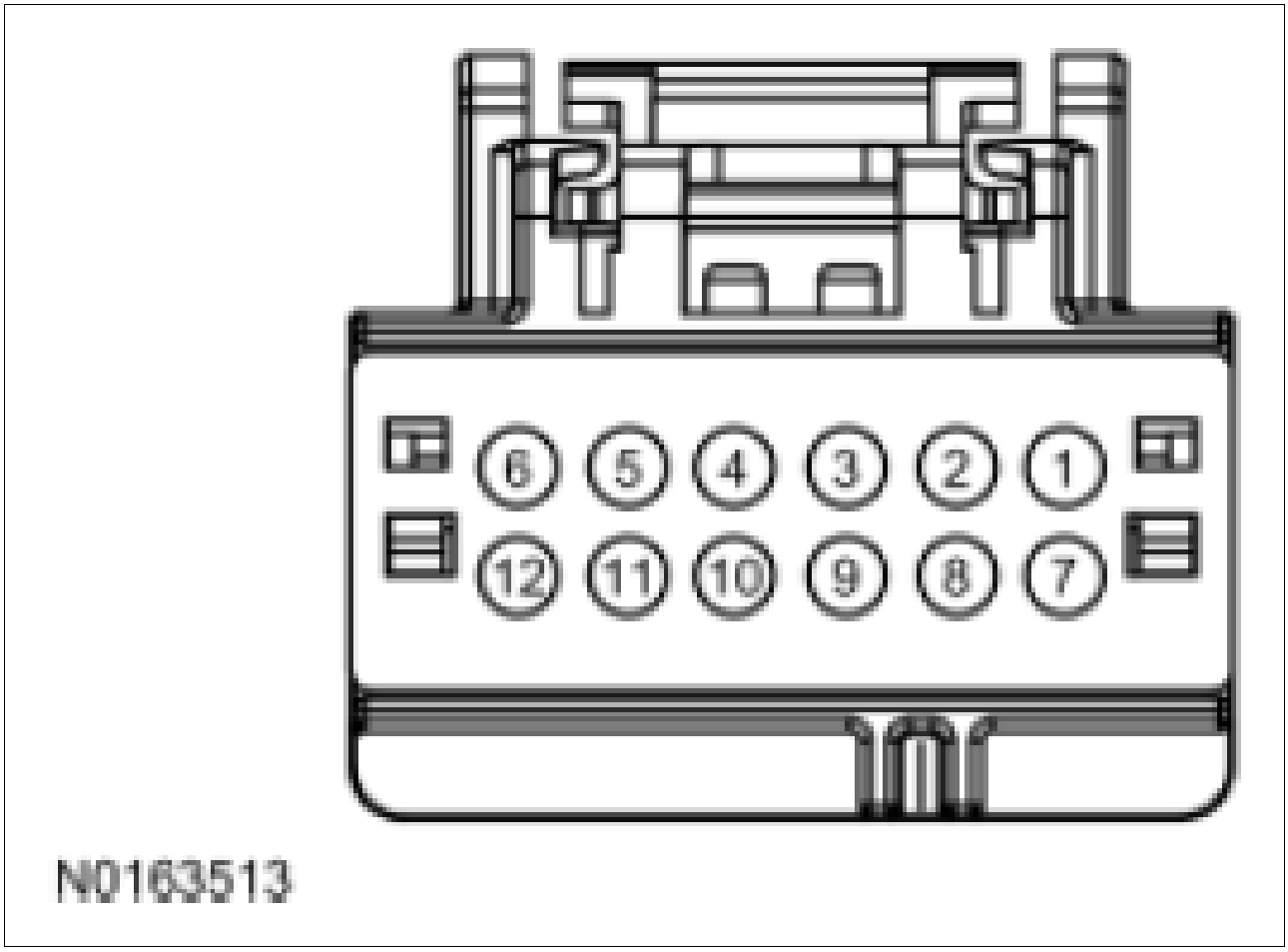
Fig 1: Identifying Ambient Air Temperature (AAT) Sensor Connector



Courtesy of FORD MOTOR CO.

Vehicle	Connector	Pin	Circuit
Transit	A	2 1	SIGRTN AAT
All other vehicles	B	2 1	SIGRTN AAT

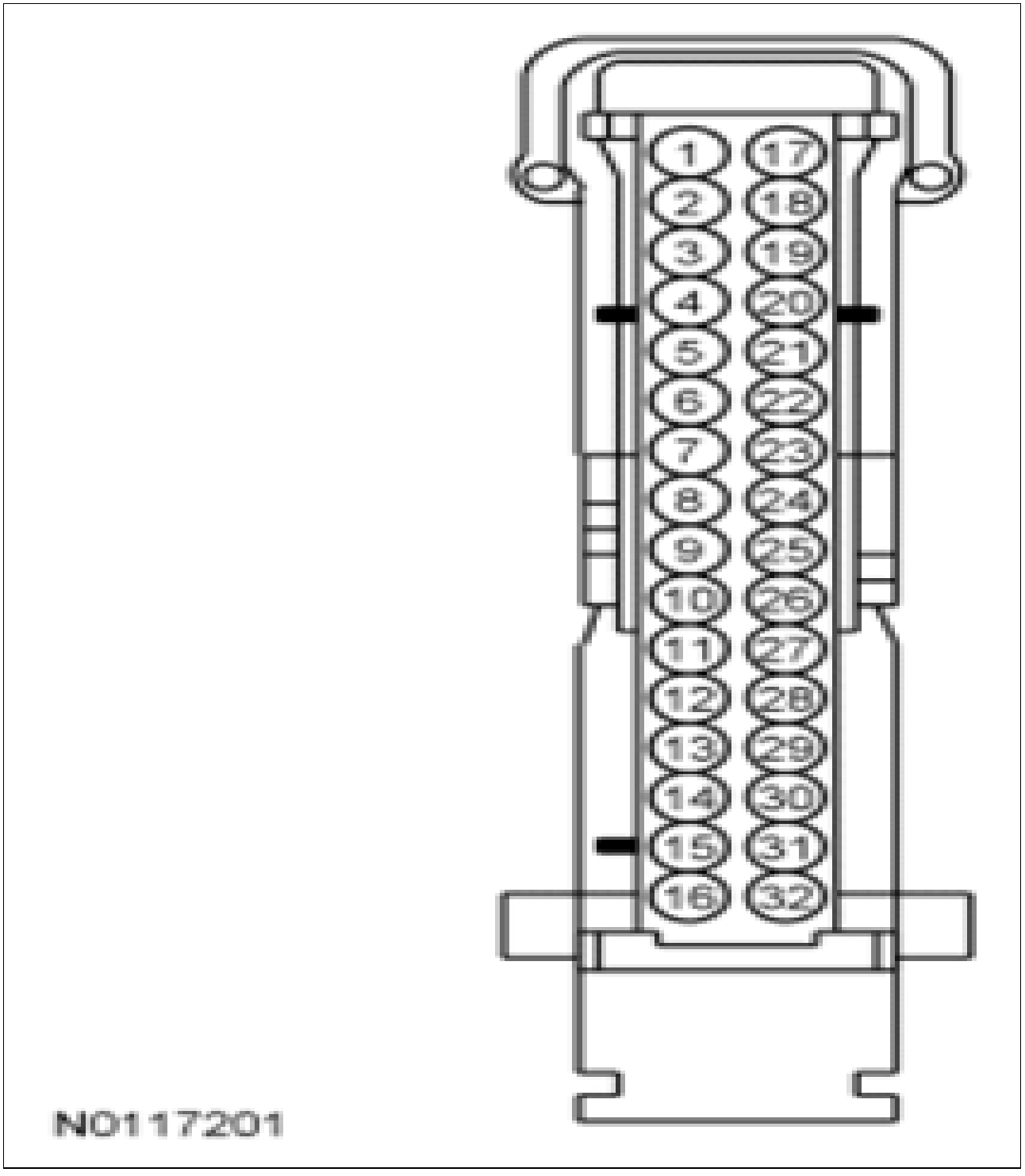
Fig 2: Identifying Right Exterior Rear View Mirror Assembly Connector



Courtesy of FORD MOTOR CO.

Pin	Circuit
10	SIGRTN (Signal Return)
9	AAT (Ambient Air Temperature)

Fig 3: Identifying Instrument Panel Cluster (IPC) Connector



Courtesy of FORD MOTOR CO.

Pin	Circuit
19	SIGRTN (Signal Return)
20	AAT (Ambient Air Temperature)

PINPOINT TEST FA: AMBIENT AIR TEMPERATURE (AAT) SENSOR > INTRODUCTION > POWERTRAIN CONTROL MODULE (PCM) CONNECTOR

For PCM connector views or reference values, refer to REFERENCE VALUES .

Vehicle	Connector	Pin	Circuit
Edge 3.5L, F-150 TiVCT 3.5L, F-150 5.0L, Mustang 3.7L, Mustang 5.0L	198 PIN	B51 B47	SIGRTN AAT
Escape/Kuga 2.5L, Explorer 3.7L, Explorer TiVCT 3.5L, F-Series Super Duty, Flex TiVCT 3.5L, Fusion 2.5L, MKS 3.7L, MKT 3.7L, MKZ 3.7L, Taurus TiVCT 3.5L, Taurus 3.7L, Transit 3.7L, Transit Connect 2.5L	190-PIN	B56 B17	SIGRTN AAT
Explorer 2.0L	154 PIN	B21 B35	SIGRTN AAT
Focus 1.0L	198 PIN	B34 B51	SIGRTN AAT
Focus GDI 2.0L	198 PIN	B34 B35	SIGRTN AAT
Fusion 1.6L	198 PIN	E17, E34 B51	SIGRTN AAT
MKX	190-PIN	B56 E29	SIGRTN AAT
Motorhome/Stripped Chassis/Step Van	190-PIN	B56	SIGRTN
All other vehicles	198 PIN	B18 B51	SIGRTN AAT

PINPOINT TEST FA: AMBIENT AIR TEMPERATURE (AAT) SENSOR > TEST PROCEDURE

FA1 CHECK FOR DTCS

Are DTCs P0071, P0072, P0073 or P0074 present?

Yes	No
For DTC P0071, GO to FA8. For DTC P0072, GO to **FA2** . For DTC P0073, GO to FA3. For all others, GO to FA7.	RETURN to SYMPTOM CHARTS for further direction.

FA2 INDUCING THE OPPOSITE DTC

NOTE: The AAT sensor is disconnected to simulate the opposite DTC.

Ignition OFF.

For Focus,

Right Exterior Rear View Mirror Assembly connector disconnected.

For all others,

AAT Sensor connector disconnected.

Ignition ON, engine OFF.

Carry out the PCM self-test.

Is the DTC P0073 present?

Yes	No
For Focus, INSTALL a new Right Exterior Rear View Mirror. REFER to the service information , Rear View Mirrors. For all others, INSTALL a new AAT sensor. REFER to the service information , Climate Control. Clear the PCM DTCs. REPEAT the self-test.	GO to FA4.

FA3 INDUCING THE OPPOSITE DTC

NOTE: DTCs set as a result of the connector being disconnected.

Ignition OFF.

For Focus,

Right Exterior Rear View Mirror Assembly connector disconnected.

Connect a 5 amp fused jumper wire between the following:

Point A Right Exterior Rear View Mirror Assembly Connector, Harness Side	Point B Right Exterior Rear View Mirror Assembly Connector, Harness Side

AAT - Pin 9	SIGRTN - Pin 10

For all others,

AAT Sensor connector disconnected.

Connect a 5 amp fused jumper wire between the following:

Point A AAT Sensor Connector, Harness Side	Point B AAT Sensor Connector, Harness Side
AAT	SIGRTN

Ignition ON, engine OFF.

Carry out the on-demand self-test.

Is DTC P0072 present?

Yes	No
For Focus, INSTALL a new Right Exterior Rear View Mirror. REFER to the service information , Rear View Mirrors. For all others, INSTALL a new AAT sensor. REFER to the service information , Climate Control. Clear the PCM DTCs. REPEAT the self-test.	GO to **FA4** .

FA4 CHECK THE AAT AND SIGRTN CIRCUITS FOR AN OPEN

Ignition OFF.

For Fiesta,

IPC connector disconnected.

Measure the resistance between:

(+) AAT Sensor Connector, Harness Side	(-) IPC Connector, Harness Side
AAT	AAT - Pin 20
SIGRTN	SIGRTN - Pin 19

For Focus,

PCM connector disconnected.

Measure the resistance between:

(+) Right Exterior Rear View Mirror Assembly Connector, Harness Side	(-) PCM Connector, Harness Side
AAT - Pin 9	AAT
SIGRTN - Pin 10	SIGRTN

For all others,

PCM connector disconnected.

Measure the resistance between:

(+) AAT Sensor Connector, Harness Side	(-) PCM Connector, Harness Side
AAT	AAT
SIGRTN	SIGRTN

Are the resistances less than 5 ohms?

Yes	No
GO to **FA5** .	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

FA5 CHECK THE AAT CIRCUIT FOR A SHORT TO GROUND

For Focus,

Measure the resistance between:

(+) Right Exterior Rear View Mirror Assembly Connector, Harness Side	(-)
AAT - Pin 9	Ground

For all others,

Measure the resistance between:

(+) AAT Sensor Connector, Harness Side	(-)
AAT	Ground

Is the resistance greater than 10K ohms?

Yes	No
GO to **FA6** .	REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.

FA6 CHECK THE AAT AND SIGRTN CIRCUITS FOR A SHORT TO VOLTAGE

Ignition ON, engine OFF.

For Focus,

Measure the voltage between:

(+) Right Exterior Rear View Mirror Assembly Connector, Harness Side	(-)

AAT - Pin 9	Ground
SIGRTN - Pin 10	Ground

For all others,

Measure the voltage between:

(+) AAT Sensor Connector, Harness Side	(-)
AAT	Ground
SIGRTN	Ground

Is any voltage present?

Yes	No
REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.	GO to **FA7** .

FA7 INTERMITTENT CHECK

Ignition OFF.

For Fiesta,

IPC connector connected.

For all others,

PCM connector connected.

For Focus,

Right Exterior Rear View Mirror Assembly connector connected.

For all others,

AAT Sensor connector connected.

Ignition ON, engine OFF.

Access the PCM and monitor the AAT (TEMP) PID.

While observing the PID, carry out the following:

Lightly tap on the sensor and wiggle the accessible harness from the sensor to the module.

Wiggle the connectors.

Look for sudden changes in the temperature when the sensor is tapped and the harness and connector are wiggled.

Is a concern present?

Yes	No
REPAIR as necessary. Clear the PCM DTCs. REPEAT the self-test.	GO to **FA8** .

FA8 TEMPERATURE SENSOR CORRELATION

NOTE: Check temperature values while engine is at ambient temperature, cold soak the engine for a minimum of 8 hours while not in direct sunlight, if necessary.

Ignition ON, engine OFF.

Access the PCM and monitor the AAT (TEMP), ECT (TEMP) and IAT (TEMP) PIDs.

Are the temperature readings within 18°C (32.4°F) of each other?

Yes	No
For Fiesta, GO to **FA9** . For all others, GO to FA10.	For Focus, INSTALL a new Right Exterior Rear View Mirror. REFER to the service information , Rear View Mirrors. For all others, INSTALL a new AAT sensor. REFER to the service information , Climate Control. RESET the keep alive memory (KAM). REFER to RESETTING THE KEEP ALIVE MEMORY (KAM) . Clear the PCM DTCs. REPEAT the self-test.

FA9 CHECK FOR CORRECT INSTRUMENT PANEL CLUSTER (IPC) OPERATION

Disconnect all the IPC connectors.

Visually inspect for:

pushed out pins

corrosion

Connect all the IPC connectors and make sure they seat correctly.

Operate the system and verify the concern is still present.

Is the concern still present?

Yes	No
INSTALL a new IPC. REFER to the service information , Instrumentation, Message Center, and Warning Chimes.	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.

FA10 CHECK FOR CORRECT PCM OPERATION

Disconnect all the PCM connectors.

Visually inspect for:

pushed out pins

corrosion

Connect all the PCM connectors and make sure they seat correctly.

Carry out the PCM self-test.

Verify the concern is still present.

Is the concern still present?

Yes	No
INSTALL a new PCM. REFER to FLASH ELECTRICALLY ERASABLE PROGRAMMABLE READ ONLY MEMORY (EEPROM) , Programming the VID Block for a Replacement PCM.	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.

PINPOINT TEST FB: POWER TAKE OFF (PTO) > INTRODUCTION

This pinpoint test is intended to diagnose the following:

- PTO switch
- harness circuit: PTO and PTOIL
- powertrain control module (PCM) (12A650)

PINPOINT TEST FB: POWER TAKE OFF (PTO) > INTRODUCTION > POWERTRAIN CONTROL MODULE (PCM) CONNECTOR

For PCM connector views or reference values, refer to REFERENCE VALUES .

Vehicle	Connector	Pin	Circuit
E-Series 6.8L	190-PIN	B7 B11 B9 B26	PTORPM PTOIL PTOENG PTO
E-Series 5.4L	190-PIN	B8 B11 B6 B3	PTORPM PTOIL PTOENG PTO
All other vehicles	190-PIN	B8 B11 B6 B22	PTORPM PTOIL PTOENG PTO

PINPOINT TEST FB: POWER TAKE OFF (PTO) > TEST PROCEDURE

FB1 PTO INDICATOR LAMP

Did you come to this pinpoint test for an always on/never on PTO indicator?

Yes	No
GO to FB6.	GO to **FB2** .

FB2 PTO NOT WORKING CORRECTLY: CHECK THE PTO INDICATOR LAMP OPERATION

NOTE: The following conditions must be met before the PTO engages:

engine at normal operating temperature

accelerator pedal is released

transmission fluid temperature (TFT) within normal operating temperature

parking brake is applied

brake pedal is released

automatic transmission is in the PARK position

manual transmission - the clutch pedal is released

NOTE: This step requires operating the PTO component. Refer to the aftermarket manufacturer for the PTO operating instructions. Follow all safety precautions.

Ignition ON, engine running.

Activate the PTO switch.

Does the PTO indicator illuminate?

Yes	No
GO to the aftermarket PTO mechanical manual.	GO to **FB3** .

FB3 CHECK THE INTEGRITY OF THE PTO SWITCH AND THE PTO SWITCH CIRCUIT

Access the PCM and monitor the PTO (MODE) PID.

Cycle the PTO switch, from off to on to off.

Does the PTO PID change state?

Yes	No
GO to **FB4** .	REPAIR the PTO circuit or switch as necessary. Clear the PCM DTCs. REPEAT the self-test.

FB4 CHECK THE PTO LOAD PID STATE IN THE PCM

Access the PCM and monitor the PTOLOAD (MODE) PID.

Cycle the PTO switch,

Does the PTO LOAD PID change state?

Yes	No
GO to **FB5** .	REPAIR the PTO ENG circuit or switch as necessary. Clear the PCM DTCs. REPEAT the self-test.

FB5 CHECK THE PTOIR_V PID STATE IN THE PCM

NOTE: The PTOIR_V PID represents an analog input which reflects the user requested engine speed.

Access the PCM and monitor the PTOIR_V (VOLT) PID.

Cycle the PTO switch,

Does the PTOIR_V PID change state?

Yes	No
GO to **FB6** .	REPAIR the PTO RPM circuit or switch as necessary. Clear the PCM DTCs. REPEAT the self-test.

FB6 CHECK THE PTOIL PID STATE IN THE PCM

Access the PCM and monitor the PTOIL (MODE) PID.

Cycle the PTO switch,

Does the PTOIL PID change state?

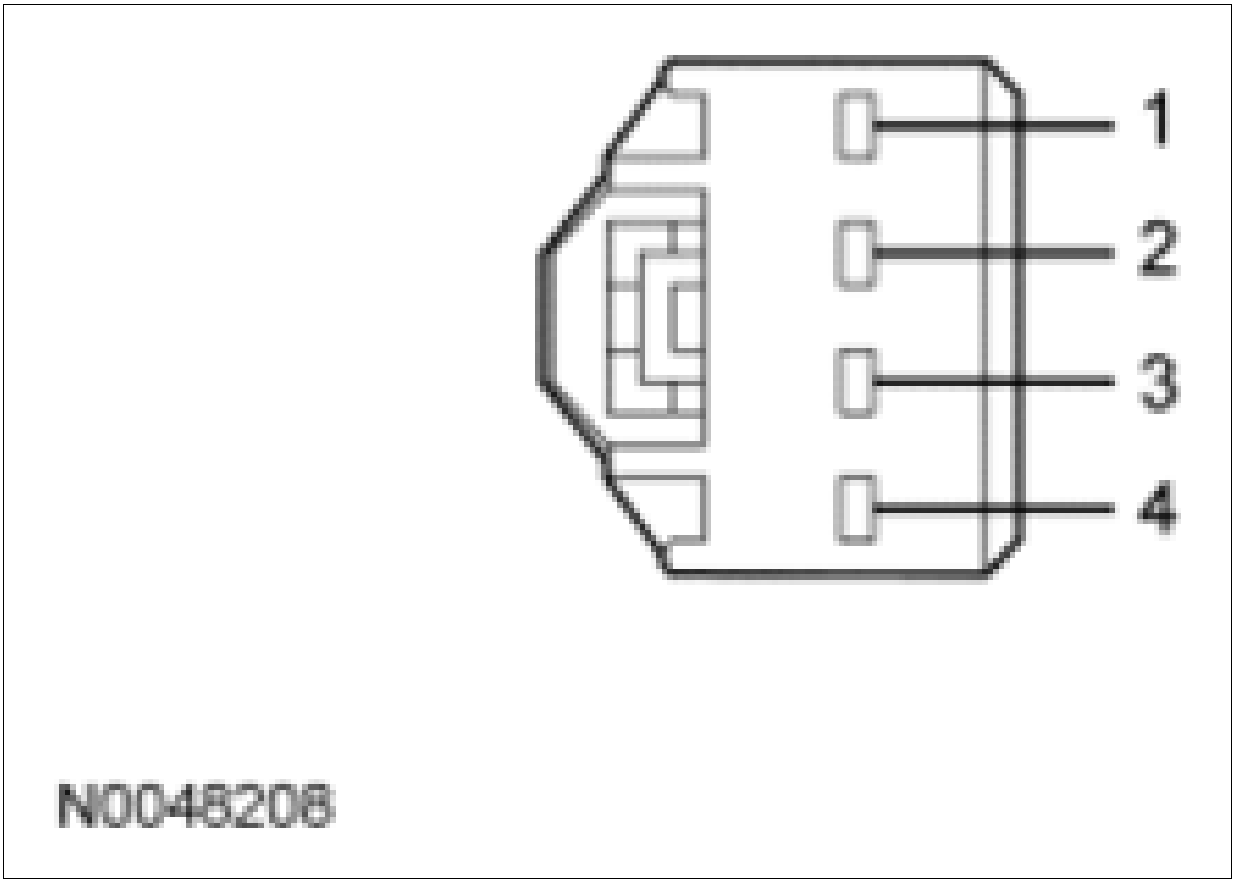
Yes	No
GO to the aftermarket PTO mechanical manual.	REPAIR the circuit as necessary. Clear the PCM DTCs. REPEAT the self-test.

PINPOINT TEST FD: BRAKE PEDAL INPUTS > INTRODUCTION

This pinpoint test is intended to diagnose the following:

- brake pedal position (BPP) switch (13480)
- harness circuits: B+, BPP, BPS and BPS1
- PCM (12A650)

Fig 1: Identifying Brake Pedal Position (BPP) Switch Connector



Courtesy of FORD MOTOR CO.

Vehicle	Connector	Pin	Circuit
E-Series	A	3	BPS
Escape/Kuga, Expedition, Explorer, Focus, Mustang, Navigator, Transit Connect	A	2 3	GND BPS
Motorhome/Stripped Chassis/Step Van	A	3 2	GND BPS1
All other vehicles	A	3 2	GND BPS

PINPOINT TEST FD: BRAKE PEDAL INPUTS > INTRODUCTION > POWERTRAIN CONTROL MODULE (PCM) CONNECTOR

For PCM connector views or reference values, refer to REFERENCE VALUES .

Vehicle	Connector	Pin	Circuit
E-Series 6.8L	190-PIN	E65 B13	BPS BPP
E-Series 5.4L, Escape/Kuga 2.5L, Explorer 3.7L, Explorer TiVCT 3.5L, F-650/F-750, F-Series Super Duty, Flex TiVCT 3.5L, Fusion 2.5L, MKS 3.7L, MKT 3.7L, MKX, MKZ 3.7L, Taurus TiVCT 3.5L, Taurus 3.7L, Transit 3.7L, Transit Connect 2.5L	190-PIN	B46 B13	BPS BPP
Edge 2.7L, F-150 2.7L, F-150 GTDI 3.5L	198 PIN	B7 B65 B66	SIGRTN BPS BPP
Edge 3.5L, F-150 TiVCT 3.5L, F-150 5.0L, Mustang 3.7L, Mustang 5.0L	198 PIN	B66 B67	BPS BPP
Explorer 2.0L	154 PIN	B16 B30	BPS BPP
Fiesta GTDI 1.6L, Fiesta 1.0L	198 PIN	B66	BPP
Fiesta TiVCT 1.6L	128 PIN	B2	BPP
Motorhome/Stripped Chassis/Step Van	190-PIN	B46 B13	BPS1 BPP
All other vehicles	198 PIN	B65 B66	BPS BPP

PINPOINT TEST FD: BRAKE PEDAL INPUTS > TEST PROCEDURE

FD1 CHECK FOR DTCS

Are DTCs P0504, P0571, P0572, P0573, P0703, P1572 or P1703 present?

Yes	No
For KOER DTCs P0571, P0703 or P1703, GO to **FD2** . For all others, GO to FD3.	RETURN to SYMPTOM CHARTS for further direction.

FD2 VERIFY THE BRAKE PEDAL WAS APPLIED

Was the brake pedal applied and released during the KOER self-test?

Yes	No
GO to **FD3** .	REPEAT the KOER self-test. APPLY and RELEASE the brake pedal during the KOER test. Clear the PCM DTCs. REPEAT the self-test.

FD3 CHECK THE OPERATION OF THE STOPLAMPS

Ignition ON, engine OFF.

Apply and release the brake pedal and check the stop lamp operation.

Do the stoplamps operate correctly?

Yes	No
GO to **FD4** .	REFER to the service information , Exterior Lighting, to diagnose all the stoplamps are inoperative. Clear the PCM DTCs. REPEAT the self-test.

FD4 CHECK THE BPP SWITCH OPERATION

Ignition ON, engine OFF.

Access the PCM and monitor the BOO1 (MODE) PID.

Apply and release the brake pedal while monitoring the brake position PID.

Does the PID cycle ON and OFF?

Yes	No
For Fiesta, GO to FD15. For E-Series, GO to FD13. For all others, GO to FD6.	GO to **FD5** .

FD5 CHECK FOR BPP CIRCUIT CYCLING

Ignition OFF.

PCM connector disconnected.

Ignition ON, engine OFF.

Apply and release the brake pedal while monitoring the voltage.

Measure the voltage between:

(+) PCM Connector, Harness Side	(-)
BPP	Ground

Is voltage less than 1 volt with the brake pedal released and greater than 10.5 volts with the brake pedal fully applied?

Yes	No
For Fiesta, GO to FD15. For E-Series, GO to FD13. For all others, GO to **FD6** .	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

FD6 CHECK BPS CIRCUIT CONTINUITY

PCM connector disconnected.

BPP Switch connector disconnected.

For Motorhome/Stripped Chassis/Step Van,

Measure the resistance between:

(+) PCM Connector, Harness Side	(-) BPP Switch Connector, Harness Side
BPS1	BPS1

For all others,

Measure the resistance between:

(+) PCM Connector, Harness Side	(-) BPP Switch Connector, Harness Side
BPS	BPS

Is the resistance less than 5 ohms?

Yes	No
GO to **FD7** .	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

FD7 CHECK THE BPS CIRCUIT

For Motorhome/Stripped Chassis/Step Van,

Measure the resistance between:

(+) BPP Switch Connector, Harness Side	(-)
BPS1	Ground

For all others,

Measure the resistance between:

(+) BPP Switch Connector, Harness Side	(-)
BPS	Ground

Is the resistance greater than 10K ohms?

Yes	No
GO to **FD8** .	REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.

FD8 CHECK THE BPS CIRCUIT FOR A SHORT TO VOLTAGE

Ignition ON, engine OFF.

For Motorhome/Stripped Chassis/Step Van,

Measure the voltage between:

(+) BPP Switch Connector, Harness Side	(-)
BPS1	Ground

For all others,

Measure the voltage between:

(+) BPP Switch Connector, Harness Side	(-)
BPS	Ground

Is any voltage present?

Yes	No
REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.	GO to **FD9** .

FD9 CHECK THE SIGRTN OR GND CIRCUIT FOR AN OPEN

Ignition OFF.

For F-150 3.5L,

Measure the resistance between:

(+) BPP Switch Connector, Harness Side	(-) PCM Connector, Harness Side
SIGRTN	SIGRTN

For all others,

Measure the resistance between:

(+) BPP Switch Connector, Harness Side	(-)
GND	Ground

Is the resistance less than 5 ohms?

Yes	No
For F-150 3.5L, GO to **FD10** . For all others, GO to FD11.	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

FD10 CHECK THE SIGRTN CIRCUIT FOR A SHORT TO GROUND

Measure the resistance between:

(+) BPP Switch Connector, Harness Side	(-)
SIGRTN	Ground

Is the resistance greater than 10K ohms?

Yes	No
GO to **FD11** .	REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.

FD11 CHECK THE CIRCUIT FOR A SHORT TO VOLTAGE

Ignition ON, engine OFF.

For F-150 3.5L,

Measure the voltage between:

(+) BPP Switch Connector, Harness Side	(-)
SIGRTN	Ground

For all others,

Measure the voltage between:

(+) BPP Switch Connector, Harness Side	(-)
GND	Ground

Is any voltage present?

Yes	No
REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.	GO to **FD12** .

FD12 CHECK THE BPP SWITCH

For F-150 3.5L,

Measure the resistance between:

(+) BPP Switch Connector, Component Side	(-) BPP Switch Connector, Component Side
BPS	SIGRTN

For all others,

Measure the resistance between:

(+) BPP Switch Connector, Component Side	(-) BPP Switch Connector, Component Side
BPS	GND

Is the resistance less than 5 ohms with brake pedal released and greater than 10K ohms with the brake pedal pressed?

Yes	No
GO to FD15.	INSTALL a new BPP switch. Clear the PCM DTCs. REPEAT the self-test.

FD13 CHECK FOR BPS CIRCUIT CYCLING

Ignition OFF.

PCM connector disconnected.

Ignition ON, engine OFF.

Apply and release the brake pedal while monitoring the voltage.

Measure the voltage between:

(+) PCM Connector, Harness Side	(-)
BPS	Ground

Is voltage greater than 10.5 volts with the brake pedal released and less than 1 volt with the brake pedal fully applied?

Yes	No
GO to **FD14** .	REFER to the service information , Cruise Control. CARRY OUT the diagnostic steps for DTC P1703 to continue diagnosis.

FD14 CHECK THE BPS CIRCUIT

Measure the resistance between:

(+) BPP Switch Connector, Harness Side	(-)
BPS	Ground

Is the resistance less than 5 ohms?

Yes	No
GO to **FD15** .	REFER to the service information , Cruise Control. CARRY OUT the diagnostic steps for DTC P1703 to continue diagnosis.

FD15 CHECK FOR CORRECT PCM OPERATION

Disconnect all the PCM connectors.

Visually inspect for:

pushed out pins

corrosion

Connect all the PCM connectors and make sure they seat correctly.

Carry out the PCM self-test.

Verify the concern is still present.

Is the concern still present?

Yes	No
INSTALL a new PCM. REFER to FLASH ELECTRICALLY ERASABLE PROGRAMMABLE READ ONLY MEMORY (EEPROM) , Programming the VID Block for a Replacement PCM.	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.

PINPOINT TEST HC: FUEL DELIVERY SYSTEM > INTRODUCTION

WARNING: THE FUEL SYSTEM REMAINS UNDER PRESSURE AFTER THE ENGINE IS OFF. RELIEVE PRESSURE BEFORE REPAIRING. HIGHLY FLAMMABLE MIXTURES ARE PRESENT. TO RELEASE PRESSURE FROM THE FUEL SYSTEM, CARRY OUT THE

FOLLOWING:

- *CONNECT FUEL PRESSURE TEST KIT 310-D009 (D95L-7211A) OR EQUIVALENT.*
- *GRADUALLY OPEN THE TESTING KIT VALVE TO RELIEVE THE FUEL PRESSURE IN THE VEHICLE FUEL SYSTEM AND DRAIN THE FUEL INTO A SUITABLE CONTAINER OR RETURN IT TO THE FUEL TANK.*
- *TO AVOID UNNECESSARY FUEL SPILLAGE AND FIRE HAZARD, ANY TIME FUEL LINES ARE DISCONNECTED, THE IGNITION SWITCH MUST BE IN THE OFF POSITION UNLESS FUEL PUMP OPERATION IS REQUIRED FOR TEST PURPOSES.*

FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN PERSONAL INJURY.

WARNING: BEFORE WORKING ON OR DISCONNECTING ANY OF THE FUEL TUBES OR FUEL SYSTEM COMPONENTS, RELIEVE THE FUEL SYSTEM PRESSURE TO PREVENT ACCIDENTAL SPRAYING OF FUEL. FUEL IN THE FUEL SYSTEM REMAINS UNDER HIGH PRESSURE, EVEN WHEN THE ENGINE IS NOT RUNNING. FAILURE TO FOLLOW THIS INSTRUCTION MAY RESULT IN SERIOUS PERSONAL INJURY.

WARNING: DO NOT SMOKE, CARRY LIGHTED TOBACCO OR HAVE AN OPEN FLAME OF ANY TYPE WHEN WORKING ON OR NEAR ANY FUEL-RELATED COMPONENT. HIGHLY FLAMMABLE MIXTURES ARE ALWAYS PRESENT AND MAY BE IGNITED. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN SERIOUS PERSONAL INJURY.

WARNING: DO NOT CARRY PERSONAL ELECTRONIC DEVICES SUCH AS CELL PHONES, PAGERS OR AUDIO EQUIPMENT OF ANY TYPE WHEN WORKING ON OR NEAR ANY FUEL-RELATED COMPONENT. HIGHLY FLAMMABLE MIXTURES ARE ALWAYS PRESENT AND MAY BE IGNITED. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN SERIOUS PERSONAL INJURY.

WARNING: WHEN HANDLING FUEL, ALWAYS OBSERVE FUEL HANDLING PRECAUTIONS AND BE PREPARED IN THE EVENT OF FUEL SPILLAGE. SPILLED FUEL MAY BE IGNITED BY HOT VEHICLE COMPONENTS OR OTHER IGNITION SOURCES. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN SERIOUS PERSONAL INJURY.

WARNING: CLEAN ALL FUEL RESIDUE FROM THE ENGINE COMPARTMENT. IF NOT REMOVED, FUEL RESIDUE MAY IGNITE WHEN THE ENGINE IS RETURNED TO OPERATION. FAILURE TO FOLLOW THIS INSTRUCTION MAY RESULT IN SERIOUS PERSONAL INJURY.

NOTE: Replacement fuel injectors may not be the same color as the original injectors in the vehicle. Verify the replacement injector is correct for the application by part number.

This pinpoint test is intended to diagnose the following:

- chassis components
- engine vacuum
- fuel pressure
- fuel supply line
- fuel supply
- fuel filter (9155)
- fuel injector(s) (9F593)
- fuel pump (9H307)

NOTE: With the engine running, the FRP PID value may be higher than a fuel pressure reading taken with a mechanical gauge.

FUEL SYSTEM SPECIFICATION CHART (IGNITION ON, ENGINE OFF VALUES)

Application	FLP PID Fuel Pressure	External Pressure Gauge
E-Series, Escape 2.5L, F-150 3.5L TiVCT, F-150 5.0L, F-Series Super Duty, Mustang 3.7L, Mustang 5.0L, Transit 3.7L	-	350-415 kPa (51-60 psi)
Edge 2.0L, Edge 2.7L, Explorer 2.0L	350-500 kPa (51-73 psi)	350-500 kPa (51-73 psi)
Escape 1.6L, Escape 2.0L, Fiesta 1.0L, Fiesta 1.6L GTDI, Focus, Transit Connect 1.6L	380-500 kPa (55-73 psi)	380-500 kPa (55-73 psi)
Transit Connect 2.5L, Fusion 2.5L	-	350-450 kPa (51-65 psi)
Fusion 1.5L, Fusion 1.6L, Fusion 2.0L, MKC, Mustang 2.3L	320-540 kPa (46-78 psi)	320-540 kPa (46-78 psi)
Expedition, F-150 2.7L, F-150 3.5L GTDI, Navigator, Transit 3.5L	-	425-510 kPa (62-74 psi)
All Others	-	331-485 kPa (48-70 psi)

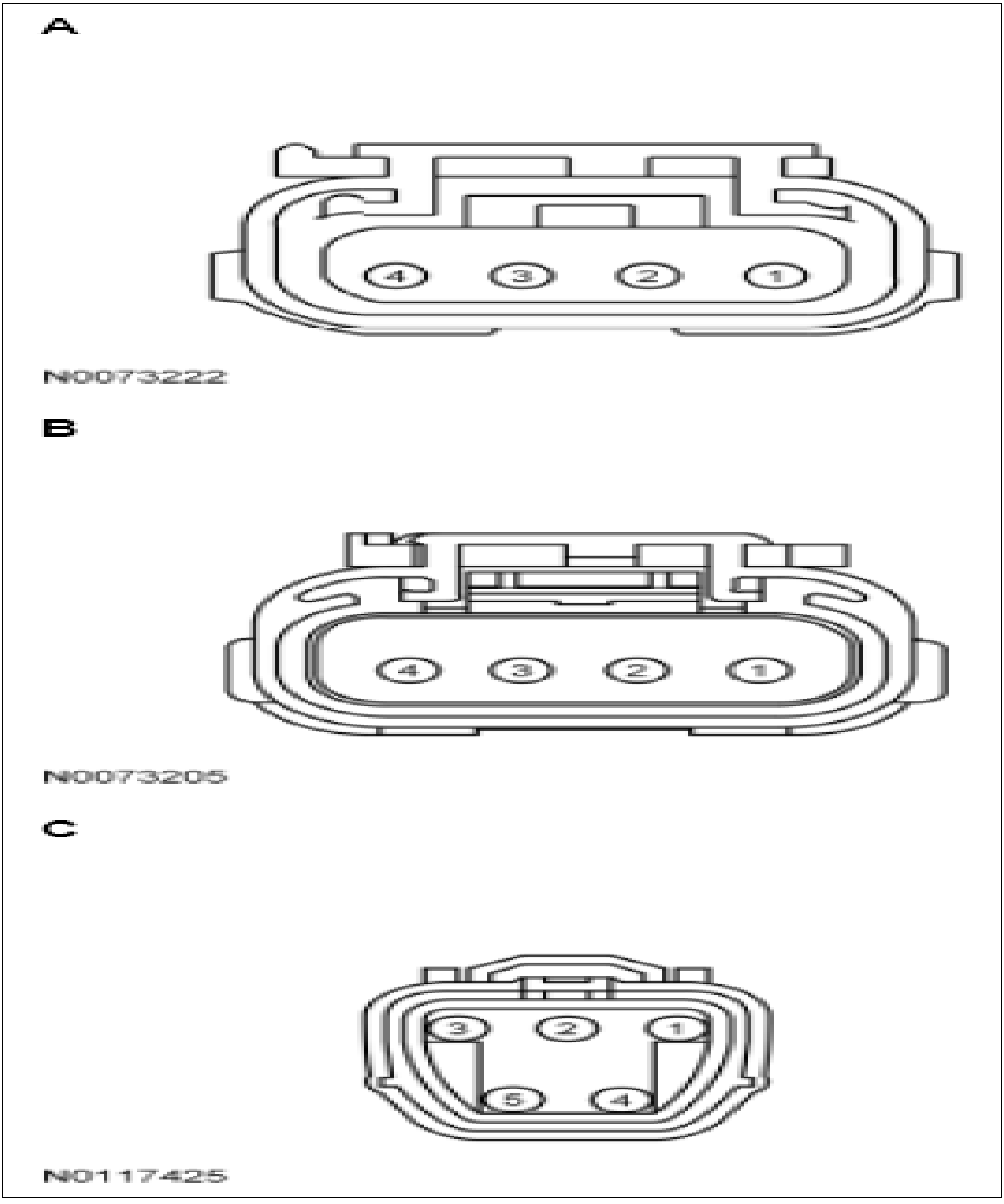
PINPOINT TEST HC: FUEL DELIVERY SYSTEM > INTRODUCTION > INERTIA FUEL

SHUTOFF (IFS) SWITCH - RESET INSTRUCTIONS

WARNING: IF YOU SEE OR SMELL GASOLINE AT ANY TIME OTHER THAN DURING FUELING, DO NOT RESET THE INERTIA FUEL SHUTOFF (IFS) SWITCH. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN PERSONAL INJURY.

- Key in OFF position.
- Check for fuel leaks in the engine compartment.
- If no leak is present, reset the IFS switch by pushing the reset button on the top of the switch. Refer to the Owner's Literature, Roadside Emergencies for the location of the IFS switch.
- In the closed position, the button can be pressed an additional 1.57 mm (1/16 in) against a spring.
- Key ON, engine OFF.
- Key in OFF position.
- Key ON, engine OFF.
- Key in OFF position.
- Check for leaking fuel.

Fig 1: Identifying Fuel Pump (FP) Connector



Courtesy of FORD MOTOR CO.

Vehicle	Connector	Pin	Circuit
E-Series, Expedition, F-150, Mustang,	A	4 3	FPPWR FPRTN

Navigator, Transit			
F-650/F-750, F-Series Super Duty, Motorhome/Stripped Chassis/Step Van	B	4 3	FPPWR FPRTN
All other vehicles	C	5 4	FPPWR FPRTN

PINPOINT TEST HC: FUEL DELIVERY SYSTEM > TEST PROCEDURE

HC1 CHECK THE SYSTEM INTEGRITY

Visually inspect the complete fuel delivery system for damage and leakage.

Check the following:

fuel lines and connections

relays

fuel tank

fuel pump

fuel pressure regulator

fuel rail at injectors

damaged connector pins

electrical connectors not fully engaged

Verify the vehicle has followed the maintenance schedule. A new fuel filter should have been installed within the last 48, 280 km (30, 000 miles) (vehicles with inline fuel filter).

Verify the inertia fuel shutoff (IFS) switch is set (button pushed in). Refer to the Owner's Literature, Roadside Emergencies for the location of the IFS switch (if equipped).

Verify the fuse integrity.

Verify the battery is fully charged.

Verify clean sufficient fuel.

Is a concern present?

Yes	No
REPAIR as necessary. Clear the PCM DTCs. REPEAT the self-test.	GO to **HC2** .

HC2 CHECK THE FUEL PRESSURE

Ignition OFF.

Relieve the fuel pressure. Refer to the service information , Fuel System for the Fuel System Pressure Release procedure.

Mechanical fuel pressure gauge connected.

Ignition ON, engine OFF.

Pressurize the fuel system. Refer to the service information , Fuel System for the Fuel System Pressure Release procedure to pressurize the fuel system.

FP connector connected.

Cycle the ignition several times to charge the fuel system.

Compare the fuel pressure reading to the Fuel System Specification Chart.

Is the fuel pressure within range?

Yes	No
For DTCs P0171, P0174, P2195 or P2197, GO to HC14. For DTCs P008A or P008B, GO to HC11. For all others, GO to HC5.	GO to **HC3** .

HC3 CHECK THE FUEL PUMP GROUND CIRCUIT FOR AN OPEN CIRCUIT

Ignition OFF.

FP connector disconnected.

Measure the voltage between:

(+) Vehicle Battery	(-) FP Connector, Harness Side
Positive terminal	FPRTN

Ignition ON, engine OFF.

Are the voltages greater than 10.5 V?

Yes	No
GO to **HC4** .	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

HC4 CHECK THE FUEL PUMP POWER CIRCUIT FOR AN OPEN

NOTE: During output state control, the fuel pump stays commanded on for only about 5 seconds. Be aware that output state control turns the FP off after a calibrated time. If this happens, command the output ON to continue testing.

Verify the inertia fuel shutoff (IFS) switch is set (button pushed in). Refer to the Owner's Literature, Roadside Emergencies for the location of the IFS switch (if equipped).

Ignition ON, engine OFF.

Measure the voltage between:

(+) FP Connector, Harness Side	(-) Vehicle Battery
FPPWR	Negative terminal

Access the PCM and control the FP (MODE) PID.

Command the fuel pump ON.

Does the voltage increase with the PID commanded ON?

Yes	No
For Vehicles that do not start, GO to HC15.	REPAIR the open circuit. Clear the PCM DTCs.
For all others, GO to HC11.	REPEAT the self-test.

HC5 CHECK THE SEPARATION LEVEL OF THE ETHANOL/WATER MIXTURE AND GASOLINE IN THE FUEL

NOTE: This step requires the use of a locally obtained 200 ml beaker and a 25 ml graduated cylinder.

NOTE: After approximately 3 minutes of standing, the ethanol and water mixes together and settles to the bottom of the 25 ml graduated cylinder. The gasoline rises to the top.

Fill the 200 ml beaker with 5 ml of clean water.

Use the pressure relief valve on the mechanical fuel gauge to drain 22 ml of fuel into an approved clean container.

Pour 20 ml of fuel from the approved clean container into the 25 ml graduated cylinder.

Add enough water from the 200 ml beaker to the 25 ml graduated cylinder to bring the total volume of liquid to 24 ml.

Insert a stopper plug in the opening of the 25 ml graduated cylinder.

Firmly hold the stopper in place and shake the 25 ml graduated cylinder to mix the water and fuel.

Allow the liquid to stand and separate for approximately 3 minutes.

Record the separation level from the 25 ml graduated cylinder where the ethanol/water mixture and gasoline meet.

Did the ethanol/water mixture and gasoline separate?

Yes	No
GO to **HC6** .	The ethanol/water mixture will separate from the gasoline. If the fuel does not appear to separate, then the fuel is either 100% ethanol or a mixture of ethanol and water. REPLACE the contaminated fuel. Clear the PCM DTCs. REPEAT the self-test.

HC6 CALCULATE THE PERCENTAGE OF ETHANOL IN THE FUEL

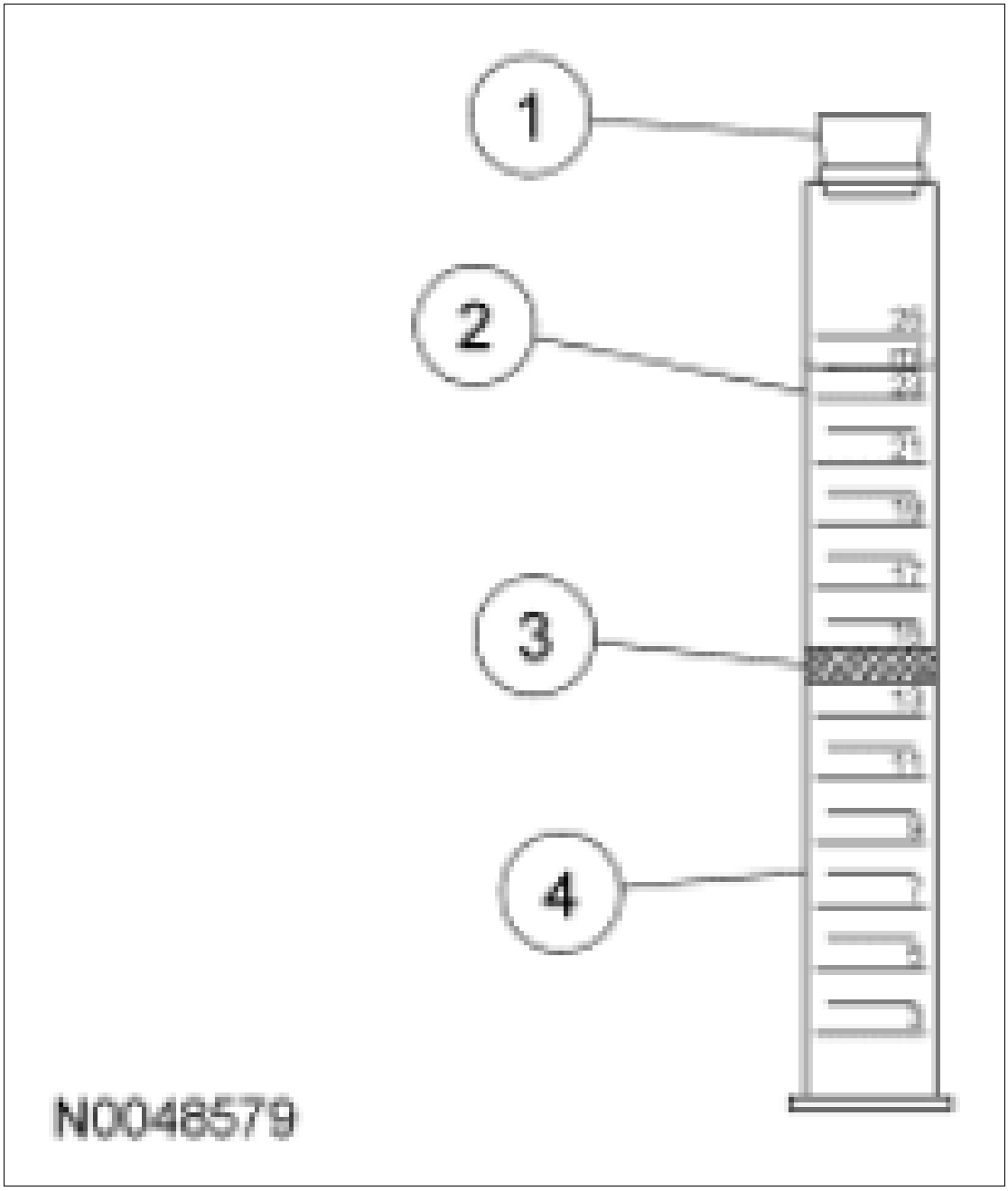
NOTE: Use the illustration as an example for calculating the percentage of ethanol in the following steps. If the separation level is at 14 ml the calculation becomes; 14 minus 4, then multiply by 5 to equal 50. The percentage of ethanol in the fuel is 50%.

Ignition OFF.

Take the recorded separation level from the previous step and subtract the amount of water added.

Multiply the new value by 5. This new value is the percentage of ethanol in the fuel.

Fig 1: Calculating Percentage Of Ethanol In Fuel



Courtesy of FORD MOTOR CO.

Item Number	Description
1	Stopper
2	Gasoline
3	Separation Point at 14 ml
4	Ethanol and Water Mixture

Record the calculated percentage of ethanol in the fuel.

Is any ethanol present in the fuel?

Yes	No
For flex fuel vehicles, GO to **HC7** . For all others, GO to HC10.	GO to HC11.

HC7 COMPARE THE FF_INF PID TO THE CALCULATED PERCENTAGE OF ETHANOL

NOTE: When determining if the FF_INF PID value is within 20% of the calculated percentage of ethanol, for example, if the calculated percentage of ethanol value is 40% then the PID value should be between 32 - 48%. The PID value cannot be less than zero.

Ignition ON, engine OFF.

Access the PCM and monitor the FF_INF (PER) PID.

Compare the FF_INF PID to the calculated percentage of ethanol.

Is the FF_INF PID value within 20% of the calculated percentage of ethanol?

Yes	No
GO to HC11.	GO to **HC8** .

HC8 RESET THE PERCENT ETHANOL PARAMETER IN THE PCM

NOTE: Certain customer fueling practices such as only fueling with small amounts of fuel or repeatedly switching between gasoline and an ethanol blend greater than E15 may prevent the PCM from learning the correct ethanol content in the fuel.

Reset the keep alive memory (KAM). Refer to RESETTING THE KEEP ALIVE MEMORY (KAM) .

Ignition ON, engine running.

Access the PCM and monitor the FF_LRND (MODE) PID.

Drive the vehicle approximately 11.3 km (7 miles) or until the FF_LRND PID indicates yes.

Is the PID state YES?

Yes	No
GO to **HC9** .	GO to HC17.

HC9 COMPARE THE UPDATED FF_INF PID TO THE CALCULATED PERCENTAGE OF ETHANOL

Ignition OFF.

Ignition ON, engine OFF.

Access the PCM and monitor the FF_INF (PER) PID.

Is the FF_INF PID value within 20% of the calculated percentage of ethanol?

Yes	No
RETURN the vehicle to the customer. ADVISE the customer of the correct fueling practices when using flex fuel. REFER to the Owner's Literature for additional information. ADVISE the customer to continue to use the same fuel for the next 2-3 refuels. This practice helps verify the PCM is learning the correct percentage of ethanol in the fuel.	A fuel system concern may be present, which prevents the PCM from learning the correct percentage of ethanol in the fuel, GO to HC11.

HC10 DETERMINE IF THE PERCENTAGE OF ETHANOL IN THE FUEL IS LESS THAN 25%

Check the recorded calculated percentage of ethanol in the fuel.

Is the calculated percentage of ethanol in the fuel less than 25%?

Yes	No
GO to **HC11** .	REPAIR as necessary. ADVISE the customer of the correct fuel type required for this vehicle. REFER to the Owner's Literature for additional information. Clear the PCM DTCs. REPEAT the self-test.

HC11 CHECK THE FUEL PRESSURE LEAKDOWN

NOTE: When the fuel pump is commanded off, the fuel pressure may substantially decrease and then stabilize.

NOTE: During output state control, the fuel pump stays commanded on for only about 5 seconds. Be aware that output state control turns the FP off after a calibrated time. If this happens, command the output ON to continue testing.

Mechanical fuel pressure gauge connected.

Ignition ON, engine OFF.

Access the PCM and control the FP (MODE) PID.

Run the fuel pump to obtain maximum fuel pressure.

Command the fuel pump OFF.

Allow the fuel pressure to stabilize.

Record the stabilized reading.

Monitor the fuel pressure for 1 minute.

Does the fuel pressure remain within 34 kPa (5 psi) of the recorded reading (MRFS) or greater than 275 kPa (40 psi) (ERFS) after 1 minute?

Yes	No
For Edge 2.0L, Edge 2.7L, Escape/Kuga 1.6L, Escape/Kuga 2.0L, Expedition, Explorer 2.0L, Explorer 3.5L GTDI, F-150 2.7L, F-150 3.5L GTDI, Fiesta 1.0L, Fiesta 1.6L GTDI, Flex 3.5L GTDI, Focus, Fusion 1.5L, Fusion 1.6L, Fusion 2.0L, MKC, MKS 3.5L, MKT 2.0L, MKT 3.5L, MKZ 2.0L, Mustang 2.3L, Navigator, Taurus 2.0L, Taurus 3.5L GTDI, and Transit Connect 1.6L, GO to HC13. For all others, GO to HC14.	GO to **HC12** .

HC12 CARRY OUT THE RELATIVE INJECTOR FLOW TEST

NOTE: The IDS test referenced in this step may not be available on all vehicles. Follow the YES answer if the IDS test is not available.

Carry out the Relative Injector Flow Test. Refer to the instruction manual provided by the scan tool manufacturer.

Does the test pass?

Yes	No
For Edge 2.0L, Edge 2.7L, Escape/Kuga 1.6L, Escape/Kuga 2.0L,	INSTALL a new fuel injector as necessary. REFER to the service information , Fuel Charging and Controls. RESET the keep alive memory (KAM). REFER to RESETTING THE KEEP ALIVE MEMORY (KAM) . REPEAT the self-test.

Expedition, Explorer 2.0L, Explorer 3.5L GTDI, F-150 2.7L, F-150 3.5L GTDI, Fiesta 1.0L, Fiesta 1.6L GTDI, Flex 3.5L GTDI, Focus, Fusion 1.5L, Fusion 1.6L, Fusion 2.0L, MKC, MKS 3.5L, MKT 2.0L, MKT 3.5L, MKZ 2.0L, Mustang 2.3L, Navigator, Taurus 2.0L, Taurus 3.5L GTDI, and Transit Connect 1.6L, GO to **HC13** . For all others, GO to HC14.	

HC13 COMPARE THE FLP PID TO THE MECHANICAL GAUGE

NOTE: The vehicle may exhibit a long crank until the fuel system is pressurized.

Ignition OFF.

Relieve the fuel pressure. Refer to the service information , Fuel System for the Fuel System Pressure Release procedure.

Disable the fuel pump.

Ignition ON, engine OFF.

Monitor the mechanical gauge.

Access the PCM and monitor the FLP (PRESS) PID.

Compare the FLP PID value to the mechanical gauge.

Ignition OFF.

Pressurize the fuel system. Refer to the service information , Fuel System for the Fuel System Pressure Release procedure to pressurize the fuel system.

Ignition ON, engine running.

Allow the fuel pressure to stabilize.

Ignition OFF.

Ignition ON, engine OFF.

Compare the FLP PID value to the mechanical gauge.

Are the FLP PID values within 34 kPa (5 psi) of the mechanical gauge readings?

Yes	No
GO to **HC14** .	INSTALL a new Fuel Pressure Sensor. REFER to the fuel system WARNING information at the beginning of this pinpoint test. REFER to the service information , Fuel Tank and Lines. Clear the PCM DTCs. REPEAT the self-test.

HC14 MONITOR THE FUEL PRESSURE WHILE ROAD TESTING THE VEHICLE

WARNING: STRICT OBSERVANCE OF POSTED SPEED LIMITS AND ATTENTION TO DRIVING CONDITIONS ARE MANDATORY WHEN CARRYING OUT THE ROAD TEST. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN PERSONAL INJURY.

NOTE: Some concerns may only be present during certain fuel level conditions. Determine the fuel level at the time of the concern. Access the information from the customer information worksheet and the customer.

Ignition OFF.

Securely route the mechanical gauge so that the gauge is viewable while road testing the vehicle.

Ignition ON, engine running.

Engine at normal operating temperature.

Monitor the mechanical gauge.

From a stop, accelerate to 89 km/h (55 mph) at full throttle. Repeat this 3 times.

Is the fuel pressure always greater than 352 kPa (51 psi)?

Yes	No
For misfire DTC diagnosis, GO to HD11. For DTCs P0171, P0174, P2195 or P2197, GO to H21. For the fuel pressure leakdown concern, INSTALL a new FP. REFER to the service information , Fuel Tank and Lines.	GO to **HC15** .

For all others, RETURN to NO DIAGNOSTIC TROUBLE CODES (DTCS) PRESENT SYMPTOM CHART INDEX for further direction.	

HC15 CHECK THE FUEL SUPPLY LINE FOR RESTRICTION

NOTE: Observe the Warnings, Cautions, and Notes.

Ignition OFF.

Disconnect the fuel supply line at the fuel rail.

Disconnect the fuel supply line at the fuel pump.

Check the fuel supply line for restriction.

Apply 21 to 34 kPa (3 to 5 psi) air pressure to the fuel supply line.

Does air flow freely through the line?

Yes	No
GO to **HC16** .	REPAIR the cause of the restriction. Clear the PCM DTCs. REPEAT the self-test.

HC16 VERIFY THE REPAIR

WARNING: STRICT OBSERVANCE OF POSTED SPEED LIMITS AND ATTENTION TO DRIVING CONDITIONS ARE MANDATORY WHEN CARRYING OUT THE ROAD TEST. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN PERSONAL INJURY.

NOTE: For vehicles that do not start, follow the NO answer.

Ignition ON, engine running.

Engine at normal operating temperature.

Monitor the mechanical gauge.

From a stop, accelerate to 89 km/h (55 mph) at full throttle. Repeat this 3 times.

Is the fuel pressure always greater than 352 kPa (51 psi)?

Yes	No
For DTC P0087, GO to PINPOINT TEST HP .	INSTALL a new FP. REFER to the service information , Fuel Tank and Lines.

For all others, the test is complete and no concerns are present.	Clear the PCM DTCs. REPEAT the self-test.

HC17 CHECK FOR CORRECT PCM OPERATION

Disconnect all the PCM connectors.

Visually inspect for:

pushed out pins

corrosion

Connect all the PCM connectors and make sure they seat correctly.

Carry out the PCM self-test.

Verify the concern is still present.

Is the concern still present?

Yes	No
INSTALL a new PCM. REFER to FLASH ELECTRICALLY ERASABLE PROGRAMMABLE READ ONLY MEMORY (EEPROM) .	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.

PINPOINT TEST HN: TURBOCHARGER SYSTEM > INTRODUCTION

WARNING: WHILE CONDUCTING TESTS ON A HOT ENGINE TAKE ALL SAFETY PRECAUTIONS TO PREVENT SKIN CONTACT WITH HOT ENGINE COMPONENTS. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN PERSONAL INJURY.

WARNING: STRICT OBSERVANCE OF POSTED SPEED LIMITS AND DRIVING CONDITIONS IS MANDATORY WHEN PROCEEDING THROUGH THE FOLLOWING DRIVE CYCLES.
FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN PERSONAL INJURY.

NOTE: To recreate the original conditions that set the DTC or caused the symptom, the vehicle may require driving.

This pinpoint test is intended to diagnose the following:

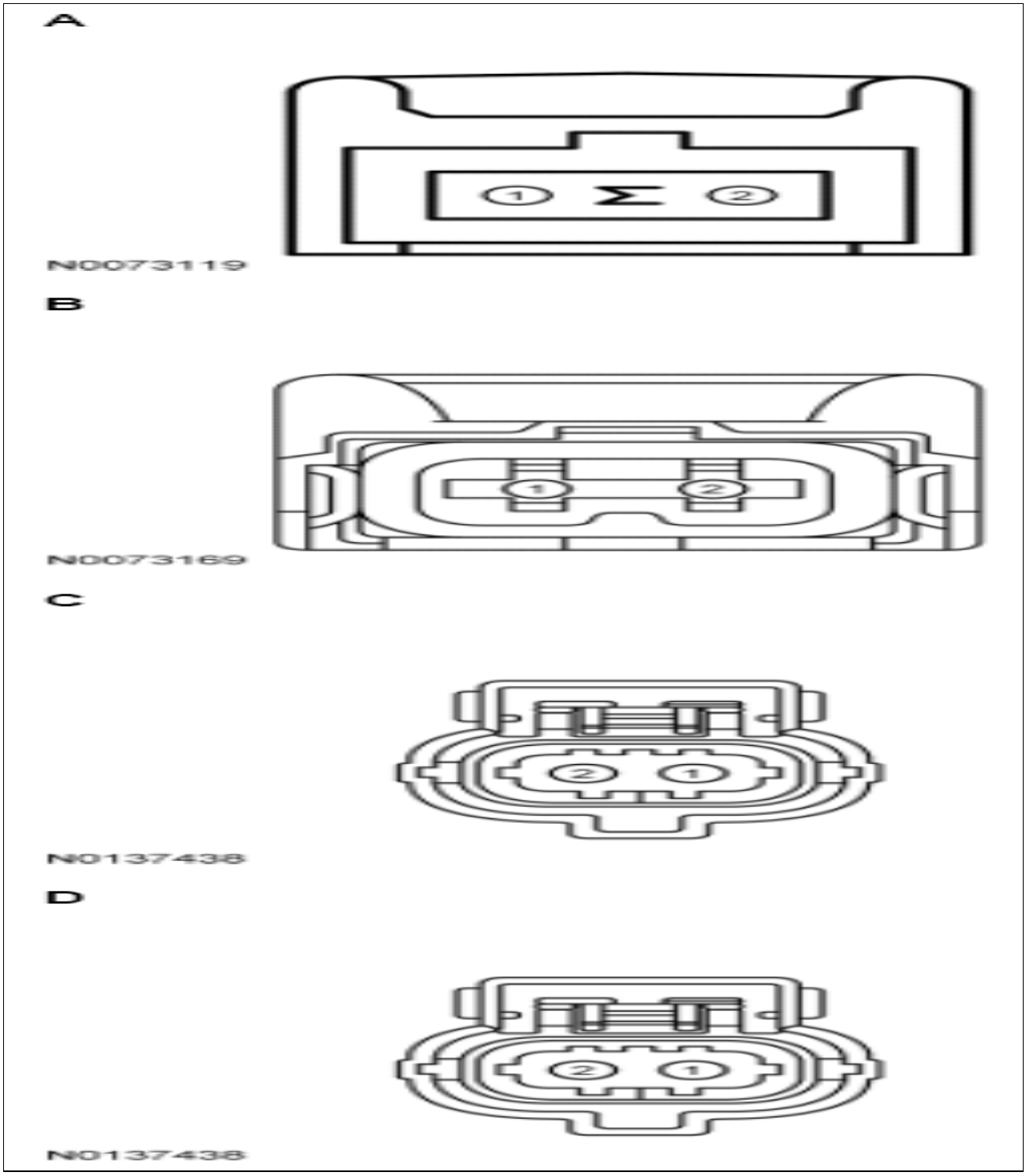
- turbocharger bypass (TCBY) valve (9K378)
- turbocharger bypass 2 (TCBY2) valve (9K378)

- turbocharger wastegate regulating valve solenoid (9961 pressure actuated, 9E882 vacuum actuated)
- wastegate vacuum sensor (9F479)
- leaks or restrictions in the intake air system and charge air cooler (CAC)
- powertrain control module (PCM) (12A650)

TURBOCHARGER SPECIFICATIONS

Vehicles	Pressure Actuated Wastegate	Vacuum Actuated Wastegate (Normally Closed)	Vacuum Actuated Wastegate (Normally Open)
Fiesta 1.0L, Focus 1.0L, Fusion 1.5L			X
Edge, Explorer 2.0L, F-150 2.7L		X	
All others	X		

Fig 1: Identifying Turbocharger Bypass (TCBY) Valve Connector

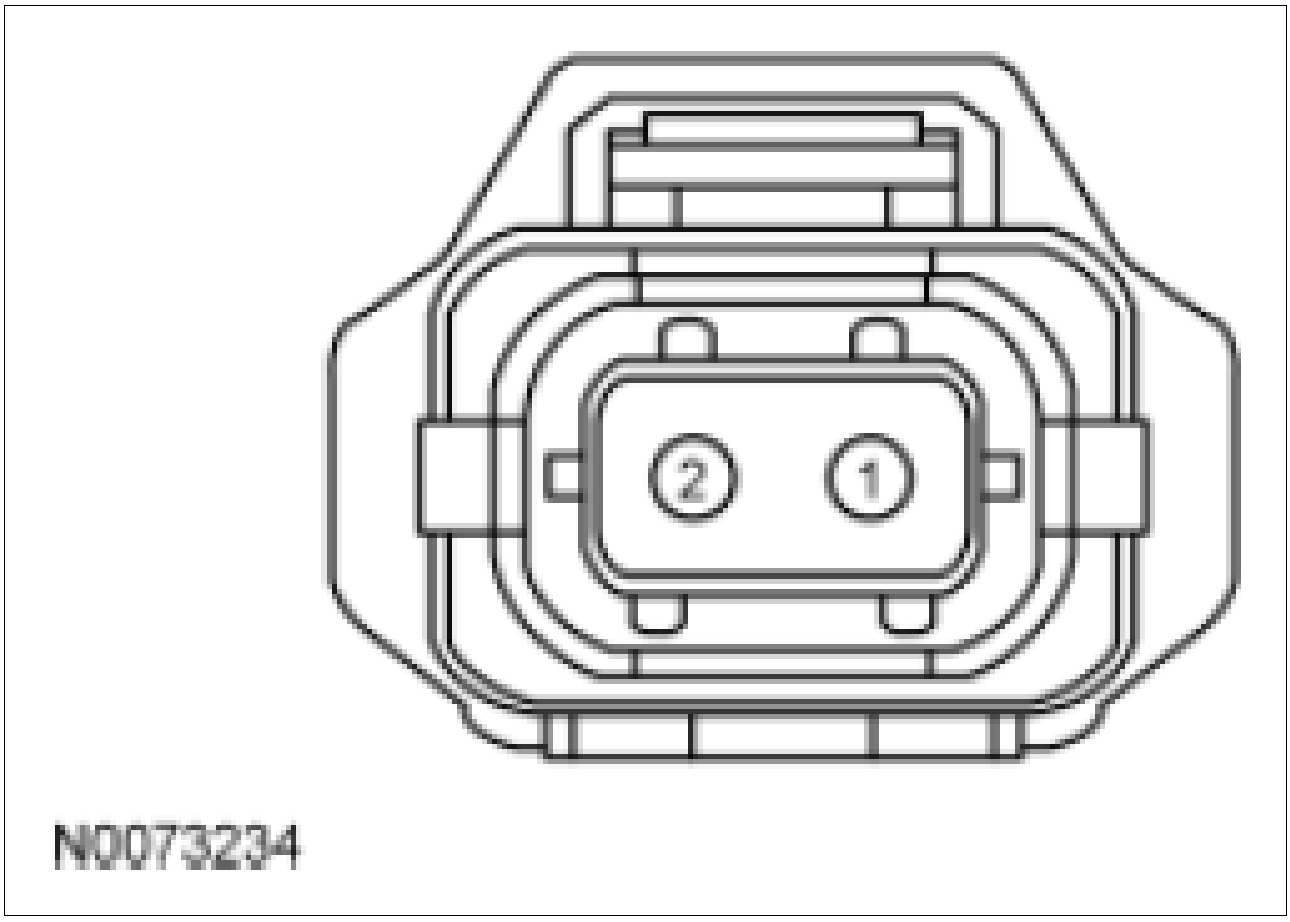


Courtesy of FORD MOTOR CO.

Vehicle	Connector	Pin	Circuit
Escape/Kuga 2.0L, Explorer 2.0L, Focus	A	1 2	TCBY VPWR

Expedition, Navigator	B	2 1	TCBY VPWR
Explorer 3.5L, Flex, MKS, MKT 3.5L, Taurus 3.5L	C	2 1	TCBY VPWR
Fiesta 1.6L	C	1 2	TCBY VPWR
Fiesta 1.0L, MKT 2.0L, Taurus 2.0L	A	2 1	TCBY VPWR
Fusion 2.0L, MKZ, Mustang	D	1 2	TCBY VPWR
MKC, Transit	B	1 2	TCBY VPWR
All other vehicles	D	2 1	TCBY VPWR

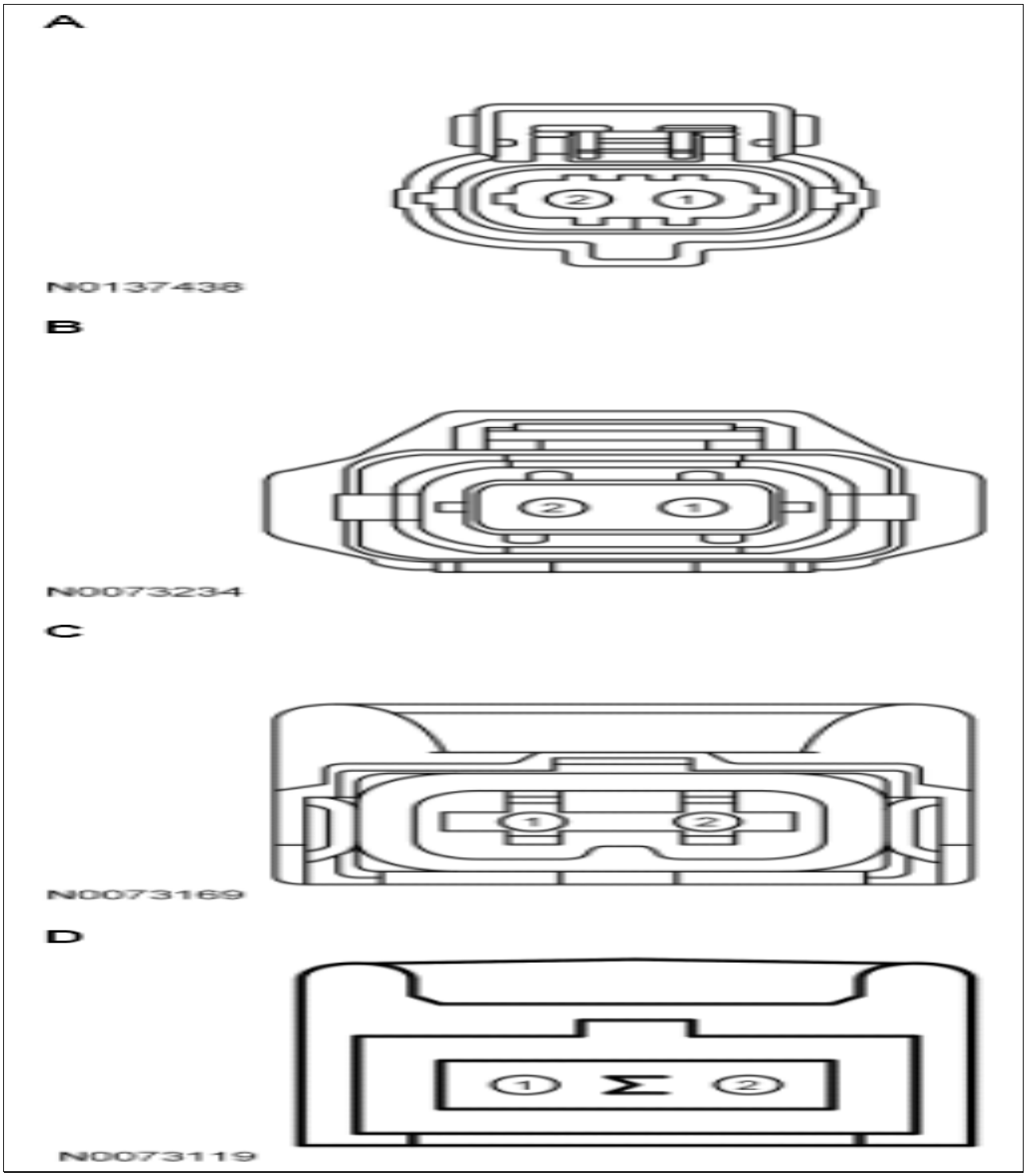
Fig 2: Identifying Turbocharger Bypass 2 (TCBY2) Valve Connector



Courtesy of FORD MOTOR CO.

Pin	Circuit
2	TCBY2 (Turbocharger Bypass 2)
1	VPWR (Vehicle Power)

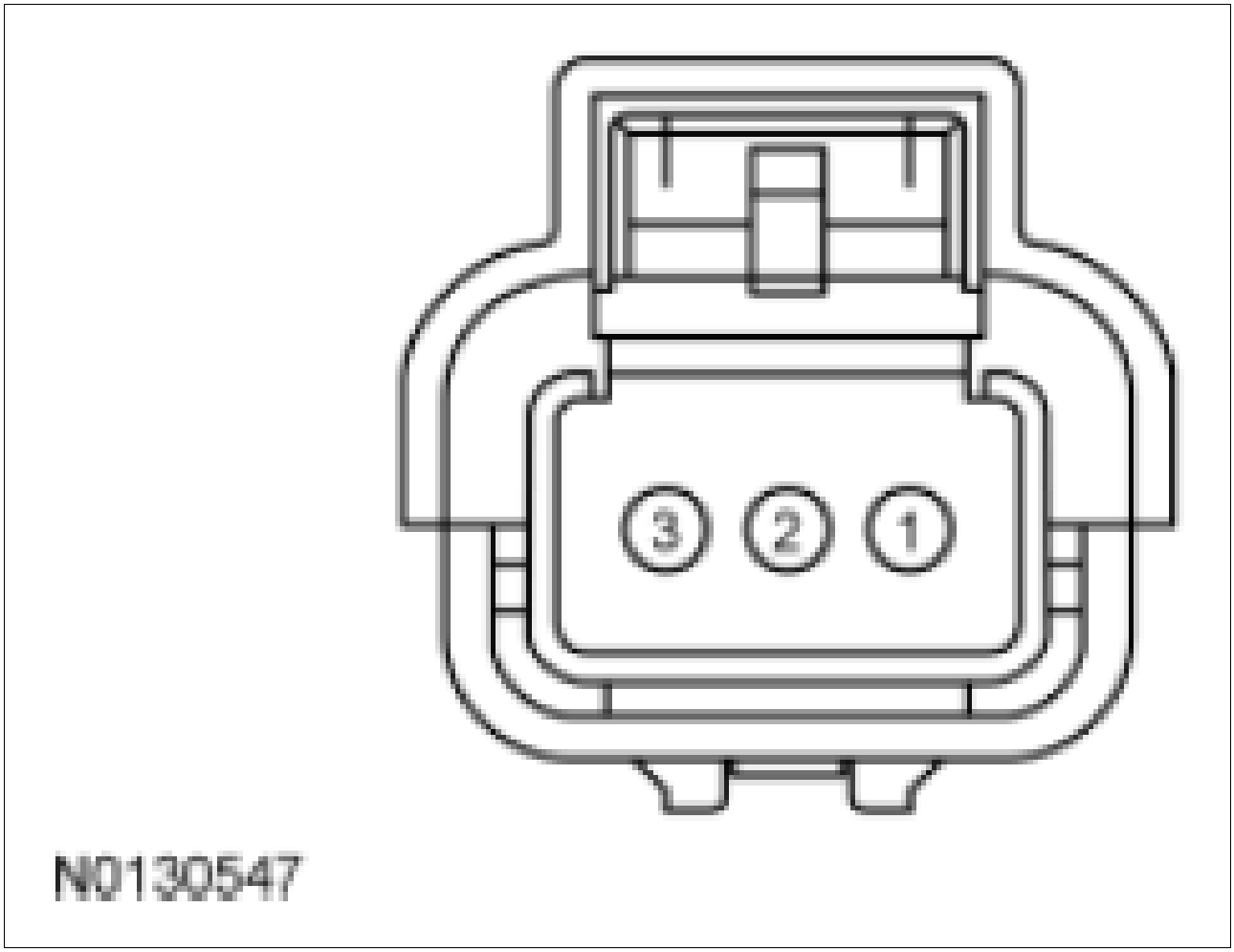
Fig 3: Identifying Turbocharger Wastegate Regulating Valve Solenoid Connector



Courtesy of FORD MOTOR CO.

Vehicle	Connector	Pin	Circuit
Escape/Kuga 1.6L, Fiesta, Fusion 1.5L, Fusion 1.6L, Transit Connect	A	2 1	TCWRVS VPWR
Edge, F-150 2.7L	B	2 1	TCWRVS VPWR
Escape/Kuga 2.0L, F-150 3.5L, Mustang	C	1 2	TCWRVS VPWR
Explorer 3.5L, Flex, MKS, MKT, Taurus	D	2 1	TCWRVS VPWR
All other vehicles	D	1 2	TCWRVS VPWR

Fig 4: Identifying Wastegate Vacuum Sensor Connector



Courtesy of FORD MOTOR CO.

Pin	Circuit
2	SIGRTN (Signal Return)
3	WVS (Wastegate Vacuum Sensor)
1	VREF (Reference Voltage)

Powertrain Control Module (PCM) Connector

For PCM connector views or reference values, refer to REFERENCE VALUES .

Vehicle	Connector	Pin	Circuit
Edge 2.0L	198 PIN	E20 E35 E16 E3	SIGRTN WVS TCWRVS TCBY
Edge 2.7L	198 PIN	B18 B33	SIGRTN WVS

		E16 E3	TCWRVS TCBY
Explorer 2.0L	154 PIN	E34 E13 E95 E29	SIGRTN WVS TCWRVS TCBY
Explorer GTDI 3.5L, Flex, MKS, MKT 3.5L, Taurus GTDI 3.5L	198 PIN	E16 E19 E3	TCWRVS TCBY2 TCBY
F-150 2.7L	198 PIN	E20 B33 E16 E3	SIGRTN WVS TCWRVS TCBY
Fiesta GTDI 1.6L	198 PIN	E47 E2	TCWRVS TCBY
Fiesta 1.0L, Focus 1.0L	198 PIN	E47 E46	TCWRVS TCBY
Fusion 1.6L	198 PIN	E47 E48	TCWRVS TCBY
All other vehicles	198 PIN	E16 E3	TCWRVS TCBY

PINPOINT TEST HN: TURBOCHARGER SYSTEM > TEST PROCEDURE

HN1 CHECK FOR DIAGNOSTIC TROUBLE CODES (DTCS)

NOTE: This pinpoint test is designed to diagnose multiple components in the same test steps, only measure the circuits that apply to the vehicle and component being diagnosed.

NOTE: Diagnose circuit concerns prior to range or performance concerns.

Are DTCs P0034, P0035, P00C1, P00C2, P0234, P0245, P0246, P0299, P100F, P1011, P1012, P1013, P1014, P1015 or P1016 present?

Yes	No
GO to **HN2** .	For symptoms without DTCs, GO to HN12. For all others, RETURN to SYMPTOM CHARTS for further direction.

HN2 VISUALLY INSPECT THE TURBOCHARGER SYSTEM

Visually inspect the turbocharger system for:

correct vacuum supply system hose connections and routing

correct vacuum turbocharger wastegate control hose connection and routing

correct pressure turbocharger wastegate control hose connection and routing

correct vacuum turbocharger bypass control hose connection and routing

leaks around tubing and intake manifold

correct electrical connections

damaged or leaking exhaust system

turbocharger oil leaks. Refer to the service information , Fuel Charging and Controls - Turbocharger.

damaged or restricted turbocharger oil return tubes. Refer to the service information , Fuel Charging and Controls - Turbocharger.

damaged turbocharger. Refer to the service information , Fuel Charging and Controls - Turbocharger.

Do the visual inspections reveal any concerns?

Yes	No
REPAIR as necessary. Clear the PCM DTCs. REPEAT the self-test.	For DTC P100F only, GO to **HN3** . For DTC P1011, P1012, P1013, P1014, P1015 or P1016. GO to HN4. For all others, GO to HN5.

HN3 SENSOR CORRELATION

Ignition ON, engine OFF.

Access the PCM and monitor the BARO (PRESS), MAP (PRESS), TCBP (PRESS) and WGATE_PRES (PRESS) PIDs.

Is the WGATE_PRES PID reading within 6.77 kPa (0.98 psi) of the other PID readings?

Yes	No
GO to HN5.	CHECK the turbocharger wastegate vacuum system hoses for restrictions. REPAIR as necessary. If no concerns are present, INSTALL a new Wastegate Vacuum Sensor. Clear the PCM DTCs. REPEAT the self-test.

HN4 CHECK FOR VREF AT THE SENSOR

Ignition OFF.

Wastegate Vacuum Sensor connector disconnected.

Ignition ON, engine OFF.

Measure the voltage between:

(+) Wastegate Vacuum Sensor Connector, Harness Side	(-) Wastegate Vacuum Sensor Connector, Harness Side
VREF - Pin 1	SIGRTN

Is the voltage between 4.5 - 5.5 V?

Yes	No
GO to HN6.	GO to PINPOINT TEST C .

HN5 CHECK FOR VOLTAGE AT THE COMPONENT

NOTE: This step applies to multiple components, only measure the circuits that apply to the vehicle and component being diagnosed.

Ignition OFF.

For TCBY,

TCBY Valve connector disconnected.

Ignition ON, engine OFF.

Measure the voltage between:

(+) TCBY Valve Connector, Harness Side	(-)
VPWR	Ground

For TCBY2,

TCBY2 Valve connector disconnected.

Ignition ON, engine OFF.

Measure the voltage between:

(+) TCBY2 Valve Connector, Harness Side	(-)
VPWR - Pin 1	Ground

For turbocharger wastegate regulating valve solenoid,

Turbocharger Wastegate Regulating Valve Solenoid connector disconnected.

Ignition ON, engine OFF.

Measure the voltage between:

(+) Turbocharger Wastegate Regulating Valve Solenoid Connector, Harness Side	(-)
VPWR	Ground

Is the voltage greater than 10.5 V?

Yes	No
GO to **HN6** .	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

HN6 CHECK FOR AN OPEN

NOTE: This step applies to multiple components, only measure the circuits that apply to the vehicle and component being diagnosed.

Ignition OFF.

PCM connector disconnected.

For TCBY,

Measure the resistance between:

(+) TCBY Valve Connector, Harness Side	(-) PCM Connector, Harness Side
TCBY	TCBY

For TCBY2,

Measure the resistance between:

(+) TCBY2 Valve Connector, Harness Side	(-) PCM Connector, Harness Side
TCBY2 - Pin 2	TCBY2

For turbocharger wastegate regulating valve solenoid,

Measure the resistance between:

(+) Turbocharger Wastegate Regulating Valve Solenoid Connector, Harness Side	(-) PCM Connector, Harness Side
TCWRVS	TCWRVS

For wastegate vacuum sensor,

Measure the resistance between:

(+) Wastegate Vacuum Sensor Connector, Harness Side	(-) PCM Connector, Harness Side

WVS - Pin 3	WVS
SIGRTN - Pin 2	SIGRTN

Are the resistances less than 5 ohms?

Yes	No
GO to **HN7** .	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

HN7 CHECK FOR A SHORT TO GROUND

NOTE: This step applies to multiple components, only measure the circuits that apply to the vehicle and component being diagnosed.

Ignition OFF.

For TCBY,

Measure the resistance between:

(+) TCBY Valve Connector, Harness Side	(-)
TCBY	Ground

For TCBY2,

Measure the resistance between:

(+) TCBY2 Valve Connector, Harness Side	(-)
TCBY2 - Pin 2	Ground

For turbocharger wastegate regulating valve solenoid,

Measure the resistance between:

(+) Turbocharger Wastegate Regulating Valve Solenoid Connector, Harness Side	(-)
TCWRVS	Ground

For wastegate vacuum sensor,

Measure the resistance between:

(+) Wastegate Vacuum Sensor Connector, Harness Side	(-)
WVS - Pin 3	Ground

Is the resistance greater than 10K ohms?

Yes	No
GO to **HN8** .	REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.

HN8 CHECK FOR A SHORT TO VOLTAGE

NOTE: This step applies to multiple components, only measure the circuits that apply to the vehicle and component being diagnosed.

Ignition ON, engine OFF.

For TCBY,

Measure the voltage between:

(+) TCBY Valve Connector, Harness Side	(-)
TCBY	Ground

For TCBY2,

Measure the voltage between:

(+) TCBY2 Valve Connector, Harness Side	(-)
TCBY2 - Pin 2	Ground

For turbocharger wastegate regulating valve solenoid,

Measure the voltage between:

(+) Turbocharger Wastegate Regulating Valve Solenoid Connector, Harness Side	(-)
TCWRVS	Ground

For wastegate vacuum sensor,

Measure the voltage between:

(+) Wastegate Vacuum Sensor Connector, Harness Side	(-)
WVS - Pin 3	Ground

Is any voltage present?

Yes	No
REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.	For DTCs P1011, P1012, P1013, P1014, P1015 or P1016, GO to HN10. For all others, GO to **HN9** .

HN9 CHECK THE COMPONENT RESISTANCE

NOTE: This step applies to multiple components, only measure the circuits that apply to the vehicle and component being diagnosed.

Ignition OFF.

For TCBY,

Measure the resistance between:

(+) TCBY Valve Connector, Component Side	(-) TCBY Valve Connector, Component Side
TCBY	VPWR

For TCBY2,

Measure the resistance between:

(+) TCBY2 Valve Connector, Component Side	(-) TCBY2 Valve Connector, Component Side
TCBY2 - Pin 2	VPWR - Pin 1

For turbocharger wastegate regulating valve solenoid,

Measure the resistance between:

(+) Turbocharger Wastegate Regulating Valve Solenoid Connector, Component Side	(-) Turbocharger Wastegate Regulating Valve Solenoid Connector, Component Side
TCWRVS	VPWR

TURBOCHARGER CONTROL COMPONENT RESISTANCE SPECIFICATIONS

Component	Resistance (Ohms)
Turbocharger Bypass Valve (Integrated Solenoid 2.7L and 3.5L GTDI)	8 to 10
Turbocharger Bypass Valve (Integrated Solenoid All Others)	12 to 14
Turbocharger Bypass Valve Solenoid (Remote Solenoid)	21 to 25
Turbocharger Wastegate Regulating Valve Solenoid (Edge, Explorer 2.0L, F-150 2.7L, Fiesta 1.0L, Focus 1.0L, Fusion 1.5L)	14 to 17
Turbocharger Wastegate Regulating Valve Solenoid (All Others)	21 to 25

Is the resistance within specification?

Yes	No
GO to **HN10** .	INSTALL a new suspect component. REFER to the service information , Electronic Engine Controls. Clear the PCM DTCs. REPEAT the self-test.

HN10 CHECK THE WIRING HARNESS

NOTE: This step applies to multiple components, only measure the circuits that apply to the vehicle and component being diagnosed.

Ignition OFF.

PCM connector connected.

For TCBY or TCBY2,

Suspect TCBY Solenoid connector connected.

Ignition ON, engine OFF.

Access the PCM and monitor the TURBO_BP1_STAT (MODE) PID.

Access the PCM and monitor the TURBO_BP2_STAT (MODE) PID.

For the turbocharger wastegate regulating valve solenoid,

Turbocharger Wastegate Regulating Valve Solenoid connector connected.

Ignition ON, engine OFF.

Access the PCM and monitor the TWGATE_STAT (MODE) PID.

For wastegate vacuum sensor,

Wastegate Vacuum Sensor connector connected.

Ignition ON, engine OFF.

Access the PCM and monitor the WGATE_PRES_F (MODE) PID.

While observing the PID, wiggle, shake, and bend small sections of the wiring harness while working from the component to the PCM.

Is there a change in the PID reading?

Yes	No
ISOLATE the concern. REPAIR as necessary. Clear the PCM DTCs. REPEAT the self-test.	GO to **HN11** .

HN11 INTERMITTENT CHECK

NOTE: This step applies to multiple components, only measure the circuits that apply to the vehicle and component being diagnosed.

For TCBY or TCBY2,

Access the PCM and monitor the TURBO_BP1_STAT (MODE) PID.

Access the PCM and monitor the TURBO_BP2_STAT (MODE) PID.

For the turbocharger wastegate regulating valve solenoid,

Access the PCM and monitor the TWGATE_STAT (MODE) PID.

For wastegate vacuum sensor,

Access the PCM and monitor the WGATE_PRES_F (MODE) PID.

While observing the PID, carry out the following:

lightly tap on the suspect component to simulate road shock

wiggle the suspect component connector

Is there a change in the PID reading?

Yes	No
INSTALL a new suspect component. REFER to the service information , Electronic Engine Controls. Clear the PCM DTCs. REPEAT the self-test.	For DTCs P1011, P1015 or P1016, GO to HN27. For all others, GO to **HN12** .

HN12 TURBOCHARGER SYSTEM PERFORMANCE CONCERNS

NOTE: For a performance concern related to a plugged or restricted exhaust, GO to HF8.

NOTE: Diagnose circuit concerns prior to range or performance concerns.

NOTE: Visually inspect the vehicle for aftermarket accessories and performance modifications (exhaust system, turbocharger, performance chip). Refer to ENGINE CONTROL (EC) SYSTEM , Modifications to OBD Vehicles.

Ignition OFF.

Check the air filter element and housing for contamination, blockage or water intrusion.

Disconnect the air intake and check for restrictions and water intrusion.

Visually inspect the turbocharger system for:

correct vacuum supply system hose connections and routing

correct vacuum turbocharger wastegate control hose connection and routing

correct pressure turbocharger wastegate control hose connection and routing

correct vacuum turbocharger bypass control hose connection and routing

leaks around tubing and intake manifold

correct electrical connections

damaged or leaking exhaust system

turbocharger oil leaks. Refer to the service information , Fuel Charging and Controls - Turbocharger.

damaged or restricted turbocharger oil return tubes. Refer to the service information , Fuel Charging and Controls - Turbocharger.

damaged turbocharger. Refer to the service information , Fuel Charging and Controls - Turbocharger.

Check the charge air cooler (CAC) system for leaks (hoses and cooler).

Check the CAC and intake air system for restrictions.

Check for aftermarket exhaust accessories and performance modifications.

Visually inspect the exhaust system for the following:

leaks, cracks, or punctures upstream of turbocharger

aftermarket accessories and performance modifications

tailpipe modifications that increase the exhaust restriction

plugged or restricted exhaust

Is a concern present?

Yes	No
REPAIR as necessary. Clear the PCM DTCs. REPEAT the self-test.	GO to **HN13** .

HN13 CHECK THE CHARGE AIR COOLER (CAC) AND INTAKE AIR SYSTEMS FOR LEAKS AND RESTRICTIONS

NOTE: Remember to reinstall the sensor, reconnect the CAC tube to the throttle body and remove the plastic bag from the air filter at the completion of this step.

Disconnect the CAC tube from the throttle body.

Use a suitable method to temporarily plug the CAC tube outlet.

Place the air filter in a plastic bag to prevent air flow out the intake port and reinstall it in the vehicle.

Remove the IAT or TCIPT sensor from the ducting between the air filter housing and the turbocharger.

Connect the Rotunda Smoke Machine, Fuel Evaporative Emission System Tester 218-00001 (522) or equivalent to the intake air system using an appropriate adapter.

Fill the intake air system with smoke.

Check the intake air system for leaks and restrictions.

Are any leaks or restrictions present?

Yes	No
REPAIR as necessary. Clear the PCM DTCs. REPEAT the self-test.	GO to **HN14** .

HN14 CHECK BYPASS VALVE OPERATION

NOTE: For vehicles without a commandable RPM PID, use the accelerator pedal to hold the engine RPM at approximately 2, 000 RPM.

NOTE: The change in the TCBP PID value on a 2.0L engine will be 3.45 kPa (0.5 psi) or less when the TURBO_BYPASS PID is commanded ON.

Ignition ON, engine running.

Access the PCM and control the TURBO_BPASS (MODE) PID.

Access the PCM and control the TURBO_BPASS_2 (MODE) PID.

Command the TURBO_BPASS PID and the TURBO_BPASS_2 PID to OFF.

Access the PCM and control the TURBO_WGATE (PER) PID.

Command the TURBO_WGATE PID duty cycle to 0%.

Access the PCM and monitor the TCBP (PRESS) PID.

Access the PCM and control the RPM (RPM) PID.

Command the RPM PID to the maximum RPM.

Record the TCBP PID reading.

Command the TURBO_BPASS and the TURBO_BPASS_2 PIDs ON and record the TCBP PID reading.

Does the TCBP PID reading decrease when the bypass valves are commanded ON?

Yes	No
GO to **HN15** .	For Escape/Kuga 2.0L, Explorer 2.0L, Fiesta 1.0L, Focus 2.0L GTDI, Fusion 2.0L, MKC, MKT 2.0L, MKZ 2.0L, and Taurus 2.0L, GO to HN19. For all others, INSTALL a new Suspect TCBY solenoid. REFER to the service information , Electronic Engine Controls. Clear the PCM DTCs. REPEAT the self-test.

HN15 CHECK WASTEGATE OPERATION

NOTE: For vehicles without a commandable RPM PID, use the accelerator pedal to hold the engine RPM at approximately 2, 000 RPM.

Ignition ON, engine running.

Access the PCM and control the TURBO_BPASS (MODE) PID.

Access the PCM and control the TURBO_BPASS_2 (MODE) PID.

Command the TURBO_BPASS PID and the TURBO_BPASS_2 PID to OFF.

Access the PCM and control the TURBO_WGATE (PER) PID.

Command the TURBO_WGATE PID duty cycle to 0%.

Access the PCM and monitor the TCBP (PRESS) PID.

Access the PCM and control the RPM (RPM) PID.

Command the RPM PID to the maximum RPM.

Record the TCBP PID reading.

Command the TURBO_WGATE PID duty cycle to 100% and record the TCBP PID reading.

Does the TCBP PID reading increase when the TURBO_WGATE PID duty cycle is commanded to 100%?

Yes	No
GO to HN26.	For Edge 2.0L, Edge 2.7L, Explorer 2.0L, F-150 2.7L, Fiesta 1.0L,

	Focus 1.0L, and Fusion 1.5L, GO to HN22. For all others, GO to **HN16** .

HN16 CHECK TURBOCHARGER PRESSURE WASTEGATE ACTUATOR OPERATION

NOTE: Do not exceed 103.4 kPa (15 psi) of pressure applied to the turbocharger actuators, excessive pressure will damage the actuators.

Disconnect the turbocharger wastegate control hose from the turbocharger wastegate actuator.

Record each of the turbocharger wastegate actuator linkage positions.

Using a suitable hand pump with pressure gauge, pressurize the turbocharger wastegate actuator to 48.3 kPa (7 psi).

Does each turbocharger wastegate actuator linkage move from the starting position and does the pressure remain steady?

Yes	No
GO to **HN17** .	GO to HN18.

HN17 CHECK PRESSURE SYSTEM TO THE TURBOCHARGER WASTEGATE ACTUATOR

NOTE: Do not exceed 103.4 kPa (15 psi) of pressure applied to the turbocharger actuators, excessive pressure will damage the actuators.

Disconnect the pressure supply hose from the inlet of the turbocharger wastegate regulating valve solenoid.

Disconnect the pressure control hose from the outlet of the turbocharger wastegate regulating valve solenoid.

Using a suitable adaptor, connect the pressure supply hose to the pressure control hose.

Disconnect the turbocharger wastegate pressure supply hose from the high pressure tube.

Using a suitable hand pump with pressure gauge, pressurize the turbocharger wastegate pressure supply hose to 48.3 kPa (7 psi).

Does each turbocharger wastegate actuator linkage move from the starting position and does the pressure remain steady?

Yes	No
INSTALL a new Turbocharger Wastegate Regulating Valve solenoid.	A pressure system leak or restriction is the cause of the concern. DIAGNOSE the turbocharger wastegate pressure system leak or restriction.

REFER to the service information , Fuel Charging and Controls, Turbocharger. Clear the PCM DTCs. REPEAT the self-test.	REPAIR as necessary. Clear the PCM DTCs. REPEAT the self-test.

HN18 CHECK THE TURBOCHARGER WASTEGATE ACTUATOR LINKAGE FOR DAMAGE OR OBSTRUCTIONS

Attempt to manually activate the suspect actuator.

Can the suspect actuator be activated manually?

Yes	No
INSTALL a new turbocharger wastegate actuator. REFER to the service information , Fuel Charging and Controls. Clear the PCM DTCs. REPEAT the self-test.	Visually inspect the suspect turbocharger wastegate actuator linkage for damage or obstructions. Repair as necessary. If no turbocharger wastegate actuator linkage concerns are present, INSTALL a new turbocharger assembly. Refer to the service information , Fuel Charging and Controls. Clear the PCM DTCs. REPEAT the self-test.

HN19 CHECK THE TURBOCHARGER BYPASS VALVE SOURCE VACUUM

Disconnect the vacuum supply tube from the vacuum reservoir.

Using the DSL ENG Pressure Test Kit 014-00761 or equivalent, measure the vacuum at the vacuum reservoir.

Ignition ON, engine running.

Record the vacuum.

Is the vacuum greater than 33.86 kPa (10 in-Hg)?

Yes	No
GO to **HN20** .	DIAGNOSE a loss of vacuum. REFER to the service information , Brake System. Clear the PCM DTCs. REPEAT the self-test.

HN20 CHECK THE BYPASS VALVE

Disconnect the vacuum control tube from the turbocharger bypass valve.

Using the DSL ENG Pressure Test Kit 014-00761 or equivalent, apply 33.86 kPa (10 in-hg) of vacuum to the turbocharger bypass valve.

Does the vacuum remain steady?

Yes	No

GO to **HN21** .	INSTALL a new TCBY valve. REFER to the service information , Fuel Charging and Controls, Turbocharger. Clear the PCM DTCs. REPEAT the self-test.

HN21 CHECK THE VACUUM SYSTEM

Disconnect the vacuum supply tube from the inlet of the turbocharger bypass valve solenoid.

Disconnect the vacuum control tube from the outlet of the turbocharger bypass valve solenoid.

Using a suitable adaptor, connect the vacuum supply tube to the vacuum control tube.

Disconnect the vacuum supply tube from the vacuum reservoir.

Using the DSL ENG Pressure Test Kit 014-00761 or equivalent, apply 33.86 kPa (10 in-hg) of vacuum to the vacuum supply tube.

Does the vacuum remain steady?

Yes	No
INSTALL a new TCBY solenoid. REFER to the service information , Fuel Charging and Controls, Turbocharger. Clear the PCM DTCs. REPEAT the self-test.	A vacuum system leak or restriction is the cause of the concern. DIAGNOSE the vacuum system leak or restriction. REPAIR as necessary. Clear the PCM DTCs. REPEAT the self-test.

HN22 CHECK THE TURBOCHARGER WASTEGATE SOURCE VACUUM

Disconnect the vacuum supply tube from the vacuum reservoir.

Using the DSL ENG Pressure Test Kit 014-00761 or equivalent, measure the vacuum at the vacuum reservoir.

Ignition ON, engine running.

Record the vacuum.

Is the vacuum greater than 33.86 kPa (10 in-Hg)?

Yes	No
GO to **HN23** .	DIAGNOSE a loss of vacuum. REFER to the service information , Brake System. Clear the PCM DTCs. REPEAT the self-test.

HN23 CHECK TURBOCHARGER VACUUM WASTEGATE ACTUATOR OPERATION

Disconnect the turbocharger wastegate control hose from the turbocharger wastegate actuator.

Record each of the turbocharger wastegate actuator linkage positions.

Using the DSL ENG Pressure Test Kit 014-00761 or equivalent, apply 33.86 kPa (10 in-hg) of vacuum to the turbocharger wastegate actuator.

Does each turbocharger wastegate actuator linkage move from the starting position and does the pressure remain steady?

Yes	No
GO to **HN24** .	GO to HN25.

HN24 CHECK THE VACUUM SUPPLY HOSE FROM THE VACUUM RESERVOIR TO THE TURBOCHARGER WASTEGATE ACTUATOR

Disconnect the vacuum supply hose from the inlet of the turbocharger wastegate regulating valve solenoid.

Disconnect the vacuum control hose from the outlet of the turbocharger wastegate regulating valve solenoid.

Using a suitable adaptor, connect the vacuum supply hose to the vacuum control hose.

Disconnect the turbocharger wastegate vacuum supply hose from the vacuum reservoir.

Using the DSL ENG Pressure Test Kit 014-00761 or equivalent, apply 33.86 kPa (10 in-hg) of vacuum to the vacuum supply hose.

Does each turbocharger wastegate actuator linkage move from the starting position and does the vacuum remain steady?

Yes	No
INSTALL a new Turbocharger Wastegate Regulating Valve solenoid. REFER to the service information , Fuel Charging and Controls, Turbocharger. Clear the PCM DTCs. REPEAT the self-test.	A vacuum system leak or restriction is the cause of the concern. DIAGNOSE the turbocharger wastegate vacuum system leak or restriction. REPAIR as necessary. Clear the PCM DTCs. REPEAT the self-test.

HN25 CHECK THE TURBOCHARGER WASTEGATE ACTUATOR LINKAGE FOR DAMAGE OR OBSTRUCTIONS

Attempt to manually activate the suspect actuator.

Can the suspect actuator be activated manually?

Yes	No
INSTALL a new turbocharger wastegate actuator. REFER to the service information , Fuel Charging and Controls, Turbocharger. Clear the PCM DTCs. REPEAT the	Visually inspect the suspect turbocharger wastegate actuator linkage for damage or obstructions. Repair as necessary. If no turbocharger wastegate actuator linkage concerns are present, INSTALL a new turbocharger

self-test.	assembly. REFER to the service information , Fuel Charging and Controls, Turbocharger. Clear the PCM DTCs. REPEAT the self-test.

HN26 TURBOCHARGER COMPRESSOR WHEEL CHECK

Inspect the turbocharger compressor wheel and housing for the following:

ability to spin freely

noise while spinning

damage to vanes on the compressor wheel

out of balance condition

debris in housing

Is a concern present?

Yes	No
INSTALL a new suspect turbocharger assembly. REFER to the service information , Fuel Charging and Controls, Turbocharger. Clear the PCM DTCs. REPEAT the self-test.	GO to HN28.

HN27 CHECK THE WASTEGATE VACUUM SENSOR

Ignition ON, engine OFF.

Access the PCM and monitor the WGATE_V (VOLT) PID.

Record the PID value.

Disconnect the wastegate vacuum tube from the vacuum port on the turbocharger wastegate vacuum sensor.

Using a suitable hand pump with gauge, apply 34.47 kPa (5 in-Hg) vacuum to the wastegate vacuum sensor port.

Record the PID value.

Does the PID value change when vacuum is applied?

Yes	No
A vacuum system leak or restriction is the cause of the concern. DIAGNOSE the vacuum system leak or restriction. REPAIR as necessary. Clear the PCM DTCs. REPEAT the self-test.	INSTALL a new Wastegate Vacuum Sensor. REFER to the service information , Electronic Engine Controls. Clear the PCM DTCs. REPEAT the self-test.

HN28 CHECK FOR CORRECT PCM OPERATION

Disconnect all the PCM connectors.

Visually inspect for:

pushed out pins

corrosion

Connect all the PCM connectors and make sure they seat correctly.

Carry out the PCM self-test.

Verify the concern is still present.

Is the concern still present?

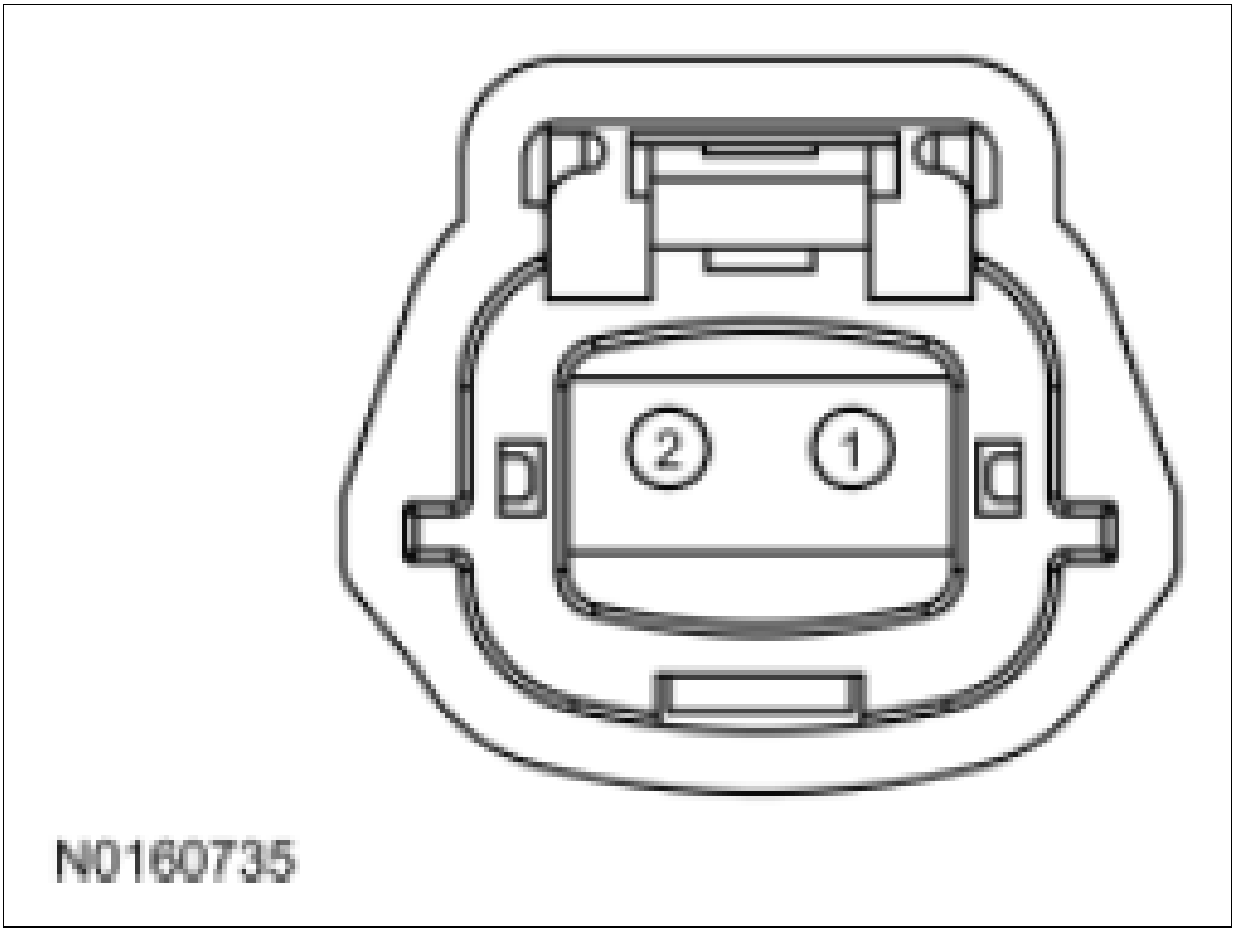
Yes	No
INSTALL a new PCM. REFER to FLASH ELECTRICALLY ERASABLE PROGRAMMABLE READ ONLY MEMORY (EEPROM) , Programming the VID Block for a Replacement PCM.	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.

PINPOINT TEST HU: INTAKE AIR SYSTEMS > INTRODUCTION

This pinpoint test is intended to diagnose the following:

- air cleaner assembly (including air cleaner element) (9600)
- air inlet tube (9F843)
- clean air tube hose and resonator (9R504) and (9F593)
- intake manifold runner control bank 1 (IMRC1) solenoid (9J559)
- intake manifold runner control bank 2 (IMRC2) solenoid (9J559)
- intake manifold runner control bank 1 (IMRC1) sensor (9P471)
- intake manifold runner control bank 2 (IMRC2) sensor (9P471)
- intake manifold tuning valve (IMTV) (9L490)
- IMTV electric actuator assembly (9L490)
- throttle body assembly (9E926)
- harness circuits: IMRC, IMRC1, IMRC1A, IMRC2, IMRC2A, IMTV, SIGRTN, VPWR and VREF
- PCM (12A650)

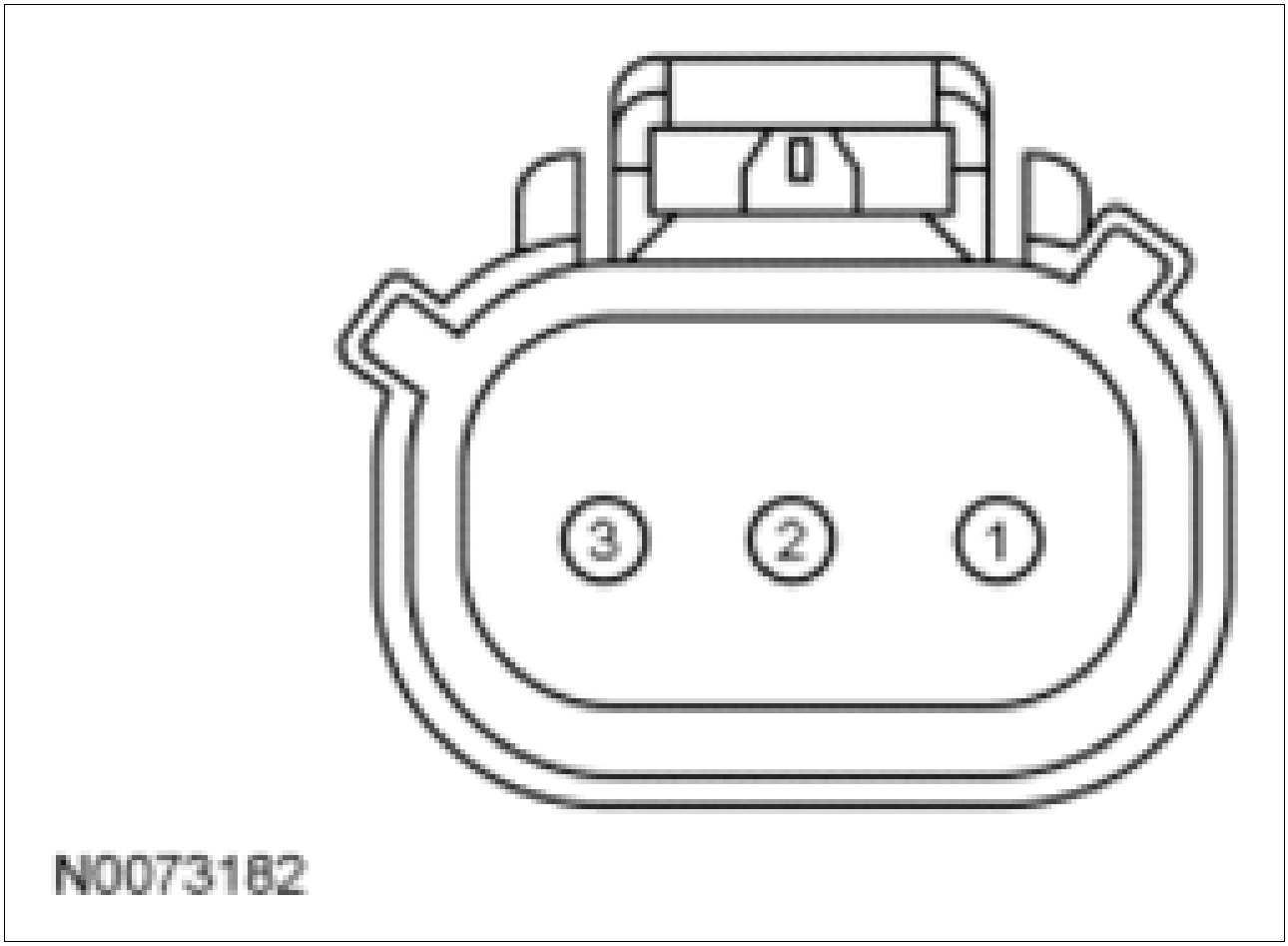
Fig 1: Identifying Intake Manifold Runner Control Bank 1 (IMRC1) Solenoid Connector



Courtesy of FORD MOTOR CO.

Pin	Circuit
1	VPWR (Vehicle Power)
2	IMRC1A (Intake Manifold Runner Control Bank 1 Actuator)

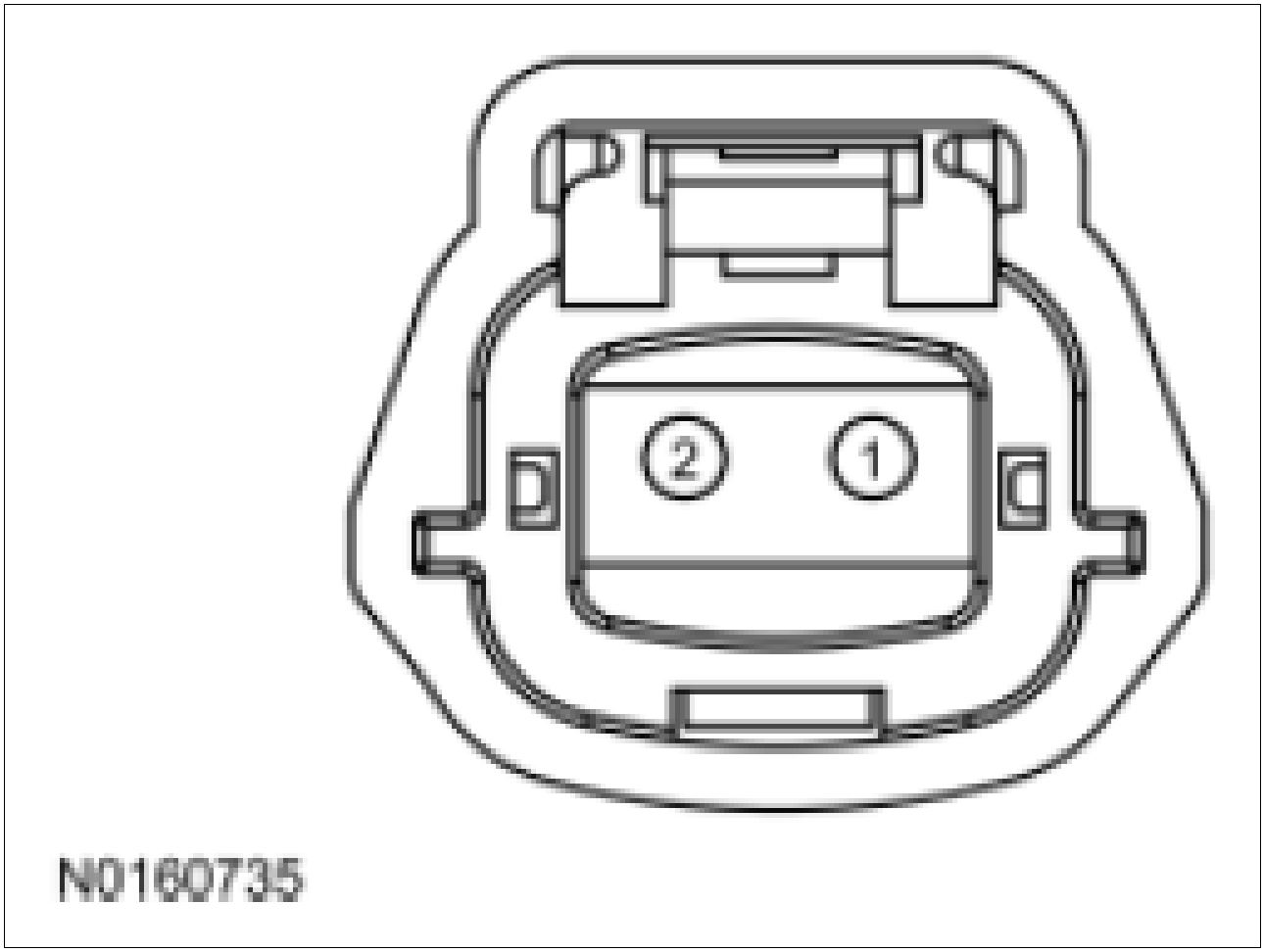
Fig 2: Identifying Intake Manifold Runner Control Bank 1 (IMRC1) Sensor Connector



Courtesy of FORD MOTOR CO.

Pin	Circuit
1	IMRC1 (Intake Manifold Runner Control Bank 1)
3	SIGRTN (Signal Return)
2	VREF (Reference Voltage)

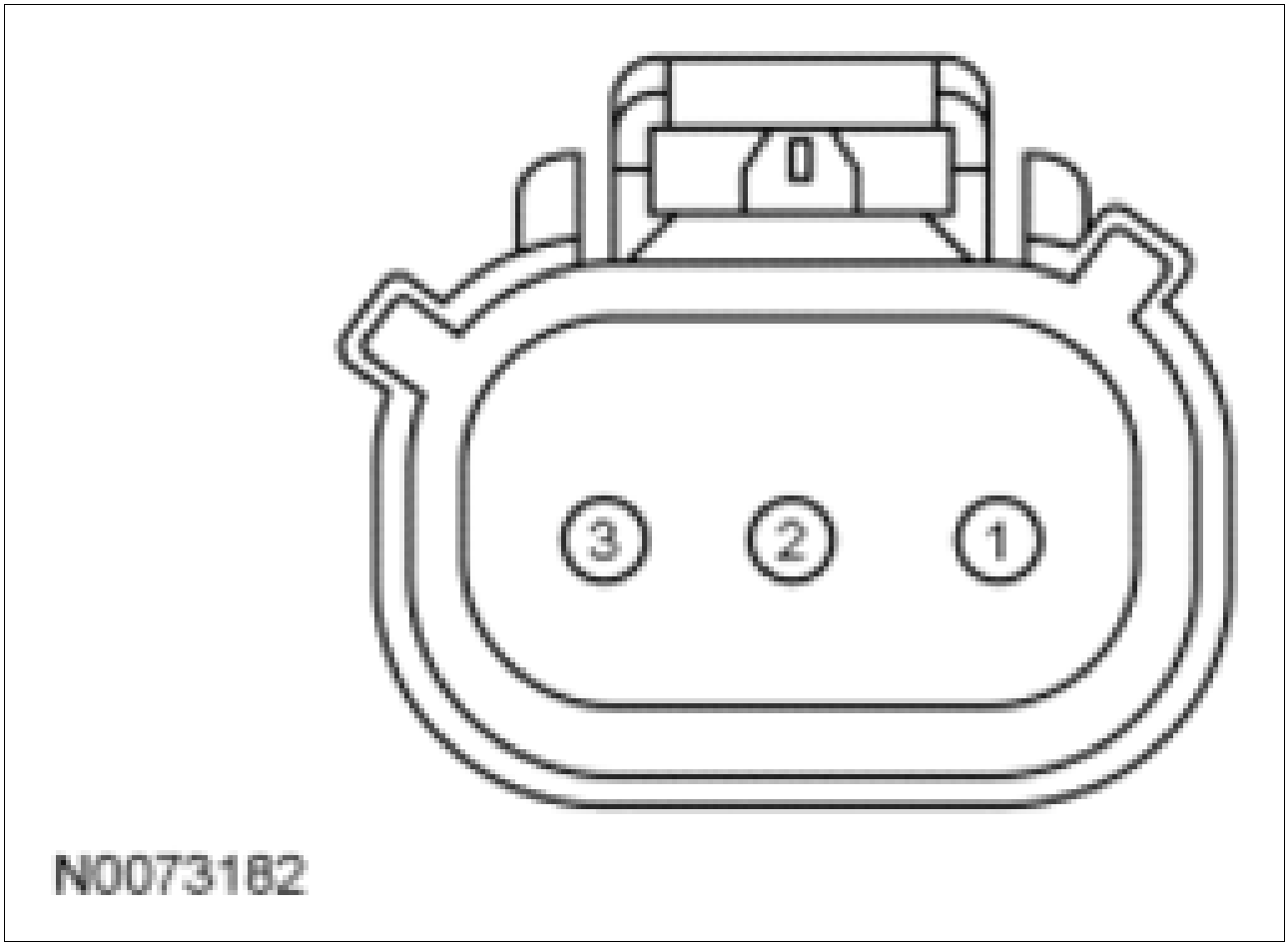
Fig 3: Identifying Intake Manifold Runner Control Bank 2 (IMRC2) Solenoid Connector



Courtesy of FORD MOTOR CO.

Pin	Circuit
1	VPWR (Vehicle Power)
2	IMRC2A (Intake Manifold Runner Control Bank 2 Actuator)

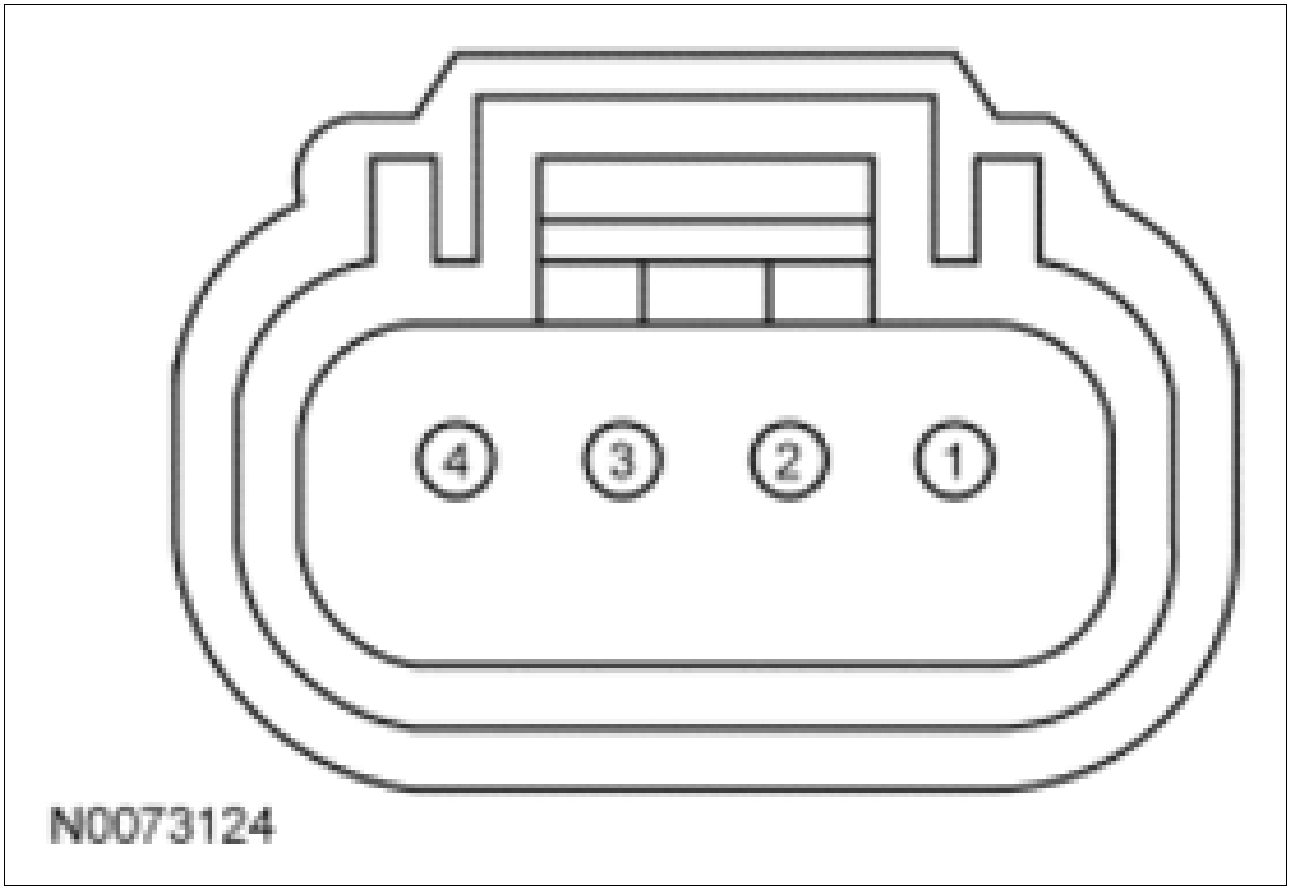
Fig 4: Identifying Intake Manifold Runner Control Bank 2 (IMRC2) Sensor Connector



Courtesy of FORD MOTOR CO.

Pin	Circuit
1	IMRC2 (Intake Manifold Runner Control Bank 2)
3	SIGRTN (Signal Return)
2	VREF (Reference Voltage)

Fig 5: Identifying Intake Manifold Tuning Valve (IMTV) Actuator Connector



Courtesy of FORD MOTOR CO.

Pin	Circuit
3	IMTV (Intake Manifold Tuning Valve)
1	VPWR (Vehicle Power)

Powertrain Control Module (PCM) Connector

For PCM connector views or reference values, refer to REFERENCE VALUES .

Vehicle	Connector	Pin	Circuit
F-150	198 PIN	E29, E40, E49, E54 E44 E45 E59 E60	SIGRTN IMRC2 IMRC1 IMRC2A IMRC1A
Mustang	198 PIN	E22, E32, E40, E49, E54 E44 E45 E59 E60	SIGRTN IMRC2 IMRC1 IMRC2A IMRC1A

All other vehicles	190-PIN	E32 E14	SIGRTN IMTV

PINPOINT TEST HU: INTAKE AIR SYSTEMS > TEST PROCEDURE

HU1 CHECK FOR DIAGNOSTIC TROUBLE CODES (DTCS)

Are DTCs P0505, P0506, P0660, P0663, P2004, P2005, P2006, P2007, P2008, P2011, P2014, P2019, P2070, or P2071 present?

Yes	No
For DTCs P0505 or P0506, GO to **HU2** . For DTCs P0660, P0663, P2070 or P2071, GO to HU9. For all others, GO to HU18.	For lack/loss of power, GO to HU9. For all other symptoms without DTCs, GO to **HU2** .

HU2 CHECK THE BASE IDLE SPEED

NOTE: The vehicle must be at operating temperature and at idle for a minimum of 1 minute.

Ignition ON, engine running.

Determine if the idle speed is incorrect. Refer to the REFERENCE VALUES Typical Reference Value Charts, if necessary.

Access the PCM and monitor the RPM (RPM) PID.

Is vehicle idle speed correct?

Yes	No
GO to HU4.	GO to **HU3** .

HU3 CHECK FOR VACUUM LEAKS

Listen for vacuum leaks.

Inspect the entire intake air system from the mass airflow (MAF) sensor to the intake manifold for leaks such as:

cracked or punctured intake air tube.

loose connections on the intake air tube at the air cleaner housing or throttle body

EGR valve gasket leak to intake manifold

intake manifold assembly or gasket

EGR valve diaphragm or control solenoid

vacuum supply connectors and hose

Are any leaks present?

Yes	No
REPAIR as necessary. Clear the PCM DTCs. REPEAT the self-test.	GO to **HU4** .

HU4 CHECK FOR BINDING OR STICKING IN THE THROTTLE SYSTEM

Gently cycle the throttle from fully closed to fully open and back to fully closed. Check for a restriction during rotation.

Is a concern present?

Yes	No
GO to HU6.	GO to **HU5** .

HU5 CHECK THE FUNCTIONALITY OF THE THROTTLE POSITION (TP) SENSOR

Ignition ON, engine OFF.

Access the PCM and monitor the TP1 (VOLT) PID.

Access the PCM and monitor the TP2 (VOLT) PID.

Gently cycle the throttle from fully closed to fully open and back to fully closed.

Do the TP PIDs display a smooth voltage reading?

Yes	No
GO to **HU6** .	INSTALL a new TP sensor. REFER to the service information , Electronic Engine Controls. Clear the PCM DTCs. REPEAT the self-test.

HU6 CHECK THE INTAKE AIR SYSTEM FOR LEAKS, OBSTRUCTIONS AND DAMAGE

NOTE: The Focus air cleaner element is integral to the air cleaner assembly. Inspect the air restriction gauge (if equipped) for a restriction indication.

Ignition OFF.

Remove the air cleaner element. Check the air cleaner for blockage.

Check for restrictions between the air inlet and the throttle body.

Are any concerns present?

Yes	No

REMOVE the restriction. INSTALL a new air cleaner element. REFER to the service information Workshop , Intake Air Distribution and Filtering. Clear the PCM DTCs. REPEAT the self-test.	REINSTALL the air cleaner element. GO to **HU7** .

HU7 CHECK THE POSITIVE CRANKCASE VENTILATION (PCV) SYSTEM

NOTE: A high idle may indicate a vacuum leak.

Check for any PCV system leaks.

Is a concern present?

Yes	No
REPAIR as necessary. Clear the PCM DTCs. REPEAT the self-test.	For Edge 2.0L, Escape/Kuga, Explorer 2.0L, Fiesta, Focus, Fusion, MKC, MKT 2.0L, MKZ, Taurus 2.0L, and Transit Connect, GO to **HU8** . For all others, GO to HU27.

HU8 CHECK THE THROTTLE BODY FOR EXCESSIVE WEAR

Ignition OFF.

Remove the throttle body assembly. Refer to the service information , Fuel Charging and Controls for removal and inspection.

Check the following:

excessive wear or grooving in the throttle bore

misaligned or worn throttle plate

excessive gap between the throttle bore and plate

Are any concerns present?

Yes	No
INSTALL a new throttle body assembly. REFER to the service information , Fuel Charging and Controls. Clear the PCM DTCs. REPEAT the self-test.	The concern is elsewhere. RETURN to NO DIAGNOSTIC TROUBLE CODES (DTCS) PRESENT SYMPTOM CHART INDEX , to DIAGNOSE performance while driving concerns.

HU9 VISUAL INSPECTION OF THE INTAKE MANIFOLD TUNING VALVE

Inspect the component for signs of damage.

Check the harness and connection.

Is a concern present?

Yes	No
REPAIR as necessary. Clear the PCM DTCs. REPEAT the self-test.	GO to **HU10** .

HU10 CHECK THE VPWR CIRCUIT FOR AN OPEN

IMTV Actuator connector disconnected.

Ignition ON, engine OFF.

Measure the voltage between:

(+) IMTV Actuator Connector, Harness Side	(-) Vehicle Battery
VPWR - Pin 1	Negative terminal

Is the voltage greater than 10.5 V?

Yes	No
GO to **HU11** .	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

HU11 CHECK THE IMTV CIRCUIT FOR AN OPEN

Ignition OFF.

PCM connector disconnected.

Measure the resistance between:

(+) IMTV Actuator Connector, Harness Side	(-) PCM Connector, Harness Side
IMTV - Pin 3	IMTV

Is the resistance less than 5 ohms?

Yes	No
GO to **HU12** .	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

HU12 CHECK THE IMTV CIRCUIT FOR A SHORT TO GROUND

Measure the resistance between:

(+) PCM Connector, Harness Side	(-)
IMTV	Ground

Is the resistance greater than 10K ohms?

Yes	No

GO to **HU13** .	REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.

HU13 CHECK THE IMTV CIRCUIT FOR A SHORT TO VOLTAGE

Measure the voltage between:

(+) IMTV Actuator Connector, Harness Side	(-)
IMTV - Pin 3	Ground

Is any voltage present?

Yes	No
REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.	GO to **HU14** .

HU14 CHECK THE IMTV DRIVER CIRCUIT WITH THE PCM CONNECTED

IMTV Actuator connector disconnected.

PCM connector connected.

Ignition ON, engine OFF.

Connect a non-powered test lamp between:

Point A IMTV Actuator Connector, Harness Side	Point B IMTV Actuator Connector, Harness Side
VPWR - Pin 1	IMTV - Pin 3

Does the test lamp illuminate?

Yes	No
GO to HU29.	GO to **HU15** .

HU15 CHECK THE IMTV PCM DRIVER CIRCUIT WHEN COMMANDED ON

Connect a non-powered test lamp between:

Point A IMTV Actuator Connector, Harness Side	Point B IMTV Actuator Connector, Harness Side
VPWR - Pin 1	IMTV - Pin 3

Carry out the PCM KOEO self-test.

Does the test lamp illuminate?

Yes	No
GO to **HU16** .	GO to HU29.

HU16 CHECK THE IMTV FOR DAMAGE

Ignition OFF.

Remove the IMTV. Refer to the service information , Engine or Section 303-14, Electronic Engine Controls.

Visually inspect the shutter for damage.

Manually rotate the shutter.

Is a concern present?

Yes	No
INSTALL a new IMTV actuator. REFER to the service information , Engine. Clear the PCM DTCs. REPEAT the self-test.	GO to **HU17** .

HU17 CHECK THE IMTV FOR FUNCTIONALITY WHEN COMMANDED ON

IMTV Actuator connector connected.

Carry out the PCM KOEO self-test.

Does the IMTV shutter rotate?

Yes	No
The concern is an intermittent. GO to PINPOINT TEST Z .	INSTALL a new IMTV actuator. REFER to the service information , Engine. Clear the PCM DTCs. REPEAT the self-test.

HU18 VISUAL INSPECTION FOR DISCONNECTED IMRC LINKAGE

Inspect the IMRC for any disconnected or damaged linkages.

Inspect the IMRC solenoid and vacuum lines for correct connection, damage, vacuum leaks or restrictions.

Disconnect the IMRC linkage.

Inspect the linkage for restrictions. Spring tension in one direction is normal.

Rotate the IMRC plate to fully open and to fully closed, contacting both limits.

Check for restrictions during rotation.

Is a concern present?

Yes	No
REPAIR as necessary. Clear the PCM DTCs. REPEAT the self-test.	GO to **HU19** .

HU19 CHECK THE FUNCTIONALITY OF THE IMRC

WARNING: KEEP FINGERS CLEAR OF THE MECHANISM. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN PERSONAL INJURY.

NOTE: On vacuum operated systems the engine must run for 20 seconds to restore vacuum between state commands.

Connect the IMRC linkage.

Ignition ON, engine running.

Access the PCM and monitor the IMRC1M (VOLT) and IMRC2M (VOLT) PIDs.

Access the PCM and control the IMRC (MODE) PID.

Command the IMRC PID to ON and then to OFF.

Do the IMRC1 and IMRC2 PIDs indicate full travel of the IMRC plates?

Yes	No
The concern is an intermittent. GO to PINPOINT TEST Z .	For DTCs P2008 or P2011, GO to **HU20** . For all others, GO to HU23.

HU20 CHECK IMRC SOLENOID COIL FOR AN OPEN

NOTE: Identify the IMRC solenoid connector location before disconnecting the connector.

Ignition OFF.

For DTC P2008,

IMRC1 Solenoid connector disconnected.

Measure the resistance between:

(+) IMRC1 Solenoid Connector, Component Side	(-) IMRC1 Solenoid Connector, Component Side
IMRC1A - Pin 2	VPWR - Pin 1

For all others,

IMRC2 Solenoid connector disconnected.

Measure the resistance between:

(+) IMRC2 Solenoid Connector, Component Side	(-) IMRC2 Solenoid Connector, Component Side

IMRC2A - Pin 2	VPWR - Pin 1

Is the resistance between 22 - 26 ohms?

Yes	No
GO to **HU21** .	INSTALL a new IMRC solenoid. REFER to the service information , Engine. Clear the PCM DTCs. REPEAT the self-test.

HU21 CHECK THE VPWR CIRCUIT FOR AN OPEN

Ignition OFF.

For DTC P2008,

IMRC1 Solenoid connector disconnected.

Ignition ON, engine OFF.

Measure the voltage between:

(+) IMRC1 Solenoid Connector, Harness Side	(-)
VPWR - Pin 1	Ground

For all others,

IMRC2 Solenoid connector disconnected.

Ignition ON, engine OFF.

Measure the voltage between:

(+) IMRC2 Solenoid Connector, Harness Side	(-)
VPWR - Pin 1	Ground

Is the voltage greater than 10.5 V?

Yes	No
GO to **HU22** .	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

HU22 CHECK THE IMRC CIRCUIT FOR AN OPEN

Ignition OFF.

PCM connector disconnected.

For DTC P2008,

Measure the resistance between:

(+) IMRC1 Solenoid Connector, Harness Side	(-) PCM Connector, Harness Side

IMRC1A - Pin 2	IMRC1A

For all others,

Measure the resistance between:

(+) IMRC2 Solenoid Connector, Harness Side	(-) PCM Connector, Harness Side
IMRC2A - Pin 2	IMRC2A

Is the resistance less than 5 ohms?

Yes	No
INSTALL a new IMRC solenoid. REFER to the service information , Engine.	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

HU23 CHECK THE VREF CIRCUIT FOR AN OPEN

Ignition OFF.

For DTCs P2004, P2006, or P2014,

IMRC1 Sensor connector disconnected.

Ignition ON, engine OFF.

Measure the voltage between:

(+) IMRC1 Sensor Connector, Harness Side	(-) IMRC1 Sensor Connector, Harness Side
VREF - Pin 2	SIGRTN - Pin 3

For all others,

IMRC2 Sensor connector disconnected.

Ignition ON, engine OFF.

Measure the voltage between:

(+) IMRC2 Sensor Connector, Harness Side	(-) IMRC2 Sensor Connector, Harness Side
VREF - Pin 2	SIGRTN - Pin 3

Is the voltage between 4.5 - 5.5 V?

Yes	No
GO to **HU24** .	GO to PINPOINT TEST C .

HU24 CHECK THE IMRCM CIRCUIT FOR AN OPEN

Ignition OFF.

PCM connector disconnected.

For DTCs P2004, P2006, or P2014,

Measure the resistance between:

(+) IMRC1 Sensor Connector, Harness Side	(-) PCM Connector, Harness Side
IMRC1 - Pin 1	IMRC1

For all others,

Measure the resistance between:

(+) IMRC2 Sensor Connector, Harness Side	(-) PCM Connector, Harness Side
IMRC2 - Pin 1	IMRC2

Is the resistance less than 5 ohms?

Yes	No
GO to **HU25** .	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

HU25 CHECK FOR A SHORT TO GROUND

For DTCs P2004, P2006, or P2014,

Measure the resistance between:

(+) IMRC1 Sensor Connector, Harness Side	(-)
IMRC1 - Pin 1	Ground

For all others,

Measure the resistance between:

(+) IMRC2 Sensor Connector, Harness Side	(-)
IMRC2 - Pin 1	Ground

Is the resistance greater than 10K ohms?

Yes	No
GO to **HU26** .	REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.

HU26 CHECK THE IMRC1 OR IMRC2 CIRCUIT FOR A SHORT TO VOLTAGE

Ignition ON, engine OFF.

For DTCs P2004, P2006, or P2014,

Measure the voltage between:

(+) IMRC1 Sensor Connector, Component Side	(-)
VREF - Pin 2	Ground

For all others,

Measure the voltage between:

(+) IMRC2 Sensor Connector, Component Side	(-)
VREF - Pin 2	Ground

Is any voltage present?

Yes	No
REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.	INSTALL a new IMRC1 or IMRC2 sensor. REFER to the service information , Engine. Clear the PCM DTCs. REPEAT the self-test.

HU27 PRELIMINARY DIAGNOSIS FOR IDLE AIR CONCERNS

Ignition ON, engine OFF.

Are any DTCs present other than P0505 or P0506?

Yes	No
DISREGARD the current diagnostic trouble code (DTC) at this time. DIAGNOSE the next DTC. GO to DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS .	GO to **HU28** .

HU28 MONITOR THE INTAKE AIR SYSTEM RELATED PIDS

NOTE: Verify the vehicle has reached the normal engine coolant operating temperature of 77°C (170° F). Allow the engine to idle an additional 5 minutes.

NOTE: The ETC_TRIM PID may not be available on all vehicles.

Access the PCM and monitor the ECT (TEMP) PID.

Access the PCM and monitor the ETC_TRIM (ANGL) PID.

Access the PCM and monitor the IACTRIM (NUM) and IACKAM2 (NUM) PIDs.

Mathematically add and record the value of the IACTRIM PID to the IACKAM2 PID value, for the total IAC value at idle.

Is the ETC_TRIM PID angle equal to 3.5 degrees or is the total IAC value greater than 0.5 lb/min?

Yes	No
INSTALL a new throttle body assembly. REFER to the service information , Fuel Charging and Controls. Clear the PCM DTCs. REPEAT the self-test.	RETURN to SYMPTOM CHARTS for further direction.

HU29 CHECK FOR CORRECT PCM OPERATION

Disconnect all the PCM connectors.

Visually inspect for:

pushed out pins

corrosion

Connect all the PCM connectors and make sure they seat correctly.

Carry out the PCM self-test.

Verify the concern is still present.

Is the concern still present?

Yes	No
INSTALL a new PCM. REFER to FLASH ELECTRICALLY ERASABLE PROGRAMMABLE READ ONLY MEMORY (EEPROM) , Programming the VID Block for a Replacement PCM.	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.

PINPOINT TEST HX: EVAPORATIVE EMISSION (EVAP) SYSTEM AND MONITOR > INTRODUCTION

WARNING: BEFORE REPAIRING OR INSTALLING A NEW COMPONENT IN THE FUEL SYSTEM, REDUCE THE POSSIBILITY OF INJURY OR FIRE BY FOLLOWING THE WARNING, CAUTION, AND HANDLING DIRECTIONS IN PINPOINT TEST HC. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN PERSONAL INJURY.

NOTE: Use this pinpoint test only when directed here.

Using a soap solution around the fuel filler cap or capless fuel tank filler pipe (if equipped) or using the hydrocarbon emission analyzer to determine an evaporative emission system leak is not recommended. The mandatory Rotunda Evaporative Emission System Leak Tester for On Board Diagnostic (OBD) (including the ultrasonic tester) and the Rotunda Smoke Machine, Fuel Evaporative Emission System

Tester 218-00001 or equivalent are the only devices to be used at this time for evaporative emission system leak detection.

When using the Rotunda Smoke Machine, Fuel Evaporative Emission System Tester 218-00001 or equivalent, the fuel level in the fuel tank must be less than 85% full.

This pinpoint test is intended to diagnose the following:

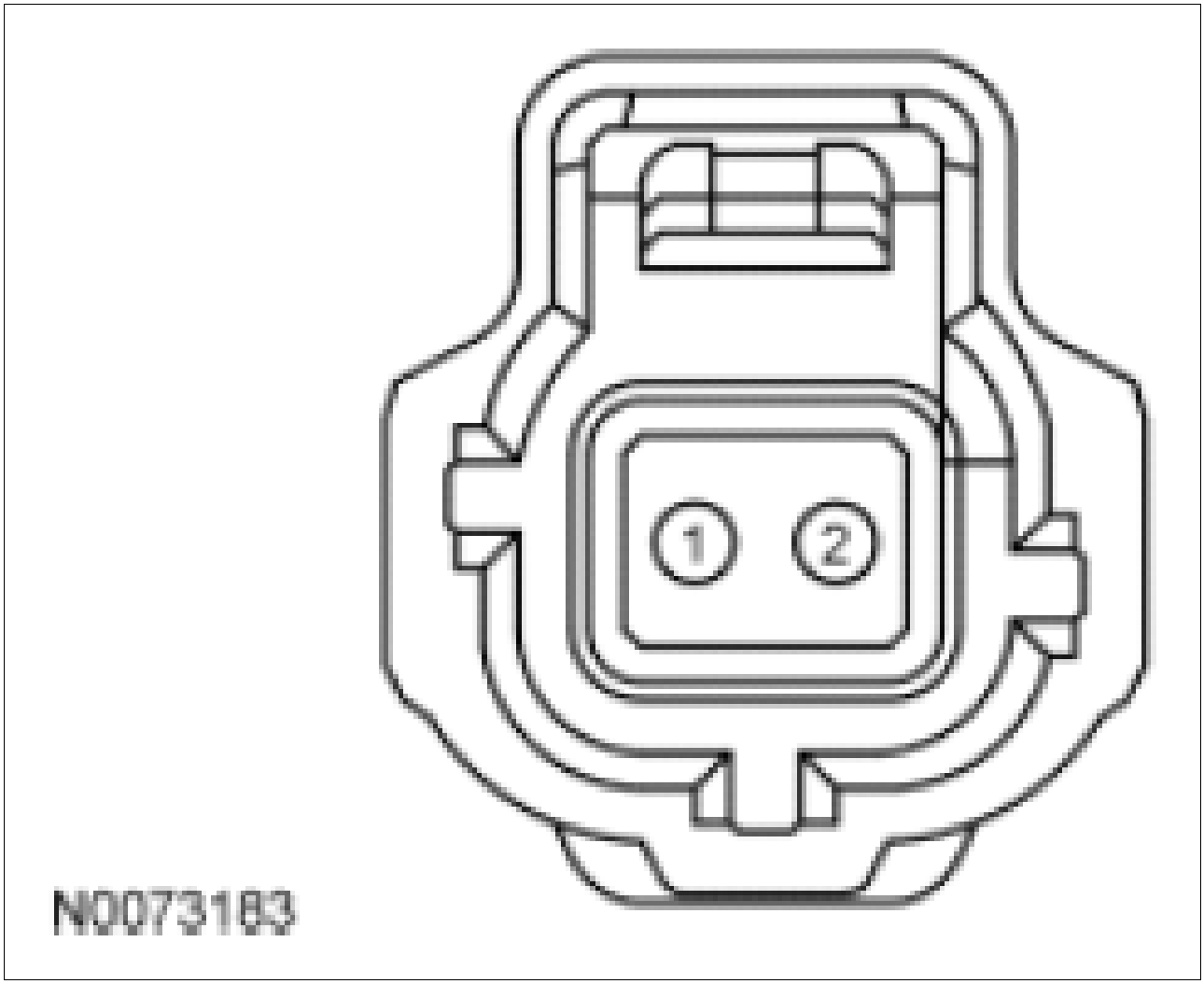
- EVAP canister vent valve (9F945)
- fuel filler cap (9030)
- capless fuel tank filler pipe (9034)
- fuel tank pressure (FTP) sensor (9C052)
- EVAP purge valve (9C915)
- EVAP check valve
- EVAP ejector
- EVAP vapor blocking valve
- EVAP system leaks using the Rotunda Smoke Machine, Fuel Evaporative Emission System Tester 218-00001
- harness circuits: B+, CANV, EVAPCP, FTP, SIGRTN, VBV, VPWR and VREF
- PCM (12A650)

For additional information on the EVAP system, refer to EVAPORATIVE EMISSION (EVAP) SYSTEMS , or the Workshop Manual Section 303-13, Evaporative Emissions.

Evaporative Emission (EVAP) Canister Vent Valve Connector

For applications using the engine off natural vacuum (EONV) EVAP leak check monitor, KAPWR provides voltage to the EVAP canister vent valve instead of VPWR.

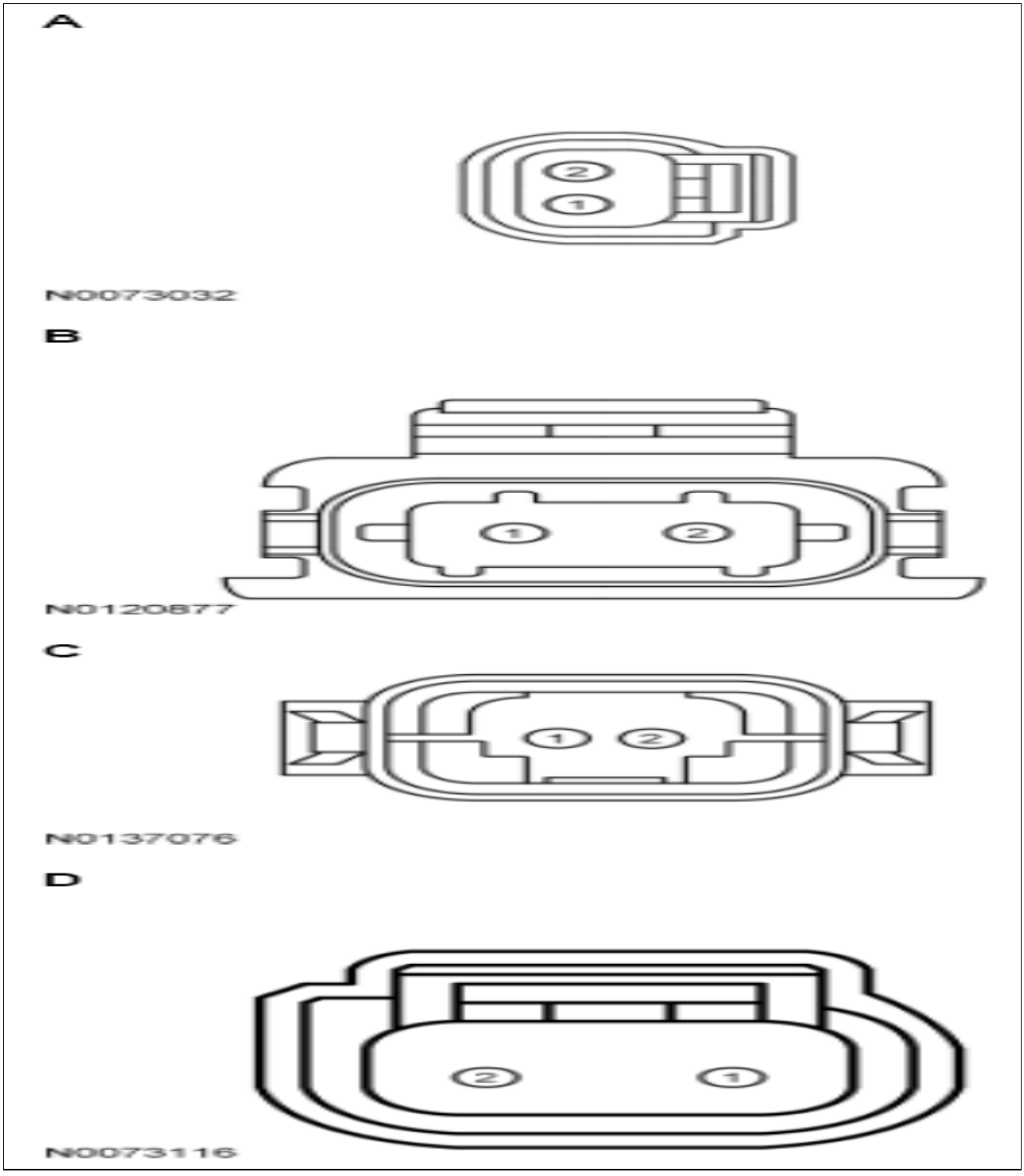
Fig 1: Identifying Evaporative Emission (EVAP) Canister Vent Valve Connector



Courtesy of FORD MOTOR CO.

Pin	Circuit
2	CANV (Canister Vent)
1	KAPWR (Keep Alive Memory Power)

Fig 2: Identifying Evaporative Emission (EVAP) Purge Valve Connector



Courtesy of FORD MOTOR CO.

Vehicle	Connector	Pin	Circuit
E-Series, Explorer, F-150, F-650/F-750,	A	1 2	EVAPCP VPWR

F-Series Super Duty, MKX, Motorhome/Stripped Chassis/Step Van, Transit Connect 2.5L			
Escape/Kuga 2.0L, Fiesta GTDI 1.6L, Fiesta 1.0L, Focus, MKC, MKZ 2.0L	B	1 2	EVAPCP VPWR
Escape/Kuga 1.6L, Transit Connect 1.6L	C	1 2	EVAPCP VPWR
Fiesta TiVCT 1.6L	B	2 1	EVAPCP VPWR
MKT 2.0L, Taurus 2.0L	D	2 1	EVAPCP VPWR
All other vehicles	D	1 2	EVAPCP VPWR

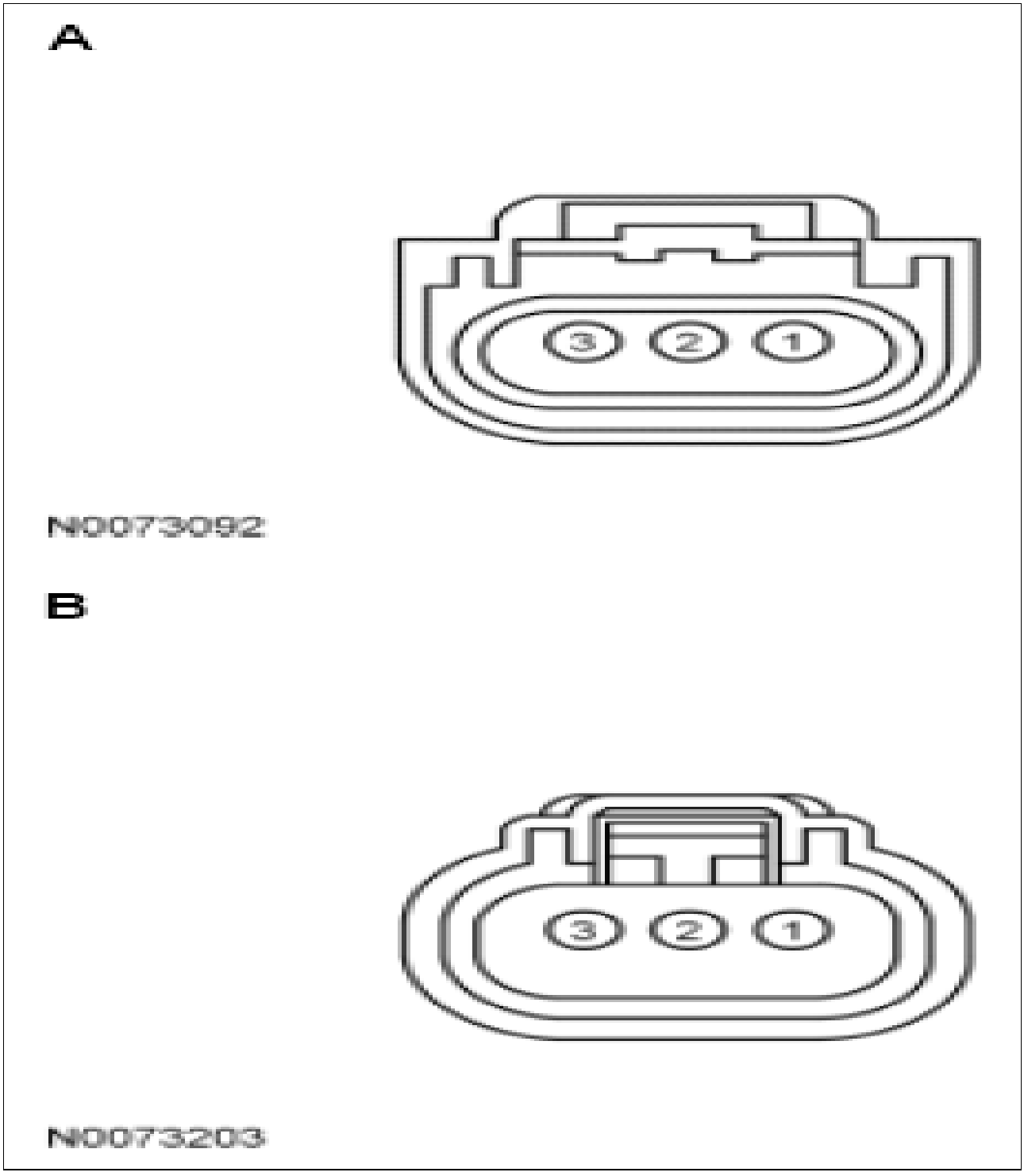
Fig 3: Identifying Evaporative Emission (EVAP) Vapor Blocking Valve Connector



Courtesy of FORD MOTOR CO.

Pin	Circuit
2	VPWR (Vehicle Power)
1	VBV (Vapor Blocking Valve)

Fig 4: Identifying Fuel Tank Pressure (FTP) Sensor Connector



Courtesy of FORD MOTOR CO.

Vehicle	Connector	Pin	Circuit
E-Series, F-650/F-750, Motorhome/Stripped Chassis/Step Van	A	1 2 3	FTP SIGRTN VREF

All other vehicles	B	1 2 3	FTP SIGRTN VREF

PINPOINT TEST HX: EVAPORATIVE EMISSION (EVAP) SYSTEM AND MONITOR > INTRODUCTION > POWERTRAIN CONTROL MODULE (PCM) CONNECTOR

For PCM connector views or reference values, refer to REFERENCE VALUES .

Vehicle	Connector	Pin	Circuit
E-Series 6.8L, F-650/F-750, F-Series Super Duty, Motorhome/Stripped Chassis/Step Van	190-PIN	B20 B65 E49	CANV FTP EVAPCP
E-Series 5.4L	190-PIN	B20 B65 E31	CANV FTP EVAPCP
Edge 3.5L, F-150 TiVCT 3.5L, F-150 5.0L, Mustang 3.7L, Mustang 5.0L	198 PIN	B39 B46 E71	CANV FTP EVAPCP
Escape/Kuga 2.5L, Explorer 3.7L, Explorer TiVCT 3.5L, Flex TiVCT 3.5L, Fusion 2.5L, MKS 3.7L, MKT 3.7L, MKX, MKZ 3.7L, Taurus TiVCT 3.5L, Taurus 3.7L, Transit 3.7L, Transit Connect 2.5L	190-PIN	B20 B65 E32	CANV FTP EVAPCP
Explorer 2.0L	154 PIN	B44 E59 E91	CANV FTP EVAPCP
F-150 2.7L, Fusion 2.0L, Fusion 1.6L, Fusion 1.5L	198 PIN	B80 B20 B73 B22	VBV CANV FTP EVAPCP
Fiesta TiVCT 1.6L	128 PIN	E22 E18 E23	CANV FTP EVAPCP

Focus 1.0L	198 PIN	B42 B20 B73 B22	VBV CANV FTP EVAPCP
Focus GDI 2.0L	198 PIN	B44 E59 E91	CANV FTP EVAPCP
All other vehicles	198 PIN	B20 B73 B22	CANV FTP EVAPCP

PINPOINT TEST HX: EVAPORATIVE EMISSION (EVAP) SYSTEM AND MONITOR > TEST PROCEDURE

HX1 CARRY OUT THE EVAPORATIVE EMISSION (EVAP) TEST

NOTE: The IDS test referenced in this step may not be available on all vehicles. Proceed to the next step if the IDS test is not available.

Carry out the EVAP Test. Refer to the instruction manual provided by the scan tool manufacturer.

Does the test pass?

Yes	No
For DTCs P0442, P0455 or P0457, the system is operating correctly at this time. Clear the PCM DTCs. REPEAT the self-test. For all others, GO to **HX2** .	GO to **HX2** .

HX2 CHECK FOR DTCS

Are DTCs P0442, P0443, P0446, P0451, P0452, P0453, P0454, P0455, P0456, P0457, P0460, P0461, P0462, P0463, P144A, P144C, P1450, P2418, P2450 or P260F present?

Yes	No
For DTC P0443, GO to **HX3** . For DTC P0446, GO to HX23. For DTC P0460, GO to HX36. For DTC P144C, GO to HX47. For DTC P1450, GO to HX9. For DTC P2418, GO to HX29. For DTCs P144A or P2450, GO to HX10. For DTCs P0461 through P0463, GO to HX34.	For symptoms without DTCs, GO to HX12. For all others, RETURN to SYMPTOM CHARTS for further direction.

For DTCs P0442, P0455, P0456 or P0457, GO to HX37. For DTCs P0451, P0452, P0453 or P0454, GO to HX18. For all others, GO to HX48.	

HX3 CHECK THE PCM OUTPUT TO EVAP PURGE VALVE

Ignition OFF.

Evaporative Emission (EVAP) Purge Valve connector disconnected.

Connect a non-powered test lamp between:

Point A Evaporative Emission (EVAP) Purge Valve Connector, Harness Side	Point B Evaporative Emission (EVAP) Purge Valve Connector, Harness Side
VPWR	EVAPCP

Ignition ON, engine OFF.

Access the PCM and control the EVAPCP (PER) PID.

Does the test lamp turn ON and OFF when the output is commanded ON and OFF?

Yes	No
GO to **HX4** .	GO to HX5.

HX4 CHECK THE EVAP PURGE VALVE RESISTANCE

Ignition OFF.

Measure the resistance between:

(+) Evaporative Emission (EVAP) Purge Valve Connector, Component Side	(-) Evaporative Emission (EVAP) Purge Valve Connector, Component Side
EVAPCP	VPWR

Is the resistance between 15 - 25 ohms?

Yes	No
Unable to duplicate or identify the concern at this time. GO to PINPOINT TEST Z .	INSTALL a new Evaporative Emission (EVAP) Purge valve. REFER to the service information , Evaporative Emissions. CARRY OUT the EVAP Test. REFER to the instruction manual provided by the scan tool manufacturer. Clear the PCM DTCs. REPEAT the self-test.

HX5 CHECK THE VPWR VOLTAGE TO THE EVAP PURGE VALVE

Ignition ON, engine OFF.

Measure the voltage between:

(+) Evaporative Emission (EVAP) Purge Valve Connector, Harness Side	(-)
VPWR	Ground

Is the voltage greater than 10.5 V?

Yes	No
GO to **HX6** .	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

HX6 CHECK THE EVAPCP CIRCUIT FOR AN OPEN

Ignition OFF.

PCM connector disconnected.

Measure the resistance between:

(+) Evaporative Emission (EVAP) Purge Valve Connector, Harness Side	(-) PCM Connector, Harness Side
EVAPCP	EVAPCP

Is the resistance less than 5 ohms?

Yes	No
GO to **HX7** .	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

HX7 CHECK THE EVAPCP CIRCUIT FOR A SHORT TO GROUND

Measure the resistance between:

(+) Evaporative Emission (EVAP) Purge Valve Connector, Harness Side	(-)
EVAPCP	Ground

Is the resistance greater than 10K ohms?

Yes	No
GO to **HX8** .	REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.

HX8 CHECK THE EVAPCP CIRCUIT FOR A SHORT TO VOLTAGE

Ignition ON, engine OFF.

Measure the voltage between:

(+) Evaporative Emission (EVAP) Purge Valve Connector, Harness Side	(-)

EVAPCP	Ground

Is any voltage present?

Yes	No
REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.	GO to HX52.

HX9 CHECK FOR VISUAL CAUSES OF EXCESSIVE FUEL TANK VACUUM

NOTE: If the EVAP canister vent valve and the fuel tank assemblies are not accessible during this step, refer to the service information , Evaporative Emissions and 310-01, Fuel Tank and Lines for removal instructions.

Check for kinks or bends in the fuel vapor hoses and tubes (EVAP purge valve outlet tube and EVAP canister tube).

Visually inspect the EVAP canister inlet port, EVAP canister vent valve filter, and canister vent hose assembly for blockage, contamination or debris.

Is a concern present?

Yes	No
REMOVE any blockage, contamination or debris around the fuel vapor hose and tubes and EVAP canister vent valve assembly. REMOVE kinks or bends in the EVAP purge valve outlet tube, EVAP canister tube, and canister vent hose assembly. Clear the PCM DTCs. For repair verification, CARRY OUT the evaporative emission leak check monitor repair verification drive cycle. REFER to ON BOARD DIAGNOSTIC (OBD) DRIVE CYCLE .	GO to **HX10** .

HX10 CHECK THE FTP SENSOR VOLTAGE WITH THE FUEL FILLER CAP REMOVED OR THE CAPLESS FUEL TANK FILLER PIPE OPENED

NOTE: After installing the supplemental refueling adaptor or removing the fuel filler cap, wait one minute to allow the pressure in the fuel tank to equalize with the ambient air pressure before accessing the PID.

For vehicles with a capless fuel filler pipe,

Install the supplemental refueling adaptor provided with the vehicle to open the capless fuel tank filler pipe.

For all others,

Remove the fuel filler cap.

Ignition ON, engine OFF.

Access the PCM and monitor the FTP (PRESS) PID.

Measurement Unit	Minimum Pressure	Maximum Pressure
kPa	-0.50	0.50
psi	-0.07	0.07
in-H20	-2.0	2.0
V	2.35	2.9

Is the pressure within specifications?

Yes	No
For DTC P144A, GO to HX15. For DTC P1450, GO to HX16. For all others, GO to HX29.	GO to **HX11** .

HX11 CHECK FOR ANY OTHER DTC

Check for other 3-wire sensor DTCs (KOEO, KOER, or continuous memory) present with the DTC P1450 or P144A.

Are any other DTCs present?

Yes	No
DISREGARD the current diagnostic trouble code (DTC) at this time. DIAGNOSE the next DTC. GO to DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS .	GO to HX18.

HX12 CHECK IF THE ENGINE IDLES

Ignition ON, engine running.

Does the engine stall or is it unable to maintain idle?

Yes	No
GO to **HX13** .	GO to HX14.

HX13 CHECK THE EVAP SYSTEM FOR A STUCK OPEN EVAP PURGE VALVE

Ignition OFF.

Disconnect the fuel vapor to intake manifold line at the EVAP purge valve and cap the line at the EVAP purge valve.

Ignition ON, engine running.

Does the engine stall or is it unable to maintain idle?

Yes	No
The EVAP system is not the cause of the symptom. RETURN to SYMPTOM CHARTS for further direction.	INSTALL a new Evaporative Emission (EVAP) Purge valve. REFER to the service information , Evaporative Emissions. CARRY OUT the EVAP Test. REFER to the instruction manual provided by the scan tool manufacturer. Clear the PCM DTCs. REPEAT the self-test.

HX14 CHECK FOR BLOCKAGE IN THE FUEL TANK VENT SYSTEM

NOTE: Do not allow FTP sensor voltage drop to less than 1.2 volts during this step. Excessive vacuum inside the fuel tank could trigger the vacuum release in the fuel filler cap or capless fuel filler system.

NOTE: The EVAP canister vent valve is normally open and venting to the atmosphere.

Ignition ON, engine running.

Access the PCM and monitor the EVAPCV (MODE) PID.

Access the PCM and monitor the FTP (VOLT) PID.

Access the PCM and control the EVAPCP (PER) PID.

While monitoring the FTP PID, ramp open the EVAP purge valve by incrementally commanding the EVAPCP PID to 100%.

Does the FTP sensor voltage drop below 1.5 volts when the EVAP purge valve is commanded fully open?

Yes	No
CHECK for blockage in the vapor line to the EVAP canister vent valve. CHECK the EVAP canister vent valve filter for blockage or contamination. CHECK the EVAP canister for blockage. If OK, INSTALL a new EVAP canister vent valve. REFER to the service information , Evaporative Emissions. CARRY OUT the EVAP Test. REFER to the instruction manual provided by the scan tool manufacturer. Clear the PCM DTCs. REPEAT the self-test.	GO to HX16.

HX15 CHECK FOR A BLOCKED FUEL VAPOR TUBE BETWEEN THE FTP SENSOR AND THE FUEL TANK

Ignition OFF.

Remove the fuel vapor tube assembly. Refer to the service information , Evaporative Emissions.

Visually inspect the fuel vapor tube for a blockage between the FTP sensor and the

connection to the fuel tank or fuel pump module.

Visually inspect the connection at the fuel tank or fuel pump module for a blockage.

Is a concern present?

Yes	No
REMOVE the blockage. GO to **HX16** .	GO to **HX16** .

HX16 CHECK FOR A STUCK OPEN EVAP PURGE VALVE

Install the fuel vapor tube assembly if removed in the previous step.

Install the fuel filler cap or remove the supplemental refueling adaptor.

Ignition ON, engine running.

Access the PCM and monitor the FTP (PRESS) PID.

Access the PCM and control the EVAPCP (PER) PID.

Close the EVAP purge valve by commanding the EVAPCP PID to 0%.

Access the PCM and control the EVAPCV (MODE) PID.

Close the EVAP canister vent valve by commanding the EVAPCV PID to ON (100% duty cycle).

Does the FTP PID decrease?

Yes	No
INSTALL a new Evaporative Emission (EVAP) Purge valve. REFER to the service information , Evaporative Emissions. CARRY OUT the EVAP Test. REFER to the instruction manual provided by the scan tool manufacturer. Clear the PCM DTCs. REPEAT the self-test.	For DTC P144A, Clear the PCM DTCs. REPEAT the self-test. For all others, GO to **HX17** .

HX17 EVAP PURGE VALVE TEST

Access the PCM and control the (MODE) PID.

Ignition ON, engine running.

Access the PCM and control the EVAPCV (MODE) PID.

Close the EVAP canister vent valve by commanding the EVAPCV PID to ON (100% duty cycle).

Access the PCM and monitor the FTP (PRESS) PID.

Access the PCM and control the EVAPCP (PER) PID.

While monitoring the FTP PID, ramp open the EVAP purge valve by incrementally

commanding the EVAPCP PID to 100%.

Does the FTP PID decrease?

Yes	No
For DTC P1450, unable to duplicate or identify the concern at this time. GO to PINPOINT TEST Z . For all others, CHECK the EVAP system for leaks. GO to HX37.	CHECK for blockages between the fuel tank, the EVAP purge valve, and the engine intake manifold. CHECK for obstructions in the EVAP purge valve diaphragm and ports. If OK, INSTALL a new EVAP purge valve. REFER to the service information , Evaporative Emissions. CARRY OUT the EVAP Test. REFER to the instruction manual provided by the scan tool manufacturer. Clear the PCM DTCs. REPEAT the self-test.

HX18 CHECK THE VOLTAGE TO THE FTP SENSOR

Ignition ON, engine OFF.

Measure the voltage between:

(+) FTP Sensor Connector, Harness Side	(-) FTP Sensor Connector, Harness Side
VREF	SIGRTN

Is the voltage between 4.5 - 5.5 V?

Yes	No
For DTCs P144A or P1450, INSTALL a new FTP sensor. REFER to the service information , Evaporative Emissions. For some vehicles, the FTP sensor is integral to the fuel vapor tube assembly. Clear the PCM DTCs. CARRY OUT the EVAP Test. REFER to the instruction manual provided by the scan tool manufacturer. For repair verification, CARRY OUT the evaporative emission leak check monitor repair verification drive cycle. REFER to ON BOARD DIAGNOSTIC (OBD) DRIVE CYCLE . For all others, GO to **HX19** .	GO to PINPOINT TEST C .

HX19 CHECK THE FTP CIRCUIT FOR AN OPEN

Ignition OFF.

PCM connector disconnected.

Measure the resistance between:

(+) FTP Sensor Connector, Harness Side	(-) PCM Connector, Harness Side
FTP	FTP

Is the resistance less than 5 ohms?

Yes	No
GO to **HX20** .	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

HX20 CHECK FOR A SHORT BETWEEN CIRCUITS

Measure the resistance between:

(+) FTP Sensor Connector, Harness Side	(-) FTP Sensor Connector, Harness Side
FTP	VREF
FTP	SIGRTN

Measure the resistance between:

(+) FTP Sensor Connector, Harness Side	(-)
FTP	Ground

Is the resistance greater than 10K ohms?

Yes	No
GO to **HX21** .	REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.

HX21 CHECK THE FTP CIRCUIT FOR A SHORT TO VOLTAGE

Ignition ON, engine OFF.

Measure the voltage between:

(+) FTP Sensor Connector, Harness Side	(-)
FTP	Ground

Is any voltage present?

Yes	No
REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.	GO to **HX22** .

HX22 INTERMITTENT CHECK

Ignition OFF.

FTP Sensor connector connected.

PCM connector connected.

Ignition ON, engine OFF.

Access the PCM and monitor the FTP (VOLT) PID.

While monitoring the PID, wiggle, shake, and bend small sections of the wiring harness while working from the sensor to the PCM.

Is the voltage between 2.2 - 4.8 V?

Yes	No
For DTC P0451, GO to HX41. For all others, INSTALL a new FTP sensor. REFER to the service information , Evaporative Emissions. Clear the PCM DTCs. For repair verification, CARRY OUT the evaporative emission leak check monitor repair verification drive cycle. REFER to ON BOARD DIAGNOSTIC (OBD) DRIVE CYCLE . CARRY OUT the EVAP Test. REFER to the instruction manual provided by the scan tool manufacturer. Clear the PCM DTCs. REPEAT the self-test.	REPAIR as necessary. Clear the PCM DTCs. REPEAT the self-test.

HX23 CHECK THE PCM OUTPUT TO THE EVAP CANISTER VENT VALVE

NOTE: For applications using the EONV EVAP leak check monitor, KAPWR provides voltage to the EVAP canister vent valve instead of VPWR.

Ignition OFF.

Evaporative Emission (EVAP) Canister Vent Valve connector disconnected.

Connect a non-powered test lamp between:

Point A Evaporative Emission (EVAP) Canister Vent Valve Connector, Harness Side	Point B Evaporative Emission (EVAP) Canister Vent Valve Connector, Harness Side
KAPWR - Pin 1	CANV - Pin 2
VPWR	CANV - Pin 2

Ignition ON, engine OFF.

Access the PCM and control the EVAPCV (MODE) PID.

Does the test lamp turn ON and OFF when the output is commanded ON and OFF?

Yes	No
GO to **HX24** .	GO to HX25.

HX24 CHECK THE EVAP CANISTER VENT VALVE RESISTANCE

NOTE: For applications using the EONV EVAP leak check monitor, KAPWR provides voltage to the EVAP canister vent valve instead of VPWR.

Ignition OFF.

Measure the resistance between:

(+) Evaporative Emission (EVAP) Canister Vent Valve Connector, Component Side	(-) Evaporative Emission (EVAP) Canister Vent Valve Connector, Component Side
KAPWR - Pin 1	CANV - Pin 2
VPWR	CANV - Pin 2

Are the resistances between 40 - 70 ohms?

Yes	No
Unable to duplicate or identify the concern at this time. GO to PINPOINT TEST Z .	INSTALL a new Evaporative Emission (EVAP) Canister Vent valve. REFER to the service information , Evaporative Emissions. CARRY OUT the EVAP Test. REFER to the instruction manual provided by the scan tool manufacturer. Clear the PCM DTCs. REPEAT the self-test.

HX25 CHECK THE VPWR VOLTAGE TO THE EVAP CANISTER VENT VALVE

NOTE: For applications using the EONV EVAP leak check monitor, KAPWR provides voltage to the EVAP canister vent valve instead of VPWR.

Measure the voltage between:

(+) Evaporative Emission (EVAP) Canister Vent Valve Connector, Harness Side	(-)
KAPWR - Pin 1	Ground
VPWR	Ground

Are the voltages greater than 10.5 V?

Yes	No
GO to **HX26** .	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

HX26 CHECK THE CANV CIRCUIT FOR AN OPEN

Ignition OFF.

PCM connector disconnected.

Measure the resistance between:

(+) Evaporative Emission (EVAP) Canister Vent Valve Connector, Harness Side	(-) PCM Connector, Harness Side
CANV - Pin 2	CANV

Is the resistance less than 5 ohms?

Yes	No
GO to **HX27** .	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

HX27 CHECK THE CANV CIRCUIT FOR A SHORT TO GROUND

Measure the resistance between:

(+) Evaporative Emission (EVAP) Canister Vent Valve Connector, Harness Side	(-)
CANV - Pin 2	Ground

Is the resistance greater than 10K ohms?

Yes	No
GO to **HX28** .	REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.

HX28 CHECK THE CANV CIRCUIT FOR A SHORT TO VOLTAGE

Ignition ON, engine OFF.

Measure the voltage between:

(+) Evaporative Emission (EVAP) Canister Vent Valve Connector, Harness Side	(-)
CANV - Pin 2	Ground

Is any voltage present?

Yes	No
REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.	GO to HX52.

HX29 CHECK THE EVAP VAPOR BLOCKING VALVE RESISTANCE

Ignition OFF.

Evaporative Emission (EVAP) Vapor Blocking Valve connector disconnected.

Measure the resistance between:

(+) Evaporative Emission (EVAP) Vapor Blocking Valve Connector, Component Side	(-) Evaporative Emission (EVAP) Vapor Blocking Valve Connector, Component Side
VBV - Pin 1	VPWR - Pin 2

Is the resistance between 23 - 30 ohms?

Yes	No
GO to **HX30** .	INSTALL a new Evaporative Emission (EVAP) Vapor Blocking valve. REFER to the service information , Evaporative Emissions. Clear the PCM DTCs. REPEAT the self-test.

HX30 CHECK THE VOLTAGE TO THE EVAP VAPOR BLOCKING VALVE

Ignition ON, engine OFF.

Measure the voltage between:

(+) Evaporative Emission (EVAP) Vapor Blocking Valve Connector, Harness Side	(-)
VPWR - Pin 2	Ground

Is the voltage greater than 10.5 V?

Yes	No
GO to **HX31** .	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

HX31 CHECK THE VBV CIRCUIT FOR AN OPEN

Ignition OFF.

PCM connector disconnected.

Measure the resistance between:

(+) Evaporative Emission (EVAP) Vapor Blocking Valve Connector, Harness Side	(-) PCM Connector, Harness Side
VBV - Pin 1	VBV

Is the resistance less than 5 ohms?

Yes	No
GO to **HX32** .	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

HX32 CHECK THE VBV CIRCUIT FOR A SHORT TO GROUND

Measure the resistance between:

(+) Evaporative Emission (EVAP) Vapor Blocking Valve Connector, Harness Side	(-)
VBV - Pin 1	Ground

Is the resistance greater than 10K ohms?

Yes	No
GO to **HX33** .	REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.

HX33 CHECK THE VBV CIRCUIT FOR A SHORT TO VOLTAGE

Ignition ON, engine OFF.

Measure the voltage between:

(+) Evaporative Emission (EVAP) Vapor Blocking Valve Connector, Harness Side	(-)
VBV - Pin 1	Ground

Is any voltage present?

Yes	No
REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.	INSTALL a new Evaporative Emission (EVAP) Vapor Blocking valve. REFER to the service information , Evaporative Emissions. Clear the PCM DTCs. REPEAT the self-test.

HX34 CHECK THE INSTRUMENT PANEL CLUSTER (IPC) FOR DTCS

Ignition ON, engine OFF.

Carry out the IC (IPC) self-test.

Are any DTCs present?

Yes	No
REFER to the service information , Instrumentation, Message Center, and Warning Chimes, DTC Charts, to continue diagnosis.	GO to **HX35** .

HX35 CHECK THE FLI PID

Ignition ON, engine running.

Access the PCM and monitor the FLI (PER) PID.

Does the FLI PID match the fuel gauge?

Yes	No
GO to **HX36** .	GO to HX52.

HX36 CHECK FOR FUEL TANK FLOAT LEVEL RESPONSE

NOTE: A dual-container (saddle type) fuel tank has two fuel level sensors. The

FLI PID in the PCM is the average value of both fuel level sensors. Some dual-container tanks may require the fuel level to be greater 3/4 full before the fuel level equalizes.

Ignition ON, engine running.

Access the PCM and monitor the FLI (PER) PID.

Ignition OFF.

If the fuel level is less than 1/4 (25% on FLI), add approximately 1/4 tank of fuel.

If the fuel level is greater than 3/4 (75% on FLI), drain approximately 1/4 tank of fuel.

Ignition ON, engine running.

Does the FLI PID indicate a movement upward or downward as fuel is either added or drained?

Yes	No
Unable to duplicate or identify the concern at this time. GO to PINPOINT TEST Z .	REFER to the service information , Instrumentation, Message Center, and Warning Chimes, Symptom Charts, to diagnose the incorrect fuel gauge indication symptom.

HX37 CHECK THE FUEL FILLER CAP OR CAPLESS FUEL TANK FILLER PIPE

For vehicles with a fuel filler cap, visually inspect the fuel filler cap without initially disturbing it.

Verify the fuel filler cap tether is visible and free to move.

Check for missing or loose fuel filler cap.

Check the fuel filler cap for damage.

For vehicles with a capless fuel tank filler pipe, visually inspect the capless fuel tank filler pipe inlet without initially disturbing it.

Check the capless fuel tank filler pipe inlet for an obstruction that prevents it from sealing.

Check the capless fuel tank filler pipe for damage.

Install and remove the supplemental fueling adapter five times in the capless fuel tank filler pipe to clear debris on the seal and repeat the test. Refer to the Owner Literature for the location of the supplemental fueling adapter in the vehicle.

Is a concern present?

Yes	No
For repair verification, CARRY OUT the Smoke Machine PHASE 1 -	For DTCs P0442 or

Leak Verification Pressure Test. REPAIR as necessary. GO to HX43.	P0456, GO to HX43. For DTCs P0455 or P0457, GO to **HX38** .

HX38 CHECK FOR FLI DTCS

Ignition ON, engine OFF.

Carry out the PCM self-test.

Are DTCs P0460, P0461, P0462 or P0463 present?

Yes	No
DISREGARD the current diagnostic trouble code (DTC) at this time. DIAGNOSE the next DTC. GO to DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS .	GO to **HX39** .

HX39 CHECK THE OPERATION OF THE FUEL GAUGE

NOTE: A fuel gauge that always indicates a fuel level less than a 1/2 tank or always a full tank, may be caused by a fuel level input (FLI) concern.

Check operation of the fuel gauge.

Is the fuel gauge functioning correctly?

Yes	No
GO to **HX40** .	CHECK the functionality of the FLI circuit. RETURN to SYMPTOM CHARTS for further direction.

HX40 EVAPORATIVE EMISSION SYSTEM VISUAL INSPECTION

Ignition OFF.

Visually inspect for:

EVAP system lines and hoses (check for correct connections, damage or blockage)

loose fuel vapor hose and tube connections to the EVAP system components

blocked vacuum hose between the EVAP purge valve and the engine intake manifold

damaged fuel tank or fuel filler pipe

Are there any concerns found during the visual inspection?

Yes	No
REPAIR as necessary. For repair verification, CARRY OUT the Smoke Machine PHASE 1 - Leak	GO to **HX41** .

Verification Pressure Test. GO to HX43.	

HX41 CHECK THE FTP SENSOR VOLTAGE WITH THE FUEL FILLER CAP REMOVED OR THE CAPLESS FUEL TANK FILLER PIPE OPENED

For vehicles with a capless fuel filler pipe,

Install the supplemental refueling adaptor provided with the vehicle to open the capless fuel tank filler pipe.

For all others,

Remove the fuel filler cap.

Ignition ON, engine OFF.

Access the PCM and monitor the FTP (VOLT) PID.

Is the voltage between 2.35 - 2.9 V?

Yes	No
For DTC P0451, CHECK for kinks or bends in the fuel vapor hoses and tubes between the fuel tank and dust separator. CHECK the EVAP canister ports and canister vent hose assembly for contamination or debris. CHECK the dust separator for blockage. REPAIR as necessary. Clear the PCM DTCs. REPEAT the self-test. For all others, GO to **HX42** .	For DTC P0451, INSTALL a new FTP sensor. REFER to the service information , Evaporative Emissions. CARRY OUT the EVAP Test. REFER to the instruction manual provided by the scan tool manufacturer. Clear the PCM DTCs. REPEAT the self-test. For all others, INSTALL a new FTP sensor. REFER to the service information , Evaporative Emissions. REPEAT the test and VERIFY the results. For repair verification, CARRY OUT the Smoke Machine PHASE 1 - Leak Verification Pressure Test. GO to HX43.

HX42 EVAP PURGE VALVE TEST

Ignition OFF.

Install the fuel filler cap or remove the supplemental refueling adaptor.

Ignition ON, engine running.

Access the PCM and control the EVAPCV (MODE) PID.

Close the EVAP canister vent valve by commanding the EVAPCV PID to ON (100% duty cycle).

Access the PCM and monitor the FTP (PRESS) PID.

Access the PCM and control the EVAPCP (PER) PID.

While monitoring the FTP PID, ramp open the EVAP purge valve by incrementally commanding the EVAPCP PID to 100%.

Does the FTP PID decrease, the engine RPM change, or the engine stall as an indication that the EVAP purge valve is opening?

Yes	No
GO to **HX43** .	INSTALL a new Evaporative Emission (EVAP) Purge valve. REFER to the service information , Evaporative Emissions. REPEAT the test and VERIFY the results. For repair verification, CARRY OUT the Smoke Machine PHASE 1 - Leak Verification Pressure Test. GO to **HX43** .

HX43 HOOK UP THE SMOKE MACHINE

NOTE: The smoke and air flow from the Rotunda Smoke Machine, Fuel Evaporative Emission System Tester 218-00001 or equivalent will not pass through liquid fuel. Liquid fuel may be present in the fuel tank filler pipe.

Ignition OFF.

Connect the smoke machine power cables to the vehicle battery. Check to see that the smoke machine power indicator lamp is on, indicating a good battery contact.

For Explorer 3.7L, Fiesta 1.6L TiVCT, Flex 3.5L TiVCT, Focus 2.0L GDI, Fusion 2.5L, MKS 3.7L, MKT 3.7L, Taurus 3.5L TiVCT and Taurus 3.7L,

Disconnect the fuel vapor to intake manifold line at the EVAP purge valve and cap the line.

Connect a suitable hose adapter to the fuel vapor to intake manifold connection at the EVAP purge valve.

For all others:

Disconnect the fuel vapor to EVAP canister line at the EVAP purge valve.

Connect a suitable hose adapter to the fuel vapor to EVAP canister connection at the EVAP purge valve.

Is the smoke machine hook up complete?

Yes	No
For leak detection, GO to **HX44** . For leak repair verification, GO to HX45.	REFER to the smoke machine operator manual for additional instructions and for helpful tips.

HX44 CARRY OUT SMOKE MACHINE PHASE 2 - LEAK DETECTION SMOKE TEST

NOTE: Check the EVAP hoses, EVAP purge valve, EVAP canister vent valve, EVAP canister, fuel tank, fuel filler pipe, the fuel tank area, at the fuel filler cap or capless fuel tank filler pipe inlet for leaks. Wiggle the components and connections and look for signs of leaking smoke. Smoke under pressure may not reach a leak in the fuel tank filler pipe between the check valve and the fuel filler cap or capless fuel tank filler pipe inlet. If leaking smoke is not found, carry out a visual inspection of the fuel tank filler pipe, fuel filler cap or capless fuel tank filler pipe inlet.

Set the Rotunda Smoke Machine, Fuel Evaporative Emission System Tester 218-00001 or equivalent to SMOKE.

Remove the fuel filler cap or install the supplemental refueling adaptor.

Connect the smoke supply hose nozzle tip into the suitable hose adapter.

Ignition ON, engine OFF.

Access the PCM and control the EVAPCV (PER) PID.

Close the EVAP canister vent valve by commanding the EVAPCV PID to ON (100% duty cycle).

Access the PCM and control the EVAPCP (PER) PID.

Open the EVAP purge valve by commanding the EVAPCP PID to 100%.

Start the smoke machine.

Verify the connection at the EVAP purge valve is not leaking.

If smoke does not exit the fuel tank filler pipe after the system is pressurized, command the EVAPCV PID open to purge the EVAP canister vent valve. Once smoke is seen at the EVAP canister vent valve, command the EVAPCV PID close.

Install the fuel filler cap or remove the supplemental refueling adaptor once smoke exits the fuel tank filler pipe.

Continue to apply smoke to the EVAP system for 60 seconds.

Press and release the remote starter button in intervals of approximately 15 seconds on and 15 seconds off while checking for exiting smoke.

Use the halogen spotlight along the EVAP system path and look for smoke exiting at the leak.

Is the EVAP leak located?

Yes	No
REPAIR as necessary. CONNECT all the disconnected components. For repair verification, CARRY OUT the Smoke Machine PHASE 1 - Leak Verification Pressure Test.	The test passed. CONNECT all the disconnected components. CARRY OUT the Smoke Machine PHASE 1 - Leak Verification Pressure Test.

GO to **HX45** .	GO to **HX45** .

HX45 CARRY OUT THE SMOKE MACHINE PHASE 1 - LEAK VERIFICATION PRESSURE TEST

Position the control lever located on the Rotunda Smoke Machine, Fuel Evaporative Emission System Tester 218-00001 or equivalent to METER.

Calibrate the smoke machine flowmeter using the 0.020 (DTC P0456) standard or the 0.040 (DTC P0442) standard as follows:

Insert the air supply hose (transparent hose) nozzle tip into the appropriate EVAP system standard located on the front of the smoke machine.

Press the remote starter button on the smoke machine. Observe the position of the flowmeter indicator ball.

Position the flowmeter red pointer flag so that it aligns with the measurement of the indicator ball.

Release the button and remove the air supply hose nozzle tip from the EVAP system standard.

Connect the air supply hose (transparent hose) nozzle tip into the suitable hose adapter.

Ignition ON, engine OFF.

Access the PCM and control the EVAPCV (MODE) PID.

Close the EVAP canister vent valve by commanding the EVAPCV PID to ON (100% duty cycle).

Access the PCM and control the EVAPCP (PER) PID.

Open the EVAP purge valve by commanding the EVAPCP PID to 100%.

Press the remote starter button on the smoke machine. Notice that the ball in the flowmeter is all the way at the top. This indicates the system is being pressurized.

Continue to press the remote starter button until the ball stops descending. Once the ball stops descending, observe if it is above or below the red pointer flag. If the measurement is below the indicator flag, the system has passed the pressure test. If the measurement is above the indicator flag, the EVAP system has an unacceptable leak.

Does the EVAP system pass the leak verification pressure test?

Yes	No
For DTC P0456, GO to **HX46** . For all others, the test passed and no concerns are present. Clear the PCM DTCs. REPEAT the self-test.	GO to HX44.

HX46 CARRY OUT THE EVAP PURGE VALVE LEAK TEST

Remove the EVAP purge valve from the vehicle. Refer to the service information , Evaporative Emissions.

Connect a suitable hose adapter to the EVAP purge valve.

Connect the air supply hose (transparent hose) nozzle tip into the suitable hose adapter.

Press the remote starter button on the smoke machine. Notice that the ball in the flowmeter is all the way at the top. This indicates the system is being pressurized.

Continue to press the remote starter button until the ball stops descending. Once the ball stops descending, observe if it is above or below the red pointer flag. If the measurement is below the indicator flag, the EVAP purge valve has passed the pressure test. If the measurement is above the indicator flag, the EVAP purge valve has an unacceptable leak.

Does the EVAP purge valve pass the leak verification test?

Yes	No
The test passed and no concerns are present. Clear the PCM DTCs. REPEAT the self-test.	INSTALL a new Evaporative Emission (EVAP) Purge valve. REFER to the service information , Evaporative Emissions. CARRY OUT the EVAP Test. REFER to the instruction manual provided by the scan tool manufacturer. Clear the PCM DTCs. REPEAT the self-test.

HX47 CHECK THE EVAP EJECTOR CONNECTIONS

Remove the EVAP ejector from the vehicle. Refer to the service information , Evaporative Emissions.

Visually inspect the EVAP ejector connections at the intake air system tube for a restriction.

Visually inspect the EVAP ejector connections for a restriction.

Is a concern present?

Yes	No
REPAIR as necessary. Clear the PCM DTCs. REPEAT the self-test.	For F-150 3.5L GTDI and Transit 3.5L, INSTALL a new EVAP Ejector. REFER to the service information , Evaporative Emissions. Clear the PCM DTCs. REPEAT the self-test. For all others, INSTALL a new Evaporative Emission (EVAP) Purge valve. REFER to the service information , Evaporative Emissions. Clear the PCM DTCs. REPEAT the self-test.

HX48 CHECK FOR THE PRESENCE OF ANY MODULE COMMUNICATION CONCERNS

Ignition ON, engine OFF.

Check for self-test DTCs in all of the vehicle modules.

Are any communication concerns or communication DTCs present?

Yes	No

For communication concerns in the PCM, DISREGARD the current diagnostic trouble code (DTC) at this time. DIAGNOSE the next DTC. GO to DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS . For communication concerns in other modules, REFER to the applicable service information to diagnose the communication DTC.	GO to **HX49** .

HX49 CHECK THE PERFORMANCE OF THE PROCESSOR

Ignition OFF.

Disconnect the battery and wait for 1 minute. Refer to the service information , Battery, Mounting and Cables.

Connect the battery.

Ignition ON, engine running.

Allow the engine idle to stabilize.

Access the PCM and monitor the FTP (VOLT) PID.

Is the voltage between 2.35 - 2.9 V?

Yes	No
GO to HX51.	GO to **HX50** .

HX50 CHECK FOR SELF-TEST DTC P260F

Idle the engine for 2 minutes.

Carry out the PCM self-test.

Is DTC P260F present?

Yes	No
GO to **HX51** .	RETURN the vehicle to the customer.

HX51 CHECK THE PCM FOR THE LATEST CALIBRATION

Program the PCM to the latest calibration.

Ignition ON, engine running.

Idle the engine for 2 minutes.

Carry out the PCM self-test.

Is DTC P260F present?

Yes	No
GO to **HX52** .	RETURN the vehicle to the customer.

HX52 CHECK FOR CORRECT PCM OPERATION

Disconnect all the PCM connectors.

Visually inspect for:

pushed out pins

corrosion

Connect all the PCM connectors and make sure they seat correctly.

Carry out the PCM self-test.

Verify the concern is still present.

Is the concern still present?

Yes	No
INSTALL a new PCM. REFER to FLASH ELECTRICALLY ERASABLE PROGRAMMABLE READ ONLY MEMORY (EEPROM) , Programming the VID Block for a Replacement PCM.	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.

PINPOINT TEST JB: SECONDARY IGNITION (COP) > INTRODUCTION

NOTE: A damaged ignition system may cause high catalyst temperatures. Check the components next to the catalyst and muffler for heat damage.

NOTE: There is additional information available on this procedure. Refer to the Service Tips tab and select the appropriate test listed under the Job Aids title.

For 2 wire coil harness connectors, select the PCM Ignition Coil Driver Test.

For 3 wire coil harness connectors, select the Driver On Coil Ignition Test.

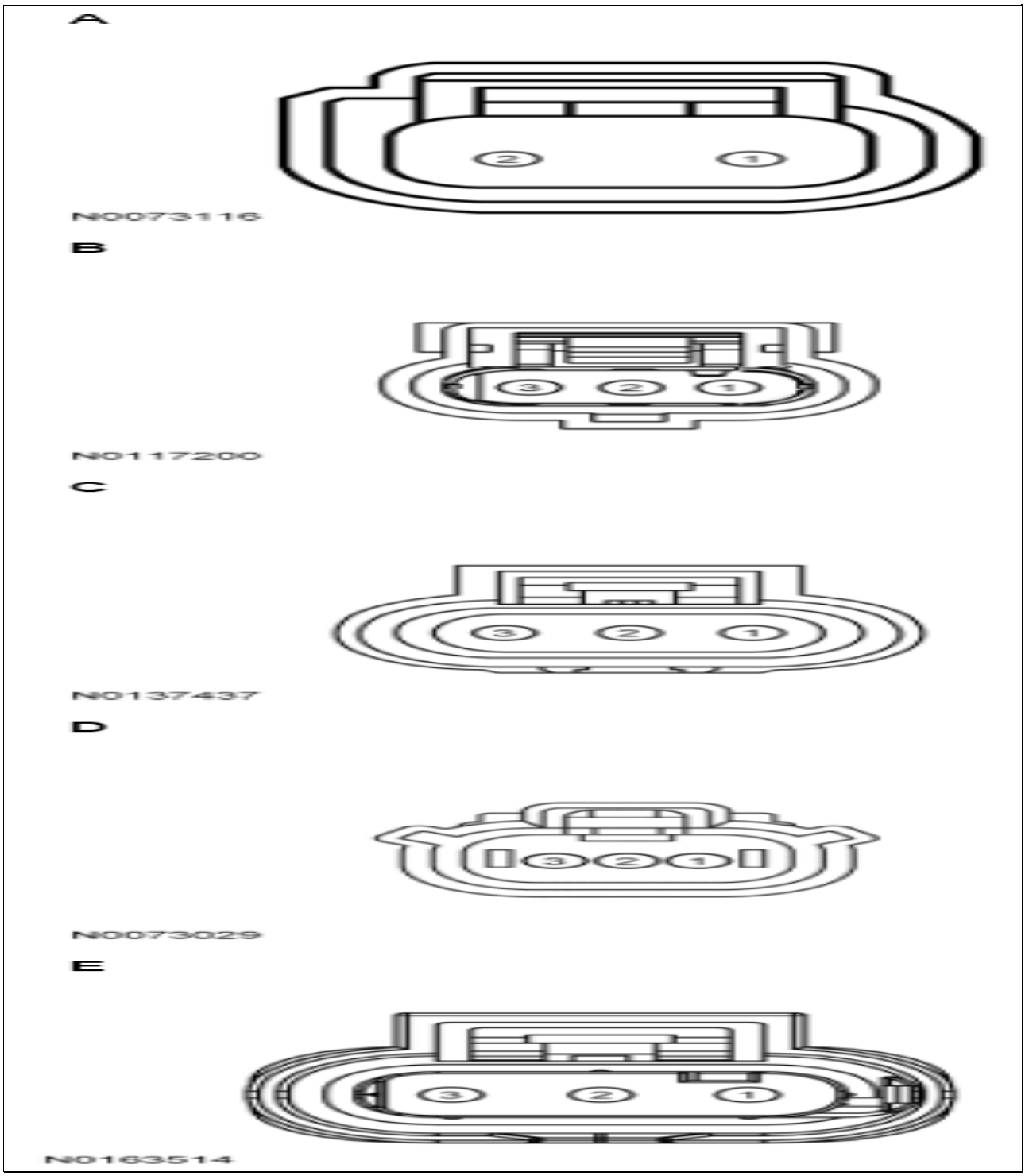
This pinpoint test is intended to diagnose the following:

- spark plugs (12405)
- secondary side of the coil
- exhaust spark plug wire (12286) (6.2L engine only)

Vehicle	Firing Order for Coil On Plug Applications
Fusion 1.5L	1 2 4 3
Mustang 5.0L, F-150, F-250 - F-550 6.2L	1 5 4 8 6 3 7 2

3-cylinder applications	1 2 3
4-cylinder applications	1 3 4 2
6-cylinder applications	1 4 2 5 3 6
8-cylinder applications	1 3 7 2 6 5 4 8
10-cylinder applications	1 6 5 10 2 7 3 8 4 9

Fig 1: Identifying Coil On Plug (COP) Connector



Courtesy of FORD MOTOR CO.

Vehicle	Connector	Pin	Circuit
E-Series, F-Series Super Duty 6.8L, Motorhome/Stripped Chassis/Step Van	A	2 1	COP VPWR
Edge 2.0L, Edge 2.7L, Escape/Kuga 2.0L, Explorer 2.0L, F-150 2.7L, Focus 2.0L, Fusion 2.0L, MKC, MKT 2.0L, MKZ 2.0L, Mustang 2.3L, Taurus 2.0L	B	2 1 3	GND COP VPWR
Escape/Kuga 1.6L, Fiesta, Fusion 1.5L, Fusion 1.6L, Transit Connect 1.6L	C	2 1 3	GND COP VPWR
Escape/Kuga 2.5L, Fusion 2.5L, Transit Connect 2.5L	A	1 2	COP VPWR
Expedition, Explorer GTDI 3.5L, F-150 GTDI 3.5L, Flex GTDI 3.5L, MKS 3.5L, MKT 3.5L, Navigator, Taurus GTDI 3.5L, Transit 3.5L	D	1 2 3	GND COP VPWR
F-Series Super Duty 6.2L	D	3 1	COP VPWR
Focus 1.0L	E	2 1 3	GND COP VPWR
All other vehicles	D	1 3	COP VPWR

PINPOINT TEST JB: SECONDARY IGNITION (COP) > TEST PROCEDURE

JB1 CHECK FOR DTCS

NOTE: Do not disconnect any COP while the engine is running, damage to the COP or PCM may occur.

Are DTCs P0300, P0301, P0302, P0303, P0304, P0305, P0306, P0307, P0308, P0309, P0310 or P0316 present?

Yes	No
GO to **JB2** .	For symptoms without DTCs, GO to **JB2** . For all others, RETURN to SYMPTOM CHARTS for further direction.

JB2 CYLINDER POWER BALANCE TEST

NOTE: The IDS test referenced in this step may not be available on all vehicles. Follow the YES answer if the IDS test is not available.

Carry out the Power Balance Test. Refer to the instruction manual provided by the scan tool manufacturer.

Are all cylinders contributing correctly during the power balance test?

Yes	No
GO to **JB3** .	GO to JB4.

JB3 VISUAL INSPECTION OF THE IGNITION SYSTEM

Visually inspect the engine compartment to make sure all coils are correctly and securely connected.

Examine all the wiring harnesses and connectors for damaged, burned, or overheated insulation, and loose or broken conditions.

Make sure the vehicle battery is in good condition and all of the accessories are turned off.

For the 6.2L engine, check the condition of the exhaust spark plug wire and boots.

Is a concern present?

Yes	No
REPAIR as necessary. Clear the PCM DTCs. REPEAT the self-test.	GO to **JB4** .

JB4 CHECK THE VPWR TO THE SUSPECT COIL

Ignition ON, engine OFF.

Suspect Coil Assembly connector disconnected.

Measure the voltage between:

(+) COP Connector, Harness Side	(-)
VPWR	Ground

Is the voltage greater than 10.5 V?

Yes	No
GO to **JB5** .	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

JB5 MISFIRE ON CYLINDERS 1 THROUGH 10

Are DTCs P0301, P0302, P0303, P0304, P0305, P0306, P0307, P0308, P0309, or P0310 present?

Yes	No
For Edge 3.5L, Explorer 3.5L TiVCT, Explorer 3.7L, F-150 3.5L TiVCT, Flex 3.5L TiVCT, MKS 3.7L, MKT 3.7L, MKX, MKZ 3.7L, Mustang 3.7L, Taurus 3.5L TiVCT, Taurus 3.7L, and Transit 3.7L, GO to **JB6** . For all others, GO to JB8.	GO to JB9.

JB6 CHECK FOR BANK 1 OR BANK 2 MISFIRE DTCS

NOTE: DTCs P0301, P0302, P0303 apply to bank 1 and DTCs P0304, P0305, P0306 apply to bank 2 on 6 cylinder engines.

Are DTCs P0301, P0302 or P0303 present?

Yes	No
GO to **JB7** .	GO to JB8.

JB7 CONFIRM COMPONENTS FOR CYLINDER MISFIRE

Remove the suspect coil (as determined from the table) for the appropriate DTC. For additional information, refer to the service information , Engine Ignition.

Remove the suspect spark plug (as determined from the table) for the appropriate DTC.

For additional information, refer to the service information , Engine Ignition.

Remove the suspect fuel injector (as determined from the table) for the appropriate DTC. For additional information, refer to the service information , Fuel Charging and Controls.

Remove opposite bank coil. For additional information, refer to the service information , Engine Ignition.

Remove the opposite bank spark plug. For additional information, refer to the service information , Engine Ignition.

Remove the opposite bank fuel injector. For additional information, refer to the service information , Fuel Charging and Controls.

Install removed components from bank 1 on the opposite cylinder in bank 2 and install the components removed from bank 2 in bank 1.

Make sure the vehicle is correctly reassembled.

Drive the vehicle to determine if the misfire is still present.

Carry out the PCM self-test.

Does the misfire move from the suspect cylinder in bank 1 to the opposite cylinder in bank 2?

Yes	No
GO to **JB8** .	GO to JB15.

JB8 CHECK FOR SPARK AT THE CYLINDERS INDICATED BY THE DTCS

Ignition OFF.

Remove the fuel pump fuse to disable the fuel pump.

Disconnect the ignition coils from the spark plugs.

Connect the Adjustable Ignition Spark Tester THX458 or equivalent to the ignition coil boot.

Observe the spark tester while cranking the engine.

For the 6.2L engine,

Connect the ignition coils to the spark plugs.

Disconnect the exhaust spark plug wires from the spark plugs.

Connect the Adjustable Ignition Spark Tester THX458 or equivalent to the exhaust spark plug wire.

Observe the spark tester while cranking the engine.

Is a bluish-white spark present?

Yes	No
GO to JB13.	For Edge 3.5L, E-Series, Escape/Kuga 2.5L, F-150 3.5L TiVCT, F-150 5.0L, F-650/F-750, F-Series Super Duty, Fusion 2.5L, Motorhome/Stripped Chassis/Step Van, Mustang 3.7L, Mustang 5.0L, Transit 3.7L, and Transit Connect 2.5L, GO to JB10. For all others, INSTALL a new COP. Clear the PCM DTCs. REPEAT the self-test.

JB9 CHECK FOR SPARK AT ALL CYLINDERS

Ignition OFF.

Remove the fuel pump fuse to disable the fuel pump.

Disconnect the ignition coils from the spark plugs.

Connect the Adjustable Ignition Spark Tester THX458 or equivalent to the ignition coil boot.

Observe the spark tester at each cylinder while cranking the engine.

For the 6.2L engine,

Connect the ignition coils to the spark plugs.

Disconnect the exhaust spark plug wires from the spark plugs.

Connect the Adjustable Ignition Spark Tester THX458 or equivalent to the exhaust spark plug wire.

Observe the spark tester at each cylinder while cranking the engine.

Is a bluish-white spark consistent between all cylinders?

Yes	No
GO to JB13.	RECORD the cylinders with inconsistent spark. For Edge 3.5L, E-Series, Escape/Kuga 2.5L, F-150 3.5L TiVCT, F-150 5.0L, F-650/F-750, F-Series Super Duty,

	Fusion 2.5L, Motorhome/Stripped Chassis/Step Van, Mustang 3.7L, Mustang 5.0L, Transit 3.7L, and Transit Connect 2.5L, GO to **JB10** . For all others, INSTALL a new COP. Clear the PCM DTCs. REPEAT the self-test.

JB10 COMPONENT INSPECTION

Inspect the coil boots for the missing cylinders. Install a new coil boot if necessary. Refer to the service information , Engine Ignition.

Inspect the spark plugs for the missing cylinders. Measure the resistance of the spark plugs. Install a new spark plug if the resistance is lower than 2, 000 ohms or higher than 12, 000 ohms at a room temperature of 25°C (77°F).

For the 6.2L engine,

Inspect the exhaust spark plug wires for damaged insulation, burns, and high voltage etching in either of the boots for the missing cylinders. Install a new exhaust spark plug wire if the resistance is lower than 5, 875 ohms or higher than 7, 875 ohms at a room temperature of 25°C (77°F).

Is a concern present?

Yes	No
REPAIR as necessary. Clear the PCM DTCs. REPEAT the self-test.	For F-Series Super Duty 6.2L, GO to JB12. For all others, GO to **JB11** .

JB11 CHECK THE SECONDARY COIL RESISTANCE FOR THE MISSING CYLINDERS

Ignition OFF.

Suspect Coil Assembly connector disconnected.

Measure resistance between: Suspect coil connector, VPWR, component side and ignition coil spring, located in the ignition coil boot.

Is the resistance between 5, 000 and 6, 000 ohms?

Yes	No
GO to PINPOINT TEST Z .	INSTALL a new COP. Clear the PCM DTCs. REPEAT the self-test.

JB12 CHECK THE SECONDARY COIL RESISTANCE

Ignition OFF.

Measure resistance between: Suspect coil connector, VPWR, component side and ignition coil spring, located in the ignition coil boot.

Is the resistance between 33, 900 ohms and 41, 500 ohms at a room temperature of 25°C (77°F)?

Yes	No
GO to PINPOINT TEST Z .	INSTALL a new COP. Clear the PCM DTCs. REPEAT the self-test.

JB13 CHECK THE SPARK PLUGS

NOTE: To determine the condition of the spark plugs, refer to the service information , Engine and carry out the Spark Plug Inspection.

Ignition OFF.

Remove and inspect the spark plugs for damage, wear, carbon tracking or deposits and correct spark plug gap.

Are the plugs OK?

Yes	No
GO to **JB14** .	REPAIR the spark plugs. ADJUST the gap or INSTALL a new spark plug as necessary. REFER to the service information Engine Ignition. Clear the PCM DTCs. REPEAT the self-test.

JB14 CHECK THE SPARK PLUG RESISTANCE

Measure the spark plug resistance.

Is the resistance between 2, 000 ohms and 12, 000 ohms at a room temperature of 25°C (77°F)?

Yes	No
GO to **JB15** .	INSTALL a new spark plug. REFER to the service information , Engine Ignition. Clear the PCM DTCs. REPEAT the self-test.

JB15 TEST DIRECTION FOR SYMPTOM CHARTS

Were you directed to this pinpoint test from Section 3?

Yes	No
RETURN to SYMPTOM CHARTS for further direction.	GO to **JB16** .

JB16 TEST DIRECTION FOR PINPOINT TEST HD

Were you directed to this pinpoint test from pinpoint test step HD8 ?

Yes	No

GO to HD9.	The concern is intermittent. GO to PINPOINT TEST Z .

PINPOINT TEST JC: SECONDARY IGNITION (COIL PACK) > INTRODUCTION

NOTE: There is additional information available on this procedure. Copy and paste the following URL into your internet browser: mms://multimedia.ford.com/seopts/Service_Tips /ignition3.wmv.

This pinpoint test is intended to diagnose the following:

- spark plugs (12405)
- spark plug wires (12280, 12281)

PINPOINT TEST JC: SECONDARY IGNITION (COIL PACK) > TEST PROCEDURE

JC1 CHECK FOR DIAGNOSTIC TROUBLE CODES (DTCS)

Are DTCs P0300, P0301, P0302, P0303 or P0304?

Yes	No
For DTC P0300, GO to **JC2** . For all others, GO to JC10.	For symptoms without DTCs, GO to **JC2** . For all others, RETURN to SYMPTOM CHARTS for further direction.

JC2 CYLINDER POWER BALANCE TEST

NOTE: The IDS test referenced in this step may not be available on all vehicles. Follow the YES answer if the IDS test is not available.

Carry out the Power Balance Test. Refer to the instruction manual provided by the scan tool manufacturer.

Are all cylinders contributing correctly during the power balance test?

Yes	No
GO to **JC3** .	For a coil pack using an engine analyzer, GO to JC4. For a coil pack not using an engine analyzer, GO to JC10.

JC3 VISUAL INSPECTION OF THE IGNITION SYSTEM

Visually inspect the engine compartment to make sure all coils and spark plug wires are correctly and securely connected.

Examine all wiring harnesses and connectors for damaged, burned or overheated insulation and loose or broken conditions.

Visually inspect the interior and exterior surfaces of the coil tower for damage or carbon tracking.

Visually inspect the interior and exterior surfaces of the spark plug wire boots for damage or carbon tracking.

Make sure the vehicle battery is in good condition and all accessories are turned off.

Is a concern present?

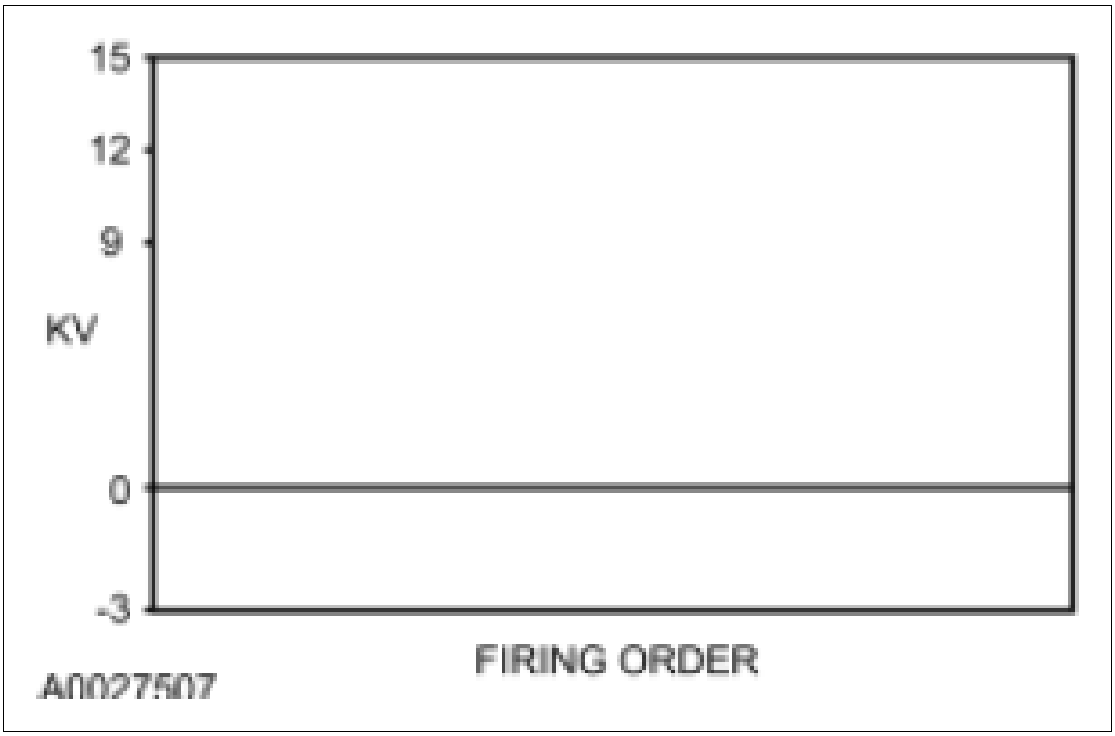
Yes	No
REPAIR as necessary. Clear the PCM DTCs. REPEAT the self-test.	For a coil pack using an engine analyzer, GO to **JC4** . For a coil pack not using an engine analyzer, GO to JC10.

JC4 CHECK FOR THE IGNITION PATTERN

Connect an engine analyzer to diagnose concerns in the secondary side of the ignition system.

Observe the pattern on a scope while cranking the engine.

Fig 1: Ignition Pattern



Courtesy of FORD MOTOR CO.

Is the pattern flat, which indicates no ignition spark on all cylinders?

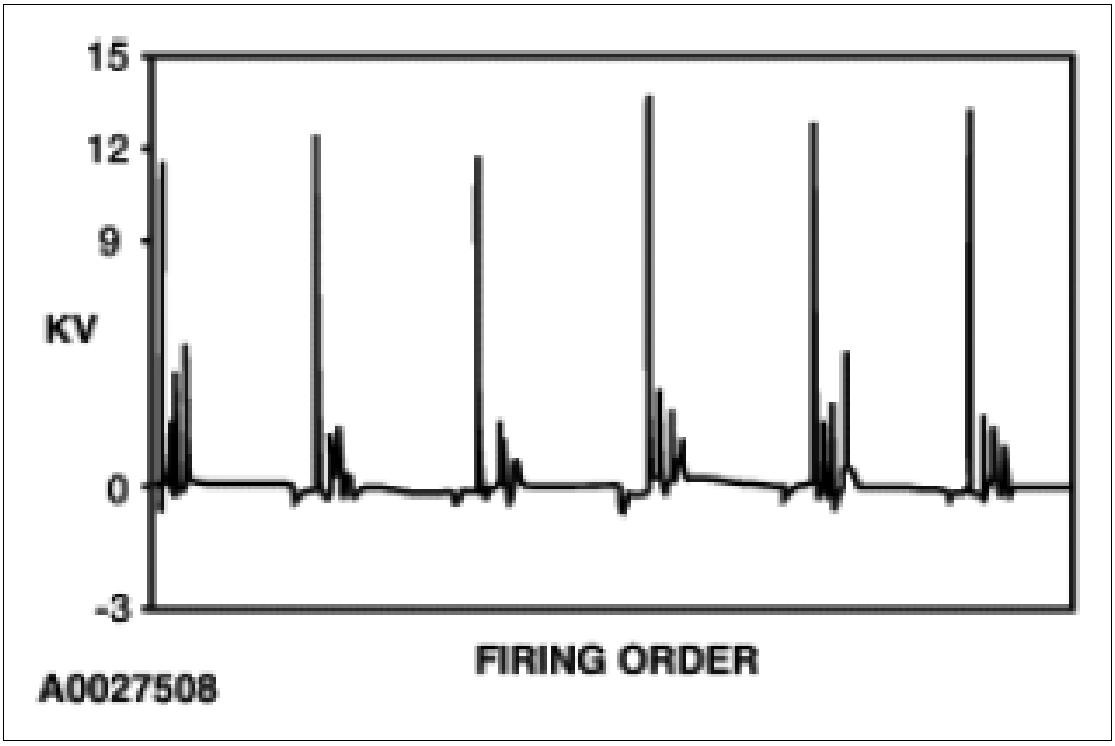
Yes	No
GO to PINPOINT TEST JE .	GO to **JC5** .

JC5 CHECK FOR A NORMAL IGNITION PATTERN

NOTE: Spark plugs may be fired more than once per combustion event. Multi-strike operating mode is RPM dependent.

Ignition ON, engine running. If no start, crank the engine.

Fig 2: Normal Ignition Pattern



Courtesy of FORD MOTOR CO.

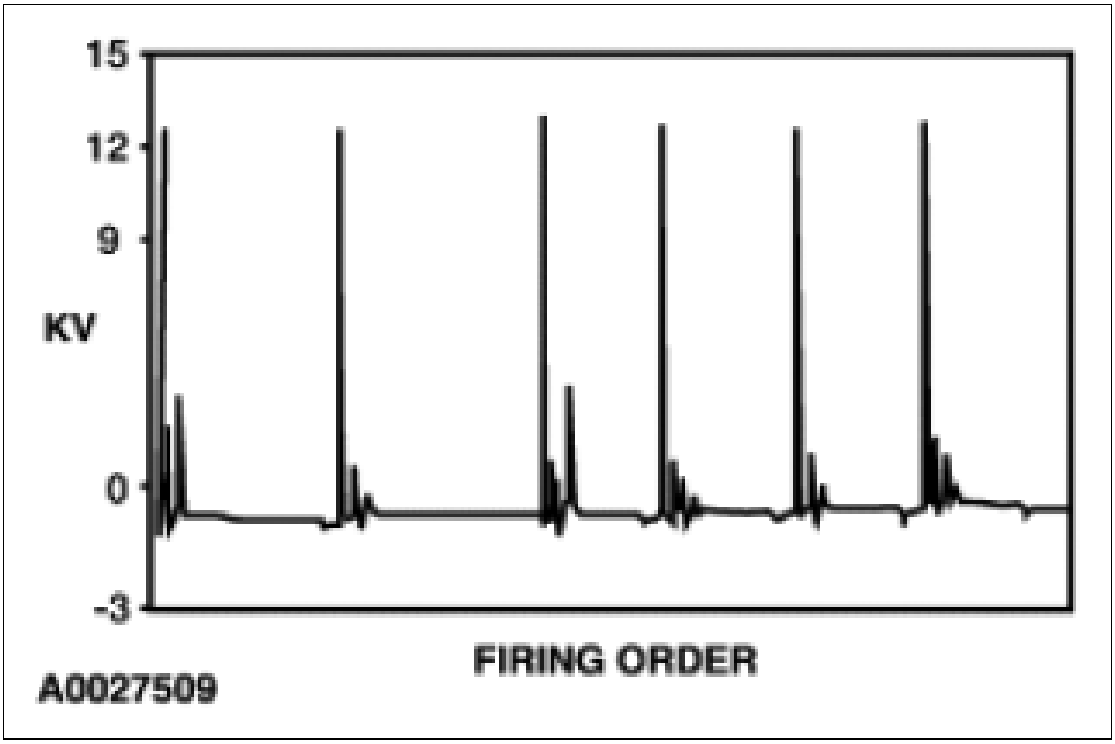
Are the patterns even and is the average value of spark plug firing voltage between 9 kV and 15 kV (higher during engine crank/no start)?

Yes	No
GO to PINPOINT TEST Z .	GO to **JC6** .

JC6 CHECK FOR MISSING SPARK PATTERNS

Observe for missing spark pattern.

Fig 3: Missing Spark Pattern



Courtesy of FORD MOTOR CO.

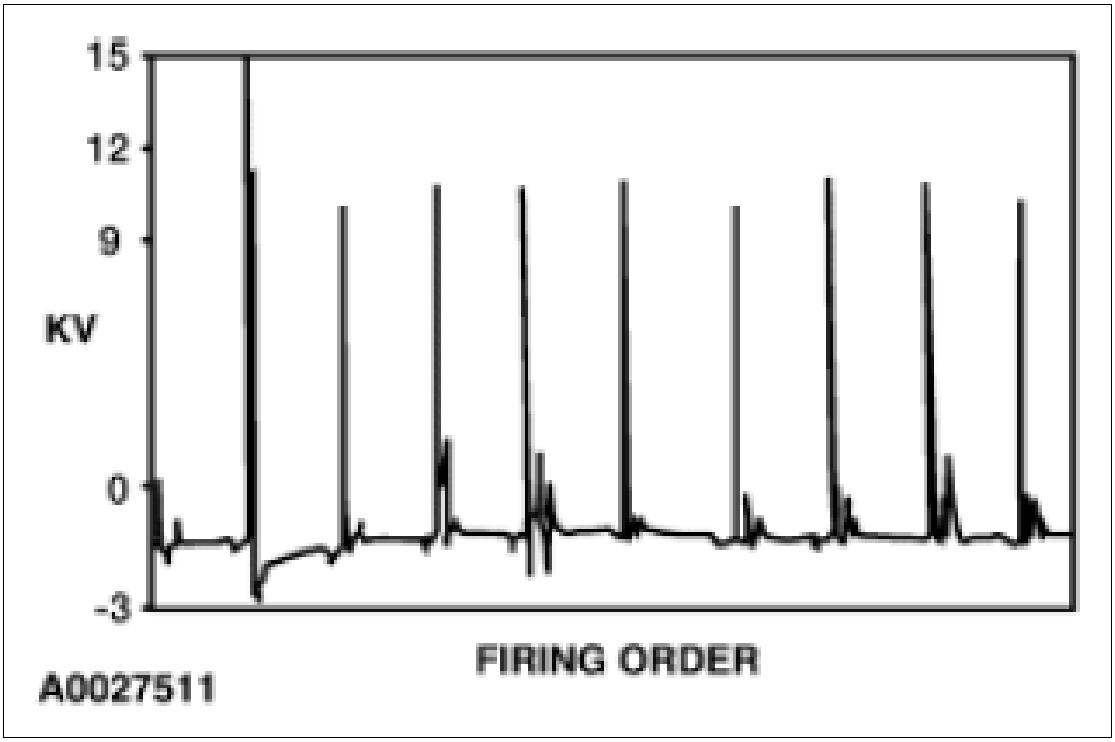
Is the spark pattern inconsistent?

Yes	No
INSPECT the spark plug wires for missing cylinders. MEASURE the resistance of the spark plug wires. INSTALL a new spark plug wire if the resistance is greater than 7, 000 ohms per 30.5 cm (1 foot). REFER to the service information , Engine Ignition. Clear the PCM DTCs. REPEAT the self-test. GO to JE2.	GO to **JC7** .

JC7 CHECK FOR A HIGH SPARK PLUG FIRING VOLTAGE

Observe for a high spark plug firing voltage.

Fig 4: High Spark Plug Firing Voltage Pattern



Courtesy of FORD MOTOR CO.

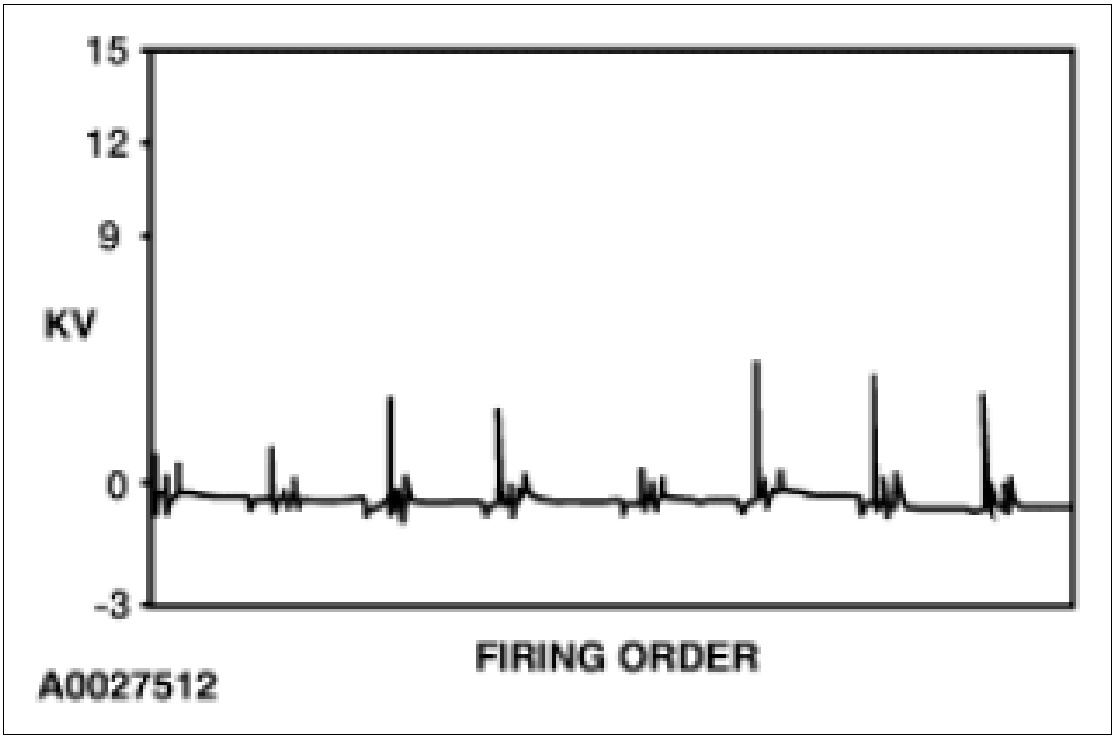
Is the average value of the spark plug firing voltage greater than 15 kV?

Yes	No
INSPECT the spark plug wires for missing cylinders. MEASURE the resistance of the spark plug wires. INSTALL a new spark plug wire if the resistance is greater than 7, 000 ohms per 30.5 cm (1 foot). REFER to the service information , Engine Ignition. Clear the PCM DTCs. REPEAT the self-test.	GO to **JC8** .

JC8 CHECK FOR LOW SPARK PLUG FIRING VOLTAGE

Check the spark plug firing voltage average pattern.

Fig 5: Spark Plug Firing Voltage Average Pattern



Courtesy of FORD MOTOR CO.

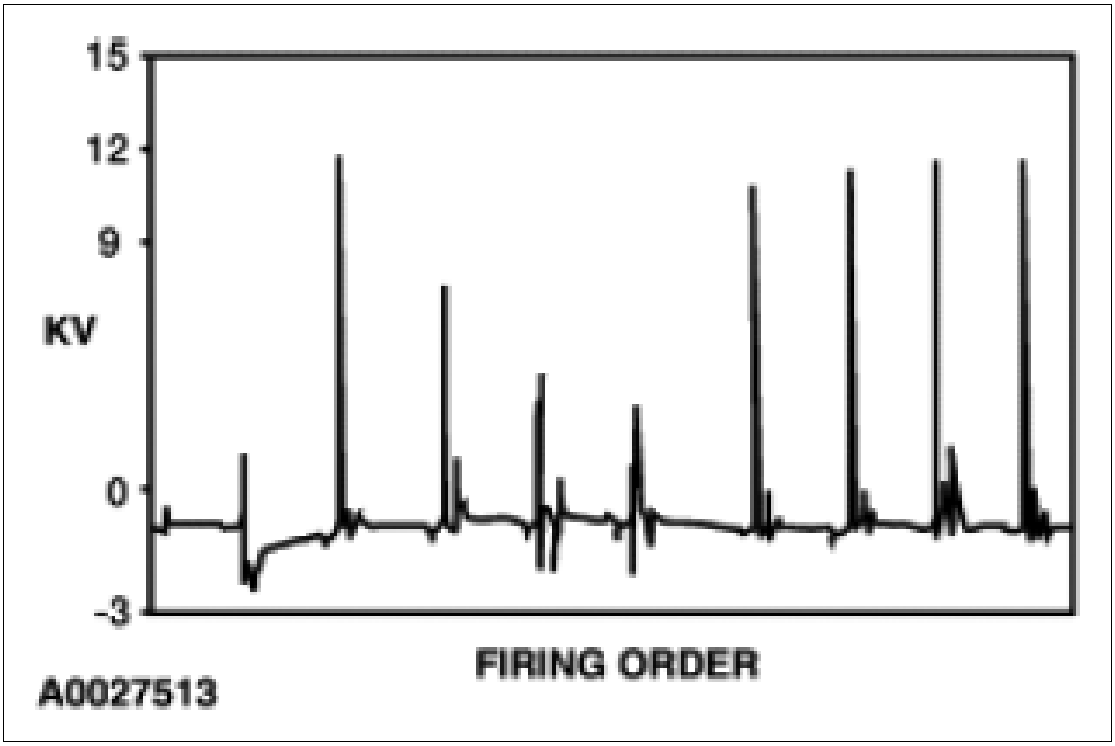
Is there consistently low spark plug firing voltage or sloping sparkline on one or more cylinders?

Yes	No
INSPECT the spark plug wires for missing cylinders. MEASURE the resistance of the spark plug wires. INSTALL a new spark plug wire if the resistance is greater than 7, 000 ohms per 30.5 cm (1 foot). MEASURE the resistance of the spark plugs. INSTALL a new spark plugs if the resistance is lower than 2, 000 or higher than 12, 000 ohms. REFER to the service information , Engine Ignition. Clear the PCM DTCs. REPEAT the self-test.	GO to **JC9** .

JC9 CHECK FOR EVENNESS BETWEEN CYLINDERS

Check the spark plug firing voltage average pattern.

Fig 6: Spark Plug Firing Voltage Average Pattern



Courtesy of FORD MOTOR CO.

Is the evenness of spark plug firing voltage greater than 6 kV?

Yes	No
INSPECT the spark plug wires for missing cylinders. MEASURE the resistance of the spark plug wires. INSTALL a new spark plug wire if the resistance is greater than 7, 000 ohms per 30.5 cm (1 foot). CHECK for damaged spark plugs or narrow spark plug gaps. MEASURE the resistance of the spark plugs. INSTALL a new spark plugs if the resistance is lower than 2, 000 or higher than 12, 000 ohms. REFER to the service information , Engine Ignition. Clear the PCM DTCs. REPEAT the self-test.	GO to PINPOINT TEST Z .

JC10 CHECK FOR SPARK AT ALL CYLINDERS

Ignition OFF.

Disconnect the spark plug wires from the spark plugs.

Connect the Adjustable Ignition Spark Tester THX458 or equivalent to a spark plug wire.

Check for spark while cranking the engine.

Is the bluish-white spark present?

Yes	No
GO to JC12.	INSPECT the spark plug wires for missing cylinders. MEASURE the resistance of the spark plug wires. INSTALL a new spark plug wires, if the resistance is greater

	than 7, 000 ohms per 30.5 cm (1 foot). REFER to the service information , Engine Ignition. If the spark plug wires are OK, GO to **JC11** .

JC11 CHECK THE SECONDARY COIL RESISTANCE FOR THE MISSING CYLINDERS

NOTE: Two adjacent coil towers share a common coil and are called a matched pair. The matched pairs are 1 and 4, and 2 and 3.

Ignition OFF.

Ignition coil pack disconnected.

Disconnect spark plug wires from the coil pack.

Measure the resistance of each matched pair.

Is the resistance between 8, 000 and 9, 600 ohms?

Yes	No
GO to PINPOINT TEST Z .	INSTALL a new ignition coil pack. REFER to the service information , Engine Ignition. Clear the PCM DTCs. REPEAT the self-test.

JC12 CHECK THE SPARK PLUGS

Ignition OFF.

Check for damaged spark plugs or narrow spark plug gaps.

Are the plugs OK?

Yes	No
GO to **JC13** .	REPAIR the spark plugs. ADJUST the gap or INSTALL a new spark plugs as necessary. REFER to the service information , Engine Ignition. Clear the PCM DTCs. REPEAT the self-test.

JC13 CHECK THE SPARK PLUG RESISTANCE

Measure the spark plug resistance.

Is the resistance between 2, 000 and 20, 000 ohms?

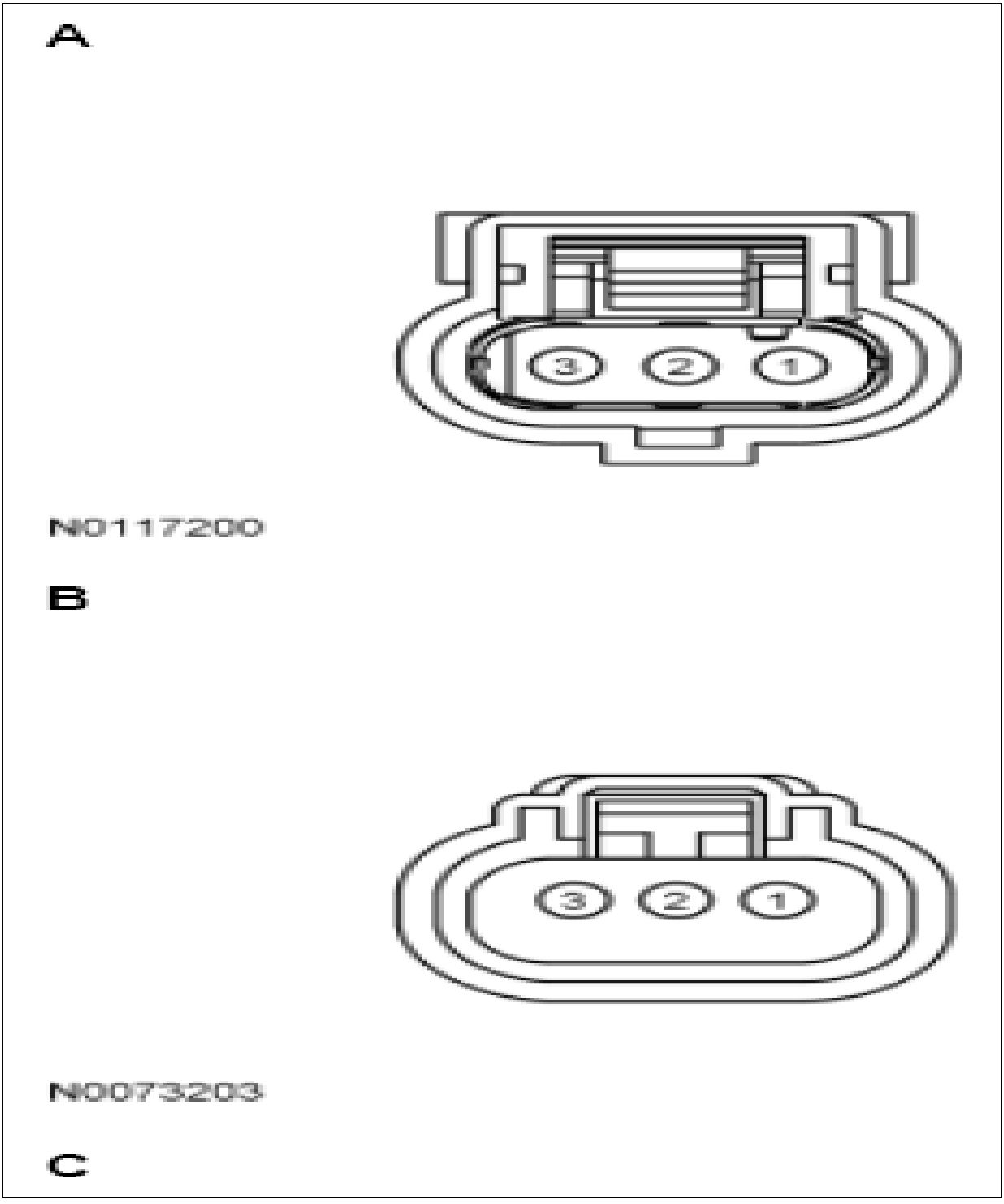
Yes	No
GO to PINPOINT TEST Z .	INSTALL a new spark plugs. REFER to the service information , Engine Ignition. Clear the PCM DTCs. REPEAT the self-test.

PINPOINT TEST JD: CRANKSHAFT POSITION (CKP) SENSOR > INTRODUCTION

This pinpoint test is intended to diagnose the following:

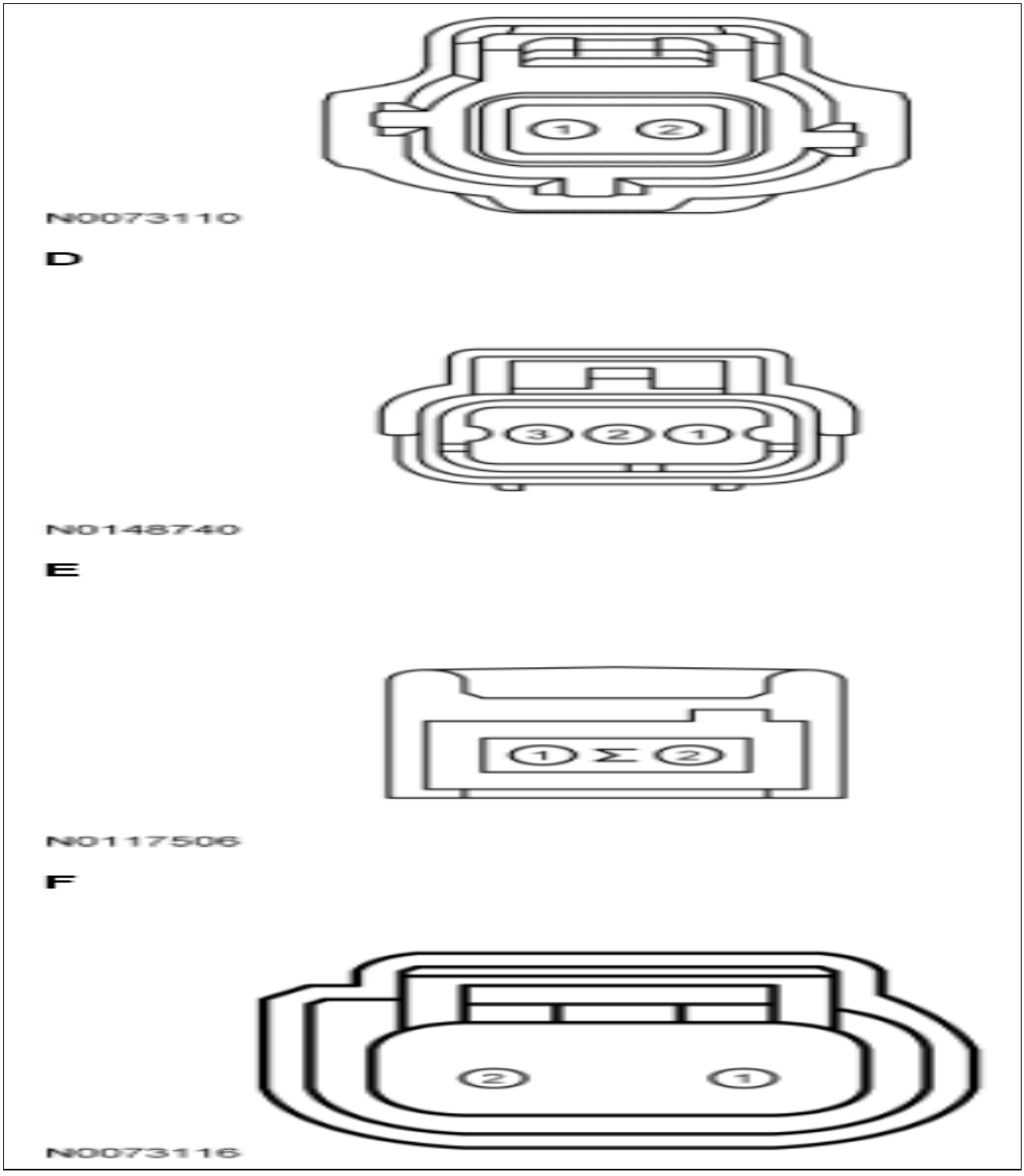
- CKP sensor (6C315)
- harness circuits: CKP, CKP+ and CKP-
- PCM (12A650)

Fig 1: Identifying Crankshaft Position (CKP) Sensor Connector (1 Of 2)



Courtesy of FORD MOTOR CO.

Fig 2: Identifying Crankshaft Position (CKP) Sensor Connector (2 Of 2)



Courtesy of FORD MOTOR CO.

Vehicle	Connector	Pin	Circuit
Edge 2.0L, Focus GTDI 2.0L, Fusion 2.0L, MKZ 2.0L	A	2 3 1	CKP SIGRTN VREF

Edge 2.7L, F-150 2.7L	A	2 1 3	CKP SIGRTN VREF
Escape/Kuga 1.6L	B	3 2 1	CKP SIGRTN VREF
Escape/Kuga 2.0L, Explorer 2.0L, Focus GDI 2.0L, MKC, MKT 2.0L, Mustang 2.3L, Taurus 2.0L	B	2 3 1	CKP SIGRTN VREF
Escape/Kuga 2.5L, Fusion 2.5L, Transit Connect 2.5L	C	2 1	CKP- CKP+
Expedition, Explorer GTDI 3.5L, F-150 GTDI 3.5L, Flex GTDI 3.5L, MKS 3.5L, MKT 3.5L, Navigator, Taurus GTDI 3.5L, Transit 3.5L	A	1 2 3	CKP SIGRTN VREF
Fiesta 1.0L, Fiesta GTDI 1.6L, Focus 1.0L, Fusion 1.5L, Fusion 1.6L, Transit Connect 1.6L	D	3 2 1	CKP SIGRTN VREF
Fiesta TiVCT 1.6L	E	2 1	CKP- CKP+
All other vehicles	F	1 2	CKP- CKP+

PINPOINT TEST JD: CRANKSHAFT POSITION (CKP) SENSOR > INTRODUCTION > POWERTRAIN CONTROL MODULE (PCM) CONNECTOR

For PCM connector views or reference values, refer to REFERENCE VALUES .

Vehicle	Connector	Pin	Circuit
E-Series 6.8L, F-650/F-750, F-Series Super Duty,	190-PIN	E13 E12	CKP+ CKP-

Motorhome/Stripped Chassis/Step Van			
E-Series 5.4L	190-PIN	E58 E42	CKP+ CKP-
Edge 3.5L, F-150 TiVCT 3.5L, F-150 5.0L, Mustang 3.7L, Mustang 5.0L	198 PIN	E70 E69	CKP+ CKP-
Escape/Kuga 2.5L, Explorer 3.7L, Explorer TiVCT 3.5L, Flex TiVCT 3.5L, Fusion 2.5L, MKS 3.7L, MKT 3.7L, MKX, MKZ 3.7L, Taurus TiVCT 3.5L, Taurus 3.7L, Transit 3.7L, Transit Connect 2.5L	190-PIN	E62 E63	CKP+ CKP-
Explorer 2.0L	154 PIN	E45	CKP
Fiesta GTDI 1.6L, Fiesta 1.0L, Focus 1.0L, Fusion 1.6L	198 PIN	E49	CKP
Fiesta TiVCT 1.6L	128 PIN	T6 T14	CKP+ CKP-
Focus GDI 2.0L	198 PIN	E45	CKP
All other vehicles	198 PIN	E11	CKP

PINPOINT TEST JD: CRANKSHAFT POSITION (CKP) SENSOR > TEST PROCEDURE

- **JD1 CHECK THE CKP SENSOR SIGNAL SENT TO THE PCM**

> *NOTE: The battery should be fully charged and the starting system should be functioning correctly.*

  - Remove the fuel pump fuse to disable the fuel pump.
  - Ignition ON, engine OFF.
  - Access the PCM and monitor the RPM (RPM) PID.
  - Crank the engine.

Is the RPM greater than 150 RPM?

Yes	No
For DTCs P0335, P0336 or P0339, GO to **JD2** . For DTC P1336 with no start, GO to PINPOINT TEST A . For DTC P1336, GO to PINPOINT TEST HD . For all others, the CKP, PCM, and harness are working correctly. RETURN to SYMPTOM CHARTS for further direction.	GO to **JD2** .

- **JD2 CHECK THE CKP SENSOR AND TRIGGER WHEEL FOR OBVIOUS PHYSICAL DAMAGE**
  - Ignition OFF.
  - Visually check the CKP sensor and trigger wheel for physical damage.

Are any trigger wheel teeth bent more than 1.0 mm or are any parts physically damaged?

Yes	No
REPAIR as necessary. RESET the keep alive memory (KAM). REFER to RESETTING THE KEEP ALIVE MEMORY (KAM) . For Edge, F-150, Fiesta 1.0L, Fiesta 1.6L GTDI, Focus, MKC, Mustang, and Transit, COMPLETE the Misfire Monitor Neutral Profile Correction procedure using the scan tool. For all others, COMPLETE the Misfire and Fuel Monitors drive cycle procedure to learn the profile. REFER to ON BOARD DIAGNOSTIC (OBD) DRIVE CYCLE , Misfire, Fuel and Deceleration Fuel Shut Off Rear, HO2S Monitors.	For Edge 2.0L, Edge 2.7L, Escape/Kuga 1.6L, Escape/Kuga 2.0L, Expedition, Explorer 2.0L, Explorer 3.5L GTDI, F-150 2.7L, F-150 3.5L GTDI, Fiesta 1.0L, Fiesta 1.6L GTDI, Flex 3.5L GTDI, Focus, Fusion 1.5L, Fusion 1.6L, Fusion 2.0L, MKC, MKS 3.5L, MKT 2.0L, MKT 3.5L, MKZ 2.0L, Mustang 2.3L, Navigator, Taurus 2.0L, Taurus 3.5L GTDI, Transit 3.5L, and Transit Connect 1.6L, GO to JD10. For all others, GO to **JD3** .

- **JD3 CHECK FOR CORRECT CKP BIAS VOLTAGES IN THE PCM**

- CKP Sensor connector disconnected.
- Ignition ON, engine OFF.
- Measure the voltage between:

(+) CKP Sensor Connector, Harness Side	(-) Vehicle Battery
CKP+	Negative terminal
CKP-	Negative terminal

Are the voltages between 1 - 3 V?

Yes	No
GO to **JD4** .	GO to JD6.

- **JD4 CHECK THE CKP SENSOR RESISTANCE**
  - Ignition OFF.
  - Measure the resistance between:

(+) CKP Sensor Connector, Component Side	(-) CKP Sensor Connector, Component Side
CKP+	CKP-

Is the resistance between 0.25K - 1.1K ohms?

Yes	No
GO to **JD5** .	INSTALL a new CKP sensor. REFER to the service information , Electronic Engine Controls. RESET the keep alive memory (KAM). REFER to RESETTING THE KEEP ALIVE MEMORY (KAM) . For Edge, F-150, Fiesta 1.0L, Fiesta 1.6L GTDI, Focus, MKC, Mustang, and Transit, COMPLETE the Misfire Monitor Neutral Profile Correction procedure using the scan tool. For all others, COMPLETE the Misfire and Fuel Monitors drive cycle procedure to learn the profile. REFER to ON BOARD DIAGNOSTIC (OBD) DRIVE CYCLE , Misfire, Fuel and Deceleration Fuel Shut Off Rear, HO2S Monitors.

- **JD5 CHECK THE CKP HARNESS SHIELD GROUND**

NOTE: The harness shield protects the CKP signal from electrical noise and is

grounded at one end, typically near the PCM.

NOTE: Carry out the following resistance measurement between the CKP shield and the ground.

- Measure the resistance between:

(+) CKP_SHLD Assembly Connector, Harness Side	(-)
CKP_SHLD	Ground

Is the resistance less than 5 ohms?

Yes	No
GO to **JD6** .	REPAIR the open circuit. CHECK for an intermittent ground connection. Clear the PCM DTCs. REPEAT the self-test.

- **JD6 CHECK FOR SHORT BETWEEN CKP(+) AND CKP(-)**
  - Ignition OFF.
  - PCM connector disconnected.
  - Measure the resistance between:

(+) CKP Sensor Connector, Harness Side	(-) CKP Sensor Connector, Harness Side
CKP+	CKP-

Is the resistance greater than 10K ohms?

Yes	No
GO to **JD7** .	REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.

- **JD7 CHECK THE CKP CIRCUITS FOR AN OPEN**
  - Measure the resistance between:

(+) CKP Sensor Connector, Harness Side	(-) PCM Connector, Harness Side
CKP-	CKP-
CKP+	CKP+

Are the resistances less than 5 ohms?

Yes	No

GO to **JD8** .	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

- **JD8 CHECK THE CKP CIRCUITS FOR A SHORT TO GROUND**
  - Measure the resistance between:

(+) CKP Sensor Connector, Harness Side	(-) Vehicle Battery
CKP+	Negative terminal
CKP-	Negative terminal

Are the resistances greater than 10K ohms?

Yes	No
GO to **JD9** .	REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.

- **JD9 CHECK THE CKP CIRCUIT FOR A SHORT TO VOLTAGE**
  - Ignition ON, engine OFF.
  - Measure the voltage between:

(+) CKP Sensor Connector, Harness Side	(-) Vehicle Battery
CKP+	Negative terminal
CKP-	Negative terminal

Is any voltage present?

Yes	No
REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.	GO to JD14.

- **JD10 CHECK FOR VOLTAGE AT THE SENSOR**
  - Ignition OFF.
  - CKP Sensor connector disconnected.
  - Ignition ON, engine OFF.
  - Measure the voltage between:

(+) CKP Sensor Connector, Harness Side	(-) CKP Sensor Connector, Harness Side
VREF	SIGRTN

Is the voltage between 4.5 - 5.5 V?

Yes	No

GO to **JD11** .	GO to PINPOINT TEST C .

- **JD11 CHECK FOR AN OPEN**
  - Ignition OFF.
  - PCM connector disconnected.
  - Measure the resistance between:

(+) CKP Sensor Connector, Harness Side	(-) PCM Connector, Harness Side
CKP	CKP

Is the resistance less than 5 ohms?

Yes	No
GO to **JD12** .	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

- **JD12 CHECK FOR A SHORT BETWEEN CIRCUITS**
  - Measure the resistance between:

(+) CKP Sensor Connector, Harness Side	(-)
CKP	Ground

  - Measure the resistance between:

(+) CKP Sensor Connector, Harness Side	(-) CKP Sensor Connector, Harness Side
CKP	VREF
CKP	SIGRTN

Are the resistances greater than 10K ohms?

Yes	No
GO to **JD13** .	REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.

- **JD13 CHECK FOR A SHORT TO VOLTAGE**
  - Ignition ON, engine OFF.
  - Measure the voltage between:

(+) CKP Sensor Connector, Harness Side	(-)
CKP	Ground

Is any voltage present?

Yes	No
REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.	GO to **JD14** .

- **JD14 INTERMITTENT CHECK**

> *NOTE: Chafed CKP or CMP wires or other physical damage to the harness may cause an intermittent short in the CKP or CMP circuit.*

  - Ignition OFF.
  - PCM connector connected.
  - Visually check for chafed CKP and CMP wires or other physical damage to the CKP or CMP harness.

Is a concern present?

Yes	No
REPAIR as necessary. Clear the PCM DTCs. REPEAT the self-test.	GO to **JD15** .

- **JD15 CHECK FOR PID CHANGE**
  - Ignition ON, engine OFF.
  - Access the PCM and monitor the FP (PER) PID.
  - Record the FP PID value.
  - Connect a 5 amp fused jumper wire between the following:

Point A CKP Sensor Connector, Harness Side	Point B CKP Sensor Connector, Harness Side
CKP	SIGRTN

  - Record the FP PID value.

Does the PID value change?

Yes	No
INSTALL a new CKP sensor. REFER to the service information , Electronic Engine Controls. RESET the keep alive memory (KAM), REFER to RESETTING THE KEEP ALIVE MEMORY (KAM) . For Edge, F-150, Fiesta 1.0L, Fiesta 1.6L GTDI,	GO to **JD16** .

Focus, MKC, Mustang, and Transit, COMPLETE the Misfire Monitor Neutral Profile Correction procedure using the scan tool. For all others, COMPLETE the Misfire and Fuel Monitors drive cycle procedure to learn the profile. REFER to ON BOARD DIAGNOSTIC (OBD) DRIVE CYCLE , Misfire, Fuel and Deceleration Fuel Shut Off Rear, HO2S Monitors.	

- **JD16 CHECK FOR CORRECT PCM OPERATION**
  - Disconnect all the PCM connectors.
  - Visually inspect for:
    - pushed out pins
    - corrosion
  - Connect all the PCM connectors and make sure they seat correctly.
  - Carry out the PCM self-test.
  - Verify the concern is still present.

  Is the concern still present?

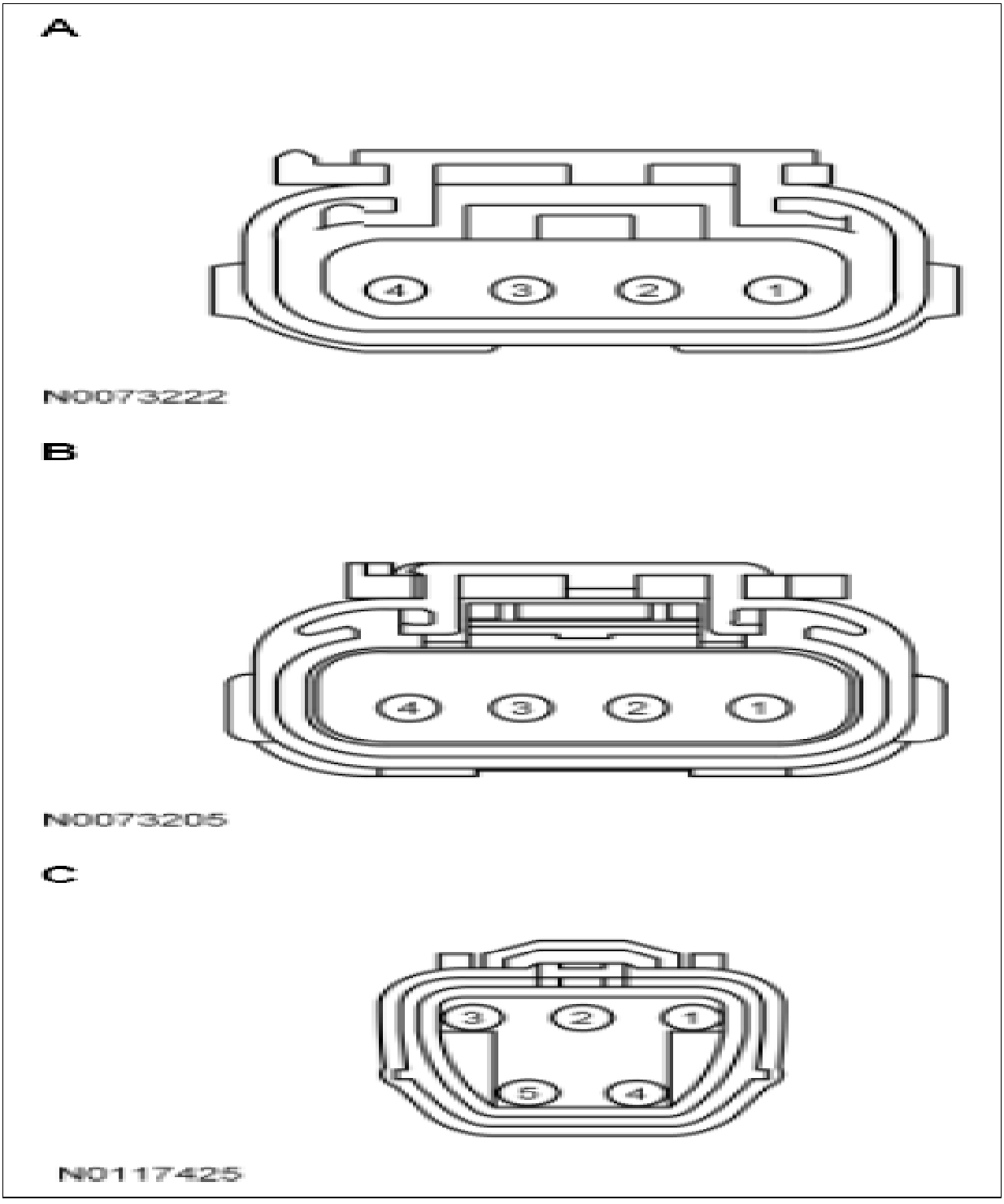
Yes	No
INSTALL a new PCM. REFER to FLASH ELECTRICALLY ERASABLE PROGRAMMABLE READ ONLY MEMORY (EEPROM) , Programming the VID Block for a Replacement PCM.	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.

PINPOINT TEST KC: FUEL PUMP CONTROL MODULE > INTRODUCTION

This pinpoint test is intended to diagnose the following:

- fuel pump (9H307)
- fuel pump control module (9D370)
- fuel pump control module relay
- inertia fuel shutoff (IFS) switch (9341)
- harness circuits: B+, GND, FPC, FPM, FPPWR, FPRTN, IES, VPWR, and VPWR Fuel
- PCM (12A650)

Fig 1: Identifying Fuel Pump (FP) Connector

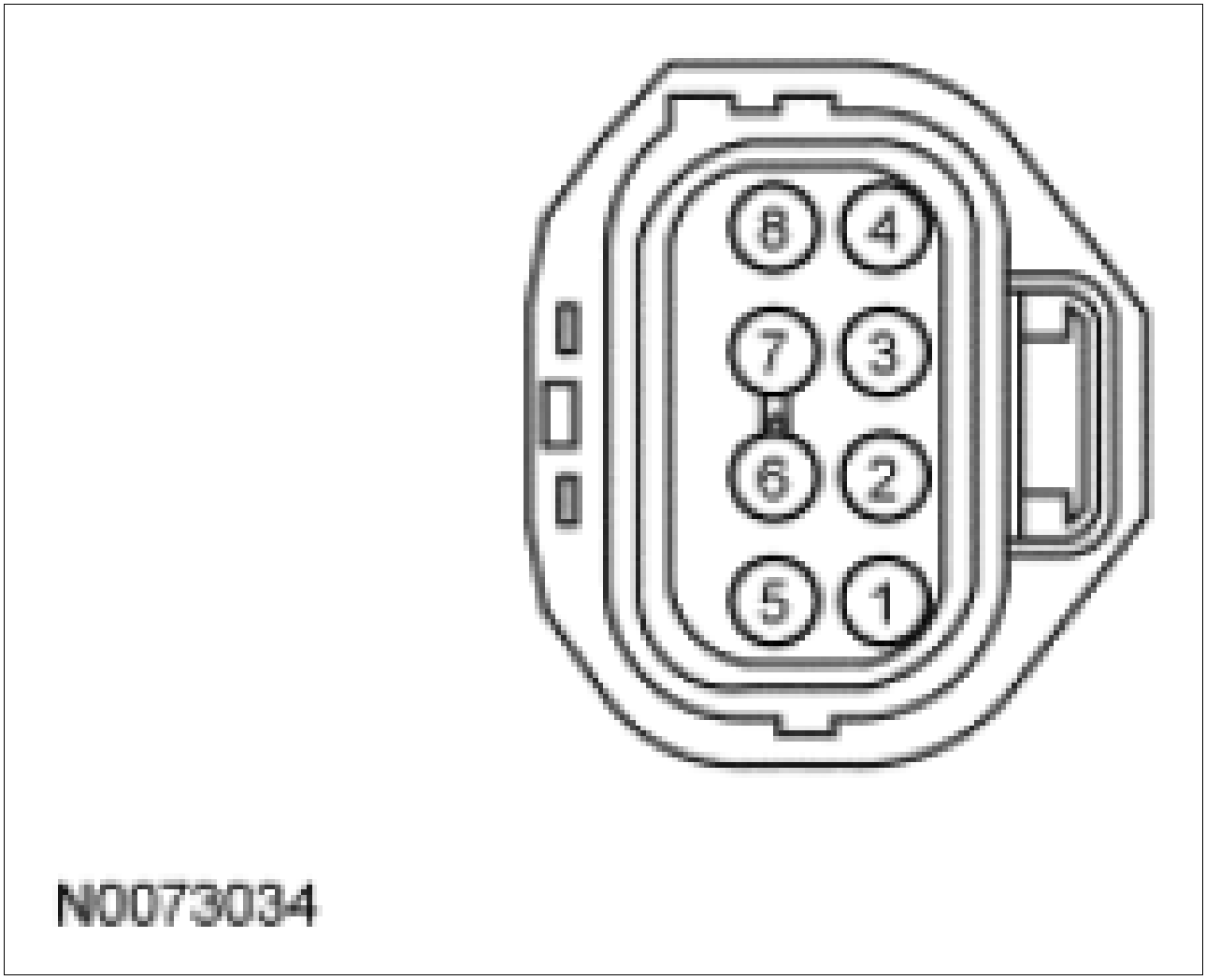


Courtesy of FORD MOTOR CO.

Vehicle	Connector	Pin	Circuit
E-Series, Expedition, F-150, Mustang,	A	3 4	FPRTN FPPWR

Navigator, Transit			
F-650/F-750, F-Series Super Duty, Motorhome/Stripped Chassis/Step Van	B	3 4	FPRTN FPPWR
All other vehicles	C	4 5	FPRTN FPPWR

Fig 2: Identifying Fuel Pump Control Module Connector



Courtesy of FORD MOTOR CO.

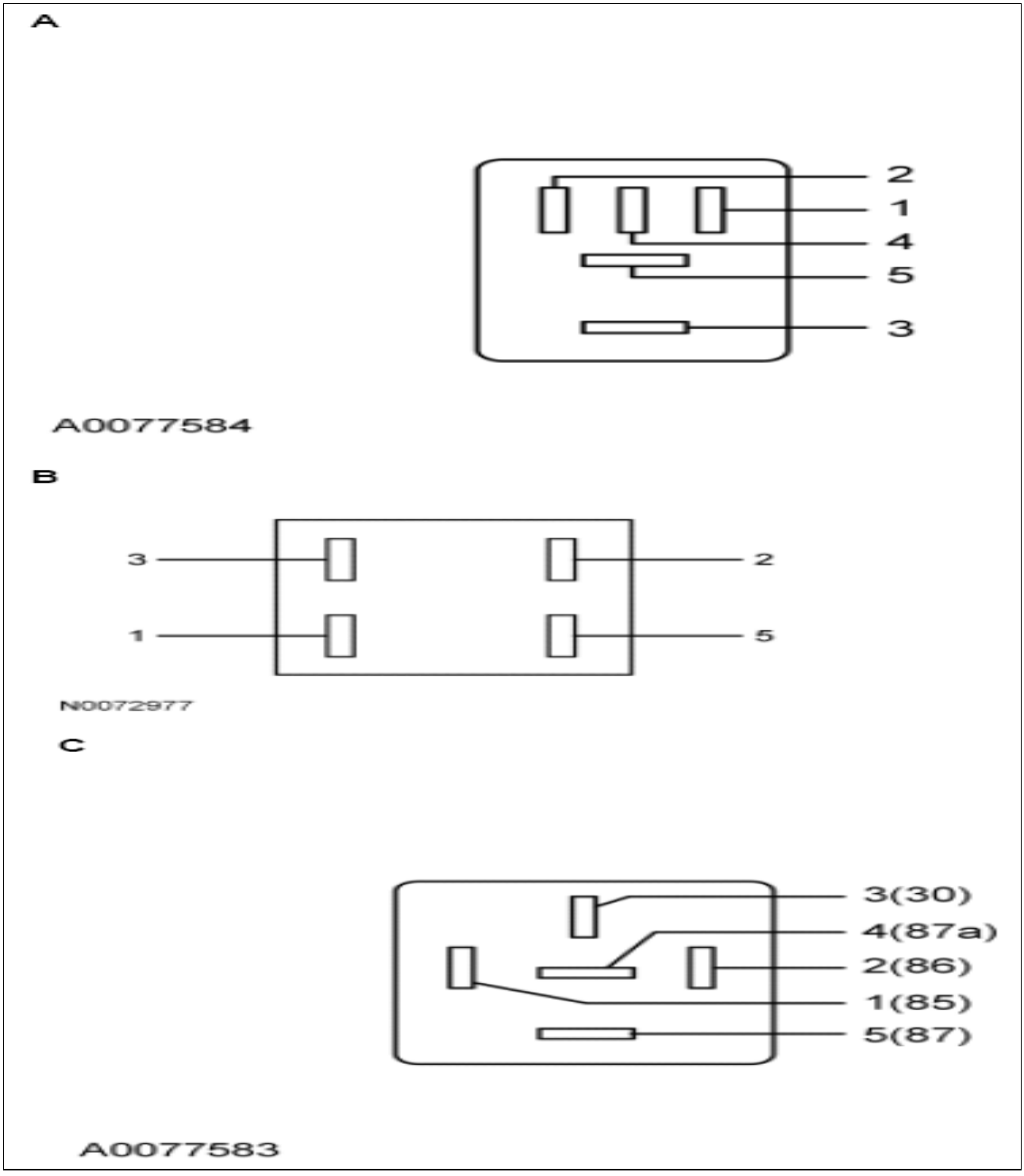
Vehicle	Connector	Pin	Circuit
F-150, F-650/F-750, Focus, Fusion, MKC, MKZ, Motorhome/Stripped Chassis/Step Van,	A	8 5 7 3 4 1	FPRTN FPPWR FPM FPC GND VPWR Fuel

Mustang			
All other vehicles	A	6 8 5 7 3 4 1	ENS FPRTN FPPWR FPM FPC GND VPWR Fuel

Fuel Pump Control Module Relay Connector

Refer to the Wiring Diagrams service information for schematic and connector information.

Fig 3: Identifying Fuel Pump Control Module Relay Connector

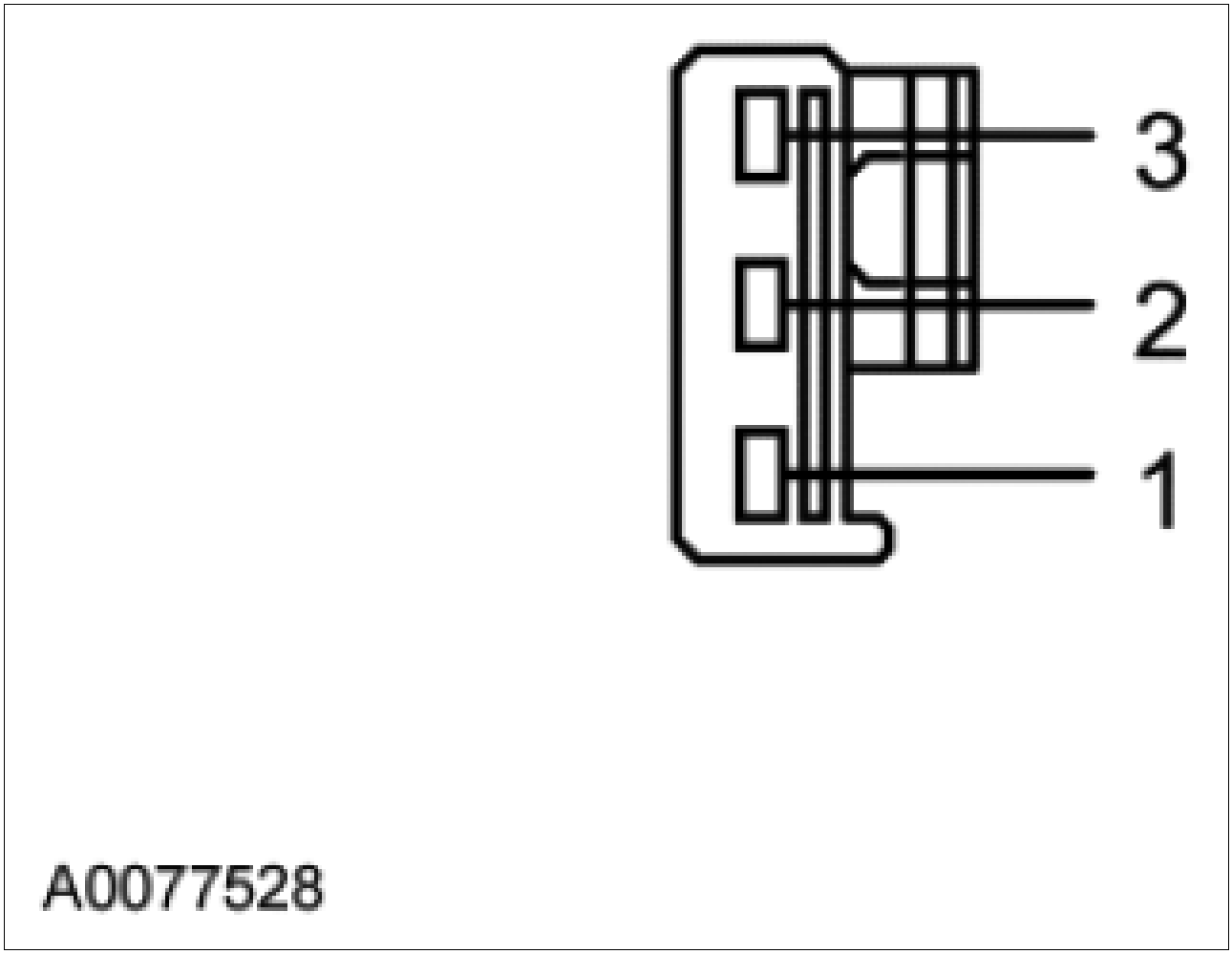


Courtesy of FORD MOTOR CO.

Vehicle	Connector	Pin	Circuit
E-Series, Motorhome/Stripped Chassis/Step Van	A	2 1 3 5	GND VPWR B+ VPWR Fuel

Edge, F-150, F-Series Super Duty, Flex, MKT	B	2 1, 3 5	FP B+ VPWR Fuel
Expedition, MKC, Mustang, Navigator, Transit	A	2 1, 3 5	FP B+ VPWR Fuel
F-650/F-750	C	86 30, 85 87	GND B+ VPWR Fuel
Fiesta	B	2 1 3 5	GND VPWR B+ VPWR Fuel
All other vehicles	B	1 2, 3 5	FP B+ VPWR Fuel

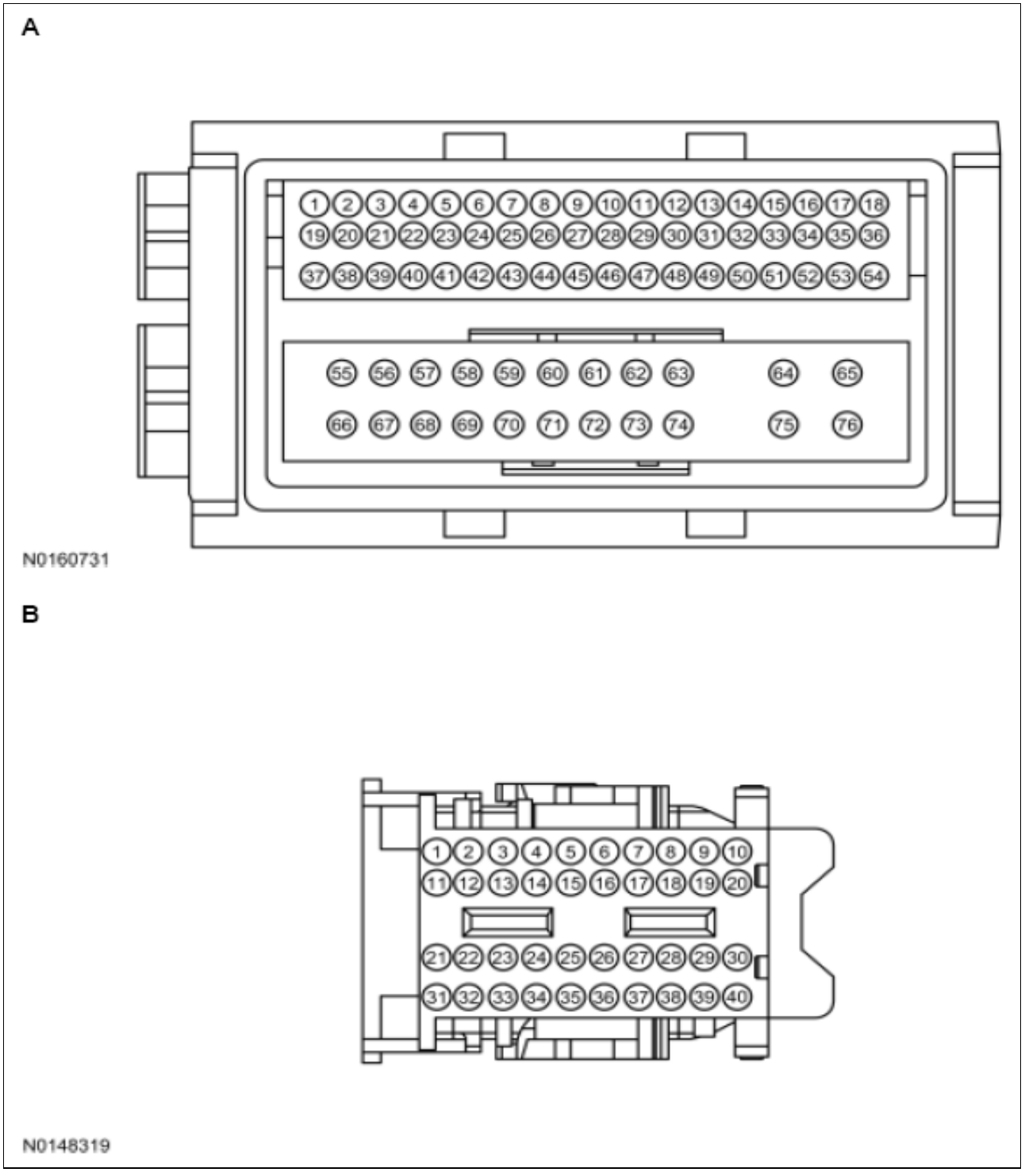
Fig 4: Identifying Inertia Fuel Shutoff (IFS) Switch Connector



Courtesy of FORD MOTOR CO.

Pin	Circuit
1	VPWR Fuel - B
2	VPWR Fuel - A

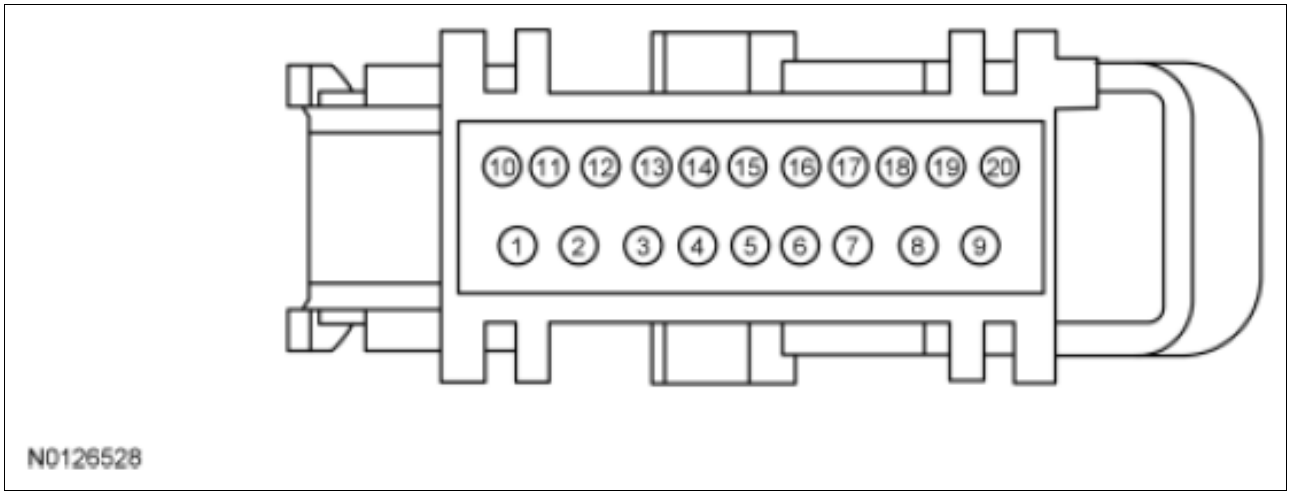
Fig 5: Identifying Body Control Module-C (BCM-C) Connector



Courtesy of FORD MOTOR CO.

Vehicle	Connector	Pin	Circuit
Transit	A	12	FP
All other vehicles	B	29 26	IES FP

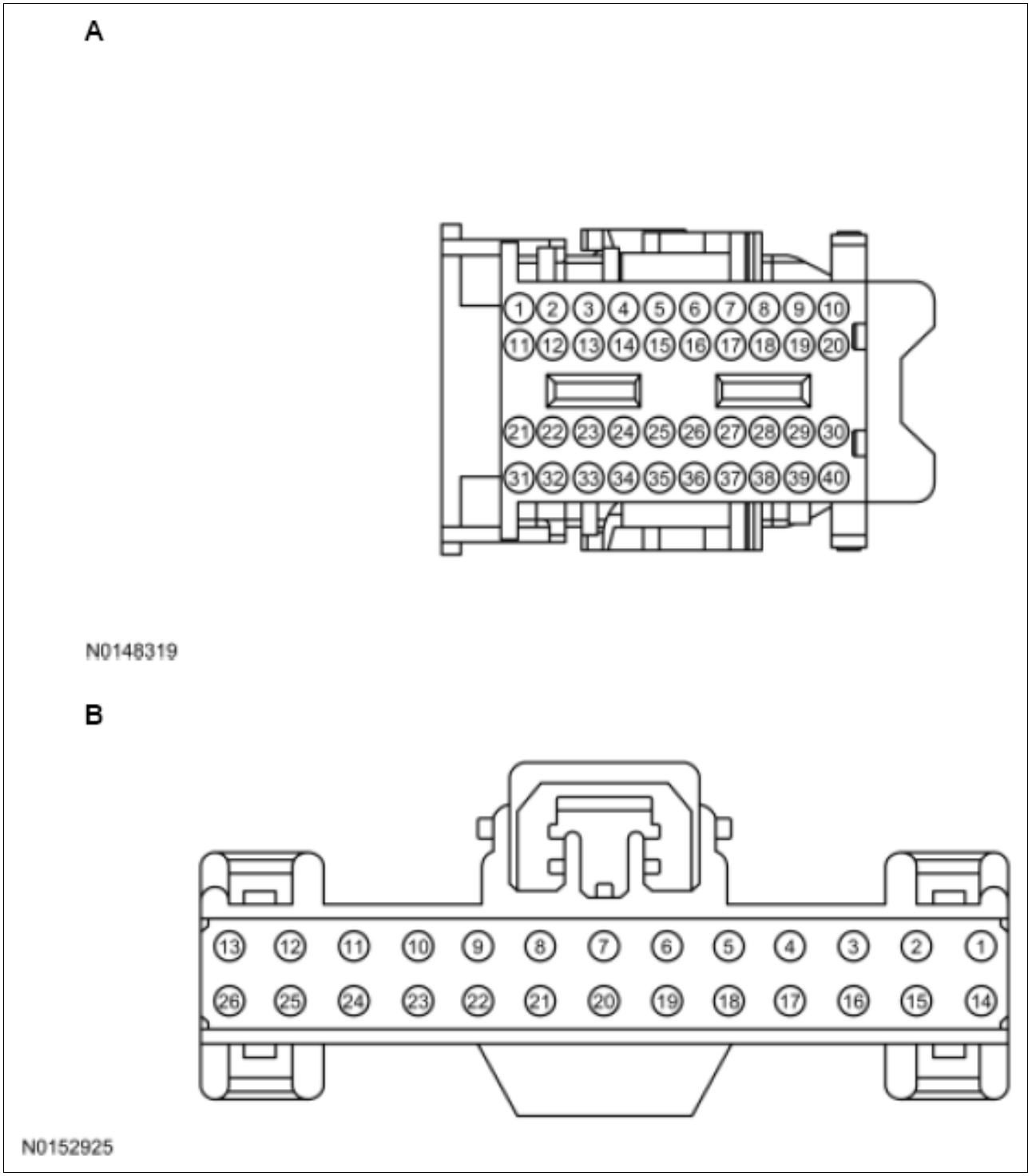
Fig 6: Identifying Body Control Module-E (BCM-E) Connector



Courtesy of FORD MOTOR CO.

Pin	Circuit
E9	VPWR (Vehicle Power)

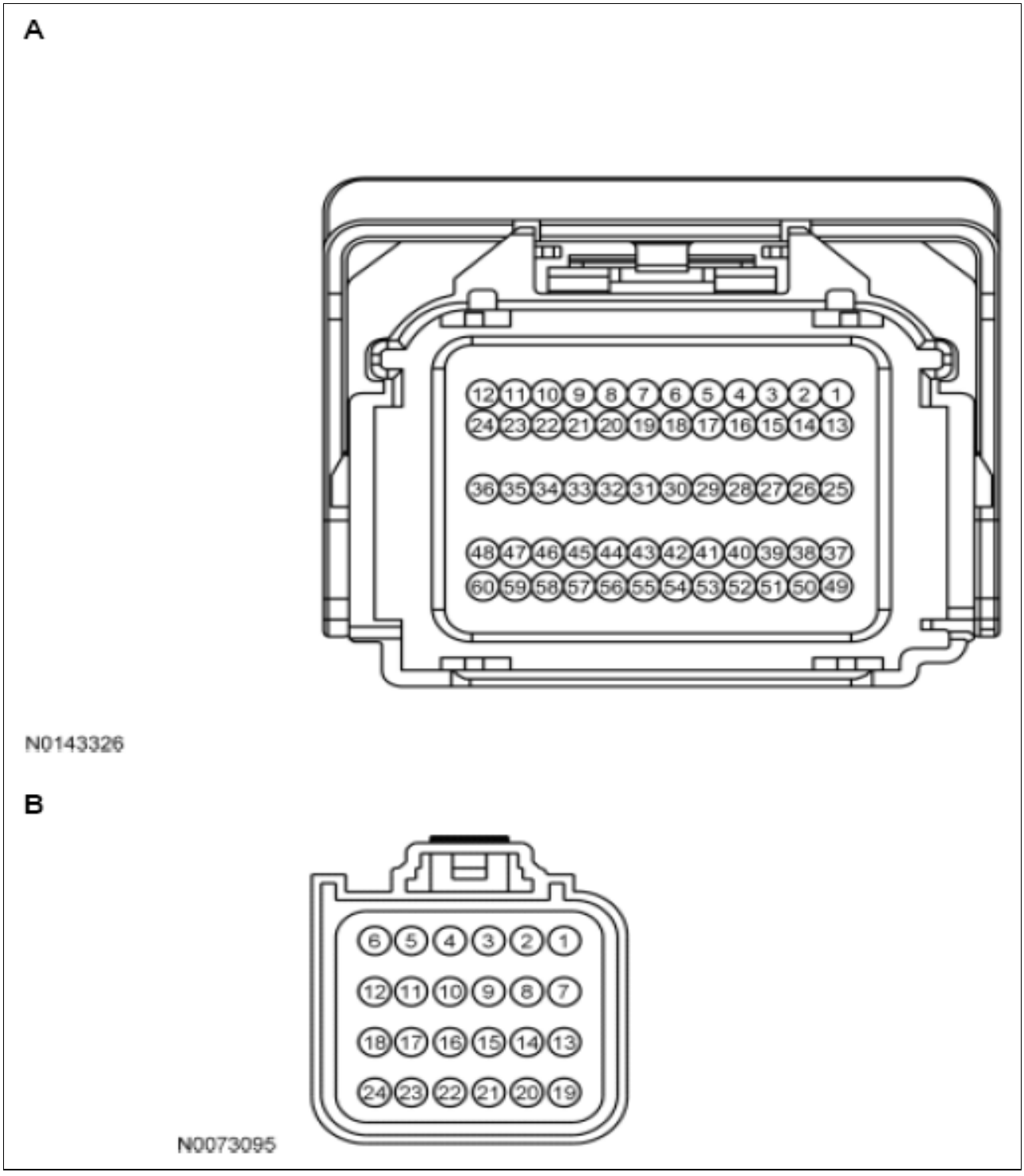
Fig 7: Identifying Body Control Module-F (BCM-F) Connector



Courtesy of FORD MOTOR CO.

Vehicle	Connector	Pin	Circuit
F-150, Mustang	A	26	FP
All other vehicles	B	6	FP

Fig 8: Identifying Restraints Control Module (RCM) Connector



Courtesy of FORD MOTOR CO.

Vehicle	Connector	Pin	Circuit
Expedition, Explorer, Fiesta, MKS,	A	42	ENS

Navigator, Taurus, Transit			
All other vehicles	B	19	ENS

PINPOINT TEST KC: FUEL PUMP CONTROL MODULE > INTRODUCTION > POWERTRAIN CONTROL MODULE (PCM) CONNECTOR

For PCM connector views or reference values, refer to REFERENCE VALUES .

Vehicle	Connector	Pin	Circuit
E-Series 6.8L	190-PIN	B21 B12	FPM FPC
E-Series 5.4L, Escape/Kuga 2.5L, Explorer 3.7L, Explorer TiVCT 3.5L, F-650/F-750, F-Series Super Duty, Flex TiVCT 3.5L, MKS 3.7L, MKT 3.7L, MKX, Motorhome/Stripped Chassis/Step Van, Taurus TiVCT 3.5L, Taurus 3.7L, Transit 3.7L, Transit Connect 2.5L	190-PIN	B32 B19	FPM FPC
Edge 3.5L, F-150 TiVCT 3.5L, F-150 5.0L, Mustang 3.7L, Mustang 5.0L	198 PIN	B27 B14	FPM FPC
Explorer 2.0L	154 PIN	B12 B45	FPM FPC
Fiesta GTDI 1.6L	198 PIN	B4 B37	FPM FPC
Fiesta TiVCT 1.6L	128 PIN	E13 B37	FPM FPC
Focus GDI 2.0L	198 PIN	B12 B45	FPM FPC
Fusion 2.5L, MKZ 3.7L	190-PIN	B9 B32 B19	IES FPM FPC

Fusion 2.0L, Fusion 1.6L, Fusion 1.5L, MKZ 2.0L	198 PIN	B29 B27 B39	IES FPM FPC
All other vehicles	198 PIN	B27 B39	FPM FPC

PINPOINT TEST KC: FUEL PUMP CONTROL MODULE > TEST PROCEDURE

KC1 CHECK FOR DIAGNOSTIC TROUBLE CODES (DTCS)

Are DTCs P025A, P025B, P025C, P025D, P0627, P166A, U0109 or U210B present?

Yes	No
For DTC P0627, GO to KC9. For DTC P166A, GO to KC30. For DTC U210B, GO to KC24. For all others, GO to **KC2** .	RETURN to SYMPTOM CHARTS for further direction.

KC2 CHECK THE VOLTAGE TO THE FUEL PUMP CONTROL MODULE

NOTE: Verify the IFS switch is set (button pressed) (if equipped).

Ignition OFF.

Fuel Pump Control Module connector disconnected.

Ignition ON, engine OFF.

Measure the voltage between:

(+) Fuel Pump Control Module Connector, Harness Side	(-)
VPWR Fuel	Ground

Is the voltage greater than 10.5 V?

Yes	No
GO to **KC3** .	GO to KC7.

KC3 CHECK THE GND CIRCUIT FOR AN OPEN

Ignition OFF.

Measure the resistance between:

(+) Fuel Pump Control Module Connector, Harness Side	(-)

GND	Ground

Is the resistance less than 5 ohms?

Yes	No
GO to **KC4** .	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

KC4 CHECK THE FPC AND FPM CIRCUITS FOR AN OPEN

PCM connector disconnected.

Measure the resistance between:

(+) Fuel Pump Control Module Connector, Harness Side	(-) PCM Connector, Harness Side
FPC	FPC
FPM	FPM

Are the resistances less than 5 ohms?

Yes	No
GO to **KC5** .	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

KC5 CHECK THE FPC AND FPM CIRCUITS FOR A SHORT TO GROUND

Measure the resistance between:

(+) Fuel Pump Control Module Connector, Harness Side	(-)
FPC	Ground
FPM	Ground

Are the resistances greater than 10K ohms?

Yes	No
GO to **KC6** .	REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.

KC6 CHECK THE FPC AND FPM CIRCUITS FOR A SHORT TO VOLTAGE

Ignition ON, engine OFF.

Measure the voltage between:

(+) Fuel Pump Control Module Connector, Harness Side	(-)
FPC	Ground
FPM	Ground

Is any voltage present?

Yes	No
REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.	INSTALL a new Fuel Pump Control Module. REFER to the service information , Fuel Charging and Controls. Clear the PCM DTCs. REPEAT the self-test.

KC7 CHECK THE VPWR FUEL CIRCUIT FOR AN OPEN

Ignition OFF.

For Escape, Focus and Transit Connect,

BCM-E connector disconnected.

Measure the resistance between:

(+) Fuel Pump Control Module Connector, Component Side	(-) BCM-E Connector, Harness Side
VPWR Fuel	VPWR - Pin E9

For all others,

Fuel Pump Control Module Relay connector disconnected.

Measure the resistance between:

(+) Fuel Pump Control Module Connector, Harness Side	(-) Fuel Pump Control Module Relay Connector, Harness Side
VPWR Fuel	VPWR Fuel

Is the resistance less than 5 ohms?

Yes	No
For Escape/Kuga, Focus, and Transit Connect, GO to **KC8** . For all others, GO to KC17.	For Motorhome/Stripped Chassis/Step Van, GO to KC22. For all others, REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

KC8 CHECK THE BODY CONTROL MODULE FOR CRASH STATUS PIDS

Ignition ON, engine OFF.

Access the BdyCM and monitor the CRASH (MODE) PID.

Is the PID state NO?

Yes	No
INSTALL a new BCM. REFER to the service information ,	RESET the PID.

Multifunction Electronic Modules. Clear the PCM DTCs. REPEAT the self-test.	Clear the PCM DTCs. REPEAT the self-test.

KC9 CHECK THE FPPWR CIRCUIT, FPRTN CIRCUIT, AND INTERNAL FUEL PUMP CIRCUIT RESISTANCE

Ignition OFF.

Fuel Pump Control Module connector disconnected.

Measure the resistance between:

(+) Fuel Pump Control Module Connector, Harness Side	(-) Fuel Pump Control Module Connector, Harness Side
FPPWR	FPRTN

Is the resistance less than 10 ohms?

Yes	No
GO to KC12.	GO to **KC10** .

KC10 CHECK THE FPPWR AND FPRTN CIRCUITS FOR AN OPEN

FP connector disconnected.

Measure the resistance between:

(+) Fuel Pump Control Module Connector, Harness Side	(-) FP Connector, Harness Side
FPPWR	FPPWR
FPRTN	FPRTN

Are the resistances less than 5 ohms?

Yes	No
GO to **KC11** .	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

KC11 CHECK THE FP FOR AN OPEN

Measure the resistance between:

(+) FP Connector, Component Side	(-) FP Connector, Component Side
FPPWR	FPRTN

Is the resistance less than 10 ohms?

Yes	No

GO to **KC12** .	INSTALL a new FP. REFER to the service information , Fuel Tank and Lines. Clear the PCM DTCs. REPEAT the self-test.

KC12 CHECK THE FPPWR AND FPRTN CIRCUITS FOR A SHORT TO GROUND

Measure the resistance between:

(+) Fuel Pump Control Module Connector, Harness Side	(-)
FPPWR	Ground
FPRTN	Ground

Are the resistances greater than 10K ohms?

Yes	No
GO to **KC13** .	REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.

KC13 CHECK FOR FPPWR AND FPRTN CIRCUITS SHORTED TOGETHER

Measure the resistance between:

(+) FP Connector, Harness Side	(-) FP Connector, Harness Side
FPPWR	FPRTN

Is the resistance greater than 10K ohms?

Yes	No
GO to **KC14** .	REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.

KC14 CHECK THE FPPWR AND FPRTN CIRCUITS FOR A SHORT TO VOLTAGE

Ignition ON, engine OFF.

Measure the voltage between:

(+) Fuel Pump Control Module Connector, Harness Side	(-)
FPPWR	Ground
FPRTN	Ground

Is any voltage present?

Yes	No
REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.	GO to **KC15** .

KC15 INTERMITTENT CHECK

Ignition OFF.

Measure the resistance between:

(+) Fuel Pump Control Module Connector, Harness Side	(-) FP Connector, Harness Side
FPPWR	FPPWR
FPRTN	FPRTN

While monitoring the resistance measurement, wiggle, shake, and bend small sections of the wiring harness while working from the FP to the fuel pump control module.

Is a concern present?

Yes	No
REPAIR as necessary. Clear the PCM DTCs. REPEAT the self-test.	GO to **KC16** .

KC16 CHECK THE FUEL PUMP CONTROL MODULE FOR CORRECT OPERATION

NOTE: During output state control, the fuel pump stays commanded on for only about 5 seconds. Be aware that output state control turns the FP off after a calibrated time. If this happens, command the output ON to continue testing.

Fuel Pump Control Module connector connected.

Measure the voltage between:

(+) FP Connector, Harness Side	(-) FP Connector, Harness Side
FPPWR	FPRTN

Ignition ON, engine OFF.

Access the PCM and control the FP (MODE) PID.

Command the FP PID ON.

Does the voltage increase with the PID commanded ON?

Yes	No
INSTALL a new FP. REFER to the service information , Fuel Tank and Lines. Clear the PCM DTCs. REPEAT the self-test.	INSTALL a new Fuel Pump Control Module. REFER to the service information , Fuel Charging and Controls. Clear the PCM DTCs. REPEAT the self-test.

KC17 CHECK THE FUEL PUMP CONTROL MODULE RELAY FOR CORRECT OPERATION

Carry out the fuel pump control module relay component test. Refer to the service information Component Testing.

Is a concern present?

Yes	No
INSTALL a new Fuel Pump Control Module relay. Clear the PCM DTCs. REPEAT the self-test.	GO to **KC18** .

KC18 CHECK THE B+ CIRCUITS FOR AN OPEN

Measure the voltage between:

(+) Fuel Pump Control Module Relay Connector, Harness Side	(-)
B+	Ground

Is the voltage greater than 10.5 V?

Yes	No
For E-Series, F-650/F-750, Fiesta, and Motorhome/Stripped Chassis/Step Van, GO to **KC19** . For all others, GO to KC21.	A B+ circuit concern is present. CHECK the condition of the related fuse/fuse links. If OK, REPAIR the open circuit. If the fuse/fuse link is damaged, CHECK the circuit for a short to ground before installing a new fuse/fuse link.

KC19 CHECK THE VPWR VOLTAGE TO THE FUEL PUMP CONTROL MODULE RELAY

Ignition ON, engine OFF.

Measure the voltage between:

(+) Fuel Pump Control Module Relay Connector, Harness Side	(-)
VPWR	Ground

Is the voltage greater than 10.5 V?

Yes	No
GO to **KC20** .	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

KC20 CHECK THE FUEL PUMP CONTROL MODULE RELAY GROUND CIRCUIT FOR AN OPEN

Ignition OFF.

Measure the resistance between:

(+) Fuel Pump Control Module Relay Connector, Harness Side	(-)
GND	Ground

Is the resistance less than 5 ohms?

Yes	No
The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

KC21 CHECK THE FP CIRCUIT FOR AN OPEN

For Edge, Fusion, MKZ and Transit,

BCM-C connector disconnected.

Measure the resistance between:

(+) Fuel Pump Control Module Relay Connector, Harness Side	(-) BCM-C Connector, Harness Side
FP	FP

For all others,

BCM-F connector disconnected.

Measure the resistance between:

(+) Fuel Pump Control Module Relay Connector, Harness Side	(-) BCM-F Connector, Harness Side
FP	FB

Is the resistance less than 5 ohms?

Yes	No
INSTALL a new BCM. REFER to the service information , Multifunction Electronic Modules. Clear the PCM DTCs. REPEAT the self-test.	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

KC22 ISOLATE THE OPEN IN THE VPWR FUEL CIRCUIT

IFS Switch connector disconnected.

Measure the resistance between:

(+) Fuel Pump Control Module Relay Connector, Harness Side	(-) IFS Switch Connector, Harness Side
VPWR Fuel	VPWR Fuel - A - Pin 2

Is the resistance less than 5 ohms?

Yes	No
GO to **KC23** .	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

KC23 CHECK THE VPWR FUEL CIRCUIT FOR AN OPEN BETWEEN THE IFS SWITCH AND FUEL PUMP CONTROL MODULE

Measure the resistance between:

(+) IFS Switch Connector, Harness Side	(-) Fuel Pump Control Module Connector, Harness Side
VPWR Fuel - B - Pin 1	VPWR Fuel

Is the resistance less than 5 ohms?

Yes	No
INSTALL a new IFS switch. REFER to the service information , Fuel Tank And Lines. Clear the PCM DTCs. REPEAT the self-test.	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

KC24 CHECK FOR RESTRAINTS CONTROL MODULE (RCM) DTCS

Carry out the RCM self-test.

Are any RCM DTCs present?

Yes	No
DIAGNOSE the supplemental restraint system concern. REFER to the service information , Supplemental Restraint System. Clear the PCM DTCs. REPEAT the self-test.	GO to **KC25** .

KC25 INSPECT THE HARNESS BETWEEN THE FUEL PUMP CONTROL MODULE AND RESTRAINTS CONTROL MODULE (RCM)

Ignition OFF.

Check the harness for the following:

damage

corrosion

correct routing

Is a concern present?

Yes	No
REPAIR as necessary. Clear the PCM DTCs. REPEAT the self-test.	GO to **KC26** .

KC26 CHECK THE ENS CIRCUIT FOR AN OPEN

NOTE: Refer to the service information , Supplemental Restraint System.

Depower the supplemental restraint system (SRS). Refer to the service information , Supplemental Restraint System for the Supplemental Restraint System (SRS) Depowering and Repowering procedure.

RCM connector disconnected.

Connect the battery ground cable.

Fuel Pump Control Module connector disconnected.

Measure the resistance between:

(+) Fuel Pump Control Module Connector, Harness Side	(-) RCM Connector, Harness Side
ENS	ENS

Is the resistance less than 5 ohms?

Yes	No
GO to **KC27** .	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

KC27 CHECK THE ENS CIRCUIT FOR A SHORT TO GROUND

Measure the resistance between:

(+) Fuel Pump Control Module Connector, Harness Side	(-)
ENS	Ground

Is the resistance greater than 10K ohms?

Yes	No
GO to **KC28** .	REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.

KC28 CHECK THE ENS CIRCUIT FOR VOLTAGE

Ignition ON, engine OFF.

Measure the voltage between:

(+) Fuel Pump Control Module Connector, Harness Side	(-)
ENS	Ground

Is any voltage present?

Yes	No
REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.	GO to **KC29** .

KC29 CHECK THE ENS CIRCUIT FOR CORRECT RESPONSE

Ignition OFF.

Fuel Pump Control Module connector connected.

Ignition ON, engine OFF.

Measure the voltage between:

(+) RCM Connector, Harness Side	(-)
ENS	Ground

Is the voltage greater than 10.5 V?

Yes	No
INSTALL a new RCM. REFER to the service information , Supplemental Restraint System. Clear the PCM DTCs. REPEAT the self-test.	INSTALL a new Fuel Pump Control Module. REFER to the service information , Fuel Charging and Controls. Clear the PCM DTCs. REPEAT the self-test.

KC30 CHECK THE IES CIRCUIT FOR AN OPEN

BCM-C connector disconnected.

PCM connector disconnected.

Measure the resistance between:

(+) BCM-C Connector, Harness Side	(-) PCM Connector, Harness Side
IES	IES

Is the resistance less than 5 ohms?

Yes	No
GO to **KC31** .	REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.

KC31 CHECK THE IES CIRCUIT FOR A SHORT TO GROUND

Measure the resistance between:

(+) BCM-C Connector, Harness Side	(-)
IES	Ground

Is the resistance greater than 10K ohms?

Yes	No
GO to **KC32** .	REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.

KC32 CHECK THE IES FOR A SHORT TO VOLTAGE

Measure the voltage between:

(+) BCM-C Connector, Harness Side	(-)
IES	Ground

Is any voltage present?

Yes	No
REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.	INSTALL a new BCM. REFER to the service information , Multifunction Electronic Modules.

PINPOINT TEST KF: FAN CONTROL RELAYS > INTRODUCTION

This pinpoint test is intended to diagnose the following:

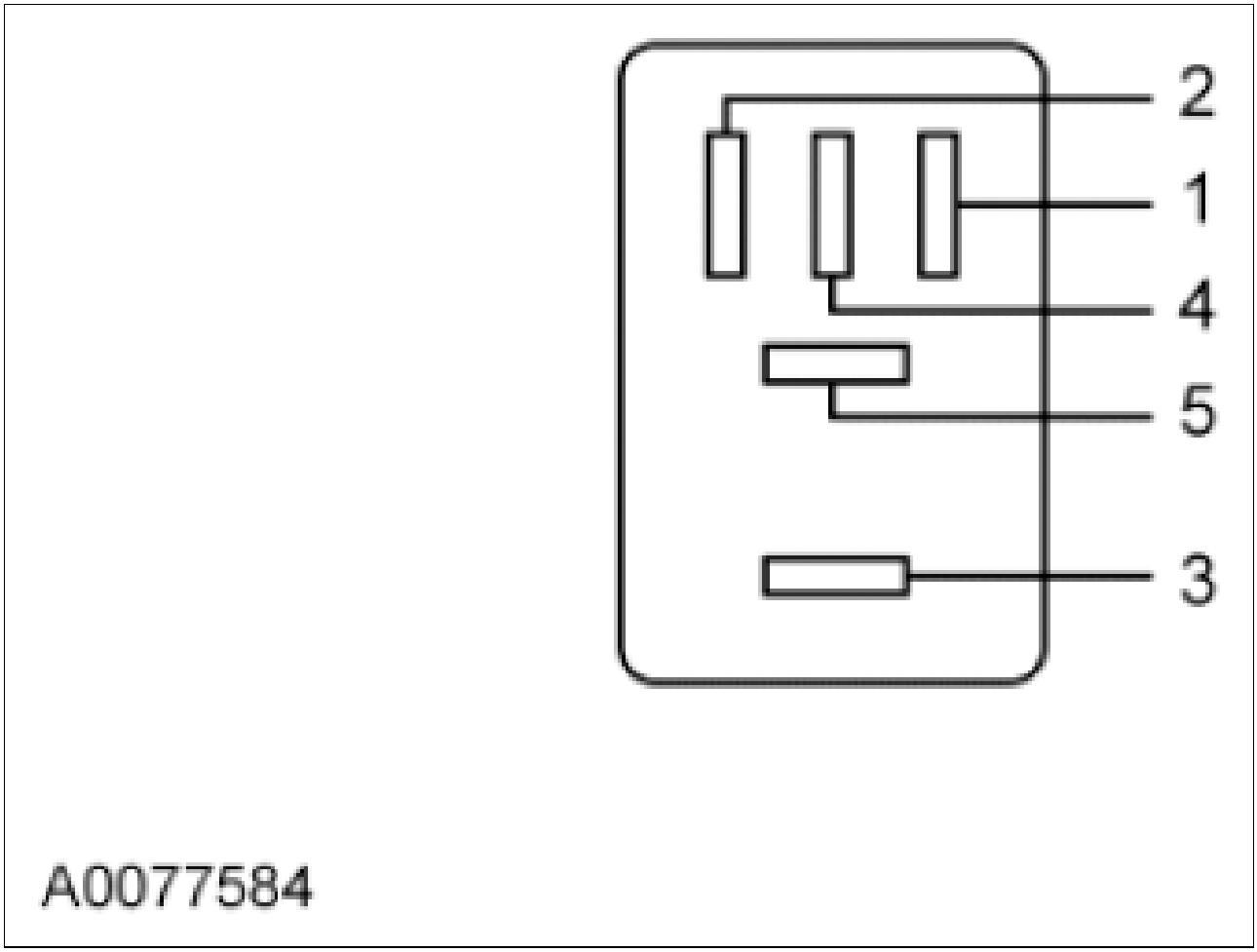
- CAC fan relay
- fan control (FC1, FC2, FC3, FC4, FC5) relays
- harness circuits: CACCF, LFC, MFC, HFC and VPWR
- PCM (12A650)

Although the PCM output circuits are called LFC, MFC, and HFC, cooling fan operation is controlled by a combination of these outputs.

COOLING FAN REFERENCE

	PCM Output	Low Speed	Medium Speed	High Speed
Vehicles With 5 Fan Control Relays	LFC	ON	ON	ON
	MFC	OFF	ON	ON
	HFC	OFF	OFF	ON
All others	LFC	ON	N/A	ON
	HFC	OFF	N/A	ON

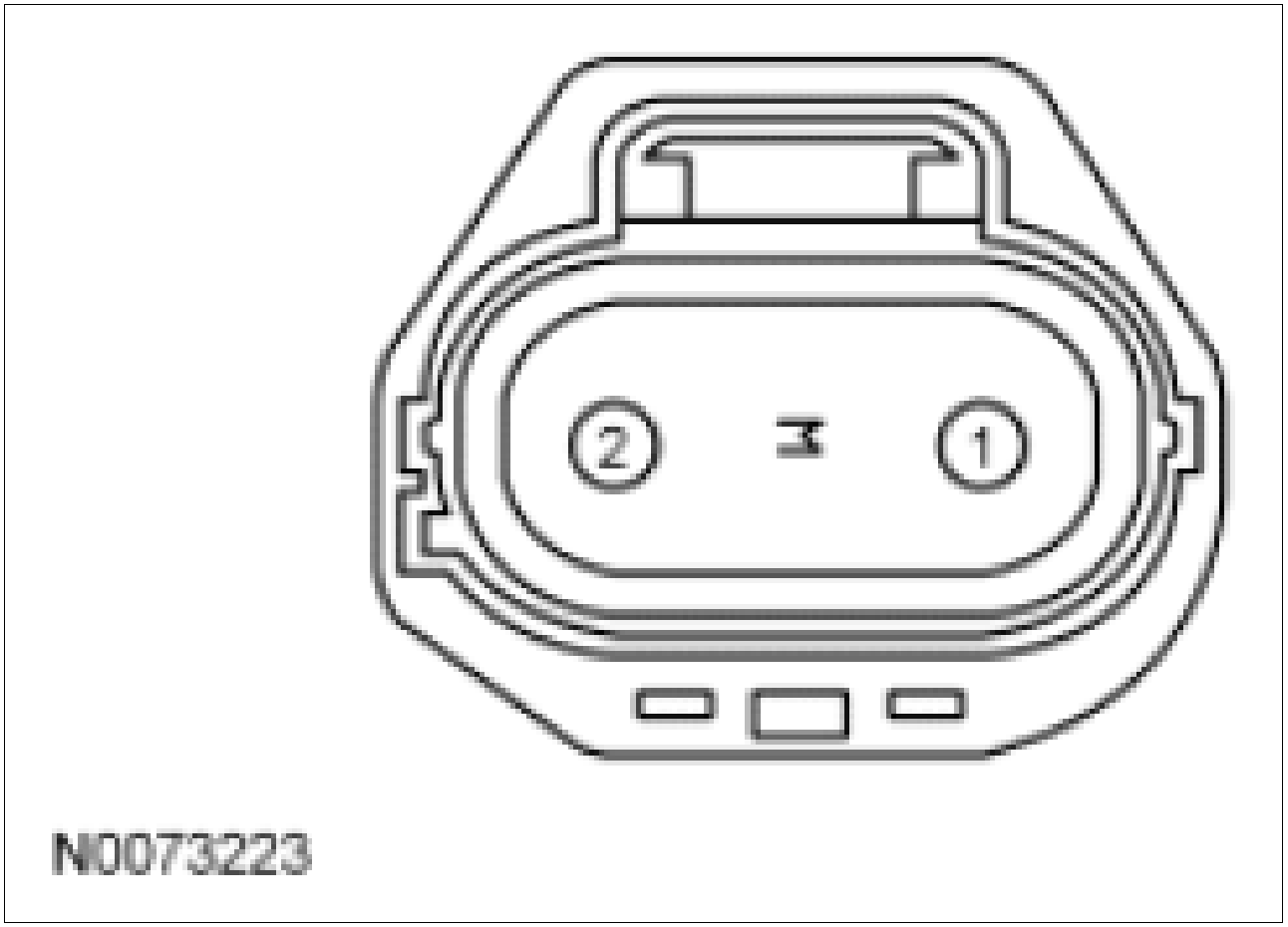
Fig 1: Identifying Charge Air Cooler Cooling Fan Relay Connector



Courtesy of FORD MOTOR CO.

Pin	Circuit
5	FANPWR (Fan Power)
2	CACCF (Charge Air Cooler Cooling Fan)
3	B+ (Battery Positive Voltage)
1	VPWR (Vehicle Power)

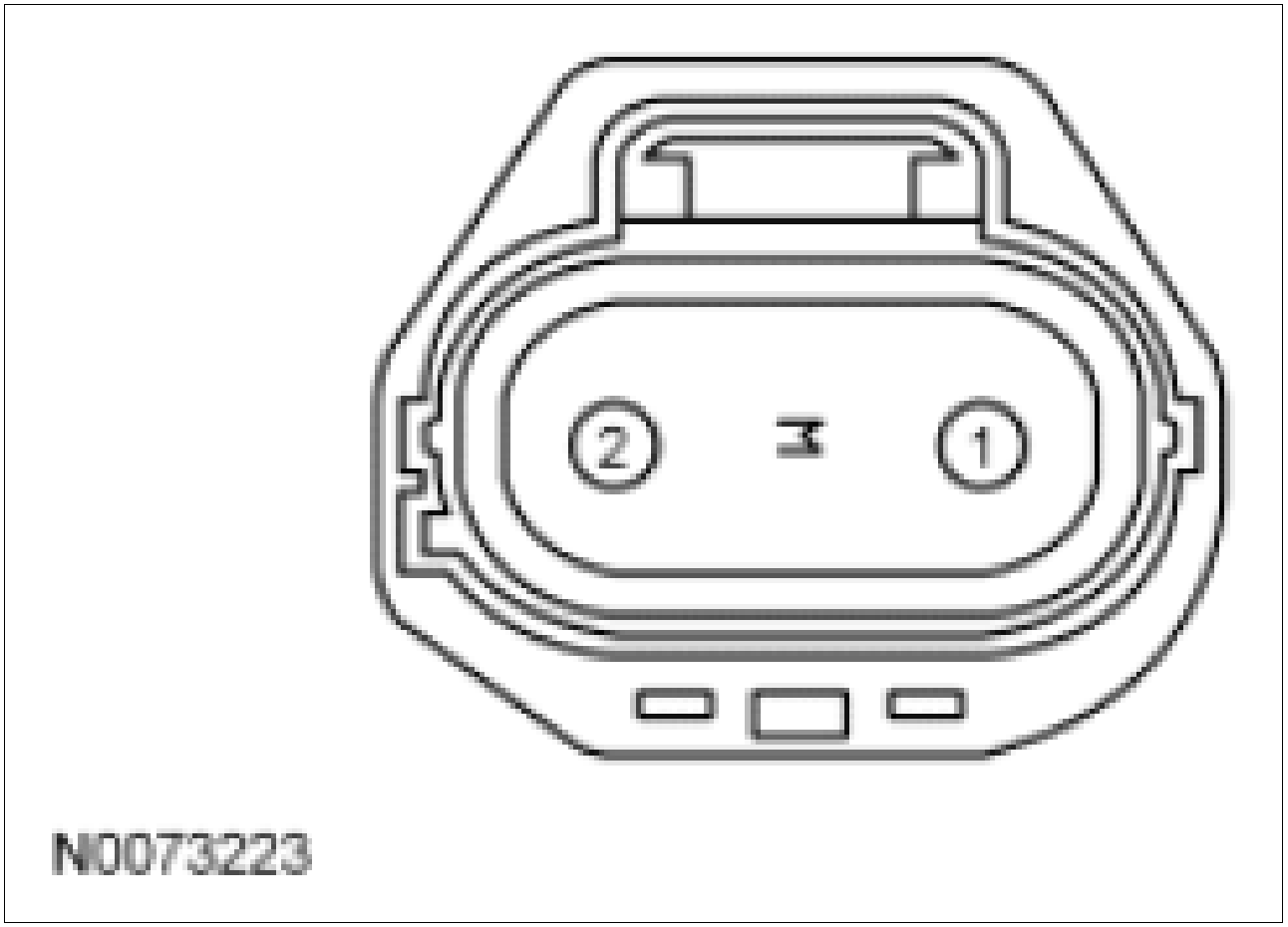
Fig 2: Identifying Charge Air Cooler Cooling Fan Motor Connector



Courtesy of FORD MOTOR CO.

Pin	Circuit
2	GND (Ground)
1	FANPWR (Fan Power)

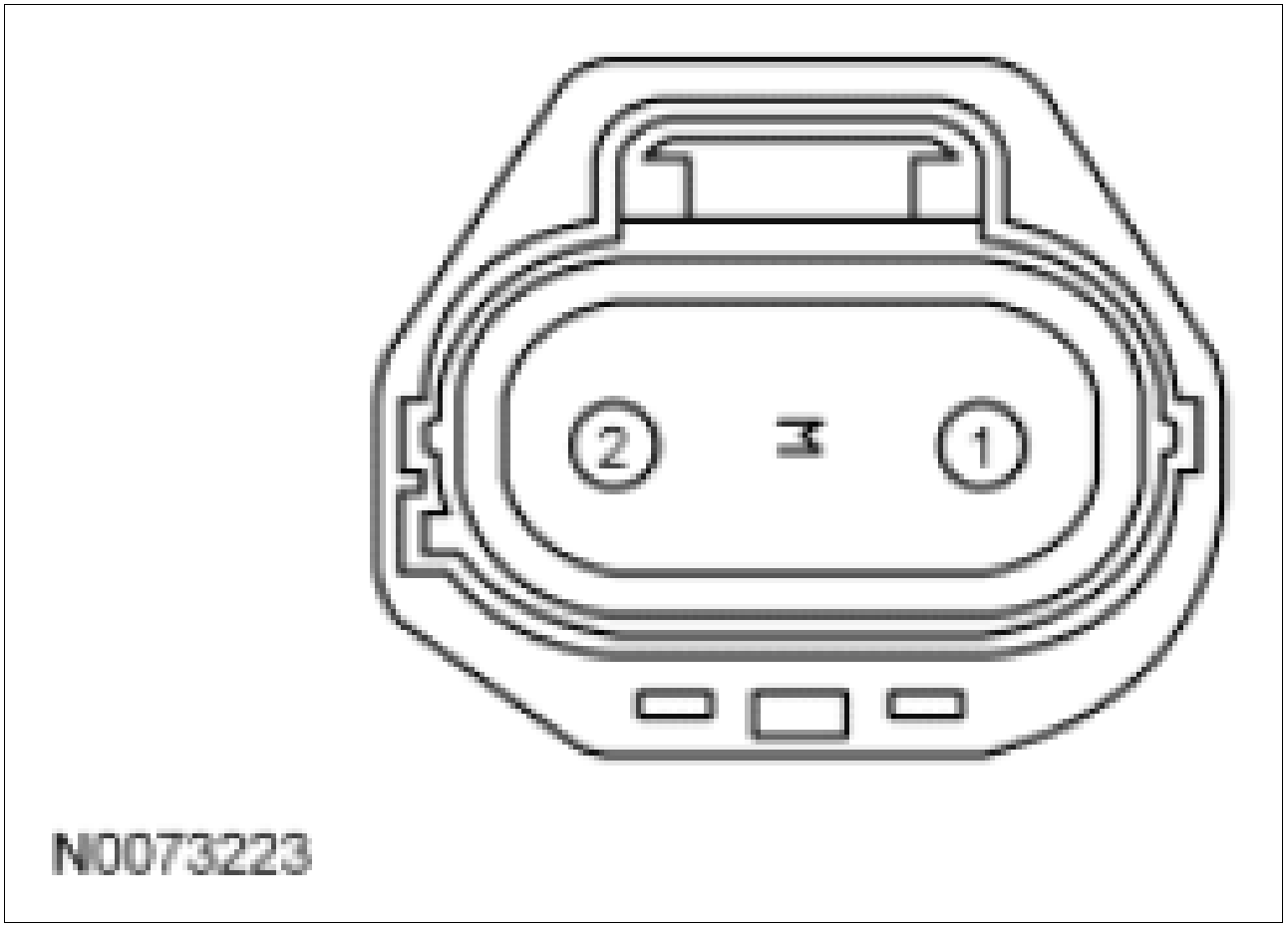
Fig 3: Identifying Cooling Fan Motor 1 Connector



Courtesy of FORD MOTOR CO.

Vehicle	Connector	Pin	Circuit
Fiesta	A	1 2	GND FANPWR
All other vehicles	A	2 1	FC FANPWR

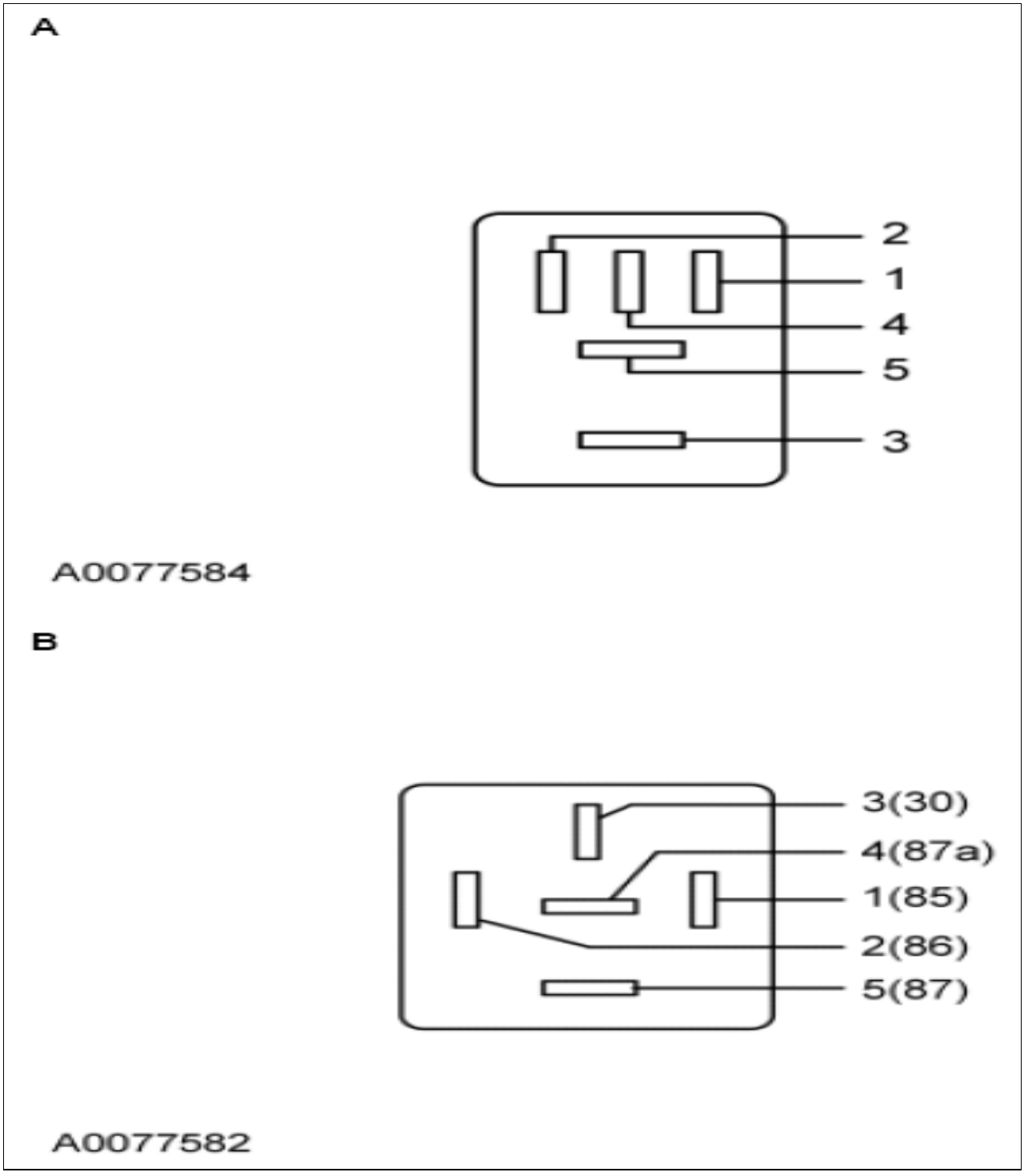
Fig 4: Identifying Cooling Fan Motor 2 Connector



Courtesy of FORD MOTOR CO.

Pin	Circuit
2	GND (Ground)
1	FANPWR (Fan Power)

Fig 5: Identifying Fan Control 1 (FC1) Relay Connector

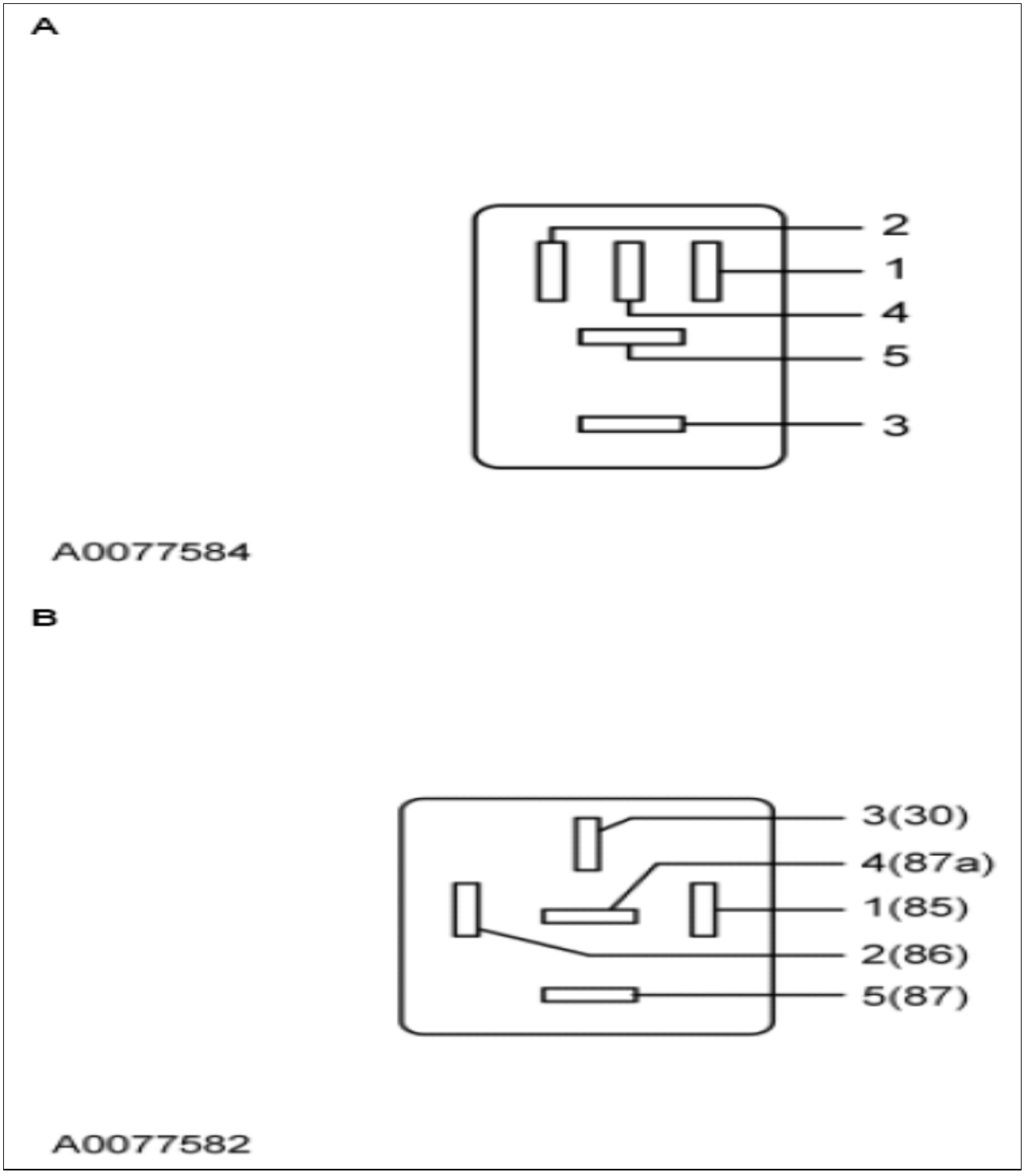


Courtesy of FORD MOTOR CO.

Vehicle	Connector	Pin	Circuit
Expedition, Edge, F-150, Fiesta,	A	5 2 3 1	FANPWR LFC B+ VPWR

Flex, Fusion, MKT, MKZ, Navigator			
Explorer, MKS, Mustang, Taurus	A	5 1 3 2	FANPWR LFC B+ VPWR
MKC, Transit	B	5 2 3 1	FANPWR LFC B+ VPWR

Fig 6: Identifying Fan Control 2 (FC2) Relay Connector



Courtesy of FORD MOTOR CO.

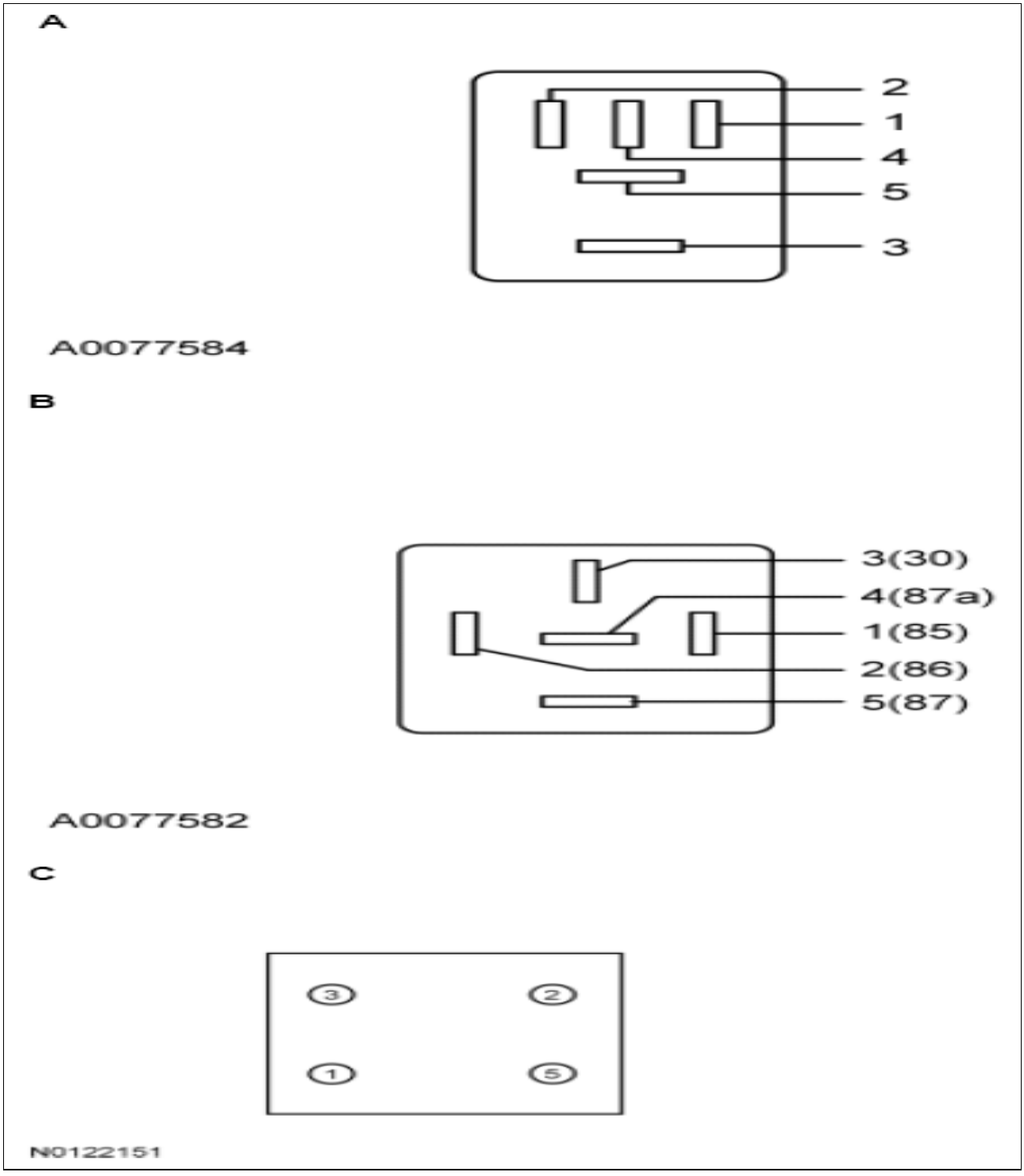
Vehicle	Connector	Pin	Circuit
Explorer, Fusion, MKS, MKZ,	A	5 4 3 1	GND FANPWR FC HFC

Mustang, Taurus		2	VPWR
Edge, F-150	A	5 4 3 2 1	GND FANPWR FC HFC VPWR
Expedition, Flex, MKC With 3 Fan Relays, MKT, Navigator	B	5 4 3 2 1	GND FANPWR FC HFC VPWR
MKC With 5 Fan Relays	B	4 5 2 1, 3	FANRSTR1 FANPWR MFC VPWR
Transit	B	3 4 2 1	FANPWR FC HFC VPWR



NOTE: The HFC circuit may be wired to the FC3 and FC5 relays. Refer to the service information for additional information.

Fig 7: Identifying Fan Control 3 (FC3) Relay Connector



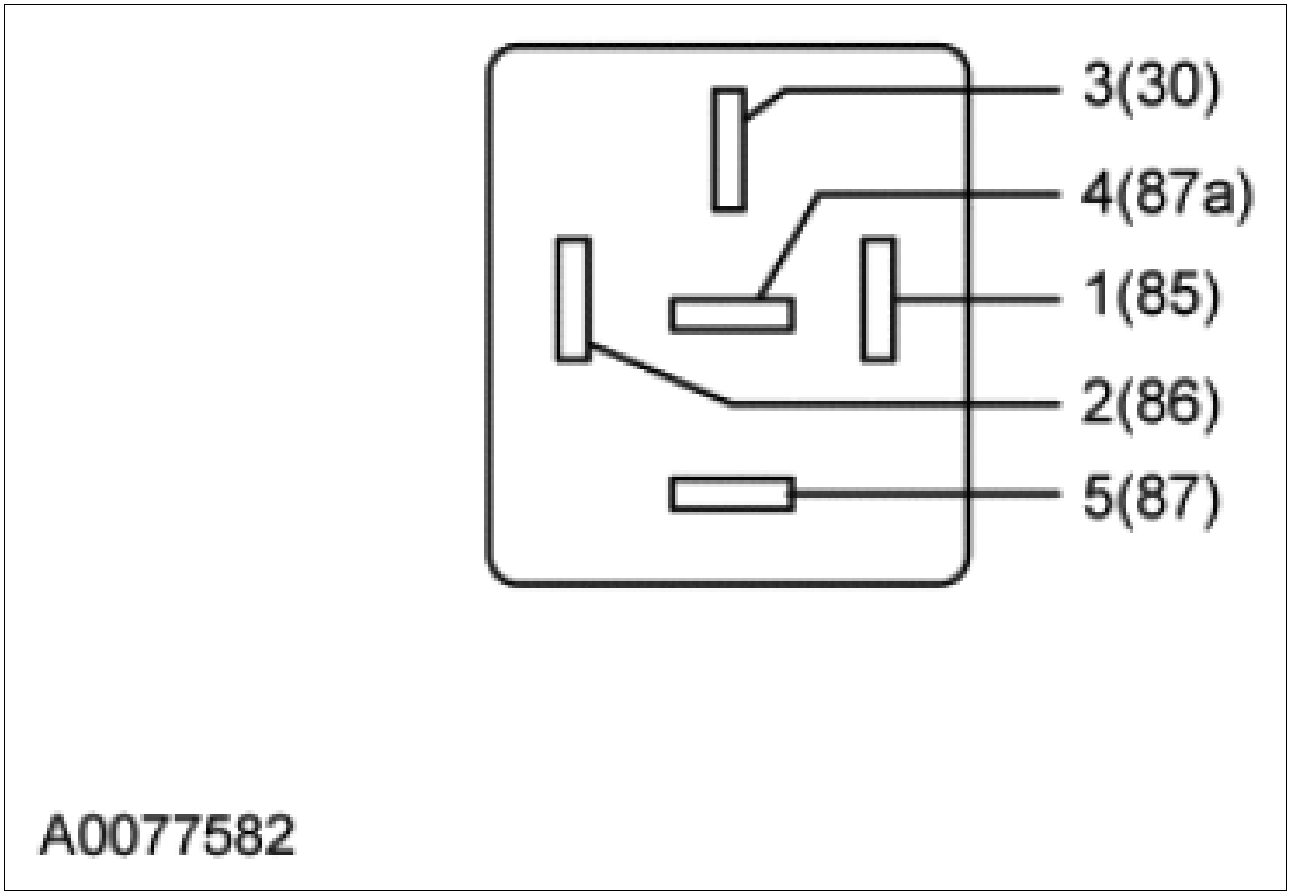
Courtesy of FORD MOTOR CO.

Vehicle	Connector	Pin	Circuit
Expedition, Edge, F-150, Navigator	A	5 2 3 1	FANPWR HFC B+ VPWR

Explorer, MKS	B	5 1 3 2	FANPWR HFC B+ VPWR
Fiesta, Flex, MKC With 3 Fan Relays, MKT	B	5 2 3 1	FANPWR HFC B+ VPWR
Fusion, MKZ	C	3 2 5 1	FANPWR HFC B+ VPWR
MKC With 5 Fan Relays	A	5 3 4 2 1	GND FC FANPWR HFC VPWR
Mustang	A	3 1 5 2	FANPWR HFC B+ VPWR
Transit	B	5 3 2 1	HFC VPWR GND FC

NOTE: The MFC circuit may be wired to the FC2 and FC4 relays. Refer to the Wiring Diagrams service information for additional information.

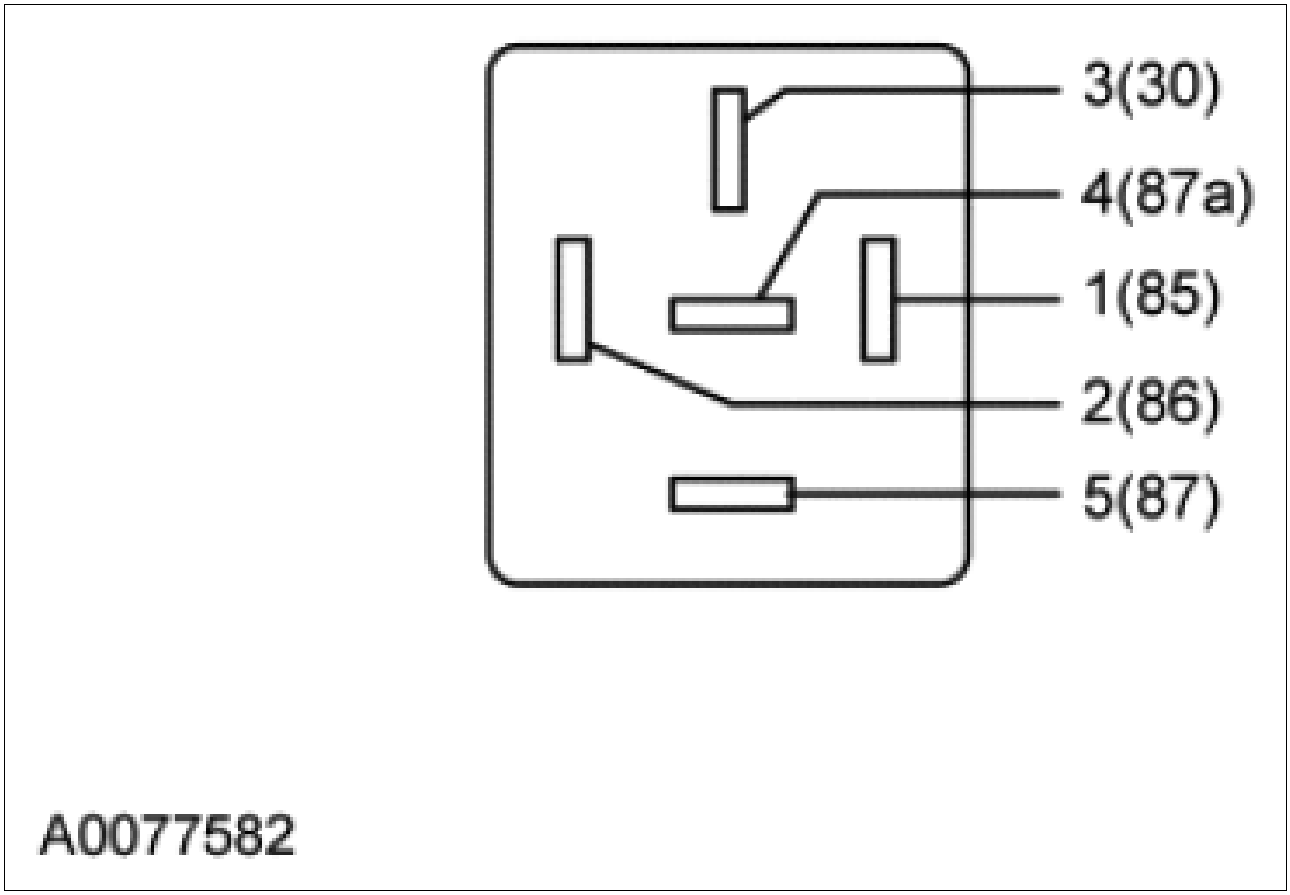
Fig 8: Identifying Fan Control 4 (FC4) Relay Connector



Courtesy of FORD MOTOR CO.

Pin	Circuit
5	FANPWR (Fan Power)
4	FANRSTR2 (Fan Resistor 2)
2	MFC (Medium Fan Control)
1, 3	VPWR (Vehicle Power)

Fig 9: Identifying Fan Control 5 (FC5) Relay Connector



Courtesy of FORD MOTOR CO.

Pin	Circuit
2	HFC (High Fan Control)
3	B+ (Battery Positive Voltage)
1, 5	VPWR (Vehicle Power)

PINPOINT TEST KF: FAN CONTROL RELAYS > INTRODUCTION > POWERTRAIN CONTROL MODULE (PCM) CONNECTOR

For PCM connector views or reference values, refer to REFERENCE VALUES .

Vehicle	Connector	Pin	Circuit
Edge 3.5L, F-150 TiVCT 3.5L, F-150 5.0L, Mustang 3.7L, Mustang 5.0L	198 PIN	B10 B17	HFC LFC

Explorer 2.0L	154 PIN	B96 B24	HFC LFC
Explorer 3.7L, Explorer TiVCT 3.5L, Flex TiVCT 3.5L, Fusion 2.5L, MKS 3.7L, MKT 3.7L, MKZ 3.7L, Taurus TiVCT 3.5L, Taurus 3.7L, Transit 3.7L	190-PIN	B18 B34	HFC LFC
Fiesta 1.6L	128 PIN	B13	LFC
Fiesta 1.0L	198 PIN	B3 B42	HFC LFC
Focus	198 PIN	B3	CACCF
MKC	198 PIN	B78 B4 B23	MFC HFC LFC
All other vehicles	198 PIN	B4 B23	HFC LFC

PINPOINT TEST KF: FAN CONTROL RELAYS > TEST PROCEDURE

KF1 CHECK FOR DIAGNOSTIC TROUBLE CODES (DTCS)

Are DTCs P028D, P028E, P0480, P0481 or P0482 present?

Yes	No
For DTC P028D, P028E, or P0480, GO to KF3. For DTC P0481, GO to KF8. For all others, GO to KF13.	For symptoms without DTCs, GO to **KF2** . For all others, RETURN to SYMPTOM CHARTS for further direction.

KF2 VERIFY A/C STATUS

Verify the A/C system is OFF.

Ignition ON, engine running.

Access the PCM and monitor the AC_REQ (MODE) PID.

Is A/C being requested?

Yes	No

REFER to the service information , Climate Control System, to diagnose the A/C system.	GO to **KF3** .

KF3 CHECK THE VOLTAGE TO THE RELAYS

Ignition OFF.

For DTCs P028D or P028E,

Charge Air Cooler Cooling Fan Relay connector disconnected.

Ignition ON, engine OFF.

Measure the voltage between:

(+) Charge Air Cooler Cooling Fan Relay Connector, Harness Side	(-)
VPWR - Pin 1	Ground
B+ - Pin 3	Ground

For all others,

FC1 Relay connector disconnected.

Ignition ON, engine OFF.

Measure the voltage between:

(+) FC1 Relay Connector, Harness Side	(-)
VPWR	Ground
B+	Ground

Are the voltages greater than 10.5 V?

Yes	No
GO to **KF4** .	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

KF4 CHECK THE RELAYS

Carry out the Relay Component Test. Refer to service information .

Is a concern present?

Yes	No
INSTALL a new relay in question. Clear the PCM DTCs. REPEAT the self-test.	GO to **KF5** .

KF5 CHECK THE CACCF AND LFC CIRCUITS FOR AN OPEN

Ignition OFF.

PCM connector disconnected.

For DTCs P028D or P028E,

Measure the resistance between:

(+) Charge Air Cooler Cooling Fan Relay Connector, Harness Side	(-) PCM Connector, Harness Side
CACCF - Pin 2	CACCF

For all others,

Measure the resistance between:

(+) FC1 Relay Connector, Harness Side	(-) PCM Connector, Harness Side
LFC	LFC

Is the resistance less than 5 ohms?

Yes	No
GO to **KF6** .	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

KF6 CHECK THE CACCF AND LFC CIRCUIT FOR A SHORT TO GROUND

For DTCs P028D or P028E,

Measure the resistance between:

(+) Charge Air Cooler Cooling Fan Relay Connector, Harness Side	(-)
CACCF - Pin 2	Ground

For all others,

Measure the resistance between:

(+) FC1 Relay Connector, Harness Side	(-)
LFC	Ground

Is the resistance greater than 10K ohms?

Yes	No
GO to **KF7** .	REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.

KF7 CHECK THE CACCF AND LFC CIRCUIT FOR A SHORT TO VOLTAGE

Ignition ON, engine OFF.

For DTCs P028D or P028E,

Measure the voltage between:

(+) Charge Air Cooler Cooling Fan Relay Connector, Harness Side	(-)
CACCF - Pin 2	Ground

For all others,

Measure the voltage between:

(+) FC1 Relay Connector, Harness Side	(-)
LFC	Ground

Is any voltage present?

Yes	No
REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.	For Focus 1.0L and Fiesta 1.6L TIVCT, GO to KF18. For DTCs P028D, P028E, or P0480, GO to KF23. For all others, GO to **KF8** .

KF8 CHECK THE VOLTAGE TO THE RELAYS

Ignition OFF.

FC3 Relay connector disconnected.

Ignition ON, engine OFF.

For Fiesta 1.0L,

Measure the voltage between:

(+) FC3 Relay Connector, Harness Side	(-)
VPWR	Ground
B+	Ground

For MKC with 5 fan relays,

FC3 Relay connector disconnected.

FC5 Relay connector disconnected.

Measure the voltage between:

(+) FC3 Relay Connector, Harness Side	(-)
VPWR	Ground

Measure the voltage between:

(+) FC5 Relay Connector, Harness Side	(-)
VPWR - Pin 1, 5	Ground
B+ - Pin 3	Ground

For all others,

FC2 Relay connector disconnected.

Measure the voltage between:

(+) FC2 Relay Connector, Harness Side	(-)
VPWR	Ground

Measure the voltage between:

(+) FC3 Relay Connector, Harness Side	(-)
VPWR	Ground
B+	Ground

Are the voltages greater than 10.5 V?

Yes	No
GO to **KF9** .	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

KF9 CHECK FC2 AND FC3 RELAYS

Carry out the Relay Component Test. Refer to service information .

Is a concern present?

Yes	No
INSTALL a new relay in question. Clear the PCM DTCs. REPEAT the self-test.	GO to **KF10** .

KF10 CHECK THE HFC CIRCUIT FOR AN OPEN

Ignition OFF.

PCM connector disconnected.

For Fiesta 1.0L,

Measure the resistance between:

(+) FC3 Relay Connector, Harness Side	(-) PCM Connector, Harness Side
HFC	HFC

For MKC with 5 fan relays,

Measure the resistance between:

(+) FC3 Relay Connector, Harness Side	(-) PCM Connector, Harness Side
HFC	HFC

Measure the resistance between:

(+) FC5 Relay Connector, Harness Side	(-) PCM Connector, Harness Side
HFC - Pin 2	HFC

For all others,

Measure the resistance between:

(+) FC2 Relay Connector, Harness Side	(-) PCM Connector, Harness Side
HFC	HFC

Measure the resistance between:

(+) FC3 Relay Connector, Harness Side	(-) PCM Connector, Harness Side
HFC	HFC

Are the resistances less than 5 ohms?

Yes	No
GO to **KF11** .	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

KF11 CHECK THE HFC CIRCUIT FOR A SHORT TO GROUND

For Fiesta 1.0L,

Measure the resistance between:

(+) FC3 Relay Connector, Harness Side	(-) PCM Connector, Harness Side
HFC	HFC

For MKC with 5 fan relays,

Measure the resistance between:

(+) FC3 Relay Connector, Harness Side	(-) PCM Connector, Harness Side
HFC	HFC

Measure the resistance between:

(+) FC5 Relay Connector, Harness Side	(-) PCM Connector, Harness Side
HFC - Pin 2	HFC

For all others,

Measure the resistance between:

(+) FC2 Relay Connector, Harness Side	(-)
HFC	Ground

Measure the resistance between:

(+) FC3 Relay Connector, Harness Side	(-)
HFC	Ground

Are the resistances greater than 10K ohms?

Yes	No
GO to **KF12** .	REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.

KF12 CHECK THE HFC CIRCUIT FOR A SHORT TO VOLTAGE

Ignition ON, engine OFF.

Measure the voltage between:

(+) PCM Connector, Harness Side	(-)
HFC	Ground

Is any voltage present?

Yes	No
REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.	For DTC P0481, GO to KF23. For all others, GO to **KF13** .

KF13 CHECK THE VOLTAGE TO THE FC2 AND FC4 RELAYS

Ignition OFF.

FC2 Relay connector disconnected.

FC4 Relay connector disconnected.

Ignition ON, engine OFF.

Access the PCM and control the LFC (MODE) PID.

Command the PID ON.

Measure the voltage between:

(+) FC2 Relay Connector, Harness Side	(-)
VPWR	Ground

Access the PCM and control the HFC (MODE) PID.

Command the PID ON.

Measure the voltage between:

(+) FC4 Relay Connector, Harness Side	(-)
VPWR - Pin 1, 3	Ground

Are the voltages greater than 10.5 V?

Yes	No
GO to **KF14** .	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

KF14 CHECK THE FC2 AND FC4 RELAYS

Carry out the Relay Component Test. Refer to service information

Is a concern present?

Yes	No
INSTALL a new FC2 or FC4 relay in question. Clear the PCM DTCs. REPEAT the self-test.	GO to **KF15** .

KF15 CHECK THE MFC CIRCUIT FOR AN OPEN

Ignition OFF.

PCM connector disconnected.

Measure the resistance between:

(+) FC2 Relay Connector, Harness Side	(-) PCM Connector, Harness Side
MFC	MFC

Measure the resistance between:

(+) FC4 Relay Connector, Harness Side	(-) PCM Connector, Harness Side
MFC - Pin 2	MFC

Are the resistances less than 5 ohms?

Yes	No
GO to **KF16** .	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

KF16 CHECK THE MFC CIRCUIT FOR A SHORT TO GROUND

Measure the resistance between:

(+) FC2 Relay Connector, Harness Side	(-)
MFC	Ground

Measure the resistance between:

(+) FC4 Relay Connector, Harness Side	(-)
MFC - Pin 2	Ground

Are the resistances greater than 10K ohms?

Yes	No
GO to **KF17** .	REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.

KF17 CHECK THE MFC CIRCUIT FOR A SHORT TO VOLTAGE

Ignition ON, engine OFF.

Measure the voltage between:

(+) PCM Connector, Harness Side	(-)
MFC	Ground

Is any voltage present?

Yes	No
REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.	For DTC P0482, GO to KF23. For all others, GO to **KF18** .

KF18 CHECK THE FAN PWR CIRCUIT FOR AN OPEN

NOTE: Only measure the circuits that apply to the vehicle being diagnosed.

Ignition OFF.

For Fiesta 1.0L,

Measure the resistance between:

(+) FC1 Relay Connector, Harness Side	(-) Cooling Fan Motor 1 Connector, Harness Side
FANPWR	FANPWR

Measure the resistance between:

(+) FC3 Relay Connector, Harness Side	(-) Cooling Fan Motor 1 Connector, Harness Side
FANPWR	FANPWR

For Focus 1.0L,

Measure the resistance between:

(+) Charge Air Cooler Cooling Fan Relay Connector, Harness Side	(-) Charge Air Cooler Cooling Fan Motor Connector, Harness Side
FANPWR - Pin 5	FANPWR - Pin 1

For all others FC1 relay,

Measure the resistance between:

(+) FC1 Relay Connector, Harness Side	(-) Cooling Fan Motor 1 Connector, Harness Side
FANPWR	FANPWR

For all others FC2 relay,

Measure the resistance between:

(+) FC2 Relay Connector, Harness Side	(-) Cooling Fan Motor 1 Connector, Harness Side
FC	FC

Measure the resistance between:

(+) FC2 Relay Connector, Harness Side	(-) Cooling Fan Motor 2 Connector, Harness Side
FANPWR	FANPWR - Pin 1

Measure the resistance between:

(+) FC2 Relay Connector, Harness Side	(-) Cooling Fan Motor 1 Connector, Harness Side
FANRSTR1	FANPWR

FANPWR	FANPWR

For all others FC3 relay,

Measure the resistance between:

(+) FC3 Relay Connector, Harness Side	(-) Cooling Fan Motor 2 Connector, Harness Side
FANPWR	FANPWR - Pin 1

Measure the resistance between:

(+) FC3 Relay Connector, Harness Side	(-) Cooling Fan Motor 1 Connector, Harness Side
FC	FC

For all others FC4 relay,

Measure the resistance between:

(+) FC4 Relay Connector, Harness Side	(-) Cooling Fan Motor 2 Connector, Harness Side
FANRSTR2 - Pin 4	FANPWR - Pin 1
FANPWR - Pin 5	FANPWR - Pin 1

Are the resistances less than 5 ohms?

Yes	No
GO to **KF19** .	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

KF19 CHECK THE FAN PWR CIRCUIT FOR A SHORT TO VOLTAGE

NOTE: For vehicles with a single cooling fan, disregard the cooling fan motor 2 measurement in this step.

Ignition ON, engine OFF.

For Focus 1.0L,

Measure the voltage between:

(+) Charge Air Cooler Cooling Fan Motor Connector, Harness Side	(-)
FANPWR - Pin 1	Ground

For all others,

Measure the voltage between:

(+) Cooling Fan Motor 1 Connector, Harness Side	(-)
FANPWR	Ground

Measure the voltage between:

(+) Cooling Fan Motor 2 Connector, Harness Side	(-)
FANPWR - Pin 1	Ground

Is any voltage present?

Yes	No
REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.	GO to **KF20** .

KF20 CHECK GROUND CIRCUITS

NOTE: Only measure the circuits that apply to the vehicle being diagnosed.

Ignition OFF.

For Fiesta,

Measure the resistance between:

(+) Cooling Fan Motor 1 Connector, Harness Side	(-)
GND	Ground

For Focus 1.0L,

Measure the resistance between:

(+) Charge Air Cooler Cooling Fan Motor Connector, Harness Side	(-)
GND - Pin 2	Ground

For all others,

Measure the resistance between:

(+) FC2 Relay Connector, Harness Side	(-)
GND	Ground

Measure the resistance between:

(+) Cooling Fan Motor 2 Connector, Harness Side	(-)
GND - Pin 2	Ground

Measure the resistance between:

(+) FC3 Relay Connector, Harness Side	(-)
GND	Ground

Are the resistances less than 5 ohms?

Yes	No
GO to **KF21** .	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

KF21 COMMAND THE FANS ON AND CHECK FOR VOLTAGE TO THE COOLING FAN MOTORS

NOTE: Only measure the circuits that apply to the vehicle being diagnosed.

NOTE: Not all vehicles will have cooling fan motor 2, MFC PID, or the HFC PID.

Ignition OFF.

PCM connector connected.

Charge Air Cooler Cooling Fan Relay connector connected.

FC1 Relay connector connected.

FC2 Relay connector connected.

FC3 Relay connector connected.

FC4 Relay connector connected.

FC5 Relay connector connected.

Ignition ON, engine OFF.

Access the PCM and control the COOLANT_PMP_A (MODE) PID.

Access the PCM and control the LFC (MODE) PID.

Access the PCM and control the MFC (MODE) PID.

Access the PCM and control the HFC (MODE) PID.

Command the PIDs ON.

Measure the voltage between:

(+) Charge Air Cooler Cooling Fan Motor Connector, Harness Side	(-)
FANPWR - Pin 1	Ground

Measure the voltage between:

(+) Cooling Fan Motor 1 Connector, Harness Side	(-)
FANPWR	Ground

Measure the voltage between:

(+) Cooling Fan Motor 2 Connector, Harness Side	(-)
FANPWR - Pin 1	Ground

For Fiesta,

Record the voltage.

Command the LFC PID OFF.

Record the voltage.

Are the voltages greater than 10.5 V?

Yes	No
GO to **KF22** .	GO to KF23.

KF22 CHECK FOR CORRECT FAN OPERATION

NOTE: Not all vehicles will have cooling fan motor 2, MFC PID, or the HFC PID.

Ignition OFF.

Charge Air Cooler Cooling Fan Motor connector connected.

Cooling Fan Motor 1 connector connected.

Cooling Fan Motor 2 connector connected.

Ignition ON, engine OFF.

Access the PCM and control the COOLANT_PMP_A (MODE) PID.

Access the PCM and control the LFC (MODE) PID.

Access the PCM and control the MFC (MODE) PID.

Access the PCM and control the HFC (MODE) PID.

Command the PIDs ON.

For Fiesta,

Check for fan operation.

Command the LFC PID OFF.

Check for fan operation.

Do the fans operate when commanded ON?

Yes	No
The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.	INSTALL a new Cooling Fan motor in question. Clear the PCM DTCs. REPEAT the self-test.

KF23 CHECK FOR CORRECT PCM OPERATION

Disconnect all the PCM connectors.

Visually inspect for:

pushed out pins

corrosion

Connect all the PCM connectors and make sure they seat correctly.

Carry out the PCM self-test.

Verify the concern is still present.

Is the concern still present?

Yes	No
INSTALL a new PCM. REFER to FLASH ELECTRICALLY ERASABLE PROGRAMMABLE READ ONLY MEMORY (EEPROM) , Programming the VID Block for a Replacement PCM.	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.

PINPOINT TEST KN: VARIABLE SPEED ELECTRIC COOLING FAN MOTOR > INTRODUCTION

This pinpoint test is intended to diagnose the following:

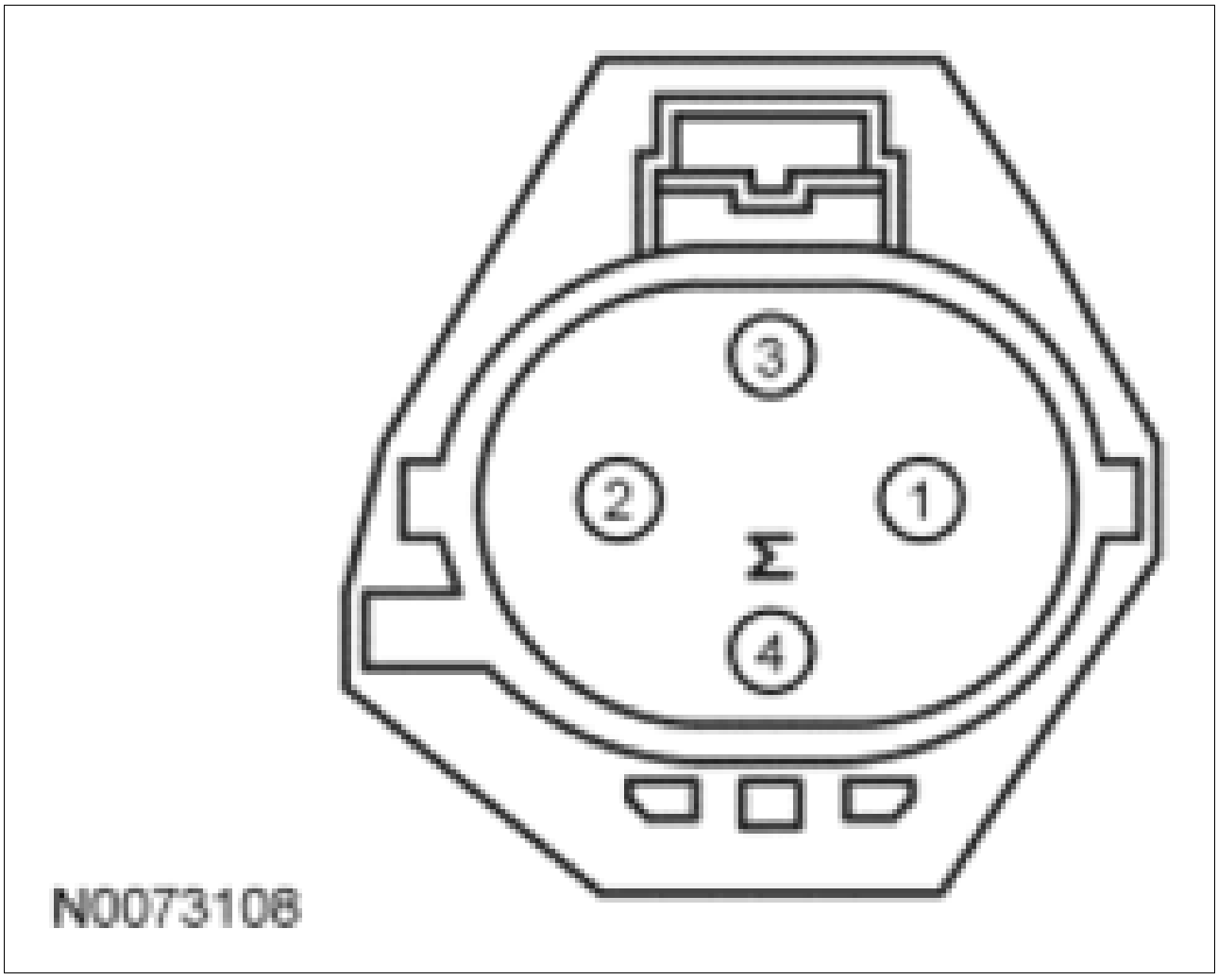
- cooling fan (CF) module (8B658)
- cooling fan assembly (8C607)
- harness circuits: FCV, FANPWR and GND

- powertrain control module (PCM) (12A650)

FCV DUTY CYCLE OUTPUT FROM PCM DESCRIPTION (NEGATIVE DUTY CYCLE)

FCV Duty Cycle Command (Negative Duty Cycle)	Cooling Fan Response And Speed
Less Than 10%	Fan OFF, Controller Inactive
10% - 90%	Linear Speed Increase
Greater Than 90% But Less Than 95%	100%
Greater Than 95% But Less Than 100%	Fan OFF

Fig 1: Identifying Cooling Fan (CF) Module Connector

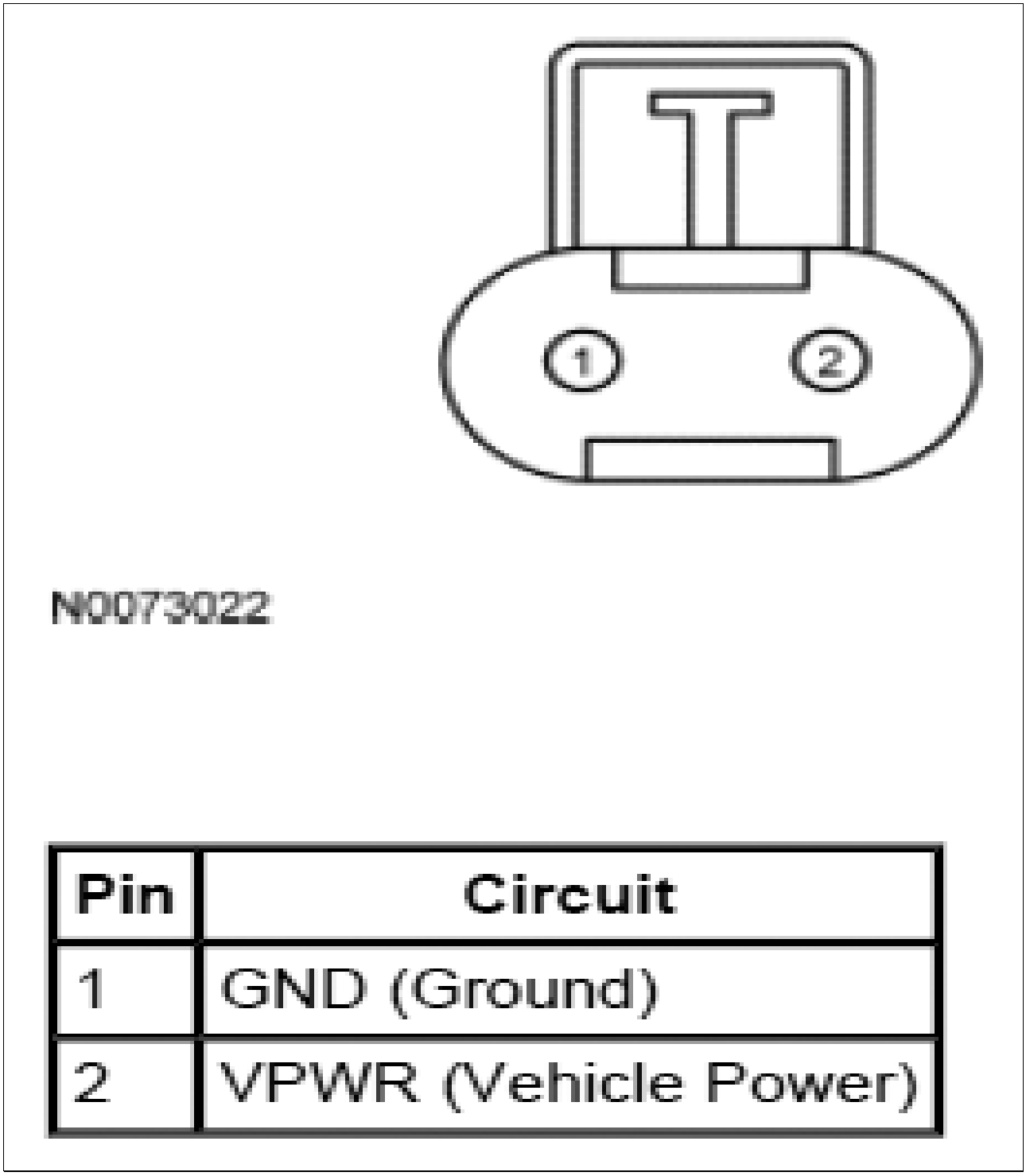


Courtesy of FORD MOTOR CO.

Pin	Circuit
4	FCV (Fan Control Variable)
2	GND (Ground)

1	FANPWR (Fan Power)

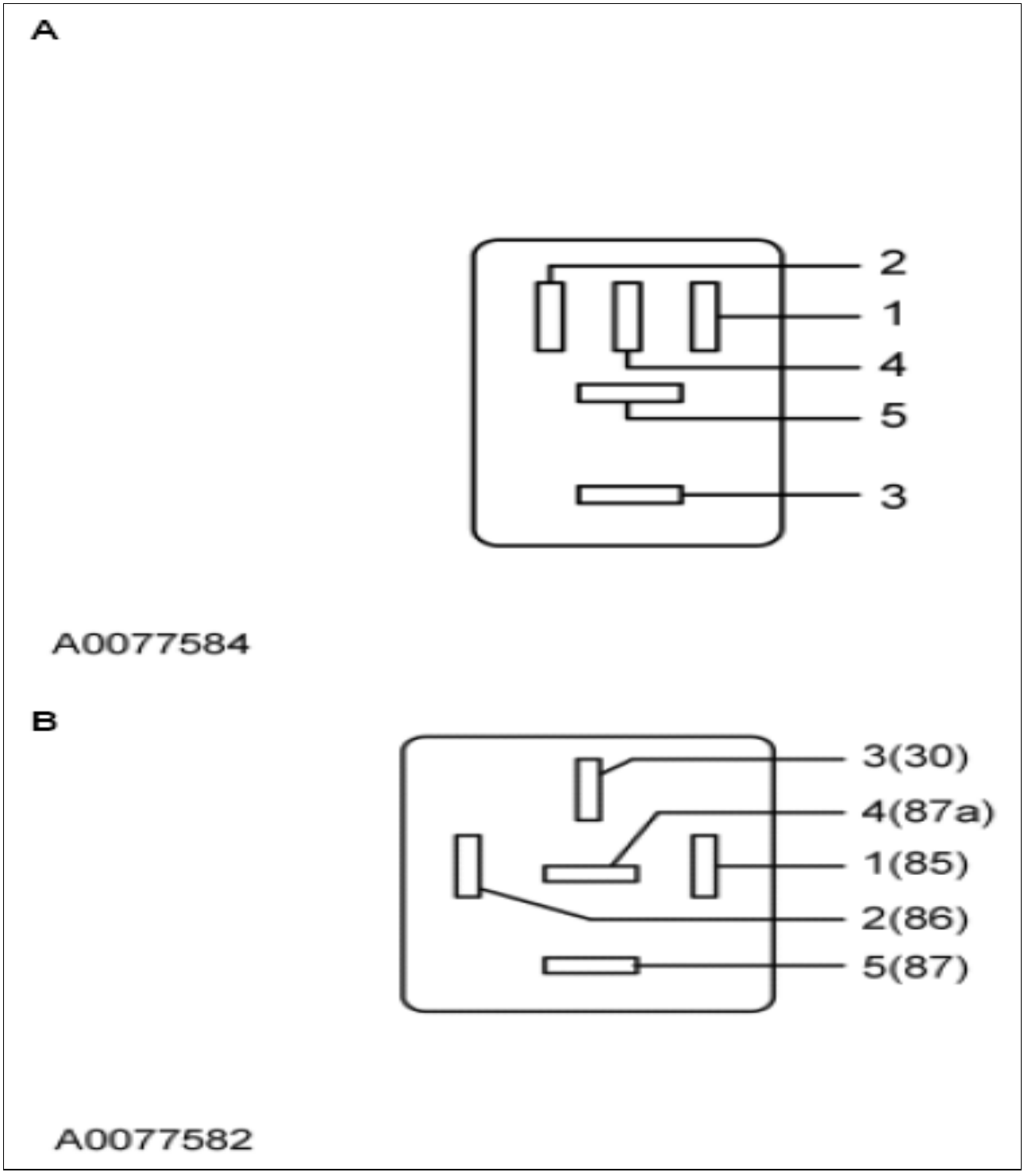
Fig 2: Identifying Cooling Fan (CF) Motor Connector



Courtesy of FORD MOTOR CO.

Pin	Circuit
1	GND (Ground)
2	FANPWR (Fan Power)

Fig 3: Identifying Fan Control (FC) Relay Connector



Courtesy of FORD MOTOR CO.

Vehicle	Connector	Pin	Circuit
Fiesta	A	5 2 1 3	FANPWR GND VPWR B+

All other vehicles	B	5 2 1 3	FANPWR GND VPWR B+

PINPOINT TEST KN: VARIABLE SPEED ELECTRIC COOLING FAN MOTOR > INTRODUCTION > POWERTRAIN CONTROL MODULE (PCM) CONNECTOR

For PCM connector views or reference values, refer to REFERENCE VALUES .

Vehicle	Connector	Pin	Circuit
Escape/Kuga 2.5L, MKX, Transit Connect 2.5L	190-PIN	B34	FCV
Fiesta, Focus 1.0L	198 PIN	B5	FCV
Focus GDI 2.0L	198 PIN	B8	FCV
All other vehicles	198 PIN	B4	FCV

PINPOINT TEST KN: VARIABLE SPEED ELECTRIC COOLING FAN MOTOR > TEST PROCEDURE

KN1 CHECK FOR DIAGNOSTIC TROUBLE CODES (DTCS)

Is DTC P0480 present?

Yes	No
GO to KN3.	For symptoms without DTCs. GO to **KN2** . For all others, RETURN to SYMPTOM CHARTS for further direction.

KN2 VERIFY A/C STATUS

Verify the A/C system is OFF.

Ignition ON, engine running.

Access the PCM and monitor the AC_REQ (MODE) PID.

Is A/C being requested?

Yes	No
REFER to the service information , Climate Control System, to diagnose the A/C system.	GO to **KN3** .

KN3 COMMAND THE COOLING FAN ON TO CHECK OPERATION

Rotate the cooling fan by hand. The cooling fan should rotate freely, with no abnormal binding. If binding is present, remove any foreign materials or install a new cooling fan as required.

Ignition ON, engine OFF.

Access the PCM and control the FAN_DSD (PER) PID.

Command the fan to full ON.

Does the cooling fan operate when commanded ON?

Yes	No
The concern is elsewhere. RETURN to NO DIAGNOSTIC TROUBLE CODES (DTCS) PRESENT SYMPTOM CHART INDEX for further direction.	GO to **KN4** .

KN4 CHECK THE VOLTAGE TO THE COOLING FAN MODULE

Ignition OFF.

CF Module connector disconnected.

Ignition ON, engine OFF.

Measure the voltage between:

(+) CF Module Connector, Harness Side	(-)
FANPWR - Pin 1	Ground

Is the voltage greater than 10.5 V?

Yes	No
GO to KN8.	For MKX, REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test. For all others, GO to **KN5** .

KN5 CHECK FOR VOLTAGE TO THE RELAY

Ignition OFF.

FC Relay connector disconnected.

Ignition ON, engine OFF.

Measure the voltage between:

(+) FC Relay Connector, Harness Side	(-)
B+	Ground

VPWR	Ground

Are the voltages greater than 10.5 V?

Yes	No
GO to **KN6** .	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

KN6 CHECK THE RELAY

Carry out the Relay Component Test. Refer to Wiring Diagrams Cell 149.

Is a concern present?

Yes	No
INSTALL a new FC relay. Clear the PCM DTCs. REPEAT the self-test.	GO to **KN7** .

KN7 CHECK THE FC RELAY GROUND

Ignition OFF.

Measure the resistance between:

(+) FC Relay Connector, Harness Side	(-)
GND	Ground

Is the resistance less than 5 ohms?

Yes	No
GO to **KN8** .	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

KN8 CHECK FOR AN OPEN CIRCUIT

Ignition OFF.

PCM connector disconnected.

Measure the resistance between:

(+) CF Module Connector, Harness Side	(-)
GND - Pin 2	Ground

Measure the resistance between:

(+) CF Module Connector, Harness Side	(-) PCM Connector, Harness Side

FCV - Pin 4	FCV

For Escape and Focus,

Measure the resistance between:

(+) FC Relay Connector, Harness Side	(-) CF Module Connector, Harness Side
FANPWR	FANPWR - Pin 1

Are the resistances less than 5 ohms?

Yes	No
GO to **KN9** .	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

KN9 CHECK THE FCV CIRCUIT FOR A SHORT TO GROUND

Measure the resistance between:

(+) CF Module Connector, Harness Side	(-)
FCV - Pin 4	Ground

Is the resistance greater than 10K ohms?

Yes	No
GO to **KN10** .	REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.

KN10 CHECK THE FCV CIRCUIT FOR A SHORT TO VOLTAGE

Ignition ON, engine OFF.

Measure the voltage between:

(+) CF Module Connector, Harness Side	(-)
FCV - Pin 4	Ground

Is any voltage present?

Yes	No
REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.	GO to **KN11** .

KN11 CHECK THE FCV CIRCUIT(S) FOR INTERMITTENT CONCERNS

NOTE: Not all vehicles have a FC relay.

Ignition OFF.

CF Motor connector disconnected.

Visually inspect all connectors for:

pushed out pins

corrosion

CF Motor connector connected.

CF Module connector connected.

PCM connector connected.

FC Relay connector connected.

Ignition ON, engine OFF.

Access the PCM and control the FAN_DSD (PER) PID.

Command the fan to full ON.

While observing the fan, wiggle, shake, and bend small sections of the wiring harness while working from the CF module to the PCM.

Lightly tap on the CF motor and wiggle the harness connector to simulate road shock.

Is a concern present?

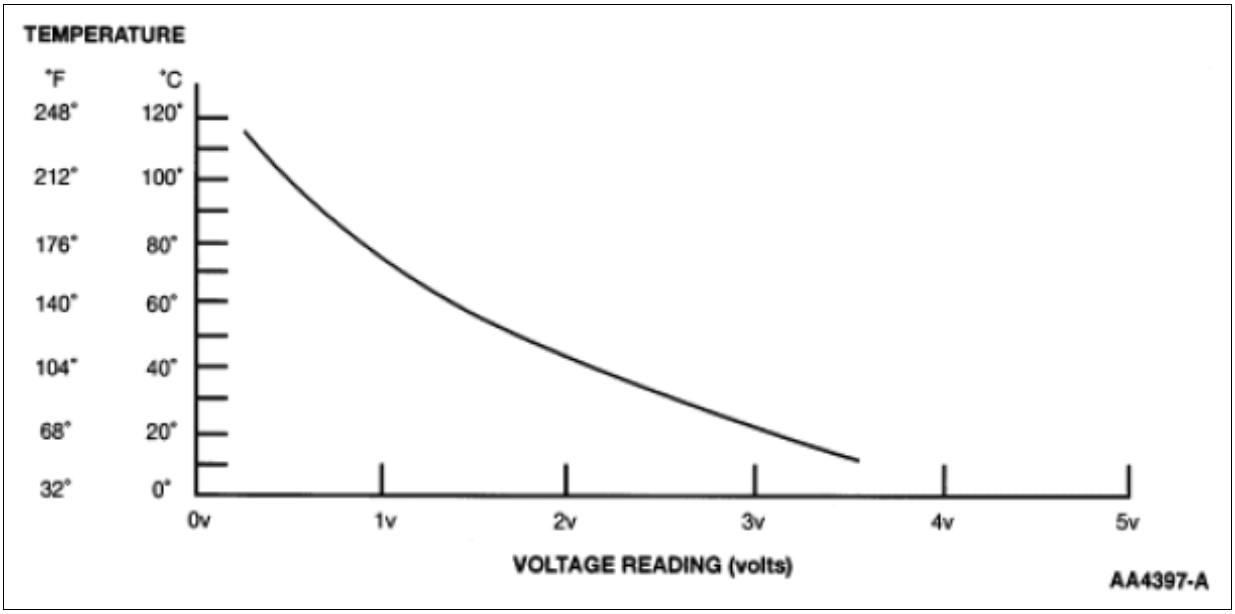
Yes	No
REPAIR as necessary. If a wiring concern is not present, INSTALL a new CF motor. REFER to the service information , Engine Cooling. Clear the PCM DTCs. REPEAT the self-test.	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.

PINPOINT TEST KP: CHARGE AIR COOLER (CAC) > INTRODUCTION

This pinpoint test is intended to diagnose the following:

- CAC coolant temperature sensor (12A648)
- CAC pump (8501)
- harness circuits: CAC, CACCTS, SIGRTN, PUMPPWR and GND
- PCM (12A650)

Fig 1: CAC Coolant Temperature Sensor Voltage Graph

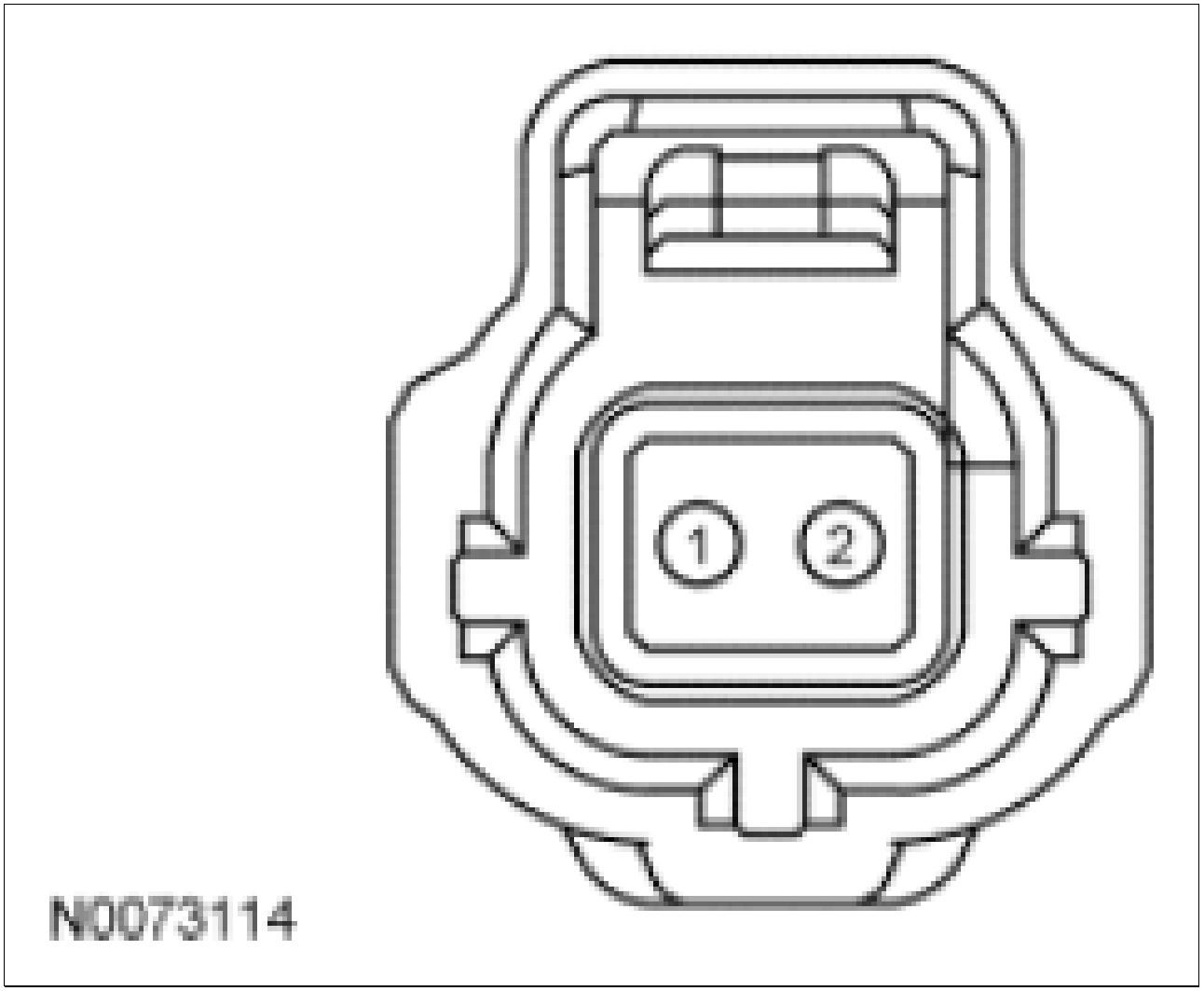


Courtesy of FORD MOTOR CO.

TEMPERATURE SENSOR VOLTAGE AND RESISTANCE SPECIFICATIONS

Temperature		Temperature Sensor Values	
°C	°F	Voltage	Resistance (K ohms)
120	248	0.28	1.18
110	230	0.36	1.55
100	212	0.47	2.07
90	194	0.61	2.80
80	176	0.80	3.84
70	158	1.05	5.37
60	140	1.37	7.70
50	122	1.77	10.97
40	104	2.23	16.15
30	86	2.74	24.27
20	68	3.26	37.30
10	50	3.73	58.75
0	32	4.14	95.85
-10	14	4.45	160.31

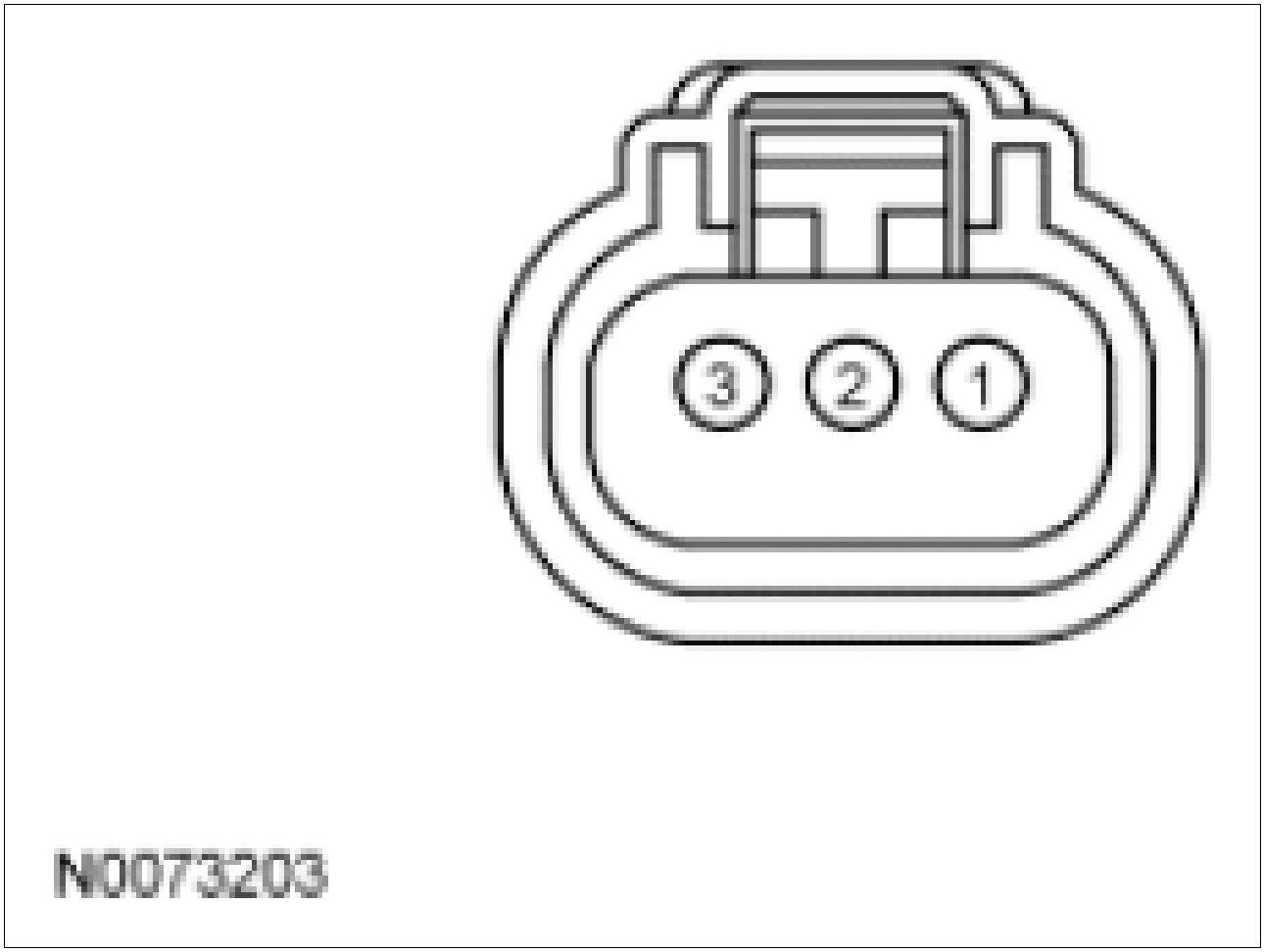
Fig 2: Identifying Charge Air Cooler (CAC) Coolant Temperature Sensor Connector



Courtesy of FORD MOTOR CO.

Pin	Circuit
2	SIGRTN (Signal Return)
1	CACCTS (Charge Air Cooler Coolant Temperature Signal)

Fig 3: Identifying Charge Air Cooler (CAC) Pump Connector



Courtesy of FORD MOTOR CO.

Pin	Circuit
3	CAC (Charge Air Cooler)
1	GND (Ground)
2	PUMPPWR (Pump Power)

PINPOINT TEST KP: CHARGE AIR COOLER (CAC) > INTRODUCTION > POWERTRAIN CONTROL MODULE (PCM) CONNECTOR

For PCM connector views or reference values, refer to REFERENCE VALUES .

Connector	Pin	Circuit
198 PIN	E13 B19 E23	CAC SIGRTN CACCTS

PINPOINT TEST KP: CHARGE AIR COOLER (CAC) > TEST PROCEDURE

KP1 CHECK FOR DIAGNOSTIC TROUBLE CODES (DTCS)

Are DTCs P00DF, P00E0, P00E1, P00E2, P023A, P023B, P023C or P026A present?

Yes	No
For DTC P00DF, P00E0, P00E1, P00E2, GO to **KP2** . For all others, GO to KP9.	For symptoms without DTCs, GO to **KP2** . For all others, RETURN to SYMPTOM CHARTS for further direction.

KP2 CHECK THE CAC COOLING SYSTEM

WARNING: TO AVOID PERSONAL INJURY DO NOT UNSCREW THE COOLANT PRESSURE RELIEF CAP WHILE THE ENGINE IS OPERATING OR HOT. THE COOLING SYSTEM IS UNDER PRESSURE. STEAM AND HOT LIQUID CAN COME OUT FORCEFULLY WHEN THE CAP IS LOOSENED SLIGHTLY. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN PERSONAL INJURY.

NOTE: Verify cooling fan operation before proceeding with this test.

Check the CAC cooling system for any loss of coolant or overheating concerns.

Is the CAC cooling system OK?

Yes	No
GO to **KP3** .	REFER to the service information , Charge Air Cooling, to continue CAC cooling system diagnosis.

KP3 CHECK THE RESISTANCE OF THE CAC COOLANT TEMPERATURE SENSOR

NOTE: Refer to the chart at the beginning of this test for the resistance specifications.

Ignition OFF.

Charge Air Cooler (CAC) Coolant Temperature Sensor connector disconnected.

Measure the resistance between:

(+) Charge Air Cooler (CAC) Coolant Temperature Sensor Connector, Component Side	(-) Charge Air Cooler (CAC) Coolant Temperature Sensor Connector, Component Side

CACCTS - Pin 1	SIGRTN - Pin 2

Is the resistance within specification?

Yes	No
GO to **KP4** .	INSTALL a new Charge Air Cooler (CAC) Coolant Temperature sensor. REFER to the service information , Electronic Engine Controls. RESET the keep alive memory (KAM), REFER to RESETTING THE KEEP ALIVE MEMORY (KAM) . Clear the PCM DTCs. REPEAT the self-test.

KP4 CHECK THE CAC COOLANT TEMPERATURE SENSOR CIRCUITS FOR AN OPEN

PCM connector disconnected.

Measure the resistance between:

(+) Charge Air Cooler (CAC) Coolant Temperature Sensor Connector, Harness Side	(-) PCM Connector, Harness Side
CACCTS - Pin 1	CACCTS - Pin E23
SIGRTN - Pin 2	SIGRTN - Pin B19

Are the resistances less than 5 ohms?

Yes	No
GO to **KP5** .	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

KP5 CHECK THE CAC COOLANT TEMPERATURE SENSOR CIRCUITS FOR A SHORT TO GROUND

Measure the resistance between:

(+) Charge Air Cooler (CAC) Coolant Temperature Sensor Connector, Harness Side	(-)
CACCTS - Pin 1	Ground
SIGRTN - Pin 2	Ground

Are the resistances greater than 10K ohms?

Yes	No
GO to **KP6** .	REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.

KP6 CHECK THE CAC COOLANT TEMPERATURE SENSOR CIRCUITS FOR A SHORT TO VOLTAGE

Ignition ON, engine OFF.

Measure the voltage between:

(+) Charge Air Cooler (CAC) Coolant Temperature Sensor Connector, Harness Side	(-)
CACCTS - Pin 1	Ground
SIGRTN - Pin 2	Ground

Is any voltage present?

Yes	No
REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.	GO to **KP7** .

KP7 CAC COOLANT TEMPERATURE SENSOR INTERMITTENT CHECK

Charge Air Cooler (CAC) Coolant Temperature Sensor connector connected.

PCM connector connected.

Ignition ON, engine OFF.

Access the PCM and monitor the CACCT_V (VOLT) PID.

While observing the PID, wiggle, shake, and bend small sections of the wiring harness while working from the sensor to the PCM.

Lightly tap on the CAC coolant temperature sensor and wiggle the harness and connector to simulate road shock.

Does the PID reading change?

Yes	No
REPAIR as necessary or INSTALL a new CAC coolant temperature sensor. REFER to the service information , Electronic Engine Controls. RESET the keep alive memory (KAM), REFER to RESETTING THE KEEP ALIVE MEMORY (KAM) .	GO to **KP8** .

KP8 CHECK THE CHARGE AIR COOLER COOLANT TEMPERATURE AND THE ENGINE COOLANT TEMPERATURE CORRELATION

NOTE: Check temperature values while engine is at ambient temperature, cold soak the engine for a minimum of 6 hours if necessary. Make sure the vehicle has not been in direct sun light.

Access the PCM and monitor the CACCT (TEMP) and ECT (TEMP) PIDs.

Are the temperature readings within 16.6° C (30°F) of each other?

Yes	No
GO to KP14.	INSTALL a new Charge Air Cooler (CAC) Coolant Temperature sensor. REFER to the service information , Electronic Engine Controls. RESET the keep alive memory (KAM). REFER to RESETTING THE KEEP ALIVE MEMORY (KAM) . Clear the PCM DTCs. REPEAT the self-test.

KP9 CHECK THE PUMPPWR CIRCUIT FOR AN OPEN

Ignition OFF.

Charge Air Cooler (CAC) Pump connector disconnected.

Ignition ON, engine OFF.

Measure the voltage between:

(+) Charge Air Cooler (CAC) Pump Connector, Harness Side	(-)
PUMPPWR - Pin 2	Ground

Is the voltage greater than 10.5 V?

Yes	No
GO to **KP10** .	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

KP10 CHECK THE GND CIRCUIT FOR AN OPEN

Ignition OFF.

Measure the resistance between:

(+) Charge Air Cooler (CAC) Pump Connector, Harness Side	(-)
GND - Pin 1	Ground

Is the resistance less than 5 ohms?

Yes	No
GO to **KP11** .	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

KP11 CHECK THE CAC CIRCUIT FOR AN OPEN

PCM connector disconnected.

Measure the resistance between:

(+) Charge Air Cooler (CAC) Pump Connector, Harness Side	(-) PCM Connector, Harness Side

CAC - Pin 3	CAC - Pin E13

Is the resistance less than 5 ohms?

Yes	No
GO to **KP12** .	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

KP12 CHECK THE CAC CIRCUIT FOR A SHORT TO GROUND

Measure the resistance between:

(+) Charge Air Cooler (CAC) Pump Connector, Harness Side	(-)
CAC - Pin 3	Ground

Is the resistance greater than 10K ohms?

Yes	No
GO to **KP13** .	REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.

KP13 CHECK THE CAC CIRCUIT FOR A SHORT TO VOLTAGE

Ignition ON, engine OFF.

Measure the voltage between:

(+) Charge Air Cooler (CAC) Pump Connector, Harness Side	(-)
CAC - Pin 3	Ground

Is any voltage present?

Yes	No
REPAIR the short circuit. Clear the PCM DTCs. REPEAT the self-test.	INSTALL a new Charge Air Cooler (CAC) Pump. REFER to the service information , Charge Air Cooling. Clear the PCM DTCs. REPEAT the self-test.

KP14 CHECK FOR CORRECT PCM OPERATION

Disconnect all the PCM connectors.

Visually inspect for:

- pushed out pins
- corrosion

Connect all the PCM connectors and make sure they seat correctly.

Carry out the PCM self-test.

Verify the concern is still present.

Is the concern still present?

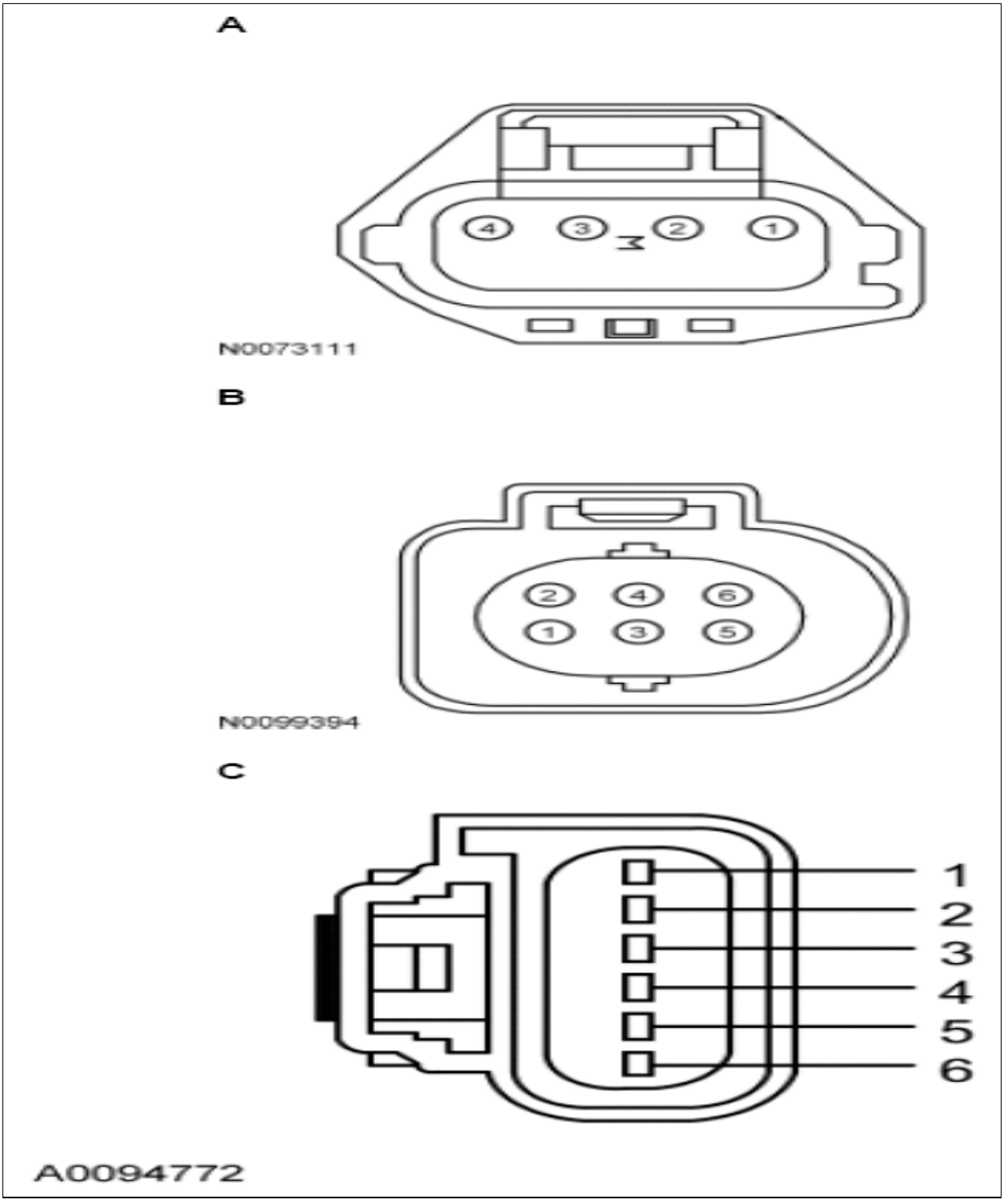
Yes	No
INSTALL a new PCM. REFER to FLASH ELECTRICALLY ERASABLE PROGRAMMABLE READ ONLY MEMORY (EEPROM) , Programming the VID Block for a Replacement PCM.	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. GO to PINPOINT TEST Z .

PINPOINT TEST QA: UNABLE TO ACTIVATE SELF-TEST/NETWORK COMMUNICATION ERROR > INTRODUCTION

This pinpoint test is intended to diagnose the following:

- unable to communicate with powertrain control module (PCM)
- unable to activate the PCM self-test
- incorrect self-test procedure
- harness circuits: ISP-R, PCMRC, PWRGND and VPWR

Fig 1: Identifying Electronic Throttle Body Throttle Position Sensor (ETBTPS) Connector



Courtesy of FORD MOTOR CO.

Vehicle	Connector	Pin	Circuit
E-Series, Explorer GTDI 3.5L, F-Series Super Duty 6.8L, Flex GTDI 3.5L,	A	3 2	ETCRTN ETCREF

MKS 3.5L, MKT 3.5L, Motorhome/Stripped Chassis/Step Van, Taurus GTDI 3.5L			
Escape/Kuga 1.6L, Fiesta 1.6L, Fusion 1.6L, Transit Connect 1.6L	B	2 6	ETCRTN ETCREF
Fiesta 1.0L, Focus 1.0L, Fusion 1.5L	B	3 1	ETCRTN ETCREF
All other vehicles	C	4 5	ETCRTN ETCREF

Powertrain Control Module (PCM) Connector

For PCM connector views or reference values, refer to REFERENCE VALUES .

Vehicle	Connector	Pin	Circuit
E-Series 6.8L, F-650/F-750, F-Series Super Duty, Motorhome/Stripped Chassis/Step Van	190-PIN	B69, B70 B67, B68 B38 B42	PWRGND VPWR PCMRC ISP-R
E-Series 5.4L	190-PIN	B22, B50, B69, B70 B30, B67, B68 B38 B42	PWRGND VPWR PCMRC ISP-R
Edge 3.5L, F-150 TiVCT 3.5L, F-150 5.0L, Mustang 3.7L, Mustang 5.0L	198 PIN	B100, B102, B103, B5 B97, B99 B20 B64	PWRGND VPWR PCMRC ISP-R
Escape/Kuga 2.5L, Explorer 3.7L, Explorer TiVCT 3.5L, Flex TiVCT 3.5L, Fusion 2.5L, MKS 3.7L, MKT 3.7L, MKX, MKZ 3.7L, Taurus TiVCT 3.5L, Taurus 3.7L, Transit 3.7L, Transit Connect 2.5L	190-PIN	B50, B69, B70 B67, B68 B38 B42	PWRGND VPWR PCMRC ISP-R
Explorer 2.0L	154 PIN	B1, B2, B4 B5, B6	PWRGND VPWR

		B27 B15	PCMRC ISP-R
Fiesta GTDI 1.6L, Fiesta 1.0L, Focus 1.0L	198 PIN	B96, B97, B99 B101, B102, B103 B58 B48	PWRGND VPWR PCMRC ISP-R
Fiesta TiVCT 1.6L	128 PIN	B35, B36, B47, B48 B11, B12, E13, E37 B1 B8	PWRGND VPWR PCMRC ISP-R
All other vehicles	198 PIN	B96, B97, B98, B99 B101, B102, B103 B58 B48	PWRGND VPWR PCMRC ISP-R

PINPOINT TEST QA: UNABLE TO ACTIVATE SELF-TEST/NETWORK COMMUNICATION ERROR > TEST PROCEDURE

QA1 CARRY OUT A VEHICLE INSPECTION AND VERIFY THE SELF-TEST PROCEDURE

NOTE: If the self-test or communication concern occurred after a failed or an aborted reprogram, the module may be blank. Attempt to reprogram the module again before continuing with this pinpoint test.

Visually inspect the following for obvious signs of electrical damage:

harness wiring

electrical connections

Verify the correct procedure was used to activate the self-test for the scan tool. Refer to SCAN TOOL SETUP AND FUNCTIONALITY .

Was the correct self-test procedure used?

Yes	No
GO to **QA2** .	REFER to SCAN TOOL SETUP AND FUNCTIONALITY .

QA2 CARRY OUT THE NETWORK TEST

NOTE: When using Integrated Diagnostic System (IDS), the scan tool attempts to communicate with the PCM first. After establishing communication with the PCM, the scan tool then attempts to communicate with all modules on the vehicle. If an IDS session cannot be established, IDS may state no communication can be established with the PCM:

choose No when the scan tool prompts whether or not to retry communication.

enter a PCM part number, tear tag or calibration number to identify the vehicle and start a session. The PCM part number and 4-character tear tag are located on the PCM.

Ignition ON, engine OFF.

Carry out the network test.

Do all modules indicate pass?

Yes	No
For DTCs U0101, U0402, U1011 or U1013, GO to QA7. For DTC U0104, GO to QA12. For DTCs U0121, U0415, U1012 or U1039, GO to QA8. For DTC U0138, GO to QA13. For DTCs U0140 or U0422, GO to QA9. For DTCs U0155 or U0423, GO to QA10. For DTC U0212, GO to QA11. For DTC U0298, GO to QA14. For all others, REFER to QT :	If only PCM indicates fail, GO to **QA3** . For network test or all other modules indicates fail, REFER to the service information , Module Communications Network, to diagnose the PCM does not respond to the scan tool or no high speed controller area network (CAN) communication, all modules are not responding symptom.

QA3 CHECK FOR VREF VOLTAGE AT THE ETBTPS SENSOR

Ignition ON, engine OFF.

ETBTPS connector disconnected.

Measure the voltage between:

(+) ETBTPS Connector, Harness Side	(-) ETBTPS Connector, Harness Side
ETCREF	ETCRTN

Is the voltage between 4.5 - 5.5 V?

Yes	No
REFER to the service information , Module Communications Network, to diagnose the PCM does not respond to the scan tool or no high speed controller area network (CAN) communication, all modules are not responding symptom.	GO to **QA4** .

QA4 CHECK THE ISP-R VOLTAGE AT THE PCM

Ignition OFF.

PCM connector disconnected.

Ignition ON, engine OFF.

Measure the voltage between:

(+) PCM Connector, Harness Side	(-)
ISP-R	Ground

Is the voltage greater than 10.5 V?

Yes	No
GO to **QA5** .	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

QA5 CHECK THE PCM VPWR CIRCUITS FOR VOLTAGE

Ignition OFF.

Disconnect the PCM.

Connect a 5 amp fused jumper wire between the following:

Point A PCM Connector, Harness Side	Point B
PCMRC	Ground

Ignition ON, engine OFF.

Measure the voltage between:

(+) PCM Connector, Harness Side	(-)
VPWR	Ground

Is the voltage greater than 10.5 V?

Yes	No
GO to **QA6** .	GO to PINPOINT TEST B .

QA6 CHECK THE PCM GROUND CIRCUITS FOR AN OPEN

Ignition OFF.

Measure the resistance between:

(+) PCM Connector, Harness Side	(-)
PWRGND	Ground

Is the resistance less than 5 ohms?

Yes	No
GO to QA17.	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

QA7 CHECK FOR A TRANSMISSION CONTROL MODULE (TCM) CONCERN

Check for any TCM DTCs.

Check for other TCM related symptoms.

Is a concern present?

Yes	No
REFER to the service information , Automatic Transmission, DTC Charts to continue diagnosis.	For DTCs U1011 or U1013, GO to QA15. For all others, GO to QA17.

QA8 CHECK FOR AN ANTI-LOCK BRAKE SYSTEM (ABS) MODULE CONCERN

Check for any ABS module DTCs.

Check for other ABS related symptoms.

Is a concern present?

Yes	No
REFER to the service information , Vehicle Dynamic Systems, DTC Charts to continue diagnosis.	For DTC U1012, GO to QA15. For all others, GO to QA17.

QA9 CHECK FOR A BODY CONTROL MODULE (BCM) CONCERN

Check for any BCM DTCs.

Check for other BCM related symptoms.

Is a concern present?

Yes	No

REFER to the service information , Multifunction Electronic Modules, DTC Charts to continue diagnosis.	GO to QA17.

QA10 CHECK FOR AN INSTRUMENT PANEL CLUSTER (IPC) CONCERN

Check for any IPC DTCs.

Check for other IPC related symptoms.

Is a concern present?

Yes	No
REFER to the service information , Instrumentation, Message Center, and Warning Chimes, DTC Charts to continue diagnosis.	GO to QA17.

QA11 CHECK FOR A CRUISE CONTROL CONCERN

Check for any other PCM DTCs.

Check for other PCM related symptoms.

Is a concern present?

Yes	No
Refer to the service information , Cruise Control to continue diagnosis of the cruise control system.	GO to QA17.

QA12 CHECK FOR A STEERING ANGLE SENSOR MODULE (SASM) CONCERN

Check for any SASM DTCs.

Check for other SASM related symptoms.

Is a concern present?

Yes	No
REFER to the service information , Vehicle Dynamic Systems to continue diagnosis of the SASM system.	GO to QA17.

QA13 CHECK FOR AN ALL TERRAIN CONTROL MODULE (ATCM) CONCERN

Check for any ATCM DTCs.

Check for other ATCM related symptoms.

Is a concern present?

Yes	No
REFER to the service information , Four Wheel Drive 4WD Systems to continue diagnosis of the ATCM system.	GO to QA17.

QA14 CHECK FOR A DC TO DC CONVERTOR CONTROL MODULE CONCERN

Check for any DC to DC convertor control module DTCs.

Check for other DC to DC convertor control module related symptoms.

Is a concern present?

Yes	No
REFER to the service information , Voltage Convertor/Invertor to continue diagnosis of the DC to DC control module system.	GO to QA17.

QA15 CHECK FOR A POWERTRAIN CONTROL MODULE (PCM) CONCERN

Check for any other PCM DTCs.

Is a concern present?

Yes	No
DISREGARD the current diagnostic trouble code (DTC) at this time. DIAGNOSE the next DTC. GO to DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS .	GO to **QA16** .

QA16 REFLASH THE PCM

Clear the PCM DTCs.

Reprogram or update the PCM calibration. Refer to FLASH ELECTRICALLY ERASABLE PROGRAMMABLE READ ONLY MEMORY (EEPROM) , Programming the VID Block for a Replacement PCM.

Road test the vehicle.

Carry out the PCM self-test.

Verify the concern is still present.

Is the concern still present?

Yes	No
For Fiesta and Focus with DTC U1013, INSTALL a new TCM. REFER to the service information , Automatic Transmission. Clear the PCM DTCs. REPEAT the self-test. For DTC U1012, REPROGRAM or UPDATE the ABS Calibration. REFER to the service information , Module Configuration. Clear the PCM DTCs. REPEAT the self-test. For all others, REPROGRAM or UPDATE the TCM Calibration. REFER to the service information , Module Configuration. Clear the PCM DTCs. REPEAT the self-test.	The system is operating correctly at this time.

QA17 CHECK FOR CORRECT PCM OPERATION

Disconnect all the PCM connectors.

Visually inspect for:

pushed out pins

corrosion

Connect all the PCM connectors and make sure they seat correctly.

Carry out the network test and verify the concern is still present.

Carry out the PCM self-test.

Verify the concern is still present.

Is the concern still present?

Yes	No
INSTALL a new PCM. REFER to FLASH ELECTRICALLY ERASABLE PROGRAMMABLE READ ONLY MEMORY (EEPROM) , Programming the VID Block for a Replacement PCM.	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.

PINPOINT TEST QB: KEEP ALIVE POWER (KAPWR) > INTRODUCTION

This pinpoint test is intended to diagnose the following:

- battery terminal condition
- KAPWR wire routing
- harness circuit: KAPWR
- powertrain control module (PCM) (12A650)

Powertrain Control Module (PCM) Connector

For PCM connector views or reference values, refer to REFERENCE VALUES .

Vehicle	Connector	Pin	Circuit
Explorer GTDI 3.5L, Fusion 2.0L, Fusion 1.6L, Fusion 1.5L, MKZ 2.0L, Transit 3.5L	198 PIN	B100	KAPWR
Fiesta	128 PIN	B10	KAPWR
All other vehicles	190-PIN	B62	KAPWR

PINPOINT TEST QB: KEEP ALIVE POWER (KAPWR) > TEST PROCEDURE

QB1 CHECK FOR DIAGNOSTIC TROUBLE CODES (DTCS)

NOTE: The DTC P2610 may set after a PCM reprogramming. If this DTC is retrieved after a PCM reprogramming, disregard this DTC.

Carry out a visual inspection.

Record the DTCs.

Record the freeze frame data.

Clear the PCM DTCs.

Carry out the PCM self-test.

Are DTCs P0603, P1633 or P2610 present?

Yes	No
For DTC P2610, GO to QB6. For all others, GO to **QB2** .	Unable to duplicate the condition. CHECK for a loose connection, and damaged or corroded terminals. WIGGLE the harness attempting to recreate the concern. REPAIR as necessary. REFER to QT , if a driveability concern exists. Clear the PCM DTCs. REPEAT the self-test.

QB2 CHECK THE 12-VOLT BATTERY TERMINALS

NOTE: If the KAPWR is interrupted to the PCM, a DTC can be generated on the first power-up.

NOTE: If DTC P0603 occurred right after or during an unsuccessful reprogramming of the PCM, clear the DTCs and repeat the PCM self-test. If DTC P0603 is retrieved again, continue with this pinpoint test.

Inspect the 12 volt battery cables for loose connections and for corrosion.

Are the 12 volt battery terminal connections in good condition?

Yes	No
GO to **QB3** .	REPAIR as necessary. Clear the PCM DTCs. REPEAT the self-test.

QB3 INSPECT THE ENGINE COMPARTMENT FOR CORRECT WIRE ROUTING

Inspect the electronic engine control (EEC) system wiring for correct wire routing.

Check the wiring routing to establish if any of the electrical connectors are being stressed due to incorrectly routed wiring. If necessary re-route and secure the wiring.

Visually inspect the wiring and connectors.

Is a concern present?

Yes	No
REPAIR as necessary. Clear the PCM DTCs. REPEAT the self-test.	For Fiesta 1.6L GTDI, or Focus 2.0L GTDI, GO to QB5. For all others, GO to **QB4** .

QB4 CHECK KAPWR TO THE PCM

Ignition OFF.

PCM connector disconnected.

Measure the voltage between:

(+) PCM Connector, Harness Side	(-) 12 Volt Vehicle Battery
KAPWR	Negative terminal

Is the voltage greater than 10.5 V?

Yes	No
GO to **QB5** .	ISOLATE the concern and REPAIR as necessary. Clear the PCM DTCs. REPEAT the self-test.

QB5 CHECK FOR A REOCCURRENCE OF THE DTC

PCM connector connected.

Clear the PCM DTCs.

Test drive the vehicle and allow the engine to reach normal operating temperature.

Carry out the PCM self-test.

Is DTC P0603 or P1633 present?

Yes	No
GO to QB8.	Unable to duplicate or identify the concern at this time. GO to PINPOINT TEST Z .

QB6 CHECK THE ENGINE OFF TIMER

NOTE: Turning the ignition ON then OFF without an engine start for the purpose

of checking the engine coolant temperature does not affect the test results.

Ignition ON, engine running.

Allow the engine to stabilize at the correct operating temperature.

Ignition OFF.

Ignition ON, engine OFF.

Clear the PCM DTCs.

Ignition OFF.

Allow the engine to cold soak long enough for the engine coolant temperature to drop at least 16.7°C (30°F).

Ignition ON, engine OFF.

Carry out the PCM self-test.

Is DTC P2610 present?

Yes	No
GO to **QB7** .	Unable to duplicate the condition. REFER to QT , to continue diagnosis.

QB7 CHECK FOR ANY BODY CONTROL MODULE (BDYCM) DTCS

Carry out the BdyCM self-test.

Are any DTCs present?

Yes	No
REFER to the service information , Multifunction Electronic Modules, to continue diagnosis.	GO to **QB8** .

QB8 CHECK FOR CORRECT PCM OPERATION

Disconnect all the PCM connectors.

Visually inspect for:

pushed out pins

corrosion

Connect all the PCM connectors and make sure they seat correctly.

Carry out the PCM self-test.

Verify the concern is still present.

Is the concern still present?

Yes	No
INSTALL a new PCM. REFER to FLASH ELECTRICALLY ERASABLE PROGRAMMABLE READ ONLY MEMORY (EEPROM) , Programming the VID Block for a Replacement PCM.	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.

PINPOINT TEST QC: ON BOARD DIAGNOSTIC (OBD) SYSTEMS READINESS > INTRODUCTION

NOTE: The vehicle may not have completed an OBD drive cycle. This is indicated by the inspection maintenance (I/M) readiness status not complete. In some areas, the OBD drive cycle must be completed to pass an I/M test. Refer to ON BOARD DIAGNOSTIC (OBD) DRIVE CYCLE .

PINPOINT TEST QC: ON BOARD DIAGNOSTIC (OBD) SYSTEMS READINESS > TEST PROCEDURE

QC1 CHECK FOR PTO

Is the vehicle equipped with PTO?

Yes	No
GO to **QC2** .	INFORM the customer the law in your area may require additional driving to complete an inspection/maintenance test.

QC2 CHECK THE PTO PID

Ignition ON, engine running.

Access the PCM and monitor the PTO (MODE) PID.

Cycle the PTO switch/actuator ON and OFF. (Follow the PTO aftermarket instructions).

Does the PTO PID cycle ON and OFF?

Yes	No
INFORM the customer the law in your area may require additional driving to complete an inspection/maintenance test.	GO to PINPOINT TEST FB .

PINPOINT TEST QE: ELECTRONIC THROTTLE CONTROL (ETC) SYSTEM > INTRODUCTION

NOTE: Diagnose and repair the following DTCs through DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS , and the Workshop Manual respectively before entering this pinpoint test:

- *C1165*
- *P0102-P0104*
- *P0106-P0108*
- *P0236-P0238*
- *P0321*
- *P0715*
- *P0720*
- *P0731-P0735*
- *P2227-P2229*
- *U1027*

This pinpoint test is intended to diagnose the informational PCM DTCs.

The informational DTCs are the result of the failure mode effects management (FMEM) operating strategy that maintains limited vehicle function in the event of a PCM, harness or component concern.

Circuit DTCs can be accompanied by the informational DTCs and should be diagnosed first. Informational DTCs without circuit DTCs may or may not indicate the actual concern and should be diagnosed as a symptom.

Powertrain Control Module (PCM) Connector

For PCM connector views or reference values, refer to REFERENCE VALUES .

Vehicle	Connector	Pin	Circuit
E-Series 6.8L, Escape/Kuga 2.5L, Explorer 3.7L, Explorer TiVCT 3.5L, F-650/F-750, F-Series Super Duty, Flex TiVCT 3.5L, Fusion 2.5L, MKS 3.7L, MKT 3.7L, MKX, MKZ 3.7L, Motorhome/Stripped Chassis/Step Van, Taurus TiVCT 3.5L,	190-PIN	B67, B68 B38	VPWR PCMRC

Taurus 3.7L, Transit 3.7L, Transit Connect 2.5L			
E-Series 5.4L	190-PIN	B30, B67, B68 B38	VPWR PCMRC
Edge 3.5L, F-150 TiVCT 3.5L, F-150 5.0L, Mustang 3.7L, Mustang 5.0L	198 PIN	B97, B99 B20	VPWR PCMRC
Explorer 2.0L	154 PIN	B5, B6 B27	VPWR PCMRC
Fiesta TiVCT 1.6L	128 PIN	B11, B12, E13, E37 B1	VPWR PCMRC
All other vehicles	198 PIN	B101, B102, B103 B58	VPWR PCMRC

PINPOINT TEST QE: ELECTRONIC THROTTLE CONTROL (ETC) SYSTEM > TEST PROCEDURE

QE1 CHECK FOR DTCS

NOTE: For DTC P061B, make sure the air cleaner and air inlet are correctly seated and correctly installed before continuing diagnosis.

Are any DTCs present other than the following: P0600, P060A, P060B, P060C, P060D, P061A, P061B, P061C, P061D, P061F, P062B, P062C, P1674, P2105, or U0300?

Yes	No
RETURN to SYMPTOM CHARTS for further direction.	For DTCs P0600, P060A or U0300, GO to **QE2** . For DTC P060B, GO to QE4. For DTC P061B, GO to QE11. For DTC P061C, GO to QE6. For DTC P061F, GO to QE8. For DTC P062B, GO to QE5. For DTCs P062C or P2105, GO to QE9. For all others, GO to QE3.

QE2 CHECK THE PCM VOLTAGE CIRCUITS FOR AN OPEN

Ignition OFF.

PCM connector disconnected.

Connect a 5 amp fused jumper wire between the following:

Point A PCM Connector, Harness Side	Point B
PCMRC	Ground

Ignition ON, engine OFF.

Measure the voltage between:

(+) PCM Connector, Harness Side	(-)
VPWR	Ground

Is the voltage greater than 10.5 V?

Yes	No
GO to **QE3** .	REPAIR the open circuit. Clear the PCM DTCs. REPEAT the self-test.

QE3 CHECK THE PCM FOR THE LATEST CALIBRATION

Ignition OFF.

Remove the jumper wire(s).

PCM connector connected.

Program the PCM to the latest calibration.

Ignition OFF.

Ignition ON, engine OFF.

Ignition OFF.

Ignition ON, engine running.

Use the customer information to recreate the concern.

Carry out the PCM self-test.

Are DTCs P0600, P060A, P060C, P060D, P061A, P061D, P1674 or U0300 present?

Yes	No
GO to QE15.	The concern is not present at this time.

QE4 CHECK FOR REFERENCE VOLTAGE CONCERNS

Inspect the PCM harness for damage.

Verify the correct operation of the sensors using ETCREF, VREF and related circuits.
GO to PINPOINT TEST C and follow the pinpoint test direction.

Is a concern present?

Yes	No
REPAIR as necessary. Clear the PCM DTCs. REPEAT the self-test.	GO to **QE5** .

QE5 CHECK FOR AN INTERMITTENT CONCERN

Clear the PCM DTCs.

Carry out the PCM KOER self-test.

Are DTCs P060B or P062B present?

Yes	No
GO to QE15.	The concern is not present at this time.

QE6 CHECK THE CRANKSHAFT POSITION (CKP) SENSOR FOR CORRECT OPERATION

Verify correct operation of the CKP sensor and related circuits. GO to PINPOINT TEST JD and follow the pinpoint test direction.

Is a concern present?

Yes	No
REPAIR as necessary. Clear the PCM DTCs. REPEAT the self-test.	GO to **QE7** .

QE7 CHECK THE CAMSHAFT POSITION (CMP) SENSOR FOR CORRECT OPERATION

Verify correct operation of the CMP sensor and related circuits. GO to PINPOINT TEST DR and follow the pinpoint test direction.

Is a concern present?

Yes	No
REPAIR as necessary. Clear the PCM DTCs. REPEAT the self-test.	GO to **QE8** .

QE8 VERIFY THE CUSTOMER CONCERN

Clear the PCM DTCs.

Use the customer information to recreate the concern.

Carry out the PCM self-test.

Are DTCs P061C or P061F present?

Yes	No

GO to QE15.	The concern is not present at this time.

QE9 CHECK FOR DTCS IN OTHER VEHICLE MODULES

Check for self-test DTCs in all of the vehicle modules.

Are any DTCs present?

Yes	No
REFER to the applicable service information to DIAGNOSE the DTC.	GO to **QE10** .

QE10 CHECK FOR THE PRESENCE OF ANY MODULE COMMUNICATION CONCERNS

Check for self-test DTCs in all of the vehicle modules.

Are any communication concerns or communication DTCs present?

Yes	No
For communication concerns in the PCM, DISREGARD the current diagnostic trouble code (DTC) at this time. DIAGNOSE the next DTC. GO to DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS . For communication concerns in other modules, REFER to the applicable service information to DIAGNOSE the communication DTC.	For DTC P062C, GO to QE14. For all others, GO to **QE11** .

QE11 CHECK FOR THE PRESENCE OF PCM DTCS

NOTE: An intermittent CKP sensor or harness concern may cause DTC P061B to set. Check for intermittent CKP sensor and harness concerns.

NOTE: P2105 may be set in combination with other DTCs.

Clear the PCM DTCs.

Check for self-test DTCs.

Are any DTCs present other than P061B or P2105?

Yes	No
DISREGARD the current diagnostic trouble code (DTC) at this time. DIAGNOSE the next DTC. GO to DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS .	For DTC P061B, GO to QE13. For all others, GO to **QE12** .

QE12 CARRY OUT A VISUAL INSPECTION

Ignition OFF.

Visually inspect the following for obvious signs of damage:

ETB

PCM

Check the harness for routing, alterations, incorrect shielding, or electrical interference from other systems. Make sure aftermarket wiring is not routed near the PCM.

Verify aftermarket equipment does not generate radio frequency interference or electromagnetic interference.

Is a concern present?

Yes	No
ISOLATE the concern and REPAIR as necessary. Clear the PCM DTCs. REPEAT the self-test.	GO to QE15.

QE13 CHECK FOR MASS AIRFLOW (MAF) AND THROTTLE POSITION (TP) SENSOR CORRELATION CONCERNS

NOTE: For a MAF and TP sensor correlation concern DTC P061B may set before DTC P0068 sets.

Check for a MAF and TP sensor correlation concern. GO to PINPOINT TEST DV and follow the pinpoint test direction for DTC P0068.

Is a concern present?

Yes	No
REPAIR as necessary. Clear the PCM DTCs. REPEAT the self-test.	CHECK for an intermittent concern with an ETC related harness or sensor. GO to PINPOINT TEST Z .

QE14 CHECK FOR ANTILOCK BRAKING SYSTEM (ABS) AND WHEEL SPEED SENSOR CONCERNS

Ignition ON, engine running.

Access the PCM and monitor the VSS (SPD) PID.

Access the ABS and monitor the LF_WSPD (SPD), LR_WSPD (SPD), RF_WSPD (SPD) and RR_WSPD (SPD) PIDs.

Road test the vehicle under various load conditions while comparing the PIDs. Check for signals that are intermittent or do not correspond.

Do the PID values correspond with the vehicle operating conditions?

Yes	No

CHECK for an intermittent concern with an ETC related harness or sensor. GO to PINPOINT TEST Z .	REFER to the service information , Vehicle Dynamic Systems, to DIAGNOSE any ABS concerns.

QE15 CHECK FOR CORRECT PCM OPERATION

Disconnect all the PCM connectors.

Visually inspect for:

pushed out pins

corrosion

Connect all the PCM connectors and make sure they seat correctly.

Carry out the PCM self-test.

Verify the concern is still present.

Is the concern still present?

Yes	No
INSTALL a new PCM. REFER to FLASH ELECTRICALLY ERASABLE PROGRAMMABLE READ ONLY MEMORY (EEPROM) , Programming the VID Block for a Replacement PCM.	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.

PINPOINT TEST Z: INTERMITTENT > INTRODUCTION

This pinpoint test is intended to diagnose and isolate intermittent concerns for all electronic engine control (EEC) subsystems.

This chart is used to determine which test to run for the suspect circuit. Parameter identifiers (PIDs) corresponding to each circuit are listed. Some circuits do not have an associated PID or the PID may not be available and has to be measured with a digital multimeter (DMM). More specific information on the PID can be found in REFERENCE VALUES .

PCM PIDS/SIGNALS REFERENCE

PCM/PIDS/SIGNALS	Associated Circuit	Test Type
AAT	AAT	Input
APP1	APP1	Input
APP2	APP2	Input
BOO1	BPP	Input
BOO2	BPS	Input

Use DMM	CD A-J (primary)	Output
CAC_T	CACT	Input
CAC_V	CACT	Input
CACCT	CACCTS	Input
CACCT_V	CACCTS	Input
CHT	CHT	Input
CKP	CKP	Input
CMP	CMP	Input
CPP/PNP	CPP	Input
ECT	ECT	Input
EGRMC1	EGRMC1	Output
EGRMC2	EGRMC2	Output
EGRMC3	EGRMC3	Output
EGRMC4	EGRMC4	Output
EGRMDSD	EGRMC	Output
EGRVR	EGRVR	Output
EVAPCV	CANV	Output
FANDC	VDF	Output
FANSS	FANSS	Input
FANVAR	FCV	Input
FLI	FLI	Input
FLP	FLP	Input
FP	FP	Output
FP M	FPM	Input
FRP	FRP	Input
FRT	FRT	Input
FTP	FTP	Input
HFC	HFC	Output
IAT	IAT	Input
IAT2	IAT	2 Input
IMRC	IMRC	Output
IMRC1M	IMRC1	Input
IMRC2M	IMRC2	Input

IMTV	IMTV1	Output
KNOCK_1	KS1	Input
KNOCK_2	KS2	Input
LFC	LFC	Output
MAF, MAF V	MAF	Input
MAP V	MAP	Input
MFC	MFC	Output
O2S12	HO2S12	Input
O2S22	HO2S22	Input
OSS	OSS	Input
PTO	PTO	Input
SCIP, SCIP V	TCIP	Input
TACM (+)	TACM (+)	Output
TACM (-)	TACM (-)	Output
TCBP	TCBP	Input
TCBP_V	TCBP	Input
TP	TP	Input
TP1	TP1	Input
TP2	TP2	Input
TURBO_BP1_STAT	TCBY	Output
TURBO_BP2_STAT	TCBY2	Output
TURBO_WGATE	TCWRVS	Output
TWGATE_STAT	TCWRVS	Output
VCT1	VCT1	Output
VCT2	VCT2	Output
	VPWR	Input
Use DMM	VREF	Output
Use DMM	VSO	Output
VSS	VSS+	Input
WGATE_PRES	WVS	Input
WGATE_V	WVS	Input

PINPOINT TEST Z: INTERMITTENT > TEST PROCEDURE

Z1 DIRECTION FOR INTERMITTENT DIAGNOSTIC PATH

NOTE: Proceed with this step only if the PCM DTCs and the freeze frame data have not been cleared. Record freeze frame data prior to clearing the PCM DTCs. Clearing the DTCs clears any freeze frame data and eliminates FMEM. This helps to recreate the original conditions that set the DTCs or caused the symptom.

Ignition ON, engine OFF.

Clear the PCM DTCs.

Are the PCM DTCs cleared?

Yes	No
GO to **Z2** .	RESET the keep alive memory (KAM). REFER to RESETTING THE KEEP ALIVE MEMORY (KAM) . REPEAT the self-test.

Z2 SELECT THE PIDS AND/OR SIGNALS RELATED TO THE SYSTEM

A list of related PIDs and/or signals are needed for use with the scan tool to monitor the suspect areas. Obtain the customer symptom description. Use the Reference Value Symptom chart and proceed to the Reference Value PID/Signal Measurement chart located at the beginning of REFERENCE VALUES .

Highlight each available PID/signal recommended by the charts under the PID/signal selection menu on the scan tool.

Are all available PIDs/signals related to the symptom selected?

Yes	No
GO to **Z3** .	REPEAT the test step. GO to **Z2** .

Z3 DECISION TO VERIFY THE SYMPTOM

NOTE: The path to symptom verification is optional but is recommended for several reasons. For example, the vehicle is back for a repeat repair, or there is no DTC present.

Is a concern or symptom present?

Yes	No
GO to Z10.	GO to **Z4** .

Z4 COLLECT ANY SYMPTOM RELATED DATA TO AID IN VERIFICATION

NOTE: Only MIL codes trigger freeze frame data. Refer to the scan tool instruction manual to retrieve the freeze frame information.

Prepare the freeze frame data for use with information from the SYMPTOM CHARTS .

Check for continuous memory DTCs that should have been recorded from an earlier pinpoint test.

Access the information from the customer information worksheet and the customer if available. Access any other symptom related data available, such as TSBs and OASIS reports.

Is all available data recorded?

Yes	No
GO to **Z5** .	GATHER as much data as possible to aid in isolating the intermittent concern area. REPEAT the test step. GO to **Z4** .

Z5 RECREATE THE SYMPTOM USING ALL AVAILABLE DATA

NOTE: To recreate the original conditions that set the DTC or caused the symptom, the vehicle may require driving.

With the scan tool, select and monitor the same PIDs as displayed in freeze frame along with any previously selected PIDs/signals from step Z2. Using the freeze frame data recorded earlier, recreate the conditions described by each freeze frame PID. Pay special attention to ECT, LOAD, RPM and VSS. Also, use any available data from the customer, TSBs, and other sources to aid in producing the correct conditions for recreating the symptom.

When the symptom occurs, press the trigger to begin recording. Refer to the scan tool instruction manual for information on the recorder function.

Can the symptom be recreated?

Yes	No
GO to Z10.	GO to **Z6** .

Z6 RECREATE THE SYMPTOM

NOTE: PIDs for output in the Reference Value Charts represent command values only. Circuit measurements with a DMM indicate the actual output status. Therefore, in the case of a concern, the PID and circuit reading on the vehicle may not correspond with each other. PIDs for PCM circuits with a mismatch in the DMM measurement indicate a possible PCM concern.

The road test is the last attempt to locate the area of concern before physically disturbing

vehicle circuits.

The Intermittent Road Test Procedure is a set of instructions for monitoring PIDs/signals with a scan tool and circuit measurements with a DMM. This is done under 4 different conditions - ignition on and engine off, hot idle, 48 km/h (30 mph) and 88 km/h (55 mph). Use the typical diagnostic reference values from REFERENCE VALUES to compare with the actual vehicle.

Locate the correct reference value chart in REFERENCE VALUES .

Setup the vehicle to measure the circuits with a DMM and a scan tool.

Connect a scan tool to the DLC.

Ignition ON, engine OFF.

With the scan tool, select and monitor PIDs and measure the circuits shown in the reference value chart in REFERENCE VALUES .

Compare the scan tool PIDs and DMM values to the reference value charts.

Are any values out of range?

Yes	No
GO to Z10.	GO to **Z7** .

Z7 RECREATE THE SYMPTOM USING THE HOT IDLE ROAD TEST

NOTE: The engine temperature should be at least 87°C (189°F).

Ignition ON, engine running.

Continue to monitor the PIDs and circuits as in the previous step.

Are any values out of range?

Yes	No
GO to Z10.	GO to **Z8** .

Z8 RECREATE THE SYMPTOM DURING AN 48 KM/H (30 MPH) ROAD TEST

Drive the vehicle on a preplanned route.

Continue to monitor the PIDs and circuits as in the previous step.

Are any values out of range?

Yes	No
GO to Z10.	GO to **Z9** .

Z9 RECREATE THE SYMPTOM DURING AN 88 KM/H (55 MPH) ROAD TEST

Continue to drive the vehicle on the preplanned route.

Continue to monitor the PIDs and circuits as in the previous step.

Are any values out of range?

Yes	No
GO to **Z10** .	It is now necessary to physically disturb the selected vehicle circuits in an attempt to recreate the intermittent concern. GO to **Z10** .

Z10 SELECT THE CIRCUITS FROM THE PCM PIDS/SIGNALS CHART

NOTE: From the same chart, be sure to select and proceed with the appropriate test type.

NOTE: The Input Test step should be used on sensing inputs such as temperature, position or oxygen.

NOTE: The Output Test step should be used on output devices such as relays, coils or solenoids.

Remain in the PID/Signal selection menu with the scan tool.

Highlight only the PIDs/signals from step Z2.

Proceed to the PCM PIDS/SIGNALS chart located at the beginning of this test.

Match the selected PIDs/signals to the corresponding circuit in the chart. There may be more than one circuit to test. If a PID/signal recording was made with the scan tool, it may be helpful to replay it at this time. Refer to the scan tool instruction manual for additional information.

Has a test been chosen?

Yes	No
For the input test step, GO to **Z11** . For the output test step, GO to Z15.	RETURN to SYMPTOM CHARTS for further direction.

Z11 KOEO INPUT TEST PROCEDURE FOR THE PCM SENSORS

WARNING: WHEN CARRYING OUT ANY TEST STEPS, ALWAYS BE AWARE OF HANDS, CLOTHING OR TOOLS NEAR COOLING FANS, BELTS OR HOT SURFACES. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN PERSONAL INJURY.

Using the circuits chosen from the REFERENCE VALUES , PCM PIDS/SIGNALS Chart, select only the recommended PIDs/signals to monitor with the scan tool. If a PID is not available for the circuit, use a DMM to check the value.

Proceed to the area of the suspect wiring or component concern.

Ignition ON, engine OFF.

If the input is a switch type-component, turn it on manually.

Monitor the PID or DMM while tapping on the component.

Monitor while wiggling the sensor harness wire from the component to the PCM/TCM.

Look for abrupt changes in the values. Compare these actual values to the reference values in REFERENCE VALUES .

Are there abrupt changes in the PID values that do not compare with the REFERENCE VALUES , **typical reference values?**

Yes	No
REPAIR as necessary. VERIFY the repair. Clear the PCM DTCs. REPEAT the self-test.	GO to **Z12** .

Z12 KOER INPUT TEST PROCEDURE FOR THE PCM SENSORS

WARNING: WHEN CARRYING OUT ANY TEST STEPS, ALWAYS BE AWARE OF HANDS, CLOTHING OR TOOLS NEAR COOLING FANS, BELTS OR HOT SURFACES. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN PERSONAL INJURY.

Ignition ON, engine running.

Continue to monitor the PIDs and circuits as in the previous step.

Proceed to the area of the suspect wiring or component concern.

If the input is a switch type-component, turn it on manually.

Monitor the PID or DMM while tapping on the component.

Monitor while wiggling the sensor harness wire from the component to the PCM.

Look for abrupt changes in the values. Compare these actual values to the reference values in REFERENCE VALUES .

Are any values fluctuating in and out of range?

Yes	No
REPAIR as necessary. VERIFY the repair. Clear the PCM DTCs. REPEAT the self-test.	GO to **Z13** .

Z13 KOEO WATER SOAK TEST PROCEDURE FOR THE PCM SENSORS, EXCLUDING HIGH VOLTAGE CIRCUITS

> *WARNING: WHEN CARRYING OUT ANY TEST STEPS, ALWAYS BE AWARE OF HANDS, CLOTHING OR TOOLS NEAR COOLING FANS, BELTS OR HOT SURFACES. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN PERSONAL INJURY.*

Ignition ON, engine OFF.

Continue to monitor the PIDs and circuits as in the previous step.

Proceed to the area of the suspect wiring or component concern.

If the input is a switch type-component, turn it on manually.

Monitor the PID or DMM values while lightly spraying a water mist on the component.

Monitor while spraying the sensor harness wire from the component to the PCM.

Look for abrupt changes in the values. Compare these actual values to the Typical Diagnostic Reference Values in REFERENCE VALUES .

Are any values fluctuating in and out of range?

Yes	No
REPAIR as necessary. VERIFY the repair. Clear the PCM DTCs. REPEAT the self-test.	GO to **Z14** .

Z14 KOER WATER SOAK TEST PROCEDURE FOR THE PCM SENSORS, EXCLUDING HIGH VOLTAGE CIRCUITS

> *WARNING: WHEN CARRYING OUT ANY TEST STEPS, ALWAYS BE AWARE OF HANDS, CLOTHING OR TOOLS NEAR COOLING FANS, BELTS OR HOT SURFACES. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN PERSONAL INJURY.*

Ignition ON, engine running.

Continue to monitor the PIDs and circuits as in the previous step.

Proceed to the area of the suspect wiring or component concern.

If the input is a switch type-component, turn it on manually.

Monitor the PID or DMM values while lightly spraying a water mist on the component.

Monitor while spraying the sensor harness wire from the component to the PCM.

Look for abrupt changes in the values. Compare these actual values to the Typical Diagnostic Reference Values in REFERENCE VALUES .

Are any values fluctuating in and out of range?

Yes	No
REPAIR as necessary. VERIFY the repair. Clear the PCM DTCs. REPEAT the self-test.	GO to **Z15** .

Z15 KOER WIGGLE TEST PROCEDURE FOR THE PCM SENSORS

WARNING: WHEN CARRYING OUT ANY TEST STEPS, ALWAYS BE AWARE OF HANDS, CLOTHING OR TOOLS NEAR COOLING FANS, BELTS OR HOT SURFACES. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN PERSONAL INJURY.

NOTE: Remember that PIDs selected from the PCM PIDS/SIGNALS Chart display commanded values only. A DMM measurement is needed to display the actual values. Be sure to compare them. Look for fluctuations to occur during any part of the following test. The output state test may not control some outputs, such as injectors and ignition coils and may not be available for all actuators.

Using the circuits chosen from the PCM PIDS/SIGNALS Chart, select only the recommended PIDs/signals to monitor with the scan tool. If a PID is not available for the circuit, use a DMM to check the value.

Ignition ON, engine OFF.

With the scan tool, turn on selected outputs using output state control. Refer to the scan tool instruction manual.

Proceed to the area of the suspect wiring or component concern.

Monitor the PID or DMM while tapping on the component.

Monitor while wiggling the sensor harness wire from the component to the PCM.

Look for abrupt changes in the values. Compare these actual values to the reference values in REFERENCE VALUES .

Is there a mismatch between command and actual or are any values fluctuating in and out of range when compared to the reference value charts in REFERENCE VALUES , **Reference Values?**

Yes	No
REPAIR as necessary. VERIFY the repair. Clear the PCM DTCs. REPEAT the self-test.	GO to **Z16** .

Z16 KOER OUTPUT TEST PROCEDURE FOR THE PCM ACTUATORS

WARNING: WHEN CARRYING OUT ANY TEST STEPS, ALWAYS BE AWARE

OF HANDS, CLOTHING OR TOOLS NEAR COOLING FANS, BELTS OR HOT SURFACES. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN PERSONAL INJURY.

NOTE: Remember that PIDs selected from the PCM PIDS/SIGNALS Chart display commanded values only. A DMM measurement is needed to display the actual values. Be sure to compare them. Look for fluctuations to occur during any part of the following test. The output state test may not control some outputs, such as injectors and ignition coils and may not be available for all actuators.

Ignition ON, engine running.

Proceed to the area of the suspect wiring or component concern.

Monitor the PIDs with the scan tool and note the values. Compare the scan tool values with values from a DMM with the engine at idle. While tapping on the suspect component look for fluctuations in the values.

If a coil for a coil on plug application is suspect, turn off the ignition. Gain access to the coil and measure continuity from the spark plug terminal to the signal terminal while tapping the coil. A large fluctuation in resistance indicates an intermittent open or short.

Monitor while wiggling the sensor harness wire from the component to the PCM.

Look for abrupt changes in the values. Compare these actual values to the reference values in REFERENCE VALUES .

Is there a scan tool to DMM value mismatch or an idle fluctuation?

Yes	No
REPAIR as necessary. VERIFY the repair. Clear the PCM DTCs. REPEAT the self-test.	GO to **Z17** .

Z17 KOEO WATER SOAK TEST PROCEDURE FOR THE PCM ACTUATORS, EXCLUDING HIGH VOLTAGE CIRCUITS

WARNING: WHEN CARRYING OUT ANY TEST STEPS, ALWAYS BE AWARE OF HANDS, CLOTHING OR TOOLS NEAR COOLING FANS, BELTS OR HOT SURFACES. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN PERSONAL INJURY.

NOTE: Remember that PIDs selected from the PCM PIDS/SIGNALS Chart display commanded values only. A DMM measurement is needed to display the actual values. Be sure to compare them. Look for fluctuations to occur during any part of the following test. The output state test may not control some outputs, such as injectors and ignition coils and may not be available for all actuators.

Ignition ON, engine OFF.

With the scan tool, turn on selected outputs using output state control. Refer to the scan tool instruction manual.

Proceed to the area of the suspect wiring or component concern.

Monitor the PID or DMM values while lightly spraying a water mist on the component.

Look for abrupt changes in the values. Compare these actual values to the reference values in REFERENCE VALUES .

Is there a mismatch between command and actual or are any values fluctuating in and out of range when compared to the reference value charts in REFERENCE VALUES , **Reference Values?**

Yes	No
REPAIR as necessary. VERIFY the repair. Clear the PCM DTCs. REPEAT the self-test.	GO to **Z18** .

Z18 KOER WATER SOAK TEST PROCEDURE FOR THE PCM ACTUATORS

WARNING: WHEN CARRYING OUT ANY TEST STEPS, ALWAYS BE AWARE OF HANDS, CLOTHING OR TOOLS NEAR COOLING FANS, BELTS OR HOT SURFACES.
FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN PERSONAL INJURY.

Ignition ON, engine running.

Using the circuits chosen from the PCM PIDS/SIGNALS Chart, select only the recommended PIDs/signals to monitor with the scan tool. If a PID is not available for the circuit, use a DMM to check the value.

Proceed to the area of the suspect wiring or component concern.

Monitor the PID or DMM values while lightly spraying a water mist on the component.

Monitor while spraying the sensor harness wire from the component to the PCM/TCM.

Look for abrupt changes in the values. Compare these actual values to the Typical Diagnostic Reference Values in REFERENCE VALUES .

Is there a mismatch between command and actual or are any values fluctuating in and out of range when compared to the Reference Value Charts in Section 6?

Yes	No
REPAIR as necessary. VERIFY the repair. Clear the PCM DTCs. REPEAT the self-test.	GO to **Z19** .

Z19 INSPECT FOR INTERMITTENT MECHANICAL CONCERNS

NOTE: It is possible for an intermittent mechanical concern to cause a good PCM system to react abnormally.

An inspection of DTC related mechanical systems should have been carried out in an earlier section. If not, visually inspect at this time.

Look for possible vacuum lines, wires, cables, linkage or hoses that may become kinked, shorted or restricted during normal engine operation.

This may include engine/transmission gear changes, acceleration and deceleration, rough roads and various engine RPM and torque related conditions.

Is a mechanical concern detected?

Yes	No
REPAIR as necessary. VERIFY the repair. Clear the PCM DTCs. REPEAT the self-test.	It is necessary to seek additional help. REFER to the Professional Technician Society (PTS) web site, the OASIS system or the Technical Hotline. A vehicle data recorder (VDR) or similar recorder may also be useful.

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS

NOTE: Refer to the applicable service information to diagnose the body and chassis DTCs.

NOTE: An X equals any number 0 through 9 or the letter A through F.

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0001 - FUEL VOLUME REGULATOR CONTROL CIRCUIT/OPEN - DTC CHART

P0001 - FUEL VOLUME REGULATOR CONTROL CIRCUIT/OPEN - DTC CHART

Description: This DTC sets when the PCM detects high or low voltage on the FVR and FVRRTN circuits.

Possible Causes:

- FVR circuit open
- FVRRTN circuit open
- Fuel volume regulator solenoid coil open

Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HP .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0003 - FUEL VOLUME REGULATOR CONTROL CIRCUIT LOW - DTC CHART

P0003 - FUEL VOLUME REGULATOR CONTROL CIRCUIT LOW - DTC CHART

Description: This DTC sets when the PCM detects high or low voltage on the FVR and FVRRTN circuits.

Possible Causes:

- FVR circuit short to ground

- FVRRTN circuit short to ground

Diagnostic Aids: A FVRRTN circuit short to ground may damage the solenoid coil. If P0001 is retrieved after a circuit repair, check the solenoid coil for an open circuit.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HP .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0004 - FUEL VOLUME REGULATOR CONTROL CIRCUIT HIGH - DTC CHART

P0004 - FUEL VOLUME REGULATOR CONTROL CIRCUIT HIGH - DTC CHART

Description: This DTC sets when the PCM detects high or low voltage on the FVR and FVRRTN circuits.

Possible Causes:

- FVR circuit short to FVRRTN circuit
- FVRRTN circuit short to voltage

Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HP .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P000A - INTAKE A CAMSHAFT POSITION SLOW RESPONSE BANK 1 - DTC CHART

P000A - INTAKE A CAMSHAFT POSITION SLOW RESPONSE BANK 1 - DTC CHART

Description: The PCM monitors and evaluates the response of the actual position on a target position change. The setpoint and camshaft position are saved at the beginning of a setpoint change. If this change over time is large enough (gradient), the camshaft phasing change is evaluated. If the change after the diagnostic time is smaller than a threshold, a slow response is detected, and if the value is greater, then there is no concern. By detecting a concern, an antibounce counter is incremented otherwise the counter is decremented. This DTC sets when the counter exceeds an adjustable limit.

Possible Causes:

- Variable camshaft timing (VCT) unit to camshaft alignment
- Erratic camshaft position due to low oil pressure
- Oil flow restriction in the oil passages or the VCT valve body

- Camshaft advance mechanism binding (VCT unit)
- Damaged VCT phaser
- Radio frequency interference

Diagnostic Aids: This DTC may be accompanied by other DTCs. Diagnose all camshaft position (CMP) sensor DTCs first. If no CMP sensor related DTCs are present, continue to follow diagnosis for this DTC.
This DTC is a functional check of the VCT unit. Diagnose any base engine concerns related to the engine oil pressure or engine timing. Refer to the service information , Engine System, Oil Pressure Test, to check the engine oil pressure. Refer to the service information , Engine, to check the engine timing and VCT phasers.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HK .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P000B - EXHAUST B CAMSHAFT POSITION SLOW RESPONSE BANK 1 - DTC CHART

P000B - EXHAUST B CAMSHAFT POSITION SLOW RESPONSE BANK 1 - DTC CHART

Description: The PCM monitors and evaluates the response of the actual position on a target position change.
The setpoint and camshaft position are saved at the beginning of a setpoint change. If this change over time is large enough (gradient), the camshaft phasing change is evaluated. If the change after the diagnostic time is smaller than a threshold, a slow response is detected, and if the value is greater, then there is no concern. By detecting a concern, an antibounce counter is incremented otherwise the counter is decremented. This DTC sets when the counter exceeds an adjustable limit.

Possible Causes:

- Variable camshaft timing (VCT) unit to camshaft alignment
- Erratic camshaft position due to low oil pressure
- Oil flow restriction in the oil passages or the VCT valve body
- Camshaft advance mechanism binding (VCT unit)
- Damaged VCT phaser
- Radio frequency interference

Diagnostic Aids: This DTC may be accompanied by other DTCs. Diagnose all camshaft position (CMP) sensor DTCs first. If no CMP sensor related DTCs are present, continue to follow diagnosis for this DTC.
This DTC is a functional check of the VCT unit. Diagnose any base engine concerns related to the engine oil pressure or engine timing. Refer to the service information , Engine System, Oil Pressure Test, to check the engine oil pressure. Refer to the service information , Engine, to check the engine timing and VCT phasers.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HK .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0010 - INTAKE CAMSHAFT POSITION ACTUATOR CIRCUIT/OPEN (BANK 1) - DTC CHART

P0010 - INTAKE CAMSHAFT POSITION ACTUATOR CIRCUIT/OPEN (BANK 1) - DTC CHART

Description: This DTC sets when a low or high voltage on the VCT11 circuit is detected. The test fails if the voltage exceeds a calibrated limit for a calibrated amount of time.

Possible Causes:

- VCT11 circuit open
- VCT11 circuit short to voltage
- VCT11 circuit short to ground
- VPWR circuit open
- Damaged variable camshaft timing bank 1 solenoid 1 (VCT11)

Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HK .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0011 - INTAKE CAMSHAFT POSITION TIMING - OVER-ADVANCED (BANK 1) - DTC CHART

P0011 - INTAKE CAMSHAFT POSITION TIMING - OVER-ADVANCED (BANK 1) - DTC CHART

Description: This DTC sets when the variable camshaft timing (VCT) position is over-advanced. The test fails when the camshaft timing exceeds a maximum calibrated value or remains in an advanced position.

Possible Causes:

- VCT unit to camshaft alignment
- Camshaft timing incorrectly set
- Continuous oil flow to the VCT piston chamber
- Erratic camshaft position due to low oil pressure
- Oil flow restriction in the oil passages or the VCT valve body

- Variable camshaft timing bank 1 solenoid 1 (VCT11) valve stuck open
- VCT11 circuit open
- VCT11 circuit short to voltage
- VCT11 circuit short to ground
- VPWR circuit open
- Camshaft advance mechanism binding (VCT unit)
- Damaged VCT11 phaser
- Damaged camshaft position bank 1 sensor 1 (CMP11)
- CMP11 sensor circuits open
- CMP11 sensor circuits short to voltage
- CMP11 sensor circuits short to ground
- Radio frequency interference

Diagnostic Aids: This DTC may be accompanied by other DTCs. Diagnose all camshaft position (CMP) sensor DTCs first. If no CMP sensor related DTCs are present, continue to follow diagnosis for this DTC.
This DTC is a functional check of the VCT unit. Diagnose any base engine concerns related to the engine oil pressure or engine timing. Refer to the service information , Engine System, Oil Pressure Test, to check the engine oil pressure. Refer to the service information , Engine, to check the engine timing and VCT phasers.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HK .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0012 - INTAKE CAMSHAFT POSITION TIMING - OVER-RETARDED (BANK 1) - DTC CHART

P0012 - INTAKE CAMSHAFT POSITION TIMING - OVER-RETARDED (BANK 1) - DTC CHART

Description: This DTC sets when the variable camshaft timing (VCT) position is over-retarded. The test fails when the camshaft timing exceeds a maximum calibrated value or remains in a retarded position.

Possible Causes:

- VCT unit to camshaft alignment
- Camshaft timing incorrectly set
- Continuous oil flow to the VCT piston chamber

- Erratic camshaft position due to low oil pressure
- Oil flow restriction in the oil passages or the VCT valve body
- variable camshaft timing bank 1 solenoid 1 (VCT11) valve stuck open
- VCT11 circuit open
- VCT11 circuit short to voltage
- VCT11 circuit short to ground
- VPWR circuit open
- Camshaft advance mechanism binding (VCT unit)
- Damaged VCT11 phaser
- Damaged camshaft position bank 1 sensor 1 (CMP11)
- CMP11 sensor circuits open
- CMP11 sensor circuits short to voltage
- CMP11 sensor circuits short to ground
- Radio frequency interference

Diagnostic Aids: This DTC may be accompanied by other DTCs. Diagnose all camshaft position (CMP) sensor DTCs first. If no CMP sensor related DTCs are present, continue to follow diagnosis for this DTC.
This DTC is a functional check of the VCT unit. Diagnose any base engine concerns related to the engine oil pressure or engine timing. Refer to the service information , Engine System, Oil Pressure Test, to check the engine oil pressure. Refer to the service information , Engine, to check the engine timing and VCT phasers.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HK .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0013 - EXHAUST CAMSHAFT POSITION ACTUATOR CIRCUIT/OPEN (BANK 1) - DTC CHART

P0013 - EXHAUST CAMSHAFT POSITION ACTUATOR CIRCUIT/OPEN (BANK 1) - DTC CHART

Description: This DTC sets when a low or high voltage on the VCT12 circuit is detected. The test fails if the voltage exceeds a calibrated limit for a calibrated amount of time.

Possible Causes:

- VCT12 circuit open
- VCT12 circuit short to voltage

- VCT12 circuit short to ground
- VPWR circuit open
- Damaged variable camshaft timing bank 1 solenoid 2 (VCT12)

Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HK .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0014 - EXHAUST CAMSHAFT POSITION TIMING - OVER-ADVANCED (BANK 1) - DTC CHART

P0014 - EXHAUST CAMSHAFT POSITION TIMING - OVER-ADVANCED (BANK 1) - DTC CHART

Description: This DTC sets when the variable camshaft timing (VCT) position is over-advanced. The test fails when the camshaft timing exceeds a maximum calibrated value or remains in an advanced position.

Possible Causes:

- VCT unit to camshaft alignment
- Camshaft timing incorrectly set
- Continuous oil flow to the VCT piston chamber
- Erratic camshaft position due to low oil pressure
- Oil flow restriction in the oil passages or the VCT valve body
- Variable camshaft timing bank 1 solenoid 2 (VCT12) valve stuck open
- VCT12 circuit open
- VCT12 circuit short to voltage
- VCT12 circuit short to ground
- VPWR circuit open
- Camshaft advance mechanism binding (VCT unit)
- Damaged VCT12 phaser
- Damaged camshaft position bank 1 sensor 2 (CMP12)
- CMP12 sensor circuits open
- CMP12 sensor circuits short to voltage
- CMP12 sensor circuits short to ground

- Radio frequency interference

Diagnostic Aids: This DTC may be accompanied by other DTCs. Diagnose all camshaft position (CMP) sensor DTCs first. If no CMP sensor related DTCs are present, continue to follow diagnosis for this DTC.
This DTC is a functional check of the VCT unit. Diagnose any base engine concerns related to the engine oil pressure or engine timing. Refer to the service information , Engine System, Oil Pressure Test, to check the engine oil pressure. Refer to the service information , Engine, to check the engine timing and VCT phasers.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HK .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0015 - EXHAUST CAMSHAFT POSITION TIMING - OVER-RETARDED (BANK 1) - DTC CHART

P0015 - EXHAUST CAMSHAFT POSITION TIMING - OVER-RETARDED (BANK 1) - DTC CHART

Description: This DTC sets when the variable camshaft timing (VCT) position is over-retarded. The test fails when the camshaft timing exceeds a maximum calibrated value or remains in a retarded position.

Possible Causes:

- VCT unit to camshaft alignment
- Camshaft timing incorrectly set
- Continuous oil flow to the VCT piston chamber
- Erratic camshaft position due to low oil pressure
- Oil flow restriction in the oil passages or the VCT valve body
- Variable camshaft timing bank 1 solenoid 2 (VCT12) valve stuck open
- VCT12 circuit open
- VCT12 circuit short to voltage
- VCT12 circuit short to ground
- VPWR circuit open
- Camshaft advance mechanism binding (VCT unit)
- Damaged VCT12 phaser
- Damaged camshaft position bank 1 sensor 2 (CMP12)
- CMP12 sensor circuits open

- CMP12 sensor circuits short to voltage
- CMP12 sensor circuits short to ground
- Radio frequency interference

Diagnostic Aids: This DTC may be accompanied by other DTCs. Diagnose all camshaft position (CMP) sensor DTCs first. If no CMP sensor related DTCs are present, continue to follow diagnosis for this DTC.
This DTC is a functional check of the VCT unit. Diagnose any base engine concerns related to the engine oil pressure or engine timing. Refer to the service information , Engine System, Oil Pressure Test, to check the engine oil pressure. Refer to the service information , Engine, to check the engine timing and VCT phasers.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HK .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0016 - CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION - BANK 1 SENSOR A - DTC CHART

P0016 - CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION - BANK 1 SENSOR A - DTC CHART

Description: This DTC sets when a misalignment between the camshaft and crankshaft is detected. The test fails when the misalignment is 1 tooth or greater. This DTC can also set due to variable camshaft timing (VCT) system concerns (oil contamination or VCT solenoid stuck).

Possible Causes:

- VCT unit to camshaft alignment
- Camshaft timing incorrectly set
- Continuous oil flow to the VCT piston chamber
- Erratic camshaft position due to low oil pressure
- Oil flow restriction in the oil passages or the VCT valve body
- variable camshaft timing bank 1 solenoid 1 (VCT11) stuck in position
- VCT11 circuit open
- VCT11 circuit short to voltage
- VCT11 circuit short to ground
- VPWR circuit open
- Camshaft advance mechanism binding (VCT unit)

- Damaged VCT11 phaser
- Damaged camshaft position bank 1 sensor 1 (CMP11)
- CMP11 sensor circuits open
- CMP11 sensor circuits short to voltage
- CMP11 sensor circuits short to ground
- Radio frequency interference

Diagnostic Aids: This DTC may be accompanied by other DTCs. Diagnose all CMP sensor DTCs first. If no CMP sensor related DTCs are present, continue to follow diagnosis for this DTC.
This DTC is a functional check of the VCT unit. Diagnose any base engine concerns related to the engine oil pressure or engine timing. Refer to the service information , Engine System, Oil Pressure Test, to check the engine oil pressure. Refer to the service information , Engine, to check the engine timing and VCT phasers.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HK .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0017 - CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION - BANK 1 SENSOR B - DTC CHART

P0017 - CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION - BANK 1 SENSOR B - DTC CHART

Description: This DTC sets when a misalignment between the camshaft and crankshaft is detected. The test fails when the misalignment is 1 tooth or greater. This DTC can also set due to variable camshaft timing (VCT) system concerns (oil contamination or VCT solenoid stuck).

Possible Causes:

- VCT unit to camshaft alignment
- Camshaft timing incorrectly set
- Continuous oil flow to the VCT piston chamber
- Erratic camshaft position due to low oil pressure
- Oil flow restriction in the oil passages or the VCT valve body
- Variable camshaft timing bank 1 solenoid 2 (VCT12) stuck in position
- VCT12 circuit open
- VCT12 circuit short to voltage
- VCT12 circuit short to ground

- VPWR circuit open
- Camshaft advance mechanism binding (VCT unit)
- Damaged VCT12 phaser
- Damaged camshaft position bank 1 sensor 2 (CMP12)
- CMP12 sensor circuits open
- CMP12 sensor circuits short to voltage
- CMP12 sensor circuits short to ground
- Radio frequency interference

Diagnostic Aids: This DTC may be accompanied by other DTCs. Diagnose all CMP sensor DTCs first. If no CMP sensor related DTCs are present, continue to follow diagnosis for this DTC.
This DTC is a functional check of the VCT unit. Diagnose any base engine concerns related to the engine oil pressure or engine timing. Refer to the service information , Engine System, Oil Pressure Test, to check the engine oil pressure. Refer to the service information , Engine, to check the engine timing and VCT phasers.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HK .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0018 - CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION - BANK 2 SENSOR A - DTC CHART

P0018 - CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION - BANK 2 SENSOR A - DTC CHART

Description: This DTC sets when a misalignment between the camshaft and crankshaft is detected. The test fails when the misalignment is 1 tooth or greater. This DTC can also set due to variable camshaft timing (VCT) system concerns (oil contamination or VCT solenoid stuck).

Possible Causes:

- VCT unit to camshaft alignment
- Camshaft timing incorrectly set
- Continuous oil flow to the VCT piston chamber
- Erratic camshaft position due to low oil pressure
- Oil flow restriction in the oil passages or the VCT valve body
- variable camshaft timing bank 2 solenoid 1 (VCT21) stuck in position
- VCT21 circuit open

- VCT21 circuit short to voltage
- VCT21 circuit short to ground
- VPWR circuit open
- Camshaft advance mechanism binding (VCT unit)
- Damaged VCT21 phaser
- Damaged camshaft position bank 2 sensor 1 (CMP21)
- CMP21 sensor circuits open
- CMP21 sensor circuits short to voltage
- CMP21 sensor circuits short to ground
- Radio frequency interference

Diagnostic Aids: This DTC may be accompanied by other DTCs. Diagnose all camshaft position (CMP) sensor DTCs first. If no CMP sensor related DTCs are present, continue to follow diagnosis for this DTC.
This DTC is a functional check of the VCT unit. Diagnose any base engine concerns related to the engine oil pressure or engine timing. Refer to the service information , Engine System, Oil Pressure Test, to check the engine oil pressure. Refer to the service information , Engine, to check the engine timing and VCT phasers.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HK .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0019 - CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION - BANK 2 SENSOR B - DTC CHART

P0019 - CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION - BANK 2 SENSOR B - DTC CHART

Description: This DTC sets when a misalignment between the camshaft and crankshaft is detected. The test fails when the misalignment is 1 tooth or greater. This DTC can also set due to variable camshaft timing (VCT) system concerns (oil contamination or VCT solenoid stuck).

Possible Causes:

- VCT unit to camshaft alignment
- Camshaft timing incorrectly set
- Continuous oil flow to the VCT piston chamber
- Erratic camshaft position due to low oil pressure

- Oil flow restriction in the oil passages or the VCT valve body
- variable camshaft timing bank 2 solenoid 2 (VCT22) stuck in position
- VCT22 circuit open
- VCT22 circuit short to voltage
- VCT22 circuit short to ground
- VPWR circuit open
- Camshaft advance mechanism binding (VCT unit)
- Damaged VCT22 phaser
- Damaged camshaft position bank 2 sensor 2 (CMP22)
- CMP22 sensor circuits open
- CMP22 sensor circuits short to voltage
- CMP22 sensor circuits short to ground
- Radio frequency interference

Diagnostic Aids: This DTC may be accompanied by other DTCs. Diagnose all camshaft position (CMP) sensor DTCs first. If no CMP sensor related DTCs are present, continue to follow diagnosis for this DTC.
This DTC is a functional check of the VCT unit. Diagnose any base engine concerns related to the engine oil pressure or engine timing. Refer to the service information , Engine System, Oil Pressure Test, to check the engine oil pressure. Refer to the service information , Engine, to check the engine timing and VCT phasers.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HK .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0020 - INTAKE CAMSHAFT POSITION ACTUATOR CIRCUIT/OPEN (BANK 2) - DTC CHART

P0020 - INTAKE CAMSHAFT POSITION ACTUATOR CIRCUIT/OPEN (BANK 2) - DTC CHART

Description: This DTC sets when a low or high voltage on the VCT21 circuit is detected. The test fails if the voltage exceeds a calibrated limit for a calibrated amount of time.

Possible Causes:

- VCT21 circuit open
- VCT21 circuit short to voltage
- VCT21 circuit short to ground

- VPWR circuit open
- Damaged variable camshaft timing bank 2 solenoid 1 (VCT21)

Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HK .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0021 - INTAKE CAMSHAFT POSITION TIMING - OVER-ADVANCED (BANK 2) - DTC CHART

P0021 - INTAKE CAMSHAFT POSITION TIMING - OVER-ADVANCED (BANK 2) - DTC CHART

Description: This DTC sets when the variable camshaft timing (VCT) position is over-advanced. The test fails when the camshaft timing exceeds a maximum calibrated value or remains in an advanced position.

Possible Causes:

- VCT unit to camshaft alignment
- Camshaft timing incorrectly set
- Continuous oil flow to the VCT piston chamber
- Erratic camshaft position due to low oil pressure
- Oil flow restriction in the oil passages or the VCT valve body
- Variable camshaft timing bank 2 solenoid 1 (VCT21) valve stuck open
- VCT21 circuit open
- VCT21 circuit short to voltage
- VCT21 circuit short to ground
- VPWR circuit open
- Camshaft advance mechanism binding (VCT unit)
- Damaged VCT21 phaser
- Damaged camshaft position bank 2 sensor 1 (CMP21)
- CMP21 sensor circuits open
- CMP21 sensor circuits short to voltage
- CMP21 sensor circuits short to ground
- Radio frequency interference

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0022 - INTAKE CAMSHAFT POSITION TIMING - OVER-RETARDED (BANK 2) - DTC CHART

P0022 - INTAKE CAMSHAFT POSITION TIMING - OVER-RETARDED (BANK 2) - DTC CHART

Description: This DTC sets when the variable camshaft timing (VCT) position is over-retarded. The test fails when the camshaft timing exceeds a maximum calibrated value or remains in a retarded position.

Possible Causes:

- VCT unit to camshaft alignment
- Camshaft timing incorrectly set
- Continuous oil flow to the VCT piston chamber
- Erratic camshaft position due to low oil pressure
- Oil flow restriction in the oil passages or the VCT valve body
- variable camshaft timing bank 2 solenoid 1 (VCT21) valve stuck open
- VCT21 circuit open
- VCT21 circuit short to voltage
- VCT21 circuit short to ground
- VPWR circuit open
- Camshaft advance mechanism binding (VCT unit)
- Damaged VCT21 phaser
- Damaged camshaft position bank 2 sensor 1 (CMP21)
- CMP21 sensor circuits open
- CMP21 sensor circuits short to voltage
- CMP21 sensor circuits short to ground
- Radio frequency interference

Diagnostic Aids: This DTC may be accompanied by other DTCs. Diagnose all camshaft position (CMP) sensor DTCs first. If no CMP sensor related DTCs are present, continue to follow diagnosis for this DTC.
This DTC is a functional check of the VCT unit. Diagnose any base engine concerns related to the engine oil pressure or engine timing. Refer to the service information , Engine System, Oil Pressure Test, to check the engine oil pressure. Refer to the service information , Engine, to check the engine timing and VCT phasers.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory

All	GO to Pinpoint Test HK .

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0023 - EXHAUST CAMSHAFT POSITION ACTUATOR CIRCUIT/OPEN (BANK 2) - DTC CHART

P0023 - EXHAUST CAMSHAFT POSITION ACTUATOR CIRCUIT/OPEN (BANK 2) - DTC CHART

Description: This DTC sets when a low or high voltage on the VCT22 circuit is detected. The test fails if the voltage exceeds a calibrated limit for a calibrated amount of time.

Possible Causes:

- VCT22 circuit open
- VCT22 circuit short to voltage
- VCT22 circuit short to ground
- VPWR circuit open
- Damaged variable camshaft timing bank 2 solenoid 2 (VCT22)

Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HK .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0024 - EXHAUST CAMSHAFT POSITION TIMING - OVER-ADVANCED (BANK 2) - DTC CHART

P0024 - EXHAUST CAMSHAFT POSITION TIMING - OVER-ADVANCED (BANK 2) - DTC CHART

Description: This DTC sets when the variable camshaft timing (VCT) position is over-advanced. The test fails when the camshaft timing exceeds a maximum calibrated value or remains in an advanced position.

Possible Causes:

- VCT unit to camshaft alignment
- Camshaft timing incorrectly set
- Continuous oil flow to the VCT piston chamber
- Erratic camshaft position due to low oil pressure
- Oil flow restriction in the oil passages or the VCT valve body
- Variable camshaft timing bank 2 solenoid 2 (VCT22) valve stuck open

- VCT22 circuit open
- VCT22 circuit short to voltage
- VCT22 circuit short to ground
- VPWR circuit open
- Camshaft advance mechanism binding (VCT unit)
- Damaged VCT22 phaser
- Damaged camshaft position bank 2 sensor 2 (CMP22)
- CMP22 sensor circuits open
- CMP22 sensor circuits short to voltage
- CMP22 sensor circuits short to ground
- Radio frequency interference

Diagnostic Aids: This DTC may be accompanied by other DTCs. Diagnose all camshaft position (CMP) sensor DTCs first. If no CMP sensor related DTCs are present, continue to follow diagnosis for this DTC.
This DTC is a functional check of the VCT unit. Diagnose any base engine concerns related to the engine oil pressure or engine timing. Refer to the service information , Engine System, Oil Pressure Test, to check the engine oil pressure. Refer to the service information , Engine, to check the engine timing and VCT phasers.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HK .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0025 - EXHAUST CAMSHAFT POSITION TIMING - OVER-RETARDED (BANK 2) - DTC CHART

P0025 - EXHAUST CAMSHAFT POSITION TIMING - OVER-RETARDED (BANK 2) - DTC CHART

Description: This DTC sets when the variable camshaft timing (VCT) position is over-retarded. The test fails when the camshaft timing exceeds a maximum calibrated value or remains in a retarded position.

Possible Causes:

- VCT unit to camshaft alignment
- Camshaft timing incorrectly set
- Continuous oil flow to the VCT piston chamber
- Erratic camshaft position due to low oil pressure

- Oil flow restriction in the oil passages or the VCT valve body
- variable camshaft timing bank 2 solenoid 2 (VCT22) valve stuck open
- VCT22 circuit open
- VCT22 circuit short to voltage
- VCT22 circuit short to ground
- VPWR circuit open
- Camshaft advance mechanism binding (VCT unit)
- Damaged VCT22 phaser
- Damaged camshaft position bank 2 sensor 2 (CMP22)
- CMP22 sensor circuits open
- CMP22 sensor circuits short to voltage
- CMP22 sensor circuits short to ground
- Radio frequency interference

Diagnostic Aids: This DTC may be accompanied by other DTCs. Diagnose all camshaft position (CMP) sensor DTCs first. If no CMP sensor related DTCs are present, continue to follow diagnosis for this DTC.
This DTC is a functional check of the VCT unit. Diagnose any base engine concerns related to the engine oil pressure or engine timing. Refer to the service information , Engine System, Oil Pressure Test, to check the engine oil pressure. Refer to the service information , Engine, to check the engine timing and VCT phasers.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HK .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0030 - HO2S HEATER CONTROL CIRCUIT (BANK 1, SENSOR 1) - DTC CHART

P0030 - HO2S HEATER CONTROL CIRCUIT (BANK 1, SENSOR 1) - DTC CHART

Description: The PCM controls the universal heated oxygen sensor bank 1, sensor 1 (HO2S11) heater ON and OFF duty cycle to maintain a calibrated temperature. This DTC sets when the sensor does not warm up to the required temperature in a calibrated amount of time. This DTC also sets when the PCM is not able to maintain the required temperature after the sensor is warm.

Possible Causes:

- UO2S11 circuit open
- UO2SGREF11 circuit open

- UO2SHTR11 circuit open
- UO2SHTR11 circuit short to voltage
- VPWR circuit open
- Incorrect connections
- Damaged or corroded terminals
- Exhaust temperature significantly higher than expected
- Damaged universal HO2S11

Diagnostic Aids: Inspect the connectors for signs of damage, water intrusion or corrosion.			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	GO to Pinpoint Test DZ .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0034 - TURBOCHARGER/SUPERCHARGER BYPASS VALVE A CONTROL CIRCUIT LOW - DTC CHART

P0034 - TURBOCHARGER/SUPERCHARGER BYPASS VALVE A CONTROL CIRCUIT LOW - DTC CHART

Description: This DTC sets when the PCM detects a short to ground in the TCBY circuit.

Possible Causes:

- Damaged turbocharger bypass (TCBY) valve
- TCBY circuit short to ground
- Damaged harness connector
- Damaged harness

Diagnostic Aids: Check the harness for intermittent concerns, incorrect connections, routing, alterations and damage due to contact with other components.
This DTC only sets when the valve is commanded closed.

Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	GO to Pinpoint Test HN .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0035 - TURBOCHARGER/SUPERCHARGER BYPASS VALVE A CONTROL CIRCUIT HIGH - DTC CHART

P0035 - TURBOCHARGER/SUPERCHARGER BYPASS VALVE A CONTROL CIRCUIT HIGH - DTC CHART

Description: This DTC sets when the PCM detects an open circuit or high voltage in the TCBY circuit.

Possible Causes:

- Damaged turbocharger bypass (TCBY) valve
- TCBY circuit open
- TCBY circuit short to voltage

Diagnostic Aids: Check the harness for intermittent concerns, incorrect connections, routing, alterations and damage due to contact with other components.
This DTC only sets when the valve is commanded open.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HN .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0036 - HO2S HEATER CONTROL CIRCUIT (BANK 1, SENSOR 2) - DTC CHART

P0036 - HO2S HEATER CONTROL CIRCUIT (BANK 1, SENSOR 2) - DTC CHART

Description: The PCM controls the heated oxygen sensor bank 1, sensor 2 (HO2S12) heater ON and OFF duty cycle to maintain a calibrated temperature. This DTC sets when the sensor does not warm up to the required temperature in a calibrated amount of time. This DTC also sets when the PCM is not able to maintain the required temperature after the sensor is warm.

Possible Causes:

- VPWR circuit open
- HTR12 circuit open
- HTR12 circuit short
- Incorrect connections
- Damaged or corroded terminals
- Exhaust temperature significantly higher than expected
- Damaged HO2S12

Diagnostic Aids: Inspect the connectors for signs of damage, water intrusion or corrosion.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DW .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0037 - HO2S HEATER CONTROL CIRCUIT LOW (BANK 1, SENSOR 2) - DTC CHART

P0037 - HO2S HEATER CONTROL CIRCUIT LOW (BANK 1, SENSOR 2) - DTC CHART

Description: The PCM controls the heated oxygen sensor bank 1, sensor 2 (HO2S12) heater ON and OFF duty cycle to maintain a calibrated temperature. This DTC sets when the sensor does not warm up to the required temperature in a calibrated amount of time. This DTC also sets when the PCM is not able to maintain the required temperature after the sensor is warm.

Possible Causes:

- HTR12 circuit short
- Incorrect connections
- Damaged or corroded terminals
- Exhaust temperature significantly higher than expected
- Damaged HO2S12

Diagnostic Aids: Inspect the connectors for signs of damage, water intrusion or corrosion.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DW .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0038 - HO2S HEATER CONTROL CIRCUIT HIGH (BANK 1, SENSOR 2) - DTC CHART

P0038 - HO2S HEATER CONTROL CIRCUIT HIGH (BANK 1, SENSOR 2) - DTC CHART

Description: The PCM controls the heated oxygen sensor bank 1, sensor 2 (HO2S12) heater ON and OFF duty cycle to maintain a calibrated temperature. This DTC sets when the sensor does not warm up to the required temperature in a calibrated amount of time. This DTC also sets when the PCM is not able to maintain the required temperature after the sensor is warm.

Possible Causes:

- HTR12 circuit short
- Incorrect connections
- Damaged or corroded terminals
- Exhaust temperature significantly higher than expected
- Damaged HO2S12

Diagnostic Aids: Inspect the connectors for signs of damage, water intrusion or corrosion.			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	GO to Pinpoint Test DW .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0040 - OXYGEN SENSOR SIGNALS SWAPPED BANK 1 SENSOR 1/BANK 2 SENSOR 1 - DTC CHART

P0040 - OXYGEN SENSOR SIGNALS SWAPPED BANK 1 SENSOR 1/BANK 2 SENSOR 1 - DTC CHART

Description: The heated oxygen sensor (HO2S) monitor determines if the universal HO2S signal response for a fuel shift corresponds to the correct engine bank. This DTC sets when there is no response from the universal HO2S being tested.

Possible Causes:

- Crossed universal HO2S harness connectors
- Crossed universal HO2S wiring at the harness connectors
- Crossed universal HO2S wiring at the PCM connectors

Diagnostic Aids: Connect the universal HO2S connector to the correct bank.			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	GO to Pinpoint Test DZ .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0041 - OXYGEN SENSOR SIGNALS SWAPPED BANK 1 SENSOR 2/BANK 2 SENSOR 2 - DTC CHART

P0041 - OXYGEN SENSOR SIGNALS SWAPPED BANK 1 SENSOR 2/BANK 2 SENSOR 2 - DTC CHART

Description: The heated oxygen sensor (HO2S) monitor determines if the HO2S signal response for a fuel shift corresponds to the correct engine bank. This DTC sets when there is no response from the HO2S being tested.

Possible Causes:

- Crossed HO2S harness connectors
- Crossed HO2S wiring at the harness connectors
- Crossed HO2S wiring at the PCM connectors

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0050 - HO2S HEATER CONTROL CIRCUIT (BANK 2, SENSOR 1) - DTC CHART

P0050 - HO2S HEATER CONTROL CIRCUIT (BANK 2, SENSOR 1) - DTC CHART

Description: The PCM controls the universal heated oxygen sensor bank 2, sensor 1 (HO2S21) heater ON and OFF duty cycle to maintain a calibrated temperature. This DTC sets when the sensor does not warm up to the required temperature in a calibrated amount of time. This DTC also sets when the PCM is not able to maintain the required temperature after the sensor is warm.

Possible Causes:

- UO2S21 circuit open
- UO2SGREF21 circuit open
- UO2SHTR21 circuit open
- UO2SHTR21 circuit short to voltage
- VPWR circuit open
- Incorrect connections
- Damaged or corroded terminals
- Exhaust temperature significantly higher than expected
- Damaged universal HO2S21

Diagnostic Aids: Inspect the connectors for signs of damage, water intrusion or corrosion.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DZ .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0053 - HO2S HEATER RESISTANCE (BANK 1, SENSOR 1) - DTC CHART

P0053 - HO2S HEATER RESISTANCE (BANK 1, SENSOR 1) - DTC CHART

Description: This DTC sets when the heater current requirements are too low or too high in the UO2SHTR11 circuit.

Possible Causes:

- VPWR circuit open
- UO2SHTR11 circuit open

- UO2SHTR11 circuit short
- Damaged universal HO2S11 heater

Diagnostic Aids: Inspect the connectors for signs of damage, water intrusion or corrosion.			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	GO to Pinpoint Test DZ .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0054 - HO2S HEATER RESISTANCE (BANK 1, SENSOR 2) - DTC CHART

P0054 - HO2S HEATER RESISTANCE (BANK 1, SENSOR 2) - DTC CHART

Description: This DTC sets when the heater current requirements are too low or too high in the HTR12 circuit.

Possible Causes:

- VPWR circuit open
- HTR12 circuit open
- HTR12 heater circuit short
- Damaged HO2S12 heater

Diagnostic Aids: Inspect the connectors for signs of damage, water intrusion or corrosion.			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	GO to Pinpoint Test DW .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0056 - HO2S HEATER CONTROL CIRCUIT (BANK 1, SENSOR 2) - DTC CHART

P0056 - HO2S HEATER CONTROL CIRCUIT (BANK 1, SENSOR 2) - DTC CHART

Description: The PCM controls the heated oxygen sensor bank 1, sensor 2 (HO2S12) heater ON and OFF duty cycle to maintain a calibrated temperature. This DTC sets when the sensor does not warm up to the required temperature in a calibrated amount of time. This DTC also sets when the PCM is not able to maintain the required temperature after the sensor is warm.

Possible Causes:

- VPWR circuit open
- HTR12 circuit open

- HTR12 circuit short
- Incorrect connections
- Damaged or corroded terminals
- Exhaust temperature significantly higher than expected
- Damaged HO2S12

Diagnostic Aids: Inspect the connectors for signs of damage, water intrusion or corrosion.			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	GO to Pinpoint Test DW .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0059 - HO2S HEATER RESISTANCE (BANK 2, SENSOR 1) - DTC CHART

P0059 - HO2S HEATER RESISTANCE (BANK 2, SENSOR 1) - DTC CHART

Description: This DTC sets when the heater current requirements are too low or too high in the UO2SHTR21 circuit.

Possible Causes:

- VPWR circuit open
- UO2SHTR21 circuit open
- UO2SHTR21 circuit short
- Damaged universal HO2S21 heater

Diagnostic Aids: Inspect the connectors for signs of damage, water intrusion or corrosion.			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	GO to Pinpoint Test DZ .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0060 - HO2S HEATER RESISTANCE (BANK 2, SENSOR 2) - DTC CHART

P0060 - HO2S HEATER RESISTANCE (BANK 2, SENSOR 2) - DTC CHART

Description: This DTC sets when the heater current requirements are too low or too high in the HTR22 circuit.

Possible Causes:

- VPWR circuit open
- HTR22 circuit open
- HTR22 circuit short
- Damaged HO2S22 heater

Diagnostic Aids: Inspect the connectors for signs of damage, water intrusion or corrosion.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DW .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0068 - MANIFOLD ABSOLUTE PRESSURE (MAP)/MASS AIR FLOW (MAF) - THROTTLE POSITION CORRELATION - DTC CHART

P0068 - MANIFOLD ABSOLUTE PRESSURE (MAP)/MASS AIR FLOW (MAF) - THROTTLE POSITION CORRELATION - DTC CHART

Description: The PCM monitors a vehicle operation rationality check by comparing sensed throttle position to mass airflow readings. This continuous memory DTC sets when during a key ON, engine running (KOER) self-test, the comparison of the throttle position (TP) sensor and MAF sensor readings are not consistent with the calibrated load values.

Possible Causes:

- Air leak at any connection or line of the intake air system components before or after the electronic throttle body (ETB)
- Leak in the positive crankcase ventilation (PCV) system
- TP sensor not seated correctly
- Damaged MAF sensor
- Damaged TP sensor

Diagnostic Aids: An intake air system leak at a hose, line or connection of any intake air system or PCV system component may cause this DTC to set.
Diagnose any MAF or TP DTCs first.
If the throttle plate is closed and the LOAD PID is greater than 55%, or with the throttle plate at wide open throttle (WOT) with the LOAD PID less than 30% indicates a concern is present.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DV .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0071 - AMBIENT AIR TEMPERATURE SENSOR CIRCUIT RANGE/PERFORMANCE - DTC CHART

P0071 - AMBIENT AIR TEMPERATURE SENSOR CIRCUIT RANGE/PERFORMANCE - DTC CHART

Description: This DTC sets when the ambient air temperature (AAT) sensor reading does not correlate with the other temperature sensor readings at ignition ON. The PCM runs this logic after an engine off and a calibrated soak period, typically 6 to 8 hours. This soak period allows the AAT sensor and the other temperature sensors to stabilize and not differ by greater than a calibrated value, typically 18°C (32.4°F).

Possible Causes:

- Damaged AAT sensor

Diagnostic Aids: Make sure the AAT sensor reading and the other temperature sensor readings are similar when the engine is cold and the vehicle has not been in direct sun light.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test FA .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0072 - AMBIENT AIR TEMPERATURE SENSOR CIRCUIT LOW - DTC CHART

P0072 - AMBIENT AIR TEMPERATURE SENSOR CIRCUIT LOW - DTC CHART

Description: This DTC sets when the ambient air temperature (AAT) sensor signal is less than the self-test minimum.

Possible Causes:

- AAT circuit short to ground
- Damaged AAT sensor

Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test FA .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0073 - AMBIENT AIR TEMPERATURE SENSOR CIRCUIT HIGH - DTC CHART

P0073 - AMBIENT AIR TEMPERATURE SENSOR CIRCUIT HIGH - DTC CHART

Description: This DTC sets when the ambient air temperature (AAT) sensor signal is greater than the self-test maximum.

Possible Causes:

- AAT circuit open
- AAT circuit short to voltage
- Damaged AAT sensor

Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test FA .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0074 - AMBIENT AIR TEMPERATURE SENSOR CIRCUIT INTERMITTENT/ERRATIC - DTC CHART

P0074 - AMBIENT AIR TEMPERATURE SENSOR CIRCUIT INTERMITTENT/ERRATIC - DTC CHART

Description: This DTC sets when the ambient air temperature (AAT) sensor signal changes beyond the minimum or maximum calibrated limit.

Possible Causes:

- AAT circuit intermittent open
- AAT circuit intermittent short to voltage
- AAT circuit intermittent short to ground
- Damaged AAT sensor

Diagnostic Aids: Check the harness and connection. Monitor the sensor PID while wiggling and bending the harness from the sensor to the PCM.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test FA .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P007B - CHARGE AIR COOLER TEMPERATURE SENSOR CIRCUIT RANGE/PERFORMANCE (BANK 1) - DTC CHART

P007B - CHARGE AIR COOLER TEMPERATURE SENSOR CIRCUIT RANGE/PERFORMANCE (BANK 1) - DTC CHART

Description: This DTC sets when the CAC_T PID does not correlate with the IAT or the IAT2 PIDs at ignition ON or if the IAT PID reading is greater than a maximum calibrated value while driving.

Possible Causes:

- Damaged charge air cooler temperature (CACT) sensor
- Contaminated or restricted CACT sensor
- Slow responding CACT sensor

Diagnostic Aids: Check temperature values while engine is at ambient temperature, cold soak the engine for a minimum of 6 hours if necessary.
Check airflow through charge air cooler (CAC), remove debris if necessary.
This DTC may be accompanied by other DTCs. Check for other DTCs and diagnose those first.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DN .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P007C - CHARGE AIR COOLER TEMPERATURE SENSOR CIRCUIT LOW (BANK 1) - DTC CHART

P007C - CHARGE AIR COOLER TEMPERATURE SENSOR CIRCUIT LOW (BANK 1) - DTC CHART

Description: This DTC sets when the charge air cooler temperature (CACT) is greater than a calibrated value or a short to ground is detected in the CACT circuit.

Possible Causes:

- Damaged charge air cooler temperature (CACT) sensor
- CACT circuit short to ground
- VPWR circuit open
- Low airflow through the charge air cooler (CAC)
- Damaged harness connector
- Damaged harness

Diagnostic Aids: Check the harness for intermittent concerns, incorrect connections, routing, alterations and damage due to contact with other components.
This DTC may be accompanied by other DTCs. Check for other DTCs and diagnose those first.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DN .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P007D - CHARGE AIR COOLER TEMPERATURE SENSOR CIRCUIT HIGH (BANK 1) - DTC CHART

P007D - CHARGE AIR COOLER TEMPERATURE SENSOR CIRCUIT HIGH (BANK 1) - DTC CHART

Description: This DTC sets when the charge air cooler temperature (CACT) is lower than a calibrated value or an open or short to voltage is detected in the CACT circuit.

Possible Causes:

- Damaged charge air cooler temperature (CACT) sensor
- CACT circuit open
- CACT circuit short to voltage
- SIGRTN circuit open
- Output from the charge air cooler (CAC) is colder than the calibrated threshold

Diagnostic Aids: Check the harness for intermittent concerns, incorrect connections, routing, alterations and damage due to contact with other components.
This DTC may be accompanied by other DTCs. Check for other DTCs and diagnose those first.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DN .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0087 - FUEL RAIL/SYSTEM PRESSURE - TOO LOW - DTC CHART

P0087 - FUEL RAIL/SYSTEM PRESSURE - TOO LOW - DTC CHART

Description: The PCM regulates the fuel rail pressure by controlling the fuel volume regulator. This DTC sets when the PCM is no longer capable of maintaining the fuel pressure within the calibrated parameters.

Possible Causes:

- Fuel filter plugged or dirty
- Fuel supply line restricted
- Damaged fuel pump module
- Damaged fuel injection pump

Diagnostic Aids: Diagnose any FRP and FVR circuit DTCs first.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory

All	GO to Pinpoint Test HP .

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0088 - FUEL RAIL/SYSTEM PRESSURE - TOO HIGH - DTC CHART

P0088 - FUEL RAIL/SYSTEM PRESSURE - TOO HIGH - DTC CHART

Description: The PCM regulates the fuel rail pressure by controlling the fuel volume regulator. This DTC sets when the PCM is no longer capable of maintaining the fuel pressure within the calibrated parameters.

Possible Causes:

- Damaged fuel injection pump

Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HP .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P008A - LOW PRESSURE FUEL SYSTEM PRESSURE - TOO LOW - DTC CHART

P008A - LOW PRESSURE FUEL SYSTEM PRESSURE - TOO LOW - DTC CHART

Description: The PCM monitors the fuel pressure sensor. This DTC sets when the low pressure fuel system pressure falls below an expected threshold.

Possible Causes:

- Low or no fuel
- Low fuel pressure
- Damaged fuel pressure sensor

Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HC .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P008B - LOW PRESSURE FUEL SYSTEM PRESSURE - TOO HIGH - DTC CHART

P008B - LOW PRESSURE FUEL SYSTEM PRESSURE - TOO HIGH - DTC CHART

Description: The PCM monitors the fuel pressure sensor. This DTC sets when the low pressure fuel system pressure rises above an expected threshold.

Possible Causes:

- High fuel pressure
- Damaged fuel pressure sensor

Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HC .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0093 - FUEL SYSTEM LEAK DETECTED - LARGE LEAK - DTC CHART

P0093 - FUEL SYSTEM LEAK DETECTED - LARGE LEAK - DTC CHART

Description: This DTC sets when the PCM detects an air leak that exceeds a calibrated limit for greater than 5 seconds. If the airflow entering the engine exceeds the airflow through the throttle, a leak is detected and this diagnostic fails.

Possible Causes:

- Unmetered air leaks between throttle body and intake valves
- Air leaks at the intake manifold
- Positive crankcase ventilation (PCV) system is leaking

Diagnostic Aids: Verify the integrity of the PCV system. Refer to POSITIVE CRANKCASE VENTILATION (PCV) SYSTEM for system information.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HG .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0094 - FUEL SYSTEM LEAK DETECTED - SMALL LEAK - DTC CHART

P0094 - FUEL SYSTEM LEAK DETECTED - SMALL LEAK - DTC CHART

Description: This DTC sets when the PCM detects an air leak that exceeds a calibrated limit for greater than 5 seconds. If the airflow entering the engine exceeds the airflow through the throttle, a leak is detected and this diagnostic fails.

Possible Causes:

- Unmetered air leaks between throttle body and intake valves
- Air leaks at the intake manifold
- Positive crankcase ventilation (PCV) system is leaking

Diagnostic Aids: Verify the integrity of the PCV system. Refer to POSITIVE CRANKCASE VENTILATION (PCV) SYSTEM for system information.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HG .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0096 - INTAKE AIR TEMPERATURE SENSOR 2 CIRCUIT RANGE/PERFORMANCE (BANK 1) - DTC CHART

P0096 - INTAKE AIR TEMPERATURE SENSOR 2 CIRCUIT RANGE/PERFORMANCE (BANK 1) - DTC CHART

Description: This DTC sets when the intake air temperature 2 (IAT2) sensor PID does not correlate with the charge air cooler temperature (CACT) sensor or the intake air temperature (IAT) sensor PIDs at ignition ON. It also sets if the IAT2 sensor PID exceeds the maximum calibrated temperature threshold while driving.

Possible Causes:

- Slow responding intake air temperature 2 (IAT2) sensor
- Damaged IAT2 sensor

Diagnostic Aids: The IAT2 sensor is located on top of the intake manifold. Aftermarket heaters that are attached to the engine, transmission or battery may cause DTC P0096 to set in cold weather climates after a 6 hour soak period.
This DTC may be accompanied by other DTCs. Check for other DTCs and diagnose those first.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DN .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0097 - INTAKE AIR TEMPERATURE SENSOR 2 CIRCUIT LOW - DTC CHART

P0097 - INTAKE AIR TEMPERATURE SENSOR 2 CIRCUIT LOW - DTC CHART

Description: This DTC sets when the intake air temperature 2 (IAT2) sensor signal is less than the

self-test minimum. The IAT2 sensor minimum is 0.2 volt.
Possible Causes: • IAT2 circuit short to ground • Incorrect harness connection • Damaged IAT2 sensor
Diagnostic Aids: Monitor the IAT2 sensor PID value. A typical IAT2 sensor temperature should be greater than the IAT sensor temperature.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DN .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0098 - INTAKE AIR TEMPERATURE SENSOR 2 CIRCUIT HIGH - DTC CHART

P0098 - INTAKE AIR TEMPERATURE SENSOR 2 CIRCUIT HIGH - DTC CHART

Description: This DTC sets when the intake air temperature 2 (IAT2) sensor signal is greater than the self-test maximum. The IAT2 sensor maximum is 4.6 volts.
Possible Causes: • IAT2 circuit open • IAT2 circuit short to voltage • Incorrect harness connection • Damaged IAT2 sensor
Diagnostic Aids: Monitor the IAT2 sensor PID value. A typical IAT2 sensor temperature should be greater than the IAT sensor temperature.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DN .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P00BA - LOW FUEL PRESSURE FORCED LIMITED POWER - DTC CHART

P00BA - LOW FUEL PRESSURE FORCED LIMITED POWER - DTC CHART

Description: This DTC sets when the fuel delivery volume is less than the requested fuel delivery volume and the PCM has reduced engine power as a result.

Possible Causes:

- Restricted fuel filter
- Restricted fuel supply line
- Damaged or worn fuel pump
- Fuel sloshing at low fuel level
- Sudden acceleration
- Vehicle driven on hilly or steep inclines

Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HC .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P00BB - FUEL INJECTOR INSUFFICIENT FLOW - FORCED LIMITED POWER - DTC CHART

P00BB - FUEL INJECTOR INSUFFICIENT FLOW - FORCED LIMITED POWER - DTC CHART

Description: This DTC sets when the requested fuel delivery volume is greater than the fuel injectors maximum delivery volume.

Possible Causes:

- High ethanol content in the fuel tank
- Customer driving habits
- Restricted fuel filter
- Restricted fuel supply line
- Damaged or worn fuel pump

Diagnostic Aids: A high fuel ethanol content combined with pulling or carrying a heavy load up a steep grade could set this DTC.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HC .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P00C1 - TURBOCHARGER/SUPERCHARGER BYPASS VALVE B CONTROL CIRCUIT LOW - DTC CHART

P00C1 - TURBOCHARGER/SUPERCHARGER BYPASS VALVE B CONTROL CIRCUIT LOW - DTC CHART

Description: This DTC sets when there is a short to ground in the TCBY2 circuit.

Possible Causes:

- Damaged turbocharger bypass 2 (TCBY2) valve
- TCBY2 circuit short to ground
- Damaged harness connector
- Damaged harness

Diagnostic Aids: Check the harness for intermittent concerns, incorrect connections, routing, alterations and damage due to contact with other components.
This DTC only sets when the valve is commanded closed.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HN .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P00C2 - TURBOCHARGER/SUPERCHARGER BYPASS VALVE B CONTROL CIRCUIT HIGH - DTC CHART

P00C2 - TURBOCHARGER/SUPERCHARGER BYPASS VALVE B CONTROL CIRCUIT HIGH - DTC CHART

Description: This DTC sets when there is an open circuit or high voltage in the TCBY2 circuit.

Possible Causes:

- Damaged turbocharger bypass 2 (TCBY2) valve
- TCBY2 circuit open
- TCBY2 circuit short to voltage

Diagnostic Aids: Check the harness for intermittent concerns, incorrect connections, routing, alterations and damage due to contact with other components.
This DTC only sets when the valve is commanded open.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HN .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P00C6 - FUEL

RAIL PRESSURE TOO LOW - ENGINE CRANKING - DTC CHART

P00C6 - FUEL RAIL PRESSURE TOO LOW - ENGINE CRANKING - DTC CHART

Description: The high pressure fuel system must reach a minimum pressure threshold before the engine can be started. This DTC sets if the high pressure fuel system cannot achieve this threshold within certain time and crankshaft rotation limits; the PCM attempts to start the engine at fuel pump assembly pressure.

Possible Causes:

- Fuel filter plugged or dirty
- Fuel supply line restricted
- Damaged fuel pump module
- Damaged fuel injection pump

Diagnostic Aids: Diagnose any fuel rail pressure (FRP) and FVR circuit DTCs first.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HP .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P00CE - INTAKE AIR TEMPERATURE MEASUREMENT SYSTEM - MULTIPLE SENSOR CORRELATION - DTC CHART

P00CE - INTAKE AIR TEMPERATURE MEASUREMENT SYSTEM - MULTIPLE SENSOR CORRELATION - DTC CHART

Description: This DTC sets when the charge air cooler temperature (CACT), intake air temperature (IAT) and the intake air temperature 2 (IAT2) PIDs are each greater than 16.67°C (30°F) different from each other at start up or that each sensor is out of the calibrated range at engine start up after a soak period of at least 6 hours when a block heater is not used.

Possible Causes:

- Damaged CACT, IAT or IAT2 sensors
- Contaminated or restricted CACT, IAT or IAT2 sensors
- Slow responding CACT, IAT or IAT2 sensors

Diagnostic Aids: Compare all sensor readings to the ambient temperature to determine which sensor is reading correctly.
This DTC may be accompanied by other DTCs. Check for other DTCs and diagnose those first.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DN .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P00D2 - HO2S HEATER CONTROL CIRCUIT RANGE/PERFORMANCE (BANK 1 SENSOR 2) - DTC CHART

P00D2 - HO2S HEATER CONTROL CIRCUIT RANGE/PERFORMANCE (BANK 1 SENSOR 2) - DTC CHART

Description: This DTC sets when the internal impedance of the heated oxygen sensor bank 1, sensor 2 (HO2S12) exceeds the calibrated threshold.

Possible Causes:

- Incorrect connections
- Damaged or corroded terminals
- Damaged HO2S12 heater

Diagnostic Aids: Inspect the connectors for signs of damage, water intrusion or corrosion.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DW .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P00DF - CHARGE AIR COOLER COOLANT TEMPERATURE SENSOR CIRCUIT RANGE/PERFORMANCE - DTC CHART

P00DF - CHARGE AIR COOLER COOLANT TEMPERATURE SENSOR CIRCUIT RANGE/PERFORMANCE - DTC CHART

Description: This DTC sets when the charge air cooler (CAC) coolant temperature sensor PID does not correlate with the IAT sensor or the ECT sensor PIDs at ignition ON or if the CAC coolant temperature PID reading is greater than a maximum calibrated value while driving.

Possible Causes:

- Damaged CAC coolant temperature sensor
- Slow responding CAC coolant temperature sensor

Diagnostic Aids: Check temperature values while engine is at ambient temperature, cold soak the engine for a minimum of 6 hours if necessary.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test KP .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P00E0 - CHARGE AIR COOLER COOLANT TEMPERATURE SENSOR CIRCUIT LOW - DTC CHART

P00E0 - CHARGE AIR COOLER COOLANT TEMPERATURE SENSOR CIRCUIT LOW - DTC CHART

Description: This DTC sets when the charge air cooler (CAC) coolant temperature is greater than a calibrated value or a short to ground is detected in the CACCTS circuit.			
Possible Causes: • CACCTS circuit short to ground • Damaged CAC coolant temperature sensor			
Diagnostic Aids: A CAC coolant temperature sensor reading less than the self-test minimum with ignition ON, engine OFF or during any engine operating mode indicates a concern is present.			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	GO to Pinpoint Test KP .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P00E1 - CHARGE AIR COOLER COOLANT TEMPERATURE SENSOR CIRCUIT HIGH - DTC CHART

P00E1 - CHARGE AIR COOLER COOLANT TEMPERATURE SENSOR CIRCUIT HIGH - DTC CHART

Description: This DTC sets when the charge air cooler (CAC) coolant temperature is less than a calibrated value or a short to voltage is detected in the CACCTS circuit.			
Possible Causes: • CACCTS circuit open • CACCTS circuit short to voltage • Damaged CAC coolant temperature sensor			
Diagnostic Aids: A CAC coolant temperature sensor reading greater than the self-test maximum with ignition ON, engine OFF or during any engine operating mode indicates a concern is present.			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	GO to Pinpoint Test KP .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P00E2 -

CHARGE AIR COOLER COOLANT TEMPERATURE SENSOR INTERMITTENT/ERRATIC - DTC CHART

P00E2 - CHARGE AIR COOLER COOLANT TEMPERATURE SENSOR INTERMITTENT/ERRATIC - DTC CHART

Description: This DTC sets when the charge air cooler (CAC) coolant temperature sensor signal changes from an in range value to beyond the minimum or maximum calibrated limit a calibrated number of times.

Possible Causes:

- CACCTS circuit intermittent open
- CACCTS circuit intermittent short to ground
- CACCTS circuit intermittent short to voltage
- Damaged CAC coolant temperature sensor
- Damaged CAC coolant temperature sensor wiring

Diagnostic Aids: Check the harness and connection. Monitor the sensor PID while wiggling and bending the harness from the sensor to the PCM.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test KP .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0100 - MASS OR VOLUME AIR FLOW A CIRCUIT - DTC CHART

P0100 - MASS OR VOLUME AIR FLOW A CIRCUIT - DTC CHART

Description: This DTC sets when the mass airflow (MAF) sensor frequency changes below a minimum calibrated limit for greater than 0.5 seconds.

Possible Causes:

- Open MAF sensor element
- Intake air system components incorrectly connected

Diagnostic Aids: Install a new mass airflow/intake air temperature (MAF/IAT) sensor. Refer to the service information , Electronic Engine Controls.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0101 - MASS OR VOLUME AIR FLOW A CIRCUIT RANGE/PERFORMANCE - DTC CHART

P0101 - MASS OR VOLUME AIR FLOW A CIRCUIT RANGE/PERFORMANCE - DTC CHART

Description: This DTC sets when the actual airflow is less or greater than the modeled airflow by greater than a calibrated value for 2.4 seconds.

Possible Causes:

- Restricted airflow
- Intake air system leak
- Damaged mass airflow (MAF) sensor

Diagnostic Aids: Check the MAF sensor for contamination and the intake air system for leaks.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DC .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0102 - MASS OR VOLUME AIR FLOW A CIRCUIT LOW - DTC CHART

P0102 - MASS OR VOLUME AIR FLOW A CIRCUIT LOW - DTC CHART

Description: This DTC sets when during key ON, engine running (KOER), the mass airflow (MAF) sensor output changes below a minimum calibrated limit for greater than a set period of time.

Possible Causes:

- MAF circuit short to ground
- Damaged MAF sensor

Diagnostic Aids: Make sure the MAF sensor connector is locked and seated correctly.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DC .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0103 - MASS OR VOLUME AIR FLOW A CIRCUIT HIGH - DTC CHART

P0103 - MASS OR VOLUME AIR FLOW A CIRCUIT HIGH - DTC CHART

Description: This DTC sets when the mass airflow (MAF) sensor output changes above a maximum

calibrated limit while the engine is running.
Possible Causes: • MAF circuit open • MAF circuit short to voltage • Damaged MAF sensor
Diagnostic Aids: Make sure the MAF sensor connector is locked and seated correctly.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DC .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0104 - MASS OR VOLUME AIR FLOW A CIRCUIT INTERMITTENT/ERRATIC - DTC CHART

P0104 - MASS OR VOLUME AIR FLOW A CIRCUIT INTERMITTENT/ERRATIC - DTC CHART

Description: This DTC sets when a concern exists in the MAF circuit, or the air tube containing the mass airflow (MAF) sensor, causing an incorrect sensor output reading.
Possible Causes: • MAF circuit intermittent open • MAF circuit intermittent short to voltage
Diagnostic Aids: Check the MAF sensor tube for air leaks.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DC .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0106 - MANIFOLD ABSOLUTE PRESSURE (MAP/BARO) SENSOR RANGE/PERFORMANCE - DTC CHART

P0106 - MANIFOLD ABSOLUTE PRESSURE (MAP/BARO) SENSOR RANGE/PERFORMANCE - DTC CHART

For Vehicles With 2.7L And 3.5L GTDI Engines
Description: This DTC sets when the MAP PID does not correlate with the BARO or the TCBP PID.
Possible Causes: • Slow responding manifold absolute pressure (MAP) sensor

- Damaged MAP sensor

Diagnostic Aids: This DTC may be accompanied by other DTCs. Check for other DTCs and diagnose those first.

For All Others

Description: This DTC sets when the manifold absolute pressure (MAP) sensor input does not correlate with an inferred MAP value. The inferred value is based on the mass airflow (MAF) sensor.

Possible Causes:

- Slow responding MAP sensor
- Damaged MAP sensor
- Damaged MAF sensor

Diagnostic Aids: This DTC may be accompanied by other DTCs. Check for other DTCs and diagnose those first.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DM .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0107 - MANIFOLD ABSOLUTE PRESSURE (MAP)/BAROMETRIC PRESSURE (BARO) SENSOR LOW - DTC CHART

P0107 - MANIFOLD ABSOLUTE PRESSURE (MAP)/BAROMETRIC PRESSURE (BARO) SENSOR LOW - DTC CHART

Description: This DTC sets when the manifold absolute pressure (MAP) sensor operating voltage is below the minimum calibrated parameter of 0.024 volt.

Possible Causes:

- MAP circuit short to ground
- VREF circuit open
- VREF circuit short to ground
- Damaged MAP sensor

Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DM .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0108 - MANIFOLD ABSOLUTE PRESSURE (MAP)/BAROMETRIC PRESSURE (BARO) SENSOR HIGH - DTC CHART

P0108 - MANIFOLD ABSOLUTE PRESSURE (MAP)/BAROMETRIC PRESSURE (BARO) SENSOR HIGH - DTC CHART

Description: This DTC sets when the manifold absolute pressure (MAP) sensor operating voltage is greater than the maximum allowable calibrated parameter of 4.96 volts.

Possible Causes:

- VREF circuit short to voltage
- MAP circuit open
- MAP circuit short to voltage

Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DM .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0109 - MANIFOLD ABSOLUTE PRESSURE (MAP)/BAROMETRIC PRESSURE (BARO) SENSOR INTERMITTENT - DTC CHART

P0109 - MANIFOLD ABSOLUTE PRESSURE (MAP)/BAROMETRIC PRESSURE (BARO) SENSOR INTERMITTENT - DTC CHART

Description: This DTC sets when the manifold absolute pressure (MAP) sensor signal is intermittent.

Possible Causes:

- MAP circuit intermittent open
- MAP circuit intermittent short to voltage
- MAP circuit intermittent short to ground
- Damaged MAP sensor
- Incorrect harness connections

Diagnostic Aids: Check the harness and connection.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DM .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0111 - INTAKE AIR TEMPERATURE (IAT) SENSOR 1 CIRCUIT RANGE/PERFORMANCE - DTC CHART

P0111 - INTAKE AIR TEMPERATURE (IAT) SENSOR 1 CIRCUIT RANGE/PERFORMANCE - DTC CHART

For Vehicles With 2.7L And 3.5L GTDI Engines

Description: This DTC sets when either of the following conditions are present.
When the IAT sensor PID does not correlate with the charge air cooler temperature (CACT) sensor or the intake air temperature 2 (IAT2) sensor PIDs at ignition ON.
When the IAT sensor PID exceeds the maximum calibrated temperature threshold while driving.

Possible Causes:

- Slow responding IAT sensor
- Damaged IAT sensor

Diagnostic Aids: The IAT sensor is located on the air filter housing.

For All Others

Description: This DTC sets when the intake air temperature value is higher than a calibrated value indicating that the rationality test has failed and could prevent one or more on board diagnostic (OBD) monitors from completing.
The PCM runs this logic after an engine OFF and a calibrated soak period (typically 6 to 8 hours). This soak period allows the intake air temperature (IAT) sensor and other temperature sensors to stabilize and not differ by greater than a calibrated value. DTC P0111 sets when the IAT sensor value at engine start exceeds the other temperature sensors by greater than a calibrated value, typically 17°C (30°F).

Possible Causes:

- Damaged IAT sensor

Diagnostic Aids: Make sure the IAT reading and the other temperature sensor readings are similar when the engine is cold.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DA .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0112 - INTAKE AIR TEMPERATURE (IAT) SENSOR 1 CIRCUIT LOW - DTC CHART

P0112 - INTAKE AIR TEMPERATURE (IAT) SENSOR 1 CIRCUIT LOW - DTC CHART

Description: This DTC sets when the IAT sensor signal is less than the self-test minimum.

Possible Causes:

- IAT circuit short to ground
- Damaged IAT sensor
- Incorrect harness connection

Diagnostic Aids: An IAT sensor PID reading less than the self-test minimum with ignition ON engine OFF or during any engine operating mode indicates a concern is present.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DA .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0113 - INTAKE AIR TEMPERATURE (IAT) SENSOR 1 CIRCUIT HIGH - DTC CHART

P0113 - INTAKE AIR TEMPERATURE (IAT) SENSOR 1 CIRCUIT HIGH - DTC CHART

Description: This DTC sets when the IAT sensor signal is greater than the self-test maximum.

Possible Causes:

- IAT circuit open
- IAT circuit short to voltage
- Damaged IAT sensor
- Incorrect harness connection

Diagnostic Aids: An IAT sensor PID reading greater than self-test maximum with the ignition ON engine OFF or during any engine operating mode indicates a concern is present.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DA .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0114 - INTAKE AIR TEMPERATURE (IAT) SENSOR 1 INTERMITTENT/ERRATIC - DTC CHART

P0114 - INTAKE AIR TEMPERATURE (IAT) SENSOR 1 INTERMITTENT/ERRATIC - DTC CHART

Description: This DTC sets when the IAT sensor signal was intermittent during the comprehensive component monitor (CCM).

Possible Causes:

- IAT circuit intermittent open

- IAT circuit intermittent short to voltage
- IAT circuit intermittent short to ground
- Damaged IAT sensor
- Damaged harness connector
- Damaged harness

Diagnostic Aids: Monitor the IAT sensor value on a scan tool. Look for sudden changes in the reading when the harness is wiggled or the sensor is tapped.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DA .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0116 - ENGINE COOLANT TEMPERATURE (ECT) SENSOR 1 CIRCUIT RANGE/PERFORMANCE - DTC CHART

P0116 - ENGINE COOLANT TEMPERATURE (ECT) SENSOR 1 CIRCUIT RANGE/PERFORMANCE - DTC CHART

Description: This DTC sets when the engine coolant temperature or cylinder head temperature value is higher than the calibrated value and could prevent one or more on board diagnostic (OBD) monitors from completing. The PCM runs this logic after an engine off and a calibrated soak period (typically 6 hours). This soak period allows the intake air temperature and the engine coolant temperature or cylinder head temperature to stabilize and not differ by greater than a calibrated value. This DTC sets when all of the following conditions are met:
The engine coolant temperature at engine start exceeds the intake air temperature at engine start by greater than a calibrated value, typically 17°C (30°F).
The engine coolant temperature exceeds a calibrated value, typically 107°C (225°F).
The fuel system, heated oxygen and misfire monitors have not completed.
The calibrated time to set this DTC has expired.

Possible Causes:

- ECT or cylinder head temperature (CHT) sensor
- Coolant system concern

Diagnostic Aids: Make sure the intake air temperature and the engine coolant temperature or cylinder head temperature are similar when the engine is cold. Also make sure the ECT or CHT sensor and the actual engine operating temperatures are the same.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
Edge 2.0L, Edge 2.7L, Escape/Kuga 2.0L, Explorer 2.0L,	GO to Pinpoint Test DX .		

F-150 2.7L, Fiesta, Focus, Fusion 1.5L, Fusion 1.6L, Fusion 2.0L, MKC, MKT 2.0L, MKZ 2.0L, Mustang 2.3L, Taurus 2.0L, Transit Connect 1.6L	
All others	GO to Pinpoint Test DL .

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0117 - ENGINE COOLANT TEMPERATURE (ECT) SENSOR 1 CIRCUIT LOW - DTC CHART

P0117 - ENGINE COOLANT TEMPERATURE (ECT) SENSOR 1 CIRCUIT LOW - DTC CHART

Description: This DTC sets when the ECT sensor signal is less than the self-test minimum. The ECT sensor signal minimum is 121°C (250°F).

Possible Causes:

- ECT circuit short to ground
- Damaged ECT sensor
- Incorrect harness connection

Diagnostic Aids: A concern is present if the ECT (TEMP) PID reading is greater than 121° C (250° F) with the ignition ON engine OFF or during any engine operating mode.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DX .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0118 - ENGINE COOLANT TEMPERATURE (ECT) SENSOR 1 CIRCUIT HIGH - DTC CHART

P0118 - ENGINE COOLANT TEMPERATURE (ECT) SENSOR 1 CIRCUIT HIGH - DTC CHART

Description: This DTC sets when the ECT sensor signal is greater than the self-test maximum. The ECT sensor signal maximum is -50° C (-58° F).

Possible Causes:

- ECT circuit open
- ECT circuit short to voltage
- Incorrect harness connection
- Damaged ECT sensor

Diagnostic Aids: A concern is present if the ECT (TEMP) PID reading is less than -50° C (-58° F) with the ignition ON engine OFF or during any engine operating mode.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DX .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0119 - ENGINE COOLANT TEMPERATURE (ECT) SENSOR 1 CIRCUIT INTERMITTENT/ERRATIC - DTC CHART

P0119 - ENGINE COOLANT TEMPERATURE (ECT) SENSOR 1 CIRCUIT INTERMITTENT/ERRATIC - DTC CHART

Description: This DTC sets when the ECT circuit is intermittently open or shorted while the engine is running.

Possible Causes:

- Damaged ECT harness
- Damaged ECT sensor
- Damaged ECT harness connector
- Low engine coolant

Diagnostic Aids: Monitor the engine coolant temperature or the cylinder head temperature on a scan tool, look for sudden changes in the reading when the harness is wiggled or the sensor is tapped.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
Edge 2.0L, Edge 2.7L, Escape/Kuga 2.0L, Explorer 2.0L, F-150 2.7L, Fiesta, Focus, Fusion 1.5L, Fusion 1.6L, Fusion 2.0L,	GO to Pinpoint Test DX .		

MKC, MKT 2.0L, MKZ 2.0L, Mustang 2.3L, Taurus 2.0L, Transit Connect 1.6L	
All others	GO to Pinpoint Test DL .

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P011E - ENGINE COOLANT TEMPERATURE 1/AMBIENT AIR TEMPERATURE CORRELATION - DTC CHART

P011E - ENGINE COOLANT TEMPERATURE 1/AMBIENT AIR TEMPERATURE CORRELATION - DTC CHART

Description: This DTC sets when the engine coolant temperature (ECT) and ambient air temperature (AAT) sensor readings differ by greater than a calibrated value.

Possible Causes:

- Biased ECT or AAT sensor
- Damaged ECT or AAT sensor
- Damaged intake air temperature (IAT) sensor

Diagnostic Aids: Make sure the ECT, AAT and IAT sensor readings are within 18°C (32.4°F) of each other after 6 to 8 hours at a stabilized ambient temperature and the vehicle has not been in direct sunlight.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DX .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0122 - THROTTLE/PEDAL POSITION SENSOR A CIRCUIT LOW - DTC CHART

P0122 - THROTTLE/PEDAL POSITION SENSOR A CIRCUIT LOW - DTC CHART

Description: This DTC sets when the electronic throttle control (ETC) throttle position 1 (TP1) signal is too low.

Possible Causes:

- TP1 circuit open
- TP1 circuit short to ground

- Damaged TP1 sensor

Diagnostic Aids: This concern exhibits a symptom of limited power. A TP1 PID reading less than 0.25 volt in ignition ON, engine OFF or ignition ON, engine running indicates a concern is present.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DV .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0123 - THROTTLE/PEDAL POSITION SENSOR A CIRCUIT HIGH - DTC CHART

P0123 - THROTTLE/PEDAL POSITION SENSOR A CIRCUIT HIGH - DTC CHART

Description: This DTC sets when the electronic throttle control (ETC) throttle position 1 (TP1) signal is too high.

Possible Causes:

- TP1 circuit short to voltage
- TP1 circuit short to VREF
- ETCRTN circuit open
- Damaged TP1 sensor

Diagnostic Aids: This concern exhibits a symptom of limited power. A TP1 PID reading greater than 4.75 volts in ignition ON, engine OFF or ignition ON, engine running indicates a concern is present.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DV .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0125 - INSUFFICIENT COOLANT TEMPERATURE FOR CLOSED LOOP FUEL CONTROL - DTC CHART

P0125 - INSUFFICIENT COOLANT TEMPERATURE FOR CLOSED LOOP FUEL CONTROL - DTC CHART

Description: This DTC sets when the engine coolant temperature (ECT) or the cylinder head temperature (CHT) sensor has not achieved the required temperature level to enter closed loop operating conditions within a specified amount of time after starting the engine.

Possible Causes:

- Insufficient warm up time

- Low engine coolant level
- Leaking or stuck open thermostat
- Damaged ECT sensor
- Damaged CHT sensor

Diagnostic Aids: Compare the thermostat specification to the actual engine coolant temperature using the engine temperature PID (ECT or CHT). The temperature reading should be similar when the engine is at a normal operating temperature.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
Edge 2.0L, Edge 2.7L, Escape/Kuga 2.0L, Explorer 2.0L, F-150 2.7L, Fiesta, Focus, Fusion 1.5L, Fusion 1.6L, Fusion 2.0L, MKC, MKT 2.0L, MKZ 2.0L, Mustang 2.3L, Taurus 2.0L, Transit Connect 1.6L	GO to Pinpoint Test DX .		
All others	GO to Pinpoint Test DL .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0128 - COOLANT THERMOSTAT (COOLANT TEMPERATURE BELOW THERMOSTAT REGULATING TEMPERATURE) - DTC CHART

P0128 - COOLANT THERMOSTAT (COOLANT TEMPERATURE BELOW THERMOSTAT REGULATING TEMPERATURE) - DTC CHART

Description: This DTC sets when the thermostat monitor has not achieved the required engine operating temperature within a specified amount of time after starting the engine.

Possible Causes:

- Insufficient warm up time
- Low engine coolant level
- Leaking or stuck open thermostat
- Damaged engine coolant temperature (ECT) sensor

- Damaged cylinder head temperature (CHT) sensor

Diagnostic Aids: Refer to THERMOSTAT MONITOR for system information.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
Edge 2.0L, Edge 2.7L, Escape/Kuga 2.0L, Explorer 2.0L, F-150 2.7L, Fiesta, Focus, Fusion 1.5L, Fusion 1.6L, Fusion 2.0L, MKC, MKT 2.0L, MKZ 2.0L, Mustang 2.3L, Taurus 2.0L, Transit Connect 1.6L	GO to Pinpoint Test DX .		
All others	GO to Pinpoint Test DL .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P012B - TURBOCHARGER/SUPERCHARGER INLET PRESSURE SENSOR CIRCUIT RANGE/PERFORMANCE - DTC CHART

P012B - TURBOCHARGER/SUPERCHARGER INLET PRESSURE SENSOR CIRCUIT RANGE/PERFORMANCE - DTC CHART

Description: This DTC sets when the TCIP PID does not correlate within the calibrated threshold of the average of the BARO, the TCBP or the MAP PID.

Possible Causes:

- Slow responding turbocharger inlet pressure and temperature (TCIPT) sensor
- Damaged TCIPT sensor

Diagnostic Aids: Check the air filter element and housing for contamination, blockage or water intrusion.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DM .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P012C -

TURBOCHARGER/SUPERCHARGER INLET PRESSURE SENSOR CIRCUIT LOW - DTC CHART

P012C - TURBOCHARGER/SUPERCHARGER INLET PRESSURE SENSOR CIRCUIT LOW - DTC CHART

Description: This DTC sets when the turbocharger inlet pressure (TCIP) reading is less than the minimum calibrated threshold.

Possible Causes:

- TCIP circuit open
- TCIP circuit short to ground
- VREF circuit open
- VREF circuit short to ground
- Damaged turbocharger inlet pressure and temperature (TCIPT) sensor

Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DM .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P012D - TURBOCHARGER/SUPERCHARGER INLET PRESSURE SENSOR CIRCUIT HIGH - DTC CHART

P012D - TURBOCHARGER/SUPERCHARGER INLET PRESSURE SENSOR CIRCUIT HIGH - DTC CHART

Description: This DTC sets when the turbocharger inlet pressure (TCIP) reading is greater than the maximum calibrated threshold.

Possible Causes:

- TCIP circuit open
- TCIP circuit short to voltage
- VREF circuit short to voltage

Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DM .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P012E - TURBOCHARGER/SUPERCHARGER INLET PRESSURE SENSOR CIRCUIT INTERMITTENT/ERRATIC - DTC CHART

P012E - TURBOCHARGER/SUPERCHARGER INLET PRESSURE SENSOR CIRCUIT INTERMITTENT/ERRATIC - DTC CHART

Description: This DTC sets when the manifold absolute pressure (MAP) sensor signal is intermittent.

Possible Causes:

- MAP circuit intermittent open
- MAP circuit intermittent short to voltage
- MAP circuit intermittent short to ground
- Damaged MAP sensor

Diagnostic Aids: Check the harness and connection.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DM .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0130 - O2 CIRCUIT (BANK 1, SENSOR 1) - DTC CHART

P0130 - O2 CIRCUIT (BANK 1, SENSOR 1) - DTC CHART

Description: This DTC sets when a concern is detected with one of the circuits used to determine the oxygen content in the exhaust gas.

Possible Causes:

- UO2S11 circuit open
- UO2S11 circuit short to ground
- UO2S11 circuit short to voltage
- UO2SGREF11 circuit open
- UO2SGREF11 circuit short to ground
- UO2SGREF11 circuit short to voltage
- UO2SPC11 circuit short to ground
- UO2SPC11 circuit short to voltage

- UO2SPCT11 circuit short to ground
- UO2SPCT11 circuit short to voltage
- Incorrect connections
- Damaged or corroded terminals
- Exhaust temperature significantly higher than expected
- Damaged universal heated oxygen sensor bank 1, sensor 1 (HO2S11)

Diagnostic Aids: Inspect the connectors for signs of damage, water intrusion or corrosion.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DZ .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0131 - O2 CIRCUIT LOW VOLTAGE (BANK 1, SENSOR 1) - DTC CHART

P0131 - O2 CIRCUIT LOW VOLTAGE (BANK 1, SENSOR 1) - DTC CHART

Description: This DTC sets when a concern is detected with one of the circuits used to determine the oxygen content in the exhaust gas.

Possible Causes:

- UO2S11 circuit short to ground
- UO2SGREF11 circuit short to ground
- UO2SPC11 circuit short to ground
- UO2SPCT11 circuit short to ground
- Damaged universal heated oxygen sensor bank 1, sensor 1 (HO2S11)

Diagnostic Aids: An engine stall condition or an extremely rich air to fuel ratio may set this DTC. Diagnose any engine stall or rich air to fuel ratio concerns before diagnosing this DTC.
Inspect the connectors for signs of damage, water intrusion or corrosion.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DZ .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0132 - O2 CIRCUIT HIGH VOLTAGE (BANK 1, SENSOR 1) - DTC CHART

P0132 - O2 CIRCUIT HIGH VOLTAGE (BANK 1, SENSOR 1) - DTC CHART

Description: This DTC sets when an over voltage concern is detected with one of the circuits used to determine the oxygen content in the exhaust gas.

Possible Causes:

- UO2S11 circuit short to voltage
- UO2SGREF11 circuit short to voltage
- UO2SPC11 circuit short to voltage
- UO2SPCT11 circuit short to voltage

Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DZ .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0133 - O2 CIRCUIT SLOW RESPONSE (BANK 1, SENSOR 1) - DTC CHART

P0133 - O2 CIRCUIT SLOW RESPONSE (BANK 1, SENSOR 1) - DTC CHART

Description: The PCM monitors oxygen sensor response time by commanding a calibrated fuel control routine. This routine sets the air fuel ratio to a calibrated limit to produce a predictable oxygen sensor signal amplitude. This DTC sets when the oxygen sensor signal does not reach the predicted amplitude within a predetermined response time.

Possible Causes:

- Exhaust leaks
- Incorrect fueling
- Mass airflow (MAF) sensor
- Intake air leaks
- Contaminated universal heated oxygen sensor bank 1, sensor 1 (HO2S11)
- Deteriorating universal HO2S11

Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DZ .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0134 - O2 CIRCUIT NO ACTIVITY DETECTED (BANK 1, SENSOR 1) - DTC CHART

P0134 - O2 CIRCUIT NO ACTIVITY DETECTED (BANK 1, SENSOR 1) - DTC CHART

Description: If the sensor signal value is not changing from the default value, the PCM commands an oscillating air to fuel ratio attempting to detect some movement in the signal value. This DTC sets when the PCM is unable to detect movement in the sensor signal while the air to fuel ratio is oscillating.
Possible Causes: • UO2SPC11 circuit open • Deteriorating universal heated oxygen sensor bank 1, sensor 1 (HO2S11)
Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DZ .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0135 - O2 HEATER CIRCUIT (BANK 1, SENSOR 1) - DTC CHART

P0135 - O2 HEATER CIRCUIT (BANK 1, SENSOR 1) - DTC CHART

Description: This DTC sets when an open or short circuit is detected or the universal heated oxygen sensor bank 1, sensor 1 (HO2S11) heater current draw exceeds a calibrated limit.
Possible Causes: • UO2SHTR11 circuit open • UO2SHTR11 circuit short to voltage • VPWR circuit open • Low battery voltage • Water in the harness connector • Corrosion • Incorrect connections • Damaged universal HO2S11 heater
Diagnostic Aids: Inspect the connectors for signs of damage, water intrusion or corrosion.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DZ .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0136 - O2

CIRCUIT (BANK 1, SENSOR 2) - DTC CHARTP0136 - O2 CIRCUIT (BANK 1, SENSOR 2) - DTC CHART

P0136 - O2 CIRCUIT (BANK 1, SENSOR 2) - DTC CHART

Description: This DTC sets when a concern is detected with one of the circuits used to determine the oxygen content in the exhaust gas.

Possible Causes:

- HO2S12 circuit open
- SIGRTN circuit open
- Incorrect connections
- Damaged or corroded terminals
- Exhaust temperature significantly higher than expected
- Damaged heated oxygen sensor bank 1, sensor 2 (HO2S12)

Diagnostic Aids: Inspect the connectors for signs of damage, water intrusion or corrosion.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DW .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0137 - O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 1 SENSOR 2) - DTC CHART

P0137 - O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 1 SENSOR 2) - DTC CHART

Description: This DTC sets when a concern is detected with one of the circuits used to determine the oxygen content in the exhaust gas.

Possible Causes:

- HO2S12 circuit open
- HO2S12 circuit short to ground
- Damaged heated oxygen sensor bank 1, sensor 2 (HO2S12)

Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DW .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0138 - O2 CIRCUIT HIGH VOLTAGE (BANK 1, SENSOR 2) - DTC CHART

P0138 - O2 CIRCUIT HIGH VOLTAGE (BANK 1, SENSOR 2) - DTC CHART

Description: This DTC sets when an over voltage condition is present on the HO2S12 circuit.

Possible Causes:

- HO2S12 circuit short to voltage

Diagnostic Aids: An O2S12 PID voltage of 1.5 volts or greater indicates a short to voltage.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DW .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0139 - O2 CIRCUIT SLOW RESPONSE (BANK 1, SENSOR 2) - DTC CHART

P0139 - O2 CIRCUIT SLOW RESPONSE (BANK 1, SENSOR 2) - DTC CHART

Description: The heated oxygen sensor (HO2S) monitor tracks the rate of voltage change during the rise and fall of the heated oxygen sensor bank 1, sensor 2 (HO2S12) signal. When the rate of voltage change is less than a calibrated value, the PCM begins to modify the fuel trim attempting to increase the HO2S voltage switch rate. This DTC sets when the PCM is at the allowable limit or has exceeded an allowable length of time for fuel trim modification, without detecting an acceptable rate of voltage change.

Possible Causes:

- Exhaust leaks
- Aftermarket accessories
- Performance modifications
- Contaminated HO2S12
- Deteriorating HO2S12
- Damaged HO2S12

Diagnostic Aids: Access the HO2S test results from the Generic OBD II menu to verify the DTC.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DW .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P013A - O2

SENSOR SLOW RESPONSE - RICH TO LEAN (BANK 1, SENSOR 2) - DTC CHART

P013A - O2 SENSOR SLOW RESPONSE - RICH TO LEAN (BANK 1, SENSOR 2) - DTC CHART

Description: The heated oxygen sensor (HO2S) monitor tracks the rate of voltage change during the rise and fall of the heated oxygen sensor bank 1, sensor 2 (HO2S12) signal. The measured rate of the rich to lean switch is compared to a calibrated fault threshold value. The threshold value takes into account the level of oxygen in the catalyst, which has an impact on how quickly the rich to lean switch occurs. This DTC sets when the measured value is slower than the threshold value.

Possible Causes:

- Exhaust leaks before or near the HO2S12
- Damaged HO2S12

Diagnostic Aids: Check for leaks in the exhaust system.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DW .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P013B - O2 SENSOR SLOW RESPONSE - LEAN TO RICH BANK 1, SENSOR 2 - DTC CHART

P013B - O2 SENSOR SLOW RESPONSE - LEAN TO RICH BANK 1, SENSOR 2 - DTC CHART

Description: During a deceleration fuel shut-off (DFSO) event, the PCM monitors how quickly the heated oxygen sensor bank 1, sensor 2 (HO2S12) switches from lean to rich. The measured rate of the lean to rich switch is compared to a calibrated fault threshold value. The measured rate of the lean to rich switch is compared to a calibrated fault threshold value. This DTC sets when the measured value is slower than the threshold value.

Possible Causes:

- Exhaust leaks before or near the HO2S12
- Damaged HO2S12

Diagnostic Aids: Check for leaks in the exhaust system.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DW .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P013C - O2 SENSOR SLOW RESPONSE - RICH TO LEAN (BANK 2, SENSOR 2) - DTC CHART

P013C - O2 SENSOR SLOW RESPONSE - RICH TO LEAN (BANK 2, SENSOR 2) - DTC CHART

Description: During a deceleration fuel shut-off (DFSO) event, the PCM monitors how quickly the heated oxygen sensor bank 2, sensor 2 (HO2S22) switches from rich to lean. The measured rate of the rich to lean switch is compared to a calibrated fault threshold value. The threshold value takes into account the level of oxygen in the catalyst, which has an impact on how quickly the rich to lean switch occurs. This DTC sets when the measured value is slower than the threshold value.

Possible Causes:

- Exhaust leaks before or near the HO2S22
- Damaged HO2S22

Diagnostic Aids: Check for leaks in the exhaust system.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DW .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P013E - SENSOR DELAYED RESPONSE - RICH TO LEAN (BANK 1, SENSOR 2) - DTC CHART

P013E - SENSOR DELAYED RESPONSE - RICH TO LEAN (BANK 1, SENSOR 2) - DTC CHART

Description: During a deceleration fuel shut-off (DFSO) event, the PCM monitors the heated oxygen sensor bank 1, sensor 2 (HO2S12) signal to determine if the signal is stuck in range. The PCM expects the signal to exceed a calibrated rich or lean value within a calibrated amount of time. If the signal voltage remains less than the rich value after a number of occurrences, the PCM intrusively controls the fuel system rich over increasing time periods in an attempt to force the signal to greater than the calibrated rich value.
This DTC sets when, after three consecutive intrusive attempts, the signal cannot be forced greater than the calibrated rich value. Also, if the signal voltage remains greater than the lean value after a calibrated amount of time with the fuel injectors off, a counter is incremented. This DTC sets when after three consecutive occurrences the signal is not less than the calibrated lean value.

Possible Causes:

- Exhaust leaks before or near the HO2S12
- Aftermarket exhaust accessories or performance modifications
- Ethanol content in the fuel
- HO2S12 circuit intermittent
- Damaged HO2S12

Diagnostic Aids: Check for leaks in the exhaust system. Check for an intermittent HO2S12 signal.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DW .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0140 - O2 CIRCUIT NO ACTIVITY DETECTED (BANK 1, SENSOR 2) - DTC CHART

P0140 - O2 CIRCUIT NO ACTIVITY DETECTED (BANK 1, SENSOR 2) - DTC CHART

Description: If the sensor signal value is not changing from the default value, the PCM commands an oscillating air to fuel ratio attempting to detect some movement in the signal value. This DTC sets when the PCM is unable to detect movement in the sensor signal while the air to fuel ratio is oscillating.

Possible Causes:

- HO2S12 circuit open
- Damaged heated oxygen sensor bank 1, sensor 2 (HO2S12)

Diagnostic Aids: An O2S12 PID switching across 0.45 volt from 0.2 to 0.9 volts indicates a normal switching HO2S.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DW .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0141 - O2 HEATER CIRCUIT (BANK 1, SENSOR 2) - DTC CHART

P0141 - O2 HEATER CIRCUIT (BANK 1, SENSOR 2) - DTC CHART

Description: This DTC sets when an open or short circuit is detected or the heated oxygen sensor bank 1, sensor 2 (HO2S12) heater current draw exceeds a calibrated limit.

Possible Causes:

- HTR12 circuit open
- HTR12 circuit short to voltage
- VPWR circuit open
- GND circuit open
- Low battery voltage
- Water in the harness connector
- Corrosion
- Incorrect connections
- Damaged HO2S12 heater

Diagnostic Aids: Inspect the connectors for signs of damage, water intrusion or corrosion.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DW .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0148 - FUEL DELIVERY ERROR - DTC CHART

P0148 - FUEL DELIVERY ERROR - DTC CHART

Description: At least one bank is lean at wide open throttle (WOT).

Possible Causes:

- Severely restricted fuel filter
- Severely restricted fuel supply line
- Damaged or worn fuel pump
- Damaged or contaminated mass airflow (MAF) sensor

Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HC .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P014A - SENSOR DELAYED RESPONSE - RICH TO LEAN (BANK 2, SENSOR 2) - DTC CHART

P014A - SENSOR DELAYED RESPONSE - RICH TO LEAN (BANK 2, SENSOR 2) - DTC CHART

Description: During a deceleration fuel shut-off (DFSO) event, the PCM monitors the heated oxygen sensor bank 2, sensor 2 (HO2S22) signal to determine if the signal is stuck in range. The PCM expects the signal to exceed a calibrated rich or lean value within a calibrated amount of time. If the signal voltage remains less than the rich value after a number of occurrences, the PCM intrusively controls the fuel system rich over increasing time periods in an attempt to force the signal to greater than the calibrated rich value.
This DTC sets when, after three consecutive intrusive attempts, the signal cannot be forced greater than the calibrated rich value. Also, if the signal voltage remains greater than the lean value after a calibrated amount of time with the fuel injectors off, a counter is incremented. This DTC sets when after three consecutive occurrences the signal is not less than the calibrated lean value.

Possible Causes:

- Exhaust leaks before or near the HO2S
- Aftermarket exhaust accessories or performance modifications

- Ethanol content in the fuel
- HO2S22 circuit intermittent
- Damaged HO2S22

Diagnostic Aids: Check for leaks in the exhaust system. Check for an intermittent HO2S22 signal.			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	GO to Pinpoint Test DW .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0150 - O2 CIRCUIT (BANK 2, SENSOR 1) - DTC CHART

P0150 - O2 CIRCUIT (BANK 2, SENSOR 1) - DTC CHART

Description: This DTC sets when a concern is detected with one of the circuits used to determine the oxygen content in the exhaust gas.

Possible Causes:

- UO2S21 circuit open
- UO2S21 circuit short to ground
- UO2S21 circuit short to voltage
- UO2SGREF21 circuit open
- UO2SGREF21 circuit short to ground
- UO2SGREF21 circuit short to voltage
- UO2SPC21 circuit short to ground
- UO2SPC21 circuit short to voltage
- UO2SPCT21 circuit short to ground
- UO2SPCT21 circuit short to voltage
- Incorrect connections
- Damaged or corroded terminals
- Exhaust temperature significantly higher than expected
- Damaged universal heated oxygen sensor bank 2, sensor 1 (HO2S21) heater

Diagnostic Aids:

Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**

All	GO to Pinpoint Test DZ .

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0151 - O2 CIRCUIT LOW VOLTAGE (BANK 2, SENSOR 1) - DTC CHART

P0151 - O2 CIRCUIT LOW VOLTAGE (BANK 2, SENSOR 1) - DTC CHART

Description: This DTC sets when a concern is detected with one of the circuits used to determine the oxygen content in the exhaust gas.

Possible Causes:

- UO2S21 circuit short to ground
- UO2SGREF21 circuit short to ground
- UO2SPC21 circuit short to ground
- UO2SPCT21 circuit short to ground
- Damaged universal heated oxygen sensor bank 2, sensor 1 (HO2S21)

Diagnostic Aids: An engine stall condition or an extremely rich air to fuel ratio may set this DTC. Diagnose any engine stall or rich air to fuel ratio concerns before diagnosing this DTC.
Inspect the connectors for signs of damage, water intrusion or corrosion.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DZ .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0152 - O2 CIRCUIT HIGH VOLTAGE (BANK 2, SENSOR 1) - DTC CHART

P0152 - O2 CIRCUIT HIGH VOLTAGE (BANK 2, SENSOR 1) - DTC CHART

Description: This DTC sets when an over voltage concern is detected with one of the circuits used to determine the oxygen content in the exhaust gas.

Possible Causes:

- UO2S21 circuit short to voltage
- UO2SGREF21 circuit short to voltage
- UO2SPC21 circuit short to voltage
- UO2SPCT21 circuit short to voltage

Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DZ .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0153 - O2 CIRCUIT SLOW RESPONSE (BANK 2, SENSOR 1) - DTC CHART

P0153 - O2 CIRCUIT SLOW RESPONSE (BANK 2, SENSOR 1) - DTC CHART

Description: The PCM monitors the universal heated oxygen sensor bank 2, sensor 1 (HO2S21) response time by commanding a calibrated fuel control routine. This routine sets the air to fuel ratio to a calibrated limit to produce a predictable oxygen sensor signal amplitude. This DTC sets when the oxygen sensor signal does not reach the predicted amplitude within a predetermined response time.

Possible Causes:

- Exhaust leaks
- Incorrect fueling
- Intake air system leaks
- Mass airflow (MAF) sensor (if equipped)
- Contaminated universal HO2S21
- Deteriorating universal HO2S21

Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DZ .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0154 - O2 CIRCUIT NO ACTIVITY DETECTED (BANK 2, SENSOR 1) - DTC CHART

P0154 - O2 CIRCUIT NO ACTIVITY DETECTED (BANK 2, SENSOR 1) - DTC CHART

Description: If the sensor signal value is not changing from the default value, the PCM commands an oscillating air to fuel ratio attempting to detect some movement in the signal value. This DTC sets when the PCM is unable to detect movement in the sensor signal while the air to fuel ratio is oscillating.

Possible Causes:

- UO2SPC21 circuit open
- Contaminated universal heated oxygen sensor bank 2, sensor 1 (HO2S21)

Diagnostic Aids:			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	GO to Pinpoint Test DZ .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0155 - O2 HEATER CIRCUIT (BANK 2, SENSOR 1) - DTC CHART

P0155 - O2 HEATER CIRCUIT (BANK 2, SENSOR 1) - DTC CHART

Description: This DTC sets when an open or short circuit is detected or the universal heated oxygen sensor bank 2, sensor 1 (HO2S21) heater current draw exceeds a calibrated limit.

Possible Causes:

- UO2SHTR21 circuit open
- UO2SHTR21 circuit short to voltage
- VPWR circuit open
- Low battery voltage
- Water in the harness connector
- Corrosion
- Incorrect connections
- Damaged universal HO2S21 heater

Diagnostic Aids: Inspect the connectors for signs of damage, water intrusion or corrosion.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DZ .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0157 - O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 2 SENSOR 2) - DTC CHART

P0157 - O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 2 SENSOR 2) - DTC CHART

Description: This DTC sets when a concern is detected with one of the circuits used to determine the oxygen content in the exhaust gas.

Possible Causes:

- HO2S22 circuit open
- HO2S22 circuit short to ground

- Damaged heated oxygen sensor bank 2, sensor 2 (HO2S22)

Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DW .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0158 - O2 CIRCUIT HIGH VOLTAGE (BANK 2, SENSOR 2) - DTC CHART

P0158 - O2 CIRCUIT HIGH VOLTAGE (BANK 2, SENSOR 2) - DTC CHART

Description: The heated oxygen sensor bank 2, sensor 2 (HO2S22) signal is monitored for an over voltage condition. This DTC sets when the HO2S signal voltage is 1.5 volts or greater.

Possible Causes:

- HO2S22 circuit short to voltage

Diagnostic Aids: See the diagnostic aids for DTC P0132.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DW .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0159 - O2 CIRCUIT SLOW RESPONSE (BANK 2, SENSOR 2) - DTC CHART

P0159 - O2 CIRCUIT SLOW RESPONSE (BANK 2, SENSOR 2) - DTC CHART

Description: The heated oxygen sensor (HO2S) monitor tracks the rate of voltage change during the rise and fall of the heated oxygen sensor bank 2, sensor 2 (HO2S22) signal. When the rate of voltage change is less than a calibrated value, the PCM begins to modify the fuel trim attempting to increase the HO2S voltage switch rate. This DTC sets when the PCM is at the allowable limit or has exceeded an allowable length of time for fuel trim modification, without detecting an acceptable rate of voltage change.

Possible Causes:

- Exhaust leaks
- Aftermarket accessories
- Performance modifications
- Contaminated HO2S22
- Deteriorating HO2S22

- Damaged HO2S22

Diagnostic Aids: Access the HO2S test results from the Generic OBD II menu to verify the DTC.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DW .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0161 - O2 HEATER CIRCUIT (BANK 2, SENSOR 2) - DTC CHART

P0161 - O2 HEATER CIRCUIT (BANK 2, SENSOR 2) - DTC CHART

Description: This DTC sets when an open or short circuit is detected or the universal heated oxygen sensor bank 2, sensor 2 (HO2S22) heater current draw exceeds a calibrated limit.

Possible Causes:

- HTR22 circuit open
- HTR22 circuit short to voltage
- VPWR circuit open
- GND circuit open
- Low battery voltage
- Water in the harness connector
- Corrosion
- Incorrect connections
- Damaged HO2S22 heater

Diagnostic Aids: Inspect the connectors for signs of damage, water intrusion or corrosion.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DW .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0171 - SYSTEM TOO LEAN (BANK 1) - DTC CHART

P0171 - SYSTEM TOO LEAN (BANK 1) - DTC CHART

Description: The adaptive fuel strategy continuously monitors the fuel delivery hardware. This DTC sets when the adaptive fuel tables reach a rich calibrated limit. Refer to POWERTRAIN CONTROL SOFTWARE , Fuel Trim for additional information.

Possible Causes:

- Ethanol content in the fuel
- Fuel filter plugged or dirty
- Damaged or worn fuel pump
- Leaking fuel pump check valve
- Leaking or contaminated fuel injectors
- Low fuel pressure or running out of fuel
- EVAP purge valve is leaking when the canister is clean
- Fuel supply line restricted
- Fuel rail pressure (FRP) sensor bias
- Exhaust leaks in the exhaust manifold gasket or mating gaskets before or near the heated oxygen sensor (HO2S)
- Air leaks after the mass airflow (MAF) sensor (if equipped)
- Vacuum leaks
- Positive crankcase ventilation (PCV) system is leaking or the valve is stuck open
- Incorrectly seated engine oil dipstick
- Intake air turbulence due to incorrect air filter
- Contaminated MAF sensor (if equipped)
- Damaged MAF sensor (if equipped)

Diagnostic Aids: View the freeze frame data to determine the operating conditions when the DTC was set. Observe the LONGFT1 and LONGFT2 PIDs. Refer to ADAPTIVE FUEL DIAGNOSTIC TROUBLE CODE (DTC) DIAGNOSTIC TECHNIQUES , for additional information and the appropriate pinpoint test for specific concern identification.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test H :		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0172 - SYSTEM TOO RICH (BANK 1) - DTC CHART

P0172 - SYSTEM TOO RICH (BANK 1) - DTC CHART

Description: The adaptive fuel strategy continuously monitors the fuel delivery hardware. This DTC sets when the adaptive fuel tables reach a lean calibrated limit. Refer to POWERTRAIN CONTROL

SOFTWARE , Fuel Trim for additional information.

Possible Causes:

- Leaking fuel injectors
- Fuel return line restricted
- Fuel rail pressure (FRP) sensor bias
- EVAP purge valve is leaking when the canister is full
- Contaminated mass airflow (MAF) sensor (if equipped)
- Damaged MAF sensor (if equipped)

Diagnostic Aids: View the freeze frame data to determine the operating conditions when the DTC was set. Observe the LONGFT1 and LONGFT2 PIDs. Refer to ADAPTIVE FUEL DIAGNOSTIC TROUBLE CODE (DTC) DIAGNOSTIC TECHNIQUES , for additional information and the appropriate pinpoint test for specific concern identification.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test H .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0174 - SYSTEM TOO LEAN (BANK 2) - DTC CHART

P0174 - SYSTEM TOO LEAN (BANK 2) - DTC CHART

Description: The adaptive fuel strategy continuously monitors the fuel delivery hardware. This DTC sets when the adaptive fuel tables reach a rich calibrated limit. Refer to POWERTRAIN CONTROL SOFTWARE , Fuel Trim for additional information.

Possible Causes:

- Ethanol content in the fuel
- Fuel filter plugged or dirty
- Damaged or worn fuel pump
- Leaking fuel pump check valve
- Leaking or contaminated fuel injectors
- Low fuel pressure or running out of fuel
- EVAP purge valve is leaking when the canister is clean
- Fuel supply line restricted
- Fuel rail pressure (FRP) sensor bias

- Exhaust leaks in the exhaust manifold gasket or mating gaskets before or near the heated oxygen sensor (HO2S)
- Air leaks after the mass airflow (MAF) sensor (if equipped)
- Vacuum leaks
- Positive crankcase ventilation (PCV) system is leaking or the valve is stuck open
- Incorrectly seated engine oil dipstick
- Intake air turbulence due to incorrect air filter
- Contaminated MAF sensor (if equipped)
- Damaged MAF sensor (if equipped)

Diagnostic Aids: View the freeze frame data to determine the operating conditions when the DTC was set. Observe the LONGFT1 and LONGFT2 PIDs. Refer to ADAPTIVE FUEL DIAGNOSTIC TROUBLE CODE (DTC) DIAGNOSTIC TECHNIQUES , for additional information and the appropriate pinpoint test for specific concern identification.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test H .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0175 - SYSTEM TOO RICH (BANK 2) - DTC CHART

P0175 - SYSTEM TOO RICH (BANK 2) - DTC CHART

Description: The adaptive fuel strategy continuously monitors the fuel delivery hardware. This DTC sets when the adaptive fuel tables reach a lean calibrated limit. Refer to POWERTRAIN CONTROL SOFTWARE , Fuel Trim for additional information.

Possible Causes:

- Leaking fuel injectors
- Fuel return line restricted
- Fuel rail pressure (FRP) sensor bias
- EVAP purge valve is leaking when the canister is full
- Contaminated mass airflow (MAF) sensor (if equipped)
- Damaged MAF sensor (if equipped)

Diagnostic Aids: View the freeze frame data to determine the operating conditions when the DTC was set. Observe the LONGFT1 and LONGFT2 PIDs. Refer to ADAPTIVE FUEL DIAGNOSTIC TROUBLE CODE (DTC) DIAGNOSTIC TECHNIQUES , for additional information and the appropriate pinpoint test for specific concern identification.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test H .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P017C - CYLINDER HEAD TEMPERATURE SENSOR CIRCUIT LOW - DTC CHART

P017C - CYLINDER HEAD TEMPERATURE SENSOR CIRCUIT LOW - DTC CHART

Description: This DTC sets when the CHT circuit is shorted to ground.

Possible Causes:

- CHT circuit short to ground
- Damaged cylinder head temperature (CHT) sensor
- Incorrect harness connection

Diagnostic Aids: The DTC P0117 may also be reported when this DTC sets. Either of these DTCs illuminates the malfunction indicator lamp (MIL).

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DL .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P017D - CYLINDER HEAD TEMPERATURE SENSOR CIRCUIT HIGH - DTC CHART

P017D - CYLINDER HEAD TEMPERATURE SENSOR CIRCUIT HIGH - DTC CHART

Description: This DTC sets when a CHT circuit concern is detected.

Possible Causes:

- CHT circuit open
- CHT circuit short to voltage
- Damaged cylinder head temperature (CHT) sensor
- Incorrect harness connection

Diagnostic Aids: The DTC P0118 may also be reported when this DTC sets. Either of these DTCs illuminate the malfunction indicator lamp (MIL).

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DL .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P017E - CYLINDER HEAD TEMPERATURE SENSOR CIRCUIT INTERMITTENT/ERRATIC - DTC CHART

P017E - CYLINDER HEAD TEMPERATURE SENSOR CIRCUIT INTERMITTENT/ERRATIC - DTC CHART

Description: This DTC sets when the CHT circuit becomes intermittently open or short while the engine is running.

Possible Causes:

- Damaged CHT harness or connector
- Damaged cylinder head temperature (CHT) sensor
- CHT circuit open
- CHT circuit short to ground
- Low engine coolant

Diagnostic Aids: Monitor the CHT PID on a scan tool. Look for sudden changes in the reading when the harness is wiggled or the sensor is tapped.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DL .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P018C - FUEL PRESSURE SENSOR B CIRCUIT LOW - DTC CHART

P018C - FUEL PRESSURE SENSOR B CIRCUIT LOW - DTC CHART

Description: The comprehensive component monitor (CCM) monitors the FLP circuit to the PCM for low voltage. The test fails if the voltage falls below a calibrated limit for a calibrated amount of time during testing.

Possible Causes:

- FLP signal short to SIGRTN or GND
- Damaged fuel pressure sensor

Diagnostic Aids: An FLP PID value during ignition ON, engine OFF, or ignition ON, engine running, less than 0.3 volt indicates a concern is present.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory

All	GO to Pinpoint Test DD .

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P018D - FUEL PRESSURE SENSOR B CIRCUIT HIGH - DTC CHART

P018D - FUEL PRESSURE SENSOR B CIRCUIT HIGH - DTC CHART

Description: The comprehensive component monitor (CCM) monitors the FLP circuit to the PCM for high voltage. The test fails if the voltage exceeds a calibrated limit for a calibrated amount of time during testing.

Possible Causes:

- FLP circuit short to voltage
- FLP circuit open
- Damaged fuel pressure sensor

Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DD .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0192 - FUEL RAIL PRESSURE SENSOR A CIRCUIT LOW - DTC CHART

P0192 - FUEL RAIL PRESSURE SENSOR A CIRCUIT LOW - DTC CHART

Description: The comprehensive component monitor (CCM) monitors the fuel rail pressure (FRP) sensor circuit to the PCM for low voltage. The test fails if the FRP voltage falls below a calibrated limit and amount of time during testing.

Possible Causes:

- FRP circuit short to SIGRTN or GND
- Damaged FRP sensor

Diagnostic Aids: A FRP PID value during ignition ON, engine OFF or ignition ON, engine running less than 0.3 volt indicates a concern is present.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DD .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0193 - FUEL RAIL PRESSURE SENSOR A CIRCUIT HIGH - DTC CHART

P0193 - FUEL RAIL PRESSURE SENSOR A CIRCUIT HIGH - DTC CHART

Description: The comprehensive component monitor (CCM) monitors the fuel rail pressure (FRP) sensor circuit to the PCM for high voltage. The test fails if the FRP voltage exceeds a calibrated limit and amount of time during testing.

Possible Causes:

- FRP signal short to voltage
- FRP signal open
- Damaged FRP sensor

Diagnostic Aids: An FRP signal high condition can be caused by any number of conditions, including a short on FRP signal to VREF, an open FRP signal or signal return. The FRP signal line is pulled up by the PCM and VREF at the sensor, and down by the sensor through SIGRTN.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DD .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0201 - CYLINDER 1 INJECTOR CIRCUIT/OPEN - DTC CHART

P0201 - CYLINDER 1 INJECTOR CIRCUIT/OPEN - DTC CHART

Description: The comprehensive component monitor (CCM) monitors the operation of the fuel injector drivers in the PCM. This DTC sets when the fuel injector circuitry is inoperative.

Possible Causes:

- VPWR circuit open (if equipped)
- INJ1 circuit open
- INJ1 circuit short to ground (direct injection vehicles)
- INJ1 circuit short to voltage (direct injection vehicles)
- INJ1RTN circuit open (if equipped)
- INJ1RTN circuit short to ground (if equipped)
- INJ1RTN circuit short to voltage (if equipped)
- Damaged fuel injector 1
- Damaged PCM

Diagnostic Aids: For direct injection vehicles, the INJ1_F PID flags a concern. For all others, the INJ1_F PID flags equals YES.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
Edge 2.0L, Edge 2.7L, Escape/Kuga 1.6L, Escape/Kuga 2.0L, Expedition, Explorer 2.0L, Explorer 3.5L GTDI, F-150 2.7L, F-150 3.5L GTDI, Fiesta 1.0L, Fiesta 1.6L GTDI, Flex 3.5L GTDI, Focus, Fusion 1.5L, Fusion 1.6L, Fusion 2.0L, MKC, MKS 3.5L, MKT 2.0L, MKT 3.5L, MKZ 2.0L, Mustang 2.3L, Navigator, Taurus 2.0L, Taurus 3.5L GTDI, Transit 3.5L, Transit Connect 1.6L	GO to Pinpoint Test DI .		
All others	GO to Pinpoint Test KG .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0202 - CYLINDER 2 INJECTOR CIRCUIT/OPEN - DTC CHART

P0202 - CYLINDER 2 INJECTOR CIRCUIT/OPEN - DTC CHART

Description: The comprehensive component monitor (CCM) monitors the operation of the fuel injector drivers in the PCM. This DTC sets when the fuel injector circuitry is inoperative.

Possible Causes:

- VPWR circuit open (if equipped)
- INJ2 circuit open
- INJ2 circuit short to ground (direct injection vehicles)
- INJ2 circuit short to voltage (direct injection vehicles)

- INJ2RTN circuit open (if equipped)
- INJ2RTN circuit short to ground (if equipped)
- INJ2RTN circuit short to voltage (if equipped)
- Damaged fuel injector 2
- Damaged PCM

Diagnostic Aids: For direct injection vehicles, the INJ2_F PID flags a concern. For all others, the INJ2_F PID flags equals YES.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
Edge 2.0L, Edge 2.7L, Escape/Kuga 1.6L, Escape/Kuga 2.0L, Expedition, Explorer 2.0L, Explorer 3.5L GTDI, F-150 2.7L, F-150 3.5L GTDI, Fiesta 1.0L, Fiesta 1.6L GTDI, Flex 3.5L GTDI, Focus, Fusion 1.5L, Fusion 1.6L, Fusion 2.0L, MKC, MKS 3.5L, MKT 2.0L, MKT 3.5L, MKZ 2.0L, Mustang 2.3L, Navigator, Taurus 2.0L, Taurus 3.5L GTDI, Transit 3.5L, Transit Connect 1.6L	GO to Pinpoint Test DI .		
All others	GO to Pinpoint Test KG .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0203 - CYLINDER 3 INJECTOR CIRCUIT/OPEN - DTC CHART

P0203 - CYLINDER 3 INJECTOR CIRCUIT/OPEN - DTC CHART

Description: The comprehensive component monitor (CCM) monitors the operation of the fuel injector

drivers in the PCM. This DTC sets when the fuel injector circuitry is inoperative.

Possible Causes:

- VPWR circuit open (if equipped)
- INJ3 circuit open
- INJ3 circuit short to ground (direct injection vehicles)
- INJ3 circuit short to voltage (direct injection vehicles)
- INJ3RTN circuit open (if equipped)
- INJ3RTN circuit short to ground (if equipped)
- INJ3RTN circuit short to voltage (if equipped)
- Damaged fuel injector 3
- Damaged PCM

Diagnostic Aids: For direct injection vehicles, the INJ3_F PID flags a concern. For all others, the INJ3_F PID flags equals YES.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
Edge 2.0L, Edge 2.7L, Escape/Kuga 1.6L, Escape/Kuga 2.0L, Expedition, Explorer 2.0L, Explorer 3.5L GTDI, F-150 2.7L, F-150 3.5L GTDI, Fiesta 1.0L, Fiesta 1.6L GTDI, Flex 3.5L GTDI, Focus, Fusion 1.5L, Fusion 1.6L, Fusion 2.0L, MKC, MKS 3.5L, MKT 2.0L, MKT 3.5L, MKZ 2.0L, Mustang 2.3L, Navigator, Taurus 2.0L, Taurus 3.5L GTDI, Transit 3.5L, Transit Connect 1.6L	GO to Pinpoint Test DI .		

All others	GO to Pinpoint Test KG .

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0204 - CYLINDER 4 INJECTOR CIRCUIT/OPEN - DTC CHART

P0204 - CYLINDER 4 INJECTOR CIRCUIT/OPEN - DTC CHART

Description: The comprehensive component monitor (CCM) monitors the operation of the fuel injector drivers in the PCM. This DTC sets when the fuel injector circuitry is inoperative.

Possible Causes:

- VPWR circuit open (if equipped)
- INJ4 circuit open
- INJ4 circuit short to ground (direct injection vehicles)
- INJ4 circuit short to voltage (direct injection vehicles)
- INJ4RTN circuit open (if equipped)
- INJ4RTN circuit short to ground (if equipped)
- INJ4RTN circuit short to voltage (if equipped)
- Damaged fuel injector 4
- Damaged PCM

Diagnostic Aids: For direct injection vehicles, the INJ4_F PID flags a concern. For all others, the INJ4_F PID flags equals YES.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
Edge 2.0L, Edge 2.7L, Escape/Kuga 1.6L, Escape/Kuga 2.0L, Expedition, Explorer 2.0L, Explorer 3.5L GTDI, F-150 2.7L, F-150 3.5L GTDI, Fiesta 1.0L, Fiesta 1.6L GTDI, Flex 3.5L GTDI, Focus, Fusion 1.5L, Fusion 1.6L, Fusion 2.0L,	GO to Pinpoint Test DI .		

MKC, MKS 3.5L, MKT 2.0L, MKT 3.5L, MKZ 2.0L, Mustang 2.3L, Navigator, Taurus 2.0L, Taurus 3.5L GTDI, Transit 3.5L, Transit Connect 1.6L	
All others	GO to Pinpoint Test KG .

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0205 - CYLINDER 5 INJECTOR CIRCUIT/OPEN - DTC CHART

P0205 - CYLINDER 5 INJECTOR CIRCUIT/OPEN - DTC CHART

Description: The comprehensive component monitor (CCM) monitors the operation of the fuel injector drivers in the PCM. This DTC sets when the fuel injector circuitry is inoperative.

Possible Causes:

- VPWR circuit open (if equipped)
- INJ5 circuit open
- INJ5 circuit short to ground (direct injection vehicles)
- INJ5 circuit short to voltage (direct injection vehicles)
- INJ5RTN circuit open (if equipped)
- INJ5RTN circuit short to ground (if equipped)
- INJ5RTN circuit short to voltage (if equipped)
- Damaged fuel injector 5
- Damaged PCM

Diagnostic Aids: For direct injection vehicles, the INJ5_F PID flags a concern. For all others, the INJ5_F PID flags equals YES.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
Edge 2.7L, Expedition, Explorer 3.5L GTDI, F-150 2.7L, F-150 3.5L GTDI, Flex 3.5L GTDI,	GO to Pinpoint Test DI .		

MKS 3.5L, MKT 3.5L, Navigator, Taurus 3.5L GTDI, Transit 3.5L	
All others	GO to Pinpoint Test KG .

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0206 - CYLINDER 6 INJECTOR CIRCUIT/OPEN - DTC CHART

P0206 - CYLINDER 6 INJECTOR CIRCUIT/OPEN - DTC CHART

Description: The comprehensive component monitor (CCM) monitors the operation of the fuel injector drivers in the PCM. This DTC sets when the fuel injector circuitry is inoperative.

Possible Causes:

- VPWR circuit open (if equipped)
- INJ6 circuit open
- INJ6 circuit short to ground (direct injection vehicles)
- INJ6 circuit short to voltage (direct injection vehicles)
- INJ6RTN circuit open (if equipped)
- INJ6RTN circuit short to ground (if equipped)
- INJ6RTN circuit short to voltage (if equipped)
- Damaged fuel injector 6
- Damaged PCM

Diagnostic Aids: For direct injection vehicles, the INJ6_F PID flags a concern. For all others, the INJ6_F PID flags equals YES.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
Edge 2.7L, Expedition, Explorer 3.5L GTDI, F-150 2.7L, F-150 3.5L GTDI, Flex 3.5L GTDI, MKS 3.5L, MKT 3.5L, Navigator, Taurus 3.5L GTDI, Transit 3.5L	GO to Pinpoint Test DI .		

All others	GO to Pinpoint Test KG .

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0207 - CYLINDER 7 INJECTOR CIRCUIT/OPEN - DTC CHART

P0207 - CYLINDER 7 INJECTOR CIRCUIT/OPEN - DTC CHART

Description: The comprehensive component monitor (CCM) monitors the operation of the fuel injector drivers in the PCM. This DTC sets when the fuel injector circuitry is inoperative.

Possible Causes:

- VPWR circuit open
- INJ7 circuit open
- Damaged fuel injector 7
- Damaged PCM

Diagnostic Aids: The INJ7_F PID flags equals YES.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test KG .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0208 - CYLINDER 8 INJECTOR CIRCUIT/OPEN - DTC CHART

P0208 - CYLINDER 8 INJECTOR CIRCUIT/OPEN - DTC CHART

Description: The comprehensive component monitor (CCM) monitors the operation of the fuel injector drivers in the PCM. This DTC sets when the fuel injector circuitry is inoperative.

Possible Causes:

- VPWR circuit open
- INJ8 circuit open
- Damaged fuel injector 8
- Damaged PCM

Diagnostic Aids: The INJ8_F PID flags equals YES.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test KG .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0209 - CYLINDER 9 INJECTOR CIRCUIT/OPEN - DTC CHART

P0209 - CYLINDER 9 INJECTOR CIRCUIT/OPEN - DTC CHART

Description: The comprehensive component monitor (CCM) monitors the operation of the fuel injector drivers in the PCM. This DTC sets when the fuel injector circuitry is inoperative.

Possible Causes:

- VPWR circuit open
- INJ9 circuit open
- Damaged fuel injector 9
- Damaged PCM

Diagnostic Aids: The INJ9_F PID flags equals YES.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test KG .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0210 - CYLINDER 10 INJECTOR CIRCUIT/OPEN - DTC CHART

P0210 - CYLINDER 10 INJECTOR CIRCUIT/OPEN - DTC CHART

Description: The comprehensive component monitor (CCM) monitors the operation of the fuel injector drivers in the PCM. This DTC sets when the fuel injector circuitry is inoperative.

Possible Causes:

- VPWR circuit open
- INJ10 circuit open
- Damaged fuel injector 10
- Damaged PCM

Diagnostic Aids: The INJ10_F PID flags equals YES.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test KG .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0217 - ENGINE COOLANT OVER TEMPERATURE CONDITION - DTC CHART

P0217 - ENGINE COOLANT OVER TEMPERATURE CONDITION - DTC CHART

Description:			
Possible Causes:			
Diagnostic Aids: Refer to the service information , Engine Cooling to diagnose the engine overheats symptom.			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0218 - TRANSMISSION FLUID OVER TEMPERATURE CONDITION - DTC CHART

P0218 - TRANSMISSION FLUID OVER TEMPERATURE CONDITION - DTC CHART

Description:			
Possible Causes:			
Diagnostic Aids: Refer to the service information , Electronic Engine Controls.			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0219 - ENGINE OVER SPEED CONDITION - DTC CHART

P0219 - ENGINE OVER SPEED CONDITION - DTC CHART

Description: This DTC sets when the vehicle has been operated in a manner which caused the engine speed to exceed a calibrated limit. The engine RPM is continuously monitored and evaluated by the PCM. This DTC sets when the RPM exceeds the calibrated limit set within the PCM.
For additional information on the engine RPM limiter, refer to POWERTRAIN CONTROL SOFTWARE .

Possible Causes:

- Wheel slippage (water, ice, mud, and snow)
- Excessive engine RPM in NEUTRAL or operated in the incorrect transmission gear
- High engine RPM with engine temperature within a calibrated limit of an overheating condition (GTDI engine)

Diagnostic Aids: This DTC may be accompanied by other DTCs. If DTC P1285 or P1299 is present, disregard DTC P0219 at this time. Diagnose DTC P1285 or P1299 first. If there are no other symptoms, return the vehicle to the customer with information about the DTC. If a symptom is present, refer to NO DIAGNOSTIC TROUBLE CODES (DTCS) PRESENT SYMPTOM CHART INDEX .			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0222 - THROTTLE/PEDAL POSITION SENSOR/SWITCH B CIRCUIT LOW - DTC CHART

P0222 - THROTTLE/PEDAL POSITION SENSOR/SWITCH B CIRCUIT LOW - DTC CHART

Description: This DTC sets when the electronic throttle control (ETC) throttle position 2 (TP2) signal is too low.

Possible Causes:

- TP2 circuit open
- TP2 circuit short to ground
- Damaged TP2 sensor

Diagnostic Aids: This concern exhibits a symptom of limited power. A TP2 PID reading less than 0.25 volt in ignition ON, engine OFF or ignition ON, engine running indicates a concern is present.

Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	GO to Pinpoint Test DV .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0223 - THROTTLE/PEDAL POSITION SENSOR/SWITCH B CIRCUIT HIGH - DTC CHART

P0223 - THROTTLE/PEDAL POSITION SENSOR/SWITCH B CIRCUIT HIGH - DTC CHART

Description: This DTC sets when the electronic throttle control (ETC) throttle position (TP) sensor signal is too high.

Possible Causes:

- TP2 circuit short to voltage
- TP2 circuit short to VREF
- TP2 circuit open
- ETCRTN circuit open

- Damaged TP2 sensor

Diagnostic Aids: This concern exhibits a symptom of limited power. A TP2 PID reading greater than 4.75 volts in ignition ON, engine OFF or ignition ON, engine running indicates a concern is present.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DV .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0234 - TURBOCHARGER/SUPERCHARGER A OVERBOOST CONDITION - DTC CHART

P0234 - TURBOCHARGER/SUPERCHARGER A OVERBOOST CONDITION - DTC CHART

Description: This DTC sets when the actual TCBP value is greater than the desired TCBP value by 27.6 kPa (4 psi) or more for 5 seconds, indicating an over boost condition.

Possible Causes:

- Damaged turbocharger (TC) wastegate regulating valve solenoid
- Damaged wastegate adjusting rod
- TC wastegate regulating solenoid valve stuck
- Wastegate stuck closed
- Wastegate control hose open or plugged
- Incorrect wastegate adjustment

Diagnostic Aids: Check tubing for restrictions, cracks and incorrect fitting connections.
Check the turbocharger wastegate regulating valve solenoid for correct operation.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HN .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0236 - TURBOCHARGER/SUPERCHARGER BOOST SENSOR A CIRCUIT RANGE/PERFORMANCE - DTC CHART

P0236 - TURBOCHARGER/SUPERCHARGER BOOST SENSOR A CIRCUIT RANGE/PERFORMANCE - DTC CHART

Description: This DTC sets when the TCBP PID does not correlate with the BARO or the MAP PID.

Possible Causes:

- Damaged turbocharger boost pressure (TCBP) sensor
- Contaminated or restricted TCBP sensor
- Slow responding TCBP sensor

Diagnostic Aids: Check the intake air system for leaks and restrictions.
This DTC may be accompanied by other DTCs. Check for other DTCs and diagnose those first.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DM .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0237 - TURBOCHARGER/SUPERCHARGER BOOST SENSOR A CIRCUIT LOW - DTC CHART

P0237 - TURBOCHARGER/SUPERCHARGER BOOST SENSOR A CIRCUIT LOW - DTC CHART

Description: This DTC sets when there is a short to ground in the TCBP circuit.

Possible Causes:

- TCBP circuit short to ground
- Damaged turbocharger boost pressure (TCBP) sensor
- Damaged harness connector
- Damaged harness

Diagnostic Aids: Check the harness for intermittent concerns, incorrect connections, routing, alterations and damage due to contact with other components.
This DTC may be accompanied by other DTCs. Check for other DTCs and diagnose those first.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DM .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0238 - TURBOCHARGER/SUPERCHARGER BOOST SENSOR A CIRCUIT HIGH - DTC CHART

P0238 - TURBOCHARGER/SUPERCHARGER BOOST SENSOR A CIRCUIT HIGH - DTC CHART

Description: This DTC sets when there is an open circuit or high voltage in the TCBP circuit.

Possible Causes:

- TCBP circuit open
- TCBP circuit short to voltage

- Damaged turbocharger boost pressure (TCBP) sensor

Diagnostic Aids: Check the harness for intermittent concerns, incorrect connections, routing, alterations and damage due to contact with other components.
This DTC may be accompanied by other DTCs. Check for other DTCs and diagnose those first.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DM .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P023A - CHARGE AIR COOLER COOLANT PUMP CONTROL CIRCUIT OPEN - DTC CHART

P023A - CHARGE AIR COOLER COOLANT PUMP CONTROL CIRCUIT OPEN - DTC CHART

Description: This DTC sets when the CAC circuit is open or an internal failure of the charge air cooler (CAC) pump occurs.

Possible Causes:

- CAC circuit open
- Damaged CAC pump

Diagnostic Aids: A CAC circuit open condition will result in the CAC pump running continuously.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test KP .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P023B - CHARGE AIR COOLER COOLANT PUMP CONTROL CIRCUIT LOW - DTC CHART

P023B - CHARGE AIR COOLER COOLANT PUMP CONTROL CIRCUIT LOW - DTC CHART

Description: This DTC sets when the CAC circuit is shorted to ground or an internal failure of the charge air cooler (CAC) pump occurs.

Possible Causes:

- CAC circuit short to ground
- Damaged CAC pump

Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test KP .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P023C - CHARGE AIR COOLER COOLANT PUMP CONTROL CIRCUIT HIGH - DTC CHART

P023C - CHARGE AIR COOLER COOLANT PUMP CONTROL CIRCUIT HIGH - DTC CHART

Description: This DTC sets when the CAC circuit is shorted to voltage or an internal failure of the charge air cooler (CAC) pump occurs.

Possible Causes:

- CAC circuit short to voltage
- Damaged CAC pump

Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test KP .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0245 - TURBOCHARGER/SUPERCHARGER WASTEGATE SOLENOID A LOW - DTC CHART

P0245 - TURBOCHARGER/SUPERCHARGER WASTEGATE SOLENOID A LOW - DTC CHART

Description: This DTC sets when there is a short to ground in the TCWRVS circuit.

Possible Causes:

- TCWRVS circuit short to ground
- Damaged turbocharger (TC) wastegate regulating valve solenoid
- Damaged harness connector
- Damaged harness

Diagnostic Aids: Check the harness for intermittent concerns, incorrect connections, routing, alterations and damage due to contact with other components.
This DTC only sets when the solenoid valve is energized.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HN .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0246 - TURBOCHARGER/SUPERCHARGER WASTEGATE SOLENOID A HIGH - DTC CHART

P0246 - TURBOCHARGER/SUPERCHARGER WASTEGATE SOLENOID A HIGH - DTC CHART

Description: This DTC sets when there is an open circuit or high voltage in the TCWRVS circuit.
Possible Causes: • TCWRVS circuit open • TCWRVS circuit short to voltage • Damaged turbocharger (TC) wastegate regulating valve solenoid
Diagnostic Aids: Check the harness for intermittent concerns, incorrect connections, routing, alterations and damage due to contact with other components. This DTC only sets when the solenoid is not energized.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HN .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P025A - FUEL PUMP MODULE A CONTROL CIRCUIT/OPEN - DTC CHART

P025A - FUEL PUMP MODULE A CONTROL CIRCUIT/OPEN - DTC CHART

Description: The PCM monitors the fuel pump command (FPC) circuit for a concern. When the PCM commands the fuel pump (FP) ON, the PCM is able to detect a short to voltage on the FPC circuit. When the PCM commands the FP OFF, the PCM is able to detect an open circuit or a short to ground on the FPC circuit. The test fails if the voltage is less than or greater than a calibrated limit, for a calibrated amount of time.
Possible Causes: • FPC circuit open or short to ground • FPC circuit short to voltage • Damaged fuel pump control module
Diagnostic Aids: Check for any harness concerns.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test KC .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P025B - FUEL PUMP MODULE A CONTROL CIRCUIT RANGE/PERFORMANCE - DTC CHART

P025B - FUEL PUMP MODULE A CONTROL CIRCUIT RANGE/PERFORMANCE - DTC CHART

Description: The fuel pump control module monitors the duty cycle and frequency of the signal it receives from the PCM. The fuel pump control module determines if the signal from the PCM on the fuel pump command (FPC) circuit is a valid duty cycle and frequency. If the duty cycle or frequency is invalid, the fuel pump control module sends a 20% duty cycle signal on the fuel pump monitor (FPM) circuit to report the concern to the PCM. The test fails when the fuel pump control module is still reporting that it is receiving an invalid duty cycle or frequency from the PCM after a calibrated amount of time.

Possible Causes:

- FPC circuit open or short to ground
- FPC circuit short to voltage
- Radio frequency interference or electromagnetic interference
- Damaged fuel pump control module
- Damaged PCM

Diagnostic Aids: Check the harness for routing, alterations, incorrect shielding, or electrical interference from other systems.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test KC .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P025C - FUEL PUMP MODULE A CONTROL CIRCUIT LOW - DTC CHART

P025C - FUEL PUMP MODULE A CONTROL CIRCUIT LOW - DTC CHART

Description: The PCM monitors the fuel pump command (FPC) circuit for a concern. When the PCM commands the fuel pump (FP) ON, the PCM is able to detect a short to voltage on the FPC circuit. When the PCM commands the FP OFF, the PCM is able to detect an open circuit or a short to ground on the FPC circuit. The test fails if the FPC voltage is less than or greater than a calibrated limit, for a calibrated amount of time.

Possible Causes:

- FPC circuit short to ground
- Damaged fuel pump control module

Diagnostic Aids: Check for any harness concerns.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test KC .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P025D - FUEL PUMP MODULE A CONTROL CIRCUIT HIGH - DTC CHART

P025D - FUEL PUMP MODULE A CONTROL CIRCUIT HIGH - DTC CHART

Description: The PCM monitors the fuel pump command (FPC) circuit for a concern. When the PCM commands the fuel pump (FP) ON, the PCM is able to detect a short to voltage on the FPC circuit. When the PCM commands the FP OFF, the PCM is able to detect an open circuit or a short to ground on the FPC circuit. The test fails if the FPC voltage is less than or greater than a calibrated limit, for a calibrated amount of time.

Possible Causes:

- FPC circuit open or short to voltage
- Damaged fuel pump control module

Diagnostic Aids: Check for any harness concerns.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test KC .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P025E - TURBOCHARGER/SUPERCHARGER BOOST SENSOR A INTERMITTENT/ERRATIC - DTC CHART

P025E - TURBOCHARGER/SUPERCHARGER BOOST SENSOR A INTERMITTENT/ERRATIC - DTC CHART

Description: This DTC sets when there are intermittent events in the TCBP circuit during a single drive cycle.

Possible Causes:

- TCBP circuit intermittent open
- TCBP circuit intermittent short to voltage
- TCBP circuit intermittent short to ground
- Damaged turbocharger boost pressure (TCBP) sensor
- Damaged harness connector
- Damaged harness

Diagnostic Aids: Check the harness for intermittent concerns, incorrect connections, routing, alterations and damage due to contact with other components.
This DTC may be accompanied by other DTCs. Check for other DTCs and diagnose those first.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DN .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P026A - CHARGE AIR COOLER EFFICIENCY BELOW THRESHOLD - DTC CHART

P026A - CHARGE AIR COOLER EFFICIENCY BELOW THRESHOLD - DTC CHART

Description: This DTC sets when the temperature differential between the intake air temperature 2 (IAT2) sensor value and the charge air cooler temperature (CACT) sensor value is less than a calibrated value.

Possible Causes:

- Low coolant
- Cooling system concern
- Biased IAT2 sensor
- Biased CACT sensor
- Damaged charge air cooler (CAC)

Diagnostic Aids: Check for any cooling system concerns.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test KP .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P028D - CHARGE AIR COOLER COOLING FAN CONTROL CIRCUIT LOW - DTC CHART

P028D - CHARGE AIR COOLER COOLING FAN CONTROL CIRCUIT LOW - DTC CHART

Description: This DTC sets when the PCM detects an open circuit or a short to ground in the CACCF circuit.

Possible Causes:

- Damaged charge air cooler (CAC) fan relay
- CACCF circuit short to ground
- CACCF circuit open
- Damaged harness connector
- Damaged harness

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P028E - CHARGE AIR COOLER COOLING FAN CONTROL CIRCUIT HIGH - DTC CHART

P028E - CHARGE AIR COOLER COOLING FAN CONTROL CIRCUIT HIGH - DTC CHART

Description: This DTC sets when the PCM detects a short to voltage in the CACCF circuit.

Possible Causes:

- Damaged charge air cooler (CAC) fan relay
- CACCF circuit short to voltage
- Damaged harness connector
- Damaged harness

Diagnostic Aids: Check the harness for intermittent concerns, incorrect connections, routing, alterations and damage due to contact with other components.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test KF .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0297 - VEHICLE OVER SPEED CONDITION - DTC CHART

P0297 - VEHICLE OVER SPEED CONDITION - DTC CHART

Description: This DTC sets when the vehicle has been operated in a manner which caused the vehicle speed to exceed a calibration limit. The vehicle speed is continuously monitored and evaluated by the PCM. For additional information on the vehicle speed limiter, refer to POWERTRAIN CONTROL SOFTWARE .

Possible Causes:

- Vehicle driven at a high rate of speed

Diagnostic Aids: If there are no other symptoms, return the vehicle to the customer with information about the DTC.
If a symptom is present, refer to NO DIAGNOSTIC TROUBLE CODES (DTCS) PRESENT SYMPTOM CHART INDEX .

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0298 - ENGINE OIL OVER TEMPERATURE CONDITION - DTC CHART

P0298 - ENGINE OIL OVER TEMPERATURE CONDITION - DTC CHART

Description: This DTC sets when the engine oil temperature protection strategy in the PCM has been activated. This temporarily prohibits high engine speed operation by disabling injectors, to reduce the risk of engine damage from high engine oil temperature. The PCM uses an oil algorithm to determine actual engine oil temperature.

Possible Causes:

- Very high engine RPM for an extended period of time
- Overheating condition
- Base engine concerns

Diagnostic Aids: The engine is operating in high RPM range due to incorrect gear selection. This may cause a lack/loss of power or surge.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DY .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0299 - TURBOCHARGER/SUPERCHARGER A UNDERBOOST CONDITION - DTC CHART

P0299 - TURBOCHARGER/SUPERCHARGER A UNDERBOOST CONDITION - DTC CHART

Description: This DTC sets when the actual TCBP value is less than the desired TCBP value by 27.6 kPa (4 psi) or more for 5 seconds, indicating an under boost condition.

Possible Causes:

- Damaged turbocharger (TC) wastegate regulating valve solenoid
- TC wastegate regulating solenoid valve stuck
- Wastegate stuck open
- Wastegate control hose open or plugged
- Air leak between turbocharger and throttle

Diagnostic Aids: Check tubing for restrictions, cracks and incorrect fitting connections.
Check the turbocharger wastegate regulating valve solenoid for correct operation.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HN .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0300 - RANDOM MISFIRE DETECTED - DTC CHART

P0300 - RANDOM MISFIRE DETECTED - DTC CHART

Description: This DTC sets when the misfire detection monitor detects an engine misfire in multiple cylinders or the PCM cannot identify which cylinder is misfiring.

Possible Causes:

- Damaged camshaft position (CMP) sensor
- Low fuel (less than 1/8 tank)
- Stuck open exhaust gas recirculation (EGR) valve
- Restricted EGR passages
- Misfire monitor neutral profile correction has not been relearned since the last mechanical repair

Diagnostic Aids: One or more EGR passages may be restricted.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HD .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0301 - CYLINDER 1 MISFIRE DETECTED - DTC CHART

P0301 - CYLINDER 1 MISFIRE DETECTED - DTC CHART

Description: This DTC sets when the misfire detection monitor detects an engine misfire in cylinder 1.

Possible Causes:

- Ignition system
- Fuel injector 1
- Running out of fuel
- EVAP purge valve
- Fuel pressure
- Evaporative emission system
- Exhaust gas recirculation (EGR) system
- Base engine

- Misfire monitor neutral profile correction has not been relearned since the last mechanical repair

Diagnostic Aids: Misfire is defined as lack of combustion in a cylinder due to absence of spark, incorrect fuel metering, low compression, or any other cause.
The malfunction indicator lamp (MIL) blinks once per second when a misfire severe enough to cause catalyst damage is detected. If the MIL is on steady state due to a misfire, this indicates the threshold for emissions was exceeded and caused the vehicle to fail an inspection and maintenance tailpipe test.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HD .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0302 - CYLINDER 2 MISFIRE DETECTED - DTC CHART

P0302 - CYLINDER 2 MISFIRE DETECTED - DTC CHART

Description: This DTC sets when the misfire detection monitor detects an engine misfire in cylinder 2.

Possible Causes:

- Ignition system
- Fuel injector 2
- Running out of fuel
- EVAP purge valve
- Fuel pressure
- Evaporative emission system
- Exhaust gas recirculation (EGR) system
- Base engine
- Misfire monitor neutral profile correction has not been relearned since the last mechanical repair

Diagnostic Aids: Misfire is defined as lack of combustion in a cylinder due to absence of spark, incorrect fuel metering, low compression, or any other cause.
The malfunction indicator lamp (MIL) blinks once per second when a misfire severe enough to cause catalyst damage is detected. If the MIL is on steady state due to a misfire, this indicates the threshold for emissions was exceeded and caused the vehicle to fail an inspection and maintenance tailpipe test.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HD .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0303 -

CYLINDER 3 MISFIRE DETECTED - DTC CHART

P0303 - CYLINDER 3 MISFIRE DETECTED - DTC CHART

Description: This DTC sets when the misfire detection monitor detects an engine misfire in cylinder 3.

Possible Causes:

- Ignition system
- Fuel injector 3
- Running out of fuel
- EVAP purge valve
- Fuel pressure
- Evaporative emission system
- Exhaust gas recirculation (EGR) system
- Base engine
- Misfire monitor neutral profile correction has not been relearned since the last mechanical repair

Diagnostic Aids: Misfire is defined as lack of combustion in a cylinder due to absence of spark, incorrect fuel metering, low compression, or any other cause.
The malfunction indicator lamp (MIL) blinks once per second when a misfire severe enough to cause catalyst damage is detected. If the MIL is on steady state due to a misfire, this indicates the threshold for emissions was exceeded and caused the vehicle to fail an inspection and maintenance tailpipe test.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HD .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0304 - CYLINDER 4 MISFIRE DETECTED - DTC CHART

P0304 - CYLINDER 4 MISFIRE DETECTED - DTC CHART

Description: This DTC sets when the misfire detection monitor detects an engine misfire in cylinder 4.

Possible Causes:

- Ignition system
- Fuel injector 4
- Running out of fuel
- EVAP purge valve

- Fuel pressure
- Evaporative emission system
- Exhaust gas recirculation (EGR) system
- Base engine
- Misfire monitor neutral profile correction has not been relearned since the last mechanical repair

Diagnostic Aids: Misfire is defined as lack of combustion in a cylinder due to absence of spark, incorrect fuel metering, low compression, or any other cause.
The malfunction indicator lamp (MIL) blinks once per second when a misfire severe enough to cause catalyst damage is detected. If the MIL is on steady state due to a misfire, this indicates the threshold for emissions was exceeded and caused the vehicle to fail an inspection and maintenance tailpipe test.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HD .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0305 - CYLINDER 5 MISFIRE DETECTED - DTC CHART

P0305 - CYLINDER 5 MISFIRE DETECTED - DTC CHART

Description: This DTC sets when the misfire detection monitor detects an engine misfire in cylinder 5.

Possible Causes:

- Ignition system
- Fuel injector 5
- Running out of fuel
- EVAP purge valve
- Fuel pressure
- Evaporative emission system
- Exhaust gas recirculation (EGR) system
- Base engine
- Misfire monitor neutral profile correction has not been relearned since the last mechanical repair

Diagnostic Aids: Misfire is defined as lack of combustion in a cylinder due to absence of spark, incorrect fuel metering, low compression, or any other cause. The malfunction indicator lamp (MIL) blinks once per second when a misfire severe enough to cause catalyst damage is detected. If the MIL is on steady state due to a misfire, this indicates the threshold for emissions was exceeded and caused the vehicle to fail an inspection and maintenance tailpipe test.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HD .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0306 - CYLINDER 6 MISFIRE DETECTED - DTC CHART

P0306 - CYLINDER 6 MISFIRE DETECTED - DTC CHART

Description: This DTC sets when the misfire detection monitor detects an engine misfire in cylinder 6.

Possible Causes:

- Ignition system
- Fuel injector 6
- Running out of fuel
- EVAP purge valve
- Fuel pressure
- Evaporative emission system
- Exhaust gas recirculation (EGR) system
- Base engine
- Misfire monitor neutral profile correction has not been relearned since the last mechanical repair

Diagnostic Aids: Misfire is defined as lack of combustion in a cylinder due to absence of spark, incorrect fuel metering, low compression, or any other cause.
The malfunction indicator lamp (MIL) blinks once per second when a misfire severe enough to cause catalyst damage is detected. If the MIL is on steady state due to a misfire, this indicates the threshold for emissions was exceeded and caused the vehicle to fail an inspection and maintenance tailpipe test.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HD .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0307 - CYLINDER 7 MISFIRE DETECTED - DTC CHART

P0307 - CYLINDER 7 MISFIRE DETECTED - DTC CHART

Description: This DTC sets when the misfire detection monitor detects an engine misfire in cylinder 7.

Possible Causes:

- Ignition system
- Fuel injector 7
- Running out of fuel
- EVAP purge valve
- Fuel pressure
- Evaporative emission system
- Exhaust gas recirculation (EGR) system
- Base engine
- Misfire monitor neutral profile correction has not been relearned since the last mechanical repair

Diagnostic Aids: Misfire is defined as lack of combustion in a cylinder due to absence of spark, incorrect fuel metering, low compression, or any other cause.
The malfunction indicator lamp (MIL) blinks once per second when a misfire severe enough to cause catalyst damage is detected. If the MIL is on steady state due to a misfire, this indicates the threshold for emissions was exceeded and caused the vehicle to fail an inspection and maintenance tailpipe test.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HD .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0308 - CYLINDER 8 MISFIRE DETECTED - DTC CHART

P0308 - CYLINDER 8 MISFIRE DETECTED - DTC CHART

Description: This DTC sets when the misfire detection monitor detects an engine misfire in cylinder 8.

Possible Causes:

- Ignition system
- Fuel injector 8
- Running out of fuel
- EVAP purge valve
- Fuel pressure
- Evaporative emission system
- Exhaust gas recirculation (EGR) system
- Base engine
- Misfire monitor neutral profile correction has not been relearned since the last mechanical repair

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0309 - CYLINDER 9 MISFIRE DETECTED - DTC CHART

P0309 - CYLINDER 9 MISFIRE DETECTED - DTC CHART

Description: This DTC sets when the misfire detection monitor detects an engine misfire in cylinder 9.

Possible Causes:

- Ignition system
- Fuel injector 9
- Running out of fuel
- EVAP purge valve
- Fuel pressure
- Evaporative emission system
- Exhaust gas recirculation (EGR) system
- Base engine
- Misfire monitor neutral profile correction has not been relearned since the last mechanical repair

Diagnostic Aids: Misfire is defined as lack of combustion in a cylinder due to absence of spark, incorrect fuel metering, low compression, or any other cause.
The malfunction indicator lamp (MIL) blinks once per second when a misfire severe enough to cause catalyst damage is detected. If the MIL is on steady state due to a misfire, this indicates the threshold for emissions was exceeded and caused the vehicle to fail an inspection and maintenance tailpipe test.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HD .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0310 - CYLINDER 10 MISFIRE DETECTED - DTC CHART

P0310 - CYLINDER 10 MISFIRE DETECTED - DTC CHART

Description: This DTC sets when the misfire detection monitor detects an engine misfire in cylinder 10.

Possible Causes:

- Ignition system
- Fuel injector 10

- Running out of fuel
- EVAP canister purge valve
- Fuel pressure
- Evaporative emission system
- Exhaust gas recirculation (EGR) system
- Base engine
- Misfire monitor neutral profile correction has not been relearned since the last mechanical repair

Diagnostic Aids: Misfire is defined as lack of combustion in a cylinder due to absence of spark, incorrect fuel metering, low compression, or any other cause.
The malfunction indicator lamp (MIL) blinks once per second when a misfire severe enough to cause catalyst damage is detected. If the MIL is on steady state due to a misfire, this indicates the threshold for emissions was exceeded and caused the vehicle to fail an inspection and maintenance tailpipe test.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HD .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0313 - MISFIRE DETECTED WITH LOW FUEL - DTC CHART

P0313 - MISFIRE DETECTED WITH LOW FUEL - DTC CHART

Description: This DTC sets when an engine misfire fault is detected with low fuel level.

Possible Causes:

- Customer driving habits
- Low fuel or no fuel in tank (less than 1/8 tank)

Diagnostic Aids: Verify the fuel level is above 1/8 before diagnosing engine misfire DTCs.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HD .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0315 - CRANKSHAFT POSITION SYSTEM VARIATION NOT LEARNED - DTC CHART

P0315 - CRANKSHAFT POSITION SYSTEM VARIATION NOT LEARNED - DTC CHART

For Neutral Profile Correction Using Scan Tool

Description: The PCM has not learned the crankshaft pulse wheel tooth spacing. This DTC disables the misfire monitor.

Possible Causes:

- PCM replacement
- Internal PCM non-volatile random access memory (NVRAM) error

Diagnostic Aids: Complete the Misfire Monitor Neutral Profile Correction procedure using the scan tool.

For All Others

Description: The PCM is unable to learn and correct for mechanical inaccuracies in crankshaft pulse wheel tooth spacing. This DTC disables the misfire monitor.

Possible Causes:

- Damaged crankshaft pulse wheel teeth
- Damaged crankshaft position (CKP) sensor

Diagnostic Aids: Requires visual inspection of the CKP sensor and the crankshaft pulse wheel teeth for damage.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
Edge, F-150, Fiesta 1.0L, Fiesta 1.6L GTDI, Focus, MKC, Mustang, Transit	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		
All others	GO to Pinpoint Test HD .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0316 - MISFIRE DETECTED ON STARTUP (FIRST 1000 REVOLUTIONS) - DTC CHART

P0316 - MISFIRE DETECTED ON STARTUP (FIRST 1000 REVOLUTIONS) - DTC CHART

Description: DTC P0316 sets in addition to any type B misfire DTC which occurs in the first 1, 000 revolution test interval following engine start.

Possible Causes:

- Damaged crankshaft position (CKP) sensor
- Damaged ignition system

- Damaged fuel injectors
- Running out of fuel
- Fuel quality
- Base engine
- Damaged PCM

Diagnostic Aids: Freeze frame data and the DTC P03xx are also stored, indicating which cylinder the misfire occurred.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HD .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0320 - IGNITION/DISTRIBUTOR ENGINE SPEED INPUT CIRCUIT - DTC CHART

P0320 - IGNITION/DISTRIBUTOR ENGINE SPEED INPUT CIRCUIT - DTC CHART

Description: This DTC sets when several erratic profile ignition pickup (PIP) pulses have occurred in the crankshaft position (CKP) sensor signal within a calibrated time period when the camshaft speed exceeds the equivalent speed of engine idle.

Possible Causes:

- CKP+ circuit intermittent open (VR type)
- CKP- circuit intermittent open (VR type)
- CKP circuit intermittent open (Hall effect)
- VREF circuit intermittent open (Hall effect)
- SIGRTN circuit intermittent open (Hall effect)
- CKP+ circuit intermittent short to voltage (VR type)
- CKP- circuit intermittent short to voltage (VR type)
- CKP circuit intermittent short to voltage (Hall effect)
- VREF circuit intermittent short to voltage (Hall effect)
- SIGRTN circuit intermittent short to voltage (Hall effect)
- CKP+ circuit intermittent short to ground (VR type)
- CKP- circuit intermittent short to ground (VR type)
- CKP circuit intermittent short to ground (Hall effect)

- VREF circuit intermittent short to ground (Hall effect)
- SIGRTN circuit intermittent short to ground (Hall effect)
- CKP sensor incorrectly installed
- Damaged CKP sensor
- Incorrect, damaged or corroded connections
- Arcing secondary ignition components (coil, wires and plugs)
- Arcing relays or other high current devices (cooling fan or starter motor)
- On board 2 way radio transceiver
- Radio frequency interference or electromagnetic interference from an external source
- Improperly grounded high power aftermarket equipment

Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test A :		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0322 - IGNITION/DISTRIBUTOR ENGINE SPEED INPUT CIRCUIT NO SIGNAL - DTC CHART

P0322 - IGNITION/DISTRIBUTOR ENGINE SPEED INPUT CIRCUIT NO SIGNAL - DTC CHART

Description: This DTC sets when the crankshaft position (CKP) sensor profile ignition pickup (PIP) pulse is missing for greater than a calibrated number of camshaft revolutions when the camshaft speed exceeds the equivalent speed of engine idle.

Possible Causes:

- CKP+ circuit intermittent open (VR type)
- CKP- circuit open (VR type)
- CKP circuit open (Hall effect)
- VREF circuit open (Hall effect)
- SIGRTN circuit open (Hall effect)
- CKP+ circuit short to voltage (VR type)
- CKP- circuit short to voltage (VR type)
- CKP circuit short to voltage (Hall effect)
- VREF circuit short to voltage (Hall effect)

- SIGRTN circuit short to voltage (Hall effect)
- CKP+ circuit short to ground (VR type)
- CKP- circuit short to ground (VR type)
- CKP circuit short to ground (Hall effect)
- VREF circuit short to ground (Hall effect)
- SIGRTN circuit short to ground (Hall effect)
- Damaged CKP sensor
- CKP sensor incorrectly installed
- Incorrect, damaged or corroded connections

Diagnostic Aids: An inactive CKP signal causes a no start condition. Monitor the RPM PID while cranking the engine. A value of 0 RPM indicates a CKP concern.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test A .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0325 - KNOCK SENSOR 1 CIRCUIT (BANK 1) - DTC CHART

P0325 - KNOCK SENSOR 1 CIRCUIT (BANK 1) - DTC CHART

Description: This DTC sets when the voltage goes outside a calibrated level. The knock sensor 1 (KS1) detects vibrations upon increase and decrease in engine RPM. The KS1 generates a voltage based on this vibration.

Possible Causes:

- KS1+ circuit open
- KS1- circuit open
- KS1+ circuit short to voltage
- KS1- circuit short to voltage
- KS1+ circuit short to ground
- KS1- circuit short to ground
- Damaged KS1

Diagnostic Aids: A KS1 voltage greater than 0.5 volt with the ignition ON, engine OFF, indicates a concern is present.
The vehicle may need to be driven for several minutes to set this DTC.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DG .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0326 - KNOCK SENSOR 1 CIRCUIT RANGE/PERFORMANCE (BANK 1) - DTC CHART

P0326 - KNOCK SENSOR 1 CIRCUIT RANGE/PERFORMANCE (BANK 1) - DTC CHART

Description: This DTC sets when the voltage goes outside a calibrated level. The knock sensor 1 (KS1) detects vibrations upon increase and decrease in engine RPM. The KS1 generates a voltage based on this vibration.

Possible Causes:

- KS1+ circuit open
- KS1- circuit open
- KS1+ circuit short to voltage
- KS1- circuit short to voltage
- KS1+ circuit short to ground
- KS1- circuit short to ground
- Damaged KS1

Diagnostic Aids: A KS1 voltage greater than 0.5 volt with the ignition ON, engine OFF, indicates a concern is present.
The vehicle may need to be driven for several minutes to set this DTC.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DG .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0327 - KNOCK SENSOR 1 CIRCUIT LOW (BANK 1) - DTC CHART

P0327 - KNOCK SENSOR 1 CIRCUIT LOW (BANK 1) - DTC CHART

Description: This DTC sets when the voltage goes outside a calibrated level. The knock sensor 1 (KS1) detects vibrations upon increase and decrease in engine RPM. The KS1 generates a voltage based on this vibration.

Possible Causes:

- KS1+ circuit open

- KS1- circuit open
- KS1+ circuit short to ground
- KS1- circuit short to ground
- Damaged KS1

Diagnostic Aids: The vehicle may need to be driven for several minutes to set this DTC.			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	GO to Pinpoint Test DG .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0328 - KNOCK SENSOR 1 CIRCUIT HIGH (BANK 1) - DTC CHART

P0328 - KNOCK SENSOR 1 CIRCUIT HIGH (BANK 1) - DTC CHART

Description: This DTC sets when the voltage goes outside a calibrated level. The knock sensor 1 (KS1) detects vibrations upon increase and decrease in engine RPM. The KS1 generates a voltage based on this vibration.

Possible Causes:

- KS1+ circuit short to voltage
- KS1- circuit short to voltage
- Damaged KS1

Diagnostic Aids: The vehicle may need to be driven for several minutes to set this DTC.			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	GO to Pinpoint Test DG .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0330 - KNOCK SENSOR 2 CIRCUIT (BANK 2) - DTC CHART

P0330 - KNOCK SENSOR 2 CIRCUIT (BANK 2) - DTC CHART

Description: This DTC sets when the voltage goes outside a calibrated level. The knock sensor 2 (KS2) detects vibrations upon increase and decrease in engine RPM. The KS2 generates a voltage based on this vibration.

Possible Causes:

- KS2+ circuit open

- KS2- circuit open
- KS2+ circuit short to voltage
- KS2- circuit short to voltage
- KS2+ circuit short to ground
- KS2- circuit short to ground
- Damaged KS2

Diagnostic Aids: A KS2 voltage greater than 0.5 volt with the ignition ON, engine OFF, indicates a concern is present.
The vehicle may need to be driven for several minutes to set this DTC.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DG .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0331 - KNOCK SENSOR 2 CIRCUIT RANGE/PERFORMANCE LOW (BANK 2) - DTC CHART

P0331 - KNOCK SENSOR 2 CIRCUIT RANGE/PERFORMANCE LOW (BANK 2) - DTC CHART

Description: This DTC sets when the voltage goes outside a calibrated level. The knock sensor 2 (KS2) detects vibrations upon increase and decrease in engine RPM. The KS2 generates a voltage based on this vibration.

Possible Causes:

- KS2+ circuit open
- KS2- circuit open
- KS2+ circuit short to voltage
- KS2- circuit short to voltage
- KS2+ circuit short to ground
- KS2- circuit short to ground
- Damaged KS2

Diagnostic Aids: A KS2 voltage greater than 0.5 volt with the ignition ON, engine OFF, indicates a concern is present.
The vehicle may need to be driven for several minutes to set this DTC.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DG .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0332 - KNOCK SENSOR 2 CIRCUIT LOW (BANK 2) - DTC CHART

P0332 - KNOCK SENSOR 2 CIRCUIT LOW (BANK 2) - DTC CHART

Description: This DTC sets when the voltage goes outside a calibrated level. The knock sensor 2 (KS2) detects vibrations upon increase and decrease in engine RPM. The KS2 generates a voltage based on this vibration.

Possible Causes:

- KS2+ circuit open
- KS2- circuit open
- KS2+ circuit short to ground
- KS2- circuit short to ground
- Damaged KS2

Diagnostic Aids: The vehicle may need to be driven for several minutes to set this DTC.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DG .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0333 - KNOCK SENSOR 2 CIRCUIT HIGH (BANK 2) - DTC CHART

P0333 - KNOCK SENSOR 2 CIRCUIT HIGH (BANK 2) - DTC CHART

Description: This DTC sets when the voltage goes outside a calibrated level. The knock sensor 2 (KS2) detects vibrations upon increase and decrease in engine RPM. The KS2 generates a voltage based on this vibration.

Possible Causes:

- KS2+ circuit short to voltage
- KS2- circuit short to voltage
- Damaged KS2

Diagnostic Aids: The vehicle may need to be driven for several minutes to set this DTC.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DG .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0335 - CRANKSHAFT POSITION SENSOR A CIRCUIT - DTC CHART

P0335 - CRANKSHAFT POSITION SENSOR A CIRCUIT - DTC CHART

Description: This DTC sets when the crankshaft position (CKP) sensor profile ignition pickup (PIP) pulse is missing for greater than a calibrated number of camshaft revolutions when the camshaft speed exceeds the equivalent speed of engine idle or the starter motor is engaged.

Possible Causes:

- CKP+ circuit intermittent open (VR type)
- CKP- circuit open (VR type)
- CKP circuit open (Hall effect type)
- VREF circuit open (Hall effect type)
- SIGRTN circuit open (Hall effect type)
- CKP+ circuit short to voltage (VR type)
- CKP- circuit short to voltage (VR type)
- CKP circuit short to voltage (Hall effect type)
- VREF circuit short to voltage (Hall effect type)
- SIGRTN circuit short to voltage (Hall effect type)
- CKP+ circuit short to ground (VR type)
- CKP- circuit short to ground (VR type)
- CKP circuit short to ground (Hall effect type)
- VREF circuit short to ground (Hall effect type)
- SIGRTN circuit short to ground (Hall effect type)
- Damaged CKP sensor
- CKP sensor incorrectly installed
- Incorrect, damaged or corroded connections

Diagnostic Aids: An inactive CKP signal causes a no start condition. Monitor the RPM PID while cranking the engine. A value of 0 RPM indicates a CKP concern.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test JD .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0336 - CRANKSHAFT POSITION SENSOR A CIRCUIT RANGE/PERFORMANCE - DTC CHART

P0336 - CRANKSHAFT POSITION SENSOR A CIRCUIT RANGE/PERFORMANCE - DTC CHART

Description: This DTC sets when the input signal from the crankshaft position (CKP) sensor is erratic.

Possible Causes:

- CKP circuit noise
- Damaged CKP sensor connection
- Damaged CKP sensor
- Damaged crankshaft pulse wheel teeth

Diagnostic Aids: An inactive CKP signal causes a no start condition. Monitor the RPM PID while cranking the engine. A value of 0 RPM indicates a CKP concern.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test JD .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0339 - CRANKSHAFT POSITION SENSOR A CIRCUIT INTERMITTENT - DTC CHART

P0339 - CRANKSHAFT POSITION SENSOR A CIRCUIT INTERMITTENT - DTC CHART

Description: This DTC sets when several erratic profile ignition pickup (PIP) pulses have occurred in the crankshaft position (CKP) sensor signal within a calibrated time period when the camshaft speed exceeds the equivalent speed of engine idle or the starter motor is engaged.

Possible Causes:

- CKP+ circuit intermittent open (VR type)
- CKP- circuit intermittent open (VR type)
- CKP circuit intermittent open (Hall effect type)
- VREF circuit intermittent open (Hall effect type)
- SIGRTN circuit intermittent open (Hall effect type)
- CKP+ circuit intermittent short to voltage (VR type)
- CKP- circuit intermittent short to voltage (VR type)
- CKP circuit intermittent short to voltage (Hall effect type)
- VREF circuit intermittent short to voltage (Hall effect type)

- SIGRTN circuit intermittent short to voltage (Hall effect type)
- CKP+ circuit intermittent short to ground (VR type)
- CKP- circuit intermittent short to ground (VR type)
- CKP circuit intermittent short to ground (Hall effect type)
- VREF circuit intermittent short to ground (Hall effect type)
- SIGRTN circuit intermittent short to ground (Hall effect type)
- CKP sensor incorrectly installed
- Damaged CKP sensor
- Incorrect, damaged or corroded connections
- Arcing secondary ignition components (coil, wires and plugs)
- Arcing relays or other high current devices (cooling fan or starter motor)
- On board 2 way radio transceiver
- Radio frequency interference or electromagnetic interference from an external source
- Improperly grounded high power aftermarket equipment

Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test JD .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0340 - CAMSHAFT POSITION SENSOR A CIRCUIT (BANK 1 OR SINGLE SENSOR) - DTC CHART

P0340 - CAMSHAFT POSITION SENSOR A CIRCUIT (BANK 1 OR SINGLE SENSOR) - DTC CHART

Description: This DTC sets when the CMP11 circuit signal cannot be detected. For additional camshaft position (CMP) sensor location information, refer to ENGINE CONTROL COMPONENTS .

Possible Causes:

- CMP11 circuit open
- CMP11 circuit short to ground
- CMP11 circuit short to voltage
- SIGRTN circuit open
- VRSRTN circuit open

- CMP11 circuit shorted to other CMP circuits (2 or more CMP sensor systems)
- Damaged camshaft position bank 1 sensor 1 (CMP11) shielding
- CMP11 sensor incorrectly installed
- Damaged CMP11 sensor

Diagnostic Aids: Harness routing, harness alterations, incorrect shielding, or electrical interference from other systems may have an intermittent impact on the CMP signal.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DR .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0341 - CAMSHAFT POSITION SENSOR A CIRCUIT RANGE/PERFORMANCE (BANK 1 OR SINGLE SENSOR) - DTC CHART

P0341 - CAMSHAFT POSITION SENSOR A CIRCUIT RANGE/PERFORMANCE (BANK 1 OR SINGLE SENSOR) - DTC CHART

Description: This DTC sets when the CMP11 circuit has a noisy signal. For additional camshaft position (CMP) sensor location information, refer to ENGINE CONTROL COMPONENTS .

Possible Causes:

- Radio frequency interference or electromagnetic interference
- Damaged camshaft phaser and sprocket
- Damaged camshaft position bank 1 sensor 1 (CMP11) shielding

Diagnostic Aids: Harness routing, harness alterations, incorrect shielding, or electrical interference from other systems may have an intermittent impact on the CMP signal.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DR .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0344 - CAMSHAFT POSITION SENSOR A CIRCUIT INTERMITTENT (BANK 1 OR SINGLE SENSOR) - DTC CHART

P0344 - CAMSHAFT POSITION SENSOR A CIRCUIT INTERMITTENT (BANK 1 OR SINGLE SENSOR) - DTC CHART

Description: This DTC sets when the CMP11 circuit signal is intermittent. For additional camshaft

position (CMP) sensor location information, refer to ENGINE CONTROL COMPONENTS .

Possible Causes:

- Intermittent open circuit
- Intermittent short circuit
- Damaged CMP sensor shielding
- Incorrect harness connections
- Corrosion
- Damaged camshaft position bank 1 sensor 1 (CMP11)

Diagnostic Aids: Harness routing, harness alterations, incorrect shielding, or electrical interference from other systems may have an intermittent impact on the CMP signal.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DR .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0345 - CAMSHAFT POSITION SENSOR A CIRCUIT (BANK 2) - DTC CHART

P0345 - CAMSHAFT POSITION SENSOR A CIRCUIT (BANK 2) - DTC CHART

Description: This DTC sets when the CMP21 circuit signal cannot be detected. For additional camshaft position (CMP) sensor location information, refer to ENGINE CONTROL COMPONENTS .

Possible Causes:

- CMP21 circuit open
- CMP21 circuit short to ground
- CMP21 circuit short to voltage
- SIGRTN circuit open
- VRSRTN circuit open
- CMP21 circuit shorted to other CMP circuits (2 or more CMP sensor systems)
- Damaged CMP sensor shielding
- Camshaft position bank 2 sensor 1 (CMP21) incorrectly installed
- Damaged CMP21 sensor

Diagnostic Aids: Harness routing, harness alterations, incorrect shielding, or electrical interference from other systems may have an intermittent impact on the CMP signal.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DR .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0346 - CAMSHAFT POSITION SENSOR A CIRCUIT RANGE/PERFORMANCE (BANK 2) - DTC CHART

P0346 - CAMSHAFT POSITION SENSOR A CIRCUIT RANGE/PERFORMANCE (BANK 2) - DTC CHART

Description: This DTC sets when the CMP21 circuit has a noisy signal. For additional camshaft position (CMP) sensor location information, refer to ENGINE CONTROL COMPONENTS .

Possible Causes:

- Radio frequency interference or electromagnetic interference
- Damaged camshaft phaser and sprocket
- Damaged camshaft position bank 2 sensor 1 (CMP21) shielding

Diagnostic Aids: Harness routing, harness alterations, incorrect shielding, or electrical interference from other systems may have an intermittent impact on the CMP signal.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DR .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0349 - CAMSHAFT POSITION SENSOR A CIRCUIT INTERMITTENT (BANK 2) - DTC CHART

P0349 - CAMSHAFT POSITION SENSOR A CIRCUIT INTERMITTENT (BANK 2) - DTC CHART

Description: This DTC sets when the CMP21 circuit signal is intermittent. For additional camshaft position (CMP) sensor location information, refer to ENGINE CONTROL COMPONENTS .

Possible Causes:

- Intermittent open circuit
- Intermittent short circuit
- Damaged CMP sensor shielding
- Incorrect harness connections
- Corrosion
- Damaged camshaft position bank 2 sensor 1 (CMP21)

Diagnostic Aids: Harness routing, harness alterations, incorrect shielding, or electrical interference from other systems may have an intermittent impact on the CMP signal.			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	GO to Pinpoint Test DR .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0351 - IGNITION COIL A PRIMARY/SECONDARY CIRCUIT - DTC CHART

P0351 - IGNITION COIL A PRIMARY/SECONDARY CIRCUIT - DTC CHART

Description: This DTC sets when the PCM does not receive a valid ignition diagnostic monitor (IDM) pulse signal from the ignition module PCM.

Possible Causes:

- VPWR circuit open
- VPWR circuit short to ground
- COP1 circuit open (COP)
- CDA circuit open (coil pack)
- COP1 circuit short to voltage (COP)
- CDA circuit short to voltage (coil pack)
- COP1 circuit short to ground (COP)
- CDA circuit short to ground (coil pack)
- Damaged COP (if equipped)
- Damaged coil pack (if equipped)

Diagnostic Aids: The DTC P0351 only sets for a coil primary circuit failure. A secondary ignition coil or spark plug failure does not set the DTC P0351. The DTC P0301 does not set for a coil primary circuit malfunction. The DTC P0351 may set with or without the DTC P0301, however the DTC P0351 sets first.
When this DTC is set, the PCM enters failure mode effects management (FMEM) which shuts down the injector for the associated cylinder in order to protect the catalytic converter. This is normal operation, do not attempt to diagnose the injector with this DTC present.
If a primary coil is damaged due to a harness short to ground the PCM will not be damaged. Do not replace the PCM without verifying the coil driver functionality.
Use the 12 volt non-powered test lamp to verify VPWR voltage at the ignition coil harness connector. Check the coil driver circuit for open, short to voltage, or short to ground.

Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
Fiesta 1.6L TiVCT	GO to Pinpoint Test JE .		

All others	GO to Pinpoint Test JF .

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0352 - IGNITION COIL B PRIMARY/SECONDARY CIRCUIT - DTC CHART

P0352 - IGNITION COIL B PRIMARY/SECONDARY CIRCUIT - DTC CHART

Description: This DTC sets when the PCM does not receive a valid ignition diagnostic monitor (IDM) pulse signal from the ignition module PCM.

Possible Causes:

- VPWR circuit open
- VPWR circuit short to ground
- COP2 circuit open (COP)
- CDB circuit open (coil pack)
- COP2 circuit short to voltage (COP)
- CDB circuit short to voltage (coil pack)
- COP2 circuit short to ground (COP)
- CDB circuit short to ground (coil pack)
- Damaged COP (if equipped)
- Damaged coil pack (if equipped)

Diagnostic Aids: The DTC P0352 only sets for a coil primary circuit failure. A secondary ignition coil or spark plug failure does not set the DTC P0352. The DTC P0302 does not set for a coil primary circuit malfunction. The DTC P0352 may set with or without the DTC P0302, however the DTC P0352 sets first.
When this DTC is set, the PCM enters failure mode effects management (FMEM) which shuts down the injector for the associated cylinder in order to protect the catalytic converter. This is normal operation do not attempt to diagnose the injector with this DTC present.
If a primary coil is damaged due to a harness short to ground the PCM will not be damaged. Do not replace the PCM without verifying the coil driver functionality.
Use the 12 volt non-powered test lamp to verify VPWR voltage at the ignition coil harness connector. Check the coil driver circuit for open, short to voltage, or short to ground.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
Fiesta 1.6L TiVCT	GO to Pinpoint Test JE .		
All others	GO to Pinpoint Test JF .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0353 -

IGNITION COIL C PRIMARY/SECONDARY CIRCUIT - DTC CHART

P0353 - IGNITION COIL C PRIMARY/SECONDARY CIRCUIT - DTC CHART

Description: This DTC sets when the PCM does not receive a valid ignition diagnostic monitor (IDM) pulse signal from the ignition module PCM.

Possible Causes:

- VPWR circuit open
- VPWR circuit short to ground
- COP3 circuit open
- COP3 circuit short to voltage
- COP3 circuit short to ground
- Damaged COP

Diagnostic Aids: The DTC P0353 only sets for a coil primary circuit failure. A secondary ignition coil or spark plug failure does not set the DTC P0353. The DTC P0303 does not set for a coil primary circuit malfunction. The DTC P0353 may set with or without the DTC P0303, however the DTC P0353 sets first.
When this DTC is set, the PCM enters failure mode effects management (FMEM) which shuts down the injector for the associated cylinder in order to protect the catalytic converter. This is normal operation, do not attempt to diagnose the injector with this DTC present.
If a primary coil is damaged due to a harness short to ground the PCM will not be damaged. Do not replace the PCM without verifying the coil driver functionality.
Use the 12 volt non-powered test lamp to verify VPWR voltage at the ignition coil harness connector. Check the coil driver circuit for open, short to voltage, or short to ground.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test JF .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0354 - IGNITION COIL D PRIMARY/SECONDARY CIRCUIT - DTC CHART

P0354 - IGNITION COIL D PRIMARY/SECONDARY CIRCUIT - DTC CHART

Description: This DTC sets when the PCM does not receive a valid ignition diagnostic monitor (IDM) pulse signal from the ignition module PCM.

Possible Causes:

- VPWR circuit open
- VPWR circuit short to ground
- COP4 circuit open

- COP4 circuit short to voltage
- COP4 circuit short to ground
- Damaged COP

Diagnostic Aids: The DTC P0354 only sets for a coil primary circuit failure. A secondary ignition coil or spark plug failure does not set the DTC P0354. The DTC P0304 does not set for a coil primary circuit malfunction. The DTC P0354 may set with or without the DTC P0304, however the DTC P0354 sets first.
When this DTC is set, the PCM enters failure mode effects management (FMEM) which shuts down the injector for the associated cylinder in order to protect the catalytic converter. This is normal operation, do not attempt to diagnose the injector with this DTC present.
If a primary coil is damaged due to a harness short to ground the PCM will not be damaged. Do not replace the PCM without verifying the coil driver functionality. Use the 12 volt non-powered test lamp to verify VPWR voltage at the ignition coil harness connector.
Check the coil driver circuit for open, short to voltage, or short to ground.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test JF .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0355 - IGNITION COIL E PRIMARY/SECONDARY CIRCUIT - DTC CHART

P0355 - IGNITION COIL E PRIMARY/SECONDARY CIRCUIT - DTC CHART

Description: This DTC sets when the PCM does not receive a valid ignition diagnostic monitor (IDM) pulse signal from the ignition module PCM.

Possible Causes:

- VPWR circuit open
- VPWR circuit short to ground
- COP5 circuit open
- COP5 circuit short to voltage
- COP5 circuit short to ground
- Damaged COP

Diagnostic Aids: The DTC P0355 only sets for a coil primary circuit failure. A secondary ignition coil or spark plug failure does not set the DTC P0355. The DTC P0305 does not set for a coil primary circuit malfunction. The DTC P0355 may set with or without the DTC P0305, however the DTC P0355 sets first.
When this DTC is set, the PCM enters failure mode effects management (FMEM) which shuts down the injector for the associated cylinder in order to protect the catalytic converter. This is normal operation, do not attempt to diagnose the injector with this DTC present.
If a primary coil is damaged due to a harness short to ground the PCM will not be damaged. Do not

replace the PCM without verifying the coil driver functionality.
Use the 12 volt non-powered test lamp to verify VPWR voltage at the ignition coil harness connector. Check the coil driver circuit for open, short to voltage, or short to ground.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test JF .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0356 - IGNITION COIL F PRIMARY/SECONDARY CIRCUIT - DTC CHART

P0356 - IGNITION COIL F PRIMARY/SECONDARY CIRCUIT - DTC CHART

Description: This DTC sets when the PCM does not receive a valid ignition diagnostic monitor (IDM) pulse signal from the ignition module PCM.

Possible Causes:

- VPWR circuit open
- VPWR circuit short to ground
- COP6 circuit open
- COP6 circuit short to voltage
- COP6 circuit short to ground
- Damaged COP

Diagnostic Aids: The DTC P0356 only sets for a coil primary circuit failure. A secondary ignition coil or spark plug failure does not set the DTC P0356. The DTC P0306 does not set for a coil primary circuit malfunction. The DTC P0356 may set with or without the DTC P0306, however the DTC P0356 sets first.
When this DTC is set, the PCM enters failure mode effects management (FMEM) which shuts down the injector for the associated cylinder in order to protect the catalytic converter. This is normal operation, do not attempt to diagnose the injector with this DTC present.
If a primary coil is damaged due to a harness short to ground the PCM will not be damaged. Do not replace the PCM without verifying the coil driver functionality.
Use the 12 volt non-powered test lamp to verify VPWR voltage at the ignition coil harness connector. Check the coil driver circuit for open, short to voltage, or short to ground.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test JF .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0357 - IGNITION COIL G PRIMARY/SECONDARY CIRCUIT - DTC CHART

P0357 - IGNITION COIL G PRIMARY/SECONDARY CIRCUIT - DTC CHART

Description: This DTC sets when the PCM does not receive a valid ignition diagnostic monitor (IDM) pulse signal from the ignition module PCM.

Possible Causes:

- VPWR circuit open
- VPWR circuit short to ground
- COP7 circuit open
- COP7 circuit short to voltage
- COP7 circuit short to ground
- Damaged COP

Diagnostic Aids: The DTC P0357 only sets for a coil primary circuit failure. A secondary ignition coil or spark plug failure does not set the DTC P0357. The DTC P0307 does not set for a coil primary circuit malfunction. The DTC P0357 may set with or without the DTC P0307, however the DTC P0357 sets first.
When this DTC is set, the PCM enters failure mode effects management (FMEM) which shuts down the injector for the associated cylinder in order to protect the catalytic converter. This is normal operation, do not attempt to diagnose the injector with this DTC present.
If a primary coil is damaged due to a harness short to ground the PCM will not be damaged. Do not replace the PCM without verifying the coil driver functionality.
Use the 12 volt non-powered test lamp to verify VPWR voltage at the ignition coil harness connector. Check the coil driver circuit for open, short to voltage, or short to ground.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test JF .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0358 - IGNITION COIL H PRIMARY/SECONDARY CIRCUIT - DTC CHART

P0358 - IGNITION COIL H PRIMARY/SECONDARY CIRCUIT - DTC CHART

Description: This DTC sets when the PCM does not receive a valid ignition diagnostic monitor (IDM) pulse signal from the ignition module PCM.

Possible Causes:

- VPWR circuit open
- VPWR circuit short to ground
- COP8 circuit open
- COP8 circuit short to voltage
- COP8 circuit short to ground

- Damaged COP

Diagnostic Aids: The DTC P0358 only sets for a coil primary circuit failure. A secondary ignition coil or spark plug failure does not set the DTC P0358. The DTC P0308 does not set for a coil primary circuit malfunction. The DTC P0358 may set with or without the DTC P0308, however the DTC P0358 sets first.
When this DTC is set, the PCM enters failure mode effects management (FMEM) which shuts down the injector for the associated cylinder in order to protect the catalytic converter. This is normal operation, do not attempt to diagnose the injector with this DTC present.
If a primary coil is damaged due to a harness short to ground the PCM will not be damaged. Do not replace the PCM without verifying the coil driver functionality.
Use the 12 volt non-powered test lamp to verify VPWR voltage at the ignition coil harness connector. Check the coil driver circuit for open, short to voltage, or short to ground.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test JF .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0359 - IGNITION COIL I PRIMARY/SECONDARY CIRCUIT - DTC CHART

P0359 - IGNITION COIL I PRIMARY/SECONDARY CIRCUIT - DTC CHART

Description: This DTC sets when the PCM does not receive a valid ignition diagnostic monitor (IDM) pulse signal from the ignition module PCM.

Possible Causes:

- VPWR circuit open
- VPWR circuit short to ground
- COP9 circuit open
- COP9 circuit short to voltage
- COP9 circuit short to ground
- Damaged COP

Diagnostic Aids: The DTC P0359 only sets for a coil primary circuit failure. A secondary ignition coil or spark plug failure does not set the DTC P0359. The DTC P0309 does not set for a coil primary circuit malfunction. The DTC P0359 may set with or without the DTC P0309, however the DTC P0359 sets first.
When this DTC is set, the PCM enters failure mode effects management (FMEM) which shuts down the injector for the associated cylinder in order to protect the catalytic converter. This is normal operation, do not attempt to diagnose the injector with this DTC present.
If a primary coil is damaged due to a harness short to ground the PCM will not be damaged. Do not replace the PCM without verifying the coil driver functionality.
Use the 12 volt non-powered test lamp to verify VPWR voltage at the ignition coil harness connector. Check the coil driver circuit for open, short to voltage, or short to ground.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test JF .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0360 - IGNITION COIL J PRIMARY/SECONDARY CIRCUIT - DTC CHART

P0360 - IGNITION COIL J PRIMARY/SECONDARY CIRCUIT - DTC CHART

Description: This DTC sets when the PCM does not receive a valid ignition diagnostic monitor (IDM) pulse signal from the ignition module PCM.

Possible Causes:

- VPWR circuit open
- VPWR circuit short to ground
- COP10 circuit open
- COP10 circuit short to voltage
- COP10 circuit short to ground
- Damaged COP

Diagnostic Aids: The DTC P0360 only sets for a coil primary circuit failure. A secondary ignition coil or spark plug failure does not set the DTC P0360. The DTC P0310 does not set for a coil primary circuit malfunction. The DTC P0360 may set with or without the DTC P0310, however the DTC P0360 sets first.
When this DTC is set, the PCM enters failure mode effects management (FMEM) which shuts down the injector for the associated cylinder in order to protect the catalytic converter. This is normal operation, do not attempt to diagnose the injector with this DTC present.
If a primary coil is damaged due to a harness short to ground the PCM will not be damaged. Do not replace the PCM without verifying the coil driver functionality.
Use the 12 volt non-powered test lamp to verify VPWR voltage at the ignition coil harness connector. Check the coil driver circuit for open, short to VPWR, or short to ground.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test JF .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0365 - CAMSHAFT POSITION SENSOR B CIRCUIT (BANK 1) - DTC CHART

P0365 - CAMSHAFT POSITION SENSOR B CIRCUIT (BANK 1) - DTC CHART

Description: This DTC sets when the CMP12 circuit signal cannot be detected. For additional camshaft position (CMP) sensor location information, refer to ENGINE CONTROL COMPONENTS .

Possible Causes:

- CMP12 circuit open
- CMP12 circuit short to ground
- CMP12 circuit short to voltage
- SIGRTN circuit open
- VRSRTN circuit open
- CMP12 circuit shorted to other CMP circuits (2 or more CMP sensor systems)
- Damaged camshaft position bank 1 sensor 2 (CMP12) shielding
- CMP12 sensor incorrectly installed
- Damaged CMP12 sensor

Diagnostic Aids: Harness routing, harness alterations, incorrect shielding, or electrical interference from other systems may have an intermittent impact on the CMP signal.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DR .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0366 - CAMSHAFT POSITION SENSOR B CIRCUIT RANGE/PERFORMANCE (BANK 1) - DTC CHART

P0366 - CAMSHAFT POSITION SENSOR B CIRCUIT RANGE/PERFORMANCE (BANK 1) - DTC CHART

Description: This DTC sets when the CMP12 circuit has a noisy signal. For additional camshaft position (CMP) sensor location information, refer to ENGINE CONTROL COMPONENTS .

Possible Causes:

- Radio frequency interference or electromagnetic interference
- Damaged camshaft phaser and sprocket
- Damaged camshaft position bank 1 sensor 2 (CMP12) shielding

Diagnostic Aids: Harness routing, harness alterations, incorrect shielding, or electrical interference from other systems may have an intermittent impact on the CMP signal.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DR .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0369 - CAMSHAFT POSITION SENSOR B CIRCUIT INTERMITTENT (BANK 1) - DTC CHART

P0369 - CAMSHAFT POSITION SENSOR B CIRCUIT INTERMITTENT (BANK 1) - DTC CHART

Description: This DTC sets when the CMP12 circuit signal is intermittent. For additional camshaft position (CMP) sensor location information, refer to ENGINE CONTROL COMPONENTS .

Possible Causes:

- Intermittent open circuit
- Intermittent short circuit
- Damaged camshaft position bank 1 sensor 2 (CMP12) shielding
- Incorrect harness connections
- Corrosion
- Damaged CMP12 sensor

Diagnostic Aids: Harness routing, harness alterations, incorrect shielding, or electrical interference from other systems may have an intermittent impact on the CMP signal.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DR .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0390 - CAMSHAFT POSITION SENSOR B CIRCUIT (BANK 2) - DTC CHART

P0390 - CAMSHAFT POSITION SENSOR B CIRCUIT (BANK 2) - DTC CHART

Description: This DTC sets when the CMP22 circuit signal can not be detected. For additional camshaft position (CMP) sensor location information, refer to ENGINE CONTROL COMPONENTS .

Possible Causes:

- CMP22 circuit open
- CMP22 circuit short to ground
- CMP22 circuit short to voltage
- SIGRTN circuit open
- VRSRTN circuit open
- CMP22 circuit shorted to other CMP circuits (2 or more CMP sensor systems)
- Damaged camshaft position bank 2 sensor 2 (CMP22) shielding

- CMP22 sensor incorrectly installed
- Damaged CMP22 sensor

Diagnostic Aids: Harness routing, harness alterations, incorrect shielding, or electrical interference from other systems may have an intermittent impact on the CMP signal.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DR .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0391 - CAMSHAFT POSITION SENSOR B CIRCUIT RANGE/PERFORMANCE (BANK 2) - DTC CHART

P0391 - CAMSHAFT POSITION SENSOR B CIRCUIT RANGE/PERFORMANCE (BANK 2) - DTC CHART

Description: This DTC sets when the CMP22 circuit has a noisy signal. For additional camshaft position (CMP) sensor location information, refer to ENGINE CONTROL COMPONENTS .

Possible Causes:

- Radio frequency interference or electromagnetic interference
- Damaged camshaft phaser and sprocket
- Damaged camshaft position bank 2 sensor 2 (CMP) shielding

Diagnostic Aids: Harness routing, harness alterations, incorrect shielding, or electrical interference from other systems may have an intermittent impact on the CMP signal.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DR .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0394 - CAMSHAFT POSITION SENSOR B CIRCUIT INTERMITTENT (BANK 2) - DTC CHART

P0394 - CAMSHAFT POSITION SENSOR B CIRCUIT INTERMITTENT (BANK 2) - DTC CHART

Description: This DTC sets when the CMP22 circuit signal is intermittent. For additional camshaft position (CMP) sensor location information, refer to ENGINE CONTROL COMPONENTS .

Possible Causes:

- Intermittent open circuit
- Intermittent short circuit

- Damaged camshaft position bank 2 sensor 2 (CMP22) shielding
- Incorrect harness connections
- Corrosion
- Damaged CMP22 sensor

Diagnostic Aids: Harness routing, harness alterations, incorrect shielding, or electrical interference from other systems may have an intermittent impact on the CMP signal.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DR .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0400 - EXHAUST GAS RECIRCULATION (EGR) FLOW - DTC CHART

P0400 - EXHAUST GAS RECIRCULATION (EGR) FLOW - DTC CHART

Description: The electric EGR (EEGR) system is monitored once per drive cycle at high and low load conditions. This DTC sets when a concern is detected by PCM calculations indicating the EGR flow is less or greater than expected.

Possible Causes:

- EEGR valve stuck open or closed
- EEGR connector not seated correctly
- EEGR stepper motor
- VPWR circuit open
- EGRMC circuit open
- EGRMC circuit short to voltage
- EGRMC circuit short to ground
- Vacuum signal to manifold absolute pressure (MAP) sensor restricted or leaking
- Mass airflow (MAF) sensor signal erroneous
- Carbon build up in the EEGR valve seat area

Diagnostic Aids: The following sensors input data to the PCM for correct operation of the EEGR system: engine coolant temperature (ECT), crankshaft position (CKP), intake air temperature (IAT), MAF, throttle position (TP), MAP and vehicle speed sensor (VSS). Diagnose any DTC relating to these sensors prior to addressing this DTC.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory

All	GO to Pinpoint Test KD .

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0403 - EXHAUST GAS RECIRCULATION (EGR) CONTROL CIRCUIT - DTC CHART

P0403 - EXHAUST GAS RECIRCULATION (EGR) CONTROL CIRCUIT - DTC CHART

Description: The electric EGR (EEGR) system is continuously monitored to check the four EEGR motor coils, circuits, and the PCM for opens, shorts to voltage and ground. If a concern is detected, the EEGR system is disabled and additional monitoring is suspended for the remainder of the drive until the next drive cycle.

Possible Causes:

- EEGR stepper motor windings open
- EEGR connector not seated correctly
- EGRMC circuit open
- EGRMC circuit short to voltage
- EGRMC circuit short to ground
- Damaged PCM

Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test KD .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0420 - CATALYST SYSTEM EFFICIENCY BELOW THRESHOLD (BANK 1) - DTC CHART

P0420 - CATALYST SYSTEM EFFICIENCY BELOW THRESHOLD (BANK 1) - DTC CHART

Description: This DTC sets when the bank 1 catalyst system efficiency is below the acceptable threshold.

Possible Causes:

- Use of leaded fuel
- Damaged heated oxygen sensor (HO2S)
- Out of range engine coolant temperature (ECT) sensor
- High fuel pressure

- Damaged exhaust manifold
- Damaged catalytic converter
- Oil contamination
- Cylinder misfiring
- Downstream HO2S wires incorrectly connected
- Damaged exhaust system pipe
- Damaged muffler and tailpipe assembly
- Retarded spark timing
- Leaking fuel injector

Diagnostic Aids: Under normal closed loop fuel conditions, high efficiency catalysts have oxygen storage which reduces the frequency and amplitude of the downstream HO2S. As catalyst efficiency deteriorates, its ability to store oxygen declines and the downstream HO2S signal has an increased amplitude and frequency. The PCM compares the signal line length of the downstream HO2S to an expected signal line length of the downstream HO2S with a deteriorated catalytic converter.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HF .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0430 - CATALYST SYSTEM EFFICIENCY BELOW THRESHOLD (BANK 2) - DTC CHART

P0430 - CATALYST SYSTEM EFFICIENCY BELOW THRESHOLD (BANK 2) - DTC CHART

Description: This DTC sets when the bank 2 catalyst system efficiency is below the acceptable threshold.

Possible Causes:

- Use of leaded fuel
- Damaged heated oxygen sensor (HO2S)
- Out of range engine coolant temperature (ECT) sensor
- High fuel pressure.
- Damaged exhaust manifold
- Damaged catalytic converter
- Oil contamination
- Cylinder misfiring

- Downstream HO2S wires incorrectly connected
- Damaged exhaust system pipe
- Damaged muffler and tailpipe assembly
- Retarded spark timing
- Leaking fuel injector

Diagnostic Aids: Under normal closed loop fuel conditions, high efficiency catalysts have oxygen storage which reduces the frequency and amplitude of the downstream HO2S. As catalyst efficiency deteriorates, its ability to store oxygen declines and the downstream HO2S signal has an increased amplitude and frequency. The PCM compares the signal line length of the downstream HO2S to an expected signal line length of the downstream HO2S with a deteriorated catalytic converter.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HF .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0442 - EVAPORATIVE EMISSION SYSTEM LEAK DETECTED (SMALL LEAK) - DTC CHART

P0442 - EVAPORATIVE EMISSION SYSTEM LEAK DETECTED (SMALL LEAK) - DTC CHART

Description: This DTC sets when a fuel vapor leak from an opening as small as 1.016 mm (0.040 in) is detected by the EVAP running loss monitor test.

Possible Causes:

- Aftermarket EVAP hardware that does not conform to the required specifications
- Small holes or cuts in the fuel vapor hoses or tubes
- EVAP canister vent valve stays partially open on closed command
- Damaged, missing or loosely installed fuel filler cap (if equipped)
- Capless fuel tank filler pipe damaged or not sealed correctly (if equipped)
- Loose fuel vapor hose or tube connections to the EVAP system components
- EVAP system component seals leaking at or near the EVAP purge valve, fuel tank pressure (FTP) sensor, EVAP canister vent valve, fuel vapor control valve tube assembly or fuel vapor vent valve assembly

Diagnostic Aids: Check for a missing fuel filler cap or the integrity of the cap (if equipped). Verify the capless fuel tank filler pipe is sealed correctly (if equipped). Install and remove the supplemental fueling adapter five times in the capless fuel tank filler pipe to clear debris on the seal. Refer to the Owner Literature for the location of the supplemental fueling adapter in the vehicle. Check for loose or damaged vapor hoses. Visually inspect the EVAP canister inlet port, EVAP canister vent valve filter, and canister vent hose assembly for contamination or debris.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HX .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0443 - EVAPORATIVE EMISSION SYSTEM PURGE CONTROL VALVE CIRCUIT - DTC CHART

P0443 - EVAPORATIVE EMISSION SYSTEM PURGE CONTROL VALVE CIRCUIT - DTC CHART

Description: This DTC sets when the signal moves outside the minimum or maximum limit for the commanded state.

Possible Causes:

- VPWR circuit open
- EVAPCP circuit open
- EVAPCP circuit short to ground
- EVAPCP circuit short to voltage
- Damaged EVAP purge valve
- Damaged PCM

Diagnostic Aids: To verify normal function, monitor the EVMV PID or EVAPCP PID and the signal voltage (PCM control side). With the valve closed, the EVMV indicates 0 mA (0% duty cycle for EVAPCP) and voltage approximately equal to battery voltage. When the valve is commanded fully open, EVMV indicates 1, 000 mA (100% duty cycle for EVAPCP) and a voltage drop of 3 volts minimum is normal.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HX .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0446 - EVAPORATIVE EMISSION SYSTEM VENT CONTROL CIRCUIT - DTC CHART

P0446 - EVAPORATIVE EMISSION SYSTEM VENT CONTROL CIRCUIT - DTC CHART

Description: This DTC sets when the signal moves outside the minimum or maximum allowable calibrated parameters for a specified EVAP canister vent valve duty cycle by PCM command.

Possible Causes:

- VPWR circuit open
- KAPWR circuit open

- CANV circuit open
- CANV circuit short to ground
- CANV circuit short to voltage
- CANV circuit short to KAPWR
- Damaged EVAP canister vent valve
- Damaged PCM

Diagnostic Aids: To verify normal function, monitor the EVAP canister vent valve signal PID EVAPCV and the signal voltage (PCM control side). With the valve open, EVAPCV indicates 0% duty cycle and a voltage approximately equal to battery voltage. When the valve is commanded fully closed, EVAPCV indicates 100% duty cycle, and a minimum voltage drop of 4 volts is normal.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HX .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0451 - EVAPORATIVE EMISSION SYSTEM PRESSURE SENSOR/SWITCH RANGE/PERFORMANCE - DTC CHART

P0451 - EVAPORATIVE EMISSION SYSTEM PRESSURE SENSOR/SWITCH RANGE/PERFORMANCE - DTC CHART

Description: This DTC sets when a fuel tank pressure (FTP) sensor range (offset) concern is detected. The FTP sensor output is offset by greater than 1.7 inches of water or less than -1.7 inches of water.

Possible Causes:

- FTP circuit intermittent open
- FTP circuit intermittent short
- FTP sensor intermittent open
- FTP sensor intermittent short
- Contaminated FTP sensor
- Damaged FTP sensor
- Damaged PCM

Diagnostic Aids: With the FTP sensor at atmospheric pressure, the FTP PID normally indicates 0 inches of water. Remove the fuel filler cap or, for vehicles with a capless fuel filler pipe, install the supplemental refueling adaptor provided with the vehicle to open the capless fuel tank filler pipe. After installing the supplemental refueling adaptor or removing the fuel filler cap, wait one minute to allow the

pressure in the fuel tank to equalize with the ambient air pressure before accessing the PID.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HX .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0452 - EVAPORATIVE EMISSION SYSTEM PRESSURE SENSOR/SWITCH LOW - DTC CHART

P0452 - EVAPORATIVE EMISSION SYSTEM PRESSURE SENSOR/SWITCH LOW - DTC CHART

Description: This DTC sets when the fuel tank pressure (FTP) sensor signal average drops below a minimum allowable calibrated parameter.

Possible Causes:

- Contamination internal to the FTP sensor connector
- FTP circuit open
- VREF circuit open
- FTP circuit short to ground
- FTP circuit short to SIGRTN
- Damaged FTP sensor

Diagnostic Aids: An FTP voltage PID reading less than 0.22 volt in ignition ON, engine OFF or ignition ON, engine running indicates a concern is present.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HX .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0453 - EVAPORATIVE EMISSION SYSTEM PRESSURE SENSOR/SWITCH HIGH - DTC CHART

P0453 - EVAPORATIVE EMISSION SYSTEM PRESSURE SENSOR/SWITCH HIGH - DTC CHART

Description: This DTC sets when the fuel tank pressure (FTP) sensor signal average jumps above a minimum allowable calibrated parameter.

Possible Causes:

- Contamination internal to the FTP sensor connector
- FTP circuit open

- FTP circuit short to voltage
- VREF circuit short to voltage
- SIGRTN circuit open
- Damaged FTP sensor

Diagnostic Aids: An FTP voltage PID reading greater than 4.85 volts with the ignition ON, engine OFF or with the ignition ON, engine running, indicates a concern is present.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HX .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0454 - EVAPORATIVE EMISSION SYSTEM PRESSURE SENSOR/SWITCH INTERMITTENT - DTC CHART

P0454 - EVAPORATIVE EMISSION SYSTEM PRESSURE SENSOR/SWITCH INTERMITTENT - DTC CHART

Description: This DTC sets when the fuel tank pressure changes greater than 14 inches of water in 0.10 seconds.

Possible Causes:

- FTP circuit intermittent open
- FTP circuit intermittent short
- FTP sensor intermittent open
- FTP sensor intermittent short
- Contaminated FTP sensor
- Damaged FTP sensor

Diagnostic Aids: Monitor the FTP PID and note if it changes from greater than 15 inches of water to less than minus (-) 15 inches of water often in 1 minute.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HX .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0455 - EVAPORATIVE EMISSION SYSTEM LEAK DETECTED (GROSS LEAK/NO FLOW) - DTC CHART

P0455 - EVAPORATIVE EMISSION SYSTEM LEAK DETECTED (GROSS LEAK/NO FLOW) - DTC CHART

Description: The PCM monitors the complete evaporative emission (EVAP) control system for no purge flow, the presence of a large fuel vapor leak, or multiple small fuel vapor leaks. This DTC sets when no purge flow, which is attributed to fuel vapor blockages or restrictions, a large fuel vapor leak, or multiple fuel vapor leaks are detected by the EVAP running loss monitor test with the engine running, but not at idle.

Possible Causes:

- Damaged, missing or loosely installed fuel filler cap (if equipped)
- Aftermarket EVAP hardware that does not conform to the required specifications
- Disconnected or cracked fuel EVAP canister tube, EVAP canister purge outlet tube, or EVAP return tube
- EVAP purge valve stuck closed
- Capless fuel tank filler pipe damaged or not sealed correctly (if equipped)
- Blockages or restrictions in the fuel vapor hoses or tubes
- Loose fuel vapor hose or tube connections to the EVAP system components
- EVAP canister vent valve stuck open
- Damaged fuel tank pressure (FTP) sensor
- Damaged EVAP canister

Diagnostic Aids: Check for audible vacuum noise or significant fuel odor in the engine compartment or near the EVAP canister and fuel tank. Verify the capless fuel tank filler pipe is sealed correctly. Install and remove the supplemental fueling adapter five times in the capless fuel tank filler pipe to clear debris on the seal. Refer to the Owner Literature for the location of the supplemental fueling adapter in the vehicle.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HX .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0456 - EVAPORATIVE EMISSION SYSTEM LEAK DETECTED (VERY SMALL LEAK) - DTC CHART

P0456 - EVAPORATIVE EMISSION SYSTEM LEAK DETECTED (VERY SMALL LEAK) - DTC CHART

Description: This DTC sets when a fuel vapor leak from an opening as small as 0.508 mm (0.020 inch) is detected by the EVAP running loss monitor test.

Possible Causes:

- Very small holes or cuts in the fuel vapor hoses or tubes
- Loose fuel vapor hose or tube connections to the EVAP system components
- EVAP system component seals leaking

Diagnostic Aids: Check for a missing fuel filler cap or the integrity of the cap (if equipped). Verify the capless fuel tank filler pipe is sealed correctly (if equipped). Install and remove the supplemental fueling adapter five times in the capless fuel tank filler pipe to clear debris on the seal. Refer to the Owner Literature for the location of the supplemental fueling adapter in the vehicle. Check for loose or damaged vapor hoses. Visually inspect the EVAP canister inlet port, EVAP canister vent valve filter, and EVAP canister vent hose assembly for contamination or debris.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HX .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0457 - EVAPORATIVE EMISSION SYSTEM LEAK DETECTED (FUEL CAP LOOSE/OFF) - DTC CHART

P0457 - EVAPORATIVE EMISSION SYSTEM LEAK DETECTED (FUEL CAP LOOSE/OFF) - DTC CHART

Description: The PCM continuously monitors the fuel level and retains the last updated value prior to the ignition switch being placed in the OFF position. After the ignition switch is placed in the ON position a new fuel level is taken and compared to the level recorded at ignition OFF. If the fuel level has increased, a flag is set in the PCM indicating the vehicle was refueled. This DTC sets when the evaporative emission (EVAP) monitor detects a gross leak while the refueling flag is set and a loose fuel filler cap (if equipped) or an incorrectly sealed capless fuel tank filler pipe (if equipped) is suspected. On most vehicles, when the DTC sets, a message on the instrument panel cluster (IPC) displays to instruct the driver to check the fuel cap or capless fuel tank filler pipe (if equipped).

Possible Causes:

- Damaged, missing, or loosely installed fuel filler cap (if equipped)
- Capless fuel tank filler pipe damaged or not sealed correctly (if equipped)

Diagnostic Aids: Check for a missing fuel filler cap or the integrity of the cap (if equipped). Verify the capless fuel tank filler pipe is sealed correctly (if equipped). Install and remove the supplemental fueling adapter five times in the capless fuel tank filler pipe to clear debris on the seal. Refer to the Owner Literature for the location of the supplemental fueling adapter in the vehicle. If OK, clear the continuous memory DTCs and test the system for correct operation.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HX .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0460 - FUEL LEVEL SENSOR A CIRCUIT - DTC CHART

P0460 - FUEL LEVEL SENSOR A CIRCUIT - DTC CHART

Description: The PCM calculates the amount of fuel used during operation. This DTC sets when the FLI signal does not change or does not correspond with the calculated fuel usage. For vehicles with a dual container (saddle type) fuel tank, either fuel level sensor may set this DTC.

Possible Causes:

- Stuck float arm
- Fuel level is always greater than 95% due to refueling patterns
- Fuel level is always less than 5% due to refueling patterns
- Fuel level is always at the same level between 3% and 97% full due to refueling patterns
- Fuel pump (FP) module concern
- Damaged instrument panel cluster (IPC)

Diagnostic Aids: Check with the customer for driving and fueling habits that would keep the fuel level at approximately the same value. Monitor the FLI PIDs while attempting to move the fuel level float by adding or removing fuel as necessary.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HX .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0461 - FUEL LEVEL SENSOR A CIRCUIT RANGE/PERFORMANCE - DTC CHART

P0461 - FUEL LEVEL SENSOR A CIRCUIT RANGE/PERFORMANCE - DTC CHART

Description: This DTC sets when the FLI signal repeatedly moves in and out of range, exceeding the minimum or maximum allowable calibrated parameters for a specified fuel fill percentage in the fuel tank. For vehicles with a dual container (saddle type) fuel tank, either fuel level sensor may set this DTC.

Possible Causes:

Diagnostic Aids: Verify aftermarket equipment does not generate radio frequency interference or electromagnetic interference which may cause noisy FLI input signal.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HX .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0462 - FUEL LEVEL SENSOR A CIRCUIT LOW - DTC CHART

P0462 - FUEL LEVEL SENSOR A CIRCUIT LOW - DTC CHART

Description: This DTC sets when the FLI signal is less than the minimum allowable calibrated parameter for a specified fuel fill percentage in the fuel tank.

Possible Causes:

- Empty fuel tank
- Incorrectly installed fuel gauge
- Fuel pump (FP) module concern
- Damaged instrument panel cluster (IPC)
- Damaged fuel gauge

Diagnostic Aids: Monitor the FLI PIDs with the ignition ON, engine running. A concern is present if the FLI percentage PID is at 25% fill and the FLI voltage PIDs is less than 0.90 volt with a non-matching fuel gauge or the FLI percentage PIDs is at 75% fill and the FLI voltage PIDs is greater than 2.45 volts with a non-matching fuel gauge.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HX .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0463 - FUEL LEVEL SENSOR A CIRCUIT HIGH - DTC CHART

P0463 - FUEL LEVEL SENSOR A CIRCUIT HIGH - DTC CHART

Description: This DTC sets when the FLI signal is greater than the maximum allowable calibrated parameter for a specified fuel fill percentage in the fuel tank.

Possible Causes:

- Overfilled fuel tank
- Fuel pump (FP) module concern
- Incorrectly installed fuel gauge
- Damaged instrument panel cluster (IPC)
- Damaged fuel gauge

Diagnostic Aids: Monitor the FLI PIDs in ignition ON, engine running. A concern is present if the FLI percentage PID is at 25% fill and the FLI voltage PID is less than 0.90 volt with a non-matching fuel gauge or the FLI percentage PID is at 75% fill and the FLI voltage PID is greater than 2.45 volts with a

non-matching fuel gauge.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HX .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0480 - FAN 1 CONTROL CIRCUIT - DTC CHART

P0480 - FAN 1 CONTROL CIRCUIT - DTC CHART

For Relay Controlled Electric Cooling Fan

Description: This DTC sets when the PCM grounds the LFC circuit and excessive current draw is detected on the LFC circuit; or with the LFC circuit not grounded by the PCM the voltage is not detected on the LFC circuit. The PCM expects to detect VPWR voltage coming through the low speed fan control (FC) relay coil to the LFC circuit.

Possible Causes:

- LFC circuit open
- LFC circuit short
- VPWR circuit to the LFC relay open
- Damaged LFC relay

Diagnostic Aids: When the LFC_F PID reads YES, a concern is present. A short to voltage can only be detected when the PCM is grounding the LFC circuit.

For Variable Speed Electric Cooling Fan

Description: This DTC sets if the PCM detects the voltage on the FCV circuit is not within the expected range.

Possible Causes:

- FCV circuit open
- FCV circuit short
- B+ or ground circuit concern to cooling fan
- VPWR open to cooling fan (if applicable)
- Damaged cooling fan module

Diagnostic Aids:

For Cooling Fan Clutch

Description: This DTC sets if the PCM detects the voltage on the FCV circuit is not within the expected range.

Possible Causes:

- FCV circuit open
- FCV circuit short
- Damaged cooling fan clutch solenoid

Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
Edge, Expedition, Explorer, F-150, Fiesta 1.0L, Fiesta 1.6L TiVCT, Flex, Fusion, MKC, MKS, MKT, MKZ, Mustang, Navigator, Taurus, Transit	GO to Pinpoint Test KF .		
Escape/Kuga, Fiesta 1.6L GTDI, Focus, MKX, Transit Connect	GO to Pinpoint Test KN .		
F-Series Super Duty	GO to Pinpoint Test HV .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0481 - FAN 2 CONTROL CIRCUIT - DTC CHART

P0481 - FAN 2 CONTROL CIRCUIT - DTC CHART

Description: This DTC sets when the HFC output is commanded on (grounded) and excessive current draw is detected on the HFC circuit; or when the HFC circuit is commanded off and voltage is not detected on the HFC circuit. The PCM expects to detect VPWR voltage through the high speed fan control (FC) relay coil to the HFC circuit.

Possible Causes:

- HFC circuit open

- HFC circuit short
- VPWR circuit to the HFC relay open
- Damaged HFC relay

Diagnostic Aids: When the HFC_F PID reads YES, a concern is present. An open circuit or short to ground can only be detected when the PCM is not grounding the HFC circuit. A short to voltage can only be detected when the PCM is grounding the HFC circuit.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test KF .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0482 - FAN 3 CONTROL CIRCUIT - DTC CHART

P0482 - FAN 3 CONTROL CIRCUIT - DTC CHART

Description: This DTC sets when the MFC output is commanded on (grounded) and excessive current draw is detected on the MFC circuit; or when the MFC circuit is commanded off and voltage is not detected on the MFC circuit. The PCM expects to detect VPWR voltage through the medium speed fan control (FC) relay coil to the MFC circuit.

Possible Causes:

- MFC circuit open
- MFC circuit short
- VPWR circuit to the MFC relay open
- Damaged MFC relay

Diagnostic Aids: When the MFC_F PID reads YES, a concern is present. An open circuit or short to ground can only be detected when the PCM is not grounding the MFC circuit. A short to voltage can only be detected when the PCM is grounding the MFC circuit.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test KF .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P04DB - CRANKCASE VENTILATION SYSTEM DISCONNECTED - DTC CHART

P04DB - CRANKCASE VENTILATION SYSTEM DISCONNECTED - DTC CHART

Description: This DTC sets when the crankcase pressure sensor voltage is less than 2.5 V.

Possible Causes:

- Disconnected positive crankcase ventilation (PCV) system hose or component
- VREF circuit open
- SIGRTN circuit open
- CKCP circuit open

Diagnostic Aids: Verify the integrity of the PCV system.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HG .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0500 - VEHICLE SPEED SENSOR (VSS) A - DTC CHART

P0500 - VEHICLE SPEED SENSOR (VSS) A - DTC CHART

Description: This DTC sets when an error in the vehicle speed information is detected. Vehicle speed data is received from either the VSS or the anti-lock brake system (ABS) module. If the engine RPM is above the torque converter stall speed (automatic transmission) and the engine load is high, it can be inferred that the vehicle must be moving. If there is insufficient vehicle speed data input to the PCM, a concern is indicated and this DTC sets. On most vehicle applications the malfunction indicator lamp (MIL) illuminates when this DTC sets.

Possible Causes:

- VSS+ circuit open (VR type)
- VSS- circuit open (VR type)
- VSS circuit open (Hall effect type)
- VSS circuit short to ground (Hall effect type)
- VSS circuit short to voltage (Hall effect type)
- Damaged drive mechanism for VSS
- Damaged VSS
- Damaged wheel speed sensors
- Damaged wheel speed sensor harness circuits

Diagnostic Aids: Monitor the VSS PID while driving the vehicle. This DTC sets when a sudden loss of vehicle speed signal over a period of time is detected. If vehicle speed data is lost, check the source of the vehicle speed input: VSS or ABS.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
F-650/F-750, F-Series Super Duty, Fiesta, Fusion, Motorhome/Stripped Chassis/Step Van	GO to Pinpoint Test DF .		
Manual Transmission	GO to Pinpoint Test DP .		
Automatic Transmission	The PCM uses information from the ABS module and the transmission control module (TCM) to calculate vehicle speed. Check these modules for DTCs.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0501 - VEHICLE SPEED SENSOR A RANGE/PERFORMANCE - DTC CHART

P0501 - VEHICLE SPEED SENSOR A RANGE/PERFORMANCE - DTC CHART

Description:			
Possible Causes:			
Diagnostic Aids: Refer to the service information , Electronic Engine Controls.			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0503 - VEHICLE SPEED SENSOR (VSS) A INTERMITTENT/ERRATIC/HIGH - DTC CHART

P0503 - VEHICLE SPEED SENSOR (VSS) A INTERMITTENT/ERRATIC/HIGH - DTC CHART

Description: This DTC sets when an incorrect or noisy VSS signal is detected. Vehicle speed data is received from either the VSS or the anti-lock brake system (ABS) module.

Possible Causes:

- Noisy VSS input signal from radio frequency interference or electromagnetic interference external sources, such as ignition components or the charging circuit
- Damaged VSS or driven gears
- Damaged VSS wiring harness or connectors
- Concern in the modules or circuits connected to the VSS circuit
- Aftermarket add-on

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0504 - BRAKE SWITCH CORRELATION - DTC CHART

P0504 - BRAKE SWITCH CORRELATION - DTC CHART

Description: This DTC sets when the calibrated threshold is exceeded during a comparison test between the brake pedal switch (BPS) and the brake pedal position (BPP) switch.

Possible Causes:

- Damaged brake switch
- BPS circuit open
- BPS circuit short to voltage
- BPS circuit short to ground
- BPP circuit open
- BPP circuit short to voltage
- BPP circuit short to ground

Diagnostic Aids: Check the state of the BOO1 and BOO2 PIDs. The BOO1 PID is normally open and BOO2 PID is normally closed.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test FD .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0505 - IDLE AIR CONTROL (IAC) SYSTEM - DTC CHART

P0505 - IDLE AIR CONTROL (IAC) SYSTEM - DTC CHART

Description: This DTC sets when the desired RPM could not be reached or controlled during the key ON, engine running (KOER), self-test.

Possible Causes:

- Failure mode effects management (FMEM) condition is present
- Intake air restriction
- Exhaust restriction
- Sludged throttle body
- Vacuum leaks

- Damaged electronic throttle body (ETB)
- Damaged PCM

Diagnostic Aids: This DTC may be accompanied by other DTCs. Diagnose other DTCs first. If no other DTCs are present, inspect the intake air system for air restrictions, vacuum leaks, and damage. If no concerns are present, clear the DTC and carry out the KOER, self-test.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HU .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0506 - IDLE AIR CONTROL (IAC) SYSTEM RPM LOWER THAN EXPECTED - DTC CHART

P0506 - IDLE AIR CONTROL (IAC) SYSTEM RPM LOWER THAN EXPECTED - DTC CHART

Description: This DTC sets when the engine idle speed is less than the desired RPM.

Possible Causes:

- Intake air restriction
- Vacuum leaks
- Exhaust restriction
- Engine mechanical concern
- Sludged throttle body
- Damaged electronic throttle body (ETB)
- Damaged PCM

Diagnostic Aids: This DTC may be accompanied by other DTCs. Diagnose other DTCs first. If no other DTCs are present, inspect the intake air system for air restrictions, vacuum leaks, and damage. If no concerns are present, clear the DTC and carry out the key ON, engine running (KOER), self-test.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HU .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0507 - IDLE AIR CONTROL (IAC) SYSTEM RPM HIGHER THAN EXPECTED - DTC CHART

P0507 - IDLE AIR CONTROL (IAC) SYSTEM RPM HIGHER THAN EXPECTED - DTC CHART

Description: This DTC sets when the engine idle speed is greater than the desired RPM.

Possible Causes:

- Intake air leak after throttle body
- Vacuum leaks
- Damaged evaporative emission (EVAP) system
- Exhaust gas recirculation (EGR) valve leaks vacuum
- Damaged electronic throttle body (ETB)
- Damaged PCM

Diagnostic Aids: This DTC is informational only and it may be accompanied by other DTCs. Diagnose other DTCs first. If no other DTCs are present, inspect the intake air system for air restrictions, vacuum leaks, and damage. If no concerns are present, clear the DTC and repeat the self-test.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P050A - COLD START IDLE AIR CONTROL PERFORMANCE - DTC CHART

P050A - COLD START IDLE AIR CONTROL PERFORMANCE - DTC CHART

Description: This DTC sets when the difference between desired and actual engine speed exceeds the calibrated threshold.

Possible Causes:

- Intake air restriction
- Exhaust restriction
- Engine mechanical concern
- Damaged or sludged electronic throttle body (ETB)
- Vacuum leaks
- Damaged PCM

Diagnostic Aids: Disregard the freeze frame data. Freeze frame data does not apply to the cold start monitor.
This DTC is informational only and may be accompanied by other DTCs. Diagnose other DTCs first. If no other DTCs are present, inspect the intake air system for air restrictions, vacuum leaks, and damage. If no concerns are present, clear the DTCs and verify the engine coolant temperature is below 37.8°C (100°F). Allow the vehicle to soak for 2 to 3 hours if necessary for the engine coolant temperature to fall below 37.8°C (100°F).
Start the engine without touching the accelerator pedal and allow the engine to idle for 6 minutes in

park. If no DTCs are present and the malfunction indicator lamp (MIL) is not illuminated after idling for 6 minutes, carry out the key ON, engine running (KOER), self-test to confirm that no DTCs are present and the repair is complete.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P050B - COLD START IGNITION TIMING PERFORMANCE - DTC CHART

P050B - COLD START IGNITION TIMING PERFORMANCE - DTC CHART

Description: This DTC sets when the difference between desired and commanded spark timing exceeds the calibrated threshold.

Possible Causes:

- Intake air restriction
- Exhaust restriction
- Engine mechanical concern
- Damaged or sludged electronic throttle body (ETB)
- Vacuum leaks
- Damaged PCM

Diagnostic Aids: Disregard the freeze frame data. Freeze frame data does not apply to the cold start monitor.
This DTC is informational only and may be accompanied by other DTCs. Diagnose other DTCs first. If no other DTCs are present, inspect the intake air system for air restrictions, vacuum leaks, and damage. If no concerns are present, clear the DTCs and verify the engine coolant temperature is below 37.8°C (100°F). Allow the vehicle to soak for 2 to 3 hours if necessary for the engine coolant temperature to fall below 37.8°C (100°F).
Start the engine without touching the accelerator pedal and allow the engine to idle for 6 minutes in park. If no DTCs are present and the malfunction indicator lamp (MIL) is not illuminated after idling for 6 minutes, carry out the key ON, engine running (KOER), self-test to confirm that no DTCs are present and the repair is complete.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P050E - COLD START ENGINE EXHAUST TEMPERATURE OUT OF RANGE - DTC CHART

P050E - COLD START ENGINE EXHAUST TEMPERATURE OUT OF RANGE - DTC CHART

Description: The PCM calculates the actual catalyst warm up temperature during a cold start. The PCM then compares the actual catalyst temperature to the expected catalyst temperature model. The difference between the actual and expected temperatures is a ratio. This DTC sets when this ratio exceeds the calibrated value and the malfunction indicator lamp (MIL) illuminates.

Possible Causes:

- Intake air restriction
- Exhaust restriction
- Engine mechanical concern
- Damaged or sludged electronic throttle body (ETB)
- Vacuum leaks
- Damaged PCM

Diagnostic Aids: Disregard the freeze frame data. Freeze frame data does not apply to the cold start monitor.
This DTC is informational only and may be accompanied by other DTCs. Diagnose other DTCs first. If no other DTCs are present, inspect the intake air system for air restrictions, vacuum leaks, and damage. If no concerns are present, clear the DTCs and verify the engine coolant temperature is below 37.8°C (100°F). Allow the vehicle to soak for 2 to 3 hours if necessary for the engine coolant temperature to fall below 37.8°C (100°F).
Start the engine without touching the accelerator pedal and allow the engine to idle for 6 minutes in park. If no DTCs are present and the malfunction indicator lamp (MIL) is not illuminated after idling for 6 minutes, carry out the key ON, engine running (KOER), self-test to confirm that no DTCs are present and the repair is complete.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0512 - STARTER REQUEST CIRCUIT - DTC CHART

P0512 - STARTER REQUEST CIRCUIT - DTC CHART

Description:

Possible Causes:

Diagnostic Aids: Refer to the service information , Starting System to continue diagnosis.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P051B -

CRANKCASE PRESSURE SENSOR CIRCUIT RANGE/PERFORMANCE - DTC CHART

P051B - CRANKCASE PRESSURE SENSOR CIRCUIT RANGE/PERFORMANCE - DTC CHART

Description: This DTC sets when the crankcase pressure sensor is greater than or less than an expected value for the current operating conditions.

Possible Causes:

- Crankcase pressure sensor is not within a calibrated range during key ON, engine OFF
- Crankcase pressure sensor voltage indicates high pressure
- Crankcase pressure sensor voltage indicates high vacuum at low airflow
- Leak in the positive crankcase ventilation (PCV) system
- Damaged crankcase pressure sensor

Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HG .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P051C - CRANKCASE PRESSURE SENSOR CIRCUIT LOW - DTC CHART

P051C - CRANKCASE PRESSURE SENSOR CIRCUIT LOW - DTC CHART

Description: This DTC sets when the crankcase pressure sensor voltage is less than 1 V.

Possible Causes:

- CKCP circuit short to ground
- Damaged crankcase pressure sensor

Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HG .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P051D - CRANKCASE PRESSURE SENSOR CIRCUIT HIGH - DTC CHART

P051D - CRANKCASE PRESSURE SENSOR CIRCUIT HIGH - DTC CHART

Description: This DTC sets when the crankcase pressure sensor voltage is greater than 4.9 V.

Possible Causes:

- CKCP circuit open
- CKCP circuit short to voltage
- Damaged crankcase pressure sensor

Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HG .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0528 - FAN SPEED SENSOR CIRCUIT NO SIGNAL - DTC CHART

P0528 - FAN SPEED SENSOR CIRCUIT NO SIGNAL - DTC CHART

Description: The PCM uses the fan speed sensor (FSS) input to monitor the cooling fan clutch speed. This DTC sets if the indicated fan speed is lower than the calibrated value during the key ON engine running (KOER) self-test.

Possible Causes:

- FSS VPWR circuit open
- FSS PWRGND circuit open
- FSS circuit open
- FSS circuit short
- Damaged FSS
- Damaged PCM

Diagnostic Aids: Visually inspect the cooling fan clutch for damage or restriction.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HV .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P052A - COLD START INTAKE (A) CAMSHAFT POSITION TIMING OVER-ADVANCED (BANK 1) - DTC CHART

P052A - COLD START INTAKE (A) CAMSHAFT POSITION TIMING OVER-ADVANCED (BANK 1) - DTC CHART

Description: This DTC sets when the variable camshaft timing (VCT) position is over-advanced during cold start up. The test fails when the camshaft timing exceeds a maximum calibrated value or remains in an advanced position.

Possible Causes:

- Camshaft timing incorrectly set
- Continuous oil flow to the VCT piston chamber
- Variable camshaft timing bank 1 solenoid 1 (VCT11) valve stuck open
- Camshaft advance mechanism binding (VCT unit)

Diagnostic Aids: This DTC is a functional check of the VCT unit. Diagnose any base engine concerns related to the engine oil pressure or engine timing. Refer to the service information , Engine System, Oil Pressure Test, to check the engine oil pressure. Refer to the service information , Engine, Timing Drive Components, to check the engine timing.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HK .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P052B - COLD START INTAKE (A) CAMSHAFT POSITION TIMING OVER-RETARDED (BANK 1) - DTC CHART

P052B - COLD START INTAKE (A) CAMSHAFT POSITION TIMING OVER-RETARDED (BANK 1) - DTC CHART

Description: This DTC sets when the variable camshaft timing (VCT) position is over-retarded during cold start up. The test fails when the camshaft timing exceeds a maximum calibrated value or remains in a retarded position.

Possible Causes:

- Camshaft timing incorrectly set
- Continuous oil flow to the VCT piston chamber
- Variable camshaft timing bank 1 solenoid 1 (VCT11) valve stuck open
- Camshaft advance mechanism binding (VCT unit)

Diagnostic Aids: This DTC is a functional check of the VCT unit. Diagnose any base engine concerns related to the engine oil pressure or engine timing. Refer to the service information , Engine System, Oil Pressure Test, to check the engine oil pressure. Refer to the service information , Engine, Timing Drive Components, to check the engine timing.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory

All	GO to Pinpoint Test HK .

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P052C - COLD START INTAKE (A) CAMSHAFT POSITION TIMING OVER-ADVANCED (BANK 2) - DTC CHART

P052C - COLD START INTAKE (A) CAMSHAFT POSITION TIMING OVER-ADVANCED (BANK 2) - DTC CHART

Description: This DTC sets when the variable camshaft timing (VCT) position is over-advanced during cold start up. The test fails when the camshaft timing exceeds a maximum calibrated value or remains in an advanced position.

Possible Causes:

- Camshaft timing incorrectly set
- Continuous oil flow to the VCT piston chamber
- variable camshaft timing bank 2 solenoid 1 (VCT21) valve stuck open
- Camshaft advance mechanism binding (VCT unit)

Diagnostic Aids: This DTC is a functional check of the VCT unit. Diagnose any base engine concerns related to the engine oil pressure or engine timing. Refer to the service information , Engine System, Oil Pressure Test, to check the engine oil pressure. Refer to the service information , Engine, Timing Drive Components, to check the engine timing.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HK .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P052D - COLD START INTAKE (A) CAMSHAFT POSITION TIMING OVER-RETARDED (BANK 2) - DTC CHART

P052D - COLD START INTAKE (A) CAMSHAFT POSITION TIMING OVER-RETARDED (BANK 2) - DTC CHART

Description: This DTC sets when the variable camshaft timing (VCT) position is over-retarded during cold start up. The test fails when the camshaft timing exceeds a maximum calibrated value or remains in a retarded position.

Possible Causes:

- Camshaft timing incorrectly set
- Continuous oil flow to the VCT piston chamber

- Variable camshaft timing bank 2 solenoid 1 (VCT21) valve stuck open
- Camshaft advance mechanism binding (VCT unit)

Diagnostic Aids: This DTC is a functional check of the VCT unit. Diagnose any base engine concerns related to the engine oil pressure or engine timing. Refer to the service information , Engine System, Oil Pressure Test, to check the engine oil pressure. Refer to the service information , Engine, Timing Drive Components, to check the engine timing.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HK .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P053F - COLD START FUEL PRESSURE PERFORMANCE BANK 1 - DTC CHART

P053F - COLD START FUEL PRESSURE PERFORMANCE BANK 1 - DTC CHART

Description: The PCM monitors fuel rail pressure to control split injection. This DTC sets if the fuel rail pressure falls outside a calibrated threshold limit for controlling split injection during a cold start.

Possible Causes:

- Restricted fuel filter
- Restricted fuel supply line
- Damaged fuel pump assembly
- Damaged fuel injection pump

Diagnostic Aids: Diagnose any FRP and FVR circuit DTCs first.
Various engine driveability symptoms, including no start, hard start, rough idle, and backfiring may occur as a result of this DTC setting. This DTC may be accompanied by other DTCs, particularly P0087, P0088, or P00C6.
Freeze frame data is not applicable to the cold start emission reduction monitor. For additional information, refer to COLD START EMISSION REDUCTION MONITOR .

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HP .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P054A - COLD START EXHAUST (B) CAMSHAFT POSITION TIMING OVER-ADVANCED (BANK 1) - DTC CHART

P054A - COLD START EXHAUST (B) CAMSHAFT POSITION TIMING OVER-ADVANCED (BANK 1) - DTC CHART

Description: This DTC sets when the variable camshaft timing (VCT) position is over-advanced during cold start up. The test fails when the camshaft timing exceeds a maximum calibrated value or remains in an advanced position.

Possible Causes:

- Camshaft timing incorrectly set
- Continuous oil flow to the VCT piston chamber
- Variable camshaft timing bank 1 solenoid 2 (VCT12) valve stuck open
- Camshaft advance mechanism binding (VCT unit)

Diagnostic Aids: This DTC is a functional check of the VCT unit. Diagnose any base engine concerns related to the engine oil pressure or engine timing. Refer to the service information , Engine System, Oil Pressure Test, to check the engine oil pressure. Refer to the service information , Engine, Timing Drive Components, to check the engine timing.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HK .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P054B - COLD START EXHAUST (B) CAMSHAFT POSITION TIMING OVER-RETARDED (BANK 1) - DTC CHART

P054B - COLD START EXHAUST (B) CAMSHAFT POSITION TIMING OVER-RETARDED (BANK 1) - DTC CHART

Description: This DTC sets when the variable camshaft timing (VCT) position is over-retarded during cold start up. The test fails when the camshaft timing exceeds a maximum calibrated value or remains in a retarded position.

Possible Causes:

- Camshaft timing incorrectly set
- Continuous oil flow to the VCT piston chamber
- Variable camshaft timing bank 1 solenoid 2 (VCT12) valve stuck open
- Camshaft advance mechanism binding (VCT unit)

Diagnostic Aids: This DTC is a functional check of the VCT unit. Diagnose any base engine concerns related to the engine oil pressure or engine timing. Refer to the service information , Engine System, Oil Pressure Test, to check the engine oil pressure. Refer to the service information , Engine, Timing Drive Components, to check the engine timing.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HK .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P054C - COLD START EXHAUST (B) CAMSHAFT POSITION TIMING OVER-ADVANCED (BANK 2) - DTC CHART

P054C - COLD START EXHAUST (B) CAMSHAFT POSITION TIMING OVER-ADVANCED (BANK 2) - DTC CHART

Description: This DTC sets when the variable camshaft timing (VCT) position is over-advanced during cold start up. The test fails when the camshaft timing exceeds a maximum calibrated value or remains in an advanced position.

Possible Causes:

- Camshaft timing incorrectly set
- Continuous oil flow to the VCT piston chamber
- Variable camshaft timing bank 2 solenoid 2 (VCT22) valve stuck open
- Camshaft advance mechanism binding (VCT unit)

Diagnostic Aids: This DTC is a functional check of the VCT unit. Diagnose any base engine concerns related to the engine oil pressure or engine timing. Refer to the service information , Engine System, Oil Pressure Test, to check the engine oil pressure. Refer to the service information , Engine, Timing Drive Components, to check the engine timing.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HK .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P054D - COLD START EXHAUST (B) CAMSHAFT POSITION TIMING OVER-RETARDED (BANK 2) - DTC CHART

P054D - COLD START EXHAUST (B) CAMSHAFT POSITION TIMING OVER-RETARDED (BANK 2) - DTC CHART

Description: This DTC sets when the variable camshaft timing (VCT) position is over-retarded during cold start up. The test fails when the camshaft timing exceeds a maximum calibrated value or remains in a retarded position.

Possible Causes:

- Camshaft timing incorrectly set
- Continuous oil flow to the VCT piston chamber
- Variable camshaft timing bank 2 solenoid 2 (VCT22) valve stuck open

- Camshaft advance mechanism binding (VCT unit)

Diagnostic Aids: This DTC is a functional check of the VCT unit. Diagnose any base engine concerns related to the engine oil pressure or engine timing. Refer to the service information , Engine System, Oil Pressure Test, to check the engine oil pressure. Refer to the service information , Engine, Timing Drive Components, to check the engine timing.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HK .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0562 - SYSTEM VOLTAGE LOW - DTC CHART

P0562 - SYSTEM VOLTAGE LOW - DTC CHART

Description:

Possible Causes:

Diagnostic Aids: Refer to the service information , Electronic Engine Controls.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0563 - SYSTEM VOLTAGE HIGH - DTC CHART

P0563 - SYSTEM VOLTAGE HIGH - DTC CHART

Description:

Possible Causes:

Diagnostic Aids: Refer to the service information , Electronic Engine Controls.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0571 - BRAKE SWITCH A CIRCUIT - DTC CHART

P0571 - BRAKE SWITCH A CIRCUIT - DTC CHART

Description: This DTC sets when the brake switch does not toggle during the key ON engine running

(KOER) test.

Possible Causes:

- BPP circuit open
- BPP circuit short to ground
- Concern in modules connected to the BPP circuit
- Damaged brake switch
- Incorrectly adjusted brake switch

Diagnostic Aids: Using the scan tool, check the BPP/BOO PID. The BPP/BOO PID should toggle on and off with brake pedal activation.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test FD .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0572 - BRAKE SWITCH A CIRCUIT LOW - DTC CHART

P0572 - BRAKE SWITCH A CIRCUIT LOW - DTC CHART

Description: This DTC sets when the brake switch is stuck in the ON position.

Possible Causes:

- BPP circuit open
- BPP circuit short to voltage
- BPP circuit short to ground
- Stoplamp circuits open
- Stoplamp circuits short to voltage
- Stoplamp circuits short to ground
- Damaged brake switch
- Incorrectly adjusted brake switch

Diagnostic Aids: Using the scan tool, check the BPP/BOO PID. The BPP/BOO PID should toggle on and off with brake pedal activation.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test FD .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0573 - BRAKE SWITCH A CIRCUIT HIGH - DTC CHART

P0573 - BRAKE SWITCH A CIRCUIT HIGH - DTC CHART

Description: This DTC sets when the brake switch is stuck in the OFF position.

Possible Causes:

- BPP circuit open
- BPP circuit short to voltage
- BPP circuit short to ground
- Stoplamp circuits open
- Stoplamp circuits short to voltage
- Stoplamp circuits short to ground
- Damaged brake switch
- Incorrectly adjusted brake switch

Diagnostic Aids: Using the scan tool, check the BPP/BOO PID. The BPP/BOO PID should toggle on and off with brake pedal activation.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test FD .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P05XX - DTC CHART

P05XX - DTC CHART

Description:

Possible Causes:

Diagnostic Aids: Refer to the service information , Electronic Engine Controls, PCM DTC Chart, to continue diagnosis.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0600 -

SERIAL COMMUNICATION LINK - DTC CHART

P0600 - SERIAL COMMUNICATION LINK - DTC CHART

Description: This DTC sets when an error occurs in the PCM. This DTC may set alone or with P2105.
Possible Causes: • Software incompatibility issue • Damaged PCM
Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test QE .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0602 - POWERTRAIN CONTROL MODULE PROGRAMMING ERROR - DTC CHART

P0602 - POWERTRAIN CONTROL MODULE PROGRAMMING ERROR - DTC CHART

Description: This DTC sets when there is a programming error within the vehicle identification (VID) block.
Possible Causes: • VID data corrupted by the scan tool during VID reprogramming
Diagnostic Aids: Program the VID block. Refer to FLASH ELECTRICALLY ERASABLE PROGRAMMABLE READ ONLY MEMORY (EEPROM) , Making Changes to the VID Block. If the PCM does not allow reprogramming of the VID block, reflashing of the PCM is required.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0603 - INTERNAL CONTROL MODULE KEEP ALIVE MEMORY (KAM) ERROR - DTC CHART

P0603 - INTERNAL CONTROL MODULE KEEP ALIVE MEMORY (KAM) ERROR - DTC CHART

Description: This DTC sets when the PCM has experienced an internal memory concern. However, there are external items that can cause this DTC.
Possible Causes: • Reprogramming

- Battery terminal corrosion
- KAPWR to PCM interrupt/open
- Incorrect battery connection

Diagnostic Aids: If KAPWR is interrupted to the PCM because of a battery or PCM disconnect, this DTC can be generated on the first power-up.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test QB .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0604 - INTERNAL CONTROL MODULE RANDOM ACCESS MEMORY (RAM) ERROR - DTC CHART

P0604 - INTERNAL CONTROL MODULE RANDOM ACCESS MEMORY (RAM) ERROR - DTC CHART

Description: This DTC sets when the PCM RAM has been corrupted.

Possible Causes:

- Module reprogramming
- Aftermarket performance products
- Damaged PCM

Diagnostic Aids: Reprogram or update the calibration. Check for other DTCs or drive symptoms for further action. Check for aftermarket performance products before installing a new PCM. If it is necessary to install a new PCM, refer to FLASH ELECTRICALLY ERASABLE PROGRAMMABLE READ ONLY MEMORY (EEPROM) , Programming the VID Block for a Replacement PCM.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0605 - INTERNAL CONTROL MODULE READ ONLY MEMORY (ROM) ERROR - DTC CHART

P0605 - INTERNAL CONTROL MODULE READ ONLY MEMORY (ROM) ERROR - DTC CHART

Description: The PCM ROM has been corrupted.

Possible Causes:

- An attempt was made to change the calibration

- Module programming error
- Aftermarket performance products
- Damaged PCM

Diagnostic Aids: Reprogram the vehicle identification (VID) block. Check for other DTCs or drive symptoms for further action. Check for aftermarket performance products before installing a new PCM. If it is necessary to install a new PCM, refer to FLASH ELECTRICALLY ERASABLE PROGRAMMABLE READ ONLY MEMORY (EEPROM) , Programming the (VID) Block for a Replacement PCM.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0606 - CONTROL MODULE PROCESSOR - DTC CHART

P0606 - CONTROL MODULE PROCESSOR - DTC CHART

Description: This DTC sets when there is an internal PCM communication error.

Possible Causes:

- Module programming error
- Aftermarket performance products
- Damaged PCM

Diagnostic Aids: Reprogram or update the calibration. Check for other DTCs and diagnose those first. Check for aftermarket performance products before installing a new PCM. Clear the DTCs, repeat the self-test. If the DTC is retrieved again, install a new PCM. Refer to FLASH ELECTRICALLY ERASABLE PROGRAMMABLE READ ONLY MEMORY (EEPROM) , Programming the VID Block for a Replacement PCM.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0607 - CONTROL MODULE PERFORMANCE - DTC CHART

P0607 - CONTROL MODULE PERFORMANCE - DTC CHART

Description: This DTC sets when the PCM internal central processing unit (CPU) has encountered an error. The PCM monitors itself and carries out internal checks of its own CPU. This DTC sets if any of these checks returns an incorrect value.

Possible Causes:

- Module programming error
- Aftermarket performance products
- Damaged PCM

Diagnostic Aids: Reprogram or update the calibration. Check for other DTCs and diagnose those first. Check for aftermarket performance products before installing a new PCM. Clear the DTCs, repeat the self-test. If the DTC is retrieved again, install a new PCM. Refer to FLASH ELECTRICALLY ERASABLE PROGRAMMABLE READ ONLY MEMORY (EEPROM) , Programming the VID Block for a Replacement PCM.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P060A - INTERNAL CONTROL MODULE MONITORING PROCESSOR PERFORMANCE - DTC CHART

P060A - INTERNAL CONTROL MODULE MONITORING PROCESSOR PERFORMANCE - DTC CHART

Description: This DTC sets when an error occurs in the PCM. This DTC may set alone or with P2105.

Possible Causes:

- Software incompatibility issue
- Damaged PCM

Diagnostic Aids: Verify the PCM is at the latest calibration level.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test QE .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P060B - INTERNAL CONTROL MODULE A/D PROCESSING PERFORMANCE - DTC CHART

P060B - INTERNAL CONTROL MODULE A/D PROCESSING PERFORMANCE - DTC CHART

Description: This DTC sets when an error occurs in the PCM.

Possible Causes:

- Damaged PCM

Diagnostic Aids: Inspect the wiring harness for damage. Verify correct operation of the sensors using VREF and related circuits.			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	GO to Pinpoint Test QE .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P060C - INTERNAL CONTROL MODULE MAIN PROCESSOR PERFORMANCE - DTC CHART

P060C - INTERNAL CONTROL MODULE MAIN PROCESSOR PERFORMANCE - DTC CHART

Description: This DTC sets when an error occurs in the PCM.			
Possible Causes: • Software incompatibility issue • Damaged PCM			
Diagnostic Aids: Verify the PCM is at the latest calibration level.			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	GO to Pinpoint Test QE .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P060D - INTERNAL CONTROL MODULE ACCELERATOR PEDAL POSITION PERFORMANCE - DTC CHART

P060D - INTERNAL CONTROL MODULE ACCELERATOR PEDAL POSITION PERFORMANCE - DTC CHART

Description: This DTC sets when an error occurs in the PCM. This DTC sets when the PCM detects a concern identifying an issue with an accelerator pedal position (APP) sensor signal or with processing the brake pedal sensor input.			
Possible Causes: • Damaged PCM			
Diagnostic Aids: Verify the PCM is at the latest calibration level.			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	GO to Pinpoint Test QE .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0610 - CONTROL MODULE VEHICLE OPTIONS ERROR - DTC CHART

P0610 - CONTROL MODULE VEHICLE OPTIONS ERROR - DTC CHART

Description: This DTC sets when one or more of the PCM VID Block fields were configured incorrectly.

Possible Causes:

- Module reprogramming
- Aftermarket performance products
- Damaged PCM

Diagnostic Aids: Reprogram or update the calibration. Check for other DTCs or drive symptoms for further action. Check for aftermarket performance products before installing a new PCM. If it is necessary to install a new PCM, refer to FLASH ELECTRICALLY ERASABLE PROGRAMMABLE READ ONLY MEMORY (EEPROM) , Programming the VID Block for a replacement PCM.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P061A - INTERNAL CONTROL MODULE TORQUE PERFORMANCE - DTC CHART

P061A - INTERNAL CONTROL MODULE TORQUE PERFORMANCE - DTC CHART

Description: This DTC sets when an error occurs in the PCM.

Possible Causes:

- Software incompatibility issue
- Damaged PCM

Diagnostic Aids: Verify the PCM is at the latest calibration level.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test QE .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P061B - INTERNAL CONTROL MODULE TORQUE CALCULATION PERFORMANCE - DTC CHART

P061B - INTERNAL CONTROL MODULE TORQUE CALCULATION PERFORMANCE - DTC CHART

Description: This DTC sets when a calculation error occurs in the PCM.			
Possible Causes:			
Diagnostic Aids: Check for sensor and circuit related DTCs. Do not install a new electronic throttle body (ETB) for this DTC.			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	GO to Pinpoint Test QE .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P061C - INTERNAL CONTROL MODULE ENGINE RPM PERFORMANCE - DTC CHART

P061C - INTERNAL CONTROL MODULE ENGINE RPM PERFORMANCE - DTC CHART

Description: This DTC sets when an error occurs in the PCM.

Possible Causes:

- CKP circuit open
- CKP circuit short
- CKP circuit intermittent
- CMP circuit open
- CMP circuit short
- CMP circuit intermittent
- Damaged crankshaft position (CKP) sensor
- Damaged camshaft position (CMP) sensor
- Damaged PCM

Diagnostic Aids: Verify correct operation of the CKP and CMP sensors and related circuits.

Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	GO to Pinpoint Test QE .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P061D - INTERNAL CONTROL MODULE ENGINE AIR MASS PERFORMANCE - DTC CHART

P061D - INTERNAL CONTROL MODULE ENGINE AIR MASS PERFORMANCE - DTC CHART

Description: This DTC sets when an error occurs in the PCM.			
Possible Causes: • Software incompatibility issue • Damaged PCM			
Diagnostic Aids: Verify the PCM is at the latest calibration level.			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	GO to Pinpoint Test QE .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P061E - INTERNAL CONTROL MODULE BRAKE SIGNAL PERFORMANCE - DTC CHART

P061E - INTERNAL CONTROL MODULE BRAKE SIGNAL PERFORMANCE - DTC CHART

Description: This DTC sets when an incorrect brake pedal position (BPP) sensor signal is received by the PCM. This DTC also sets when an internal PCM communication error occurs in the PCM.			
Possible Causes: • Incorrectly adjusted BPP sensor • Damaged BPP sensor • Damaged PCM			
Diagnostic Aids: Check for an incorrectly adjusted BPP sensor. Refer to service information , Exterior Lighting. Check for other DTCs and diagnose those first. Check for aftermarket performance products before installing a new PCM. Clear the DTCs, repeat the self-test. If the DTC is retrieved again, install a new PCM. Refer to FLASH ELECTRICALLY ERASABLE PROGRAMMABLE READ ONLY MEMORY (EEPROM) , Programming the VID Block for a Replacement PCM.			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P061F - INTERNAL CONTROL MODULE THROTTLE ACTUATOR CONTROLLER PERFORMANCE - DTC CHART

P061F - INTERNAL CONTROL MODULE THROTTLE ACTUATOR CONTROLLER PERFORMANCE - DTC CHART

Description: This DTC sets when an error occurs in the PCM.

Possible Causes:			
Diagnostic Aids: Verify correct operation of the electronic throttle control (ETC) components and related circuits.			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	GO to Pinpoint Test QE .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P061X - DTC CHART

P061X - DTC CHART

Description:			
Possible Causes:			
Diagnostic Aids: Refer to the service information , Electronic Engine Controls.			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0627 - FUEL PUMP A CONTROL CIRCUIT/OPEN - DTC CHART

P0627 - FUEL PUMP A CONTROL CIRCUIT/OPEN - DTC CHART

Description: The fuel pump control module monitors the fuel pump module and secondary circuits for a concern. If the fuel pump control module detects a concern with the fuel pump module or secondary circuits, the fuel pump control module sends an 80% duty cycle signal on the fuel pump monitor (FPM) circuit to report the concern to the PCM. The test fails when the fuel pump control module is still reporting a concern with the fuel pump module or secondary circuits after a calibrated amount of time.

Possible Causes:

- FPPWR circuit open
- FPPWR circuit short to ground
- FPRTN circuit open
- FPPWR circuit short to voltage
- FPRTN circuit short to voltage
- Damaged fuel pump assembly
- Damaged fuel pump control module

Diagnostic Aids: Check for any harness concerns. The fuel pump control module controls the speed of the fuel pump module by supplying a variable voltage to the fuel pump module on the FPPWR circuit.			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	GO to Pinpoint Test KC .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P062B - INTERNAL CONTROL MODULE FUEL INJECTOR CONTROL PERFORMANCE - DTC CHART

P062B - INTERNAL CONTROL MODULE FUEL INJECTOR CONTROL PERFORMANCE - DTC CHART

Description: This DTC sets when an error occurs in the PCM.			
Possible Causes: • Damaged PCM			
Diagnostic Aids:			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	GO to Pinpoint Test QE .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P062C - INTERNAL CONTROL MODULE VEHICLE SPEED PERFORMANCE - DTC CHART

P062C - INTERNAL CONTROL MODULE VEHICLE SPEED PERFORMANCE - DTC CHART

Description: This DTC sets when a network communication error occurred in the PCM.			
Possible Causes: • Module communications network concerns • Output shaft speed (OSS) sensor concern • Anti-lock brake system (ABS) concern			
Diagnostic Aids: Repair any ABS or TCM DTCs, ABS or TCM related DTCs in other modules, or vehicle communication concerns.			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	GO to Pinpoint Test QE .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P062F - INTERNAL CONTROL MODULE EEPROM ERROR - DTC CHART

P062F - INTERNAL CONTROL MODULE EEPROM ERROR - DTC CHART

Description: The PCM read only memory (ROM) has been corrupted.

Possible Causes:

- Aftermarket performance products
- An attempt was made to change the calibration
- PCM programming error
- PCM internal software error
- Damaged PCM

Diagnostic Aids: Reprogram or update the calibration. Check for other DTCs or drive symptoms for further action. Check for aftermarket performance products before installing a new PCM. If it is necessary to install a new PCM, refer to FLASH ELECTRICALLY ERASABLE PROGRAMMABLE READ ONLY MEMORY (EEPROM) , Programming the VID Block for a Replacement PCM.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P062X - DTC CHART

P062X - DTC CHART

Description:

Possible Causes:

Diagnostic Aids: Refer to the service information , Electronic Engine Controls.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0630 - VIN NOT PROGRAMMED OR INCOMPATIBLE - ECM/PCM - DTC CHART

P0630 - VIN NOT PROGRAMMED OR INCOMPATIBLE - ECM/PCM - DTC CHART

Description: This DTC sets when the PCM detects various VID data that is out of a specified

acceptable range.
Possible Causes:
Diagnostic Aids: The PCM did not receive a valid vehicle identification number (VIN) during reprogramming. Refer to FLASH ELECTRICALLY ERASABLE PROGRAMMABLE READ ONLY MEMORY (EEPROM) , Programming The VID Block For A Replacement PCM, to reprogram the PCM.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0642 - SENSOR REFERENCE VOLTAGE A CIRCUIT LOW - DTC CHART

P0642 - SENSOR REFERENCE VOLTAGE A CIRCUIT LOW - DTC CHART

Description: This DTC sets when the VREF circuit is less than VREF minimum.

Possible Causes:

- VREF circuit short to ground
- Damaged sensor
- Incorrect harness connection

Diagnostic Aids: This DTC sets due to an under voltage condition on the VREF circuit.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test C :		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0643 - SENSOR REFERENCE VOLTAGE A CIRCUIT HIGH - DTC CHART

P0643 - SENSOR REFERENCE VOLTAGE A CIRCUIT HIGH - DTC CHART

Description: This DTC sets when the VREF circuit is greater than VREF maximum.

Possible Causes:

- VREF circuit short to voltage
- Damaged sensor
- Incorrect harness connection

Diagnostic Aids: This DTC sets due to an over voltage condition on the VREF circuit.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test C .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P064A - FUEL PUMP CONTROL MODULE A - DTC CHART

P064A - FUEL PUMP CONTROL MODULE A - DTC CHART

Description: This DTC sets when the fuel pump control module detects an internal concern.

Possible Causes:

- Damaged fuel pump control module

Diagnostic Aids: Clear the PCM DTCs. Repeat the self-test. If the DTC is retrieved again, install a new fuel pump control module. Refer to the service information , Fuel Charging And Controls.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P064D - INTERNAL CONTROL MODULE O2 SENSOR PROCESSOR PERFORMANCE - BANK 1 - DTC CHART

P064D - INTERNAL CONTROL MODULE O2 SENSOR PROCESSOR PERFORMANCE - BANK 1 - DTC CHART

Description: The PCM monitors the application specific integrated circuit that controls and monitors the universal heated oxygen sensor bank 1, sensor 1 (HO2S11). This DTC sets when the PCM detects an internal circuit or communication concern.

Possible Causes:

- Damaged universal HO2S11 wiring
- Damaged PCM

Diagnostic Aids: Check for other DTCs and diagnose those first. Check for intermittent universal HO2S wiring concerns. Check the universal HO2S wiring between the PCM and the sensor for damage. Check for aftermarket performance products.
Reprogram or update the calibration. Clear the DTCs, repeat the self-test. If the DTC is retrieved again, install a new PCM. Refer to FLASH ELECTRICALLY ERASABLE PROGRAMMABLE READ ONLY MEMORY (EEPROM) .

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P064E - INTERNAL CONTROL MODULE O2 SENSOR PROCESSOR PERFORMANCE - BANK 2 - DTC CHART

P064E - INTERNAL CONTROL MODULE O2 SENSOR PROCESSOR PERFORMANCE - BANK 2 - DTC CHART

Description: The PCM monitors the application specific integrated circuit that controls and monitors the universal heated oxygen sensor bank 2, sensor 1 (HO2S21). This DTC sets when the PCM detects an internal circuit or communication concern.

Possible Causes:

- Damaged universal HO2S21 wiring
- Damaged PCM

Diagnostic Aids: Check for other DTCs and diagnose those first. Check for intermittent universal HO2S wiring concerns. Check the universal HO2S wiring between the PCM and the sensor for damage. Check for aftermarket performance products.
Reprogram or update the calibration. Clear the DTCs, repeat the self-test. If the DTC is retrieved again, install a new PCM. Refer to FLASH ELECTRICALLY ERASABLE PROGRAMMABLE READ ONLY MEMORY (EEPROM) .

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0652 - SENSOR REFERENCE VOLTAGE B CIRCUIT LOW - DTC CHART

P0652 - SENSOR REFERENCE VOLTAGE B CIRCUIT LOW - DTC CHART

Description: This DTC sets when the electronic throttle control reference voltage (ETCREF) circuit is less than VREF minimum.

Possible Causes:

- ETCREF circuit short to ground
- Damaged sensor
- Incorrect harness connection

Diagnostic Aids: This DTC sets due to an under voltage condition on the ETCREF circuit.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test C .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0653 - SENSOR REFERENCE VOLTAGE B CIRCUIT HIGH - DTC CHART

P0653 - SENSOR REFERENCE VOLTAGE B CIRCUIT HIGH - DTC CHART

Description: This DTC sets when the electronic throttle control reference voltage (ETCREF) circuit is greater than VREF maximum.			
Possible Causes: • ETCREF circuit short to voltage • Damaged sensor • Incorrect harness connection			
Diagnostic Aids: This DTC sets due to an over voltage condition on the ETCREF circuit.			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	GO to Pinpoint Test C .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0657 - ACTUATOR SUPPLY VOLTAGE A CIRCUIT/OPEN - DTC CHART

P0657 - ACTUATOR SUPPLY VOLTAGE A CIRCUIT/OPEN - DTC CHART

Description:			
Possible Causes:			
Diagnostic Aids: Refer to the service information , Electronic Engine Controls.			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P065X - DTC CHART

P065X - DTC CHART

Description:
Possible Causes:
Diagnostic Aids: Refer to the service information , Electronic Engine Controls.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0660 - INTAKE MANIFOLD TUNING VALVE (IMTV) CONTROL CIRCUIT OPEN - BANK 1 - DTC CHART

P0660 - INTAKE MANIFOLD TUNING VALVE (IMTV) CONTROL CIRCUIT OPEN - BANK 1 - DTC CHART

Description: This DTC sets when the intake manifold tuning valve (IMTV) control signal is greater or less than an expected calibrated range during continuous, key ON, engine OFF (KOEO) or key ON, engine running (KOER), self-tests.

Possible Causes:

- IMTV circuit open
- IMTV circuit short to ground
- Damaged IMTV actuator

Diagnostic Aids: An IMTVM PID reading may indicate a fault.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HU .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0663 - INTAKE MANIFOLD TUNING VALVE (IMTV) CONTROL CIRCUIT OPEN - BANK 2 - DTC CHART

P0663 - INTAKE MANIFOLD TUNING VALVE (IMTV) CONTROL CIRCUIT OPEN - BANK 2 - DTC CHART

Description: This DTC sets when the intake manifold tuning valve (IMTV) control signal is greater or less than an expected calibrated range during continuous, key ON, engine OFF (KOEO) or key ON, engine running (KOER), self-tests.

Possible Causes:

- IMTV circuit open
- IMTV circuit short to ground
- Damaged IMTV actuator

Diagnostic Aids: An IMTVM PID reading may indicate a fault.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory

All	GO to Pinpoint Test HU .

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0685 - ECM/PCM POWER RELAY CONTROL CIRCUIT/OPEN - DTC CHART

P0685 - ECM/PCM POWER RELAY CONTROL CIRCUIT/OPEN - DTC CHART

Description: This DTC sets when the ignition switch position run (ISP-R) circuit indicates the ignition is in the OFF, ACC, or LOCK position, and the amount of time the PCM remains powered through the PCM power relay exceeds a predetermined amount of time.

Possible Causes:

- PCMRC circuit short to ground
- Damaged PCM power relay

Diagnostic Aids: Ability to communicate with the PCM when the ignition is in the OFF, ACC, or LOCK position indicates a hard fault.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test B :		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0686 - ECM/PCM POWER RELAY CONTROL CIRCUIT LOW - DTC CHART

P0686 - ECM/PCM POWER RELAY CONTROL CIRCUIT LOW - DTC CHART

Description: This DTC sets when the ignition switch position run (ISP-R) circuit indicates the ignition is in the OFF, ACC, or LOCK position, and the amount of time the PCM remains powered through the PCM power relay exceeds a predetermined amount of time.

Possible Causes:

- PCMRC circuit short to ground
- Damaged PCM

Diagnostic Aids: Ability to communicate with the PCM when the ignition is in the OFF, ACC, or LOCK position indicates a hard fault.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test B .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0687 -

ECM/PCM POWER RELAY CONTROL CIRCUIT HIGH - DTC CHART

P0687 - ECM/PCM POWER RELAY CONTROL CIRCUIT HIGH - DTC CHART

Description: This DTC sets when the ignition switch position run (ISP-R) circuit indicates the ignition is in the OFF, ACC, or LOCK position, and the amount of time the PCM remains powered through the PCM power relay exceeds a predetermined amount of time.

Possible Causes:

- PCMRC circuit short to voltage
- Damaged PCM power relay

Diagnostic Aids: Ability to communicate with the PCM when the ignition is in the OFF, ACC, or LOCK position indicates a hard fault.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test B .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0689 - ELECTRONIC CONTROL MODULE (ECM)/POWERTRAIN CONTROL MODULE (PCM) POWER RELAY SENSE CIRCUIT LOW - DTC CHART

P0689 - ELECTRONIC CONTROL MODULE (ECM)/POWERTRAIN CONTROL MODULE (PCM) POWER RELAY SENSE CIRCUIT LOW - DTC CHART

Description: This DTC sets when the ISP-R and the INJPWRM circuit voltages do not correspond for a calibrated period of time.

Possible Causes:

- Ignition circuit fuse
- ISP-R circuit open
- ISP-R circuit short to ground
- VPWR circuit short to voltage
- INJPWR circuit short to voltage
- Damaged ignition switch
- Damaged fuel pump relay
- Damaged PCM power relay

Diagnostic Aids: The INJPWRM PID voltage reading should be 0 volts when the ignition is in the OFF, ACC or LOCK position.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test B .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P068A - ECM/PCM POWER RELAY DE-ENERGIZED - TOO EARLY - DTC CHART

P068A - ECM/PCM POWER RELAY DE-ENERGIZED - TOO EARLY - DTC CHART

Description: This DTC sets when the non volatile random access memory (NVRAM) write did not complete successfully after the ignition key was turned OFF, prior to PCM shutdown. This DTC also sets when the PCM power relay is de-energized too early.

Possible Causes:

- PCMRC circuit open
- PCM power relay
- Low battery voltage

Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test B .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0690 - ELECTRONIC CONTROL MODULE (ECM)/POWERTRAIN CONTROL MODULE (PCM) POWER RELAY SENSE CIRCUIT HIGH - DTC CHART

P0690 - ELECTRONIC CONTROL MODULE (ECM)/POWERTRAIN CONTROL MODULE (PCM) POWER RELAY SENSE CIRCUIT HIGH - DTC CHART

Description: This DTC sets when the voltage on the ISP-R and the INJPWRM or VPWR circuits do not correspond for a calibrated period of time.

Possible Causes:

- ISP-R circuit short to voltage
- VPWR circuit open
- INJPWRM circuit open
- Damaged fuel pump relay
- Damaged PCM power relay

Diagnostic Aids:			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	GO to Pinpoint Test B .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P06A6 - SENSOR REFERENCE VOLTAGE A CIRCUIT RANGE/PERFORMANCE - DTC CHART

P06A6 - SENSOR REFERENCE VOLTAGE A CIRCUIT RANGE/PERFORMANCE - DTC CHART

Description: This DTC sets when the VREF circuit is not within a calibrated voltage range.			
Possible Causes: • VREF circuit short to voltage • VREF circuit short to ground • Damaged sensor			
Diagnostic Aids: This DTC may set with additional component DTCs.			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	GO to Pinpoint Test C .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P06A7 - SENSOR REFERENCE VOLTAGE B CIRCUIT RANGE/PERFORMANCE - DTC CHART

P06A7 - SENSOR REFERENCE VOLTAGE B CIRCUIT RANGE/PERFORMANCE - DTC CHART

Description: This DTC sets when the VREF circuit is not within a calibrated voltage range.			
Possible Causes: • VREF circuit short to voltage • VREF circuit short to ground • Damaged sensor			
Diagnostic Aids: This DTC may set with additional component DTCs.			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	GO to Pinpoint Test C .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P06A8 - SENSOR REFERENCE VOLTAGE C CIRCUIT RANGE/PERFORMANCE - DTC CHART

P06A8 - SENSOR REFERENCE VOLTAGE C CIRCUIT RANGE/PERFORMANCE - DTC CHART

Description: This DTC sets when the VREF circuit is not within a calibrated voltage range.

Possible Causes:

- VREF circuit short to voltage
- VREF circuit short to ground
- Damaged sensor

Diagnostic Aids: This DTC may set with additional component DTCs.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test C .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P06B6 - INTERNAL CONTROL MODULE KNOCK SENSOR PROCESSOR 1 PERFORMANCE - DTC CHART

P06B6 - INTERNAL CONTROL MODULE KNOCK SENSOR PROCESSOR 1 PERFORMANCE - DTC CHART

Description: This DTC sets when the PCM has detected an error condition with the knock sensor (KS) processor integrated circuit.

Possible Causes:

- Damaged PCM

Diagnostic Aids: Reprogram or update the calibration. Check for other DTCs or drive symptoms for further action. Check for aftermarket performance products before installing a new PCM. If it is necessary to install a new PCM, refer to FLASH ELECTRICALLY ERASABLE PROGRAMMABLE READ ONLY MEMORY (EEPROM) .

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P06B8 - INTERNAL CONTROL MODULE NON-VOLATILE RANDOM ACCESS MEMORY (NVRAM) ERROR - DTC CHART

P06B8 - INTERNAL CONTROL MODULE NON-VOLATILE RANDOM ACCESS MEMORY (NVRAM)

ERROR - DTC CHART

Description: This DTC sets when a concern with the ability of the PCM to correctly store permanent DTCs is present.
Possible Causes: • Low battery voltage • Battery or charging system concern • VPWR circuit intermittently short • VPWR circuit intermittently open • PWRGND circuit intermittently open
Diagnostic Aids: Check for other DTCs and diagnose those first. Check for aftermarket performance products. Check for an electrical or charging system concern. If an updated calibration is available, update the calibration to the latest level. If an updated calibration is not available, clear the DTCs and repeat the self-test. If this DTC is retrieved after a PCM reprogramming, turn the ignition OFF and allow the PCM to complete a normal power down sequence. If the DTC is retrieved again, install a new PCM. Refer to FLASH ELECTRICALLY ERASABLE PROGRAMMABLE READ ONLY MEMORY (EEPROM) , Programming the VID Block for a Replacement PCM.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P06D1 - INTERNAL CONTROL MODULE IGNITION COIL CONTROL MODULE PERFORMANCE - DTC CHART

P06D1 - INTERNAL CONTROL MODULE IGNITION COIL CONTROL MODULE PERFORMANCE - DTC CHART

Description: This DTC sets when the PCM has detected an error with the ignition coil driver and diagnostic circuit.
Possible Causes: • Aftermarket performance products • Damaged PCM
Diagnostic Aids: Reprogram or update the calibration. Check for other DTCs or drive symptoms for further action. Make sure to check for aftermarket performance products before installing a new PCM. If it is necessary to install a new PCM, refer to FLASH ELECTRICALLY ERASABLE PROGRAMMABLE READ ONLY MEMORY (EEPROM) .

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P06E9 - ENGINE STARTER PERFORMANCE - DTC CHART

P06E9 - ENGINE STARTER PERFORMANCE - DTC CHART

Description:			
Possible Causes:			
Diagnostic Aids: Refer to the service information , Electronic Engine Controls.			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0703 - BRAKE SWITCH B INPUT CIRCUIT - DTC CHART

P0703 - BRAKE SWITCH B INPUT CIRCUIT - DTC CHART

Description: This DTC sets when the brake pedal position (BPP) input is missing.

Possible Causes:

- BPP circuit open
- BPP circuit short to ground
- Damaged modules connected to the BPP circuit
- Damaged brake switch
- Incorrectly adjusted brake switch

Diagnostic Aids: Check for correct function of the stoplamps. Using a scan tool, check the BPP PID. The stoplamps and PID should turn ON and OFF with brake pedal activation.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
Expedition, Navigator	Verify the brake pedal was applied and released during the key ON engine running (KOER) self-test. For additional concerns, refer to the service information , Vehicle Dynamic Systems.		
All others	GO to Pinpoint Test FD .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0704 - CLUTCH SWITCH INPUT CIRCUIT - DTC CHART

P0704 - CLUTCH SWITCH INPUT CIRCUIT - DTC CHART

Description: When the clutch pedal is applied the voltage switches to low. This DTC sets if the PCM does not see the clutch pedal voltage change from high to low.

Possible Causes:

- CPP circuit short to voltage
- Damaged clutch pedal position (CPP) switch
- SIGRTN circuit open

Diagnostic Aids: When the clutch pedal is applied and then released, the clutch pedal switch voltage should cycle.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test TA .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0720 - OUTPUT SHAFT SPEED (OSS) SENSOR CIRCUIT - DTC CHART

P0720 - OUTPUT SHAFT SPEED (OSS) SENSOR CIRCUIT - DTC CHART

Description: This DTC sets when the OSS sensor signal input exceeds the calibrated threshold. The OSS sensor provides a signal to the PCM based on the speed of the output shaft of the transmission.

Possible Causes:

- OSS circuit short to ground
- OSS circuit short to voltage
- OSS circuit open
- Damaged OSS sensor

Diagnostic Aids: Verify the sensor signal output varies with the vehicle speed.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
Manual Transmission	GO to Pinpoint Test DP .		
Automatic Transmission	Refer to the service information , Automatic Transmission, Diagnostic Trouble Code (DTC) Index to continue diagnosis.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0721 - OUTPUT SHAFT SPEED (OSS) SENSOR CIRCUIT RANGE/PERFORMANCE - DTC CHART

P0721 - OUTPUT SHAFT SPEED (OSS) SENSOR CIRCUIT RANGE/PERFORMANCE - DTC CHART

Description: This DTC sets when the OSS sensor signal input exceeds the calibrated threshold or has excessive electrical noise. The OSS signal is very sensitive to electrical noise. This electrical noise distorts the OSS input to the PCM.

Possible Causes:

- Incorrect OSS wiring harness routing
- Aftermarket add-on
- OSS wiring damaged
- OSS wiring insulation wear

Diagnostic Aids: Check the routing of the OSS wiring harness.
Check the OSS wiring and the OSS connector for damage.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
Manual Transmission	GO to Pinpoint Test DP .		
Automatic Transmission	Refer to the service information , Automatic Transmission, Diagnostic Trouble Code (DTC) Index to continue diagnosis.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0722 - OUTPUT SHAFT SPEED (OSS) SENSOR CIRCUIT NO SIGNAL - DTC CHART

P0722 - OUTPUT SHAFT SPEED (OSS) SENSOR CIRCUIT NO SIGNAL - DTC CHART

Description: This DTC sets when the OSS sensor signal is missing upon the initial movement of the vehicle.

Possible Causes:

- Damaged OSS connector
- Damaged OSS sensor
- Incorrectly installed OSS sensor
- OSS wiring harness intermittent short
- OSS wiring harness open

Diagnostic Aids: Check the wiring, connector, and OSS sensor for damage.			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
Manual Transmission	GO to Pinpoint Test DP .		
Automatic Transmission	Refer to the service information , Automatic Transmission, Diagnostic Trouble Code (DTC) Index to continue diagnosis.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0723 - OUTPUT SHAFT SPEED (OSS) SENSOR CIRCUIT INTERMITTENT - DTC CHART

P0723 - OUTPUT SHAFT SPEED (OSS) SENSOR CIRCUIT INTERMITTENT - DTC CHART

Description: This DTC sets when the OSS sensor signal provided to the PCM is irregular or interrupted.

Possible Causes:

- OSS connector not correctly seated
- OSS circuit intermittently short
- OSS circuit intermittently open
- Damaged OSS connector
- OSS sensor not installed correctly
- Damaged OSS sensor

Diagnostic Aids: Verify OSS harness and connector integrity. Verify correct installation of the OSS sensor.			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
Manual Transmission	GO to Pinpoint Test DP .		
Automatic Transmission	Refer to the service information , Automatic Transmission, Diagnostic Trouble Code (DTC) Index to continue diagnosis.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P07XX - DTC CHART

P07XX - DTC CHART

Description:

Possible Causes:			
Diagnostic Aids: Refer to the service information or the Master DTC Chart on the Professional Technician Society (PTS) web site to continue diagnosis.			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0830 - CLUTCH PEDAL SWITCH A CIRCUIT - DTC CHART

P0830 - CLUTCH PEDAL SWITCH A CIRCUIT - DTC CHART

Description: The PCM monitors the clutch pedal position (CPP) bottom of travel (CPP-BT) switch only during the calibrated engine speed range (cranking speed range). This DTC sets when the CPP-BT switch does not indicate that the clutch is disengaged (clutch pedal pressed) when the engine is cranked.

Possible Causes:

- Damaged CPP-BT switch
- Damaged CPP-BT harness
- GND circuit open to the CPP-BT switch
- Vehicle push-started with the clutch engaged (clutch pedal released)
- Aftermarket remote starting device

Diagnostic Aids: Verify the vehicle was not push-started with the clutch engaged. Check for aftermarket equipment such as remote starting devices which may bypass the CPP switch when cranking the engine. Refer to the service information , Starting System, The Engine Does Not Crank to diagnose the symptom no start, no crank.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0833 - CLUTCH PEDAL SWITCH B CIRCUIT - DTC CHART

P0833 - CLUTCH PEDAL SWITCH B CIRCUIT - DTC CHART

Description: The PCM monitors the clutch pedal position top of travel (CPP-TT) switch only during the calibrated engine speed range (cranking speed range). This DTC sets when the CPP-TT does not indicate that the clutch is disengaged (clutch pedal pressed) when the engine is cranked.

Possible Causes:

- Damaged CPP-TT switch
- Damaged CPP-TT harness
- GND circuit open to the CPP-TT switch
- Vehicle push-started with the clutch engaged (clutch pedal released)
- Aftermarket remote starting device

Diagnostic Aids: Verify the vehicle was not push-started with the clutch engaged. Check for aftermarket equipment such as remote starting devices which may bypass the CPP-TT switch when cranking the engine. Refer to the service information , Cruise Control, the speed control does not disengage when the clutch pedal is applied to continue diagnosis.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P08A9 - CLUTCH PEDAL POSITION SENSOR A CIRCUIT LOW - DTC CHART

P08A9 - CLUTCH PEDAL POSITION SENSOR A CIRCUIT LOW - DTC CHART

Description: This DTC sets when the clutch pedal position 1 (CPP1) signal is out of self-test range low.

Possible Causes:

- CPP1 circuit open
- CPP1 circuit short to ground
- Damaged CPP sensor

Diagnostic Aids: A CPP1 sensor PID reading may indicate a concern.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test TA .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P08AA - CLUTCH PEDAL POSITION SENSOR A CIRCUIT HIGH - DTC CHART

P08AA - CLUTCH PEDAL POSITION SENSOR A CIRCUIT HIGH - DTC CHART

Description: This DTC sets when the clutch pedal position 1 (CPP1) signal is out of self-test range

high.
Possible Causes: • CPP1 circuit open • CPP1 circuit short to voltage • Damaged CPP sensor
Diagnostic Aids: A CPP1 sensor PID reading may indicate a concern.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test TA .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P08B6 - CLUTCH PEDAL POSITION SENSOR B CIRCUIT LOW - DTC CHART

P08B6 - CLUTCH PEDAL POSITION SENSOR B CIRCUIT LOW - DTC CHART

Description: This DTC sets when the clutch pedal position 2 (CPP2) signal is out of self-test range low.
Possible Causes: • CPP2 circuit open • CPP2 circuit short to ground • Damaged CPP sensor
Diagnostic Aids: A CPP sensor PID reading may indicate a concern.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test TA .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P08B7 - CLUTCH PEDAL POSITION SENSOR B CIRCUIT HIGH - DTC CHART

P08B7 - CLUTCH PEDAL POSITION SENSOR B CIRCUIT HIGH - DTC CHART

Description: This DTC sets when the clutch pedal position 2 (CPP2) signal is out of self-test range high.
Possible Causes: • CPP sensor assembly is binding

- CPP2 circuit short to voltage
- Damaged CPP sensor

Diagnostic Aids: A CPP sensor PID reading may indicate a concern.			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	GO to Pinpoint Test TA .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P08B9 - CLUTCH PEDAL POSITION SENSOR A/B CORRELATION - DTC CHART

P08B9 - CLUTCH PEDAL POSITION SENSOR A/B CORRELATION - DTC CHART

Description: The PCM compares the clutch pedal position information from CPP1 and CPP2 signals. This DTC sets when the CPP sensor inputs CPP1 and CPP2 disagree on the position of the clutch pedal by greater than an expected value.

Possible Causes:

- CPP sensor circuit concerns
- Damaged CPP sensor

Diagnostic Aids: Monitor the CPP sensor PIDs while applying and releasing the clutch pedal.			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	GO to Pinpoint Test TA .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P08XX - DTC CHART

P08XX - DTC CHART

Description:

Possible Causes:

Diagnostic Aids: Refer to the service information or the Master DTC Chart on the Professional Technician Society (PTS) web site to continue diagnosis.

Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P09XX - DTC

CHART

P09XX - DTC CHART

Description:			
Possible Causes:			
Diagnostic Aids: Refer to the service information , Automatic Transmission.			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0A3B - GENERATOR OVER TEMPERATURE - DTC CHART

P0A3B - GENERATOR OVER TEMPERATURE - DTC CHART

Description:			
Possible Causes:			
Diagnostic Aids: Refer to the service information , Electronic Engine Controls.			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P0A5X - DTC CHART

P0A5X - DTC CHART

Description:			
Possible Causes:			
Diagnostic Aids: Refer to the service information , Electronic Engine Controls.			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P1001 - KEY ON ENGINE RUNNING (KOER) NOT ABLE TO COMPLETE, KOER ABORTED - DTC CHART

P1001 - KEY ON ENGINE RUNNING (KOER) NOT ABLE TO COMPLETE, KOER ABORTED - DTC

CHART

Description: This non-malfunction indicator lamp (MIL) DTC sets when the KOER self-test does not complete in the time allowed.
Possible Causes: • Incorrect self-test procedure • Unexpected response from the self-test monitors • RPM out of specification
Diagnostic Aids: Carry out the KOEO self-test. Refer to GO to Pinpoint Test QT .

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P100F - WASTEGATE CONTROL PRESSURE/BARO CORRELATION - DTC CHART

P100F - WASTEGATE CONTROL PRESSURE/BARO CORRELATION - DTC CHART

Description: This DTC sets when the difference between the wastegate vacuum sensor reading is greater than the barometric pressure (BARO) sensor, manifold absolute pressure (MAP) sensor and the turbocharger boost pressure (TCBP) sensor readings by a calibrated threshold at key ON, engine OFF (KOEO), and the fault timer has exceeded the calibrated time threshold.
Possible Causes: • Contaminated or restricted wastegate vacuum sensor • Restricted wastegate actuator control tube • Restricted vent tube from the turbocharger wastegate regulating valve to the intake air tube • Damaged wastegate vacuum sensor
Diagnostic Aids: The typical sensor difference threshold is 8.47 kPa (1.23 psi) and time threshold is 5 seconds.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HN .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P1011 - WASTEGATE CONTROL PRESSURE SENSOR CIRCUIT RANGE/PERFORMANCE - DTC CHART

P1011 - WASTEGATE CONTROL PRESSURE SENSOR CIRCUIT RANGE/PERFORMANCE - DTC CHART

Description: This DTC sets when the wastegate vacuum sensor reading has exceeded the atmospheric pressure by greater than a calibrated threshold and the fault timer has exceeded the calibrated time threshold.
Possible Causes: • Damaged wastegate vacuum sensor
Diagnostic Aids: The typical maximum threshold is 10.16 kPa (1.47 psi) and time threshold is 5 seconds.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HN .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P1012 - WASTEGATE CONTROL PRESSURE CIRCUIT LOW - DTC CHART

P1012 - WASTEGATE CONTROL PRESSURE CIRCUIT LOW - DTC CHART

Description: This DTC sets when the wastegate vacuum sensor reading is less than a calibrated threshold and the fault timer has exceeded the calibrated time threshold indicating a short to SIGRTN or ground.
Possible Causes: • WVS circuit short to ground • Damaged wastegate vacuum sensor
Diagnostic Aids: The typical minimum threshold is 0.2V and time threshold is 5 seconds.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HN .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P1013 - WASTEGATE CONTROL PRESSURE CIRCUIT HIGH - DTC CHART

P1013 - WASTEGATE CONTROL PRESSURE CIRCUIT HIGH - DTC CHART

Description: This DTC sets when the wastegate vacuum sensor reading is greater than a calibrated threshold and the fault timer has exceeded the calibrated time threshold indicating an open circuit or a short to voltage.

Possible Causes:

- WVS circuit open
- WVS circuit short to voltage
- Damaged wastegate vacuum sensor

Diagnostic Aids: The typical maximum threshold is 4.93 V and time threshold is 5 seconds.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HN .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P1014 - WASTEGATE CONTROL PRESSURE CIRCUIT INTERMITTENT/ERRATIC - DTC CHART

P1014 - WASTEGATE CONTROL PRESSURE CIRCUIT INTERMITTENT/ERRATIC - DTC CHART

Description: This DTC sets when the wastegate vacuum sensor reading is less than or greater than the minimum or maximum calibrated thresholds and the fault counter has exceeded the calibrated count threshold indicating an intermittent open or short circuit.

Possible Causes:

- WVS circuit intermittent open
- WVS circuit intermittent short to voltage
- WVS circuit intermittent short to ground
- Damaged wiring or harness connector
- Damaged wastegate vacuum sensor

Diagnostic Aids: The typical minimum and maximum threshold is 0.2 V and 4.93 V and the count threshold is 25.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HN .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P1015 - WASTEGATE CONTROL PRESSURE LOWER THAN EXPECTED - DTC CHART

P1015 - WASTEGATE CONTROL PRESSURE LOWER THAN EXPECTED - DTC CHART

Description: This DTC sets when the measured wastegate vacuum sensor reading is less than the

expected reading by greater than the calibrated threshold and the fault timer has exceeded the calibrated time threshold.
Possible Causes: • Restricted vent tube from the turbocharger wastegate regulating valve to the intake air tube • Damaged turbocharger wastegate regulating valve • Contaminated or restricted wastegate vacuum sensor • Damaged wastegate vacuum sensor
Diagnostic Aids: The typical difference threshold is 16.93 kPa (2.46 psi) and time threshold is 5 seconds.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HN .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P1016 - WASTEGATE CONTROL PRESSURE HIGHER THAN EXPECTED - DTC CHART

P1016 - WASTEGATE CONTROL PRESSURE HIGHER THAN EXPECTED - DTC CHART

Description: This DTC sets when the measured wastegate vacuum sensor reading is higher than the expected reading by greater than the calibrated threshold and the fault timer has exceeded the calibrated time threshold.
Possible Causes: • Leak in control tube between the turbocharger wastegate regulating valve and the wastegate actuator • Leak in the tube between the vacuum reservoir and the turbocharger wastegate regulating valve • Damaged turbocharger wastegate regulating valve
Diagnostic Aids: The typical difference threshold is 16.93 kPa (2.46 psi) and time threshold is 5 seconds.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HN .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P101F - CYLINDER HEAD TEMPERATURE SENSOR 1 OUT OF SELF-TEST RANGE - DTC CHART

P101F - CYLINDER HEAD TEMPERATURE SENSOR 1 OUT OF SELF-TEST RANGE - DTC CHART

Description: This DTC sets when the cylinder head temperature (CHT) sensor is out of self-test range. The engine is not at a normal operating temperature.

Possible Causes:

- Cold engine
- Engine overheating
- Low engine coolant level
- Damaged CHT harness connector
- Damaged CHT sensor

Diagnostic Aids: Bring the engine to operating temperature and repeat the self-test. If the engine overheats, check the cooling system. Refer to the service information , Engine Cooling, to diagnose the engine overheats symptom.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DL .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P1021 - CYLINDER HEAD TEMPERATURE SENSOR 2 CIRCUIT RANGE/PERFORMANCE - DTC CHART

P1021 - CYLINDER HEAD TEMPERATURE SENSOR 2 CIRCUIT RANGE/PERFORMANCE - DTC CHART

Description: This DTC sets when the cylinder head temperature value is higher than the calibrated value and could prevent one or more on board diagnostic (OBD) monitors from completing. The PCM runs this logic after an engine off and a calibrated soak period (typically 6 hours). This soak period allows the intake air temperature and the cylinder head temperature to stabilize and not differ by greater than a calibrated value. This DTC sets when all of the following conditions are met:
The cylinder head temperature at engine start exceeds the intake air temperature at engine start by greater than a calibrated value, typically 17°C (30°F).
The cylinder head temperature exceeds a calibrated value, typically 107°C (225°F).
The fuel system, heated oxygen and misfire monitors have not completed.
The calibrated time to set this DTC has expired.

Possible Causes:

- Cylinder head temperature 2 (CHT2) sensor
- Coolant system concern

Diagnostic Aids: Make sure the intake air temperature and the cylinder head temperature are similar when the engine is cold. Also make sure the CHT sensor and the actual engine operating temperatures are the same.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DL .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P1022 - CYLINDER HEAD TEMPERATURE SENSOR 2 CIRCUIT LOW - DTC CHART

P1022 - CYLINDER HEAD TEMPERATURE SENSOR 2 CIRCUIT LOW - DTC CHART

Description: This DTC sets when a CHT2 circuit concern is present.

Possible Causes:

- CHT2 circuit short to ground
- Damaged CHT2 sensor
- Incorrect CHT2 harness connection

Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DL .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P1023 - CYLINDER HEAD TEMPERATURE SENSOR 2 CIRCUIT HIGH - DTC CHART

P1023 - CYLINDER HEAD TEMPERATURE SENSOR 2 CIRCUIT HIGH - DTC CHART

Description: This DTC sets when a CHT2 circuit concern is present.

Possible Causes:

- CHT2 circuit open
- CHT circuit short to voltage
- Damaged CHT2 sensor
- Incorrect CHT2 harness connection

Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DL .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P1024 - CYLINDER HEAD TEMPERATURE SENSOR 2 CIRCUIT INTERMITTENT/ERRATIC - DTC CHART

P1024 - CYLINDER HEAD TEMPERATURE SENSOR 2 CIRCUIT INTERMITTENT/ERRATIC - DTC CHART

Description: This DTC sets when a CHT2 circuit concern is intermittently present while the engine is running.

Possible Causes:

- Damaged CHT2 harness or connector
- Damaged CHT2 sensor
- CHT2 circuit open
- CHT2 circuit short to ground

Diagnostic Aids: Monitor the CHT PID on a scan tool. Look for sudden changes in the reading when the harness is wiggled or the sensor is tapped.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DL .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P1025 - CYLINDER HEAD TEMPERATURE SENSOR 2 OUT OF SELF TEST RANGE - DTC CHART

P1025 - CYLINDER HEAD TEMPERATURE SENSOR 2 OUT OF SELF TEST RANGE - DTC CHART

Description: This DTC sets when the cylinder head temperature 2 (CHT2) sensor is out of self-test range. The engine is not at a normal operating temperature.

Possible Causes:

- Cold engine
- Engine overheating
- Low engine coolant level
- Damaged CHT2 harness connector
- Damaged CHT2 sensor

Diagnostic Aids: Bring the engine to operating temperature and repeat the self-test. If the engine overheats, check the cooling system. Refer to the service information , Engine Cooling, to diagnose the engine overheats symptom.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DL .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P1026 - ENGINE COOLANT TEMPERATURE 1/CYLINDER HEAD TEMPERATURE 2 CORRELATION - DTC CHART

P1026 - ENGINE COOLANT TEMPERATURE 1/CYLINDER HEAD TEMPERATURE 2 CORRELATION - DTC CHART

Description: This DTC sets when the engine coolant temperature (ECT) and cylinder head temperature 2 (CHT2) sensor readings differ by greater than a calibrated value.

Possible Causes:

- Biased CHT2 sensor
- Damaged CHT2 sensor

Diagnostic Aids: Make sure the ECT and CHT2 sensor readings are within 17°C (30°F) of each other after 6 hours at ambient temperature.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DL .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P1100 - MASS AIR FLOW (MAF) SENSOR CIRCUIT INTERMITTENT - DTC CHART

P1100 - MASS AIR FLOW (MAF) SENSOR CIRCUIT INTERMITTENT - DTC CHART

Description: This DTC sets when the PCM has detected a sudden input change in the MAF sensor circuit through the comprehensive component monitor (CCM). If during the last 40 warm-up cycles in ignition ON, engine running, the PCM detects an input change beyond the minimum or maximum calibrated limit, a continuous memory DTC is stored.

Possible Causes:

- MAF circuit intermittent open
- MAF circuit intermittent short to voltage
- MAF circuit intermittent short to ground
- Damaged MAF sensor
- Damaged harness connector

- Damaged harness

Diagnostic Aids: While accessing the MAF PID on the scan tool, lightly tap on the MAF sensor or wiggle the MAF sensor connector and harness. If the MAF PID suddenly changes, an intermittent fault is indicated.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DC .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P1101 - MASS AIR FLOW (MAF) SENSOR OUT OF SELF-TEST RANGE - DTC CHART

P1101 - MASS AIR FLOW (MAF) SENSOR OUT OF SELF-TEST RANGE - DTC CHART

Description: This DTC sets when during ignition ON, engine OFF, the MAF sensor output signal is greater than a calibrated limit or during ignition ON, engine running, the MAF output signal is not within the calibrated range.

Possible Causes:

- Low battery charge
- MAF sensor partially connected
- MAF sensor contamination
- GND circuit open
- MAFRTN circuit open
- Damaged MAF sensor
- Intake air leaks

Diagnostic Aids: Diagnose circuit DTCs before range or performance DTCs.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DC .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P1112 - INTAKE AIR TEMPERATURE (IAT) CIRCUIT INTERMITTENT - DTC CHART

P1112 - INTAKE AIR TEMPERATURE (IAT) CIRCUIT INTERMITTENT - DTC CHART

Description: This DTC sets when the IAT sensor signal is intermittent.

Possible Causes:

- IAT circuit intermittent open
- IAT circuit intermittent short to voltage
- IAT circuit intermittent short to ground
- Damaged IAT sensor
- Damaged harness connector
- Damaged harness

Diagnostic Aids: Monitor the IAT PID on a scan tool. Look for sudden changes in the reading when the harness is wiggled or the sensor is tapped.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DA .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P1116 - ENGINE COOLANT TEMPERATURE (ECT) SENSOR OUT OF SELF-TEST RANGE - DTC CHART

P1116 - ENGINE COOLANT TEMPERATURE (ECT) SENSOR OUT OF SELF-TEST RANGE - DTC CHART

Description: This DTC sets when the ECT sensor is out of self-test range. The correct range is 0.3 to 3.7 volts.

Possible Causes:

- Overheating condition
- Damaged thermostat
- Damaged ECT sensor
- Low engine coolant
- Damaged ECT harness connector

Diagnostic Aids: The engine coolant temperature must be greater than 10°C (50°F) to pass the key ON engine OFF (KOEO) self-test and greater than 82°C (180°F) to pass the key ON engine running (KOER) self-test.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DX .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P1117 - ENGINE COOLANT TEMPERATURE (ECT) SENSOR CIRCUIT INTERMITTENT - DTC CHART

P1117 - ENGINE COOLANT TEMPERATURE (ECT) SENSOR CIRCUIT INTERMITTENT - DTC CHART

Description: This DTC sets when the ECT circuit is intermittently open or short while the engine is running.

Possible Causes:

- Damaged ECT harness or connector
- Damaged ECT sensor
- ECT circuit open
- ECT circuit short to ground
- Low engine coolant

Diagnostic Aids: Monitor the ECT PID on a scan tool. Look for sudden changes in the reading when the harness is wiggled or the sensor is tapped.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DX .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P111B - ENGINE COOLANT WARM-UP NOT DETECTED - DTC CHART

P111B - ENGINE COOLANT WARM-UP NOT DETECTED - DTC CHART

Description: This DTC sets when the engine coolant temperature does not rise by a calibrated threshold value when compared to the inferred engine coolant temperature.

Possible Causes:

- Low engine coolant
- Damaged heater core shut off valve
- Damaged coolant bypass valve
- Damaged ECT sensor

Diagnostic Aids: Verify the engine cooling system is operating correctly. Refer to the service information , Engine Cooling.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DX .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P1121 - THROTTLE POSITION SENSOR A INCONSISTENT WITH MAF/MAP SENSOR - DTC CHART

P1121 - THROTTLE POSITION SENSOR A INCONSISTENT WITH MAF/MAP SENSOR - DTC CHART

Description: This DTC sets when the PCM detects an air leak that exceeds a calibrated limit for greater than 5 seconds. If the airflow entering the engine exceeds the airflow through the throttle, a leak is detected and this diagnostic fails.

Possible Causes:

- Unmetered air leaks between throttle body and intake valves
- Air leaks at the intake manifold
- Positive crankcase ventilation (PCV) system is leaking

Diagnostic Aids: Verify the integrity of the PCV system. Refer to POSITIVE CRANKCASE VENTILATION (PCV) SYSTEM for system information.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HG .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P1124 - THROTTLE POSITION SENSOR A OUT OF SELF-TEST RANGE - DTC CHART

P1124 - THROTTLE POSITION SENSOR A OUT OF SELF-TEST RANGE - DTC CHART

Description: During key ON engine OFF (KOEO) and key ON, engine running (KOER) self-tests, the PCM monitors the electronic throttle control (ETC) throttle position (TP) sensor inputs to determine if the TP1 and TP2 signals are less than an expected value. This DTC sets when TP1 or TP2 is greater than the expected value.

Possible Causes:

- Accelerator pedal applied during KOEO or KOER self-test

Diagnostic Aids: Repeat the self-test without applying the accelerator pedal. Make sure the floor mat is not interfering with the accelerator pedal. Diagnose any TP circuit DTCs first.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DV .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P1127 -

EXHAUST TEMPERATURE OUT OF RANGE, O2 SENSOR TESTS NOT COMPLETED - DTC CHART

P1127 - EXHAUST TEMPERATURE OUT OF RANGE, O2 SENSOR TESTS NOT COMPLETED - DTC CHART

Description: The heated oxygen sensor (HO2S) monitor uses an exhaust temperature model to determine when the universal HO2S heaters are cycled ON. This DTC sets when the inferred exhaust temperature is below a minimum calibrated value.

Possible Causes:

- Engine not operating long enough before carrying out the key ON, engine running (KOER) self-test
- Exhaust system too cool

Diagnostic Aids: Monitor the universal HO2S heater PIDs to determine the ON or OFF state. DTC P1127 is present if the exhaust is not hot.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DZ .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P115E - THROTTLE ACTUATOR CONTROL (TAC) THROTTLE BODY AIR FLOW TRIM AT MAX LIMIT - DTC CHART

P115E - THROTTLE ACTUATOR CONTROL (TAC) THROTTLE BODY AIR FLOW TRIM AT MAX LIMIT - DTC CHART

Description: During idle, the PCM monitors the throttle angle and airflow. If the airflow is determined to be less than expected, the PCM adjusts the throttle angle to compensate. The airflow reduction is typically the result of engine deposit buildup around the throttle plate. This DTC sets when the PCM has reached the maximum allowed compensation and is no longer able to compensate for the buildup.

Possible Causes:

- Engine deposits around the throttle plate

Diagnostic Aids: Install a new throttle body. Refer to the service information , Fuel Charging and Controls.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P117A - ENGINE OIL OVER TEMPERATURE - FORCED LIMITED POWER - DTC CHART

P117A - ENGINE OIL OVER TEMPERATURE - FORCED LIMITED POWER - DTC CHART

Description: This DTC sets when the engine oil protection strategy is enabled when the engine oil temperature reaches a predetermined level in the PCM. The PCM then limits the engine RPMs until the engine oil temperature returns to normal.

Possible Causes:

- Engine overheating
- Low engine coolant
- Loaded weight is greater than the maximum vehicle weight rating. Refer to the Owner's Literature for vehicle weight ratings.

Diagnostic Aids: This DTC is an informational DTC and may be set by an engine overheating concern. If the engine overheats, check the cooling system. Refer to the service information , Engine Cooling, to diagnose the engine overheats symptom.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P1184 - ENGINE OIL TEMPERATURE (EOT) SENSOR OUT OF SELF-TEST RANGE - DTC CHART

P1184 - ENGINE OIL TEMPERATURE (EOT) SENSOR OUT OF SELF-TEST RANGE - DTC CHART

Description: This DTC sets when the EOT was out of self-test range.

Possible Causes:

- Engine oil temperature below self-test threshold

Diagnostic Aids: The engine should be at operating temperature before carrying out the self-test.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P124X - DTC CHART

P124X - DTC CHART

Description:

Possible Causes:			
Diagnostic Aids: Refer to the service information , Electronic Engine Controls.			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P1260 - THEFT DETECTED, VEHICLE IMMOBILIZED - DTC CHART

P1260 - THEFT DETECTED, VEHICLE IMMOBILIZED - DTC CHART

Description: This DTC can be set if the passive anti-theft system (PATS) has determined a theft condition existed and the engine is disabled or an engine start was attempted using a non- PATS key. This DTC is a good indicator to check the PATS for DTCs.
This DTC can also be set when a new instrument panel cluster (IPC) or PCM is installed without correctly programming either module even if the vehicle is not equipped with PATS.

Possible Causes:

- Incorrectly programmed PCM
- Incorrectly programmed IPC
- Previous theft condition
- Anti-theft system concern

Diagnostic Aids: Theft indicator flashing rapidly or on solid when the ignition is in the ON position. Check the anti-theft system for DTCs. Refer to the service information Anti-Theft, Diagnostic Trouble Code (DTC) Charts to continue diagnosis.
If a new IPC or PCM is installed without correctly programming either module, the parameters must be reset in both modules. Refer to the service information Anti-Theft, Passive Anti-Theft System (PATS) Parameter Reset, to continue diagnosis.

Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	GO to Pinpoint Test QD .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P1270 - ENGINE RPM OR VEHICLE SPEED LIMITER REACHED - DTC CHART

P1270 - ENGINE RPM OR VEHICLE SPEED LIMITER REACHED - DTC CHART

Description: This DTC sets when the vehicle has been operated in a manner which caused the engine or vehicle to exceed a calibration limit. The engine RPM and vehicle speed are continuously monitored and evaluated by the PCM. This DTC sets when the RPM or vehicle speed falls out of a calibrated range. For additional information on the engine RPM/vehicle speed limiter, refer to POWERTRAIN

CONTROL SOFTWARE .

Possible Causes:

- Wheel slippage (water, ice, mud, and snow)
- Excessive engine RPM in NEUTRAL or operated in the wrong transmission gear
- Vehicle driven at a high rate of speed

Diagnostic Aids: If there are no other symptoms, return the vehicle to the customer with information about the DTC.
If a symptom is present, refer to NO DIAGNOSTIC TROUBLE CODES (DTCS) PRESENT SYMPTOM CHART INDEX .

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P1285 - CYLINDER HEAD OVER TEMPERATURE CONDITION - DTC CHART

P1285 - CYLINDER HEAD OVER TEMPERATURE CONDITION - DTC CHART

Description: This DTC sets when an engine overheat condition was sensed by the cylinder head temperature (CHT) sensor.

Possible Causes:

- Low engine coolant level
- Base engine concerns
- Engine cooling system concerns
- CHT sensor concern

Diagnostic Aids: On some applications when this fault occurs the engine temperature warning indicator illuminates or forces the temperature gauge to the full H (hot) zone. The warning indicator can be triggered by either grounding the engine temperature warning circuit when wired to the PCM, or by sending a PCM network message to the instrument panel cluster (IPC).

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DL .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P1288 - CYLINDER HEAD TEMPERATURE (CHT) SENSOR OUT OF SELF-TEST RANGE - DTC CHART

P1288 - CYLINDER HEAD TEMPERATURE (CHT) SENSOR OUT OF SELF-TEST RANGE - DTC CHART

Description: This DTC sets when the CHT sensor is out of self-test range. The engine is not at a normal operating temperature.

Possible Causes:

- Cold engine
- Engine overheating
- Damaged CHT wiring harness or connector
- Low engine coolant level
- Damaged CHT sensor

Diagnostic Aids: Bring the engine to operating temperature. If cold, repeat the self-test. If the engine overheats, check the cooling system. Refer to the service information , Engine Cooling, The Engine Overheats for cooling system diagnosis.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DL .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P1289 - CYLINDER HEAD TEMPERATURE (CHT) SENSOR CIRCUIT HIGH - DTC CHART

P1289 - CYLINDER HEAD TEMPERATURE (CHT) SENSOR CIRCUIT HIGH - DTC CHART

Description: This DTC sets when a CHT circuit open concern is present.

Possible Causes:

- CHT circuit open
- CHT circuit short to voltage
- Damaged CHT sensor
- Damaged CHT wiring harness or connector

Diagnostic Aids: The DTC P0118 may also be reported when this DTC sets. Either of these DTCs illuminate the malfunction indicator lamp (MIL).

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DL .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P128A - CYLINDER HEAD TEMPERATURE (CHT) SENSOR CIRCUIT INTERMITTENT/ERRATIC - DTC CHART

P128A - CYLINDER HEAD TEMPERATURE (CHT) SENSOR CIRCUIT INTERMITTENT/ERRATIC - DTC CHART

Description: This DTC sets when the CHT circuit is intermittently open or short while the engine is running.

Possible Causes:

- Damaged harness or connector
- Damaged sensor
- CHT circuit open
- CHT circuit short to ground

Diagnostic Aids: Monitor the CHT PID on a scan tool. Look for sudden changes in the reading when the harness is wiggled or the sensor is tapped.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DL .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P1290 - CYLINDER HEAD TEMPERATURE (CHT) SENSOR CIRCUIT LOW - DTC CHART

P1290 - CYLINDER HEAD TEMPERATURE (CHT) SENSOR CIRCUIT LOW - DTC CHART

Description: This DTC sets when a CHT circuit short to ground concern is present.

Possible Causes:

- CHT circuit short to ground
- Damaged CHT sensor
- Damaged CHT wiring harness or connector

Diagnostic Aids: The DTC P0117 may also be reported when this DTC sets. Either of these DTCs illuminates the malfunction indicator lamp (MIL).

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DL .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P1299 - CYLINDER HEAD OVER TEMPERATURE PROTECTION ACTIVE - DTC CHART

P1299 - CYLINDER HEAD OVER TEMPERATURE PROTECTION ACTIVE - DTC CHART

Description:			
Possible Causes:			
Diagnostic Aids: Refer to the service information , Engine Cooling to diagnose the engine overheats symptom.			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P130D - ENGINE KNOCK/COMBUSTION PERFORMANCE - FORCED LIMITED POWER - DTC CHART

P130D - ENGINE KNOCK/COMBUSTION PERFORMANCE - FORCED LIMITED POWER - DTC CHART

Description: This DTC sets when the knock sensor (KS) voltage has exceeded a maximum value greater than a calibrated number of times within a set time period.

Possible Causes:

- Fuel quality
- Base engine concerns
- Damaged spark plug
- Loose or corroded connector on ignition coil
- Lean fuel injector
- Long term fuel trim at lean limits
- Positive crankcase ventilation (PCV) system is leaking or stuck open
- Oil and filter maintenance beyond recommended intervals
- Charge air cooler (CAC) restriction
- Damaged PCM

Diagnostic Aids: Engine performance may be limited to protect the engine if this DTC is set.
Verify no base engine concerns are present before continuing with diagnosis. Refer to the service information , Engine System.
The following driving conditions may cause this DTC to set: heavy acceleration from a stop, towing, carrying a heavy load or driving up a grade during a boost condition.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DG .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P1336 - CRANKSHAFT/CAMSHAFT SENSOR RANGE/PERFORMANCE - DTC CHART

P1336 - CRANKSHAFT/CAMSHAFT SENSOR RANGE/PERFORMANCE - DTC CHART

Description: This DTC sets when the input signal from the crankshaft position (CKP) sensor or the camshaft position (CMP) sensor is erratic.

Possible Causes:

- Damaged CKP sensor
- Damaged CMP sensor
- Base engine concerns
- Harness concerns

Diagnostic Aids: Check the harness for routing, alterations, incorrect shielding, or electrical interference from other systems.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test JD .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P1397 - SYSTEM VOLTAGE OUT OF SELF - TEST RANGE - DTC CHART

P1397 - SYSTEM VOLTAGE OUT OF SELF - TEST RANGE - DTC CHART

Description: This DTC sets when the 12-volt system voltage is too high or too low during the key ON engine OFF (KOEO) or key ON engine running (KOER) self-test. It sets if the system voltage falls below or exceeds the calibrated threshold at any time during the KOEO or KOER self-test.

Possible Causes:

- Battery or charging system concern

Diagnostic Aids: Make sure the battery voltage is between 11 and 18 volts before running a KOEO or KOER self-test. Refer to the service information , Electronic Engine Controls.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P1408 - EXHAUST GAS RECIRCULATION (EGR) FLOW OUT OF SELF-TEST RANGE - DTC CHART

P1408 - EXHAUST GAS RECIRCULATION (EGR) FLOW OUT OF SELF-TEST RANGE - DTC CHART

Description: This test is carried out during the key ON, engine running (KOER) on demand self-test only. The EGR system is commanded on at a fixed engine speed. This DTC sets when the measured EGR flow falls above or below the required calibration.

Possible Causes:

- For electric EGR (EEGR) system,
- EEGR valve stuck open or closed
- EEGR connector not seated correctly
- EEGR stepper motor
- VPWR circuit open
- EGRMC circuit open
- EGRMC circuit short to voltage
- EGRMC circuit short to ground
- Vacuum signal to manifold absolute pressure (MAP) sensor restricted or leaking
- Mass airflow (MAF) sensor signal erroneous
- Carbon build up in the EEGR valve seat area

Diagnostic Aids: Use the output state control function of the scan tool and monitor the manifold absolute pressure (MAP) PID and the EEGR PID (EGRMDSD) while commanding the EEGR on. If EGR is introduced into the engine at idle, the RPM drops or stalls out.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test KD .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P144A - EVAPORATIVE EMISSION SYSTEM PURGE VAPOR LINE RESTRICTED/BLOCKED - DTC CHART

P144A - EVAPORATIVE EMISSION SYSTEM PURGE VAPOR LINE RESTRICTED/BLOCKED - DTC CHART

Description: The PCM monitors the evaporative emission (EVAP) system for a restricted fuel vapor

tube between the fuel tank pressure (FTP) sensor and the fuel tank. During the initial phase of the EVAP monitor, the PCM closes the canister vent and a vacuum develops in the fuel vapor tubes and lines and in the fuel tank. The PCM monitors the FTP sensor to determine the amount of vacuum and how quickly the vacuum increases. The rate at which the vacuum increases is compared to an expected value. If the vacuum increases quicker than expected, a restricted fuel vapor tube is suspected and an intrusive test is carried out in the final phase of the EVAP monitor. This DTC sets when the intrusive test confirms a blockage a counter is incremented and the counter reaches a calibrated number of completions.

Possible Causes:

- Restricted fuel vapor tube between the FTP sensor and the fuel tank
- EVAP purge valve stuck partially open

Diagnostic Aids: Check the fuel vapor tube for blockage between the FTP sensor and the fuel tank.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HX .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P144C - EVAPORATIVE EMISSION SYSTEM PURGE CHECK VALVE PERFORMANCE - DTC CHART

P144C - EVAPORATIVE EMISSION SYSTEM PURGE CHECK VALVE PERFORMANCE - DTC CHART

Description: The EVAP check valve test is performed during minimal boost conditions, once per drive cycle, when entry conditions are met. This DTC sets when the fuel tank pressure exceeds a calibrated amount within a specified amount of time during the test.

Possible Causes:

- Restricted EVAP ejector connections at the intake air system
- Stuck open EVAP check valve
- Stuck closed EVAP check valve
- Damaged EVAP ejector
- Damaged EVAP check valve

Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HX .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P1450 - UNABLE TO BLEED UP FUEL TANK VACUUM - DTC CHART

P1450 - UNABLE TO BLEED UP FUEL TANK VACUUM - DTC CHART

Description: This DTC sets when the evaporative emission (EVAP) running loss monitor detects excessive fuel tank vacuum with the engine running, but not at idle.

Possible Causes:

- EVAP purge valve stuck open
- Blockages or kinks in the EVAP canister tube or EVAP canister purge outlet tube between the fuel tank, the EVAP purge valve and the EVAP canister
- Fuel filler cap stuck closed, preventing vacuum relief (if equipped)
- Capless fuel tank filler pipe damaged, preventing vacuum relief (if equipped)
- Contaminated fuel vapor elbow on the EVAP canister
- Restricted EVAP canister
- EVAP canister vent valve stuck partially or fully closed
- Plugged EVAP canister vent valve filter
- VREF circuit open
- Damaged FTP sensor

Diagnostic Aids: Visually inspect the EVAP canister inlet port, EVAP canister vent valve filter, and EVAP canister vent hose assembly for contamination or debris.
Check EVAP purge valve for vacuum leak.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HX .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P1500 - VEHICLE SPEED SENSOR (VSS) - DTC CHART

P1500 - VEHICLE SPEED SENSOR (VSS) - DTC CHART

Description: This DTC sets when a VSS concern interferes with other on board diagnostic (OBD) tests, such as the catalyst efficiency monitor, the EVAP monitor or the HO2S monitor. Presence of this DTC indicates the VSS input signal was intermittent.

Possible Causes:

- Intermittent VSS connections
- VSS harness circuits intermittent open
- VSS harness circuits intermittent short

- Damaged VSS

Diagnostic Aids: Check the wiring, connector, and sensor for damage.			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
F-650/F-750, F-Series Super Duty, Fiesta, Fusion, Motorhome/Stripped Chassis/Step Van	GO to Pinpoint Test DF .		
Manual Transmission	GO to Pinpoint Test DP .		
All others	The PCM uses information from the ABS control module and the TCM to calculate vehicle speed. Check these modules for DTCs.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P1501 - VEHICLE SPEED SENSOR (VSS) OUT OF SELF-TEST RANGE - DTC CHART

P1501 - VEHICLE SPEED SENSOR (VSS) OUT OF SELF-TEST RANGE - DTC CHART

Description: This DTC sets when the VSS input signal is out of self-test range. If the PCM detects a VSS input signal any time during the self-test, this DTC sets and the test aborts.

Possible Causes:

- Electrical noise on the VSS input signal from radio frequency interference or electro magnetic interference
- External sources, such as ignition wires, the charging circuit or aftermarket equipment

Diagnostic Aids: Verify the VSS input is 0 km/h (0 mph) when the vehicle transmission is in PARK.			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
F-650/F-750, F-Series Super Duty, Fiesta, Fusion, Motorhome/Stripped Chassis/Step Van	GO to Pinpoint Test DF .		
Manual Transmission	GO to Pinpoint Test DP .		
All others	The PCM uses information from the ABS control module and the TCM to calculate vehicle speed. Check these modules for DTCs.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P1502 -

VEHICLE SPEED SENSOR (VSS) INTERMITTENT - DTC CHART

P1502 - VEHICLE SPEED SENSOR (VSS) INTERMITTENT - DTC CHART

Description: This DTC sets when there is a concern with the vehicle speed data. Vehicle speed data is received from either the VSS or anti-lock brake system (ABS) control module. This DTC sets the same way as P0500. However, it is intended to flash the transmission control indicator lamp (TCIL) for first time VSS circuit error.

Possible Causes:

- Noisy VSS input signal from the radio frequency interference/electromagnetic interference (RFI/EMI) external sources, such as ignition wires, the charging circuit or after market equipment

Diagnostic Aids: Verify the VSS input is 0 km/h (0 mph) when the vehicle transmission is in PARK.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
F-650/F-750, F-Series Super Duty, Fiesta, Fusion, Motorhome/Stripped Chassis/Step Van	GO to Pinpoint Test DF .		
Manual Transmission	GO to Pinpoint Test DP .		
All others	The PCM uses information from the ABS module and the TCM to calculate vehicle speed. Check these modules for DTCs.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P1548 - ENGINE AIR FILTER RESTRICTION - DTC CHART

P1548 - ENGINE AIR FILTER RESTRICTION - DTC CHART

Description: This DTC sets when the airflow is out of range at various engine speeds and during wide open throttle (WOT) operation when compared to the calibrated value.

Possible Causes:

- Intake air restriction
- Clogged air filter

Diagnostic Aids: If this DTC sets, inspect the intake air system and replace the air filter if no restrictions are found. Refer to the service information , Intake Air Distribution and Filtering for air filter replacement.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P1561 - BRAKE LINE PRESSURE SENSOR CIRCUIT - DTC CHART

P1561 - BRAKE LINE PRESSURE SENSOR CIRCUIT - DTC CHART

Description:			
Possible Causes:			
Diagnostic Aids: Refer to the service information , Electronic Engine Controls.			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P1572 - BRAKE PEDAL SWITCH CIRCUIT - DTC CHART

P1572 - BRAKE PEDAL SWITCH CIRCUIT - DTC CHART

Description: This DTC sets when the brake input rationality test for brake pedal position (BPP) and brake pressure switch (BPS) has detected a concern. One or both inputs to the PCM did not change state when expected. On some vehicles with stability assist, the BPP switch is connected to the anti-lock brake system (ABS) module and the ABS generates a driver brake application signal, which is then sent to the PCM.

Possible Causes:

- Incorrectly adjusted BPP switch
- Blown fuse
- Damaged BPP switch
- Damaged BPS
- BPP circuit open
- BPP circuit short to voltage
- BPP circuit short to ground
- BPS circuit open
- BPS circuit short to voltage
- BPS circuit short to ground

Diagnostic Aids: This DTC sets when the PCM does not sense the correct sequence of the brake pedal input signal from both the BPP switch and the BPS when the brake pedal is pressed and

released.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test FD .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P1575 - PEDAL POSITION OUT OF SELF TEST RANGE - DTC CHART

P1575 - PEDAL POSITION OUT OF SELF TEST RANGE - DTC CHART

Description: During key ON engine OFF (KOEO) self-test, the PCM monitors the accelerator pedal position (APP) sensor inputs to determine if the APP1 and APP2 signals are less than an expected value. This DTC sets when either APP1 or APP2 is greater than the expected value.

Possible Causes:

- Accelerator pedal applied during KOEO self-test

Diagnostic Aids: Repeat the self-test without applying the accelerator pedal. Make sure the floor mat is not interfering with the accelerator pedal. Diagnose any APP circuit DTCs first.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DK .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P160A - CONTROL MODULE VEHICLE OPTIONS RECONFIGURATION ERROR - DTC CHART

P160A - CONTROL MODULE VEHICLE OPTIONS RECONFIGURATION ERROR - DTC CHART

Description: This DTC sets when the body control module (BCM) detects a mismatch in configuration data and programmable parameters between the PCM and BCM.

Possible Causes:

- Module reprogramming
- Aftermarket performance products
- PCM

Diagnostic Aids: Reprogram or update the calibration. If the PCM already has the latest calibration, carry out the RELEARN VEHICLE DATA procedure from the SERVICE FUNCTIONS menu on the scan tool. Check for other DTCs or drive symptoms for further action. Make sure to check for aftermarket performance products before installing a new PCM. If it is necessary to install a new PCM, refer to FLASH ELECTRICALLY ERASABLE PROGRAMMABLE READ ONLY MEMORY (EEPROM) , Programming the VID Block for a replacement PCM.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P161A - INCORRECT RESPONSE FROM IMMOBILIZER CONTROL MODULE - DTC CHART

P161A - INCORRECT RESPONSE FROM IMMOBILIZER CONTROL MODULE - DTC CHART

Description:			
Possible Causes:			
Diagnostic Aids: Refer to the service information , Electronic Engine Controls.			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P162F - STARTER MOTOR DISABLED - ENGINE CRANK TIME TOO LONG - DTC CHART

P162F - STARTER MOTOR DISABLED - ENGINE CRANK TIME TOO LONG - DTC CHART

Description: This DTC sets when there has been at least 60 seconds of total accumulated cranking time without sufficient time allowed between crank attempts for the starter to cool down.

Possible Causes:

- Repeated excessive attempts to start the engine
- Vehicle is low on fuel
- Battery or starter motor concerns

Diagnostic Aids: This DTC may be accompanied by other DTCs. Diagnose all other DTCs first. Clear the DTCs and repeat the self-test. If the DTC is retrieved again, check for the cause of the excessive crank time.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P1633 - KEEP ALIVE POWER (KAPWR) VOLTAGE TOO LOW - DTC CHART

P1633 - KEEP ALIVE POWER (KAPWR) VOLTAGE TOO LOW - DTC CHART

Description: This DTC sets when the KAPWR circuit has experienced a voltage interrupt.
Possible Causes: • KAPWR circuit open • KAPWR intermittent
Diagnostic Aids: Loss of KAPWR to the PCM results in immediate malfunction indicator lamp (MIL) illumination and sets DTC P1633.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test QB .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P1635 - TIRE/AXLE RATIO OUT OF ACCEPTABLE RANGE - DTC CHART

P1635 - TIRE/AXLE RATIO OUT OF ACCEPTABLE RANGE - DTC CHART

Description: This DTC sets when the tire and axle information contained in the vehicle identification (VID) block does not match the vehicle hardware.
Possible Causes: • Incorrect tire size • Incorrect axle ratio • Incorrect VID configuration parameters
Diagnostic Aids: Using the scan tool, view the tire and axle parameters within the VID. They must match the vehicle hardware.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P1636 - INDUCTIVE SIGNATURE CHIP COMMUNICATION ERROR - DTC CHART

P1636 - INDUCTIVE SIGNATURE CHIP COMMUNICATION ERROR - DTC CHART

Description: This DTC sets when the PCM has lost communication with the inductive signature chip.
Possible Causes: • Damaged PCM

Diagnostic Aids: Check for other DTCs and diagnose those first. Clear the DTCs, repeat the self-test. If the DTC is retrieved again, install a new PCM. Refer to FLASH ELECTRICALLY ERASABLE PROGRAMMABLE READ ONLY MEMORY (EEPROM) .			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P1639 - VEHICLE ID (VID) BLOCK CORRUPTED, NOT PROGRAMMED - DTC CHART

P1639 - VEHICLE ID (VID) BLOCK CORRUPTED, NOT PROGRAMMED - DTC CHART

Description: This DTC sets when the VID block is not programmed or the information within is corrupt.

Possible Causes:

- New PCM
- Incorrect PCM
- Incorrect VID configuration

Diagnostic Aids: Program the PCM to the most recent calibration available.
The VID block must be programmed. Refer to FLASH ELECTRICALLY ERASABLE PROGRAMMABLE READ ONLY MEMORY (EEPROM) , Making Changes to the VID Block.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P1646 - LINEAR O2 SENSOR CONTROL CHIP (BANK 1) - DTC CHART

P1646 - LINEAR O2 SENSOR CONTROL CHIP (BANK 1) - DTC CHART

Description: The PCM monitors the application specific integrated circuit that controls and monitors the universal heated oxygen sensor bank 1, sensor 1 (HO2S11). This DTC sets when the PCM detects an internal circuit or communication concern.

Possible Causes:

- Damaged universal HO2S11 wiring
- Damaged PCM

Diagnostic Aids: Check for other DTCs and diagnose those first. Check for intermittent universal HO2S wiring concerns. Check the universal HO2S wiring between the PCM and the sensor for damage. Check for aftermarket performance products.

Reprogram or update the calibration. Clear the DTCs, repeat the self-test. If the DTC is retrieved again, install a new PCM. Refer to FLASH ELECTRICALLY ERASABLE PROGRAMMABLE READ ONLY MEMORY (EEPROM) .

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P1647 - LINEAR O2 SENSOR CONTROL CHIP (BANK 2) - DTC CHART

P1647 - LINEAR O2 SENSOR CONTROL CHIP (BANK 2) - DTC CHART

Description: The PCM monitors the application specific integrated circuit that controls and monitors the universal heated oxygen sensor bank 2, sensor 1 (HO2S21). This DTC sets when the PCM detects an internal circuit or communication concern.

Possible Causes:

- Damaged universal HO2S21 wiring
- Damaged PCM

Diagnostic Aids: Check for other DTCs and diagnose those first. Check for intermittent universal HO2S wiring concerns. Check the universal HO2S wiring between the PCM and the sensor for damage. Check for aftermarket performance products.
Reprogram or update the calibration. Clear the DTCs, repeat the self-test. If the DTC is retrieved again, install a new PCM. Refer to FLASH ELECTRICALLY ERASABLE PROGRAMMABLE READ ONLY MEMORY (EEPROM) .

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P164A - O2 SENSOR POSITIVE CURRENT TRIM CIRCUIT PERFORMANCE (BANK 1 SENSOR 1) - DTC CHART

P164A - O2 SENSOR POSITIVE CURRENT TRIM CIRCUIT PERFORMANCE (BANK 1 SENSOR 1) - DTC CHART

Description: A resistor is installed in the universal heated oxygen sensor bank 1, sensor 1 (HO2S11) connector for part to part variance. The PCM determines the value of this resistor by taking multiple measurements of the resistor during each ignition ON event. The PCM uses this value to compensate for the variance in the pumping current signal. This DTC sets when the PCM receives an inconsistent or erratic measurement of the resistor.

Possible Causes:

- Corrosion
- Incorrect connections
- Damaged universal HO2S11

Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DZ .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P164B - O2 SENSOR POSITIVE CURRENT TRIM CIRCUIT PERFORMANCE (BANK 2 SENSOR 1) - DTC CHART

P164B - O2 SENSOR POSITIVE CURRENT TRIM CIRCUIT PERFORMANCE (BANK 2 SENSOR 1) - DTC CHART

Description: A resistor is installed in the universal heated oxygen sensor bank 2, sensor 1 (HO2S21) connector for part to part variance. The PCM determines the value of this resistor by taking multiple measurements of the resistor during each ignition ON event. The PCM uses this value to compensate for the variance in the pumping current signal. This DTC sets when the PCM receives an inconsistent or erratic measurement of the resistor.

Possible Causes:

- Corrosion
- Incorrect connections
- Damaged universal HO2S21

Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DZ .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P164C - INTERNAL CONTROL MODULE START-STOP PERFORMANCE - DTC CHART

P164C - INTERNAL CONTROL MODULE START-STOP PERFORMANCE - DTC CHART

Description: This DTC sets when an error occurs in the PCM.

Possible Causes:

- Module programming error
- Aftermarket performance products
- Damaged PCM

Diagnostic Aids: This DTC may be accompanied by other DTCs. Check for other DTCs and diagnose those first. If no DTCs are present, continue to follow diagnosis for this DTC.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test AA .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P166A - RESTRAINTS DEPLOYMENT COMMUNICATION CIRCUIT - DTC CHART

P166A - RESTRAINTS DEPLOYMENT COMMUNICATION CIRCUIT - DTC CHART

Description: This DTC sets when the PCM detects an open or short in the IES circuit.

Possible Causes:

- IES circuit open
- IES circuit short to ground
- IES circuit short to voltage

Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test KC .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P1674 - CONTROL MODULE SOFTWARE CORRUPTED - DTC CHART

P1674 - CONTROL MODULE SOFTWARE CORRUPTED - DTC CHART

Description: This DTC sets when an error occurs in the PCM. This DTC sets in combination with P2105.

Possible Causes:

- Software incompatibility issue
- Damaged PCM

Diagnostic Aids: Verify the PCM is at the latest calibration level.			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	GO to Pinpoint Test QE .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P1703 - BRAKE SWITCH OUT OF SELF-TEST RANGE - DTC CHART

P1703 - BRAKE SWITCH OUT OF SELF-TEST RANGE - DTC CHART

Description: This DTC sets when the BPP signal is high during the key ON engine OFF (KOEO) self-test or the BPP signal did not cycle high and low during the key ON engine running (KOER) self-test.

Possible Causes:

- BPP circuit open
- BPP circuit short to ground
- Concern in modules connected to the BPP circuit
- Damaged brake switch
- Incorrectly adjusted brake switch
- Stoplamp circuits open
- Stoplamp circuits short to ground

Diagnostic Aids: Check for correct function of the stoplamps. Using a scan tool, check the brake pedal position PID. The stoplamps and PID should turn ON and OFF with brake pedal activation.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test FD .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P1705 - TRANSMISSION RANGE SENSOR OUT OF SELF-TEST RANGE - DTC CHART

P1705 - TRANSMISSION RANGE SENSOR OUT OF SELF-TEST RANGE - DTC CHART

Description:			
Possible Causes:			
Diagnostic Aids: Refer to the service information , Electronic Engine Controls.			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**

All	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P1709 - PARK/NEUTRAL POSITION (PNP) SWITCH OUT OF SELF-TEST RANGE - DTC CHART

P1709 - PARK/NEUTRAL POSITION (PNP) SWITCH OUT OF SELF-TEST RANGE - DTC CHART

Description:			
Possible Causes:			
Diagnostic Aids: Refer to the service information , Electronic Engine Controls.			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P1780 - TRANSMISSION CONTROL SWITCH (TCS) OUT OF SELF-TEST RANGE - DTC CHART

P1780 - TRANSMISSION CONTROL SWITCH (TCS) OUT OF SELF-TEST RANGE - DTC CHART

Description:			
Possible Causes:			
Diagnostic Aids: Refer to the service information , Electronic Engine Controls.			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P1793 - IGNITION SUPPLY MALFUNCTION - DTC CHART

P1793 - IGNITION SUPPLY MALFUNCTION - DTC CHART

Description: The ignition switch position run (ISP-R) circuit is monitored for low and high voltage conditions. This DTC sets when the voltage is less than 7 volts or greater than 16 volts.

Possible Causes:

- ISP-R circuit short to voltage
- ISP-R circuit short to ground
- Battery or charging system concern

Diagnostic Aids:			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	GO to Pinpoint Test B .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P17XX - DTC CHART

P17XX - DTC CHART

Description:			
Possible Causes:			
Diagnostic Aids: Refer to the service information , Electronic Engine Controls.			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P18XX - DTC CHART

P18XX - DTC CHART

Description:			
Possible Causes:			
Diagnostic Aids: Refer to the service information , Electronic Engine Controls.			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P1900 - OUTPUT SHAFT SPEED (OSS) SENSOR CIRCUIT INTERMITTENT - DTC CHART

P1900 - OUTPUT SHAFT SPEED (OSS) SENSOR CIRCUIT INTERMITTENT - DTC CHART

Description: This DTC sets when the OSS sensor signal to the PCM is irregular or interrupted.

Possible Causes:

- OSS sensor connector not correctly seated
- OSS harness circuits intermittent open

- OSS harness circuits intermittent short
- Damaged OSS sensor connector
- OSS sensor damaged, or not installed correctly

Diagnostic Aids: Verify the OSS harness and connector integrity. Verify correct installation of the OSS sensor.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
Manual Transmission	GO to Pinpoint Test DP .		
Automatic Transmission	Refer to the service information , Automatic Transmission, Pinpoint Test Output Shaft Speed Sensor to continue diagnosis.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P1934 - VEHICLE SPEED SIGNAL - DTC CHART

P1934 - VEHICLE SPEED SIGNAL - DTC CHART

Description: This DTC sets when there is a sudden loss of vehicle speed signal over a period of time. Vehicle speed data is received from either the transmission control module (TCM) or the anti-lock brake system (ABS) module.

Possible Causes:

- VSS+ circuit open
- VSS- circuit open
- VSS circuit short to ground
- VSS circuit short to voltage
- Damaged drive mechanism for VSS
- Damaged VSS
- Damaged wheel speed sensors
- Damaged wheel speed sensor harness circuits

Diagnostic Aids: Monitor the VSS PID while driving the vehicle. If vehicle speed data is lost, check the TCM or ABS module for related DTCs.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
Manual Transmission	GO to Pinpoint Test DP .		
All others	The PCM uses information from the ABS module and the transmission control module (TCM) to calculate vehicle speed. Check these modules for DTCs.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P193C - STEERING WHEEL ANGLE SIGNAL - DTC CHART

P193C - STEERING WHEEL ANGLE SIGNAL - DTC CHART

Description:			
Possible Causes:			
Diagnostic Aids: Check for other module DTCs or related symptoms. Refer to the appropriate service information to diagnose any other DTCs retrieved. If no other module DTCs are retrieved, follow the service information diagnostic routine for steering wheel rotation sensor concerns.			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P193F - VEHICLE SPEED SIGNAL INTERMITTENT - DTC CHART

P193F - VEHICLE SPEED SIGNAL INTERMITTENT - DTC CHART

Description: This DTC sets when the vehicle speed sensor (VSS) input signal was intermittent. This DTC sets when the PCM detects the vehicle speed signal has been interrupted several times during a drive cycle.

Possible Causes:

- VSS connections intermittent
- VSS circuits intermittent short
- VSS circuits intermittent open
- Damaged VSS

Diagnostic Aids: Check the wiring, connector, and sensor for damage.

Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
Manual Transmission	GO to Pinpoint Test DP .		
All others	The PCM uses information from the anti-lock brake system (ABS) module and the transmission control module (TCM) to calculate vehicle speed. Check these modules for DTCs.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P19XX - DTC

CHART

P19XX - DTC CHART

Description:			
Possible Causes:			
Diagnostic Aids: Refer to the service information , Automatic Transmission.			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P2004 - INTAKE MANIFOLD RUNNER CONTROL (IMRC) STUCK OPEN (BANK 1) - DTC CHART

P2004 - INTAKE MANIFOLD RUNNER CONTROL (IMRC) STUCK OPEN (BANK 1) - DTC CHART

Description: This DTC sets when the IMRC is commanded closed and the intake manifold runner control bank 1 (IMRC1) sensor indicates the IMRC is open.

Possible Causes:

- IMRC1 circuit short to voltage
- IMRC1 circuit short to SIGRTN
- IMRC1 circuit short to ground
- Damaged IMRC actuator
- Damaged IMRC solenoid
- Restricted vacuum hoses
- Damaged PCM

Diagnostic Aids: The IMRC1 sensor value should change when the IMRC is commanded open or closed.

Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	GO to Pinpoint Test HU .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P2005 - INTAKE MANIFOLD RUNNER CONTROL (IMRC) STUCK OPEN (BANK 2) - DTC CHART

P2005 - INTAKE MANIFOLD RUNNER CONTROL (IMRC) STUCK OPEN (BANK 2) - DTC CHART

Description: This DTC sets when the IMRC is commanded closed and the intake manifold runner control bank 2 (IMRC2) sensor indicates the IMRC is open.

Possible Causes:

- IMRC2 circuit short to voltage
- IMRC2 circuit short to SIGRTN
- IMRC2 circuit short to ground
- Damaged IMRC actuator
- Damaged IMRC solenoid
- Blocked vacuum hoses
- Damaged PCM

Diagnostic Aids: The IMRC2 sensor value should change when the IMRC is commanded open or closed.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HU .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P2006 - INTAKE MANIFOLD RUNNER CONTROL (IMRC) STUCK CLOSED (BANK 1) - DTC CHART

P2006 - INTAKE MANIFOLD RUNNER CONTROL (IMRC) STUCK CLOSED (BANK 1) - DTC CHART

Description: This DTC sets when the IMRC is commanded open and the intake manifold runner control bank 1 (IMRC1) sensor indicates the IMRC is closed.

Possible Causes:

- IMRC circuit open
- IMRC1 circuit open
- IMRC1 circuit short to voltage
- Damaged IMRC actuator
- Damaged IMRC solenoid

Diagnostic Aids: The IMRC1 sensor value should change when the IMRC is commanded open or closed.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HU .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P2007 - INTAKE MANIFOLD RUNNER CONTROL (IMRC) STUCK CLOSED (BANK 2) - DTC CHART

P2007 - INTAKE MANIFOLD RUNNER CONTROL (IMRC) STUCK CLOSED (BANK 2) - DTC CHART

Description: This DTC sets when the IMRC is commanded open and the intake manifold runner control bank 2 (IMRC2) sensor indicates the IMRC is closed.

Possible Causes:

- IMRC circuit open
- IMRC2 circuit open
- IMRC2 circuit short to voltage
- Damaged IMRC actuator
- Damaged IMRC solenoid

Diagnostic Aids: The IMRC2 sensor value should change when the IMRC is commanded open or closed.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HU .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P2008 - INTAKE MANIFOLD RUNNER CONTROL (IMRC) CIRCUIT OPEN (BANK 1) - DTC CHART

P2008 - INTAKE MANIFOLD RUNNER CONTROL (IMRC) CIRCUIT OPEN (BANK 1) - DTC CHART

Description: This DTC sets when an open circuit is detected in the IMRC1A circuit.

Possible Causes:

- IMRC1A circuit open

Diagnostic Aids: The IMRC1 and IMRC2 sensor values should change when the IMRC is commanded open or closed.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory

All	GO to Pinpoint Test HU .

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P2011 - INTAKE MANIFOLD RUNNER CONTROL (IMRC) CIRCUIT OPEN (BANK 2) - DTC CHART

P2011 - INTAKE MANIFOLD RUNNER CONTROL (IMRC) CIRCUIT OPEN (BANK 2) - DTC CHART

Description: This DTC sets when an open circuit is detected in the IMRC2A circuit.			
Possible Causes: • IMRC2A circuit open			
Diagnostic Aids: The IMRC1 and IMRC2 sensor values should change when the IMRC is commanded open or closed.			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	GO to Pinpoint Test HU .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P2014 - INTAKE MANIFOLD RUNNER POSITION SENSOR/SWITCH CIRCUIT (BANK 1) - DTC CHART

P2014 - INTAKE MANIFOLD RUNNER POSITION SENSOR/SWITCH CIRCUIT (BANK 1) - DTC CHART

Description: This DTC sets when the IMRC1 circuit voltage is greater than or less than a calibrated range.			
Possible Causes: • IMRC1 circuit open • Mechanical concern, damage or restriction of IMRC hardware			
Diagnostic Aids: The IMRC1 sensor value should change when the IMRC is commanded open or closed.			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	GO to Pinpoint Test HU .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P2019 - INTAKE MANIFOLD RUNNER POSITION SENSOR/SWITCH CIRCUIT (BANK 2) - DTC

CHART

P2019 - INTAKE MANIFOLD RUNNER POSITION SENSOR/SWITCH CIRCUIT (BANK 2) - DTC CHART

Description: This DTC sets when the IMRC2 circuit voltage is greater than or less than a calibrated range.
Possible Causes: • IMRC2 circuit open • Mechanical concern, damage or restriction of IMRC hardware
Diagnostic Aids: The IMRC2 sensor value should change when the IMRC is commanded open or closed.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HU .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P206X - DTC CHART

P206X - DTC CHART

Description:
Possible Causes:
Diagnostic Aids: Refer to the service information , Electronic Engine Controls.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P2070 - INTAKE MANIFOLD TUNING VALVE (IMTV) STUCK OPEN BANK 1 - DTC CHART

P2070 - INTAKE MANIFOLD TUNING VALVE (IMTV) STUCK OPEN BANK 1 - DTC CHART

Description: This DTC sets when the signal is greater or less than an expected calibrated range during self-test.
Possible Causes: • IMTV circuit short to ground • Damaged IMTV actuator

Diagnostic Aids: An IMTVM PID reading may indicate a fault.			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	GO to Pinpoint Test HU .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P2071 - INTAKE MANIFOLD TUNING VALVE (IMTV) STUCK CLOSED BANK 1 - DTC CHART

P2071 - INTAKE MANIFOLD TUNING VALVE (IMTV) STUCK CLOSED BANK 1 - DTC CHART

Description: This DTC sets when the signal is greater or less than an expected calibrated range during self-test.

Possible Causes:

- IMTV circuit open
- IMTV circuit short to ground
- Damaged IMTV actuator

Diagnostic Aids: An IMTVM PID reading may indicate a fault.			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	GO to Pinpoint Test HU .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P2088 - A CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT LOW BANK 1 - DTC CHART

P2088 - A CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT LOW BANK 1 - DTC CHART

Description: This DTC sets when a low voltage on the VCT11 circuit exceeds a calibrated limit for a calibrated amount of time.

Possible Causes:

- VCT11 circuit open
- VCT11 circuit short to ground
- VPWR circuit open
- Damaged variable camshaft timing bank 1 solenoid 1 (VCT11)

Diagnostic Aids:			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**

All	GO to Pinpoint Test HK .

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P2089 - A CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT HIGH BANK 1 - DTC CHART

P2089 - A CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT HIGH BANK 1 - DTC CHART

Description: This DTC sets when a high voltage on the VCT11 circuit exceeds a calibrated limit for a calibrated amount of time.

Possible Causes:

- VCT11 circuit open
- VCT11 circuit short to voltage
- VPWR circuit open
- Damaged variable camshaft timing bank 1 solenoid 1 (VCT11)

Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HK .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P2090 - B CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT LOW BANK 1 - DTC CHART

P2090 - B CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT LOW BANK 1 - DTC CHART

Description: This DTC sets when a low voltage on the VCT12 circuit exceeds a calibrated limit for a calibrated amount of time.

Possible Causes:

- VCT12 circuit open
- VCT12 circuit short to ground
- VPWR circuit open
- Damaged variable camshaft timing bank 1 solenoid 2 (VCT12)

Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HK .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P2091 - B CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT HIGH BANK 1 - DTC CHART

P2091 - B CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT HIGH BANK 1 - DTC CHART

Description: This DTC sets when high voltage on the VCT12 circuit exceeds a calibrated limit for a calibrated amount of time.

Possible Causes:

- VCT12 circuit open
- VCT12 circuit short to voltage
- VPWR circuit open
- Damaged variable camshaft timing bank 1 solenoid 2 (VCT12)

Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HK .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P2096 - POST CATALYST FUEL TRIM SYSTEM TOO LEAN BANK 1 - DTC CHART

P2096 - POST CATALYST FUEL TRIM SYSTEM TOO LEAN BANK 1 - DTC CHART

Description: The PCM monitors the correction value from the heated oxygen sensor bank 1, sensor 2 (HO2S12) as part of the fore-aft oxygen sensor control routine. This DTC sets when the correction value is greater than a calibrated limit.

Possible Causes:

- Corrosion
- Incorrect connections
- Exhaust leaks
- Contaminated universal HO2S11

Diagnostic Aids: Inspect the connectors for signs of damage, water intrusion or corrosion.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DZ .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P2097 - POST CATALYST FUEL TRIM SYSTEM TOO RICH BANK 1 - DTC CHART

P2097 - POST CATALYST FUEL TRIM SYSTEM TOO RICH BANK 1 - DTC CHART

Description: The PCM monitors the correction value from the heated oxygen sensor bank 1, sensor 2 (HO2S12) as part of the fore-aft oxygen sensor control routine. This DTC sets when the correction value is greater than a calibrated limit.

Possible Causes:

- Corrosion
- Incorrect connections
- Exhaust leaks
- Contaminated universal HO2S11

Diagnostic Aids: Inspect the connectors for signs of damage, water intrusion or corrosion.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DZ .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P2098 - POST CATALYST FUEL TRIM SYSTEM TOO LEAN BANK 2 - DTC CHART

P2098 - POST CATALYST FUEL TRIM SYSTEM TOO LEAN BANK 2 - DTC CHART

Description: The PCM monitors the correction value from the heated oxygen sensor bank 2, sensor 2 (HO2S22) as part of the fore-aft oxygen sensor control routine. This DTC sets when the correction value is greater than a calibrated limit.

Possible Causes:

- Corrosion
- Incorrect connections
- Exhaust leaks
- Contaminated universal HO2S21

Diagnostic Aids: Inspect the connectors for signs of damage, water intrusion or corrosion.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DZ .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P2099 - POST CATALYST FUEL TRIM SYSTEM TOO RICH BANK 2 - DTC CHART

P2099 - POST CATALYST FUEL TRIM SYSTEM TOO RICH BANK 2 - DTC CHART

Description: The PCM monitors the correction value from the heated oxygen sensor bank 2, sensor 2 (HO2S22) as part of the fore-aft oxygen sensor control routine. This DTC sets when the correction value is greater than a calibrated limit.

Possible Causes:

- Corrosion
- Incorrect connections
- Exhaust leaks
- Contaminated universal HO2S21

Diagnostic Aids: Inspect the connectors for signs of damage, water intrusion or corrosion.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DZ .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P2100 - THROTTLE ACTUATOR CONTROL (TAC) MOTOR CIRCUIT/OPEN - DTC CHART

P2100 - THROTTLE ACTUATOR CONTROL (TAC) MOTOR CIRCUIT/OPEN - DTC CHART

Description: This DTC sets when a PCM fault flag is set indicating the motor circuit is open.

Possible Causes:

- ETBTACM connector is unplugged
- TACM+ circuit open
- TACM+ circuit short to voltage
- TACM- circuit open
- TACM- circuit short to voltage
- TACM+ and TACM- circuits are short together
- TAC motor has an open winding
- Damaged TAC motor

Diagnostic Aids: A TAC motor circuit PID reading may indicate a concern, if available.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DV .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P2101 - THROTTLE ACTUATOR CONTROL (TAC) MOTOR RANGE/PERFORMANCE - DTC CHART

P2101 - THROTTLE ACTUATOR CONTROL (TAC) MOTOR RANGE/PERFORMANCE - DTC CHART

Description: This DTC sets when a PCM fault flag is set indicating the motor circuit is open.
Possible Causes: • TAC motor circuits are cross wired
Diagnostic Aids: A TAC motor circuit PID reading may indicate a concern, if available.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DV .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P2105 - THROTTLE ACTUATOR CONTROL (TAC) SYSTEM - FORCED ENGINE SHUTDOWN - DTC CHART

P2105 - THROTTLE ACTUATOR CONTROL (TAC) SYSTEM - FORCED ENGINE SHUTDOWN - DTC CHART

Description: This DTC sets when the TAC system is in the failure mode effects management (FMEM) mode of forced engine shutdown.
Possible Causes:
Diagnostic Aids: This DTC is an informational DTC and may set with a number of other DTCs which are causing the FMEM. Diagnose other DTCs first.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test QE .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P2107 - THROTTLE ACTUATOR CONTROL (TAC) MODULE PROCESSOR - DTC CHART

P2107 - THROTTLE ACTUATOR CONTROL (TAC) MODULE PROCESSOR - DTC CHART

Description: This DTC sets when the electronic throttle control (ETC) area of the PCM failed the self-test. The concern could be the result of an incorrect throttle position command, or TAC motor wires shorted together.

Possible Causes:

- TACM+ circuit short to ground
- TACM+ circuit short to voltage
- TACM- circuit short to ground
- TACM- circuit short to voltage
- Damaged electronic throttle body (ETB)
- Damaged PCM

Diagnostic Aids: This DTC may be accompanied by other DTCs. Diagnose other DTCs first. A TAC motor circuit PID reading may indicate a concern, if available.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DV .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P2111 - THROTTLE ACTUATOR CONTROL (TAC) SYSTEM - STUCK OPEN - DTC CHART

P2111 - THROTTLE ACTUATOR CONTROL (TAC) SYSTEM - STUCK OPEN - DTC CHART

Description: This DTC sets when the PCM fault status indicates the throttle plate is at a greater angle than commanded.

Possible Causes:

- Throttle body stuck open or binding
- TACM+ circuit open
- TACM- circuit open
- TACM+ and TACM- circuits are cross wired
- TACM+ and TACM- circuits are shorted together
- Damaged PCM

Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DV .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P2112 - THROTTLE ACTUATOR CONTROL (TAC) SYSTEM - STUCK CLOSED - DTC CHART

P2112 - THROTTLE ACTUATOR CONTROL (TAC) SYSTEM - STUCK CLOSED - DTC CHART

Description: This DTC sets when the fault status indicates the throttle plate is at a lower angle than commanded.

Possible Causes:

- Throttle body stuck closed
- Throttle body stuck binding
- TACM+ circuit open
- TACM- circuit open
- TACM+ and TACM- circuits are cross wired
- TACM+ and TACM- circuits are shorted together
- Damaged PCM

Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DV .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P2122 - THROTTLE/PEDAL POSITION SENSOR/SWITCH D CIRCUIT LOW - DTC CHART

P2122 - THROTTLE/PEDAL POSITION SENSOR/SWITCH D CIRCUIT LOW - DTC CHART

Description: This DTC sets when the accelerator pedal position 1 (APP1) is out of self-test range low.

Possible Causes:

- APP1 circuit open
- APP1 circuit short to ground
- Damaged APP sensor

Diagnostic Aids: An APP1 sensor PID reading may indicate a concern.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DK .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P2123 - THROTTLE/PEDAL POSITION SENSOR/SWITCH D CIRCUIT HIGH - DTC CHART

P2123 - THROTTLE/PEDAL POSITION SENSOR/SWITCH D CIRCUIT HIGH - DTC CHART

Description: This DTC sets when the accelerator pedal position 1 (APP1) is out of self-test range high.

Possible Causes:

- APP1 circuit open
- APP1 circuit short to voltage
- Damaged APP sensor

Diagnostic Aids: An APP1 sensor PID reading may indicate a concern.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DK .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P2127 - THROTTLE/PEDAL POSITION SENSOR/SWITCH E CIRCUIT LOW - DTC CHART

P2127 - THROTTLE/PEDAL POSITION SENSOR/SWITCH E CIRCUIT LOW - DTC CHART

Description: This DTC sets when the accelerator pedal position 2 (APP2) is out of self-test range low.

Possible Causes:

- APP2 circuit open
- APP2 circuit short to ground
- Damaged APP sensor

Diagnostic Aids: An APP2 sensor PID reading may indicate a concern.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DK .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P2128 - THROTTLE/PEDAL POSITION SENSOR/SWITCH E CIRCUIT HIGH - DTC CHART

P2128 - THROTTLE/PEDAL POSITION SENSOR/SWITCH E CIRCUIT HIGH - DTC CHART

Description: This DTC sets when the accelerator pedal position 2 (APP2) is out of self-test range high.			
Possible Causes: • APP sensor assembly is binding • APP2 circuit short to voltage • Damaged APP sensor			
Diagnostic Aids: An APP2 sensor PID reading may indicate a concern.			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	GO to Pinpoint Test DK .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P2135 - THROTTLE/PEDAL POSITION SENSOR/SWITCH A/B VOLTAGE CORRELATION - DTC CHART

P2135 - THROTTLE/PEDAL POSITION SENSOR/SWITCH A/B VOLTAGE CORRELATION - DTC CHART

Description: This DTC sets when the PCM indicates that throttle position (TP) voltage PIDs TP1 and TP2 disagree by greater than a calibrated limit.			
Possible Causes: • Corrosion • Incorrect connections • Damaged TP sensor			
Diagnostic Aids:			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	GO to Pinpoint Test DV .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P2138 - THROTTLE/PEDAL POSITION SENSOR/SWITCH D/E VOLTAGE CORRELATION - DTC CHART

P2138 - THROTTLE/PEDAL POSITION SENSOR/SWITCH D/E VOLTAGE CORRELATION - DTC CHART

Description: The PCM compares the accelerator pedal position (APP) sensor information from APP1 and APP2 signals. This DTC sets when the APP sensor inputs APP1 and APP2 disagree on the position of the accelerator pedal by greater than an expected value.

Possible Causes:

- APP sensor circuit concerns
- Damaged APP sensor

Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DK .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P2195 - O2 SENSOR SIGNAL BIASED/STUCK LEAN - BANK 1, SENSOR 1 - DTC CHART

P2195 - O2 SENSOR SIGNAL BIASED/STUCK LEAN - BANK 1, SENSOR 1 - DTC CHART

Description: A universal heated oxygen sensor bank 1, sensor 1 (HO2S11) indicating lean at the end of a test is trying to correct for an over lean condition. This DTC sets when the fuel control system no longer detects switching for a calibrated amount of time.

Possible Causes:

- Water in the harness connector
- UO2SPC11 circuit open
- Corrosion
- Incorrect connections
- Low fuel pressure or running out of fuel
- EVAP purge valve stuck open
- Biased MAP sensor signal
- Incorrect learned ethanol content
- Air leaks after the mass airflow (MAF) sensor (if equipped)
- Contaminated MAF sensor (if equipped)
- Vacuum leaks
- Positive crankcase ventilation (PCV) system is leaking
- Incorrectly seated engine oil dipstick
- Leaking gasket

- Camshaft timing
- Exhaust leaks before or near the universal HO2S11
- Damaged universal HO2S11
- Damaged PCM

Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test H .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P2196 - O2 SENSOR SIGNAL BIASED/STUCK RICH - BANK 1, SENSOR 1 - DTC CHART

P2196 - O2 SENSOR SIGNAL BIASED/STUCK RICH - BANK 1, SENSOR 1 - DTC CHART

Description: A universal heated oxygen sensor bank 1, sensor 1 (HO2S11) indicating rich at the end of a test is trying to correct for an over rich condition. This DTC sets when the fuel control system no longer detects switching for a calibrated amount of time.

Possible Causes:

- Water in the harness connector
- UO2SPC11 circuit open
- Corrosion
- Incorrect connections
- Excessive fuel pressure
- Leaking or contaminated fuel injectors
- EVAP purge valve stuck open
- Biased MAP sensor signal
- Incorrect learned ethanol content
- Contaminated MAF sensor (if equipped)
- Positive crankcase ventilation (PCV) system
- Contaminated oil
- Oil overfill
- Camshaft timing
- Damaged universal HO2S11

- Damaged PCM

Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test H .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P2197 - O2 SENSOR SIGNAL BIASED/STUCK LEAN - BANK 2, SENSOR 1 - DTC CHART

P2197 - O2 SENSOR SIGNAL BIASED/STUCK LEAN - BANK 2, SENSOR 1 - DTC CHART

Description: A universal heated oxygen sensor bank 2, sensor 1 (HO2S21) indicating lean at the end of a test is trying to correct for an over lean condition. This DTC sets when the fuel control system no longer detects switching for a calibrated amount of time.

Possible Causes:

- Water in the harness connector
- UO2SPC21 circuit open
- Corrosion
- Incorrect connections
- Low fuel pressure or running out of fuel
- EVAP purge valve stuck open
- Biased MAP sensor signal
- Incorrect learned ethanol content
- Air leaks after the mass airflow (MAF) sensor (if equipped)
- Contaminated MAF sensor (if equipped)
- Vacuum leaks
- Positive crankcase ventilation (PCV) system is leaking
- Incorrectly seated engine oil dipstick
- Leaking gasket
- Camshaft timing
- Exhaust leaks before or near the universal HO2S21
- Damaged universal HO2S21
- Damaged PCM

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P2198 - O2 SENSOR SIGNAL BIASED/STUCK RICH - BANK 2, SENSOR 1 - DTC CHART

P2198 - O2 SENSOR SIGNAL BIASED/STUCK RICH - BANK 2, SENSOR 1 - DTC CHART

Description: A universal heated oxygen sensor bank 2, sensor 1 (HO2S21) indicating rich at the end of a test is trying to correct for an over rich condition. This DTC sets when the fuel control system no longer detects switching for a calibrated amount of time.

Possible Causes:

- Water in the harness connector
- UO2SPC21 circuit open
- Corrosion
- Incorrect connections
- Excessive fuel pressure
- Leaking or contaminated fuel injectors
- EVAP purge valve stuck open
- Biased MAP sensor signal
- Incorrect learned ethanol content
- Contaminated MAF sensor (if equipped)
- Positive crankcase ventilation (PCV) system
- Contaminated oil
- Oil overfill
- Camshaft timing
- Damaged universal HO2S21
- Damaged PCM

Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test H .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P219A - BANK 1 AIR/FUEL RATIO IMBALANCE - DTC CHART

P219A - BANK 1 AIR/FUEL RATIO IMBALANCE - DTC CHART

Description: The air to fuel imbalance monitor is designed to detect differences in the air to fuel ratio between cylinders per engine bank. This DTC sets when the air to fuel ratio difference per cylinder is greater than a calculated amount.

Possible Causes:

- Leaking or contaminated fuel injectors
- Low fuel pressure or running out of fuel
- Leaking EVAP purge valve
- Exhaust or intake air system leaks
- Exhaust gas recirculation (EGR) system
- Positive crankcase ventilation (PCV) system is leaking
- Ignition system
- Incorrectly seated engine oil dipstick, tube or oil fill cap
- Base engine concerns

Diagnostic Aids: The EGR port is restricted.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test H .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P219B - BANK 2 AIR/FUEL RATIO IMBALANCE - DTC CHART

P219B - BANK 2 AIR/FUEL RATIO IMBALANCE - DTC CHART

Description: The air to fuel imbalance monitor is designed to detect differences in the air to fuel ratio between cylinders per engine bank. This DTC sets when the air to fuel ratio difference per cylinder is greater than a calculated amount.

Possible Causes:

- Leaking or contaminated fuel injectors
- Low fuel pressure or running out of fuel
- Leaking EVAP purge valve
- Exhaust or intake air system leaks
- Positive crankcase ventilation (PCV) system is leaking

- Ignition system
- Incorrectly seated engine oil dipstick, tube or oil fill cap
- Base engine concerns

Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test H .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P2227 - BAROMETRIC PRESSURE SENSOR A CIRCUIT RANGE/PERFORMANCE - DTC CHART

P2227 - BAROMETRIC PRESSURE SENSOR A CIRCUIT RANGE/PERFORMANCE - DTC CHART

For Fiesta

Description: This DTC sets when there is an out of range condition in the BARO circuit.

Possible Causes:

- Damaged barometric pressure (BARO) sensor
- Damaged PCM

Diagnostic Aids: The BARO sensor is integral to the PCM. A BARO reading less than 50 kPa (7.25 psi) indicates a concern.
Clear the PCM DTCs. Repeat the self-test. If the DTC is retrieved again, install a new PCM. Refer to FLASH ELECTRICALLY ERASABLE PROGRAMMABLE READ ONLY MEMORY (EEPROM) .

For Vehicles With 2.7L And 3.5L GTDI Engines

Description: This DTC sets when either of the following conditions are present.
When the BARO PID does not correlate with the TCBP and the MAP PIDs at ignition ON, engine OFF.
When the MAP and TCBP PIDs correlate with the engine running, but the TCBP PID does not correlate with the BARO PID at idle.

Possible Causes:

- Damaged BARO sensor
- Damaged PCM

Diagnostic Aids: This DTC is only operational between 1, 000 feet below sea level to 15, 000 feet above sea level, it should be disregarded if set outside the operational range.

For All Others

Description: This DTC sets when the BARO does not correlate with an inferred barometric pressure calculation based on the MAP or mass airflow (MAF) value.

Possible Causes:

- Damaged BARO sensor
- Damaged PCM

Diagnostic Aids: This DTC is only operational between 1, 000 feet below sea level to 15, 000 feet above sea level, it should be disregarded if set outside the operational range.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
Fiesta	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		
All others	GO to Pinpoint Test DO .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P2228 - BAROMETRIC PRESSURE SENSOR A CIRCUIT LOW - DTC CHART

P2228 - BAROMETRIC PRESSURE SENSOR A CIRCUIT LOW - DTC CHART

For Fiesta

Description: This DTC sets when the signal from the barometric pressure (BARO) sensor is below the minimum threshold.

Possible Causes:

- Damaged BARO sensor
- Damaged PCM

Diagnostic Aids: The BARO sensor is integral to the PCM.
When the BARO signal is less than the calibrated threshold, a concern is indicated.
Clear the PCM DTCs. Repeat the self-test. If the DTC is retrieved again, install a new PCM. Refer to FLASH ELECTRICALLY ERASABLE PROGRAMMABLE READ ONLY MEMORY (EEPROM) .

For All Others

Description: This DTC sets when the barometric pressure (BARO) reading is abnormally low indicating an extreme high altitude.

Possible Causes:

- Damaged BARO sensor

Diagnostic Aids: When the BARO signal is less than the calibrated threshold for greater than 100 ms, a concern is indicated.
This DTC is only operational between 1, 000 feet below sea level to 15, 000 feet above sea level, it should be disregarded if set outside the operational range.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
Fiesta	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		

All others	GO to Pinpoint Test DO .

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P2229 - BAROMETRIC PRESSURE SENSOR A CIRCUIT HIGH - DTC CHART

P2229 - BAROMETRIC PRESSURE SENSOR A CIRCUIT HIGH - DTC CHART

For Fiesta

Description: This DTC sets when the signal from the barometric pressure (BARO) sensor is above the maximum threshold.

Possible Causes:

- Damaged BARO sensor
- Damaged PCM

Diagnostic Aids: The BARO sensor is integral to the PCM.
When the BARO signal is greater than a calibrated threshold, a concern is indicated.
Clear the PCM DTCs. Repeat the self-test. If the DTC is retrieved again, install a new PCM. Refer to FLASH ELECTRICALLY ERASABLE PROGRAMMABLE READ ONLY MEMORY (EEPROM) .

For All Others

Description: This DTC sets when the barometric pressure (BARO) reading is abnormally high indicating an extreme low altitude.

Possible Causes:

- Damaged BARO sensor

Diagnostic Aids: When the BARO signal is greater than a calibrated threshold for greater than 100 ms, a concern is indicated.
This DTC is only operational between 1, 000 feet below sea level to 15, 000 feet above sea level, it should be disregarded if set outside the operational range.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
Fiesta	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		
All others	GO to Pinpoint Test DO .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P2230 - BAROMETRIC PRESSURE SENSOR A CIRCUIT INTERMITTENT/ERRATIC - DTC CHART

P2230 - BAROMETRIC PRESSURE SENSOR A CIRCUIT INTERMITTENT/ERRATIC - DTC CHART

Description: This DTC sets when the BARO reading is intermittently above the maximum value or intermittently below the minimum value for a calibrated number of times.			
Possible Causes: • Damaged BARO sensor			
Diagnostic Aids: When the BARO signal is greater than or less than a calibrated threshold for greater than 100 ms, a concern is indicated. This DTC is only operational between 1, 000 feet below sea level to 15, 000 feet above sea level, it should be disregarded if set outside the operational range.			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	GO to Pinpoint Test DO .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P2237 - O2 SENSOR POSITIVE CURRENT CONTROL CIRCUIT OPEN - BANK 1, SENSOR 1 - DTC CHART

P2237 - O2 SENSOR POSITIVE CURRENT CONTROL CIRCUIT OPEN - BANK 1, SENSOR 1 - DTC CHART

Description: This DTC sets when a concern is detected with the circuit used to determine the oxygen content in the exhaust gas.			
Possible Causes: • UO2SPC11 circuit open • Damaged universal heated oxygen sensor bank 1, sensor 1 (HO2S11)			
Diagnostic Aids:			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	GO to Pinpoint Test DZ .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P2240 - O2 SENSOR POSITIVE CURRENT CONTROL CIRCUIT OPEN - BANK 2, SENSOR 1 - DTC CHART

P2240 - O2 SENSOR POSITIVE CURRENT CONTROL CIRCUIT OPEN - BANK 2, SENSOR 1 - DTC CHART

Description: This DTC sets when a concern is detected with the circuit used to determine the oxygen content in the exhaust gas.

Possible Causes:

- UO2SPC21 circuit open
- Damaged universal heated oxygen sensor bank 2, sensor 1 (HO2S21)

Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DZ .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P2243 - O2 SENSOR REFERENCE VOLTAGE CIRCUIT OPEN - BANK 1, SENSOR 1 - DTC CHART

P2243 - O2 SENSOR REFERENCE VOLTAGE CIRCUIT OPEN - BANK 1, SENSOR 1 - DTC CHART

Description: This DTC sets when a concern is detected with the circuit used to determine the oxygen content in the exhaust gas.

Possible Causes:

- UO2S11 circuit open
- Damaged universal heated oxygen sensor bank 1, sensor 1 (HO2S11)

Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DZ .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P2247 - O2 SENSOR REFERENCE VOLTAGE CIRCUIT OPEN - BANK 2, SENSOR 1 - DTC CHART

P2247 - O2 SENSOR REFERENCE VOLTAGE CIRCUIT OPEN - BANK 2, SENSOR 1 - DTC CHART

Description: This DTC sets when a concern is detected with the circuit used to determine the oxygen content in the exhaust gas.

Possible Causes:

- UO2S21 circuit open
- Damaged universal heated oxygen sensor bank 2, sensor 1 (HO2S21)

Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory

All	GO to Pinpoint Test DZ .

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P2251 - O2 SENSOR NEGATIVE CURRENT CONTROL CIRCUIT OPEN - BANK 1, SENSOR 1 - DTC CHART

P2251 - O2 SENSOR NEGATIVE CURRENT CONTROL CIRCUIT OPEN - BANK 1, SENSOR 1 - DTC CHART

Description: This DTC sets when a concern is detected with the circuit used to determine the oxygen content in the exhaust gas.

Possible Causes:

- UO2SGREF11 circuit open
- Damaged universal heated oxygen sensor bank 1, sensor 1 (HO2S11)

Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DZ .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P2254 - O2 SENSOR NEGATIVE CURRENT CONTROL CIRCUIT OPEN - BANK 2, SENSOR 1 - DTC CHART

P2254 - O2 SENSOR NEGATIVE CURRENT CONTROL CIRCUIT OPEN - BANK 2, SENSOR 1 - DTC CHART

Description: This DTC sets when a concern is detected with the circuit used to determine the oxygen content in the exhaust gas.

Possible Causes:

- UO2SGREF21 circuit open
- Damaged universal heated oxygen sensor bank 2, sensor 1 (HO2S21)

Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DZ .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P2270 - O2 SENSOR SIGNAL STUCK LEAN - BANK 1, SENSOR 2 - DTC CHART

P2270 - O2 SENSOR SIGNAL STUCK LEAN - BANK 1, SENSOR 2 - DTC CHART

Description: The heated oxygen sensor bank 1, sensor 2 (HO2S12) is forced rich and lean and monitored by the PCM. This DTC sets when the PCM does not detect the output of the HO2S12 in a calibrated amount of time.

Possible Causes:

- Pinched, shorted, and corroded wiring and pins
- Crossed HO2S12 wires
- Exhaust leaks
- Contaminated HO2S12
- Damaged HO2S12

Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test H .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P2271 - O2 SENSOR SIGNAL STUCK RICH - BANK 1, SENSOR 2 - DTC CHART

P2271 - O2 SENSOR SIGNAL STUCK RICH - BANK 1, SENSOR 2 - DTC CHART

Description: The heated oxygen sensor bank 1, sensor 2 (HO2S12) is forced rich and lean and monitored by the PCM. This DTC sets when the PCM does not detect the output of the HO2S in a calibrated amount of time.

Possible Causes:

- Pinched, shorted, and corroded wiring and pins
- Crossed HO2S12 wires
- Exhaust leaks
- Contaminated HO2S12
- Damaged HO2S12

Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory

All	GO to Pinpoint Test H .

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P2272 - O2 SENSOR SIGNAL STUCK LEAN - BANK 2, SENSOR 2 - DTC CHART

P2272 - O2 SENSOR SIGNAL STUCK LEAN - BANK 2, SENSOR 2 - DTC CHART

Description: The heated oxygen sensor bank 2, sensor 2 (HO2S22) is forced rich and lean and monitored by the PCM. This DTC sets when the PCM does not detect the output of the HO2S22 in a calibrated amount of time.

Possible Causes:

- Pinched, shorted, and corroded wiring and pins
- Crossed HO2S22 wires
- Exhaust leaks
- Contaminated HO2S22
- Damaged HO2S22

Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test H .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P2273 - O2 SENSOR SIGNAL STUCK RICH - BANK 2, SENSOR 2 - DTC CHART

P2273 - O2 SENSOR SIGNAL STUCK RICH - BANK 2, SENSOR 2 - DTC CHART

Description: The heated oxygen sensor bank 2, sensor 2 (HO2S22) is forced rich and lean and monitored by the PCM. This DTC sets when the PCM does not detect the output of the HO2S22 in a calibrated amount of time.

Possible Causes:

- Pinched, shorted, and corroded wiring and pins
- Crossed HO2S22 wires
- Exhaust leaks
- Contaminated HO2S22
- Damaged HO2S22

Diagnostic Aids:			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	GO to Pinpoint Test H .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P2279 - INTAKE AIR SYSTEM LEAK - DTC CHART

P2279 - INTAKE AIR SYSTEM LEAK - DTC CHART

Description: This DTC sets when the PCM detects an air leak that exceeds a calibrated limit for greater than 5 seconds. If the airflow entering the engine exceeds the airflow through the throttle, a leak is detected and this diagnostic fails.

Possible Causes:

- Unmetered air leaks between throttle body and intake valves
- Air leaks at the intake manifold
- Positive crankcase ventilation (PCV) system is leaking

Diagnostic Aids: Verify the integrity of the PCV system. Refer to POSITIVE CRANKCASE VENTILATION (PCV) SYSTEM for system information.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HG .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P2280 - AIR FLOW RESTRICTION/AIR LEAK BETWEEN AIR FILTER AND MAF BANK 1 - DTC CHART

P2280 - AIR FLOW RESTRICTION/AIR LEAK BETWEEN AIR FILTER AND MAF BANK 1 - DTC CHART

Description: This DTC sets when the PCM detects an air leak that exceeds a calibrated limit for greater than 5 seconds. If the airflow entering the engine exceeds the airflow through the throttle, a leak is detected and this diagnostic fails.

Possible Causes:

- Unmetered air leaks between throttle body and intake valves
- Air leaks at the intake manifold
- Positive crankcase ventilation (PCV) system is leaking

Diagnostic Aids: Verify the integrity of the PCV system. Refer to POSITIVE CRANKCASE VENTILATION (PCV) SYSTEM for system information.			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	GO to Pinpoint Test HG .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P2281 - AIR LEAK BETWEEN MAF AND THROTTLE BODY - DTC CHART

P2281 - AIR LEAK BETWEEN MAF AND THROTTLE BODY - DTC CHART

Description: This DTC sets when the PCM detects an air leak that exceeds a calibrated limit for greater than 5 seconds. If the airflow entering the engine exceeds the airflow through the throttle, a leak is detected and this diagnostic fails.

Possible Causes:

- Unmetered air leaks between throttle body and intake valves
- Air leaks at the intake manifold
- Positive crankcase ventilation (PCV) system is leaking

Diagnostic Aids: Verify the integrity of the PCV system. Refer to POSITIVE CRANKCASE VENTILATION (PCV) SYSTEM for system information.			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	GO to Pinpoint Test HG .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P2282 - AIR LEAK BETWEEN THROTTLE BODY AND INTAKE VALVE - DTC CHART

P2282 - AIR LEAK BETWEEN THROTTLE BODY AND INTAKE VALVE - DTC CHART

Description: This DTC sets when the PCM detects an air leak that exceeds a calibrated limit for greater than 5 seconds. If the airflow entering the engine exceeds the airflow through the throttle, a leak is detected and this diagnostic fails.

Possible Causes:

- Unmetered air leaks between throttle body and intake valves
- Air leaks at the intake manifold
- Positive crankcase ventilation (PCV) system is leaking

Diagnostic Aids: Verify the integrity of the PCV system. Refer to POSITIVE CRANKCASE VENTILATION (PCV) SYSTEM for system information.			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	GO to Pinpoint Test HG .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P2300 - IGNITION COIL A PRIMARY CONTROL CIRCUIT LOW - DTC CHART

P2300 - IGNITION COIL A PRIMARY CONTROL CIRCUIT LOW - DTC CHART

Description: This DTC sets when there is a short to ground in the COP1 (COP) or CDA (coil pack) circuit.

Possible Causes:

- COP1 circuit short to ground (COP)
- CDA circuit short to ground (coil pack)
- Damaged COP (if equipped)
- Damaged coil pack (if equipped)
- Damaged ignition coil wiring harness

Diagnostic Aids:

Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
Fiesta 1.6L TiVCT	GO to Pinpoint Test JE .		
All others	GO to Pinpoint Test JF .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P2301 - IGNITION COIL A PRIMARY CONTROL CIRCUIT HIGH - DTC CHART

P2301 - IGNITION COIL A PRIMARY CONTROL CIRCUIT HIGH - DTC CHART

Description: This DTC sets when there is a short to voltage in the COP1 (COP) or CDA (coil pack) circuit.

Possible Causes:

- COP1 circuit short to voltage (COP)
- CDA circuit short to voltage (coil pack)
- Damaged COP (if equipped)

- Damaged coil pack (if equipped)
- Damaged ignition coil wiring harness

Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
Fiesta 1.6L TiVCT	GO to Pinpoint Test JE .		
All others	GO to Pinpoint Test JF .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P2303 - IGNITION COIL B PRIMARY CONTROL CIRCUIT LOW - DTC CHART

P2303 - IGNITION COIL B PRIMARY CONTROL CIRCUIT LOW - DTC CHART

Description: This DTC sets when there is a short to ground in the COP2 (COP) or CDB (coil pack) circuit.

Possible Causes:

- COP2 circuit short to ground (COP)
- CDB circuit short to ground (coil pack)
- Damaged COP (if equipped)
- Damaged coil pack (if equipped)
- Damaged ignition coil wiring harness

Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
Fiesta 1.6L TiVCT	GO to Pinpoint Test JE .		
All others	GO to Pinpoint Test JF .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P2304 - IGNITION COIL B PRIMARY CONTROL CIRCUIT HIGH - DTC CHART

P2304 - IGNITION COIL B PRIMARY CONTROL CIRCUIT HIGH - DTC CHART

Description: This DTC sets when there is a short to voltage in the COP2 (COP) or CDB (coil pack) circuit.

Possible Causes:

- COP2 circuit short to voltage (COP)
- CDB circuit short to voltage (coil pack)
- Damaged COP (if equipped)
- Damaged coil pack (if equipped)
- Damaged ignition coil wiring harness

Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
Fiesta 1.6L TiVCT	GO to Pinpoint Test JE .		
All others	GO to Pinpoint Test JF .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P2306 - IGNITION COIL C PRIMARY CONTROL CIRCUIT LOW - DTC CHART

P2306 - IGNITION COIL C PRIMARY CONTROL CIRCUIT LOW - DTC CHART

Description: This DTC sets when there is a short to ground in the COP3 circuit.

Possible Causes:

- COP3 circuit short to ground
- Damaged ignition coil
- Damaged ignition coil wiring harness

Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test JF .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P2307 - IGNITION COIL C PRIMARY CONTROL CIRCUIT HIGH - DTC CHART

P2307 - IGNITION COIL C PRIMARY CONTROL CIRCUIT HIGH - DTC CHART

Description: This DTC sets when there is a short to voltage in the COP3 circuit.

Possible Causes:

- COP3 circuit short to voltage

- Damaged ignition coil
- Damaged ignition coil wiring harness

Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test JF .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P2309 - IGNITION COIL D PRIMARY CONTROL CIRCUIT LOW - DTC CHART

P2309 - IGNITION COIL D PRIMARY CONTROL CIRCUIT LOW - DTC CHART

Description: This DTC sets when there is a short to ground in the COP4 circuit.

Possible Causes:

- COP4 circuit short to ground
- Damaged ignition coil
- Damaged ignition coil wiring harness

Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test JF .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P2310 - IGNITION COIL D PRIMARY CONTROL CIRCUIT HIGH - DTC CHART

P2310 - IGNITION COIL D PRIMARY CONTROL CIRCUIT HIGH - DTC CHART

Description: This DTC sets when there is a short to voltage in the COP4 circuit.

Possible Causes:

- COP4 circuit short to voltage
- Damaged ignition coil
- Damaged ignition coil wiring harness

Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory

All	GO to Pinpoint Test JF .

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P2312 - IGNITION COIL E PRIMARY CONTROL CIRCUIT LOW - DTC CHART

P2312 - IGNITION COIL E PRIMARY CONTROL CIRCUIT LOW - DTC CHART

Description: This DTC sets when there is a short to ground in the COP5 circuit.

Possible Causes:

- COP5 circuit short to ground
- Damaged ignition coil
- Damaged ignition coil wiring harness

Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test JF .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P2313 - IGNITION COIL E PRIMARY CONTROL CIRCUIT HIGH - DTC CHART

P2313 - IGNITION COIL E PRIMARY CONTROL CIRCUIT HIGH - DTC CHART

Description: This DTC sets when there is a short to voltage in the COP5 circuit.

Possible Causes:

- COP5 circuit short to voltage
- Damaged ignition coil
- Damaged ignition coil wiring harness

Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test JF .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P2315 - IGNITION COIL F PRIMARY CONTROL CIRCUIT LOW - DTC CHART

P2315 - IGNITION COIL F PRIMARY CONTROL CIRCUIT LOW - DTC CHART

Description: This DTC sets when there is a short to ground in the COP6 circuit.
Possible Causes: • COP6 circuit short to ground • Damaged ignition coil • Damaged ignition coil wiring harness
Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test JF .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P2316 - IGNITION COIL F PRIMARY CONTROL CIRCUIT HIGH - DTC CHART

P2316 - IGNITION COIL F PRIMARY CONTROL CIRCUIT HIGH - DTC CHART

Description: This DTC sets when there is a short to voltage in the COP6 circuit.
Possible Causes: • COP6 circuit short to voltage • Damaged ignition coil • Damaged ignition coil wiring harness
Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test JF .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P2418 - EVAP SYSTEM SWITCHING VALVE CONTROL CIRCUIT/OPEN - DTC CHART

P2418 - EVAP SYSTEM SWITCHING VALVE CONTROL CIRCUIT/OPEN - DTC CHART

Description: This DTC sets when the signal moves outside the minimum or maximum limit for the commanded state of the evaporative emission (EVAP) vapor blocking valve.
Possible Causes: • VPWR circuit open

- VBV circuit open
- VBV circuit short to ground
- Damaged EVAP vapor blocking valve

Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HX .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P2450 - EVAP SYSTEM SWITCHING VALVE PERFORMANCE/STUCK OPEN - DTC CHART

P2450 - EVAP SYSTEM SWITCHING VALVE PERFORMANCE/STUCK OPEN - DTC CHART

Description: The PCM commands the evaporative emission (EVAP) vapor blocking valve closed while vacuum is present in the fuel tank. If the valve does not close, the vacuum in the tank is quickly lost. This DTC sets when the rate of vacuum loss is greater than a calibrated threshold.

Possible Causes:

- Contaminated EVAP vapor blocking valve
- EVAP vapor blocking valve stuck open
- Damaged EVAP vapor blocking valve

Diagnostic Aids: Retrieve all continuous memory and on-demand self-test DTCs from the PCM. Diagnose and repair any circuit related EVAP vapor blocking valve DTCs before diagnosing this performance DTC.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test HX .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P2510 - ECM/PCM POWER RELAY SENSE CIRCUIT RANGE/PERFORMANCE - DTC CHART

P2510 - ECM/PCM POWER RELAY SENSE CIRCUIT RANGE/PERFORMANCE - DTC CHART

Description: The ISP-R and the INJPWRM circuits are monitored for correlation. This DTC sets when the voltage on the ISP-R and the INJPWRM circuit voltages do not correspond for a calibrated period of time.

Possible Causes:

- Ignition circuit fuse

- ISP-R circuit open
- ISP-R circuit short to ground
- Fuel injector VPWR circuit short to voltage
- Fuel injector INJPWR circuit short to voltage
- Damaged ignition switch
- Damaged fuel pump relay
- Damaged PCM power relay

Diagnostic Aids: The INJPWRM PID voltage reading should be 0 volts when the ignition is in the OFF, ACC or LOCK position.			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	GO to Pinpoint Test B .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P253X - DTC CHART

P253X - DTC CHART

Description:			
Possible Causes:			
Diagnostic Aids: Refer to the service information , Electronic Engine Controls.			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P25B1 - FUEL LEVEL SENSOR B STUCK - DTC CHART

P25B1 - FUEL LEVEL SENSOR B STUCK - DTC CHART

Description:			
Possible Causes:			
Diagnostic Aids: Refer to the service information , Electronic Engine Controls.			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P25B2 - FUEL LEVEL SENSOR A OR B STUCK - DTC CHART

P25B2 - FUEL LEVEL SENSOR A OR B STUCK - DTC CHART

Description:			
Possible Causes:			
Diagnostic Aids: Refer to the service information , Electronic Engine Controls.			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P260F - EVAPORATIVE SYSTEM MONITORING PROCESSOR PERFORMANCE - DTC CHART

P260F - EVAPORATIVE SYSTEM MONITORING PROCESSOR PERFORMANCE - DTC CHART

Description: This DTC sets when a concern is detected internal to the PCM. The microprocessor that controls the engine off natural vacuum (EONV) leak check monitor is separate from the main processor within the PCM.

Possible Causes:

- Module communications network concerns
- PCM calibration level
- Damaged PCM

Diagnostic Aids: Verify the PCM is at the latest calibration level. Reprogram if necessary.

Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	GO to Pinpoint Test HX .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P2610 - ECM/PCM ENGINE OFF TIMER PERFORMANCE - DTC CHART

P2610 - ECM/PCM ENGINE OFF TIMER PERFORMANCE - DTC CHART

Description: This DTC sets when the difference between the engine off time and the central processing unit (CPU) time exceeds a calibrated limit for a calibrated amount of time.

Possible Causes:

- Incorrect or intermittent battery cable connections
- KAPWR circuit to PCM concern
- Engine coolant temperature (ECT) sensor concern
- Engine cooling system concerns
- Electrical interference around vehicle or PCM

Diagnostic Aids: Verify the PCM, remote function actuator (RFA) and instrument panel control (IPC) module are at the latest calibration level.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test QB .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P2626 - O2 SENSOR POSITIVE CURRENT TRIM CIRCUIT/OPEN (BANK 1 SENSOR 1) - DTC CHART

P2626 - O2 SENSOR POSITIVE CURRENT TRIM CIRCUIT/OPEN (BANK 1 SENSOR 1) - DTC CHART

Description: During deceleration fuel shut-off (DFSO) the PCM monitors the integrity of the UO2SPCT11 circuit by comparing the actual oxygen sensor voltage signal to an expected oxygen sensor voltage signal. This DTC sets when the actual oxygen sensor voltage exceeds the maximum expected voltage threshold for a specified amount of time.

Possible Causes:

- Corrosion
- Incorrect connections
- UO2SPCT11 circuit open

Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DZ .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P2627 - O2 SENSOR PUMPING CURRENT TRIM CIRCUIT LOW BANK 1, SENSOR 1 - DTC CHART

P2627 - O2 SENSOR PUMPING CURRENT TRIM CIRCUIT LOW BANK 1, SENSOR 1 - DTC CHART

Description: A resistor is installed in the universal heated oxygen sensor (HO2S) connector for part to part variance. The PCM determines the value of this resistor by taking multiple measurements of the

resistor during each ignition ON event. The PCM uses this value in order to compensate for the variance in the pumping current signal. This DTC sets when the PCM determines the resistance value is too high.

Possible Causes:

- UO2SPCT11 circuit open
- UO2SPCT11 circuit short to ground
- Contaminated universal heated oxygen sensor bank 1, sensor 1 (HO2S11)
- Damaged universal HO2S11

Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DZ .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P2628 - O2 SENSOR POSITIVE CURRENT TRIM CIRCUIT HIGH (BANK 1 SENSOR 1) - DTC CHART

P2628 - O2 SENSOR POSITIVE CURRENT TRIM CIRCUIT HIGH (BANK 1 SENSOR 1) - DTC CHART

Description: This DTC sets when a concern is detected with the circuit used to determine the oxygen content in the exhaust gas.

Possible Causes:

- UO2SPCT11 circuit short to voltage
- Damaged universal heated oxygen sensor bank 1, sensor 1 (HO2S11)

Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DZ .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P2629 - O2 SENSOR POSITIVE CURRENT TRIM CIRCUIT/OPEN (BANK 2 SENSOR 1) - DTC CHART

P2629 - O2 SENSOR POSITIVE CURRENT TRIM CIRCUIT/OPEN (BANK 2 SENSOR 1) - DTC CHART

Description: During deceleration fuel shut-off (DFSO) the PCM monitors the integrity of the UO2SPCT21 circuit by comparing the actual oxygen sensor voltage signal to an expected oxygen

sensor voltage signal. This DTC sets when the actual oxygen sensor voltage exceeds the maximum expected voltage threshold for a specified amount of time.
Possible Causes: • Corrosion • Incorrect connections • UO2SPCT21 circuit open
Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DZ .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P2630 - O2 SENSOR PUMPING CURRENT TRIM CIRCUIT LOW BANK 2, SENSOR 1 - DTC CHART

P2630 - O2 SENSOR PUMPING CURRENT TRIM CIRCUIT LOW BANK 2, SENSOR 1 - DTC CHART

Description: A resistor is installed in the universal heated oxygen sensor (HO2S) connector for part to part variance. The powertrain control module (PCM) determines the value of this resistor by taking multiple measurements of the resistor during each ignition ON event. The PCM uses this value in order to compensate for the variance in the pumping current signal. This DTC sets when the PCM determines the resistance value is too high.
Possible Causes: • UO2SPCT21 circuit open • UO2SPCT21 circuit short to ground • Contaminated universal heated oxygen sensor bank 2, sensor 1 (HO2S21) • Damaged universal HO2S21
Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DZ .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P2631 - O2 SENSOR POSITIVE CURRENT TRIM CIRCUIT HIGH (BANK 2 SENSOR 1) - DTC CHART

P2631 - O2 SENSOR POSITIVE CURRENT TRIM CIRCUIT HIGH (BANK 2 SENSOR 1) - DTC CHART

Description: This DTC sets when a concern is detected with the circuit used to determine the oxygen content in the exhaust gas.
Possible Causes: • UO2SPCT21 circuit short to voltage • Damaged universal heated oxygen sensor bank 2, sensor 1 (HO2S21)
Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DZ .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P264F - ENGINE SERIAL NUMBER NOT PROGRAMMED OR INCOMPATIBLE - DTC CHART

P264F - ENGINE SERIAL NUMBER NOT PROGRAMMED OR INCOMPATIBLE - DTC CHART

Description: This DTC sets when the PCM does not receive a valid engine serial number during reprogramming.
Possible Causes: • Engine serial number corrupted during vehicle identification (VID) reprogramming • PCM replacement • Damaged PCM
Diagnostic Aids: The VID block must be programmed. Refer to FLASH ELECTRICALLY ERASABLE PROGRAMMABLE READ ONLY MEMORY (EEPROM) , Programming VID Block. If the PCM does not allow reprogramming of the VID block, reflashing of the PCM is required.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P268X - DTC CHART

P268X - DTC CHART

Description:
Possible Causes:
Diagnostic Aids: Refer to the service information , Engine Cooling to continue diagnosis.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P26BX - DTC CHART

P26BX - DTC CHART

Description:			
Possible Causes:			
Diagnostic Aids: Refer to the service information , Engine Cooling to continue diagnosis.			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P26XX - DTC CHART

P26XX - DTC CHART

Description:			
Possible Causes:			
Diagnostic Aids: Refer to the appropriate service information or the Master DTC Chart on the Professional Technician Society (PTS) web site to continue diagnosis.			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P2A01 - O2 CIRCUIT RANGE/PERFORMANCE BANK 1, SENSOR 2 - DTC CHART

P2A01 - O2 CIRCUIT RANGE/PERFORMANCE BANK 1, SENSOR 2 - DTC CHART

Description: This DTC sets when the heated oxygen sensor bank 1, sensor 2 (HO2S12) voltage is out of range low for a calibrated period of time.

Possible Causes:

- Crossed HO2S12 and SIGRTN circuits
- Corrosion

- Incorrect connections
- Contaminated HO2S12
- Deteriorating HO2S12
- Damaged HO2S12

Diagnostic Aids: Inspect the connectors for signs of damage, water intrusion or corrosion.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DW .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > P2A04 - O2 CIRCUIT RANGE/PERFORMANCE BANK 2, SENSOR 2 - DTC CHART

P2A04 - O2 CIRCUIT RANGE/PERFORMANCE BANK 2, SENSOR 2 - DTC CHART

Description: This DTC sets when the heated oxygen sensor bank 2, sensor 2 (HO2S22) voltage is out of range low for a calibrated period of time.

Possible Causes:

- Crossed HO2S22 and SIGRTN circuits
- Corrosion
- Incorrect connections
- Contaminated HO2S22
- Deteriorating HO2S22
- Damaged HO2S22

Diagnostic Aids: Inspect the connectors for signs of damage, water intrusion or corrosion.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test DW .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > PXXXX - DTC CHART

PXXXX - DTC CHART

Description:

Possible Causes:

Diagnostic Aids: For Pxxxx DTCs not listed in this chart, refer to the customer's symptom to determine the applicable service information for diagnosis.			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > U0046 - VEHICLE COMMUNICATION BUS C - DTC CHART

U0046 - VEHICLE COMMUNICATION BUS C - DTC CHART

Description:			
Possible Causes:			
Diagnostic Aids: Refer to the service information , Electronic Engine Controls, PCM DTC Chart, to continue diagnosis.			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > U0101 - LOST COMMUNICATION WITH TCM - DTC CHART

U0101 - LOST COMMUNICATION WITH TCM - DTC CHART

Description: The PCM continuously monitors the controller area network (CAN) for messages from the transmission control module (TCM). This DTC sets when the PCM does not receive the TCM message within the defined amount of time.			
Possible Causes: • Communication error			
Diagnostic Aids: Check for other PCM DTCs or PCM related symptoms. Diagnose all other PCM DTCs or PCM related symptoms first.			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	GO to Pinpoint Test QA .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > U0104 - LOST COMMUNICATION WITH CRUISE CONTROL MODULE - DTC CHART

U0104 - LOST COMMUNICATION WITH CRUISE CONTROL MODULE - DTC CHART

Description: The PCM continuously monitors for messages from the cruise control module. This DTC sets when the PCM does not receive the cruise control module message within the defined amount of time.
Possible Causes: • Communication error
Diagnostic Aids: Check for other PCM DTCs or PCM related symptoms. Diagnose all other PCM DTCs or PCM related symptoms first.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test QA .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > U0109 - LOST COMMUNICATION WITH FUEL PUMP CONTROL MODULE A - DTC CHART

U0109 - LOST COMMUNICATION WITH FUEL PUMP CONTROL MODULE A - DTC CHART

Description: The PCM monitors the fuel pump monitor (FPM) circuit for the presence of a duty cycled signal. If the FPM circuit is fixed at a low or high voltage, the PCM begins to increment a counter. The test fails when the PCM is still not detecting a duty cycled signal on the FPM circuit after a calibrated amount of time.
Possible Causes: • FPM circuit open or short to ground • FPM circuit short to voltage • VPWR fuel circuit open • GND circuit open • Damaged inertia fuel shutoff (IFS) switch (if equipped) • Damaged fuel pump control module relay
Diagnostic Aids: Check if the inertia fuel shutoff (IFS) switch is tripped.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test KC .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > U0121 - LOST COMMUNICATION WITH ANTI-LOCK BRAKE SYSTEM (ABS) CONTROL MODULE - DTC CHART

U0121 - LOST COMMUNICATION WITH ANTI-LOCK BRAKE SYSTEM (ABS) CONTROL MODULE -

DTC CHART

Description: The PCM continuously monitors the controller area network (CAN) for messages from the ABS. This DTC sets when the PCM fails to receive the ABS message within the defined amount of time.
Possible Causes: • Communication error
Diagnostic Aids: Check for other PCM DTCs or PCM related symptoms. Diagnose all other PCM DTCs or PCM related symptoms first.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test QA .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > U0138 - LOST COMMUNICATION WITH ALL TERRAIN CONTROL MODULE - DTC CHART

U0138 - LOST COMMUNICATION WITH ALL TERRAIN CONTROL MODULE - DTC CHART

Description: The PCM continuously monitors the controller area network (CAN) for messages from the all terrain control module (ATCM). This DTC sets when the PCM does not receive the ATCM message within the defined amount of time.
Possible Causes: • Communication error
Diagnostic Aids: Check for other PCM DTCs or PCM related symptoms. Diagnose all other PCM DTCs or PCM related symptoms first.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test QA .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > U0140 - LOST COMMUNICATION WITH BODY CONTROL MODULE - DTC CHART

U0140 - LOST COMMUNICATION WITH BODY CONTROL MODULE - DTC CHART

Description: The PCM continuously monitors controller area network (CAN) for messages from body control module (BCM). This DTC sets when the PCM does not receive the BCM message within the defined amount of time.
Possible Causes: • Communication error

Diagnostic Aids: Check for other PCM DTCs or PCM related symptoms. Diagnose all other PCM DTCs or PCM related symptoms first.			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	GO to Pinpoint Test QA .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > U0155 - LOST COMMUNICATION WITH INSTRUMENT PANEL CLUSTER CONTROL MODULE - DTC CHART

U0155 - LOST COMMUNICATION WITH INSTRUMENT PANEL CLUSTER CONTROL MODULE - DTC CHART

Description: The PCM continuously monitors the controller area network (CAN) for messages from the instrument panel cluster (IPC) module. This DTC sets when the PCM does not receive the IPC message within the defined amount of time.			
Possible Causes: • Communication error			
Diagnostic Aids: Check for other PCM DTCs or PCM related symptoms. Diagnose all other PCM DTCs or PCM related symptoms first.			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	GO to Pinpoint Test QA .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > U0212 - LOST COMMUNICATION WITH STEERING COLUMN CONTROL MODULE - DTC CHART

U0212 - LOST COMMUNICATION WITH STEERING COLUMN CONTROL MODULE - DTC CHART

Description: The PCM continuously monitors the controller area network (CAN) for messages from the steering angle sensor. This DTC sets when the PCM does not receive the steering angle sensor message within the defined amount of time.			
Possible Causes: • Communication error			
Diagnostic Aids: Check for other PCM DTCs or PCM related symptoms. Diagnose all other PCM DTCs or PCM related symptoms first.			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	GO to Pinpoint Test QA .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > U028X - DTC CHART

U028X - DTC CHART

Description:			
Possible Causes:			
Diagnostic Aids: Refer to the service information , Electronic Engine Controls, PCM DTC Chart, to continue diagnosis.			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > U0298 - LOST COMMUNICATION WITH DC TO DC CONVERTER CONTROL MODULE A - DTC CHART

U0298 - LOST COMMUNICATION WITH DC TO DC CONVERTER CONTROL MODULE A - DTC CHART

Description: The PCM continuously monitors the controller area network (CAN) for messages from the DC to DC convertor control module. This DTC sets when the PCM does not receive the DC to DC convertor control module message within the defined amount of time.			
Possible Causes: • Communication error			
Diagnostic Aids: Check for other PCM DTCs or PCM related symptoms. Diagnose all other PCM DTCs or PCM related symptoms first.			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	GO to Pinpoint Test QA .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > U0300 - INTERNAL CONTROL MODULE SOFTWARE INCOMPATIBILITY - DTC CHART

U0300 - INTERNAL CONTROL MODULE SOFTWARE INCOMPATIBILITY - DTC CHART

Description: The electronic throttle control (ETC) system uses multiple microprocessors within the PCM, each having its own software level and function. The microprocessors must have the correct level of software in order to communicate and function together. This DTC sets when there are incompatible software levels within the PCM that control the ETC system.

Possible Causes:			
Diagnostic Aids: Verify the PCM is at the latest calibration level.			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	GO to Pinpoint Test QE .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > U0402 - INVALID DATA RECEIVED FROM TCM - DTC CHART

U0402 - INVALID DATA RECEIVED FROM TCM - DTC CHART

Description: Network DTC concerns occur during module to module communication.

Possible Causes:

- Invalid data network concerns - data is transferred within the normal inter-module message, but contains known invalid data. The transmitting module logs a DTC related to the invalid data concern.
- Missing message network concerns - missing message concerns are logged by the module upon failure to receive a message from another module within a defined retry period.

Diagnostic Aids: Check for other PCM DTCs or PCM related symptoms. Diagnose all other PCM DTCs or PCM related symptoms first.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test QA .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > U0415 - INVALID DATA RECEIVED FROM ABS CONTROL MODULE - DTC CHART

U0415 - INVALID DATA RECEIVED FROM ABS CONTROL MODULE - DTC CHART

Description: Network DTC concerns occur during module to module communication.

Possible Causes:

- Invalid data network concerns - data is transferred within the normal inter-module message, but contains known invalid data. The transmitting module logs a DTC related to the invalid data concern.
- Missing message network concerns - missing message concerns are logged by the module upon failure to receive a message from another module within a defined retry period.

Diagnostic Aids: Check for other PCM DTCs or PCM related symptoms. Diagnose all other PCM DTCs or PCM related symptoms first.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test QA .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > U0422 - INVALID DATA RECEIVED FROM BODY CONTROL MODULE - DTC CHART

U0422 - INVALID DATA RECEIVED FROM BODY CONTROL MODULE - DTC CHART

Description: Network DTC concerns occur during module to module communication.

Possible Causes:

- Invalid data network concerns - data is transferred within the normal inter-module message, but contains known invalid data. The transmitting module logs a DTC related to the invalid data concern.
- Missing message network concerns - missing message concerns are logged by the module upon failure to receive a message from another module within a defined retry period.

Diagnostic Aids: Check for other PCM DTCs or PCM related symptoms. Diagnose all other PCM DTCs or PCM related symptoms first.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test QA .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > U0423 - INVALID DATA RECEIVED FROM IPC - DTC CHART

U0423 - INVALID DATA RECEIVED FROM IPC - DTC CHART

Description: Network DTC concerns occur during module to module communication.

Possible Causes:

- Invalid data network concerns - data is transferred within the normal inter-module message, but contains known invalid data. The transmitting module logs a DTC related to the invalid data concern.
- Missing message network concerns - missing message concerns are logged by the module upon failure to receive a message from another module within a defined retry period.

Diagnostic Aids: Check for other PCM DTCs or PCM related symptoms. Diagnose all other PCM DTCs or PCM related symptoms first.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test QA .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > U042E - INVALID DATA RECEIVED FROM GENERATOR CONTROL MODULE - DTC CHART

U042E - INVALID DATA RECEIVED FROM GENERATOR CONTROL MODULE - DTC CHART

Description:			
Possible Causes:			
Diagnostic Aids: Refer to the service information , Electronic Engine Controls, PCM DTC Chart, to continue diagnosis.			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > U058X - DTC CHART

U058X - DTC CHART

Description:			
Possible Causes:			
Diagnostic Aids: Refer to the service information , Electronic Engine Controls, PCM DTC Chart, to continue diagnosis.			
Application	**Key On Engine Off**	**Key On Engine Running**	**Continuous Memory**
All	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > U1011 - INVALID INTERNAL CONTROL MODULE MONITORING DATA RECEIVED FROM ECM/PCM - DTC CHART

U1011 - INVALID INTERNAL CONTROL MODULE MONITORING DATA RECEIVED FROM ECM/PCM - DTC CHART

Description: Network DTC concerns occur during module to module communication.
Possible Causes: • Invalid data network concerns - data is transferred within the normal inter-module message, but contains known invalid data. The receiving module logs a DTC related to the invalid data concern.
Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test QA .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > U1012 - INVALID INTERNAL CONTROL MODULE MONITORING DATA RECEIVED FROM ANTI-LOCK BRAKE SYSTEM (ABS) CONTROL MODULE - DTC CHART

U1012 - INVALID INTERNAL CONTROL MODULE MONITORING DATA RECEIVED FROM ANTI-LOCK BRAKE SYSTEM (ABS) CONTROL MODULE - DTC CHART

Description: Network DTC concerns occur during module to module communication.

Possible Causes:

- Invalid data network concerns - data is transferred within the normal inter-module message, but contains known invalid data. The receiving module logs a DTC related to the invalid data concern.

Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test QA .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > U1013 - INVALID INTERNAL CONTROL MODULE MONITORING DATA RECEIVED FROM TCM - DTC CHART

U1013 - INVALID INTERNAL CONTROL MODULE MONITORING DATA RECEIVED FROM TCM - DTC CHART

Description: Network DTC concerns occur during module to module communication.

Possible Causes:

- Invalid data network concerns - data is transferred within the normal inter-module message, but contains known invalid data. The receiving module logs a DTC related to the invalid data concern.

Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test QA .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > U1039 - SCP (J1850) INVALID OR MISSING DATA FOR VEHICLE SPEED - DTC CHART

U1039 - SCP (J1850) INVALID OR MISSING DATA FOR VEHICLE SPEED - DTC CHART

Description: Network DTC(s) occur during module to module communication concerns.

Possible Causes:

- Invalid data network concerns - data is transferred within the normal inter-module message, but contains known invalid data. The transmitting module logs a DTC related to the invalid data concern.
- Missing message network concerns - missing message concerns are logged by the module upon failure to receive a message from another module within a defined retry period.

Diagnostic Aids: Check for other PCM DTCs or PCM related symptoms. Diagnose all other PCM DTCs or PCM related symptoms first.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test QA .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > U210B - LOST COMMUNICATION BETWEEN FUEL PUMP CONTROL MODULE A AND RESTRAINTS CONTROL MODULE - DTC CHART

U210B - LOST COMMUNICATION BETWEEN FUEL PUMP CONTROL MODULE A AND RESTRAINTS CONTROL MODULE - DTC CHART

Description: The fuel pump control module monitors the duty cycle and frequency of the signal it receives from the restraints control module (RCM). The fuel pump control module determines if the signal on the event notification signal (ENS) circuit from the RCM is a valid duty cycle and frequency. If the duty cycle or frequency is invalid, the fuel pump control module sends a 40% duty cycle signal on the fuel pump monitor (FPM) circuit to report the concern to the PCM. The test fails when the fuel pump control module is still reporting that it is receiving an invalid duty cycle or frequency from the RCM after a calibrated amount of time.

Possible Causes:

- ENS circuit open or short to ground
- ENS circuit short to voltage
- Radio frequency interference or electromagnetic interference
- Damaged fuel pump control module
- Damaged RCM

Diagnostic Aids: Check the harness for routing, alterations, incorrect shielding, or electrical interference from other systems. The ENS is used to notify the fuel pump control module of an event requiring the fuel pump to be disabled. This signal is used instead of an inertia fuel shutoff (IFS) switch. The fuel pump control module monitors the ENS signal by sending a 12V low current signal on the ENS

circuit to the RCM.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test KC .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > U300C - IGNITION INPUT OFF/ON/START - DTC CHART

U300C - IGNITION INPUT OFF/ON/START - DTC CHART

Description: The PCM monitors the ignition key state. This DTC sets when the key state is not available.

Possible Causes:

- ISP-R circuit open
- ISP-R circuit short to ground

Diagnostic Aids:

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	GO to Pinpoint Test B .		

DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS > UXXXX - NETWORK COMMUNICATION - DTC CHART

UXXXX - NETWORK COMMUNICATION - DTC CHART

Description: Powertrain related DTC from another module.

Possible Causes:

- Communication error

Diagnostic Aids: Network DTC concerns occur during module to module communication. Refer to the service information Module Communications Network, Communication Network Diagnostic Trouble Codes (DTC) Index to continue diagnosis.

Application	Key On Engine Off	Key On Engine Running	Continuous Memory
All	Refer to the Description, Possible Causes and Diagnostic Aids for the DTC.		

REFERENCE VALUE SYMPTOM CHART

The Reference Value Symptom Chart provides guidance in selecting the appropriate parameter identification (PID) or measured signal related to the fault area. Select a symptom from the symptom chart along with the category number and go to the PID/MEASURED SIGNAL CHART . For multiple symptoms, select the symptom that is the most evident.

REFERENCE VALUE SYMPTOM CHART > SYMPTOM CHART

Symptom Occurs During	Symptom	Category Number
Startup:	No start/Normal crank	1
	Hard start/Long crank	2
	Stall after start	3
	Diesels/Runs on	4
Idle:	MIL	5
	Stalls/Quits	6
	Slow	7
	Slow return	8
	Rolling	9
	Fast	10
	Rough	11
	Misses	12
	Backfires	13
Acceleration:	Stalls/Quits	6
	Misses	12
	Bucks/Jerks	14
	Backfires	13
	Hesitation	15
	Lack/Loss of power	16
	Surge	17
	Spark knock	18
	Cooling system temperature	19
	Poor fuel economy	20
	Emissions compliance	21

Cruise:	Stalls/Quits	6
	Misses	12
	Bucks/Jerks	14
	Backfires	13
	Lack/Loss of power	16
	Surge	17
	Spark knock	18
	Cooling system temperature	19
	Poor fuel economy	20
	Emissions compliance	21
Deceleration:	Stalls/Quits	6
	Backfires	13

REFERENCE VALUE PARAMETER IDENTIFICATION (PID)/MEASURED SIGNAL CHART

The following listing reflects PIDS and/or measured values which may reveal a possible concern within each system illustrated. Match the category number with the related PID/measured signal and go to the TYPICAL DIAGNOSTIC REFERENCE VALUE CHARTS .

PID/MEASURED SIGNAL CHART

Category Number	Related PIDS/Measured Signals
5-10-17	ACP
1-23	APP1
1-23	APP2
23	BOO1/BOO2
18-19	CHT
1-2-3-5-6-7-11-12-13-14-15-16-17-20-21	CKP
1-2-3-5-6-7-11-12-13-14-15-16-17-20-21	CMP
10	CPP/PNP
3-5-6-7-9-11-15-16-20-21	DPFEGR
4-18-19-21-22	ECT
3-5-6-7-9-11-15-16-20-21	EGRMC1-4
3-5-6-7-9-11-15-16-20-21	EGRMDSD
3-5-6-7-9-11-15-16-20-21	EGRVR
5-18-19-20-21	EOT
3-5-6-11-21	EVAPCV

3-5-6-11-21	EVMV
20	FLI
1 thru 21	FP
1 thru 21	FPM
1 thru 21	FRP
1 thru 21	FRT
5	FTP
1 thru 21	FUELPW1/2
1 thru 21	FUELSYS (OL/CLSD-LP)
19	HFC
1 thru 21	HTR11/12/21/22
2-3-5-7-8-10-22	IAT
2-3-5-7-8-10-22	IAT2
5-14-15-16-17-20	IMTV
4-5-16-18-19-20-21	KS
19	LFC
1 thru 21	LONGFT1/2
1 thru 23	MAF
1 thru 23	MAP
1 thru 22	MISF
1 thru 21	O2S11/12/21/22
22	OSS
10	PSP
5	PTO
1 thru 23	RPM
5-14-16-17	SCICP
1 thru 21	SHRTFT1/2/11/12/21/22
15-16-18-19-20-21	SPARKADV [a]
1-23	TP
2-4-5-9-10-11-16-17-18-19-20-21	VCT
2-4-5-9-10-11-16-17-18-19-20-21	VCTDC/VCTDC2
1-2-3-5-6-11-12-13-14	VPWR
22-23	VSS

Some signals can only be measured and require the use of a digital multimeter (DMM).

TYPICAL DIAGNOSTIC REFERENCE VALUES

NOTE: Footnotes are referenced throughout the Typical Diagnostic Reference Value Charts. A letter in parentheses next to a value indicates supplemental information is available.
An attempt is made to provide as much information as possible. Some vehicles may not display all input and output signals.
The Typical Diagnostic Reference Value Charts do not display fault parameter identifications (PIDs). These are PIDs which indicate a hard fault with the circuit. They display a value of FAULT or NO FAULT and are PIDs ending with the letter F.
Reference values may vary 20% depending on operating conditions, altitude, and other factors.
The RPM values are axle and tire dependent.
Values are taken at an altitude of approximately 189 meters (620 ft) above sea level with the engine at normal operating temperature and accessories off.
Refer to the Introduction Information, Acronyms and Definitions for technical terms applicable to Ford Motor Company products.
Refer to PARAMETER IDENTIFICATION (PID) , for PID descriptions.
For detailed transmission diagnostics, refer to the sevice information signals may be referred to in either alpha or numeric form. For example, 1=A, 2=B, 3=C.

A. A/C on.

B. Cooling fan on (low or high speed).

C. Heated oxygen sensors (HO2S) should switch from rich to lean at least once every 3 seconds. HO2S voltage should toggle above and below 0.450 DCV and never be a negative value. Valid HO2S switching occurs only during closed loop fuel control operation.

D. Downstream oxygen sensors stay close to a constant voltage when the catalyst monitor is off (positive value only). When the catalyst monitor is on, the HO2S switches from rich to lean above and below 0.450 DCV and should never be a negative value. For downstream oxygen sensors (12, 22) greater activity results when the catalyst monitor is active.

E. Brake pedal applied.

F. The electric vapor management valve (VMV) commanded current varies from 0 mA - 1000 mA depending on the powertrain control module (PCM) command to purge the evaporative emission (EVAP) system.

G. While pressing the transmission control switch (TCS) or switching to manual drive mode.

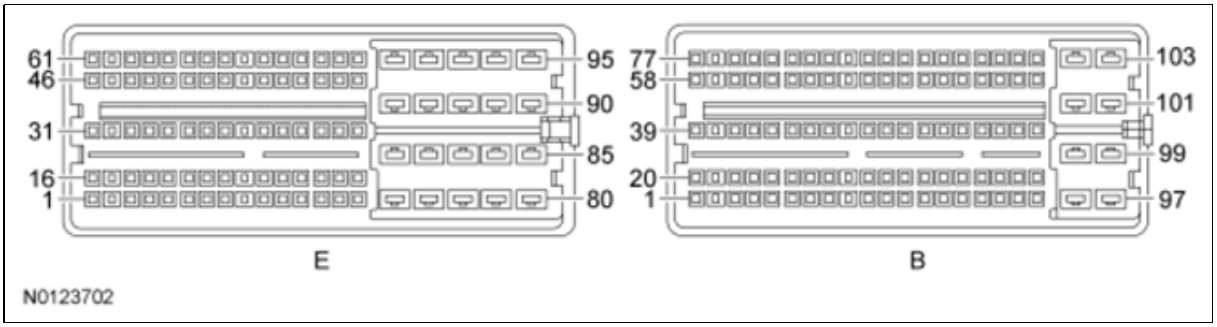
H. Value depends on fuel tank level. Typical operating range is 15% (empty) to 90% (full).

I. Value is not useful under this condition.

J. The normal operation value is from -1.5 to 3.5 degrees.

1.0L GTDI FIESTA

Fig 1: 1.0L GTDI Fiesta PCM Connector



Courtesy of FORD MOTOR CO.

1.0L GTDI FIESTA > TYPICAL DIAGNOSTIC REFERENCE VALUES

Sensors/Inputs	PCM Pin/PID Only	Measured/PID Values				Units Measured/PID
		KOEO	Hot Idle	48 KM/H (30 MPH)	89 KM/H (55 MPH)	
HTRCM12	B1	0	0	0	0	mA
FPM	B27	59.40	59.79	59.41	59.41	%
CAC_T	B32	0 (0)	0 (0)	0 (0)	0 (0)	DEG C (DEG F)
APP1	B45	0.95	0.95	1.56	1.50	VOLTS
KEYST	B48	ON	ON	ON	ON	ON/OFF
BOO1	B66	OFF	OFF	OFF	OFF	ON/OFF
O2S12	B57	0.46 (I)	switching (D)	switching (D)	switching (D)	VOLTS
FTP	B73	2.16/-14 (0)	2.15/-830 (-0.12)	1.86/-1.33kPa (-0.19)	2.57/-91 (-0.01)	VOLTS/Pa (PSI)
FTP_H2O	B73	-0.07	-2.79	-5.38	-0.10	in-H_2 O
TCBP	B74	100.44 (14.57)	101.76 (14.76)	101.76 (14.76)	101.40 (14.71)	kPa (PSI)
TCBP_V	B74	1.62	1.62	1.62	1.73	VOLTS
IAT	B75	0.81/69 (156.2)	1.56/44 (111.2)	1.91/35 (95)	1.92/35 (95)	VOLTS/DEG C (DEG F)
ECT	E23	0.44/101 (213.8)	0.49/97 (206.6)	0.84/78 (172.4)	0.55/93 (199.4)	VOLTS/DEG C (DEG F)
TP1	E33	3.87/22.35	4.32/13.33	4.12/17.25	3.10/38.03	VOLTS/%
TP2	E34	1.13/22.35	0.68/13.33	0.88/17.64	1.89/37.64	VOLTS/%
MAP	E35	1.62/100 (14.50)	0.71/39 (5.66)	1.12/67 (9.72)	1.03/61 (8.85)	VOLTS/kPa (PSI)

MAP_GAUGE	E35	1 (0.15)	62 (8.99)	34 (4.93)	40 (5.80)	kPa (PSI)
FRP	E38	1.18/3.43 (497.48)	1.10/3.01 (436.56)	1.15/3.26 (472.82)	2.46/9.90 (1435.87)	VOLTS/MPa (PSI)
O2S11_CUR	E39	0.00 (I)	switching	switching	switching	mA/uA
KNOCK_1	E59	198	43	31	29	N/A
AC_REQ	PID	NO	NO	NO	NO	YES/NO
APP	PID	0	0	9.50	9.50	%
APP_MAXDIFF	PID	0	0	-0.06	-0.12	DEG
APP_MODE	PID	NO PEDAL	NO PEDAL	NO PEDAL	PART PEDAL	NO PEDAL/PART PEDAL
APP1 (APP_D)	PID	7.84	7.84	12.54	12.15	%
APP2 (APP_E)	PID	7.84	7.84	12.94	12.94	%
B+	PID	12.70	13.72	14.22	14.22	VOLTS
BARO	PID	3.96/100 (14.50)/157	3.96/100 (14.50)/157	3.96/100 (14.50)/157	3.96/100 (14.50)/157	VOLTS/kPa (PSI)/Hz/
BOO2	PID	OFF	OFF	OFF	OFF	ON/OFF
BRKOVR_ACTION	PID	0	0	0	0	NUMERIC VALUE
BRKOVRD_POSS	PID	2	2	2	2	NUMERIC VALUE
CHT	PID	101 (213.8)	97 (206.6)	78 (172.4)	93 (199.4)	DEG C (DEG F)
DECHOKE	PID	YES	NO	NO	NO	YES/NO
DIST_BRKOVRD	PID	17.98 (11.17)	17.98 (11.17)	0.50 (0.31)	1.99 (1.24)	KM (MILES)
EQ_RAT11	PID	0/0:1	1/14.66:1	0.92/13.52:1	0.96/14.03:1	RATIO
ETC_ACT	PID	13.54	2.28	4.98	4.81	DEG
ETC_TRIM	PID	0	-0.17	-0.78	-0.78	DEG
FLI	PID	14.51 (H)	16.47 (H)	14.51 (H)	16.47 (H)	%
FUELSYS	PID	OPEN LOOP	CLOSED LOOP	CLOSED LOOP	CLOSED LOOP	OPEN LOOP/CLOSED LOOP
LOAD	PID	0.00 (I)	34.51	12.94	24.70	%
MISFIRE	PID	NO	NO	NO	NO	YES/NO
MP_LRN	PID	YES	YES	YES	YES	YES/NO
NUM_MISFIRE	PID	0	13	9	9	COUNT
O2S11_IMPED	PID	4.93	1.01	1.01	1.01	VOLTS
O2S11_READY	PID	NO	YES	YES	YES	YES/NO
O2S11_TR	PID	0	0	0	0	Kohm
OCTADJ_R_LRND	PID	13.89	13.89	13.89	13.89	%

RPM	PID	0	864.25	1466.75	1987.25	RPM
SYNC	PID	NO	YES	YES	YES	YES/NO
TP1_LRN_TRIM	PID	15.25	15.12	15.12	15.12	DEG
TP2_LRN_TRIM	PID	15.50	15.37	15.37	15.37	DEG
TPMODE	PID	PT	CT	CT	PT	CLOSED/PART/WIDE OPEN THROTTLE
TURBO_BP1_STAT	PID	NO FAULT	NO FAULT	NO FAULT	NO FAULT	FAULT/NO FAULT
VCT_EXH_ACT1	PID	0	0.18	27.12	11.25	DEG
VCT_EXH_DIF1	PID	0	-0.18	-0.37	0.31	DEG
VCT_INT_ACT1	PID	0	0.12	0	0	DEG
VCT_INT_DIF1	PID	0	0	-0.06	0	DEG
VCTSYS	PID	OPEN LOOP	CLOSED LOOP	CLOSED LOOP	CLOSED LOOP	OPEN LOOP/CLOSED LOOP
VSS	PID	0	0	48 km/h (30 MPH)	89 km/h (55 MPH)	km/h/MPH

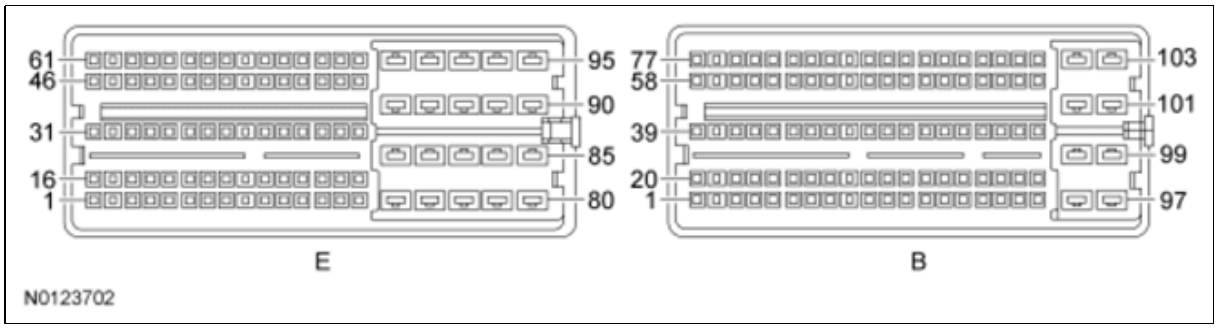
Actuators/Outputs	PCM Pin/PID Only	Measured/PID Values				Units Measured/PID
		KOEO	Hot Idle	48 KM/H (30 MPH)	89 KM/H (55 MPH)	
HTR12	B1	OFF	ON	ON	ON	ON/OFF
EVAPCV	B20	0/OFF	0/OFF	0/OFF	0/OFF	%/ON-OFF
EVAPCP	B22	0	50.27	46.93	35.89	%
FP	B39	1.99/OFF	79.92/OFF	79.92/OFF	79.92/OFF	%/ON/OFF
HTR11	E1	OFF	ON	ON	ON	ON/OFF
O2S11_HTR	E1	0	43.92	29.41	25.88	%
VCT_INT_DC1	E16	0	0	0	0	%
VCT_EXH_DC1	E31	0	0	42.15	42.68	%
TURBO_WGATE	E47	19.99	89.32	16.56	18.95	%
ETC [TAC_PCT]	PID	10.98	2.47	5.88	5.88	%
EVAP020C	PID	NO	NO	NO	NO	YES/NO
EVAPSOAK	PID	YES	YES	YES	YES	YES/NO
EVAPSTA	PID	NOT RUNNING	NOT RUNNING	NOT RUNNING	NOT RUNNING	STATUS
INJ1-3_OFF	PID	--	--	--	--	--/DISABLE
LONGFT1	PID	(I)	-20 TO +20	-20 TO +20	-20 TO +20	%
MIL	PID	OFF	OFF	OFF	OFF	ON/OFF
O2_DS_DISBL	PID	YES	NO	NO	NO	YES/NO

RO2FT1	PID	0	-0.58	1.47	1.84	%
SHRTFT1	PID	0.00 (I)	-10 TO +10	-10 TO +10	-10 TO +10	%
SPARKADV	PID	10	6.25	23.75	14.75	DEG
TQ_CNTRL	PID	NONE REQUESTED	IDLE SPEED CONTROL	TIP-IN MANAGEMENT	NONE REQUESTED	STATUS
TURBO_BPASS	PID	OFF	OFF	ON	OFF	ON/OFF

Other	PCM Pin/PID Only	Measured/PID Values				Units Measured/PID
		KOEO	Hot Idle	48 KM/H (30 MPH)	89 KM/H (55 MPH)	
VREF	B13/B14/E3/E7	5	5	5	5	VOLTS
VPWR	B101/B102/B103	VBAT	VBAT	VBAT	VBAT	VOLTS

1.6L GTDI FIESTA

Fig 1: 1.6L GTDI Fiesta PCM Connector



Courtesy of FORD MOTOR CO.

1.6L GTDI FIESTA > TYPICAL DIAGNOSTIC REFERENCE VALUES

Sensors/Inputs	PCM Pin/PID Only	Measured/PID Values				Units Measured/PID
		KOEO	Hot Idle	48 KM/H (30 MPH)	89 KM/H (55 MPH)	
HTRCM12	B1	0	0	0	0	mA
FPM	B4	59.40	59.40	59.38	59.40	%
CAC_T	B32	38	36	41	41	DEG C (DEG F)
CAC_V	B32	1.62	1.69	1.50	1.51	VOLTS
APP1	B45	0.95	0.95	2.10	2.77	VOLTS
KEYST	B48	ON	ON	ON	ON	ON/OFF

O2S12	B57	0.45 (I)	switching (D)	switching (D)	switching (D)	VOLTS
BOO1	B66	OFF	OFF	OFF	OFF	ON/OFF
FLP	B71	463 (67.15)	529 (76.72)	500 (72.52)	481.50 (69.84)	kPa (PSI)
FLP_V	B71	2.97	3.39	3.24	3.09	VOLTS
FTP	B73	2.66/72 (0.01)	2.11/-899 (-0.13)	2.45/-289 (-0.04)	2.15/-830 (-0.12)	VOLTS/Pa (PSI)
FTP_H2O	B73	0.28	-3.62	-0.96	-3.34	in-H_2 O
TCBP	B74	100.12 (14.52)	100.76 (14.61)	101.41 (14.71)	108.49 (15.74)	kPa (PSI)
TCBP_V	B74	1.61	1.62	1.63	1.74	VOLTS
IAT	B75	1.23/53 (127.4)	1.31/51 (123.8)	1.75/39 (102.2)	1.83/37 (98.6)	VOLTS/DEG C (DEG F)
ECT	E23	86 (186.8)	89 (192.2)	87 (188.6)	89 (192.2)	DEG C (DEG F)
TP1	E33	4.22/15.29	4.41/11.76	4.34/12.94	4.16/16.47	VOLTS/%
TP2	E34	0.78/15.68	0.59/11.76	0.66/13.33	0.99/19.60	VOLTS/%
MAP	E35	1.61/99 (0.01)	0.86/52 (0.01)	0.90/51 (0.01)	0.59/32 (0)	VOLTS/kPa (PSI)
MAP_GAUGE	E35	2	49	50	69	in-H_2 O
FRP	E38	1.41/4.58 (664.27)	1.50/5.01 (726.64)	1.61/5.55 (804.96)	1.76/6.45 (935.49)	VOLTS/MPa (PSI)
O2S11_CUR	E39	0.00 (I)	switching	switching	switching	mA/uA
KNOCK_2	E57	167	65	116	106	N/A
KNOCK_1	E59	167	85	104	137	N/A
AAT	PID	24 (75.2)	24 (75.2)	24 (75.2)	24 (75.2)	DEG C (DEG F)
AC_REQ	PID	NO	NO	NO	NO	YES/NO
APP	PID	0	0	18	29	%
APP_MAXDIFF	PID	0	0	-0.06	-0.06	DEG
APP_MODE	PID	NO PEDAL	NO PEDAL	PART PEDAL	PART PEDAL	NO PEDAL/PART PEDAL
APP1 (APP_D)	PID	7.84	7.84	17.25	23.13	%
APP2 (APP_E)	PID	7.84	7.84	17.64	23.52	%
B+	PID	12.51	13.80	13.64	13.61	VOLTS
BARO	PID	3.94/99 (14.36)/156.11	3.94/99 (14.36)/156.11	3.93/99 (14.36)/156.11	3.93/99 (14.36)/156.11	VOLTS/kPa (PSI)/Hz/
BOO2	PID	OFF	OFF	OFF	OFF	ON/OFF
BRKOVR_ACTION	PID	0	0	0	0	NUMERIC VALUE
BRKOVRD_POSS	PID	105	105	106	106	NUMERIC VALUE

DECHOKE	PID	YES	NO	NO	NO	YES/NO
DIST_BRKOVRD	PID	1622.99 (1008.48)	1622.99 (1008.48)	1622.99 (1008.48)	1624.49 (1009.41)	KM (MILES)
EQ_RAT11	PID	0/0:1	1.00/14.62:1	1.00/14.5:1	0.99/14.45:1	RATIO
ETC_ACT	PID	6.76	3.79	6.49	10.75	DEG
ETC_TRIM	PID	0.10	0.10	0.17	0.17	DEG
FLI	PID	99.60 (H)	99.60 (H)	99.60 (H)	99.60 (H)	%
KNK_CNTR_CYL1	PID	0	0	0	0	COUNT
KNK_CNTR_CYL2	PID	0	0	0	0	COUNT
KNK_CNTR_CYL3	PID	0	0	0	0	COUNT
KNK_CNTR_CYL4	PID	0	0	0	0	COUNT
LOAD	PID	0.00 (I)	45.49	25.09	10.19	%
MISFIRE	PID	NO	NO	NO	NO	YES/NO
MP_LRN	PID	YES	YES	YES	YES	YES/NO
NUM_MISFIRE	PID	0	1	1	1	COUNT
O2S11_IMPED	PID	4.93	1.03	1.03	1.03	VOLTS
O2S11_READY	PID	NO	NO	NO	NO	YES/NO
O2S11_TR	PID	0	0	0	0	Kohm
OCTADJ_R_LRND	PID	63.01	63.01	63.01	63.01	%
RPM	PID	0	815.25	1760.75	2577.50	RPM
SYNC	PID	NO	YES	YES	YES	YES/NO
TP1_LRN_TRIM	PID	9.50	9.50	9.50	9.50	DEG
TP2_LRN_TRIM	PID	9.62	9.62	9.62	9.62	DEG
TPMODE	PID	CT	CT	PT	PT	CLOSED/PART/WIDE OPEN THROTTLE
TURBO_BP1_STAT	PID	NO FAULT	NO FAULT	NO FAULT	NO FAULT	FAULT/NO FAULT
VCT_EXH_ACT1	PID	0	0.06	24	11.25	DEG
VCT_EXH_DIF1	PID	0	-0.06	0	-0.06	DEG
VCT_INT_ACT1	PID	0	0.06	-0.25	-0.12	DEG
VCT_INT_DIF1	PID	0	-0.06	0.25	0.12	DEG
VCTSYS	PID	OPEN LOOP	CLOSED LOOP	CLOSED LOOP	CLOSED LOOP	OPEN LOOP/CLOSED LOOP
VSS	PID	0	0	48 km/h (30 MPH)	89 km/h (55 MPH)	km/h/MPH

Actuators/Outputs	PCM	Measured/PID Values	Units

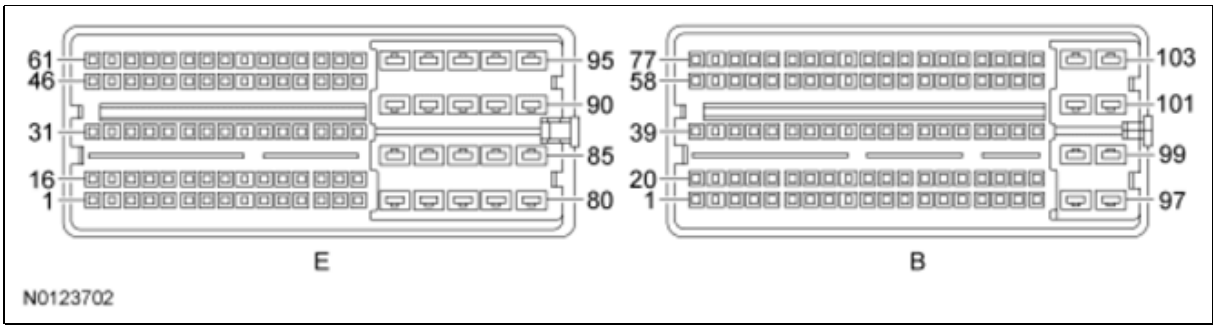
	Pin/PID Only					Measured/PID
		KOEO	Hot Idle	48 KM/H (30 MPH)	89 KM/H (55 MPH)	
HTR12	B1	OFF	ON	ON	ON	ON/OFF
EVAPCV	B20	0/OFF	0/OFF	0/OFF	0/OFF	%/ON-OFF
EVAPCP	B22	0	0	54.31	55.34	%
FP	B37	1.99/OFF	79.92/OFF	79.92/OFF	78.13/OFF	%/ON/OFF
HTR11	E1	OFF	ON	ON	ON	ON/OFF
O2S11_HTR	E1	0	45.49	45.49	45.49	%
TURBO_BPASS	E2	OFF	OFF	OFF	OFF	ON/OFF
VCT_INT_DC1	E16	0	0	0	0	%
VCT_EXH_DC1	E31	0	0	50.23	48.93	%
TURBO_WGATE	E47	0	8.49	0	8.93	%
ETC [TAC_PCT]	PID	10.58	4.31	7.45	12.94	%
EVAP020C	PID	NO	NO	NO	NO	YES/NO
EVAPSOAK	PID	YES	YES	YES	YES	YES/NO
EVAPSTA	PID	NOT RUNNING	NOT RUNNING	NOT RUNNING	NOT RUNNING	STATUS
FANDC	PID	0	55.29	60.78	13.72	%
FUELSYS	PID	OPEN LOOP	CLOSED LOOP	CLOSED LOOP	CLOSED LOOP	OPEN LOOP/CLOSED LOOP
HFC	PID	OFF	OFF	OFF	OFF	ON/OFF
INJ1-4_OFF	PID	--	--	--	--	--/DISABLE
LFC	PID	OFF	OFF	OFF	OFF	ON/OFF
LONGFT1	PID	4.68 (I)	-20 TO +20	-20 TO +20	-20 TO +20	%
MIL	PID	OFF	OFF	OFF	OFF	ON/OFF
O2_DS_DISBL	PID	YES	YES	NO	NO	YES/NO
RO2FT1	PID	0	0	-1.95	0.36	%
SHRTFT1	PID	0.00 (I)	-10 TO +10	-10 TO +10	-10 TO +10	%
SPARKADV	PID	10	-2	35.25	21.50	DEG
TQ_CNTRL	PID	NONE REQUESTED	IDLE SPEED CONTROL	NONE REQUESTED	NONE REQUESTED	STATUS

Other	PCM Pin/PID Only	Measured/PID Values				Units Measured/PID
		KOEO	Hot Idle	48 KM/H (30 MPH)	89 KM/H (55 MPH)	

VREF	B13/B14/E3/E7	5	5	5	5	VOLTS
VPWR	B101/B102/B103	VBAT	VBAT	VBAT	VBAT	VOLTS

1.0L GTDI FOCUS

Fig 1: 1.0L GTDI Focus PCM Connector



Courtesy of FORD MOTOR CO.

1.0L GTDI FOCUS > TYPICAL DIAGNOSTIC REFERENCE VALUES

Sensors/Inputs	PCM Pin/PID Only	Measured/PID Values				Units Measured/PID
		KOEO	Hot Idle	48 KM/H (30 MPH)	89 KM/H (55 MPH)	
CRNKAS_PRS	B15					Pa (PSI)
CRNKAS_P_V	B15					VOLTS
CPP_BOT	B30					YES/NO
CAC_T	B32					DEG C (DEG F)
CAC_V	B32					VOLTS
FP	B39					%/ON/OFF
AAT	B51					DEG C (DEG F)
AAT_V	B51					VOLTS
APP2	B54					VOLTS
APP1	B55					VOLTS
O2S12	B57					VOLTS
BOO2	B65					ON/OFF
BOO1	B66					ON/OFF
FLP_V	B71					VOLTS
FTP	B73					VOLTS/kPa (PSI)

FTP_H2O	B73					in-H 20
TCBP	B74					kPa (PSI)
TCBP_V	B74					VOLTS
IAT	B75					VOLTS/DEG C (DEG F)
CHT2	E13					DEG C (DEG F)
ECT	E23					DEG C (DEG F)
O2S11_CUR	E26					uA
TP1	E33					VOLTS/%
TP2	E34					%
MAP	E35					VOLTS/kPa (PSI)
MAP_GAUGE	E35					in-H_2 O
FRP	E38					VOLTS/kPa (PSI)
KNOCK_1	E59					N/A
AC_REQ	PID					YES/NO
APP	PID					%
APP_MAXDIFF	PID					DEG
APP_MODE	PID					NO PEDAL/PART PEDAL
APP1 (APP_D)	PID					%
APP2 (APP_E)	PID					%
B+	PID					VOLTS
BARO	PID					VOLTS/kPa (PSI)/Hz/in-H_2 O
BRKOVR_ACTION	PID					NUMERIC VALUE
BRKOVRD_POSS	PID					NUMERIC VALUE
DECHOKE	PID					YES/NO
DIST_BRKOVRD	PID					KM (MILES)
EQ_RAT11	PID					RATIO
ETC_ACT	PID					DEG
ETC_TRIM	PID					DEG
LOAD	PID					%
MISFIRE	PID					YES/NO
MP_LRN	PID					YES/NO
NUM_MISFIRE	PID					COUNT
O2S11_IMPED	PID					VOLTS
O2S11_READY	PID					YES/NO
O2S11_TR	PID					Kohm

OCTADJ_R_LRND	PID					%
RPM	PID					RPM
SYNC	PID					YES/NO
TP1_LRN_TRIM	PID					DEG
TP2_LRN_TRIM	PID					DEG
TPMODE	PID					CLOSED/PART/WIDE OPEN THROTTLE
TURBO_BP1_STAT	PID					FAULT/NO FAULT
VCT_EXH_ACT1	PID					DEG
VCT_EXH_DIF1	PID					DEG
VCT_INT_ACT1	PID					DEG
VCT_INT_DIF1	PID					DEG
VCTSYS	PID					OPEN LOOP/CLOSED LOOP
VSS	PID					km/h/MPH

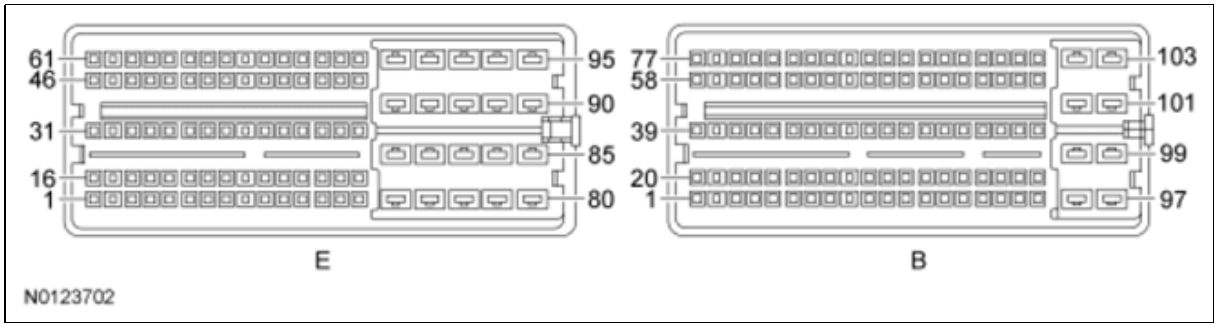
Actuators/Outputs	PCM Pin/PID Only	Measured/PID Values				Units Measured/PID
		KOEO	Hot Idle	48 KM/H (30 MPH)	89 KM/H (55 MPH)	
HTR12	B1					ON/OFF
HTRCM12	B1					mA
EVAPCV	B20					%/ON-OFF
EVAPCP	B22					%
FPM	B27					%
HTR11	E1					ON/OFF
O2S11_HTR	E1					%
VCT_EXH_DC1	E31					%
TURBO_BPASS	E46					ON/OFF
VCT_INT_DC1	E47					%
TURBO_WGATE	E47					%
ETC [TAC_PCT]	PID					%
EVAP020C	PID					YES/NO
EVAPSOAK	PID					YES/NO
EVAPSTA	PID					STATUS
FUELSYS	PID					OPEN/CLOSED LOOP
LONGFT1	PID					%

MIL	PID					ON/OFF
O2_DS_DISBL	PID					YES/NO
RO2FT1	PID					%
SHRTFT1	PID					%
SPARKADV	PID					DEG
TQ_CNTRL	PID					STATUS

Other	PCM Pin/PID Only	Measured/PID Values				Units Measured/PID
		KOEO	Hot Idle	48 KM/H (30 MPH)	89 KM/H (55 MPH)	
VREF	B13/B14/E3/E7					VOLTS
VPWR	B101/B102/B103					VOLTS

2.0L GTDI FOCUS

Fig 1: 2.0L GTDI Focus PCM Connector



Courtesy of FORD MOTOR CO.

2.0L GTDI FOCUS > TYPICAL DIAGNOSTIC REFERENCE VALUES

Sensors/Inputs	PCM Pin/PID Only	Measured/PID Values				Units Measured/PID
		KOEO	Hot Idle	48 KM/H (30 MPH)	89 KM/H (55 MPH)	
CAC_T	B32	29 (84.20)	28 (82.40)	25 (77)	22 (71.60)	DEG C (DEG F)
CAC_V	B32	2.69	2.72	2.85	2.97	VOLTS
FP	B39	75/OFF	21.43/ON	21.74/ON	22.12/ON	%/ON/OFF
AAT	B51	15 (59)	15 (59)	12 (53.60)	12 (53.60)	DEG C (DEG F)
AAT_V	B51	1.42	1.42	1.51	1.50	VOLTS
APP2	B54	0.38	0.38	0.55	0.40	VOLTS
APP1	B55	0.76	0.76	1.09	0.80	VOLTS

O2S12	B56	0.56	0.81	0.73	0.62	VOLTS
BOO2	B65	OFF	OFF	OFF	OFF	ON/OFF
BOO1	B66	OFF	OFF	OFF	OFF	ON/OFF
FLP	B71	707.82 (102.66)	661.83 (95.99)	575.85 (83.52)	580.81 (84.24)	kPa (PSI)
FLP_V	B71	2.91	2.72	2.38	2.40	VOLTS
CRNKAS_PRS	B72	0	299 (0.04)	-455 (-0.07)	584 (0.08)	Pa (PSI)
CRNKAS_P_V	B72	0	3.74	3.72	3.79	VOLTS
FTP	B73	2.63/0 (0)	2.67/0.07 (0.01)	2.60/0 (-0)	2.01/-1.03 (-0.15)	VOLTS/kPa (PSI)
FTP_H2O	B73	0.07	0.33	-1.86	-4.31	in-H_2 O
TCBP	B74	97.49 (14.14)	97.49 (14.14)	98.46 (14.28)	112.94 (16.38)	kPa (PSI)
TCBP_V	B74	1.57	1.57	1.59	1.81	VOLTS
IAT	B75	2.10/30 (86)	2.12/30 (86)	2.47/23 (73.40)	2.60/20 (68)	VOLTS/DEG C (DEG F)
MAP	E33	1.58/97.97 (14.21)	0.59/32.96 (4.78)	0.72/40.95 (5.94)	1.04/61.98 (8.99)	VOLTS/kPa (PSI)
MAP_GAUGE	E33	12.04	272.99	240.87	156.57	in-H_2 O
ECT	E36	83 (181.40)	85 (185)	91 (195.80)	93 (199.40)	DEG C (DEG F)
FRP	E37	1.30/4088.94 (593.05)	0.85/2037.75 (295.55)	0.93/2329.39 (337.85)	1.35/4428.85 (642.35)	VOLTS/kPa (PSI)
CHT2	E46	83 (181.40)	85 (185)	91 (195.80)	93 (199.40)	DEG C (DEG F)
KNOCK_2	E50	167	31	89	103	N/A
TP2	E52	0.82/16.47	0.54/10.98	0.74/14.90	0.87/17.25	VOLTS/%
O2S11_CUR	E63	(I)	switching (C)	switching (C)	switching (C)	uA
KNOCK_1	E65	167	34	105	119	N/A
TP1	E68	4.17/16.07	4.45/10.58	4.26/14.51	4.13/17.25	VOLTS/%
AC_REQ	PID	NO	NO	NO	NO	YES/NO
APP	PID	0	0	10.50	0	%
APP_MAXDIFF	PID	0	0	0	0	DEG
APP_MODE	PID	NO PEDAL	NO PEDAL	PART PEDAL	PART PEDAL	NO PEDAL/PART PEDAL
APP1 (APP_D)	PID	14.90	14.90	21.56	16.07	%
APP2 (APP_E)	PID	7.45	7.45	10.98	7.84	%
B+	PID	12.65	14.44	14.46	14.41	VOLTS
BARO	PID	3.88/97.97 (14.21)/155.19 /393.43	3.88/97.97 (14.21)/155.19 /393.43	3.87/97.97 (14.21)/155.19 /393.43	3.88/97.97 (14.21)/155.19 /393.43	VOLTS/kPa (PSI)/Hz /in-H_2 O

BRKOVR_ACTION	PID	0	0	0	0	NUMERIC VALUE
BRKOVRD_POSS	PID	111	111	112	112	NUMERIC VALUE
DECHOKE	PID	YES	NO	NO	NO	YES/NO
DIST_BRKOVRD	PID	0 (0)	0 (0)0	0 (0)	1.5 (0.93)	KM (MILES)
EQ_RAT11	PID	0/0:1	1/14.65:1	1/14.68:1	1.02/14.95:1	RATIO
ETC_ACT	PID	7.84	2.10	5.01	8.40	DEG
ETC_TRIM	PID	0.08	0.10	-0.06	-0.06	DEG
LOAD	PID	0	25.88	25.88	28.23	%
MISFIRE	PID	NO	NO	NO	NO	YES/NO
MP_LRN	PID	YES	YES	YES	YES	YES/NO
NUM_MISFIRE	PID	0	0	1	1	COUNT
O2S11_IMPED	PID	4.94	1	1.01	1.01	VOLTS
O2S11_READY	PID	NO	NO	YES	YES	YES/NO
O2S11_TR	PID	0	0	0	0	Kohm
OCTADJ_R_LRND	PID	0	0	0	0	%
RPM	PID	0	742.50	1218.25	2081.75	RPM
SYNC	PID	NO	YES	YES	YES	YES/NO
TP1_LRN_TRIM	PID	9.37	9.37	9.37	9.37	DEG
TP2_LRN_TRIM	PID	9.50	9.50	9.50	9.50	DEG
TPMODE	PID	PT	CT	PT	CT	CLOSED/PART/WIDE OPEN THROTTLE
TURBO_BP1_STAT	PID	NO FAULT	NO FAULT	NO FAULT	NO FAULT	FAULT/NO FAULT
VCT_EXH_ACT1	PID	0	-0.25	22.62	26.31	DEG
VCT_EXH_DIF1	PID	0	0.25	-0.06	-0.12	DEG
VCT_INT_ACT1	PID	0	0.18	-0.06	-0.06	DEG
VCT_INT_DIF1	PID	0	-0.18	0	0.06	DEG
VCTSYS	PID	OPEN LOOP	CLOSED LOOP	CLOSED LOOP	CLOSED LOOP	OPEN LOOP/CLOSED LOOP
VSS	PID	0	0	48 km/h (30 MPH)	89 km/h (55 MPH)	km/h/MPH

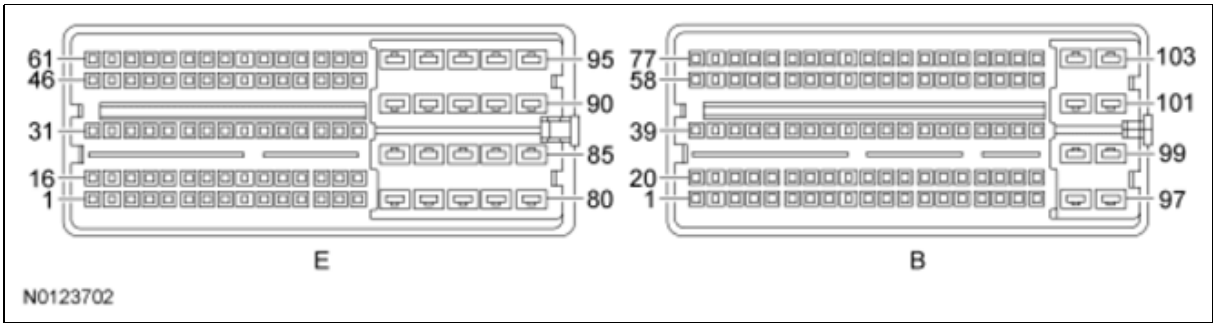
Actuators/Outputs	PCM Pin/PID Only	Measured/PID Values				Units Measured/PID
		KOEO	Hot Idle	48 KM/H (30 MPH)	89 KM/H (55 MPH)	
HTR12	B1	OFF	ON	ON	ON	ON/OFF
HTRCM12	B1	0	0	0	0	mA

EVAPCV	B20	0/OFF	0/OFF	0/OFF	0/OFF	%/ON-OFF
EVAPCP	B22	0	18.89	16.84	55.12	%
FPM	B27	39	38.99	39.97	39.01	%
VCT_INT_DC1	E1	0	0	0	0	%
TURBO_BPASS	E3	OFF	OFF	OFF	ON	ON/OFF
HTR11	E14	OFF	ON	ON	ON	ON/OFF
O2S11_HTR	E14					%
TURBO_WGATE	E16	0	0.76	0.64	0	%
VCT_EXH_DC1	E29	0	0	39.90	40.55	%
ETC [TAC_PCT]	PID	9.41	2.35	5.88	10.19	%
EVAP020C	PID	NO	NO	NO	NO	YES/NO
EVAPSOAK	PID	YES	YES	YES	YES	YES/NO
EVAPSTA	PID	NOT RUNNING	NOT RUNNING	NOT RUNNING	NOT RUNNING	STATUS
FUELSYS	PID	OPEN LOOP	CLOSED LOOP	CLOSED LOOP	CLOSED LOOP	OPEN/CLOSED LOOP
LONGFT1	PID	(I)	-20 TO +20	-20 TO +20	-20 TO +20	%
MIL	PID	OFF	OFF	OFF	OFF	ON/OFF
O2_DS_DISBL	PID	YES	YES	YES	NO	YES/NO
RO2FT1	PID	0.56	0.81	0.73	0.62	%
SHRTFT1	PID	(I)	-10 TO +10	-10 TO +10	-10 TO +10	%
SPARKADV	PID	10	8.25	34.75	29.75	DEG
TQ_CNTRL	PID	ANTI THEFT	IDLE SPEED CONTROL	NONE REQUESTED	NONE REQUESTED	STATUS

Other	PCM Pin/PID Only	Measured/PID Values				Units Measured/PID
		KOEO	Hot Idle	48 KM/H (30 MPH)	89 KM/H (55 MPH)	
VREF	B11/E6/E8	5	5	5	5	VOLTS
VPWR	B101/B102/B103	VBAT	VBAT	VBAT	VBAT	VOLTS

2.0L GTDI ESCAPE

Fig 1: 2.0L GTDI Escape PCM Connector



Courtesy of FORD MOTOR CO.

2.0L GTDI ESCAPE > TYPICAL DIAGNOSTIC REFERENCE VALUES

Sensors/Inputs	PCM Pin/PID Only	Measured/PID Values				Units Measured/PID
		KOEO	Hot Idle	48 KM/H (30 MPH)	89 KM/H (55 MPH)	
HTRCM12	B1	0	1130	720	720	mA
FPM	B27	39.99	40.40	40.40	41	%
CAC_T	B32	11 (51.80)	8 (46.40)	7 (44.60)	4 (39.20)	DEG C (DEG F)
CAC_V	B32	3.43	3.57	3.61	3.70	VOLTS
AAT	B51	-1 (30.20)	-2 (28.40)	-3 (26.60)	-4 (24.80)	DEG C (DEG F)
AAT_V	B51	4.00	4.03	4.10	4.10	VOLTS
APP2	B54	0.40	0.40	0.50	0.40	VOLTS
APP1	B55	0.79	0.79	1	0.80	VOLTS
O2S12	B57	0.37	0.74	0.67	0.63	VOLTS
BOO2	B65	OFF	OFF	OFF	OFF	ON/OFF
BOO1	B66	OFF	OFF	OFF	OFF	ON/OFF
FLP	B71	537.31 (77.93)	565.09 (81.96)	611.01 (88.62)	632.66 (91.76)	kPa (PSI)
FLP_V	B71	3.52	4.19	4.01	3.92	VOLTS
FTP	B73	2.61/0 (0)	2.23/-0.62 (-0.09)	2.29/-0.55 (-0.08)	2.52/-0.14 (-0.02)	VOLTS/kPa (PSI)
FTP_H2O	B73	-0.07	-2.76	-2.24	-0.69	in-H_2 O
TCBP	B74	100.04 (14.51)	100.39 (14.56)	101.97 (14.79)	131.55 (19.08)	kPa (PSI)
TCBP_V	B74	1.61	1.62	1.64	2.09	VOLTS
IAT	B75	2.04/32 (89.60)	2.27/27 (80.60)	3.31/5 (41.00)	3.45/2 (35.60)	VOLTS/DEG C (DEG F)

MAP	E33	1.62/99.97 (14.50)	0.58/31.99 (4.64)	0.71/39.99 (5.80)	1.31/79.98 (11.60)	VOLTS/kPa (PSI)
MAP_GAUGE	E33	4.01	277.01	244.89	84.30	in-H_2 O
ECT	E36	87 (188.60)	87 (188.60)	90 (194)	94 (201.20)	DEG C (DEG F)
FRP	E37	1.09/2989.22 (433.55)	0.84/1739.55 (252.30)	1.08/3009.22 (436.45)	1.18/3499.09 (507.50)	VOLTS/kPa (PSI)
CHT	E46	87 (188.60)	87 (188.60)	90 (194)	94 (201.20)	DEG C (DEG F)
KNOCK_2	E50	167	25	50	46	N/A
TP2	E52	1.23/24.7	0.70/13.72	0.99/19.60	1.03/20.78	VOLTS/%
O2S11_CUR	E64	(I)	switching (C)	switching (C)	switching (C)	uA
KNOCK_1	E65	167	27	53	48	N/A
TP1	E68	4.20/15.68	4.48/10.19	4.27/14.11	3.84/22.74	VOLTS/%
AC_REQ	PID	NO	NO	NO	NO	YES/NO
APP	PID	0	0	5.50	0	%
APP_MAXDIFF	PID	0	0	0	0	DEG
APP_MODE	PID	NO PEDAL	NO PEDAL	PART PEDAL	NO PEDAL	NO PEDAL/PART PEDAL
APP1 (APP_D)	PID	15.68	15.68	20	15.68	%
APP2 (APP_E)	PID	7.84	7.84	9.80	7.84	%
B+	PID	12.07	14.49	14.63	14.55	VOLTS
BARO	PID	3.95/99.97 (14.50)/157.02 /401.46	3.95/99.97 (14.50)/157.02 /401.46	3.94/99.97 (14.50)/157.02 /401.46	3.94/99.97 (14.50)/157.02 /401.46	VOLTS/kPa (PSI)/Hz /in-H_2 O
BRKOVR_ACTION	PID	0	0	0	0	NUMERIC VALUE
BRKOVRD_POSS	PID	151	151	150	150	NUMERIC VALUE
DECHOKE	PID	YES	NO	NO	NO	YES/NO
DIST_BRKOVRD	PID	1629.83 (1012.73)	1629.83 (1012.73)	1604.84 (997.20)	1606.83 (998.44)	KM (MILES)
EQ_RAT11	PID	0/0:1	1/14.62:1	1/14.62:1	1/14.64:1	RATIO
ETC_ACT	PID	7.42	1.45	3.21	11.41	DEG
ETC_TRIM	PID	0.24	0.24	0.33	0.11	DEG
FLI	PID	81.56	81.69	88.62	91.76	%
LOAD	PID	0	24.70	31.37	58.43	%
MIL_DIS	PID	0 (0)	0 (0)	0 (0)	0 (0)	KM (MILES)
MISFIRE	PID	NO	NO	NO	NO	YES/NO
MP_LRN	PID	YES	YES	YES	YES	YES/NO
NUM_MISFIRE	PID	0	0	0	0	COUNT

O2S11_IMPED	PID	4.93	1	1	1	VOLTS
O2S11_READY	PID	NO	YES	YES	YES	YES/NO
O2S11_TR	PID	0	0	0	0	Kohm
OCTADJ_R_LRND	PID	8.88	8.88	8.88	4.98	%
RPM	PID	0	698.75	1532.25	1607	RPM
SYNC	PID	NO	YES	YES	YES	YES/NO
TP1_LRN_TRIM	PID	9.25	9.25	9.25	9.25	DEG
TP2_LRN_TRIM	PID	9.25	9.37	9.37	9.37	DEG
TPMODE	PID	CT	CT	PT	PT	CLOSED/PART/WIDE OPEN THROTTLE
TURBO_BP1_STAT	PID	NO FAULT	NO FAULT	NO FAULT	NO FAULT	FAULT/NO FAULT
VCT_EXH_ACT1	PID	0	-0.06	20.31	22.37	DEG
VCT_EXH_DIF1	PID	0	0.06	-0.43	0.37	DEG
VCT_INT_ACT1	PID	0	0	0	-0.06	DEG
VCT_INT_DIF1	PID	0	0.06	0	0.06	DEG
VCTSYS	PID	OPEN LOOP	CLOSED LOOP	CLOSED LOOP	CLOSED LOOP	OPEN LOOP/CLOSED LOOP
VSS	PID	0	0	48 km/h (30 MPH)	89 km/h (55 MPH)	km/h/MPH

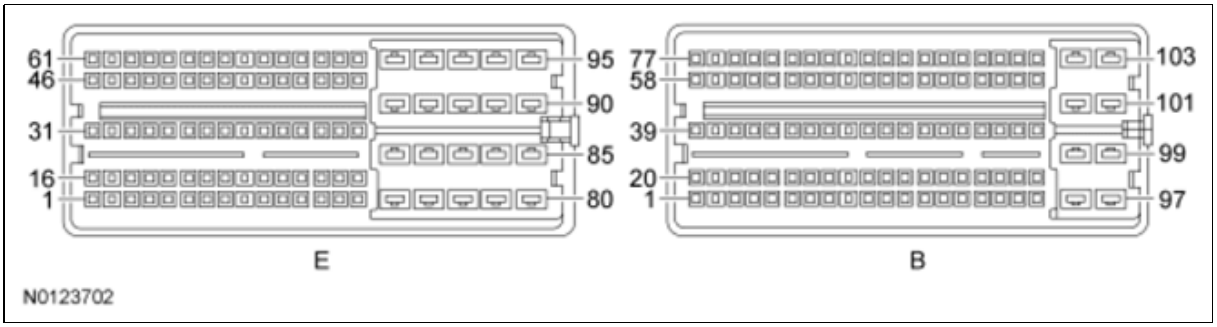
Actuators/Outputs	PCM Pin/PID Only	Measured/PID Values				Units Measured/PID
		KOEO	Hot Idle	48 KM/H (30 MPH)	89 KM/H (55 MPH)	
HTR12	B1	OFF	ON	ON	ON	ON/OFF
EVAPCV	B20	0/OFF	0/OFF	0/OFF	0/OFF	%/ON-OFF
EVAPCP	B22	0	28.06	30.35	96.19	%
FP	B39	75/OFF	22.07/ON	22.18/ON	21.93/ON	%/ON/OFF
VCT_INT_DC1	E1	0	0	0	0	%
TURBO_BPASS	E3	OFF	OFF	ON	OFF	ON/OFF
O2S11_HTR	E14	0	37.25	30.98	30.19	%
TURBO_WGATE	E16	0	0.84	1.91	0	%
VCT_EXH_DC1	E29	0	0	38.48	40.68	%
HTR11	E64	OFF	ON	ON	ON	ON/OFF
ETC [TAC_PCT]	PID	9.41	1.56	3.52	13.72	%
EVAP020C	PID	NO	NO	NO	NO	YES/NO
EVAPSOAK	PID	NO	NO	YES	YES	YES/NO

EVAPSTA	PID	NOT RUNNING	NOT RUNNING	NOT RUNNING	NOT RUNNING	STATUS
FAN_DSD	PID	7.49	7.49	7.49	7.49	%
FUELSYS	PID	OPEN LOOP	CLOSED LOOP	CLOSED LOOP	CLOSED LOOP	OPEN/CLOSED LOOP
GRILL_A_CMD	PID	0/CLOSED	0/OPEN	100/CLOSED	100/CLOSED	%/OPEN /CLOSED
GRILL_A_INF	PID	0	0	0	0	%
GRILL_CMDCAL	PID	NO	YES	YES	YES	YES/NO
LONGFT1	PID	(I)	-20 TO +20	-20 TO +20	-20 TO +20	%
MIL	PID	OFF	OFF	OFF	OFF	ON/OFF
O2_DS_DISBL	PID	YES	NO	NO	NO	YES/NO
RO2FT1	PID	0	0.67	1.66	1	%
SHRTFT1	PID	(I)	-10 TO +10	-10 TO +10	-10 TO +10	%
SPARKADV	PID	10	7.50	32.75	29	DEG
TQ_CNTRL	PID	ANTI THEFT	IDLE SPEED CONTROL	NONE REQUESTED	CRUISE CONTROL	STATUS

		Measured/PID Values				
Other	PCM Pin/PID Only	KOEO	Hot Idle	48 KM/H (30 MPH)	89 KM/H (55 MPH)	Units Measured/PID
VREF	B11/B13/E6/E8	5	5	5	5	VOLTS
VPWR	B101/B102/B103	11.85	14.35	14.85	14.82	VOLTS

2.0L GTDI MKC

Fig 1: 2.0L GTDI MKC PCM Connector



Courtesy of FORD MOTOR CO.

2.0L GTDI MKC > TYPICAL DIAGNOSTIC REFERENCE VALUES

Sensors/Inputs	PCM Pin/PID Only	Measured/PID Values				Units Measured/PID
		KOEO	Hot Idle	48 KM/H (30 MPH)	89 KM/H (55 MPH)	
HTRCM12	B1	0	537	537	537	mA
FPM	B27	39.99	40.4	40.99	40.4	%
CAC_T	B32	20 (68)	16 (60.8)	6 (42.8)	21 (69.8)	DEG C (DEG F)
CAC_V	B32	2.68	2.91	3.35	2.65	VOLTS
KEYST	B48	ON	ON	ON	ON	ON/OFF
AAT	B51	10 (50)	12 (53.6)	4 (39.2)	3 (37.4)	DEG C (DEG F)
AAT_V	B51	3.49	3.41	3.77	3.84	VOLTS
APP2	B54	0.39	0.39	0.56	0.56	VOLTS
APP1	B55	0.78	0.78	1.11	1.11	VOLTS
O2S12	B56	(I)	switching (D)	switching (D)	switching (D)	VOLTS
BOO2	B65	OFF	OFF	OFF	OFF	ON/OFF
BOO1	B66	OFF	OFF	OFF	OFF	ON/OFF
FLP	B71	692 (100.37)	643.5 (93.33)	547 (79.34)	523 (75.85)	kPa (PSI)
FLP_V	B71	4.45	4.16	3.57	3.43	VOLTS
FTP	B73	2.611-5 (0)	2.46/-272 (-0.04)	2.46/-272 (-0.04)	2.57/-82 (-0.01)	VOLTS/Pa (PSI)
FTP_H2O	B73	-0.03	-1.10	0.23	-0.34	in-H_2 O
TCBP	B74	98.19 (14.24)	98.51 (14.29)	99.80 (14.47)	107.20 (15.55)	kPa (PSI)
TCBP_V	B74	1.58	1.59	1.61	1.72	VOLTS
IAT	B75	2.5/24 (75.2)	2.41/25 (77)	3.12/11 (51.8)	3.18/10 (50)	VOLTS/DEG C (DEG F)
MAP	E33	1.58/97 (14.07)	0.64/35 (5.08)	0.72/41 (5.95)	1.59/98 (14.21)	VOLTS/kPa (PSI)
MAP_GAUGE	E33	4 (0.58)	66 (9.57)	60 (8.70)	3 (0.44)	kPa (PSI)
ECT	E36	0.74/82 (179.6)	0.69/85 (185)	0.63/88 (190.4)	0.63/88 (190.4)	VOLTS/DEG C (DEG F)
FRP	E37	1.75/6.28 (910.84)	1.24/3.84 (556.94)	1.62/5.82 (844.12)	1.66/6.02 (873.13)	VOLTS/MPa (PSI)
KNOCK_2	E50	167	34	25	58	N/A
TP2	E52	0.84/16.86	0.55/10.98	0.76/14.90	0.75/14.90	VOLTS/%
O2S11_CUR	E64	(I)	switching	switching	switching	mA/uA
KNOCK_1	E65	167	28	29	67	N/A
TP1	E68	4.16/16.47	4.44/10.98	4.24/14.90	4.25/14.51	VOLTS/%

AC_REQ	PID	NO	NO	NO	NO	YES/NO
APP	PID	0	0	13.5	15.5	%
APP_MAXDIFF	PID	0	0	-0.06	0	DEG
APP_MODE	PID	NO PEDAL	NO PEDAL	PART PEDAL	PART PEDAL	NO PEDAL/PART PEDAL
APP1 (APP_D)	PID	15.29	15.29	21.96	21.96	%
APP2 (APP_E)	PID	7.84	7.84	10.98	11.37	%
B+	PID	12.29	14.74	14.69	14.69	VOLTS
BARO	PID	3.86/97 (14.07)/154.28	3.86/97 (14.07)/154.28	3.85/97 (14.07)/154.28	3.85/97 (14.07)/154.28	VOLTS/kPa (PSI)/Hz/inHg
BRKOVR_ACTION	PID	0	0	0	0	NUMERIC VALUE
BRKOVRD_POSS	PID	193	193	194	194	NUMERIC VALUE
DECHOKE	PID	YES	NO	NO	NO	YES/NO
DIST_BRKOVRD	PID	3959.54 (2460.34)	3959.54 (2460.34)	3959.54 (2460.34)	3961.03 (2461.27)	KM (MILES)
EQ_RAT11	PID	0/0:1	0/0:1	0.99/14.54:1	1.02/14.98:1	RATIO
ETC_ACT	PID	7.88	3.05	6.15	22.61	DEG
ETC_TRIM	PID	0.64	0.63	0.59	0.59	DEG
FLI	PID	83.52 (H)	82.74 (H)	90.19 (H)	90.19 (H)	%
LOAD	PID	0.00 (I)	27.84	25.49	61.96	%
MISFIRE	PID	NO	NO	NO	NO	YES/NO
MP_LRN	PID	YES	YES	YES	YES	YES/NO
NUM_MISFIRE	PID	0	0	0	0	COUNT
O2S11_IMPED	PID	4.93	1.01	1.01	1.01	VOLTS
O2S11_READY	PID	NO	YES	YES	YES	YES/NO
O2S11_TR	PID	0	0	0	0	Kohm
OCTADJ_R_LRND	PID	45.83	45.83	45.83	45.83	%
RPM	PID	0	795.5	1986.25	1730	RPM
SYNC	PID	NO	YES	YES	YES	YES/NO
TP1_LRN_TRIM	PID	9.37	9.12	9.12	9.12	DEG
TP2_LRN_TRIM	PID	9.62	9.37	9.37	9.37	DEG
TPMODE	PID	PT	CT	CT	PT	CLOSED/PART/WIDE OPEN THROTTLE
TURBO_BP1_STAT	PID	NO FAULT	NO FAULT	NO FAULT	NO FAULT	FAULT/NO FAULT
VCTSYS	PID	OPEN LOOP	CLOSED LOOP	CLOSED LOOP	CLOSED LOOP	OPEN LOOP/CLOSED LOOP

VCT_EXH_ACT1	PID	0	-0.25	0	18.68	DEG
VCT_EXH_DIF1	PID	0	0.25	0	2.12	DEG
VCT_INT_ACT1	PID	0	-0.25	-0.06	-0.12	DEG
VCT_INT_DIF1	PID	0	0.25	0	0.12	DEG
VSS	PID	0	0	48 km/h (30 MPH)	89 km/h (55 MPH)	km/h/MPH

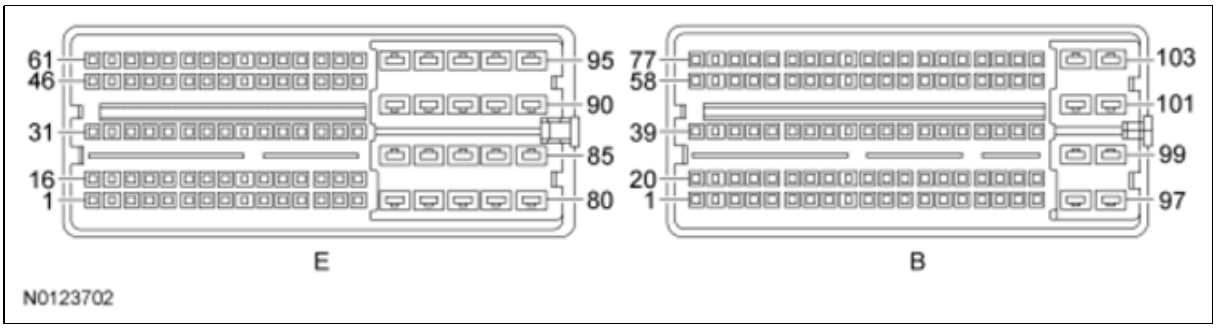
Actuators/Outputs	PCM Pin/PID Only	Measured/PID Values				Units Measured/PID
		KOEO	Hot Idle	48 KM/H (30 MPH)	89 KM/H (55 MPH)	
HTR12	B1	OFF	ON	ON	ON	VOLTS/ON/OFF
HFC	B4	OFF	OFF	OFF	OFF	ON/OFF
EVAPCV	B20	0/OFF	0/OFF	0/OFF	0/OFF	%/ON-OFF
EVAPCP	B22	0	6.44	62.98	8.93	%
LFC	B23	OFF	OFF	OFF	OFF	ON/OFF
FP	B39	75/OFF	23.11/ON	23.45/ON	22.85/ON	%/ON/OFF
MFC	B78	OFF	OFF	OFF	OFF	ON/OFF
VCT_INT_DC1	E1	0	0	0	0	%
TURBO_BPASS	E3	OFF	OFF	OFF	ON	ON/OFF
HTR11	E14	OFF	ON	ON	ON	VOLTS/ON/OFF
O2S11_HTR	E14	0	34.51	29.02	23.13	%
TURBO_WGATE	E16	0	0	0	0	%
VCT_EXH_DC1	E29	0	0	0	39.71	%
ETC [TAC_PCT]	PID	9.41	3.52	7.45	23.52	%
EVAP020C	PID	NO	NO	NO	NO	YES/NO
EVAPSOAK	PID	NO	NO	NO	NO	YES/NO
EVAPSTA	PID	NOT RUNNING	NOT RUNNING	NOT RUNNING	NOT RUNNING	STATUS
FUELSYS	PID	OPEN LOOP	CLOSED LOOP	CLOSED LOOP	CLOSED LOOP	OPEN LOOP/CLOSED LOOP
INJ1-4_OFF	PID	--	--	--	--	--/DISABLE
LONGFT1	PID	(I)	-20 TO +20	-20 TO +20	-20 TO +20	%
MIL	PID	OFF	OFF	OFF	OFF	ON/OFF
O2_DS_DISBL	PID	YES	NO	NO	NO	YES/NO
RO2FT1	PID	0	0.62	-1.23	0	%
SHRTFT1	PID	(I)	-10 TO +10	-10 TO +10	-10 TO +10	%

SPARKADV	PID	10	11.5	27	-2.25	DEG
TQ_CNTRL	PID	NONE REQUESTED	IDLE SPEED CONTROL	TORQUE BASED DECEL	NONE REQUESTED	STATUS

Other	PCM Pin/PID Only	Measured/PID Values				Units Measured/PID
		KOEO	Hot Idle	48 KM/H (30 MPH)	89 KM/H (55 MPH)	
VPWR	B101/B102 B103	VBAT	VBAT	VBAT	VBAT	VOLTS
VREF	B11/E6 E8	5	5	5	5	VOLTS

1.5L GTDI FUSION

Fig 1: 1.5L GTDI Fusion PCM Connector



Courtesy of FORD MOTOR CO.

1.5L GTDI FUSION > TYPICAL DIAGNOSTIC REFERENCE VALUES

Sensors/Inputs	PCM Pin/PID Only	Measured/PID Values				Units Measured/PID
		KOEO	Hot Idle	48 KM/H (30 MPH)	89 KM/H (55 MPH)	
HTRCM12	B1	0	1.74	1.74	1.74	A
FPM	B27	39.99	40.39	40	40.99	%
CAC_T	B32	47 (116.6)	39 (102.2)	49 (120.2)	46 (114.8)	DEG C (DEG F)
CAC_V	B32	1.29	4.53	1.21	1.30	VOLTS
KEYST	B48	ON	ON	ON	ON	ON/OFF
AAT	B51	26 (78.8)	32 (89.6)	28 (82.4)	25 (77)	DEG C (DEG F)
AAT_V	B51	2.68	2.38	2.60	2.72	VOLTS
APP2	B54	0.41	0.40	0.46	0.64	VOLTS
APP1	B55	0.81	0.81	0.92	1.27	VOLTS

O2S12	B57	(I)	switching (D)	switching (D)	switching (D)	VOLTS
BOO2	B65	OFF	OFF	OFF	OFF	ON/OFF
BOO1	B66	OFF	OFF	OFF	OFF	ON/OFF
FLP	B71	684.50 (99.28)	563 (81.66)	592 (85.86)	606 (87.89)	kPa (PSI)
FLP_V	B71	4.43	3.78	3.84	3.81	VOLTS
FTP	B73	2.64/46 (0.01)	2.27/-607 (-0.09)	2.08/-950 (-0.14)	2.15/-830 (-0.12)	VOLTS/Pa (PSI)
FTP_H2O	B73	0.17	-3.34	-3.86	-3.34	in-H_2 O
MAP	B74	1.60/99 (14.36)	0.66/37 (5.37)	0.85/50 (7.25)	0.86/49 (7.11)	VOLTS/kPa (PSI)
MAP_GAUGE	B74	2 (0.29)	64 (9.28)	51 (7.40)	52 (7.54)	kPa (PSI)
IAT	B75	1.41/49 (120.2)	1.92/34 (93.2)	1.94/34 (93.2)	2.08/31 (87.8)	VOLTS/DEG C (DEG F)
B+	B100	12.26	12.70	12.98	14.46	VOLTS
CACCT	E23	38 (100.4)	41 (105.8)	39 (102.2)	32 (89.6)	DEG C (DEG F)
CACCT_V	E23	2.39	2.24	2.34	2.69	VOLTS
TCBP	E33	99.71 (14.46)	100.02 (14.51)	100.02 (14.51)	100.64 (14.60)	kPa (PSI)
TCBP_V	E33	1.55	1.55	1.55	1.56	VOLTS
IAT2	E34	1.88/54 (129.2)	2/51 (123.8)	2/51 (123.8)	1.64/61 (141.8)	VOLTS/DEG C (DEG F)
ECT	E36	0.59/90 (194)	0.51/95 (203)	0.66/86 (186.8)	0.60/90 (194)	VOLTS/DEG C (DEG F)
FRP	E37	2.17/11.74 (1702.74)	1.05/3.91 (567.10)	1.67/8.36 (1212.52)	1.31/5.76 (835.41)	VOLTS/MPa (PSI)
KNOCK_2	E50	167	136	141	140	N/A
TP2	E52	0.96/19.21	0.57/11.37	0.90/18.03	1.43/28.23	VOLTS/%
O2S11_CUR	E63	0.00 (I)	switching	switching	switching	mA/uA
KNOCK_1	E65	167	123	147	153	N/A
TP1	E68	4.06/18.43	4.45/10.58	4.12/17.25	3.59/27.84	VOLTS/%
AC_REQ	PID	NO	NO	NO	NO	YES/NO
APP	PID	0	0	3	19	%
APP_MODE	PID	NO PEDAL	NO PEDAL	PART PEDAL	PART PEDAL	NO PEDAL/PART PEDAL
APP1 (APP_D)	PID	16.07	16.07	18.03	25.49	%
APP2 (APP_E)	PID	8.23	7.84	9.02	12.54	%
APP_MAXDIFF	PID	0	0	0	-0.06	DEG

BARO	PID	3.93/99 (14.36)/156.11	3.93/99 (14.36)/156.11	3.92/99 (14.36)/156.11	3.92/99 (14.36)/156.11	VOLTS/kPa (PSI)/Hz/
BRKOVRD_POSS	PID	4	3	4	4	NUMERIC VALUE
BRKOVR_ACTION	PID	0	0	0	0	NUMERIC VALUE
DECHOKE	PID	YES	NO	NO	NO	YES/NO
DIST_BRKOVRD	PID	34.97 (21.73)	7.99 (4.96)	15.49 (9.63)	13.49 (8.38)	KM (MILES)
EQ_RAT11	PID	0/0:1	0.99/14.48:1	0.99/14.47:1	1.01/14.72:1	RATIO
ETC_ACT	PID	10.44	1.99	9.24	9.24	DEG
ETC_TRIM	PID	0.42	0.09	0.10	0.10	DEG
FLI	PID	46.27 (H)	54.90 (H)	54.11 (H)	49.02 (H)	%
KNK_CNTR_CYL1	PID	0	0	0	0	COUNT
KNK_CNTR_CYL2	PID	0	0	0	0	COUNT
KNK_CNTR_CYL3	PID	0	0	0	0	COUNT
KNK_CNTR_CYL4	PID	0	0	0	0	COUNT
LOAD	PID	0.00 (I)	29.41	35.68	32.15	%
MISFIRE	PID	NO	NO	NO	NO	YES/NO
MP_LRN	PID	YES	YES	YES	YES	YES/NO
NUM_MISFIRE	PID	0	0	0	0	COUNT
O2S11_IMPED	PID	4.93	1	1	1	VOLTS
O2S11_READY	PID	NO	YES	YES	YES	YES/NO
O2S11_TR	PID	0	0	0	0	Kohm
OCTADJ_R_LRND	PID	22.28	22.28	22.28	22.28	%
RPM	PID	0	782.50	1841.50	1669.75	RPM
SYNC	PID	NO	YES	YES	YES	YES/NO
TP1_LRN_TRIM	PID	9.37	9.37	9.37	9.37	DEG
TP2_LRN_TRIM	PID	9.87	9.87	9.87	9.87	DEG
TPMODE	PID	CT	CT	PT	PT	CLOSED/PART/WIDE OPEN THROTTLE
TURBO_BP1_STAT	PID	NO FAULT	NO FAULT	NO FAULT	NO FAULT	FAULT/NO FAULT
TURBO_INLET	PID	NO FAULT	NO FAULT	NO FAULT	NO FAULT	FAULT/NO FAULT
VCTSYS	PID	OPEN LOOP	CLOSED LOOP	CLOSED LOOP	CLOSED LOOP	OPEN LOOP/CLOSED LOOP
VCT_EXH_ACT1	PID	0	-0.12	27.43	21.75	DEG
VCT_EXH_DIF1	PID	0	0.12	0.50	-1.31	DEG
VCT_INT_ACT1	PID	0	-0.12	-0.31	-0.25	DEG

VCT_INT_DIF1	PID	0	0.12	0.31	0.25	DEG
VSS	PID	0	0	48 km/h (30 MPH)	89 km/h (55 MPH)	km/h/MPH

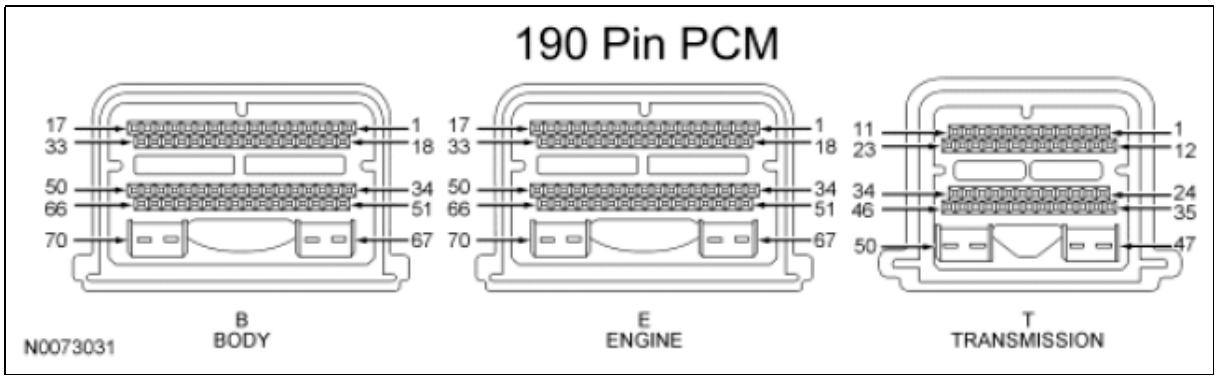
Actuators/Outputs	PCM Pin/PID Only	Measured/PID Values				Units Measured/PID
		KOEO	Hot Idle	48 KM/H (30 MPH)	89 KM/H (55 MPH)	
HTR12	B1	OFF	ON	ON	ON	ON/OFF
HFC	B4	OFF	OFF	OFF	OFF	ON/OFF
EVAPCV	B20	0/OFF	0/OFF	0/OFF	0/OFF	%/ON-OFF
EVAPCP	B22	0	44.31	97.48	97.51	%
FP	B39	75/OFF	35.35/ON	32.20/ON	32.42/ON	%/ON/OFF
VCT_INT_DC1	E1	0	0	0	0	%
TURBO_BPASS	E3	OFF	OFF	OFF	OFF	ON/OFF
HTR11	E14	OFF	ON	ON	ON	ON/OFF
O2S11_HTR	E14	0	54.41	37.64	35.29	%
TURBO_WGATE	E16	29.49	100	26.95	26.82	%
VCT_EXH_DC1	E29	0	0	46.59	43.76	%
AEIS_ACTION	PID	0	0	0	0	NUMERIC VALUE
AEIS_POSS	PID	0	0	0	0	NUMERIC VALUE
ETC [TAC_PCT]	PID	9.80	2.35	11.37	11.37	%
EVAP020C	PID	NO	NO	NO	NO	YES/NO
EVAPSOAK	PID	NO	NO	NO	NO	YES/NO
EVAPSTA	PID	NOT RUNNING	NOT RUNNING	NOT RUNNING	NOT RUNNING	STATUS
FUELSYS	PID	OPEN LOOP	CLOSED LOOP	CLOSED LOOP	CLOSED LOOP	OPEN LOOP/CLOSED LOOP
INJ1-4_OFF	PID	--	--	--	--	--/DISABLE
LFC	PID	OFF	OFF	ON	ON	ON/OFF
LONGFT1	PID	(I)	-20 TO +20	-20 TO +20	-20 TO +20	%
MIL	PID	OFF	OFF	OFF	OFF	ON/OFF
O2_DS_DISBL	PID	YES	NO	NO	NO	YES/NO
RO2FT1	PID	0	-1.52	-1.47	1.50	%
SHRTFT1	PID	(I)	-10 TO +10	-10 TO +10	-10 TO +10	%
SPARKADV	PID	10	-3.50	33.25	30	DEG

TQ_CNTRL	PID	NONE REQUESTED	IDLE SPEED CONTROL	NONE REQUESTED	NONE REQUESTED	STATUS

Other	PCM Pin/PID Only	Measured/PID Values				Units Measured/PID
		KOEO	Hot Idle	48 KM/H (30 MPH)	89 KM/H (55 MPH)	
VREF	B11/B13 E6/E8	5	5	5	5	VOLTS
VPWR	B101/B102/B103	VBAT	VBAT	VBAT	VBAT	VOLTS

2.5L 4V FUSION

Fig 1: 2.5L 4V Fusion PCM Connector



Courtesy of FORD MOTOR CO.

2.5L 4V FUSION > TYPICAL DIAGNOSTIC REFERENCE VALUES

Sensors/Inputs	PCM Pin/PID Only	Measured/PID Values				Units Measured/PID
		KOEO	Hot Idle	48 KM/H (30 MPH)	89 KM/H (55 MPH)	
BOO1	B13	OFF	OFF	OFF	OFF	ON/OFF
AAT	B17	7 (44.60)	6 (42.80)	3 (37.40)	3 (37.40)	DEG C (DEG F)
AAT_V	B17	3.64	3.69	3.83	3.82	VOLTS
FPM	B19	40.79	40.32	40.32	40.32	%
APP1	B28	0.77	0.77	0.98	1.30	VOLTS
APP2	B29	0.38	0.38	0.49	0.65	VOLTS
MAF	B40	0	3.17	7.32	15.60	g/s
MAF_HZ	B40	0.66	2.37	3.24	4.38	kHz
BOO2	B46	OFF	OFF	OFF	OFF	ON/OFF

IAT	B47	3.60/13 (55.40)	3.72/10 (50)	3.88/6 (42.80)	3.92/5 (41)	VOLTS/DEG C (DEG F)
B+	B62	12.92	14.32	14.52	14.42	VOLTS
FTP	B65	0/-4.55 (-0.66)	0/-4.55 (-0.66)	0/-4.55 (-0.66)	0/-4.55 (-0.66)	VOLTS/kPa (PSI)
O2S11_CUR	E37	(D)	switching (A)	switching (A)	switching (A)	uA
CHT	E39	0.65/87 (188.60)	0.69/84 (183.20)	3.77/88 (190.40)	3.71/90 (194)	VOLTS/DEG C (DEG F)
MAP	E40	4.05/99.97 (14.50)	1.30/31.99 (4.64)	1.14/33.99 (4.93)	2.52/61.98 (8.99)	VOLTS/kPa (PSI)
MAP_GAUGE	E40	4.01	277.01	268.98	156.57	in-H_2 O
TP1	E41	4.09/18.03	4.34/12.94	4.14/16.86	3.90/21.56	VOLTS/%
KNOCK_1	E43	258	269	334	359	N/A
TP2	E58	1.23/24.70	0.74/14.90	1.03/22.35	1.60/31.76	VOLTS/%
HTRCM11	E69	0	2.53	2.61	2.61	AMPS
O2S12	T29	0.06 (B)	0.82 (B)	0.48 (B)	0.65 (B)	VOLTS
HTRCM12	T49	0	702	705	705	mA
AC_REQ	PID	NO	NO	NO	NO	YES/NO
APP	PID	0	0	7	16.50	%
APP_MAXDIFF	PID	0	0	0	-0.06	DEG
APP_MODE	PID	NO PEDAL	NO PEDAL	PART PEDAL	PART PEDAL	NO PEDAL/PART PEDAL
APP1 (APP_D)	PID	15.29	15.29	20	25.88	%
APP2 (APP_E)	PID	7.45	7.45	9.80	12.94	%
BARO	PID	99.97 (14.50)/157.02 /401.46	99.97 (14.50)/157.02 /401.46	99.97 (14.50)/157.02 /401.46	99.97 (14.50)/157.02 /401.46	kPa (PSI)/Hz/in-H_2 O
BRKOVR_ACTION	PID	0	0	0	0	NUMERIC VALUE
BRKOVRD_POSS	PID	3	3	4	4	NUMERIC VALUE
DECHOKE	PID	YES	NO	NO	NO	YES/NO
DIST_BRKOVRD	PID	10.49 (6.52)	10.49 (6.52)	14.98 (9.31)	13.49 (8.38)	KM (MILES)
EQ_RAT11	PID	0/0:1	1/14.70:1	1.03/15.14:1	1.01/14.82:1	RATIO
ETC_ACT	PID	7.99	2.54	7.03	9.45	DEG
ETC_TRIM	PID	-0.02 (E)	-0.02 (E)	-0.02 (E)	-0.02 (E)	DEG
FLI	PID	81.56 (C)	81.56 (C)	74.51 (C)	77.64 (C)	%
INJPWR_M	PID	12.91	14.42	14.47	14.47	VOLTS
LOAD	PID	0 (D)	25.09	30.58	58.43	%
MISFIRE	PID	NO	NO	NO	NO	YES/NO

MP_LRN	PID	YES	YES	YES	YES	YES/NO
NUM_MISFIRE	PID	0	0	0	0	COUNT
O2S11_IMPED	PID	5	0.09	0.09	0.09	VOLTS
O2S11_READY	PID	NO	YES	YES	YES	YES/NO
O2S11_TR	PID	61.20	61.20	60.60	60.60	Kohm
RPM	PID	0	772	1914.50	1798.50	RPM
SYNC	PID	NO	YES	YES	YES	YES/NO
TPMODE	PID	CT	CT	PT	PT	CLOSED/PART/WIDE OPEN THROTTLE
VCTSYS	PID	OPEN LOOP	CLOSED LOOP	CLOSED LOOP	CLOSED LOOP	OPEN LOOP/CLOSED LOOP
VSS	PID	0	0	48 km/h (30 MPH)	89 km/h (55 MPH)	km/h/MPH

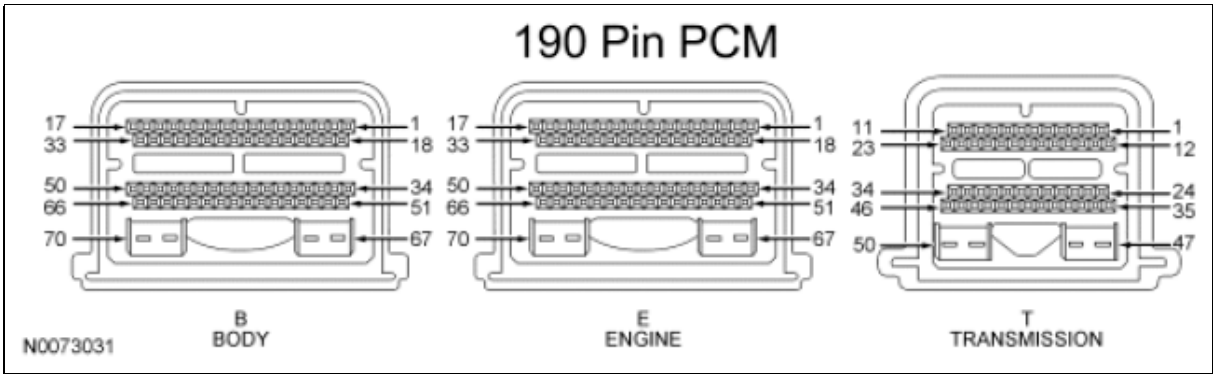
Actuators/Outputs	PCM Pin/PID Only	Measured/PID Values				Units Measured/PID
		KOEO	Hot Idle	48 KM/H (30 MPH)	89 KM/H (55 MPH)	
FP	B19	OFF	ON	ON	ON	ON/OFF
EVAPCV	B20	0/OFF	0/OFF	0/OFF	0/OFF	%/ON-OFF
EGRMC1F	E14	NO FAULT	NO FAULT	NO FAULT	NO FAULT	FAULT/NO FAULT
EGRMC2F	E15	NO FAULT	NO FAULT	NO FAULT	NO FAULT	FAULT/NO FAULT
EGRMC3F	E16	NO FAULT	NO FAULT	NO FAULT	NO FAULT	FAULT/NO FAULT
EGRMC4F	E17	NO FAULT	NO FAULT	NO FAULT	NO FAULT	FAULT/NO FAULT
EVAPCP	E32	0	10.73	12.80	77.58	%
VCTDC	E67	0	0	0	0	%
HTR11	E69	OFF	ON	ON	ON	ON/OFF
O2S11_HTR	E69	20	31.37	24.70	25.09	%
HTR12	T49	OFF	ON	ON	ON	ON/OFF
EGR_STEP	PID	0	0	12	31	POSITION
EGRPCT	PID	0	0	22.74	59.60	%
ETC [TAC_PCT]	PID	9.41	2.74	8.23	11.37	%
EVAP020C	PID	NO	NO	NO	NO	YES/NO
EVAPSOAK	PID	NO	NO	NO	NO	YES/NO

FUELSYS	PID	OPEN LOOP	CLOSED LOOP	CLOSED LOOP	CLOSED LOOP	OPEN/CLOSED LOOP
LONGFT1	PID	(D)	-20 TO +20	-20 TO +20	-20 TO +20	%
MIL	PID	OFF	OFF	OFF	OFF	ON/OFF
O2_DS_DISBL	PID	YES	NO	NO	NO	YES/NO
RO2FT1	PID	0	-0.47	2.06	-0.70	%
SHRTFT1	PID	(D)	-10 TO +10	-10 TO +10	-10 TO +10	%
SPARKADV	PID	29.50	12.75	45.50	38	DEG
TQ_CNTRL	PID	ANTI-THEFT	IDLE SPEED CONTROL	NONE REQUESTED	NONE REQUESTED	STATUS
VCTADV	PID	0	-0.37	-0.18	0	DEG
VCTADVERR	PID	0	0.37	0.18	0.12	DEG

Other	PCM Pin/PID Only	Measured/PID Values				Units Measured/PID
		KOEO	Hot Idle	48 KM/H (30 MPH)	89 KM/H (55 MPH)	
VREF	B45/B52/B61/B66 /E35/E57	5	5	5	5	VOLTS
VPWR	B67/B68	VBAT	VBAT	VBAT	VBAT	VOLTS

3.7L TIVCT MKZ

Fig 1: 3.7L TIVCT MKZ PCM Connector



Courtesy of FORD MOTOR CO.

3.7L TIVCT MKZ > TYPICAL DIAGNOSTIC REFERENCE VALUES

Sensors/Inputs	PCM	Measured/PID Values	Units Measured/PID

	Pin/PID Only					
		KOEO	Hot Idle	48 KM/H (30 MPH)	89 KM/H (55 MPH)	
BOO1	B13	OFF	OFF	OFF	OFF	ON/OFF
AAT	B17	40 (104)	40 (104)	29 (84.20)	25 (77)	DEG C (DEG F)
AAT_V	B17	1.94	1.97	2.50	2.69	VOLTS
APP1	B28	0.80	0.80	0.80	0.80	VOLTS
APP2	B29	0.40	0.40	0.40	0.39	VOLTS
FPM	B32	41	40.97	40.41	40.01	%
MAF	B40	0	3.60	12.66	30.65	g/s
BOO2	B46	OFF	OFF	OFF	OFF	ON/OFF
IAT	B47	1.18/55 (131)	1.25/52 (125.60)	1.97/33 (91.40)	2.08/31 (87.80)	VOLTS/DEG C (DEG F)
B+	B62	12.69	14.09	14.27	14.22	VOLTS
FTP	B65	2.62/0 (0)	2.59/0 (0)	2.58/0 (0)	2.17/-0.76 (-0.11)	VOLTS/kPa (PSI)
FTP_H2O	B65	0.03	-0.28	-0.28	-3.14	in-H_2 O
O2S11_CUR	E23	(I)	switching (C)	switching (C)	switching (C)	uA
O2S21_CUR	E24	(I)	switching (C)	switching (C)	switching (C)	uA
CHT	E39	0.59/88 (190.40)	0.60/87 (188.60)	3.21/101 (213.80)	3.28/99 (210.20)	VOLTS/DEG C (DEG F)
TP1	E41	4.10/17.64	4.33/13.33	4.19/15.68	4.14/16.86	VOLTS/%
KNOCK_1	E43	154	177	238	230	N/A
TP2	E58	1.23/24.70	0.76/15.29	1.03/20.39	1.14/22.74	VOLTS/%
KNOCK_2	E60	116	107	257	260	N/A
O2S12	T29	0.84	0.89	0.82	0.75	VOLTS
O2S22	T40	0.18	0.89	0.78	0.72	VOLTS
HTRCM22	T48	0	705	732	732	mA
HTRCM12	T49	0	683	705	705	mA
AC_REQ	PID	NO	NO	NO	NO	YES/NO
APP	PID	0	0	0	0	%
APP_MAXDIFF	PID	0	0	0	0	DEG
APP_MODE	PID	NO PEDAL	NO PEDAL	PART PEDAL	NO PEDAL	NO PEDAL/PART PEDAL
APP1 (APP_D)	PID	16.07	16.07	16.07	15.68	%
APP2 (APP_E)	PID	7.84	7.84	7.84	7.84	%

BARO	PID	94.94 (13.77)/152.45 /381.39	94.94 (13.77)/152.45 /381.39	94.94 (13.77)/152.45 /381.39	94.94 (13.77)/152.45 /381.39	kPa (PSI)/Hz/in-H_2 O
BRKOVR_ACTION	PID	1	1	1	1	NUMERIC VALUE
BRKOVRD_POSS	PID	12	12	12	12	NUMERIC VALUE
DECHOKE	PID	YES	NO	NO	NO	YES/NO
DIST_BRKOVRD	PID	31.48 (19.56)	31.48 (19.56)	31.48 (19.56)	33.47 (20.80)	KM (MILES)
EONV_RDY	PID	NOT READY	NOT READY	NOT READY	NOT READY	READY/NOT READY
EQ_RAT11	PID	0/0:1	0.99/14.54:1	1.01/14.83:1	0.99/14.43:1	RATIO
EQ_RAT21	PID	0/0:1	1/14.59:1	0.99/14.48:1	0.98/14.41:1	RATIO
ETC_ACT	PID	8.05	2.26	5.03	11.64	DEG
ETC_TRIM	PID	0.38	0.38	0.37	0.37	DEG
FLI	PID	98.43	98.43	98.43	98.43	%
INJPWR_M	PID	12.76	14.03	14.28	14.20	VOLTS
LOAD	PID	0	34.51	47.05	81.96	%
MISFIRE	PID	NO	NO	NO	NO	YES/NO
MP_LRN	PID	YES	YES	YES	YES	YES/NO
NUM_MISFIRE	PID	0	0	0	0	COUNT
O2S11_IMPED	PID	5	0.09	0.09	0.09	VOLTS
O2S11_READY	PID	NO	YES	YES	YES	YES/NO
O2S11_TR	PID	23.40	23.40	23.40	23.40	Kohm
O2S21_IMPED	PID	5	0.09	0.09	0.09	VOLTS
O2S21_READY	PID	NO	YES	YES	YES	YES/NO
O2S21_TR	PID	42.60	42.60	42.60	42.60	Kohm
RPM	PID	0	601.25	1282	1772.25	RPM
SYNC	PID	YES	YES	YES	YES	YES/NO
TP1_LRN_TRIM	PID	15	15	15	15	DEG
TP2_LRN_TRIM	PID	7.75	7.75	7.75	7.75	DEG
TPMODE	PID	PT	CT	PT	PT	CLOSED/PART/WIDE OPEN THROTTLE
VCT_EXH_ACT1	PID	0	0.06	22.31	0.87	DEG
VCT_EXH_ACT2	PID	0	-0.06	21.87	0.62	DEG
VCT_EXH_DIF1	PID	0	-0.06	-0.25	-1	DEG
VCT_EXH_DIF2	PID	0	0.06	0.06	-0.62	DEG
VCT_INT_ACT1	PID	0	0	-9.62	-10.31	DEG
VCT_INT_ACT2	PID	0	-0.12	-9.87	-9.93	DEG

VCT_INT_DIF1	PID	0	0	-0.37	0.31	DEG
VCT_INT_DIF2	PID	0	0.12	-0.18	0	DEG
VSS	PID	0	0	48 km/h (30 MPH)	89 km/h (55 MPH)	km/h/MPH

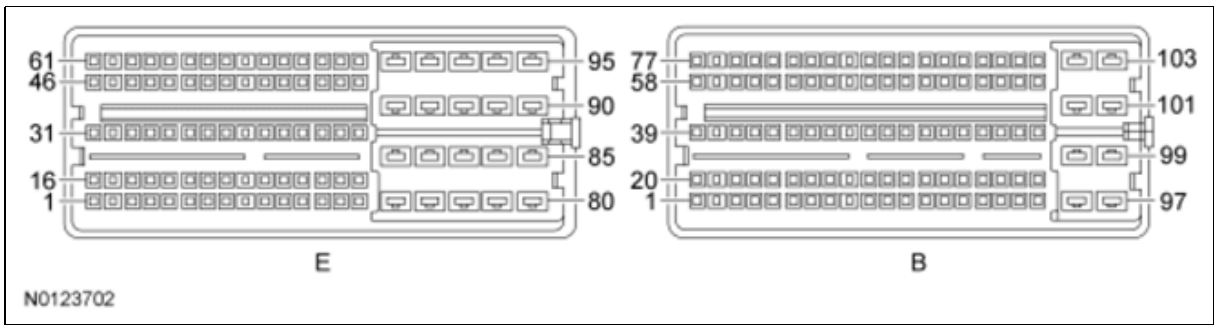
Actuators/Outputs	PCM Pin/PID Only	Measured/PID Values				Units Measured/PID
		KOEO	Hot Idle	48 KM/H (30 MPH)	89 KM/H (55 MPH)	
FP	B19	75/OFF	37/ON	36.86/ON	36.87/ON	%/ON/OFF
EVAPCV	B20	0/OFF	0/OFF	0/OFF	0/OFF	%/ON-OFF
VCT_EXH_DC2	E18	0	0	45.54	0	%
EVAPCP	E32	0	13.31	17.09	60.79	%
VCT_EXH_DC1	E52	0	0	43.32	0	%
VCT_INT_DC1	E67	0	0	46.04	44.34	%
VCT_INT_DC2	E68	0	0	46.35	45.86	%
HTR11	E69	OFF	ON	ON	ON	ON/OFF
O2S11_HTR	E69	21.17	34.90	29.41	30.19	%
HTR21	E70	OFF	ON	ON	ON	ON/OFF
O2S21_HTR	E70	21.17	37.25	31.37	29.80	%
HTR22	T48	OFF	ON	ON	ON	ON/OFF
HTR12	T49	OFF	ON	ON	ON	ON/OFF
ETC [TAC_PCT]	PID	9.80	2.35	5.88	14.11	%
EVAP020C	PID	NO	NO	NO	NO	YES/NO
EVAPSOAK	PID	NO	NO	NO	NO	YES/NO
EVAPSTA	PID	NOT RUNNING	NOT RUNNING	NOT RUNNING	NOT RUNNING	STATUS
FUELSYS	PID	OPEN LOOP	CLOSED LOOP	CLOSED LOOP	CLOSED LOOP	OPEN/CLOSED LOOP
LONGFT1	PID	(I)	-20 TO +20	-20 TO +20	-20 TO +20	%
LONGFT2	PID	(I)	-20 TO +20	-20 TO +20	-20 TO +20	%
MIL	PID	OFF	OFF	OFF	OFF	ON/OFF
O2_DS_DISBL	PID	YES	YES	NO	NO	YES/NO
RO2FT1	PID	0	-0.87	-1.48	-1.57	%
RO2FT2	PID	0	-0.87	-1.47	1.63	%
SHRTFT1	PID	(I)	-10 TO +10	-10 TO +10	-10 TO +10	%
SHRTFT2	PID	(I)	-10 TO +10	-10 TO +10	-10 TO +10	%

SPARKADV	PID	23.50	11.25	37.25	43.50	DEG
TQ_CNTRL	PID	NONE REQUESTED	IDLE SPEED CONTROL	CRUISE CONTROL	CRUISE CONTROL	STATUS

Other	PCM Pin/PID Only	Measured/PID Values				Units Measured/PID
		KOEO	Hot Idle	48 KM/H (30 MPH)	89 KM/H (55 MPH)	
VREF	B52/B61 /B66/E35/E57	5	5	5	5	VOLTS
VPWR	B67/B68	VBAT	VBAT	VBAT	VBAT	VOLTS

2.7L GTDI EDGE

Fig 1: 2.7L GTDI Edge PCM Connector



Courtesy of FORD MOTOR CO.

2.7L GTDI EDGE > TYPICAL DIAGNOSTIC REFERENCE VALUES

Sensors/Inputs	PCM Pin/PID Only	Measured/PID Values				Units Measured/PID
		KOEO	Hot Idle	48 KM/H (30 MPH)	89 KM/H (55 MPH)	
HTRCM12	B1					mA
FPM	B27					%
CAC_T	B32					DEG C (DEG F)
CAC_V	B32					VOLTS
KEYST	B48					ON/OFF
AAT	B51					DEG C (DEG F)
AAT_V	B51					VOLTS
APP2	B54					VOLTS
APP1	B55					VOLTS

O2S22	B56					VOLTS
O2S12	B57					VOLTS
HTRCM22	B61					mA
BOO2	B65					ON/OFF
BOO1	B66					ON/OFF
FTP	B73					VOLTS/Pa (PSI)
FTP_H2O	B73					in-H 20
TCBP	B74					kPa (PSI)
TCBP_V	B74					VOLTS
IAT	B75					VOLTS/DEG C (DEG F)
IAT2	E33					VOLTS/DEG C (DEG F)
MAP	E34					VOLTS/kPa (PSI)
MAP_GAUGE	E34					kPa (PSI)
FRP	E35					VOLTS/MPa (PSI)
CHT2	E36					VOLTS/DEG C (DEG F)
ECT	E37					VOLTS/DEG C (DEG F)
KNOCK_2	E50					N/A
TP2	E52					VOLTS/%
O2S21_CUR	E62					mA/uA
O2S11_CUR	E64					mA/uA
KNOCK_1	E65					N/A
TP1	E68					VOLTS/%
AC_REQ	PID					YES/NO
APP	PID					%
APP_MAXDIFF	PID					DEG
APP_MODE	PID					NO PEDAL/PART PEDAL
APP1 (APP_D)	PID					%
APP2 (APP_E)	PID					%
B+	PID					VOLTS
BRKOVR_ACTION	PID					NUMERIC VALUE
BRKOVRD_POSS	PID					NUMERIC VALUE
DECHOKE	PID					YES/NO
DIST_BRKOVRD	PID					KM (MILES)
EONV_RDY	PID					READY/NOT READY
EQ_RAT11	PID					RATIO

EQ_RAT21	PID					RATIO
ETC_ACT	PID					DEG
ETC_TRIM	PID					DEG
FLI	PID					%
IACKAM2	PID					NUMERIC VALUE
INJPWR_M	PID					VOLTS
KNK_CNTR_CYL1	PID					COUNT
KNK_CNTR_CYL2	PID					COUNT
KNK_CNTR_CYL3	PID					COUNT
KNK_CNTR_CYL4	PID					COUNT
KNK_CNTR_CYL5	PID					COUNT
KNK_CNTR_CYL6	PID					COUNT
LOAD	PID					%
MISFIRE	PID					YES/NO
MP_LRN	PID					YES/NO
NUM_MISFIRE	PID					COUNT
O2S11_IMPED	PID					VOLTS
O2S11_READY	PID					YES/NO
O2S11_TR	PID					Kohm
O2S21_IMPED	PID					VOLTS
O2S21_READY	PID					YES/NO
O2S21_TR	PID					Kohm
OCTADJ_R_LRND	PID					%
RPM	PID					RPM
SYNC	PID					YES/NO
TP1_LRN_TRIM	PID					DEG
TP2_LRN_TRIM	PID					DEG
TPMODE	PID					CLOSED/PART/WIDE OPEN THROTTLE
TURBO_BP1_STAT	PID					FAULT/NO FAULT
TURBO_BP2_STAT	PID					FAULT/NO FAULT
VCT_EXH_ACT1	PID					DEG
VCT_EXH_ACT2	PID					DEG
VCT_EXH_DIF1	PID					DEG
VCT_EXH_DIF2	PID					DEG

VCT_INT_ACT1	PID					DEG
VCT_INT_ACT2	PID					DEG
VCT_INT_DIF1	PID					DEG
VCT_INT_DIF2	PID					DEG
VCTSYS	PID					OPEN LOOP/CLOSED LOOP
VSS	PID					km/h/MPH

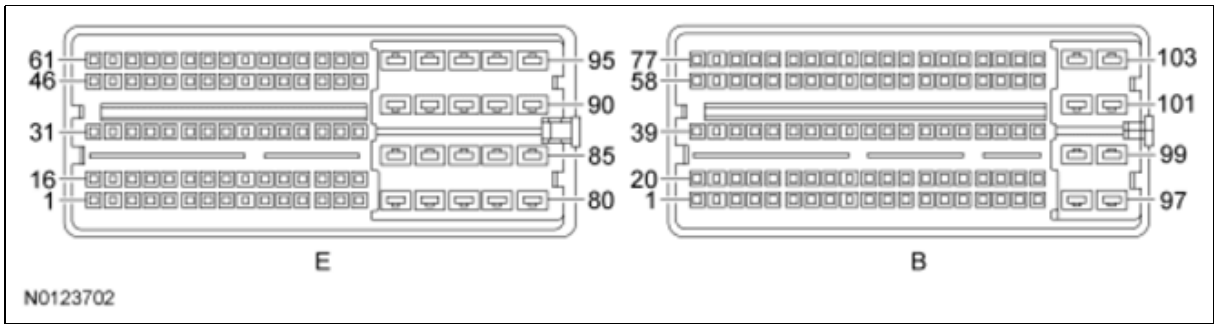
Actuators/Outputs	PCM Pin/PID Only	Measured/PID Values				Units Measured/PID
		KOEO	Hot Idle	48 KM/H (30 MPH)	89 KM/H (55 MPH)	
HTR12	B1					ON/OFF
HFC	B4					ON/OFF
EVAPCV	B20					%/ON-OFF
EVAPCP	B22					%
LFC	B23					ON/OFF
FP	B39					%/ON/OFF
HTR22	B61					ON/OFF
VCT_INT_DC1	E1					%
TURBO_BPASS	E3					ON/OFF
HTR11	E14					ON/OFF
O2S11_HTR	E14					%
HTR21	E15					ON/OFF
O2S21_HTR	E15					%
TURBO_WGATE	E16					%
VCT_EXH_DC2	E17					%
VCT_INT_DC2	E18					%
VCT_EXH_DC1	E29					%
CYL_1-6_ACCL	PID					NUMERIC VALUE
ETC [TAC_PCT]	PID					%
EVAP020C	PID					YES/NO
EVAPSOAK	PID					YES/NO
EVAPSTA	PID					STATUS
FUELSYS	PID					OPEN LOOP/CLOSED LOOP
IACTRIM	PID					NUMERIC VALUE
LONGFT1	PID					%

LONGFT2	PID					%
MIL	PID					ON/OFF
O2_DS_DISBL	PID					YES/NO
PCVHC	PID					%
RO2FT1	PID					%
RO2FT2	PID					%
SHRTFT1	PID					%
SHRTFT2	PID					%
SPARKADV	PID					DEG
TQ_CNTRL	PID					STATUS
WGATE_VAC_DSD	PID					kPa/PSI
WGATE_VAC_INF	PID					kPa/PSI

Other	PCM Pin/PID Only	Measured/PID Values				Units Measured/PID
		KOEO	Hot Idle	48 KM/H (30 MPH)	89 KM/H (55 MPH)	
VREF	B11/B13 /E6/E8/E22					VOLTS
VPWR	B101/B102/B103					VOLTS

1.6L GTDI TRANSIT CONNECT

Fig 1: 1.6L GTDI Transit PCM Connector



Courtesy of FORD MOTOR CO.

1.6L GTDI TRANSIT CONNECT > TYPICAL DIAGNOSTIC REFERENCE VALUES

Sensors/Inputs	PCM	Measured/PID Values	Units Measured/PID

	Pin/PID Only					
		KOEO	Hot Idle	48 KM/H (30 MPH)	89 KM/H (55 MPH)	
HTRCM12	B1	0	517	513	513	mA
FPM	B27	39.60	39.99	40	39.60	%
CAC_T	B32	28 (82.4)	28 (82.4)	31 (87.8)	31 (87.8)	DEG C (DEG F)
CAC_V	B32	2.71	2.71	2.60	2.58	VOLTS
KEYST	B48	ON	ON	ON	ON	ON/OFF
AAT	B51	23 (73.4)	23 (73.4)	22 (71.6)	21 (69.8)	DEG C (DEG F)
AAT_V	B51	2.80	2.80	2.88	2.92	VOLTS
APP2	B54	0.39	0.39	0.42	0.66	VOLTS
APP1	B55	0.78	0.78	0.81	1.29	VOLTS
O2S12	B57	(I)	switching (D)	switching (D)	switching (D)	VOLTS
BOO2	B65	OFF	OFF	OFF	OFF	ON/OFF
BOO1	B66	OFF	OFF	OFF	OFF	ON/OFF
FLP	B71	713.5 (103.48)	646 (93.69)	623.5 (90.43)	616 (89.34)	kPa (PSI)
FLP_V	B71	4.58	4.17	4.03	3.99	VOLTS
FTP	B73	2.61/-5 (-0.0001)	2.62/3 (0.0004)	2.50/-203 (0.029)	2.61/-5 (-0.0001)	VOLTS/Pa (PSI)
FTP_H2O	B73	-0.034	0	-0.275	-0.034	in-H_2 O
TCBP	B74	99.48 (14.43)	99.48 (14.43)	100.76 (14.61)	101.73 (14.75)	kPa (PSI)
TCBP_V	B74	1.60	1.60	1.62	1.64	VOLTS
IAT	B75	1.66/42 (107.6)	1.72/40 (104)	2.08/32 (89.6)	2.22/29 (84.2)	VOLTS/DEG C (DEG F)
F_VCV	E78	0	9.42	16.61	19.85	%
MAP	E33	98 (14.21)/28.94	38 (5.51)/11.22	40 (5.80)/11.81	58 (8.41)/17.13	kPa (PSI)/inHg
MAP_GAUGE	E33	3 (0.4)	63 (9.14)	61 (8.85)	43 (6.24)	kPa (PSI)
MAP_V	E33	1.59	0.66	0.73	0.96	VOLTS
ECT	E36	87 (188.6)	89 (192.2)	87 (188.6)	88 (190.4)	DEG C (DEG F)
FRP	E37	1.5/5.06 (733.89)	1.4/4.55 (659.92)	1.47/4.97 (720.84)	1.79/6.28 (910.84)	VOLTS/MPa (PSI)
KNOCK_2	E50	16	5	12	16	COUNT
TP2	E52	0.78/15.66	0.55/10.98	0.78/15.68	1.02/20.39	VOLTS/%
O2S11_CUR	E64	(I)	switching	switching	switching	mA/uA

KNOCK_1	E65	16	5	12	17	COUNT
TP1	E68	4.19/15.66	4.42/11.37	4.19/160.7	3.96/20.78	VOLTS/%
AC_REQ	PID	NO	NO	NO	NO	YES/NO
APP	PID	0	0	2.50	16	%
APP_MAXDIFF	PID	0	0	-0.06	-0.06	DEG
APP_MODE	PID	NO PEDAL	NO PEDAL	PART PEDAL	PART PEDAL	NO PEDAL/PART PEDAL
APP1 (APP_D)	PID	15.29	15.29	16.07	25.88	%
APP2 (APP_E)	PID	7.84	7.84	8.23	12.94	%
B+	PID	12.73	14.24	14.13	14.16	VOLTS
BARO	PID	3.92/99 (14.36)/156.11	3.92/99 (14.36)/156.11	3.92/99 (14.36)/156.11	3.92/99 (14.36)/156.11	VOLTS/kPa (PSI)/Hz
BRKOVRD_POSS	PID	30	30	31	31	NUMERIC VALUE
BRKOVR_ACTION	PID	0	0	0	0	NUMERIC VALUE
DECHOKE	PID	YES	NO	NO	NO	YES/NO
DIST_BRKOVRD	PID	193.37 (120.15)	193.37 (120.15)	193.88 (120.47)	194.87 (121.09)	KM (MILES)
EQ_RAT11	PID	0:1	14.116:1	15.045:1	14.43:1	RATIO
ETC_ACT	PID	6.71	2.27	4.58	9.84	DEG
ETC_TRIM	PID	0.03	0.04	0.21	0.21	DEG
FLI	PID	89.80 (H)	89.41 (H)	81.17 (H)	82.74 (H)	%
KNK_CNTR_CYL1	PID	0	0	0	0	COUNT
KNK_CNTR_CYL2	PID	0	0	0	0	COUNT
KNK_CNTR_CYL3	PID	0	0	0	0	COUNT
KNK_CNTR_CYL4	PID	0	0	0	0	COUNT
LOAD	PID	0.00 (I)	33.72	26.66	23.52	%
MISFIRE	PID	NO	NO	NO	NO	YES/NO
MP_LRN	PID	YES	YES	YES	YES	YES/NO
NUM_MISFIRE	PID	0	2	2	2	COUNT
O2S11_IMPED	PID	4.93	4.93	1.02	1.01	VOLTS
O2S11_READY	PID	NO	YES	YES	YES	YES/NO
O2S11_TR	PID	0	0	0	0	Kohm
OCTADJ_R_LRND	PID	50.85	50.85	50.85	50.85	%
RPM	PID	0	798	1633.5	2028.25	RPM
SYNC	PID	NO	YES	YES	YES	YES/NO
TP1_LRN_TRIM	PID	10	10	10	10	DEG

TP2_LRN_TRIM	PID	9.75	9.75	9.75	9.75	DEG
TPMODE	PID	CT	CT	PT	PT	CLOSED/PART/WIDE OPEN THROTTLE
TURBO_BP1_STAT	PID	NO FAULT	NO FAULT	NO FAULT	NO FAULT	FAULT/NO FAULT
VCTSYS	PID	OPEN LOOP	CLOSED LOOP	CLOSED LOOP	CLOSED LOOP	OPEN LOOP/CLOSED LOOP
VCT_EXH_ACT1	PID	0	-0.18	21.12	12.68	DEG
VCT_EXH_DIF1	PID	0	0.25	0.18	0.62	DEG
VCT_INT_ACT1	PID	0	-0.31	-0.18	0	DEG
VCT_INT_DIF1	PID	0	0.25	0.18	0.06	DEG
VSS	PID	0	0	48 km/h (30 MPH)	89 km/h (55 MPH)	km/h/MPH

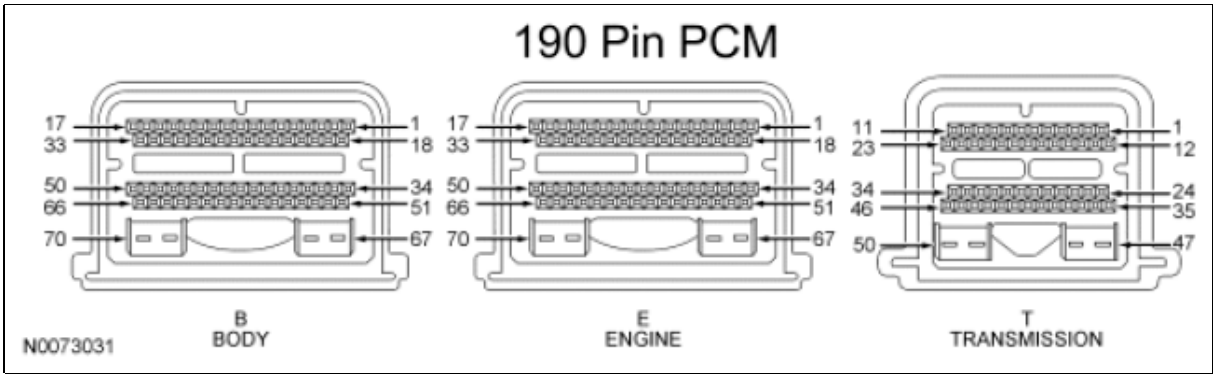
Actuators/Outputs	PCM Pin/PID Only	Measured/PID Values				Units Measured/PID
		KOEO	Hot Idle	48 KM/H (30 MPH)	89 KM/H (55 MPH)	
HTR12	B1	OFF	ON	ON	ON	VOLTS/ON/OFF
EVAPCV	B20	0	0	0	0	%/ON-OFF
EVAPCP	B22	0	3.79	8.78	64.53	%
FP	B39	75	27.7	27.43	28.58	%/ON/OFF
VCT_INT_DC1	E1	0	0	0	0	%
TURBO_BPASS	E3	OFF	OFF	ON	OFF	ON/OFF
HTR11	E14	OFF	ON	ON	ON	VOLTS/ON/OFF
O2S11_HTR	E14	0	80.78	28.23	23.92	%
TURBO_WGATE	E16	0	84.99	0	84.99	%
VCT_EXH_DC1	E29	0	0	45.09	44.41	%
CYL_1-4_ACCL	PID	(I)	-1 TO +1	-1 TO +1	-1 TO +1	NUMERIC VALUE
ETC [TAC_PCT]	PID	9.41	2.74	5.49	12.15	%
EVAP020C	PID	NO	NO	NO	NO	YES/NO
EVAPSOAK	PID	YES	YES	YES	YES	YES/NO
EVAPSTA	PID	NOT RUNNING	NOT RUNNING	NOT RUNNING	NOT RUNNING	STATUS
FANDC	PID	7.45	7.45	7.45	7.45	%
FAN_DSD	PID	7.49	7.49	7.49	7.49	%
FUELSYS	PID	OPEN LOOP	CLOSED LOOP	CLOSED LOOP	CLOSED LOOP	OPEN LOOP/CLOSED LOOP

INJ1-4_OFF	PID	--	--	--	--	--/DISABLE
LONGFT1	PID	(I)	-20 TO +20	-20 TO +20	-20 TO +20	%
MIL	PID	OFF	OFF	OFF	OFF	ON/OFF
O2_DS_DISBL	PID	YES	NO	NO	NO	YES/NO
RO2FT1	PID	0	0	0	1.51	%
SHRTFT1	PID	(I)	-10 TO +10	-10 TO +10	-10 TO +10	%
SPARKADV	PID	10	0	27.75	32.25	DEG
TQ_CNTRL	PID	ANTI THEFT	IDLE SPEED CONTROL	NONE REQUESTED	CRUISE CONTROL	STATUS

Other	PCM Pin/PID Only	Measured/PID Values				Units Measured/PID
		KOEO	Hot Idle	48 KM/H (30 MPH)	89 KM/H (55 MPH)	
VREF	B11/B13 /B14/E8/E6	5	5	5	5	VOLTS
VPWR	B101/B102/B103	VBAT	VBAT	VBAT	VBAT	VOLTS

3.5L TIVCT FLEX/TAURUS

Fig 1: 3.5L TIVCT Flex/Taurus PCM Connector



Courtesy of FORD MOTOR CO.

3.5L TIVCT FLEX/TAURUS > TYPICAL DIAGNOSTIC REFERENCE VALUES

Sensors/Inputs	PCM Pin/PID Only	Measured/PID Values				Units Measured/PID
		KOEO	Hot Idle	48 KM/H (30 MPH)	89 KM/H (55 MPH)	
BOO1	B13	OFF	OFF	OFF	OFF	ON/OFF
APP1	B28	0.80	0.79	1.11	1.56	VOLTS

APP2	B29	0.40	0.40	0.57	0.59	VOLTS
FPM	B32	60.31	58.72	59.67	59.77	%
MAF	B40	0.00	3.59	10.96	20.55	G/S
BOO2	B46	OFF	OFF	OFF	OFF	ON/OFF
IAT	B47	2.73/29 (84.2)	3.38/17 (62.6)	3.65/12 (53.60)	3.71/10 (50.00)	VOLTS/DEG C (DEG F)
FTP	B65	2.64/0.00	2.63/0.00	2.61/0.00	2.09/-0.13	VOLTS/PS I
FTP_H2O	B65	0.136	0.101	0.00	-3.75	in-H_2 O
02S21_CUR	E10	(I)	switching	switching	switching	mA/uA
02S11_CUR	E27	(I)	switching	switching	switching	mA/uA
CHT	E39	0.57/89 (192.2)	0.75/82 (179.6)	0.64/86 (186.8)	0.59/88 (190.4)	VOLTS/DEG C (DEG F)
TP1	E41	4.11	4.35	4.32	4.27	VOLTS
TP2	E58	1.20	0.72	0.77	0.89	VOLTS
O2S12	T29	(I)	(D)	(D)	(D)	VOLTS
O2S22	T40	(I)	(D)	(D)	(D)	VOLTS
APP	PID	0.00	0.00	10.00	24.00	%
B+	PID	12.49	14.32	14.32	14.29	VOLTS
BARO	PID	14.35/156.11	13.34/149.7	13.34/149.7	14.35/156.11	PSI/Hz
BARO	PID	397.44	369.34	369.34	397.44	H2O
DECHOKE	PID	YES	NO	NO	NO	YES/NO
EONV_RDY	PID	NOT READY	NOT READY	NOT READY	NOT READY	READY/NOT READY
EQ_RAT11	PID	0:1	14.52:1	12.84:1	14.96:1	RATIO
EQ_RAT21	PID	0:1	14.56:1	12.92:1	15.05:1	RATIO
ETC_TRIM	PID	0.23	0.13	0.14	0.21	DEG
FLI	PID	67.84	73.72	72.94	70.19	%
IACKAM2	PID	-0.52	-0.40	-0.34	-0.34	NUMERIC VALUE
INJPWR_M	PID	12.52	14.4	14.25	14.28	VOLTS
LOAD	PID	0.00	34.11	21.56	80.00	%
MIL_DIS	PID	0	0	0	0	Miles
MISFIRE	PID	NO	NO	NO	NO	YES/NO
MP_LRN	PID	YES	YES	YES	YES	YES/NO
O2S11_IMPED	PID	5.00	0.09	0.09	0.09	VOLTS
O2S21_IMPED	PID	5.00	0.09	0.09	0.09	VOLTS
RPM	PID	0	618	1194	1683	RPM

SYNC	PID	YES	YES	YES	YES	YES/NO
TP1	PID	4.11	4.35	4.32	4.27	VOLTS
TP2	PID	1.20	0.72	0.77	0.89	VOLTS
VCT_EXH_ACT1	PID	0.00	0.06	0.18	29.12	DEG
VCT_EXH_ACT2	PID	0.00	0.12	0.25	28.25	DEG
VCT_EXH_DIF1	PID	0.00	0.00	-0.18	0.12	DEG
VCT_EXH_DIF2	PID	0.00	-0.12	-0.43	0.81	DEG
VCT_INT_ACT1	PID	0.00	0.18	-5.50	-21.62	DEG
VCT_INT_ACT2	PID	0.00	-0.12	-5.50	-21.12	DEG
VCT_INT_DIF1	PID	0.00	0.06	-0.25	4.87	DEG
VCT_INT_DIF2	PID	0.00	0.18	-0.18	4.37	DEG
VCTSYS	PID	OPEN LOOP	CLOSED LOOP	CLOSED LOOP	CLOSED LOOP	OPEN/CLOSED LOOP
VSS	PID	0	0	48 km/h (30 MPH)	89 km/h (55 MPH)	km/h/MPH

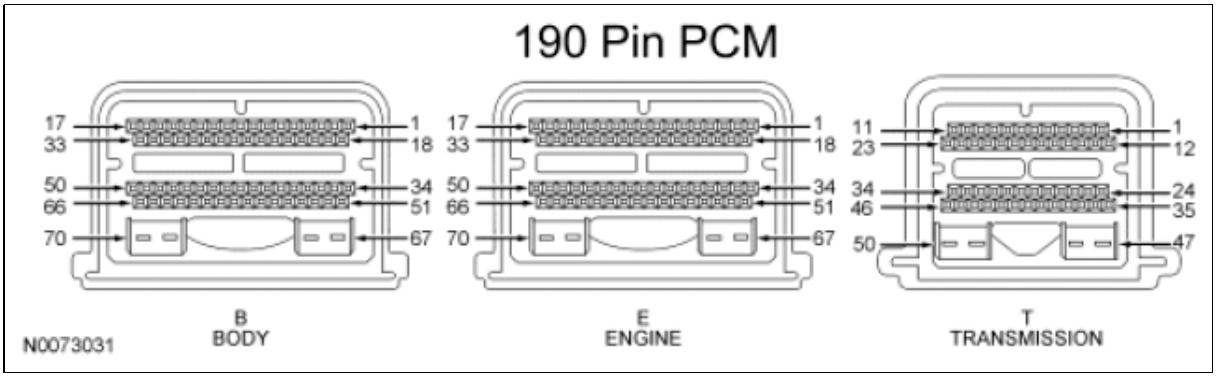
Actuators/Outputs	PCM Pin/PID Only	Measured/PID Values				Units Measured/PID
		KOEO	Hot Idle	48 KM/H (30 MPH)	89 KM/H (55 MPH)	
FP	B19	75.00	35.75	35.88	35.91	%
VCT_EXH_DC2	E18	0.00	0.00	0.00	47.35	%
EVAPCP	E32	0.00	0.00	24.46	66.41	%
VCT_EXH_DC1	E52	0.00	0.00	0.00	46.72	%
VCT_INT_DC1	E67	0.00	0.00	43.48	36.45	%
VCT_INT_DC2	E68	0.00	0.00	43.27	35.87	%
HTR11	E69	OFF	ON	ON	ON	ON/OFF
O2S11_HTR	E69	20.78	37.25	34.11	30.98	%
HTR21	E70	OFF	ON	ON	ON	ON/OFF
O2S21_HTR	E70	20.78	34.51	33.72	34.11	%
HTR22	T48	OFF	ON	ON	ON	ON/OFF
HTRCM22	T48	0.00 (Amps)	759.0 (Amps)	789.0 (Amps)	789.0 (Amps)	mA/Amps
HTR12	T49	OFF	ON	ON	ON	ON/OFF
HTRCM12	T49	0.00 (0.00A)	747.0 (Amps)	812.0 (Amps)	812.0 (Amps)	mA/Amps
CLRDIST	PID	27.96	2.48	3.10	11.80	MILES
EGR_EVAL	PID	YES	YES	YES	YES	YES/NO

EVAP020C	PID	NO	NO	NO	NO	YES/NO
EVAPSOAK	PID	NO	NO	NO	NO	YES/NO
EVAPSTA	PID	NOT RUNNING	NOT RUNNING	NOT RUNNING	NOT RUNNING	STATUS
EVAP_EVAL	PID	NO	NO	NO	NO	YES/NO
EVAPCV	PID	0/OFF	0/OFF	0/OFF	0/OFF	%/ON/OFF
FUELSYS	PID	OPEN LOOP	CLOSED LOOP	CLOSED LOOP	CLOSED LOOP	OPEN/CLOSED LOOP
LONGFT1	PID	(I)	-20 TO +20	-20 TO +20	-20 TO +20	%
LONGFT2	PID	(I)	-20 TO +20	-20 TO +20	-20 TO +20	%
MIL	PID	OFF	OFF	OFF	OFF	ON/OFF
O2S_EVAL	PID	YES	NO	NO	YES	YES/NO
O2SHTR_EVAL	PID	YES	NO	NO	YES	YES/NO
RPMDSD	PID	875	600	600	600	RPM
SHRTFT1	PID	(I)	-10 TO +10	-10 TO +10	-10 TO +10	%
SHRTFT2	PID	(I)	-10 TO +10	-10 TO +10	-10 TO +10	%
SPARKADV	PID	22.75	11.00	29.00	31.00	DEG

Other	PCM Pin/PID Only	Measured/PID Values				Units Measured/PID
		KOEO	Hot Idle	48 KM/H (30 MPH)	89 KM/H (55 MPH)	
VPWR	B67/68	12.44	13-14	13-14	13-14	VOLTS
VREF	B52/66	5	5	5	5	VOLTS

3.7L TIVCT MKS/MKT

Fig 1: 3.7L TIVCT MKS/MKT PCM Connector



Courtesy of FORD MOTOR CO.

3.7L TIVCT MKS/MKT > TYPICAL DIAGNOSTIC REFERENCE VALUES

Sensors/Inputs	PCM Pin/PID Only	Measured/PID Values				Units Measured/PID
		KOEO	Hot Idle	48 KM/H (30 MPH)	89 KM/H (55 MPH)	
BOO1	B13	OFF	ON	OFF	OFF	ON/OFF
AAT	B17	3.71/5 (41)	3.71/5 (41)	3.78/4 (39.2)	3.81/3 (37.4)	VOLTS/DEG C (DEG F)
APP1	B28	0.78	0.78	0.98	1.09	VOLTS
APP2	B29	0.39	0.39	0.50	0.56	VOLTS
ACP_PRESS	B31	0.93/65.54	0.94/66.70	0.87/58.58	0.85/55.97	VOLTS/PS I
FPM	B32	59.67 (H)	59.67 (H)	59.67 (H)	60.31 (H)	%
BOO2	B46	OFF	ON	OFF	OFF	ON/OFF
IAT	B47	2.87/26 (78.80)	3.58/13 (55.40)	3.74/10 (50.0)	3.88/6 (42.80)	VOLTS/DEG C (DEG F)
B+	B62	12.51	13.81	14.24	14.72	VOLTS
FTP	B65	2.66/0.01 /0.308	2.53/-0.02 /-0.62	1.87/-0.19 /-5.27	2.36/-0.06 /-1.75	VOLTS/PS 1/in-H_2 O
O2S11_CUR	E23	(I)	switching	switching	switching	mA/uA
O2S21_CUR	E24	(I)	switching	switching	switching	mA/uA
CHT	E39	3.82/85 (185.0)	0.70/84 (183.20)	0.65/86 (186.80)	0.60/88 (190.40)	VOLTS/DEG C (DEG F)
TP1	E41	4.09/17.64	4.26/12.54	4.22/15.29	4.19/16.07	VOLTS/%
TP2	E58	1.23/24.7	0.70/13.72	0.99/19.60	1.03/20.78	VOLTS/%
O2S12	T29	(I)	(D)	(D)	(D)	VOLTS
O2S22	T40	(I)	(D)	(D)	(D)	VOLTS
APP	PID	0.00	0.00	11.5	6.5	%
APP1 (APP_D)	PID	15.68	15.68	19.6	21.56	%
APP2 (APP_E)	PID	7.84	7.84	9.8	10.98	%
APP_MAXDIFF	PID	0	0	0	0	%
BARO	PID	13.19/148.79	13.19/148.79	13.19/148.79	13.63/151.53	PSI/Hz
BRKOVR_ACTION	PID	0	0	0	0	km/Miles
BRKOVRD_POSS	PID	0	0	0	0	km/Miles
DECHOKE	PID	YES	NO	NO	NO	YES/NO
DIST_BRKOVRD	PID	0	0	0	0	km/Miles
EONV_RDY	PID	NOT READY	NOT READY	NOT READY	NOT READY	READY/NOT READY

ETC_ACT	PID	7.95	1.25	9.03	8.20	Degrees
ETC_DSD	PID	8.06	1.27	9.18	8.23	Degrees
GEAR	PID	1	1	5	6	GEAR
IACKAM2	PID	-0.25	-0.13	-0.22	-0.22	NUMERIC VALUE
INJPWR_M	PID	12.52	14.11	14.16	14.18	VOLTS
LOAD	PID	0.00 (I)	33.33	36.07	68.23	%
MAF	PID	0.00	3.15	7.98	17.75	g/s
MAF	PID	693.75	1.63k	2.56k	3.46k	Hz
MIL_DIS	PID	0	0	0	0	Miles
MISFIRE	PID	NO	NO	NO	NO	YES/NO
O2S11_IMPED	PID	5.00	0.09	0.09	0.09	VOLTS
O2S21_IMPED	PID	5.00	0.09	0.09	0.09	VOLTS
RPM	PID	0	604	1125	1530	RPM
SYNC	PID	NO	YES	YES	YES	YES/NO
VCT_EXH_ACT1	PID	0.00	0.00	18.68	49.25	Degrees
VCT_EXH_ACT2	PID	0.00	-0.25	18.98	49.25	Degrees
VCT_INT_ACT1	PID	0.00	0.00	-9.81	-11.37	Degrees
VCT_INT_ACT2	PID	0.00	0.00	-9.81	-11.31	Degrees
VCTSYS	PID	OPEN LOOP	CLOSED LOOP	CLOSED LOOP	CLOSED LOOP	OPEN/CLOSED LOOP
VSS	PID	0	0	48 km/h (30 MPH)	89 km/h (55 MPH)	km/h/MPH

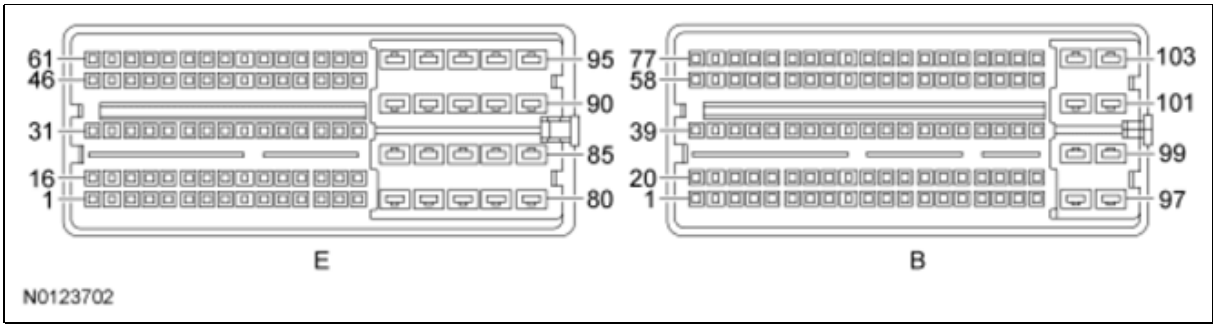
Actuators/Outputs	PCM Pin/PID Only	Measured/PID Values				Units Measured/PID
		KOEO	Hot Idle	48 KM/H (30 MPH)	89 KM/H (55 MPH)	
EVAPCV	B20	0.00	0.00	0.00	0.00	%
FP	B62	OFF	ON	ON	ON	ON/OFF
EVAPCP	E32	0.00	34.97	32.15	34.51	%
HTR11	E69	OFF	ON	ON	ON	ON/OFF
O2S11_HTR	E69	0.00	34.90	31.37	31.76	%
HTR21	E70	OFF	ON	ON	ON	ON/OFF
O2S21_HTR	E70	0.00	34.11	30.98	31.37	%
HTR12	T49	OFF	ON	ON	ON	ON/OFF
HTR22	T48	OFF	ON	ON	ON	ON/OFF

CLRDIST	PID	0.00	0.00	0.00	0.00	MILES
GRILL_A_CMD	PID	VARYING	OPEN	VARYING	CLOSED	POSITION
GRILL_CMDCAL	PID	YES	NO	NO	NO	YES/NO
EGR_EVAL	PID	YES	YES	YES	YES	YES/NO
EVAP_EVAL	PID	NO	NO	NO	NO	YES/NO
EVAPSTA	PID	NOT RUNNING	NOT RUNNING	NOT RUNNING	NOT RUNNING	STATUS
FUELSYS	PID	OPEN LOOP	CLOSED LOOP	CLOSED LOOP	CLOSED LOOP	OPEN/CLOSED LOOP
LONGFT1	PID	3.12 (I)	-20 TO +20	-20 TO +20	-20 TO +20	%
LONGFT2	PID	3.90 (I)	-20 TO +20	-20 TO +20	-20 TO +20	%
MIL	PID	OFF	OFF	OFF	OFF	ON/OFF
O2S_EVAL	PID	NO	NO	NO	NO	YES/NO
O2SHTR_EVAL	PID	NO	NO	NO	NO	YES/NO
RPMDSD	PID	875	600	600	600	RPM
SHRTFT1	PID	0 (I)	-10 TO +10	-10 TO +10	-10 TO +10	%
SHRTFT2	PID	0 (I)	-10 TO +10	-10 TO +10	-10 TO +10	%
SPARKADV	PID	10.00	10.75	33.25	38.00	DEG

Other	PCM Pin/PID Only	Measured/PID Values				Units Measured/PID
		KOEO	Hot Idle	48 KM/H (30 MPH)	89 KM/H (55 MPH)	
VPWR	B52/66	12	13-14	13-14	13-14	VOLTS
VREF	B67/68	5	5	5	5	VOLTS

2.3L GTDI MUSTANG

Fig 1: 2.3L GTDI Mustang PCM Connector



Courtesy of FORD MOTOR CO.

2.3L GTDI MUSTANG > TYPICAL DIAGNOSTIC REFERENCE VALUES

Sensors/Inputs	PCM Pin/PID Only	Measured/PID Values				Units Measured/PID
		KOEO	Hot Idle	48 KM/H (30 MPH)	89 KM/H (55 MPH)	
HTRCM12	B1	0	1.65	0	0	A
FPM	B27	40.40	40.99	39.99	40.39	%
CPP_BOT	B30	NO	NO	NO	NO	YES/NO
CAC_T	B32	0 (32)	0 (32)	0 (32)	0 (32)	DEG C (DEG F)
KEYST	B48	ON	ON	ON	ON	ON/OFF
AAT	B51	11 (51.8)	11 (51.8)	11 (51.8)	11 (51.8)	DEG C (DEG F)
AAT_V	B51	3.43	3.44	3.43	3.44	VOLTS
APP2	B54	0.38	0.38	0.53	0.60	VOLTS
APP1	B55	0.77	0.77	1.06	1.20	VOLTS
O2S12	B57	(I)	switching (D)	switching (D)	switching (D)	VOLTS
BOO1	B66	OFF	OFF	OFF	OFF	ON/OFF
BOO2	B65	OFF	OFF	OFF	OFF	ON/OFF
FLP	B71	586 (84.99)	608.50 (88.26)	533.50 (77.38)	567.50 (82.31)	kPa (PSI)
FLP_V	B71	3.81	3.95	3.49	3.70	VOLTS
CRNKAS_PRS	B72	0	299 (0.04)	-455 (-0.07)	584 (0.08)	Pa (PSI)
CRNKAS_P_V	B72	0	3.74	3.72	3.79	VOLTS
FTP	B73	2.65/55 (0.01)	2.65/-624 (-0.09)	2.58/-65 (-0.01)	2.76/244 (0.04)	VOLTS/Pa (PSI)
TCBP	B74	98.19 (14.24)	98.51 (14.29)	104.63 (15.18)	101.08 (14.66)	kPa (PSI)
TCBP_V	B74	1.58	1.59	1.68	1.63	VOLTS
IAT	B75	2.30/27 (80.60)	2.41/25 (77)	2.63/20 (68)	2.60/21 (69.80)	VOLTS/DEG C (DEG F)
MAP	E33	99 (14.36)	37 (5.37)	42 (6.09)	46 (6.67)	kPa (PSI)
MAP_GAUGE	E33	2 (0.29)	67 (9.72)	38 (5.51)	-9 (-1.31)	kPa (PSI)
MAP_V	E33	1.60	0.62	1.06	1.77	VOLTS
ECT	E36	0.67/86 (186.80)	0.67/86 (186.80)	0.66/86 (186.80)	0.61/89 (192.20)	VOLTS/DEG C (DEG F)
FRP	E37	2.27/0.84 (329.24)	1.76/0.75 (255.27)	2.90/0.94 (420.61)	2.97/0.94 (430.76)	VOLTS/MPa (PSI)
CHT2	E46	98 (208.40)	99 (210.20)	102 (215.60)	103 (217.40)	DEG C (DEG F)
CHT2_V	E46	3.47	3.44	3.32	3.30	VOLTS
KNOCK_2	E50	167	38	24	25	COUNT

TP2	E52	0.80/16.07	0.52/10.19	0.67/13.33	1.29/25.88	VOLTS/%
O2S11_CUR	E64	(I)	switching	switching	switching	mA/uA
KNOCK_1	E65	167	55	43	41	COUNT
TP1	E68	4.20/15.68	4.48/10.19	4.33/13.33	3.70/25.49	VOLTS/%
AC_REQ	PID	NO	NO	NO	NO	YES/NO
APP	PID	0	0	9.50	13.50	%
APP_MAXDIFF	PID	0	0	-0.06	-0.06	DEG
APP_MODE	PID	NO PEDAL	NO PEDAL	PART PEDAL	PART PEDAL	NO PEDAL/PART PEDAL
APP1 (APP_D)	PID	15.29	15.29	21.17	23.92	%
APP2 (APP_E)	PID	7.45	7.45	10.58	12.15	%
B+	PID	11.96	14.38	14.41	14.33	VOLTS
BARO	PID	3.88/98 (14.21)/155.19	3.89/98 (14.21)/155.19	3.89/98 (14.21)/155.19	3.88/98 (14.21)/155.19	VOLTS/kPa (PSI)/Hz
BRKOVR_ACTION	PID	0	0	0	0	NUMERIC VALUE
BRKOVRD_POSS	PID	3	3	4	4	NUMERIC VALUE
DECHOKE	PID	YES	NO	NO	NO	YES/NO
DIST_BRKOVRD	PID	1.99 (1.24)	1.99 (1.24)	7.49 (4.65)	6.49 (4.03)	KM (MILES)
EQ_RAT11	PID	0/0:1	1.01/14.78:1	1.02/14.95:1	1/14.93:1	RATIO
ETC_ACT	PID	7.62	1.71	1.23	10.96	DEG
ETC_TRIM	PID	-0.66	-0.63	-0.50	-0.50	DEG
FLI	PID	29.80 (H)	29.80 (H)	22.74 (H)	25.88 (H)	%
LOAD	PID	0.00 (I)	27.45	25.49	23.92	%
MISFIRE	PID	NO	NO	NO	NO	YES/NO
MP_LRN	PID	YES	YES	YES	YES	YES/NO
NUM_MISFIRE	PID	0	0	0	0	COUNT
O2S11_IMPED	PID	4.93	1.01	1.01	1.01	VOLTS
O2S11_READY	PID	NO	NO	YES	YES	YES/NO
O2S11_TR	PID	0	0	0	0	Kohm
OCTADJ_R_LRND	PID	88.69	88.69	88.69	88.69	%
RPM	PID	0	699.25	1319.25	1707.50	RPM
SYNC	PID	NO	YES	YES	YES	YES/NO
TP1_LRN_TRIM	PID	9.12	9.12	9.12	9.12	DEG

TP2_LRN_TRIM	PID	9.25	9.25	9.25	9.25	DEG
TURBO_BP1_STAT	PID	NO FAULT	NO FAULT	NO FAULT	NO FAULT	FAULT/NO FAULT
VCT_EXH_ACT1	PID	0	-0.25	28.37	46.12	DEG
VCT_EXH_DIF1	PID	0	0.25	-0.43	-2.37	DEG
VCT_INT_ACT1	PID	0	-0.06	0.12	0.06	DEG
VCT_INT_DIF1	PID	0	0.06	-0. 12	-0.06	DEG
VCTSYS	PID	OPEN LOOP	CLOSED LOOP	CLOSED LOOP	CLOSED LOOP	OPEN LOOP/CLOSED LOOP
VSS	PID	0	0	48 km/h (30 MPH)	89 km/h (55 MPH)	km/h/MPH

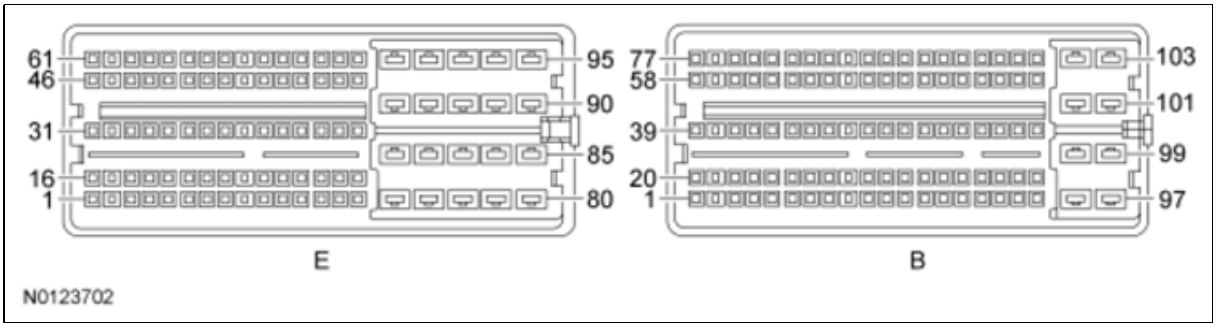
Actuators/Outputs	PCM Pin/PID Only	Measured/PID Values				Units Measured/PID
		KOEO	Hot Idle	48 KM/H (30 MPH)	89 KM/H (55 MPH)	
HTR12	B1	OFF	ON	ON	ON	VOLTS/ON/OFF
HFC	B4	OFF	OFF	OFF	OFF	ON/OFF
EVAPCV	B20	0/OFF	0/OFF	0/OFF	0/OFF	%/ON-OFF
EVAPCP	B22	0	8.56	21	9.10	%
LFC	B23	OFF	ON	ON	OFF	ON/OFF
FP	B39	75/ON	25.14/ON	24.74/ON	24.39/ON	%/ON/OFF
VCT_INT_DC1	E1	0	0	0	0	%
TURBO_BPASS	E3	OFF	OFF	OFF	OFF	ON/OFF
HTR11	E14	OFF	ON	ON	ON	VOLTS/ON/OFF
O2S11_HTR	E14	0	38.03	34.51	36.47	%
TURBO_WGATE	E16	10.10	10.07	43.28	89.73	%
VCT_EXH_DC1	E29	0	0	40.14	39.32	%
AEIS_ACTION	PID	0	0	0	0	NUMERIC VALUE
AEIS_POSS	PID	59	59	59	59	NUMERIC VALUE
CYL_1-4_ACCL	PID	(I)	-1 TO +1	-1 TO +1	-1 TO +1	NUMERIC VALUE
DIST_AEIS	PID	0	0	0	0	KM (MILES)
ETC [TAC_PCT]	PID	9.41	1.96	1.17	13.33	%
EVAP020C	PID	NO	NO	NO	NO	YES/NO
EVAPSOAK	PID	YES	YES	YES	YES	YES/NO
EVAPSTA	PID	NOT RUNNING	NOT RUNNING	NOT RUNNING	NOT RUNNING	STATUS

FUELSYS	PID	CLOSED LOOP	CLOSED LOOP	CLOSED LOOP	CLOSED LOOP	OPEN LOOP/CLOSED LOOP
LONGFT1	PID	(I)	-20 TO +20	-20 TO +20	-20 TO +20	%
MIL	PID	OFF	OFF	OFF	OFF	ON/OFF
O2_DS_DISBL	PID	YES	NO	NO	NO	YES/NO
RO2FT1	PID	0	0.80	1.23	1.78	%
SHRTFT1	PID	(I)	-10 TO +10	-10 TO +10	-10 TO +10	%
SPARKADV	PID	10	10.50	33.00	26.50	DEG
TQ_CNTRL	PID	NONE REQUESTED	IDLE SPEED CONTROL	NONE REQUESTED	NONE REQUESTED	STATUS

Other	PCM Pin/PID Only	Measured/PID Values				Units Measured/PID
		KOEO	Hot Idle	48 KM/H (30 MPH)	89 KM/H (55 MPH)	
VREF	B11/E5/E6/E8	5	5	5	5	VOLTS
VPWR	B102/B103	VBAT	VBAT	VBAT	VBAT	VOLTS

3.7L TIVCT MUSTANG

Fig 1: 3.7L TIVCT Mustang PCM Connector



Courtesy of FORD MOTOR CO.

3.7L TIVCT MUSTANG > TYPICAL DIAGNOSTIC REFERENCE VALUES

Sensors/Inputs	PCM Pin/PID Only	Measured/PID Values				Units Measured/PID
		KOEO	Hot Idle	48 KM/H (30 MPH)	89 KM/H (55 MPH)	
CPP_BOT	B9	NO	NO	NO	NO	YES/NO
FPM	B27	39.99	40.40	40.01	40.99	%

FTP	B46	2.64/30 (0)	2.45/-289 (-0.04)	2.28/-589 (-0.09)	2.05/-993 (-0.14)	VOLTS/Pa (PSI)
AAT	B47	28 (82.40)	28 (82.40)	26 (78.80)	26 (78.80)	DEG C (DEG F)
AAT_V	B47	2.55	2.55	2.65	2.68	VOLTS
APP2	B60	0.40	0.40	0.58	0.55	VOLTS
APP1	B61	0.79	0.79	1.14	1.08	VOLTS
KEYST	B64	ON	ON	ON	ON	ON/OFF
BOO2	B66	OFF	OFF	OFF	OFF	ON/OFF
BOO1	B67	OFF	OFF	OFF	OFF	ON/OFF
O2S12	B72	(I)	switching (D)	switching (D)	switching (D)	VOLTS
O2S22	B91	(I)	switching (D)	switching (D)	switching (D)	VOLTS
TP2	E9	1.16/23.13	0.86/17.25	1.01/20.00	1.08/21.58	VOLTS/%
TP1	E10	4.12/17.25	4.27/14.11	4.27/15.29	4.09/18.43	VOLTS/%
IAT	E27	1.42/49 (120.20)	1.47/47 (116.60)	1.65/43 (109.40)	1.70/41 (105.80)	VOLTS/DEG C (DEG F)
MAP	E32	98 (14.21)	48 (6.96)	27 (3.91)	43 (6.24)	kPa (PSI)
MAP_GAUGE	E32	3 (0.44)	53 (7.69)	74 (10.73)	58 (8.41)	kPa (PSI)
O2S11_CUR	E35	(I)	switching	switching	switching	mA/uA
O2S21_CUR	E36	(I)	switching	switching	switching	mA/uA
CHT	E47	0.57/88 (190.40)	0.56/89 (192.20)	3.51/92 (197.60)	3.48/93 (199.40)	VOLTS/DEG C (DEG F)
KNOCK_1	E53	0	84	145	267	COUNT
KNOCK_2	E68	0	109	127	189	COUNT
HTRCM12	E78	0	0	0	0	mA
HTRCM22	E83	0	0	0	0	mA
AC_REQ	PID	NO	NO	NO	NO	YES/NO
APP	PID	0	0	11	8.50	%
APP1 (APP_D)	PID	15.68	15.68	23.13	21.56	%
APP2 (APP_E)	PID	7.84	7.84	11.76	10.98	%
APP_MAXDIFF	PID	0	0	-0.06	0	DEG
APP_MODE	PID	NO PEDAL	NO PEDAL	PART PEDAL	PART PEDAL	NO PEDAL/PART PEDAL
B+	PID	12.21	14.29	14.21	14.26	VOLTS
BARO	PID	98 (14.21)/155.19	98 (14.21)/155.19	98 (14.21)/155.19	98 (14.21)/155.19	kPa (PSI)/Hz

BRKOVRD_POSS	PID	11	11	12	12	NUMERIC VALUE
BRKOVR_ACTION	PID	0	0	0	0	NUMERIC VALUE
DECHOKE	PID	YES	NO	NO	NO	YES/NO
DIST_BRKOVRD	PID	4.99 (3.10)	4.99 (3.10)	5.49 (3.41)	6.49 (4.03)	KM (MILES)
EONV_RDY	PID	NOT READY	NOT READY	NOT READY	NOT READY	READY/NOT READY
EQ_RAT11	PID	0:1	14.82:1	14.85:1	14.69:1	RATIO
EQ_RAT21	PID	0:1	14.84:1	14.45:1	14.98:1	RATIO
ETC_ACT	PID	7.11	2.96	3.44	7.65	DEG
ETC_TRIM	PID	0.04	0.04	0.04	0.04	DEG
FLI	PID	89.41 (H)	89.41 (H)	80.78 (H)	85.09 (H)	%
INJPWR_M	PID	12.19	14.12	14.29	14.19	VOLTS
LOAD	PID	0 (I)	43.13	22.35	36.47	%
MISFIRE	PID	NO	NO	NO	NO	YES/NO
MP_LRN	PID	YES	YES	YES	YES	YES/NO
NUM_MISFIRE	PID	0	0	5	5	COUNT
O2S11_IMPED	PID	5	0.09	0.09	0.09	VOLTS
O2S11_READY	PID	NO	YES	YES	YES	YES/NO
O2S11_TR	PID	0	0	0	0	Kohm
O2S21_IMPED	PID	5	0.09	0.09	0.09	VOLTS
O2S21_READY	PID	NO	YES	YES	YES	YES/NO
O2S21_TR	PID	0	0	0	0	Kohm
OCTADJ_R_LRND	PID	0	0	0	0	%
RPM	PID	0	653.25	1360	1526	RPM
SYNC	PID	NO	YES	YES	YES	YES/NO
TP1_LRN_TRIM	PID	15.25	15.25	15.25	15.25	DEG
TP2_LRN_TRIM	PID	7.87	7.87	7.87	7.87	DEG
VCTSYS	PID	OPEN LOOP	CLOSED LOOP	CLOSED LOOP	CLOSED LOOP	OPEN LOOP/CLOSED LOOP
VCT_EXH_ACT1	PID	0	0.06°	25.93	28.25	DEG
VCT_EXH_ACT2	PID	0	0	25.93	28.31	DEG
VCT_EXH_DIF1	PID	0	-0.25	-0.31	0.25	DEG
VCT_EXH_DIF2	PID	0	0	-0.12	0	DEG

VCT_INT_ACT1	PID	0	0.12	-22.81	-9.56	DEG
VCT_INT_ACT2	PID	0	-0.25	-22.68	-9.87	DEG
VCT_INT_DIF1	PID	0	-0.12	0.12	-1.12	DEG
VCT_INT_DIF2	PID	0	0.18	0	-0.81	DEG
VSS	PID	0	0	48 km/h (30 MPH)	89 km/h (55 MPH)	km/h/MPH

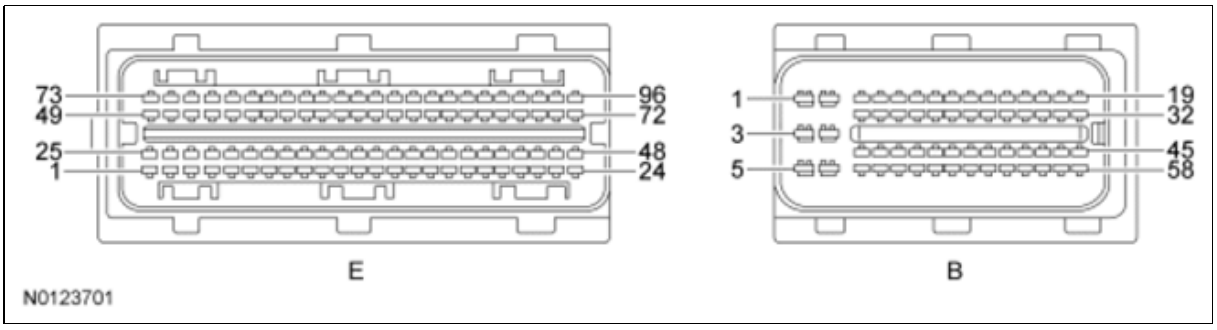
Actuators/Outputs	PCM Pin/PID Only	Measured/PID Values				Units Measured/PID
		KOEO	Hot Idle	48 KM/H (30 MPH)	89 KM/H (55 MPH)	
HFC	B10	OFF	OFF	OFF	OFF	ON/OFF
FP	B14	75/OFF	30.02/ON	29.87/ON	29.86/ON	%/ON/OFF
LFC	B17	OFF	ON	OFF	OFF	ON/OFF
EVAPCV	B39	0/OFF	0/OFF	0/OFF	0/OFF	%/ON-OFF
VCT_EXH_DC1	E4	0	0	42.06	0	%
VCT_INT_DC1	E5	0	0	44.99	45.88	%
VCT_EXH_DC2	E6	0	0	41.86	0	%
VCT_INT_DC2	E7	0	0	49.09	48.99	%
EVAPCP	E71	0	18.35	68.61	89.09	%
HTR12	E78	OFF	ON	ON	ON	ON/OFF
HTR11	E79	OFF	ON	ON	ON	ON/OFF
O2S11_HTR	E79	0	60	40.39	30.58	%
HTR22	E83	OFF	ON	ON	ON	ON/OFF
HTR21	E84	OFF	ON	ON	ON	ON/OFF
O2S21_HTR	E84	0	51.25	38.82	30.19	%
AEIS_ACTION	PID	0	0	0	0	NUMERIC VALUE
AEIS_POSS	PID	40	40	40	40	NUMERIC VALUE
CYL_1-6_ACCL	PID	(I)	-1 TO +1	-1 TO +1	-1 TO +1	NUMERIC VALUE
DIST_AEIS	PID	0	0	0	0	KM (MILES)
ETC [TAC_PCT]	PID	9.41	3.52	3.92	9.02	%
EVAP020C	PID	NO	NO	NO	NO	YES/NO
EVAPSOAK	PID	NO	NO	NO	NO	YES/NO
EVAPSTA	PID	NOT RUNNING	NOT RUNNING	NOT RUNNING	NOT RUNNING	STATUS
FUELSYS	PID	OPEN LOOP	CLOSED LOOP	CLOSED LOOP	CLOSED LOOP	OPEN LOOP/CLOSED LOOP

INJ1-6_OFF	PID	--	--	--	--	--/DISABLE
LONGFT1	PID	(I)	-20 TO +20	-20 TO +20	-20 TO +20	%
LONGFT2	PID	(I)	-20 TO +20	-20 TO +20	-20 TO +20	%
MIL	PID	OFF	OFF	OFF	OFF	ON/OFF
O2_DS_DISBL	PID	YES	NO	NO	NO	YES/NO
RO2FT1	PID	0	-0.74	-0.90	1.14	%
RO2FT2	PID	0	-0.78	-0.90	1.00	%
SHRTFT1	PID	(I)	-10 TO +10	-10 TO +10	-10 TO +10	%
SHRTFT2	PID	(I)	-10 TO +10	-10 TO +10	-10 TO +10	%
SPARKADV	PID	26.75	8	45.25	46	DEG
TQ_CNTRL	PID	NONE REQUESTED	IDLE SPEED CONTROL	NONE REQUESTED	NONE REQUESTED	STATUS

Other	PCM Pin/PID Only	Measured/PID Values				Units Measured/PID
		KOEO	Hot Idle	48 KM/H (30 MPH)	89 KM/H (55 MPH)	
VREF	B52/B66/E34	5	5	5	5	VOLTS
VPWR	B97/B99	VBAT	VBAT	VBAT	VBAT	VOLTS

2.0L GTDI EXPLORER

Fig 1: 2.0L GTDI Explorer PCM Connector



Courtesy of FORD MOTOR CO.

2.0L GTDI EXPLORER > TYPICAL DIAGNOSTIC REFERENCE VALUES

Sensors/Inputs	PCM Pin/PID Only	Measured/PID Values				Units Measured/PID
		KOEO	Hot Idle	48 KM/H (30 MPH)	89 KM/H (55 MPH)	

FPM	B12	59.40	60.00	60.00	58.98	%
BOO2	B16	OFF	OFF	OFF	OFF	ON/OFF
APP2	B26	0.39/7.84	0.39/7.84	0.48/9.41	0.39/7.84	VOLTS/%
BOO1	B30	OFF	OFF	OFF	OFF	ON/OFF
AAT	B35	29 (84.2)	24 (75.2)	18 (64.4)	17 (62.6)	DEG C (DEG F)
AAT_V	B35	2.48	2.76	3.08	3.11	VOLTS
O2S12	B48	(I)	(D)	(D)	(D)	VOLTS
APP1	B52	0.77/15.29	0.77/15.29	0.94/18.82	0.77/15.29	VOLTS/%
TP1	E6	4.20	4.44	4.29	4.23	VOLTS
FLP	E7	718.77/104.25	622.80/90.33	570.81/82.79	566.33/82.14	kPa/PSI
FLP_DSD	E7	629.83/91.35	629.83/91.35	557.85/80.91	584.81/84.82	kPa/PSI
FLP_V	E7	2.95	2.57	2.36	2.34	VOLTS
TCBP	E8	99.42/14.42	99.4214.42	103.09/15.07	101.00/14.65	kPa/PSI
TCBP_V	E8	1.60	1.60	1.67	1.63	VOLTS
FRP	E9	0.96/2349.3 /340.75	0.84/1689.5 /245.05	1.08/3039.2 /440.80	1.54/5498.5 /797.50	VOLTS/kPa/PSI
IAT	E10	1.61/42 (107.6)	1.60/43 (109.4)	2.65/19 (66.2)	2.65/19 (66.2)	VOLTS/DEG C (DEG F)
CAC_T	E11	42 (107.6)	38 (100.4)	22 (71.6)	21 (69.8)	DEG C (DEG F)
CAC_V	E11	2.17	2.34	3.07	3.10	VOLTS
ECT	E12	90 (194)	93 (199.4)	74 (165.2)	95 (203)	DEG C (DEG F)
CHT	E56	0/90 (194.0)	0/93 (199.4)	0/74 (165.2)	0/95 (203.0)	VOLTS/DEG C (DEG F)
FTP	E59	2.61/0.00 /-0.00	2.13/-0.82 /-0.12	1.62/-1.72 /-0.25	1.96/-1.10 /-0.16	VOLTS/kPa/PSI
TP2	E81	0.79	0.55	0.70	0.76	VOLTS
MAP	E83	1.60/98.93 /14.35	0.68/39.98/5.80	0.56/28.95/4.20	1.20/69.98 /10.15	VOLTS/kPa/PSI
O2S11_CUR	E89	(I)	switching (C)	switching (C)	switching (C)	uA
APP	PID	0.0	0.0	11.5	0.0	%
APP_MAXDIFF	PID	0.00	0.00	-0.06	0.00	DEG
B+	PID	VBAT	VBAT	VBAT	VBAT	VOLTS
BARO	PID	3.92/98.93 /14.35/156.11 /397.44	3.92/98.93 /14.35/156.11 /397.44	3.92/98.93 /14.35/156.11 /397.44	3.92/98.93 /14.35/156.11 /397.44	VOLTS/kPa /PSI/Hz/in-H_2 O
BRKOVR_ACTION	PID	0	0	0	0	NUMERIC VALUE

BRKOVRD_POSS	PID	27	27	27	27	NUMERIC VALUE
DECHOKE	PID	YES	NO	NO	NO	YES/NO
DIST_BRKOVRD	PID	520.7 (323.6)	520.7 (323.6)	493.7 (306.83)	502.2 (312.11)	KM (MILES)
EQ_RAT11	PID	0	0.995	0.995	1.005	RATIO
ETC_TRIM	PID	0.08 (J)	0.08 (J)	0.31 (J)	0.27 (J)	DEG
FLI	PID	91.76 (H)	91.76 (H)	94.51 (H)	92.54 (H)	%
FRP_DSD	PID	369.9/53.65	1749.5/253.75	2929.2/424.85	5648.5/819.25	kPa/PSI
INJPWR_M	PID	0	0	0	0	VOLTS
LOAD	PID	0.00 (I)	32.54	16.86	52.54	%
MIL_DIS	PID	0	0	0	0	Miles
MISFIRE	PID	NO	NO	NO	NO	YES/NO
MP_LRN	PID	YES	YES	YES	YES	YES/NO
O2S_EVAL	PID	YES	YES	YES	YES	YES/NO
O2S11_IMPED	PID	4.93	1.02	1.01	1.02	VOLTS
O2S11_READY	PID	NO	YES	YES	YES	YES/NO
O2SHTR_EVAL	PID	YES	YES	YES	YES	YES/NO
RPM	PID	0	780.75	1737.25	1447.25	RPM
SYNC	PID	NO	YES	YES	YES	YES/NO
TCBP_DSD	PID	100.6/14.60	100.6/14.60	100.6/14.60	100.5/14.59	kPa/PSI
VCT_EXH_ACT1	PID	0.00	-0.06	20.06	30.43	DEG
VCT_EXH_DIF1	PID	0.00	0.06	0.00	42.53	DEG
VCT_INT_ACT1	PID	0.00	-0.06	-0.06	0.00	DEG
VCT_INT_DIF1	PID	0.00	0.06	0.06	0.00	DEG
VCTSYS	PID	OPEN LOOP	CLOSED LOOP	CLOSED LOOP	CLOSED LOOP	OPEN/CLOSED LOOP
VSS	PID	0	0	48 km/h (30 MPH)	89 km/h (55 MPH)	km/h/MPH

Actuators/Outputs	PCM Pin/PID Only	Measured/PID Values				Units Measured/PID
		KOEO	Hot Idle	48 KM/H (30 MPH)	89 KM/H (55 MPH)	
HTR12	B20	OFF	ON	ON	ON	ON/OFF
HTRCM12	B20	0	0	0	0	A/mA
FP	B45	75	25.28	23.37	24.49	%
FTP_H2O	E59	-0.068	-3.447	-7.033	-4.758	in-H_2 O

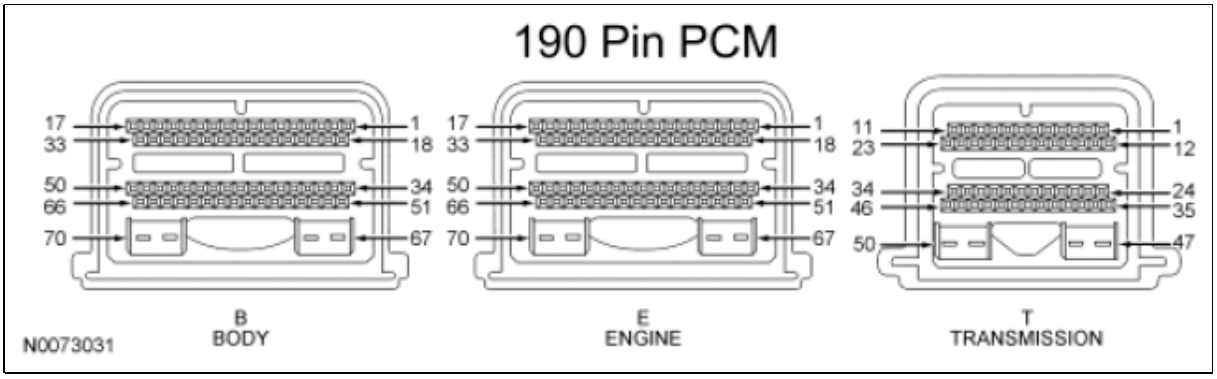
VCT_INT_DC1	E67	0	0	0	0	%
VCT_EXH_DC1	E71	0.00	0.00	43.28	43.93	%
HTR11	E72	OFF	ON	ON	ON	ON/OFF
O2S11_HTR	E72	0.00	36.07	29.80	28.62	%
EVAPCP	E91	0.00	65.46	94.32	97.07	%
EVAPCV	E91	0/OFF	0/OFF	0/OFF	0/OFF	%/ON/OFF
TURBO_WGATE	E95	0.00	47.91	46.49	45.21	%
ETC [TAC_PCT]	PID	9.41	1.96	5.09	5.49	%
EVAP020C	PID	NO	NO	NO	NO	YES/NO
EVAPSOAK	PID	YES	YES	YES	YES	YES/NO
EVAPSTA	PID	NOT RUNNING	NOT RUNNING	NOT RUNNING	NOT RUNNING	STATUS
EVAP_EVAL	PID	YES	YES	YES	YES	YES/NO
F_VCV	PID	0.00	8.89	5.15	9.98	%-VARYING
FAN_DSD	PID	7.99	25.76	7.99	7.99	%
FANDC	PID	7.84	25.49	7.84	7.84	%
FUELSYS	PID	OPEN LOOP	CLOSED LOOP	CLOSED LOOP	CLOSED LOOP	OPEN/CLOSED LOOP
GRILL_A_CMD	PID	0/CLOSED	0/CLOSED	0/CLOSED	0/CLOSED	%/OPEN/CLOSED
GRILL_A_INF	PID	0	0	0	0	%
GRILL_CMDCAL	PID	NO	YES	YES	YES	YES/NO
LONGFT1	PID	(I)	-20 TO +20	-20 TO +20	-20 TO +20	%
O2_DS_DISBL	PID	YES	NO	NO	NO	YES/NO
O2_DS1_ERR	PID	0.00	-0.12	0.04	-0.02	VOLTS
PATSENABL	PID	ENABLED	ENABLED	ENABLED	ENABLED	ENABLED/DISABLED
RO2FT1	PID	0.00	0.12	-1.40	1.31	%
SHRTFT1	PID	(I)	-10 TO +10	-10 TO +10	-10 TO +10	%
SPARKADV	PID	10	10.75	36	29.50	%
WGATE_PRES	PID	98.9/14.35	64.4/9.35	65.9/9.57	54.4/7.90	kPa/PSI
WGATE_V	PID	4.26	2.88	2.95	2.53	VOLTS
WGATE_VAC_DSD	PID	33.4/4.85	33.4/4.85	32.4/4.71	41.9/6.09	kPa/PSI
WGATE_VAC_INF	PID	0.0/0.00	34.4/5.00	32.9/4.78	43.9/6.38	kPa/PSI

Other	PCM Pin/PID Only	Measured/PID Values				Units Measured/PID
		KOEO	Hot Idle	48 KM/H (30 MPH)	89 KM/H (55 MPH)	
VREF	B7/B31/E15/E18	5	5	5	5	VOLTS

VPWR	B5/B6	12.52	13-14	13-14	13-14	VOLTS

3.5L TIVCT EXPLORER

Fig 1: 3.5L TIVCT Explorer PCM Connector



Courtesy of FORD MOTOR CO.

3.5L TIVCT EXPLORER > TYPICAL DIAGNOSTIC REFERENCE VALUES

Sensors/Inputs	PCM Pin/PID Only	Measured/PID Values				Units Measured/PID
		KOEO	Hot Idle	48 KM/H (30 MPH)	89 KM/H (55 MPH)	
BOO1	B13	OFF	ON (E)	OFF	OFF	ON/OFF
APP1	B28	0.76/15.29	0.76/15.29	0.76/14.90	1.18/23.52	VOLTS/%
APP2	B29	0.37/7.45	0.37/7.45	0.59/11.76	0.49/9.80	VOLTS/%
ACP_PRESS	B31	118.32	209.67	95.70	133.98	PSI
FPM	B32	58.72	58.72	58.72	59.37	%
MAF	B40	0	4.02	10.54	33.41	g/s
MAF_HZ	B40	693.75 Hz	1.84	2.83	4.44	kHz
BOO2	B46	OFF	ON (E)	OFF	OFF	ON/OFF
IAT	B47	1.16/66 (150.8)	1.82/48 (118.4)	2.36/37 (98.6)	2.41/37 (98.6)	VOLTS/DEG C (DEG F)
FTP	B65	2.62/0	2.21/-0.10	2.67/0.01	2.38/-0.06	VOLTS/PS I
FTP_H2O	B65	0	-2.862	0.343	-1.724	in-H_2 O
AAT	E29	25 (77)	25.6 (78)	29.1 (84.4)	33 (91.4)	DEG C (DEG F)
AAT_V	E29	1.35	2.64	2.53	2.30	VOLTS
CHT	E39	0.79/81.7 (179)	0.77/81 (177.8)	0.64/88 (190.4)	0.67/86 (186.8)	VOLTS/DEG C (DEG F)

TP1	E41	4.09	4.36	4.20	4.10	VOLTS
KNOCK_1	E43	65535	214	284	419	N/A
TP2	E58	1.24	0.69	1.02	1.23	VOLTS
KNOCK_2	E60	65535	188	205	270	N/A
O2S12	T29	(I)	(D)	(D)	(D)	VOLTS
O2S22	T40	(I)	(D)	(D)	(D)	VOLTS
APP	PID	0	0	0	13	%
BARO	PID	14.64/101 /157.87	14.64/101 /157.87	14.64/101 /157.87	14.50/100 /157.02	PSI/kPa/Hz
BRKOVRD_POSS	PID	131	131	132	132	NUMERIC VALUE
BRKOVR_ACTION	PID	2	2	2	2	NUMERIC VALUE
B+	PID	VBAT	VBAT	VBAT	VBAT	VOLTS
DECHOKE	PID	YES	NO	NO	NO	YES/NO
DIST_BRKOVRD	PID	812.97 (505.16)	812.97 (505.16)	812.97 (505.16)	813.97 (505.78)	KM (MILES)
EONV_RDY	PID	NOT READY	NOT READY	NOT READY	NOT READY	READY/NOT READY
FLI	PID	50 (H)	50 (H)	50 (H)	50 (H)	%
GEAR	PID	1	1	5	6	GEAR
IACKAM2	PID	-0.38	-0.22	-0.22	-0.22	NUMERIC VALUE
LOAD	PID	(I)	43.52	37.64	91.37	%
MISFIRE	PID	NO	NO	NO	NO	YES/NO
MP_LRN	PID	YES	YES	YES	YES	YES/NO
O2S11_CUR	PID	(I)	switching	switching	switching	mA/uA
O2S11_IMPED	PID	5	0.09	0.09	0.09	VOLTS
O2S21_CUR	PID	(I)	switching	switching	switching	mA/uA
O2S21_IMPED	PID	5	0.09	0.09	0.09	VOLTS
O2S11_READY	PID	NO	YES	YES	YES	YES/NO
O2S21_READY	PID	NO	YES	YES	YES	YES/NO
RPM	PID	0	601.50	1298.00	1569.50	RPM
SYNC	PID	NO	YES	YES	YES	YES/NO
VCT_EXH_ACT1	PID	0	0.18	51.06	21.93	DEG
VCT_EXH_ACT2	PID	0	-0.31	22	11.31	DEG
VCT_EXH_DIF1	PID	0	0	1.81	2.31	DEG
VCT_EXH_DIF2	PID	0	0.31	3.00	1.93	DEG
VCT_INT_ACT1	PID	0	0	-17.00	-11.50	DEG

VCT_INT_ACT2	PID	0	-0.43	-18.56	-11.12	DEG
VCT_INT_DIF1	PID	0	0.06	0.50	-0.87	DEG
VCT_INT_DIF2	PID	0	-0.37	0.06	-0.43	DEG
VSS	PID	0	0	48 km/h (30 MPH)	89 km/h (55 MPH)	km/h/MPH

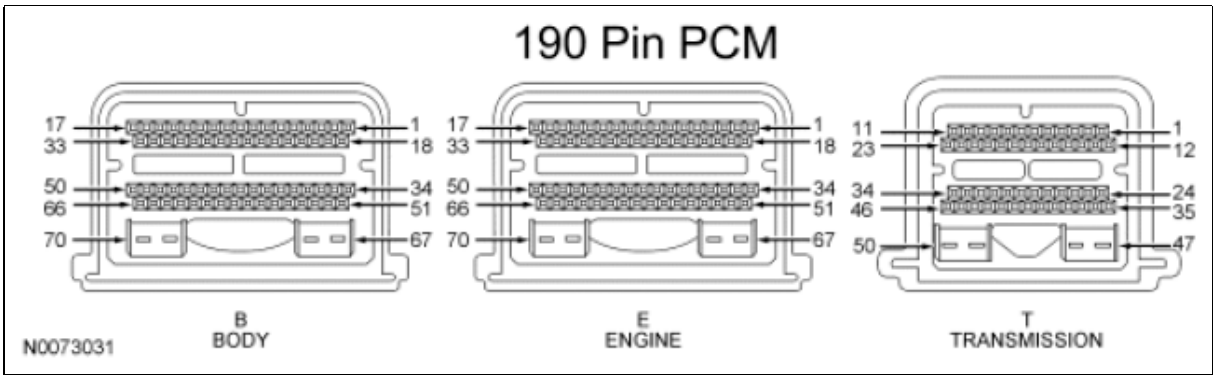
Actuators/Outputs	PCM Pin/PID Only	Measured/PID Values				Units Measured/PID
		KOEO	Hot Idle	48 KM/H (30 MPH)	89 KM/H (55 MPH)	
EVAPCV	B20	0/OFF	0/OFF	0/OFF	0/OFF	%/ON/OFF
FP	B32	75/OFF	38.54/ON	37.40/ON	37.38/ON	%/ON/OFF
VCT_EXH_DC2	E18	0	0	51.58	44.93	DEG
EVAPCP	E32	0	73.81	48.23	15.83	%
VCT_EXH_DC1	E52	0	0	79.99	47.43	%
VCT_INT_DC1	E67	0	0	37.12	41.55	DEG
VCT_INT_DC2	E68	0	0	43.43	44.88	%
O2S11_HTR	E69	23.13	36.07	30.58	21.56	%
HTR11	E69	OFF	ON	ON	ON	ON/OFF
O2S21_HTR	E70	23.13	34.51	32.94	25.49	%
HTR21	E70	OFF	ON	ON	ON	ON/OFF
HTR22	T48	OFF	ON	ON	ON	ON/OFF
HTR12	T49	OFF	ON	ON	ON	ON/OFF
EVAP020C	PID	NO	NO	NO	NO	YES/NO
EVAPSOAK	PID	YES	YES	YES	YES	YES/NO
EVAP_EVAL	PID	YES	YES	YES	YES	YES/NO
FUELSYS	PID	OPEN LOOP	CLOSED LOOP	CLOSED LOOP	CLOSED LOOP	OPEN/CLOSED LOOP
LONGFT1	PID	(I)	-20 TO +20	-20 TO +20	-20 TO +20	%
LONGFT2	PID	(I)	-20 TO +20	-20 TO +20	-20 TO +20	%
MIL	PID	OFF	OFF	OFF	OFF	ON/OFF
O2SHTR_EVAL	PID	YES	YES	YES	YES	YES/NO
SHRTFT1	PID	0	-10 TO +10	-10 TO +10	-10 TO +10	%
SHRTFT2	PID	0	-10 TO +10	-10 TO +10	-10 TO +10	%

Other	PCM Pin/PID Only	Measured/PID Values				Units Measured/PID
		KOEO	Hot Idle	48 KM/H (30 MPH)	89 KM/H (55 MPH)	

VREF	B52/B66	5	5	5	5	VOLTS
VPWR	B67/B68	VBAT	VBAT	VBAT	VBAT	VOLTS

3.7L TIVCT EXPLORER

Fig 1: 3.7L TIVCT Explorer PCM Connector



Courtesy of FORD MOTOR CO.

3.7L TIVCT EXPLORER > TYPICAL DIAGNOSTIC REFERENCE VALUES

Sensors/Inputs	PCM Pin/PID Only	Measured/PID Values				Units Measured/PID
		KOEO	Hot Idle	48 KM/H (30 MPH)	89 KM/H (55 MPH)	
BOO1	B13	OFF	OFF	OFF	OFF	ON/OFF
APP1	B28	0.76	0.76	0.78	0.78	VOLTS
APP2	B29	0.38	0.38	0.39	0.39	VOLTS
ACP_PRESS	B31	0.97/71.05	0.97/70.76	0.93/66.41	0.88/59.16	VOLTS/PSI
FPM	B32	58.72	58.72	58.72	60.31	%
MAF	B40	0	0	0	0	VOLTS
BOO2	B46	OFF	OFF	OFF	OFF	ON/OFF
IAT	B47	2.90/26 (78.80)	3.50/14 (57.20)	3.86/11 (44.60)	3.96/4 (39.20)	VOLTS/DEG C (DEG F)
FTP	B65	2.65/0.00	2.60/0.00	1.99/-0.15	2.05/-0.14	VOLTS/PSI
FTP_H2O	B65	0.24	-0.724	-3.69	-6.93	in-H_2 O
O2S22	E10	0.07	0.84	0.85	0.70	VOLTS
O2S11_CUR	E23	0.00	-51.00	27.00	-94.00	uA
O2S21_CUR	E24	0.00	27.00	-12.00	-109.00	uA
O2S12	E27	0.03	0.83	0.87	0.71	VOLTS

CHT	E39	0.63/86 (186.80)	0.71/84 (183.20)	0.61/87 (188.60)	0.59/88 (190.40)	VOLTS/DEG C (DEG F)
TP1	E41	4.11	4.36	4.16	3.96	VOLTS
TP2	E58	1.19	0.69	1.10	1.49	VOLTS
ACCS	PID	OFF	OFF	OFF	OFF	ON/OFF
APP	PID	0	0	0	0	%
APP1	PID	0.76	0.76	0.78	0.78	VOLTS
B+	PID	12.69	14.37	14.40	14.34	VOLTS
BARO	PID	14.50/157.02	14.50/157.02	14.50/157.02	14.35/156.11	PSI/Hz
DECHOKE	PID	YES	NO	NO	NO	YES/NO
EONV_RDY	PID	NOT READY	NOT READY	NOT READY	NOT READY	READY/NOT READY
EQ_RAT11	PID	0	14.80:1	14.84:1	14.71:1	RATIO
EQ_RAT21	PID	0	14.70:1	14.84:1	14.90:1	RATIO
ETC_TRIM	PID	0.29	0.30	0.29	0.28	DEG
FLI	PID	41.56	41.56	40.39	37.64	%
GEAR	PID	1	1	5	6	GEAR
IACKAM2	PID	-0.41	-0.34	-0.41	-0.41	NUMERIC VALUE
INJPWR_M	PID	12.62	14.23	14.23	14.33	VOLTS
LOAD	PID	0.00	26.66	54.11	70.19	%
MIL_DIS	PID	0	0	0	0	Miles
MISFIRE	PID	NO	NO	NO	NO	YES/NO
MP_LRN	PID	0	0	0	0	YES/NO
NM	PID	0	0	0	0	COUNT
O2S11_IMPED	PID	5.0	0.09	0.09	0.09	VOLTS
O2S21_IMPED	PID	5.0	0.09	0.09	0.09	VOLTS
RPM	PID	0	600	1310	1725	RPM
SYNC	PID	YES	YES	YES	YES	YES/NO
TORQUE	PID	0	0	0	0	Nm
VCT_EXH_DIF1	PID	0.00	0.00	-0.62	-2.00	DEG
VCT_EXH_DIF2	PID	0.00	0.25	-0.62	-1.75	DEG
VCT_INT_ACT1	PID	0.00	0.25	-9.75	-10.12	DEG
VCT_INT_ACT2	PID	0.00	-0.25	-10.12	-10.00	DEG
VSS	PID	0	0	48 km/h (30 MPH)	89 km/h (55 MPH)	km/h/MPH

Actuators/Outputs	PCM Pin/PID Only	Measured/PID Values				Units Measured/PID
		KOEO	Hot Idle	48 KM/H (30 MPH)	89 KM/H (55 MPH)	
EVAPCV	B20	0.00/OFF	23.01/OFF	29.63/OFF	085.92/OFF	%/ON/OFF
FP	B62	75.00	35.85	35.74	035.73	%
VCT_EXH_DC2	E18	0.00	0.00	41.81	37.47	%
EVAPCP	E32	0.00	23.01	029.63	85.92	%
VCT_EXH_DC1	E52	0.00	0.00	41.28	37.49	%
VCT_INT_DC1	E67	0.00	0.00	42.34	39.26	%
VCT_INT_DC2	E68	0.00	0.00	42.52	38.50	%
O2S11_HTR	E69	20.78	31.37	25.88	25.49	%
HTR11	E69	OFF	ON	ON	ON	ON/OFF
HTRCM11	E69	0	0	0	0	Amps
O2S21_HTR	E70	20.78	36.47	29.02	27.45	%
HTR21	E70	OFF	ON	ON	ON	ON/OFF
HTRCM21	E70	0	0	0	0	Amps
HTR22	T48	OFF	ON	ON	ON	ON/OFF
HTRCM22	T48	0.00	819.00	747.00	747.00	mA
HTR12	T49	OFF	ON	ON	ON	ON/OFF
HTRCM12	T49	0.00	819.00	785.00	0785.00	mA
CLRDIST	PID	73.94	73.94	74.56	078.29	MILES
EGR_EVAL	PID	YES	YES	YES	YES	YES/NO
EVAP020C	PID	NO	NO	NO	NO	YES/NO
EVAP020D	PID	0	0	0	0	ALLOW/DISALLOW
EVAP020R	PID	0	0	0	0	READY/NOT READY
EVAPSOAK	PID	NO	YES	NO	NO	YES/NO
EVAPSTA	PID	NOT RUNNING	NOT RUNNING	NOT RUNNING	NOT RUNNING	STATUS
EVAP_EVAL	PID	YES	YES	YES	YES	YES/NO
FANDC	PID	0	0	0	0	%
FANVAR	PID	0	0	0	0	%
FUELSYS	PID	OPEN	OPEN	OPEN	OPEN	OPEN/CLOSED LOOP
IGN_R/S	PID	0	0	0	0	ON/OFF
LONGFT1	PID	6.25	6.25	-0.78	2.34	%

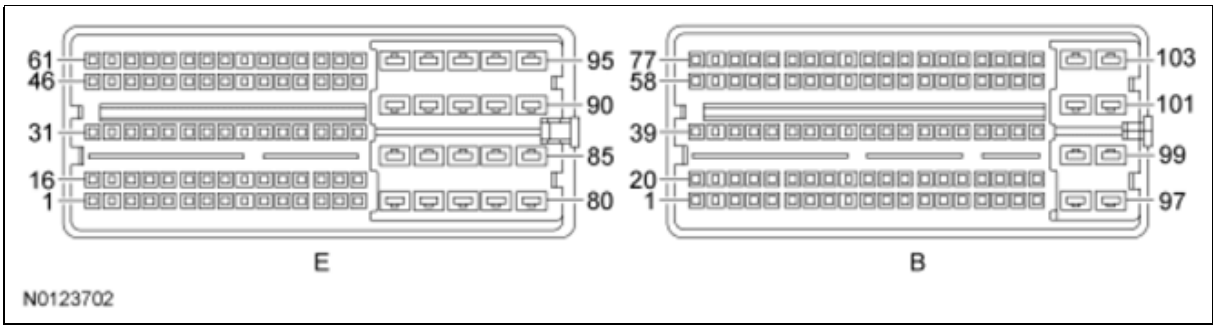
LONGFT2	PID	5.46	5.46	0.78	3.12	%
MIL	PID	OFF	OFF	OFF	OFF	ON/OFF
O2S_EVAL	PID	YES	YES	YES	YES	YES/NO
O2SHTR_EVAL	PID	YES	YES	YES	YES	YES/NO
RPMDSD	PID	925	600	1310	600	RPM
SHRTFT1	PID	0.00	2.34	0.78	0.78	%
SHRTFT2	PID	0.00	2.34	0.78	2.34	%
SPARKADV	PID	25.50	11.25	36.50	21.50	DEG
VCTSYS	PID	OPEN	CLOSED	CLOSED	CLOSED	OPEN/CLOSED LOOP

Other	PCM Pin/PID Only	Measured/PID Values				Units Measured/PID
		KOEO	Hot Idle	48 KM/H (30 MPH)	89 KM/H (55 MPH)	
VPWR	B52/66	12	13-14	13-14	13-14	VOLTS
VREF	B67/68	5	5	5	5	VOLTS

3.5L GTDI F-150

198-Pin PCM

Fig 1: 3.5L GTDI F-150 PCM Connector



Courtesy of FORD MOTOR CO.

3.5L GTDI F-150 > TYPICAL DIAGNOSTIC REFERENCE VALUES

Sensors/Inputs	PCM Pin/PID Only	Measured/PID Values				Units Measured/PID
		KOEO	Hot Idle	48 KM/H (30 MPH)	89 KM/H (55 MPH)	
FPM	B27	60.39	60.39	59.40	59.40	%
CAC_T	B32	51 (123.8)	25 (77.0)	14 (57.2)	14 (57.2)	DEG C (DEG F)

CAC_V	B32	1.72	3.02	3.52	3.55	VOLTS
APP2	B54	0.40/7.84	0.40/7.84	0.56/10.98	0.58/11.37	VOLTS/%
APP1	B55	0.80/16.7	0.80/16.7	1.11/9.0	1.15/11.0	VOLTS/%
O2S12	B57	(I)	(D)	(D)	(D)	VOLTS
BOO1	B66	OFF	OFF	OFF	OFF	ON/OFF
FTP	B73	2.63/0	2.66/0	2.63/0	2.37/-0.06	VOLTS/PSI
FTP_H2O	B73	0.103	0.275	0.103	-1.689	in-H_2 O
TCBP	B74	99.3/14.41	99.5/14.44	100.2/14.54	115.6/16.77	kPa/PSI
TCBP_V	B74	1.56	1.56	1.56	1.79	VOLTS
IAT	B75	1.61/53 (127.4)	3.35/17 (62.6)	3.71/10 (51.8)	3.69/10 (51.8)	VOLTS/DEG C (DEG F)
BOO2	B93	OFF	OFF	OFF	OFF	ON/OFF
VCT_EXH_ACT2	E17	0	0.06	46.00	42.06	DEG
VCT_INT_ACT1	E1	0	0.18	-0.56	-0.81	DEG
VCT_INT_ACT2	E18	0	-0.12	0.25	0.31	DEG
VCT_EXH_ACT1	E29	0	-0.06	48.25	41.93	DEG
FRP	E35	1.61/6.55 (949.75)	0.73/1.39 (201.55)	0.85/2.22 (321.90)	1.06/3.45 (500.25)	VOLTS/MPa (PSI)
CHT	E36	3.27/89 (192.2)	3.18/92 (197.6)	3.48/80 (176.0)	2.96/91 (195.8)	VOLTS/DEG C (DEG F)
TP2	E52	1.24	0.82	1.03	1.17	VOLTS
O2S11_CUR	E62	(I)	switching (C)	switching (C)	switching (C)	uA
TP1	E68	4.08	4.29	4.19	4.11	VOLTS
APP	PID	0	0	4.5	13	%
B+	PID	VBAT	VBAT	VBAT	VBAT	VOLTS
BARO	PID	3.97	3.93	3.93	3.93	VOLTS
BRKOVRD_POSS	PID	45	45	45	45	NUMERIC VALUE
BRKOVR_ACTION	PID	0	0	0	0	NUMERIC VALUE
DECHOKE	PID	YES	NO	NO	NO	YES/NO
DIST_BRKOVRD	PID	391.3 (243.16)	391.3 (243.16)	361.3 (224.53)	362.8 (225.46)	KM (MILES)
EQ_RAT11	PID	0	14.56	14.37	14.88	RATIO
EQ_RAT21	PID	0	14.83	14.84	14.61	RATIO
ETC_TRIM	PID	0.18 (J)	0.13 (J)	0.17 (J)	0.17 (J)	DEG
FLI	PID	93.72 (H)	93.72 (H)	92.54 (H)	93.72 (H)	%
INJPWR_M	PID	0	0	0	0	VOLTS

LOAD	PID	(I)	33.33	32.94	56.86	%
MIL_DIS	PID	0	0	0	0	Miles
MISFIRE	PID	NO	NO	NO	NO	YES/NO
MP_LRN	PID	YES	YES	YES	YES	YES/NO
O2S11_IMPED	PID	4.93	1	1	1	VOLTS
O2S21_IMPED	PID	4.93	1	1	1	VOLTS
RPM	PID	0	653	1260	1357	RPM
SYNC	PID	NO	YES	YES	YES	YES/NO
VCT_EXH_DIF1	PID	0	0.06	-9.68	0.50	DEG
VCT_EXH_DIF2	PID	0	-0.06	-7.37	0.31	DEG
VCT_EXH_DSD	PID	0	0	38.56	42.43	DEG
VCT_INT_DIF1	PID	0	-0.12	0.37	0.68	DEG
VCT_INT_DIF2	PID	0	0	-0.25	-0.37	DEG
TCBP_DSD	PID	99.8/14.48	99.8/14.48	99.6/14.46	114.1/16.56	kPa/PSI
VSS	PID	0	0	48 km/h (30 MPH)	89 km/h (55 MPH)	km/h/MPH

Actuators/Outputs	PCM Pin/PID Only	Measured/PID Values				Units Measured/PID
		KOEO	Hot Idle	48 KM/H (30 MPH)	89 KM/H (55 MPH)	
HTR12	B1	OFF	ON	ON	ON	ON/OFF
HTRCM12	B1	0	609	854	854	A/mA
EVAPCP	B22	0	11.79	67.58	59.08	%
FP	B39	75	27.93	28.01	28.07	%
HTR22	B61	OFF	ON	ON	ON	ON/OFF
O2S11_HTR	E15	0	1.00	36.86	33.33	%
TURBO_WGATE	E16	0	0	0	6.75	%
CAT_EVAL	PID	YES	YES	NO	NO	YES/NO
EGR_EVAL	PID	YES	YES	NO	NO	YES/NO
EVAP020C	PID	NO	NO	NO	NO	YES/NO
EVAPCV	PID	OFF	OFF	OFF	OFF	%/ON/OFF
EVAPSOAK	PID	YES	YES	YES	YES	YES/NO
EVAPSTA	PID	NOT RUNNING	NOT RUNNING	NOT RUNNING	NOT RUNNING	STATUS
EVAP_EVAL	PID	NO	NO	NO	NO	YES/NO

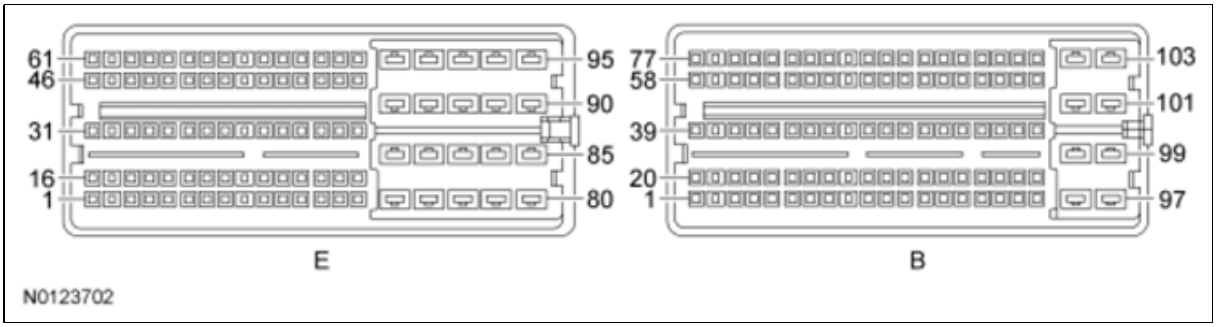
FUELSYS	PID	OPEN LOOP	CLOSED LOOP	CLOSED LOOP	CLOSED LOOP	OPEN/CLOSED LOOP
F_VCV	PID	0	4.94	14.18	16.01	%-VARYING
HFC	PID	OFF	OFF	OFF	OFF	%
LFC	PID	OFF	OFF	OFF	OFF	%
LONGFT1	PID	(I)	-20 TO +20	-20 TO +20	-20 TO +20	%
LONGFT2	PID	(I)	-20 TO +20	-20 TO +20	-20 TO +20	%
O2S_EVAL	PID	YES	YES	YES	NO	YES/NO
O2SHTR_EVAL	PID	YES	YES	YES	NO	YES/NO
RPMDSD	PID	875	655	580	634	RPM
SHRTFT1	PID	(I)	-10 TO +10	-10 TO +10	-10 TO +10	%
SHRTFT2	PID	(I)	-10 TO +10	-10 TO +10	-10 TO +10	%
SPARKADV	PID	10.00	-3.00	36.25	22.25	DEG
TURBO_BPASS	PID	OFF	OFF	OFF	OFF	ON/OFF
TURBO_BPASS_2	PID	OFF	OFF	OFF	OFF	ON/OFF
VCT_EXH_DC1	PID	0	0	29.80	43.79	%
VCT_EXH_DC2	PID	0	0	31.35	43.11	%
VCT_INT_DC1	PID	0	0	-0.56	-0.81	%
VCT_INT_DC2	PID	0	0	0.25	0.31	%
VCT_INTK_DSD	PID	0	0	0.25	0.31	DEG

Other	PCM Pin/PID Only	Measured/PID Values				Units Measured/PID
		KOEO	Hot Idle	48 KM/H (30 MPH)	89 KM/H (55 MPH)	
VPWR	B101/B102/B103	VBAT	VBAT	VBAT	VBAT	VOLTS
VREF	B11/B52/E8	5	5	5	5	VOLTS

3.5L GTDI TRANSIT

198-Pin PCM

Fig 1: 3.5L GTDI Transit PCM Connector



Courtesy of FORD MOTOR CO.

3.5L GTDI TRANSIT > TYPICAL DIAGNOSTIC REFERENCE VALUES

Sensors/Inputs	PCM Pin/PID Only	Measured/PID Values				Units Measured/PID
		KOEO	Hot Idle	48 KM/H (30 MPH)	89 KM/H (55 MPH)	
HTRCM12	B1	0	569	569	569	mA
FPM	B27	59.40	59.40	60	60.39	%
CAC_T	B32	34 (93.20)	33 (91.40)	28 (82.40)	30 (86)	DEG C (DEG F)
CAC_V	B32	2.54	2.56	2.84	2.74	VOLTS
KEYST	B48	ON	ON	ON	ON	ON/OFF
AAT	B51	21 (69.80)	21 (69.80)	20 (68)	20 (68)	DEG C (DEG F)
AAT_V	B51	1.23	1.23	1.25	1.24	VOLTS
APP2	B54	0.39	0.39	0.63	0.66	VOLTS
APP1	B55	0.78	0.78	1.25	1.30	VOLTS
O2S22	B56	(I)	switching (D)	switching (D)	switching (D)	VOLTS
O2S12	B57	(I)	switching (D)	switching (D)	switching (D)	VOLTS
HTRCM22	B61	0	618	618	618	mA
BOO2	B65	OFF	OFF	OFF	OFF	ON/OFF
BOO1	B66	OFF	OFF	OFF	OFF	ON/OFF
TURBO_INLET	B72	98.87 (14.34)	98.87 (14.34)	98.87 (14.34)	98.75 (14.32)	kPa (PSI)
TURBO_INLET_V	B72	3.99	3.99	3.99	3.99	VOLTS
FTP	B73	2.26/-632 (-0.09)	2.26/-632 (-0.09)	2.19/-744 (-0.11)	2.38/-426 (-0.06)	VOLTS/Pa (PSI)
FTP_H2O	B73	-2.52	-2.52	-3	-1.72	in-H_2 O

TCBP	B74	99.38 (14.41)	99.38 (14.41)	99.71 (14.46)	102.71 (14.90)	kPa (PSI)
TCBP_V	B74	1.56	1.56	1.56	1.77	VOLTS
IAT	B75	1.16/66 (150.8)	1.52/45.56 (114.80)	2.31/26 (78.80)	2.35/27 (80.60)	VOLTS/DEG C (DEG F)
B+	B100	12.29	14.33	13.89	14.05	VOLTS
IAT2	E33	1.46/58 (136.40)	1.44/58 (136.40)	2.48/34 (93.20)	2.32/38 (100.40)	VOLTS/DEG C (DEG F)
MAP	E34	99 (14.36)	42 (6.09)	39 (5.66)	77 (11.17)	kPa (PSI)
MAP_GAUGE	E34	2 (0.29)	59 (8.56)	62 (8.99)	24 (3.48)	kPa (PSI)
MAP_V	E34	1.60	0.97	0.93	1.64	VOLTS
FRP	E35	1.12/3.68 (533.74)	0.74/1.48 (214.66)	0.87/2.25 (326.33)	1/3.02 (438.01)	VOLTS/MPa (PSI)
CHT	E36	3.01/97 (206.60)	3.01/97 (206.60)	3.18/91 (195.80)	3.05/91 (195.80)	VOLTS/DEG C (DEG F)
KNOCK_2	E50	0	46	67	57	COUNT
TP2	E52	1.24/24.70	0.77/15.29	1.17/23.13	1.63/32.54	VOLTS/%
O2S21_CUR	E61	(I)	switching	switching	switching	mA/uA
O2S21	E62	(I)	switching (C)	switching (C)	switching (C)	VOLTS
O2S11_CUR	E63	(I)	switching	switching	switching	mA/uA
KNOCK_1	E65	0	30	42	43	COUNT
TP1	E68	4.09/18.03	4.32/15.29	4.23/15.29	3.96/20.39	VOLTS/%
AC_REQ	PID	NO	NO	NO	NO	YES/NO
APP	PID	0	0	15	16.50	%
APP_MAXDIFF	PID	0	0	0	0	DEG
APP_MODE	PID	NO PEDAL	NO PEDAL	PART PEDAL	PART PEDAL	NO PEDAL/PART PEDAL
APP1 (APP_D)	PID	15.29	15.29	25.09	25.88	%
APP2 (APP_E)	PID	7.84	7.84	12.54	12.94	%
BRKOVR_ACTION	PID	1	1	1	1	NUMERIC VALUE
BRKOVRD_POSS	PID	143	143	144	144	NUMERIC VALUE
CYL_1-6_ACCL	PID	(I)	-1 TO +1	-1 TO +1	-1 TO +1	NUMERIC VALUE
DECHOKE	PID	YES	NO	NO	NO	YES/NO
DIST_BRKOVRD	PID	50.96 (31.67)	50.96 (31.67)	78.45 (48.75)	80.45 (49.99)	KM (MILES)
EONV_RDY	PID	NOT READY	NOT READY	NOT READY	NOT READY	READY/NOT READY

EQ_RAT11	PID	0:1	14.466:1	14.044:1	14.419:1	RATIO
EQ_RAT21	PID	0:1	14.452:1	14.218:1	14.476:1	RATIO
ETC_ACT	PID	7.97	2.27	6.35	5.92	DEG
ETC_TRIM	PID	0.36	0.36	0.36	0.36	DEG
FLI	PID	90.19 (H)	90.19 (H)	86.27 (H)	85.49 (H)	%
IACKAM2	PID	-0.23	-0.38	-0.47	-0.38	NUMERIC VALUE
INJPWR_M	PID	0	0	0	0	VOLTS
KNK_CNTR_CYL1	PID	0	0	0	0	COUNT
KNK_CNTR_CYL2	PID	0	1	1	1	COUNT
KNK_CNTR_CYL3	PID	0	0	0	0	COUNT
KNK_CNTR_CYL4	PID	0	0	0	0	COUNT
KNK_CNTR_CYL5	PID	0	0	0	0	COUNT
KNK_CNTR_CYL6	PID	0	0	0	0	COUNT
LOAD	PID	0 (I)	32.54	30.19	52.54	%
MISFIRE	PID	NO	NO	NO	NO	YES/NO
MP_LRN	PID	YES	YES	YES	YES	YES/NO
NUM_MISFIRE	PID	0	2	22	2	COUNT
O2S11_IMPED	PID	4.98	1.01	1.01	1.01	VOLTS
O2S11_READY	PID	NO	YES	YES	YES	YES/NO
O2S11_TR	PID	0	0	0	0	Kohm
O2S21_IMPED	PID	4.99	1.02	1.01	1.01	VOLTS
O2S21_READY	PID	NO	YES	YES	YES	YES/NO
O2S21_TR	PID	0	0	0	0	Kohm
OCTADJ_R_LRND	PID	3.27	3.27	5.26	5.26	%
RPM	PID	0	654.50	1418	1565	RPM
SYNC	PID	NO	YES	YES	YES	YES/NO
TP1_LRN_TRIM	PID	6.87	6.87	6.87	6.87	DEG
TP2_LRN_TRIM	PID	7	7	7	7	DEG
TPMODE	PID	CT	CT	PT	PT	CLOSED/PART/WIDE OPEN THROTTLE
TURBO_BP1_STAT	PID	NO FAULT	NO FAULT	NO FAULT	NO FAULT	FAULT/NO FAULT
VCT_EXH_ACT1	PID	0	-0.12	39	37.50	DEG
VCT_EXH_ACT2	PID	0	0.12	38.68	36.25	DEG
VCT_EXH_DIF1	PID	0	0.12	-0.31	0.12	DEG
VCT_EXH_DIF2	PID	0	-0.12	0	0.75	DEG

VCT_INT_ACT1	PID	0	0.06	1.25	1.25	DEG
VCT_INT_ACT2	PID	0	0	0.12	0.43	DEG
VCT_INT_DIF1	PID	0	-0.18	-1.43	-1.37	DEG
VCT_INT_DIF2	PID	0	0.12	-0.31	-0.31	DEG
VCTSYS	PID	OPEN LOOP	CLOSED LOOP	CLOSED LOOP	CLOSED LOOP	OPEN LOOP/CLOSED LOOP
VSS	PID	0	0	48 km/h (30 MPH)	89 km/h (55 MPH)	km/h/MPH

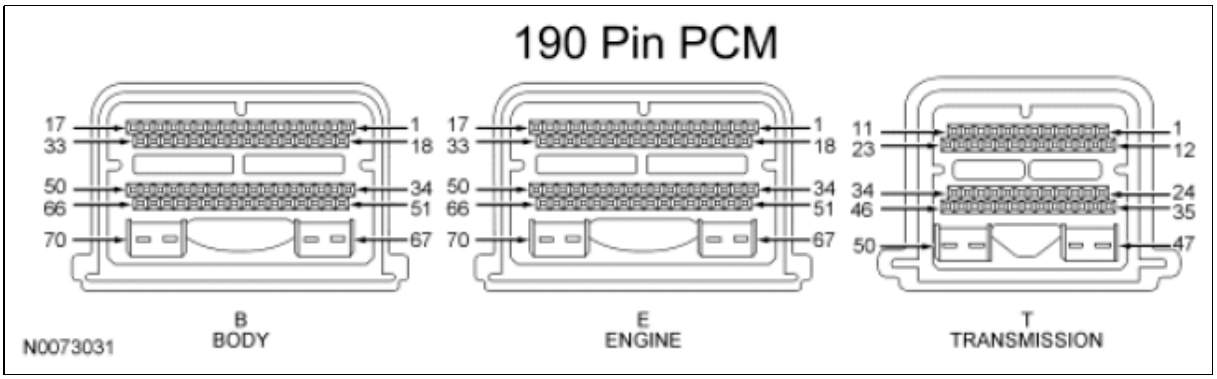
Actuators/Outputs	PCM Pin/PID Only	Measured/PID Values				Units Measured/PID
		KOEO	Hot Idle	48 KM/H (30 MPH)	89 KM/H (55 MPH)	
HTR12	B1	OFF	ON	ON	ON	ON/OFF
HFC	B4	OFF	OFF	OFF	OFF	ON/OFF
EVAPCV	B20	0/OFF	0/OFF	0/OFF	0/OFF	%/ON-OFF
EVAPCP	B22	0	35	0	22.30	%
LFC	B23	OFF	OFF	OFF	OFF	ON/OFF
FP	B39	75/OFF	27.96/ON	28.17/ON	28.43/ON	%/ON/OFF
HTR22	B61	OFF	ON	ON	ON	ON/OFF
VCT_INT_DC1	E1	0	0	0	41.79	%
TURBO_BPASS	E3	OFF	OFF	ON	OFF	ON/OFF
HTR11	E14	OFF	ON	ON	ON	ON/OFF
O2S11_HTR	E14	0	40	35.29	34.11	%
HTR21	E15	OFF	ON	ON	ON	ON/OFF
O2S21_HTR	E15	0	41.96	35.29	34.11	%
TURBO_WGATE	E16	0	0	0	90.89	%
VCT_EXH_DC2	E17	0	0	48.44	50.64	%
VCT_INT_DC2	E18	0	0	0	41.59	%
VCT_EXH_DC1	E29	0	0	44.64	45.09	%
F_VCV	E78	0	7.40	12.06	19.55	%
ETC [TAC_PCT]	PID	9.02	2.74	7.84	7.05	%
EVAP020C	PID	NO	NO	NO	NO	YES/NO
EVAPSOAK	PID	NO	NO	NO	NO	YES/NO
EVAPSTA	PID	NOT RUNNING	NOT RUNNING	NOT RUNNING	NOT RUNNING	STATUS

FUELSYS	PID	OPEN LOOP	CLOSED LOOP	CLOSED LOOP	CLOSED LOOP	OPEN LOOP/CLOSED LOOP
IACTRIM	PID	0	0.54	0.29	0.46	NUMERIC VALUE
INJ1-6_OFF	PID	--	--	--	--	--/DISABLE
LONGFT1	PID	(I)	-20 TO +20	-20 TO +20	-20 TO +20	%
LONGFT2	PID	(I)	-20 TO +20	-20 TO +20	-20 TO +20	%
MIL	PID	OFF	OFF	OFF	OFF	ON/OFF
O2_DS_DISBL	PID	YES	NO	NO	NO	YES/NO
RO2FT1	PID	0	1	-1.67	1.77	%
RO2FT2	PID	0	1	1.72	-1.70	%
SHRTFT1	PID	(I)	-10 TO +10	-10 TO +10	-10 TO +10	%
SHRTFT2	PID	(I)	-10 TO +10	-10 TO +10	-10 TO +10	%
SPARKADV	PID	10	-0.50	33	22.25	DEG
TQ_CNTRL	PID	ANTI THEFT	NONE REQUESTED	NONE REQUESTED	NONE REQUESTED	STATUS

Other	PCM Pin/PID Only	Measured/PID Values				Units Measured/PID
		KOEO	Hot Idle	48 KM/H (30 MPH)	89 KM/H (55 MPH)	
VREF	B11/E8	5	5	5	5	VOLTS
VPWR	B101/B102/B103	VBAT	VBAT	VBAT	VBAT	VOLTS

5.4L 2V E-SERIES

Fig 1: 5.4L 2V E-Series PCM Connector



Courtesy of FORD MOTOR CO.

5.4L 2V E-SERIES > TYPICAL DIAGNOSTIC REFERENCE VALUES

Sensors/Inputs	PCM Pin/PID Only	Measured/PID Values				Units Measured/PID
		KOEO	Hot Idle	48 KM/H (30 MPH)	89 KM/H (55 MPH)	
PTO (5R110W)	B3	OFF	OFF	OFF	OFF	ON/OFF
PTOLOAD	B6	NO	NO	NO	NO	YES/NO
PTOIR_V (5R110W)	B8	0	0	0	0	VOLTS
BOO1	B13	OFF	ON (E)	OFF	OFF	ON/OFF
APP1	B28	0.78	0.78	1.33	1.62	VOLTS
APP2	B29	0.39	0.39	0.67	0.81	VOLTS
FPM	B32	59.7	60.3	60.33	59.66	%
MAF	B40	0	0.71	1.49	1.58	VOLTS
BOO2	B46	OFF	ON (E)	OFF	OFF	ON/OFF
IAT	B47	1.9/46 (114.8)	2.51/34 (93.2)	3.91/5 (41)	4/2 (35.6)	VOLTS/DEG C (DEG F)
FTP	B65	2.6/0	2.6/0	2.1/-0.13	1.95/-0.17	VOLTS/PS I
FTP_H2O	B65	0.06	-0.75	0.03	0.13	in-H_2 0
CHT	E15	0.61/88.8 (192)	0.67/88 (190.4)	0.91/75 (167)	0.65/87 (188.6)	VOLTS/DEG C (DEG F)
KNOCK 1	E46	41	41	61	91	N/A
HTRCM11	E69	0	1.7	1.7	1.7	AMPS
O2S12	T16	(I)	(D)	(D)	(D)	VOLTS
HTRCM12	T18	0	1.26	1.33	1.33	AMPS
O2S22	T20	(I)	(D)	(D)	(D)	VOLTS
APP	PID	0	0	17	26	%
BARO	PID	14.3/156.2	14.3/156.2	14.3/156.2	14.21/155.2	PSI/Hz
B+	PID	12.52	13-14	13-14	13-14	VOLTS
DECHOKE	PID	NO	NO	NO	NO	YES/NO
ETC_TRIM	PID	-0.33 (J)	-0.35 (J)	-0.3 (J)	-0.3 (J)	DEG
FLI	PID	9.41 (H)	9.41 (H)	6.27 (H)	6.66 (H)	%
LOAD	PID	0 (I)	24.71	34.9	52.16	%
MISFIRE	PID	NO	NO	NO	NO	YES/NO
O2S11_CUR	PID	(I)	switching	switching	switching	mA/uA
O2S11_IMPED	PID	4.96	1.02	1.07	1.03	VOLTS
O2S21_CUR	PID	(I)	switching	switching	switching	mA/uA
O2S21_IMPED	PID	4.97	1.02	0.97	0.99	VOLTS

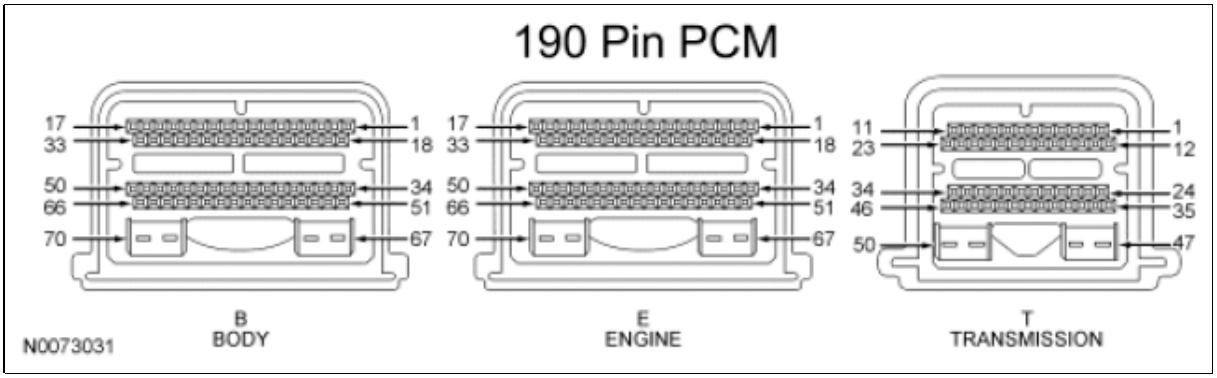
RPM	PID	0	720	1100	1600	RPM
VSS	PID	0	0	48 km/h (30 MPH)	89 km/h (55 MPH)	km/h/MPH

Actuators/Outputs	PCM Pin/PID Only	Measured/PID Values				Units Measured/PID
		KOEO	Hot Idle	48 KM/H (30 MPH)	89 KM/H (55 MPH)	
PTOIL	B11	OFF	OFF	OFF	OFF	ON/OFF
FP	B19	75/OFF	20/ON	20/ON	23/ON	%/ON/OFF
EVAPCV	B20	0/OFF	0/OFF	0/OFF	0/OFF	%/ON/OFF
EVAPCP	E31	0	39.61	0	0	%
HTR11	E69	OFF	ON	ON	ON	ON/OFF
HTR12	T18	OFF	ON	ON	ON	ON/OFF
HTR22	T48	ON	ON	ON	ON	ON/OFF
EGR_EVAL	PID	YES	YES	YES	YES	YES/NO
EVAP020C	PID	NO	NO	NO	NO	YES/NO
EVAPSOAK	PID	NO	NO	NO	NO	YES/NO
EVAP_EVAL	PID	NO	NO	NO	NO	YES/NO
LONGFT1	PID	(I)	-20 TO +20	-20 TO +20	-20 TO +20	%
LONGFT2	PID	(I)	-20 TO +20	-20 TO +20	-20 TO +20	%
SHRTFT1	PID	(I)	-10 TO +10	-10 TO +10	-10 TO +10	%
SHRTFT2	PID	(I)	-10 TO +10	-10 TO +10	-10 TO +10	%
SPARKADV	PID	27.5	11	22.75	8.75	DEG

Other	PCM Pin/PID Only	Measured/PID Values				Units Measured/PID
		KOEO	Hot Idle	48 KM/H (30 MPH)	89 KM/H (55 MPH)	
VPWR	B30/B67/B68	12-13	13-14	13-14	13-14	VOLTS
VREF	B52/E63/T10	5	5	5	5	VOLTS

6.2L 2V F-SERIES SUPER DUTY

Fig 1: 6.2L 2V F-Series Super Duty PCM Connector



Courtesy of FORD MOTOR CO.

6.2L 2V F-SERIES SUPER DUTY > TYPICAL DIAGNOSTIC REFERENCE VALUES

Sensors/Inputs	PCM Pin/PID Only	Measured/PID Values				Units Measured/PID
		KOEO	Hot Idle	48 KM/H (30 MPH)	89 KM/H (55 MPH)	
FANSS	B3	6375	575	775	950	RPM
PTOIR_V	B8	0	0	0	0	VOLTS
BOO1	B13	OFF	ON (E)	OFF	OFF	ON/OFF
PTO	B22	OFF	OFF	OFF	OFF	ON/OFF
APP1	B28	0.84	0.82	1.45	1.36	VOLTS
APP2	B29	0.42	0.41	0.73	0.69	VOLTS
FPM	B32	61.32	61.32	60.35	60.31	%
MAF	B40	0.29	5.23	14.28	32.09	g/s
BOO2	B46	OFF	OFF	OFF	OFF	ON/OFF
IAT	B47	1.96/43.8 (111)	2.11/40.5 (105)	2.65/28.8 (84)	3.38/13.8 (57)	VOLTS/DEG C (DEG F)
B+	B62	12.4	13-14	13-14	13-14	VOLTS
FTP	B65	2.6/0.61	2.6/0.61	2.3/0.61	1.45/0.61	VOLTS/PS I
FTP_H2O	B65	-0.06	-0.03	-2.17	-8.34	in-H_2 0
KNOCK_1	E7	0	689	749	946	N/A
CHT	E30	0.56/92 (197.6)	0.55/93 (199.4)	3.51/95.5 (204)	3.4/98.8 (210)	VOLTS/DEG C (DEG F)
KNOCK_2	E45	0	528	670	834	N/A
O2S11_CUR	T4/T29	(I)	switching	switching	switching	mA/uA
O2S12	T18	(I)	(D)	(D)	(D)	VOLTS

CPP/PNP (M/T)	T19	NEUTRAL	NEUTRAL	DRIVE	DRIVE	NEUTRAL/DRIVE
HTRCM11	T24	0	1.66	1.66	1.49	AMPS
O2S22	T27	(I)	(D)	(D)	(D)	VOLTS
O2S21_CUR	T28/T39	(I)	switching	switching	switching	mA/uA
HTRCM21	T35	0	1.09	1.66	1.5	AMPS
HTRCM12	T47	0 (AMP)	1.09 (AMP)	1.09 (AMP)	895 (mA)	mA/AMP
APP	PID	0	0	7	16.5	%
APP_MODE	PID	NO PEDAL	NO PEDAL	PART PEDAL	PART PEDAL	NO PEDAL/PART PEDAL
BARO	PID	14.79/159.3	14.79/159.3	14.73/158.9	14.86/159.7	PSI/Hz
CAT_EVAL	PID	YES	YES	YES	YES	YES/NO
EGR_EVAL	PID	YES	YES	YES	YES	YES/NO
EONV_RDY	PID	NOT READY	NOT READY	NOT READY	NOT READY	READY/NOT READY
ETC_TRIM	PID	-0.51 (J)	-0.51 (J)	-0.51 (J)	-0.51 (J)	DEG
EVAP_EVAL	PID	NO	NO	NO	NO	YES/NO
EVAP020C	PID	NO	NO	NO	NO	YES/NO
EVAPSOAK	PID	YES	YES	YES	YES	YES/NO
FLI	PID	89 (H)	88 (H)	85 (H)	95 (H)	%
FUELSYS	PID	OPEN LOOP	CLOSED LOOP	CLOSED LOOP	CLOSED LOOP	OPEN/CLOSED LOOP
LOAD	PID	0	21	51	87	%
MISFIRE	PID	NO	NO	NO	NO	YES/NO
MP_LRN	PID	NO	NO	NO	NO	YES/NO
O2S_EVAL	PID	OFF	NO	YES	YES	YES/NO
PTOLOAD	PID	OFF	OFF	OFF	OFF	OFF/ON
RPM	PID	0	598	1047	1493	RPM
VCTADVERR	PID	0	0.62	-1	1.37	DEG
VCTADVERR2	PID	0	-0.18	-1	1.12	DEG
VCTSYS	PID	OPEN LOOP	CLOSED LOOP	CLOSED LOOP	CLOSED LOOP	OPEN/CLOSED LOOP
VSS	PID	0	0	48 km/h (30 MPH)	89 km/h (55 MPH)	km/h/MPH

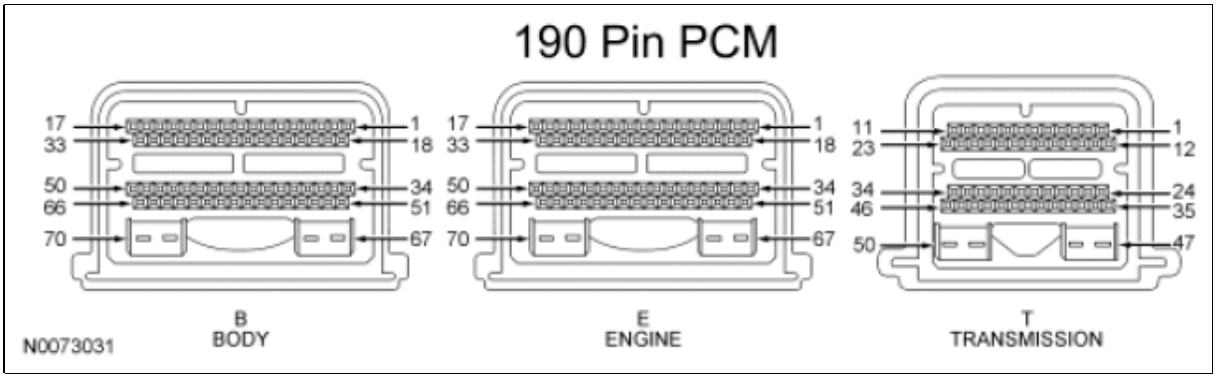
Actuators/Outputs	PCM Pin/PID Only	Measured/PID Values				Units Measured/PID
		KOEO	Hot Idle	48 KM/H (30 MPH)	89 KM/H (55 MPH)	

PTOIL	B11	OFF	OFF	OFF	OFF	ON/OFF
FP	B19	75/OFF	35/ON	34.5/ON	34.6/ON	%/ON/OFF
EVAPCV	B20	0/OFF	0/OFF	0/OFF	0/OFF	%/ON/OFF
VCTDC	E2	0	0	39	44.46	VOLTS
VCTDC2	E16	0	0	45.92	43.12	VOLTS
EVAPCP	E49	0	24.16	98.53	98.19	%
O2S11_HTR	T24	0	41	39	37	%
O2S21_HTR	T35	0	41	39	35	%
HTR11	T24	OFF	ON	ON	ON	ON/OFF
HTR12	T47	OFF	ON	ON	ON	ON/OFF
O2SHTR_EVAL	PID	NO	NO	YES	YES	YES/NO
RPMDSD	PID	602	600	525	565	RPM
LONGFT1	PID	(I)	-20 TO +20	-20 TO +20	-20 TO +20	%
LONGFT2	PID	(I)	-20 TO +20	-20 TO +20	-20 TO +20	%
MIL	PID	OFF	OFF	OFF	OFF	ON/OFF
SHRTFT1	PID	(I)	-10 TO +10	-10 TO +10	-10 TO +10	%
SHRTFT2	PID	(I)	-10 TO +10	-10 TO +10	-10 TO +10	%
SPARKADV	PID	10	15.75	40	38	DEG
VCTADV	PID	0	-0.62	52.06	50.25	DEG
VCTADV2	PID	0	0.18	52.06	49.88	DEG

Other	PCM Pin/PID Only	Measured/PID Values				Units Measured/PID
		KOEO	Hot Idle	48 KM/H (30 MPH)	89 KM/H (55 MPH)	
VREF	B52/E20/T31	5	5	5	5	VOLTS
VPWR	B67/68	VBAT	VBAT	VBAT	VBAT	VOLTS

6.8L 3V F-650/F-750

Fig 1: 6.8L 3V F-650/F-750 PCM Connector



Courtesy of FORD MOTOR CO.

6.8L 3V F-650/F-750 > TYPICAL DIAGNOSTIC REFERENCE VALUES

Sensors/Inputs	PCM Pin/PID Only	Measured/PID Values				Units Measured/PID
		KOEO	Hot Idle	48 KM/H (30 MPH)	89 KM/H (55 MPH)	
BOO1	B13	OFF	OFF	OFF	OFF	ON/OFF
APP1	B28	0.78	0.78	1.20	1.43	VOLTS
APP2	B29	0.39	0.39	0.60	0.71	VOLTS
FPM	B32	41.26	40.28	39.68	41.22	%
MAF	B40	0/657	8.41/2.63	34.53/4.60	49.39/5.29	g/s/Hz/kHz
BOO2	B46	OFF	OFF	OFF	OFF	ON/OFF
IAT	B47	2.71/30 (86)	3.08/22 (71.6)	3.99/3 (37.40)	3.99/3 (37.40)	VOLTS/DEG C (DEG F)
B+	B62	12.4	13-14	13-14	13-14	VOLTS
FTP	B65	2.62/0	2.63/0	1.92/-0.17	1.87/-0.19	VOLTS/PS I
KNOCK_1	E7	0	186	331	395	N/A
TP2	E10	1.18	0.75	1.19	1.52	VOLTS
CHT	E30	0.61/89 (192.2)	0.61/89 (192.2)	3.58/94 (201.2)	3.56/96 (204.8)	VOLTS/DEG C (DEG F)
TP1	E39	4.10	4.31	4.09	3.94	VOLTS
KNOCK_2	E45	0	206	315	320	N/A
O2S11_CUR	T4/T29	(I)	switching	switching	switching	mA/uA
O2S21_CUR	T28/T39	(I)	switching	switching	switching	mA/uA
O2S12	T30	(I)	(D)	(D)	(D)	VOLTS
BARO	PID	14.35/156.11	14.35/156.11	14.35/156.11	14.35/156.11	PSI/Hz

ETC_TRIM	PID	0.60 (J)	0.69 (J)	0.31 (J)	0.36 (J)	DEG
GEAR	PID	1	1	5	6	GEAR
LOAD	PID	0.00 (I)	21.96	42.35	45.09	%
MISFIRE	PID	NO	NO	NO	NO	YES/NO
RPM	PID	0	723	1592	2077	RPM
VSS	PID	0	0	48 km/h (30 MPH)	89 km/h (55 MPH)	km/h/MPH

Actuators/Outputs	PCM Pin/PID Only	Measured/PID Values				Units Measured/PID
		KOEO	Hot Idle	48 KM/H (30 MPH)	89 KM/H (55 MPH)	
FP	B19	75	33.42	31.71	32.70	%
EVAPCV	B20	0	0	0	0	%
IMTV	E14	0.00	0.00	0.00	0.00	%
EVAPCP	E49	0	0	100	100	%
O2S11_HTR	T24	20.78	0.00	26.66	23.13	%
O2S21_HTR	T35	20.78	0.00	27.05	22.74	%
LONGFT1	PID	(I)	-20 TO +20	-20 TO +20	-20 TO +20	%
LONGFT2	PID	(I)	-20 TO +20	-20 TO +20	-20 TO +20	%
MIL	PID	OFF	OFF	OFF	OFF	ON/OFF
SHRTFT1	PID	(I)	-10 TO +10	-10 TO +10	-10 TO +10	%
SHRTFT2	PID	(I)	-10 TO +10	-10 TO +10	-10 TO +10	%
SPARKADV	PID	27.00	13.50	32.00	30.75	DEG

Other	PCM Pin/PID Only	Measured/PID Values				Units Measured/PID
		KOEO	Hot Idle	48 KM/H (30 MPH)	89 KM/H (55 MPH)	
VREF	B52/E20 T31	5	5	5	5	VOLTS
VPWR	B67/B68	VBAT	VBAT	VBAT	VBAT	VOLTS

QT: POWERTRAIN CONTROL MODULE (PCM) QUICK TEST > QT1 CARRY OUT THE PCM QUICK TEST

NOTE: For vehicles indicating not ready for inspection maintenance (I/M) testing, refer to the Owner Literature, Readiness For Inspection/Maintenance (I/M) Testing to complete the system readiness. If an I/M testing system readiness concern is still present, GO to Pinpoint Test QC .

NOTE: If the vehicle was brought in with an emission compliance concern, GO to Pinpoint Test EM .

NOTE: For applications that use a stand alone transmission control module (TCM), the PCM does not output TCM related diagnostic trouble codes (DTCs). Refer to the service information , Automatic Transmission, to continue diagnosis.

NOTE: If unable to access the PCM DTCs, or a scan tool communication concern exists, GO to Pinpoint Test QA For additional information on retrieving malfunction indicator lamp (MIL) and non-MIL DTCs, refer to QUICK TEST DESCRIPTION for the Continuous Memory Self-Test.

- Complete the preliminary checks looking for obvious concerns that may relate to the symptom. Check for the following items:
  - fuses
  - electrical circuits and connectors
  - vacuum lines (leaks, routing)
  - air intake system (leaks, restrictions)
  - fuel quality (octane, contamination, winter/summer blend)
  - cooling system (engine operating at correct temperature)
  - oil quality (contamination and correct maintenance)
- Access any related Online Automotive Service Information System (OASIS) or Technical Service Bulletin (TSB) information (if available).
- Carry out the PCM self-test to access any DTCs. Record any key ON engine OFF (KOEO), key ON engine running (KOER) (if the engine runs) and continuous memory (MIL and non-MIL) DTCs.

Are any DTCs present?

Yes	No
GO to DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND DESCRIPTIONS for direction to repair DTCs after noting the following: DIAGNOSE the DTCs in the following order (begin diagnosis with the first DTC output in that mode and diagnose any circuit related DTCs first). For multiple circuit DTCs that are set as a result of a concern with more than one component, REFER to the service information Wiring Diagrams Electronic Engine Controls Cell and identify the common cause such as SIGRTN, VREF, or VPWR. CONTINUE DTC diagnosis by referring to the appropriately identified pinpoint test. 1. Any KOEO self-test DTCs. 2. Any KOER self-test DTCs. 3. Any continuous memory self-test DTCs. Retrieve any available freeze frame data and disregard any identical/related continuous DTCs already repaired.	GO to NO DIAGNOSTIC TROUBLE CODES (DTCS) PRESENT SYMPTOM CHART INDEX for direction to the correct symptom chart in NO DIAGNOSTIC TROUBLE CODES (DTCS) PRESENT SYMPTOM CHARTS . If the symptom is not listed, REFER to the applicable service information to continue diagnosis.

NO DIAGNOSTIC TROUBLE CODES (DTCS) PRESENT SYMPTOM CHART INDEX

DRIVEABILITY - DTC SYMPTOM CHART

System/Symptom		Oasis Number	Chart Number
Starting Concerns	Hard Start/Long Crank/Erratic Start/Erratic Crank	-	CHART NUMBER: 2
	No crank	-	CHART NUMBER: 22
	No start (engine cranks)	-	CHART NUMBER: 3
Unique Idle Concerns	Slow return to idle	-	CHART NUMBER: 4
	Rolling idle	-	CHART NUMBER: 1
	Fast idle	-	CHART NUMBER: 5
	Low/Slow idle	-	CHART NUMBER: 6

DRIVEABILITY - PERFORMANCE WHILE DRIVING CONCERNS - DTC SYMPTOM CHART

System/Symptom		Oasis Number	Chart Number
Stalls/Quits	Idle/Acceleration/Cruise	-	CHART NUMBER: 1
	Deceleration	-	CHART NUMBER: 6

	Stall after start	-	CHART NUMBER: 1
Runs Rough		-	CHART NUMBER: 1
Misses		-	CHART NUMBER: 1
Buck/Jerk		-	CHART NUMBER: 1
Hesitation/Stumble		-	CHART NUMBER: 1
Surge		-	CHART NUMBER: 1
Backfires		-	CHART NUMBER: 7
Lack/Loss of Power		-	CHART NUMBER: 8
Spark Knock		-	CHART NUMBER: 9

ADDITIONAL DRIVEABILITY CONCERNS - DTC SYMPTOM CHART

System/Symptom	Oasis Number	Chart Number
Diesels/Runs On	-	CHART NUMBER: 5
Poor Fuel Economy	-	CHART NUMBER: 10
Emissions Compliance	-	CHART NUMBER: 11

ELECTRICAL - DTC SYMPTOM CHART

System/Symptom		Oasis Number	Chart Number
Warning Indicators	Malfunction indicator lamp (MIL)	-	CHART NUMBER: 12
	Transmission control indicator lamp (TCIL)	-	CHART NUMBER: 12
	Power take off (PTO)	-	CHART NUMBER: 12
	Temperature warning indicator or gauge (for vehicles equipped with a cylinder head temperature (CHT) sensor only)	-	CHART NUMBER: 12
	Check fuel cap	-	CHART NUMBER: 12
	Powertrain malfunction indicator (wrench)	-	CHART NUMBER: 12
Instrumentation	Tachometer inoperative	-	CHART NUMBER: 14
	Speedometer/odometer inoperative	-	CHART NUMBER: 14

	Boost gauge indicates higher than normal boost	-	CHART NUMBER: 14
	Fuel gauge inoperative	-	CHART NUMBER: 14

ENGINE - DTC SYMPTOM CHART

System/Symptom		Oasis Number	Chart Number
Oil System Concerns	High oil consumption	-	CHART NUMBER: 15
	Leaks	-	CHART NUMBER: 15
Cooling System Concerns	Electric cooling fan does not operate (low, high or variable speed)	-	CHART NUMBER: 16
	Cooling fan clutch does not operate	-	CHART NUMBER: 16
	Electric cooling fan always runs	-	CHART NUMBER: 17
Exhaust System Concerns	Visible smoke	-	CHART NUMBER: 18
	Odor (sulfur or rotten egg smell)	-	CHART NUMBER: 21
Fuel System Concerns	Odor, engine compartment	-	CHART NUMBER: 19
Engine Noise (under hood)		-	CHART NUMBER: 20

DRIVELINE - DTC SYMPTOM CHART

System/Symptom		Oasis Number	Chart Number
Automatic Transmission (A/T) Shift Concerns	Upshift	-	CHART NUMBER: 13
	Downshift	-	CHART NUMBER: 13
	Engagement	-	CHART NUMBER: 13

POWER TAKE OFF (PTO) - DTC SYMPTOM CHART

System/Symptom		Oasis Number	Chart Number
PTO Concerns	Not working correctly	-	CHART NUMBER: 12

NO DIAGNOSTIC TROUBLE CODES (DTCS) PRESENT SYMPTOM CHARTS > CHART 1

- Stalls/Quits: Idle, Acceleration, Cruise, Stall After Start
- Runs Rough
- Misses
- Buck/Jerk
- Hesitation/Stumble
- Surge
- Unique Idle Concerns: Rolling Idle

NOTE: For some vehicle applications, the engine may stall if left running while refueling. Advise the customer to turn the engine off while refueling to avoid contamination or damage to the evaporative emission (EVAP) system.

SYSTEM/COMPONENT	REFERENCE (Pinpoint Test unless noted)
Check the following parameter identifiers (PIDs): • LONGFT1 or LONGFT2 (value between -20 and +20%) • VPWR (value between 10.5 and 17.0 volts, and within 0.5 volt of battery voltage)	**LONGFT1 or LONGFT2 value low (-):** Continue diagnosis. Concentrate checks in areas that would cause the engine to run rich. **LONGFT1 or LONGFT2 value high (+):** Continue diagnosis. Concentrate checks in areas that would cause the engine to run lean. **VPWR not between 10.5 and 17.0 volts:** REFER to the service information , Charging System, Diagnosis and Testing to continue diagnosis. **VPWR between 10.5 and 17.0 volts, but not within 0.5 volt of battery voltage:** CHECK the B+ voltage to the powertrain control module (PCM) power relay. CHECK the VPWR circuit between the PCM and the PCM power relay. CHECK the PWR GND circuits.
Fuel Injection System	For vehicles that run rough at idle check the INJx_F PIDs (the x indicates the injector number) with the ignition ON, engine running. There is 1 INJx_F PID for each engine cylinder. All INJx_F PIDs must indicate NO FAULT. The INJx_F PIDs indicate a fault (an injector circuit concern is indicated). For Edge 2.0L, Edge 2.7L, Escape/Kuga 1.6L, Escape/Kuga 2.0L, Expedition, Explorer 2.0L, Explorer 3.5L GTDI, F-150 2.7L, F-150 3.5L GTDI, Fiesta 1.0L, Fiesta 1.6L GTDI, Flex 3.5L GTDI, Focus, Fusion 1.5L, Fusion 1.6L, Fusion 2.0L, MKC, MKS 3.5L, MKT 2.0L, MKT 3.5L, MKZ 2.0L, Mustang 2.3L, Navigator, Taurus

	2.0L, Taurus 3.5L GTDI, Transit 3.5L and Transit Connect 1.6L, GO to Pinpoint Test DI . For all others, GO to Pinpoint Test KG .
Mass Airflow (MAF) Sensor	GO to Pinpoint Test DC .
Manifold Absolute Pressure (MAP) Sensor	GO to Pinpoint Test DM .
Secondary Ignition System	For Fiesta 1.6L TIVCT, GO to Pinpoint Test JC . For all others, GO to Pinpoint Test JB .
Fuel Delivery System	GO to Pinpoint Test HC .
Exhaust System	GO to Pinpoint Test HF .
Positive Crankcase Ventilation (PCV) System	GO to Pinpoint Test HG .
EVAP System	GO to Pinpoint Test HX .
Charging System	REFER to the service information , Charging System, Diagnosis and Testing to continue diagnosis.
Universal Heated Oxygen Sensor (HO2S)	GO to Pinpoint Test DZ .
Automatic Transmission	REFER to the service information , Automatic Transmission, Diagnosis By Symptom to continue diagnosis.
Base Engine	REFER to the service information , Engine System, Diagnosis and Testing to continue diagnosis.
Intake Air System	GO to Pinpoint Test HU .
Auto Start Stop System	GO to Pinpoint Test AA .
Additional Testing	GO to Pinpoint Test Z .
Additional Checks: • Some vehicles have a TQ_CNTRL PID available. Check this PID to determine if the PCM is reducing torque. The TQ_CNTRL PID may indicate which component or system, if any, is requesting a torque reduction. • Correct PCM vehicle identification (VID) block information. Refer to FLASH ELECTRICALLY ERASABLE PROGRAMMABLE READ ONLY MEMORY (EEPROM) to carry out the Making Changes to the VID Block procedure. • Be aware of engine RPM and speed limiting functions of the PCM (look for incorrect high vehicle speed signal	REFER to the applicable service information.

from ABS or VSS). • Drivelines • Manual transmission or clutch • Charging system • Traction control system (if equipped) • A/C system (for surge with A/C on) • Cruise control system (for surge with cruise control on)	
Brake Over Accelerator	CHECK for simultaneous brake pedal and accelerator pedal operation inadvertently activating the brake over accelerator feature. CHECK the BRKOVR_ACTION, BRKOVRD_POSS, and DIST_BRKOVRD PIDs for recent simultaneous brake pedal and accelerator pedal operation. ADVISE the customer that simultaneous brake pedal and accelerator pedal operation by the vehicle operator activates the brake over accelerator feature. REFER to POWERTRAIN CONTROL SOFTWARE for additional information.

NO DIAGNOSTIC TROUBLE CODES (DTCS) PRESENT SYMPTOM CHARTS > CHART 2

- Starting Concerns: Hard Start/Long Crank/Erratic Start/Erratic Crank

NOTE: For Escape/Kuga, Focus, Fusion, MKC, MKZ, and Transit Connect, check the BdyCM CRASH PID status. The CRASH PID status YES indicates a crash event has occurred, and may be the cause of the Hard Start/Long Crank/Erratic Start symptom. If the CRASH PID indicates YES, carry out the BdyCM Electrical Service Function Crash Status Reset to reset the PID status. Verify the Hard Start/Long Crank/Erratic Start symptom still exists before continuing with the following diagnostics.

SYSTEM/COMPONENT	REFERENCE (Pinpoint Test unless noted)
Battery Condition and Current Draw	REFER to the service information , Charging System, Diagnosis and Testing to continue diagnosis.
Secondary Ignition System	For Fiesta 1.6L TIVCT, GO to Pinpoint Test JC . For all others, GO to Pinpoint Test JB .
Fuel Delivery System	GO to Pinpoint Test HC .
Exhaust System	GO to Pinpoint Test HF .

Positive Crankcase Ventilation (PCV) System	GO to Pinpoint Test HG .
EVAP System	GO to Pinpoint Test HX .
Intake Air System	GO to Pinpoint Test HU .
Starting System	REFER to the service information , Starting System to diagnose the engine cranks slowly symptom.
Mass Airflow (MAF) Sensor	GO to Pinpoint Test DC .
Additional Testing	GO to Pinpoint Test Z .

NO DIAGNOSTIC TROUBLE CODES (DTCS) PRESENT SYMPTOM CHARTS > CHART 3

- Starting Concerns: No Start (Engine Cranks)

NOTE: An extended crank because of a no start may load the exhaust system with raw fuel, damaging the catalytic converter after the engine starts.

SYSTEM/COMPONENT	REFERENCE (Pinpoint Test unless noted)
Add On Anti-Theft Devices	Visual. CHECK with the customer.
Fuel And Ignition	GO to Pinpoint Test A :
Exhaust System Restrictions	GO to Pinpoint Test HF .
Base Engine	REFER to the service information , Engine System, Diagnosis and Testing to continue diagnosis.
Additional Testing	GO to Pinpoint Test Z .

NO DIAGNOSTIC TROUBLE CODES (DTCS) PRESENT SYMPTOM CHARTS > CHART 4

- Unique Idle Concerns: Slow Return To Idle

SYSTEM/COMPONENT	REFERENCE (Pinpoint Test unless noted)
Vacuum Leaks, Throttle Body	Visual.
Positive Crankcase Ventilation (PCV) System	GO to Pinpoint Test HG .
Intake Air System Leaks	GO to Pinpoint Test HU .

NO DIAGNOSTIC TROUBLE CODES (DTCS) PRESENT SYMPTOM CHARTS > CHART 5

- Unique Idle Concerns: Fast Idle
- Diesels/Runs On

> *NOTE: If the vehicle runs normally with the ignition in the OFF position, check for a damaged ignition switch, an IGN START/RUN or ISP-R circuit short to voltage, or a VPWR circuit short to voltage.*

SYSTEM/COMPONENT	REFERENCE (Pinpoint Test unless noted)
Base Engine	Check for air leaks, including correct sealing of intake manifold and components or vacuum lines attached to intake air (such as the PCV or EGR valve or vacuum lines). REFER to the service information , Engine System, Diagnosis and Testing to continue diagnosis.
Cooling System	Verify the engine operates at normal temperature. REFER to the service information , Engine Cooling or NO DIAGNOSTIC TROUBLE CODES (DTCS) PRESENT SYMPTOM CHART INDEX , to diagnose any cooling system concerns that are present.
Intake Air System Leaks	GO to Pinpoint Test HU .
Additional Testing	GO to Pinpoint Test Z .

NO DIAGNOSTIC TROUBLE CODES (DTCS) PRESENT SYMPTOM CHARTS > CHART 6

- Unique Idle Concerns: Low/Slow Idle
- Stalls/Quits: Deceleration

SYSTEM/COMPONENT	REFERENCE (Pinpoint Test unless noted)
Automatic Transmission (stalls or quits on deceleration)	REFER to the service information , Automatic Transmission to diagnose the torque convertor operation concerns.
Fuel Delivery System	GO to Pinpoint Test HC .
Intake Air System	GO to Pinpoint Test HU .
Charging System	REFER to the service information , Charging System, Diagnosis and Testing to continue diagnosis.
Universal Heated Oxygen Sensor (HO2S)	GO to Pinpoint Test DZ .

Base Engine	REFER to the service information , Engine System, Diagnosis and Testing to continue diagnosis.
Additional Testing	GO to Pinpoint Test Z .

NO DIAGNOSTIC TROUBLE CODES (DTCS) PRESENT SYMPTOM CHARTS > CHART 7

- Backfires

SYSTEM/COMPONENT	REFERENCE (Pinpoint Test unless noted)
Secondary Ignition	For Fiesta 1.6L TIVCT, GO to Pinpoint Test JC . For all others, GO to Pinpoint Test JB .
Fuel Delivery System	GO to Pinpoint Test HC .
Base Engine	REFER to the service information Engine System, Diagnosis and Testing to continue diagnosis.
Exhaust System	GO to Pinpoint Test HF .
Additional Testing	GO to Pinpoint Test Z .

NO DIAGNOSTIC TROUBLE CODES (DTCS) PRESENT SYMPTOM CHARTS > CHART 8

- Lack/Loss of Power

NOTE: Verify the symptom is reported under normal driving conditions without excessive engine or vehicle load. Also, be aware of the engine RPM and speed limiting functions of the PCM.

NOTE: For vehicles equipped with a knock sensor (KS), a lack of power may result when the vehicle is operated with a breakout box installed at the PCM. The KS circuits are not shielded in a breakout box, and KS signal noise may be noticed by the PCM. If this happens, spark timing is retarded and a lack of power may result.

NOTE: For applications with a KS, a lack of power may result if the engine has developed an abnormal noise. The KS may interpret some abnormal noise as detonation and retard spark timing.

SYSTEM/COMPONENT	REFERENCE (Pinpoint Test unless noted)

Automatic Transmission Fluid	Visual.
Air Cleaner Element	Visual.
Check the following PIDS: • LONGFT1 or LONGFT2 (value between -20 and +20%) • IMTV_F (if equipped): For both ignition ON, engine OFF and ignition ON, engine running with the transmission in PARK/NEUTRAL and the engine RPM greater than 3, 000 RPM, the PID should indicate NO FAULT in both situations.	**LONGFT1 or LONGFT2 value low (-):** Continue diagnosis. Concentrate checks in areas that would cause the engine to run rich. **LONGFT1 or LONGFT2 value high (+):** Continue diagnosis. Concentrate checks in areas that would cause the engine to run lean. **IMTV_F PID indicates a fault:** GO to Pinpoint Test HU .
Fuel Delivery System	GO to Pinpoint Test HC .
Secondary Ignition	For Fiesta 1.6L TIVCT, GO to Pinpoint Test JC . For all others, GO to Pinpoint Test JB .
Mass Airflow (MAF) Sensor	GO to Pinpoint Test DC .
Exhaust System	GO to Pinpoint Test HF .
Variable Camshaft Timing (VCT) System	GO to Pinpoint Test HK .
Accelerator Pedal Position (APP) Sensor	GO to Pinpoint Test DK .
Base Engine	REFER to the service information , Engine System, Diagnosis and Testing to continue diagnosis.
Automatic Transmission	REFER to the service information , Automatic Transmission, Shift Point Road Test to continue diagnosis.
Brake System Drag or Binding	REFER to the service information , Brake System.
Turbocharger System	GO to Pinpoint Test HN .
Additional Testing	GO to Pinpoint Test Z .
Additional Checks: • Some vehicles have a TQ_CNTRL PID available. Check this PID to determine if the PCM is reducing torque. The TQ_CNTRL PID may indicate which component or system, if any, is requesting a torque reduction. • Customer driving habits • Correct PCM vehicle identification (VID) block information. Refer to FLASH ELECTRICALLY ERASABLE PROGRAMMABLE READ ONLY	Visual. REFER to the applicable service information.

MEMORY (EEPROM) to carry out the Making Changes to the VID Block procedure. • Intake manifold runner control (IMRC) linkage (if equipped) • Clutch (M/T) • Charging system • Engine RPM or speed limiting functions of the PCM (look for incorrect high vehicle speed signal from ABS or VSS)	
Brake Over Accelerator	CHECK for simultaneous brake pedal and accelerator pedal operation inadvertently activating the brake over accelerator feature. CHECK the BRKOVR_ACTION, BRKOVRD_POSS, and DIST_BRKOVRD PIDs for recent simultaneous brake pedal and accelerator pedal operation. ADVISE the customer that simultaneous brake pedal and accelerator pedal operation by the vehicle operator activates the brake over accelerator feature. REFER to POWERTRAIN CONTROL SOFTWARE for additional information.

NO DIAGNOSTIC TROUBLE CODES (DTCS) PRESENT SYMPTOM CHARTS > CHART 9

- Spark Knock

NOTE: Carbon build up in the combustion chamber and on the back of valves can be a contributing factor for engine spark knock concerns. Remove carbon deposits prior to any component replacements.

SYSTEM/COMPONENT	REFERENCE (Pinpoint Test unless noted)
Cooling System	Verify the engine operates at normal temperature. REFER to the service information , Engine Cooling, The Engine Overheats or NO DIAGNOSTIC TROUBLE CODES (DTCS) PRESENT SYMPTOM CHART INDEX to diagnose any cooling system concerns that are present. Verify correct coolant level and coolant concentration. REFER to the service information , Engine Cooling, Cooling System Draining, Filling and Bleeding for correct coolant concentrations and fill procedures.
Mass Airflow (MAF) Sensor	GO to Pinpoint Test DC .
Base Engine	REFER to the service information , Engine System, Diagnosis and Testing to continue diagnosis.

Fuel Delivery System	GO to Pinpoint Test HC .
Secondary Ignition System	For Fiesta 1.6L TIVCT, GO to Pinpoint Test JC . For all others, GO to Pinpoint Test JB .
Positive Crankcase Ventilation (PCV) System	GO to Pinpoint Test HG .
Engine Oil Quality	Visual.
Additional Testing	GO to Pinpoint Test Z .

NO DIAGNOSTIC TROUBLE CODES (DTCS) PRESENT SYMPTOM CHARTS > CHART 10

- Poor Fuel Economy

NOTE: Driving styles may have a significant influence on fuel economy. Verify the concern before starting an in-depth diagnosis. If available, use the integrated diagnostic system (IDS) fuel economy test to verify a concern is present. The following external factors may contribute to poor fuel economy:

- *stop and go driving*
- *incorrect tire pressure and size*
- *vehicle loads (such as trailer towing)*
- *extended winter warm-up conditions*
- *high speed driving*
- *incorrect axle ratio*
- *road or weather conditions*
- *aftermarket add ons*
- *short run operations*
- *customer expectations*

SYSTEM/COMPONENT	REFERENCE (Pinpoint Test unless noted)
Check the following PIDs: • LONGFT1 or LONGFT2 (value between -20 and +20%) • VPWR (value between 10.5	**LONGFT1 or LONGFT2 value low (-):** Continue diagnosis. Concentrate checks in areas that would cause the engine to run rich. **LONGFT1 or LONGFT2 value high (+):** Continue diagnosis. Concentrate checks in areas that would cause the engine to run lean. **VPWR not between 10.5 and 17.0 volts:**

and 17.0 volts, and within 0.5 volt of battery voltage)	REFER to the service information , Charging System, Diagnosis and Testing to continue diagnosis. **VPWR between 10.5 and 17.0 volts, but not within 0.5 volt of battery voltage:** CHECK the B+ voltage to the PCM power relay. CHECK the VPWR circuit between the PCM and the PCM power relay. CHECK the PWR GND circuits.
Cooling System	Verify the engine operates at normal temperature. REFER to the service information , Engine Cooling, Symptom Chart to diagnose any cooling system concerns that are present.
Transmission Fluid Level	Visual.
Secondary Ignition System	For Fiesta 1.6L TIVCT, GO to Pinpoint Test JC . For all others, GO to Pinpoint Test JB .
Fuel Delivery System	GO to Pinpoint Test HC .
Exhaust System	GO to Pinpoint Test HF .
Variable Camshaft Timing (VCT) System	GO to Pinpoint Test HK .
Automatic Transmission	REFER to the service information , Automatic Transmission, Diagnosis By Symptom to continue diagnosis.
Positive Crankcase Ventilation (PCV) System	GO to Pinpoint Test HG .
Grille Shutter	REFER to the service information , Front End Body Panels, to continue diagnosis.
Additional Checks	Check for base engine or intake air system concerns. Check for a contaminated MAF sensor. REFER to the applicable service information. Check for correct PCM VID block information. REFER to FLASH ELECTRICALLY ERASABLE PROGRAMMABLE READ ONLY MEMORY (EEPROM) to CARRY OUT the Making Changes to the VID Block procedure.
Auto Start Stop System	GO to Pinpoint Test AA .
Additional Testing	GO to Pinpoint Test Z .

NO DIAGNOSTIC TROUBLE CODES (DTCS) PRESENT SYMPTOM CHARTS > CHART 11

- Emissions Compliance

SYSTEM/COMPONENT	REFERENCE (Pinpoint Test unless noted)
Emissions Related Systems	GO to Pinpoint Test EM .

NO DIAGNOSTIC TROUBLE CODES (DTCS) PRESENT SYMPTOM CHARTS > CHART 12

- Warning Indicators: Check Fuel Cap, Malfunction Indicator Lamp (MIL), Power Take Off (PTO), Temperature Warning Indicator or Gauge (applications with cylinder head temperature [CHT] sensor only), Transmission Control Indicator Lamp (TCIL), Powertrain Malfunction Indicator (Wrench)
- PTO Concerns: Not Working Correctly

NOTE:

- *If the symptom is both a MIL on and exhaust emission test failure, GO directly to Chart 11.*
- *If the engine is a no start, GO directly to Chart 3.*
- *If the engine runs rough at idle, GO directly to Chart 1.*

SYSTEM/COMPONENT	REFERENCE (Pinpoint Test unless noted)
Check Fuel Cap	Verify the fuel filler cap is correctly tightened or the capless fuel tank filler pipe is correctly sealed. REFER to the service information , Instrumentation, Message Center, and Warning Chimes, to diagnose the check fuel message.
MIL • Always on when the engine is running (no DTCs present) • Never on (including during indicator prove out)	REFER to the service information , Instrumentation, Message Center, and Warning Chimes, Diagnosis and Testing to continue diagnosis.
PTO	GO to Pinpoint Test FB .
Temperature Warning Indicator or Gauge (applications with CHT sensor only)	For an engine that is overheating, REFER to the service information , Engine Cooling to diagnose the engine overheating symptom. Be aware that since a PCM DTC is not present, the PCM is not attempting to activate the indicator. For an engine operating at normal temperature, GO to Pinpoint Test DL .
TCIL • Always on when the engine is running (no DTCs present) • Never on	REFER to the service information , Automatic Transmission, External Controls.

Powertrain Malfunction Indicator (Wrench)	REFER to the service information , Instrumentation, Message Center, and Warning Chimes, to diagnose the wrench indicator is never/always on or to diagnose the POWERTRAIN MALFUNCTION warning is inoperative.
Additional Testing	GO to Pinpoint Test Z .

NO DIAGNOSTIC TROUBLE CODES (DTCS) PRESENT SYMPTOM CHARTS > CHART 13

- Automatic Transmission (A/T) Shift Concerns: Upshift, Downshift, Engagement

SYSTEM/COMPONENT	REFERENCE (Pinpoint Test unless noted)
Transmission	REFER to the service information , Automatic Transmission, Diagnosis and Testing to continue diagnosis.
Additional Tests	GO to Pinpoint Test Z .

NO DIAGNOSTIC TROUBLE CODES (DTCS) PRESENT SYMPTOM CHARTS > CHART 14

- Instrumentation: Tachometer Inoperative, Speedometer/Odometer Inoperative, Boost Gauge Indicates Higher Than Normal Boost, Fuel Gauge Inoperative

SYSTEM/COMPONENT	REFERENCE (Pinpoint Test unless noted)
Tachometer Inoperative	REFER to the service information , Instrumentation, Message Center, and Warning Chimes, to diagnose the incorrect tachometer indication.
Speedometer/Odometer Inoperative	REFER to the service information , Instrumentation, Message Center, and Warning Chimes, to diagnose the inoperative speedometer/odometer.
Boost Gauge	For charge air cooler (CAC) system concerns, GO to Pinpoint Test KP .
Fuel Gauge Inoperative	REFER to the service information , Instrumentation, Message Center, and Warning Chimes, to diagnose the incorrect fuel gauge indication.
Instrumentation	REFER to the service information , Instrumentation, Message Center, and Warning Chimes.

NO DIAGNOSTIC TROUBLE CODES (DTCS) PRESENT SYMPTOM CHARTS > CHART 15

- Oil System Concerns: High Oil Consumption, Leaks

SYSTEM/COMPONENT	REFERENCE (Pinpoint Test unless noted)
Positive Crankcase Ventilation (PCV) System	GO to Pinpoint Test HG .
Base Engine	REFER to the service information , Engine System, Diagnosis and Testing to continue diagnosis.
Additional Checks	Check for external oil leaks and correct oil viscosity. Check the turbocharger system for oil leaks.

NO DIAGNOSTIC TROUBLE CODES (DTCS) PRESENT SYMPTOM CHARTS > CHART 16

- Cooling System Concerns: Electric Cooling Fan Does Not Operate (Low, High or Variable Speed), Cooling Fan Clutch Does Not Operate

SYSTEM/COMPONENT	REFERENCE (Pinpoint Test unless noted)
Electric Cooling Fan	For Focus 1.0L GTDI charge air cooler (CAC) cooling fan, GO to Pinpoint Test KF . For Escape/Kuga, Fiesta 1.6L GTDI, Focus, MKX, and Transit Connect, GO to Pinpoint Test KN . For all others, GO to Pinpoint Test KF .
Cooling Fan Clutch	GO to Pinpoint Test HV .
Cooling System	REFER to the service information , Engine Cooling to diagnose the cooling system concern.

NO DIAGNOSTIC TROUBLE CODES (DTCS) PRESENT SYMPTOM CHARTS > CHART 17

- Cooling System Concerns: Electric Cooling Fan Always Runs

> *NOTE: This chart is only intended to diagnose an electric cooling fan that always runs with a cool engine and the A/C and defroster off.*

SYSTEM/COMPONENT	REFERENCE (Pinpoint Test unless noted)
Cooling Fan	For Escape/Kuga, Fiesta 1.6L GTDI, Focus, MKX, and Transit Connect, GO to Pinpoint Test KN . For all others, GO to Pinpoint Test KF .
Cooling System	REFER to the service information , Engine Cooling, The Engine Overheats to diagnose the cooling system concern.

NO DIAGNOSTIC TROUBLE CODES (DTCS) PRESENT SYMPTOM CHARTS > CHART 18

- Exhaust System Concerns: Visible Smoke

> *NOTE: Black smoke indicates a rich fuel mixture, blue smoke indicates burning oil, and white smoke indicates water in the combustion chamber.*

SYSTEM/COMPONENT	REFERENCE (Pinpoint Test unless noted)
Base Engine	REFER to the service information , Engine System, Diagnosis and Testing to continue diagnosis.
Fuel Delivery System • Black smoke	GO to Pinpoint Test HC .
Ignition System • Black smoke	For Fiesta 1.6L TIVCT, GO to Pinpoint Test JC . For all others, GO to Pinpoint Test JB .
Positive Crankcase Ventilation (PCV) System • Blue smoke	REFER to the service information , Engine System for a description of the Oil Consumption Test.
Turbocharger System • Blue smoke	REFER to the service information Fuel Charging and Controls - Turbocharger for the Oil Consumption Test.

NO DIAGNOSTIC TROUBLE CODES (DTCS) PRESENT SYMPTOM CHARTS > CHART 19

- Fuel System Concerns: Odor, Engine Compartment

SYSTEM/COMPONENT	REFERENCE (Pinpoint Test unless noted)
EVAP System	Visual.
Fuel Delivery System	Visual. GO to Pinpoint Test HC .

NO DIAGNOSTIC TROUBLE CODES (DTCS) PRESENT SYMPTOM CHARTS > CHART 20

- Engine Noise (under hood)

NOTE: Attempt to identify the source of the noise. If the noise is from a source other than those listed below, refer to NO DIAGNOSTIC TROUBLE CODES (DTCS) PRESENT SYMPTOM CHART INDEX (for noise such as spark knock) or the applicable Workshop Manual section to continue diagnosis.

SYSTEM/COMPONENT	REFERENCE (Pinpoint Test unless noted)
Secondary Ignition System	CHECK for a snap noise that may be due to secondary ignition arcing. For Fiesta 1.6L TIVCT, GO to Pinpoint Test JC . For all others, CHECK the condition of the spark plug boots.
Turbocharger System	REFER to the service information Fuel Charging and Controls - Turbocharger to diagnose the turbocharger noise.

NO DIAGNOSTIC TROUBLE CODES (DTCS) PRESENT SYMPTOM CHARTS > CHART 21

- Exhaust System Concerns: Odor (Sulfur or Rotten Egg Smell)

NOTE: A slight sulfur smell may be normal. Catalysts with less than 8, 000-16, 000 kilometers (5, 000-10, 000 miles), either from a new vehicle or new catalyst, are likely to have a sulfur smell due to the highly active state of new catalysts. Installing a new catalyst may actually make the symptom worse.

SYSTEM/COMPONENT	REFERENCE (Pinpoint Test unless noted)
Fuel Delivery System	GO to Pinpoint Test HC .
Fuel Source	TALK with the customer. Sulfur content can vary in different fuels. SUGGEST trying a different fuel source.

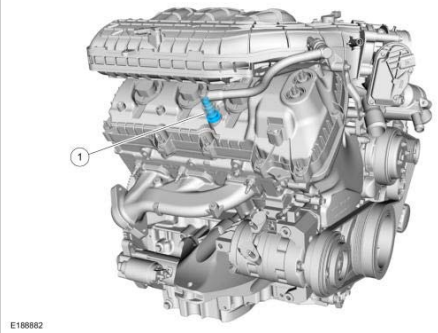
NO DIAGNOSTIC TROUBLE CODES (DTCS) PRESENT SYMPTOM CHARTS > CHART 22

- Starting Concerns: No Crank

SYSTEM/COMPONENT	REFERENCE (Pinpoint Test unless noted)
Add On Anti-Theft Devices	Visual. CHECK with the customer.
Anti-Theft	REFER to the service information , Anti-Theft to diagnose the vehicle does not start symptom.

Starting system	REFER to the service information , Starting System to diagnose the engine does not crank symptom.

DESCRIPTION AND OPERATION > ENGINE EMISSION CONTROL - COMPONENT LOCATION > 3.7L DURATEC



Item	Description
1	PCV valve

DESCRIPTION AND OPERATION > ENGINE EMISSION CONTROL - SYSTEM OPERATION AND COMPONENT DESCRIPTION > SYSTEM OPERATION

For System Operation, Refer to ENGINE CONTROLS - DESCRIPTION & OPERATION (EXCEPT DIESEL & HYBRID) .

DESCRIPTION AND OPERATION > ENGINE EMISSION CONTROL - SYSTEM OPERATION AND COMPONENT DESCRIPTION > SYSTEM DESCRIPTION

For Component Description, Refer to ENGINE CONTROLS - DESCRIPTION & OPERATION (EXCEPT DIESEL & HYBRID) .

DIAGNOSIS AND TESTING > ENGINE EMISSION CONTROL

Diagnostics in this service information assume a certain skill level and knowledge of Ford-specific diagnostic practices. For information about these, REFER to: Diagnostic Methods .

For PCM DTC,

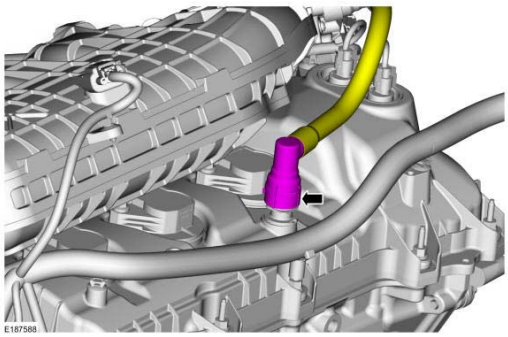
REFER to: ELECTRONIC ENGINE CONTROLS - 3.7L DURATEC (227KW/301PS) .

For driveability symptoms without DTC, refer to ENGINE CONTROLS - SYMPTOM CHARTS (EXCEPT DIESEL & HYBRID) .

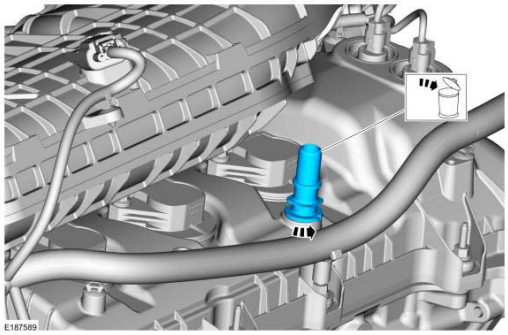
REMOVAL AND INSTALLATION > POSITIVE CRANKCASE VENTILATION (PCV) VALVE > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1. Disconnect the crankcase ventilation tube-to-PCV valve quick connect coupling. Refer to: QUICK RELEASE COUPLING .



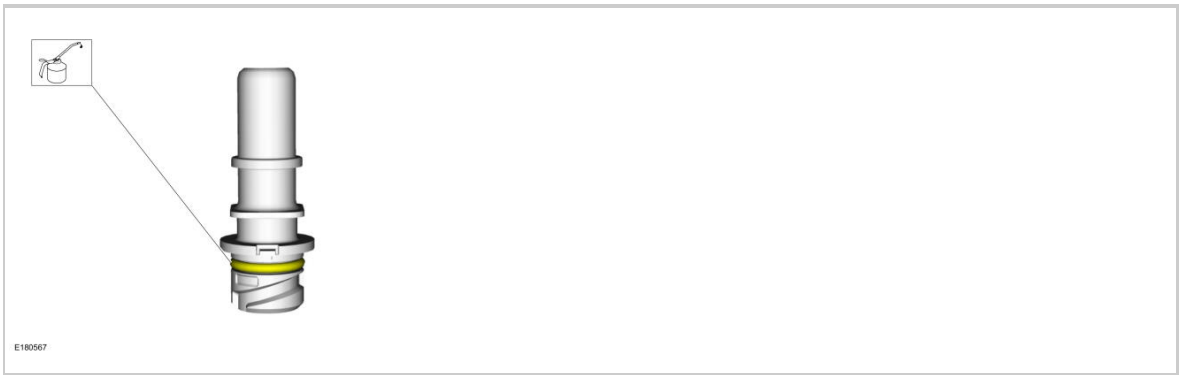
Rotate the PCV valve counterclockwise and remove the PCV valve. Discard the PCV valve.



REMOVAL AND INSTALLATION > POSITIVE CRANKCASE VENTILATION (PCV) VALVE > INSTALLATION

NOTE: A new PCV valve must be installed if removed. Damage will occur to the locking mechanism on the PCV valve.

1. Lubricate the new PCV valve O-ring seal with clean engine oil.

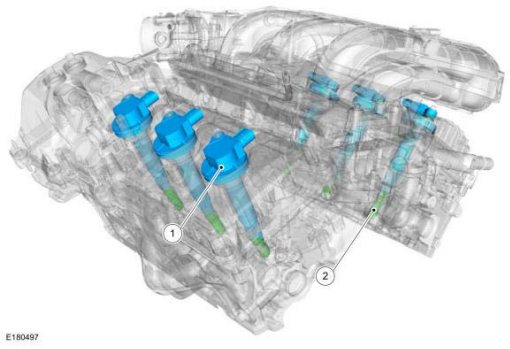


2. To install, reverse the removal procedure.

SPECIFICATIONS > SPECIFICATIONS

Item	Specification
Spark plug	12405
Spark plug gap	0.049-0.053in (1.25-1.35mm)

DESCRIPTION AND OPERATION > ENGINE IGNITION - COMPONENT LOCATION > 3.7L DURATEC (227KW/301PS)



Item	Description
1	Ignition coil-on-plug(s)
2	Spark plug(s)

DESCRIPTION AND OPERATION > ENGINE IGNITION - SYSTEM OPERATION AND COMPONENT DESCRIPTION > SYSTEM OPERATION

For System Operation, Refer to ENGINE CONTROLS - DESCRIPTION & OPERATION (EXCEPT DIESEL & HYBRID) . .

DESCRIPTION AND OPERATION > ENGINE IGNITION - SYSTEM OPERATION AND COMPONENT DESCRIPTION > COMPONENT DESCRIPTION

For Component Description, Refer to ENGINE CONTROLS - DESCRIPTION & OPERATION (EXCEPT DIESEL & HYBRID) . .

DIAGNOSIS AND TESTING > ENGINE IGNITION

Diagnostics in this service information assume a certain skill level and knowledge of Ford-specific diagnostic practices. For information about these, REFER to: Diagnostic Methods .

For PCM DTC,

REFER to: ELECTRONIC ENGINE CONTROLS - 3.7L DURATEC (227KW/301PS)

For driveability symptoms without DTC, Refer to ENGINE CONTROLS - SYMPTOM CHARTS (EXCEPT DIESEL & HYBRID) .

REMOVAL AND INSTALLATION > IGNITION COIL-ON-PLUG > REMOVAL

RH Side

NOTE: The upper intake manifold must be removed to access the RH ignition coil-on-plugs.

1.

Remove the upper intake manifold. Refer to: UPPER INTAKE MANIFOLD .

Both sides

NOTE: When removing the ignition coil-on-plugs, a slight twisting motion will break the seal and ease removal.

NOTE: Use compressed air to remove any foreign material from the ignition coil-on-plugs and surrounding area before removing the ignition coil-on-plugs.

2.

1.

Disconnect the ignition coil-on-plug electrical connectors.

2.

Remove the ignition coil-on-plug mounting bolts.

3.

Remove the ignition coil-on-plugs.



REMOVAL AND INSTALLATION > IGNITION COIL-ON-PLUG > INSTALLATION

Both sides

1.

Inspect the ignition coil-on-plugs and replace any ignition coil-on-plug rubber boots with cracks, rips or tears.



2.

1.

Install the ignition coil-on-plugs.

2.

Install the ignition coil-on-plug mounting bolts.

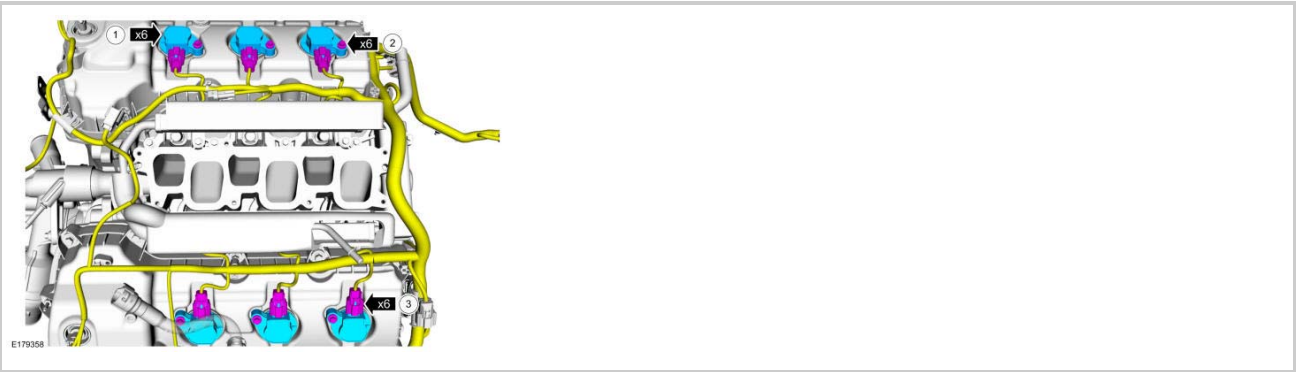
Torque

Stage 1: 62 lb.in (7 Nm)

Stage 2: 50°

3.

Connect the ignition coil-on-plug electrical connectors.



RH Side

3.

Install the upper intake manifold. Refer to: UPPER INTAKE MANIFOLD .

REMOVAL AND INSTALLATION > SPARK PLUGS > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

Remove the ignition coil-on-plugs. Refer to: Ignition Coil-On-Plug .

NOTE: Use compressed air to remove any foreign material in the spark plug well before removing the spark plugs.

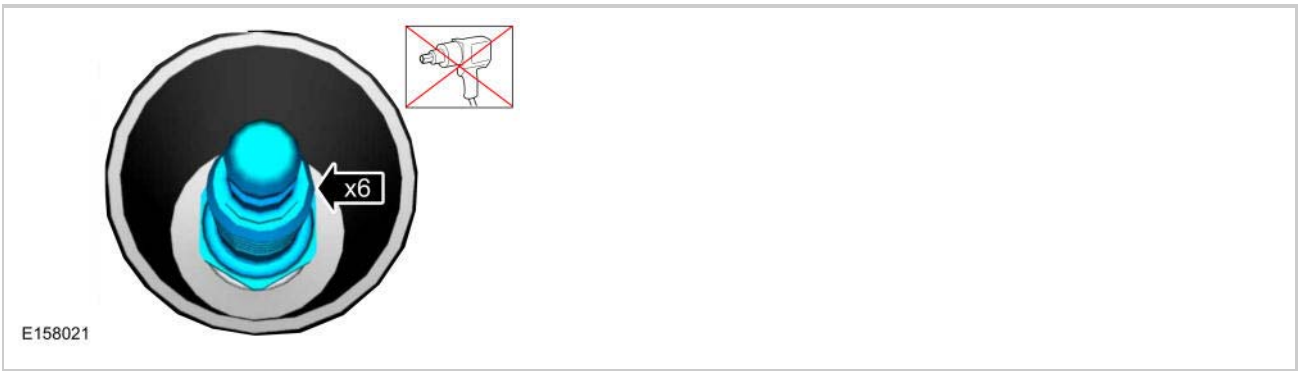
NOTE: If a spark plug is dropped, internal damage may result and the spark plug must be discarded. The use of a damaged spark plug may cause cylinder misfire resulting in engine damage.

NOTE: Do not remove the spark plugs when the engine is hot or cold soaked. Spark plug thread or cylinder head damage can occur. Make sure the engine is warm (hand touch after cooling down) prior to spark plug removal.

2.
Remove the spark plugs.

Torque

: 133 lb.in (15 Nm)



REMOVAL AND INSTALLATION > SPARK PLUGS > INSTALLATION

1.

To install, reverse the removal procedure.

DESCRIPTION AND OPERATION > EVAPORATIVE EMISSIONS - OVERVIEW > OVERVIEW

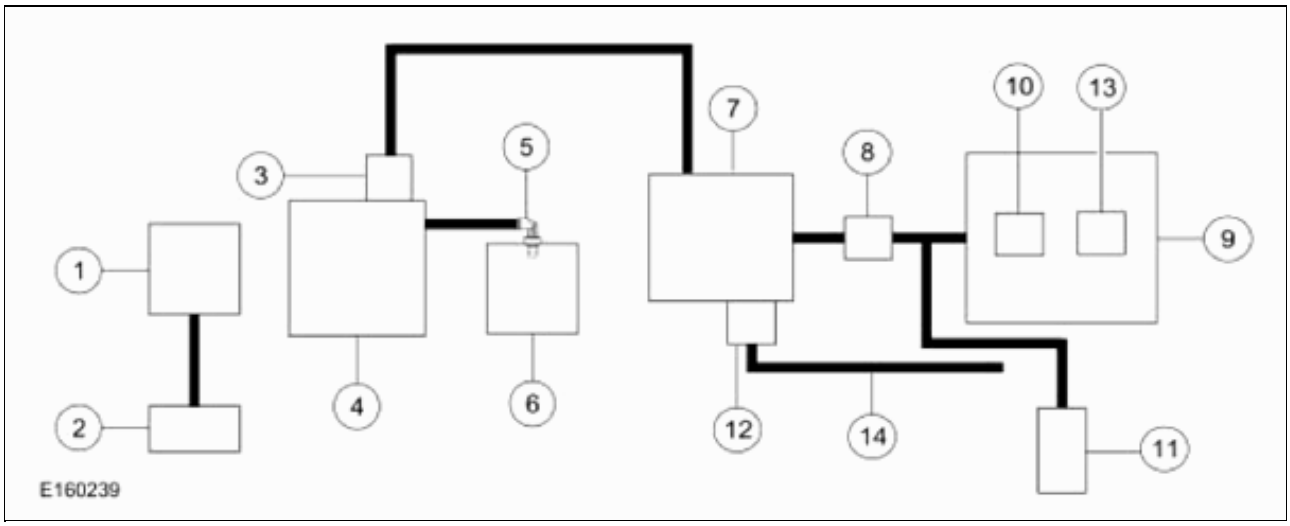
The EVAP system prevents hydrocarbon emissions from entering the atmosphere by storing fuel vapors and routing the vapors to the engine to be consumed during normal engine operation.

The EVAP system consists of:

- EVAP canister
- EVAP canister purge valve
- EVAP canister vent solenoid
- Fuel Tank Pressure (FTP) sensor and tube
- Easy Fuel (capless) fuel tank filler pipe

DESCRIPTION AND OPERATION > EVAPORATIVE EMISSIONS - SYSTEM OPERATION AND COMPONENT DESCRIPTION

Fig 1: Evaporative Emissions - System Diagram



Courtesy of FORD MOTOR CO.

Item	Description
1	LH Valve cover
2	Air Cleaner (ACL) outlet pipe
3	EVAP canister purge valve

4	Upper intake manifold
5	PCV
6	RH valve cover
7	EVAP canister
8	Fuel Tank Pressure (FTP) sensor and tube
9	Fuel tank
10	Fuel level sensors
11	Fuel tank filler pipe
12	EVAP canister vent solenoid
13	Fuel pump and sender assembly
14	Fresh air hose

DIAGNOSIS AND TESTING > EVAPORATIVE EMISSIONS > ENGINE DIAGNOSTIC INFORMATION

For PCM DTC, REFER to: ELECTRONIC ENGINE CONTROLS - 3.7L DURATEC (227KW/301PS) .

For driveability symptoms without DTC, Refer to ENGINE CONTROLS - SYMPTOM CHARTS (EXCEPT DIESEL & HYBRID) .

GENERAL PROCEDURES > EVAPORATIVE EMISSION SYSTEM LEAK TEST

Activation

Phase 1 - Leak Verification

1.

Run the EVAP Test with the scan tool.

> *NOTE: Some small leaks may not be detected using the EVAP Test. If the system has passed the test but a leak is still suspected, then proceed to Phase 2.*

2.
If the EVAP system failed the EVAP Test, then proceed to Phase 2.

Phase 2 - System Leak Check

3.

Disconnect the fuel vapor tube-to-EVAP canister purge valve quick connect coupling. Refer to: QUICK RELEASE COUPLING .

4.

Connect the VACUTEC Smoke Machine Fuel EVAP Emissions System Tester to the fuel vapor tube quick connect coupling. Refer to the manufacturer's instructions.

> *NOTE: The battery ground cable was previously disconnected in the fuel vapor tube quick connect coupling procedure.*

5.
Connect the battery ground cable. Refer to: Battery Disconnect and Connect .

6.

Close the canister vent solenoid with the scan tool.

> *NOTE: The supplemental refueling adapter is located in the jack storage compartment.*

7.
Install the supplemental refueling adapter into the Easy Fuel™ (capless) fuel tank filler pipe assembly.

> *NOTE: If smoke does not exit the fuel tank filler pipe neck area after the system is pressurized, open the canister vent solenoid with the scan tool to allow the air to purge. Once smoke is seen at the canister vent solenoid, close the canister vent solenoid with the scan tool.*

8.
Introduce smoke from the VACUTEC Smoke Machine Fuel EVAP Emissions System Tester into the EVAP system and verify that smoke is exiting the fuel tank filler pipe neck area. For additional information, refer to the manufacturer's instructions.

9.

Remove the supplemental refueling adapter once smoke is observed exiting the fuel tank filler pipe neck area.

10.

Continue to enter smoke into the system for 60 seconds to obtain pressure.

11.

Press and release the remote start button in intervals of 15 seconds ON and 15 seconds OFF while checking for exiting smoke.

12.

Use the halogen light provided with the VACUTEC Smoke Machine Fuel EVAP Emissions System

Tester to follow the EVAP system path and look for smoke exiting at the source of the leak(s).

13.

Repair any leaks as necessary.

14.

Repeat the leak test until the system passes.

REMOVAL AND INSTALLATION > EVAPORATIVE EMISSION CANISTER > REMOVAL

WARNING: Do not smoke, carry lighted tobacco or have an open flame of any type when working on or near any fuel-related component. Highly flammable mixtures are always present and may be ignited. Failure to follow these instructions may result in serious personal injury.

WARNING: Do not carry personal electronic devices such as cell phones, pagers or audio equipment of any type when working on or near any fuel-related component. Highly flammable mixtures are always present and may be ignited. Failure to follow these instructions may result in serious personal injury.

WARNING: Always disconnect the battery ground cable at the battery when working on an evaporative emission (EVAP) system or fuel-related component. Highly flammable mixtures are always present and may be ignited. Failure to follow these instructions may result in serious personal injury.

NOTE: Removal steps in this procedure may contain installation details.

1.

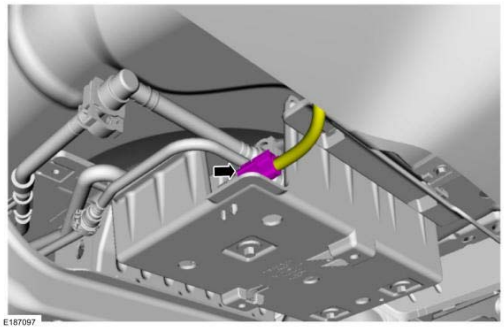
Position the vehicle on a hoist. Refer to: Jacking and Lifting - Overview .

2.

Disconnect the negative battery cable. Refer to: Battery Disconnect and Connect .

3.

Disconnect the EVAP canister electrical connector.

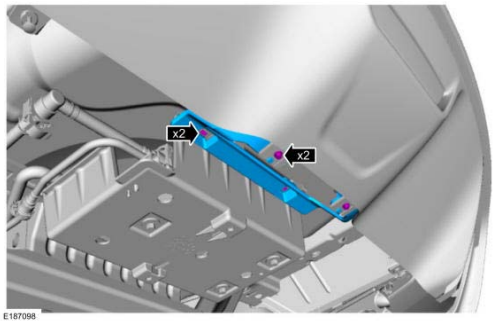


4.

Remove the bolts, pin type retainers and bracket.

Torque

: 44 lb.in (5 Nm)

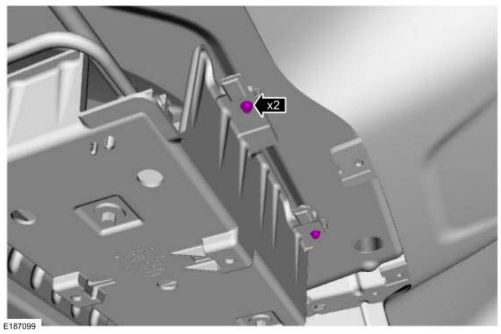


5.

Remove the bolts.

Torque

: 62 lb.in (7 Nm)

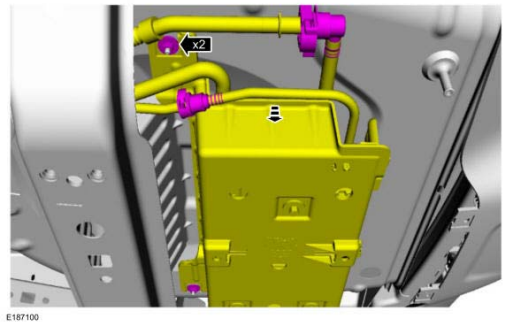


6.

Remove the nuts and lower the EVAP canister.

Torque

: 62 lb.in (7 Nm)



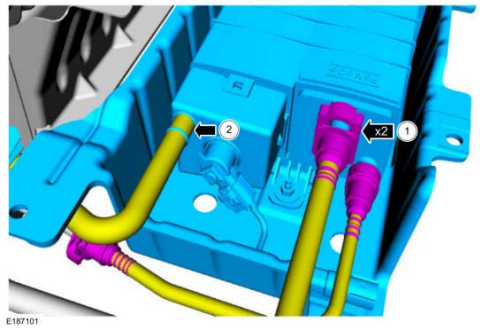
7.

1.

Disconnect the EVAP canister quick connect couplings. Refer to: QUICK RELEASE COUPLING .

2.

Disconnect the vent hose and remove the EVAP canister.



REMOVAL AND INSTALLATION > EVAPORATIVE EMISSION CANISTER > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > EVAPORATIVE EMISSION CANISTER PURGE VALVE > REMOVAL

WARNING: Do not smoke, carry lighted tobacco or have an open flame of any type

when working on or near any fuel-related component. Highly flammable mixtures are always present and may be ignited. Failure to follow these instructions may result in serious personal injury.

WARNING: Do not carry personal electronic devices such as cell phones, pagers or audio equipment of any type when working on or near any fuel-related component. Highly flammable mixtures are always present and may be ignited. Failure to follow these instructions may result in serious personal injury.

WARNING: Always disconnect the battery ground cable at the battery when working on an evaporative emission (EVAP) system or fuel-related component. Highly flammable mixtures are always present and may be ignited. Failure to follow these instructions may result in serious personal injury.

NOTE: Removal steps in this procedure may contain installation details.

1.

Disconnect the negative battery cable. Refer to Battery Disconnect and Connect .

2.

1.

Disconnect the EVAP canister purge valve electrical connector.

2.

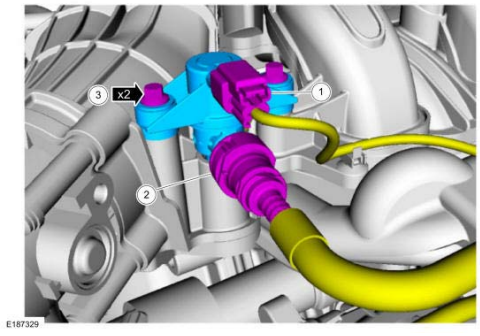
Disconnect the EVAP canister purge valve quick connect coupling. Refer to: QUICK RELEASE COUPLING

3.

Remove the bolts and the EVAP canister purge valve.

Torque

: 89 lb.in (10 Nm)



REMOVAL AND INSTALLATION > EVAPORATIVE EMISSION CANISTER PURGE VALVE > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > EVAPORATIVE EMISSION CANISTER VENTILATION FILTER > REMOVAL

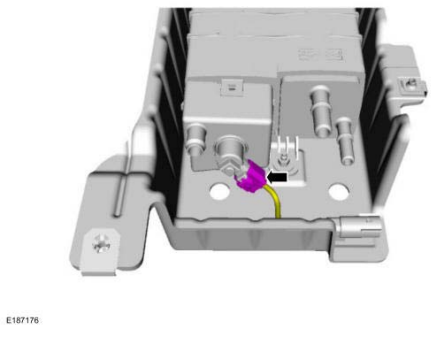
NOTE: Removal steps in this procedure may contain installation details.

1.

Remove the EVAP canister. Refer to: Evaporative Emission Canister .

2.

Disconnect the EVAP canister solenoid electrical connector.

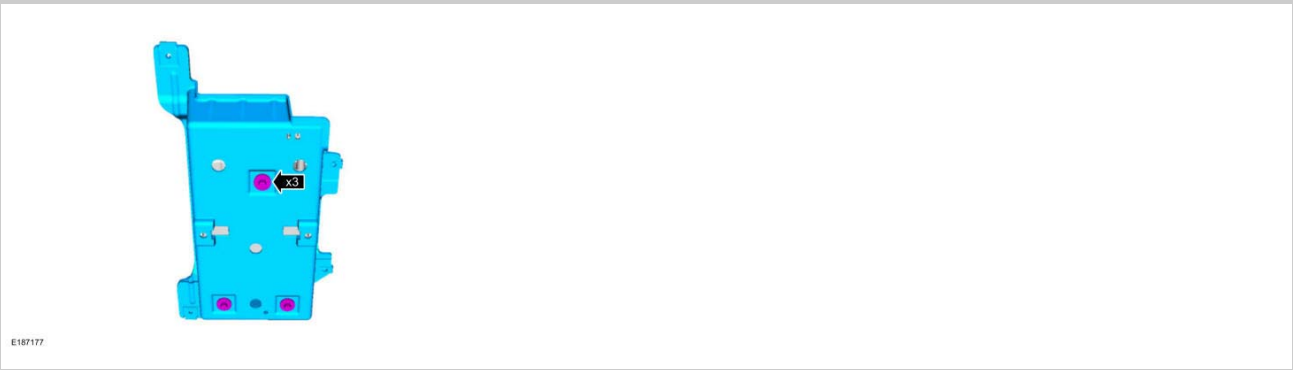


3.

Remove the bolts and EVAP canister shield.

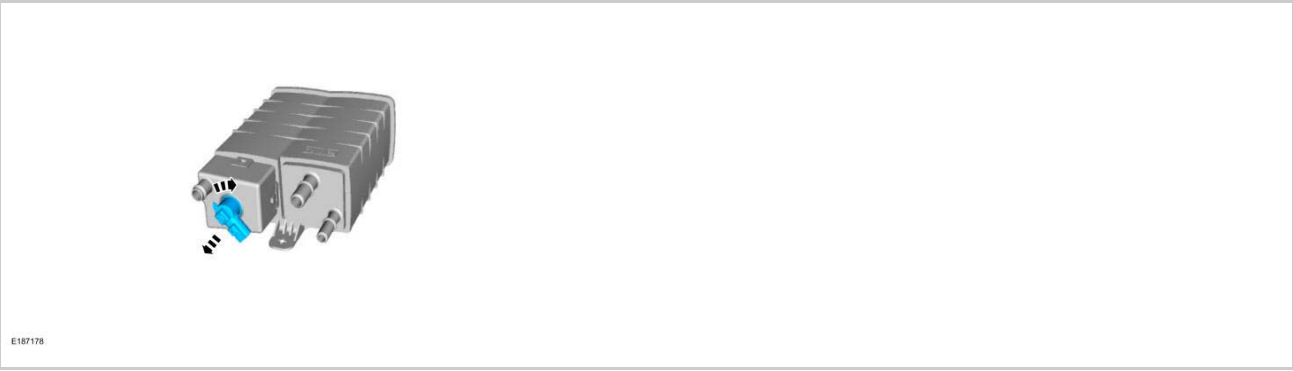
Torque

: 62 lb.in (7 Nm)



4.

If necessary, remove the EVAP canister solenoid.



5.

Release the tabs and remove EVAP canister ventilation filter.



REMOVAL AND INSTALLATION > EVAPORATIVE EMISSION CANISTER VENTILATION FILTER > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > EVAPORATIVE EMISSION CANISTER VENT SOLENOID > REMOVAL

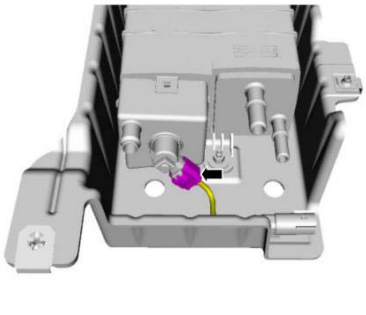
NOTE: Removal steps in this procedure may contain installation details.

1.

Remove the EVAP canister. Refer to: Evaporative Emission Canister .

2.

Disconnect the EVAP canister solenoid electrical connector.

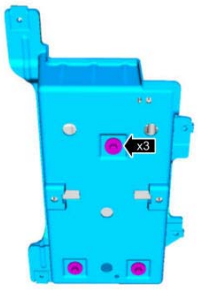


3.

Remove the bolts and EVAP canister shield.

Torque

: 62 lb.in (7 Nm)



4.

Remove the EVAP canister solenoid.



REMOVAL AND INSTALLATION > EVAPORATIVE EMISSION CANISTER VENT SOLENOID > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > FUEL TANK PRESSURE SENSOR AND TUBE > REMOVAL

WARNING: Do not smoke, carry lighted tobacco or have an open flame of any type when working on or near any fuel-related component. Highly flammable mixtures are always present and may be ignited. Failure to follow these instructions may result in serious personal injury.

WARNING: Do not carry personal electronic devices such as cell phones, pagers or audio equipment of any type when working on or near any fuel-related component. Highly flammable mixtures are always present and may be ignited. Failure to follow these instructions may result in serious personal injury.

WARNING: Always disconnect the battery ground cable at the battery when working on an evaporative emission (EVAP) system or fuel-related component. Highly flammable mixtures are always present and may be ignited. Failure to follow these instructions may result in serious personal injury.

NOTE: Removal steps in this procedure may contain installation details.

1.

Position the vehicle on a hoist. Refer to: Jacking and Lifting - Overview .

2.

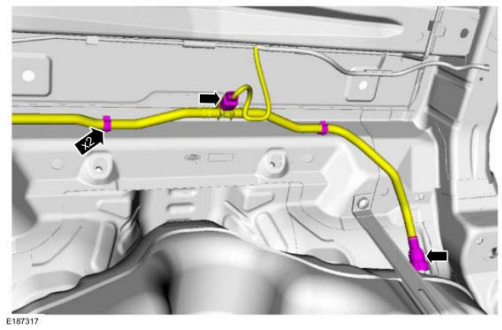
Disconnect the battery ground cable. Refer to: Battery Disconnect and Connect .

3.

Remove the rear subframe. Refer to: Rear Subframe .

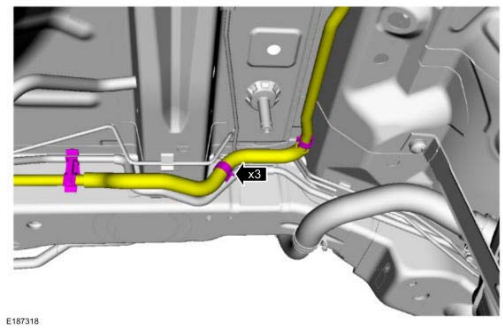
4.

Disconnect the quick release coupling, routing clips and the fuel tank pressure sensor electrical connector. Refer to: QUICK RELEASE COUPLING .



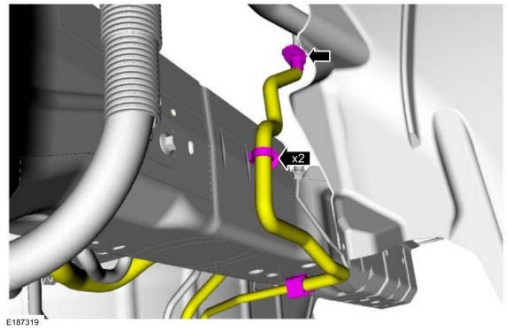
5.

Disconnect the routing clips.



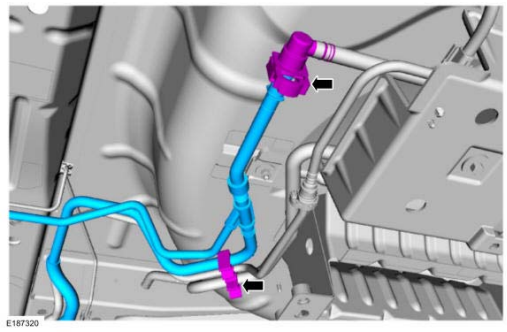
6.

Disconnect the quick release coupling and routing clips. Refer to: QUICK RELEASE COUPLING .



7.

Disconnect the quick release coupling and routing clips. Remove the fuel tank pressure sensor and tube. Refer to: QUICK RELEASE COUPLING .



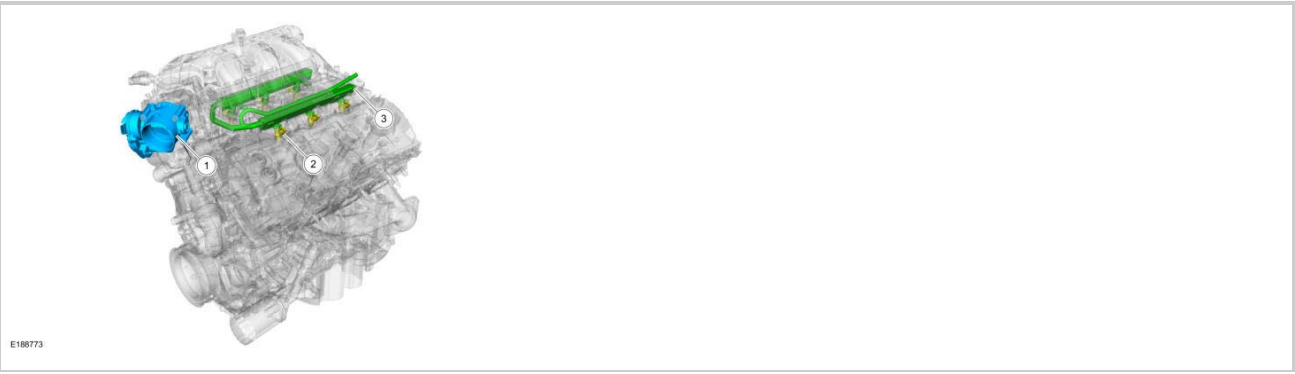
REMOVAL AND INSTALLATION > FUEL TANK PRESSURE SENSOR AND TUBE > INSTALLATION

1.

To install, reverse the removal procedure.

DESCRIPTION AND OPERATION > FUEL CHARGING AND CONTROLS - COMPONENT LOCATION

3.7L Duratec



Item	Description
1	Throttle Body (TB)
2	Fuel injector
3	Fuel rail

FPDM



Item	Description
1	FPDM. (The FPDM is located beneath the rear seat cushion on the LH side).

DESCRIPTION AND OPERATION > FUEL CHARGING AND CONTROLS - SYSTEM OPERATION AND COMPONENT DESCRIPTION > SYSTEM OPERATION

For System Operation, Refer to ENGINE CONTROLS - DESCRIPTION & OPERATION (EXCEPT DIESEL & HYBRID) . .

DESCRIPTION AND OPERATION > FUEL CHARGING AND CONTROLS - SYSTEM OPERATION AND COMPONENT DESCRIPTION > COMPONENT DESCRIPTION

ENGINE CONTROLS - DESCRIPTION & OPERATION (EXCEPT DIESEL & HYBRID) . .

DIAGNOSIS AND TESTING > FUEL CHARGING AND CONTROLS

Diagnostics in this service information assume a certain skill level and knowledge of Ford-specific diagnostic practices. For information about these, REFER to: Diagnostic Methods .

For PCM DTC, REFER to: ELECTRONIC ENGINE CONTROLS - 3.7L DURATEC (227KW/301PS).

For driveability symptoms without DTC, Refer to ENGINE CONTROLS - SYMPTOM CHARTS (EXCEPT DIESEL & HYBRID) .

REMOVAL AND INSTALLATION > FUEL INJECTORS > REMOVAL AND INSTALLATION

1.

The fuel injectors are serviced with the fuel rail. Refer to: Fuel Rail .

REMOVAL AND INSTALLATION > FUEL PUMP DRIVER MODULE (FPDM) > REMOVAL

NOTE: The FPDM is located beneath the rear seat cushion on the LH side.

1.

Remove the rear seat cushion. Refer to: Rear Seat Cushion .

2.

1.

Disconnect the FPDM electrical connector.

2.

Remove the FPDM retaining nuts and then remove the FPDM.



REMOVAL AND INSTALLATION > FUEL PUMP DRIVER MODULE (FPDM) > INSTALLATION

1.

1.

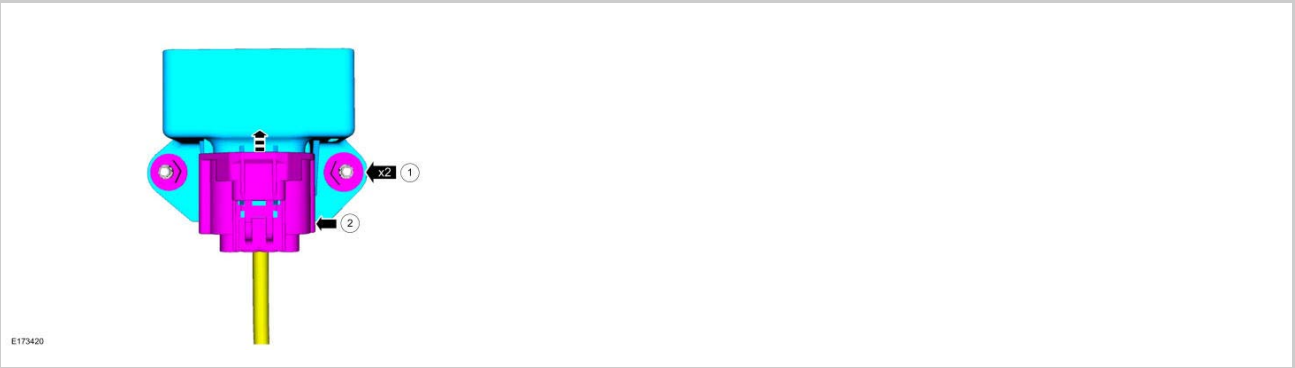
Install the FPDM, then install and tighten the FPDM retaining nuts.

Torque

: 44 lb.in (5 Nm)

2.

Connect the FPDM electrical connector.



2.

Install the rear seat cushion. Refer to: Rear Seat Cushion .

REMOVAL AND INSTALLATION > FUEL RAIL > REMOVAL

1.

Release the fuel system pressure. Refer to: FUEL SYSTEM PRESSURE RELEASE .

2.

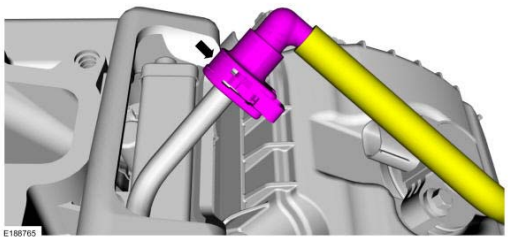
Disconnect the battery. Refer to: Battery Disconnect and Connect .

3.

Remove the upper intake manifold. Refer to: UPPER INTAKE MANIFOLD .

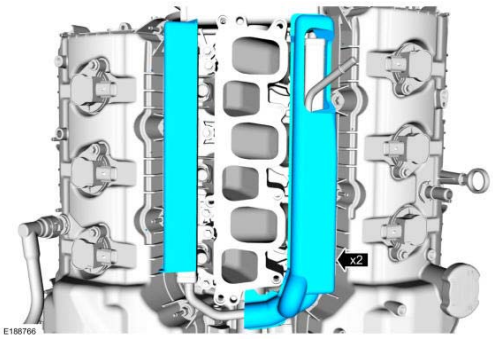
4.

Disconnect the fuel rail fuel feed tube. Refer to: QUICK RELEASE COUPLING .



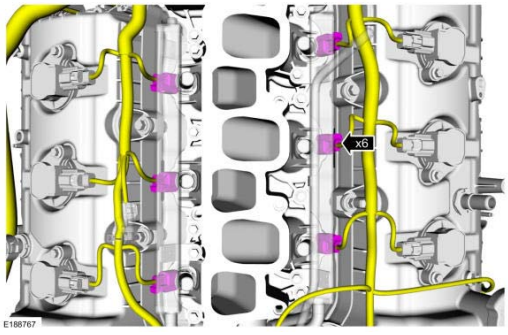
5.

Remove the RH and LH fuel rail insulators.



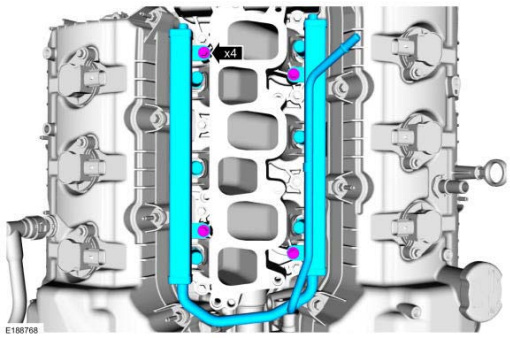
6.

Disconnect the fuel injector electrical connectors.



7.

Remove the fuel rail retaining bolts and then remove the fuel rail.



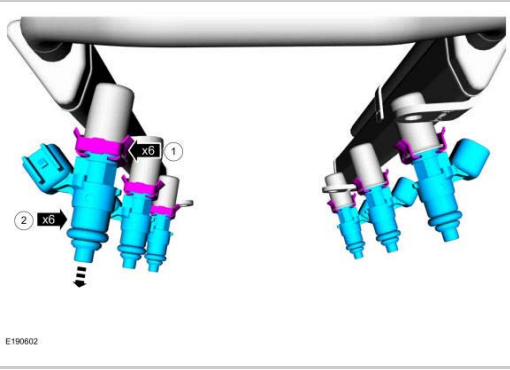
8.

1.

Remove the fuel injector retaining clips.

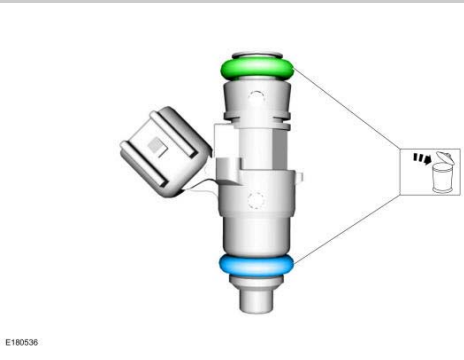
2.

Remove the fuel injectors from the fuel rail.



9.

Remove and discard all of the fuel injector O-ring seals.



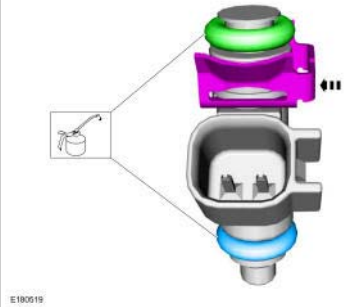
REMOVAL AND INSTALLATION > FUEL RAIL > INSTALLATION

NOTE: Use O-ring seals that are made of special fuel-resistant material. Use of ordinary O-rings can cause the fuel system to leak. Do not reuse the O-ring seals.

NOTE: The upper and lower fuel injector O-ring seals are similar in appearance, but are not interchangeable.

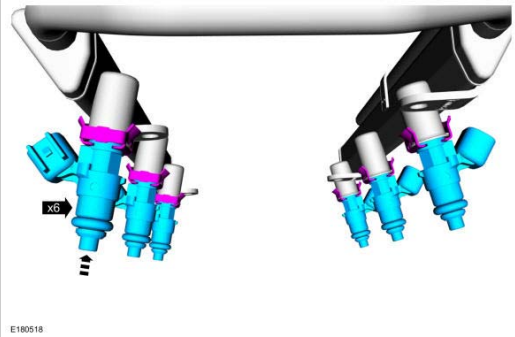
NOTE: Make sure that new fuel injector O-ring seals are installed.

1.
Install the new fuel injector O-ring seals and the fuel injector retaining clips onto the fuel injectors. Lubricate the new fuel injector O-ring seals with clean engine oil.



2.

Install the fuel injectors into the fuel rail.

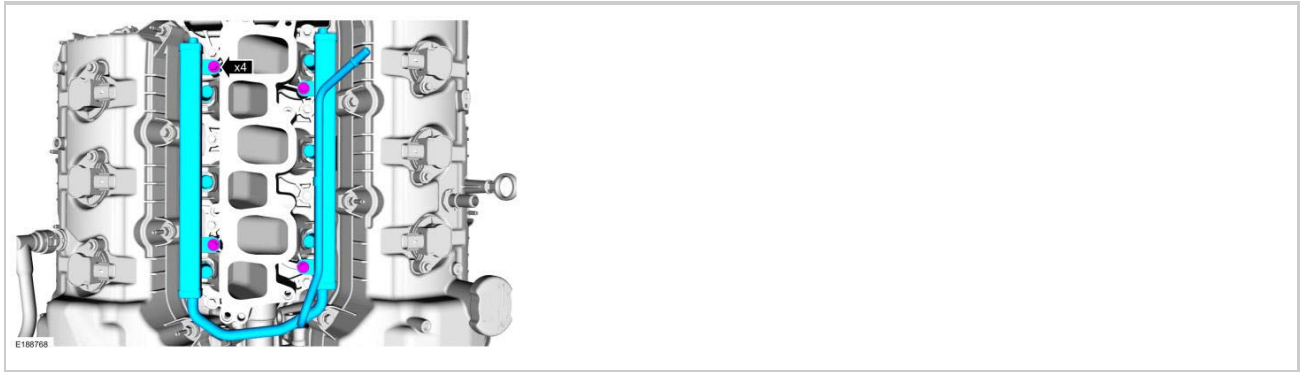


3.

Install the fuel rail, then install and tighten the fuel rail retaining bolts.

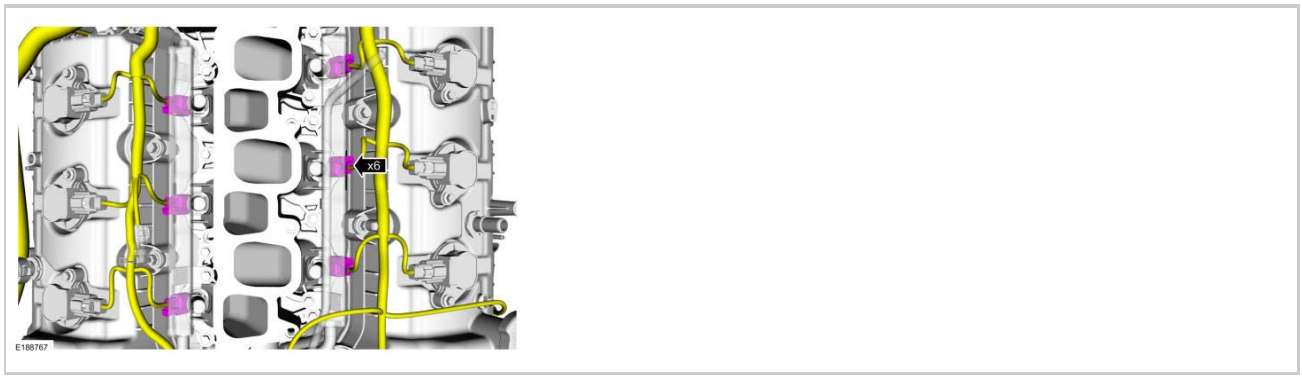
Torque

: 89 lb.in (10 Nm)



4.

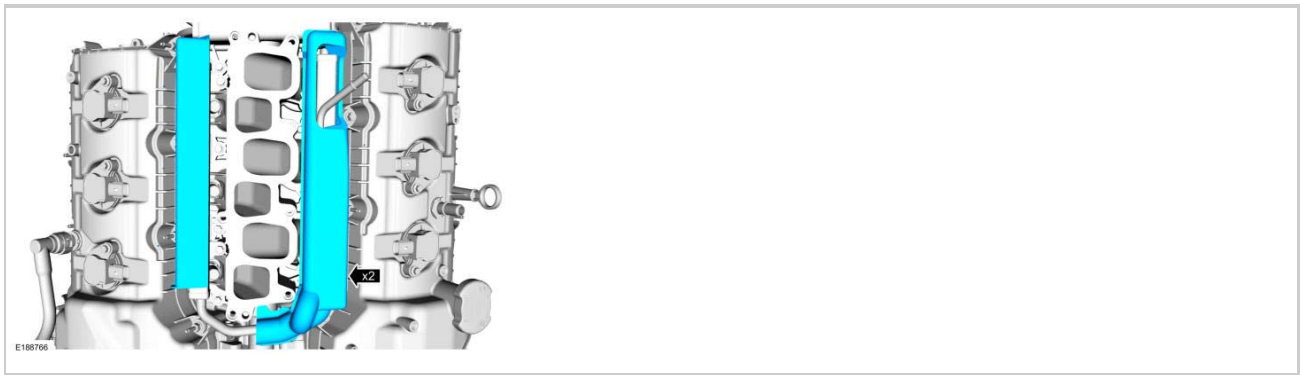
Connect the fuel injector electrical connectors.



5.

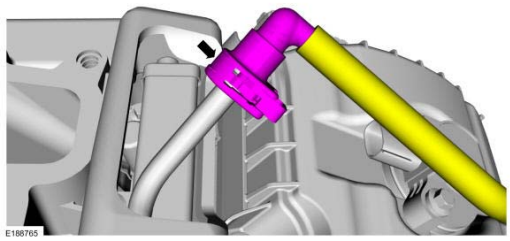
1.

Install the RH and LH fuel rail insulators.



6.

Connect the fuel rail fuel feed tube. Refer to: QUICK RELEASE COUPLING .



7.

Install the upper intake manifold. Refer to: UPPER INTAKE MANIFOLD .

8.

Reconnect the battery. Refer to: Battery Disconnect and Connect .

9.

Pressurize the fuel system. Refer to: FUEL SYSTEM PRESSURE RELEASE .

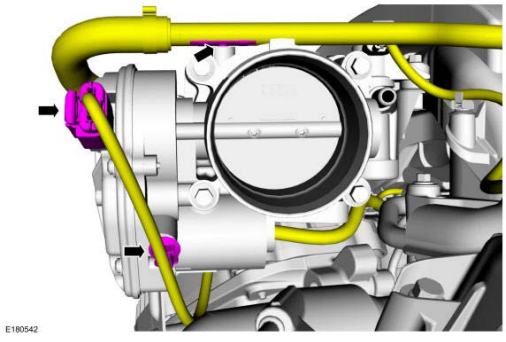
REMOVAL AND INSTALLATION > THROTTLE BODY > REMOVAL

1.

Remove the air cleaner outlet pipe. Refer to: AIR CLEANER OUTLET PIPE .

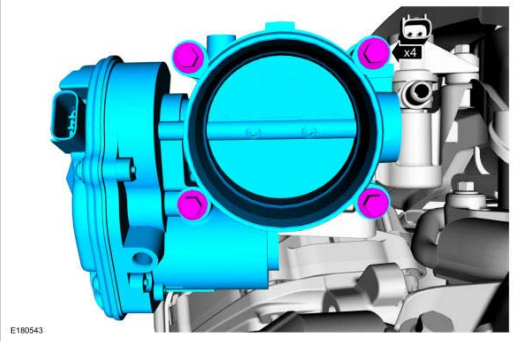
2.

Release the brake vacuum hose retainer and the Throttle Body (TB) electrical connector wire harness retainer from the Throttle Body (TB). Disconnect the Throttle Body (TB) electrical connector.



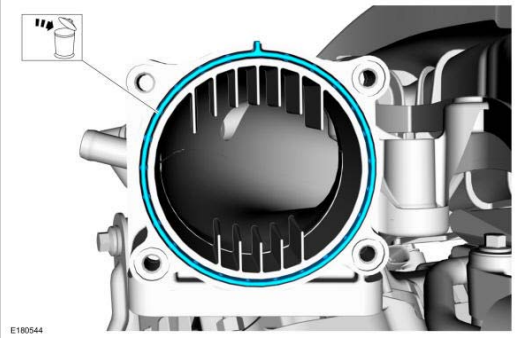
3.

Remove the Throttle Body (TB) retaining bolts and then remove the Throttle Body (TB).



4.

Remove and discard the Throttle Body (TB) gasket.

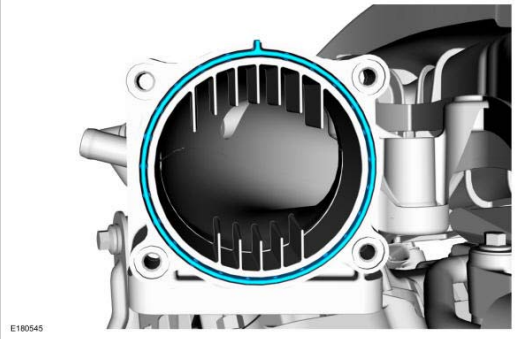


REMOVAL AND INSTALLATION > THROTTLE BODY > INSTALLATION

NOTE: Make sure that the mating faces are clean and free of foreign material.

1.

Install a new Throttle Body (TB) gasket.



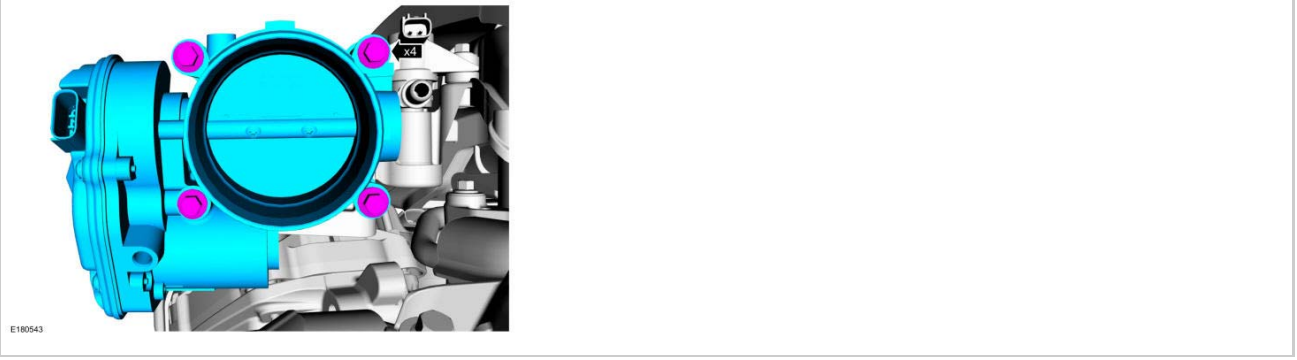
2.

Install the Throttle Body (TB), then install and tighten the Throttle Body (TB) retaining bolts.

Torque:

Stage 1: 89 lb.in (10 Nm)

Stage 2: 90°



3.

Connect the Throttle Body (TB) electrical connector. Attach the brake vacuum hose retainer and the Throttle Body (TB) electrical connector wire harness retainer to the Throttle Body (TB).

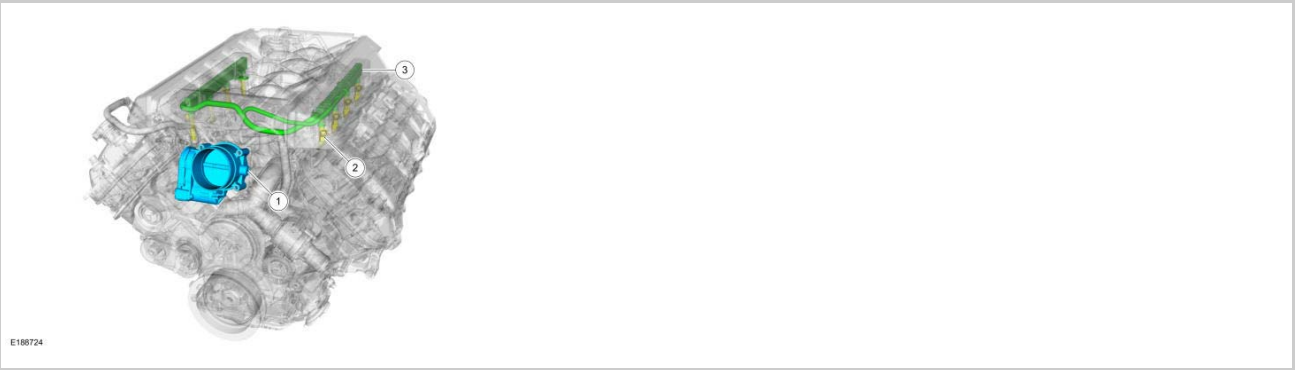


4.

Install the air cleaner outlet pipe. Refer to: AIR CLEANER OUTLET PIPE .

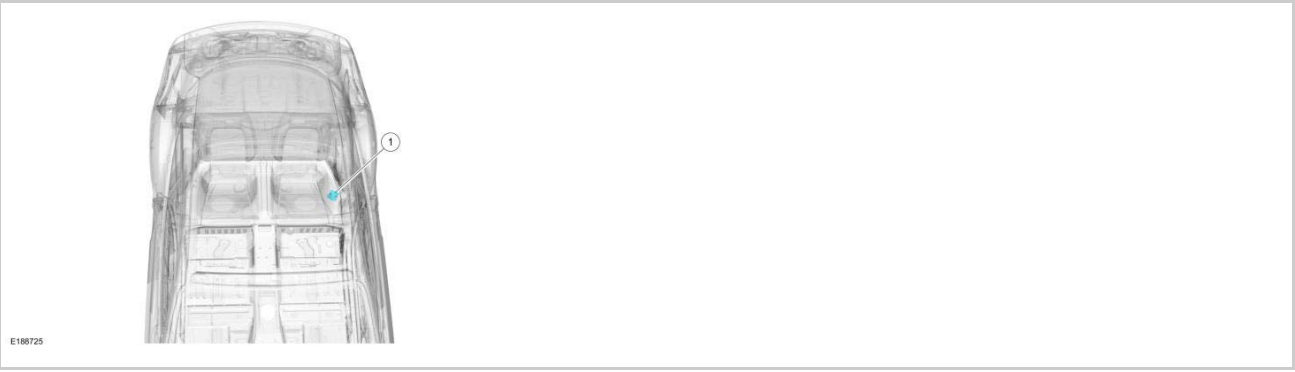
DESCRIPTION AND OPERATION > FUEL CHARGING AND CONTROLS - COMPONENT LOCATION

5.0L 32V Ti-VCT



Item	Description
1	Throttle Body (TB)
2	Fuel injector
3	Fuel rail

FPDM



Item	Description
1	FPDM. (The FPDM is located beneath the rear seat cushion on the LH side).

DESCRIPTION AND OPERATION > FUEL CHARGING AND CONTROLS - SYSTEM OPERATION AND COMPONENT DESCRIPTION > SYSTEM OPERATION

For System Operation, Refer to ENGINE CONTROLS - DESCRIPTION & OPERATION (EXCEPT DIESEL & HYBRID) .

DESCRIPTION AND OPERATION > FUEL CHARGING AND CONTROLS - SYSTEM OPERATION AND COMPONENT DESCRIPTION > COMPONENT DESCRIPTION

For Component Description, Refer to ENGINE CONTROLS - DESCRIPTION & OPERATION (EXCEPT DIESEL & HYBRID) .

DIAGNOSIS AND TESTING > FUEL CHARGING AND CONTROLS

Diagnostics in this service information assume a certain skill level and knowledge of Ford-specific diagnostic practices. For information about these, REFER to: Diagnostic Methods .

For PCM DTC, REFER to: ELECTRONIC ENGINE CONTROLS - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS).

For driveability symptoms without DTC, Refer to ENGINE CONTROLS - SYMPTOM CHARTS (EXCEPT DIESEL & HYBRID) .

REMOVAL AND INSTALLATION > FUEL INJECTORS > REMOVAL AND INSTALLATION

1.

The fuel injectors are serviced with the fuel rail. Refer to: Fuel Rail .

REMOVAL AND INSTALLATION > FUEL PUMP DRIVER MODULE (FPDM) > REMOVAL

NOTE: The FPDM is located beneath the rear seat cushion on the LH side.

1.

Remove the rear seat cushion. Refer to: Rear Seat Cushion .

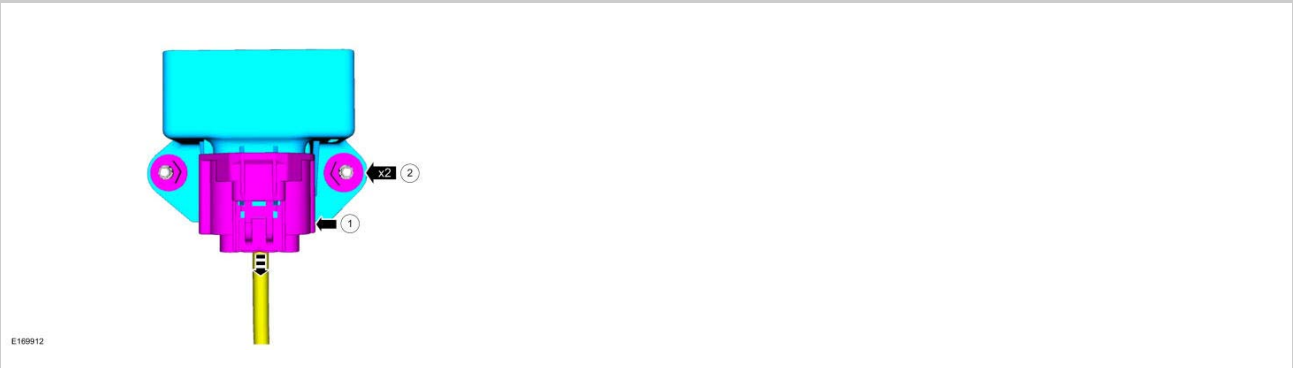
2.

1.

Disconnect the FPDM electrical connector.

2.

Remove the FPDM retaining nuts and then remove the FPDM.



REMOVAL AND INSTALLATION > FUEL PUMP DRIVER MODULE (FPDM) > INSTALLATION

1.

1.

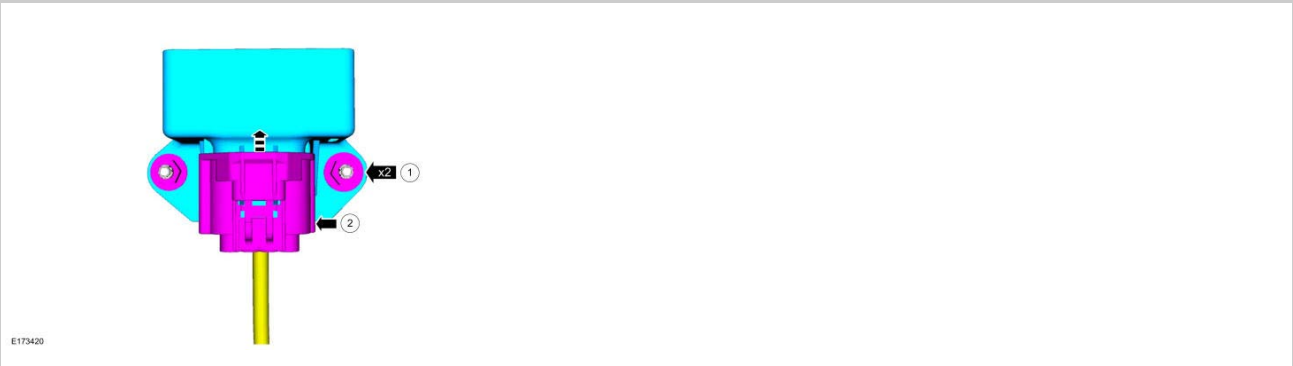
Install the FPDM, then install and tighten the FPDM retaining nuts.

Torque

: 44 lb.in (5 Nm)

2.

Connect the FPDM electrical connector.



2.

Install the rear seat cushion. Refer to: Rear Seat Cushion .

REMOVAL AND INSTALLATION > FUEL RAIL > REMOVAL

1.

Release the fuel system pressure. Refer to: FUEL SYSTEM PRESSURE RELEASE - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS).

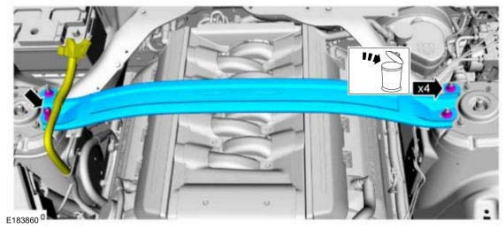
2.

Disconnect the battery ground and positive cables. Refer to: Battery Disconnect and Connect .

3.

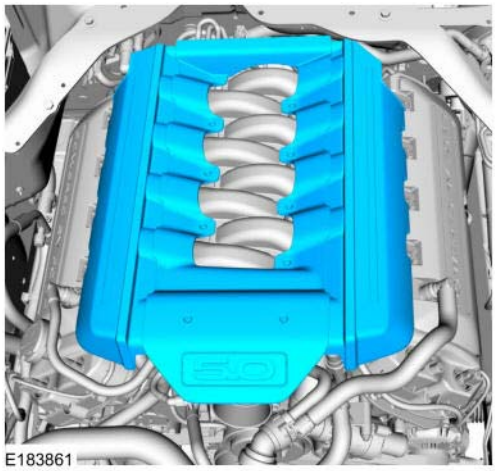
If equipped with a strut tower cross brace, detach the wiring harness retainer.

Remove the nuts and the strut tower cross brace.



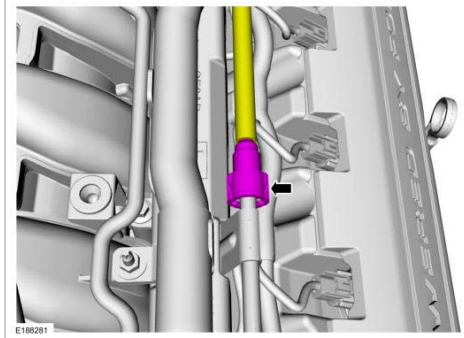
NOTE: The engine appearance cover rubber grommets may remain on the cover. If so, remove the grommets from the cover and install them on the intake manifold before installing the cover.

4.
Remove the engine appearance cover.



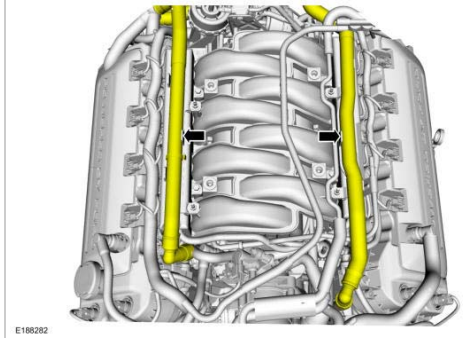
5.

Disconnect the fuel supply tube quick release coupling. Refer to: QUICK RELEASE COUPLING .



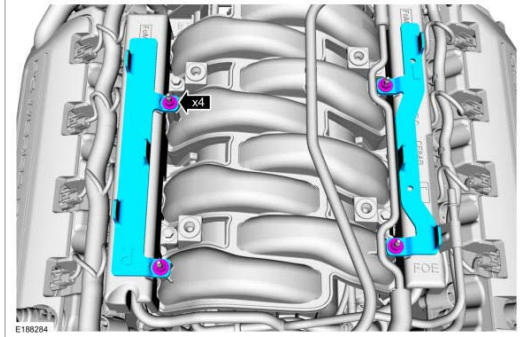
6.

Position the heater hoses aside.



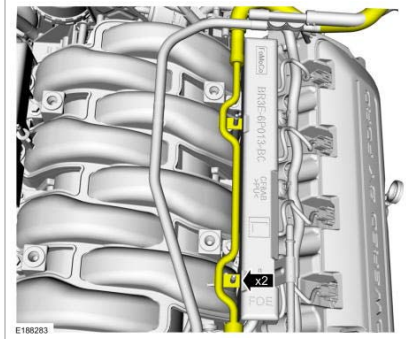
7.

Remove the nuts and then remove the heater hose supports.



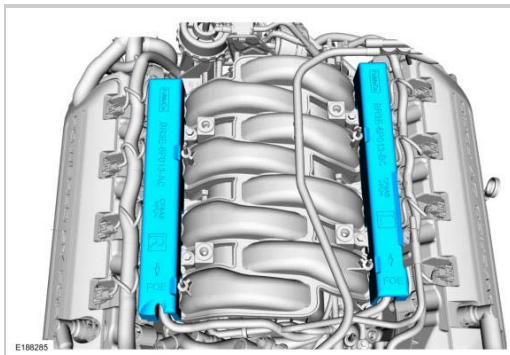
8.

Position the vacuum tube assembly aside.



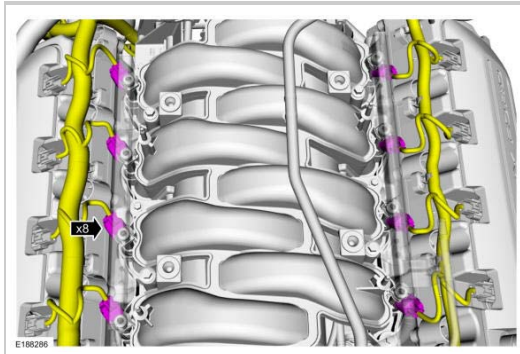
9.

Remove the LH and RH fuel rail insulators.



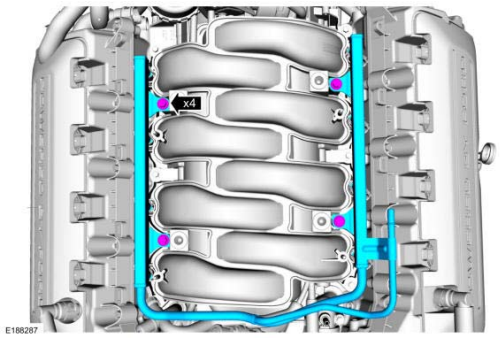
10.

Disconnect the fuel injector electrical connectors.



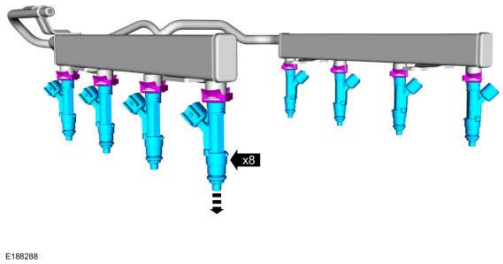
11.

Remove the fuel rail retaining bolts and remove the fuel rail.



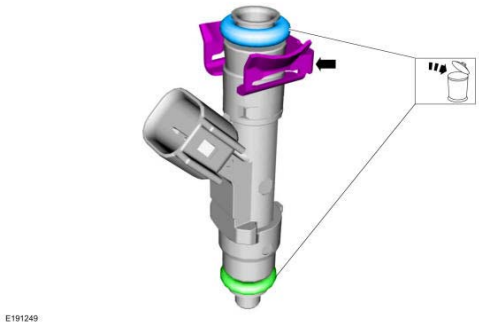
12.

Remove the fuel injectors from the fuel rail.



13.

Remove and discard all of the fuel injector O-ring seals. Remove the fuel injector retaining clips.



REMOVAL AND INSTALLATION > FUEL RAIL > INSTALLATION

NOTE: Use O-ring seals that are made of special fuel-resistant material. Use of ordinary O-rings can cause the fuel system to leak. Do not reuse the O-ring seals.

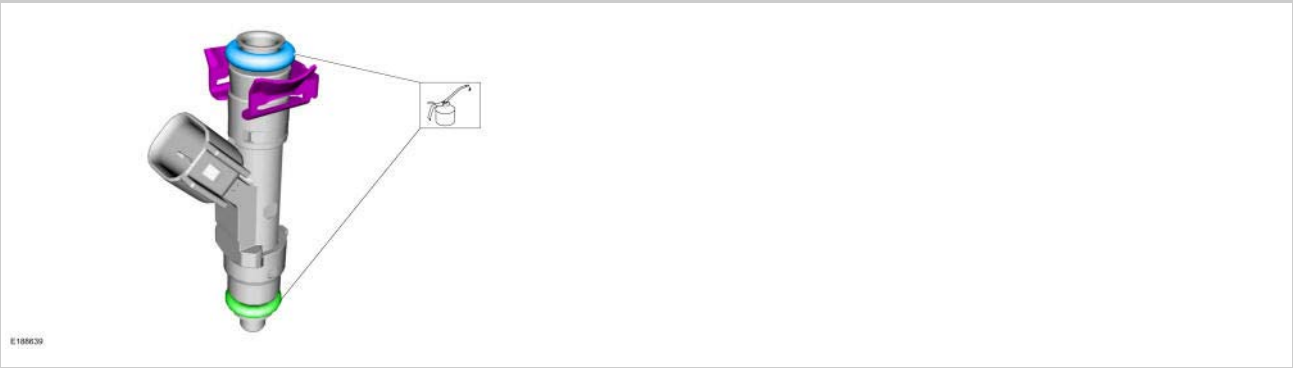
NOTE: The upper and lower fuel injector O-ring seals are similar in appearance,

but are not interchangeable.

NOTE: Make sure that new fuel injector O-ring seals are installed.

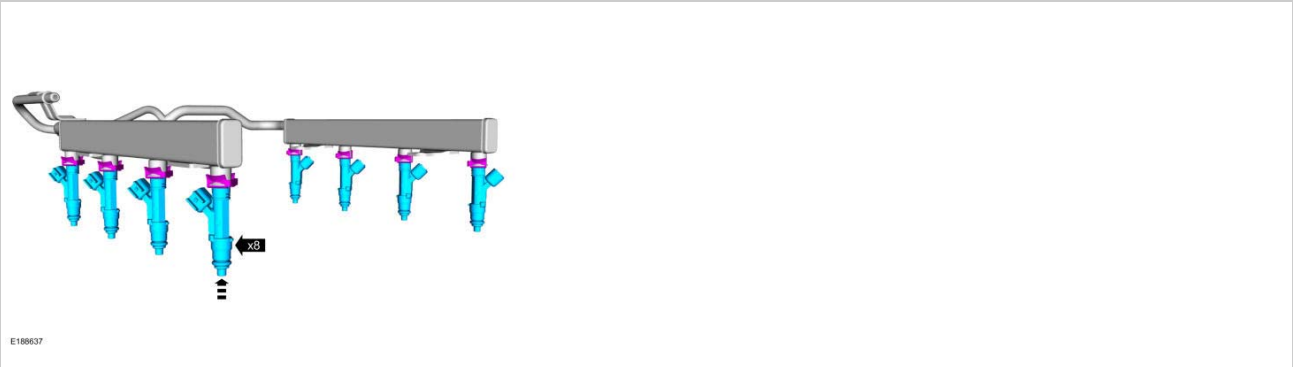
NOTE: The fuel injector clip can be reused if it is not damaged during removal. If the clip is reused, the 2 sides of the clip should be squeezed back into shape by placing it between index finger and thumb.

1.
Install the new fuel injector O-ring seals and the new fuel injector retaining clips onto the fuel injectors. Lubricate the new fuel injector O-ring seals with clean engine oil.



NOTE: Orient the fuel injector assemblies so the flat sides of the fuel rail injector cup is aligned with the flat side of the fuel injector retainer.

2.
Install the fuel injectors into the fuel rail.



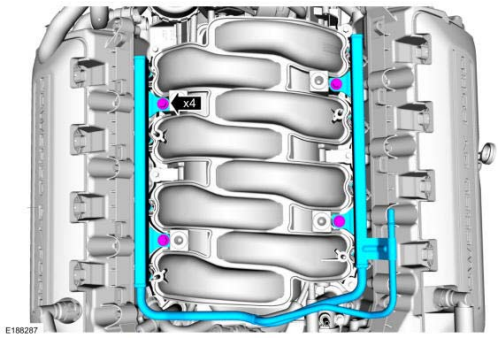
3.

Install the fuel rail, then install and tighten the fuel rail retaining bolts.

Torque:

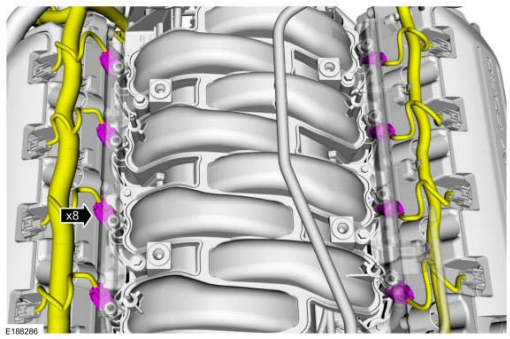
Stage 1: 89 lb.in (10 Nm)

Stage 2: 90°



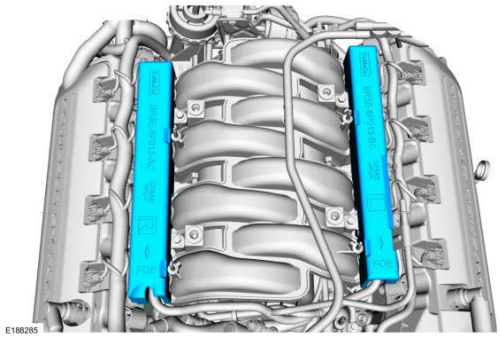
4.

Connect the fuel injector electrical connectors.



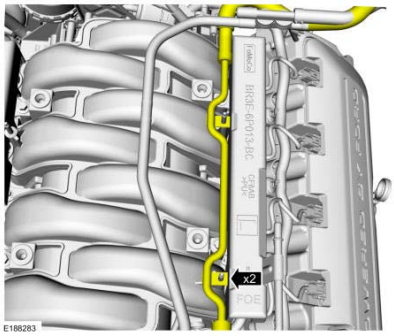
5.

Install the LH and RH fuel rail insulators.



6.

Install the vacuum tube assembly aside.

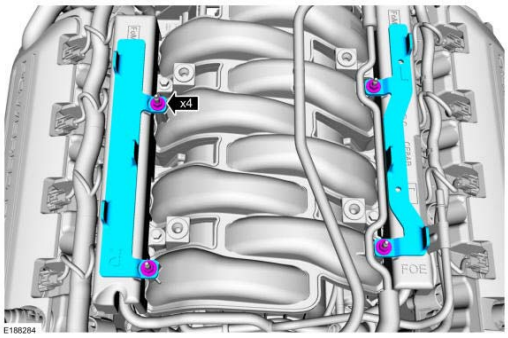


7.

Install the heater hose supports, then install and tighten the heater hose support nuts.

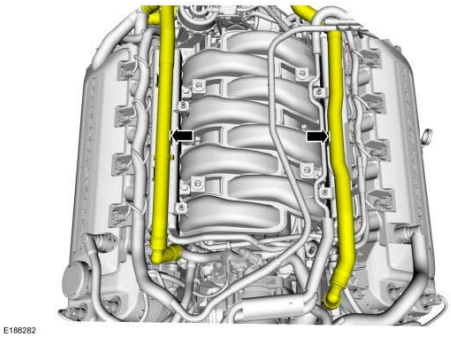
Torque

: 62 lb.in (7 Nm)



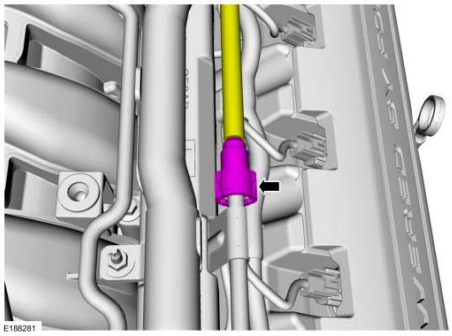
8.

Install the heater hoses.



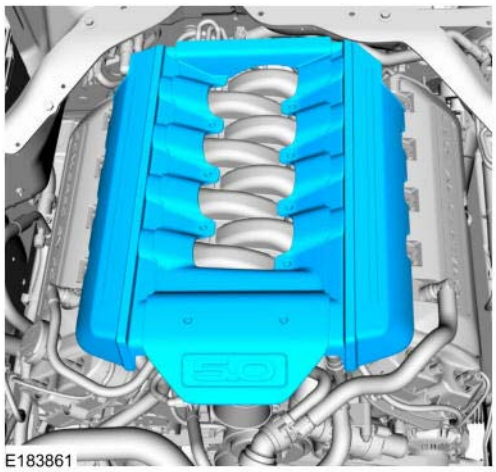
9.

Connect the fuel supply tube quick release coupling. Refer to: QUICK RELEASE COUPLING .



NOTE: The engine appearance cover rubber grommets may remain on the cover. If so, remove the grommets from the cover and install them on the intake manifold before installing the cover.

10.
Install the engine appearance cover.



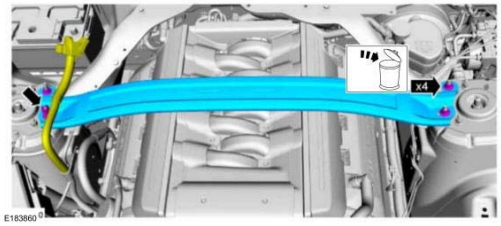
11.

If equipped, install the strut tower cross brace and nuts.

Torque

: 41 lb.ft (55 Nm)

Attach the wiring harness retainer.



12.

Connect the battery ground and positive cables. Refer to: Battery Disconnect and Connect .

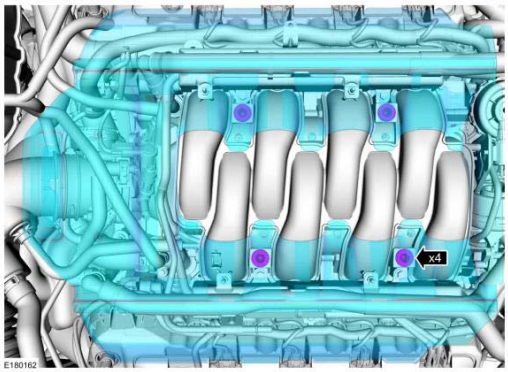
13.

Pressurize the fuel system. Refer to: FUEL SYSTEM PRESSURE RELEASE - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS).

REMOVAL AND INSTALLATION > THROTTLE BODY > REMOVAL

1.

Remove the engine appearance cover.

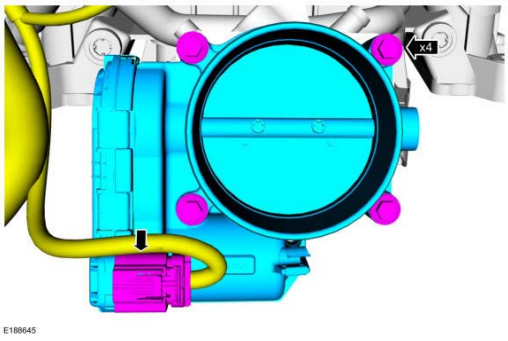


2.

Remove the air cleaner outlet pipe. Refer to: AIR CLEANER OUTLET PIPE .

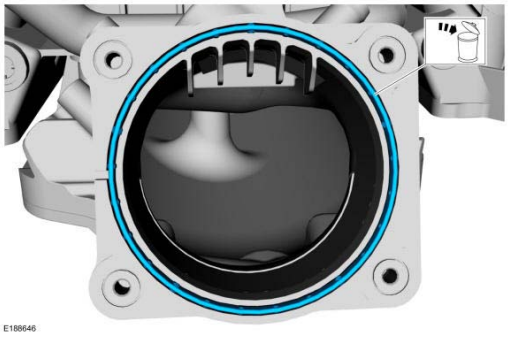
3.

Disconnect the Throttle Body (TB) electrical connector. Remove the Throttle Body (TB) retaining bolts and then remove the Throttle Body (TB).



4.

Remove and discard the Throttle Body (TB) gasket.

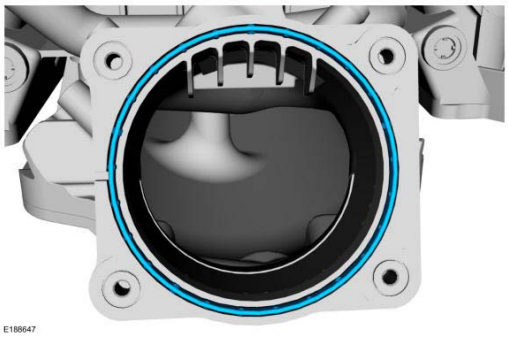


REMOVAL AND INSTALLATION > THROTTLE BODY > INSTALLATION

NOTE: Make sure that the mating faces are clean and free of foreign material.

1.

Install a new Throttle Body (TB) gasket.



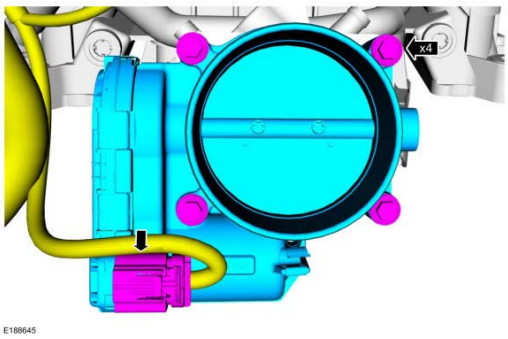
2.

Install the Throttle Body (TB), then install and tighten the Throttle Body (TB) retaining bolts. Connect the Throttle Body (TB) electrical connector.

Torque:

Stage 1: 62 lb.in (7 Nm)

Stage 2: 60°

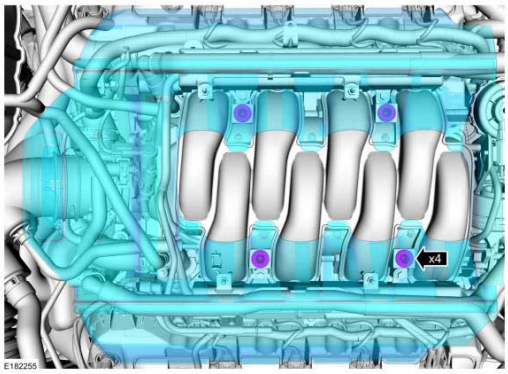


3.

Install the air cleaner outlet pipe. Refer to: AIR CLEANER OUTLET PIPE .

4.

The engine appearance cover rubber grommets may remain on the cover. If so, remove the grommets from the cover and install them on the intake manifold before installing the cover.Install the engine appearance cover.



Service Manual: STATE EMISSION STANDARDS - DIESEL

ARIZONA

NOTE: Because of frequent revisions in state emission standards, the emission standards listed in this article should only be used as a guide.

ARIZONA EMISSION STANDARDS - PHOENIX & TUCSON AREA (DIESEL OPACITY LOADED CRUISE TEST)

Application	Altitude (Feet)	Opacity (% For 10 Seconds)
Light Duty Vehicles (8500 GVWR Or Less)		
All Years	Less Than 2000	20 Or Less
	2001-4000	30 Or Less
	Greater Than 4000	40 Or Less

ARIZONA EMISSION STANDARDS - PHOENIX & TUCSON AREA (DIESEL J1667 SNAP IDLE TEST)

Application	Altitude (Feet)	Opacity (% For 10 Seconds)
Heavy Duty Vehicles (8500 GVWR Or Greater)		
1990 & Earlier	All	55
1991 & Newer	All	40

COLORADO

COLORADO EMISSION STANDARDS - DIESEL OPACITY

Application	Opacity %
14,000 GVWR Or Less	
Non-Turbo	40
Turbo	35
14,000 GVWR Or More	
Non-Turbo	35
Turbo	20

CONNECTICUT

CONNECTICUT EMISSION STANDARDS - DIESEL OPACITY

Application	Opacity %
10,000 GVWR Or Less	
1979 & Newer	20
26,000 GVWR Or More	
1974 & Earlier	70
1974-90	55
1991 & Newer	40

IDAHO

IDAHO EMISSION STANDARDS - DIESEL OPACITY

Application	Opacity %
All Weight Range	
1965-74	70
1975-91	55
1992 & Newer	40

KENTUCKY

KENTUCKY EMISSION STANDARDS - BOONE, CAMPBELL & KENTON COUNTIES (DIESEL OPACITY)

Application	Opacity
18,000 GVWR Or Less	
All Years	10% @ Idle

MASSACHUSETTS

MASSACHUSETTS EMISSION STANDARDS - DIESEL OPACITY

Application	Opacity %
Light Duty (8500 GVWR Or Less)	
1984 & Newer	20
Light Duty (8501-10,000 GVWR Or Less)	
1984 & Newer	40
Heavy Duty Buses (10,000 GVWR Or More)	
1984-93	40
1994 & Newer	30
Heavy Duty Trucks (10,000 Or Less GVWR)	
1984-90	55
1991 & Newer	40

NEW YORK

NEW YORK EMISSION STANDARDS - DIESEL OPACITY TEST

Application	Opacity %
Heavy Duty Vehicles (8500 GVWR Or More)	
1973 & Earlier	70
1974-90	55
1991 & Newer	40

OHIO

OHIO EMISSION STANDARDS - DIESEL OPACITY TEST

Application	Opacity %
Light Duty Diesel	20

RHODE ISLAND

RHODE ISLAND EMISSION STANDARDS - DIESEL OPACITY TEST

Application	Opacity %

All Model Years (8500 GVWR Or Less)	20

UTAH

UTAH EMISSION STANDARDS - DAVIS COUNTY - DIESEL OPACITY TEST

Application	Opacity %
Light Duty Diesel - Turbo (16,000 GVWR Or Less)	30
Light Duty Diesel - Non-Turbo (16,000 GVWR Or Less)	35
Heavy Duty Diesel (16,000 GVWR Or More)	70

UTAH EMISSION STANDARDS - SALT LAKE COUNTY - DIESEL OPACITY TEST

Application	Opacity %
All Model Years - Turbo (16,000 GVWR Or Less)	30
All Model Years - Non-Turbo (16,000 GVWR Or Less)	35
All Model Years (16,000 GVWR Or More)	70

UTAH EMISSION STANDARDS - UTAH COUNTY - DIESEL OPACITY TEST

Application	Opacity %
All Model Years - Turbo (16,000 GVWR Or Less)	30
All Model Years - Non-Turbo (16,000 GVWR Or Less)	35
All Model Years (16,000 GVWR Or More)	70

WASHINGTON

WASHINGTON EMISSION STANDARDS - DIESEL OPACITY TEST

Application	Opacity %
Light Duty Diesel (8500 GVWR Or Less)	
All Model Years	20
Heavy Duty Diesel (8500 GVWR Or More)	
1991 & Earlier	55
1992 & Newer	40

Service Manual: STATE EMISSION STANDARDS - GAS

ALASKA

NOTE: Because of frequent revisions in state emission standards, the emission standards listed in this article should only be used as a guide.

NOTE: As of March 1, 2012, Alaska is not testing for tailpipe emissions.

ALASKA EMISSION STANDARDS - ANCHORAGE & FAIRBANKS (2-SPEED IDLE TEST)

Application	Idle HC ppm (CO %)	2500 RPM HC ppm (CO %)
Passenger Cars (1)		
1968-71	1000 (5.0)	1000 (4.0)
1972-74	1000 (4.0)	1000 (3.0)
1975-80	1000 (2.0)	1000 (2.0)
1981-83	1000 (1.0)	1000 (1.0)
1984-93	750 (1.0)	750 (1.0)
1994-	200 (0.5)	200 (0.5)
Light & Medium Duty Trucks (1)		
1968-72	1000 (5.0)	1000 (4.0)
1973-78	1000 (4.0)	1000 (3.0)
1979-83	1000 (2.0)	1000 (2.0)
1984-93	750 (1.0)	750 (1.0)
1994-	220 (0.5)	220 (0.5)
Heavy Duty Vehicles (2)		
1968-73	1000 (5.0)	1000 (5.0)
1974-93	1000 (4.0)	1000 (4.0)
1994-	220 (1.0)	220 (1.0)

(1) 8500 GVWR or less.

(2) 8500 GVWR or more.

ARIZONA

NOTE: Curb idle only test are for vehicles with full-time 4WD, non-defeatable traction control and motorcycles. Curb idle and loaded cruise tests are performed on 1967-80 light-duty gasoline powered vehicles and all heavy-duty gasoline powered vehicles.

ARIZONA EMISSION STANDARDS - PHOENIX AREA (CURB IDLE & LOADED CRUISE TESTS)

Application (1)	Idle HC ppm (CO %)	(2) Loaded/Cruise HC ppm (CO %)
Light Duty Vehicles (6000 GVWR Or Less)		
1967-71 4-Cyl. Or Less	500 (5.50)	500 (4.20)
1967-71 More Than 4-Cyl.	450 (5.00)	450 (3.75)
1972-74 4-Cyl. Or Less	400 (5.50)	400 (4.20)
1972-74 More Than 4-Cyl.	400 (5.00)	400 (3.75)
1975-78 4-Cyl. Or Less	250 (2.20)	250 (1.65)
1975-78 More Than 4-Cyl.	250 (2.00)	250 (1.50)
Light Duty Vehicles (8500 GVWR Or Less)		
1979 4-Cyl. Or Less	220 (2.20)	220 (1.65)
1979 More Than 4-Cyl.	220 (2.20)	220 (1.50)
1980	220 (1.20)	220 (1.20)
1981 & Newer	220 (1.20)	.....
Light Duty Trucks (6000 GVWR Or Less)		
1967-80	(3)	(3)
Light Duty Trucks (6001-8500 GVWR)		
1967-74	(3)	(3)
1975-78	350 (4.00)	350 (3.00)
1979 4-Cyl. Or Less	220 (2.20)	220 (1.65)
1979 More Than 4-Cyl.	220 (2.00)	220 (1.50)
1980	220 (1.20)	220 (1.20)
1981 & Newer	220 (1.20)	.....
Heavy Duty Trucks (Greater Than 8500 GVWR)		
1967-74	(3)	(3)
1975-78	350 (4.00)	350 (3.00)

1979 & Newer	300 (4.00)	300 (3.00)
Motorcycles		
1967 & Newer	1800 (5.50)	.....

(1)	4-stroke engines only.
(2)	Except AWD, non-defeatable traction control and motorcycles.
(3)	Same as light duty vehicles.

ARIZONA EMISSION STANDARDS - PHOENIX AREA (IM147 TEST)

Application	HC gpm (CO gpm)	NOx gpm
Light Duty Vehicles		
1981-82	3.0 (25.0)	3.5
1983-85	2.4 (20.0)	3.5
1986-89	1.6 (15.0)	2.5
1990-93	1.0 (12.0)	2.5
1994 & Newer	0.8 (12.0)	2.0
Light Trucks (6000 GVWR Or Less)		
1981-85	4.0 (40.0)	5.5
1986-89	3.0 (25.0)	4.5
1990-93	2.0 (20.0)	4.0
1994 & Newer	1.6 (20.0)	3.0
Light Duty Trucks (6000-8500 GVWR)		
1981-85	4.4 (48.0)	7.0
1986-87	4.0 (40.0)	5.5
1988-89	3.0 (25.0)	5.5
1990-93	3.0 (25.0)	5.0
1994 & Newer	2.4 (25.0)	4.0

NOTE: Curb idle test only for 1967-80 light-duty gasoline vehicles, all vehicles with full-time 4WD and/or non-defeatable traction control and motorcycles. Curb idle and loaded cruise tests are performed on all 1981 and later vehicles except those with full-time 4WD and/or non-defeatable traction control.

ARIZONA EMISSION STANDARDS - TUCSON AREA (CURB IDLE & LOADED CRUISE TESTS)

Application [1]	Idle HC ppm (CO %)	[2] Loaded/Cruise HC ppm (CO %)
Light Duty Vehicles (6000 GVWR Or Less)		
1967-71 4-Cyl. Or Less	500 (5.50)	.....
1967-71 More Than 4-Cyl.	450 (5.00)	.....
1972-74 4-Cyl. Or Less	400 (5.50)	.....
1972-74 More Than 4-Cyl.	400 (5.00)	.....
1975-78 4-Cyl. Or Less	250 (2.20)	.....
1975-78 More Than 4-Cyl.	250 (2.00)	.....
Light Duty Vehicles (8500 GVWR Or Less)		
1979 4-Cyl. Or Less	220 (2.20)	.....
1979 More Than 4-Cyl.	220 (2.20)	.....
1980	220 (1.20)	.....
1981 & Newer	220 (1.20)	220 (1.20)
Light Duty Trucks (6000 GVWR Or Less)		
1967-80	[3]	[3]
Light Duty Trucks (6001-8500 GVWR)		
1967-74	[3]	[3]
1975-78	350 (4.00)	.....
1979 4-Cyl. Or Less	220 (2.20)	.....
1979 More Than 4-Cyl.	220 (2.00)	.....
1980	220 (1.20)	.....
1981 & Newer	220 (1.20)	220 (1.20)
Heavy Duty Trucks (Greater Than 8500 GVWR)		
1967-74	[3]	[3]
1975-78	350 (4.00)	.....
1979-80	300 (4.00)	.....
1981 & Newer	300 (4.00)	300 (3.00)
Motorcycles		
1967 & Newer	1800 (5.50)	.....

[1]	4-stroke engines only.
[2]	Except AWD, non-defeatable traction control and motorcycles.

(3)	Same as light duty vehicles.

CALIFORNIA > CALIFORNIA EMISSION STANDARDS ASM TESTS

Specific vehicle cutpoints are available on the California BAR web site at www.bar.ca.gov under the Industry tab, then Cutpoints Application.

Fig 1: California Emission Standards - Enhanced & Partially Enhanced Program Areas - Light & Medium Duty Vehicles (ASM Test)

ESC	MODEL YEAR GROUP	VEHICLE TYPE (by GVWR and LVW)					PASS/FAIL EMISSION STANDARD						GROSS POLLUTER STANDARD					
							ASM 5015			ASM 2525			ASM 5015			ASM 2525		
		PC	LDT1	LDT2	MDV		HC	CO	NO	HC	CO	NO	HC	CO	NO	HC	CO	NO
1	1974-	X	X	X		A	235.4	2.56	1301.5	185.4	2.36	1161.5	435.4	4.26	2659.3	385.4	4.06	2459.3
						B	436041.7	4453.19	1192593.0	436041.7	4453.19	1192593.0	436041.7	4453.19	1703703.7	436041.7	4453.19	1703703.7
2	1975-1980	X				A	123.0	0.91	1016.3	90.3	0.71	876.3	315.3	2.51	2051.9	265.3	2.31	1851.9
						B	273316.7	1362.96	1043519.0	273316.7	1362.96	1043519.0	273316.7	1362.96	1490740.7	273316.7	1362.96	1490740.7
3	1981-1983	X				A	63.2	0.64	850.0	42.1	0.44	680.0	253.1	2.14	1844.4	192.4	1.94	1644.4
						B	234259.3	1064.81	894444.5	212963.0	1064.81	894444.5	234259.3	1064.81	1277777.8	212963.0	1064.81	1277777.8
4	1984-1986	X				A	67.0	0.52	850.0	42.1	0.32	680.0	242.4	2.02	1744.4	192.4	1.82	1544.4
						B	212963.0	979.63	894444.5	212963.0	979.63	894444.5	212963.0	979.63	1277777.8	212963.0	979.63	1277777.8
5	1987-1992	X				A	57.0	0.48	608.0	31.7	0.32	547.0	231.7	1.98	1729.6	181.7	1.82	1529.6
						B	191666.7	851.85	596296.3	191666.7	979.63	596296.3	191666.7	851.85	851851.9	191666.7	979.63	851851.9
6	1993-1995	X				A	59.0	0.29	617.1	24.3	0.23	547.0	234.3	1.79	1759.3	184.3	1.73	1559.3
						B	89951.3	724.07	271314.8	89951.3	851.85	596296.3	128501.9	724.07	553703.7	128501.9	851.85	553703.7
7	1996-2000	X				A	16.8	0.29	260.0	0.5	0.23	547.0	234.3	1.79	1759.3	184.3	1.73	1559.3
						B	128501.9	724.07	596296.3	128501.9	851.85	596296.3	128501.9	724.07	553703.7	128501.9	851.85	553703.7
8	2001-2003	X				A	16.8	0.29	260.0	0.5	0.23	547.0	234.3	1.79	1759.3	184.3	1.73	1559.3
						B	128501.9	724.07	596296.3	128501.9	851.85	596296.3	128501.9	724.07	553703.7	128501.9	851.85	553703.7
9	2004+	X				A	16.8	0.29	260.0	0.5	0.23	547.0	234.3	1.79	1759.3	184.3	1.73	1559.3
						B	128501.9	724.07	596296.3	128501.9	851.85	596296.3	128501.9	724.07	553703.7	128501.9	851.85	553703.7
10	1975-1978		X			A	139.4	1.08	1320.9	105.0	0.88	1180.9	330.0	2.58	2487.0	280.0	2.38	2287.0
						B	225000.0	2025.00	745370.4	225000.0	2025.00	745370.4	225000.0	2025.00	1064814.8	225000.0	2025.00	1064814.8
11	1979-1983		X			A	139.4	0.88	1315.7	80.0	0.68	1175.7	320.0	2.38	2479.6	255.0	2.18	2279.6
						B	225000.0	2025.00	596296.3	150000.0	2025.00	596296.3	225000.0	2025.00	851851.9	150000.0	2025.00	851851.9
12	1984-1987		X			A	91.3	0.41	945.0	63.1	0.50	840.0	280.0	1.71	1850.0	230.0	1.80	1700.0
						B	150000.0	1725.00	525000.0	150000.0	2250.00	1050000.0	150000.0	1725.00	750000.0	150000.0	2250.00	1500000.0
13	1988-1992		X			A	83.0	0.27	875.0	63.1	0.43	735.0	270.0	1.57	1600.0	220.0	1.73	1400.0
						B	150000.0	1725.00	525000.0	150000.0	1875.00	525000.0	150000.0	1725.00	750000.0	150000.0	1875.00	750000.0
14	1993-1995		X			A	68.3	0.30	377.0	33.3	0.40	630.0	247.5	1.60	1350.0	197.5	1.70	1400.0
						B	78750.0	1350.00	525000.0	78750.0	1500.00	525000.0	112500.0	1350.00	750000.0	112500.0	1500.00	750000.0
15	1996-2000		X			A	22.1	0.30	377.0	5.8	0.40	630.0	247.5	1.60	1350.0	197.5	1.70	1400.0
						B	112500.0	1350.00	525000.0	112500.0	1500.00	525000.0	112500.0	1350.00	750000.0	112500.0	1500.00	750000.0
16	2001-2003		X			A	22.1	0.30	377.0	5.8	0.40	630.0	247.5	1.60	1350.0	197.5	1.70	1400.0
						B	112500.0	1350.00	525000.0	112500.0	1500.00	525000.0	112500.0	1350.00	750000.0	112500.0	1500.00	750000.0
17	2004+		X			A	22.1	0.30	377.0	5.8	0.40	630.0	247.5	1.60	1350.0	197.5	1.70	1400.0
						B	112500.0	1350.00	525000.0	112500.0	1500.00	525000.0	112500.0	1350.00	750000.0	112500.0	1500.00	750000.0
18	1975-1978			X		A	139.4	1.08	1320.9	105.0	0.88	1180.9	330.0	2.58	2487.0	280.0	2.38	2287.0
						B	225000.0	2025.00	745370.4	225000.0	2025.00	745370.4	225000.0	2025.00	1064814.8	225000.0	2025.00	1064814.8
19	1979-1983			X		A	139.4	0.88	1315.7	80.0	0.68	1175.7	320.0	2.38	2479.6	255.0	2.18	2279.6
						B	225000.0	2025.00	596296.3	150000.0	2025.00	596296.3	225000.0	2025.00	851851.9	150000.0	2025.00	851851.9
20	1984-1987			X		A	91.3	0.41	945.0	63.1	0.50	840.0	280.0	1.71	1850.0	230.0	1.80	1700.0
						B	150000.0	1725.00	525000.0	150000.0	2250.00	1050000.0	150000.0	1725.00	750000.0	150000.0	2250.00	1500000.0
21	1988-1992			X		A	83.0	0.27	875.0	63.1	0.43	735.0	270.0	1.57	1600.0	220.0	1.73	1400.0
						B	150000.0	1725.00	525000.0	150000.0	1875.00	525000.0	150000.0	1725.00	750000.0	150000.0	1875.00	750000.0
22	1993-1995			X		A	68.3	0.30	377.0	33.3	0.40	630.0	247.5	1.60	1350.0	197.5	1.70	1400.0
						B	78750.0	1350.00	525000.0	78750.0	1500.00	525000.0	112500.0	1350.00	750000.0	112500.0	1500.00	750000.0
23	1996-2000			X		A	22.1	0.30	377.0	5.8	0.40	630.0	247.5	1.60	1350.0	197.5	1.70	1400.0
						B	112500.0	1350.00	525000.0	112500.0	1500.00	525000.0	112500.0	1350.00	750000.0	112500.0	1500.00	750000.0
24	2001-2003			X		A	22.1	0.30	377.0	5.8	0.40	630.0	247.5	1.60	1350.0	197.5	1.70	1400.0
						B	112500.0	1350.00	525000.0	112500.0	1500.00	525000.0	112500.0	1350.00	750000.0	112500.0	1500.00	750000.0
25	2004+			X		A	22.1	0.30	377.0	5.8	0.40	630.0	247.5	1.60	1350.0	197.5	1.70	1400.0
						B	112500.0	1350.00	525000.0	112500.0	1500.00	525000.0	112500.0	1350.00	750000.0	112500.0	1500.00	750000.0
26	1978-				X	A	173.3	2.90	1703.3	123.3	2.70	1563.3	423.3	5.40	3233.3	373.3	5.20	3033.3
						B	583333.3	3500.00	1633333.3	583333.3	3500.00	1633333.3	583333.3	3500.00	2333333.3	583333.3	3500.00	2333333.3
27	1979-1983				X	A	139.4	0.88	1315.7	80.0	0.68	1175.7	320.0	2.38	2479.6	255.0	2.18	2279.6
						B	225000.0	2025.00	596296.3	150000.0	2025.00	596296.3	225000.0	2025.00	851851.9	150000.0	2025.00	851851.9
28	1984-1987				X	A	91.3	0.41	945.0	63.1	0.50	840.0	280.0	1.71	1850.0	230.0	1.80	1700.0
						B	150000.0	1725.00	525000.0	150000.0	2250.00	1050000.0	150000.0	1725.00	750000.0	150000.0	2250.00	1500000.0
29	1988-1992				X	A	83.0	0.27	875.0	63.1	0.43	735.0	270.0	1.57	1600.0	220.0	1.73	1400.0
						B	150000.0	1725.00	525000.0	150000.0	1875.00	525000.0	150000.0	1725.00	750000.0	150000.0	1875.00	750000.0
30	1993-1995				X	A	83.0	0.30	875.0	60.0	0.70	735.0	300.0	1.60	1750.0	250.0	2.00	1550.0
						B	150000.0	1350.00	525000.0	150000.0	1500.00	525000.0	150000.0	1350.00	750000.0	150000.0	1500.00	750000.0
31	1996-2000				X	A	71.2	0.30	875.0	60.0	0.70	735.0	300.0	1.60	1750.0	250.0	2.00	1550.0
						B	150000.0	1350.00	525000.0	150000.0	1500.00	525000.0	150000.0	1350.00	750000.0	150000.0	1500.00	750000.0
32	2001-2003				X	A	71.2	0.30	875.0	60.0	0.70	735.0	300.0	1.60	1750.0	250.0	2.00	1550.0
						B	150000.0	1350.00	525000.0	150000.0	1500.00	525000.0	150000.0	1350.00	750000.0	150000.0	1500.00	750000.0
33	2004+				X	A	71.2	0.30	875.0	60.0	0.70	735.0	300.0	1.60	1750.0	250.0	2.00	1550.0
						B	150000.0	1350.00	525000.0	150000.0	1500.00	525000.0	150000.0	1350.00	750000.0	150000.0	1500.00	750000.0

Fig 2: California Emission Standards - Enhanced & Partially Enhanced Program Areas - Heavy Duty Vehicles (ASM Test)

ESC	MODEL YEAR GROUP	VEHICLE TYPE (by GVWR and LVW)						PASS/FAIL EMISSION STANDARD						GROSS POLLUTER STANDARD					
								ASM 5015			ASM 2525			ASM 5015			ASM 2525		
		PC	LDT1	LDT2	MDV	HDV		HC	CO	NO	HC	CO	NO	HC	CO	NO	HC	CO	NO
46	1978-					X	A	243.8	3.92	2615.8	199.8	3.92	2770.8	594.9	7.29	4970.0	605.4	7.57	5375.4
							B	583333.3	3500.00	1633333.3	583333.3	3500.00	1633333.3	583333.3	3500.00	1633333.3	583333.3	3500.00	1633333.3
47	1979 - 1983					X	A	205.5	2.16	2250.6	106.0	1.96	2400.6	454.2	6.62	4231.1	338.1	6.54	4657.2
							B	225000.0	2025.00	596296.3	150000.0	2025.00	596296.3	225000.0	2025.00	596296.3	150000.0	2025.00	596296.3
48	1984 - 1987					X	A	143.0	1.60	2162.5	78.0	1.80	1975.0	307.5	6.67	4238.5	250.0	6.48	3989.5
							B	150000.0	1725.00	525000.0	150000.0	2250.00	1050000.0	150000.0	1725.00	525000.0	150000.0	2250.00	1050000.0
49	1988 - 1992					X	A	105.0	1.01	2112.5	78.0	1.24	2062.5	300.0	5.87	3865.9	250.0	4.98	3929.9
							B	150000.0	1725.00	525000.0	150000.0	1875.00	525000.0	150000.0	1725.00	525000.0	150000.0	1875.00	525000.0
50	1993 - 1995					X	A	105.0	0.49	1912.5	75.0	1.22	1862.5	300.0	2.61	3825.0	250.0	3.49	3929.9
							B	150000.0	1350.00	525000.0	150000.0	1500.00	525000.0	150000.0	1350.00	525000.0	150000.0	1500.00	525000.0
51	1996 - 2000					X	A	105.0	0.49	1662.5	75.0	1.16	1462.5	300.0	2.61	3325.0	250.0	3.32	3085.9
							B	150000.0	1350.00	525000.0	150000.0	1500.00	525000.0	150000.0	1350.00	525000.0	150000.0	1500.00	525000.0
52	2001+					X	A	105.0	0.49	1662.5	75.0	1.16	1462.5	300.0	2.61	3325.0	250.0	3.32	3085.9
							B	150000.0	1350.00	525000.0	150000.0	1500.00	525000.0	150000.0	1350.00	525000.0	150000.0	1500.00	525000.0

CALIFORNIA > LEGEND

ESC - Emission Standard Category

GVWR - Manufacture's Gross Vehicle Weight Rating

LVW - Loaded Vehicle Weight

PC - Passenger Car

LDT1 - Light-Duty Truck up through 3750 LVW and GVWR no greater than 6000 lbs.

LDT2 - Light-Duty Truck greater than 3750 LVW and GVWR no greater than 6000 lbs.

MDV - Medium-Duty Vehicle, GVWR from 6001 to 8500 lbs.

HC - Hydrocarbon, ppm

CO - Carbon Monoxide, %

NO - Nitric Oxide, ppm

CALIFORNIA > PASS/FAIL EMISSION STANDARDS = A+B / VTW

PASS/FAIL STANDARDS - Emission standards used to determine if a vehicle passes the emission inspection. A vehicle passes if the emission levels are equal to or less than the standards for HC, CO and NO for ASM 5015 and ASM 2525.

GROSS POLLUTER STANDARDS - Emission standards used to designate a vehicle as a gross polluter. A vehicle is designated as a gross polluter if the emission levels at the time of the initial inspection, before repairs are greater than the gross polluter standards for HC, CO or NO for ASM 5015 or ASM 2525.

NOTE: If test data on emission pass/fail rates or gross polluter identification rates

indicate adjustments are required, the emission standards may be increased or decreased by the bureau by 30% or by the following tolerances, or standards may be set for any specific vehicle and engine configuration which the bureau determines has excessive errors of commission of omission, whichever is necessary to comply with Section 44001.5 of the Health and Safety Code.

COLORADO

COLORADO EMISSION STANDARDS - ENHANCED PROGRAM (IM240)

Application	HC gpm	CO gpm	NOx gpm
Passenger Cars			
1982	3.5	45	5.0
1983	3.5	30	4.5
1984	3.0	30	4.5
1985	2.5	20	4.5
1986	2.5	20	4.5
1987	2.5	20	4.0
1988 & 1989	2.0	20	4.0
1990	2.0	20	3.5
1991	1.5	20	3.5
1992	1.5	15	3.5
1993	1.5	15	3.5
1994	1.2	15	3.0
1995	1.2	15	2.5
1996	1.2	15	2.0
1997	1.2	15	2.0
1998 & Newer	1.2	15	1.5
Light Duty Vehicles			
1982	6.0	65	6.0
1983	6.0	65	6.0
1984	5.0	55	6.0
1985	4.5	45	6.0
1986	4.0	40	6.0

1987	3.5	30	5.5
1988 & 1989	3.0	25	5.0
1990	3.0	25	5.0
1991	2.5	25	4.5
1992	2.5	25	4.5
1993	2.5	25	4.5
1994	2.0	20	4.0
1995	2.0	20	4.0
1996	1.2	15	3.5
1997	1.2	15	3.0
1998	1.2	15	2.0
1999 & Newer	1.2	15	2.0

COLORADO EMISSION STANDARDS - 2-SPEED IDLE TEST

Application	HC ppm	CO %
Passenger Cars & Light Duty Trucks		
1970 & Earlier	1000	3.5
1971	1000	3.0
1972	1000	3.0
1973	1000	3.0
1974	1000	3.0
1975	600	2.0
1976	600	2.0
1977	400	1.5
1978	400	1.5
1979	400	1.5
1980	400	1.5
1981 & Newer	220	1.2
Heavy Duty Trucks (6000 GVWR Or Greater)		
1967 Or Earlier	1500	7.0
1968-69	1200	6.5
1969	1200	6.5

1970	1000	5.5
1971	1000	5.5
1972	1000	5.5
1973	1000	5.5
1974	1000	5.5
1975	1000	5.5
1976	1000	5.5
1977	1000	5.5
1978	1000	5.5
Heavy Duty Trucks (8501 GVWR Or Greater)		
1979	800	4.0
1980	800	3.5
1981	600	3.0
1982	600	3.0
1983	600	3.0
1984	600	3.0
1985	600	3.0
1986 & Newer	300	2.0

CONNECTICUT

CONNECTICUT EMISSION STANDARDS - IDLE TEST

Application	HC ppm (CO)
10,000 GVWR Or Less	
1979	250 (2.1)
1980	225 (2.0)
1981-82	200 (1.2)
1983	175 (1.0)
1984-87	150 (1.0)
1988 & Newer	125 (1.0)

DELAWARE

DELAWARE EMISSION STANDARDS - KENT, NEW CASTLE & SUSSEX COUNTIES (IDLE TEST)

Application	HC ppm (CO %)
Light Duty Vehicles (6000 GVWR Or Less)	
1968-70	900 (9.0)
1971-74	600 (6.0)
1975-79	400 (4.0)
1980	220 (2.0)
1981 & Newer	220 (1.2)
Light Duty Trucks (6001-8500 GVWR)	
1970-72	900 (9.0)
1973-78	600 (6.0)
1979-83	400 (4.0)
1984 & Newer	220 (1.2)

DISTRICT OF COLUMBIA

DISTRICT OF COLUMBIA EMISSION STANDARDS - IDLE TEST

Application	HC ppm (CO %)
Light Duty Vehicles & Trucks (26000 GVWR Or Less)	
1968-70	1250 (11.0)
1971-74	1200 (9.0)
1975-79	600 (6.5)
1980	300 (1.5)
1981 & Newer	220 (1.2)

GEORGIA

NOTE: The Georgia program incorporates original U.S. EPA recommended start-up ASM2525 and ASM5015 standards for 1995 and older model year vehicles. Refer to appropriate model year range in appropriate table. See U. S. EPA ASM2525 & ASM5015 START-UP EMISSION STANDARDS .

GEORGIA EMISSION STANDARDS - 2-SPEED IDLE TEST

Application [1]	HC ppm (CO %)
1979	500 (5.0)
1980	350 (3.5)
1981-83	250 (1.5)
1984 & Newer	220 (1.2)

[1] 8500 GVWR or less.

IDAHO

IDAHO EMISSION STANDARDS - 2-SPEED IDLE TEST

Application	HC ppm (CO %)
Light Duty Vehicles	
8500 GVWR Or Less	
1965-74	900 (5.0)
1975-79	700 (3.0)
1980	400 (1.5)
1981 & Newer	220 (1.2)
Heavy Duty Trucks	
8501 GVWR Or More	
1965-74	900 (6.0)
1975-80	700 (5.0)
1981 & Newer	500 (3.0)

ILLINOIS

ILLINOIS EMISSION STANDARDS - IM240 TEST

Application	HC gpm	CO gpm
Light Duty Vehicles (6000 GVWR Or Less)		
1981-82	2.00	60.0

1983-87	2.00	30.0
1988-95	0.80	15.0
1996 & Newer	0.60	10.0
Light Duty Trucks (6000 GVWR Or Less)		
1981-83	7.50	100.0
1984-87	3.20	80.0
1988-95	1.60	40.0
1996 & Newer (3750 LVW Or More) (1)	0.80	13.0
1996 & Newer (3750 LVW Or Less) (1)	0.60	10.0
Light Duty Trucks (6001-6500 GVWR)		
1981-83	7.50	100.0
1984-87	3.20	80.0
1988-95	1.60	40.0
1996 & Newer (5750 ALVW Or More)	0.80	15.0
1996 & Newer (5750 ALVW Or Less)	0.80	13.0
(1) Loaded Vehicle Weight (LVW) is vehicle curb weight plus 300 lbs.		

ILLINOIS EMISSION STANDARDS - IDLE TEST

Application	HC ppm (CO %)
Passenger Vehicles (6000 GVWR Or Less)	
1968-71	900 (9.0)
1972-74	800 (8.0)
1975-77	700 (7.0)
1978-79	600 (6.0)
1980	300 (3.0)
1981 & Newer	220 (1.2)
Light Duty Vehicles (8000 GVWR Or Less)	
1968-71	900 (9.0)
1972-74	800 (8.0)
1975-78	700 (7.0)
1979-80	600 (6.0)
1981-83	300 (3.0)

1984 & Newer	220 (1.2)
Heavy Duty Vehicles (8001 GVWR Or More)	
1968-71	1500 (9.5)
1972-78	900 (9.0)
1979-84	700 (7.0)
1985 & Newer	300 (3.0)

INDIANA

INDIANA EMISSION STANDARDS - IM93 TEST

Application	HC gpm (CO gpm)	NOx (gpm)
Passenger Cars		
1981-82	2.0 (60)	3.0
1983-86	2.0 (30)	3.0
1987-90	1.4 (20)	3.0
1991-95	0.8 (15)	2.5
1996 & Newer	0.6 (10)	2.5
Light Duty Trucks (6000 GVWR Or Less)		
1981-83	5.0 (80)	7.0
1984-86	3.2 (70)	7.0
1987-90	2.2 (55)	3.5
1991-95	1.6 (40)	3.0
1996 & Newer	0.8 (20)	3.0
Light Duty Trucks (6001-8500 GVWR)		
1981-83	5.0 (80)	7.0
1984-86	3.2 (70)	7.0
1987-90	2.2 (55)	5.0
1991-96	1.6 (40)	4.5
1997 & Newer	0.8 (20)	4.5
Heavy Duty Trucks (8501-9000 GVWR)		
1981-82	7.5 (100)	8.0
1983-84	6.0 (100)	8.0

1985-86	5.0 (75)	8.0
1987-90	3.0 (60)	8.0
1991-97	2.4 (40)	8.0
1998 & Newer	2.0 (30)	6.0

INDIANA EMISSION STANDARDS - IDLE TEST

Application	HC ppm (CO %)
Passenger Cars	
1976-79	350 (3.5)
1980	250 (2.0)
1981 & Newer	220 (1.2)
Light Duty Trucks (6000 GVWR Or Less)	
1976-78	500 (5.0)
1979-83	350 (3.5)
1984 & Newer	220 (1.2)
Medium Duty Trucks (6001-8500 GVWR)	
1976-78	500 (5.0)
1979-83	350 (3.5)
1984 & Newer	220 (1.2)

KENTUCKY

NOTE: Currently, there is no emission testing in Kentucky.

KENTUCKY EMISSION STANDARDS - BOONE, CAMPBELL & KENTON COUNTIES (IDLE TEST)

Application	HC ppm (CO)
Passenger Cars (Automobiles)	
1968	950 (8.5)
1969	900 (8.5)
1970	850 (8.1)
1972	800 (8.0)

1973	800 (7.8)
1974	800 (7.6)
1975	700 (7.5)
1976	700 (6.5)
1977	650 (6.3)
1978	600 (5.5)
1979	600 (4.5)
1980	250 (2.5)
1981 & Newer	220 (1.2)
Light Duty Trucks (6000 GVWR Or Less)	
1968	1300 (8.0)
1969	1200 (8.0)
1970-71	1100 (8.0)
1972-73	1000 (7.8)
1974	950 (7.8)
1975	900 (7.0)
1976-77	700 (7.0)
1978	700 (6.3)
1979	450 (5.5)
1980	450 (4.0)
1981	350 (1.7)
1982 & Newer	220 (1.2)
Light Duty Trucks (6001-10,000 GVWR)	
1969	1500 (9.0)
1970	1100 (8.0)
1971	1000 (8.0)
1972-75	950 (7.5)
1976	900 (7.5)
1977	850 (7.5)
1978	700 (6.0)
1979	650 (5.5)
1980	550 (5.0)
1981	450 (4.0)

1982	400 (2.5)
1983	350 (2.0)
1984	220 (1.5)
1985 & Newer	220 (1.2)
Heavy Duty Trucks (10,001-18,000 GVWR)	
1968	1500 (9.0)
1969-70	1300 (8.5)
1971	1200 (8.5)
1972-76	1000 (7.0)
1977-80	900 (6.5)
1982-83	400 (3.0)
1984 & Newer	250 (1.5)

MARYLAND

MARYLAND EMISSION STANDARDS - IM240 TEST

Application	HC gpm (CO gpm)	NOx gpm
Light Duty Vehicles (6000 GVWR Or Less)		
1984-87	1.80 (30.0)	2.8
1988-90	1.40 (30.0)	2.5
1991-93	1.00 (20.0)	2.2
1994-95	0.90 (20.0)	2.1
Light Duty Trucks (6000 GVWR Or Less)		
1984-87	2.80 (80.0)	5.8
1988-90	2.40 (80.0)	3.0
1991-93	2.00 (60.0)	2.7
1994-95	1.80 (60.0)	2.6
Light Duty Trucks (6001-8500 GVWR)		
1984-87	2.90 (80.0)	6.6
1988-90	2.40 (80.0)	4.2
1991-93	2.00 (60.0)	4.0
1994-95	1.80 (60.0)	3.7

Heavy Duty Trucks (8501-9999 GVWR)		
1984	5.80 (100.0)	7.7
1985-86	4.70 (80.0)	7.7
1987	3.00 (80.0)	7.7
1988-90	2.60 (80.0)	7.0
1991-97	2.50 (60.0)	5.5
1998 & Newer	2.20 (60.0)	4.0

MARYLAND EMISSION STANDARDS - IDLE TEST

Application	HC ppm (CO %)
Light Duty Vehicles (6000 GVWR Or Less)	
1977	500 (6.0)
1978	430 (5.5)
1979	400 (4.0)
1980	220 (1.7)
1981 & Newer	220 (1.2)
Light Duty Trucks (6001-9999 GVWR)	
1977	580 (7.0)
1978	550 (6.7)
1979	470 (5.0)
1980	350 (5.0)
1981	250 (3.0)
1982	220 (2.5)
1983	220 (1.5)
1984 & Newer	220 (1.2)
Heavy Duty Trucks (10,000-26,000 GVWR)	
1977-78	650 (7.0)
1979	650 (6.5)
1980-82	500 (6.0)
1983	500 (3.5)
1984-85	440 (3.0)
1986	280 (2.5)

1987 & Newer	220 (1.2)

MASSACHUSETTS

MASSACHUSETTS EMISSION STANDARDS - MA31 TEST

Application	HC gpm (CO gpm)	NOx gpm
Passenger Cars		
1984-90	2.0 (30)	3.0
1991-95	1.2 (20)	2.5
1996 & Newer	0.8 (13)	2.0
Light Duty Trucks (6000 GVWR Or Less)		
1984-87	3.2 (80)	7.0
1988-1990	3.2 (80)	3.5
1991-95	2.4 (60)	3.0
1996 & Newer (3750 LVW (1) Or Less)	0.8 (15)	2.0
1996 & Newer (3751 LVW (1) Or Greater)	1.0 (20)	2.5
Light Duty Trucks (6001-8500 GVWR)		
1984-87	3.2 (80)	7.0
1988-90	3.2 (80)	5.0
1991-95	2.4 (60)	4.5
1996 & Newer (5750 ALVW (2) Or Less)	1.0 (20)	2.5
1996 & Newer (5751 ALVW (2) Or Greater)	2.4 (60)	4.0
Heavy Duty Trucks (8501-10,000 Or Greater)		
1984-87	3.2 (80)	7.0
1988-90	3.2 (80)	5.0
1991-95	2.4 (60)	4.5
1996 & Newer	2.4 (60)	4.0

(1)	Loaded Vehicle Weight (LVW).
(2)	Adjusted Loaded Vehicle Weight (ALVW).

MASSACHUSETTS EMISSION STANDARDS - 2-SPEED IDLE TEST

Application	HC ppm (CO %)
All Vehicles	
1984-86	220 (0.80)
1987 & Newer	100 (0.60)

MISSOURI

MISSOURI EMISSION STANDARDS - JEFFERSON, ST. CHARLES & ST. LOUIS COUNTIES - IM240 TEST

Application	HC gpm (CO gpm)	NOx gpm
Light Duty Vehicles (6000 GVWR Or Less)		
1981-82	0.80 (30.0)	2.0
1983-95	0.80 (15.0)	2.0
1996 & Newer	0.60 (10.0)	1.5
Light Duty Trucks (6000 GVWR Or Less)		
1981-83	3.40 (70.0)	4.5
1984-87	1.60 (40.0)	4.5
1988-95	1.60 (40.0)	2.5
1996 & Newer (Less Than 3750 LVW)	0.80 (13.0)	1.8
1996 & Newer (3750 LVW Or Less)	0.60 (10.0)	1.5
Light Duty Trucks (6001-8500 GVWR)		
1981-83	3.4 (70.0)	4.5
1984-87	1.6 (40.0)	4.5
1988-95	1.60 (40.0)	3.5
1996 & Newer (5750 ALVW Or Less)	0.80 (13.0)	1.8
1996 & Newer (5750 ALVW Or More)	0.80 (15.0)	2.0

MISSOURI EMISSION STANDARDS - FRANKLIN, JEFFERSON, ST. CHARLES & ST. LOUIS COUNTIES - IDLE TEST

Application [1]	HC ppm (CO %)
1971-74	700 (7.0)
1975-79	600 (6.0)

1980	300 (3.0)
1981 & Newer	220 (1.2)

(1) 8500 GVWR or less.

MISSOURI EMISSION STANDARDS - FRANKLIN, JEFFERSON, ST. CHARLES & ST. LOUIS COUNTIES - REMOTE SENSING CLEAN SCREEN TEST

Application (1)	HC ppm (CO %)	NOx ppm
All Vehicles (8500 GVWR Or Less)		
1971 & Newer	200 (0.5)	2000

(1) 8500 GVWR or less.

NEVADA

NEVADA EMISSION STANDARDS - 2-SPEED IDLE TEST

Application	HC ppm (CO %)
Light Duty Vehicles (8500 GVWR Or Less)	
1968-69	800 (4.0)
1970-74	700 (3.5)
1975-78	500 (2.5)
1979-80	500 (2.0)
1981 & Newer	220 (1.2)
Heavy Duty Vehicles (8501 GVWR Or More)	
1968-69	1400 (7.0)
1970-78	1400 (6.0)
1979	1000 (5.0)
1980	1000 (4.0)
1981 & Newer	1000 (3.5)

NEW JERSEY

NOTE: The New Jersey program incorporates original U.S. EPA recommended start-up

ASM5015 standards for 1981 and newer model year vehicles. Refer to appropriate model year range in appropriate table. See U. S. EPA ASM2525 & ASM5015 START-UP EMISSION STANDARDS .

NEW JERSEY EMISSION STANDARDS - 2-SPEED IDLE TEST

Application	Idle HC ppm (CO %)	2500 RPM HC ppm (CO %)
Light Duty Vehicles (8500 GVWR Or Less)		
1967 & Earlier	1400 (8.5)	.....
1968-70	700 (7.0)	.....
1971-74	500 (5.0)	.....
1975-80	300 (3.0)	.....
1981 & Newer	220 (1.2)	100 (0.5)
Heavy Duty Vehicles (8501 GVWR Or Greater)		
1967 & Earlier	1400 (8.5)	.....
1968-70	1200 (8.5)	.....
1971-74	700 (6.0)	.....
1975-78	500 (4.0)	.....
1979 & Earlier	300 (3.0)	.....

NEW MEXICO

NEW MEXICO EMISSION STANDARDS - 2-SPEED IDLE TEST

Application	Idle HC ppm (CO %)	2500 RPM HC ppm (CO %)
Light Duty Vehicles (6000 GVWR Or Less)		
1975-78	500 (5.0)	500 (5.0)
1979-80	400 (4.0)	400 (4.0)
1981-85	220 (1.2)	220 (1.2)
1986-90	200 (1.2)	200 (1.2)
1991-95	180 (1.2)	180 (1.2)
Light Duty Trucks (6001-8000 GVWR)		
1975-78	600 (6.0)	600 (6.0)
1979-80	600 (4.5)	600 (4.5)

1981-82	400 (2.7)	400 (3.0)
1983-88	300 (1.2)	300 (3.0)
1989-95	220 (1.2)	220 (1.2)
Medium Duty Trucks (8001-10,000 GVWR)		
1975 & Newer	650 (6.5)	650 (6.5)

NEW YORK

NEW YORK EMISSION STANDARDS - IM240 TEST

Application	HC gpm Composite	HC gpm Phase 2	CO gpm Composite	CO gpm Phase 2	NOx gpm Both
Light Duty Vehicles					
1981-82	0.80	0.50	30.0	24.0	2.0
1983-95	0.80	0.50	15.0	12.0	2.0
1996 & Newer	0.60	0.40	10.0	8.0	1.5
Light Duty Trucks (6000 GVWR Or Less)					
1981-83	3.40	2.00	70.0	56.0	4.5
1984-87	1.60	1.00	40.0	32.0	4.5
1988-95	1.60	1.00	40.0	32.0	2.5
1996 & Newer (3750 LVW Or Less)	0.60	0.40	10.0	8.0	1.5
1996 & Newer (3751 LVW Or More)	0.80	0.50	13.0	10.0	1.8
Light Duty Trucks (6501-8500 GVWR)					
1981-83	3.40	2.00	70.0	56.0	4.5
1984-87	1.60	1.00	40.0	32.0	4.5
1988-95	1.60	1.00	40.0	32.0	3.5
1996 & Newer (5750 ALVW Or Less)	0.80	0.50	13.0	10.0	1.8
1996 & Newer (5751 ALVW Or More)	0.80	0.50	15.0	12.0	2.0

NEW YORK EMISSION STANDARDS - IDLE TEST

Application	HC ppm (CO %)

Light Duty Vehicles (8500 GVWR Or Less)	
1978	300 (3.0)
1979-80	300 (2.5)
1981 & Newer	220 (1.2)
Heavy Duty Vehicles (8501 GVWR Or More)	
1978	600 (4.5)
1979 & Newer	300 (3.0)

NORTH CAROLINA

NORTH CAROLINA EMISSION STANDARDS - IDLE TEST

Application	HC ppm (CO %)
Light Duty Vehicles (8500 GVWR Or Less)	
1977	450 (4.5)
1978-79	350 (3.5)
1980	250 (2.0)
1981 & Newer	250 (1.2)
Heavy Duty Trucks (8501 GVWR Or More)	
1977-78	500 (5.0)
1979 & Newer	400 (4.0)

OHIO

NOTE: The Ohio program incorporates original U.S. EPA recommended start-up ASM2525 standards for all model year vehicles. Refer to appropriate model year range in appropriate table. See U. S. EPA ASM2525 & ASM5015 START-UP EMISSION STANDARDS .

OHIO EMISSION STANDARDS - 2-SPEED IDLE TEST

Application	HC ppm (CO %)
1978	350 (4.0)
1979	275 (3.0)

1980	230 (2.0)
1981 & Newer	220 (1.2)

OREGON

OREGON EMISSION STANDARDS - METROPOLITAN PORTLAND ENHANCED AREA - BAR31

Application	HC gpm (CO gpm)	NOx gpm
Light Duty Passenger Cars		
1981-82	2.0 (64)	3.70
1983-89	2.0 (32)	3.70
1990-95	1.2 (30)	3.00
1996 & Newer	OBD-II Test	OBD-II Test
Light Duty Trucks (6000 GVWR Or Less)		
1981-83	8.5 (149)	8.32
1984-87	4.0 (85)	8.32
1988-89	4.0 (85)	4.62
1990-95	2.4 (80)	3.75
1996 & Newer	OBD-II Test	OBD-II Test
Light Duty Trucks (6001-8500 GVWR)		
1981-83	8.5 (149)	8.32
1984-87	4.0 (85)	8.32
1988-89	4.0 (85)	6.47
1990-95	2.4 (80)	5.25
1996 & Newer	OBD-II Test	OBD-II Test

OREGON EMISSION STANDARDS - METROPOLITAN PORTLAND & ROGUE VALLEY AREA BASIC TEST - 2-SPEED IDLE TEST

Application	Idle HC ppm (CO %)	2500 RPM HC ppm (CO %)
Light Duty Passenger Cars (6000 GVWR Or Less)		
1975-80 (No Catalyst)	300 (2.5)	-
1975-80 (Catalyst)	220 (1.0)	-
1981 & Newer (All)	220 (1.0)	220 (1.0)

1975 & Newer (2-Stroke)	n/a (7.0)	-
Light Duty Trucks (6001-8500 GVWR)		
1975-78 (All)	350 (2.5)	-
1979-80 (No Catalyst)	300 (2.5)	-
1979-80 (Catalyst)	220 (1.0)	-
1981 & Newer (All)	220 (1.0)	220 (1.0)
1996 & Newer (3750 LVW Or Less)	0.9 (20)	2.25
Heavy Duty Trucks (8501 GVWR Or More)		
1975-78 (Carbureted)	500 (4.0)	n/a (3.0)
1975-78 (Fuel Injection)	500 (4.0)	-
1979-84 (Carbureted)	350 (3.0)	n/a (3.0)
1979-84 (Fuel Injection)	350 (3.0)	-
1985 & Newer (No Catalyst)	350 (3.0)	n/a (3.0)
1985 & Newer (W/Catalyst)	220 (1.0)	220 (1.0)

OREGON EMISSION STANDARDS - METROPOLITAN PORTLAND & ROGUE VALLEY AREA BASIC TEST - EXHAUST OPACITY TEST

Application	Opacity % @ Idle	Opacity % @ High Idle
1975 & Newer		
2-Cycle Engines	20	.....
Gasoline Engines	0	0

PENNSYLVANIA

NOTE: The Pennsylvania (in Philadelphia area) program incorporates original U.S. EPA recommended start-up ASM5015 standards for 1981 and newer model year vehicles. Refer to appropriate model year range in appropriate table. See U. S. EPA ASM2525 & ASM5015 START-UP EMISSION STANDARDS .

PENNSYLVANIA EMISSION STANDARDS - PITTSBURGH & OLDER PHILADELPHIA VEHICLES - IDLE TEST

Application	HC ppm (CO %)
6000 GVWR Or Less	

1975-79	400 (4.0)
1980	300 (3.0)
1981-92	220 (1.2)
1993 & Newer	130 (1.0)
6001-9000 GVWR	
1975-78	650 (6.0)
1979	400 (4.0)
1980	300 (3.0)
1981-92	220 (1.2)
1993 & Newer	180 (1.0)

RHODE ISLAND

RHODE ISLAND EMISSION STANDARDS - RI2000 TEST

Application	HC gpm (CO gpm)	NOx gpm
Light Duty Vehicles		
1974 & Earlier	15.92 (132.44)	14.92
1975-76	6.74 (96.21)	9.92
1977-79	6.74 (96.21)	6.59
1980	2.25 (45.48)	6.59
1981-82	2.25 (45.48)	3.25
1983-95	2.25 (23.74)	3.25
1996 & Newer	1.84 (16.50)	2.42
Light Duty Trucks (6000 GVWR Or Less)		
1975 & Earlier	16.94 (175.92)	14.92
1975-78	8.78 (117.95)	9.92
1979-83	7.55 (103.45)	7.42
1984-87	3.88 (59.97)	7.42
1988-90	3.88 (59.97)	4.09
1991-95	3.88 (59.97)	4.09
1996 & Newer (3750 LVW Or Less)	1.84 (16.50)	2.42
1996 & Newer (3751 LVW Or More)	2.25 (20.84)	2.92

Light Duty Trucks (6001-8500 GVWR)		
1974 & Earlier	16.94 (175.92)	14.92
1975-78	8.78 (117.95)	9.92
1979-83	7.55 (103.45)	7.42
1984-87	3.88 (59.97)	7.42
1989-90	3.88 (59.97)	5.75
1991-95	3.88 (59.97)	5.75
1996 & Newer (5750 LVW Or Less)	2.25 (20.84)	2.92
1996 & Newer (5751 LVW or More)	5.51 (23.74)	3.25

RHODE ISLAND EMISSION STANDARDS - 2-SPEED IDLE TEST

Application Idle [1]	HC ppm (CO %)
1967 & Earlier	800 (7.0)
1968-74	700 (6.0)
1975-78	300 (3.0)
1979-80	300 (2.5)
1981 & Newer	220 (1.2)

[1] 8500 GVWR or less.

TENNESSEE

TENNESSEE EMISSION STANDARDS - MEMPHIS - IDLE TEST

Application	HC ppm (CO %)
Light Duty Vehicles (9000 GVWR Or Less)	
1971 & Older	900 (8.9)
1972-74	700 (8.2)
1975-79	600 (7.5)
1980	400 (4.7)
1981 & Newer	220 (1.2)
Heavy Duty Trucks (9001-25,999 GVWR)	
1971 & Older	1000 (8.9)

1972-74	1000 (8.2)
1975-79	1000 (8.0)
1980	800 (6.0)
1981 & Newer	400 (4.0)

TENNESSEE EMISSION STANDARDS - DAVIDSON & NASHVILLE COUNTIES - IDLE TEST

Application	HC ppm (CO %)
Light Duty Vehicles (6000 GVWR Or Less)	
1975-77	500 (5.0)
1978-79	400 (4.0)
1980	300 (3.0)
1981 & Newer	220 (1.2)
Medium Duty Trucks (6001-8500 GVWR)	
1975-77	750 (6.5)
1978-79	600 (6.0)
1980	400 (4.5)
1981 & Newer	400 (4.0)

TENNESSEE EMISSION STANDARDS - FOUR COUNTY AREA SURROUNDING NASHVILLE - IDLE TEST

Application	HC ppm (CO %)
Light Duty Vehicles (6000 GVWR Or Less)	
1975-77	500 (5.0)
1978-79	400 (4.0)
1980	300 (3.0)
1981 & Newer	220 (1.2)
Medium Duty Trucks (6001-8500 GVWR)	
1975-77	750 (6.5)
1978-79	600 (6.0)
1980	400 (4.5)
1981 & Newer	400 (4.0)

TEXAS

NOTE: The Texas program incorporates original U.S. EPA recommended start-up ASM2525 and ASM5015 standards for 1995 and newer model year vehicles. Refer to appropriate model year range in appropriate table. See U. S. EPA ASM2525 & ASM5015 START-UP EMISSION STANDARDS .

TEXAS EMISSION STANDARDS - 2-SPEED IDLE TEST

Application	HC ppm (CO %)
Light Duty Vehicles (8500 GVWR Or Less)	
1979	600 (6.0)
1980	400 (4.0)
1981 & Newer	220 (1.2)
Heavy Duty Vehicles (8501 GVWR Or More)	
1979-81	700 (7.0)
1982-84	500 (5.0)
1985 & Newer	300 (3.0)

UTAH

UTAH EMISSION STANDARDS - DAVIS COUNTY - DC98 TEST

Application	HC gpm (CO gpm)	NOx gpm
Light Duty Vehicles (6000 GVWR Or Less)		
1989-90	2.00 (30)	3.0
1991-95	1.2 (20)	2.5
Light Duty Trucks (6000 GVWR Or Less)		
1989-90	3.2 (80)	3.5
1991-95	2.4 (60)	3.0
Light Duty Trucks (6001-8500 GVWR)		
1989-90	3.2 (80)	5.0
1991-95	2.4 (60)	4.5

UTAH EMISSION STANDARDS - DAVIS COUNTY - 2-SPEED IDLE TEST

Application	HC ppm (CO %)
Light Duty Vehicles (6000 GVWR Or Less)	
1968-69	800 (6.0)
1970-74	700 (5.0)
1975-76	600 (4.0)
1977-79	500 (3.0)
1980	300 (2.0)
1981-95	220 (1.2)
Light Duty Vehicles (6001-8500 GVWR)	
1968-69	1500 (7.0)
1970-78	1200 (5.0)
1979	500 (3.0)
1980	300 (2.0)
1981-95	220 (1.2)
Heavy Duty Vehicles (8501 GVWR Or More)	
1968-69	1500 (7.0)
1970-78	1200 (5.0)
1979-80	1000 (4.0)
1981 & Newer	800 (3.5)



NOTE: The Salt Lake County program incorporates California style ASM2525 and ASM5015 standards for 1968 and newer model year vehicles; however, actual cutpoints are unique to this program and current information is not available at this time.

UTAH EMISSION STANDARDS - SALT LAKE COUNTY - 2-SPEED IDLE TEST

Application	HC ppm (CO %)
Light Duty Vehicles (6000 GVWR Or Less)	
1968-69	800 (6.0)
1970-74	700 (5.0)
1975-76	600 (4.0)
1977-79	500 (3.0)
1980	300 (2.0)

1981 & Newer	220 (1.2)
Light Duty Trucks (6000 GVWR Or Less)	
1968-99	800 (6.0)
1970-74	700 (5.0)
1975-76	600 (4.0)
1977-79	500 (3.0)
1980	300 (2.0)
1981 & Newer	220 (1.2)
Light Duty Trucks (6001-8500 GVWR)	
1968-69	1500 (7.0)
1970-78	1200 (5.0)
1979	500 (3.0)
1980	300 (2.0)
1981 & Newer	220 (1.2)
Heavy Duty Trucks (8500 GVWR Or More)	
1968-69	1500 (7.0)
1970-78	1200 (5.0)
1979-80	1000 (4.0)
1981 & Newer	800 (3.5)

UTAH EMISSION STANDARDS - UTAH & WEBER COUNTIES - 2-SPEED IDLE TEST

Application	HC ppm (CO %)
Light Duty Vehicles (6000 GVWR Or Less)	
1968-69	800 (6.0)
1970-74	700 (5.0)
1975-76	600 (4.0)
1977-79	500 (3.0)
1980	300 (2.0)
1981-95	220 (1.2)
Light Duty Trucks (6000 GVWR Or Less)	
1968-99	800 (6.0)
1970-74	700 (5.0)

1975-76	600 (4.0)
1977-79	500 (3.0)
1980	300 (2.0)
1981 & Newer	220 (1.2)
Light Duty Trucks (6001-8500 GVWR)	
1968-69	1500 (7.0)
1970-78	1200 (5.0)
1979	500 (3.0)
1980	300 (2.0)
1981 & Newer	220 (1.2)
Heavy Duty Trucks (8500 GVWR Or More)	
1968-69	1500 (7.0)
1970-78	1200 (5.0)
1979-80	1000 (4.0)
1981 & Newer	800 (3.5)

VIRGINIA

NOTE: The Virginia program incorporates original U.S. EPA recommended start-up ASM2525 and ASM5015 standards for 1981 and newer model year vehicles. Refer to appropriate model year range in appropriate table. See U. S. EPA ASM2525 & ASM5015 START-UP EMISSION STANDARDS .

VIRGINIA EMISSION STANDARDS - 2-SPEED IDLE TEST

Application	HC ppm (CO %)
8500 GVWR Or Less	
1975-90	400 (4.0)
1980	220 (2.0)
1981-89	220 (1.2)
1990-95	125 (1.0)
1996 & Newer	100 (0.75)
8501-10,000 GVWR	
1975-79	400 (4.0)

1980	220 (2.0)
1981-90	220 (1.2)
1991-96	150 (1.0)
1997 & Newer	125 (0.75)

WASHINGTON

WASHINGTON EMISSION STANDARDS - ASM2525 TEST

Application	HC ppm (CO %)
1980 & Earlier (Light-Duty Vehicles)	
1750 GVWR	400 (4.2)
1875 GVWR	380 (4.0)
2000 GVWR	350 (3.8)
2125 GVWR	340 (3.6)
2250 GVWR	320 (3.4)
2375 GVWR	300 (3.2)
2500 GVWR	290 (3.0)
2625 GVWR	270 (2.9)
2750 GVWR	260 (2.8)
2875 GVWR	250 (2.7)
3000 GVWR	240 (2.6)
3125 GVWR	230 (2.5)
3250 GVWR	220 (2.4)
3375 GVWR	220 (2.3)
3500 GVWR	210 (2.2)
3625 GVWR	200 (2.1)
3750 Or Greater GVWR (Passenger Cars Only)	200 (2.1)
3750 Or Greater GVWR (Light Duty Trucks)	300 (2.5)
1981 & Newer (Light-Duty Vehicles)	
1750 GVWR	250 (1.8)
1875 GVWR	240 (1.7)
2000 GVWR	220 (1.6)

2125 GVWR	210 (1.5)
2250 GVWR	200 (1.5)
2375 GVWR	190 (1.4)
2500 GVWR	180 (1.3)
2625 GVWR	180 (1.3)
2750 GVWR	171 (1.2)
2875 GVWR	160 (1.2)
3000 GVWR	160 (1.1)
3125 GVWR	150 (1.1)
3250 GVWR	150 (1.0)
3375 GVWR	150 (1.0)
3500 GVWR	150 (1.0)
3625 GVWR	150 (1.0)
3750 Or Greater GVWR (Passenger Cars Only)	150 (1.0)
3750 Or Greater GVWR (Light Duty Trucks)	300 (2.5)

WASHINGTON EMISSION STANDARDS - 2-SPEED IDLE TEST

Application	Idle/2500 RPM HC ppm (CO %)
Light Duty Vehicles (8500 GVWR Or Less)	
1980 & Earlier	600 (3.0)
1981 & Newer	220 (1.2)
Heavy Duty Trucks (8500 GVWR Or More)	
1981 & Newer	400 (3.0)

WISCONSIN

WISCONSIN EMISSION STANDARDS - IM240 TEST

Application	HC gpm (CO gpm)	NOx gpm
Light Duty Vehicles (6000 GVWR Or Less)		
1968-72	7.0 (120)	7.0
1973-74	7.0 (120)	6.0
1975-76	3.0 (65)	6.0

1977-79	3.0 (65)	4.0
1980	2.0 (60)	4.0
1981-82	2.0 (60)	3.0
1983-86	2.0 (30)	3.0
1987-93	0.8 (15)	2.0
1991-95	0.8 (15)	2.0
1996 & Newer	0.6 (10)	1.5
Light Duty Trucks (6000 GVWR Or Less)		
1968-72	7.0 (120)	7.0
1973-74	7.0 (120)	6.0
1975-78	4.0 (80)	6.0
1979-83	3.4 (70)	4.5
1984-86	3.2 (70)	4.5
1987	1.6 (40)	4.5
1988-95	1.6 (40)	2.5
1996 & Newer (3750 LVW Or Less)	0.6 (10)	1.5
1996 & Newer (3751 LVW Or More)	0.8 (13)	1.8
Light Duty Trucks (6001-8500 GVWR)		
1968-72	7.0 (120)	7.0
1973-74	7.0 (120)	6.0
1975-78	4.0 (80)	6.0
1979-83	3.4 (70)	4.5
1984-86	3.2 (70)	4.5
1988-96	1.6 (40)	3.5
1997 & Newer (5750 ALVW Or Less)	0.8 (13)	1.8
1997 & Newer (5751 ALVW Or More)	0.8 (15)	2.0
Heavy Duty Trucks (8501-10,000 GVWR)		
1968-69	20.0 (200)	15.0
1970-73	10.0 (175)	10.0
1974-78	10.0 (150)	10.0
1979-84	7.5 (100)	8.0
1985-86	5.0 (80)	8.0
1987-90	2.0 (40)	6.0

1991-97	2.0 (40)	5.0
1998 & Newer	2.0 (30)	4.0
Heavy Duty Trucks (10,001 GVWR or More)		
1968-69	24.0 (250)	30.0
1970-73	13.0 (175)	20.0
1974-78	13.0 (150)	20.0
1979-84	11.5 (150)	16.0
1985-86	10.0 (150)	16.0
1987-90	3.5 (70)	11.0
1991-97	3.5 (70)	9.0
1998 & Newer	3.5 (60)	7.0

WISCONSIN EMISSION STANDARDS - 2-SPEED IDLE TEST

Application	HC ppm (CO %)
Passenger Cars	
1968-71	800 (8.0)
1972-74	550 (7.0)
1975-77	450 (5.5)
1978	350 (4.0)
1979	275 (3.0)
1980	230 (2.0)
1981 & Newer	220 (1.2)
Light Duty Trucks (6000 GVWR Or Less)	
1968-71	800 (8.0)
1972-74	700 (7.0)
1975-77	500 (6.0)
1978	450 (5.0)
1979	300 (3.0)
1980	275 (2.5)
1981-84	250 (2.0)
1985 & Newer	220 (1.2)
Light Duty Trucks (6001-8500 GVWR)	

1968-69	1450 (9.0)
1970-71	800 (8.0)
1972-74	700 (7.0)
1975-77	550 (6.5)
1978	450 (5.5)
1979	300 (3.0)
1980	275 (2.5)
1981-84	250 (2.0)
1985 & Newer	220 (1.2)
Heavy Duty Trucks (8501 GVWR Or More)	
1968-71	1500 (9.5)
1972-78	900 (9.0)
1979-84	700 (7.0)
1985 & Newer	300 (3.0)

U. S. EPA ASM2525 & ASM5015 START-UP EMISSION STANDARDS

U.S. EPA ASM EMISSION STANDARDS - 1968-72 LIGHT DUTY VEHICLES

Test Weight	ASM5015		ASM2525	
	HC ppm (CO %)	NOx ppm	HC ppm (CO %)	NOx ppm
1750	1118 (8.02)	4990	1098 (9.90)	4990
1875	1052 (7.56)	4990	1034 (9.90)	4990
2000	992 (7.14)	4990	975 (9.90)	4990
2125	938 (6.75)	4990	921 (9.66)	4990
2250	887 (6.40)	4990	872 (9.14)	4990
2375	841 (6.07)	4990	827 (8.67)	4990
2500	800 (5.78)	4990	786 (8.25)	4990
2625	761 (5.51)	4990	748 (7.85)	4990
2750	726 (5.26)	4990	714 (7.50)	4772
2875	695 (5.03)	4892	683 (7.17)	4556
3000	666 (4.83)	4680	654 (6.87)	4359

3125	639 (4.64)	4488	628 (6.60)	4180
3250	615 (4.47)	4311	604 (6.35)	4016
3375	593 (4.31)	4150	583 (6.13)	3866
3500	573 (4.17)	4002	563 (5.92)	3728
3625	554 (4.04)	3867	544 (5.73)	3602
3750	537 (3.91)	3741	527 (5.55)	3485
3875	521 (3.80)	3625	512 (5.39)	3377
4000	506 (3.70)	3517	497 (5.24)	3276
4125	492 (3.60)	3416	484 (5.09)	3182
4250	479 (3.51)	3321	471 (4.96)	3094
4375	467 (3.42)	3230	459 (4.83)	3010
4500	455 (3.34)	3145	447 (4.71)	2930
4625	444 (3.26)	3063	436 (4.60)	2854
4750	433 (3.18)	2983	425 (4.49)	2780
4875	423 (3.11)	2907	415 (4.38)	2709
5000	412 (3.03)	2833	405 (4.28)	2540
5125	402 (2.97)	2760	395 (4.18)	2573
5250	393 (2.90)	2690	386 (4.08)	2507
5375	383 (2.83)	2621	376 (3.98)	2443
5500	374 (2.77)	2554	367 (3.89)	2381
5625	365 (2.70)	2489	359 (3.80)	2321
5750	357 (2.64)	2426	350 (3.71)	2262
5875	348 (2.59)	2366	342 (3.62)	2206
6000	341 (2.53)	2308	334 (3.54)	2152
6125	333 (2.48)	2254	327 (3.47)	2102
6250	326 (2.43)	2204	320 (3.40)	2056
6375	320 (2.39)	2159	314 (3.34)	2014
6500	315 (2.35)	2119	309 (3.28)	1977
6625	310 (2.32)	2087	304 (3.23)	1947
6750	307 (2.29)	2062	301 (3.20)	1924
6875	305 (2.28)	2046	299 (3.17)	1909
7000	304 (2.27)	2040	298 (3.17)	1904
7125 Or More	304 (2.27)	2045	298 (3.17)	1904

U.S. EPA ASM EMISSION STANDARDS - 1973-74 LIGHT DUTY VEHICLES

Test Weight	ASM5015		ASM2525	
	HC ppm (CO %)	NOx ppm	HC ppm (CO %)	NOx ppm
1750	1118 (8.02)	4990	1098 (9.90)	4980
1875	1052 (7.56)	4990	1034 (9.90)	4906
2000	992 (7.14)	4919	975 (9.90)	4838
2125	938 (6.75)	4853	921 (9.66)	4776
2250	887 (6.40)	4792	872 (9.14)	4720
2375	841 (6.07)	4736	827 (8.67)	4668
2500	800 (5.78)	4685	786 (8.25)	4620
2625	761 (5.51)	4639	748 (7.85)	4577
2750	726 (5.26)	4596	714 (7.50)	4374
2875	695 (5.03)	4484	683 (7.17)	4176
3000	666 (4.83)	4290	654 (6.87)	3996
3125	639 (4.64)	4114	628 (6.60)	3832
3250	615 (4.47)	3952	604 (6.35)	3681
3375	593 (4.31)	3804	583 (6.13)	3544
3500	573 (4.17)	3669	563 (5.92)	3418
3625	554 (4.04)	3544	544 (5.73)	3302
3750	537 (3.91)	3429	527 (5.55)	3195
3875	521 (3.80)	3323	512 (5.39)	3096
4000	506 (3.70)	3224	497 (5.24)	3003
4125	492 (3.60)	3131	484 (5.09)	2917
4250	479 (3.51)	3044	471 (4.96)	2836
4375	467 (3.42)	2961	459 (4.83)	2759
4500	455 (3.34)	2883	447 (4.71)	2686
4625	444 (3.26)	2807	436 (4.60)	2616
4750	433 (3.18)	2735	425 (4.49)	2549
4875	423 (3.11)	2665	415 (4.38)	2483
5000	412 (3.03)	2597	405 (4.28)	2420
5125	402 (2.97)	2530	395 (4.18)	2359

5250	393 (2.90)	2466	386 (4.08)	2298
5375	383 (2.83)	2403	376 (3.98)	2240
5500	374 (2.77)	2341	367 (3.89)	2183
5625	365 (2.70)	2282	359 (3.80)	2127
5750	357 (2.64)	2224	350 (3.71)	2074
5875	348 (2.59)	2168	342 (3.62)	2022
6000	341 (2.53)	2116	334 (3.54)	1973
6125	333 (2.48)	2066	327 (3.47)	1927
6250	326 (2.43)	2020	320 (3.40)	1884
6375	320 (2.39)	1979	314 (3.34)	1846
6500	315 (2.35)	1943	309 (3.28)	1813
6625	310 (2.32)	1913	304 (3.23)	1785
6750	307 (2.29)	1890	301 (3.20)	1764
6875	305 (2.28)	1875	299 (3.17)	1750
7000	304 (2.27)	1870	298 (3.17)	1745
7125 Or More	304 (2.27)	1874	298 (3.17)	1745

U.S. EPA ASM EMISSION STANDARDS - 1975-76 LIGHT DUTY VEHICLES

Test Weight	ASM5015		ASM2525	
	HC ppm (CO %)	NOx ppm	HC ppm (CO %)	NOx ppm
1750	774 (3.92)	4990	761 (5.45)	4980
1875	729 (3.70)	4990	717 (5.14)	4906
2000	688 (3.49)	4919	676 (4.85)	4838
2125	650 (3.31)	4853	638 (4.58)	4776
2250	615 (3.13)	4792	604 (4.34)	4720
2375	583 (2.98)	4736	573 (4.12)	4668
2500	554 (2.83)	4685	544 (3.91)	4620
2625	528 (2.70)	4639	518 (3.73)	4577
2750	503 (2.58)	4596	495 (3.56)	4374
2875	481 (2.47)	4484	473 (3.41)	4176
3000	461 (2.37)	4290	453 (3.27)	3996
3125	443 (2.28)	4114	435 (3.14)	3832

3250	426 (2.20)	3952	419 (3.02)	3681
3375	411 (2.12)	3804	404 (2.91)	3544
3500	397 (2.05)	3669	390 (2.82)	3418
3625	384 (1.99)	3544	377 (2.73)	3302
3750	372 (1.93)	3429	365 (2.64)	3195
3875	361 (1.87)	3323	355 (2.57)	3096
4000	351 (1.82)	3224	345 (2.49)	3003
4125	341 (1.77)	3131	335 (2.43)	2917
4250	332 (1.73)	3044	326 (2.36)	2836
4375	323 (1.68)	2961	318 (2.31)	2759
4500	315 (1.64)	2883	310 (2.25)	2686
4625	308 (1.61)	2807	302 (2.19)	2616
4750	300 (1.57)	2735	295 (2.14)	2549
4875	293 (1.53)	2665	288 (2.09)	2483
5000	286 (1.50)	2597	281 (2.04)	2420
5125	279 (1.46)	2530	274 (2.00)	2359
5250	272 (1.43)	2466	267 (1.95)	2298
5375	266 (1.40)	2403	261 (1.90)	2240
5500	259 (1.37)	2341	255 (1.86)	2183
5625	253 (1.34)	2282	248 (1.82)	2127
5750	247 (1.31)	2224	243 (1.78)	2074
5875	241 (1.28)	2168	237 (1.74)	2022
6000	236 (1.25)	2116	232 (1.70)	1973
6125	231 (1.23)	2066	227 (1.66)	1927
6250	226 (1.20)	2020	222 (1.63)	1884
6375	222 (1.18)	1979	218 (1.60)	1846
6500	218 (1.16)	1943	214 (1.57)	1813
6625	215 (1.15)	1913	211 (1.55)	1785
6750	213 (1.14)	1890	209 (1.54)	1764
6875	211 (1.13)	1875	207 (1.52)	1750
7000	211 (1.12)	1870	207 (1.52)	1745
7125 Or More	211 (1.12)	1874	206 (1.52)	1745

U.S. EPA ASM EMISSION STANDARDS - 1977-79 LIGHT DUTY VEHICLES

Test Weight	ASM5015		ASM2525	
	HC ppm (CO %)	NOx ppm	HC ppm (CO %)	NOx ppm
1750	774 (3.92)	4990	761 (5.45)	4950
1875	729 (3.70)	4990	717 (5.14)	4655
2000	688 (3.49)	4707	676 (4.85)	4384
2125	650 (3.31)	4441	638 (4.58)	4136
2250	615 (3.13)	4197	604 (4.34)	3909
2375	583 (2.98)	3974	573 (4.12)	3701
2500	554 (2.83)	3771	544 (3.91)	3512
2625	528 (2.70)	3585	518 (3.73)	3339
2750	503 (2.58)	3416	495 (3.56)	3181
2875	481 (2.47)	3261	473 (3.41)	3037
3000	461 (2.37)	3120	453 (3.27)	2906
3125	443 (2.28)	2992	435 (3.14)	2787
3250	426 (2.20)	2874	419 (3.02)	2677
3375	411 (2.12)	2767	404 (2.91)	2577
3500	397 (2.05)	2668	390 (2.82)	2486
3625	384 (1.99)	2578	377 (2.73)	2401
3750	372 (1.93)	2494	365 (2.64)	2323
3875	361 (1.87)	2417	355 (2.57)	2251
4000	351 (1.82)	2345	345 (2.49)	2184
4125	341 (1.77)	2277	335 (2.43)	2122
4250	332 (1.73)	2214	326 (2.36)	2063
4375	323 (1.68)	2154	318 (2.31)	2007
4500	315 (1.64)	2096	310 (2.25)	1953
4625	308 (1.61)	2042	302 (2.19)	1903
4750	300 (1.57)	1989	295 (2.14)	1854
4875	293 (1.53)	1938	288 (2.09)	1806
5000	286 (1.50)	1889	281 (2.04)	1760
5125	279 (1.46)	1840	274 (2.00)	1715
5250	272 (1.43)	1793	267 (1.95)	1672

5375	266 (1.40)	1747	261 (1.90)	1629
5500	259 (1.37)	1703	255 (1.86)	1587
5625	253 (1.34)	1659	248 (1.82)	1547
5750	247 (1.31)	1617	243 (1.78)	1508
5875	241 (1.28)	1577	237 (1.74)	1471
6000	236 (1.25)	1539	232 (1.70)	1435
6125	231 (1.23)	1503	227 (1.66)	1401
6250	226 (1.20)	1469	222 (1.63)	1371
6375	222 (1.18)	1439	218 (1.60)	1343
6500	218 (1.16)	1413	214 (1.57)	1318
6625	215 (1.15)	1391	211 (1.55)	1298
6750	213 (1.14)	1374	209 (1.54)	1283
6875	211 (1.13)	1364	207 (1.52)	1273
7000 Or More	211 (1.12)	1360	207 (1.52)	1269

U.S. EPA ASM EMISSION STANDARDS - 1980 LIGHT DUTY VEHICLES

Test Weight	ASM5015		ASM2525	
	HC ppm (CO %)	NOx ppm	HC ppm (CO %)	NOx ppm
1750	291 (2.78)	4990	282 (3.64)	4950
1875	275 (2.63)	4990	266 (3.43)	4655
2000	260 (2.48)	4707	252 (3.24)	4384
2125	246 (2.35)	4441	239 (3.06)	4136
2250	234 (2.23)	4197	227 (2.90)	3909
2375	223 (2.12)	3974	216 (2.76)	3701
2500	212 (2.02)	3771	206 (2.62)	3512
2625	203 (1.92)	3585	197 (2.50)	3339
2750	194 (1.84)	3416	189 (2.39)	3181
2875	187 (1.76)	3261	181 (2.29)	3037
3000	180 (1.69)	3120	174 (2.19)	2906
3125	173 (1.63)	2992	168 (2.11)	2787
3250	167 (1.57)	2874	162 (2.03)	2677
3375	162 (1.52)	2767	157 (1.96)	2577

3500	157 (1.47)	2668	152 (1.89)	2486
3625	152 (1.42)	2578	148 (1.84)	2401
3750	148 (1.38)	2492	144 (1.78)	2323
3875	144 (1.34)	2417	140 (1.73)	2251
4000	140 (1.31)	2345	137 (1.68)	2184
4125	137 (1.27)	2277	133 (1.64)	2122
4250	134 (1.24)	2214	130 (1.60)	2063
4375	131 (1.21)	2154	127 (1.56)	2007
4500	128 (1.18)	2096	124 (1.52)	1953
4625	125 (1.15)	2042	122 (1.48)	1903
4750	122 (1.13)	1989	119 (1.45)	1854
4875	120 (1.10)	1938	117 (1.42)	1806
5000	117 (1.08)	1889	114 (1.38)	1760
5125	115 (1.05)	1840	112 (1.35)	1715
5250	112 (1.03)	1793	110 (1.32)	1672
5375	110 (1.01)	1747	107 (1.29)	1629
5500	108 (0.99)	1703	105 (1.26)	1587
5625	106 (0.97)	1659	103 (1.24)	1547
5750	104 (0.94)	1617	101 (1.21)	1508
5875	102 (0.92)	1577	99 (1.18)	1471
6000	100 (0.91)	1539	97 (1.16)	1435
6125	98 (0.89)	1503	95 (1.13)	1401
6250	96 (0.87)	1469	94 (1.11)	1371
6375	95 (0.86)	1439	92 (1.09)	1343
6500	93 (0.84)	1413	91 (1.08)	1318
6625	92 (0.83)	1391	90 (1.06)	1298
6750	91 (0.82)	1374	89 (1.05)	1283
6875	91 (0.82)	1364	89 (1.04)	1273
7000	91 (0.82)	1360	88 (1.04)	1269
7125 Or More	90 (0.81)	1360	88 (1.04)	1269

U.S. EPA ASM EMISSION STANDARDS - 1981-82 LIGHT DUTY VEHICLES

Test Weight	ASM5015		ASM2525	
	HC ppm (CO %)	NOx ppm	HC ppm (CO %)	NOx ppm
1750	291 (2.78)	2272	282 (3.64)	2114
1875	275 (2.63)	2181	266 (3.43)	1991
2000	260 (2.48)	2058	252 (3.24)	1877
2125	246 (2.35)	1944	239 (3.06)	1774
2250	234 (2.23)	1839	227 (2.90)	1678
2375	223 (2.12)	1744	216 (2.76)	1592
2500	212 (2.02)	1657	206 (2.62)	1512
2625	203 (1.92)	1577	197 (2.50)	1440
2750	194 (1.84)	1504	189 (2.39)	1374
2875	187 (1.76)	1438	181 (2.29)	1313
3000	180 (1.69)	1378	174 (2.19)	1258
3125	173 (1.63)	1323	168 (2.11)	1208
3250	167 (1.57)	1273	162 (2.03)	1163
3375	162 (1.52)	1227	157 (1.96)	1121
3500	157 (1.47)	1184	152 (1.89)	1082
3625	152 (1.42)	1146	148 (1.84)	1047
3750	148 (1.38)	1110	144 (1.78)	1014
3875	144 (1.34)	1077	140 (1.73)	984
4000	140 (1.31)	1046	137 (1.68)	956
4125	137 (1.27)	1017	133 (1.64)	930
4250	134 (1.24)	990	130 (1.60)	905
4375	131 (1.21)	964	127 (1.56)	882
4500	128 (1.18)	939	124 (1.52)	859
4625	125 (1.15)	916	122 (1.48)	838
4750	122 (1.13)	893	119 (1.45)	818
4875	120 (1.10)	872	117 (1.42)	798
5000	117 (1.08)	850	114 (1.38)	778
5125	115 (1.05)	830	112 (1.35)	760
5250	112 (1.03)	810	110 (1.32)	741
5375	110 (1.01)	790	107 (1.29)	723

5500	108 (0.99)	771	105 (1.26)	706
5625	106 (0.97)	752	103 (1.24)	689
5750	104 (0.94)	734	101 (1.21)	673
5875	102 (0.92)	717	99 (1.18)	657
6000	100 (0.91)	701	97 (1.16)	642
6125	98 (0.89)	685	95 (1.13)	628
6250	96 (0.87)	671	94 (1.11)	615
6375	95 (0.86)	658	92 (1.09)	604
6500	93 (0.84)	647	91 (1.08)	593
6625	92 (0.83)	638	90 (1.06)	585
6750	91 (0.82)	631	89 (1.05)	578
6875	91 (0.82)	626	89 (1.04)	574
7000	91 (0.82)	624	88 (1.04)	573
7125 Or More	90 (0.81)	625	88 (1.04)	573

U.S. EPA ASM EMISSION STANDARDS - 1983-90 LIGHT DUTY VEHICLES

Test Weight	ASM5015		ASM2525	
	HC ppm (CO %)	NOx ppm	HC ppm (CO %)	NOx ppm
1750	291 (1.64)	2272	282 (1.83)	2114
1875	275 (1.55)	2181	266 (1.72)	1991
2000	260 (1.47)	2058	252 (1.63)	1877
2125	246 (1.39)	1944	239 (1.54)	1774
2250	234 (1.31)	1839	227 (1.47)	1678
2375	223 (1.26)	1744	216 (1.39)	1592
2500	212 (1.20)	1657	206 (1.33)	1512
2625	203 (1.15)	1577	197 (1.27)	1440
2750	194 (1.10)	1504	189 (1.21)	1374
2875	187 (1.05)	1438	181 (1.16)	1313
3000	180 (1.01)	1378	174 (1.12)	1258
3125	173 (0.98)	1323	168 (1.08)	1208
3250	167 (0.94)	1273	162 (1.04)	1163
3375	162 (0.91)	1227	157 (1.00)	1121

3500	157 (0.88)	1184	152 (0.97)	1082
3625	152 (0.86)	1146	148 (0.94)	1047
3750	148 (0.83)	1110	144 (0.92)	1014
3875	144 (0.81)	1077	140 (0.89)	984
4000	140 (0.79)	1046	137 (0.87)	956
4125	137 (0.77)	1017	133 (0.85)	930
4250	134 (0.75)	990	130 (.83)	905
4375	131 (0.74)	964	127 (0.81)	882
4500	128 (0.72)	939	124 (0.79)	859
4625	125 (0.70)	916	122 (0.77)	838
4750	122 (0.69)	893	119 (0.76)	818
4875	120 (0.67)	872	117 (0.74)	798
5000	117 (0.66)	850	114 (0.73)	778
5125	115 (0.65)	830	112 (0.71)	760
5250	112 (0.63)	810	110 (0.70)	741
5375	110 (0.62)	790	107 (0.68)	723
5500	108 (0.61)	771	105 (0.67)	706
5625	106 (0.59)	752	103 (0.65)	689
5750	104 (0.58)	734	101 (0.64)	673
5875	102 (0.57)	717	99 (0.63)	657
6000	100 (0.56)	701	97 (0.62)	642
6125	98 (0.55)	685	95 (0.61)	628
6250	96 (0.54)	671	94 (0.60)	615
6375	95 (0.53)	658	92 (0.59)	604
6500	93 (0.52)	647	91 (0.58)	593
6625	92 (0.52)	638	90 (0.57)	585
6750	91 (0.51)	631	89 (0.57)	578
6875	91 (0.51)	626	89 (0.56)	574
7000	91 (0.51)	624	88 (0.56)	573
7125	90 (0.51)	625	88 (0.56)	573
7250 Or More	90 (0.50)	625	88 (0.56)	573

U.S. EPA ASM EMISSION STANDARDS - 1991-95 LIGHT DUTY VEHICLES

Test Weight	ASM5015		ASM2525	
	HC ppm (CO %)	NOx ppm	HC ppm (CO %)	NOx ppm
1750	224 (1.26)	1819	216 (1.22)	1642
1875	212 (1.19)	1713	205 (1.16)	1547
2000	201 (1.13)	1616	194 (1.09)	1460
2125	191 (1.07)	1527	184 (1.04)	1380
2250	182 (1.02)	1446	175 (0.99)	1307
2375	173 (0.97)	1372	167 (0.94)	1240
2500	166 (0.93)	1304	160 (0.90)	1179
2625	159 (0.89)	1242	153 (0.86)	1123
2750	152 (0.85)	1186	147 (0.82)	1072
2875	146 (0.82)	1134	141 (0.79)	1026
3000	141 (0.79)	1088	136 (0.76)	984
3125	136 (0.76)	1045	132 (0.73)	945
3250	132 (0.73)	1006	127 (0.71)	910
3375	128 (0.71)	970	123 (0.69)	878
3500	124 (0.69)	937	120 (0.67)	848
3625	120 (0.67)	907	117 (0.65)	821
3750	117 (0.65)	879	114 (0.63)	796
3875	114 (0.63)	853	111 (0.61)	773
4000	112 (0.62)	829	108 (0.60)	751
4125	109 (0.60)	807	106 (0.58)	731
4250	107 (0.59)	786	103 (0.57)	712
4375	104 (0.58)	766	101 (0.56)	694
4500	102 (0.57)	747	99 (0.55)	677
4625	100 (0.55)	728	97 (0.54)	661
4750	98 (0.54)	711	95 (0.53)	645
4875	96 (0.53)	694	93 (0.52)	630
5000	94 (0.52)	677	92 (0.51)	615
5125	93 (0.51)	661	90 (0.50)	600
5250	91 (0.50)	646	88 (0.49)	586
5375	89 (0.49)	631	86 (0.48)	573

5500	87 (0.48)	616	85 (0.47)	559
5625	86 (0.47)	601	83 (0.46)	546
5750	84 (0.46)	587	82 (0.45)	534
5875	83 (0.45)	574	80 (0.44)	522
6000	81 (0.44)	561	79 (0.44)	510
6125	80 (0.44)	549	78 (0.43)	499
6250	79 (0.43)	538	76 (0.42)	489
6375	77 (0.42)	528	75 (0.42)	480
6500	76 (0.42)	519	74 (0.41)	473
6625	76 (0.41)	512	74 (0.41)	466
6750	75 (0.41)	507	73 (0.41)	461
6875	75 (0.40)	503	73 (0.40)	458
7000 Or More	74 (0.40)	502	72 (0.40)	457

U.S. EPA ASM EMISSION STANDARDS - 1994 & NEWER + TIER 1 LIGHT DUTY VEHICLES

Test Weight	ASM5015		ASM2525	
	HC ppm (CO %)	NOx ppm	HC ppm (CO %)	NOx ppm
1750	142 (0.80)	1212	136 (0.77)	1095
1875	134 (0.75)	1142	129 (0.73)	1031
2000	127 (0.71)	1077	123 (0.69)	973
2125	121 (0.68)	1018	116 (0.66)	920
2250	115 (0.64)	964	111 (0.62)	871
2375	109 (0.61)	915	106 (0.59)	827
2500	105 (0.59)	869	101 (0.57)	786
2625	100 (0.56)	828	97 (0.54)	749
2750	96 (0.54)	791	93 (0.52)	715
2875	92 (0.52)	756	89 (0.50)	684
3000	89 (0.50)	725	86 (0.48)	656
3125	86 (0.48)	696	83 (0.46)	630
3250	83 (0.46)	670	80 (0.45)	607
3375	81 (0.45)	647	78 (0.43)	585
3500	78 (0.44)	625	76 (0.42)	566

3625	76 (0.42)	605	74 (0.41)	547
3750	74 (0.41)	586	72 (0.40)	531
3875	72 (0.40)	569	70 (0.39)	515
4000	71 (0.39)	553	68 (0.38)	501
4125	69 (0.38)	538	67 (0.37)	487
4250	67 (0.37)	524	65 (0.36)	475
4375	66 (0.36)	510	64 (0.35)	463
4500	65 (0.36)	498	63 (0.35)	440
4625	63 (0.35)	486	61 (0.34)	440
4750	62 (0.34)	474	60 (0.33)	430
4875	61 (0.34)	463	59 (0.33)	420
5000	60 (0.33)	452	58 (0.32)	410
5125	58 (0.32)	441	57 (0.31)	400
5250	57 (0.32)	431	56 (0.31)	391
5375	56 (0.31)	420	55 (0.30)	382
5500	55 (0.30)	410	54 (0.30)	373
5625	54 (0.30)	401	53 (0.29)	364
5750	53 (0.29)	391	52 (0.29)	356
5875	52 (0.29)	383	51 (0.28)	348
6000	51 (0.28)	374	50 (0.28)	340
6125	50 (0.28)	366	49 (0.27)	333
6250	50 (0.27)	359	48 (0.27)	326
6375	49 (0.27)	352	48 (0.26)	320
6500	48 (0.26)	346	47 (0.26)	315
6625	48 (0.26)	341	46 (0.26)	311
6750	47 (0.26)	338	46 (0.26)	307
6875	47 (0.26)	335	46 (0.25)	305
7000 Or More	47 (0.25)	335	46 (0.25)	305

U.S. EPA ASM EMISSION STANDARDS - 1968-72 LIGHT DUTY TRUCKS (6000 GVWR OR LESS)

Test Weight	ASM5015		ASM2525	
	HC ppm (CO %)	NOx ppm	HC ppm (CO %)	NOx ppm

1750	1118 (8.02)	4990	1098 (9.90)	4990
1875	1052 (7.56)	4990	1034 (9.90)	4990
2000	992 (7.14)	4990	975 (9.90)	4990
2125	938 (6.75)	4990	921 (9.66)	4990
2250	887 (6.40)	4990	872 (9.14)	4990
2375	841 (6.07)	4990	827 (8.67)	4990
2500	800 (5.78)	4990	786 (8.25)	4990
2625	761 (5.51)	4990	748 (7.85)	4990
2750	726 (5.26)	4990	714 (7.50)	4772
2875	695 (5.03)	4892	683 (7.17)	4556
3000	666 (4.83)	4680	654 (6.87)	4359
3125	639 (4.64)	4488	628 (6.60)	4180
3250	615 (4.47)	4311	604 (6.35)	4016
3375	593 (4.31)	4150	583 (6.13)	3866
3500	573 (4.17)	4002	563 (5.92)	3728
3625	554 (4.04)	3867	544 (5.73)	3602
3750	537 (3.91)	3741	527 (5.55)	3485
3875	521 (3.80)	3625	512 (5.39)	3377
4000	506 (3.70)	3517	497 (5.24)	3276
4125	492 (3.60)	3416	484 (5.09)	3182
4250	479 (3.51)	3321	471 (4.96)	3094
4375	467 (3.42)	3230	459 (4.83)	3010
4500	455 (3.34)	3145	447 (4.71)	2930
4625	444 (3.26)	3063	436 (4.60)	2854
4750	433 (3.18)	2983	425 (4.49)	2780
4875	423 (3.11)	2907	415 (4.38)	2709
5000	412 (3.03)	2833	405 (4.28)	2540
5125	402 (2.97)	2760	395 (4.18)	2573
5250	393 (2.90)	2690	386 (4.08)	2507
5375	383 (2.83)	2621	376 (3.98)	2443
5500	374 (2.77)	2554	367 (3.89)	2381
5625	365 (2.70)	2489	359 (3.80)	2321
5750	357 (2.64)	2426	350 (3.71)	2262

5875	348 (2.59)	2366	342 (3.62)	2206
6000	341 (2.53)	2308	334 (3.54)	2152
6125	333 (2.48)	2254	327 (3.47)	2102
6250	326 (2.43)	2204	320 (3.40)	2056
6375	320 (2.39)	2159	314 (3.34)	2014
6500	315 (2.35)	2119	309 (3.28)	1977
6625	310 (2.32)	2087	304 (3.23)	1947
6750	307 (2.29)	2062	301 (3.20)	1924
6875	305 (2.28)	2046	299 (3.17)	1909
7000	304 (2.27)	2040	298 (3.17)	1904
7125 Or More	304 (2.27)	2045	298 (3.17)	1904

U.S. EPA ASM EMISSION STANDARDS - 1973-74 LIGHT DUTY TRUCKS (6000 GVWR OR LESS)

Test Weight	ASM5015		ASM2525	
	HC ppm (CO %)	NOx ppm	HC ppm (CO %)	NOx ppm
1750	1118 (8.02)	4990	1098 (9.90)	4980
1875	1052 (7.56)	4990	1034 (9.90)	4906
2000	992 (7.14)	4919	975 (9.90)	4838
2125	938 (6.75)	4853	921 (9.66)	4776
2250	887 (6.40)	4792	872 (9.14)	4720
2375	841 (6.07)	4736	827 (8.67)	4668
2500	800 (5.78)	4685	786 (8.25)	4620
2625	761 (5.51)	4639	748 (7.85)	4577
2750	726 (5.26)	4596	714 (7.50)	4374
2875	695 (5.03)	4484	683 (7.17)	4176
3000	666 (4.83)	4290	654 (6.87)	3996
3125	639 (4.64)	4114	628 (6.60)	3832
3250	615 (4.47)	3952	604 (6.35)	3681
3375	593 (4.31)	3804	583 (6.13)	3544
3500	573 (4.17)	3669	563 (5.92)	3418
3625	554 (4.04)	3544	544 (5.73)	3302
3750	537 (3.91)	3429	527 (5.55)	3195

3875	521 (3.80)	3323	512 (5.39)	3096
4000	506 (3.70)	3224	497 (5.24)	3003
4125	492 (3.60)	3131	484 (5.09)	2917
4250	479 (3.51)	3044	471 (4.96)	2836
4375	467 (3.42)	2961	459 (4.83)	2759
4500	455 (3.34)	2883	447 (4.71)	2686
4625	444 (3.26)	2807	436 (4.60)	2616
4750	433 (3.18)	2735	425 (4.49)	2549
4875	423 (3.11)	2665	415 (4.38)	2483
5000	412 (3.03)	2597	405 (4.28)	2420
5125	402 (2.97)	2530	395 (4.18)	2359
5250	393 (2.90)	2466	386 (4.08)	2298
5375	383 (2.83)	2403	376 (3.98)	2240
5500	374 (2.77)	2341	367 (3.89)	2183
5625	365 (2.70)	2282	359 (3.80)	2127
5750	357 (2.64)	2224	350 (3.71)	2074
5875	348 (2.59)	2168	342 (3.62)	2022
6000	341 (2.53)	2116	334 (3.54)	1973
6125	333 (2.48)	2066	327 (3.47)	1927
6250	326 (2.43)	2020	320 (3.40)	1884
6375	320 (2.39)	1979	314 (3.34)	1846
6500	315 (2.35)	1943	309 (3.28)	1813
6625	310 (2.32)	1913	304 (3.23)	1785
6750	307 (2.29)	1890	301 (3.20)	1764
6875	305 (2.28)	1875	299 (3.17)	1750
7000	304 (2.27)	1870	298 (3.17)	1745
7125 Or More	304 (2.27)	1874	298 (3.17)	1745

U.S. EPA ASM EMISSION STANDARDS - 1975-78 LIGHT DUTY TRUCKS (6000 GVWR OR LESS)

Test Weight	ASM5015		ASM2525	
	HC ppm (CO %)	NOx ppm	HC ppm (CO %)	NOx ppm
1750	843 (5.07)	4990	828 (7.26)	4980

1875	794 (4.78)	4990	780 (6.84)	4906
2000	749 (4.51)	4919	736 (6.45)	4838
2125	707 (4.26)	4853	695 (6.10)	4776
2250	669 (4.04)	4792	658 (5.78)	4720
2375	635 (3.83)	4736	624 (5.48)	4668
2500	603 (3.65)	4685	593 (5.21)	4620
2625	574 (3.48)	4639	564 (4.96)	4577
2750	548 (3.32)	4596	539 (4.73)	4374
2875	524 (3.18)	4484	515 (4.53)	4176
3000	502 (3.05)	4290	493 (4.34)	3996
3125	482 (2.93)	4114	474 (4.17)	3832
3250	464 (2.82)	3952	456 (4.01)	3681
3375	447 (2.72)	3804	440 (3.87)	3544
3500	432 (2.63)	3669	424 (3.74)	3418
3625	418 (2.55)	3544	411 (3.62)	3302
3750	405 (2.47)	3429	398 (3.51)	3195
3875	393 (2.40)	3323	386 (3.40)	3096
4000	382 (2.33)	3224	375 (3.31)	3003
4125	371 (2.27)	3131	365 (3.22)	2917
4250	361 (2.21)	3044	355 (3.13)	2836
4375	352 (2.16)	2961	346 (3.05)	2759
4500	343 (2.11)	2883	337 (2.98)	2686
4625	335 (2.06)	2807	329 (2.90)	2616
4750	327 (2.01)	2735	321 (2.83)	2549
4875	319 (1.96)	2665	313 (2.77)	2483
5000	311 (1.92)	2597	305 (2.70)	2420
5125	304 (1.87)	2530	298 (2.64)	2359
5250	296 (1.83)	2466	291 (2.58)	2298
5375	289 (1.79)	2403	284 (2.51)	2240
5500	282 (1.75)	2341	277 (2.46)	2183
5625	276 (1.71)	2282	271 (2.40)	2127
5750	269 (1.67)	2224	264 (2.34)	2074
5875	263 (1.63)	2168	258 (2.29)	2022

6000	257 (1.60)	2116	252 (2.24)	1973
6125	251 (1.57)	2066	247 (2.19)	1927
6250	246 (1.54)	2020	242 (2.15)	1884
6375	242 (1.51)	1979	237 (2.11)	1846
6500	238 (1.48)	1943	233 (2.07)	1813
6625	234 (1.46)	1913	230 (2.04)	1785
6750	232 (1.45)	1890	227 (2.02)	1764
6875	230 (1.44)	1875	225 (2.00)	1750
7000	229 (1.43)	1870	225 (2.00)	1745
7125 Or More	229 (1.43)	1874	225 (2.00)	1745

U.S. EPA ASM EMISSION STANDARDS - 1979-83 LIGHT DUTY TRUCKS (6000 GVWR OR LESS)

Test Weight	ASM5015		ASM2525	
	HC ppm (CO %)	NOx ppm	HC ppm (CO %)	NOx ppm
1750	774 (4.31)	4990	761 (6.06)	4960
1875	729 (4.06)	4990	717 (5.70)	4738
2000	688 (3.83)	4778	676 (5.38)	4535
2125	650 (3.63)	4578	638 (5.09)	4349
2250	615 (3.44)	4395	604 (4.82)	4179
2375	583 (3.26)	4228	573 (4.57)	4024
2500	554 (3.10)	4076	544 (4.35)	3881
2625	528 (2.96)	3936	518 (4.14)	3752
2750	503 (2.83)	3809	495 (3.95)	3579
2875	481 (2.71)	3669	473 (3.78)	3417
3000	461 (2.60)	3510	453 (3.62)	3270
3125	443 (2.50)	3366	435 (3.48)	3135
3250	426 (2.40)	3234	419 (3.35)	3012
3375	411 (2.32)	3113	404 (3.23)	2899
3500	397 (2.24)	3002	390 (3.12)	2796
3625	384 (2.17)	2900	377 (3.02)	2701
3750	372 (2.11)	2806	365 (2.93)	2614
3875	361 (2.05)	2719	355 (2.58)	2533

4000	351 (1.99)	2638	345 (2.77)	2457
4125	341 (1.94)	2562	335 (2.69)	2387
4250	332 (1.89)	2490	326 (2.62)	2320
4375	323 (1.84)	2423	318 (2.55)	2258
4500	315 (1.80)	2359	310 (2.49)	2198
4625	308 (1.76)	2297	302 (2.43)	2140
4750	300 (1.72)	2238	295 (2.37)	2085
4875	293 (1.68)	2180	288 (2.32)	2032
5000	286 (1.64)	2125	281 (2.26)	1980
5125	279 (1.60)	2070	274 (2.21)	1930
5250	272 (1.56)	2017	267 (2.16)	1881
5375	26 (1.53)	1966	261 (2.11)	1833
5500	259 (1.49)	1916	255 (2.06)	1786
5625	253 (1.46)	1867	248 (2.01)	1740
5750	247 (1.43)	1820	243 (1.96)	1697
5875	241 (1.40)	1774	237 (1.92)	1654
6000	236 (1.37)	1731	232 (1.88)	1614
6125	231 (1.34)	1690	227 (1.84)	1577
6250	226 (1.31)	1653	222 (1.80)	1542
6375	222 (1.29)	1619	218 (1.77)	1510
6500	218 (1.27)	1590	214 (1.74)	1483
6625	215 (1.25)	1565	211 (1.72)	1460
6750	213 (1.24)	1546	209 (1.70)	1443
6875	211 (1.23)	1534	207 (1.68)	1432
7000	211 (1.23)	1530	207 (1.68)	1428
7125 Or More	211 (1.22)	1531	206 (1.68)	1428

U.S. EPA ASM EMISSION STANDARDS - 1984-87 LIGHT DUTY TRUCKS (6000 GVWR OR LESS)

Test Weight	ASM5015		ASM2525	
	HC ppm (CO %)	NOx ppm	HC ppm (CO %)	NOx ppm
1750	390 (3.54)	4990	381 (4.85)	4960
1875	368 (3.34)	4990	359 (4.57)	4738

2000	348 (3.16)	4778	339 (4.31)	4535
2125	329 (2.99)	4578	321 (4.08)	4349
2250	312 (2.83)	4395	305 (3.86)	4179
2375	297 (2.69)	4228	290 (3.66)	4024
2500	283 (2.56)	4076	276 (3.48)	3881
2625	270 (2.44)	3936	263 (3.32)	3752
2750	258 (2.33)	3809	252 (3.17)	3579
2875	247 (2.23)	3669	241 (3.03)	3417
3000	237 (2.14)	3510	232 (2.91)	3270
3125	228 (2.06)	3366	223 (2.79)	3135
3250	220 (1.99)	3234	215 (2.69)	3012
3375	213 (1.92)	3113	208 (2.60)	2899
3500	206 (1.86)	3002	201 (2.51)	2796
3625	200 (1.80)	2900	195 (2.43)	2701
3750	194 (1.74)	2806	189 (2.36)	2614
3875	188 (1.69)	2719	184 (2.29)	2533
4000	183 (1.65)	2638	179 (2.22)	2457
4125	179 (1.61)	2562	175 (2.16)	2387
4250	174 (1.56)	2490	170 (2.11)	2320
4375	170 (1.53)	2423	166 (2.06)	2258
4500	166 (1.49)	2359	162 (2.01)	2198
4625	162 (1.46)	2297	159 (1.96)	2140
4750	159 (1.42)	2238	155 (1.91)	2085
4875	155 (1.39)	2180	152 (1.87)	2032
5000	152 (1.36)	2125	148 (1.82)	1980
5125	148 (1.33)	2070	145 (1.78)	1930
5250	145 (1.30)	2017	142 (1.74)	1881
5375	142 (1.27)	1966	139 (1.70)	1833
5500	139 (1.24)	1916	136 (1.66)	1786
5625	136 (1.12)	1867	133 (1.62)	1740
5750	133 (1.19)	1820	130 (1.59)	1697
5875	130 (1.16)	1774	127 (1.55)	1654
6000	127 (1.14)	1731	124 (1.52)	1614

6125	125 (1.11)	1690	122 (1.49)	1577
6250	123 (1.09)	1653	120 (1.46)	1542
6375	120 (1.07)	1619	118 (1.43)	1510
6500	119 (1.06)	1590	116 (1.41)	1483
6625	117 (1.04)	1565	114 (1.39)	1460
6750	116 (1.03)	1546	113 (1.37)	1443
6875	115 (1.02)	1534	113 (1.36)	1432
7000	115 (1.02)	1530	112 (1.36)	1428
7125 Or More	115 (1.02)	1531	112 (1.36)	1428

U.S. EPA ASM EMISSION STANDARDS - 1988-90 LIGHT DUTY TRUCKS (6000 GVWR OR LESS)

Test Weight	ASM5015		ASM2525	
	HC ppm (CO %)	NOx ppm	HC ppm (CO %)	NOx ppm
1750	390 (3.54)	2725	381 (4.85)	2587
1875	368 (3.34)	2649	359 (4.57)	2435
2000	348 (3.16)	2499	339 (4.31)	2295
2125	329 (2.99)	2360	321 (4.08)	2167
2250	312 (2.83)	2232	305 (3.86)	2050
2375	297 (2.69)	2115	290 (3.66)	1943
2500	283 (2.56)	2009	276 (3.48)	1845
2625	270 (2.44)	1912	263 (3.32)	1756
2750	258 (2.33)	1823	252 (3.17)	1675
2875	247 (2.23)	1742	241 (3.03)	1601
3000	237 (2.14)	1668	232 (2.91)	1533
3125	228 (2.06)	1601	223 (2.79)	1471
3250	220 (1.99)	1539	215 (2.69)	1415
3375	213 (1.92)	1483	208 (2.60)	1363
3500	206 (1.86)	1432	201 (2.51)	1316
3625	200 (1.80)	1384	195 (2.43)	1273
3750	194 (1.74)	1340	189 (2.36)	1233
3875	188 (1.69)	1300	184 (2.29)	1195
4000	183 (1.65)	1262	179 (2.22)	1161

4125	179 (1.61)	1227	175 (2.16)	1126
4250	174 (1.56)	1194	170 (2.11)	1098
4375	170 (1.53)	1162	166 (2.06)	1069
4500	166 (1.49)	1132	162 (2.01)	1042
4625	162 (1.46)	1104	159 (1.96)	1015
4750	159 (1.42)	1076	155 (1.91)	990
4875	155 (1.39)	1049	152 (1.87)	966
5000	152 (1.36)	1023	148 (1.82)	942
5125	148 (1.33)	998	145 (1.78)	919
5250	145 (1.30)	974	142 (1.74)	896
5375	142 (1.27)	950	139 (1.70)	874
5500	139 (1.24)	926	136 (1.66)	853
5625	136 (1.12)	904	133 (1.62)	832
5750	133 (1.19)	882	130 (1.59)	812
5875	130 (1.16)	860	127 (1.55)	793
6000	127 (1.14)	840	124 (1.52)	774
6125	125 (1.11)	822	122 (1.49)	757
6250	123 (1.09)	804	120 (1.46)	741
6375	120 (1.07)	788	118 (1.43)	727
6500	119 (1.06)	775	116 (1.41)	714
6625	117 (1.04)	763	114 (1.39)	704
6750	116 (1.03)	755	113 (1.37)	696
6875	115 (1.02)	749	113 (1.36)	691
7000 Or More	115 (1.02)	747	112 (1.36)	689

U.S. EPA ASM EMISSION STANDARDS - 1991-95 LIGHT DUTY TRUCKS (6000 GVWR OR LESS)

Test Weight	ASM5015		ASM2525	
	HC ppm (CO %)	NOx ppm	HC ppm (CO %)	NOx ppm
1750	324 (2.78)	2272	315 (3.64)	2114
1875	306 (2.63)	2181	297 (3.43)	1991
2000	289 (2.48)	2058	281 (3.24)	1877
2125	274 (2.35)	1944	267 (3.06)	1774

2250	260 (2.23)	1839	253 (2.90)	1678
2375	247 (2.12)	1744	241 (2.76)	1592
2500	236 (2.02)	1657	230 (2.62)	1512
2625	225 (1.92)	1577	219 (2.50)	1440
2750	216 (1.84)	1504	210 (2.39)	1374
2875	207 (1.76)	1438	210 (2.29)	1313
3000	199 (1.69)	1378	194 (2.19)	1258
3125	191 (1.63)	1323	186 (2.11)	1208
3250	185 (1.57)	1273	180 (2.03)	1163
3375	179 (1.52)	1227	174 (1.96)	1121
3500	173 (1.47)	1184	169 (1.89)	1082
3625	168 (1.42)	1146	164 (1.84)	1047
3750	163 (1.38)	1110	159 (1.78)	1014
3875	159 (1.34)	1077	155 (1.73)	984
4000	155 (1.31)	1046	151 (1.68)	956
4125	151 (1.27)	1017	147 (1.64)	930
4250	147 (1.24)	990	143 (1.60)	905
4375	144 (1.21)	964	140 (1.56)	882
4500	141 (1.18)	939	137 (1.52)	859
4625	137 (1.15)	916	134 (1.48)	838
4750	134 (1.13)	893	131 (1.45)	818
4875	132 (1.10)	872	128 (1.42)	798
5000	129 (1.08)	850	126 (1.38)	778
5125	126 (1.05)	830	123 (1.35)	760
5250	123 (1.03)	810	120 (1.32)	741
5375	121 (1.01)	790	118 (1.29)	723
5500	118 (0.99)	771	115 (1.26)	706
5625	116 (0.97)	752	113 (1.24)	689
5750	113 (0.94)	734	111 (1.21)	673
5875	111 (0.92)	717	108 (1.18)	657
6000	109 (0.91)	701	106 (1.16)	642
6125	107 (0.89)	685	104 (1.13)	628
6250	105 (.087)	671	102 (1.11)	615

6375	103 (0.86)	658	101 (1.09)	604
6500	102 (0.84)	647	99 (1.08)	593
6625	101 (0.83)	638	98 (1.06)	585
6750	100 (0.82)	631	97 (1.05)	578
6875	99 (0.82)	626	97 (1.04)	574
7000	99 (0.82)	624	96 (1.04)	573
7125 Or More	98 (0.81)	625	96 (1.04)	573

U.S. EPA ASM EMISSION STANDARDS - 1994 + TIER 1 LIGHT DUTY TRUCKS (3750 LVW OR LESS)

Test Weight	ASM5015		ASM2525	
	HC ppm (CO %)	NOx ppm	HC ppm (CO %)	NOx ppm
1750	142 (0.80)	1212	136 (0.77)	1095
1875	134 (0.75)	1142	129 (0.73)	1031
2000	127 (0.71)	1077	123 (0.69)	973
2125	121 (0.68)	1018	116 (0.66)	920
2250	115 (0.64)	964	111 (0.62)	871
2375	109 (0.61)	915	106 (0.59)	827
2500	105 (0.59)	869	101 (0.57)	786
2625	100 (0.56)	828	97 (0.54)	749
2750	96 (0.54)	791	93 (0.52)	715
2875	92 (0.52)	756	89 (0.50)	684
3000	89 (0.50)	725	86 (0.48)	656
3125	86 (0.48)	696	83 (0.46)	630
3250	83 (0.46)	670	80 (0.45)	607
3375	81 (0.45)	647	78 (0.43)	585
3500	78 (0.44)	625	76 (0.42)	566
3625	76 (0.42)	605	74 (0.41)	547
3750	74 (0.41)	586	72 (0.40)	531
3875	72 (0.40)	569	70 (0.39)	515
4000	71 (0.39)	553	68 (0.38)	501
4125	69 (0.38)	538	67 (0.37)	487
4250	67 (0.37)	524	65 (0.36)	475

4375	66 (0.36)	510	64 (0.35)	463
4500	65 (0.36)	498	63 (0.35)	440
4625	63 (0.35)	486	61 (0.34)	440
4750	62 (0.34)	474	60 (0.33)	430
4875	61 (0.34)	463	59 (0.33)	420
5000	60 (0.33)	452	58 (0.32)	410
5125	58 (0.32)	441	57 (0.31)	400
5250	57 (0.32)	431	56 (0.31)	391
5375	56 (0.31)	420	55 (0.30)	382
5500	55 (0.30)	410	54 (0.30)	373
5625	54 (0.30)	401	53 (0.29)	364
5750	53 (0.29)	391	52 (0.29)	356
5875	52 (0.29)	383	51 (0.28)	348
6000	51 (0.28)	374	50 (0.28)	340
6125	50 (0.28)	366	49 (0.27)	333
6250	50 (0.27)	359	48 (0.27)	326
6375	49 (0.27)	352	48 (0.26)	320
6500	48 (0.26)	346	47 (0.26)	315
6625	48 (0.26)	341	46 (0.26)	311
6750	47 (0.26)	338	46 (0.26)	307
6875	47 (0.26)	335	46 (0.25)	305
7000 Or More	47 (0.25)	335	46 (0.25)	305

U.S. EPA ASM EMISSION STANDARDS - 1994 + TIER 1 LIGHT DUTY TRUCKS (3751 LVW OR MORE)

Test Weight	ASM5015		ASM2525	
	HC ppm (CO %)	NOx ppm	HC ppm (CO %)	NOx ppm
1750	224 (1.26)	1819	216 (1.22)	1642
1875	212 (1.19)	1713	205 (1.16)	1547
2000	201 (1.13)	1616	194 (1.09)	1460
2125	191 (1.07)	1527	184 (1.04)	1380
2250	182 (1.02)	1446	175 (0.99)	1307
2375	173 (0.97)	1372	167 (0.94)	1240

2500	166 (0.93)	1304	160 (0.90)	1179
2625	159 (0.89)	1242	153 (0.86)	1123
2750	152 (0.85)	1186	147 (0.82)	1072
2875	146 (0.82)	1134	141 (0.79)	1026
3000	141 (0.79)	1088	136 (0.76)	984
3125	136 (0.76)	1045	132 (0.73)	945
3250	132 (0.73)	1006	127 (0.71)	910
3375	128 (0.71)	970	123 (0.69)	878
3500	124 (0.69)	937	120 (0.67)	848
3625	120 (0.67)	907	117 (0.65)	821
3750	117 (0.65)	879	114 (0.63)	796
3875	114 (0.63)	853	111 (0.61)	773
4000	112 (0.62)	829	108 (0.60)	751
4125	109 (0.60)	807	106 (0.58)	731
4250	107 (0.59)	786	103 (0.57)	712
4375	104 (0.58)	766	101 (0.56)	694
4500	102 (0.57)	747	99 (0.55)	677
4625	100 (0.55)	728	97 (0.54)	661
4750	98 (0.54)	711	95 (0.53)	645
4875	96 (0.53)	694	93 (0.52)	630
5000	94 (0.52)	677	92 (0.51)	615
5125	93 (0.51)	661	90 (0.50)	600
5250	91 (0.50)	646	88 (0.49)	586
5375	89 (0.49)	631	86 (0.48)	573
5500	87 (0.48)	616	85 (0.47)	559
5625	86 (0.47)	601	83 (0.46)	546
5750	84 (0.46)	587	82 (0.45)	534
5875	83 (0.45)	574	80 (0.44)	522
6000	81 (0.44)	561	79 (0.44)	510
6125	80 (0.44)	549	78 (0.43)	499
6250	79 (0.43)	538	76 (0.42)	489
6375	77 (0.42)	528	75 (0.42)	480
6500	76 (0.42)	519	74 (0.41)	473

6625	76 (0.41)	512	74 (0.41)	466
6750	75 (0.41)	507	73 (0.41)	461
6875	75 (0.40)	503	73 (0.40)	458
7000 Or More	74 (0.40)	502	72 (0.40)	457

U.S. EPA ASM EMISSION STANDARDS - 1968-72 LIGHT DUTY TRUCKS (6001 GVWR OR MORE)

Test Weight	ASM5015		ASM2525	
	HC ppm (CO %)	NOx ppm	HC ppm (CO %)	NOx ppm
1750	1118 (8.02)	4990	1098 (9.90)	4990
1875	1052 (7.56)	4990	1034 (9.90)	4990
2000	992 (7.14)	4990	975 (9.90)	4990
2125	938 (6.75)	4990	921 (9.66)	4990
2250	887 (6.40)	4990	872 (9.14)	4990
2375	841 (6.07)	4990	827 (8.67)	4990
2500	800 (5.78)	4990	786 (8.25)	4990
2625	761 (5.51)	4990	748 (7.85)	4990
2750	726 (5.26)	4990	714 (7.50)	4772
2875	695 (5.03)	4892	683 (7.17)	4556
3000	666 (4.83)	4680	654 (6.87)	4359
3125	639 (4.64)	4488	628 (6.60)	4180
3250	615 (4.47)	4311	604 (6.35)	4016
3375	593 (4.31)	4150	583 (6.13)	3866
3500	573 (4.17)	4002	563 (5.92)	3728
3625	554 (4.04)	3867	544 (5.73)	3602
3750	537 (3.91)	3741	527 (5.55)	3485
3875	521 (3.80)	3625	512 (5.39)	3377
4000	506 (3.70)	3517	497 (5.24)	3276
4125	492 (3.60)	3416	484 (5.09)	3182
4250	479 (3.51)	3321	471 (4.96)	3094
4375	467 (3.42)	3230	459 (4.83)	3010
4500	455 (3.34)	3145	447 (4.71)	2930
4625	444 (3.26)	3063	436 (4.60)	2854

4750	433 (3.18)	2983	425 (4.49)	2780
4875	423 (3.11)	2907	415 (4.38)	2709
5000	412 (3.03)	2833	405 (4.28)	2640
5125	402 (2.97)	2760	395 (4.18)	2573
5250	393 (2.90)	2690	386 (4.08)	2507
5375	383 (2.83)	2621	376 (3.98)	2443
5500	374 (2.77)	2554	367 (3.89)	2381
5625	365 (2.70)	2489	359 (3.80)	2321
5750	357 (2.64)	2426	350 (3.71)	2262
5875	348 (2.59)	2366	342 (3.62)	2206
6000	341 (2.53)	2308	334 (3.54)	2152
6125	333 (2.48)	2254	327 (3.47)	2102
6250	326 (2.43)	2204	320 (3.40)	2056
6375	320 (2.39)	2159	314 (3.34)	2014
6500	315 (2.35)	2119	309 (3.28)	1977
6625	310 (2.32)	2087	304 (3.23)	1947
6750	307 (2.29)	2062	301 (3.20)	1924
6875	305 (2.28)	2046	299 (3.17)	1909
7000	304 (2.27)	2040	298 (3.17)	1904
7125 Or More	304 (2.27)	2045	298 (3.17)	1904

U.S. EPA ASM EMISSION STANDARDS - 1973-74 LIGHT DUTY TRUCKS (6001 GVWR OR MORE)

Test Weight	ASM5015		ASM2525	
	HC ppm (CO %)	NOx ppm	HC ppm (CO %)	NOx ppm
1750	1118 (8.02)	4990	1098 (9.90)	4980
1875	1052 (7.56)	4990	1034 (9.90)	4906
2000	992 (7.14)	4919	975 (9.90)	4838
2125	938 (6.75)	4853	921 (9.66)	4776
2250	887 (6.40)	4792	872 (9.14)	4720
2375	841 (6.07)	4736	827 (8.67)	4668
2500	800 (5.78)	4685	786 (8.25)	4620
2625	761 (5.51)	4639	748 (7.85)	4577

2750	726 (5.26)	4596	714 (7.50)	4374
2875	695 (5.03)	4484	683 (7.17)	4176
3000	666 (4.83)	4290	654 (6.87)	3996
3125	639 (4.64)	4114	628 (6.60)	3832
3250	615 (4.47)	3952	604 (6.35)	3681
3375	593 (4.31)	3804	583 (6.13)	3544
3500	573 (4.17)	3669	563 (5.92)	3418
3625	554 (4.04)	3544	544 (5.73)	3302
3750	537 (3.91)	3429	527 (5.55)	3195
3875	521 (3.80)	3323	512 (5.39)	3096
4000	506 (3.70)	3224	497 (5.24)	3003
4125	492 (3.60)	3131	484 (5.09)	2917
4250	479 (3.51)	3044	471 (4.96)	2836
4375	467 (3.42)	2961	459 (4.83)	2759
4500	455 (3.34)	2883	447 (4.71)	2686
4625	444 (3.26)	2807	436 (4.60)	2616
4750	433 (3.18)	2735	425 (4.49)	2549
4875	423 (3.11)	2665	415 (4.38)	2483
5000	412 (3.03)	2597	405 (4.28)	2420
5125	402 (2.97)	2530	395 (4.18)	2359
5250	393 (2.90)	2466	386 (4.08)	2298
5375	383 (2.83)	2403	376 (3.98)	2240
5500	374 (2.77)	2341	367 (3.89)	2183
5625	365 (2.70)	2282	359 (3.80)	2127
5750	357 (2.64)	2224	350 (3.71)	2074
5875	348 (2.59)	2168	342 (3.62)	2022
6000	341 (2.53)	2116	334 (3.54)	1973
6125	333 (2.48)	2066	327 (3.47)	1927
6250	326 (2.43)	2020	320 (3.40)	1884
6375	320 (2.39)	1979	314 (3.34)	1846
6500	315 (2.35)	1943	309 (3.28)	1813
6625	310 (2.32)	1913	304 (3.23)	1785
6750	307 (2.29)	1890	301 (3.20)	1764

6875	305 (2.28)	1875	299 (3.17)	1750
7000	304 (2.27)	1870	298 (3.17)	1745
7125 Or More	304 (2.27)	1874	298 (3.17)	1745

U.S. EPA ASM EMISSION STANDARDS - 1975-78 LIGHT DUTY TRUCKS (6001 GVWR OR MORE)

Test Weight	ASM5015		ASM2525	
	HC ppm (CO %)	NOx ppm	HC ppm (CO %)	NOx ppm
1750	843 (5.07)	4990	828 (7.26)	4980
1875	794 (4.78)	4990	780 (6.84)	4906
2000	749 (4.51)	4919	736 (6.45)	4838
2125	707 (4.26)	4853	695 (6.10)	4776
2250	669 (4.04)	4792	658 (5.78)	4720
2375	635 (3.83)	4736	624 (5.48)	4668
2500	603 (3.65)	4685	593 (5.21)	4620
2625	574 (3.48)	4639	564 (4.96)	4577
2750	548 (3.32)	4596	539 (4.73)	4374
2875	524 (3.18)	4484	515 (4.53)	4176
3000	502 (3.05)	4290	493 (4.34)	3996
3125	482 (2.93)	4114	474 (4.17)	3832
3250	464 (2.82)	3952	456 (4.01)	3681
3375	447 (2.72)	3804	440 (3.87)	3544
3500	432 (2.63)	3669	424 (3.74)	3418
3625	418 (2.55)	3544	411 (3.62)	3302
3750	405 (2.47)	3429	398 (3.51)	3195
3875	393 (2.40)	3323	386 (3.40)	3096
4000	382 (2.33)	3224	375 (3.31)	3003
4125	371 (2.27)	3131	365 (3.22)	2917
4250	361 (2.21)	3044	355 (3.13)	2836
4375	352 (2.16)	2961	346 (3.05)	2759
4500	343 (2.11)	2883	337 (2.98)	2686
4625	335 (2.06)	2807	329 (2.90)	2616
4750	327 (2.01)	2735	321 (2.83)	2549

4875	319 (1.96)	2665	313 (2.77)	2483
5000	311 (1.92)	2597	305 (2.70)	2420
5125	304 (1.87)	2530	298 (2.64)	2359
5250	296 (1.83)	2466	291 (2.58)	2298
5375	289 (1.79)	2403	284 (2.51)	2240
5500	282 (1.75)	2341	277 (2.46)	2183
5625	276 (1.71)	2282	271 (2.40)	2127
5750	269 (1.67)	2224	264 (2.34)	2074
5875	263 (1.63)	2168	258 (2.29)	2022
6000	257 (1.60)	2116	252 (2.24)	1973
6125	251 (1.57)	2066	247 (2.19)	1927
6250	246 (1.54)	2020	242 (2.15)	1884
6375	242 (1.51)	1979	237 (2.11)	1846
6500	238 (1.48)	1943	233 (2.07)	1813
6625	234 (1.46)	1913	230 (2.04)	1785
6750	232 (1.45)	1890	227 (2.02)	1764
6875	230 (1.44)	1875	225 (2.00)	1750
7000	229 (1.43)	1870	225 (2.00)	1745
7125 Or More	229 (1.43)	1874	225 (2.00)	1745

U.S. EPA ASM EMISSION STANDARDS - 1979-83 LIGHT DUTY TRUCKS (6001 GVWR OR MORE)

Test Weight	ASM5015		ASM2525	
	HC ppm (CO %)	NOx ppm	HC ppm (CO %)	NOx ppm
1750	774 (4.31)	4990	761 (6.06)	4960
1875	729 (4.06)	4990	717 (5.70)	4738
2000	688 (3.83)	4778	676 (5.38)	4535
2125	650 (3.63)	4578	638 (5.09)	4349
2250	615 (3.44)	4395	604 (4.82)	4179
2375	583 (3.26)	4228	573 (4.57)	4024
2500	554 (3.10)	4076	544 (4.35)	3881
2625	528 (2.96)	3936	518 (4.14)	3752
2750	503 (2.83)	3809	495 (3.95)	3579

2875	481 (2.71)	3669	473 (3.78)	3417
3000	461 (2.60)	3510	453 (3.62)	3270
3125	443 (2.50)	3366	435 (3.48)	3135
3250	426 (2.40)	3234	419 (3.35)	3012
3375	411 (2.32)	3113	404 (3.23)	2899
3500	397 (2.24)	3002	390 (3.12)	2796
3625	384 (2.17)	2900	377 (3.02)	2701
3750	372 (2.11)	2806	365 (2.93)	2614
3875	361 (2.05)	2719	355 (2.58)	2533
4000	351 (1.99)	2638	345 (2.77)	2457
4125	341 (1.94)	2562	335 (2.69)	2387
4250	332 (1.89)	2490	326 (2.62)	2320
4375	323 (1.84)	2423	318 (2.55)	2258
4500	315 (1.80)	2359	310 (2.49)	2198
4625	308 (1.76)	2297	302 (2.43)	2140
4750	300 (1.72)	2238	295 (2.37)	2085
4875	293 (1.68)	2180	288 (2.32)	2032
5000	286 (1.64)	2125	281 (2.26)	1980
5125	279 (1.60)	2070	274 (2.21)	1930
5250	272 (1.56)	2017	267 (2.16)	1881
5375	26 (1.53)	1966	261 (2.11)	1833
5500	259 (1.49)	1916	255 (2.06)	1786
5625	253 (1.46)	1867	248 (2.01)	1740
5750	247 (1.43)	1820	243 (1.96)	1697
5875	241 (1.40)	1774	237 (1.92)	1654
6000	236 (1.37)	1731	232 (1.88)	1614
6125	231 (1.34)	1690	227 (1.84)	1577
6250	226 (1.31)	1653	222 (1.80)	1542
6375	222 (1.29)	1619	218 (1.77)	1510
6500	218 (1.27)	1590	214 (1.74)	1483
6625	215 (1.25)	1565	211 (1.72)	1460
6750	213 (1.24)	1546	209 (1.70)	1443
6875	211 (1.23)	1534	207 (1.68)	1432

7000	211 (1.23)	1530	207 (1.68)	1428
7125 Or More	211 (1.22)	1531	206 (1.68)	1428

U.S. EPA ASM EMISSION STANDARDS - 1984-87 LIGHT DUTY TRUCKS (6001 GVWR OR MORE)

Test Weight	ASM5015		ASM2525	
	HC ppm (CO %)	NOx ppm	HC ppm (CO %)	NOx ppm
1750	390 (3.54)	4990	381 (4.85)	4960
1875	368 (3.34)	4990	359 (4.57)	4738
2000	348 (3.16)	4778	339 (4.31)	4535
2125	329 (2.99)	4578	321 (4.08)	4349
2250	312 (2.83)	4395	305 (3.86)	4179
2375	297 (2.69)	4228	290 (3.66)	4024
2500	283 (2.56)	4076	276 (3.48)	3881
2625	270 (2.44)	3936	263 (3.32)	3752
2750	258 (2.33)	3809	252 (3.17)	3579
2875	247 (2.23)	3669	241 (3.03)	3417
3000	237 (2.14)	3510	232 (2.91)	3270
3125	228 (2.06)	3366	223 (2.79)	3135
3250	220 (1.99)	3234	215 (2.69)	3012
3375	213 (1.92)	3113	208 (2.60)	2899
3500	206 (1.86)	3002	201 (2.51)	2796
3625	200 (1.80)	2900	195 (2.43)	2701
3750	194 (1.74)	2806	189 (2.36)	2614
3875	188 (1.69)	2719	184 (2.29)	2533
4000	183 (1.65)	2638	179 (2.22)	2457
4125	179 (1.61)	2562	175 (2.16)	2387
4250	174 (1.56)	2490	170 (2.11)	2320
4375	170 (1.53)	2423	166 (2.06)	2258
4500	166 (1.49)	2359	162 (2.01)	2198
4625	162 (1.46)	2297	159 (1.96)	2140
4750	159 (1.42)	2238	155 (1.91)	2085
4875	155 (1.39)	2180	152 (1.87)	2032

5000	152 (1.36)	2125	148 (1.82)	1980
5125	148 (1.33)	2070	145 (1.78)	1930
5250	145 (1.30)	2017	142 (1.74)	1881
5375	142 (1.27)	1966	139 (1.70)	1833
5500	139 (1.24)	1916	136 (1.66)	1786
5625	136 (1.12)	1867	133 (1.62)	1740
5750	133 (1.19)	1820	130 (1.59)	1697
5875	130 (1.16)	1774	127 (1.55)	1654
6000	127 (1.14)	1731	124 (1.52)	1614
6125	125 (1.11)	1690	122 (1.49)	1577
6250	123 (1.09)	1653	120 (1.46)	1542
6375	120 (1.07)	1619	118 (1.43)	1510
6500	119 (1.06)	1590	116 (1.41)	1483
6625	117 (1.04)	1565	114 (1.39)	1460
6750	116 (1.03)	1546	113 (1.37)	1443
6875	115 (1.02)	1534	113 (1.36)	1432
7000	115 (1.02)	1530	112 (1.36)	1428
7125 Or More	115 (1.02)	1531	112 (1.36)	1428

U.S. EPA ASM EMISSION STANDARDS - 1988-90 LIGHT DUTY TRUCKS (6001 GVWR OR MORE)

Test Weight	ASM5015		ASM2525	
	HC ppm (CO %)	NOx ppm	HC ppm (CO %)	NOx ppm
1750	390 (3.54)	4084	381 (4.85)	4005
1875	368 (3.34)	4054	359 (4.57)	3767
2000	348 (3.16)	3824	339 (4.31)	3548
2125	329 (2.99)	3609	321 (4.08)	3348
2250	312 (2.83)	3411	305 (3.86)	3165
2375	297 (2.69)	3231	290 (3.66)	2998
2500	283 (2.56)	3066	276 (3.48)	2845
2625	270 (2.44)	2916	263 (3.32)	2706
2750	258 (2.33)	2779	252 (3.17)	2579
2875	247 (2.23)	2654	241 (3.03)	2463

3000	237 (2.14)	2539	232 (2.91)	2357
3125	228 (2.06)	2435	223 (2.79)	2260
3250	220 (1.99)	2340	215 (2.69)	2172
3375	213 (1.92)	2253	208 (2.60)	2092
3500	206 (1.86)	2174	201 (2.51)	2018
3625	200 (1.80)	2100	195 (2.43)	1950
3750	194 (1.74)	2033	189 (2.36)	1887
3875	188 (1.69)	1970	184 (2.29)	1829
4000	183 (1.65)	1912	179 (2.22)	1775
4125	179 (1.61)	1857	175 (2.16)	1724
4250	174 (1.56)	1806	170 (2.11)	1677
4375	170 (1.53)	1757	166 (2.06)	1632
4500	166 (1.49)	1711	162 (2.01)	1589
4625	162 (1.46)	1666	159 (1.96)	1548
4750	159 (1.42)	1624	155 (1.91)	1508
4875	155 (1.39)	1583	152 (1.87)	1470
5000	152 (1.36)	1542	148 (1.82)	1433
5125	148 (1.33)	1503	145 (1.78)	1397
5250	145 (1.30)	1465	142 (1.74)	1362
5375	142 (1.27)	1428	139 (1.70)	1327
5500	139 (1.24)	1392	136 (1.66)	1294
5625	136 (1.12)	1357	133 (1.62)	1261
5750	133 (1.19)	1323	130 (1.59)	1230
5875	130 (1.16)	1290	127 (1.55)	1199
6000	127 (1.14)	1259	124 (1.52)	1171
6125	125 (1.11)	1230	122 (1.49)	1144
6250	123 (1.09)	1203	120 (1.46)	1119
6375	120 (1.07)	1179	118 (1.43)	1096
6500	119 (1.06)	1158	116 (1.41)	1077
6625	117 (1.04)	1140	114 (1.39)	1060
6750	116 (1.03)	1127	113 (1.37)	1048
6875	115 (1.02)	1118	113 (1.36)	1040
7000 Or More	115 (1.02)	1115	112 (1.36)	1037

U.S. EPA ASM EMISSION STANDARDS - 1991-95 LIGHT DUTY TRUCKS (6001 GVWR OR MORE)

Test Weight	ASM5015		ASM2525	
	HC ppm (CO %)	NOx ppm	HC ppm (CO %)	NOx ppm
1750	324 (2.78)	3631	315 (3.64)	3532
1875	306 (2.63)	3586	297 (3.43)	3323
2000	289 (2.48)	3383	281 (3.24)	3131
2125	274 (2.35)	3192	267 (3.06)	2955
2250	260 (2.23)	3018	253 (2.90)	2794
2375	247 (2.12)	2859	241 (2.76)	2646
2500	236 (2.02)	2714	230 (2.62)	2512
2625	225 (1.92)	2581	219 (2.50)	2389
2750	216 (1.84)	2460	210 (2.39)	2277
2875	207 (1.76)	2350	210 (2.29)	2175
3000	199 (1.69)	2249	194 (2.19)	2082
3125	191 (1.63)	2157	186 (2.11)	1997
3250	185 (1.57)	2073	180 (2.03)	1920
3375	179 (1.52)	1997	174 (1.96)	1849
3500	173 (1.47)	1926	169 (1.89)	1784
3625	168 (1.42)	1862	164 (1.84)	1724
3750	163 (1.38)	1802	159 (1.78)	1669
3875	159 (1.34)	1747	155 (1.73)	1618
4000	155 (1.31)	1695	151 (1.68)	1570
4125	151 (1.27)	1647	147 (1.64)	1526
4250	147 (1.24)	1602	143 (1.60)	1484
4375	144 (1.21)	1559	140 (1.56)	1444
4500	141 (1.18)	1518	137 (1.52)	1406
4625	137 (1.15)	1479	134 (1.48)	1370
4750	134 (1.13)	1441	131 (1.45)	1336
4875	132 (1.10)	1405	128 (1.42)	1302
5000	129 (1.08)	1369	126 (1.38)	1269
5125	126 (1.05)	1335	123 (1.35)	1237
5250	123 (1.03)	1031	120 (1.32)	1206

5375	121 (1.01)	1269	118 (1.29)	1176
5500	118 (0.99)	1237	115 (1.26)	1147
5625	116 (0.97)	1206	113 (1.24)	1118
5750	113 (0.94)	1176	111 (1.21)	1090
5875	111 (0.92)	1147	108 (1.18)	1064
6000	109 (0.91)	1120	106 (1.16)	1039
6125	107 (0.89)	1094	104 (1.13)	1015
6250	105 (.087)	1070	102 (1.11)	993
6375	103 (0.86)	1049	101 (1.09)	973
6500	102 (0.84)	1030	99 (1.08)	956
6625	101 (0.83)	1014	98 (1.06)	941
6750	100 (0.82)	1003	97 (1.05)	931
6875	99 (0.82)	995	97 (1.04)	924
7000	99 (0.82)	992	96 (1.04)	921
7125 Or More	98 (0.81)	992	96 (1.04)	921

U.S. EPA ASM EMISSION STANDARDS - 1994 + TIER 1 LIGHT DUTY TRUCKS (5750 LVW OR LESS)

Test Weight	ASM5015		ASM2525	
	HC ppm (CO %)	NOx ppm	HC ppm (CO %)	NOx ppm
1750	224 (1.26)	1819	216 (1.22)	1642
1875	212 (1.19)	1713	205 (1.16)	1547
2000	201 (1.13)	1616	194 (1.09)	1460
2125	191 (1.07)	1527	184 (1.04)	1380
2250	182 (1.02)	1446	175 (0.99)	1307
2375	173 (0.97)	1372	167 (0.94)	1240
2500	166 (0.93)	1304	160 (0.90)	1179
2625	159 (0.89)	1242	153 (0.86)	1123
2750	152 (0.85)	1186	147 (0.82)	1072
2875	146 (0.82)	1134	141 (0.79)	1026
3000	141 (0.79)	1088	136 (0.76)	984
3125	136 (0.76)	1045	132 (0.73)	945
3250	132 (0.73)	1006	127 (0.71)	910

3375	128 (0.71)	970	123 (0.69)	878
3500	124 (0.69)	937	120 (0.67)	848
3625	120 (0.67)	907	117 (0.65)	821
3750	117 (0.65)	879	114 (0.63)	796
3875	114 (0.63)	853	111 (0.61)	773
4000	112 (0.62)	829	108 (0.60)	751
4125	109 (0.60)	807	106 (0.58)	731
4250	107 (0.59)	786	103 (0.57)	712
4375	104 (0.58)	766	101 (0.56)	694
4500	102 (0.57)	747	99 (0.55)	677
4625	100 (0.55)	728	97 (0.54)	661
4750	98 (0.54)	711	95 (0.53)	645
4875	96 (0.53)	694	93 (0.52)	630
5000	94 (0.52)	677	92 (0.51)	615
5125	93 (0.51)	661	90 (0.50)	600
5250	91 (0.50)	646	88 (0.49)	586
5375	89 (0.49)	631	86 (0.48)	573
5500	87 (0.48)	616	85 (0.47)	559
5625	86 (0.47)	601	83 (0.46)	546
5750	84 (0.46)	587	82 (0.45)	534
5875	83 (0.45)	574	80 (0.44)	522
6000	81 (0.44)	561	79 (0.44)	510
6125	80 (0.44)	549	78 (0.43)	499
6250	79 (0.43)	538	76 (0.42)	489
6375	77 (0.42)	528	75 (0.42)	480
6500	76 (0.42)	519	74 (0.41)	473
6625	76 (0.41)	512	74 (0.41)	466
6750	75 (0.41)	507	73 (0.41)	461
6875	75 (0.40)	503	73 (0.40)	458
7000 Or More	74 (0.40)	502	72 (0.40)	457

U.S. EPA ASM EMISSION STANDARDS - 1994 + TIER 1 LIGHT DUTY TRUCKS (5751 LVW OR MORE)

Test Weight	ASM5015		ASM2525	
	HC ppm (CO %)	NOx ppm	HC ppm (CO %)	NOx ppm
1750	324 (2.78)	3178	315 (3.64)	3060
1875	306 (2.63)	3117	297 (3.43)	2879
2000	289 (2.48)	2941	281 (3.24)	2713
2125	274 (2.35)	2776	267 (3.06)	2561
2250	260 (2.23)	2625	253 (2.90)	2422
2375	247 (2.12)	2487	241 (2.76)	2295
2500	236 (2.02)	2361	230 (2.62)	2179
2625	225 (1.92)	2246	219 (2.50)	2073
2750	216 (1.84)	2142	210 (2.39)	1976
2875	207 (1.76)	2046	210 (2.29)	1888
3000	199 (1.69)	1959	194 (2.19)	1808
3125	191 (1.63)	1879	186 (2.11)	1734
3250	185 (1.57)	1806	180 (2.03)	1667
3375	179 (1.52)	1740	174 (1.96)	1606
3500	173 (1.47)	1679	169 (1.89)	1550
3625	168 (1.42)	1623	164 (1.84)	1498
3750	163 (1.38)	1571	159 (1.78)	1451
3875	159 (1.34)	1523	155 (1.73)	1407
4000	155 (1.31)	1479	151 (1.68)	1365
4125	151 (1.27)	1437	147 (1.64)	1327
4250	147 (1.24)	1398	143 (1.60)	1291
4375	144 (1.21)	1360	140 (1.56)	1257
4500	141 (1.18)	1325	137 (1.52)	1224
4625	137 (1.15)	1291	134 (1.48)	1193
4750	134 (1.13)	1259	131 (1.45)	1163
4875	132 (1.10)	1227	128 (1.42)	1134
5000	129 (1.08)	1196	126 (1.38)	1106
5125	126 (1.05)	1167	123 (1.35)	1078
5250	123 (1.03)	1138	120 (1.32)	1051
5375	121 (1.01)	1109	118 (1.29)	1025

5500	118 (0.99)	1082	115 (1.26)	1000
5625	116 (0.97)	1055	113 (1.24)	975
5750	113 (0.94)	1029	111 (1.21)	951
5875	111 (0.92)	1004	108 (1.18)	928
6000	109 (0.91)	980	106 (1.16)	906
6125	107 (0.89)	958	104 (1.13)	886
6250	105 (.087)	937	102 (1.11)	867
6375	103 (0.86)	919	101 (1.09)	850
6500	102 (0.84)	902	99 (1.08)	835
6625	101 (0.83)	889	98 (1.06)	823
6750	100 (0.82)	879	97 (1.05)	813
6875	99 (0.82)	872	97 (1.04)	807
7000	99 (0.82)	870	96 (1.04)	805
7125 Or More	98 (0.81)	870	96 (1.04)	805

U. S. EPA REVISED FINAL ASM EMISSION STANDARDS (ASM5015 & ASM2525)

NOTE: EPA has not published a revised final standards for High Altitude, Light Duty Trucks 2 (6000-8500 GVWR), or vehicles older than 1980 model year. EPA guidance as of February 2003 states that a program may choose to use combinations of the Original and the Revised Final Standards.

U.S. EPA REVISED FINAL ASM EMISSION STANDARDS

Application	ASM5015		ASM2525	
	HC ppm (CO %)	NOx ppm	HC ppm (CO %)	NOx ppm
Passenger Cars				
1980	275 (1.3)	8500	500 (2.3)	4750
1981-82	275 (1.3)	3600	500 (2.3)	3500
1983-89	275 (1.1)	3600	500 (1.6)	3500
1990 & Newer	275 (1.1)	3600	300 (1.6)	3500

Light Duty Trucks (Less Than 6000 GVWR)				
1980-83	1140 (9.7)	14,145	340 (23.28)	32,200
1984-87	537 (5.4)	14,145	160 (12.96)	32,200
1988-95	537 (5.4)	7380	160 (12.96)	16,800
1996 & Newer	275 (1.1)	6150	82 (4.40)	14,000

U.S. EPA IM240 EMISSION STANDARDS > START-UP STANDARDS

Start-up standards should be used during the first 2 years of program operation. Tier 1 standards are recommended for all 1996 and newer vehicles and may be used for 1994 and newer vehicles certified to Tier 1 standards as well.

U.S. EPA IM240 HYDROCARBONS EMISSION START-UP STANDARDS

Application	Hydrocarbons (Grams/Mile)	
Composite		Phase 2
Light Duty Vehicles		
1996 & Newer	0.80	0.50
1991-95	1.20	0.75
1983-90	2.00	1.25
1980-82	2.00	1.25
1975-79	7.50	5.00
1968-74	10.0	6.00
High Altitude Light Duty Vehicles		
1983-84	2.00	1.25
1982	2.00	1.25
Light Duty Trucks (0-6000 Lbs. GVWR)		
1996 & Newer (Less Than 3750 LVW)	0.80	0.50
1996 & Newer (More Than 3750 LVW)	1.00	0.63
1991-95	2.40	1.50
1984-90	3.20	2.00
1979-83	7.50	5.00

1975-78	8.00	5.00
1968-74	10.0	6.00
High Altitude Light Duty Trucks (0-6000 Lbs. GVWR)		
1991 & Newer	3.00	2.00
1984-90	4.00	2.50
1982-83	8.00	5.00
Light Duty Trucks (6001-8500 Lbs. GVWR)		
1996 & Newer (Less Than 5750 ALVW)	1.00	0.63
1996 & Newer (More Than 5750 ALVW)	2.40	1.50
1991-95	2.40	1.50
1984-90	3.20	2.00
1979-83	7.50	5.00
1975-78	8.00	5.00
1968-74	10.0	6.00
High Altitude Light Duty Trucks (6001-8500 Lbs. GVWR)		
1991 & Newer	3.00	2.00
1984-90	4.00	2.50
1982-83	8.00	5.00
Heavy Duty Trucks (Greater Than 8500 Lbs. GVWR)		
1998 & Newer	2.00	1.30
1987-97	3.00	1.90
1985-86	5.00	3.10
1979-84	6.00	3.80
1970-78	10.0	6.30
1969 & Earlier	20.0	12.50

U.S. EPA IM240 CARBON MONOXIDE EMISSION START-UP STANDARDS

Application	Carbon Monoxide (Grams/Mile)	
Composite		Phase 2
Light Duty Vehicles		
1996 & Newer	15.0	12.0
1991-95	20.0	16.0

1983-90	30.0	24.0
1980-82	60.0	48.0
1975-79	90.0	72.0
1968-74	150.0	120.0
High Altitude Light Duty Vehicles		
1983-84	60.0	48.0
1982	75.0	60.0
Light Duty Trucks (0-6000 Lbs. GVWR)		
1996 & Newer (Less Than 3750 LVW)	15.0	12.0
1996 & Newer (More Than 3750 LVW)	20.0	16.0
1991-95	60.0	48.0
1984-90	80.0	64.0
1979-83	100.0	80.0
1975-78	120.0	96.0
1968-74	150.0	120.0
High Altitude Light Duty Trucks (0-6000 Lbs. GVWR)		
1991 & Newer	70.0	56.0
1984-90	90.0	72.0
1982-83	130.0	104.0
Light Duty Trucks (6001-8500 Lbs. GVWR)		
1996 & Newer (Less Than 5750 ALVW)	20.0	16.0
1996 & Newer (More Than 5750 ALVW)	60.0	48.0
1991-95	60.0	48.0
1984-90	80.0	64.0
1979-83	100.0	80.0
1975-78	120.0	96.0
1968-74	150.0	120.0
High Altitude Light Duty Trucks (6001-8500 Lbs. GVWR)		
1991 & Newer	70.0	56.0
1984-90	90.0	72.0
1982-83	130.0	104.0
Heavy Duty Trucks (Greater Than 8500 Lbs. GVWR)		
1998 & Newer	30.0	24.0

1987-97	60.0	48.0
1985-86	75.0	60.0
1979-84	100.0	80.0
1974-78	150.00	120.0
1970-73	175.00	140.00
1969 & Earlier	200.0	160.0

U.S. EPA IM240 OXIDES OF NITROGEN EMISSION START-UP STANDARDS

Application	Oxides Of Nitrogen (Grams/Mile)	
Composite		Phase 2
Light Duty Vehicles		
1996 & Newer	2.0	2.0
1991-95	2.5	2.5
1981-90	3.0	3.0
1977-80	6.0	6.0
1973-76	9.0	9.0
1968-72	10.0	10.0
High Altitude Light Duty Vehicles		
1982-84	3.0	3.0
Light Duty Trucks (0-6000 Lbs. GVWR)		
1996 & Newer (Less Than 3750 LVW)	2.0	2.0
1996 & Newer (More Than 3750 LVW)	2.5	2.5
1991-95	3.0	3.0
1988-90	3.5	3.5
1979-87	7.0	7.0
1973-78	9.0	9.0
1968-72	10.0	10.0
High Altitude Light Duty Trucks (0-6000 Lbs. GVWR)		
1991 & Newer	3.0	3.0
1988-90	3.5	3.5
1982-87	7.0	7.0
Light Duty Trucks (6001-8500 Lbs. GVWR)		

1996 & Newer (Less Than 5750 ALVW)	2.5	2.5
1996 & Newer (More Than 5750 ALVW)	4.0	4.0
1991-95	4.5	4.5
1988-90	5.0	5.0
1979-87	7.0	7.0
1973-78	9.0	9.0
1968-72	10.0	10.0
High Altitude Light Duty Trucks (6001-8500 Lbs. GVWR)		
1991 & Newer	4.5	4.5
1988-90	5.0	5.0
1982-87	7.0	7.0
Heavy Duty Trucks (Greater Than 8500 Lbs. GVWR)		
1998 & Newer	4.0	4.0
1991-97	6.0	6.0
1979-90	8.0	8.0
1970-78	10.0	10.0
1969 & Earlier	15.0	15.0

U.S. EPA IM240 EMISSION STANDARDS > FINAL STANDARDS

Final standards are recommended for vehicles tested in calendar years 1997 and later. Tier 1 standards are recommended for all 1996 and newer vehicles and may be used for 1994 and newer vehicles.

U.S. EPA IM240 HYDROCARBONS EMISSION FINAL STANDARDS

Application	Hydrocarbons (Grams/Mile)	
	Composite	Phase 2
Light Duty Vehicles		
1996 & Newer	0.60	0.40
1980-95	0.80	0.50
1975-79	3.00	2.00
1968-74	7.00	4.50
High Altitude Light Duty Vehicles		
1982-84	1.20	0.75

Light Duty Trucks (0-6000 Lbs. GVWR)		
1996 & Newer (Less Than 3750 LVW)	0.60	0.40
1996 & Newer (More Than 3750 LVW)	0.80	0.50
1984-95	1.60	1.00
1979-83	3.40	2.00
1975-78	4.00	2.50
1968-74	7.00	4.50
High Altitude Light Duty Trucks (0-6000 Lbs. GVWR)		
1988 & Newer	2.00	1.25
1984-87	2.00	1.25
1982-83	4.00	2.50
Light Duty Trucks (6001-8500 Lbs. GVWR)		
1996 & Newer (Less Than 5750 ALVW)	0.80	0.50
1996 & Newer (More Than 5750 ALVW)	0.80	0.50
1984-95	1.60	1.00
1979-83	3.40	2.00
1975-78	4.00	2.50
1968-74	7.00	4.50
High Altitude Light Duty Trucks (6001-8500 Lbs. GVWR)		
1988 & Newer	2.00	1.25
1984-87	2.00	1.25
1982-83	4.00	2.50
Heavy Duty Trucks (Greater Than 8500 Lbs. GVWR)		
1998 & Newer	2.00	1.30
1987-97	2.00	1.30
1985-86	3.00	1.90
1979-84	5.00	3.10
1970-78	10.0	6.30
1969 & Earlier	20.0	12.50

U.S. EPA IM240 CARBON MONOXIDE EMISSION FINAL STANDARDS

Application	Carbon Monoxide (Grams/Mile)

Composite		Phase 2
Light Duty Vehicles		
1996 & Newer	10.0	8.0
1983-95	15.0	12.0
1980-82	30.0	24.0
1975-79	65.0	52.0
1968-74	120.0	96.0
High Altitude Light Duty Vehicles		
1983-84	30.0	24.0
1982	45.0	36.0
Light Duty Trucks (0-6000 Lbs. GVWR)		
1996 & Newer (Less Than 3750 LVW)	10.0	8.0
1996 & Newer (More Than 3750 LVW)	13.0	10.0
1984-95	40.0	32.0
1979-83	70.0	56.0
1975-78	80.0	64.0
1968-74	120.0	96.0
High Altitude Light Duty Trucks (0-6000 Lbs. GVWR)		
1988 & Newer	60.0	48.0
1984-87	60.0	48.0
1982-83	90.0	72.0
Light Duty Trucks (6001-8500 Lbs. GVWR)		
1996 & Newer (Less Than 5750 ALVW)	13.0	10.0
1996 & Newer (More Than 5750 ALVW)	15.0	12.0
1984-95	40.0	32.0
1979-83	70.0	56.0
1975-78	80.0	64.0
1968-74	120.0	96.0
High Altitude Light Duty Trucks (6001-8500 Lbs. GVWR)		
1984 & Newer	60.0	48.0
1982-83	90.0	72.0
Heavy Duty Trucks (Greater Than 8500 Lbs. GVWR)		

1998 & Newer	30.0	24.0
1987-97	40.0	32.0
1985-86	50.0	40.0
1979-84	75.0	60.0
1974-78	150.0	120.0
1970-73	175.0	140.0
1969 & Earlier	200.0	160.0

U.S. EPA IM240 OXIDES OF NITROGEN EMISSION FINAL STANDARDS

Application	Oxides Of Nitrogen (Grams/Mile)	
Composite		Phase 2
Light Duty Vehicles		
1996 & Newer	1.5	1.5
1981-95	2.0	2.0
1977-80	4.0	4.0
1973-76	6.0	6.0
1968-72	7.0	7.0
High Altitude Light Duty Vehicles		
1982-84	2.0	2.0
Light Duty Trucks (0-6000 Lbs. GVWR)		
1996 & Newer (Less Than 3750 LVW)	1.5	1.5
1996 & Newer (More Than 3750 LVW)	1.8	1.8
1988-95	2.5	2.5
1979-87	4.5	4.5
1973-78	6.0	6.0
1968-72	7.0	7.0
High Altitude Light Duty Trucks (0-6000 Lbs. GVWR)		
1988 & Newer	2.5	2.5
1982-87	4.5	4.5
Light Duty Trucks (6001-8500 Lbs. GVWR)		
1996 & Newer (Less Than 5750 ALVW)	1.8	1.8
1996 & Newer (More Than 5750 ALVW)	2.0	2.0

1988-95	3.5	3.5
1979-87	4.5	4.5
1973-78	6.0	6.0
1968-72	7.0	7.0
High Altitude Light Duty Trucks (6001-8500 Lbs. GVWR)		
1988 & Newer	3.5	3.5
1982-87	4.5	4.5
Heavy Duty Trucks (Greater Than 8500 Lbs. GVWR)		
1998 & Newer	4.0	4.0
1991-97	5.0	5.0
1979-90	6.0	6.0
1970-78	10.0	10.0
1969 & Earlier	15.0	15.0

SPECIFICATIONS > SPECIFICATIONS > LUBRICANTS, FLUIDS, SEALERS AND ADHESIVES

	Specifications
Motorcraft ® PAG Refrigerant Compressor Oil YN-12-D	WSH-M1C231-B
Motorcraft ® R-134a Refrigerant YN-19 (US); CYN-16-R (Canada)	WSH-M17B19-A
Motorcraft ® A/C System Flushing Solvent YN-23	-
Motorcraft ® A/C Cooling Coil Coating YN-29	-

SPECIFICATIONS > SPECIFICATIONS > CAPACITIES

Motorcraft ® PAG Refrigerant Compressor Oil YN-12-D	vehicles with 2.3L EcoBoost and 3.7L Duratec 3.4 fl. oz. (100 ml)
	vehicles with 5.0L 32V Ti-VCT 4 fl. oz. (120 ml)
Motorcraft ® R-134a Refrigerant YN-19 (US); CYN-16-R (Canada)	vehicles with 2.3L EcoBoost and 3.7L Duratec 21 oz. (0.6 kg)
	vehicles with 5.0L 32V Ti-VCT 24 oz. (0.7 kg)

SPECIFICATIONS > SPECIFICATIONS > A/C COMPRESSOR CLUTCH AIR GAP

	mm
A/C compressor clutch air gap	vehicles with 2.3L EcoBoost 0.21 - 0.55
	vehicles with 3.7L Duratec and 5.0L 32V Ti-VCT 0.3 - 0.6

DESCRIPTION AND OPERATION > CLIMATE CONTROL SYSTEM - VEHICLES WITH: DUAL AUTOMATIC TEMPERATURE CONTROL (DATC) - OVERVIEW > OVERVIEW

The Dual Automatic Temperature Control (DATC) system maintains the selected vehicle interior temperature by heating and/or cooling the air depending on the HVAC control panel selection.

- The driver may override the automatic mode of operation.

- The temperature control setting is the desired cabin air temperature.
- The blower motor control override buttons vary the blower motor speed.
- The driver side and passenger side temperature settings can be individually controlled.
- During A/C operation, the system reduces the relative humidity of the air inside the vehicle.

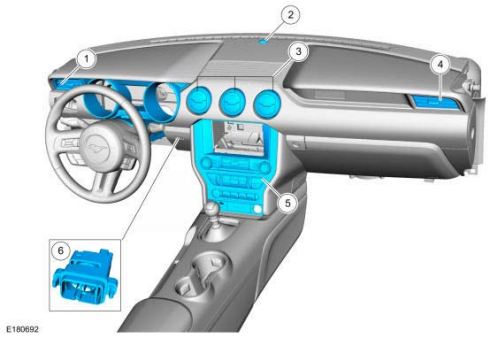
DESCRIPTION AND OPERATION > CLIMATE CONTROL SYSTEM - VEHICLES WITH: ELECTRONIC MANUAL TEMPERATURE CONTROL (EMTC) - OVERVIEW > OVERVIEW

The Electronic Manual Temperature Control (EMTC) system heats or cools the vehicle depending on the HVAC control panel selection.

- The control panel selection determines heating or cooling, air distribution and enables blower motor operation.
- The temperature control setting determines the outlet air temperature.
- The blower motor switch varies the blower motor speed.
- During A/C operation, the system reduces the relative humidity of the air inside the vehicle.

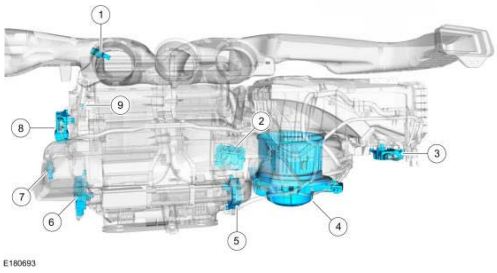
DESCRIPTION AND OPERATION > CLIMATE CONTROL SYSTEM - VEHICLES WITH: DUAL AUTOMATIC TEMPERATURE CONTROL (DATC) - COMPONENT LOCATION

NOTE: 5.0L shown all other engines similar.

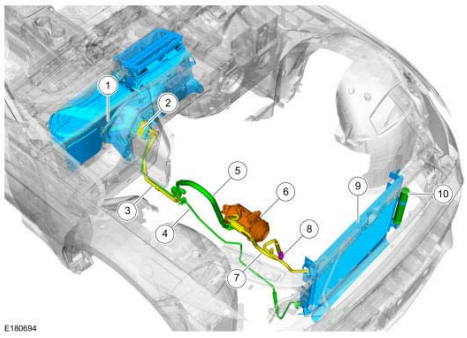


Item	Description
1	Driver Side Register
2	Sunload Sensor
3	Center Registers

4	Passenger Side Register
5	FCIM
6	In-Vehicle Temperature And Humidity Sensor



Item	Description
1	Center Register Air Discharge Temperature Sensor
2	Blower Motor Speed Control
3	Air Inlet Door Actuator
4	Blower Motor
5	Passenger Side Temperature Door Actuator
6	Driver Side Temperature Door Actuator
7	Footwell Air Discharge Sensor
8	Air Distribution Door Actuator
9	Evaporator Temperature Sensor



Item	Description
1	Climate Control Housing
2	Thermostatic Expansion Valve
3	Evaporator Outlet Line
4	Condenser Outlet Line

5	A/C Compressor Inlet Line
6	A/C Compressor
7	A/C Compressor Outlet Line
8	A/C Pressure Transducer
9	Condenser
10	Receiver Drier

DESCRIPTION AND OPERATION > CLIMATE CONTROL SYSTEM - VEHICLES WITH: DUAL AUTOMATIC TEMPERATURE CONTROL (DATC) - SYSTEM OPERATION AND COMPONENT DESCRIPTION

System Operation

DESCRIPTION AND OPERATION > CLIMATE CONTROL SYSTEM - VEHICLES WITH: DUAL AUTOMATIC TEMPERATURE CONTROL (DATC) - SYSTEM OPERATION AND COMPONENT DESCRIPTION > NETWORK MESSAGE CHART

Module Network Input Messages APIM

Broadcast Message	Originating Module	Message Purpose
Climate control button status	FCIM	This message contains the climate control button status.

Module Network Input Messages FCIM

Broadcast Message	Originating Module	Message Purpose
Ambient air temperature	PCM	This message contains raw value from the ambient air temperature sensor.
Climate control requests	APIM	This message contains both the climate control system voice commands as well as all climate control system touch screen inputs.
A/C clutch status	PCM	This message contains the status of the A/C compressor clutch.

Module Network Input Messages PCM

Broadcast Message	Originating Module	Message Purpose

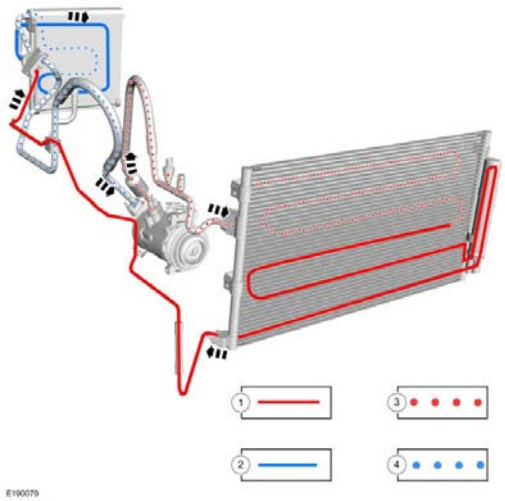
HVAC A/C request	FCIM	This message requests the A/C compressor to be engaged.
Evaporator temperature	FCIM	This message contains the evaporator temperature. The PCM uses the evaporator temperature to determine the A/C compressor output.

DESCRIPTION AND OPERATION > CLIMATE CONTROL SYSTEM - VEHICLES WITH: DUAL AUTOMATIC TEMPERATURE CONTROL (DATC) - SYSTEM OPERATION AND COMPONENT DESCRIPTION > THE REFRIGERANT CYCLE

For information regarding base refrigerant operation within the HVAC system, refer to the current Ford Web Based Technical Training courses. The diagram below shows the refrigerant system state in each component on this vehicle.

The following statements apply to this refrigerant system:

- The PCM controls the A/C clutch relay.
- The evaporator temperature sensor monitors the temperature of the air that has passed through the evaporator core and sends a signal to the PCM. If the temperature of the evaporator core discharge air is low enough to cause the condensed water vapor to freeze, the A/C clutch is disengaged by the PCM.
- The line pressure is monitored so that A/C compressor operation is interrupted if the system pressure becomes too high or too low.
- The A/C compressor relief valve opens and vents refrigerant to relieve unusually high system pressure.



Item	Description
1	High pressure liquid

2	Low pressure liquid
3	High pressure vapor
4	Low pressure vapor

DESCRIPTION AND OPERATION > CLIMATE CONTROL SYSTEM - VEHICLES WITH: DUAL AUTOMATIC TEMPERATURE CONTROL (DATC) - SYSTEM OPERATION AND COMPONENT DESCRIPTION > CONTROL SYSTEM LOGIC

The climate control system controls are in one or more locations depending on vehicle option content:

- FCIM (Dual Automatic Temperature Control (DATC) system)
- FDIM (part of APIM)

When the FDIM touchscreen or voice commands are used and A/C is selected, the APIM sends a function request message over the HS-CAN3 to the GWM. The GWM sends the message to the FCIM over the Medium Speed Controller Area Network (MS-CAN). The GWM sends the requests to the PCM over the High Speed Controller Area Network (HS-CAN)1. The PCM controls the A/C clutch relay.

When the customer directly inputs an A/C request into the FCIM, the module sends the request to the GWM over the Medium Speed Controller Area Network (MS-CAN). The GWM sends the request to the PCM over the High Speed Controller Area Network (HS-CAN)1. The PCM controls the A/C clutch relay.

The FCIM requires Programmable Module Installation (PMI) when it is replaced.

DESCRIPTION AND OPERATION > CLIMATE CONTROL SYSTEM - VEHICLES WITH: DUAL AUTOMATIC TEMPERATURE CONTROL (DATC) - SYSTEM OPERATION AND COMPONENT DESCRIPTION > A/C REQUEST

When an A/C request is received by the PCM, the PCM engages the A/C clutch relay when all of the following conditions are met:

- The PCM does not detect excessively high or low refrigerant pressure from the A/C pressure transducer.
- The PCM does not detect an ambient air temperature below approximately 32.0 °F (°C).
- The PCM does not detect temperatures from the Mass Airflow/Intake Air Temperature sensor that does not correlate with other temperature sensor readings at ignition ON. (Most Mass Airflow (MAF) sensors have an integrated Intake Air Temperature (IAT) sensor).
- The PCM does not receive a message from the FCIM detecting an evaporator temperature below approximately 33.8 °F (1 °C).

The PCM monitors multiple temperature sensors correlation (AAT, CHT, ECT IAT, MAF...). The PCM runs this logic after an engine off and a calibrated soak period, typically 6 to 8 hours. This soak period allows the Ambient Air Temperature (AAT) sensor and the other temperature sensors to stabilize and not differ by greater than a calibrated value, typically 18 °C (32.4 °F). If a sensor input is found to be reporting a

temperature imbalance the PCM does not allow the A/C clutch to engage. For more information on PCM sensors, Refer to ENGINE CONTROLS - INTRODUCTION (EXCEPT DIESEL & HYBRID) .

The PCM monitors the discharge pressure measured by the A/C pressure transducer. The PCM interrupts A/C compressor operation in the event the A/C pressure transducer indicates high system discharge pressures. It is also used to sense low charge conditions. If the pressure is below a predetermined value for a given ambient temperature, the PCM does not allow the A/C clutch to engage.

The FCIM may adjust the air inlet door depending on the humidity measured by the in-vehicle temperature and humidity sensor.

The sunload sensor supplies information to the FCIM indicating the intensity of the sun on the vehicle. The FCIM adjusts the system based on the intensity.

DESCRIPTION AND OPERATION > CLIMATE CONTROL SYSTEM - VEHICLES WITH: DUAL AUTOMATIC TEMPERATURE CONTROL (DATC) - SYSTEM OPERATION AND COMPONENT DESCRIPTION > HEATING AND VENTILATION

The heating and ventilation system:

- controls the temperature of the air inside the vehicle.
- reduces the relative humidity of the air inside the vehicle (during A/C compressor operation).
- delivers heated or cooled air to maintain the vehicle interior temperature and comfort level.

The heating and ventilation system uses a reheat method to provide conditioned air to the passenger compartment. Temperature blending is controlled by the temperature doors, which regulate the amount of air that flows through and around the heater core, where it is then mixed and distributed. All airflow from the blower motor passes through the A/C evaporator core.

Vehicles equipped with Auto Start-Stop have a cabin heater coolant pump.

DESCRIPTION AND OPERATION > CLIMATE CONTROL SYSTEM - VEHICLES WITH: DUAL AUTOMATIC TEMPERATURE CONTROL (DATC) - SYSTEM OPERATION AND COMPONENT DESCRIPTION > AIR HANDLING

There are 4 door actuators that control the air flow into the passenger compartment:

- Air distribution
- Air inlet
- Driver side temperature
- Passenger side temperature

All of the door actuators contain a reversible electric motor and a potentiometer. The potentiometer circuit consists of a 5-volt reference signal connected to one end of a variable resistor, and a signal ground connected to the other. A signal circuit is connected to a contact wiper, which is driven along the variable resistor by the actuator shaft. The signal to the FCIM from the contact wiper indicates the

position of the actuator door. The FCIM powers the actuator motors to move the doors to the desired positions. The desired door positions are calculated by the FCIM based on the set temperature, in-vehicle temperature, ambient air temperature and sunload.

When an airflow mode, desired driver or passenger temperature, fresh air, or recirculation mode is selected, the FCIM moves the actuator motor in the desired direction.

The FCIM sends a PWM signal to the blower motor speed control to regulate the blower speed as necessary. The blower motor speed control provides variable ground feed for the blower motor based on the input from the FCIM. A delay function provides a gradual increase or decrease in blower motor speed under all conditions.

DESCRIPTION AND OPERATION > CLIMATE CONTROL SYSTEM - VEHICLES WITH: DUAL AUTOMATIC TEMPERATURE CONTROL (DATC) - SYSTEM OPERATION AND COMPONENT DESCRIPTION > AUTO

When AUTO is selected:

- the HVAC system operates in a manner to achieve and maintain the temperature set by the operator.
- the driver and passenger side temperature doors are automatically controlled by the FCIM based on the temperature setting.
- the A/C compressor is automatically controlled by the PCM from information sent by the FCIM, based on the temperature setting. The A/C compressor does not operate if the outside temperature is below approximately 32.0 °F (°C).
- the blower motor speed is automatically controlled through the blower motor speed control that receives a PWM signal from the FCIM based on the temperature setting, but can be manually overridden.
- the FCIM controls the air inlet door to recirculate, partially recirculate or open to the fresh air position depending on the in-car temperature and humidity sensor inputs.

DESCRIPTION AND OPERATION > CLIMATE CONTROL SYSTEM - VEHICLES WITH: DUAL AUTOMATIC TEMPERATURE CONTROL (DATC) - SYSTEM OPERATION AND COMPONENT DESCRIPTION > OFF

When OFF is selected:

- the air inlet door closes, preventing outside air and allowing only recirculated air.
- the blower motor is off.

DESCRIPTION AND OPERATION > CLIMATE CONTROL SYSTEM - VEHICLES WITH: DUAL AUTOMATIC TEMPERATURE CONTROL (DATC) - SYSTEM OPERATION AND

COMPONENT DESCRIPTION > MAX A/C

When MAX A/C is selected:

- the air inlet door closes, preventing outside air and allowing only recirculated air.
- the recirculated air indicator is illuminated (recirculated air forced on).
- the footwell vent doors and defrost vent/register doors operate in combination to direct airflow to the instrument panel registers.
- the temperature doors move to the full cool position. Air temperature can be manually overridden.
- the A/C button is illuminated.
- the A/C compressor operates if the outside temperature is above approximately 32.0 °F (°C).
- the blower motor is commanded to the highest speed. The blower motor speed is adjustable.

DESCRIPTION AND OPERATION > CLIMATE CONTROL SYSTEM - VEHICLES WITH: DUAL AUTOMATIC TEMPERATURE CONTROL (DATC) - SYSTEM OPERATION AND COMPONENT DESCRIPTION > PANEL

When PANEL mode is selected:

- the recirculated air request button is enabled. If the recirculated air request button is selected (indicator on), the air inlet door closes, preventing outside air from entering the passenger compartment. If the recirculated air request button is not selected (indicator off), the air inlet door opens, allowing only outside air into the passenger compartment.
- the footwell vent doors and defrost vent/register doors operate in combination to direct airflow to the instrument panel registers.
- blended air temperature is available. Only when A/C compressor operation has been selected by pressing the A/C button (indicator on) can the airflow temperature be cooled below the outside air temperature.
- the blower motor is on and the speed is adjustable.

DESCRIPTION AND OPERATION > CLIMATE CONTROL SYSTEM - VEHICLES WITH: DUAL AUTOMATIC TEMPERATURE CONTROL (DATC) - SYSTEM OPERATION AND COMPONENT DESCRIPTION > PANEL/FLOOR

When PANEL/FLOOR mode is selected:

- the recirculated air request button is enabled. If the recirculated air request button is selected (indicator on), the air inlet door closes, preventing outside air from entering the passenger compartment. If the recirculated air request button is not selected (indicator off), the air inlet door opens, allowing only outside air into the passenger compartment.
- the air distribution doors operate in combination to direct airflow to the floor duct and the

instrument panel registers. A small amount of airflow from the side window demisters and defrost duct is present.

- blended air temperature is available. Only when A/C compressor operation has been selected by pressing the A/C button (indicator on) can the airflow temperature be cooled below the outside air temperature.
- the blower motor is on and the speed is adjustable.

DESCRIPTION AND OPERATION > CLIMATE CONTROL SYSTEM - VEHICLES WITH: DUAL AUTOMATIC TEMPERATURE CONTROL (DATC) - SYSTEM OPERATION AND COMPONENT DESCRIPTION > FLOOR

When FLOOR mode is selected:

- the recirculated air request button is enabled. If the recirculated air request button is selected (indicator on), the air inlet door closes, preventing outside air from entering the passenger compartment. If the recirculated air request button is not selected (indicator off), the air inlet door opens, allowing only outside air into the passenger compartment.
- the air distribution doors operate in combination to direct airflow to the floor duct. A small amount of airflow from the defroster duct and side window demisters is present.
- blended air temperature is available. Only when A/C compressor operation has been selected by pressing the A/C button (indicator on) can the airflow temperature be cooled below the outside air temperature.
- the blower motor is on and the speed is adjustable.

DESCRIPTION AND OPERATION > CLIMATE CONTROL SYSTEM - VEHICLES WITH: DUAL AUTOMATIC TEMPERATURE CONTROL (DATC) - SYSTEM OPERATION AND COMPONENT DESCRIPTION > FLOOR/DEFROST

When FLOOR/DEFROST mode is selected:

- the recirculated air request button is enabled. If the recirculated air request button is selected (indicator on), the air inlet door closes, preventing outside air from entering the passenger compartment. If the recirculated air request button is not selected (indicator off), the air inlet door opens, allowing only outside air into the passenger compartment.
- the air distribution doors operate in combination to direct airflow to the floor duct, the defroster duct and the side window demisters.
- blended air temperature is available. Only when A/C compressor operation has been selected by pressing the A/C button (indicator on) can the airflow temperature be cooled below the outside air temperature.
- the blower motor is on and the speed is adjustable.

DESCRIPTION AND OPERATION > CLIMATE CONTROL SYSTEM - VEHICLES WITH: DUAL AUTOMATIC TEMPERATURE CONTROL (DATC) - SYSTEM OPERATION AND COMPONENT DESCRIPTION > MAX DEFROST

When MAX DEFROST mode is selected:

- The recirculated air request button is disabled. The air inlet door opens, allowing only outside air into the passenger compartment.
- The air distribution doors operate in combination to direct airflow to the defroster duct and side window demisters. A small amount of airflow from the floor duct is present.
- The A/C is turned on in defrost mode. The A/C compressor operates as long as the outside temperature is above approximately 32.0 °F (°C).
- The temperature is set to the highest setting and is **not** adjustable.
- The fan is set to the highest speed and is **not** adjustable.
- MAX DEFROST can be exited by pressing the AUTO button.

DESCRIPTION AND OPERATION > CLIMATE CONTROL SYSTEM - VEHICLES WITH: DUAL AUTOMATIC TEMPERATURE CONTROL (DATC) - SYSTEM OPERATION AND COMPONENT DESCRIPTION > MYTEMP

The MyTemp feature can be used to store and recall a preset driver's temperature. This feature is provided so this temperature can be quickly adjusted to a frequently used setting with a single button press. For additional information about MyTemp, refer to the Owner's Literature.

DESCRIPTION AND OPERATION > CLIMATE CONTROL SYSTEM - VEHICLES WITH: DUAL AUTOMATIC TEMPERATURE CONTROL (DATC) - SYSTEM OPERATION AND COMPONENT DESCRIPTION > REMOTE START - MESSAGE CENTER SET TO AUTO

Remote start is an optional feature available on this vehicle. In addition to being able to start the vehicle remotely, the remote start feature also utilizes other vehicle systems to increase the level of comfort to the vehicle occupants upon entering the vehicle. Additional information on the remote start feature and the other vehicle systems, refer to Owner's Literature.

Set the climate control to operate in Auto mode through the information display setting: Remote Start > Climate Control > Heater-A/C > Auto, refer to the Owner's Literature for more information.

When the factory remote start feature is used, the Dual Automatic Temperature Control (DATC) system automatically sets certain parameters in an attempt to achieve a comfortable cabin temperature. These parameters are set based on outside air temperature. During remote start, the outside air temperature is continually evaluated and HVAC system behavior can change if the outside air changes between cold, moderate and warm temperatures.

For cold ambient air temperatures as determined by the FCIM AUTO mode to request heat:

- the airflow mode is set to AUTO if Front Defrost is set to Off in the message center. (if the FCIM requests FOOTWELL in AUTO mode, FOOTWELL/DEFROST will be used in remote start mode).
- the airflow mode is set to DEFROST if Front Defrost is set to Auto in the message center.
- the temperature is set to 22 C (71.6 F).
- the blower speed is set to AUTO.
- the air inlet mode is set to AUTO.
- A/C is set to AUTO.

For moderate and warm ambient air temperatures as determined by the FCIM AUTO mode to request heat or cooling:

- the airflow mode is set to AUTO.
- the temperature is set to 22 C (71.6 F).
- the blower speed is set to AUTO.
- the air inlet mode is set to AUTO.
- A/C is set to AUTO.

DESCRIPTION AND OPERATION > CLIMATE CONTROL SYSTEM - VEHICLES WITH: DUAL AUTOMATIC TEMPERATURE CONTROL (DATC) - SYSTEM OPERATION AND COMPONENT DESCRIPTION > REMOTE START - MESSAGE CENTER SET TO LAST USER SETTINGS

Remote start is an optional feature available on this vehicle. In addition to being able to start the vehicle remotely, the remote start feature also utilizes other vehicle systems to increase the level of comfort to the vehicle occupants upon entering the vehicle. Additional information on the remote start feature and the other vehicle systems, refer to Owner's Literature.

Set the climate control to operate using the last climate control settings through the information display setting: Remote Start > Climate Control > Heater-A/C > Last Settings, refer to the Owner's Literature for more information.

When the factory remote start feature is used and the IPC message center is set to last user settings, the Dual Automatic Temperature Control (DATC) system automatically sets certain parameters in an attempt to achieve a comfortable cabin temperature. These parameters are set based on outside air temperature. During remote start, the outside air temperature is continually evaluated and HVAC system behavior can change if the outside air changes between cold, moderate and warm temperatures.

For cold ambient air temperatures as determined by the FCIM AUTO mode to request heat:

- the airflow mode is set to the last user setting if Front Defrost is set to Off in the message center.
- the airflow mode is set to DEFROST if Front Defrost is set to Auto in the message center.
- the temperature is set to the last user setting.

- the blower speed is set to the last user setting.
- the air inlet mode is set to the last user setting.
- A/C is set to the last user setting.

For moderate and warm ambient air temperatures as determined by the FCIM AUTO mode to request heat or cooling:

- the airflow mode is set to the last user setting.
- the temperature is set to the last user setting.
- the blower speed is set to the last user setting.
- the air inlet mode is set to the last user setting.
- A/C is set to the last user setting.

DESCRIPTION AND OPERATION > CLIMATE CONTROL SYSTEM - VEHICLES WITH: DUAL AUTOMATIC TEMPERATURE CONTROL (DATC) - SYSTEM OPERATION AND COMPONENT DESCRIPTION > COMPONENT DESCRIPTION

FCIM - Dual Automatic Temperature Control (DATC)

The Dual Automatic Temperature Control (DATC) system uses the FCIM as the HVAC control module. The FCIM also controls the outputs for rear window defrost and climate controlled seats. For vehicles equipped with touchscreen audio, the Dual Automatic Temperature Control (DATC) system uses voice commands or the touchscreen to control the system. For details on the FCIM communication, refer to Control System Logic in this article.

The FCIM utilizes a Field-Effect Transistor (FET) protective circuit strategy for its actuator outputs. Output load (current level) is monitored for excessive current (typically short circuits) and is shut down (turns off the voltage or ground provided by the module) when a fault event is detected. A short circuit DTC is stored at the fault event and a cumulative counter is started.

When the demand for the output is no longer present, the module resets the Field-Effect Transistor (FET) circuit protection to allow the circuit to function. The next time the driver requests a circuit to activate that has been shut down by a previous short (Field-Effect Transistor (FET) protection) and the circuit is still shorted, the Field-Effect Transistor (FET) protection shuts off the circuit again and the cumulative counter advances.

When the excessive circuit load occurs often enough, the module shuts down the output until a repair procedure is carried out. The Field-Effect Transistor (FET) protected circuit has 3 predefined levels of short circuit tolerance based on the harmful effect of each circuit fault on the Field-Effect Transistor (FET) and the ability of the Field-Effect Transistor (FET) to withstand it. A module lifetime level of fault events is established based upon the durability of the Field-Effect Transistor (FET). If the total tolerance level is determined to be 600 fault events, the 3 predefined levels would be 200, 400 and 600 fault events.

When each tolerance level is reached, the short circuit DTC that was stored on the first failure cannot be cleared by a command to clear the Diagnostic Trouble Codes (DTCs). The module does not allow the DTC to be cleared or the circuit to be restored to normal operation until a successful self-test proves

that the fault has been repaired. After the self-test has successfully completed (no on-demand Diagnostic Trouble Codes (DTCs) present), DTC U1000:00 and the associated DTC (the DTC related to the shorted circuit) automatically clears and the circuit function returns.

When each level is reached, the DTC associated with the short circuit sets along with DTC U1000:00. These Diagnostic Trouble Codes (DTCs) can be cleared using the diagnostic scan tool. The module never resets the fault event counter to zero and continues to advance the fault event counter as short circuit fault events occur.

If the number of short circuit fault events reach the third level, then Diagnostic Trouble Codes (DTCs) U1000:00 and U3000:49 set along with the associated short circuit DTC. DTC U3000:49 cannot be cleared and a new module must be installed after the repair.

The FCIM requires Programmable Module Installation (PMI) when it is replaced.

Ambient Air Temperature (AAT) Sensor

The Ambient Air Temperature (AAT) sensor contains a thermistor. The sensor varies its resistance with the temperature. As the temperature rises, the resistance falls. As the temperature falls, the resistance rises. The Ambient Air Temperature (AAT) sensor is hardwired to the PCM through separate input and return circuits. If the outside air temperature is below approximately 0 °C (32 °F), the PCM does not allow the A/C compressor clutch to engage.

The PCM sends raw ambient air temperature data to the HVAC module. The HVAC module filters the raw data, sends it to the APIM and the touchscreen displays the outside temperature.

After replacing an Ambient Air Temperature (AAT) sensor, the sensor data must be reset by either driving the vehicle at speeds consistently about 20 MPH for at least 5 minutes to update the filtered data or perform the multiple button press reset procedure to update to the current raw value.

The multiple button reset for the Ambient Air Temperature (AAT) sensor is as follows:

- On the HVAC panel controls, press the A/C and Recirc buttons simultaneously, then, release both.
- Within 2 seconds press the A/C button again.

Blower Motor

The blower motor pulls air from the air inlet and forces it into the heater core and evaporator core housing and the plenum chamber where it is mixed and distributed.

Blower Motor Speed Control

The blower motor speed control uses a PWM signal from the FCIM to determine the desired blower speed and varies the ground feed for the blower motor to control the speed.

Compressor Clutch Assembly

When battery voltage is applied to the A/C compressor clutch field coil, the clutch disc and hub assembly is drawn toward the A/C clutch pulley. The magnetic force locks the clutch disc and hub assembly and the A/C clutch pulley together as one unit, causing the compressor shaft to rotate with the engine. When battery voltage is removed from the A/C compressor clutch field coil, springs in the clutch disc and hub assembly move the clutch disc away from the A/C clutch pulley.

An A/C clutch diode is integrated into the coil for A/C clutch field coil circuit spike suppression.

Evaporator Core

The evaporator core is an aluminum plate/fin type and is located in the climate control housing. A mixture of liquid refrigerant and oil enters the evaporator through the evaporator inlet tube and continues out of the evaporator through the evaporator outlet tube as a vapor. During A/C compressor operation, airflow from the blower motor is cooled and dehumidified as it flows through the evaporator fins.

Heater Core

The heater core consists of fins and tubes arranged to extract heat from the engine coolant and transfer it to air passing through the heater core.

Climate Control Housing

The climate control housing directs airflow from the blower motor through the evaporator core and heater core. All airflow from the blower motor passes through the evaporator core. The airflow is directed through or around the heater core by the temperature doors. Airflow is then distributed to the selected outlet by the airflow mode doors.

Air Distribution Door Actuator

The air distribution door actuator contains a reversible electric motor and a potentiometer. The potentiometer allows the FCIM to monitor the position of the airflow mode door.

Air Inlet Door Actuator

The air inlet door actuator contains a reversible electric motor and a potentiometer. The potentiometer allows the FCIM to monitor the position of the air inlet door. The FCIM may adjust the air inlet door depending on the humidity measured by the in-vehicle temperature and humidity sensor. If the vehicle cabin becomes too humid, and recirculated air is not selected, the FCIM adjusts the air inlet door to allow more fresh air. When the humidity level drops, it may adjust back to partial recirculated air. Additionally, when recirculated air is not selected, the FCIM may also adjust the system based on the in-vehicle and outside ambient temperatures to reduce loading on the compressor when required.

Driver Side Temperature Door Actuator

The driver side temperature door actuator contains a reversible electric motor and potentiometer. The potentiometer allows the FCIM to monitor the position of the temperature blend door.

Passenger Side Temperature Door Actuator

The passenger side temperature door actuator contains a reversible electric motor and potentiometer. The potentiometer allows the FCIM to monitor the position of the temperature blend door.

Air Conditioning (A/C) Pressure Transducer

The PCM monitors the discharge pressure measured by the A/C pressure transducer. As the refrigerant pressure changes, the resistance of the A/C pressure transducer changes. It is not necessary to recover the refrigerant before removing the A/C pressure transducer.

In-Vehicle Temperature And Humidity Sensor

The in-vehicle temperature and humidity sensor contains a thermistor and a sensing element which separately measures the in-vehicle air temperature and the humidity, then sends those readings to the FCIM. The in-vehicle temperature and humidity sensor has an electric fan within the sensor that draws in-vehicle air across the two sensing elements. The FCIM may adjust the air inlet door based on the in-vehicle temperature and humidity sensor information to maintain the desired humidity of the passenger cabin air.

Autolamp/Sunload Sensor

The autolamp/sunload sensor supplies information to the FCIM indicating the intensity of the sun on the vehicle. The FCIM compensates high sun load with higher blower and reduced discharge temperatures.

Evaporator Temperature Sensor

The evaporator temperature sensor contains a thermistor. The sensor varies its resistance with the temperature. As the temperature rises, the resistance falls. As the temperature falls, the resistance rises. The evaporator temperature sensor is an input to the FCIM and the information is relayed to the PCM over the CAN. If the evaporator temperature is below approximately 1 °C (33.8 °F), the PCM does not allow the A/C compressor to operate.

Air Discharge Temperature Sensors

There are 2 air discharge temperature sensors in the Dual Automatic Temperature Control (DATC) system:

- Center register air discharge temperature sensor
- Footwell air discharge temperature sensor

The air discharge temperature sensors contain a thermistor and are inputs to the FCIM. The sensors vary their resistance with the temperature. As the temperature rises, the resistance falls. As the temperature falls, the resistance rises. The FCIM uses the sensor information to maintain the desired temperature of the passenger cabin air.

Externally Controlled Variable Displacement A/C Compressor (2.3L)

> *NOTE: Proper Air Conditioning (A/C) system diagnosis on a vehicle's compressor is dependent on correct refrigerant system charge and tested in ambient temperatures above 21.1 °C (70 °F).*

The externally controlled variable displacement compressor has:

- a non-serviceable shaft seal.
- a serviceable pressure relief valve installed in the rear of the compressor to protect the refrigerant system against excessively high refrigerant pressures.
- a serviceable A/C clutch and field coil.
- Uses Motorcraft ® PAG Refrigerant Compressor Oil YN-12-D. This oil contains special additives required for the A/C compressor. The oil may have some slightly dark-colored streaks while maintaining normal oil viscosity. This is normal for this A/C compressor because of break-in wear that can discolor the oil.

Variable displacement compressors have a swash plate that rotates to reciprocate pistons, which compresses refrigerant. Variable displacement compressors change the swash plate angle to change the refrigerant displacement. The externally controlled variable displacement compressor changes the swash plate angle in accordance with an electrical signal from the PCM. Externally controlled variable displacement compressor manages displacement by controlling refrigerant differential pressure before and after a throttle at the discharge side; achieving precise cooling capability control in accordance with cabin environment and driving conditions.

The PCM sends a PWM signal to the solenoid in the compressor to control the compressor displacement based upon the:

- Evaporator temperature
- Ambient air temperature
- Engine RPM
- Vehicle speed
- A/C high side pressure
- Intake air temperature

Fixed Displacement A/C Compressor (3.7L, 5.0L and 5.2L)

> *NOTE: Proper Air Conditioning (A/C) system diagnosis on a vehicle's compressor is dependent on correct refrigerant system charge and tested in ambient temperatures above 21.1 °C (70 °F).*

The fixed displacement compressor has:

- a non-serviceable shaft seal.
- a serviceable pressure relief valve installed in the rear of the compressor to protect the refrigerant system against excessively high refrigerant pressures.
- a serviceable A/C clutch and field coil.
- Uses Motorcraft ® PAG Refrigerant Compressor Oil YN-12-D. This oil contains special additives required for the A/C compressor. The oil may have some slightly dark-colored streaks while maintaining normal oil viscosity. This is normal for this A/C compressor because of break-in wear that can discolor the oil.

Fixed displacement A/C compressors are always at 100% displacement. The pistons are placed around an angled plate (swash plate) and are pushed back and forth as the plate rotates. Cooling performance is controlled by switching the compressor clutch on or off depending upon the evaporator temperature.

Condenser

The A/C condenser is an aluminum fin-and-tube design heat exchanger. It cools compressed refrigerant gas by allowing air to pass over fins and tubes to extract heat, and condenses gas to liquid refrigerant as it is cooled. The receiver drier is mounted on the left side of the condenser.

Receiver Drier

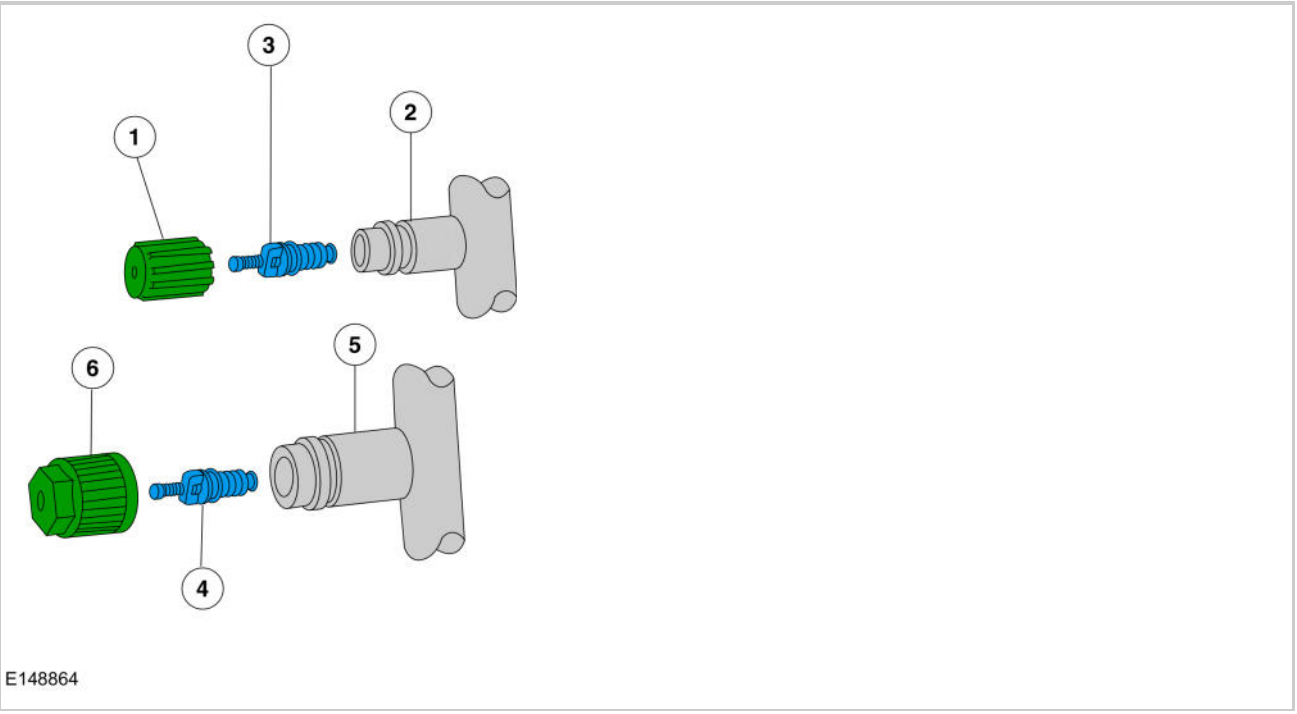
The receiver drier stores high-pressure liquid. The desiccant bag mounted inside the receiver drier removes any retained moisture from the refrigerant.

Thermostatic Expansion Valve (TXV)

The Thermostatic Expansion Valve (TXV) is located at the evaporator core inlet and outlet tubes at the center rear of the engine compartment. The TXV provides a restriction to the refrigerant flow and separates the low-pressure and high-pressure sides of the refrigerant system. Refrigerant entering and

exiting the evaporator core passes through the TXV through 2 separate flow paths. An internal temperature sensing bulb senses the temperature of the refrigerant flowing out of the evaporator core and adjusts an internal pin-type valve to meter the refrigerant flow into the evaporator core. The internal pin-type valve decreases the amount of refrigerant entering the evaporator core at lower temperatures and increases the amount of refrigerant entering the evaporator core at higher temperatures.

Service Gauge Port Valves



Item	Description	Torque
1	Low-pressure service gauge port valve cap	0.8 Nm (7 lb-in)
2	Low-pressure service gauge port valve	-
3	Low-pressure Schrader-type valve	2.26 Nm (20 lb-in)
4	High-pressure Schrader-type valve	3.4 Nm (30 lb-in)
5	High-pressure service gauge port valve	-
6	High-pressure service gauge port valve cap	0.8 Nm (7 lb-in)

The service gauge port fitting is an integral part of the refrigerant line or component.

- Prior to leak testing, blow air over the service gauge port valves to ensure an accurate test.
- Special couplings are required for both the high-side and low-side service gauge ports.
- A very small amount of leakage around the Schrader-type valve with the service gauge port valve cap removed is considered normal. Install a new Schrader-type valve core if the seal leaks excessively.

- The A/C service gauge port valve caps are used as primary seals in the refrigerant system to prevent leakage through the Schrader-type valves from reaching the atmosphere. Always install and tighten the A/C service gauge port valve caps to the correct torque after they are removed.
- Follow the procedure and the notes for electronic leak testing. Refer to: Electronic Leak Detection .

Refrigerant System Dye

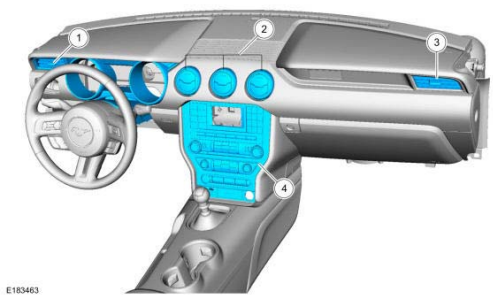
A fluorescent refrigerant system dye wafer is added to the receiver drier desiccant bag at the factory to assist in refrigerant system leak diagnosis. This fluorescent dye wafer dissolves after about 30 minutes of continuous A/C operation. It is not necessary to add additional dye to the refrigerant system before diagnosing leaks, even if a significant amount of refrigerant has been removed from the system. Refer to: Fluorescent Dye Leak Detection .

Replacement desiccant bags, either separately or part of the receiver drier assembly, are equipped with a new fluorescent dye wafer. It is not necessary to add additional dye to the refrigerant system before diagnosing leaks. If the system has been out of refrigerant through the winter the dye at the leak point may have oxidized and may not fluoresce. If this happens, recharge and operate the A/C system to circulate the oil and allow any residual dye to show up at the leak point. It is important to understand that dye adheres to the oil not the refrigerant; the refrigerant carries the oil out of the leak point.

NOTE: Check for leaks using a Rotunda-approved UV lamp and dye enhancing glasses.

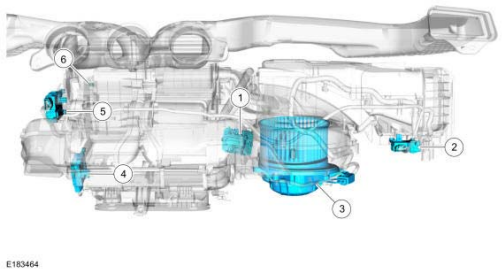
DESCRIPTION AND OPERATION > CLIMATE CONTROL SYSTEM - VEHICLES WITH: ELECTRONIC MANUAL TEMPERATURE CONTROL (EMTC) - COMPONENT LOCATION

NOTE: 5.0L shown all other engines similar.

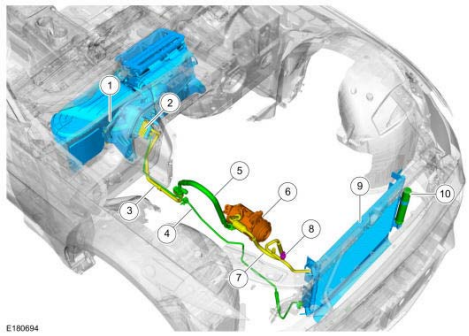


Item	Description
1	Driver Side Register
2	Center Registers

3	Passenger Side Register
4	FCIM



Item	Description
1	Blower Motor Speed Control
2	Air Inlet Door Actuator
3	Blower Motor
4	Driver Side Temperature Door Actuator
5	Air Distribution Door Actuator
6	Evaporator Temperature Sensor



Item	Description
1	Climate Control Housing
2	Thermostatic Expansion Valve
3	Evaporator Outlet Line
4	Condenser Outlet Line
5	A/C Compressor Inlet Line
6	A/C Compressor
7	A/C Compressor Outlet Line
8	A/C Pressure Transducer

9	Condenser
10	Receiver Drier

DESCRIPTION AND OPERATION > CLIMATE CONTROL SYSTEM - VEHICLES WITH: ELECTRONIC MANUAL TEMPERATURE CONTROL (EMTC) - SYSTEM OPERATION AND COMPONENT DESCRIPTION

System Operation

DESCRIPTION AND OPERATION > CLIMATE CONTROL SYSTEM - VEHICLES WITH: ELECTRONIC MANUAL TEMPERATURE CONTROL (EMTC) - SYSTEM OPERATION AND COMPONENT DESCRIPTION > NETWORK MESSAGE CHART

Module Network Input Messages PCM

Broadcast Message	Originating Module	Message Purpose
HVAC A/C request	FCIM	This message requests the A/C compressor to be engaged.
Evaporator temperature	FCIM	This message contains the evaporator temperature. The PCM uses the evaporator temperature to determine the A/C compressor output.

Module Network Input Messages FCIM

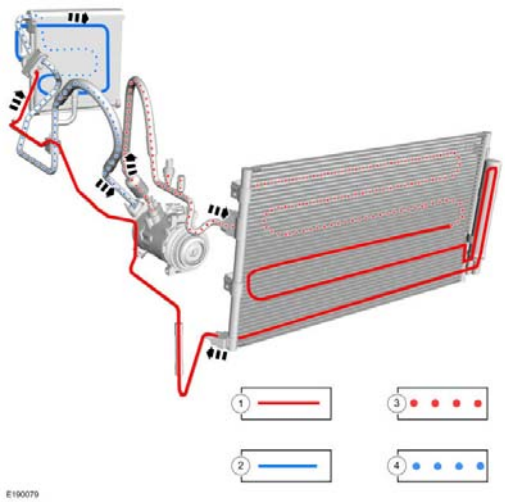
Broadcast Message	Originating Module	Message Purpose
A/C clutch status	PCM	This message contains the status of the A/C compressor clutch.
Ambient air temperature	PCM	This message contains raw value from the ambient air temperature sensor.

DESCRIPTION AND OPERATION > CLIMATE CONTROL SYSTEM - VEHICLES WITH: ELECTRONIC MANUAL TEMPERATURE CONTROL (EMTC) - SYSTEM OPERATION AND COMPONENT DESCRIPTION > THE REFRIGERANT CYCLE

For information regarding base refrigerant operation within the HVAC system, refer to the current Ford Web Based Technical Training courses. The diagram below shows the refrigerant system state in each component on this vehicle.

The following statements apply to this refrigerant system:

- The PCM controls the A/C clutch relay.
- The evaporator temperature sensor monitors the temperature of the air that has passed through the evaporator core and sends a signal to the PCM. If the temperature of the evaporator core discharge air is low enough to cause the condensed water vapor to freeze, the A/C clutch is disengaged by the PCM.
- The line pressure is monitored so that A/C compressor operation is interrupted if the system pressure becomes too high or too low.
- The A/C compressor relief valve opens and vents refrigerant to relieve unusually high system pressure.



Item	Description
1	High pressure liquid
2	Low pressure liquid
3	High pressure vapor
4	Low pressure vapor

DESCRIPTION AND OPERATION > CLIMATE CONTROL SYSTEM - VEHICLES WITH: ELECTRONIC MANUAL TEMPERATURE CONTROL (EMTC) - SYSTEM OPERATION AND COMPONENT DESCRIPTION > CONTROL SYSTEM LOGIC

When the customer directly inputs an A/C request into the FCIM, the module sends the request to the GWM over the MS-CAN. The GWM sends the request to the PCM over the HS-CAN. The PCM controls the A/C clutch relay. The GWM also sends the climate control button status to the IPC.

The FCIM requires Programmable Module Installation (PMI) when it is replaced.

DESCRIPTION AND OPERATION > CLIMATE CONTROL SYSTEM - VEHICLES WITH: ELECTRONIC MANUAL TEMPERATURE CONTROL (EMTC) - SYSTEM OPERATION AND COMPONENT DESCRIPTION > A/C REQUEST

When an A/C request is received by the PCM, the PCM engages the A/C clutch relay when all of the following conditions are met:

- The PCM does not detect excessively high or low refrigerant pressure from the A/C pressure transducer.
- The PCM does not detect an ambient air temperature below approximately 32.0 °F (°C).
- The PCM does not detect temperatures from the Mass Airflow/Intake Air Temperature sensor that does not correlate with other temperature sensor readings at ignition ON. (Most Mass Airflow (MAF) sensors have an integrated Intake Air Temperature (IAT) sensor).
- The PCM does not receive a message from the FCIM detecting an evaporator temperature below approximately 33.8 °F (1 °C).

The PCM monitors multiple temperature sensors correlation (AAT, CHT, ECT IAT, MAF...). The PCM runs this logic after an engine off and a calibrated soak period, typically 6 to 8 hours. This soak period allows the Ambient Air Temperature (AAT) sensor and the other temperature sensors to stabilize and not differ by greater than a calibrated value, typically 18 °C (32.4 °F). If a sensor input is found to be reporting a temperature imbalance the PCM does not allow the A/C clutch to engage. For more information on PCM sensors, Refer to ENGINE CONTROLS - INTRODUCTION (EXCEPT DIESEL & HYBRID) .

The PCM monitors the discharge pressure measured by the A/C pressure transducer. The PCM interrupts A/C compressor operation in the event the A/C pressure transducer indicates high system discharge pressures. It is also used to sense low charge conditions. If the pressure is below a predetermined value for a given ambient temperature, the PCM does not allow the A/C clutch to engage.

The FCIM may adjust the air inlet door depending on the humidity measured by the in-vehicle temperature and humidity sensor.

The sunload sensor supplies information to the FCIM indicating the intensity of the sun on the vehicle. The FCIM adjusts the system based on the intensity.

DESCRIPTION AND OPERATION > CLIMATE CONTROL SYSTEM - VEHICLES WITH: ELECTRONIC MANUAL TEMPERATURE CONTROL (EMTC) - SYSTEM OPERATION AND COMPONENT DESCRIPTION > HEATING AND VENTILATION

The heating and ventilation system:

- controls the temperature of the air inside the vehicle.
- reduces the relative humidity of the air inside the vehicle (during A/C compressor operation).
- delivers heated or cooled air to maintain the vehicle interior temperature and comfort level.

The heating and ventilation system uses a reheat method to provide conditioned air to the passenger compartment. Temperature blending is controlled by the temperature door, which regulates the amount of air that flows through and around the heater core, where it is then mixed and distributed. All airflow from

the blower motor passes through the A/C evaporator core.

DESCRIPTION AND OPERATION > CLIMATE CONTROL SYSTEM - VEHICLES WITH: ELECTRONIC MANUAL TEMPERATURE CONTROL (EMTC) - SYSTEM OPERATION AND COMPONENT DESCRIPTION > AIR HANDLING

There are 3 door actuators that control the air flow into the passenger compartment:

- Air distribution
- Air inlet
- Driver side temperature

All of the door actuators contain a reversible electric motor and a potentiometer. The potentiometer circuit consists of a 5-volt reference signal connected to one end of a variable resistor, and a signal ground connected to the other. A signal circuit is connected to a contact wiper, which is driven along the variable resistor by the actuator shaft. The signal to the FCIM from the contact wiper indicates the position of the actuator door. The FCIM powers the actuator motors to move the doors to the desired positions. The desired door positions are calculated by the FCIM based on the set temperature and ambient air temperature.

When an airflow mode, desired temperature, fresh air, or recirculation mode is selected, the FCIM moves the actuator motor in the desired direction.

The FCIM sends a PWM signal to the blower motor speed control to regulate the blower speed as necessary. The blower motor speed control provides variable ground feed for the blower motor based on the input from the FCIM. A delay function provides a gradual increase or decrease in blower motor speed under all conditions.

DESCRIPTION AND OPERATION > CLIMATE CONTROL SYSTEM - VEHICLES WITH: ELECTRONIC MANUAL TEMPERATURE CONTROL (EMTC) - SYSTEM OPERATION AND COMPONENT DESCRIPTION > OFF

When OFF is selected:

- the recirculated air request button is disabled.
- the air inlet door actuator closes off outside air and admits only recirculated air.
- the A/C request button is disabled.
- the blower motor is off.

DESCRIPTION AND OPERATION > CLIMATE CONTROL SYSTEM - VEHICLES WITH: ELECTRONIC MANUAL TEMPERATURE CONTROL (EMTC) - SYSTEM OPERATION AND COMPONENT DESCRIPTION > MAX A/C

When MAX A/C is selected:

- the air inlet door actuator closes off outside air and admits only recirculated air.
- the recirculated air request button is disabled and the indicator is illuminated.
- the air distribution doors operate in combination to direct airflow to the instrument panel registers.
- the temperature door moves to the full cool position. The air temperature is adjustable.
- the A/C request button is illuminated and disabled.
- the A/C compressor operates if the outside temperature is above approximately 32.0 °F (°C).
- the blower motor is commanded to the highest speed. The blower motor speed is adjustable.

DESCRIPTION AND OPERATION > CLIMATE CONTROL SYSTEM - VEHICLES WITH: ELECTRONIC MANUAL TEMPERATURE CONTROL (EMTC) - SYSTEM OPERATION AND COMPONENT DESCRIPTION > PANEL

When PANEL mode is selected:

- the recirculated air request button is enabled. If the recirculated air request button is selected (indicator on), the air inlet door closes, preventing outside air from entering the passenger compartment. If the recirculated air request button is not selected (indicator off), the air inlet door opens, allowing only outside air into the passenger compartment.
- the air distribution doors operate in combination to direct airflow to the instrument panel registers.
- blended air temperature is available. Only when A/C compressor operation has been selected by pressing the A/C button (indicator on) can the airflow temperature be cooled below the outside air temperature.
- the blower motor is on and the speed is adjustable.

DESCRIPTION AND OPERATION > CLIMATE CONTROL SYSTEM - VEHICLES WITH: ELECTRONIC MANUAL TEMPERATURE CONTROL (EMTC) - SYSTEM OPERATION AND COMPONENT DESCRIPTION > PANEL/FLOOR

When PANEL/FLOOR mode is selected:

- the recirculated air request button is enabled. If the recirculated air request button is selected (indicator on), the air inlet door closes, preventing outside air from entering the passenger compartment. If the recirculated air request button is not selected (indicator off), the air inlet door opens, allowing only outside air into the passenger compartment.
- the air distribution doors operate in combination to direct airflow to the floor duct and the instrument panel registers. A small amount of airflow from the side window demisters and defrost duct is present.
- blended air temperature is available. Only when A/C compressor operation has been selected by

pressing the A/C button (indicator on) can the airflow temperature be cooled below the outside air temperature.

- the blower motor is on and the speed is adjustable.

DESCRIPTION AND OPERATION > CLIMATE CONTROL SYSTEM - VEHICLES WITH: ELECTRONIC MANUAL TEMPERATURE CONTROL (EMTC) - SYSTEM OPERATION AND COMPONENT DESCRIPTION > FLOOR

When FLOOR mode is selected:

- the recirculated air request button is enabled. If the recirculated air request button is selected (indicator on), the air inlet door closes, preventing outside air from entering the passenger compartment. If the recirculated air request button is not selected (indicator off), the air inlet door opens, allowing only outside air into the passenger compartment.
- the air distribution doors operate in combination to direct airflow to the floor duct. A small amount of airflow from the defroster duct and side window demisters is present.
- blended air temperature is available. Only when A/C compressor operation has been selected by pressing the A/C button (indicator on) can the airflow temperature be cooled below the outside air temperature.
- the blower motor is on and the speed is adjustable.

DESCRIPTION AND OPERATION > CLIMATE CONTROL SYSTEM - VEHICLES WITH: ELECTRONIC MANUAL TEMPERATURE CONTROL (EMTC) - SYSTEM OPERATION AND COMPONENT DESCRIPTION > FLOOR/DEFROST

When FLOOR/DEFROST mode is selected:

- the recirculated air request button is enabled. If the recirculated air request button is selected (indicator on), the air inlet door closes, preventing outside air from entering the passenger compartment. If the recirculated air request button is not selected (indicator off), the air inlet door opens, allowing only outside air into the passenger compartment.
- the air distribution doors operate in combination to direct airflow to the floor duct, the defroster duct and the side window demisters.
- blended air temperature is available. Only when A/C compressor operation has been selected by pressing the A/C button (indicator on) can the airflow temperature be cooled below the outside air temperature.
- the blower motor is on and the speed is adjustable.

DEFROST

When DEFROST mode is selected:

- the recirculated air request button is disabled. The air inlet door opens, allowing only outside air

into the passenger compartment.

- the air distribution doors operate in combination to direct airflow to the defroster duct and side window demisters. A small amount of airflow from the floor duct is present.
- the A/C is turned on in defrost mode. The A/C compressor operates as long as the outside temperature is above approximately 32.0 °F (°C).
- blended air temperature is available.
- the blower motor is on and the speed is adjustable.

MAX

DESCRIPTION AND OPERATION > CLIMATE CONTROL SYSTEM - VEHICLES WITH: ELECTRONIC MANUAL TEMPERATURE CONTROL (EMTC) - SYSTEM OPERATION AND COMPONENT DESCRIPTION > DEFROST

When DEFROST mode is selected:

- the recirculated air request button is disabled. The air inlet door opens, allowing only outside air into the passenger compartment.
- the air distribution doors operate in combination to direct airflow to the defroster duct and side window demisters. A small amount of airflow from the floor duct is present.
- the A/C is turned on in defrost mode. The A/C compressor operates as long as the outside temperature is above approximately 32.0 °F (°C).
- blended air temperature is available.
- the blower motor is on and the speed is adjustable.

DESCRIPTION AND OPERATION > CLIMATE CONTROL SYSTEM - VEHICLES WITH: ELECTRONIC MANUAL TEMPERATURE CONTROL (EMTC) - SYSTEM OPERATION AND COMPONENT DESCRIPTION > MAX DEFROST

When MAX DEFROST mode is selected:

- the recirculated air request button is disabled. The air inlet door opens, allowing only outside air into the passenger compartment.
- the air distribution doors operate in combination to direct airflow to the defroster duct and side window demisters. A small amount of airflow from the floor duct is present.
- the A/C is turned on in defrost mode. The A/C compressor operates as long as the outside temperature is above approximately 32.0 °F (°C).
- the temperature is set to the highest setting and is **not** adjustable.
- the fan is set to the highest speed and is **not** adjustable.

DESCRIPTION AND OPERATION > CLIMATE CONTROL SYSTEM - VEHICLES WITH: ELECTRONIC MANUAL TEMPERATURE CONTROL (EMTC) - SYSTEM OPERATION AND COMPONENT DESCRIPTION > REMOTE START

Remote start is an optional feature available on this vehicle. In addition to being able to start the vehicle remotely, the remote start feature also utilizes other vehicle systems to increase the level of comfort to the vehicle occupants upon entering the vehicle. Additional information on the remote start feature and the other vehicle systems, refer to Owner's Literature.

When the factory remote start feature is used, the EMTC system runs at the setting it was set to when the vehicle was last turned off. You cannot adjust the climate control system during remote start operation. Turn the ignition on to return the system to its previous settings.

Set the climate control to operate using the last climate control settings through the information display setting: Remote Start > Climate Control > Heater-A/C > Last Settings, refer to the Owner's Literature for more information.

DESCRIPTION AND OPERATION > CLIMATE CONTROL SYSTEM - VEHICLES WITH: ELECTRONIC MANUAL TEMPERATURE CONTROL (EMTC) - SYSTEM OPERATION AND COMPONENT DESCRIPTION > COMPONENT DESCRIPTION

FCIM - Electronic Manual Temperature Control (EMTC)

The EMTC system uses the FCIM as the HVAC control module. The FCIM also controls the outputs for rear window defrost and climate controlled seats. For details on the FCIM communication, refer to Control System Logic in this article.

The FCIM utilizes a Field-Effect Transistor (FET) protective circuit strategy for its actuator outputs. Output load (current level) is monitored for excessive current (typically short circuits) and is shut down (turns off the voltage or ground provided by the module) when a fault event is detected. A short circuit DTC is stored at the fault event and a cumulative counter is started.

When the demand for the output is no longer present, the module resets the Field-Effect Transistor (FET) circuit protection to allow the circuit to function. The next time the driver requests a circuit to activate that has been shut down by a previous short (Field-Effect Transistor (FET) protection) and the circuit is still shorted, the Field-Effect Transistor (FET) protection shuts off the circuit again and the cumulative counter advances.

When the excessive circuit load occurs often enough, the module shuts down the output until a repair procedure is carried out. The Field-Effect Transistor (FET) protected circuit has 3 predefined levels of short circuit tolerance based on the harmful effect of each circuit fault on the Field-Effect Transistor (FET) and the ability of the Field-Effect Transistor (FET) to withstand it. A module lifetime level of fault events is established based upon the durability of the Field-Effect Transistor (FET). If the total tolerance level is determined to be 600 fault events, the 3 predefined levels would be 200, 400 and 600 fault events.

When each tolerance level is reached, the short circuit DTC that was stored on the first failure cannot be cleared by a command to clear the Diagnostic Trouble Codes (DTCs). The module does not allow the DTC to be cleared or the circuit to be restored to normal operation until a successful self-test proves

that the fault has been repaired. After the self-test has successfully completed (no on-demand Diagnostic Trouble Codes (DTCs) present), DTC U1000:00 and the associated DTC (the DTC related to the shorted circuit) automatically clears and the circuit function returns.

When each level is reached, the DTC associated with the short circuit sets along with DTC U1000:00. These Diagnostic Trouble Codes (DTCs) can be cleared using the diagnostic scan tool. The module never resets the fault event counter to zero and continues to advance the fault event counter as short circuit fault events occur.

If the number of short circuit fault events reach the third level, then Diagnostic Trouble Codes (DTCs) U1000:00 and U3000:49 set along with the associated short circuit DTC. DTC U3000:49 cannot be cleared and a new module must be installed after the repair.

The FCIM requires Programmable Module Installation (PMI) when it is replaced.

Ambient Air Temperature (AAT) Sensor

The Ambient Air Temperature (AAT) sensor contains a thermistor. The sensor varies its resistance with the temperature. As the temperature rises, the resistance falls. As the temperature falls, the resistance rises. The Ambient Air Temperature (AAT) sensor is hardwired to the PCM through separate input and return circuits. If the outside air temperature is below approximately 0 °C (32 °F), the PCM does not allow the A/C compressor clutch to engage.

The PCM sends raw ambient air temperature data to the HVAC module. The HVAC module filters the raw data, sends it to the APIM and the touchscreen displays the outside temperature.

After replacing an Ambient Air Temperature (AAT) sensor, the sensor data must be reset by either driving the vehicle at speeds consistently about 20 MPH for at least 5 minutes to update the filtered data or perform the multiple button press reset procedure to update to the current raw value.

The multiple button reset for the Ambient Air Temperature (AAT) sensor is as follows:

- On the HVAC panel controls, press the A/C and Recirc buttons simultaneously, then, release both.
- Within 2 seconds press the A/C button again.

Blower Motor

The blower motor pulls air from the air inlet and forces it into the heater core and evaporator core housing and the plenum chamber where it is mixed and distributed.

Blower Motor Speed Control

The blower motor speed control uses a PWM signal from the FCIM to determine the desired blower speed and varies the ground feed for the blower motor to control the speed.

Compressor Clutch Assembly

When battery voltage is applied to the A/C compressor clutch field coil, the clutch disc and hub assembly is drawn toward the A/C clutch pulley. The magnetic force locks the clutch disc and hub assembly and the A/C clutch pulley together as one unit, causing the compressor shaft to rotate with the engine. When battery voltage is removed from the A/C compressor clutch field coil, springs in the clutch disc and hub assembly move the clutch disc away from the A/C clutch pulley.

An A/C clutch diode is integrated into the coil for A/C clutch field coil circuit spike suppression.

Evaporator Core

The evaporator core is an aluminum plate/fin type and is located in the climate control housing. A mixture of liquid refrigerant and oil enters the evaporator through the evaporator inlet tube and continues out of the evaporator through the evaporator outlet tube as a vapor. During A/C compressor operation, airflow from the blower motor is cooled and dehumidified as it flows through the evaporator fins.

Heater Core

The heater core consists of fins and tubes arranged to extract heat from the engine coolant and transfer it to air passing through the heater core.

Climate Control Housing

The climate control housing directs airflow from the blower motor through the evaporator core and heater core. All airflow from the blower motor passes through the evaporator core. The airflow is directed through or around the heater core by the temperature door. Airflow is then distributed to the selected outlet by the airflow mode doors.

Air Distribution Door Actuator

The air distribution door actuator contains a reversible electric motor and a potentiometer. The potentiometer allows the FCIM to monitor the position of the airflow mode door.

Air Inlet Door Actuator

The air inlet door actuator contains a reversible electric motor and a potentiometer. The potentiometer allows the FCIM to monitor the position of the air inlet door. The FCIM drives the actuator motor in the direction necessary to move the door to the position set by the recirculation button and when the MAX A/C, Defrost or MAX Defrost buttons are selected.

Driver Side Temperature Door Actuator

The EMTC system has one temperature door actuator located on the driver side of the climate control housing. The driver side temperature door actuator contains a reversible electric motor and potentiometer. The potentiometer allows the FCIM to monitor the position of the temperature blend door.

Evaporator Temperature Sensor

The evaporator temperature sensor contains a thermistor. The sensor varies its resistance with the temperature. As the temperature rises, the resistance falls. As the temperature falls, the resistance rises. The evaporator temperature sensor is an input to the FCIM and the information is relayed to the PCM over the CAN. If the evaporator temperature is below approximately 1 °C (33.8 °F), the PCM does not allow the A/C compressor to operate.

Air Conditioning (A/C) Pressure Transducer

The PCM monitors the discharge pressure measured by the A/C pressure transducer. As the refrigerant pressure changes, the resistance of the A/C pressure transducer changes. It is not necessary to recover the refrigerant before removing the A/C pressure transducer.

In-Vehicle Temperature And Humidity Sensor

The in-vehicle temperature and humidity sensor contains a thermistor and a sensing element which separately measures the in-vehicle air temperature and the humidity, then sends those readings to the FCIM. The in-vehicle temperature and humidity sensor has an electric fan within the sensor that draws in-vehicle air across the two sensing elements. The FCIM may adjust the air inlet door based on the in-vehicle temperature and humidity sensor information to maintain the desired humidity of the passenger

cabin air.

Externally Controlled Variable Displacement A/C Compressor (2.3L)

> *NOTE: Proper Air Conditioning (A/C) system diagnosis on a vehicle's compressor is dependent on correct refrigerant system charge and tested in ambient temperatures above 21.1 °C (70 °F).*

The externally controlled variable displacement compressor has:

- a non-serviceable shaft seal.
- a serviceable pressure relief valve installed in the rear of the compressor to protect the refrigerant system against excessively high refrigerant pressures.
- a serviceable A/C clutch and field coil.
- Uses Motorcraft ® PAG Refrigerant Compressor Oil YN-12-D. This oil contains special additives required for the A/C compressor. The oil may have some slightly dark-colored streaks while maintaining normal oil viscosity. This is normal for this A/C compressor because of break-in wear that can discolor the oil.

Variable displacement compressors have a swash plate that rotates to reciprocate pistons, which compresses refrigerant. Variable displacement compressors change the swash plate angle to change the refrigerant displacement. The externally controlled variable displacement compressor changes the swash plate angle in accordance with an electrical signal from the PCM. Externally controlled variable displacement compressor manages displacement by controlling refrigerant differential pressure before and after a throttle at the discharge side; achieving precise cooling capability control in accordance with cabin environment and driving conditions.

The PCM sends a PWM signal to the solenoid in the compressor to control the compressor displacement based upon the:

- Evaporator temperature
- Ambient air temperature
- Engine RPM
- Vehicle speed
- A/C high side pressure
- Intake air temperature

Fixed Displacement A/C Compressor (3.7L, 5.0L and 5.2L)

> *NOTE: Proper Air Conditioning (A/C) system diagnosis on a vehicle's compressor is dependent on correct refrigerant system charge and tested in ambient temperatures above 21.1 °C (70 °F).*

The fixed displacement compressor has:

- a non-serviceable shaft seal.
- a serviceable pressure relief valve installed in the rear of the compressor to protect the refrigerant system against excessively high refrigerant pressures.
- a serviceable A/C clutch and field coil.
- Uses Motorcraft ® PAG Refrigerant Compressor Oil YN-12-D. This oil contains special additives required for the A/C compressor. The oil may have some slightly dark-colored streaks while maintaining normal oil viscosity. This is normal for this A/C compressor because of break-in wear that can discolor the oil.

Fixed displacement A/C compressors are always at 100% displacement. The pistons are placed around an angled plate (swash plate) and are pushed back and forth as the plate rotates. Cooling performance is controlled by switching the compressor clutch on or off depending upon the evaporator temperature.

Condenser

The A/C condenser is an aluminum fin-and-tube design heat exchanger. It cools compressed refrigerant gas by allowing air to pass over fins and tubes to extract heat, and condenses gas to liquid refrigerant as it is cooled. The receiver drier is mounted on the left side of the condenser.

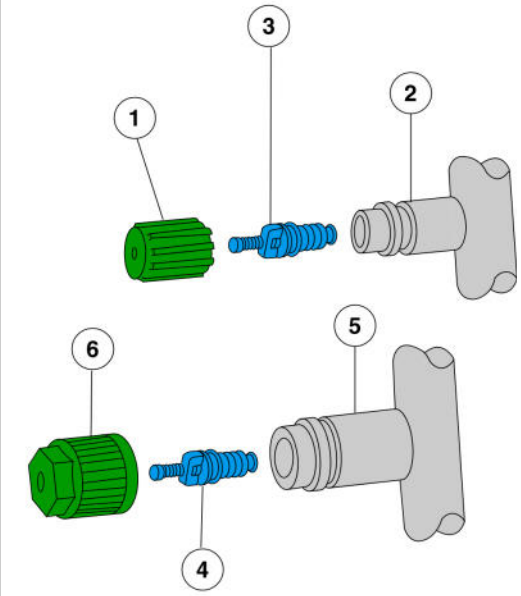
Receiver Drier

The receiver drier stores high-pressure liquid. The desiccant bag mounted inside the receiver drier removes any retained moisture from the refrigerant.

Thermostatic Expansion Valve (TXV)

The Thermostatic Expansion Valve (TXV) is located at the evaporator core inlet and outlet tubes at the center rear of the engine compartment. The TXV provides a restriction to the refrigerant flow and separates the low-pressure and high-pressure sides of the refrigerant system. Refrigerant entering and exiting the evaporator core passes through the TXV through 2 separate flow paths. An internal temperature sensing bulb senses the temperature of the refrigerant flowing out of the evaporator core and adjusts an internal pin-type valve to meter the refrigerant flow into the evaporator core. The internal pin-type valve decreases the amount of refrigerant entering the evaporator core at lower temperatures and increases the amount of refrigerant entering the evaporator core at higher temperatures.

Service Gauge Port Valves



E148864

Item	Description	Torque
1	Low-pressure service gauge port valve cap	0.8 Nm (7 lb-in)
2	Low-pressure service gauge port valve	-
3	Low-pressure Schrader-type valve	2.26 Nm (20 lb-in)
4	High-pressure Schrader-type valve	3.4 Nm (30 lb-in)
5	High-pressure service gauge port valve	-
6	High-pressure service gauge port valve cap	0.8 Nm (7 lb-in)

The service gauge port fitting is an integral part of the refrigerant line or component.

- Prior to leak testing, blow air over the service gauge port valves to ensure an accurate test.
- Special couplings are required for both the high-side and low-side service gauge ports.
- A very small amount of leakage around the Schrader-type valve with the service gauge port valve cap removed is considered normal. Install a new Schrader-type valve core if the seal leaks excessively.
- The A/C service gauge port valve caps are used as primary seals in the refrigerant system to prevent leakage through the Schrader-type valves from reaching the atmosphere. Always install and tighten the A/C service gauge port valve caps to the correct torque after they are removed.
- Follow the procedure and the notes for electronic leak testing. Refer to: Electronic Leak Detection .

Refrigerant System Dye

A fluorescent refrigerant system dye wafer is added to the receiver drier desiccant bag at the factory to assist in refrigerant system leak diagnosis. This fluorescent dye wafer dissolves after about 30 minutes of continuous A/C operation. It is not necessary to add additional dye to the refrigerant system before diagnosing leaks, even if a significant amount of refrigerant has been removed from the system. Refer to: Fluorescent Dye Leak Detection .

Replacement desiccant bags, either separately or part of the receiver drier assembly, are equipped with a new fluorescent dye wafer. It is not necessary to add additional dye to the refrigerant system before diagnosing leaks. If the system has been out of refrigerant through the winter the dye at the leak point may have oxidized and may not fluoresce. If this happens, recharge and operate the A/C system to circulate the oil and allow any residual dye to show up at the leak point. It is important to understand that dye adheres to the oil not the refrigerant; the refrigerant carries the oil out of the leak point.

NOTE: Check for leaks using a Rotunda-approved UV lamp and dye enhancing glasses.

DIAGNOSIS AND TESTING > CLIMATE CONTROL SYSTEM - VEHICLES WITH: DUAL AUTOMATIC TEMPERATURE CONTROL (DATC) > DTC CHART: FRONT CONTROLS INTERFACE MODULE (FCIM) - DUAL AUTOMATIC TEMPERATURE CONTROL (DATC)

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

Network Diagnostic Trouble Codes (DTCs) (U-codes) are often a result of intermittent concerns such as damaged wiring or low battery voltage occurrences. Additionally, vehicle repair procedures, such as module reprogramming, often set network Diagnostic Trouble Codes (DTCs). Replacing a module to resolve a network DTC is unlikely to resolve the concern. To prevent repeat network DTC concerns, inspect all network wiring, especially connectors. Test the vehicle battery. REFER to: BATTERY, MOUNTING AND CABLES .

FCIM - Dual Automatic Temperature Control (DATC) DTC CHART

DTC	Description	Action
B105A:12	Cabin Temperature Sensor Fan: Circuit Short To Battery	GO to Pinpoint Test N
B105A:14	Cabin Temperature Sensor Fan: Circuit Short To Ground or Open	GO to Pinpoint Test N
B1081:07	Left Temperature Damper Motor: Mechanical Failure	INSPECT for a binding or damaged linkage or door. REPAIR as necessary. If no condition is found, INSTALL a new driver side temperature door actuator. REFER to: Driver Side Temperature Door Actuator .

B1081:11	Left Temperature Damper Motor: Circuit Short To Ground	GO to Pinpoint Test I
B1081:12	Left Temperature Damper Motor: Circuit Short To Battery	GO to Pinpoint Test I
B1081:13	Left Temperature Damper Motor: Circuit Open	GO to Pinpoint Test I
B1082:07	Right Temperature Damper Motor: Mechanical Failure	INSPECT for a binding or damaged linkage or door. REPAIR as necessary. If no condition is found, INSTALL a new passenger side temperature door actuator. REFER to: Passenger Side Temperature Door Actuator .
B1082:11	Right Temperature Damper Motor: Circuit Short To Ground	GO to Pinpoint Test J
B1082:12	Right Temperature Damper Motor: Circuit Short To Battery	GO to Pinpoint Test J
B1082:13	Right Temperature Damper Motor: Circuit Open	GO to Pinpoint Test J
B1083:07	Recirculation Damper Motor: Mechanical Failure	INSPECT for a binding or damaged linkage or door. REPAIR as necessary. If no condition is found, INSTALL a new air inlet mode door actuator. REFER to: Air Inlet Door Actuator .
B1083:11	Recirculation Damper Motor: Circuit Short To Ground	GO to Pinpoint Test D
B1083:12	Recirculation Damper Motor: Circuit Short To Battery	GO to Pinpoint Test D
B1083:13	Recirculation Damper Motor: Circuit Open	GO to Pinpoint Test D
B1086:07	Air Distribution Damper Motor: Mechanical Failure	INSPECT for a binding or damaged linkage or door. REPAIR as necessary. If no condition is found, INSTALL a new air distribution door actuator. REFER to: Air Distribution Door Actuator .
B1086:11	Air Distribution Damper Motor: Circuit Short To Ground	GO to Pinpoint Test E
B1086:12	Air Distribution Damper Motor: Circuit Short To Battery	GO to Pinpoint Test E
B1086:13	Air Distribution Damper Motor: Circuit Open	GO to Pinpoint Test E

B10AF:11	Blower Fan Relay: Circuit Short To Ground	GO to Pinpoint Test K
B10AF:15	Blower Fan Relay: Circuit Short To Battery or Open	For an inoperative blower motor, GO to Pinpoint Test K For all other blower motor symptoms, GO to Pinpoint Test L
B10B5:11	Left Panel Air Discharge Temperature: Circuit Short To Ground	GO to Pinpoint Test M
B10B5:15	Left Panel Air Discharge Temperature: Circuit Short To Battery or Open	GO to Pinpoint Test M
B10B6:11	Left Floor Air Discharge Temperature: Circuit Short To Ground	GO to Pinpoint Test M
B10B6:15	Left Floor Air Discharge Temperature: Circuit Short To Battery or Open	GO to Pinpoint Test M
B10B8:63	Push Buttons: Circuit / Component Protection Time-Out	This DTC sets when the buttons have been held down too long. ATTEMPT to clean buttons. CLEAR the Diagnostic Trouble Codes (DTCs) and REPEAT the self-test. If the DTC returns, INSTALL a new FCIM. Refer to the appropriate article for the procedure.
B10B9:12	Blower Control: Circuit Short To Battery	GO to Pinpoint Test K
B10B9:14	Blower Control: Circuit Short To Ground or Open	For an inoperative blower motor, GO to Pinpoint Test K For all other blower motor symptoms, GO to Pinpoint Test L
B11E5:12	Left HVAC Damper Position Sensor: Circuit Short To Battery	GO to Pinpoint Test I
B11E5:14	Left HVAC Damper Position Sensor: Circuit Short To Ground or Open	GO to Pinpoint Test I
B11E6:12	Right HVAC Damper Position Sensor: Circuit Short To Battery	GO to Pinpoint Test J
B11E6:14	Right HVAC Damper Position Sensor: Circuit Short To Ground or Open	GO to Pinpoint Test J

B11E7:12	Air Distribution Damper Position Sensor: Circuit Short To Battery	GO to Pinpoint Test E
B11E7:14	Air Distribution Damper Position Sensor: Circuit Short To Ground or Open	GO to Pinpoint Test E
B11F0:12	Air Intake Damper Position Sensor: Circuit Short To Battery	GO to Pinpoint Test D
B11F0:14	Air Intake Damper Position Sensor: Circuit Short To Ground or Open	GO to Pinpoint Test D
B1A61:11	Cabin Temperature Sensor: Circuit Short To Ground	GO to Pinpoint Test N
B1A61:15	Cabin Temperature Sensor: Circuit Short To Battery or Open	GO to Pinpoint Test N
B1A63:11	Right Solar Sensor: Circuit Short To Ground	GO to Pinpoint Test O
B1A63:15	Right Solar Sensor: Circuit Short To Battery or Open	GO to Pinpoint Test O
B1A64:11	Left Solar Sensor: Circuit Short To Ground	GO to Pinpoint Test O
B1A64:15	Left Solar Sensor: Circuit Short To Battery or Open	GO to Pinpoint Test O
B1A69:12	Humidity Sensor: Circuit Short To Battery	GO to Pinpoint Test N
B1A69:14	Humidity Sensor: Circuit Short To Ground or Open	GO to Pinpoint Test N
B1B71:11	Evaporator Temperature Sensor: Circuit Short To Ground	GO to Pinpoint Test P
B1B71:15	Evaporator Temperature Sensor: Circuit Short To Battery or Open	GO to Pinpoint Test P
C1B14:11	Sensor Supply Voltage A: Circuit Short To Ground	GO to Pinpoint Test Q
C1B14:12	Sensor Supply Voltage A: Circuit Short To Battery	GO to Pinpoint Test Q
All Other FCIM Diagnostic Trouble Codes (DTCs) not listed in this chart	-	Refer to the appropriate article for the procedure.

DIAGNOSIS AND TESTING > CLIMATE CONTROL SYSTEM - VEHICLES WITH: DUAL AUTOMATIC TEMPERATURE CONTROL (DATC) > DTC CHART: POWERTRAIN

CONTROL MODULE (PCM)

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

Powertrain Control Module (PCM) DTC Chart

DTC	Description	Action
P0532	A/C Refrigerant Pressure Sensor "A" Circuit Low	GO to Pinpoint Test A
P0533	A/C Refrigerant Pressure Sensor "A" Circuit High	GO to Pinpoint Test A
P0645	A/C Clutch Relay Control Circuit	GO to Pinpoint Test B
P06A0	Variable A/C Compressor Control Circuit	GO to Pinpoint Test R
P1464	A/C Demand Out Of Self Test Range	If the HVAC selector was not powered off, POWER the HVAC off, CLEAR the Diagnostic Trouble Codes (DTCs) and REPEAT the self-test. If the DTC returns, GO to Pinpoint Test H
P193E	A/C Clutch Request Signal	GO to Pinpoint Test S
All Other PCM Diagnostic Trouble Codes (DTCs)	-	For 2.3L PCM DTC Chart, REFER to: Electronic Engine Controls . For 3.7L PCM DTC Chart, REFER to: Electronic Engine Controls . For 5.0L PCM DTC Chart, REFER to: Electronic Engine Controls .

DIAGNOSIS AND TESTING > CLIMATE CONTROL SYSTEM - VEHICLES WITH: DUAL AUTOMATIC TEMPERATURE CONTROL (DATC) > SYMPTOM CHART(S)

Symptom Chart: Climate Control - Dual Automatic Temperature Control (DATC)

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

Symptom Chart

Condition	Possible Sources	Actions
A module does not communicate with the diagnostic scan tool	Fuse(s) Wiring, terminals or connectors	REFER to: MODULE COMMUNICATIONS NETWORK .

Externally Controlled Variable Displacement Compressor (EVDC) poor performance/does not operate correctly	Refer to Pinpoint Test	GO to Pinpoint Test R
Unable To Duplicate The Customer Concern And No Diagnostic Trouble Codes (DTCs) Present	Refer to Pinpoint Test	GO to Pinpoint Test C
HVAC functions are inoperative/do not operate correctly from touchscreen only	Communication network FCIM APIM	Refer to the appropriate article for the procedure.
Reduced outlet airflow	Plugged cabin air filter	INSPECT the cabin air filter. REFER to: Cabin Air Filter . If OK, DIAGNOSE for low refrigerant charge, A/C always commanded on or blower motor not operating correctly.
	Improper refrigerant level	CARRY OUT the refrigerant system tests. REFER to: Refrigerant System Tests - 2.3L EcoBoost (201kW/273PS) . REFER to: Refrigerant System Tests - 3.7L Duratec (227kW/301PS) . REFER to: Refrigerant System Tests - 5.0L 32V Ti-VCT . If refrigerant charge is OK, GO to Pinpoint Test H
	Blower motor	GO to Pinpoint Test L
The air inlet door is inoperative	Refer to Pinpoint Test	GO to Pinpoint Test D
Incorrect or erratic direction of airflow from outlets	Refer to Pinpoint Test	GO to Pinpoint Test E
Insufficient, erratic or no heat	Refer to Pinpoint Test	GO to Pinpoint Test F
The A/C is inoperative	Refer to Pinpoint Test	GO to Pinpoint Test G
The A/C is always on - A/C mode always commanded ON	Refer to Pinpoint Test	GO to Pinpoint Test H
Temperature control is inoperative/does not operate correctly - driver side	Refer to Pinpoint Test	GO to Pinpoint Test I
Temperature control is inoperative/does not operate correctly - passenger side	Refer to Pinpoint Test	GO to Pinpoint Test J
The blower motor is inoperative	Refer to Pinpoint Test	GO to Pinpoint Test K
The blower motor does not operate correctly	Refer to Pinpoint Test	GO to Pinpoint Test L

Insufficient A/C cooling	Improper refrigerant level	CARRY OUT the refrigerant system tests. REFER to: Refrigerant System Tests - 2.3L EcoBoost (201kW/273PS) . REFER to: Refrigerant System Tests - 3.7L Duratec (227kW/301PS) . REFER to: Refrigerant System Tests - 5.0L 32V Ti-VCT . If OK, DIAGNOSE for a temperature door actuator not operating correctly.
	Temperature door actuator	For inadequate temperature out of the driver side, GO to Pinpoint Test I For inadequate temperature out of the passenger side, GO to Pinpoint Test J
A/C pressure relief valve discharging	A/C pressure relief valve	CHECK the high side system pressure. REFER to: Specifications If the pressure is below the A/C pressure relief valve open pressure, INSTALL a new A/C pressure relief valve. Refer to the appropriate article for the procedure.
	High system pressure	CHECK the high side system pressure. REFER to: Specifications . If the system pressure is above the A/C pressure relief valve open pressure, REPAIR the A/C system for a restriction.
Climate control does not operate only when remote start is used	IPC information display settings Non-Ford approved remote start system installed	VERIFY Remote Start - Message Center Set To Auto, or Remote Start - Message Center Set To Last User Settings. REFER to: Climate Control System - Vehicles With: Dual Automatic Temperature Control (DATC) - System Operation and Component Description . VERIFY module communications network operation. DIAGNOSE Diagnostic Trouble Codes (DTCs) if present.

Symptom Chart: Noise, Vibration, and Harshness (NVH)

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

Symptom Chart

Condition	Possible Sources	Actions
Noisy A/C compressor	A/C compressor pulley bearing worn	INSPECT the A/C compressor pulley bearing for roughness. If bearing roughness is found, INSTALL a new A/C compressor clutch and A/C clutch field coil. REFER to: Air Conditioning (A/C) Clutch and Air Conditioning (A/C) Clutch Field Coil .
Excessive hissing from the plenum when the A/C is on	Incorrect A/C refrigerant level	CHECK the A/C refrigerant level. REFER to: Refrigerant System Tests - 2.3L EcoBoost (201kW/273PS) . REFER to: Refrigerant System Tests - 3.7L Duratec (227kW/301PS) . REFER to: Refrigerant System Tests - 5.0L 32V Ti-VCT .

DIAGNOSIS AND TESTING > CLIMATE CONTROL SYSTEM - VEHICLES WITH: DUAL AUTOMATIC TEMPERATURE CONTROL (DATC) > PINPOINT TEST(S) > PINPOINT TEST A : P0532, P0533

Refer to Automatic Climate Control System for schematic and connector information.

Normal operation and Fault Conditions

The A/C pressure transducer receives a ground from the PCM. A 5-volt reference voltage is supplied to the A/C pressure transducer from the PCM. The A/C pressure transducer then sends a voltage to the PCM to indicate the A/C pressure.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
P0532	A/C Refrigerant Pressure Sensor "A" Circuit Low	This DTC sets if the feedback voltage is less than 0.26 volt for at least 2 seconds and the ambient air temperature is greater than 0 °C (32 °F).
P0533	A/C Refrigerant Pressure Sensor "A" Circuit High	This DTC sets if the feedback voltage is greater than 4.95 volts for at least 2 seconds and the ambient air temperature is greater than 0 °C (32 °F).

Possible Sources

- Wiring, terminals or connectors
- A/C pressure transducer

- PCM

Visual Inspection and Diagnostic Pre-checks

- Inspect for loose or corroded PCM and A/C pressure transducer connections.

DIAGNOSIS AND TESTING > CLIMATE CONTROL SYSTEM - VEHICLES WITH: DUAL AUTOMATIC TEMPERATURE CONTROL (DATC) > PINPOINT TEST(S) > PINPOINT TEST A : P0532, P0533 > PINPOINT TEST A : P0532, P0533

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may damage the connector.

A1 COMPARE THE PCM (POWERTRAIN CONTROL MODULE) PRESSURE SENSOR (ACP_PRESS) PID (PARAMETER IDENTIFICATION) WITH THE MANIFOLD GAUGE SET READINGS

Allow the A/C system to stabilize to the outside ambient temperature.

Ignition ON.

Using a diagnostic scan tool, view PCM Parameter Identifications (PIDs).

With the manifold gauge set connected, compare the pressure readings of the manifold gauge set and the PCM ACP_PRESS PID.

Are the pressure values of the manifold gauge set and the ACP_PRESS PCM PID within ± 103 kPa (15 psi)?

Yes	IGNORE the Diagnostic Trouble Codes (DTCs). REFER to the Symptom Chart .

No	GO to A2

A2 CHECK THE A/C (AIR CONDITIONING) PRESSURE SENSOR CIRCUITS FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect PCM, 2.3L C1551B , 3.7L C1381B or 5.0L and 5.2L C175B .

Disconnect A/C pressure transducer C1260 .

Disconnect Turbocharger boost pressure sensor C1588 (if equipped).

Disconnect Generator current sensor C1645 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1260-1		Ground
C1260-2		Ground
C1260-3		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to A3

A3 CHECK THE A/C (AIR CONDITIONING) PRESSURE SENSOR CIRCUITS FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1260-1	Ω	Ground
C1260-2	Ω	Ground
C1260-3	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to A4

No	REPAIR the circuit.

A4 CHECK THE A/C (AIR CONDITIONING) PRESSURE SENSOR CIRCUITS FOR AN OPEN

Measure:

2.3L

Positive Lead	Measurement / Action	Negative Lead
C1260-1	Ω	C1551B-56
C1260-2	Ω	C1551B-31
C1260-3	Ω	C1551B-52

3.7L

Positive Lead	Measurement / Action	Negative Lead
C1260-1	Ω	C1381B-18
C1260-2	Ω	C1381B-52
C1260-3	Ω	C1381B-11

5.0L or 5.2L

Positive Lead	Measurement / Action	Negative Lead
C1260-1	Ω	C175B-18
C1260-2	Ω	C175B-52
C1260-3	Ω	C175B-11

Are the resistances less than 3 ohms?

Yes	GO to A5

No	REPAIR the circuit.

A5 CHECK THE A/C (AIR CONDITIONING) PRESSURE SENSOR CIRCUITS FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1260-1	Ω	C1260-2
C1260-1	Ω	C1260-3
C1260-2	Ω	C1260-3

Are the resistances greater than 10, 000 ohms?

Yes	INSTALL a new A/C pressure transducer. REFER to: Air Conditioning (A/C) Pressure Transducer . TEST the system for normal operation. If the concern is still present, GO to A6

No	REPAIR the circuits.

A6 CHECK FOR CORRECT PCM (POWERTRAIN CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all PCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect all PCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PCM. For 2.3L, REFER to: Powertrain Control Module (PCM) . For 3.7L, REFER to: Powertrain Control Module (PCM) . For 5.0L, REFER to: Powertrain Control Module (PCM) .

No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > CLIMATE CONTROL SYSTEM - VEHICLES WITH: DUAL AUTOMATIC TEMPERATURE CONTROL (DATC) > PINPOINT TEST(S) > PINPOINT TEST B : P0645

Refer to Automatic Climate Control System for schematic and connector information.

Normal Operation and Fault Conditions

Voltage is provided to the A/C clutch relay. When A/C is requested and A/C line pressures allow, a ground is provided to the A/C clutch relay coil from the PCM, energizing the A/C clutch relay.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
P0645	A/C Clutch Relay Control Circuit	This DTC sets when the PCM grounds the relay circuit and more voltage than expected is detected on the relay circuit. This DTC also sets when the relay circuit is off and no voltage is detected on the relay circuit. The PCM expects to detect voltage coming through the relay coil to the relay circuit when it is not grounding it.

Possible Sources

- Wiring, terminals or connectors
- A/C clutch relay
- PCM

Visual Inspection and Diagnostic Pre-checks

- Inspect BJB fuses 23 (10A) and 42 (15A).

DIAGNOSIS AND TESTING > CLIMATE CONTROL SYSTEM - VEHICLES WITH: DUAL AUTOMATIC TEMPERATURE CONTROL (DATC) > PINPOINT TEST(S) > PINPOINT TEST B : P0645 > PINPOINT TEST B : P0645

NOTE: Use the correct probe adapter(s) from the Flex Probe Kit when taking measurements. Failure to use the correct probe adapter(s) may damage the connector.

B1 CHECK THE VOLTAGE TO THE A/C (AIR CONDITIONING) CLUTCH RELAY VOLTAGE SUPPLY CIRCUITS

Ignition OFF.

Disconnect A/C clutch relay.

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
A/C clutch relay socket 1	V	Ground
A/C clutch relay socket 3	V	Ground

Are the voltages greater than 11 volts?

Yes	GO to B2

No	VERIFY BJB fuses 23 (10A) and 42 (15A) are OK. If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short. If OK, REPAIR the circuit.

B2 CHECK THE A/C (AIR CONDITIONING) CLUTCH RELAY

Carry out the component test on the A/C clutch relay. Refer to Component Testing for schematic and connector information.

Did the relay pass the component test?

Yes	GO to B3

No	INSTALL a new A/C clutch relay.

B3 CHECK THE A/C (AIR CONDITIONING) CLUTCH RELAY CONTROL CIRCUIT FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect A/C clutch relay.

Disconnect PCM, 2.3L C1551B , 3.7L C1381B or 5.0L and 5.2L C175B .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
A/C clutch relay socket 2		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to B4

B4 CHECK THE A/C (AIR CONDITIONING) CLUTCH RELAY CONTROL CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
A/C clutch relay socket 2	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to B5

No	REPAIR the circuit.

B5 CHECK THE A/C (AIR CONDITIONING) CLUTCH RELAY CONTROL CIRCUIT FOR AN OPEN

Measure:

2.3L

Positive Lead	Measurement / Action	Negative Lead
A/C clutch relay socket 2	Ω	C1551B-2

3.7L

Positive Lead	Measurement / Action	Negative Lead
A/C clutch relay socket 2	Ω	C1381B-15

5.0L or 5.2L

Positive Lead	Measurement / Action	Negative Lead
A/C clutch relay socket 2	Ω	C175B-15

Is the resistance less than 3 ohms?

Yes	GO to B6

No	REPAIR the circuit.

B6 CHECK FOR CORRECT PCM (POWERTRAIN CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all PCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect all PCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PCM. For 2.3L, REFER to: Powertrain Control Module (PCM) . For 3.7L, REFER to: Powertrain Control Module (PCM) . For 5.0L, REFER to: Powertrain Control Module (PCM) .

No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > CLIMATE CONTROL SYSTEM - VEHICLES WITH: DUAL AUTOMATIC TEMPERATURE CONTROL (DATC) > PINPOINT TEST(S) > PINPOINT TEST C : UNABLE TO DUPLICATE THE CUSTOMER CONCERN AND NO DIAGNOSTIC TROUBLE CODES (DTCS) PRESENT

This diagnostic procedure tests the functions of the HVAC system and identifies the correct HVAC symptom pinpoint test.

Normal Operation and Fault Conditions

System Operation REFER to: Climate Control System - Vehicles With: Dual Automatic Temperature Control (DATC) - System Operation and Component Description .

DIAGNOSIS AND TESTING > CLIMATE CONTROL SYSTEM - VEHICLES WITH: DUAL AUTOMATIC TEMPERATURE CONTROL (DATC) > PINPOINT TEST(S) > PINPOINT TEST C : UNABLE TO DUPLICATE THE CUSTOMER CONCERN AND NO DIAGNOSTIC TROUBLE CODES (DTCS) PRESENT > PINPOINT TEST C : UNABLE TO DUPLICATE THE CUSTOMER CONCERN AND NO DIAGNOSTIC TROUBLE CODES (DTCS) PRESENT

C1 CHECK THE PCM (POWERTRAIN CONTROL MODULE) FOR DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition ON.

Using a diagnostic scan tool, perform PCM self-test.

Are any climate control related Diagnostic Trouble Codes (DTCs) present?

Yes	REFER to the PCM DTC chart .

No	GO to C2

C2 CHECK THE FCIM (FRONT CONTROLS INTERFACE MODULE) FOR DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition ON.

Using a diagnostic scan tool, perform FCIM self-test.

Are any Diagnostic Trouble Codes (DTCs) present?

Yes	REFER to the FCIM DTC chart .

No	GO to C3

C3 CHECK THE BLOWER MOTOR OPERATION

Ignition ON.

Select panel mode.

Observe blower motor operation and select each blower motor speed.

Does the blower motor operate in all ranges?

Yes	GO to C4

No	If the blower motor does not operate in any setting, GO to Pinpoint Test K If the blower motor does not correctly change speeds or shut off, GO to Pinpoint Test L

C4 CHECK AIRFLOW OPERATION

Select the highest blower motor setting.

While observing the airflow, select each of the airflow positions (panel, panel/floor, floor, floor/defrost, defrost).

Is the airflow directed to the correct outlets?

Yes	GO to C5

No	GO to Pinpoint Test E

C5 VERIFY TEMPERATURE CONTROL OPERATION

Start the vehicle and allow it to reach normal operating temperature.

With the A/C off, select panel mode.

Change the driver and passenger temperature settings from the coldest to the warmest and back to the coldest.

Does the temperature change between very warm to cool?

Yes	GO to C6

No	If the temperature does not get very warm, GO to Pinpoint Test F If the driver side temperature does not change at all, GO to Pinpoint Test I If the passenger side temperature does not change at all, GO to Pinpoint Test J

C6 VERIFY THE AIR CONDITIONING COMPRESSOR DOES NOT ENGAGE WITH A/C (AIR CONDITIONING) OFF

With the engine running and the A/C off, select panel mode.

Select the coldest temperature setting.

Is the outlet temperature close to ambient air temperature?

Yes	GO to C7

No	If the driver side temperature is warmer than ambient air temperature, GO to Pinpoint Test I If the passenger side temperature is warmer than ambient air temperature, GO to Pinpoint Test J If the outlet temperature is significantly colder than ambient air temperature and the A/C compressor clutch is engaged, GO to Pinpoint Test H

C7 VERIFY THE A/C (AIR CONDITIONING) COMPRESSOR IS OPERATIONAL IN THE A/C (AIR CONDITIONING) MODE

Make sure the ambient air temperature is above 0 °C (32 °F).

With the engine running, select panel mode.

Press the A/C button (indicator on).

Is the A/C compressor operational when the panel and A/C button (indicator on) is pressed?

Yes	GO to C8

No	GO to Pinpoint Test G

C8 CHECK THE RECIRCULATED AIR OPERATION

With the engine running, press the recirculated air button (indicator off).

Select panel mode.

Select the highest blower motor setting.

Observe airflow noise.

Press the recirculated air button (indicator on).

Does the airflow noise increase when the recirculated air mode is selected (indicator on)?

Yes	GO to C9

No	GO to Pinpoint Test D

C9 CHECK THE FCIM (FRONT CONTROLS INTERFACE MODULE) LEFT DISCHARGE FLOOR TEMPERATURE (LDFTEMP) PID (PARAMETER IDENTIFICATION)

Using a diagnostic scan tool, view the FCIM Parameter Identifications (PIDs).

Monitor the LDFTEMP PID.

Is the temperature coming out of the driver footwell vent similar to the PID?

Yes	GO to C10

No	GO to Pinpoint Test M

C10 CHECK THE FCIM (FRONT CONTROLS INTERFACE MODULE) LEFT DISCHARGE PANEL TEMPERATURE (LDPT) PID (PARAMETER IDENTIFICATION)

Using a diagnostic scan tool, view the FCIM Parameter Identifications (PIDs).

Monitor the LDPT PID.

Is the temperature coming out of the driver side register similar to the PID?

Yes	GO to C11

No	GO to Pinpoint Test M

C11 CHECK THE FCIM (FRONT CONTROLS INTERFACE MODULE) INTERIOR TEMPERATURE SENSOR (INT_TEMP) PID (PARAMETER IDENTIFICATION)

Using a diagnostic scan tool view the FCIM Parameter Identifications (PIDs).

Monitor the INT_TEMP PID.

Is the air temperature at the cabin temperature sensor similar to the PID?

Yes	GO to C12

No	GO to Pinpoint Test N

C12 CHECK THE TOUCHSCREEN CONTROLS OPERATION

Using the touchscreen controls, select each climate control function.

Using the touchscreen controls, select each audio control function.

Do all touchscreen controls operate?

Yes	The system is operating correctly.

No	Refer to the appropriate article for the procedure.

DIAGNOSIS AND TESTING > CLIMATE CONTROL SYSTEM - VEHICLES WITH: DUAL AUTOMATIC TEMPERATURE CONTROL (DATC) > PINPOINT TEST(S) > PINPOINT TEST D : THE AIR INLET DOOR IS INOPERATIVE

Refer to Automatic Climate Control System for schematic and connector information.

Normal Operation and Fault Conditions

To rotate the air inlet door actuator, the FCIM supplies voltage and ground to the air inlet door actuator through the door actuator motor circuits. To reverse the air inlet door actuator rotation, the FCIM reverses the voltage and ground circuits. The air inlet door actuator feedback resistors are supplied a ground from the FCIM by the air inlet door actuator return circuits and a 5-volt reference voltage on the air inlet door actuator reference circuits. The FCIM uses the actuator feedback resistor wiper arm position and the voltage on the air distribution door actuator feedback circuits to determine the air inlet door actuator position.

During an actuator calibration cycle, the FCIM drives the air inlet door until the door reaches both internal stops in the FCIM case. If the air inlet door is temporarily obstructed or binding during a calibration cycle, the FCIM may interpret this as the actual end of travel for the door. When this condition occurs and the FCIM commands the actuator to its end of travel, the air intake may not be from the expected source.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1083:11	Recirculation Damper Motor: Circuit Short To Ground	This DTC sets when the module senses lower than expected voltage on an actuator motor circuit when voltage is applied to drive the motor, indicating a short to ground. The motor can move only in one direction.
B1083:12	Recirculation Damper Motor: Circuit Short To Battery	This DTC sets when the module senses higher than expected voltage on the actuator motor circuit when ground is applied to drive the motor, indicating a short to voltage. The motor can move only in one direction.
B1083:13	Recirculation Damper Motor: Circuit Open	This DTC sets when the module senses no voltage on the actuator motor circuit when ground is applied to drive the motor, indicating an open circuit. The motor cannot move.
B11F0:12	Air Intake Damper Position Sensor: Circuit Short to Battery	This DTC sets when the module senses greater than 5 volts on the actuator feedback circuit,

		indicating a short to voltage.
B11F0:14	Air Intake Damper Position Sensor: Circuit Short to Ground or Open	This DTC sets when the module senses less than 1 volt on the actuator feedback circuit, indicating an open circuit or a short to ground.

Possible Sources

- Wiring, terminals or connectors
- Air inlet door actuator
- Air inlet door binding or stuck
- FCIM

DIAGNOSIS AND TESTING > CLIMATE CONTROL SYSTEM - VEHICLES WITH: DUAL AUTOMATIC TEMPERATURE CONTROL (DATC) > PINPOINT TEST(S) > PINPOINT TEST D : THE AIR INLET DOOR IS INOPERATIVE > PINPOINT TEST D : THE AIR INLET DOOR IS INOPERATIVE

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may damage the connector.

D1 CHECK THE AIR INLET DOOR ACTUATOR CIRCUITS FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect Air distribution door actuator C232 .

Disconnect In-vehicle temperature and humidity sensor C233 .

Disconnect Driver side temperature door actuator C2091 .

Disconnect Passenger side temperature door actuator C2092 .

Disconnect Air inlet door actuator C282 .

Ignition ON.

Disconnect FCIM C2402A .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C282-1		Ground

C282-2	V	Ground
C282-3	V	Ground
C282-5	V	Ground
C282-6	V	Ground

Is there any voltage present?

Yes	REPAIR the circuit.

No	GO to D2

D2 CHECK THE AIR INLET DOOR ACTUATOR CIRCUITS FOR A SHORT TO GROUND

Connect FCIM C2402A .

Ignition OFF.

Disconnect FCIM C2402A .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C282-1	Ω	Ground
C282-2	Ω	Ground
C282-3	Ω	Ground
C282-5	Ω	Ground
C282-6	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to D3

No	REPAIR the circuit.

D3 CHECK THE AIR INLET DOOR ACTUATOR CIRCUITS FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C282-1	Ω	C2402A-2
C282-2	Ω	C2402A-16

C282-3	Ω	C2402A-3
C282-5	Ω	C2402A-24
C282-6	Ω	C2402A-25

Are the resistances less than 3 ohms?

Yes	GO to D4

No	REPAIR the circuit.

D4 CHECK THE AIR INLET DOOR ACTUATOR CIRCUITS FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C282-1	Ω	C282-2
C282-1	Ω	C282-3
C282-1	Ω	C282-5
C282-1	Ω	C282-6
C282-2	Ω	C282-3
C282-2	Ω	C282-5
C282-2	Ω	C282-6
C282-3	Ω	C282-5
C282-3	Ω	C282-6
C282-5	Ω	C282-6

Are the resistances greater than 10, 000 ohms?

Yes	INSTALL a new air inlet door actuator. REFER to: Air Inlet Door Actuator . TEST the system for normal operation. If the concern is still present, GO to D5

No	REPAIR the circuit.

D5 CHECK FOR CORRECT FRONT CONTROLS INTERFACE MODULE OPERATION

Disconnect and inspect all FCIM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect all FCIM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new FCIM. Refer to the appropriate article for the procedure.

No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > CLIMATE CONTROL SYSTEM - VEHICLES WITH: DUAL AUTOMATIC TEMPERATURE CONTROL (DATC) > PINPOINT TEST(S) > PINPOINT TEST E : INCORRECT OR ERRATIC DIRECTION OF AIRFLOW FROM OUTLETS

Refer to Automatic Climate Control System for schematic and connector information.

Normal Operation and Fault Conditions

To rotate the air distribution door actuator, the FCIM supplies voltage and ground to the air distribution door actuator through the door actuator motor circuits. To reverse the air distribution door actuator rotation, the FCIM reverses the voltage and ground circuits. The air distribution door actuator feedback resistors are supplied a ground from the FCIM by the air distribution door actuator return circuits and a 5-volt reference voltage on the air distribution door actuator reference circuits. The FCIM uses the actuator feedback resistor wiper arm position and the voltage on the air distribution door actuator feedback circuits to determine the air distribution door actuator position.

During an actuator calibration cycle, the FCIM drives the air distribution door until the door reaches both internal stops in the FCIM case. If the air distribution door is temporarily obstructed or binding during a calibration cycle, the FCIM may interpret this as the actual end of travel for the door. When this condition occurs and the FCIM commands the actuator to its end of travel, the airflow may not be from the expected outlets.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1086:11	Air Distribution Damper Motor: Circuit Short to Ground	This DTC sets when the module senses lower than expected voltage on an actuator motor circuit when voltage is applied to drive the motor, indicating a short to ground. The motor can move only in one direction.

B1086:12	Air Distribution Damper Motor: Circuit Short to Battery	This DTC sets when the module senses higher than expected voltage on the actuator motor circuit when ground is applied to drive the motor, indicating a short to voltage. The motor can move only in one direction.
B1086:13	Air Distribution Damper Motor: Circuit Open	This DTC sets when the module senses no voltage on the actuator motor circuit when ground is applied to drive the motor, indicating an open circuit. The motor cannot move.
B11E7:12	Air Distribution Damper Position Sensor: Circuit Short to Battery	This DTC sets when the module senses greater than 5 volts on the actuator feedback circuit, indicating a short to voltage.
B11E7:14	Air Distribution Damper Position Sensor: Circuit Short to Ground or Open	This DTC sets when the module senses less than 1 volt on the actuator feedback circuit, indicating an open circuit or a short to ground.

Possible Sources

- Wiring, terminals or connectors
- Air distribution door actuator
- Air distribution door binding or stuck
- FCIM

DIAGNOSIS AND TESTING > CLIMATE CONTROL SYSTEM - VEHICLES WITH: DUAL AUTOMATIC TEMPERATURE CONTROL (DATC) > PINPOINT TEST(S) > PINPOINT TEST E : INCORRECT OR ERRATIC DIRECTION OF AIRFLOW FROM OUTLETS > PINPOINT TEST E : INCORRECT OR ERRATIC DIRECTION OF AIRFLOW FROM OUTLETS

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may damage the connector.

E1 CHECK THE AIR DISTRIBUTION DOOR ACTUATOR CIRCUITS FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect In-vehicle temperature and humidity sensor C233 .

Disconnect Driver side temperature door actuator C2091 .

Disconnect Passenger side temperature door actuator C2092 .

Disconnect Air inlet door actuator C282 .

Disconnect Air distribution door actuator C232 .

Ignition ON.

Disconnect FCIM C2402A .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C232-1	V	Ground
C232-2	V	Ground
C232-3	V	Ground
C232-5	V	Ground
C232-6	V	Ground

Is there any voltage present?

Yes	REPAIR the circuit.

No	GO to E2

E2 CHECK THE AIR DISTRIBUTION DOOR ACTUATOR CIRCUITS FOR A SHORT TO GROUND

Connect FCIM C2402A .

Ignition OFF.

Disconnect FCIM C2402A .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C232-1	Ω	Ground
C232-2	Ω	Ground
C232-3	Ω	Ground
C232-5	Ω	Ground
C232-6	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to E3

No	REPAIR the circuit.

E3 CHECK THE AIR DISTRIBUTION DOOR ACTUATOR CIRCUITS FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C232-1	Ω	C2402A-2
C232-2	Ω	C2402A-22
C232-3	Ω	C2402A-3
C232-5	Ω	C2402A-20
C232-6	Ω	C2402A-21

Are the resistances less than 3 ohms?

Yes	GO to E4

No	REPAIR the circuit.

E4 CHECK THE AIR DISTRIBUTION DOOR ACTUATOR CIRCUITS FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C232-1	Ω	C232-2
C232-1	Ω	C232-3
C232-1	Ω	C232-5
C232-1	Ω	C232-6
C232-2	Ω	C232-3
C232-2	Ω	C232-5
C232-2	Ω	C232-6
C232-3	Ω	C232-5
C232-3	Ω	C232-6

C232-5	Ω	C232-6

Are the resistances greater than 10, 000 ohms?

Yes	INSTALL a new air distribution door actuator, REFER to: Air Distribution Door Actuator . TEST the system for normal operation. If the concern is still present, GO to E5

No	REPAIR the circuit.

E5 CHECK FOR CORRECT FCIM (FRONT CONTROLS INTERFACE MODULE) OPERATION

Disconnect and inspect all FCIM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect all FCIM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new FCIM. Refer to the appropriate article for the procedure.

No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > CLIMATE CONTROL SYSTEM - VEHICLES WITH: DUAL AUTOMATIC TEMPERATURE CONTROL (DATC) > PINPOINT TEST(S) > PINPOINT TEST F : INSUFFICIENT, ERRATIC OR NO HEAT

Normal Operation and Fault Conditions

When the engine is at operating temperature hot coolant flows from the coolant pump through the heater core and back to the coolant pump. Correct coolant temperatures are critical for good heater performance.

Possible Sources

- Wiring, terminals or connectors

- Temperature door actuator(s)
- Air trapped in the coolant system
- Heater core

Visual Inspection and Diagnostic Pre-checks

- Inspect for low engine coolant level.

DIAGNOSIS AND TESTING > CLIMATE CONTROL SYSTEM - VEHICLES WITH: DUAL AUTOMATIC TEMPERATURE CONTROL (DATC) > PINPOINT TEST(S) > PINPOINT TEST F : INSUFFICIENT, ERRATIC OR NO HEAT > PINPOINT TEST F : INSUFFICIENT, ERRATIC OR NO HEAT

F1 CHECK FOR CORRECT ENGINE COOLANT LEVEL

Ignition OFF.

Check the engine coolant level.

Is the engine coolant at the correct level as indicated on the engine coolant recovery reservoir?

Yes	GO to F3

No	GO to F2

F2 CHECK THE ENGINE COOLING SYSTEM FOR LEAKS

Pressure test the cooling system for leaks. Refer to the appropriate article for the procedure..

Does the engine cooling system leak?

Yes	REPAIR the engine coolant leak. Refer to the appropriate article for the procedure. TEST the system for normal operation.

No	FILL and BLEED the cooling system. Refer to the appropriate article for the procedure. After filling and bleeding the cooling system, GO to F3

F3 CHECK FOR COOLANT FLOW TO THE HEATER CORE

Run the motor until it reaches normal operating temperature. Select the floor position on the control assembly. Set the temperature control to full warm and the blower to the lowest setting.

Increase engine speed to 3, 500 RPM and hold for 30 seconds.

Allow the engine to idle for 30 seconds.

Using a suitable temperature measuring device, check the heater core inlet hose to see if it is hot.

Is the heater core inlet hose hot?

Yes	GO to F4

No	BLEED the cooling system per the cooling system draining and vacuum filling general procedure. Refer to the appropriate article for the procedure. After bleeding the cooling system, GO to F4

F4 CHECK FOR A PLUGGED OR RESTRICTED HEATER CORE

Using a suitable temperature measuring device, measure the heater core outlet hose temperature.

Is the heater core outlet hose temperature similar to the inlet hose temperature (within approximately 6-17 °C [10-30 °F])?

Yes	DIAGNOSE for a temperature door actuator not operating correctly. For inadequate temperature out of the driver side, GO to Pinpoint Test I For inadequate temperature out of the passenger side, GO to Pinpoint Test J

No	INSTALL a new heater core. REFER to: Heater Core .

DIAGNOSIS AND TESTING > CLIMATE CONTROL SYSTEM - VEHICLES WITH: DUAL AUTOMATIC TEMPERATURE CONTROL (DATC) > PINPOINT TEST(S) > PINPOINT TEST G : THE A/C (AIR CONDITIONING) IS INOPERATIVE

Refer to Automatic Climate Control System for schematic and connector information.

Normal Operation and Fault Conditions

Control System Logic REFER to: Climate Control System - Vehicles With: Dual Automatic Temperature Control (DATC) - System Operation and Component Description .

Possible Sources

- Wiring, terminals or connectors
- Communication network
- Ambient Air Temperature (AAT) sensor
- A/C pressure transducer
- Evaporator temperature sensor

- Electric cooling fan
- Intake Air Temperature (IAT) or other temperature sensors
- Active grille shutters
- FCIM
- PCM

Visual Inspection and Diagnostic Pre-checks

- Inspect BJB fuses 23 (10A) and 42 (15A).

DIAGNOSIS AND TESTING > CLIMATE CONTROL SYSTEM - VEHICLES WITH: DUAL AUTOMATIC TEMPERATURE CONTROL (DATC) > PINPOINT TEST(S) > PINPOINT TEST G : THE A/C (AIR CONDITIONING) IS INOPERATIVE > PINPOINT TEST G : THE A/C (AIR CONDITIONING) IS INOPERATIVE

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may damage the connector.

G1 CHECK THE A/C (AIR CONDITIONING) SYSTEM PRESSURE

Ignition OFF.

With the R-134a manifold gauge set connected, check the A/C system pressure.

Is the A/C system pressure above 290 kPa (42 psi)?

Yes	GO to G2

No	CHECK the A/C system for leaks. REFER to: Electronic Leak Detection . REFER to: Fluorescent Dye Leak Detection . After the leak is repaired, RECHARGE the A/C system. REFER to: Air Conditioning (A/C) System Recovery, Evacuation and Charging .

G2 CHECK THE COMMUNICATION NETWORK

Ignition ON.

Using a diagnostic scan tool, carry out the network test.

Do the FCIM and the PCM pass the network test?

Yes	GO to G3

No	DIAGNOSE the FCIM or PCM does not communicate with the diagnostic scan tool.

	REFER to: MODULE COMMUNICATIONS NETWORK .

G3 CHECK THE PCM (POWERTRAIN CONTROL MODULE) A/C (AIR CONDITIONING) PRESSURE SENSOR (ACP_PRESS) PID (PARAMETER IDENTIFICATION)

Ignition ON.

Using a diagnostic scan tool, view PCM Parameter Identifications (PIDs).

With a manifold gauge set connected, compare the pressure readings of the manifold gauge set and the PCM ACP_PRESS PID.

Are the pressure values of the manifold gauge set and the ACP_PRESS PCM PID within ± 103 kPa (15 psi)?

Yes	GO to G4

No	DIAGNOSE the A/C pressure transducer. GO to Pinpoint Test A

G4 ELECTRIC COOLING FAN FUNCTIONAL CHECK

Ignition ON.

Using a diagnostic scan tool, carry out the PCM KOEO self-test.

Does the electric cooling fan operate during the KOEO self-test?

Yes	GO to G5

No	DIAGNOSE the electric cooling fan operation. REFER to ENGINE CONTROLS - SYMPTOM CHARTS (EXCEPT DIESEL & HYBRID) .

NOTE: Compare multiple engine sensor readings to the ambient temperature to determine sensors are reading correctly. A faulty sensor can cause the PCM to disable the A/C with or without a DTC.

G5 COMPARE THE PCM (POWERTRAIN CONTROL MODULE) INTAKE AIR TEMPERATURE (IAT) PID (PARAMETER IDENTIFICATION) AND THE OTHER TEMPERATURE SENSOR READINGS TO THE PCM (POWERTRAIN CONTROL MODULE) AMBIENT AIR TEMPERATURE (AAT) PID (PARAMETER IDENTIFICATION)

Allow the vehicle exterior and interior to stabilize to ambient temperature. This can take a soak period of at least 6 hours.

Using a diagnostic scan tool, view PCM Parameter Identifications (PIDs).

Monitor the CHT, ECT, IAT, MAPT, and AAT Parameter Identifications (PIDs) (as applicable).

Are the temperature values similar (typically within 18 °C (32.4 °F)?

Yes	GO to G6

No	DIAGNOSE the suspect temperature sensor. REFER to ENGINE CONTROLS - SYMPTOM CHARTS (EXCEPT DIESEL & HYBRID) .

G6 COMPARE THE EVAPORATOR TEMPERATURE SENSOR TO THE PCM (POWERTRAIN CONTROL MODULE) AMBIENT AIR TEMPERATURE (AAT) PID (PARAMETER IDENTIFICATION)

Ignition OFF.

Disconnect Evaporator temperature sensor C296 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C296-1 (component side)	Ω	C296-2 (component side)

Compare the resistance values to the table below:

Ambient Temperature °F (°C)	Resistance ohms
-39.9 °F (-40 °C)	98, 625 - 103, 275 ohms
-4.0 °F (-20 °C)	28, 640 - 29, 600 ohms
32.0 °F (°C)	9695 - 9895 ohms
68.0 °F (20 °C)	3675 - 3810 ohms
77.0 °F (25 °C)	2950 - 3050 ohms
86.0 °F (30 °C)	2370 - 2565 ohms
103.9 °F (40 °C)	1565 - 1635 ohms

Ignition ON.

Using a diagnostic scan tool, view PCM Parameter Identifications (PIDs).

Monitor the AAT PID.

Is the resistance within the specified values for the temperatures?

Yes	GO to G7

No	INSTALL a new evaporator temperature sensor. REFER to: Evaporator Temperature Sensor .

G7 VERIFY THE GRILLE SHUTTER OPERATION USING THE PCM (POWERTRAIN CONTROL MODULE) GRILL SHUTTER A POSITION - COMMANDED (GRILL_A_CMD) PID (PARAMETER IDENTIFICATION)

Start the engine and allow it to idle for at least 30 seconds to allow for the grille shutter calibration to complete.

Using a diagnostic scan tool, view PCM PID.

Using a diagnostic scan tool, select the PCM PID GRILL_A_CMD and command the grille shutter from 100% (open) to 0% (closed) while observing the grille shutter operation from the front of the vehicle.

Does the grille shutter fully open and close when commanded by the scan tool?

Yes	GO to G8

No	DIAGNOSE the active grille shutter is inoperative or does not operate correctly. REFER to: Active Grille Shutter .

G8 CHECK THE FCIM (FRONT CONTROLS INTERFACE MODULE) A/C (AIR CONDITIONING) SWITCH (CC_SW_AC) PID (PARAMETER IDENTIFICATION) WITH THE A/C (AIR CONDITIONING) ON

Using a diagnostic scan tool, view FCIM Parameter Identifications (PIDs).

Monitor the CC_SW_AC PID.

Does the PID display Active?

Yes	GO to G9

No	GO to G17

G9 CHECK THE PCM (POWERTRAIN CONTROL MODULE) A/C (AIR CONDITIONING) REQUEST SIGNAL (AC_REQ) PID (PARAMETER IDENTIFICATION) WITH THE A/C (AIR CONDITIONING) ON

Start the engine.

Using a diagnostic scan tool, monitor the PCM AC_REQ PID.

On the HVAC controls, select PANEL and then press the A/C button (indicator on).

Does the PID display Yes when the button is pressed?

Yes	GO to G11

No	GO to G10

G10 RESET THE AMBIENT AIR TEMPERATURE (AAT) SENSOR

On the HVAC controls, press the A/C (air conditioning) and Recirc buttons simultaneously, then release both. Within 2 seconds press A/C button again.

Start the engine.

On the HVAC controls, set the temperature to full cold, select PANEL and select the A/C button (indicator on).

Does the A/C compressor turn on?

Yes	RETEST the A/C system for normal operation. REFER to: Refrigerant System Tests - 2.3L EcoBoost (201kW/273PS) . REFER to: Refrigerant System Tests - 3.7L Duratec (227kW/301PS) . REFER to: Refrigerant System Tests - 5.0L 32V Ti-VCT .

No	GO to G11

G11 CHECK THE PCM (POWERTRAIN CONTROL MODULE) A/C (AIR CONDITIONING) COMPRESSOR COMMANDED STATE (ACC_CMD) PID (PARAMETER IDENTIFICATION) WITH THE A/C (AIR CONDITIONING) COMMANDED ON

Using a diagnostic scan tool, activate the PCM ACC_CMD PID.

Does the A/C compressor turn on?

Yes	GO to G18

No	GO to G12

G12 CHECK THE VOLTAGE TO THE A/C (AIR CONDITIONING) CLUTCH RELAY

Ignition OFF.

Disconnect the A/C clutch relay.

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
A/C clutch relay socket 1		Ground
A/C clutch relay socket 3		Ground

Are the voltages greater than 11 volts?

Yes	GO to G13

No	VERIFY BJB fuses 23 (10A) and 42 (15A) are OK. If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short.

G13 BYPASS THE A/C (AIR CONDITIONING) CLUTCH RELAY

Ignition OFF.

Connect a fused jumper wire:

Positive Lead	Measurement / Action	Negative Lead
A/C clutch relay socket 3		A/C clutch relay socket 5

Ignition ON.

Does the A/C compressor clutch engage?

Yes	REMOVE the fused jumper wire. INSTALL a new A/C clutch relay.

No	LEAVE the fused jumper wire installed. GO to G14

G14 CHECK THE A/C (AIR CONDITIONING) COMPRESSOR CLUTCH FIELD COIL VOLTAGE SUPPLY CIRCUIT FOR AN OPEN

Disconnect A/C compressor clutch field coil C100 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C100-1		Ground

Is the voltage greater than 11 volts?

Yes	REMOVE the fused jumper wire. GO to G15

No	REMOVE the fused jumper wire. REPAIR the circuit.

G15 CHECK THE A/C (AIR CONDITIONING) COMPRESSOR CLUTCH FIELD COIL GROUND CIRCUIT FOR AN OPEN

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C100-2		Ground

Is the resistance less than 3 ohms?

Yes	GO to G16

No	REPAIR the circuit.

G16 CHECK THE A/C (AIR CONDITIONING) COMPRESSOR CLUTCH AIR GAP

Measure the A/C compressor clutch air gap at 3 equally spaced locations between the clutch hub and the A/C compressor clutch pulley. REFER to: Air Conditioning (A/C) Clutch Air Gap Adjustment .

Is the A/C compressor clutch air gap greater than 0.6 mm (0.0236 in)?

Yes	ADJUST the A/C compressor clutch air gap. REFER to: Air Conditioning (A/C) Clutch Air Gap Adjustment .

No	INSTALL a new A/C compressor clutch and A/C clutch field coil. REFER to: Air Conditioning (A/C) Clutch and Air Conditioning (A/C) Clutch Field Coil .

G17 CHECK FOR CORRECT FCIM (FRONT CONTROLS INTERFACE MODULE) OPERATION

Disconnect and inspect all FCIM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect all FCIM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new FCIM. Refer to the appropriate article for the procedure.

No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

G18 CHECK FOR CORRECT PCM (POWERTRAIN CONTROL MODULE) OPERATION

Disconnect and inspect all PCM connectors.

Repair:

corrosion (replace connector or terminals - clean module pins)

damaged or bent pins - replace terminals/pins

pushed-out pins - replace pins as necessary

Reconnect all PCM connectors. Make sure they seat and latch correctly.

Operate the system and verify the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PCM. For 2.3L, REFER to: Powertrain Control Module (PCM) . For 3.7L, REFER to: Powertrain Control Module (PCM) . For 5.0L, REFER to: Powertrain Control Module (PCM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > CLIMATE CONTROL SYSTEM - VEHICLES WITH: DUAL AUTOMATIC TEMPERATURE CONTROL (DATC) > PINPOINT TEST(S) > PINPOINT TEST H : THE A/C (AIR CONDITIONING) IS ALWAYS ON - A/C (AIR CONDITIONING) MODE ALWAYS COMMANDED ON

Refer to Automatic Climate Control System for schematic and connector information.

Normal Operation and Fault Conditions

Control System Logic REFER to: Climate Control System - Vehicles With: Dual Automatic Temperature Control (DATC) - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
P1464	A/C Demand Out Of Self Test Range	This DTC sets when the PCM senses an A/C request during a PCM self-test.

Possible Sources

- A/C clutch relay
- Wiring, terminals or connectors
- PCM
- FCIM

DIAGNOSIS AND TESTING > CLIMATE CONTROL SYSTEM - VEHICLES WITH: DUAL AUTOMATIC TEMPERATURE CONTROL (DATC) > PINPOINT TEST(S) > PINPOINT TEST H : THE A/C (AIR CONDITIONING) IS ALWAYS ON - A/C (AIR CONDITIONING) MODE ALWAYS COMMANDED ON > PINPOINT TEST H : THE A/C (AIR CONDITIONING) IS ALWAYS ON - A/C (AIR CONDITIONING) MODE ALWAYS COMMANDED ON

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may damage the connector.

H1 CHECK THE A/C (AIR CONDITIONING) CLUTCH RELAY

Carry out the component test on the A/C clutch relay. Refer to Component Testing for schematic and connector information.

Did the relay pass the component test?

Yes	GO to H2

No	INSTALL a new A/C clutch relay.

H2 CHECK THE A/C (AIR CONDITIONING) COMPRESSOR CLUTCH FIELD COIL VOLTAGE SUPPLY CIRCUIT FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect A/C compressor clutch field coil C100 .

Disconnect the A/C clutch relay.

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C100-1		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to H3

H3 COMPARE THE EVAPORATOR TEMPERATURE SENSOR TO THE PCM (POWERTRAIN CONTROL MODULE) AMBIENT AIR TEMPERATURE (AAT) PID (PARAMETER IDENTIFICATION)

Ignition OFF.

Allow the vehicle exterior and interior to stabilize to ambient temperature.

Disconnect Evaporator Temperature Sensor C296 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C296-1 (component side)	Ω	C296-2 (component side)

Compare the resistance values to the table below:

Ambient Temperature °F (°C)	Resistance ohms
-39.9 °F (-40 °C)	98, 625 - 103, 275 ohms
-4.0 °F (-20 °C)	28, 640 - 29, 600 ohms
32.0 °F (°C)	9695 - 9895 ohms
68.0 °F (20 °C)	3675 - 3810 ohms
77.0 °F (25 °C)	2950 - 3050 ohms
86.0 °F (30 °C)	2370 - 2565 ohms
103.9 °F (40 °C)	1565 - 1635 ohms

Ignition ON.

Using a diagnostic scan tool, view PCM Parameter Identifications (PIDs).

Monitor the AAT PID.

Is the resistance within the specified values for the temperatures?

Yes	GO to H4

No	INSTALL a new evaporator temperature sensor. REFER to: Evaporator Temperature Sensor .

H4 CHECK THE FCIM (FRONT CONTROLS INTERFACE MODULE) A/C (AIR CONDITIONING) SWITCH STATUS (CC_SW_AC) PID (PARAMETER IDENTIFICATION)

Ignition ON.

Using a diagnostic scan tool, view FCIM Parameter Identifications (PIDs).

Monitor the CC_SW_AC PID.

Select panel mode, press and release the A/C button (indicator off) on the FCIM controls.

Does the PID display Active when pressed and Inactive when released?

Yes	GO to H5

No	GO to H8

H5 CHECK THE A/C (AIR CONDITIONING) PRESSURE SENSOR (ACP_PRESS) PARAMETER IDENTIFICATION (PID)

Using a diagnostic scan tool, view the PCM Parameter Identification (PIDs).

With a manifold gauge set connected, compare the pressure readings of the manifold gauge set and the PCM Parameter Identification (PID) ACP_PRESS.

Are the pressure values of the manifold gauge set and the ACP_PRESS PCM PID within ± 103 kPa (15 psi)?

Yes	GO to H6

No	INSTALL a new A/C pressure transducer. REFER to: Air Conditioning (A/C) Pressure Transducer .

H6 CHECK THE PCM (POWERTRAIN CONTROL MODULE) A/C (AIR CONDITIONING) REQUEST SIGNAL (AC_REQ) PID (PARAMETER IDENTIFICATION) WITH THE A/C (AIR CONDITIONING) OFF

Using a diagnostic scan tool, view PCM Parameter Identifications (PIDs).

Monitor the AC_REQ PID.

While in panel mode, release the A/C button (indicator off) on the FCIM controls.

Does the PID display No?

Yes	GO to H9

No	GO to H7

H7 CHECK THE PCM (POWERTRAIN CONTROL MODULE) A/C (AIR CONDITIONING) REQUEST SIGNAL (AC_REQ) PID (PARAMETER IDENTIFICATION) WITH FCIM (FRONT CONTROLS INTERFACE MODULE) DISCONNECTED

Ignition ON.

Disconnect FCIM C2402A .

Using a diagnostic scan tool, view PCM Parameter Identifications (PIDs).

Monitor the AC_REQ PID.

Does the PID display No?

Yes	GO to H9

No	GO to H8

H8 CHECK FOR CORRECT FCIM (FRONT CONTROLS INTERFACE MODULE) OPERATION

Connect FCIM C2402A .

Ignition OFF.

Disconnect and inspect all FCIM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect all FCIM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new FCIM. Refer to the appropriate article for the procedure.

No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

H9 CHECK FOR CORRECT PCM (POWERTRAIN CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all PCM connectors.

Repair:

corrosion (replace connector or terminals - clean module pins)

damaged or bent pins - replace terminals/pins

pushed-out pins - replace pins as necessary

Reconnect all PCM connectors. Make sure they seat and latch correctly.

Operate the system and verify the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PCM. For 2.3L, REFER to: Powertrain Control Module (PCM) . For 3.7L, REFER to: Powertrain Control Module (PCM) . For 5.0L, REFER to: Powertrain Control Module (PCM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > CLIMATE CONTROL SYSTEM - VEHICLES WITH: DUAL AUTOMATIC TEMPERATURE CONTROL (DATC) > PINPOINT TEST(S) > PINPOINT TEST I : THE TEMPERATURE CONTROL IS INOPERATIVE OR DOES NOT OPERATE CORRECTLY - DRIVER SIDE

Refer to Automatic Climate Control System for schematic and connector information.

Normal Operation and Fault Conditions

Temperature Door Actuator - Driver side, REFER to: Climate Control System - Vehicles With: Dual Automatic Temperature Control (DATC) - System Operation and Component Description .

During an actuator calibration cycle, the FCIM drives the temperature door until the door reaches both internal stops in the HVAC case. If the temperature door is temporarily obstructed or binding during a calibration cycle, the module may interpret this as the actual end of travel for the door. When this condition occurs and the module commands the actuator to its end of travel, the airflow may not be the expected temperature.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1081:11	Left Temperature Damper Motor: Circuit Short To Ground	This DTC sets when the module senses lower than expected voltage on an actuator motor circuit when voltage is applied to drive the motor, indicating a short to ground. The motor can move only in one direction.
B1081:12	Left Temperature Damper Motor: Circuit Short To Battery	This DTC sets when the module senses higher than expected voltage on the actuator motor circuit when ground is applied to drive the motor, indicating a short to voltage. The motor can move only in one direction.
B1081:13	Left Temperature Damper Motor: Open Circuit	This DTC sets when the module senses no voltage on the actuator motor circuit when ground is

		applied to drive the motor, indicating an open circuit. The motor cannot move.
B11E5:12	Left HVAC Damper Position Sensor: Circuit Short to Battery	This DTC sets when the module senses greater than 5 volts on the actuator feedback circuit, indicating a short to voltage.
B11E5:14	Left HVAC Damper Position Sensor: Circuit Short to Ground or Open	This DTC sets when the module senses less than 1 volt on the actuator feedback circuit, indicating an open circuit or a short to ground.

Possible Sources

- Wiring, terminals or connectors
- Driver side temperature door actuator
- FCIM

DIAGNOSIS AND TESTING > CLIMATE CONTROL SYSTEM - VEHICLES WITH: DUAL AUTOMATIC TEMPERATURE CONTROL (DATC) > PINPOINT TEST(S) > PINPOINT TEST I : THE TEMPERATURE CONTROL IS INOPERATIVE OR DOES NOT OPERATE CORRECTLY - DRIVER SIDE > PINPOINT TEST I : THE TEMPERATURE CONTROL IS INOPERATIVE OR DOES NOT OPERATE CORRECTLY - DRIVER SIDE

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may damage the connector.

I1 CHECK THE DRIVER SIDE TEMPERATURE DOOR ACTUATOR CIRCUITS FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect Air distribution door actuator C232 .

Disconnect Air inlet door actuator C282 .

Disconnect In-vehicle temperature and humidity sensor C233 .

Disconnect Passenger side temperature door actuator C2092 .

Disconnect Driver side temperature door actuator C2091 .

Ignition ON.

Disconnect FCIM C2402A .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2091-1	V	Ground
C2091-2	V	Ground
C2091-3	V	Ground
C2091-5	V	Ground
C2091-6	V	Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to I2

I2 CHECK THE DRIVER SIDE TEMPERATURE DOOR ACTUATOR CIRCUITS FOR A SHORT TO GROUND

Connect FCIM C2402A .

Ignition OFF.

Disconnect FCIM C2402A .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2091-1	Ω	Ground
C2091-2	Ω	Ground
C2091-3	Ω	Ground
C2091-5	Ω	Ground
C2091-6	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to I3

No	REPAIR the circuit.

I3 CHECK THE DRIVER SIDE TEMPERATURE DOOR ACTUATOR CIRCUITS FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2091-1	Ω	C2402A-2
C2091-2	Ω	C2402A-10
C2091-3	Ω	C2402A-3
C2091-5	Ω	C2402A-8
C2091-6	Ω	C2402A-9

Are the resistances less than 3 ohms?

Yes	GO to I4

No	REPAIR the circuit.

I4 CHECK THE DRIVER SIDE TEMPERATURE DOOR ACTUATOR CIRCUITS FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2091-1	Ω	C2091-2
C2091-1	Ω	C2091-3
C2091-1	Ω	C2091-5
C2091-1	Ω	C2091-6
C2091-2	Ω	C2091-3
C2091-2	Ω	C2091-5
C2091-2	Ω	C2091-6
C2091-3	Ω	C2091-5
C2091-3	Ω	C2091-6
C2091-5	Ω	C2091-6

Are the resistances greater than 10, 000 ohms?

Yes	INSTALL a new driver side temperature door actuator. REFER to: Driver Side Temperature Door Actuator . TEST the system for normal operation. If the concern is still present, GO to I5

No	REPAIR the circuit.

I5 CHECK FOR CORRECT FCIM (FRONT CONTROLS INTERFACE MODULE) OPERATION

Disconnect and inspect all FCIM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect all FCIM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new FCIM. Refer to the appropriate article for the procedure.

No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > CLIMATE CONTROL SYSTEM - VEHICLES WITH: DUAL AUTOMATIC TEMPERATURE CONTROL (DATC) > PINPOINT TEST(S) > PINPOINT TEST J : THE TEMPERATURE CONTROL IS INOPERATIVE OR DOES NOT OPERATE CORRECTLY - PASSENGER SIDE

Refer to Automatic Climate Control System for schematic and connector information.

Normal Operation and Fault Conditions

Temperature Door Actuator - Passenger side, REFER to: Climate Control System - Vehicles With: Dual Automatic Temperature Control (DATC) - System Operation and Component Description .

During an actuator calibration cycle, the FCIM drives the temperature door until the door reaches both internal stops in the HVAC case. If the temperature door is temporarily obstructed or binding during a calibration cycle, the module may interpret this as the actual end of travel for the door. When this condition occurs and the module commands the actuator to its end of travel, the airflow may not be the expected temperature.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1082:11	Right Temperature Damper Motor: Circuit Short To Ground	This DTC sets when the module senses lower than expected

		voltage on an actuator motor circuit when voltage is applied to drive the motor, indicating a short to ground. The motor can move only in one direction.
B1082:12	Right Temperature Damper Motor: Circuit Short To Battery	This DTC sets when the module senses higher than expected voltage on the actuator motor circuit when ground is applied to drive the motor, indicating a short to voltage. The motor can move only in one direction.
B1082:13	Right Temperature Damper Motor: Open Circuit	This DTC sets when the module senses no voltage on the actuator motor circuit when ground is applied to drive the motor, indicating an open circuit. The motor cannot move.
B11E6:12	Right HVAC Damper Position Sensor: Circuit Short to Battery	This DTC sets when the module senses greater than 5 volts on the actuator feedback circuit, indicating a short to voltage.
B11E6:14	Right HVAC Damper Position Sensor: Circuit Short to Ground or Open	This DTC sets when the module senses less than 1 volt on the actuator feedback circuit, indicating an open circuit or a short to ground.

Possible Sources

- Wiring, terminals or connectors
- Passenger side temperature door actuator
- FCIM

DIAGNOSIS AND TESTING > CLIMATE CONTROL SYSTEM - VEHICLES WITH: DUAL AUTOMATIC TEMPERATURE CONTROL (DATC) > PINPOINT TEST(S) > PINPOINT TEST J : THE TEMPERATURE CONTROL IS INOPERATIVE OR DOES NOT OPERATE CORRECTLY - PASSENGER SIDE > PINPOINT TEST J : THE TEMPERATURE CONTROL IS INOPERATIVE OR DOES NOT OPERATE CORRECTLY - PASSENGER SIDE

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may damage the connector.

J1 CHECK THE PASSENGER SIDE TEMPERATURE DOOR ACTUATOR CIRCUITS FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect Air distribution door actuator C232 .

Disconnect In-vehicle temperature and humidity sensor C233 .

Disconnect Driver side temperature door actuator C2091 .

Disconnect Air inlet door actuator C282 .

Disconnect Passenger side temperature door actuator C2092 .

Ignition ON.

Disconnect FCIM C2402A .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2092-1	V	Ground
C2092-2	V	Ground
C2092-3	V	Ground
C2092-5	V	Ground
C2092-6	V	Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to J2

J2 CHECK THE PASSENGER SIDE TEMPERATURE DOOR ACTUATOR CIRCUITS FOR A SHORT TO GROUND

Connect FCIM C2402A .

Ignition OFF.

Disconnect FCIM C2402A .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2092-1	Ω	Ground

C2092-2	Ω	Ground
C2092-3	Ω	Ground
C2092-5	Ω	Ground
C2092-6	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to J3

No	REPAIR the circuit.

J3 CHECK THE PASSENGER SIDE TEMPERATURE DOOR ACTUATOR CIRCUITS FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2092-1	Ω	C2402A-2
C2092-3	Ω	C2402A-3

Positive Lead	Measurement / Action	Negative Lead
C2092-2	Ω	C2402B-18
C2092-5	Ω	C2402B-13
C2092-6	Ω	C2402B-14

Are the resistances less than 3 ohms?

Yes	GO to J4

No	REPAIR the circuit.

J4 CHECK THE PASSENGER SIDE TEMPERATURE DOOR ACTUATOR CIRCUITS FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2092-1	Ω	C2092-2
C2092-1	Ω	C2092-3

C2092-1	Ω	C2092-5
C2092-1	Ω	C2092-6
C2092-2	Ω	C2092-3
C2092-2	Ω	C2092-5
C2092-2	Ω	C2092-6
C2092-3	Ω	C2092-5
C2092-3	Ω	C2092-6
C2092-5	Ω	C2092-6

Are the resistances greater than 10, 000 ohms?

Yes	INSTALL a new passenger side temperature door actuator. REFER to: Passenger Side Temperature Door Actuator . TEST the system for normal operation. If the concern is still present, GO to J5

No	REPAIR the circuit.

J5 CHECK FOR CORRECT FCIM (FRONT CONTROLS INTERFACE MODULE) OPERATION

Disconnect and inspect all FCIM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect all FCIM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new FCIM. Refer to the appropriate article for the procedure.

No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > CLIMATE CONTROL SYSTEM - VEHICLES WITH: DUAL

AUTOMATIC TEMPERATURE CONTROL (DATC) > PINPOINT TEST(S) > PINPOINT TEST K : THE BLOWER MOTOR IS INOPERATIVE

Refer to Automatic Climate Control System for schematic and connector information.

Normal Operation and Fault Conditions

Voltage is supplied to the blower motor relay switched contact from the BJB. Ground to the relay coil is a dedicated circuit. When the blower motor relay coil receives power from the FCIM, the relay coil is energized and voltage is delivered to the blower motor speed control. Power and ground for the blower motor is provided by the blower motor speed control. The FCIM sends a PWM signal to the blower motor speed control to control the blower speed.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B10AF:11	Blower Fan Relay: Circuit Short To Ground	This DTC sets when the module senses low voltage on the relay coil voltage circuit when the module is energizing the circuit. The blower motor relay is permanently inactive.
B10AF:15	Blower Fan Relay: Circuit Short To Battery or Open	This DTC sets when the module senses greater than expected voltage on the blower motor relay coil voltage circuit, indicating an open circuit or a short to voltage. The blower motor relay is inactive when circuit is open; the blower motor relay is on all the time when shorted to battery.
B10B9:12	Blower Control: Circuit Short To Battery	This DTC sets when the module senses high voltage on the blower motor control PWM circuit, indicating a short directly to voltage. The blower motor is inoperative.
B10B9:14	Blower Control: Circuit Short To Ground or Open	This DTC sets when the module senses no voltage on the blower motor control PWM circuit, indicating a short directly to ground or an open circuit. The blower motor runs at full speed if the circuit is shorted to ground. The blower motor is inoperative if the circuit is open.

Possible Sources

- Wiring, terminals or connectors

- Fuse
- Blower motor relay
- Blower motor
- Blower motor speed control
- FCIM

Visual Inspection and Diagnostic Pre-checks

- Inspect BJB fuse 10 (40A).

DIAGNOSIS AND TESTING > CLIMATE CONTROL SYSTEM - VEHICLES WITH: DUAL AUTOMATIC TEMPERATURE CONTROL (DATC) > PINPOINT TEST(S) > PINPOINT TEST K : THE BLOWER MOTOR IS INOPERATIVE > PINPOINT TEST K : THE BLOWER MOTOR IS INOPERATIVE

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may damage the connector.

K1 CHECK THE BLOWER MOTOR RELAY

Ignition OFF.

Disconnect Blower motor relay.

Carry out the component test on the blower motor relay. Refer to Component Testing for schematic and connector information.

Did the relay pass the component test?

Yes	GO to K2

No	INSTALL a new blower motor relay.

K2 CHECK THE BLOWER MOTOR RELAY SWITCH CONTACT SUPPLY VOLTAGE

Measure:

Positive Lead	Measurement / Action	Negative Lead
Blower motor relay socket 3		Ground

Is the voltage greater than 11 volts?

Yes	GO to K3

No	VERIFY BJB fuse 10 (40A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short.

K3 CHECK THE BLOWER MOTOR RELAY COIL GROUND CIRCUIT FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
Blower motor relay socket 1	Ω	Ground

Is the resistance less than 3 ohms?

Yes	GO to K4

No	REPAIR the circuit.

K4 CHECK THE BLOWER MOTOR RELAY COIL CONTROL CIRCUIT FOR A SHORT TO GROUND

Disconnect FCIM C2402A .

Measure:

Positive Lead	Measurement / Action	Negative Lead
Blower motor relay socket 2	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to K5

No	REPAIR the circuit.

K5 CHECK THE BLOWER MOTOR RELAY COIL CONTROL CIRCUIT FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
Blower motor relay socket 2	Ω	C2402A-11

Is the resistance less than 3 ohms?

Yes	GO to K6

No	REPAIR the circuit.

K6 CHECK THE BLOWER MOTOR SPEED CONTROL VOLTAGE CIRCUIT

Disconnect Blower motor speed control C297 .

Connect Blower motor relay.

Connect FCIM C2402A .

Ignition ON.

Select PANEL on the HVAC controls.

Select the highest blower motor setting.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C297-5		Ground

Is the voltage greater than 11 volts?

Yes	GO to K7

No	REPAIR the circuit.

K7 CHECK THE BLOWER MOTOR SPEED CONTROL GROUND CIRCUIT FOR AN OPEN

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C297-1		Ground

Is the resistance less than 3 ohms?

Yes	GO to K8

No	REPAIR the circuit.

K8 CHECK THE BLOWER MOTOR CONTROL PWM (PULSE WIDTH MODULATION) CIRCUIT FOR A SHORT TO VOLTAGE

Ignition ON.

Disconnect FCIM C2402A .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C297-2		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to K9

K9 CHECK THE BLOWER MOTOR CONTROL PWM (PULSE WIDTH MODULATION) CIRCUIT FOR AN OPEN

Connect FCIM C2402A .

Ignition OFF.

Disconnect FCIM C2402A .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C297-2	Ω	C2402A-23

Is the resistance less than 3 ohms?

Yes	GO to K10

No	REPAIR the circuit.

K10 CHECK THE OUTPUTS TO THE BLOWER MOTOR

Disconnect Blower motor C2066 .

Connect Blower motor speed control C297 .

Connect FCIM C2402A .

Ignition ON.

Select PANEL on the HVAC controls.

Select the highest blower motor setting.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2066-1		C2066-2

Is the voltage greater than 11 volts?

Yes	INSTALL a new blower motor. REFER to: Blower Motor .

No	GO to K11

K11 CHECK THE CIRCUITS TO THE BLOWER MOTOR FOR AN OPEN

Ignition OFF.

Disconnect Blower motor speed control C297 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C297-6	Ω	C2066-1
C297-5	Ω	C2066-2

Are the resistances less than 3 ohms?

Yes	GO to K12

No	REPAIR the circuit in question.

K12 CHECK THE BLOWER MOTOR CIRCUITS FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2066-1	Ω	C2066-2

Is the resistance greater than 10, 000 ohms?

Yes	INSTALL a new blower motor speed control. REFER to: Blower Motor Speed Control . TEST the system for normal operation. If the concern is still present, GO to K13

No	REPAIR the circuits.

K13 CHECK FOR CORRECT FRONT CONTROLS INTERFACE MODULE (FCIM) OPERATION

Disconnect and inspect all FCIM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect all FCIM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new FCIM. Refer to the appropriate article for the procedure.

No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > CLIMATE CONTROL SYSTEM - VEHICLES WITH: DUAL AUTOMATIC TEMPERATURE CONTROL (DATC) > PINPOINT TEST(S) > PINPOINT TEST L : THE BLOWER MOTOR DOES NOT OPERATE CORRECTLY

Refer to Automatic Climate Control System for schematic and connector information.

Normal Operation and Fault Conditions

Voltage is supplied to the blower motor relay switched contact from the BJB. Ground to the relay coil is a dedicated circuit. When the blower motor relay coil receives power from the FCIM, the relay coil is energized and voltage is delivered to the blower motor speed control. Power and ground for the blower motor is provided by the blower motor speed control. The FCIM sends a PWM signal to the blower motor speed control to control the blower speed.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B10AF:15	Blower Fan Relay: Circuit Short To Battery or Open	This DTC sets when the module senses greater than expected voltage on the blower relay coil voltage circuit, indicating an open circuit or a short to voltage. Blower relay is inactive when circuit is open; blower relay is on all the time when shorted to battery.

B10B9:14	Blower Control: Circuit Short To Ground or Open	This DTC sets when the module senses no voltage on the blower motor control PWM circuit, indicating a short directly to ground or an open circuit. The blower motor runs at full speed if the circuit is shorted to ground. The blower motor is inoperative if the circuit is open.

Possible Sources

- Wiring, terminals or connectors
- Blower motor relay
- Blower motor speed control
- FCIM

DIAGNOSIS AND TESTING > CLIMATE CONTROL SYSTEM - VEHICLES WITH: DUAL AUTOMATIC TEMPERATURE CONTROL (DATC) > PINPOINT TEST(S) > PINPOINT TEST L : THE BLOWER MOTOR DOES NOT OPERATE CORRECTLY > PINPOINT TEST L : THE BLOWER MOTOR DOES NOT OPERATE CORRECTLY

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may damage the connector.

L1 VERIFY THE BLOWER MOTOR OPERATION

Ignition ON.

Select PANEL on the HVAC controls. Adjust the blower motor setting to the minimum and maximum settings.

Does the blower motor operate at any setting?

Yes	GO to L2

No	GO to Pinpoint Test K

L2 CHECK THE BLOWER MOTOR CONTROL PWM (PULSE WIDTH MODULATION) CIRCUIT FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect Blower motor speed control C297 .

Ignition ON.

Disconnect FCIM C2402A .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2402A-23		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to L3

L3 CHECK THE BLOWER MOTOR CONTROL PWM (PULSE WIDTH MODULATION) CIRCUIT FOR A SHORT TO GROUND

Connect FCIM C2402A .

Ignition OFF.

Disconnect FCIM C2402A .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2402A-23	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to L4

No	REPAIR the circuit.

L4 CHECK THE BLOWER MOTOR RELAY COIL CONTROL CIRCUIT FOR A SHORT TO VOLTAGE

Disconnect Blower motor relay.

Connect FCIM C2402A .

Ignition ON.

Disconnect FCIM C2402A .

Measure:

Positive Lead	Measurement / Action	Negative Lead

C2402A-11		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to L5

L5 CHECK THE BLOWER MOTOR OPERATION WITH THE BLOWER MOTOR RELAY DISCONNECTED

Connect FCIM C2402A .

Ignition OFF.

Connect Blower motor speed control C297 .

Ignition ON.

Operate the system and determine if the concern is still present.

Does the fan still operate all the time?

Yes	REPAIR the blower motor speed control voltage circuit CH402 (YE/GN) for a short to voltage.

No	GO to L6

L6 CHECK FOR CORRECT BLOWER MOTOR SPEED CONTROL OPERATION

Ignition OFF.

Disconnect and inspect all the blower motor speed control connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the blower motor speed control connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	INSTALL a new blower motor speed control. REFER to: Blower Motor Speed Control . TEST the system for normal operation. If the concern is still present, GO to L7

No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

L7 CHECK FOR CORRECT FCIM (FRONT CONTROLS INTERFACE MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all FCIM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect all FCIM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new FCIM. Refer to the appropriate article for the procedure.

No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > CLIMATE CONTROL SYSTEM - VEHICLES WITH: DUAL AUTOMATIC TEMPERATURE CONTROL (DATC) > PINPOINT TEST(S) > PINPOINT TEST M : AIR DISCHARGE TEMPERATURE SENSOR CIRCUIT FAULTS

Refer to Automatic Climate Control System for schematic and connector information.

Normal Operation and Fault Conditions

The 2 air discharge temperature sensors contain a thermistor. The sensor varies its resistance with the temperature. As the temperature rises, the resistance falls. As the temperature falls, the resistance rises. REFER to: Climate Control System - Vehicles With: Dual Automatic Temperature Control (DATC) - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B10B5:11	Left Panel Air Discharge Temperature: Circuit Short To	This DTC sets when the FCIM senses erratic voltages from the

	Ground	left panel air discharge temperature sensor.
B10B5:15	Left Panel Air Discharge Temperature: Circuit Short To Battery or Open	This DTC sets when the FCIM senses erratic voltages from the left panel air discharge temperature sensor.
B10B6:11	Left Floor Air Discharge Temperature: Circuit Short To Ground	This DTC sets when the FCIM senses erratic voltages from the left floor air discharge temperature sensor.
B10B6:15	Left Floor Air Discharge Temperature: Circuit Short To Battery or Open	This DTC sets when the FCIM senses erratic voltages from the left floor air discharge temperature sensor.

Possible Sources

- Wiring, terminals or connectors
- Air discharge temperature sensor(s)
- FCIM

DIAGNOSIS AND TESTING > CLIMATE CONTROL SYSTEM - VEHICLES WITH: DUAL AUTOMATIC TEMPERATURE CONTROL (DATC) > PINPOINT TEST(S) > PINPOINT TEST M : AIR DISCHARGE TEMPERATURE SENSOR CIRCUIT FAULTS > PINPOINT TEST M : AIR DISCHARGE TEMPERATURE SENSOR CIRCUIT FAULTS

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may damage the connector.

M1 CHECK THE AIR DISCHARGE TEMPERATURE SENSOR OUTPUT VOLTAGE CIRCUIT

Ignition OFF.

Disconnect the suspect air discharge temperature sensor:

Driver side register air discharge temperature sensor C2438

Driver side footwell air discharge temperature sensor C2436

Ignition ON.

Turn the HVAC system on.

Measure:

Driver side footwell air discharge temperature sensor

Positive Lead	Measurement / Action	Negative Lead
C2436-1		C2436-2

Driver side register air discharge temperature sensor

Positive Lead	Measurement / Action	Negative Lead
C2438-1		C2438-2

Is the voltage between 4.7 and 5.1 volts?

Yes	INSTALL a new air discharge temperature sensor. Refer to the appropriate article for the procedure. CLEAR the Diagnostic Trouble Codes (DTCs). REPEAT the self-test. If Diagnostic Trouble Code (DTC) returns, GO to M9

No	GO to M2

M2 CHECK THE AIR DISCHARGE TEMPERATURE SENSOR SIGNAL CIRCUIT FOR A SHORT TO VOLTAGE

Disconnect FCIM C2402A .

Disconnect FCIM C2402B .

Measure:

Driver side footwell air discharge temperature sensor

Positive Lead	Measurement / Action	Negative Lead
C2436-1		Ground

Driver side register air discharge temperature sensor

Positive Lead	Measurement / Action	Negative Lead
C2438-2		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to M3

M3 CHECK THE AIR DISCHARGE TEMPERATURE SENSOR SIGNAL RETURN CIRCUIT FOR A SHORT TO VOLTAGE

Measure:

Driver side footwell air discharge temperature sensor

Positive Lead	Measurement / Action	Negative Lead
C2436-2		Ground

Driver side register air discharge temperature sensor

Positive Lead	Measurement / Action	Negative Lead
C2438-1		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to M4

M4 CHECK THE AIR DISCHARGE TEMPERATURE SENSOR SIGNAL CIRCUIT FOR A SHORT TO GROUND

Connect FCIM C2402A .

Ignition OFF.

Disconnect FCIM C2402A .

Measure:

Driver side footwell air discharge temperature sensor

Positive Lead	Measurement / Action	Negative Lead
C2436-1	Ω	Ground

Driver side register air discharge temperature sensor

Positive Lead	Measurement / Action	Negative Lead
C2438-2	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to M5

No	REPAIR the circuit.

M5 CHECK THE AIR DISCHARGE TEMPERATURE SENSOR SIGNAL RETURN CIRCUIT FOR A

SHORT TO GROUND

Measure:

Driver side footwell air discharge temperature sensor

Positive Lead	Measurement / Action	Negative Lead
C2436-2	Ω	Ground

Driver side register air discharge temperature sensor

Positive Lead	Measurement / Action	Negative Lead
C2438-1	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to M6

No	REPAIR the circuit.

M6 CHECK THE AIR DISCHARGE TEMPERATURE SENSOR SIGNAL CIRCUIT FOR AN OPEN

Measure:

Driver side footwell air discharge temperature sensor

Positive Lead	Measurement / Action	Negative Lead
C2436-1	Ω	C2402B-4

Driver side register air discharge temperature sensor

Positive Lead	Measurement / Action	Negative Lead
C2438-2	Ω	C2402B-5

Are the resistances less than 3 ohms?

Yes	GO to M7

No	REPAIR the circuit.

M7 CHECK THE AIR DISCHARGE TEMPERATURE SENSOR SIGNAL RETURN CIRCUIT FOR AN OPEN

Measure:

Driver side footwell air discharge temperature sensor

Positive Lead	Measurement / Action	Negative Lead
C2436-2	Ω	C2402A-2

Driver side register air discharge temperature sensor

Positive Lead	Measurement / Action	Negative Lead
C2438-1	Ω	C2402A-2

Are the resistances less than 3 ohms?

Yes	GO to M8

No	REPAIR the circuit.

M8 CHECK AIR DISCHARGE TEMPERATURE SENSOR SIGNAL CIRCUIT AND THE SIGNAL RETURN FOR A SHORT TO TOGETHER

Measure:

Driver side footwell air discharge temperature sensor

Positive Lead	Measurement / Action	Negative Lead
C2436-1	Ω	C2436-2

Driver side register air discharge temperature sensor

Positive Lead	Measurement / Action	Negative Lead
C2438-1	Ω	C2438-2

Are the resistances greater than 10, 000 ohms?

Yes	INSTALL a new air discharge temperature sensor.Refer to the appropriate article for the procedure. CLEAR the Diagnostic Trouble Codes (DTCs). REPEAT the self-test. If Diagnostic Trouble Code (DTC) returns, GO to M9

No	REPAIR the circuit.

M9 CHECK FOR CORRECT FCIM (FRONT CONTROLS INTERFACE MODULE) OPERATION

Disconnect and inspect all FCIM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect all FCIM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new FCIM. Refer to the appropriate article for the procedure.

No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > CLIMATE CONTROL SYSTEM - VEHICLES WITH: DUAL AUTOMATIC TEMPERATURE CONTROL (DATC) > PINPOINT TEST(S) > PINPOINT TEST N : B105A:12, B105A:14, B1A61:11, B1A61:15, B1A69:12, B1A69:14

Refer to Automatic Climate Control System for schematic and connector information.

Normal Operation and Fault Conditions

In-Vehicle Temperature and Humidity Sensor, REFER to: Climate Control System - Vehicles With: Dual Automatic Temperature Control (DATC) - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B105A:12	Cabin Temperature Sensor Fan: Circuit Short To Battery	This DTC sets when the module senses higher than expected voltage on the in-vehicle temperature and humidity sensor fan motor circuit. The in-vehicle temperature and humidity sensor fan motor is inactive.
B105A:14	Cabin Temperature Sensor Fan: Circuit Short To Ground or Open	This DTC sets when the module senses no voltage on the in-vehicle temperature and humidity sensor fan motor circuit, indicating an open or a short directly to ground. The in-vehicle temperature and humidity sensor fan motor is active.

B1A61:11	Cabin Temperature Sensor: Circuit Short to Ground	This DTC sets when the module senses lower than expected voltage on the in-vehicle temperature and humidity sensor feedback circuit, indicating a short to ground.
B1A61:15	Cabin Temperature Sensor: Circuit Short to Battery or Open	This DTC sets when the module senses greater than expected voltage on the in-vehicle temperature and humidity sensor feedback circuit, indicating a short to voltage or an open circuit or sensor.
B1A69:12	Humidity Sensor: Circuit Short To Battery	This DTC sets when the module senses greater than expected voltage on the in-vehicle temperature and humidity sensor humidity input circuit, indicating a short to voltage.
B1A69:14	Humidity Sensor: Circuit Short To Ground or Open	This DTC sets when the module senses no voltage on the in-vehicle temperature and humidity sensor humidity input circuit, indicating a short to ground or an open circuit or sensor.

Possible Sources

- Fuse
- Wiring, terminals or connectors
- In-vehicle temperature and humidity sensor
- FCIM

Visual Inspection and Diagnostic Pre-checks

- Make sure the in-vehicle temperature and humidity sensor harness is not chaffed.

DIAGNOSIS AND TESTING > CLIMATE CONTROL SYSTEM - VEHICLES WITH: DUAL AUTOMATIC TEMPERATURE CONTROL (DATC) > PINPOINT TEST(S) > PINPOINT TEST N : B105A:12, B105A:14, B1A61:11, B1A61:15, B1A69:12, B1A69:14 > PINPOINT TEST N : B105A:12, B105A:14, B1A61:11, B1A61:15, B1A69:12, B1A69:14

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the

correct probe adapter(s) may damage the connector.

N1 CHECK THE IN-VEHICLE TEMPERATURE AND HUMIDITY SENSOR CIRCUITS FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect Air distribution door actuator C232 .

Disconnect Driver side temperature door actuator C2091 .

Disconnect Passenger side temperature door actuator C2092 .

Disconnect Air inlet door actuator C282 .

Disconnect In-vehicle temperature and humidity sensor C233 .

Disconnect BCM fuse 21 (5A).

Ignition ON.

Disconnect FCIM C2402A .

Disconnect FCIM C2402B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C233-1		Ground
C233-2		Ground
C233-3		Ground
C233-4		Ground
C233-5		Ground
C233-6		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to N2

N2 CHECK THE IN-VEHICLE TEMPERATURE AND HUMIDITY SENSOR CIRCUITS FOR A SHORT TO GROUND

Connect FCIM C2402A .

Ignition OFF.

Disconnect FCIM C2402A .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C233-1	Ω	Ground
C233-2	Ω	Ground
C233-3	Ω	Ground
C233-4	Ω	Ground
C233-5	Ω	Ground
C233-6	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to N3

No	REPAIR the circuit.

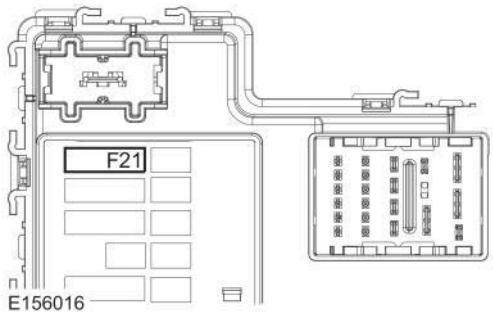
N3 CHECK THE IN-VEHICLE TEMPERATURE AND HUMIDITY SENSOR CIRCUITS FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C233-3	Ω	C2402A-3
C233-5	Ω	C2402A-2

Positive Lead	Measurement / Action	Negative Lead
C233-1	Ω	C2402B-27
C233-2	Ω	C2402B-29
C233-4	Ω	C2402B-19

Positive Lead	Measurement / Action	Negative Lead
C233-6	Ω	BCM fuse 21 cavity, (component side)



Are the resistances less than 3 ohms?

Yes	GO to N4

No	REPAIR the circuit.

N4 CHECK THE IN-VEHICLE TEMPERATURE AND HUMIDITY SENSOR CIRCUITS FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C233-1	Ω	C233-2
C233-1	Ω	C233-3
C233-1	Ω	C233-4
C233-1	Ω	C233-5
C233-1	Ω	C233-6
C233-2	Ω	C233-3
C233-2	Ω	C233-4
C233-2	Ω	C233-5
C233-2	Ω	C233-6
C233-3	Ω	C233-4
C233-3	Ω	C233-5
C233-3	Ω	C233-6
C233-4	Ω	C233-5
C233-4	Ω	C233-6
C233-5	Ω	C233-6

Are the resistances greater than 10, 000 ohms?

Yes	GO to N5

No	REPAIR the circuit.

N5 CHECK FOR CORRECT IN-VEHICLE TEMPERATURE AND HUMIDITY SENSOR OPERATION

Inspect the disconnected connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect all disconnected connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	INSTALL a new in-vehicle temperature sensor. REFER to: In-Vehicle Temperature and Humidity Sensor . TEST the system for normal operation. If the concern is still present, GO to N6

No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

N6 CHECK FOR CORRECT FCIM (FRONT CONTROLS INTERFACE MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all FCIM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect all FCIM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new FCIM. Refer to the

	appropriate article for the procedure.

No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > CLIMATE CONTROL SYSTEM - VEHICLES WITH: DUAL AUTOMATIC TEMPERATURE CONTROL (DATC) > PINPOINT TEST(S) > PINPOINT TEST O : B1A63:11, B1A63:15, B1A64:11, B1A64:15

Refer to Automatic Climate Control System for schematic and connector information.

Normal Operation and Fault Conditions

Sunload Sensor, REFER to: Climate Control System - Vehicles With: Dual Automatic Temperature Control (DATC) - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1A63:11	Right Solar Sensor: Circuit Short To Ground	This DTC sets when the control module senses lower than expected voltage on the RH sensor feedback circuit, indicating a short to ground.
B1A63:15	Right Solar Sensor: Circuit Short To Battery or Open	This DTC sets when the control module senses higher than expected voltage on the RH sensor feedback circuit, indicating a short to voltage or an open circuit or sensor.
B1A64:11	Left Solar Sensor: Circuit Short To Ground	This DTC sets when the control module senses lower than expected voltage on the LH sensor feedback circuit, indicating a short to ground.
B1A64:15	Left Solar Sensor: Circuit Short To Battery or Open	This DTC sets when the control module senses higher than expected voltage on the LH sensor feedback circuit, indicating a short to voltage or an open circuit or sensor.

Possible Sources

- Wiring, terminals or connectors
- Sunload sensor

- FCIM
- Inspect loose or corroded FCIM and sunload sensor connections.

DIAGNOSIS AND TESTING > CLIMATE CONTROL SYSTEM - VEHICLES WITH: DUAL AUTOMATIC TEMPERATURE CONTROL (DATC) > PINPOINT TEST(S) > PINPOINT TEST O : B1A63:11, B1A63:15, B1A64:11, B1A64:15 > PINPOINT TEST O : B1A63:11, B1A63:15, B1A64:11, B1A64:15

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may damage the connector.

O1 CHECK THE SUNLOAD SENSOR CIRCUITS FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect Sunload sensor C286 .

Disconnect FCIM C2402B .

Disconnect BCM C2280B .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C286-1	V	Ground
C286-2	V	Ground
C286-3	V	Ground
C286-4	V	Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to O2

O2 CHECK THE SUNLOAD SENSOR CIRCUITS FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C286-1	Ω	Ground
C286-2	Ω	Ground
C286-3	Ω	Ground
C286-4	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to O3

No	REPAIR the circuit.

O3 CHECK THE SUNLOAD SENSOR SIGNAL CIRCUITS FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C286-1	Ω	C2402B-22
C286-3	Ω	C2402B-21

Positive Lead	Measurement / Action	Negative Lead
C286-2	Ω	C2280B-24
C286-4	Ω	C2280B-22

Are the resistances less than 3 ohms?

Yes	GO to O4

No	REPAIR the circuit.

O4 CHECK THE SUNLOAD SENSOR SIGNAL CIRCUITS FOR A SHORT TO EACH OTHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C286-1	Ω	C286-2
C286-1	Ω	C286-3
C286-1	Ω	C286-4

C286-2	Ω	C286-3
C286-2	Ω	C286-4
C286-3	Ω	C286-4

Are the resistances greater than 10, 000 ohms?

Yes	INSTALL a new sunload sensor. REFER to: Sunload Sensor . TEST the system for normal operation. If the concern is still present, GO to O5

No	REPAIR the circuit.

O5 CHECK FOR CORRECT FCIM (FRONT CONTROLS INTERFACE MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all FCIM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect all FCIM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new FCIM. Refer to the appropriate article for the procedure.

No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > CLIMATE CONTROL SYSTEM - VEHICLES WITH: DUAL AUTOMATIC TEMPERATURE CONTROL (DATC) > PINPOINT TEST(S) > PINPOINT TEST P : B1B71:11, B1B71:15

Refer to Automatic Climate Control System for schematic and connector information.

Normal Operation and Fault Conditions

Evaporator Temperature Sensor, REFER to: Climate Control System - Vehicles With: Dual Automatic

Temperature Control (DATC) - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1B71:11	Evaporator Temperature Sensor: Circuit Short To Ground	The module senses excessive voltage drop on the sensor reference voltage circuit, indicating a short directly to ground. The module defaults to calculated evaporator temperature and the compressor is shut off.
B1B71:15	Evaporator Temperature Sensor: Circuit Short To Battery or Open	The module senses no voltage drop on the sensor reference voltage circuit, indicating a short directly to voltage or an open circuit. The module defaults to calculated evaporator temperature and the compressor is shut off.

Possible Sources

- Wiring, terminals or connectors
- Evaporator temperature sensor
- FCIM

DIAGNOSIS AND TESTING > CLIMATE CONTROL SYSTEM - VEHICLES WITH: DUAL AUTOMATIC TEMPERATURE CONTROL (DATC) > PINPOINT TEST(S) > PINPOINT TEST P : B1B71:11, B1B71:15 > PINPOINT TEST P : B1B71:11, B1B71:15

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may damage the connector.

P1 CHECK THE EVAPORATOR TEMPERATURE SENSOR RESISTANCE

Ignition OFF.

Disconnect Evaporator temperature sensor C296 .

Measure:

Positive Lead	Measurement / Action	Negative Lead

C296-1 (component side)	Ω	C296-2 (component side)

Compare the evaporator temperature sensor measured resistance with the table below.

Ambient Temperature °F (°C)	Resistance ohms
-39.9 °F (-40 °C)	98, 625 - 103, 275 ohms
-4.0 °F (-20 °C)	28, 640 - 29, 600 ohms
32.0 °F (°C)	9695 - 9895 ohms
68.0 °F (20 °C)	3675 - 3810 ohms
77.0 °F (25 °C)	2950 - 3050 ohms
86.0 °F (30 °C)	2370 - 2565 ohms
103.9 °F (40 °C)	1565 - 1635 ohms

Is the resistance within the specified values for the temperatures?

Yes	GO to P2

No	INSTALL a new evaporator temperature sensor. REFER to: Evaporator Temperature Sensor .

P2 CHECK THE EVAPORATOR TEMPERATURE SENSOR INPUT CIRCUIT FOR A SHORT TO VOLTAGE

Ignition ON.

Disconnect FCIM C2402A .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2402A-19		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to P3

P3 CHECK THE EVAPORATOR TEMPERATURE SENSOR INPUT CIRCUIT FOR A SHORT TO GROUND

Connect FCIM C2402A .

Ignition OFF.

Disconnect FCIM C2402A .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2402A-19	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to P4

No	REPAIR the circuit.

P4 CHECK THE EVAPORATOR TEMPERATURE SENSOR INPUT CIRCUIT FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2402A-19	Ω	C296-1

Is the resistance less than 3 ohms?

Yes	GO to P5

No	REPAIR the circuit.

P5 CHECK THE EVAPORATOR TEMPERATURE SENSOR SIGNAL AND SIGNAL RETURN CIRCUITS FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C296-1	Ω	C296-2

Is the resistance greater than 10, 000 ohms?

Yes	GO to P6

No	REPAIR the circuit.

P6 CHECK FOR CORRECT FCIM (FRONT CONTROLS INTERFACE MODULE) OPERATION

Disconnect and inspect all FCIM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect all FCIM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new FCIM. Refer to the appropriate article for the procedure.

No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > CLIMATE CONTROL SYSTEM - VEHICLES WITH: DUAL AUTOMATIC TEMPERATURE CONTROL (DATC) > PINPOINT TEST(S) > PINPOINT TEST Q : C1B14:11, C1B14:12

Refer to Automatic Climate Control System for schematic and connector information.

Normal Operation and Fault Conditions

A 5-volt reference voltage and ground is supplied to the climate control sensors and actuators from the FCIM.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
C1B14:11	Sensor Supply Voltage A: Circuit Short to Ground	This DTC sets when the module senses less than 5 volts on the sensor reference voltage circuit, indicating a short to ground.
C1B14:12	Sensor Supply Voltage A: Circuit Short to Battery	This DTC sets when the module senses greater than 5 volts on the sensor reference voltage circuit, indicating a short to voltage.

Possible Sources

- Wiring, terminals or connectors
- FCIM

DIAGNOSIS AND TESTING > CLIMATE CONTROL SYSTEM - VEHICLES WITH: DUAL AUTOMATIC TEMPERATURE CONTROL (DATC) > PINPOINT TEST(S) > PINPOINT TEST Q : C1B14:11, C1B14:12 > PINPOINT TEST Q : C1B14:11, C1B14:12

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may damage the connector.

Q1 CHECK THE FCIM (FRONT CONTROLS INTERFACE MODULE) DTCS

Ignition ON.

Using a diagnostic scan tool, perform FCIM self-test.

Is DTC C1B14:11 present?

Yes	GO to Q2

No	GO to Q5

Q2 CHECK THE REFERENCE VOLTAGE CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Disconnect FCIM C2402A .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2402A-3	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to Q3

No	REPAIR the circuit.

Q3 CHECK THE REFERENCE VOLTAGE CIRCUIT AND THE SIGNAL RETURN CIRCUIT FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2402A-3	Ω	C2402A-2

Is the resistance greater than 200 ohms?

Yes	GO to Q6

No	GO to Q4

Q4 CHECK THE A/C (AIR CONDITIONING) COMPONENTS

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2402A-3	Ω	C2402A-2

While measuring the resistance, disconnect the following components one at a time, in order. Stop disconnecting components if the measured resistance rises above 200 ohms.

In-vehicle temperature and humidity sensor C233

Driver side temperature door actuator C2091

Air distribution door actuator C232

Passenger temperature door actuator C2092

Air inlet door actuator C289

Did the resistance rise above 200 ohms?

Yes	INSTALL a new sensor or actuator (the last one to be disconnected). Refer to the appropriate article for the procedure. When installing an actuator, CONNECT the actuator electrical connector before the FCIM. This allows the actuator to be calibrated when the FCIM is connected.

No	REPAIR the circuit.

Q5 CHECK THE REFERENCE VOLTAGE CIRCUIT FOR A SHORT TO VOLTAGE

Disconnect FCIM C2402A .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2402A-3	V	Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to Q6

Q6 CHECK FOR CORRECT FCIM (FRONT CONTROLS INTERFACE MODULE) OPERATION

Connect FCIM C2402A .

Ignition OFF.

Disconnect and inspect all FCIM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect all FCIM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new FCIM. Refer to the appropriate article for the procedure.

No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > CLIMATE CONTROL SYSTEM - VEHICLES WITH: DUAL AUTOMATIC TEMPERATURE CONTROL (DATC) > PINPOINT TEST(S) > PINPOINT TEST R : P06A0

Refer to Automatic Climate Control System for schematic and connector information.

Normal Operation and Fault Conditions

The externally controlled variable displacement compressor is electronically controlled by the PCM. The PCM pulse width modulates the ground to the externally controlled variable displacement compressor to change the displacement of the A/C compressor. REFER to: Climate Control System - Vehicles With: Dual Automatic Temperature Control (DATC) - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
P06A0	Variable A/C Compressor Control	The PCM senses greater than

	Circuit	expected voltage on the sensor feedback circuit, indicating a short to voltage or an open circuit or sensor.

Possible Sources

- Wiring, terminals or connectors
- A/C compressor
- PCM

Visual Inspection and Diagnostic Pre-checks

- Inspect for loose or corroded PCM and A/C compressor connections.

DIAGNOSIS AND TESTING > CLIMATE CONTROL SYSTEM - VEHICLES WITH: DUAL AUTOMATIC TEMPERATURE CONTROL (DATC) > PINPOINT TEST(S) > PINPOINT TEST R : P06A0 > PINPOINT TEST R : P06A0

NOTE: The performance check test is used to determine if the Externally Controlled Variable Displacement Compressor (EVDC) is able to change the displacement by measuring the amperage to the solenoid and monitoring the manifold pressure gauges soon after the air conditioning clutch is engaged.

NOTE: Proper Air Conditioning (A/C) system diagnosis on a vehicle's compressor is dependent on correct refrigerant system charge and tested in ambient temperatures above 21.1 °C (70 °F).

R1 EXTERNALLY CONTROLLED VARIABLE DISPLACEMENT COMPRESSOR (EVDC) PERFORMANCE CHECK

Ignition OFF.

Disconnect BJB fuse 42 (15A).

Measure:

Positive Lead	Measurement / Action	Negative Lead
BJB fuse 42 socket, component side		BJB fuse 42 socket, component side

With a manifold gauge set connected, monitor the low side and high side pressures.

Start the engine. Run the engine until it reaches normal operating temperature.

Select the floor position on the HVAC controls. Set the temperature control to full warm and

the blower to the highest setting. Set the A/C to off. Close all windows and doors. Run for 5 minutes to heat up the climate control housing.

Monitor the multi meter and the manifold gauges. Select the PANEL position on the HVAC controls. Set the temperature control to full cold and the blower to the highest setting. Set the recirculated air mode to on. Set the A/C to on.

Record the highest amperage measurement and the A/C pressures.

Did the amperage initially increase approximately 0.8A, and did the low side pressure decrease and the high side pressure increase and after a few minutes did the amperage and high side pressure decrease and low side pressure increase?

Yes	The Externally Controlled Variable Displacement Compressor (EVDC) is able to change the displacement. CHECK refrigerant charge amount. REFER to: Air Conditioning (A/C) System Recovery, Evacuation and Charging .

No	GO to R2

R2 CHECK FOR VOLTAGE TO THE A/C (AIR CONDITIONING) COMPRESSOR CONTROL SOLENOID

Ignition OFF.

Connect BJB fuse 42 (15A).

Disconnect A/C Compressor Control Solenoid C1110 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1110-2		Ground

Is the voltage greater than 11 volts?

Yes	GO to R3

No	VERIFY the BJB fuse 42 (15A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short.

R3 CHECK THE A/C (AIR CONDITIONING) COMPRESSOR DISPLACEMENT CONTROL SOLENOID PWM (PULSE WIDTH MODULATION) CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Disconnect PCM 2.3L C1551B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1110-1	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to R4

No	REPAIR the circuit.

R4 CHECK THE A/C (AIR CONDITIONING) COMPRESSOR DISPLACEMENT CONTROL SOLENOID PWM (PULSE WIDTH MODULATION) CIRCUIT FOR A SHORT TO VOLTAGE

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1110-1	V	Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to R5

R5 CHECK THE A/C (AIR CONDITIONING) COMPRESSOR DISPLACEMENT CONTROL SOLENOID PWM (PULSE WIDTH MODULATION) CIRCUIT FOR AN OPEN

Ignition OFF.

Measure:

2.3L

Positive Lead	Measurement / Action	Negative Lead
C1110-1	Ω	C1551B-41

Is the resistance less than 3 ohms?

Yes	INSTALL a new A/C compressor. For 2.3L REFER to: Air Conditioning (A/C) Compressor - 2.3L EcoBoost (201kW/273PS) . CLEAR the DTC and REPEAT the self-test. If the DTC returns, GO to R6

No	REPAIR the circuit.

R6 CHECK FOR CORRECT PCM (POWERTRAIN CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all PCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the PCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PCM. For 2.3L, REFER to: Powertrain Control Module (PCM) .

No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > CLIMATE CONTROL SYSTEM - VEHICLES WITH: DUAL AUTOMATIC TEMPERATURE CONTROL (DATC) > PINPOINT TEST(S) > PINPOINT TEST S : P193E

Refer to Automatic Climate Control System for schematic and connector information.

Normal Operation and Fault Conditions

The PCM controls the A/C compressor clutch field coil based on messages received from the BCM over the HS-CAN. When the FCIM determines it is necessary to activate the A/C compressor due to driver request or automatic climate control settings, the FCIM sends a message to the BCM over the MS-CAN, the BCM then sends a message to the PCM to activate the A/C compressor.

An internal failure of the PCM, BCM or FCIM, or a failure in the MS-CAN or HS-CAN, causes the PCM to set a DTC.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions

P193E	A/C Clutch Request Signal	This DTC sets when the PCM does not receive the A/C enable request from the BCM.

Possible Sources

- Network concerns
- BCM
- PCM
- FCIM

DIAGNOSIS AND TESTING > CLIMATE CONTROL SYSTEM - VEHICLES WITH: DUAL AUTOMATIC TEMPERATURE CONTROL (DATC) > PINPOINT TEST(S) > PINPOINT TEST S : P193E > PINPOINT TEST S : P193E

S1 VERIFY THE CUSTOMER CONCERN

Ignition ON.

Verify there is an observable symptom present.

Is an observable symptom present?

Yes	GO to S2

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

S2 CHECK THE COMMUNICATION NETWORK

Using a diagnostic scan tool, carry out the Network Test.

Do the BCM, PCM and the FCIM pass the Network Test?

Yes	GO to S3

No	DIAGNOSE the BCM, PCM or FCIM does not communicate with the diagnostic scan tool. REFER to: MODULE COMMUNICATIONS NETWORK .

S3 CHECK THE PCM (POWERTRAIN CONTROL MODULE) A/C (AIR CONDITIONING) REQUEST SIGNAL (AC_REQ) PID (PARAMETER IDENTIFICATION)

Start the engine.

Using a diagnostic scan tool, monitor the PCM AC_REQ PID.

On the HVAC controls, select PANEL mode, then press the A/C button (indicator ON).

Does the AC_REQ PID display YES when the A/C button indicator is illuminated?

Yes	GO to S7

No	GO to S4

S4 CHECK THE FCIM (FRONT CONTROLS INTERFACE MODULE) A/C (AIR CONDITIONING) SWITCH (CC_SW_AC) PID (PARAMETER IDENTIFICATION)

Using a diagnostic scan tool, monitor the FCIM CC_SW_AC PID while pressing and releasing the A/C button.

Does the PID display Active when the A/C button indicator is illuminated?

Yes	GO to S6

No	GO to S5

S5 CHECK FOR CORRECT FCIM (FRONT CONTROLS INTERFACE MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all FCIM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect all FCIM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new FCIM. Refer to the appropriate article for the procedure.

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

S6 VERIFY CORRECT BCM (BODY CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all BCM electrical connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals or pins

pushed-out pins - install new pins as necessary

Reconnect all BCM electrical connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

S7 VERIFY CORRECT PCM (POWERTRAIN CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all PCM electrical connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals or pins

pushed-out pins - install new pins as necessary

Reconnect all PCM electrical connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PCM. For 2.3L, REFER to: Powertrain Control Module (PCM) . For 3.7L, REFER to: Powertrain Control Module (PCM) . For 5.0L, REFER to: Powertrain Control Module (PCM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > CLIMATE CONTROL SYSTEM - VEHICLES WITH: ELECTRONIC MANUAL TEMPERATURE CONTROL (EMTC) > DTC CHART: FRONT CONTROLS INTERFACE MODULE (FCIM) - ELECTRONIC MANUAL TEMPERATURE CONTROL (EMTC)

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

Network Diagnostic Trouble Codes (DTCs) (U-codes) are often a result of intermittent concerns such as damaged wiring or low battery voltage occurrences. Additionally, vehicle repair procedures, such as module reprogramming, often set network Diagnostic Trouble Codes (DTCs). Replacing a module to resolve a network DTC is unlikely to resolve the concern. To prevent repeat network DTC concerns, inspect all network wiring, especially connectors. Test the vehicle battery. REFER to: BATTERY, MOUNTING AND CABLES .

FCIM - Electronic Manual Temperature Control (EMTC) DTC CHART

DTC	Description	Action
B105A:12	Cabin Temperature Sensor Fan: Circuit Short To Battery	GO to PINPOINT TEST P : B105A:12, B105A:14, B1A61:11, B1A61:15, B1A69:12, B1A69:14
B105A:14	Cabin Temperature Sensor Fan: Circuit Short To Ground or Open	GO to PINPOINT TEST P : B105A:12, B105A:14, B1A61:11, B1A61:15, B1A69:12, B1A69:14
B1081:07	Left Temperature Damper Motor: Mechanical Failure	INSPECT for a binding or damaged linkage or door. REPAIR as necessary. If no condition is found, INSTALL a new driver side temperature door actuator. REFER to: Driver Side Temperature Door Actuator .
B1081:11	Left Temperature Damper Motor: Circuit Short To Ground	GO to PINPOINT TEST I : THE TEMPERATURE CONTROL IS INOPERATIVE OR DOES NOT OPERATE CORRECTLY
B1081:12	Left Temperature Damper Motor: Circuit Short To Battery	GO to PINPOINT TEST I : THE TEMPERATURE CONTROL IS INOPERATIVE OR DOES NOT OPERATE CORRECTLY
B1081:13	Left Temperature Damper Motor: Circuit Open	GO to PINPOINT TEST I : THE TEMPERATURE CONTROL IS INOPERATIVE OR DOES NOT OPERATE CORRECTLY
B1083:07	Recirculation Damper Motor: Mechanical Failure	INSPECT for a binding or damaged linkage or door. REPAIR as

		necessary. If no condition is found, INSTALL a new air inlet mode door actuator. REFER to: Air Inlet Door Actuator .
B1083:11	Recirculation Damper Motor: Circuit Short To Ground	GO to PINPOINT TEST D : THE AIR INLET DOOR IS INOPERATIVE
B1083:12	Recirculation Damper Motor: Circuit Short To Battery	GO to PINPOINT TEST D : THE AIR INLET DOOR IS INOPERATIVE
B1083:13	Recirculation Damper Motor: Circuit Open	GO to PINPOINT TEST D : THE AIR INLET DOOR IS INOPERATIVE
B1086:07	Air Distribution Damper Motor: Mechanical Failure	INSPECT for a binding or damaged linkage or door. REPAIR as necessary. If no condition is found, INSTALL a new air distribution door actuator. REFER to: Air Distribution Door Actuator .
B1086:11	Air Distribution Damper Motor: Circuit Short To Ground	GO to PINPOINT TEST E : INCORRECT OR ERRATIC DIRECTION OF AIRFLOW FROM OUTLETS
B1086:12	Air Distribution Damper Motor: Circuit Short To Battery	GO to PINPOINT TEST E : INCORRECT OR ERRATIC DIRECTION OF AIRFLOW FROM OUTLETS
B1086:13	Air Distribution Damper Motor: Circuit Open	GO to PINPOINT TEST E : INCORRECT OR ERRATIC DIRECTION OF AIRFLOW FROM OUTLETS
B10AF:11	Blower Fan Relay: Circuit Short To Ground	GO to PINPOINT TEST J : THE BLOWER MOTOR IS INOPERATIVE
B10AF:15	Blower Fan Relay: Circuit Short To Battery or Open	For an inoperative blower motor, GO to PINPOINT TEST J : THE BLOWER MOTOR IS INOPERATIVE For all other blower motor symptoms, GO to PINPOINT TEST K : THE BLOWER MOTOR DOES NOT OPERATE CORRECTLY
B10B8:63	Push Buttons: Circuit / Component Protection Time-Out	This DTC sets when the buttons have been held down too long. ATTEMPT to clean buttons. CLEAR the Diagnostic Trouble Codes (DTCs) and REPEAT the self-test. If the DTC returns, INSTALL a new FCIM. Refer to the appropriate

		article for the procedure.
B10B9:12	Blower Control: Circuit Short To Battery	GO to PINPOINT TEST J : THE BLOWER MOTOR IS INOPERATIVE
B10B9:14	Blower Control: Circuit Short To Ground or Open	For an inoperative blower motor, GO to PINPOINT TEST J : THE BLOWER MOTOR IS INOPERATIVE For all other blower motor symptoms, GO to PINPOINT TEST K : THE BLOWER MOTOR DOES NOT OPERATE CORRECTLY
B11E5:12	Left HVAC Damper Position Sensor: Circuit Short To Battery	GO to PINPOINT TEST I : THE TEMPERATURE CONTROL IS INOPERATIVE OR DOES NOT OPERATE CORRECTLY
B11E5:14	Left HVAC Damper Position Sensor: Circuit Short To Ground or Open	GO to PINPOINT TEST I : THE TEMPERATURE CONTROL IS INOPERATIVE OR DOES NOT OPERATE CORRECTLY
B11E7:12	Air Distribution Damper Position Sensor: Circuit Short To Battery	GO to PINPOINT TEST E : INCORRECT OR ERRATIC DIRECTION OF AIRFLOW FROM OUTLETS
B11E7:14	Air Distribution Damper Position Sensor: Circuit Short To Ground or Open	GO to PINPOINT TEST E : INCORRECT OR ERRATIC DIRECTION OF AIRFLOW FROM OUTLETS
B11F0:12	Air Intake Damper Position Sensor: Circuit Short To Battery	GO to PINPOINT TEST D : THE AIR INLET DOOR IS INOPERATIVE
B11F0:14	Air Intake Damper Position Sensor: Circuit Short To Ground or Open	GO to PINPOINT TEST D : THE AIR INLET DOOR IS INOPERATIVE
B1A61:11	Cabin Temperature Sensor: Circuit Short To Ground	GO to PINPOINT TEST P : B105A:12, B105A:14, B1A61:11, B1A61:15, B1A69:12, B1A69:14
B1A61:15	Cabin Temperature Sensor: Circuit Short To Battery or Open	GO to PINPOINT TEST P : B105A:12, B105A:14, B1A61:11, B1A61:15, B1A69:12, B1A69:14
B1A69:12	Humidity Sensor: Circuit Short To Battery	GO to PINPOINT TEST P : B105A:12, B105A:14, B1A61:11, B1A61:15, B1A69:12, B1A69:14
B1A69:14	Humidity Sensor: Circuit Short To Ground or Open	GO to PINPOINT TEST P : B105A:12, B105A:14, B1A61:11, B1A61:15, B1A69:12, B1A69:14

B1B71:11	Evaporator Temperature Sensor: Circuit Short To Ground	GO to PINPOINT TEST L : B1B71:11, B1B71:15
B1B71:15	Evaporator Temperature Sensor: Circuit Short To Battery or Open	GO to PINPOINT TEST L : B1B71:11, B1B71:15
C1B14:11	Sensor Supply Voltage A: Circuit Short To Ground	GO to PINPOINT TEST M : C1B14:11, C1B14:12
C1B14:12	Sensor Supply Voltage A: Circuit Short To Battery	GO to PINPOINT TEST M : C1B14:11, C1B14:12
All Other FCIM Diagnostic Trouble Codes (DTCs) not listed in this chart	-	Refer to the appropriate article for the procedure.

DIAGNOSIS AND TESTING > CLIMATE CONTROL SYSTEM - VEHICLES WITH: ELECTRONIC MANUAL TEMPERATURE CONTROL (EMTC) > DTC CHART: POWERTRAIN CONTROL MODULE (PCM)

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. For information about these practices, REFER to: Diagnostic Methods .

Powertrain Control Module (PCM) DTC Chart

DTC	Description	Action
P0532	A/C Refrigerant Pressure Sensor "A" Circuit Low	GO to PINPOINT TEST A : P0532, P0533
P0533	A/C Refrigerant Pressure Sensor "A" Circuit High	GO to PINPOINT TEST A : P0532, P0533
P0645	A/C Clutch Relay Control Circuit	GO to PINPOINT TEST B : P0645
P06A0	Variable A/C Compressor Control Circuit	GO to PINPOINT TEST N : P06A0
P1464	A/C Demand Out Of Self Test Range	If the HVAC selector was not powered off, POWER the HVAC off, CLEAR the Diagnostic Trouble Codes (DTCs) and REPEAT the self-test. If the DTC returns, GO to PINPOINT TEST H : THE A/C (AIR CONDITIONING) IS ALWAYS ON - A/C (AIR CONDITIONING) MODE ALWAYS COMMANDED ON
P193E	A/C Clutch Request Signal	GO to PINPOINT TEST O : P193E
All Other PCM Diagnostic Trouble Codes (DTCs)	-	For 2.3L PCM DTC Chart, REFER to: Electronic Engine Controls . For 3.7L PCM DTC Chart, REFER to: Electronic Engine Controls .

		For 5.0L PCM DTC Chart, REFER to: Electronic Engine Controls .

DIAGNOSIS AND TESTING > CLIMATE CONTROL SYSTEM - VEHICLES WITH: ELECTRONIC MANUAL TEMPERATURE CONTROL (EMTC) > SYMPTOM CHART(S)

Symptom Chart: Climate Control - Electronic Manual Temperature Control (EMTC)

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

Symptom Chart

Condition	Possible Sources	Actions
A module does not communicate with the diagnostic scan tool	Fuse(s) Wiring, terminals or connectors	REFER to: MODULE COMMUNICATIONS NETWORK .
Externally Controlled Variable Displacement Compressor (EVDC) poor performance/does not operate correctly	Refer to Pinpoint Test	GO to PINPOINT TEST N : P06A0
Unable To Duplicate The Customer Concern And No Diagnostic Trouble Codes (DTCs) Present	Refer to Pinpoint Test	GO to PINPOINT TEST C : UNABLE TO DUPLICATE THE CUSTOMER CONCERN AND NO DIAGNOSTIC TROUBLE CODES (DTCS) PRESENT
Reduced outlet airflow	Plugged cabin air filter	INSPECT the cabin air filter. REFER to: Cabin Air Filter . If OK, DIAGNOSE for low refrigerant charge, A/C always commanded on or blower motor not operating correctly.
	Improper refrigerant level	CARRY OUT the refrigerant system tests. REFER to: Refrigerant System Tests - 2.3L EcoBoost (201kW/273PS) . REFER to: Refrigerant System Tests - 3.7L Duratec (227kW/301PS) . REFER to: Refrigerant System Tests - 5.0L 32V Ti-VCT . If refrigerant charge is OK, GO to PINPOINT TEST H : THE A/C (AIR CONDITIONING) IS ALWAYS ON - A/C (AIR CONDITIONING) MODE ALWAYS COMMANDED ON

	Blower motor	GO to PINPOINT TEST K : THE BLOWER MOTOR DOES NOT OPERATE CORRECTLY
The air inlet door is inoperative	Refer to Pinpoint Test	GO to PINPOINT TEST D : THE AIR INLET DOOR IS INOPERATIVE
Incorrect or erratic direction of airflow from outlets	Refer to Pinpoint Test	GO to PINPOINT TEST E : INCORRECT OR ERRATIC DIRECTION OF AIRFLOW FROM OUTLETS
Insufficient, erratic or no heat	Refer to Pinpoint Test	GO to PINPOINT TEST F : INSUFFICIENT, ERRATIC OR NO HEAT .
The A/C is inoperative	Refer to Pinpoint Test	GO to PINPOINT TEST G : THE A/C (AIR CONDITIONING) IS INOPERATIVE .
The A/C is always on - A/C mode always commanded ON	Refer to Pinpoint Test	GO to PINPOINT TEST H : THE A/C (AIR CONDITIONING) IS ALWAYS ON - A/C (AIR CONDITIONING) MODE ALWAYS COMMANDED ON
Temperature control is inoperative/does not operate correctly	Refer to Pinpoint Test	GO to PINPOINT TEST I : THE TEMPERATURE CONTROL IS INOPERATIVE OR DOES NOT OPERATE CORRECTLY
The blower motor is inoperative	Refer to Pinpoint Test	GO to PINPOINT TEST J : THE BLOWER MOTOR IS INOPERATIVE
The blower motor does not operate correctly	Refer to Pinpoint Test	GO to PINPOINT TEST K : THE BLOWER MOTOR DOES NOT OPERATE CORRECTLY
Insufficient A/C cooling	Improper refrigerant level	CARRY OUT the refrigerant system tests. REFER to: Refrigerant System Tests - 2.3L EcoBoost (201kW/273PS) . REFER to: Refrigerant System Tests - 3.7L Duratec (227kW/301PS) . REFER to: Refrigerant System Tests - 5.0L 32V Ti-VCT .
	Temperature door actuator	GO to PINPOINT TEST I : THE TEMPERATURE CONTROL IS INOPERATIVE OR DOES NOT OPERATE CORRECTLY
A/C pressure relief valve discharging	A/C pressure relief valve	CHECK the high side system pressure. REFER to: Specifications . If the pressure is below the A/C pressure relief valve

		open pressure, INSTALL a new A/C pressure relief valve. Refer to the appropriate article for the procedure.
	High system pressure	CHECK the high side system pressure. REFER to: Specifications . If the system pressure is above the A/C pressure relief valve open pressure, REPAIR the A/C system for a restriction.
Climate control does not operate only when remote start is used	IPC information display settings Non-Ford approved remote start system installed	VERIFY Remote Start - Message Center Set To Auto, or Remote Start - Message Center Set To Last User Settings. REFER to: Climate Control System - Vehicles With: Electronic Manual Temperature Control (EMTC) - System Operation and Component Description . VERIFY module communications network operation. DIAGNOSE Diagnostic Trouble Codes (DTCs) if present.

Symptom Chart: Noise, Vibration, and Harshness (NVH)

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

Symptom Chart

Condition	Possible Sources	Actions
Noisy A/C compressor	A/C compressor pulley bearing worn	INSPECT the A/C compressor pulley bearing for roughness. If bearing roughness is found, INSTALL a new A/C compressor clutch and A/C clutch field coil. REFER to: Air Conditioning (A/C) Clutch and Air Conditioning (A/C) Clutch Field Coil .
Excessive hissing from the plenum when the A/C is on	Incorrect A/C refrigerant level	CHECK the A/C refrigerant level. REFER to: Refrigerant System Tests - 2.3L EcoBoost (201kW/273PS) . REFER to: Refrigerant System Tests - 3.7L Duratec (227kW/301PS) . REFER to: Refrigerant System Tests - 5.0L 32V Ti-VCT .

DIAGNOSIS AND TESTING > CLIMATE CONTROL SYSTEM - VEHICLES WITH:

ELECTRONIC MANUAL TEMPERATURE CONTROL (EMTC) > PINPOINT TEST(S) > PINPOINT TEST A : P0532, P0533

Refer to Manual Climate Control System for schematic and connector information.

Normal operation and Fault Conditions

The A/C pressure transducer receives a ground from the PCM. A 5-volt reference voltage is supplied to the A/C pressure transducer from the PCM. The A/C pressure transducer then sends a voltage to the PCM to indicate the A/C pressure.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
P0532	A/C Refrigerant Pressure Sensor "A" Circuit Low	This DTC sets if the feedback voltage is less than 0.26 volt for at least 2 seconds and the ambient air temperature is greater than 0 °C (32 °F).
P0533	A/C Refrigerant Pressure Sensor "A" Circuit High	This DTC sets if the feedback voltage is greater than 4.95 volts for at least 2 seconds and the ambient air temperature is greater than 0 °C (32 °F).

Possible Sources

- Wiring, terminals or connectors
- A/C pressure transducer
- PCM

Visual Inspection and Diagnostic Pre-checks

- Inspect for loose or corroded PCM and A/C pressure transducer connections.

DIAGNOSIS AND TESTING > CLIMATE CONTROL SYSTEM - VEHICLES WITH: ELECTRONIC MANUAL TEMPERATURE CONTROL (EMTC) > PINPOINT TEST(S) > PINPOINT TEST A : P0532, P0533 > PINPOINT TEST A : P0532, P0533

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may damage the connector.

A1 COMPARE THE PCM (POWERTRAIN CONTROL MODULE) PRESSURE SENSOR (ACP_PRESS) PID (PARAMETER IDENTIFICATION) WITH THE MANIFOLD GAUGE SET READINGS

Allow the A/C system to stabilize to the outside ambient temperature.

Ignition ON.

Using a diagnostic scan tool, view PCM Parameter Identifications (PIDs).

With the manifold gauge set connected, compare the pressure readings of the manifold gauge set and the PCM ACP_PRESS PID.

Are the pressure values of the manifold gauge set and the ACP_PRESS PCM PID within ± 103 kPa (15 psi)?

Yes	IGNORE the Diagnostic Trouble Codes (DTCs). REFER to the Symptom Chart .

No	GO to A2

A2 CHECK THE A/C (AIR CONDITIONING) PRESSURE SENSOR CIRCUITS FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect PCM, 2.3L C1551B , 3.7L C1381B or 5.0L and 5.2L C175B .

Disconnect A/C pressure transducer C1260 .

Disconnect Turbocharger boost pressure sensor C1588 (if equipped).

Disconnect Generator current sensor C1645 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1260-1		Ground
C1260-2		Ground
C1260-3		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to A3

A3 CHECK THE A/C (AIR CONDITIONING) PRESSURE SENSOR CIRCUITS FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1260-1	Ω	Ground
C1260-2	Ω	Ground
C1260-3	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to A4

No	REPAIR the circuit.

A4 CHECK THE A/C (AIR CONDITIONING) PRESSURE SENSOR CIRCUITS FOR AN OPEN

Measure:

2.3L

Positive Lead	Measurement / Action	Negative Lead
C1260-1	Ω	C1551B-56
C1260-2	Ω	C1551B-31
C1260-3	Ω	C1551B-52

3.7L

Positive Lead	Measurement / Action	Negative Lead
C1260-1	Ω	C1381B-18
C1260-2	Ω	C1381B-52
C1260-3	Ω	C1381B-11

5.0L or 5.2L

Positive Lead	Measurement / Action	Negative Lead
C1260-1	Ω	C175B-18
C1260-2	Ω	C175B-52
C1260-3	Ω	C175B-11

Are the resistances less than 3 ohms?

Yes	GO to A5

No	REPAIR the circuit.

A5 CHECK THE A/C (AIR CONDITIONING) PRESSURE SENSOR CIRCUITS FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1260-1	Ω	C1260-2
C1260-1	Ω	C1260-3
C1260-2	Ω	C1260-3

Are the resistances greater than 10, 000 ohms?

Yes	INSTALL a new A/C pressure transducer. REFER to: Air Conditioning (A/C) Pressure Transducer . TEST the system for normal operation. If the concern is still present, GO to A6

No	REPAIR the circuits.

A6 CHECK FOR CORRECT PCM (POWERTRAIN CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all PCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect all PCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PCM. For 2.3L, REFER to: Powertrain Control Module (PCM) . For 3.7L, REFER to: Powertrain Control Module (PCM) . For 5.0L, REFER to: Powertrain Control Module (PCM) .

No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > CLIMATE CONTROL SYSTEM - VEHICLES WITH: ELECTRONIC MANUAL TEMPERATURE CONTROL (EMTC) > PINPOINT TEST(S) > PINPOINT TEST B : P0645

Refer to Manual Climate Control System for schematic and connector information.

Normal Operation and Fault Conditions

Voltage is provided to the A/C clutch relay. When A/C is requested and A/C line pressures allow, a ground is provided to the A/C clutch relay coil from the PCM, energizing the A/C clutch relay.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
P0645	A/C Clutch Relay Control Circuit	This DTC sets when the PCM grounds the relay circuit and more voltage than expected is detected on the relay circuit. This DTC also sets when the relay circuit is off and no voltage is detected on the relay circuit. The PCM expects to detect voltage coming through the relay coil to the relay circuit when it is not grounding it.

Possible Sources

- Wiring, terminals or connectors
- A/C clutch relay
- PCM

Visual Inspection and Diagnostic Pre-checks

- Inspect BJB fuses 23 (10A) and 42 (15A).

DIAGNOSIS AND TESTING > CLIMATE CONTROL SYSTEM - VEHICLES WITH: ELECTRONIC MANUAL TEMPERATURE CONTROL (EMTC) > PINPOINT TEST(S) > PINPOINT TEST B : P0645 > PINPOINT TEST B : P0645

NOTE: Use the correct probe adapter(s) from the Flex Probe Kit when taking

measurements. Failure to use the correct probe adapter(s) may damage the connector.

B1 CHECK THE VOLTAGE TO THE A/C (AIR CONDITIONING) CLUTCH RELAY VOLTAGE SUPPLY CIRCUITS

Ignition OFF.

Disconnect A/C clutch relay.

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
A/C clutch relay socket 1		Ground
A/C clutch relay socket 3		Ground

Are the voltages greater than 11 volts?

Yes	GO to B2

No	VERIFY BJB fuses 23 (10A) and 42 (15A) are OK. If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short. If OK, REPAIR the circuit.

B2 CHECK THE A/C (AIR CONDITIONING) CLUTCH RELAY

Carry out the component test on the A/C clutch relay. Refer to Component Testing for schematic and connector information.

Did the relay pass the component test?

Yes	GO to B3

No	INSTALL a new A/C clutch relay.

B3 CHECK THE A/C (AIR CONDITIONING) CLUTCH RELAY CONTROL CIRCUIT FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect A/C clutch relay.

Disconnect PCM, 2.3L C1551B , 3.7L C1381B or 5.0L and 5.2L C175B .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
A/C clutch relay socket 2		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to B4

B4 CHECK THE A/C (AIR CONDITIONING) CLUTCH RELAY CONTROL CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
A/C clutch relay socket 2	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to B5

No	REPAIR the circuit.

B5 CHECK THE A/C (AIR CONDITIONING) CLUTCH RELAY CONTROL CIRCUIT FOR AN OPEN

Measure:

2.3L

Positive Lead	Measurement / Action	Negative Lead
A/C clutch relay socket 2	Ω	C1551B-2

3.7L

Positive Lead	Measurement / Action	Negative Lead
A/C clutch relay socket 2	Ω	C1381B-15

5.0L or 5.2L

Positive Lead	Measurement / Action	Negative Lead
A/C clutch relay socket 2	Ω	C175B-15

Is the resistance less than 3 ohms?

Yes	GO to B6

No	REPAIR the circuit.

B6 CHECK FOR CORRECT PCM (POWERTRAIN CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all PCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect all PCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PCM. For 2.3L, REFER to: Powertrain Control Module (PCM) . For 3.7L, REFER to: Powertrain Control Module (PCM) . For 5.0L, REFER to: Powertrain Control Module (PCM) .

No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > CLIMATE CONTROL SYSTEM - VEHICLES WITH: ELECTRONIC MANUAL TEMPERATURE CONTROL (EMTC) > PINPOINT TEST(S) > PINPOINT TEST C : UNABLE TO DUPLICATE THE CUSTOMER CONCERN AND NO DIAGNOSTIC TROUBLE CODES (DTCS) PRESENT

This diagnostic procedure tests the functions of the HVAC system and identifies the correct HVAC symptom pinpoint test.

Normal Operation and Fault Conditions

System Operation REFER to: Climate Control System - Vehicles With: Electronic Manual Temperature Control (EMTC) - System Operation and Component Description .

DIAGNOSIS AND TESTING > CLIMATE CONTROL SYSTEM - VEHICLES WITH: ELECTRONIC MANUAL TEMPERATURE CONTROL (EMTC) > PINPOINT TEST(S) > PINPOINT TEST C : UNABLE TO DUPLICATE THE CUSTOMER CONCERN AND NO DIAGNOSTIC TROUBLE CODES (DTCS) PRESENT > PINPOINT TEST C : UNABLE TO DUPLICATE THE CUSTOMER CONCERN AND NO DIAGNOSTIC TROUBLE CODES (DTCS) PRESENT

C1 CHECK THE PCM (POWERTRAIN CONTROL MODULE) FOR DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition ON.

Using a scan tool, perform PCM self-test.

Are any climate control related Diagnostic Trouble Codes (DTCs) present?

Yes	REFER to the PCM DTC chart .

No	GO to C2

C2 CHECK THE FCIM (FRONT CONTROLS INTERFACE MODULE) FOR DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition ON.

Using a diagnostic scan tool, perform FCIM self-test.

Are any Diagnostic Trouble Codes (DTCs) present?

Yes	REFER to the FCIM DTC chart .

No	GO to C3

C3 CHECK THE BLOWER MOTOR OPERATION

Ignition ON.

Select panel mode.

Observe blower motor operation and select each blower motor speed.

Does the blower motor operate in all ranges?

Yes	GO to C4

No	If the blower motor does not operate in any setting, GO to PINPOINT TEST J : THE BLOWER MOTOR IS INOPERATIVE If the blower motor does not correctly change

	speeds or shut off, GO to PINPOINT TEST K : THE BLOWER MOTOR DOES NOT OPERATE CORRECTLY .

C4 CHECK AIRFLOW OPERATION

Select the highest blower motor setting.

While observing the airflow, select each of the airflow positions (panel, panel/floor, floor, floor/defrost, defrost).

Is the airflow directed to the correct outlets?

Yes	GO to C5

No	GO to PINPOINT TEST E : INCORRECT OR ERRATIC DIRECTION OF AIRFLOW FROM OUTLETS .

C5 VERIFY TEMPERATURE CONTROL OPERATION

Start the vehicle and allow it to reach normal operating temperature.

With the A/C off, select panel mode.

Change the driver and passenger temperature settings from the coldest to the warmest and back to the coldest.

Does the temperature change between very warm to cool?

Yes	GO to C6

No	If the temperature does not get very warm, GO to PINPOINT TEST F : INSUFFICIENT, ERRATIC OR NO HEAT If the temperature does not change at all, GO to PINPOINT TEST I : THE TEMPERATURE CONTROL IS INOPERATIVE OR DOES NOT OPERATE CORRECTLY .

C6 VERIFY THE AIR CONDITIONING COMPRESSOR DOES NOT ENGAGE WITH A/C (AIR CONDITIONING) OFF

With the engine running and the A/C off, select panel mode.

Select the coldest temperature setting.

Is the outlet temperature close to ambient air temperature?

Yes	GO to C7

No	If the temperature is warmer than ambient air temperature, GO to PINPOINT TEST I : THE TEMPERATURE CONTROL IS INOPERATIVE OR DOES NOT OPERATE CORRECTLY If the outlet temperature is significantly colder than ambient air temperature and the A/C

	compressor clutch is engaged, GO to PINPOINT TEST H : THE A/C (AIR CONDITIONING) IS ALWAYS ON - A/C (AIR CONDITIONING) MODE ALWAYS COMMANDED ON .

C7 VERIFY THE A/C (AIR CONDITIONING) COMPRESSOR IS OPERATIONAL IN THE A/C (AIR CONDITIONING) MODE

Make sure the ambient air temperature is above 0 °C (32 °F).

With the engine running, select panel mode.

Press the A/C button (indicator on).

Is the A/C compressor operational when the panel and A/C button (indicator on) is pressed?

Yes	GO to C8

No	GO to PINPOINT TEST G : THE A/C (AIR CONDITIONING) IS INOPERATIVE .

C8 CHECK THE RECIRCULATED AIR OPERATION

With the engine running, press the recirculated air button (indicator off).

Select panel mode.

Select the highest blower motor setting.

Observe airflow noise.

Press the recirculated air button (indicator on).

Does the airflow noise increase when the recirculated air mode is selected (indicator on)?

Yes	The system is operating correctly.

No	GO to PINPOINT TEST D : THE AIR INLET DOOR IS INOPERATIVE

DIAGNOSIS AND TESTING > CLIMATE CONTROL SYSTEM - VEHICLES WITH: ELECTRONIC MANUAL TEMPERATURE CONTROL (EMTC) > PINPOINT TEST(S) > PINPOINT TEST D : THE AIR INLET DOOR IS INOPERATIVE

Refer to Manual Climate Control System for schematic and connector information.

Normal Operation and Fault Conditions

To rotate the air inlet door actuator, the FCIM supplies voltage and ground to the air inlet door actuator through the door actuator motor circuits. To reverse the air inlet door actuator rotation, the FCIM reverses the voltage and ground circuits. The air inlet door actuator feedback resistors are supplied a

ground from the FCIM by the air inlet door actuator return circuits and a 5-volt reference voltage on the air inlet door actuator reference circuits. The FCIM uses the actuator feedback resistor wiper arm position and the voltage on the air distribution door actuator feedback circuits to determine the air inlet door actuator position.

During an actuator calibration cycle, the FCIM drives the air inlet door until the door reaches both internal stops in the FCIM case. If the air inlet door is temporarily obstructed or binding during a calibration cycle, the FCIM may interpret this as the actual end of travel for the door. When this condition occurs and the FCIM commands the actuator to its end of travel, the air intake may not be from the expected source.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1083:11	Recirculation Damper Motor: Circuit Short To Ground	This DTC sets when the module senses lower than expected voltage on an actuator motor circuit when voltage is applied to drive the motor, indicating a short to ground. The motor can move only in one direction.
B1083:12	Recirculation Damper Motor: Circuit Short To Battery	This DTC sets when the module senses higher than expected voltage on the actuator motor circuit when ground is applied to drive the motor, indicating a short to voltage. The motor can move only in one direction.
B1083:13	Recirculation Damper Motor: Circuit Open	This DTC sets when the module senses no voltage on the actuator motor circuit when ground is applied to drive the motor, indicating an open circuit. The motor cannot move.
B11F0:12	Air Intake Damper Position Sensor: Circuit Short to Battery	This DTC sets when the module senses greater than 5 volts on the actuator feedback circuit, indicating a short to voltage.
B11F0:14	Air Intake Damper Position Sensor: Circuit Short to Ground or Open	This DTC sets when the module senses less than 1 volt on the actuator feedback circuit, indicating an open circuit or a short to ground.

Possible Sources

- Wiring, terminals or connectors
- Air inlet door actuator

- Air inlet door binding or stuck
- FCIM

DIAGNOSIS AND TESTING > CLIMATE CONTROL SYSTEM - VEHICLES WITH: ELECTRONIC MANUAL TEMPERATURE CONTROL (EMTC) > PINPOINT TEST(S) > PINPOINT TEST D : THE AIR INLET DOOR IS INOPERATIVE > PINPOINT TEST D : THE AIR INLET DOOR IS INOPERATIVE

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may damage the connector.

D1 CHECK THE AIR INLET DOOR ACTUATOR CIRCUITS FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect Air distribution door actuator C232 .

Disconnect In-vehicle temperature and humidity sensor C233 .

Disconnect Driver side temperature door actuator C2091 .

Disconnect Air inlet door actuator C282 .

Ignition ON.

Disconnect FCIM C2402A .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C282-1	V	Ground
C282-2	V	Ground
C282-3	V	Ground
C282-5	V	Ground
C282-6	V	Ground

Is there any voltage present?

Yes	REPAIR the circuit.

No	GO to D2

D2 CHECK THE AIR INLET DOOR ACTUATOR CIRCUITS FOR A SHORT TO GROUND

Connect FCIM C2402A .

Ignition OFF.

Disconnect FCIM C2402A .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C282-1	Ω	Ground
C282-2	Ω	Ground
C282-3	Ω	Ground
C282-5	Ω	Ground
C282-6	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to D3

No	REPAIR the circuit.

D3 CHECK THE AIR INLET DOOR ACTUATOR CIRCUITS FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C282-1	Ω	C2402A-2
C282-2	Ω	C2402A-16
C282-3	Ω	C2402A-3
C282-5	Ω	C2402A-24
C282-6	Ω	C2402A-25

Are the resistances less than 3 ohms?

Yes	GO to D4

No	REPAIR the circuit.

D4 CHECK THE AIR INLET DOOR ACTUATOR CIRCUITS FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C282-1	Ω	C282-2
C282-1	Ω	C282-3
C282-1	Ω	C282-5
C282-1	Ω	C282-6
C282-2	Ω	C282-3
C282-2	Ω	C282-5
C282-2	Ω	C282-6
C282-3	Ω	C282-5
C282-3	Ω	C282-6
C282-5	Ω	C282-6

Are the resistances greater than 10, 000 ohms?

Yes	INSTALL a new air inlet door actuator. REFER to: Air Inlet Door Actuator . TEST the system for normal operation. If the concern is still present, GO to D5

No	REPAIR the circuit.

D5 CHECK FOR CORRECT FRONT CONTROLS INTERFACE MODULE OPERATION

Disconnect and inspect all FCIM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect all FCIM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new FCIM. Refer to the appropriate article for the procedure.

No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > CLIMATE CONTROL SYSTEM - VEHICLES WITH: ELECTRONIC MANUAL TEMPERATURE CONTROL (EMTC) > PINPOINT TEST(S) > PINPOINT TEST E : INCORRECT OR ERRATIC DIRECTION OF AIRFLOW FROM OUTLETS

Refer to Manual Climate Control System for schematic and connector information.

Normal Operation and Fault Conditions

To rotate the air distribution door actuator, the FCIM supplies voltage and ground to the air distribution door actuator through the door actuator motor circuits. To reverse the air distribution door actuator rotation, the FCIM reverses the voltage and ground circuits. The air distribution door actuator feedback resistors are supplied a ground from the FCIM by the air distribution door actuator return circuits and a 5-volt reference voltage on the air distribution door actuator reference circuits. The FCIM uses the actuator feedback resistor wiper arm position and the voltage on the air distribution door actuator feedback circuits to determine the air distribution door actuator position.

During an actuator calibration cycle, the FCIM drives the air distribution door until the door reaches both internal stops in the FCIM case. If the air distribution door is temporarily obstructed or binding during a calibration cycle, the FCIM may interpret this as the actual end of travel for the door. When this condition occurs and the FCIM commands the actuator to its end of travel, the airflow may not be from the expected outlets.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1086:11	Air Distribution Damper Motor: Circuit Short to Ground	This DTC sets when the module senses lower than expected voltage on an actuator motor circuit when voltage is applied to drive the motor, indicating a short to ground. The motor can move only in one direction.
B1086:12	Air Distribution Damper Motor: Circuit Short to Battery	This DTC sets when the module senses higher than expected voltage on the actuator motor circuit when ground is applied to drive the motor, indicating a short to voltage. The motor can move only in one direction.
B1086:13	Air Distribution Damper Motor: Circuit Open	This DTC sets when the module senses no voltage on the actuator motor circuit when ground is applied to drive the motor,

		indicating an open circuit. The motor cannot move.
B11E7:12	Air Distribution Damper Position Sensor: Circuit Short to Battery	This DTC sets when the module senses greater than 5 volts on the actuator feedback circuit, indicating a short to voltage.
B11E7:14	Air Distribution Damper Position Sensor: Circuit Short to Ground or Open	This DTC sets when the module senses less than 1 volt on the actuator feedback circuit, indicating an open circuit or a short to ground.

Possible Sources

- Wiring, terminals or connectors
- Air distribution door actuator
- Air distribution door binding or stuck
- FCIM

DIAGNOSIS AND TESTING > CLIMATE CONTROL SYSTEM - VEHICLES WITH: ELECTRONIC MANUAL TEMPERATURE CONTROL (EMTC) > PINPOINT TEST(S) > PINPOINT TEST E : INCORRECT OR ERRATIC DIRECTION OF AIRFLOW FROM OUTLETS > PINPOINT TEST E : INCORRECT OR ERRATIC DIRECTION OF AIRFLOW FROM OUTLETS

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may damage the connector.

E1 CHECK THE AIR DISTRIBUTION DOOR ACTUATOR CIRCUITS FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect In-vehicle temperature and humidity sensor C233 .

Disconnect Driver side temperature door actuator C2091 .

Disconnect Air inlet door actuator C282 .

Disconnect Air distribution door actuator C232 .

Ignition ON.

Disconnect FCIM C2402A .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C232-1		Ground
C232-2		Ground
C232-3		Ground
C232-5		Ground
C232-6		Ground

Is there any voltage present?

Yes	REPAIR the circuit.

No	GO to E2

E2 CHECK THE AIR DISTRIBUTION DOOR ACTUATOR CIRCUITS FOR A SHORT TO GROUND

Connect FCIM C2402A .

Ignition OFF.

Disconnect FCIM C2402A .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C232-1	Ω	Ground
C232-2	Ω	Ground
C232-3	Ω	Ground
C232-5	Ω	Ground
C232-6	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to E3

No	REPAIR the circuit.

E3 CHECK THE AIR DISTRIBUTION DOOR ACTUATOR CIRCUITS FOR AN OPEN

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C232-1	Ω	C2402A-2
C232-2	Ω	C2402A-22
C232-3	Ω	C2402A-3
C232-5	Ω	C2402A-20
C232-6	Ω	C2402A-21

Are the resistances less than 3 ohms?

Yes	GO to E4

No	REPAIR the circuit.

E4 CHECK THE AIR DISTRIBUTION DOOR ACTUATOR CIRCUITS FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C232-1	Ω	C232-2
C232-1	Ω	C232-3
C232-1	Ω	C232-5
C232-1	Ω	C232-6
C232-2	Ω	C232-3
C232-2	Ω	C232-5
C232-2	Ω	C232-6
C232-3	Ω	C232-5
C232-3	Ω	C232-6
C232-5	Ω	C232-6

Are the resistances greater than 10, 000 ohms?

Yes	INSTALL a new air distribution door actuator, REFER to: Air Distribution Door Actuator . TEST the system for normal operation. If the concern is still present, GO to E5

No	REPAIR the circuit.

E5 CHECK FOR CORRECT FCIM (FRONT CONTROLS INTERFACE MODULE) OPERATION

Disconnect and inspect all FCIM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect all FCIM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new FCIM. Refer to the appropriate article for the procedure.

No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > CLIMATE CONTROL SYSTEM - VEHICLES WITH: ELECTRONIC MANUAL TEMPERATURE CONTROL (EMTC) > PINPOINT TEST(S) > PINPOINT TEST F : INSUFFICIENT, ERRATIC OR NO HEAT

Normal Operation and Fault Conditions

When the engine is at operating temperature hot coolant flows from the coolant pump through the heater core and back to the coolant pump. Correct coolant temperatures are critical for good heater performance.

Possible Sources

- Wiring, terminals or connectors
- Temperature door actuator(s)
- Air trapped in the coolant system
- Heater core

Visual Inspection and Diagnostic Pre-checks

- Inspect for low engine coolant level.

DIAGNOSIS AND TESTING > CLIMATE CONTROL SYSTEM - VEHICLES WITH: ELECTRONIC MANUAL TEMPERATURE CONTROL (EMTC) > PINPOINT TEST(S) >

PINPOINT TEST F : INSUFFICIENT, ERRATIC OR NO HEAT > PINPOINT TEST F : INSUFFICIENT, ERRATIC OR NO HEAT

F1 CHECK FOR CORRECT ENGINE COOLANT LEVEL

Ignition OFF.

Check the engine coolant level.

Is the engine coolant at the correct level as indicated on the engine coolant recovery reservoir?

Yes	GO to F3

No	GO to F2

F2 CHECK THE ENGINE COOLING SYSTEM FOR LEAKS

Pressure test the cooling system for leaks. Refer to the appropriate article for the procedure.

Does the engine cooling system leak?

Yes	REPAIR the engine coolant leak. Refer to the appropriate article for the procedure. TEST the system for normal operation.

No	FILL and BLEED the cooling system. Refer to the appropriate article for the procedure. After filling and bleeding the cooling system, GO to F3

F3 CHECK FOR COOLANT FLOW TO THE HEATER CORE

Run the motor until it reaches normal operating temperature. Select the floor position on the control assembly. Set the temperature control to full warm and the blower to the lowest setting.

Increase engine speed to 3, 500 RPM and hold for 30 seconds.

Allow the engine to idle for 30 seconds.

Using a suitable temperature measuring device, check the heater core inlet hose to see if it is hot.

Is the heater core inlet hose hot?

Yes	GO to F4

No	BLEED the cooling system per the cooling system draining and vacuum filling general procedure. Refer to the appropriate article for the procedure. After bleeding the cooling system, GO to F4

F4 CHECK FOR A PLUGGED OR RESTRICTED HEATER CORE

Using a suitable temperature measuring device, measure the heater core outlet hose temperature.

Is the heater core outlet hose temperature similar to the inlet hose temperature (within approximately 6-17 °C [10-30 °F])?

Yes	DIAGNOSE for a blend door actuator not operating correctly. For inadequate temperature, GO to PINPOINT TEST I : THE TEMPERATURE CONTROL IS INOPERATIVE OR DOES NOT OPERATE CORRECTLY

No	INSTALL a new heater core. REFER to: Heater Core .

DIAGNOSIS AND TESTING > CLIMATE CONTROL SYSTEM - VEHICLES WITH: ELECTRONIC MANUAL TEMPERATURE CONTROL (EMTC) > PINPOINT TEST(S) > PINPOINT TEST G : THE A/C (AIR CONDITIONING) IS INOPERATIVE

Refer to Manual Climate Control System for schematic and connector information.

Normal Operation and Fault Conditions

Control System Logic REFER to: Climate Control System - Vehicles With: Electronic Manual Temperature Control (EMTC) - System Operation and Component Description .

Possible Sources

- Wiring, terminals or connectors
- Communication network
- Ambient Air Temperature (AAT) sensor
- A/C pressure transducer
- Evaporator temperature sensor
- Electric cooling fan
- Intake Air Temperature (IAT) or other temperature sensors
- Active grille shutters
- FCIM
- PCM

Visual Inspection and Diagnostic Pre-checks

- Inspect BJB fuses 23 (10A) and 42 (15A).

DIAGNOSIS AND TESTING > CLIMATE CONTROL SYSTEM - VEHICLES WITH: ELECTRONIC MANUAL TEMPERATURE CONTROL (EMTC) > PINPOINT TEST(S) > PINPOINT TEST G : THE A/C (AIR CONDITIONING) IS INOPERATIVE > PINPOINT TEST G : THE A/C (AIR CONDITIONING) IS INOPERATIVE

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may damage the connector.

G1 CHECK THE A/C (AIR CONDITIONING) SYSTEM PRESSURE

Ignition OFF.

With the R-134a manifold gauge set connected, check the A/C system pressure.

Is the A/C system pressure above 290 kPa (42 psi)?

Yes	GO to G2

No	CHECK the A/C system for leaks. REFER to: Electronic Leak Detection . REFER to: Fluorescent Dye Leak Detection . After leak is repaired, RECHARGE the A/C system. REFER to: Air Conditioning (A/C) System Recovery, Evacuation and Charging .

G2 CHECK THE COMMUNICATION NETWORK

Ignition ON.

Using a diagnostic scan tool, carry out the network test.

Do the FCIM and the PCM pass the network test?

Yes	GO to G3

No	DIAGNOSE the FCIM or PCM does not communicate with the diagnostic scan tool. REFER to: MODULE COMMUNICATIONS NETWORK .

G3 CHECK THE PCM (POWERTRAIN CONTROL MODULE) A/C (AIR CONDITIONING) PRESSURE SENSOR (ACP_PRESS) PID (PARAMETER IDENTIFICATION)

Ignition ON.

Using a diagnostic scan tool, view PCM Parameter Identifications (PIDs).

With a manifold gauge set connected, compare the pressure readings of the manifold gauge set and the PCM ACP_PRESS PID.

Are the pressure values of the manifold gauge set and the ACP_PRESS PCM PID within ±

103 kPa (15 psi)?

Yes	GO to G4

No	DIAGNOSE the A/C pressure transducer. GO to PINPOINT TEST A : P0532, P0533

G4 ELECTRIC COOLING FAN FUNCTIONAL CHECK

Ignition ON.

Using a diagnostic scan tool, carry out the PCM KOEO self-test.

Does the electric cooling fan operate sometime during the KOEO self-test?

Yes	GO to G5

No	DIAGNOSE the electric cooling fan operation. REFER to ENGINE CONTROLS - SYMPTOM CHARTS (EXCEPT DIESEL & HYBRID) .

NOTE: Compare multiple engine sensor readings to the ambient temperature to determine sensors are reading correctly. A faulty sensor can cause the PCM to disable the A/C with or without a DTC.

G5 COMPARE THE PCM (POWERTRAIN CONTROL MODULE) INTAKE AIR TEMPERATURE (IAT) PID (PARAMETER IDENTIFICATION) AND THE OTHER TEMPERATURE SENSOR READINGS TO THE PCM (POWERTRAIN CONTROL MODULE) AMBIENT AIR TEMPERATURE (AAT) PID (PARAMETER IDENTIFICATION)

Allow the vehicle exterior and interior to stabilize to ambient temperature. This can take a soak period of at least 6 hours.

Using a diagnostic scan tool, view PCM Parameter Identifications (PIDs).

Monitor the CHT, ECT, IAT, MAPT, and AAT Parameter Identifications (PIDs) (as applicable).

Are the temperature values similar (typically within 18 °C (32.4 °F)?

Yes	GO to G6

No	DIAGNOSE the suspect temperature sensor. REFER to ENGINE CONTROLS - SYMPTOM CHARTS (EXCEPT DIESEL & HYBRID) .

G6 COMPARE THE EVAPORATOR TEMPERATURE SENSOR TO THE PCM (POWERTRAIN CONTROL MODULE) AMBIENT AIR TEMPERATURE (AAT) PID (PARAMETER IDENTIFICATION)

Ignition OFF.

Disconnect Evaporator temperature sensor C296 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C296-1 (component side)	Ω	C296-2 (component side)

Compare the resistance values to the table below:

Ambient Temperature °F (°C)	Resistance ohms
-39.9 °F (-40 °C)	98, 625 - 103, 275 ohms
-4.0 °F (-20 °C)	28, 640 - 29, 600 ohms
32.0 °F (°C)	9695 - 9895 ohms
68.0 °F (20 °C)	3675 - 3810 ohms
77.0 °F (25 °C)	2950 - 3050 ohms
86.0 °F (30 °C)	2370 - 2565 ohms
103.9 °F (40 °C)	1565 - 1635 ohms

Ignition ON.

Using a diagnostic scan tool, view PCM Parameter Identifications (PIDs).

Monitor the AAT PID.

Is the resistance within the specified values for the temperatures?

Yes	GO to G7

No	INSTALL a new evaporator temperature sensor. REFER to: Evaporator Temperature Sensor .

G7 VERIFY THE GRILLE SHUTTER OPERATION USING THE PCM (POWERTRAIN CONTROL MODULE) GRILL SHUTTER A POSITION - COMMANDED (GRILL_A_CMD) PID (PARAMETER IDENTIFICATION)

Start the engine and allow it to idle for at least 30 seconds to allow for the grille shutter calibration to complete.

Using a diagnostic scan tool, view PCM PID.

Using a diagnostic scan tool, select the PCM PID GRILL_A_CMD and command the grille shutter from 100% (open) to 0% (closed) while observing the grille shutter operation from the front of the vehicle.

Does the grille shutter fully open and close when commanded by the scan tool?

Yes	GO to G8

No	DIAGNOSE the active grille shutter is inoperative or does not operate correctly. REFER to: Active Grille Shutter .

G8 CHECK THE FCIM (FRONT CONTROLS INTERFACE MODULE) A/C (AIR CONDITIONING) SWITCH (CC_SW_AC) PID (PARAMETER IDENTIFICATION) WITH THE A/C (AIR CONDITIONING) ON

Using a diagnostic scan tool, view FCIM Parameter Identifications (PIDs).

Monitor the CC_SW_AC PID.

Does the PID display Active?

Yes	GO to G9

No	GO to G17

G9 CHECK THE PCM (POWERTRAIN CONTROL MODULE) A/C (AIR CONDITIONING) REQUEST SIGNAL (AC_REQ) PID (PARAMETER IDENTIFICATION) WITH THE A/C (AIR CONDITIONING) ON

Start the engine.

Using a diagnostic scan tool, monitor the PCM AC_REQ PID.

On the HVAC controls, select PANEL and then press the A/C button (indicator on).

Does the PID display Yes when the button is pressed?

Yes	GO to G11

No	GO to G10

G10 RESET THE AMBIENT AIR TEMPERATURE (AAT) SENSOR

On the HVAC controls, press the A/C (air conditioning) and Recirc buttons simultaneously, then release both. Within 2 seconds press A/C button again.

Start the engine.

On the HVAC controls, set the temperature to full cold, select PANEL and select the A/C button (indicator on).

Does the A/C compressor turn on?

Yes	RETEST the A/C system for normal operation. REFER to: Refrigerant System Tests - 2.3L EcoBoost (201kW/273PS) . REFER to: Refrigerant System Tests - 3.7L Duratec (227kW/301PS) . REFER to: Refrigerant System Tests - 5.0L 32V Ti-VCT .

No	GO to G11

G11 CHECK THE PCM (POWERTRAIN CONTROL MODULE) A/C (AIR CONDITIONING) COMPRESSOR COMMANDED STATE (ACC_CMD) PID (PARAMETER IDENTIFICATION) WITH THE A/C (AIR CONDITIONING) COMMANDED ON

Using a diagnostic scan tool, activate the PCM ACC_CMD PID.

Does the A/C compressor turn on?

Yes	GO to G18

No	GO to G12

G12 CHECK THE VOLTAGE TO THE A/C (AIR CONDITIONING) CLUTCH RELAY

Ignition OFF.

Disconnect the A/C clutch relay.

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
A/C clutch relay socket 1		Ground
A/C clutch relay socket 3		Ground

Are the voltages greater than 11 volts?

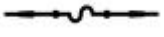
Yes	GO to G13

No	VERIFY BJB fuses 23 (10A) and 42 (15A) are OK. If not OK, REFER to the ENGINE CONTROLS - INTRODUCTION (EXCEPT DIESEL & HYBRID) to identify the possible causes of the circuit short.

G13 BYPASS THE A/C (AIR CONDITIONING) CLUTCH RELAY

Ignition OFF.

Connect a fused jumper wire:

Positive Lead	Measurement / Action	Negative Lead
A/C clutch relay socket 3		A/C clutch relay socket 5

Ignition ON.

Does the A/C compressor clutch engage?

Yes	REMOVE the fused jumper wire. INSTALL a new A/C clutch relay.

No	LEAVE the fused jumper wire installed. GO to G14

G14 CHECK THE A/C (AIR CONDITIONING) COMPRESSOR CLUTCH FIELD COIL VOLTAGE SUPPLY CIRCUIT FOR AN OPEN

Disconnect A/C compressor clutch field coil C100 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C100-1		Ground

Is the voltage greater than 11 volts?

Yes	REMOVE the fused jumper wire. GO to G15

No	REMOVE the fused jumper wire. REPAIR the circuit.

G15 CHECK THE A/C (AIR CONDITIONING) COMPRESSOR CLUTCH FIELD COIL GROUND CIRCUIT FOR AN OPEN

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C100-2	Ω	Ground

Is the resistance less than 3 ohms?

Yes	GO to G16

No	REPAIR the circuit.

G16 CHECK THE A/C (AIR CONDITIONING) COMPRESSOR CLUTCH AIR GAP

Measure the A/C compressor clutch air gap at 3 equally spaced locations between the clutch hub and the A/C compressor clutch pulley. REFER to: Air Conditioning (A/C) Clutch Air Gap Adjustment .

Is the A/C compressor clutch air gap greater than 0.6 mm (0.0236 in)?

Yes	ADJUST the A/C compressor clutch air gap. REFER to: Air Conditioning (A/C) Clutch Air Gap Adjustment .

No	INSTALL a new A/C compressor clutch and A/C clutch field coil. REFER to: Air Conditioning (A/C) Clutch and Air Conditioning (A/C) Clutch Field Coil .

G17 CHECK FOR CORRECT FCIM (FRONT CONTROLS INTERFACE MODULE) OPERATION

Disconnect and inspect all FCIM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect all FCIM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new FCIM. Refer to the appropriate article for the procedure.

No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

G18 CHECK FOR CORRECT PCM (POWERTRAIN CONTROL MODULE) OPERATION

Disconnect and inspect all PCM connectors.

Repair:

corrosion (replace connector or terminals - clean module pins)

damaged or bent pins - replace terminals/pins

pushed-out pins - replace pins as necessary

Reconnect all PCM connectors. Make sure they seat and latch correctly.

Operate the system and verify the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical

	Service Bulletins (TSBs) address this concern, INSTALL a new PCM. For 2.3L, REFER to: Powertrain Control Module (PCM) . For 3.7L, REFER to: Powertrain Control Module (PCM) . For 5.0L, REFER to: Powertrain Control Module (PCM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > CLIMATE CONTROL SYSTEM - VEHICLES WITH: ELECTRONIC MANUAL TEMPERATURE CONTROL (EMTC) > PINPOINT TEST(S) > PINPOINT TEST H : THE A/C (AIR CONDITIONING) IS ALWAYS ON - A/C (AIR CONDITIONING) MODE ALWAYS COMMANDED ON

Refer to Manual Climate Control System for schematic and connector information.

Normal Operation and Fault Conditions

Control System Logic REFER to: Climate Control System - Vehicles With: Electronic Manual Temperature Control (EMTC) - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
P1464	A/C Demand Out Of Self Test Range	This DTC sets when the PCM senses an A/C request during a PCM self-test.

Possible Sources

- A/C clutch relay
- Wiring, terminals or connectors
- PCM
- FCIM

DIAGNOSIS AND TESTING > CLIMATE CONTROL SYSTEM - VEHICLES WITH: ELECTRONIC MANUAL TEMPERATURE CONTROL (EMTC) > PINPOINT TEST(S) > PINPOINT TEST H : THE A/C (AIR CONDITIONING) IS ALWAYS ON - A/C (AIR CONDITIONING) MODE ALWAYS COMMANDED ON > PINPOINT TEST H : THE A/C (AIR CONDITIONING) IS ALWAYS ON - A/C (AIR CONDITIONING) MODE ALWAYS COMMANDED ON

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the

correct probe adapter(s) may damage the connector.

H1 CHECK THE A/C (AIR CONDITIONING) CLUTCH RELAY

Carry out the component test on the A/C clutch relay. Refer to Component Testing for schematic and connector information.

Did the relay pass the component test?

Yes	GO to H2

No	INSTALL a new A/C clutch relay.

H2 CHECK THE A/C (AIR CONDITIONING) COMPRESSOR CLUTCH FIELD COIL VOLTAGE SUPPLY CIRCUIT FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect A/C compressor clutch field coil C100 .

Disconnect the A/C clutch relay.

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C100-1		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to H3

H3 COMPARE THE EVAPORATOR TEMPERATURE SENSOR TO THE PCM (POWERTRAIN CONTROL MODULE) AMBIENT AIR TEMPERATURE (AAT) PID (PARAMETER IDENTIFICATION)

Ignition OFF.

Allow the vehicle exterior and interior to stabilize to ambient temperature.

Disconnect Evaporator Temperature Sensor C296 .

Measure:

Positive Lead	Measurement / Action	Negative Lead

C296-1 (component side)	Ω	C296-2 (component side)

Compare the resistance values to the table below:

Ambient Temperature °F (°C)	Resistance ohms
-39.9 °F (-40 °C)	98, 625 - 103, 275 ohms
-4.0 °F (-20 °C)	28, 640 - 29, 600 ohms
32.0 °F (°C)	9695 - 9895 ohms
68.0 °F (20 °C)	3675 - 3810 ohms
77.0 °F (25 °C)	2950 - 3050 ohms
86.0 °F (30 °C)	2370 - 2565 ohms
103.9 °F (40 °C)	1565 - 1635 ohms

Ignition ON.

Using a diagnostic scan tool, view PCM Parameter Identifications (PIDs).

Monitor the AAT PID.

Is the resistance within the specified values for the temperatures?

Yes	GO to H4

No	INSTALL a new evaporator temperature sensor. REFER to: Evaporator Temperature Sensor .

H4 CHECK THE FCIM (FRONT CONTROLS INTERFACE MODULE) A/C (AIR CONDITIONING) SWITCH STATUS (CC_SW_AC) PID (PARAMETER IDENTIFICATION)

Ignition ON.

Using a diagnostic scan tool, view FCIM Parameter Identifications (PIDs).

Monitor the CC_SW_AC PID.

Select panel mode, press and release the A/C button (indicator off) on the FCIM controls.

Does the PID display Active when pressed and Inactive when released?

Yes	GO to H5

No	GO to H8

H5 CHECK THE A/C (AIR CONDITIONING) PRESSURE SENSOR (ACP_PRESS) PARAMETER IDENTIFICATION (PID)

Using a diagnostic scan tool, view the PCM Parameter Identification (PIDs).

With a manifold gauge set connected, compare the pressure readings of the manifold gauge set and the PCM Parameter Identification (PID) ACP_PRESS.

Are the pressure values of the manifold gauge set and the ACP_PRESS PCM PID within ± 103 kPa (15 psi)?

Yes	GO to H6

No	INSTALL a new A/C pressure transducer. REFER to: Air Conditioning (A/C) Pressure Transducer .

H6 CHECK THE PCM (POWERTRAIN CONTROL MODULE) A/C (AIR CONDITIONING) REQUEST SIGNAL (AC_REQ) PID (PARAMETER IDENTIFICATION) WITH THE A/C (AIR CONDITIONING) OFF

Using a diagnostic scan tool, view PCM Parameter Identifications (PIDs).

Monitor the AC_REQ PID.

While in panel mode, release the A/C button (indicator off) on the FCIM controls.

Does the PID display No?

Yes	GO to H9

No	GO to H7

H7 CHECK THE PCM (POWERTRAIN CONTROL MODULE) A/C (AIR CONDITIONING) REQUEST SIGNAL (AC_REQ) PID (PARAMETER IDENTIFICATION) WITH FCIM (FRONT CONTROLS INTERFACE MODULE) DISCONNECTED

Ignition ON.

Disconnect FCIM C2402A .

Using a diagnostic scan tool, view PCM Parameter Identifications (PIDs).

Monitor the AC_REQ PID.

Does the PID display No?

Yes	GO to H9

No	GO to H8

H8 CHECK FOR CORRECT FCIM (FRONT CONTROLS INTERFACE MODULE) OPERATION

Connect FCIM C2402A .

Ignition OFF.

Disconnect and inspect all FCIM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect all FCIM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new FCIM. Refer to the appropriate article for the procedure.

No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

H9 CHECK FOR CORRECT PCM (POWERTRAIN CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all PCM connectors.

Repair:

corrosion (replace connector or terminals - clean module pins)

damaged or bent pins - replace terminals/pins

pushed-out pins - replace pins as necessary

Reconnect all PCM connectors. Make sure they seat and latch correctly.

Operate the system and verify the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PCM. For 2.3L, REFER to: Powertrain Control Module (PCM) . For 3.7L, REFER to: Powertrain Control Module (PCM) . For 5.0L, REFER to: Powertrain Control Module (PCM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > CLIMATE CONTROL SYSTEM - VEHICLES WITH: ELECTRONIC MANUAL TEMPERATURE CONTROL (EMTC) > PINPOINT TEST(S) > PINPOINT TEST I : THE TEMPERATURE CONTROL IS INOPERATIVE OR DOES NOT OPERATE CORRECTLY

Refer to Manual Climate Control System for schematic and connector information.

Normal Operation and Fault Conditions

Temperature Door Actuator - Driver side, REFER to: Climate Control System - Vehicles With: Electronic Manual Temperature Control (EMTC) - System Operation and Component Description .

During an actuator calibration cycle, the FCIM drives the temperature door until the door reaches both internal stops in the HVAC case. If the temperature door is temporarily obstructed or binding during a calibration cycle, the module may interpret this as the actual end of travel for the door. When this condition occurs and the module commands the actuator to its end of travel, the airflow may not be the expected temperature.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1081:11	Left Temperature Damper Motor: Circuit Short To Ground	This DTC sets when the module senses lower than expected voltage on an actuator motor circuit when voltage is applied to drive the motor, indicating a short to ground. The motor can move only in one direction.
B1081:12	Left Temperature Damper Motor: Circuit Short To Battery	This DTC sets when the module senses higher than expected voltage on the actuator motor circuit when ground is applied to drive the motor, indicating a short to voltage. The motor can move only in one direction.
B1081:13	Left Temperature Damper Motor: Open Circuit	This DTC sets when the module senses no voltage on the actuator motor circuit when ground is applied to drive the motor, indicating an open circuit. The motor cannot move.
B11E5:12	Left HVAC Damper Position Sensor: Circuit Short to Battery	This DTC sets when the module senses greater than 5 volts on the actuator feedback circuit, indicating a short to voltage.

B11E5:14	Left HVAC Damper Position Sensor: Circuit Short to Ground or Open	This DTC sets when the module senses less than 1 volt on the actuator feedback circuit, indicating an open circuit or a short to ground.

Possible Sources

- Wiring, terminals or connectors
- Driver side temperature door actuator
- FCIM

DIAGNOSIS AND TESTING > CLIMATE CONTROL SYSTEM - VEHICLES WITH: ELECTRONIC MANUAL TEMPERATURE CONTROL (EMTC) > PINPOINT TEST(S) > PINPOINT TEST I : THE TEMPERATURE CONTROL IS INOPERATIVE OR DOES NOT OPERATE CORRECTLY > PINPOINT TEST I : THE TEMPERATURE CONTROL IS INOPERATIVE OR DOES NOT OPERATE CORRECTLY

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may damage the connector.

I1 CHECK THE TEMPERATURE DOOR ACTUATOR CIRCUITS FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect In-vehicle temperature and humidity sensor C233 .

Disconnect Air inlet door actuator C282 .

Disconnect Air distribution door actuator C232 .

Disconnect Driver side temperature door actuator C2091 .

Ignition ON.

Disconnect FCIM C2402A .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2091-1		Ground
C2091-2		Ground
C2091-3		Ground

C2091-5	V	Ground
C2091-6	V	Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to I2

I2 CHECK THE TEMPERATURE DOOR ACTUATOR CIRCUITS FOR A SHORT TO GROUND

Connect FCIM C2402A .

Ignition OFF.

Disconnect FCIM C2402A .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2091-1	Ω	Ground
C2091-2	Ω	Ground
C2091-3	Ω	Ground
C2091-5	Ω	Ground
C2091-6	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to I3

No	REPAIR the circuit.

I3 CHECK THE TEMPERATURE DOOR ACTUATOR CIRCUITS FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2091-1	Ω	C2402A-2
C2091-2	Ω	C2402A-10
C2091-3	Ω	C2402A-3
C2091-5	Ω	C2402A-8

C2091-6	Ω	C2402A-9

Are the resistances less than 3 ohms?

Yes	GO to I4

No	REPAIR the circuit.

I4 CHECK THE TEMPERATURE DOOR ACTUATOR CIRCUITS FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2091-1	Ω	C2091-2
C2091-1	Ω	C2091-3
C2091-1	Ω	C2091-5
C2091-1	Ω	C2091-6
C2091-2	Ω	C2091-3
C2091-2	Ω	C2091-5
C2091-2	Ω	C2091-6
C2091-3	Ω	C2091-5
C2091-3	Ω	C2091-6
C2091-5	Ω	C2091-6

Are the resistances greater than 10, 000 ohms?

Yes	INSTALL a new driver side temperature door actuator. REFER to: Driver Side Temperature Door Actuator . TEST the system for normal operation. If the concern is still present, GO to I5

No	REPAIR the circuit.

I5 CHECK FOR CORRECT FCIM (FRONT CONTROLS INTERFACE MODULE) OPERATION

Disconnect and inspect all FCIM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect all FCIM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new FCIM. Refer to the appropriate article for the procedure.

No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > CLIMATE CONTROL SYSTEM - VEHICLES WITH: ELECTRONIC MANUAL TEMPERATURE CONTROL (EMTC) > PINPOINT TEST(S) > PINPOINT TEST J : THE BLOWER MOTOR IS INOPERATIVE

Refer to Manual Climate Control System for schematic and connector information.

Normal Operation and Fault Conditions

Voltage is supplied to the blower motor relay switched contact from the BJB. Ground to the relay coil is a dedicated circuit. When the blower motor relay coil receives power from the FCIM, the relay coil is energized and voltage is delivered to the blower motor speed control. Power and ground for the blower motor is provided by the blower motor speed control. The FCIM sends a PWM signal to the blower motor speed control to control the blower speed.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B10AF:11	Blower Fan Relay: Circuit Short To Ground	This DTC sets when the module senses low voltage on the relay coil voltage circuit when the module is energizing the circuit. The blower motor relay is permanently inactive.
B10AF:15	Blower Fan Relay: Circuit Short To Battery or Open	This DTC sets when the module senses greater than expected voltage on the blower relay coil voltage circuit, indicating an open circuit or a short to voltage. The blower motor relay is inactive when circuit is open; the blower motor relay is on all the time when shorted to battery.

B10B9:12	Blower Control: Circuit Short To Battery	This DTC sets when the module senses high voltage on the blower motor control PWM circuit, indicating a short directly to voltage. The blower motor is inoperative.
B10B9:14	Blower Control: Circuit Short To Ground or Open	This DTC sets when the module senses no voltage on the blower motor control PWM circuit, indicating a short directly to ground or an open circuit. The blower motor runs at full speed if the circuit is shorted to ground. The blower motor is inoperative if the circuit is open.

Possible Sources

- Wiring, terminals or connectors
- Fuse
- Blower motor relay
- Blower motor
- Blower motor speed control
- FCIM

Visual Inspection and Diagnostic Pre-checks

- Inspect BJB fuse 10 (40A).

DIAGNOSIS AND TESTING > CLIMATE CONTROL SYSTEM - VEHICLES WITH: ELECTRONIC MANUAL TEMPERATURE CONTROL (EMTC) > PINPOINT TEST(S) > PINPOINT TEST J : THE BLOWER MOTOR IS INOPERATIVE > PINPOINT TEST J : THE BLOWER MOTOR IS INOPERATIVE

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may damage the connector.

J1 CHECK THE BLOWER MOTOR RELAY

Ignition OFF.

Disconnect Blower motor relay.

Carry out the component test on the blower motor relay. Refer to Component Testing for

schematic and connector information.

Did the relay pass the component test?

Yes	GO to J2

No	INSTALL a new blower motor relay.

J2 CHECK THE BLOWER MOTOR RELAY SWITCH CONTACT SUPPLY VOLTAGE

Measure:

Positive Lead	Measurement / Action	Negative Lead
Blower motor relay socket 3		Ground

Is the voltage greater than 11 volts?

Yes	GO to J3

No	VERIFY BJB fuse 10 (40A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short.

J3 CHECK THE BLOWER MOTOR RELAY COIL GROUND CIRCUIT FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
Blower motor relay socket 1	Ω	Ground

Is the resistance less than 3 ohms?

Yes	GO to J4

No	REPAIR the circuit.

J4 CHECK THE BLOWER MOTOR RELAY COIL CONTROL CIRCUIT FOR A SHORT TO GROUND

Disconnect FCIM C2402A .

Measure:

Positive Lead	Measurement / Action	Negative Lead

Blower motor relay socket 2	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to J5

No	REPAIR the circuit.

J5 CHECK THE BLOWER MOTOR RELAY COIL CONTROL CIRCUIT FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
Blower motor relay socket 2	Ω	C2402A-11

Is the resistance less than 3 ohms?

Yes	GO to J6

No	REPAIR the circuit.

J6 CHECK THE BLOWER MOTOR SPEED CONTROL VOLTAGE CIRCUIT

Disconnect Blower motor speed control C297 .

Connect Blower motor relay.

Connect FCIM C2402A .

Ignition ON.

Select PANEL on the HVAC controls.

Select the highest blower motor setting.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C297-5	V	Ground

Is the voltage greater than 11 volts?

Yes	GO to J7

No	REPAIR the circuit.

J7 CHECK THE BLOWER MOTOR SPEED CONTROL GROUND CIRCUIT FOR AN OPEN

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C297-1	Ω	Ground

Is the resistance less than 3 ohms?

Yes	GO to J8

No	REPAIR the circuit.

J8 CHECK THE BLOWER MOTOR CONTROL PWM (PULSE WIDTH MODULATION) CIRCUIT FOR A SHORT TO VOLTAGE

Ignition ON.

Disconnect FCIM C2402A .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C297-2	V	Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to J9

J9 CHECK THE BLOWER MOTOR CONTROL PWM (PULSE WIDTH MODULATION) CIRCUIT FOR AN OPEN

Connect FCIM C2402A .

Ignition OFF.

Disconnect FCIM C2402A .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C297-2	Ω	C2402A-23

Is the resistance less than 3 ohms?

Yes	GO to J10

No	REPAIR the circuit.

J10 CHECK THE OUTPUTS TO THE BLOWER MOTOR

Disconnect Blower motor C2066 .

Connect Blower motor speed control C297 .

Connect FCIM C2402A .

Ignition ON.

Select PANEL on the HVAC controls.

Select the highest blower motor setting.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2066-1	V	C2066-2

Is the voltage greater than 11 volts?

Yes	INSTALL a new blower motor. REFER to: Blower Motor .

No	GO to J11

J11 CHECK THE CIRCUITS TO THE BLOWER MOTOR FOR AN OPEN

Ignition OFF.

Disconnect Blower motor speed control C297 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C297-6	Ω	C2066-1
C297-5	Ω	C2066-2

Are the resistances less than 3 ohms?

Yes	GO to J12

No	REPAIR the circuit in question.

J12 CHECK THE BLOWER MOTOR CIRCUITS FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2066-1	Ω	C2066-2

Is the resistance greater than 10, 000 ohms?

Yes	INSTALL a new blower motor speed control. REFER to: Blower Motor Speed Control . TEST the system for normal operation. If the concern is still present, GO to J13

No	REPAIR the circuits.

J13 CHECK FOR CORRECT FRONT CONTROLS INTERFACE MODULE (FCIM) OPERATION

Disconnect and inspect all FCIM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect all FCIM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new FCIM. Refer to the appropriate article for the procedure.

No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > CLIMATE CONTROL SYSTEM - VEHICLES WITH: ELECTRONIC MANUAL TEMPERATURE CONTROL (EMTC) > PINPOINT TEST(S) > PINPOINT TEST K : THE BLOWER MOTOR DOES NOT OPERATE CORRECTLY

Refer to Manual Climate Control System for schematic and connector information.

Normal Operation and Fault Conditions

Voltage is supplied to the blower motor relay switched contact from the BJB. Ground to the relay coil is a dedicated circuit. When the blower motor relay coil receives power from the FCIM, the relay coil is energized and voltage is delivered to the blower motor speed control. Power and ground for the blower motor is provided by the blower motor speed control. The FCIM sends a PWM signal to the blower motor speed control to control the blower speed.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B10AF:15	Blower Fan Relay: Circuit Short To Battery or Open	This DTC sets when the module senses greater than expected voltage on the blower relay coil voltage circuit, indicating an open circuit or a short to voltage. Blower relay is inactive when circuit is open; blower relay is on all the time when shorted to battery.
B10B9:14	Blower Control: Circuit Short To Ground or Open	This DTC sets when the module senses no voltage on the blower motor control PWM circuit, indicating a short directly to ground or an open circuit. The blower motor runs at full speed if the circuit is shorted to ground. The blower motor is inoperative if the circuit is open.

Possible Sources

- Wiring, terminals or connectors
- Blower motor relay
- Blower motor speed control
- FCIM

DIAGNOSIS AND TESTING > CLIMATE CONTROL SYSTEM - VEHICLES WITH: ELECTRONIC MANUAL TEMPERATURE CONTROL (EMTC) > PINPOINT TEST(S) > PINPOINT TEST K : THE BLOWER MOTOR DOES NOT OPERATE CORRECTLY > PINPOINT TEST K : THE BLOWER MOTOR DOES NOT OPERATE CORRECTLY

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the

correct probe adapter(s) may damage the connector.

K1 VERIFY THE BLOWER MOTOR OPERATION

Ignition ON.

Select PANEL on the HVAC controls. Adjust the blower motor setting to the minimum and maximum settings.

Does the blower motor operate at any setting?

Yes	GO to K2

No	GO to PINPOINT TEST J : THE BLOWER MOTOR IS INOPERATIVE

K2 CHECK THE BLOWER MOTOR CONTROL PWM (PULSE WIDTH MODULATION) CIRCUIT FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect Blower motor speed control C297 .

Ignition ON.

Disconnect FCIM C2402A .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2402A-23		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to K3

K3 CHECK THE BLOWER MOTOR CONTROL PWM (PULSE WIDTH MODULATION) CIRCUIT FOR A SHORT TO GROUND

Connect FCIM C2402A .

Ignition OFF.

Disconnect FCIM C2402A .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2402A-23	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to K4

No	REPAIR the circuit.

K4 CHECK THE BLOWER MOTOR RELAY COIL CONTROL CIRCUIT FOR A SHORT TO VOLTAGE

Disconnect Blower motor relay.

Connect FCIM C2402A .

Ignition ON.

Disconnect FCIM C2402A .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2402A-11	V	Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to K5

K5 CHECK THE BLOWER MOTOR OPERATION WITH THE BLOWER MOTOR RELAY DISCONNECTED

Connect FCIM C2402A .

Ignition OFF.

Connect Blower motor speed control C297 .

Ignition ON.

Operate the system and determine if the concern is still present.

Does the fan still operate all the time?

Yes	REPAIR the blower motor speed control voltage circuit CH402 (YE/GN) for a short to voltage.

No	GO to K6

K6 CHECK FOR CORRECT BLOWER MOTOR SPEED CONTROL OPERATION

Ignition OFF.

Disconnect and inspect all the blower motor speed control connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the blower motor speed control connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	INSTALL a new blower motor speed control. REFER to: Blower Motor Speed Control . TEST the system for normal operation. If the concern is still present, GO to K7

No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

K7 CHECK FOR CORRECT FCIM (FRONT CONTROLS INTERFACE MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all FCIM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect all FCIM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new FCIM. Refer to the appropriate article for the procedure.

No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > CLIMATE CONTROL SYSTEM - VEHICLES WITH: ELECTRONIC MANUAL TEMPERATURE CONTROL (EMTC) > PINPOINT TEST(S) > PINPOINT TEST L : B1B71:11, B1B71:15

Refer to Manual Climate Control System for schematic and connector information.

Normal Operation and Fault Conditions

Evaporator Temperature Sensor, REFER to: Climate Control System - Vehicles With: Electronic Manual Temperature Control (EMTC) - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1B71:11	Evaporator Temperature Sensor: Circuit Short To Ground	The module senses excessive voltage drop on the sensor reference voltage circuit, indicating a short directly to ground. The module defaults to calculated evaporator temperature and the compressor is shut off.
B1B71:15	Evaporator Temperature Sensor: Circuit Short To Battery or Open	The module senses no voltage drop on the sensor reference voltage circuit, indicating a short directly to voltage or an open circuit. The module defaults to calculated evaporator temperature and the compressor is shut off.

Possible Sources

- Wiring, terminals or connectors
- Evaporator temperature sensor
- FCIM

DIAGNOSIS AND TESTING > CLIMATE CONTROL SYSTEM - VEHICLES WITH: ELECTRONIC MANUAL TEMPERATURE CONTROL (EMTC) > PINPOINT TEST(S) > PINPOINT TEST L : B1B71:11, B1B71:15 > PINPOINT TEST L : B1B71:11, B1B71:15

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may damage the connector.

L1 CHECK THE EVAPORATOR TEMPERATURE SENSOR RESISTANCE

Ignition OFF.

Disconnect Evaporator temperature sensor C296 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C296-1 (component side)	Ω	C296-2 (component side)

Compare the evaporator temperature sensor measured resistance with the table below.

Ambient Temperature °F (°C)	Resistance ohms
-39.9 °F (-40 °C)	98, 625 - 103, 275 ohms
-4.0 °F (-20 °C)	28, 640 - 29, 600 ohms
32.0 °F (°C)	9695 - 9895 ohms
68.0 °F (20 °C)	3675 - 3810 ohms
77.0 °F (25 °C)	2950 - 3050 ohms
86.0 °F (30 °C)	2370 - 2565 ohms
103.9 °F (40 °C)	1565 - 1635 ohms

Is the resistance within the specified values for the temperatures?

Yes	GO to L2

No	INSTALL a new evaporator temperature sensor. REFER to: Evaporator Temperature Sensor .

L2 CHECK THE EVAPORATOR TEMPERATURE SENSOR INPUT CIRCUIT FOR A SHORT TO VOLTAGE

Ignition ON.

Disconnect FCIM C2402A .

Measure:

Positive Lead	Measurement / Action	Negative Lead

C2402A-19		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to L3

L3 CHECK THE EVAPORATOR TEMPERATURE SENSOR INPUT CIRCUIT FOR A SHORT TO GROUND

Connect FCIM C2402A .

Ignition OFF.

Disconnect FCIM C2402A .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2402A-19	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to L4

No	REPAIR the circuit.

L4 CHECK THE EVAPORATOR TEMPERATURE SENSOR INPUT CIRCUIT FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2402A-19	Ω	C296-1

Is the resistance less than 3 ohms?

Yes	GO to L5

No	REPAIR the circuit.

L5 CHECK THE EVAPORATOR TEMPERATURE SENSOR SIGNAL AND SIGNAL RETURN CIRCUITS FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C296-1	Ω	C296-2

Is the resistance greater than 10, 000 ohms?

Yes	GO to L6

No	REPAIR the circuit.

L6 CHECK FOR CORRECT FCIM (FRONT CONTROLS INTERFACE MODULE) OPERATION

Disconnect and inspect all FCIM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect all FCIM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new FCIM. Refer to the appropriate article for the procedure.

No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > CLIMATE CONTROL SYSTEM - VEHICLES WITH: ELECTRONIC MANUAL TEMPERATURE CONTROL (EMTC) > PINPOINT TEST(S) > PINPOINT TEST M : C1B14:11, C1B14:12

Refer to Manual Climate Control System for schematic and connector information.

Normal Operation and Fault Conditions

A 5-volt reference voltage and ground is supplied to the climate control sensors and actuators from the FCIM.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
C1B14:11	Sensor Supply Voltage A: Circuit Short to Ground	This DTC sets when the module senses less than 5 volts on the sensor reference voltage circuit, indicating a short to ground.
C1B14:12	Sensor Supply Voltage A: Circuit Short to Battery	This DTC sets when the module senses greater than 5 volts on the sensor reference voltage circuit, indicating a short to voltage.

Possible Sources

- Wiring, terminals or connectors
- FCIM

DIAGNOSIS AND TESTING > CLIMATE CONTROL SYSTEM - VEHICLES WITH: ELECTRONIC MANUAL TEMPERATURE CONTROL (EMTC) > PINPOINT TEST(S) > PINPOINT TEST M : C1B14:11, C1B14:12 > PINPOINT TEST M : C1B14:11, C1B14:12

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may damage the connector.

M1 CHECK THE FCIM (FRONT CONTROLS INTERFACE MODULE) DTCS

Ignition ON.

Using a diagnostic scan tool, perform FCIM self-test.

Is DTC C1B14:11 present?

Yes	GO to M2

No	GO to M5

M2 CHECK THE REFERENCE VOLTAGE CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Disconnect FCIM C2402A .

Measure:

Positive Lead	Measurement / Action	Negative Lead

C2402A-3	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to M3

No	REPAIR the circuit.

M3 CHECK THE REFERENCE VOLTAGE CIRCUIT AND THE SIGNAL RETURN CIRCUIT FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2402A-3	Ω	C2402A-2

Is the resistance greater than 200 ohms?

Yes	GO to M6

No	GO to M4

M4 CHECK THE A/C (AIR CONDITIONING) COMPONENTS

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2402A-3	Ω	C2402A-2

While measuring the resistance, disconnect the following components one at a time, in order. Stop disconnecting components if the measured resistance rises above 200 ohms.

In-vehicle temperature and humidity sensor C233

Air distribution door actuator C232

Driver side temperature door actuator C2091

Air inlet door actuator C282

Did the resistance rise above 200 ohms?

Yes	INSTALL a new sensor or actuator (the last one to be disconnected). Refer to the appropriate article for the procedure. When installing an actuator, CONNECT the actuator electrical connector before the FCIM. This allows the actuator to be calibrated when the FCIM is connected.

No	REPAIR the circuit.

M5 CHECK THE REFERENCE VOLTAGE CIRCUIT FOR A SHORT TO VOLTAGE

Disconnect FCIM C2402A .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2402A-3		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to M6

M6 CHECK FOR CORRECT FCIM (FRONT CONTROLS INTERFACE MODULE) OPERATION

Connect FCIM C2402A .

Ignition OFF.

Disconnect and inspect all FCIM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect all FCIM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new FCIM. Refer to the appropriate article for the procedure.

No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > CLIMATE CONTROL SYSTEM - VEHICLES WITH: ELECTRONIC MANUAL TEMPERATURE CONTROL (EMTC) > PINPOINT TEST(S) > PINPOINT TEST N : P06A0

Refer to Manual Climate Control System for schematic and connector information.

Normal Operation and Fault Conditions

The externally controlled variable displacement compressor is electronically controlled by the PCM. The PCM pulse width modulates the ground to the externally controlled variable displacement compressor to change the displacement of the A/C compressor. REFER to: Climate Control System - Vehicles With: Electronic Manual Temperature Control (EMTC) - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
P06A0	Variable A/C Compressor Control Circuit	The PCM senses greater than expected voltage on the sensor feedback circuit, indicating a short to voltage or an open circuit or sensor.

Possible Sources

- Wiring, terminals or connectors
- A/C compressor
- PCM

Visual Inspection and Diagnostic Pre-checks

- Inspect for loose or corroded PCM and A/C compressor connections.

DIAGNOSIS AND TESTING > CLIMATE CONTROL SYSTEM - VEHICLES WITH: ELECTRONIC MANUAL TEMPERATURE CONTROL (EMTC) > PINPOINT TEST(S) > PINPOINT TEST N : P06A0 > PINPOINT TEST N : P06A0

NOTE: The performance check test is used to determine if the Externally Controlled Variable Displacement Compressor (EVDC) is able to change the displacement by measuring the amperage to the solenoid and monitoring the manifold pressure gauges soon after the air conditioning clutch is engaged.

NOTE: Proper Air Conditioning (A/C) system diagnosis on a vehicle's compressor is dependent on correct refrigerant system charge and tested in ambient temperatures above 21.1 °C (70 °F).

N1 EXTERNALLY CONTROLLED VARIABLE DISPLACEMENT COMPRESSOR (EVDC) PERFORMANCE CHECK

Ignition OFF.

Disconnect BJB fuse 42 (15A).

Measure:

Positive Lead	Measurement / Action	Negative Lead
BJB fuse 42 socket, component side		BJB fuse 42 socket, component side

With a manifold gauge set connected, monitor the low side and high side pressures.

Start the engine. Run the engine until it reaches normal operating temperature.

Select the floor position on the HVAC controls. Set the temperature control to full warm and the blower to the highest setting. Set the A/C to off. Close all windows and doors. Run for 5 minutes to heat up the climate control housing.

Monitor the multi meter and the manifold gauges. Select the PANEL position on the HVAC controls. Set the temperature control to full cold and the blower to the highest setting. Set the recirculated air mode to on. Set the A/C to on.

Record the highest amperage measurement and the A/C pressures.

Did the amperage initially increase approximately 0.8A, and did the low side pressure decrease and the high side pressure increase and after a few minutes did the amperage and high side pressure decrease and low side pressure increase?

Yes	The Externally Controlled Variable Displacement Compressor (EVDC) is able to change the displacement. CHECK refrigerant charge amount. REFER to: Air Conditioning (A/C) System Recovery, Evacuation and Charging .

No	GO to N2

N2 CHECK FOR VOLTAGE TO THE A/C (AIR CONDITIONING) COMPRESSOR CONTROL SOLENOID

Ignition OFF.

Connect BJB fuse 42 (15A).

Disconnect A/C Compressor Control Solenoid C1110 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead

C1110-2		Ground

Is the voltage greater than 11 volts?

Yes	GO to N3

No	VERIFY the BJB fuse 42 (15A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the OEM ELECTRICAL WIRING DIAGRAM INTRODUCTION to identify the possible causes of the circuit short.

N3 CHECK THE A/C (AIR CONDITIONING) COMPRESSOR DISPLACEMENT CONTROL SOLENOID PWM (PULSE WIDTH MODULATION) CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Disconnect PCM 2.3L C1551B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1110-1	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to N4

No	REPAIR the circuit.

N4 CHECK THE A/C (AIR CONDITIONING) COMPRESSOR DISPLACEMENT CONTROL SOLENOID PWM (PULSE WIDTH MODULATION) CIRCUIT FOR A SHORT TO VOLTAGE

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1110-1		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to N5

N5 CHECK THE A/C (AIR CONDITIONING) COMPRESSOR DISPLACEMENT CONTROL SOLENOID PWM (PULSE WIDTH MODULATION) CIRCUIT FOR AN OPEN

Ignition OFF.

Measure:

2.3L

Positive Lead	Measurement / Action	Negative Lead
C1110-1	Ω	C1551B-41

Is the resistance less than 3 ohms?

Yes	INSTALL a new A/C compressor. For 2.3L REFER to: Air Conditioning (A/C) Compressor - 2.3L EcoBoost (201kW/273PS) . CLEAR the DTC and REPEAT the self-test. If the DTC returns, GO to N6

No	REPAIR the circuit.

N6 CHECK FOR CORRECT PCM (POWERTRAIN CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all PCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect the PCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PCM. For 2.3L, REFER to: Powertrain Control Module (PCM) .

No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > CLIMATE CONTROL SYSTEM - VEHICLES WITH: ELECTRONIC MANUAL TEMPERATURE CONTROL (EMTC) > PINPOINT TEST(S) >

PINPOINT TEST O : P193E

Refer to Manual Climate Control System for schematic and connector information.

Normal Operation and Fault Conditions

The PCM controls the A/C compressor clutch field coil based on messages received from the BCM over the HS-CAN. When the FCIM determines it is necessary to activate the A/C compressor due to driver request or automatic climate control settings, the FCIM sends a message to the BCM over the MS-CAN, the BCM then sends a message to the PCM to activate the A/C compressor.

An internal failure of the PCM, BCM or FCIM, or a failure in the MS-CAN or HS-CAN, causes the PCM to set a DTC.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
P193E	A/C Clutch Request Signal	This DTC sets when the PCM does not receive the A/C enable request from the BCM.

Possible Sources

- Network concerns
- BCM
- PCM
- FCIM

DIAGNOSIS AND TESTING > CLIMATE CONTROL SYSTEM - VEHICLES WITH: ELECTRONIC MANUAL TEMPERATURE CONTROL (EMTC) > PINPOINT TEST(S) > PINPOINT TEST O : P193E > PINPOINT TEST O : P193E

O1 VERIFY THE CUSTOMER CONCERN

Ignition ON.

Verify there is an observable symptom present.

Is an observable symptom present?

Yes	GO to O2

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

O2 CHECK THE COMMUNICATION NETWORK

Using a diagnostic scan tool, carry out the Network Test.

Do the BCM, PCM and the FCIM pass the Network Test?

Yes	GO to O3

No	DIAGNOSE the BCM, PCM or FCIM does not communicate with the diagnostic scan tool. REFER to: MODULE COMMUNICATIONS NETWORK .

O3 CHECK THE PCM (POWERTRAIN CONTROL MODULE) A/C (AIR CONDITIONING) REQUEST SIGNAL (AC_REQ) PID (PARAMETER IDENTIFICATION)

Start the engine.

Using a diagnostic scan tool, monitor the PCM AC_REQ PID.

On the HVAC controls, select PANEL mode, then press the A/C button (indicator ON).

Does the AC_REQ PID display YES when the A/C button indicator is illuminated?

Yes	GO to O7

No	GO to O4

O4 CHECK THE FCIM (FRONT CONTROLS INTERFACE MODULE) A/C (AIR CONDITIONING) SWITCH (CC_SW_AC) PID (PARAMETER IDENTIFICATION)

Using a diagnostic scan tool, monitor the FCIM CC_SW_AC PID while pressing and releasing the A/C button.

Does the PID display Active when the A/C button indicator is illuminated?

Yes	GO to O6

No	GO to O5

O5 CHECK FOR CORRECT FCIM (FRONT CONTROLS INTERFACE MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all FCIM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect all FCIM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new FCIM. Refer to the appropriate article for the procedure.

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

O6 VERIFY CORRECT BCM (BODY CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all BCM electrical connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect all BCM electrical connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

O7 VERIFY CORRECT PCM (POWERTRAIN CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all PCM electrical connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals or pins

pushed-out pins - install new pins as necessary

Reconnect all PCM electrical connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PCM. For 2.3L, REFER to: Powertrain Control Module (PCM) . For 3.7L, REFER to: Powertrain Control Module (PCM) . For 5.0L, REFER to: Powertrain Control Module (PCM) .

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > CLIMATE CONTROL SYSTEM - VEHICLES WITH: ELECTRONIC MANUAL TEMPERATURE CONTROL (EMTC) > PINPOINT TEST(S) > PINPOINT TEST P : B105A:12, B105A:14, B1A61:11, B1A61:15, B1A69:12, B1A69:14

Refer to Manual Climate Control System for schematic and connector information.

Normal Operation and Fault Conditions

In-Vehicle Temperature and Humidity Sensor, REFER to: Climate Control System - Vehicles With: Electronic Manual Temperature Control (EMTC) - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B105A:12	Cabin Temperature Sensor Fan: Circuit Short To Battery	This DTC sets when the module senses higher than expected voltage on the in-vehicle temperature and humidity sensor fan motor circuit. The in-vehicle temperature and humidity sensor fan motor is inactive.
B105A:14	Cabin Temperature Sensor Fan: Circuit Short To Ground or Open	This DTC sets when the module senses no voltage on the in-vehicle temperature and humidity sensor fan motor circuit, indicating an open or a short directly to ground. The in-vehicle temperature and humidity sensor fan motor is active.
B1A61:11	Cabin Temperature Sensor: Circuit Short to Ground	This DTC sets when the module senses lower than expected

		voltage on the in-vehicle temperature and humidity sensor feedback circuit, indicating a short to ground.
B1A61:15	Cabin Temperature Sensor: Circuit Short to Battery or Open	This DTC sets when the module senses greater than expected voltage on the in-vehicle temperature and humidity sensor feedback circuit, indicating a short to voltage or an open circuit or sensor.
B1A69:12	Humidity Sensor: Circuit Short To Battery	This DTC sets when the module senses greater than expected voltage on the in-vehicle temperature and humidity sensor humidity input circuit, indicating a short to voltage.
B1A69:14	Humidity Sensor: Circuit Short To Ground or Open	This DTC sets when the module senses no voltage on the in-vehicle temperature and humidity sensor humidity input circuit, indicating a short to ground or an open circuit or sensor.

Possible Sources

- Fuse
- Wiring, terminals or connectors
- In-vehicle temperature and humidity sensor
- FCIM

Visual Inspection and Diagnostic Pre-checks

- Make sure the in-vehicle temperature and humidity sensor harness is not chaffed.

DIAGNOSIS AND TESTING > CLIMATE CONTROL SYSTEM - VEHICLES WITH: ELECTRONIC MANUAL TEMPERATURE CONTROL (EMTC) > PINPOINT TEST(S) > PINPOINT TEST P : B105A:12, B105A:14, B1A61:11, B1A61:15, B1A69:12, B1A69:14 > PINPOINT TEST P : B105A:12, B105A:14, B1A61:11, B1A61:15, B1A69:12, B1A69:14

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may damage the connector.

P1 CHECK THE IN-VEHICLE TEMPERATURE AND HUMIDITY SENSOR CIRCUITS FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect Air distribution door actuator C232 .

Disconnect Driver side temperature door actuator C2091 .

Disconnect Passenger side temperature door actuator C2092 .

Disconnect Air inlet door actuator C282 .

Disconnect In-vehicle temperature and humidity sensor C233 .

Disconnect BCM fuse 21 (5A).

Ignition ON.

Disconnect FCIM C2402A .

Disconnect FCIM C2402B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C233-1		Ground
C233-2		Ground
C233-3		Ground
C233-4		Ground
C233-5		Ground
C233-6		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to P2

P2 CHECK THE IN-VEHICLE TEMPERATURE AND HUMIDITY SENSOR CIRCUITS FOR A SHORT TO GROUND

Connect FCIM C2402A .

Ignition OFF.

Disconnect FCIM C2402A .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C233-1	Ω	Ground
C233-2	Ω	Ground
C233-3	Ω	Ground
C233-4	Ω	Ground
C233-5	Ω	Ground
C233-6	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to P3

No	REPAIR the circuit.

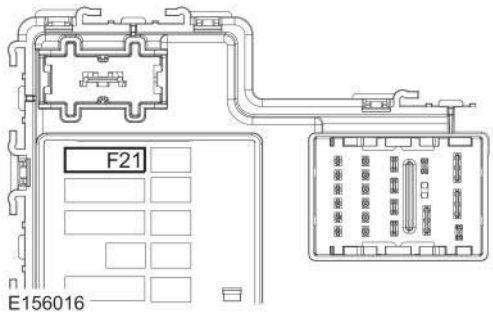
P3 CHECK THE IN-VEHICLE TEMPERATURE AND HUMIDITY SENSOR CIRCUITS FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C233-3	Ω	C2402A-3
C233-5	Ω	C2402A-2

Positive Lead	Measurement / Action	Negative Lead
C233-1	Ω	C2402B-27
C233-2	Ω	C2402B-29
C233-4	Ω	C2402B-19

Positive Lead	Measurement / Action	Negative Lead
C233-6	Ω	BCM fuse 21 cavity, (component side)



Are the resistances less than 3 ohms?

Yes	GO to P4

No	REPAIR the circuit.

P4 CHECK THE IN-VEHICLE TEMPERATURE AND HUMIDITY SENSOR CIRCUITS FOR A SHORT TOGETHER

Measure:

Positive Lead	Measurement / Action	Negative Lead
C233-1	Ω	C233-2
C233-1	Ω	C233-3
C233-1	Ω	C233-4
C233-1	Ω	C233-5
C233-1	Ω	C233-6
C233-2	Ω	C233-3
C233-2	Ω	C233-4
C233-2	Ω	C233-5
C233-2	Ω	C233-6
C233-3	Ω	C233-4
C233-3	Ω	C233-5
C233-3	Ω	C233-6
C233-4	Ω	C233-5
C233-4	Ω	C233-6
C233-5	Ω	C233-6

Are the resistances greater than 10, 000 ohms?

Yes	GO to P5

No	REPAIR the circuit.

P5 CHECK FOR CORRECT IN-VEHICLE TEMPERATURE AND HUMIDITY SENSOR OPERATION

Inspect the disconnected connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect all disconnected connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	INSTALL a new in-vehicle temperature sensor. REFER to: In-Vehicle Temperature and Humidity Sensor . TEST the system for normal operation. If the concern is still present, GO to P6

No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

P6 CHECK FOR CORRECT FCIM (FRONT CONTROLS INTERFACE MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all FCIM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Reconnect all FCIM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new FCIM. Refer to the

	appropriate article for the procedure.

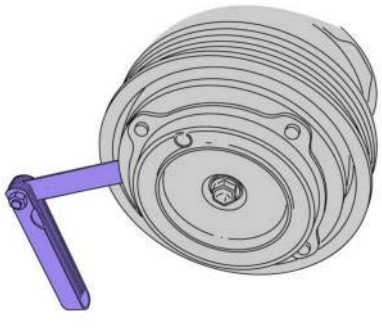
No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

GENERAL PROCEDURES > AIR CONDITIONING (A C) CLUTCH AIR GAP ADJUSTMENT

Activation

1.

Check the A/C clutch air gap at 3 equally spaced places between the clutch plate and the A/C clutch pulley. Refer to: Specifications .

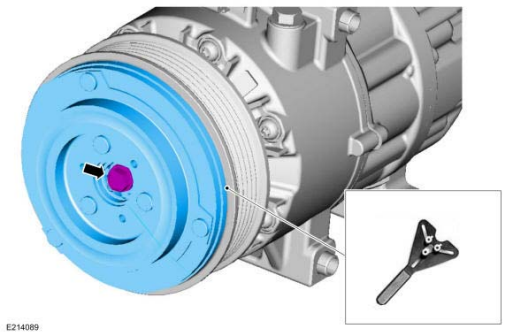


2.

Using the universal clutch holding tool, hold the A/C clutch disc and hub, remove the A/C clutch disc and bolt. Add or remove spacers between the clutch plate hub and the compressor shaft until the clearance is within specification. Refer to: Specifications .

Torque

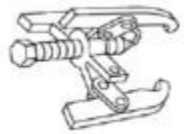
: 124 lb.in (14 Nm)



GENERAL PROCEDURES > AIR CONDITIONING (AC) CLUTCH AND AIR

CONDITIONING (AC) CLUTCH FIELD COIL

Special Tool(s) / General Equipment

	412-001 (T71P-19703-B) Remover, Compressor Pulley

Activation

1.

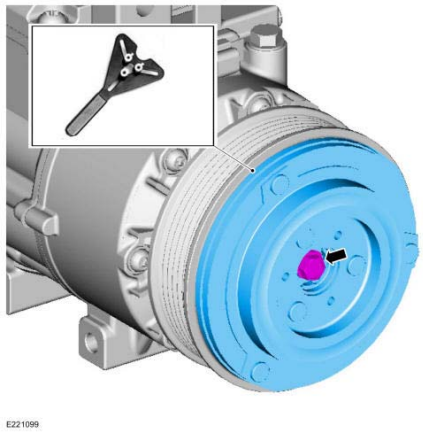
Remove the A/C compressor.

2.

Using the universal clutch holding tool, hold the clutch and remove the A/C clutch disc and hub bolt.

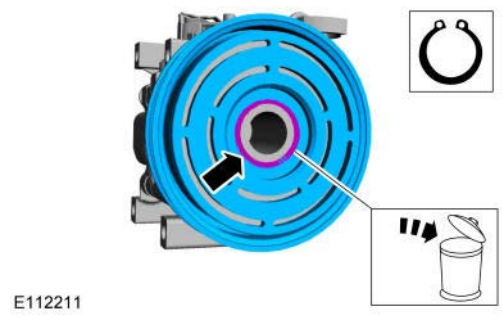
Torque

: 159 lb.in (18 Nm)



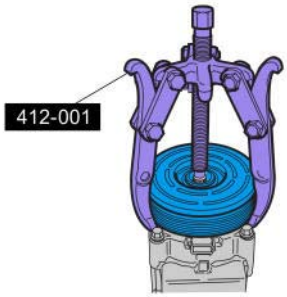
3.

Remove the A/C compressor pulley snap ring.



NOTE: Do not use air tools. Damage to the A/C clutch pulley or A/C compressor may result.

4.
Remove the A/C compressor pulley. Use Special Service Tool: 412-001 (T71P-19703-B) Remover, Compressor Pulley.



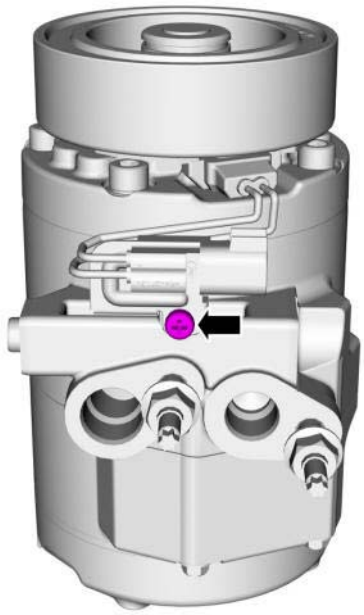
E153143

5.

Remove the A/C clutch field coil electrical connector retainer.

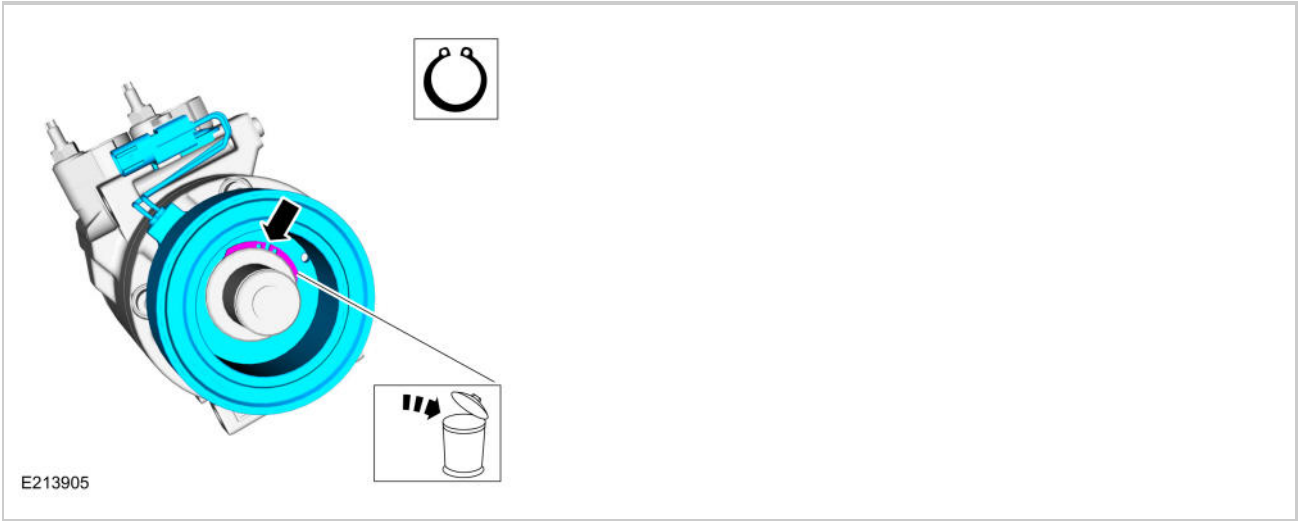
Torque

: 35 lb.in (4 Nm)


E213527

6.

Remove the A/C clutch field coil snap ring, and remove the clutch field coil.



7.

Visually inspect the A/C clutch disc and hub, compressor pulley and clutch field coil for damage.

Inspect for physical damage, including cracked or melted components or discoloration due to excessive heat.

Inspect for excessive wear, including grooving in the A/C clutch disc and hub or the compressor pulley that is more than fingernail depth.

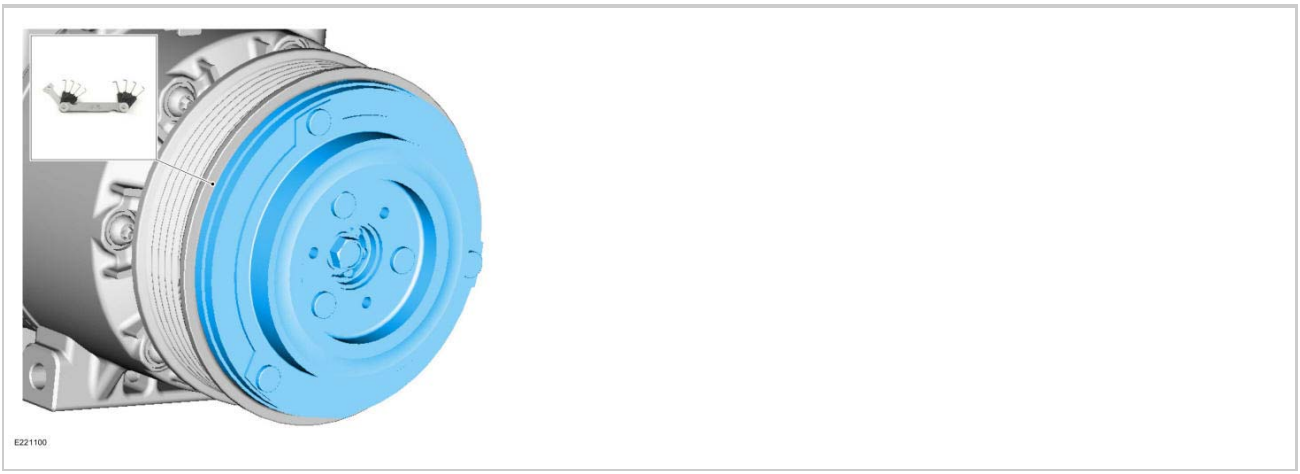
Inspect for roughness in the A/C compressor pulley bearing.

8.

To install, reverse the steps in this procedure.

9.

Measure and adjust the clutch air gap by removing or adding clutch disc and hub spacers. Refer to: Air Conditioning (A/C) Clutch Air Gap Adjustment .



GENERAL PROCEDURES > AIR CONDITIONING (A C) ODOR TREATMENT

Special Tool(s) / General Equipment

 E221429	258-62644 (258-00005) A/C ODOR REMOVER FLEXIBLE APPLICATOR

Materials

Name	Specification
Motorcraft ® A/C Cooling Coil Coating YN-29	-

Activation

NOTE: Microbiological odors, if in the A/C system, usually last for about 30 seconds after the system is turned on. They will be detected while the A/C is turned on and using either outside or recirculated air. Microbiological odors that occur in areas other than the A/C system (for example, water in doors or wet carpeting) may last indefinitely and will be more intense when recirculated air is used. Microbiological odors will not be present at temperatures at or below 10 °C (50 °F).

NOTE: Human and other interior-generated odors occur while the source is present and may linger for a short time after. These odors may be more noticeable during A/C operation. Human odors may be eliminated by removing the source and cleaning the affected area.

NOTE: Environmental odors usually occur for a short time and diminish after the vehicle passes through the affected area. These odors are typically only detected when the vehicle windows are open, or when the climate control system is operating in a mode that allows for fresh air. Environmental odors cannot be eliminated because they are external in source, but they may be minimized by switching to a climate control setting that uses recirculated air.

NOTE: Chemical odors are usually constant regardless of the climate control system setting although they may be enhanced by A/C operation. Most chemical odors are caused by fluid leaks or incorrectly cured adhesives. Chemical odors can be eliminated by repairing the leaking component and removing any residue.

NOTE: There are typically 4 types of objectionable odors found in a vehicle:

Chemical, environmental, human and other interior-generated odors, microbiological odors. Before determining that A/C odor treatment is required, determine the source and the circumstances under which the odor occurs.

1.

NOTE: Microbiological odors result from microbial growth supported by warm temperatures and moisture. Microbiological odors are described as musty/mildew type smells and may occur on/in:

2.

foam seals

rubber seals

adhesives

standing water

water soaked carpet/trim

3.

Eliminate microbiological odors by removing the source and treating the affected area. Allow standing water to drain and dry out. A/C systems may be treated by using A/C Cooling Coil Coating as described in the service procedure.

4.

Identify the type of odor present in the vehicle. Do not proceed with A/C odor treatment if the odor source is found to be outside of the A/C system. Refer to the following list for examples.

Odor Source	Odor Description
Chemical Odors	
Coolant	Sweet smell
Fuel	Gasoline or diesel fuel smell
Oil	Oil type or burning smell
Power Steering Fluid	Oil type or burning smell
Transmission Fluid	Oil type or burning smell
Washer Fluid	Alcohol type smell
Gear Lube	Garlic/sulfur smell
Refrigerant Oil	Ether type smell
Carpet/trim Adhesives	Fishy, urine or sweet smell
Evaporator Core Coating	Wet cement type smell

Environmental Odors	
Exhaust	Exhaust, fuel or burning type smell
Industrial Pollutants	Various smells
Dust	Musty, mildew or wet cement type smell
Pollen	Sweet smell
Tobacco	Burning, tar smell
Human and Other Interior Generated Odors	
Body Secretions	Body odor
Perfuming Agents	Sweet or fragrance smell
Clothing	Musty, mildew or body odors
Food/Beverage	Sweet, musty, mildew or fishy smell
Microbiological Odors	
Microbiological Odors Occurring Inside of A/C System	Musty, mildew smell lasting about 30 seconds after A/C is turned on
Microbiological Odors Occurring Outside of A/C System	Musty, mildew smell lasting indefinitely and possibly more pronounced when using recirculated air

NOTE: Identify the source of the odor.

5.

Check the evaporator core drain tube for restriction.

Check the passenger and driver side carpet for moisture. If moisture is found, A/C odor treatment is not necessary. Diagnose for a water leak as needed.

Check the cabin air filter and cabin air filter cover for moisture resulting from water bypassing the cowl baffling system. If moisture is found, A/C odor treatment is not necessary. Diagnose for a water leak as needed.

Check the cowl top panel and air inlet screen for standing water or foreign material. If possible, remove any standing water and clean the air inlet screen using a wet/dry vacuum.

6.

Open all vehicle windows and doors.

7.

Make sure the A/C is off.

8.

Select REGISTER mode (A/C off).

9.

Adjust the temperature setting to full warm.

10.

Adjust the blower motor speed to HI.

11.

Run the engine for 25 minutes to dry out the A/C system.

12.

Turn the ignition OFF.

13.

Remove the blower motor.

> *NOTE: Blower motor resistors or blower motor speed controls that are mounted outside of the climate control housing and not exposed to the blower motor airflow do not need to be removed.*

14.
Remove the blower motor resister or blower motor speed control (if equipped and exposed to the inside of the climate control housing).

> *NOTE: Only Motorcraft YN-29 is approved for use on Ford vehicles no other coating is approved. Use of other coatings may cause damage to the factory coating and more odor issues.*

> *NOTE: To avoid damage to the vehicle interior, do not spill or spray this product on any interior surface.*

15.
Add one full bottle of A/C Cooling Coil Coating to the Flexible Applicator Tool. Use Special Service Tool: 258-62644 (258-00005) A/C ODOR REMOVER FLEXIBLE APPLICATOR.

Material

: Motorcraft ® A/C Cooling Coil Coating / YN-29

16.

Insert the nozzle into the evaporator housing and direct the spray toward the evaporator core face. Spray the entire evaporator core face until empty.

17.

Install the blower motor and blower motor resistor or blower motor speed control.

18.

Repeat Steps 7 through 11 to cure the evaporator core coating.

GENERAL PROCEDURES > AIR CONDITIONING (A C) SYSTEM FLUSHING

Activation

NOTE: Use an A/C refrigerant analyzer before recovering any of the vehicle's refrigerant. Failure to do so puts the shop's bulk refrigerant at risk of contamination. If the vehicle's A/C refrigerant is contaminated, refer the customer to the service facility that carried out the last A/C service. If the customer wishes to pay the additional cost, use the A/C recovery equipment that is designated for recovering contaminated A/C refrigerant. All contaminated A/C refrigerant must be disposed of as hazardous waste. For all equipment, follow the equipment manufacturer procedures and instructions.

NOTE: Before flushing the A/C system, remove the receiver drier or receiver drier element, front Thermostatic Expansion Valve (TXV), rear TXV (if equipped) and hoses with mufflers. Internal plumbing of these devices makes it impossible to correctly remove any residual-flushing agent. These components are typically discarded after A/C system contamination. Hoses without mufflers can be reused unless they are clogged with foreign material. The 3.78L (1 gal) of Motorcraft ® A/C System Flushing Solvent YN-23 and FL1-A filter used in A/C Flush and Purge Machine 357-405 80001 00 are intended for use on one vehicle only. They may be used to flush both the A/C condenser core and the A/C evaporator core on an individual vehicle, but under no circumstances should they be used on more than one vehicle.

NOTE: Only the A/C Flush and Purge Machine 357-405 80001 00 and Motorcraft ® A/C System Flushing Solvent are approved for use on Ford vehicles. No other flushing device or solvent is approved for flushing heat exchangers (A/C condenser, A/C evaporator). Use of any other flusher or solvent may cause damage to the A/C system and the flushing unit.

NOTE: Prior to using the A/C Flush and Purge Machine 357-405 80001 00 for the first time, review the operating instructions.

NOTE: Never push shop air directly through an a/c system. Shop air is full of contaminants and must be run through flush machine to clean and dry air.

NOTE: Ford Motor Company has approved a procedure to provide technicians with a non-CFC method of flushing contaminated A/C system heat exchangers. The procedure allows the specific components to be cleaned and flushed. The types of contamination flushed include particle matter that results from A/C compressor or desiccant failure and gummy residue that can form when refrigerant oil is overheated during A/C compressor seizure. The flushing process is a 2-step procedure that involves using an A/C Flush and Purge Machine 357-405 80001 00 to:

- circulate the flushing solvent through the heat exchanger in the reverse direction of normal refrigerant flow (back-flushing). Particulate matter picked up during flushing is filtered from the returning solvent before the solvent is returned to the reservoir for continued circulation.
- remove the flushing solvent from the heat exchanger. In this step of the procedure, pressurized air 621-862 kPa (90-125 psi) connected to the flush machine is used to push and evaporate any remaining flush solvent from the heat exchanger.

1.

Recover the refrigerant. Refer to: Air Conditioning (A/C) System Recovery, Evacuation and Charging .

2.

Disconnect the refrigerant lines from the heat exchanger(s) to be flushed.

NOTE: Do not flush through the condenser integrated receiver drier element (if equipped), TXV (if equipped) or hoses with mufflers. Internal plumbing and material make-up of these components make it impossible to correctly remove foreign material or residual flushing solvent.

3.
Use the correct adapters with 357-405 80001 00 to flush the heat exchanger. Do not flush through the condenser integrated receiver drier element (if equipped), TXV (if equipped) or hoses with mufflers. Internal plumbing and material make-up of these components make it impossible to correctly remove foreign material or residual flushing solvent.

NOTE: Use 3.78 L (1 gal) of Motorcraft ® A/C System Flushing Solvent to flush the heat exchanger for a minimum of 15 minutes. The flush solvent may be used for one or both heat exchangers in the A/C system. However, the flush solvent is intended for one vehicle only. The filter used on the flushing unit is also intended for use on one vehicle only.

4.
Flush the heat exchanger for a minimum of 15 minutes.

5.

Apply 621-862 kPa (90-125 psi) pressurized air to the flush machine, flush the component for a minimum of 30 minutes using the flush machine. The 30-minute purge time is required to force and

evaporate all residual solvent from the A/C system component. Failure to successfully remove all residual solvent within the component can result in system damage when reconnected and operated. Dispose of the used flush solvent and filter in accordance with local, state and federal regulations.

6.

Install a new TXV (if equipped) in any vehicle being serviced for an internal A/C compressor or desiccant failure. Refer to: Thermostatic Expansion Valve - 2.3L EcoBoost (201kW/273PS) . Refer to: Thermostatic Expansion Valve - 3.7L Duratec (227kW/301PS) . Refer to: Thermostatic Expansion Valve - 5.0L 32V Ti-VCT .

7.

Install new refrigerant hoses with mufflers if clogged with foreign material.

8.

Install a new receiver drier (if equipped) or receiver drier element (if equipped) in any vehicle being serviced for an internal A/C compressor or desiccant failure. Refer to: Receiver Drier - 5.0L 32V Ti-VCT . Refer to: Receiver Drier - 2.3L EcoBoost (201kW/273PS) . Refer to: Receiver Drier - 3.7L Duratec (227kW/301PS) .

9.

Reconnect the heat exchanger being serviced.

10.

If a new A/C compressor is not being installed, lubricate the refrigerant system with the correct amount of clean PAG oil. Refer to: Refrigerant Oil Adding .

11.

If a new A/C compressor is not being installed, evacuate, leak test and charge the A/C system. Refer to: Air Conditioning (A/C) System Recovery, Evacuation and Charging .

12.

If a new A/C compressor is being installed, install the A/C compressor. Refer to: Air Conditioning (A/C) Compressor - 2.3L EcoBoost (201kW/273PS) . Refer to: Refrigerant System Tests - 3.7L Duratec (227kW/301PS) . Refer to: Air Conditioning (A/C) Compressor - 5.0L 32V Ti-VCT .

GENERAL PROCEDURES > AIR CONDITIONING (A C) SYSTEM RECOVERY, EVACUATION AND CHARGING

Special Tool(s) / General Equipment

Air Conditioning Service Unit

Recovery

NOTE: An A/C refrigerant analyzer must be used before the recovery of any vehicle's A/C refrigerant. Failure to do so puts the shop's bulk refrigerant at risk of contamination. If the vehicle's A/C refrigerant is contaminated, refer the customer to the service facility that carried out the last A/C service. If the customer wishes to pay the additional cost, use the A/C recovery equipment that is designated for recovering contaminated A/C refrigerant. Dispose of all contaminated A/C refrigerant as hazardous waste. For all equipment, follow the manufacturer's instructions.

1.

NOTE: Ford Motor Company recommends the use of R-134a refrigerant management equipment that meets the requirements of the SAE J2788 standard.

2.

Prior to recovering, verify the purity of the refrigerant. Refer to: Refrigerant Identification Testing .

3.

Connect the tool to the low- and high-pressure service gauge port valves following the manufacturer's instructions. Use the General Equipment: Air Conditioning Service Unit

NOTE: Never attempt to recover from only the low side service gauge port valve (solenoid valves in the system will not allow for full recovery).

4.
Recover the refrigerant from the system following the operating manufacturer's instructions. Note the amount of oil removed during the refrigerant recovery (if any). Add that same amount back into the system once repairs are complete. Refer to: Refrigerant Oil Adding .

5.

Allow the system to set for about 2 minutes, and observe the system vacuum reading. If the vacuum is not lost, disconnect the recovery equipment.

6.

If the system does lose vacuum, repeat Steps 3 through 5 until the vacuum level remains stable for 2 minutes.

7.

Carry out the required repairs.

Evacuation

NOTE: An A/C refrigerant analyzer must be used before the recovery of any vehicle's

A/C refrigerant. Failure to do so puts the shop's bulk refrigerant at risk of contamination. If the vehicle's A/C refrigerant is contaminated, refer the customer to the service facility that carried out the last A/C service. If the customer wishes to pay the additional cost, use the A/C recovery equipment that is designated for recovering contaminated A/C refrigerant. Dispose of all contaminated A/C refrigerant as hazardous waste. For all equipment, follow the manufacturer's instructions.

1.

Connect the tool to the low- and high-pressure service gauge port valves following the operating instructions provided by the equipment manufacturer. Use the General Equipment: Air Conditioning Service Unit

NOTE: Never attempt to recover from only the low side service gauge port valve (solenoid valves in the system will not allow for full recovery).

2.
Evacuate the system until the low-pressure gauge reads at least 99.4 kPa (29.5 in-Hg) of vacuum and as close to 101.1 kPa (30 in-Hg) as possible. Continue to operate the Vacuum Pump for a minimum of 45 minutes.

3.

Turn off the vacuum pump. Observe the low-pressure gauge for 10 minutes to make sure that the system vacuum is held.

Charging

NOTE: An A/C refrigerant analyzer must be used before the recovery of any vehicle's A/C refrigerant. Failure to do so puts the shop's bulk refrigerant at risk of contamination. If the vehicle's A/C refrigerant is contaminated, refer the customer to the service facility that carried out the last A/C service. If the customer wishes to pay the additional cost, use the A/C recovery equipment that is designated for recovering contaminated A/C refrigerant. Dispose of all contaminated A/C refrigerant as hazardous waste. For all equipment, follow the manufacturer's instructions.

1.

Lubricate the refrigerant system with the correct amount of clean PAG (polyalkylene glycol) oil. Refer to: Refrigerant Oil Adding .

2.

Connect the tool to the low-side and high-side service gauge port valves following the manufacturer's instructions. Use the General Equipment: Air Conditioning Service Unit

3.

Set the refrigerant charge amount, and charge the refrigerant system following the manufacturer's instructions.

GENERAL PROCEDURES > ELECTRONIC LEAK DETECTION

Special Tool(s) / General Equipment

UV Leak Detector

Inspection

NOTE: If the surrounding air is contaminated with refrigerant gas, the leak detector indicates this gas all the time. Odors from other chemicals such as antifreeze, disc brake cleaner or other cleaning solvents can cause the same problem.

NOTE: Good ventilation is necessary in the area where electronic A/C leak testing is to be carried out. If the surrounding air is contaminated with refrigerant gas, the leak detector indicates this gas all the time. Odors from other chemicals such as antifreeze, disc brake cleaner or other cleaning solvents can cause the same problem. Using a fan to ventilate the area to be tested before proceeding with the leak detection procedure is helpful in removing small traces of contamination from the air, but the fan should be turned off during actual testing.

1.
R-134a, if present, is heavier than air, and tends to move down from the source of the leak. It is possible that a leak may not be detected if the leak detector tip is held above the leaking fitting, line or component. Always be sure to thoroughly leak test below, above and around the fitting, line or component for the presence of R-134a. Use the General Equipment: UV Leak Detector

NOTE: The system pressure should be 413-551 kPa (60 - 80 psi) at 24 ° C (75.2 ° F) with the engine off and cool. The pressure reading may be higher if the engine is hot.

2.
Leak test the refrigerant system. Follow the instructions included with the Infrared Refrigerant Leak Detector or Dual Mode Refrigerant Gas and UV Dye Leak Detector for handling and operation techniques. Use the General Equipment: UV Leak Detector

GENERAL PROCEDURES > FLUORESCENT DYE LEAK DETECTION

Special Tool(s) / General Equipment

	219-00069 R134a Loop/Add On Kit Set
UV Leak Detector	
Fluorescent Dye Injector	

Activation

Fluorescent Dye Injection Using a R-134a Refrigerant Management Machine and Dye Injector - Vehicles Requiring R-134a Addition

NOTE: This method of fluorescent dye injection requires the addition of R-134a from a R-134a Refrigerant Management Machine or R-134a Manifold Gauge Set hooked to an external tank to charge the dye into the refrigerant system. If adding fluorescent dye to a refrigerant system that is already fully charged, use the R-134a Loop/Add On Injector Kit-Set.

NOTE: Fluorescent refrigerant system dye is added to the refrigerant system at the factory to assist in refrigerant system leak diagnosis using a Rotunda-approved UV lamp. It is not necessary to add additional dye to the refrigerant system before diagnosing leaks, even if a significant amount of refrigerant has been removed from the system. Replacement suction accumulators and receiver/driers are shipped with a fluorescent dye wafer included in the desiccant bag which dissolves after approximately 30 minutes of continuous A/C operation. It is not necessary to add dye after flushing the refrigerant system because a new suction accumulator or receiver/drier is installed as part of the flushing procedure.

NOTE: Before using the R-134a Loop/Add On Injector Kit-Set for the first time, refer to the manufacturer's instructions on evacuation of any non-condensable gases from the hoses.

NOTE: Only connect the dye/lubricant injector from the R-134a Loop/Add On Injector Kit-Set when fluorescent dye is to be injected. The dye/lubricant injector has a one-way check valve that prevents refrigerant system recovery and evacuation.

NOTE: If no R-134a pressure is present in the refrigerant system, evacuate the system before carrying out the injection procedure.

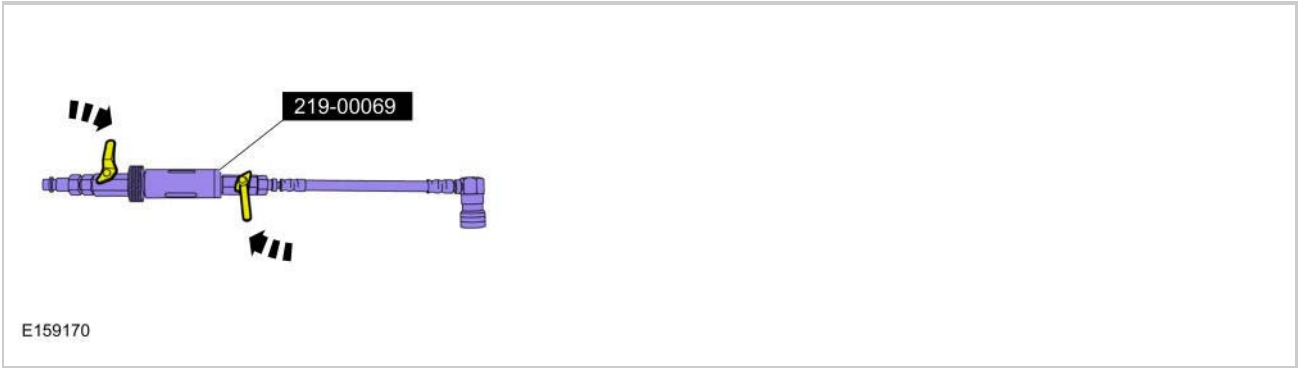
1.
Refer to: Air Conditioning (A/C) System Recovery, Evacuation and Charging .

2.

Connect a R-134a Refrigerant Management Machine or a R-134a Manifold Gauge Set to the refrigerant system service port valves.

3.

Verify the valves on the R-134a Loop/Add On Injector Kit-Set are closed. Install Special Service Tool: 219-00069 R134a Loop/Add On Kit Set.



4.

Fill the R-134a fluorescent dye injector reservoir with 7 ml (0.25 fl. oz.) of fluorescent dye. Use the General Equipment: Fluorescent Dye Injector



5.

Install the R-134a Loop/Add On Injector Kit-Set between the high-pressure and low-pressure service gauge port valves. Install Special Service Tool: 219-00069 R134a Loop/Add On Kit Set.

NOTE: Following fluorescent dye injection, the refrigerant system should be fully charged to make sure of correct movement of the dye. The dye moves with the oil not the refrigerant. The oil moves with the refrigerant.

6.
Open all valves and inject the fluorescent dye into the refrigerant system by charging the refrigerant system with the required amount of R-134a.

7.

When fluorescent dye injection is complete, close all valves.

8.

Recover the refrigerant from the dye/lubricant injector.

9.

Remove the dye/lubricant injector from the low-pressure service gauge port valve and the R-134a Refrigerant Management Machine or R-134a Manifold Gauge Set. Use the General Equipment: Fluorescent Dye Injector

Fluorescent Dye Injection Using a R-134a Loop/Add On Injector Kit-Set - Vehicles Not Requiring R-134a Addition

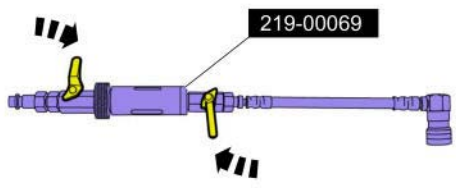
NOTE: Fluorescent refrigerant system dye is added to the refrigerant system at the factory to assist in refrigerant system leak diagnosis using a Rotunda-approved UV lamp. It is not necessary to add additional dye to the refrigerant system before diagnosing leaks, even if a significant amount of refrigerant has been removed from the system. Replacement suction accumulators and receiver driers are shipped with a fluorescent dye wafer included in the desiccant bag which dissolves after approximately 30 minutes of continuous A/C operation. It is not necessary to add dye after flushing the refrigerant system because a new suction accumulator or receiver drier is installed as part of the flushing procedure.

NOTE: Before using the R-134a Loop/Add On Injector Kit-Set for the first time, refer to the equipment manufacturer's instructions on evacuation of non-condensable gases from the hoses.

NOTE: Refrigerant system pressure should be between 413-551 kPa (60-80 psi) at 24 ° C (75 ° F) with the engine off and cool.

10.

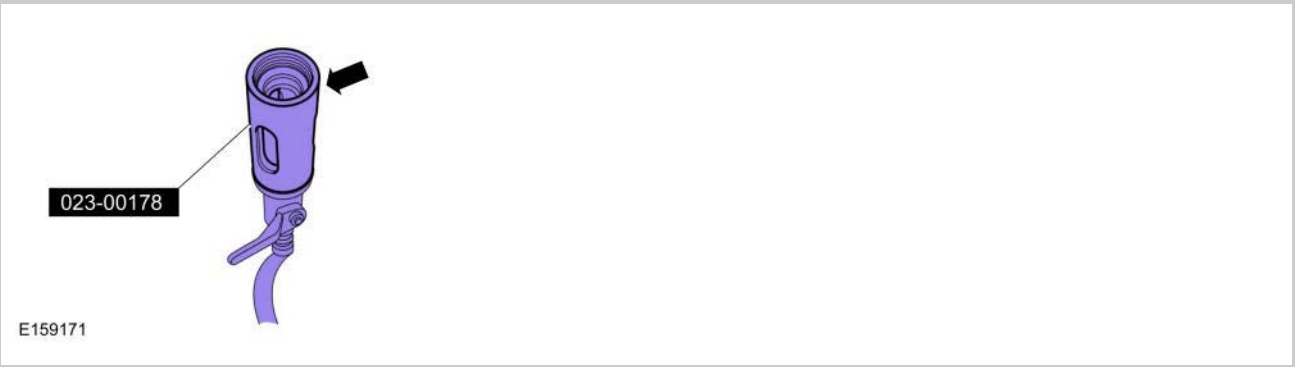
Verify the valves on the R-134a Loop/Add On Injector Kit-Set are closed. Install Special Service Tool: 219-00069 R134a Loop/Add On Kit Set.



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11.

Fill the R-134a Loop/Add On Injector Kit-Set reservoir with 7 ml (0.25 fl. oz.) of fluorescent dye.



12.

Install the R-134a Loop/Add On Injector Kit-Set between the high-pressure and low-pressure service gauge port valves.

NOTE: Make sure all tools and hoses are clear of the engine cooling fan and drive belt before starting the engine. Failure to keep tools and hoses clear from the engine cooling fan and drive belt results in damage to the tools and/or vehicle.

13.
With the A/C off, start the engine. Allow engine speed to stabilize below 1, 000 RPM.

14.

Set the A/C to the ON position.

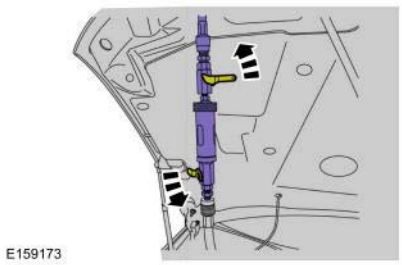
15.

Open the high-pressure service valve.



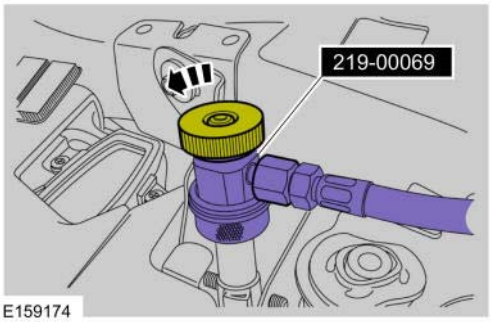
NOTE: To prevent pressure spike/liquid slug, slowly open the R-134a Loop/Add On Injector Kit-Set valves and inject the fluorescent dye into the refrigerant system.

16.
Open the R-134a Loop/Add On Injector Kit-Set valves and inject the fluorescent dye into the refrigerant system.



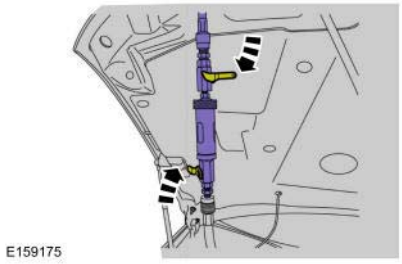
17.

Close the high-pressure service valve to allow the pressure inside the R-134a Loop/Add On Injector Kit-Set to equalize with the suction side of the refrigerant system.



NOTE: Close the valves on the R-134a Loop/Add On Injector Kit-Set while the A/C compressor is operating.

18.
Close the valves on the R-134a Loop/Add On Injector Kit-Set.



NOTE: Make sure all of the valves on the R-134a Loop/Add On Injector Kit-Set remain closed when not in use.

19.
Disconnect the high-pressure and low-pressure service valves and remove the R-134a Loop/Add On Injector Kit-Set from the vehicle. Remove Special Service Tool: 219-00069 R134a Loop/Add On Kit Set.

Fluorescent Dye Detection

NOTE: Ford Motor Company vehicles are produced with R-134a fluorescent dye installed in the refrigerant system from the factory. The location of leaks can be pinpointed by the bright yellow-green glow of the fluorescent dye under a UV lamp. Since more than one leak can exist, inspect each component, line and fitting in the refrigerant system for a leak.

NOTE: Use of dye-enhancing glasses or goggles greatly improves the detection of the dye under the UV lamp.

NOTE: Not all UV lamps will fluoresce the dye used in Ford vehicles. All Rotunda UV lamps are optimized to fluoresce the dye.

20.

Check for leaks using a Rotunda-approved UV lamp and dye enhancing glasses.

21.

Inspect all components, lines and fittings of the refrigerant system.

22.

After the leak(s) is repaired, remove any traces of fluorescent dye with a general purpose oil solvent.

23.

Verify the repair by running the vehicle for a short period of time and rechecking the area of the leak with a Rotunda-approved UV lamp. Use the General Equipment: UV Leak Detector

GENERAL PROCEDURES > REFRIGERANT IDENTIFICATION TESTING

Special Tool(s) / General Equipment

Refrigerant Identification Equipment

Activation

NOTE: Use a Refrigerant Blend Identifier to identify gas samples taken directly from the refrigeration system or storage containers prior to recovering or charging the refrigerant system.

1.
Follow the instructions included with Refrigerant Blend Identifier to obtain the sample for testing.

Use the General Equipment: Refrigerant Identification Equipment

> *NOTE: The refrigerant identifier displays one of the following:*

2.

If the purity level of R-134a is 98% or greater by weight, the green PASS LED. The weight concentrations of R-134a, R-12, R-22, hydrocarbons and air will be displayed on the digital display.

If refrigerant R-134a does not meet the 98% purity level, the red FAIL LED and an alarm sounds alerting the user of potential hazards. The weight concentrations of R-134a, R-12, R-22 and hydrocarbons are displayed on the digital display.

If hydrocarbon concentrations are 2% or greater by weight, the red FAIL LED, "Hydrocarbon High" will be displayed on the digital display, and an alarm sounds alerting the user of potential hazards. The weight concentrations of R-134a, R-12, R-22 and hydrocarbons also are displayed on the digital display.

3.

The percentage of air contained in the sample is displayed if the R-134a content is 98% or greater. The refrigerant identifier eliminates the effect of air when determining the refrigerant sample content because air is not considered a contaminant, although air can affect A/C system performance. When the refrigerant identifier has determined that a refrigerant source is pure (R-134a is 98% or greater by weight) and air concentration levels are 2% or greater by weight, it prompts the user if an air purge is desired.

4.

If contaminated refrigerant is detected, repeat the refrigerant identification test to verify the refrigerant is indeed contaminated.

> *NOTE: Install a new suction accumulator or receiver/drier as directed by the A/C system flushing procedure.*

> *NOTE: If contaminated refrigerant is detected, DO NOT recover the refrigerant into R-134a recovery/recycling equipment. Recovery of contaminated refrigerant contaminates the recovered refrigerant supply and may damage the recovery/recycling equipment.*

5.
Recover the contaminated refrigerant using suitable recovery-only equipment designed for capturing and storing contaminated refrigerant only.

6.

Determine and correct the cause of the customer's initial concern.

7.

Refer to: Air Conditioning (A/C) System Flushing .

8.

Dispose of the contaminated refrigerant in accordance with all federal, state and local regulations.

GENERAL PROCEDURES > REFRIGERANT OIL ADDING

Special Tool(s) / General Equipment

Air Conditioning Service Unit

Check

Compressor Type

NOTE: New compressors come fully charged with PAG (polyalkylene glycol) compressor oil. The old compressor is only partially charged because some of the oil is elsewhere in the A/C system.

NOTE: The purpose of oil balance is to make sure the amount of oil in the system is not increased or decreased as a result of the replacement component(s).

NOTE: Perform an oil balance when replacing a compressor where system flush will not be performed.

NOTE: During normal A/C operation, oil is circulated through the system with the refrigerant, and a small amount is retained in each component. If certain components of the system are removed, some of the refrigerant oil will go with the component. To maintain the original total oil charge, it is necessary to compensate for the oil lost by adding oil to the system with the new part.

NOTE: Motorcraft ® PAG Refrigerant Compressor Oil YN-12-D only must be used as a refrigerant system lubricant. Addition of any oil other than Motorcraft ® PAG Refrigerant Compressor Oil YN-12-D to the refrigerant system will damage the A/C compressor and contaminate the refrigerant system.

NOTE: An A/C refrigerant analyzer must be used before the recovery of any vehicle's A/C refrigerant. Failure to do so puts the shop's bulk refrigerant at risk of

contamination. If the vehicle's A/C refrigerant is contaminated, refer the customer to the service facility that carried out the last A/C service. If the customer wishes to pay the additional cost, use the A/C recovery equipment that is designated for recovering contaminated A/C refrigerant. Dispose of all contaminated A/C refrigerant as hazardous waste. For all equipment, follow the manufacturer's instructions.

1.
Verify the location of the drain plug by compressor type. Once the compressor type has been identified, proceed to appropriate compressor type below for compressor oil matching steps.

NOTE: ***Type 1: (IVDC) Internal Variable Displacement Air Conditioning (A/C) Compressor***

2.


E169516

NOTE: ***Type 2: (EVDC) External Variable Displacement Air Conditioning (A/C) Compressor***

3.


E169517

NOTE: ***Type 3: (EVDC) External Variable Displacement Air Conditioning (A/C) Compressor***

4.


E169628

NOTE: ***Type 4: Fixed Air Conditioning (A/C) Compressor***

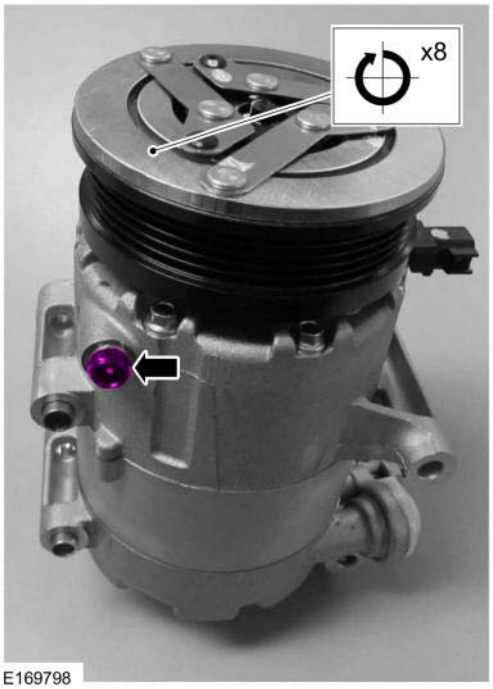
5.



Type 1

> *NOTE: Make sure the old A/C compressor shaft is rotating and not just the A/C pulley.*

6.
Remove the oil drain bolt and rotate the old A/C compressor clutch 6 to 8 revolutions while collecting oil in a clean measuring device.



7.

Install the oil drain bolt in the old A/C compressor.

Torque

: 177 lb.in (20 Nm)

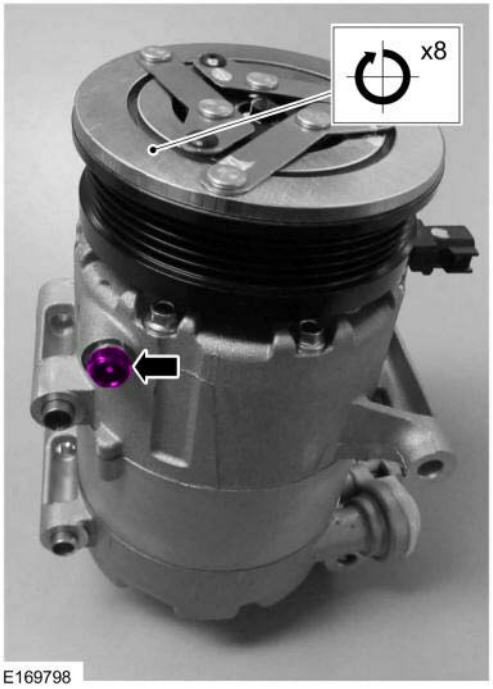


8.

Remove the suction and discharge port seal cap from the new A/C compressor.

NOTE: Make sure the new A/C compressor shaft is rotating and not just the A/C pulley.

9.
Remove the drain bolt and rotate the new A/C compressor clutch 6 to 8 revolutions while collecting oil in a clean measuring device.



10.

Measure the amount of oil drained for the old A/C compressor and add the same amount of new oil to the new A/C compressor.

11.

Install the oil drain bolt in the new A/C compressor.

Torque

: 177 lb.in (20 Nm)


E169516

12.

Install the suction and discharge port seal cap on the new A/C compressor.

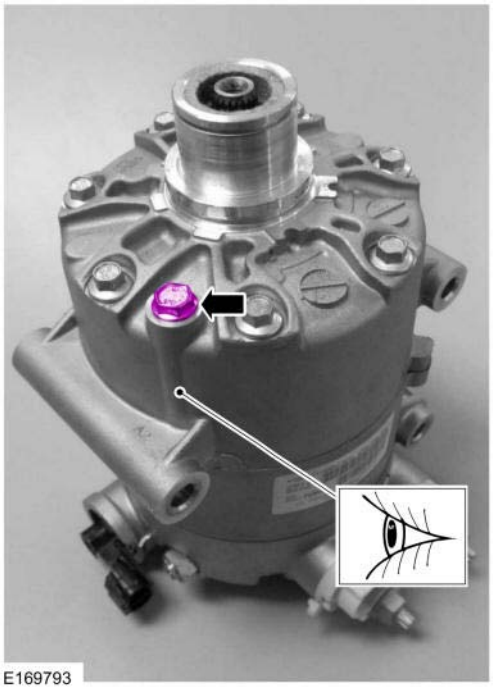
Type 2

13.

Remove the A/C clutch and A/C clutch field coil from the old A/C compressor. Refer to: Air Conditioning (A/C) Clutch and Air Conditioning (A/C) Clutch Field Coil .

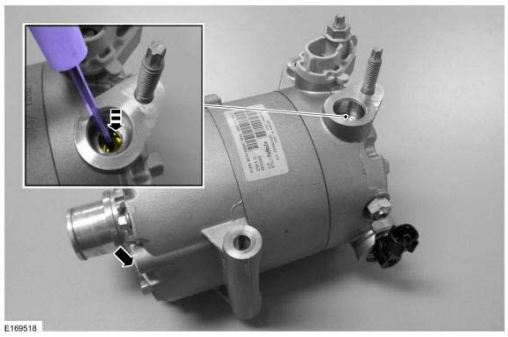
14.

Remove the oil drain bolt from the old A/C compressor.



15.

Press the suction damper to allow proper ventilation while draining the oil from the old A/C compressor.



16.

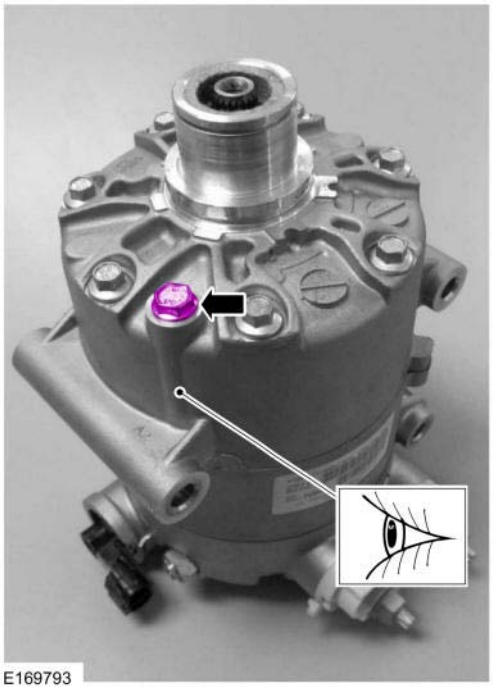
Drain as much oil from the old A/C compressor.

17.

Install the oil drain bolt in the old A/C compressor.

Torque

: 80 lb.in (9 Nm)

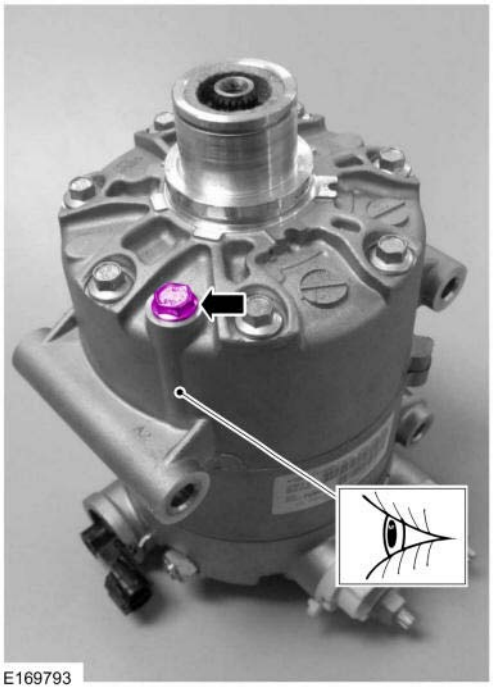


18.

Remove the A/C clutch and A/C clutch field coil from the new A/C compressor. Refer to: Air Conditioning (A/C) Clutch and Air Conditioning (A/C) Clutch Field Coil .

19.

Remove the oil drain bolt from the new A/C compressor.

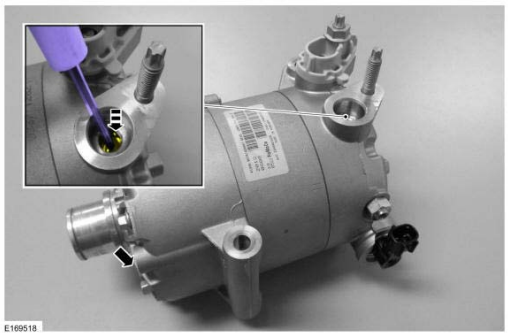


20.

Remove the suction port seal cap.

21.

Press the suction damper to allow proper ventilation while draining the oil from the old A/C compressor.



22.

Drain as much oil from the new A/C compressor.

23.

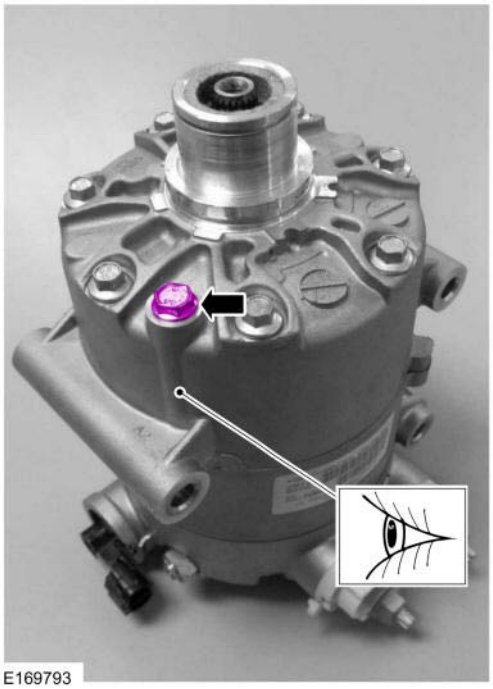
Measure the amount of oil drained for the old A/C compressor and add the same amount of new oil to the new A/C compressor.

24.

Install the oil drain bolt in the new A/C compressor.

Torque

: 80 lb.in (9 Nm)



25.

Install the suction port seal cap.

26.

Install the A/C clutch and A/C clutch field coil on the new A/C compressor. Refer to: Air Conditioning (A/C) Clutch and Air Conditioning (A/C) Clutch Field Coil .

Type 3

NOTE: Make sure the old A/C compressor shaft is rotating and not just the A/C pulley.

27.
Remove the oil drain bolt and rotate the old A/C compressor clutch 6 to 8 revolutions while collecting oil in a clean measuring device.



28.

Install the oil drain bolt in the old A/C compressor.

Torque

: 22 lb.ft (30 Nm)



29.

Remove the suction and discharge port seal cap from the new A/C compressor.

NOTE: Make sure the new A/C compressor shaft is rotating and not just the A/C pulley.

30.
Remove the drain bolt and rotate the new A/C compressor clutch 6 to 8 revolutions while collecting oil in a clean measuring device.



31.

Measure the amount of oil drained for the old A/C compressor and add the same amount of new oil to the new A/C compressor.

32.

Install the oil drain bolt in the new A/C compressor.

Torque

: 22 lb.ft (30 Nm)


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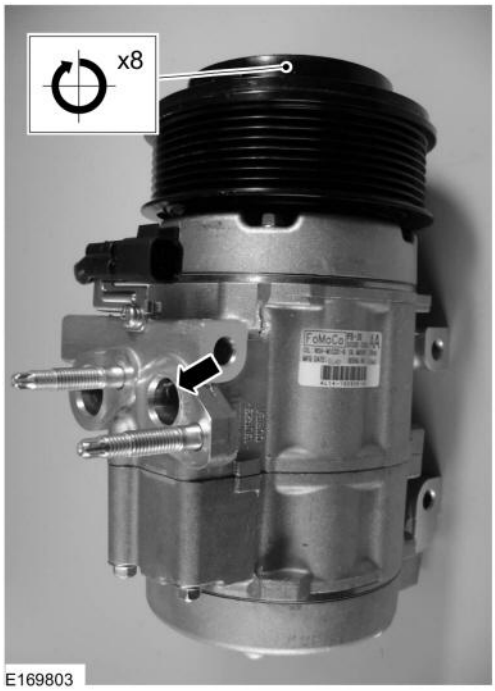
33.

Install the suction and discharge port seal cap on the new A/C compressor.

Type 4

NOTE: Make sure the old A/C compressor shaft is rotating and not just the A/C pulley.

34.
Rotate the old A/C compressor clutch 6 to 8 revolutions while collecting oil in a clean measuring device from the A/C compressor discharge port.

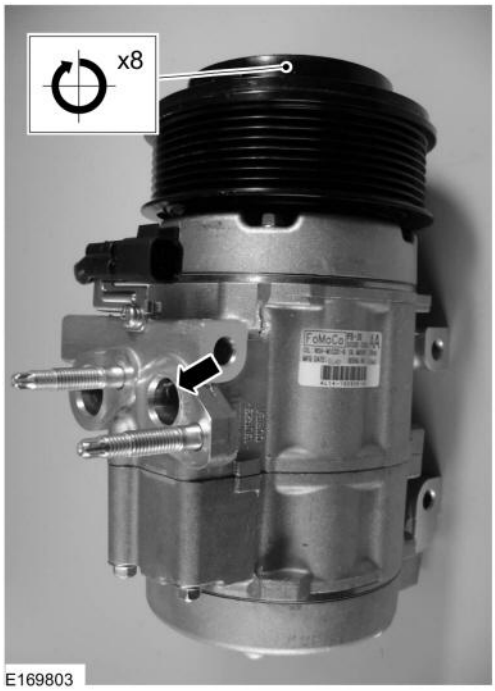


35.

Remove the suction and discharge port seal cap from the new A/C compressor.

NOTE: Make sure the new A/C compressor shaft is rotating and not just the A/C pulley.

36.
Remove the drain bolt and rotate the new A/C compressor clutch 6 to 8 revolutions while collecting oil in a clean measuring device from the A/C compressor discharge port.



37.

Measure the amount of oil drained for the old A/C compressor and add the same amount of new oil to the new A/C compressor.

38.

Install the suction and discharge port seal cap on the new A/C compressor.

Activation

NOTE: During normal A/C operation, oil is circulated through the system with the refrigerant, and a small amount is retained in each component. If certain components of the system are removed, some of the refrigerant oil will go with the component. To maintain the original total oil charge, it is necessary to compensate for the oil lost by adding oil to the system with the new part.

NOTE: Motorcraft ® PAG Refrigerant Compressor Oil YN-12-D only must be used as a refrigerant system lubricant. Addition of any oil other than Motorcraft ® PAG Refrigerant Compressor Oil YN-12-D to the refrigerant system will damage the A/C compressor and contaminate the refrigerant system.

NOTE: An A/C refrigerant analyzer must be used before the recovery of any vehicle's A/C refrigerant. Failure to do so puts the shop's bulk refrigerant at risk of contamination. If the vehicle's A/C refrigerant is contaminated, refer the customer to the service facility that carried out the last A/C service. If the customer wishes to pay the additional cost, use the A/C recovery equipment that is designated for recovering

contaminated A/C refrigerant. Dispose of all contaminated A/C refrigerant as hazardous waste. For all equipment, follow the manufacturer's instructions.

1.

NOTE: During normal A/C operation, oil is circulated through the system with the refrigerant, and a small amount is retained in each component. If certain components of the system are removed, some of the PAG (polyalkylene glycol) oil will go with the component. To maintain the original total oil charge, it is necessary to compensate for the oil lost by adding oil to the system with the new part.

NOTE: Make sure the equipment is clean and free of foreign material.

2.
Refer to the chart below for refrigerant oil adding amounts and methods of installation.**Refrigerant Oil Adding (When new components are installed)**

	PAG (polyalkylene glycol) Refrigerant Compressor Oil YN-12-D Oil Amount fl. oz. (ml)	Method of Adding
After installing the A/C Compressor.	Service compressor contains full system charge of oil. Oil matching required plus amount collected during recovery.	Refer to oil adding steps above.
After installing the receiver/drier.	2 fl. oz. (60 ml) plus the amount collected during refrigerant recovery.	Inject to low-side service port during system charging.
After installing the receiver/drier element.	1 fl. oz. (30 ml) plus the amount collected during refrigerant recovery.	Inject to low-side service port during system charging.
After installing the condenser core.	1.5 fl. oz. (45 ml) plus the amount collected during refrigerant recovery.	Add directly to inlet port or inject to low-side service port during system charging.
After installing the condenser core, and the receiver/drier element.	2 fl. oz. (60 ml) plus the amount collected during refrigerant recovery.	Add directly to inlet port or inject to low-side service port during system charging.
After installing the evaporator core.	1.5 fl. oz. (45 ml) plus the amount collected during refrigerant recovery.	Add directly to inlet port or inject to low-side service port during system charging.

After installing/reassembling the thermostatic expansion valve.	Amount collected during refrigerant recovery.	Inject to low-side service port during system charging.
After installing a refrigerant Hose/Line.	2 fl. oz. (60 ml) plus the amount collected during refrigerant recovery **FOOTNOTE (a)** .	Inject to low-side service port during system charging.
After an O-ring Leak Repair.	1 fl. oz. (30 ml) plus the amount collected during refrigerant recovery **FOOTNOTE (b)** .	Inject to low-side service port during system charging.
After a service port leak repair.	Amount collected during refrigerant recovery.	Inject to low-side service port during system charging.
FOOTNOTE (a) If an excessive amount of PAG (polyalkylene glycol) Refrigerant Compressor Oil YN-12-D is lost due to a hose rupture/separation or other damage, the total system PAG (polyalkylene glycol) Refrigerant Compressor Oil YN-12-D capacity must be added. Also, it is necessary to replace the receiver/drier.		
FOOTNOTE (b) The amount specified may be used for one or multiple O-ring leak repairs. Do not multiply the PAG (polyalkylene glycol) Refrigerant Compressor Oil YN-12-D amount by the number of O-ring leaks being repaired.		

Use the General Equipment: Air Conditioning Service Unit

Oil Injection Using a Dye/Lubricant Injector

NOTE: Refrigerant system pressure should be between 413-551 kPa (60-80 psi) at 24 ° C (75 ° F) with the engine off and cool.

NOTE: Before using the R-134a Loop/Add On Injector Kit-Set for the first time, refer to the equipment manufacturer's instructions on evacuation of non-condensable gases from the hoses.

NOTE: Fluorescent refrigerant system dye is added to the refrigerant system at the factory to assist in refrigerant system leak diagnosis using a Rotunda-approved UV black light. It is not necessary to add additional dye to the refrigerant system before diagnosing leaks, even if a significant amount of refrigerant has been removed from the system. Replacement suction accumulators and receiver/driers are shipped with a fluorescent dye wafer included in the desiccant bag which dissolves after approximately 30 minutes of continuous A/C operation. It is not necessary to add dye after flushing the refrigerant system because a new suction accumulator or receiver/drier is installed as part of the flushing procedure. Replace hose/accumulator, receiver/drier or receiver/drier element.

3.

Evacuate the refrigerant system. Refer to: Air Conditioning (A/C) System Recovery, Evacuation and Charging .

4.

Assemble the dye/lubricant injector and the correct adapters to match the amount of refrigerant compressor oil to be injected.

5.

Verify that all the valves on the dye/lubricant injector are closed.

6.

Fill the dye/lubricant injector with the correct amount of clean, new PAG (polyalkylene glycol) oil.

7.

Install the dye/lubricant injector between the low-side service gauge port valve and the refrigerant service station or manifold gauge set.

NOTE: Make sure all tools and hoses are clear of the engine cooling fan and drive belt before starting the engine. Failure to keep tools and hoses clear from the engine cooling fan and drive belt results in damage to the tools and/or vehicle.

8.
Open all valves and charge the refrigerant system. Refer to: Air Conditioning (A/C) System Recovery, Evacuation and Charging .

GENERAL PROCEDURES > REFRIGERANT SYSTEM TESTS - 2.3L ECOBOOST (201KW 273PS)

Activation

NOTE: In order to perform an accurate test the vehicle ambient temperature must be 21 °C (70 °F) or above.

NOTE: Procedure 1 - Ambient Temperature between 21 °C (70 °F) and 38 °C (100 °F)

1.
Run the engine until it reaches normal operating temperature.

2.

Connect the air conditioning service unit to the refrigerant system.

3.

Set temperature to (lowest possible temp setting) with the dual function disabled (if equipped). Manually set blower on HI. If the vehicle has a fresh air/recirc button, set it to FRESH. If the vehicle has an Air Conditioning (A/C) switch or compressor on switch, set it to Air Conditioning (A/C) ON.

4.

Open all vehicle windows and leave the hood open for the test. Open the rear doors.

5.

Confirm the compressor is operating and the engine cooling fan(s) are operating or engaged. Allow the vehicle to idle until the suction (low-side) and discharge (high-side) pressures are stable or fluctuate in a range that repeats.

6.

Record the ambient (shop) temperature.

7.

Record the discharge pressure. If the pressure is fluctuating, record the average value.

8.

Determine if the discharge pressure falls within the normal operating limits using the

Normal Refrigerant Discharge Pressures 21 - 38 °C (70 - 100 °F) Ambient (30 - 60% Relative Humidity) chart below.



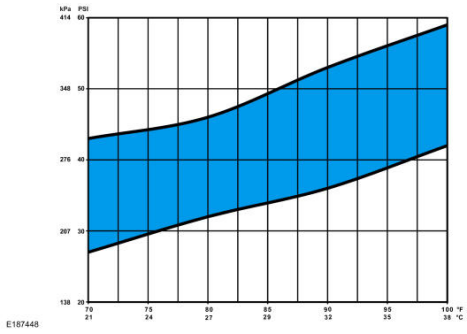
9.

Record the suction pressure. If the pressure is fluctuating, record the average value.

10.

Determine if the suction pressure falls within the normal operating limits using the

Normal Refrigerant Suction Pressures 21 - 38 °C (70 - 100 °F) Ambient (30 - 60% Relative Humidity) chart below.



NOTE: Use the following table to guide diagnosis of the refrigerant system if operating pressures are outside normal limits.

11.
Refer to the chart below.

High (Discharge) Pressure	Low (Suction) Pressure	Component - Causes
High	Normal to High	Condenser - inadequate airflow. Engine - overheating.
Normal to High	Normal	Refrigerant overcharge - air in refrigerant.
Normal to Low	High	A/C Compressor - low performance.
Normal to Low	Normal to High	A/C suction line - partially restricted or plugged. **FOOTNOTE (a)**
Normal to Low	Low	Low refrigerant charge - leak in system. A/C suction line - partially restricted or plugged. **FOOTNOTE (b)**
Erratic Operation or Compressor Not Running		Ambient Air Temperature (AAT) sensor - poor connection. A/C pressure transducer - poor connection. Evaporator temperature sensor - poor connection. Low refrigerant charge - leak in system.
Additional Possible Components or Causes Associated With Inadequate Compressor Operation		
Compressor drive belt - loose Compressor clutch - slipping Clutch coil open - shorted, or loose mounting		

Control assembly switch - dirty contacts or sticking open Clutch wiring circuit - high resistance, open or blown fuse Compressor operation interrupted by engine computer
Additional Possible Components or Causes Associated With a Damaged Compressor
Incorrect clutch air-gap Suction accumulator - refrigerant oil bleed hose plugged Refrigerant leaks

FOOTNOTE (a) Low pressure reading will be normal to high if restriction is downstream of service access valve. **FOOTNOTE (b)** Low pressure reading will be low if restriction is upstream of service access valve.

Inspection

NOTE: Procedure 2 - Ambient Temperature Above 38 °C (100 °F)

1.
Run the engine until it reaches normal operating temperature.

2.

Connect the air conditioning service unit to the refrigerant system.

3.

Set temperature to (lowest possible temp setting) with the dual function disabled (if equipped). Manually set blower on HI. If the vehicle has a fresh air/recirc button, set it to FRESH. If the vehicle has an Air Conditioning (A/C) switch or compressor on switch, set it to Air Conditioning (A/C) ON.

4.

Open all vehicle windows and leave the hood open for the test. Open the rear hatch and/or rear doors (if equipped).

5.

Confirm the compressor is operating and the engine cooling fan(s) are operating or engaged. Allow the vehicle to idle until the suction (low-side) and discharge (high-side) pressures are stable or fluctuate in a range that repeats.

6.

Record the ambient (shop) temperature.

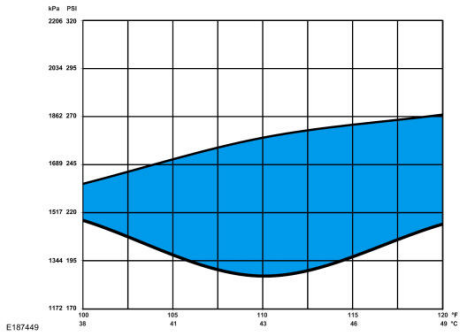
7.

Record the discharge pressure. If the pressure is fluctuating, record the average value.

8.

Determine if the discharge pressure falls within the normal operating limits using the

Normal Refrigerant Discharge Pressures 38 - 49 °C (100 - 120 °F) Ambient (15 - 40% Relative Humidity) chart below.



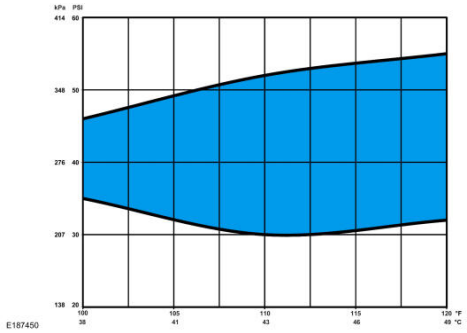
9.

Record the suction pressure. If the pressure is fluctuating, record the average value.

10.

Determine if the suction pressure falls within the normal operating limits using the

Normal Refrigerant Suction Pressures 38 - 49 °C (100 - 120 °F) Ambient (15 - 40% Relative Humidity) chart below.



NOTE: Use the following table to guide diagnosis of the refrigerant system if operating pressures are outside normal limits.

11.
Refer to the chart below.

High (Discharge) Pressure	Low (Suction) Pressure	Component - Causes
High	Normal to High	Condenser - inadequate airflow. Engine - overheating.
Normal to High	Normal	Refrigerant overcharge - air in refrigerant.
Normal to Low	High	A/C Compressor - low performance.

Normal to Low	Normal to High	A/C suction line - partially restricted or plugged. **FOOTNOTE (a)**
Normal to Low	Low	Low refrigerant charge - leak in system. A/C suction line - partially restricted or plugged. **FOOTNOTE (b)**
Erratic Operation or Compressor Not Running		Ambient Air Temperature (AAT) sensor - poor connection. A/C pressure transducer - poor connection. Evaporator temperature sensor - poor connection. Low refrigerant charge - leak in system.
Additional Possible Components or Causes Associated With Inadequate Compressor Operation		
Compressor drive belt - loose Compressor clutch - slipping Clutch coil open - shorted, or loose mounting Control assembly switch - dirty contacts or sticking open Clutch wiring circuit - high resistance, open or blown fuse Compressor operation interrupted by engine computer		
Additional Possible Components or Causes Associated With a Damaged Compressor		
Incorrect clutch air-gap Suction accumulator - refrigerant oil bleed hose plugged Refrigerant leaks		

FOOTNOTE (a) Low pressure reading will be normal to high if restriction is downstream of service access valve. **FOOTNOTE (b)** Low pressure reading will be low if restriction is upstream of service access valve.

GENERAL PROCEDURES > REFRIGERANT SYSTEM TESTS - 3.7L DURATEC (227KW 301PS)

Activation

NOTE: In order to perform an accurate test the vehicle ambient temperature must be 21 °C (70 °F) or above.

NOTE: Procedure 1 - Ambient Temperature between 21 °C (70 °F) and 38 °C (100 °F)

1.
Run the engine until it reaches normal operating temperature.

2.

Connect the air conditioning service unit to the refrigerant system.

3.

Set temperature to (lowest possible temp setting) with the dual function disabled (if equipped). Manually set blower on HI. If the vehicle has a fresh air/recirc button, set it to FRESH. If the vehicle has an Air Conditioning (A/C) switch or compressor on switch, set it to Air Conditioning (A/C) ON.

4.

Open all vehicle windows and leave the hood open for the test. Open the rear doors.

5.

Confirm the compressor is operating and the engine cooling fan(s) are operating or engaged. Allow the vehicle to idle until the suction (low-side) and discharge (high-side) pressures are stable or fluctuate in a range that repeats.

6.

Record the ambient (shop) temperature.

7.

Record the discharge pressure. If the pressure is fluctuating, record the average value.

8.

Determine if the discharge pressure falls within the normal operating limits using the

Normal Refrigerant Discharge Pressures 21 - 38 °C (70 - 100 °F) Ambient (30 - 60% Relative Humidity) chart below.



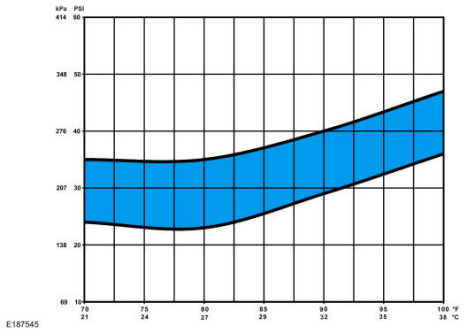
9.

Record the suction pressure. If the pressure is fluctuating, record the average value.

10.

Determine if the suction pressure falls within the normal operating limits using the

Normal Refrigerant Suction Pressures 21 - 38 °C (70 - 100 °F) Ambient (30 - 60% Relative Humidity) chart below.



NOTE: Use the following table to guide diagnosis of the refrigerant system if operating pressures are outside normal limits.

11.
Refer to the chart below.

High (Discharge) Pressure	Low (Suction) Pressure	Component - Causes
High	Normal to High	Condenser - inadequate airflow. Engine - overheating.
Normal to High	Normal	Refrigerant overcharge - air in refrigerant.
Normal to Low	High	A/C Compressor - low performance.
Normal to Low	Normal to High	A/C suction line - partially restricted or plugged. **FOOTNOTE (a)**
Normal to Low	Low	Low refrigerant charge - leak in system. A/C suction line - partially restricted or plugged. **FOOTNOTE (b)**
Erratic Operation or Compressor Not Running		Ambient Air Temperature (AAT) sensor - poor connection. A/C pressure transducer - poor connection. Evaporator temperature sensor - poor connection. Low refrigerant charge - leak in system.

Additional Possible Components or Causes Associated With Inadequate Compressor Operation
Compressor drive belt - loose Compressor clutch - slipping Clutch coil open - shorted, or loose mounting Control assembly switch - dirty contacts or sticking open Clutch wiring circuit - high resistance, open or blown fuse Compressor operation interrupted by engine computer
Additional Possible Components or Causes Associated With a Damaged Compressor
Incorrect clutch air-gap Suction accumulator - refrigerant oil bleed hose plugged Refrigerant leaks

FOOTNOTE (a) Low pressure reading will be normal to high if restriction is downstream of service access valve. **FOOTNOTE (b)** Low pressure reading will be low if restriction is upstream of service access valve.

Inspection

NOTE: Procedure 2 - Ambient Temperature Above 38 °C (100 °F)

1.
Run the engine until it reaches normal operating temperature.

2.

Connect the air conditioning service unit to the refrigerant system.

3.

Set temperature to (lowest possible temp setting) with the dual function disabled (if equipped). Manually set blower on HI. If the vehicle has a fresh air/recirc button, set it to FRESH. If the vehicle has an Air Conditioning (A/C) switch or compressor on switch, set it to Air Conditioning (A/C) ON.

4.

Open all vehicle windows and leave the hood open for the test. Open the rear hatch and/or rear doors (if equipped).

5.

Confirm the compressor is operating and the engine cooling fan(s) are operating or engaged. Allow the vehicle to idle until the suction (low-side) and discharge (high-side) pressures are stable or fluctuate in a range that repeats.

6.

Record the ambient (shop) temperature.

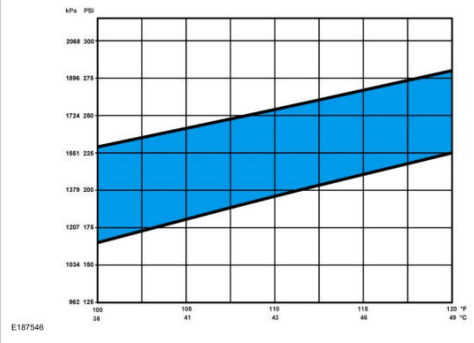
7.

Record the discharge pressure. If the pressure is fluctuating, record the average value.

8.

Determine if the discharge pressure falls within the normal operating limits using the

Normal Refrigerant Discharge Pressures 38 - 49 °C (100 - 120 °F) Ambient (15 - 40% Relative Humidity) chart below.



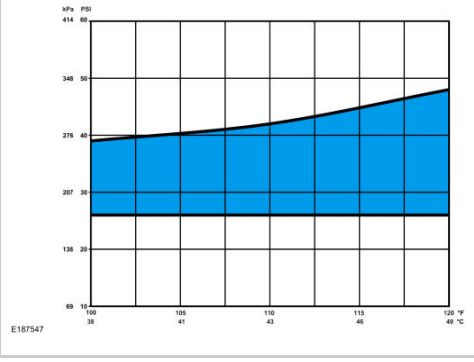
9.

Record the suction pressure. If the pressure is fluctuating, record the average value.

10.

Determine if the suction pressure falls within the normal operating limits using the

Normal Refrigerant Suction Pressures 38 - 49 °C (100 - 120 °F) Ambient (15 - 40% Relative Humidity) chart below.



NOTE: Use the following table to guide diagnosis of the refrigerant system if operating pressures are outside normal limits.

11.
Refer to the chart below.

High (Discharge) Pressure	Low (Suction) Pressure	Component - Causes
High	Normal to High	Condenser - inadequate airflow.

		Engine - overheating.
Normal to High	Normal	Refrigerant overcharge - air in refrigerant.
Normal to Low	High	A/C Compressor - low performance.
Normal to Low	Normal to High	A/C suction line - partially restricted or plugged. **FOOTNOTE (a)**
Normal to Low	Low	Low refrigerant charge - leak in system. A/C suction line - partially restricted or plugged. **FOOTNOTE (b)**
Erratic Operation or Compressor Not Running		Ambient Air Temperature (AAT) sensor - poor connection. A/C pressure transducer - poor connection. Evaporator temperature sensor - poor connection. Low refrigerant charge - leak in system.
Additional Possible Components or Causes Associated With Inadequate Compressor Operation		
Compressor drive belt - loose Compressor clutch - slipping Clutch coil open - shorted, or loose mounting Control assembly switch - dirty contacts or sticking open Clutch wiring circuit - high resistance, open or blown fuse Compressor operation interrupted by engine computer		
Additional Possible Components or Causes Associated With a Damaged Compressor		
Incorrect clutch air-gap Suction accumulator - refrigerant oil bleed hose plugged Refrigerant leaks		

FOOTNOTE (a) Low pressure reading will be normal to high if restriction is downstream of service access valve. **FOOTNOTE (b)** Low pressure reading will be low if restriction is upstream of service access valve.

GENERAL PROCEDURES > REFRIGERANT SYSTEM TESTS - 5.0L 32V TI-VCT

Activation

NOTE: In order to perform an accurate test the vehicle ambient temperature must be 21

°C (70 °F) or above.

NOTE: Procedure 1 - Ambient Temperature between 21 °C (70 °F) and 38 °C (100 °F)

1.
Run the engine until it reaches normal operating temperature.

2.

Connect the air conditioning service unit to the refrigerant system.

3.

Set temperature to (lowest possible temp setting) with the dual function disabled (if equipped). Manually set blower on HI. If the vehicle has a fresh air/recirc button, set it to FRESH. If the vehicle has an Air Conditioning (A/C) switch or compressor on switch, set it to Air Conditioning (A/C) ON.

4.

Open all vehicle windows and leave the hood open for the test. Open the rear doors.

5.

Confirm the compressor is operating and the engine cooling fan(s) are operating or engaged. Allow the vehicle to idle until the suction (low-side) and discharge (high-side) pressures are stable or fluctuate in a range that repeats.

6.

Record the ambient (shop) temperature.

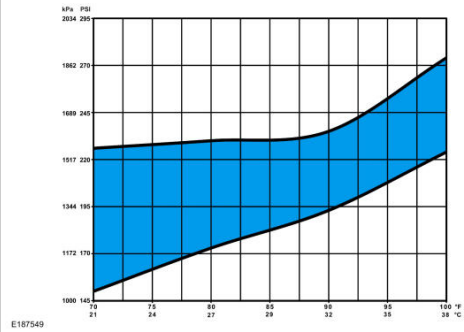
7.

Record the discharge pressure. If the pressure is fluctuating, record the average value.

8.

Determine if the discharge pressure falls within the normal operating limits using the

Normal Refrigerant Discharge Pressures 21 - 38 °C (70 - 100 °F) Ambient (30 - 60% Relative Humidity) chart below.



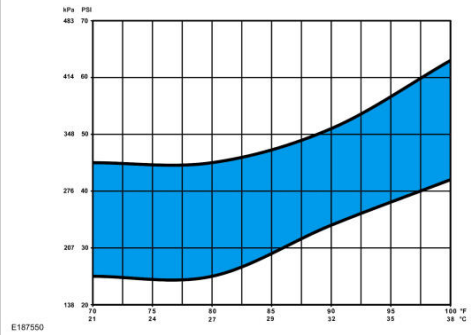
9.

Record the suction pressure. If the pressure is fluctuating, record the average value.

10.

Determine if the suction pressure falls within the normal operating limits using the

Normal Refrigerant Suction Pressures 21 - 38 °C (70 - 100 °F) Ambient (30 - 60% Relative Humidity) chart below.



NOTE: Use the following table to guide diagnosis of the refrigerant system if operating pressures are outside normal limits.

11.
Refer to the chart below.

High (Discharge) Pressure	Low (Suction) Pressure	Component - Causes
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Normal to High	Normal	Refrigerant overcharge - air in refrigerant.
Normal to Low	High	A/C Compressor - low performance.
Normal to Low	Normal to High	A/C suction line - partially restricted or plugged. **FOOTNOTE (a)** .

Normal to Low	Low	Low refrigerant charge - leak in system. A/C suction line - partially restricted or plugged. **FOOTNOTE (b)** .
Erratic Operation or Compressor Not Running		Ambient Air Temperature (AAT) sensor - poor connection. A/C pressure transducer - poor connection. Evaporator temperature sensor - poor connection. Low refrigerant charge - leak in system.
Additional Possible Components or Causes Associated With Inadequate Compressor Operation		
Compressor drive belt - loose Compressor clutch - slipping Clutch coil open - shorted, or loose mounting Control assembly switch - dirty contacts or sticking open Clutch wiring circuit - high resistance, open or blown fuse Compressor operation interrupted by engine computer		
Additional Possible Components or Causes Associated With a Damaged Compressor		
Incorrect clutch air-gap Suction accumulator - refrigerant oil bleed hose plugged Refrigerant leaks		

FOOTNOTE (a) Low pressure reading will be normal to high if restriction is downstream of service access valve. **FOOTNOTE (b)** Low pressure reading will be low if restriction is upstream of service access valve.

Inspection

NOTE: Procedure 2 - Ambient Temperature Above 38 °C (100 °F)

1.
Run the engine until it reaches normal operating temperature.

2.

Connect the air conditioning service unit to the refrigerant system.

3.

Set temperature to (lowest possible temp setting) with the dual function disabled (if equipped). Manually set blower on HI. If the vehicle has a fresh air/recirc button, set it to FRESH. If the vehicle has an Air Conditioning (A/C) switch or compressor on switch, set it to Air Conditioning (A/C) ON.

4.

Open all vehicle windows and leave the hood open for the test. Open the rear hatch and/or rear doors (if equipped).

5.

Confirm the compressor is operating and the engine cooling fan(s) are operating or engaged. Allow the vehicle to idle until the suction (low-side) and discharge (high-side) pressures are stable or fluctuate in a range that repeats.

6.

Record the ambient (shop) temperature.

7.

Record the discharge pressure. If the pressure is fluctuating, record the average value.

8.

Determine if the discharge pressure falls within the normal operating limits using the

Normal Refrigerant Discharge Pressures 38 - 49 °C (100 - 120 °F) Ambient (15 - 40% Relative Humidity) chart below.



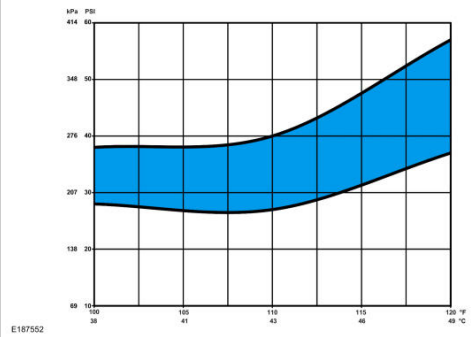
9.

Record the suction pressure. If the pressure is fluctuating, record the average value.

10.

Determine if the suction pressure falls within the normal operating limits using the

Normal Refrigerant Suction Pressures 38 - 49 °C (100 - 120 °F) Ambient (15 - 40% Relative Humidity) chart below.



NOTE: Use the following table to guide diagnosis of the refrigerant system if operating pressures are outside normal limits.

11.
Refer to the chart below.

High (Discharge) Pressure	Low (Suction) Pressure	Component - Causes
High	Normal to High	Condenser - inadequate airflow. Engine - overheating.
Normal to High	Normal	Refrigerant overcharge - air in refrigerant.
Normal to Low	High	A/C Compressor - low performance.
Normal to Low	Normal to High	A/C suction line - partially restricted or plugged. **FOOTNOTE (a)**
Normal to Low	Low	Low refrigerant charge - leak in system. A/C suction line - partially restricted or plugged. **FOOTNOTE (b)**
Erratic Operation or Compressor Not Running		Ambient Air Temperature (AAT) sensor - poor connection. A/C pressure transducer - poor connection. Evaporator temperature sensor - poor connection. Low refrigerant charge - leak in system.
Additional Possible Components or Causes Associated With Inadequate Compressor Operation		
Compressor drive belt - loose Compressor clutch - slipping Clutch coil open - shorted, or loose mounting		

Control assembly switch - dirty contacts or sticking open Clutch wiring circuit - high resistance, open or blown fuse Compressor operation interrupted by engine computer
Additional Possible Components or Causes Associated With a Damaged Compressor
Incorrect clutch air-gap Suction accumulator - refrigerant oil bleed hose plugged Refrigerant leaks

FOOTNOTE (a) Low pressure reading will be normal to high if restriction is downstream of service access valve. **FOOTNOTE (b)** Low pressure reading will be low if restriction is upstream of service access valve.

REMOVAL AND INSTALLATION > AIR CONDITIONING (A C) COMPRESSOR - 2.3L ECOBOOST (201KW 273PS) > REMOVAL

NOTE: If installing a new A/C compressor due to an internal failure of the old unit, carry out the following procedures to remove contamination from the A/C system. Failure to remove contamination from the A/C system, if present, will result in poor A/C performance and/or damage to the new A/C compressor and other components.

- **If A/C flushing equipment is available, carry out flushing of the A/C system prior to installing a new A/C compressor.**
- **If A/C flushing equipment is not available, replace all contaminated components after a new A/C compressor has been installed.**
- **Install a new Thermostatic Expansion Valve (TXV) as directed by the A/C flushing.**
- **Install a new receiver drier element as directed by the A/C flushing.**

NOTE: Installation of a new receiver drier element is not required when repairing the A/C system except when there is physical evidence of system contamination from a failed A/C compressor or damage to the receiver drier element.

NOTE: A new A/C compressor may come equipped with an A/C clutch disc and hub, A/C compressor pulley and A/C clutch field coil already installed. If these components are not pre-installed, it will be necessary to transfer these parts from the old A/C compressor to the new compressor prior to installation of the A/C compressor if suitable for reuse.

NOTE: Removal steps in this procedure may contain installation details.

1.

Recover the refrigerant. Refer to: Air Conditioning (A/C) System Recovery, Evacuation and Charging .

2.

Remove the A/C compressor belt. Refer to: Air Conditioning (A/C) Compressor Belt .

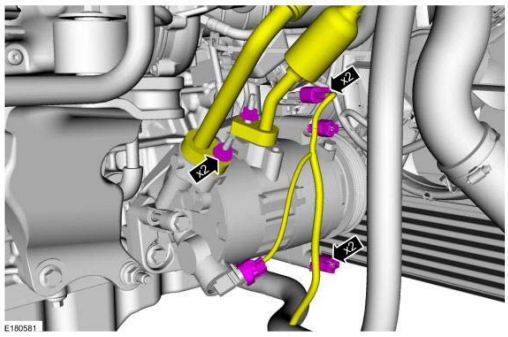
> *NOTE: Make sure that all openings are sealed.*

> *NOTE: Discard the O-ring seals and gaskets.*

3.
Remove the wiring harness retainers and disconnect the electrical connectors. Remove the nuts and disconnect the A/C compressor inlet and outlet lines.

Torque

: 159 lb.in (18 Nm)

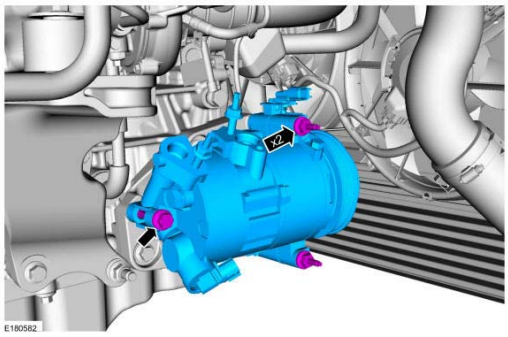


4.

Remove the bolt, studbolts and the A/C compressor.

Torque

: 18 lb.ft (25 Nm)



REMOVAL AND INSTALLATION > AIR CONDITIONING (A C) COMPRESSOR - 2.3L ECOBOOST (201KW 273PS) > INSTALLATION

1.

Add the correct amount of clean Polyalkylene Glycol (PAG) oil to the refrigerant system. Refer to: Refrigerant Oil Adding .

2.

Install new O-ring seals and gasket seals.

3.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > AIR CONDITIONING (A C) COMPRESSOR - 3.7L DURATEC (227KW 301PS) > REMOVAL

NOTE: If installing a new A/C compressor due to an internal failure of the old unit, carry out the following procedures to remove contamination from the A/C system. Failure to remove contamination from the A/C system, if present, will result in poor A/C performance and/or damage to the new A/C compressor and other components.

- **If A/C flushing equipment is available, carry out flushing of the A/C system prior to installing a new A/C compressor.**
- **If A/C flushing equipment is not available, replace all contaminated components after a new A/C compressor has been installed.**
- **Install a new Thermostatic Expansion Valve (TXV) as directed by the A/C flushing.**
- **Install a new receiver drier element as directed by the A/C flushing.**

NOTE: Installation of a new receiver drier element is not required when repairing the A/C system except when there is physical evidence of system contamination from a failed A/C compressor or damage to the receiver drier element.

NOTE: A new A/C compressor may come equipped with an A/C clutch disc and hub, A/C compressor pulley and A/C clutch field coil already installed. If these components are not pre-installed, it will be necessary to transfer these parts from the old A/C compressor to the new compressor prior to installation of the A/C compressor if suitable for reuse.

NOTE: Removal steps in this procedure may contain installation details.

1.

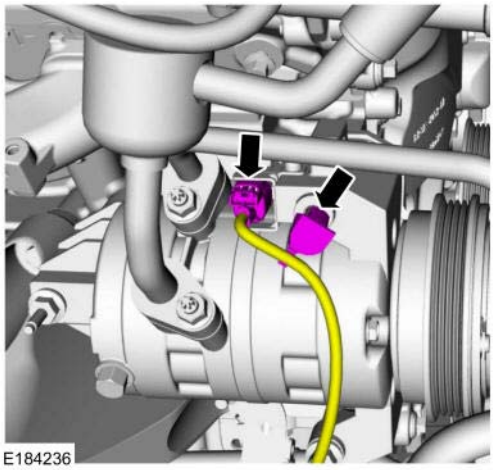
Recover the refrigerant. Refer to: Air Conditioning (A/C) System Recovery, Evacuation and Charging .

2.

Remove the A/C compressor belt. Refer to: Air Conditioning (A/C) Compressor Belt .

3.

Disconnect the A/C compressor electrical connector and the wire harness retainer.



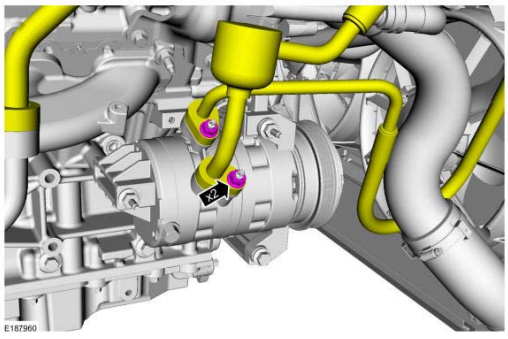
NOTE: Make sure that all openings are sealed.

NOTE: Discard the O-ring seals and gaskets.

4.
Remove the nuts and disconnect the A/C compressor inlet and outlet lines.

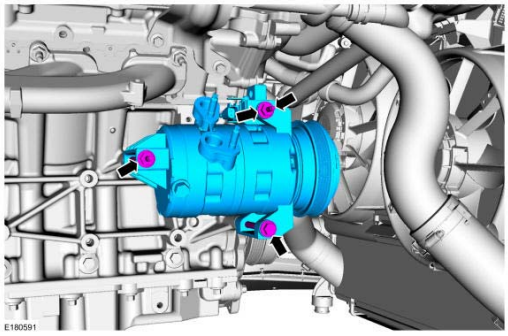
Torque

: 159 lb.in (18 Nm)



5.

Remove the bolt, studbolts and the A/C compressor.



REMOVAL AND INSTALLATION > AIR CONDITIONING (A C) COMPRESSOR - 3.7L DURATEC (227KW 301PS) > INSTALLATION

1.

Add the correct amount of clean PAG oil to the refrigerant system. Refer to: Refrigerant Oil Adding .

2.

Install new O-ring seals and gasket seals.

3.

To install, reverse the removal procedure.

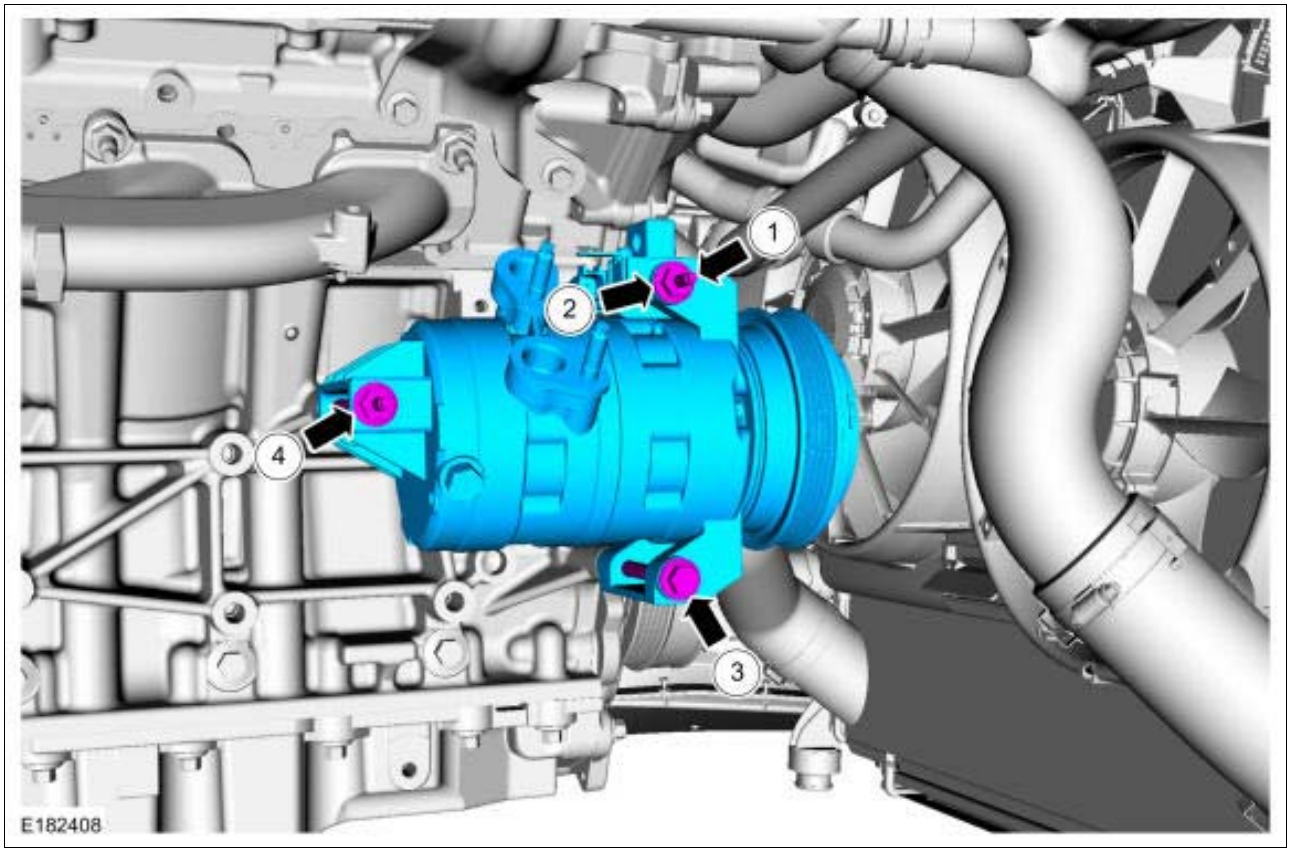
4.

Tighten the A/C compressor stud, bolt, studbolt and nut in the sequence shown below.

Torque

: 1.: 80 lb.in (9 Nm) 2.: 18 lb.ft (25 Nm)3.: 18 lb.ft (25 Nm) 4.: 18 lb.ft (25 Nm)

Fig 1: A/C Compressor Bolts Tightening Sequence



Courtesy of FORD MOTOR CO.

REMOVAL AND INSTALLATION > AIR CONDITIONING (A C) COMPRESSOR - 5.0L 32V TI-VCT > REMOVAL

NOTE: If installing a new A/C compressor due to an internal failure of the old unit, carry out the following procedures to remove contamination from the A/C system. Failure to remove contamination from the A/C system, if present, will result in poor A/C performance and/or damage to the new A/C compressor and other components.

- **If A/C flushing equipment is available, carry out flushing of the A/C system prior to installing a new A/C compressor.**
- **If A/C flushing equipment is not available, replace all contaminated components after a new A/C compressor has been installed.**
- **Install a new Thermostatic Expansion Valve (TXV) as directed by the A/C flushing.**
- **Install a new receiver drier element as directed by the A/C flushing.**

NOTE: Installation of a new receiver drier element is not required when repairing the A/C

system except when there is physical evidence of system contamination from a failed A/C compressor or damage to the receiver drier element.

NOTE: A new A/C compressor may come equipped with an A/C clutch disc and hub, A/C compressor pulley and A/C clutch field coil already installed. If these components are not pre-installed, it will be necessary to transfer these parts from the old A/C compressor to the new compressor prior to installation of the A/C compressor if suitable for reuse.

NOTE: Removal steps in this procedure may contain installation details.

1.

Recover the refrigerant. Refer to: Air Conditioning (A/C) System Recovery, Evacuation and Charging .

2.

With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

3.

Remove the A/C compressor belt. Refer to: Air Conditioning (A/C) Compressor Belt .

4.

Remove transmission fluid cooler tubes. Refer to: Transmission Fluid Cooler Tubes - 5.0L 32V Ti-VCT .

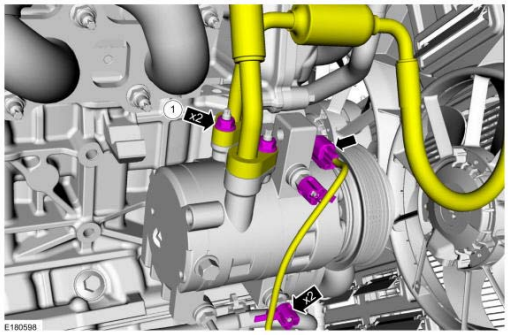
NOTE: Make sure that all openings are sealed.

NOTE: Discard the O-ring seals and gaskets.

5.
Remove the wiring harness retainers and disconnect the electrical connector. Remove the nuts and disconnect the A/C compressor inlet and outlet lines.

Torque

: 159 lb.in (18 Nm)

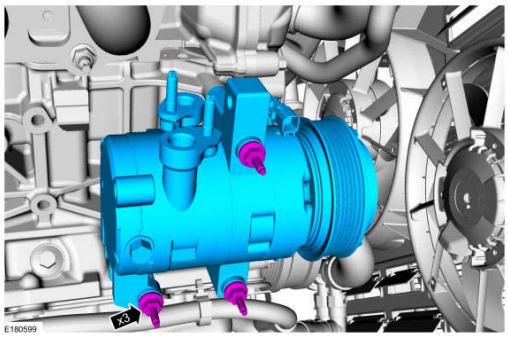


6.

Remove the studbolts and the A/C compressor.

Torque

: 18 lb.ft (25 Nm)



REMOVAL AND INSTALLATION > AIR CONDITIONING (A C) COMPRESSOR - 5.0L 32V TI-VCT > INSTALLATION

1.

Add the correct amount of clean PAG oil to the refrigerant system. Refer to: Refrigerant Oil Adding .

2.

Install new O-ring seals and gasket seals.

3.

To install, reverse the removal procedure.

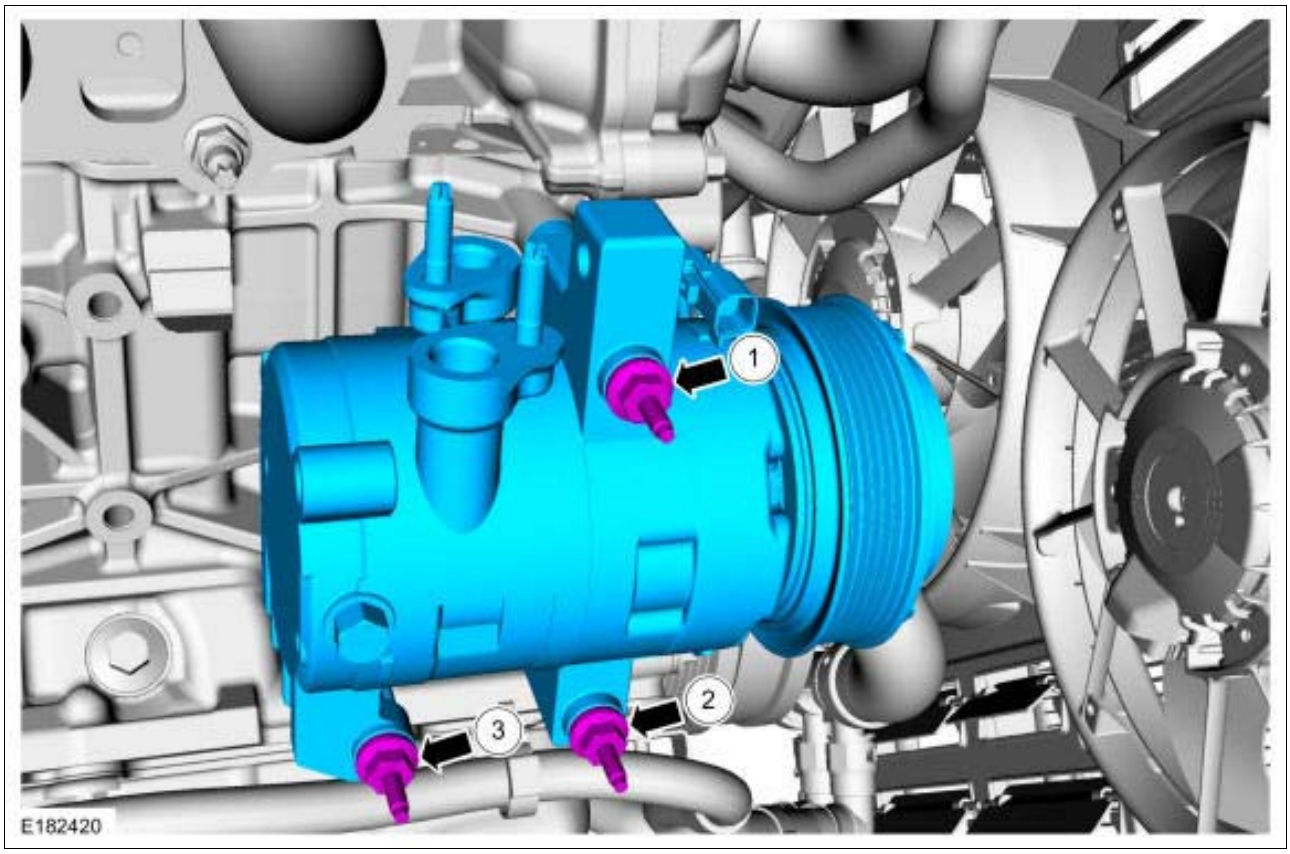
4.

Tighten the A/C compressor studbolts in the sequence shown below.

Torque

: 18 lb.ft (25 Nm)

Fig 1: A/C Compressor Bolts Tightening Sequence



Courtesy of FORD MOTOR CO.

REMOVAL AND INSTALLATION > AIR CONDITIONING (A C) COMPRESSOR OUTLET LINE - 2.3L ECOBOOST (201KW 273PS) > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

Recover the refrigerant. Refer to: Air Conditioning (A/C) System Recovery, Evacuation and Charging .

NOTE: Make sure that all openings are sealed.

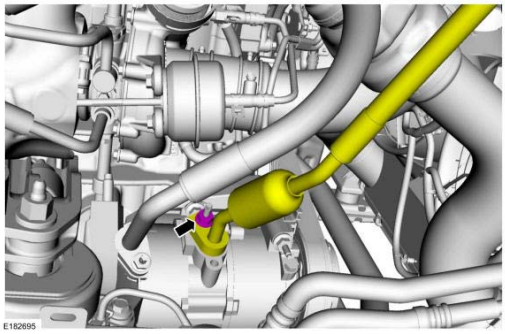
NOTE: Discard the O-ring seals and gaskets.

2.

Remove the nut and disconnect the A/C compressor outlet line.

Torque

: 159 lb.in (18 Nm)



NOTE: Discard the O-ring seals and gaskets.

3.

1.

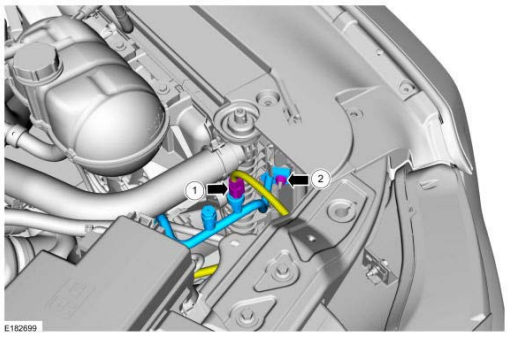
Disconnect the A/C pressure transducer connector.

2.

Remove the nut and the A/C compressor outlet line.

Torque

: 159 lb.in (18 Nm)



REMOVAL AND INSTALLATION > AIR CONDITIONING (A C) COMPRESSOR OUTLET LINE - 2.3L ECOBOOST (201KW 273PS) > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Install new O-ring seals and gasket seals.

3.

Add the correct amount of clean Polyalkylene Glycol (PAG) oil to the refrigerant system. Refer to: Refrigerant Oil Adding .

REMOVAL AND INSTALLATION > AIR CONDITIONING (A C) COMPRESSOR OUTLET LINE - 3.7L DURATEC (227KW 301PS) > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

Recover the refrigerant. Refer to: Air Conditioning (A/C) System Recovery, Evacuation and Charging .

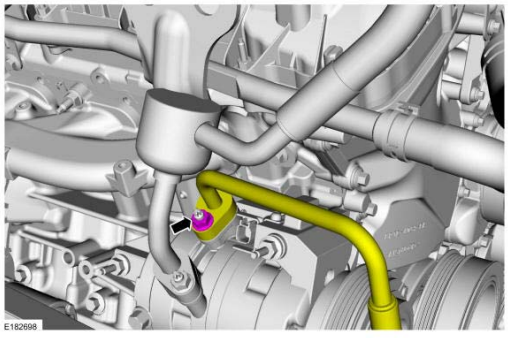
NOTE: Make sure that all openings are sealed.

NOTE: Discard the O-ring seals and gaskets.

2.
Remove the nut and disconnect the A/C compressor outlet line.

Torque

: 159 lb.in (18 Nm)



NOTE: Discard the O-ring seals and gaskets.

3.

1.

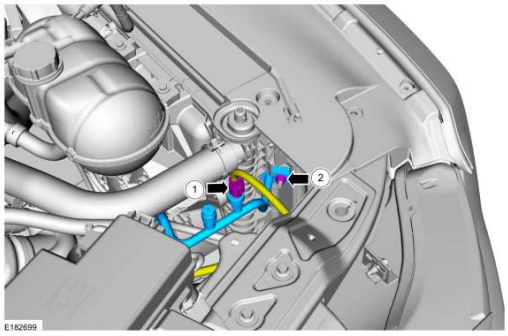
Disconnect the A/C pressure transducer electrical connector.

2.

Remove the nut and the A/C compressor outlet line.

Torque

: 159 lb.in (18 Nm)



REMOVAL AND INSTALLATION > AIR CONDITIONING (A C) COMPRESSOR OUTLET LINE - 3.7L DURATEC (227KW 301PS) > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Install new O-ring seals and gasket seals.

3.

Add the correct amount of clean Polyalkylene Glycol (PAG) oil to the refrigerant system. Refer to: Refrigerant Oil Adding .

REMOVAL AND INSTALLATION > AIR CONDITIONING (A C) COMPRESSOR OUTLET LINE - 5.0L 32V TI-VCT > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

Recover the refrigerant. Refer to: Air Conditioning (A/C) System Recovery, Evacuation and Charging .

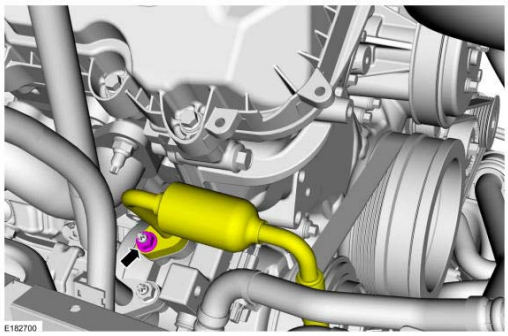
NOTE: Make sure that all openings are sealed.

NOTE: Discard the O-ring seals and gaskets.

2.
Remove the nut and disconnect the A/C compressor outlet line.

Torque

: 159 lb.in (18 Nm)



NOTE: Discard the O-ring seals and gaskets.

3.

1.

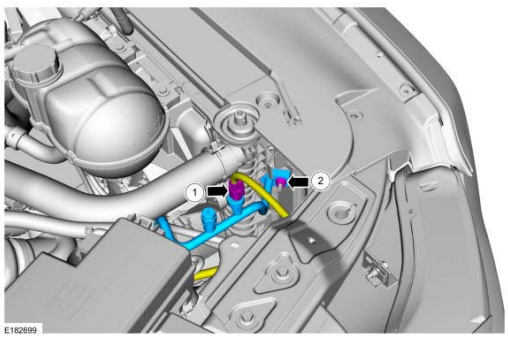
Disconnect the A/C pressure transducer electrical connector.

2.

Remove the nut and the A/C compressor outlet line.

Torque

: 159 lb.in (18 Nm)



REMOVAL AND INSTALLATION > AIR CONDITIONING (A C) COMPRESSOR OUTLET LINE - 5.0L 32V TI-VCT > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Install new O-ring seals and gasket seals.

3.

Add the correct amount of clean Polyalkylene Glycol (PAG) oil to the refrigerant system. Refer to: Refrigerant Oil Adding .

REMOVAL AND INSTALLATION > AIR CONDITIONING (A C) PRESSURE RELIEF VALVE - 3.7L DURATEC (227KW 301PS) > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

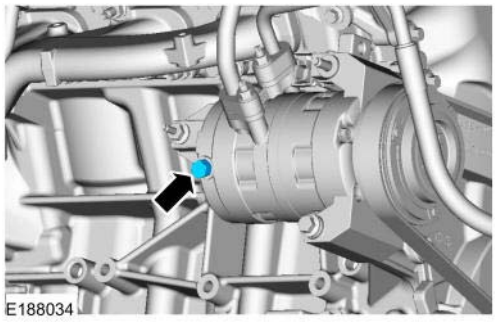
Recover the refrigerant. Refer to: Air Conditioning (A/C) System Recovery, Evacuation and Charging .

2.

Remove the A/C compressor pressure relief valve.

Torque

: 89 lb.in (10 Nm)



REMOVAL AND INSTALLATION > AIR CONDITIONING (A C) PRESSURE RELIEF

VALVE - 3.7L DURATEC (227KW 301PS) > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Add the correct amount of clean Polyalkylene Glycol (PAG) oil to the refrigerant system. Refer to: Refrigerant Oil Adding .

REMOVAL AND INSTALLATION > AIR CONDITIONING (A C) PRESSURE RELIEF VALVE - 5.0L 32V TI-VCT > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

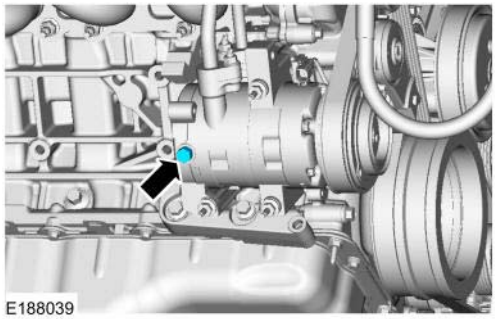
Recover the refrigerant. Refer to: Air Conditioning (A/C) System Recovery, Evacuation and Charging .

2.

Remove the A/C compressor pressure relief valve.

Torque

: 89 lb.in (10 Nm)



REMOVAL AND INSTALLATION > AIR CONDITIONING (A C) PRESSURE RELIEF VALVE - 5.0L 32V TI-VCT > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Add the correct amount of clean Polyalkylene Glycol (PAG) oil to the refrigerant system. Refer to: Refrigerant Oil Adding .

REMOVAL AND INSTALLATION > AIR CONDITIONING (AC) PRESSURE TRANSDUCER > REMOVAL

NOTE: 5.0L engine shown, all others are similar.

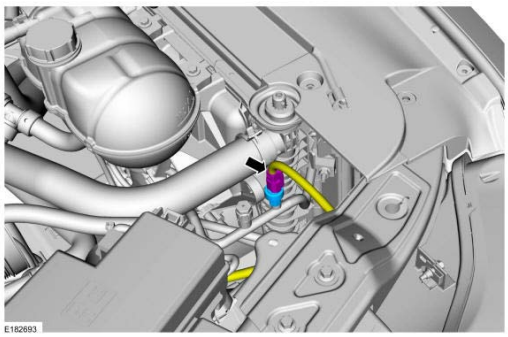
NOTE: Removal steps in this procedure may contain installation details.

1.

Disconnect the electrical connector and remove the A/C pressure transducer.

Torque

: 62 lb.in (7 Nm)



REMOVAL AND INSTALLATION > AIR CONDITIONING (AC) PRESSURE TRANSDUCER > INSTALLATION

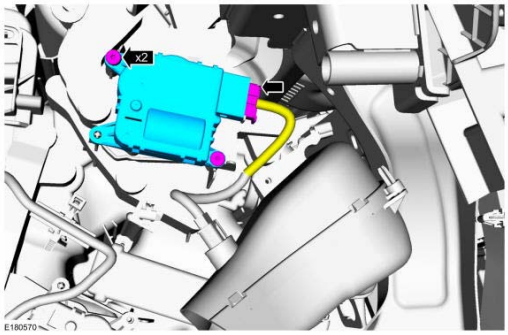
1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > AIR DISTRIBUTION DOOR ACTUATOR > REMOVAL

1.

Remove the retainers, the air distribution door actuator and disconnect the electrical connector.



REMOVAL AND INSTALLATION > AIR DISTRIBUTION DOOR ACTUATOR > INSTALLATION

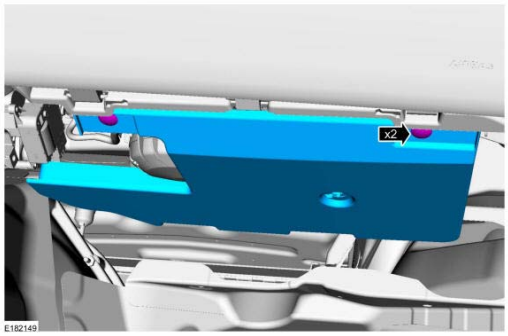
1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > AIR INLET DOOR ACTUATOR > REMOVAL

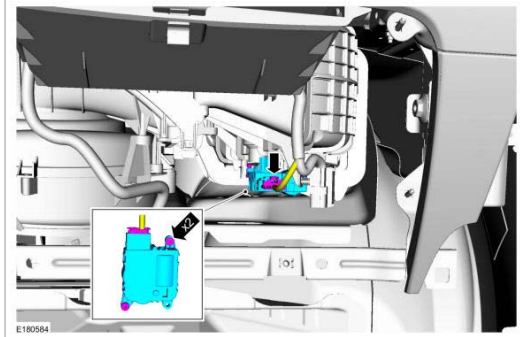
1.

Remove the retainers and the RH lower instrument panel insulator.



2.

Disconnect the air inlet door actuator connector, remove the retainers and the air inlet door actuator.



REMOVAL AND INSTALLATION > AIR INLET DOOR ACTUATOR > INSTALLATION

1.

To install, reverse the removal procedure.

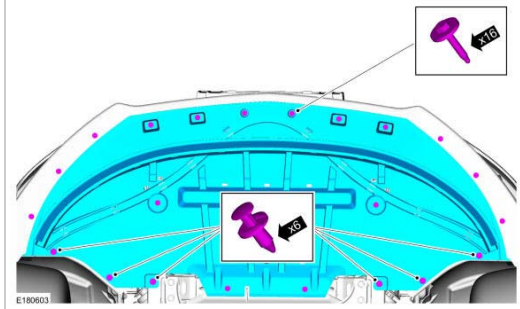
REMOVAL AND INSTALLATION > AMBIENT AIR TEMPERATURE SENSOR > REMOVAL

1.

With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

2.

Remove the underbody shield.



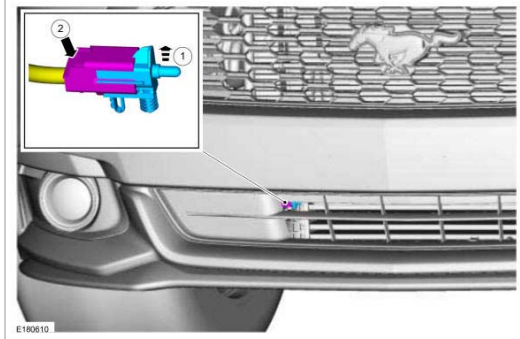
3.

1.

Remove the ambient air temperature sensor.

2.

Disconnect the ambient temperature sensor connector.



REMOVAL AND INSTALLATION > AMBIENT AIR TEMPERATURE SENSOR > INSTALLATION

1.

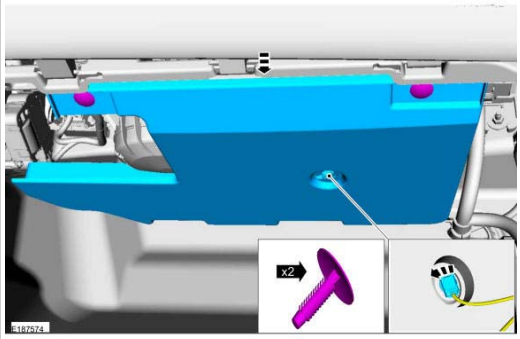
To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > BLOWER MOTOR > REMOVAL

1.

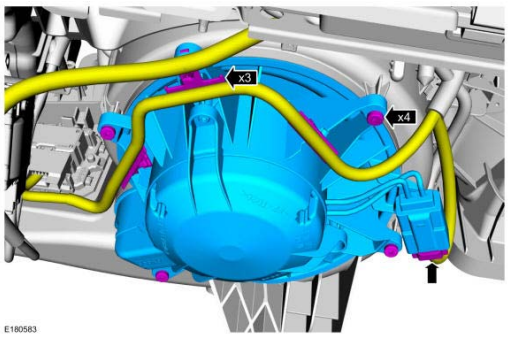
Remove the push pins and remove the RH insulation panel.

Remove the insulation panel ambient light.



2.

Disconnect the blower motor connector, the wiring harness retainers and position aside the harness. Remove the retainers and the blower motor.



REMOVAL AND INSTALLATION > BLOWER MOTOR > INSTALLATION

1.

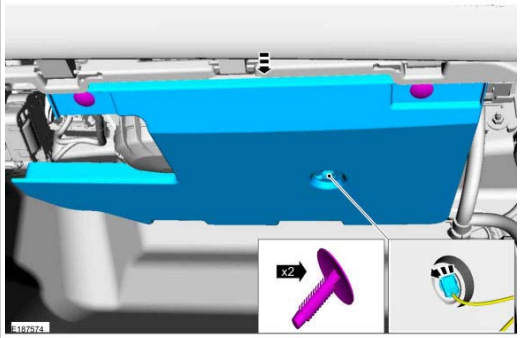
To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > BLOWER MOTOR SPEED CONTROL > REMOVAL

1.

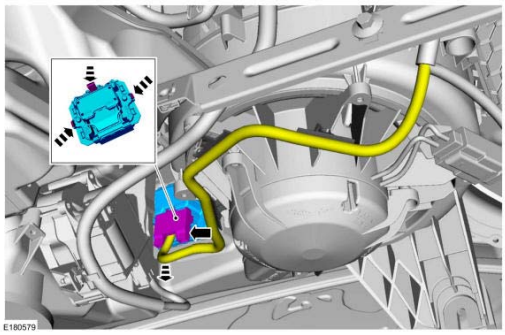
Remove the push pins and remove the RH insulation panel.

Remove the insulation panel ambient light.



2.

Disconnect the blower motor speed control connector, position aside the wiring harness and remove the blower motor speed control.



REMOVAL AND INSTALLATION > BLOWER MOTOR SPEED CONTROL > INSTALLATION

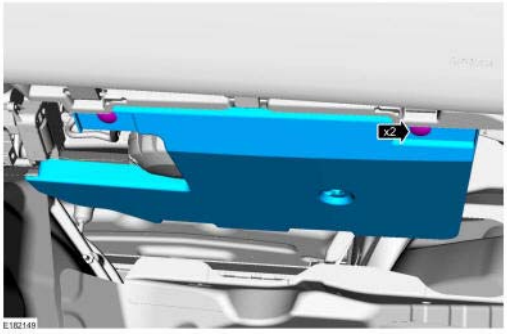
1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > CABIN AIR FILTER > REMOVAL

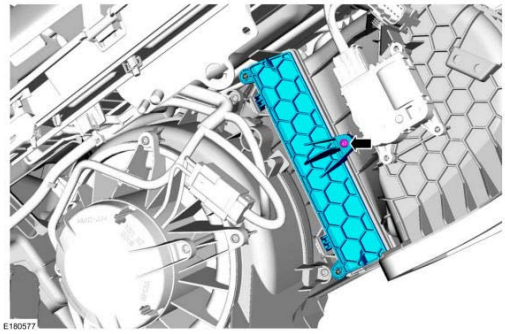
1.

Remove the retainers and the RH lower instrument panel insulator.



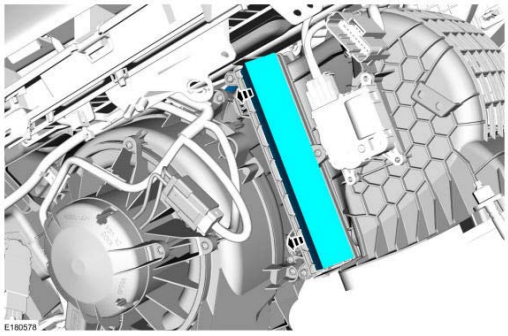
2.

Remove the retainer and the cabin air filter cover.



3.

Remove the cabin air filter.



REMOVAL AND INSTALLATION > CABIN AIR FILTER > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > CENTER REGISTER AIR DISCHARGE TEMPERATURE SENSOR > REMOVAL

1.

Remove the instrument panel cluster. Refer to: Instrument Panel Cluster (IPC) .

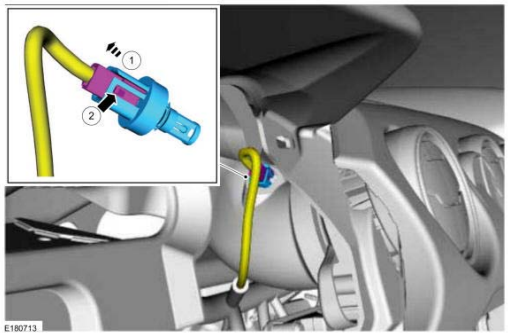
2.

1.

Remove the center register air discharge temperature sensor.

2.

Disconnect the center register air discharge temperature sensor connector.



REMOVAL AND INSTALLATION > CENTER REGISTER AIR DISCHARGE TEMPERATURE SENSOR > INSTALLATION

1.

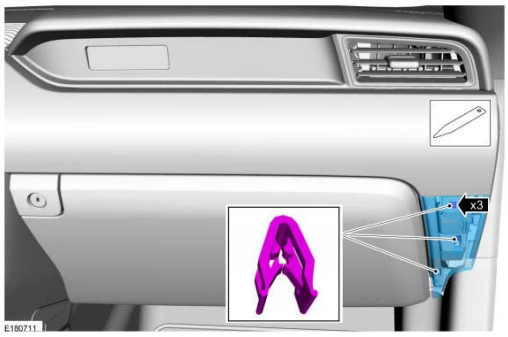
To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > CENTER REGISTERS > REMOVAL

NOTE: Vehicle with center gauges shown, without center gauges similar.

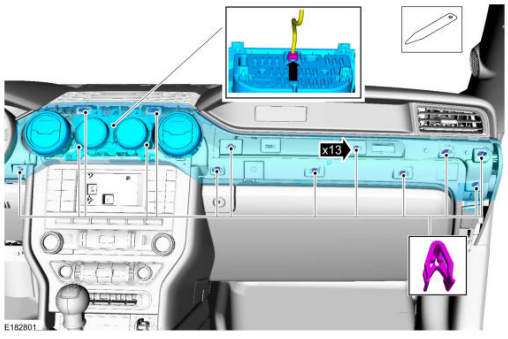
1.

Remove the instrument panel side trim panel.



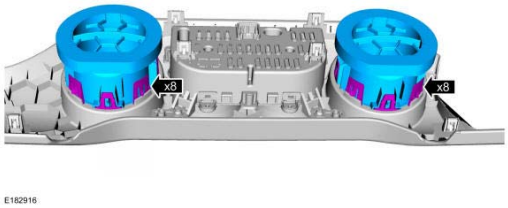
2.

Remove the instrument panel center upper trim panel and disconnect the electrical connector.



3.

Release the clips and remove the center registers.



REMOVAL AND INSTALLATION > CENTER REGISTERS > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > CLIMATE CONTROL HOUSING - 2.3L ECOBOOST (201KW 273PS) > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

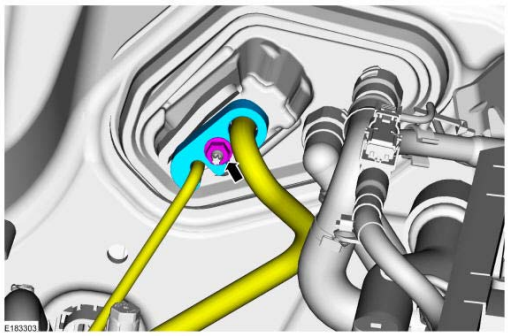
Recover the refrigerant. Refer to: Air Conditioning (A/C) System Recovery, Evacuation and Charging .

2.

Remove the nut and the Thermostatic Expansion Valve (TXV) bracket, and disconnect the A/C condenser outlet line and the evaporator outlet line.

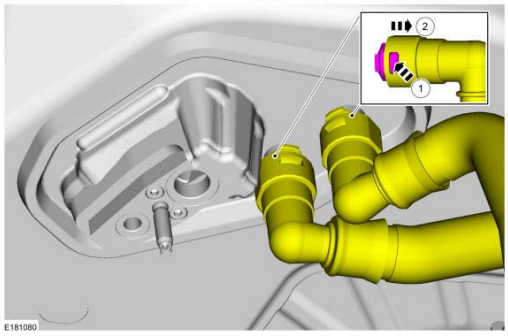
Torque

: 133 lb.in (15 Nm)



3.

Disconnect the heater core inlet and outlet hoses.

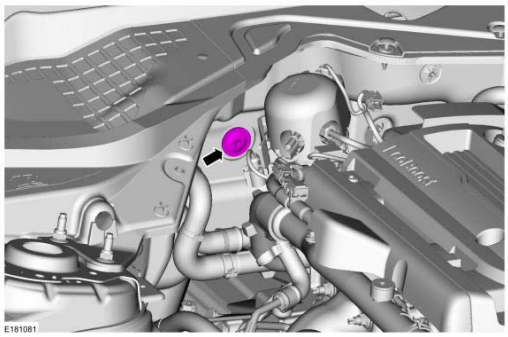


4.

Remove the bolt and washer.

Torque

: 62 lb.in (7 Nm)

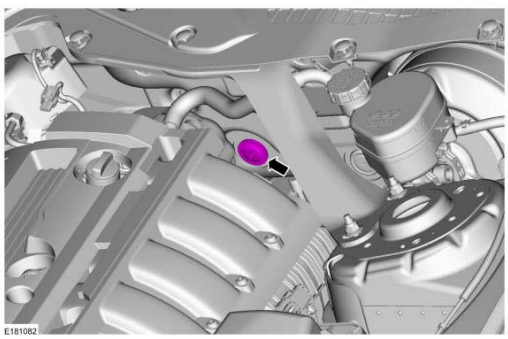


5.

Remove the bolt and washer.

Torque

: 62 lb.in (7 Nm)



6.

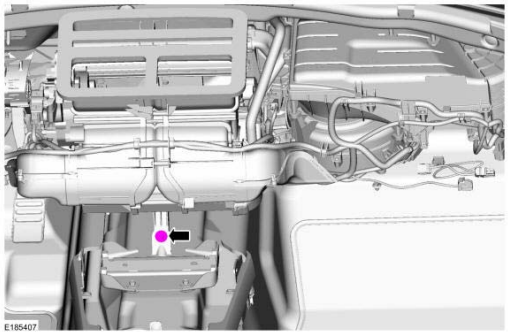
Remove the instrument panel. Refer to: Instrument Panel .

7.

Remove the bolt.

Torque

: 62 lb.in (7 Nm)

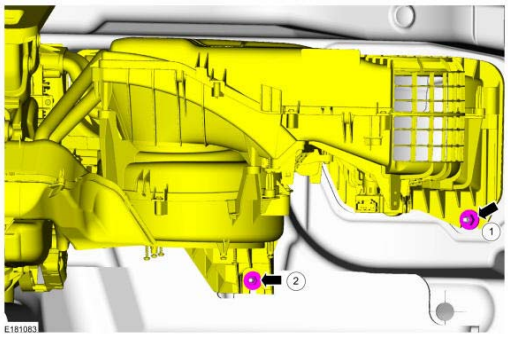


8.

Remove the nuts and washers.

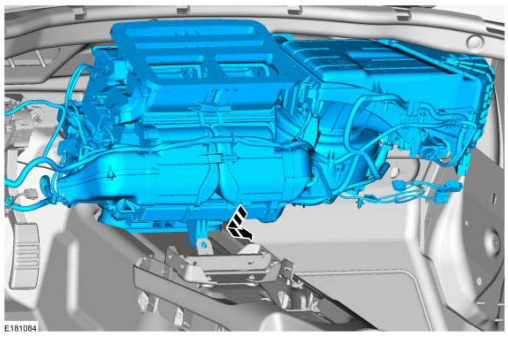
Torque

: 1: 62 lb.in (7 Nm)2: 80 lb.in (9 Nm)



9.

Remove the climate control housing.



REMOVAL AND INSTALLATION > CLIMATE CONTROL HOUSING - 2.3L ECOBOOST (201KW 273PS) > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Add the correct amount of clean Polyalkylene Glycol (PAG) oil to the refrigerant system. Refer to: Refrigerant Oil Adding .

REMOVAL AND INSTALLATION > CLIMATE CONTROL HOUSING - 3.7L DURATEC (227KW 301PS) > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

Recover the refrigerant. Refer to: Air Conditioning (A/C) System Recovery, Evacuation and Charging .

2.

Remove the instrument panel. Refer to: Instrument Panel .

3.

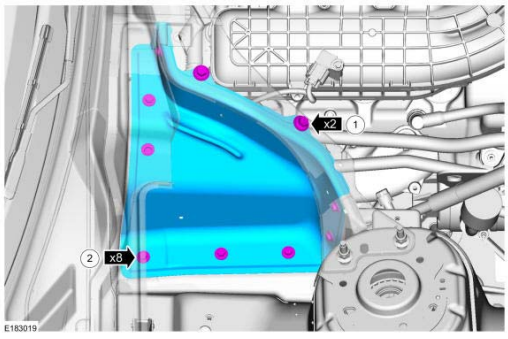
Remove the battery tray. Refer to: Battery Tray .

4.

Remove the 10 bolts and the battery heat shield.

Torque

: 1: 26 lb.ft (35 Nm)2: 80 lb.in (9 Nm)

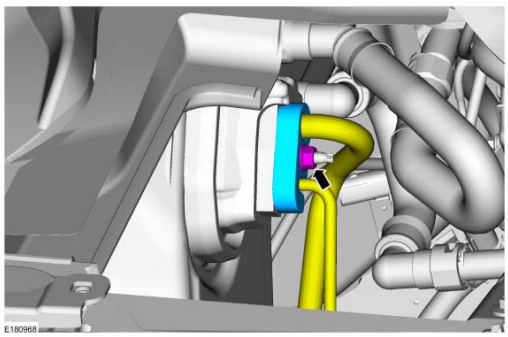


NOTE: Make sure that all openings are sealed.

5.
Remove the nut and the Thermostatic Expansion Valve (TXV) bracket, and disconnect the A/C condenser outlet line and the evaporator outlet line.

Torque

: 133 lb.in (15 Nm)

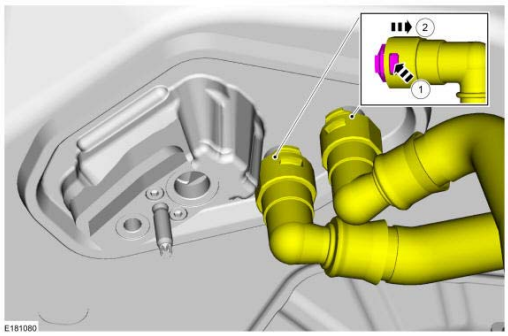


6.

Drain the cooling system. Refer to: Cooling System Draining and Vacuum Filling .

7.

Disconnect the heater core inlet and outlet hoses.

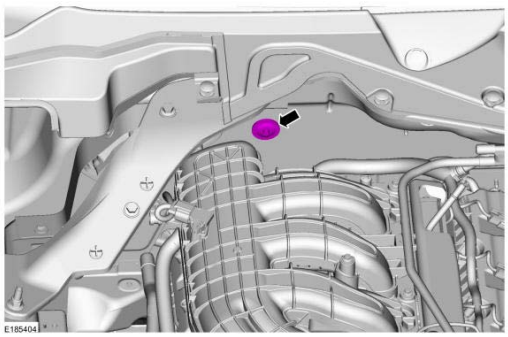


8.

Remove the bolt and washer.

Torque

: 62 lb.in (7 Nm)

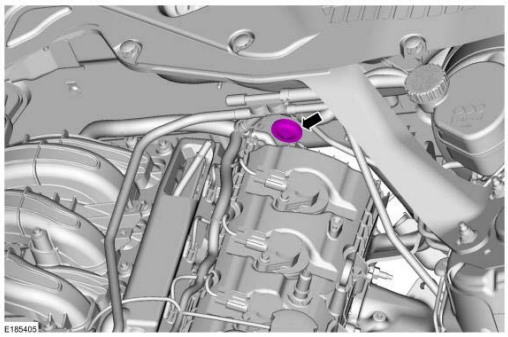


9.

Remove the bolt and washer.

Torque

: 62 lb.in (7 Nm)

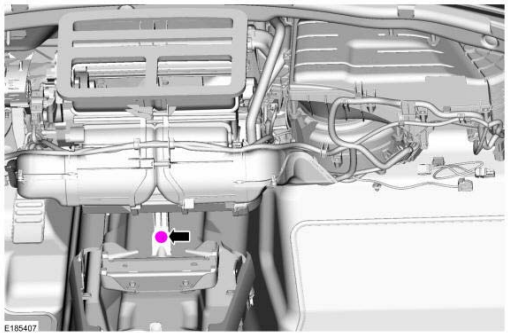


10.

Remove the bolt.

Torque

: 62 lb.in (7 Nm)

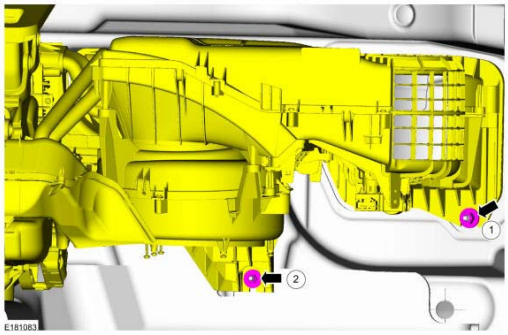


11.

Remove the nuts and washers.

Torque

: 1: 62 lb.in (7 Nm) 2: 80 lb.in (9 Nm)

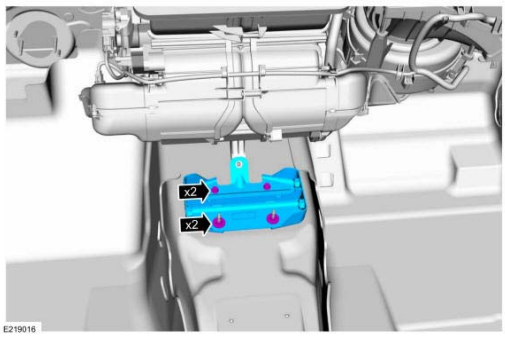


12.

Remove the bolts, nuts and the bracket.

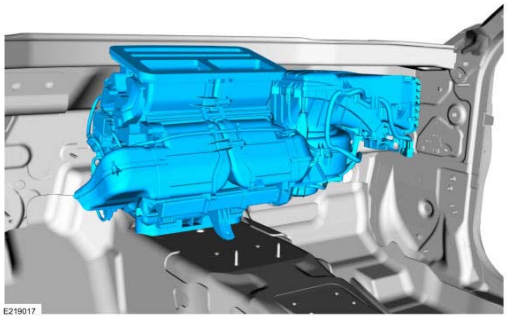
Torque

: 97 lb.in (11 Nm)



13.

Remove the climate control housing.



REMOVAL AND INSTALLATION > CLIMATE CONTROL HOUSING - 3.7L DURATEC (227KW 301PS) > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Add the correct amount of clean Polyalkylene Glycol (PAG) oil to the refrigerant system. Refer to: Refrigerant Oil Adding .

3.

Fill and bleed the cooling system. Refer to: Cooling System Draining and Vacuum Filling .

REMOVAL AND INSTALLATION > CLIMATE CONTROL HOUSING - 5.0L 32V TI-VCT > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

Recover the refrigerant. Refer to: Air Conditioning (A/C) System Recovery, Evacuation and Charging .

2.

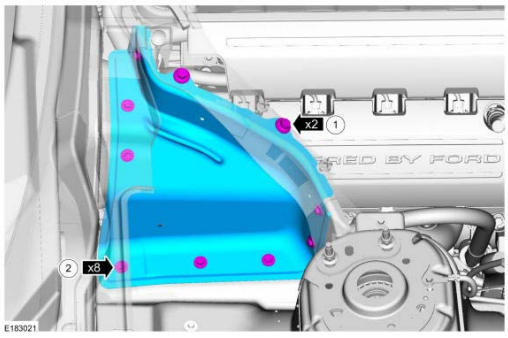
Remove the battery tray. Refer to: Battery Tray .

3.

Remove the 10 bolts and the battery heat shield.

Torque

: 1: 26 lb.ft (35 Nm) 2: 80 lb.in (9 Nm)



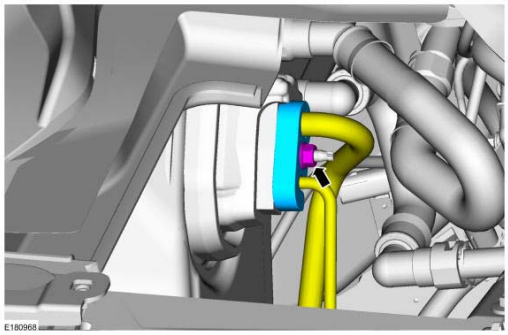
NOTE: Make sure that all openings are sealed.

4.
Remove the nut and the Thermostatic Expansion Valve (TXV) bracket, and disconnect the A/C

condenser outlet line and the evaporator outlet line.

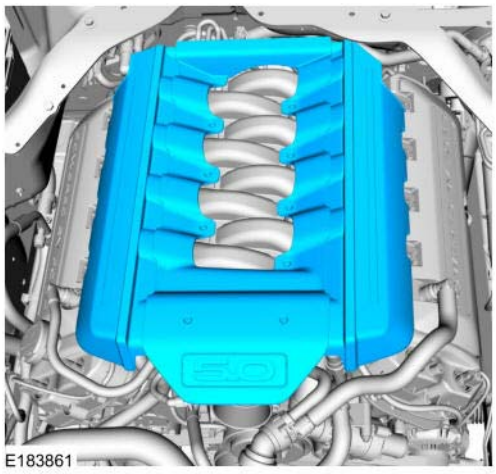
Torque

: 133 lb.in (15 Nm)



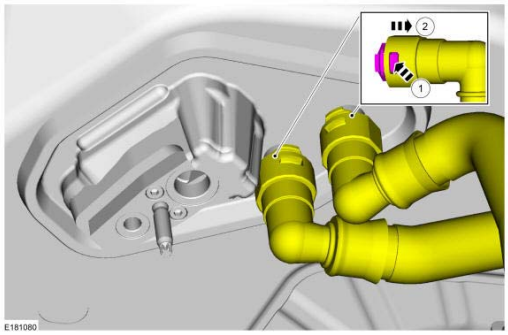
NOTE: The engine appearance cover rubber grommets may remain on the cover. If so, remove the grommets from the cover and install them on the intake manifold before installing the cover.

5.
Remove the engine appearance cover.



6.

Disconnect the heater core inlet and outlet hoses.

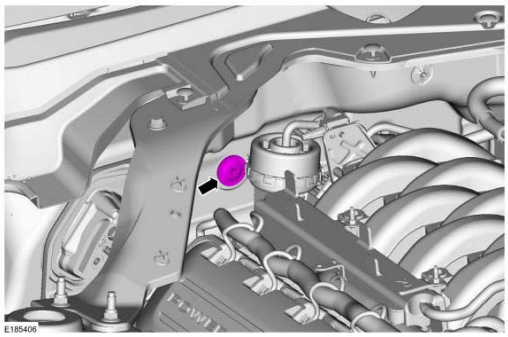


7.

Remove the bolt and washer.

Torque

: 62 lb.in (7 Nm)

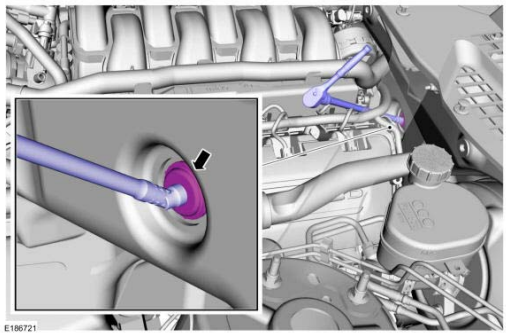


8.

Remove the bolt and washer.

Torque

: 62 lb.in (7 Nm)



9.

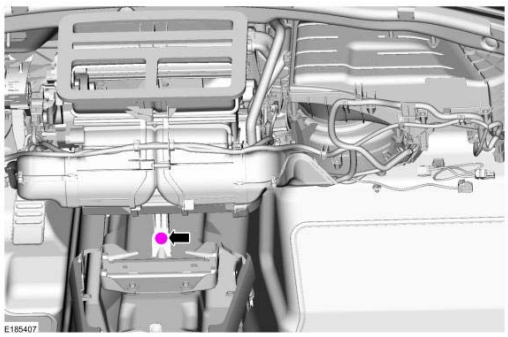
Remove the instrument panel. Refer to: Instrument Panel .

10.

Remove the bolt.

Torque

: 62 lb.in (7 Nm)

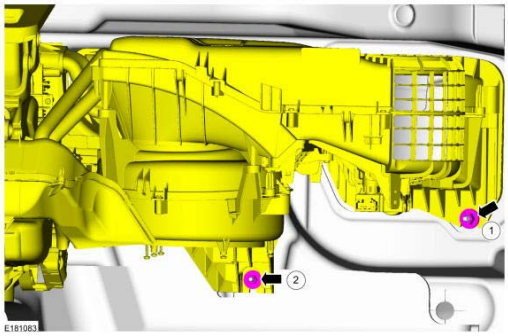


11.

Remove the nuts and washers.

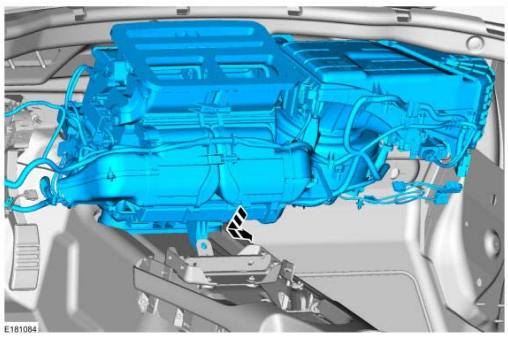
Torque

: 1: 62 lb.in (7 Nm)2: 80 lb.in (9 Nm)



12.

Remove the climate control housing.



REMOVAL AND INSTALLATION > CLIMATE CONTROL HOUSING - 5.0L 32V TI-VCT > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Add the correct amount of clean Polyalkylene Glycol (PAG) oil to the refrigerant system. Refer to: Refrigerant Oil Adding .

REMOVAL AND INSTALLATION > CONDENSER - 2.3L ECOBOOST (201KW 273PS) > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

Recover the refrigerant. Refer to: Air Conditioning (A/C) System Recovery, Evacuation and Charging .

2.

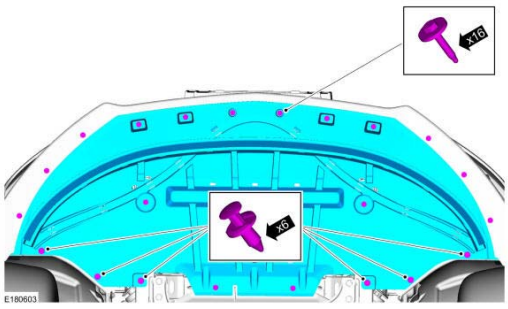
With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

3.

Remove the bolts, the retainers and the underbody shield.

Torque

: 18 lb.in (2 Nm)



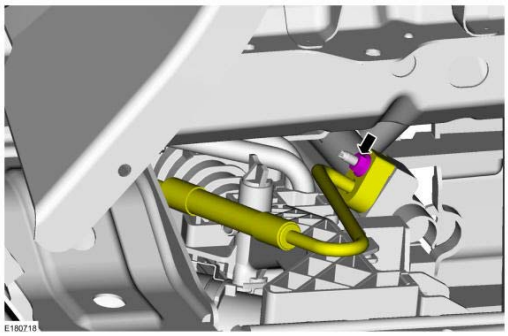
NOTE: Make sure that all openings are sealed.

4.

Remove the nut and disconnect the A/C condenser outlet line.

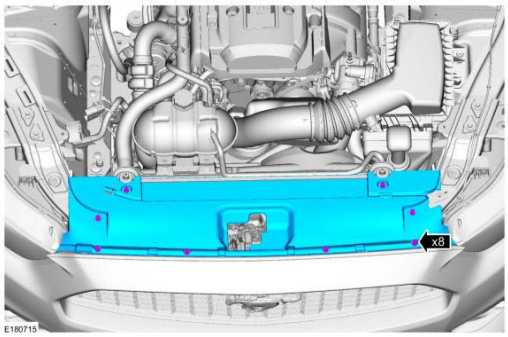
Torque

: 80 lb.in (9 Nm)



5.

Remove the retainers and the radiator sight shield.

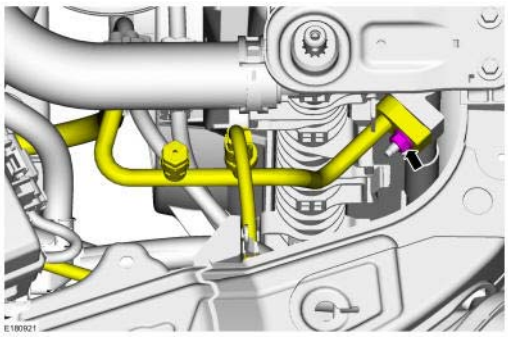


NOTE: Make sure that all openings are sealed.

6.
Remove the nut and disconnect the A/C compressor outlet line.

Torque

: 159 lb.in (18 Nm)



7.

Remove the air cleaner. Refer to: Air Cleaner .

8.

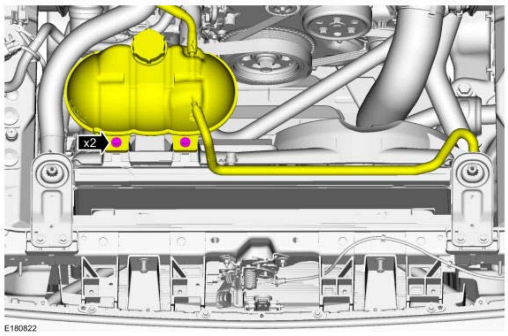
Remove the air cleaner outlet pipe. Refer to: Air Cleaner Outlet Pipe .

9.

Remove the bolts and position the degas bottle aside.

Torque

: 80 lb.in (9 Nm)

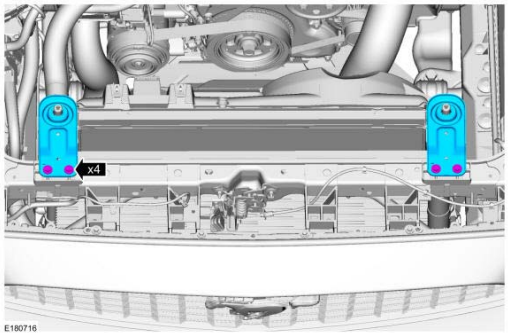


10.

Remove the bolts and the upper radiator brackets.

Torque

: 97 lb.in (11 Nm)



NOTE: Front bumper removed for clarity.

11.

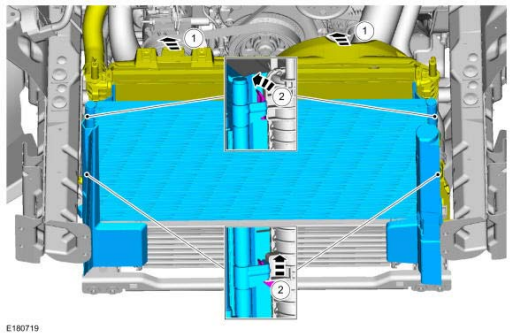
1.

Lift the radiator off the lower radiator support and position the radiator, transmission fluid

cooler assembly and cooling fan motor and shroud toward the engine.

2.

Release the tabs and remove the condenser.



REMOVAL AND INSTALLATION > CONDENSER - 2.3L ECOBOOST (201KW 273PS) > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Add the correct amount of clean Polyalkylene Glycol (PAG) oil to the refrigerant system. Refer to: Refrigerant Oil Adding .

REMOVAL AND INSTALLATION > CONDENSER - 3.7L DURATEC (227KW 301PS) > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

Recover the refrigerant. Refer to: Air Conditioning (A/C) System Recovery, Evacuation and Charging .

2.

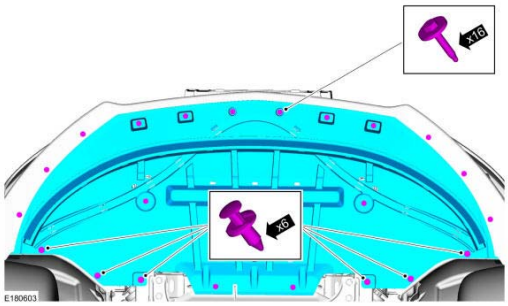
With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

3.

Remove the bolts, the retainers and the underbody shield.

Torque

: 18 lb.in (2 Nm)

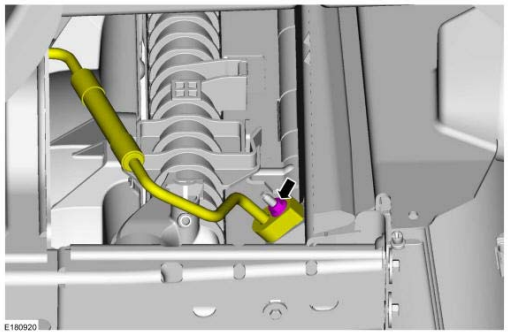


NOTE: Make sure that all openings are sealed.

4.
Remove the nut and disconnect the A/C condenser outlet line.

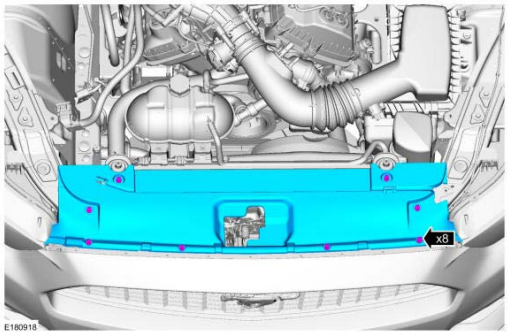
Torque

: 80 lb.in (9 Nm)



5.

Remove the retainers and the radiator sight shield.

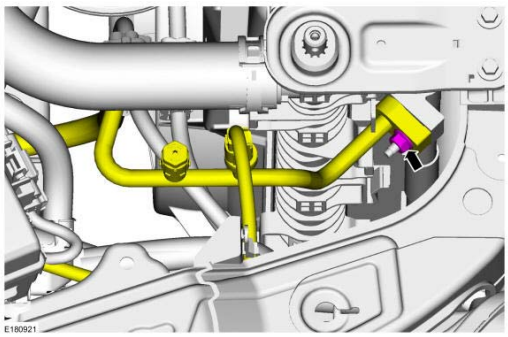


NOTE: Make sure that all openings are sealed.

6.
Remove the nut and disconnect the A/C compressor outlet line.

Torque

: 159 lb.in (18 Nm)



7.

Remove the air cleaner. Refer to: Air Cleaner .

8.

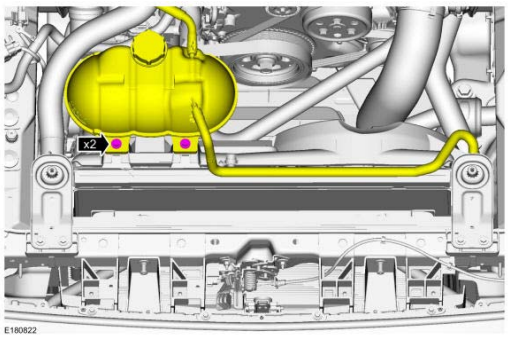
Remove the air cleaner outlet pipe. Refer to: Air Cleaner Outlet Pipe .

9.

Remove the bolts and position the degas bottle aside.

Torque

: 80 lb.in (9 Nm)

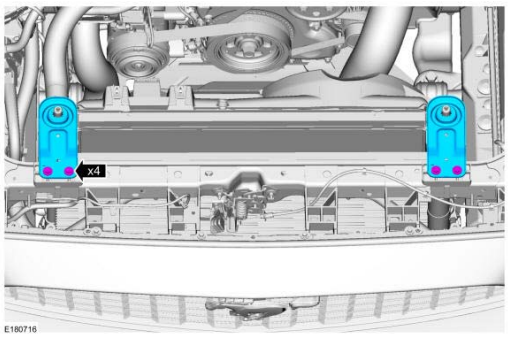


10.

Remove the bolts and the upper radiator brackets.

Torque

: 97 lb.in (11 Nm)



NOTE: Front bumper removed for clarity.

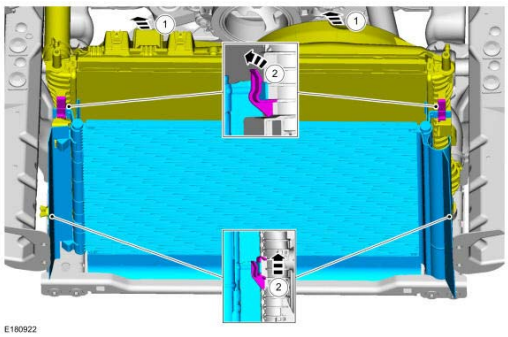
11.

1.

Lift the radiator off the lower radiator support and position the radiator, transmission fluid cooler assembly, and the cooling fan motor and shroud toward the engine.

2.

Release the tabs and remove the condenser.



REMOVAL AND INSTALLATION > CONDENSER - 3.7L DURATEC (227KW 301PS) > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Add the correct amount of clean Polyalkylene Glycol (PAG) oil to the refrigerant system. Refer to: Refrigerant Oil Adding .

REMOVAL AND INSTALLATION > CONDENSER - 5.0L 32V TI-VCT > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

Recover the refrigerant. Refer to: Air Conditioning (A/C) System Recovery, Evacuation and Charging .

2.

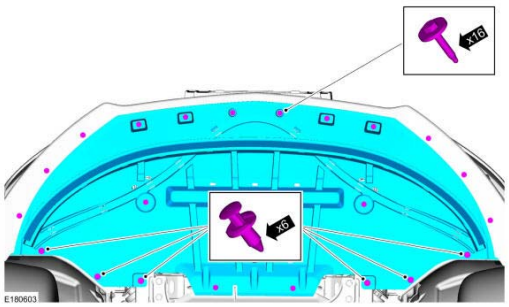
With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

3.

Remove the bolts, the retainers and the underbody shield.

Torque

: 18 lb.in (2 Nm)

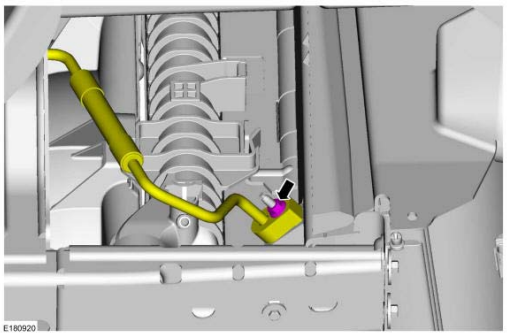


NOTE: Make sure that all openings are sealed.

4.
Remove the nut and disconnect the A/C condenser outlet line.

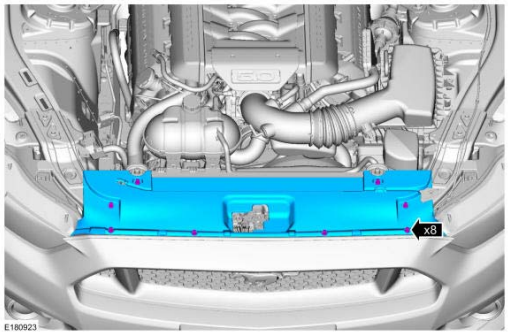
Torque

: 80 lb.in (9 Nm)



5.

Remove the retainers and the radiator sight shield.

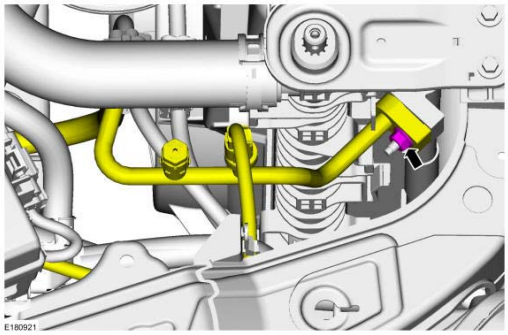


NOTE: Make sure that all openings are sealed.

6.
Remove the nut and disconnect the A/C compressor outlet line.

Torque

: 159 lb.in (18 Nm)



7.

Remove the air cleaner. Refer to: Air Cleaner .

8.

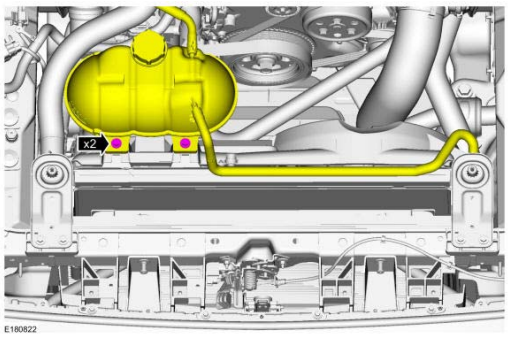
Remove the air cleaner outlet pipe. Refer to: Air Cleaner Outlet Pipe .

9.

Remove the bolts and position the degas bottle aside.

Torque

: 80 lb.in (9 Nm)

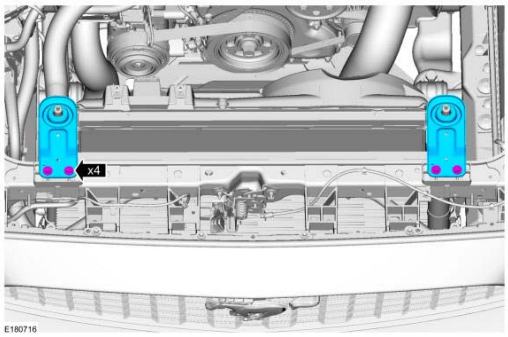


10.

Remove the bolts and the upper radiator brackets.

Torque

: 97 lb.in (11 Nm)



NOTE: Front bumper removed for clarity.

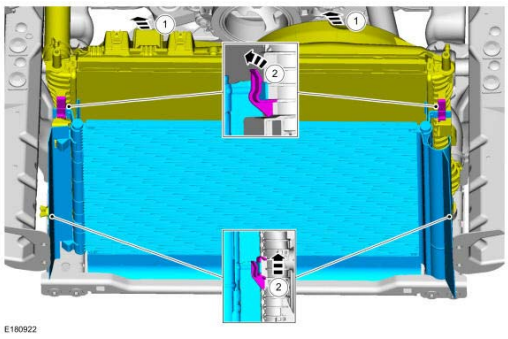
11.

1.

Lift the radiator off the lower radiator support and position the radiator, transmission fluid cooler assembly and cooling fan motor and shroud toward the engine.

2.

Release the tabs and remove the condenser.



REMOVAL AND INSTALLATION > CONDENSER - 5.0L 32V TI-VCT > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Add the correct amount of clean Polyalkylene Glycol (PAG) oil to the refrigerant system. Refer to: Refrigerant Oil Adding .

REMOVAL AND INSTALLATION > CONDENSER OUTLET LINE - 2.3L ECOBOOST (201KW 273PS) > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

Recover the refrigerant. Refer to: Air Conditioning (A/C) System Recovery, Evacuation and Charging .

2.

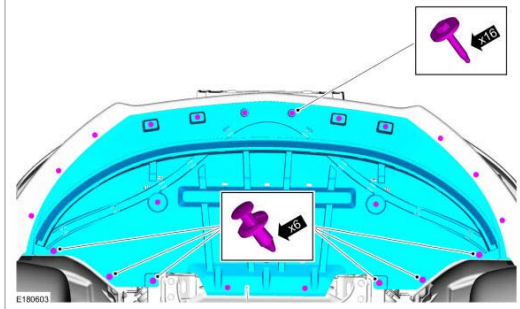
With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

3.

Remove the bolts, the retainers and the underbody shield.

Torque

: 18 lb.in (2 Nm)

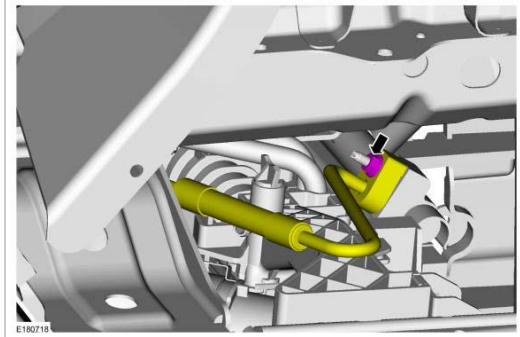


4.

Remove the nut and disconnect the A/C condenser outlet line.

Torque

: 80 lb.in (9 Nm)

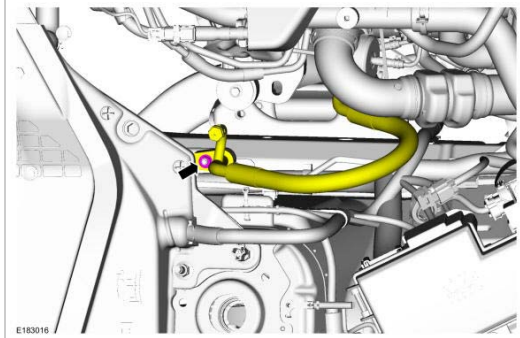


NOTE: Make sure that all openings are sealed.

5.
Remove the nut and disconnect the A/C compressor inlet line.

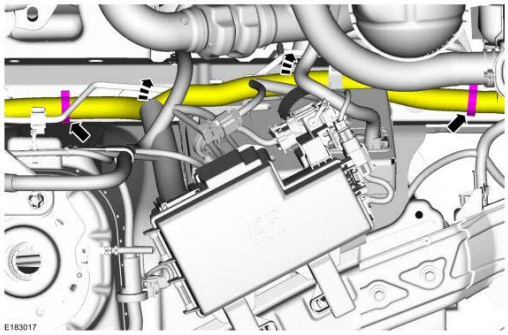
Torque

: 159 lb.in (18 Nm)



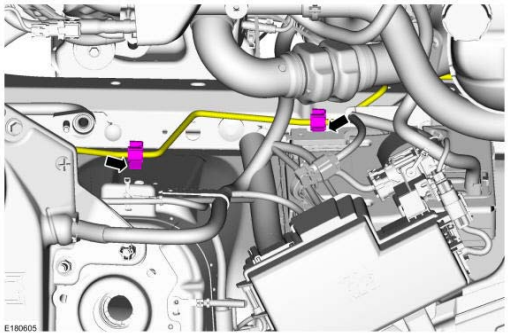
6.

Detach the wiring retainers and position aside the wiring harness.



7.

Detach the 2 A/C condenser outlet line clips.

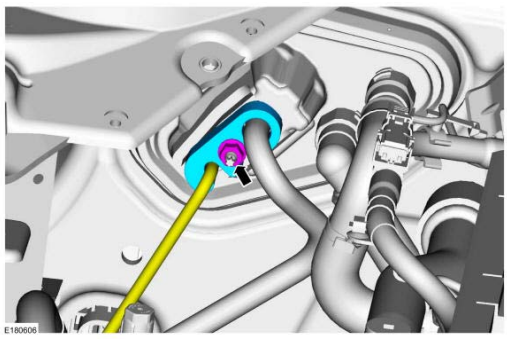


8.

Remove the nut and the Thermostatic Expansion Valve (TXV) bracket.

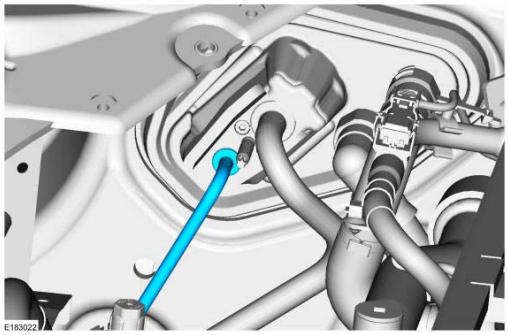
Torque

: 133 lb.in (15 Nm)



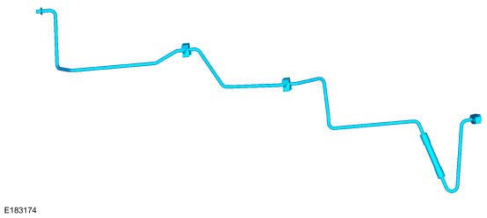
9.

Detach the A/C condenser outlet line.



10.

Remove the A/C condenser outlet line.



REMOVAL AND INSTALLATION > CONDENSER OUTLET LINE - 2.3L ECOBOOST (201KW 273PS) > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > CONDENSER OUTLET LINE - 3.7L DURATEC (227KW 301PS) > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

Recover the refrigerant. Refer to: Air Conditioning (A/C) System Recovery, Evacuation and Charging .

2.

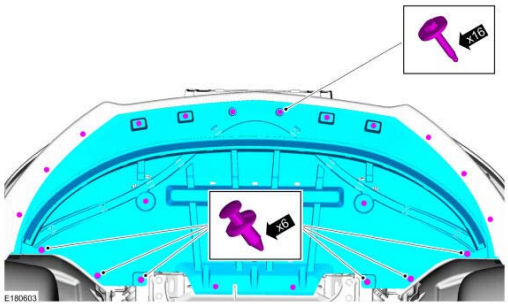
With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

3.

Remove the bolts, the retainers and the underbody shield.

Torque

: 18 lb.in (2 Nm)

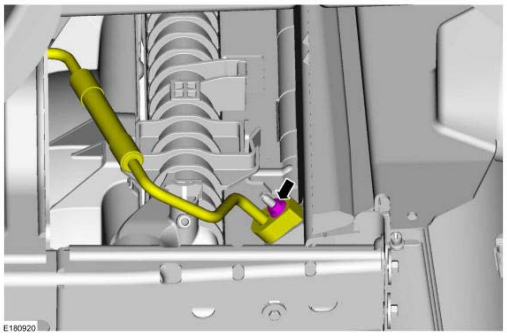


4.

Remove the nut and disconnect the A/C condenser outlet line.

Torque

: 80 lb.in (9 Nm)

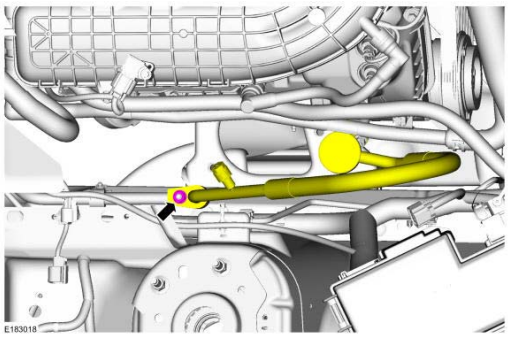


NOTE: Make sure that all openings are sealed.

5.
Remove the nut and disconnect the A/C compressor inlet line.

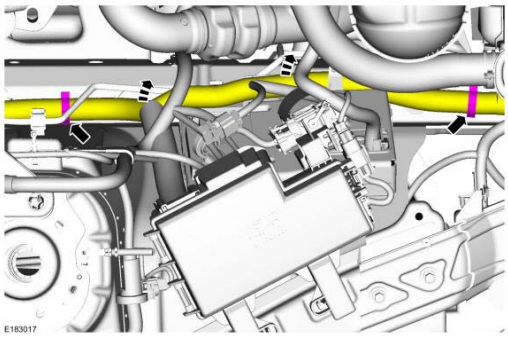
Torque

: 159 lb.in (18 Nm)



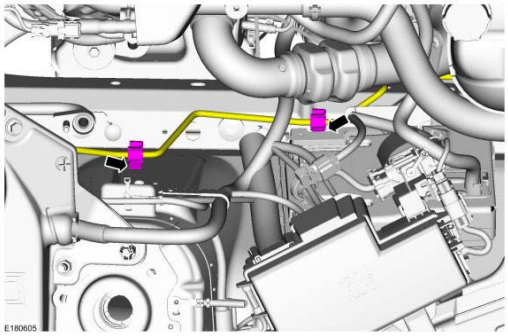
6.

Detach the wiring retainers and position aside the wiring harness.



7.

Detach the 2 A/C condenser outlet line clips.



8.

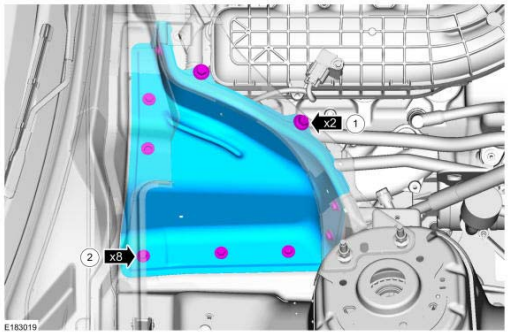
Remove the battery tray. Refer to: Battery Tray .

9.

Remove the 10 bolts and the battery heat shield.

Torque

: 1: 26 lb.ft (35 Nm)2: 80 lb.in (9 Nm)

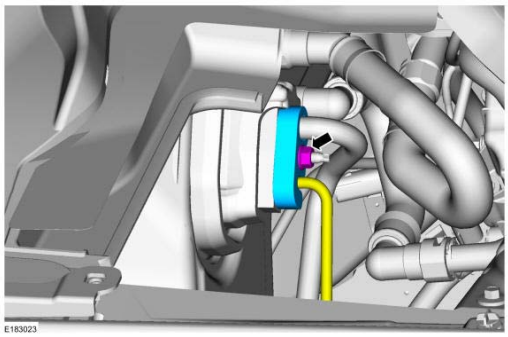


10.

Remove the nut and the Thermostatic Expansion Valve (TXV) bracket.

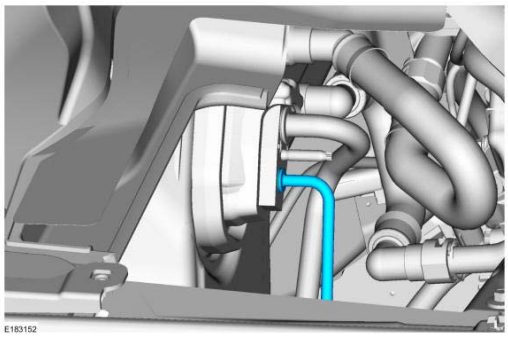
Torque

: 133 lb.in (15 Nm)



11.

Detach the A/C condenser outlet line.



12.

Remove the A/C condenser outlet line.



REMOVAL AND INSTALLATION > CONDENSER OUTLET LINE - 3.7L DURATEC (227KW 301PS) > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > CONDENSER OUTLET LINE - 5.0L 32V TI-VCT > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

Recover the refrigerant. Refer to: Air Conditioning (A/C) System Recovery, Evacuation and Charging .

2.

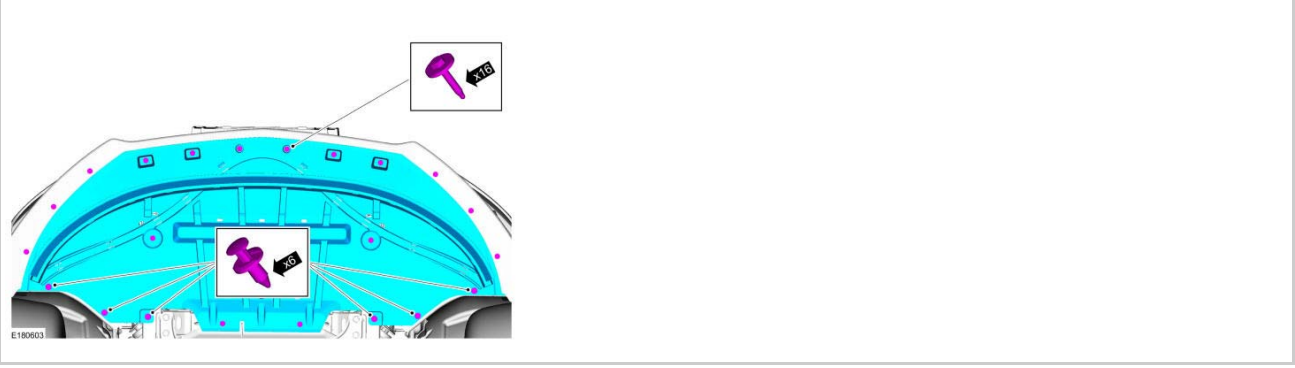
With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

3.

Remove the bolts, the retainers and the underbody shield.

Torque

: 18 lb.in (2 Nm)

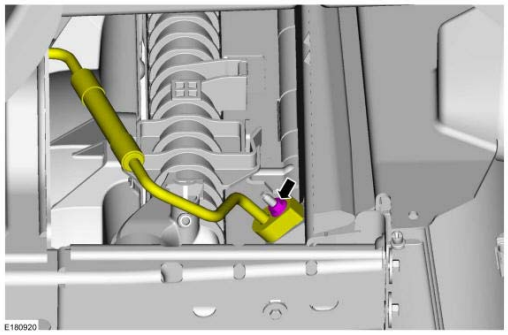


4.

Remove the nut and disconnect the A/C condenser outlet line.

Torque

: 80 lb.in (9 Nm)

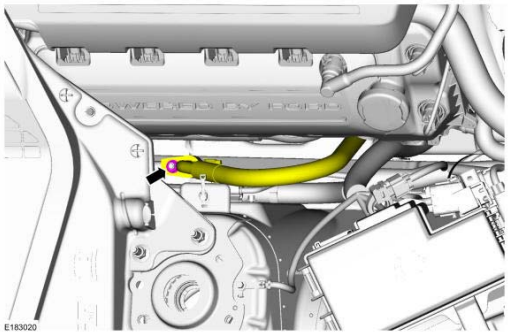


NOTE: Make sure that all openings are sealed.

5.
Remove the nut and disconnect the A/C compressor inlet line.

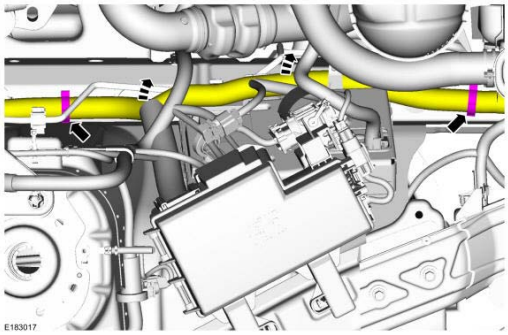
Torque

: 159 lb.in (18 Nm)



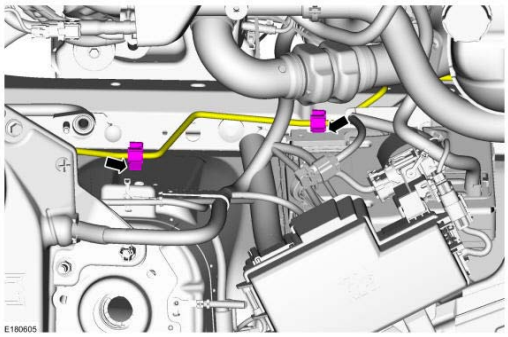
6.

Detach the wiring retainers and position aside the wiring harness.



7.

Detach the 2 A/C condenser outlet line clips.



8.

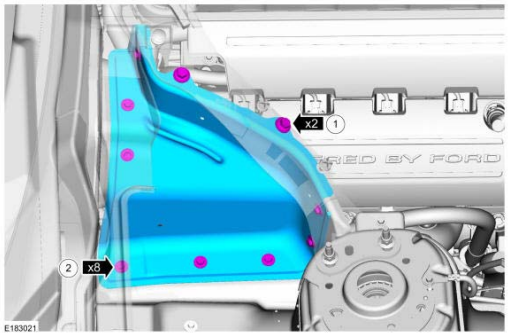
Remove the battery tray. Refer to: Battery Tray .

9.

Remove the 10 bolts and the battery heat shield.

Torque

: 1: 26 lb.ft (35 Nm)2: 80 lb.in (9 Nm)

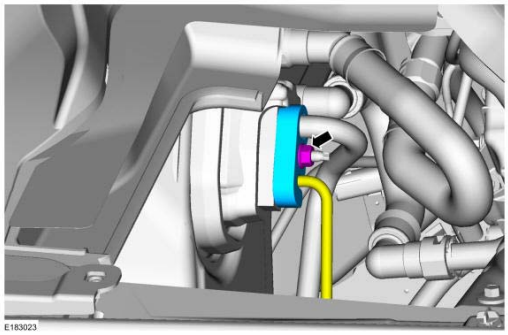


10.

Remove the nut and the Thermostatic Expansion Valve (TXV) bracket.

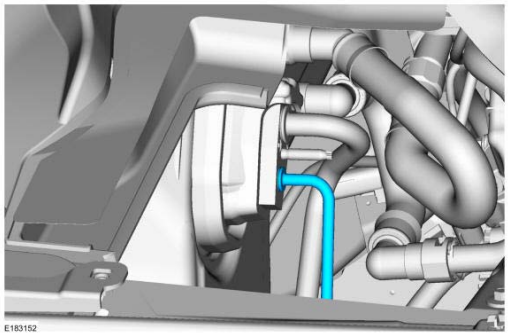
Torque

: 133 lb.in (15 Nm)



11.

Detach the A/C condenser outlet line.



12.

Remove the A/C condenser outlet line.



REMOVAL AND INSTALLATION > CONDENSER OUTLET LINE - 5.0L 32V TI-VCT > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > DRIVER SIDE REGISTER

Special Tool(s) / General Equipment

Interior Trim Remover

REMOVAL AND INSTALLATION > DRIVER SIDE REGISTER > REMOVAL

1.

Remove the instrument panel center finish panel. Refer to: Instrument Panel Center Finish Panel .

2.

Release the clips and remove the LH instrument panel trim panel. Use the General Equipment: Interior Trim Remover



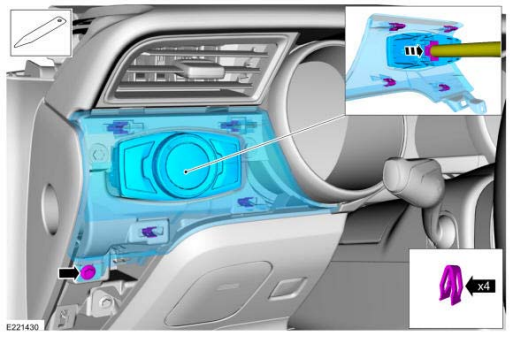
3.

Remove the bolt, release the clips and remove the lighting switch trim panel.

Disconnect the electrical connector. Use the General Equipment: Interior Trim Remover

Torque

: 27 lb.in (3 Nm)



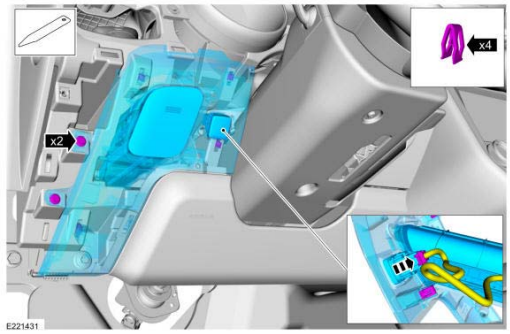
4.

Remove the bolts, release the clips and remove the LH finish panel.

Disconnect the electrical connector. Use the General Equipment: Interior Trim Remover

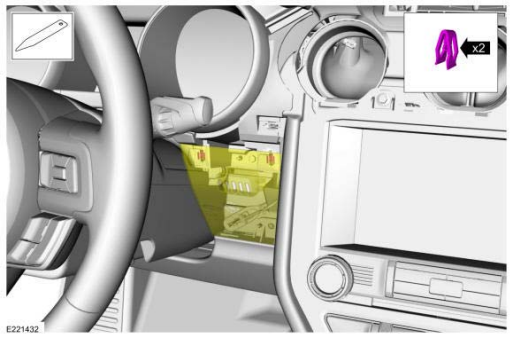
Torque

: 27 lb.in (3 Nm)



5.

Release the clips and position aside the lower instrument panel cover. Use the General Equipment: Interior Trim Remover



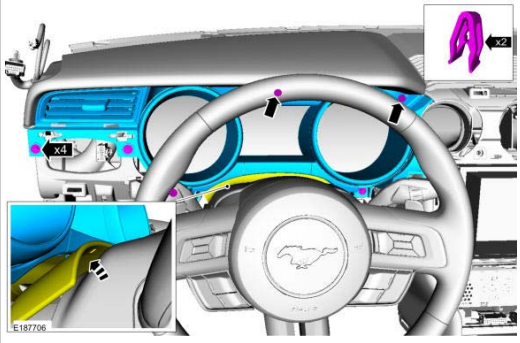
6.

Remove the bolts, release the clips and remove the IPC trim panel.

Detach the gap hider from the upper steering column trim cover.

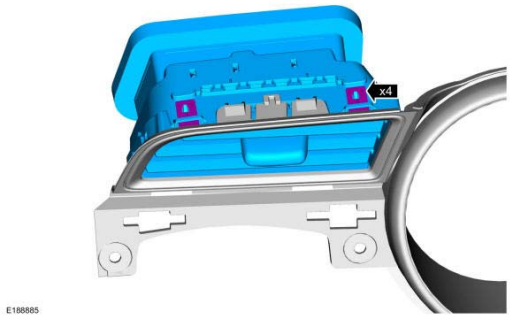
Torque

: 27 lb.in (3 Nm)



7.

Release the clips and remove the driver side register assembly.



REMOVAL AND INSTALLATION > DRIVER SIDE REGISTER > INSTALLATION

1.

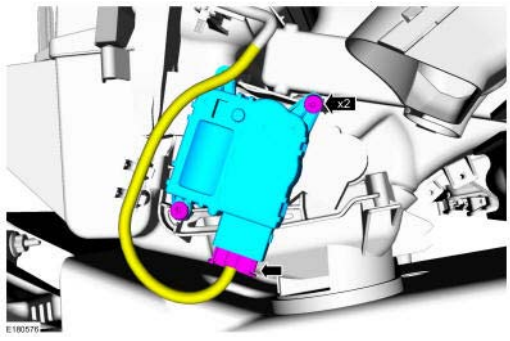
To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > DRIVER SIDE TEMPERATURE DOOR ACTUATOR > REMOVAL

NOTE: If possible, place the temperature door in the mid-position. This will unload the tension on the temperature door to ease replacement of the actuator.

NOTE: Do not apply power to the actuator while disconnected from the temperature door shaft.

1.
Disconnect the driver side temperature door actuator connector, remove the retainers and the driver side temperature door actuator.



REMOVAL AND INSTALLATION > DRIVER SIDE TEMPERATURE DOOR ACTUATOR > INSTALLATION

1.

Inspect and align the timing marks prior to installation of the driver side temperature door actuator.



2.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > EVAPORATOR > REMOVAL

NOTE: The evaporator is available only as part of the climate control housing.

1.

Remove the climate control housing. Refer to: Climate Control Housing - 2.3L EcoBoost (201kW/273PS) . Refer to: Climate Control Housing - 3.7L Duratec (227kW/301PS) . Refer to: Climate Control Housing - 5.0L 32V Ti-VCT .

REMOVAL AND INSTALLATION > EVAPORATOR > INSTALLATION

1.

Transfer the components from the old housing to the new housing as required.

2.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > EVAPORATOR OUTLET LINE - 2.3L ECOBOOST (201KW 273PS) > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

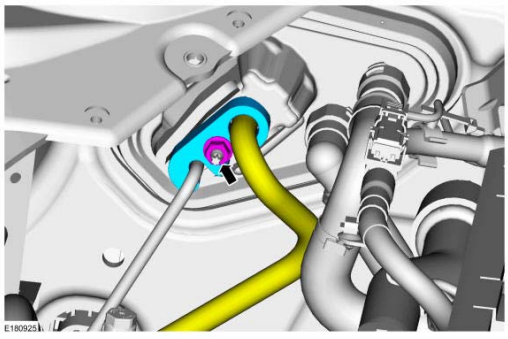
Recover the refrigerant. Refer to: Air Conditioning (A/C) System Recovery, Evacuation and Charging .

2.

Remove the nut, the Thermostatic Expansion Valve (TXV) bracket and disconnect the evaporator outlet line.

Torque

: 133 lb.in (15 Nm)

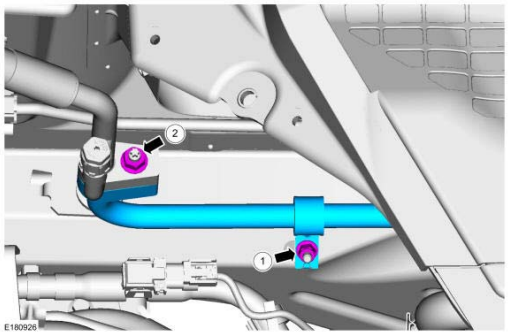


NOTE: Make sure that all openings are sealed.

3.
Remove the nuts and the evaporator outlet line.

Torque

: 1: 62 lb.in (7 Nm)2: 159 lb.in (18 Nm)



REMOVAL AND INSTALLATION > EVAPORATOR OUTLET LINE - 2.3L ECOBOOST (201KW 273PS) > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > EVAPORATOR OUTLET LINE - 3.7L DURATEC (227KW 301PS) > REMOVAL

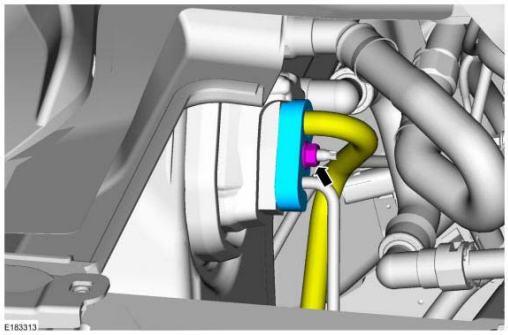
NOTE: Removal steps in this procedure may contain installation details.

1.

Recover the refrigerant. Refer to: Air Conditioning (A/C) System Recovery, Evacuation and Charging .

2.

Remove the nut and the Thermostatic Expansion Valve (TXV) bracket, and disconnect the evaporator outlet line.

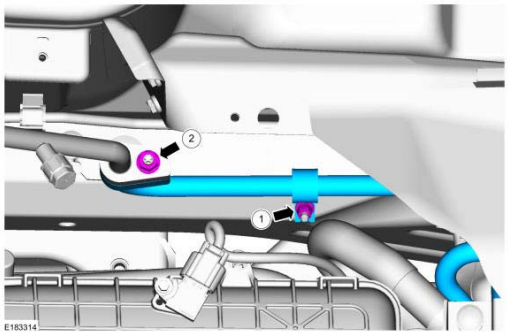


NOTE: Make sure that all openings are sealed.

3.
Remove the nuts and the evaporator outlet line.

Torque

: 1: 62 lb.in (7 Nm)2: 159 lb.in (18 Nm)



REMOVAL AND INSTALLATION > EVAPORATOR OUTLET LINE - 3.7L DURATEC (227KW 301PS) > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > EVAPORATOR OUTLET LINE - 5.0L 32V TI-VCT > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

Recover the refrigerant. Refer to: Air Conditioning (A/C) System Recovery, Evacuation and Charging .

2.

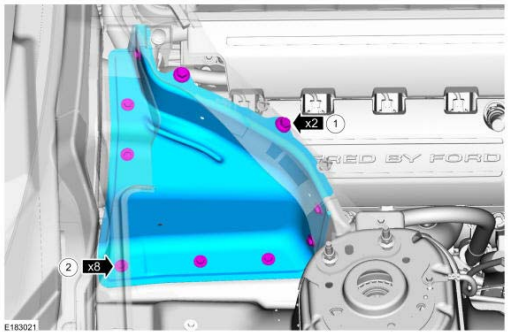
Remove the battery tray. Refer to: Battery Tray .

3.

Remove the 10 bolts and the battery heat shield.

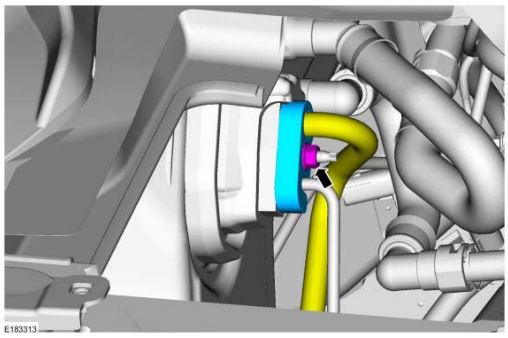
Torque

: 1: 26 lb.ft (35 Nm)2: 80 lb.in (9 Nm)



4.

Remove the nut and the Thermostatic Expansion Valve (TXV) bracket, and disconnect the evaporator outlet line.

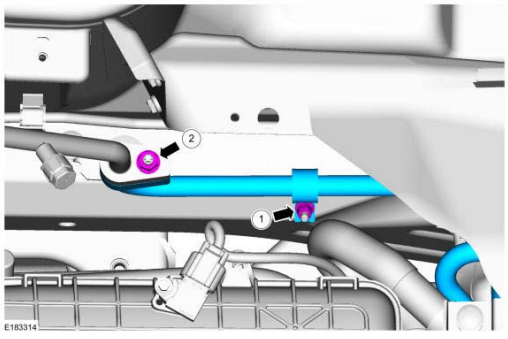


NOTE: Make sure that all openings are sealed.

5.
Remove the nuts and the evaporator outlet line.

Torque

: 1: 62 lb.in (7 Nm)2: 159 lb.in (18 Nm)



REMOVAL AND INSTALLATION > EVAPORATOR OUTLET LINE - 5.0L 32V TI-VCT > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > EVAPORATOR TEMPERATURE SENSOR > REMOVAL

NOTE: The evaporator temperature sensor is available only as part of the climate control housing.

1.

Remove the climate control housing. Refer to: Climate Control Housing - 2.3L EcoBoost (201kW/273PS) . Refer to: Climate Control Housing - 3.7L Duratec (227kW/301PS) . Refer to: Climate Control Housing - 5.0L 32V Ti-VCT .

REMOVAL AND INSTALLATION > EVAPORATOR TEMPERATURE SENSOR > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > FOOTWELL AIR DISCHARGE TEMPERATURE SENSOR > REMOVAL

1.

Remove the driver knee airbag. Refer to: Driver Knee Airbag .

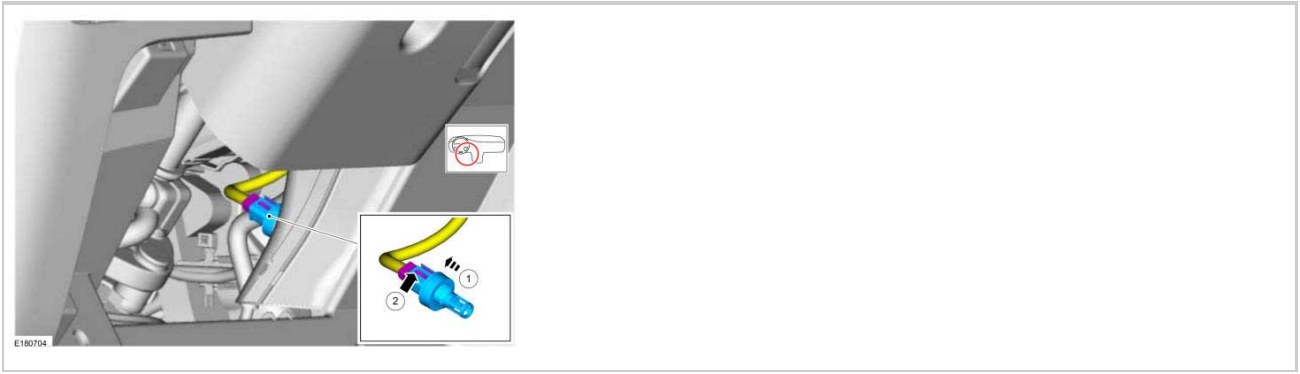
2.

1.

Remove the footwell air discharge temperature sensor.

2.

Disconnect the footwell air discharge temperature sensor connector.



REMOVAL AND INSTALLATION > FOOTWELL AIR DISCHARGE TEMPERATURE SENSOR > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > HEATER CORE > REMOVAL

NOTE: If a heater core leak is suspected, the heater core must be leak tested before it is removed from the vehicle.

NOTE: The heater core is available only as part of the climate control housing.

1.

Remove the climate control housing. Refer to: Climate Control Housing - 2.3L EcoBoost (201kW/273PS) . Refer to: Climate Control Housing - 3.7L Duratec (227kW/301PS) . Refer to: Climate Control Housing - 5.0L 32V Ti-VCT .

REMOVAL AND INSTALLATION > HEATER CORE > INSTALLATION

1.

Transfer the components from the old housing to the new housing as required.

2.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > HEATING, VENTILATION AND AIR CONDITIONING (HVAC) CONTROL MODULE > REMOVAL

NOTE: The HVAC (heating, ventilation and air conditioning) module is available only as part of the FCIM (front controls interface module).

1.

Remove the FCIM. Vehicles With: AM/FM/CD/SYNC Refer to: Front Controls Interface Module (FCIM) . Vehicles With: Touchscreen Display, Refer to: Front Display Interface Module (FDIM) . Vehicles With: AM/FM/CD/SYNC Refer to: Front Controls Interface Module (FCIM) . Vehicles With: AM/FM/CD/SYNC Refer to: Front Controls Interface Module (FCIM) .

REMOVAL AND INSTALLATION > HEATING, VENTILATION AND AIR CONDITIONING (HVAC) CONTROL MODULE > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > IN-VEHICLE TEMPERATURE AND HUMIDITY SENSOR

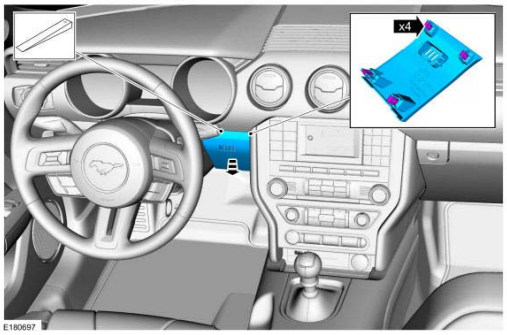
Special Tool(s) / General Equipment

Interior Trim Remover

REMOVAL AND INSTALLATION > IN-VEHICLE TEMPERATURE AND HUMIDITY SENSOR > REMOVAL

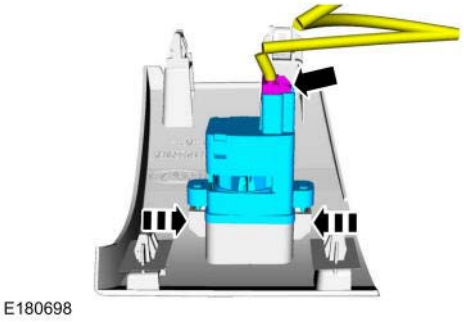
1.

Remove the lower instrument panel cover. Use the General Equipment: Interior Trim Remover



2.

Disconnect the electrical connector and remove the in-vehicle temperature and humidity sensor.



REMOVAL AND INSTALLATION > IN-VEHICLE TEMPERATURE AND HUMIDITY SENSOR > INSTALLATION

1.

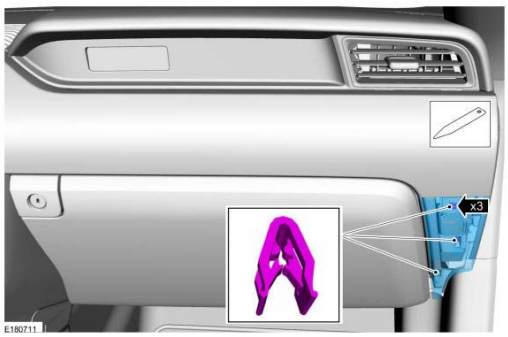
To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > PASSENGER SIDE REGISTER > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

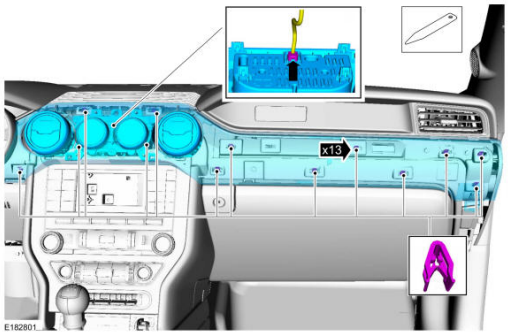
1.

Remove the instrument panel side trim panel.



NOTE: Vehicle with center gauges shown, without center gauges similar.

2.
Remove the instrument panel center upper trim panel and disconnect the electrical connector.

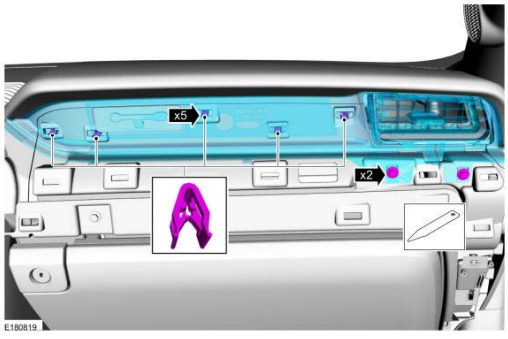


3.

Remove the retainers and instrument panel passenger side finish panel.

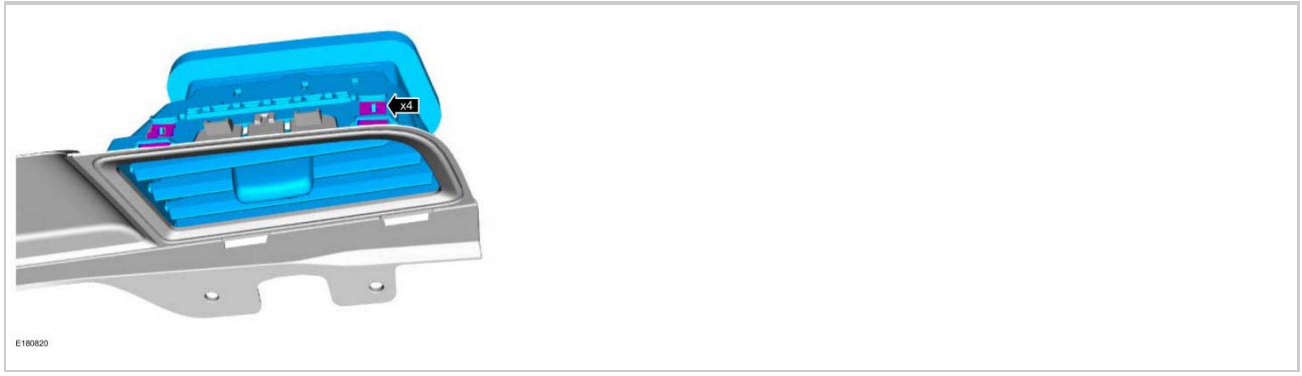
Torque

: 22 lb.in (2.5 Nm)



4.

Release the clips and remove the passenger side register assembly.



REMOVAL AND INSTALLATION > PASSENGER SIDE REGISTER > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > PASSENGER SIDE TEMPERATURE DOOR ACTUATOR > REMOVAL

NOTE: If possible, place the temperature door in the mid-position. This will unload the tension on the temperature door to ease replacement of the actuator.

1.

Disconnect the passenger side temperature door actuator connector. Remove the retainers and the passenger side temperature door actuator.



REMOVAL AND INSTALLATION > PASSENGER SIDE TEMPERATURE DOOR ACTUATOR > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > RECEIVER DRIER - 2.3L ECOBOOST (201KW 273PS) > REMOVAL

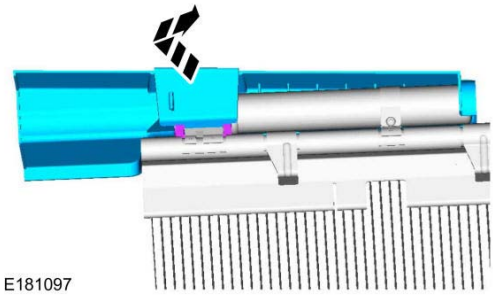
NOTE: Removal steps in this procedure may contain installation details.

1.

Remove the condenser. Refer to: Condenser - 2.3L EcoBoost (201kW/273PS) .

2.

Remove the air deflector.



3.

1.

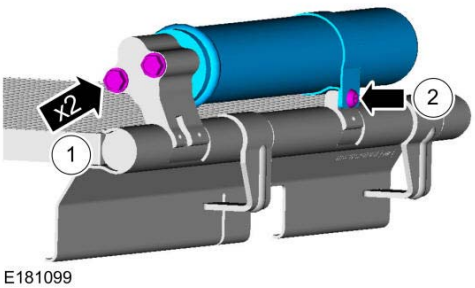
Remove the bolts.

Torque

: 80 lb.in (9 Nm)

2.

Remove the retainer and the receiver drier.



REMOVAL AND INSTALLATION > RECEIVER DRIER - 2.3L ECOBOOST (201KW 273PS) > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > RECEIVER DRIER - 3.7L DURATEC (227KW 301PS) > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

Recover the refrigerant. Refer to: Air Conditioning (A/C) System Recovery, Evacuation and Charging .

2.

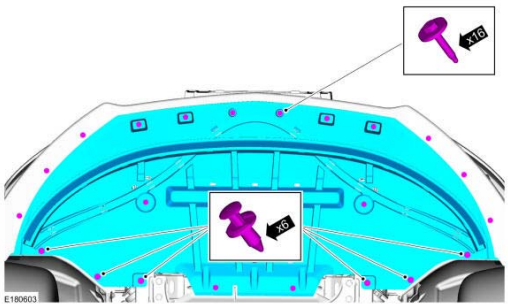
With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

3.

Remove the bolts, the retainers, and the underbody shield.

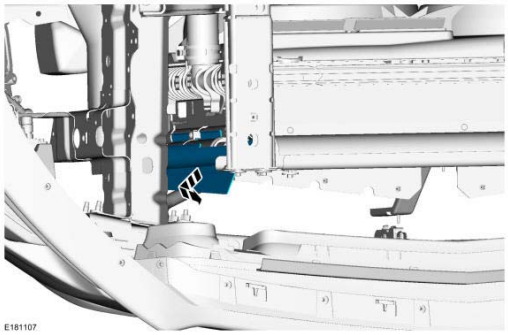
Torque

: 18 lb.in (2 Nm)



4.

Remove the air deflector.

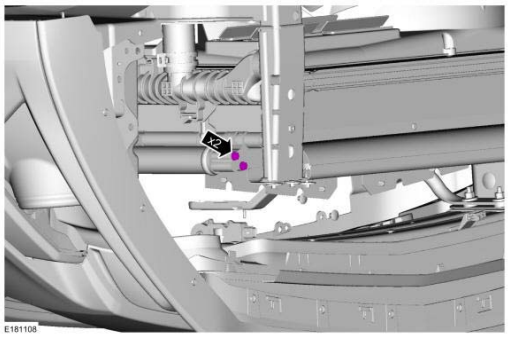


5.

Remove the bolts.

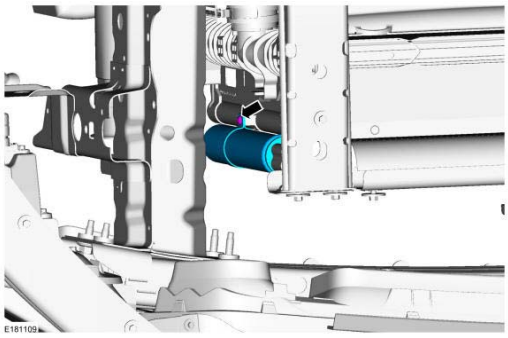
Torque

: 80 lb.in (9 Nm)



6.

Remove the retainer and the receiver drier.



REMOVAL AND INSTALLATION > RECEIVER DRIER - 3.7L DURATEC (227KW 301PS) > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Add the correct amount of clean Polyalkylene Glycol (PAG) oil to the refrigerant system. Refer to: Refrigerant Oil Adding .

REMOVAL AND INSTALLATION > RECEIVER DRIER - 5.0L 32V TI-VCT > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

Recover the refrigerant. Refer to: Air Conditioning (A/C) System Recovery, Evacuation and Charging .

2.

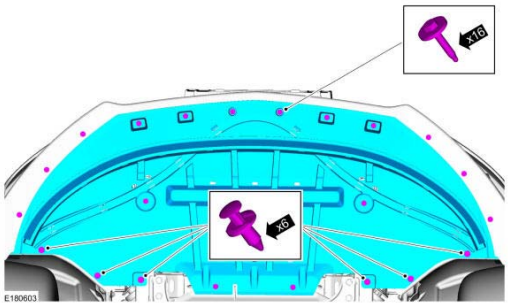
With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

3.

Remove the bolts, the retainers and the underbody shield.

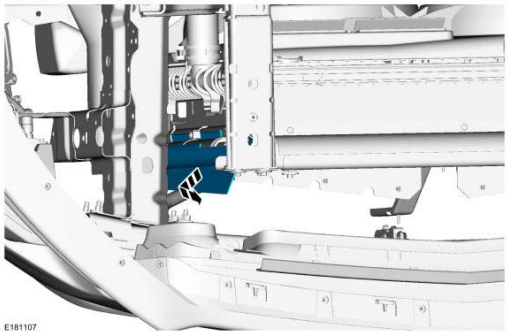
Torque

: 18 lb.in (2 Nm)



4.

Remove the air deflector.

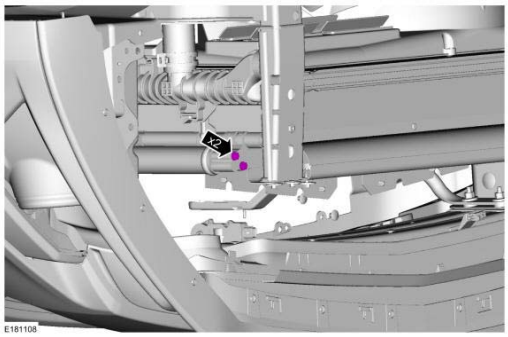


5.

Remove the bolts.

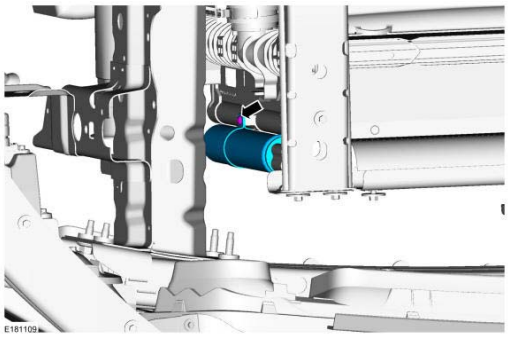
Torque

: 80 lb.in (9 Nm)



6.

Remove the retainer and the receiver drier.



REMOVAL AND INSTALLATION > RECEIVER DRIER - 5.0L 32V TI-VCT > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Add the correct amount of clean Polyalkylene Glycol (PAG) oil to the refrigerant system. Refer to: Refrigerant Oil Adding .

REMOVAL AND INSTALLATION > SUNLOAD SENSOR

Special Tool(s) / General Equipment

Interior Trim Remover

REMOVAL AND INSTALLATION > SUNLOAD SENSOR > REMOVAL

1.

Remove the sunload sensor and disconnect the electrical connector. Use the General Equipment: Interior Trim Remover



REMOVAL AND INSTALLATION > SUNLOAD SENSOR > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > THERMOSTATIC EXPANSION VALVE - 2.3L ECOBOOST (201KW 273PS) > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

Recover the refrigerant. Refer to: Air Conditioning (A/C) System Recovery, Evacuation and

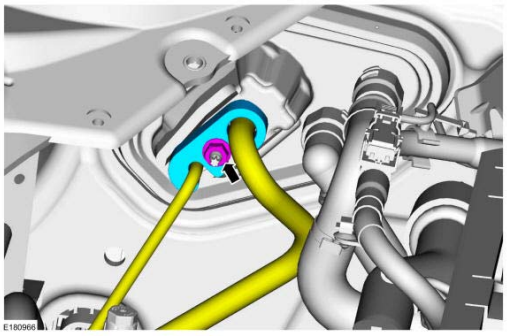
Charging .

NOTE: Make sure that all openings are sealed.

2.
Remove the nut and the Thermostatic Expansion Valve (TXV) bracket, and disconnect the A/C condenser outlet line and the evaporator outlet line.

Torque

: 133 lb.in (15 Nm)

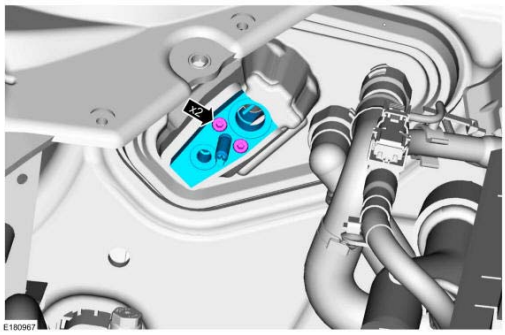


3.

Remove the bolts and the Thermostatic Expansion Valve (TXV).

Torque

: 62 lb.in (7 Nm)



REMOVAL AND INSTALLATION > THERMOSTATIC EXPANSION VALVE - 2.3L ECOBOOST (201KW 273PS) > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Add the correct amount of clean Polyalkylene Glycol (PAG) oil to the refrigerant system. Refer to: Refrigerant Oil Adding .

REMOVAL AND INSTALLATION > THERMOSTATIC EXPANSION VALVE - 3.7L DURATEC (227KW 301PS) > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

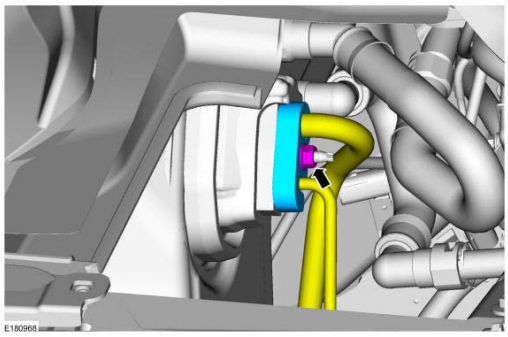
Recover the refrigerant. Refer to: Air Conditioning (A/C) System Recovery, Evacuation and Charging .

NOTE: Make sure that all openings are sealed.

2.
Remove the nut and the Thermostatic Expansion Valve (TXV) bracket, and disconnect the A/C condenser outlet line and the evaporator outlet line.

Torque

: 133 lb.in (15 Nm)

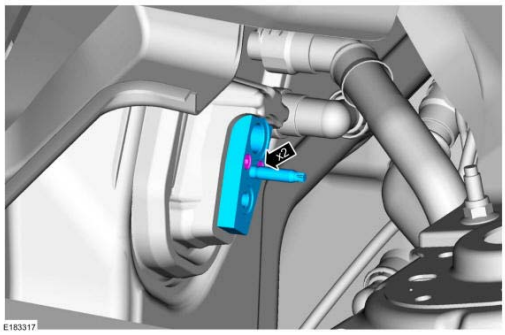


3.

Remove the bolts and the Thermostatic Expansion Valve (TXV).

Torque

: 62 lb.in (7 Nm)



REMOVAL AND INSTALLATION > THERMOSTATIC EXPANSION VALVE - 3.7L DURATEC (227KW 301PS) > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Add the correct amount of clean Polyalkylene Glycol (PAG) oil to the refrigerant system. Refer to: Refrigerant Oil Adding .

REMOVAL AND INSTALLATION > THERMOSTATIC EXPANSION VALVE - 5.0L 32V TI-VCT > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

Recover the refrigerant. Refer to: Air Conditioning (A/C) System Recovery, Evacuation and Charging .

2.

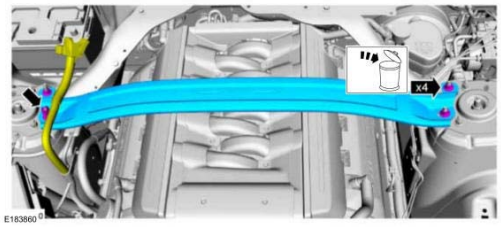
Disconnect the battery ground and positive cables. Refer to: Battery Disconnect and Connect .

NOTE: If equipped.

3.
Detach the battery cable retainer and remove the nuts and the cross brace.

Torque

: 41 lb.ft (55 Nm)

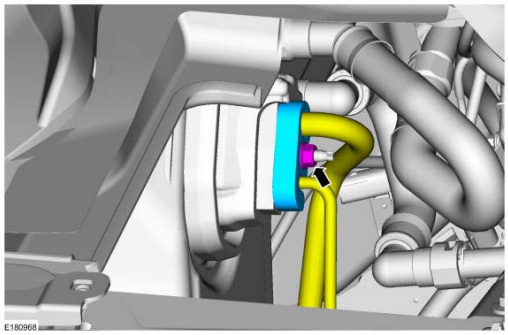


NOTE: Make sure that all openings are sealed.

4.
Remove the nut, the Thermostatic Expansion Valve (TXV) bracket and disconnect the A/C condenser outlet line, the evaporator outlet line.

Torque

: 133 lb.in (15 Nm)

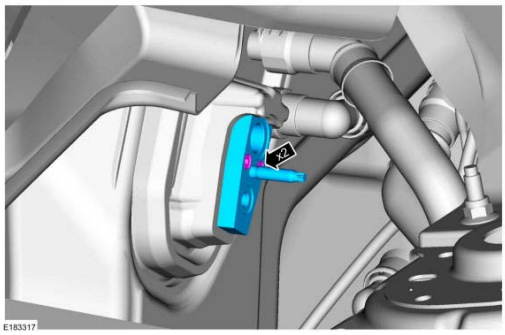


5.

Remove the bolts and the Thermostatic Expansion Valve (TXV).

Torque

: 62 lb.in (7 Nm)



REMOVAL AND INSTALLATION > THERMOSTATIC EXPANSION VALVE - 5.0L 32V TI-VCT > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Add the correct amount of clean Polyalkylene Glycol (PAG) oil to the refrigerant system. Refer to: Refrigerant Oil Adding .

A/C FILTER SERVICE REMINDER

NOTE: To determine the appropriate reset procedure, refer to A/C FILTER SERVICE REMINDER RESET INDEX . Only vehicles listed in this index have a Check A/C (Cabin) Filter Message reset.

A/C FILTER SERVICE REMINDER RESET INDEX

Model & Year	Reset Procedure
LS	
2000-06	A/C Filter Service Reminder Reset - Procedure 1

A/C FILTER SERVICE REMINDER > A/C FILTER SERVICE REMINDER RESET - PROCEDURE 1

1. To reset the A/C filter monitoring system to 100%, press the STATUS control to access the System Check function. Message center will display A/C FILTER XXX% RESET FOR NEW.
2. Press and hold RESET control to change setting to 100%. Message center will now display IF NEW FILTER HOLD RESET.
3. If reset procedure is successful, the message center will display A/C FILTER LIFE SET TO 100%.

MAINTENANCE SERVICE REMINDER (OVERHEAD WARNING LIGHTS)

NOTE: To determine the appropriate reset procedure, refer to MAINTENANCE SERVICE REMINDER RESET INDEX . Only vehicles listed in this index have an Overhead Warning Lights reset.

OVERHEAD WARNING LIGHTS RESET INDEX

Model & Year	Reset Procedure
Cougar	
1992-02	Maintenance Service Reminder Reset - Procedure 1

MAINTENANCE SERVICE REMINDER (OVERHEAD WARNING LIGHTS) > MAINTENANCE SERVICE REMINDER RESET - PROCEDURE 1

1. One or more of the 7 overhead lights will turn on after about 358 days or 4800 miles to indicate routine service should be performed.
2. To reset the light, hold the SELECT and UNITS buttons on the trip computer for 5 seconds. The service interval light will be illuminated, and then turn off after about 4 seconds.

MAINTENANCE SERVICE REMINDER (SRI)

Tip: oil change reminder light - 1989 Thunderbird

NOTE: To determine the appropriate reset procedure, refer to MAINTENANCE SERVICE REMINDER RESET INDEX . Only vehicles listed in this index have a Service Interval Reminder Light reset.

SERVICE INTERVAL REMINDER LIGHT RESET INDEX

Model & Year	Reset Procedure
Passenger Cars	
1985-89	Maintenance Service Reminder Reset - Procedure 1
Continental	
1990-94	Maintenance Service Reminder Reset - Procedure 2
Light Duty Trucks	
1985-87	Maintenance Service Reminder Reset - Procedure 3
Non-EEC Light Duty Trucks	
1988	Maintenance Service Reminder Reset - Procedure 3

MAINTENANCE SERVICE REMINDER (SRI) > MAINTENANCE SERVICE REMINDER RESET - PROCEDURE 1

Every 5000 or 7500 miles, depending upon engine application, a SERVICE interval reminder light on the dash will illuminate (for approximately 30 seconds), or begin flashing, indicating an oil change is due.

To reset reminder light, turn ignition on. Simultaneously depress and hold TRIP (ODO SEL on Taurus and Sable, SYSTEM CHECK or CHECK OUT on Continental) and RESET or TRIP RESET buttons. On Probe, depress and hold SERVICE RESET button, located on speed alarm keyboard. On all models, 3 beeps will verify that reminder light has been reset.

MAINTENANCE SERVICE REMINDER (SRI) > MAINTENANCE SERVICE REMINDER RESET - PROCEDURE 2

During system check sequence, the SERVICE symbol comes on and displays the number of miles to go before the next normal service. To reset the service interval reminder, press SYSTEM CHECK and RESET buttons simultaneously. The display should now show 7200 miles. Service interval reminder light has been reset.

MAINTENANCE SERVICE REMINDER (SRI) > MAINTENANCE SERVICE REMINDER RESET - PROCEDURE 3

A SRI is used to indicate emission system maintenance is required. Control unit (timer) for maintenance light is located under dash, near steering column or behind glove box. Some models use a non-resettable control unit. Replace it with a resettable type. After servicing emission system, reset SRI.

1. To reset SRI, turn ignition off. Remove tape over reset hole in timer. Lightly push a small Phillips screwdriver into hole in timer unit marked RESET. With light pressure on screwdriver, turn ignition switch to RUN position.
2. Light should stay on while screwdriver is pressed down. Hold screwdriver down for approximately 5 seconds. Remove screwdriver. Light should go out within 2-5 seconds. If light does not go out, repeat step 1
3. Cycle ignition from OFF to RUN position. Light should glow for 2-5 seconds. This verifies proper reset of maintenance reminder light.

MAINTENANCE SERVICE REMINDER (VMM)

NOTE: To determine the appropriate reset procedure, refer to MAINTENANCE SERVICE REMINDER RESET INDEX . Only vehicles listed in this index have a Vehicle Maintenance Monitor reset.

MAINTENANCE SERVICE REMINDER RESET INDEX

Model & Year	Reset Procedure
Cougar	
1989-92	Maintenance Service Reminder Reset - Procedure 1
Probe	
With Standard Inst.Cluster	
1990-92	Maintenance Service Reminder Reset - Procedure 1

With Electronic Inst.Cluster	
1990-92	Maintenance Service Reminder Reset - Procedure 2
Thunderbird	
1989-92	Maintenance Service Reminder Reset - Procedure 3

MAINTENANCE SERVICE REMINDER (VMM) > MAINTENANCE SERVICE REMINDER RESET - PROCEDURE 1

NOTE: For models with Standard Instrument Cluster.

1. The SERVICE light will come on approximately every 7500 miles, indicating routine service is required. The light will remain on for 3 minutes after vehicle is started.
2. To cancel the message and reset SERVICE light on 1990 models, depress and hold SERVICE RESET button until 3 beeps are sounded. This will verify that reminder light has been reset. SERVICE RESET button is located in VMM unit, in center of overhead console.
3. To cancel the message and reset SERVICE light on 1991-92 models, insert a small diameter shank into hole centered directly above VMM display lights, and press switch once.

MAINTENANCE SERVICE REMINDER (VMM) > MAINTENANCE SERVICE REMINDER RESET - PROCEDURE 2

NOTE: For models with Electronic Instrument Cluster.

1. SERVICE INTERVAL will be displayed on system scanner every 7500 miles, indicating that routine service is due. At 7500 miles, the message will remain on for 3 minutes after vehicle is started.
2. To cancel message and reset service interval on 1990 models, press and hold ODO SEL and TRIP RESET buttons until 3 beeps are heard. Buttons are located on speed alarm keyboard.
3. To cancel message and reset service interval on 1991-92 models, press and hold SERV button until 3 tones are heard. SERV button is located on speed alarm keyboard.

MAINTENANCE SERVICE REMINDER (VMM) > MAINTENANCE SERVICE REMINDER RESET - PROCEDURE 3

1. Turn ignition switch to ON position. Within 16 seconds of turning ignition on, insert small diameter shank into reset switch hole, and firmly push in switch. Reset switch hole is located on left side of VMM panel.

2. Keep switch depressed until left side of display stops flashing. If switch is not kept depressed until left side of display stops flashing, VMM will not be reset.

TIRE PRESSURE MONITOR SYSTEM REMINDER

Tip: TPM reset - 2001 ford windstar

Question: service tire mobility reset ? - RESOLVED

Question: TPMS Reset - 2007 Fusion (and maybe others) - RESOLVED

more

> *NOTE: To determine the appropriate reset procedure, refer to TPMS REMINDER RESET INDEX . Only vehicles listed in this index have a TPMS reset.*

TPMS REMINDER RESET INDEX

Model & Year	Procedure
Ford	
C-Max	
2013-17	TPMS Reminder Reset - Procedure 1
Crown Victoria	
2008-11	TPMS Reminder Reset - Procedure 1
E-Series Van	
2008-11	TPMS Reminder Reset - Procedure 1
2012-17	TPMS Reminder Reset - Procedure 4
Edge	
2008-11	TPMS Reminder Reset - Procedure 1
2012-17	TPMS Reminder Reset - Procedure 4
Escape	
2006-11	TPMS Reminder Reset - Procedure 1
2012-17	TPMS Reminder Reset - Procedure 4
Expedition/EL	
2004-06	TPMS Reminder Reset - Procedure 2
007-11	TPMS Reminder Reset - Procedure 1
2012-17	TPMS Reminder Reset - Procedure 4

Explorer	
2004-05	TPMS Reminder Reset - Procedure 2
2006-11	TPMS Reminder Reset - Procedure 1
-Intelligent Access (IA)	
2012-15	TPMS Reminder Reset - Procedure 3
-Integrated Keyhead Transmitter (IKT)	
2012-15	TPMS Reminder Reset - Procedure 4
-All Models	
2016-17	TPMS Reminder Reset - Procedure 4
Explorer Sport Trac	
2008-10	TPMS Reminder Reset - Procedure 1
F-Series Pickups	
2008-17	(3) TPMS Reminder Reset - Procedure 1
Fiesta	
2011	TPMS Reminder Reset - Procedure 1
2012-17	TPMS Reminder Reset - Procedure 4
Flex	
2009-11	TPMS Reminder Reset - Procedure 1
2012	TPMS Reminder Reset - Procedure 4
-Intelligent Access (IA)	
2013-17	TPMS Reminder Reset - Procedure 3
-Integrated Keyhead Transmitter (IKT)	
2013-17	TPMS Reminder Reset - Procedure 4
Focus	
2008-11	TPMS Reminder Reset - Procedure 1
-Intelligent Access (IA)	
2012-15	TPMS Reminder Reset - Procedure 3
-Integrated Keyhead Transmitter (IKT)	
2012-15	TPMS Reminder Reset - Procedure 4
-All Models	
2016-17	TPMS Reminder Reset - Procedure 4
Freestar	
2004-05 (Indirect)	(1) TPMS Reminder Reset - Procedure 5

2004-05 (Direct)	TPMS Reminder Reset - Procedure 2
2006-07	TPMS Reminder Reset - Procedure 1
Fusion	
2008-11	TPMS Reminder Reset - Procedure 1
2012-17	TPMS Reminder Reset - Procedure 4
Mustang	
2007-11	TPMS Reminder Reset - Procedure 1
2012-17	TPMS Reminder Reset - Procedure 4
Police Interceptor (Sedan)	
-Intelligent Access (IA)	
2014-17	TPMS Reminder Reset - Procedure 3
-Integrated Keyhead Transmitter (IKT)	
2014-17	TPMS Reminder Reset - Procedure 4
Police Interceptor (Utility)	
-Intelligent Access (IA)	
2014-15	TPMS Reminder Reset - Procedure 3
-Integrated Keyhead Transmitter (IKT)	
2014-15	TPMS Reminder Reset - Procedure 4
-All Models	
2016-17	TPMS Reminder Reset - Procedure 4
Police Sedan (Special Service)	
-Intelligent Access (IA)	
2016-17	TPMS Reminder Reset - Procedure 3
-Integrated Keyhead Transmitter (IKT)	
2016-17	TPMS Reminder Reset - Procedure 4
Ranger	
2007-11	TPMS Reminder Reset - Procedure 1
Taurus	
2008-10	TPMS Reminder Reset - Procedure 1
-Intelligent Access (IA)	
2011-17	TPMS Reminder Reset - Procedure 3
-Integrated Keyhead Transmitter (IKT)	
2011-17	TPMS Reminder Reset - Procedure 4

Taurus X	
2008-09	TPMS Reminder Reset - Procedure 1
Transit Connect	
2010-11	TPMS Reminder Reset - Procedure 1
2012-17	TPMS Reminder Reset - Procedure 4
Transit Series (150 /250 /350)	
2015-17	TPMS Reminder Reset - Procedure 4
Windstar	
2001-03	(1) TPMS Reminder Reset - Procedure 5
Lincoln	
Aviator	
2004-05	TPMS Reminder Reset - Procedure 2
Continental	
2017	TPMS Reminder Reset - Procedure 4
Mark LT	
2007-08	TPMS Reminder Reset - Procedure 1
MKC	
2015-17	TPMS Reminder Reset - Procedure 4
MKS	
2009-11	TPMS Reminder Reset - Procedure 1
-Integrated Keyhead Transmitter (IKT)	
2012	TPMS Reminder Reset - Procedure 4
-Intelligent Access (IA)	
2012	TPMS Reminder Reset - Procedure 3
-All Models	
2013-17	TPMS Reminder Reset - Procedure 4
MKT	
2010-11	TPMS Reminder Reset - Procedure 1
2012-17	TPMS Reminder Reset - Procedure 4
MKX	
2008-11	TPMS Reminder Reset - Procedure 1
2012-17	TPMS Reminder Reset - Procedure 4
MKZ	

2008-11	TPMS Reminder Reset - Procedure 1
2012-17	TPMS Reminder Reset - Procedure 4
Navigator/L	
2003-06	TPMS Reminder Reset - Procedure 2
2007-10	TPMS Reminder Reset - Procedure 1
2011-17	TPMS Reminder Reset - Procedure 4
Town Car	
2008-11	TPMS Reminder Reset - Procedure 1
Mercury	
Grand Marquis	
2008-11	TPMS Reminder Reset - Procedure 1
Mariner	
2006-11	TPMS Reminder Reset - Procedure 1
Milan	
2008-11	TPMS Reminder Reset - Procedure 1
Monterey	
2004-05 (Indirect)	(1) TPMS Reminder Reset - Procedure 5
2004-05 (Direct)	TPMS Reminder Reset - Procedure 2
2006-07	TPMS Reminder Reset - Procedure 1
Mountaineer	
2003-05	TPMS Reminder Reset - Procedure 2
2006-10	TPMS Reminder Reset - Procedure 1
Sable	
2008-09	TPMS Reminder Reset - Procedure 1

(1)	This is an Indirect TPM System. A transmitter activation tool is not required for this procedure.
(2)	For 2010 models with Integrated Keyhead Transmitter (IKT) or Intelligent Access (IA) type of Remote Keyless Entry system, see TPMS Reminder Reset - Procedure 3 or 4
(3)	For vehicles with Dual Rear wheels, see Procedure 7.

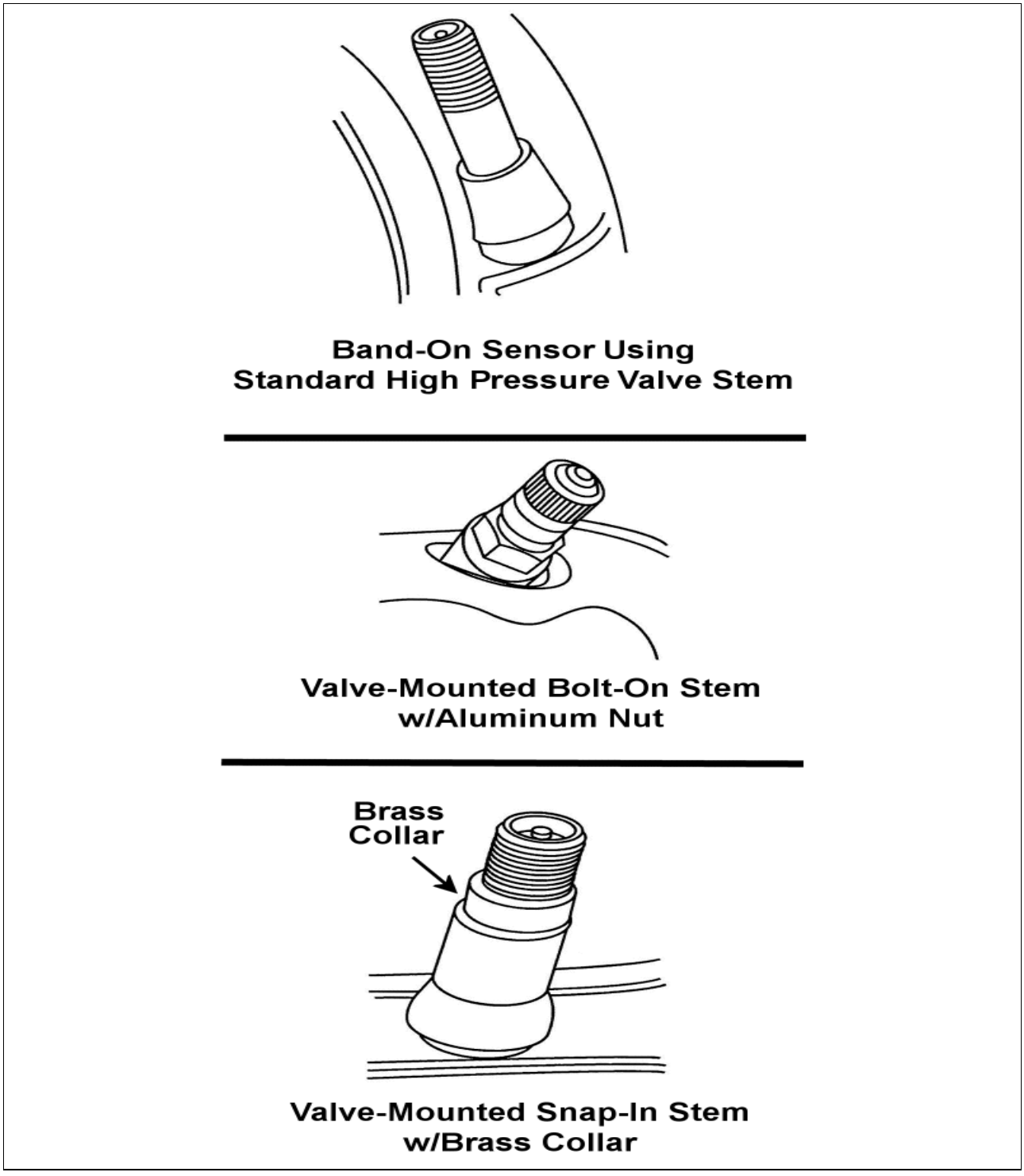
TIRE PRESSURE MONITOR SYSTEM REMINDER > TPMS SENSOR TYPES

Ford Motor Company uses three different designs of TPMS sensor:

- Banded Sensor
- Valve Mounted Bolt-On Sensor
- Valve Mounted Snap-In Sensor

> *NOTE: Although the three different system use similar methods for communicating, the tire pressure sensors are not interchangeable.*

Fig 1: Identifying Valve Stems Used With Ford TPMS Sensors



TIRE PRESSURE MONITOR SYSTEM REMINDER > TPMS SENSOR TYPES > BANDED SENSOR

The banded (or band-on) TPMS sensor assembly consists of:

- A metal band around the center of the wheel

- A cradle or bracket to hold the sensor
- A tire pressure sensor

TIRE PRESSURE MONITOR SYSTEM REMINDER > TPMS SENSOR TYPES > VALVE MOUNTED BOLT-ON SENSOR

The valve mounted sensors (also known as a Schrader Valve Sensor) are one-piece "bolt-on" valve mounted sensor where the sensor and valve stem are molded together. The sensor is secured in place by a hex nut and uses a rubber grommet to prevent any leaks. This sensor was replaced by the Banded Sensor.

TIRE PRESSURE MONITOR SYSTEM REMINDER > TPMS SENSOR TYPES > VALVE MOUNTED SNAP-IN SENSOR

Beginning in 2009 with the Escape and F-150, a two piece snap-in valve mounted sensor was used. The sensor and valve stem are separate pieces which are screwed together and can be replaced separately.

The sensor is referred to as "snap-in" because it uses a more traditional rubber valve stem for installation and does not use a hex nut fastener or rubber o-ring for attachment.

NOTE: Snap-In Sensors MUST USE new style valve stem.

TIRE PRESSURE MONITOR SYSTEM REMINDER > TPMS REMINDER RESET - PROCEDURE 1

NOTE: If tire pressure sensor is replaced, it will need to be trained. The TPM system is not affected by wheel and tire rotation.

NOTE: As ambient temperature decreases by 6°C (10°F), tire pressure decreases 1 psi (7 kPa). Because tire pressures fluctuate with temperature changes, tire pressures must be set when tires are at outdoor ambient temperatures. If the tire pressure may drop enough to be detected by the TPM system, which will activate the low pressure warning light.

NOTE: When the tire pressure warning light comes on solid and message center displays "LOW TIRE PRESSURE", check the air pressure of all tires and adjust to the specified cold pressure listed on vehicle certification label (found on driver's door or door pillar). Drive the vehicle at 20 mph (32 km/h) for at least 2 minutes. If the vehicle has been

stationary for more than 30 minutes, a TPM sensor Activation procedure may be needed. Make sure the warning light goes off. If the warning light stays on, there is a malfunction in the TPM system. See appropriate manufacturer service information.

NOTE: When the tire pressure warning light flashes for 70 seconds and then remains illuminated, after bulb-check has been performed and message center displays warning messages, there is a malfunction in the TPM system. See appropriate manufacturer service information.

NOTE: Under the following conditions, the TPM system may not function properly:

- *Low tire pressure.*
- *Tire pressure sensor is missing or damaged.*
- *Spare tire is installed as a road wheel.*
- *Incorrect tire pressure sensor is installed.*
- *Tire pressure sensor installed incorrectly.*
- *Non-OEM wheels installed (aftermarket rims).*
- *Non-OEM equipped run-flat tires installed.*
- *Other non-OEM modifications (roll cages, service barriers, part racks, ladder racks, etc.)*

NOTE: The tire pressure sensor training procedure must be done on a single vehicle, in an area without Radio Frequency (RF) noise and at least 3 ft. (1 m) away from any other vehicle equipped with TPM system. RF noise is generated by electrical motor and appliance operation, cellular telephones and remote transmitters, power inverters and portable entertainment equipment.

NOTE: A new tire pressure sensor is shipped in an OFF mode (or battery saver mode), and must be turned ON before it can be trained. To turn the sensor on, inflate the tire to the recommended inflation pressure and wait at least 2 minutes, then continue with the sensor training procedure.

1. Turn ignition switch to OFF position, then press and release brake pedal.
2. Turn ignition switch from OFF position to the RUN position 3 times, ending in RUN position. Do not wait more than one minute between each key cycle.
3. Press and release the brake pedal.
4. Turn ignition switch to OFF position.

5. Turn ignition switch from OFF position to the RUN position 3 times, ending in RUN position. Do not wait more than one minute between each key cycle.

> *NOTE: The horn will sound once and the tire pressure warning light will flash if train mode has been entered successfully (if equipped, the message center displays "TRAIN LF TIRE").*

6. Depending on TPMS sensor type, place transmitter activation tool on the left front tire wall:
    1. **Band-On Type Sensor:** Opposite (180 degrees) from the valve stem. See Fig 1
    2. **Valve-Mounted Type Sensor:** Near the valve stem.

   Press the activation button. The horn will sound briefly to indicate that the tire pressure sensor has been recognized by the Driver's Door Module (DDM).

> *NOTE: It may take up to 6 seconds to activate a tire pressure sensor. During this time, the transmitter activation tool must remain in place, in the appropriate position relative to the valve stem.*

> *NOTE: If a sensor does not respond to the activation tool, move the vehicle to rotate the wheels at least 1/4 of a turn and attempt to activate the same sensor again.*

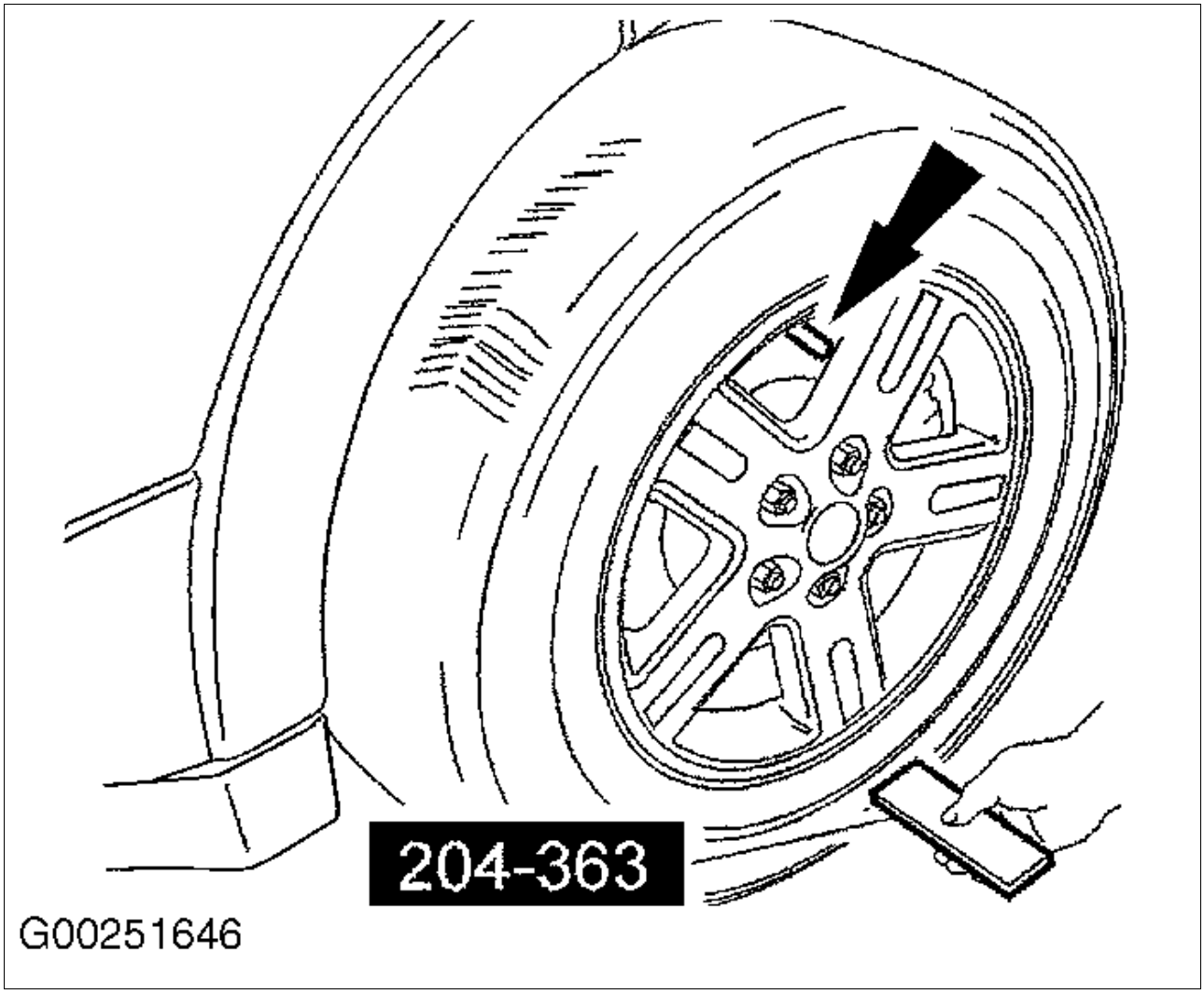
> *NOTE: If the DDM does not recognize any one of the 4 tire pressure sensors during the 2 minute time limit for each sensor response, the horn will sound twice and the message center (if equipped) will display "TIRE NOT TRAINED REPEAT". The training procedure must be repeated from the beginning.*

7. Within 2 minutes after the horn sounds, place transmitter activation tool on the right front tire wall, in the appropriate position relative to the valve stem. Then press the activation button to train the right front tire pressure sensor. Repeat procedure for right rear and left rear tires.

> *NOTE: Do not wait more than 2 minutes between training each sensor. If the wait time is more than 2 minutes the DDM will stop and the training procedure must be repeated from the beginning.*

8. When the tire training procedure is complete, the message center (if equipped) will display "TIRE TRAINING COMPLETE". For vehicles not equipped with a message center, successful completion of the training procedure will be verified by turning the ignition switch to the OFF position without the horn sounding. If the horn sounds twice when ignition is turned off, the training procedure was not successful.

Fig 1: Training Tire Pressure Sensors (Wheels With Band-On Sensors)



Courtesy of FORD MOTOR CO.

TIRE PRESSURE MONITOR SYSTEM REMINDER > TPMS REMINDER RESET - PROCEDURE 2

NOTE: If vehicle is stationary overnight when outside temperature is significantly lower than daytime temperature, tire pressure may decrease about 3 psi (21 kPa) for a drop of 30°F (17°C) in ambient temperature. This pressure decrease may activate TPM warning system.

NOTE: Since tire pressure information is updated once every minute, it may take up to a minute for warning light to turn off after tire pressure has been adjusted. If vehicle has been parked for over 15 minutes, system information will be updated once an hour. In this case, it may take up to an hour for warning light to turn off after tire pressure has been adjusted.

NOTE: When the tire pressure warning light comes on solid, check the air pressure of all tires and adjust to the specified pressure listed on tire label (located on the driver's door or "B" pillar). Drive the vehicle at 20 mph (32 km/h) for at least 2 minutes. Make sure the warning light goes off. If the warning light stays on, there is a malfunction in the TPM system. See appropriate manufacturer service information.

NOTE: When the tire pressure warning light flashes for 20-30 seconds either at start-up or while driving, check to see if a spare tire is being used. Repair as necessary. Make sure the warning light goes off. If the tires are adjusted to the appropriate pressure, spare tire is not in use, and warning light continues to flash, there is a malfunction in the TPM system. See appropriate manufacturer service information.

WARNING: In the following procedure, a magnet is used. Death or serious injury can occur if magnetically sensitive devices are exposed to the relearn magnet. Magnets can affect pacemakers.

NOTE: The tire pressure sensor training procedure must be done on a single vehicle, in an area without radio frequency (RF) noise. RF noise is generated by electrical motor and appliance operation, cellular telephones and remote transmitters, power inverters and portable entertainment equipment.

1. Turn ignition switch to OFF position.
2. Turn ignition switch from OFF position to the RUN position 3 times, ending in RUN position. Do not wait more than one minute between each key cycle.
3. Press and release the brake pedal.
4. Turn ignition switch to OFF position.
5. Turn ignition switch from OFF position to the RUN position 3 times, ending in RUN position. Do not wait more than one minute between each key cycle. The horn will sound once and the TPMS indicator will flash if train mode has been entered successfully (if equipped, the message center displays "TRAIN LF TIRE").
6. Place the TPM Relearn Magnet on the valve stem of the left front tire pressure sensor. The horn will sound briefly to indicate that the tire pressure sensor has been recognized by the TPMS module.
7. Within 2 minutes after the horn sounds, place the magnet on the valve stem of the right front tire pressure sensor. Repeat procedure for right rear and left rear tires.

   NOTE: If the VSM (TPMS module is integral to VSM) does not recognize any one of the 4 tire pressure sensors during the tire training procedure, the horn will sound twice and the message center (if equipped) will display "TIRE NOT TRAINED

REPEAT". If this occurs, procedure must be repeated.

8. When the tire training procedure is complete, the horn will sound once and the message center (if equipped) will display "TIRE TRAINING MODE COMPLETE".

TIRE PRESSURE MONITOR SYSTEM REMINDER > TPMS REMINDER RESET - PROCEDURE 3

NOTE: The TPMS can be placed into learn mode using a diagnostic scan tool.

1. *Select Chassis.*
2. *Select TPMS.*
3. *Select Training Mode*

The horn will sound once and the TPMS indicator will flash if the training mode has been entered successfully. If equipped, the message center will display TRAIN Left Front (LF) TIRE.

Enter Training Mode Without Scan Tool:

1. Set the tire pressure of all wheels to pressure specified on the tire and loading information label.
2. **Close All Doors.**
3. Turn ignition switch to OFF position, then press and release brake pedal.
4. Using the START/STOP button, switch from OFF to ACCESSORY to RUN position 3 times, ending in RUN position.
5. Press and release the brake pedal.
6. Turn ignition switch to OFF position.
7. Using the START/STOP button, switch from OFF to ACCESSORY to RUN position 3 times, ending in RUN position.
8. Place transmitter activation tool on the left front tire wall at the valve stem. Press the activation button. The horn will sound briefly to indicate that the tire pressure sensor has been recognized.
9. Within 2 minutes after the horn sounds, place transmitter activation tool on the right front tire wall at the valve stem. Then press the activation button to train the right front tire pressure sensor. Repeat procedure for right rear and left rear tires.
10. When the tire training procedure is complete, the message center (if equipped) will display "TIRE TRAINING COMPLETE". For vehicles not equipped with a message center, successful completion of the training procedure will be verified by turning the ignition switch to the OFF

position without the horn sounding. If the horn sounds twice when ignition is turned off, the training procedure was not successful.

TIRE PRESSURE MONITOR SYSTEM REMINDER > TPMS REMINDER RESET - PROCEDURE 4

NOTE: The TPMS can be placed into learn mode using a diagnostic scan tool.

1. *Select Chassis.*
2. *Select TPMS.*
3. *Select Training Mode*

The horn will sound once and the TPMS indicator will flash if the training mode has been entered successfully. If equipped, the message center will display TRAIN Left Front (LF) TIRE.

Enter Training Mode Without Scan Tool:

1. Set the tire pressure of all wheels to pressure specified on the tire and loading information label.
2. Turn ignition switch to OFF position, then press and release brake pedal.
3. Turn ignition switch from OFF position to the RUN position 3 times, ending in RUN position. Do not wait more than one minute between each key cycle.
4. Press and release the brake pedal.
5. Turn ignition switch to OFF position.
6. Turn ignition switch from OFF position to the RUN position 3 times, ending in RUN position. Do not wait more than one minute between each key cycle. The horn will sound once and the TPMS indicator will flash if the training mode has been entered successfully. If equipped, the message center will display TRAIN LF TIRE.
7. Place transmitter activation tool on the left front tire wall at the valve stem. Press the activation button. The horn will sound briefly to indicate that the tire pressure sensor has been recognized by the DDM.

   NOTE: Do not wait more than 2 minutes between training each sensor. If the wait time is more than 2 minutes the DDM will stop and the training procedure must be repeated from the beginning.

8. Within 2 minutes after the horn sounds, place transmitter activation tool on the right front tire wall at the valve stem. Then press the activation button to train the right front tire pressure sensor. Repeat procedure for right rear and left rear tires.

9. When the tire training procedure is complete, the message center (if equipped) will display "TIRE TRAINING COMPLETE". For vehicles not equipped with a message center, successful completion of the training procedure will be verified by turning the ignition switch to the OFF position without the horn sounding. If the horn sounds twice when ignition is turned off, the training procedure was not successful.

TIRE PRESSURE MONITOR SYSTEM REMINDER > TPMS REMINDER RESET - PROCEDURE 5

NOTE: After tire rotation, replacement, balancing, alignment or pressure adjustment, TPM system will need to be reset.

TIRE PRESSURE MONITOR SYSTEM REMINDER > TPMS REMINDER RESET - PROCEDURE 5 > VEHICLES WITH MESSAGE CENTER

1. To reset the system, turn ignition switch to ON position or press ENGINE START/STOP button (brake pedal not depressed).
2. Press and hold the SETUP button and wait for the message center to display "SYSTEM CHECK".
3. Press the RESET button and wait for the message center to display "HOLD RESET TO RELEARN".
4. Continue to hold the RESET button for 3 seconds. The message "HOLD RESET TO RELEARN" and the low tire warning light will flash 3 times, indicating the reset procedure is complete.
5. If the light illuminates, reset the tire pressure to specification, then repeat procedure from step 1.
6. The system normally requires 15-20 minutes of driving in each of 3 speed ranges to learn how the tires behave after the system has been reset. However, the system will become functional in each speed range as soon as learning completes in each individual speed range.
   TIRE LEARNING SPEED RANGES

Speed Range	MPH (KM/H)
Low	25-42 (40-68)
Medium	42-62 (68-100)
High	Above 62 (100)

TIRE PRESSURE MONITOR SYSTEM REMINDER > TPMS REMINDER RESET -

PROCEDURE 5 > VEHICLES WITHOUT MESSAGE CENTER

1. To reset the system, turn ignition switch to ON position.
2. Press and hold the Trip/Odometer reset button, and wait until "TIRE RESET" or "CHECK TIRE AND RESET" is displayed in odometer display window.
3. Continue to press the button for 3 seconds, then release. After 3 seconds, the low tire pressure warning light will flash 3 times, indicating that the low tire warning system reset procedure is complete.

TIRE PRESSURE MONITOR SYSTEM REMINDER > TPMS REMINDER RESET - PROCEDURE 6

1. Drive the vehicle above 20 mph (32 km/h) for at least two minutes and then park in a location where you can easily get to all four tires and have access to an air pump.
2. Turn the ignition ON, with the engine OFF.
3. Turn the hazard flashers on then off three times. This must be accomplished within 10 seconds. If the reset mode has been entered successfully, the horn will sound once, the system indicator will flash and the message center (if equipped) will display TRAIN LEFT FRONT TIRE. If this does not occur, please try again starting at Step 2.
4. Place a transmitter activation tool on the left front tire wall at the valve stem. Press the activation button. The horn will sound briefly to indicate that the tire pressure sensor has been recognized.
5. Within 2 minutes after the horn sounds, place activation tool on the right front tire wall at the valve stem. Then press the activation button to train the right front tire pressure sensor. Repeat procedure for right rear and left rear tires.
6. After all four tires have been trained, remove the valve cap from the valve stem on the left front tire; decrease the air pressure until the horn sounds. The single horn chirp confirms that the sensor identification code has been learned by the module for this position. If a double horn is heard, the reset procedure was unsuccessful, and must be repeated.
7. Repeat the air pressure decrease procedure for the remaining three tires.
8. Training is complete after the horn sounds for the last tire trained (driver's side rear tire), the system indicator stops flashing, and the message center (if equipped) displays TRAINING COMPLETE.
9. Turn the ignition off. If two short horn beeps are heard, the reset procedure was unsuccessful and must be repeated.
10. Set all four tires to the recommended air pressure as indicated on the Safety Compliance Certification Label or Tire Label.

TIRE PRESSURE MONITOR SYSTEM REMINDER > TPMS REMINDER RESET - PROCEDURE 7

NOTE: This procedure is for vehicles the Dual Rear Wheels.

NOTE: The TPMS can be placed into learn mode using a diagnostic scan tool.

1. *Select Chassis.*
2. *Select TPMS.*
3. *Select Training Mode*

The horn will sound once and the TPMS indicator will flash if the training mode has been entered successfully. If equipped, the message center will display TRAIN Left Front (LF) TIRE.

Enter Training Mode Without Scan Tool:

1. Set the tire pressure of all wheels to pressure specified on the tire and loading information label.
2. Turn ignition switch to OFF position, then press and release brake pedal.
3. Turn ignition switch from OFF position to the RUN position 3 times, ending in RUN position. Do not wait more than one minute between each key cycle.
4. Press and release the brake pedal.
5. Turn ignition switch to OFF position.
6. Turn ignition switch from OFF position to the RUN position 3 times, ending in RUN position. Do not wait more than one minute between each key cycle. The horn will sound once and the TPMS indicator will flash if the training mode has been entered successfully. If equipped, the message center will display TRAIN LF TIRE.
7. Remove both rear outer tires and lay them flat on the ground. Left Rear Outer (LRO) and Right Rear Outer (RRO).
8. Place the transmitter activation tool on the Left Front (LF) tire sidewall at the valve stem. Press and release the test button on the tool. The horn will sound briefly to indicate that the tire pressure sensor has been recognized by the BCM.

   NOTE: It may take up to 6 seconds to activate a tire pressure sensor. During this time, the transmitter activation tool must remain in place at the valve stem.

9. Within 2 minutes of the horn sounding, place the transmitter activation tool on the Right Front (RF) tire sidewall at the valve stem and press and release the test button to train the Right Front (RF) tire pressure sensor.
10. Repeat procedure for the Right Rear (RR), (RRO) Left Rear (LR) and (LRO) tires. The procedure is completed after the last tire has been trained. When the training procedure is complete, the message center (if equipped) will display TIRE TRAINING COMPLETE. For

vehicles not equipped with a message center, successful completion of the training procedure will be verified by positioning the ignition to OFF without the horn sounding. If the horn sounds twice when the ignition is positioned to OFF, the training procedure was not successful

11. Using the scan tool, locate the updated TPMS sensor identifiers trained to the BCM and document them on the applicable warranty claim. This step is required to clear DTC B1182:55, cause the BCM to exit the manufacturing mode and to make sure there are no other concerns with a newly programmed BCM.
12. If the sensors are being trained due to the installation of a new BCM, clear any DTC and carry out the BCM On-Demand Self Test.
13. Install both rear outer tires.

Service Manual: SEATBELT SYSTEMS

DESCRIPTION AND OPERATION > SEATBELT SYSTEMS - SYSTEM OPERATION AND COMPONENT DESCRIPTION

System Operation

DESCRIPTION AND OPERATION > SEATBELT SYSTEMS - SYSTEM OPERATION AND COMPONENT DESCRIPTION > EMERGENCY LOCKING RETRACTOR (ELR)

All retractors have an Emergency Locking Retractor (ELR) mode, which is a vehicle-sensitive feature designed to activate and lock the safety belt webbing during hard braking, cornering, or an impact of approximately 24 km/h (14.9 mph). The Emergency Locking Retractor (ELR) feature helps reduce the forward movement of the driver and passengers. For testing, see Functional Test - Safety Belt Retractor, Road Test Inspection , Refer to: Seatbelt Systems .

DESCRIPTION AND OPERATION > SEATBELT SYSTEMS - SYSTEM OPERATION AND COMPONENT DESCRIPTION > AUTOMATIC LOCKING RETRACTOR (ALR)

The Automatic Locking Retractor (ALR) mode is used when locking a child seat in any passenger seating position. The Automatic Locking Retractor (ALR) mode automatically activates when the safety belt webbing is fully extracted from the retractor and then allowed to retract. As the safety belt webbing retracts back onto the spool, an audible clicking sound is made, indicating the safety belt retractor is in Automatic Locking Retractor (ALR) mode and the safety belt webbing cannot pull back out of the safety belt retractor. The Automatic Locking Retractor (ALR) mode disengages when the webbing is allowed to fully retract back into the retractor. For testing, see Functional Test - Safety Belt Retractor, Automatic Locking Retractor (ALR) Mode , Refer to: Seatbelt Systems .

DESCRIPTION AND OPERATION > SEATBELT SYSTEMS - SYSTEM OPERATION AND COMPONENT DESCRIPTION > SAFETY BELT WARNING INDICATOR AND CHIME

The conditions of operation for the driver and/or front passenger safety belt warning indicator and chime operate as follows:

- If the driver and/or passenger safety belt is not buckled with the ignition ON, then the safety belt warning indicator illuminates for 1 to 2 minutes and the warning chime sounds for 4 to 8 seconds.
- If the driver and/or passenger safety belt is buckled while the warning indicator is illuminated and the warning chime is sounding, then the indicator and chime turn off.
- If the driver and/or passenger safety belt is buckled before the ignition is in the ON position, the safety belt warning indicator and chime remain off.

DESCRIPTION AND OPERATION > SEATBELT SYSTEMS - SYSTEM OPERATION AND COMPONENT DESCRIPTION > BELT-MINDER®

The Belt-Minder® feature is a supplemental warning to the safety belt warning function. This feature provides an additional reminder that the driver and/or front passenger safety belt is unbuckled by intermittently sounding a chime and illuminating the safety belt warning indicator in the IPC.

Either the driver or front passenger safety belt systems may activate the Belt-Minder®. If the Belt-Minder® warnings have expired (warnings for approximately 5 minutes) for one occupant (driver or front passenger), the other occupant can still activate the Belt-Minder® feature.

The passenger Belt-Minder® feature is activated only when the OCS detects a passenger in the right front seat and the passenger weight exceeds a programmed limit. For information on the OCS, Refer to: Airbag and Seatbelt Pretensioner Supplemental Restraint System (SRS) - System Operation and Component Description .

When a MyKey® is in the ignition, the Belt-Minder® feature cannot be deactivated. Refer to the Owner's Literature for further information on MyKey® functionality.

To activate or deactivate the Belt-Minder® feature, Refer to: Seatbelt Minder Deactivating/Activating .

The Belt-Minder® feature works as follows:

If...	Then...
the driver and/or passenger safety belt is buckled before the ignition is turned ON or less than 1-2 minutes have elapsed since the ignition has been turned ON...	the Belt-Minder® feature will not activate.
the driver and/or front passenger safety belt is not buckled before the vehicle has reached at least 9.7 km/h (6.0 mph) and 1-2 minutes have elapsed since the ignition has been turned ON...	the Belt-Minder® feature is activated - the safety belt warning indicator illuminates and the warning chime sounds for 6 seconds every 25 seconds, repeating for approximately 5 minutes or until the safety belt(s) is buckled.
the driver or front passenger safety belt becomes unbuckled for approximately one minute while the vehicle is traveling at least 9.7 km/h (6.0 mph) and more than 1-2 minutes have elapsed since the ignition has been ON...	the Belt-Minder® feature is activated - the safety belt warning indicator illuminates and the warning chime sounds for 6 seconds every 25 seconds, repeating for approximately 5 minutes or until the safety belt(s) is buckled.

Component Description

Child Safety Seat Tether Anchor

Child safety seat tether anchors are located at the rear seating positions and are part of the parcel shelf sheet metal.

If a child safety seat was in use during a collision, inspect the child safety seat mounting areas and restore the vehicle to the original production configuration.

Child Safety Seat Tether Anchor - Lower Anchors and Tethers for Children (LATCH)

Lower Anchors and Tethers for Children (LATCH) are located under the rear seat where the backrest and

cushion meet and are released for service. Refer to: Child Safety Seat Tether Anchor .

If a child safety seat was in use during a collision, inspect the child safety seat mounting areas and restore the vehicle to the original production configuration.

DIAGNOSIS AND TESTING > SEATBELT SYSTEMS > SYMPTOM CHART(S)

Preliminary Inspection

Diagnostics in this service information assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

Before diagnosing or repairing the safety belt system, inspect the following items:

- Safety belt webbing integrity (torn, frayed, cut or stretched)
- Safety belt buckle and tongue assembly

Symptom Chart: Safety Belt System

Symptom Chart

Condition	Possible Sources	Actions
The safety belt warning indicator does not operate	Failed indicator Wiring, terminals or connectors IPC RCM	If the air bag warning indicator is not illuminated, REFER to: Instrumentation, Message Center and Warning Chimes .
The safety belt warning chime does not operate	Wiring, terminals or connectors Safety belt switch IPC RCM	If the air bag warning indicator is illuminated, REFER to: Airbag Supplemental Restraint System (SRS) . If the air bag warning indicator is not illuminated, REFER to: Instrumentation, Message Center and Warning Chimes .
The safety belt retractor webbing does not extract or exhibits excessive pressure on the occupant during use	Safety belt retractor is in Automatic Locking Retractor (ALR) mode Safety belt retractor binding internally	CARRY OUT Functional Test - Safety Belt Retractor, Automatic Locking Retractor (ALR) Mode . INSTALL new components as directed.
The safety belt retractor webbing does not retract or has excessive slack during use	Twisted or incorrectly routed safety belt webbing Safety belt retractor binding internally	CORRECT the twisted safety belt webbing. REFER to: Seatbelt Twisted at the Seatbelt Guide . REFER to: Seatbelt Tongue Rotated On Belt . CARRY OUT Functional Test - Safety Belt Retractor . INSTALL new components as directed.

The Belt-Minder® feature is inoperative	Belt-Minder® feature is deactivated Wiring, terminals or connectors	Activate the Belt-Minder® feature. REFER to: Seatbelt Minder Deactivating/Activating . If the Belt-Minder® is activated, DIAGNOSE the inoperative Belt-Minder® feature. REFER to: Instrumentation, Message Center and Warning Chimes .
The safety belt tongue is rotated on the safety belt webbing	Twisted or incorrectly routed safety belt webbing	REFER to: Seatbelt Tongue Rotated On Belt .
The safety belt webbing is twisted at the safety belt guide	Twisted or incorrectly routed safety belt webbing	REFER to: Seatbelt Twisted at the Seatbelt Guide .
The safety belt webbing is dirty or soiled	Dirty or soiled safety belt webbing	REFER to: Seatbelt Cleaning .

DIAGNOSIS AND TESTING > SEATBELT SYSTEMS > FUNCTIONAL TEST - SAFETY BELT BUCKLE AND TONGUE

NOTE: Make sure the safety belt buckle and tongue assembly operate freely during the latching and unlatching function. Fasten the safety belt by inserting the tongue (male portion) into the buckle (female portion).

1.

Verify the following during the latching sequence:

- Tongue insertion does not require excessive effort.
- A click is heard when the safety belt buckle latches the tongue.

2.

Verify the system integrity by forcefully pulling on the safety belt webbing.

3.

Unlatch the safety belt by fully pressing the safety belt buckle release button and allowing the safety belt to release and retract.

4.

Verify the following during the unlatching process:

- Pressing the push button does not require excessive effort.
- The tongue can be removed easily from the buckle.

5.

Repeat the above steps 3 times.

6.

If the functional test reveals a concern(s), install a new safety belt buckle or safety belt retractor as required.

DIAGNOSIS AND TESTING > SEATBELT SYSTEMS > FUNCTIONAL TEST - SAFETY BELT RETRACTOR

NOTE: Make sure the safety belt retractor is freely operational for extraction and retraction of the safety belt webbing between full extension and in-vehicle stowed positions.

1.

Extract and retract the safety belt between the full extension and stowed positions.

2.

Verify the safety belt retractor operates without excessive effort or binding.

3.

Install a new safety belt retractor if any concern is found or the complaint has been verified.

DIAGNOSIS AND TESTING > SEATBELT SYSTEMS > FUNCTIONAL TEST - SAFETY BELT RETRACTOR, AUTOMATIC LOCKING RETRACTOR (ALR) MODE

1.

Position the seat backrest fully upright (if adjustable).

2.

Position the safety belt shoulder height adjuster (if equipped) in the full down or up position.

3.

Fasten the safety belt.

4.

Pull out the safety belt webbing until the Automatic Locking Retractor (ALR) feature is activated.

5.

Allow the safety belt webbing to retract until it stops.

6.

Pull on the safety belt webbing to make sure the safety belt retractor has remained in the Automatic Locking Retractor (ALR) mode. If the safety belt retractor is not locked, install a new safety belt retractor.

7.

Unfasten the safety belt and allow the safety belt webbing to retract to its stowed position.

8.

Pull out and retract the safety belt webbing to verify the safety belt retractor has converted automatically out of Automatic Locking Retractor (ALR) mode. If the safety belt retractor remains locked in the Automatic Locking Retractor (ALR) mode, install a new safety belt retractor.

DIAGNOSIS AND TESTING > SEATBELT SYSTEMS > FUNCTIONAL TEST - SAFETY BELT RETRACTOR, ROAD TEST INSPECTION

NOTE: Make sure there is no excessive slack in the safety belt webbing across the torso during testing.

NOTE: Do not jerk on the safety belt webbing when carrying out this test.

1.

Fasten the safety belts and proceed to a safe area.

2.

Reach a speed of 24 km/h (14.9 mph).

WARNING: Apply maximum brake force only on dry concrete or equivalent hard surface, never on wet pavement or gravel. Failure to follow this instruction may result in serious personal injury.

3.

Grasp the shoulder harness, lean forward and apply the brakes, making a maximum braking application without a skid.

4.

The safety belts should lock up with minimum webbing extension.

5.

If there is a lockup of all safety belt retractors being tested, the safety belt retractors are functioning correctly. If any safety belt retractor fails to lock up, install a new safety belt retractor(s).

GENERAL PROCEDURES > SEATBELT CLEANING

Cleaning

> *WARNING: Do not bleach or re-dye the safety belt webbing, as the webbing may weaken. Failure to follow this instruction may increase the risk of serious personal injury or death in a crash.*

1.

Refer to the owner's literature for information on safety belt care and the recommended cleaning solution to use. Follow the manufacturer's instructions provided with the cleaning solution.

GENERAL PROCEDURES > SEATBELT MAINTENANCE

Inspection

> *WARNING: All safety belt components must be inspected and corrected as part of any collision repair. Inspect all safety belt components as prescribed by Safety Belt Inspection and Repair After a Collision found in Seatbelt Procedure After a Collision . Failure to follow this instruction may result in incorrect operation of the safety belt system and increase the risk of serious personal injury or death in a crash.*

1.

Periodically inspect the safety belt assemblies for damage and that they remain in correct operating condition, particularly if they have been subjected to severe stress.

2.

Before installing the new safety belt assembly, inspect the safety belt retaining areas for damage and distortion. If the retaining points are damaged and distorted, work the sheet metal back to its original shape and structural integrity.

3.

Install the new safety belt(s) using the appropriate instructions. Carry out the appropriate Functional Test procedure for all seating positions. Refer to: Seatbelt Systems .

GENERAL PROCEDURES > SEATBELT PROCEDURE AFTER A COLLISION

Inspection

> *WARNING: All safety belt components must be inspected and corrected as part of any collision repair. Inspect all safety belt components as prescribed by Safety Belt Inspection and Repair After a Collision in this service information . Failure to follow this instruction may result in incorrect operation of the safety belt system and increase the risk of serious personal injury or death in a crash.*

1.

Before installing the new safety belt assembly, inspect the safety belt attaching areas for damage and distortion. If the attaching points are damaged and distorted, work the sheet metal back to its original shape and structural integrity.

2.

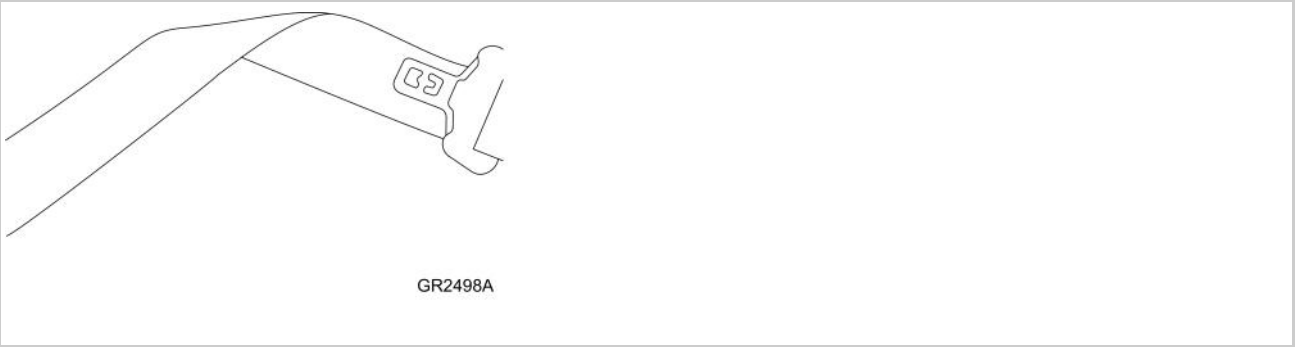
Install new safety belt(s) at any seating position(s) where deployment has occurred and the safety belt(s) were used. Carry out the appropriate Functional Test procedure for all seating positions. Refer to: Seatbelt Systems .

GENERAL PROCEDURES > SEATBELT TONGUE ROTATED ON BELT

Adjustment

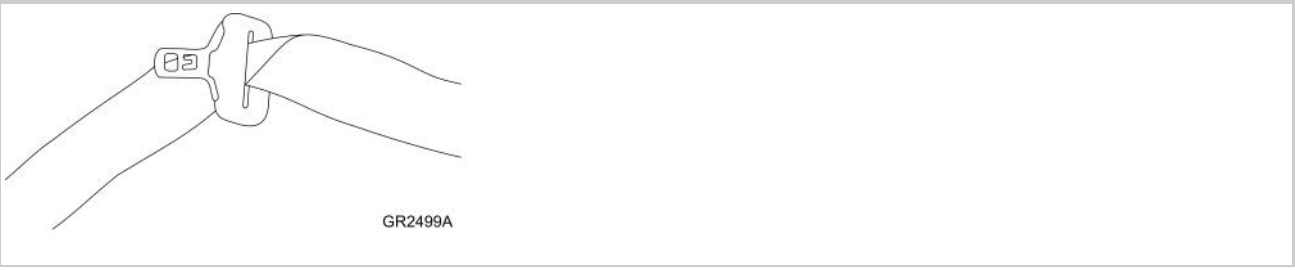
1.

Fold the safety belt as indicated.



2.

Pull the safety belt tongue over the fold in the safety belt.



GENERAL PROCEDURES > SEATBELT TWISTED AT THE SEATBELT GUIDE

Adjustment

1.

> *WARNING: Before beginning any service procedure in this service information, refer to Safety Warnings in GENERAL INFORMATION . Failure to follow this instruction may result in serious personal injury.*

Refer to: Health and Safety Precautions .

2.

If necessary, remove necessary trim panel(s).

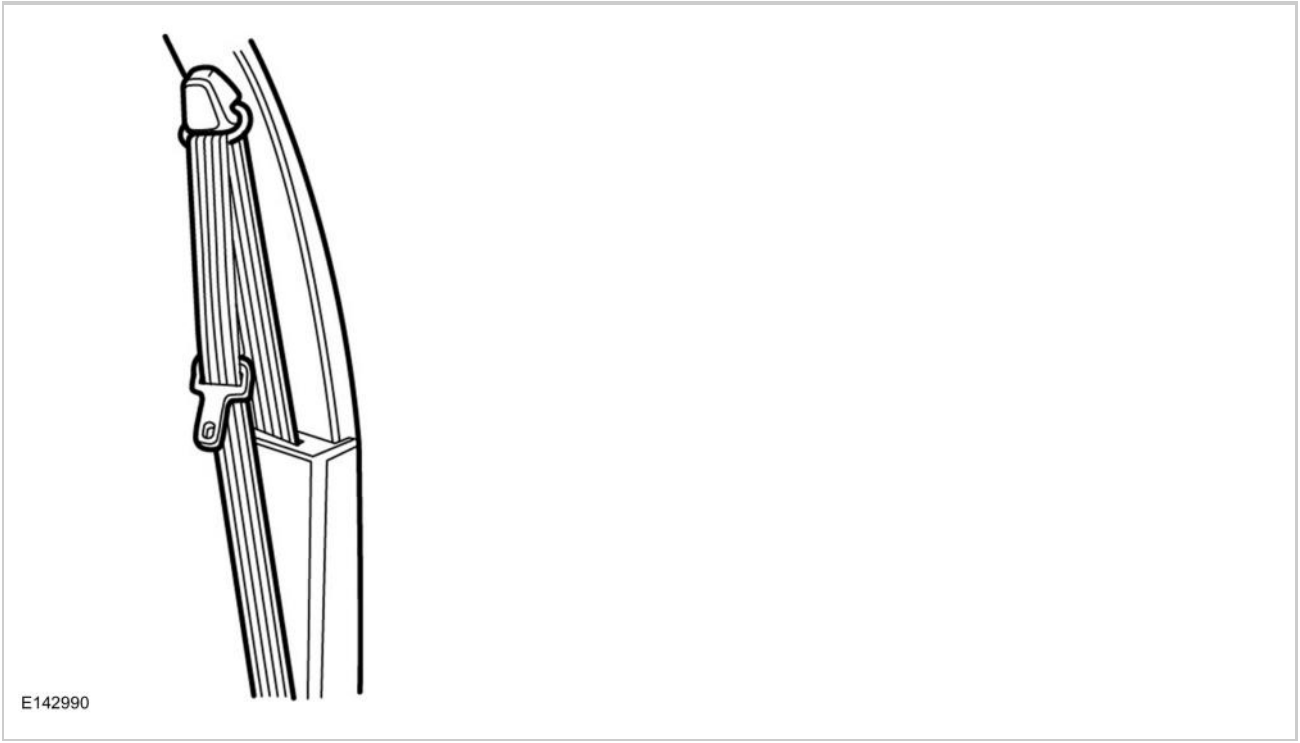
> *NOTE: Typical D-ring shown in illustration, others similar.*

3.
Grasp the safety belt webbing at the D-ring and fold the twisted portion of the safety belt webbing over itself.



4.

Feed the folded portion of the safety belt webbing through the D-ring to remove the twist from the safety belt webbing.



REMOVAL AND INSTALLATION > CHILD SAFETY SEAT TETHER ANCHOR > REMOVAL

NOTE: LHD shown in illustration, RHD similar.

NOTE: RH shown in illustration, LH similar.

NOTE: Removal steps in this procedure may contain installation details.

1.

Remove the rear seat cushion. Refer to: Rear Seat Cushion .

2.

Remove the retainers and the child safety seat tether anchor.

Torque

: 30 lb.ft (40 Nm)



REMOVAL AND INSTALLATION > CHILD SAFETY SEAT TETHER ANCHOR > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > FRONT SEATBELT BUCKLE > REMOVAL

NOTE: LHD passenger seat shown in illustration, all other seats similar.

NOTE: Removal steps in this procedure may contain installation details.

1.

Remove the front seat. Refer to: Front Seat .

2.

Remove the front safety belt buckle.

1.

Remove the wire harness retainers.

2.

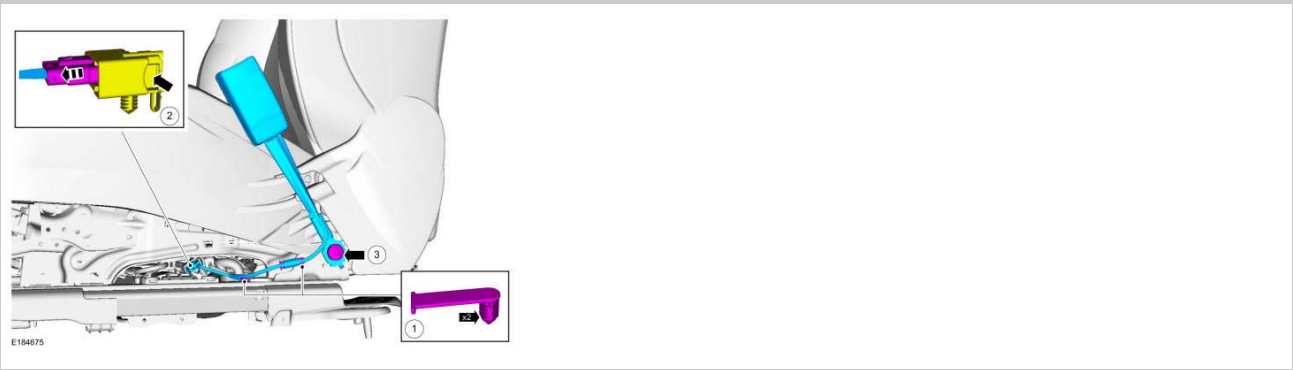
Disconnect the safety belt buckle electrical connector.

3.

Remove the retainer and the safety belt buckle.

Torque

: 30 lb.ft (40 Nm)



REMOVAL AND INSTALLATION > FRONT SEATBELT BUCKLE > INSTALLATION

NOTE: During installation, make sure the safety belt webbing is not twisted and the safety belts and buckles are accessible to the occupants.

1.
To install, reverse the removal procedure.

2.

Check the active restraint system for correct operation. Refer to: Seatbelt Systems .

REMOVAL AND INSTALLATION > FRONT SEATBELT RETRACTOR AND PRETENSIONER > REMOVAL

NOTE: LHD shown in illustration, RHD similar.

NOTE: RH shown in illustration, LH similar.

NOTE: Removal steps in this procedure may contain installation details.

All vehicles

1.

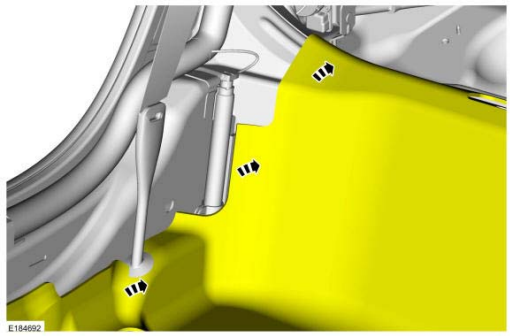
Depower the SRS. Refer to: Supplemental Restraint System (SRS) Depowering .

2.

Remove the loadspace trim panel. Refer to: Loadspace Trim Panel - Coupe). Refer to: Loadspace Trim Panel - Convertible .

3.

Position the carpet aside.



4.

1.

Disconnect the anchor pretensioner electrical connector.

2.

Remove the anchor pretensioner bolt.

Torque

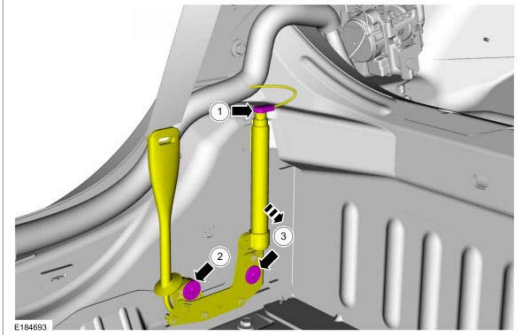
: 30 lb.ft (40 Nm)

NOTE: The rear anchor pretensioner bolt must remain attached and flush to the anchor plate during removal and installation. Failure to follow this instruction prevents correct installation of the anchor pretensioner, requiring installation of a new safety belt assembly.

3.
While pulling outward on the anchor pretensioner, remove the rear bolt.

Torque

: 30 lb.ft (40 Nm)



Convertible

5.

For the RH side, remove the RTM.

1.

Detach the wire harness retainers.

2.

Remove the nut.

Torque

: 71 lb.in (8 Nm)

3.

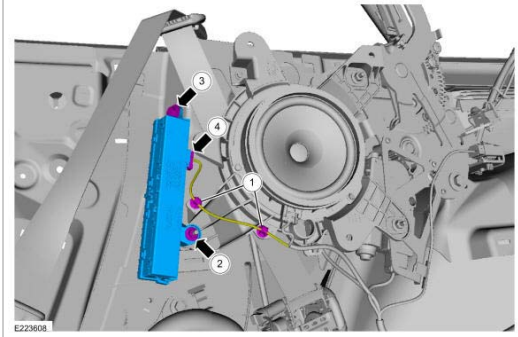
Remove the bolt.

Torque

: 17 lb.in (1.9 Nm)

4.

Disconnect the electrical connector.



6.

Remove the speaker and bracket assembly.

1.

Detach the wire harness retainer.

2.

Disconnect the electrical connector.

3.

Remove the screw.

4.

Remove the stud bolt.

Torque

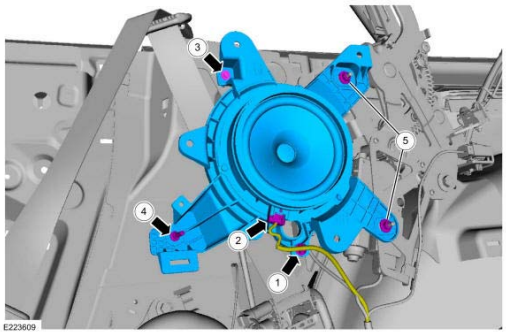
: 97 lb.in (11 Nm)

5.

Remove the nuts.

Torque

: 71 lb.in (8 Nm)

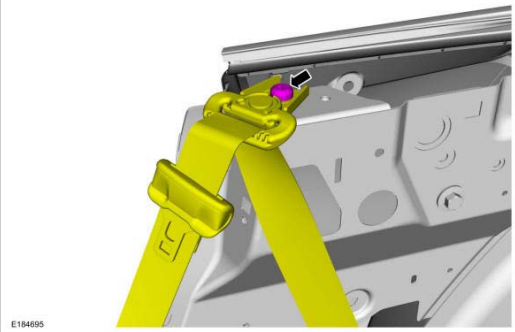


7.

Remove the D-ring bolt and position the safety belt aside.

Torque

: 30 lb.ft (40 Nm)

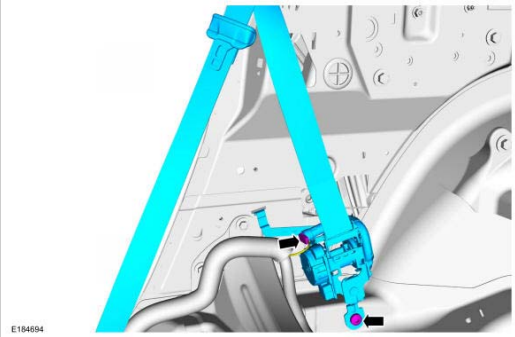


8.

Disconnect the electrical connector, remove the retainer and the safety belt retractor and pretensioner.

Torque

: 30 lb.ft (40 Nm)



Coupe

NOTE: Follow the unique instructions or graphics for this step in the installation.

9.
Remove the D-ring bolt.

1.

Remove the D-ring bolt cover.

2.

Remove the D-ring bolt and position the safety belt aside.



10.

Remove the safety belt retractor and pretensioner.

1.

Remove the safety belt retractor retainer.

2.

Disconnect the electrical connector and remove the safety belt retractor and pretensioner.



REMOVAL AND INSTALLATION > FRONT SEATBELT RETRACTOR AND PRETENSIONER > INSTALLATION

Convertible

> *NOTE: During installation, make sure the safety belt webbing is not twisted and the safety belts and buckles are accessible to the occupants.*

1.
To install, reverse the removal procedure.

Coupe

2.

Install the safety belt retractor and pretensioner.

1.

Connect the electrical connector and position the safety belt retractor and pretensioner.

2.

Install the safety belt retractor and pretensioner retainer.

Torque

: 30 lb.ft (40 Nm)



3.

Install the D-ring bolt.

1.

Position the safety belt and install the D-ring bolt.

Torque

: 30 lb.ft (40 Nm)

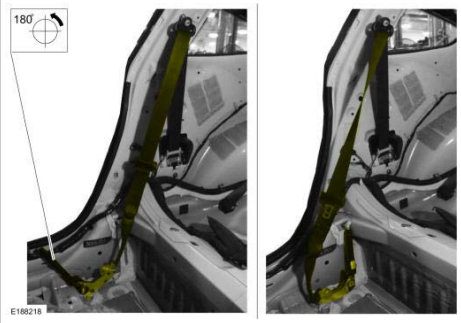
2.

Install the D-ring bolt cover.



NOTE: During installation, make sure the safety belt webbing is not twisted between the D-ring and the safety belt retractor and a single 180 degree twist clockwise LH side or counterclockwise RH side.

4.
Rotate the anchor pretensioner clockwise on the LH side, counterclockwise on the RH side, 180 degrees.



5.

To install, reverse the removal procedure.

All vehicles

6.

Repower the SRS. Refer to: Supplemental Restraint System (SRS) Repowering .

7.

Check the active restraint system for correct operation. Refer to: Seatbelt Systems .

REMOVAL AND INSTALLATION > REAR SEATBELT BUCKLE > REMOVAL

NOTE: RH shown in illustration, LH similar.

NOTE: Removal steps in this procedure may contain installation details.

1.

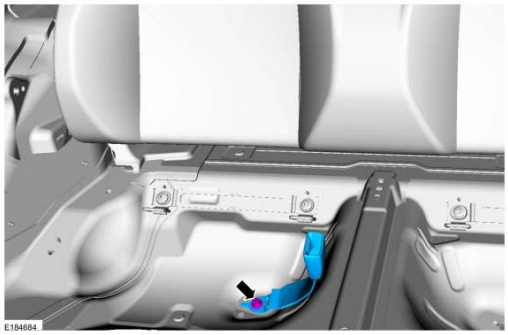
Remove the rear seat cushion. Refer to: Rear Seat Cushion .

2.

Remove the bolt and the safety belt buckle.

Torque

: 30 lb.ft (40 Nm)



REMOVAL AND INSTALLATION > REAR SEATBELT BUCKLE > INSTALLATION

NOTE: During installation, make sure the safety belt webbing is not twisted and the safety belts and buckles are accessible to the occupants.

1.
To install, reverse the removal procedure.

2.

Check the active restraint system for correct operation. Refer to: Seatbelt Systems .

REMOVAL AND INSTALLATION > REAR SEATBELT RETRACTOR - COUPE > REMOVAL

NOTE: RH shown in illustration, LH similar.

NOTE: Removal steps in this procedure may contain installation details.

1.

Remove the rear seat cushion. Refer to: Rear Seat Cushion .

2.

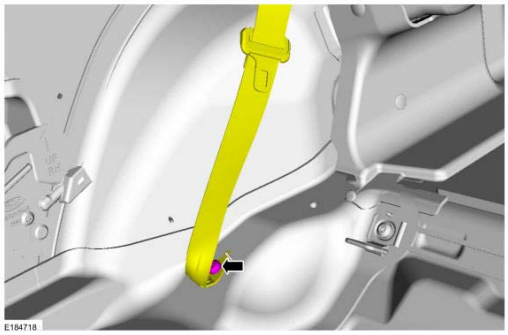
Remove the parcel shelf. Refer to: Parcel Shelf - Coupe .

3.

Remove the retainer and position the safety belt aside.

Torque

: 30 lb.ft (40 Nm)

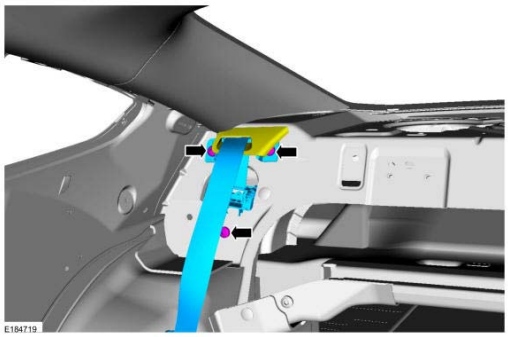


4.

Remove the retainers and the safety belt retractor.

Torque

: 30 lb.ft (40 Nm)



REMOVAL AND INSTALLATION > REAR SEATBELT RETRACTOR - COUPE > INSTALLATION

NOTE: During installation, make sure the safety belt webbing is not twisted and the safety belts and buckles are accessible to the occupants.

1.
To install, reverse the removal procedure.

2.

Check the active restraint system for correct operation. Refer to: Seatbelt Systems .

REMOVAL AND INSTALLATION > REAR SEATBELT RETRACTOR - CONVERTIBLE > REMOVAL

NOTE: LH shown in illustration, RH similar.

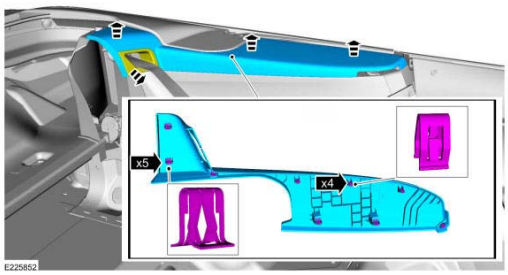
NOTE: Removal steps in this procedure may contain installation details.

1.

Remove the rear seat backrest. Refer to: Rear Seat Backrest - Convertible .

2.

Position the seatbelt guide aside, release the clips and remove the upper loadspace trim panel.



3.

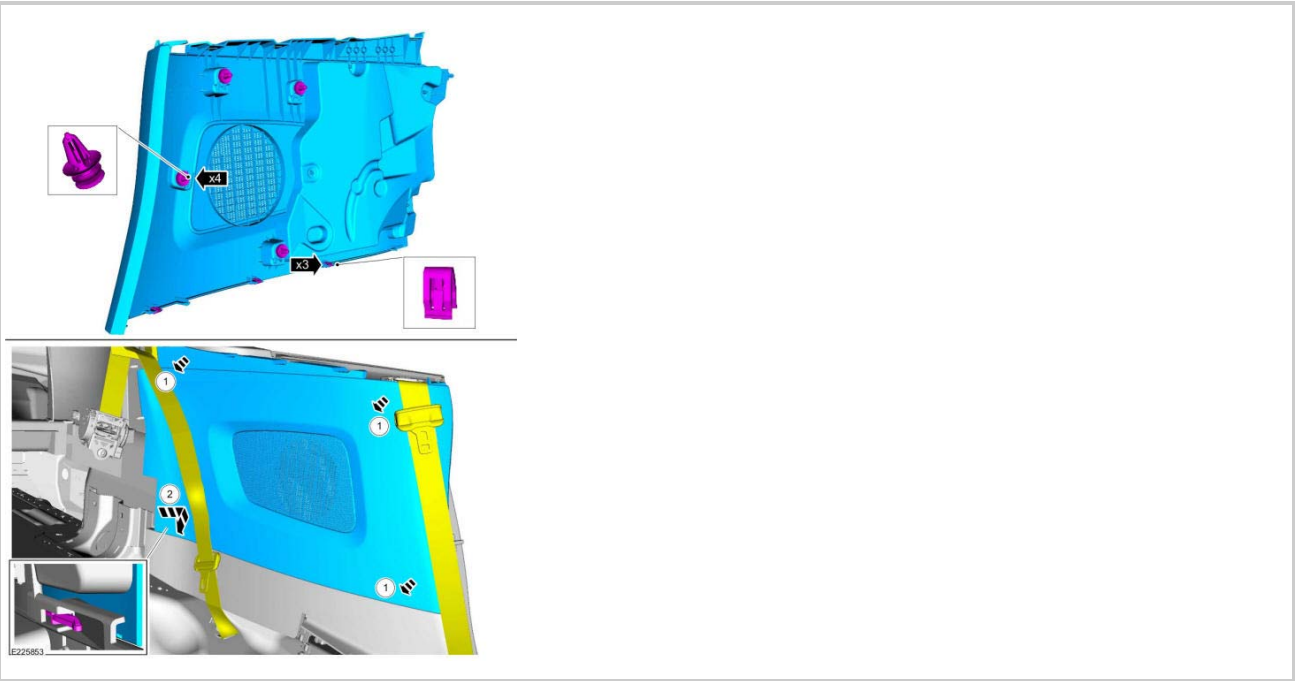
Remove the middle loadspace trim panel.

1.

Release the clips.

2.

Pull forward and outward to release the rear tab, position the front and rear safety belts aside and remove the middle loadspace trim panel.

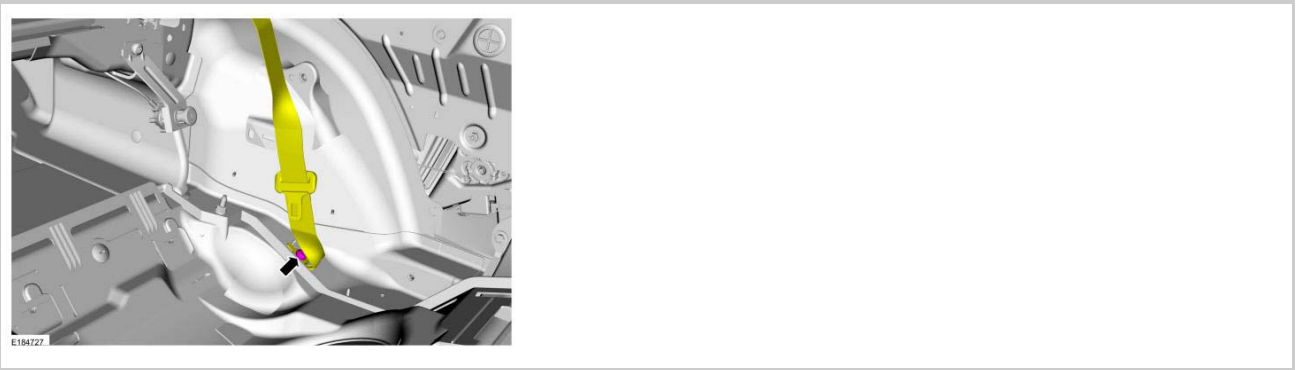


4.

Remove the retainer and position the seatbelt aside.

Torque

: 30 lb.ft (40 Nm)



5.

Remove the seatbelt retractor.

1.

Remove the D-ring bolt.

Torque

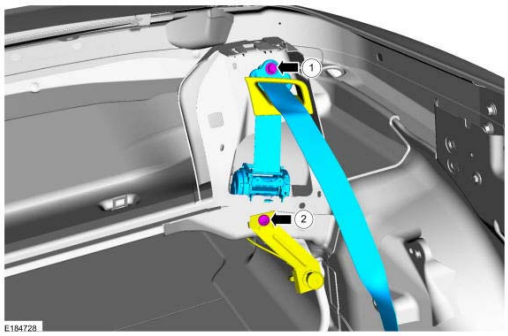
: 30 lb.ft (40 Nm)

2.

Remove the seatbelt retractor bolt, position the luggage compartment lid lock cylinder bracket aside (LH side only), and remove the seatbelt retractor.

Torque

: 30 lb.ft (40 Nm)



REMOVAL AND INSTALLATION > REAR SEATBELT RETRACTOR - CONVERTIBLE > INSTALLATION

NOTE: During installation, make sure the seatbelt webbing is not twisted and the seatbelts and buckles are accessible to the occupants.

1.
To install, reverse the removal procedure.

2.

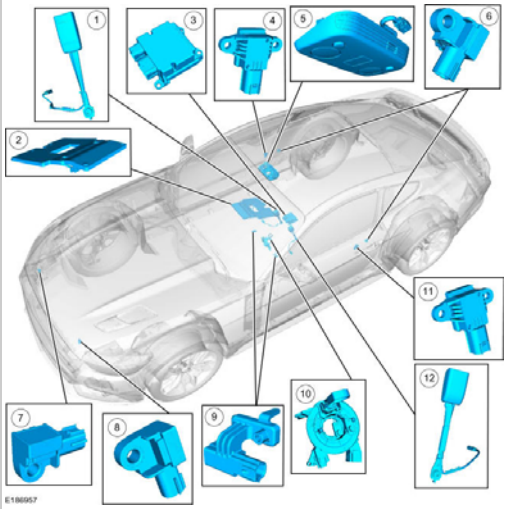
Check the seatbelt system for correct operation. Refer to: Seatbelt Systems .

Service Manual: SUPPLEMENTAL RESTRAINT SYSTEM

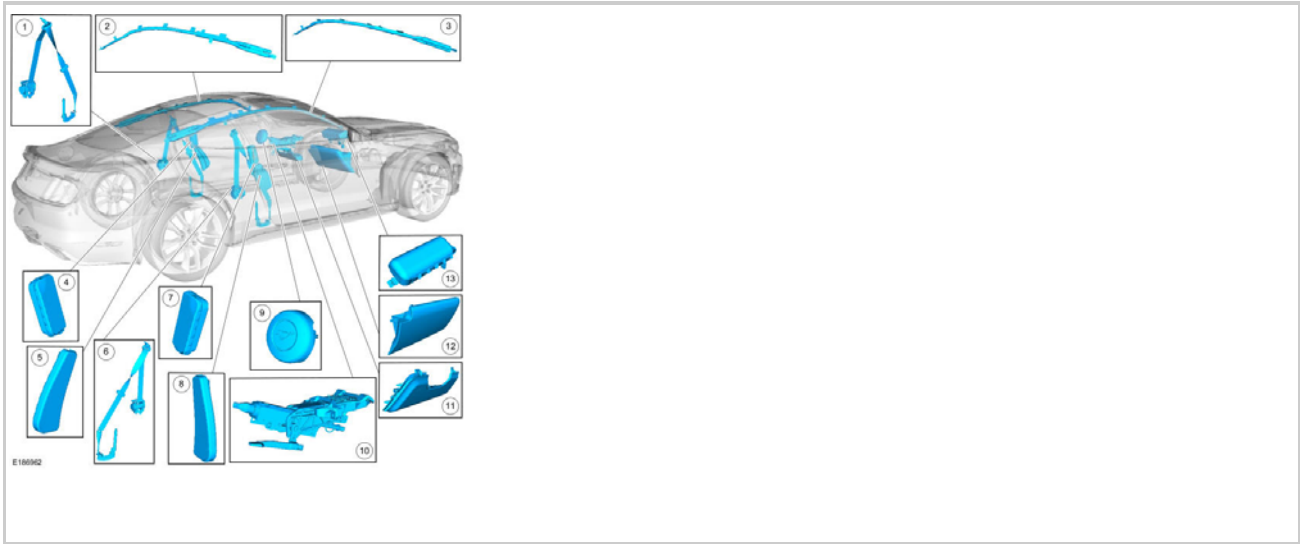
DESCRIPTION AND OPERATION > AIRBAG AND SEATBELT PRETENSIONER

SUPPLEMENTAL RESTRAINT SYSTEM (SRS) - COMPONENT LOCATION

NOTE: LHD vehicle shown in illustration, RHD vehicle similar.



Item	Description
1	Front passenger safety belt buckle (includes buckle switch and Belt Tension Sensor (BTS))
2	OCSM (includes OCS sensor and gel-filled bladder)
3	RCM
4	Passenger front door side impact sensor
5	Overhead console (includes PAD indicator)
6	LH and RH C-pillar side impact sensors (coupe only)
7	RH front impact severity sensor
8	LH front impact severity sensor
9	Seat position sensors
10	Clockspring
11	Driver front door side impact sensor
12	Driver safety belt buckle (includes buckle switch)



Item	Description
1	Driver safety belt retractor (includes retractor pretensioner and anchor pretensioner)
2	LH side air curtain (coupe only)
3	RH side air curtain (coupe only)
4	Driver upper side airbag (convertible only)
5	Driver side airbag
6	Front passenger safety belt retractor (includes retractor pretensioner and anchor pretensioner)
7	Passenger upper side airbag (convertible only)
8	Passenger side airbag
9	Driver airbag
10	Deployable steering column
11	Driver knee airbag
12	Passenger knee airbag
13	Passenger airbag

DESCRIPTION AND OPERATION > AIRBAG AND SEATBELT PRETENSIONER SUPPLEMENTAL RESTRAINT SYSTEM (SRS) - OVERVIEW > OVERVIEW

The RCM continually receives and monitors inputs from the OCSM and various other hard-wired switches and sensors. If the RCM detects a sudden vehicle deceleration and/or lateral deceleration based on the information received from the various sensors, and determines that deployment is necessary, the RCM applies voltage and current to deploy the appropriate SRS components.

The SRS utilizes Connector Position Assurance (CPA) tabs on deployable component connectors. The tabs disengage the shorting bars of the deployable component from its electrical pins and keep the harness connector securely attached to the deployable component.

If the connector is attached to the deployable component yet the tab is not fully seated, the pins of the

connector still make contact with the deployable component pins. However, because the tab is not fully seated and the shorting bars are still applied to the deployable component pins, the RCM detects a fault (circuit resistance below threshold) during self-diagnostics when the vehicle is powered on (airbag warning indicator is illuminated).

DESCRIPTION AND OPERATION > AIRBAG AND SEATBELT PRETENSIONER SUPPLEMENTAL RESTRAINT SYSTEM (SRS) - SYSTEM OPERATION AND COMPONENT DESCRIPTION

System Operation

DESCRIPTION AND OPERATION > AIRBAG AND SEATBELT PRETENSIONER SUPPLEMENTAL RESTRAINT SYSTEM (SRS) - SYSTEM OPERATION AND COMPONENT DESCRIPTION > NETWORK MESSAGE CHART - SUPPLEMENTAL RESTRAINT SYSTEM (SRS)

Module Network Input Messages - RCM

Broadcast Message	Originating Module	Message Purpose
eCall confirmation	APIM	Used for SYNC® 911 Assist™ operation. Indicates whether eCall notification is in progress after an airbag deployment.
Ignition status	BCM	Used to qualify certain faults during RCM self-diagnostics.
Airbag warning indicator status	IPC	Confirms airbag warning indicator status to the RCM.
OCS vehicle calibration data	OCSM	Shares application-specific data for comparison purposes to make sure the correct OCSM and RCM are installed.
OCS fault status	OCSM	Indicates an OCS fault, if present.
OCS sensor data	OCSM	OCS sensor readings.
OCS serial number	OCSM	OCSM serial number.
Vehicle configuration data	BCM	Used for verifying vehicle configuration data.

DESCRIPTION AND OPERATION > AIRBAG AND SEATBELT PRETENSIONER SUPPLEMENTAL RESTRAINT SYSTEM (SRS) - SYSTEM OPERATION AND COMPONENT DESCRIPTION > NETWORK MESSAGE CHART - OCCUPANT

CLASSIFICATION SYSTEM (OCS)

Module Network Input Messages

Broadcast Message	Originating Module	Message Purpose
Front passenger safety belt buckle status	RCM	Used for determining passenger airbag disable status.
RCM serial number	RCM	RCM serial number.

DESCRIPTION AND OPERATION > AIRBAG AND SEATBELT PRETENSIONER SUPPLEMENTAL RESTRAINT SYSTEM (SRS) - SYSTEM OPERATION AND COMPONENT DESCRIPTION > SUPPLEMENTAL RESTRAINT SYSTEM

The SRS is controlled by the RCM, which continually monitors various inputs. When these inputs indicate a frontal or side crash, the RCM may deploy some components, based upon the severity of the crash and the sensor inputs.

Although some deployable devices may not have activated for all occupants during a crash, it does not mean that something is wrong with the SRS.

The RCM performs a self-test of the complete SRS during each startup. In addition to the self-test at start up, the RCM continuously monitors all of the SRS components and circuitry for correct operation.

Airbag Warning Indicator

The airbag warning indicator:

- proves out by lighting for 6 seconds and then turning off.
- flashes and/or illuminates based on the message the IPC receives from the RCM.
- illuminates if the IPC does not receive a message from the RCM.

When the ignition is turned ON during normal operation, the IPC illuminates the airbag warning indicator continuously for 6 seconds. If the SRS is free of faults, the airbag warning indicator turns off and remains off. If a SRS fault exists, the airbag warning indicator illuminates and remains illuminated for the rest of the ignition cycle. The RCM communicates with the IPC via the HS-CAN. The IPC illuminates the airbag warning indicator based on messaging from the RCM. The IPC also illuminates the airbag warning indicator if there is no communication between the RCM and IPC.

Event Notification Signal

The event notification feature provides other vehicle subsystems with information pertaining to SRS deployment or fuel cutoff status. When an impact occurs which exceeds a pre-determined threshold, the RCM sends a signal on a dedicated circuit to the BCM.

When the BCM receives the crash signal input, it initiates fuel cutoff to disable the fuel system.

After the fuel system is disabled, the vehicle can be re-started after carrying out the following steps:

a. Turn the ignition ON and wait 10 seconds.

b. Turn the ignition OFF.

c. Turn the ignition ON.

d. Turn the ignition OFF.

e. Turn the ignition ON.

Occupant Classification System (OCS)

The OCS classifies the size of the front passenger seat occupant and provides this information to the RCM.

Pressure is applied to the OCS bladder when weight of any occupant or object in the front passenger seat is present. The pressure is then transferred through a tube and sensed by the OCS pressure sensor within the OCSM. The OCSM sends information concerning the weight of any occupant or object on the front passenger seat to the RCM via the HS-CAN. The RCM uses this information when determining if the passenger airbag or side airbag needs to be deployed in the event of a crash.

The OCS is also used for operation of the passenger Belt-Minder®. For information about Belt-Minder®, Refer to: Seatbelt Systems - System Operation and Component Description .

To deactivate or reactivate the passenger Belt-Minder® feature, Refer to: Seatbelt Minder Deactivating/Activating .

Passenger Airbag Deactivation (PAD) Indicator

The RCM controls the PAD indicator through a direct, hard-wired connection, based on information provided by the OCS. The PAD indicator illuminates to indicate the passenger airbag is disabled. An exception to this is when the front passenger seat is determined to be empty and indication of a deactivated passenger airbag is not necessary. In all other cases, the PAD indicator is off when the passenger airbag is enabled.

The RCM briefly activates the PAD indicator to prove out the indicator function and verify proper functional operation of the PAD indicator to the front occupants.

The following table indicates the passenger airbag and PAD indicator status based on the size of the front passenger occupant.

Occupant Size	Passenger Safety Belt Buckle Status	Passenger Airbag Status	PAD Indicator Status
Empty	Unbuckled	Disabled	Unlit
Empty	Buckled	Disabled	Lit
Small	Buckled or Unbuckled	Disabled	Lit
Large	Buckled or Unbuckled	Enabled	Unlit

Airbag Second Stage Deployment Check

The driver and passenger front airbags each have 2 deployment stages. After an airbag deployment, it is possible that stage 1 has deployed and stage 2 has not. If a front airbag has deployed, the front airbag must be remotely deployed using the appropriate airbag disposal procedure to make sure both stages have been deployed. For information on driver airbag and/or passenger airbag remote deployment, Refer to: Pyrotechnic Device Disposal .

SOS Post-Crash Alert System™

The SOS Post-Crash Alert System™ is controlled by the BCM, but initiated by the RCM.

When a deployment or fuel cutoff event occurs, the RCM sends a message on the HS-CAN2 (via the GWM)

to the BCM. The BCM flashes the turn signal lamps and sounds the horn (except when 911 Assist™ is active) until it is turned off. The system can be turned off 10 seconds after a crash event by pressing the hazard switch. The BCM also unlocks the doors and illuminates the courtesy lamps after a crash event.

Vehicle Spin-out Detection

When internal RCM sensors detect that the vehicle has spun out, the ABS module receives this data on a dedicated HS-CAN and sends a message to the BCM on the HS-CAN2 (via the GWM). The BCM then activates the hazard warning flashers and displays a message in the IPC to indicate the hazard warning flashers are activated due to the spin-out.

Component Description

Front Impact Severity Sensor

The front impact severity sensors measure acceleration (g-rate) and are hardwired to the RCM. Mounting position and orientation is critical for correct operation of the front impact severity sensors.

Occupant Classification System (OCS)

The OCS is found only on the front passenger seat. The OCS classifies the size of the front passenger seat occupant.

The OCS is comprised of a silicone gel-filled bladder mounted between the seat cushion foam and pan, an OCSM which is mounted to the seat frame, and a pressure sensor that is internal to the OCSM. Pressure is applied to the OCS bladder when weight of any occupant or object in the front passenger seat is present. The pressure is then transferred through a tube and sensed by the OCS pressure sensor and OCSM. The components of an OCS bladder system (bladder, tube, and OCSM with integrated pressure sensor) are serviced as an assembly, and the OCS bladder system is serviced as a kit with the seat cushion and seat heater mat (if applicable).

The Belt Tension Sensor (BTS) is a Hall-effect sensor that modifies a reference voltage supplied by the OCSM. As the amount of tension applied to the belt varies, so does the voltage that returns to the OCSM. The Belt Tension Sensor (BTS) is part of the front passenger safety belt anchor and can only be serviced with the front passenger safety belt retractor and pretensioner.

Safety Belt Buckle Sensor

The safety belt buckles contain integrated sensors that are Hall-effect switches. The safety belt buckle sensors are serviced with the safety belt buckle.

Safety Belt Tension Sensor (BTS)

The safety Belt Tension Sensor (BTS) is a 3-wire Hall-effect sensor that is part of the front passenger safety belt buckle and cannot be serviced separately from the front passenger safety belt buckle assembly.

Seat Position Sensor

The seat position sensor is a Hall-effect sensor which indicates the position of the seat along the seat track. The sensor detects the presence of a shunt bracket on the track, indicating the seat has moved past a certain point in the adjustment range.

Side Impact Sensor - Front Door

The front door side impact sensors monitor air pressure within the door in order to detect certain crashes, such as a side impact. Mounting position and orientation is critical for correct operation of the front door side impact sensors.

Side Impact Sensor - Second Row (coupe only)

The second row side impact sensors measure acceleration (g-rate), and are hardwired to the RCM. Mounting position and orientation is critical for correct operation of the second row side impact sensors.

Deployable Steering Column

The deployable steering column includes a device that, once deployed, reduces the amount of force necessary to collapse the steering column during a crash event. The deployable device is activated by the RCM, depending on the driver seat position and the force of the crash. After deployment, a new steering column must be installed.

Driver Airbag

The driver airbag is a dual-stage airbag. Upon receiving a flow of current, it deploys at 1 of 2 different rates, depending upon vehicle impact severity and sensor input.

Driver Knee Airbag

The driver knee airbag is part of the steering column opening trim panel and deploys upon receiving current flow from the RCM.

Passenger Airbag

The passenger airbag is a dual-stage airbag which deploys at 1 of 2 different rates depending upon vehicle impact severity and sensor input.

Passenger Airbag Canister Vent

The passenger airbag canister vent is a deployable device that is part of the passenger airbag. Canister venting controls the inflation rate of the passenger airbag and the escape rate of gases from the airbag. The canister vent cannot be serviced separately from the passenger airbag.

Passenger Airbag Deactivation (PAD) Indicator

The PAD indicator is a LED which is hard-wired to the RCM. The PAD indicator is part of the overhead console and cannot be serviced separately.

Passenger Knee Airbag

The passenger knee airbag is part of the glovebox door and deploys upon receiving current flow from the RCM. The passenger knee airbag is only serviced with the glovebox.

Safety Belt Anchor and Pretensioner

The safety belt anchor pretensioner is a pyrotechnic device that removes excess of webbing slack from the safety belts when deployed. One is included as part of each front row outboard safety belt assembly and cannot be serviced separately.

To diagnose any pretensioner Diagnostic Trouble Codes (DTCs), Refer to: Airbag Supplemental Restraint System (SRS) .

Safety Belt Retractor and Pretensioner

The safety belt retractor and pretensioner is a pyrotechnic device that removes excess of webbing slack from the safety belts when deployed. The retractor and pretensioner are serviced together with the front row outboard safety belt assembly.

To diagnose any pretensioner Diagnostic Trouble Codes (DTCs), Refer to: Airbag Supplemental Restraint

System (SRS) .

For any concerns regarding safety belt retractor function, Refer to: Seatbelt Systems .

Side Air Curtain (coupe only)

The side air curtain is a single-stage airbag which is designed to protect the vehicle occupant(s) during certain side impact crashes.

Side Airbag

The side airbag is a single-stage airbag which is designed to provide protection for the seat occupant's torso. It deploys upon receipt of current flow during certain side impact crashes and is attached to the outboard side of each front seat. It is used in conjunction with the side air curtain or upper side airbag, depending on body style.

Upper Side Airbag (convertible only)

The upper side airbag is a single-stage airbag which is designed to provide protection for the seat occupant's head. It deploys upon receipt of current flow during certain side impact crashes and is attached to the outboard side of each front seat.

Clockspring

The clockspring allows for continuous electrical connections between the driver airbag and the RCM. A spiral-wound cable wraps around the center of the clockspring and as the steering wheel is turned, the spiral cable inside expands or contracts in diameter as the 2 halves of the clockspring turn.

Restraints Control Module (RCM)

NOTE: This vehicle may be equipped with SYNC®, which contains the 911 Assist™ option. Refer to the Owner's Literature for information about this feature.

The RCM monitors various sensor inputs and uses that data for controlling SRS outputs such as event notification function and airbag deployment.

The RCM includes a backup power supply. This feature provides sufficient backup power to deploy the airbags in the event the ignition circuit is lost or damaged during impact. The backup power supply depletes its stored energy approximately one minute after power and/or ground has been removed from the RCM.

The RCM requires PMI when being replaced. Refer to the diagnostic scan tool instructions to carry out PMI.

DIAGNOSIS AND TESTING > AIRBAG SUPPLEMENTAL RESTRAINT SYSTEM (SRS) > DTC CHART: RESTRAINT CONTROL MODULE (RCM)

Diagnostics in this service information assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

NOTE: Unlisted Diagnostic Trouble Codes (DTCs) are often retrieved as a result of incorrect repair procedures. Before attempting any repairs for unlisted Diagnostic Trouble Codes (DTCs), check the vehicle service history for recent repairs. For RCM Diagnostic Trouble Codes (DTCs) not listed in this chart,

- Repair all other RCM Diagnostic Trouble Codes (DTCs) before attempting to repair any Diagnostic Trouble Codes (DTCs) not listed in this chart.
- If no other RCM Diagnostic Trouble Codes (DTCs) are retrieved, CLEAR the RCM Diagnostic Trouble Codes (DTCs) and REPEAT the self-test. If the RCM Diagnostic Trouble Codes (DTCs) return, VERIFY that the RCM is the correct part number for the vehicle application, and INSTALL As-Built data following scan tool instructions under Module Programming > As-Built.

RCM DTC Chart

DTC	Description	Action
B0001:11	Driver Frontal Stage 1 Deployment Control: Circuit Short to Ground	REFER to: Pinpoint Test - DTC: A .
B0001:12	Driver Frontal Stage 1 Deployment Control: Circuit Short to Battery	REFER to: Pinpoint Test - DTC: A .
B0001:13	Driver Frontal Stage 1 Deployment Control: Circuit Open	REFER to: Pinpoint Test - DTC: A .
B0001:1A	Driver Frontal Stage 1 Deployment Control: Circuit Resistance Below Threshold	REFER to: Pinpoint Test - DTC: A .
B0001:2B	Driver Frontal Stage 1 Deployment Control: Signal Cross Coupled	REFER to: Pinpoint Test - DTC: AA .
B0001:4A	Driver Frontal Stage 1 Deployment Control: Incorrect Component Installed	REFER to: Pinpoint Test - DTC: AB .
B0002:11	Driver Frontal Stage 2 Deployment Control: Circuit Short to Ground	REFER to: Pinpoint Test - DTC: B .
B0002:12	Driver Frontal Stage 2 Deployment Control: Circuit Short to Battery	REFER to: Pinpoint Test - DTC: B .
B0002:13	Driver Frontal Stage 2 Deployment Control: Circuit Open	REFER to: Pinpoint Test - DTC: B .
B0002:1A	Driver Frontal Stage 2 Deployment Control: Circuit Resistance Below Threshold	REFER to: Pinpoint Test - DTC: B .
B0002:2B	Driver Frontal Stage 2 Deployment Control: Signal Cross Coupled	REFER to: Pinpoint Test - DTC: AA .
B0002:4A	Driver Frontal Stage 2 Deployment Control: Incorrect Component Installed	REFER to: Pinpoint Test - DTC: AB .
B0004:11	Driver Knee Bolster Deployment Control: Circuit Short to Ground	REFER to: Pinpoint Test - DTC: C .
B0004:12	Driver Knee Bolster Deployment Control: Circuit Short to Battery	REFER to: Pinpoint Test - DTC: C .
B0004:13	Driver Knee Bolster Deployment Control: Circuit Open	REFER to: Pinpoint Test - DTC: C .

B0004:1A	Driver Knee Bolster Deployment Control: Circuit Resistance Below Threshold	REFER to: Pinpoint Test - DTC: C .
B0004:2B	Driver Knee Bolster Deployment Control: Signal Cross Coupled	REFER to: Pinpoint Test - DTC: AA .
B0004:4A	Driver Knee Bolster Deployment Control: Incorrect Component Installed	REFER to: Pinpoint Test - DTC: AB .
B0005:11	Collapsible Steering Column Deployment Control: Circuit Short to Ground	REFER to: Pinpoint Test - DTC: D .
B0005:12	Collapsible Steering Column Deployment Control: Circuit Short to Battery	REFER to: Pinpoint Test - DTC: D .
B0005:13	Collapsible Steering Column Deployment Control: Circuit Open	REFER to: Pinpoint Test - DTC: D .
B0005:1A	Collapsible Steering Column Deployment Control: Circuit Resistance Below Threshold	REFER to: Pinpoint Test - DTC: D .
B0005:2B	Collapsible Steering Column Deployment Control: Signal Cross Coupled	REFER to: Pinpoint Test - DTC: AA .
B0005:4A	Collapsible Steering Column Deployment Control: Incorrect Component Installed	REFER to: Pinpoint Test - DTC: AB .
B0010:11	Passenger Frontal Stage 1 Deployment Control: Circuit Short to Ground	REFER to: Pinpoint Test - DTC: E .
B0010:12	Passenger Frontal Stage 1 Deployment Control: Circuit Short to Battery	REFER to: Pinpoint Test - DTC: E .
B0010:13	Passenger Frontal Stage 1 Deployment Control: Circuit Open	REFER to: Pinpoint Test - DTC: E .
B0010:1A	Passenger Frontal Stage 1 Deployment Control: Circuit Resistance Below Threshold	REFER to: Pinpoint Test - DTC: E .
B0010:2B	Passenger Frontal Stage 1 Deployment Control: Signal Cross Coupled	REFER to: Pinpoint Test - DTC: AA .
B0010:4A	Passenger Frontal Stage 1 Deployment Control: Incorrect Component Installed	REFER to: Pinpoint Test - DTC: AB .
B0011:11	Passenger Frontal Stage 2 Deployment Control: Circuit Short to Ground	REFER to: Pinpoint Test - DTC: F .

B0011:12	Passenger Frontal Stage 2 Deployment Control: Circuit Short to Battery	REFER to: Pinpoint Test - DTC: F .
B0011:13	Passenger Frontal Stage 2 Deployment Control: Circuit Open	REFER to: Pinpoint Test - DTC: F .
B0011:1A	Passenger Frontal Stage 2 Deployment Control: Circuit Resistance Below Threshold	REFER to: Pinpoint Test - DTC: F .
B0011:2B	Passenger Frontal Stage 2 Deployment Control: Signal Cross Coupled	REFER to: Pinpoint Test - DTC: AA .
B0011:4A	Passenger Frontal Stage 2 Deployment Control: Incorrect Component Installed	REFER to: Pinpoint Test - DTC: AB .
B0013:11	Passenger Knee Bolster Deployment Control: Circuit Short to Ground	REFER to: Pinpoint Test - DTC: G .
B0013:12	Passenger Knee Bolster Deployment Control: Circuit Short to Battery	REFER to: Pinpoint Test - DTC: G .
B0013:13	Passenger Knee Bolster Deployment Control: Circuit Open	REFER to: Pinpoint Test - DTC: G .
B0013:1A	Passenger Knee Bolster Deployment Control: Circuit Resistance Below Threshold	REFER to: Pinpoint Test - DTC: G .
B0013:2B	Passenger Knee Bolster Deployment Control: Signal Cross Coupled	REFER to: Pinpoint Test - DTC: AA .
B0013:4A	Passenger Knee Bolster Deployment Control: Incorrect Component Installed	REFER to: Pinpoint Test - DTC: AB .
B0050:11	Driver Seatbelt Sensor: Circuit Short to Ground	REFER to: Pinpoint Test - DTC: H .
B0050:12	Driver Seatbelt Sensor: Circuit Short to Battery	REFER to: Pinpoint Test - DTC: H .
B0050:13	Driver Seatbelt Sensor: Circuit Open	REFER to: Pinpoint Test - DTC: H .
B0050:1D	Driver Seatbelt Sensor: Circuit Current Out of Range	REFER to: Pinpoint Test - DTC: H .
B0050:2B	Driver Seatbelt Sensor: Signal Cross Coupled	REFER to: Pinpoint Test - DTC: AA .
B0050:4A	Driver Seatbelt Sensor: Incorrect Component Installed	REFER to: Pinpoint Test - DTC: AB .

B0052:11	Passenger Seatbelt Sensor: Circuit Short to Ground	REFER to: Pinpoint Test - DTC: I .
B0052:12	Passenger Seatbelt Sensor: Circuit Short to Battery	REFER to: Pinpoint Test - DTC: I .
B0052:13	Passenger Seatbelt Sensor: Circuit Open	REFER to: Pinpoint Test - DTC: I .
B0052:1D	Passenger Seatbelt Sensor: Circuit Current Out of Range	REFER to: Pinpoint Test - DTC: I .
B0052:2B	Passenger Seatbelt Sensor: Signal Cross Coupled	REFER to: Pinpoint Test - DTC: AA .
B0052:4A	Passenger Seatbelt Sensor: Incorrect Component Installed	REFER to: Pinpoint Test - DTC: AB .
B0070:11	Driver Seatbelt Pretensioner "A" Deployment Control: Circuit Short to Ground	REFER to: Pinpoint Test - DTC: J .
B0070:12	Driver Seatbelt Pretensioner "A" Deployment Control: Circuit Short to Battery	REFER to: Pinpoint Test - DTC: J .
B0070:13	Driver Seatbelt Pretensioner "A" Deployment Control: Circuit Open	REFER to: Pinpoint Test - DTC: J .
B0070:1A	Driver Seatbelt Pretensioner "A" Deployment Control: Circuit Resistance Below Threshold	REFER to: Pinpoint Test - DTC: J .
B0070:2B	Driver Seatbelt Pretensioner "A" Deployment Control: Signal Cross Coupled	REFER to: Pinpoint Test - DTC: AA .
B0070:4A	Driver Seatbelt Pretensioner "A" Deployment Control: Incorrect Component Installed	REFER to: Pinpoint Test - DTC: AB .
B0072:11	Passenger Seatbelt Pretensioner "A" Deployment Control: Circuit Short to Ground	REFER to: Pinpoint Test - DTC: K .
B0072:12	Passenger Seatbelt Pretensioner "A" Deployment Control: Circuit Short to Battery	REFER to: Pinpoint Test - DTC: K .
B0072:13	Passenger Seatbelt Pretensioner "A" Deployment Control: Circuit Open	REFER to: Pinpoint Test - DTC: K .
B0072:1A	Passenger Seatbelt Pretensioner "A" Deployment Control: Circuit Resistance Below Threshold	REFER to: Pinpoint Test - DTC: K .
B0072:2B	Passenger Seatbelt Pretensioner "A" Deployment Control: Signal Cross Coupled	REFER to: Pinpoint Test - DTC: AA .

B0072:4A	Passenger Seatbelt Pretensioner "A" Deployment Control: Incorrect Component Installed	REFER to: Pinpoint Test - DTC: AB .
B007E:11	Driver Seatbelt Pretensioner "C" Deployment Control: Circuit Short to Ground	REFER to: Pinpoint Test - DTC: L .
B007E:12	Driver Seatbelt Pretensioner "C" Deployment Control: Circuit Short to Battery	REFER to: Pinpoint Test - DTC: L .
B007E:13	Driver Seatbelt Pretensioner "C" Deployment Control: Circuit Open	REFER to: Pinpoint Test - DTC: L .
B007E:1A	Driver Seatbelt Pretensioner "C" Deployment Control: Circuit Resistance Below Threshold	REFER to: Pinpoint Test - DTC: L .
B007E:2B	Driver Seatbelt Pretensioner "C" Deployment Control: Signal Cross Coupled	REFER to: Pinpoint Test - DTC: AA .
B007E:4A	Driver Seatbelt Pretensioner "C" Deployment Control: Incorrect Component Installed	REFER to: Pinpoint Test - DTC: AB .
B007F:11	Passenger Seatbelt Pretensioner "C" Deployment Control: Circuit Short to Ground	REFER to: Pinpoint Test - DTC: M .
B007F:12	Passenger Seatbelt Pretensioner "C" Deployment Control: Circuit Short to Battery	REFER to: Pinpoint Test - DTC: M .
B007F:13	Passenger Seatbelt Pretensioner "C" Deployment Control: Circuit Open	REFER to: Pinpoint Test - DTC: M .
B007F:1A	Passenger Seatbelt Pretensioner "C" Deployment Control: Circuit Resistance Below Threshold	REFER to: Pinpoint Test - DTC: M .
B007F:2B	Passenger Seatbelt Pretensioner "C" Deployment Control: Signal Cross Coupled	REFER to: Pinpoint Test - DTC: AA .
B007F:4A	Passenger Seatbelt Pretensioner "C" Deployment Control: Incorrect Component Installed	REFER to: Pinpoint Test - DTC: AB .
B0080:4A	Driver Seatbelt Load Limiter Deployment Control: Incorrect Component Installed	REFER to: Pinpoint Test - DTC: AB .
B00A0:09	Occupant Classification System: Component Failures	REFER to: Pinpoint Test - DTC: N .
B00A0:4A	Occupant Classification System: Incorrect Component Installed	REFER to: Pinpoint Test - DTC: N .

B00A0:63	Occupant Classification System: Circuit / Component Protection Time-Out	REFER to: Pinpoint Test - DTC: N .
B00A0:64	Occupant Classification System: Signal Plausibility Failure	REFER to: Pinpoint Test - DTC: N .
B00A0:68	Occupant Classification System: Event Information	REFER to: Pinpoint Test - DTC: N .
B00B5:11	Driver Seat Track Position Restraints Sensor: Circuit Short to Ground	REFER to: Pinpoint Test - DTC: O .
B00B5:12	Driver Seat Track Position Restraints Sensor: Circuit Short to Battery	REFER to: Pinpoint Test - DTC: O .
B00B5:13	Driver Seat Track Position Restraints Sensor: Circuit Open	REFER to: Pinpoint Test - DTC: O .
B00B5:1D	Driver Seat Track Position Restraints Sensor: Circuit Current Out of Range	REFER to: Pinpoint Test - DTC: O .
B00B5:2B	Driver Seat Track Position Restraints Sensor: Signal Cross Coupled	REFER to: Pinpoint Test - DTC: AA .
B00B5:4A	Driver Seat Track Position Restraints Sensor: Incorrect Component Installed	REFER to: Pinpoint Test - DTC: AB .
B00C5:11	Passenger Seat Track Position Restraints Sensor: Circuit Short to Ground	REFER to: Pinpoint Test - DTC: P .
B00C5:12	Passenger Seat Track Position Restraints Sensor: Circuit Short to Battery	REFER to: Pinpoint Test - DTC: P
B00C5:13	Passenger Seat Track Position Restraints Sensor: Circuit Open	REFER to: Pinpoint Test - DTC: P .
B00C5:1D	Passenger Seat Track Position Restraints Sensor: Circuit Current Out of Range	REFER to: Pinpoint Test - DTC: P .
B00C5:2B	Passenger Seat Track Position Restraints Sensor: Signal Cross Coupled	REFER to: Pinpoint Test - DTC: AA .
B00C5:4A	Passenger Seat Track Position Restraints Sensor: Incorrect Component Installed	REFER to: Pinpoint Test - DTC: AB .
B00D5:11	Restraint System Passenger Disable Indicator: Circuit Short to Ground	REFER to: Pinpoint Test - DTC: AR .

B00D5:12	Restraint System Passenger Disable Indicator: Circuit Short to Battery	REFER to: Pinpoint Test - DTC: AR .
B00D5:13	Restraint System Passenger Disable Indicator: Circuit Open	REFER to: Pinpoint Test - DTC: AR .
B00D5:4A	Restraint System Passenger Disable Indicator: Incorrect Component Installed	REFER to: Pinpoint Test - DTC: AB .
B1193:00	Crash Event Storage Full and Locked: No Sub Type Information	This DTC indicates the vehicle has been in a crash. INSTALL a new RCM and impact sensors. REFER to: Inspection and Repair after a Supplemental Restraint System (SRS) Deployment .
B11CF:11	Passenger Frontal Airbag Canister Vent: Circuit Short to Ground	REFER to: Pinpoint Test - DTC: Q .
B11CF:12	Passenger Frontal Airbag Canister Vent: Circuit Short to Battery	REFER to: Pinpoint Test - DTC: Q .
B11CF:13	Passenger Frontal Airbag Canister Vent: Circuit Open	REFER to: Pinpoint Test - DTC: Q .
B11CF:1A	Passenger Frontal Airbag Canister Vent: Circuit Resistance Below Threshold	REFER to: Pinpoint Test - DTC: Q .
B11CF:2B	Passenger Frontal Airbag Canister Vent: Signal Cross Coupled	REFER to: Pinpoint Test - DTC: AA .
B11CF:4A	Passenger Frontal Airbag Canister Vent: Incorrect Component Installed	REFER to: Pinpoint Test - DTC: AB .
B11D8:12	Restraint Event Notification: Circuit Short to Battery	REFER to: Pinpoint Test - DTC: R .
B11D8:14	Restraint Event Notification: Circuit Short to Ground or Open	REFER to: Pinpoint Test - DTC: R .
B1404:11	Driver Side Airbag Deployment Control: Circuit Short to Ground	REFER to: Pinpoint Test - DTC: S .
B1404:12	Driver Side Airbag Deployment Control: Circuit Short to Battery	REFER to: Pinpoint Test - DTC: S .
B1404:13	Driver Side Airbag Deployment Control: Circuit Open	REFER to: Pinpoint Test - DTC: S .
B1404:1A	Driver Side Airbag Deployment Control: Circuit Resistance Below Threshold	REFER to: Pinpoint Test - DTC: S .
B1404:2B	Driver Side Airbag Deployment Control: Signal Cross Coupled	REFER to: Pinpoint Test - DTC: AA .

B1404:4A	Driver Side Airbag Deployment Control: Incorrect Component Installed	REFER to: Pinpoint Test - DTC: AB .
B1405:11	Driver Side Curtain Deployment Control 1: Circuit Short to Ground	For coupe. REFER to: Pinpoint Test - DTC: T, Coupe . For convertible. REFER to: Pinpoint Test - DTC: AN, Convertible .
B1405:12	Driver Side Curtain Deployment Control 1: Circuit Short to Battery	For coupe. REFER to: Pinpoint Test - DTC: T, Coupe . For convertible. REFER to: Pinpoint Test - DTC: AN, Convertible .
B1405:13	Driver Side Curtain Deployment Control 1: Circuit Open	For coupe. REFER to: Pinpoint Test - DTC: T, Coupe . For convertible. REFER to: Pinpoint Test - DTC: AN, Convertible .
B1405:1A	Driver Side Curtain Deployment Control 1: Circuit Resistance Below Threshold	For coupe. REFER to: Pinpoint Test - DTC: T, Coupe . For convertible. REFER to: Pinpoint Test - DTC: AN, Convertible .
B1405:2B	Driver Side Curtain Deployment Control 1: Signal Cross Coupled	REFER to: Pinpoint Test - DTC: AA .
B1405:4A	Driver Side Curtain Deployment Control 1: Incorrect Component Installed	REFER to: Pinpoint Test - DTC: AB .
B1407:11	Passenger Side Airbag Deployment Control: Circuit Short to Ground	REFER to: Pinpoint Test - DTC: U .
B1407:12	Passenger Side Airbag Deployment Control: Circuit Short to Battery	REFER to: Pinpoint Test - DTC: U .
B1407:13	Passenger Side Airbag Deployment Control: Circuit Open	REFER to: Pinpoint Test - DTC: U .
B1407:1A	Passenger Side Airbag Deployment Control: Circuit Resistance Below Threshold	REFER to: Pinpoint Test - DTC: U .
B1407:2B	Passenger Side Airbag Deployment Control: Signal Cross Coupled	REFER to: Pinpoint Test - DTC: AA .
B1407:4A	Passenger Side Airbag Deployment Control: Incorrect Component Installed	REFER to: Pinpoint Test - DTC: AB .
B1408:11	Passenger Side Curtain Deployment Control 1: Circuit Short to Ground	For coupe. REFER to: Pinpoint Test - DTC: V, Coupe . For convertible. REFER to: Pinpoint Test - DTC: AO,

		Convertible .
B1408:12	Passenger Side Curtain Deployment Control 1: Circuit Short to Battery	For coupe. REFER to: Pinpoint Test - DTC: V, Coupe . For convertible. REFER to: Pinpoint Test - DTC: AO, Convertible .
B1408:13	Passenger Side Curtain Deployment Control 1: Circuit Open	For coupe. REFER to: Pinpoint Test - DTC: V, Coupe . For convertible. REFER to: Pinpoint Test - DTC: AO, Convertible .
B1408:1A	Passenger Side Curtain Deployment Control 1: Circuit Resistance Below Threshold	For coupe. REFER to: Pinpoint Test - DTC: V, Coupe . For convertible. REFER to: Pinpoint Test - DTC: AO, Convertible .
B1408:2B	Passenger Side Curtain Deployment Control 1: Signal Cross Coupled	REFER to: Pinpoint Test - DTC: AA .
B1408:4A	Passenger Side Curtain Deployment Control 1: Incorrect Component Installed	REFER to: Pinpoint Test - DTC: AB .
B1413:11	Driver Frontal Restraints Sensor: Circuit Short to Ground	REFER to: Pinpoint Test - DTC: W .
B1413:4A	Driver Frontal Restraints Sensor: Incorrect Component Installed	REFER to: Pinpoint Test - DTC: AB .
B1413:81	Driver Frontal Restraints Sensor: Invalid Serial Data Received	INSTALL a new LH front impact severity sensor. REFER to: Front Impact Severity Sensor .
B1413:93	Driver Frontal Restraints Sensor: No Operation	REFER to: Pinpoint Test - DTC: W .
B1413:96	Driver Frontal Restraints Sensor: Component Internal Failure	INSTALL a new LH front impact severity sensor. REFER to: Front Impact Severity Sensor .
B1414:11	Driver Side Restraints Sensor 1: Circuit Short to Ground	For coupe. REFER to: Pinpoint Test - DTC: X, Coupe . For convertible. REFER to: Pinpoint Test - DTC: AP, Convertible .
B1414:4A	Driver Side Restraints Sensor 1: Incorrect Component Installed	REFER to: Pinpoint Test - DTC: AB .
B1414:81	Driver Side Restraints Sensor 1: Invalid Serial Data Received	INSTALL a new driver door side impact sensor. REFER to: Front Door Side Impact Sensor .
B1414:93	Driver Side Restraints Sensor 1: No Operation	For coupe. REFER to: Pinpoint Test - DTC: X, Coupe .

		For convertible. REFER to: Pinpoint Test - DTC: AP, Convertible .
B1414:96	Driver Side Restraints Sensor 1: Component Internal Failure	INSTALL a new driver door side impact sensor. REFER to: Front Door Side Impact Sensor .
B1415:11	Driver Side Restraints Sensor 2: Circuit Short to Ground	REFER to: Pinpoint Test - DTC: Y, Coupe .
B1415:4A	Driver Side Restraints Sensor 2: Incorrect Component Installed	REFER to: Pinpoint Test - DTC: AB .
B1415:81	Driver Side Restraints Sensor 2: Invalid Serial Data Received	INSTALL a new LH B-pillar side impact sensor. REFER to: B-Pillar Side Impact Sensor .
B1415:93	Driver Side Restraints Sensor 2: No Operation	REFER to: Pinpoint Test - DTC: Y, Coupe .
B1415:96	Driver Side Restraints Sensor 2: Component Internal Failure	INSTALL a new LH B-pillar side impact sensor. REFER to: B-Pillar Side Impact Sensor .
B1417:11	Passenger Frontal Restraints Sensor: Circuit Short to Ground	REFER to: Pinpoint Test - DTC: Z .
B1417:4A	Passenger Frontal Restraints Sensor: Incorrect Component Installed	REFER to: Pinpoint Test - DTC: AB .
B1417:81	Passenger Frontal Restraints Sensor: Invalid Serial Data Received	INSTALL a new RH front impact severity sensor. REFER to: Front Impact Severity Sensor .
B1417:93	Passenger Frontal Restraints Sensor: No Operation	REFER to: Pinpoint Test - DTC: Z .
B1417:96	Passenger Frontal Restraints Sensor: Component Internal Failure	INSTALL a new RH front impact severity sensor. REFER to: Front Impact Severity Sensor .
B1418:11	Passenger Side Restraints Sensor 1: Circuit Short to Ground	For coupe. REFER to: Pinpoint Test - DTC: Y, Coupe . For convertible. REFER to: Pinpoint Test - DTC: AQ, Convertible .
B1418:4A	Passenger Side Restraints Sensor 1: Incorrect Component Installed	REFER to: Pinpoint Test - DTC: AB .
B1418:81	Passenger Side Restraints Sensor 1: Invalid Serial Data Received	INSTALL a new passenger door side impact sensor. REFER to: Front Door Side Impact Sensor .
B1418:93	Passenger Side Restraints Sensor 1: No Operation	For coupe. REFER to: Pinpoint Test - DTC: Y, Coupe . For convertible. REFER to: Pinpoint Test - DTC: AQ, Convertible .

B1418:96	Passenger Side Restraints Sensor 1: Component Internal Failure	INSTALL a new passenger door side impact sensor. REFER to: Front Door Side Impact Sensor .
B1419:11	Passenger Side Restraints Sensor 2: Circuit Short to Ground	REFER to: Pinpoint Test - DTC: X, Coupe .
B1419:4A	Passenger Side Restraints Sensor 2: Incorrect Component Installed	REFER to: Pinpoint Test - DTC: AB .
B1419:81	Passenger Side Restraints Sensor 2: Invalid Serial Data Received	INSTALL a new RH B-pillar side impact sensor. REFER to: B-Pillar Side Impact Sensor .
B1419:93	Passenger Side Restraints Sensor 2: No Operation	REFER to: Pinpoint Test - DTC: X, Coupe .
B1419:96	Passenger Side Restraints Sensor 2: Component Internal Failure	INSTALL a new RH B-pillar side impact sensor. REFER to: B-Pillar Side Impact Sensor .
B1424:11	Pedestrian Protection Sensor Center: Circuit Short to Ground	REFER to: Pinpoint Test - DTC: Y, Coupe .
B1424:4A	Pedestrian Protection Sensor Center: Incorrect Component Installed	REFER to: Pinpoint Test - DTC: AB .
B1427:11	Pedestrian Protection Sensor Driver Outer: Circuit Short to Ground	REFER to: Pinpoint Test - DTC: X, Coupe .
B1427:4A	Pedestrian Protection Sensor Driver Outer: Incorrect Component Installed	REFER to: Pinpoint Test - DTC: AB .
B142D:00	Pyrotechnic End of Life Activation Performed: No Sub Type Information	INSTALL a new RCM and CARRY OUT PMI. Use As-Built data when carrying out PMI for this DTC. REFER to: Restraints Control Module (RCM) .
B1469:4A	Unused Satellite Restraints Sensor 1: Incorrect Component Installed	REFER to: Pinpoint Test - DTC: AB .
B146A:4A	Unused Satellite Restraints Sensor 2: Incorrect Component Installed	REFER to: Pinpoint Test - DTC: AB .
B147D:11	Driver Side Hood Hinge Deployment Control: Circuit Short to Ground	Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering . DISCONNECT RCM C310A and C310B . MEASURE the resistance between RCM C310B-7 and ground, and between RCM C310B-8 and ground. TURN ON the ignition and MEASURE the voltage between RCM C310B-7 and ground, and between RCM C310B-8 and

		ground. If either resistance is less than 10, 000 ohms, or if any voltage is present on either circuit, REPAIR the circuit(s) as necessary. If the resistances are greater than 10, 000 ohms and there is not any voltage present, INSTALL a new RCM. REFER to: Restraints Control Module (RCM) .
B147D:4A	Driver Side Hood Hinge Deployment Control: Incorrect Component Installed	REFER to: Pinpoint Test - DTC: AB .
B147E:11	Passenger Side Hood Hinge Deployment Control: Circuit Short to Ground	Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering . DISCONNECT RCM C310A and C310B . MEASURE the resistance between RCM C310B-5 and ground, and between RCM C310B-6 and ground. TURN ON the ignition and MEASURE the voltage between RCM C310B-5 and ground, and between RCM C310B-6 and ground. If either resistance is less than 10, 000 ohms, or if any voltage is present on either circuit, REPAIR the circuit(s) as necessary. If the resistances are greater than 10, 000 ohms and there is not any voltage present, INSTALL a new RCM. REFER to: Restraints Control Module (RCM) .
B147E:4A	Passenger Side Hood Hinge Deployment Control: Incorrect Component Installed	REFER to: Pinpoint Test - DTC: AB .
B14EB:11	Pedestrian Protection Sensor Passenger Outer: Circuit Short to Ground	REFER to: Pinpoint Test - DTC: X, Coupe .
B14EB:4A	Pedestrian Protection Sensor Passenger Outer: Incorrect Component Installed	REFER to: Pinpoint Test - DTC: AB .
C0061:68	Lateral Acceleration Sensor: Event Information	REFER to: Pinpoint Test - DTC: AC .
C0062:68	Longitudinal Acceleration Sensor: Event Information	REFER to: Pinpoint Test - DTC: AC .
C0063:68	Yaw Rate Sensor: Event Information	REFER to: Pinpoint Test - DTC: AC .

C0064:68	Roll Rate Sensor: Event Information	REFER to: Pinpoint Test - DTC: AC .
C0065:68	Vertical Acceleration Sensor: Event Information	REFER to: Pinpoint Test - DTC: AC .
U0100:00	Lost Communication with ECM/PCM A: No Sub Type Information	REFER to: Pinpoint Test - DTC: AD .
U0140:00	Lost Communication with Body Control Module: No Sub Type Information	REFER to: Pinpoint Test - DTC: AE .
U0154:00	Lost Communication with Restraints Occupation Classification System Module: No Sub Type Information	REFER to: Pinpoint Test - DTC: AF .
U0155:00	Lost Communication with Instrument Panel Cluster (IPC) Control Module: No Sub Type Information	REFER to: Pinpoint Test - DTC: AG .
U0253:00	Lost Communication With Accessory Protocol Interface Module: No Sub Type Information	REFER to: Pinpoint Test - DTC: AH .
U0300:00	Internal Control Module Software Incompatibility: No Sub Type Information	CARRY OUT PMI. RETRIEVE RCM Diagnostic Trouble Codes (DTCs). If RCM DTC U0300:00 is retrieved on-demand during self-test, INSTALL a new RCM. REFER to: Restraints Control Module (RCM) .
U0401:00	Invalid Data Received From ECM/PCM A: No Sub Type Information	*NOTE: This DTC sets in a module that is reporting a missing or invalid message from another module on the data bus. The module that reports the fault is not the problem module. Do not install a new RCM as part of the repair unless directed to do so in a pinpoint test.* CHECK for additional RCM and PCM Diagnostic Trouble Codes (DTCs). DIAGNOSE and REPAIR any Diagnostic Trouble Codes (DTCs) that are retrieved. For RCM Diagnostic Trouble Codes (DTCs). REFER to the DTC Chart: Restraint Control Module (RCM) . To diagnose PCM Diagnostic Trouble Codes (DTCs), Refer to the appropriate Engine article for the

		procedure.
U0422:00	Invalid Data Received From Body Control Module: No Sub Type Information	*NOTE: This DTC sets in a module that is reporting a missing or invalid message from another module on the data bus. The module that reports the fault is not the problem module. Do not install a new RCM as part of the repair unless directed to do so in a pinpoint test.* CHECK for additional RCM and BCM Diagnostic Trouble Codes (DTCs). DIAGNOSE and REPAIR any Diagnostic Trouble Codes (DTCs) that are retrieved. For RCM Diagnostic Trouble Codes (DTCs). REFER to the DTC Chart: Restraint Control Module (RCM) . For BCM Diagnostic Trouble Codes (DTCs). REFER to: Body Control Module (BCM)).
U0422:81	Invalid Data Received From Body Control Module: Invalid Serial Data Received	*NOTE: This DTC sets in a module that is reporting a missing or invalid message from another module on the data bus. The module that reports the fault is not the problem module. Do not install a new RCM as part of the repair unless directed to do so in a pinpoint test.* CHECK for additional RCM and BCM Diagnostic Trouble Codes (DTCs). DIAGNOSE and REPAIR any Diagnostic Trouble Codes (DTCs) that are retrieved. For RCM Diagnostic Trouble Codes (DTCs). REFER to the DTC Chart: Restraint Control Module (RCM) . For BCM Diagnostic Trouble Codes (DTCs). REFER to: Body Control Module (BCM) .
U0554:00	Invalid Data Received From Accessory Protocol Interface	CHECK for additional RCM and APIM Diagnostic Trouble Codes

	Module: No Sub Type Information	(DTCs). For RCM Diagnostic Trouble Codes (DTCs). REFER to the DTC Chart: Restraint Control Module (RCM) . For APIM Diagnostic Trouble Codes (DTCs), Refer to the appropriate Information and Entertainment System article for the procedure.
U0557:82	Invalid Data Received From Front Controls Interface Module "A": No Sub Type Information	CHECK for additional RCM and FCIM Diagnostic Trouble Codes (DTCs). For RCM Diagnostic Trouble Codes (DTCs), RETURN to the beginning of this chart. For FCIM Diagnostic Trouble Codes (DTCs), Refer to the appropriate Information and Entertainment System article for the procedure.
U2100:00	Initial Configuration Not Complete: No Sub Type Information	CHECK vehicle history for recent service actions related to this module. This DTC sets due to incomplete or improper PMI procedures. If there have been recent service actions with this module, REPEAT the PMI procedure as directed by the diagnostic scan tool using As-Built data.
U2101:00	Control Module Configuration Incompatible: No Sub Type Information	CARRY OUT PMI using As-Built data. RETRIEVE RCM Diagnostic Trouble Codes (DTCs). If RCM DTC U2101:00 is retrieved on-demand, INSTALL a new RCM. Use As-Built data when carrying out PMI for this DTC. REFER to: Restraints Control Module (RCM) .
U2200:00	Control Module Configuration Memory Corrupt: No Sub Type Information	INSTALL a new RCM. Use As-Built data when CARRYING OUT PMI during the RCM installation. REFER to: Restraints Control Module (RCM) .
U2300:55	Central Configuration: Not Configured	REFER to: Pinpoint Test - DTC: AI .
U2300:64	Central Configuration: Signal Plausibility Failure	REFER to: Pinpoint Test - DTC: AI .
U3000:46	Control Module: Calibration / Parameter Memory Failure	INSTALL a new RCM. Use As-Built data when CARRYING OUT PMI during the RCM installation. REFER to: Restraints Control Module (RCM) .

U3000:49	Control Module: Internal Electronic Failure	INSTALL a new RCM. Using a diagnostic scan tool, CARRY OUT RCM PMI. If DTC U2200:00 is also present, USE As-Built data when CARRYING OUT PMI during the RCM installation. REFER to: Restraints Control Module (RCM) .
U3003:16	Battery Voltage: Circuit Voltage Below Threshold	REFER to: Pinpoint Test - DTC: AJ .
U3003:17	Battery Voltage: Circuit Voltage Above Threshold	REFER to: Pinpoint Test - DTC: AJ .

DIAGNOSIS AND TESTING > AIRBAG SUPPLEMENTAL RESTRAINT SYSTEM (SRS) > DTC CHART: OCCUPANT CLASSIFICATION SYSTEM MODULE (OCSM)

Diagnostics in this service information assume a certain skill level and knowledge of Ford-specific diagnostic practice. REFER to: Diagnostic Methods .

OCSM DTC Chart

DTC	Description	Action
B0061:11	Passenger Seatbelt Tension Sensor: Circuit Short To Ground	REFER to: Pinpoint Test - DTC: AK .
B0061:12	Passenger Seatbelt Tension Sensor: Circuit Short To Battery	REFER to: Pinpoint Test - DTC: AK .
B0061:13	Passenger Seatbelt Tension Sensor: Circuit Open	REFER to: Pinpoint Test - DTC: AK .
B0061:49	Passenger Seatbelt Tension Sensor: Internal Electronic Failure	REFER to: Pinpoint Test - DTC: AK .
B0061:64	Passenger Seatbelt Tension Sensor: Signal Plausibility Failure	REFER to: Pinpoint Test - DTC: AK .
B00C0:11	Passenger Seat Occupant Classification Sensor "A": Circuit Short to Ground	INSPECT the OCS for any damage and for correct installation. If damage is found, REPAIR the root cause of the damage and INSTALL a new OCS, as necessary. REFER to: Occupant Classification System (OCS) Sensor . If any installation concerns are found, CORRECT the OCS installation, referring to the OCS Removal and Installation procedure as needed to make sure the sensor hose is free from kinks and correctly route. REFER to:

		Occupant Classification System (OCS) Sensor . If no damage or installation concerns are found, INSTALL a new OCS. REFER to: Occupant Classification System (OCS) Sensor .
B00C0:12	Passenger Seat Occupant Classification Sensor "A": Circuit Short to Battery	INSTALL a new OCS sensor. REFER to: Occupant Classification System (OCS) Sensor .
B00C0:16	Passenger Seat Occupant Classification Sensor "A": Circuit Voltage Below Threshold	INSTALL a new OCS sensor. REFER to: Occupant Classification System (OCS) Sensor .
B00C0:49	Passenger Seat Occupant Classification Sensor "A": Internal Electronic Failure	INSTALL a new OCS sensor. REFER to: Occupant Classification System (OCS) Sensor .
B00C0:7B	Passenger Seat Occupant Classification Sensor "A": Low Fluid Level	INSPECT the OCS for any damage and for correct installation. If damage is found, REPAIR the root cause of the damage and INSTALL a new OCS, as necessary. REFER to: Occupant Classification System (OCS) Sensor . If any installation concerns are found, CORRECT the OCS installation, referring to the OCS Removal and Installation procedure as needed to make sure the sensor hose is correctly route. REFER to: Occupant Classification System (OCS) Sensor . If no damage or installation concerns are found, INSTALL a new OCS. REFER to: Occupant Classification System (OCS) Sensor .
B00C2:11	Passenger Seat Occupant Classification Sensor "C": Circuit Short to Ground	REFER to: Pinpoint Test - DTC: AL .
B00C2:12	Passenger Seat Occupant Classification Sensor "C": Circuit Short to Battery	REFER to: Pinpoint Test - DTC: AL .
B1193:00	Crash Event Storage Full and Locked: No Sub Type Information	CLEAR the OCSM Diagnostic Trouble Codes (DTCs) and REPEAT the self-test. If DTC B1193:00 returns, INSTALL a new OCS sensor. INSTALL a new OCS sensor. REFER to: Occupant Classification System (OCS)

		Sensor .
U0100:00	Lost Communication with ECM/PCM A: No Sub Type Information	REFER to: Pinpoint Test - DTC: AD .
U0151:00	Lost Communication with Restraints Control Module: No Sub Type Information	REFER to: Pinpoint Test - DTC: AM .
U0401:00	Invalid Data Received from ECM/PCM A: No Sub Type Information	CARRY OUT the PCM self-test. REFER to the appropriate service information. Refer to the appropriate Engine article for the procedure.
U3000:41	Control Module: General Checksum Failure	INSTALL a new OCS sensor. REFER to: Occupant Classification System (OCS) Sensor .
U3000:42	Control Module: General Memory Failure	INSTALL a new OCS sensor. REFER to: Occupant Classification System (OCS) Sensor .
U3000:46	Control Module: Calibration / Parameter Memory Failure	INSTALL a new OCS sensor. REFER to: Occupant Classification System (OCS) Sensor .
U3000:54	Control Module: Missing Calibration	Using a diagnostic scan tool, CARRY OUT the OCS Reset. FOLLOW all instructions on the diagnostic scan tool. If the OCS Reset was not successful, VERIFY correct installation of the OCS. VERIFY the pressure sensor hose is correctly routed and CORRECT the installation as necessary. REPEAT the self-test. If DTC U3000:54 is still present, INSTALL a new OCS sensor. REFER to: Occupant Classification System (OCS) Sensor).
U3003:16	Battery Voltage: Circuit Voltage Below Threshold	REFER to: Pinpoint Test - DTC: AJ .
U3003:17	Battery Voltage: Circuit Voltage Above Threshold	REFER to: Pinpoint Test - DTC: AJ .

DIAGNOSIS AND TESTING > AIRBAG SUPPLEMENTAL RESTRAINT SYSTEM (SRS) > DTC CHART: BODY CONTROL MODULE (BCM)

Diagnostics in this service information assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

OCSM DTC Chart

DTC	Description	Action
B11D8:01	Restraint Event Notification: General Electrical Failure	CARRY OUT the RCM self-test. DIAGNOSE and REPAIR the RCM Diagnostic Trouble Codes (DTCs). REFER to DTC Chart: Restraint Control Module (RCM) .
All other BCM Diagnostic Trouble Codes (DTCs)	-	REFER to: Body Control Module (BCM) .

DIAGNOSIS AND TESTING > AIRBAG SUPPLEMENTAL RESTRAINT SYSTEM (SRS) > SYMPTOM CHART(S)

Symptom Chart: Supplemental Restraint System

Diagnostics in this service information assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

Symptom Chart

Condition	Possible Sources	Actions
A module does not respond to the diagnostic scan tool	Fuse Diagnostic scan tool DLC Wiring, terminals or connectors Module	REFER to: MODULE COMMUNICATIONS NETWORK .
An audible tone sounds within 60 seconds of ignition ON	SRS fault or airbag warning indicator fault	CARRY OUT the RCM and IPC self-tests. For RCM Diagnostic Trouble Codes (DTCs). REFER to DTC Chart: Restraint Control Module (RCM) . For IPC Diagnostic Trouble Codes (DTCs). REFER to: Instrumentation, Message Center and Warning Chimes .
The airbag indicator is flashing	SRS fault	CARRY OUT the RCM and OCSM self tests. REFER to DTC Chart: Restraint Control Module (RCM) or REFER to DTC Chart: Occupant Classification System Module (OCSM) .
The airbag warning indicator is illuminated continuously	Fuse Wiring, terminals or connectors IPC RCM or OCSM	CARRY OUT the RCM and OCSM self tests. REFER to DTC Chart: Restraint Control Module (RCM) or REFER to DTC Chart: Occupant Classification System Module (OCSM) . If no Diagnostic Trouble Codes (DTCs) were retrieved from the RCM or OCSM. REFER to: Instrumentation, Message Center and Warning Chimes .

		If the OCSM or RCM does not respond to the diagnostic scan tool. REFER to: MODULE COMMUNICATIONS NETWORK .

DIAGNOSIS AND TESTING > PINPOINT TEST - DTC: A > B0001:11, B0001:12, B0001:13 AND B0001:1A

Refer to Supplemental Restraint System for schematic and connector information.

Normal Operation and Fault Conditions

The RCM continuously monitors the driver airbag stage 1 circuits for the following faults:

- Resistance out of range
- Unexpected voltage
- Short to ground
- Faulted driver airbag

If a fault is detected, the RCM stores DTC B0001:11, B0001:12, B0001:13 or B0001:1A in memory and sends a message to the IPC to illuminate the airbag warning indicator.

The RCM analyzes the deployment loop resistance to determine if a fault exists. The value displayed in the PID is the deployment loop resistance measured by the RCM. If the value displayed is lower or higher than the desired range (refer to diagram below in illustration), the RCM can set a DTC. As the deployment loop resistance drifts farther outside the desired range, the chance for a DTC increases. Small variations in resistance can occur due to the effect of road vibrations on terminal fit. Crimps and terminals can be affected by stress and harness movement and can cause an increase in resistance due to wire strain. These variables can result in an intermittent fault. For this reason, the test requires the PID value to be within the desired range before the fault is considered repaired, regardless if the module is reporting an on-demand DTC at the time of diagnosis. Following this direction helps make sure that minor changes in resistance do not create a repeat concern. This test uses process of elimination to diagnose each part of the deployment loop circuit including:

- Wiring
- Connections
- Clockspring
- Driver airbag
- RCM



DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B0001:11	Driver Frontal Stage 1 Deployment Control: Circuit Short to Ground	A fault is indicated when the RCM senses a short to ground on either driver airbag stage 1 circuit for more than 6 seconds.
B0001:12	Driver Frontal Stage 1 Deployment Control: Circuit Short to Battery	A fault is indicated when the RCM senses a short to voltage on either driver airbag stage 1 circuit for more than 6 seconds.
B0001:13	Driver Frontal Stage 1 Deployment Control: Circuit Open	A fault is indicated when the RCM measures more than the desired resistance range between driver airbag stage 1 circuits for more than 6 seconds.
B0001:1A	Driver Frontal Stage 1 Deployment Control: Circuit Resistance Below Threshold	A fault is indicated when the RCM measures less than the desired resistance range between driver airbag stage 1 circuits for more than 6 seconds.

Possible Sources

- Wiring, terminals or connectors
- Clockspring
- Driver airbag
- RCM

PINPOINT TEST A : B0001:11, B0001:12, B0001:13 AND B0001:1A

WARNING: Incorrect repair techniques or actions can cause an accidental Supplemental Restraint System (SRS) deployment. Never compromise or depart from these instructions. Failure to precisely follow all instructions could result in serious personal injury from an accidental deployment.

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may cause damage to the connector.

NOTE: Most faults are due to connector and/or wiring concerns. Carry out a thorough inspection and verification before proceeding with the pinpoint test.

NOTE: Only disconnect or reconnect SRS components when instructed to do so within a pinpoint test step. Failure to follow this instruction may result in incorrect

diagnosis of the SRS.

NOTE: Always make sure the correct SRS component is being installed. Parts released for other vehicles may not be compatible even if they appear physically similar. Check the part number listed in the Ford parts catalog or equivalent to make sure the correct component is being installed. If an incorrect SRS component is installed, Diagnostic Trouble Codes (DTCs) may set.

NOTE: The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

A1 RETRIEVE RCM (RESTRAINTS CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

WARNING: Before beginning any service procedure in this service information, refer to Safety Warnings in GENERAL INFORMATION . Failure to follow this instruction may result in serious personal injury.

REFER to: Pyrotechnic Device Health and Safety Precautions .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B0001:11, B0001:12, B0001:13 or B0001:1A retrieved on-demand during self-test?

Yes	This fault cannot be cleared until it is corrected and the DTC is no longer retrieved on-demand during self-test. If DTC U3003:16 or U3003:17 is retrieved on-demand, DIAGNOSE those Diagnostic Trouble Codes (DTCs) first. REFER to: Pinpoint Test - DTC: AJ . If DTC U3003:16 or U3003:17 is not retrieved on-demand during self-test, DIAGNOSE the driver airbag Diagnostic Trouble Codes (DTCs). For DTC B0001:13 or B0001:1A, GO to A2. For DTC B0001:11, GO to A12. For DTC B0001:12, GO to A15.
No	This is an intermittent fault when present as a Continuous Memory Diagnostic Trouble Code (CMDTC) only.If DTC U3003:16 or U3003:17 is retrieved on-demand, DIAGNOSE those Diagnostic Trouble Codes (DTCs) first. REFER to: Pinpoint Test - DTC: AJ . If DTC U3003:16 or U3003:17 is not retrieved on-demand during self-test, DIAGNOSE the driver airbag Continuous Memory Diagnostic Trouble Codes (CMDTCs). For DTC B0001:13 or B0001:1A, GO to A20. For DTC B0001:11, GO to A21. For DTC B0001:12, GO to A22.

A2 CHECK THE DRIVER FRONTAL STAGE 1 DEPLOYMENT CONTROL RESISTANCE (DEPLOY_00_R) PID (PARAMETER IDENTIFICATION)

Using a diagnostic scan tool, view RCM Parameter Identifications (PIDs).

Monitor and record the resistance value displayed by the DEPLOY_00_R PID.

Does the PID value read between 1.62 and 4.46 ohms?

Yes	GO to A19

No	GO to A3

A3 CHECK THE DRIVER FRONTAL STAGE 1 DEPLOYMENT CONTROL RESISTANCE (DEPLOY_00_R) PID (PARAMETER IDENTIFICATION) WHILE CARRYING OUT THE HARNESS TEST

Remove the steering column shrouds to access the clockspring connectors. REFER to: Steering Column Shrouds .

While monitoring the DEPLOY_00_R PID, carry out the harness test of the driver airbag circuits and accessible connectors (including any inline connectors) by wiggling and flexing the wire harness, connectors, tilting and rotating the steering wheel frequently. Record the resistance value indicated by the PID.

Does the PID value read between 1.62 and 4.46 ohms while carrying out the harness test?

Yes	DEPOWER the SRS. REFER to: Supplemental Restraint System (SRS) Depowering . REPAIR the connector, terminals or wire harness or INSTALL a new clockspring as needed. REFER to: Clockspring . Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A24.

No	For PID value less than 1.62 ohms, GO to A4. For PID value greater than 4.46 ohms, GO to A8.

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the reported fault changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A4 CHECK THE DRIVER FRONTAL STAGE 1 DEPLOYMENT CONTROL DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (LOW RESISTANCE INDICATED)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Remove the driver airbag. REFER to: Driver Airbag .

Repower the SRS. Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

DIAGNOSTIC TIP: When viewing Diagnostic Trouble Codes (DTCs) with the driver airbag disconnected, open circuit faults are normally retrieved on stages 1 and 2.

Did the on-demand DTC change from B0001:1A to B0001:13?

Yes	GO to A17

No	GO to A5

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the reported fault changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A5 CHECK THE DRIVER FRONTAL STAGE 1 DEPLOYMENT CONTROL DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (LOW RESISTANCE INDICATED) (CLOCKSPRING DISCONNECTED)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Clockspring C218A .

Repower the SRS. Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

DIAGNOSTIC TIP: When viewing Diagnostic Trouble Codes (DTCs) with the clockspring disconnected, open circuit faults are normally retrieved on stages 1 and 2.

Did the on-demand DTC change from B0001:1A to B0001:13?

Yes	GO to A18

No	GO to A6

A6 CHECK FOR A SHORT BETWEEN DRIVER AIRBAG STAGE 1 CIRCUITS

Ignition OFF.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C218A-11	Ω	C218A-12

Is the resistance greater than 10, 000 ohms?

Yes	GO to A19

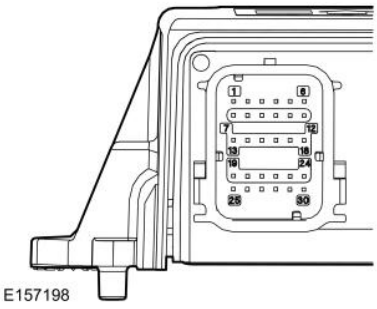
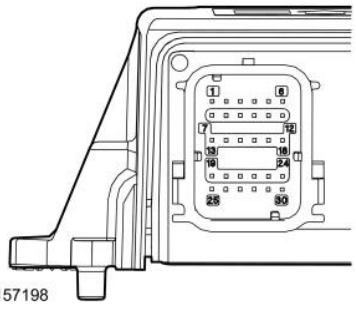
No	GO to A7

A7 CHECK THE RCM (RESTRAINTS CONTROL MODULE) FOR LOW RESISTANCE

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect RCM C310A and C310B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
 E157198 C310A, pin 29, component side	Ω	 E157198 C310A, pin 30, component side

Is the resistance greater than 10, 000 ohms?

Yes	REPAIR the driver airbag stage 1 circuit(s) for a short together. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A24.

No	GO to A19

A8 CHECK THE DRIVER AIRBAG STAGE 1 CIRCUITS FOR AN OPEN

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Remove the driver airbag. REFER to: Driver Airbag .

Disconnect RCM C310A and C310B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C310A-29	Ω	C216A-1
C310A-30	Ω	C216A-2

Are the resistances less than 1 ohm?

Yes	GO to A10

No	GO to A9

A9 CHECK THE DRIVER AIRBAG STAGE 1 CIRCUITS FOR AN OPEN (CLOCKSPRING DISCONNECTED)

Disconnect Clockspring C218A .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C310A-29	Ω	C218A-12
C310A-30	Ω	C218A-11

Are the resistances less than 0.5 ohm?

Yes	GO to A18

No	REPAIR the circuit(s). Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A24.

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the reported fault changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A10 CHECK THE DRIVER AIRBAG STAGE 1 DEPLOYMENT CONTROL DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (OPEN INDICATED)

Connect RCM C310A and C310B .

Connect a fused jumper wire:

Lead 1	Measurement / Action	Lead 2
C216A-1		C216A-2

Repower the SRS. Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

DIAGNOSTIC TIP: When viewing Diagnostic Trouble Codes (DTCs) with the driver airbag stage 1 circuits shorted together, a low resistance fault is normally retrieved on stage 1. Stage 2 shows an open circuit fault because the driver airbag is disconnected.

Was DTC B0001:1A retrieved on-demand during self-test?

Yes	REMOVE the fused jumper wire and GO to A17

No	REMOVE the fused jumper wire and GO to A11

A11 CHECK THE DRIVER AIRBAG STAGE 1 DEPLOYMENT CONTROL DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (OPEN INDICATED)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Clockspring C218A .

Connect a fused jumper wire:

Lead 1	Measurement / Action	Lead 2
C218A-11		C218A-12

Repower the SRS. Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

DIAGNOSTIC TIP: When viewing Diagnostic Trouble Codes (DTCs) with the driver airbag stage 1 circuits shorted together, a low resistance fault is normally retrieved on stage 1. Stage 2 shows an open circuit fault because the clockspring is disconnected.

Was DTC B0001:1A retrieved on-demand during self-test?

Yes	REMOVE the fused jumper wire and GO to A18

No	REMOVE the fused jumper wire and GO to A19

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the reported fault changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A12 CHECK THE DRIVER FRONTAL STAGE 1 DEPLOYMENT CONTROL DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (SHORT TO GROUND INDICATED)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Remove the driver airbag. REFER to: Driver Airbag .

Repower the SRS. Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

DIAGNOSTIC TIP: When viewing Diagnostic Trouble Codes (DTCs) with the driver airbag disconnected, open circuit faults are normally retrieved on stages 1 and 2.

Did the on-demand DTC change from B0001:11 to B0001:13?

Yes	GO to A17

No	GO to A13

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the reported fault changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A13 CHECK THE DRIVER FRONTAL STAGE 1 DEPLOYMENT CONTROL DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (SHORT TO GROUND INDICATED) (CLOCKSPRING DISCONNECTED)

Ignition OFF.

Disconnect Clockspring C218A .

Remove the steering column shrouds to access the clockspring connector. REFER to: Steering Column Shrouds .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

DIAGNOSTIC TIP: When viewing Diagnostic Trouble Codes (DTCs) with the clockspring disconnected, open circuit faults are normally retrieved on stages 1 and 2.

Did the on-demand DTC change from B0001:11 to B0001:13?

Yes	GO to A18

No	GO to A14

A14 CHECK THE DRIVER AIRBAG STAGE 1 CIRCUITS FOR A SHORT TO GROUND

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect RCM C310A and C310B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C218A-11	Ω	Ground
C218A-12	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to A19

No	Due to the shorting bar feature in the RCM electrical connector, the fault can exist in either circuit. Do not remove or defeat the shorting bar. REPAIR the circuit(s). Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A24.

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the reported fault changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A15 CHECK THE DRIVER FRONTAL STAGE 1 DEPLOYMENT CONTROL DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (SHORT TO BATTERY INDICATED) (CLOCKSPRING DISCONNECTED)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Remove the driver airbag. REFER to: Driver Airbag .

Disconnect Clockspring C218A .

Remove the steering column shrouds to access the clockspring connector. REFER to: Steering Column Shrouds .

Repower the SRS. Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

DIAGNOSTIC TIP: When viewing Diagnostic Trouble Codes (DTCs) with the clockspring disconnected, open circuit faults are normally retrieved on stages 1 and 2.

Did the on-demand DTC change from B0001:12 to B0001:13?

Yes	GO to A18

No	GO to A16

A16 CHECK THE DRIVER AIRBAG STAGE 1 CIRCUITS FOR A SHORT TO VOLTAGE

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect RCM C310A and C310B .

Repower the SRS. Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering).

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C218A-11		Ground
C218A-12		Ground

Is any voltage present?

Yes	Due to the shorting bar feature in the RCM electrical connector, the fault can exist in either circuit. Do not remove or defeat the shorting bar. REPAIR the circuit(s). Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A24.

No	GO to A19

NOTE: Make sure all SRS components and the RCM electrical connectors are connected before carrying out the self-test. If not, Diagnostic Trouble Codes (DTCs) will be recorded.

A17 CONFIRM THE DRIVER AIRBAG FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Prior to reconnecting any previously disconnected SRS component:

inspect connector(s) (including any inline connectors) for pushed-out, loose or spread terminals and loose or frayed wire connections at terminals.

inspect wire harness for any damaged, pinched, cut or pierced wires.

inspect RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

inspect Driver Airbag C216A and make sure the Connector Position Assurance (CPA) tabs are not broken and the clip is not damaged.

repair any concerns found. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

Install the driver airbag. REFER to: Driver Airbag .

Repower the SRS. Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was the original DTC retrieved on-demand during self-test?

Yes	INSTALL a new driver airbag. REFER to: Driver Airbag . GO to A24.

No	In the process of diagnosing the fault, the fault condition has become intermittent. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. For DTC B0001:13 or B0001:1A, GO to A20. For DTC B0001:11, GO to A21. For DTC B0001:12, GO to A22.

NOTE: Make sure all SRS components and the RCM electrical connectors are connected before carrying out the self-test. If not, Diagnostic Trouble Codes (DTCs) will be recorded.

A18 CONFIRM THE CLOCKSPRING FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Prior to reconnecting any previously disconnected SRS component:

inspect connector(s) (including any inline connectors) for pushed-out, loose or spread terminals and loose or frayed wire connections at terminals.

inspect wire harness for any damaged, pinched, cut or pierced wires.

inspect RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

repair any concerns found. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

Connect Clockspring C218A .

Install the driver airbag. REFER to: Driver Airbag .

Connect RCM C310A and C310B (if previously disconnected).

Repower the SRS. Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was the original DTC retrieved on-demand during self-test?

Yes	INSTALL a new clockspring. REFER to: Clockspring . GO to A24.

No	In the process of diagnosing the fault, the fault condition has become intermittent. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. For DTC B0001:13 or B0001:1A, GO to A20. For DTC B0001:11, GO to A21. For DTC B0001:12, GO to A22.

NOTE: Make sure all SRS components and the RCM electrical connectors are connected before carrying out the self-test. If not, Diagnostic Trouble Codes (DTCs) will

be recorded.

A19 CONFIRM THE RCM (RESTRAINTS CONTROL MODULE) FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Prior to reconnecting any previously disconnected SRS component:

inspect connector(s) (including any inline connectors) for pushed-out, loose or spread terminals and loose or frayed wire connections at terminals.

inspect wire harness for any damaged, pinched, cut or pierced wires.

inspect RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

repair any concerns found. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

Install the driver airbag (if previously removed. REFER to: Driver Airbag .

Connect Clockspring C218A (if previously disconnected).

Connect RCM C310A and C310B (if previously disconnected).

Repower the SRS. Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was the original DTC retrieved on-demand during self-test?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new RCM. REFER to: Restraints Control Module (RCM) . GO to A24.

No	In the process of diagnosing the fault, the fault condition has become intermittent. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. For DTC B0001:13 or B0001:1A, GO to A20. For DTC B0001:11, GO to A21. For DTC B0001:12, GO to A22.

A20 CHECK THE DRIVER FRONTAL STAGE 1 DEPLOYMENT CONTROL RESISTANCE (DEPLOY_00_R) PID (PARAMETER IDENTIFICATION) FOR AN INTERMITTENT LOW RESISTANCE OR OPEN CIRCUIT FAULT

Ignition OFF.

Remove the steering column shrouds to access the clockspring connector. REFER to: Steering Column Shrouds .

Ignition ON.

Using a diagnostic scan tool, view RCM Parameter Identifications (PIDs).

While monitoring the DEPLOY_00_R PID, attempt to recreate the fault by wiggling connectors (including any inline connectors) and flexing the wire harness, tilting and rotating the steering wheel frequently. Record the resistance value indicated by the PID.

Does the PID value read between 1.62 and 4.46 ohms?

Yes	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A23.

No	If the driver airbag PID indicates incorrect resistance only when the steering wheel is rotated, INSTALL a new clockspring. REFER to: Clockspring . For all other faults, DEPOWER the SRS and REPAIR as necessary. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A24.

A21 CHECK THE DRIVER FRONTAL STAGE 1 DEPLOYMENT CONTROL CIRCUITS FOR AN INTERMITTENT SHORT TO GROUND FAULT

Ignition OFF.

Remove the steering column shrouds to access the clockspring connector. REFER to: Steering Column Shrouds .

Ignition ON.

Attempt to recreate the fault by wiggling connectors (including any inline connectors) and flexing the wire harness, tilting and rotating the steering wheel frequently.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B0001:11 retrieved on-demand during self-test?

Yes	DEPOWER the SRS and REPAIR as necessary. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A24.

No	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A23.

A22 CHECK THE DRIVER FRONTAL STAGE 1 DEPLOYMENT CONTROL CIRCUITS FOR AN INTERMITTENT SHORT TO BATTERY FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Remove the driver airbag. REFER to: Driver Airbag .

Remove the steering column shrouds to access the clockspring connector. REFER to: Steering Column Shrouds .

Repower the SRS. Do not prove out the SRS at this time. REFER to: Supplemental Restraint

System (SRS) Repowering .

Ignition ON.

Attempt to recreate the fault by wiggling connectors (including any inline connectors) and flexing the wire harness, tilting and rotating the steering wheel frequently.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B0001:12 retrieved on-demand during self-test?

Yes	DEPOWER the SRS and REPAIR as necessary. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A24.

No	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A23.

A23 CHECK THE HARNESS AND CONNECTORS

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Remove the driver airbag. REFER to: Driver Airbag .

Inspect connector(s) (including any inline connectors) for corrosion, loose or spread terminals and loose or frayed wire connections at terminals.

Inspect wire harness for any damage, pinched, cut or pierced wires.

Inspect RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

Inspect Driver Airbag C216A Connector Position Assurance (CPA) tab to verify that it is correctly seated and free of damage.

Were any concerns found?

Yes	REPAIR as necessary. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A24.

No	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A24.

A24 CHECK FOR ADDITIONAL SRS (SUPPLEMENTAL RESTRAINT SYSTEM) DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition OFF.

Reconnect all SRS components (if previously disconnected).

If previously directed to depower the SRS, repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

NOTE: When selecting Restraints from the Self Test menu, DTCs are retrieved from the RCM and OCSM.

Using a diagnostic scan tool, perform

Restraints self-test.

Are any RCM and/or OCSM Diagnostic Trouble Codes (DTCs) retrieved on-demand during self-test?

Yes	Do not clear any Diagnostic Trouble Codes (DTCs) until all Diagnostic Trouble Codes (DTCs) have been resolved. DIAGNOSE and REPAIR the RCM and/or OCSM Diagnostic Trouble Codes (DTCs). REFER to: Airbag Supplemental Restraint System (SRS) .

No	The repair is complete. RETURN the vehicle to the customer.

DIAGNOSIS AND TESTING > PINPOINT TEST - DTC: B > B0002:11, B0002:12, B0002:13 AND B0002:1A

Refer to Supplemental Restraint System for schematic and connector information.

Normal Operation and Fault Conditions

The RCM continuously monitors the driver airbag stage 2 circuits for the following faults:

- Resistance out of range
- Unexpected voltage
- Short to ground
- Faulted driver airbag

If a fault is detected, the RCM stores DTC B0002:11, B0002:12, B0002:13 or B0002:1A in memory and sends a message to the IPC to illuminate the airbag warning indicator.

The RCM analyzes the deployment loop resistance to determine if a fault exists. The value displayed in the PID is the deployment loop resistance measured by the RCM. If the value displayed is lower or higher than the desired range (refer to diagram below in illustration), the RCM can set a DTC. As the deployment loop resistance drifts farther outside the desired range, the chance for a DTC increases. Small variations in resistance can occur due to the effect of road vibrations on terminal fit. Crimps and terminals can be affected by stress and harness movement and can cause an increase in resistance due to wire strain. These variables can result in an intermittent fault. For this reason, the test requires the PID value to be within the desired range before the fault is considered repaired, regardless if the module is reporting an on-demand DTC at the time of diagnosis. Following this direction helps make sure that minor changes in resistance do not create a repeat concern. This test uses process of elimination to diagnose each part of the deployment loop circuit including:

- Wiring
- Clockspring
- Driver airbag
- Connections
- RCM



DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B0002:11	Driver Frontal Stage 2 Deployment Control: Circuit Short to Ground	A fault is indicated when the RCM senses a short to ground on either driver airbag stage 2 circuit for more than 6 seconds.
B0002:12	Driver Frontal Stage 2 Deployment Control: Circuit Short to Battery	A fault is indicated when the RCM senses a short to voltage on either driver airbag stage 2 circuit for more than 6 seconds.
B0002:13	Driver Frontal Stage 2 Deployment Control: Circuit Open	A fault is indicated when the RCM measures more than the desired resistance range between driver airbag stage 2 circuits for more than 6 seconds.
B0002:1A	Driver Frontal Stage 2 Deployment Control: Circuit Resistance Below Threshold	A fault is indicated when the RCM measures less than the desired resistance range between driver airbag stage 2 circuits for more than 6 seconds.

Possible Sources

- Wiring, terminals or connectors
- Clockspring
- Driver airbag
- RCM

PINPOINT TEST A : B0002:11, B0002:12, B0002:13 AND B0002:1A

WARNING: Incorrect repair techniques or actions can cause an accidental Supplemental Restraint System (SRS) deployment. Never compromise or depart from

these instructions. Failure to precisely follow all instructions could result in serious personal injury from an accidental deployment.

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may cause damage to the connector.

NOTE: Most faults are due to connector and/or wiring concerns. Carry out a thorough inspection and verification before proceeding with the pinpoint test.

NOTE: Only disconnect or reconnect SRS components when instructed to do so within a pinpoint test step. Failure to follow this instruction may result in incorrect diagnosis of the SRS.

NOTE: Always make sure the correct SRS component is being installed. Parts released for other vehicles may not be compatible even if they appear physically similar. Check the part number listed in the parts catalog to make sure the correct component is being installed. If an incorrect SRS component is installed, Diagnostic Trouble Codes (DTCs) may set.

NOTE: The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

A1 RETRIEVE RCM (RESTRAINTS CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

WARNING: Before beginning any service procedure in this service information, refer to Safety Warnings in GENERAL INFORMATION . Failure to follow this instruction may result in serious personal injury.

REFER to: Pyrotechnic Device Health and Safety Precautions .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B0002:11, B0002:12, B0002:13 or B0002:1A retrieved on-demand during self-test?

Yes	This fault cannot be cleared until it is corrected and the DTC is no longer retrieved on-demand during self-test. If DTC U3003:16 or U3003:17 is retrieved on-demand, DIAGNOSE those Diagnostic Trouble Codes (DTCs) first. REFER to: Pinpoint Test - DTC: AJ . If DTC U3003:16 or U3003:17 is not retrieved on-demand during self-test, DIAGNOSE the driver airbag Diagnostic Trouble Codes (DTCs). For DTC B0002:13 or B0002:1A, GO to A2. For DTC B0002:11, GO to A11. For DTC B0002:12, GO to A14.

No	This is an intermittent fault when present as a Continuous Memory Diagnostic Trouble Code (CMDTC) only. If DTC U3003:16 or U3003:17 is retrieved on-demand, DIAGNOSE those Diagnostic Trouble Codes (DTCs) first. REFER to: Pinpoint Test - DTC: AJ . If DTC U3003:16 or U3003:17 is not retrieved on-demand during self-test, DIAGNOSE the driver airbag Continuous Memory Diagnostic Trouble Codes (CMDTCs). For DTC B0002:13 or B0002:1A, GO to A19. For DTC B0002:11, GO to A20. For DTC B0002:12, GO to A21.

A2 CHECK THE DRIVER FRONTAL STAGE 2 DEPLOYMENT CONTROL RESISTANCE (DEPLOY_01_R) PID (PARAMETER IDENTIFICATION)

Using a diagnostic scan tool, view RCM Parameter Identifications (PIDs).

Monitor and record the resistance value displayed by the DEPLOY_01_R PID.

Does the PID value read between 1.62 and 4.46 ohms?

Yes	GO to A18

No	GO to A3

A3 CHECK THE DRIVER FRONTAL STAGE 2 DEPLOYMENT CONTROL RESISTANCE (DEPLOY_01_R) PID (PARAMETER IDENTIFICATION) WHILE CARRYING OUT THE HARNESS TEST

Remove the steering column shrouds to access the clockspring connector. REFER to: Steering Column Shrouds .

While monitoring the DEPLOY_01_R PID, carry out the harness test of the driver airbag circuits and accessible connectors (including any inline connectors) by wiggling and flexing the wire harness, connectors, tilting and rotating the steering wheel frequently. Record the resistance value indicated by the PID.

Does the PID value read between 1.62 and 4.46 ohms while carrying out the harness test?

Yes	DEPOWER the SRS. REFER to: Supplemental Restraint System (SRS) Depowering . REPAIR the connector, terminals or wire harness or INSTALL a new clockspring as needed. REFER to: Clockspring . Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A23.

No	For PID value less than 1.62 ohms, GO to A4. For PID value greater than 4.46 ohms, GO to A7.

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the reported fault changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A4 CHECK THE DRIVER FRONTAL STAGE 2 DEPLOYMENT CONTROL DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (LOW RESISTANCE INDICATED)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Remove the driver airbag. REFER to: Driver Airbag .

Repower the SRS. Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

DIAGNOSTIC TIP: When viewing Diagnostic Trouble Codes (DTCs) with the driver airbag disconnected, open circuit faults are normally retrieved on stages 1 and 2.

Did the on-demand DTC change from B0002:1A to B0002:13?

Yes	GO to A16

No	GO to A5

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the reported fault changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A5 CHECK THE DRIVER FRONTAL STAGE 2 DEPLOYMENT CONTROL DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (LOW RESISTANCE INDICATED) (CLOCKSPRING DISCONNECTED)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Clockspring C218A .

Repower the SRS. Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

DIAGNOSTIC TIP: When viewing Diagnostic Trouble Codes (DTCs) with the driver airbag / clockspring disconnected, open circuit faults are normally retrieved on stages 1 and 2.

Did the on-demand DTC change from B0002:1A to B0002:13?

Yes	GO to A17

No	GO to A6

A6 CHECK FOR A SHORT BETWEEN DRIVER AIRBAG STAGE 2 CIRCUITS

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect RCM C310A and C310B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C218A-9	Ω	C218A-10

Is the resistance greater than 10, 000 ohms?

Yes	GO to A18

No	REPAIR the circuits. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A23.

A7 CHECK THE DRIVER AIRBAG STAGE 2 CIRCUITS FOR AN OPEN

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Remove the driver airbag. REFER to: Driver Airbag .

Disconnect RCM C310A and C310B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C310A-22	Ω	C216B-1
C310A-21	Ω	C216B-2

Are the resistances less than 1 ohm?

Yes	GO to A9

No	GO to A8

A8 CHECK THE DRIVER AIRBAG STAGE 2 CIRCUITS FOR AN OPEN (CLOCKSPRING DISCONNECTED)

Disconnect Clockspring C218A .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C310A-22	Ω	C218A-9
C310A-21	Ω	C218A-10

Are the resistances less than 0.5 ohm?

Yes	GO to A17

No	REPAIR the circuit(s). Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A23.

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the reported fault changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A9 CHECK THE DRIVER AIRBAG STAGE 2 DEPLOYMENT CONTROL DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (OPEN INDICATED)

Connect RCM C310A and C310B .

Connect a fused jumper wire:

Lead 1	Measurement / Action	Lead 2
C216B-1		C216B-2

Repower the SRS. Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

DIAGNOSTIC TIP: When viewing Diagnostic Trouble Codes (DTCs) with the driver airbag stage 2 circuits shorted together, a low resistance fault is normally retrieved on stage 2. Stage 1 shows an open circuit fault because the driver airbag is disconnected.

Was DTC B0002:1A retrieved on-demand during self-test?

Yes	REMOVE the fused jumper wire and GO to A16

No	REMOVE the fused jumper wire and GO to A10

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the reported fault changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A10 CHECK THE DRIVER AIRBAG STAGE 2 DEPLOYMENT CONTROL DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (OPEN INDICATED)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Clockspring C218A .

Connect a fused jumper wire:

Lead 1	Measurement / Action	Lead 2
C218A-9		C218A-10

Repower the SRS. Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

DIAGNOSTIC TIP: When viewing Diagnostic Trouble Codes (DTCs) with the driver airbag stage 2 circuits shorted together, a low resistance fault is normally retrieved on stage 2. Stage 1 shows an open circuit fault because the driver airbag is disconnected.

Was DTC B0002:1A retrieved on-demand during self-test?

Yes	REMOVE the fused jumper wire and GO to A17

No	REMOVE the fused jumper wire and GO to A18

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the reported fault changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A11 CHECK THE DRIVER FRONTAL STAGE 2 DEPLOYMENT CONTROL DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (SHORT TO GROUND INDICATED)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Remove the driver airbag. REFER to: Driver Airbag .

Repower the SRS. Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

DIAGNOSTIC TIP: When viewing Diagnostic Trouble Codes (DTCs) with the driver airbag disconnected, open circuit faults are normally retrieved on stages 1 and 2.

Did the on-demand DTC change from B0002:11 to B0002:13?

Yes	GO to A16

No	GO to A12

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the reported fault changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A12 CHECK THE DRIVER FRONTAL STAGE 2 DEPLOYMENT CONTROL DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (SHORT TO GROUND INDICATED) (CLOCKSPRING DISCONNECTED)

Ignition OFF.

Disconnect Clockspring C218A .

Remove the steering column shrouds to access the clockspring connectors. REFER to: Steering Column Shrouds .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

DIAGNOSTIC TIP: When viewing Diagnostic Trouble Codes (DTCs) with the clockspring disconnected, open circuit faults are normally retrieved on stages 1 and 2.

Did the on-demand DTC change from B0002:11 to B0002:13?

Yes	GO to A17

No	GO to A13

A13 CHECK THE DRIVER AIRBAG STAGE 2 CIRCUITS FOR A SHORT TO GROUND

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect RCM C310A and C310B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C218A-9	Ω	Ground
C218A-10	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to A18

No	REPAIR the circuit(s). Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A23.

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the reported fault changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A14 CHECK THE DRIVER FRONTAL STAGE 2 DEPLOYMENT CONTROL DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (SHORT TO BATTERY INDICATED) (CLOCKSPRING DISCONNECTED)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Remove the driver airbag. REFER to: Driver Airbag .

Disconnect Clockspring C218A .

Remove the steering column shrouds to access the clockspring connector. REFER to: Steering Column Shrouds .

Repower the SRS. Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

DIAGNOSTIC TIP: When viewing Diagnostic Trouble Codes (DTCs) with the clockspring disconnected, open circuit faults are normally retrieved on stages 1 and 2.

Did the on-demand DTC change from B0002:12 to B0002:13?

Yes	GO to A17

No	GO to A15

A15 CHECK THE DRIVER AIRBAG STAGE 2 CIRCUITS FOR A SHORT TO VOLTAGE

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect RCM C310A and C310B .

Repower the SRS. Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C218A-9		Ground

C218A-10		Ground

Is any voltage present?

Yes	REPAIR the circuit(s). Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A23.

No	GO to A18

NOTE: Make sure all SRS components and the RCM electrical connectors are connected before carrying out the self-test. If not, Diagnostic Trouble Codes (DTCs) will be recorded.

A16 CONFIRM THE DRIVER AIRBAG FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Prior to reconnecting any previously disconnected SRS component:

inspect connector(s) (including any inline connectors) for pushed-out, loose or spread terminals and loose or frayed wire connections at terminals.

inspect wire harness for any damaged, pinched, cut or pierced wires.

inspect RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

inspect Driver Airbag C216B and make sure the Connector Position Assurance (CPA) tabs are not broken and the clip is not damaged.

repair any concerns found. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

Connect Clockspring C218A (if previously disconnected).

Install the driver airbag. REFER to: Driver Airbag .

Repower the SRS. Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was the original DTC retrieved on-demand during self-test?

Yes	INSTALL a new driver airbag. REFER to: Driver Airbag . GO to A23.

No	In the process of diagnosing the fault, the fault condition has become intermittent. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. For DTC B0002:13 or B0002:1A, GO to A19. For DTC B0002:11,

	GO to A20. For DTC B0002:12, GO to A21.

NOTE: Make sure all SRS components and the RCM electrical connectors are connected before carrying out the self-test. If not, Diagnostic Trouble Codes (DTCs) will be recorded.

A17 CONFIRM THE CLOCKSPRING FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Prior to reconnecting any previously disconnected SRS component:

inspect connector(s) (including any inline connectors) for pushed-out, loose or spread terminals and loose or frayed wire connections at terminals.

inspect wire harness for any damaged, pinched, cut or pierced wires.

inspect RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

repair any concerns found. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

Connect Clockspring C218A .

Connect RCM C310A and C310B .

Install the driver airbag. REFER to: Driver Airbag .

Repower the SRS. Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was the original DTC retrieved on-demand during self-test?

Yes	INSTALL a new clockspring. REFER to: Clockspring . GO to A23.

No	In the process of diagnosing the fault, the fault condition has become intermittent. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. For DTC B0002:13 or B0002:1A, GO to A19. For DTC B0002:11, GO to A20. For DTC B0002:12, GO to A21.

NOTE: Make sure all SRS components and the RCM electrical connectors are connected before carrying out the self-test. If not, Diagnostic Trouble Codes (DTCs) will be recorded.

A18 CONFIRM THE RCM (RESTRAINTS CONTROL MODULE) FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Prior to reconnecting any previously disconnected SRS component:

inspect connector(s) (including any inline connectors) for pushed-out, loose or spread terminals and loose or frayed wire connections at terminals.

inspect wire harness for any damaged, pinched, cut or pierced wires.

inspect RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

repair any concerns found. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

Install the driver airbag (if previously removed. REFER to: Driver Airbag .

Connect Clockspring C218A (if previously disconnected).

Connect RCM C310A and C310B (if previously disconnected).

Repower the SRS. Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was the original DTC retrieved on-demand during self-test?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new RCM. REFER to: Restraints Control Module (RCM) . GO to A23.

No	In the process of diagnosing the fault, the fault condition has become intermittent. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. For DTC B0002:13 or B0002:1A, GO to A19. For DTC B0002:11, GO to A20. For DTC B0002:12, GO to A21.

A19 CHECK THE DRIVER FRONTAL STAGE 2 DEPLOYMENT CONTROL RESISTANCE (DEPLOY_01_R) PID (PARAMETER IDENTIFICATION) FOR AN INTERMITTENT LOW RESISTANCE OR OPEN CIRCUIT FAULT

Ignition OFF.

Remove the steering column shrouds to access the clockspring connector. REFER to: Steering Column Shrouds .

Ignition ON.

Using a diagnostic scan tool, view RCM Parameter Identifications (PIDs).

While monitoring the DEPLOY_01_R PID, attempt to recreate the fault by wiggling connectors (including any inline connectors) and flexing the wire harness, tilting and rotating the steering

wheel frequently. Record the resistance value indicated by the PID.

Does the PID value read between 1.62 and 4.46 ohms?

Yes	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A22.

No	If the driver airbag PID indicates incorrect resistance only when the steering wheel is rotated, INSTALL a new clockspring. REFER to: Clockspring . For all other faults, DEPOWER the SRS and REPAIR as necessary. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A23.

A20 CHECK THE DRIVER FRONTAL STAGE 2 DEPLOYMENT CONTROL CIRCUITS FOR AN INTERMITTENT SHORT TO GROUND FAULT

Ignition OFF.

Remove the steering column shrouds to access the clockspring connector. REFER to: Steering Column Shrouds .

Ignition ON.

Attempt to recreate the fault by wiggling connectors (including any inline connectors) and flexing the wire harness, tilting and rotating the steering wheel frequently.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B0002:11 retrieved on-demand during self-test?

Yes	DEPOWER the SRS and REPAIR as necessary. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A23.

No	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A22.

A21 CHECK THE DRIVER FRONTAL STAGE 2 DEPLOYMENT CONTROL CIRCUITS FOR AN INTERMITTENT SHORT TO BATTERY FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Remove the driver airbag. REFER to: Driver Airbag .

Remove the steering column shrouds to access the clockspring connector. REFER to: Steering Column Shrouds .

Repower the SRS. Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Attempt to recreate the fault by wiggling connectors (including any inline connectors) and flexing the wire harness, tilting and rotating the steering wheel frequently.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B0002:12 retrieved on-demand during self-test?

Yes	DEPOWER the SRS and REPAIR as necessary. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A23.

No	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A22.

A22 CHECK THE HARNESS AND CONNECTORS

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Remove the driver airbag. REFER to: Driver Airbag .

Inspect connector(s) (including any inline connectors) for corrosion, loose or spread terminals and loose or frayed wire connections at terminals.

Inspect wire harness for any damage, pinched, cut or pierced wires.

Inspect RCM C216B Connector Position Assurance (CPA) lever/lock for correct operation.

Inspect Driver Airbag C216B Connector Position Assurance (CPA) tab to verify that it is correctly seated and free of damage.

Were any concerns found?

Yes	REPAIR as necessary. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A23.

No	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A23.

A23 CHECK FOR ADDITIONAL SRS (SUPPLEMENTAL RESTRAINT SYSTEM) DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition OFF.

Reconnect all SRS components (if previously disconnected).

If previously directed to depower the SRS, repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

> *NOTE: When selecting Restraints from the Self Test menu, DTCs are retrieved from the RCM and OCSM.*

Using a diagnostic scan tool, perform

Restraints self-test.

Are any RCM and/or OCSM Diagnostic Trouble Codes (DTCs) retrieved on-demand during self-test?

Yes	Do not clear any Diagnostic Trouble Codes (DTCs) until all Diagnostic Trouble Codes (DTCs) have been resolve. REFER to: Airbag Supplemental Restraint System (SRS) .

No	The repair is complete. RETURN the vehicle to the customer.

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Refer to Supplemental Restraint System for schematic and connector information.

Normal Operation and Fault Conditions

The RCM continuously monitors the driver knee airbag circuits for the following faults:

- Resistance out of range
- Unexpected voltage
- Short to ground
- Faulted driver knee airbag

If a fault is detected, the RCM stores DTC B0004:11, B0004:12, B0004:13 or B0004:1A in memory and sends a message to the IPC to illuminate the airbag warning indicator.

The RCM analyzes the deployment loop resistance to determine if a fault exists. The value displayed in the PID is the deployment loop resistance measured by the RCM. If the value displayed is lower or higher than the desired range (refer to diagram below in illustration), the RCM can set a DTC. As the deployment loop resistance drifts farther outside the desired range, the chance for a DTC increases. Small variations in resistance can occur due to the effect of road vibrations on terminal fit. Crimps and terminals can be affected by stress and harness movement and can cause an increase in resistance due to wire strain. These variables can result in an intermittent fault. For this reason, the test requires the PID value to be within the desired range before the fault is considered repaired, regardless if the module is reporting an on-demand DTC at the time of diagnosis. Following this direction helps make sure that minor changes in resistance do not create a repeat concern. This test uses process of elimination to diagnose each part of the deployment loop circuit including:

- Wiring
- Connections
- Driver knee airbag

- RCM



DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B0004:11	Driver Knee Bolster Deployment Control: Circuit Short to Ground	A fault is indicated when the RCM senses a short to ground on either driver knee airbag circuit for more than 6 seconds.
B0004:12	Driver Knee Bolster Deployment Control: Circuit Short to Battery	A fault is indicated when the RCM senses a short to voltage on either driver knee airbag circuit for more than 6 seconds.
B0004:13	Driver Knee Bolster Deployment Control: Circuit Open	A fault is indicated when the RCM measures more than the desired resistance between the driver knee airbag circuits for more than 6 seconds.
B0004:1A	Driver Knee Bolster Deployment Control: Circuit Resistance Below Threshold	A fault is indicated when the RCM measures less than the desired resistance between the driver knee airbag circuits for more than 6 seconds.

Possible Sources

- Wiring, terminals or connectors
- Driver knee airbag
- RCM

PINPOINT TEST A : B0004:11, B0004:12, B0004:13 AND B0004:1A

WARNING: Incorrect repair techniques or actions can cause an accidental Supplemental Restraint System (SRS) deployment. Never compromise or depart from these instructions. Failure to precisely follow all instructions could result in serious personal injury from an accidental deployment.

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may cause damage to the connector.

NOTE: Most faults are due to connector and/or wiring concerns. Carry out a thorough inspection and verification before proceeding with the pinpoint test.

NOTE: Only disconnect or reconnect SRS components when instructed to do so within a pinpoint test step. Failure to follow this instruction may result in incorrect diagnosis of the SRS.

NOTE: Always make sure the correct SRS component is being installed. Parts released for other vehicles may not be compatible even if they appear physically similar. Check the part number listed in the Ford parts catalog to make sure the correct component is being installed. If an incorrect SRS component is installed, Diagnostic Trouble Codes (DTCs) may set.

NOTE: The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

A1 RETRIEVE RCM (RESTRAINTS CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

WARNING: Before beginning any service procedure in this service information, refer to Safety Warnings in GENERAL INFORMATION . Failure to follow this instruction may result in serious personal injury.

REFER to: Pyrotechnic Device Health and Safety Precautions .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B0004:11, B0004:12, B0004:13 and B0004:1A retrieved on-demand during self-test?

Yes	This fault cannot be cleared until it is corrected and the DTC is no longer retrieved on-demand during self-test. If DTC U3003:16 or U3003:17 is retrieved on-demand, DIAGNOSE those Diagnostic Trouble Codes (DTCs) first. REFER to: Pinpoint Test - DTC: AJ . If DTC U3003:16 or U3003:17 is not retrieved on-demand during self-test, DIAGNOSE the driver knee airbag Diagnostic Trouble Codes (DTCs). For DTC B0004:13 or B0004:1A, GO to A2. For DTC B0004:11, GO to A8. For DTC B0004:12, GO to A10.
No	This is an intermittent fault when present as a Continuous Memory Diagnostic Trouble Code (CMDTC) only. If DTC U3003:16 or U3003:17 is retrieved on-demand, DIAGNOSE those Diagnostic Trouble Codes (DTCs) first. REFER to: Pinpoint Test - DTC: AJ . If DTC U3003:16 or U3003:17 is not retrieved on-demand during self-test, DIAGNOSE the driver knee airbag Continuous Memory Diagnostic Trouble Codes (CMDTCs). For DTC B0004:13 or B0004:1A, GO to A13. For DTC B0004:11, GO to A14. For DTC B0004:12, GO to A15.

A2 CHECK THE DRIVER KNEE BOLSTER DEPLOYMENT CONTROL (DEPLOY_02_R) PID (PARAMETER IDENTIFICATION)

Using a diagnostic scan tool, view RCM Parameter Identifications (PIDs).

Monitor and record the resistance value displayed by the DEPLOY_02_R PID.

Does the PID value read between 1.44 and 3.52 ohms?

Yes	GO to A12

No	GO to A3

A3 CHECK THE DRIVER KNEE BOLSTER DEPLOYMENT CONTROL (DEPLOY_02_R) PID (PARAMETER IDENTIFICATION) WHILE CARRYING OUT THE HARNESS TEST

While monitoring the DEPLOY_02_R PID, carry out the harness test of the driver knee airbag circuits and accessible connectors (including any inline connectors) by wiggling and flexing the wire harness and connectors frequently. Record the resistance value indicated by the PID.

Does the PID value read between 1.44 and 3.52 ohms while carrying out the harness test?

Yes	DEPOWER the SRS and REPAIR the connector, terminals or wire harness as needed. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

No	For PID value less than 1.44 ohms, GO to A4. For PID value greater than 3.52 ohms, GO to A6.

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the reported fault changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A4 CHECK THE DRIVER KNEE AIRBAG DEPLOYMENT CONTROL DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (LOW RESISTANCE INDICATED)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Remove the driver knee airbag. REFER to: Driver Knee Airbag .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

DIAGNOSTIC TIP: When viewing Diagnostic Trouble Codes (DTCs) with the driver knee airbag

disconnected, an open circuit fault is normally retrieved.

Did the on-demand DTC change from B0004:1A to B0004:13?

Yes	GO to A11

No	GO to A5

A5 CHECK FOR A SHORT BETWEEN THE DRIVER KNEE AIRBAG CIRCUITS

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect RCM C310A and C310B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2432-3	Ω	C2432-4

Is the resistance greater than 10, 000 ohms?

Yes	GO to A12

No	REPAIR the circuit(s). Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

A6 CHECK THE DRIVER KNEE AIRBAG CIRCUITS FOR AN OPEN

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Remove the driver knee airbag. REFER to: Driver Knee Airbag .

Disconnect RCM C310A and C310B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C310A-7	Ω	C2432-3
C310A-8	Ω	C2432-4

Are the resistances less than 0.5 ohm?

Yes	GO to A7

No	REPAIR the circuits. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and

	connector information. GO to A17.

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the reported fault changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A7 CHECK THE DRIVER KNEE AIRBAG DEPLOYMENT CONTROL DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (OPEN INDICATED)

Connect RCM C310A and C310B .

Connect a fused jumper wire:

Lead 1	Measurement / Action	Lead 2
C2432-3		C2432-4

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

DIAGNOSTIC TIP: When viewing Diagnostic Trouble Codes (DTCs) with the driver knee airbag circuits shorted together, a low resistance fault is normally retrieved.

Did the on-demand DTC change from B0004:13 to B0004:1A?

Yes	REMOVE the fused jumper wire and GO to A11

No	REMOVE the fused jumper wire and GO to A12

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the reported fault changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A8 CHECK THE DRIVER KNEE AIRBAG DEPLOYMENT CONTROL DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (SHORT TO GROUND INDICATED)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Remove the driver knee airbag. REFER to: Driver Knee Airbag .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

DIAGNOSTIC TIP: When viewing Diagnostic Trouble Codes (DTCs) with the driver knee airbag disconnected, an open circuit fault is normally retrieved.

Did the on-demand DTC change from B0004:11 to B0004:13?

Yes	GO to A11

No	GO to A9

A9 CHECK THE DRIVER KNEE AIRBAG CIRCUITS FOR A SHORT TO GROUND

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect RCM C310A and C310B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2432-3	Ω	Ground
C2432-4	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to A12

No	REPAIR the circuit(s). Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

A10 CHECK THE DRIVER KNEE AIRBAG CIRCUITS FOR A SHORT TO VOLTAGE

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Remove the driver knee airbag. REFER to: Driver Knee Airbag .

Disconnect RCM C310A and C310B .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2432-3		Ground
C2432-4		Ground

Is any voltage present?

Yes	REPAIR the circuit(s). Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

No	GO to A12

NOTE: Make sure all SRS components and the RCM electrical connectors are connected before carrying out the self-test. If not, Diagnostic Trouble Codes (DTCs) will be recorded.

A11 CONFIRM THE DRIVER KNEE AIRBAG FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Prior to reconnecting any previously disconnected SRS component:

Inspect connector(s) (including any inline connectors) for pushed-out, loose or spread terminals and loose or frayed wire connections at terminals.

Inspect wire harness for any damaged, pinched, cut or pierced wires.

Inspect RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

Inspect Driver Knee Airbag C2432 and make sure the Connector Position Assurance (CPA) tabs are not broken and the clip is not damaged.

Repair any concerns found. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

Install the driver knee airbag. REFER to: Driver Knee Airbag .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was the original DTC retrieved on-demand during self-test?

Yes	INSTALL a new driver knee airbag. REFER to: Driver Knee Airbag . GO to A17.

No	In the process of diagnosing the fault, the fault condition has become intermittent. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. For DTC B0004:13 or B0004:1A, GO to A13. For DTC B0004:11, GO to A14. For DTC B0004:12, GO to A15.

NOTE: Make sure all SRS components and the RCM electrical connectors are connected before carrying out the self-test. If not, Diagnostic Trouble Codes (DTCs) will be recorded.

A12 CONFIRM THE RCM (RESTRAINTS CONTROL MODULE) FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Prior to reconnecting any previously disconnected SRS component:

Inspect connector(s) (including any inline connectors) for pushed-out, loose or spread terminals and loose or frayed wire connections at terminals.

Inspect wire harness for any damaged, pinched, cut or pierced wires.

Inspect RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

Repair any concerns found. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

Install the driver knee airbag (if previously removed. REFER to: Driver Knee Airbag .

Connect RCM C310A and C310B (if previously disconnected).

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was the original DTC retrieved on-demand during self-test?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new RCM. REFER to: Restraints Control Module (RCM) . GO to A17.

No	In the process of diagnosing the fault, the fault condition has become intermittent. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. For DTC B0004:13 or B0004:1A, GO to A13. For DTC B0004:11, GO to A14. For DTC B0004:12, GO to A15.

A13 CHECK THE DRIVER KNEE BOLSTER DEPLOYMENT CONTROL (DEPLOY_02_R) PID

(PARAMETER IDENTIFICATION) FOR AN INTERMITTENT LOW RESISTANCE OR OPEN CIRCUIT FAULT

Using a diagnostic scan tool, view RCM Parameter Identifications (PIDs).

While monitoring the DEPLOY_02_R PID, attempt to recreate the fault by wiggling connectors (including any inline connectors) and flexing the wire harness frequently. Record the resistance value indicated by the PID.

Does the PID value read between 1.44 and 3.52 ohms?

Yes	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A16.

No	Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering . REPAIR as necessary. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

A14 CHECK THE DRIVER KNEE AIRBAG DEPLOYMENT CONTROL CIRCUITS FOR AN INTERMITTENT SHORT TO GROUND FAULT

Attempt to recreate the fault by wiggling connectors (including any inline connectors) and flexing the wire harness frequently.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B0004:11 retrieved on-demand during self-test?

Yes	DEPOWER the SRS and REPAIR as necessary. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

No	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A16.

A15 CHECK THE DRIVER KNEE AIRBAG DEPLOYMENT CONTROL CIRCUITS FOR AN INTERMITTENT SHORT TO BATTERY FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Remove the driver knee airbag. REFER to: Driver Knee Airbag .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Attempt to recreate the fault by wiggling connectors (including any inline connectors) and flexing

the wire harness frequently.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B0004:12 retrieved on-demand during self-test?

Yes	DEPOWER the SRS and REPAIR as necessary. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

No	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A16.

A16 CHECK THE HARNESS AND CONNECTORS

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Remove the driver knee airbag. REFER to: Driver Knee Airbag .

Inspect connector(s) (including any inline connectors) for corrosion, loose or spread terminals and loose or frayed wire connections at terminals.

Inspect wire harness for any damage, pinched, cut or pierced wires.

Inspect RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

Inspect Driver Knee Airbag C2432 Connector Position Assurance (CPA) tab to verify that it is correctly seated and free of damage.

Were any concerns found?

Yes	REPAIR as necessary. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

No	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A17.

A17 CHECK FOR ADDITIONAL SRS (SUPPLEMENTAL RESTRAINT SYSTEM) DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition OFF.

Reconnect all SRS components (if previously disconnected).

Install the driver knee airbag. REFER to: Driver Knee Airbag .

If previously directed to depower the SRS, repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

> *NOTE: When selecting Restraints from the Self Test menu, DTCs are retrieved from the RCM and OCSM.*

Using a diagnostic scan tool, perform

Restraints self-test.

Are any RCM and/or OCSM Diagnostic Trouble Codes (DTCs) retrieved on-demand during self-test?

Yes	Do not clear any Diagnostic Trouble Codes (DTCs) until all Diagnostic Trouble Codes (DTCs) have been resolved. DIAGNOSE and REPAIR the RCM and/or OCSM Diagnostic Trouble Codes (DTCs). REFER to: Airbag Supplemental Restraint System (SRS) .

No	The repair is complete. RETURN the vehicle to the customer.

DIAGNOSIS AND TESTING > PINPOINT TEST - DTC: D > B0005:11, B0005:12, B0005:13, B0005:1A

Refer to Supplemental Restraint System for schematic and connector information.

Normal Operation and Fault Conditions

The RCM continuously monitors the deployable steering column circuits for the following faults:

- Resistance out of range
- Unexpected voltage
- Short to ground
- Faulted deployable steering column

If a fault is detected, the RCM stores DTC B0005:11, B0005:12, B0005:13 or B0005:1A in memory and sends a message to the IPC to illuminate the airbag warning indicator.

The RCM analyzes the deployment loop resistance to determine if a fault exists. The value displayed in the PID is the deployment loop resistance measured by the RCM. If the value displayed is lower or higher than the desired range (refer to diagram below in illustration), the RCM can set a DTC. As the deployment loop resistance drifts farther outside the desired range, the chance for a DTC increases. Small variations in resistance can occur due to the effect of road vibrations on terminal fit. Crimps and terminals can be affected by stress and harness movement and can cause an increase in resistance due to wire strain. These variables can result in an intermittent fault. For this reason, the test requires the PID value to be within the desired range before the fault is considered repaired, regardless if the module is reporting an on-demand DTC at the time of diagnosis. Following this direction helps make sure that minor changes in resistance do not create a repeat concern. This test uses process of elimination to diagnose each part of the deployment loop circuit including:

- Wiring

- Connections
- Deployable steering column
- RCM



DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B0005:11	Collapsible Steering Column Deployment Control: Circuit Short to Ground	A fault is indicated when the RCM senses a short to ground on either deployable steering column circuit for more than 6 seconds.
B0005:12	Collapsible Steering Column Deployment Control: Circuit Short to Battery	A fault is indicated when the RCM senses a short to voltage on either deployable steering column circuit for more than 6 seconds.
B0005:13	Collapsible Steering Column Deployment Control: Circuit Open	A fault is indicated when the RCM measures more than the desired resistance between the deployable steering column circuits for more than 6 seconds.
B0005:1A	Collapsible Steering Column Deployment Control: Circuit Resistance Below Threshold	A fault is indicated when the RCM measures less than the desired resistance between the deployable steering column circuits for more than 6 seconds.

Possible Sources

- Wiring, terminals or connectors
- Deployable steering column
- RCM

PINPOINT TEST A : B0005:11, B0005:12, B0005:13 AND B0005:1A

WARNING: Incorrect repair techniques or actions can cause an accidental Supplemental Restraint System (SRS) deployment. Never compromise or depart from these instructions. Failure to precisely follow all instructions could result in serious personal injury from an accidental deployment.

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use

the correct probe adapter(s) may cause damage to the connector.

NOTE: Most faults are due to connector and/or wiring concerns. Carry out a thorough inspection and verification before proceeding with the pinpoint test.

NOTE: Only disconnect or reconnect SRS components when instructed to do so within a pinpoint test step. Failure to follow this instruction may result in incorrect diagnosis of the SRS.

NOTE: Always make sure the correct SRS component is being installed. Parts released for other vehicles may not be compatible even if they appear physically similar. Check the part number listed in the Ford parts catalog to make sure the correct component is being installed. If an incorrect SRS component is installed, Diagnostic Trouble Codes (DTCs) may set.

NOTE: The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

A1 RETRIEVE RCM (RESTRAINTS CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

WARNING: Before beginning any service procedure in this service information, refer to Safety Warnings in GENERAL INFORMATION . Failure to follow this instruction may result in serious personal injury.

REFER to: Pyrotechnic Device Health and Safety Precautions .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B0005:11, B0005:12, B0005:13 and B0005:1A retrieved on-demand during self-test?

Yes	This fault cannot be cleared until it is corrected and the DTC is no longer retrieved on-demand during self-test. If DTC U3003:16 or U3003:17 is retrieved on-demand, DIAGNOSE those Diagnostic Trouble Codes (DTCs) first. REFER to: Pinpoint Test - DTC: AJ . If DTC U3003:16 or U3003:17 is not retrieved on-demand during self-test, DIAGNOSE the deployable steering column Diagnostic Trouble Codes (DTCs). For DTC B0005:13 or B0005:1A, GO to A2. For DTC B0005:11, GO to A8. For DTC B0005:12, GO to A10.
No	This is an intermittent fault when present as a Continuous Memory Diagnostic Trouble Code (CMDTC) only. If DTC U3003:16 or U3003:17 is retrieved on-demand, DIAGNOSE those Diagnostic Trouble Codes (DTCs) first. REFER to: Pinpoint Test - DTC: AJ . If DTC U3003:16 or U3003:17 is not retrieved on-demand during self-test, DIAGNOSE the deployable steering

	column Continuous Memory Diagnostic Trouble Codes (CMDTCs). For DTC B0005:13 or B0005:1A, GO to A13. For DTC B0005:11, GO to A14. For DTC B0005:12, GO to A15.

A2 CHECK THE COLLAPSIBLE STEERING COLUMN DEPLOYMENT CONTROL (DEPLOY_04_R) PID (PARAMETER IDENTIFICATION)

Using a diagnostic scan tool, view RCM Parameter Identifications (PIDs).

Monitor and record the resistance value displayed by the DEPLOY_04_R PID.

Does the PID value read between 1.44 and 3.52 ohms?

Yes	GO to A12

No	GO to A3

A3 CHECK THE COLLAPSIBLE STEERING COLUMN DEPLOYMENT CONTROL (DEPLOY_04_R) PID (PARAMETER IDENTIFICATION) WHILE CARRYING OUT THE HARNESS TEST

While monitoring the DEPLOY_04_R PID, carry out the harness test of the deployable steering column circuits and accessible connectors (including any inline connectors) by wiggling and flexing the wire harness and connectors frequently. Record the resistance value indicated by the PID.

Does the PID value read between 1.44 and 3.52 ohms while carrying out the harness test?

Yes	DEPOWER the SRS and REPAIR the connector, terminals or wire harness as needed. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

No	For PID value less than 1.44 ohms, GO to A4. For PID value greater than 3.52 ohms, GO to A6.

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the reported fault changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A4 CHECK THE DEPLOYABLE STEERING COLUMN DEPLOYMENT CONTROL DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (LOW RESISTANCE INDICATED)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Deployable Steering Column C2360 .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

DIAGNOSTIC TIP: When viewing Diagnostic Trouble Codes (DTCs) with the deployable steering column disconnected, an open circuit fault is normally retrieved.

Did the on-demand DTC change from B0005:1A to B0005:13?

Yes	GO to A11

No	GO to A5

A5 CHECK FOR A SHORT BETWEEN THE DEPLOYABLE STEERING COLUMN CIRCUITS

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect RCM C310A and C310B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2360-1	Ω	C2360-2

Is the resistance greater than 10, 000 ohms?

Yes	GO to A12

No	REPAIR the circuit(s). Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17

A6 CHECK THE DEPLOYABLE STEERING COLUMN CIRCUITS FOR AN OPEN

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Deployable Steering Column C2360 .

Disconnect RCM C310A and C310B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C310A-11	Ω	C2360-1
C310A-12	Ω	C2360-2

Are the resistances less than 0.5 ohm?

Yes	GO to A7

No	REPAIR the circuits. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the reported fault changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A7 CHECK THE DEPLOYABLE STEERING COLUMN DEPLOYMENT CONTROL DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (OPEN INDICATED)

Connect RCM C310A and C310B .

Connect a fused jumper wire:

Lead 1	Measurement / Action	Lead 2
C2360-1		C2360-2

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

DIAGNOSTIC TIP: When viewing Diagnostic Trouble Codes (DTCs) with the deployable steering column circuits shorted together, a low resistance fault is normally retrieved.

Did the on-demand DTC change from B0005:13 to B0005:1A?

Yes	REMOVE the fused jumper wire and GO to A11

No	REMOVE the fused jumper wire and GO to A12

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the reported fault changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A8 CHECK THE DEPLOYABLE STEERING COLUMN DEPLOYMENT CONTROL DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (SHORT TO GROUND INDICATED)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Deployable Steering Column C2360 .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

DIAGNOSTIC TIP: When viewing Diagnostic Trouble Codes (DTCs) with the deployable steering column disconnected, an open circuit fault is normally retrieved.

Did the on-demand DTC change from B0005:11 to B0005:13?

Yes	GO to A11

No	GO to A9

A9 CHECK THE DEPLOYABLE STEERING COLUMN CIRCUITS FOR A SHORT TO GROUND

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect RCM C310A and C310B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2360-1	Ω	Ground
C2360-2	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to A12

No	REPAIR the circuit(s). Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

A10 CHECK THE DEPLOYABLE STEERING COLUMN CIRCUITS FOR A SHORT TO VOLTAGE

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Deployable Steering Column C2360 .

Disconnect RCM C310A and C310B .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS)

Repowering .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2360-1		Ground
C2360-2		Ground

Is any voltage present?

Yes	REPAIR the circuit(s). Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

No	GO to A12

NOTE: Make sure all SRS components and the RCM electrical connectors are connected before carrying out the self-test. If not, Diagnostic Trouble Codes (DTCs) will be recorded.

A11 CONFIRM THE DEPLOYABLE STEERING COLUMN FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Prior to reconnecting any previously disconnected SRS component:

Inspect connector(s) (including any inline connectors) for pushed-out, loose or spread terminals and loose or frayed wire connections at terminals.

Inspect wire harness for any damaged, pinched, cut or pierced wires.

Inspect RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

Inspect Deployable Steering Column C2360 and make sure the Connector Position Assurance (CPA) tabs are not broken and the clip is not damaged.

Repair any concerns found. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

Connect Deployable Steering Column C2360 .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was the original DTC retrieved on-demand during self-test?

Yes	INSTALL a new steering column (includes deployable device. REFER to: Steering Column . GO to A17.

No	In the process of diagnosing the fault, the fault condition has become intermittent. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. For DTC B0005:13 or B0005:1A, GO to A13. For DTC B0005:11, GO to A14. For DTC B0005:12, GO to A15.

NOTE: Make sure all SRS components and the RCM electrical connectors are connected before carrying out the self-test. If not, Diagnostic Trouble Codes (DTCs) will be recorded.

A12 CONFIRM THE RCM (RESTRAINTS CONTROL MODULE) FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Prior to reconnecting any previously disconnected SRS component:

Inspect connector(s) (including any inline connectors) for pushed-out, loose or spread terminals and loose or frayed wire connections at terminals.

Inspect wire harness for any damaged, pinched, cut or pierced wires.

Inspect RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

Repair any concerns found. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

Connect Deployable Steering Column C2360 (if previously disconnected).

Connect RCM C310A and C310B (if previously disconnected).

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was the original DTC retrieved on-demand during self-test?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new RCM. REFER to: Restraints Control Module (RCM) . GO to A17.

No	In the process of diagnosing the fault, the fault condition has become intermittent. Do not

	install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. For DTC B0005:13 or B0005:1A, GO to A13. For DTC B0005:11, GO to A14. For DTC B0005:12, GO to A15.

A13 CHECK THE COLLAPSIBLE STEERING COLUMN DEPLOYMENT CONTROL (DEPLOY_04_R) PID (PARAMETER IDENTIFICATION) FOR AN INTERMITTENT LOW RESISTANCE OR OPEN CIRCUIT FAULT

Using a diagnostic scan tool, view RCM Parameter Identifications (PIDs).

While monitoring the DEPLOY_04_R PID, attempt to recreate the fault by wiggling connectors (including any inline connectors) and flexing the wire harness frequently. Record the resistance value indicated by the PID.

Does the PID value read between 1.44 and 3.52 ohms?

Yes	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A16.

No	Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering . REPAIR as necessary. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

A14 CHECK THE DEPLOYABLE STEERING COLUMN DEPLOYMENT CONTROL CIRCUITS FOR AN INTERMITTENT SHORT TO GROUND FAULT

Attempt to recreate the fault by wiggling connectors (including any inline connectors) and flexing the wire harness frequently.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B0005:11 retrieved on-demand during self-test?

Yes	DEPOWER the SRS and REPAIR as necessary. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

No	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A16.

A15 CHECK THE DEPLOYABLE STEERING COLUMN DEPLOYMENT CONTROL CIRCUITS FOR AN INTERMITTENT SHORT TO BATTERY FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Deployable Steering Column C2360 .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Attempt to recreate the fault by wiggling connectors (including any inline connectors) and flexing the wire harness frequently.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B0005:12 retrieved on-demand during self-test?

Yes	DEPOWER the SRS and REPAIR as necessary. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

No	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A16.

A16 CHECK THE HARNESS AND CONNECTORS

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Deployable Steering Column C2360 .

Inspect connector(s) (including any inline connectors) for corrosion, loose or spread terminals and loose or frayed wire connections at terminals.

Inspect wire harness for any damage, pinched, cut or pierced wires.

Inspect RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

Inspect Deployable Steering Column C2360 Connector Position Assurance (CPA) tab to verify that it is correctly seated and free of damage.

Were any concerns found?

Yes	REPAIR as necessary. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

No	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A17.

A17 CHECK FOR ADDITIONAL SRS (SUPPLEMENTAL RESTRAINT SYSTEM) DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition OFF.

Reconnect all SRS components (if previously disconnected).

If previously directed to depower the SRS, repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

NOTE: When selecting Restraints from the Self Test menu, DTCs are retrieved from the RCM and OCSM.

Using a diagnostic scan tool, perform

Restraints self-test.

Are any RCM and/or OCSM Diagnostic Trouble Codes (DTCs) retrieved on-demand during self-test?

Yes	Do not clear any Diagnostic Trouble Codes (DTCs) until all Diagnostic Trouble Codes (DTCs) have been resolved. DIAGNOSE and REPAIR the RCM and/or OCSM Diagnostic Trouble Codes (DTCs). REFER to: Airbag Supplemental Restraint System (SRS) .

No	The repair is complete. RETURN the vehicle to the customer.

DIAGNOSIS AND TESTING > PINPOINT TEST - DTC: E > B0010:11, B0010:12, B0010:13 AND B0010:1A

Refer to Supplemental Restraint System for schematic and connector information.

Normal Operation and Fault Conditions

The RCM continuously monitors the passenger airbag stage 1 circuits for the following faults:

- Resistance out of range
- Unexpected voltage
- Short to ground
- Faulted passenger airbag

If a fault is detected, the RCM stores DTC B0010:11, B0010:12, B0010:13 or B0010:1A in memory and sends a message to the IPC to illuminate the airbag warning indicator.

The RCM analyzes the deployment loop resistance to determine if a fault exists. The value displayed in the PID is the deployment loop resistance measured by the RCM. If the value displayed is lower or higher than the desired range (refer to diagram below in illustration), the RCM can set a DTC. As the deployment loop resistance drifts farther outside the desired range, the chance for a DTC increases. Small variations in resistance can occur due to the effect of road vibrations on terminal fit. Crimps and terminals can be affected by stress and harness movement and can cause an increase in resistance due to wire strain. These variables can result in an intermittent fault. For this reason, the test requires the PID value to be within the desired range before the fault is considered repaired, regardless if the module is reporting an on-demand DTC at the time of diagnosis. Following this direction helps make sure that minor changes in

resistance do not create a repeat concern. This test uses process of elimination to diagnose each part of the deployment loop circuit including:

- Wiring
- Connections
- Passenger airbag
- RCM



DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B0010:11	Passenger Frontal Stage 1 Deployment Control: Circuit Short to Ground	A fault is indicated when the RCM senses a short to ground on either passenger airbag stage 1 circuit for more than 6 seconds.
B0010:12	Passenger Frontal Stage 1 Deployment Control: Circuit Short to Battery	A fault is indicated when the RCM senses a short to voltage on either passenger airbag stage 1 circuit for more than 6 seconds.
B0010:13	Passenger Frontal Stage 1 Deployment Control: Circuit Open	A fault is indicated when the RCM measures more than the desired resistance range between the passenger airbag stage 1 circuits for more than 6 seconds.
B0010:1A	Passenger Frontal Stage 1 Deployment Control: Circuit Resistance Below Threshold	A fault is indicated when the RCM measures less than the desired resistance range between the passenger airbag stage 1 circuits for more than 6 seconds.

Possible Sources

- Wiring, terminals or connectors
- Passenger airbag
- RCM

Visual Inspection and Diagnostic Pre-checks

- Inspect for damaged wiring harness(es).
- Inspect for loose or damaged connectors.

PINPOINT TEST A : B0010:11, B0010:12, B0010:13 AND B0010:1A

WARNING: Incorrect repair techniques or actions can cause an accidental Supplemental Restraint System (SRS) deployment. Never compromise or depart from these instructions. Failure to precisely follow all instructions could result in serious personal injury from an accidental deployment.

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may cause damage to the connector.

NOTE: Most faults are due to connector and/or wiring concerns. Carry out a thorough inspection and verification before proceeding with the pinpoint test.

NOTE: Only disconnect or reconnect SRS components when instructed to do so within a pinpoint test step. Failure to follow this instruction may result in incorrect diagnosis of the SRS.

NOTE: Always make sure the correct SRS component is being installed. Parts released for other vehicles may not be compatible even if they appear physically similar. Check the part number listed in the Ford parts catalog to make sure the correct component is being installed. If an incorrect SRS component is installed, Diagnostic Trouble Codes (DTCs) may set.

NOTE: The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

A1 RETRIEVE RCM (RESTRAINTS CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

WARNING: Before beginning any service procedure in this service information, refer to Safety Warnings in GENERAL INFORMATION . Failure to follow this instruction may result in serious personal injury.

REFER to: Pyrotechnic Device Health and Safety Precautions .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B0010:11, B0010:12, B0010:13 or B0010:1A retrieved on-demand during self-test?

Yes	This fault cannot be cleared until it is corrected and the DTC is no longer retrieved on-demand during self-test. If DTC U3003:16 or U3003:17 is retrieved on-demand, DIAGNOSE those Diagnostic Trouble Codes (DTCs) first. REFER to: Pinpoint Test - DTC: AJ . If DTC U3003:16 or U3003:17 is not retrieved on-demand during self-test, DIAGNOSE the passenger airbag

	Diagnostic Trouble Codes (DTCs). For DTC B0010:13 or B0010:1A, GO to A2. For DTC B0010:11, GO to A9. For DTC B0010:12, GO to A11.

No	This is an intermittent fault when present as a Continuous Memory Diagnostic Trouble Code (CMDTC) only. If DTC U3003:16 or U3003:17 is retrieved on-demand, DIAGNOSE those Diagnostic Trouble Codes (DTCs) first. REFER to: Pinpoint Test - DTC: AJ . If DTC U3003:16 or U3003:17 is not retrieved on-demand during self-test, DIAGNOSE the passenger airbag Continuous Memory Diagnostic Trouble Codes (CMDTCs). For DTC B0010:13 or B0010:1A, GO to A14. For DTC B0010:11, GO to A15. For DTC B0010:12, GO to A16.

A2 CHECK THE PASSENGER FRONTAL STAGE 1 DEPLOYMENT CONTROL RESISTANCE (DEPLOY_05_R) PID (PARAMETER IDENTIFICATION)

Using a diagnostic scan tool, view RCM Parameter Identifications (PIDs).

Monitor and record the resistance value displayed by the DEPLOY_05_R PID.

Does the PID value read between 1.44 and 3.52 ohms?

Yes	GO to A13

No	GO to A3

A3 CHECK THE PASSENGER FRONTAL STAGE 1 DEPLOYMENT CONTROL RESISTANCE (DEPLOY_05_R) PID (PARAMETER IDENTIFICATION) WHILE CARRYING OUT THE HARNESS TEST

Remove the glove compartment. REFER to: Glove Compartment .

While monitoring the DEPLOY_05_R PID, carry out the harness test of the passenger airbag circuits and accessible connectors (including any inline connectors) by wiggling and flexing the wire harness and connectors frequently. Record the resistance value indicated by the PID.

Does the PID value read between 1.44 and 3.52 ohms while carrying out the harness test?

Yes	DEPOWER the SRS and REPAIR the connector, terminals or wire harness. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A18.

No	For PID value less than 1.44 ohms, GO to A4. For PID value greater than 3.52 ohms, GO to A7.

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the reported fault changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A4 CHECK THE PASSENGER FRONTAL STAGE 1 DEPLOYMENT CONTROL DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (LOW RESISTANCE INDICATED)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Passenger Airbag C256 .

Repower the SRS. Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

DIAGNOSTIC TIP: When viewing Diagnostic Trouble Codes (DTCs) with the passenger airbag disconnected, open circuit faults are normally retrieved on passenger airbag stages 1 and 2, and for the passenger airbag canister vent.

Did the on-demand DTC change from B0010:1A to B0010:13?

Yes	GO to A12

No	GO to A5

A5 CHECK FOR A SHORT BETWEEN PASSENGER AIRBAG STAGE 1 CIRCUITS

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C256-1	Ω	C256-2

Is the resistance greater than 10, 000 ohms?

Yes	GO to A13

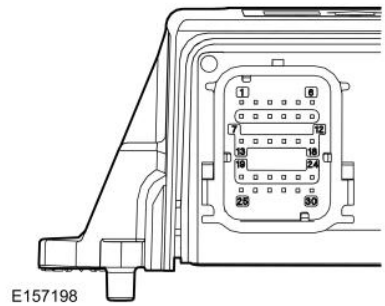
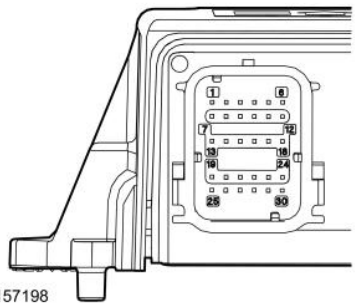
No	GO to A6

A6 CHECK THE RCM (RESTRAINTS CONTROL MODULE) FOR LOW RESISTANCE

Disconnect RCM C310A and C310B .

Measure:

Positive Lead	Measurement / Action	Negative Lead

 E157198 C310A, pin 28, component side	Ω	 E157198 C310A, pin 27, component side

Is the resistance greater than 10, 000 ohms?

Yes	REPAIR the passenger airbag stage 1 circuits for a short together. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A18.

No	GO to A13

A7 CHECK THE PASSENGER AIRBAG STAGE 1 CIRCUITS FOR AN OPEN

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Passenger Airbag C256 .

Disconnect RCM C310A and C310B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C310A-27	Ω	C256-2
C310A-28	Ω	C256-1

Are the resistances less than 0.5 ohm?

Yes	GO to A8

No	REPAIR the circuit(s). Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A18.

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the reported fault changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A8 CHECK THE PASSENGER AIRBAG STAGE 1 DEPLOYMENT CONTROL DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (OPEN INDICATED)

Connect RCM C310A and C310B .

Connect a fused jumper wire:

Lead 1	Measurement / Action	Lead 2
C256-1		C256-2

Repower the SRS. Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

DIAGNOSTIC TIP: When viewing Diagnostic Trouble Codes (DTCs) with the passenger airbag stage 1 circuits shorted together, a low resistance fault is normally retrieved on stage 1. Stage 2 and the passenger airbag canister vent both show an open circuit fault due to the passenger airbag being disconnected.

Did the on-demand DTC change from B0010:13 to B0010:1A?

Yes	REMOVE the fused jumper wire and GO to A12

No	REMOVE the fused jumper wire and GO to A13

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the reported fault changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A9 CHECK THE PASSENGER FRONTAL STAGE 1 DEPLOYMENT CONTROL DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (SHORT TO GROUND INDICATED)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Passenger Airbag C256 .

Remove the glove compartment. REFER to: Glove Compartment .

Repower the SRS. Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

DIAGNOSTIC TIP: When viewing Diagnostic Trouble Codes (DTCs) with the passenger airbag disconnected, open circuit faults are normally retrieved on passenger airbag stages 1 and 2, and for the passenger airbag canister vent.

Did the on-demand DTC change from B0010:11 to B0010:13?

Yes	GO to A12

No	GO to A10

A10 CHECK THE PASSENGER AIRBAG STAGE 1 CIRCUITS FOR A SHORT TO GROUND

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect RCM C310A and C310B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C256-1	Ω	Ground
C256-2	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to A13

No	Due to the shorting bar feature in the RCM electrical connector, the fault can exist in either circuit. Do not remove or defeat the shorting bar. REPAIR the circuit(s). Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A18.

A11 CHECK THE PASSENGER AIRBAG STAGE 1 CIRCUITS FOR A SHORT TO VOLTAGE

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Passenger Airbag C256 .

Remove the glove compartment. REFER to: Glove Compartment .

Disconnect RCM C310A and C310B .

Repower the SRS. Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C256-1	V	Ground
C256-2	V	Ground

Is any voltage present?

Yes	Due to the shorting bar feature in the RCM electrical connector, the fault can exist in either circuit. Do not remove or defeat the shorting bar. REPAIR the circuit(s). Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A18.

No	GO to A13

NOTE: Make sure all SRS components and the RCM electrical connectors are connected before carrying out the self-test. If not, Diagnostic Trouble Codes (DTCs) will be recorded.

A12 CONFIRM THE PASSENGER AIRBAG FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Prior to reconnecting any previously disconnected SRS component:

inspect connector(s) (including any inline connectors) for pushed-out, loose or spread terminals and loose or frayed wire connections at terminals.

inspect wire harness for any damaged, pinched, cut or pierced wires.

inspect RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

inspect Passenger Airbag C256 and make sure the Connector Position Assurance (CPA) tabs are not broken and the clip is not damaged.

repair any concerns found. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

Connect Passenger Airbag C256 (if previously disconnected).

Repower the SRS. Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was the original DTC retrieved on-demand during self-test?

Yes	INSTALL a new passenger airbag. REFER to: Passenger Airbag . GO to A18.

No	In the process of diagnosing the fault, the fault condition has become intermittent. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. For DTC B0010:13 or B0010:1A, GO to A14. For DTC B0010:11, GO to A15. For DTC B0010:12, GO to A16.

NOTE: Make sure all SRS components and the RCM electrical connectors are connected before carrying out the self-test. If not, Diagnostic Trouble Codes (DTCs) will

be recorded.

A13 CONFIRM THE RCM (RESTRAINTS CONTROL MODULE) FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Prior to reconnecting any previously disconnected SRS component:

inspect connector(s) (including any inline connectors) for pushed-out, loose or spread terminals and loose or frayed wire connections at terminals.

inspect wire harness for any damaged, pinched, cut or pierced wires.

inspect RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

repair any concerns found. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

Connect Passenger Airbag C256 (if previously disconnected).

Connect RCM C310A and C310B (if previously disconnected).

Repower the SRS. Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was the original DTC retrieved on-demand during self-test?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new RCM. REFER to: Restraints Control Module (RCM) . GO to A18.

No	In the process of diagnosing the fault, the fault condition has become intermittent. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. For DTC B0010:13 or B0010:1A, GO to A14. For DTC B0010:11, GO to A15. For DTC B0010:12, GO to A16.

A14 CHECK THE PASSENGER FRONTAL STAGE 1 DEPLOYMENT CONTROL RESISTANCE (DEPLOY_05_R) PID (PARAMETER IDENTIFICATION) FOR AN INTERMITTENT LOW RESISTANCE OR OPEN CIRCUIT FAULT

Remove the glove compartment. REFER to: Glove Compartment .

Using a diagnostic scan tool, view RCM Parameter Identifications (PIDs).

While monitoring the DEPLOY_05_R PID, attempt to recreate the fault by wiggling connectors (including any inline connectors) and flexing the wire harness frequently. Record the resistance value indicated by the PID.

Does the PID value read between 1.44 and 3.52 ohms?

Yes	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A17.

No	DEPOWER the SRS and REPAIR as necessary. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A18.

A15 CHECK THE PASSENGER FRONTAL STAGE 1 DEPLOYMENT CONTROL CIRCUITS FOR AN INTERMITTENT SHORT TO GROUND FAULT

Remove the glove compartment. REFER to: Glove Compartment .

Attempt to recreate the fault by wiggling connectors (including any inline connectors) and flexing the wire harness frequently.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B0010:11 retrieved on-demand during self-test?

Yes	DEPOWER the SRS and REPAIR as necessary. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A18.

No	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A17.

A16 CHECK THE PASSENGER FRONTAL STAGE 1 DEPLOYMENT CONTROL CIRCUITS FOR AN INTERMITTENT SHORT TO BATTERY FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Passenger Airbag C256 .

Remove the glove compartment. REFER to: Glove Compartment .

Repower the SRS. Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Attempt to recreate the fault by wiggling connectors (including any inline connectors) and flexing the wire harness frequently.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B0010:12 retrieved on-demand during self-test?

Yes	DEPOWER the SRS and REPAIR as necessary. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A18.

No	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A17.

A17 CHECK THE HARNESS AND CONNECTORS

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Passenger Airbag C256 .

Inspect connector(s) (including any inline connectors) for corrosion, loose or spread terminals and loose or frayed wire connections at terminals.

Inspect wire harness for any damage, pinched, cut or pierced wires.

Inspect RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

Inspect Passenger Airbag C256 and make sure the Connector Position Assurance (CPA) tabs are not broken and the clip is not damaged.

Were any concerns found?

Yes	REPAIR as necessary. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A18.

No	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A18.

A18 CHECK FOR ADDITIONAL SRS (SUPPLEMENTAL RESTRAINT SYSTEM) DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition OFF.

Reconnect all SRS components (if previously disconnected).

If previously directed to depower the SRS, repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

NOTE: When selecting Restraints from the Self Test menu, DTCs are retrieved from the RCM and OCSM.

Using a diagnostic scan tool, perform

Restraints self-test.

Are any RCM and/or OCSM Diagnostic Trouble Codes (DTCs) retrieved on-demand during self-test?

Yes	Do not clear any Diagnostic Trouble Codes (DTCs) until all Diagnostic Trouble Codes (DTCs) have been resolve. REFER to: Airbag Supplemental Restraint System (SRS) .

No	The repair is complete. RETURN the vehicle to the customer.

DIAGNOSIS AND TESTING > PINPOINT TEST - DTC: F > B0011:11, B0011:12, B0011:13, B0011:1A

Refer to Supplemental Restraint System for schematic and connector information.

Normal Operation and Fault Conditions

The RCM continuously monitors the passenger airbag stage 2 circuits for the following faults:

- Resistance out of range
- Unexpected voltage
- Short to ground
- Faulted passenger airbag

If a fault is detected, the RCM stores DTC B0011:11, B0011:12, B0011:13 or B0011:1A in memory and sends a message to the IPC to illuminate the airbag warning indicator.

The RCM analyzes the deployment loop resistance to determine if a fault exists. The value displayed in the PID is the deployment loop resistance measured by the RCM. If the value displayed is lower or higher than the desired range (refer to diagram below in illustration), the RCM can set a DTC. As the deployment loop resistance drifts farther outside the desired range, the chance for a DTC increases. Small variations in resistance can occur due to the effect of road vibrations on terminal fit. Crimps and terminals can be affected by stress and harness movement and can cause an increase in resistance due to wire strain. These variables can result in an intermittent fault. For this reason, the test requires the PID value to be within the desired range before the fault is considered repaired, regardless if the module is reporting an on-demand DTC at the time of diagnosis. Following this direction helps make sure that minor changes in resistance do not create a repeat concern. This test uses process of elimination to diagnose each part of the deployment loop circuit including:

- Wiring
- Connections
- Passenger airbag
- RCM



DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B0011:11	Passenger Frontal Stage 2 Deployment Control: Circuit Short to Ground	A fault is indicated when the RCM senses a short to ground on either passenger airbag stage 2 circuit for more than 6 seconds.
B0011:12	Passenger Frontal Stage 2 Deployment Control: Circuit Short to Battery	A fault is indicated when the RCM senses a short to voltage on either passenger airbag stage 2 circuit for more than 6 seconds.
B0011:13	Passenger Frontal Stage 2 Deployment Control: Circuit Open	A fault is indicated when the RCM measures more than the desired resistance between the passenger airbag stage 2 circuits for more than 6 seconds.
B0011:1A	Passenger Frontal Stage 2 Deployment Control: Circuit Resistance Below Threshold	A fault is indicated when the RCM measures less than the desired resistance between the passenger airbag stage 2 circuits for more than 6 seconds.

Possible Sources

- Wiring, terminals or connectors
- Passenger airbag
- RCM

Visual Inspection and Diagnostic Pre-checks

- Inspect for damaged wiring harness(es).
- Inspect for loose or damaged connectors.

PINPOINT TEST A : B0011:11, B0011:12, B0011:13 AND B0011:1A

WARNING: Incorrect repair techniques or actions can cause an accidental Supplemental Restraint System (SRS) deployment. Never compromise or depart from these instructions. Failure to precisely follow all instructions could result in serious personal injury from an accidental deployment.

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may cause damage to the connector.

NOTE: Most faults are due to connector and/or wiring concerns. Carry out a thorough inspection and verification before proceeding with the pinpoint test.

NOTE: Only disconnect or reconnect SRS components when instructed to do so within a pinpoint test step. Failure to follow this instruction may result in incorrect diagnosis of the SRS.

NOTE: Always make sure the correct SRS component is being installed. Parts released for other vehicles may not be compatible even if they appear physically similar. Check the part number listed in the Ford parts catalog to make sure the correct component is being installed. If an incorrect SRS component is installed, Diagnostic Trouble Codes (DTCs) may set.

NOTE: The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

A1 RETRIEVE RCM (RESTRAINTS CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

WARNING: Before beginning any service procedure in this service information, refer to Safety Warnings in GENERAL INFORMATION . Failure to follow this instruction may result in serious personal injury.

REFER to: Pyrotechnic Device Health and Safety Precautions .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B0011:11, B0011:12, B0011:13 and B0011:1A retrieved on-demand during self-test?

Yes	This fault cannot be cleared until it is corrected and the DTC is no longer retrieved on-demand during self-test. If DTC U3003:16 or U3003:17 is retrieved on-demand, DIAGNOSE those Diagnostic Trouble Codes (DTCs) first. REFER to: Pinpoint Test - DTC: AJ . If DTC U3003:16 or U3003:17 is not retrieved on-demand during self-test, DIAGNOSE the passenger airbag Diagnostic Trouble Codes (DTCs). For DTC B0011:13 or B0011:1A, GO to A2. For DTC B0011:11, GO to A8. For DTC B0011:12, GO to A10.
No	This is an intermittent fault when present as a Continuous Memory Diagnostic Trouble Code (CMDTC) only. If DTC U3003:16 or U3003:17 is retrieved on-demand, DIAGNOSE those Diagnostic Trouble Codes (DTCs) first. REFER to: Pinpoint Test - DTC: AJ . If DTC U3003:16 or U3003:17 is not retrieved on-demand during self-test, DIAGNOSE the passenger airbag Continuous Memory Diagnostic Trouble Codes (CMDTCs). For DTC B0011:13 or B0011:1A, GO to A13. For DTC B0011:11, GO to A14. For DTC B0011:12, GO to A15.

A2 CHECK THE PASSENGER FRONTAL STAGE 2 DEPLOYMENT CONTROL (DEPLOY_06_R) PID (PARAMETER IDENTIFICATION)

Using a diagnostic scan tool, view RCM Parameter Identifications (PIDs).

Monitor and record the resistance value displayed by the DEPLOY_06_R PID.

Does the PID value read between 1.44 and 3.52 ohms?

Yes	GO to A12

No	GO to A3

A3 CHECK THE PASSENGER FRONTAL STAGE 2 DEPLOYMENT CONTROL (DEPLOY_06_R) PID (PARAMETER IDENTIFICATION) WHILE CARRYING OUT THE HARNESS TEST

Remove the glove compartment. REFER to: Glove Compartment .

While monitoring the DEPLOY_06_R PID, carry out the harness test of the passenger airbag circuits and accessible connectors (including any inline connectors) by wiggling and flexing the wire harness and connectors frequently. Record the resistance value indicated by the PID.

Does the PID value read between 1.44 and 3.52 ohms while carrying out the harness test?

Yes	DEPOWER the SRS and REPAIR the connector, terminals or wire harness as needed. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

No	For PID value less than 1.44 ohms, GO to A4. For PID value greater than 3.52 ohms, GO to A6.

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the reported fault changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A4 CHECK THE PASSENGER AIRBAG DEPLOYMENT CONTROL DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (LOW RESISTANCE INDICATED)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Passenger Airbag C256 .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

DIAGNOSTIC TIP: When viewing Diagnostic Trouble Codes (DTCs) with the passenger airbag disconnected, an open circuit fault is normally retrieved for passenger airbag stage 2. An open circuit fault is also retrieved for passenger airbag stage 1 and the passenger airbag canister vent, due to the passenger airbag connector being disconnected.

Did the on-demand DTC change from B0011:1A to B0011:13?

Yes	GO to A11

No	GO to A5

A5 CHECK FOR A SHORT BETWEEN THE PASSENGER AIRBAG CIRCUITS

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect RCM C310A and C310B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C256-4	Ω	C256-5

Is the resistance greater than 10, 000 ohms?

Yes	GO to A12

No	REPAIR the circuit(s). Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

A6 CHECK THE PASSENGER AIRBAG CIRCUITS FOR AN OPEN

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Passenger Airbag C256 .

Disconnect RCM C310A and C310B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C310A-23	Ω	C256-4
C310A-24	Ω	C256-5

Are the resistances less than 0.5 ohm?

Yes	GO to A7

No	REPAIR the circuits. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the reported fault changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A7 CHECK THE PASSENGER AIRBAG DEPLOYMENT CONTROL DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (OPEN INDICATED)

Connect RCM C310A and C310B .

Connect a fused jumper wire:

Lead 1	Measurement / Action	Lead 2
C256-4		C256-5

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

DIAGNOSTIC TIP: When viewing Diagnostic Trouble Codes (DTCs) with the passenger airbag stage 2 circuits shorted together, a low resistance fault is normally retrieved. An open circuit fault is also retrieved for passenger airbag stage 1 and the passenger airbag canister vent, due to the passenger airbag connector being disconnected.

Did the on-demand DTC change from B0011:13 to B0011:1A?

Yes	REMOVE the fused jumper wire and GO to A11.

No	REMOVE the fused jumper wire and GO to A12.

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the reported fault changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A8 CHECK THE PASSENGER AIRBAG DEPLOYMENT CONTROL DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (SHORT TO GROUND INDICATED)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Remove the glove compartment. REFER to: Glove Compartment .

Disconnect Passenger Airbag C256 .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS)

Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

DIAGNOSTIC TIP: When viewing Diagnostic Trouble Codes (DTCs) with the passenger airbag disconnected, an open circuit fault is normally retrieved for passenger airbag stage 2. An open circuit fault is also retrieved for passenger airbag stage 1 and the passenger airbag canister vent, due to the passenger airbag connector being disconnected.

Did the on-demand DTC change from B0011:11 to B0011:13?

Yes	GO to A11

No	GO to A9

A9 CHECK THE PASSENGER AIRBAG CIRCUITS FOR A SHORT TO GROUND

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect RCM C310A and C310B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C256-4	Ω	Ground
C256-5	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to A12

No	REPAIR the circuit(s). Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17

A10 CHECK THE PASSENGER AIRBAG CIRCUITS FOR A SHORT TO VOLTAGE

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Remove the glove compartment. REFER to: Glove Compartment .

Disconnect Passenger Airbag C256 .

Remove the glove compartment. REFER to: Glove Compartment .

Disconnect RCM C310A and C310B .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C256-4		Ground
C256-5		Ground

Is any voltage present?

Yes	REPAIR the circuit(s). Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17

No	GO to A12

NOTE: Make sure all SRS components and the RCM electrical connectors are connected before carrying out the self-test. If not, Diagnostic Trouble Codes (DTCs) will be recorded.

A11 CONFIRM THE PASSENGER AIRBAG FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Prior to reconnecting any previously disconnected SRS component:

Inspect connector(s) (including any inline connectors) for pushed-out, loose or spread terminals and loose or frayed wire connections at terminals.

Inspect wire harness for any damaged, pinched, cut or pierced wires.

Inspect RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

Inspect Passenger Airbag C256 and make sure the Connector Position Assurance (CPA) tabs are not broken and the clip is not damaged.

Repair any concerns found. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

Connect Passenger Airbag C256 .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was the original DTC retrieved on-demand during self-test?

Yes	INSTALL a new passenger airbag. REFER to: Passenger Airbag . GO to A17

No	In the process of diagnosing the fault, the fault condition has become intermittent. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. For DTC B0011:13 or B0011:1A, GO to A13. For DTC B0011:11, GO to A14. For DTC B0011:12, GO to A15.

NOTE: Make sure all SRS components and the RCM electrical connectors are connected before carrying out the self-test. If not, Diagnostic Trouble Codes (DTCs) will be recorded.

A12 CONFIRM THE RCM (RESTRAINTS CONTROL MODULE) FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Prior to reconnecting any previously disconnected SRS component:

Inspect connector(s) (including any inline connectors) for pushed-out, loose or spread terminals and loose or frayed wire connections at terminals.

Inspect wire harness for any damaged, pinched, cut or pierced wires.

Inspect RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

Repair any concerns found. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

Remove the glove compartment. REFER to: Glove Compartment .

Connect Passenger Airbag C256 (if previously disconnected).

Remove the glove compartment. REFER to: Glove Compartment .

Connect RCM C310A and C310B (if previously disconnected).

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was the original DTC retrieved on-demand during self-test?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new RCM. REFER to: Restraints Control Module (RCM) . GO to A17.

No	In the process of diagnosing the fault, the fault condition has become intermittent. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. For DTC B0011:13 or B0011:1A, GO to A13. For DTC B0011:11, GO to A14. For DTC B0011:12, GO to A15.

A13 CHECK THE PASSENGER FRONTAL STAGE 2 DEPLOYMENT CONTROL (DEPLOY_06_R) PID (PARAMETER IDENTIFICATION) FOR AN INTERMITTENT LOW RESISTANCE OR OPEN CIRCUIT FAULT

Remove the glove compartment. REFER to: Glove Compartment .

Using a diagnostic scan tool, view RCM Parameter Identifications (PIDs).

Remove the glove compartment. REFER to: Glove Compartment .

While monitoring the DEPLOY_06_R PID, attempt to recreate the fault by wiggling connectors (including any inline connectors) and flexing the wire harness frequently. Record the resistance value indicated by the PID.

Does the PID value read between 1.44 and 3.52 ohms?

Yes	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A16.

No	Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering . REPAIR as necessary. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

A14 CHECK THE PASSENGER AIRBAG DEPLOYMENT CONTROL CIRCUITS FOR AN INTERMITTENT SHORT TO GROUND FAULT

Remove the glove compartment. REFER to: Glove Compartment .

Attempt to recreate the fault by wiggling connectors (including any inline connectors) and flexing the wire harness frequently.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B0011:11 retrieved on-demand during self-test?

Yes	DEPOWER the SRS and REPAIR as necessary. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

No	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint

	test. GO to A16.

A15 CHECK THE PASSENGER AIRBAG DEPLOYMENT CONTROL CIRCUITS FOR AN INTERMITTENT SHORT TO BATTERY FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Remove the glove compartment. REFER to: Glove Compartment .

Disconnect Passenger Airbag C256 .

Remove the glove compartment. REFER to: Glove Compartment .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Attempt to recreate the fault by wiggling connectors (including any inline connectors) and flexing the wire harness frequently.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B0011:12 retrieved on-demand during self-test?

Yes	DEPOWER the SRS and REPAIR as necessary. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

No	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A16.

A16 CHECK THE HARNESS AND CONNECTORS

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Passenger Airbag C256 .

Inspect connector(s) (including any inline connectors) for corrosion, loose or spread terminals and loose or frayed wire connections at terminals.

Inspect wire harness for any damage, pinched, cut or pierced wires.

Inspect RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

Inspect Passenger Airbag C256 Connector Position Assurance (CPA) tab to verify that it is correctly seated and free of damage.

Were any concerns found?

Yes	REPAIR as necessary. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

No	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A17

A17 CHECK FOR ADDITIONAL SRS (SUPPLEMENTAL RESTRAINT SYSTEM) DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition OFF.

Reconnect all SRS components (if previously disconnected).

If previously directed to depower the SRS, repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

NOTE: When selecting Restraints from the Self Test menu, DTCs are retrieved from the RCM and OCSM.

Using a diagnostic scan tool, perform

Restraints self-test.

Are any RCM and/or OCSM Diagnostic Trouble Codes (DTCs) retrieved on-demand during self-test?

Yes	Do not clear any Diagnostic Trouble Codes (DTCs) until all Diagnostic Trouble Codes (DTCs) have been resolved. DIAGNOSE and REPAIR the RCM and/or OCSM Diagnostic Trouble Codes (DTCs). REFER to: Airbag Supplemental Restraint System (SRS) .

No	The repair is complete. RETURN the vehicle to the customer.

DIAGNOSIS AND TESTING > PINPOINT TEST - DTC: G > B0013:11, B0013:12, B0013:13, B0013:1A

Refer to Supplemental Restraint System for schematic and connector information.

Normal Operation and Fault Conditions

The RCM continuously monitors the passenger knee airbag circuits for the following faults:

- Resistance out of range

- Unexpected voltage
- Short to ground
- Faulted passenger knee airbag

If a fault is detected, the RCM stores DTC B0013:11, B0013:12, B0013:13 or B0013:1A in memory and sends a message to the IPC to illuminate the airbag warning indicator.

The RCM analyzes the deployment loop resistance to determine if a fault exists. The value displayed in the PID is the deployment loop resistance measured by the RCM. If the value displayed is lower or higher than the desired range (refer to diagram below in illustration), the RCM can set a DTC. As the deployment loop resistance drifts farther outside the desired range, the chance for a DTC increases. Small variations in resistance can occur due to the effect of road vibrations on terminal fit. Crimps and terminals can be affected by stress and harness movement and can cause an increase in resistance due to wire strain. These variables can result in an intermittent fault. For this reason, the test requires the PID value to be within the desired range before the fault is considered repaired, regardless if the module is reporting an on-demand DTC at the time of diagnosis. Following this direction helps make sure that minor changes in resistance do not create a repeat concern. This test uses process of elimination to diagnose each part of the deployment loop circuit including:

- Wiring
- Connections
- Passenger knee airbag
- RCM



DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B0013:11	Passenger Knee Bolster Deployment Control: Circuit Short to Ground	A fault is indicated when the RCM senses a short to ground on either passenger knee airbag circuit for more than 6 seconds.
B0013:12	Passenger Knee Bolster Deployment Control: Circuit Short to Battery	A fault is indicated when the RCM senses a short to voltage on either passenger knee airbag circuit for more than 6 seconds.
B0013:13	Passenger Knee Bolster Deployment Control: Circuit Open	A fault is indicated when the RCM measures more than the desired resistance between the passenger knee airbag circuits for more than 6 seconds.
B0013:1A	Passenger Knee Bolster Deployment Control: Circuit	A fault is indicated when the RCM measures less than the desired

	Resistance Below Threshold	resistance between the passenger knee airbag circuits for more than 6 seconds.

Possible Sources

- Wiring, terminals or connectors
- Passenger knee airbag
- RCM

PINPOINT TEST A : B0013:11, B0013:12, B0013:13 AND B0013:1A

WARNING: Incorrect repair techniques or actions can cause an accidental Supplemental Restraint System (SRS) deployment. Never compromise or depart from these instructions. Failure to precisely follow all instructions could result in serious personal injury from an accidental deployment.

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may cause damage to the connector.

NOTE: Most faults are due to connector and/or wiring concerns. Carry out a thorough inspection and verification before proceeding with the pinpoint test.

NOTE: Only disconnect or reconnect SRS components when instructed to do so within a pinpoint test step. Failure to follow this instruction may result in incorrect diagnosis of the SRS.

NOTE: Always make sure the correct SRS component is being installed. Parts released for other vehicles may not be compatible even if they appear physically similar. Check the part number listed in the Ford parts catalog to make sure the correct component is being installed. If an incorrect SRS component is installed, Diagnostic Trouble Codes (DTCs) may set.

NOTE: The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

A1 RETRIEVE RCM (RESTRAINTS CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

WARNING: Before beginning any service procedure in this service information, refer to Safety Warnings in GENERAL INFORMATION . Failure to follow this instruction

may result in serious personal injury.

REFER to: Pyrotechnic Device Health and Safety Precautions .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B0013:11, B0013:12, B0013:13 and B0013:1A retrieved on-demand during self-test?

Yes	This fault cannot be cleared until it is corrected and the DTC is no longer retrieved on-demand during self-test. If DTC U3003:16 or U3003:17 is retrieved on-demand, DIAGNOSE those Diagnostic Trouble Codes (DTCs) first. REFER to: Pinpoint Test - DTC: AJ . If DTC U3003:16 or U3003:17 is not retrieved on-demand during self-test, DIAGNOSE the passenger knee airbag Diagnostic Trouble Codes (DTCs). For DTC B0013:13 or B0013:1A, GO to A2. For DTC B0013:11, GO to A8. For DTC B0013:12, GO to A10.

No	This is an intermittent fault when present as a Continuous Memory Diagnostic Trouble Code (CMDTC) only. If DTC U3003:16 or U3003:17 is retrieved on-demand, DIAGNOSE those Diagnostic Trouble Codes (DTCs) first. REFER to: Pinpoint Test - DTC: AJ . If DTC U3003:16 or U3003:17 is not retrieved on-demand during self-test, DIAGNOSE the passenger knee airbag Continuous Memory Diagnostic Trouble Codes (CMDTCs). For DTC B0013:13 or B0013:1A, GO to A13. For DTC B0013:11, GO to A14. For DTC B0013:12, GO to A15.

A2 CHECK THE PASSENGER KNEE BOLSTER DEPLOYMENT CONTROL (DEPLOY_07_R) PID (PARAMETER IDENTIFICATION)

Using a diagnostic scan tool, view RCM Parameter Identifications (PIDs).

Monitor and record the resistance value displayed by the DEPLOY_07_R PID.

Does the PID value read between 1.44 and 3.52 ohms?

Yes	GO to A12

No	GO to A3

A3 CHECK THE PASSENGER KNEE BOLSTER DEPLOYMENT CONTROL (DEPLOY_07_R) PID (PARAMETER IDENTIFICATION) WHILE CARRYING OUT THE HARNESS TEST

While monitoring the DEPLOY_07_R PID, carry out the harness test of the passenger knee airbag circuits and accessible connectors (including any inline connectors) by wiggling and flexing the wire harness and connectors frequently. Record the resistance value indicated by the PID.

Does the PID value read between 1.44 and 3.52 ohms while carrying out the harness test?

Yes	DEPOWER the SRS and REPAIR the connector, terminals or wire harness as needed. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

No	For PID value less than 1.44 ohms, GO to A4. For PID value greater than 3.52 ohms, GO to A6.

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the reported fault changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A4 CHECK THE PASSENGER KNEE AIRBAG DEPLOYMENT CONTROL DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (LOW RESISTANCE INDICATED)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Passenger Knee Airbag C2600 .

Lower the glove compartment.

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

DIAGNOSTIC TIP: When viewing Diagnostic Trouble Codes (DTCs) with the passenger knee airbag disconnected, an open circuit fault is normally retrieved.

Did the on-demand DTC change from B0013:1A to B0013:13?

Yes	GO to A11

No	GO to A5

A5 CHECK FOR A SHORT BETWEEN THE PASSENGER KNEE AIRBAG CIRCUITS

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect RCM C310A and C310B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2600-1	Ω	C2600-2

Is the resistance greater than 10, 000 ohms?

Yes	GO to A12

No	REPAIR the circuit(s). Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

A6 CHECK THE PASSENGER KNEE AIRBAG CIRCUITS FOR AN OPEN

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Passenger Knee Airbag C2600 .

Lower the glove compartment.

Disconnect RCM C310A and C310B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C310A-5	Ω	C2600-1
C310A-6	Ω	C2600-2

Are the resistances less than 0.5 ohm?

Yes	GO to A7

No	REPAIR the circuits. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the reported fault changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A7 CHECK THE PASSENGER KNEE AIRBAG DEPLOYMENT CONTROL DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (OPEN INDICATED)

Connect RCM C310A and C310B .

Connect a fused jumper wire:

Lead 1	Measurement / Action	Lead 2
C2600-1		C2600-2

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

DIAGNOSTIC TIP: When viewing Diagnostic Trouble Codes (DTCs) with the passenger knee airbag circuits shorted together, a low resistance fault is normally retrieved.

Did the on-demand DTC change from B0013:13 to B0013:1A?

Yes	REMOVE the fused jumper wire and GO to A11.

No	REMOVE the fused jumper wire and GO to A12.

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the reported fault changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A8 CHECK THE PASSENGER KNEE AIRBAG DEPLOYMENT CONTROL DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (SHORT TO GROUND INDICATED)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Passenger Knee Airbag C2600 .

Lower the glove compartment.

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

DIAGNOSTIC TIP: When viewing Diagnostic Trouble Codes (DTCs) with the passenger knee airbag disconnected, an open circuit fault is normally retrieved.

Did the on-demand DTC change from B0013:11 to B0013:13?

Yes	GO to A11

No	GO to A9

A9 CHECK THE PASSENGER KNEE AIRBAG CIRCUITS FOR A SHORT TO GROUND

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect RCM C310A and C310B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2600-1	Ω	Ground
C2600-2	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to A12

No	REPAIR the circuit(s). Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

A10 CHECK THE PASSENGER KNEE AIRBAG CIRCUITS FOR A SHORT TO VOLTAGE

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Passenger Knee Airbag C2600 .

Lower the glove compartment.

Disconnect RCM C310A and C310B .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2600-1	V	Ground
C2600-2	V	Ground

Is any voltage present?

Yes	REPAIR the circuit(s). Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

No	GO to A12

NOTE: Make sure all SRS components and the RCM electrical connectors are connected before carrying out the self-test. If not, Diagnostic Trouble Codes (DTCs) will be recorded.

A11 CONFIRM THE PASSENGER KNEE AIRBAG FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Prior to reconnecting any previously disconnected SRS component:

Inspect connector(s) (including any inline connectors) for pushed-out, loose or spread terminals and loose or frayed wire connections at terminals.

Inspect wire harness for any damaged, pinched, cut or pierced wires.

Inspect RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

Inspect Passenger Knee Airbag C2600 and make sure the Connector Position Assurance (CPA) tabs are not broken and the clip is not damaged.

Repair any concerns found. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

Connect Passenger Knee Airbag C2600 .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was the original DTC retrieved on-demand during self-test?

Yes	INSTALL a new passenger knee airbag. REFER to: Passenger Knee Airbag . GO to A17.

No	In the process of diagnosing the fault, the fault condition has become intermittent. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. For DTC B0013:13 or B0013:1A, GO to A13. For DTC B0013:11, GO to A14. For DTC B0013:12, GO to A15.

NOTE: Make sure all SRS components and the RCM electrical connectors are connected before carrying out the self-test. If not, Diagnostic Trouble Codes (DTCs) will be recorded.

A12 CONFIRM THE RCM (RESTRAINTS CONTROL MODULE) FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Prior to reconnecting any previously disconnected SRS component:

Inspect connector(s) (including any inline connectors) for pushed-out, loose or spread terminals and loose or frayed wire connections at terminals.

Inspect wire harness for any damaged, pinched, cut or pierced wires.

Inspect RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

Repair any concerns found. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

Connect Passenger Knee Airbag C2600 (if previously disconnected).

Lower the glove compartment.

Connect RCM C310A and C310B (if previously disconnected).

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was the original DTC retrieved on-demand during self-test?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new RCM. REFER to: Restraints Control Module (RCM) . GO to A17.

No	In the process of diagnosing the fault, the fault condition has become intermittent. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. For DTC B0013:13 or B0013:1A, GO to A13. For DTC B0013:11, GO to A14. For DTC B0013:12, GO to A15.

A13 CHECK THE PASSENGER KNEE BOLSTER DEPLOYMENT CONTROL (DEPLOY_07_R) PID (PARAMETER IDENTIFICATION) FOR AN INTERMITTENT LOW RESISTANCE OR OPEN CIRCUIT FAULT

Using a diagnostic scan tool, view RCM Parameter Identifications (PIDs).

While monitoring the DEPLOY_07_R PID, attempt to recreate the fault by wiggling connectors (including any inline connectors) and flexing the wire harness frequently. Record the resistance value indicated by the PID.

Does the PID value read between 1.44 and 3.52 ohms?

Yes	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A16

No	Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering . REPAIR as necessary. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

A14 CHECK THE PASSENGER KNEE AIRBAG DEPLOYMENT CONTROL CIRCUITS FOR AN INTERMITTENT SHORT TO GROUND FAULT

Attempt to recreate the fault by wiggling connectors (including any inline connectors) and flexing the wire harness frequently.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B0013:11 retrieved on-demand during self-test?

Yes	DEPOWER the SRS and REPAIR as necessary. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

No	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A16.

A15 CHECK THE PASSENGER KNEE AIRBAG DEPLOYMENT CONTROL CIRCUITS FOR AN INTERMITTENT SHORT TO BATTERY FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Passenger Knee Airbag C2600 .

Lower the glove compartment.

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Attempt to recreate the fault by wiggling connectors (including any inline connectors) and flexing the wire harness frequently.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B0013:12 retrieved on-demand during self-test?

Yes	DEPOWER the SRS and REPAIR as necessary. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

No	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A16.

A16 CHECK THE HARNESS AND CONNECTORS

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Passenger Knee Airbag C2600 .

Inspect connector(s) (including any inline connectors) for corrosion, loose or spread terminals and loose or frayed wire connections at terminals.

Inspect wire harness for any damage, pinched, cut or pierced wires.

Inspect RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

Inspect Passenger Knee Airbag C2600 Connector Position Assurance (CPA) tab to verify that it is correctly seated and free of damage.

Were any concerns found?

Yes	REPAIR as necessary. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

No	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A17.

A17 CHECK FOR ADDITIONAL SRS (SUPPLEMENTAL RESTRAINT SYSTEM) DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition OFF.

Reconnect all SRS components (if previously disconnected).

If previously directed to depower the SRS, repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

NOTE: When selecting Restraints from the Self Test menu, DTCs are retrieved from the RCM and OCSM.

Using a diagnostic scan tool, perform

Restraints self-test.

Are any RCM and/or OCSM Diagnostic Trouble Codes (DTCs) retrieved on-demand during self-test?

Yes	Do not clear any Diagnostic Trouble Codes (DTCs) until all Diagnostic Trouble Codes (DTCs) have been resolved. DIAGNOSE and REPAIR the RCM and/or OCSM Diagnostic Trouble Codes (DTCs). REFER to: Airbag Supplemental Restraint System (SRS) .

No	The repair is complete. RETURN the vehicle to the customer.

DIAGNOSIS AND TESTING > PINPOINT TEST - DTC: H > B0050:11, B0050:12, B0050:13, B0050:1D

Refer to Supplemental Restraint System for schematic and connector information.

Normal Operation and Fault Conditions

The RCM continuously monitors the driver safety belt buckle switch circuits for the following faults:

- Open circuit
- Short to voltage
- Short to ground
- Current out of range
- Faulted driver safety belt buckle switch

If a fault is detected, the RCM stores DTC B0050:11, B0050:12, B0050:13 or B0050:1D in memory and sends a message to the IPC to illuminate the airbag warning indicator.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B0050:11	Driver Seatbelt Sensor: Circuit Short to Ground	A fault is indicated when the RCM senses a short to ground on the driver safety belt buckle switch circuit for more than 6 seconds.
B0050:12	Driver Seatbelt Sensor: Circuit Short to Battery	A fault is indicated when the RCM senses a short to voltage on the driver safety belt buckle switch circuit for more than 6 seconds.
B0050:13	Driver Seatbelt Sensor: Circuit Open	A fault is indicated when the RCM senses an open on either driver safety belt buckle switch circuit for more than 6 seconds.
B0050:1D	Driver Seatbelt Sensor: Circuit Current Out of Range	A fault is indicated when the RCM measures current outside of an acceptable range on the driver safety belt buckle switch circuit for more than 6 seconds.

Possible Sources

- Wiring, terminals or connectors
- Driver safety belt buckle switch
- RCM

Visual Inspection and Diagnostic Pre-checks

- Inspect for a damaged driver safety belt buckle.
- Inspect for damaged wiring harness(es).
- Inspect for loose or damaged connectors.

PINPOINT TEST A : B0050:11, B0050:12, B0050:13 AND B0050:1D

> *WARNING: Incorrect repair techniques or actions can cause an accidental Supplemental Restraint System (SRS) deployment. Never compromise or depart from these instructions. Failure to precisely follow all instructions could result in serious personal injury from an accidental deployment.*

> *NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may cause damage to the connector.*

> *NOTE: Most faults are due to connector and/or wiring concerns. Carry out a thorough inspection and verification before proceeding with the pinpoint test.*

> *NOTE: Only disconnect or reconnect SRS components when instructed to do so within a pinpoint test step. Failure to follow this instruction may result in incorrect diagnosis of the SRS.*

> *NOTE: Always make sure the correct SRS component is being installed. Parts released for other vehicles may not be compatible even if they appear physically similar. Check the part number listed in the Ford parts catalog to make sure the correct component is being installed. If an incorrect SRS component is installed, Diagnostic Trouble Codes (DTCs) may set.*

> *NOTE: The SRS must be fully operational and free of faults before releasing the vehicle to the customer.*

A1 RETRIEVE RCM (RESTRAINTS CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

> *WARNING: Before beginning any service procedure in this service information, refer to Safety Warnings in GENERAL INFORMATION . Failure to follow this instruction may result in serious personal injury.*

REFER to: Pyrotechnic Device Health and Safety Precautions .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B0050:11, B0050:12, B0050:13 and B0050:1D retrieved on-demand during self-test?

Yes	This fault cannot be cleared until it is corrected and the DTC is no longer retrieved on-demand during self-test. If DTC U3003:16 or U3003:17 is retrieved on-demand, DIAGNOSE those Diagnostic Trouble Codes (DTCs) first. REFER to: Pinpoint Test - DTC: AJ . If DTC U3003:16 or U3003:17 is not retrieved on-demand during self-test, DIAGNOSE the driver safety belt buckle switch Diagnostic Trouble Codes (DTCs). For DTC B0050:11 or B0050:1D, GO to A2. For DTC B0050:12, GO to A4. For DTC B0050:13, GO to A5.

No	If DTC U3003:16 or U3003:17 is retrieved on-demand, DIAGNOSE those Diagnostic Trouble Codes (DTCs) first. REFER to: Pinpoint Test - DTC: AJ . If DTC U3003:16 or U3003:17 is not retrieved on-demand during self-test, DIAGNOSE the driver safety belt buckle switch Continuous Memory Diagnostic Trouble Codes (CMDTCs). This is an intermittent fault when present as a Continuous Memory Diagnostic Trouble Code (CMDTC) only. GO to A10.

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the reported fault changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A2 CHECK THE DRIVER SAFETY BELT BUCKLE SWITCH DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (SHORT TO GROUND OR CURRENT OUT OF RANGE INDICATED)

Ignition OFF.

Disconnect Driver Safety Belt Buckle C3201 .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

DIAGNOSTIC TIP: When viewing Diagnostic Trouble Codes (DTCs) with the driver safety belt buckle switch disconnected, an open circuit fault is normally retrieved.

Did the on-demand DTC change from B0050:11 or B0050:1D to B0050:13?

Yes	GO to A8

No	For DTC B0050:11, GO to A3. For DTC B0050:1D, GO to A9.

A3 CHECK THE DRIVER SAFETY BELT BUCKLE SWITCH CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect RCM C310A and C310B .

Measure:

Positive Lead	Measurement / Action	Negative Lead

C3201-5	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to A9

No	REPAIR the circuit. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A11.

A4 CHECK THE DRIVER SAFETY BELT BUCKLE SWITCH CIRCUIT FOR A SHORT TO VOLTAGE

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect RCM C310A and C310B .

Disconnect Driver Side Airbag (Inline) C345 .

Disconnect Driver Safety Belt Buckle C3201 .

Repower the SRS. Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3201-5	V	Ground

Is any voltage present?

Yes	REPAIR the circuit. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A11.

No	GO to A9

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the reported fault changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A5 CHECK THE DRIVER SAFETY BELT BUCKLE SWITCH DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (OPEN INDICATED)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Driver Side Airbag (Inline) C345 .

Disconnect Driver Safety Belt Buckle C3201 .

Connect a fused jumper wire:

Lead 1	Measurement / Action	Lead 2
C3201-5		C3201-6

Repower the SRS. Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

DIAGNOSTIC TIP: When viewing Diagnostic Trouble Codes (DTCs) with the driver safety belt buckle switch circuits shorted together, a short to ground fault is normally retrieved.

Did the on-demand DTC change from B0050:13 to B0050:11?

Yes	REMOVE the fused jumper wire and GO to A8

No	REMOVE the fused jumper wire and GO to A6

A6 CHECK THE DRIVER SAFETY BELT BUCKLE SWITCH CIRCUIT FOR AN OPEN

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect RCM C310A and C310B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C310B-54	Ω	C3201-5

Is the resistance less than 0.5 ohm?

Yes	GO to A7

No	REPAIR the circuit. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A11.

A7 CHECK THE DRIVER SAFETY BELT BUCKLE SWITCH GROUND CIRCUIT FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3201-6	Ω	C310B-53

Is the resistance less than 3 ohms?

Yes	GO to A9

No	REPAIR the circuit. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A11.

NOTE: Make sure all SRS components and the RCM electrical connectors are connected before carrying out the self-test. If not, Diagnostic Trouble Codes (DTCs) will be recorded.

A8 CONFIRM THE DRIVER SAFETY BELT BUCKLE SWITCH FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Prior to reconnecting any previously disconnected SRS component:

inspect connector(s) (including any inline connectors) for pushed-out, loose or spread terminals and loose or frayed wire connections at terminals.

inspect wire harness for any damaged, pinched, cut or pierced wires.

inspect RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

repair any concerns found. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

Connect Driver Side Airbag (Inline) C345 (if previously disconnected).

Connect Driver Safety Belt Buckle C3201 .

Repower the SRS. Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was the original DTC retrieved on-demand during self-test?

Yes	INSTALL a new driver safety belt buckle (includes safety belt buckle switch. REFER to: Front Seatbelt Buckle . GO to A11.

No	In the process of diagnosing the fault, the fault condition has become intermittent. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A10.

NOTE: Make sure all SRS components and the RCM electrical connectors are connected before carrying out the self-test. If not, Diagnostic Trouble Codes (DTCs) will

be recorded.

A9 CONFIRM THE RCM (RESTRAINTS CONTROL MODULE) FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Prior to reconnecting any previously disconnected SRS component:

inspect connector(s) (including any inline connectors) for pushed-out, loose or spread terminals and loose or frayed wire connections at terminals.

inspect wire harness for any damaged, pinched, cut or pierced wires.

inspect RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

repair any concerns found. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

Connect RCM C310A and C310B (if previously disconnected).

Connect Driver Side Airbag (Inline) C345 (if previously disconnected).

Connect Driver Safety Belt Buckle C3201 .

Repower the SRS. Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was the original DTC retrieved on-demand during self-test?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new RCM. REFER to: Restraints Control Module (RCM) . GO to A11.

No	In the process of diagnosing the fault, the fault condition has become intermittent. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A10.

A10 CHECK FOR AN INTERMITTENT FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Driver Safety Belt Buckle C3201 .

Inspect connector(s) (including any inline connectors) for corrosion, loose or spread terminals and loose or frayed wire connections at terminals.

Inspect wire harness for any damage, pinched, cut or pierced wires.

Inspect RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

Repair any concerns found. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

Connect all previously disconnected component(s) / connector(s).

Repower the SRS. Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B0050:11, B0050:12, B0050:13 and B0050:1D retrieved on-demand during self-test?

Yes	This fault cannot be cleared until it is corrected and the DTC is no longer retrieved on-demand during self-test. For DTC B0050:11 or B0050:1D, GO to A2. For DTC B0050:12, GO to A4. For DTC B0050:13, GO to A5.

No	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A11.

A11 CHECK FOR ADDITIONAL SRS (SUPPLEMENTAL RESTRAINT SYSTEM) DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Reconnect all SRS components (if previously disconnected).

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

NOTE: When selecting Restraints from the Self Test menu, DTCs are retrieved from the RCM and OCSM.

Using a diagnostic scan tool, perform

Restraints self-test.

Are any RCM and/or OCSM Diagnostic Trouble Codes (DTCs) retrieved on-demand during self-test?

Yes	Do not clear any Diagnostic Trouble Codes (DTCs) until all Diagnostic Trouble Codes (DTCs) have been resolved. DIAGNOSE and REPAIR the RCM and/or OCSM Diagnostic Trouble Codes (DTCs). REFER to: Airbag Supplemental Restraint System (SRS) .

No	The repair is complete. RETURN the vehicle to the customer.

DIAGNOSIS AND TESTING > PINPOINT TEST - DTC: I > B0052:11, B0052:12, B0052:13, B0052:1D

Refer to Supplemental Restraint System for schematic and connector information.

Normal Operation and Fault Conditions

The RCM continuously monitors the passenger safety belt buckle switch circuits for the following faults:

- Open circuit
- Short to voltage
- Short to ground
- Current out of range
- Faulted passenger safety belt buckle switch

If a fault is detected, the RCM stores DTC B0052:11, B0052:12, B0052:13 or B0052:1D in memory and sends a message to the IPC to illuminate the airbag warning indicator.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B0052:11	Passenger Seatbelt Sensor: Circuit Short to Ground	A fault is indicated when the RCM senses a short to ground on the passenger safety belt buckle switch circuit for more than 6 seconds.
B0052:12	Passenger Seatbelt Sensor: Circuit Short to Battery	A fault is indicated when the RCM senses a short to voltage on the passenger safety belt buckle switch circuit for more than 6 seconds.
B0052:13	Passenger Seatbelt Sensor: Circuit Open	A fault is indicated when the RCM senses an open on either passenger safety belt buckle switch circuit for more than 6 seconds.
B0052:1D	Passenger Seatbelt Sensor: Circuit Current Out of Range	A fault is indicated when the RCM measures current outside of an acceptable range on the passenger safety belt buckle

		switch circuit for more than 6 seconds.

Possible Sources

- Wiring, terminals or connectors
- Passenger safety belt buckle switch
- RCM

Visual Inspection and Diagnostic Pre-checks

- Inspect for a damaged passenger safety belt buckle.
- Inspect for damaged wiring harness(es).
- Inspect for loose or damaged connectors.

PINPOINT TEST A : B0052:11, B0052:12, B0052:13 AND B0052:1D

WARNING: Incorrect repair techniques or actions can cause an accidental Supplemental Restraint System (SRS) deployment. Never compromise or depart from these instructions. Failure to precisely follow all instructions could result in serious personal injury from an accidental deployment.

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may cause damage to the connector.

NOTE: Most faults are due to connector and/or wiring concerns. Carry out a thorough inspection and verification before proceeding with the pinpoint test.

NOTE: Only disconnect or reconnect SRS components when instructed to do so within a pinpoint test step. Failure to follow this instruction may result in incorrect diagnosis of the SRS.

NOTE: Always make sure the correct SRS component is being installed. Parts released for other vehicles may not be compatible even if they appear physically similar. Check the part number listed in the Ford parts catalog to make sure the correct component is being installed. If an incorrect SRS component is installed, Diagnostic Trouble Codes (DTCs) may set.

NOTE: The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

A1 RETRIEVE RCM (RESTRAINTS CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

WARNING: Before beginning any service procedure in this service information, refer to Safety Warnings in GENERAL INFORMATION . Failure to follow this instruction may result in serious personal injury.

REFER to: Pyrotechnic Device Health and Safety Precautions .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B0052:11, B0052:12, B0052:13 and B0052:1D retrieved on-demand during self-test?

Yes	This fault cannot be cleared until it is corrected and the DTC is no longer retrieved on-demand during self-test. If DTC U3003:16 or U3003:17 is retrieved on-demand, DIAGNOSE those Diagnostic Trouble Codes (DTCs) first. REFER to: Pinpoint Test - DTC: AJ . If DTC U3003:16 or U3003:17 is not retrieved on-demand during self-test, DIAGNOSE the passenger safety belt buckle switch Diagnostic Trouble Codes (DTCs). For DTC B0052:11 or B0052:1D, GO to A2. For DTC B0052:12, GO to A4. For DTC B0052:13, GO to A5.

No	If DTC U3003:16 or U3003:17 is retrieved on-demand, DIAGNOSE those Diagnostic Trouble Codes (DTCs) first. REFER to: Pinpoint Test - DTC: AJ . If DTC U3003:16 or U3003:17 is not retrieved on-demand during self-test, DIAGNOSE the passenger safety belt buckle switch Continuous Memory Diagnostic Trouble Codes (CMDTCs). This is an intermittent fault when present as a Continuous Memory Diagnostic Trouble Code (CMDTC) only. GO to A10.

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the reported fault changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A2 CHECK THE PASSENGER SAFETY BELT BUCKLE SWITCH DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (SHORT TO GROUND OR CURRENT OUT OF RANGE INDICATED)

Ignition OFF.

Disconnect Passenger Safety Belt Buckle C3238 .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

DIAGNOSTIC TIP: When viewing Diagnostic Trouble Codes (DTCs) with the passenger safety belt buckle switch disconnected, an open circuit fault is normally retrieved. A Belt Tension Sensor (BTS) circuit fault will also be present in the OCSM, since the passenger safety belt buckle switch shares a connector with the Belt Tension Sensor (BTS).

Did the on-demand DTC change from B0052:11 or B0052:1D to B0052:13?

Yes	GO to A8

No	For DTC B0052:11, GO to A3. For DTC B0052:1D, GO to A9.

A3 CHECK THE PASSENGER SAFETY BELT BUCKLE SWITCH CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect RCM C310A and C310B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3238-5	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to A9

No	REPAIR the circuit. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A11.

A4 CHECK THE PASSENGER SAFETY BELT BUCKLE SWITCH CIRCUIT FOR A SHORT TO VOLTAGE

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect RCM C310A and C310B .

Disconnect Passenger Side Airbag (Inline) C219 .

Disconnect Passenger Safety Belt Buckle C3238 .

Repower the SRS. Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3238-5	V	Ground

Is any voltage present?

Yes	REPAIR the circuit. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A11.

No	GO to A9

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the reported fault changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A5 CHECK THE PASSENGER SAFETY BELT BUCKLE SWITCH DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (OPEN INDICATED)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Passenger Side Airbag (Inline) C219 .

Disconnect Passenger Safety Belt Buckle C3238 .

Connect a fused jumper wire:

Lead 1	Measurement / Action	Lead 2
C3238-5		C3238-6

Repower the SRS. Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

DIAGNOSTIC TIP: When viewing Diagnostic Trouble Codes (DTCs) with the passenger safety belt buckle switch circuits shorted together, a short to ground fault is normally retrieved. A Belt Tension Sensor (BTS) circuit fault will also be present in the OCSM, since the passenger safety belt buckle switch shares a connector with the Belt Tension Sensor (BTS).

Did the on-demand DTC change from B0052:13 to B0052:11?

Yes	REMOVE the fused jumper wire and GO to A8

No	REMOVE the fused jumper wire and GO to A6

A6 CHECK THE PASSENGER SAFETY BELT BUCKLE SWITCH CIRCUIT FOR AN OPEN

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect RCM C310A and C310B .

Measure:

Positive Lead	Measurement / Action	Negative Lead

C310B-55	Ω	C3238-5

Is the resistance less than 0.5 ohm?

Yes	GO to A7

No	REPAIR the circuit. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A11.

A7 CHECK THE PASSENGER SAFETY BELT BUCKLE SWITCH GROUND CIRCUIT FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3238-6	Ω	Ground

Is the resistance less than 3 ohms?

Yes	GO to A9

No	REPAIR the circuit. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A11.

NOTE: Make sure all SRS components and the RCM electrical connectors are connected before carrying out the self-test. If not, Diagnostic Trouble Codes (DTCs) will be recorded.

A8 CONFIRM THE PASSENGER SAFETY BELT BUCKLE SWITCH FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Prior to reconnecting any previously disconnected SRS component:

inspect connector(s) (including any inline connectors) for pushed-out, loose or spread terminals and loose or frayed wire connections at terminals.

inspect wire harness for any damaged, pinched, cut or pierced wires.

inspect RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

repair any concerns found. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

Connect Passenger Side Airbag (Inline) C219 (if previously disconnected).

Connect Passenger Safety Belt Buckle C3238 .

Repower the SRS. Do not prove out the SRS at this time. REFER to: Supplemental Restraint

System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was the original DTC retrieved on-demand during self-test?

Yes	INSTALL a new passenger safety belt buckle (includes safety belt buckle switch. REFER to: Front Seatbelt Buckle . GO to A11.

No	In the process of diagnosing the fault, the fault condition has become intermittent. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A10.

NOTE: Make sure all SRS components and the RCM electrical connectors are connected before carrying out the self-test. If not, Diagnostic Trouble Codes (DTCs) will be recorded.

A9 CONFIRM THE RCM (RESTRAINTS CONTROL MODULE) FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Prior to reconnecting any previously disconnected SRS component:

inspect connector(s) (including any inline connectors) for pushed-out, loose or spread terminals and loose or frayed wire connections at terminals.

inspect wire harness for any damaged, pinched, cut or pierced wires.

inspect RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

repair any concerns found. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

Connect RCM C310A and C310B (if previously disconnected).

Connect Passenger Side Airbag (Inline) C219 (if previously disconnected).

Connect Passenger Safety Belt Buckle C3238 .

Repower the SRS. Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was the original DTC retrieved on-demand during self-test?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service

	Bulletins (TSBs) address this concern, INSTALL a new RCM. REFER to: Restraints Control Module (RCM) . GO to A11.

No	In the process of diagnosing the fault, the fault condition has become intermittent. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A10.

A10 CHECK FOR AN INTERMITTENT FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Passenger Safety Belt Buckle C3238 .

Inspect connector(s) (including any inline connectors) for corrosion, loose or spread terminals and loose or frayed wire connections at terminals.

Inspect wire harness for any damage, pinched, cut or pierced wires.

Inspect RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

Repair any concerns found. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

Connect all previously disconnected component(s) / connector(s).

Repower the SRS. Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B0052:11, B0052:12, B0052:13 and B0052:1D retrieved on-demand during self-test?

Yes	This fault cannot be cleared until it is corrected and the DTC is no longer retrieved on-demand during self-test. For DTC B0052:11 or B0052:1D, GO to A2. For DTC B0052:12, GO to A4. For DTC B0052:13, GO to A5.

No	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A11.

A11 CHECK FOR ADDITIONAL SRS (SUPPLEMENTAL RESTRAINT SYSTEM) DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Reconnect all SRS components (if previously disconnected).

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

> *NOTE: When selecting Restraints from the Self Test menu, DTCs are retrieved from the RCM and OCSM.*

Using a diagnostic scan tool, perform

Restraints self-test.

Are any RCM and/or OCSM Diagnostic Trouble Codes (DTCs) retrieved on-demand during self-test?

Yes	Do not clear any Diagnostic Trouble Codes (DTCs) until all Diagnostic Trouble Codes (DTCs) have been resolved. DIAGNOSE and REPAIR the RCM and/or OCSM Diagnostic Trouble Codes (DTCs). REFER to: Airbag Supplemental Restraint System (SRS) .

No	The repair is complete. RETURN the vehicle to the customer.

DIAGNOSIS AND TESTING > PINPOINT TEST - DTC: J > B0070:11, B0070:12, B0070:13, B0070:1A

Refer to Supplemental Restraint System for schematic and connector information.

Normal Operation and Fault Conditions

The RCM continuously monitors the driver safety belt anchor pretensioner circuits for the following faults:

- Resistance out of range
- Unexpected voltage
- Short to ground
- Faulted driver safety belt anchor pretensioner

If a fault is detected, the RCM stores DTC B0070:11, B0070:12, B0070:13 or B0070:1A in memory and sends a message to the IPC to illuminate the airbag warning indicator.

The RCM analyzes the deployment loop resistance to determine if a fault exists. The value displayed in the PID is the deployment loop resistance measured by the RCM. If the value displayed is lower or higher than the desired range (refer to diagram below in illustration), the RCM can set a DTC. As the deployment loop resistance drifts farther outside the desired range, the chance for a DTC increases. Small variations in resistance can occur due to the effect of road vibrations on terminal fit. Crimps and terminals can be affected by stress and harness movement and can cause an increase in resistance due to wire strain. These variables can result in an intermittent fault. For this reason, the test requires the PID value to be within the desired range before the fault is considered repaired, regardless if the module is reporting an on-demand DTC at the time of diagnosis. Following this direction helps make sure that minor changes in

resistance do not create a repeat concern. This test uses process of elimination to diagnose each part of the deployment loop circuit including:

- Wiring
- Connections
- Driver safety belt anchor pretensioner
- RCM



DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B0070:11	Driver Seatbelt Pretensioner "A" Deployment Control: Circuit Short to Ground	A fault is indicated when the RCM senses a short to ground on either driver safety belt anchor pretensioner circuit for more than 6 seconds.
B0070:12	Driver Seatbelt Pretensioner "A" Deployment Control: Circuit Short to Battery	A fault is indicated when the RCM senses a short to voltage on either driver safety belt anchor pretensioner circuit for more than 6 seconds.
B0070:13	Driver Seatbelt Pretensioner "A" Deployment Control: Circuit Open	A fault is indicated when the RCM measures more than the desired resistance between the driver safety belt anchor pretensioner circuits for more than 6 seconds.
B0070:1A	Driver Seatbelt Pretensioner "A" Deployment Control: Circuit Resistance Below Threshold	A fault is indicated when the RCM measures less than the desired resistance between the driver safety belt anchor pretensioner circuits for more than 6 seconds.

Possible Sources

- Wiring, terminals or connectors
- Driver safety belt anchor pretensioner
- RCM

PINPOINT TEST A : B0070:11, B0070:12, B0070:13 AND B0070:1A

WARNING: Incorrect repair techniques or actions can cause an accidental

Supplemental Restraint System (SRS) deployment. Never compromise or depart from these instructions. Failure to precisely follow all instructions could result in serious personal injury from an accidental deployment.

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may cause damage to the connector.

NOTE: Most faults are due to connector and/or wiring concerns. Carry out a thorough inspection and verification before proceeding with the pinpoint test.

NOTE: Only disconnect or reconnect SRS components when instructed to do so within a pinpoint test step. Failure to follow this instruction may result in incorrect diagnosis of the SRS.

NOTE: Always make sure the correct SRS component is being installed. Parts released for other vehicles may not be compatible even if they appear physically similar. Check the part number listed in the Ford parts catalog to make sure the correct component is being installed. If an incorrect SRS component is installed, Diagnostic Trouble Codes (DTCs) may set.

NOTE: The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

A1 RETRIEVE RCM (RESTRAINTS CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

WARNING: Before beginning any service procedure in this service information, refer to Safety Warnings in GENERAL INFORMATION . Failure to follow this instruction may result in serious personal injury.

REFER to: Pyrotechnic Device Health and Safety Precautions .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B0070:11, B0070:12, B0070:13 and B0070:1A retrieved on-demand during self-test?

Yes	This fault cannot be cleared until it is corrected and the DTC is no longer retrieved on-demand during self-test. If DTC U3003:16 or U3003:17 is retrieved on-demand, DIAGNOSE those Diagnostic Trouble Codes (DTCs) first. REFER to: Pinpoint Test - DTC: AJ . If DTC U3003:16 or U3003:17 is not retrieved on-demand during self-test, DIAGNOSE the anchor pretensioner Diagnostic Trouble Codes (DTCs). For DTC B0070:13 or B0070:1A, GO to A2. For DTC

	B0070:11, GO to A8. For DTC B0070:12, GO to A10.

No	This is an intermittent fault when present as a Continuous Memory Diagnostic Trouble Code (CMDTC) only. If DTC U3003:16 or U3003:17 is retrieved on-demand, DIAGNOSE those Diagnostic Trouble Codes (DTCs) first. REFER to: Pinpoint Test - DTC: AJ . If DTC U3003:16 or U3003:17 is not retrieved on-demand during self-test, DIAGNOSE the anchor pretensioner Continuous Memory Diagnostic Trouble Codes (CMDTCs). For DTC B0070:13 or B0070:1A, GO to A13. For DTC B0070:11, GO to A14. For DTC B0070:12, GO to A15.

A2 CHECK THE DRIVER SEATBELT ANCHOR PRETENSIONER DEPLOYMENT CONTROL (DEPLOY_29_RES) PID (PARAMETER IDENTIFICATION)

Using a diagnostic scan tool, view RCM Parameter Identifications (PIDs).

Monitor and record the resistance value displayed by the DEPLOY_29_RES PID.

Does the PID value read between 1.44 and 3.52 ohms?

Yes	GO to A12

No	GO to A3

A3 CHECK THE DRIVER SEATBELT ANCHOR PRETENSIONER DEPLOYMENT CONTROL (DEPLOY_29_RES) PID (PARAMETER IDENTIFICATION) WHILE CARRYING OUT THE HARNESS TEST

While monitoring the DEPLOY_29_RES PID, carry out the harness test of the driver safety belt anchor pretensioner circuits and accessible connectors (including any inline connectors) by wiggling and flexing the wire harness and connectors frequently. Record the resistance value indicated by the PID.

Does the PID value read between 1.44 and 3.52 ohms while carrying out the harness test?

Yes	DEPOWER the SRS and REPAIR the connector, terminals or wire harness as needed. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

No	For PID value less than 1.44 ohms, GO to A4. For PID value greater than 3.52 ohms, GO to A6.

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the reported fault changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A4 CHECK THE DRIVER SAFETY BELT ANCHOR PRETENSIONER DEPLOYMENT CONTROL DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (LOW RESISTANCE INDICATED)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Driver Safety Belt Anchor Pretensioner C3065 .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

DIAGNOSTIC TIP: When viewing Diagnostic Trouble Codes (DTCs) with the driver safety belt anchor pretensioner disconnected, an open circuit fault is normally retrieved.

Did the on-demand DTC change from B0070:1A to B0070:13?

Yes	GO to A11

No	GO to A5

A5 CHECK FOR A SHORT BETWEEN THE DRIVER SAFETY BELT ANCHOR PRETENSIONER CIRCUITS

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect RCM C310A and C310B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3065-1	Ω	C3065-2

Is the resistance greater than 10, 000 ohms?

Yes	GO to A12

No	REPAIR the circuit(s). Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

A6 CHECK THE DRIVER SAFETY BELT ANCHOR PRETENSIONER CIRCUITS FOR AN OPEN

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Driver Safety Belt Anchor Pretensioner C3065 .

Disconnect RCM C310A and C310B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C310B-16	Ω	C3065-1
C310B-15	Ω	C3065-2

Are the resistances less than 0.5 ohm?

Yes	GO to A7

No	REPAIR the circuits. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the reported fault changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A7 CHECK THE DRIVER SAFETY BELT ANCHOR PRETENSIONER DEPLOYMENT CONTROL DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (OPEN INDICATED)

Connect RCM C310A and C310B .

Connect a fused jumper wire:

Lead 1	Measurement / Action	Lead 2
C3065-1		C3065-2

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

DIAGNOSTIC TIP: When viewing Diagnostic Trouble Codes (DTCs) with the driver safety belt anchor pretensioner circuits shorted together, a low resistance fault is normally retrieved.

Did the on-demand DTC change from B0070:13 to B0070:1A?

Yes	REMOVE the fused jumper wire and GO to A11

No	REMOVE the fused jumper wire and GO to A12

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the reported fault changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A8 CHECK THE DRIVER SAFETY BELT ANCHOR PRETENSIONER DEPLOYMENT CONTROL DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (SHORT TO GROUND INDICATED)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Driver Safety Belt Anchor Pretensioner C3065 .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

DIAGNOSTIC TIP: When viewing Diagnostic Trouble Codes (DTCs) with the driver safety belt anchor pretensioner disconnected, an open circuit fault is normally retrieved.

Did the on-demand DTC change from B0070:11 to B0070:13?

Yes	GO to A11

No	GO to A9

A9 CHECK THE DRIVER SAFETY BELT ANCHOR PRETENSIONER CIRCUITS FOR A SHORT TO GROUND

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect RCM C310A and C310B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3065-1	Ω	Ground
C3065-2	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to A12

No	REPAIR the circuit(s). Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

A10 CHECK THE DRIVER SAFETY BELT ANCHOR PRETENSIONER CIRCUITS FOR A SHORT TO VOLTAGE

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Driver Safety Belt Anchor Pretensioner C3065 .

Disconnect RCM C310A and C310B .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3065-1		Ground
C3065-2		Ground

Is any voltage present?

Yes	REPAIR the circuit(s). Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

No	GO to A12

NOTE: Make sure all SRS components and the RCM electrical connectors are connected before carrying out the self-test. If not, Diagnostic Trouble Codes (DTCs) will be recorded.

A11 CONFIRM THE DRIVER SAFETY BELT ANCHOR PRETENSIONER FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Prior to reconnecting any previously disconnected SRS component:

Inspect connector(s) (including any inline connectors) for pushed-out, loose or spread terminals and loose or frayed wire connections at terminals.

Inspect wire harness for any damaged, pinched, cut or pierced wires.

Inspect RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

Inspect Driver Safety Belt Anchor Pretensioner C3065 and make sure the Connector Position Assurance (CPA) tabs are not broken and the clip is not damaged.

Repair any concerns found. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

Connect Driver Safety Belt Anchor Pretensioner C3065 .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was the original DTC retrieved on-demand during self-test?

Yes	INSTALL a new driver safety belt retractor (includes anchor pretensioner. REFER to: Front Seatbelt Retractor and Pretensioner . GO to A17.

No	In the process of diagnosing the fault, the fault condition has become intermittent. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. For DTC B0070:13 or B0070:1A, GO to A13. For DTC B0070:11, GO to A14. For DTC B0070:12, GO to A15.

NOTE: Make sure all SRS components and the RCM electrical connectors are connected before carrying out the self-test. If not, Diagnostic Trouble Codes (DTCs) will be recorded.

A12 CONFIRM THE RCM (RESTRAINTS CONTROL MODULE) FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Prior to reconnecting any previously disconnected SRS component:

Inspect connector(s) (including any inline connectors) for pushed-out, loose or spread terminals and loose or frayed wire connections at terminals.

Inspect wire harness for any damaged, pinched, cut or pierced wires.

Inspect RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

Repair any concerns found. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

Connect Driver Safety Belt Anchor Pretensioner C3065 (if previously disconnected).

Connect RCM C310A and C310B (if previously disconnected).

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was the original DTC retrieved on-demand during self-test?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new RCM. REFER to: Restraints Control Module (RCM)). GO to A17.

No	In the process of diagnosing the fault, the fault condition has become intermittent. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. For DTC B0070:13 or B0070:1A, GO to A13. For DTC B0070:11, GO to A14. For DTC B0070:12, GO to A15.

A13 CHECK THE DRIVER SEATBELT ANCHOR PRETENSIONER DEPLOYMENT CONTROL (DEPLOY_29_RES) PID (PARAMETER IDENTIFICATION) FOR AN INTERMITTENT LOW RESISTANCE OR OPEN CIRCUIT FAULT

Using a diagnostic scan tool, view RCM Parameter Identifications (PIDs).

While monitoring the DEPLOY_29_RES PID, attempt to recreate the fault by wiggling connectors (including any inline connectors) and flexing the wire harness frequently. Record the resistance value indicated by the PID.

Does the PID value read between 1.44 and 3.52 ohms?

Yes	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A16.

No	Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering . REPAIR as necessary. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

A14 CHECK THE DRIVER SAFETY BELT ANCHOR PRETENSIONER DEPLOYMENT CONTROL CIRCUITS FOR AN INTERMITTENT SHORT TO GROUND FAULT

Attempt to recreate the fault by wiggling connectors (including any inline connectors) and flexing the wire harness frequently.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B0070:11 retrieved on-demand during self-test?

Yes	DEPOWER the SRS and REPAIR as necessary. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

No	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A16.

A15 CHECK THE DRIVER SAFETY BELT ANCHOR PRETENSIONER DEPLOYMENT CONTROL CIRCUITS FOR AN INTERMITTENT SHORT TO BATTERY FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Driver Safety Belt Anchor Pretensioner C3065 .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Attempt to recreate the fault by wiggling connectors (including any inline connectors) and flexing the wire harness frequently.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B0070:12 retrieved on-demand during self-test?

Yes	DEPOWER the SRS and REPAIR as necessary. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

No	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A16.

A16 CHECK THE HARNESS AND CONNECTORS

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Driver Safety Belt Anchor Pretensioner C3065 .

Inspect connector(s) (including any inline connectors) for corrosion, loose or spread terminals and loose or frayed wire connections at terminals.

Inspect wire harness for any damage, pinched, cut or pierced wires.

Inspect RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

Inspect Driver Safety Belt Anchor Pretensioner C3065 Connector Position Assurance (CPA) tab to verify that it is correctly seated and free of damage.

Were any concerns found?

Yes	REPAIR as necessary. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

No	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint

	test. GO to A17.

A17 CHECK FOR ADDITIONAL SRS (SUPPLEMENTAL RESTRAINT SYSTEM) DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition OFF.

Reconnect all SRS components (if previously disconnected).

If previously directed to depower the SRS, repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

NOTE: When selecting Restraints from the Self Test menu, DTCs are retrieved from the RCM and OCSM.

Using a diagnostic scan tool, perform

Restraints self-test.

Are any RCM and/or OCSM Diagnostic Trouble Codes (DTCs) retrieved on-demand during self-test?

Yes	Do not clear any Diagnostic Trouble Codes (DTCs) until all Diagnostic Trouble Codes (DTCs) have been resolved. DIAGNOSE and REPAIR the RCM and/or OCSM Diagnostic Trouble Codes (DTCs). REFER to: Airbag Supplemental Restraint System (SRS) .

No	The repair is complete. RETURN the vehicle to the customer.

DIAGNOSIS AND TESTING > PINPOINT TEST - DTC: K > B0072:11, B0072:12, B0072:13, B0072:1A

Refer to Supplemental Restraint System for schematic and connector information.

Normal Operation and Fault Conditions

The RCM continuously monitors the passenger safety belt anchor pretensioner circuits for the following faults:

- Resistance out of range
- Unexpected voltage
- Short to ground
- Faulted passenger safety belt anchor pretensioner

If a fault is detected, the RCM stores DTC B0072:11, B0072:12, B0072:13 or B0072:1A in memory and

sends a message to the IPC to illuminate the airbag warning indicator.

The RCM analyzes the deployment loop resistance to determine if a fault exists. The value displayed in the PID is the deployment loop resistance measured by the RCM. If the value displayed is lower or higher than the desired range (refer to diagram below in illustration), the RCM can set a DTC. As the deployment loop resistance drifts farther outside the desired range, the chance for a DTC increases. Small variations in resistance can occur due to the effect of road vibrations on terminal fit. Crimps and terminals can be affected by stress and harness movement and can cause an increase in resistance due to wire strain. These variables can result in an intermittent fault. For this reason, the test requires the PID value to be within the desired range before the fault is considered repaired, regardless if the module is reporting an on-demand DTC at the time of diagnosis. Following this direction helps make sure that minor changes in resistance do not create a repeat concern. This test uses process of elimination to diagnose each part of the deployment loop circuit including:

- Wiring
- Connections
- Passenger safety belt anchor pretensioner
- RCM



DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B0072:11	Passenger Seatbelt Pretensioner "A" Deployment Control: Circuit Short to Ground	A fault is indicated when the RCM senses a short to ground on either passenger safety belt anchor pretensioner circuit for more than 6 seconds.
B0072:12	Passenger Seatbelt Pretensioner "A" Deployment Control: Circuit Short to Battery	A fault is indicated when the RCM senses a short to voltage on either passenger safety belt anchor pretensioner circuit for more than 6 seconds.
B0072:13	Passenger Seatbelt Pretensioner "A" Deployment Control: Circuit Open	A fault is indicated when the RCM measures more than the desired resistance between the passenger safety belt anchor pretensioner circuits for more than 6 seconds.
B0072:1A	Passenger Seatbelt Pretensioner "A" Deployment Control: Circuit Resistance Below Threshold	A fault is indicated when the RCM measures less than the desired resistance between the passenger safety belt anchor pretensioner circuits for more than 6 seconds.

Possible Sources

- Wiring, terminals or connectors
- Passenger safety belt anchor pretensioner
- RCM

PINPOINT TEST A : B0072:11, B0072:12, B0072:13 AND B0072:1A

WARNING: Incorrect repair techniques or actions can cause an accidental Supplemental Restraint System (SRS) deployment. Never compromise or depart from these instructions. Failure to precisely follow all instructions could result in serious personal injury from an accidental deployment.

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may cause damage to the connector.

NOTE: Most faults are due to connector and/or wiring concerns. Carry out a thorough inspection and verification before proceeding with the pinpoint test.

NOTE: Only disconnect or reconnect SRS components when instructed to do so within a pinpoint test step. Failure to follow this instruction may result in incorrect diagnosis of the SRS.

NOTE: Always make sure the correct SRS component is being installed. Parts released for other vehicles may not be compatible even if they appear physically similar. Check the part number listed in the Ford parts catalog to make sure the correct component is being installed. If an incorrect SRS component is installed, Diagnostic Trouble Codes (DTCs) may set.

NOTE: The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

A1 RETRIEVE RCM (RESTRAINTS CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

WARNING: Before beginning any service procedure in this service information, refer to Safety Warnings in GENERAL INFORMATION . Failure to follow this instruction may result in serious personal injury.

REFER to: Pyrotechnic Device Health and Safety Precautions .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B0072:11, B0072:12, B0072:13 and B0072:1A retrieved on-demand during self-test?

Yes	This fault cannot be cleared until it is corrected and the DTC is no longer retrieved on-demand during self-test. If DTC U3003:16 or U3003:17 is retrieved on-demand, DIAGNOSE those Diagnostic Trouble Codes (DTCs) first. REFER to: Pinpoint Test - DTC: AJ . If DTC U3003:16 or U3003:17 is not retrieved on-demand during self-test, DIAGNOSE the anchor pretensioner Diagnostic Trouble Codes (DTCs). For DTC B0072:13 or B0072:1A, GO to A2. For DTC B0072:11, GO to A8. For DTC B0072:12, GO to A10.

No	This is an intermittent fault when present as a Continuous Memory Diagnostic Trouble Code (CMDTC) only. If DTC U3003:16 or U3003:17 is retrieved on-demand, DIAGNOSE those Diagnostic Trouble Codes (DTCs) first. REFER to: Pinpoint Test - DTC: AJ . If DTC U3003:16 or U3003:17 is not retrieved on-demand during self-test, DIAGNOSE the anchor pretensioner Continuous Memory Diagnostic Trouble Codes (CMDTCs). For DTC B0072:13 or B0072:1A, GO to A13. For DTC B0072:11, GO to A14. For DTC B0072:12, GO to A15.

A2 CHECK THE PASSENGER SEATBELT ANCHOR PRETENSIONER DEPLOYMENT CONTROL (DEPLOY_30_RES) PID (PARAMETER IDENTIFICATION)

Using a diagnostic scan tool, view RCM Parameter Identifications (PIDs).

Monitor and record the resistance value displayed by the DEPLOY_30_RES PID.

Does the PID value read between 1.44 and 3.52 ohms?

Yes	GO to A12

No	GO to A3

A3 CHECK THE PASSENGER SEATBELT ANCHOR PRETENSIONER DEPLOYMENT CONTROL (DEPLOY_30_RES) PID (PARAMETER IDENTIFICATION) WHILE CARRYING OUT THE HARNESS TEST

While monitoring the DEPLOY_30_RES PID, carry out the harness test of the passenger safety belt anchor pretensioner circuits and accessible connectors (including any inline connectors) by wiggling and flexing the wire harness and connectors frequently. Record the resistance value indicated by the PID.

Does the PID value read between 1.44 and 3.52 ohms while carrying out the harness test?

Yes	DEPOWER the SRS and REPAIR the connector, terminals or wire harness as needed. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

No	For PID value less than 1.44 ohms, GO to A4 For PID value greater than 3.52 ohms, GO to A6.

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by

inducing a different fault condition. If the reported fault changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A4 CHECK THE PASSENGER SAFETY BELT ANCHOR PRETENSIONER DEPLOYMENT CONTROL DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (LOW RESISTANCE INDICATED)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Passenger Safety Belt Anchor Pretensioner C3066 .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

DIAGNOSTIC TIP: When viewing Diagnostic Trouble Codes (DTCs) with the passenger safety belt anchor pretensioner disconnected, an open circuit fault is normally retrieved.

Did the on-demand DTC change from B0072:1A to B0072:13?

Yes	GO to A11

No	GO to A5

A5 CHECK FOR A SHORT BETWEEN THE PASSENGER SAFETY BELT ANCHOR PRETENSIONER CIRCUITS

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect RCM C310A and C310B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3066-1	Ω	C3066-2

Is the resistance greater than 10, 000 ohms?

Yes	GO to A12

No	REPAIR the circuit(s). Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

A6 CHECK THE PASSENGER SAFETY BELT ANCHOR PRETENSIONER CIRCUITS FOR AN OPEN

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Passenger Safety Belt Anchor Pretensioner C3066 .

Disconnect RCM C310A and C310B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C310B-13	Ω	C3066-1
C310B-14	Ω	C3066-2

Are the resistances less than 0.5 ohm?

Yes	GO to A7

No	REPAIR the circuits. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the reported fault changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A7 CHECK THE PASSENGER SAFETY BELT ANCHOR PRETENSIONER DEPLOYMENT CONTROL DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (OPEN INDICATED)

Connect RCM C310A and C310B .

Connect a fused jumper wire:

Lead 1	Measurement / Action	Lead 2
C3066-1		C3066-2

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

DIAGNOSTIC TIP: When viewing Diagnostic Trouble Codes (DTCs) with the passenger safety belt anchor pretensioner circuits shorted together, a low resistance fault is normally retrieved.

Did the on-demand DTC change from B0072:13 to B0072:1A?

Yes	REMOVE the fused jumper wire and GO to A11

No	REMOVE the fused jumper wire and GO to A12

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the reported fault changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A8 CHECK THE PASSENGER SAFETY BELT ANCHOR PRETENSIONER DEPLOYMENT CONTROL DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (SHORT TO GROUND INDICATED)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Passenger Safety Belt Anchor Pretensioner C3066 .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

DIAGNOSTIC TIP: When viewing Diagnostic Trouble Codes (DTCs) with the passenger safety belt anchor pretensioner disconnected, an open circuit fault is normally retrieved.

Did the on-demand DTC change from B0072:11 to B0072:13?

Yes	GO to A11

No	GO to A9

A9 CHECK THE PASSENGER SAFETY BELT ANCHOR PRETENSIONER CIRCUITS FOR A SHORT TO GROUND

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect RCM C310A and C310B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3066-1	Ω	Ground
C3066-2	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to A12

No	REPAIR the circuit(s). Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

A10 CHECK THE PASSENGER SAFETY BELT ANCHOR PRETENSIONER CIRCUITS FOR A SHORT TO VOLTAGE

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Passenger Safety Belt Anchor Pretensioner C3066 .

Disconnect RCM C310A and C310B .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3066-1		Ground
C3066-2		Ground

Is any voltage present?

Yes	REPAIR the circuit(s). Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

No	GO to A12

NOTE: Make sure all SRS components and the RCM electrical connectors are connected before carrying out the self-test. If not, Diagnostic Trouble Codes (DTCs) will be recorded.

A11 CONFIRM THE PASSENGER SAFETY BELT ANCHOR PRETENSIONER FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Prior to reconnecting any previously disconnected SRS component:

Inspect connector(s) (including any inline connectors) for pushed-out, loose or spread

terminals and loose or frayed wire connections at terminals.

Inspect wire harness for any damaged, pinched, cut or pierced wires.

Inspect RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

Inspect Passenger Safety Belt Anchor Pretensioner C3066 and make sure the Connector Position Assurance (CPA) tabs are not broken and the clip is not damaged.

Repair any concerns found. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

Connect Passenger Safety Belt Anchor Pretensioner C3066 .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was the original DTC retrieved on-demand during self-test?

Yes	INSTALL a new passenger safety belt retractor (includes anchor pretensioner. REFER to: Front Seatbelt Retractor and Pretensioner . GO to A17

No	In the process of diagnosing the fault, the fault condition has become intermittent. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. For DTC B0072:13 or B0072:1A, GO to A13. For DTC B0072:11, GO to A14. For DTC B0072:12, GO to A15.

NOTE: Make sure all SRS components and the RCM electrical connectors are connected before carrying out the self-test. If not, Diagnostic Trouble Codes (DTCs) will be recorded.

A12 CONFIRM THE RCM (RESTRAINTS CONTROL MODULE) FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Prior to reconnecting any previously disconnected SRS component:

Inspect connector(s) (including any inline connectors) for pushed-out, loose or spread terminals and loose or frayed wire connections at terminals.

Inspect wire harness for any damaged, pinched, cut or pierced wires.

Inspect RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

Repair any concerns found. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

Connect Passenger Safety Belt Anchor Pretensioner C3066 (if previously disconnected).

Connect RCM C310A and C310B (if previously disconnected).

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was the original DTC retrieved on-demand during self-test?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new RCM. REFER to: Restraints Control Module (RCM) . GO to A17.

No	In the process of diagnosing the fault, the fault condition has become intermittent. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. For DTC B0072:13 or B0072:1A, GO to A13. For DTC B0072:11, GO to A14. For DTC B0072:12, GO to A15.

A13 CHECK THE PASSENGER SEATBELT ANCHOR PRETENSIONER DEPLOYMENT CONTROL (DEPLOY_30_RES) PID (PARAMETER IDENTIFICATION) FOR AN INTERMITTENT LOW RESISTANCE OR OPEN CIRCUIT FAULT

Using a diagnostic scan tool, view RCM Parameter Identifications (PIDs).

While monitoring the DEPLOY_30_RES PID, attempt to recreate the fault by wiggling connectors (including any inline connectors) and flexing the wire harness frequently. Record the resistance value indicated by the PID.

Does the PID value read between 1.44 and 3.52 ohms?

Yes	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A16

No	Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering . REPAIR as necessary. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17

A14 CHECK THE PASSENGER SAFETY BELT ANCHOR PRETENSIONER DEPLOYMENT CONTROL CIRCUITS FOR AN INTERMITTENT SHORT TO GROUND FAULT

Attempt to recreate the fault by wiggling connectors (including any inline connectors) and flexing the wire harness frequently.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B0072:11 retrieved on-demand during self-test?

Yes	DEPOWER the SRS and REPAIR as necessary. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

No	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A16.

A15 CHECK THE PASSENGER SAFETY BELT ANCHOR PRETENSIONER DEPLOYMENT CONTROL CIRCUITS FOR AN INTERMITTENT SHORT TO BATTERY FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Passenger Safety Belt Anchor Pretensioner C3066 .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Attempt to recreate the fault by wiggling connectors (including any inline connectors) and flexing the wire harness frequently.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B0072:12 retrieved on-demand during self-test?

Yes	DEPOWER the SRS and REPAIR as necessary. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

No	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A16.

A16 CHECK THE HARNESS AND CONNECTORS

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Passenger Safety Belt Anchor Pretensioner C3066 .

Inspect connector(s) (including any inline connectors) for corrosion, loose or spread terminals and loose or frayed wire connections at terminals.

Inspect wire harness for any damage, pinched, cut or pierced wires.

Inspect RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

Inspect Passenger Safety Belt Anchor Pretensioner C3066 Connector Position Assurance (CPA) tab to verify that it is correctly seated and free of damage.

Were any concerns found?

Yes	REPAIR as necessary. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

No	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A17.

A17 CHECK FOR ADDITIONAL SRS (SUPPLEMENTAL RESTRAINT SYSTEM) DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition OFF.

Reconnect all SRS components (if previously disconnected).

If previously directed to depower the SRS, repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

NOTE: When selecting Restraints from the Self Test menu, DTCs are retrieved from the RCM and OCSM.

Using a diagnostic scan tool, perform

Restraints self-test.

Are any RCM and/or OCSM Diagnostic Trouble Codes (DTCs) retrieved on-demand during self-test?

Yes	Do not clear any Diagnostic Trouble Codes (DTCs) until all Diagnostic Trouble Codes (DTCs) have been resolved. DIAGNOSE and REPAIR the RCM and/or OCSM Diagnostic Trouble Codes (DTCs). REFER to: Airbag Supplemental Restraint System (SRS) .

No	The repair is complete. RETURN the vehicle to the customer.

DIAGNOSIS AND TESTING > PINPOINT TEST - DTC: L > B007E:11, B007E:12, B007E:13, B007E:1A

Refer to Supplemental Restraint System for schematic and connector information.

Normal Operation and Fault Conditions

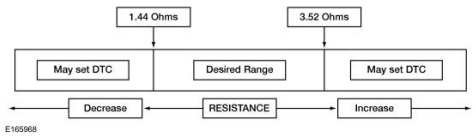
The RCM continuously monitors the driver safety belt retractor pretensioner circuits for the following faults:

- Resistance out of range
- Unexpected voltage
- Short to ground
- Faulted driver safety belt retractor pretensioner

If a fault is detected, the RCM stores DTC B007E:11, B007E:12, B007E:13 or B007E:1A in memory and sends a message to the IPC to illuminate the airbag warning indicator.

The RCM analyzes the deployment loop resistance to determine if a fault exists. The value displayed in the PID is the deployment loop resistance measured by the RCM. If the value displayed is lower or higher than the desired range (refer to diagram below in illustration), the RCM can set a DTC. As the deployment loop resistance drifts farther outside the desired range, the chance for a DTC increases. Small variations in resistance can occur due to the effect of road vibrations on terminal fit. Crimps and terminals can be affected by stress and harness movement and can cause an increase in resistance due to wire strain. These variables can result in an intermittent fault. For this reason, the test requires the PID value to be within the desired range before the fault is considered repaired, regardless if the module is reporting an on-demand DTC at the time of diagnosis. Following this direction helps make sure that minor changes in resistance do not create a repeat concern. This test uses process of elimination to diagnose each part of the deployment loop circuit including:

- Wiring
- Connections
- Driver safety belt retractor pretensioner
- RCM



DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B007E:11	Driver Seatbelt Pretensioner "C" Deployment Control: Circuit Short to Ground	A fault is indicated when the RCM senses a short to ground on either driver safety belt retractor pretensioner circuit for more than 6 seconds.
B007E:12	Driver Seatbelt Pretensioner "C" Deployment Control: Circuit Short to Battery	A fault is indicated when the RCM senses a short to voltage on either driver safety belt retractor pretensioner circuit for more than 6 seconds.
B007E:13	Driver Seatbelt Pretensioner "C" Deployment Control: Circuit Open	A fault is indicated when the RCM measures more than the desired resistance between the driver safety belt retractor pretensioner

		circuits for more than 6 seconds.
B007E:1A	Driver Seatbelt Pretensioner "C" Deployment Control: Circuit Resistance Below Threshold	A fault is indicated when the RCM measures less than the desired resistance between the driver safety belt retractor pretensioner circuits for more than 6 seconds.

Possible Sources

- Wiring, terminals or connectors
- Driver safety belt retractor pretensioner
- RCM

PINPOINT TEST A : B007E:11, B007E:12, B007E:13 AND B007E:1A

WARNING: Incorrect repair techniques or actions can cause an accidental Supplemental Restraint System (SRS) deployment. Never compromise or depart from these instructions. Failure to precisely follow all instructions could result in serious personal injury from an accidental deployment.

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may cause damage to the connector.

NOTE: Most faults are due to connector and/or wiring concerns. Carry out a thorough inspection and verification before proceeding with the pinpoint test.

NOTE: Only disconnect or reconnect SRS components when instructed to do so within a pinpoint test step. Failure to follow this instruction may result in incorrect diagnosis of the SRS.

NOTE: Always make sure the correct SRS component is being installed. Parts released for other vehicles may not be compatible even if they appear physically similar. Check the part number to make sure the correct component is being installed. If an incorrect SRS component is installed, Diagnostic Trouble Codes (DTCs) may set.

NOTE: The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

A1 RETRIEVE RCM (RESTRAINTS CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

WARNING: Before beginning any service procedure in this service information, refer to Safety Warnings in GENERAL INFORMATION . Failure to follow this instruction may result in serious personal injury.

REFER to: Pyrotechnic Device Health and Safety Precautions .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B007E:11, B007E:12, B007E:13 and B007E:1A retrieved on-demand during self-test?

Yes	This fault cannot be cleared until it is corrected and the DTC is no longer retrieved on-demand during self-test. If DTC U3003:16 or U3003:17 is retrieved on-demand, DIAGNOSE those Diagnostic Trouble Codes (DTCs) first. REFER to: Pinpoint Test - DTC: AJ . If DTC U3003:16 or U3003:17 is not retrieved on-demand during self-test, DIAGNOSE the retractor pretensioner Diagnostic Trouble Codes (DTCs). For DTC B007E:13 or B007E:1A, GO to A2. For DTC B007E:11, GO to A8. For DTC B007E:12, GO to A10.

No	This is an intermittent fault when present as a Continuous Memory Diagnostic Trouble Code (CMDTC) only. If DTC U3003:16 or U3003:17 is retrieved on-demand, DIAGNOSE those Diagnostic Trouble Codes (DTCs) first. REFER to: Pinpoint Test - DTC: AJ . If DTC U3003:16 or U3003:17 is not retrieved on-demand during self-test, DIAGNOSE the retractor pretensioner Continuous Memory Diagnostic Trouble Codes (CMDTCs). For DTC B007E:13 or B007E:1A, GO to A13. For DTC B007E:11, GO to A14. For DTC B007E:12, GO to A15.

A2 CHECK THE DRIVER SEATBELT RETRACTOR PRETENSIONER DEPLOYMENT CONTROL (DEPLOY_23_R) PID (PARAMETER IDENTIFICATION)

Using a diagnostic scan tool, view RCM Parameter Identifications (PIDs).

Monitor and record the resistance value displayed by the DEPLOY_23_R PID.

Does the PID value read between 1.44 and 3.52 ohms?

Yes	GO to A12

No	GO to A3

A3 CHECK THE DRIVER SEATBELT RETRACTOR PRETENSIONER DEPLOYMENT CONTROL (DEPLOY_23_R) PID (PARAMETER IDENTIFICATION) WHILE CARRYING OUT THE HARNESS TEST

While monitoring the DEPLOY_23_R PID, carry out the harness test of the driver safety belt retractor pretensioner circuits and accessible connectors (including any inline connectors) by wiggling and flexing the wire harness and connectors frequently. Record the resistance value indicated by the PID.

Does the PID value read between 1.44 and 3.52 ohms while carrying out the harness test?

Yes	DEPOWER the SRS and REPAIR the connector, terminals or wire harness as needed. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

No	For PID value less than 1.44 ohms, GO to A4 For PID value greater than 3.52 ohms, GO to A6.

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the reported fault changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A4 CHECK THE DRIVER SAFETY BELT RETRACTOR PRETENSIONER DEPLOYMENT CONTROL DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (LOW RESISTANCE INDICATED)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Driver Safety Belt Retractor Pretensioner C323 .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

DIAGNOSTIC TIP: When viewing Diagnostic Trouble Codes (DTCs) with the driver safety belt retractor pretensioner disconnected, an open circuit fault is normally retrieved.

Did the on-demand DTC change from B007E:1A to B007E:13?

Yes	GO to A11

No	GO to A5

A5 CHECK FOR A SHORT BETWEEN THE DRIVER SAFETY BELT RETRACTOR PRETENSIONER CIRCUITS

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect RCM C310A and C310B .

Measure:

Positive Lead	Measurement / Action	Negative Lead

C323-1	Ω	C323-2

Is the resistance greater than 10, 000 ohms?

Yes	GO to A12

No	REPAIR the circuit(s). Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17

A6 CHECK THE DRIVER SAFETY BELT RETRACTOR PRETENSIONER CIRCUITS FOR AN OPEN

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Driver Safety Belt Retractor Pretensioner C323 .

Disconnect RCM C310A and C310B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C310B-52	Ω	C323-1
C310B-51	Ω	C323-2

Are the resistances less than 0.5 ohm?

Yes	GO to A7

No	REPAIR the circuits. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the reported fault changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A7 CHECK THE DRIVER SAFETY BELT RETRACTOR PRETENSIONER DEPLOYMENT CONTROL DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (OPEN INDICATED)

Connect RCM C310A and C310B .

Connect a fused jumper wire:

Lead 1	Measurement / Action	Lead 2
C323-1		C323-2

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

DIAGNOSTIC TIP: When viewing Diagnostic Trouble Codes (DTCs) with the driver safety belt retractor pretensioner circuits shorted together, a low resistance fault is normally retrieved.

Did the on-demand DTC change from B007E:13 to B007E:1A?

Yes	REMOVE the fused jumper wire and GO to A11

No	REMOVE the fused jumper wire and GO to A12

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the reported fault changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A8 CHECK THE DRIVER SAFETY BELT RETRACTOR PRETENSIONER DEPLOYMENT CONTROL DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (SHORT TO GROUND INDICATED)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Driver Safety Belt Retractor Pretensioner C323 .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

DIAGNOSTIC TIP: When viewing Diagnostic Trouble Codes (DTCs) with the driver safety belt retractor pretensioner disconnected, an open circuit fault is normally retrieved.

Did the on-demand DTC change from B007E:11 to B007E:13?

Yes	GO to A11

No	GO to A9

A9 CHECK THE DRIVER SAFETY BELT RETRACTOR PRETENSIONER CIRCUITS FOR A SHORT TO GROUND

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect RCM C310A and C310B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C323-1	Ω	Ground
C323-2	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to A12

No	REPAIR the circuit(s). Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

A10 CHECK THE DRIVER SAFETY BELT RETRACTOR PRETENSIONER CIRCUITS FOR A SHORT TO VOLTAGE

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Driver Safety Belt Retractor Pretensioner C323 .

Disconnect RCM C310A and C310B .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C323-1	V	Ground
C323-2	V	Ground

Is any voltage present?

Yes	REPAIR the circuit(s). Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

No	GO to A12

NOTE: Make sure all SRS components and the RCM electrical connectors are

connected before carrying out the self-test. If not, Diagnostic Trouble Codes (DTCs) will be recorded.

A11 CONFIRM THE DRIVER SAFETY BELT RETRACTOR PRETENSIONER FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Prior to reconnecting any previously disconnected SRS component:

Inspect connector(s) (including any inline connectors) for pushed-out, loose or spread terminals and loose or frayed wire connections at terminals.

Inspect wire harness for any damaged, pinched, cut or pierced wires.

Inspect RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

Inspect Driver Safety Belt Retractor Pretensioner C323 and make sure the Connector Position Assurance (CPA) tabs are not broken and the clip is not damaged.

Repair any concerns found. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

Connect Driver Safety Belt Retractor Pretensioner C323 .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was the original DTC retrieved on-demand during self-test?

Yes	INSTALL a new driver safety belt retractor (includes retractor pretensioner). REFER to: Front Seatbelt Retractor and Pretensioner . GO to A17.

No	In the process of diagnosing the fault, the fault condition has become intermittent. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. For DTC B007E:13 or B007E:1A, GO to A13. For DTC B007E:11, GO to A14. For DTC B007E:12, GO to A15.

NOTE: Make sure all SRS components and the RCM electrical connectors are connected before carrying out the self-test. If not, Diagnostic Trouble Codes (DTCs) will be recorded.

A12 CONFIRM THE RCM (RESTRAINTS CONTROL MODULE) FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Prior to reconnecting any previously disconnected SRS component:

Inspect connector(s) (including any inline connectors) for pushed-out, loose or spread terminals and loose or frayed wire connections at terminals.

Inspect wire harness for any damaged, pinched, cut or pierced wires.

Inspect RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

Repair any concerns found. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

Connect Driver Safety Belt Retractor Pretensioner C323 (if previously disconnected).

Connect RCM C310A and C310B (if previously disconnected).

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was the original DTC retrieved on-demand during self-test?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new RCM. REFER to: Restraints Control Module (RCM) . GO to A17.

No	In the process of diagnosing the fault, the fault condition has become intermittent. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. For DTC B007E:13 or B007E:1A, GO to A13. For DTC B007E:11, GO to A14. For DTC B007E:12, GO to A15.

A13 CHECK THE DRIVER SEATBELT RETRACTOR PRETENSIONER DEPLOYMENT CONTROL (DEPLOY_23_R) PID (PARAMETER IDENTIFICATION) FOR AN INTERMITTENT LOW RESISTANCE OR OPEN CIRCUIT FAULT

Using a diagnostic scan tool, view RCM Parameter Identifications (PIDs).

While monitoring the DEPLOY_23_R PID, attempt to recreate the fault by wiggling connectors (including any inline connectors) and flexing the wire harness frequently. Record the resistance value indicated by the PID.

Does the PID value read between 1.44 and 3.52 ohms?

Yes	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A16.

No	Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering . REPAIR

	as necessary. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

A14 CHECK THE DRIVER SAFETY BELT RETRACTOR PRETENSIONER DEPLOYMENT CONTROL CIRCUITS FOR AN INTERMITTENT SHORT TO GROUND FAULT

Attempt to recreate the fault by wiggling connectors (including any inline connectors) and flexing the wire harness frequently.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B007E:11 retrieved on-demand during self-test?

Yes	DEPOWER the SRS and REPAIR as necessary. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

No	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A16.

A15 CHECK THE DRIVER SAFETY BELT RETRACTOR PRETENSIONER DEPLOYMENT CONTROL CIRCUITS FOR AN INTERMITTENT SHORT TO BATTERY FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Driver Safety Belt Retractor Pretensioner C323 .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Attempt to recreate the fault by wiggling connectors (including any inline connectors) and flexing the wire harness frequently.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B007E:12 retrieved on-demand during self-test?

Yes	DEPOWER the SRS and REPAIR as necessary. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

No	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A16.

A16 CHECK THE HARNESS AND CONNECTORS

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Driver Safety Belt Retractor Pretensioner C323 .

Inspect connector(s) (including any inline connectors) for corrosion, loose or spread terminals and loose or frayed wire connections at terminals.

Inspect wire harness for any damage, pinched, cut or pierced wires.

Inspect RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

Inspect Driver Safety Belt Retractor Pretensioner C323 Connector Position Assurance (CPA) tab to verify that it is correctly seated and free of damage.

Were any concerns found?

Yes	REPAIR as necessary. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

No	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A17.

A17 CHECK FOR ADDITIONAL SRS (SUPPLEMENTAL RESTRAINT SYSTEM) DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition OFF.

Reconnect all SRS components (if previously disconnected).

If previously directed to depower the SRS, repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

NOTE: When selecting Restraints from the Self Test menu, DTCs are retrieved from the RCM and OCSM.

Using a diagnostic scan tool, perform

Restraints self-test.

Are any RCM and/or OCSM Diagnostic Trouble Codes (DTCs) retrieved on-demand during self-test?

Yes	Do not clear any Diagnostic Trouble Codes (DTCs) until all Diagnostic Trouble Codes (DTCs) have been resolved. DIAGNOSE and REPAIR the RCM and/or OCSM Diagnostic Trouble Codes (DTCs). REFER to: Airbag Supplemental Restraint System (SRS) .

No	The repair is complete. RETURN the vehicle to the customer.

DIAGNOSIS AND TESTING > PINPOINT TEST - DTC: M > B007F:11, B007F:12, B007F:13, B007F:1A

Refer to Supplemental Restraint System for schematic and connector information.

Normal Operation and Fault Conditions

The RCM continuously monitors the passenger safety belt retractor pretensioner circuits for the following faults:

- Resistance out of range
- Unexpected voltage
- Short to ground
- Faulted passenger safety belt retractor pretensioner

If a fault is detected, the RCM stores DTC B007F:11, B007F:12, B007F:13 or B007F:1A in memory and sends a message to the IPC to illuminate the airbag warning indicator.

The RCM analyzes the deployment loop resistance to determine if a fault exists. The value displayed in the PID is the deployment loop resistance measured by the RCM. If the value displayed is lower or higher than the desired range (refer to diagram below in illustration), the RCM can set a DTC. As the deployment loop resistance drifts farther outside the desired range, the chance for a DTC increases. Small variations in resistance can occur due to the effect of road vibrations on terminal fit. Crimps and terminals can be affected by stress and harness movement and can cause an increase in resistance due to wire strain. These variables can result in an intermittent fault. For this reason, the test requires the PID value to be within the desired range before the fault is considered repaired, regardless if the module is reporting an on-demand DTC at the time of diagnosis. Following this direction helps make sure that minor changes in resistance do not create a repeat concern. This test uses process of elimination to diagnose each part of the deployment loop circuit including:

- Wiring
- Connections
- Passenger safety belt retractor pretensioner
- RCM



DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B007F:11	Passenger Seatbelt Pretensioner	A fault is indicated when the RCM

	"C" Deployment Control: Circuit Short to Ground	senses a short to ground on either passenger safety belt retractor pretensioner circuit for more than 6 seconds.
B007F:12	Passenger Seatbelt Pretensioner "C" Deployment Control: Circuit Short to Battery	A fault is indicated when the RCM senses a short to voltage on either passenger safety belt retractor pretensioner circuit for more than 6 seconds.
B007F:13	Passenger Seatbelt Pretensioner "C" Deployment Control: Circuit Open	A fault is indicated when the RCM measures more than the desired resistance between the passenger safety belt retractor pretensioner circuits for more than 6 seconds.
B007F:1A	Passenger Seatbelt Pretensioner "C" Deployment Control: Circuit Resistance Below Threshold	A fault is indicated when the RCM measures less than the desired resistance between the passenger safety belt retractor pretensioner circuits for more than 6 seconds.

Possible Sources

- Wiring, terminals or connectors
- Passenger safety belt retractor pretensioner
- RCM

PINPOINT TEST A : B007F:11, B007F:12, B007F:13 AND B007F:1A

WARNING: Incorrect repair techniques or actions can cause an accidental Supplemental Restraint System (SRS) deployment. Never compromise or depart from these instructions. Failure to precisely follow all instructions could result in serious personal injury from an accidental deployment.

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may cause damage to the connector.

NOTE: Most faults are due to connector and/or wiring concerns. Carry out a thorough inspection and verification before proceeding with the pinpoint test.

NOTE: Only disconnect or reconnect SRS components when instructed to do so within a pinpoint test step. Failure to follow this instruction may result in incorrect diagnosis of the SRS.

NOTE: Always make sure the correct SRS component is being installed. Parts released for other vehicles may not be compatible even if they appear physically similar. If an incorrect SRS component is installed, Diagnostic Trouble Codes (DTCs) may set.

NOTE: The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

A1 RETRIEVE RCM (RESTRAINTS CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

WARNING: Before beginning any service procedure in this service information, refer to Safety Warnings in GENERAL INFORMATION . Failure to follow this instruction may result in serious personal injury.

REFER to: Pyrotechnic Device Health and Safety Precautions .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B007F:11, B007F:12, B007F:13 and B007F:1A retrieved on-demand during self-test?

Yes	This fault cannot be cleared until it is corrected and the DTC is no longer retrieved on-demand during self-test.If DTC U3003:16 or U3003:17 is retrieved on-demand, DIAGNOSE those Diagnostic Trouble Codes (DTCs) first. REFER to: Pinpoint Test - DTC: AJ . If DTC U3003:16 or U3003:17 is not retrieved on-demand during self-test, DIAGNOSE the retractor pretensioner Diagnostic Trouble Codes (DTCs). For DTC B007F:13 or B007F:1A, GO to A2. For DTC B007F:11, GO to A8. For DTC B007F:12, GO to A10.
No	This is an intermittent fault when present as a Continuous Memory Diagnostic Trouble Code (CMDTC) only. If DTC U3003:16 or U3003:17 is retrieved on-demand, DIAGNOSE those Diagnostic Trouble Codes (DTCs) first. REFER to: Pinpoint Test - DTC: AJ . If DTC U3003:16 or U3003:17 is not retrieved on-demand during self-test, DIAGNOSE the retractor pretensioner Continuous Memory Diagnostic Trouble Codes (CMDTCs). For DTC B007F:13 or B007F:1A, GO to A13. For DTC B007F:11, GO to A14. For DTC B007F:12, GO to A15.

A2 CHECK THE PASSENGER SEATBELT RETRACTOR PRETENSIONER DEPLOYMENT CONTROL (DEPLOY_24_R) PID (PARAMETER IDENTIFICATION)

Using a diagnostic scan tool, view RCM Parameter Identifications (PIDs).

Monitor and record the resistance value displayed by the DEPLOY_24_R PID.

Does the PID value read between 1.44 and 3.52 ohms?

Yes	GO to A12

No	GO to A3

A3 CHECK THE PASSENGER SEATBELT RETRACTOR PRETENSIONER DEPLOYMENT CONTROL (DEPLOY_24_R) PID (PARAMETER IDENTIFICATION) WHILE CARRYING OUT THE HARNESS TEST

While monitoring the DEPLOY_24_R PID, carry out the harness test of the passenger safety belt retractor pretensioner circuits and accessible connectors (including any inline connectors) by wiggling and flexing the wire harness and connectors frequently. Record the resistance value indicated by the PID.

Does the PID value read between 1.44 and 3.52 ohms while carrying out the harness test?

Yes	DEPOWER the SRS and REPAIR the connector, terminals or wire harness as needed. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

No	For PID value less than 1.44 ohms, GO to A4. For PID value greater than 3.52 ohms, GO to A6.

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the reported fault changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A4 CHECK THE PASSENGER SAFETY BELT RETRACTOR PRETENSIONER DEPLOYMENT CONTROL DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (LOW RESISTANCE INDICATED)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Passenger Safety Belt Retractor Pretensioner C303 .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

DIAGNOSTIC TIP: When viewing Diagnostic Trouble Codes (DTCs) with the passenger safety belt retractor pretensioner disconnected, an open circuit fault is normally retrieved.

Did the on-demand DTC change from B007F:1A to B007F:13?

Yes	GO to A11

No	GO to A5

A5 CHECK FOR A SHORT BETWEEN THE PASSENGER SAFETY BELT RETRACTOR PRETENSIONER CIRCUITS

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect RCM C310A and C310B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C303-1	Ω	C303-2

Is the resistance greater than 10, 000 ohms?

Yes	GO to A12

No	REPAIR the circuit(s). Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

A6 CHECK THE PASSENGER SAFETY BELT RETRACTOR PRETENSIONER CIRCUITS FOR AN OPEN

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Passenger Safety Belt Retractor Pretensioner C303 .

Disconnect RCM C310A and C310B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C310B-49	Ω	C303-1
C310B-50	Ω	C303-2

Are the resistances less than 0.5 ohm?

Yes	GO to A7

No	REPAIR the circuits. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the reported fault changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A7 CHECK THE PASSENGER SAFETY BELT RETRACTOR PRETENSIONER DEPLOYMENT CONTROL DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (OPEN INDICATED)

Connect RCM C310A and C310B .

Connect a fused jumper wire:

Lead 1	Measurement / Action	Lead 2
C303-1		C303-2

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

DIAGNOSTIC TIP: When viewing Diagnostic Trouble Codes (DTCs) with the passenger safety belt retractor pretensioner circuits shorted together, a low resistance fault is normally retrieved.

Did the on-demand DTC change from B007F:13 to B007F:1A?

Yes	REMOVE the fused jumper wire and GO to A11

No	REMOVE the fused jumper wire and GO to A12

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the reported fault changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A8 CHECK THE PASSENGER SAFETY BELT RETRACTOR PRETENSIONER DEPLOYMENT CONTROL DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (SHORT TO GROUND INDICATED)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Passenger Safety Belt Retractor Pretensioner C303 .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

DIAGNOSTIC TIP: When viewing Diagnostic Trouble Codes (DTCs) with the passenger safety belt retractor pretensioner disconnected, an open circuit fault is normally retrieved.

Did the on-demand DTC change from B007F:11 to B007F:13?

Yes	GO to A11

No	GO to A9

A9 CHECK THE PASSENGER SAFETY BELT RETRACTOR PRETENSIONER CIRCUITS FOR A SHORT TO GROUND

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect RCM C310A and C310B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C303-1	Ω	Ground
C303-2	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to A12

No	REPAIR the circuit(s). Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

A10 CHECK THE PASSENGER SAFETY BELT RETRACTOR PRETENSIONER CIRCUITS FOR A SHORT TO VOLTAGE

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Passenger Safety Belt Retractor Pretensioner C303 .

Disconnect RCM C310A and C310B .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C303-1	V	Ground

C303-2		Ground

Is any voltage present?

Yes	REPAIR the circuit(s). Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

No	GO to A12

NOTE: Make sure all SRS components and the RCM electrical connectors are connected before carrying out the self-test. If not, Diagnostic Trouble Codes (DTCs) will be recorded.

A11 CONFIRM THE PASSENGER SAFETY BELT RETRACTOR PRETENSIONER FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Prior to reconnecting any previously disconnected SRS component:

Inspect connector(s) (including any inline connectors) for pushed-out, loose or spread terminals and loose or frayed wire connections at terminals.

Inspect wire harness for any damaged, pinched, cut or pierced wires.

Inspect RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

Inspect Passenger Safety Belt Retractor Pretensioner C303 and make sure the Connector Position Assurance (CPA) tabs are not broken and the clip is not damaged.

Repair any concerns found. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

Connect Passenger Safety Belt Retractor Pretensioner C303 .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was the original DTC retrieved on-demand during self-test?

Yes	INSTALL a new passenger safety belt retractor (includes retractor pretensioner. REFER to: Front Seatbelt Retractor and Pretensioner . GO to A17.

No	In the process of diagnosing the fault, the fault condition has become intermittent. Do not install any new SRS components at this time. Install SRS components only when directed to

	do so in the pinpoint test. For DTC B007F:13 or B007F:1A, GO to A13. For DTC B007F:11, GO to A14. For DTC B007F:12, GO to A15.

NOTE: Make sure all SRS components and the RCM electrical connectors are connected before carrying out the self-test. If not, Diagnostic Trouble Codes (DTCs) will be recorded.

A12 CONFIRM THE RCM (RESTRAINTS CONTROL MODULE) FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Prior to reconnecting any previously disconnected SRS component:

Inspect connector(s) (including any inline connectors) for pushed-out, loose or spread terminals and loose or frayed wire connections at terminals.

Inspect wire harness for any damaged, pinched, cut or pierced wires.

Inspect RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

Repair any concerns found. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

Connect Passenger Safety Belt Retractor Pretensioner C303 (if previously disconnected).

Connect RCM C310A and C310B (if previously disconnected).

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was the original DTC retrieved on-demand during self-test?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new RCM. REFER to: Restraints Control Module (RCM) . GO to A17.

No	In the process of diagnosing the fault, the fault condition has become intermittent. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. For DTC B007F:13 or B007F:1A, GO to A13. For DTC B007F:11, GO to A14. For DTC B007F:12, GO to A15.

A13 CHECK THE PASSENGER SEATBELT RETRACTOR PRETENSIONER DEPLOYMENT CONTROL (DEPLOY_24_R) PID (PARAMETER IDENTIFICATION) FOR AN INTERMITTENT LOW RESISTANCE OR OPEN CIRCUIT FAULT

Using a diagnostic scan tool, view RCM Parameter Identifications (PIDs).

While monitoring the DEPLOY_24_R PID, attempt to recreate the fault by wiggling connectors (including any inline connectors) and flexing the wire harness frequently. Record the resistance value indicated by the PID.

Does the PID value read between 1.44 and 3.52 ohms?

Yes	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A16.

No	Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering . REPAIR as necessary. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

A14 CHECK THE PASSENGER SAFETY BELT RETRACTOR PRETENSIONER DEPLOYMENT CONTROL CIRCUITS FOR AN INTERMITTENT SHORT TO GROUND FAULT

Attempt to recreate the fault by wiggling connectors (including any inline connectors) and flexing the wire harness frequently.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B007F:11 retrieved on-demand during self-test?

Yes	DEPOWER the SRS and REPAIR as necessary. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

No	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A16

A15 CHECK THE PASSENGER SAFETY BELT RETRACTOR PRETENSIONER DEPLOYMENT CONTROL CIRCUITS FOR AN INTERMITTENT SHORT TO BATTERY FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Passenger Safety Belt Retractor Pretensioner C303 .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Attempt to recreate the fault by wiggling connectors (including any inline connectors) and flexing the wire harness frequently.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B007F:12 retrieved on-demand during self-test?

Yes	DEPOWER the SRS and REPAIR as necessary. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

No	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A16

A16 CHECK THE HARNESS AND CONNECTORS

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Passenger Safety Belt Retractor Pretensioner C303 .

Inspect connector(s) (including any inline connectors) for corrosion, loose or spread terminals and loose or frayed wire connections at terminals.

Inspect wire harness for any damage, pinched, cut or pierced wires.

Inspect RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

Inspect Passenger Safety Belt Retractor Pretensioner C303 Connector Position Assurance (CPA) tab to verify that it is correctly seated and free of damage.

Were any concerns found?

Yes	REPAIR as necessary. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

No	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A17.

A17 CHECK FOR ADDITIONAL SRS (SUPPLEMENTAL RESTRAINT SYSTEM) DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition OFF.

Reconnect all SRS components (if previously disconnected).

If previously directed to depower the SRS, repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

NOTE: When selecting Restraints from the Self Test menu, DTCs are retrieved from the RCM and OCSM.

Using a diagnostic scan tool, perform

Restraints self-test.

Are any RCM and/or OCSM Diagnostic Trouble Codes (DTCs) retrieved on-demand during self-test?

Yes	Do not clear any Diagnostic Trouble Codes (DTCs) until all Diagnostic Trouble Codes (DTCs) have been resolved. DIAGNOSE and REPAIR the RCM and/or OCSM Diagnostic Trouble Codes (DTCs). REFER to: Airbag Supplemental Restraint System (SRS) .

No	The repair is complete. RETURN the vehicle to the customer.

DIAGNOSIS AND TESTING > PINPOINT TEST - DTC: N > B00A0:09, B00A0:4A, B00A0:63, B00A0:64 AND B00A0:68

Refer to Supplemental Restraint System for schematic and connector information.

Normal Operation and Fault Conditions

The RCM is in constant communication with various control modules on the High Speed Controller Area Network 2 (HS2-CAN). One of those modules is the OCSM. The RCM continuously monitors the High Speed Controller Area Network 2 (HS2-CAN) for fault messages reported by the OCSM. The RCM also checks for the correct identification of the OCSM. If the RCM receives fault message(s) from the OCSM, it stores DTC B00A0:09, B00A0:4A, B00A0:63, B00A0:64 or B00A0:68 in memory and sends a message to the IPC to illuminate the airbag warning indicator.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B00A0:09	Occupant Classification System: Component Failure	A fault is indicated when the RCM receives a message from the OCSM that a fault exists within the OCS.
B00A0:4A	Occupant Classification System: Incorrect Component Installed	A fault is indicated when the RCM senses the OCSM is present but not configured.
B00A0:63	Occupant Classification System: Circuit / Component Protection Time-Out	A fault is indicated when the RCM receives 8 or more invalid states from the OCSM.
B00A0:64	Occupant Classification System: Signal Plausibility Failure	A fault is indicated when the RCM receives messages containing upper or lower data limits other than limits stored in memory.

B00A0:68	Occupant Classification System: Event Information	A fault is indicated when the RCM receives a message from the OCSM that indicates an OCS fault is present.

Possible Sources

- OCSM
- OCSM Diagnostic Trouble Codes (DTCs)
- RCM

PINPOINT TEST A : B00A0:09, B00A0:4A, B00A0:63, B00A0:64 AND B00A0:68

> *NOTE: Most faults are due to connector and/or wiring concerns. Carry out a thorough inspection and verification before proceeding with the pinpoint test.*

> *NOTE: Only disconnect or reconnect SRS components when instructed to do so within a pinpoint test step. Failure to follow this instruction may result in incorrect diagnosis of the SRS.*

> *NOTE: Always make sure the correct SRS component is being installed. Parts released for other vehicles may not be compatible even if they appear physically similar. Check the part number listed in the Ford parts catalog to make sure the correct component is being installed. If an incorrect SRS component is installed, Diagnostic Trouble Codes (DTCs) may set.*

> *NOTE: The SRS must be fully operational and free of faults before releasing the vehicle to the customer.*

A1 RETRIEVE RCM (RESTRAINTS CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

> *WARNING: Before beginning any service procedure in this service information, refer to Safety Warnings in GENERAL INFORMATION . Failure to follow this instruction may result in serious personal injury.*

REFER to: Health and Safety Precautions .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B00A0:09, B00A0:4A, B00A0:63, B00A0:64 or B00A0:68 retrieved on-demand during self-test?

Yes	This fault cannot be cleared until it is corrected and the DTC is no longer retrieved on-demand during self-test.For DTC B00A0:09, B00A0:63 or B00A0:68, RETRIEVE Diagnostic Trouble Codes (DTCs) from the OCSM an. REFER to DTC Chart: Occupant Classification System Module (OCSM) for diagnostic direction. For DTC B00A0:4A or B00A0:64, GO to A2.

No	CHECK for causes of the intermittent fault. Refer to Supplemental Restraint System for schematic and connector information. ATTEMPT to recreate the hard fault by flexing the wire harness and cycling the ignition frequently. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A5.

A2 VERIFY THE OCSM (OCCUPANT CLASSIFICATION SYSTEM MODULE) PART NUMBER

Using the Log Viewer function of the diagnostic scan tool, retrieve and record the OCSM part number.

Check the part number recorded against the number listed in the parts catalog and verify the correct OCSM is present in the vehicle.

Is the correct OCSM installed?

Yes	GO to A3

No	INSTALL the correct OCS. REFER to: Occupant Classification System (OCS) Sensor . GO to A5.

A3 VERIFY THE RCM (RESTRAINTS CONTROL MODULE) PART NUMBER

Using the Log Viewer function of the diagnostic scan tool, retrieve and record the RCM part number.

Check the part number recorded against the number listed in the parts catalog and verify the correct RCM is present in the vehicle.

Is the correct RCM installed?

Yes	GO to A4

No	INSTALL the correct RCM. REFER to: Restraints Control Module (RCM) . GO to A5.

A4 VERIFY THE RCM (RESTRAINTS CONTROL MODULE) CONFIGURATION

Carry out PMI for the RCM. Manually enter As-Built data. Refer to the diagnostic scan tool instructions when carrying out PMI.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B00A0:4A retrieved on-demand during self-test?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service

	Bulletins (TSBs) address this concern, INSTALL a new RCM. REFER to: Restraints Control Module (RCM) . GO to A5.

No	The fault is corrected. GO to A5

A5 CHECK FOR ADDITIONAL SRS (SUPPLEMENTAL RESTRAINT SYSTEM) DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition OFF.

Ignition ON.

NOTE: When selecting Restraints from the Self Test menu, DTCs are retrieved from the RCM and OCSM.

Using a diagnostic scan tool, perform

Restraints self-test.

Are any RCM and/or OCSM Diagnostic Trouble Codes (DTCs) retrieved on-demand during self-test?

Yes	Do not clear any Diagnostic Trouble Codes (DTCs) until all Diagnostic Trouble Codes (DTCs) have been resolve. REFER to: Airbag Supplemental Restraint System (SRS) .

No	The repair is complete. RETURN the vehicle to the customer.

DIAGNOSIS AND TESTING > PINPOINT TEST - DTC: O > B00B5:11, B00B5:12, B00B5:13, B00B5:1D

Refer to Supplemental Restraint System for schematic and connector information.

Normal Operation and Fault Conditions

The RCM continuously monitors the driver seat track position sensor circuits for the following faults:

- Open circuit
- Short to voltage
- Short to ground
- Current out of range
- Faulted driver seat track position sensor

If a fault is detected, the RCM stores DTC B00B5:11, B00B5:12, B00B5:13 or B00B5:1D in memory and sends a message to the IPC to illuminate the airbag warning indicator.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B00B5:11	Driver Seat Track Position Restraints Sensor: Circuit Short to Ground	A fault is indicated when the RCM senses a short to ground on the driver seat track position sensor circuit for more than 6 seconds.
B00B5:12	Driver Seat Track Position Restraints Sensor: Circuit Short to Battery	A fault is indicated when the RCM senses a short to voltage on the driver seat track position sensor circuit for more than 6 seconds.
B00B5:13	Driver Seat Track Position Restraints Sensor: Circuit Open	A fault is indicated when the RCM senses an open on either driver seat track position sensor circuit for more than 6 seconds.
B00B5:1D	Driver Seat Track Position Restraints Sensor: Circuit Current Out of Range	A fault is indicated when the RCM measures current outside of an acceptable range on the driver seat track position sensor circuit for more than 6 seconds.

Possible Sources

- Wiring, terminals or connectors
- Driver seat track position sensor
- RCM

Visual Inspection and Diagnostic Pre-checks

- Inspect for a damaged driver seat track position sensor.
- Inspect for damaged wiring harness(es).
- Inspect for loose or damaged connectors.

PINPOINT TEST A : B00B5:11, B00B5:12, B00B5:13 AND B00B5:1D

WARNING: Incorrect repair techniques or actions can cause an accidental Supplemental Restraint System (SRS) deployment. Never compromise or depart from these instructions. Failure to precisely follow all instructions could result in serious personal injury from an accidental deployment.

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may cause damage to the connector.

NOTE: Most faults are due to connector and/or wiring concerns. Carry out a thorough inspection and verification before proceeding with the pinpoint test.

NOTE: Only disconnect or reconnect SRS components when instructed to do so within a pinpoint test step. Failure to follow this instruction may result in incorrect diagnosis of the SRS.

NOTE: Always make sure the correct SRS component is being installed. Parts released for other vehicles may not be compatible even if they appear physically similar. Check the part number listed in the Ford parts catalog to make sure the correct component is being installed. If an incorrect SRS component is installed, Diagnostic Trouble Codes (DTCs) may set.

NOTE: The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

A1 RETRIEVE RCM (RESTRAINTS CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

WARNING: Before beginning any service procedure in this service information, refer to Safety Warnings in GENERAL INFORMATION . Failure to follow this instruction may result in serious personal injury.

REFER to: Pyrotechnic Device Health and Safety Precautions .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B00B5:11, B00B5:12, B00B5:13 and B00B5:1D retrieved on-demand during self-test?

Yes	This fault cannot be cleared until it is corrected and the DTC is no longer retrieved on-demand during self-test. If DTC U3003:16 or U3003:17 is also retrieved on-demand. REFER to: Pinpoint Test - DTC: AJ . If DTC U3003:16 or U3003:17 is not retrieved on-demand during self-test, DIAGNOSE the driver seat track position sensor Diagnostic Trouble Codes (DTCs). For DTC B00B5:11 or B00B5:1D, GO to A2. For DTC B00B5:12, GO to A4For DTC B00B5:13, GO to A5.
No	If DTC U3003:16 or U3003:17 is also retrieved on-demand. REFER to: Pinpoint Test - DTC: AJ . If DTC U3003:16 or U3003:17 is not retrieved on-demand during self-test, DIAGNOSE the driver seat track position sensor Continuous Memory Diagnostic Trouble Codes (CMDTCs). This is an intermittent fault when present as a Continuous Memory Diagnostic Trouble Code (CMDTC) only. GO to A10.

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the reported fault changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A2 CHECK THE DRIVER SEAT TRACK POSITION SENSOR DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (SHORT TO GROUND OR CURRENT OUT OF RANGE INDICATED)

Ignition OFF.

Disconnect Driver Seat Position Sensor C356 .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

DIAGNOSTIC TIP: When viewing Diagnostic Trouble Codes (DTCs) with the driver seat track position sensor disconnected, an open circuit fault is normally retrieved.

Did the on-demand DTC change from B00B5:11 or B00B5:1D to B00B5:13?

Yes	GO to A8.

No	For DTC B00B5:11, GO to A3. For DTC B00B5:1D, GO to A9.

A3 CHECK THE DRIVER SEAT TRACK POSITION SENSOR CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect RCM C310A and C310B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C356-2	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to A9

No	REPAIR the circuit. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A11.

A4 CHECK THE DRIVER SEAT TRACK POSITION SENSOR CIRCUIT FOR A SHORT TO VOLTAGE

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect RCM C310A and C310B .

Disconnect Driver Side Airbag (Inline) C345 .

Disconnect Driver Seat Position Sensor C356 .

Repower the SRS. Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C356-2		Ground

Is any voltage present?

Yes	REPAIR the circuit. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A11.

No	GO to A9

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the reported fault changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A5 CHECK THE DRIVER SEAT TRACK POSITION SENSOR DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (OPEN INDICATED)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Driver Side Airbag (Inline) C345 .

Disconnect Driver Seat Position Sensor C356 .

Connect a fused jumper wire:

Lead 1	Measurement / Action	Lead 2
C356-2		C356-1

Repower the SRS. Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

DIAGNOSTIC TIP: When viewing Diagnostic Trouble Codes (DTCs) with the driver seat track position sensor circuits shorted together, a short to ground fault is normally retrieved.

Did the on-demand DTC change from B00B5:13 to B00B5:11?

Yes	REMOVE the fused jumper wire and GO to A8

No	REMOVE the fused jumper wire and GO to A6

A6 CHECK THE DRIVER SEAT TRACK POSITION SENSOR CIRCUIT FOR AN OPEN

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect RCM C310A and C310B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C310B-23	Ω	C356-2

Is the resistance less than 0.5 ohm?

Yes	GO to A7

No	REPAIR the circuit. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A11.

A7 CHECK THE DRIVER SEAT TRACK POSITION SENSOR GROUND CIRCUIT FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C356-1	Ω	C310B-53

Is the resistance less than 3 ohms?

Yes	GO to A9

No	REPAIR the circuit. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A11.

NOTE: Make sure all SRS components and the RCM electrical connectors are connected before carrying out the self-test. If not, Diagnostic Trouble Codes (DTCs) will be recorded.

A8 CONFIRM THE DRIVER SEAT TRACK POSITION SENSOR FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Prior to reconnecting any previously disconnected SRS component:

inspect connector(s) (including any inline connectors) for pushed-out, loose or spread terminals and loose or frayed wire connections at terminals.

inspect wire harness for any damaged, pinched, cut or pierced wires.

inspect RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

repair any concerns found. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

Connect Driver Side Airbag (Inline) C345 (if previously disconnected).

Connect Driver Seat Position Sensor C356 .

Repower the SRS. Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was the original DTC retrieved on-demand during self-test?

Yes	INSTALL a new driver seat track position sensor. REFER to: Seat Position Sensor . GO to A11.

No	In the process of diagnosing the fault, the fault condition has become intermittent. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A10.

NOTE: Make sure all SRS components and the RCM electrical connectors are connected before carrying out the self-test. If not, Diagnostic Trouble Codes (DTCs) will be recorded.

A9 CONFIRM THE RCM (RESTRAINTS CONTROL MODULE) FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Prior to reconnecting any previously disconnected SRS component:

inspect connector(s) (including any inline connectors) for pushed-out, loose or spread terminals and loose or frayed wire connections at terminals.

inspect wire harness for any damaged, pinched, cut or pierced wires.

inspect RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

repair any concerns found. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

Connect RCM C310A and C310B (if previously disconnected).

Connect Driver Side Airbag (Inline) C345 (if previously disconnected).

Connect Driver Seat Position Sensor C356 .

Repower the SRS. Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was the original DTC retrieved on-demand during self-test?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new RCM. REFER to: Restraints Control Module (RCM) . GO to A11.

No	In the process of diagnosing the fault, the fault condition has become intermittent. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A10.

A10 CHECK FOR AN INTERMITTENT FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Driver Seat Position Sensor C356 .

Inspect connector(s) (including any inline connectors) for corrosion, loose or spread terminals and loose or frayed wire connections at terminals.

Inspect wire harness for any damage, pinched, cut or pierced wires.

Inspect RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

Repair any concerns found. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

Connect all previously disconnected component(s) / connector(s).

Repower the SRS. Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B00B5:11, B00B5:12, B00B5:13 and B00B5:1D retrieved on-demand during self-test?

Yes	This fault cannot be cleared until it is corrected and the DTC is no longer retrieved on-demand during self-test.For DTC B00B5:11 or B00B5:1D, GO to A2. For DTC B00B5:12, GO to A4. For DTC B00B5:13, GO to A5.

No	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A11.

A11 CHECK FOR ADDITIONAL SRS (SUPPLEMENTAL RESTRAINT SYSTEM) DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Reconnect all SRS components (if previously disconnected).

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

NOTE: When selecting Restraints from the Self Test menu, DTCs are retrieved from the RCM and OCSM.

Using a diagnostic scan tool, perform

Restraints self-test.

Are any RCM and/or OCSM Diagnostic Trouble Codes (DTCs) retrieved on-demand during self-test?

Yes	Do not clear any Diagnostic Trouble Codes (DTCs) until all Diagnostic Trouble Codes (DTCs) have been resolved. DIAGNOSE and REPAIR the RCM and/or OCSM Diagnostic Trouble Codes (DTCs). REFER to: Airbag Supplemental Restraint System (SRS) .

No	The repair is complete. RETURN the vehicle to the customer.

DIAGNOSIS AND TESTING > PINPOINT TEST - DTC: P > B00C5:11, B00C5:12, B00C5:13, B00C5:1D

Refer to Supplemental Restraint System for schematic and connector information.

Normal Operation and Fault Conditions

The RCM continuously monitors the passenger seat track position sensor circuits for the following faults:

- Open circuit
- Short to voltage
- Short to ground

- Current out of range
- Faulted passenger seat track position sensor

If a fault is detected, the RCM stores DTC B00C5:11, B00C5:12, B00C5:13 or B00C5:1D in memory and sends a message to the IPC to illuminate the airbag warning indicator.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B00C5:11	Passenger Seat Track Position Restraints Sensor: Circuit Short to Ground	A fault is indicated when the RCM senses a short to ground on the passenger seat track position sensor circuit for more than 6 seconds.
B00C5:12	Passenger Seat Track Position Restraints Sensor: Circuit Short to Battery	A fault is indicated when the RCM senses a short to voltage on the passenger seat track position sensor circuit for more than 6 seconds.
B00C5:13	Passenger Seat Track Position Restraints Sensor: Circuit Open	A fault is indicated when the RCM senses an open on either passenger seat track position sensor circuit for more than 6 seconds.
B00C5:1D	Passenger Seat Track Position Restraints Sensor: Circuit Current Out of Range	A fault is indicated when the RCM measures current outside of an acceptable range on the passenger seat track position sensor circuit for more than 6 seconds.

Possible Sources

- Wiring, terminals or connectors
- Passenger seat track position sensor
- RCM

Visual Inspection and Diagnostic Pre-checks

- Inspect for a damaged passenger seat track position sensor.
- Inspect for damaged wiring harness(es).
- Inspect for loose or damaged connectors.

PINPOINT TEST A : B00C5:11, B00C5:12, B00C5:13 AND B00C5:1D

> *WARNING: Incorrect repair techniques or actions can cause an accidental Supplemental Restraint System (SRS) deployment. Never compromise or depart from*

these instructions. Failure to precisely follow all instructions could result in serious personal injury from an accidental deployment.

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may cause damage to the connector.

NOTE: Most faults are due to connector and/or wiring concerns. Carry out a thorough inspection and verification before proceeding with the pinpoint test.

NOTE: Only disconnect or reconnect SRS components when instructed to do so within a pinpoint test step. Failure to follow this instruction may result in incorrect diagnosis of the SRS.

NOTE: Always make sure the correct SRS component is being installed. Parts released for other vehicles may not be compatible even if they appear physically similar. Check the part number listed in the Ford parts catalog to make sure the correct component is being installed. If an incorrect SRS component is installed, Diagnostic Trouble Codes (DTCs) may set.

NOTE: The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

A1 RETRIEVE RCM (RESTRAINTS CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

WARNING: Before beginning any service procedure in this service information, refer to Safety Warnings in GENERAL INFORMATION . Failure to follow this instruction may result in serious personal injury.

REFER to: Pyrotechnic Device Health and Safety Precautions .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B00C5:11, B00C5:12, B00C5:13 and B00C5:1D retrieved on-demand during self-test?

Yes	This fault cannot be cleared until it is corrected and the DTC is no longer retrieved on-demand during self-test.If DTC U3003:16 or U3003:17 is also retrieved on-demand. REFER to: Pinpoint Test - DTC: AJ . If DTC U3003:16 or U3003:17 is not retrieved on-demand during self-test, DIAGNOSE the passenger seat track position sensor Diagnostic Trouble Codes (DTCs). For DTC B00C5:11 or B00C5:1D, GO to A2. For DTC B00C5:12, GO to A4. For DTC B00C5:13, GO to A5.

No	If DTC U3003:16 or U3003:17 is also retrieved on-demand. REFER to: Pinpoint Test - DTC: AJ . If DTC U3003:16 or U3003:17 is not retrieved on-demand during self-test, DIAGNOSE the passenger seat track position sensor Continuous Memory Diagnostic Trouble Codes (CMDTCs). This is an intermittent fault when present as a Continuous Memory Diagnostic Trouble Code (CMDTC) only. GO to A10.

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the reported fault changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A2 CHECK THE PASSENGER SEAT TRACK POSITION SENSOR DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (SHORT TO GROUND OR CURRENT OUT OF RANGE INDICATED)

Ignition OFF.

Disconnect Passenger Seat Position Sensor C3240 .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

DIAGNOSTIC TIP: When viewing Diagnostic Trouble Codes (DTCs) with the passenger seat track position sensor disconnected, an open circuit fault is normally retrieved.

Did the on-demand DTC change from B00C5:11 or B00C5:1D to B00C5:13?

Yes	GO to A8

No	For DTC B00C5:11, GO to A3. For DTC B00C5:1D, GO to A9.

A3 CHECK THE PASSENGER SEAT TRACK POSITION SENSOR CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect RCM C310A and C310B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3240-2	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to A9

No	REPAIR the circuit. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and

	connector information. GO to A11.

A4 CHECK THE PASSENGER SEAT TRACK POSITION SENSOR CIRCUIT FOR A SHORT TO VOLTAGE

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect RCM C310A and C310B .

Disconnect Passenger Side Airbag (Inline) C219 .

Disconnect Passenger Seat Position Sensor C3240 .

Repower the SRS. Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3240-2		Ground

Is any voltage present?

Yes	REPAIR the circuit. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A11.

No	GO to A9.

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the reported fault changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A5 CHECK THE PASSENGER SEAT TRACK POSITION SENSOR DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (OPEN INDICATED)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Passenger Side Airbag (Inline) C219 .

Disconnect Passenger Seat Position Sensor C3240 .

Connect a fused jumper wire:

Lead 1	Measurement / Action	Lead 2

C3240-2		C3240-1

Repower the SRS. Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

DIAGNOSTIC TIP: When viewing Diagnostic Trouble Codes (DTCs) with the passenger seat track position sensor circuits shorted together, a short to ground fault is normally retrieved.

Did the on-demand DTC change from B00C5:13 to B00C5:11?

Yes	REMOVE the fused jumper wire and GO to A8

No	REMOVE the fused jumper wire and GO to A6

A6 CHECK THE PASSENGER SEAT TRACK POSITION SENSOR CIRCUIT FOR AN OPEN

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect RCM C310A and C310B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C310B-24	Ω	C3240-2

Is the resistance less than 0.5 ohm?

Yes	GO to A7

No	REPAIR the circuit. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A11.

A7 CHECK THE PASSENGER SEAT TRACK POSITION SENSOR GROUND CIRCUIT FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3240-1	Ω	Ground

Is the resistance less than 3 ohms?

Yes	GO to A9.

No	REPAIR the circuit. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A11.

NOTE: Make sure all SRS components and the RCM electrical connectors are connected before carrying out the self-test. If not, Diagnostic Trouble Codes (DTCs) will be recorded.

A8 CONFIRM THE PASSENGER SEAT TRACK POSITION SENSOR FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Prior to reconnecting any previously disconnected SRS component:

inspect connector(s) (including any inline connectors) for pushed-out, loose or spread terminals and loose or frayed wire connections at terminals.

inspect wire harness for any damaged, pinched, cut or pierced wires.

inspect RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

repair any concerns found. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

Connect Passenger Side Airbag (Inline) C219 (if previously disconnected).

Connect Passenger Seat Position Sensor C3240 .

Repower the SRS. Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was the original DTC retrieved on-demand during self-test?

Yes	INSTALL a new passenger seat track position sensor. REFER to: Seat Position Sensor . GO to A11.

No	In the process of diagnosing the fault, the fault condition has become intermittent. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A10.

NOTE: Make sure all SRS components and the RCM electrical connectors are connected before carrying out the self-test. If not, Diagnostic Trouble Codes (DTCs) will be recorded.

A9 CONFIRM THE RCM (RESTRAINTS CONTROL MODULE) FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Prior to reconnecting any previously disconnected SRS component:

inspect connector(s) (including any inline connectors) for pushed-out, loose or spread terminals and loose or frayed wire connections at terminals.

inspect wire harness for any damaged, pinched, cut or pierced wires.

inspect RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

repair any concerns found. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

Connect RCM C310A and C310B (if previously disconnected).

Connect Passenger Side Airbag (Inline) C219 (if previously disconnected).

Connect Passenger Seat Position Sensor C3240 .

Repower the SRS. Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was the original DTC retrieved on-demand during self-test?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new RCM. REFER to: Restraints Control Module (RCM) . GO to A11.

No	In the process of diagnosing the fault, the fault condition has become intermittent. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A10

A10 CHECK FOR AN INTERMITTENT FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Passenger Seat Position Sensor C3240 .

Inspect connector(s) (including any inline connectors) for corrosion, loose or spread terminals and loose or frayed wire connections at terminals.

Inspect wire harness for any damage, pinched, cut or pierced wires.

Inspect RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

Repair any concerns found. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

Connect all previously disconnected component(s) / connector(s).

Repower the SRS. Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B00C5:11, B00C5:12, B00C5:13 and B00C5:1D retrieved on-demand during self-test?

Yes	This fault cannot be cleared until it is corrected and the DTC is no longer retrieved on-demand during self-test.For DTC B00C5:11 or B00C5:1D, GO to A2. For DTC B00C5:12, GO to A4. For DTC B00C5:13, GO to A5.

No	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A11.

A11 CHECK FOR ADDITIONAL SRS (SUPPLEMENTAL RESTRAINT SYSTEM) DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Reconnect all SRS components (if previously disconnected).

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

NOTE: When selecting Restraints from the Self Test menu, DTCs are retrieved from the RCM and OCSM.

Using a diagnostic scan tool, perform

Restraints self-test.

Are any RCM and/or OCSM Diagnostic Trouble Codes (DTCs) retrieved on-demand during self-test?

Yes	Do not clear any Diagnostic Trouble Codes (DTCs) until all Diagnostic Trouble Codes (DTCs) have been resolved. DIAGNOSE and REPAIR the RCM and/or OCSM Diagnostic Trouble Codes (DTCs). REFER to: Airbag Supplemental Restraint System (SRS) .

No	The repair is complete. RETURN the vehicle to the customer.

DIAGNOSIS AND TESTING > PINPOINT TEST - DTC: Q > B11CF:11, B11CF:12, B11CF:13, B11CF:1A

Refer to Supplemental Restraint System for schematic and connector information.

Normal Operation and Fault Conditions

The RCM continuously monitors the passenger airbag adaptive canister vent circuits for the following faults:

- Resistance out of range
- Unexpected voltage
- Short to ground
- Faulted passenger airbag adaptive canister vent

If a fault is detected, the RCM stores DTC B11CF:11, B11CF:12, B11CF:13 or B11CF:1A in memory and sends a message to the IPC to illuminate the airbag warning indicator.

The RCM analyzes the deployment loop resistance to determine if a fault exists. The value displayed in the PID is the deployment loop resistance measured by the RCM. If the value displayed is lower or higher than the desired range (refer to diagram below in illustration), the RCM can set a DTC. As the deployment loop resistance drifts farther outside the desired range, the chance for a DTC increases. Small variations in resistance can occur due to the effect of road vibrations on terminal fit. Crimps and terminals can be affected by stress and harness movement and can cause an increase in resistance due to wire strain. These variables can result in an intermittent fault. For this reason, the test requires the PID value to be within the desired range before the fault is considered repaired, regardless if the module is reporting an on-demand DTC at the time of diagnosis. Following this direction helps make sure that minor changes in resistance do not create a repeat concern. This test uses process of elimination to diagnose each part of the deployment loop circuit including:

- Wiring
- Connections
- Passenger airbag adaptive canister vent
- RCM



DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B11CF:11	Passenger Frontal Airbag Canister Vent: Circuit Short to Ground	A fault is indicated when the RCM senses a short to ground on either

		passenger airbag adaptive canister vent circuit for more than 6 seconds.
B11CF:12	Passenger Frontal Airbag Canister Vent: Circuit Short to Battery	A fault is indicated when the RCM senses a short to voltage on either passenger airbag adaptive canister vent circuit for more than 6 seconds.
B11CF:13	Passenger Frontal Airbag Canister Vent: Circuit Open	A fault is indicated when the RCM measures more than the desired resistance between the passenger airbag adaptive canister vent circuits for more than 6 seconds.
B11CF:1A	Passenger Frontal Airbag Canister Vent: Circuit Resistance Below Threshold	A fault is indicated when the RCM measures less than the desired resistance between the passenger airbag adaptive canister vent circuits for more than 6 seconds.

Possible Sources

- Wiring, terminals or connectors
- Passenger airbag adaptive canister vent
- RCM

PINPOINT TEST A : B11CF:11, B11CF:12, B11CF:13 AND B11CF:1A

> *WARNING: Incorrect repair techniques or actions can cause an accidental Supplemental Restraint System (SRS) deployment. Never compromise or depart from these instructions. Failure to precisely follow all instructions could result in serious personal injury from an accidental deployment.*

> *NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may cause damage to the connector.*

> *NOTE: Most faults are due to connector and/or wiring concerns. Carry out a thorough inspection and verification before proceeding with the pinpoint test.*

> *NOTE: Only disconnect or reconnect SRS components when instructed to do so within a pinpoint test step. Failure to follow this instruction may result in incorrect diagnosis of the SRS.*

> *NOTE: Always make sure the correct SRS component is being installed. Parts*

released for other vehicles may not be compatible even if they appear physically similar. Check the part number listed in the Ford parts catalog to make sure the correct component is being installed. If an incorrect SRS component is installed, Diagnostic Trouble Codes (DTCs) may set.

NOTE: The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

A1 RETRIEVE RCM (RESTRAINTS CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

WARNING: Before beginning any service procedure in this service information, refer to Safety Warnings in GENERAL INFORMATION . Failure to follow this instruction may result in serious personal injury.

REFER to: Pyrotechnic Device Health and Safety Precautions .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B11CF:11, B11CF:12, B11CF:13 and B11CF:1A retrieved on-demand during self-test?

Yes	This fault cannot be cleared until it is corrected and the DTC is no longer retrieved on-demand during self-test.If DTC U3003:16 or U3003:17 is also retrieved on-demand. REFER to: Pinpoint Test - DTC: AJ . If DTC U3003:16 or U3003:17 is not retrieved on-demand during self-test, DIAGNOSE the passenger airbag adaptive canister vent Diagnostic Trouble Codes (DTCs). For DTC B11CF:13 or B11CF:1A, GO to A2. For DTC B11CF:11, GO to A8. For DTC B11CF:12, GO to A10.

No	This is an intermittent fault when present as a CMDTC only. If DTC U3003:16 or U3003:17 is also retrieved on-demand. REFER to: Pinpoint Test - DTC: AJ . If DTC U3003:16 or U3003:17 is not retrieved on-demand during self-test, DIAGNOSE the passenger airbag adaptive canister vent Continuous Memory Diagnostic Trouble Codes (CMDTCs). For DTC B11CF:13 or B11CF:1A, GO to A13. For DTC B11CF:11, GO to A14. For DTC B11CF:12, GO to A15.

A2 CHECK THE PASSENGER FRONTAL AIRBAG CAN VENT CONTROL (DEPLOY_08_R) PID (PARAMETER IDENTIFICATION)

Using a diagnostic scan tool, view RCM Parameter Identifications (PIDs).

Monitor and record the resistance value displayed by the DEPLOY_08_R PID.

Does the PID value read between 1.44 and 3.52 ohms?

Yes	GO to A12

No	GO to A3

A3 CHECK THE PASSENGER FRONTAL AIRBAG CAN VENT CONTROL (DEPLOY_08_R) PID (PARAMETER IDENTIFICATION) WHILE CARRYING OUT THE HARNESS TEST

Remove the glove compartment. REFER to: Glove Compartment .

While monitoring the DEPLOY_08_R PID, carry out the harness test of the passenger airbag adaptive canister vent circuits and accessible connectors (including any inline connectors) by wiggling and flexing the wire harness and connectors frequently. Record the resistance value indicated by the PID.

Does the PID value read between 1.44 and 3.52 ohms while carrying out the harness test?

Yes	DEPOWER the SRS and REPAIR the connector, terminals or wire harness as needed. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

No	For PID value less than 1.44 ohms, GO to A4. For PID value greater than 3.52 ohms, GO to A6.

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the reported fault changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A4 CHECK THE PASSENGER AIRBAG ADAPTIVE CANISTER VENT DEPLOYMENT CONTROL DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (LOW RESISTANCE INDICATED)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Passenger Airbag C256 .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

DIAGNOSTIC TIP: When viewing Diagnostic Trouble Codes (DTCs) with the passenger airbag adaptive canister vent disconnected, an open circuit fault is normally retrieved. An open circuit fault is also retrieved on passenger airbag stages 1 and 2, due to the passenger airbag connector being disconnected.

Did the on-demand DTC change from B11CF:1A to B11CF:13?

Yes	GO to A11

No	GO to A5.

A5 CHECK FOR A SHORT BETWEEN THE PASSENGER AIRBAG ADAPTIVE CANISTER VENT CIRCUITS

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect RCM C310A and C310B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C256-7	Ω	C256-8

Is the resistance greater than 10, 000 ohms?

Yes	GO to A12

No	REPAIR the circuit(s). Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

A6 CHECK THE PASSENGER AIRBAG ADAPTIVE CANISTER VENT CIRCUITS FOR AN OPEN

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Passenger Airbag C256 .

Disconnect RCM C310A and C310B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C310A-10	Ω	C256-7
C310A-9	Ω	C256-8

Are the resistances less than 0.5 ohm?

Yes	GO to A7.

No	REPAIR the circuits. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by

inducing a different fault condition. If the reported fault changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A7 CHECK THE PASSENGER AIRBAG ADAPTIVE CANISTER VENT DEPLOYMENT CONTROL DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (OPEN INDICATED)

Connect RCM C310A and C310B .

Connect a fused jumper wire:

Lead 1	Measurement / Action	Lead 2
C256-7		C256-8

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

DIAGNOSTIC TIP: When viewing Diagnostic Trouble Codes (DTCs) with the passenger airbag adaptive canister vent circuits shorted together, a low resistance fault is normally retrieved. An open circuit fault is also retrieved on passenger airbag stages 1 and 2, due to the passenger airbag connector being disconnected.

Did the on-demand DTC change from B11CF:13 to B11CF:1A?

Yes	REMOVE the fused jumper wire and GO to A11

No	REMOVE the fused jumper wire and GO to A12

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the reported fault changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A8 CHECK THE PASSENGER AIRBAG ADAPTIVE CANISTER VENT DEPLOYMENT CONTROL DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (SHORT TO GROUND INDICATED)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Remove the glove compartment. REFER to: Glove Compartment .

Disconnect Passenger Airbag C256 .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

DIAGNOSTIC TIP: When viewing Diagnostic Trouble Codes (DTCs) with the passenger airbag adaptive canister vent disconnected, an open circuit fault is normally retrieved. An open circuit fault is also retrieved on passenger airbag stages 1 and 2, due to the passenger airbag connector being disconnected.

Did the on-demand DTC change from B11CF:11 to B11CF:13?

Yes	GO to A11

No	GO to A9

A9 CHECK THE PASSENGER AIRBAG ADAPTIVE CANISTER VENT CIRCUITS FOR A SHORT TO GROUND

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect RCM C310A and C310B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C256-7	Ω	Ground
C256-8	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to A12

No	REPAIR the circuit(s). Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

A10 CHECK THE PASSENGER AIRBAG ADAPTIVE CANISTER VENT CIRCUITS FOR A SHORT TO VOLTAGE

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Remove the glove compartment. REFER to: Glove Compartment .

Disconnect Passenger Airbag C256 .

Disconnect RCM C310A and C310B .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C256-7		Ground
C256-8		Ground

Is any voltage present?

Yes	REPAIR the circuit(s). Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

No	GO to A12

NOTE: Make sure all SRS components and the RCM electrical connectors are connected before carrying out the self-test. If not, Diagnostic Trouble Codes (DTCs) will be recorded.

A11 CONFIRM THE PASSENGER AIRBAG ADAPTIVE CANISTER VENT FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Prior to reconnecting any previously disconnected SRS component:

Inspect connector(s) (including any inline connectors) for pushed-out, loose or spread terminals and loose or frayed wire connections at terminals.

Inspect wire harness for any damaged, pinched, cut or pierced wires.

Inspect RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

Inspect the passenger airbag and make sure the Connector Position Assurance (CPA) tabs on each deployable connector are not broken and the clip is not damaged.

Repair any concerns found. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

Connect Passenger Airbag C256 .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was the original DTC retrieved on-demand during self-test?

Yes	INSTALL a new passenger airbag (includes passenger airbag canister vent). REFER to: Passenger Airbag . GO to A17.

No	In the process of diagnosing the fault, the fault condition has become intermittent. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. For DTC B11CF:13 or B11CF:1A, GO to A13. For DTC B11CF:11, GO to A14. For DTC B11CF:12, GO to A15.

NOTE: Make sure all SRS components and the RCM electrical connectors are connected before carrying out the self-test. If not, Diagnostic Trouble Codes (DTCs) will be recorded.

A12 CONFIRM THE RCM (RESTRAINTS CONTROL MODULE) FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Prior to reconnecting any previously disconnected SRS component:

Inspect connector(s) (including any inline connectors) for pushed-out, loose or spread terminals and loose or frayed wire connections at terminals.

Inspect wire harness for any damaged, pinched, cut or pierced wires.

Inspect RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

Repair any concerns found. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

Remove the glove compartment. REFER to: Glove Compartment .

Connect Passenger Airbag C256 (if previously disconnected).

Connect RCM C310A and C310B (if previously disconnected).

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was the original DTC retrieved on-demand during self-test?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new RCM. REFER to: Restraints Control

	Module (RCM) . GO to A17

No	In the process of diagnosing the fault, the fault condition has become intermittent. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. For DTC B11CF:13 or B11CF:1A, GO to A13. For DTC B11CF:11, GO to A14. For DTC B11CF:12, GO to A15.

A13 CHECK THE PASSENGER FRONTAL AIRBAG CAN VENT CONTROL (DEPLOY_08_R) PID (PARAMETER IDENTIFICATION) FOR AN INTERMITTENT LOW RESISTANCE OR OPEN CIRCUIT FAULT

Remove the glove compartment. REFER to: Glove Compartment .

Using a diagnostic scan tool, view RCM Parameter Identifications (PIDs).

While monitoring the DEPLOY_08_R PID, attempt to recreate the fault by wiggling connectors (including any inline connectors) and flexing the wire harness frequently. Record the resistance value indicated by the PID.

Does the PID value read between 1.44 and 3.52 ohms?

Yes	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A16.

No	Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering . REPAIR as necessary. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

A14 CHECK THE PASSENGER AIRBAG ADAPTIVE CANISTER VENT DEPLOYMENT CONTROL CIRCUITS FOR AN INTERMITTENT SHORT TO GROUND FAULT

Remove the glove compartment. REFER to: Glove Compartment .

Attempt to recreate the fault by wiggling connectors (including any inline connectors) and flexing the wire harness frequently.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B11CF:11 retrieved on-demand during self-test?

Yes	DEPOWER the SRS and REPAIR as necessary. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

No	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A16.

A15 CHECK THE PASSENGER AIRBAG ADAPTIVE CANISTER VENT DEPLOYMENT CONTROL CIRCUITS FOR AN INTERMITTENT SHORT TO BATTERY FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Remove the glove compartment. REFER to: Glove Compartment .

Disconnect Passenger Airbag C256 .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Attempt to recreate the fault by wiggling connectors (including any inline connectors) and flexing the wire harness frequently.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B11CF:12 retrieved on-demand during self-test?

Yes	DEPOWER the SRS and REPAIR as necessary. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

No	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A16.

A16 CHECK THE HARNESS AND CONNECTORS

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Passenger Airbag C256 .

Inspect connector(s) (including any inline connectors) for corrosion, loose or spread terminals and loose or frayed wire connections at terminals.

Inspect wire harness for any damage, pinched, cut or pierced wires.

Inspect RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

Inspect the passenger airbag and make sure the Connector Position Assurance (CPA) tabs on each deployable connector are correctly seated and the clip is not damaged.

Were any concerns found?

Yes	REPAIR as necessary. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

No	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint

	test. GO to A17.

A17 CHECK FOR ADDITIONAL SRS (SUPPLEMENTAL RESTRAINT SYSTEM) DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition OFF.

Reconnect all SRS components (if previously disconnected).

If previously directed to depower the SRS, repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

NOTE: When selecting Restraints from the Self Test menu, DTCs are retrieved from the RCM and OCSM.

Using a diagnostic scan tool, perform

Restraints self-test.

Are any RCM and/or OCSM Diagnostic Trouble Codes (DTCs) retrieved on-demand during self-test?

Yes	Do not clear any Diagnostic Trouble Codes (DTCs) until all Diagnostic Trouble Codes (DTCs) have been resolved. DIAGNOSE and REPAIR the RCM and/or OCSM Diagnostic Trouble Codes (DTCs). REFER to: Airbag Supplemental Restraint System (SRS) .

No	The repair is complete. RETURN the vehicle to the customer.

DIAGNOSIS AND TESTING > PINPOINT TEST - DTC: R > B11D8:12 AND B11D8:14

Refer to Supplemental Restraint System for schematic and connector information.

Normal Operation and Fault Conditions

The RCM transmits an event notification signal which communicates crash status and SRS deployment status to the BCM. When the BCM receives an event notification signal which indicates a crash, it initiates fuel cut-off.

The RCM monitors the event notification signal circuit for the following faults:

- Short to voltage
- Short to ground
- Open circuit

If a fault is detected, the RCM stores DTC B11D8:12 or B11D8:14 in memory. The airbag warning indicator

does not illuminate if B11D8:12 or B11D8:14 is set.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B11D8:12	Restraint Event Notification: Circuit Short to Battery	A fault is indicated when the RCM senses a short to voltage on the event notification signal circuit for more than 15 seconds.
B11D8:14	Restraint Event Notification: Circuit Short to Ground or Open	A fault is indicated when the RCM senses a short to ground or an open on the event notification signal circuit for more than 15 seconds.

Possible Sources

- Wiring, terminals or connectors
- BCM
- RCM

PINPOINT TEST A : B11D8:12 AND B11D8:14

WARNING: Incorrect repair techniques or actions can cause an accidental Supplemental Restraint System (SRS) deployment. Never compromise or depart from these instructions. Failure to precisely follow all instructions could result in serious personal injury from an accidental deployment.

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may cause damage to the connector.

NOTE: Most faults are due to connector and/or wiring concerns. Carry out a thorough inspection and verification before proceeding with the pinpoint test.

NOTE: Only disconnect or reconnect SRS components when instructed to do so within a pinpoint test step. Failure to follow this instruction may result in incorrect diagnosis of the SRS.

NOTE: Install new components only when directed to do so in the pinpoint test.

NOTE: Always make sure the correct SRS component is being installed. Parts

released for other vehicles may not be compatible even if they appear physically similar. Check the part number listed in the Ford parts catalog to make sure the correct component is being installed. If an incorrect SRS component is installed, Diagnostic Trouble Codes (DTCs) may set.

NOTE: The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

A1 RETRIEVE RCM (RESTRAINTS CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

WARNING: Before beginning any service procedure in this service information, refer to Safety Warnings in GENERAL INFORMATION . Failure to follow this instruction may result in serious personal injury.

REFER to: Pyrotechnic Device Health and Safety Precautions .

Ignition ON.

Using a diagnostic scan tool, perform the RCM self-test to retrieve Diagnostic Trouble Codes (DTCs).

Was DTC B11D8:12 or B11D8:14 retrieved on-demand during self-test?

Yes	This fault cannot be cleared until it is corrected and the DTC is no longer retrieved on-demand during the self-test. For DTC B11D8:14, GO to A2. For DTC B11D8:12, GO to A5.

No	This is an intermittent fault when present as a Continuous Memory Diagnostic Trouble Code (CMDTC) only. GO to A8.

A2 CHECK THE EVENT NOTIFICATION SIGNAL CIRCUIT FOR AN OPEN

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect RCM C310A and C310B .

Disconnect BCM C2280E .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C310B-42	Ω	C2280E-49

Is the resistance less than 3 ohms?

Yes	GO to A3.

No	REPAIR the circuit. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A9.

A3 CHECK THE EVENT NOTIFICATION SIGNAL CIRCUIT FOR A SHORT TO GROUND

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2280E-49	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to A4

No	REPAIR the circuit. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A9.

NOTE: Make sure all SRS electrical connectors and the BCM electrical connector are connected before carrying out the self-test. If not, Diagnostic Trouble Codes (DTCs) will be recorded.

A4 CONFIRM THE BCM (BODY CONTROL MODULE) OR RCM (RESTRAINTS CONTROL MODULE) FAULT

Prior to reconnecting any previously disconnected SRS component:

Inspect connector(s) (including any inline connectors) for pushed-out, loose or spread terminals and loose or frayed wire connections at terminals.

Inspect wire harness for any damage, pinched, cut or pierced wires.

Repair any concerns found. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

Connect BCM C2280E .

Connect RCM C310A and C310B .

Repower the SRS. Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform the RCM self-test to retrieve Diagnostic Trouble Codes (DTCs).

Was DTC B11D8:14 retrieved on-demand during self-test?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, CLEAR the RCM Diagnostic Trouble Codes (DTCs) and

	REPEAT the RCM self-test. If DTC B11D8:14 returns, INSTALL a new RCM. REFER to: Restraints Control Module (RCM) . GO to A9. If DTC B11D8:14 does not return, GO to A9.

No	In the process of diagnosing the fault, the fault condition has become intermittent. Do not install any new SRS components at this time. SRS components should only be installed when directed to do so in the pinpoint test. GO to A8.

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the fault reported changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A5 CHECK THE EVENT NOTIFICATION SIGNAL CIRCUIT DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE

Disconnect BCM C2280E .

Using a diagnostic scan tool, perform the RCM self-test to retrieve Diagnostic Trouble Codes (DTCs).

Was DTC B11D8:12 retrieved on-demand during self-test?

Yes	GO to A6

No	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, GO to A9.

A6 CHECK THE EVENT NOTIFICATION SIGNAL CIRCUIT FOR A SHORT TO VOLTAGE

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect RCM C310A and C310B .

Repower the SRS. Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2280E-49		Ground

Is any voltage present?

Yes	REPAIR the circuit. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A9.

No	GO to A7

NOTE: Make sure all SRS electrical connectors and the BCM electrical connector are connected before carrying out the self-test. If not, Diagnostic Trouble Codes (DTCs) will be recorded.

A7 CONFIRM THE RCM (RESTRAINTS CONTROL MODULE) FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Prior to reconnecting any previously disconnected SRS component:

inspect connector(s) (including any inline connectors) for pushed-out, loose or spread terminals and loose or frayed wire connections at terminals.

inspect wire harness for any damage, pinched, cut or pierced wires.

repair any concerns found. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

Connect BCM C2280E .

Connect RCM C310A and C310B .

Repower the SRS. Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform the RCM self-test to retrieve Diagnostic Trouble Codes (DTCs).

Was the original DTC retrieved on-demand during self-test?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new RCM. REFER to: Restraints Control Module (RCM) . GO to A9.

No	In the process of diagnosing the fault, the fault condition has become intermittent. Do not install any new SRS components at this time. SRS components should only be installed when directed to do so in the pinpoint test. GO to A8.

A8 CHECK FOR AN INTERMITTENT FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect BCM C2280E .

Disconnect RCM C310A and C310B .

inspect connector(s) (including any inline connectors) for loose or spread terminals and loose or frayed wire connections at terminals.

inspect wire harness for any damage, pinched, cut or pierced wires.

repair any concerns found. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

Connect BCM C2280E .

Connect RCM C310A and C310B .

Repower the SRS. Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform the RCM self-test to retrieve Diagnostic Trouble Codes (DTCs).

Was DTC B11D8:12 or B11D8:14 retrieved on-demand during self-test?

Yes	The fault condition is now present. This fault cannot be cleared until it is corrected and the DTC is no longer retrieved on-demand during the self-test.For DTC B11D8:14, GO to A2. For DTC B11D8:12, GO to A5.

No	CHECK for causes of the intermittent fault. ATTEMPT to recreate the hard fault by flexing the wire harness and cycling the ignition frequently. ACTIVATE other systems in the same wire harness. Do not install any new SRS components at this time. Only install SRS components when directed to do so in the pinpoint test. REPAIR any intermittent concerns found. GO to A9.

A9 CHECK FOR ADDITIONAL SRS (SUPPLEMENTAL RESTRAINT SYSTEM) DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition OFF.

Reconnect all connectors (if previously disconnected).

If previously directed to depower the SRS, repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

NOTE: When selecting Restraints from the Self Test menu, Diagnostic Trouble Codes (DTCs) are retrieved from the RCM and OCSM.

Using a diagnostic scan tool, perform the

Restraints self-test.

Are any RCM and/or OCSM Diagnostic Trouble Codes (DTCs) retrieved?

Yes	Do not clear any Diagnostic Trouble Codes (DTCs) until all Diagnostic Trouble Codes (DTCs) have been resolve. REFER to: Airbag Supplemental Restraint System (SRS) .

No	The repair is complete. RETURN the vehicle to the customer.

DIAGNOSIS AND TESTING > PINPOINT TEST - DTC: S > B1404:11, B1404:12, B1404:13, B1404:1A

Refer to Supplemental Restraint System for schematic and connector information.

Normal Operation and Fault Conditions

The RCM continuously monitors the driver side airbag circuits for the following faults:

- Resistance out of range
- Unexpected voltage
- Short to ground
- Faulted driver side airbag

If a fault is detected, the RCM stores DTC B1404:11, B1404:12, B1404:13 or B1404:1A in memory and sends a message to the IPC to illuminate the airbag warning indicator.

The RCM analyzes the deployment loop resistance to determine if a fault exists. The value displayed in the PID is the deployment loop resistance measured by the RCM. If the value displayed is lower or higher than the desired range (refer to diagram below in illustration), the RCM can set a DTC. As the deployment loop resistance drifts farther outside the desired range, the chance for a DTC increases. Small variations in resistance can occur due to the effect of road vibrations on terminal fit. Crimps and terminals can be affected by stress and harness movement and can cause an increase in resistance due to wire strain. These variables can result in an intermittent fault. For this reason, the test requires the PID value to be within the desired range before the fault is considered repaired, regardless if the module is reporting an on-demand DTC at the time of diagnosis. Following this direction helps make sure that minor changes in resistance do not create a repeat concern. This test uses process of elimination to diagnose each part of the deployment loop circuit including:

- Wiring
- Connections
- Driver side airbag
- RCM



DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1404:11	Driver Side Airbag Deployment Control: Circuit Short to Ground	A fault is indicated when the RCM senses a short to ground on either driver side airbag circuit for more than 6 seconds.
B1404:12	Driver Side Airbag Deployment Control: Circuit Short to Battery	A fault is indicated when the RCM senses a short to voltage on either driver side airbag circuit for more than 6 seconds.
B1404:13	Driver Side Airbag Deployment Control: Circuit Open	A fault is indicated when the RCM measures more than the desired resistance between the driver side airbag circuits for more than 6 seconds.
B1404:1A	Driver Side Airbag Deployment Control: Circuit Resistance Below Threshold	A fault is indicated when the RCM measures less than the desired resistance between the driver side airbag circuits for more than 6 seconds.

Possible Sources

- Wiring, terminals or connectors
- Driver side airbag
- RCM

Visual Inspection and Diagnostic Pre-checks

- Inspect for damaged wiring harness(es).
- Inspect for loose or damaged connectors.

PINPOINT TEST A : B1404:11, B1404:12, B1404:13 AND B1404:1A

WARNING: Incorrect repair techniques or actions can cause an accidental Supplemental Restraint System (SRS) deployment. Never compromise or depart from these instructions. Failure to precisely follow all instructions could result in serious personal injury from an accidental deployment.

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may cause damage to the connector.

NOTE: Most faults are due to connector and/or wiring concerns. Carry out a thorough inspection and verification before proceeding with the pinpoint test.

NOTE: Only disconnect or reconnect SRS components when instructed to do so within a pinpoint test step. Failure to follow this instruction may result in incorrect diagnosis of the SRS.

NOTE: Always make sure the correct SRS component is being installed. Parts released for other vehicles may not be compatible even if they appear physically similar. Check the part number listed in the Ford parts catalog to make sure the correct component is being installed. If an incorrect SRS component is installed, Diagnostic Trouble Codes (DTCs) may set.

NOTE: The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

A1 RETRIEVE RCM (RESTRAINTS CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

WARNING: Before beginning any service procedure in this service information, refer to Safety Warnings in GENERAL INFORMATION . Failure to follow this instruction may result in serious personal injury.

REFER to: Pyrotechnic Device Health and Safety Precautions .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B1404:11, B1404:12, B1404:13 and B1404:1A retrieved on-demand during self-test?

Yes	This fault cannot be cleared until it is corrected and the DTC is no longer retrieved on-demand during self-test. If DTC U3003:16 or U3003:17 is also retrieved on-demand. REFER to: Pinpoint Test - DTC: AJ . If DTC U3003:16 or U3003:17 is not retrieved on-demand during self-test, DIAGNOSE the driver side airbag Diagnostic Trouble Codes (DTCs). For DTC B1404:13 or B1404:1A, GO to A2. For DTC B1404:11, GO to A8. For DTC B1404:12, GO to A10.
No	This is an intermittent fault when present as a Continuous Memory Diagnostic Trouble Code (CMDTC) only. If DTC U3003:16 or U3003:17 is also retrieved on-demand. REFER to: Pinpoint Test - DTC: AJ . If DTC U3003:16 or U3003:17 is not retrieved on-demand during self-test, DIAGNOSE the driver side airbag Continuous Memory Diagnostic Trouble Codes (CMDTCs). For DTC B1404:13 or B1404:1A, GO to A13. For DTC B1404:11, GO to A14. For DTC B1404:12, GO to A15.

A2 CHECK THE LEFT SIDE AIRBAG DEPLOYMENT CONTROL (DEPLOY_10_R) PID (PARAMETER IDENTIFICATION)

Using a diagnostic scan tool, view RCM Parameter Identifications (PIDs).

Monitor and record the resistance value displayed by the DEPLOY_10_R PID.

Does the PID value read between 1.44 and 3.52 ohms?

Yes	GO to A12

No	GO to A3

A3 CHECK THE LEFT SIDE AIRBAG DEPLOYMENT CONTROL (DEPLOY_10_R) PID (PARAMETER IDENTIFICATION) WHILE CARRYING OUT THE HARNESS TEST

While monitoring the DEPLOY_10_R PID, carry out the harness test of the driver side airbag circuits and accessible connectors (including any inline connectors) by wiggling and flexing the wire harness and connectors frequently. Record the resistance value indicated by the PID.

Does the PID value read between 1.44 and 3.52 ohms while carrying out the harness test?

Yes	DEPOWER the SRS and REPAIR the connector, terminals or wire harness as needed. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

No	For PID value less than 1.44 ohms, GO to A4. For PID value greater than 3.52 ohms, GO to A6.

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the reported fault changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A4 CHECK THE DRIVER SIDE AIRBAG DEPLOYMENT CONTROL DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (LOW RESISTANCE INDICATED)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Driver Side Airbag (Inline) C3206 .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

DIAGNOSTIC TIP: When viewing Diagnostic Trouble Codes (DTCs) with the driver side airbag disconnected, an open circuit fault is normally retrieved.

Did the on-demand DTC change from B1404:1A to B1404:13?

Yes	GO to A11

No	GO to A5

A5 CHECK FOR A SHORT BETWEEN THE DRIVER SIDE AIRBAG CIRCUITS

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect RCM C310A and C310B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3206-3	Ω	C3206-4

Is the resistance greater than 10, 000 ohms?

Yes	GO to A12

No	REPAIR the circuit(s). Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

A6 CHECK THE DRIVER SIDE AIRBAG CIRCUITS FOR AN OPEN

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Driver Side Airbag (Inline) C3206 .

Disconnect RCM C310A and C310B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C310B-40	Ω	C3206-3
C310B-39	Ω	C3206-4

Are the resistances less than 0.5 ohm?

Yes	GO to A7

No	REPAIR the circuits. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the reported fault changes, this indicates the RCM is

functioning correctly and is not the source of the fault.

A7 CHECK THE DRIVER SIDE AIRBAG DEPLOYMENT CONTROL DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (OPEN INDICATED)

Connect RCM C310A and C310B .

Connect a fused jumper wire:

Lead 1	Measurement / Action	Lead 2
C3206-3		C3206-4

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

DIAGNOSTIC TIP: When viewing Diagnostic Trouble Codes (DTCs) with the driver side airbag circuits shorted together, a low resistance fault is normally retrieved.

Did the on-demand DTC change from B1404:13 to B1404:1A?

Yes	REMOVE the fused jumper wire and GO to A11

No	REMOVE the fused jumper wire and GO to A12

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the reported fault changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A8 CHECK THE DRIVER SIDE AIRBAG DEPLOYMENT CONTROL DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (SHORT TO GROUND INDICATED)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Driver Side Airbag (Inline) C3206 .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

DIAGNOSTIC TIP: When viewing Diagnostic Trouble Codes (DTCs) with the driver side airbag

disconnected, an open circuit fault is normally retrieved.

Did the on-demand DTC change from B1404:11 to B1404:13?

Yes	GO to A11

No	GO to A9

A9 CHECK THE DRIVER SIDE AIRBAG CIRCUITS FOR A SHORT TO GROUND

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect RCM C310A and C310B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3206-3	Ω	Ground
C3206-4	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to A12

No	REPAIR the circuit(s). Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

A10 CHECK THE DRIVER SIDE AIRBAG CIRCUITS FOR A SHORT TO VOLTAGE

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Driver Side Airbag (Inline) C3206 .

Disconnect RCM C310A and C310B .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3206-3	+ V −	Ground

C3206-4		Ground

Is any voltage present?

Yes	REPAIR the circuit(s). Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

No	GO to A12

NOTE: Make sure all SRS components and the RCM electrical connectors are connected before carrying out the self-test. If not, Diagnostic Trouble Codes (DTCs) will be recorded.

A11 CONFIRM THE DRIVER SIDE AIRBAG FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Prior to reconnecting any previously disconnected SRS component:

Inspect connector(s) (including any inline connectors) for pushed-out, loose or spread terminals and loose or frayed wire connections at terminals.

Inspect wire harness for any damaged, pinched, cut or pierced wires.

Inspect RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

Inspect Driver Side Airbag C367 and make sure the Connector Position Assurance (CPA) tabs are not broken and the clip is not damaged.

Repair any concerns found. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

Connect Driver Side Airbag (Inline) C3206 .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was the original DTC retrieved on-demand during self-test?

Yes	REMOVE and INSPECT the driver seat backrest harness for damage. REFER to: Side Airbag . If a concern is found, REPAIR as necessary. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17. If a concern is not found, INSTALL a new driver side airbag. REFER to: Side Airbag . GO to A17.

No	In the process of diagnosing the fault, the fault condition has become intermittent. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. For DTC B1404:13 or B1404:1A, GO to A13. For DTC B1404:11, GO to A14. For DTC B1404:12, GO to A15.

NOTE: Make sure all SRS components and the RCM electrical connectors are connected before carrying out the self-test. If not, Diagnostic Trouble Codes (DTCs) will be recorded.

A12 CONFIRM THE RCM (RESTRAINTS CONTROL MODULE) FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Prior to reconnecting any previously disconnected SRS component:

Inspect connector(s) (including any inline connectors) for pushed-out, loose or spread terminals and loose or frayed wire connections at terminals.

Inspect wire harness for any damaged, pinched, cut or pierced wires.

Inspect RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

Repair any concerns found. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

Connect Driver Side Airbag (Inline) C3206 (if previously disconnected).

Connect RCM C310A and C310B (if previously disconnected).

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was the original DTC retrieved on-demand during self-test?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new RCM. REFER to: Restraints Control Module (RCM) . GO to A17.

No	In the process of diagnosing the fault, the fault condition has become intermittent. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. For DTC B1404:13 or B1404:1A, GO to A13. For DTC B1404:11, GO to A14. For DTC B1404:12, GO to A15.

A13 CHECK THE LEFT SIDE AIRBAG DEPLOYMENT CONTROL (DEPLOY_10_R) PID

(PARAMETER IDENTIFICATION) FOR AN INTERMITTENT LOW RESISTANCE OR OPEN CIRCUIT FAULT

Using a diagnostic scan tool, view RCM Parameter Identifications (PIDs).

While monitoring the DEPLOY_10_R PID, attempt to recreate the fault by wiggling connectors (including any inline connectors) and flexing the wire harness frequently. Record the resistance value indicated by the PID.

Does the PID value read between 1.44 and 3.52 ohms?

Yes	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A16.

No	Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering . REPAIR as necessary. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

A14 CHECK THE DRIVER SIDE AIRBAG DEPLOYMENT CONTROL CIRCUITS FOR AN INTERMITTENT SHORT TO GROUND FAULT

Attempt to recreate the fault by wiggling connectors (including any inline connectors) and flexing the wire harness frequently.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B1404:11 retrieved on-demand during self-test?

Yes	DEPOWER the SRS and REPAIR as necessary. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

No	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A16.

A15 CHECK THE DRIVER SIDE AIRBAG DEPLOYMENT CONTROL CIRCUITS FOR AN INTERMITTENT SHORT TO BATTERY FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Driver Side Airbag (Inline) C3206 .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Attempt to recreate the fault by wiggling connectors (including any inline connectors) and flexing

the wire harness frequently.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B1404:12 retrieved on-demand during self-test?

Yes	DEPOWER the SRS and REPAIR as necessary. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

No	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A16.

A16 CHECK THE HARNESS AND CONNECTORS

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Driver Side Airbag (Inline) C3206 .

Inspect connector(s) (including any inline connectors) for corrosion, loose or spread terminals and loose or frayed wire connections at terminals.

Inspect wire harness for any damage, pinched, cut or pierced wires.

Inspect RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

Inspect Driver Side Airbag C367 Connector Position Assurance (CPA) tab to verify that it is correctly seated and free of damage.

Were any concerns found?

Yes	REPAIR as necessary. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

No	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A17.

A17 CHECK FOR ADDITIONAL SRS (SUPPLEMENTAL RESTRAINT SYSTEM) DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition OFF.

Reconnect all SRS components (if previously disconnected).

If previously directed to depower the SRS, repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

NOTE: When selecting Restraints from the Self Test menu, DTCs are retrieved from the RCM and OCSM.

Using a diagnostic scan tool, perform

Restraints self-test.

Are any RCM and/or OCSM Diagnostic Trouble Codes (DTCs) retrieved on-demand during self-test?

Yes	Do not clear any Diagnostic Trouble Codes (DTCs) until all Diagnostic Trouble Codes (DTCs) have been resolved. DIAGNOSE and REPAIR the RCM and/or OCSM Diagnostic Trouble Codes (DTCs). REFER to: Airbag Supplemental Restraint System (SRS) .

No	The repair is complete. RETURN the vehicle to the customer.

DIAGNOSIS AND TESTING > PINPOINT TEST - DTC: T, COUPE > B1405:11, B1405:12, B1405:13, B1405:1A

Refer to Supplemental Restraint System for schematic and connector information.

Normal Operation and Fault Conditions

The RCM continuously monitors the LH side air curtain circuits for the following faults:

- Resistance out of range
- Unexpected voltage
- Short to ground
- Faulted LH side air curtain

If a fault is detected, the RCM stores DTC B1405:11, B1405:12, B1405:13 or B1405:1A in memory and sends a message to the IPC to illuminate the airbag warning indicator.

The RCM analyzes the deployment loop resistance to determine if a fault exists. The value displayed in the PID is the deployment loop resistance measured by the RCM. If the value displayed is lower or higher than the desired range (refer to diagram below in illustration), the RCM can set a DTC. As the deployment loop resistance drifts farther outside the desired range, the chance for a DTC increases. Small variations in resistance can occur due to the effect of road vibrations on terminal fit. Crimps and terminals can be affected by stress and harness movement and can cause an increase in resistance due to wire strain. These variables can result in an intermittent fault. For this reason, the test requires the PID value to be within the desired range before the fault is considered repaired, regardless if the module is reporting an on-demand DTC at the time of diagnosis. Following this direction helps make sure that minor changes in resistance do not create a repeat concern. This test uses process of elimination to diagnose each part of the deployment loop circuit including:

- Wiring
- Connections

- LH side air curtain
- RCM



DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1405:11	Driver Side Curtain Deployment Control 1: Circuit Short to Ground	A fault is indicated when the RCM senses a short to ground on either LH side air curtain circuit for more than 6 seconds.
B1405:12	Driver Side Curtain Deployment Control 1: Circuit Short to Battery	A fault is indicated when the RCM senses a short to voltage on either LH side air curtain circuit for more than 6 seconds.
B1405:13	Driver Side Curtain Deployment Control 1: Circuit Open	A fault is indicated when the RCM measures more than the desired resistance between the LH side air curtain circuits for more than 6 seconds.
B1405:1A	Driver Side Curtain Deployment Control 1: Circuit Resistance Below Threshold	A fault is indicated when the RCM measures less than the desired resistance between the LH side air curtain circuits for more than 6 seconds.

Possible Sources

- Wiring, terminals or connectors
- LH side air curtain
- RCM

PINPOINT TEST A : B1405:11, B1405:12, B1405:13 AND B1405:1A

WARNING: Incorrect repair techniques or actions can cause an accidental Supplemental Restraint System (SRS) deployment. Never compromise or depart from these instructions. Failure to precisely follow all instructions could result in serious personal injury from an accidental deployment.

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may cause damage to the connector.

NOTE: Most faults are due to connector and/or wiring concerns. Carry out a thorough inspection and verification before proceeding with the pinpoint test.

NOTE: Only disconnect or reconnect SRS components when instructed to do so within a pinpoint test step. Failure to follow this instruction may result in incorrect diagnosis of the SRS.

NOTE: Always make sure the correct SRS component is being installed. Parts released for other vehicles may not be compatible even if they appear physically similar. Check the part number listed in the Ford parts catalog to make sure the correct component is being installed. If an incorrect SRS component is installed, Diagnostic Trouble Codes (DTCs) may set.

NOTE: The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

A1 RETRIEVE RCM (RESTRAINTS CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

WARNING: Before beginning any service procedure in this service information, refer to Safety Warnings in GENERAL INFORMATION . Failure to follow this instruction may result in serious personal injury.

REFER to: Pyrotechnic Device Health and Safety Precautions .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B1405:11, B1405:12, B1405:13 and B1405:1A retrieved on-demand during self-test?

Yes	This fault cannot be cleared until it is corrected and the DTC is no longer retrieved on-demand during self-test. If DTC U3003:16 or U3003:17 is also retrieved on-demand. REFER to: Pinpoint Test - DTC: AJ . If DTC U3003:16 or U3003:17 is not retrieved on-demand during self-test, DIAGNOSE the driver side air curtain Diagnostic Trouble Codes (DTCs). For DTC B1405:13 or B1405:1A, GO to A2. For DTC B1405:11, GO to A8. For DTC B1405:12, GO to A10.
No	This is an intermittent fault when present as a Continuous Memory Diagnostic Trouble Code (CMDTC) only. If DTC U3003:16 or U3003:17 is also retrieved on-demand. REFER to: Pinpoint Test - DTC: AJ . If DTC U3003:16 or U3003:17 is not retrieved on-demand during self-test, DIAGNOSE the driver side air curtain Continuous Memory Diagnostic Trouble Codes (CMDTCs). For DTC B1405:13 or B1405:1A, GO to A13. For DTC B1405:11, GO to A14. For DTC B1405:12, GO to A15.

A2 CHECK THE LEFT CURTAIN DEPLOYMENT CONTROL 1 (DEPLOY_11_R) PID (PARAMETER IDENTIFICATION)

Using a diagnostic scan tool, view RCM Parameter Identifications (PIDs).

Monitor and record the resistance value displayed by the DEPLOY_11_R PID.

Does the PID value read between 1.44 and 3.52 ohms?

Yes	GO to A12

No	GO to A3

A3 CHECK THE LEFT CURTAIN DEPLOYMENT CONTROL 1 (DEPLOY_11_R) PID (PARAMETER IDENTIFICATION) WHILE CARRYING OUT THE HARNESS TEST

While monitoring the DEPLOY_11_R PID, carry out the harness test of the LH side air curtain circuits and accessible connectors (including any inline connectors) by wiggling and flexing the wire harness and connectors frequently. Record the resistance value indicated by the PID.

Does the PID value read between 1.44 and 3.52 ohms while carrying out the harness test?

Yes	DEPOWER the SRS and REPAIR the connector, terminals or wire harness as needed. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

No	For PID value less than 1.44 ohms, GO to A4. For PID value greater than 3.52 ohms, GO to A6.

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the reported fault changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A4 CHECK THE LH (LEFT-HAND) SIDE AIR CURTAIN DEPLOYMENT CONTROL DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (LOW RESISTANCE INDICATED)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect LH Side Air Curtain C9031 .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

DIAGNOSTIC TIP: When viewing Diagnostic Trouble Codes (DTCs) with the LH side air

curtain disconnected, an open circuit fault is normally retrieved.

Did the on-demand DTC change from B1405:1A to B1405:13?

Yes	GO to A11

No	GO to A5

A5 CHECK FOR A SHORT BETWEEN THE LH (LEFT-HAND) SIDE AIR CURTAIN CIRCUITS

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect RCM C310A and C310B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C9031-1	Ω	C9031-2

Is the resistance greater than 10, 000 ohms?

Yes	GO to A12

No	REPAIR the circuit(s). Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

A6 CHECK THE LH (LEFT-HAND) SIDE AIR CURTAIN CIRCUITS FOR AN OPEN

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect LH Side Air Curtain C9031 .

Disconnect RCM C310A and C310B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C310B-25	Ω	C9031-1
C310B-26	Ω	C9031-2

Are the resistances less than 0.5 ohm?

Yes	GO to A7

No	REPAIR the circuits. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and

	connector information. GO to A17.

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the reported fault changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A7 CHECK THE LH (LEFT-HAND) SIDE AIR CURTAIN DEPLOYMENT CONTROL DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (OPEN INDICATED)

Connect RCM C310A and C310B .

Connect a fused jumper wire:

Lead 1	Measurement / Action	Lead 2
C9031-1		C9031-2

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

DIAGNOSTIC TIP: When viewing Diagnostic Trouble Codes (DTCs) with the LH side air curtain circuits shorted together, a low resistance fault is normally retrieved.

Did the on-demand DTC change from B1405:13 to B1405:1A?

Yes	REMOVE the fused jumper wire and GO to A11

No	REMOVE the fused jumper wire and GO to A12

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the reported fault changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A8 CHECK THE LH (LEFT-HAND) SIDE AIR CURTAIN DEPLOYMENT CONTROL DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (SHORT TO GROUND INDICATED)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect LH Side Air Curtain C9031 .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS)

Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

DIAGNOSTIC TIP: When viewing Diagnostic Trouble Codes (DTCs) with the LH side air curtain disconnected, an open circuit fault is normally retrieved.

Did the on-demand DTC change from B1405:11 to B1405:13?

Yes	GO to A11

No	GO to A9

A9 CHECK THE LH (LEFT-HAND) SIDE AIR CURTAIN CIRCUITS FOR A SHORT TO GROUND

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect RCM C310A and C310B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C9031-1	Ω	Ground
C9031-2	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to A12

No	REPAIR the circuit(s). Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

A10 CHECK THE LH (LEFT-HAND) SIDE AIR CURTAIN CIRCUITS FOR A SHORT TO VOLTAGE

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect LH Side Air Curtain C9031 .

Disconnect RCM C310A and C310B .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C9031-1		Ground
C9031-2		Ground

Is any voltage present?

Yes	REPAIR the circuit(s). Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

No	GO to A12

NOTE: Make sure all SRS components and the RCM electrical connectors are connected before carrying out the self-test. If not, Diagnostic Trouble Codes (DTCs) will be recorded.

A11 CONFIRM THE LH (LEFT-HAND) SIDE AIR CURTAIN FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Prior to reconnecting any previously disconnected SRS component:

Inspect connector(s) (including any inline connectors) for pushed-out, loose or spread terminals and loose or frayed wire connections at terminals.

Inspect wire harness for any damaged, pinched, cut or pierced wires.

Inspect RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

Inspect LH Side Air Curtain C9031 and make sure the Connector Position Assurance (CPA) tabs are not broken and the clip is not damaged.

Repair any concerns found. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

Connect LH Side Air Curtain C9031 .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was the original DTC retrieved on-demand during self-test?

Yes	INSTALL a new LH side air curtain. REFER to: Side Curtain Airbag . GO to A17.

No	In the process of diagnosing the fault, the fault condition has become intermittent. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. For DTC B1405:13 or B1405:1A, GO to A13. For DTC B1405:11, GO to A14. For DTC B1405:12, GO to A15.

NOTE: Make sure all SRS components and the RCM electrical connectors are connected before carrying out the self-test. If not, Diagnostic Trouble Codes (DTCs) will be recorded.

A12 CONFIRM THE RCM (RESTRAINTS CONTROL MODULE) FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Prior to reconnecting any previously disconnected SRS component:

Inspect connector(s) (including any inline connectors) for pushed-out, loose or spread terminals and loose or frayed wire connections at terminals.

Inspect wire harness for any damaged, pinched, cut or pierced wires.

Inspect RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

Repair any concerns found. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

Connect LH Side Air Curtain C9031 (if previously disconnected).

Connect RCM C310A and C310B (if previously disconnected).

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was the original DTC retrieved on-demand during self-test?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new RCM. REFER to: Restraints Control Module (RCM) . GO to A17.

No	In the process of diagnosing the fault, the fault condition has become intermittent. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. For DTC B1405:13 or B1405:1A, GO to A13. For DTC B1405:11, GO to A14. For DTC B1405:12, GO to A15.

A13 CHECK THE LEFT CURTAIN DEPLOYMENT CONTROL 1 (DEPLOY_11_R) PID (PARAMETER IDENTIFICATION) FOR AN INTERMITTENT LOW RESISTANCE OR OPEN CIRCUIT FAULT

Using a diagnostic scan tool, view RCM Parameter Identifications (PIDs).

While monitoring the DEPLOY_11_R PID, attempt to recreate the fault by wiggling connectors (including any inline connectors) and flexing the wire harness frequently. Record the resistance value indicated by the PID.

Does the PID value read between 1.44 and 3.52 ohms?

Yes	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A16.

No	Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering . REPAIR as necessary. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

A14 CHECK THE LH (LEFT-HAND) SIDE AIR CURTAIN DEPLOYMENT CONTROL CIRCUITS FOR AN INTERMITTENT SHORT TO GROUND FAULT

Attempt to recreate the fault by wiggling connectors (including any inline connectors) and flexing the wire harness frequently.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B1405:11 retrieved on-demand during self-test?

Yes	DEPOWER the SRS and REPAIR as necessary. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

No	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A16.

A15 CHECK THE LH (LEFT-HAND) SIDE AIR CURTAIN DEPLOYMENT CONTROL CIRCUITS FOR AN INTERMITTENT SHORT TO BATTERY FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect LH Side Air Curtain C9031 .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Attempt to recreate the fault by wiggling connectors (including any inline connectors) and flexing

the wire harness frequently.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B1405:12 retrieved on-demand during self-test?

Yes	DEPOWER the SRS and REPAIR as necessary. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

No	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A16.

A16 CHECK THE HARNESS AND CONNECTORS

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect LH Side Air Curtain C9031 .

Inspect connector(s) (including any inline connectors) for corrosion, loose or spread terminals and loose or frayed wire connections at terminals.

Inspect wire harness for any damage, pinched, cut or pierced wires.

Inspect RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

Inspect LH Side Air Curtain C9031 Connector Position Assurance (CPA) tab to verify that it is correctly seated and free of damage.

Were any concerns found?

Yes	REPAIR as necessary. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

No	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A17.

A17 CHECK FOR ADDITIONAL SRS (SUPPLEMENTAL RESTRAINT SYSTEM) DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition OFF.

Reconnect all SRS components (if previously disconnected).

If previously directed to depower the SRS, repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

NOTE: When selecting Restraints from the Self Test menu, DTCs are retrieved from the RCM and OCSM.

Using a diagnostic scan tool, perform

Restraints self-test.

Are any RCM and/or OCSM Diagnostic Trouble Codes (DTCs) retrieved on-demand during self-test?

Yes	Do not clear any Diagnostic Trouble Codes (DTCs) until all Diagnostic Trouble Codes (DTCs) have been resolved. DIAGNOSE and REPAIR the RCM and/or OCSM Diagnostic Trouble Codes (DTCs). REFER to: Airbag Supplemental Restraint System (SRS) .

No	The repair is complete. RETURN the vehicle to the customer.

DIAGNOSIS AND TESTING > PINPOINT TEST - DTC: U > B1407:11, B1407:12, B1407:13, B1407:1A

Refer to Supplemental Restraint System for schematic and connector information.

Normal Operation and Fault Conditions

The RCM continuously monitors the passenger side airbag circuits for the following faults:

- Resistance out of range
- Unexpected voltage
- Short to ground
- Faulted passenger side airbag

If a fault is detected, the RCM stores DTC B1407:11, B1407:12, B1407:13 or B1407:1A in memory and sends a message to the IPC to illuminate the airbag warning indicator.

The RCM analyzes the deployment loop resistance to determine if a fault exists. The value displayed in the PID is the deployment loop resistance measured by the RCM. If the value displayed is lower or higher than the desired range (refer to diagram below in illustration), the RCM can set a DTC. As the deployment loop resistance drifts farther outside the desired range, the chance for a DTC increases. Small variations in resistance can occur due to the effect of road vibrations on terminal fit. Crimps and terminals can be affected by stress and harness movement and can cause an increase in resistance due to wire strain. These variables can result in an intermittent fault. For this reason, the test requires the PID value to be within the desired range before the fault is considered repaired, regardless if the module is reporting an on-demand DTC at the time of diagnosis. Following this direction helps make sure that minor changes in resistance do not create a repeat concern. This test uses process of elimination to diagnose each part of the deployment loop circuit including:

- Wiring
- Connections

- Passenger side airbag
- RCM



DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1407:11	Passenger Side Airbag Deployment Control: Circuit Short to Ground	A fault is indicated when the RCM senses a short to ground on either passenger side airbag circuit for more than 6 seconds.
B1407:12	Passenger Side Airbag Deployment Control: Circuit Short to Battery	A fault is indicated when the RCM senses a short to voltage on either passenger side airbag circuit for more than 6 seconds.
B1407:13	Passenger Side Airbag Deployment Control: Circuit Open	A fault is indicated when the RCM measures more than the desired resistance between the passenger side airbag circuits for more than 6 seconds.
B1407:1A	Passenger Side Airbag Deployment Control: Circuit Resistance Below Threshold	A fault is indicated when the RCM measures less than the desired resistance between the passenger side airbag circuits for more than 6 seconds.

Possible Sources

- Wiring, terminals or connectors
- Passenger side airbag
- RCM

PINPOINT TEST A : B1407:11, B1407:12, B1407:13 AND B1407:1A

WARNING: Incorrect repair techniques or actions can cause an accidental Supplemental Restraint System (SRS) deployment. Never compromise or depart from these instructions. Failure to precisely follow all instructions could result in serious personal injury from an accidental deployment.

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may cause damage to the connector.

NOTE: Most faults are due to connector and/or wiring concerns. Carry out a thorough inspection and verification before proceeding with the pinpoint test.

NOTE: Only disconnect or reconnect SRS components when instructed to do so within a pinpoint test step. Failure to follow this instruction may result in incorrect diagnosis of the SRS.

NOTE: Always make sure the correct SRS component is being installed. Parts released for other vehicles may not be compatible even if they appear physically similar. Check the part number listed in the Ford parts catalog to make sure the correct component is being installed. If an incorrect SRS component is installed, Diagnostic Trouble Codes (DTCs) may set.

NOTE: The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

A1 RETRIEVE RCM (RESTRAINTS CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

WARNING: Before beginning any service procedure in this service information, refer to Safety Warnings in GENERAL INFORMATION . Failure to follow this instruction may result in serious personal injury.

REFER to: Pyrotechnic Device Health and Safety Precautions .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B1407:11, B1407:12, B1407:13 and B1407:1A retrieved on-demand during self-test?

Yes	This fault cannot be cleared until it is corrected and the DTC is no longer retrieved on-demand during self-test. If DTC U3003:16 or U3003:17 is also retrieved on-demand. REFER to: Pinpoint Test - DTC: AJ . If DTC U3003:16 or U3003:17 is not retrieved on-demand during self-test, DIAGNOSE the passenger side airbag Diagnostic Trouble Codes (DTCs). For DTC B1407:13 or B1407:1A, GO to A2. For DTC B1407:11, GO to A8. For DTC B1407:12, GO to A10.
No	This is an intermittent fault when present as a Continuous Memory Diagnostic Trouble Code (CMDTC) only. If DTC U3003:16 or U3003:17 is also retrieved on-demand. REFER to: Pinpoint Test - DTC: AJ . If DTC U3003:16 or U3003:17 is not retrieved on-demand during self-test, DIAGNOSE the passenger side airbag Continuous Memory Diagnostic Trouble Codes (CMDTCs). For DTC B1407:13 or B1407:1A, GO to A13. For DTC B1407:11, GO to A14. For DTC B1407:12, GO to A15.

A2 CHECK THE RIGHT SIDE AIRBAG DEPLOYMENT CONTROL (DEPLOY_13_R) PID (PARAMETER IDENTIFICATION)

Using a diagnostic scan tool, view RCM Parameter Identifications (PIDs).

Monitor and record the resistance value displayed by the DEPLOY_13_R PID.

Does the PID value read between 1.44 and 3.52 ohms?

Yes	GO to A12

No	GO to A3

A3 CHECK THE RIGHT SIDE AIRBAG DEPLOYMENT CONTROL (DEPLOY_13_R) PID (PARAMETER IDENTIFICATION) WHILE CARRYING OUT THE HARNESS TEST

While monitoring the DEPLOY_13_R PID, carry out the harness test of the passenger side airbag circuits and accessible connectors (including any inline connectors) by wiggling and flexing the wire harness and connectors frequently. Record the resistance value indicated by the PID.

Does the PID value read between 1.44 and 3.52 ohms while carrying out the harness test?

Yes	DEPOWER the SRS and REPAIR the connector, terminals or wire harness as needed. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

No	For PID value less than 1.44 ohms, GO to A4. For PID value greater than 3.52 ohms, GO to A6.

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the reported fault changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A4 CHECK THE PASSENGER SIDE AIRBAG DEPLOYMENT CONTROL DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (LOW RESISTANCE INDICATED)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Passenger Side Airbag (Inline) C219 .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

DIAGNOSTIC TIP: When viewing Diagnostic Trouble Codes (DTCs) with the passenger side airbag disconnected, an open circuit fault is normally retrieved.

Did the on-demand DTC change from B1407:1A to B1407:13?

Yes	GO to A11

No	GO to A5

A5 CHECK FOR A SHORT BETWEEN THE PASSENGER SIDE AIRBAG CIRCUITS

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect RCM C310A and C310B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C219-3	Ω	C219-4

Is the resistance greater than 10, 000 ohms?

Yes	GO to A12

No	REPAIR the circuit(s). Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

A6 CHECK THE PASSENGER SIDE AIRBAG CIRCUITS FOR AN OPEN

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Passenger Side Airbag (Inline) C219 .

Disconnect RCM C310A and C310B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C310B-37	Ω	C219-3
C310B-38	Ω	C219-4

Are the resistances less than 0.5 ohm?

Yes	GO to A7.

No	REPAIR the circuits. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the reported fault changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A7 CHECK THE PASSENGER SIDE AIRBAG DEPLOYMENT CONTROL DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (OPEN INDICATED)

Connect RCM C310A and C310B .

Connect a fused jumper wire:

Lead 1	Measurement / Action	Lead 2
C219-3		C219-4

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

DIAGNOSTIC TIP: When viewing Diagnostic Trouble Codes (DTCs) with the passenger side airbag circuits shorted together, a low resistance fault is normally retrieved.

Did the on-demand DTC change from B1407:13 to B1407:1A?

Yes	REMOVE the fused jumper wire and GO to A11

No	REMOVE the fused jumper wire and GO to A12

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the reported fault changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A8 CHECK THE PASSENGER SIDE AIRBAG DEPLOYMENT CONTROL DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (SHORT TO GROUND INDICATED)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Passenger Side Airbag (Inline) C219 .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS)

Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

DIAGNOSTIC TIP: When viewing Diagnostic Trouble Codes (DTCs) with the passenger side airbag disconnected, an open circuit fault is normally retrieved.

Did the on-demand DTC change from B1407:11 to B1407:13?

Yes	GO to A11

No	GO to A9

A9 CHECK THE PASSENGER SIDE AIRBAG CIRCUITS FOR A SHORT TO GROUND

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect RCM C310A and C310B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C219-3	Ω	Ground
C219-4	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to A12

No	REPAIR the circuit(s). Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

A10 CHECK THE PASSENGER SIDE AIRBAG CIRCUITS FOR A SHORT TO VOLTAGE

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Passenger Side Airbag (Inline) C219 .

Disconnect RCM C310A and C310B .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C219-3		Ground
C219-4		Ground

Is any voltage present?

Yes	REPAIR the circuit(s). Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

No	GO to A12.

NOTE: Make sure all SRS components and the RCM electrical connectors are connected before carrying out the self-test. If not, Diagnostic Trouble Codes (DTCs) will be recorded.

A11 CONFIRM THE PASSENGER SIDE AIRBAG FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Prior to reconnecting any previously disconnected SRS component:

Inspect connector(s) (including any inline connectors) for pushed-out, loose or spread terminals and loose or frayed wire connections at terminals.

Inspect wire harness for any damaged, pinched, cut or pierced wires.

Inspect RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

Inspect Passenger Side Airbag C3459 and make sure the Connector Position Assurance (CPA) tabs are not broken and the clip is not damaged.

Repair any concerns found. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

Connect Passenger Side Airbag (Inline) C219 .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was the original DTC retrieved on-demand during self-test?

Yes	REMOVE and INSPECT the driver seat backrest harness for damage. REFER to: Side Airbag . If a concern is found, REPAIR as necessary. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17. If a concern is not found, INSTALL a new passenger side airbag. REFER to: Side Airbag . GO to A17.

No	In the process of diagnosing the fault, the fault condition has become intermittent. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. For DTC B1407:13 or B1407:1A, GO to A13. For DTC B1407:11, GO to A14. For DTC B1407:12, GO to A15.

NOTE: Make sure all SRS components and the RCM electrical connectors are connected before carrying out the self-test. If not, Diagnostic Trouble Codes (DTCs) will be recorded.

A12 CONFIRM THE RCM (RESTRAINTS CONTROL MODULE) FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Prior to reconnecting any previously disconnected SRS component:

Inspect connector(s) (including any inline connectors) for pushed-out, loose or spread terminals and loose or frayed wire connections at terminals.

Inspect wire harness for any damaged, pinched, cut or pierced wires.

Inspect RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

Repair any concerns found. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

Connect Passenger Side Airbag (Inline) C219 (if previously disconnected).

Connect RCM C310A and C310B (if previously disconnected).

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was the original DTC retrieved on-demand during self-test?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new RCM. REFER to: Restraints Control Module (RCM) . GO to A17.

No	In the process of diagnosing the fault, the fault condition has become intermittent. Do not

	install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. For DTC B1407:13 or B1407:1A, GO to A13. For DTC B1407:11, GO to A14. For DTC B1407:12, GO to A15.

A13 CHECK THE RIGHT SIDE AIRBAG DEPLOYMENT CONTROL (DEPLOY_13_R) PID (PARAMETER IDENTIFICATION) FOR AN INTERMITTENT LOW RESISTANCE OR OPEN CIRCUIT FAULT

Using a diagnostic scan tool, view RCM Parameter Identifications (PIDs).

While monitoring the DEPLOY_13_R PID, attempt to recreate the fault by wiggling connectors (including any inline connectors) and flexing the wire harness frequently. Record the resistance value indicated by the PID.

Does the PID value read between 1.44 and 3.52 ohms?

Yes	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A16.

No	Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering . REPAIR as necessary. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

A14 CHECK THE PASSENGER SIDE AIRBAG DEPLOYMENT CONTROL CIRCUITS FOR AN INTERMITTENT SHORT TO GROUND FAULT

Attempt to recreate the fault by wiggling connectors (including any inline connectors) and flexing the wire harness frequently.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B1407:11 retrieved on-demand during self-test?

Yes	DEPOWER the SRS and REPAIR as necessary. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

No	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A16.

A15 CHECK THE PASSENGER SIDE AIRBAG DEPLOYMENT CONTROL CIRCUITS FOR AN INTERMITTENT SHORT TO BATTERY FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Passenger Side Airbag (Inline) C219 .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Attempt to recreate the fault by wiggling connectors (including any inline connectors) and flexing the wire harness frequently.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B1407:12 retrieved on-demand during self-test?

Yes	DEPOWER the SRS and REPAIR as necessary. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

No	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A16.

A16 CHECK THE HARNESS AND CONNECTORS

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Passenger Side Airbag (Inline) C219 .

Inspect connector(s) (including any inline connectors) for corrosion, loose or spread terminals and loose or frayed wire connections at terminals.

Inspect wire harness for any damage, pinched, cut or pierced wires.

Inspect RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

Inspect Passenger Side Airbag C3459 Connector Position Assurance (CPA) tab to verify that it is correctly seated and free of damage.

Were any concerns found?

Yes	REPAIR as necessary. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

No	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A17.

A17 CHECK FOR ADDITIONAL SRS (SUPPLEMENTAL RESTRAINT SYSTEM) DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition OFF.

Reconnect all SRS components (if previously disconnected).

If previously directed to depower the SRS, repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

NOTE: When selecting Restraints from the Self Test menu, DTCs are retrieved from the RCM and OCSM.

Using a diagnostic scan tool, perform

Restraints self-test.

Are any RCM and/or OCSM Diagnostic Trouble Codes (DTCs) retrieved on-demand during self-test?

Yes	Do not clear any Diagnostic Trouble Codes (DTCs) until all Diagnostic Trouble Codes (DTCs) have been resolved. DIAGNOSE and REPAIR the RCM and/or OCSM Diagnostic Trouble Codes (DTCs). REFER to: Airbag Supplemental Restraint System (SRS) .

No	The repair is complete. RETURN the vehicle to the customer.

DIAGNOSIS AND TESTING > PINPOINT TEST - DTC: V, COUPE > B1408:11, B1408:12, B1408:13, B1408:1A

Refer to Supplemental Restraint System for schematic and connector information.

Normal Operation and Fault Conditions

The RCM continuously monitors the RH side air curtain circuits for the following faults:

- Resistance out of range
- Unexpected voltage
- Short to ground
- Faulted RH side air curtain

If a fault is detected, the RCM stores DTC B1408:11, B1408:12, B1408:13 or B1408:1A in memory and sends a message to the IPC to illuminate the airbag warning indicator.

The RCM analyzes the deployment loop resistance to determine if a fault exists. The value displayed in the PID is the deployment loop resistance measured by the RCM. If the value displayed is lower or higher than the desired range (refer to diagram below in illustration), the RCM can set a DTC. As the deployment loop resistance drifts farther outside the desired range, the chance for a DTC increases. Small variations in resistance can occur due to the effect of road vibrations on terminal fit. Crimps and terminals can be affected by stress and harness movement and can cause an increase in resistance due to wire strain. These variables can result in an intermittent fault. For this reason, the test requires the PID value to be within the desired range before the fault is considered repaired, regardless if the module is reporting an on-demand DTC at the time of diagnosis. Following this direction helps make sure that minor changes in

resistance do not create a repeat concern. This test uses process of elimination to diagnose each part of the deployment loop circuit including:

- Wiring
- Connections
- RH side air curtain
- RCM



DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1408:11	Passenger Side Curtain Deployment Control 1: Circuit Short to Ground	A fault is indicated when the RCM senses a short to ground on either RH side air curtain circuit for more than 6 seconds.
B1408:12	Passenger Side Curtain Deployment Control 1: Circuit Short to Battery	A fault is indicated when the RCM senses a short to voltage on either RH side air curtain circuit for more than 6 seconds.
B1408:13	Passenger Side Curtain Deployment Control 1: Circuit Open	A fault is indicated when the RCM measures more than the desired resistance between the RH side air curtain circuits for more than 6 seconds.
B1408:1A	Passenger Side Curtain Deployment Control 1: Circuit Resistance Below Threshold	A fault is indicated when the RCM measures less than the desired resistance between the RH side air curtain circuits for more than 6 seconds.

Possible Sources

- Wiring, terminals or connectors
- RH side air curtain
- RCM

PINPOINT TEST A : B1408:11, B1408:12, B1408:13 AND B1408:1A

WARNING: Incorrect repair techniques or actions can cause an accidental Supplemental Restraint System (SRS) deployment. Never compromise or depart from these instructions. Failure to precisely follow all instructions could result in serious

personal injury from an accidental deployment.

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may cause damage to the connector.

NOTE: Most faults are due to connector and/or wiring concerns. Carry out a thorough inspection and verification before proceeding with the pinpoint test.

NOTE: Only disconnect or reconnect SRS components when instructed to do so within a pinpoint test step. Failure to follow this instruction may result in incorrect diagnosis of the SRS.

NOTE: Always make sure the correct SRS component is being installed. Parts released for other vehicles may not be compatible even if they appear physically similar. Check the part number listed in the Ford parts catalog to make sure the correct component is being installed. If an incorrect SRS component is installed, Diagnostic Trouble Codes (DTCs) may set.

NOTE: The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

A1 RETRIEVE RCM (RESTRAINTS CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

WARNING: Before beginning any service procedure in this service information, refer to Safety Warnings in GENERAL INFORMATION . Failure to follow this instruction may result in serious personal injury.

REFER to: Pyrotechnic Device Health and Safety Precautions .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B1408:11, B1408:12, B1408:13 and B1408:1A retrieved on-demand during self-test?

Yes	This fault cannot be cleared until it is corrected and the DTC is no longer retrieved on-demand during self-test. If DTC U3003:16 or U3003:17 is also retrieved on-demand. REFER to: Pinpoint Test - DTC: AJ . If DTC U3003:16 or U3003:17 is not retrieved on-demand during self-test, DIAGNOSE the RH side air curtain Diagnostic Trouble Codes (DTCs). For DTC B1408:13 or B1408:1A, GO to A2. For DTC B1408:11, GO to A8. For DTC B1408:12, GO to A10.

No	This is an intermittent fault when present as a Continuous Memory Diagnostic Trouble Code (CMDTC) only. If DTC U3003:16 or U3003:17 is also retrieved on-demand. REFER to: Pinpoint Test - DTC: AJ . If DTC U3003:16 or U3003:17 is not retrieved on-demand during self-test, DIAGNOSE the RH side air curtain Continuous Memory Diagnostic Trouble Codes (CMDTCs). For DTC B1408:13 or B1408:1A, GO to A13. For DTC B1408:11, GO to A14. For DTC B1408:12, GO to A15.

A2 CHECK THE RIGHT CURTAIN DEPLOYMENT CONTROL 1 (DEPLOY_14_R) PID (PARAMETER IDENTIFICATION)

Using a diagnostic scan tool, view RCM Parameter Identifications (PIDs).

Monitor and record the resistance value displayed by the DEPLOY_14_R PID.

Does the PID value read between 1.44 and 3.52 ohms?

Yes	GO to A12

No	GO to A3

A3 CHECK THE RIGHT CURTAIN DEPLOYMENT CONTROL 1 (DEPLOY_14_R) PID (PARAMETER IDENTIFICATION) WHILE CARRYING OUT THE HARNESS TEST

While monitoring the DEPLOY_14_R PID, carry out the harness test of the RH side air curtain circuits and accessible connectors (including any inline connectors) by wiggling and flexing the wire harness and connectors frequently. Record the resistance value indicated by the PID.

Does the PID value read between 1.44 and 3.52 ohms while carrying out the harness test?

Yes	DEPOWER the SRS and REPAIR the connector, terminals or wire harness as needed. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

No	For PID value less than 1.44 ohms, GO to A4. For PID value greater than 3.52 ohms, GO to A6.

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the reported fault changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A4 CHECK THE RH (RIGHT-HAND) SIDE AIR CURTAIN DEPLOYMENT CONTROL DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (LOW RESISTANCE INDICATED)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect RH Side Air Curtain C9032 .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

DIAGNOSTIC TIP: When viewing Diagnostic Trouble Codes (DTCs) with the RH side air curtain disconnected, an open circuit fault is normally retrieved.

Did the on-demand DTC change from B1408:1A to B1408:13?

Yes	GO to A11

No	GO to A5

A5 CHECK FOR A SHORT BETWEEN THE RH (RIGHT-HAND) SIDE AIR CURTAIN CIRCUITS

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect RCM C310A and C310B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C9032-1	Ω	C9032-2

Is the resistance greater than 10, 000 ohms?

Yes	GO to A12

No	REPAIR the circuit(s). Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

A6 CHECK THE RH (RIGHT-HAND) SIDE AIR CURTAIN CIRCUITS FOR AN OPEN

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect RH Side Air Curtain C9032 .

Disconnect RCM C310A and C310B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C310B-17	Ω	C9032-1

C310B-18	Ω	C9032-2

Are the resistances less than 0.5 ohm?

Yes	GO to A7.

No	REPAIR the circuits. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the reported fault changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A7 CHECK THE RH (RIGHT-HAND) SIDE AIR CURTAIN DEPLOYMENT CONTROL DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (OPEN INDICATED)

Connect RCM C310A and C310B .

Connect a fused jumper wire:

Lead 1	Measurement / Action	Lead 2
C9032-1		C9032-2

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

DIAGNOSTIC TIP: When viewing Diagnostic Trouble Codes (DTCs) with the RH side air curtain circuits shorted together, a low resistance fault is normally retrieved.

Did the on-demand DTC change from B1408:13 to B1408:1A?

Yes	REMOVE the fused jumper wire and GO to A11

No	REMOVE the fused jumper wire and GO to A12

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the reported fault changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A8 CHECK THE RH (RIGHT-HAND) SIDE AIR CURTAIN DEPLOYMENT CONTROL DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (SHORT TO GROUND INDICATED)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect RH Side Air Curtain C9032 .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

DIAGNOSTIC TIP: When viewing Diagnostic Trouble Codes (DTCs) with the RH side air curtain disconnected, an open circuit fault is normally retrieved.

Did the on-demand DTC change from B1408:11 to B1408:13?

Yes	GO to A11

No	GO to A9

A9 CHECK THE RH (RIGHT-HAND) SIDE AIR CURTAIN CIRCUITS FOR A SHORT TO GROUND

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect RCM C310A and C310B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C9032-1	Ω	Ground
C9032-2	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to A12

No	REPAIR the circuit(s). Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

A10 CHECK THE RH (RIGHT-HAND) SIDE AIR CURTAIN CIRCUITS FOR A SHORT TO VOLTAGE

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect RH Side Air Curtain C9032 .

Disconnect RCM C310A and C310B .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C9032-1		Ground
C9032-2		Ground

Is any voltage present?

Yes	REPAIR the circuit(s). Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

No	GO to A12

NOTE: Make sure all SRS components and the RCM electrical connectors are connected before carrying out the self-test. If not, Diagnostic Trouble Codes (DTCs) will be recorded.

A11 CONFIRM THE RH (RIGHT-HAND) SIDE AIR CURTAIN FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Prior to reconnecting any previously disconnected SRS component:

Inspect connector(s) (including any inline connectors) for pushed-out, loose or spread terminals and loose or frayed wire connections at terminals.

Inspect wire harness for any damaged, pinched, cut or pierced wires.

Inspect RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

Inspect RH Side Air Curtain C9032 and make sure the Connector Position Assurance (CPA) tabs are not broken and the clip is not damaged.

Repair any concerns found. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

Connect RH Side Air Curtain C9032 .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS)

Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was the original DTC retrieved on-demand during self-test?

Yes	INSTALL a new RH side air curtain. REFER to: Side Curtain Airbag . GO to A17.

No	In the process of diagnosing the fault, the fault condition has become intermittent. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. For DTC B1408:13 or B1408:1A, GO to A13. For DTC B1408:11, GO to A14. For DTC B1408:12, GO to A15.

NOTE: Make sure all SRS components and the RCM electrical connectors are connected before carrying out the self-test. If not, Diagnostic Trouble Codes (DTCs) will be recorded.

A12 CONFIRM THE RCM (RESTRAINTS CONTROL MODULE) FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Prior to reconnecting any previously disconnected SRS component:

Inspect connector(s) (including any inline connectors) for pushed-out, loose or spread terminals and loose or frayed wire connections at terminals.

Inspect wire harness for any damaged, pinched, cut or pierced wires.

Inspect RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

Repair any concerns found. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

Connect RH Side Air Curtain C9032 (if previously disconnected).

Connect RCM C310A and C310B (if previously disconnected).

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was the original DTC retrieved on-demand during self-test?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service

	Bulletins (TSBs) address this concern, INSTALL a new RCM. REFER to: Restraints Control Module (RCM) . GO to A17.

No	In the process of diagnosing the fault, the fault condition has become intermittent. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. For DTC B1408:13 or B1408:1A, GO to A13. For DTC B1408:11, GO to A14. For DTC B1408:12, GO to A15.

A13 CHECK THE RIGHT CURTAIN DEPLOYMENT CONTROL 1 (DEPLOY_14_R) PID (PARAMETER IDENTIFICATION) FOR AN INTERMITTENT LOW RESISTANCE OR OPEN CIRCUIT FAULT

Using a diagnostic scan tool, view RCM Parameter Identifications (PIDs).

While monitoring the DEPLOY_14_R PID, attempt to recreate the fault by wiggling connectors (including any inline connectors) and flexing the wire harness frequently. Record the resistance value indicated by the PID.

Does the PID value read between 1.44 and 3.52 ohms?

Yes	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A16.

No	Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering . REPAIR as necessary. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17

A14 CHECK THE RH (RIGHT-HAND) SIDE AIR CURTAIN DEPLOYMENT CONTROL CIRCUITS FOR AN INTERMITTENT SHORT TO GROUND FAULT

Attempt to recreate the fault by wiggling connectors (including any inline connectors) and flexing the wire harness frequently.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B1408:11 retrieved on-demand during self-test?

Yes	DEPOWER the SRS and REPAIR as necessary. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

No	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A16.

A15 CHECK THE RH (RIGHT-HAND) SIDE AIR CURTAIN DEPLOYMENT CONTROL CIRCUITS FOR AN INTERMITTENT SHORT TO BATTERY FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect RH Side Air Curtain C9032 .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Attempt to recreate the fault by wiggling connectors (including any inline connectors) and flexing the wire harness frequently.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B1408:12 retrieved on-demand during self-test?

Yes	DEPOWER the SRS and REPAIR as necessary. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

No	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A16.

A16 CHECK THE HARNESS AND CONNECTORS

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect RH Side Air Curtain C9032 .

Inspect connector(s) (including any inline connectors) for corrosion, loose or spread terminals and loose or frayed wire connections at terminals.

Inspect wire harness for any damage, pinched, cut or pierced wires.

Inspect RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

Inspect RH Side Air Curtain C9032 Connector Position Assurance (CPA) tab to verify that it is correctly seated and free of damage.

Were any concerns found?

Yes	REPAIR as necessary. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

No	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A17.

A17 CHECK FOR ADDITIONAL SRS (SUPPLEMENTAL RESTRAINT SYSTEM) DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition OFF.

Reconnect all SRS components (if previously disconnected).

If previously directed to depower the SRS, repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

> *NOTE: When selecting Restraints from the Self Test menu, DTCs are retrieved from the RCM and OCSM.*

Using a diagnostic scan tool, perform

Restraints self-test.

Are any RCM and/or OCSM Diagnostic Trouble Codes (DTCs) retrieved on-demand during self-test?

Yes	Do not clear any Diagnostic Trouble Codes (DTCs) until all Diagnostic Trouble Codes (DTCs) have been resolved. DIAGNOSE and REPAIR the RCM and/or OCSM Diagnostic Trouble Codes (DTCs). REFER to: Airbag Supplemental Restraint System (SRS) .

No	The repair is complete. RETURN the vehicle to the customer.

DIAGNOSIS AND TESTING > PINPOINT TEST - DTC: W > B1413:11 AND B1413:93

Refer to Supplemental Restraint System for schematic and connector information.

Normal Operation and Fault Conditions

The RCM monitors the LH front impact severity sensor circuits for the following faults:

- Open circuit
- Short to voltage
- Short to ground
- Faulted LH front impact severity sensor

If a fault is detected, the RCM stores DTC B1413:11 or B1413:93 in memory and sends a message to the IPC to illuminate the airbag warning indicator.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1413:11	Driver Frontal Restraints Sensor: Circuit Short to Ground	A fault is indicated when the RCM senses a short to ground on the LH front impact severity sensor feed

		circuit.
B1413:93	Driver Frontal Restraints Sensor: No Operation	A fault is indicated when the RCM senses a faulted LH front impact severity sensor, a short to voltage on the sensor feed circuit or an open feed or return circuit.

Possible Causes

- Wiring, terminals or connectors
- LH front impact severity sensor
- RCM

Visual Inspection and Diagnostic Pre-checks

- Inspect for a damaged LH front impact severity sensor.
- Inspect the LH front impact severity sensor mounting and orientation.
- Inspect for damaged wiring harness(es).
- Inspect for loose or damaged connectors.

PINPOINT TEST A : B1413:11 AND B1413:93

WARNING: Incorrect repair techniques or actions can cause an accidental Supplemental Restraint System (SRS) deployment. Never compromise or depart from these instructions. Failure to precisely follow all instructions could result in serious personal injury from an accidental deployment.

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may cause damage to the connector.

NOTE: Most faults are due to connector and/or wiring concerns. Carry out a thorough inspection and verification before proceeding with the pinpoint test.

NOTE: Only disconnect or reconnect SRS components when instructed to do so within a pinpoint test step. Failure to follow this instruction may result in incorrect diagnosis of the SRS.

NOTE: Always make sure the correct SRS component is being installed. Parts released for other vehicles may not be compatible even if they appear physically similar. Check the part number listed in the Ford parts catalog to make sure the correct component is being installed. If an incorrect SRS component is installed, Diagnostic Trouble Codes (DTCs) may set.

NOTE: The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

NOTE: Do not probe any impact sensor. The impact sensor cannot be tested using a multi-meter

A1 RETRIEVE RCM (RESTRAINTS CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

WARNING: Before beginning any service procedure in this service information, refer to Safety Warnings in GENERAL INFORMATION . Failure to follow this instruction may result in serious personal injury.

REFER to: Pyrotechnic Device Health and Safety Precautions .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B1413:11 or B1413:93 retrieved on-demand during self-test?

Yes	This fault cannot be cleared until it is corrected and the DTC is no longer retrieved on-demand during self-test.If DTC U3003:16 or U3003:17 is also retrieved on-demand, DIAGNOSE those Diagnostic Trouble Codes (DTCs) first. REFER to: Pinpoint Test - DTC: AJ . If DTC U3003:16 or U3003:17 is not retrieved on-demand during self-test, DIAGNOSE the impact sensor Diagnostic Trouble Codes (DTCs).For DTC B1413:11, GO to A2. For DTC B1413:93, GO to A5.
No	If DTC U3003:16 or U3003:17 is also retrieved on-demand. REFER to: Pinpoint Test - DTC: AJ . If DTC U3003:16 or U3003:17 is not retrieved on-demand during self-test, DIAGNOSE the impact sensor Continuous Memory Diagnostic Trouble Codes (CMDTCs). This is an intermittent fault when present as a Continuous Memory Diagnostic Trouble Code (CMDTC) only. GO to A10.

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the reported fault changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A2 CHECK THE LEFT FRONTAL RESTRAINTS SENSOR DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (SHORT TO GROUND INDICATED)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect LH Front Impact Severity Sensor C1465 .

Remove the air cleaner. Refer to the appropriate Engine article for the procedure.

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Did the on-demand DTC change from B1413:11 to B1413:93?

Yes	INSTALL a new LH front impact severity sensor. REFER to: Front Impact Severity Sensor . GO to A11.

No	GO to A3.

A3 CHECK THE LH (LEFT-HAND) FRONT IMPACT SEVERITY SENSOR FEED CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect RCM C310A and C310B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1465-1	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to A4.

No	REPAIR the circuit. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A11.

A4 CHECK FOR A SHORT BETWEEN LH (LEFT-HAND) FRONT IMPACT SEVERITY SENSOR CIRCUITS

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1465-1	Ω	C1465-2

Is the resistance greater than 10, 000 ohms?

Yes	GO to A9.

No	REPAIR the circuits. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A11.

A5 CHECK THE LH (LEFT-HAND) FRONT IMPACT SEVERITY SENSOR AND RCM (RESTRAINTS CONTROL MODULE) CONNECTIONS (NO OPERATION INDICATED)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Inspect the LH Front Impact Severity Sensor electrical connector C1465 to make sure it is fully seated and locked. Seat and lock the connector as necessary.

Remove the air cleaner. Refer to the appropriate Engine article for the procedure.

Gain access to the RCM and inspect C310A and C310B to make sure they are fully seated and locked. Seat and lock the connector as necessary

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B1413:93 retrieved on-demand during self-test?

Yes	GO to A6

No	The fault has been corrected. GO to A11

A6 CHECK THE LH (LEFT-HAND) FRONT IMPACT SEVERITY SENSOR FEED CIRCUIT FOR A SHORT TO VOLTAGE (NO OPERATION INDICATED)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect LH Front Impact Severity Sensor C1465 .

Disconnect RCM C310A and C310B .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead

C1465-1		Ground

Is any voltage present?

Yes	REPAIR the circuit. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A11.

No	GO to A7.

A7 CHECK THE LH (LEFT-HAND) FRONT IMPACT SEVERITY SENSOR CIRCUITS FOR AN OPEN

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C310A-17	Ω	C1465-1
C310A-18	Ω	C1465-2

Are the resistances less than 0.5 ohm?

Yes	GO to A8.

No	REPAIR the circuit(s). Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A11.

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the reported fault changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A8 CHECK THE LEFT FRONTAL RESTRAINTS SENSOR DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (NO OPERATION INDICATED)

Connect RCM C310A and C310B .

Connect a fused jumper wire as shown in illustration:

Lead 1	Measurement / Action	Lead 2
C1465-1		C1465-2

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Did the on-demand DTC change from B1413:93 to B1413:11?

Yes	REMOVE the fused jumper wire and INSTALL a new LH front impact severity sensor. REFER to: Front Impact Severity Sensor . GO to A11.

No	REMOVE the fused jumper wire and GO to A9

NOTE: Make sure all SRS components and the RCM electrical connectors are connected before carrying out the self-test. If not, Diagnostic Trouble Codes (DTCs) will be recorded.

A9 CONFIRM THE RCM (RESTRAINTS CONTROL MODULE) FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Prior to reconnecting any previously disconnected SRS component:

inspect connector(s) (including any inline connectors) for pushed-out, loose or spread terminals and loose or frayed wire connections at terminals.

inspect wire harness for any damaged, pinched, cut or pierced wires.

inspect RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

repair any concerns found. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

Connect LH Front Impact Severity Sensor C1465 .

Connect RCM C310A and C310B .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was the original DTC retrieved on-demand during self-test?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new RCM. REFER to: Restraints Control Module (RCM) . GO to A11.

No	In the process of diagnosing the fault, the fault condition has become intermittent. Do not install any new SRS components at this time. Install SRS components only when directed to

	do so in the pinpoint test. GO to A10.

A10 CHECK FOR AN INTERMITTENT FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect LH Front Impact Severity Sensor C1465 .

Remove the air cleaner. Refer to the appropriate Engine article for the procedure.

Disconnect RCM C310A and C310B .

Inspect:

harness and component connectors for loose or spread terminals and loose or frayed wire connections at terminals.

wire harness for any damage, pinched, cut or pierced wires.

RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

repair any concerns found. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

Connect LH Front Impact Severity Sensor C1465 .

Connect RCM C310A and C310B .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B1413:11 or B1413:93 retrieved on-demand during the self-test?

Yes	This fault cannot be cleared until it is corrected and the DTC is no longer retrieved on-demand during self-test. For DTC B1413:11, GO to A2. For DTC B1413:93, GO to A5.

No	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A11.

A11 CHECK FOR ADDITIONAL SRS (SUPPLEMENTAL RESTRAINT SYSTEM) DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition OFF.

Reconnect all SRS components (if previously disconnected).

If previously directed to depower the SRS, repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

NOTE: When selecting Restraints from the Self Test menu, DTCs are retrieved from the RCM and OCSM.

Using a diagnostic scan tool, perform

Restraints self-test.

Are any RCM and/or OCSM Diagnostic Trouble Codes (DTCs) retrieved on-demand during self-test?

Yes	Do not clear any Diagnostic Trouble Codes (DTCs) until all Diagnostic Trouble Codes (DTCs) have been resolved. DIAGNOSE and REPAIR the RCM and/or OCSM Diagnostic Trouble Codes (DTCs). REFER to: Airbag Supplemental Restraint System (SRS) .

No	The repair is complete. RETURN the vehicle to the customer.

DIAGNOSIS AND TESTING > PINPOINT TEST - DTC: X, COUPE > B1414:11, B1414:93, B1419:11, B1419:93, B1427:11, B14EB:11

Refer to Supplemental Restraint System for schematic and connector information.

Normal Operation and Fault Conditions

The RCM monitors the driver front door and RH B-pillar side impact sensors and circuits for the following faults:

- Open circuit
- Short to voltage
- Short to ground
- Faulted driver front door side impact sensor
- Faulted RH B-pillar side impact sensor

NOTE: A short to ground on either impact sensor feed circuit sets Diagnostic Trouble Codes (DTCs) B1414:11 and B1419:11. A short to voltage on either impact sensor feed or return circuit sets Diagnostic Trouble Codes (DTCs) B1414:93 and B1419:93.

If a fault is detected, the RCM stores DTC B1414:11, B1414:93, B1419:11, B1419:93, B1427:11 or B14EB:11 in memory and sends a message to the IPC to illuminate the airbag warning indicator.

The RCM communicates with each impact sensor. If the RCM is unable to communicate with the sensor, a

DTC is stored in memory. A CMDTC **no operation** (failure type: 93) can be set by a short to voltage on the return circuit of the impact sensor.

Some vehicles may be equipped with wiring for pedestrian protection system sensors, although the vehicle is not equipped with the sensors themselves. On these vehicles, if a short to ground condition occurs on the pedestrian protection sensor wiring, short to ground Diagnostic Trouble Codes (DTCs) set for the side impact sensors, in addition to short to ground Diagnostic Trouble Codes (DTCs) for pedestrian protection sensors. Alternatively, if a short to ground condition occurs on the side impact sensor circuits, then pedestrian protection sensor Diagnostic Trouble Codes (DTCs) set as well.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1414:11	Driver Side Restraints Sensor 1: Circuit Short to Ground	A fault is indicated when the RCM senses a shorted driver front door side impact sensor, a shorted RH B-pillar side impact sensor, a short to ground on the driver front door side impact sensor feed circuit or a short to ground on the RH B-pillar side impact sensor feed circuit. If equipped with wiring for pedestrian protection sensors, a short to voltage on those circuits may also set this DTC.
B1414:93	Driver Side Restraints Sensor 1: No Operation	A fault is indicated when the RCM senses a faulted driver front door side impact sensor, a short to voltage on the feed or return circuit of the driver front door side impact sensor, a short to voltage on the feed or return circuit of RH B-pillar side impact sensor or an open feed or return circuit of the driver front door side impact sensor.
B1419:11	Passenger Side Restraints Sensor 2: Circuit Short to Ground	A fault is indicated when the RCM senses a shorted driver front door side impact sensor, a shorted RH B-pillar side impact sensor, a short to ground on the driver front door side impact sensor feed circuit or a short to ground on the RH B-pillar side impact sensor feed circuit. If equipped with wiring for pedestrian protection sensors, a short to voltage on those circuits may also set this DTC.
B1419:93	Passenger Side Restraints Sensor 2: No Operation	A fault is indicated when the RCM senses a faulted RH B-pillar side impact sensor, a short to voltage on the feed or return circuit of RH B-pillar side impact sensor, a short

		to voltage on the feed or return circuit of the driver front door side impact sensor or an open feed or return circuit of the RH B-pillar side impact sensor.
B1427:11	Pedestrian Protection Sensor Driver Outer: Circuit Short to Ground	If equipped with wiring for pedestrian protection sensors, a fault is indicated when the RCM senses a shorted driver front door side impact sensor, a shorted RH B-pillar side impact sensor, a short to ground on the driver front door side impact sensor feed circuit, a short to ground on the RH B-pillar side impact sensor feed circuit, or a short to ground on the wiring for pedestrian protection sensors.
B14EB:11	Pedestrian Protection Sensor Passenger Outer: Circuit Short to Ground	If equipped with wiring for pedestrian protection sensors, a fault is indicated when the RCM senses a shorted driver front door side impact sensor, a shorted RH B-pillar side impact sensor, a short to ground on the driver front door side impact sensor feed circuit, a short to ground on the RH B-pillar side impact sensor feed circuit, or a short to ground on the wiring for pedestrian protection sensors.

Possible Causes

- Wiring, terminals or connectors
- Driver front door side impact sensor
- RH B-pillar side impact sensor
- RCM

Visual Inspection and Diagnostic Pre-checks

- Inspect for damaged wiring harness(es).

PINPOINT TEST A : B1414:11, B1414:93, B1419:11, B1419:93, B1427:11, B14EB:11

> *WARNING: Incorrect repair techniques or actions can cause an accidental Supplemental Restraint System (SRS) deployment. Never compromise or depart from these instructions. Failure to precisely follow all instructions could result in serious personal injury from an accidental deployment.*

> *NOTE: Use the correct probe adapter(s) when making measurements. Failure to use*

the correct probe adapter(s) may cause damage to the connector.

NOTE: Most faults are due to connector and/or wiring concerns. Carry out a thorough inspection and verification before proceeding with the pinpoint test.

NOTE: Only disconnect or reconnect SRS components when instructed to do so within a pinpoint test step. Failure to follow this instruction may result in incorrect diagnosis of the SRS.

NOTE: Always make sure the correct SRS component is being installed. Parts released for other vehicles may not be compatible even if they appear physically similar. Check the part number listed in the Ford parts catalog to make sure the correct component is being installed. If an incorrect SRS component is installed, Diagnostic Trouble Codes (DTCs) may set.

NOTE: The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

NOTE: Do not probe any impact sensor. The impact sensor cannot be tested using a multi-meter.

A1 RETRIEVE RCM (RESTRAINTS CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

WARNING: Before beginning any service procedure in this service information, refer to Safety Warnings in GENERAL INFORMATION . Failure to follow this instruction may result in serious personal injury.

REFER to: Pyrotechnic Device Health and Safety Precautions .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Were any Diagnostic Trouble Codes (DTCs) retrieved on-demand during self-test?

Yes	The fault(s) cannot be cleared until corrected and the Diagnostic Trouble Codes (DTCs) are no longer retrieved on-demand during self-test. If DTC U3003:16 or U3003:17 is also retrieved on-demand, DIAGNOSE those Diagnostic Trouble Codes (DTCs) first. REFER to: Pinpoint Test - DTC: AJ . If DTC U3003:16 or U3003:17 is not retrieved on-demand during self-test, DIAGNOSE the impact sensor Diagnostic Trouble Codes (DTCs). For DTC B1414:11 and B1419:11 and, if equipped, B1427:11 and B14EB:11, GO to A2. For DTC B1414:93 **AND** B1419:93, GO to A6

	For DTC B1414:93 **ONLY** , GO to A8 For DTC B1419:93 **ONLY** , GO to Airbag Supplemental Restraint System (SRS) .

No	If DTC U3003:16 or U3003:17 is also retrieved on-demand. REFER to: Pinpoint Test - DTC: AJ . If DTC U3003:16 or U3003:17 is not retrieved on-demand during self-test, DIAGNOSE the impact sensor Continuous Memory Diagnostic Trouble Codes (CMDTCs). The fault is intermittent when present as a CMDTC only. GO to A15.

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the fault reported changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A2 CHECK THE DRIVER SIDE RESTRAINTS SENSOR 1 DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (SHORT TO GROUND INDICATED)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Driver Front Door Side Impact Sensor C567 .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Did the on-demand Diagnostic Trouble Codes (DTCs) change from B1414:11 and B1419:11 and, if equipped, B1427:11 and B14EB:11 to B1414:93?

Yes	INSTALL a new driver front door side impact sensor. REFER to: Front Door Side Impact Sensor . GO to A16.

No	GO to A3

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the fault reported changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A3 CHECK THE PASSENGER SIDE RESTRAINTS SENSOR 2 DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (SHORT TO GROUND INDICATED)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Connect Driver Front Door Side Impact Sensor C567 .

Disconnect RH B-pillar Side Impact Sensor C3212 .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Did the on-demand DTC change from B1414:11 and B1419:11 and, if equipped, B1427:11 and B14EB:11 to B1419:93?

Yes	INSTALL a new RH B-pillar side impact sensor. REFER to: B-Pillar Side Impact Sensor . GO to A16.

No	GO to A4

A4 CHECK THE DRIVER FRONT DOOR SIDE IMPACT SENSOR FEED CIRCUIT FOR A SHORT TO GROUND AND SHORT BETWEEN SENSOR CIRCUITS

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Driver Front Door Side Impact Sensor C567 .

Disconnect RCM C310A and C310B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C567-1	Ω	C567-2

Measure:

Positive Lead	Measurement / Action	Negative Lead
C567-1	Ω	Ground

If equipped, measure:

Positive Lead	Measurement / Action	Negative Lead
C310B-19	Ω	Ground
C310B-29	Ω	Ground

If equipped, measure:

Positive Lead	Measurement / Action	Negative Lead

C310B-19	Ω	C310B-20
C310B-29	Ω	C310B-30

Are the resistances greater than 10, 000 ohms?

Yes	GO to A5

No	REPAIR the affected circuit(s). Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A16.

A5 CHECK THE RH (RIGHT-HAND) B-PILLAR SIDE IMPACT SENSOR FEED CIRCUIT FOR A SHORT TO GROUND AND SHORT BETWEEN SENSOR CIRCUITS

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3212-1	Ω	C3212-2

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3212-1	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to A14

No	REPAIR the affected circuit(s). Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A16.

A6 CHECK THE DRIVER FRONT DOOR SIDE IMPACT SENSOR CIRCUITS FOR A SHORT TO VOLTAGE (NO OPERATION INDICATED)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Driver Front Door Side Impact Sensor C567 .

Disconnect RCM C310A and C310B .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C567-1		Ground
C567-2		Ground

Is any voltage present?

Yes	REPAIR the affected circuits. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A16.

No	GO to A7.

A7 CHECK THE RH (RIGHT-HAND) B-PILLAR SIDE IMPACT SENSOR CIRCUITS FOR A SHORT TO VOLTAGE (NO OPERATION INDICATED)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect RH B-pillar Side Impact Sensor C3212 .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3212-1		Ground
C3212-2		Ground

Is any voltage present?

Yes	REPAIR the affected circuits. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A16.

No	GO to A14.

A8 CHECK THE DRIVER FRONT DOOR SIDE IMPACT SENSOR AND RCM (RESTRAINTS CONTROL MODULE) CONNECTIONS (NO OPERATION INDICATED)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Gain access to the driver front door side impact sensor and inspect C567 to make sure it is

fully seated and locked. Seat and lock the connector as necessary.

Gain access to the RCM and inspect C310A and C310B to make sure they are fully seated and locked. Seat and lock the connector(s) as necessary.

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B1414:93 retrieved on-demand during self-test?

Yes	GO to A9

No	The fault is corrected. GO to A16

A9 CHECK THE DRIVER FRONT DOOR SIDE IMPACT SENSOR CIRCUITS FOR AN OPEN (NO OPERATION INDICATED)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect RCM C310A and C310B .

Disconnect Driver Front Door Side Impact Sensor C567 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C310B-44	Ω	C567-1
C310B-43	Ω	C567-2

Are the resistances less than 0.5 ohm?

Yes	GO to A10.

No	REPAIR the affected circuit. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A16.

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the fault reported changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A10 CHECK THE DRIVER SIDE RESTRAINTS SENSOR 1 DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (NO OPERATION INDICATED)

Connect RCM C310A and C310B .

Connect a fused jumper wire:

Lead 1	Measurement / Action	Lead 2
C567-1		C567-2

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Did the DTC change from B1414:93 to B1414:11 and B1419:11 and, if equipped, B1427:11 and B14EB:11?

Yes	REMOVE the fused jumper wire and INSTALL a new driver front door side impact sensor. REFER to: Front Door Side Impact Sensor . GO to A16.

No	REMOVE the fused jumper wire and GO to A14

A11 CHECK THE RH (RIGHT-HAND) B-PILLAR SIDE IMPACT SENSOR AND RCM (RESTRAINTS CONTROL MODULE) CONNECTIONS (NO OPERATION INDICATED)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Gain access to the RH B-pillar side impact sensor and inspect C3212 to be fully seated and locked. Seat and lock the connector as necessary.

Gain access to the RCM and inspect C310A and C310B to be fully seated and locked. Seat and lock the connector(s) as necessary.

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B1419:93 retrieved on-demand during self-test?

Yes	GO to A12.

No	The fault is corrected. GO to A16.

A12 CHECK THE RH (RIGHT-HAND) B-PILLAR SIDE IMPACT SENSOR CIRCUITS FOR AN OPEN (NO OPERATION INDICATED)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect RCM C310A and C310B .

Disconnect RH B-pillar Side Impact Sensor C3212 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C310B-32	Ω	C3212-1
C310B-31	Ω	C3212-2

Are the resistances less than 0.5 ohm?

Yes	GO to A13.

No	REPAIR the affected circuit. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A16.

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the fault reported changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A13 CHECK THE PASSENGER SIDE RESTRAINTS SENSOR 2 DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (NO OPERATION INDICATED)

Connect RCM C310A and C310B .

Connect a fused jumper wire:

Lead 1	Measurement / Action	Lead 2
C3212-1		C3212-2

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Did the DTC change from B1419:93 to B1414:11 and B1419:11 and, if equipped, B1427:11 and B14EB:11?

Yes	REMOVE the fused jumper wire and INSTALL a new RH B-pillar side impact sensor. REFER to: B-Pillar Side Impact Sensor . GO to A16.

No	REMOVE the fused jumper wire and GO to A14.

NOTE: Make sure all SRS components and the RCM electrical connectors are connected before carrying out the self-test. If not, Diagnostic Trouble Codes (DTCs) will be recorded.

A14 CONFIRM THE RCM (RESTRAINTS CONTROL MODULE) FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Prior to reconnecting any previously disconnected SRS component:

inspect connector(s) (including any inline connectors) for pushed-out, loose or spread terminals and loose or frayed wire connections at terminals.

inspect wire harness for any damage, pinched, cut or pierced wires.

inspect RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

repair any concerns found. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

Connect RH B-pillar Side Impact Sensor C3212 (if previously disconnected).

Connect Driver Front Door Side Impact Sensor C567 (if previously disconnected).

Connect RCM C310A and C310B .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was the original DTC retrieved on-demand during self-test?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new RCM. REFER to: Restraints Control Module (RCM) . GO to A16.

No	In the process of diagnosing the fault, the fault condition has become intermittent. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A15.

A15 CHECK FOR AN INTERMITTENT FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect RH B-pillar Side Impact Sensor C3212 .

Disconnect Driver Front Door Side Impact Sensor C567 .

Disconnect RCM C310A and C310B .

Inspect:

harness and component connectors for loose or spread terminals and loose or frayed wire connections at terminals.

wire harness for any damage, pinched, cut or pierced wires.

RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation

repair any concerns found. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

Connect RH B-pillar Side Impact Sensor C3212 .

Connect Driver Front Door Side Impact Sensor C567 .

Connect RCM C310A and C310B .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B1414:11, B1414:93, B1419:11, B1419:93, B1427:11 or B14EB:11 retrieved on-demand during self-test?

Yes	The fault(s) cannot be cleared until corrected and the DTC is no longer retrieved on-demand during self-test.For DTC B1414:11 and B1419:11 and, if equipped, B1427:11 and B14EB:11, GO to A2. For DTC B1414:93 **AND** B1419:93, GO to A6. For DTC B1414:93 **ONLY** , GO to A8. For DTC B1419:93 **ONLY** , GO to A11.

No	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A16.

A16 CHECK FOR ADDITIONAL SRS (SUPPLEMENTAL RESTRAINT SYSTEM) DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition OFF.

Reconnect all SRS components (if previously disconnected).

If previously directed to depower the SRS, repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

> *NOTE: When selecting Restraints from the Self Test menu, DTCs are retrieved from the RCM and OCSM.*

Using a diagnostic scan tool, perform

Restraints self-test.

Are any RCM and/or OCSM Diagnostic Trouble Codes (DTCs) retrieved on-demand during self-test?

Yes	Do not clear any Diagnostic Trouble Codes (DTCs) until all Diagnostic Trouble Codes (DTCs) have been resolved. DIAGNOSE and REPAIR the RCM and/or OCSM Diagnostic Trouble Codes (DTCs). REFER to: Airbag Supplemental Restraint System (SRS) .

No	The repair is complete. RETURN the vehicle to the customer.

DIAGNOSIS AND TESTING > PINPOINT TEST - DTC: Y, COUPE > B1415:11, B1415:93, B1418:11, B1418:93, B1424:11

Refer to Supplemental Restraint System for schematic and connector information.

Normal Operation and Fault Conditions

The RCM monitors the passenger front door and LH B-pillar side impact sensors and circuits for the following faults:

- Open circuit
- Short to voltage
- Short to ground
- Faulted passenger front door side impact sensor
- Faulted LH B-pillar side impact sensor

> *NOTE: A short to ground on either impact sensor feed circuit sets DTC B1415:11 and B1418:11. A short to voltage on either impact sensor feed or return circuit sets DTC B1415:93 and B1418:93.*

If a fault is detected, the RCM stores DTC B1415:11, B1415:93, B1418:11, B1418:93 or B1424:11 in memory and sends a message to the IPC to illuminate the airbag warning indicator.

The RCM communicates with each impact sensor. If the RCM is unable to communicate with the sensor, a DTC is stored in memory. A Continuous Memory Diagnostic Trouble Code (CMDTC) **no operation** (failure type: 93) can be set by a short to voltage on the return circuit of the impact sensor.

Some vehicles may be equipped with wiring for pedestrian protection system sensors, although the vehicle is not equipped with the sensors themselves. On these vehicles, if a short to ground condition occurs on the pedestrian protection sensor wiring, short to ground Diagnostic Trouble Codes (DTCs) set for the side impact sensors, in addition to short to ground Diagnostic Trouble Codes (DTCs) for pedestrian protection sensors. Alternatively, if a short to ground condition occurs on the side impact sensor circuits, then pedestrian protection sensor Diagnostic Trouble Codes (DTCs) set as well.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1415:11	Driver Side Restraints Sensor 2: Circuit Short to Ground	A fault is indicated when the RCM senses a shorted passenger door side impact sensor, a shorted LH B-pillar side impact sensor, a short to ground on the passenger front door side impact sensor feed circuit or a short to ground on the LH B-pillar side impact sensor feed circuit.
B1415:93	Driver Side Restraints Sensor 2: No Operation	A fault is indicated when the RCM senses a faulted LH B-pillar side impact sensor, a short to voltage on the feed or return circuit of the LH B-pillar side impact sensor, a short to voltage on the feed or return circuit of passenger front door side impact sensor or an open feed or return circuit of the passenger front door impact sensor.
B1418:11	Passenger Side Restraints Sensor 1: Circuit Short to Ground	A fault is indicated when the RCM senses a shorted passenger front door side impact sensor, a shorted LH B-pillar side impact sensor, a short to ground on the passenger front door side impact sensor feed circuit or a short to ground on the LH B-pillar side impact sensor feed circuit.
B1418:93	Passenger Side Restraints Sensor 1: No Operation	A fault is indicated when the RCM senses a faulted passenger front door side impact sensor, a short to voltage on the feed or return circuit of passenger front door side impact sensor, a short to voltage

		on the feed or return circuit of the LH B-pillar side impact sensor or an open feed or return circuit of the passenger front door side impact sensor.
B1424:11	Pedestrian Protection Sensor Center: Circuit Short to Ground	If equipped with wiring for pedestrian protection sensors, a fault is indicated when the RCM senses a shorted passenger front door side impact sensor, a shorted LH B-pillar side impact sensor, a short to ground on the passenger front door side impact sensor feed circuit, a short to ground on the LH B-pillar side impact sensor feed circuit, or a short to ground on the wiring for pedestrian protection sensors.

Possible Causes

- Wiring, terminals or connectors
- Passenger front door side impact sensor
- LH B-pillar side impact sensor
- RCM

Visual Inspection and Diagnostic Pre-checks

- Inspect for damaged wiring harness(es).

PINPOINT TEST A : B1415:11, B1415:93, B1418:11, B1418:93, B1424:11

> *WARNING: Incorrect repair techniques or actions can cause an accidental Supplemental Restraint System (SRS) deployment. Never compromise or depart from these instructions. Failure to precisely follow all instructions could result in serious personal injury from an accidental deployment.*

> *NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may cause damage to the connector.*

> *NOTE: Most faults are due to connector and/or wiring concerns. Carry out a thorough inspection and verification before proceeding with the pinpoint test.*

> *NOTE: SRS components should only be disconnected or reconnected when instructed to do so within a pinpoint test step. Failure to follow this instruction may result in*

incorrect diagnosis of the SRS.

NOTE: Always make sure the correct SRS component is being installed. Parts released for other vehicles may not be compatible even if they appear physically similar. Check the part number listed in the Ford parts catalog to make sure the correct component is being installed. If an incorrect SRS component is installed, Diagnostic Trouble Codes (DTCs) may set.

NOTE: The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

NOTE: Do not probe any impact sensor. The impact sensor cannot be tested using a multi-meter.

A1 RETRIEVE RCM (RESTRAINTS CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

WARNING: Before beginning any service procedure in this service information, refer to Safety Warnings in GENERAL INFORMATION . Failure to follow this instruction may result in serious personal injury.

REFER to: Pyrotechnic Device Health and Safety Precautions .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Were any Diagnostic Trouble Codes (DTCs) retrieved on-demand during self-test?

Yes	The fault(s) cannot be cleared until corrected and the Diagnostic Trouble Codes (DTCs) are no longer retrieved on-demand during self-test.If DTC U3003:16 or U3003:17 is also retrieved on-demand, DIAGNOSE those Diagnostic Trouble Codes (DTCs) first. REFER to: Pinpoint Test - DTC: AJ . If DTC U3003:16 or U3003:17 is not retrieved on-demand during self-test, DIAGNOSE the impact sensor Diagnostic Trouble Codes (DTCs). For DTC B1415:11, B1418:11 and, if equipped, B1424:11, GO to A2. For DTC B1415:93 **AND** B1418:93, GO to A6. For DTC B1415:93 **ONLY** , GO to A8. For DTC B1418:93 **ONLY** , GO to A11. For any other Diagnostic Trouble Codes (DTCs). REFER to: Airbag Supplemental Restraint System (SRS) .
No	If DTC U3003:16 or U3003:17 is also retrieved on-demand. REFER to: Pinpoint Test - DTC: AJ . If DTC U3003:16 or U3003:17 is not retrieved on-demand during self-test, DIAGNOSE the impact sensor Continuous Memory Diagnostic Trouble Codes (CMDTCs). The fault is

	intermittent when present as a Continuous Memory Diagnostic Trouble Code (CMDTC) only. GO to A15.

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the fault reported changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A2 CHECK THE DRIVER SIDE RESTRAINTS SENSOR 2 DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (SHORT TO GROUND INDICATED)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect LH B-pillar Side Impact Sensor C3210 .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Did the on-demand Diagnostic Trouble Codes (DTCs) change from B1415:11, B1418:11 and, if equipped, B1424:11 to B1415:93?

Yes	INSTALL a new LH B-pillar side impact sensor. REFER to: B-Pillar Side Impact Sensor . GO to A16.

No	GO to A3.

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the fault reported changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A3 CHECK THE PASSENGER SIDE RESTRAINTS SENSOR 1 DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (SHORT TO GROUND INDICATED)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Connect LH B-pillar Side Impact Sensor C3210 .

Disconnect Passenger Front Door Side Impact Sensor C644 .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Did the on-demand DTC change from B1415:11, B1418:11 and, if equipped, B1424:11 to B1418:93?

Yes	INSTALL a new passenger front door side impact sensor. REFER to: Front Door Side Impact Sensor . GO to A16.

No	GO to A4.

A4 CHECK THE LH (LEFT-HAND) B-PILLAR SIDE IMPACT SENSOR FEED CIRCUIT FOR A SHORT TO GROUND AND SHORT BETWEEN SENSOR CIRCUITS

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect LH B-pillar Side Impact Sensor C3210 .

Disconnect RCM C310A and C310B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3210-1	Ω	C3210-2

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3210-1	Ω	Ground

If equipped, measure:

Positive Lead	Measurement / Action	Negative Lead
C310B-22	Ω	Ground

If equipped, measure:

Positive Lead	Measurement / Action	Negative Lead
C310B-22	Ω	C310B-21

Are the resistances greater than 10, 000 ohms?

Yes	GO to A5

No	REPAIR the affected circuit(s). Refer to OEM CONNECTOR REPAIR PROCEDURES for

	schematic and connector information. GO to A16.

A5 CHECK THE PASSENGER FRONT DOOR SIDE IMPACT SENSOR FEED CIRCUIT FOR A SHORT TO GROUND AND SHORT BETWEEN SENSOR CIRCUITS

Measure:

Positive Lead	Measurement / Action	Negative Lead
C644-1	Ω	C644-2

Measure:

Positive Lead	Measurement / Action	Negative Lead
C644-1	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to A14

No	REPAIR the affected circuit(s). Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A16.

A6 CHECK THE LH (LEFT-HAND) B-PILLAR SIDE IMPACT SENSOR FEED CIRCUIT FOR A SHORT TO VOLTAGE (NO OPERATION INDICATED)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect RCM C310A and C310B .

Disconnect LH B-pillar Side Impact Sensor C3210 .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3210-1		Ground
C3210-2		Ground

Is any voltage present?

Yes	REPAIR the circuits. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A16.

No	GO to A7.

A7 CHECK THE PASSENGER FRONT DOOR SIDE IMPACT SENSOR FEED CIRCUIT FOR A SHORT TO VOLTAGE (NO OPERATION INDICATED)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Passenger Front Door Side Impact Sensor C644 .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C644-1		Ground
C644-2		Ground

Is any voltage present?

Yes	REPAIR the affected circuits. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A16.

No	GO to A14.

A8 CHECK THE LH (LEFT-HAND) B-PILLAR SIDE IMPACT SENSOR AND RCM (RESTRAINTS CONTROL MODULE) CONNECTIONS (NO OPERATION INDICATED)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Gain access to the LH B-pillar side impact sensor and inspect C3210 to make sure it is fully seated and locked. Seat and lock the connector as necessary.

Gain access to the RCM and inspect C310A and C310B to make sure they are fully seated and locked. Seat and lock the connector(s) as necessary.

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B1415:93 retrieved on-demand during self-test?

Yes	GO to A9

No	The fault is corrected. GO to A16

A9 CHECK THE LH (LEFT-HAND) B-PILLAR SIDE IMPACT SENSOR CIRCUITS FOR AN OPEN (NO OPERATION INDICATED)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect RCM C310A and C310B .

Disconnect LH B-pillar Side Impact Sensor C3210 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C310B-33	Ω	C3210-1
C310B-34	Ω	C3210-2

Are the resistances less than 0.5 ohm?

Yes	GO to A10

No	REPAIR the affected circuit. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A16.

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the fault reported changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A10 CHECK THE DRIVER SIDE RESTRAINTS SENSOR 2 DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (NO OPERATION INDICATED)

Connect RCM C310A and C310B .

Connect a fused jumper wire:

Lead 1	Measurement / Action	Lead 2
C3210-1		C3210-2

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Did the DTC change from B1415:93 to B1415:11, B1418:11 and, if equipped, B1424:11?

Yes	REMOVE the fused jumper wire and INSTALL a new LH B-pillar side impact sensor. REFER to: B-Pillar Side Impact Sensor . GO to A16.

No	REMOVE the fused jumper wire and GO to A14

A11 CHECK THE PASSENGER FRONT DOOR SIDE IMPACT SENSOR AND RCM (RESTRAINTS CONTROL MODULE) CONNECTIONS (NO OPERATION INDICATED)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Gain access to the passenger front door side impact sensor and inspect C644 to make sure it is fully seated and locked. Seat and lock the connector as necessary.

Gain access to the RCM and inspect C310A and C310B to make sure they are fully seated and locked. Seat and lock the connector(s) as necessary.

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B1418:93 retrieved on-demand during self-test?

Yes	GO to A12

No	Fault corrected. GO to A16

A12 CHECK THE PASSENGER FRONT DOOR SIDE IMPACT SENSOR CIRCUITS FOR AN OPEN (NO OPERATION INDICATED)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect RCM C310A and C310B .

Disconnect Passenger Front Door Side Impact Sensor C644 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C310B-45	Ω	C644-1
C310B-46	Ω	C644-2

Are the resistances less than 0.5 ohm?

Yes	GO to A13.

No	REPAIR the affected circuit. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A16.

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the fault reported changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A13 CHECK THE PASSENGER SIDE RESTRAINTS SENSOR 1 DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (NO OPERATION INDICATED)

Connect RCM C310A and C310B .

Connect a fused jumper wire:

Lead 1	Measurement / Action	Lead 2
C644-1		C644-2

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Did the DTC change from B1418:93 to B1415:11, B1418:11 and, if equipped, B1424:11?

Yes	REMOVE the fused jumper wire and INSTALL a new passenger front door side impact sensor. REFER to: Front Door Side Impact Sensor . GO to A16.

No	REMOVE the fused jumper wire and GO to A14

NOTE: Make sure all SRS components and the RCM electrical connectors are connected before carrying out the self-test. If not, Diagnostic Trouble Codes (DTCs) will be recorded.

A14 CONFIRM THE RCM (RESTRAINTS CONTROL MODULE) FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Prior to reconnecting any previously disconnected SRS component:

inspect connector(s) (including any inline connectors) for pushed-out, loose or spread terminals and loose or frayed wire connections at terminals.

inspect wire harness for any damage, pinched, cut or pierced wires.

inspect RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

repair any concerns found. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

Connect LH B-pillar Side Impact Sensor C3210 (if previously disconnected).

Connect Passenger Front Door Side Impact Sensor C644 (if previously disconnected).

Connect RCM C310A and C310B .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was the original DTC retrieved on-demand during self-test?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new RCM. REFER to: Restraints Control Module (RCM) . GO to A16.

No	In the process of diagnosing the fault, the fault condition has become intermittent. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A15.

A15 CHECK FOR AN INTERMITTENT FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect LH B-pillar Side Impact Sensor C3210 .

Disconnect Passenger Front Door Side Impact Sensor C644 .

Disconnect RCM C310A and C310B .

Inspect:

harness and component connectors for loose or spread terminals and loose or frayed wire connections at terminals.

wire harness for any damage, pinched, cut or pierced wires.

RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

repair any concerns found. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

Connect LH B-pillar Side Impact Sensor C3210 .

Connect Passenger Front Door Side Impact Sensor C644 .

Connect RCM C310A and C310B .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B1415:11, B1415:93, B1418:11, B1418:93 or B1424:11 retrieved on-demand during self-test?

Yes	The fault(s) cannot be cleared until corrected and the DTC is no longer retrieved on-demand during self-test. For DTC B1415:11, B1418:11 and, if equipped, B1424:11, GO to A2 For DTC B1415:93 **AND** B1418:93, GO to A6. For DTC B1415:93 **ONLY** , GO to A8. For DTC B1418:93 **ONLY** , GO to A11.

No	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A16.

A16 CHECK FOR ADDITIONAL SRS (SUPPLEMENTAL RESTRAINT SYSTEM) DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition OFF.

Reconnect all SRS components (if previously disconnected).

If previously directed to depower the SRS, repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

NOTE: When selecting Restraints from the Self Test menu, Diagnostic Trouble Codes (DTCs) are retrieved from the RCM and OCSM.

Using a diagnostic scan tool, perform the

Restraints self-test.

Are any RCM and/or OCSM Diagnostic Trouble Codes (DTCs) retrieved on-demand during self-test?

Yes	Do not clear any Diagnostic Trouble Codes (DTCs) until all Diagnostic Trouble Codes (DTCs) have been resolved. DIAGNOSE and REPAIR the RCM and/or OCSM Diagnostic Trouble Codes (DTCs). REFER to: Airbag Supplemental Restraint System (SRS) .

No	The repair is complete. RETURN the vehicle to the customer.

DIAGNOSIS AND TESTING > PINPOINT TEST - DTC: Z > B1417:11 AND B1417:93

Refer to Supplemental Restraint System for schematic and connector information.

The RCM monitors the RH front impact severity sensor circuits for the following faults:

- Open circuit
- Short to voltage
- Short to ground
- Faulted RH front impact severity sensor

If a fault is detected, the RCM stores DTC B1417:11 or B1417:93 in memory and sends a message to the IPC to illuminate the airbag warning indicator.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1417:11	Passenger Frontal Restraints Sensor: Circuit Short to Ground	A fault is indicated when the RCM senses a short to ground on the RH front impact severity sensor feed circuit.
B1417:93	Passenger Frontal Restraints Sensor: No Operation	A fault is indicated when the RCM senses a faulted RH front impact severity sensor, a short to voltage on the feed circuit or an open feed or return circuit.

Possible Causes

- Wiring, terminals or connectors

- RH front impact severity sensor
- RCM

Visual Inspection and Diagnostic Pre-checks

- Inspect for a damaged RH front impact severity sensor.
- Inspect the RH front impact severity sensor mounting and orientation.
- Inspect for damaged wiring harness(es).
- Inspect for loose or damaged connectors.

PINPOINT TEST A : B1417:11 AND B1417:93

WARNING: Incorrect repair techniques or actions can cause an accidental Supplemental Restraint System (SRS) deployment. Never compromise or depart from these instructions. Failure to precisely follow all instructions could result in serious personal injury from an accidental deployment.

NOTE: Most faults are due to connector and/or wiring concerns. Carry out a thorough inspection and verification before proceeding with the pinpoint test.

NOTE: Only disconnect or reconnect SRS components when instructed to do so within a pinpoint test step. Failure to follow this instruction may result in incorrect diagnosis of the SRS.

NOTE: Always make sure the correct SRS component is being installed. Parts released for other vehicles may not be compatible even if they appear physically similar. Check the part number listed in the Ford parts catalog to make sure the correct component is being installed. If an incorrect SRS component is installed, Diagnostic Trouble Codes (DTCs) may set.

NOTE: Do not probe any impact sensor. The impact sensor cannot be tested using a multi-meter

NOTE: The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

A1 RETRIEVE RCM (RESTRAINTS CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

WARNING: Before beginning any service procedure in this service information,

refer to Safety Warnings in GENERAL INFORMATION . Failure to follow this instruction may result in serious personal injury.

REFER to: Pyrotechnic Device Health and Safety Precautions .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B1417:11 or B1417:93 retrieved on-demand during self-test?

Yes	This fault cannot be cleared until it is corrected and the DTC is no longer retrieved on-demand during self-test.If DTC U3003:16 or U3003:17 is also retrieved on-demand, DIAGNOSE those Diagnostic Trouble Codes (DTCs) first. REFER to: Pinpoint Test - DTC: AJ . If DTC U3003:16 or U3003:17 is not retrieved on-demand during self-test, DIAGNOSE the impact sensor Diagnostic Trouble Codes (DTCs). For DTC B1417:11, GO to A2. For DTC B1417:93, GO to A5.

No	If DTC U3003:16 or U3003:17 is also retrieved on-demand. REFER to: Pinpoint Test - DTC: AJ . If DTC U3003:16 or U3003:17 is not retrieved on-demand during self-test, DIAGNOSE the impact sensor Continuous Memory Diagnostic Trouble Codes (CMDTCs). This is an intermittent fault when present as a Continuous Memory Diagnostic Trouble Code (CMDTC) only. GO to A10.

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the reported fault changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A2 CHECK THE RIGHT FRONTAL RESTRAINTS SENSOR DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (SHORT TO GROUND INDICATED)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect RH Front Impact Severity Sensor C1466 .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Did the on-demand DTC change from B1417:11 to B1417:93?

Yes	INSTALL a new RH front impact severity sensor. REFER to: Front Impact Severity Sensor . GO to A11.

No	GO to A3

A3 CHECK THE RH (RIGHT-HAND) FRONT IMPACT SEVERITY SENSOR FEED CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect RCM C310A and C310B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1466-1	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to A4

No	REPAIR the circuit. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A11.

A4 CHECK FOR A SHORT BETWEEN RH (RIGHT-HAND) FRONT IMPACT SEVERITY SENSOR CIRCUITS

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1466-1	Ω	C1466-2

Is the resistance greater than 10, 000 ohms?

Yes	GO to A9.

No	REPAIR the circuits. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A11.

A5 CHECK THE RH (RIGHT-HAND) FRONT IMPACT SEVERITY SENSOR AND RCM (RESTRAINTS CONTROL MODULE) CONNECTIONS (NO OPERATION INDICATED)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Inspect the RH Front Impact Severity Sensor C1466 to make sure it is fully seated and locked. Seat and lock the connector as necessary.

Gain access to the RCM and inspect C310A and C310B to make sure they are fully seated and locked. Seat and lock the connector as necessary.

Repower the SRS. Do not prove out the SRS at this time. REFER to: Supplemental Restraint

System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B1417:93 retrieved on-demand during self-test?

Yes	GO to A6

No	The fault has been corrected. GO to A11

A6 CHECK THE RH (RIGHT-HAND) FRONT IMPACT SEVERITY SENSOR FEED CIRCUIT FOR A SHORT TO VOLTAGE (NO OPERATION INDICATED)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect RH Front Impact Severity Sensor C1466 .

Disconnect RCM C310A and C310B .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1466-1		Ground

Is any voltage present?

Yes	REPAIR the circuit. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A11.

No	GO to A7

A7 CHECK THE RH (RIGHT-HAND) FRONT IMPACT SEVERITY SENSOR CIRCUITS FOR AN OPEN (NO OPERATION INDICATED)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Measure:

Positive Lead	Measurement / Action	Negative Lead

C310A-16	Ω	C1466-1
C310A-15	Ω	C1466-2

Are the resistances less than 0.5 ohm?

Yes	GO to A8.

No	REPAIR the circuit(s). Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A11.

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the reported fault changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A8 CHECK THE RIGHT FRONTAL RESTRAINTS SENSOR DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (NO OPERATION INDICATED)

Connect: RCM C310A and C310B .

Connect a fused jumper wire as shown in illustration:

Lead 1	Measurement / Action	Lead 2
C1466-1		C1466-2

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Did the on-demand DTC change from B1417:93 to B1417:11?

Yes	REMOVE the fused jumper wire and INSTALL a new RH front impact severity sensor. REFER to: Front Impact Severity Sensor . GO to A11.

No	REMOVE the fused jumper wire and GO to A9

NOTE: Make sure all SRS components and the RCM electrical connectors are connected before carrying out the self-test. If not, Diagnostic Trouble Codes (DTCs) will be recorded.

A9 CONFIRM THE RCM (RESTRAINTS CONTROL MODULE) FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Prior to reconnecting any previously disconnected SRS component:

inspect connector(s) (including any inline connectors) for pushed-out, loose or spread terminals and loose or frayed wire connections at terminals.

inspect wire harness for any damaged, pinched, cut or pierced wires.

inspect RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

repair any concerns found. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

Connect RH Front Impact Severity Sensor C1466 .

Connect RCM C310A and C310B .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was the original DTC retrieved on-demand during self-test?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new RCM. REFER to: Restraints Control Module (RCM) . GO to A11.

No	In the process of diagnosing the fault, the fault condition has become intermittent. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A10.

A10 CHECK FOR AN INTERMITTENT FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect RH Front Impact Severity Sensor C1466 .

Disconnect RCM C310A and C310B .

Inspect:

harness and component connectors for loose or spread terminals and loose or frayed wire connections at terminals.

wire harness for any damage, pinched, cut or pierced wires.

RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct

operation.

repair any concerns found. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

Connect RH Front Impact Severity Sensor C1466 .

Connect RCM C310A and C310B .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B1417:11 or B1417:93 retrieved on-demand during the self-test?

Yes	This fault cannot be cleared until it is corrected and the DTC is no longer retrieved on-demand during self-test.For DTC B1417:11, GO to A2. For DTC B1417:93, GO to A5.

No	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A11.

A11 CHECK FOR ADDITIONAL SRS (SUPPLEMENTAL RESTRAINT SYSTEM) DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition OFF.

Reconnect all SRS components (if previously disconnected).

If previously directed to depower the SRS, repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

NOTE: When selecting Restraints from the Self Test menu, DTCs are retrieved from the RCM and OCSM.

Using a diagnostic scan tool, perform

Restraints self-test.

Are any RCM and/or OCSM Diagnostic Trouble Codes (DTCs) retrieved on-demand during self-test?

Yes	Do not clear any Diagnostic Trouble Codes (DTCs) until all Diagnostic Trouble Codes (DTCs) have been resolved. DIAGNOSE and REPAIR the RCM and/or OCSM Diagnostic Trouble Codes (DTCs). REFER to: Airbag Supplemental Restraint System (SRS) .

No	The repair is complete. RETURN the vehicle to the customer.

DIAGNOSIS AND TESTING > PINPOINT TEST - DTC: AA > BXXXX:2B (ANY BXXXX DTC WITH A 2B FAILURE TYPE) SIGNAL CROSS COUPLED

Refer to Supplemental Restraint System for schematic and connector information.

Normal Operation and Fault Conditions

The RCM monitors all deployable device and sensor circuits for a signal cross coupled (short) between components. Signal cross coupled Diagnostic Trouble Codes (DTCs) are present when one or both circuits of a component are shorted to one or both circuits of another component. Signal cross coupled Diagnostic Trouble Codes (DTCs) do not set when the circuits of a single device are shorted together, a different DTC is present (for example, a DTC for circuit resistance below threshold). The RCM sends a message to the IPC to illuminate the airbag warning indicator. When a normal loop fault is present (one loop is either shorted to battery/ground, open circuit or low resistance), then signal cross coupled diagnostics are not active. Once the normal loop fault is repaired, the signal cross coupled diagnostics resume.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B0001:2B	Driver Frontal Stage 1 Deployment Control: Signal Cross Coupled	If the RCM detects a short between the driver airbag stage 1 circuits and the circuits of another SRS component, it sets this DTC and the DTC of the corresponding SRS component.
B0002:2B	Driver Frontal Stage 2 Deployment Control: Signal Cross Coupled	If the RCM detects a short between the driver airbag stage 2 circuits and the circuits of another SRS component, it sets this DTC and the DTC of the corresponding SRS component.
B0004:2B	Driver Knee Bolster Deployment Control: Signal Cross Coupled	If the RCM detects a short between the driver lower airbag circuits and the circuits of another SRS component, it sets this DTC and the DTC of the corresponding SRS component.
B0005:2B	Collapsible Steering Column Deployment Control: Signal Cross Coupled	If the RCM detects a short between the deployable steering column circuits and the circuits of another SRS component, it sets this DTC and the DTC of the corresponding SRS component.
B0010:2B	Passenger Frontal Stage 1 Deployment Control: Signal Cross Coupled	If the RCM detects a short between the passenger airbag stage 1 circuits and the circuits of another

		SRS component, it sets this DTC and the DTC of the corresponding SRS component.
B0011:2B	Passenger Frontal Stage 2 Deployment Control: Signal Cross Coupled	If the RCM detects a short between the passenger airbag stage 2 circuits and the circuits of another SRS component, it sets this DTC and the DTC of the corresponding SRS component.
B0013:2B	Passenger Knee Bolster Deployment Control: Signal Cross Coupled	If the RCM detects a short between the passenger knee bolster circuits and the circuits of another SRS component, it sets this DTC and the DTC of the corresponding SRS component.
B0050:2B	Driver Seatbelt Sensor: Signal Cross Coupled	If the RCM detects a short between the driver safety belt buckle switch circuits and the circuits of another SRS component, it sets this DTC and the DTC of the corresponding SRS component.
B0052:2B	Passenger Seatbelt Sensor: Signal Cross Coupled	If the RCM detects a short between the passenger safety belt buckle switch circuits and the circuits of another SRS component, it sets this DTC and the DTC of the corresponding SRS component.
B0070:2B	Driver Seatbelt Pretensioner "A" Deployment Control: Signal Cross Coupled	If the RCM detects a short between the driver safety belt anchor pretensioner circuits and the circuits of another SRS component, it sets this DTC and the DTC of the corresponding SRS component.
B0072:2B	Passenger Seatbelt Pretensioner "A" Deployment Control: Signal Cross Coupled	If the RCM detects a short between the passenger safety belt anchor pretensioner circuits and the circuits of another SRS component, it sets this DTC and the DTC of the corresponding SRS component.
B007E:2B	Driver Seatbelt Pretensioner "C" Deployment Control: Signal Cross Coupled	If the RCM detects a short between the driver safety belt retractor pretensioner circuits and the circuits of another SRS component, it sets this DTC and the DTC of the corresponding SRS component.
B007F:2B	Passenger Seatbelt Pretensioner "C" Deployment Control: Signal Cross Coupled	If the RCM detects a short between the passenger safety belt retractor pretensioner circuits and the circuits of another SRS component,

		it sets this DTC and the DTC of the corresponding SRS component.
B00B5:2B	Driver Seat Track Position Restraints Sensor: Signal Cross Coupled	If the RCM detects a short between the LH seat track position sensor circuits and the circuits of another SRS component, it sets this DTC and the DTC of the corresponding SRS component.
B00C5:2B	Passenger Seat Track Position Restraints Sensor: Signal Cross Coupled	If the RCM detects a short between the RH seat track position sensor circuits and the circuits of another SRS component, it sets this DTC and the DTC of the corresponding SRS component.
B11CF:2B	Passenger Frontal Airbag Canister Vent: Signal Cross Coupled	If the RCM detects a short between the passenger airbag canister vent circuits and the circuits of another SRS component, it sets this DTC and the DTC of the corresponding SRS component.
B1404:2B	Driver Side Airbag Deployment Control: Signal Cross Coupled	If the RCM detects a short between the driver side airbag circuits and the circuits of another SRS component, it sets this DTC and the DTC of the corresponding SRS component.
B1405:2B	Driver Curtain Deployment Control 1: Signal Cross Coupled	If the RCM detects a short between the LH side air curtain circuits and the circuits of another SRS component, it sets this DTC and the DTC of the corresponding SRS component.
B1407:2B	Passenger Side Airbag Deployment Control: Signal Cross Coupled	If the RCM detects a short between the passenger side airbag circuits and the circuits of another SRS component, it sets this DTC and the DTC of the corresponding SRS component.
B1408:2B	Passenger Curtain Deployment Control 1: Signal Cross Coupled	If the RCM detects a short between the RH side air curtain circuits and the circuits of another SRS component, it sets this DTC and the DTC of the corresponding SRS component.

Possible Sources

- Wiring, terminals or connectors
- RCM

Visual Inspection and Diagnostic Pre-Checks

- Inspect the affected wiring harness(es) for damage, if accessible.

PINPOINT TEST A : BXXXX:2B (ANY BXXXX DTC (DIAGNOSTIC TROUBLE CODE) WITH A 2B FAILURE TYPE) SIGNAL CROSS COUPLED

WARNING: Incorrect repair techniques or actions can cause an accidental Supplemental Restraint System (SRS) deployment. Never compromise or depart from these instructions. Failure to precisely follow all instructions could result in serious personal injury from an accidental deployment.

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may cause damage to the connector.

NOTE: Most faults are due to connector and/or wiring concerns. Carry out a thorough inspection and verification before proceeding with the pinpoint test.

NOTE: Only disconnect or reconnect SRS components when instructed to do so within a pinpoint test step. Failure to follow this instruction may result in incorrect diagnosis of the SRS.

NOTE: Always make sure the correct SRS component is being installed. Parts released for other vehicles may not be compatible even if they appear physically similar. Check the part number listed in the Ford parts catalog to make sure the correct component is being installed. If an incorrect SRS component is installed, Diagnostic Trouble Codes (DTCs) may set.

NOTE: The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

A1 RETRIEVE RCM (RESTRAINTS CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

WARNING: Before beginning any service procedure in this service information, refer to Safety Warnings in GENERAL INFORMATION . Failure to follow this instruction may result in serious personal injury.

REFER to: Pyrotechnic Device Health and Safety Precautions .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Were any signal cross coupled Diagnostic Trouble Codes (DTCs) retrieved on-demand during self-test?

Yes	This fault cannot be cleared until it is corrected and the DTC is no longer retrieved during the on-demand self test. If DTC U3003:16 or U3003:17 is also retrieved on-demand, DIAGNOSE those Diagnostic Trouble Codes (DTCs) first. REFER to: Pinpoint Test - DTC: AJ . If DTC U3003:16 or U3003:17 are not retrieved on-demand, GO to A2

No	If DTC U3003:16 or U3003:17 is retrieved on-demand as well, DIAGNOSE those Diagnostic Trouble Codes (DTCs) first. REFER to: Pinpoint Test - DTC: AJ . If DTC U3003:16 or U3003:17 are not retrieved on-demand, DIAGNOSE the signal cross-coupled Continuous Memory Diagnostic Trouble Codes (CMDTCs). This is an intermittent fault when present as a Continuous Memory Diagnostic Trouble Code (CMDTC) only. GO to A4.

A2 CHECK THE AFFECTED CIRCUITS FOR A SIGNAL CROSS COUPLED FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect RCM C310A and C310B .

Using the signal cross coupled Diagnostic Trouble Codes (DTCs) present on-demand, identify the affected SRS devices.

NOTE: Most signal cross coupled faults are due to connector and/or wiring harness damage. Carry out a thorough inspection of connector(s) and/or wiring harness for damage.

Disconnect all of the affected SRS devices.

Using the following table, measure the resistance between the circuits of one affected SRS device to the other affected SRS device.

Example: If Diagnostic Trouble Codes (DTCs) B0001:2B and B0002:2B are being diagnosed, measure the resistance between circuit CR101 to circuits CR102 and RR102. Then measure the resistance between circuit RR101 to circuits CR102 and RR102.

Device/Loop (DTC)	Connector
Driver airbag stage 1 (B0001:2B)	C216A-1 C216A-2
Driver airbag stage 2 (B0002:2B)	C216B-1 C216B-2
Driver knee airbag (B0004:2B)	C2432-3 C2432-4
Deployable steering column (B0005:2B)	C2360-1 C2360-2

Passenger airbag stage 1 (B0010:2B)	C256-1 C256-2
Passenger airbag stage 2 (B0011:2B)	C256-4 C256-5
Passenger knee airbag (B0013:2B)	C2600-1 C2600-2
Driver safety belt buckle switch (B0050:2B)	C3201-5
Passenger safety belt buckle switch (B0052:2B)	C3238-5
Driver safety belt anchor pretensioner (B0070:2B)	C3065-1 C3065-2
Passenger safety belt anchor pretensioner (B0072:2B)	C3066-1 C3066-2
Driver safety belt retractor pretensioner (B007E:2B)	C323-1 C323-2
Passenger safety belt retractor pretensioner (B007F:2B)	C303-1 C303-2
Driver seat position sensor (B00B5:2B)	C356-2
Passenger seat track position sensor (B00C5:2B)	C3240-2
Passenger airbag canister vent (B11CF:2B)	C256-7 C256-8
Driver side airbag (B1404:2B)	C3206-3 (Inline) C3206-4 (Inline)
LH side air curtain (B1405:2B, coupe only)	C9031-1 C9031-2
Driver upper side airbag (B1405:2B, convertible only)	C3206-1 (Inline) C3206-2 (Inline)
Passenger side airbag (B1407:2B)	C219-3 (Inline) C219-4 (Inline)
RH side air curtain (B1408:2B, coupe only)	C9032-1 C9032-2
Passenger upper side airbag (B1408:2B, convertible only)	C219-1 (Inline) C219-2 (Inline)

Are the resistances greater than 10, 000 ohms between the affected circuits?

Yes	GO to A3

No	REPAIR the affected circuits. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A5

NOTE: Make sure all SRS components and the RCM electrical connectors are connected before carrying out the self-test. If not, Diagnostic Trouble Codes (DTCs) will be recorded.

A3 CONFIRM THE RCM (RESTRAINTS CONTROL MODULE) FAULT

Prior to reconnecting any previously disconnected SRS component:

Inspect connector(s) (including any inline connectors) for pushed-out, loose or spread terminals and loose or frayed wire connections at terminals.

Inspect wire harness for any damage, pinched, cut or pierced wires.

Inspect RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

Repair any concerns found. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

Connect all previously disconnected restraint system component(s).

Connect RCM C310A and C310B .

Repower the SRS. Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Were any signal cross coupled Diagnostic Trouble Codes (DTCs) retrieved on-demand during self-test?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new RCM. REFER to: Restraints Control Module (RCM) . GO to A5.

No	In the process of diagnosing the fault, the fault condition has become intermittent. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A4.

NOTE: Most cross link faults are due to connector and/or wiring harness damage. Carry out a thorough inspection of connector(s) and/or wiring harness for damage.

A4 CHECK FOR AN INTERMITTENT FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect all of the affected SRS devices. Refer to Supplemental Restraint System for schematic and connector information.

Inspect the wiring harness(es) for any type of damage. If damage is found, repair as necessary. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

Repower the SRS. Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Were any signal cross coupled Diagnostic Trouble Codes (DTCs) retrieved on-demand during self-test?

Yes	This fault cannot be cleared until it is corrected and the DTC is no longer retrieved on-demand during self-test. GO to A2.

No	The fault is not present and cannot be recreated at this time. CHECK for causes of the intermittent fault. ATTEMPT to recreate the hard fault by flexing the wire harness and cycling the ignition frequently. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A5

A5 CHECK FOR ADDITIONAL SRS (SUPPLEMENTAL RESTRAINT SYSTEM) DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition OFF.

Reconnect all SRS components (if previously disconnected).

If previously directed to depower the SRS, repower the SRS. Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

NOTE: When selecting Restraints from the Self Test menu, DTCs are retrieved from the RCM and OCSM.

Using a diagnostic scan tool, perform

Restraints self-test.

Are any RCM and/or OCSM Diagnostic Trouble Codes (DTCs) retrieved on-demand during self-test?

Yes	Do not clear any Diagnostic Trouble Codes (DTCs) until all Diagnostic Trouble Codes (DTCs) have been resolve. REFER to: Airbag Supplemental Restraint System (SRS) .

No	The repair is complete. RETURN the vehicle to the customer.

DIAGNOSIS AND TESTING > PINPOINT TEST - DTC: AB > BXXXX:4A (ANY BXXXX DTC WITH A 4A FAILURE TYPE) INCORRECT COMPONENT INSTALLED

Normal Operation and Fault Conditions

The RCM monitors all SRS device connections. If the RCM detects a connection or device connected that is not stored in memory or is not configured for the component, the RCM sets a DTC and sends a message to the IPC to illuminate the airbag warning indicator.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B0001:4A	Driver Frontal Stage 1 Deployment Control: Incorrect Component Installed	This DTC sets if the RCM detects the device but it is not configured for this component.
B0002:4A	Driver Frontal Stage 2 Deployment Control: Incorrect Component Installed	This DTC sets if the RCM detects the device but it is not configured for this component.
B0004:4A	Driver Knee Bolster Deployment Control: Incorrect Component Installed	This DTC sets if the RCM detects the device but it is not configured for this component.
B0005:4A	Collapsible Steering Column Deployment Control: Incorrect Component Installed	This DTC sets if the RCM detects the device but it is not configured for this component.
B0010:4A	Passenger Frontal Stage 1 Deployment Control: Incorrect Component Installed	This DTC sets if the RCM detects the device but it is not configured for this component.
B0011:4A	Passenger Frontal Stage 2 Deployment Control: Incorrect Component Installed	This DTC sets if the RCM detects the device but it is not configured for this component.
B0013:4A	Passenger Knee Bolster Deployment Control: Incorrect Component Installed	This DTC sets if the RCM detects the device but it is not configured for this component.
B0050:4A	Driver Seatbelt Sensor: Incorrect Component Installed	This DTC sets if the RCM detects the device but it is not configured for this component.
B0052:4A	Passenger Seatbelt Sensor: Incorrect Component Installed	This DTC sets if the RCM detects the device but it is not configured for this component.
B0070:4A	Driver Seatbelt Pretensioner "A" Deployment Control: Incorrect Component Installed	This DTC sets if the RCM detects the device but it is not configured for this component.
B0072:4A	Passenger Seatbelt Pretensioner "A" Deployment Control: Incorrect Component Installed	This DTC sets if the RCM detects the device but it is not configured for this component.
B007E:4A	Driver Seatbelt Pretensioner "C" Deployment Control: Incorrect Component Installed	This DTC sets if the RCM detects the device but it is not configured for this component.

B007F:4A	Passenger Seatbelt Pretensioner "C" Deployment Control: Incorrect Component Installed	This DTC sets if the RCM detects the device but it is not configured for this component.
B0080:4A	Driver Seatbelt Load Limiter Deployment Control: Incorrect Component Installed	This DTC sets if the RCM detects the device but it is not configured for this component.
B00B5:4A	Driver Seat Track Position Restraints Sensor: Incorrect Component Installed	This DTC sets if the RCM detects the device but it is not configured for this component.
B00C5:4A	Passenger Seat Track Position Restraints Sensor: Incorrect Component Installed	This DTC sets if the RCM detects the device but it is not configured for this component.
B00D5:4A	Restraint System Passenger Disable Indicator: Incorrect Component Installed	This DTC sets if the RCM detects the device but it is not configured for this component.
B11CF:4A	Passenger Frontal Airbag Canister Vent: Incorrect Component Installed	This DTC sets if the RCM detects the device but it is not configured for this component.
B1404:4A	Driver Side Airbag Deployment Control: Incorrect Component Installed	This DTC sets if the RCM detects the device but it is not configured for this component.
B1405:4A	Driver Curtain Deployment Control 1: Incorrect Component Installed	This DTC sets if the RCM detects the device but it is not configured for this component.
B1407:4A	Passenger Side Airbag Deployment Control: Incorrect Component Installed	This DTC sets if the RCM detects the device but it is not configured for this component.
B1408:4A	Passenger Curtain Deployment Control 1: Incorrect Component Installed	This DTC sets if the RCM detects the device but it is not configured for this component.
B1413:4A	Driver Frontal Restraints Sensor: Incorrect Component Installed	This DTC sets if the RCM detects the device but it is not configured for this component.
B1414:4A	Driver Side Restraints Sensor 1: Incorrect Component Installed	This DTC sets if the RCM detects the device but it is not configured for this component.
B1415:4A	Driver Side Restraints Sensor 2: Incorrect Component Installed	This DTC sets if the RCM detects the device but it is not configured for this component.
B1417:4A	Passenger Frontal Restraints Sensor: Incorrect Component Installed	This DTC sets if the RCM detects the device but it is not configured for this component.
B1418:4A	Passenger Side Restraints Sensor 1: Incorrect Component Installed	This DTC sets if the RCM detects the device but it is not configured for this component.

B1419:4A	Passenger Side Restraints Sensor 2: Incorrect Component Installed	This DTC sets if the RCM detects the device but it is not configured for this component.
B1424:4A	Pedestrian Protection Sensor Center: Incorrect Component Installed	This DTC sets if the RCM detects an unexpected impact sensor.
B1427:4A	Pedestrian Protection Sensor Driver Outer: Incorrect Component Installed	This DTC sets if the RCM detects an unexpected impact sensor.
B1469:4A	Unused Satellite Restraints Sensor 1: Incorrect Component Installed	This DTC sets if the RCM detects an unexpected impact sensor.
B146A:4A	Unused Satellite Restraints Sensor 2: Incorrect Component Installed	This DTC sets if the RCM detects an unexpected impact sensor.
B147D:4A	Driver Side Hood Hinge Deployment Control: Incorrect Component Installed	This DTC sets if the RCM detects the device but it is not configured for this component.
B147E:4A	Passenger Side Hood Hinge Deployment Control: Incorrect Component Installed	This DTC sets if the RCM detects the device but it is not configured for this component.
B14EB:4A	Pedestrian Protection Sensor Passenger Outer: Incorrect Component Installed	This DTC sets if the RCM detects an unexpected impact sensor.

Possible Sources

- RCM not configured or configured incorrectly
- Incorrect RCM installed
- Incorrect impact sensor installed

Visual Inspection and Diagnostic Pre-checks

- Review recent service history to identify repairs where an incorrect component may have been installed.

PINPOINT TEST A : BXXXX:4A (ANY BXXXX DTC (DIAGNOSTIC TROUBLE CODE) WITH A 4A FAILURE TYPE) INCORRECT COMPONENT INSTALLED

> *WARNING: Incorrect repair techniques or actions can cause an accidental Supplemental Restraint System (SRS) deployment. Never compromise or depart from these instructions. Failure to precisely follow all instructions could result in serious personal injury from an accidental deployment.*

> *NOTE: Most faults are due to connector and/or wiring concerns. Carry out a thorough inspection and verification before proceeding with the pinpoint test.*

NOTE: Only disconnect or reconnect SRS components when instructed to do so within a pinpoint test step. Failure to follow this instruction may result in incorrect diagnosis of the SRS.

NOTE: Always make sure the correct SRS component is being installed. Parts released for other vehicles may not be compatible even if they appear physically similar. Check the part number listed in the Ford parts catalog to make sure the correct component is being installed. If an incorrect SRS component is installed, Diagnostic Trouble Codes (DTCs) may set.

NOTE: The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

A1 RETRIEVE RCM (RESTRAINTS CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

WARNING: Before beginning any service procedure in this service information, refer to Safety Warnings in GENERAL INFORMATION . Failure to follow this instruction may result in serious personal injury.

REFER to: Pyrotechnic Device Health and Safety Precautions .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Were any incorrect component installed Diagnostic Trouble Codes (DTCs) retrieved on-demand during self-test?

Yes	This fault cannot be cleared until it is corrected and the DTC is no longer retrieved during self-test. If DTC B00A0:4A was retrieved. REFER to: Pinpoint Test - DTC: N . If DTC U3003:16 or U3003:17 is retrieved on-demand as well, DIAGNOSE those Diagnostic Trouble Codes (DTCs) first. REFER to: Pinpoint Test - DTC: AJ . For all other incorrect component installed Diagnostic Trouble Codes (DTCs), GO to A2.
No	If DTC U3003:16 or U3003:17 is retrieved on-demand as well, DIAGNOSE those Diagnostic Trouble Codes (DTCs) first. REFER to: Pinpoint Test - DTC: AJ . If DTC U3003:16 or U3003:17 are not retrieved on-demand, DIAGNOSE the Continuous Memory Diagnostic Trouble Codes (CMDTCs). This is an intermittent fault when present as a Continuous Memory Diagnostic Trouble Code (CMDTC) only. GO to A5.

A2 CHECK THE RCM (RESTRAINTS CONTROL MODULE) PART NUMBER

Ignition ON.

Check the vehicle repair history. Using the Log Viewer function of the diagnostic scan tool, retrieve and record the RCM part number.

Check the part number recorded against the number listed in the Ford parts catalog and verify the correct RCM is installed in the vehicle.

Is the correct RCM installed?

Yes	GO to A3

No	INSTALL the correct RCM. REFER to: Restraints Control Module (RCM) . GO to A6.

A3 VERIFY THE RCM (RESTRAINTS CONTROL MODULE) CONFIGURATION

Carry out PMI for the RCM. Use As-Built data when carrying out PMI. Refer to the scan tool instructions to carry out PMI.

Using a diagnostic scan tool, perform RCM self-test.

Were any incorrect component installed Diagnostic Trouble Codes (DTCs) retrieved on-demand during self-test?

Yes	For DTC B1413:4A, B1414:4A, B1415:4A, B1417:4A, B1418:4A or B1419:4A, GO to A4. For all other incorrect component installed Diagnostic Trouble Codes (DTCs), CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new RCM. REFER to: Restraints Control Module (RCM) . GO to A6.

No	The fault is corrected. GO to A6.

A4 VERIFY THE SUSPECT IMPACT SENSOR PART NUMBER

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Gain access to the suspect impact sensor(s) for which incorrect component installed Diagnostic Trouble Codes (DTCs) were retrieved. Refer to the chart for the appropriate procedure(s).

DTC	Component	Procedure
B1413:4A	LH front impact severity sensor	REFER to: Front Impact Severity Sensor .
B1414:4A	Driver front door side impact sensor	REFER to: Front Door Side Impact Sensor .
B1415:4A	LH B-pillar side impact sensor	REFER to: B-Pillar Side Impact Sensor .
B1417:4A	RH front impact severity sensor	REFER to: Front Impact Severity Sensor .
B1418:4A	Passenger front door side impact sensor	REFER to: Front Door Side Impact Sensor .

B1419:4A	RH B-pillar side impact sensor	REFER to: B-Pillar Side Impact Sensor .

Record the part number from each suspect impact sensor.

Check the part number(s) recorded against the number listed in the Ford parts catalog and verify that each suspect impact sensor installed in the vehicle is correct.

Do the part numbers of all suspect impact sensors match the part numbers listed in the Ford parts catalog?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new RCM. GO to A6.

No	INSTALL the correct impact sensor(s) as necessary. For DTC B1413:4A or B1417:4. REFER to: Front Impact Severity Sensor . For DTC B1414:4A or B1418:4. REFER to: Front Door Side Impact Sensor . For DTC B1415:4A or B1419:4. REFER to: B-Pillar Side Impact Sensor . GO to A6.

A5 CHECK FOR AN INTERMITTENT FAULT

Using a diagnostic scan tool, clear RCM Diagnostic Trouble Codes (DTCs).

Using a diagnostic scan tool, perform RCM self-test to retrieve Diagnostic Trouble Codes (DTCs).

Were any incorrect component installed Diagnostic Trouble Codes (DTCs) retrieved on-demand during self-test?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new RCM. REFER to: Restraints Control Module (RCM) . GO to A6.

No	Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A6.

A6 CHECK FOR ADDITIONAL SRS (SUPPLEMENTAL RESTRAINT SYSTEM) DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition OFF.

If previously directed to depower the SRS, repower the SRS. Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

NOTE: When selecting Restraints from the Self Test menu, DTCs are retrieved from the RCM and OCSM.

Using a diagnostic scan tool, perform

Restraints self-test.

Are any RCM and/or OCSM Diagnostic Trouble Codes (DTCs) retrieved on-demand during self-test?

Yes	Do not clear any Diagnostic Trouble Codes (DTCs) until all Diagnostic Trouble Codes (DTCs) have been resolve. REFER to: Airbag Supplemental Restraint System (SRS) .

No	CLEAR all RCM and OCSM Continuous Memory Diagnostic Trouble Codes (CMDTCs). PROVE OUT the SRS. The repair is complete. RETURN the vehicle to the customer.

DIAGNOSIS AND TESTING > PINPOINT TEST - DTC: AC > C0061:68, C0062:68, C0063:68, C0064:68, C0065:68

Diagnostic Overview

Normal Operation and Fault Conditions

The RCM provides the stability/traction control system with acceleration sensor data over the HS-CAN2. In addition to transmitting the data, the RCM monitors this data internally to make sure that the data is within an expected range.

If the data is outside of the expected range and a fault is detected, the RCM stores DTC C0061:68, C0062:68, C0063:68, C0064:68, and/or C0065:68 in memory. However, the RCM does not request that the IPC illuminate the airbag warning indicator when these faults are present.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
C0061:68	Lateral Acceleration Sensor: Event Information	A fault is indicated when the lateral acceleration sensor is transmitting data that is outside of the range expected by the RCM.
C0062:68	Longitudinal Acceleration Sensor: Event Information	A fault is indicated when the longitudinal acceleration sensor is transmitting data that is outside of the range expected by the RCM.
C0063:68	Yaw Rate Sensor: Event Information	A fault is indicated when the yaw rate sensor is transmitting data that is outside of the range expected by the RCM.
C0064:68	Roll Rate Sensor: Event Information	A fault is indicated when the roll rate sensor is transmitting data that is outside of the range expected by the RCM.

C0065:68	Vertical Acceleration Sensor: Event Information	A fault is indicated when the vertical acceleration sensor is transmitting data that is outside of the range expected by the RCM.

Possible Sources

- Aggressive driving conditions or rough roads
- RCM mounting
- RCM

PINPOINT TEST A : C0061:68, C0062:68, C0063:68, C0064:68, C0065:68

WARNING: Do not handle, move or change the original horizontal mounting position of the Restraints Control Module (RCM) while the Restraints Control Module (RCM) is connected and the ignition switch is ON. Failure to follow this instruction may result in the accidental deployment of the Safety Canopy® and cause serious personal injury or death.

NOTE: Most faults are due to connector and/or wiring concerns. Carry out a thorough inspection and verification before proceeding with the pinpoint test.

NOTE: SRS components should only be disconnected or reconnected when instructed to do so within a pinpoint test step. Failure to follow this instruction may result in incorrect diagnosis of the SRS.

NOTE: Always make sure the correct SRS component is being installed. Parts released for other vehicles may not be compatible even if they appear physically similar. Check the part number listed in the Ford parts catalog to make sure the correct component is being installed. If an incorrect SRS component is installed, Diagnostic Trouble Codes (DTCs) may set.

NOTE: The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

A1 RETRIEVE RCM (RESTRAINTS CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Were Diagnostic Trouble Codes (DTCs) C0061:68, C0062:68, C0063:68, C0064:68, or C0065:68 the only Diagnostic Trouble Codes (DTCs) retrieved?

Yes	CLEAR the RCM Diagnostic Trouble Codes (DTCs). GO to A2

No	DIAGNOSE all other RCM Diagnostic Trouble Codes (DTCs) first. REFER to: Airbag Supplemental Restraint System (SRS) .

A2 CHECK FOR A RETURNING FAULT

Test drive the vehicle. Choose a route with LH and RH turns. Avoid rough roads and **do not** drive the vehicle aggressively.

Using a diagnostic scan tool, perform RCM self-test.

Were Diagnostic Trouble Codes (DTCs) C0061:68, C0062:68, C0063:68, C0064:68, or C0065:68 the only RCM Diagnostic Trouble Codes (DTCs) retrieved?

Yes	GO to A3

No	If no RCM Diagnostic Trouble Codes (DTCs) were retrieved, the Diagnostic Trouble Codes (DTCs) may have been triggered by aggressive driving or rough road conditions. INFORM the customer that aggressive driving conditions or rough road conditions can set these Diagnostic Trouble Codes (DTCs). RETURN the vehicle to the customer. If any other RCM Diagnostic Trouble Codes (DTCs) were retrieved, DIAGNOSE those Diagnostic Trouble Codes (DTCs). REFER to: Airbag Supplemental Restraint System (SRS) .

A3 CHECK THE RCM (RESTRAINTS CONTROL MODULE) INSTALLATION

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Inspect the RCM installation and make sure that the hardware is fully seated and tightened correctly. REFER to: Restraints Control Module (RCM) .

Inspect the RCM mounting surface for damage, corrosion, or foreign materials.

Is the RCM mounted correctly and is the mounting surface clean and free from damage?

Yes	GO to A4

No	REPAIR the mounting or INSTALL new hardware, as necessary. GO to A6

NOTE: Make sure all SRS components and the RCM electrical connectors are connected before carrying out the self-test. If not, Diagnostic Trouble Codes (DTCs) will be recorded.

A4 CONFIRM THE RCM (RESTRAINTS CONTROL MODULE) FAULT

Prior to reconnecting any previously disconnected SRS component:

Inspect connector(s) (including any inline connectors) for pushed-out, loose or spread

terminals and loose or frayed wire connections at terminals.

Inspect wire harness for any damaged, pinched, cut or pierced wires.

Inspect RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

Repair any concerns found. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

Connect RCM C310A and C310B .

Repower the SRS. Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, clear all RCM Diagnostic Trouble Codes (DTCs).

Using a diagnostic scan tool, perform RCM self-test.

Was the original DTC retrieved on-demand during self-test?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new RCM. REFER to: Restraints Control Module (RCM) . GO to A6.

No	In the process of diagnosing the fault, the fault condition has become intermittent. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A5.

A5 CHECK THE HARNESS AND CONNECTORS

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect RCM C310A and C310B .

Inspect RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

Inspect RCM C310A and C310B for pushed-out, loose or spread terminals and loose or frayed wire connections at terminals.

Inspect wire harnesses for any damaged, pinched, cut or pierced wires.

Were any concerns found?

Yes	REPAIR as necessary. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A6.

No	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint

	test. GO to A6.

A6 CHECK FOR ADDITIONAL SRS (SUPPLEMENTAL RESTRAINT SYSTEM) DIAGNOSTIC TROUBLE CODES (DTCS)

WARNING: Turn the ignition OFF and wait one minute to deplete the backup power supply. Failure to follow this instruction may result in serious personal injury or death in the event of an accidental deployment.

Ignition OFF.

Reconnect all SRS components (if previously disconnected).

If previously directed to depower the SRS, repower the SRS. Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

NOTE: When selecting Restraints from the Self Test menu, Diagnostic Trouble Codes (DTCs) are retrieved from the RCM and OCSM.

Using a diagnostic scan tool, perform the

Restraints self-test to retrieve Diagnostic Trouble Codes (DTCs).

Are any RCM and/or OCSM Diagnostic Trouble Codes (DTCs) retrieved on-demand during self-test?

Yes	Do not clear any Diagnostic Trouble Codes (DTCs) until all Diagnostic Trouble Codes (DTCs) have been resolve. REFER to: Airbag Supplemental Restraint System (SRS) .

No	CLEAR all RCM and OCSM Continuous Memory Diagnostic Trouble Codes (CMDTCs). PROVE OUT the SRS. The repair is complete. RETURN the vehicle to the customer.

DIAGNOSIS AND TESTING > PINPOINT TEST - DTC: AD > U0100:00

Normal Operation and Fault Conditions

The OCSM and RCM both use information contained in messages from the PCM sent on the HS-CAN.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0100:00	Lost Communication with ECM/PCM "A": No Sub Type Information	This DTC sets if the OCSM does not receive an expected message from the PCM.

U0100:00	Lost Communication with ECM/PCM "A": No Sub Type Information	This DTC sets if the RCM does not receive an expected message from the PCM.

Possible Causes

- Network traffic
- PCM
- RCM
- OCSM

PINPOINT TEST A : U0100:00

> *NOTE: Most faults are due to connector and/or wiring concerns. Carry out a thorough inspection and verification before proceeding with the pinpoint test.*

> *NOTE: Only disconnect or reconnect SRS components when instructed to do so within a pinpoint test step. Failure to follow this instruction may result in incorrect diagnosis of the SRS.*

> *NOTE: Always make sure the correct SRS component is being installed. Parts released for other vehicles may not be compatible even if they appear physically similar. Check the part number listed in the Ford parts catalog to make sure the correct component is being installed. If an incorrect SRS component is installed, Diagnostic Trouble Codes (DTCs) may set.*

A1 VERIFY DIAGNOSTIC SCAN TOOL COMMUNICATION WITH THE PCM (POWERTRAIN CONTROL MODULE)

> *WARNING: Before beginning any service procedure in this service information, refer to Safety Warnings in GENERAL INFORMATION . Failure to follow this instruction may result in serious personal injury.*

REFER to: Pyrotechnic Device Health and Safety Precautions .

Ignition ON.

Connect the diagnostic scan tool.

Check that a vehicle session can be established using the diagnostic scan tool.

Can a vehicle session be established?

Yes	If DTC U0100:00 was retrieved from the OCSM, GO to A2. If DTC U0100:00 was retrieved from the RCM, GO to A3.

No	To diagnose no communication with the PCM. REFER to: MODULE COMMUNICATIONS NETWORK .

A2 CHECK THE OCSM (OCCUPANT CLASSIFICATION SYSTEM MODULE) CONTINUOUS MEMORY DIAGNOSTIC TROUBLE CODES (CMDTCS)

Using a diagnostic scan tool, perform OCSM self-test.

Using a diagnostic scan tool, clear OCSM Diagnostic Trouble Codes (DTCs).

Wait 10 seconds.

Using a diagnostic scan tool, perform OCSM self-test.

Is DTC U0100:00 retrieved again?

Yes	GO to A4

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

A3 CHECK THE RCM (RESTRAINTS CONTROL MODULE) CONTINUOUS MEMORY DIAGNOSTIC TROUBLE CODES (CMDTCS)

Using a diagnostic scan tool, perform RCM self-test.

Using a diagnostic scan tool, clear RCM Diagnostic Trouble Codes (DTCs).

Wait 10 seconds.

Using a diagnostic scan tool, perform RCM self-test.

Is DTC U0100:00 retrieved again?

Yes	GO to A4

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

A4 RETRIEVE THE RECORDED DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE PCM (POWERTRAIN CONTROL MODULE) KOEO (KEY ON, ENGINE OFF) SELF-TEST

Using a diagnostic scan tool, perform PCM self-test.

Check for recorded Diagnostic Trouble Codes (DTCs) from the PCM KOEO self-test.

Is DTC P0562 or P0563 recorded?

Yes	DIAGNOSE the PCM Diagnostic Trouble Codes (DTCs). Refer to the appropriate Engine article for the procedure.

No	If DTC U0100:00 was originally retrieved from the OCSM, GO to A5. If DTC U0100:00 was originally retrieved from the RCM, GO to A6.

A5 RETRIEVE THE RECORDED DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE OCSM (OCCUPANT CLASSIFICATION SYSTEM MODULE) SELF-TEST

Using a diagnostic scan tool, perform OCSM self-test.

Check for recorded Diagnostic Trouble Codes (DTCs) from the OCSM self-test.

Is DTC U3003:16 or U3003:17 recorded?

Yes	REFER to: Pinpoint Test - DTC: AJ .

No	GO to A7.

A6 RETRIEVE THE RECORDED DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE RCM (RESTRAINTS CONTROL MODULE) SELF-TEST

Using a diagnostic scan tool, perform RCM self-test.

Check for recorded Diagnostic Trouble Codes (DTCs) from the RCM self-test.

Is DTC U3003:16 or U3003:17 recorded?

Yes	REFER to: Pinpoint Test - DTC: AJ .

No	GO to A8.

A7 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0100:00 SET IN MODULES OTHER THAN THE OCSM (OCCUPANT CLASSIFICATION SYSTEM MODULE)

Using a diagnostic scan tool, perform self-test for all modules.

Is DTC U0100:00 set in the ABS module or in the RCM?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PCM. Refer to the appropriate Engine article for the procedure.

No	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new OCS. REFER to: Occupant Classification System (OCS) Sensor .

A8 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0100:00 SET IN OTHER MODULES OTHER THAN THE RCM (RESTRAINTS CONTROL MODULE)

Using a diagnostic scan tool, perform self-test for all modules.

Is DTC U0100:00 set in the ABS module or in the OCSM?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PCM. Refer to the appropriate Engine article for the procedure.

No	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new RCM. REFER to: Restraints Control Module (RCM) .

DIAGNOSIS AND TESTING > PINPOINT TEST - DTC: AE > U0140:00

Normal Operation and Fault Conditions

The RCM uses information contained in messages from the BCM sent on the HS-CAN2.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0140:00	Lost Communication with Body Control Module: No Sub Type Information	This DTC sets if the RCM does not receive an expected message from the BCM.

Possible Sources

- Network traffic
- BCM
- RCM

PINPOINT TEST A : U0140:00

WARNING: Do not handle, move or change the original horizontal mounting position of the Restraints Control Module (RCM) while the Restraints Control Module (RCM) is connected and the ignition switch is ON. Failure to follow this instruction may result in the accidental deployment of the Safety Canopy® and cause serious personal injury or death.

NOTE: Most faults are due to connector and/or wiring concerns. Carry out a thorough inspection and verification before proceeding with the pinpoint test.

NOTE: SRS components should only be disconnected or reconnected when

instructed to do so within a pinpoint test step. Failure to follow this instruction may result in incorrect diagnosis of the SRS.

NOTE: Always make sure the correct SRS component is being installed. Parts released for other vehicles may not be compatible even if they appear physically similar. Check the part number listed in the Ford parts catalog to make sure the correct component is being installed. If an incorrect SRS component is installed, Diagnostic Trouble Codes (DTCs) may set.

NOTE: The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

A1 CHECK THE COMMUNICATION NETWORK

WARNING: Before beginning any service procedure in this service information, refer to Safety Warnings in GENERAL INFORMATION . Failure to follow this instruction may result in serious personal injury.

REFER to: Pyrotechnic Device Health and Safety Precautions .

Ignition ON.

Using a diagnostic scan tool, carry out a network test.

Does the BCM pass the network test?

Yes	GO to A2

No	To diagnose no communication with the BCM. REFER to: MODULE COMMUNICATIONS NETWORK .

A2 CHECK THE RCM (RESTRAINTS CONTROL MODULE) CONTINUOUS MEMORY DIAGNOSTIC TROUBLE CODES (CMDTCS)

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Using a diagnostic scan tool, clear RCM Diagnostic Trouble Codes (DTCs).

Wait 10 seconds.

Using a diagnostic scan tool, perform RCM self-test.

Is DTC U0140:00 retrieved again?

Yes	GO to A3

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

A3 RETRIEVE THE RECORDED DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE RCM (RESTRAINTS CONTROL MODULE) SELF-TEST

Check the recorded Diagnostic Trouble Codes (DTCs) from the RCM self-test.

Is DTC U3003:16 or U3003:17 recorded?

Yes	REFER to: Pinpoint Test - DTC: AJ .

No	GO to A4

A4 RETRIEVE THE RECORDED DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE BCM (BODY CONTROL MODULE) SELF-TEST

Using a diagnostic scan tool, perform BCM self-test.

Check for recorded Diagnostic Trouble Codes (DTCs) from the BCM self-test.

Is DTC U3003:16 or U3003:17 recorded?

Yes	REFER to: Body Control Module (BCM) .

No	GO to A5

A5 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0140:00 SET IN OTHER MODULES

Ignition ON.

Using a diagnostic scan tool, perform self-test for all modules.

Is DTC U0140:00 set in the ABS Module or in the IPC?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new RCM. REFER to: Restraints Control Module (RCM) .

DIAGNOSIS AND TESTING > PINPOINT TEST - DTC: AF > U0154:00

Normal Operation and Fault Conditions

The RCM uses information contained in messages from the OCSM sent on the High Speed Controller Area Network 2 (HS2-CAN).

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0154:00	Lost Communication with Restraints Occupant Classification System Module: No Sub Type Information	This DTC sets if the RCM does not receive an expected message from the OCSM.

Possible Sources

- Network traffic
- OCSM
- RCM

PINPOINT TEST A : U0154:00

WARNING: Do not handle, move or change the original horizontal mounting position of the Restraints Control Module (RCM) while the Restraints Control Module (RCM) is connected and the ignition switch is ON. Failure to follow this instruction may result in the accidental deployment of the Safety Canopy® and cause serious personal injury or death.

NOTE: Most faults are due to connector and/or wiring concerns. Carry out a thorough inspection and verification before proceeding with the pinpoint test.

NOTE: SRS components should only be disconnected or reconnected when instructed to do so within a pinpoint test step. Failure to follow this instruction may result in incorrect diagnosis of the SRS.

NOTE: Always make sure the correct SRS component is being installed. Parts released for other vehicles may not be compatible even if they appear physically similar. Check the part number listed in the Ford parts catalog to make sure the correct component is being installed. If an incorrect SRS component is installed, Diagnostic Trouble Codes (DTCs) may set.

NOTE: The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

A1 CHECK THE COMMUNICATION NETWORK

WARNING: Before beginning any service procedure in this service information, refer to Safety Warnings in GENERAL INFORMATION . Failure to follow this instruction may result in serious personal injury.

REFER to: Pyrotechnic Device Health and Safety Precautions .

Ignition ON.

Using a diagnostic scan tool, carry out a network test.

Does the OCSM pass the network test?

Yes	GO to A2

No	To diagnose no communication with the OCSM. REFER to: MODULE COMMUNICATIONS NETWORK .

A2 CHECK THE RCM (RESTRAINTS CONTROL MODULE) CONTINUOUS MEMORY DIAGNOSTIC TROUBLE CODES (CMDTCS)

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Using a diagnostic scan tool, clear RCM Diagnostic Trouble Codes (DTCs).

Wait 10 seconds.

Using a diagnostic scan tool, perform RCM self-test.

Is DTC U0154:00 retrieved again?

Yes	GO to A3

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

A3 RETRIEVE THE RECORDED DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE RCM (RESTRAINTS CONTROL MODULE) SELF-TEST

Check the recorded Diagnostic Trouble Codes (DTCs) from the RCM self-test.

Is DTC U3003:16 or U3003:17 recorded?

Yes	REFER to: Pinpoint Test - DTC: AJ .

No	GO to A4

A4 RETRIEVE THE RECORDED DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE OCSM (OCCUPANT CLASSIFICATION SYSTEM MODULE) SELF-TEST

Using a diagnostic scan tool, perform OCSM self-test.

Check for recorded Diagnostic Trouble Codes (DTCs) from the OCSM self-test.

Is DTC U3003:16 or U3003:17 recorded?

Yes	REFER to: Pinpoint Test - DTC: AJ .

No	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new RCM. REFER to: Restraints Control Module (RCM) . REPEAT the RCM self-test. If DTC U0154:00 returns, INSTALL a new OCS sensor. REFER to: Occupant Classification System (OCS) Sensor .

DIAGNOSIS AND TESTING > PINPOINT TEST - DTC: AG > U0155:00

Normal Operation and Fault Conditions

The RCM uses information contained in messages from the IPC sent on the HS-CAN.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0155:00	Lost Communication with Instrument Panel Cluster (IPC) Control Module: No Sub Type Information	This DTC sets if the RCM does not receive an expected message from the IPC for 6 seconds.

Possible Causes

- Network traffic
- IPC
- RCM

PINPOINT TEST A : U0155:00

NOTE: Most faults are due to connector and/or wiring concerns. Carry out a thorough inspection and verification before proceeding with the pinpoint test.

NOTE: Only disconnect or reconnect SRS components when instructed to do so within a pinpoint test step. Failure to follow this instruction may result in incorrect diagnosis of the SRS.

NOTE: Always make sure the correct SRS component is being installed. Parts

released for other vehicles may not be compatible even if they appear physically similar. Check the part number listed in the Ford parts catalog to make sure the correct component is being installed. If an incorrect SRS component is installed, Diagnostic Trouble Codes (DTCs) may set.

NOTE: The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

A1 CHECK THE COMMUNICATION NETWORK

WARNING: Before beginning any service procedure in this service information, refer to Safety Warnings in GENERAL INFORMATION . Failure to follow this instruction may result in serious personal injury.

REFER to: Pyrotechnic Device Health and Safety Precautions .

Ignition ON.

Using a diagnostic scan tool, carry out a network test.

Does the IPC pass the network test?

Yes	GO to A2

No	To diagnose no communication with the IPC. REFER to: MODULE COMMUNICATIONS NETWORK .

A2 CHECK THE RCM (RESTRAINTS CONTROL MODULE) CONTINUOUS MEMORY DIAGNOSTIC TROUBLE CODES (CMDTCS)

Using a diagnostic scan tool, perform RCM self-test.

Using a diagnostic scan tool, clear RCM Diagnostic Trouble Codes (DTCs).

Wait 10 seconds.

Using a diagnostic scan tool, perform RCM self-test.

Is DTC U0155:00 retrieved again?

Yes	GO to A3

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

A3 RETRIEVE THE RECORDED DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE RCM (RESTRAINTS CONTROL MODULE) SELF-TEST

Check the recorded Diagnostic Trouble Codes (DTCs) from the RCM self-test.

Is DTC U3003:16 or U3003:17 recorded?

Yes	REFER to: Pinpoint Test - DTC: AJ .

No	GO to A4

A4 RETRIEVE THE RECORDED DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE IPC (INSTRUMENT PANEL CLUSTER) SELF-TEST

Using a diagnostic scan tool, perform IPC self-test.

Check for recorded Diagnostic Trouble Codes (DTCs) from the IPC self-test.

Is DTC U3003:16 or U3003:17 recorded?

Yes	REFER to: Instrumentation, Message Center and Warning Chimes .

No	GO to A5

A5 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0155:00 SET IN OTHER MODULES

Using a diagnostic scan tool, perform self-test for all modules.

Is DTC U0155:00 set in the BCM, ACM, or APIM (if equipped)?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, .

No	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new RCM. REFER to: Restraints Control Module (RCM) .

DIAGNOSIS AND TESTING > PINPOINT TEST - DTC: AH > U0253:00

Normal Operation and Fault Conditions

The RCM uses information contained in messages from the APIM sent on the High Speed Controller Area Network 2 (HS2-CAN).

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0253:00	Lost Communication with Accessory Protocol Interface Module: No Sub	This DTC sets if the RCM does not receive an expected message

	Type Information	from the APIM.

Possible Sources

- Network traffic
- APIM
- RCM

PINPOINT TEST A : U0253:00

WARNING: Do not handle, move or change the original horizontal mounting position of the Restraints Control Module (RCM) while the Restraints Control Module (RCM) is connected and the ignition switch is ON. Failure to follow this instruction may result in the accidental deployment of the Safety Canopy® and cause serious personal injury or death.

NOTE: Most faults are due to connector and/or wiring concerns. Carry out a thorough inspection and verification before proceeding with the pinpoint test.

NOTE: SRS components should only be disconnected or reconnected when instructed to do so within a pinpoint test step. Failure to follow this instruction may result in incorrect diagnosis of the SRS.

NOTE: Always make sure the correct SRS component is being installed. Parts released for other vehicles may not be compatible even if they appear physically similar. Check the part number listed in the Ford parts catalog to make sure the correct component is being installed. If an incorrect SRS component is installed, Diagnostic Trouble Codes (DTCs) may set.

NOTE: The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

A1 CHECK THE COMMUNICATION NETWORK

Ignition ON.

Using a diagnostic scan tool, carry out a network test.

Does the APIM pass the network test?

Yes	GO to A2
No	To diagnose no communication with the APIM. REFER to: MODULE COMMUNICATIONS

	NETWORK .

A2 CHECK THE RCM (RESTRAINTS CONTROL MODULE) CONTINUOUS MEMORY DIAGNOSTIC TROUBLE CODES (CMDTCS)

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Using a diagnostic scan tool, clear RCM Diagnostic Trouble Codes (DTCs).

Wait 10 seconds.

Using a diagnostic scan tool, perform RCM self-test.

Is DTC U0253:00 retrieved again?

Yes	GO to A3

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

A3 RETRIEVE THE RECORDED DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE RCM (RESTRAINTS CONTROL MODULE) SELF-TEST

Check for recorded Diagnostic Trouble Codes (DTCs) from the RCM self-test.

Is DTC U3003:16 or U3003:17 recorded?

Yes	REFER to: Pinpoint Test - DTC: AJ .

No	GO to A4

A4 RETRIEVE THE RECORDED DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE APIM (SYNC MODULE) SELF-TEST

Using a diagnostic scan tool, perform APIM self-test.

Check for recorded Diagnostic Trouble Codes (DTCs) from the APIM self-test.

Is DTC U3003:16 or U3003:17 recorded?

Yes	REFER to the appropriate procedure to DIAGNOSE the battery voltage Diagnostic Trouble Codes (DTCs). Refer to the appropriate Information and Entertainment System article for the procedure.

No	GO to A5

A5 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0253:00 SET IN OTHER MODULES

Ignition ON.

Using a diagnostic scan tool, perform self-test for all modules.

Is DTC U0253:00 set in the ACM?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new APIM. Refer to the appropriate Information and Entertainment System article for the procedure.

No	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new RCM. REFER to: Restraints Control Module (RCM) .

DIAGNOSIS AND TESTING > PINPOINT TEST - DTC: AI > U2300:55, U2300:64

Refer to Supplemental Restraint System for schematic and connector information.

NOTE: DTC U2300:55 is set in every new RCM that has not previously been installed or that has previously been installed but has not yet successfully received configuration data messages from the BCM. DO NOT replace any components for this DTC unless directed to do so by the following pinpoint test.

Normal Operation and Fault Conditions

The RCM receives a configuration data message from the BCM when the RCM proves out during the very first ignition cycle after it is installed. During prove-out at the beginning of each subsequent ignition cycle, the BCM sends configuration data to the RCM and the RCM compares the message to the message that was received during the very first ignition cycle.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U2300:55	Central Configuration: Not Configured	This DTC is present in every new RCM. Once the new RCM is installed and it successfully receives a configuration data message from the BCM, this DTC reports as a Continuous Memory Diagnostic Trouble Code (CMDTC). If the RCM reports this DTC on-demand, it means that the configuration data message has not been received from the BCM.
U2300:64	Central Configuration: Signal Plausibility Failure	If the RCM receives a configuration data message that does not match the configuration

		data that was previously received and stored, it sets this DTC. This DTC can set on-demand during the RCM prove-out, but change to a Continuous Memory Diagnostic Trouble Code (CMDTC) later on in the ignition cycle if the correct message is eventually received. If PMI has not been carried out for the BCM, this DTC sets.

Possible Sources

- RCM or BCM configuration
- BCM
- RCM

PINPOINT TEST A : U2300:55, U2300:64

WARNING: Do not handle, move or change the original horizontal mounting position of the Restraints Control Module (RCM) while the Restraints Control Module (RCM) is connected and the ignition switch is ON. Failure to follow this instruction may result in the accidental deployment of the Safety Canopy® and cause serious personal injury or death.

NOTE: SRS components should only be disconnected or reconnected when instructed to do so within a pinpoint test step. Failure to follow this instruction may result in incorrect diagnosis of the SRS.

NOTE: Always make sure the correct SRS component is being installed. Parts released for other vehicles may not be compatible even if they appear physically similar. Check the part number listed in the Ford parts catalog to make sure the correct component is being installed. If an incorrect SRS component is installed, Diagnostic Trouble Codes (DTCs) may set.

NOTE: The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

A1 RETRIEVE RCM (RESTRAINTS CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

WARNING: Before beginning any service procedure in this service information, refer to Safety Warnings in GENERAL INFORMATION . Failure to follow this instruction may result in serious personal injury.

REFER to: Health and Safety Precautions .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Record the RCM Diagnostic Trouble Codes (DTCs) that were retrieved during the self-test.

Is DTC U2300:55 or U2300:64 retrieved on-demand?

Yes	GO to A2.

No	If DTC U2300:55 or U2300:64 is retrieved as a Continuous Memory Diagnostic Trouble Code (CMDTC), CLEAR the RCM Diagnostic Trouble Codes (DTCs) and REPEAT the self-test. If DTC U2300:55 or U2300:64 does not return, RELEASE the vehicle to the customer. If DTC U2300:55 or U2300:64 returns on-demand, GO to A2.

A2 CHECK FOR THE CORRECT BCM (BODY CONTROL MODULE)

Using the Log Viewer function of the diagnostic scan tool, retrieve and record the BCM part number.

Check the recorded part number against the number listed in the Ford parts catalog.

Does the recorded part number match the number listed in the Ford parts catalog?

Yes	GO to A3

No	INSTALL the correct BCM and USE As-Built data when carrying out PM. REFER to: Body Control Module (BCM) . GO to A4.

A3 CHECK FOR THE CORRECT RCM (RESTRAINTS CONTROL MODULE)

Using the Log Viewer function of the diagnostic scan tool, retrieve and record the RCM part number.

Check the recorded part number against the number listed in the Ford parts catalog.

Does the recorded part number match the number listed in the Ford parts catalog?

Yes	CARRY OUT PMI for the BCM using As-Built data. CLEAR the Diagnostic Trouble Codes (DTCs) and REPEAT the RCM self-test. If DTC U2300:55 or U2300:64 are retrieved, CARRY OUT PMI for the RCM using As-Built data. GO to A4.

No	INSTALL the correct RCM and use As-Built data when carrying out PM. REFER to: Restraints Control Module (RCM) . GO to A4.

NOTE: Make sure all SRS components and the RCM electrical connectors are connected before carrying out the self-test. If not, Diagnostic Trouble Codes (DTCs) will be recorded.

A4 CHECK FOR ADDITIONAL RCM (RESTRAINTS CONTROL MODULE) OR BCM (BODY CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Using a diagnostic scan tool, perform BCM self-test.

Were any Diagnostic Trouble Codes (DTCs) retrieved from the RCM or BCM during self-test?

Yes	If RCM Diagnostic Trouble Codes (DTCs) were retrieved, do not clear any Diagnostic Trouble Codes (DTCs) until all Diagnostic Trouble Codes (DTCs) have been resolve. REFER to: Airbag Supplemental Restraint System (SRS) . If BCM Diagnostic Trouble Codes (DTCs) were retrieved, diagnose the BCM. REFER to: Body Control Module (BCM) .

No	CLEAR all Continuous Memory Diagnostic Trouble Codes (CMDTCs). PROVE OUT the SRS. The repair is complete. RETURN the vehicle to the customer.

DIAGNOSIS AND TESTING > PINPOINT TEST - DTC: AJ > U3003:16 AND U3003:17

Refer to Supplemental Restraint System for schematic and connector information.

NOTE: Diagnostic Trouble Codes (DTCs) U3003:16 and U3003:17 can be set if the vehicle has been recently jump started, the battery has been recently charged or the battery has been discharged. The battery may become discharged due to excessive load(s) on the charging system from aftermarket accessories or if the battery has been left unattended with the accessories on.

Normal Operation - RCM

The RCM continuously monitors the input voltage for correct operation. If the RCM detects input voltage below 9.0 volts while a fault is present, or below 6.0 volts, whether or not a fault is present, it stores DTC U3003:16 in memory. If the RCM detects input voltage above 16 volts while a fault is present, or above 18 volts, regardless of fault status, it stores DTC U3003:17 in memory. If the RCM sets DTC U3003:16 or U3003:17, it sends a message to the IPC to illuminate the airbag warning indicator.

Normal Operation - OCSM

The OCSM continuously monitors the input voltage for correct operation. If the OCSM detects input voltage below 8 volts, it stores DTC U3003:16 in memory. If the OCSM detects input voltage above 18 volts, it stores DTC U3003:17 in memory. If the OCSM sets DTC U3003:16 or U3003:17, it sends a fault message to the RCM. The RCM then sends a message to the IPC to illuminate the airbag warning indicator.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U3003:16	Battery Voltage: Circuit Voltage Below Threshold	This DTC sets if the RCM detects voltage below 9 volts with certain SRS faults present or below 6

		volts, whether or not a SRS fault exists.
U3003:17	Battery Voltage: Circuit Voltage Above Threshold	This DTC sets if the RCM detects voltage above 16 volts with certain SRS faults present or above 18 volts without a SRS fault.
U3003:16	Battery Voltage: Circuit Voltage Below Threshold	This DTC sets if the OCSM detects voltage below 8 volts.
U3003:17	Battery Voltage: Circuit Voltage Above Threshold	This DTC sets if the OCSM detects voltage above 18 volts.

Possible Sources

- Wiring, terminals or connectors
- OCSM
- RCM

Visual Inspection and Diagnostic Pre-checks

- Inspect for damaged wiring harness(es).
- Inspect for loose or damaged connectors.

PINPOINT TEST A : U3003:16 AND U3003:17

WARNING: Incorrect repair techniques or actions can cause an accidental Supplemental Restraint System (SRS) deployment. Never compromise or depart from these instructions. Failure to precisely follow all instructions could result in serious personal injury from an accidental deployment.

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may cause damage to the connector.

NOTE: Most faults are due to connector and/or wiring concerns. Carry out a thorough inspection and verification before proceeding with the pinpoint test.

NOTE: Only disconnect or reconnect SRS components when instructed to do so within a pinpoint test step. Failure to follow this instruction may result in incorrect diagnosis of the SRS.

NOTE: Install new components only when directed to do so in the pinpoint test.

NOTE: Always make sure the correct SRS component is being installed. Parts released for other vehicles may not be compatible even if they appear physically similar. Check the part number listed in the Ford parts catalog to make sure the correct component is being installed. If an incorrect SRS component is installed, Diagnostic Trouble Codes (DTCs) may set.

NOTE: The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

A1 RETRIEVE ALL CONTINUOUS MEMORY DIAGNOSTIC TROUBLE CODES (CMDTCS) IN ALL MODULES

WARNING: Before beginning any service procedure in this service information, refer to Safety Warnings in GENERAL INFORMATION . Failure to follow this instruction may result in serious personal injury.

REFER to: Pyrotechnic Device Health and Safety Precautions .

Ignition ON.

Using a diagnostic scan tool, retrieve ALL Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC B1317, B1318, B1676, U3003:16 or U3003:17 present in one or more modules AND are any charging system Diagnostic Trouble Codes (DTCs) present in the PCM?

Yes	DIAGNOSE the charging system. Refer to the appropriate Battery and Charging System article for the procedure.

No	GO to A2

A2 TEST BATTERY CONDITION

Ignition OFF.

Carry out the Battery Condition Test. REFER to: BATTERY .

Did the battery pass the condition test?

Yes	If the battery passed the condition test but required a recharge, DIAGNOSE the charging system. Refer to the appropriate Battery and Charging System article for the procedure. CLEAR all Continuous Memory Diagnostic Trouble Codes (CMDTCs).If the battery passed the condition test and did not require a recharge, GO to A3.

No	INSTALL a new battery. REFER to: Battery . CLEAR all Continuous Memory Diagnostic Trouble Codes (CMDTCs).

A3 CHECK THE CHARGING SYSTEM VOLTAGE

Start the engine.

Measure the voltage of the battery.

For DTC U3003:17, turn off all accessories while measuring the battery voltage.

For DTC U3003:16, turn on headlights and HVAC fan on high while measuring the battery voltage.

Is the voltage between 13 and 15.2 volts?

Yes	For DTC U3003:16, GO to A4. For DTC U3003:17, GO to A6.

No	DIAGNOSE the charging system. Refer to the appropriate Battery and Charging System article for the procedure. CLEAR all Continuous Memory Diagnostic Trouble Codes (CMDTCs).

A4 CHECK FOR OPEN IGNITION CIRCUIT TO THE MODULE

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect the module with the concern:

For the RCM, disconnect C310A and C310B .

For the OCSM, disconnect C3159 .

For the RCM, measure:

Positive Lead	Measurement / Action	Negative Lead
C310A-19	Ω	C2280A-4

For the OCSM, measure:

Positive Lead	Measurement / Action	Negative Lead
C3043-1	Ω	C2280C-23

Is the resistance less than 1 ohm?

Yes	GO to A5

No	REPAIR the circuit as necessary. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. CLEAR all Continuous Memory Diagnostic Trouble Codes (CMDTCs).

A5 CHECK FOR OPEN GROUND TO THE MODULE

For the RCM, measure:

Positive Lead	Measurement / Action	Negative Lead
RCM mounting bracket	Ω	Ground

For the OCSM, measure:

Positive Lead	Measurement / Action	Negative Lead
C3043-6	Ω	Ground

Is the resistance less than 1 ohm?

Yes	GO to A6

No	For the RCM, VERIFY there is no corrosion between the RCM and the mounting surface. VERIFY the fasteners are clean and tightened to specification with no corrosion. REPAIR as necessary. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. For the OCSM, REPAIR the circuit. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. CLEAR all Continuous Memory Diagnostic Trouble Codes (CMDTCs).

A6 CHECK FOR MODULE OPERATION

Ignition OFF.

If not previously directed to do so. Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect the module with the concern:

For the RCM, disconnect C310A and C310B (if not previously disconnected).

For the OCSM, disconnect OCSM C3043 (if not previously disconnected).

Check for the following:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Connect the module with the concern:

For the RCM, connect C310A and C310B . Make sure the connector seats correctly and engages the Connector Position Assurance (CPA) lever/lock.

For the OCSM, connect C3043 . Make sure the connector seats correctly.

Repower the SRS. Refer to: Supplemental Restraint System (SRS) Repowering .

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern and DTC U3003:16 or U3003:17 was present in the RCM, INSTALL a new RCM. REFER to: Restraints Control Module (RCM) . If no Technical Service Bulletins (TSBs) address this concern and DTC U3003:16 or U3003:17 was present in the OCSM, INSTALL a new OCS. REFER to: Occupant Classification System (OCS) Sensor .

No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.

DIAGNOSIS AND TESTING > PINPOINT TEST - DTC: AK > B0061:11, B0061:12, B0061:13, B0061:49 AND B0061:64

Refer to Supplemental Restraint System for schematic and connector information.

Normal Operation and Fault Conditions

The Belt Tension Sensor (BTS) operates in conjunction with the OCS. The OCS interprets a variable voltage signal provided by the Belt Tension Sensor (BTS) to identify the possible presence of a child safety seat in the front passenger seat. The voltage output of the Belt Tension Sensor (BTS) is proportional to the amount of tension applied to the sensor by the belt: no belt tension causes a low voltage (approximately 0.95 volt) to be output and high belt tension causes a high voltage (approximately 3.8 volts) to be returned to the OCSM.

The OCSM monitors the Belt Tension Sensor (BTS) and related circuits for the following faults:

- Resistance out of range
- Unexpected voltage
- Short to ground
- Faulted Belt Tension Sensor (BTS) (part of RH front passenger safety belt buckle)

If a fault is detected, the OCSM stores DTC B0061:11, B0061:12, B0061:13, B0061:49 or B0061:64 in memory and sends a message to the RCM over the HS-CAN2 indicating that an OCS fault is present. Upon receipt of this message, the RCM sets DTC B00A0:09 and sends a message to the IPC to illuminate the airbag warning indicator.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B0061:11	Passenger Seatbelt Tension Sensor: Circuit Short to Ground	A fault is indicated when the OCSM measures voltage below a predetermined threshold on the Belt Tension Sensor (BTS) signal circuit. An open Belt Tension Sensor (BTS) VREF circuit can also set this DTC.
B0061:12	Passenger Seatbelt Tension Sensor: Circuit Short to Battery	A fault is indicated when the OCSM measures voltage above a predetermined threshold on the Belt

		Tension Sensor (BTS) signal circuit. An open Belt Tension Sensor (BTS) return circuit can also set this DTC.
B0061:13	Passenger Seatbelt Tension Sensor: Circuit Open	A fault is indicated when the OCSM senses an open on either Belt Tension Sensor (BTS) circuit.
B0061:49	Passenger Seatbelt Tension Sensor: Internal Electronic Failure	A fault is indicated when the OCSM senses an internal fault on the Belt Tension Sensor (BTS) signal circuit.
B0061:64	Passenger Seatbelt Tension Sensor: Signal Plausibility Failure	A fault is indicated when the passenger safety belt is unbuckled and the OCSM measures voltage on the Belt Tension Sensor (BTS) signal circuit greater than the maximum voltage returned during normal sensor operation.

Possible Sources

- Wiring, terminals or connectors
- Belt Tension Sensor (BTS) (part of RH front passenger safety belt buckle)
- OCSM

Visual Inspection and Diagnostic Pre-checks

- Inspect for a damaged passenger safety belt buckle or Belt Tension Sensor (BTS).
- Inspect for a damaged passenger seat cushion wiring harness.
- Inspect for a loose or damaged OCSM or Belt Tension Sensor (BTS) connector.
- Inspect for a damaged OCSM.

PINPOINT TEST A : B0061:11, B0061:12, B0061:13, B0061:49 AND B0061:64

> *WARNING: Incorrect repair techniques or actions can cause an accidental Supplemental Restraint System (SRS) deployment. Never compromise or depart from these instructions. Failure to precisely follow all instructions could result in serious personal injury from an accidental deployment.*

> *NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may cause damage to the connector.*

> *NOTE: Most faults are due to connector and/or wiring concerns. Carry out a thorough inspection and verification before proceeding with the pinpoint test.*

NOTE: Only disconnect or reconnect SRS components when instructed to do so within a pinpoint test step. Failure to follow this instruction may result in incorrect diagnosis of the SRS.

NOTE: Always make sure the correct SRS component is being installed. Parts released for other vehicles may not be compatible even if they appear physically similar. Check the part number listed in the Ford parts catalog to make sure the correct component is being installed. If an incorrect SRS component is installed, Diagnostic Trouble Codes (DTCs) may set.

NOTE: The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

A1 RETRIEVE OCSM (OCCUPANT CLASSIFICATION SYSTEM MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

WARNING: Before beginning any service procedure in this service information, refer to Safety Warnings in GENERAL INFORMATION . Failure to follow this instruction may result in serious personal injury.

REFER to: Pyrotechnic Device Health and Safety Precautions .

Ignition ON.

Using a diagnostic scan tool, perform OCSM self-test.

Was DTC B0061:11, B0061:12, B0061:13, B0061:49 or B0061:64 retrieved on-demand during self-test?

Yes	This fault cannot be cleared until it is corrected and the DTC is no longer retrieved on-demand during the self-test. For DTC B0061:11, GO to A2. For DTC B0061:12, GO to A5. For DTC B0061:13, GO to A7. For DTC B0061:49, INSTALL a new OCS sensor. REFER to: Occupant Classification System (OCS) Sensor . GO to A13. For DTC B0061:64, GO to A9.
No	This is an intermittent fault when present as a Continuous Memory Diagnostic Trouble Code (CMDTC) only. GO to A12.

NOTE: This pinpoint test step attempts to change the fault reported by the OCSM by inducing a different fault condition. If the fault reported changes, this indicates the OCSM is functioning correctly and is not the source of the fault.

A2 CHECK THE BELT TENSION SENSOR (BTS)

Ignition OFF.

Disconnect Passenger Safety Belt Buckle C3238 .

Using a diagnostic scan tool, perform OCSM self-test.

DIAGNOSTIC TIP: When viewing Diagnostic Trouble Codes (DTCs) with the Belt Tension Sensor (BTS) disconnected, an open circuit fault is normally retrieved. The Belt Tension Sensor (BTS) shares a connector with the passenger safety belt buckle switch, and a passenger safety belt buckle switch circuit fault will also be present in the RCM.

Was DTC B0061:11 retrieved on-demand during self-test?

Yes	GO to A3

No	INSTALL a new front passenger safety belt buckle. REFER to: Front Seatbelt Buckle . GO to A13.

A3 CHECK THE BELT TENSION SENSOR (BTS) CIRCUITS FOR A SHORT TO GROUND OR A SHORT TOGETHER

Ignition OFF.

Disconnect OCSM C3043 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3238-1	Ω	Ground

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3238-1	Ω	C3238-2

Are the resistances greater than 10, 000 ohms?

Yes	GO to A4.

No	REPAIR the circuit(s). Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A13.

A4 CHECK THE BELT TENSION SENSOR (BTS) VREF CIRCUIT FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3043-5	Ω	C3238-2

Is the resistance less than 0.5 ohm?

Yes	GO to A11.

No	REPAIR the circuit. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A13.

A5 CHECK THE BELT TENSION SENSOR (BTS) SIGNAL CIRCUIT FOR A SHORT TO VOLTAGE

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Passenger Side Airbag (Inline) C219 .

Disconnect Passenger Safety Belt Buckle C3238 .

Disconnect OCSM C3043 .

Repower the SRS. Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3043-6		Ground

Is any voltage present?

Yes	REPAIR the circuit. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A13.

No	GO to A6

A6 CHECK THE BELT TENSION SENSOR (BTS) GROUND CIRCUIT FOR AN OPEN

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect RCM C310A and C310B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3238-3	Ω	Ground

Is the resistance less than 3 ohms?

Yes	GO to A10

No	REPAIR the circuit. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A13.

NOTE: This pinpoint test step will attempt to change the fault reported by the OCSM by inducing a different fault condition. If the fault reported changes, this indicates the OCSM is functioning correctly and is not the source of the fault.

A7 CHECK THE BELT TENSION SENSOR (BTS)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Passenger Side Airbag (Inline) C219 .

Disconnect Passenger Safety Belt Buckle C3238 .

Connect a fused jumper wire:

Lead 1	Measurement / Action	Lead 2
C3238-1		C3238-3

Repower the SRS. Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform OCSM self-test.

DIAGNOSTIC TIP: When viewing Diagnostic Trouble Codes (DTCs) with the Belt Tension Sensor (BTS) circuits shorted together, a short to ground fault is normally retrieved. The Belt Tension Sensor (BTS) shares a connector with the passenger safety belt buckle switch, and a passenger safety belt buckle switch circuit fault will also be present in the RCM.

Did the on-demand DTC change from B0061:13 to B0061:11?

Yes	INSTALL a new front passenger safety belt buckle. REFER to: Front Seatbelt Buckle . GO to A13.

No	GO to A8

A8 CHECK THE BELT TENSION SENSOR (BTS) SIGNAL CIRCUIT FOR AN OPEN

Ignition OFF.

Disconnect OCSM C3043 .

Measure:

Positive Lead	Measurement / Action	Negative Lead

C3238-1	Ω	C3043-6

Is the resistance less than 0.5 ohm?

Yes	GO to A10

No	REPAIR the circuit. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A13.

A9 CHECK THE BELT TENSION SENSOR (BTS) SIGNAL CIRCUIT FOR A SHORT TO THE BELT TENSION SENSOR (BTS) VREF CIRCUIT

WARNING: Turn the ignition OFF and wait one minute to deplete the backup power supply. Failure to follow this instruction may result in serious personal injury or death in the event of an accidental deployment.

Ignition OFF.

Disconnect OCSM C3043 .

Disconnect Passenger Safety Belt Buckle C3238 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3238-2	Ω	C3238-1

Is the resistance greater than 10, 000 ohms?

Yes	GO to A10

No	REPAIR the circuits. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A13.

A10 CHECK BELT TENSION SENSOR (BTS) VOLTAGE OUTPUT

Ignition OFF.

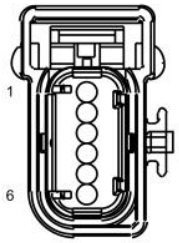
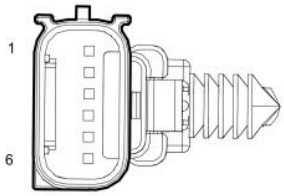
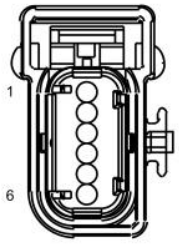
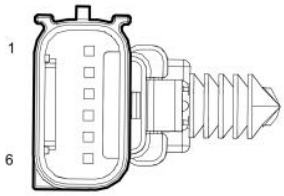
Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Connect OCSM C3043 .

Disconnect Passenger Side Airbag (Inline) C219 .

Connect fused jumper wires:

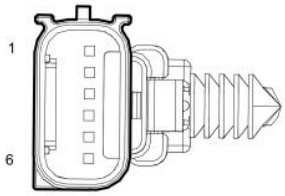
Lead 1	Measurement / Action	Lead 2

 E155161 C3238, pin 2, harness side		 E155160 C3238, pin 2, component side
 E155161 C3238, pin 3, harness side		 E155160 C3238, pin 3, component side

Repower the SRS. Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
 E155160 C3238, pin 1, component side		Ground

Does the voltage vary from approximately 0.95 volt with no tension applied to the sensor to approximately 3.8 volts with full tension applied to the sensor?

Yes	REMOVE the fused jumper wires and GO to A11

No	REMOVE the fused jumper wires and INSTALL a new front passenger safety belt buckle. REFER to: Front Seatbelt Buckle . GO to A13.

NOTE: Make sure all OCS components, SRS electrical connectors and the RCM

electrical connectors are connected before carrying out the self-test. If not, Diagnostic Trouble Codes (DTCs) will be recorded.

A11 CONFIRM THE OCSM (OCCUPANT CLASSIFICATION SYSTEM MODULE) FAULT

Ignition OFF.

Prior to reconnecting any previously disconnected SRS component:

Inspect connector(s) (including any inline connectors) for pushed-out, loose or spread terminals and loose or frayed wire connections at terminals.

Inspect wire harness for any damage, pinched, cut or pierced wires.

Repair any concerns found. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

Connect OCSM C3043 .

Connect Passenger Safety Belt Buckle C3238 (if previously disconnected).

If previously directed to disconnect Passenger Side Airbag (Inline) C219 . Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Connect Passenger Side Airbag (Inline) C219 (if previously disconnected).

If previously directed to depower the SRS, repower the SRS. Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform OCSM self-test.

Was the original DTC retrieved on-demand during self-test?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new OCS sensor. REFER to: Occupant Classification System (OCS) Sensor . GO to A13.

No	In the process of diagnosing the fault, the fault condition has become intermittent. Do not install any new SRS components at this time. SRS components should only be installed when directed to do so in the pinpoint test. GO to A12.

A12 CHECK FOR AN INTERMITTENT FAULT

Ignition OFF.

Disconnect Passenger Safety Belt Buckle C3238 .

Inspect connector(s) (including any inline connectors) for loose or spread terminals and loose or frayed wire connections at terminals.

Inspect wire harness for any damage, pinched, cut or pierced wires.

Repair any concerns found. Refer to OEM CONNECTOR REPAIR PROCEDURES for

schematic and connector information.

Connect Passenger Safety Belt Buckle C3238 .

Ignition ON.

Using a diagnostic scan tool, perform OCSM self-test.

Was DTC B0061:11, B0061:12, B0061:13, B0061:49 or B0061:64 retrieved on-demand during self-test?

Yes	The fault condition is now present. This fault cannot be cleared until it is corrected and the DTC is no longer retrieved on-demand during the self-test.For DTC B0061:11, GO to A2. For DTC B0061:12, GO to A5. For DTC B0061:13, GO to A7. For DTC B0061:49, INSTALL a new OCS sensor. REFER to: Occupant Classification System (OCS) Sensor . GO to A13. For DTC B0061:64, GO to A9.

No	CHECK for causes of the intermittent fault. ATTEMPT to recreate the hard fault by flexing the wire harness and cycling the ignition frequently. ACTIVATE other system in the same wire harness. Do not install any new SRS components at this time. Only install SRS components when directed to do so in the pinpoint test. REPAIR any intermittent concerns found. GO to A13

A13 CHECK FOR ADDITIONAL SRS (SUPPLEMENTAL RESTRAINT SYSTEM) DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition OFF.

If previously directed to disconnect Passenger Side Airbag (Inline) C219 . Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Reconnect all SRS components (if previously disconnected).

If previously directed to depower the SRS, repower the SRS. Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

NOTE: When selecting Restraints from the Self Test menu, DTCs are retrieved from the RCM and OCSM.

Using a diagnostic scan tool, perform

Restraints self-test.

Are any RCM and/or OCSM Diagnostic Trouble Codes (DTCs) retrieved?

Yes	Do not clear any Diagnostic Trouble Codes (DTCs) until all Diagnostic Trouble Codes (DTCs) have been resolve. REFER to: Airbag Supplemental Restraint System (SRS) .

No	The repair is complete. RETURN the vehicle to the customer.

DIAGNOSIS AND TESTING > PINPOINT TEST - DTC: AL > B00C2:11 AND B00C2:12

Refer to Supplemental Restraint System for schematic and connector information.

Normal Operation and Fault Conditions

The Belt Tension Sensor (BTS) operates in conjunction with the OCS. The OCSM provides a reference voltage to the Belt Tension Sensor (BTS), which changes as it passes through the sensor, based on how much tension is applied to the safety belt and Belt Tension Sensor (BTS).

The OCSM monitors the Belt Tension Sensor (BTS) reference voltage circuit for a short to voltage or a short to ground.

If a fault is detected, the OCSM stores DTC B00C2:11 or B00C2:12 in memory and sends a message to the RCM over the HS-CAN2 indicating that an OCS fault is present. Upon receipt of this message, the RCM sets DTC B00A0:09 and sends a message to the IPC to illuminate the airbag warning indicator.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B00C2:11	Passenger Seat Occupant Classification Sensor "C": Circuit Short to Ground	A fault is indicated when the OCSM senses a short to ground on the Belt Tension Sensor (BTS) reference voltage circuit.
B00C2:12	Passenger Seat Occupant Classification Sensor "C": Circuit Short to Battery	A fault is indicated when the OCSM senses a short to voltage on the Belt Tension Sensor (BTS) reference voltage circuit.

Possible Sources

- Wiring, terminals or connectors
- Belt Tension Sensor (BTS) (part of RH front passenger safety belt buckle)
- OCSM

Visual Inspection and Diagnostic Pre-checks

- Inspect for a damaged passenger safety belt buckle or Belt Tension Sensor (BTS).
- Inspect for a damaged passenger seat cushion wiring harness.
- Inspect for a loose or damaged OCSM or Belt Tension Sensor (BTS) connector.
- Inspect for a damaged OCSM.

PINPOINT TEST A : B00C2:11 AND B00C2:12

> *WARNING: Incorrect repair techniques or actions can cause an accidental Supplemental Restraint System (SRS) deployment. Never compromise or depart from these instructions. Failure to precisely follow all instructions could result in serious personal injury from an accidental deployment.*

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may cause damage to the connector.

NOTE: Most faults are due to connector and/or wiring concerns. Carry out a thorough inspection and verification before proceeding with the pinpoint test.

NOTE: SRS components should only be disconnected or reconnected when instructed to do so within a pinpoint test step. Failure to follow this instruction may result in incorrect diagnosis of the SRS.

NOTE: Always make sure the correct SRS component is being installed. Parts released for other vehicles may not be compatible even if they appear physically similar. Check the part number listed in the Ford parts catalog to make sure the correct component is being installed. If an incorrect SRS component is installed, Diagnostic Trouble Codes (DTCs) may set.

NOTE: The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

A1 RETRIEVE OCSM (OCCUPANT CLASSIFICATION SYSTEM MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

WARNING: Before beginning any service procedure in this service information, refer to Safety Warnings in GENERAL INFORMATION . Failure to follow this instruction may result in serious personal injury.

REFER to: Health and Safety Precautions .

Ignition ON.

Using a diagnostic scan tool, perform OCSM self-test.

Was DTC B00C2:11 or B00C2:12 retrieved on-demand during self-test?

Yes	This fault cannot be cleared until it is corrected and the DTC is no longer retrieved on-demand during the self-test. For DTC B00C2:11, GO to A2. For DTC B00C2:12, GO to A4.
No	This is an intermittent fault when present as a Continuous Memory Diagnostic Trouble Code (CMDTC) only. GO to A6.

NOTE: This pinpoint test step attempts to change the fault reported by the OCSM by

inducing a different fault condition. If the fault reported changes, this indicates the OCSM is functioning correctly and is not the source of the fault.

A2 CHECK THE BELT TENSION SENSOR (BTS)

Ignition OFF.

Disconnect Passenger Safety Belt Buckle C3238 .

Using a diagnostic scan tool, perform OCSM self-test.

DIAGNOSTIC TIP: When viewing Diagnostic Trouble Codes (DTCs) with the Belt Tension Sensor (BTS) disconnected, an open circuit fault is normally retrieved. The Belt Tension Sensor (BTS) shares a connector with the passenger safety belt buckle switch, and a passenger safety belt buckle switch circuit fault will also be present in the RCM.

Was DTC B00C2:11 retrieved on-demand during self-test?

Yes	GO to A3.

No	INSTALL a new passenger safety belt buckle. REFER to: Front Seatbelt Buckle . GO to A7.

A3 CHECK THE BELT TENSION SENSOR (BTS) VREF CIRCUIT FOR A SHORT TO GROUND

WARNING: Turn the ignition OFF and wait one minute to deplete the backup power supply. Failure to follow this instruction may result in serious personal injury or death in the event of an accidental deployment.

Ignition OFF.

Disconnect OCSM C3043 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3238-2	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to A5.

No	REPAIR the circuit. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A7.

A4 CHECK THE BELT TENSION SENSOR (BTS) VREF CIRCUIT FOR A SHORT TO VOLTAGE

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Passenger Side Airbag (Inline) C219 .

Disconnect Passenger Safety Belt Buckle C3238 .

Disconnect OCSM C3043 .

Repower the SRS. Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3238-2		Ground

Is any voltage present?

Yes	REPAIR the circuit. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A7.

No	GO to A5.

NOTE: Make sure all OCS system components, restraint system sensor electrical connectors and the RCM electrical connectors are connected before carrying out the self-test. If not, Diagnostic Trouble Codes (DTCs) will be recorded.

A5 CONFIRM THE OCSM (OCCUPANT CLASSIFICATION SYSTEM MODULE) FAULT

Ignition OFF.

Prior to reconnecting any previously disconnected SRS component:

inspect connector(s) (including any inline connectors) for pushed-out, loose or spread terminals and loose or frayed wire connections at terminals.

inspect wire harness for any damage, pinched, cut or pierced wires.

repair any concerns found. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

Connect OCSM C3043 (if previously disconnected).

Connect Passenger Safety Belt Buckle C3238 .

If previously directed to disconnect Passenger Side Airbag (Inline) C3049 Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Connect Passenger Side Airbag (Inline) C219 (if previously disconnected).

Repower the SRS. Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform OCSM self-test.

Was the original DTC retrieved on-demand during self-test?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new OCS sensor. REFER to: Occupant Classification System (OCS) Sensor . GO to A7.

No	In the process of diagnosing the fault, the fault condition has become intermittent. Do not install any new SRS components at this time. SRS components should only be installed when directed to do so in the pinpoint test. GO to A6.

A6 CHECK FOR AN INTERMITTENT FAULT

Ignition OFF.

Disconnect Passenger Safety Belt Buckle C3238 .

inspect connector(s) (including any inline connectors) for loose or spread terminals and loose or frayed wire connections at terminals.

inspect wire harness for any damage, pinched, cut or pierced wires.

repair any concerns found. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

Connect Passenger Safety Belt Buckle C3238 .

Ignition ON.

Using a diagnostic scan tool, perform OCSM self-test to retrieve Diagnostic Trouble Codes (DTCs).

Was DTC B00C2:11 or B00C2:12 retrieved on-demand during self-test?

Yes	The fault condition is now present. This fault cannot be cleared until it is corrected and the DTC is no longer retrieved on-demand during the self-test. For DTC B00C2:11, GO to A2For DTC B00C2:12, GO to A4.

No	CHECK for causes of the intermittent fault. ATTEMPT to recreate the hard fault by flexing the wire harness and cycling the ignition frequently. ACTIVATE other system in the same wire harness. Do not install any new SRS components at this time. Only install SRS components when directed to do so in the pinpoint test. REPAIR any intermittent concerns found. GO to A7.

A7 CHECK FOR ADDITIONAL SRS (SUPPLEMENTAL RESTRAINT SYSTEM) DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition OFF.

If previously directed to disconnect Passenger Side Airbag (Inline) C219 . Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Reconnect all SRS components (if previously disconnected).

If previously directed to depower the SRS, repower the SRS. Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

> *NOTE: When selecting Restraints from the Self Test menu, DTCs are retrieved from the RCM and OCSM.*

Using a diagnostic scan tool, perform

Restraints self-test.

Are any RCM and/or OCSM Diagnostic Trouble Codes (DTCs) retrieved?

Yes	Do not clear any Diagnostic Trouble Codes (DTCs) until all Diagnostic Trouble Codes (DTCs) have been resolve. REFER to: Airbag Supplemental Restraint System (SRS) .

No	CLEAR all RCM and OCSM Diagnostic Trouble Codes (DTCs). PROVE OUT the SRS. The repair is complete. RETURN the vehicle to the customer.

DIAGNOSIS AND TESTING > PINPOINT TEST - DTC: AM > U0151:00

Normal Operation and Fault Conditions

The OCSM uses information contained in messages from the RCM sent on the High Speed Controller Area Network 2 (HS2-CAN).

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0151:00	Lost Communication with Restraints Control Module: No Sub Type Information	This DTC sets if the OCSM does not receive an expected message from the RCM.

Possible Sources

- Network traffic
- OCSM
- RCM

PINPOINT TEST A : U0151:00

> *WARNING: Do not handle, move or change the original horizontal mounting position of the Restraints Control Module (RCM) while the Restraints Control Module (RCM) is connected and the ignition switch is ON. Failure to follow this instruction may result in the*

accidental deployment of the Safety Canopy® and cause serious personal injury or death.

NOTE: Most faults are due to connector and/or wiring concerns. Carry out a thorough inspection and verification before proceeding with the pinpoint test.

NOTE: SRS components should only be disconnected or reconnected when instructed to do so within a pinpoint test step. Failure to follow this instruction may result in incorrect diagnosis of the SRS.

NOTE: Always make sure the correct SRS component is being installed. Parts released for other vehicles may not be compatible even if they appear physically similar. Check the part number listed in the Ford parts catalog to make sure the correct component is being installed. If an incorrect SRS component is installed, Diagnostic Trouble Codes (DTCs) may set.

A1 CHECK THE COMMUNICATION NETWORK

WARNING: Before beginning any service procedure in this service information, refer to Safety Warnings in GENERAL INFORMATION . Failure to follow this instruction may result in serious personal injury.

REFER to: Pyrotechnic Device Health and Safety Precautions .

Ignition ON.

Using a diagnostic scan tool, carry out a network test.

Does the RCM pass the network test?

Yes	GO to A2

No	To diagnose no communication with the RCM. REFER to: MODULE COMMUNICATIONS NETWORK .

A2 CHECK THE OCSM (OCCUPANT CLASSIFICATION SYSTEM MODULE) CONTINUOUS MEMORY DIAGNOSTIC TROUBLE CODES (CMDTCS)

Using a diagnostic scan tool, perform OCSM self-test.

Using a diagnostic scan tool, clear OCSM Diagnostic Trouble Codes (DTCs).

Wait 10 seconds.

Using a diagnostic scan tool, perform OCSM self-test.

Is DTC U0151:00 retrieved again?

Yes	GO to A3

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

A3 RETRIEVE THE RECORDED DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE RCM (RESTRAINTS CONTROL MODULE) SELF-TEST

Using a diagnostic scan tool, perform RCM self-test.

Is DTC U3003:16 or U3003:17 recorded?

Yes	REFER to: Pinpoint Test - DTC: AJ .

No	GO to A4

A4 RETRIEVE THE RECORDED DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE OCSM (OCCUPANT CLASSIFICATION SYSTEM MODULE) SELF-TEST

Using a diagnostic scan tool, perform OCSM self-test.

Check the recorded Diagnostic Trouble Codes (DTCs) from the OCSM self-test.

Is DTC U3003:16 or U3003:17 recorded?

Yes	REFER to: Pinpoint Test - DTC: AJ .

No	GO to A5

A5 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0151:00 SET IN OTHER MODULES

Ignition ON.

Using a diagnostic scan tool, perform self-test for all modules.

Is DTC U0151:00 set in the ABS module or in the BCM?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new RCM. REFER to: Restraints Control Module (RCM) .

No	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new OCS sensor. REFER to: Occupant Classification System (OCS) Sensor .

DIAGNOSIS AND TESTING > PINPOINT TEST - DTC: AN, CONVERTIBLE

Pinpoint Test - DTC: AN, Convertible

DIAGNOSIS AND TESTING > PINPOINT TEST - DTC: AN, CONVERTIBLE > B1405:11, B1405:12, B1405:13, B1405:1A

Refer to Supplemental Restraint System for schematic and connector information.

Normal Operation and Fault Conditions

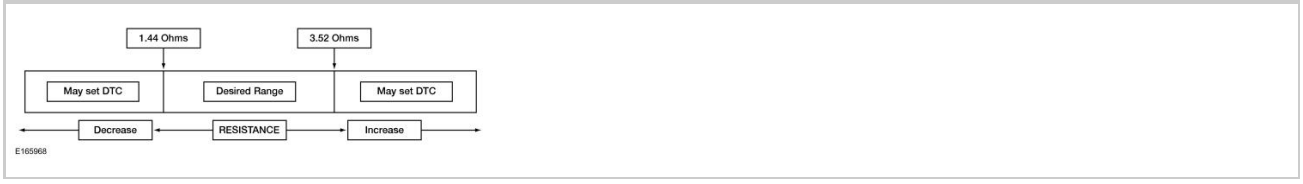
The RCM continuously monitors the driver upper side airbag circuits for the following faults:

- Resistance out of range
- Unexpected voltage
- Short to ground
- Faulted driver upper side airbag

If a fault is detected, the RCM stores DTC B1405:11, B1405:12, B1405:13 or B1405:1A in memory and sends a message to the IPC to illuminate the airbag warning indicator.

The RCM analyzes the deployment loop resistance to determine if a fault exists. The value displayed in the PID is the deployment loop resistance measured by the RCM. If the value displayed is lower or higher than the desired range (refer to diagram below in illustration), the RCM can set a DTC. As the deployment loop resistance drifts farther outside the desired range, the chance for a DTC increases. Small variations in resistance can occur due to the effect of road vibrations on terminal fit. Crimps and terminals can be affected by stress and harness movement and can cause an increase in resistance due to wire strain. These variables can result in an intermittent fault. For this reason, the test requires the PID value to be within the desired range before the fault is considered repaired, regardless if the module is reporting an on-demand DTC at the time of diagnosis. Following this direction helps make sure that minor changes in resistance do not create a repeat concern. This test uses process of elimination to diagnose each part of the deployment loop circuit including:

- Wiring
- Connections
- Driver upper side airbag
- RCM



DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions

B1405:11	Driver Side Curtain Deployment Control 1: Circuit Short to Ground	A fault is indicated when the RCM senses a short to ground on either driver upper side airbag circuit for more than 6 seconds.
B1405:12	Driver Side Curtain Deployment Control 1: Circuit Short to Battery	A fault is indicated when the RCM senses a short to voltage on either driver upper side airbag circuit for more than 6 seconds.
B1405:13	Driver Side Curtain Deployment Control 1: Circuit Open	A fault is indicated when the RCM measures more than the desired resistance between the driver upper side airbag circuits for more than 6 seconds.
B1405:1A	Driver Side Curtain Deployment Control 1: Circuit Resistance Below Threshold	A fault is indicated when the RCM measures less than the desired resistance between the driver upper side airbag circuits for more than 6 seconds.

Possible Sources

- Wiring, terminals or connectors
- Driver upper side airbag
- RCM

PINPOINT TEST A : B1405:11, B1405:12, B1405:13 AND B1405:1A

> *WARNING: Incorrect repair techniques or actions can cause an accidental Supplemental Restraint System (SRS) deployment. Never compromise or depart from these instructions. Failure to precisely follow all instructions could result in serious personal injury from an accidental deployment.*

> *NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may cause damage to the connector.*

> *NOTE: Most faults are due to connector and/or wiring concerns. Carry out a thorough inspection and verification before proceeding with the pinpoint test.*

> *NOTE: Only disconnect or reconnect SRS components when instructed to do so within a pinpoint test step. Failure to follow this instruction may result in incorrect diagnosis of the SRS.*

> *NOTE: Always make sure the correct SRS component is being installed. Parts*

released for other vehicles may not be compatible even if they appear physically similar. Check the part number listed in the Ford parts catalog to make sure the correct component is being installed. If an incorrect SRS component is installed, Diagnostic Trouble Codes (DTCs) may set.

NOTE: The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

A1 RETRIEVE RCM (RESTRAINTS CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

WARNING: Before beginning any service procedure in this service information, refer to Safety Warnings in GENERAL INFORMATION . Failure to follow this instruction may result in serious personal injury.

REFER to: Pyrotechnic Device Health and Safety Precautions .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B1405:11, B1405:12, B1405:13 and B1405:1A retrieved on-demand during self-test?

Yes	This fault cannot be cleared until it is corrected and the DTC is no longer retrieved on-demand during self-test. If DTC U3003:16 or U3003:17 is also retrieved on-demand. REFER to: Pinpoint Test - DTC: AJ . If DTC U3003:16 or U3003:17 is not retrieved on-demand during self-test, DIAGNOSE the driver upper side airbag Diagnostic Trouble Codes (DTCs). For DTC B1405:13 or B1405:1A, GO to A2. For DTC B1405:11, GO to A8. For DTC B1405:12, GO to A10.

No	This is an intermittent fault when present as a Continuous Memory Diagnostic Trouble Code (CMDTC) only. If DTC U3003:16 or U3003:17 is also retrieved on-demand. REFER to: Pinpoint Test - DTC: AJ . If DTC U3003:16 or U3003:17 is not retrieved on-demand during self-test, DIAGNOSE the driver upper side airbag Continuous Memory Diagnostic Trouble Codes (CMDTCs). For DTC B1405:13 or B1405:1A, GO to A13. For DTC B1405:11, GO to A14. For DTC B1405:12, GO to A15.

A2 CHECK THE LEFT CURTAIN DEPLOYMENT CONTROL 1 (DEPLOY_11_R) PID (PARAMETER IDENTIFICATION)

Using a diagnostic scan tool, view RCM Parameter Identifications (PIDs).

Monitor and record the resistance value displayed by the DEPLOY_11_R PID.

Does the PID value read between 1.44 and 3.52 ohms?

Yes	GO to A12

No	GO to A3

A3 CHECK THE LEFT CURTAIN DEPLOYMENT CONTROL 1 (DEPLOY_11_R) PID (PARAMETER IDENTIFICATION) WHILE CARRYING OUT THE HARNESS TEST

While monitoring the DEPLOY_11_R PID, carry out the harness test of the driver upper side airbag circuits and accessible connectors (including any inline connectors) by wiggling and flexing the wire harness and connectors frequently. Record the resistance value indicated by the PID.

Does the PID value read between 1.44 and 3.52 ohms while carrying out the harness test?

Yes	DEPOWER the SRS and REPAIR the connector, terminals or wire harness as needed. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

No	For PID value less than 1.44 ohms, GO to A4. For PID value greater than 3.52 ohms, GO to A6.

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the reported fault changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A4 CHECK THE DRIVER UPPER SIDE AIRBAG DEPLOYMENT CONTROL DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (LOW RESISTANCE INDICATED)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Driver Upper Side Airbag (Inline) C3206 .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

DIAGNOSTIC TIP: When viewing Diagnostic Trouble Codes (DTCs) with the driver upper side airbag disconnected, an open circuit fault is normally retrieved.

Did the on-demand DTC change from B1405:1A to B1405:13?

Yes	GO to A11.

No	GO to A5.

A5 CHECK FOR A SHORT BETWEEN THE DRIVER UPPER SIDE AIRBAG CIRCUITS

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect RCM C310A and C310B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3206-1	Ω	C3206-2

Is the resistance greater than 10, 000 ohms?

Yes	GO to A12.

No	REPAIR the circuit(s). Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

A6 CHECK THE DRIVER UPPER SIDE AIRBAG CIRCUITS FOR AN OPEN

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Driver Upper Side Airbag (Inline) C3206 .

Disconnect RCM C310A and C310B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C310B-25	Ω	C3206-1
C310B-26	Ω	C3206-2

Are the resistances less than 0.5 ohm?

Yes	GO to A7

No	REPAIR the circuits. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the reported fault changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A7 CHECK THE DRIVER UPPER SIDE AIRBAG DEPLOYMENT CONTROL DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (OPEN INDICATED)

Connect RCM C310A and C310B .

Connect a fused jumper wire:

Lead 1	Measurement / Action	Lead 2
C3206-1		C3206-2

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

DIAGNOSTIC TIP: When viewing Diagnostic Trouble Codes (DTCs) with the driver upper side airbag circuits shorted together, a low resistance fault is normally retrieved.

Did the on-demand DTC change from B1405:13 to B1405:1A?

Yes	REMOVE the fused jumper wire and GO to A11

No	REMOVE the fused jumper wire and GO to A12

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the reported fault changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A8 CHECK THE DRIVER UPPER SIDE AIRBAG DEPLOYMENT CONTROL DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (SHORT TO GROUND INDICATED)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Driver Upper Side Airbag (Inline) C3206 .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

DIAGNOSTIC TIP: When viewing Diagnostic Trouble Codes (DTCs) with the driver upper side airbag disconnected, an open circuit fault is normally retrieved.

Did the on-demand DTC change from B1405:11 to B1405:13?

Yes	GO to A11

No	GO to A9

A9 CHECK THE DRIVER UPPER SIDE AIRBAG CIRCUITS FOR A SHORT TO GROUND

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect RCM C310A and C310B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3206-1	Ω	Ground
C3206-2	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to A12

No	REPAIR the circuit(s). Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

A10 CHECK THE DRIVER UPPER SIDE AIRBAG CIRCUITS FOR A SHORT TO VOLTAGE

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Driver Upper Side Airbag (Inline) C3206 .

Disconnect RCM C310A and C310B .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3206-1	V	Ground
C3206-2	V	Ground

Is any voltage present?

Yes	REPAIR the circuit(s). Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

No	GO to A12

NOTE: Make sure all SRS components and the RCM electrical connectors are connected before carrying out the self-test. If not, Diagnostic Trouble Codes (DTCs) will be recorded.

A11 CONFIRM THE DRIVER UPPER SIDE AIRBAG FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Prior to reconnecting any previously disconnected SRS component:

Inspect connector(s) (including any inline connectors) for pushed-out, loose or spread terminals and loose or frayed wire connections at terminals.

Inspect wire harness for any damaged, pinched, cut or pierced wires.

Inspect RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

Inspect Driver Upper Side Airbag C3464 and make sure the Connector Position Assurance (CPA) tabs are not broken and the clip is not damaged.

Repair any concerns found. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

Connect Driver Upper Side Airbag (Inline) C3206 .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was the original DTC retrieved on-demand during self-test?

Yes	REMOVE and INSPECT the driver seat backrest harness for damage. REFER to: Side Airbag . If a concern is found, REPAIR as necessary. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17. If a concern is not found, INSTALL a new driver upper side airbag. REFER to: Side Airbag . GO to A17.

No	In the process of diagnosing the fault, the fault condition has become intermittent. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. For DTC B1405:13 or B1405:1A, GO to A13. For DTC B1405:11, GO to A14. For DTC B1405:12, GO to A15.

NOTE: Make sure all SRS components and the RCM electrical connectors are

connected before carrying out the self-test. If not, Diagnostic Trouble Codes (DTCs) will be recorded.

A12 CONFIRM THE RCM (RESTRAINTS CONTROL MODULE) FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Prior to reconnecting any previously disconnected SRS component:

Inspect connector(s) (including any inline connectors) for pushed-out, loose or spread terminals and loose or frayed wire connections at terminals.

Inspect wire harness for any damaged, pinched, cut or pierced wires.

Inspect RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

Repair any concerns found. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

Connect Driver Upper Side Airbag (Inline) C3206 (if previously disconnected).

Connect RCM C310A and C310B (if previously disconnected).

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was the original DTC retrieved on-demand during self-test?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new RCM. REFER to: Restraints Control Module (RCM) . GO to A17.

No	In the process of diagnosing the fault, the fault condition has become intermittent. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. For DTC B1405:13 or B1405:1A, GO to A13. For DTC B1405:11, GO to A14. For DTC B1405:12, GO to A15.

A13 CHECK THE LEFT CURTAIN DEPLOYMENT CONTROL 1 (DEPLOY_11_R) PID (PARAMETER IDENTIFICATION) FOR AN INTERMITTENT LOW RESISTANCE OR OPEN CIRCUIT FAULT

Using a diagnostic scan tool, view RCM Parameter Identifications (PIDs).

While monitoring the DEPLOY_11_R PID, attempt to recreate the fault by wiggling connectors (including any inline connectors) and flexing the wire harness frequently. Record the resistance value indicated by the PID.

Does the PID value read between 1.44 and 3.52 ohms?

Yes	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A16

No	Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering . REPAIR as necessary. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17

A14 CHECK THE DRIVER UPPER SIDE AIRBAG DEPLOYMENT CONTROL CIRCUITS FOR AN INTERMITTENT SHORT TO GROUND FAULT

Attempt to recreate the fault by wiggling connectors (including any inline connectors) and flexing the wire harness frequently.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B1405:11 retrieved on-demand during self-test?

Yes	DEPOWER the SRS and REPAIR as necessary. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

No	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A16.

A15 CHECK THE DRIVER UPPER SIDE AIRBAG DEPLOYMENT CONTROL CIRCUITS FOR AN INTERMITTENT SHORT TO BATTERY FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Driver Upper Side Airbag (Inline) C3206 .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Attempt to recreate the fault by wiggling connectors (including any inline connectors) and flexing the wire harness frequently.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B1405:12 retrieved on-demand during self-test?

Yes	DEPOWER the SRS and REPAIR as necessary. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

No	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A16.

A16 CHECK THE HARNESS AND CONNECTORS

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Driver Upper Side Airbag (Inline) C3206 .

Inspect connector(s) (including any inline connectors) for corrosion, loose or spread terminals and loose or frayed wire connections at terminals.

Inspect wire harness for any damage, pinched, cut or pierced wires.

Inspect RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

Inspect Driver Upper Side Airbag C3464 Connector Position Assurance (CPA) tab to verify that it is correctly seated and free of damage.

Were any concerns found?

Yes	REPAIR as necessary. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

No	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A17.

A17 CHECK FOR ADDITIONAL SRS (SUPPLEMENTAL RESTRAINT SYSTEM) DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition OFF.

Reconnect all SRS components (if previously disconnected).

If previously directed to depower the SRS, repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

NOTE: When selecting Restraints from the Self Test menu, DTCs are retrieved from the RCM and OCSM.

Using a diagnostic scan tool, perform

Restraints self-test.

Are any RCM and/or OCSM Diagnostic Trouble Codes (DTCs) retrieved on-demand during self-test?

Yes	Do not clear any Diagnostic Trouble Codes (DTCs) until all Diagnostic Trouble Codes (DTCs) have been resolved. DIAGNOSE and REPAIR the RCM and/or OCSM Diagnostic Trouble Codes (DTCs). REFER to: Airbag Supplemental Restraint System (SRS) .

No	The repair is complete. RETURN the vehicle to the customer.

DIAGNOSIS AND TESTING > PINPOINT TEST - DTC: AO, CONVERTIBLE > B1408:11, B1408:12, B1408:13, B1408:1A

Refer to Supplemental Restraint System for schematic and connector information.

Normal Operation and Fault Conditions

The RCM continuously monitors the passenger upper side airbag circuits for the following faults:

- Resistance out of range
- Unexpected voltage
- Short to ground
- Faulted passenger upper side airbag

If a fault is detected, the RCM stores DTC B1408:11, B1408:12, B1408:13 or B1408:1A in memory and sends a message to the IPC to illuminate the airbag warning indicator.

The RCM analyzes the deployment loop resistance to determine if a fault exists. The value displayed in the PID is the deployment loop resistance measured by the RCM. If the value displayed is lower or higher than the desired range (refer to diagram below in illustration), the RCM can set a DTC. As the deployment loop resistance drifts farther outside the desired range, the chance for a DTC increases. Small variations in resistance can occur due to the effect of road vibrations on terminal fit. Crimps and terminals can be affected by stress and harness movement and can cause an increase in resistance due to wire strain. These variables can result in an intermittent fault. For this reason, the test requires the PID value to be within the desired range before the fault is considered repaired, regardless if the module is reporting an on-demand DTC at the time of diagnosis. Following this direction helps make sure that minor changes in resistance do not create a repeat concern. This test uses process of elimination to diagnose each part of the deployment loop circuit including:

- Wiring
- Connections
- Passenger upper side airbag
- RCM



DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1408:11	Passenger Side Curtain Deployment Control 1: Circuit Short to Ground	A fault is indicated when the RCM senses a short to ground on either passenger upper side airbag circuit for more than 6 seconds.
B1408:12	Passenger Side Curtain Deployment Control 1: Circuit Short to Battery	A fault is indicated when the RCM senses a short to voltage on either passenger upper side airbag circuit for more than 6 seconds.
B1408:13	Passenger Side Curtain Deployment Control 1: Circuit Open	A fault is indicated when the RCM measures more than the desired resistance between the passenger upper side airbag circuits for more than 6 seconds.
B1408:1A	Passenger Side Curtain Deployment Control 1: Circuit Resistance Below Threshold	A fault is indicated when the RCM measures less than the desired resistance between the passenger upper side airbag circuits for more than 6 seconds.

Possible Sources

- Wiring, terminals or connectors
- Passenger upper side airbag
- RCM

PINPOINT TEST A : B1408:11, B1408:12, B1408:13 AND B1408:1A

WARNING: Incorrect repair techniques or actions can cause an accidental Supplemental Restraint System (SRS) deployment. Never compromise or depart from these instructions. Failure to precisely follow all instructions could result in serious personal injury from an accidental deployment.

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may cause damage to the connector.

NOTE: Most faults are due to connector and/or wiring concerns. Carry out a thorough inspection and verification before proceeding with the pinpoint test.

NOTE: Only disconnect or reconnect SRS components when instructed to do so within a pinpoint test step. Failure to follow this instruction may result in incorrect

diagnosis of the SRS.

NOTE: Always make sure the correct SRS component is being installed. Parts released for other vehicles may not be compatible even if they appear physically similar. Check the part number listed in the Ford parts catalog to make sure the correct component is being installed. If an incorrect SRS component is installed, Diagnostic Trouble Codes (DTCs) may set.

NOTE: The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

A1 RETRIEVE RCM (RESTRAINTS CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

WARNING: Before beginning any service procedure in this service information, refer to Safety Warnings in GENERAL INFORMATION . Failure to follow this instruction may result in serious personal injury.

REFER to: Pyrotechnic Device Health and Safety Precautions .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B1408:11, B1408:12, B1408:13 and B1408:1A retrieved on-demand during self-test?

Yes	This fault cannot be cleared until it is corrected and the DTC is no longer retrieved on-demand during self-test. If DTC U3003:16 or U3003:17 is also retrieved on-demand. REFER to: Pinpoint Test - DTC: AJ . If DTC U3003:16 or U3003:17 is not retrieved on-demand during self-test, DIAGNOSE the passenger upper side airbag Diagnostic Trouble Codes (DTCs). For DTC B1408:13 or B1408:1A, GO to A2. For DTC B1408:11, GO to A8. For DTC B1408:12, GO to A10.
No	This is an intermittent fault when present as a Continuous Memory Diagnostic Trouble Code (CMDTC) only. If DTC U3003:16 or U3003:17 is also retrieved on-demand. REFER to: Pinpoint Test - DTC: AJ . If DTC U3003:16 or U3003:17 is not retrieved on-demand during self-test, DIAGNOSE the passenger upper side airbag Continuous Memory Diagnostic Trouble Codes (CMDTCs). For DTC B1408:13 or B1408:1A, GO to A13. For DTC B1408:11, GO to A14. For DTC B1408:12, GO to A15.

A2 CHECK THE RIGHT CURTAIN DEPLOYMENT CONTROL 1 (DEPLOY_14_R) PID (PARAMETER IDENTIFICATION)

Using a diagnostic scan tool, view RCM Parameter Identifications (PIDs).

Monitor and record the resistance value displayed by the DEPLOY_14_R PID.

Does the PID value read between 1.44 and 3.52 ohms?

Yes	GO to A12

No	GO to A3

A3 CHECK THE RIGHT CURTAIN DEPLOYMENT CONTROL 1 (DEPLOY_14_R) PID (PARAMETER IDENTIFICATION) WHILE CARRYING OUT THE HARNESS TEST

While monitoring the DEPLOY_14_R PID, carry out the harness test of the passenger upper side airbag circuits and accessible connectors (including any inline connectors) by wiggling and flexing the wire harness and connectors frequently. Record the resistance value indicated by the PID.

Does the PID value read between 1.44 and 3.52 ohms while carrying out the harness test?

Yes	DEPOWER the SRS and REPAIR the connector, terminals or wire harness as needed. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

No	For PID value less than 1.44 ohms, GO to A4 For PID value greater than 3.52 ohms, GO to A6.

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the reported fault changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A4 CHECK THE PASSENGER UPPER SIDE AIRBAG DEPLOYMENT CONTROL DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (LOW RESISTANCE INDICATED)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Passenger Upper Side Airbag (Inline) C219 .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

DIAGNOSTIC TIP: When viewing Diagnostic Trouble Codes (DTCs) with the passenger upper side airbag disconnected, an open circuit fault is normally retrieved.

Did the on-demand DTC change from B1408:1A to B1408:13?

Yes	GO to A11

No	GO to A5

A5 CHECK FOR A SHORT BETWEEN THE PASSENGER UPPER SIDE AIRBAG CIRCUITS

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect RCM C310A and C310B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C219-1	Ω	C219-2

Is the resistance greater than 10, 000 ohms?

Yes	GO to A12.

No	REPAIR the circuit(s). Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

A6 CHECK THE PASSENGER UPPER SIDE AIRBAG CIRCUITS FOR AN OPEN

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Passenger Upper Side Airbag (Inline) C219 .

Disconnect RCM C310A and C310B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C310B-17	Ω	C219-1
C310B-18	Ω	C219-2

Are the resistances less than 0.5 ohm?

Yes	GO to A7

No	REPAIR the circuits. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the reported fault changes, this indicates the RCM is

functioning correctly and is not the source of the fault.

A7 CHECK THE PASSENGER UPPER SIDE AIRBAG DEPLOYMENT CONTROL DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (OPEN INDICATED)

Connect RCM C310A and C310B .

Connect a fused jumper wire:

Lead 1	Measurement / Action	Lead 2
C219-1		C219-2

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

DIAGNOSTIC TIP: When viewing Diagnostic Trouble Codes (DTCs) with the passenger upper side airbag circuits shorted together, a low resistance fault is normally retrieved.

Did the on-demand DTC change from B1408:13 to B1408:1A?

Yes	REMOVE the fused jumper wire and GO to A11

No	REMOVE the fused jumper wire and GO to A12

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the reported fault changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A8 CHECK THE PASSENGER UPPER SIDE AIRBAG DEPLOYMENT CONTROL DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (SHORT TO GROUND INDICATED)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Passenger Upper Side Airbag (Inline) C219 .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

DIAGNOSTIC TIP: When viewing Diagnostic Trouble Codes (DTCs) with the passenger upper

side airbag disconnected, an open circuit fault is normally retrieved.

Did the on-demand DTC change from B1408:11 to B1408:13?

Yes	GO to A11

No	GO to A9

A9 CHECK THE PASSENGER UPPER SIDE AIRBAG CIRCUITS FOR A SHORT TO GROUND

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect RCM C310A and C310B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C219-1	Ω	Ground
C219-2	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to A12.

No	REPAIR the circuit(s). Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

A10 CHECK THE PASSENGER UPPER SIDE AIRBAG CIRCUITS FOR A SHORT TO VOLTAGE

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Passenger Upper Side Airbag (Inline) C219 .

Disconnect RCM C310A and C310B .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C219-1		Ground

C219-2		Ground

Is any voltage present?

Yes	REPAIR the circuit(s). Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

No	GO to A12

NOTE: Make sure all SRS components and the RCM electrical connectors are connected before carrying out the self-test. If not, Diagnostic Trouble Codes (DTCs) will be recorded.

A11 CONFIRM THE PASSENGER UPPER SIDE AIRBAG FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Prior to reconnecting any previously disconnected SRS component:

Inspect connector(s) (including any inline connectors) for pushed-out, loose or spread terminals and loose or frayed wire connections at terminals.

Inspect wire harness for any damaged, pinched, cut or pierced wires.

Inspect RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

Inspect Passenger Upper Side Airbag C3465 and make sure the Connector Position Assurance (CPA) tabs are not broken and the clip is not damaged.

Repair any concerns found. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

Connect Passenger Upper Side Airbag (Inline) C219 .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was the original DTC retrieved on-demand during self-test?

Yes	REMOVE and INSPECT the passenger seat backrest harness for damage. REFER to: Side Airbag . If a concern is found, REPAIR as necessary. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17. If a concern is not found, INSTALL a new passenger upper side airbag. REFER to: Side Airbag . GO to A17.

No	In the process of diagnosing the fault, the fault condition has become intermittent. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test.For DTC B1408:13 or B1408:1A, GO to A13. For DTC B1408:11, GO to A14. For DTC B1408:12, GO to A15.

NOTE: Make sure all SRS components and the RCM electrical connectors are connected before carrying out the self-test. If not, Diagnostic Trouble Codes (DTCs) will be recorded.

A12 CONFIRM THE RCM (RESTRAINTS CONTROL MODULE) FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Prior to reconnecting any previously disconnected SRS component:

Inspect connector(s) (including any inline connectors) for pushed-out, loose or spread terminals and loose or frayed wire connections at terminals.

Inspect wire harness for any damaged, pinched, cut or pierced wires.

Inspect RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

Repair any concerns found. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

Connect Passenger Upper Side Airbag (Inline) C219 (if previously disconnected).

Connect RCM C310A and C310B (if previously disconnected).

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was the original DTC retrieved on-demand during self-test?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new RCM. REFER to: Restraints Control Module (RCM) . GO to A17.

No	In the process of diagnosing the fault, the fault condition has become intermittent. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. For DTC B1408:13 or B1408:1A, GO to A13. For DTC B1408:11, GO to A14. For DTC B1408:12, GO to A15.

A13 CHECK THE RIGHT CURTAIN DEPLOYMENT CONTROL 1 (DEPLOY_14_R) PID

(PARAMETER IDENTIFICATION) FOR AN INTERMITTENT LOW RESISTANCE OR OPEN CIRCUIT FAULT

Using a diagnostic scan tool, view RCM Parameter Identifications (PIDs).

While monitoring the DEPLOY_14_R PID, attempt to recreate the fault by wiggling connectors (including any inline connectors) and flexing the wire harness frequently. Record the resistance value indicated by the PID.

Does the PID value read between 1.44 and 3.52 ohms?

Yes	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A16.

No	Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering . REPAIR as necessary. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

A14 CHECK THE PASSENGER UPPER SIDE AIRBAG DEPLOYMENT CONTROL CIRCUITS FOR AN INTERMITTENT SHORT TO GROUND FAULT

Attempt to recreate the fault by wiggling connectors (including any inline connectors) and flexing the wire harness frequently.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B1408:11 retrieved on-demand during self-test?

Yes	DEPOWER the SRS and REPAIR as necessary. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

No	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A16.

A15 CHECK THE PASSENGER UPPER SIDE AIRBAG DEPLOYMENT CONTROL CIRCUITS FOR AN INTERMITTENT SHORT TO BATTERY FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Passenger Upper Side Airbag (Inline) C219 .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Attempt to recreate the fault by wiggling connectors (including any inline connectors) and flexing

the wire harness frequently.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B1408:12 retrieved on-demand during self-test?

Yes	DEPOWER the SRS and REPAIR as necessary. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

No	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A16.

A16 CHECK THE HARNESS AND CONNECTORS

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Passenger Upper Side Airbag (Inline) C219 .

Inspect connector(s) (including any inline connectors) for corrosion, loose or spread terminals and loose or frayed wire connections at terminals.

Inspect wire harness for any damage, pinched, cut or pierced wires.

Inspect RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

Inspect Passenger Upper Side Airbag C3465 Connector Position Assurance (CPA) tab to verify that it is correctly seated and free of damage.

Were any concerns found?

Yes	REPAIR as necessary. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A17.

No	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A17.

A17 CHECK FOR ADDITIONAL SRS (SUPPLEMENTAL RESTRAINT SYSTEM) DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition OFF.

Reconnect all SRS components (if previously disconnected).

If previously directed to depower the SRS, repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

NOTE: When selecting Restraints from the Self Test menu, DTCs are retrieved from the RCM and OCSM.

Using a diagnostic scan tool, perform

Restraints self-test.

Are any RCM and/or OCSM Diagnostic Trouble Codes (DTCs) retrieved on-demand during self-test?

Yes	Do not clear any Diagnostic Trouble Codes (DTCs) until all Diagnostic Trouble Codes (DTCs) have been resolved. DIAGNOSE and REPAIR the RCM and/or OCSM Diagnostic Trouble Codes (DTCs). REFER to: Airbag Supplemental Restraint System (SRS) .

No	The repair is complete. RETURN the vehicle to the customer.

DIAGNOSIS AND TESTING > PINPOINT TEST - DTC: AP, CONVERTIBLE > B1414:11 AND B1414:93

Refer to Supplemental Restraint System for schematic and connector information.

Normal Operation and Fault Conditions

The RCM monitors the driver door side impact sensor circuits for the following faults:

- Open circuit
- Short to voltage
- Short to ground
- Faulted driver door side impact sensor

If a fault is detected, the RCM stores DTC B1414:11 or B1414:93 in memory and sends a message to the IPC to illuminate the airbag warning indicator.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1414:11	Driver Side Restraints Sensor 1: Circuit Short to Ground	A fault is indicated when the RCM senses a short to ground on the driver door side impact sensor feed circuit.
B1414:93	Driver Side Restraints Sensor 1: No Operation	A fault is indicated when the RCM senses a faulted driver door side impact sensor, a short to voltage on the sensor feed circuit or an open feed or return circuit.

Possible Causes

- Wiring, terminals or connectors
- Driver door side impact sensor
- RCM

Visual Inspection and Diagnostic Pre-checks

- Inspect for damaged wiring harness(es).
- Inspect for loose or damaged connectors.

PINPOINT TEST A : B1414:11 AND B1414:93

> *WARNING: Incorrect repair techniques or actions can cause an accidental Supplemental Restraint System (SRS) deployment. Never compromise or depart from these instructions. Failure to precisely follow all instructions could result in serious personal injury from an accidental deployment.*

> *NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may cause damage to the connector.*

> *NOTE: Most faults are due to connector and/or wiring concerns. Carry out a thorough inspection and verification before proceeding with the pinpoint test.*

> *NOTE: Only disconnect or reconnect SRS components when instructed to do so within a pinpoint test step. Failure to follow this instruction may result in incorrect diagnosis of the SRS.*

> *NOTE: Always make sure the correct SRS component is being installed. Parts released for other vehicles may not be compatible even if they appear physically similar. Check the part number listed in the Ford parts catalog to make sure the correct component is being installed. If an incorrect SRS component is installed, Diagnostic Trouble Codes (DTCs) may set.*

> *NOTE: The SRS must be fully operational and free of faults before releasing the vehicle to the customer.*

> *NOTE: Do not probe any impact sensor. The impact sensor cannot be tested using a multi-meter*

A1 RETRIEVE RCM (RESTRAINTS CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

WARNING: Before beginning any service procedure in this service information, refer to Safety Warnings in GENERAL INFORMATION . Failure to follow this instruction may result in serious personal injury.

REFER to: Pyrotechnic Device Health and Safety Precautions .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B1414:11 or B1414:93 retrieved on-demand during self-test?

Yes	This fault cannot be cleared until it is corrected and the DTC is no longer retrieved on-demand during self-test. If DTC U3003:16 or U3003:17 is retrieved on-demand, DIAGNOSE those Diagnostic Trouble Codes (DTCs) first. REFER to: Pinpoint Test - DTC: AJ . If DTC U3003:16 or U3003:17 is not retrieved on-demand during self-test, DIAGNOSE the impact sensor Diagnostic Trouble Codes (DTCs). For DTC B1414:11, GO to A2. For DTC B1414:93, GO to A4.

No	If DTC U3003:16 or U3003:17 is retrieved on-demand, DIAGNOSE those Diagnostic Trouble Codes (DTCs) first. REFER to: Pinpoint Test - DTC: AJ . If DTC U3003:16 or U3003:17 is not retrieved on-demand during self-test, DIAGNOSE the impact sensor Continuous Memory Diagnostic Trouble Codes (CMDTCs). This is an intermittent fault when present as a Continuous Memory Diagnostic Trouble Code (CMDTC) only. GO to A9.

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the reported fault changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A2 CHECK THE DRIVER SIDE RESTRAINTS SENSOR 1 DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (SHORT TO GROUND INDICATED)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Driver Front Door Side Impact Sensor C567 .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Did the on-demand DTC change from B1414:11 to B1414:93?

Yes	INSTALL a new driver door side impact sensor. REFER to: Front Door Side Impact Sensor . GO to A10.

No	GO to A3.

A3 CHECK THE DRIVER DOOR SIDE IMPACT SENSOR FEED CIRCUIT FOR A SHORT TO GROUND AND A SHORT BETWEEN SENSOR CIRCUITS

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect RCM C310A and C310B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C567-1	Ω	Ground

Measure:

Positive Lead	Measurement / Action	Negative Lead
C567-1	Ω	C567-2

Are the resistances greater than 10, 000 ohms?

Yes	GO to A8.

No	REPAIR the circuit. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A10.

A4 CHECK THE DRIVER DOOR SIDE IMPACT SENSOR AND RCM (RESTRAINTS CONTROL MODULE) CONNECTIONS (NO OPERATION INDICATED)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Inspect the Driver Front Door Side Impact Sensor electrical connector C567 to make sure it is fully seated and locked. Seat and lock the connector as necessary.

Gain access to the RCM and inspect C310A and C310B to make sure they are fully seated and locked. Seat and lock the connector as necessary

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B1414:93 retrieved on-demand during self-test?

Yes	GO to A5.

No	The fault has been corrected. GO to A10.

A5 CHECK THE DRIVER DOOR SIDE IMPACT SENSOR FEED CIRCUIT FOR A SHORT TO VOLTAGE (NO OPERATION INDICATED)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Driver Front Door Side Impact Sensor C567 .

Disconnect RCM C310A and C310B .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C567-1	V	Ground

Is any voltage present?

Yes	REPAIR the circuit. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A10.

No	GO to A6

A6 CHECK THE DRIVER DOOR SIDE IMPACT SENSOR CIRCUITS FOR AN OPEN

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C310B-44	Ω	C567-1
C310B-43	Ω	C567-2

Are the resistances less than 0.5 ohm?

Yes	GO to A7

No	REPAIR the circuit(s). Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A10.

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the reported fault changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A7 CHECK THE DRIVER SIDE RESTRAINTS SENSOR 1 DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (NO OPERATION INDICATED)

Connect RCM C310A and C310B .

Connect a fused jumper wire as shown in illustration:

Lead 1	Measurement / Action	Lead 2
C567-1		C567-2

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Did the on-demand DTC change from B1414:93 to B1414:11?

Yes	REMOVE the fused jumper wire and INSTALL a new driver door side impact sensor. REFER to: Front Door Side Impact Sensor . GO to A10.

No	REMOVE the fused jumper wire and GO to A8.

NOTE: Make sure all SRS components and the RCM electrical connectors are connected before carrying out the self-test. If not, Diagnostic Trouble Codes (DTCs) will be recorded.

A8 CONFIRM THE RCM (RESTRAINTS CONTROL MODULE) FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Prior to reconnecting any previously disconnected SRS component:

inspect connector(s) (including any inline connectors) for pushed-out, loose or spread terminals and loose or frayed wire connections at terminals.

inspect wire harness for any damaged, pinched, cut or pierced wires.

inspect RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for

correct operation.

repair any concerns found. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

Connect Driver Door Side Impact Sensor C567 .

Connect RCM C310A and C310B .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was the original DTC retrieved on-demand during self-test?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new RCM. REFER to: Restraints Control Module (RCM) . GO to A10.

No	In the process of diagnosing the fault, the fault condition has become intermittent. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A9.

A9 CHECK FOR AN INTERMITTENT FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Driver Door Side Impact Sensor C567 .

Disconnect RCM C310A and C310B .

Inspect:

harness and component connectors for loose or spread terminals and loose or frayed wire connections at terminals.

wire harness for any damage, pinched, cut or pierced wires.

RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

repair any concerns found. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

Connect Driver Door Side Impact Sensor C567 .

Connect RCM C310A and C310B .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B1414:11 or B1414:93 retrieved on-demand during the self-test?

Yes	This fault cannot be cleared until it is corrected and the DTC is no longer retrieved on-demand during self-test. For DTC B1414:11, GO to A2. For DTC B1414:93, GO to A4.

No	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A10.

A10 CHECK FOR ADDITIONAL SRS (SUPPLEMENTAL RESTRAINT SYSTEM) DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition OFF.

Reconnect all SRS components (if previously disconnected).

If previously directed to depower the SRS, repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

NOTE: When selecting Restraints from the Self Test menu, DTCs are retrieved from the RCM and OCSM.

Using a diagnostic scan tool, perform

Restraints self-test.

Are any RCM and/or OCSM Diagnostic Trouble Codes (DTCs) retrieved on-demand during self-test?

Yes	Do not clear any Diagnostic Trouble Codes (DTCs) until all Diagnostic Trouble Codes (DTCs) have been resolved. DIAGNOSE and REPAIR the RCM and/or OCSM Diagnostic Trouble Codes (DTCs). REFER to: Airbag Supplemental Restraint System (SRS) .

No	The repair is complete. RETURN the vehicle to the customer.

DIAGNOSIS AND TESTING > PINPOINT TEST - DTC: AQ, CONVERTIBLE > B1418:11 AND B1418:93

Refer to Supplemental Restraint System for schematic and connector information.

Normal Operation and Fault Conditions

The RCM monitors the passenger door side impact sensor circuits for the following faults:

- Open circuit
- Short to voltage
- Short to ground
- Faulted passenger door side impact sensor

If a fault is detected, the RCM stores DTC B1418:11 or B1418:93 in memory and sends a message to the IPC to illuminate the airbag warning indicator.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1418:11	Passenger Side Restraints Sensor 1: Circuit Short to Ground	A fault is indicated when the RCM senses a short to ground on the passenger door side impact sensor feed circuit.
B1418:93	Passenger Side Restraints Sensor 1: No Operation	A fault is indicated when the RCM senses a faulted passenger door side impact sensor, a short to voltage on the sensor feed circuit or an open feed or return circuit.

Possible Causes

- Wiring, terminals or connectors
- Passenger door side impact sensor
- RCM

Visual Inspection and Diagnostic Pre-checks

- Inspect for damaged wiring harness(es).
- Inspect for loose or damaged connectors.

PINPOINT TEST A : B1418:11 AND B1418:93

WARNING: Incorrect repair techniques or actions can cause an accidental Supplemental Restraint System (SRS) deployment. Never compromise or depart from these instructions. Failure to precisely follow all instructions could result in serious personal injury from an accidental deployment.

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may cause damage to the connector.

NOTE: Most faults are due to connector and/or wiring concerns. Carry out a thorough inspection and verification before proceeding with the pinpoint test.

NOTE: Only disconnect or reconnect SRS components when instructed to do so within a pinpoint test step. Failure to follow this instruction may result in incorrect diagnosis of the SRS.

NOTE: Always make sure the correct SRS component is being installed. Parts released for other vehicles may not be compatible even if they appear physically similar. Check the part number listed in the Ford parts catalog to make sure the correct component is being installed. If an incorrect SRS component is installed, Diagnostic Trouble Codes (DTCs) may set.

NOTE: The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

NOTE: Do not probe any impact sensor. The impact sensor cannot be tested using a multi-meter

A1 RETRIEVE RCM (RESTRAINTS CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

WARNING: Before beginning any service procedure in this service information, refer to Safety Warnings in GENERAL INFORMATION . Failure to follow this instruction may result in serious personal injury.

REFER to: Pyrotechnic Device Health and Safety Precautions .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B1418:11 or B1418:93 retrieved on-demand during self-test?

Yes	This fault cannot be cleared until it is corrected and the DTC is no longer retrieved on-demand during self-test. If DTC U3003:16 or U3003:17 is retrieved on-demand, DIAGNOSE those Diagnostic Trouble Codes (DTCs) first. REFER to: Pinpoint Test - DTC: AJ . If DTC U3003:16 or U3003:17 is not retrieved on-demand during self-test, DIAGNOSE the impact sensor Diagnostic Trouble Codes (DTCs). For DTC B1418:11, GO to A2. For DTC B1418:93, GO to A4.
No	If DTC U3003:16 or U3003:17 is retrieved on-demand, DIAGNOSE those Diagnostic Trouble Codes (DTCs) first. REFER to: Pinpoint Test - DTC: AJ . If DTC U3003:16 or U3003:17 is not retrieved on-demand during self-test, DIAGNOSE the impact sensor Continuous Memory

	Diagnostic Trouble Codes (CMDTCs). This is an intermittent fault when present as a Continuous Memory Diagnostic Trouble Code (CMDTC) only. GO to A9.

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the reported fault changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A2 CHECK THE PASSENGER SIDE RESTRAINTS SENSOR 1 DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (SHORT TO GROUND INDICATED)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Passenger Front Door Side Impact Sensor C644 .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Did the on-demand DTC change from B1418:11 to B1418:93?

Yes	INSTALL a new passenger door side impact sensor. REFER to: Front Door Side Impact Sensor . GO to A10.

No	GO to A3

A3 CHECK THE PASSENGER DOOR SIDE IMPACT SENSOR FEED CIRCUITS FOR A SHORT TO GROUND OR A SHORT TOGETHER

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect RCM C310A and C310B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C644-1	Ω	Ground

Measure:

Positive Lead	Measurement / Action	Negative Lead
C644-1	Ω	C644-2

Is the resistance greater than 10, 000 ohms?

Yes	GO to A8.

No	REPAIR the circuits. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A10.

A4 CHECK THE PASSENGER DOOR SIDE IMPACT SENSOR AND RCM (RESTRAINTS CONTROL MODULE) CONNECTIONS (NO OPERATION INDICATED)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Inspect the Passenger Front Door Side Impact Sensor electrical connector C644 to make sure it is fully seated and locked. Seat and lock the connector as necessary.

Gain access to the RCM and inspect C310A and C310B to make sure they are fully seated and locked. Seat and lock the connector as necessary

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B1418:93 retrieved on-demand during self-test?

Yes	GO to A5

No	The fault has been corrected. GO to A10

A5 CHECK THE PASSENGER DOOR SIDE IMPACT SENSOR FEED CIRCUIT FOR A SHORT TO VOLTAGE (NO OPERATION INDICATED)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Passenger Front Door Side Impact Sensor C644 .

Disconnect RCM C310A and C310B .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C644-1		Ground

Is any voltage present?

Yes	REPAIR the circuit. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A10.

No	GO to A6

A6 CHECK THE PASSENGER DOOR SIDE IMPACT SENSOR CIRCUITS FOR AN OPEN

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C310B-45	Ω	C644-1
C310B-46	Ω	C644-2

Are the resistances less than 0.5 ohm?

Yes	GO to A7.

No	REPAIR the circuit(s). Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A10.

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the reported fault changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A7 CHECK THE PASSENGER SIDE RESTRAINTS SENSOR 1 DTC (DIAGNOSTIC TROUBLE CODE) FOR A FAULT STATUS CHANGE (NO OPERATION INDICATED)

Connect RCM C310A and C310B .

Connect a fused jumper wire as shown in illustration:

Lead 1	Measurement / Action	Lead 2
C644-1		C644-2

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Did the on-demand DTC change from B1418:93 to B1418:11?

Yes	REMOVE the fused jumper wire and INSTALL a new passenger door side impact sensor. REFER to: Front Door Side Impact Sensor . GO to A10.

No	REMOVE the fused jumper wire and GO to A8.

NOTE: Make sure all SRS components and the RCM electrical connectors are connected before carrying out the self-test. If not, Diagnostic Trouble Codes (DTCs) will be recorded.

A8 CONFIRM THE RCM (RESTRAINTS CONTROL MODULE) FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Prior to reconnecting any previously disconnected SRS component:

inspect connector(s) (including any inline connectors) for pushed-out, loose or spread terminals and loose or frayed wire connections at terminals.

inspect wire harness for any damaged, pinched, cut or pierced wires.

inspect RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

repair any concerns found. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

Connect Passenger Door Side Impact Sensor C644 .

Connect RCM C310A and C310B .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was the original DTC retrieved on-demand during self-test?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new RCM. REFER to: Restraints Control Module (RCM) . GO to A10.

No	In the process of diagnosing the fault, the fault condition has become intermittent. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A9.

A9 CHECK FOR AN INTERMITTENT FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect Passenger Door Side Impact Sensor C644 .

Disconnect RCM C310A and C310B .

Inspect:

harness and component connectors for loose or spread terminals and loose or frayed wire connections at terminals.

wire harness for any damage, pinched, cut or pierced wires.

RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

repair any concerns found. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

Connect Passenger Door Side Impact Sensor C644 .

Connect RCM C310A and C310B .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B1418:11 or B1418:93 retrieved on-demand during the self-test?

Yes	This fault cannot be cleared until it is corrected and the DTC is no longer retrieved on-demand during self-test. For DTC B1418:11, GO to A2. For DTC B1418:93, GO to A4.

No	The fault is not present and cannot be recreated at this time. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A10.

A10 CHECK FOR ADDITIONAL SRS (SUPPLEMENTAL RESTRAINT SYSTEM) DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition OFF.

Reconnect all SRS components (if previously disconnected).

If previously directed to depower the SRS, repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

> *NOTE: When selecting Restraints from the Self Test menu, DTCs are retrieved from the RCM and OCSM.*

Using a diagnostic scan tool, perform

Restraints self-test.

Are any RCM and/or OCSM Diagnostic Trouble Codes (DTCs) retrieved on-demand during self-test?

Yes	Do not clear any Diagnostic Trouble Codes (DTCs) until all Diagnostic Trouble Codes (DTCs) have been resolved. DIAGNOSE and REPAIR the RCM and/or OCSM Diagnostic Trouble Codes (DTCs). REFER to: Airbag Supplemental Restraint System (SRS) .

No	The repair is complete. RETURN the vehicle to the customer.

DIAGNOSIS AND TESTING > PINPOINT TEST - DTC: AR > B00D5:11, B00D5:12 AND B00D5:13

Refer to Supplemental Restraint System for schematic and connector information.

Normal Operation and Fault Conditions

The RCM briefly activates the PAD indicator to prove-out and verify correct functional operation of the PAD indicator to the occupants.

The RCM monitors the PAD indicator power supply and LED circuits for the following faults:

- Open circuit
- Short to voltage
- Short to ground
- Faulted PAD indicator

If a fault is detected, the RCM stores DTC B00D5:11, B00D5:12 or B00D5:13 in memory and sends a message to the IPC to illuminate the airbag warning indicator.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B00D5:11	Restraint System Passenger Disable Indicator: Circuit Short to	A fault is indicated when the RCM senses a short to ground on the

	Ground	PAD indicator LED circuit.
B00D5:12	Restraint System Passenger Disable Indicator: Circuit Short to Battery	A fault is indicated when the RCM senses a short to voltage on the PAD indicator LED circuit.
B00D5:13	Restraint System Passenger Disable Indicator: Circuit Open	A fault is indicated when the RCM senses an open on the PAD indicator LED circuit. An open on the ignition voltage supply circuit to the PAD indicator also sets this DTC.

Possible Causes

- Wiring, terminals or connectors
- PAD indicator
- RCM

Visual Inspection and Diagnostic Pre-checks

- Verify BCM fuse 19 (5A) is OK.

PINPOINT TEST A : B00D5:11, B00D5:12 AND B00D5:13

WARNING: Incorrect repair techniques or actions can cause an accidental Supplemental Restraint System (SRS) deployment. Never compromise or depart from these instructions. Failure to precisely follow all instructions could result in serious personal injury from an accidental deployment.

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may cause damage to the connector.

NOTE: Most faults are due to connector and/or wiring concerns. Carry out a thorough inspection and verification before proceeding with the pinpoint test.

NOTE: Only disconnect or reconnect SRS components when instructed to do so within a pinpoint test step. Failure to follow this instruction may result in incorrect diagnosis of the SRS.

NOTE: Always make sure the correct SRS component is being installed. Parts released for other vehicles may not be compatible even if they appear physically similar. Check the part number listed in the Ford parts catalog to make sure the correct component is being installed. If an incorrect SRS component is installed, Diagnostic Trouble Codes (DTCs) may set.

NOTE: The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

A1 RETRIEVE RCM (RESTRAINTS CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

WARNING: Before beginning any service procedure in this service information, refer to Safety Warnings in GENERAL INFORMATION . Failure to follow this instruction may result in serious personal injury.

REFER to: Pyrotechnic Device Health and Safety Precautions .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B00D5:11, B00D5:12 or B00D5:13 retrieved on-demand during self-test?

Yes	This fault cannot be cleared until it is corrected and the DTC is no longer retrieved on-demand during self-test. For DTC B00D5:11, GO to A2. For DTC B00D5:12, GO to A7. For DTC B00D5:13, GO to A4.

No	This is an intermittent fault when present as a Continuous Memory Diagnostic Trouble Code (CMDTC) only. GO to A10

A2 CHECK THE PAD (PASSENGER AIRBAG DEACTIVATION) INDICATOR 'OFF' LED (LIGHT EMITTING DIODE) CONTROL CIRCUIT FOR A SHORT TO GROUND

Ignition OFF.

Disconnect PAD Indicator C9801 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C9801-2	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to A9

No	GO to A3

A3 CHECK THE RCM (RESTRAINTS CONTROL MODULE) FOR LOW RESISTANCE

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect RCM C310A and C310B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C9801-2	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to A9

No	REPAIR the circuit. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A11

A4 CHECK THE PAD (PASSENGER AIRBAG DEACTIVATION) INDICATOR 'OFF' LED (LIGHT EMITTING DIODE) CIRCUIT FOR AN OPEN

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect RCM C310A and C310B .

Disconnect PAD Indicator C9801 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C9801-2	Ω	C310A-20

Is the resistance less than 0.5 ohm?

Yes	GO to A5

No	REPAIR the circuit. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A11

A5 CHECK THE IGNITION CIRCUIT AT THE PAD (PASSENGER AIRBAG DEACTIVATION) INDICATOR FOR VOLTAGE

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C9801-3	V	Ground

Is the voltage greater than 10 volts?

Yes	GO to A6

No	VERIFY BCM fuse 19 (5A) is OK. If OK, REPAIR the circuit. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. If not OK. REFER to the SYSTEM WIRING DIAGRAMS to identify the possible causes of the circuit short. GO to A11.

A6 CHECK THE PAD (PASSENGER AIRBAG DEACTIVATION) INDICATOR

Ignition OFF.

Connect PAD Indicator C9801 .

Connect a fused jumper wire:

Positive Lead	Measurement / Action	Negative Lead
C310A-20		Ground

Ignition ON.

Monitor the PAD indicator.

Does the PAD indicator LED illuminate?

Yes	REMOVE the fused jumper wire and GO to A9

No	REMOVE the fused jumper wire, INSTALL a new PAD indicator and GO to A11

A7 CHECK THE PAD (PASSENGER AIRBAG DEACTIVATION) INDICATOR 'OFF' LED (LIGHT EMITTING DIODE) CONTROL CIRCUIT FOR A SHORT TO VOLTAGE

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Disconnect RCM C310A and C310B .

Disconnect PAD Indicator C9801 .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead

C9801-2		Ground

Is any voltage present?

Yes	REPAIR the circuit. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information. GO to A11

No	GO to A8

NOTE: This pinpoint test step attempts to change the fault reported by the RCM by inducing a different fault condition. If the reported fault changes, this indicates the RCM is functioning correctly and is not the source of the fault.

A8 CHECK THE RCM (RESTRAINTS CONTROL MODULE)

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Connect RCM C310A and C310B .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

DIAGNOSTIC TIP: When viewing Diagnostic Trouble Codes (DTCs) with the PAD indicator disconnected, an open circuit fault is normally retrieved.

Did the on-demand DTC change from B00D5:12 to B00D5:13?

Yes	INSTALL a new PAD indicator. GO to A11

No	GO to A9

NOTE: Make sure all SRS components and the RCM electrical connectors are connected before carrying out the self-test. If not, Diagnostic Trouble Codes (DTCs) will be recorded.

A9 CONFIRM THE RCM (RESTRAINTS CONTROL MODULE) FAULT

Ignition OFF.

Depower the SRS. REFER to: Supplemental Restraint System (SRS) Depowering .

Prior to reconnecting any previously disconnected SRS component:

inspect connector(s) (including any inline connectors) for pushed-out, loose or spread terminals and loose or frayed wire connections at terminals.

inspect wire harness for any damaged, pinched, cut or pierced wires.

inspect RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

repair any concerns found. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

Connect PAD Indicator C9801 .

Connect RCM C310A and C310B .

Repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was the original DTC retrieved on-demand during self-test?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new RCM. REFER to: Restraints Control Module (RCM) . GO to A11.

No	In the process of diagnosing the fault, the fault condition has become intermittent. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A10.

A10 CHECK FOR AN INTERMITTENT FAULT

Ignition OFF.

Connect PAD Indicator C9801 (if previously disconnected).

Inspect connector(s) (including any inline connectors) for corrosion, loose or spread terminals and loose or frayed wire connections at terminals.

Inspect wire harness for any damage, pinched, cut or pierced wires.

Inspect RCM C310A and C310B Connector Position Assurance (CPA) lever/lock for correct operation.

Repair any concerns found. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

Connect all previously disconnected component(s) / connector(s).

Ignition ON.

Using a diagnostic scan tool, perform RCM self-test.

Was DTC B00D5:11, B00D5:12 or B00D5:13 retrieved on-demand during self-test?

Yes	This fault cannot be cleared until it is corrected and the DTC is no longer retrieved on-demand during self-test. For DTC B00D5:11, GO to A2. For DTC B00D5:12, GO to A7. For DTC B00D5:13, GO to A4.

No	CHECK for causes of intermittent open, short to ground or short to voltage on the PAD indicator circuit. ATTEMPT to recreate the hard fault by flexing the wire harness and cycling the ignition frequently. ACTIVATE other systems in the same wire harness. Do not install any new SRS components at this time. Install SRS components only when directed to do so in the pinpoint test. GO to A11.

A11 CHECK FOR ADDITIONAL SRS (SUPPLEMENTAL RESTRAINT SYSTEM) DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition OFF.

Reconnect all SRS components (if previously disconnected).

If previously directed to depower the SRS, repower the SRS.

Do not prove out the SRS at this time. REFER to: Supplemental Restraint System (SRS) Repowering .

Ignition ON.

NOTE: When selecting Restraints from the Self Test menu, DTCs are retrieved from the RCM and OCSM.

Using a diagnostic scan tool, perform

Restraints self-test.

Are any RCM and/or OCSM Diagnostic Trouble Codes (DTCs) retrieved on-demand during self-test?

Yes	Do not clear any Diagnostic Trouble Codes (DTCs) until all Diagnostic Trouble Codes (DTCs) have been resolved. DIAGNOSE and REPAIR the RCM and/or OCSM Diagnostic Trouble Codes (DTCs). REFER to: Airbag Supplemental Restraint System (SRS) .

No	The repair is complete. RETURN the vehicle to the customer.

GENERAL PROCEDURES > CLOCKSPRING ADJUSTMENT

Special Tool(s) / General Equipment

Adhesive Tape

WARNING: If the clockspring is not correctly centralized, it may fail prematurely. If in doubt, repeat the centralizing procedure. Failure to follow these instructions may increase the risk of serious personal injury or death in a crash.

NOTE: Typical clockspring shown in illustration, others similar.

NOTE: This procedure is not for use on vehicles with adaptive steering.

1.

NOTE: Do not over-rotate the clockspring rotor. The internal ribbon wire is connected to the clockspring rotor. The internal ribbon wire acts as a stop and can be broken from its internal connection. Failure to follow this instruction may result in component damage and/or system failure.

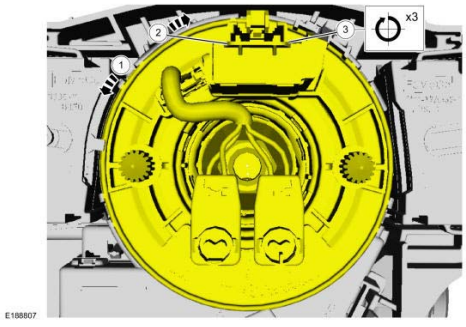
1.
Turn the clockspring rotor counterclockwise, carefully feeling for resistance to turning.

2.

Turn the clockspring rotor clockwise so the electrical connector is in the 12 o'clock position.

NOTE: After final positioning, do not allow the clockspring rotor to rotate from this position.

3.
Turn the clockspring rotor clockwise through 3 complete turns ending with the clockspring rotor electrical connector in the 12 o'clock position.



2.

Use the General Equipment: Adhesive Tape



GENERAL PROCEDURES > INSPECTION AND REPAIR AFTER A SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPLOYMENT

Inspection

NOTE: Deployable devices such as airbags, pretensioners and inflatable belt inflators, may deploy alone or in various combinations depending on the impact event.

NOTE: Always refer to the appropriate service information procedures prior to carrying out vehicle repairs affecting the SRS and SEATBELT SYSTEMS article.

NOTE: The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

NOTE: Refer to the correct removal and installation procedure for all SRS components being installed.

1.
When any deployable device or combination of devices have deployed and/or the RCM has DTC B1193:00 (event threshold exceeded) in memory, the repair of the vehicle SRS is to include the removal of all deployed devices and the installation of new deployable devices, the removal of all impact sensors and installation of new impact sensors and the removal and installation of a new RCM. Diagnostic Trouble Codes (DTCs) must be cleared from all required modules after repairs are carried out.

NOTE: After installation of new OCS components, use a diagnostic scan tool to carry out the OCS Reset procedure as in this service information.

2.
When a vehicle has been involved in a collision and the OCSM has DTC B1193:00 stored in memory, the repair of the OCS is to include the following procedures for the specified system:

3.

For a weight sensor bolt-type OCS, inspect the passenger side floorpan for damage and repair as necessary. Install a new seat track with OCS weight sensor bolts. The DTC must be cleared from the OCSM before carrying out OCS Reset. Do not install a new OCSM unless DTC B1193:00 cannot be cleared.

For a bladder-type OCS, inspect for damage and repair as necessary. If installation of an OCS component is required, an OCS service kit must be installed.

4.

When any damage to the impact sensor mounting points or mounting hardware has occurred, repair or install new mounting points and mounting hardware as needed.

5.

When the driver airbag has deployed, install a new steering wheel, clockspring and steering column.

6.

New driver and/or front passenger safety belt systems (including retractors, buckles and height adjusters) must be installed if the vehicle is involved in a collision that results in deployment of the driver and/or front passenger safety belt pretensioners.

7.

New second row safety belt systems (including retractors, buckles and inflators) must be installed if the vehicle is involved in a collision that results in deployment of the rear inflatable safety belt system.

8.

Inspect the entire vehicle for damage, including the following components:

9.

Steering column lower shaft (verify the length is correct). Refer to: Steering Column Collapsed Check .

Steering column (deployable column if equipped)

Instrument panel knee bolsters and mounting points

Safety Canopy® and mounting points

Instrument panel braces and brackets

Instrument panel and mounting points

Seats and seat mounting points

Safety belts, safety belt buckles, safety belt retractors and safety belt anchors.

SRS wiring, wiring harnesses and connectors

10.

After carrying out the review and inspection of the entire vehicle for damage, repair or install new components as needed.

11.

Inspect the fuel system for damage or leaks. Repair the system and install new components as necessary.

12.

Connect a diagnostic scan tool and view the BCM CRASH PID.

If the BCM CRASH PID is present and reads 'Yes', use the diagnostic scan tool to carry out the BCM Crash Status Reset under "Electrical - Service Functions".

If the BCM CRASH PID reads 'No' or is not present, complete any necessary repairs before returning the vehicle to the customer.

GENERAL PROCEDURES > PYROTECHNIC DEVICE DISPOSAL

Disposal

Disposal of Deployable Devices and Pyrotechnic Devices That Are Undeployed-Inoperative

NOTE: All inoperative airbags, safety belt pretensioners and inflatable safety belt inflators have been placed on the Mandatory Return List. Treat all discolored or damaged airbags the same as any inoperative live airbag being returned.

1.

Depower the SRS. Refer to: Supplemental Restraint System (SRS) Depowering .

2.

Remove the undeployed/inoperative device. Refer to the appropriate procedure in this service information or in the SEATBELT SYSTEMS article.

NOTE: When installing a new airbag or inflatable safety belt inflator, a prepaid return postcard is provided with the replacement part. The serial number for the new part and the VIN must be recorded and sent to Ford Motor Company.

3.
If installing a new airbag, or inflatable safety belt inflator, record the necessary information and return the inoperative airbag to Ford Motor Company.

Disposal of Deployable Devices and Pyrotechnic Devices That Are Deployed

4.

Depower the SRS. Refer to: Supplemental Restraint System (SRS) Depowering .

5.

Remove the deployed device. Refer to the appropriate procedure in this service information or in the SEATBELT SYSTEMS article.

> *NOTE: If a dual stage driver or passenger airbag has deployed due to a crash event, the airbag requires manual deployment to make sure both stages and the active canister vent (if equipped) have deployed before scrapping the vehicle or disposing of the airbag.*

6.
Determine if the vehicle is equipped with dual stage driver or passenger airbags. Refer to: Airbag and Seatbelt Pretensioner Supplemental Restraint System (SRS) - System Operation and Component Description .

7.

REFER to: Disposal of Deployable Devices and Pyrotechnic Devices That Require Manual Deployment in this procedure.

8.

Dispose of the deployed device in the same manner as any other part to be scrapped.

Disposal of Deployable Devices and Pyrotechnic Devices That Require Manual Deployment

> *NOTE: Safety and environmental concerns require consideration and treatment of restraints system deployable and pyrotechnic devices when disposing of vehicles, deployable devices or pyrotechnic devices. Deploying deployable and pyrotechnic devices before scrapping a vehicle or the device eliminates the potential for hazardous exposures or reactions during processing. If special handling procedures are followed, deployable and pyrotechnic devices can be deployed safely and recycled with the vehicle, shipped separately to a recycling facility or disposed of safely.*

9.

To determine the deployable devices a vehicle is equipped with: Refer to: Airbag and Seatbelt Pretensioner Supplemental Restraint System (SRS) - System Operation and Component Description .

10.

A vehicle equipped with any of the following deployable devices requires manual deployment of the devices before scrapping the vehicle or component. For additional information, refer to the appropriate portion of this procedure.

11.

Driver airbag

Inflatable safety belt inflators

Knee airbag

Passenger airbag

Seat side airbag

Safety Canopy®

Side air curtain

12.

To determine the pyrotechnic devices a vehicle is equipped with: Refer to: Airbag and Seatbelt Pretensioner Supplemental Restraint System (SRS) - System Operation and Component Description .

13.

A vehicle equipped with any of the following pyrotechnic devices requires manual deployment of the devices before scrapping the vehicle or component. For additional information, refer to the appropriate portion of this procedure.

14.

Inflatable safety belt inflators

Safety belt buckle pretensioners

Safety belt retractor pretensioners

Safety belt anchor pretensioners

Adaptive load-limiting retractors

Deployable steering column

NOTE: If a dual stage driver or passenger airbag has deployed due to a crash event, the airbag requires manual deployment to make sure both stages and the active canister vent (if equipped) have deployed before scrapping the vehicle or disposing of the airbag.

15.
To determine if a vehicle is equipped with dual stage driver or passenger airbags: Refer to: Airbag and Seatbelt Pretensioner Supplemental Restraint System (SRS) - System Operation and Component Description .

16.

If a dual stage driver or passenger airbag has deployed due to a crash event, the airbag requires manual deployment to make sure both stages and the active canister vent have deployed before scrapping the vehicle or disposing of the airbag. Refer to Driver, Passenger, Knee and Seat Side Airbags - Remote Deployment below.

Driver, Passenger, Knee and Seat Side Airbags - Remote Deployment

NOTE: For airbags with multiple loops, deploy all of the loops on the airbag.

NOTE: Some driver and passenger front airbags have 2 deployment stages and an active canister vent. After a collision it is possible that Stage 1 has deployed and Stage 2 and the active canister vent have not. If a front airbag has deployed, it is mandatory the front airbag be remotely deployed using the appropriate airbag disposal procedure.

NOTE: A typical airbag disposal is shown in illustration that is similar for all vehicles.

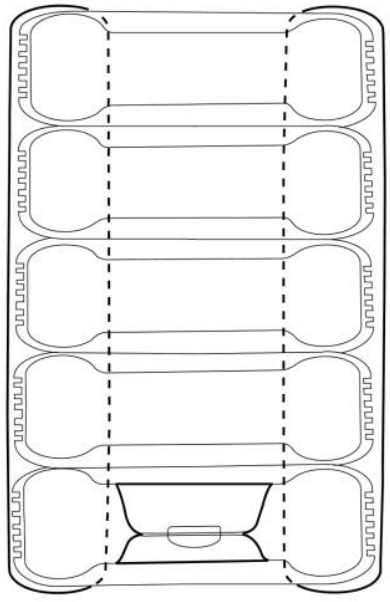
17.

NOTE: The tires must be of sufficient size to accommodate the airbag.

Obtain a tire and wheel assembly and 4 additional tires (without wheels) of the same size.

With the tire and wheel assembly on the bottom, stack the tires.

Securely tie all of the tires together.



E142968

18.

Depower the SRS. Refer to: Supplemental Restraint System (SRS) Depowering .

19.

Remove the airbag. Refer to the appropriate procedure in this service information.

20.

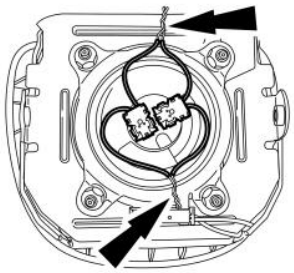
If the airbag does not have a hard-wired pigtail, cut each of the airbag wires near the electrical connector that connects to the vehicle wire harness.

21.

Remove any sheathing (if present) and strip the insulation from the ends of the cut wires.

NOTE: Typical driver airbag with 2 loops shown in illustration, other airbags with multiple loops or multiple features (canister vent, active tether) similar.

22.
For airbags with multiple loops, twist together a wire from each loop then repeat for the remaining wires from each loop.


E144159

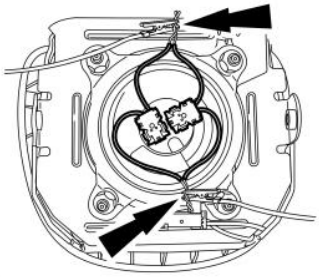
23.

Make a jumper harness to deploy the airbag module by obtaining 2 wires (20 gauge minimum) at least 9.14 m (30 ft).

At one end of the jumper harness, connect the wires together.

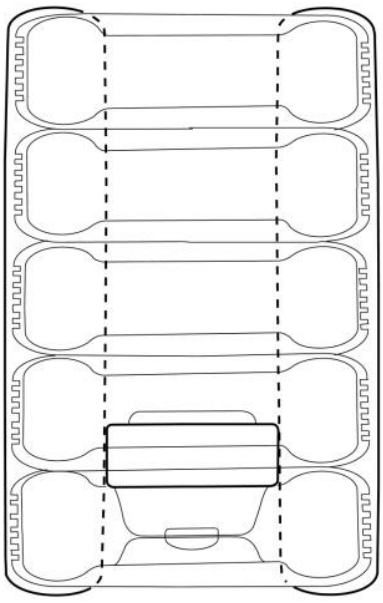
24.

Using the end of the jumper harness where the wires are not connected together, attach each wire of the jumper harness to each wire of the airbag or to the twisted-together wires if multiple loops. Use tape or other insulating material to make sure the leads do not make contact with each other.


E144158

NOTE: Make sure the airbag connections are maintained.

25.
For driver airbags, with the stack of tires upright and the wheel on the bottom, carefully place the driver airbag, with the trim cover facing up, on the wheel.



E142969

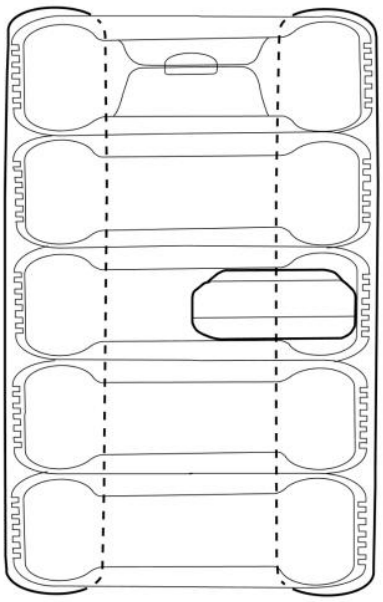
NOTE: Make sure the airbag connections are maintained.

26.

For passenger, knee and seat side airbags, tip the stack of tires on its side.

Place the airbag inside the center tire, making sure that there are 2 tires beneath the tire containing the airbag and 2 tires (including the tire and wheel assembly) above the tire containing the airbag.

Place the tire stack upright, with the wheel on top.



E142970

27.

Remain at least 9.14 m (30 ft) away from the airbag.

28.

From the end of the jumper harness that is not connected to the airbag, disconnect the 2 wires of the jumper harness from each other.

29.

Deploy the airbag by touching the ends of the 2 wires of the jumper harness to the terminals of a 12-volt battery.

30.

To allow for cooling, wait at least 10 minutes before approaching the deployed airbag.

31.

Dispose of the deployed airbag in the same manner as any other part to be scrapped.

Safety Belt Anchor-Buckle-Retractor Pretensioners, Adaptive Load Limiting Retractors and Safety Belt Inflators - Remote Deployment

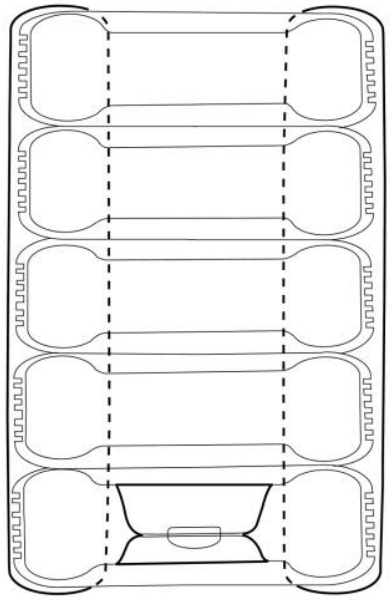
32.

NOTE: The tires must be of sufficient size to accommodate the safety belt anchor, buckle, retractor or inflator.

Obtain a tire and wheel assembly and 4 additional tires (without wheels) of the same size.

With the tire and wheel assembly on the bottom, stack the tires.

Securely tie all of the tires together.



E142968

33.

Depower the SRS. Refer to: Supplemental Restraint System (SRS) Depowering .

34.

Remove the safety belt anchor, buckle, retractor or inflator. Refer to the appropriate procedure in the SEATBELT SYSTEMS article.

35.

If the safety belt anchor, buckle, retractor or inflator does not have a hard-wired pigtail, cut each of the wires near the electrical connector that connects to the vehicle wire harness.

36.

When deploying a safety belt buckle pretensioner, install a nut and bolt of sufficient length and the same diameter used to retain it to the seat.

37.

Remove any sheathing (if present) and strip the insulation from the ends of the cut wires.

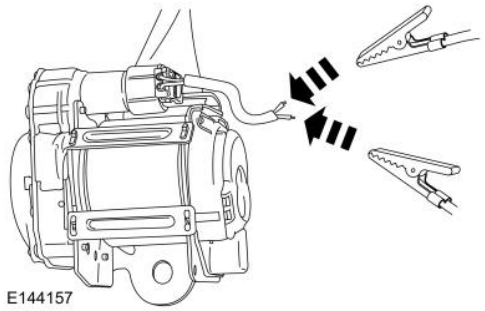
38.

Make a jumper harness to deploy the safety belt anchor, buckle, retractor or inflator by obtaining 2 wires (20 gauge minimum) at least 9.14 m (30 ft).

At one end of the jumper harness, connect the wires together.

NOTE: Typical safety belt retractor pretensioner shown in illustration, other safety belt anchor pretensioners, buckle pretensioners, load-limiting retractors and safety belt inflators similar.

39.
Using the end of the jumper harness where the wires are not connected together, attach each wire of the jumper harness to each wire of the safety belt anchor, buckle, retractor or inflator. Use tape or other insulating material to make sure the leads do not make contact with each other.



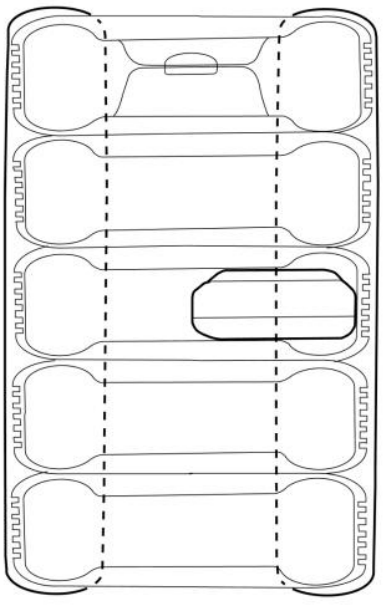
NOTE: Make sure the airbag connections are maintained.

40.

Tip the stack of tires on its side.

Place the safety belt anchor, buckle, retractor or inflator inside the center tire, making sure that there are 2 tires beneath the tire containing the airbag and 2 tires (including the tire and wheel assembly) above the tire containing the airbag.

Place the tire stack upright, with the wheel on top.



41.

Remain at least 9.14 m (30 ft) away from the safety belt anchor, buckle, retractor or inflator.

42.

From the end of the jumper harness that is not connected to the safety belt anchor, buckle, retractor or inflator, disconnect the 2 wires of the jumper harness from each other.

43.

Deploy the safety belt anchor, buckle, retractor or inflator by touching the ends of the 2 wires of the jumper harness to the terminals of a 12-volt battery.

44.

To allow for cooling, wait at least 10 minutes before approaching the deployed safety belt anchor, buckle, retractor or inflator.

45.

Dispose of the deployed safety belt anchor, buckle, retractor or inflator in the same manner as any other part to be scrapped.

Safety Belt Anchor-Buckle-Retractor Pretensioners, and Adaptive Load Limiting Retractors - In-Vehicle Deployment

46.

Depower the SRS. Refer to: Supplemental Restraint System (SRS) Depowering .

47.

Access the safety belt anchor, buckle or retractor electrical connectors. Refer to the appropriate procedure in the SEATBELT SYSTEMS article procedure(s).

48.

Cut each of the safety belt anchor, buckle or retractor wires, leaving at least 101.6 mm (4 in) to work with.

49.

Remove any sheathing (if present) and strip the insulation from the ends of the cut wires.

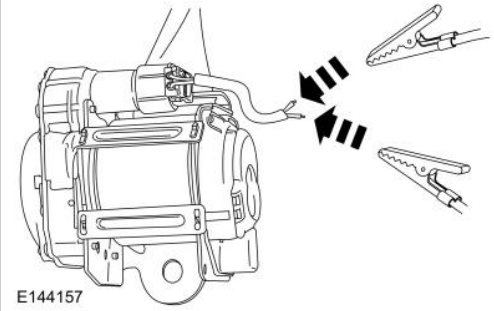
50.

Make a jumper harness to deploy the safety belt anchor, buckle or retractor by obtaining 2 wires (20 gauge minimum) at least 9.14 m (30 ft).

At one end of the jumper harness, connect the wires together.

NOTE: Typical safety belt retractor pretensioner shown in illustration, other safety belt anchor pretensioners, buckle pretensioners and load-limiting retractors are similar.

51.
Using the end of the jumper harness where the wires are not connected together, attach each wire of the jumper harness to each wire of the safety belt anchor, buckle or retractor. Use tape or other insulating material to make sure the leads do not make contact with each other.



52.

Remain at least 9.14 m (30 ft) away from the safety belt anchor, buckle or retractor.

53.

Remain at least 9.14 m (30 ft) away from the safety belt anchor, buckle, retractor or inflator.

54.

From the end of the jumper harness that is not connected to the safety belt anchor, buckle or retractor, disconnect the 2 wires of the jumper harness from each other.

55.

Deploy the safety belt anchor, buckle or retractor by touching the ends of the 2 wires of the jumper harness to the terminals of a 12-volt battery.

56.

To allow for cooling, wait at least 10 minutes before approaching the deployed safety belt anchor, buckle or retractor.

57.

Dispose of the deployed safety belt anchor, buckle or retractor in the same manner as any other part to be scrapped.

Safety Canopy® and Side Air Curtains - In-Vehicle Deployment

NOTE: The Safety Canopy® deployment for a scrapped vehicle occurs in its installed position in the vehicle.

NOTE: A typical Safety Canopy® disposal is shown in illustration.

58.

Depower the SRS. Refer to: Supplemental Restraint System (SRS) Depowering .

59.

Access the Safety Canopy® /side air curtain electrical connectors. For additional information, refer to the appropriate procedure in this service information.

60.

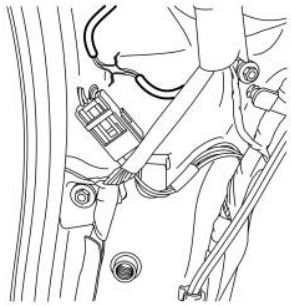
Cut each of the Safety Canopy® /side air curtain wires, leaving at least 101.6 mm (4 in) to work with.

61.

Remove any sheathing (if present) and strip the insulation from the ends of the cut wires.

NOTE: Typical Safety Canopy® /side air curtain with 2 loops shown in illustration, other Safety Canopy® /side air curtains with 2 loops are similar.

62.
For Safety Canopy® /side air curtains with multiple loops, twist together a wire from each loop then repeat for the remaining wires from each loop.



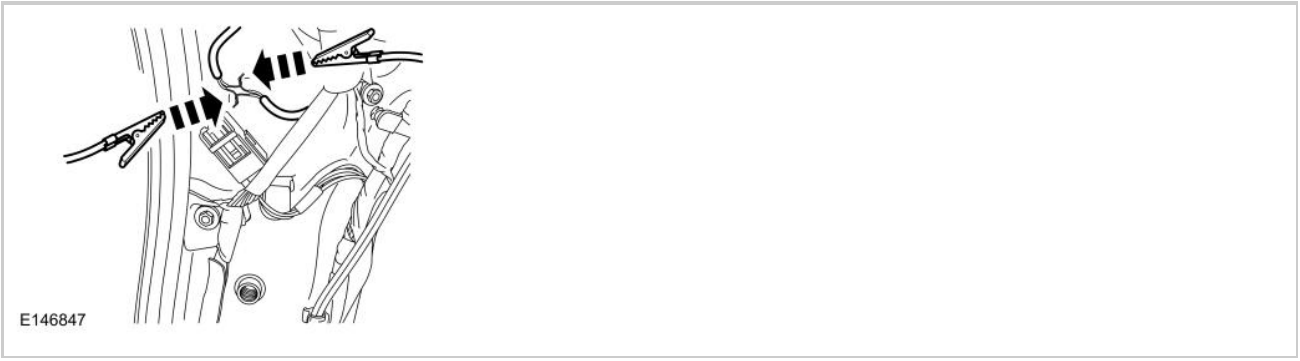
63.

Make a jumper harness to deploy the safety belt anchor, buckle or retractor by obtaining 2 wires (20 gauge minimum) at least 9.14 m (30 ft).

At one end of the jumper harness, connect the wires together.

64.

Using the end of the jumper harness where the wires are not connected together, attach each wire of the jumper harness to each wire of the Safety Canopy® /side air curtain or to the twisted-together wires if multiple loops. Use tape or other insulating material to make sure the leads do not make contact with each other.



65.

From the end of the jumper harness that is not connected to the Safety Canopy® /side air curtain, disconnect the 2 wires of the jumper harness from each other.

66.

Deploy the Safety Canopy® /side air curtain by touching the ends of the 2 wires of the jumper harness to the terminals of a 12-volt battery.

67.

To allow for cooling, wait at least 10 minutes before approaching the deployed Safety Canopy® /side air curtain.

68.

Dispose of the deployed Safety Canopy® /side air curtain in the same manner as any other part to be scrapped.

Deployable Steering Column - In-Vehicle Deployment

69.

Depower the SRS. Refer to: Supplemental Restraint System (SRS) Depowering .

NOTE: It may be necessary to lower or remove the deployable steering column from the instrument panel to access the deployable steering column electrical connector.

70.
Access the deployable steering column electrical connector.

NOTE: If the deployable steering column does not have a hard-wired pigtail, cut the wires and connector(s) from the vehicle wire harness and reconnect to the deployable steering column.

71.
Cut each of the deployable steering column wires, leaving at least 101.6 mm (4 in) to work with.

72.

Remove any sheathing (if present) and strip the insulation from the ends of the cut wires.

73.

Make a jumper harness to deploy the deployable steering column by obtaining 2 wires (20 gauge minimum) at least 9.14 m (30 ft).

At one end of the jumper harness, connect the wires together.

74.

Using the end of the jumper harness where the wires are not connected together, attach each wire of the jumper harness to each wire of the deployable steering column. Use tape or other insulating material to make sure the leads do not make contact with each other.



75.

Remain at least 9.14 m (30 ft) away from the deployable steering column.

76.

From the end of the jumper harness that is not connected to the deployable steering column, disconnect the 2 wires of the jumper harness from each other.

77.

Deploy the deployable steering column by touching the ends of the 2 wires of the jumper harness to the terminals of a 12-volt battery.

78.

To allow for cooling, wait at least 10 minutes before approaching the deployed steering column.

79.

Dispose of the deployed steering column in the same manner as any other part to be scrapped.

GENERAL PROCEDURES > SUPPLEMENTAL RESTRAINT SYSTEM (SRS) DEPOWERING

Depower

WARNING: Incorrect repair techniques or actions can cause an accidental Supplemental

Restraint System (SRS) deployment. Never compromise or depart from these instructions. Failure to precisely follow all instructions could result in serious personal injury from an accidental deployment.

1.

WARNING: Before beginning any service procedure in this service information, refer to Safety Warnings in GENERAL INFORMATION . Failure to follow this instruction may result in serious personal injury.

Refer to: Health and Safety Precautions .

2.

Determine if a SRS fault is present. Turn the ignition OFF and wait 10 seconds, then turn the ignition ON and monitor the airbag warning indicator. The airbag warning indicator illuminates continuously for approximately 6 seconds and then turns off. Continue to monitor the airbag warning indicator for approximately 30 seconds as this is the time required for the RCM to complete testing of the SRS.

3.

If a SRS fault is present the airbag warning indicator either fails to light, remains lit continuously or flashes. The flashing may not occur until approximately 30 seconds after the ignition has been turned from OFF to ON. If this occurs, diagnose and repair any SRS faults before proceeding with other repairs.

If after the ignition has been turned ON for 30 seconds the airbag warning indicator remains unlit with no chime or SRS message displayed in the message center, no SRS fault is present.

If the airbag warning indicator is inoperative and a SRS fault exists, a chime sounds in a pattern of 5 sets of 5 beeps or a message displays in the message center. If this occurs, diagnose and repair the airbag warning indicator and any SRS faults before proceeding with other repairs.

No SRS Fault Present (with ignition ON, airbag warning indicator stays off after prove out)

4.

WARNING: Turn the ignition OFF and wait one minute to deplete the backup power supply. Ignition must remain OFF until repair is complete. Failure to follow this instruction may result in serious personal injury or death in the event of an accidental deployment.

Turn the ignition OFF and wait one minute before continuing vehicle service.

SRS Fault Present

5.

Turn the ignition OFF.

6.

Remove the RCM fuse. Refer to OEM FUSE AND RELAY INFORMATION .

7.

Turn the ignition ON.

8.

Using a diagnostic scan tool, carry out a Network Test. Verify that the RCM does not respond to the Network Test. If the RCM passes the Network Test, remove the correct RCM fuse and repeat the Network Test to verify before proceeding.

9.

Turn the ignition OFF.

10.

Disconnect the battery. Refer to: Battery Disconnect and Connect .

11.

Wait at least one minute before continuing vehicle service.

GENERAL PROCEDURES > SUPPLEMENTAL RESTRAINT SYSTEM (SRS) REPOWERING

Repower

WARNING: Incorrect repair techniques or actions can cause an accidental Supplemental Restraint System (SRS) deployment. Never compromise or depart from these instructions. Failure to precisely follow all instructions could result in serious personal injury from an accidental deployment.

NOTE: The SRS must be fully operational and free of faults before releasing the vehicle to the customer.

1.

WARNING: Before beginning any service procedure in this service information, refer to Safety Warnings in GENERAL INFORMATION . Failure to follow this instruction may result in serious personal injury.

Refer to: Health and Safety Precautions .

No SRS Fault Present At Beginning of Repair

2.

Prove out the SRS. Verify all airbags are installed and connected and the ignition is OFF. Wait 10 seconds then turn the ignition ON and monitor the airbag warning indicator. The airbag warning indicator illuminates continuously for approximately 6 seconds and turns off. Continue to monitor the airbag warning indicator for approximately 30 seconds as this is the time required for the RCM to complete testing of the SRS.

3.

If a SRS fault is present, the airbag warning indicator either fails to light, remains lit continuously or flashes. The flashing may not occur until approximately 30 seconds after the ignition has been turned from OFF to ON. If this occurs, diagnose and repair any SRS faults before proceeding with other repairs.

If, after the ignition has been turned on for 30 seconds, the airbag warning indicator remains unlit with no chime or SRS message displayed in the message center, no SRS fault is present.

If the airbag warning indicator is inoperative and a SRS fault exists, a chime sounds in a pattern of 5 sets of 5 beeps or a message displays in the message center. If this occurs, diagnose and repair the airbag warning indicator and any SRS faults before proceeding with other repairs.

SRS Fault Present At Beginning of Repair

4.

Verify the ignition is OFF.

5.

Install the RCM fuse. Refer to OEM FUSE AND RELAY INFORMATION .

6.

Connect the battery. Refer to: Battery Disconnect and Connect .

7.

Sit in the driver seat in an upright position. Make sure no objects are between you and any pyrotechnic device. Move the driver seat to the rearmost position to maintain the maximum possible distance from the driver airbag.

8.

Turn the ignition from OFF to ON.

9.

Prove out the SRS. Verify all airbags are installed and connected and the ignition is OFF. Wait 10 seconds, then turn the ignition ON and monitor the airbag warning indicator. The airbag warning indicator illuminates continuously for approximately 6 seconds and then turns off. Continue to monitor the airbag warning indicator for approximately 30 seconds, as this is the time required for the RCM to complete testing of the SRS.

10.

If a SRS fault is present, the airbag warning indicator either fails to light, remains lit continuously or flashes. The flashing may not occur until approximately 30 seconds after the ignition has been turned from OFF to ON. If this occurs, diagnose and repair any SRS faults before proceeding with other repairs.

If, after the ignition has been turned on for 30 seconds, the airbag warning indicator remains unlit with no chime or SRS message displayed in the message center, no SRS fault is present.

If the airbag warning indicator is inoperative and a SRS fault exists, a chime sounds in a pattern of 5 sets of 5 beeps or a message displays in the message center. If this occurs, diagnose and repair the airbag warning indicator and any SRS faults before proceeding with other repairs.

11.

Using a scan tool, clear all Continuous Memory Diagnostic Trouble Codes (CMDTCs) from all modules.

REMOVAL AND INSTALLATION > CLOCKSPRING > REMOVAL

WARNING: The following procedure prescribes critical repair steps required for correct restraint system operation during a crash. Follow all notes and steps carefully. Failure to follow step instructions may result in incorrect operation of the restraint system and increases the risk of serious personal injury or death in a crash.

NOTE: Removal steps in this procedure may contain installation details.

1.

Remove the following items:

NOTE: Follow the unique instructions or graphic for this step in installation.

Refer to: Steering Wheel .

Refer to: Steering Column Shrouds .

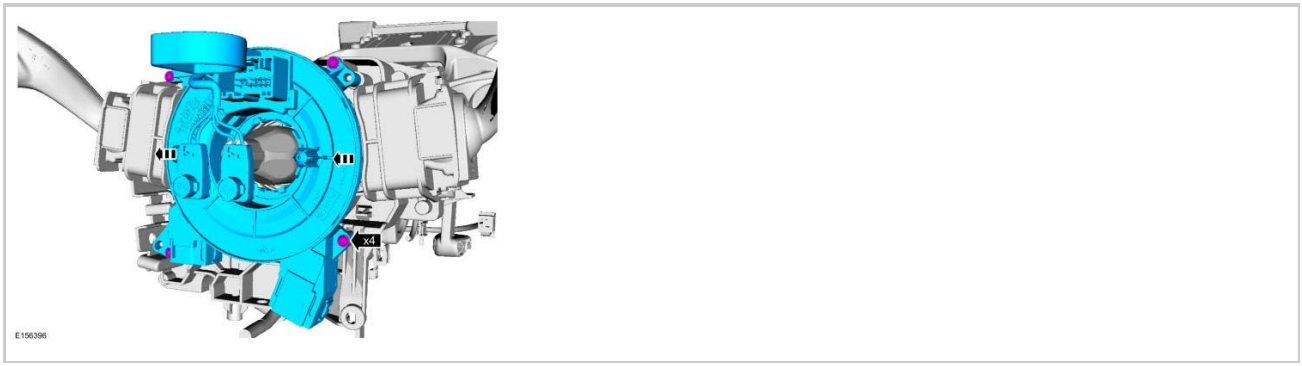
2.

Disconnect the electrical connectors.



3.

Remove the screws and the clockspring.



REMOVAL AND INSTALLATION > CLOCKSPRING > INSTALLATION

NOTE: If installing a new clockspring, do not remove the clockspring anti-rotation key until the steering wheel is installed. If the anti-rotation key has been removed before installing the steering wheel, the clockspring must be centered. Failure to follow this instruction may result in component damage and/or system failure.

1.

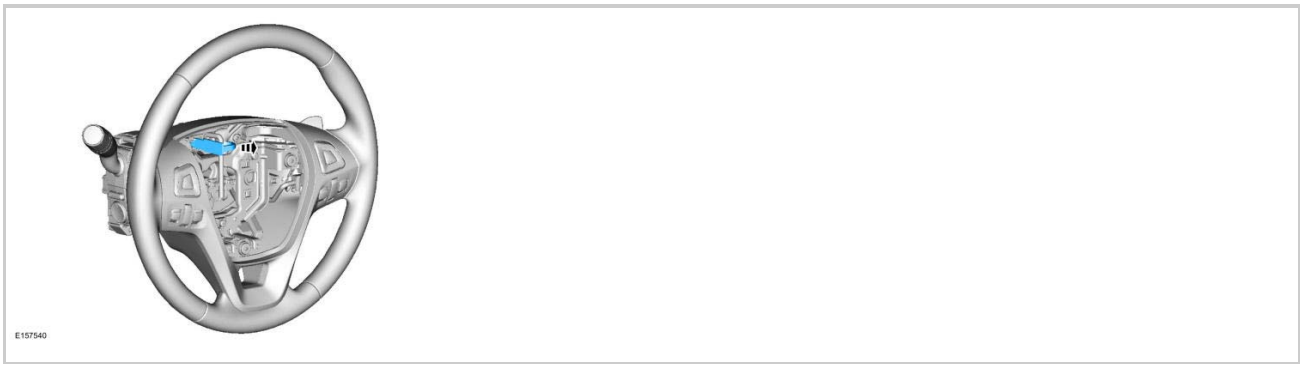
To install, reverse the removal procedure.

NOTE: This step is only necessary if adjustment is required.

2.
Adjust the clockspring. Refer to: Clockspring Adjustment .

NOTE: To install, remove the anti-rotation key from a new clockspring after installing the steering wheel.

3.
Install the steering wheel. Refer to: Steering Wheel .



REMOVAL AND INSTALLATION > B-PILLAR SIDE IMPACT SENSOR > REMOVAL

WARNING: The following procedure prescribes critical repair steps required for correct restraint system operation during a crash. Follow all notes and steps carefully. Failure to follow step instructions may result in incorrect operation of the restraint system and increases the risk of serious personal injury or death in a crash.

NOTE: Removal steps in this procedure may contain installation details.

1.

Depower the SRS. Refer to: Supplemental Restraint System (SRS) Depowering .

2.

Remove the load space trim panel.

Refer to: Loadspace Trim Panel - Convertible .

Refer to: Loadspace Trim Panel - Coupe .

3.

1.

Disconnect the electrical connector.

2.

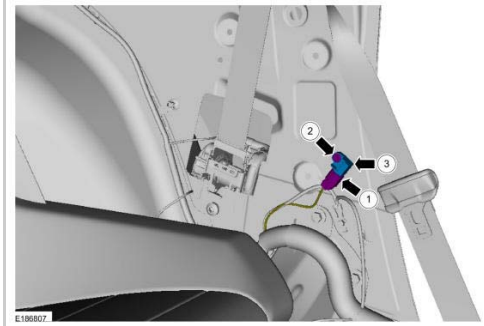
Remove the bolt.

Torque

: 93 lb.in (10.5 Nm)

3.

Remove the side impact sensor.



REMOVAL AND INSTALLATION > B-PILLAR SIDE IMPACT SENSOR > INSTALLATION

NOTE: The impact sensor mating surfaces must be smooth and allow for a flush attachment to each other.

1.
To install, reverse the removal procedure.

2.

Repower the SRS. Refer to: Supplemental Restraint System (SRS) Repowering .

REMOVAL AND INSTALLATION > DRIVER AIRBAG > REMOVAL

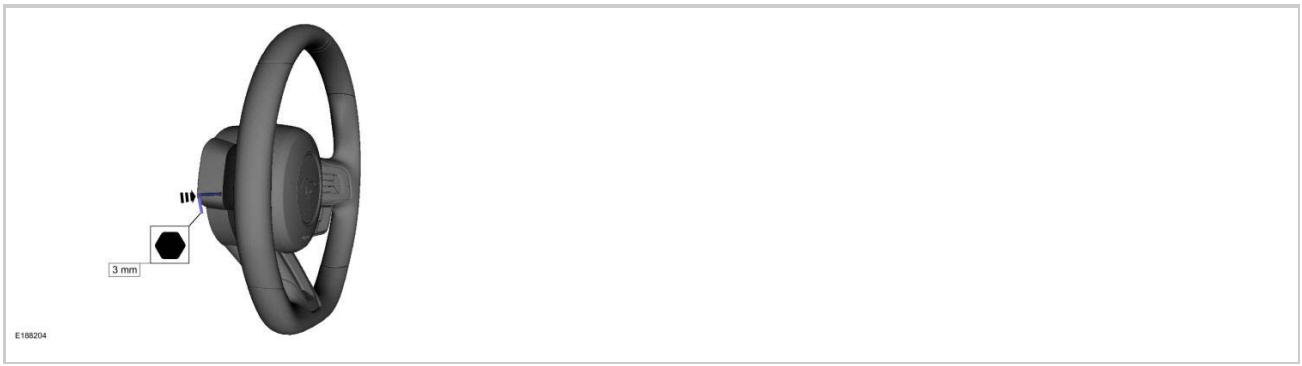
WARNING: The following procedure prescribes critical repair steps required for correct restraint system operation during a crash. Follow all notes and steps carefully. Failure to follow step instructions may result in incorrect operation of the restraint system and increases the risk of serious personal injury or death in a crash.

1.

Depower the SRS. Refer to: Supplemental Restraint System (SRS) Depowering .

2.

At the side of the steering wheel cover, locate the hole and insert a 3 mm (0.125 inch) Allen key.



NOTE: The driver airbag has been removed for clarity.

3.
Angle the inserted end of the Allen key up and toward the front of the vehicle for ideal contact with the spring clip.



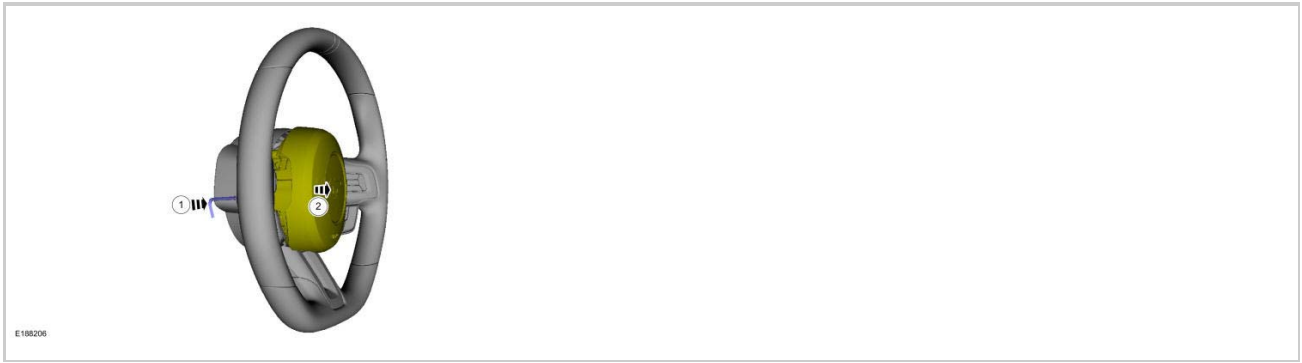
4.

1.

Push in on the steering wheel spring clip to release the driver airbag retainer.

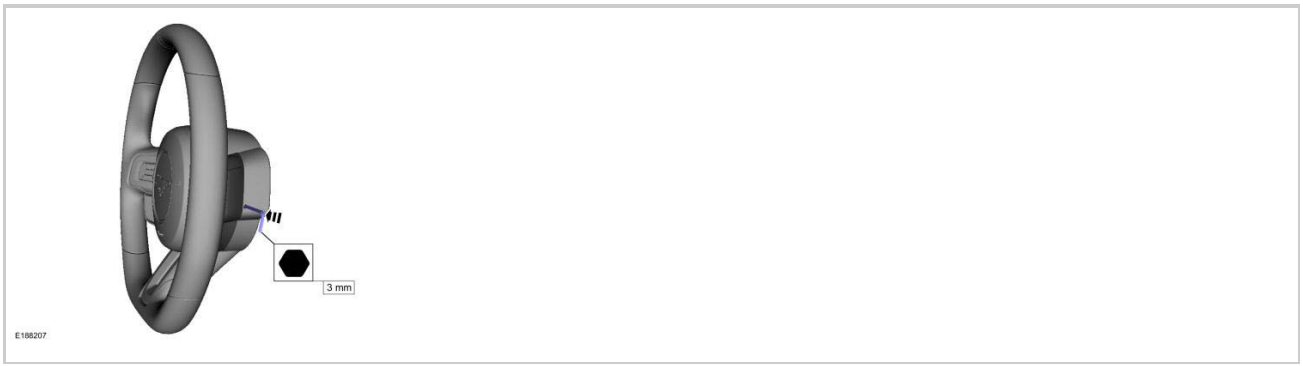
2.

Pull the driver airbag out and separate it from the steering wheel.



5.

At the side of the steering wheel cover, locate the hole and insert a 3 mm (0.125 inch) Allen key.



NOTE: The driver airbag has been removed for clarity.

6.
Angle the inserted end of the Allen key up and toward the front of the vehicle for ideal contact with the spring clip.



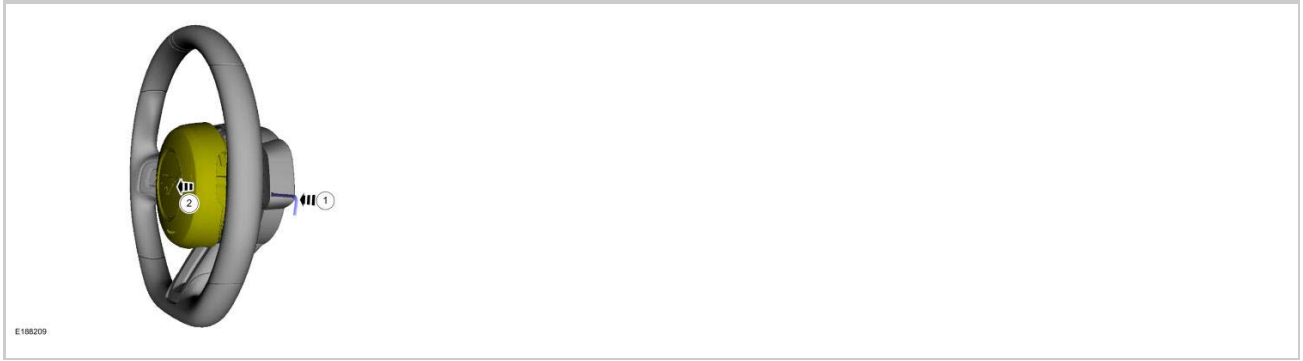
7.

1.

Push in on the steering wheel spring clip to release the driver airbag retainer.

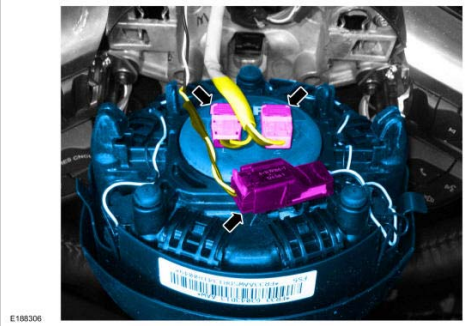
2.

Pull the driver airbag out and separate it from the steering wheel.



8.

Disconnect the 3 driver airbag electrical connectors.

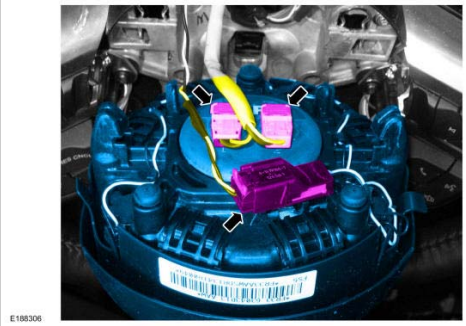


REMOVAL AND INSTALLATION > DRIVER AIRBAG > INSTALLATION

WARNING: Incorrect repair techniques or actions can cause an accidental Supplemental Restraint System deployment. Make sure the restraint system is depowered before reconnecting the component. Refer to the Supplemental Restraint System (SRS) Depowering . Failure to precisely follow depowering instructions could result in serious personal injury from an accidental deployment.

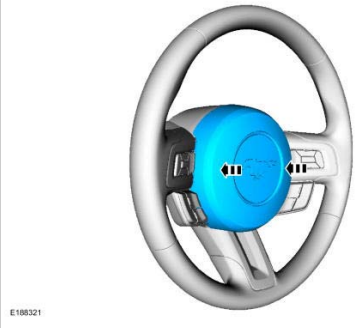
1.

Connect the 3 driver airbag electrical connectors.



2.

Align the driver airbag to the steering wheel and push in, engaging the driver airbag retainers to the spring clips.



3.

Repower the SRS. Refer to: Supplemental Restraint System (SRS) Repowering .

REMOVAL AND INSTALLATION > DRIVER KNEE AIRBAG > REMOVAL

WARNING: The following procedure prescribes critical repair steps required for correct restraint system operation during a crash. Follow all notes and steps carefully. Failure to follow step instructions may result in incorrect operation of the restraint system and increases the risk of serious personal injury or death in a crash.

NOTE: LH drive shown in illustration, RH drive similar except where called out.

NOTE: Removal steps in this procedure may contain installation details.

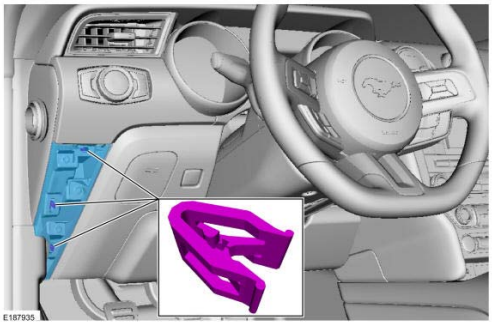
All vehicles

1.

Depower the SRS. Refer to: Supplemental Restraint System (SRS) Depowering .

2.

Release the clips and remove LH instrument panel trim panel.



3.

1.

Remove the screw.

Torque

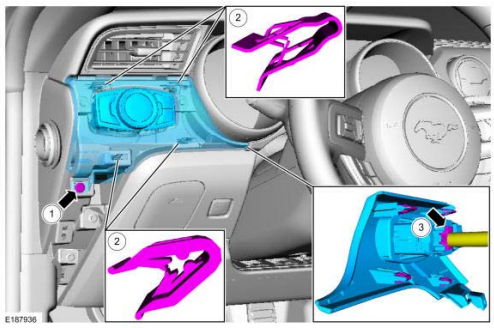
: 22 lb.in (2.5 Nm)

2.

Release the clips and detach the lighting switch trim panel.

3.

Disconnect the electrical connector and remove the lighting switch trim panel.



4.

1.

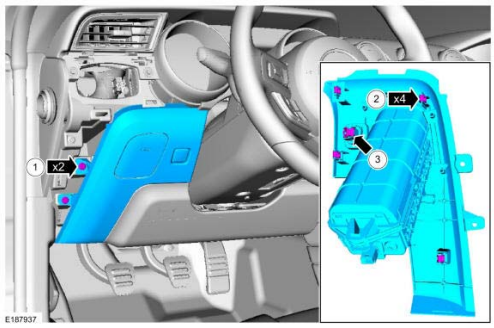
Remove the screws.

2.

Detach the trim panel.

3.

Disconnect the electrical connector and remove the trim panel.



5.

1.

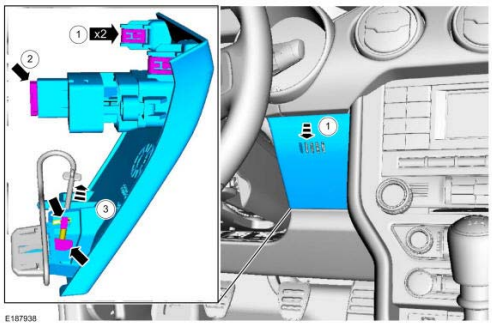
Detach the ambient air temp grille panel.

2.

Disconnect the electrical connector.

3.

Detach the tether and remove the ambient air temp grille panel.



6.

1.

From under the instrument panel, remove the nuts.

Torque

: 71 lb.in (8 Nm)

2.

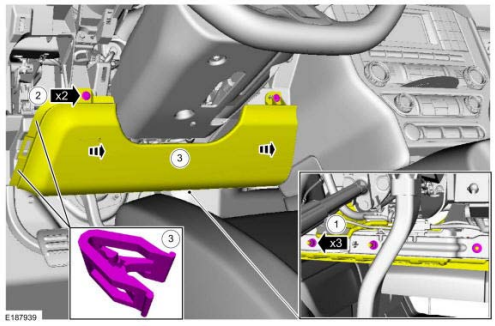
Remove the screws.

Torque

: 22 lb.in (2.5 Nm)

3.

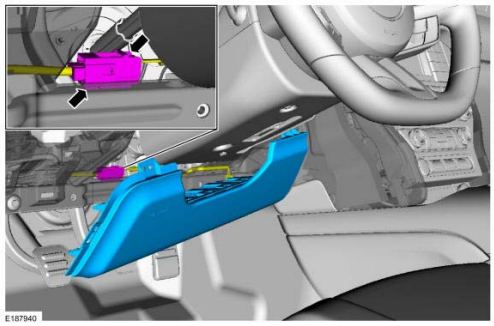
Disengage the clips and separate the driver knee airbag from the instrument panel.



Left hand drive vehicles

7.

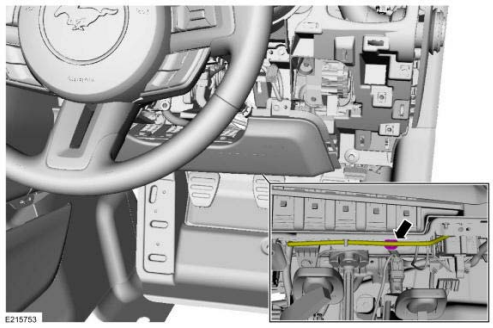
Detach and disconnect the electrical connector and remove the driver knee airbag.



Right hand drive vehicles

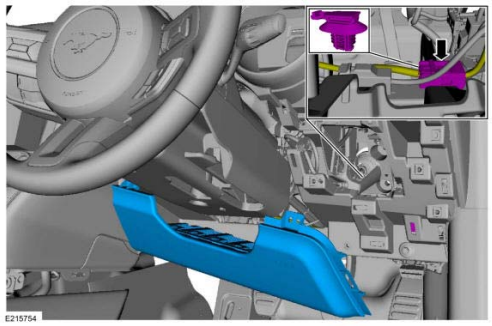
8.

Detach the driver knee airbag wire harness pin-type retainer.



9.

Detach and disconnect the electrical connector and remove the driver knee airbag.



REMOVAL AND INSTALLATION > DRIVER KNEE AIRBAG > INSTALLATION

WARNING: Incorrect repair techniques or actions can cause an accidental Supplemental Restraint System deployment. Make sure the restraint system is depowered before reconnecting the component. Refer to the Supplemental Restraint System (SRS) Depowering . Failure to precisely follow depowering instructions could result in serious personal injury from an accidental deployment.

1.

To install, reverse the removal procedure.

2.

Repower the SRS. Refer to: Supplemental Restraint System (SRS) Repowering .

REMOVAL AND INSTALLATION > FRONT DOOR SIDE IMPACT SENSOR > REMOVAL

WARNING: The following procedure prescribes critical repair steps required for correct restraint system operation during a crash. Follow all notes and steps carefully. Failure to follow step instructions may result in incorrect operation of the restraint system and increases the risk of serious personal injury or death in a crash.

NOTE: Removal steps in this procedure may contain installation details.

1.

Depower the SRS. Refer to: Supplemental Restraint System (SRS) Depowering .

2.

Remove the front door trim panel. Refer to: Front Door Trim Panel .

3.

1.

Disconnect the electrical connector.

2.

Remove the bolts.

Torque

: 17 lb.in (1.9 Nm)

3.

Remove the side impact sensor.



REMOVAL AND INSTALLATION > FRONT DOOR SIDE IMPACT SENSOR > INSTALLATION

NOTE: The impact sensor mating surfaces must be smooth and allow for a flush attachment to each other.

1.
To install, reverse the removal procedure.

2.

Repower the SRS. Refer to: Supplemental Restraint System (SRS) Repowering .

REMOVAL AND INSTALLATION > FRONT IMPACT SEVERITY SENSOR > REMOVAL

WARNING: The following procedure prescribes critical repair steps required for correct restraint system operation during a crash. Follow all notes and steps carefully. Failure to follow step instructions may result in incorrect operation of the restraint system and increases the risk of serious personal injury or death in a crash.

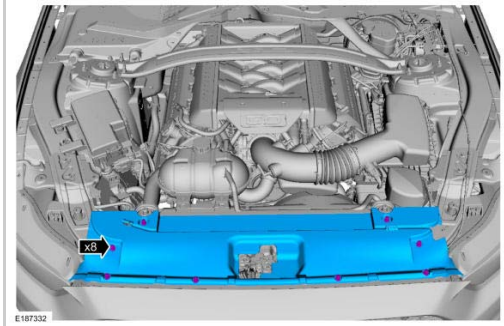
NOTE: Removal steps in this procedure may contain installation details.

1.

Depower the SRS. Refer to: Supplemental Restraint System (SRS) Depowering .

2.

Remove the retainers and the radiator upper air deflector.



3.

1.

Disconnect the electrical connector.

2.

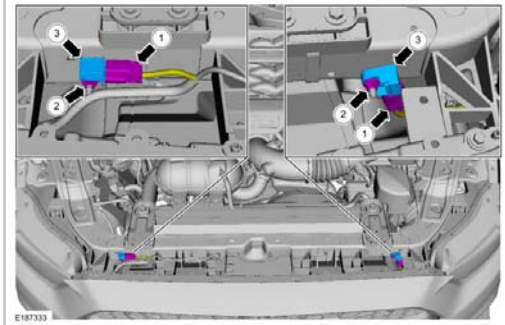
Remove the nut.

Torque

: 93 lb.in (10.5 Nm)

3.

Remove the front impact severity sensor.



REMOVAL AND INSTALLATION > FRONT IMPACT SEVERITY SENSOR > INSTALLATION

NOTE: The impact sensor mating surfaces must be smooth and allow for a flush attachment to each other.

1.
To install, reverse the removal procedure.

2.

Repower the SRS. Refer to: Supplemental Restraint System (SRS) Repowering .

REMOVAL AND INSTALLATION > OCCUPANT CLASSIFICATION SYSTEM (OCS) SENSOR > REMOVAL

WARNING: The following procedure prescribes critical repair steps required for correct restraint system operation during a crash. Follow all notes and steps carefully. Failure to follow step instructions may result in incorrect operation of the restraint system and increases the risk of serious personal injury or death in a crash.

NOTE: To prevent system failure, carry out the OCS reset when a front passenger seat cushion is disassembled, a new trim cover is installed or an OCS service kit is installed. Use a scan tool to carry out the OCS reset command.

NOTE: The cushion heater mat on a front outboard passenger seat is not serviced separately. If a new cushion heater mat is needed on the front passenger seat, install an OCS service kit equipped with a heater mat. Failure to follow this instruction may result in incorrect operation of the OCS.

NOTE: OCS components (seat cushion foam pad, bladder with OCSM) are calibrated to each other and are serviced as an assembly. The OCS components are not to be installed separately. If a new OCS, OCS component or seat cushion foam pad are needed, a new OCS service kit (seat cushion foam pad, bladder with OCSM) must be installed as an assembly.

NOTE: LH drive passenger seat shown in illustration, RH drive passenger seat similar.

NOTE: Removal steps in this procedure may contain installation details.

1.

Remove the front passenger seat. Refer to: Front Seat .

2.

Remove the clip and the recline handle.



3.

Remove the 2 cushion side shield screws.



4.

1.

Pull the rear of the cushion side shield out.

2.

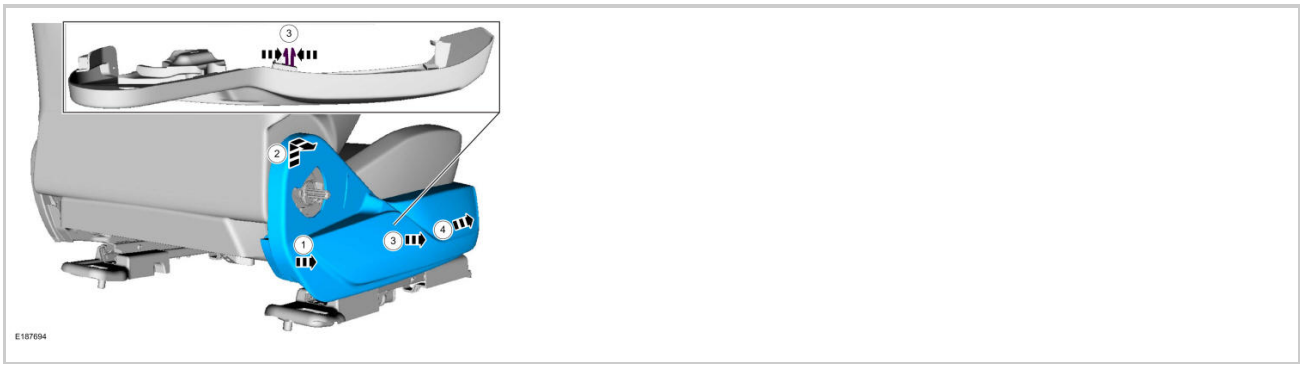
Firmly grasp the cushion side shield, lift up and out, separating the cushion side shield from the recliner bracket.

3.

If equipped with a manual seat track, from underneath, squeeze the retainers together and pull out on the cushion side shield.

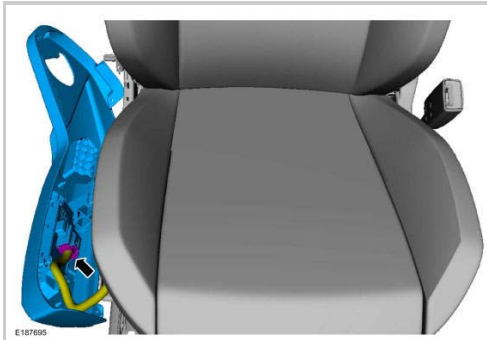
4.

Slide the cushion side shield forward and for a manual seat track, remove the cushion side shield.



5.

If equipped with a power seat track, disconnect the seat control switch electrical connector and remove the cushion side shield.



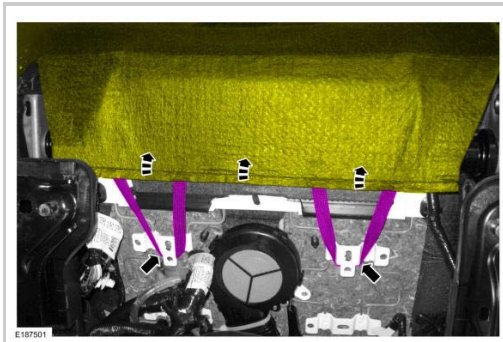
6.

Detach the 2 electrical connector pin-type retainers and position aside.



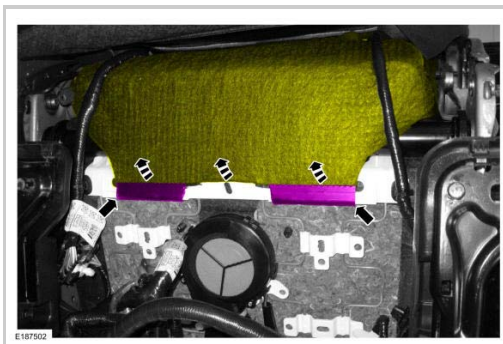
7.

Detach the 2 backrest cover straps and position the backrest cover aside.



8.

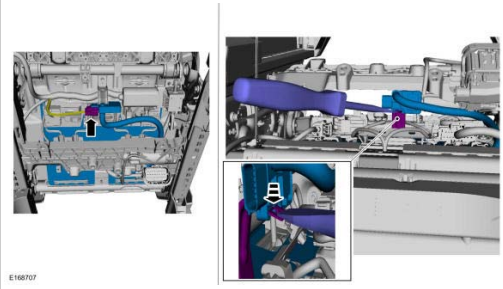
Detach the 2 cushion cover J-clips and position the cushion cover aside.



NOTE: Follow the unique instructions or graphic for this step in the installation.

NOTE: Using excessive force when bending the bracket tab can damage the OCS sensor housing.

9.
Disconnect the electrical connector, bend the bracket tab away and slide the OCS sensor off the bracket.



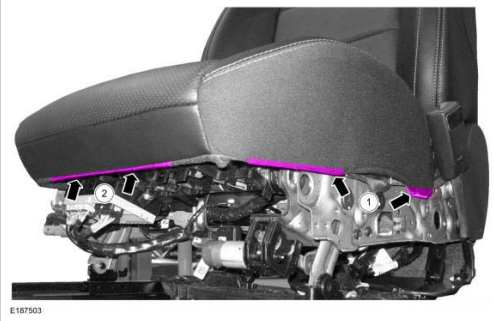
10.

1.

On both sides. Detach the cushion cover J-clips.

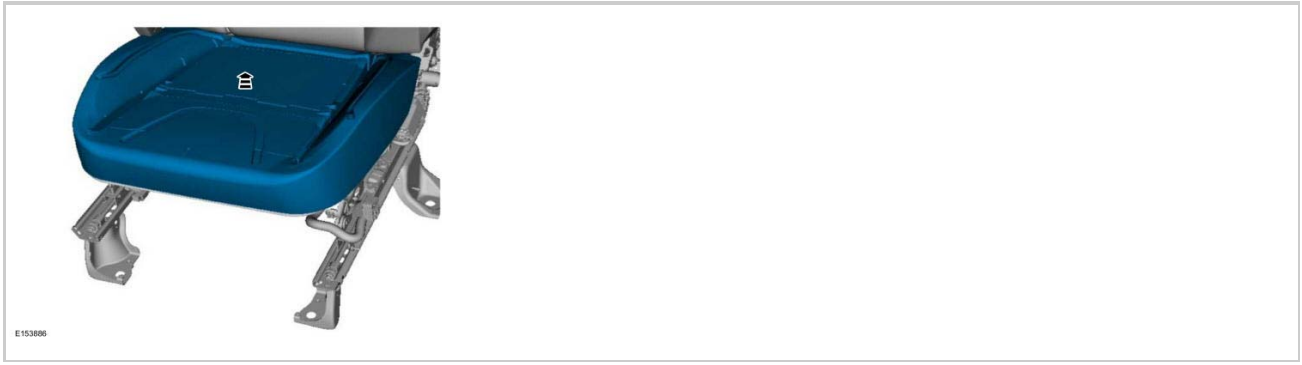
2.

Detach the cushion cover J-clip.



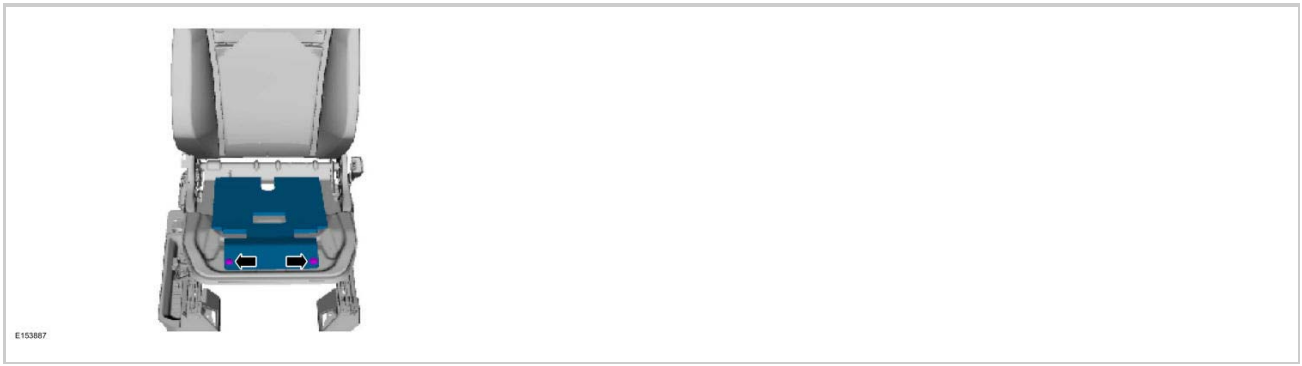
11.

If equipped with OE (original equipment) OCS, remove the cushion foam pad and cover.



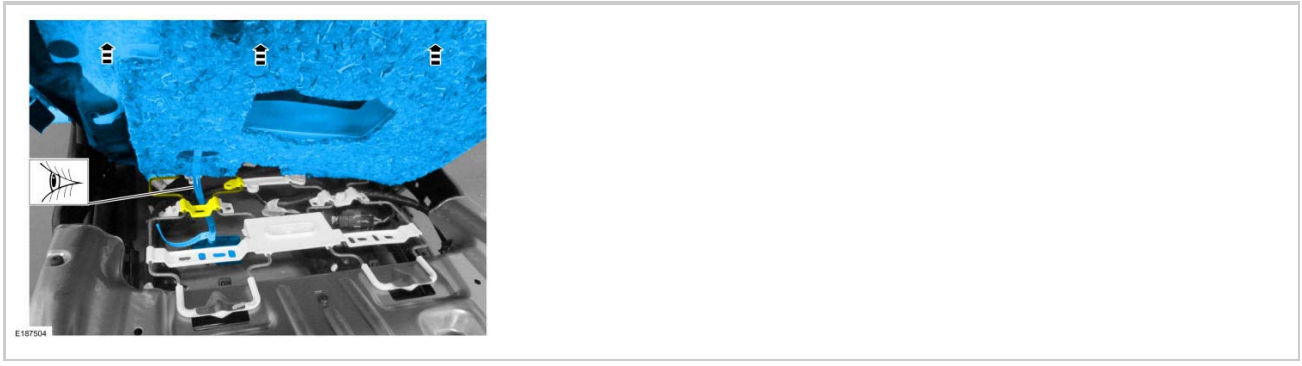
NOTE: Typical OE OCS shown in illustration, service kit similar.

12.
Remove the 2 pin-type retainers.



NOTE: Note the location of the OCS hose as it passes through the seat springs for proper installation.

13.
Route out the OCS hose and sensor from between the seat cushion support wires.



NOTE: Use care when separating the seat cushion trim cover from the hook-and-loop strips or the hook-and-loop strips may be torn from the seat cushion foam pad.

NOTE: Use care when separating the seat cushion from the hook-and-arrow or the

hook may be torn from the seat cushion foam pad.

14.
Remove the seat cushion cover.

1.

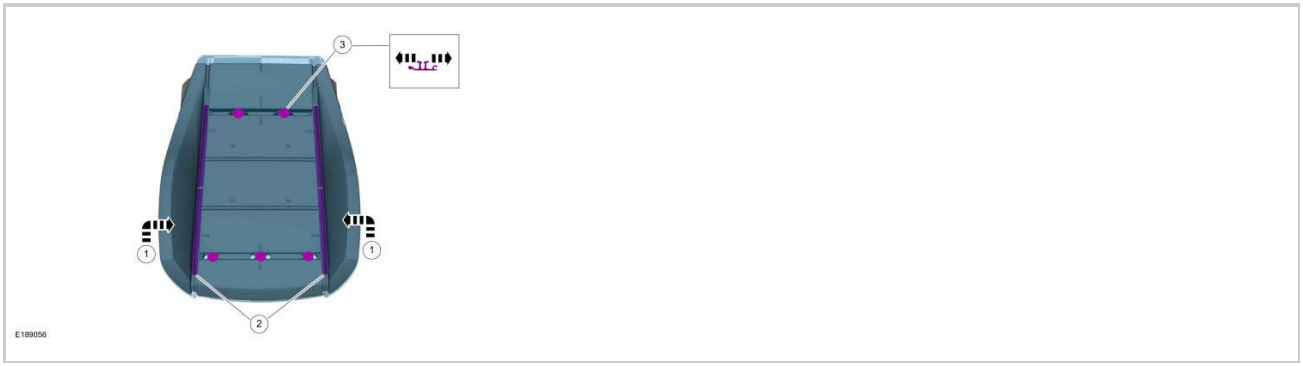
Invert the seat cushion cover.

2.

Release hook-and-loop strips.

3.

Release the hook and arrows.



REMOVAL AND INSTALLATION > OCCUPANT CLASSIFICATION SYSTEM (OCS) SENSOR > INSTALLATION

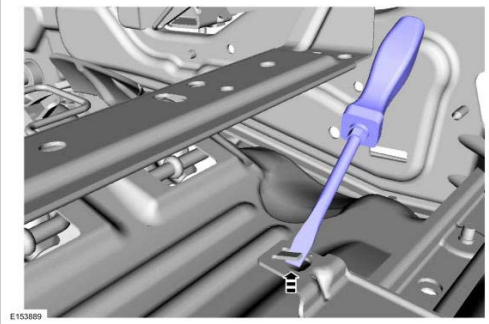
NOTE: Do not trap the pressure sensor hose incorrectly over the seat's suspension or spring. Route the hose so that it lays in a natural bend, and is not twisted due to being forced into an unnatural position. Failure to follow these instructions may result in component damage and/or system failure.

NOTE: Inspect the OCS bladder, seat cushion pan and support assembly for any foreign objects before installing the OCS to the seat cushion pan. Remove any foreign objects. Failure to follow these instructions may result in incorrect operation of the OCS and may cause system failure.

1.
To install, reverse the removal procedure.

2.

Bend the OCS sensor bracket tab back.



3.

Install the front passenger seat. Do not prove out the SRS at this time. Refer to: Front Seat .

NOTE: To prevent system failure, take the following precautions before carrying out the OCS reset.

WARNING: Occupant Classification System (OCS) parts are calibrated as an assembly and must only be replaced in the configuration they are sold. Never separate parts of an assembly. Failure to follow this instruction may result in incorrect operation of the OCS and increases the risk of serious personal injury or death in a crash.

WARNING: Make sure the front passenger seat repair is complete, the seat and all attached components (head restraint, seat side shield, etc.) are correctly assembled, and the seat is correctly installed to the vehicle before using System Reset to rezero the seat weight. Failure to follow these instructions may result in incorrect operation of the occupant classification system (OCS) and increases the risk of serious personal injury or death in a crash.

4.

Make sure the voltage to the OCSM is greater than 8 volts and less than 18 volts.

Make sure the OCS is not below 6°C (42.8°F) or above 36°C (96.7°F) when initiating the OCS reset process. If the vehicle has been exposed to extreme cold or hot temperatures, the vehicle must be exposed and kept at a temperature between 6°C (42.8°F) to 36°C (96.7°F) for a minimum of 30 minutes.

Make sure nothing is present on the passenger seat before and during the OCS reset process.

Prior to carrying out the OCS reset, make sure a minimum of 8 seconds has elapsed after cycling the ignition switch on.

Using a diagnostic scan tool, carry out the OCS reset. Cycle the ignition switch after the OCS reset.

5.

If the first system reset attempt was successful, proceed to prove out the SRS.

6.

If the first system reset attempt was not successful, carry out a thorough visual inspection of the OCS connector and wiring for damage, pressure sensor hose for kinks and or damage, and seat-related wiring harness and body wiring harness terminals and connectors for damage. Repair any concerns found and proceed to the next step.

7.

Carry out a second OCS reset. Cycle the ignition switch after the OCS reset. If the second attempt is unsuccessful, install a new OCS service kit.

8.

Prove out the SRS. Verify all airbags are installed and connected and the ignition is OFF. Wait 10 seconds then turn the ignition ON and monitor the airbag warning indicator. The airbag warning indicator illuminates continuously for approximately 6 seconds and turns off. Continue to monitor the airbag warning indicator for approximately 30 seconds, as this is the time required for the RCM to complete testing of the SRS.

If a SRS fault is present, the airbag warning indicator either fails to light, remains lit continuously or flashes. The flashing may not occur until approximately 30 seconds after the ignition has been turned from OFF to ON. If this occurs, diagnose and repair any SRS faults before proceeding with other repairs.

If, after the ignition has been turned on for 30 seconds, the airbag warning indicator remains unlit with no chime or SRS message displayed in the message center, no SRS fault is present.

If the airbag warning indicator is inoperative and a SRS fault exists, a chime sounds in a pattern of 5 sets of 5 beeps or a message displays in the message center. If this occurs, diagnose and repair the airbag warning indicator and any SRS faults before proceeding with other repairs.

9.

Using a scan tool, clear all Continuous Memory Diagnostic Trouble Codes (CMDTCs) from all modules.

REMOVAL AND INSTALLATION > PASSENGER AIRBAG > REMOVAL

WARNING: The following procedure prescribes critical repair steps required for correct supplemental restraint system operation during a crash. Follow all notes and steps carefully. Failure to follow step instructions may result in incorrect operation of the supplemental restraint system and increases the risk of serious personal injury or death in a crash.

NOTE: LH drive shown in illustration, RH drive similar.

1.

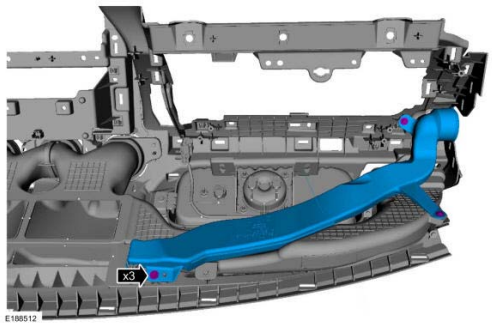
Depower the SRS. Refer to: Supplemental Restraint System (SRS) Depowering .

2.

Remove the instrument panel upper section. Refer to: INSTRUMENT PANEL UPPER SECTION .

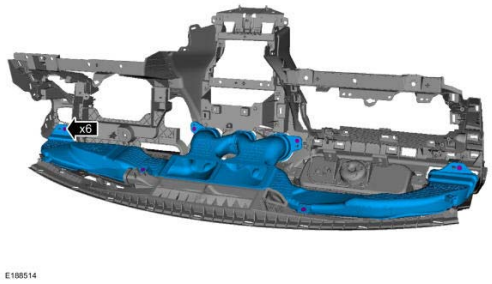
NOTE: RH side shown in illustration, LH similar.

3.
On both sides. Remove the screws and the demister duct.



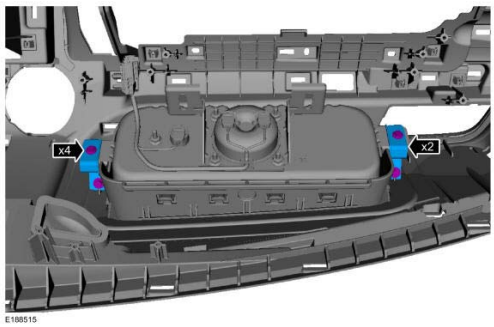
4.

Remove the screws and the air conditioning duct.



5.

Remove the screws and brackets.



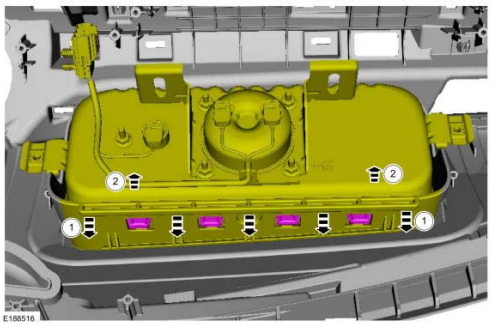
6.

1.

Pull the passenger airbag deployment chute away from the passenger airbag.

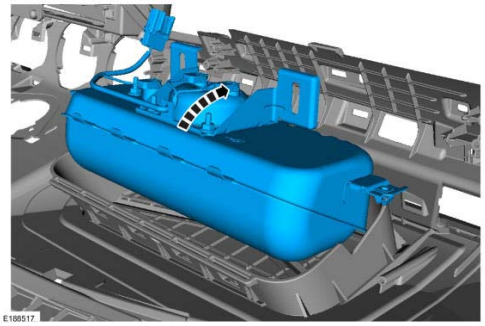
2.

Rotate the passenger airbag out of the deployment chute and disengage the 4 passenger airbag retainers.



7.

Continue to rotate the passenger airbag and remove it from the deployment chute.



REMOVAL AND INSTALLATION > PASSENGER AIRBAG > INSTALLATION

WARNING: Incorrect repair techniques or actions can cause an accidental Supplemental Restraint System deployment. Make sure the restraint system is depowered before reconnecting the component. Refer to the Supplemental Restraint System (SRS) Depowering . Failure to precisely follow depowering instructions could result in serious personal injury from an accidental deployment.

1.

WARNING: Before installing the passenger air bag module assembly:

Inspect the passenger air bag module and instrument panel/deployment chute cavity for any damage or foreign material.

Remove any foreign material from the passenger air bag module and instrument panel/deployment chute cavity.

Install new parts if damaged.

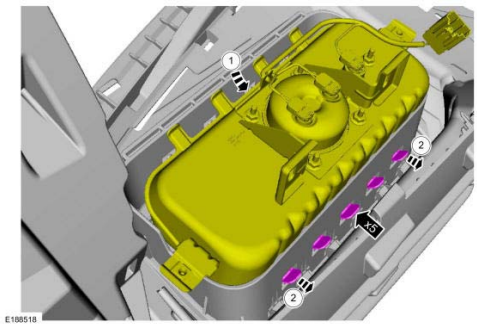
Failure to follow these instructions may result in the passenger air bag deploying incorrectly, which increases the risk of serious personal injury or death in a crash.

1.

Position the passenger airbag to the deployment chute.

2.

Engage the 5 passenger airbag retainers to the deployment chute.



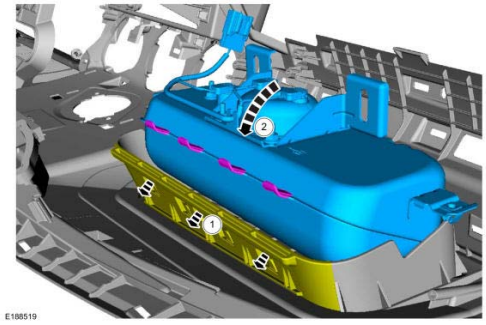
2.

1.

Pull the passenger airbag deployment chute out, making room for the passenger airbag to pass.

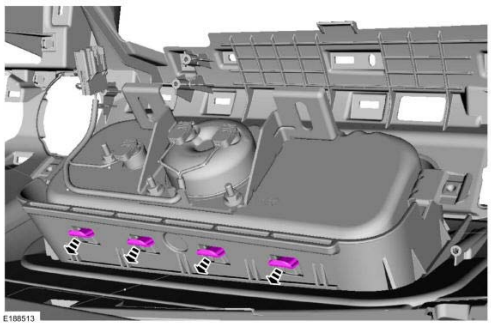
2.

Rotate the passenger airbag down and into the deployment chute.



3.

Engage the passenger airbag retainers to the deployment chute.

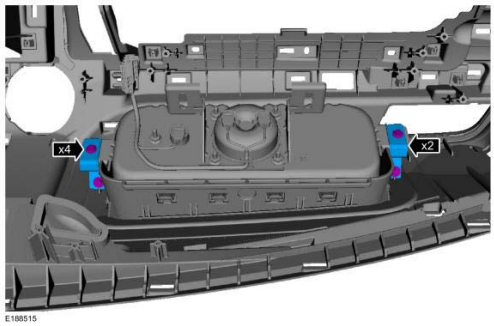


4.

Install the brackets and screws.

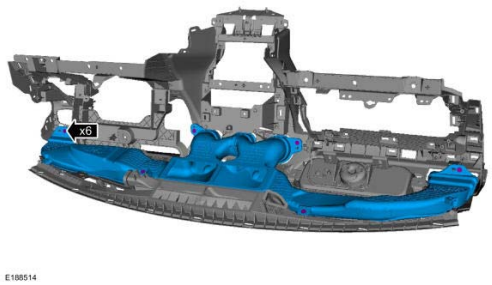
Torque

: 22 lb.in (2.5 Nm)



5.

Install the air conditioning duct and screws.



NOTE: RH side shown in illustration, LH similar.

6.
On both sides. Install the demister duct and screws.



7.

Install the instrument panel upper section. Refer to: INSTRUMENT PANEL UPPER SECTION .

8.

Repower the SRS. Refer to: Supplemental Restraint System (SRS) Repowering .

REMOVAL AND INSTALLATION > PASSENGER KNEE AIRBAG

Special Tool(s) / General Equipment

Interior Trim Remover

REMOVAL AND INSTALLATION > PASSENGER KNEE AIRBAG > REMOVAL

WARNING: The following procedure prescribes critical repair steps required for correct restraint system operation during a crash. Follow all notes and steps carefully. Failure to follow step instructions may result in incorrect operation of the restraint system and increases the risk of serious personal injury or death in a crash.

NOTE: LHD shown in illustration, RHD similar.

NOTE: Removal steps in this procedure may contain installation details.

1.

Depower the SRS. Refer to: Supplemental Restraint System (SRS) Depowering .

2.

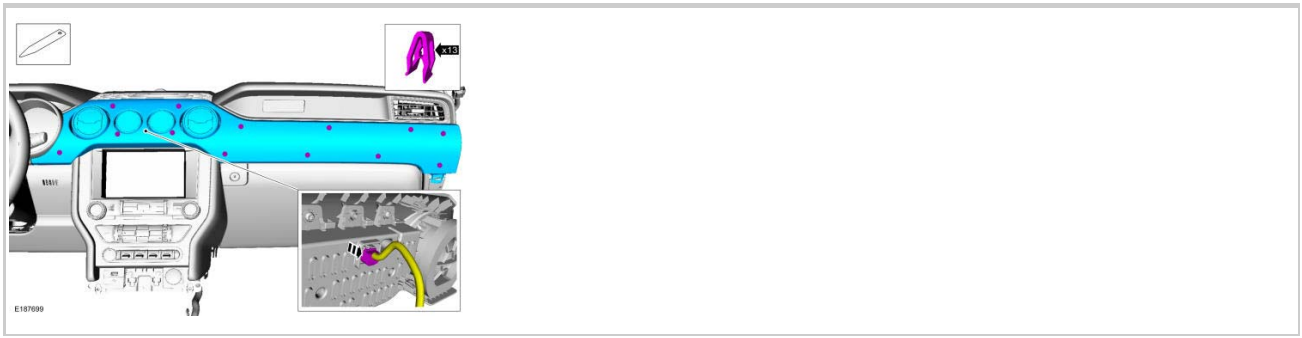
Release the clips and remove the RH instrument panel trim panel. Use the General Equipment: Interior Trim Remover



NOTE: Instrument panel center finish panel with optional ICM shown in illustration.

3.
Release the clips and remove the instrument panel center finish panel.

Disconnect the electrical connector. Use the General Equipment: Interior Trim Remover



4.

Open the glove box.



5.

1.

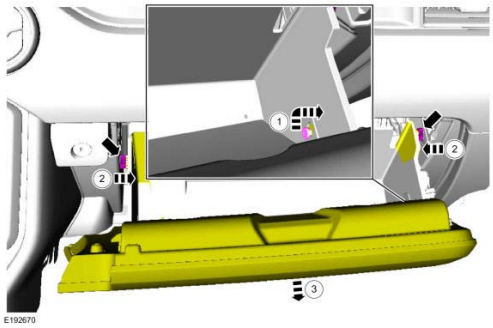
Detach the glove box door damper.

2.

Push each side of the glove box door, disengaging the stops.

3.

Open the glove box door past its stops.



6.

1.

Disconnect and detach the electrical connector and wire harness.

2.

Remove the upper screws.

Torque

: 22 lb.in (2.5 Nm)

3.

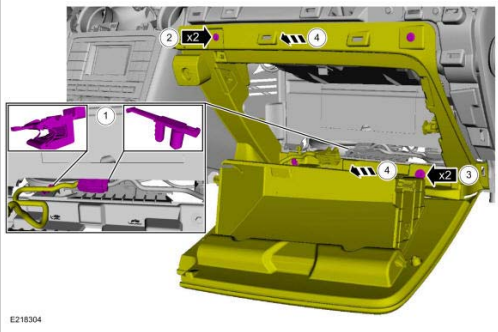
Remove the lower screws.

Torque

: 44 lb.in (5.0 Nm)

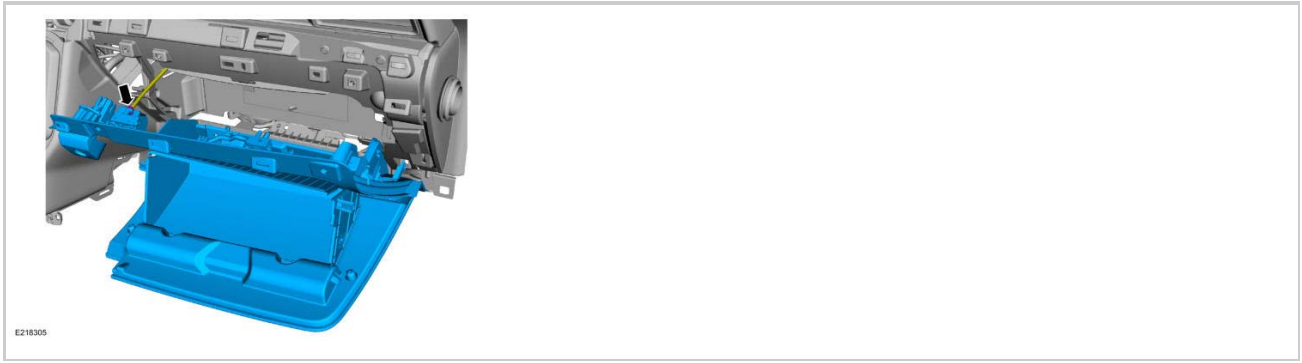
4.

Separate the glove box assembly from the instrument panel.



7.

Disconnect the electrical connector and remove the glove box assembly.



REMOVAL AND INSTALLATION > PASSENGER KNEE AIRBAG > INSTALLATION

WARNING: Incorrect repair techniques or actions can cause an accidental Supplemental Restraint System deployment. Make sure the restraint system is depowered before reconnecting the component. Refer to the Supplemental Restraint System (SRS) Depowering . Failure to precisely follow depowering instructions could result in serious personal injury from an accidental deployment.

1.

To install, reverse the removal procedure.

2.

Repower the SRS. Refer to: Supplemental Restraint System (SRS) Repowering .

REMOVAL AND INSTALLATION > RESTRAINTS CONTROL MODULE (RCM) > REMOVAL

WARNING: The following procedure prescribes critical repair steps required for correct restraint system operation during a crash. Follow all notes and steps carefully. Failure to follow step instructions may result in incorrect operation of the restraint system and increases the risk of serious personal injury or death in a crash.

NOTE: Removal steps in this procedure may contain installation details.

NOTE: The PMI process must begin with the current RCM installed. If the current RCM does not respond to the diagnostic scan tool, the tool may prompt for As-Built Data as part of the repair.

NOTE: This step is only necessary when installing a new component.

1.
Using a diagnostic scan tool, begin the PMI process for the RCM following the on-screen instructions.

2.

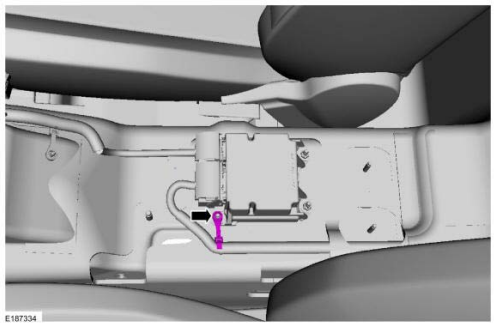
Depower the SRS. Refer to: Supplemental Restraint System (SRS) Depowering

3.

Remove the floor console. Refer to: Floor Console .

4.

Detach the wire harness retainer.



5.

1.

Disconnect the RCM electrical connectors.

2.

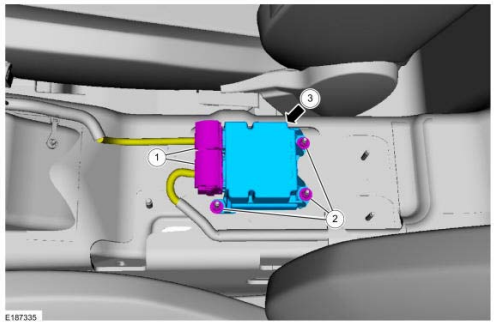
Remove the nuts.

Torque

: 93 lb.in (10.5 Nm)

3.

Remove the RCM.



REMOVAL AND INSTALLATION > RESTRAINTS CONTROL MODULE (RCM) > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Repower the SRS. For a new RCM, do not prove out the SRS at this time. Refer to: Supplemental Restraint System (SRS) Repowering .

> *NOTE: This step is only necessary when installing a new component.*

3.
Using a diagnostic scan tool, complete the PMI process for the RCM following the on-screen instructions.

4.

For a new RCM, prove out the SRS. Verify all airbags are installed and connected and the ignition is OFF. Wait 10 seconds then turn the ignition ON and monitor the airbag warning indicator. The airbag warning indicator illuminates continuously for approximately 6 seconds and turns off. Continue to monitor the airbag warning indicator for approximately 30 seconds, as this is the time required for the RCM to complete testing of the SRS.

If a SRS fault is present, the airbag warning indicator either fails to light, remains lit continuously or flashes. The flashing may not occur until approximately 30 seconds after the ignition has been turned from OFF to ON. If this occurs, diagnose and repair any SRS faults before proceeding with other repairs.

If, after the ignition has been turned on for 30 seconds, the airbag warning indicator remains unlit with no chime or SRS message displayed in the message center, no SRS fault is present.

If the airbag warning indicator is inoperative and a SRS fault exists, a chime sounds in a pattern of 5 sets of 5 beeps or a message displays in the message center. If this occurs, diagnose and repair the airbag warning indicator and any SRS faults before proceeding with other repairs.

REMOVAL AND INSTALLATION > SEAT POSITION SENSOR

Seat Position Sensor

REMOVAL AND INSTALLATION > SEAT POSITION SENSOR > REMOVAL

> *NOTE: Removal steps in this procedure may contain installation details.*

NOTE: RH manual seat shown in illustration, other seats similar.

1.

1.

Remove the screw.

Torque

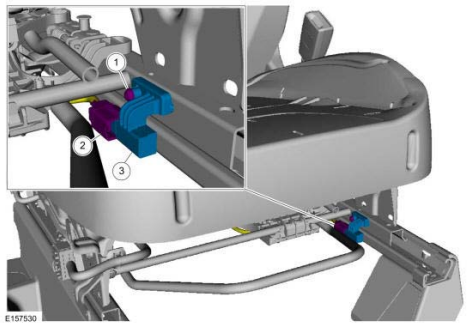
: 8 lb.in (0.9 Nm)

2.

Disconnect the electrical connector.

3.

Remove the seat position sensor.



REMOVAL AND INSTALLATION > SEAT POSITION SENSOR > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > SIDE AIRBAG

Special Tool(s) / General Equipment

Hog Ring Plier

REMOVAL AND INSTALLATION > SIDE AIRBAG > REMOVAL

WARNING: The following procedure prescribes critical repair steps required for correct

restraint system operation during a crash. Follow all notes and steps carefully. Failure to follow step instructions may result in incorrect operation of the restraint system and increases the risk of serious personal injury or death in a crash.

WARNING: Front seat backrest trim covers installed on seats equipped with seat side airbags cannot be repaired. A new trim cover must be installed. Cleaning is permissible. Failure to follow these instructions may result in the seat side airbag deploying incorrectly and increase the risk of serious personal injury or death in a crash.

NOTE: Removal steps in this procedure may contain installation details.

Side airbag and upper side airbag

1.

Remove the front seat. Refer to: Front Seat .

2.

Position the front seat backrest cover.

1.

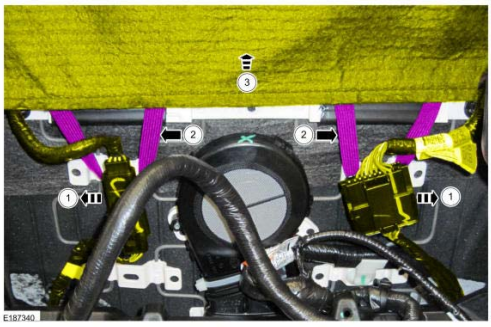
Releases the wire harness electrical connector retainers.

2.

Detach the front seat backrest cover straps from the seat cushion frame.

3.

Position the front seat backrest cover aside.



3.

Remove the backrest cover insert.

1.

Remove the pin-type retainers.

2.

Position the backrest cover upwards and remove the insert.



4.

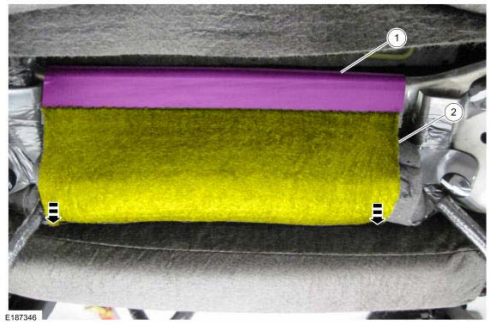
Position the front seat backrest cover.

1.

Release the J-clip.

2.

Position the backrest cover from between the seat cushion and backrest.



NOTE: Use care when separating the seat backrest trim cover from the hook-and-loop strips or the hook-and-loop strips may be torn from the seat backrest foam pad.

5.
Partially invert the backrest cover to access the side airbag deployment chute.



6.

Detach the side airbag deployment chute retainers and position aside.



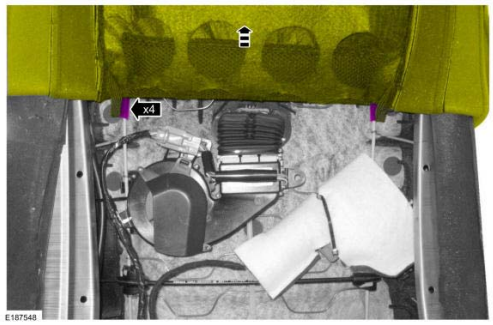
7.

Pull the side airbag deployment chute through the backrest foam.



8.

Release the 4 backrest cover J-clip type retainers and position the backrest cover upward.



Side airbag

9.

Remove the side airbag nuts.

Torque

: 53 lb.in (6 Nm)



10.

1.

Detach the side airbag from the backrest frame.

2.

Slide the locking wedge out, disconnect the electrical connector and remove the side airbag.



Upper side airbag

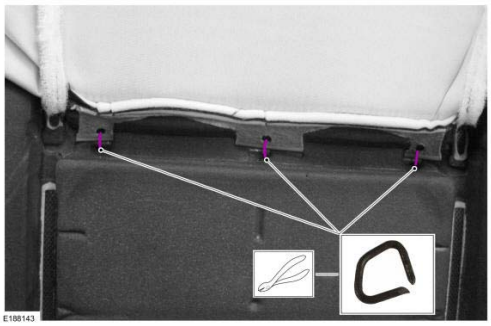
11.

Release the J-clip from the backrest frame.



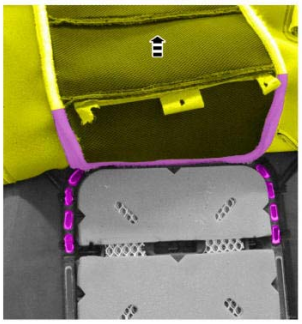
12.

Remove the hog rings.



NOTE: Use care when separating the seat backrest trim cover from the hook-and-loop strips or the hook-and-loop strips may be torn from the seat backrest foam pad.

13.
Detach the hook-and-loop strips.

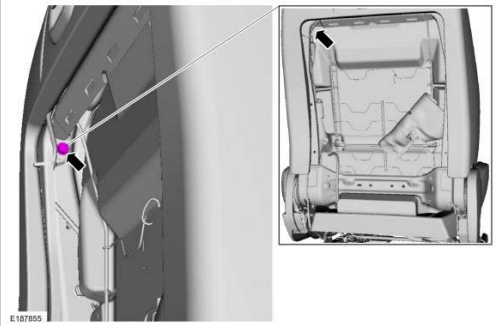


14.

Remove the side airbag bolt.

Torque

: 53 lb.in (6 Nm)



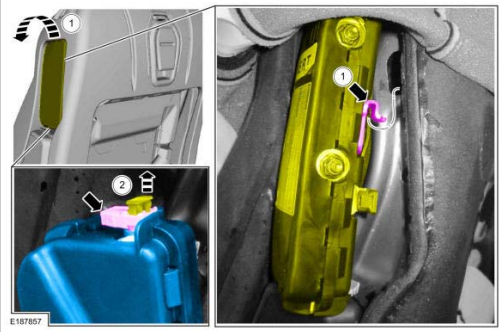
15.

1.

Detach the side airbag from the backrest frame.

2.

Slide the locking wedge out, disconnect the electrical connector and remove the side airbag.



REMOVAL AND INSTALLATION > SIDE AIRBAG > INSTALLATION

WARNING: Incorrect repair techniques or actions can cause an accidental Supplemental Restraint System deployment. Make sure the restraint system is depowered before reconnecting the component. Refer to the Supplemental Restraint System (SRS) Depowering . Failure to precisely follow depowering instructions could result in serious personal injury from an accidental deployment.

1.

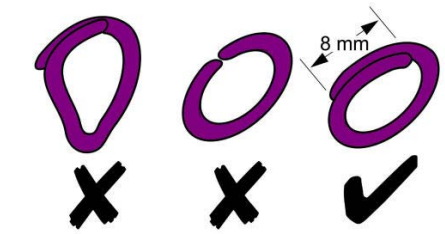
WARNING: Inspect the seat side airbag, airbag cavity, mounting surface and deployment chute for damage or the presence of foreign material. Remove all foreign material. Install a new side airbag if it is damaged. Install a new deployment chute if the deployment chute is damaged. Failure to follow these instructions may result in the seat side airbag deploying incorrectly and increase the risk of serious personal injury or death in a crash.

WARNING: If the seat side airbag cover has been damaged or separated from its mounting, or if the airbag material has been exposed, install a new seat side airbag assembly. Never try to repair the seat side airbag assembly. Failure to follow these instructions may result in the seat side airbag deploying incorrectly, which increases the risk of serious personal injury or death in a crash.

To install, reverse the removal procedure.

2.

Use the General Equipment: Hog Ring Plier



REMOVAL AND INSTALLATION > SIDE CURTAIN AIRBAG > REMOVAL

WARNING: The following procedure prescribes critical repair steps required for correct restraint system operation during a crash. Follow all notes and steps carefully. Failure to follow step instructions may result in incorrect operation of the restraint system and increases the risk of serious personal injury or death in a crash.

NOTE: Removal steps in this procedure may contain installation details.

1.

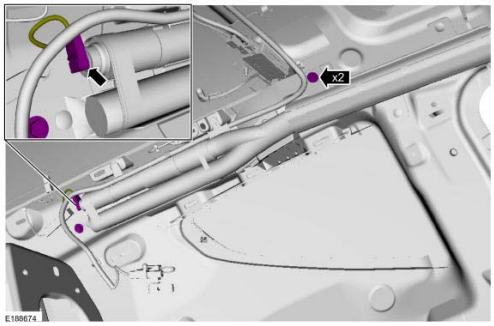
Depower the SRS. Refer to: Supplemental Restraint System (SRS) Depowering .

2.

Remove the headliner. Refer to: Headliner .

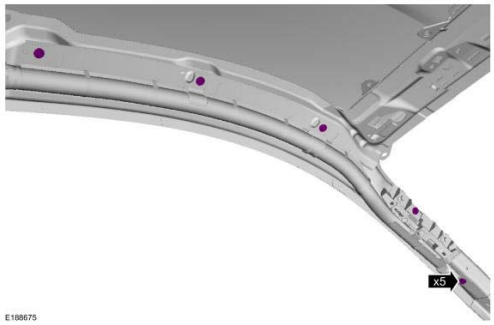
NOTE: Follow the unique instructions or graphic for this step in installation.

3.
Disconnect the electrical connector and remove the screws.



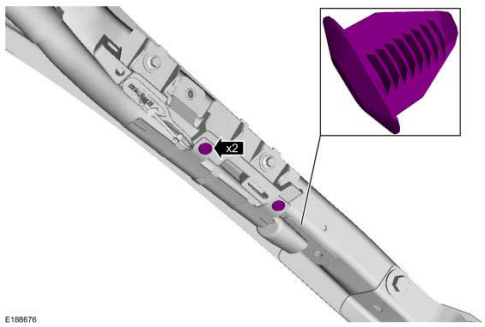
NOTE: Follow the unique instructions or graphic for this step in installation.

4.
Remove the screws.



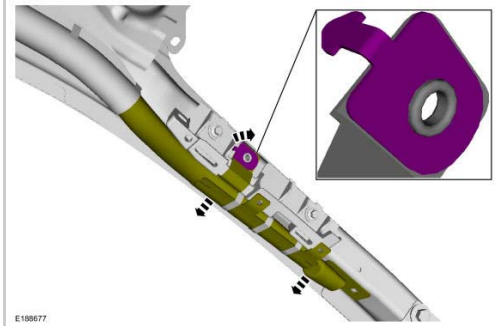
5.

Remove the pin-type retainers at the A-pillar.



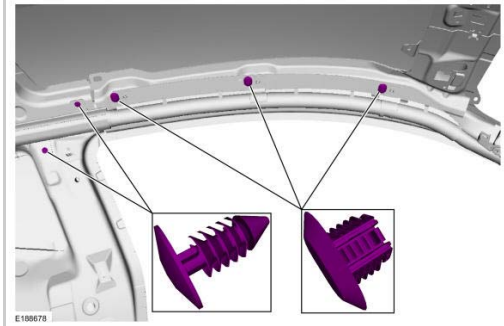
6.

Disengage the retainer and position the side curtain airbag away from the A-pillar.



7.

Disengage the pin-type retainers.



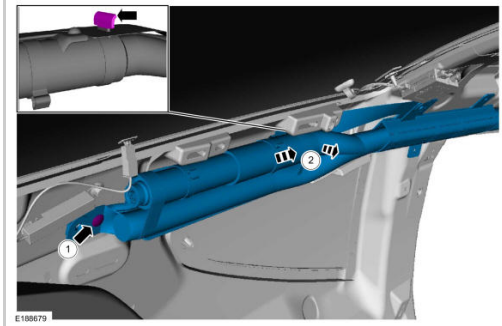
8.

1.

Remove the pin-type retainer.

2.

Slide the side curtain airbag forward and out, disengaging the T-tab from the sheet metal and remove the side curtain airbag.



REMOVAL AND INSTALLATION > SIDE CURTAIN AIRBAG > INSTALLATION

WARNING: Incorrect repair techniques or actions can cause an accidental Supplemental

Restraint System deployment. Make sure the restraint system is depowered before reconnecting the component. Refer to the Supplemental Restraint System (SRS) Depowering . Failure to precisely follow depowering instructions could result in serious personal injury from an accidental deployment.

WARNING: Before installing a Safety Canopy® or side air curtain module, inspect the roofline for any damage. If necessary, the sheet metal must be reworked to its original condition and structural integrity. Install new fasteners if damaged and remove foreign material. Failure to follow these instructions may result in the Safety Canopy® or side air curtain deploying incorrectly, which increases the risk of serious personal injury or death in a crash.

NOTE: During installation, ensure that the side curtain airbag is not twisted 360° between attachment points.

1.

To install, reverse the removal procedure.

2.

Tighten the screws in the sequence shown in illustration.

1.

Tighten screws 1 and 2.

Torque

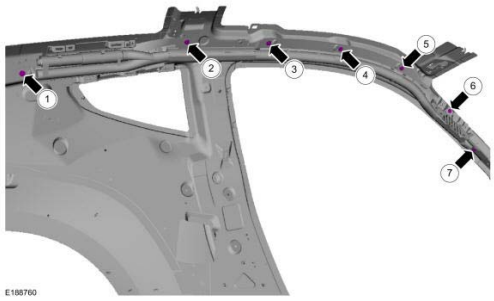
: 106 lb.in (12 Nm)

2.

Tighten screws 3 through 7.

Torque

: 80 lb.in (9 Nm)



3.

Repower the SRS. Refer to: Supplemental Restraint System (SRS) Repowering .

REMOVAL AND INSTALLATION > SIDE AIRBAG - VEHICLES WITH: RECARO SEATS > REMOVAL

WARNING: The following procedure prescribes critical repair steps required for correct restraint system operation during a crash. Follow all notes and steps carefully. Failure to follow step instructions may result in incorrect operation of the restraint system and increases the risk of serious personal injury or death in a crash.

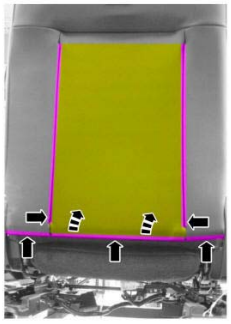
NOTE: Removal steps in this procedure may contain installation details.

1.

Remove the front seat. Refer to: Front Seat .

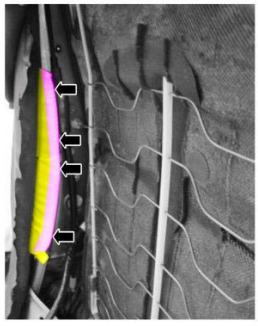
2.

Detach the backrest cover J-clips and position the backrest cover upward.



3.

Detach the side airbag deployment chute J-clips from the backrest frame.

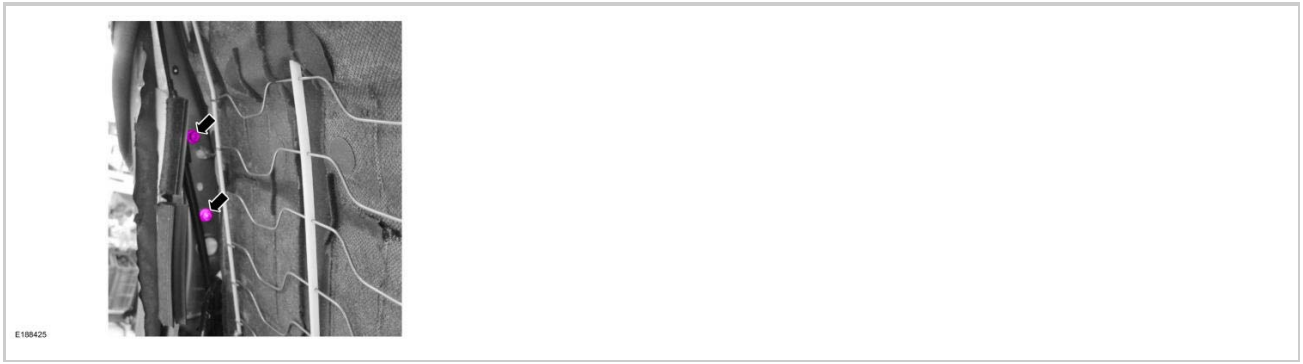


4.

Remove the side airbag nuts.

Torque

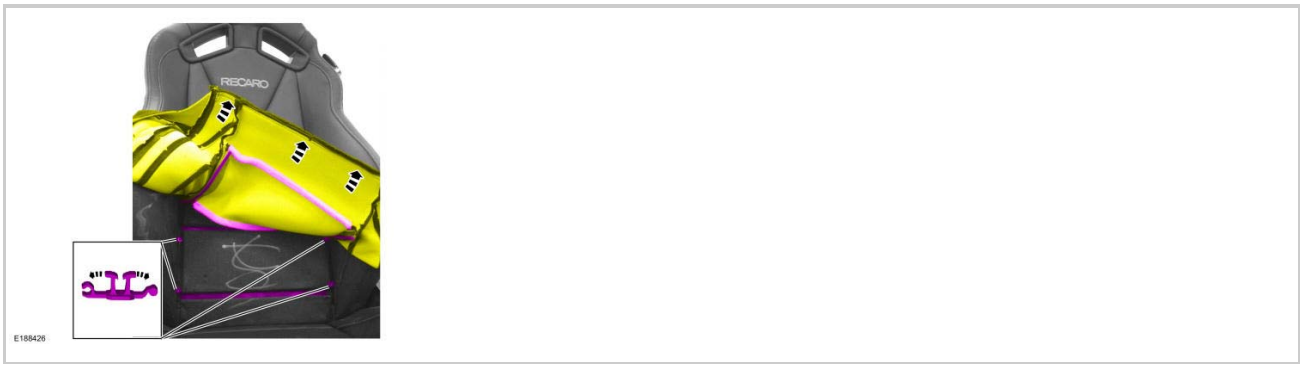
: 53 lb.in (6 Nm)



NOTE: Use care when separating the backrest cover from the hook-and-arrows, or the hooks can be torn from the backrest foam pad.

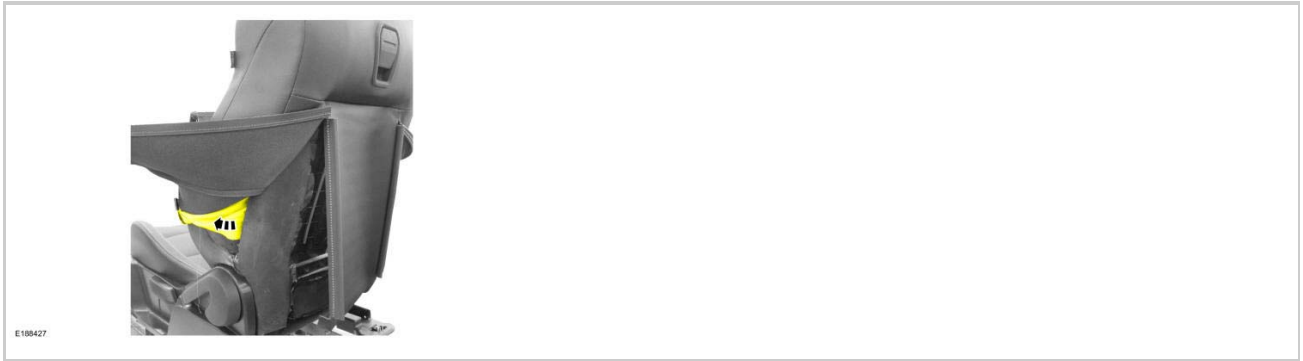
NOTE: Use care when separating the backrest cover from the hook-and-loop strip, or the hook-and-loop strip can be torn from the backrest foam pad.

5.
Detach the hook-and-loop strips, the hook-and-arrows and position the backrest cover up.



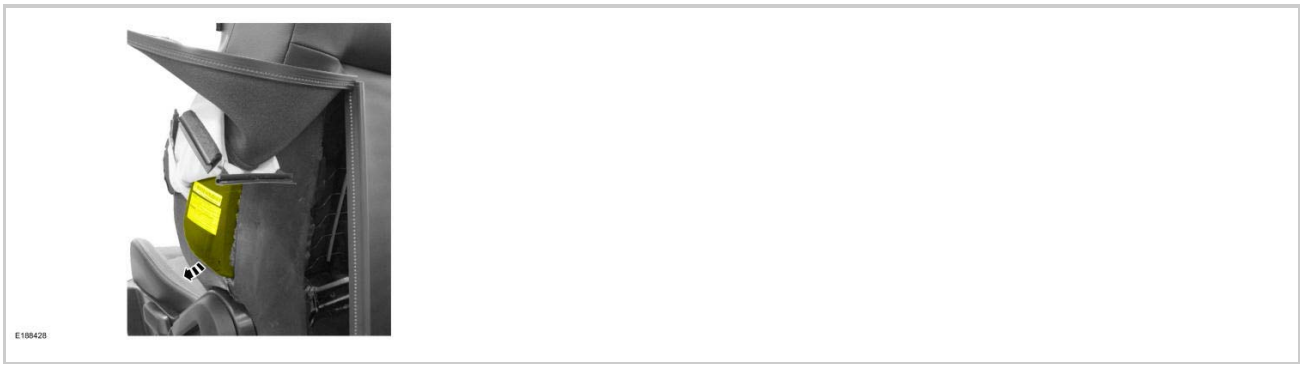
6.

Position the deployment chute through the backrest foam.



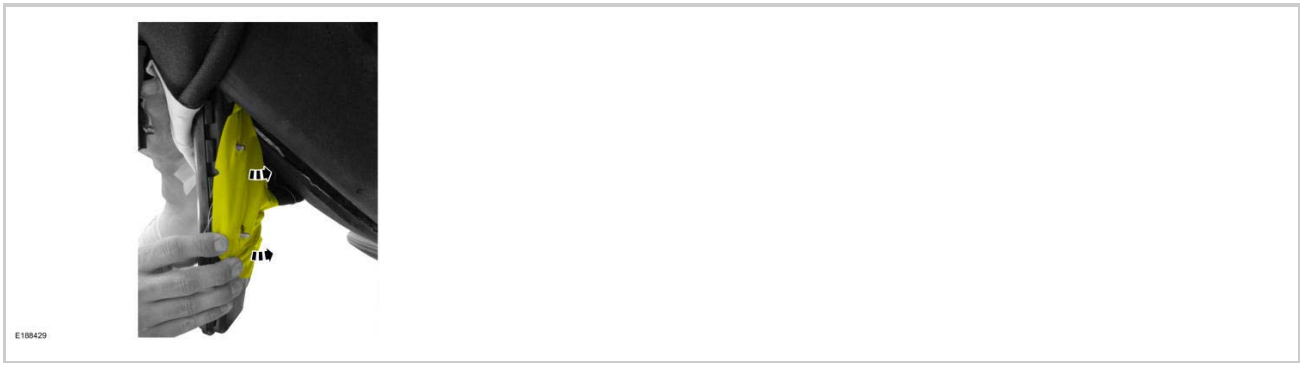
7.

Separate the side airbag from the backrest frame.



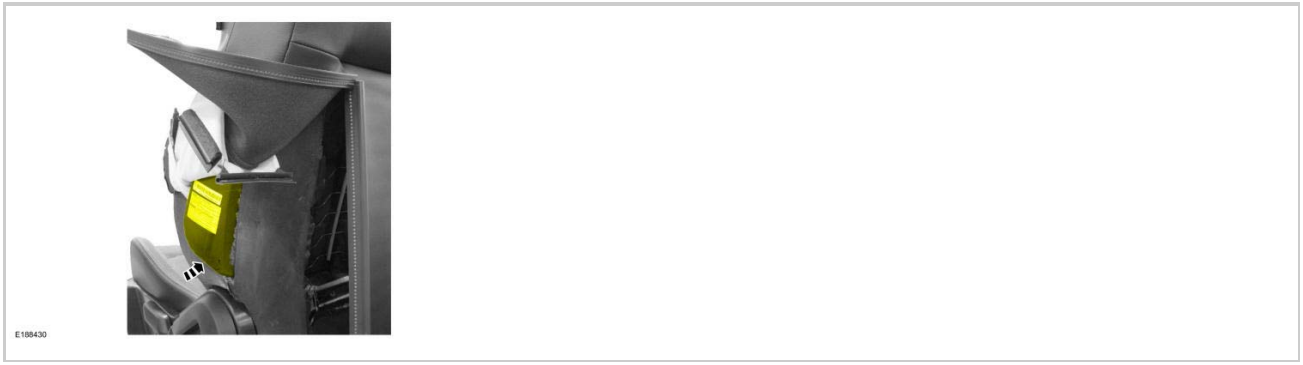
8.

Separate the deployment chute from the side airbag studs.



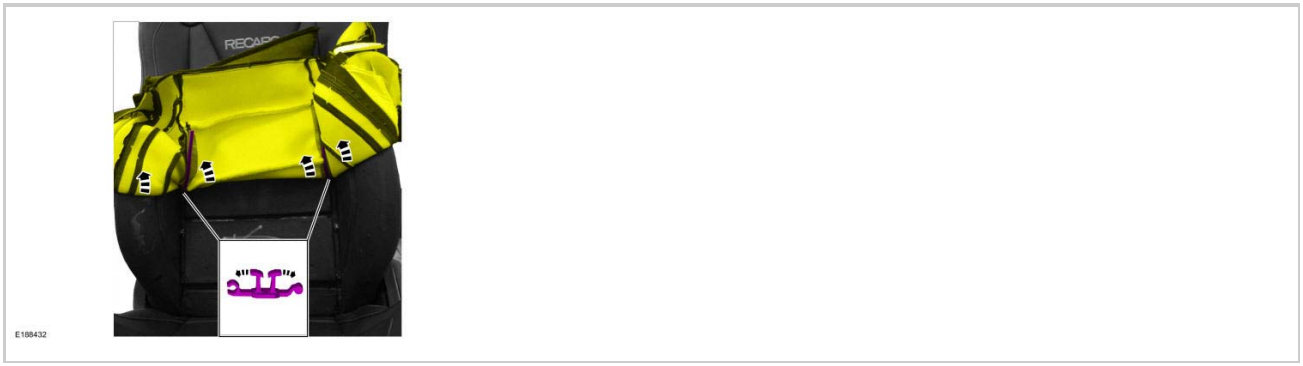
9.

Position the side airbag back into the backrest foam pad.



10.

Detach the hook-and-arrows and position the backrest cover up.



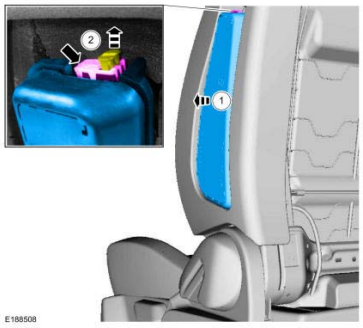
11.

1.

Detach the side airbag from the backrest frame.

2.

Slide the locking wedge out, disconnect the electrical connector and remove the side airbag.



REMOVAL AND INSTALLATION > SIDE AIRBAG - VEHICLES WITH: RECARO SEATS > INSTALLATION

WARNING: Incorrect repair techniques or actions can cause an accidental Supplemental Restraint System deployment. Make sure the restraint system is depowered before reconnecting the component. Refer to the Supplemental Restraint System (SRS) Depowering . Failure to precisely follow depowering instructions could result in serious personal injury from an accidental deployment.

1.

WARNING: Inspect the seat side airbag, airbag cavity, mounting surface and deployment chute for damage or the presence of foreign material. Remove all foreign material. Install a new side airbag if it is damaged. Install a new deployment chute if the deployment chute is damaged. Failure to follow these instructions may result in the seat side airbag deploying incorrectly and increase the risk of serious personal injury or death in a crash.

To install, reverse the removal procedure.

Service Manual: POWER STEERING

DESCRIPTION AND OPERATION > POWER STEERING - OVERVIEW > OVERVIEW

The EPAS system provides steering assist to the driver by replacing the conventional hydraulic valve system with a steering gear equipped with an integrated electrical motor and PSCM. The motor operation and level of steering assist provided is controlled by the PSCM.

DESCRIPTION AND OPERATION > POWER STEERING - SYSTEM OPERATION AND COMPONENT DESCRIPTION

System Operation

DESCRIPTION AND OPERATION > POWER STEERING - SYSTEM OPERATION AND COMPONENT DESCRIPTION > NETWORK MESSAGE CHART

PSCM Network Input Messages

Broadcast Message	Originating Module	Message Purpose
ABS active	ABS module	Used to confirm the operational state of the ABS.
Ignition status	BCM	This message is first sent to the GWM and then to the PSCM. Used to confirm the ignition status of the vehicle.
Power pack status	PCM	This message is first sent to the GWM and then to the PSCM. Used to confirm the status of the operating mode; off - torque not available, on - torque not available, start in progress - torque not available or on - torque available.
Power system status	BCM	This message is first sent to the GWM and then to the PSCM. Used to confirm the status of the vehicle battery and charging system.
Stability control brake active	ABS module	Used to confirm the operational state of the stability control system.
Steering wheel angle	ABS module	Used to verify the validity of the steering angle sensor.

Traction control brake active	ABS module	Used to confirm the operational state of the traction control system.
Vehicle configuration information	BCM	This message is first sent to the GWM and then to the PSCM. Used to compare the PSCM configuration against the vehicles specific configuration (central car configuration).
Vehicle lateral acceleration	ABS module	Used by the PSCM for steering assist calculations.
Vehicle lateral acceleration	RCM	Used by the PSCM for steering assist calculations.
Vehicle longitudinal acceleration	ABS module	Used by the PSCM for steering assist calculations.
Vehicle speed	PCM	This message is first sent to the GWM and then to the PSCM. Used to determine the level of assist supplied to the steering gear.
Vehicle yaw rate	ABS module	Used by the PSCM for steering assist calculations.
Wheel speed data	ABS module	Used to determine the level of assist supplied to the steering gear and to validate the steering wheel component angle by comparing the rotational speeds of each wheel. The difference in the speed of each wheel is used to derive a steering angle for comparison against the absolute steering angle message from the SCCM.

DESCRIPTION AND OPERATION > POWER STEERING - SYSTEM OPERATION AND COMPONENT DESCRIPTION > EPAS SYSTEM

The PSCM controls the functions of the EPAS system and communicates with other modules over the HS-CAN2.

To activate, the EPAS system requires battery voltage at the hot at all times PSCM input, battery voltage at the PSCM ignition-run input, the PSCM must communicate with other modules over the HS-CAN2 and the PSCM must receive both the power pack status message from the PCM.

The main input for calculating the level of EPAS assist is the steering torque sensor signal (internal to the PSCM). Vehicle speed is also taken into consideration in order to achieve the vehicle speed

dependent steering assist characteristic.

The EPAS gear uses a reversible motor to apply the steering assist by moving the rack inside the steering gear. The motor is connected to the rack of the steering gear by a toothed belt and pulley-bearing assembly.

The PSCM continually monitors and adjusts steering efforts based on the steering torque sensor signal, motor position and HS-CAN2 inputs to enhance the feel of the steering system. As vehicle speed increases, the amount of assist decreases to improve and enhance road feel at the steering wheel. As vehicle speed decreases, the amount of assist increases to ease vehicle maneuvering. Compensation is made to reduce the effect of pull or drift experienced when driving on roads with a high degree of camber. Compensation is also made for the impact of wheel imbalance on steering feel, up to a predetermined threshold.

The steering torque sensor senses the torque at the steering wheel. It is integrated into the PSCM and works by measuring the relative rotation between an input and output shaft which are connected by a torsion bar. The steering torque sensor sends out 2 PWM signals which allows a channel to channel cross-check and an accurate correction of the neutral point.

The PSCM is self-monitoring and is capable of setting and storing Diagnostic Trouble Codes (DTCs). Depending on the DTC set, the PSCM may enter a failure mode. In addition, the PSCM may send a request to the IPC to display a message in the message center, alerting the driver of a potential EPAS concern. The warning message is sent over the HS-CAN2 to the GWM which relays the message to the IPC over the HS-CAN3.

DESCRIPTION AND OPERATION > POWER STEERING - SYSTEM OPERATION AND COMPONENT DESCRIPTION > FAILURE MODES

When a DTC is present in the PSCM, the EPAS enters 1 of 2 modes of operation.

The EPAS enters a **reduced steering assist mode** to protect the internal components of the EPAS when a non-critical safety concern is detected by the PSCM, concerns such as low battery voltage, high battery voltage or over-temperature are considered non-critical safety concerns. This reduced steering assist mode gives the steering operation a heavier than normal feel.

The EPAS enters a **manual steering mode** (no electrical steering assistance is provided) when a concern considered to be a critical safety concern is detected. In manual steering mode, the vehicle has mechanical steering only which gives the steering operation a heavy feel.

DESCRIPTION AND OPERATION > POWER STEERING - SYSTEM OPERATION AND COMPONENT DESCRIPTION > SELECTABLE STEERING

The selectable steering button on the FCIM allows the driver to select 1 of 3 steering modes. These steering modes alter the feel and response of the EPAS system. After a selection is made, a soft feedback bump may be felt in the steering wheel. Pressing the switch causes the FCIM to send a message to the IPC and the PSCM. The IPC displays the current mode in the message center and the PSCM modifies EPAS operation according to the selected steering mode.

- **Standard**

: Default system setting. The system defaults to standard mode if the battery is disconnected.

- **Sport**

  : Slightly higher effort required for steering with more road feel through the steering wheel.

- **Comfort**

  : Slightly less effort required for steering with less road feel through the steering wheel.

If the vehicle is equipped with the selectable drive mode feature, the steering feel changes when a new drive mode is selected. This automatic selection can be overridden by using the selectable steering button. For additional information on the selectable drive mode feature, Refer to: Anti-Lock Brake System (ABS) and Stability Control - System Operation and Component Description .

Component Description

EPAS Steering Gear

The EPAS gear is an assembly consisting of a PSCM, a motor, and a steering torque sensor, all of which are serviced as an assembly. The inner and outer tie rods and the steering gear bellows boots are available separately for service.

- The steering torque sensor is mounted near the input shaft of the EPAS gear and is used by the PSCM to determine how much force is being used to turn the steering wheel.
- The EPAS gear has one inner tie rod located at each end of the gear assembly and is available separately for service.
- The EPAS gear has one outer tie rod located at each end of the gear assembly and is available separately for service.
- The EPAS gear has one bellows boot located at each side of the EPAS gear assembly. Each boot is held in place with 2 boot clamps. The boots and clamps are available for service.

PSCM

The PSCM is the Electronic Control Unit (ECU) for the EPAS system. The module monitors all sensor inputs and HS-CAN2 messages relating to the EPAS system and directly controls the output of the EPAS motor.

REMOVAL AND INSTALLATION > STEERING GEAR

Special Tool(s) / General Equipment

 E188617	204-816 Rack Holding Tool TKIT-2014D-FL_ROW TKIT-2014D-ROW2
Boot Clamp Pliers	
Oil Drain Equipment	

Materials

Name	Specification
Premium Long-Life Grease XG-1-E1	ESA-M1C75-B
Motorcraft® SAE 5W-30 Premium Synthetic Blend Motor Oil (U.S.) XO-5W30-QSP (U.S.)	WSS-M2C946-A

REMOVAL AND INSTALLATION > STEERING GEAR > REMOVAL

All vehicles

1.

If installing a new steering gear, connect the scan tool and upload the module configuration information from the PSCM. Refer to: MODULE CONFIGURATION .

NOTE: Make sure to minimize damage to sealer foam and avoid pulling apart dash seal brackets from retainer pins. Excessive damage may allow engine noise, fumes, air or water to enter the passenger compartment.

2.

1.

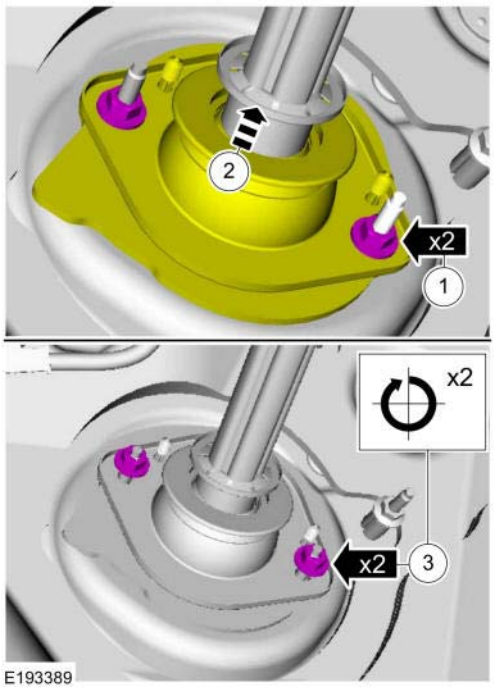
Remove the steering column dash seal nuts.

2.

Loosen the dash seal.

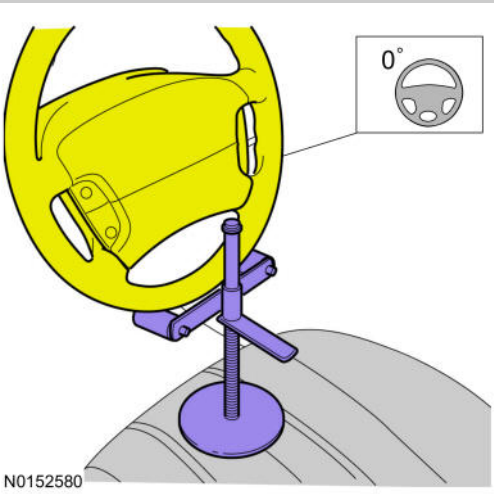
3.

Hand start the dash seal nuts.



3.

Using a holding device, hold the steering wheel in the straight-ahead position.

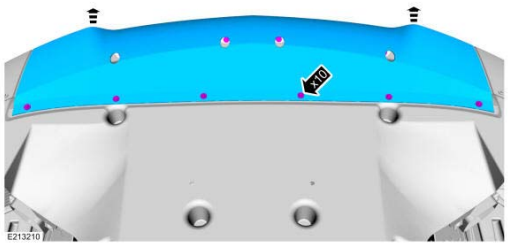


4.

On both sides. Remove the tie rod end. Refer to: Tie Rod End .

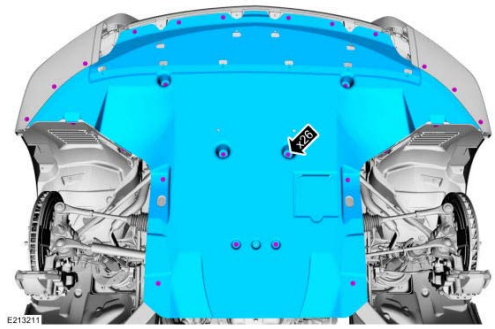
NOTE: If equipped.

5.
Remove the bolts and the underbody shield.



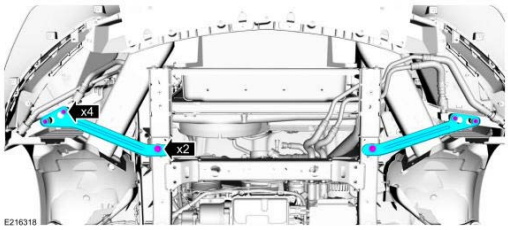
NOTE: If equipped.

6.
Remove the bolts and the underbody shield.



NOTE: If equipped.

7.
Remove the bolts and the support brackets.



NOTE: If equipped.

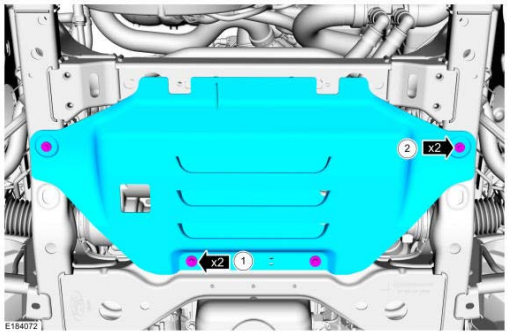
8.

1.

Remove the 2 rearward underbody shield bolts.

2.

Remove the 2 remaining underbody shield bolts and remove the underbody shield.



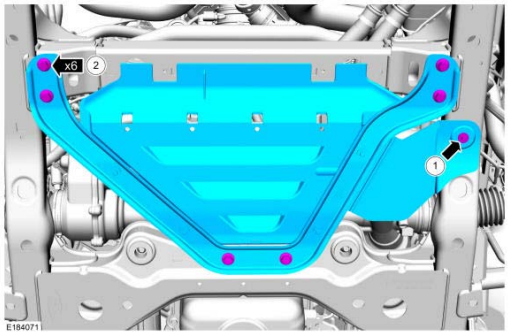
9.

NOTE: If equipped.

1.
Remove the underbody shield bolt.

NOTE: It is not necessary to separate the underbody shield from the V-brace.

2.
Remove the 6 V-brace bolts and remove the V-brace and underbody shield.



WARNING: Do not reuse steering column shaft bolts. This may result in fastener failure and steering column shaft detachment or loss of steering control. Failure to follow this instruction may result in serious injury to vehicle occupant(s).

NOTE: DO NOT hammer, pry or force steering column and column shafts during installation or removal. Failure to follow this instruction may cause damage to steering

components that could lead to loss of steering control during vehicle operation and could result in serious personal injury or death.

NOTE: DO NOT attempt to remove or install the steering column lower coupler at the steering gear without first loosening the steering column dash seal and fasteners. Failure to follow this instruction may cause damage to steering components that could lead to loss of steering control during vehicle operation and could result in serious personal injury or death.

10.
Detach the steering column lower shaft from the lower coupler.

1.

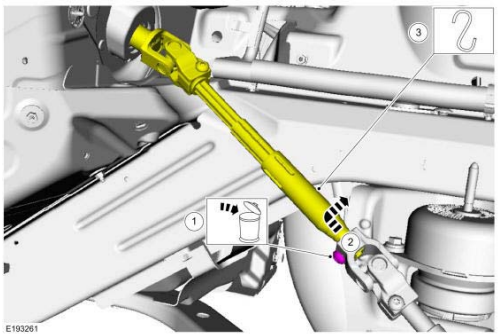
Remove and discard the steering column shaft bolt.

2.

Pull apart the steering column shaft from the coupler.

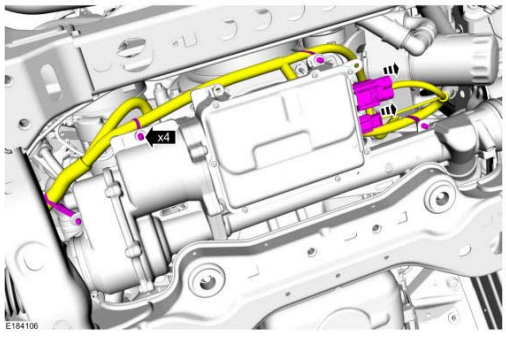
3.

Secure the lower shaft to the frame rail to avoid damaging it during steering gear removal.



11.

Disconnect the 2 EPAS gear electrical connectors and unclip the 4 wiring fasteners and position the wiring harness aside.



NOTE: When servicing inner tie rods, install a new bellows boot and clamps. The boots and clamps are designed to provide an airtight seal and protect the internal components of the steering gear. If the seal is not airtight, the vacuum generated during turning will draw water and contamination into the gear, causing failure of the steering gear components. Zip ties must not be used as they do not provide an airtight seal.

NOTE: The inner ball joint grease is not compatible with water contamination. Do not allow water to become trapped in the grease or degradation and failure of the joint may occur.

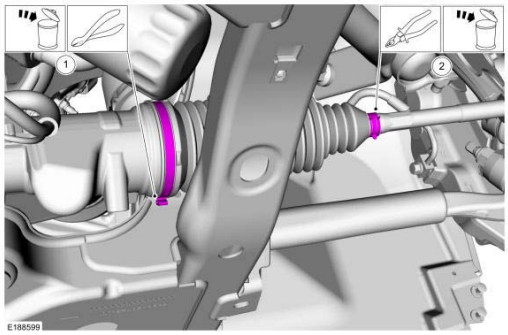
12.

1.

On both sides. Remove and discard the inner bellows boot clamp.

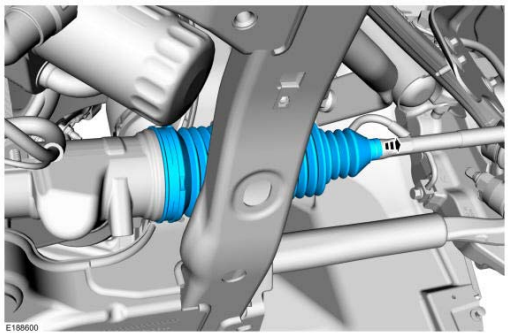
2.

On both sides. Remove and discard the outer bellows boot clamp.



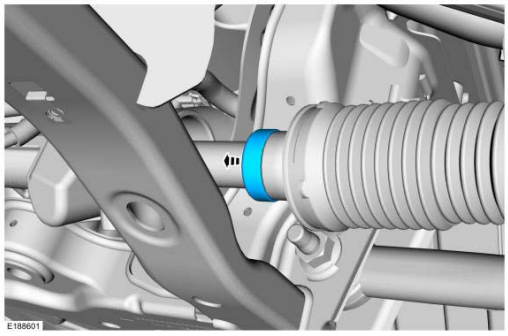
NOTE: Move the bellows boot enough to gain access to the inner tie rod nut.

13.
On both sides.Position aside the bellows boot.



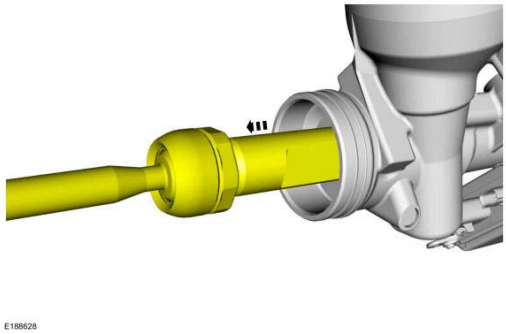
14.

On both sides.Position aside the steering stop.



NOTE: The rack must be positioned completely to the LH side to gain clearance for tools.

15.
Position the steering rack completely to the LH side.



NOTE: Hold the steering gear rack while loosening the inner tie rod. Failure to hold the rack securely could result in steering gear damage.

NOTE: The steering gear rack holding tool must be reversed to remove the RH tie rod or damage to the rack and/or special tool may occur.

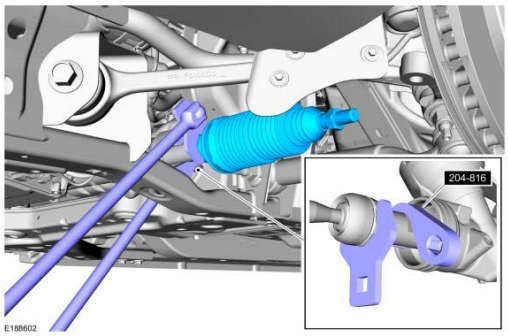
NOTE: The holding tool can only be used on the LH side of the steering gear.

NOTE: LH side shown in illustration, RH side similar.

16.
On both sides. Using the special tool to hold the rack and an appropriate size crows foot wrench

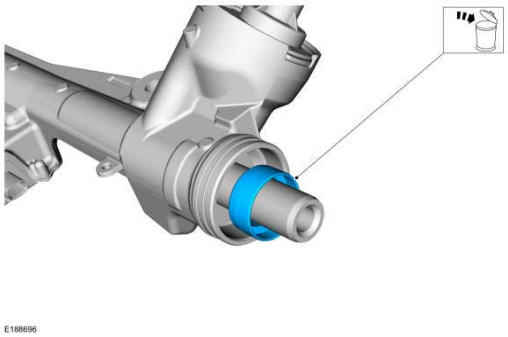
or open end wrench, remove and discard the inner tie rod.

Use Special Service Tool: 204-816 Rack Holding Tool.



17.

On both sides. Remove and discard the steering stop.

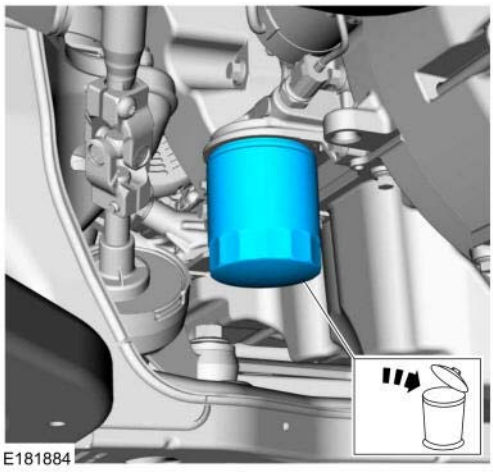


2.3L EcoBoost (231kW/314PS)

18.

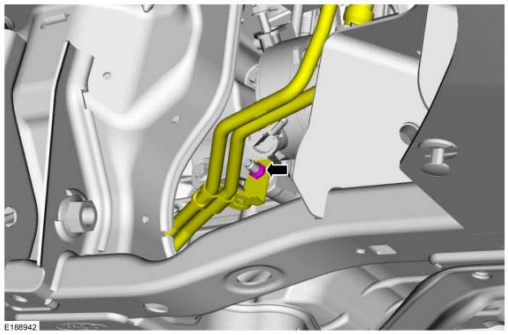
Remove and discard the engine oil filter.

Use the General Equipment: Oil Drain Equipment



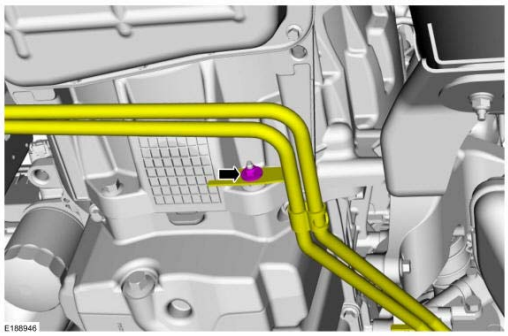
NOTE: If equipped with 2.3L EcoBoost and automatic transmission.

19.
Remove the transmission fluid cooler tubes bracket-to-engine mount nut.



NOTE: If equipped with 2.3L EcoBoost and automatic transmission.

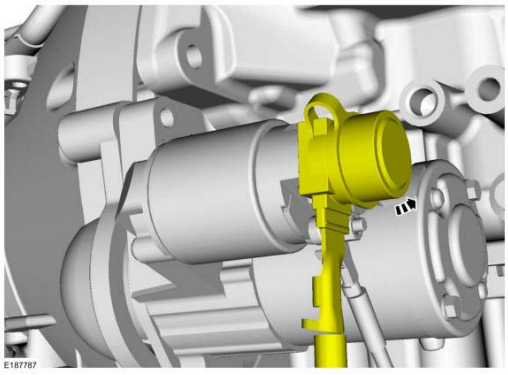
20.
Remove the transmission fluid cooler tubes bracket-to-transmission nut and position the tubes aside.



3.7L Duratec (227kW/301PS)

21.

Open the starter motor solenoid battery cable cover.



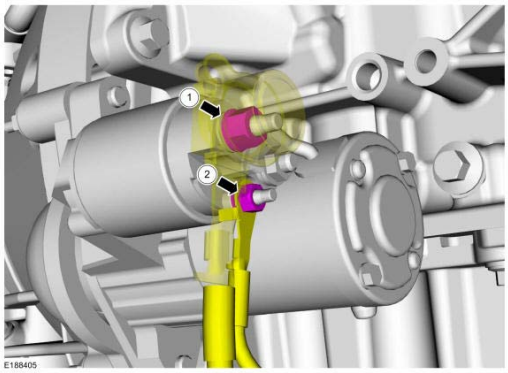
22.

1.

Remove the starter motor solenoid battery cable nut and then disconnect the starter motor solenoid battery cable.

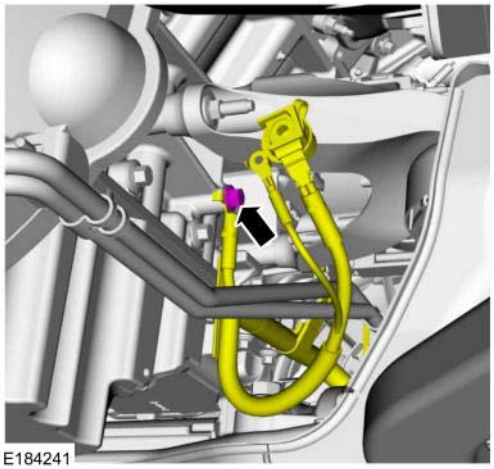
2.

Remove the starter motor solenoid wire nut and then disconnect starter motor solenoid wire.



NOTE: Automatic transmission shown in illustration, manual transmission similar.

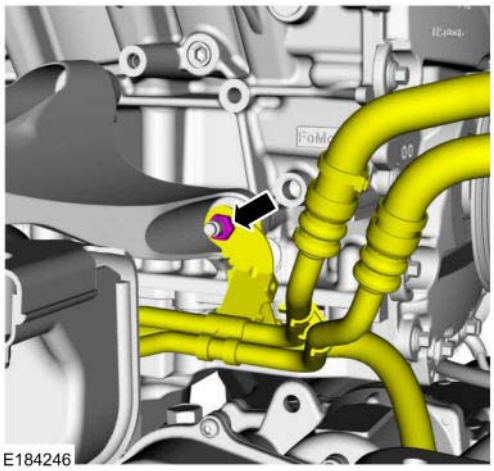
23.
Remove the bolt and ground wire from the RH side of the engine.



6-Speed Automatic Transmission - 6R80

24.

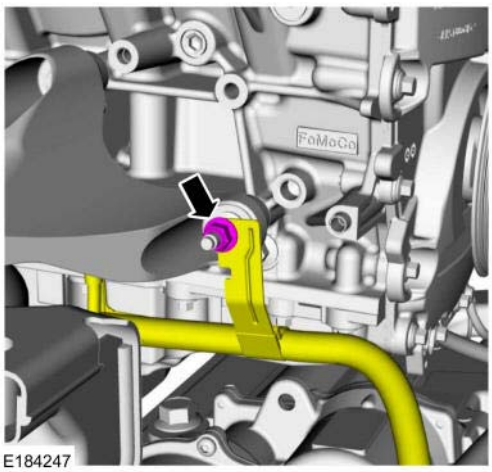
Remove the nut from the front of the RH engine mount bracket stud bolt and position the brackets for the transmission cooling tubes and wire harness aside.



6-Speed Manual Transmission - MT82

25.

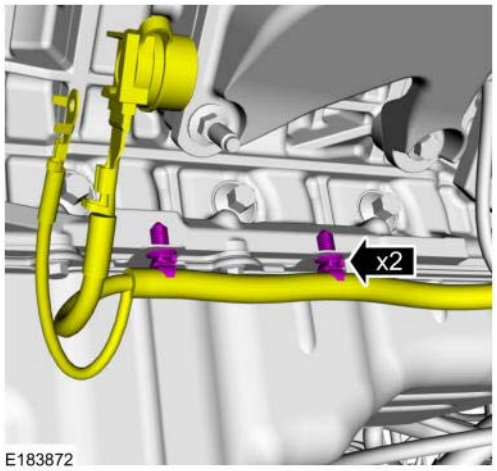
Remove the nut from the front of the RH engine mount bracket stud bolt and position the bracket for the wire harness aside.



5.0L 32V Ti-VCT/5.2L 32V Ti-VCT

26.

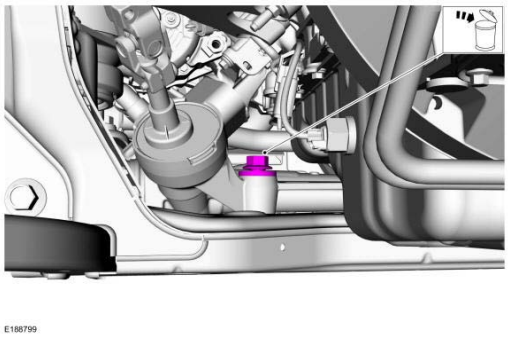
Detach the wire harness retainers from the oil pan.



All vehicles

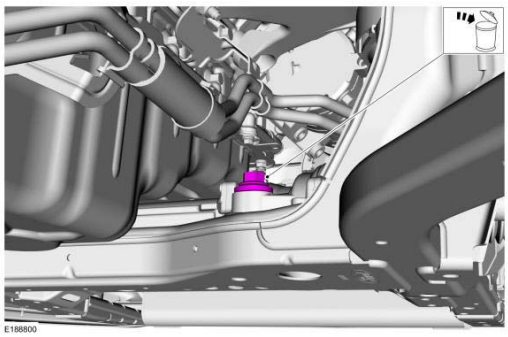
28.

Remove and discard the LH steering gear bolt.



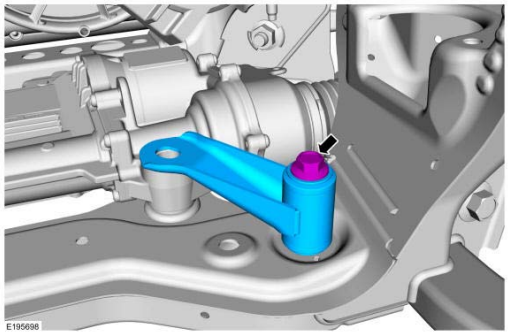
29.

Remove and discard the RH steering gear bolt.



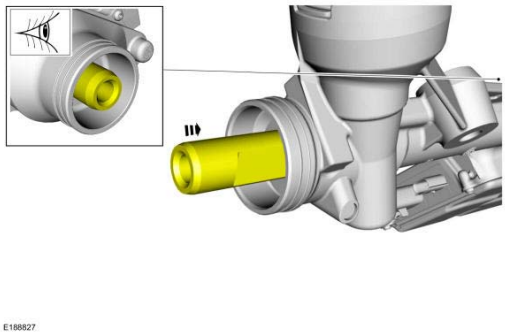
30.

On convertible vehicles. If equipped.Remove the steering gear bracket bolt and the steering gear bracket.



NOTE: The steering gear rack must be positioned so that the end of the rack is flush with the RH side of the steering gear case to gain clearance for removal.

31.
Position the steering gear rack so the end of the rack is flush with the RH side of the steering gear case.



NOTE: It will be necessary to slide the steering gear to the LH side of the vehicle, then rotate and remove by lowering the RH side of the steering gear in order to remove it from the vehicle.

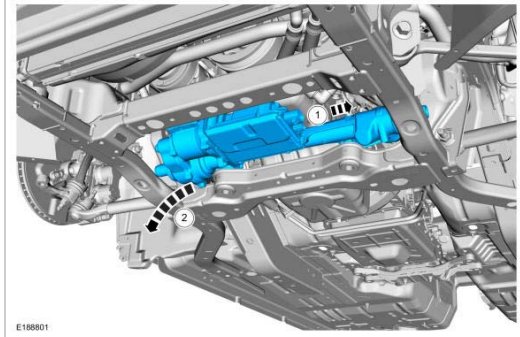
32.
Remove the steering gear.

1.

Slide the steering gear to the LH side of the vehicle.

2.

Lower the RH side of the steering gear and remove it from the vehicle.



NOTE: This step is only necessary when installing a new component.

33.

WARNING: Do not reuse steering column shaft bolts. This may result in fastener failure and steering column shaft detachment or loss of steering control. Failure to follow this instruction may result in serious injury to vehicle occupant(s).

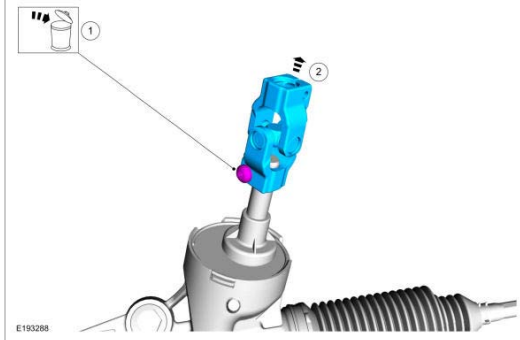
NOTE: DO NOT attempt to remove or install the steering column lower coupler at the steering gear without first loosening the steering column dash seal and fasteners. Failure to follow this instruction may cause damage to steering components that could lead to loss of steering control during vehicle operation and could result in serious personal injury or death.

1.

Remove and discard the steering coupler bolt.

2.

Remove the steering coupler.



REMOVAL AND INSTALLATION > STEERING GEAR > INSTALLATION

All vehicles

NOTE: This step is only necessary when installing a new component.

1.

1.

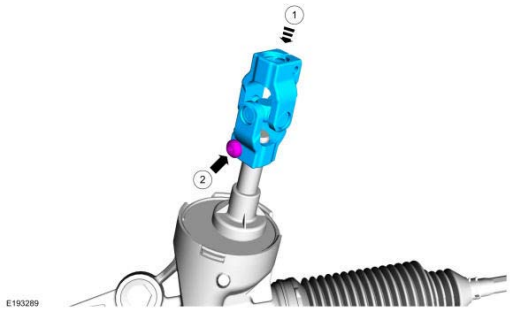
Install the steering coupler.

2.

Install the new steering coupler bolt.

Torque

: 22 lb.ft (30 Nm)



NOTE: The steering gear is shipped without the inner tie rods attached. The inner tie rods, bellows boots, bellows boot clamps and tie rod end jamb nuts are supplied in a kit and are to be installed after the steering gear is installed into the vehicle.

NOTE: It will be necessary to raise the LH side of the steering gear and slide it to the LH side of the vehicle, then rotate and raise the RH side of the steering gear in order to install it into the vehicle.

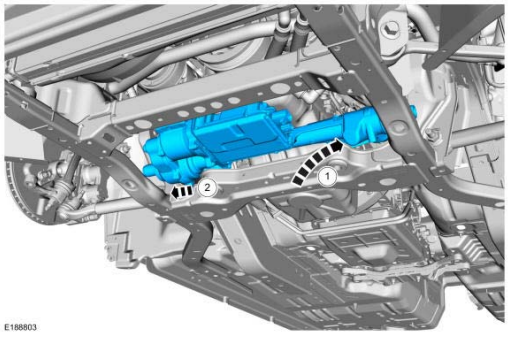
2.
Install the steering gear.

1.

Lift the LH side of the steering gear and slide it to the LH side of the vehicle.

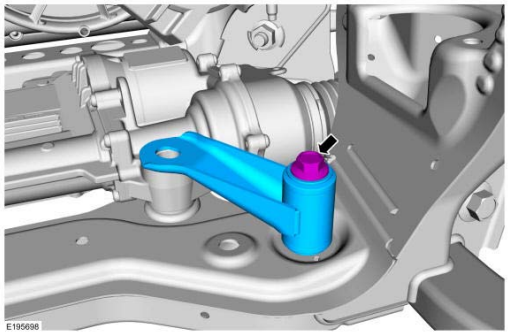
2.

Raise the RH side of the steering gear and slide it to the RH side of the vehicle.



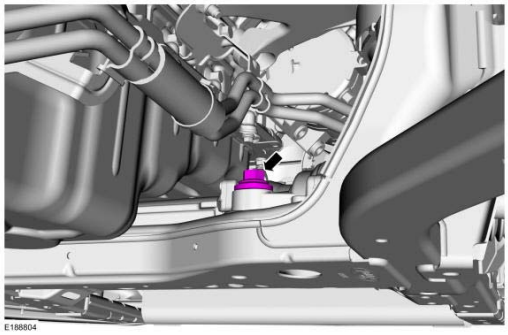
NOTE: Only tighten the bolt finger tight at this stage.

3.
On convertible vehicles. If equipped.Install the steering gear bracket and the steering gear bracket bolt.



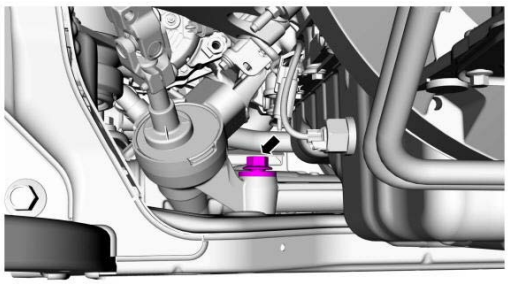
NOTE: Only tighten the bolt finger tight at this stage.

4.
Install the new RH steering gear bolt.



NOTE: Only tighten the bolt finger tight at this stage.

5.
Install the new LH steering gear bolt.

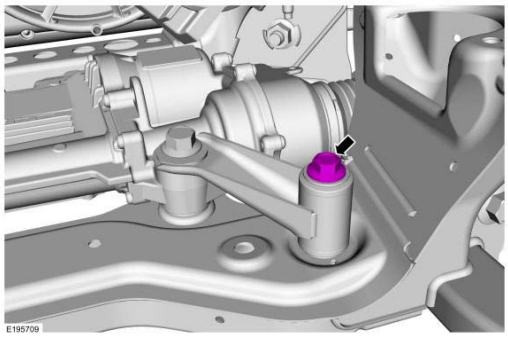


6.

On convertible vehicles. If equipped.Tighten the steering gear bracket bolt.

Torque

: 85 lb.ft (115 Nm)

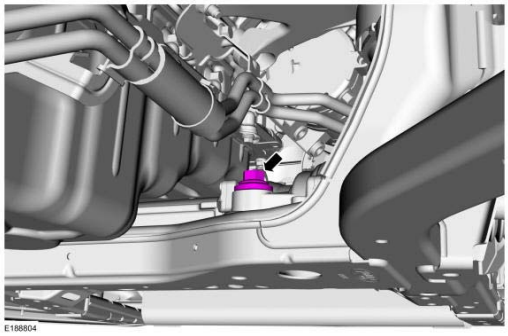


7.

Tighten the new RH steering gear bolt.

Torque

: 148 lb.ft (200 Nm)

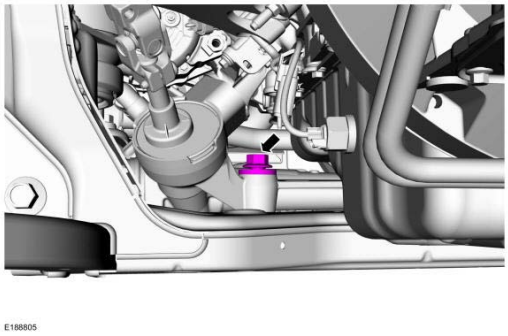


8.

Tighten the new LH steering gear bolt.

Torque

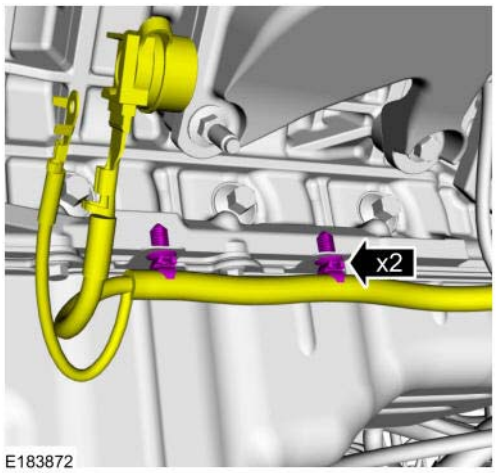
: 148 lb.ft (200 Nm)



5.0L Ti-VCT V8 (308kW/418PS)

9.

Attach the wire harness retainers to the oil pan.



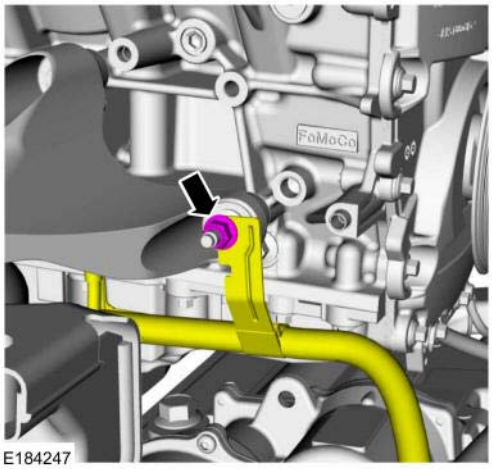
6-Speed Manual Transmission - MT82

10.

Position the bracket for the wire harness and install the nut on the front of the RH engine mount bracket stud bolt.

Torque

: 35 lb.ft (47.5 Nm)



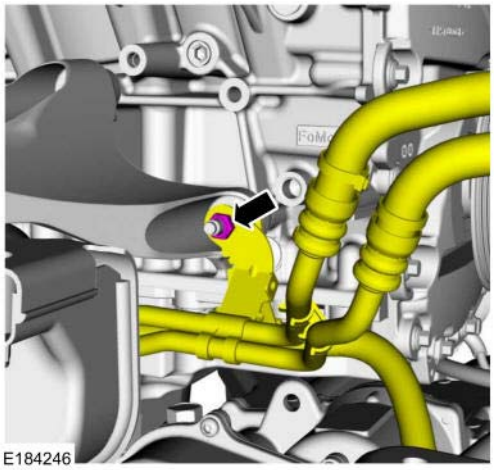
6-Speed Automatic Transmission - 6R80

11.

Position the brackets for the transmission cooling tubes and wire harness and install the nut on the front of the RH engine mount bracket stud bolt.

Torque

: 35 lb.ft (47.5 Nm)



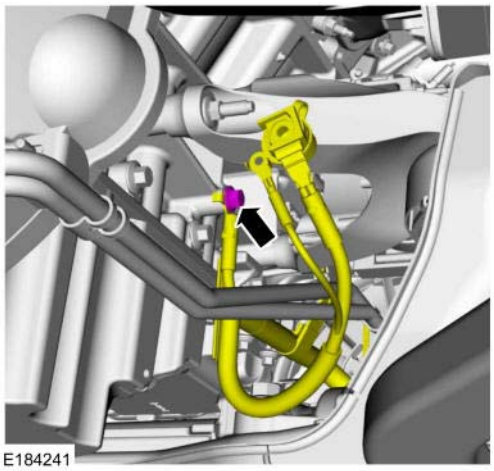
3.7L Duratec (227kW/301PS)

NOTE: Automatic transmission shown in illustration, manual transmission similar.

12.
Position the ground wire and install the bolt to the RH side of the engine.

Torque

: 35 lb.ft (47.5 Nm)



13.

1.

Connect starter motor solenoid wire and install the starter motor solenoid wire nut.

Torque

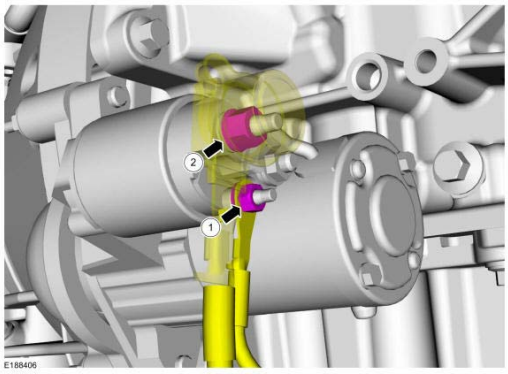
: 53 lb.in (6 Nm)

2.

Connect the starter motor solenoid battery cable and install the starter motor solenoid battery cable nut.

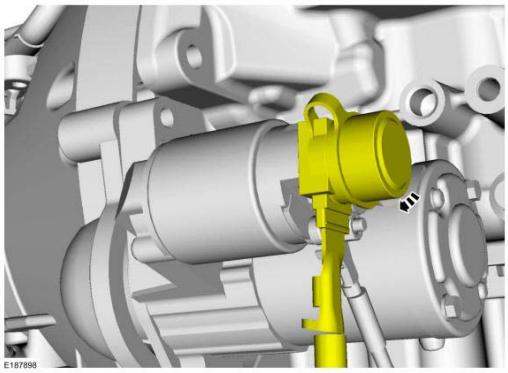
Torque

: 106 lb.in (12 Nm)



14.

Close the starter motor solenoid battery cable cover.



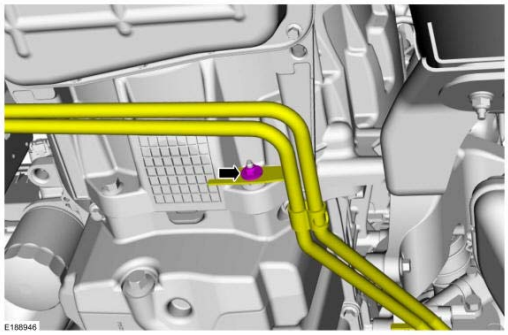
2.3L EcoBoost (231kW/314PS)

> *NOTE: If equipped with 2.3L EcoBoost and automatic transmission.*

15.
Position the tubes and install the transmission fluid cooler tubes bracket-to-transmission nut.

Torque

: 124 lb.in (14 Nm)

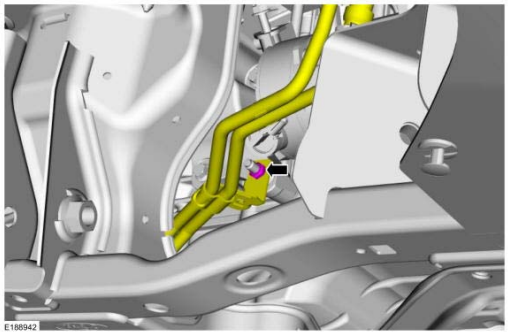


> *NOTE: If equipped with 2.3L EcoBoost and automatic transmission.*

16.
Install the transmission fluid cooler tubes bracket-to-engine mount nut.

Torque

: 35 lb.ft (48 Nm)



17.

Install the new engine oil filter.

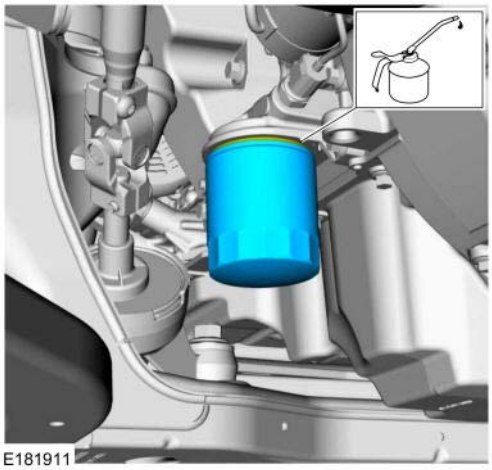
Material

: Motorcraft® SAE 5W-30 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W30-QSP (U.S.) (WSS-M2C946-A)

Torque:

Stage 1: 71 lb.in (8 Nm)

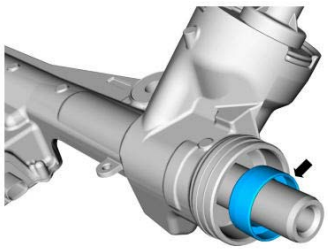
Stage 2: 180°



All vehicles

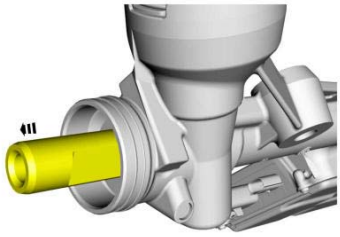
18.

On both sides. Position the new steering stop.



19.

Position the steering rack completely to the LH side.



NOTE: Hold the steering gear rack while tightening the inner tie rod. Failure to hold the rack securely could result in steering gear damage.

NOTE: The steering gear rack holding tool must be reversed to install the RH tie rod or damage to the rack and/or special tool may occur.

NOTE: The holding tool can only be used on the LH side of the steering gear.

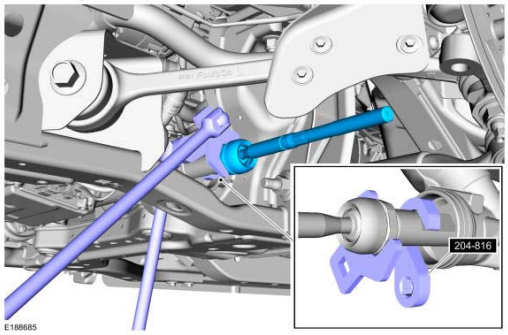
NOTE: LH side shown in illustration, RH side similar.

20.
On both sides.Using the special tool to hold the rack and an appropriate size crows foot wrench or open end wrench, install the inner tie rod and steering stop.

Use Special Service Tool: 204-816 Rack Holding Tool.

Torque

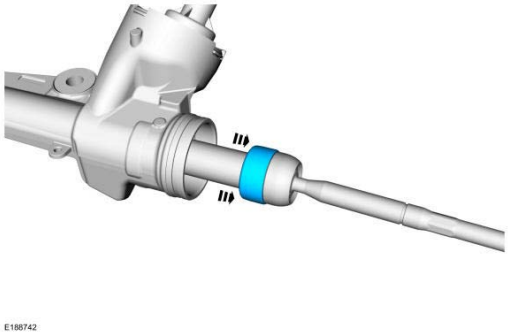
: 89 lb.ft (120 Nm)



NOTE: An audible click will be heard when the steering stop seats onto the inner tie rod. Make sure that the steering stop is fully seated and cannot be separated by hand.

NOTE: Install the steering stop using hand force only. Striking the steering stop may cause damage to the stop.

21.
On both sides.Install the steering stop onto the inner tie rod using hand force only.

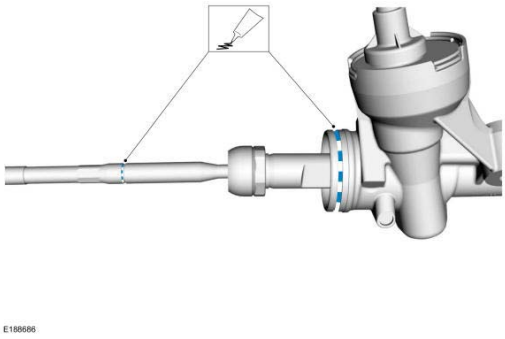


22.

On both sides.Apply the specified grease to the steering gear-to-bellows boot mating surface and bellows boot groove on the inner tie-rod.

Material

: Premium Long-Life Grease / XG-1-E1 (ESA-M1C75-B)



NOTE: LH side shown in illustration, RH side similar.

23.

NOTE: Make sure the steering gear bellows boot is positioned correctly over the steering gear housing bead and the groove in the inner tie rod.

1.
On both sides. Install the new steering gear bellows boot.

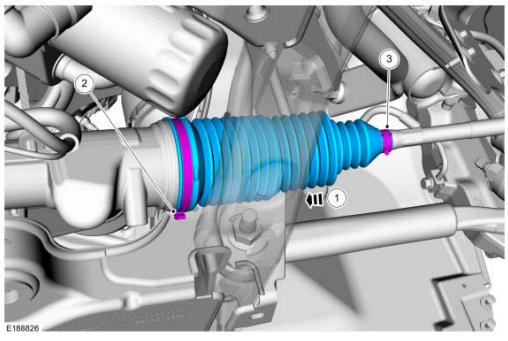
2.

On both sides. Install the new inner bellows boot clamp.

Use the General Equipment: Boot Clamp Pliers

3.

On both sides. Install the new outer bellows boot clamp.



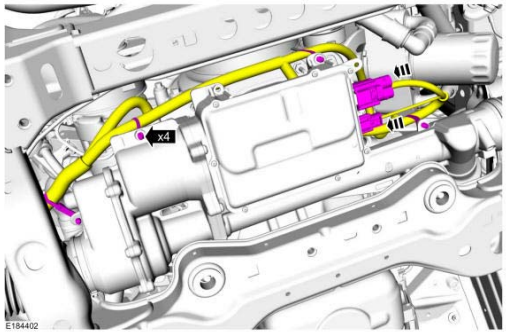
24.

On both sides.Thread the tie-rod end jam nut onto the inner tie rod.



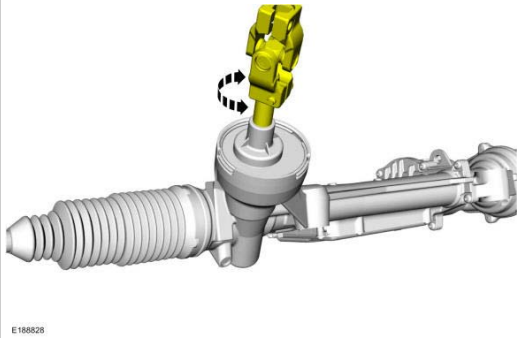
25.

Position the EPAS gear wiring harness, clip the 4 wiring fasteners and connect the 2 electrical connectors.



NOTE: Make sure steering gear is centered before connecting the steering column shaft. Damage to the steering gear and/or clockspring may result.

26.
Turn the steering gear input shaft completely to the right then completely to the left and return to the center position.



NOTE: DO NOT hammer, pry or force steering column and column shafts during installation or removal. Failure to follow this instruction may cause damage to steering components that could lead to loss of steering control during vehicle operation and could result in serious personal injury or death.

NOTE: DO NOT attempt to remove or install the steering column lower coupler at the steering gear without first loosening the steering column dash seal and fasteners. Failure to follow this instruction may cause damage to steering components that could lead to loss of steering control during vehicle operation and could result in serious personal injury or death.

27.

1.

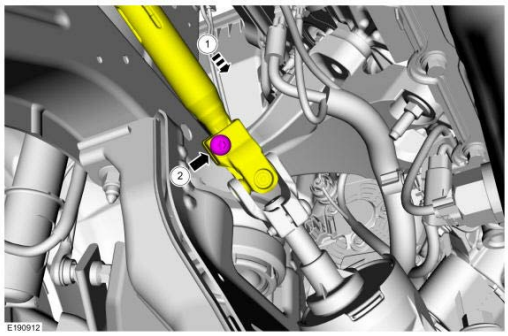
Connect the steering column shaft to the steering gear universal joint.

2.

Install the new steering column shaft bolt.

Torque

: 22 lb.ft (30 Nm)



28.

Inspect the steering column lower shaft. Refer to: Steering Column Collapsed Check .

29.

NOTE: If equipped.

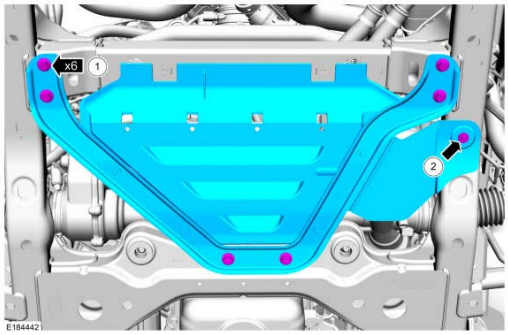
1.
Position the V-brace and underbody shield and install the 6 V-brace bolts.

Torque

: 46 lb.ft (63 Nm)

2.

Install the underbody shield bolt.



NOTE: If equipped.

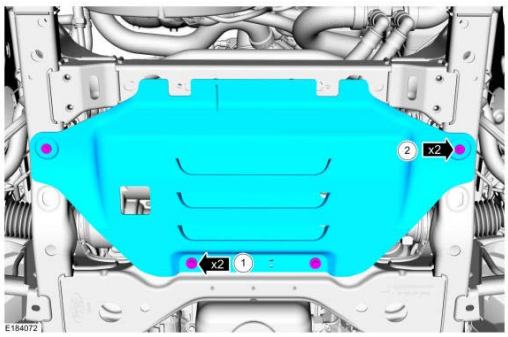
30.

1.

Position the underbody shield and install the 2 rearward underbody shield bolts.

2.

Install the 2 remaining underbody shield bolts.



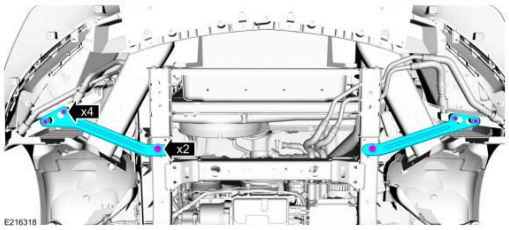
NOTE: If equipped.

31.
Install the 2 support brackets and the bolts.

Torque:

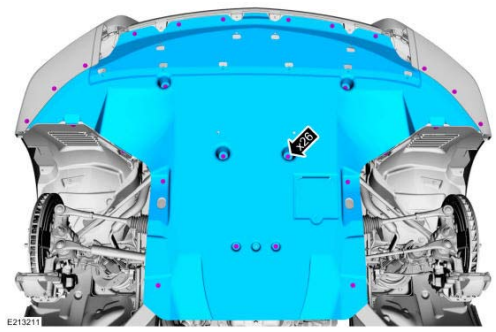
Bracket to subframe bolts: 22 lb.ft (30 Nm)

Bracket to cooler bolts: 93 lb.in (10.5 Nm)



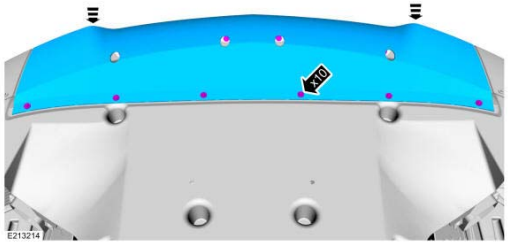
NOTE: If equipped.

32.
Position the underbody shield and install the bolts.



NOTE: If equipped.

33.
Position the underbody shield and install the bolts.



34.

On both sides.Install the tie rod end. Refer to: Tie Rod End .

35.

1.

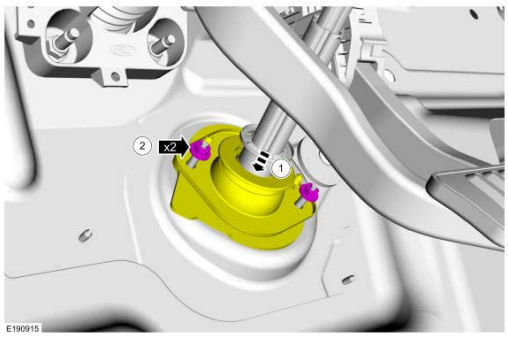
Position the steering column dash seal.

2.

Tighten the steering column dash seal nuts.

Torque

: 80 lb.in (9 Nm)



36.

Turn the steering wheel lock-to-lock to assure the steering stops are fully seated.

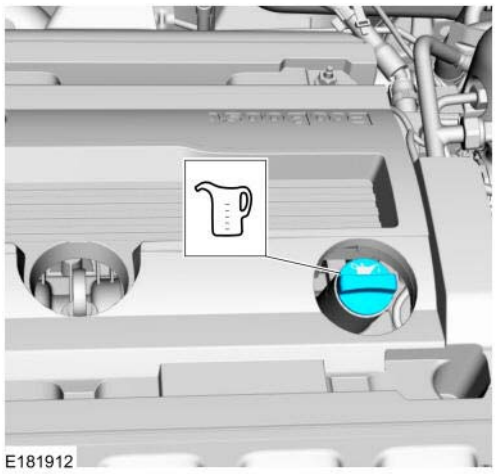
2.3L EcoBoost (231kW/314PS)

37.

Fill the engine with clean engine oil. Refer to: SPECIFICATIONS - 2.3L EcoBoost (231kW/314PS).

Material

: Motorcraft® SAE 5W-30 Premium Synthetic Blend Motor Oil (U.S.) / XO-5W30-QSP (U.S.) (WSS-M2C946-A)



All vehicles

38.

When installing a new steering gear, it must be configured (using vehicle as-built data or module

configuration information retrieved earlier in this procedure). Connect a scan tool and follow the scan tool instructions. Refer to: MODULE CONFIGURATION .

39.

Check and if necessary adjust front toe. Refer to: Front Toe Adjustment .

REMOVAL AND INSTALLATION > TIE ROD

Special Tool(s) / General Equipment

 E188617	204-816 Rack Holding Tool TKIT-2014D-FL_ROW TKIT-2014D-ROW2
Boot Clamp Pliers	

Materials

Name	Specification
Premium Long-Life GreaseXG-1-E1	ESA-M1C75-B

REMOVAL AND INSTALLATION > TIE ROD > REMOVAL

NOTE: When servicing inner tie rods, install a new bellows boot and clamps. The boots and clamps are designed to provide an airtight seal and protect the internal components of the steering gear. If the seal is not airtight, the vacuum generated during turning will draw water and contamination into the gear, causing failure of the steering gear components. Zip ties must not be used as they do not provide an airtight seal.

NOTE: The inner ball joint grease is not compatible with water contamination. Do not allow water to become trapped in the grease or degradation and failure of the joint may occur.

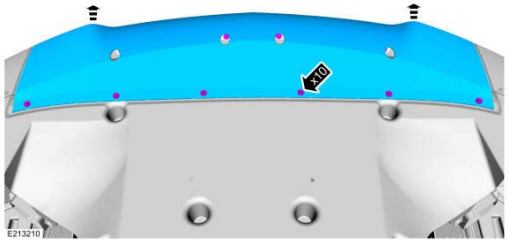
NOTE: If the RH inner tie rod is being serviced, remove the LH outer tie rod end and bellows boot to access and hold the steering rack when loosening and tightening the inner tie rod.

1.

Remove the tie rod end. Refer to: Tie Rod End .

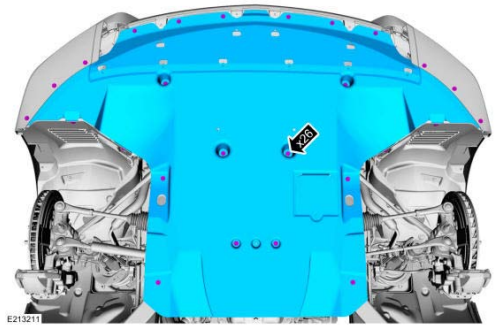
NOTE: If equipped.

2.
Remove the bolts and the underbody shield.



NOTE: If equipped.

3.
Remove the bolts and the underbody shield.



NOTE: If equipped.

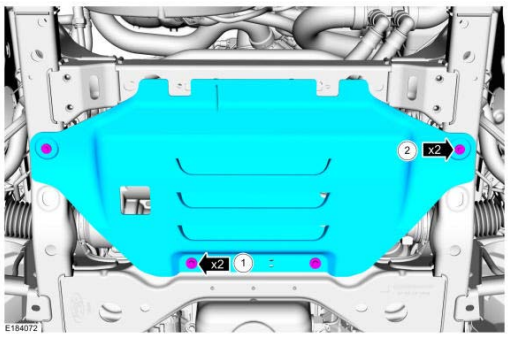
4.

1.

Remove the 2 rearward underbody shield bolts.

2.

Remove the 2 remaining underbody shield bolts and remove the underbody shield.



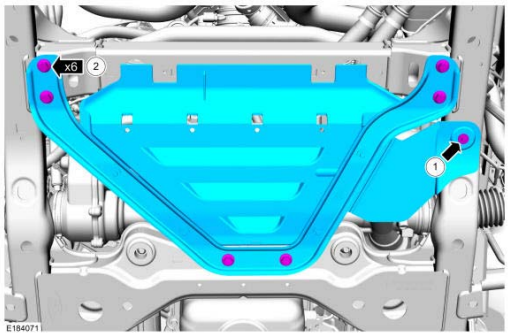
5.

NOTE: If equipped.

1.
Remove the underbody shield bolt.

NOTE: It is not necessary to separate the underbody shield from the V-brace.

2.
Remove the 6 V-brace bolts and remove the V-brace and underbody shield.



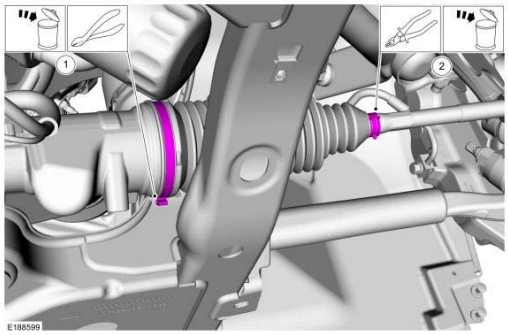
6.

1.

Remove and discard the inner bellows boot clamp.

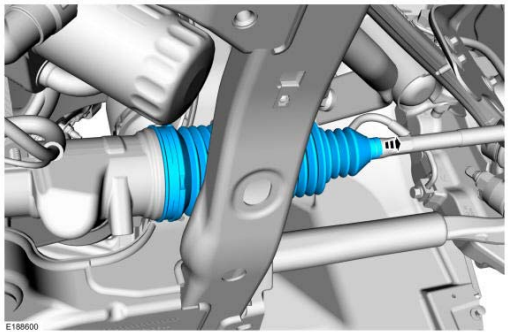
2.

Remove and discard the outer bellows boot clamp.



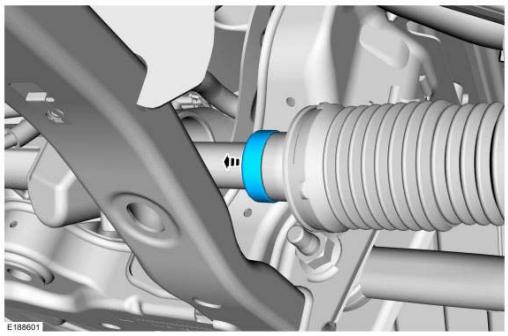
NOTE: Move the bellows boot enough to gain access to the inner tie rod nut.

7.
Position aside the bellows boot.



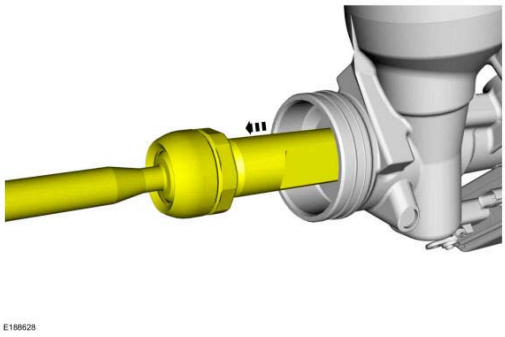
8.

Position aside the steering stop.



9.

Position the steering rack completely to the left.



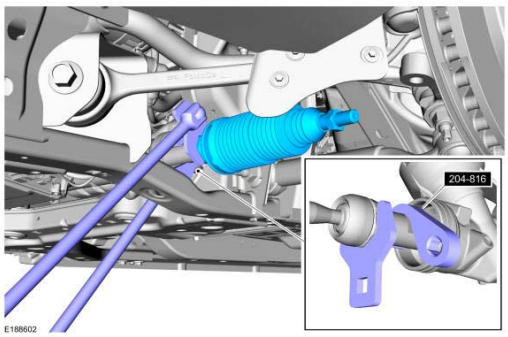
NOTE: The holding tool can only be used on the LH side of the steering gear.

NOTE: The steering gear rack holding tool must be reversed to remove the RH tie rod or damage to the rack and/or special tool may occur.

NOTE: Hold the steering gear rack while loosening the inner tie rod. Failure to hold the rack securely could result in steering gear damage.

10.
Using the special tool to hold the rack and an appropriate size crows foot wrench or open end wrench, remove and discard the inner tie rod.

Use Special Service Tool: 204-816 Rack Holding Tool.



11.

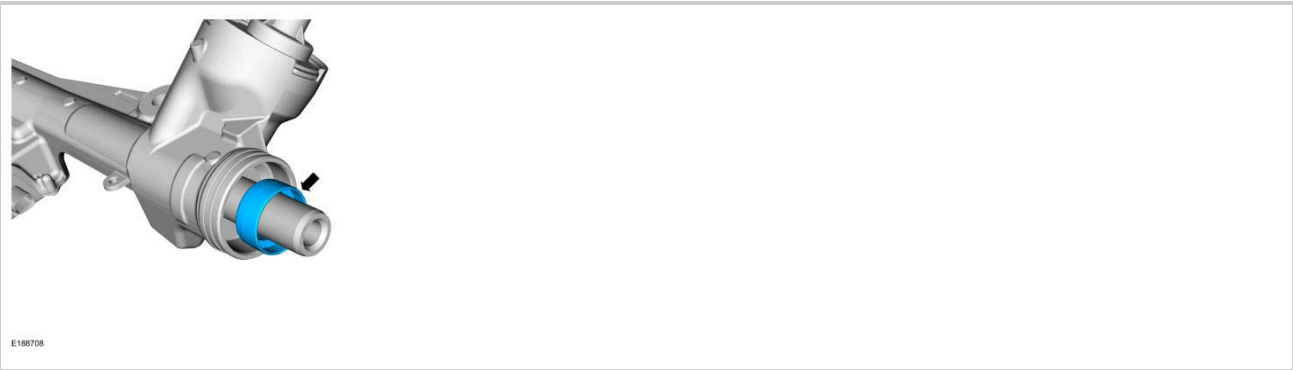
Remove and discard the steering stop.



REMOVAL AND INSTALLATION > TIE ROD > INSTALLATION

1.

Position the new steering stop.



NOTE: Hold the steering gear rack while loosening the inner tie rod. Failure to hold the rack securely could result in steering gear damage.

NOTE: The steering gear rack holding tool must be reversed to install the RH tie rod or damage to the rack and/or special tool may occur.

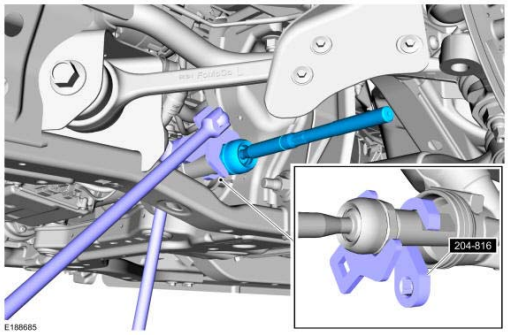
NOTE: The holding tool can only be used on the LH side of the steering gear.

2.
Using the special tool to hold the rack and an appropriate size crows foot wrench or open end wrench, install the inner tie rod and steering stop.

Use Special Service Tool: 204-816 Rack Holding Tool.

Torque

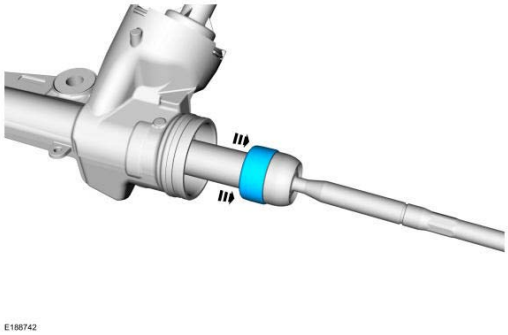
: 89 lb.ft (120 Nm)



NOTE: Install the steering stop using hand force only. Striking the steering stop may cause damage to the stop.

NOTE: An audible click will be heard when the steering stop seats onto the inner tie rod. Make sure that the steering stop is fully seated and cannot be separated by hand.

3.
Install the steering stop onto the inner tie rod using hand force only.

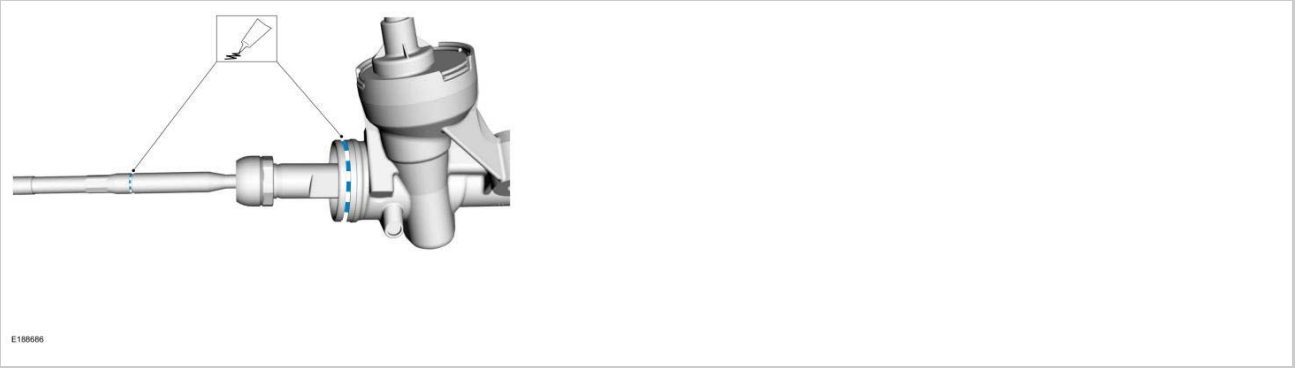


4.

Apply the specified grease to the steering gear-to-bellows boot mating surface and bellows boot groove on the inner tie-rod.

Material

: Premium Long-Life Grease / XG-1-E1 (ESA-M1C75-B)



NOTE: LH side shown in illustration, RH side similar.

5.

NOTE: Make sure the steering gear bellows boot is positioned correctly over the steering gear housing bead and the groove in the inner tie rod.

1.
Install the new steering gear bellows boot.

2.

Install the new inner bellows boot clamp.

Use the General Equipment: Boot Clamp Pliers

3.

Install the new outer bellows boot clamp.



6.

Thread the tie-rod end jam nut onto the inner tie rod.



7.

NOTE: If equipped.

1.
Position the V-brace and underbody shield and install the 6 V-brace bolts.

Torque

: 46 lb.ft (63 Nm)

2.

Install the underbody shield bolt.



NOTE: If equipped.

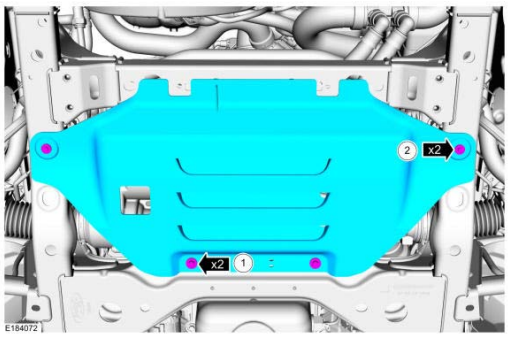
8.

1.

Position the underbody shield and install the 2 rearward underbody shield bolts.

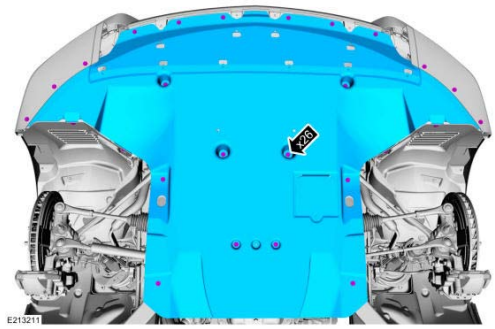
2.

Install the 2 remaining underbody shield bolts.



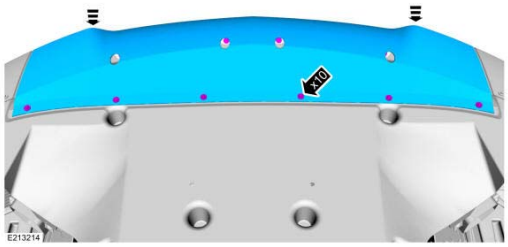
NOTE: If equipped.

9.
Position the underbody shield and install the bolts.



NOTE: If equipped.

10.
Position the underbody shield and install the bolts.



11.

Install the tie rod end.Refer to: Tie Rod End .

12.

Turn the steering wheel lock-to-lock to assure the steering stops are fully seated.

REMOVAL AND INSTALLATION > TIE ROD END

Special Tool(s) / General Equipment

Tie Rod End Remover

REMOVAL AND INSTALLATION > TIE ROD END > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

NOTE: Disconnect the battery ground cable anytime the steering linkage is being serviced or damage to the steering gear may occur resulting in steering gear replacement.

1.
Disconnect the battery ground cable. Refer to: Battery Disconnect and Connect .

2.

Remove the wheel and tire. Refer to: Wheel and Tire .

3.

1.

Loosen the tie rod end jam nut.

Torque

: 76 lb.ft (103 Nm)

2.

Remove and discard the outer tie rod end nut.

Torque:

Non SVT: 59 lb.ft (80 Nm)

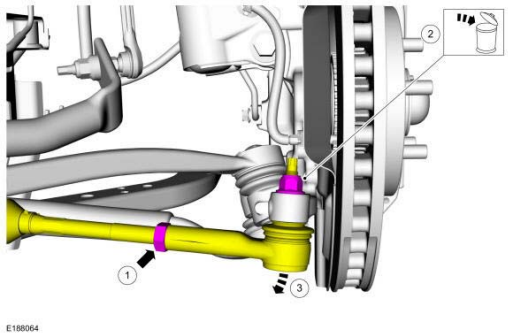
SVT: 30 lb.ft (40 Nm)

NOTE: Do not use a hammer to separate the outer tie-rod end from the wheel spindle or damage to the wheel spindle may result.

NOTE: Use care when installing the tie rod separator or damage to the outer tie-rod end boot may occur.

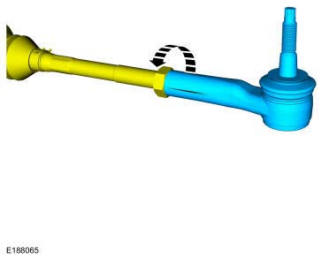
3.
Separate the outer tie rod end from the wheel spindle.

Use the General Equipment: Tie Rod End Remover



NOTE: Count and record the number of turns required to remove the outer tie-rod end for reference during installation.

4.
Remove the tie-rod end.



REMOVAL AND INSTALLATION > TIE ROD END > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Check and if necessary, adjust front toe. Refer to: Front Toe Adjustment .

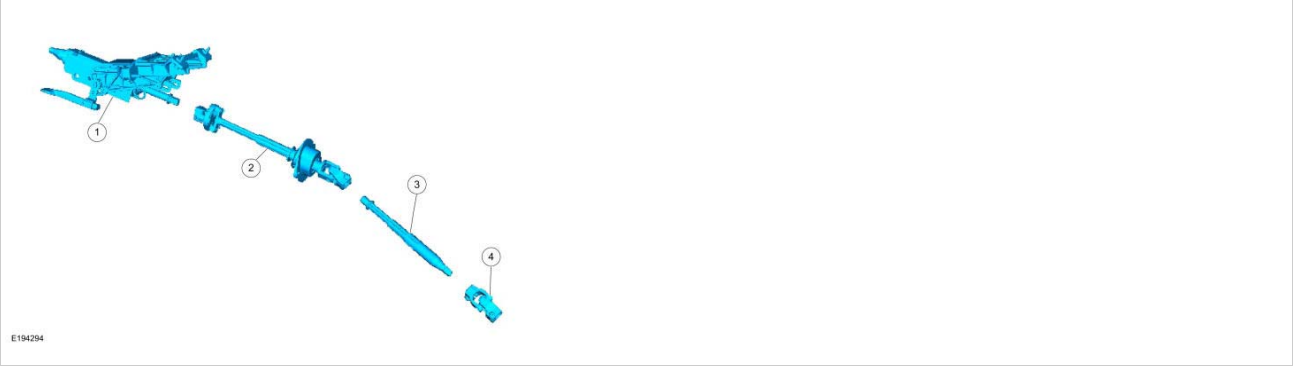
Service Manual: STEERING COLUMN

DESCRIPTION AND OPERATION > STEERING COLUMN - OVERVIEW

Authoring Template

DESCRIPTION AND OPERATION > STEERING COLUMN - OVERVIEW > STEERING COLUMN OVERVIEW

The steering column is the mechanical linkage between the steering wheel and the steering gear. The steering wheel is mounted to a shaft, which passes through the center of the steering column. The shaft is centered by bearings within the steering column. The upper and lower steering column shafts then connect the steering column to the steering gear. The lower steering column shaft is a collapsible shaft and needs to be measured any time the shaft has been disconnected from the upper shaft or the coupling.



Item	Description
1	Steering column
2	Steering column upper shaft
3	Steering column lower shaft
4	Steering column coupling

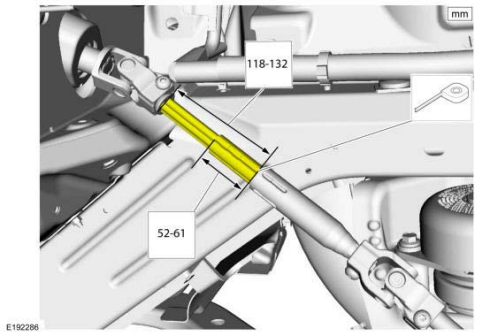
GENERAL PROCEDURES > STEERING COLUMN COLLAPSED CHECK

Inspection

Left hand drive

1.

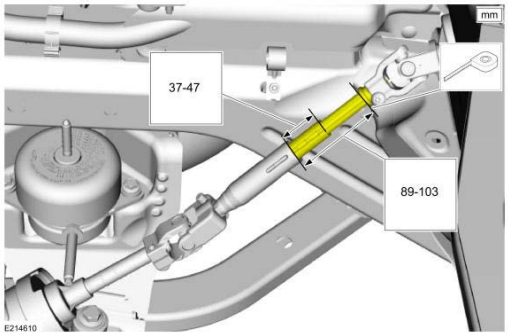
With the steering system fully assembled, measure the lengths of the lower shaft. If either length is out of range, discard the lower shaft and install a new one. Do not attempt to repair the shaft.



Right hand drive

2.

With the steering system fully assembled, measure the lengths of the lower shaft. If either length is out of range, discard the lower shaft and install a new one. Do not attempt to repair the shaft.



GENERAL PROCEDURES > STEERING WHEEL COVER REPAIR

Materials

Name	Specification
Instant Gel Adhesive TA-19	WSK-M2G402-A4

Activation

NOTE: If re-adhering leather to the front side of the steering wheel only, it will not be necessary to remove the steering wheel. Steering wheel removal is necessary only when repairing loose leather on the backside of the steering wheel.

1.
If necessary, remove the steering wheel. Refer to: Steering Wheel .

2.

Position the loose leather out of the way.

3.

Apply the specified adhesive evenly over the wheel spoke.

Material

: Instant Gel Adhesive / TA-19 (WSK-M2G402-A4)

4.

Position the loose leather back into the original position.

> *NOTE: The adhesive should be completely set after 5 minutes. Do not pull on the repair area.*

5.
Smooth the leather and tuck in for neat appearance.

6.

Apply pressure (for at least 30 seconds) until the leather is bonded to the wheel spoke.

7.

If removed, install the steering wheel. Refer to: Steering Wheel .

REMOVAL AND INSTALLATION > STEERING COLUMN > REMOVAL

All vehicles

> *NOTE: DO NOT hammer, pry or force steering column and column shafts during installation or removal. Failure to follow this instruction may cause damage to steering components that could lead to loss of steering control during vehicle operation and could result in serious personal injury or death.*

> *NOTE: Do not allow the steering column to rotate while the steering column shaft system is disconnected or damage to the steering column electrical components may result.*

> *NOTE: LHD shown in illustration below, RHD similar.*

> *NOTE: Removal steps in this procedure may contain installation details.*

NOTE: This step is only necessary when installing a new component.

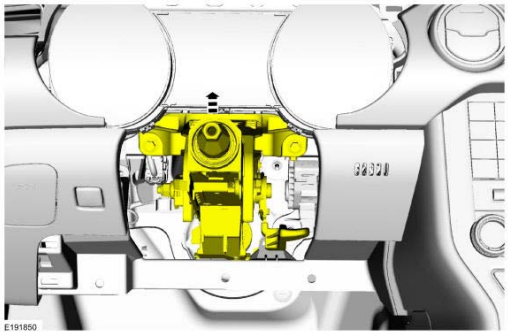
1.
Remove the SCCM. Refer to: Steering Column Control Module (SCCM) .

2.

Remove the driver knee airbag. Refer to: Driver Knee Airbag .

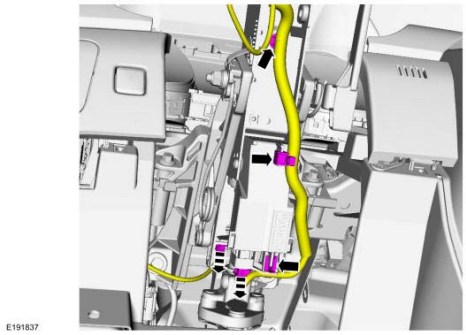
3.

Position the steering column in the full up/rearward position.



NOTE: Vehicles equipped with electronic steering column lock shown in illustration below, vehicles without similar.

4.
Remove the retainers and disconnect the steering column electrical connectors.

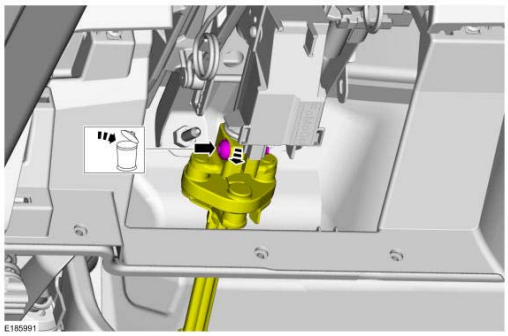


NOTE: Do not reuse steering column shaft bolts. This may result in fastener failure and steering column shaft detachment or loss of steering control. Failure to follow this instruction may result in serious injury to vehicle occupant(s).

5.
Remove and discard the bolt and pull apart the upper steering column shaft from the steering column.

Torque

: 22 lb.ft (30 Nm)



NOTE: The front and rear fasteners are not the same. DO NOT install in place of one another.

6.
Remove the steering column.

1.

Remove and discard the bolts.

Torque

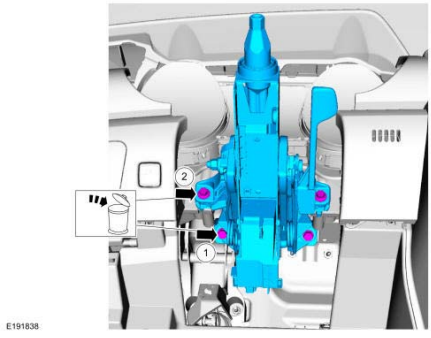
: 18 lb.ft (25 Nm)

2.

Remove and discard the bolts. Remove the steering column.

Torque

: 18 lb.ft (25 Nm)



With security pack

NOTE: This step is only necessary when installing a new component.

7.
Remove the steering column lock module. Refer to: Steering Column Lock Module .

REMOVAL AND INSTALLATION > STEERING COLUMN > INSTALLATION

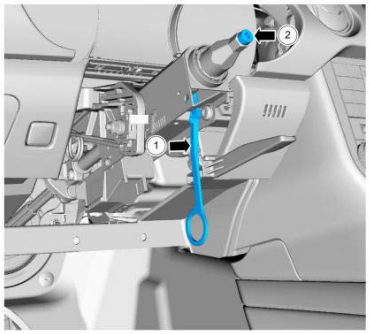
NOTE: DO NOT hammer, pry or force steering column and column shafts during installation or removal. Failure to follow this instruction may cause damage to steering components that could lead to loss of steering control during vehicle operation and could result in serious personal injury or death.

1.

To install, reverse the removal procedure.

NOTE: This step is only necessary when installing a new component.

2.
With the steering system fully assembled, remove the anti-rotation pin and the spindle bolt.



REMOVAL AND INSTALLATION > STEERING COLUMN LOWER SHAFT > REMOVAL

NOTE: DO NOT hammer, pry or force steering column and column shafts during installation or removal. Failure to follow this instruction may cause damage to steering components that could lead to loss of steering control during vehicle operation and could result in serious personal injury or death.

NOTE: DO NOT attempt to remove or install the steering column lower u-joint at the steering gear without first loosening the steering column dash seal and fasteners. Failure to follow this instruction may cause damage to steering components that could lead to loss of steering control during vehicle operation and could result in serious personal injury or death.

NOTE: Do not allow the steering column to rotate while the steering column shaft system is disconnected or damage to the steering column electrical components may result.

NOTE: LHD shown in illustration below, RHD similar.

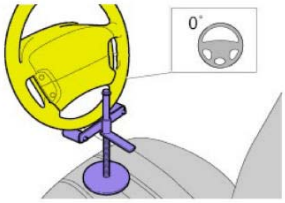
NOTE: Removal steps in this procedure may contain installation details.

1.

With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

NOTE: Use a steering wheel holding device (such as Hunter® 28-75-1 or equivalent).

2.
Keep the steering wheel in the straight-ahead position.



E190302

NOTE: Make sure to minimize damage to sealer foam and avoid pulling apart dash seal brackets from retainer pins. Excessive damage may allow engine noise, fumes, air or water to enter the passenger compartment.

3.
Loosen the dash seal.

1.

Remove the nuts.

Torque

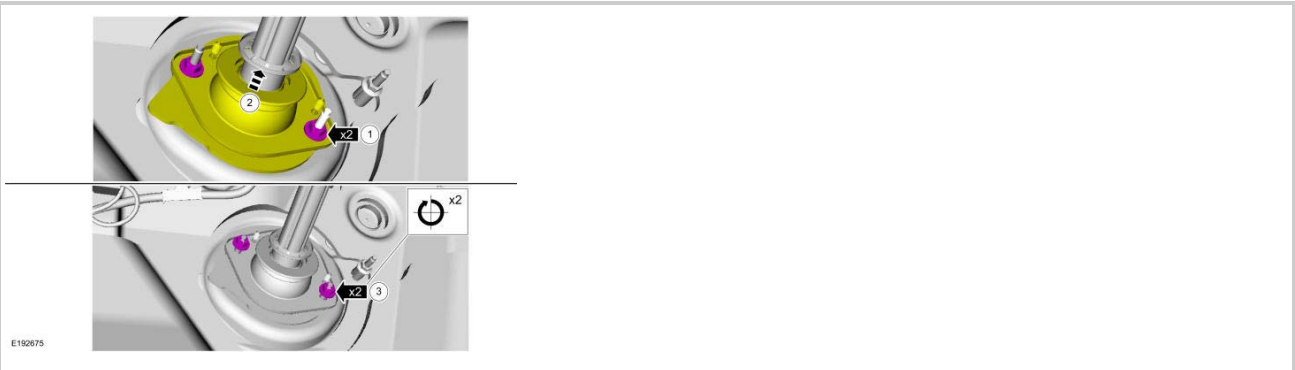
: 80 lb.in (9 Nm)

2.

Loosen the dash seal.

3.

Hand start the nuts.



NOTE: Do not reuse steering column shaft bolts. This may result in fastener failure and steering column shaft detachment or loss of steering control. Failure to follow this instruction may result in serious injury to vehicle occupant(s).

4.
Remove the steering column lower shaft.

1.

Remove and discard the bolt.

Torque

: 22 lb.ft (30 Nm)

NOTE: Vehicles equipped with LHD.

2.
Remove and discard the bolt.

Torque

: 22 lb.ft (30 Nm)

NOTE: Vehicles equipped with RHD.

3.
Remove and discard the bolt.

Torque

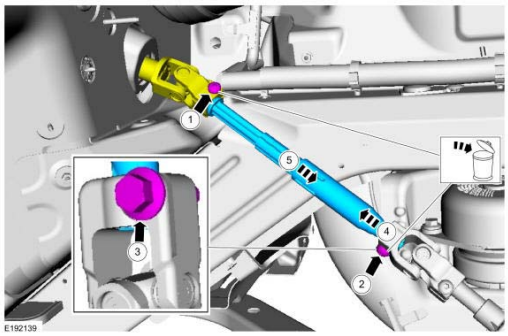
: 35 lb.ft (47.5 Nm)

4.

Pull apart the steering column lower shaft from the coupling.

5.

Pull apart the steering column lower shaft from the steering column upper shaft.



REMOVAL AND INSTALLATION > STEERING COLUMN LOWER SHAFT > INSTALLATION

NOTE: DO NOT attempt to remove or install the steering column lower u-joint at the steering gear without first loosening the steering column dash seal and fasteners. Failure to follow this instruction may cause damage to steering components that could lead to loss of steering control during vehicle operation and could result in serious personal injury or death.

NOTE: DO NOT hammer, pry or force steering column and column shafts during installation or removal. Failure to follow this instruction may cause damage to steering components that could lead to loss of steering control during vehicle operation and could result in serious personal injury or death.

1.

To install, reverse the removal procedure.

2.

Inspect the steering column lower shaft. Refer to: Steering Column Collapsed Check .

REMOVAL AND INSTALLATION > STEERING COLUMN UPPER SHAFT

Special Tool(s) / General Equipment

Steering Wheel Holder

REMOVAL AND INSTALLATION > STEERING COLUMN UPPER SHAFT > REMOVAL

NOTE: DO NOT hammer, pry or force steering column and column shafts during installation or removal. Failure to follow this instruction may cause damage to steering components that could lead to loss of steering control during vehicle operation and could result in serious personal injury or death.

NOTE: Do not allow the steering column to rotate while the steering column shaft system is disconnected or damage to the steering column electrical components may result.

NOTE: LHD shown in illustration below, RHD similar.

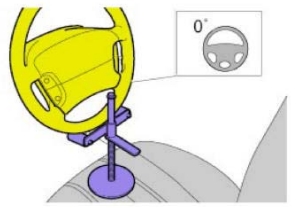
1.

With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

NOTE: Use a steering wheel holding device (such as Hunter® 28-75-1 or equivalent).

2.
Keep the steering wheel in straight ahead-position.

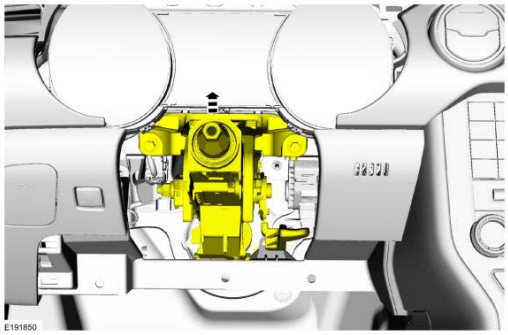
Use the General Equipment: Steering Wheel Holder



E190302

3.

Position the steering column in the full up/rearward position.



NOTE: Make sure to minimize damage to sealer foam and avoid pulling apart dash seal brackets from retainer pins. Excessive damage may allow engine noise, fumes, air or water to enter the passenger compartment.

4.
Loosen the dash seal.

1.

Remove the nuts.

Torque

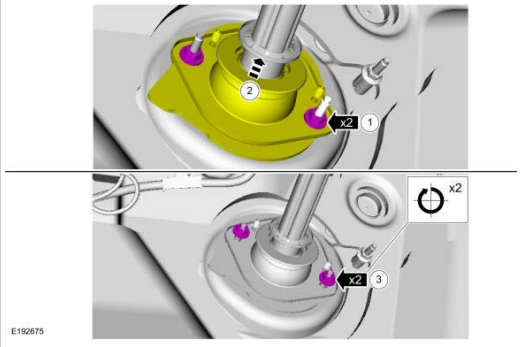
: 80 lb.in (9 Nm)

2.

Loosen the dash seal.

3.

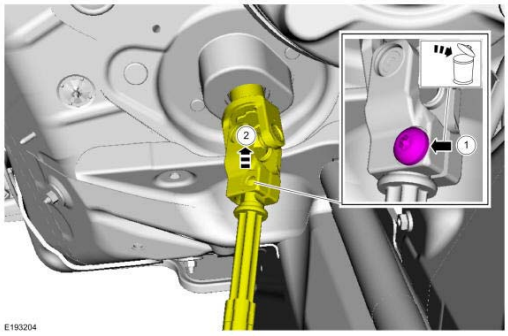
Hand start the nuts.



NOTE: Do not reuse steering column shaft bolts. This may result in fastener failure and steering column shaft detachment or loss of steering control. Failure to follow this instruction may result in serious injury to vehicle occupant(s).

5.

Remove and discard the bolt and loosen the upper shaft from the lower shaft by partially pulling them apart from each other.



6.

Remove the driver knee airbag. Refer to: Driver Knee Airbag .

NOTE: Do not reuse steering column shaft bolts. This may result in fastener failure and steering column shaft detachment or loss of steering control. Failure to follow this instruction may result in serious injury to vehicle occupant(s).

7.
Remove the steering column upper shaft.

1.

Remove the nuts.

2.

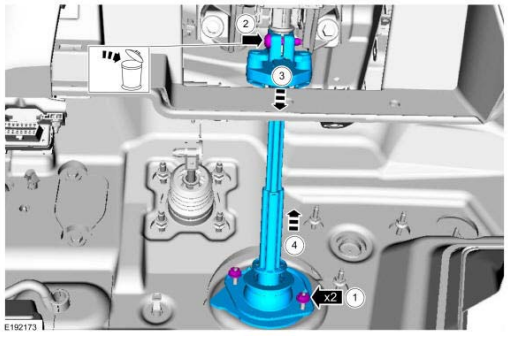
Remove and discard the bolt.

3.

Pull apart the upper shaft from the steering column.

4.

Pull apart and remove the upper shaft from the lower shaft.



REMOVAL AND INSTALLATION > STEERING COLUMN UPPER SHAFT > INSTALLATION

1.

Install the steering column upper shaft.

> *NOTE: Do not reuse steering column shaft bolts. This may result in fastener failure and steering column shaft detachment or loss of steering control. Failure to follow this instruction may result in serious injury to vehicle occupant(s).*

1.
Connect the upper shaft to the steering column.

2.

Install the bolt.

Torque

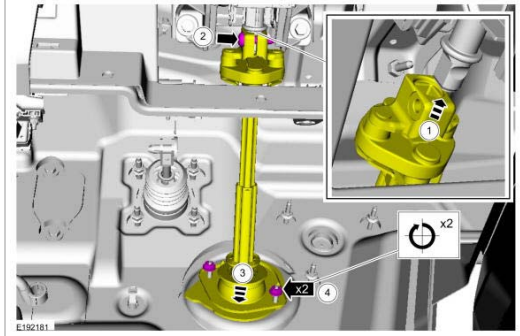
: 22 lb.ft (30 Nm)

3.

Seat the dash seal.

4.

Hand start the nuts.

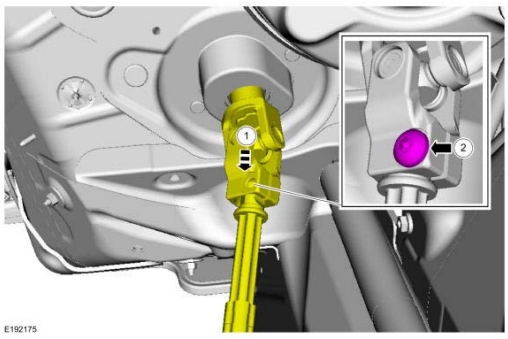


2.

Connect the upper shaft to the lower shaft and install the bolt.

Torque

: 22 lb.ft (30 Nm)

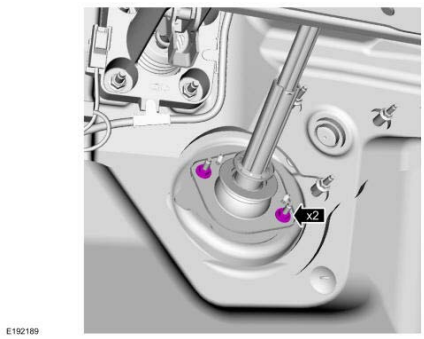


3.

Tighten the dash seal nuts.

Torque

: 80 lb.in (9 Nm)



4.

Inspect the steering column lower shaft. Refer to: Steering Column Collapsed Check .

REMOVAL AND INSTALLATION > STEERING WHEEL > REMOVAL

NOTE: To prevent damage to the clockspring, make sure the front wheels are in the straight-ahead position.

NOTE: Removal steps in this procedure may contain installation details.

NOTE: LHD shown in illustration below, RHD similar.

1.

Remove the driver airbag module. Refer to: Driver Airbag .

2.

1.

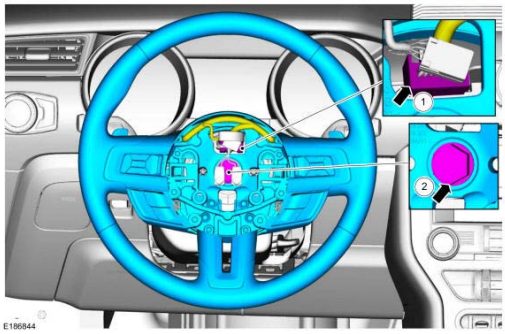
Disconnect the steering wheel switches electrical connector.

2.

Remove the steering wheel bolt and the steering wheel.

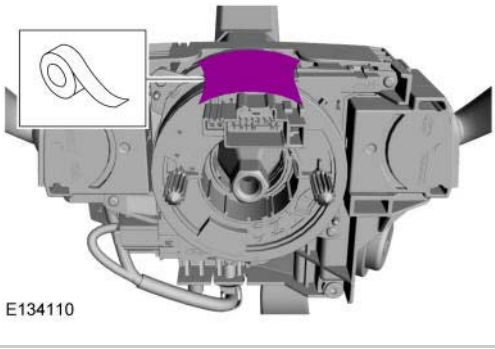
Torque

: 35 lb.ft (47.5 Nm)



3.

Tape the clockspring rotor to the outer housing to keep it from rotating.



REMOVAL AND INSTALLATION > STEERING WHEEL > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > STEERING COLUMN COUPLING

Special Tool(s) / General Equipment

Steering Wheel Holder

REMOVAL AND INSTALLATION > STEERING COLUMN COUPLING > REMOVAL

NOTE: DO NOT hammer, pry or force steering column and column shafts during installation or removal. Failure to follow this instruction may cause damage to steering components that could lead to loss of steering control during vehicle operation and could result in serious personal injury or death.

NOTE: DO NOT attempt to remove or install the steering column lower u-joint at the steering gear without first loosening the steering column dash seal and fasteners. Failure to follow this instruction may cause damage to steering components that could lead to loss of steering control during vehicle operation and could result in serious personal injury or death.

NOTE: Do not allow the steering column to rotate while the steering column shaft system is disconnected or damage to the steering column electrical components may result.

NOTE: LHD shown in illustration below, RHD similar.

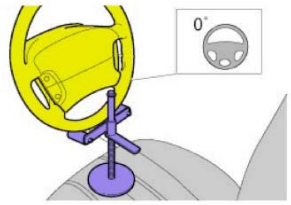
1.

With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

NOTE: Use a steering wheel holding device (such as Hunter® 28-75-1 or equivalent).

2.
Keep the steering wheel in the straight-ahead position.

Use the General Equipment: Steering Wheel Holder



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NOTE: Make sure to minimize damage to the sealer foam and avoid pulling apart dash seal brackets from retainer pins. Excessive damage may allow engine noise, fumes, air or water to enter the passenger compartment.

3.
Loosen the dash seal.

1.

Remove the nuts.

Torque

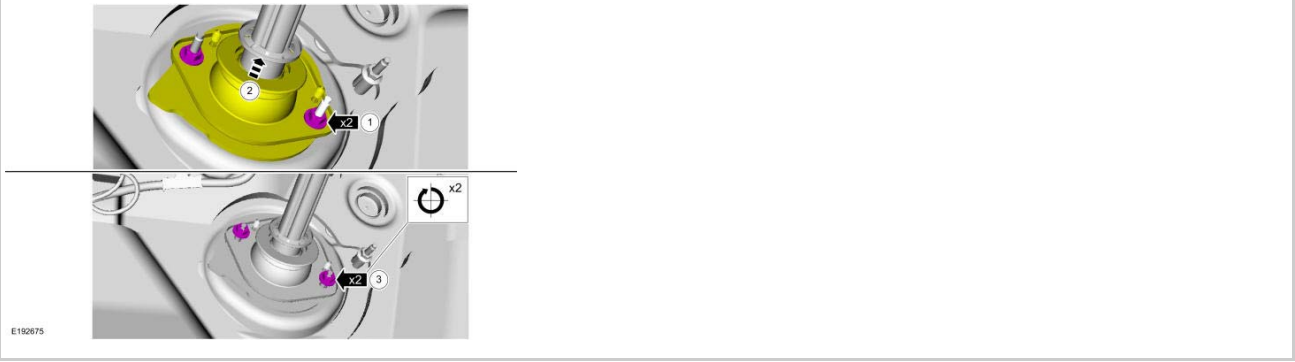
: 80 lb.in (9 Nm)

2.

Loosen the dash seal.

3.

Hand start the nuts.



4.

Detach the steering column lower shaft from the coupling.

NOTE: Vehicles equipped with LHD.

NOTE: Do not reuse steering column shaft bolts. This may result in fastener failure and steering column shaft detachment or loss of steering control. Failure to follow this instruction may result in serious injury to vehicle occupant(s).

1.
Remove and discard the bolt.

Torque

: 22 lb.ft (30 Nm)

NOTE: Vehicles equipped with RHD.

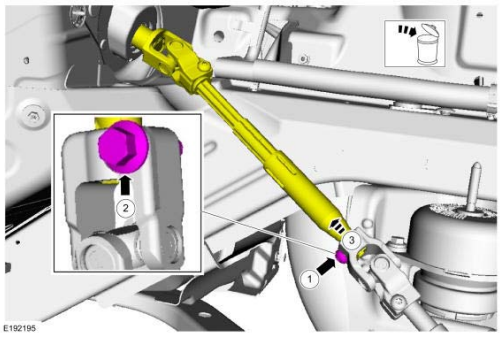
2.
Remove and discard the bolt.

Torque

: 35 lb.ft (47.5 Nm)

3.

Pull apart the steering column lower shaft from the coupling.

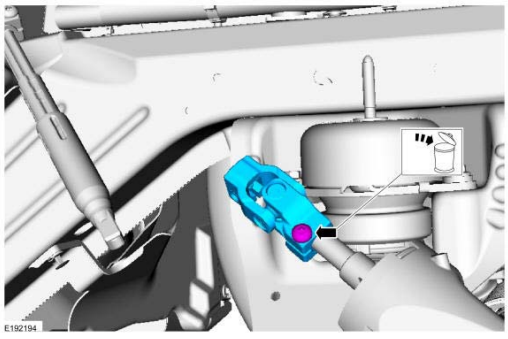


5.

Remove and discard the bolt. Pull apart the coupling from the steering gear.

Torque

: 22 lb.ft (30 Nm)



REMOVAL AND INSTALLATION > STEERING COLUMN COUPLING > INSTALLATION

NOTE: DO NOT attempt to remove or install the steering column lower u-joint at the steering gear without first loosening the steering column dash seal and fasteners. Failure to

follow this instruction may cause damage to steering components that could lead to loss of steering control during vehicle operation and could result in serious personal injury or death.

NOTE: DO NOT hammer, pry or force steering column and column shafts during installation or removal. Failure to follow this instruction may cause damage to steering components that could lead to loss of steering control during vehicle operation and could result in serious personal injury or death.

1.

To install, reverse the removal procedure.

2.

Inspect the steering column lower shaft. Refer to: Steering Column Collapsed Check .

Service Manual: FRONT SUSPENSION

DESCRIPTION AND OPERATION > FRONT SUSPENSION > THE FRONT SUSPENSION CONSISTS OF THE FOLLOWING COMPONENTS:

- Front and rear lower arms
- Stabilizer bar and links
- Strut and spring assembly
- Wheel bearing and wheel hub
- Wheel spindle

The front suspension system incorporates a strut assembly that takes the place of the upper arm and ball joint. The strut carries out the function of a shock absorber and is encompassed by a coil spring. The strut and spring assembly supports the weight of the vehicle and is also the pivot point for the steering spindle. This system uses front and rear lower control arms and ball joints for the lower (unloaded) pivot points of the steering spindle and/or knuckle.

DIAGNOSIS AND TESTING > FRONT SUSPENSION

REFER to: Suspension System

REMOVAL AND INSTALLATION > FRONT LOWER ARM

Special Tool(s) / General Equipment

	204-592 Separator, Lower Arm Ball Joint TKIT-2006C-FFMFLM TKIT-2006C-LM TKIT-2006C-ROW
Vehicle/Axle Stands	

REMOVAL AND INSTALLATION > FRONT LOWER ARM > REMOVAL

NOTE: Suspension fasteners are critical parts that affect the performance of vital components and systems. Failure of these fasteners may result in major service expense. Use the same or equivalent parts if replacement is necessary. Do not use a replacement part of lesser quality or substitute design. Tighten fasteners as specified.

1.

Remove the wheel and tire. Refer to: Wheel and Tire .

NOTE: If equipped with dynamic suspension.

NOTE: The front suspension height sensor must be disconnected from the lower control arm prior to servicing suspension components or damage to the suspension height sensor and/or the vehicle dynamic suspension system may occur. The sensor will need to be recalibrated after reassembly.

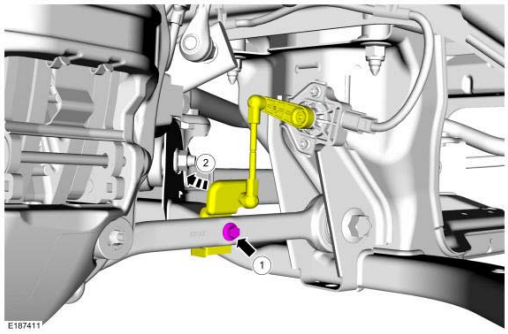
2.

1.

Remove the ride height sensor arm bracket bolt.

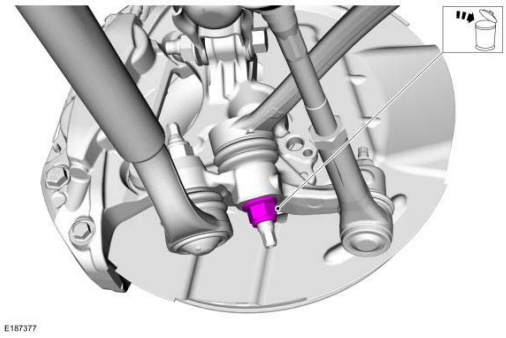
2.

Position the ride height sensor arm bracket aside.



3.

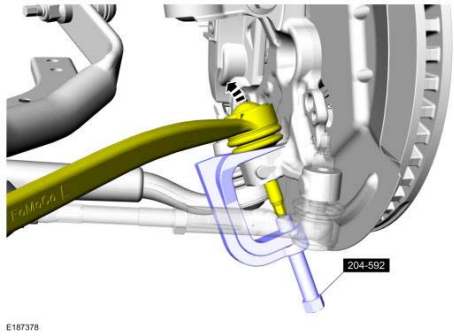
Remove and discard the front lower arm outboard nut.



NOTE: Use care when releasing the lower arm and wheel knuckle into the resting position or damage to the ball joint seal may occur.

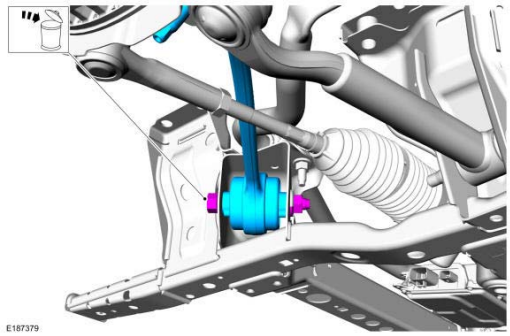
NOTE: Do not use a prying device or separator fork between the ball joint and the wheel knuckle. Damage to the ball joint or ball joint seal may result. Only use the pry bar by inserting it into the lower arm body opening.

4.
Separate the front lower arm from the wheel spindle. Use Special Service Tool: 204-592 Separator, Lower Arm Ball Joint.



5.

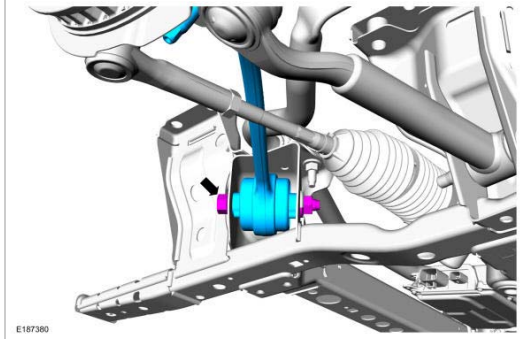
Remove and discard the front lower arm-to-frame bolt and remove the front lower arm.



REMOVAL AND INSTALLATION > FRONT LOWER ARM > INSTALLATION

NOTE: Only tighten the bolt finger tight at this stage.

1.
Position the front lower arm and install the new front lower arm-to-frame bolt.



2.

1.

Attach the front lower arm to the wheel spindle.

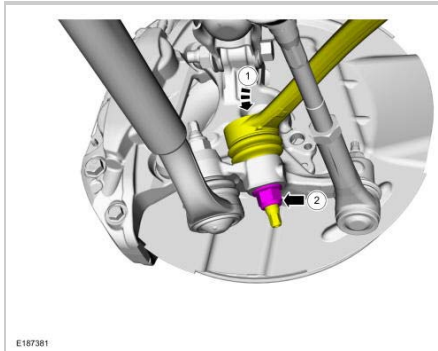
2.

Install the new front lower arm outboard nut.

Torque:

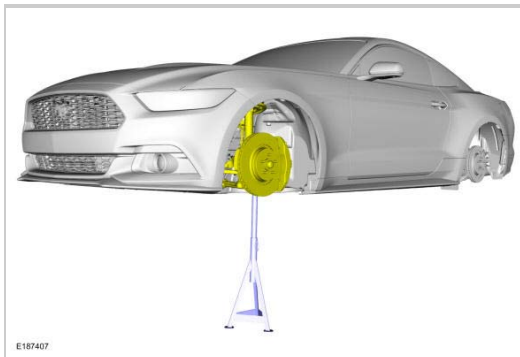
Non SVT: 85 lb.ft (115 Nm)

SVT: 76 lb.ft (103 Nm)



3.

Support the suspension at curb height. Use the General Equipment: Vehicle/Axle Stands

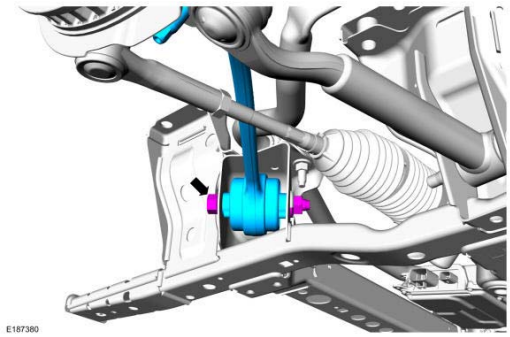


NOTE: Tighten the suspension bushing fasteners with the suspension loaded or with the weight of the vehicle resting on the wheels and tires, otherwise incorrect clamp load and bushing damage may occur.

4.
Tighten the front lower arm-to-frame bolt.

Torque

: 184 lb.ft (250 Nm)



NOTE: If equipped with dynamic suspension.

5.

1.

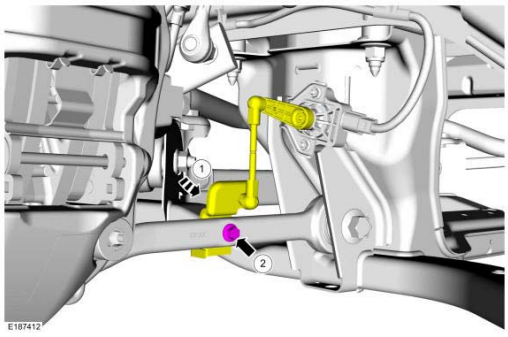
Position the ride height sensor arm bracket.

2.

Install the ride height sensor arm bracket bolt.

Torque

: 177 lb.in (20 Nm)



6.

Install the wheel and tire. Refer to: Wheel and Tire .

7.

Check and if necessary adjust front toe. Refer to: Front Toe Adjustment .

8.

If equipped with dynamic suspension, calibrate the suspension system. Connect the scan tool and carry out the Ride Height Calibration routine. Follow the scan tool directions.

REMOVAL AND INSTALLATION > FRONT STABILIZER BAR

Front Stabilizer Bar

REMOVAL AND INSTALLATION > FRONT STABILIZER BAR > REMOVAL

NOTE: Suspension fasteners are critical parts that affect the performance of vital components and systems. Failure of these fasteners may result in major service expense. Use the same or equivalent parts if replacement is necessary. Do not use a replacement part of lesser quality or substitute design. Tighten fasteners as specified.

1.

Remove the front subframe. Refer to: Front Subframe - 2.3L EcoBoost (201kW/273PS) . Refer to: Front Subframe - 3.7L Duratec (227kW/301PS)/5.0L 32V Ti-VCT/5.2L 32V Ti-VCT .

2.

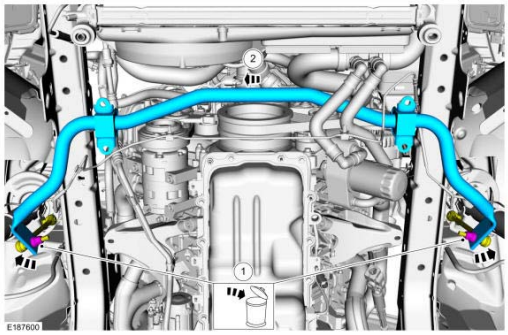
NOTE: Use the hex-holding feature to prevent the ball stud from turning while removing the stabilizer bar link nut.

NOTE: The stabilizer bar links are designed with low friction ball joints that have a low breakaway torque.

1.
Remove and discard the 2 front stabilizer bar link lower nuts and position aside the front stabilizer bar links.

2.

Remove the front stabilizer bar.



REMOVAL AND INSTALLATION > FRONT STABILIZER BAR > INSTALLATION

1.

> *NOTE: Use the hex-holding feature to prevent the ball stud from turning while installing the stabilizer bar link nut.*

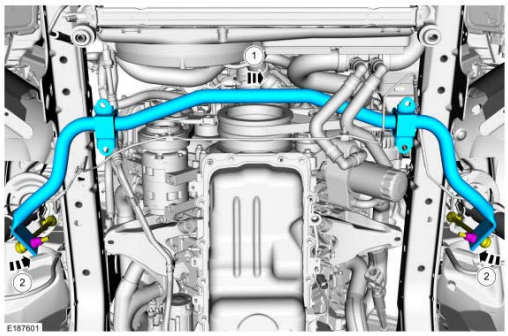
1.
Position the front stabilizer bar.

2.

Position the front stabilizer bar links and install the 2 new front stabilizer bar link lower nuts.

Torque

: 85 lb.ft (115 Nm)



2.

Install the front subframe. Refer to: Front Subframe - 2.3L EcoBoost (201kW/273PS) . Refer to: Front Subframe - 3.7L Duratec (227kW/301PS)/5.0L 32V Ti-VCT/5.2L 32V Ti-VCT .

REMOVAL AND INSTALLATION > FRONT STABILIZER BAR BUSHING > REMOVAL

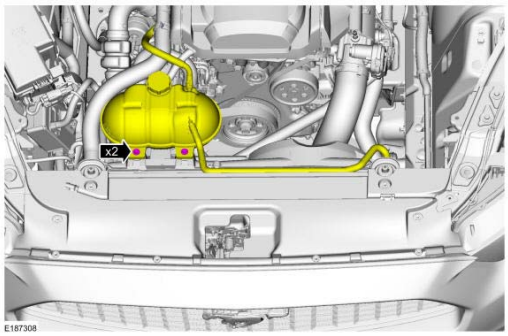
NOTE: Vehicles equipped with performance package, front stabilizer bushings are not serviceable separately. Replace the front stabilizer bar.

1.

Remove the air cleaner. Refer to: AIR CLEANER - 2.3L EcoBoost (231kW/314PS) . Refer to: AIR CLEANER - 3.7L Duratec (227kW/301PS) . Refer to: AIR CLEANER - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS) .

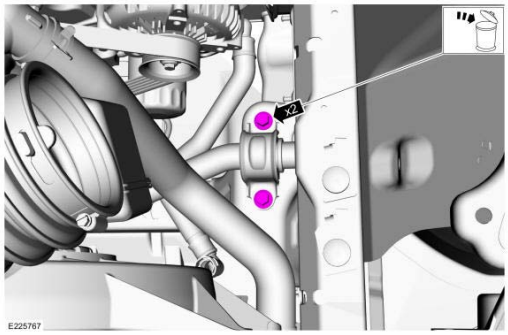
2.

Remove the bolts and position the degas bottle aside.



NOTE: All vehicles except vehicles equipped with 5.0L engine.

3.
On both sides. Remove and discard the front stabilizer bar bushing bracket bolts.



NOTE: Vehicles equipped with 5.0L engine.

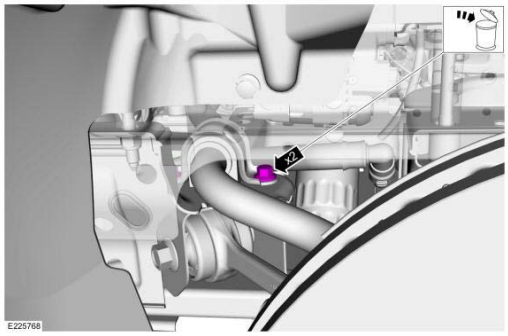
4.
Remove the LH wheel and tire. Refer to: Wheel and Tire .

NOTE: On vehicles equipped with 5.0L engine, the reward front stabilizer bar

bushing bracket bolt is under the alternator and must be removed through the wheel opening.

NOTE: Vehicles equipped with 5.0L engine.

5.
On both sides. Remove and discard the front stabilizer bar bushing bracket bolts.



NOTE: Non performance package vehicle front stabilizer bushing shown in illustration below.

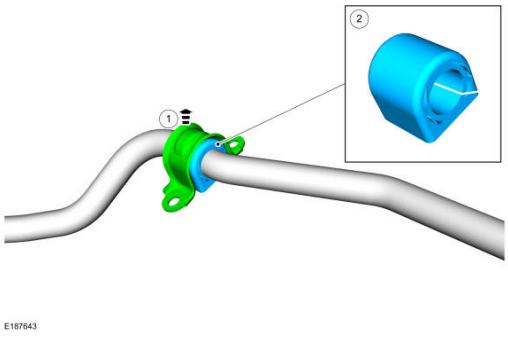
6.

1.

Remove the front stabilizer bar bushing bracket.

2.

Remove the front stabilizer bar bushing.



REMOVAL AND INSTALLATION > FRONT STABILIZER BAR BUSHING > INSTALLATION

NOTE: Do not use any lubrication on the stabilizer bar or the bushings or damage to the bushings may occur.

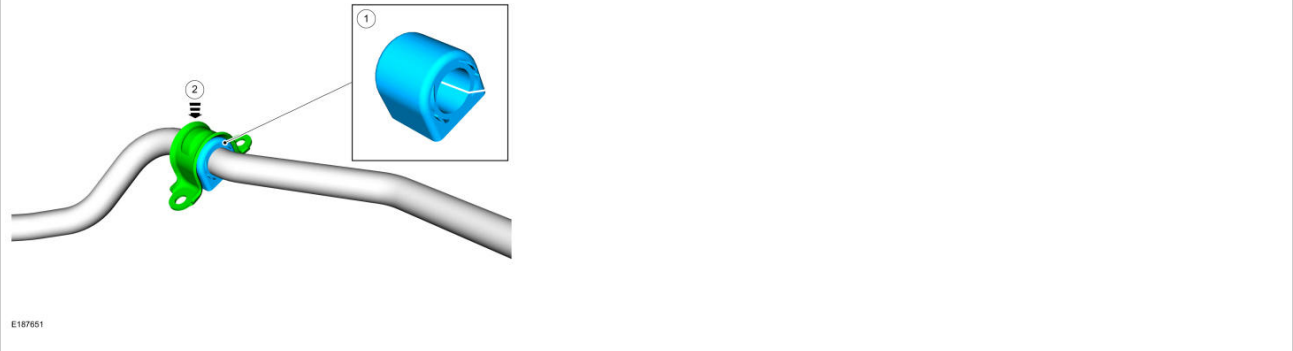
1.

NOTE: Stabilizer bar bushings must be installed with slits facing the rear of the vehicle.

1.
Install the front stabilizer bar bushing.

2.

Install the front stabilizer bar bushing bracket.



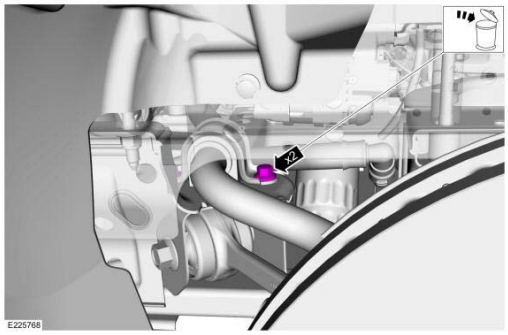
NOTE: On vehicles equipped with 5.0L engine, the reward front stabilizer bar bushing bracket bolt is under the alternator and must be installed through the wheel opening.

NOTE: Vehicles equipped with 5.0L engine.

2.
On both sides. Install the new front stabilizer bar bushing bracket bolts.

Torque

: 76 lb.ft (103 Nm)



NOTE: Vehicles equipped with 5.0L engine.

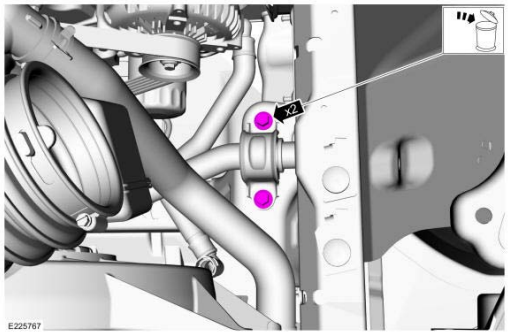
3.
Install the LH wheel and tire. Refer to: Wheel and Tire .

NOTE: All vehicles except vehicles equipped with 5.0L engine.

4.
On both sides. Install the new front stabilizer bar bushing bracket bolts.

Torque

: 76 lb.ft (103 Nm)

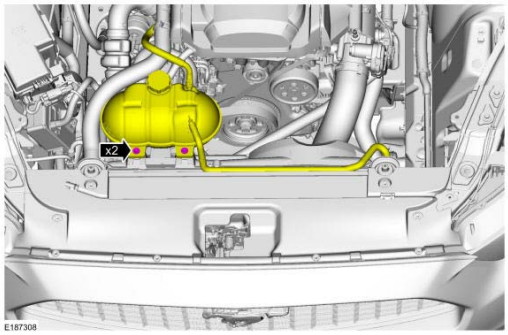


5.

Position the degas bottle and install the bolts.

Torque

: 80 lb.in (9 Nm)



6.

Install the air cleaner. Refer to: AIR CLEANER - 2.3L EcoBoost (231kW/314PS). Refer to: AIR CLEANER - 3.7L Duratec (227kW/301PS). Refer to: AIR CLEANER - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS).

REMOVAL AND INSTALLATION > FRONT STABILIZER BAR LINK > REMOVAL

NOTE: Suspension fasteners are critical parts that affect the performance of vital components and systems. Failure of these fasteners may result in major service expense. Use the same or equivalent parts if replacement is necessary. Do not use a replacement part of lesser quality or substitute design. Tighten fasteners as specified.

NOTE: Removal steps in this procedure may contain installation details.

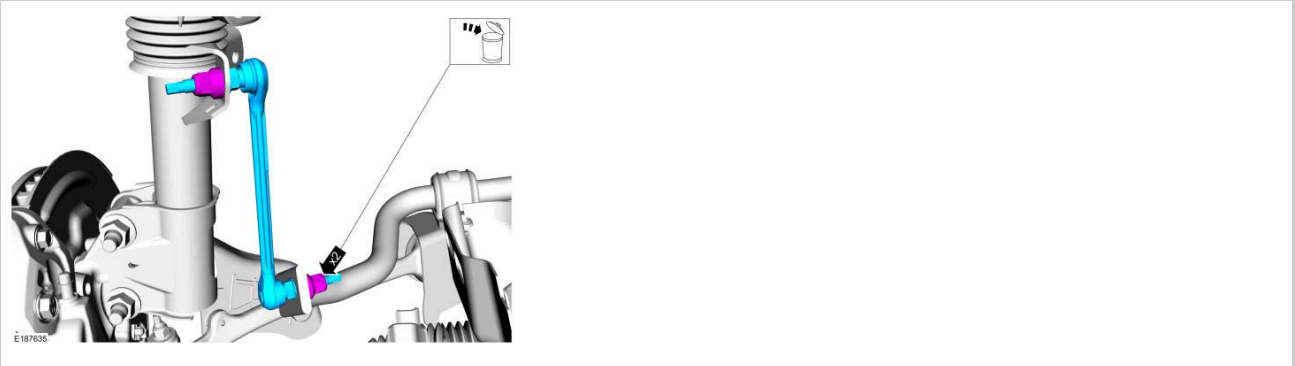
NOTE: Use the hex-holding feature to prevent the ball stud from turning while removing or installing the stabilizer bar link nut.

NOTE: The stabilizer bar links are designed with low friction ball joints that have a low breakaway torque.

1.
Remove and discard the 2 front stabilizer bar link nuts and remove the front stabilizer bar link.

Torque

: 85 lb.ft (115 Nm)



REMOVAL AND INSTALLATION > FRONT STABILIZER BAR LINK > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > FRONT STRUT AND SPRING ASSEMBLY > REMOVAL

NOTE: Suspension fasteners are critical parts that affect the performance of vital components and systems. Failure of these fasteners may result in major service expense. Use the same or equivalent parts if replacement is necessary. Do not use a replacement part of lesser quality or substitute design. Tighten fasteners as specified.

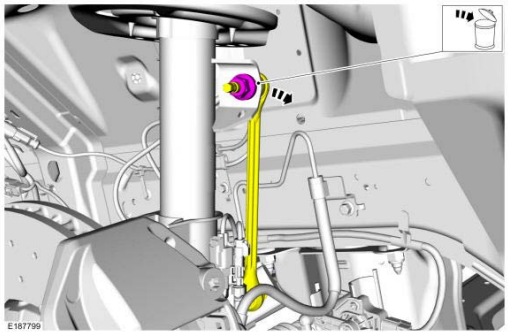
1.

Remove the wheel and tire. Refer to: Wheel and Tire .

NOTE: Use the hex-holding feature to prevent the ball stud from turning while removing or installing the stabilizer bar link nut.

NOTE: The stabilizer bar links are designed with low friction ball joints that have a low breakaway torque.

2.
Remove and discard the front stabilizer bar link upper nut and separate the front stabilizer bar link from the strut and spring assembly.



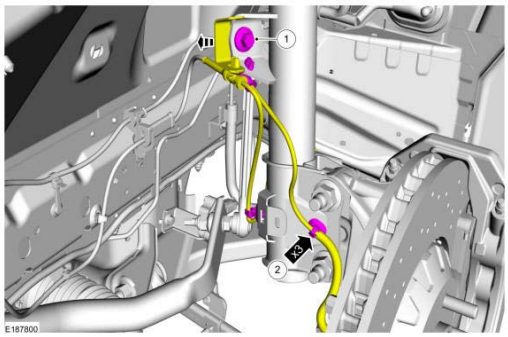
3.

1.

If equipped with dynamic suspension. Remove the dynamic suspension strut wire harness bracket bolt and position the bracket and wire harness aside.

2.

Disconnect the 2 wheel speed sensor retainers and the 1 dynamic suspension strut wire harness retainer.



4.

1.

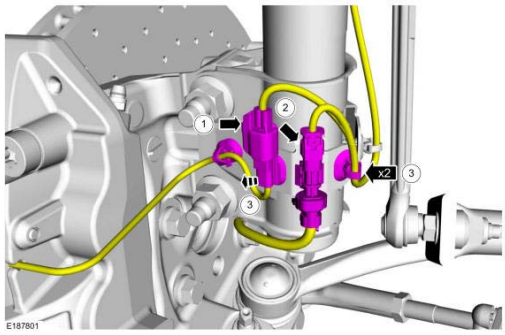
If equipped. Disconnect the brake sensor electrical connector.

2.

If equipped with dynamic suspension. Disconnect the dynamic suspension strut wire harness connector.

3.

If equipped. Unclip the brake sensor electrical connector and the 2 wire retainers from the strut.



NOTE: Base brakes shown in illustration below, other applications similar.

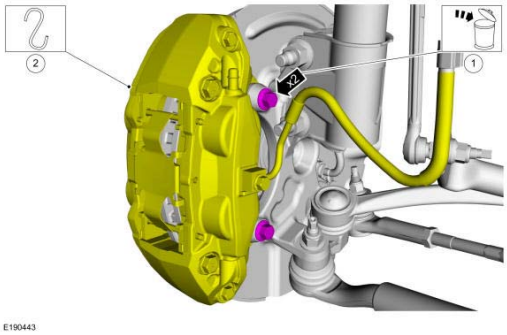
5.
Position aside the brake caliper assembly.

1.

Remove and discard the 2 brake caliper anchor plate bolts.

2.

Position aside the brake caliper assembly.



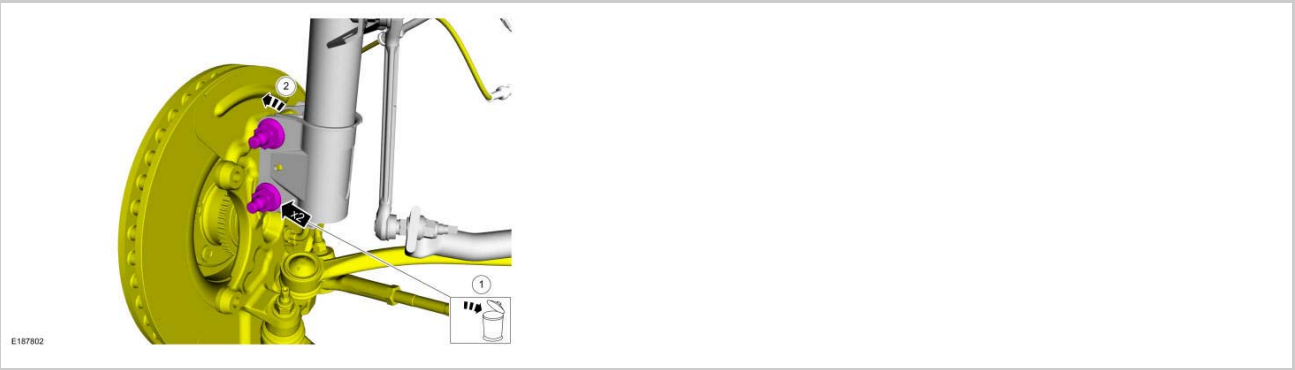
6.

NOTE: Original strut-to-wheel spindle bolts are splined and may need to be driven out.

1.
Remove and discard the 2 strut-to-wheel spindle bolts and nuts.

2.

Separate the wheel spindle from the front strut and spring assembly.



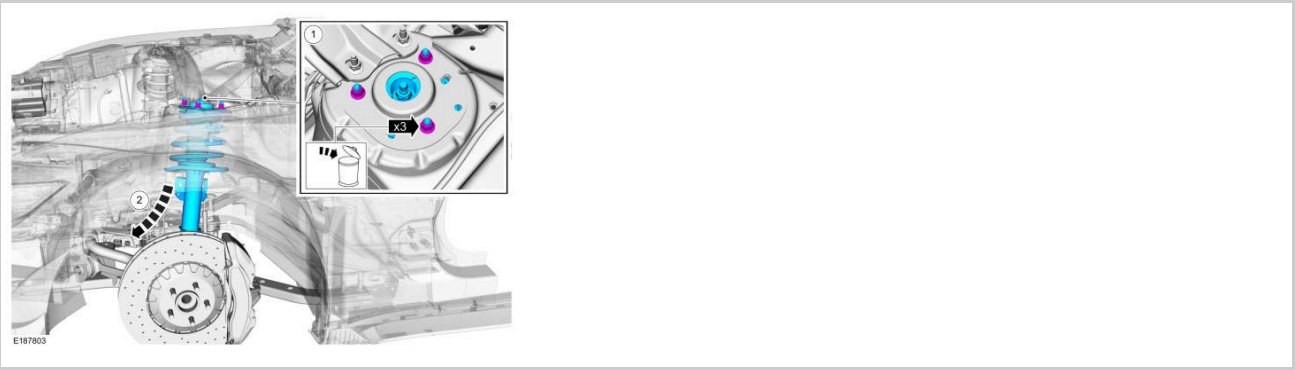
7.

1.

Remove and discard the 3 upper strut mount nuts.

2.

Remove the front strut and spring assembly.



REMOVAL AND INSTALLATION > FRONT STRUT AND SPRING ASSEMBLY > INSTALLATION

1.

1.

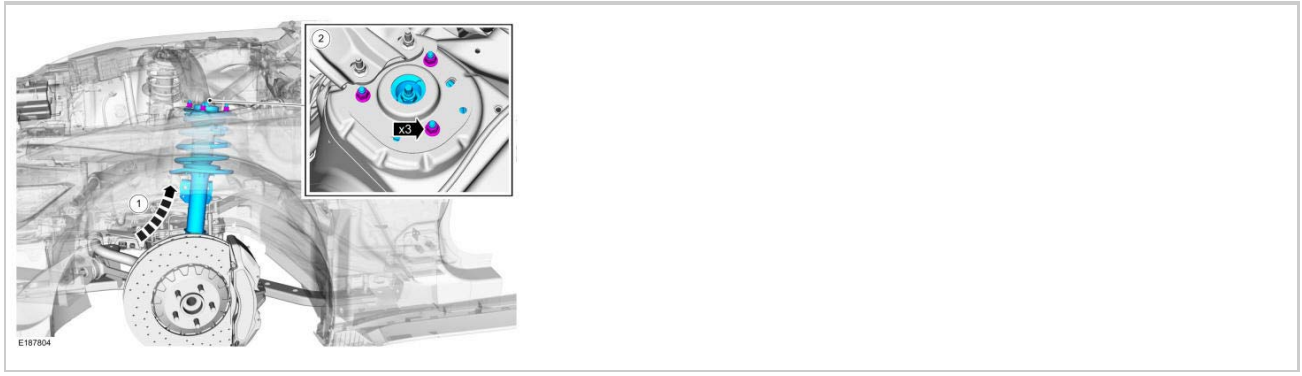
Install the front strut and spring assembly.

2.

Install the 3 new upper strut mount nuts.

Torque

: 46 lb.ft (63 Nm)



2.

1.

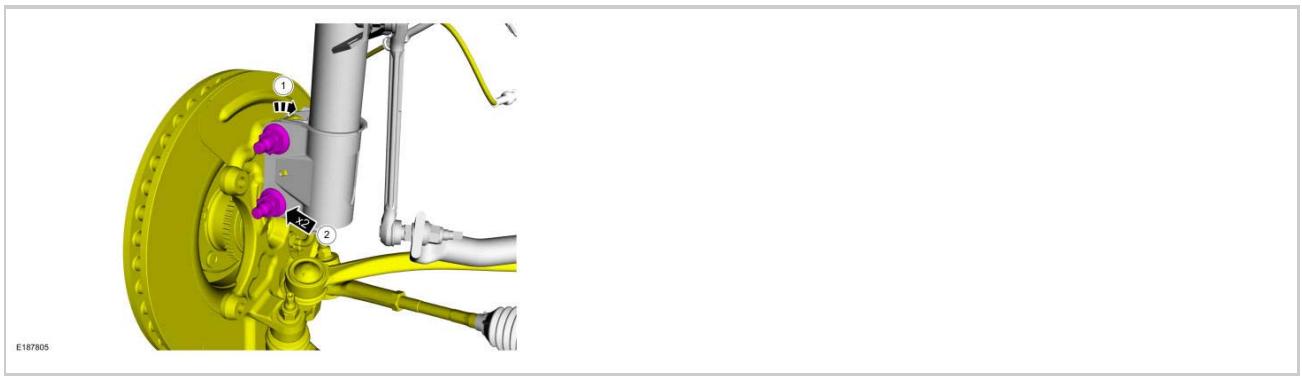
Attach the wheel spindle to the front strut and spring assembly.

2.

Install the 2 new strut-to-wheel spindle bolts and nuts.

Torque

: 184 lb.ft (250 Nm)

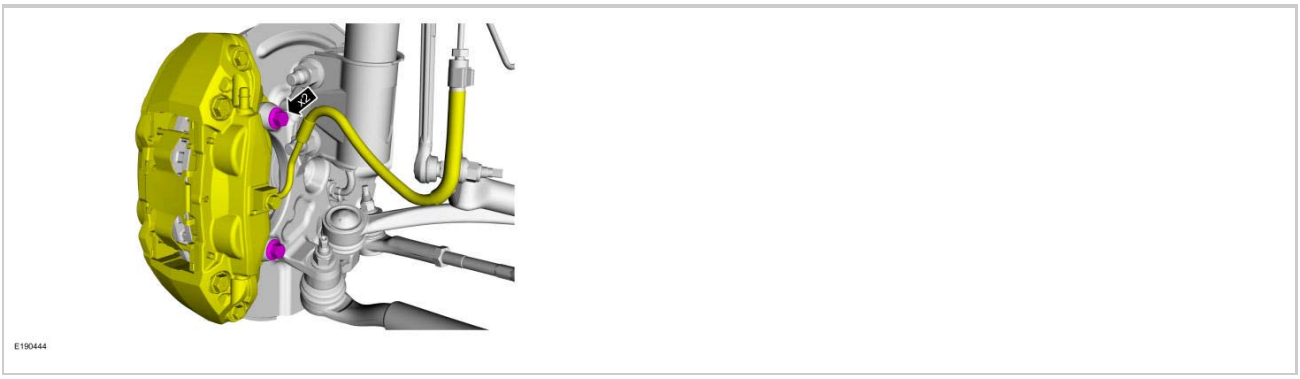


3.

Position the brake caliper assembly and install the 2 new brake caliper anchor plate bolts.

Torque

: 85 lb.ft (115 Nm)



4.

1.

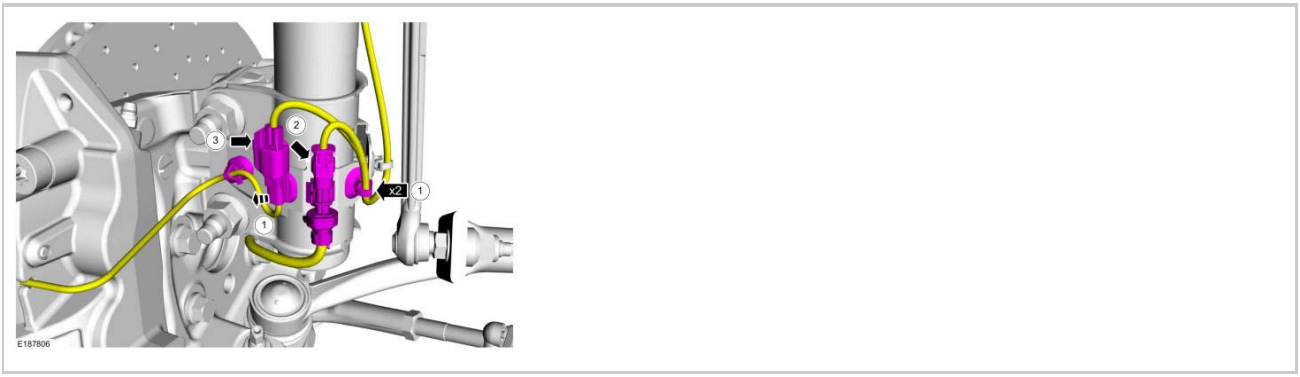
If equipped. Clip the brake sensor electrical connector and the 2 wire retainers to the strut.

2.

If equipped with dynamic suspension. Connect the dynamic suspension strut wire harness connector.

3.

If equipped. Connect the brake sensor electrical connector.



5.

1.

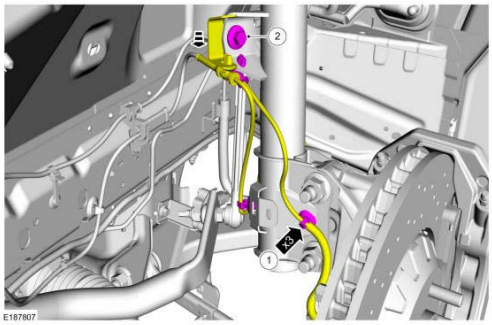
Connect the 2 wheel speed sensor retainers and the 1 dynamic suspension strut wire harness retainer.

2.

If equipped with dynamic suspension. Position the dynamic suspension strut wire harness bracket install the bolt.

Torque

: 46 lb.ft (63 Nm)



6.

1.

Position the front stabilizer bar link.

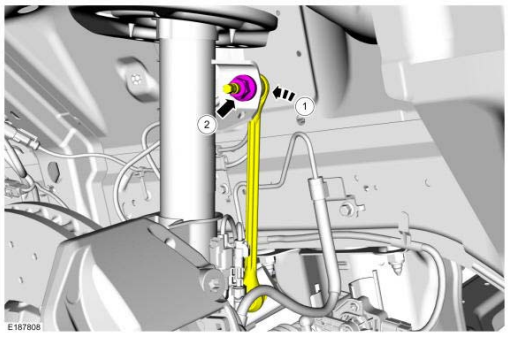
> *NOTE: Use the hex-holding feature to prevent the ball stud from turning while removing or installing the stabilizer bar link nut.*

> *NOTE: The stabilizer bar links are designed with low friction ball joints that have a low breakaway torque.*

2.
Install the front stabilizer bar link upper nut.

Torque

: 85 lb.ft (115 Nm)



7.

Install the wheel and tire. Refer to: Wheel and Tire .

8.

Check and if necessary adjust front camber. Refer to: Front Camber Adjustment .

REMOVAL AND INSTALLATION > FRONT WHEEL BEARING AND WHEEL HUB > REMOVAL

NOTE: Suspension fasteners are critical parts that affect the performance of vital components and systems. Failure of these fasteners may result in major service expense. Use the same or equivalent parts if replacement is necessary. Do not use a replacement part of lesser quality or substitute design. Tighten fasteners as specified.

1.

Remove the brake disc. Refer to: Brake Disc .

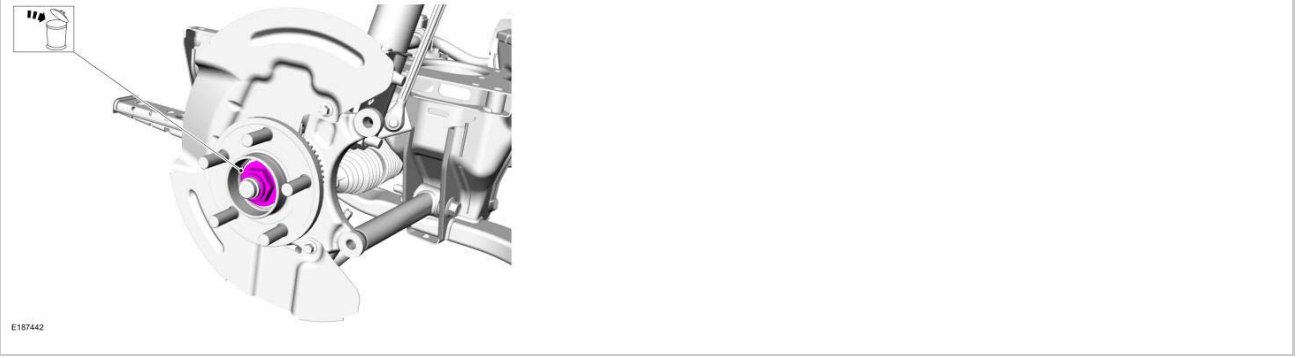
2.

Remove and discard the wheel hub grease cap.



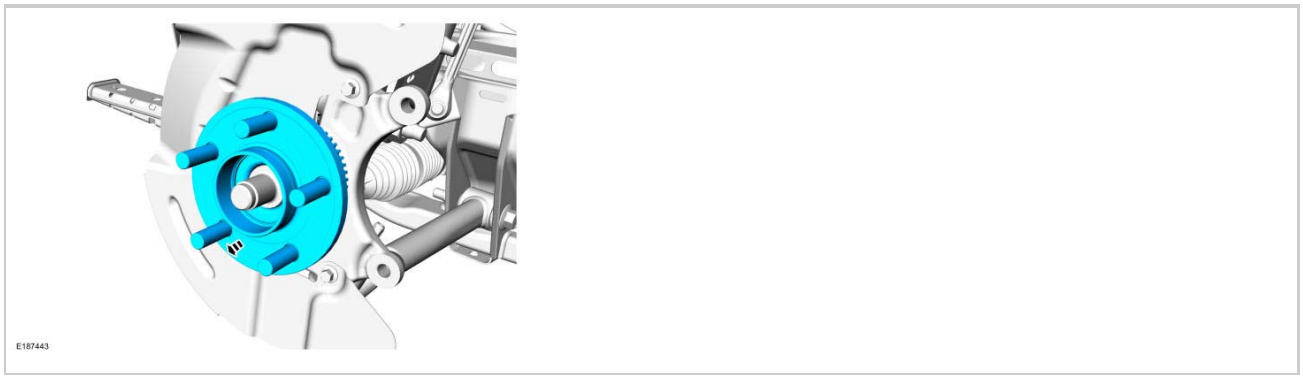
3.

Remove and discard the wheel hub nut.



4.

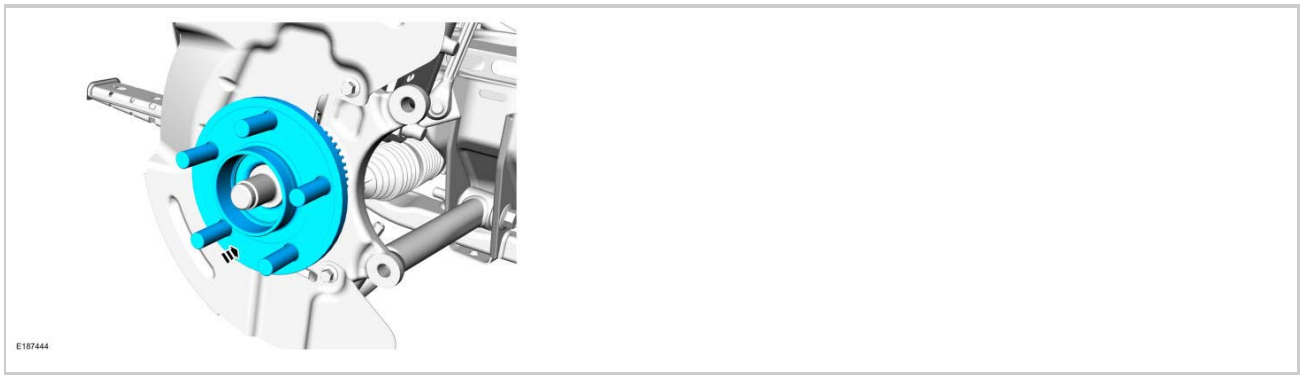
Remove the front wheel bearing and wheel hub.



REMOVAL AND INSTALLATION > FRONT WHEEL BEARING AND WHEEL HUB > INSTALLATION

1.

Install the front wheel bearing and wheel hub.

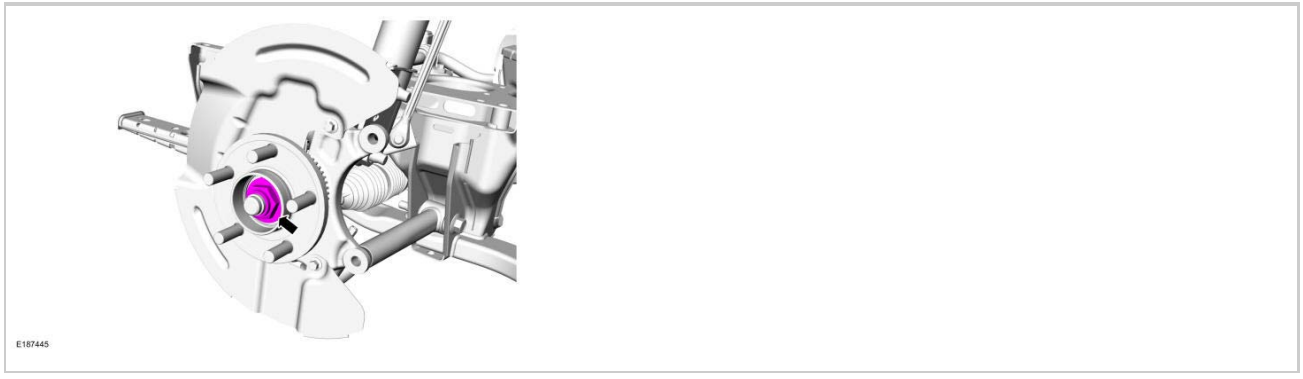


2.

Install the new the wheel hub nut.

Torque

: 251 lb.ft (340 Nm)



3.

Install the new wheel hub grease cap.



4.

Install the brake disc. Refer to: Brake Disc .

REMOVAL AND INSTALLATION > FRONT WHEEL BEARING AND WHEEL HUB - VEHICLES WITH: SVT PERFORMANCE PACKAGE > REMOVAL

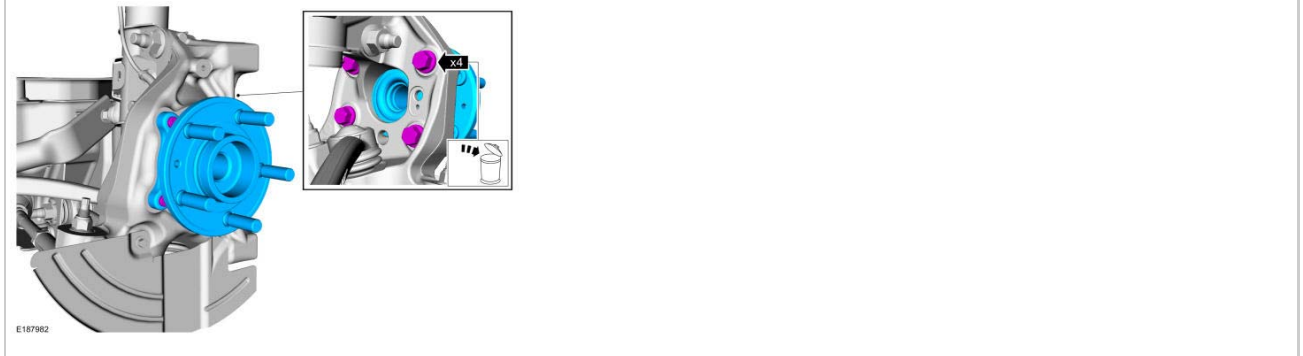
NOTE: Suspension fasteners are critical parts that affect the performance of vital components and systems. Failure of these fasteners may result in major service expense. Use the same or equivalent parts if replacement is necessary. Do not use a replacement part of lesser quality or substitute design. Tighten fasteners as specified.

1.

Remove the brake disc. Refer to: Brake Disc .

2.

Remove and discard the 4 front wheel bearing and wheel hub bolts and remove the front wheel bearing and wheel hub.



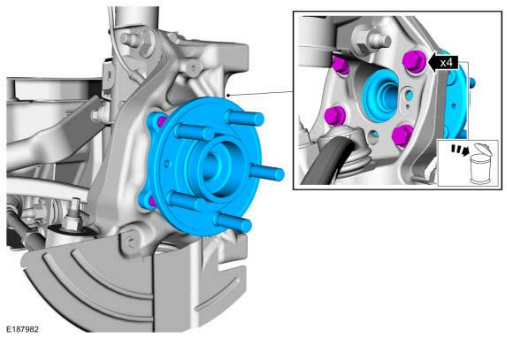
REMOVAL AND INSTALLATION > FRONT WHEEL BEARING AND WHEEL HUB - VEHICLES WITH: SVT PERFORMANCE PACKAGE > INSTALLATION

NOTE: Tighten the front wheel bearing and wheel hub bolts in a cross pattern.

1.
Install the front wheel bearing and wheel hub and install the 4 new front wheel bearing and wheel hub bolts.

Torque

: 98 lb.ft (133 Nm)



2.

Install the brake disc. Refer to: Brake Disc .

REMOVAL AND INSTALLATION > REAR LOWER ARM

Special Tool(s) / General Equipment

	204-592 Separator, Lower Arm Ball Joint TKIT-2006C-FFMFLM TKIT-2006C-LM TKIT-2006C-ROW
Vehicle/Axle Stands	

REMOVAL AND INSTALLATION > REAR LOWER ARM > REMOVAL

NOTE: Suspension fasteners are critical parts that affect the performance of vital components and systems. Failure of these fasteners may result in major service expense. Use the same or equivalent parts if replacement is necessary. Do not use a replacement part of lesser quality or substitute design. Tighten fasteners as specified.

1.

Remove the wheel and tire. Refer to: Wheel and Tire .

NOTE: If equipped with dynamic suspension.

NOTE: The front suspension height sensor must be disconnected from the lower control arm prior to servicing suspension components or damage to the suspension height sensor and/or the vehicle dynamic suspension system may occur. The sensor will need to be recalibrated after reassembly.

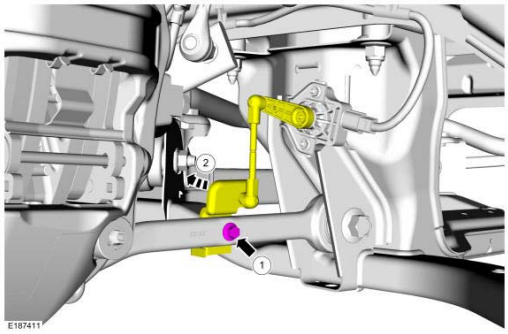
2.

1.

Remove the ride height sensor arm bracket bolt.

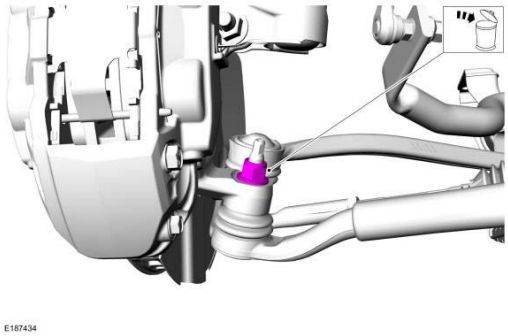
2.

Position the ride height sensor arm bracket aside.



3.

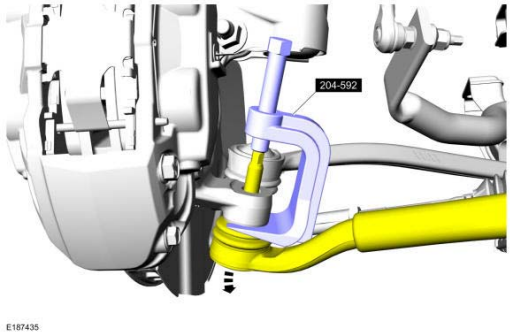
Remove and discard the rear lower arm outboard nut.



NOTE: Use care when releasing the lower arm and wheel knuckle into the resting position or damage to the ball joint seal may occur.

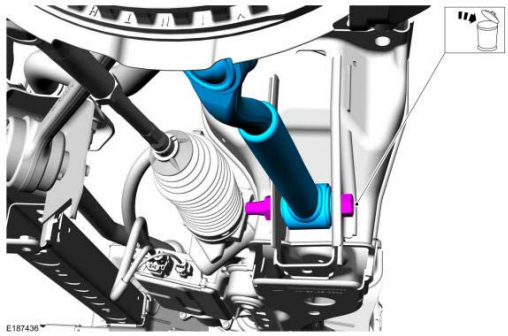
NOTE: Do not use a prying device or separator fork between the ball joint and the wheel knuckle. Damage to the ball joint or ball joint seal may result. Only use the pry bar by inserting it into the lower arm body opening.

4.
Separate the rear lower arm from the wheel spindle. Use Special Service Tool: 204-592 Separator, Lower Arm Ball Joint.



5.

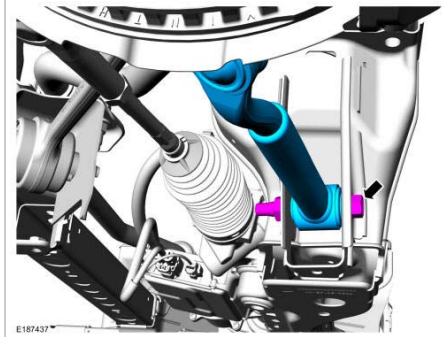
Remove and discard the rear lower arm-to-frame bolt and remove the rear lower arm.



REMOVAL AND INSTALLATION > REAR LOWER ARM > INSTALLATION

NOTE: Only tighten the bolt finger tight at this stage.

1.
Position the rear lower arm and install the new rear lower arm-to-frame bolt.



2.

1.

Attach the rear lower arm to the wheel spindle.

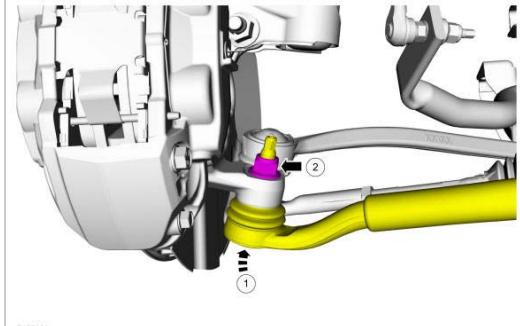
2.

Install the new rear lower arm outboard nut.

Torque:

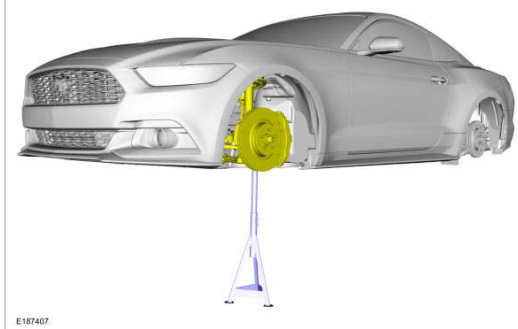
Non SVT: 85 lb.ft (115 Nm)

SVT: 76 lb.ft (103 Nm)



3.

Support the suspension at curb height. Use the General Equipment: Vehicle/Axle Stands

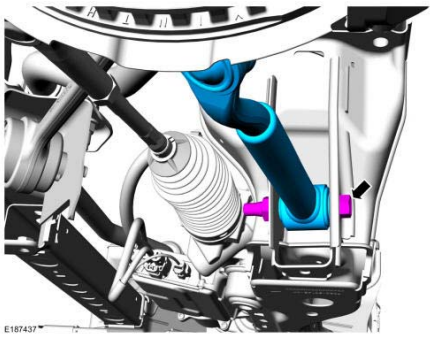


NOTE: Tighten the suspension bushing fasteners with the suspension loaded or with the weight of the vehicle resting on the wheels and tires, otherwise incorrect clamp load and bushing damage may occur.

4.
Tighten the rear lower arm-to-frame bolt.

Torque

: 184 lb.ft (250 Nm)



NOTE: If equipped with dynamic suspension.

5.

1.

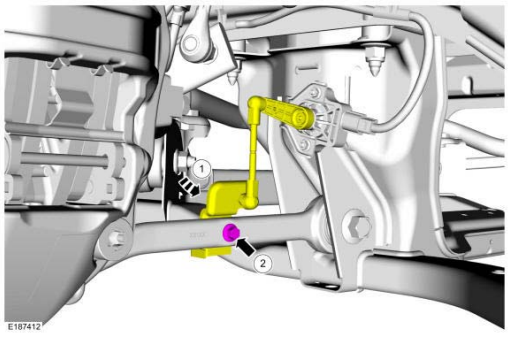
Position the ride height sensor arm bracket.

2.

Install the ride height sensor arm bracket bolt.

Torque

: 177 lb.in (20 Nm)



6.

Install the wheel and tire. Refer to: Wheel and Tire .

7.

Check and if necessary adjust front toe. Refer to: Front Toe Adjustment .

8.

If equipped with dynamic suspension, calibrate the suspension system. Connect the scan tool and carry out the Ride Height Calibration routine. Follow the scan tool directions.

REMOVAL AND INSTALLATION > WHEEL KNUCKLE - VEHICLES WITH: SVT PERFORMANCE PACKAGE

Special Tool(s) / General Equipment

	204-592 Separator, Lower Arm Ball Joint TKIT-2006C-FFMFLM TKIT-2006C-LM TKIT-2006C-ROW
Vehicle/Axle Stands	

REMOVAL AND INSTALLATION > WHEEL KNUCKLE - VEHICLES WITH: SVT PERFORMANCE PACKAGE > REMOVAL

NOTE: Suspension fasteners are critical parts that affect the performance of vital components and systems. Failure of these fasteners may result in major service expense. Use the same or equivalent parts if replacement is necessary. Do not use a replacement part of lesser quality or substitute design. Tighten fasteners as specified.

NOTE: Disconnect the battery ground cable anytime the steering gear is being serviced or damage to the steering gear internal power relay may occur resulting in steering gear replacement.

1.
Disconnect the battery ground cable. Refer to: Battery Disconnect and Connect .

2.

Remove the front wheel bearing and hub assembly. Refer to: Front Wheel Bearing and Wheel Hub - Vehicles With: SVT Performance Package .

3.

Remove the brake disc shield. Refer to: Brake Disc Shield .

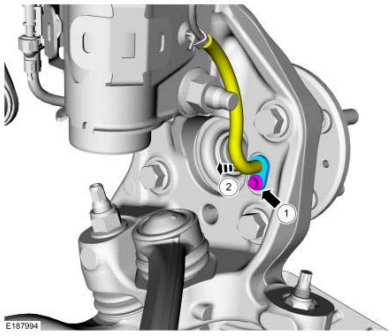
4.

1.

Remove the front wheel speed sensor bolt.

2.

Position the front wheel speed sensor aside.



NOTE: Use care when installing the tie rod separator or damage to the outer tie-rod end boot may occur.

NOTE: Do not use a hammer to separate the outer tie-rod end from the wheel knuckle or damage to the wheel knuckle may result.

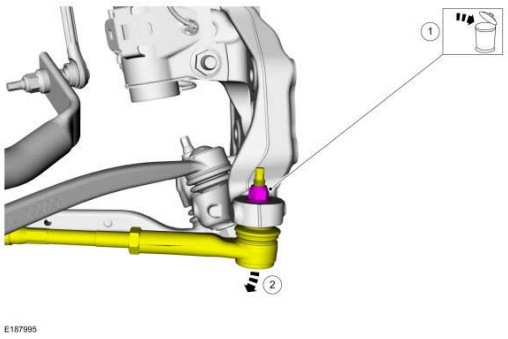
5.

1.

Remove and discard the tie rod end nut.

2.

Disconnect the tie rod end from the wheel knuckle. Use the General Equipment: Tie Rod End Remover



NOTE: If equipped with dynamic suspension.

NOTE: The front suspension height sensor must be disconnected from the lower control arm prior to servicing suspension components or damage to the suspension height sensor and/or the vehicle dynamic suspension system may occur. The sensor will need to be recalibrated after reassembly.

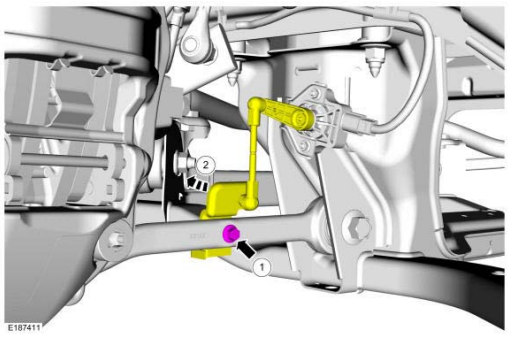
6.

1.

Remove the ride height sensor arm bracket bolt.

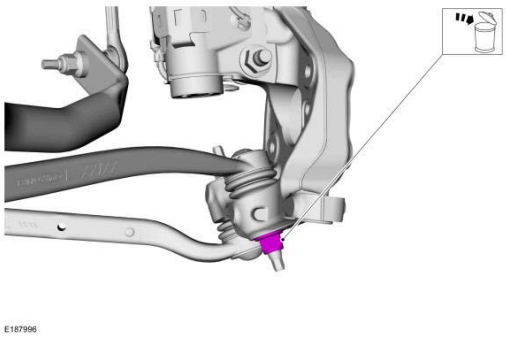
2.

Position the ride height sensor arm bracket aside.



7.

Remove and discard the front lower arm outboard nut.

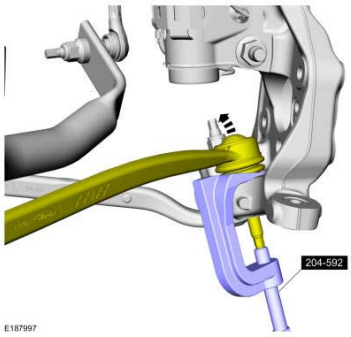


NOTE: Use care when releasing the lower arm and wheel knuckle into the resting position or damage to the ball joint seal may occur.

NOTE: Do not use a prying device or separator fork between the ball joint and the wheel knuckle. Damage to the ball joint or ball joint seal may result. Only use the pry bar by inserting it into the lower arm body opening.

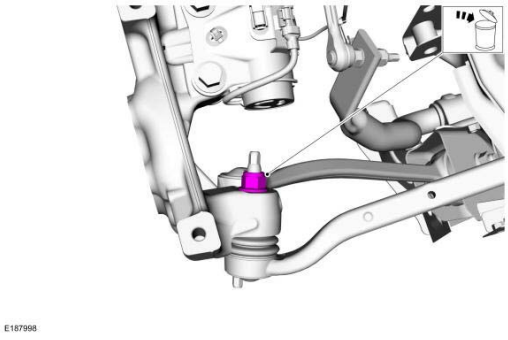
8.
Separate the front lower arm from the wheel knuckle.

Use Special Service Tool: 204-592 Separator, Lower Arm Ball Joint.



9.

Remove and discard the rear lower arm outboard nut.



NOTE: Use care when releasing the lower arm and wheel knuckle into the resting position or damage to the ball joint seal may occur.

NOTE: Do not use a prying device or separator fork between the ball joint and the wheel knuckle. Damage to the ball joint or ball joint seal may result. Only use the pry bar by inserting it into the lower arm body opening.

10.
Separate the rear lower arm from the wheel knuckle.

Use Special Service Tool: 204-592 Separator, Lower Arm Ball Joint.



11.

1.

Remove and discard the 2 strut-to-wheel knuckle bolts and nuts.

2.

Remove the wheel knuckle.



REMOVAL AND INSTALLATION > WHEEL KNUCKLE - VEHICLES WITH: SVT PERFORMANCE PACKAGE > INSTALLATION

1.

1.

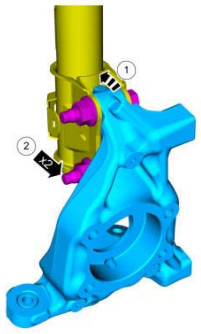
Position the wheel knuckle.

2.

Install the 2 new strut-to-wheel knuckle bolts and nuts.

Torque

: 184 lb.ft (250 Nm)



2.

1.

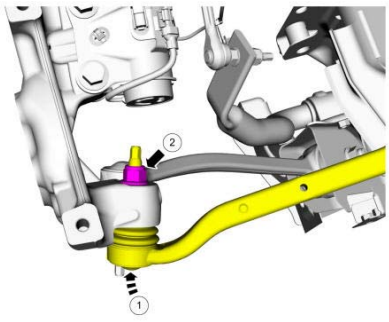
Attach the rear lower arm to the wheel knuckle.

2.

Install the new rear lower arm outboard nut.

Torque

: 76 lb.ft (103 Nm)



3.

1.

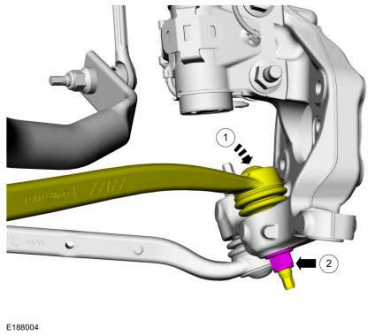
Attach the front lower arm to the wheel knuckle.

2.

Install the new front lower arm outboard nut.

Torque

: 76 lb.ft (103 Nm)



NOTE: If equipped with dynamic suspension.

4.

1.

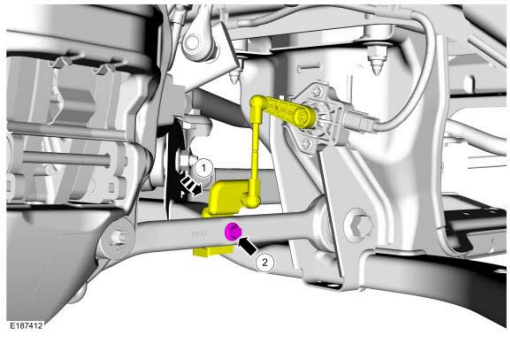
Position the ride height sensor arm bracket.

2.

Install the ride height sensor arm bracket bolt.

Torque

: 177 lb.in (20 Nm)



5.

1.

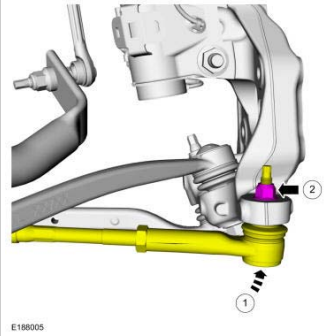
Attach the tie rod end to the wheel knuckle.

2.

Install the new tie rod end nut.

Torque

: 30 lb.ft (40 Nm)



6.

1.

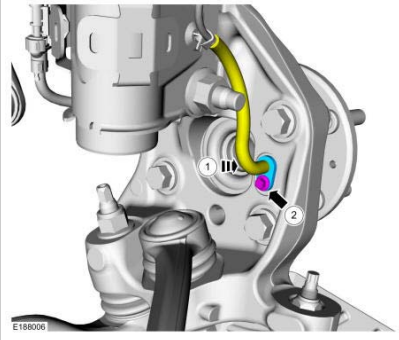
Position the front wheel speed sensor.

2.

Install the front wheel speed sensor bolt.

Torque

: 133 lb.in (15 Nm)



7.

Install the brake disc shield. Refer to: Brake Disc Shield .

8.

Install the front wheel bearing and hub assembly. Refer to: Front Wheel Bearing and Wheel Hub - Vehicles With: SVT Performance Package .

9.

Connect the battery ground cable. Refer to: Battery Disconnect and Connect .

10.

Check and if necessary adjust front camber. Refer to: Front Camber Adjustment .

11.

If equipped with dynamic suspension, calibrate the suspension system. Connect the scan tool and carry out the Ride Height Calibration routine. Follow the scan tool directions.

REMOVAL AND INSTALLATION > WHEEL SPINDLE

Wheel Spindle

Special Tool(s) / General Equipment

	204-592 Separator, Lower Arm Ball Joint TKIT-2006C-FFMFLM TKIT-2006C-LM TKIT-2006C-ROW
Tie Rod End Remover	

REMOVAL AND INSTALLATION > WHEEL SPINDLE > REMOVAL

NOTE: Suspension fasteners are critical parts that affect the performance of vital components and systems. Failure of these fasteners may result in major service expense. Use the same or equivalent parts if replacement is necessary. Do not use a replacement part of lesser quality or substitute design. Tighten fasteners as specified.

NOTE: Disconnect the battery ground cable anytime the steering gear is being serviced or damage to the steering gear internal power relay may occur resulting in steering gear replacement.

1.
Disconnect the battery ground cable. Refer to: Battery Disconnect and Connect .

2.

Remove the front wheel bearing and hub assembly. Refer to: Front Wheel Bearing and Wheel Hub .

3.

Remove the brake disc shield. Refer to: Brake Disc Shield .

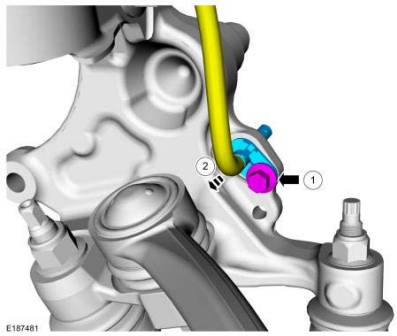
4.

1.

Remove the front wheel speed sensor bolt.

2.

Position the front wheel speed sensor aside.



NOTE: Use care when installing the tie rod separator or damage to the outer tie-rod end boot may occur.

NOTE: Do not use a hammer to separate the outer tie-rod end from the wheel spindle or damage to the wheel spindle may result.

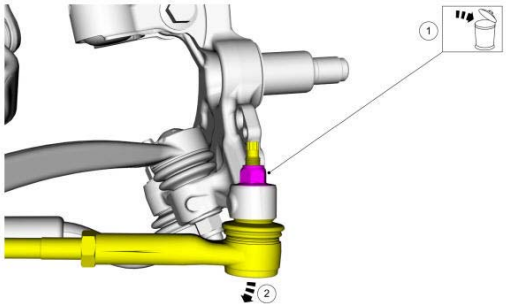
5.

1.

Remove and discard the tie rod end nut.

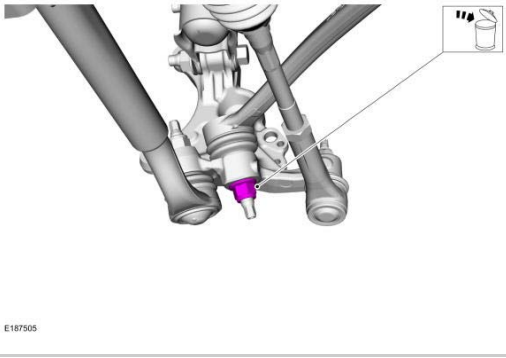
2.

Disconnect the tie rod end from the wheel spindle. Use the General Equipment: Tie Rod End Remover



6.

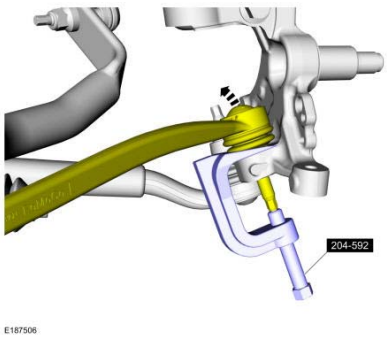
Remove and discard the front lower arm outboard nut.



NOTE: Use care when releasing the lower arm and wheel spindle into the resting position or damage to the ball joint seal may occur.

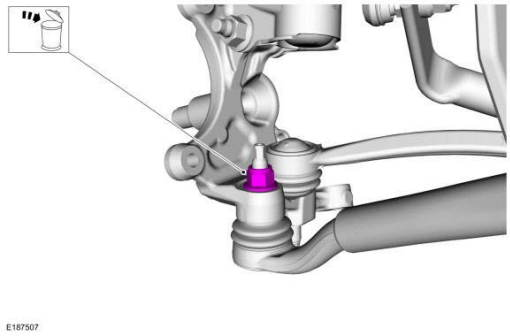
NOTE: Do not use a prying device or separator fork between the ball joint and the wheel spindle. Damage to the ball joint or ball joint seal may result. Only use the pry bar by inserting it into the lower arm body opening.

7.
Separate the front lower arm from the wheel spindle. Use Special Service Tool: 204-592 Separator, Lower Arm Ball Joint.



8.

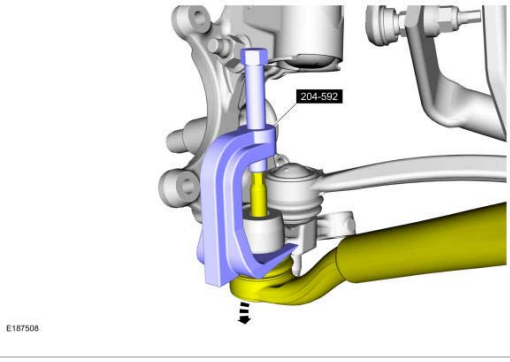
Remove and discard the rear lower arm outboard nut.



NOTE: Use care when releasing the lower arm and wheel spindle into the resting position or damage to the ball joint seal may occur.

NOTE: Do not use a prying device or separator fork between the ball joint and the wheel spindle. Damage to the ball joint or ball joint seal may result. Only use the pry bar by inserting it into the lower arm body opening.

9.
Separate the rear lower arm from the wheel spindle. Use Special Service Tool: 204-592 Separator, Lower Arm Ball Joint.



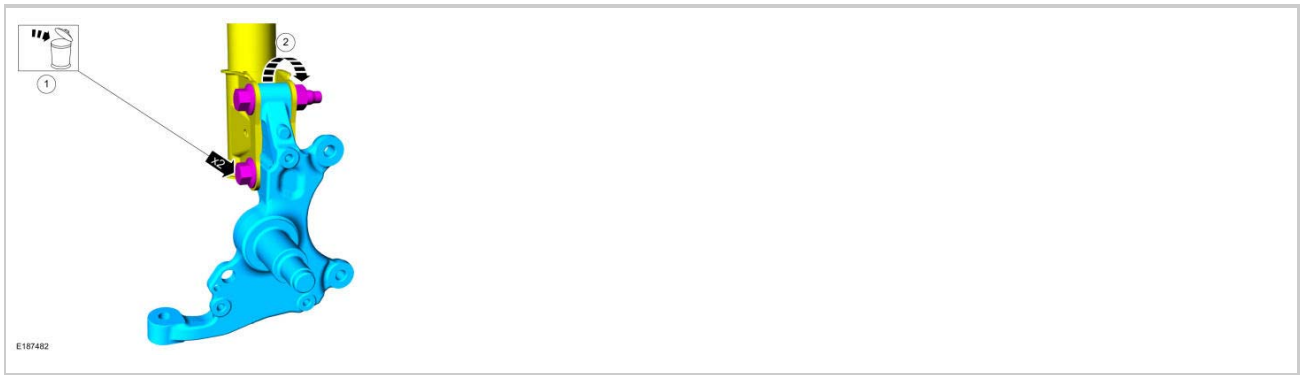
10.

1.

Remove and discard the 2 strut-to-wheel spindle bolts and nuts.

2.

Remove the wheel spindle.



REMOVAL AND INSTALLATION > WHEEL SPINDLE > INSTALLATION

1.

1.

Position the wheel spindle.

2.

Install the 2 new strut-to-wheel spindle bolts and nuts.

Torque

: 184 lb.ft (250 Nm)



2.

1.

Attach the rear lower arm to the wheel spindle.

2.

Install the new rear lower arm outboard nut.

Torque

: 85 lb.ft (115 Nm)



3.

1.

Attach the front lower arm to the wheel spindle.

2.

Install the new front lower arm outboard nut.

Torque

: 85 lb.ft (115 Nm)



4.

1.

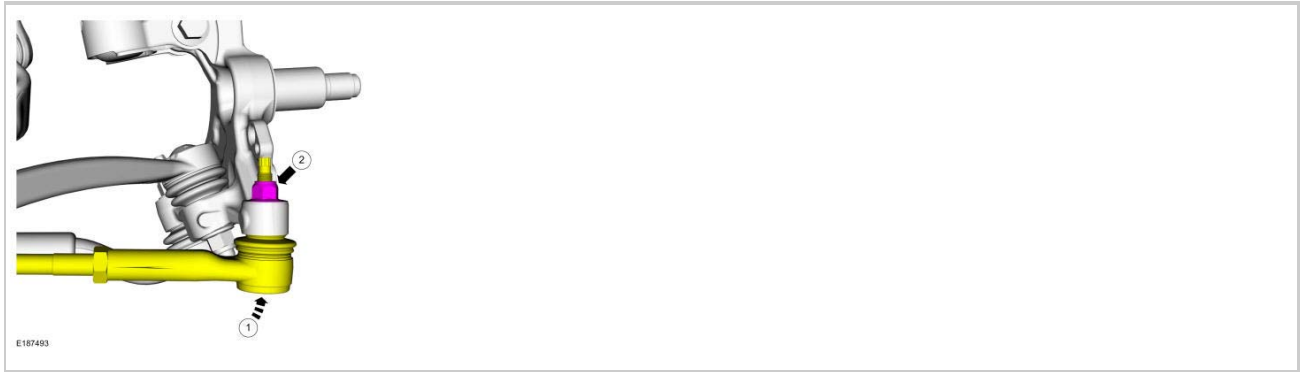
Attach the tie rod end to the wheel spindle.

2.

Install the new tie rod end nut.

Torque

: 59 lb.ft (80 Nm)



5.

1.

Position the front wheel speed sensor.

2.

Install the front wheel speed sensor bolt.

Torque

: 133 lb.in (15 Nm)



6.

Install the brake disc shield. Refer to: Brake Disc Shield .

7.

Install the front wheel bearing and hub assembly. Refer to: Front Wheel Bearing and Wheel Hub .

8.

Connect the battery ground cable. Refer to: Battery Disconnect and Connect .

9.

Check and if necessary adjust front camber. Refer to: Front Camber Adjustment .

REMOVAL AND INSTALLATION > WHEEL STUDS

Special Tool(s) / General Equipment

Hydraulic Press

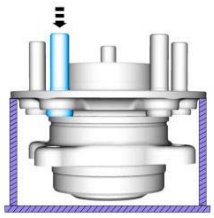
REMOVAL AND INSTALLATION > WHEEL STUDS > REMOVAL

1.

Remove the wheel bearing and wheel hub. Refer to: Front Wheel Bearing and Wheel Hub . Refer to: Front Wheel Bearing and Wheel Hub - Vehicles With: SVT Performance Package .

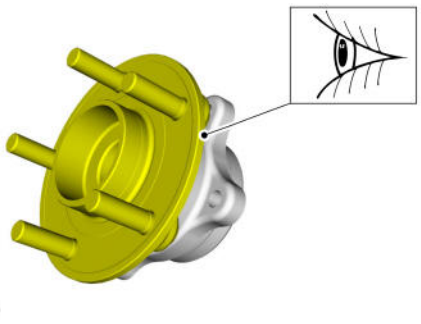
2.

Press the wheel stud from the wheel bearing and wheel hub. Use the General Equipment: Hydraulic Press



3.

Inspect the wheel bearing and wheel hub for damage. Replace as necessary.

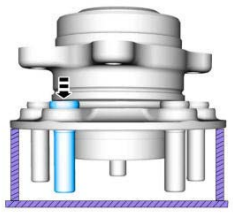


REMOVAL AND INSTALLATION > WHEEL STUDS > INSTALLATION

1.

Press the wheel stud into the wheel bearing and wheel hub. Use the General Equipment: Hydraulic

Press



2.

Install the wheel bearing and wheel hub. Refer to: Front Wheel Bearing and Wheel Hub . Refer to: Front Wheel Bearing and Wheel Hub - Vehicles With: SVT Performance Package .

DISASSEMBLY AND ASSEMBLY > FRONT STRUT AND SPRING ASSEMBLY

Front Strut and Spring Assembly

Special Tool(s) / General Equipment

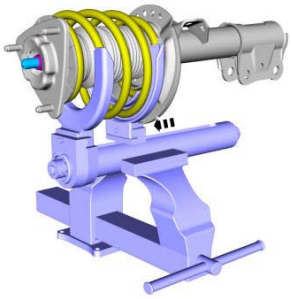
Spring Compressor
Vise

DISASSEMBLY AND ASSEMBLY > FRONT STRUT AND SPRING ASSEMBLY > DISASSEMBLY

NOTE: Suspension fasteners are critical parts that affect the performance of vital components and systems. Failure of these fasteners may result in major service expense. Use the same or equivalent parts if replacement is necessary. Do not use a replacement part of lesser quality or substitute design. Tighten fasteners as specified.

NOTE: Typical strut and spring assembly shown in illustration below.

1.
Compress the coil spring enough to relieve the tension on the strut assembly. Use the General Equipment: Spring Compressor Use the General Equipment: Vise



NOTE: Utilize the hex holding feature to prevent the strut rod from turning while removing the strut rod nut.

NOTE: Do not use an impact wrench on the strut rod nut.

NOTE: Note the position of the components before removal.

2.
Disassemble the front strut and spring assembly by removing the components as listed.

1.

Cap.

2.

Strut rod nut. (Discard)

3.

Upper strut mount.

4.

Upper spring seat.

5.

Spring.

6.

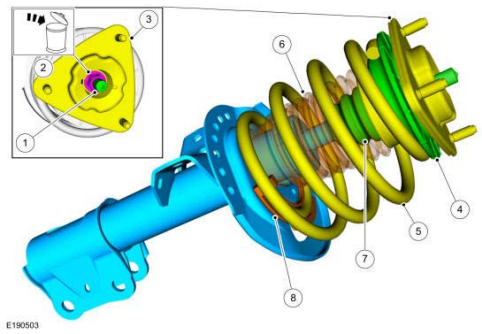
Dust boot.

7.

Jounce bumper.

8.

Lower spring seat.



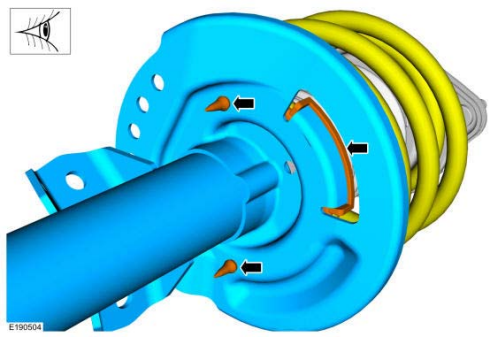
DISASSEMBLY AND ASSEMBLY > FRONT STRUT AND SPRING ASSEMBLY > ASSEMBLY

NOTE: Make sure that the components are installed to the position noted before removal.

1.
To assemble, reverse the disassembly procedure.

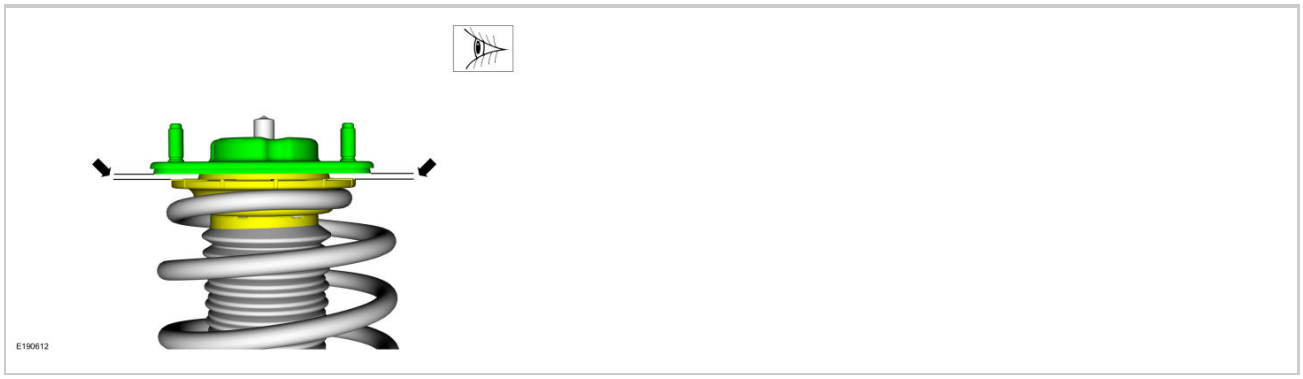
NOTE: Make sure that the spring is centered in the lower spring seat.

2.
Make sure that the lower spring seat is properly installed.



NOTE: If bearing is properly seated, there should be equal spacing on all sides.

3.
Make sure that the bearing is properly seated in the mount.



NOTE: Typical strut and spring assembly shown in illustration below.

4.

NOTE: Utilize the hex holding feature to prevent the strut rod from turning while installing the strut rod nut.

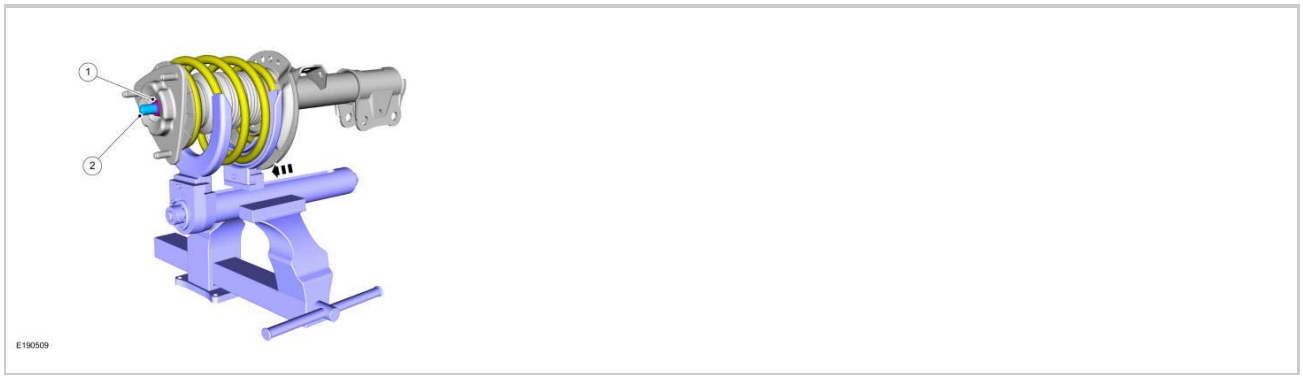
1.
Install the new strut rod nut. Use the General Equipment: Spring Compressor Use the General Equipment: Vise

Torque

: 76 lb.ft (103 Nm)

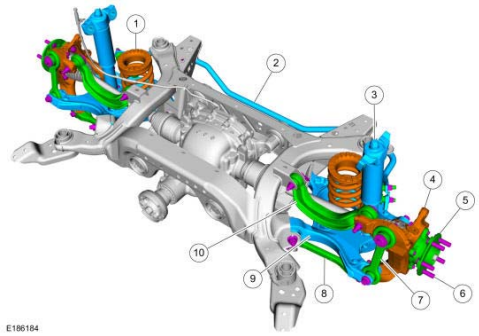
2.

Install the cap.



Service Manual: REAR SUSPENSION

DESCRIPTION AND OPERATION > REAR SUSPENSION - COMPONENT LOCATION



Item	Description
1	Coil spring
2	Stabilizer and links
3	Shock absorber
4	Wheel knuckle
5	Wheel bearing and wheel hub assembly
6	Wheel studs
7	Lower arm vertical link
8	Toe link
9	Lower arm and bushing assembly
10	Upper arm

DESCRIPTION AND OPERATION > REAR SUSPENSION - OVERVIEW > OVERVIEW

The rear suspension consists of the following components:

- Coil springs
- Lower arm and bushing assemblies
- Shock absorbers
- Stabilizer bar and links
- Toe links
- Upper arms
- Lower arm vertical links

- Wheel bearing and wheel hub assemblies
- Wheel knuckles
- Wheel studs

The rear suspension uses 2 parallel arms (1 upper and 1 lower). Each arm has a mounting position to the chassis and an attachment at the wheel knuckle. This suspension allows the wheels to react to road imperfections independent of each other. The shock absorber mounts to the lower arm and along with the spring, controls vertical movement. The stabilizer bar and links control suspension lean/sway.

DIAGNOSIS AND TESTING > REAR SUSPENSION

REFER to: Suspension System .

REMOVAL AND INSTALLATION > LOWER ARM

Lower Arm

Special Tool(s) / General Equipment

Vehicle/Axle Stands

REMOVAL AND INSTALLATION > LOWER ARM > REMOVAL

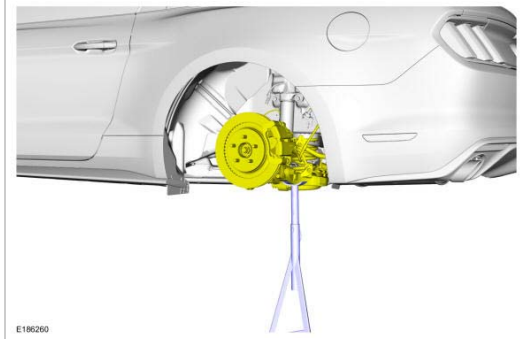
NOTE: Suspension fasteners are critical parts that affect the performance of vital components and systems. Failure of these fasteners may result in major service expense. Use the same or equivalent parts if replacement is necessary. Do not use a replacement part of lesser quality or substitute design. Tighten fasteners as specified.

1.

Remove the wheel and tire. Refer to: Wheel and Tire .

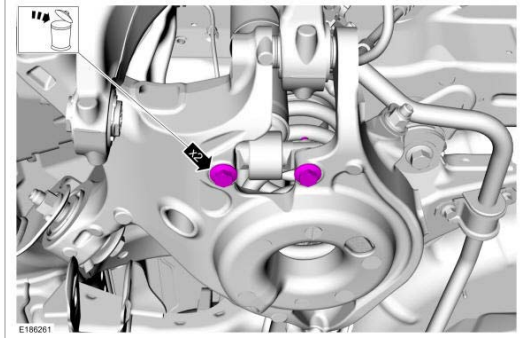
2.

Support the suspension at curb height. Use the General Equipment: Vehicle/Axle Stands



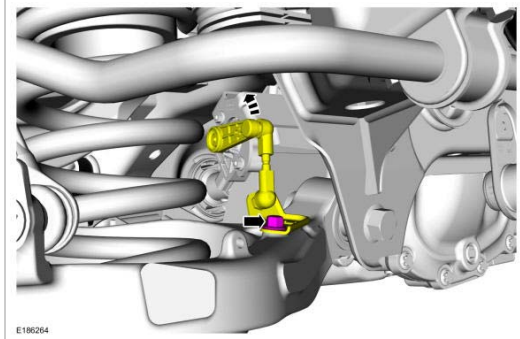
3.

Remove and discard the 2 lower shock absorber bolts.



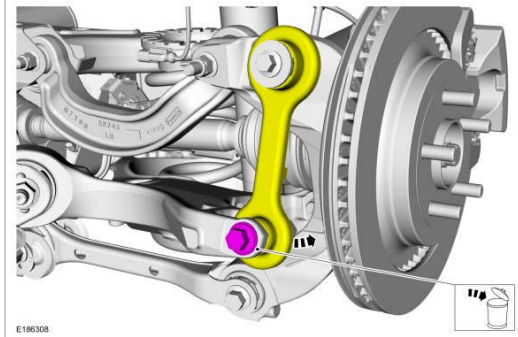
NOTE: If equipped with dynamic suspension.

4.
Remove the ride height sensor arm bracket bolt and position the bracket aside.



5.

Remove and discard the lower arm vertical link lower bolt and position the lower arm vertical link aside.



6.

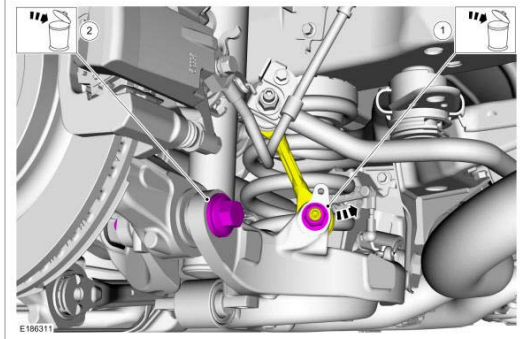
NOTE: The stabilizer bar links are designed with low friction ball joints that have a low breakaway torque.

NOTE: Use the hex-holding feature to prevent the ball stud from turning while removing the stabilizer bar link nut.

1.
Remove and discard the stabilizer bar link lower nut and position the stabilizer bar link aside.

2.

Remove and discard the lower control arm-to-wheel knuckle bolt.

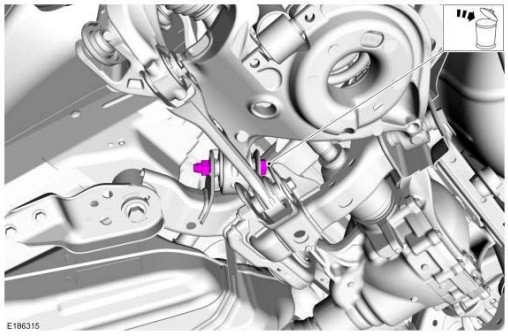


NOTE: The muffler and tailpipe must be removed for clearance for the lower control arm rearward bolts.

7.
Remove the muffler and tailpipe. Refer to: MUFFLER AND TAILPIPE - 2.3L EcoBoost (231kW/314PS). Refer to: MUFFLER AND TAILPIPE - 3.7L Duratec (227kW/301PS). Refer to: MUFFLER AND TAILPIPE - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS).

8.

Remove and discard the forward lower control arm-to-frame bolt.



9.

1.

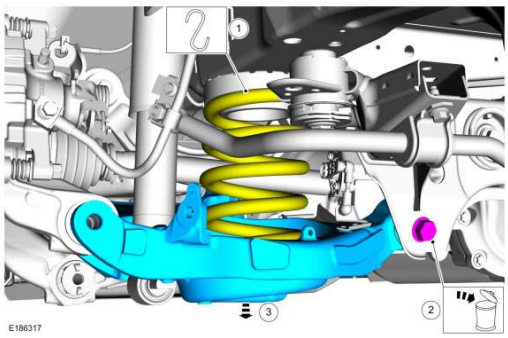
Support the coil spring.

2.

Remove and discard the rearward lower control arm-to-frame bolt.

3.

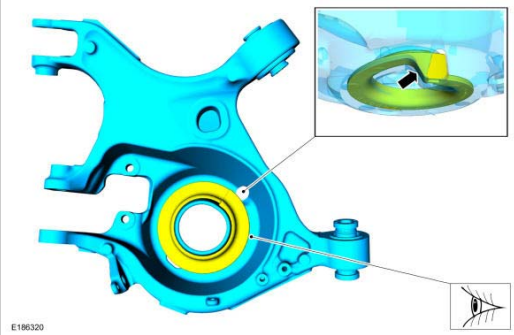
Remove the lower control arm.



REMOVAL AND INSTALLATION > LOWER ARM > INSTALLATION

1.

Inspect the lower coil spring seat. Make sure it is properly aligned in the lower control arm.



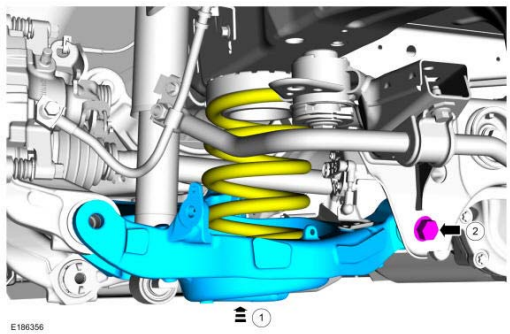
2.

1.

Position the lower control arm.

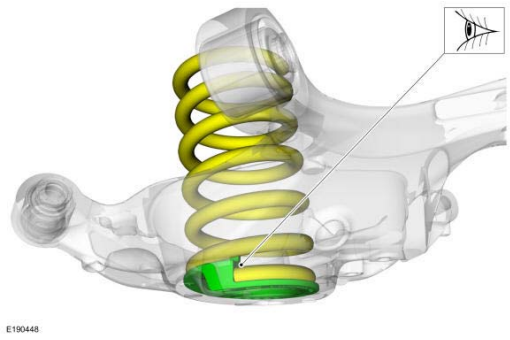
> *NOTE: Only tighten the bolt finger tight at this stage.*

2.
Install the new rearward lower control arm-to-frame bolt.



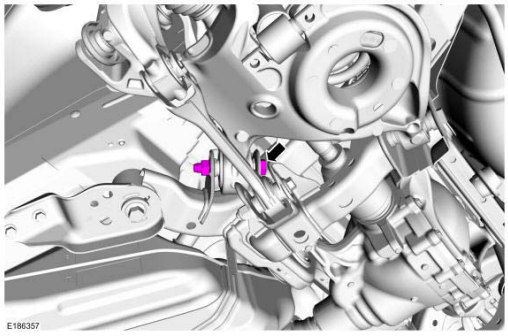
3.

Make sure that the coil spring is properly positioned in the lower coil spring seat.



> *NOTE: Only tighten the bolt finger tight at this stage.*

4.
Install the new forward lower control arm-to-frame bolt.



NOTE: The muffler and tailpipe were removed for clearance for the lower control arm rearward bolts.

5.
Install the muffler and tailpipe. Refer to: MUFFLER AND TAILPIPE - 2.3L EcoBoost (231kW/314PS). Refer to: MUFFLER AND TAILPIPE - 3.7L Duratec (227kW/301PS). Refer to: MUFFLER AND TAILPIPE - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS).

6.

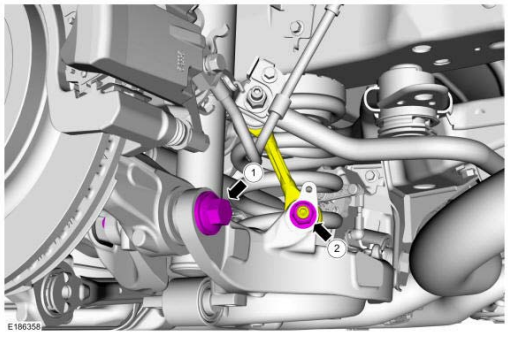
NOTE: Only tighten the bolt finger tight at this stage.

1.
Install the new lower control arm-to-wheel knuckle bolt.

NOTE: Use the hex-holding feature to prevent the ball stud from turning while installing the stabilizer bar link nut.

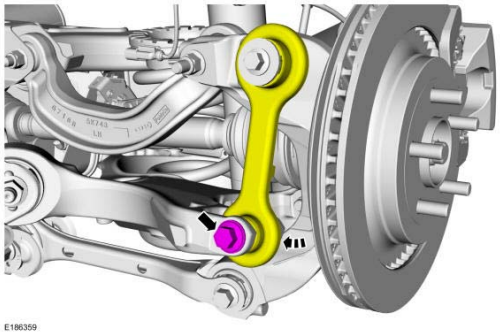
NOTE: The stabilizer bar links are designed with low friction ball joints that have a low breakaway torque.

2.
Position the stabilizer bar link and install the new stabilizer bar link lower nut.



NOTE: Only tighten the bolt finger tight at this stage.

7.
Position the lower arm vertical link and install the new lower arm vertical link lower bolt.

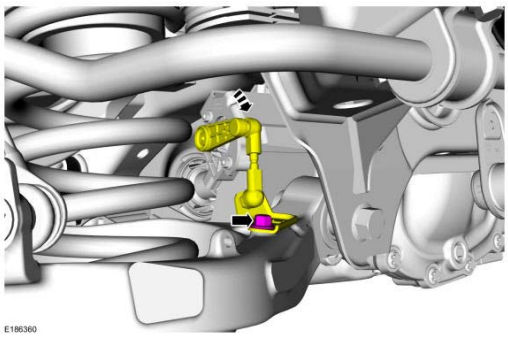


NOTE: If equipped with dynamic suspension.

8.
Position the ride height sensor arm bracket and install the ride height sensor arm bracket bolt.

Torque

: 177 lb.in (20 Nm)

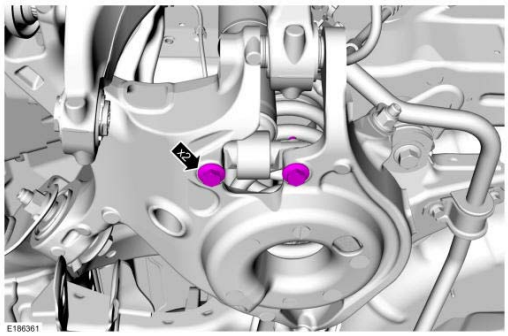


9.

Install the 2 new lower shock absorber bolts.

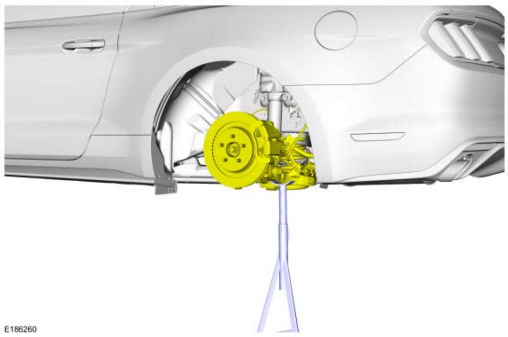
Torque

: 35 lb.ft (48 Nm)



10.

Support the suspension at curb height. Use the General Equipment: Vehicle/Axle Stands



NOTE: Tighten the suspension bushing fasteners with the suspension loaded or with the weight of the vehicle resting on the wheels and tires, otherwise incorrect clamp load and bushing damage may occur.

11.

1.

Tighten the rearward lower control arm-to-frame bolt.

Torque

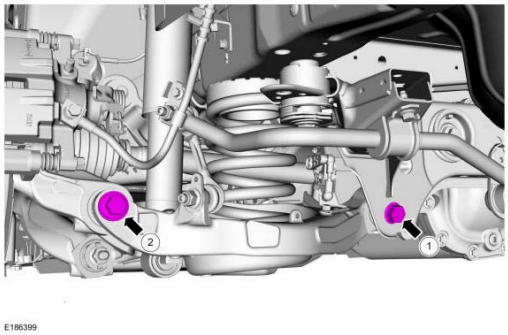
: 184 lb.ft (250 Nm)

2.

Tighten the lower control arm-to-wheel knuckle bolt.

Torque

: 203 lb.ft (275 Nm)

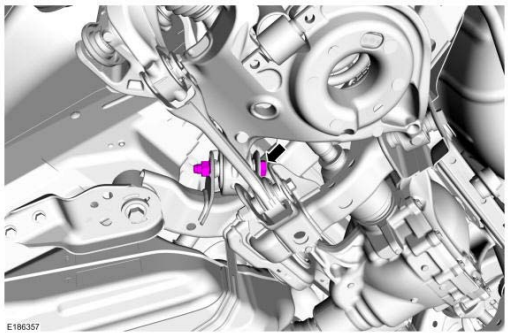


NOTE: Tighten the suspension bushing fasteners with the suspension loaded or with the weight of the vehicle resting on the wheels and tires, otherwise incorrect clamp load and bushing damage may occur.

12.
Tighten the forward lower control arm-to-frame bolt.

Torque

: 166 lb.ft (225 Nm)

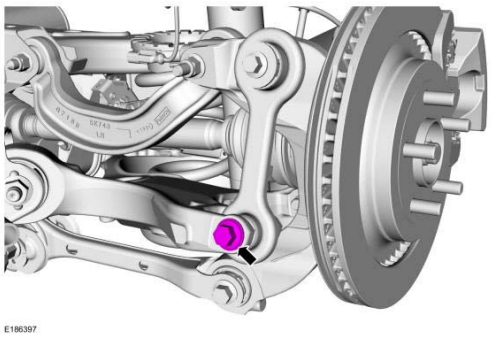


NOTE: Tighten the suspension bushing fasteners with the suspension loaded or with the weight of the vehicle resting on the wheels and tires, otherwise incorrect clamp load and bushing damage may occur.

13.
Tighten lower arm vertical link lower bolt.

Torque

: 129 lb.ft (175 Nm)



14.

Install the wheel and tire. Refer to: Wheel and Tire .

15.

Check and if necessary, adjust rear camber. Refer to: Rear Camber Adjustment .

16.

If equipped with dynamic suspension, calibrate the suspension system. Connect the scan tool and carry out the Ride Height Calibration routine. Follow the scan tool directions.

REMOVAL AND INSTALLATION > LOWER ARM VERTICAL LINK

Special Tool(s) / General Equipment

Vehicle/Axle Stands

REMOVAL AND INSTALLATION > LOWER ARM VERTICAL LINK > REMOVAL

NOTE: Suspension fasteners are critical parts that affect the performance of vital components and systems. Failure of these fasteners may result in major service expense. Use the same or equivalent parts if replacement is necessary. Do not use a replacement part of lesser quality or substitute design. Tighten fasteners as specified.

1.

Remove the wheel and tire. Refer to: Wheel and Tire .

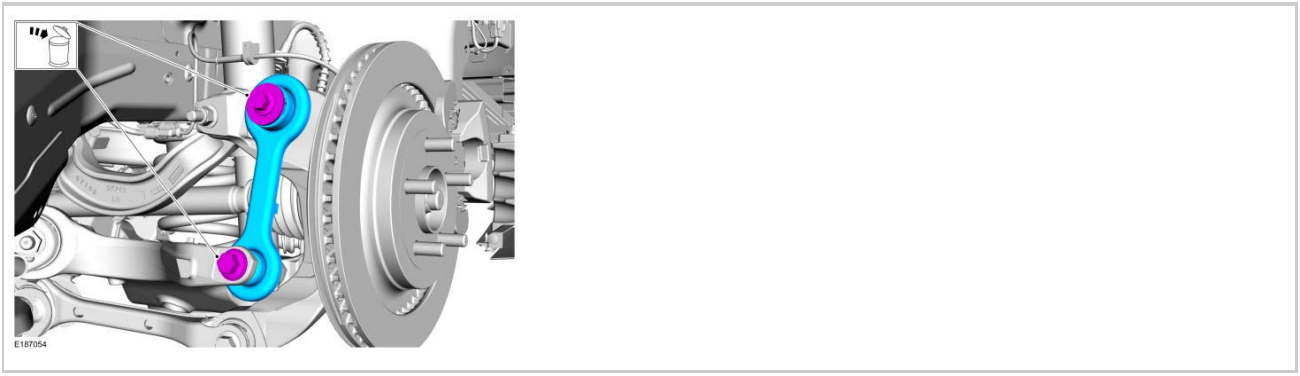
2.

Support the suspension at curb height. Use the General Equipment: Vehicle/Axle Stands



3.

Remove and discard the 2 lower arm vertical link bolts and remove the lower arm vertical link.



REMOVAL AND INSTALLATION > LOWER ARM VERTICAL LINK > INSTALLATION

NOTE: Tighten the suspension bushing fasteners with the suspension loaded or with the weight of the vehicle resting on the wheels and tires, otherwise incorrect clamp load and bushing damage may occur.

1.

Position the lower arm vertical link and install the 2 new lower arm vertical link bolts.

1.

Tighten the lower arm vertical link upper bolt.

Torque

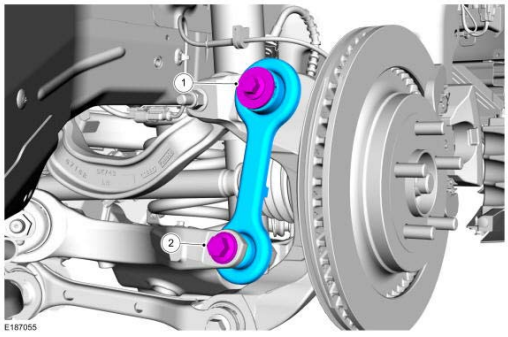
: 76 lb.ft (103 Nm)

2.

Tighten the lower arm vertical link lower bolt.

Torque

: 129 lb.ft (175 Nm)



2.

Install the wheel and tire. Refer to: Wheel and Tire .

REMOVAL AND INSTALLATION > REAR SHOCK ABSORBER

Special Tool(s) / General Equipment

Vehicle/Axle Stands

REMOVAL AND INSTALLATION > REAR SHOCK ABSORBER > REMOVAL

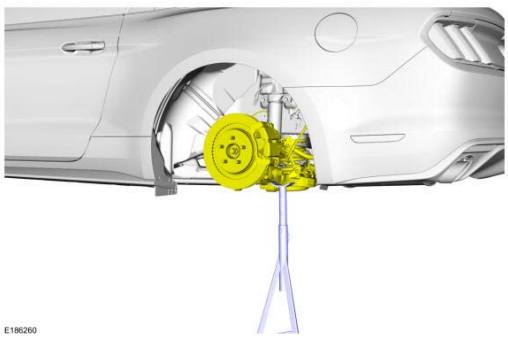
NOTE: Suspension fasteners are critical parts that affect the performance of vital components and systems. Failure of these fasteners may result in major service expense. Use the same or equivalent parts if replacement is necessary. Do not use a replacement part of lesser quality or substitute design. Tighten fasteners as specified.

1.

Remove the wheel and tire. Refer to: Wheel and Tire .

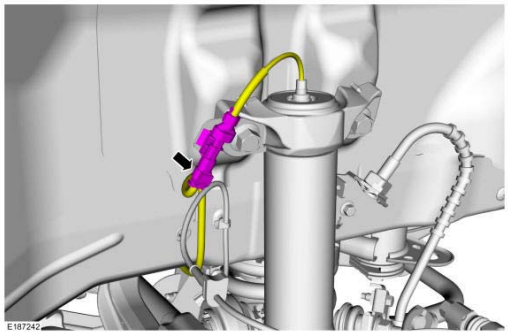
2.

Support the rear suspension. Use the General Equipment: Vehicle/Axle Stands



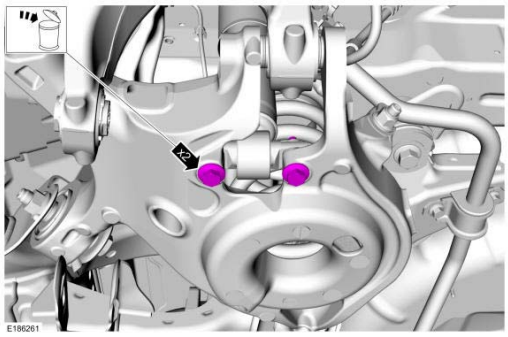
NOTE: If equipped with dynamic suspension.

3.
Disconnect the rear shock absorber electrical connector.



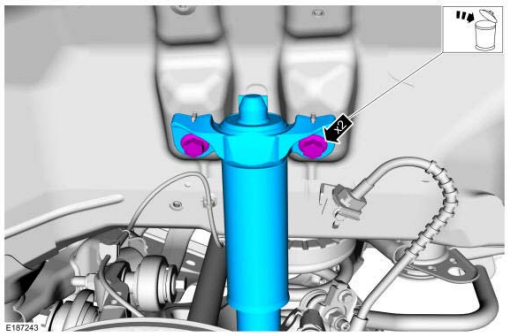
4.

Remove and discard the 2 rear shock absorber lower bolts.



5.

Remove and discard the 2 rear shock absorber upper bolts and remove the rear shock absorber.



NOTE: This step is only necessary when installing a new component.

NOTE: If equipped.

6.
Remove the rear shock absorber rod nut cap.

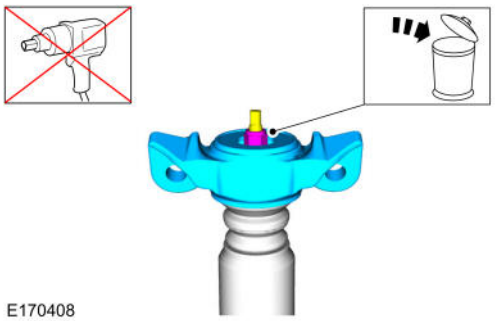


NOTE: Do not use power tools to remove the nut.

NOTE: This step is only necessary when installing a new component.

NOTE: Use the hex-holding feature to prevent the shock absorber rod from turning while removing the shock absorber rod nut.

7.
Remove and discard the rear shock absorber rod nut.



REMOVAL AND INSTALLATION > REAR SHOCK ABSORBER > INSTALLATION

NOTE: This step is only necessary when installing a new component.

NOTE: Use the hex-holding feature to prevent the shock absorber rod from turning while installing the shock absorber rod nut.

1.
Install the new rear shock absorber rod nut.

Torque

: 22 lb.ft (30 Nm)



NOTE: This step is only necessary when installing a new component.

NOTE: If equipped.

2.
Install the rear shock absorber rod nut cap.

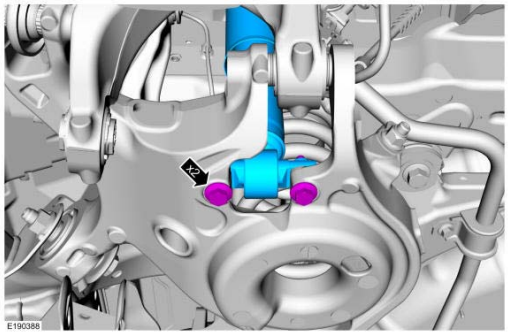


3.

Install the rear shock absorber and install the 2 new rear shock absorber lower bolts.

Torque

: 35 lb.ft (48 Nm)



4.

1.

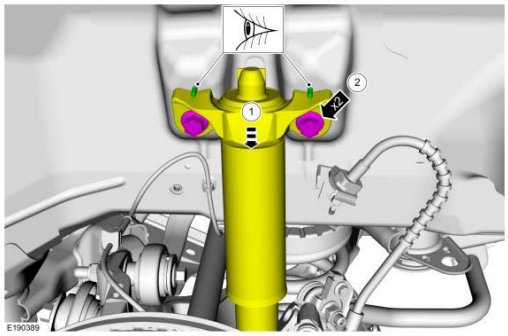
Compress the rear shock absorber and align the rear shock absorber upper mount under the body alignment pins.

2.

Install the 2 new rear shock absorber upper bolts.

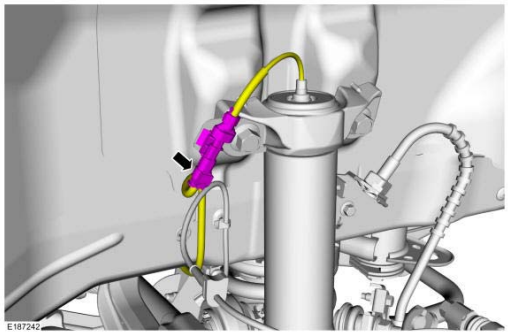
Torque

: 66 lb.ft (90 Nm)



NOTE: If equipped with dynamic suspension.

5.
Connect the rear shock absorber electrical connector.



6.

Install the wheel and tire. Refer to: Wheel and Tire .

REMOVAL AND INSTALLATION > REAR STABILIZER BAR > REMOVAL

NOTE: Suspension fasteners are critical parts that affect the performance of vital components and systems. Failure of these fasteners may result in major service expense. Use the same or equivalent parts if replacement is necessary. Do not use a replacement part of lesser quality or substitute design. Tighten fasteners as specified.

1.

Remove the RH rear wheel and tire. Refer to: Wheel and Tire .

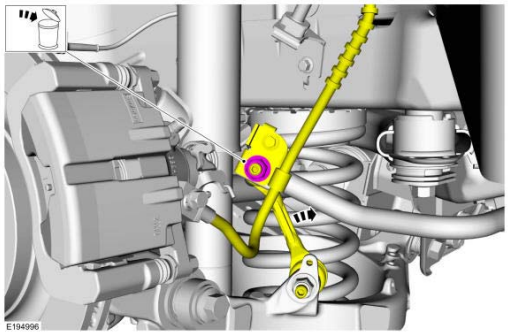
NOTE: Do not use power tools to remove or install the stabilizer bar link nuts. Damage to the stabilizer bar link ball joints and boots may occur.

NOTE: The stabilizer bar links are designed with low friction ball joints that have a low breakaway torque.

NOTE: Use the hex-holding feature to prevent the ball stud from turning while removing the stabilizer bar link nut.

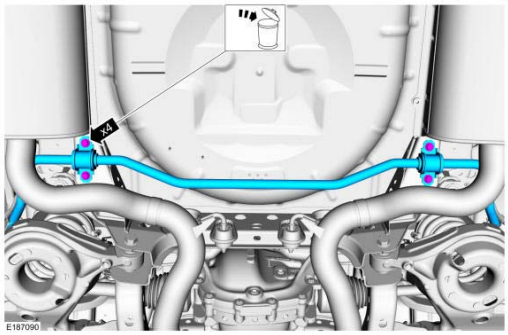
2.
On both sides.

Remove and discard the stabilizer bar link upper nut and position the stabilizer bar link aside.



3.

Remove and discard the 4 stabilizer bar bracket bolts, remove the stabilizer bar brackets and remove the stabilizer bar.



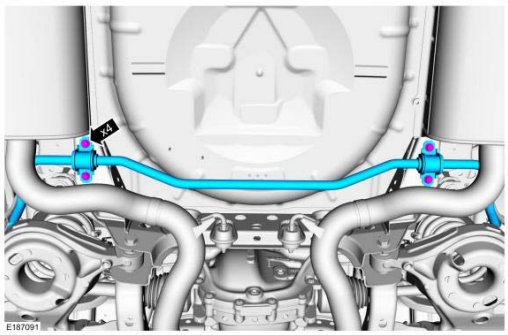
REMOVAL AND INSTALLATION > REAR STABILIZER BAR > INSTALLATION

1.

Position the stabilizer bar, the stabilizer bar brackets and install the 4 new stabilizer bar bracket bolts.

Torque

: 52 lb.ft (70 Nm)



2.

1.

On both sides.

Position the stabilizer bar link.

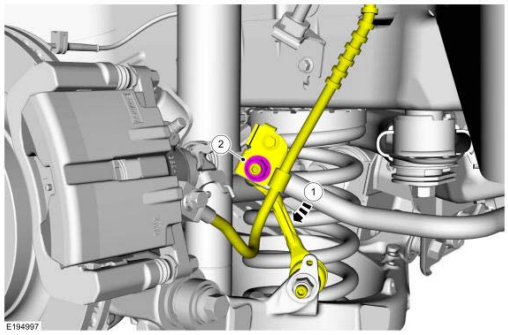
> *NOTE: Use the hex-holding feature to prevent the ball stud from turning while installing the stabilizer bar link nut.*

2.
On both sides.

Install the new stabilizer bar link upper nut.

Torque

: 85 lb.ft (115 Nm)



3.

Install the RH rear wheel and tire. Refer to: Wheel and Tire .

REMOVAL AND INSTALLATION > REAR STABILIZER BAR BUSHING > REMOVAL

1.

With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

2.

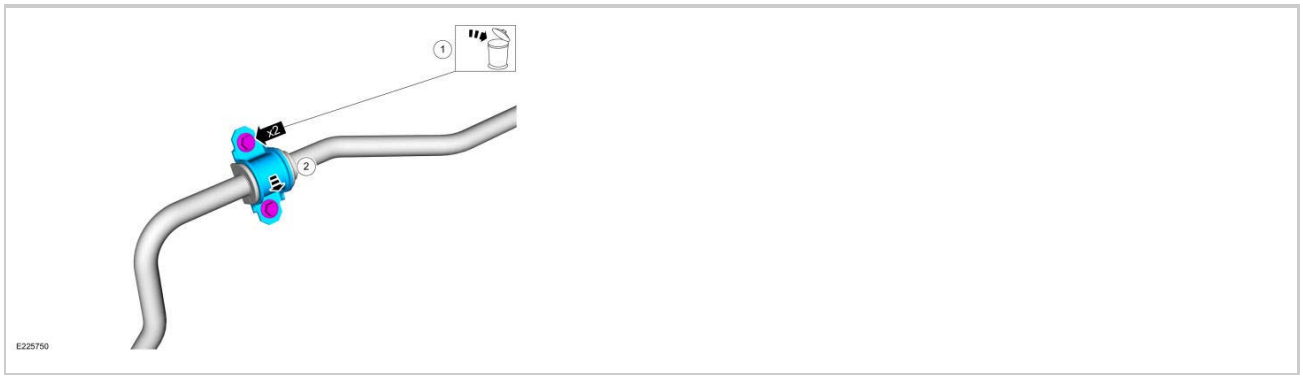
On both sides.

1.

Remove and discard the rear stabilizer bar bushing bracket bolts.

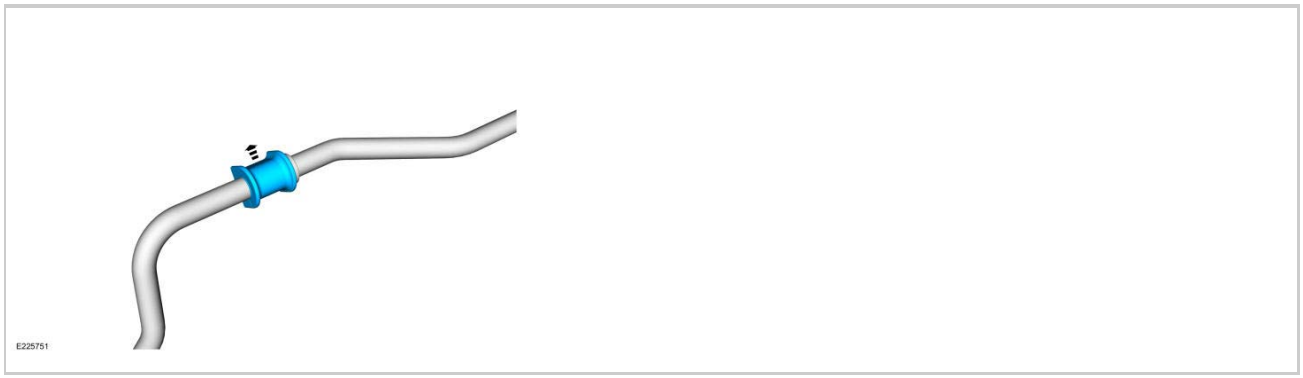
2.

Remove the rear stabilizer bar bushing bracket.



3.

On both sides. Remove the rear stabilizer bar bushing.

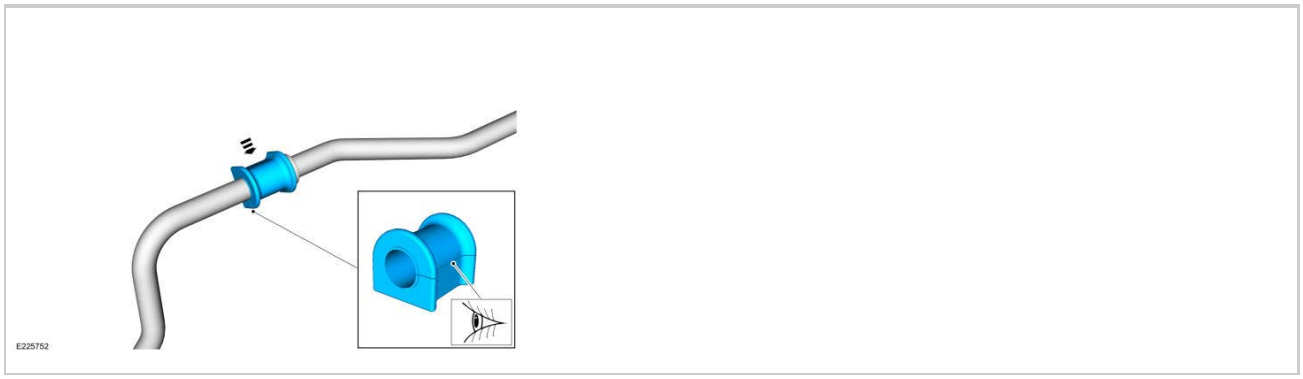


REMOVAL AND INSTALLATION > REAR STABILIZER BAR BUSHING > INSTALLATION

NOTE: Do not use any lubrication on the stabilizer bar or the bushings or damage to the bushings may occur.

NOTE: Stabilizer bar bushings must be installed with slits facing the front of the vehicle.

1.
On both sides. Install the rear stabilizer bar bushing.



NOTE: Water may be applied to the bracket to aid in installation.

2.

On both sides.

1.

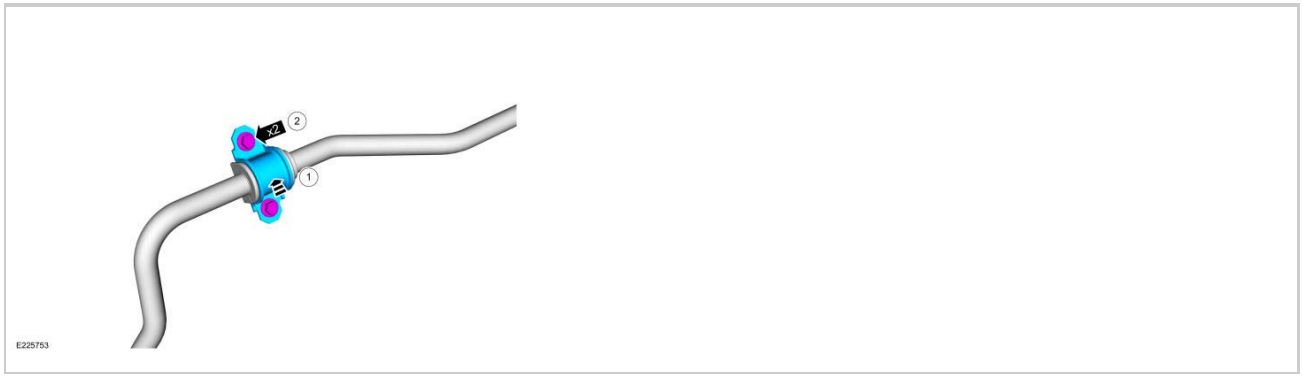
Install the rear stabilizer bar bushing bracket.

2.

Install the new rear stabilizer bar bushing bracket bolts.

Torque

: 52 lb.ft (70 Nm)



REMOVAL AND INSTALLATION > REAR STABILIZER BAR LINK > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

NOTE: Do not use power tools to remove or install the stabilizer bar link nuts. Damage to the stabilizer bar link ball joints and boots may occur.

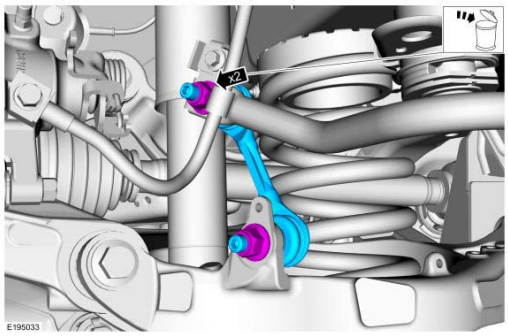
NOTE: The stabilizer bar links are designed with low friction ball joints that have a low breakaway torque.

NOTE: Use the hex-holding feature to prevent the ball stud from turning while removing the stabilizer bar link nut.

1.
Remove and discard the 2 rear stabilizer bar link nuts and remove the rear stabilizer bar link.

Torque

: 85 lb.ft (115 Nm)



REMOVAL AND INSTALLATION > REAR STABILIZER BAR LINK > INSTALLATION

1.

To install, reverse the removal procedure.

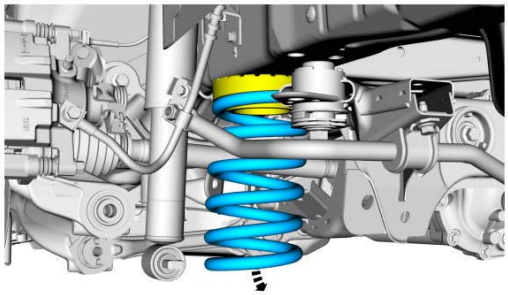
REMOVAL AND INSTALLATION > SPRING > REMOVAL

1.

Remove the lower arm. Refer to: Lower Arm .

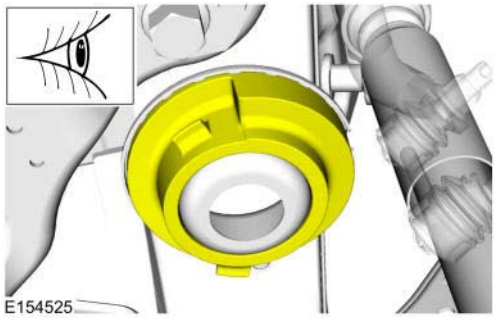
2.

Remove the spring.



3.

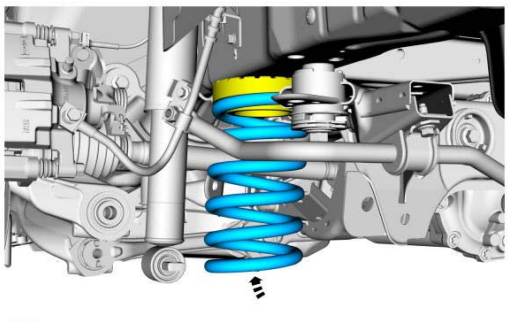
Inspect the upper spring seat for damage. Replace as necessary.



REMOVAL AND INSTALLATION > SPRING > INSTALLATION

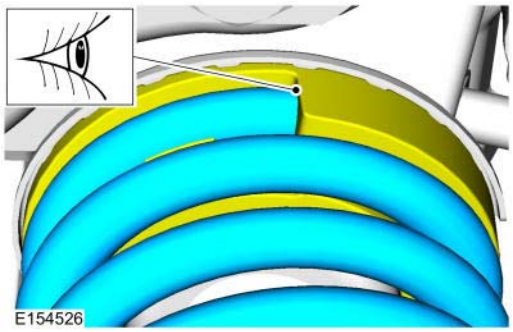
1.

Install the spring.



2.

Make sure that the spring is correctly located in the upper spring seat.



3.

Install the lower arm. Refer to: Lower Arm .

REMOVAL AND INSTALLATION > TOE LINK > REMOVAL

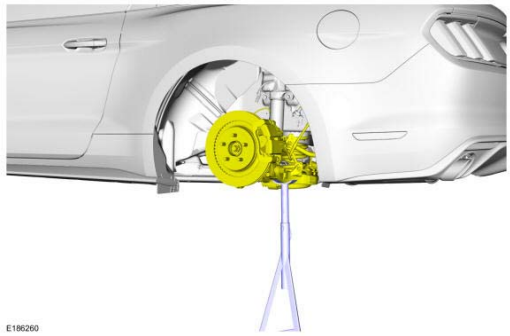
NOTE: Suspension fasteners are critical parts that affect the performance of vital components and systems. Failure of these fasteners may result in major service expense. Use the same or equivalent parts if replacement is necessary. Do not use a replacement part of lesser quality or substitute design. Tighten fasteners as specified.

1.

Remove the wheel and tire. Refer to: Wheel and Tire .

2.

Support the suspension at curb height.



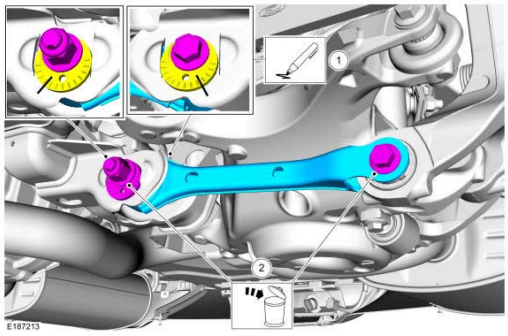
3.

1.

Index mark both the inner and outer cam wheels for use during assembly.

2.

Remove and discard the toe link-to-knuckle bolt and nut, the toe link-to-frame bolt and nut and remove the toe link.



REMOVAL AND INSTALLATION > TOE LINK > INSTALLATION

NOTE: Tighten the suspension bushing fasteners with the suspension loaded or with the weight of the vehicle resting on the wheels and tires, otherwise incorrect clamp load and bushing damage may occur.

NOTE: Align reference marks made during removal.

1.
Position the toe link.

1.

Install the new toe link-to-frame bolt and nut.

Torque

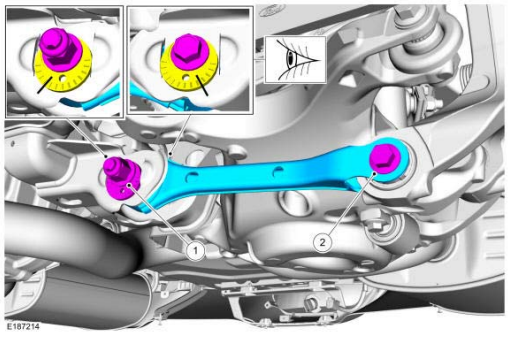
: 129 lb.ft (175 Nm)

2.

Install the new toe link-to-knuckle bolt and nut.

Torque

: 129 lb.ft (175 Nm)



2.

Install the wheel and tire. Refer to: Wheel and Tire .

3.

Recheck rear toe and adjust as necessary. Refer to: Rear Toe Adjustment .

REMOVAL AND INSTALLATION > UPPER ARM > REMOVAL

NOTE: Suspension fasteners are critical parts that affect the performance of vital components and systems. Failure of these fasteners may result in major service expense. Use the same or equivalent parts if replacement is necessary. Do not use a replacement part of lesser quality or substitute design. Tighten fasteners as specified.

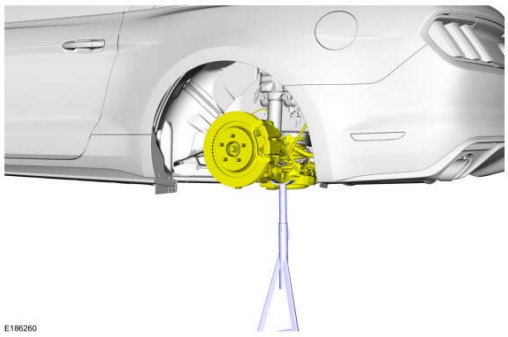
NOTE: Removal steps in this procedure may contain installation details.

1.

Remove the wheel and tire. Refer to: Wheel and Tire .

2.

Support the suspension at curb height.



NOTE: Tighten the suspension bushing fasteners with the suspension loaded or with the weight of the vehicle resting on the wheels and tires, otherwise incorrect clamp load and bushing damage may occur.

3.

1.

Remove and discard the upper arm-to-wheel knuckle bolt and nut.

Torque

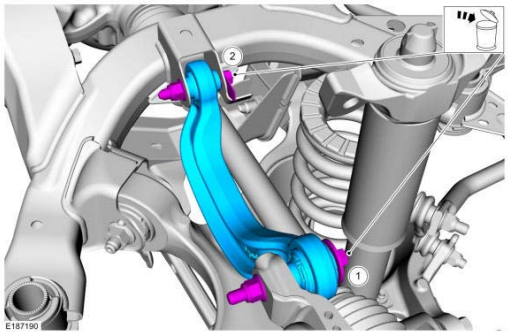
: 76 lb.ft (103 Nm)

2.

Remove and discard the upper arm-to-frame flag-bolt and nut and remove the upper arm.

Torque

: 85 lb.ft (115 Nm)



REMOVAL AND INSTALLATION > UPPER ARM > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Check and if necessary adjust rear camber. Refer to: Rear Camber Adjustment .

REMOVAL AND INSTALLATION > WHEEL BEARING AND WHEEL HUB

Special Tool(s) / General Equipment

	205-D070 (D93P-1175-B) Remover, Front Wheel Hub

REMOVAL AND INSTALLATION > WHEEL BEARING AND WHEEL HUB > REMOVAL

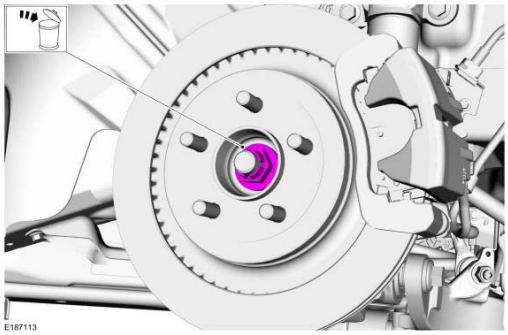
NOTE: Suspension fasteners are critical parts that affect the performance of vital components and systems. Failure of these fasteners may result in major service expense. Use the same or equivalent parts if replacement is necessary. Do not use a replacement part of lesser quality or substitute design. Tighten fasteners as specified.

1.

Remove the wheel and tire. Refer to: Wheel and Tire .

2.

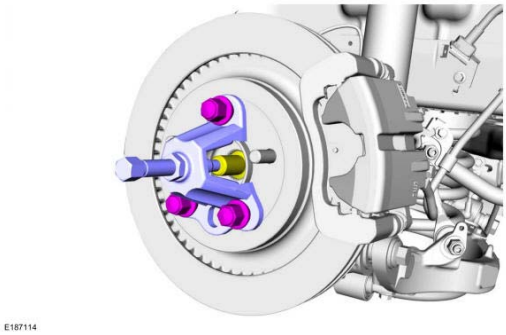
Remove and discard the spindle nut.



3.

Press the halfshaft from the hub.

Use Special Service Tool: 205-D070 (D93P-1175-B) Remover, Front Wheel Hub.

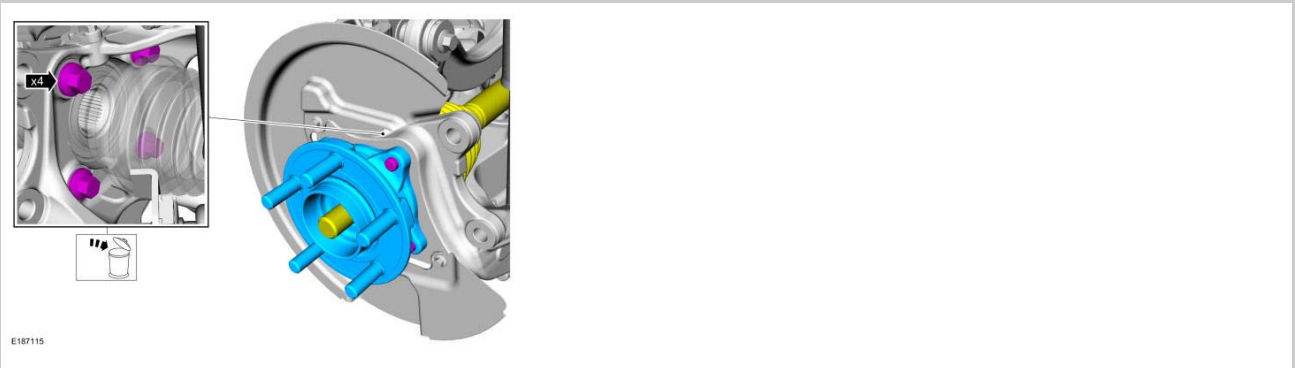


4.

Remove the brake disc. Refer to: Brake Disc .

5.

Remove and discard the 4 wheel bearing and wheel hub bolts and remove the wheel bearing and wheel hub.



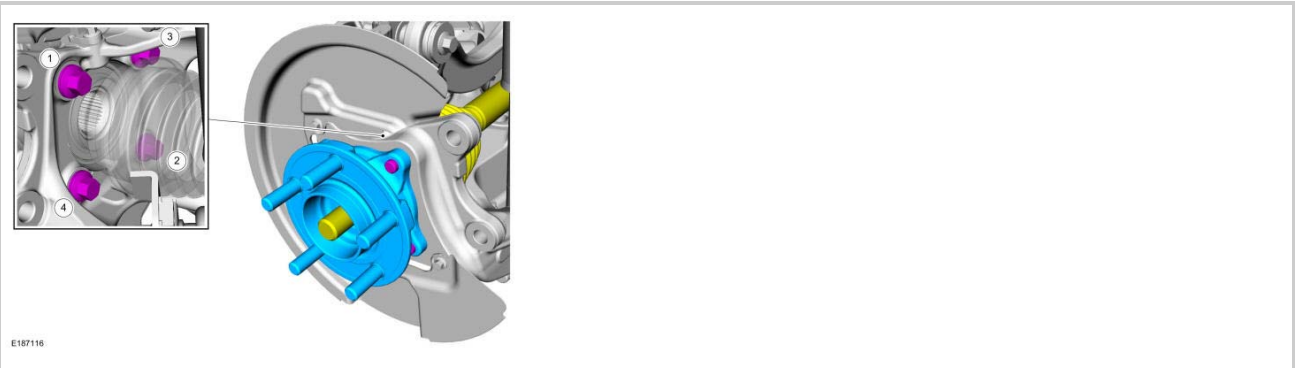
REMOVAL AND INSTALLATION > WHEEL BEARING AND WHEEL HUB > INSTALLATION

NOTE: Tighten the wheel bearing and wheel hub bolts in a cross pattern.

1.
Position the wheel bearing and wheel hub and install the 4 new wheel bearing and wheel hub bolts.

Torque

: 98 lb.ft (133 Nm)



2.

Install the brake disc. Refer to: Brake Disc .

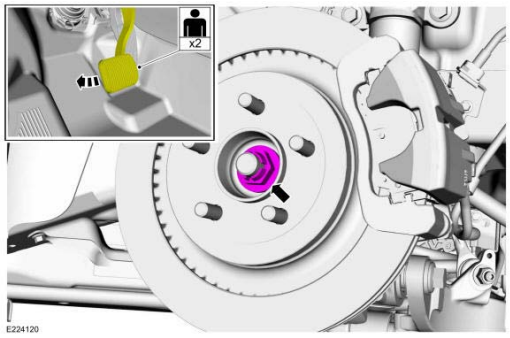
NOTE: Apply the brake to keep the halfshaft from rotating.

3.
Install the new spindle nut.

Torque:

Stage 1: 98 lb.ft (133 Nm)

Stage 2: 45°



4.

Install the wheel and tire. Refer to: Wheel and Tire .

REMOVAL AND INSTALLATION > WHEEL KNUCKLE > REMOVAL

NOTE: Suspension fasteners are critical parts that affect the performance of vital components and systems. Failure of these fasteners may result in major service expense. Use the same or equivalent parts if replacement is necessary. Do not use a replacement part of lesser quality or substitute design. Tighten fasteners as specified.

1.

Remove the wheel bearing and wheel hub. Refer to: Wheel Bearing and Wheel Hub .

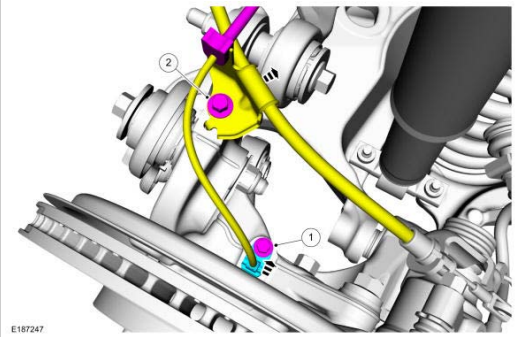
2.

1.

Remove the wheel speed sensor bolt and position aside the wheel speed sensor.

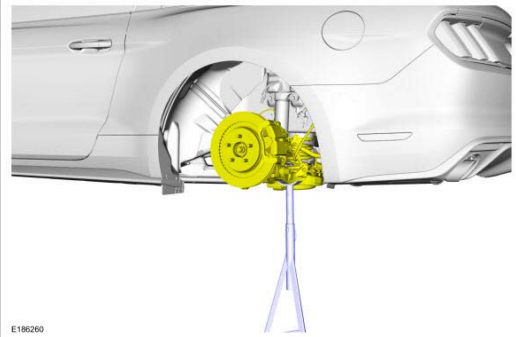
2.

Remove the parking brake cable bracket bolt and position the parking brake cable bracket aside.



3.

Support the suspension at curb height.



4.

Remove the lower arm vertical link. Refer to: Lower Arm Vertical Link .

NOTE: Support the halfshaft.

5.

1.

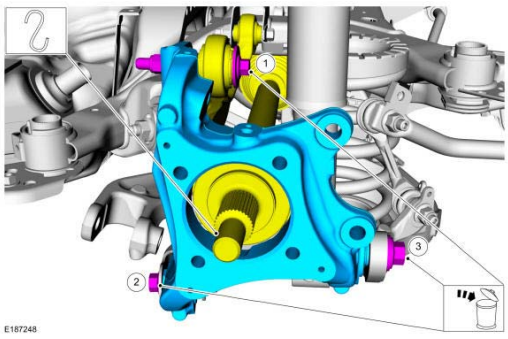
Remove and discard the wheel knuckle-to-upper arm bolt and nut.

2.

Remove and discard the wheel knuckle-to-toe link bolt and nut.

3.

Remove and discard the wheel knuckle-to-lower arm bolt. Remove the knuckle.



REMOVAL AND INSTALLATION > WHEEL KNUCKLE > INSTALLATION

NOTE: Tighten the suspension bushing fasteners with the suspension loaded or with the weight of the vehicle resting on the wheels and tires, otherwise incorrect clamp load and bushing damage may occur.

1.

1.

Position the wheel knuckle and install the new wheel knuckle-to-lower arm bolt.

Torque

: 203 lb.ft (275 Nm)

2.

Install the new wheel knuckle-to-toe link bolt and nut.

Torque

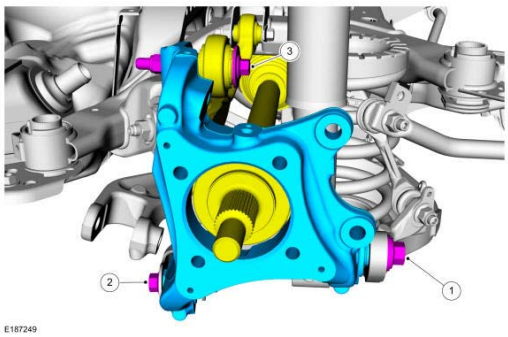
: 129 lb.ft (175 Nm)

3.

Install the new wheel knuckle-to-upper arm bolt and nut.

Torque

: 76 lb.ft (103 Nm)



2.

1.

Position the parking brake cable bracket and install the parking brake cable bracket bolt.

Torque

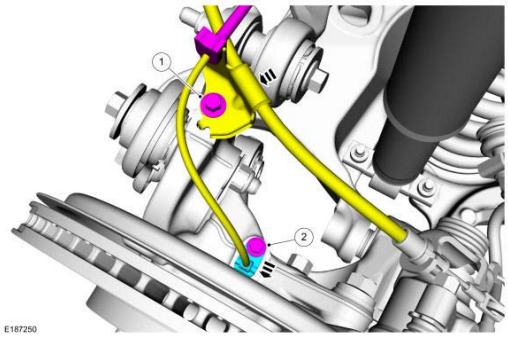
: 21 lb.ft (28 Nm)

2.

Position the wheel speed sensor and install the wheel speed sensor bolt.

Torque

: 80 lb.in (9 Nm)



3.

Install the lower arm vertical link. Refer to: Lower Arm Vertical Link .

4.

Install the wheel bearing and wheel hub. Refer to: Wheel Bearing and Wheel Hub .

5.

Check and if necessary adjust rear toe. Refer to: Rear Toe Adjustment .

REMOVAL AND INSTALLATION > WHEEL STUDS

Special Tool(s) / General Equipment

Hydraulic Press

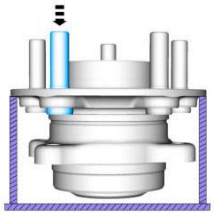
REMOVAL AND INSTALLATION > WHEEL STUDS > REMOVAL

1.

Remove the wheel bearing and wheel hub. Refer to: Wheel Bearing and Wheel Hub .

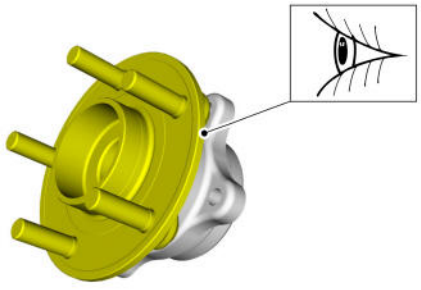
2.

Press the wheel stud from the wheel bearing and wheel hub. Use the General Equipment: Hydraulic Press



3.

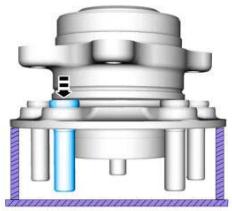
Inspect the wheel bearing and wheel hub for damage. Replace as necessary.



REMOVAL AND INSTALLATION > WHEEL STUDS > INSTALLATION

1.

Press the wheel stud into the wheel bearing and wheel hub. Use the General Equipment: Hydraulic Press



E153907

2.

Install the wheel bearing and wheel hub. Refer to: Wheel Bearing and Wheel Hub .

SPECIFICATIONS > SPECIFICATIONS

Alignment Specifications

NOTE: Measurements listed at curb load. Curb load is defined as "full service fluids, full fuel tank(s), no passengers and no cargo".

Item	LH	RH	Total/Split
Front			
Camber - (Base Coupe, Base Convertible, Performance Package Convertible, Track Package Convertible)	-0.72° ± 0.75°	-0.72° ± 0.75°	0.0° ± 0.75°
Camber - (Performance Package Coupe, Track Package Coupe)	-1.03° ± 0.75°	-1.03° ± 0.75°	0.0° ± 0.75°
Caster - (Base Coupe, Base Convertible, Performance Package Convertible, Track Package Convertible)	7.12° ± 0.75°	7.12° ± 0.75°	0.0° ± 0.75°
Caster - (Performance Package Coupe, Track Package Coupe)	6.91° ± 0.75°	6.91° ± 0.75°	0.0° ± 0.75°
Toe - (All Models)	-	-	0.0° ± 0.20°
Rear			
Camber - (All Models)	-1.50° ± 0.75°	-1.50° ± 0.75°	-
Toe - (All Models)	0.12° ± 0.20°	0.12° ± 0.20°	0.23° ± 0.20°

Ride Height

NOTE: Measurements listed at curb load. Curb load is defined as "full service fluids, full fuel tank(s), no passengers and no cargo".

Item	Specification
Front Ride Height	
All Models	48.8 mm (1.921 in) ± 12 mm (0.472 in)

Rear Ride Height	
All Models	32.1 mm (1.264) ± 10 mm (0.394 in)

Vehicle Lean Side-To-Side Differences

Front - Maximum	7.5 mm (0.295 in)
Rear - Maximum	6.3 mm (0.248 in)

General Specifications

Item	Specification
Thrust Angle - Rear	
All Models	0.0° ± 0.5°

DIAGNOSIS AND TESTING > SUSPENSION SYSTEM > PRELIMINARY INSPECTION

1.

Road test the vehicle:

If any suspension alignment or ride height concerns are present, REFER to Symptom Chart: Suspension System .

Verify the customer concern by carrying out a road test on a smooth road. If any vibrations are present, REFER to Symptom Chart: NVH .

2.

Inspect the tires:

Check the tire pressures with all normal loads in the vehicle and the tires cold. REFER to the VC label.

Verify that all tires are sized to specification. REFER to the VC label.

Inspect the tires for incorrect wear and damage. INSTALL new tires as necessary.

3.

Inspect the chassis and underbody:

Remove any excessive accumulation of mud, dirt or road deposits from the chassis and underbody.

Front or rear suspension components.

Suspension fastener(s).

Incorrect spring usage Spring(s).

Shock absorber(s).

Strut(s).

Suspension bushing(s).

Steering system components.

Wheel bearing and wheel hub(s).

4.

Inspect for aftermarket equipment:

Check for aftermarket changes to the steering, suspension, and wheel and tire components (such as competition or heavy duty). The specifications shown in this service information do not apply to vehicles equipped with aftermarket equipment.

DIAGNOSIS AND TESTING > SUSPENSION SYSTEM > SYMPTOM CHART: SUSPENSION SYSTEM

Diagnostics in this service information assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

Condition	Possible Sources	Actions
Vehicle drifts/pulls	Refer to the Diagnostic Routine.	GO to Pinpoint Test A
Wander	Overloaded, unevenly or incorrectly loaded vehicle	NOTIFY the customer of incorrect vehicle loading.
	Ball joint(s)	INSPECT ball joints. INSTALL new control arm(s) as necessary. REFER to: Front Lower Arm or REFER to: Rear Lower Arm .
	Damaged or missing front strut mount bearing(s)	INSTALL a new front strut mount bearing(s) as necessary. REFER to: Front Strut and Spring Assembly .
	Loose, worn or damaged front wheel bearing(s)	INSPECT the wheel bearings. INSTALL new wheel bearings as necessary. REFER to: Front Wheel Bearing and Wheel Hub .
	Loose, worn or damaged suspension component(s)	INSTALL new suspension component(s) as necessary.
	Loose suspension fasteners	INSPECT the suspension fasteners. TIGHTEN to specifications.

	Steering components	INSPECT the steering system. INSTALL new components as necessary.
	Wheel alignment (excessive total front toe out)	ADJUST as necessary. REFER to: Front Toe Adjustment .
Front bottoming or riding low	Worn, damaged or incorrect springs	MEASURE the ride height. REFER to: Ride Height Measurement . INSTALL new springs as necessary. REFER to: Front Strut and Spring Assembly .
	Worn front strut(s)	INSTALL new struts as necessary. REFER to: Front Strut and Spring Assembly .
Abnormal/incorrect tire wear	Incorrect tire pressure (rapid center rib or inner and outer edge wear)	ADJUST the tire pressure. REFER to VC label.
	Incorrect tire rotation intervals	REFER to Owners Literature for correct tire rotation intervals.
	High-speed cornering Excessive front or rear toe (inner or outer edge wear) Excessive negative or positive camber (inner or outer edge wear)	REFER to: Wheels and Tires .
	Front or rear suspension components	INSPECT the front and rear suspension system. REPAIR or INSTALL new suspension components as necessary.
Sticky steering, poor returnability	Damaged or worn front strut mount bearing(s)	INSTALL a new front strut mount bearing(s) as necessary. REFER to: Front Strut and Spring Assembly .
	Binding ball joints	INSPECT ball joints. INSTALL new control arm(s) as necessary. REFER to: Front Lower Arm or REFER to: Rear Lower Arm .
	Steering components	INSPECT the steering system. INSTALL new components as necessary.
Steering wheel off-center	Unequal front or rear toe setting (side-to-side)	CHECK the wheel alignment. REFER to: Front Toe Adjustment or REFER to: Rear Toe Adjustment .
	Steering components	INSPECT the steering system. INSTALL new components as

		necessary.
Sway or roll	Overloaded, unevenly or incorrectly loaded vehicle	NOTIFY the customer of incorrect vehicle loading.
	Loose wheel nut(s)	TIGHTEN the wheel nut(s) to specification. REFER to: Wheel and Tire .
	Strut(s) or shock absorber(s)	INSTALL new struts or shock absorbers as necessary. REFER to: Front Strut and Spring Assembly or REFER to: Rear Shock Absorber .
	Loose stabilizer bracket-to-frame bolts	TIGHTEN the bolts to specification. REFER to: Front Stabilizer Bar .
	Worn stabilizer bar bushings or links	INSTALL new stabilizer bar bushings, stabilizer bar links or stabilizer bar assembly as necessary. REFER to: Front Stabilizer Bar Bushing or REFER to: Front Stabilizer Bar Link or REFER to: Front Stabilizer Bar .
	Damaged or broken stabilizer bar	INSTALL a new stabilizer bar or stabilizer bar assembly as necessary. REFER to: Front Stabilizer Bar .
	Worn spring(s)	INSTALL new springs as necessary. REFER to: Front Strut and Spring Assembly or REFER to: Spring .
Vehicle leans to one side	Unevenly loaded or overloaded vehicle	NOTIFY the customer of incorrect vehicle loading.
	Front or rear suspension components	INSPECT the front and rear suspension systems. INSTALL new suspension components as necessary.
	Incorrect drive axle(s) ride height. Side-to-side lean out of specification	MEASURE the ride height..3to: Ride Height Measurement . INSPECT the front and rear suspension systems. REPAIR or INSTALL new components as necessary.

- If an obvious cause for an observed or reported condition is found, correct the cause (if possible) before proceeding to the next step.
- If the fault is not visually evident, REFER to Symptom Chart or REFER to Symptom Chart: NVH .

DIAGNOSIS AND TESTING > SUSPENSION SYSTEM > SYMPTOM CHART: NVH

Diagnostics in this service information assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

NVH symptoms should be identified using the diagnostic tools that are available. For a list of these tools, an explanation of their uses and a glossary of common terms, Glossary of Terms REFER to: Noise, Vibration and Harshness (NVH) . Since it is possible any one of multiple systems may be the cause of a symptom, it may be necessary to use a process of elimination type of diagnostic approach to pinpoint the responsible system. If this is not the causal system for the symptom, REFER to: Noise, Vibration and Harshness (NVH) . for the next likely system and continue diagnosis.

Additional diagnostics may be necessary to further isolate the concern. An electronic listening tool such as Chassis Ear® may be used. Follow the tool manufacturer's instructions and the Possible Sources found in the following NVH chart to determine the connection points.

Condition	Possible Sources	Actions
Front suspension noise - a squeak, creak or rattle noise. Occurs mostly over bumps or rough roads due to the suspension moving in an up/down motion.	Strut top nut	INSPECT and TIGHTEN to specification. REFER to: Front Strut and Spring Assembly .
	Jounce bumper	INSPECT, LUBRICATE or INSTALL new components as necessary.
	Stabilizer bar insulators and/or Stabilizer bar links	INSPECT for out-of-position bushings, isolators or locating pins. INSTALL new components as necessary. REFER to: Front Stabilizer Bar or REFER to: Front Stabilizer Bar Bushing or REFER to: Front Stabilizer Bar Link .
	Steering gear and/or Tie rod ends	INSPECT the steering gear and tie rod ends. INSTALL new components as necessary. REFER to: POWER STEERING .
	Front brake caliper	INSPECT the front brake caliper(s). REFER to: Brake System .
	Lower control arm / ball joint	INSPECT ball joints. INSTALL new control arm(s) as necessary. REFER to: Front Lower Arm or REFER to: Rear Lower Arm .
	Hub	INSPECT hub(s). REPAIR or REPLACE as necessary. REFER to: Front Wheel Bearing and Wheel Hub - Vehicles With: SVT Performance Package (204-01

		Front Suspension, Removal and Installation).
	Exhaust system	INSPECT the exhaust system. REFER to: EXHAUST SYSTEM - 2.3L EcoBoost (231kW/314PS) or REFER to: EXHAUST SYSTEM - 3.7L Duratec (227kW/301PS) or REFER to: EXHAUST SYSTEM - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS).
	Powertrain mounts	INSPECT the powertrain mounts. REFER to: ENGINE MOUNT LH - 2.3L EcoBoost (231kW/314PS). REFER to: ENGINE MOUNT RH - 2.3L EcoBoost (231kW/314PS). REFER to: ENGINE MOUNT LH - 3.7L Duratec (227kW/301PS). REFER to: ENGINE MOUNT RH - 3.7L Duratec (227kW/301PS). REFER to: ENGINE MOUNT LH - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS) or REFER to: ENGINE MOUNT RH - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS).
	Subframe welds or insulators	INSPECT subframe. REPAIR or REPLACE as necessary. REFER to: Front Subframe - 2.3L EcoBoost (201kW/273PS) .
Rear suspension noise - a squeak, creak or rattle noise. Occurs mostly over bumps or rough roads due to the suspension moving in an up/down motion.	Loose or damaged rear shock absorber(s) or shock absorber bushing(s)	INSPECT the rear shock absorber(s) or shock absorber bushing(s). INSTALL new components as necessary. REFER to: Rear Shock Absorber .
	Damaged spring(s) or spring mount(s)	INSPECT the rear spring(s) and spring mount(s). REPLACE damaged components as necessary. REFER to: Spring .
	Worn or damaged stabilizer bar bushing(s) or link(s)	INSPECT the stabilizer bar bushing(s) or link(s). REPLACE damaged or worn components as necessary. REFER to: Rear Stabilizer Bar Bushing or REFER to: Rear Stabilizer Bar Link .
	Worn or damaged lower control arms, toe link ball joints or cross-axis joints	INSPECT for worn or damaged lower control arms, toe link ball joints or cross-axis joints.

		REPLACE damaged or worn components as necessary.
Noise from front suspension when turning - crunch or ratcheting noise. Occurs as a result of the suspension twisting and flexing.	Strut top nut	INSPECT and TIGHTEN to specification. REFER to: Front Strut and Spring Assembly .
	Worn or damaged front strut bearing(s)	INSPECT for worn or damaged strut bearing. INSTALL new components as necessary. REFER to: Front Strut and Spring Assembly .
	Coil Spring	INSPECT springs. REPLACE as necessary. REFER to: Front Strut and Spring Assembly .
	Strut brackets or seat(s)	INSPECT strut brackets or seat(s). REPAIR as necessary.
	Stabilizer bar	INSPECT the stabilizer bar. REPAIR or REPLACE as necessary. REFER to: Front Stabilizer Bar .
	Steering gear	INSPECT the steering gear. REFER to: POWER STEERING .
	Tie rod ends	INSPECT tie rod ends. INSTALL new components as necessary. REFER to: Tie Rod End .
	Hub	INSPECT hub(s). REPAIR or REPLACE as necessary. REFER to: Front Wheel Bearing and Wheel Hub - Vehicles With: SVT Performance Package .
	Lower control arm / ball joint	INSPECT ball joints. INSTALL new control arm(s) as necessary. REFER to: Front Lower Arm or REFER to: Rear Lower Arm .
Noise from front suspension when turning - Crunch clunk or grunt noise from the front suspension occurring when turning to full left or right stop.	Steering stops	Normal condition. No action required.
Noise while braking - Noises occurring during this condition result from rearward and downward force applied to the suspension and subframe such as rearward force applied to the lower control arm.	Front brake caliper	INSPECT the front brake caliper(s). REFER to: Brake System .
	Hub	INSPECT hub(s). REPAIR or REPLACE as necessary. REFER to: Front Wheel Bearing and Wheel Hub - Vehicles With: SVT Performance Package .

	Lower control arm / ball joint	INSPECT ball joints. INSTALL new control arm(s) as necessary. REFER to: Front Lower Arm or REFER to: Rear Lower Arm .
	Powertrain mounts	INSPECT the powertrain mounts. REFER to: ENGINE MOUNT LH - 2.3L EcoBoost (231kW/314PS). REFER to: ENGINE MOUNT RH - 2.3L EcoBoost (231kW/314PS). REFER to: ENGINE MOUNT LH - 3.7L Duratec (227kW/301PS). REFER to: ENGINE MOUNT RH - 3.7L Duratec (227kW/301PS). REFER to: ENGINE MOUNT LH - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS) or REFER to: ENGINE MOUNT RH - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS).
Noise while accelerating - Noises occurring during this condition result from powertrain torque and flex, such as torque on the powertrain mounts during acceleration.	Body (inner fender, bulkhead, seams and pinch welds)	INSPECT and REPAIR as necessary.
	Hub	INSPECT hub(s). REPAIR or REPLACE as necessary. REFER to: Front Wheel Bearing and Wheel Hub - Vehicles With: SVT Performance Package (204-01 Front Suspension, Removal and Installation).
	Powertrain mounts	INSPECT the powertrain mounts. REFER to: ENGINE MOUNT LH - 2.3L EcoBoost (231kW/314PS). REFER to: ENGINE MOUNT RH - 2.3L EcoBoost (231kW/314PS). REFER to: ENGINE MOUNT LH - 3.7L Duratec (227kW/301PS). REFER to: ENGINE MOUNT RH - 3.7L Duratec (227kW/301PS). REFER to: ENGINE MOUNT LH - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS) or REFER to: ENGINE MOUNT RH - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS).
	Exhaust system	INSPECT the exhaust system. REFER to: EXHAUST SYSTEM - 2.3L EcoBoost (231kW/314PS) or REFER to: EXHAUST SYSTEM - 3.7L Duratec (227kW/301PS) or REFER to: EXHAUST SYSTEM -

		5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS).
	Subframe welds or insulators	INSPECT subframe. REPAIR or REPLACE as necessary. REFER to: Front Subframe - 2.3L EcoBoost (201kW/273PS) .
Noise while entering driveways or driving over dips or depressions - Noises occurring during this condition result from the body, subframe or suspension twisting or flexing such as the tension on body structure welds.	Body (inner fender, bulkhead, seams and pinch welds)	INSPECT and REPAIR as necessary.
	Stabilizer bar links	INSPECT the stabilizer bar links. INSTALL new stabilizer bar links as necessary. REFER to: Front Stabilizer Bar Link or REFER to: Rear Stabilizer Bar Link .
	Subframe welds or insulators	INSPECT subframe. REPAIR or REPLACE as necessary. REFER to: Front Subframe - 2.3L EcoBoost (201kW/273PS) .
Clunk or pop or thump/thud - noise may be thought of as a loose part striking an adjacent part or a secure part coming loose when force is applied. A clunk is often rhythmic, repeatable and metallic in nature.	Loose fasteners	INSPECT for loose nuts or bolts.
	Worn or damaged bushings	INSPECT for out-of-position or damaged components.
	Struts & shocks	INSPECT for worn or damaged struts or shocks. REPLACE as necessary. REFER to: Front Strut and Spring Assembly or REFER to: Rear Shock Absorber .
	Coil spring or spring seat out of position	INSPECT for out-of-position or damaged components. ADJUST or REPLACE as necessary.
	Worn or damaged ball joint(s)	INSPECT ball joints. INSTALL new control arm(s) as necessary. REFER to: Front Lower Arm or REFER to: Rear Lower Arm .
Rattle - noise occurs mostly over bumps, rough roads or uneven surfaces at low speeds (i.e. parking lot). A rattle is often a rapid, repetitive noise that can be metallic or non-metallic in nature.	Loose fasteners or brackets Loose or damaged front struts, shock absorber(s) or shock absorber bushing(s), dust boot(s), jounce bumper(s) Damaged spring or spring mount(s) Damaged or worn control/radius arm bushing(s) Worn or damaged stabilizer bar bushings or link(s)	INSPECT for loose nuts or bolts. TIGHTEN to specification. INSPECT for out-of-position or damaged components. ADJUST or INSTALL new components as necessary.
Whine, roar or groan - noise generally occurs over 30 mph and is often more noticeable with	Loose or damaged wheel bearings	INSPECT the front or rear wheel bearing(s). INSTALL new bearing(s) as necessary. REFER

steering input.		to: Front Wheel Bearing and Wheel Hub - Vehicles With: SVT Performance Package .
Shimmy	Loose wheel nut(s)	TIGHTEN the nut(s) to specification. REFER to: Wheel and Tire .
	Loose front suspension fastener(s)	TIGHTEN the fastener(s) to specifications.
	Loose front wheel bearing(s)	INSPECT the front wheel bearing(s). INSTALL new bearing(s) as necessary. REFER to: Front Wheel Bearing and Wheel Hub - Vehicles With: SVT Performance Package .
	Strut(s) or shock absorber(s)	INSTALL new struts or shock absorbers as necessary. REFER to: Front Strut and Spring Assembly or REFER to: Rear Shock Absorber .
Shimmy - most noticeable on coast/deceleration. Also hard steering condition	Excessive positive caster	INSPECT the front suspension. REPAIR or INSTALL new suspension components as necessary.
Rough/harsh ride	Incorrect tire pressure	ADJUST the tire pressure. REFER to VC label.
	Strut(s) or shock absorber(s)	INSTALL new struts or shock absorbers as necessary. REFER to: Front Strut and Spring Assembly or REFER to: Rear Shock Absorber .
	Spring(s)	MEASURE the ride height. REFER to: Ride Height Measurement . INSTALL new springs as necessary. REFER to: Front Strut and Spring Assembly or REFER to: Spring .
	Damaged suspension component(s)	INSTALL new suspension component(s) as necessary.

DIAGNOSIS AND TESTING > SUSPENSION SYSTEM > PINPOINT TESTS

Vehicle Drifts, Pulls

Diagnostic Overview

Diagnostics in this service information assume a certain skill level and knowledge of Ford-specific

diagnostic practices. REFER to: Diagnostic Methods .

Possible Causes

- Unevenly loaded vehicle
- Tire pressure
- Tire forces
- Brake drag
- Incorrect vehicle alignment
- Bent/damaged vehicle components
- Steering system

DIAGNOSIS AND TESTING > SUSPENSION SYSTEM > PINPOINT TESTS > PINPOINT TEST A : VEHICLE DRIFTS, PULLS > PINPOINT TEST A : VEHICLE DRIFTS, PULLS

A1 CHECK FOR UNEVENLY LOADED VEHICLE

Visually check the vehicle for an uneven loading condition.

Is the vehicle unevenly loaded?

Yes	ADVISE the customer of uneven loading condition.

No	GO to A2

A2 CHECK THE TIRE PRESSURES AND TIRE CONDITIONS

Check the tire pressures: REFER to VC label. REFER to: Identification Codes . Check the tires for uneven/abnormal wear: REFER to: Wheels and Tires .

Are the tire pressures and tire conditions OK?

Yes	GO to A3

No	ADJUST the tire pressures to the specified pressure or INSTALL new tires as necessary.

A3 ISOLATE TIRE DRIFT/PULL CONDITION

Cross the front wheel and tire assemblies from left-to-right.

Does the vehicle drift/pull?

Yes	If the vehicle drifts/pulls in the opposite direction, tire forces are causing the drift/pull. ROTATE the wheel and tire assemblies front-to-rear. If the vehicle drifts/pulls in the same direction, GO to A4

No	Tire forces were causing the drift/pull and the concern has been corrected.

A4 CHECK FOR BRAKE DRAG

Spin all four wheel and tire assemblies by hand and check for brake drag.

Do the wheels spin freely?

Yes	GO to A5

No	REFER to: Brake System to diagnose brake drag condition.

A5 CHECK THE WHEEL ALIGNMENT

Using alignment equipment and the manufacturer's instructions, check the wheel alignment.

Is the wheel alignment out of specification?

Yes	ADJUST the alignment as necessary. REFER to: Front Toe Adjustment .

No	REFER to: POWER STEERING to diagnose steering system drift/pull/wander condition.

GENERAL PROCEDURES > FRONT CAMBER ADJUSTMENT

Special Tool(s) / General Equipment

Wheel Alignment System

Adjustment

NOTE: Suspension fasteners are critical parts that affect the performance of vital components and systems. Failure of these fasteners may result in major service expense. Use the same or equivalent parts if replacement is necessary. Do not use a replacement part of lesser quality or substitute design. Tighten fasteners as specified.

1.

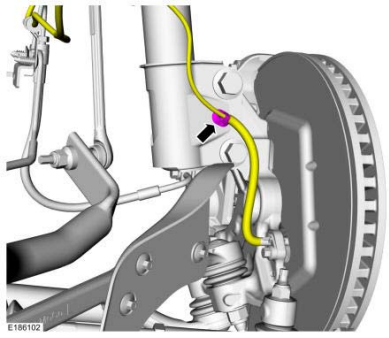
Using alignment equipment and the manufacturer's instructions, measure the front camber. Use the General Equipment: Wheel Alignment System

2.

Remove the wheels and tires. Refer to: Wheel and Tire .

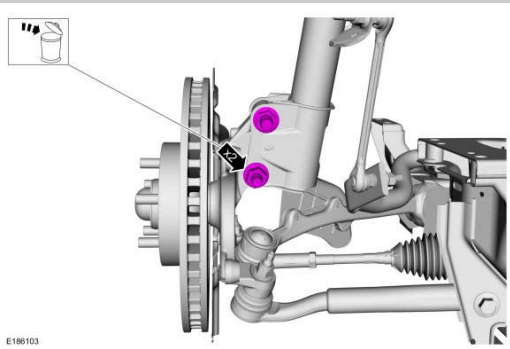
3.

On both sides. Unclip and position aside the wheel speed sensor harness.



4.

On both sides. Remove and discard the strut-to-spindle bolts and nuts.



NOTE: Do not fully tighten the strut-to-spindle bolts and nuts until the alignment has been corrected.

NOTE: Original equipment bolts are splined, service bolts are smooth and smaller in diameter which allows for camber adjustment.

5.
On both sides. Position the wheel spindle and install the 2 new service strut-to-spindle bolts and nuts and tighten until snug.



6.

On both sides. Position the wheel speed sensor harness.



7.

Install the wheels and tires. Refer to: Wheel and Tire .

8.

Using alignment equipment and the manufacturer's instructions, measure the front camber. Use the General Equipment: Wheel Alignment System

9.

On both sides. Tighten the strut-to-spindle bolts and nuts.

Torque

: 184 lb.ft (250 Nm)



10.

Recheck alignment to verify camber change and adjust front toe if necessary. Refer to: Front Toe Adjustment .

GENERAL PROCEDURES > FRONT TOE ADJUSTMENT

Special Tool(s) / General Equipment

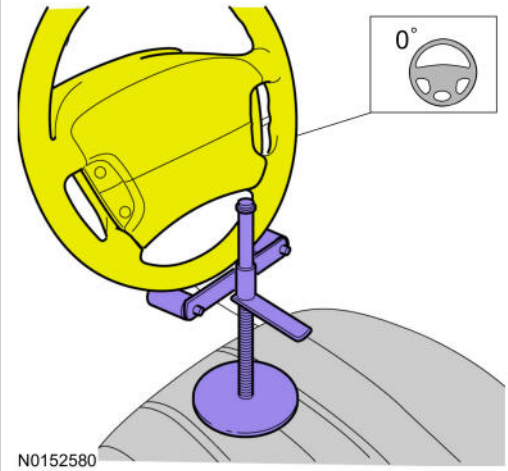
Wheel Alignment System

Adjustment

NOTE: Make sure that the vehicle is standing on a level surface.

1.

Steering wheel in straight ahead position.



2.

Using alignment equipment and the manufacturer's instructions, check the front toe setting on both sides. Use the General Equipment: Wheel Alignment System

3.

1.

On both sides. Loosen the outer tie rod end jamb nut.

Torque

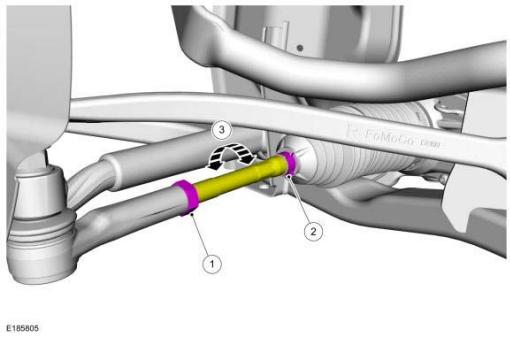
: 76 lb.ft (103 Nm)

2.

On both sides. Position aside the steering gear boot clamp.

NOTE: Do not allow the steering gear bellows to twist when the inner tie rod is rotated.

3.
On both sides. Rotate the inner tie rods until the toe reading is within specifications.



4.

Recheck the toe settings and adjust as necessary.

GENERAL PROCEDURES > REAR CAMBER ADJUSTMENT

Special Tool(s) / General Equipment

Wheel Alignment System

Adjustment

NOTE: Suspension fasteners are critical parts that affect the performance of vital components and systems. Failure of these fasteners may result in major service expense. Use the same or equivalent parts if replacement is necessary. Do not use a replacement part of lesser quality or substitute design. Tighten fasteners as specified.

1.

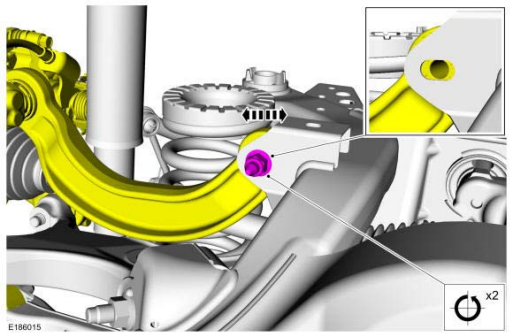
Using alignment equipment and the manufacturer's instructions, measure the rear camber. Use the General Equipment: Wheel Alignment System

2.

Loosen the upper control arm inboard nut approximately 2 turns, and slide the upper control arm inboard or outboard to adjust the rear camber.

Torque

: 85 lb.ft (115 Nm)



3.

Recheck alignment to verify camber change and adjust rear toe if necessary. Refer to: Rear Toe Adjustment .

GENERAL PROCEDURES > REAR TOE ADJUSTMENT

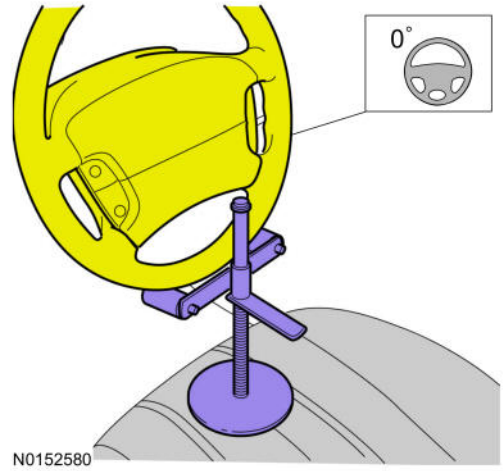
Special Tool(s) / General Equipment

Wheel Alignment System

Adjustment

1.

Using a holding device, hold the steering wheel in the straight-ahead position.



2.

Using alignment equipment and the manufacturer's instructions, check the rear toe setting on both sides. Use the General Equipment: Wheel Alignment System

3.

NOTE: Make sure that the toe settings are not disturbed while tightening the nuts.

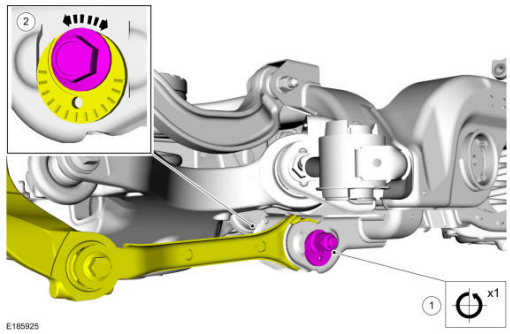
1.
Loosen the toe link nut approximately one full turn.

Torque

: 129 lb.ft (175 Nm)

2.

Rotate the toe link bolt to achieve the specified toe setting.



4.

Recheck the rear toe settings and adjust as necessary.

GENERAL PROCEDURES > RIDE HEIGHT MEASUREMENT

Special Tool(s) / General Equipment

Surface Gauge

Check

Ride Height Measurement - Front

NOTE: Make sure that the vehicle is positioned on a flat, level surface and the tires are inflated to the correct pressure. Vehicle should have a full tank of fuel.

1.

1.

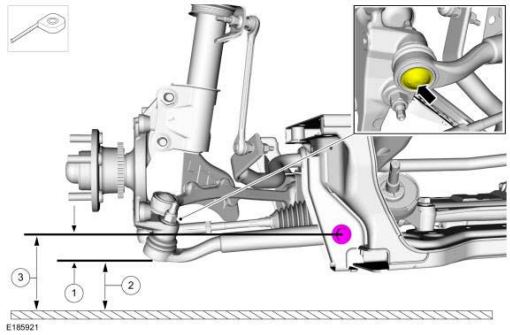
Ride height = 3-2

2.

Measure the distance between the flat level surface and the center of the rear control arm ball joint cap (measurement 2)

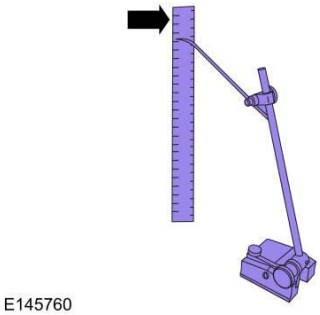
3.

Measure the distance between the flat level surface and the center of the rear control arm inboard bolt (measurement 3) Use the General Equipment: Surface Gauge



2.

With the surface gauge positioned on a flat, level surface, record the measurement of the surface gauge position (measurement 2) and (measurement 3).



3.

Subtract measurement 2 from measurement 3 to obtain the front ride height.

Ride Height Measurement - Rear

4.

1.

Ride height = 2-3

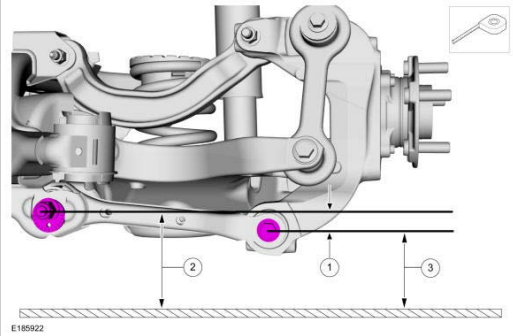
2.

Measurement 2

3.

Measurement 3

Use the General Equipment: Surface Gauge



5.

Measure the distance between the flat level surface and the center of the toe link inboard cam bolt (measurement 2).

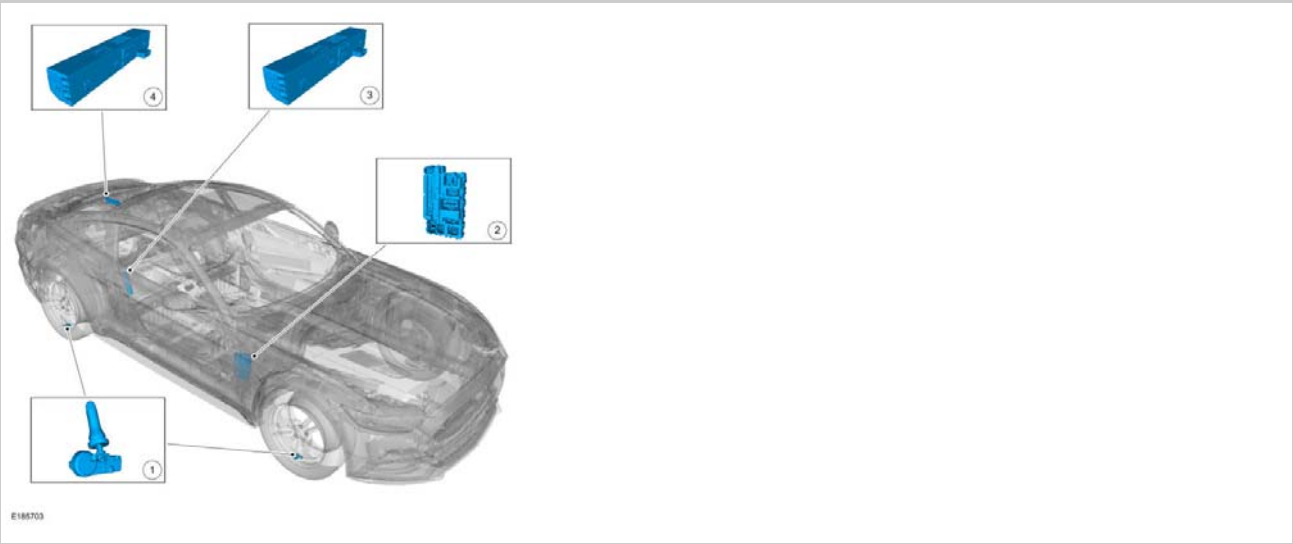
6.

Measure the distance between the flat level surface and the center of the toe link outboard bolt (measurement 3).

7.

Subtract measurement 3 from measurement 2 to obtain the rear ride height.

DESCRIPTION AND OPERATION > TIRE PRESSURE MONITORING SYSTEM (TPMS) - COMPONENT LOCATION



Item	Description
1	TPMS sensor (4 required)
2	BCM
3	RTM, convertible (1 required)
4	RTM, coupe (1 required)

DESCRIPTION AND OPERATION > TIRE PRESSURE MONITORING SYSTEM (TPMS) - OVERVIEW > OVERVIEW

The BCM uses tire pressure sensors to monitor tire pressure. The sensors use radio signals to transmit the tire pressure to the RTM. The RTM sends the information to the BCM over a LIN. The tire pressure sensors are battery operated and mounted to the valve stems. The IPC illuminates the TPMS warning indicator and the message center displays a message when a fault is present or when the tire pressure falls below the low pressure limit.

DESCRIPTION AND OPERATION > TIRE PRESSURE MONITORING SYSTEM (TPMS) - SYSTEM OPERATION AND COMPONENT DESCRIPTION

System Operation

DESCRIPTION AND OPERATION > TIRE PRESSURE MONITORING SYSTEM (TPMS) - SYSTEM OPERATION AND COMPONENT DESCRIPTION > NETWORK MESSAGE CHART

RTM TPMS Network Input Messages

Broadcast Message	Originating Module	Message Purpose
TPMS data	RTM	Communicates tire pressure information to the BCM

DESCRIPTION AND OPERATION > TIRE PRESSURE MONITORING SYSTEM (TPMS) - SYSTEM OPERATION AND COMPONENT DESCRIPTION > TPMS FUNCTION

*NOTE: When directed to train any TPMS sensors, use **only** the sensor training procedure outlined in this service information. Do not use the TPMS reset procedure outlined in the Owner's Literature as this procedure **does not** program new sensors to the module.*

The TPMS uses 4 valve stem mounted sensors to monitor tire pressure. These sensors wirelessly transmit tire pressure data to the RTM. The RTM is a radio signal receiver which collects the tire pressure data and sends the information to the BCM along a LIN. All TPMS functions are controlled by the BCM. The BCM compares the tire pressure data sent by the RTM with a programmed tire pressure. This programmed pressure is specified on the VC label and cannot be changed. If the actual tire pressure is less than the programmed tire pressure, the BCM sends a low tire pressure message to the IPC along the MS-CAN. The IPC responds by illuminating the TPMS warning indicator and displaying a low tire pressure message in the message center. The TPMS sensors are trained (calibrated) to the BCM which records the unique identifier for each TPMS sensor and records the location of each sensor based on the training (calibration) order. The BCM sends messages to the RTM by first sending the information along the HS-CAN1 to the GWM which then sends the information to the RTM along the MS-CAN.

The diagnostic scan tool is useful in diagnosing TPMS concerns and may be used to verify the accuracy of the tire pressure data transmitted by the TPMS sensors. This is accomplished by comparing the BCM tire pressure PID data to the actual tire pressure using a digital tire pressure gauge.

It is not necessary to train the sensors after a tire rotation on vehicles with the same front and rear tire pressures however, the BCM cannot recognize the sensor identifiers have been moved to different positions and retains the original position information for each sensor.

Wheel Rotation and Sensor Training Techniques

Training known good sensors from another vehicle can help determine whether the concern is with a sensor or the RTM. This technique cannot help determine whether the concern is due to RFI as some RFI source could be preventing the RTM from receiving the tire pressure status from the known good sensors as well as the original sensors.

If the RTM in the suspect vehicle cannot train any of the original sensors and, likewise, cannot train known good sensors from another vehicle, then the concern is with the module or RFI and not with the

original sensors. The original sensors should not be replaced. If a sensor in a certain location has caused several events, yet the sensor trains and seems to operate normally, moving that particular wheel to a different location on the vehicle is a good way to isolate the concern to a certain sensor/wheel location. Rotate the wheels and road test the vehicle. This can be done in an attempt to replicate the concern and help determine if the concern followed the sensor or remained in the original sensor location.

If the vehicle has been stationary for more than 30 minutes, the sensors go into a "sleep mode" to conserve battery power and need to be "woken up" so they transmit the latest tire pressure information to the RTM. Refer to: Tire Pressure Monitoring System (TPMS) Sensor Activation .

Training Sensors in a Different Order

If the first sensor fails the TPMS training procedure, the BCM aborts the entire procedure. Starting the training procedure at a different wheel is a technique which can be used to determine if the remaining sensors can train to the module. This can help save time determining if one sensor is damaged, other sensors are having concerns or the BCM is experiencing training difficulties with a certain TPMS sensor location.

DESCRIPTION AND OPERATION > TIRE PRESSURE MONITORING SYSTEM (TPMS) - SYSTEM OPERATION AND COMPONENT DESCRIPTION > TPMS WARNING INDICATOR

The TPMS warning indicator is used to indicate both a low tire pressure event and a possible system fault condition. The message center displays additional information associated with the low tire pressure event or the system fault condition. Occasionally, the warning indicator and message center indicate faults that cannot be resolved by the customer. Treat these as TPMS faults that must be serviced.

TPMS Warning Indicator Illuminates Continuously

The TPMS warning indicator remains on continuously and the message center displays LOW TIRE PRESSURE when any of the tire pressures fall below the low pressure limit. When this condition exists, adjust the tire pressure to the recommended cold tire pressure indicated on the VC label.

Tire Pressure Monitoring System (TPMS) Warning Indicator Flashes

The TPMS warning indicator flashes for 70 seconds and then remains on continuously when the ignition is set to ON and the TPMS is malfunctioning. The TPMS status (TPMS_STATUS) PID can be used to determine why the TPMS warning indicator is flashing.

- Tire Pressure Sensor Fault - The message center displays TIRE PRESSURE SENSOR FAULT when a TPMS sensor is malfunctioning.
- No communication with the BCM - The TPMS warning indicator illuminates when the IPC has not received any signals from the BCM for more than 5 seconds. The message center displays TIRE PRESSURE MONITOR FAULT.
- Tire Pressure Monitor Fault - The message center displays TIRE PRESSURE MONITOR FAULT when the TPMS is malfunctioning.

DESCRIPTION AND OPERATION > TIRE PRESSURE MONITORING SYSTEM (TPMS) - SYSTEM OPERATION AND COMPONENT DESCRIPTION > TPMS PID DEFINITIONS

The BCM monitors the TPMS status. Use the diagnostic scan tool to view the current status of the TPMS status (TPMS_STATUS) PID. This helps identify the current system status and may aid in diagnosing the system. The PID has 4 valid states:

- TPMS_STATUS PID displays SENSOR FAULT if the BCM has not received the tire pressure data from 1 to 3 TPMS sensors for 20 minutes when vehicle speed is above 32.2 km/h (20 mph).
- TPMS_STATUS PID displays SYSTEM FAULT if the BCM has not received the tire pressure data from all 4 TPMS sensors for 20 minutes when vehicle speed is above 32.2 km/h (20 mph).
- TPMS_STATUS PID displays LOW if the BCM has detected that at least 1 TPMS sensor is reporting low tire pressure.
- TPMS_STATUS PID displays SYSTEM ACTIVE if the TPMS is functioning normally.

Last Warning Event PID Definitions

The TPMS uses the TPMS last warning event Parameter Identifications (PIDs) to store detailed information about the last 5 times the TPMS warning indicator was activated. These Parameter Identifications (PIDs) can be used to acquire more information about a particular TPMS event, but must be used carefully.

PID	Definition
EVT1_AGE_IGN through EVT5_AGE_IGN	The number of key cycles since the TPMS was activated. This PID cycles from zero to 255 and then starts over from zero again. This can be used to determine how long ago a TPMS event occurred and the time (in key cycles) between events.
EVT1_TR_LOC through EVT5_TR_LOC	This is the last programmed location for the TPMS sensor identifier causing each TPMS event. Due to tire rotation, the sensor may no longer be at the original location. It is suggested that all the Parameter Identifications (PIDs) be recorded, the system retrained, and then the sensor identifier Parameter Identifications (PIDs) be used to pinpoint the actual location of each sensor.
EVT1_PRES_BP through EVT5_PRES_BP	This is the tire pressure associated with each TPMS indicator event. This can be used along with the function code to clearly identify the TPMS events that were strictly due to low pressure. It can also be used to determine when a sensor is transmitting inaccurate tire pressure.
EVT1_SNSR_ST through EVT5_SNSR_ST	Describes the warning status of each TPMS event by using the information received from the TPMS_STATUS PID. If there is a communication concern, the status could be NORMAL. UNKNOWN

	NORMAL (normal operation) LOW (low pressure event) FAULT (sensor fault or system fault)
EVT1_SNSR_ID through EVT5_SNSR_ID	This is the identifier of the sensor involved in each TPMS event. EVT1 is the most recent event that triggered the TPMS warning indicator.

Radio Frequency Interference (RFI)

RFI can be caused by:

- Video equipment has been found to cause RFI especially when the video and power supply lines are near the TPMS.
- Anti-theft alarms (even those installed by the dealership) have been found to create enough RFI to cause the TPMS to malfunction or lose considerable range. These anti-theft alarms can be difficult to locate, as they are usually hidden somewhere out of the way for reduced accessibility.
- Many in-vehicle cell phone chargers have been found to cause considerable RFI. The vehicles with the power point closest to the RTM are the most affected. It must be noted that most cell phone chargers do not produce high levels of RFI all the time. This depends on the state of charge of the cell phone battery. The phone battery must be almost completely discharged in some cases.
- Power supplies and DC/ AC inverters typically create a lot of RFI. Most consumer grade equipment has very little filtering or shielding.

Using Hit Rate Parameter Identifiers (PIDs) to Determine the Presence of Radio Frequency Interference (RFI)

If an intermittent RFI issue is suspected, the information contained in the last 5 TPMS warning event Parameter Identifiers (PIDs) can be combined with specific Parameter Identifiers (PIDs) from the BCM to determine which TPMS sensors are being affected and if a RFI source is currently present in the vehicle.

The BCM module contains Parameter Identifiers (PIDs) that keep track of the number of TPMS messages received from the 4 trained TPMS sensors. These Parameter Identifiers (PIDs) can provide insight on the performance of the TPMS, and can help establish the presence of an Frequency Interference (RFI) source.

- TPM_HITS_LF (Tire Pressure Monitor Hit Rate Left Front) - The number of TPMS messages received by the BCM module from the LH front sensor
- TPM_HITS_RF (Tire Pressure Monitor Hit Rate Right Front) - The number of TPMS messages received by the BCM module from the RH front sensor.
- TPM_HITS_LRO (Tire Pressure Monitor Hit Rate Left Rear Outer) - The number of TPMS messages received by the BCM module from the LH rear sensor
- TPM_HITS_RRO (Tire Pressure Monitor Hit Rate Right Rear Outer) - The number of TPMS messages received by the BCM module from the RH rear sensor.

Method for determining if a RFI issue has been affecting the TPMS:

- Collect the last 5 TPMS events and determine if they were due to system faults or low tire air pressure.

- Collect the TPMS Hit Rate PID counters and compare them to the last 5 TPMS events.
- If the TPMS Hit Rate PID counters are significantly different from each other or if the locations with lower hit rate values show up as fault locations in last 5 TPMS events and BCM DTC B124D:02 (Tire Pressure Sensor: General Signal Failure) is present, an intermittent RFI source is most likely preventing the signals from these TPMS sensors from reaching the RTM.
- An intermittent RFI source can also be the case when all 4 TPMS sensors show up in the last 5 fault events and BCM DTC B1182:00 (Tire Pressure Monitoring System (TPMS): No Sub Type Information) is present. The possible cause would a strong source of RFI noise.

Original Equipment Manufacturer (OEM) Modules

In some cases the RFI may actually be caused by a module or ground on the vehicle. Depending on the severity of the concern, a dirty ground, improperly built ground shield or module can disable the system. Modules which have microcontrollers using clock circuits to create timing pulses for the microprocessor may radiate RFI.

Using Customer Electronics to Pinpoint Radio Frequency Interference (RFI)

This method can be a way to determine the cause of a concern before the sensors and module are replaced with little or no effect on system performance. Discuss with the customer what types of devices were being used when the event occurred. Determine which power points were being used and, if necessary, ask the devices be activated to determine their affect on the TPMS.

Options for Eliminating Intermittent TPMS Operation Caused by Radio Frequency Interference (RFI)

RFI can be caused by:

- Video equipment has been found to cause RFI especially when the video and power supply lines are near the TPMS.
- Anti-theft alarms (even those installed by the dealership) have been found to create enough RFI to cause the TPMS to malfunction or lose considerable range. These anti-theft alarms can be difficult to locate, as they are usually hidden somewhere out of the way for reduced accessibility.
- Many in-vehicle cell phone chargers have been found to cause considerable RFI. The vehicles with the power point closest to the RTM are the most affected. It must be noted that most cell phone chargers do not produce high levels of RFI all the time. This depends on the state of charge of the cell phone battery. The phone battery must be almost completely discharged in some cases.
- Power supplies and DC/ AC inverters typically create a lot of RFI. Most consumer grade equipment has very little filtering or shielding.

Using Hit Rate Parameter Identifiers (PIDs) to Determine the Presence of Radio Frequency Interference (RFI)

If an intermittent RFI issue is suspected, the information contained in the last 5 TPMS warning event Parameter Identifiers (PIDs) can be combined with specific Parameter Identifiers (PIDs) from the BCM to determine which TPMS sensors are being affected and if a RFI source is currently present in the vehicle.

The BCM module contains Parameter Identifiers (PIDs) that keep track of the number of TPMS messages received from the 4 trained TPMS sensors. These Parameter Identifiers (PIDs) can provide insight on the performance of the TPMS, and can help establish the presence of an Frequency

Interference (RFI) source.

- TPM_HITS_LF (Tire Pressure Monitor Hit Rate Left Front) - The number of TPMS messages received by the BCM module from the LH front sensor
- TPM_HITS_RF (Tire Pressure Monitor Hit Rate Right Front) - The number of TPMS messages received by the BCM module from the RH front sensor.
- TPM_HITS_LRO (Tire Pressure Monitor Hit Rate Left Rear Outer) - The number of TPMS messages received by the BCM module from the LH rear sensor
- TPM_HITS_RRO (Tire Pressure Monitor Hit Rate Right Rear Outer) - The number of TPMS messages received by the BCM module from the RH rear sensor.

Method for determining if a RFI issue has been affecting the TPMS:

- Collect the last 5 TPMS events and determine if they were due to system faults or low tire air pressure.
- Collect the TPMS Hit Rate PID counters and compare them to the last 5 TPMS events.
- If the TPMS Hit Rate PID counters are significantly different from each other or if the locations with lower hit rate values show up as fault locations in last 5 TPMS events and BCM DTC B124D:02 (Tire Pressure Sensor: General Signal Failure) is present, an intermittent RFI source is most likely preventing the signals from these TPMS sensors from reaching the RTM.
- An intermittent RFI source can also be the case when all 4 TPMS sensors show up in the last 5 fault events and BCM DTC B1182:00 (Tire Pressure Monitoring System (TPMS): No Sub Type Information) is present. The possible cause would a strong source of RFI noise.

Original Equipment Manufacturer (OEM) Modules

In some cases the RFI may actually be caused by a module or ground on the vehicle. Depending on the severity of the concern, a dirty ground, improperly built ground shield or module can disable the system. Modules which have microcontrollers using clock circuits to create timing pulses for the microprocessor may radiate RFI.

Using Customer Electronics to Pinpoint Radio Frequency Interference (RFI)

This method can be a way to determine the cause of a concern before the sensors and module are replaced with little or no effect on system performance. Discuss with the customer what types of devices were being used when the event occurred. Determine which power points were being used and, if necessary, ask the devices be activated to determine their affect on the TPMS.

Options for Eliminating Intermittent TPMS Operation Caused by Radio Frequency Interference (RFI)

- If an Original Equipment Manufacturer (OEM) component or customer device is causing a RFI concern, replace the device.
- If a phone charger is causing a RFI concern, the customer should consult with their cell phone provider to acquire a different battery charger.
- If a device such as a dealer installed anti-theft alarm is causing a RFI concern, move the device to another location in the vehicle. In the case of a portable device move the power cord to another power point location.

In summary, if the RFI source is present and cannot be moved or replaced, the intermittent concern remains. The TPMS must accept the unwanted system operation the RFI can cause.

Ambient Temperature Change and Tire Pressure

Tire pressures fluctuate with temperature changes. For this reason, tire pressures must be set to specification when tires are at outdoor ambient temperatures. If the vehicle is allowed to warm up to shop temperatures, and the outside temperature is less than shop temperature, the tire inflation pressure must be adjusted accordingly.

If the tires are inflated to specification at shop temperatures, and the vehicle is moved outdoors when the outdoor ambient temperature is significantly lower, the tire pressure may drop enough to be detected by the TPMS and illuminate the TPMS warning indicator.

As the ambient temperature decreases by -12.2°C (10°F), tire pressure decreases 6.9 kPa (1 psi). Adjust the tire pressure by 6.9 kPa (1 psi) for each -12.2° C (10° F) of ambient temperature drop as necessary to keep the tire at the specified VC label pressure. To adjust the tire pressure indoors for colder outside temperatures, refer to the following chart.

Table 1. Use Table to Adjust Tire Pressure Inside Garage for Colder Outside Temperature[1]
** Do Not Inflate Tire Higher than Maximum Pressure Stamped on Tire Sidewall. **

Table is based on a Garage Temperature of 70˚F. Max Pressure Adjustment is 7 psi.																		
Outside Temperature (˚F)	Tire Placard Pressure (PSI) →																	
	30	32	34	35	38	40	41	42	45	50	55	60	65	70	75	80	85	90
70	30	32	34	35	38	40	41	42	45	50	55	60	65	70	75	80	85	90
60	31	33	35	36	39	41	42	43	46	51	56	61	67	72	77	82	87	92
50	32	34	36	37	40	42	43	44	47	53	58	63	68	73	79	84	89	94
40	33	35	37	38	41	43	44	45	49	54	59	64	70	75	80	86	91	96
30	34	36	38	39	42	44	46	47	50	55	61	66	72	77	82	87	92	97
20	35	37	39	40	43	46	47	48	51	57	62	67	72	77	82	87	92	97
10	36	38	40	41	45	47	48	49	52	57	62	67	72	77	82	87	92	97
0	37	39	41	42	45	47	48	49	52	57	62	67	72	77	82	87	92	97
-10	37	39	41	42	45	47	48	49	52	57	62	67	72	77	82	87	92	97
-20	37	39	41	42	45	47	48	49	52	57	62	67	72	77	82	87	92	97
-30	37	39	41	42	45	47	48	49	52	57	62	67	72	77	82	87	92	97
-40	37	39	41	42	45	47	48	49	52	57	62	67	72	77	82	87	92	97

Table 2. Use Table to Adjust Tire Pressure Inside Garage for Colder Outside Temperature (Metric Units)[1]
** Do Not Inflate Tire Higher than Maximum Pressure Stamped on Tire Sidewall. **

Table is based on a Garage Temperature of 21˚C. Max Pressure Adjustment is 50 kPa.																		
Outside Temperature (˚C)	Tire Placard Pressure (kPa) →																	
	205	220	235	240	260	275	285	290	310	345	380	415	450	485	515	550	585	620
21	205	220	235	240	260	275	285	290	310	345	380	415	450	485	515	550	585	620
16	215	230	240	250	270	285	290	295	315	350	385	420	460	495	530	565	600	635
10	220	235	250	255	275	290	295	305	325	365	400	435	470	505	545	580	615	650
4	230	240	255	260	285	295	305	310	340	370	405	440	485	515	550	595	625	660
-1	235	250	260	270	290	305	315	325	345	380	420	455	495	530	565	600	635	670
-7	240	255	270	275	295	315	325	330	350	395	425	460	495	530	565	600	635	670
-12	250	260	275	285	310	325	330	340	360	395	425	460	495	530	565	600	635	670
-18	255	270	285	290	310	325	330	340	360	395	425	460	495	530	565	600	635	670
-23	255	270	285	290	310	325	330	340	360	395	425	460	495	530	565	600	635	670
-29	255	270	285	290	310	325	330	340	360	395	425	460	495	530	565	600	635	670
-34	255	270	285	290	310	325	330	340	360	395	425	460	495	530	565	600	635	670
-40	255	270	285	290	310	325	330	340	360	395	425	460	495	530	565	600	635	670

[1]When Outside (Ambient) Temperature is greater than 21˚C (70˚F), Inflate tires to placard pressure.
[1]Use the table to adjust tire pressure for P-metric and LT tires only.
[1]Do NOT use table for Commercial Truck Tires (i.e. 19.5 inch tires for F450 & F550). See F-Super Duty Service Manual for tire inflation procedure.

E142982

Component Description

BCM

The BCM is a multifunction module which monitors all sensor inputs and all CAN messages relating to the TPMS. The BCM records and retains the unique sensor identifier of each TPMS sensor.

The BCM retains the previous sensor location information following a tire rotation. For the BCM to learn the new sensor location, the sensors must be trained (calibrated) to the BCM. Refer to: Tire Pressure Monitoring System (TPMS) Sensor Location Calibration . Additionally, the sensors must be trained when a new BCM is installed.

When installing a new BCM, there are several procedures that must be carried out in order for the module to function correctly. These procedures include, but are not limited to; PMI, anti-theft parameter reset, programming keyless entry remote and setting customer preferences. Refer to: Body Control Module (BCM) .

RTM

The RTM is a radio signal receiver which collects the tire pressure data from the TPMS sensors.

TPMS Sensor

Each of the 4 TPMS sensors contain a battery, a tire pressure sensor and a radio transmitter. The TPMS sensor radio transmissions are sent approximately once every 60 seconds when the vehicle speed exceeds 32.2 km/h (20 mph).

DIAGNOSIS AND TESTING > TIRE PRESSURE MONITORING SYSTEM (TPMS) > DTC CHARTS

Diagnostics in this service information assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

DIAGNOSIS AND TESTING > TIRE PRESSURE MONITORING SYSTEM (TPMS) > DTC CHARTS > RTM DTC CHART

DTC	Description	Action
U0146:00	Lost Communication with Gateway "A": No Sub Type Information	GO to Pinpoint Test H
U0401:00	Invalid Data Received from ECM / PCM "A": No Sub Type Information	GO to Pinpoint Test J
U0401:82	Invalid Data Received from ECM / PCM "A": Alive / Sequence Counter Incorrect / Not Updated	GO to Pinpoint Test J
U1A00:00	Private Communication Network: No Sub Type Information	GO to Pinpoint Test I
U2100:00	Initial Configuration Not Complete: No Sub Type Information	This DTC is present when a new RTM is installed, or when the RTM is incorrectly flashed or reconfigured. This DTC clears when the RTM is correctly configured. Using a diagnostic scan tool, CONFIGURE the RTM. FOLLOW all diagnostic scan tool instructions.
U3000:04	Control Module: System Internal Failure	CHECK vehicle service history for recent service actions related to this module. This DTC sets due to incomplete or improper PMI procedures. If there have been recent service actions with this module, REPEAT the PMI procedure as directed by the diagnostic scan tool.

		If there have been no recent service actions, INSTALL a new RTM to correct the failure to retain configuration data. REFER to: Radio Transceiver Module (RTM) .

Diagnostics in this service information assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

DIAGNOSIS AND TESTING > TIRE PRESSURE MONITORING SYSTEM (TPMS) > DTC CHARTS > BCM DTC CHART

DTC	Description	Action
B1182:00	Tire Pressure Monitoring System: No Sub Type Information	GO to Pinpoint Test A
B1182:55	Tire Pressure Monitoring System: Not Configured	This DTC is only present when a new BCM is installed, or the BCM is flashed or reconfigured. This DTC clears when the BCM is correctly configured, all 4 TPMS sensors are trained to the BCM and the BCM self-test completes successfully. Using a diagnostic scan tool, CONFIGURE the BCM. FOLLOW all diagnostic scan tool instructions. TRAIN the TPMS sensors, REFER to: Tire Pressure Monitoring System (TPMS) Sensor Location Calibration . CARRY OUT a BCM self-test to clear the DTC.
B124D:02	Tire Pressure Sensor: General Signal Failure	GO to Pinpoint Test E
B1251:00	Tire Pressure Sensor Low Battery: No Sub Type Information	GO to Pinpoint Test C
B1254:51	Right Rear (Outside on Dual Wheel) Tire Pressure Sensor and Transmitter Assembly: Not Programmed	This DTC is only present when a new BCM is installed, or the BCM is flashed or reconfigured. This DTC is cleared after the TPMS senors locations are trained to the BCM. TRAIN the TPMS sensors, REFER to: Tire Pressure Monitoring

		System (TPMS) Sensor Location Calibration .
B1255:51	Left Rear (Outside On Dual Wheel) Tire Pressure Sensor and Transmitter Assembly: Not Programmed	This DTC is only present when a new BCM is installed, or the BCM is flashed or reconfigured. This DTC is cleared after the TPMS senors locations are trained to the BCM. TRAIN the TPMS sensors, REFER to: Tire Pressure Monitoring System (TPMS) Sensor Location Calibration .
C1A56:51	Left Front Tire Pressure Sensor and Transmitter Assembly: Not Programmed	This DTC is only present when a new BCM is installed, or the BCM is flashed or reconfigured. This DTC is cleared after the TPMS senors locations are trained to the BCM. TRAIN the TPMS sensors, REFER to: Tire Pressure Monitoring System (TPMS) Sensor Location Calibration .
C1A58:51	Right Front Tire Pressure Sensor and Transmitter Assembly: Not Programmed	This DTC is only present when a new BCM is installed, or the BCM is flashed or reconfigured. This DTC is cleared after the TPMS senors locations are trained to the BCM. TRAIN the TPMS sensors, REFER to: Tire Pressure Monitoring System (TPMS) Sensor Location Calibration .
U0559:56	Invalid Data Received from Radio Transceiver: Invalid / Incomplete Configuration	CHECK the service history for recent service actions related to the RTM. This DTC sets due to incomplete or improper PMI procedures. If there have been recent service actions with the RTM, REPEAT the PMI procedure as directed by the diagnostic scan tool. If there have been no recent service actions with the RTM, INSTALL a new RTM to correct the failure to retain the configuration data. REFER to: Radio Transceiver Module (RTM) .
-	All Other BCM Diagnostic Trouble Codes (DTCs)	REFER to: Body Control Module (BCM) .

DIAGNOSIS AND TESTING > TIRE PRESSURE MONITORING SYSTEM (TPMS) > SYMPTOM CHART

Symptom Chart: Tire Pressure Monitoring System

Diagnostics in this service information assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

Symptom Chart

Condition	Possible Sources	Actions
A module does not respond to the diagnostic scan tool	Fuse Wiring, terminals or connectors Communication network concern BCM	REFER to: MODULE COMMUNICATIONS NETWORK .
TPMS warning indicator is on continuously and the message center displays LOW TIRE PRESSURE	Refer to the Pinpoint Test	GO to Pinpoint Test E
TPMS warning indicator is on continuously and the message center **does not** display LOW TIRE PRESSURE	Diagnostic Trouble Codes (DTCs) present in the BCM or RTM	Using a diagnostic scan tool, RETRIEVE all Diagnostic Trouble Codes (DTCs) from the BCM and the RTM. For any BCM Diagnostic Trouble Codes (DTCs), GO to the BCM DTC Chart . For any RTM Diagnostic Trouble Codes (DTCs), GO to the RTM DTC Chart .
The BCM does not enter TPMS sensor training mode	Refer to the Pinpoint Test	GO to Pinpoint Test F
The TPMS warning indicator is never or always on	Communication network concern IPC	REFER to: Instrumentation, Message Center and Warning Chimes .
One or more TPMS sensors do not train and no Diagnostic Trouble Codes (DTCs) are present	Refer to the Pinpoint Test	GO to Pinpoint Test G

DIAGNOSIS AND TESTING > TIRE PRESSURE MONITORING SYSTEM (TPMS) > PINPOINT TESTS

B1182:00

Normal Operations and Fault Conditions

REFER to: Tire Pressure Monitoring System (TPMS) - System Operation and Component Description .

Communication between the RTM and the TPMS sensors can be interrupted by Radio Frequency Interference (RFI), which causes intermittent issues that are not vehicle concerns. Radio Frequency Interference (RFI) is generated by electrical motors and appliance operation, cellular telephones, remote transmitters, power inverters and portable entertainment equipment.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1182:00	Tire Pressure Monitoring System (TPMS): No Sub Type Information	Set by the BCM in continuous memory when **all 4** of the tire pressure sensors are faulted, not communicating with the RTM or when sensor data is not received by the BCM from the RTM.

Possible Sources

- Radio Frequency Interference (RFI)
- RTM communication concern
- TPMS sensor(s)
- GWM
- BCM

Visual Inspection and Diagnostic Pre-checks

- Inspect for cell phone chargers or GPS units.
- Inspect for Non-Original Equipment Manufacturer (OEM) wheels or run-flat tires.
- Verify horn operation.
- Verify spare tire is not in use.

NOTE: Make sure all aftermarket electronic equipment has been disconnected (if possible) and the customer has been questioned about the electronic equipment they may have been using in the vehicle when this concern was identified.

DIAGNOSIS AND TESTING > TIRE PRESSURE MONITORING SYSTEM (TPMS) > PINPOINT TESTS > PINPOINT TEST A : B1182:00 > PINPOINT TEST A : B1182:00

A1 CHECK FOR COMMUNICATION WITH THE GWM (GATEWAY MODULE A), THE RTM (RADIO TRANSCEIVER MODULE) AND THE BCM (BODY CONTROL MODULE)

Ignition ON.

Using a diagnostic scan tool, carry out the Network Test.

Does the GWM, the RTM and the BCM all pass the Network Test?

Yes	GO to A2

No	DIAGNOSE the GWM, RTM or BCM does not respond to the scan tool. REFER to: MODULE COMMUNICATIONS NETWORK .

A2 CHECK FOR RTM (RADIO TRANSCEIVER MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, carry out the RTM self-test.

Are any Diagnostic Trouble Codes (DTCs) present in the RTM?

Yes	DIAGNOSE all RTM Diagnostic Trouble Codes (DTCs). GO to the RTM DTC Chart .

No	GO to A3

A3 CHECK THE BCM (BODY CONTROL MODULE) TPMS (TIRE PRESSURE MONITORING SYSTEM) STATUS (TPMS_STATUS) PID (PARAMETER IDENTIFICATION)

Using a diagnostic scan tool, view the BCM TPMS_STATUS PID.

Does the TPMS_STATUS PID display SYSTEM FAULT?

Yes	GO to A4

No	GO to A6

A4 CARRY OUT THE TPMS (TIRE PRESSURE MONITORING SYSTEM) SENSOR TRAINING PROCEDURE

Train all 4 TPMS sensors. REFER to: Tire Pressure Monitoring System (TPMS) Sensor Location Calibration .

Did all of the TPMS sensors train and did the horn sound when each sensor was trained?

Yes	The system is operating correctly at this time. The concern may have been caused by Radio Frequency Interference (RFI). For information on locating sources of Radio Frequency Interference (RFI), REFER to: Tire Pressure Monitoring System (TPMS) - System Operation and Component Description .

No	GO to A5

A5 REPEAT THE TPMS (TIRE PRESSURE MONITORING SYSTEM) TRAINING

NOTE: A spare tire cannot be programmed to the vehicle. If a damaged road wheel is located in the vehicle and the RTM cannot communicate with it, or if the damaged wheel has been dropped off at a repair facility, the BCM sets a TPMS sensor fault. Repair and remount the road wheel as necessary to restore system operation.

If the spare tire is in use, repair and remount the road wheel as necessary to restore system operation. REFER to: Wheel and Tire .

Move the vehicle to rotate the wheels at least one-fourth of a turn. Leave the vehicle doors open. Start the sensor training procedure at a different wheel. REFER to: Tire Pressure Monitoring System (TPMS) Sensor Location Calibration .

Did any of the TPMS sensors train and did the horn sound when each sensor was trained?

Yes	If only some of the sensors trained, INSTALL a new TPMS sensor for each sensor that failed to train. REFER to: Tire Pressure Monitoring System (TPMS) Sensor . If all the sensors trained, the concern may have been caused by Radio Frequency Interference (RFI). For information on locating sources of Radio Frequency Interference (RFI), REFER to: Tire Pressure Monitoring System (TPMS) - System Operation and Component Description .

No	GO to A6

A6 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all BCM connectors.

Repair:

corrosion (replace connector or terminals - clean module pins)

damaged or bent pins - replace terminals or pins

pushed-out pins - replace pins as necessary

Connect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	The sensors may not be present. DISMOUNT the tires and VERIFY the sensors are present and mounted to the wheels. REFER to: Wheel and Tire . If a sensor is missing, INSTALL a new sensor. REFER to: Tire Pressure Monitoring System (TPMS) Sensor . If all the sensors are present, CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by Radio Frequency Interference (RFI). For information on locating sources of Radio Frequency Interference (RFI), REFER to: Tire Pressure Monitoring System (TPMS) - System Operation and Component Description .

DIAGNOSIS AND TESTING > TIRE PRESSURE MONITORING SYSTEM (TPMS) > PINPOINT TESTS > PINPOINT TEST B : B124D:02

B124D:02

Normal Operation and Fault Conditions

REFER to: Tire Pressure Monitoring System (TPMS) - System Operation and Component Description .

Communication between the RTM and the TPMS sensors can be interrupted by Radio Frequency Interference (RFI), which causes intermittent issues that are not vehicle concerns. Radio Frequency Interference (RFI) is generated by electrical motors and appliance operation, cellular telephones, remote transmitters, power inverters and portable entertainment equipment.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B124D:02	Tire Pressure Sensor: General Signal Failure	Set by the BCM in continuous memory when 1, 2 or 3 of the tire pressure sensors are faulted, not communicating with the RTM or when sensor data is not received by the BCM from the RTM.

Possible Sources

- Radio Frequency Interference (RFI)
- One or more TPMS sensors not trained
- TPMS sensor(s)

Visual Inspection and Diagnostic Pre-checks

- Inspect for customer electronic devices, such as cell phone chargers or GPS units.
- Inspect for Non-Original Equipment Manufacturer (OEM) wheels or run-flat tires.
- Verify horn operation.
- Verify spare tire is not in use.

DIAGNOSIS AND TESTING > TIRE PRESSURE MONITORING SYSTEM (TPMS) > PINPOINT TESTS > PINPOINT TEST B : B124D:02 > PINPOINT TEST B : B124D:02

B1 CHECK THE BCM (BODY CONTROL MODULE) TPMS (TIRE PRESSURE MONITORING SYSTEM) STATUS (TPMS_STATUS) PID (PARAMETER IDENTIFICATION) AND SENSOR IDENTIFIERS

Ignition ON.

Using a diagnostic scan tool, view and **record** the following BCM Parameter Identifications (PIDs):

Left Front Tire Transmitter Identifier (TPM_S_ID_LF)

Right Front Tire Transmitter Identifier (TPM_S_ID_RF)

Left Rear Tire Transmitter Identifier (TPM_S_ID_LRO)

Right Rear Tire Transmitter Identifier (TPM_S_ID_RRO)

View the BCM TPMS_STATUS PID.

Does the BCM TPMS_STATUS PID display SENSOR FAULT?

Yes	GO to B2

No	If the TPMS_STATUS PID displays SYSTEM FAULT, GO to Pinpoint Test A

B2 CARRY OUT THE TPMS (TIRE PRESSURE MONITORING SYSTEM) SENSOR TRAINING PROCEDURE

Train all 4 TPMS sensors. REFER to: Tire Pressure Monitoring System (TPMS) Sensor Location Calibration .

Did all of the TPMS sensors train and did the horn sound when each sensor was trained?

Yes	Using a diagnostic scan tool, LOCATE the updated TPMS sensor identifiers trained to the BCM. COMPARE these values to those recorded prior to the TPMS sensor training procedure. Disregarding sensor position, any sensor identifiers not matching those retrieved from the module were changed, but not retrained. The sensors are now trained to the vehicle, diagnosis is complete. DOCUMENT all TPMS sensor identifiers on the applicable warranty claim.

No	GO to B3

B3 ATTEMPT TO TRAIN THE TPMS (TIRE PRESSURE MONITORING SYSTEM) SENSORS AGAIN

Move the vehicle to rotate the wheels at least one-fourth of a turn. Starting at a different wheel, train all 4 TPMS sensors. REFER to: Tire Pressure Monitoring System (TPMS) Sensor Location Calibration .

Did any of the TPMS sensors train and did the horn sound when each sensor was trained?

Yes	If only some of the sensors trained, INSTALL a new TPMS sensor for each sensor that failed to train. REFER to: Tire Pressure Monitoring System (TPMS) Sensor . If all the sensors trained, the concern may have been caused by Radio Frequency Interference (RFI). For information on locating sources of Radio Frequency Interference (RFI), REFER to: Tire Pressure Monitoring System (TPMS) - System Operation and Component Description .

No	GO to B4

B4 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all BCM connectors.

Repair:

corrosion (replace connector or terminals - clean module pins)

damaged or bent pins - replace terminals or pins

pushed-out pins - replace pins as necessary

Connect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	The sensors may not be present. DISMOUNT the tires and VERIFY the sensors are present and mounted to the wheels. REFER to: Wheel and Tire . If the sensors are missing, INSTALL new sensors. REFER to: Tire Pressure Monitoring System (TPMS) Sensor . CLEAR the Diagnostic Trouble Codes (DTCs). If all the sensors are present, CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues. CLEAR the Diagnostic Trouble Codes (DTCs).

DIAGNOSIS AND TESTING > TIRE PRESSURE MONITORING SYSTEM (TPMS) > PINPOINT TESTS > PINPOINT TEST C : B1251:00

Normal Operation and Fault Conditions

REFER to: Tire Pressure Monitoring System (TPMS) - System Operation and Component Description .

When one or more of the TPMS sensors have a low battery, the TPMS warning indicator flashes for 70 seconds and then remains on continuously when the ignition is turned to the ON position, and the

message center displays TIRE PRESSURE SENSOR FAULT.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1251:00	Tire Pressure Sensor Low Battery: No Sub Type Information	Sets in continuous memory when attempting to train a TPMS sensor with a low battery.

Possible Sources

- Radio Frequency Interference (RFI)
- One or more TPMS sensors not trained
- TPMS sensor

Visual Inspection and Diagnostic Pre-checks

- Inspect for Non-Original Equipment Manufacturer (OEM) wheels or run-flat tires.
- Verify horn operation.

DIAGNOSIS AND TESTING > TIRE PRESSURE MONITORING SYSTEM (TPMS) > PINPOINT TESTS > PINPOINT TEST C : B1251:00 > PINPOINT TEST C : B1251:00

C1 TRAIN THE TPMS (TIRE PRESSURE MONITORING SYSTEM) SENSORS TO DETERMINE THE INOPERATIVE SENSOR

Train all 4 tire pressure sensors. REFER to: Tire Pressure Monitoring System (TPMS) Sensor Location Calibration .

Did all of the TPMS sensors train and did the horn sound when each sensor was trained?

Yes	The system is operating correctly at this time.

No	**Before installing a new sensor(s):** If a sensor does not respond, MOVE the vehicle to rotate the wheels at least one-fourth of a turn and ATTEMPT to activate the same sensor again. If the sensor still does not respond, ATTEMPT to activate the same sensor again. If the sensor still fails to train, ATTEMPT to train the sensor with the vehicle doors open. If the sensor(s) fails to train a second time, INSTALL a new TPMS sensor(s). REFER to: Tire Pressure Monitoring System (TPMS) Sensor .

DIAGNOSIS AND TESTING > TIRE PRESSURE MONITORING SYSTEM (TPMS) > PINPOINT TESTS > PINPOINT TEST D : DIAGNOSING RADIO FREQUENCY INTERFERENCE FAULTS

Normal Operation and Fault Conditions

REFER to: Tire Pressure Monitoring System (TPMS) - System Operation and Component Description .

One or more TPMS sensors not being trained or missing, RTM wiring and BCM wiring, or an internal failure of the RTM, GWM or BCM can all present symptoms similar to Radio Frequency Interference (RFI).

Possible Sources

- Wiring, terminals or connectors
- Not all TPMS sensors are installed
- TPMS sensor(s) not trained
- TPMS sensor(s)
- Intermittent TPMS operation due to Radio Frequency Interference (RFI)
- RTM
- GWM
- BCM

Visual Inspection and Diagnostic Pre-checks

- Inspect for customer electronic devices, such as a cell phone charger or GPS unit.
- Inspect for aftermarket wheels or run-flat tires (tires with steel body cord plies in the tire sidewall).
- Verify horn operation

NOTE: Make sure that all aftermarket electronic equipment has been disconnected (if possible) and the customer has been questioned about the electronic equipment they may have been using in the vehicle when this concern was identified.

DIAGNOSIS AND TESTING > TIRE PRESSURE MONITORING SYSTEM (TPMS) > PINPOINT TESTS > PINPOINT TEST D : DIAGNOSING RADIO FREQUENCY INTERFERENCE FAULTS > PINPOINT TEST D : DIAGNOSING RADIO FREQUENCY INTERFERENCE FAULTS

D1 CHECK FOR COMMUNICATION WITH THE GWM (GATEWAY MODULE A) AND THE RTM (RADIO TRANSCEIVER MODULE)

Ignition ON.

Using a diagnostic scan tool, carry out the Network Test.

Do the GWM and the RTM pass the Network Test?

Yes	GO to D2

No	DIAGNOSE the GWM or RTM does not respond to the scan tool. REFER to: MODULE COMMUNICATIONS NETWORK .

D2 CHECK FOR RTM (RADIO TRANSCEIVER MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, carry out the RTM self-test.

Are there any Diagnostic Trouble Codes (DTCs) present in the RTM?

Yes	DIAGNOSE all RTM Diagnostic Trouble Codes (DTCs). REFER to the RTM DTC Chart .

No	GO to D3

D3 VIEW THE BCM (BODY CONTROL MODULE) TPMS (TIRE PRESSURE MONITORING SYSTEM) STATUS (TPMS_STATUS) PID (PARAMETER IDENTIFICATION)

Ignition ON.

Using a diagnostic scan tool, view the BCM TPMS_STATUS PID.

Does the TPMS_STATUS PID display SYSTEM FAULT?

Yes	GO to D4

No	GO to D6

D4 CARRY OUT THE TPMS (TIRE PRESSURE MONITORING SYSTEM) SENSOR TRAINING PROCEDURE

NOTE: Before beginning TPMS sensor training, make sure the vehicle is away from other vehicles or devices which may cause Radio Frequency Interference (RFI) such as electric motors or radio transmitters.

Train all 4 TPMS sensors. REFER to: Tire Pressure Monitoring System (TPMS) Sensor Location Calibration .

Did all of the TPMS sensors train and did the horn sound when each sensor was trained?

Yes	The system is operating correctly at this time. The concern may have been caused by Radio Frequency Interference (RFI). For information on locating sources of Radio Frequency Interference (RFI), REFER to: Tire Pressure Monitoring System (TPMS) - System Operation and Component Description .

No	GO to D5

D5 ATTEMPT TO CARRY OUT THE SENSOR TRAINING PROCEDURE AGAIN USING KNOWN GOOD SENSORS

Move the vehicle to rotate the wheels at least one-fourth of a turn. Leave the vehicle doors open.

Attempt to train known good TPMS sensors from another vehicle. REFER to: Tire Pressure Monitoring System (TPMS) Sensor Location Calibration .

Did all of the known good TPMS sensors train and did the horn sound when each known good sensor was trained?

Yes	If some of the sensors trained, INSTALL a new TPMS sensor for each sensor that failed to train. REFER to: Tire Pressure Monitoring System (TPMS) Sensor . If all the known good sensors trained, INSTALL new TPMS sensors. REFER to: Tire Pressure Monitoring System (TPMS) Sensor .

No	INSTALL a new RTM. REFER to: Radio Transceiver Module (RTM) . If the concern is still present, GO to D6

D6 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins).

damaged or bent pins - install new terminals or pins.

pushed-out pins - install new pins as necessary.

Connect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > TIRE PRESSURE MONITORING SYSTEM (TPMS) > PINPOINT TESTS > PINPOINT TEST E : TPMS (TIRE PRESSURE MONITORING SYSTEM) WARNING INDICATOR IS ON CONTINUOUSLY AND THE MESSAGE CENTER DISPLAYS LOW TIRE PRESSURE

Normal Operations and Fault Conditions

REFER to: Tire Pressure Monitoring System (TPMS) - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B124D:02	Tire Pressure Sensor: General Signal Failure	This DTC sets in continuous memory if any of the TPMS sensors fail to transmit any tire pressure data.

Possible Sources

- Tire pressure not set to specifications listed on the VC label
- Spare tire currently in use
- TPMS sensor

Visual Inspection and Diagnostic Pre-checks

- Verify the spare tire is **not** in use.
- Verify the air pressure in all 4 tires matches the pressure indicated on the VC label.

DIAGNOSIS AND TESTING > TIRE PRESSURE MONITORING SYSTEM (TPMS) > PINPOINT TESTS > PINPOINT TEST E : TPMS (TIRE PRESSURE MONITORING SYSTEM) WARNING INDICATOR IS ON CONTINUOUSLY AND THE MESSAGE CENTER DISPLAYS LOW TIRE PRESSURE > PINPOINT TEST E : TPMS (TIRE PRESSURE MONITORING SYSTEM) WARNING INDICATOR IS ON CONTINUOUSLY AND THE MESSAGE CENTER DISPLAYS LOW TIRE PRESSURE

E1 CHECK FOR BCM (BODY CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition ON.

Using a diagnostic scan tool, carry out the BCM Diagnostic Trouble Codes (DTCs).

Is DTC B124D:02 present?

Yes	GO to E2

No	For other BCM Diagnostic Trouble Codes (DTCs), GO to the BCM DTC Chart . If there are no Diagnostic Trouble Codes (DTCs) present in the BCM, GO to E3

E2 VERIFY BCM (BODY CONTROL MODULE) DTC (DIAGNOSTIC TROUBLE CODE) B124D:02

Using a diagnostic scan tool, clear the BCM Diagnostic Trouble Codes (DTCs).

Ignition OFF.

Ignition ON.

Activate each TPMS sensor. REFER to: Tire Pressure Monitoring System (TPMS) Sensor Activation .

Using a diagnostic scan tool, carry out the BCM Diagnostic Trouble Codes (DTCs).

Is DTC B124D:02 present?

Yes	GO to E3

No	If the TPMS warning indicator is on continuously and the message center is displaying low tire pressure, GO to E3 If the TPMS warning indicator is **not** illuminated and the message center does **not** display low tire pressure, the system is operating correctly at this time. The concern may have been caused by Radio Frequency Interference (RFI). For information on locating sources of Radio Frequency Interference (RFI), REFER to: Tire Pressure Monitoring System (TPMS) - Component Location .

E3 CHECK FOR SPARE TIRE IN USE

NOTE: A spare tire cannot be programmed to the vehicle. If a damaged road wheel is located in the vehicle and the RTM cannot communicate with it, or if the damaged wheel has been dropped off at a repair facility, the BCM sets a TPMS sensor fault. Repair and remount the road wheel as necessary to restore system operation.

Check the spare tire location.

Is the spare tire in use?

Yes	REPAIR and REMOUNT the wheel to the vehicle. REFER to: Wheel and Tire . ADJUST tire pressures to the required pressure as defined on the VC label.

No	GO to E4

E4 CHECK FOR LOW TIRE PRESSURE

Measure and record the pressure in all 4 tires using a digital tire pressure gauge.

Adjust the pressure for those found to be below the specification listed on the VC label.

To clear the low pressure warning indicator, drive the vehicle for at least 2 minutes above 32.2 km/h (20 mph) or activate each sensor at least twice. REFER to: Tire Pressure Monitoring System (TPMS) Sensor Activation . Do not train the sensors at this time.

Has the TPMS warning indicator gone out?

Yes	The system is operating correctly at this time. The cause was low tire pressure.

No	GO to E5

E5 TRAIN ALL 4 TPMS (TIRE PRESSURE MONITORING SYSTEM) SENSORS

Train all 4 TPMS sensors. REFER to: Tire Pressure Monitoring System (TPMS) Sensor Location Calibration .

Did all of the TPMS sensors train and did the horn sound when each sensor was trained?

Yes	GO to E6

No	GO to Pinpoint Test G

E6 CHECK THE TIRE PRESSURES USING THE BCM (BODY CONTROL MODULE) TPMS (TIRE PRESSURE MONITORING SYSTEM) SENSOR PARAMETER IDENTIFICATIONS (PIDS)

Using a diagnostic scan tool, view the following BCM Parameter Identifications (PIDs):

Left Front Tire Pressure (TPM_PRES_LF)

Right Front Tire Pressure (TPM_PRES_RF)

Left Rear Tire Pressure (TPM_PRES_LRO)

Right Rear Tire Pressure (TPM_PRES_RRO)

Do the tire pressures indicated by the Parameter Identifications (PIDs) match the tire pressures measured previously, ±20.7 kPa (3 psi)?

Yes	The system is operating normally at this time. The concern may have been caused by an incomplete or incorrectly performed sensor calibration or low tire pressure.

No	INSTALL a new TPMS sensor(s) for the sensor(s) displaying inaccurate tire pressure. REFER to: Tire Pressure Monitoring System (TPMS) Sensor .

PINPOINT TESTS > PINPOINT TEST F : THE BCM (BODY CONTROL MODULE) DOES NOT ENTER TPMS (TIRE PRESSURE MONITORING SYSTEM) SENSOR TRAINING MODE

The BCM Does Not Enter TPMS Sensor Training Mode

Normal Operation and Fault Conditions

The training (calibration) can be carried out manually or by using a diagnostic scan tool, REFER to: Tire Pressure Monitoring System (TPMS) Sensor Location Calibration .

When one or more new TPMS sensors are installed or a new BCM is installed, the sensors must be trained (calibrated) to the BCM. For the manual training procedure, the BCM must receive a valid ignition signal, a valid brake pedal position signal and a valid vehicle speed signal. The start-stop switch signal and the brake pedal position signal are both direct inputs to the BCM, the vehicle speed signal is sent to the BCM from the PCM over the HS-CAN1.

If the vehicle has been stationary for more than 30 minutes, the TPMS sensors enter a "sleep mode" to conserve battery power. It becomes necessary to wake them up so they transmit the latest tire pressure information to the RTM. REFER to: Tire Pressure Monitoring System (TPMS) Sensor Activation .

Possible Sources

- Network communication concern
- Stoplamp switch concern
- Start-stop switch concern
- PCM concern
- BCM

Visual Inspection and Diagnostic Pre-checks

- Inspect for customer electronic devices, such as a cell phone charger or GPS unit.
- Inspect for non-Original Equipment Manufacturer (OEM) wheel or run-flat tires.

DIAGNOSIS AND TESTING > TIRE PRESSURE MONITORING SYSTEM (TPMS) > PINPOINT TESTS > PINPOINT TEST F : THE BCM (BODY CONTROL MODULE) DOES NOT ENTER TPMS (TIRE PRESSURE MONITORING SYSTEM) SENSOR TRAINING MODE > PINPOINT TEST F : THE BCM (BODY CONTROL MODULE) DOES NOT ENTER TPMS (TIRE PRESSURE MONITORING SYSTEM) SENSOR TRAINING MODE

F1 CHECK FOR BCM (BODY CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition ON.

Using a diagnostic scan tool, carry out the BCM self-test.

Are there any "Lost Communication" or "Invalid Data" Diagnostic Trouble Codes (DTCs) present in the BCM?

Yes	DIAGNOSE all BCM Diagnostic Trouble Codes (DTCs). REFER to: Body Control Module (BCM) .

No	GO to F2

F2 CHECK THE IGNITION SWITCH INPUT

Ignition ON.

Observe the start-stop switch LED indicator after entering RUN mode.

Is the start-stop switch LED indicator flashing?

Yes	GO to F3

No	DIAGNOSE the start-stop switch. REFER to: Steering Wheel and Column Electrical Components .

F3 CHECK FOR VEHICLE SPEED-RELATED DIAGNOSTIC TROUBLE CODES (DTCS) IN THE PCM (POWERTRAIN CONTROL MODULE)

Ignition ON.

Using a diagnostic scan tool, carry out the PCM KOEO self-test.

Are there any Diagnostic Trouble Codes (DTCs) present in the PCM?

Yes	DIAGNOSE the PCM DTC. REFER to: ELECTRONIC ENGINE CONTROLS - 2.3L ECOBOOST (231KW/314PS) . REFER to: ELECTRONIC ENGINE CONTROLS - 3.7L DURATEC (227KW/301PS) . REFER to: ELECTRONIC ENGINE CONTROLS - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS).

No	GO to F4

F4 CHECK THE STOPLAMP OPERATION

Press and release the brake pedal while monitoring the stoplamps.

Do the stoplamps operate correctly?

Yes	GO to F5

No	DIAGNOSE the stoplamp switch and stoplamps. REFER to: Stoplamps .

F5 CHECK FOR CORRECT BCM (BODY CONTROL MODULE) OPERATION

Ignition OFF.

Disconnect and inspect all BCM connectors.

Repair:

corrosion (install new connector or terminals - clean module pins).

damaged or bent pins - install new terminals or pins.

pushed-out pins - install new pins as necessary.

Connect the BCM connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern,

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > TIRE PRESSURE MONITORING SYSTEM (TPMS) > PINPOINT TESTS > PINPOINT TEST G : ONE OR MORE TPMS (TIRE PRESSURE MONITORING SYSTEM) SENSORS DO NOT TRAIN AND NO DIAGNOSTIC TROUBLE CODES (DTCS) ARE PRESENT

One or More TPMS Sensors Do Not Train and No Diagnostic Trouble Codes (DTCs) are Present

Normal Operation and Fault Conditions

REFER to: Tire Pressure Monitoring System (TPMS) - System Operation and Component Description .

If the vehicle has been stationary for more than 30 minutes, the TPMS sensors enter a "sleep mode" to conserve battery power. It becomes necessary to wake them up so they transmit the latest tire pressure information to the RTM. REFER to: Tire Pressure Monitoring System (TPMS) Sensor Activation .

Possible Sources

- TPMS sensors
- Radio Frequency Interference (RFI)

Visual Inspection and Diagnostic Pre-checks

- Inspect for customer electronic devices, such as a cell phone charger or GPS unit.
- Inspect for non-Original Equipment Manufacturer (OEM) wheel or run-flat tires.

- Verify horn operation.

DIAGNOSIS AND TESTING > TIRE PRESSURE MONITORING SYSTEM (TPMS) > PINPOINT TESTS > PINPOINT TEST G : ONE OR MORE TPMS (TIRE PRESSURE MONITORING SYSTEM) SENSORS DO NOT TRAIN AND NO DIAGNOSTIC TROUBLE CODES (DTCS) ARE PRESENT > PINPOINT TEST G : ONE OR MORE TPMS (TIRE PRESSURE MONITORING SYSTEM) SENSORS DO NOT TRAIN AND NO DIAGNOSTIC TROUBLE CODES (DTCS) ARE PRESENT

NOTE: The BCM has a 2-minute time limit between sensor responses. If the BCM does not recognize any of the 4 TPMS sensors during this time limit, the horn sounds twice and the message center displays TIRE NOT TRAINED REPEAT. The entire procedure must be repeated.

G1 ATTEMPT TO TRAIN THE TPMS (TIRE PRESSURE MONITORING SYSTEM) SENSORS

TRAIN all 4 TPMS sensors. REFER to: Tire Pressure Monitoring System (TPMS) Sensor Location Calibration .

Did all of the TPMS sensors train and did the horn sound when each sensor was trained?

Yes	The system is operating correctly at this time. The concern may have been caused by Radio Frequency Interference (RFI). For information on locating sources of Radio Frequency Interference (RFI), REFER to: Tire Pressure Monitoring System (TPMS) - System Operation and Component Description .

No	If one or more TPMS sensors trained, GO to G2 If none of the TPMS sensors trained, GO to Pinpoint Test D

G2 CHECK FOR RADIO FREQUENCY INTERFERENCE

Ignition ON.

Move the vehicle to rotate the wheels at least one-fourth turn.

TRAIN all 4 TPMS sensors. REFER to: Tire Pressure Monitoring System (TPMS) Sensor Location Calibration .

Did all of the TPMS sensors train and did the horn sound when each sensor was trained?

Yes	The system is operating correctly at this time. The concern may have been caused by Radio Frequency Interference (RFI). For information on locating sources of Radio Frequency Interference (RFI), REFER to: Tire Pressure Monitoring System (TPMS) - System Operation and Component Description .

No	For each sensor that did not train, INSTALL a new TPMS sensor. REFER to: Tire

	Pressure Monitoring System (TPMS) Sensor .

DIAGNOSIS AND TESTING > TIRE PRESSURE MONITORING SYSTEM (TPMS) > PINPOINT TESTS > PINPOINT TEST H : U0146:00

Normal Operation and Fault Conditions

With the ignition ON, the GWM sends messages to the RTM using the MS-CAN 1. If the RTM does not receive these messages within a predetermined time frame, the RTM sets a DTC.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0146:00	Lost Communication with Gateway "A": No Sub Type Information	This DTC sets in continuous memory if any of the following messages is missing from the GWM or contain invalid information; ignition status, TPMS status or vehicle configuration data.

Possible Sources

- Network communication concern
- GWM
- RTM

DIAGNOSIS AND TESTING > TIRE PRESSURE MONITORING SYSTEM (TPMS) > PINPOINT TESTS > PINPOINT TEST H : U0146:00 > PINPOINT TEST H : U0146:00

H1 CHECK THE COMMUNICATION NETWORK

Ignition ON.

Using a diagnostic scan tool, carry out the Network Test.

Does the GWM pass the Network Test?

Yes	GO to H2

No	DIAGNOSE the GWM does not respond to the scan tool. REFER to: MODULE COMMUNICATIONS NETWORK .

H2 RECHECK THE RTM (RADIO TRANSCEIVER MODULE) DIAGNOSTIC TROUBLE CODES

(DTCS)

Using a diagnostic scan tool, clear the RTM Diagnostic Trouble Codes (DTCs).

Ignition OFF.

Ignition ON.

Using a diagnostic scan tool, carry out the RTM self-test.

Is DTC U0146:00 retrieved again?

Yes	GO to H3

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

H3 RETRIEVE ALL DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE GWM (GATEWAY MODULE A)

Using a diagnostic scan tool, carry out the GWM self-test.

Are any Diagnostic Trouble Codes (DTCS) present in the GWM?

Yes	DIAGNOSE the GWM Diagnostic Trouble Codes (DTCS). REFER to: MODULE COMMUNICATIONS NETWORK .

No	GO to H4

H4 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0146:00 SET IN OTHER MODULES

Using a diagnostic scan tool, carry out the self-test to retrieve all Continuous Memory Diagnostic Trouble Codes (CMDTCs) from all modules.

Is DTC set in 1 or more modules in addition to the RTM?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new GWM. REFER to: Gateway Module A (GWM) .

No	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new RTM. REFER to: Radio Transceiver Module (RTM) .

DIAGNOSIS AND TESTING > TIRE PRESSURE MONITORING SYSTEM (TPMS) >

PINPOINT TESTS > PINPOINT TEST I : U1A00:00

Normal Operation and Fault Conditions

With the ignition ON, the BCM and the RTM communicate using a LIN. If the RTM is unable to communicate with the BCM using this LIN, the RTM sets a DTC.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U1A00:00	Private Communication Network: No Sub Type Information	This DTC sets in continuous memory if the RTM communication bus reset counter reaches zero. This is most likely due to a circuit failure in the LIN, an internal failure of the BCM or an internal failure of the RTM.

Possible Sources

- Wiring, terminals or connectors
- BCM
- RTM

DIAGNOSIS AND TESTING > TIRE PRESSURE MONITORING SYSTEM (TPMS) > PINPOINT TESTS > PINPOINT TEST I : U1A00:00 > PINPOINT TEST I : U1A00:00

NOTE: Use the correct probe adapter(s) when making measurements. Failure to use the correct probe adapter(s) may cause damage to the connector.

I1 CHECK THE COMMUNICATION NETWORK

Ignition ON.

Using a diagnostic scan tool, carry out the Network Test.

Do the RTM and the BCM pass the Network Test?

Yes	GO to I2

No	DIAGNOSE the RTM or BCM does not respond to the scan tool. REFER to: MODULE COMMUNICATIONS NETWORK .

I2 CHECK FOR BCM (BODY CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, carry out the BCM self-test.

Are any Diagnostic Trouble Codes (DTCs) present in the BCM?

Yes	DIAGNOSE the Diagnostic Trouble Codes (DTCs). REFER to: Body Control Module (BCM) .

No	GO to I6

I3 CHECK THE RTM (RADIO TRANSCEIVER MODULE) BATTERY VOLTAGE INPUT FOR AN OPEN

Ignition OFF.

Disconnect BCM C2280C .

Disconnect RTM C4458 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2280C-22	Ω	C4458-6

Is the resistance less than 3 ohms?

Yes	GO to I4

No	REPAIR the circuit.

I4 CHECK THE RTM (RADIO TRANSCEIVER MODULE) BATTERY VOLTAGE INPUT FOR A SHORT TO GROUND

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4458-6	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to I5

No	REPAIR the circuit. VERIFY BCM fuse 32 (10A) is OK. INSTALL a new fuse as necessary.

I5 CHECK THE RTM (RADIO TRANSCEIVER MODULE) GROUND CIRCUIT FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4458-1	Ω	Ground

Is the resistance less than 3 ohms?

Yes	GO to I6

No	REPAIR the circuit.

I6 CHECK THE LIN (LOCAL INTERCONNECT NETWORK) CIRCUIT FOR A SHORT TO GROUND

Disconnect BCM C2280B .

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2280B-26	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to I7

No	REPAIR the circuit.

I7 CHECK THE LIN (LOCAL INTERCONNECT NETWORK) CIRCUIT FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2280B-26	Ω	C4458-2

Is the resistance less than 3 ohms?

Yes	GO to I8

No	REPAIR the circuit.

I8 CHECK THE LIN (LOCAL INTERCONNECT NETWORK) CIRCUIT FOR A SHORT TO VOLTAGE

Connect BCM C2280B .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4458-2		Ground

Is a steady voltage greater than 3 volts present?

Yes	REPAIR the circuit.

No	GO to I9

I9 CHECK FOR CORRECT RTM (RADIO TRANSCEIVER MODULE) OPERATION

Ignition OFF.

Inspect the RTM electrical connector.

Repair:

corrosion (install new connector or terminal - clean module pins)

damaged or bent pins - install new terminals or pins

pushed-out pins - install new pins as necessary

Connect RTM C4458 , make sure the connector seats and latches correctly.

Connect all previously disconnected BCM electrical connectors, make sure the connectors seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new RTM. REFER to: Radio Transceiver Module (RTM) .

No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > TIRE PRESSURE MONITORING SYSTEM (TPMS) > PINPOINT TESTS > PINPOINT TEST J : U0401:00, U0401:82

Normal Operation and Fault Conditions

With the ignition ON, the PCM sends vehicle speed data messages to the GWM along the HS-CAN1. The GWM relays the messages to the RTM using the MS-CAN 1. If the vehicle speed data messages are invalid or faulted, the RTM sets a DTC and the TPMS warning indicator is illuminated.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0401:00	Invalid Data Received from ECM / PCM "A": No Sub Type Information	This DTC sets in continuous memory if the vehicle speed message from the PCM is "invalid" or "faulted" instead of the actual vehicle speed data.
U0401:82	Invalid Data Received from ECM / PCM "A": Alive / Sequence Counter Incorrect / Not Updated	This DTC sets in continuous memory if the vehicle speed message from the PCM does not refresh.

Possible Sources

- Network communication concern
- GWM
- PCM
- RTM

DIAGNOSIS AND TESTING > TIRE PRESSURE MONITORING SYSTEM (TPMS) > PINPOINT TESTS > PINPOINT TEST J : U0401:00, U0401:82 > PINPOINT TEST J : U0401:00, U0401:82

J1 CHECK THE RTM (RADIO TRANSCEIVER MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, carry out the RTM self-test.

Is DTC U0146:00 also present?

Yes	DIAGNOSE DTC U0146:00 before diagnosing DTC U0401:00 or U0401:82, GO to Pinpoint Test H

No	GO to J2

J2 CHECK THE COMMUNICATION NETWORK

Ignition ON.

Using a diagnostic scan tool, carry out the Network Test.

Does the GWM and the PCM pass the Network Test?

Yes	GO to J3

No	DIAGNOSE the GWM or the PCM does not respond to the diagnostic scan tool. REFER to: MODULE COMMUNICATIONS NETWORK .

J3 RECHECK THE RTM (RADIO TRANSCEIVER MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, clear the RTM Diagnostic Trouble Codes (DTCs).

Ignition OFF.

Ignition ON.

Test drive the vehicle for a minimum of 2 minutes at a speed greater than 24 km/h (15 mph).

Using a diagnostic scan tool, carry out the RTM self-test.

Is DTC U0401:00 or U0401:82 present?

Yes	GO to J4

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

J4 RETRIEVE ANY DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE GWM (GATEWAY MODULE A)

Using a diagnostic scan tool, carry out the GWM self-test.

Are there any Diagnostic Trouble Codes (DTCs) present in the GWM?

Yes	DIAGNOSE the GWM Diagnostic Trouble Codes (DTCs). REFER to: MODULE COMMUNICATIONS NETWORK .

No	GO to J5

J5 RETRIEVE ANY DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE PCM (POWERTRAIN CONTROL MODULE)

Using a diagnostic scan tool, carry out the PCM KOEO self-test.

Are there any Diagnostic Trouble Codes (DTCs) present in the PCM?

Yes	DIAGNOSE the PCM DTC. REFER to: ELECTRONIC ENGINE CONTROLS - 2.3L ECOBOOST (231KW/314PS). REFER to: ELECTRONIC ENGINE CONTROLS - 3.7L DURATEC (227KW/301PS). REFER to: ELECTRONIC ENGINE CONTROLS - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS.

No	GO to J6

J6 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0146:XX OR U0447:XX SET IN OTHER MODULES

Using a diagnostic scan tool, carry out the self-test for all modules.

Retrieve and record the Continuous Memory Diagnostic Trouble Codes (CMDTCs) from all modules.

Is DTC U0146:xx or U0447:xx set in 2 or more modules?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new GWM. REFER to: Gateway Module A (GWM) .

No	GO to J7

J7 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0401 OR U0401:XX SET IN OTHER MODULES

Using a diagnostic scan tool, carry out the self-test for all modules.

Retrieve the Continuous Memory Diagnostic Trouble Codes (CMDTCs) from all modules.

Is DTC U0401 or U0401:xx set in 1 or more modules in addition to the RTM?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new PCM. REFER to: POWERTRAIN CONTROL MODULE (PCM) - 2.3L EcoBoost (231kW/314PS). REFER to: POWERTRAIN CONTROL MODULE (PCM) - 3.7L Duratec (227kW/301PS). REFER to: POWERTRAIN CONTROL MODULE (PCM) - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS).

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

GENERAL PROCEDURES > TIRE PRESSURE MONITORING SYSTEM (TPMS) SENSOR ACTIVATION

Special Tool(s) / General Equipment

 E170534	204-D081 TPM Activation Tool

Activation

> *NOTE: The tire pressure sensors will go into a "sleep mode" when a vehicle is stationary to conserve battery power. The sensors do not transmit information while in sleep mode. It will be necessary to wake them up so they will transmit the latest tire pressure information.*

1.
Turn the ignition switch to the ON position.

2.

Position the special tool against the Left Front (LF) tire sidewall at the tire valve stem. Use Special Service Tool: 204-D081 TPM Activation Tool.

> *NOTE: If a sensor does not respond to the special tool move the vehicle to rotate the wheels at least one-fourth of a turn and attempt to activate the same sensor again. If the sensor still does not respond, attempt to activate the same sensor again using the customer activation tool (if available). If the sensor still fails to train, attempt to train the sensor with the vehicle doors open.*

> *NOTE: The special tool should provide feedback in the form of a flashing green light and a beep sound for each successful response from a tire pressure sensor. This feedback may not always be present, do not rely on it as a confirmation that the module heard a particular sensor.*

3.
Press the test button on the special tool to activate the sensor. Activate the sensor at least 2 times. Use Special Service Tool: 204-D081 TPM Activation Tool.

4.

Repeat Steps 2 and 3 for the remaining tires.

5.

If the TPMS indicator remains illuminated after adjusting and activating each sensor, Refer to: Tire Pressure Monitoring System (TPMS) .

GENERAL PROCEDURES > TIRE PRESSURE MONITORING SYSTEM (TPMS) SENSOR LOCATION CALIBRATION

Tire Pressure Monitoring System (TPMS) Sensor Location Calibration

Special Tool(s) / General Equipment

 E170534	204-D081 TPM Activation Tool

Programming

NOTE: The TPMS can be placed into learn mode using a diagnostic scan tool or manually where a diagnostic scan tool is not available.

NOTE: ***Enter Training Mode With Scan Tool***

NOTE: The horn will sound once and the TPMS indicator will flash if the training mode has been entered successfully. If equipped, the message center will display TRAIN Left Front (LF) TIRE.

1.

1.

Select Chassis.

2.

Select TPMS.

3.

Select Training Mode. Use the General Equipment: Ford Diagnostic Equipment

Programming

NOTE: ***Enter Training Mode Without Scan Tool***

NOTE: The horn will sound once and the TPMS indicator will flash if the training mode has been entered successfully. If equipped, the message center will display

TRAIN Left Front (LF) TIRE.

1.
With the ignition OFF, press and release the brake pedal.

2.

Using the start/stop switch, position the ignition from OFF to RUN 3 times, ending in the RUN position.

3.

Press and release the brake pedal.

4.

Position the ignition to OFF position.

5.

Using the start/stop switch, position the ignition from OFF to RUN 3 times, ending in the RUN position.

Programming

NOTE: ***TPMS Sensor Training Procedure***

NOTE: It may take up to 6 seconds to activate a tire pressure sensor. During this time, the special tool must remain in place at the valve stem.

1.
Place the special tool on the Left Front (LF) tire sidewall at the valve stem. Press and release the test button on the special tool. The horn will sound briefly to indicate that the tire pressure sensor has been recognized by the BCM. Use Special Service Tool: 204-D081 TPM Activation Tool.

2.

Within 2 minutes of the horn sounding, place the special tool on the Right Front (RF) tire sidewall at the valve stem and press and release the test button to train the Right Front (RF) tire pressure sensor. Use Special Service Tool: 204-D081 TPM Activation Tool.

3.

Repeat Step 1 for the Right Rear (RR) and Left Rear (LR) tires. The procedure is completed after the last tire has been trained. When the training procedure is complete, the message center (if equipped) will display TIRE TRAINING COMPLETE. For vehicles not equipped with a message center, successful completion of the training procedure will be verified by positioning the ignition to OFF without the horn sounding. If the horn sounds twice when the ignition is positioned to OFF, the training procedure was not successful.

4.

Using the scan tool, locate the updated TPMS sensor identifiers trained to the BCM and document them on the applicable warranty claim. Use Special Service Tool: 204-D081 TPM Activation Tool.

5.

This step is required to clear DTC B1182:55, cause the BCM to exit the manufacturing mode and to make sure there are no other concerns with a newly programmed BCM.

6.

If the sensors are being trained due to the installation of a new BCM, clear any DTC and carry out the BCM On-Demand Self Test.

REMOVAL AND INSTALLATION > TIRE PRESSURE MONITORING SYSTEM (TPMS) SENSOR > REMOVAL

1.

WARNING: Before beginning any service procedure in this service information, refer to Safety Warnings in GENERAL INFORMATION . Failure to follow this instruction may result in serious personal injury.

Refer to: Health and Safety Precautions .

2.

WARNING: The Tire Pressure Monitoring System (TPMS) sensor battery may release hazardous chemicals if exposed to extreme mechanical damage. If these chemicals contact the skin or eyes, flush immediately with water for a minimum of 15 minutes and get prompt medical attention. If any part of the battery is swallowed, contact a physician immediately. When disposing of Tire Pressure Monitoring System (TPMS) sensors, follow the correct procedures for hazardous material disposal. Failure to follow these instructions may result in serious personal injury.

NOTE: The Tire Pressure Monitoring System (TPMS) sensor cannot be removed without disassembly of the wheel and tire.

NOTE: The maximum shelf life of a TPMS snap in valve stems before being mounted to a wheel is 1 year. The production date / week / year is marked on the TPMS sensor / valve stem itself. Snap in valve stems which are older than 1 year are to be scrapped. TPMS snap in sensors with valve stems older than one year should

not be mounted but the valve stem should be replaced.

Refer to: Wheel and Tire .

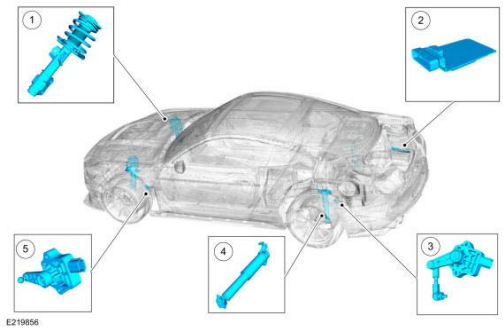
REMOVAL AND INSTALLATION > TIRE PRESSURE MONITORING SYSTEM (TPMS) SENSOR > INSTALLATION

NOTE: The Tire Pressure Monitoring System (TPMS) sensor cannot be installed without disassembly of the wheel and tire.

1.
Refer to: Wheel and Tire .

Service Manual: VEHICLE DYNAMIC SUSPENSION

DESCRIPTION AND OPERATION > VEHICLE DYNAMIC SUSPENSION - COMPONENT LOCATION



Item	Description
1	Strut (2 required)
2	VDM
3	Rear height sensor (2 required)
4	Shock (2 required)
5	Front height sensor (2 required)

DESCRIPTION AND OPERATION > VEHICLE DYNAMIC SUSPENSION - OVERVIEW > OVERVIEW

The semi-active, computer-controlled suspension damping system utilizes vehicle sensors and magneto-rheological fluid-filled dampers to offer improved handling, comfort and stability by continuously adjusting the adaptive shock absorber force to the current road and driving conditions.

DESCRIPTION AND OPERATION > VEHICLE DYNAMIC SUSPENSION - SYSTEM OPERATION AND COMPONENT DESCRIPTION

System Operation

DESCRIPTION AND OPERATION > VEHICLE DYNAMIC SUSPENSION - SYSTEM OPERATION AND COMPONENT DESCRIPTION > NETWORK MESSAGE CHART

Module Network Input Messages - VDM

Broadcast Message	Originating Module	Message Purpose
ABS active	ABS module	Indicates the current ABS activity, on or off.
Ambient air temperature	PCM	This message is sent to the GWM and then to the VDM. Indicates the current ambient air temperature.
Brake pedal applied	PCM	This message is sent to the GWM and then to the VDM. Indicates whether or not the driver is applying the brake pedal.
Brake torque request	ABS module	This message indicates the current amount of braking requested by the ABS module. The VDM adjusts the suspension to prevent nose-diving during hard braking maneuvers.
Driven wheel torque actual	PCM	This message is sent to the GWM and then to the VDM. Indicates the current amount of torque being applied to the rear wheels in Newton meters.
Driven wheel torque request	PCM	This message is sent to the GWM and then to the VDM. Indicates the current amount of torque being requested by the driver through the launch control system.
Engine coolant temperature	PCM	This message is sent to the GWM and then to the VDM. Indicates the current engine coolant temperature in degrees Celsius.
Ignition status	BCM	This message is sent to the GWM and then to the VDM. Indicates the current ignition status; off, accessory, run, start, invalid or unknown.
Odometer master value	IPC	This message is sent to the GWM and then to the VDM. Indicates the current odometer reading in kilometers.
Stability control brake active	ABS module	Indicates the current ESC activity, on or off.
Steering wheel angle	ABS module	Indicates the current steering wheel angle relative to the

		straight ahead position. Used to determine the amount of dampening required during vehicle operation.
Traction control mode	ABS module	Indicates the current traction control activity, on or off.
Vehicle configuration data	BCM	This message is sent to the GWM and then to the VDM. Indicates the current vehicle configuration and optional equipment.
Vehicle lateral acceleration	RCM	Indicates the current lateral acceleration as measured by the sensors in the RCM. Used to determine the amount of dampening required during vehicle operation.
Vehicle longitudinal acceleration	RCM	Indicates the current longitudinal acceleration as measured by the sensors in the RCM. Used to determine the amount of dampening required during vehicle operation.
Vehicle roll rate	RCM	Indicates the current roll rate as measured by the sensors in the RCM. Used to determine the amount of dampening required during vehicle operation.
Vehicle speed	PCM	This message is sent to the GWM and then to the VDM. Indicates the current vehicle speed in kilometers per hour.
Vehicle yaw rate	RCM	Indicates the current yaw rate as measured by the sensors in the RCM. Used to determine the amount of dampening required during vehicle operation.

DESCRIPTION AND OPERATION > VEHICLE DYNAMIC SUSPENSION - SYSTEM OPERATION AND COMPONENT DESCRIPTION > VEHICLE DYNAMIC SUSPENSION

The VDM is connected to the HS-CAN to communicate with the ABS module, the RCM, the BCM and the PCM to monitor vehicle roll, pitch, cornering, braking and acceleration. Using the information received from other modules and the information from the 4 vehicle height sensors, the VDM calculates the best action for each of the 4 suspension dampers.

The driver is also able to select 1 of 4 preset system modes (Tour, Sport, Track or Drag) using the

message center. When a mode is selected, the VDM regulates the magnetic field of the damper piston to keep the suspension "feel" relational to the selected mode.

When the VDM is initialized (ignition ON), it carries out a preliminary electrical check of the height sensors, height sensor circuits, damper piston electromagnetic coils and damper piston electromagnetic coil circuits. Any malfunction detected in the system causes the VDM to set a DTC and send a message over the HS-CAN2 to the GWM. The GWM relays this message to the IPC over the HS-CAN3 and the IPC responds by displaying a message in the message center.

Depending on the DTC present, the VDM may deactivate the dynamic suspension resulting in a firm suspension feel.

Component Description

Vehicle Dynamics Control Module (VDM)

The VDM monitors all sensor inputs and all HS-CAN messages relating to the vehicle dynamic suspension and directly controls the damper piston electromagnetic coils. The VDM sends an individual electrical current to each damper piston to control the amount of damping required.

When a new VDM is installed, it must be programmed with the correct vehicle information for proper dynamic suspension operation. New module programming is carried out using a diagnostic scan tool, follow all diagnostic scan tool instructions. Refer to: MODULE CONFIGURATION .

When one of the following components is installed new, disassembled, disconnected or removed the VDM must be calibrated.

- VDM
- Suspension height sensor
- Front lower control arm
- Front strut assembly
- Rear lower control arm
- Rear shock

The calibration routine is required for the system to learn the zero-position of the vehicle which means the vehicle must be on a level surface, must not be moving and cannot contain any passengers or cargo. The calibration routine is carried out using a diagnostic scan tool. The calibration routine should not be performed with the vehicle raised off the ground or immediately after lowering the vehicle as the suspension will not be in a neutral position. The suspension must be neutralized before performing the calibration routine by driving the vehicle for a short distance such as around a parking lot.

Height Sensor

The height sensor is an electronic device which behaves like a potentiometer to send a variable amount of voltage back to the VDM. The sensor has 3 circuits, one circuit is for the 5 volt sensor supply, one circuit is for sensor ground and one circuit is for the sensor output.

Damper Piston Electromagnetic Coils

Each damper piston contains 2 sets of electromagnetic coils wound around the damper piston. The coils produce a magnetic field restricting flow of fluid in the damper. The VDM uses a PWM output to increase or decrease the magnetic field of the damper piston coils. The higher the PWM, the stronger the

magnetic field, resulting in a "firm" suspension feel.

DIAGNOSIS AND TESTING > VEHICLE DYNAMIC SUSPENSION > DTC CHART: VEHICLE DYNAMICS CONTROL MODULE (VDM)

Diagnostics in this service information assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

VDM DTC Chart

DTC	Description	Action
B14C1:64	Damper Temperature: Signal Plausibility Failure	GO to Pinpoint Test C
C103E:00	Suspension System Shipping Blocks Not Removed: No Sub Type Information	The vehicle is fitted with spacers designed to maintain a very high vehicle trim height in order to protect against front splitter or rear diffuser damage. If all 4 height sensors have been correctly configured and there are no height sensor Diagnostic Trouble Codes (DTCs) present, the VDM sets this DTC if there is no change in ride height information. REMOVE the shipping blocks from the front struts and rear shock absorbers.
C110C:11	Left Front Damper Solenoid: Circuit Shorted to Ground	GO to Pinpoint Test C
C110C:12	Left Front Damper Solenoid: Circuit Shorted to Battery	GO to Pinpoint Test C
C110C:13	Left Front Damper Solenoid: Circuit Open	GO to Pinpoint Test C
C110C:19	Left Front Damper Solenoid: Circuit Current Above Threshold	GO to Pinpoint Test C
C110C:1A	Left Front Damper Solenoid: Circuit Resistance Below Threshold	GO to Pinpoint Test C
C110C:1B	Left Front Damper Solenoid: Circuit Resistance Above Threshold	GO to Pinpoint Test C
C110D:11	Right Front Damper Solenoid: Circuit Shorted to Ground	GO to Pinpoint Test C
C110D:12	Right Front Damper Solenoid: Circuit Shorted to Battery	GO to Pinpoint Test C

C110D:13	Right Front Damper Solenoid: Circuit Open	GO to Pinpoint Test C
C110D:19	Right Front Damper Solenoid: Circuit Current Above Threshold	GO to Pinpoint Test C
C110D:1A	Right Front Damper Solenoid: Circuit Resistance Below Threshold	GO to Pinpoint Test C
C110D:1B	Right Front Damper Solenoid: Circuit Resistance Above Threshold	GO to Pinpoint Test C
C110E:11	Left Rear Damper Solenoid: Circuit Shorted to Ground	GO to Pinpoint Test C
C110E:12	Left Rear Damper Solenoid: Circuit Shorted to Battery	GO to Pinpoint Test C
C110E:13	Left Rear Damper Solenoid: Circuit Open	GO to Pinpoint Test C
C110E:19	Left Rear Damper Solenoid: Circuit Current Above Threshold	GO to Pinpoint Test C
C110E:1A	Left Rear Damper Solenoid: Circuit Resistance Below Threshold	GO to Pinpoint Test C
C110E:1B	Left Rear Damper Solenoid: Circuit Resistance Above Threshold	GO to Pinpoint Test C
C110F:11	Right Front Damper Solenoid: Circuit Shorted to Ground	GO to Pinpoint Test C
C110F:12	Right Front Damper Solenoid: Circuit Shorted to Battery	GO to Pinpoint Test C
C110F:13	Right Front Damper Solenoid: Circuit Open	GO to Pinpoint Test C
C110F:19	Right Front Damper Solenoid: Circuit Current Above Threshold	GO to Pinpoint Test C
C110F:1A	Right Front Damper Solenoid: Circuit Resistance Below Threshold	GO to Pinpoint Test C
C110F:1B	Right Front Damper Solenoid: Circuit Resistance Above Threshold	GO to Pinpoint Test C
C1121:4B	Damper Solenoid(s): Over Temperature	DIAGNOSE all other damper solenoid Diagnostic Trouble Codes (DTCs) before diagnosing DTC C1121:4B. Using a diagnostic scan tool, CLEAR

		the DTC. CYCLE the ignition from ON to OFF and back to ON. Using a diagnostic scan tool, CARRY OUT the VDM self-test. If the DTC returns, INSPECT the front struts and rear shock absorbers for signs of leakage or damage. INSTALL new components as necessary.
C1124:55	Height Sensor(s): Not Configured	This DTC is automatically set in a new VDM and indicates the system requires height sensor calibration. Once the system is calibrated, the DTC can be cleared. CALIBRATE the VDM and sensors. FOLLOW the diagnostic scan tool instructions. CLEAR the DTCs. REPEAT the VDM self-test.
C1124:56	Height Sensor(s): Invalid / Incompatible Configuration	This DTC is automatically set in a new VDM and indicates the system requires height sensor calibration. Once the system is calibrated, the DTC can be cleared. CALIBRATE the VDM and sensors. FOLLOW the diagnostic scan tool instructions. CLEAR the DTCs. REPEAT the VDM self-test.
C1A03:12	Left Front Height Sensor: Circuit Shorted to Battery	GO to Pinpoint Test D
C1A03:14	Left Front Height Sensor: Circuit Shorted to Ground or Open	GO to Pinpoint Test D
C1A03:2A	Left Front Height Sensor: Signal Stuck In Range	GO to Pinpoint Test D
C1A03:64	Left Front Height Sensor: Signal Plausibility Failure	GO to Pinpoint Test D
C1A04:12	Right Front Height Sensor: Circuit Shorted to Battery	GO to Pinpoint Test D
C1A04:14	Right Front Height Sensor: Circuit Shorted to Ground or Open	GO to Pinpoint Test D
C1A04:2A	Right Front Height Sensor: Signal Stuck In Range	GO to Pinpoint Test D
C1A04:64	Right Front Height Sensor: Signal Plausibility Failure	GO to Pinpoint Test D
C1A05:12	Left Rear Height Sensor: Circuit Shorted to Battery	GO to Pinpoint Test D

C1A05:14	Left Rear Height Sensor: Circuit Shorted to Ground or Open	GO to Pinpoint Test D
C1A05:2A	Left Rear Height Sensor: Signal Stuck In Range	GO to Pinpoint Test D
C1A05:64	Left Rear Height Sensor: Signal Plausibility Failure	GO to Pinpoint Test D
C1A06:12	Right Rear Height Sensor: Circuit Shorted to Battery	GO to Pinpoint Test D
C1A06:14	Right Rear Height Sensor: Circuit Shorted to Ground or Open	GO to Pinpoint Test D
C1A06:2A	Right Rear Height Sensor: Signal Stuck In Range	GO to Pinpoint Test D
C1A06:64	Right Rear Height Sensor: Signal Plausibility Failure	GO to Pinpoint Test D
C1B14:16	Sensor Supply Voltage A: Circuit Voltage Below Threshold	GO to Pinpoint Test D
C1B14:17	Sensor Supply Voltage A: Circuit Voltage Above Threshold	GO to Pinpoint Test D
P0562:16	System Voltage Low: Circuit Voltage Below Threshold	GO to Pinpoint Test A
P0563:17	System Voltage High: Circuit Voltage Above Threshold	GO to Pinpoint Test B
P0601:52	Internal Control Module Memory Checksum Error: Not Activated	CHECK the service history for recent service actions related to the VDM. This DTC sets due to incomplete or improper PMI procedures. If there have been recent service actions with the VDM, REPEAT the PMI procedure, FOLLOW all diagnostic scan tool instructions. CARRY OUT the ride height sensor calibration routine, FOLLOW all diagnostic scan tool directions. If there have been no recent service actions, INSTALL a new VDM to correct the failure to retain the configuration data. REFER to: Vehicle Dynamics Control Module (VDM) .
P1674:48	Control Module Software Corrupted: Supervision Software Failure	CHECK the service history for recent service actions related to the VDM. This DTC sets due to incomplete or improper PMI procedures. If there have been recent service actions with the VDM, REPEAT the

		PMI procedure, FOLLOW all diagnostic scan tool instructions. CARRY OUT the ride height sensor calibration routine, FOLLOW all diagnostic scan tool directions. If there have been no recent service actions, INSTALL a new VDM to correct the failure to retain the configuration data. REFER to: Vehicle Dynamics Control Module (VDM) .
P1794:17	Battery Voltage Circuit: Circuit Voltage Above Threshold	GO to Pinpoint Test B
P1794:18	Battery Voltage Circuit: Circuit Current Below Threshold	GO to Pinpoint Test A
U0121:00	Lost Communication with Anti-Lock Brake System (ABS) Control Module: No Sub Type Information	GO to Pinpoint Test F
U0146:00	Lost Communication With Gateway "A": No Sub Type Information	GO to Pinpoint Test E
U0151:00	Lost Communication with Restraints Control Module: No Sub Type Information	GO to Pinpoint Test G
U0300:57	Internal Control Module Software Incompatibility: Invalid / Incompatible Software Component	CHECK the service history for recent service actions related to the VDM. This DTC sets due to incomplete or improper PMI procedures. If there have been recent service actions with the VDM, REPEAT the PMI procedure, FOLLOW all diagnostic scan tool instructions. CARRY OUT the ride height sensor calibration routine, FOLLOW all diagnostic scan tool directions. If there have been no recent service actions, INSTALL a new VDM to correct the failure to retain the configuration data. REFER to: Vehicle Dynamics Control Module (VDM) .
U0415:68	Invalid Data Received from Anti-Lock Brake System (ABS) Control Module: Event Information	This DTC sets if the VDM receives invalid or faulted steering wheel angle information or total brake torque information from the ABS module. Using a diagnostic scan tool, RETRIEVE and DIAGNOSE all ABS

		module Diagnostic Trouble Codes (DTCs). REFER to: Anti-Lock Brake System (ABS) and Stability Control . If the diagnostic scan tool cannot communicate with the ABS module, REFER to: MODULE COMMUNICATIONS NETWORK . If there are no Diagnostic Trouble Codes (DTCs) in the ABS module, the DTC may be caused by an intermittent concern. SET the ignition to OFF. DISCONNECT and INSPECT all VDM and ABS module electrical connectors and related in-line connectors for corrosion, bent pins, pushed-out pins and spread terminals. REPAIR as necessary.
U0447:68	Invalid Data Received From Gateway "A": Event Information	This DTC sets if the VDM receives invalid or faulted engine, body or instrument cluster information from the GWM. For additional information on PCM, BCM and IPC messages received by the VDM, REFER to the VDM Network Message Input Chart. REFER to: Vehicle Dynamic Suspension - System Operation and Component Description . Using a diagnostic scan tool, RETRIEVE and DIAGNOSE all GWM Diagnostic Trouble Codes (DTCs). REFER to: MODULE COMMUNICATIONS NETWORK . If the diagnostic scan tool cannot communicate with the GWM, REFER to: MODULE COMMUNICATIONS NETWORK . If there are no Diagnostic Trouble Codes (DTCs) in the GWM, the DTC may be caused by an intermittent concern. SET the ignition to OFF. DISCONNECT and INSPECT all VDM, GWM, PCM, BCM and IPC electrical connectors and related in-line connectors for corrosion, bent pins, pushed-out pins and spread terminals. REPAIR as necessary.
U0452:68	Invalid Data Received from Restraints Control Module: Event Information	This DTC sets if the VDM receives invalid or faulted vehicle yaw rate, lateral acceleration, longitudinal

		acceleration or roll rate information from the RCM. Using a diagnostic scan tool, RETRIEVE and DIAGNOSE all RCM Diagnostic Trouble Codes (DTCs). REFER to: Airbag Supplemental Restraint System (SRS) . If the diagnostic scan tool cannot communicate with the RCM, REFER to: MODULE COMMUNICATIONS NETWORK . If there are no Diagnostic Trouble Codes (DTCs) in the RCM, the DTC may be caused by an intermittent concern. SET the ignition to OFF and WAIT one minute. DISCONNECT and INSPECT all VDM and RCM electrical connectors and related in-line connectors for corrosion, bent pins, pushed-out pins and spread terminals. REPAIR as necessary.
U3000:47	Control Module: Watchdog / Safety µC Failure	CLEAR the Diagnostic Trouble Codes (DTCs). CARRY OUT the VDM self-test. RETRIEVE and RECORD all Diagnostic Trouble Codes (DTCs). If the DTC returns INSTALL a new VDM. REFER to: Vehicle Dynamics Control Module (VDM) .
U3000:48	Control Module: Supervision Software Failure	CLEAR the Diagnostic Trouble Codes (DTCs). CARRY OUT the VDM self-test. RETRIEVE and RECORD all Diagnostic Trouble Codes (DTCs). If the DTC returns INSTALL a new VDM. REFER to: Vehicle Dynamics Control Module (VDM) .
U3000:49	Control Module: Internal Electronic Failure	CLEAR the Diagnostic Trouble Codes (DTCs). CARRY OUT the VDM self-test. RETRIEVE and RECORD all Diagnostic Trouble Codes (DTCs). If the DTC returns INSTALL a new VDM. REFER to: Vehicle Dynamics Control Module (VDM) .
U3000:4B	Control Module: Over Temperature	This DTC sets when the calculated temperature of the VDM exceeds 115°C (239°F). This can be due to ambient temperature issues or internal circuit current. SET the ignition to OFF and ALLOW the vehicle to cool down for at least

		30 minutes. CLEAR the Diagnostic Trouble Codes (DTCs). CARRY OUT the VDM self-test. RETRIEVE and RECORD all Diagnostic Trouble Codes (DTCs). DIAGNOSE all other VDM Diagnostic Trouble Codes (DTCs) before diagnosing U3000:4B. If the DTC returns INSTALL a new VDM. REFER to: Vehicle Dynamics Control Module (VDM) .
U3000:98	Control Module: Component or System Over Temperature	This DTC sets when the calculated temperature of the VDM exceeds 120°C (248°F). This can be due to ambient temperature issues or internal circuit current. SET the ignition to OFF and ALLOW the vehicle to cool down for at least 30 minutes. CLEAR the Diagnostic Trouble Codes (DTCs). CARRY OUT the VDM self-test. RETRIEVE and RECORD all Diagnostic Trouble Codes (DTCs). DIAGNOSE all other VDM Diagnostic Trouble Codes (DTCs) before diagnosing U3000:4B. If the DTC returns INSTALL a new VDM. REFER to: Vehicle Dynamics Control Module (VDM) .
U3006:2F	Control Module Input Power "A": Signal Erratic	GO to Pinpoint Test A

DIAGNOSIS AND TESTING > VEHICLE DYNAMIC SUSPENSION > SYMPTOM CHART

Symptom Chart: Vehicle Dynamic Suspension

Diagnostics in this service information assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

Condition	Possible Sources	Actions
A module does not respond to the diagnostic scan tool	Fuse Wiring, terminals or connectors VDM concern	REFER to: MODULE COMMUNICATIONS NETWORK .
Message center displays, DRIVE CONTROL MALFUNCTION SERVICE REQUIRED	Diagnostic Trouble Codes (DTCs) present in the VDM	RETRIEVE and DIAGNOSE all VDM Diagnostic Trouble Codes (DTCs).

Rough or harsh ride	Vehicle dynamic suspension system disabled	RETRIEVE and DIAGNOSE all VDM Diagnostic Trouble Codes (DTCs). If no Diagnostic Trouble Codes (DTCs) are present, REFER to: Suspension System .

DIAGNOSIS AND TESTING > VEHICLE DYNAMIC SUSPENSION > PINPOINT TESTS

P0562:16, P1794:18, U3006:2F

Refer to VEHICLE DYNAMIC SYSTEMS for schematic and connector information.

Normal Operation and Fault Conditions

The VDM requires an operating voltage between 9 and 16 volts. The VDM receives this voltage from the BCM and has a single ground circuit. Excessive resistance or an open in one or more of these circuits, a discharged battery or a inoperative charging system results in the VDM setting a DTC.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
P0562:16	Battery Voltage Low: Circuit Voltage Below Threshold	This DTC sets in continuous memory if the voltage supplied to the VDM falls below 9 volts for more than 3 seconds.
P1794:18	Battery Voltage Circuit: Circuit Current Below Threshold	This DTC sets in continuous memory if the voltage supplied to the VDM falls below 9 volts for more than 60 seconds.
U3006:2F	Control Module Input Power "A": Signal Erratic	This DTC sets in continuous memory if the power reset indicates an irregular shutdown and power up has been detected. This is usually caused by a sudden loss of vehicle battery voltage due to an open circuit, a disconnected electrical connector or disconnected battery terminal.

Possible Sources

- Fuses
- Wiring, terminals or connectors
- VDM

Visual Inspection and Diagnostic Pre-checks

- Make sure the vehicle battery terminals and cables are free of any corrosion and other

contaminants.

- Make sure the vehicle battery terminals are tightened to their correct torque specifications.
- Make sure BJB fuse 66 (5A) is OK.
- Make sure BCM fuse 25 (30A) is OK.

DIAGNOSIS AND TESTING > VEHICLE DYNAMIC SUSPENSION > PINPOINT TESTS > PINPOINT TEST A : P0562:16, P1794:18, U3006:2F > PINPOINT TEST A : P0562:16, P1794:18, U3006:2F

A1 RECHECK THE VDM (VEHICLE DYNAMICS CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, clear the VDM Diagnostic Trouble Codes (DTCs).

Ignition OFF.

Ignition ON.

Using a diagnostic scan tool, carry out the VDM self-test.

Is DTC P0562:16, P1794:18 or U3006:2F still present?

Yes	GO to A2

No	The system is operating correctly at this time. The DTC may have set due to a previous low battery voltage condition.

A2 CHECK FOR CHARGING SYSTEM DIAGNOSTIC TROUBLE CODES (DTCS) IN THE PCM (POWERTRAIN CONTROL MODULE)

Using a diagnostic scan tool, retrieve all Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC B1317, B1318, B1676, U3003:16 or U3003:17 present in one or more modules AND are any charging system Diagnostic Trouble Codes (DTCs) present in the PCM?

Yes	DIAGNOSE the vehicle charging concern. REFER to: CHARGING SYSTEM - 2.3L ECOBOOST (201KW 273PS) , CHARGING SYSTEM - 3.7L DURATEC (227KW 301PS) or CHARGING SYSTEM - 5.0L 32V TI-VCT .

No	GO to A3

A3 CHECK THE BATTERY CONDITION AND STATE OF CHARGE

Carry out the Battery Condition Test. REFER to: BATTERY .

Did the battery pass the condition test?

Yes	GO to A4

No	INSTALL a new battery. REFER to: Battery .

A4 CHECK THE VDM (VEHICLE DYNAMICS CONTROL MODULE) VOLTAGE (VDM_SUPPLY_V) PID (PARAMETER IDENTIFICATION)

Ignition ON.

Measure and record the voltage at the battery.

Using a diagnostic scan tool, monitor the VDM_Supply_V PID.

Is the PID) display within 0.2 volt of the recorded battery voltage?

Yes	GO to A7

No	GO to A5

A5 CHECK THE VDM (VEHICLE DYNAMICS CONTROL MODULE) VOLTAGE SUPPLY

Ignition OFF.

Disconnect VDM.

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4585A-16		Ground
C4585A-32		Ground

Is the voltage within 1 volt of the recorded battery voltage?

Yes	GO to A6

No	VERIFY BJB fuse 66 (5A) and BCM fuse 25 (30A) are OK. If OK, REPAIR the affected circuit for high resistance or an open. If not OK, REFER to the OEM WIRING DIAGRAMS to identify the cause of the circuit short.

A6 CHECK THE VDM (VEHICLE DYNAMICS CONTROL MODULE) GROUND CIRCUIT FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C4585A-47	Ω	Ground

Is the resistance less than 3 ohms?

Yes	GO to A8

No	REPAIR the circuit.

A7 VERIFY ALL WIRING CONNECTIONS

Ignition OFF.

Disconnect all VDM related in-line electrical connectors.

Using a good light source, inspect **all** disconnected electrical connectors for the following:

corrosion - install new connector or terminal and clean the module pins

damaged or bent pins - install new terminals or pins

pushed-out pins - install new pins as necessary

spread terminals - install new terminals as necessary

Are the connectors free of corrosion, damaged pins, bent pins, pushed-out pins and spread terminals?

Yes	GO to A8

No	REPAIR the connector or terminals. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

A8 CHECK FOR CORRECT VDM (VEHICLE DYNAMICS CONTROL MODULE) OPERATION

Connect VDM and all related in-line electrical connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new VDM.REFER to: Vehicle Dynamics Control Module (VDM) .

No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > VEHICLE DYNAMIC SUSPENSION > PINPOINT TESTS > PINPOINT TEST B : P0563:17, P1794:17

P0563:17, P1794:17

Refer to VEHICLE DYNAMIC SYSTEMS for schematic and connector information.

Normal Operation and Fault Conditions

The VDM requires an operating voltage that is between 9 and 16 volts. The VDM receives this voltage from the BCM and has a single ground circuit. Excessive resistance or an open in one or more of these circuits, a discharged battery or a inoperative charging system results in the VDM setting a DTC.

An overcharging condition in the charging system results in the VDM setting a DTC. This DTC may also set in the VDM due to battery charging or vehicle jump starting events.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
P0563:17	System Voltage High: Circuit Voltage Above Threshold	This DTC sets in continuous memory and on-demand if the voltage supplied to the VDM is above 16 volts for more than 3 seconds.
P1794:17	Battery Voltage Circuit: Circuit Voltage Above Threshold	This DTC sets in continuous memory and on-demand if the voltage supplied to the VDM is above 16 volts for more than 60 seconds.

Possible Sources

- Charging system concern
- VDM

DIAGNOSIS AND TESTING > VEHICLE DYNAMIC SUSPENSION > PINPOINT TESTS > PINPOINT TEST B : P0563:17, P1794:17 > PINPOINT TEST B : P0563:17, P1794:17

B1 CHECK FOR HIGH VOLTAGE DIAGNOSTIC TROUBLE CODES (DTCS) SET IN OTHER MODULES

Using a diagnostic scan tool, retrieve all Continuous Memory Diagnostic Trouble Codes (CMDTCs).

Is DTC B1317, B1318, B1676, U3003:16 or U3003:17 present in one or more modules AND are any charging system Diagnostic Trouble Codes (DTCs) present in the PCM?

Yes	DIAGNOSE the vehicle charging concern. REFER to: CHARGING SYSTEM - 2.3L ECOBOOST (201KW 273PS) , CHARGING SYSTEM - 3.7L DURATEC (227KW 301PS) or CHARGING SYSTEM - 5.0L 32V TI-VCT .

No	GO to B2

B2 CHECK THE BATTERY VOLTAGE

Turn off all interior lights, exterior lights and accessories.

NOTE: Do not allow the engine speed to increase above 2, 000 RPM while performing this step or the generator may self-excite and result in default charging system output voltage. If engine speed goes above 2, 000 RPM, turn the engine off and restart the engine before performing this step.

Start and run the engine at approximately 1, 500 RPM for 3 minutes while monitoring the battery voltage.

Is the battery voltage between 13 and 15.2 volts?

Yes	GO to B3

No	DIAGNOSE the overcharging condition. REFER to: CHARGING SYSTEM - 2.3L ECOBOOST (201KW 273PS) , CHARGING SYSTEM - 3.7L DURATEC (227KW 301PS) or CHARGING SYSTEM - 5.0L 32V TI-VCT .

B3 RECHECK THE VDM (VEHICLE DYNAMICS CONTROL MODULE) FOR DTC (DIAGNOSTIC TROUBLE CODE) U3003:17

Ignition OFF.

Ignition ON.

Using a diagnostic scan tool, clear the VDM Diagnostic Trouble Codes (DTCs).

Ignition OFF.

Ignition ON.

Using a diagnostic scan tool, carry out the VDM self-test.

Is DTC P0563:17 or P1794:17 still present?

Yes	GO to B4

No	The system is operating normally at this time. The DTC may have been set previously during battery charging or while jump starting the vehicle.

B4 VERIFY ALL WIRING CONNECTIONS

Ignition OFF.

Disconnect and inspect VDM and related in-line electrical connectors.

Using a good light source, inspect **all** disconnected electrical connectors for the following:

corrosion - install new connector or terminal and clean the module pins

damaged or bent pins - install new terminals or pins

pushed-out pins - install new pins as necessary

spread terminals - install new terminals as necessary

Are the connectors free of corrosion, damaged pins, bent pins, pushed-out pins and spread terminals?

Yes	GO to B5

No	REPAIR the connector or terminals. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

B5 CHECK FOR CORRECT VDM (VEHICLE DYNAMICS CONTROL MODULE) OPERATION

Connect VDM and all related in-line electrical connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new VDM. REFER to: Vehicle Dynamics Control Module (VDM) .

No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > VEHICLE DYNAMIC SUSPENSION > PINPOINT TESTS > PINPOINT TEST C : DAMPER SOLENOID ELECTRICAL FAULT DIAGNOSTIC TROUBLE CODES (DTCS)

Damper Solenoid Electrical Fault Diagnostic Trouble Codes (DTCs)

Refer to VEHICLE DYNAMIC SYSTEMS for schematic and connector information.

Normal Operation and Fault Conditions

The VDM sends a PWM voltage to the shock absorber solenoids based on sensor input and HS-CAN messages. The VDM continually monitors the shock absorber solenoid circuits and sets a DTC when a circuit fault is detected. A shorted or open shock absorber solenoid also causes the VDM to set a DTC.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
C110C:11 C110D:11 C110E:11 C110F:11	Left Front Damper Solenoid: Circuit Short to Ground Right Front Damper Solenoid: Circuit Short to Ground Left Rear Damper Solenoid: Circuit Short to Ground Right Rear Damper Solenoid: Circuit Short to Ground	This DTC sets in continuous memory when the VDM detects a short to ground on one or both of the shock absorber solenoid circuits for longer than 3 seconds.
C110C:12 C110D:12 C110E:12 C110F:12	Left Front Damper Solenoid: Circuit Short to Battery Right Front Damper Solenoid: Circuit Short to Battery Left Rear Damper Solenoid: Circuit Short to Battery Right Rear Damper Solenoid: Circuit Short to Battery	This DTC sets in continuous memory when the VDM detects a short to battery voltage on one or both of the shock absorber solenoid circuits for longer than 3 seconds.
C110C:13 C110D:13 C110E:13 C110F:13	Left Front Damper Solenoid: Circuit Open Right Front Damper Solenoid: Circuit Open Left Rear Damper Solenoid: Circuit Open Right Rear Damper Solenoid: Circuit Open	This DTC sets in continuous memory when the VDM detects an open circuit on one or both of the shock absorber solenoid circuits for longer than 3 seconds.
C110C:19 C110D:19 C110E:19 C110F:19	Left Front Damper Solenoid: Circuit Current Above Threshold Right Front Damper Solenoid: Circuit Current Above Threshold Left Rear Damper Solenoid: Circuit Current Above Threshold Right Rear Damper Solenoid: Circuit Current Above Threshold	This DTC sets in continuous memory when the VDM detects the shock absorber commanded current is higher than the calibrated threshold.
C110C:1A C110D:1A C110E:1A C110F:1A	Left Front Damper Solenoid: Circuit Resistance Below Threshold Right Front Damper Solenoid: Circuit Resistance Below Threshold Left Rear Damper Solenoid: Circuit Resistance Below	This DTC sets in continuous memory when the estimated shock absorber solenoid resistance is less than 0.4 ohms.

	Threshold Right Rear Damper Solenoid: Circuit Resistance Below Threshold	
C110C:1B C110D:1B C110E:1B C110F:1B	Left Front Damper Solenoid: Circuit Resistance Above Threshold Right Front Damper Solenoid: Circuit Resistance Above Threshold Left Rear Damper Solenoid: Circuit Resistance Above Threshold Right Rear Damper Solenoid: Circuit Resistance Above Threshold	This DTC sets in continuous memory when the estimated shock absorber solenoid resistance is greater than 4 ohms.

Possible Sources

- Wiring, terminals or connectors
- Shock or Strut (solenoid is serviced as an assembly with the shock or strut)
- VDM

Visual Inspection and Diagnostic Pre-checks

- Make sure the solenoid harness is routed correctly and is undamaged.
- Make sure the solenoid electrical connector is free from any corrosion or other contaminants.

DIAGNOSIS AND TESTING > VEHICLE DYNAMIC SUSPENSION > PINPOINT TESTS > PINPOINT TEST C : DAMPER SOLENOID ELECTRICAL FAULT DIAGNOSTIC TROUBLE CODES (DTCS) > PINPOINT TEST C : DAMPER SOLENOID ELECTRICAL FAULT DIAGNOSTIC TROUBLE CODES (DTCS)

C1 CHECK THE VDM (VEHICLE DYNAMICS CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition ON.

Using a diagnostic scan tool, carry out the VDM self-test.

Is DTC C110X:11 or C110X:1A present?

Yes	GO to C2

No	If DTC C110X:12 is present, GO to C3If DTC C110X:13, C110X:19 or C110X:1B is present, GO to C4

	For all other VDM Diagnostic Trouble Codes (DTCs), GO to the DTC Chart: Vehicle Dynamics Control Module (VDM) .

C2 CHECK THE SHOCK ABSORBER SOLENOID CIRCUITS FOR A SHORT TO GROUND

Ignition OFF.

Disconnect VDM.

Disconnect the suspect shock absorber solenoid electrical connector.

For the LH front shock absorber solenoid, measure:

Positive Lead	Measurement / Action	Negative Lead
C4585A-30	Ω	Ground
C4585A-31	Ω	Ground

For the RH front shock absorber solenoid, measure:

Positive Lead	Measurement / Action	Negative Lead
C4585A-27	Ω	Ground
C4585A-28	Ω	Ground

For the LH rear shock absorber solenoid, measure:

Positive Lead	Measurement / Action	Negative Lead
C4585A-42	Ω	Ground
C4585A-43	Ω	Ground

For the RH rear shock absorber solenoid, measure:

Positive Lead	Measurement / Action	Negative Lead
C4585A-45	Ω	Ground
C4585A-46	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to C5

No	REPAIR the circuit.

C3 CHECK THE DAMPER SOLENOID CIRCUITS FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect VDM.

Disconnect the suspect shock absorber solenoid electrical connector.

Ignition ON.

For the LH front shock absorber solenoid, measure:

Positive Lead	Measurement / Action	Negative Lead
C4585A-30		Ground
C4585A-31		Ground

For the RH front shock absorber solenoid, measure:

Positive Lead	Measurement / Action	Negative Lead
C4585A-27		Ground
C4585A-28		Ground

For the LH rear shock absorber solenoid, measure:

Positive Lead	Measurement / Action	Negative Lead
C4585A-42		Ground
C4585A-43		Ground

For the RH rear shock absorber solenoid, measure:

Positive Lead	Measurement / Action	Negative Lead
C4585A-45		Ground
C4585A-46		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to C5

C4 CHECK THE SHOCK ABSORBER SOLENOID CIRCUITS FOR AN OPEN

Ignition OFF.

Disconnect VDM.

Disconnect the suspect shock absorber solenoid electrical connector.

For the LH front shock absorber solenoid, measure:

Positive Lead	Measurement / Action	Negative Lead
C4585A-30	Ω	C1668-2
C4585A-31	Ω	C1668-1

For the RH front shock absorber solenoid, measure:

Positive Lead	Measurement / Action	Negative Lead
C4585A-27	Ω	C1669-2
C4585A-28	Ω	C1669-1

For the LH rear shock absorber solenoid, measure:

Positive Lead	Measurement / Action	Negative Lead
C4585A-42	Ω	C4044-2
C4585A-43	Ω	C4044-1

For the RH rear shock absorber solenoid, measure:

Positive Lead	Measurement / Action	Negative Lead
C4585A-45	Ω	C4045-2
C4585A-46	Ω	C4045-1

Are the resistances less than 3 ohms?

Yes	GO to C5

No	REPAIR the circuit.

C5 CHECK THE SHOCK ABSORBER SOLENOID CIRCUITS FOR A SHORT TOGETHER

Ignition OFF.

For the LH front shock absorber solenoid, measure:

Positive Lead	Measurement / Action	Negative Lead
C4585A-30	Ω	C4585A-31

For the RH front shock absorber solenoid, measure:

Positive Lead	Measurement / Action	Negative Lead

C4585A-27	Ω	C4585A-28

For the LH rear shock absorber solenoid, measure:

Positive Lead	Measurement / Action	Negative Lead
C4585A-42	Ω	C4585A-43

For the RH rear shock absorber solenoid, measure:

Positive Lead	Measurement / Action	Negative Lead
C4585A-45	Ω	C4585A-46

Are the resistances greater than 10, 000 ohms?

Yes	GO to C6

No	REPAIR the circuit.

C6 CHECK THE SHOCK ABSORBER SOLENOID RESISTANCE

Ignition OFF.

For the LH front shock absorber solenoid, measure:

Positive Lead	Measurement / Action	Negative Lead
C1668-1 **Component Side**	Ω	C1668-2 **Component Side**

For the RH front shock absorber solenoid, measure:

Positive Lead	Measurement / Action	Negative Lead
C1669-2 **Component Side**	Ω	C1669-1 **Component Side**

For the LH rear shock absorber solenoid, measure:

Positive Lead	Measurement / Action	Negative Lead
C4044-2 **Component Side**	Ω	C4044-1 **Component Side**

For the RH rear shock absorber solenoid, measure:

Positive Lead	Measurement / Action	Negative Lead
C4045-1	Ω	C4045-2

Component Side		**Component Side**

Is the resistance between 2.8 and 4.5 ohms?

Yes	GO to C7

No	INSTALL a new front strut or rear shock absorber. REFER to: Front Strut and Spring Assembly . REFER to: Rear Shock Absorber .

C7 VERIFY ALL WIRING CONNECTIONS

Ignition OFF.

Disconnect all VDM and shock absorber solenoid related in-line electrical connectors.

Using a good light source, inspect **all** disconnected electrical connectors for the following:

corrosion - install new connector or terminal and clean the module pins

damaged or bent pins - install new terminals or pins

pushed-out pins - install new pins as necessary

spread terminals - install new terminals as necessary

Are the connectors free of corrosion, damaged pins, bent pins, pushed-out pins and spread terminals?

Yes	GO to C8

No	REPAIR the connector or terminals. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

C8 CHECK FOR CORRECT VDM (VEHICLE DYNAMICS CONTROL MODULE) OPERATION

Connect VDM. Make sure it seats and latches correctly.

Connect all VDM and shock absorber solenoid related in-line electrical connectors. Make sure they seat and latch correctly.

Connect the suspect damper solenoid electrical connector. Make sure it seats and latches correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new VDM. REFER to: Vehicle Dynamics Control Module (VDM) .

No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > VEHICLE DYNAMIC SUSPENSION > PINPOINT TESTS > PINPOINT TEST D : HEIGHT SENSOR ELECTRICAL FAULT DIAGNOSTIC TROUBLE CODES (DTCS)

Height Sensor Electrical Fault Diagnostic Trouble Codes (DTCs)

Refer to VEHICLE DYNAMIC SYSTEMS for schematic and connector information.

Normal Operation and Fault Conditions

The VDM continually monitors the height sensor circuits and sets a DTC when a circuit fault is detected. A shorted height sensor also causes the VDM to set a DTC.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
C1A03:12 C1A04:12 C1A05:12 C1A06:12	Left Front Height Sensor: Circuit Short to Battery Right Front Height Sensor: Circuit Short to Battery Left Rear Height Sensor: Circuit Short to Battery Right Rear Height Sensor: Circuit Short to Battery	This DTC sets in continuous memory when the VDM detects a short to battery on one or more of the height sensor circuits.
C1A03:14 C1A04:14 C1A05:14 C1A06:14	Left Front Height Sensor: Circuit Short to Ground or Open Right Front Height Sensor: Circuit Short to Ground or Open Left Rear Height Sensor: Circuit Short to Ground or Open Right Rear Height Sensor: Circuit Short to Ground or Open	This DTC sets in continuous memory when the VDM detects a short to ground or an open on one or more of the height sensor circuits.
C1A03:2A C1A04:2A C1A05:2A C1A06:2A	Left Front Damper Solenoid: Signal Stuck In Range Right Front Damper Solenoid: Signal Stuck In Range Left Rear Damper Solenoid: Signal Stuck In Range Right Rear Damper Solenoid: Signal Stuck In Range	This DTC sets in continuous memory when the VDM does not detect sufficient movement in the height sensor. This could be due to a mechanical failure or excessive resistance in the circuit.
C1A03:64 C1A04:64 C1A05:64 C1A06:64	Left Front Damper Solenoid: Signal Plausibility Failure Right Front Damper Solenoid: Signal Plausibility Failure	This DTC sets in continuous memory when one of the height sensors does not agree with the other sensors.

	Left Rear Damper Solenoid: Signal Plausibility Failure Right Rear Damper Solenoid: Signal Plausibility Failure	

Possible Sources

- Wiring, terminals or connectors
- Height sensor
- VDM

Visual Inspection and Diagnostic Pre-checks

- Make sure the height sensor harness is routed correctly and is undamaged.
- Make sure the height sensor electrical connector is free from any corrosion or other contaminants.
- Make sure the height sensor and linkage are installed and connected correctly.

DIAGNOSIS AND TESTING > VEHICLE DYNAMIC SUSPENSION > PINPOINT TESTS > PINPOINT TEST D : HEIGHT SENSOR ELECTRICAL FAULT DIAGNOSTIC TROUBLE CODES (DTCS) > PINPOINT TEST D : HEIGHT SENSOR ELECTRICAL FAULT DIAGNOSTIC TROUBLE CODES (DTCS)

D1 CHECK THE VDM (VEHICLE DYNAMICS CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Ignition ON.

Using a diagnostic scan tool, carry out the VDM self-test.

Is DTC C1A0X:14, C1A0X:2A or C1A0X:64 present?

Yes	GO to D2

No	If DTC C1A03:12, C1A04:12, C1A05:12 or C1A06:12 is present, GO to D4 For all other VDM Diagnostic Trouble Codes (DTCs), GO to the DTC Chart: Vehicle Dynamics Control Module (VDM)

D2 CHECK THE HEIGHT SENSOR CIRCUITS FOR A SHORT TO GROUND

Ignition OFF.

Disconnect VDM.

Disconnect the suspect height sensor electrical connector(s).

For the LH front height sensor, measure:

Positive Lead	Measurement / Action	Negative Lead
C1733-1	Ω	Ground
C1733-2	Ω	Ground
C1733-3	Ω	Ground

For the RH front height sensor, measure:

Positive Lead	Measurement / Action	Negative Lead
C1151-1	Ω	Ground
C1151-2	Ω	Ground
C1151-3	Ω	Ground

For the LH rear height sensor, measure:

Positive Lead	Measurement / Action	Negative Lead
C4092-1	Ω	Ground
C4092-2	Ω	Ground
C4092-3	Ω	Ground

For the RH rear height sensor, measure:

Positive Lead	Measurement / Action	Negative Lead
C4093-1	Ω	Ground
C4093-2	Ω	Ground
C4093-3	Ω	Ground

Are the resistance greater than 10, 000 ohms?

Yes	GO to D3

No	For front height sensor concerns, INSPECT connectors C1733 and C1153 for corrosion, pushed out pins, bent pins and spread terminals. REPAIR as necessary. If the connectors are OK, REPAIR the affected circuit(s). For rear height sensor concerns, INSPECT connectors C4092 and C4093 for corrosion, pushed out pins, bent pins and spread terminals. REPAIR as necessary. If the connectors are OK, REPAIR the affected circuit(s).

D3 CHECK THE HEIGHT SENSOR CIRCUITS FOR AN OPEN

For the LH front height sensor, measure:

Positive Lead	Measurement / Action	Negative Lead
C1733-1	Ω	C4585A-6
C1733-2	Ω	C4585A-21
C1733-3	Ω	C4585A-36

For the RH front height sensor, measure:

Positive Lead	Measurement / Action	Negative Lead
C1151-1	Ω	C4585A-3
C1151-2	Ω	C4585A-18
C1151-3	Ω	C4585A-34

For the LH rear height sensor, measure:

Positive Lead	Measurement / Action	Negative Lead
C4092-1	Ω	C4585A-17
C4092-2	Ω	C4585A-2
C4092-3	Ω	C4585A-33

For the RH rear height sensor, measure:

Positive Lead	Measurement / Action	Negative Lead
C4093-1	Ω	C4585A-20
C4093-2	Ω	C4585A-5
C4093-3	Ω	C4585A-35

Are the resistance less than 3 ohms?

Yes	If DTC C1A0X:64 is present, GO to D4 If DTC C1A0X:14 or C1A0X:2A is present, GO to D5

No	For front height sensor concerns, INSPECT connectors C1733 and C1153 for corrosion, pushed out pins, bent pins and spread terminals. REPAIR as necessary. If the connectors are OK, REPAIR the affected circuit(s). For rear height sensor concerns, INSPECT connectors C4092 and C4093 for corrosion, pushed out pins, bent pins and spread terminals. REPAIR as necessary.If the connectors are OK, REPAIR the affected circuit(s).

D4 CHECK THE HEIGHT SENSOR CIRCUITS FOR A SHORT TO VOLTAGE

Ignition OFF.

Disconnect VDM (if not previously disconnected).

Disconnect the suspect height sensor electrical connector(s) (if not previously disconnected).

Ignition ON.

For the LH front height sensor, measure:

Positive Lead	Measurement / Action	Negative Lead
C1733-1		Ground
C1733-2		Ground
C1733-3		Ground

For the RH front height sensor, measure:

Positive Lead	Measurement / Action	Negative Lead
C1151-1		Ground
C1151-2		Ground
C1151-3		Ground

For the LH rear height sensor, measure:

Positive Lead	Measurement / Action	Negative Lead
C4092-1		Ground
C4092-2		Ground
C4092-3		Ground

For the RH rear height sensor, measure:

Positive Lead	Measurement / Action	Negative Lead
C4093-1		Ground
C4093-2		Ground
C4093-3		Ground

Is any voltage present?

Yes	For front height sensor concerns, INSPECT connectors C1733 and C1153 for corrosion, pushed out pins, bent pins and spread terminals. REPAIR as necessary. If the connectors are OK, REPAIR the affected circuit(s). For rear height sensor concerns, INSPECT connectors C4092 and 4093 for corrosion, pushed out pins, bent pins and spread terminals. REPAIR as necessary. If the connectors are OK, REPAIR the affected circuit(s).

No	GO to D5

D5 CHECK THE HEIGHT SENSOR CIRCUITS FOR A SHORT TOGETHER

Ignition OFF.

For the LH front height sensor, measure:

Positive Lead	Measurement / Action	Negative Lead
C1733-1	Ω	C1733-2
C1733-1	Ω	C1733-3
C1733-2	Ω	C1733-3

For the RH front height sensor, measure:

Positive Lead	Measurement / Action	Negative Lead
C1151-1	Ω	C1151-2
C1151-1	Ω	C1151-3
C1151-2	Ω	C1151-3

For the LH rear height sensor, measure:

Positive Lead	Measurement / Action	Negative Lead
C4092-1	Ω	C4092-2
C4092-1	Ω	C4092-3
C4092-2	Ω	C4092-3

For the RH rear height sensor, measure:

Positive Lead	Measurement / Action	Negative Lead
C4093-1	Ω	C4093-2
C4093-1	Ω	C4093-3
C4093-2	Ω	C4093-3

Are the resistances greater than 10, 000 ohms?

Yes	INSTALL a new height sensor. REFER to: Front Suspension Height Sensor . REFER to: Rear Suspension Height Sensor .

No	For front height sensor concerns, INSPECT connectors C1733 and C1153 for corrosion,

	pushed out pins, bent pins and spread terminals. REPAIR as necessary. If the connectors are OK, REPAIR the affected circuit(s). For rear height sensor concerns, INSPECT connectors C4092 and C4093 for corrosion, pushed out pins, bent pins and spread terminals. REPAIR as necessary. If the connectors are OK, REPAIR the affected circuit(s).

DIAGNOSIS AND TESTING > VEHICLE DYNAMIC SUSPENSION > PINPOINT TESTS > PINPOINT TEST E : U0146:00

U0146:00

Refer to VEHICLE DYNAMIC SYSTEMS for schematic and connector information.

Normal Operation and Fault Conditions

With the ignition ON, the GWM sends messages to the VDM over the HS-CAN2. If the VDM does not receive these messages within a certain time frame, the module sets Diagnostic Trouble Codes (DTCs). For information on the messages sent to the VDM by the GWM, go to the Module Network Input Messages - VDM. REFER to: Vehicle Dynamic Suspension - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0146:00	Lost Communication With Gateway "A": No Sub Type Information	This DTC sets in continuous memory if any one of the BCM, IPC or PCM messages are missing.

Possible Sources

- Wiring, terminals or connectors
- Network communication concern
- GWM

DIAGNOSIS AND TESTING > VEHICLE DYNAMIC SUSPENSION > PINPOINT TESTS > PINPOINT TEST E : U0146:00 > PINPOINT TEST E : U0146:00

E1 CHECK THE COMMUNICATION NETWORK

Ignition ON.

Using a diagnostic scan tool, carry out the Network Test.

Does the GWM pass the Network Test?

Yes	GO to E2

No	DIAGNOSE the GWM does not respond to the diagnostic scan tool. REFER to: MODULE COMMUNICATIONS NETWORK .

E2 CHECK THE VDM (VEHICLE DYNAMICS CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, carry out the VDM self-test.

Clear the Diagnostic Trouble Codes (DTCs).

Ignition OFF.

Ignition ON.

Using a diagnostic scan tool, carry out the VDM self-test.

Record the VDM Diagnostic Trouble Codes (DTCs).

Is DTC U0146:00 retrieved again?

Yes	GO to E3

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

E3 REVIEW THE RECORDED DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE VDM (VEHICLE DYNAMICS CONTROL MODULE) SELF-TEST

Check the recorded Diagnostic Trouble Codes (DTCs) from the VDM self-test.

Is DTC P0562:16, P0563:17, P1794:17 or P1794:18 present in the VDM?

Yes	If DTC P0562:16 or P1794:18 is present, GO to Pinpoint Test A If DTC P0563:17 or P1794:17 is present, GO to Pinpoint Test B

No	GO to E4

E4 CHECK FOR DIAGNOSTIC TROUBLE CODES (DTCS) IN THE GWM (GATEWAY MODULE A)

Using a diagnostic scan tool, carry out the GWM self-test.

Are any Diagnostic Trouble Codes (DTCs) present in the GWM?

Yes	GO to the DTC Chart: GWM. REFER to: MODULE COMMUNICATIONS NETWORK .

No	GO to E5

NOTE: If new modules were installed prior to the DTC being set, the module configuration can be incorrectly set during the PMI or the PMI may not have been carried out.

E5 CHECK FOR OTHER CAUSES OF COMMUNICATION NETWORK CONCERN

Check the vehicle service history for recent service actions related to the VDM or GWM. If recent service history is found:

verify the correct replacement module was installed.

HVBOM may be used to verify correct part fitment.

verify the configuration of replacement module was correct.

re-configure the module using as-built data if prior configuration is suspect.

verify the module was not obtained from a like vehicle and installed into customer vehicle.

return the swapped module to source vehicle and obtain new replacement module.

Operate the system and determine if the observable symptom is still present.

Is the observable symptom still present?

Yes	GO to E6

No	The system is operating correctly at this time. The concern may have been due to incorrect parts replacement procedures or incorrect module configuration.

E6 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0146:XX SET IN OTHER MODULES

Using a diagnostic scan tool, carry out the self-test for all modules.

Is DTC U0146:xx set in 1 or more modules in addition to the VDM?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new GWM. REFER to: Gateway Module A (GWM) .

No	GO to E7

E7 VERIFY ALL WIRING CONNECTIONS

Ignition OFF.

Disconnect all VDM electrical connectors and related in-line electrical connectors.

Using a good light source, inspect **all** disconnected electrical connectors for the following:

corrosion - install new connector or terminal and clean the module pins

damaged or bent pins - install new terminals or pins

pushed-out pins - install new pins as necessary

spread terminals - install new terminals as necessary

Are the connectors free of corrosion, damaged pins, bent pins, pushed-out pins and spread terminals?

Yes	GO to E8

No	REPAIR the connector or terminals. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

E8 CHECK FOR CORRECT VDM (VEHICLE DYNAMICS CONTROL MODULE) OPERATION

Connect all VDM electrical connectors and all related in-line electrical connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new VDM. REFER to: Vehicle Dynamics Control Module (VDM) .

No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > VEHICLE DYNAMIC SUSPENSION > PINPOINT TESTS > PINPOINT TEST F : U0121:00

U0121:00

Refer to VEHICLE DYNAMIC SYSTEMS for schematic and connector information.

Normal Operation and Fault Conditions

With the ignition ON, the ABS module sends messages to the VDM over the HS-CAN2. If the VDM does not receive these messages within a certain time frame, the module sets Diagnostic Trouble Codes (DTCs). For information on the messages sent to the VDM by the ABS module, go to the Module Network Input Messages - VDM. REFER to: Vehicle Dynamic Suspension - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0121:00	Lost Communication With Anti-Lock Brake System (ABS) Control Module: No Sub Type Information	This DTC sets in continuous memory if any of the following ABS module messages is missing.

Possible Sources

- Wiring, terminals or connectors
- Network communication concern
- ABS module

DIAGNOSIS AND TESTING > VEHICLE DYNAMIC SUSPENSION > PINPOINT TESTS > PINPOINT TEST F : U0121:00 > PINPOINT TEST F : U0121:00

F1 CHECK THE COMMUNICATION NETWORK

Ignition ON.

Using a diagnostic scan tool, carry out the Network Test.

Does the ABS module pass the Network Test?

Yes	GO to F2

No	DIAGNOSE the ABS module does not respond to the diagnostic scan tool. REFER to: MODULE COMMUNICATIONS NETWORK .

F2 CHECK THE VDM (VEHICLE DYNAMICS CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, carry out the VDM self-test.

Clear the Diagnostic Trouble Codes (DTCs).

Ignition OFF.

Ignition ON.

Using a diagnostic scan tool, carry out the VDM self-test.

Record the VDM Diagnostic Trouble Codes (DTCs).

Is DTC U0121:00 retrieved again?

Yes	GO to F3

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

F3 REVIEW THE RECORDED DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE VDM (VEHICLE DYNAMICS CONTROL MODULE) SELF-TEST

Check the recorded Diagnostic Trouble Codes (DTCs) from the VDM self-test.

Is DTC P0562:16, P0563:17, P1794:17 or P1794:18 present in the VDM?

Yes	If DTC P0562:16 or P1794:18 is present, GO to Pinpoint Test A If DTC P0563:17 or P1794:17 is present, GO to Pinpoint Test B

No	GO to F4

F4 CHECK FOR DIAGNOSTIC TROUBLE CODES (DTCS) IN THE ABS (ANTI-LOCK BRAKE SYSTEM) MODULE

Using a diagnostic scan tool, carry out the ABS module self-test.

Are any Diagnostic Trouble Codes (DTCs) present in the ABS module?

Yes	DIAGNOSE the ABS module Diagnostic Trouble Codes (DTCs). REFER to: Anti-Lock Brake System (ABS) and Stability Control .

No	GO to F5

NOTE: If new modules were installed prior to the DTC being set, the module configuration can be incorrectly set during the PMI or the PMI may not have been carried out.

F5 CHECK FOR OTHER CAUSES OF COMMUNICATION NETWORK CONCERN

Check the vehicle service history for recent service actions related to the VDM or ABS module. If recent service history is found:

verify the correct replacement module was installed.

HVBOM may be used to verify correct part fitment.

verify the configuration of replacement module was correct.

re-configure the module using as-built data if prior configuration is suspect.

verify the module was not obtained from a like vehicle and installed into customer vehicle.

return the swapped module to source vehicle and obtain new replacement module.

Operate the system and determine if the observable symptom is still present.

Is the observable symptom still present?

Yes	GO to F6

No	The system is operating correctly at this time. The concern may have been due to incorrect parts replacement procedures or incorrect module configuration.

F6 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0121:XX SET IN OTHER MODULES

Using a diagnostic scan tool, carry out the self-test for all modules.

Is DTC U0121:xx set in 1 or more modules in addition to the VDM?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new ABS module. REFER to: Anti-Lock Brake System (ABS) Module .

No	GO to F7

F7 VERIFY ALL WIRING CONNECTIONS

Ignition OFF.

Disconnect all VDM electrical connectors and related in-line electrical connectors.

Using a good light source, inspect **all** disconnected electrical connectors for the following:

corrosion - install new connector or terminal and clean the module pins

damaged or bent pins - install new terminals or pins

pushed-out pins - install new pins as necessary

spread terminals - install new terminals as necessary

Are the connectors free of corrosion, damaged pins, bent pins, pushed-out pins and spread terminals?

Yes	GO to F8

No	REPAIR the connector or terminals. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

F8 CHECK FOR CORRECT VDM (VEHICLE DYNAMICS CONTROL MODULE) OPERATION

Connect all VDM electrical connectors and all related in-line electrical connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new VDM. REFER to: Vehicle Dynamics Control Module (VDM) .

No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

DIAGNOSIS AND TESTING > VEHICLE DYNAMIC SUSPENSION > PINPOINT TESTS > PINPOINT TEST G : U0151:00

U0151:00

Refer to VEHICLE DYNAMIC SYSTEMS for schematic and connector information.

Normal Operation and Fault Conditions

With the ignition ON, the RCM sends messages to the VDM over the HS-CAN2. If the VDM does not receive these messages within a certain time frame, the module sets Diagnostic Trouble Codes (DTCs). For information on the messages sent to the VDM by the RCM, go to the Module Network Input Messages - VDM. REFER to: Vehicle Dynamic Suspension - System Operation and Component Description .

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
U0151:00	Lost Communication With RCM: No Sub Type Information	This DTC sets in continuous memory if any of the RCM messages is missing.

Possible Sources

- Wiring, terminals or connectors
- Network communication concern
- RCM

DIAGNOSIS AND TESTING > VEHICLE DYNAMIC SUSPENSION > PINPOINT TESTS > PINPOINT TEST G : U0151:00 > PINPOINT TEST G : U0151:00

G1 CHECK THE COMMUNICATION NETWORK

Ignition ON.

Using a diagnostic scan tool, carry out the Network Test.

Does the RCM pass the Network Test?

Yes	GO to G2

No	DIAGNOSE the RCM does not respond to the diagnostic scan tool. REFER to: MODULE COMMUNICATIONS NETWORK .

G2 CHECK THE VDM (VEHICLE DYNAMICS CONTROL MODULE) DIAGNOSTIC TROUBLE CODES (DTCS)

Using a diagnostic scan tool, carry out the VDM self-test.

Clear the Diagnostic Trouble Codes (DTCs).

Ignition OFF.

Ignition ON.

Using a diagnostic scan tool, carry out the VDM self-test.

Record the VDM Diagnostic Trouble Codes (DTCs).

Is DTC U0151:00 retrieved again?

Yes	GO to G3

No	The system is operating correctly at this time. The DTC may have been set due to high network traffic or an intermittent fault condition.

G3 REVIEW THE RECORDED DIAGNOSTIC TROUBLE CODES (DTCS) FROM THE VDM (VEHICLE DYNAMICS CONTROL MODULE) SELF-TEST

Check the recorded Diagnostic Trouble Codes (DTCs) from the VDM self-test.

Is DTC P0562:16, P0563:17, P1794:17 or P1794:18 present in the VDM?

Yes	If DTC P0562:16 or P1794:18 is present, GO to Pinpoint Test A If DTC P0563:17 or P1794:17 is present, GO to Pinpoint Test B

No	GO to G4

G4 CHECK FOR DIAGNOSTIC TROUBLE CODES (DTCS) IN THE RCM (RESTRAINTS CONTROL MODULE)

Using a diagnostic scan tool, carry out the RCM self-test.

Are any Diagnostic Trouble Codes (DTCs) present in the RCM?

Yes	DIAGNOSE the RCM Diagnostic Trouble Codes (DTCs). REFER to: Airbag Supplemental Restraint System (SRS) .

No	GO to G5

NOTE: If new modules were installed prior to the DTC being set, the module configuration can be incorrectly set during the PMI or the PMI may not have been carried out.

G5 CHECK FOR OTHER CAUSES OF COMMUNICATION NETWORK CONCERN

Check the vehicle service history for recent service actions related to the VDM or RCM. If recent service history is found:

verify the correct replacement module was installed.

HVBOM may be used to verify correct part fitment.

verify the configuration of replacement module was correct.

re-configure the module using as-built data if prior configuration is suspect.

verify the module was not obtained from a like vehicle and installed into customer vehicle.

return the swapped module to source vehicle and obtain new replacement module.

Operate the system and determine if the observable symptom is still present.

Is the observable symptom still present?

Yes	GO to G6

No	The system is operating correctly at this time. The concern may have been due to incorrect parts replacement procedures or incorrect module configuration.

G6 CHECK FOR DTC (DIAGNOSTIC TROUBLE CODE) U0151:XX SET IN OTHER MODULES

Using a diagnostic scan tool, carry out the self-test for all modules.

Is DTC U0151:xx set in 1 or more modules in addition to the VDM?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new RCM. REFER to: Restraints

	Control Module (RCM) .

No	GO to G7

G7 VERIFY ALL WIRING CONNECTIONS

Ignition OFF.

Disconnect all VDM electrical connectors and related in-line electrical connectors.

Using a good light source, inspect **all** disconnected electrical connectors for the following:

corrosion - install new connector or terminal and clean the module pins

damaged or bent pins - install new terminals or pins

pushed-out pins - install new pins as necessary

spread terminals - install new terminals as necessary

Are the connectors free of corrosion, damaged pins, bent pins, pushed-out pins and spread terminals?

Yes	GO to G8

No	REPAIR the connector or terminals. Refer to OEM CONNECTOR REPAIR PROCEDURES for schematic and connector information.

G8 CHECK FOR CORRECT VDM (VEHICLE DYNAMICS CONTROL MODULE) OPERATION

Connect all VDM electrical connectors and all related in-line electrical connectors. Make sure they seat and latch correctly.

Operate the system and determine if the concern is still present.

Is the concern still present?

Yes	CHECK OASIS for any applicable Technical Service Bulletins (TSBs). If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no Technical Service Bulletins (TSBs) address this concern, INSTALL a new VDM. REFER to: Vehicle Dynamics Control Module (VDM) .

No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector. ADDRESS the root cause of any connector or pin issues.

REMOVAL AND INSTALLATION > FRONT SUSPENSION HEIGHT SENSOR > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

Position the vehicle on a hoist. Refer to: Jacking and Lifting - Overview .

NOTE: LH height sensor assembly shown in illustration below, RH similar.

NOTE: Note the position of the components before removal.

2.

1.

Disconnect the front suspension height sensor electrical connector.

2.

Remove the front suspension height sensor arm bracket-to-lower arm bolt.

Torque

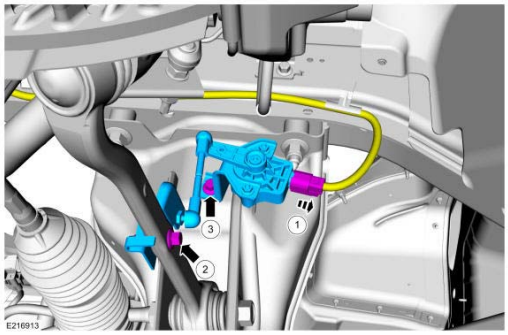
: 177 lb.in (20 Nm)

3.

Remove the front suspension height sensor bracket mounting bolt and remove the sensor.

Torque

: 177 lb.in (20 Nm)



REMOVAL AND INSTALLATION > FRONT SUSPENSION HEIGHT SENSOR > INSTALLATION

*NOTE: The RH and LH height sensor assemblies **cannot** be used on opposite sides of the vehicle.*

NOTE: The linkage must be in a vertical position after installation. Failure to follow these instructions may result in component damage and/or failure.

1.
To install, reverse the removal procedure.

2.

Calibrate the suspension system. Connect the scan tool and carry out the Ride Height Calibration routine. Follow the scan tool directions.

REMOVAL AND INSTALLATION > REAR SUSPENSION HEIGHT SENSOR > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

Position the vehicle on a hoist. Refer to: Jacking and Lifting - Overview .

NOTE: LH height sensor assembly shown in illustration below, RH similar.

NOTE: Note the position of the components before removal.

2.

Disconnect the rear suspension height sensor electrical connector.

Remove the rear suspension height sensor arm bracket-to-lower arm bolt.

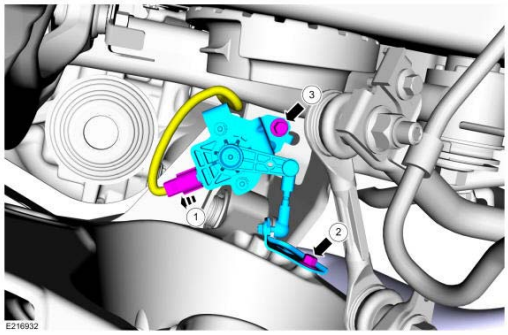
Torque

: 177 lb.in (20 Nm)

Remove the rear suspension height sensor bracket bolt and remove the sensor.

Torque

: 177 lb.in (20 Nm)



REMOVAL AND INSTALLATION > REAR SUSPENSION HEIGHT SENSOR > INSTALLATION

*NOTE: The RH and LH height sensor assemblies **cannot** be used on opposite sides of the vehicle.*

NOTE: The linkage must be in a vertical position after installation. Failure to follow these instructions may result in component damage and/or failure.

1.
To install, reverse the removal procedure.

2.

Calibrate the suspension system. Connect the scan tool and carry out the Ride Height Calibration routine. Follow the scan tool directions.

REMOVAL AND INSTALLATION > VEHICLE DYNAMICS CONTROL MODULE (VDM) > REMOVAL

NOTE: Electronic modules are sensitive to static electrical charges. If exposed to these charges, damage may result.

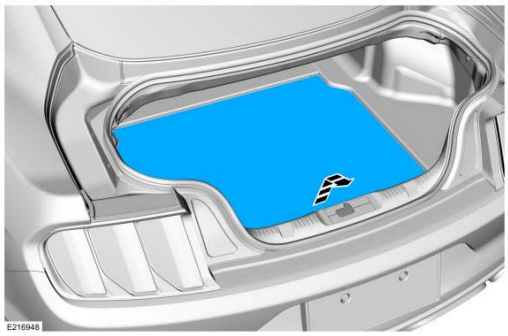
NOTE: Removal steps in this procedure may contain installation details.

NOTE: The current PMI process must begin with the current VDM installed. If the current VDM does not respond to the diagnostic scan tool, the tool may prompt for As-Built Data as part of the repair.

1.
Using a diagnostic scan tool, begin the PMI process for the VDM following the on-screen instructions.

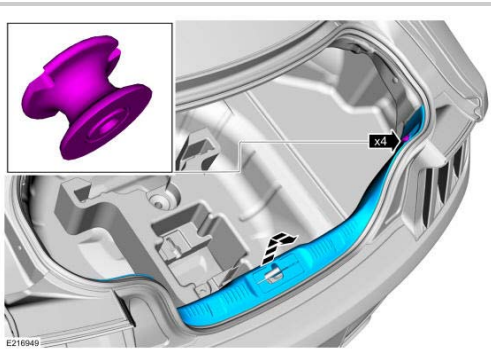
2.

Remove the load space floor panel.



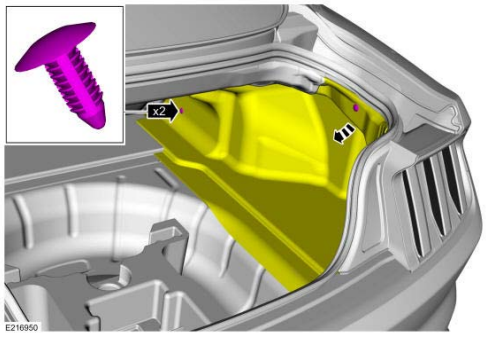
3.

Remove the load space rear trim panel.



4.

Position aside the RH load space trim panel.



5.

1.

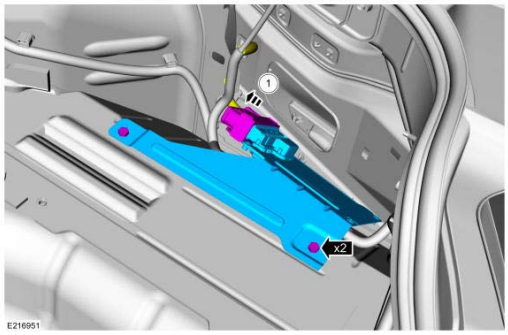
Disconnect the VDM electrical connector.

2.

Remove the VDM retainers and remove the VDM.

Torque

: 93 lb.in (10.5 Nm)



REMOVAL AND INSTALLATION > VEHICLE DYNAMICS CONTROL MODULE (VDM) > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Using a diagnostic scan tool, complete the PMI process for the VDM following the on-screen instructions.

3.

Calibrate the VDM. Connect the scan tool and carry out the Ride Height Calibration routine. Follow the scan tool directions.

Service Manual: WHEELS AND TIRES

DESCRIPTION AND OPERATION > SAFETY PRECAUTIONS - OVERVIEW > OVERVIEW

WARNING: Before servicing any tire, ask the customer if anyone injected a tire sealant into the tire. Tire sealants may be flammable and can burn or explode if exposed to an ignition source. Failure to follow this instruction may result in serious personal injury.

NOTE: NOTICE

Ford Recommends The Following For Vehicles With Carbon Fiber And Alloy Wheels:

- **Tire Changer:**
  - Ford requires center clamp style tire changers such as Hunter® Auto 34, Revolution, TC3900 or equivalent. Anything else, especially table top style machines, are highly likely to damage the wheel which is not warrantable. Do not use table top design machines that grab onto the inside of the wheel and that ride on the front wheel flange to remove the tire. Wheel damage will occur.
- **Tire Balancer:**
  - Ford requires the use of wheel balancers that do not contact the wheel face such as, Hunter® Road Force Touch GSP9700. Do not use machines that contact the wheel face. Wheel damage will occur.
- **Alignment Machine:**
  - Ford requires non-spade style alignment machines such as Hunter® Hawkeye Elite, or equivalent. Anything else is highly likely to damage the wheel which is not warrantable. Do not use machines that grab onto or contact the outside edge of the wheel. Wheel damage will occur.

NOTE: Do not clean aluminum wheels with steel wool, abrasive-type cleaners or strong detergents or damage to the wheel finish may occur.

Factory-installed tires and wheels are designed to operate satisfactorily with loads up to and including full-rated load capacity when inflated to recommended inflation pressures.

Correct tire pressure and driving techniques have an important influence on tire life. Heavy cornering, excessively rapid acceleration and unnecessary sharp braking increase tire wear.

To equalize tire wear, the tires should be rotated at recommended intervals.

DIAGNOSIS AND TESTING > WHEELS AND TIRES > PRELIMINARY INSPECTION

1.

Verify the customer concern by carrying out a road test on a smooth road. If any vibrations are apparent, Refer to the Symptom Chart: NVH in Symptom Chart(s) .

2.

To maximize tire performance, inspect for signs of incorrect inflation and uneven wear, which may indicate a need for balancing, rotation or front suspension alignment.

3.

Correct tire pressure and driving techniques have an important influence on tire life. Heavy cornering, excessively rapid acceleration and unnecessary sharp braking increase tire wear.

Correct tire pressure and driving techniques have an important influence on tire life. Heavy cornering, excessively rapid acceleration and unnecessary sharp braking increase tire wear.

- tire sizes.
- speed rating.
- load range.
- tire construction type.

The use of any other tire/wheel size, load range or type can seriously affect:

- ride.
- handling.
- speedometer/odometer calibration.
- vehicle ground clearance.
- tire clearance between the body and chassis.
- wheel bearing life.
- braking performance.

New wheels need to be installed when the vehicle wheels:

- are bent.
- are cracked.
- are dented.
- are heavily corroded.
- are leaking.
- have elongated wheel hub bolt holes.
- have excessive lateral or radial runout.

It is mandatory to use only the tire sizes recommended on the tire label located on the driver door or door pillar attached to the vehicle. Larger or smaller tires can damage the vehicle, affect durability and require changing the speedometer calibration. Make sure wheel size and offsets match those recommended for the tire in use.

Inspect the tires for signs of uneven wear. the following descriptions to identify the type of wear.

Check the tires for:

- cuts.
- stone bruises.
- abrasions.
- blisters.
- embedded objects.

Check the valve stems for:

- cracks.
- cuts.

Install a new valve stem when damage is found or anytime a new tire or wheel is installed.

Tread wear indicators are molded into the bottom of the tread grooves. Install a new tire when the indicator bands become less than measurement 2/32 inch.

Tire Wear

Tire wear is commonly defined as a loss of tread depth. Tire tread wear occurs due to friction with the contact surface (road/pavement). The tread should wear down uniformly all the way around the circumference of the tire and all the way across the tread face. When this does not occur, the tire may have abnormal/incorrect wear.

Normal Tire Wear

Normal tire wear is identified as even wear around and across the tread. Because there are many factors (driving style, road surfaces, type of vehicle, type of tire) that can affect tire wear, there is no absolute mileage expectation for a normal wear condition. A tire is considered worn-out when the tread has worn to the level of the tread-wear indicators.

Abnormal/Incorrect Tire Wear

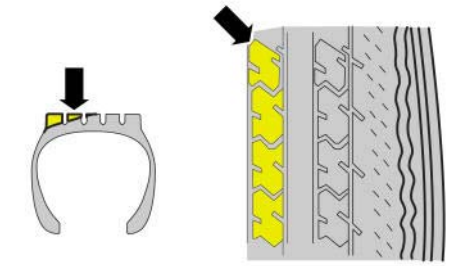
Abnormal/incorrect tire wear is identified as tire wear that is not even around or across the tread and that creates performance-related issues.

Abnormal/incorrect wear can be caused by numerous factors, some of which include driving style (aggressive, passive), climate (hot, cold), road conditions, vehicle loading and maintenance (correct tire pressure, rotation intervals and balance). It is important to determine the root cause of wear on a vehicle before carrying out repair. Tires exhibiting abnormal/incorrect tire wear may still be serviceable provided that the minimum tread depth is greater than and the tire is not causing a vehicle performance (noise/vibration) concern.

Inner Edge/Shoulder Wear

Inner edge (or shoulder) wear occurs on the inside edge of the tire and is usually caused by excessive toe out and/or excessive negative camber. If the tread depth of the outer shoulder is at least 50% greater than the tread depth of the inner shoulder, the tire is experiencing inner edge/shoulder wear. To determine whether tires have this type of wear, visually inspect the tires. In some instances, it may be necessary to measure the tread depth of each rib and compare it to that of the shoulder.

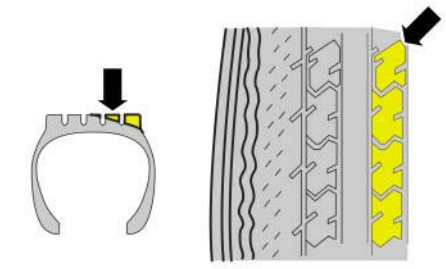
NOTE: Right Front tire shown in illustration below, others similar.

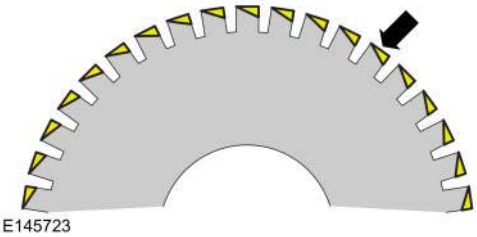

E145721

Outer Edge/Shoulder Wear

Outer edge (or shoulder) wear occurs on the outside edge of the tire and is usually caused by excessive toe in and/or excessive positive camber. If the tread depth of the inner shoulder is at least 50% greater than the tread depth of the outer shoulder, the tire is experiencing outer edge/shoulder wear. To determine whether tires have this type of wear, visually inspect the tires. In some instances, it may be necessary to measure the tread depth of each rib and compare it to that of the shoulder.

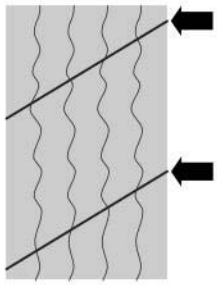
NOTE: Right Front tire shown in illustration below, others similar.


E145722


E145723

Heel/Toe Wear

Heel/toe wear (also known as feathering) occurs along the outside or inside edge/shoulder of the tire. To determine whether tires have this type of wear, visually inspect the tires in both the inside and outside shoulder ribs. In some instances, it may be necessary to measure the difference in tread depth of leading versus trailing edge of each lug in the inside and outside shoulder rib.



Diagonal Wear

Diagonal wear occurs diagonally across the tread area and around the circumference of the tire. To determine whether tires have this type of wear, visually inspect the tires to determine if the wear pattern runs diagonally across the tread and around the circumference of the tire. In some instances, the difference in tread depth along the diagonal wear pattern may need to be measured.

DIAGNOSIS AND TESTING > WHEELS AND TIRES > SYMPTOM CHART(S)

Diagnostics in this service information assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

WARNING: Vehicle may have multiple drive wheels. Do not use engine to power the driveline unless all drive wheels are elevated off the ground. Drive wheels in contact with ground could cause unexpected vehicle movement. Failure to follow this instruction may result in serious personal injury.

Symptom Chart: Tire Wear

Condition	Possible Sources	Actions
Inner edge/shoulder wear	Excessive toe out and/or negative camber Incorrect wheel and tire assembly rotation intervals High-speed cornering	GO to Pinpoint Test A
Outer edge/shoulder wear	Excessive toe in and/or positive camber Incorrect wheel and tire assembly rotation intervals High-speed cornering	GO to Pinpoint Test B

Heel/toe wear	Excessive toe in/out Incorrect wheel and tire assembly rotation intervals	ROTATE the wheel and tire assemblies. CHECK the alignment, ADJUST as necessary.
Diagonal wear	Excessive toe in/out Incorrect tire rotation intervals	GO to Pinpoint Test C
	Loose, worn or damaged suspension components	REFER to: Suspension System .

Symptom Chart: NVH

Diagnostics in this service information assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

NVH symptoms should be identified using the diagnostic tools that are available. For a list of these tools, an explanation of their uses and a glossary of common terms, REFER to: Noise, Vibration and Harshness (NVH) . Since it is possible any one of multiple systems may be the cause of a symptom, it may be necessary to use a process of elimination type of diagnostic approach to pinpoint the responsible system. If this is not the causal system for the symptom, REFER to: Noise, Vibration and Harshness (NVH) . for the next likely system and continue diagnosis.

Condition	Possible Sources	Actions
Wobble or shimmy	Bent wheel	INSTALL a new wheel as necessary.
	Damaged tire	INSTALL a new tire as necessary.
	Loose wheel nuts	TIGHTEN to specification.
High-speed shake	Tires/wheels	REFER to Radial Runout Measurement - Loaded Hunter Road Force® Method in Component Test- Radial Runout or Radial Runout Measurement - Dial Indicator Method .
Vehicle vibration	Tires/wheels	REFER to Component Test- Radial Runout or Radial Runout Measurement - Dial Indicator Method .

DIAGNOSIS AND TESTING > WHEELS AND TIRES > PINPOINT TESTS

Inner Edge, Shoulder Wear

Diagnostic Overview

Diagnostics in this service information assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

DIAGNOSIS AND TESTING > WHEELS AND TIRES > PINPOINT TESTS > PINPOINT TEST A : INNER EDGE, SHOULDER WEAR > PINPOINT TEST A : INNER EDGE, SHOULDER WEAR

A1 MEASURE THE TREAD DEPTH

Using a tread depth gauge or similar tool, measure the inside edge/shoulder tread depth.

Is the tread depth greater than 1.588 mm (0.0625 in) ?

Yes	ROTATE the wheel and tire assemblies. CHECK and ADJUST the toe to nominal +0.15 degrees (toe in). CHECK and ADJUST caster and camber to nominal. REFER to: Front Camber Adjustment .

No	INSTALL a new tire(s). CHECK and ADJUST the toe to nominal. CHECK and ADJUST caster and camber to nominal. REFER to: Front Camber Adjustment .

DIAGNOSIS AND TESTING > WHEELS AND TIRES > PINPOINT TESTS > PINPOINT TEST B : OUTER EDGE, SHOULDER WEAR

Outer Edge, Shoulder Wear

Diagnostic Overview

Diagnostics in this service information assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

DIAGNOSIS AND TESTING > WHEELS AND TIRES > PINPOINT TESTS > PINPOINT TEST B : OUTER EDGE, SHOULDER WEAR > PINPOINT TEST B : OUTER EDGE, SHOULDER WEAR

B1 MEASURE THE TREAD DEPTH

Using a tread depth gauge or similar tool, measure the outside edge/shoulder tread depth.

Is the tread depth greater than 1.588 mm (0.0625 in) ?

Yes	ROTATE the wheel and tire assemblies. CHECK and ADJUST the toe to nominal -0.15 degrees (toe out). CHECK and ADJUST caster and camber to nominal. REFER to: Front Camber Adjustment .

No	INSTALL a new tire(s). CHECK and ADJUST the toe to nominal. CHECK and ADJUST caster and camber to nominal. REFER to: Front Camber Adjustment .

DIAGNOSIS AND TESTING > WHEELS AND TIRES > PINPOINT TESTS > PINPOINT TEST C : DIAGONAL WEAR

Diagonal Wear

Diagnostic Overview

Diagnostics in this service information assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

DIAGNOSIS AND TESTING > WHEELS AND TIRES > PINPOINT TESTS > PINPOINT TEST C : DIAGONAL WEAR > PINPOINT TEST C : DIAGONAL WEAR

C1 MEASURE THE TREAD DEPTH

Using a tread depth gauge or similar tool, measure the tread depth of the wear pattern.

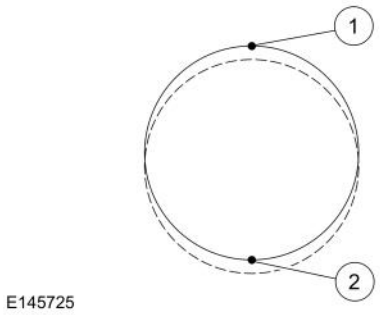
Is the tread depth greater than 1.588 mm (0.0625 in) ?

Yes	If no performance concerns (noise/vibration) are present, the tire can remain in service. CHECK the air pressure in the tires, ADJUST as necessary. ROTATE the wheel and tire assemblies. INSPECT for loose, worn or damaged suspension components. INSTALL new components as necessary. CHECK the alignment and ADJUST as necessary.

No	INSTALL a new tire(s). CHECK the air pressure in the tires, ADJUST as necessary. ROTATE the wheel and tire assemblies. INSPECT for loose, worn or damaged suspension components. INSTALL new components as necessary. CHECK the alignment and ADJUST as necessary.

DIAGNOSIS AND TESTING > WHEELS AND TIRES > COMPONENT TEST- RADIAL RUNOUT

Radial runout is the egg-shaped deviation from a perfect circle and is measured perpendicular to the circumference. On a wheel and tire assembly, this means measuring the center tire tread rib. The center rib is indicative of the condition of the tire as a whole. Total runout is the difference between the maximum-to-minimum gauge reading. The high spot is the location of maximum runout.



Item	Description
1	High spot
2	Low spot

Radial Runout Measurement - Loaded Hunter Road Force® Method

NOTE: Diagnosis of tire/wheel vibration should not be performed on tires with less than 198.8 mi (320 km). Some initial tire/wheel vibration issues (such as flat spotting) may correct themselves after the tires have been in service for 198.8 mi (320 km). This procedure is intended to assist with the diagnosis of wheel and tire assembly runout and/or force variation issues. The Hunter Road Force® 9700 Series Wheel Balancer measures the wheel and tire assembly's loaded runout and the tire's radial spring rate. The balancer then converts the runout into pounds of force (termed as Road Force). Measuring loaded runout (Road Force) is more effective than measuring unloaded runout using a dial indicator.

1.

Using a tire crayon, record the vehicle position on the inward sidewall of all 4 tires.

2.

Remove the wheel and tire assemblies. REFER to: Wheel and Tire .

NOTE: Use only a digital tire pressure gauge any time tire pressures are measured to be sure that accurate values are obtained.

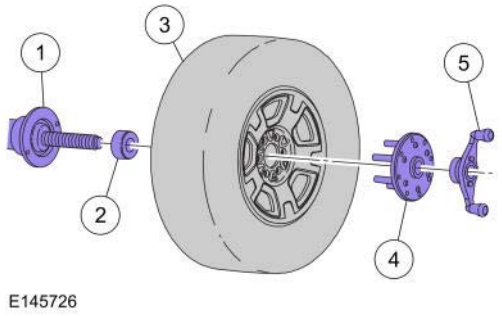
3.
Make sure that the tire pressures are set to the correct pressure as indicated on the VC label.

NOTE: The wheel balancer inflation station must be turned OFF for tires with inflation pressures of 60.0 psi (414 kPa) or above.

NOTE: Make sure that the wheel and tire assembly is clean and free of foreign material prior to installation on the balancer.

NOTE: Make sure that the correct wheel balancer adapters are used when mounting the assembly to the wheel balancer or damage to the wheel may occur.

4.
Mount the wheel and tire assembly on a suitable wheel balancer using the correct wheel balancer adapters as shown in illustration below.



Item	Description
1	Wheel balancer
2	Cone
3	Wheel and tire assembly
4	Finger plate
5	Balancer wing nut

5.

Measure the Road Force®.

- Temporarily mark the high spot and the Road Force® value on the sidewall of the tire. If the wheel and tire assembly Road Force® value is greater than 9 kg (20 lb), carry out the Match Mounting procedure to optimize the wheel and tire assembly.
- If the wheel and tire assembly Road Force® value is 9 kg (20 lb) or less, permanently mark the high spot and the Road Force® value on the inward sidewall of the tire for reference during future wheel and tire service. Balance the assembly and install the wheel and tire on the vehicle using the Wheel-to-Hub Optimization procedure.

DIAGNOSIS AND TESTING > WHEELS AND TIRES > RADIAL RUNOUT MEASUREMENT - DIAL INDICATOR METHOD

NOTE: Diagnosis of tire/wheel vibration should not be performed on tires with less than 320 km (200 mi). Some initial tire/wheel vibration issues (such as flat spotting) will correct themselves after the tires have been in service for 320 km (200 mi).

NOTE: Loaded run-out measurements are the preferred method for verifying tire serviceability. While a dial indicator can be used to optimize the position of the tire on the wheel, the unloaded run-out measurement cannot accurately determine if the tire should be removed from service.

NOTE: The following procedures should be used if normal diagnostics leads to a potential runout issue.

NOTE: Some vehicles may exhibit a wheel and tire vibration caused by excessive runout. Radial runout measurements can be taken using a dial indicator and should be measured with the wheel and tire assembly mounted on a suitable wheel balancer. The dial indicator should be mounted securely to eliminate gauge movement when measuring runout.

NOTE: Use only a digital tire pressure gauge any time tire pressures are measured to be sure that accurate values are obtained.

1.

Make sure that the tire pressures are set to the correct pressure as indicated on the VC label.

2.

Using a tire crayon, record the vehicle position on the inward sidewall of all 4 tires.

3.

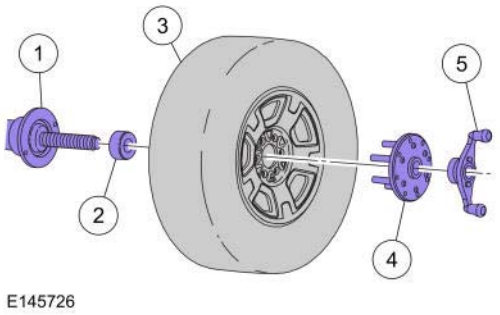
Remove the wheel and tire assemblies. REFER to: Wheel and Tire .

NOTE: Make sure that the correct wheel balancer adapters are used when mounting the assembly to the wheel balancer or damage to the wheel may occur.

NOTE: Make sure that the wheel and tire assembly is clean and free of foreign material prior to installation on the balancer.

NOTE: The wheel balancer inflation station must be turned OFF for tires with inflation pressures of 60.0 psi (414 kPa) or above.

4.
Mount the wheel and tire assembly on a suitable wheel balancer using the correct wheel balancer adapters as shown in illustration below.

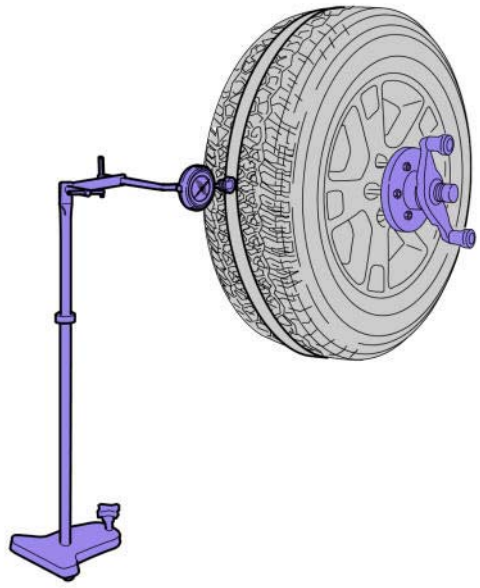


Item	Description
1	Wheel balancer
2	Cone
3	Wheel and tire assembly
4	Finger plate
5	Balancer wing nut

NOTE: Masking tape can be applied on the center tread rib to allow for a smoother measuring surface. Some fluctuation of the gauge reading is expected. Observe the overall sweep of the gauge from the highest to the lowest spot on the tire.

5.
Position a suitable dial indicator and stand with the dial indicator on the center tread rib.

- Rotate the wheel and tire assembly (or wheel) to locate the low spot.
- Adjust the runout gauge to read 0.
- Rotate the wheel and tire assembly one complete revolution to make sure that the low spot has been found and that the dial indicator returns to a 0 reading.

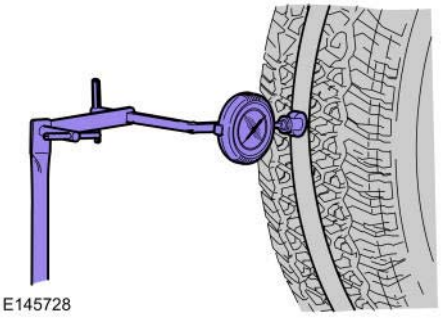


E145727

6.

While slowly and constantly rotating the wheel and tire assembly (or wheel), measure the radial runout.

- Note the variance (runout) from 0 on the dial of the gauge.
- If the runout reading of a wheel and tire assembly is greater than 1.14 mm (0.045 in), locate and temporarily mark the high spot and runout reading on the sidewall of the tire and carry out the Match Mounting procedure to optimize the wheel and tire assembly.
- If the runout reading of a wheel and tire assembly is 1.14 mm (0.045 in) or less, permanently mark the high spot and the runout reading on the inward sidewall of the tire for reference during future wheel and tire service. Balance the assembly and install the wheel and tire on the vehicle using the Wheel-to-Hub Optimization procedure.



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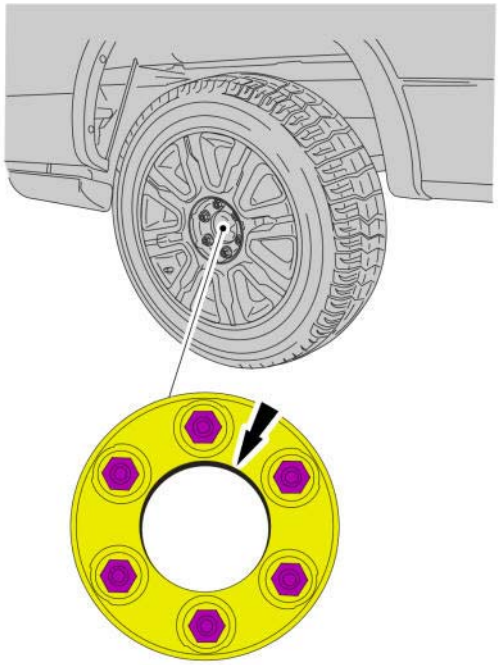
GENERAL PROCEDURES > WHEEL TO HUB RUNOUT MINIMIZATION

Check

NOTE: Wheel-to-hub optimization is important. Clearance between the wheel and hub can be used to offset or neutralize the Road Force® or run-out of the wheel and tire assembly. For every 0.001 inch of wheel-to-hub clearance, the Road Force® can be affected between 1 and 3 pounds depending on the tire stiffness.

NOTE: The example below illustrates how the clearance between the wheel and the hub can be used to offset the high spot of radial run-out or Road Force®. Following the procedure will make sure of the best optimization.

1.
Position the wheel and tire assembly on the vehicle so that the high spot location of radial run-out or Road Force® is at the 6 o'clock position and install the wheel nuts by hand until snug.



NOTE: Do not allow the full weight of the vehicle to rest on the tires while tightening the wheel nuts.

2.
Lower the vehicle until the tires make contact with the ground, slightly loading the suspension. Tighten the wheel nuts. Refer to: Wheel and Tire .

GENERAL PROCEDURES > WHEEL TO TIRE RUNOUT MINIMIZATION

Check

NOTE: Road Force® values in illustrations are shown in pounds.

NOTE: Match mounting is a technique used to reduce radial runout or road force on wheel and tire assemblies. Excessive runout is a source of ride quality complaints and match mounting can be used to minimize the runout. Match mounting can be accomplished by changing the position of the tire on the wheel.

NOTE: Position the wheel and tire assembly on a tire machine and put a reference mark on the tire sidewall at the valve stem position.

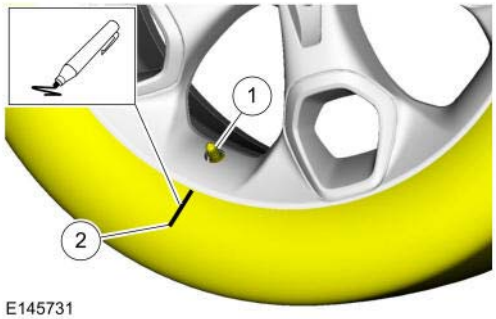
1.

1.

Valve stem

2.

Reference mark



NOTE: For vehicles equipped with a TPMS, the sensor may be damaged by incorrect tire mounting or dismounting. Dismount the tire from the wheel as instructed in the procedure. Failure to follow these instructions may result in TPMS component damage.

NOTE: Always make sure that the final high spot and measurement values are permanently marked on the inward sidewall of the tire for reference during future wheel and tire service.

2.
Marker. Using a suitable tire machine, separate the tire beads from the wheel.

3.

Lubricate the tire beads using a suitable fast drying, corrosion inhibiting tire bead lubricant. Position the tire 180 degrees (half-way around) on the rim so the valve stem reference mark is now opposite the valve stem.

4.

Re-inflate the wheel and tire assembly to the specified air pressure and measure the assembly again using a suitable dial indicator or Hunter Road Force® 9700 Series Wheel Balancer. Mark the second high spot on the tire.

5.

If the runout or Road Force is reduced to within specifications, the concern has been resolved. Balance the assembly and install on the vehicle using the Wheel-to-Hub Optimization procedure.

6.

If the second runout or Road Force® measurement is still not within specification and both high spots are close to each other (within 101.6 mm [4 in]), the root cause is probably the tire (the high spot followed the tire).

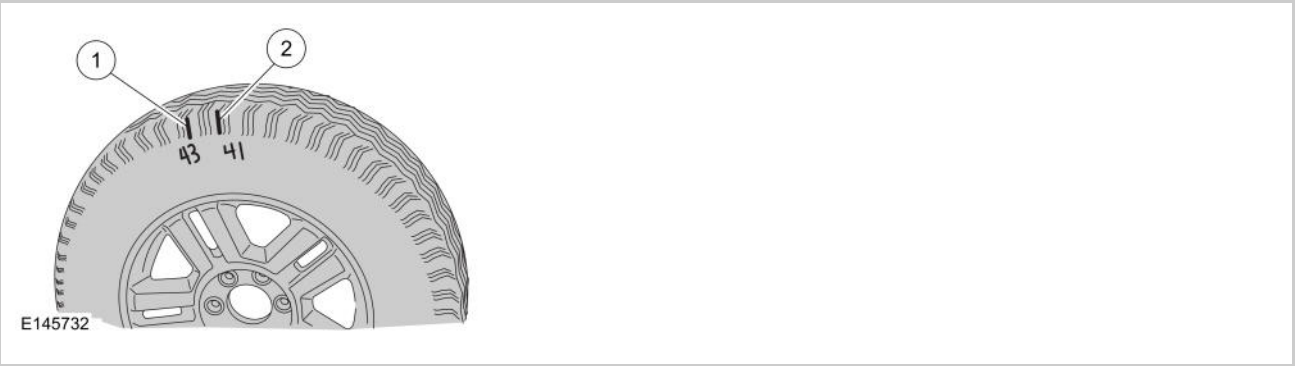
7.

1.

First high spot on the tire

2.

Second high spot on the tire



8.

To be SURE that the tire is causing the high runout, it is necessary to have 2 runout or Road Force® measurements that are not within specification and the high spots must be in approximately the same location on the tire's sidewall. If the tire is the cause, install a new tire, balance the assembly and install on the vehicle using the Wheel-to-Hub Optimization procedure. If the second high spot is not within 101.6 mm (4 in) of the first high spot, proceed to the next step.

9.

If the second high spot is still above specification and is within 101.6 mm (4 in) of being opposite

the first high spot on the wheel, the root cause is probably the wheel (the high spot followed the wheel). Dismount the tire from the wheel, mount the wheel on a balancer and check the wheel runout. If the wheel runout exceeds 1.14 mm (0.0449 in), install a new wheel, balance the assembly and install on the vehicle using the Wheel-to-Hub Optimization procedure. Refer to: Wheel to Hub Runout Minimization .

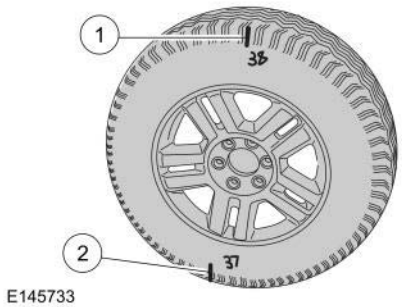
10.

1.

First high spot on the tire

2.

Second high spot on the tire



NOTE: If the second high spot did not follow the wheel or the tire and the runout is still not within specification, improvements may be made by rotating the tire 90 degrees (one-fourth turn).

11.
Draw an arrow on the tire sidewall from the second high spot towards the first high spot (in the shortest direction).

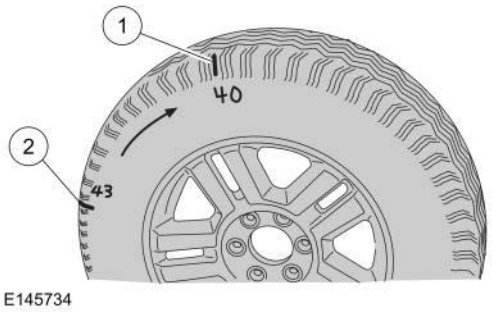
12.

1.

First high spot on the tire

2.

Second high spot on the tire



13.

Separate the tire beads from the wheel and rotate the tire 90 degrees (one-fourth turn) in the direction of the arrow.

REMOVAL AND INSTALLATION > WHEEL AND TIRE

Materials

Name	Specification
High Temperature Nickel Anti-Seize LubricantXL-2	-

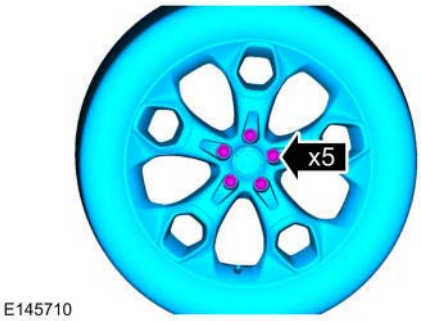
REMOVAL AND INSTALLATION > WHEEL AND TIRE > REMOVAL

1.

With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

NOTE: Do not use heat to loosen a seized wheel nut or damage to the wheel and wheel bearing can occur.

2.
Remove the wheel nuts.



REMOVAL AND INSTALLATION > WHEEL AND TIRE > INSTALLATION

WARNING: When a wheel is installed, always remove any corrosion, dirt or foreign material present on the mounting surface of the wheel and the mounting surface of the wheel hub, brake drum or brake disc. Make sure that any fasteners that attach the rotor to the hub are secured so they do not interfere with the mounting surfaces of the wheel. Failure to follow these instructions when installing wheels may result in the wheel nuts loosening and the wheel coming off while the vehicle is in motion, which could result in loss of control, leading to serious injury or death to vehicle occupant(s).

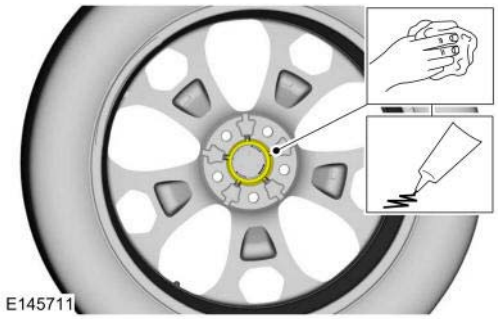
NOTE: Make sure to apply a thin coat of anti-seize lubricant only to the interface between the wheel pilot bore and the hub pilot. Do not allow the anti-seize to make contact with the wheel-to-brake disc/drum mounting surface, wheel studs, wheel nuts, brake pads or brake disc friction surfaces or damage to components may occur.

1.

Clean the mounting surface of the wheel. Apply the substance from the specified tube.

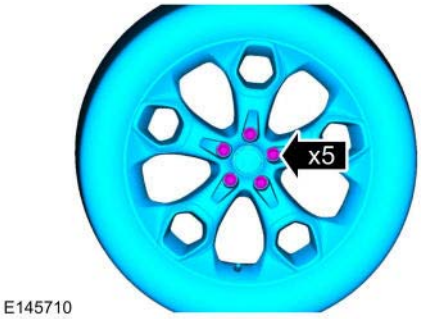
Material

: High Temperature Nickel Anti-Seize Lubricant / XL-2



NOTE: Only tighten the nuts finger tight at this stage.

2.
Position the wheel and install the wheel nuts.



3.

WARNING: Retighten wheel nuts within 160 km (100 mi) after a wheel is reinstalled. Wheels can loosen after initial tightening. Failure to follow this instruction may result in serious injury to vehicle occupant(s).

NOTE: Failure to tighten the wheel nuts in a star/cross pattern can result in high brake disc runout, which accelerates the development of brake roughness, shudder and vibration.

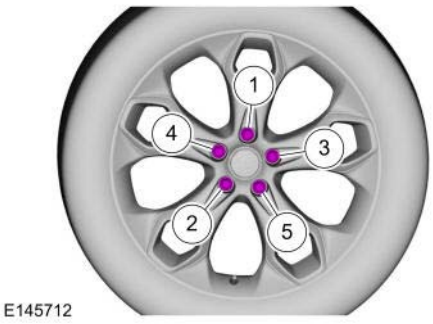
NOTE: The wheel nut torque specification is for clean, dry wheel stud and wheel nut threads.

NOTE: Final tightening to be performed with vehicle resting on tires.

Tighten the wheel nuts in a star pattern.

Torque

: 148 lb.ft (200 Nm)



DISASSEMBLY AND ASSEMBLY > WHEEL AND TIRE

Special Tool(s) / General Equipment

Wooden Block

DISASSEMBLY AND ASSEMBLY > WHEEL AND TIRE > DISASSEMBLY

NOTE: Failure to follow the instructions below may result in damage to the TPMS.

NOTE: The TPMS sensor is mounted to the valve stem. Removal of the valve stem requires dismounting the tire from the wheel and removal of the TPMS sensor.

NOTE: Use only the Digital Tire Pressure Gauge any time tire pressures are measured to be sure that accurate values are obtained.

1.

Remove the wheel and tire. Refer to: Wheel and Tire .

NOTE: The valve stem is connected to the TPMS sensor. Do not pull the valve stem from the wheel, or damage to the sensor will occur.

NOTE: If a new TPMS sensor is being installed, remove and discard the valve stem-to-sensor screw and the sensor.

2.
Remove the valve stem core and fully deflate all air from the tire.

NOTE: Do not allow the tire beads to move beyond the wheel mid-plane (middle of the wheel) when separating the beads from the wheels, damage to the TPMS sensor may occur.

NOTE: Tire and valve stem position is critical to prevent damage to the TPMS sensor when using a paddle-type bead separator.

NOTE: Some machines may have a nylon roller bead separator at the 12 o'clock position instead of the paddle-type bead separator at the 3 o'clock position.

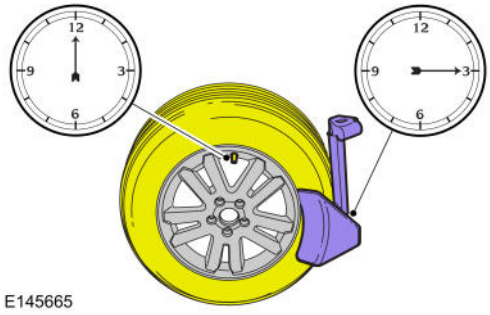
For a paddle-type tire machine, position the valve stem at the 12 o'clock or 6

o'clock position and the paddle at the 3 o'clock position.

For a roller-type tire machine, align the valve stem with the roller at any position.

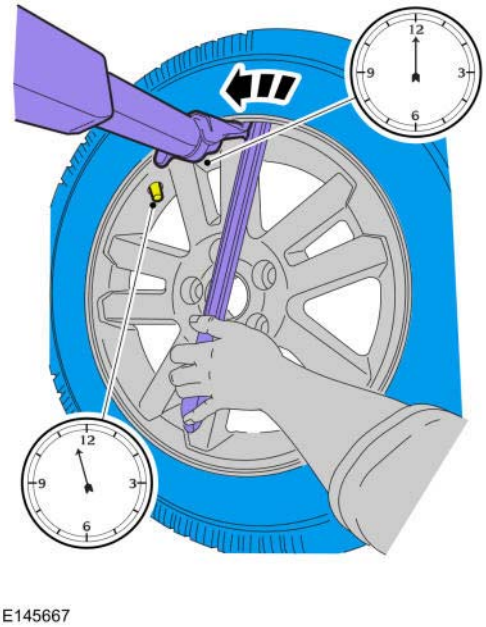
NOTE: Paddle type shown in illustration below, roller type similar.

3.



NOTE: Index-mark the valve stem and wheel weight positions on the tire.

4.
Place the wheel and tire assembly on the turntable of the tire machine with the valve stem at the 11:30 position and the machine arm at the 12 o'clock position and dismount the outer bead from the wheel.



5.

Reset the wheel and tire assembly on the turntable of the tire machine with the valve stem at the 11:30 position and the machine arm at the 12 o'clock position and dismount the inner bead from the wheel.

NOTE: A new valve stem must be installed whenever a new tire or wheel is installed.

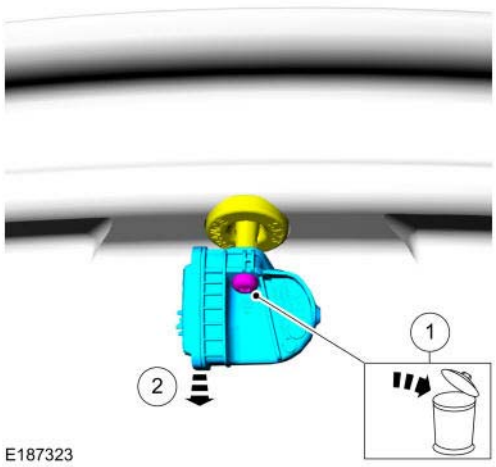
6.

1.

Remove and discard the TPMS sensor-to-valve stem screw.

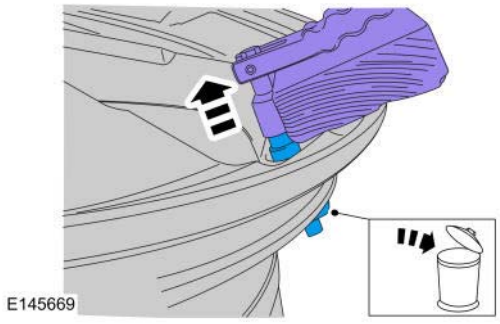
2.

Separate the TPMS sensor from the valve stem.



NOTE: Use care not to damage the wheel surface when removing the valve stem.

7.
Using a suitable valve stem remover/installer, remove and discard the valve stem. Use the General Equipment: Wooden Block



NOTE: When installing a new wheel, always install a new valve stem and sensor screw. Reuse the TPMS sensor from the previous wheel if possible. The TPMS will not have to be trained if the sensor is reused.

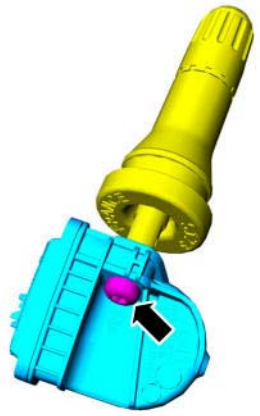
NOTE: If the TPMS sensor is being reused, inspect the TPMS sensor for damage and install a new sensor as necessary.

NOTE: To prevent TPMS sensor and valve stem damage, the valve stem must be installed onto the TPMS sensor and then installed into the wheel as an assembly.

8.
Position the new valve stem onto the TPMS sensor and install the new screw.

Torque

: 13 lb.in (1.5 Nm)



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DISASSEMBLY AND ASSEMBLY > WHEEL AND TIRE > ASSEMBLY

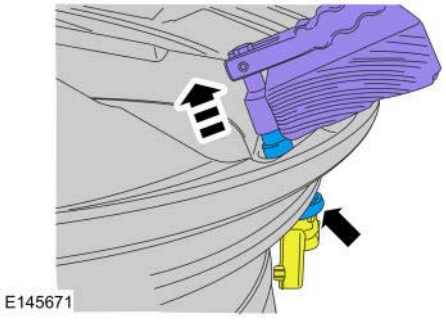
NOTE: Damage to the TPMS sensor may result if the tire mounting is not carried out as instructed.

NOTE: It is important to pull the valve stem and TPMS sensor assembly through the wheel rim hole in a direction parallel to the valve stem hole axis. If the assembly is pulled through at an angle, damage to the valve stem and sensor assembly may occur.

NOTE: Use care not to damage the wheel surface when installing the valve stem and TPMS sensor assembly.

NOTE: Lubricate the valve stem with soapy water and install the valve stem and TPMS sensor assembly into the wheel using a block of wood and a suitable valve stem installer.

1.
Using a suitable valve stem installer, install the new valve stem and TPMS sensor assembly. Use the General Equipment: Wooden Block



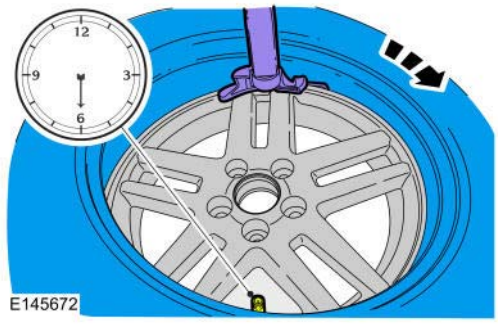
NOTE: Lubricate the tire beads using a suitable fast-drying, corrosion-inhibiting tire bead lubricant.

NOTE: Do not mount the tire at this time.

2.
Position the wheel on the turntable of the tire machine, then lubricate and position the bottom bead of the tire on the wheel.

3.

Position the wheel to align the valve stem with the machine arm, at the 6 o'clock position, and mount the bottom bead of the tire.



4.

Reposition the wheel to align the valve stem with the machine arm at the 6 o'clock position, and mount the top bead of the tire.

> *NOTE: Use only the Digital Tire Pressure Gauge any time tire pressures are measured to be sure that accurate values are obtained.*

5.
Inflate the tire to the pressure specified on the VC label located on the driver door or door pillar.

> *NOTE: Proceed to the next step if the tire beads do not seat at the specified inflation pressure.*

> *WARNING: If there is a need to exceed the maximum pressure indicated on the sidewall of the tire in order to seat the beads, follow all steps listed below. Failure to follow these steps may result in serious personal injury.*

> *NOTE: The following steps should only be carried out if the tire beads cannot be seated by inflating the tire up to the maximum inflation pressure listed on the tire sidewall.*

6.

1.

Relubricate the tire bead and wheel bead seat area.

2.

Install a remote valve and pressure gauge.

3.

Wear eye and ear protection and stand at a minimum of 3.65 m (12 ft) away from the wheel and tire assembly.

4.

Inflate the tire using the remote valve and tire gauge until the beads have seated or until the pressure gauge is 138 kPa (20 psi) more than maximum inflation pressure on tire sidewall. If beads have not seated, deflate the tire and proceed to the next step.

5.

Place the wheel and tire assembly in an OSHA-approved tire safety cage.

6.

Inflate the tire using the remote valve and pressure gauge until the beads have seated or until the pressure gauge is 276 kPa (40 psi) more than maximum inflation pressure on the tire sidewall.

Do not exceed 276 kPa (40 psi) above the maximum pressure on tire sidewall. Install a new tire if the beads do not seat at this pressure.

7.

Install the wheel and tire. Refer to: Wheel and Tire .

SPECIFICATIONS > SPECIFICATIONS > LUBRICANTS, FLUIDS, SEALERS AND ADHESIVES

	Specifications
Motorcraft ® MERCON ® LV Automatic Transmission Fluid XT-10-QLVC	MERCON ® LV

SPECIFICATIONS > SPECIFICATIONS > CAPACITIES

	Liters
Transmission fluid	13 qt (12.3 L)

SPECIFICATIONS > SPECIFICATIONS > GENERAL SPECIFICATION

NOTE: Transmission fluids are not interchangeable. The use of any other fluid or cleaning agents will cause internal transmission damage.

Item	Specification
Transmission fluid	The transmission fluid should be changed every 241, 000 km (150, 000 mi) regardless of normal or special operating conditions.
-	Transmission fluid should be checked with the vehicle on a level surface and at normal operating temperature.
Fluid Filter	Internal to the transmission

SPECIFICATIONS > SPECIFICATIONS > GENERAL SPECIFICATION

Item	Specification
Transmission Weight	185.19 lb (84 kg)

SPECIFICATIONS > SPECIFICATIONS > CLUTCH APPLICATION CHART

Gear	Forward A (1, 2, 3, 4)	Direct B (3, 5, R)	Intermediate C (2, 6)	Low / Reverse D (1, R)	Overdrive E (4, 5, 6)	Low - OWC
Park				H		
Reverse		D		H		
Neutral				H		
1st Gear D	D			H **FOOTNOTE (a)**		H
2nd Gear D	D		H			O/R
3rd Gear D	D	D				O/R
4th Gear D	D				D	O/R
5th Gear D		D			D	O/R
6th Gear D			H		D	O/R
1st Gear Manual	D			H		
Planetary Component	Front planetary carrier-to-No. 3 sun gear	Front carrier-to-No. 2 sun gear	No. 2 sun gear	Rear planetary carrier	Input shaft-to-rear planetary carrier	Rear planetary carrier

- H = Holding
- D = Driven
- O/R = Overrunning
- Clutch released when vehicle speed is above 3 mph.

SPECIFICATIONS > SPECIFICATIONS > SOLENOID OPERATION CHART

Base Selector Lever Position	PCM Commanded Gear	SSA NL (1, 2, 3, 4)	SSB NH (3, 5, R)	SSC NL (2, 6)	SSD NH (L, R/C 4, 5, 6)	SSE (On/Off) NC	TCC NL
P	P	Off	On	Off	Off	Off	Off
R	R	Off	Off	Off	Off	Off	Off
N	N	Off	On	Off	Off	Off	Off
D	1	On	On	Off	Off **FOOTNOTE (b)**	Off	Off

	2	On	On	On	On	Off	Off
	3	On	Off	Off	On	On/Off **FOOTNOTE (a)**	On/Off
	4	On	On	Off	Off	On	On/Off
	5	Off	Off	Off	Off	On	On/Off
	6	Off	On	On	Off	On	On/Off
M **FOOTNOTE (c)**	-	-	-	-	-	-	-

- CB = Clutch brake
- NC = Normally closed
- NH = Normally high
- NL = Normally low
- Solenoid changes from off to on just before the 2-3 upshift and from on to off just before the 3-1 downshift.
- Solenoid is On when vehicle is above 3 mph.
- All gears available upon driver request.

SPECIFICATIONS > SPECIFICATIONS > GEAR RATIO CHART

Gear	Ratio
1st	4.17:1
2nd	2.34:1
3rd	1.52:1
4th	1.14:1
5th	0.87:1
6th	0.69:1
Reverse	3.40:1

SPECIFICATIONS > SPECIFICATIONS > STALL SPEED

Engine	Min	Max
2.3L GTDI	2350	2650

3.7L TIVCT	2300	2580
5.0L TIVCT	2400	2700

SPECIFICATIONS > SPECIFICATIONS > CLUTCH END PLAY

NOTE: All friction and steel plates use a wave design plate.

Item	Specifications
Forward Clutch (A)	0.028-0.043 in (.71-1.1 mm)
Direct Clutch (B)	0.020-0.051 in (.5-1.3 mm)
Intermediate Clutch (C)	0.028-0.043 in (.71-1.1 mm)
Low/Reverse Clutch (D)	0.039-0.063 in (1-1.6 mm)
Overdrive (O/D) Clutch (E)	0.020-0.035 in (.5 -. 9 mm)

SPECIFICATIONS > SPECIFICATIONS > FORWARD CLUTCH, DIRECT CLUTCH AND INTERMEDIATE CLUTCH SELECTIVE SNAP RINGS

Part Number	Snap Ring Thickness
6L2Z-7D483-BA	0.118 in (3 mm)
6L2Z-7D483-CA	0.126 in (3.2 mm)
6L2Z-7D483-DA	0.134 in (3.4 mm)
6L2Z-7D483-EA	0.142 in (3.6 mm)
6L2Z-7D483-FA	0.150 in (3.8 mm)
6L2Z-7D483-GA	0.157 in (4 mm)
6L2Z-7D483-HA	0.165 in (4.2 mm)

SPECIFICATIONS > SPECIFICATIONS > OVERDRIVE CLUTCH SELECTIVE SNAP RINGS

Part Number	Snap Ring Thickness
6L2Z-7D483-M	0.067 in (1.7 mm)
6L2Z-7D483-N	0.075 in (1.9 mm)

6L2Z-7D483-P	0.083 in (2.1 mm)
6L2Z-7D483-Q	0.091 in (2.3 mm)
6L2Z-7D483-R	0.098 in (2.5 mm)
6L2Z-7D483-S	0.106 in (2.7 mm)

SPECIFICATIONS > SPECIFICATIONS > LOW/REVERSE CLUTCH SELECTIVE PRESSURE PLATES

Part Number	Pressure Plate Thickness
6L2Z-7B066-HA	0.201 in (5.1 mm)
6L2Z-7B066-M	0.209 in (5.3 mm)
6L2Z-7B066-JA	0.213 in (5.4 mm)
6L2Z-7B066-N	0.220 in (5.6 mm)
6L2Z-7B066-KA	0.224 in (5.7 mm)
6L2Z-7B066-P	0.232 in (5.9 mm)
6L2Z-7B066-LA	0.236 in (6 mm)

SPECIFICATIONS > SPECIFICATIONS > CLUTCH PLATE QUANTITY 2.3L GTDI AND 3.7L TIVCT

Component	Number of Frictions	Number of Separator Plates	Separator Plate Thickness	Number of Pressure Plates	Pressure Plate Thickness
Forward Clutch (A)	3	4	0.118 in (3 mm)	1	0.118 in (3 mm)
Direct Clutch (B)	4	4	0.083 in (2.1 mm)	1	0.154 in (3.9 mm)
Intermediate Clutch (C)	4	4	0.118 in (3 mm)	1	0.154 in (3.9 mm)
Low/Reverse Clutch (D)	4	4	0.083 in (2.1 mm)	Selective	Refer to: Low/Reverse Clutch Selective Pressure Plate Chart
Overdrive Clutch (E)	6	6	0.118 in (3 mm)	1	0.122 in (3.1 mm)

SPECIFICATIONS > SPECIFICATIONS > CLUTCH PLATE QUANTITY 5.0L TIVCT

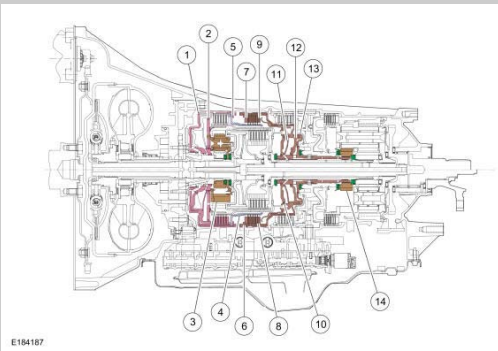
Component	Number of Frictions	Number of Separator Plates	Separator Plate Thickness	Number of Pressure Plates	Pressure Plate Thickness
Forward Clutch (A)	5	6	0.083 in (2.1 mm)	1	0.083 in (2.1 mm)
Direct Clutch (B)	5	5	0.083 in (2.1 mm)	1	0.154 in (3.9 mm)
Intermediate Clutch (C)	5	5	0.118 in (3 mm)	1	0.154 in (3.9 mm)
Low/Reverse Clutch (D)	5	5	0.083 in (2.1 mm)	Selective	Refer to: Low/Reverse Clutch Selective Pressure Plate Chart
Overdrive Clutch (E)	6	6	0.118 in (3 mm)	1	0.122 in (3.1 mm)

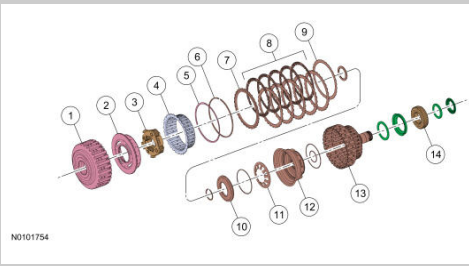
SPECIFICATIONS > SPECIFICATIONS > SHIFT SPEEDS

Throttle Position	Shift	KM/H	MPH
Light Throttle	1-2	13-21	8-13
	2-3	26-34	16-21
	3-4	35-43	22-27
	4-5	56-64	35-40
	5-6	71-79	44-49
	5-6	100-105	62-65
Closed Throttle	6-5	56-64	35-40
	5-4	40-48	25-30
	4-3	13-21	8-13
	3-2	3-11	2-7
	2-1	2-6	1-4
Wide Open Throttle	1-2	45-53	28-33
	2-3	87-95	54-59
	3-4	140-148	87-92

DESCRIPTION AND OPERATION > DIRECT CLUTCH ASSEMBLY

Direct Clutch Cutaway View





Direct Clutch Exploded View

Item	Description
1	Forward clutch (A) cylinder
2	Forward clutch balance piston
3	Front planetary carrier assembly
4	Direct clutch (B) hub
5	Direct clutch pressure plate retaining ring (selective)
6	Direct clutch pressure plate retaining ring (selective)
7	Direct clutch pressure plate
8	Direct clutch assembly (quantity model dependent)
9	Direct clutch cushion plate
10	Direct clutch balance piston
11	Direct clutch piston return spring
12	Direct clutch piston
13	Direct clutch cylinder
14	Rear planetary sun gear No. 2

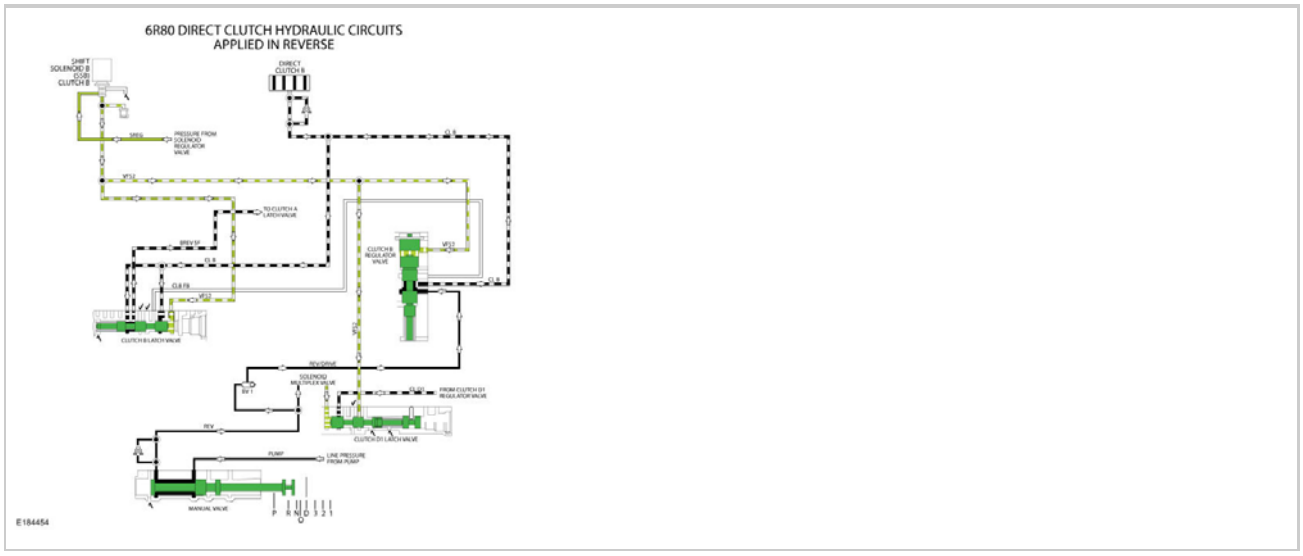
Direct Clutch (B) Hydraulic Circuits

To apply the direct clutch (B), the manual valve can be in the REVERSE, DRIVE, 3, 2 or 1 position to provide line pressure to the clutch B regulator valve through the REV/DRIVE circuit.

For the direct clutch (B) to apply in reverse, SSB provides regulated solenoid pressure from the SREG circuit to the clutch B regulator and latch valves through the VFS2 circuit.

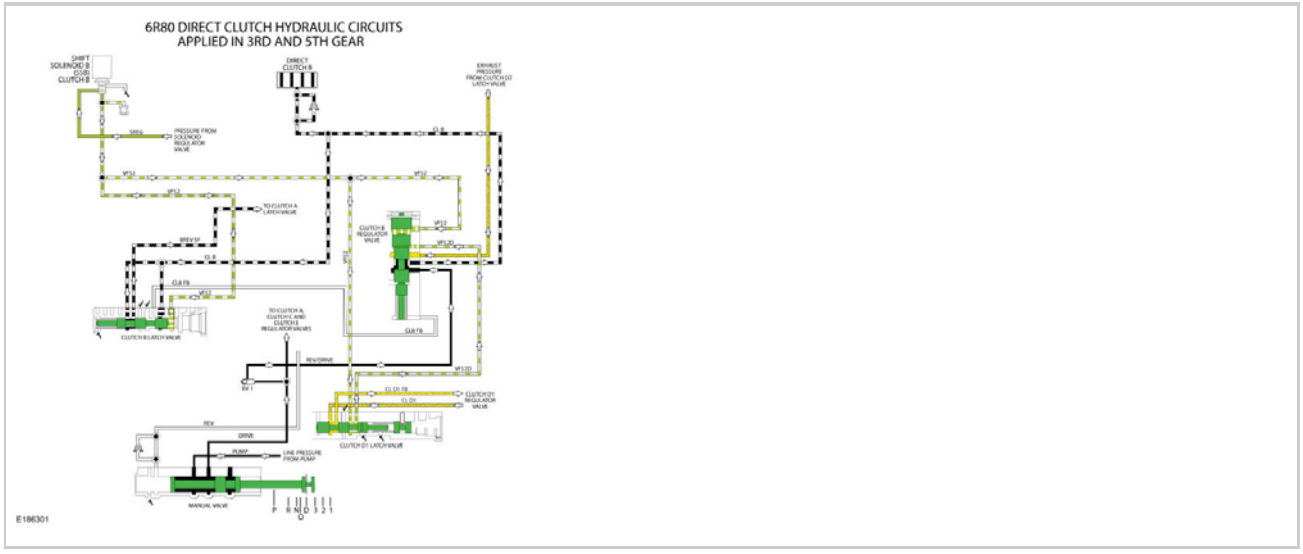
The clutch B regulator valve provides regulated line pressure to the CL B circuit to apply the direct clutch (B).

Direct (3, 5, R) Clutch Hydraulic Circuits (Applied in reverse)



The direct clutch is applied the same way in 3rd and 5th gear with one exception. VFS2 pressure is routed through the Clutch D1 Latch valve into the VFS2D circuit. VFS2D is routed to the clutch B regulator valve where it opposes VFS2 pressure. This action effectively reduces the amount of VFS2 force acting on the regulator valve and results in a smooth shift.

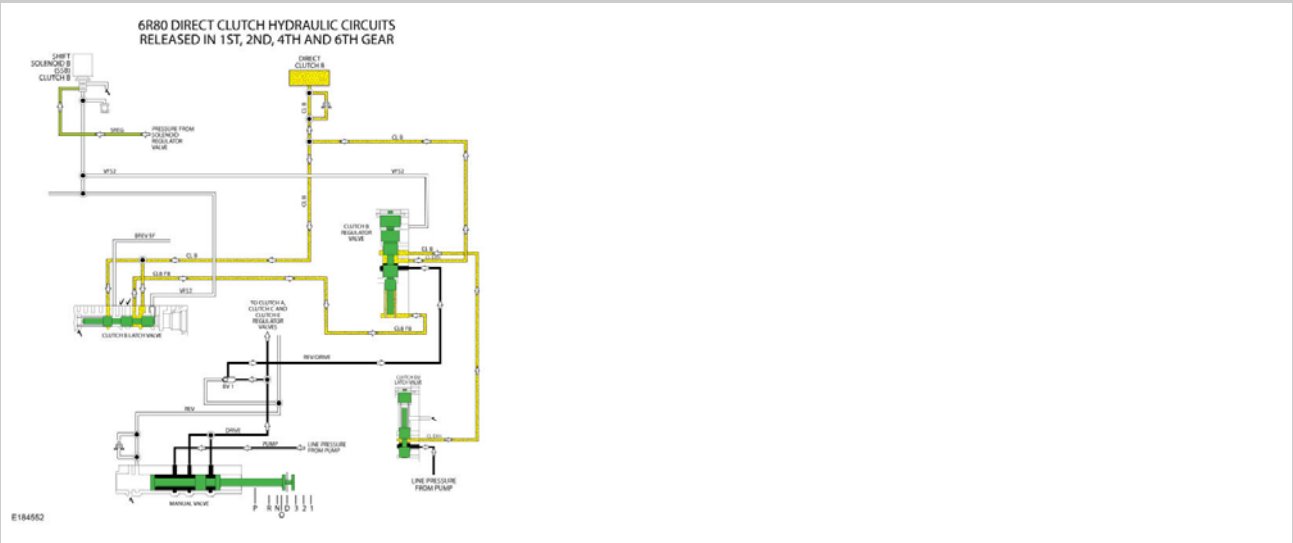
Direct (3, 5, R) Clutch Hydraulic Circuits (Applied in 3rd and 5th gear)



To release the direct clutch (B), In 1st, 2nd, 4th or 6th gear, the manual valve supplies line pressure to the clutch B regulator valve. The SSB lowers pressure to the clutch B regulator and clutch B latch valve to position the valves to lower the regulated line pressure in the CL B circuit to release the clutch.

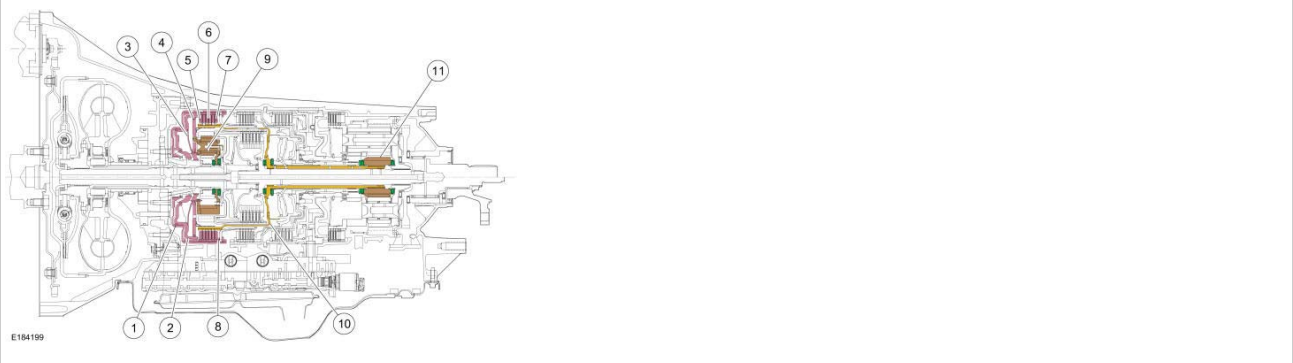
In 2nd, 3rd, 4th, 5th and 6th gear, the D2 Latch valve directs exhaust circuit pressure from the CL EXH circuit to the CL B circuit to fill the circuit and the direct clutch (B) with fluid at low pressure, approximately 21 kPa (3 psi). This keeps air out of the Clutch B circuits resulting in smooth shifts when the clutch is applied in 3rd or 5th gear.

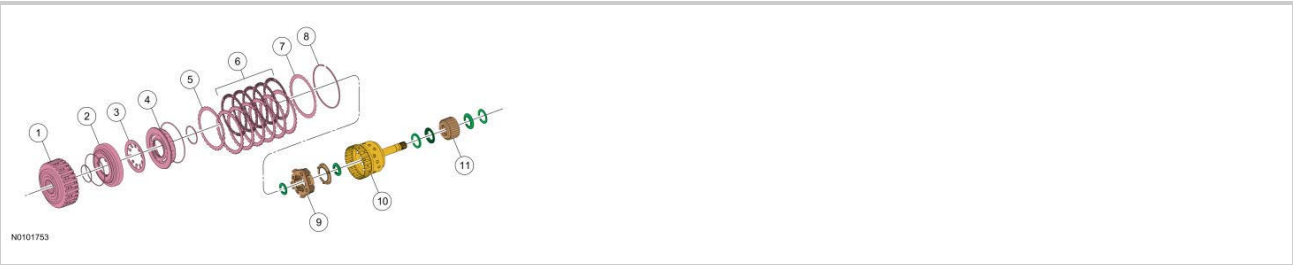
Direct Clutch (B) Released in 1st, 2nd, 4th and 6th Gear



DESCRIPTION AND OPERATION > FORWARD CLUTCH ASSEMBLY

Forward Clutch Cutaway View





Item	Description
1	Forward clutch (A) cylinder
2	Forward clutch piston

3	Forward clutch piston return spring
4	Forward clutch balance piston
5	Forward clutch wave spring
6	Forward clutch assembly (quantity model dependent)
7	Forward clutch pressure plate
8	Forward clutch snap ring (selective)
9	Front planetary carrier assembly
10	Rear planetary No. 3 sun gear hub and shaft assembly
11	Rear planetary No. 3 sun gear

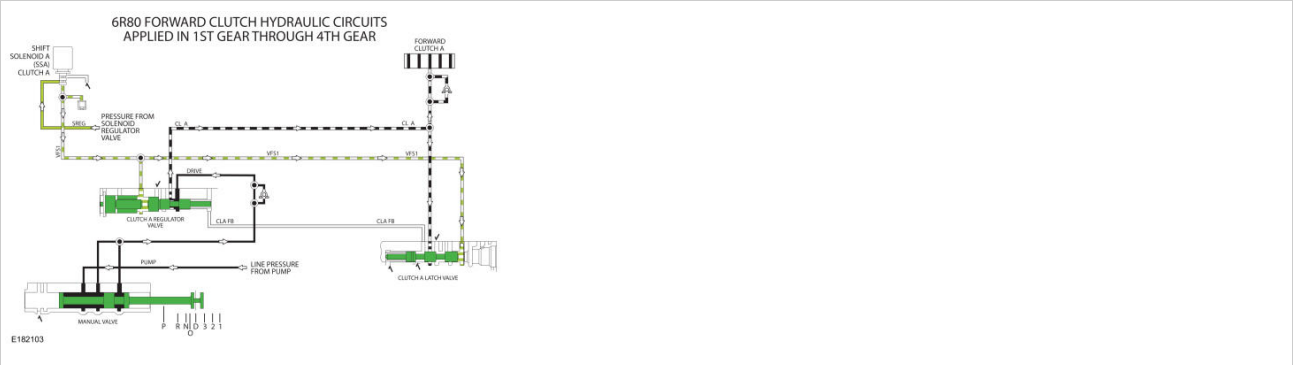
Forward Clutch Hydraulic Circuits

To apply the forward clutch, the manual valve must be in the DRIVE, 3, 2 or 1 position to provide line pressure to the clutch A regulator valve through the DRIVE circuit.

For the forward clutch to apply, SSA provides regulated solenoid pressure from the SREG circuit to the clutch A regulator and latch valves through the VFS1 circuit to position the valves.

The clutch A regulator valve provides regulated line pressure to the CL A circuit to apply the forward clutch.

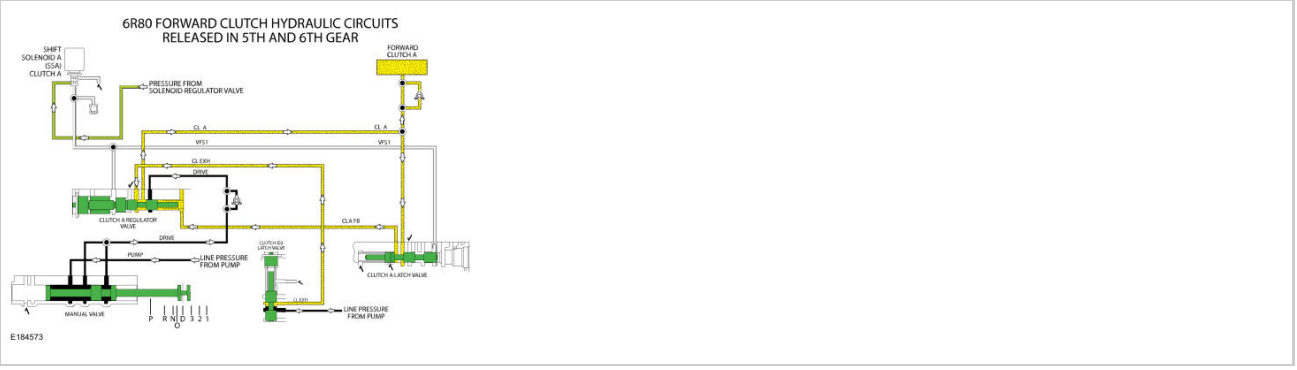
Forward (1, 2, 3, 4) Clutch Hydraulic Circuits (Applied in 1st, 2nd, 3rd and 4th gear)



The forward clutch is released when the manual valve is in the NEUTRAL, REVERSE or PARK position or the when the manual valve is in the DRIVE position with the transmission in 5th or 6th gear.

To release the forward clutch, the SSA lowers pressure to the clutch A regulator and the clutch A latch valve. This blocks the regulated line pressure in the CL A circuit to release the forward clutch.

In 2nd, 3rd, 4th, 5th and 6th gear, the D2 Latch valve directs exhaust circuit pressure from the CL EXH circuit to the CL A circuit to fill the circuit and the forward clutch with fluid at low pressure, approximately 21 kPa (3 psi). This keeps air out of the Clutch A circuits resulting in smooth shifts when the clutch is applied during a downshift into 4th gear.



DESCRIPTION AND OPERATION > INTERMEDIATE CLUTCH ASSEMBLY

Intermediate Clutch Cutaway View





Intermediate (2, 6) Clutch Exploded View

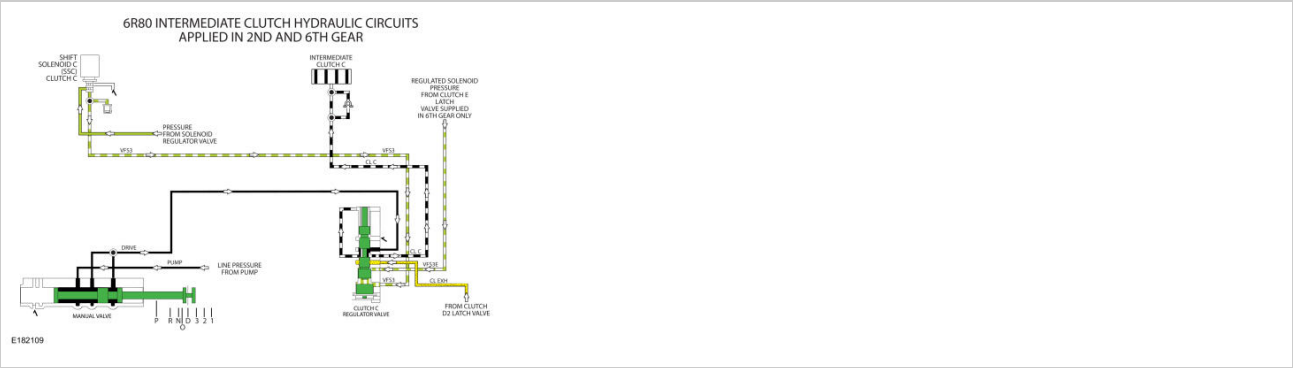
Item	Description
1	Direct clutch (B) cylinder
2	Center support retaining ring
3	Intermediate clutch (C) pressure plate retaining ring (selective)
4	Intermediate clutch pressure plate
5	Intermediate clutch assembly (quantity model dependent)
6	Intermediate clutch plate spring
7	Intermediate clutch piston return spring

8	Intermediate clutch piston
9	Center support assembly
10	Rear planetary sun gear No. 2
11	Transmission case assembly

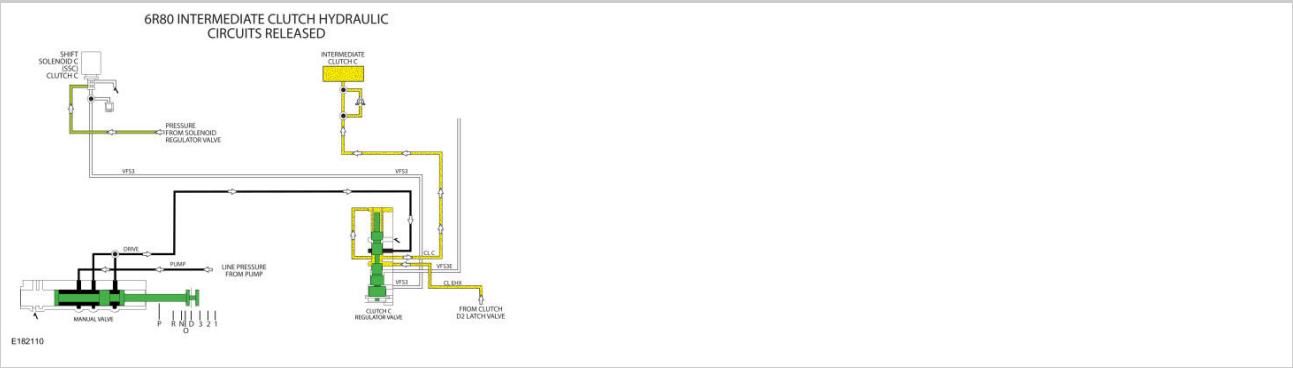
Intermediate Clutch (C) Hydraulic Circuits

To apply the intermediate clutch, the manual valve can be in the DRIVE, 3, 2 or 1 position to provide line pressure to the clutch C regulator valve through the DRIVE circuit. SSC provides regulated solenoid pressure from the SREG circuit to the clutch C regulator valve through the VFS3 circuit to position the valve to apply the intermediate clutch). As the intermediate clutch is applied, SSC increases pressure to the clutch C regulator valve. The clutch C regulator valve provides regulated line pressure to the CL C circuit to apply the intermediate clutch. In 6th gear, regulated solenoid pressure from the clutch E latch valve is supplied to the clutch C regulator valve through the VFS3E circuit. VFS3E opposes VFS3 pressure. This action effectively reduces the amount of VFS3 force acting on the regulator valve and results in a smooth shift into 6th gear.

Intermediate (2, 6) Clutch Hydraulic Circuits (Released)



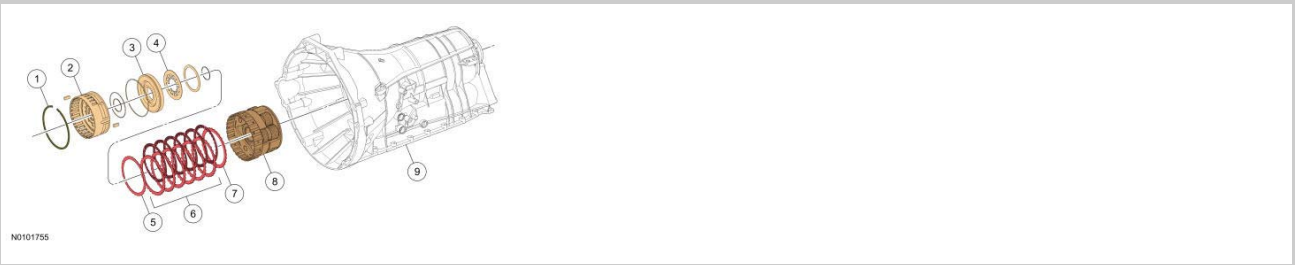
In 2nd, 3rd, 4th, 5th and 6th gear, the D2 Latch valve directs a small amount of fluid from the PUMP circuit the CL EXH circuit. When SSC is hydraulically off and the Manual Valve is in DRIVE, the Clutch C circuits are filled with fluid from the CL EXH circuit under low pressure, (21kPa/ 3 PSI). This keeps air out of the Clutch C circuits resulting in smooth shifts when the clutch is applied in 2nd and 6th gear.



DESCRIPTION AND OPERATION > LOW REVERSE CLUTCH ASSEMBLY

Low/Reverse Clutch Cutaway View



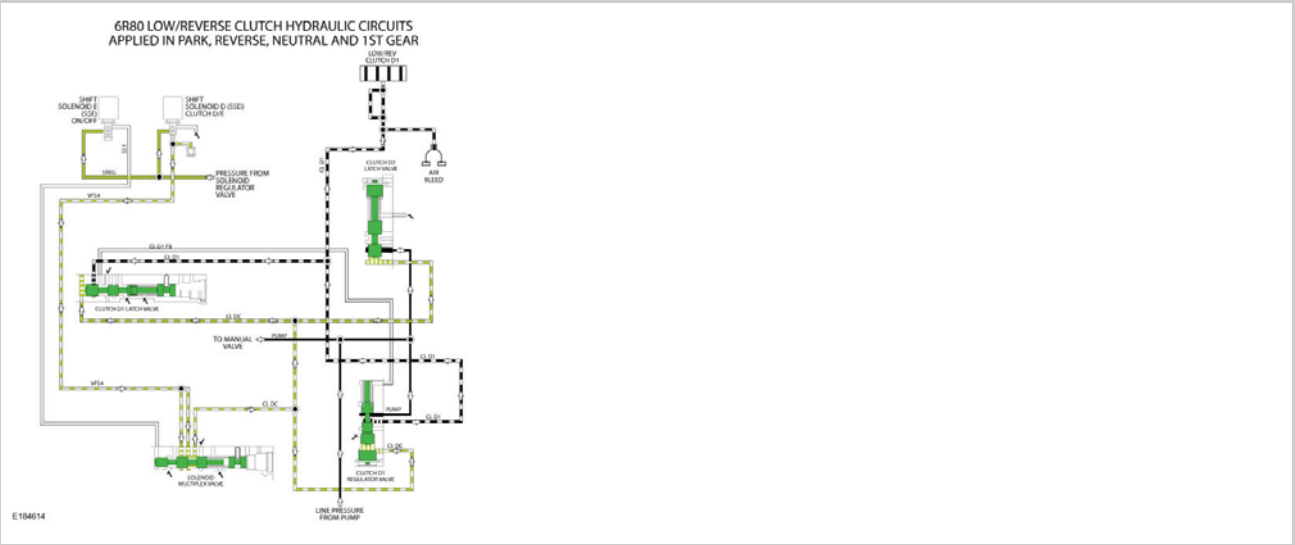


Low/Reverse Clutch Exploded View

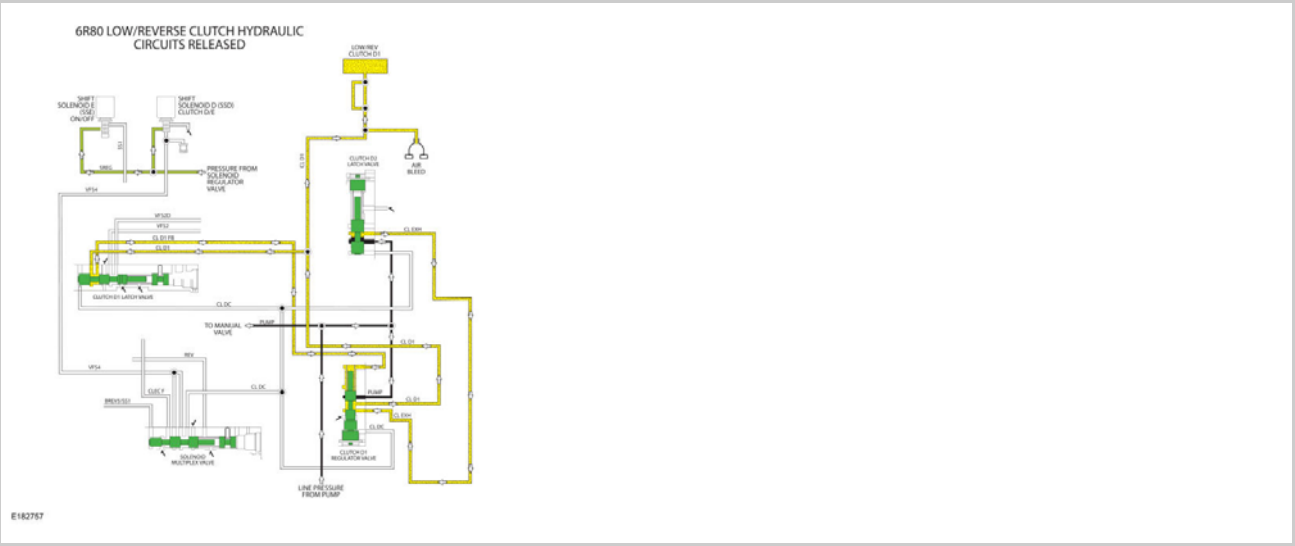
Item	Description
1	Center support retaining ring
2	Center support assembly
3	Low/reverse clutch (D) piston
4	Low/reverse clutch piston return spring
5	Low/reverse clutch disc cushion plate
6	Low/reverse clutch assembly
7	Low/reverse clutch pressure plate
8	Rear planetary carrier assembly
9	Transmission case assembly

Low/Reverse Clutch Hydraulic Circuits

To apply the low/reverse clutch, the manual valve can be in any position. Line pressure is supplied to the D1 regulator and latch valves through the PUMP circuit. SSD provides regulated solenoid pressure from the SREG circuit to the solenoid multiplex valve through the VFS4 circuit where it is directed to the D1 regulator and latch valves through the CL DC circuit to position the valves. The clutch D1 regulator valve provide regulated line pressure from the PUMP circuit to the CL D1 circuit to apply the low/reverse clutch.



In 2nd, 3rd, 4th, 5th and 6th gear, the D2 Latch valve directs a small amount of fluid from the PUMP circuit the CL EXH circuit. When SSD is hydraulically off and the Manual Valve is in DRIVE, CLD1 circuits are filled with fluid from the CL EXH circuit under low pressure, (21kPa/ 3 PSI). This keeps air out of the CLD1 circuit resulting in a smooth downshift into 1st gear.



DESCRIPTION AND OPERATION > LOW ONE-WAY CLUTCH ASSEMBLY



Low One-Way Clutch Exploded View

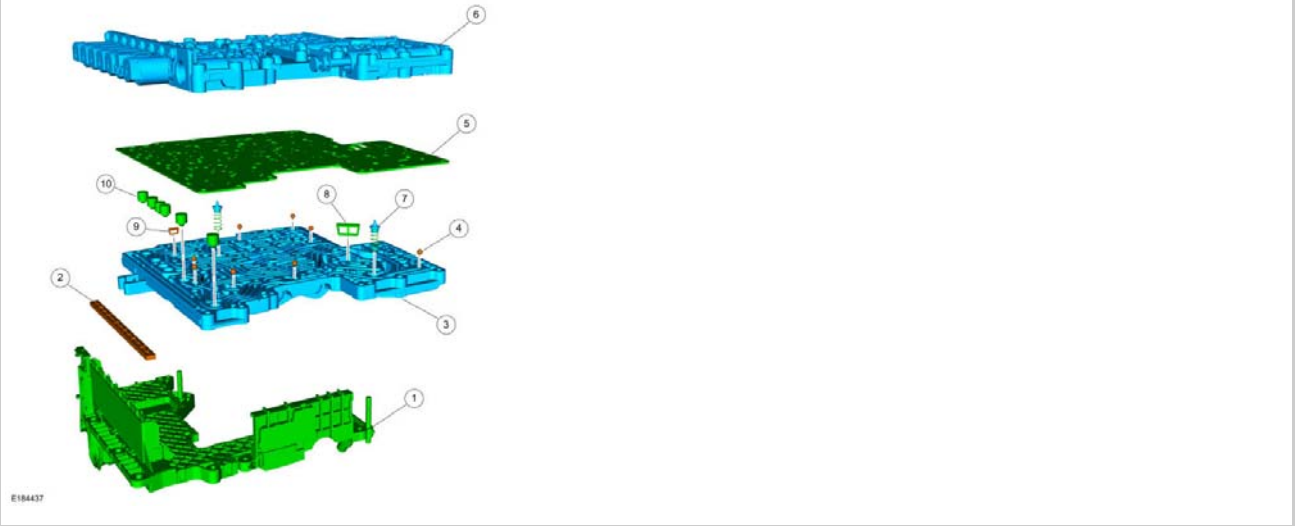
Item	Description

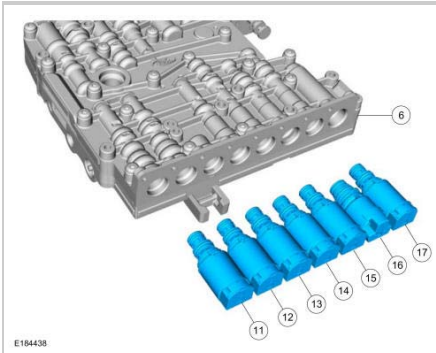
1	Center support assembly
2	Low/reverse clutch piston
3	Low/reverse clutch piston return spring
4	Low/reverse clutch piston retainer
5	Low OWC
6	Low/reverse clutch wave spring
7	Low/reverse clutch friction and steel plates
8	Low/reverse clutch pressure plate
9	Rear planetary carrier assembly
10	Transmission case assembly

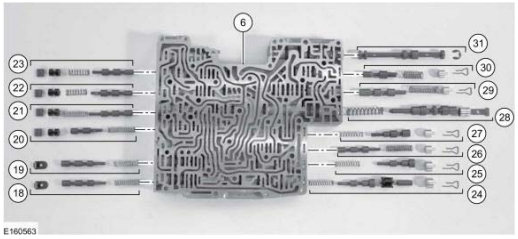
Low One-way Clutch

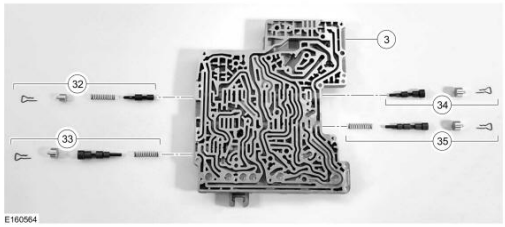
The low One-Way Clutch (OWC) is a brake clutch that holds the rear planetary carrier in one direction and allows it to freewheel in the opposite direction which eliminates engine braking in 1st gear when the transmission is in DRIVE. The low One-Way Clutch (OWC) is also the pressure plate for the low/reverse clutch.

DESCRIPTION AND OPERATION > MAIN CONTROL VALVE BODY









1	Main control / Molded leadframe
2	Foam strip seal
3	Transmission control valve body (upper)
4	Transmission control valve check ball (8 required)
5	Transmission control valve body separator plate
6	Transmission control valve body (lower)
7	Transmission control valve assembly
8	Transmission control filter assembly
9	Transmission fluid filter
10	Transmission solenoid damper valve assembly
11	Solenoid A (SSA)
12	Solenoid B (SSB)
13	Solenoid C (SSC)
14	Line Pressure Control (LPC) solenoid
15	Shift Solenoid D (SSD)
16	Shift Solenoid E (SSE)

17	Torque Converter Clutch (TCC) solenoid
18	Forward (A) clutch latch valve assembly
19	Direct (B) clutch latch valve assembly
20	Solenoid regulator valve
21	Low/reverse (D1) clutch latch valve assembly
22	Drive enable valve
23	Solenoid multiplex valve
24	Forward (A) clutch regulator valve assembly
25	Overdrive (E) clutch regulator valve assembly
26	Overdrive (E) clutch latch valve assembly
27	Bypass clutch control regulator valve assembly
28	Main regulator valve assembly
29	Converter release regulator valve assembly
30	Lubrication control valve assembly
31	Manual valve assembly
32	Low/reverse (D2) clutch latch valve assembly
33	Direct (B) clutch regulator valve assembly
34	Low/reverse (D1) clutch regulator valve assembly
35	Intermediate (C) clutch regulator valve

DESCRIPTION AND OPERATION > MAIN CONTROL VALVE BODY > MAIN CONTROL VALVE BODY



1	TSS
2	OSS
3	Molded leadframe
4	TFT
5	TR
6	Leadframe connector
7	Terminal 1
8	Terminal 16

DESCRIPTION AND OPERATION > MAIN CONTROL VALVE BODY > SOLENOID OPERATION CHART

Selector Lever Position	PCM/TCM Commanded Gear	TCC NL					
SSA NL (1, 2, 3, 4)	SSB NH (3, 5, R)	SSC NL (CB 2, 6)	SSD NH (CB L, R/C 4, 5, 6)	SSE NC			
P	P	OFF	ON	OFF	OFF	OFF	OFF
R	R	OFF	OFF	OFF	OFF	OFF	OFF
N	N	OFF	ON	OFF	OFF a	OFF	OFF
D	1	ON	ON	OFF	OFF b	OFF	OFF
2		ON	ON	ON	ON	OFF	OFF
3		ON	OFF	OFF	ON	ON	ON/OFF
4		ON	ON	OFF	OFF	ON	ON/OFF
5		OFF	OFF	OFF	OFF	ON	ON/OFF
6		OFF	ON	ON	OFF	ON	ON/OFF

a Solenoid state will change if vehicle is moving forward with the selector lever in the NEUTRAL position. Solenoid is On when vehicle is above 3 mph.

CB = Clutch brake

NC = Normally closed

NH = Normally high

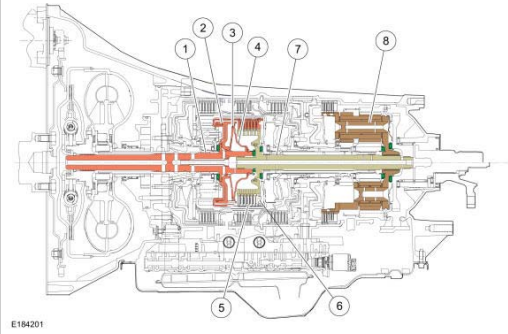
NL = Normally low

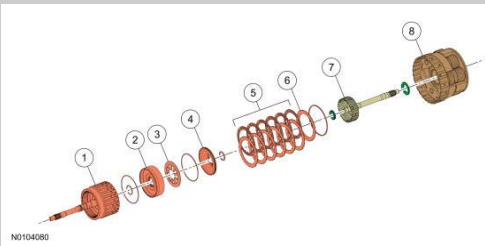
Main Control Valve Body Mechanical Operation

The main control consists of a valve body assembly with solenoids that are controlled by the PCM. The PCM operates the electrical components to provide refined engagement feel, shift feel, and shift scheduling.

DESCRIPTION AND OPERATION > OVERDRIVE CLUTCH ASSEMBLY

Overdrive (O/D) Clutch Cutaway View





Overdrive (O/D) Clutch Exploded View

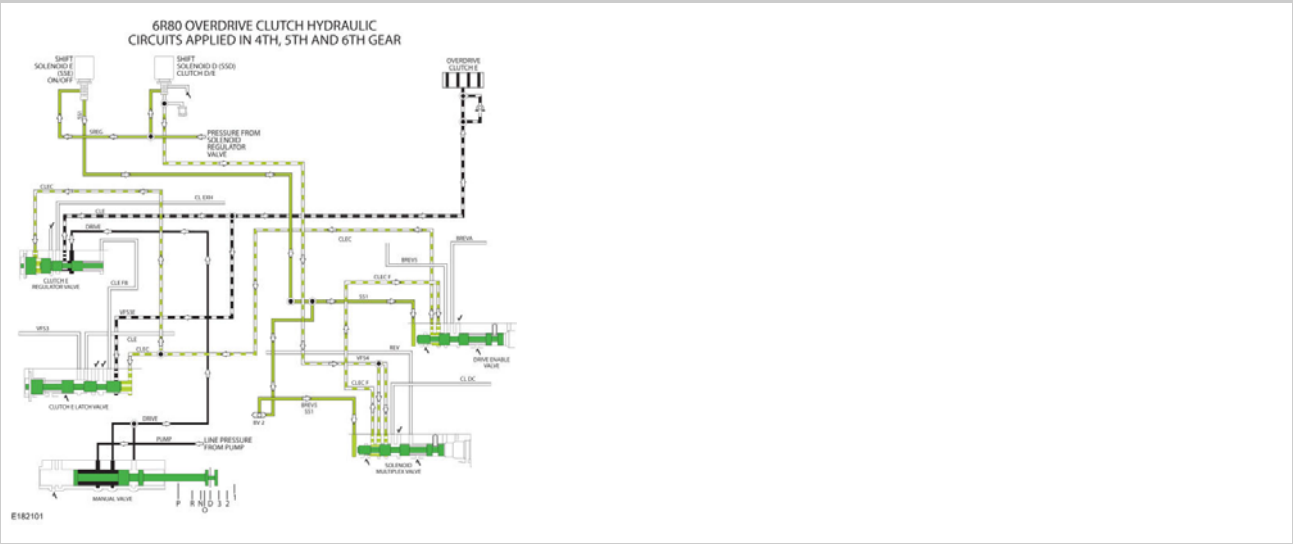
Item	Description
1	Input shaft assembly
2	Overdrive clutch piston
3	Overdrive clutch piston return spring
4	Overdrive clutch balance piston
5	Overdrive clutch friction and steel plates
6	Overdrive clutch pressure plate
7	Intermediate shaft
8	Rear planetary carrier assembly

To apply the overdrive clutch, the manual valve must be in the DRIVE position. Line pressure is supplied to the clutch E regulator valve.

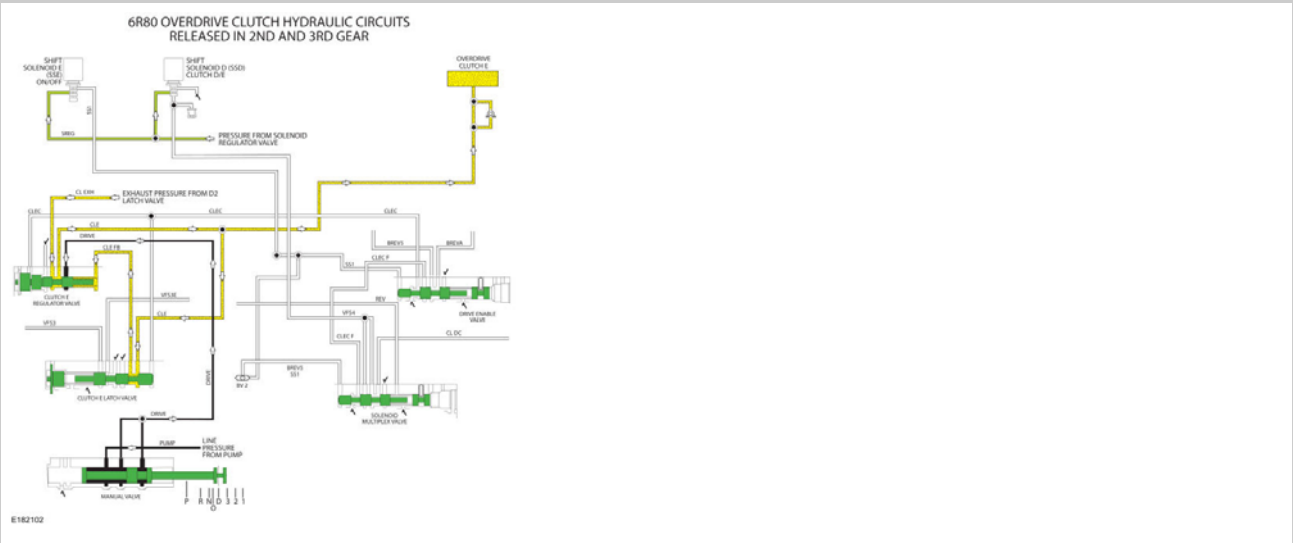
SSD provides regulated solenoid pressure from the SREG circuit to the solenoid multiplex valve through the VFS4 circuit. SSE supplies pressure to the solenoid multiplex valve and the drive enable valve to

position the valves to direct pressure from the VFS4 circuit to the CLEC F and CLEC circuits to position the clutch E regulator and latch valves to apply the overdrive clutch.

The clutch E regulator valve provides regulated line pressure from the DRIVE circuit to the CLE circuit to apply the overdrive clutch.

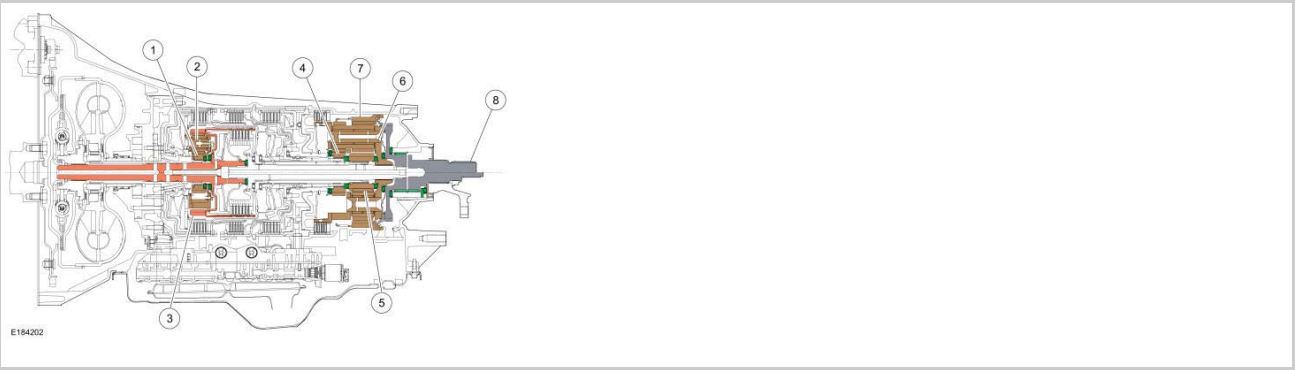


In 2nd, 3rd, 4th, 5th and 6th gear, the D2 Latch valve directs a small amount of fluid from the PUMP circuit the CL EXH circuit. When SSD is hydraulically off and the Manual Valve is in DRIVE, CLE circuits are filled with fluid from the CL EXH circuit under low pressure, (21kPa/ 3 PSI). This keeps air out of the CLE circuit resulting in a smooth shift into 4th gear.

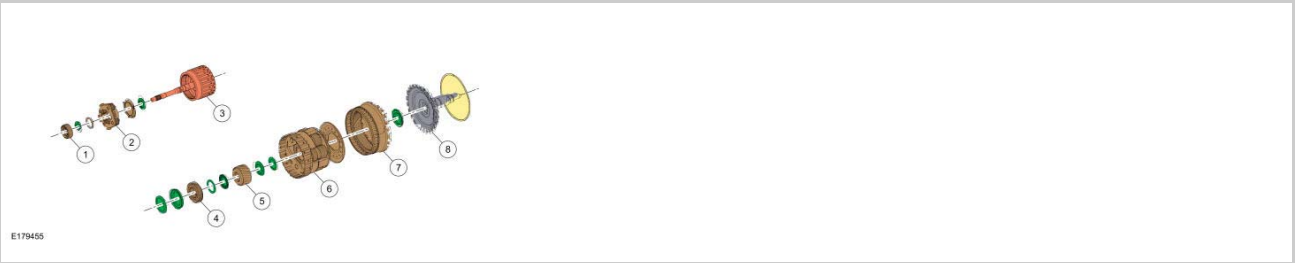


DESCRIPTION AND OPERATION > PLANETARY ASSEMBLY

Planetary Gearset Cutaway View



Planetary Gearset Exploded View



Item	Description
1	Front planetary No. 1 sun gear
2	Front planetary carrier
3	Front planetary ring gear (part of input shaft assembly)
4	Rear planetary No. 2 sun gear
5	Rear planetary No. 3 sun gear
6	Rear planetary carrier
7	Rear planetary ring gear
8	Output shaft

Mechanical Components and Functions

Planetary Gearset

This transmission has 2 planetary gearsets (front and rear) to provide operation in reverse and 6 forward speeds.

The front planetary gearset is a single planetary gearset and has the following components:

- Front planetary No. 1 sun gear
- Front planetary carrier
- Front planetary ring gear (part of the input shaft assembly)

The input shaft rotates the front ring gear as a driving member. The front sun gear is connected to the fluid pump and is held stationary. The front ring gear rotates the front planetary carrier assembly with a

reduction ratio of 1.52:1

The front planetary carrier assembly is the only output member of the front planetary gearset in reverse, 1st gear, 2nd gear and 3rd gear. The front planetary gearset provides a 1.52:1 gear ratio to the rear planetary gearset.

In 4th gear and 5th gear, both the front ring gear and front planetary carrier assembly are output members of the front planetary gearset. The front planetary gearset provides both a 1:1 and 1.52:1 gear ratio to different members of the rear planetary gearset.

In 6th gear, the front ring gear is the only output member of the front planetary gearset. The front planetary gearset provides a 1:1 gear ratio to the rear planetary gearset.

The rear planetary gearset is a ravigneaux planetary gearset and has the following components:

- Rear planetary No. 2 sun gear
- Rear planetary No. 3 sun gear
- Rear planetary carrier assembly (2 sets of pinion gears)
- Rear planetary ring gear assembly

Power flow through the rear planetary gearset is as follows:

- In reverse, rear sun gear No. 2 is driven, the rear planetary carrier is held and the ring gear is the output (2.24:1 with reverse direction)
- In 1st gear, sun gear No. 3 is driven, the rear planetary carrier is held and the ring gear is the output (2.74:1)
- In 2nd gear, sun gear No. 3 is driven, sun gear No. 2 is held and the ring gear is the output (1.54:1)
- In 3rd gear, sun gear No. 3 and sun gear No. 2 are driven and the ring gear is the output (1:1)
- In 4th gear, sun gear No. 3 and the rear planetary carrier are driven and the ring gear is the output (1.14:1)
- In 5th gear, sun gear No. 2 and the rear planetary carrier are driven and the ring gear is the output (0.87:1)
- In 6th gear, the rear planetary carrier is driven, sun gear No. 2 is held and the ring gear is the output (0.69:1)

DESCRIPTION AND OPERATION > PUMP ASSEMBLY

Pump Assembly and Transmission Fluid Filter

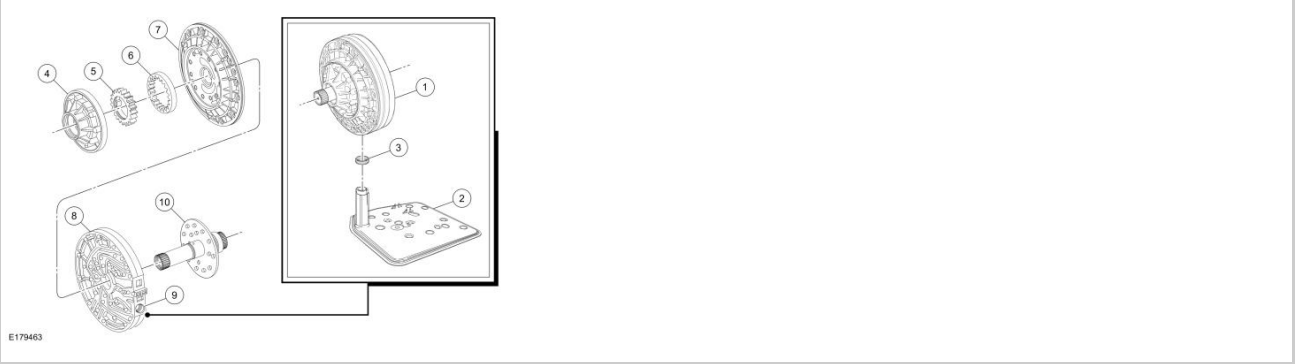
This transmission has a gear type pump that supplies transmission fluid pressure to the hydraulic system. The inner (drive) gear is turned by the torque converter hub. The transmission fluid pump has the following parts:

- Pump body, with inner (drive) and outer (driven) gears
- Centering plate

- Intermediate plate
- Stator shaft

The transmission fluid pump draws transmission fluid from the sump area, formed by the transmission fluid pan, through the transmission fluid filter, which is installed into the intermediate plate portion of the pump assembly and sealed by a rubber seal. A magnet attached to the transmission fluid pan collects any metallic material in the transmission fluid.

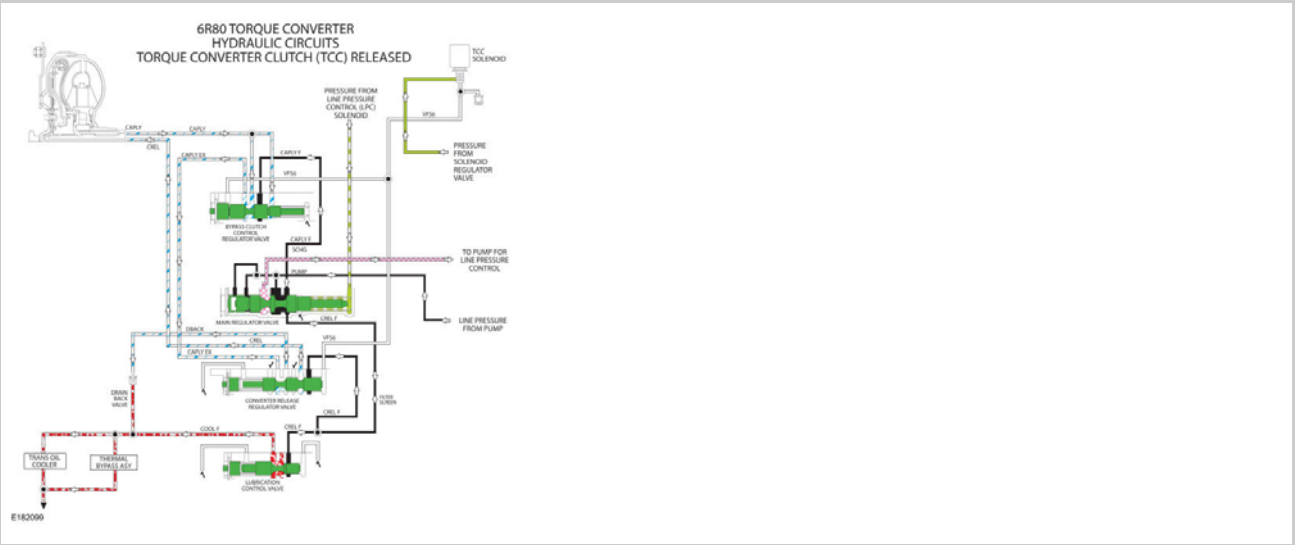
Pump Assembly and Transmission Fluid Filter Components



Item	Description
1	Transmission fluid pump assembly
2	Transmission fluid filter
3	Transmission fluid filter seal
4	Transmission fluid pump body
5	Inner (drive) gear
6	Outer (driven) gear
7	Centering plate
8	Intermediate plate
9	Filter suction port
10	Stator shaft

DESCRIPTION AND OPERATION > TORQUE CONVERTER

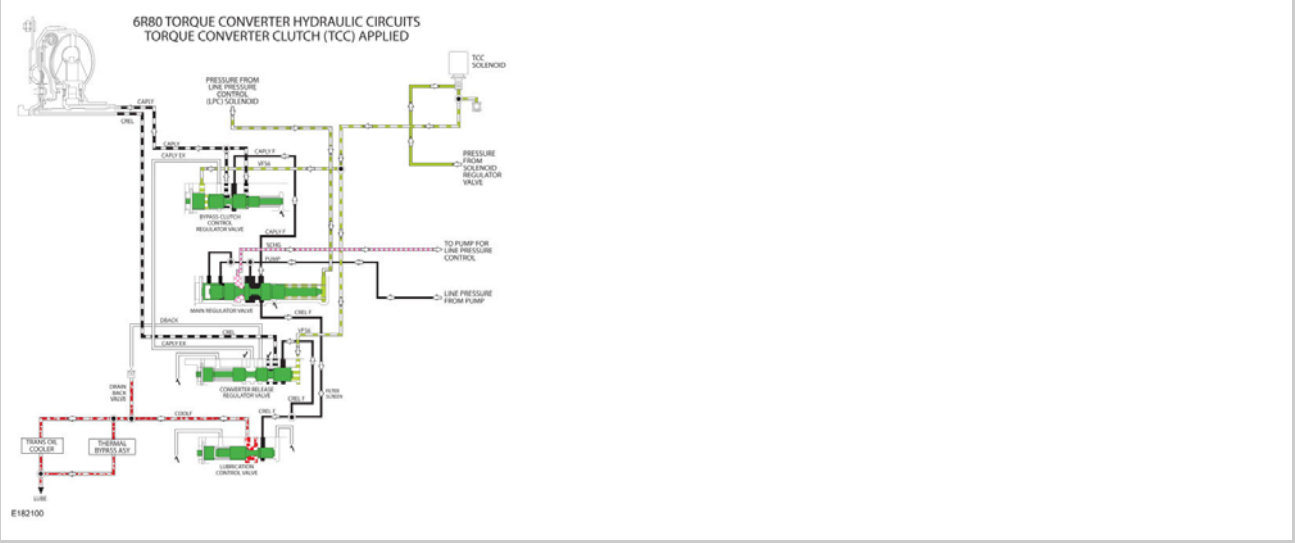
When the TCC is released, line pressure is supplied to the converter release regulator valve from the lubrication control valve through the CREL F circuit. The converter release regulator valve supplies fluid to the torque converter through the CREL circuit. Fluid exits the torque converter through the CAPLY circuit and goes to the bypass clutch control regulator valve. The bypass clutch control regulator valve directs the fluid back to the converter release regulator valve through the CAPLY EX circuit. The converter release regulator valve directs the fluid to the DBACK circuit where it supplies lubrication in the LUBE circuit.



When the TCC is applied, the TCC solenoid applies hydraulic pressure to the bypass clutch control regulator valve and the converter release regulator valve through the VFS6 circuit to position the valves.

Line pressure is supplied to the bypass clutch control regulator valve from the main regulator valve. The bypass clutch control regulator valve directs regulated line pressure to the TCC through the CAPLY circuit to apply the TCC.

Fluid exits the torque converter through the CREL circuit and goes to the converter release regulator valve.



DESCRIPTION AND OPERATION > TRANSMISSION DESCRIPTION - OVERVIEW > OVERVIEW



This transmission uses planetary gears with hydraulic electronic controls.

This transmission has the following features:

- Six forward speeds
- Torque converter with an integral converter clutch
- Electronic shift and pressure controls
- Single planetary gear set
- Double planetary gear set
- Two fixed multi-disc clutches
- Three multi-plate clutches

All hydraulic functions are directed by electronic solenoids to control the following:

- Engagement feel
- Shift feel
- Shift scheduling
- Modulated TCC applications

This transmission has a main control unit which contains:

- TSS sensor
- OSS sensor
- An integral transmission range sensor
- TFT sensor

Engine power reaches the transmission by a torque converter with an integral clutch. The 6 forward gears and one reverse gear are obtained from 2 planetary gearsets.

Gear selection is achieved by the control of automatic transmission fluid flow to operate various internal clutches. The PCM operates the electrical components and provides for the control of gear selection shift pressure, which increases refinement and torque converter slip.

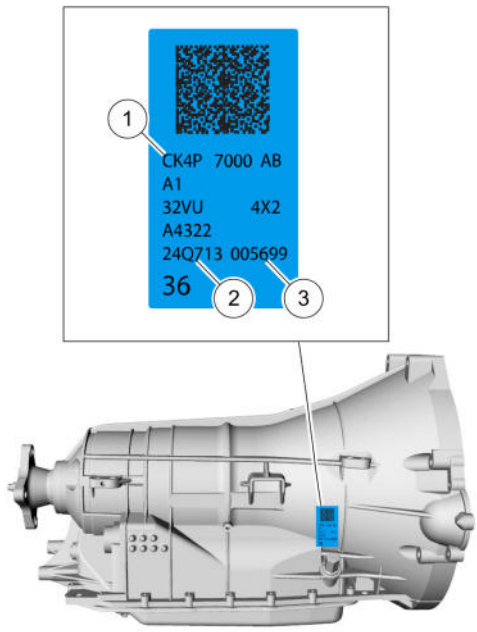
In the event of a system fault, the PCM also provides for Failure Mode Effect Management to maintain

maximum functional operation of the transmission with a minimum reduction in driver, passenger or vehicle safety. In the event of a total loss of control or electrical power, the basic transmission functions P, R, N and D are retained. Also 3rd or 5th gear is retained by the hydraulic system. The gear retained is dependent upon the gear selected at the time of the failure.

This transmission has an internal thermal bypass valve contained within the case.

DESCRIPTION AND OPERATION > TRANSMISSION DESCRIPTION - OVERVIEW > IDENTIFICATION TAGS

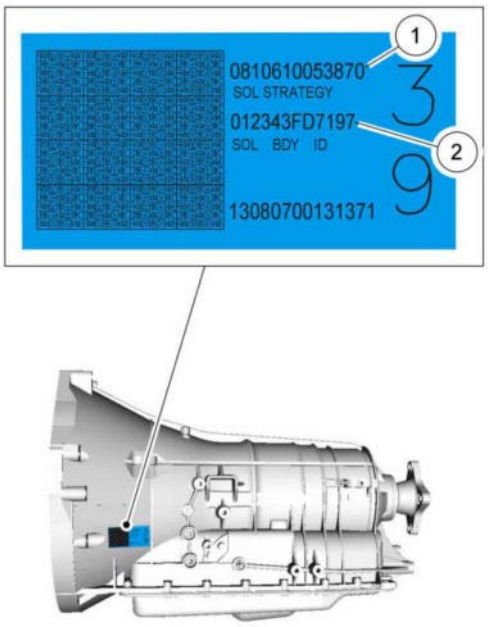
All vehicles come equipped with a Vehicle Certification Label. The location on the label marked TR is reserved for the transmission code. Refer to: IDENTIFICATION_CODES . All transmissions are equipped with an identification tag located on the transmission case. For transmission part number, serial number and build date, see the transmission identification tag located on the transmission case.



E181705

Item	Description
1	Part number
2	Build date
3	Serial number

DESCRIPTION AND OPERATION > TRANSMISSION DESCRIPTION - OVERVIEW > ORIGINAL SOLENOID BODY TAG

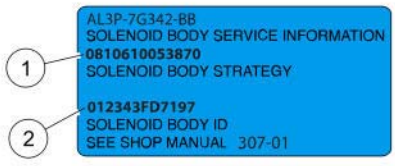


E160542

Item	Description
1	13 Digit Solenoid Strategy
2	12 Digit Solenoid body identification

The solenoid body strategy is programmed into the PCM to control the shift, Line Pressure Control (LPC) and TCC solenoids to prevent harsh shifts. The solenoid body tag on the transmission case contains the 13-digit solenoid body strategy and the 12-digit solenoid body identification. Letters are not used in the 13 digit solenoid body strategy. The characters consist of all numbers.

DESCRIPTION AND OPERATION > TRANSMISSION DESCRIPTION - OVERVIEW > REPLACEMENT SOLENOID BODY TAG



E181713

Item	Description
1	13 Digit Solenoid Strategy
2	12 Digit Solenoid body identification

When a new solenoid body is installed, a new solenoid body strategy file is downloaded into the PCM. A replacement solenoid body tag is supplied with the new solenoid body which contains the 13-digit solenoid body strategy and the 12-digit solenoid body identification. The new tag is placed over the original solenoid body tag.

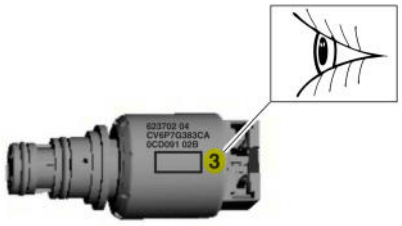
DESCRIPTION AND OPERATION > TRANSMISSION DESCRIPTION - OVERVIEW > MAIN CONTROL SOLENOID BODY STRATEGY IDENTIFICATION



E184453

If the solenoid body strategy etched on the main control does not match what the scan tool displays, the solenoid body strategy must be downloaded into the PCM or harsh shifts will result.

DESCRIPTION AND OPERATION > TRANSMISSION DESCRIPTION - OVERVIEW > SOLENOID BAND NUMBER



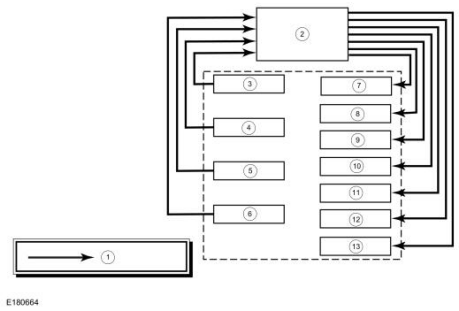
E150961

The solenoids are calibrated from the factory and are not all the same. The solenoids can be replaced separately, but only with a replacement solenoid with a injector nozzle and band number that matches the solenoid being replaced. When solenoid(s) are replaced, the new solenoid band number must match the old solenoid band number. The band number is next to the two-dimensional matrix barcode on the side of the solenoid and will be a 1, 2, 3, 4 or 5.

DESCRIPTION AND OPERATION > TRANSMISSION DESCRIPTION - SYSTEM

OPERATION AND COMPONENT DESCRIPTION

System Diagram



Item	Description
1	Hardwire Connection
2	PCM
3	TFT
4	TR
5	TSS
6	OSS
7	LPC
8	SSA
9	SSB
10	SSC
11	SSD
12	SSE
13	TCC

Network Message Chart

Broadcast Message	Originating Module	Message Purpose
Engine Speed	PCM	Directly affects shift scheduling, TCC control, line pressure and transmission diagnostics. Indirectly affects shift pressure control.
Engine torque estimate	PCM	Directly affects shift pressure control, TCC control and transmission diagnostics. Indirectly affects shift scheduling and TCC scheduling.
APP	PCM	Directly affects shift scheduling, TCC scheduling and transmission diagnostics. Indirectly affects TCC control and shift control.

Commanded engine torque	PCM	Directly affects shift scheduling, TCC scheduling and transmission diagnostics. Indirectly affects shift control.
BPP	PCM	Directly affects shift scheduling and TCC scheduling

System Operation

The PCM and its input/output network controls the following operations:

Shift timing

Line pressure (shift feel)

The transmission control strategy is separate from the engine control strategy in the PCM, although some of the input signals are shared. When determining the best operating strategy for transmission operation, the PCM uses input information from engine and driver related sensors and switches.

In addition, the PCM receives input signals from transmission related sensors and switches. The PCM uses these signals when determining transmission operating strategy.

Using all of these input signals, the PCM can determine when the time and conditions are right for a shift or when to apply or release the TCC. It also determines the best line pressure to optimize shift engagement feel. To accomplish this, the PCM uses output solenoids to control transmission operation.

The transmission control strategy is separate from the engine control strategy in the PCM, although some of the input signals are shared. When determining the best operating strategy for transmission operation, the PCM uses input information from engine and driver related sensors and switches. In addition, the PCM receives input signals from transmission related sensors and switches. The PCM uses these signals when determining transmission operating strategy. Using all of these input signals, the PCM can determine when the time and conditions are right for a shift or when to apply or release the TCC. It also determines the best line pressure to optimize shift engagement feel. To accomplish this, the PCM uses output solenoids to control transmission operation.

Component Description

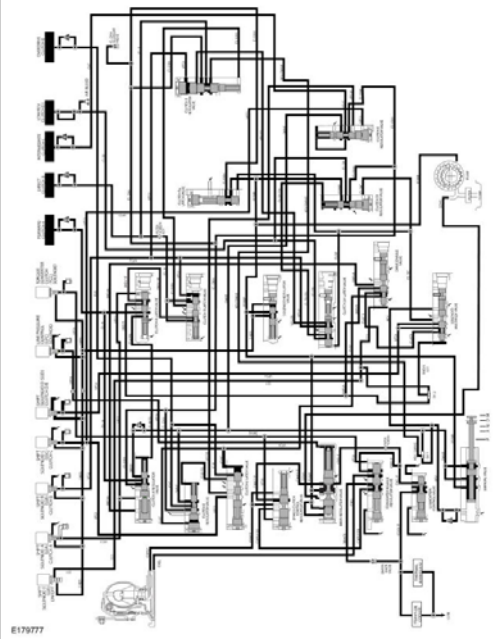
Sensors and Switches

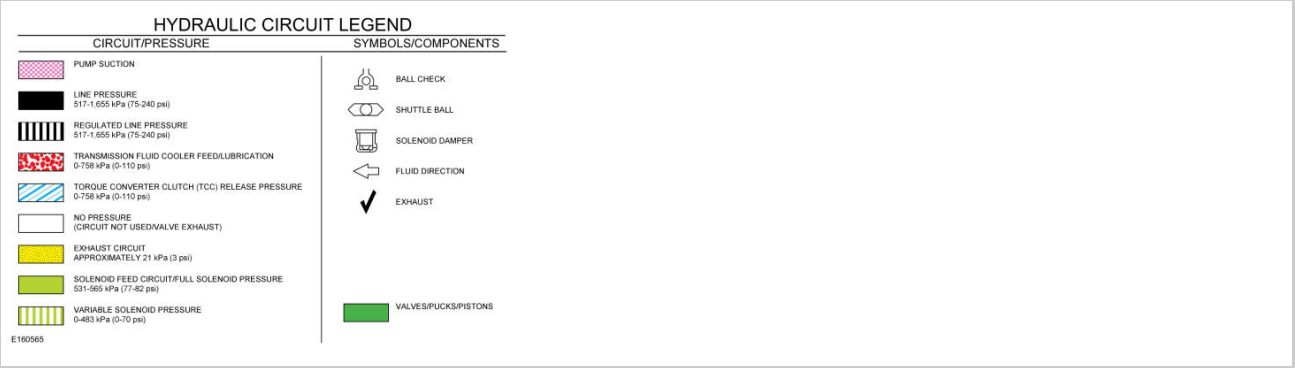
The PCM controls the electronic functions of this transmission. The PCM receives input signals from engine and transmission sensors and uses these inputs to control line pressure, shift time, TCC and shift solenoids.

Item	Description
TFT Sensor	This sensor is located in the transmission solenoid body. It is a temperature-sensitive device called a thermistor. The resistance value of the TFT sensor will vary with temperature change. The PCM monitors the voltage across the TFT sensor to determine the temperature of the transmission fluid. The PCM uses this initial signal to determine whether a cold start shift schedule is necessary. The cold start shift schedule allows delayed shifts when the transmission fluid is cold to help warm the transmission fluid. The PCM also inhibits TCC operation at low transmission fluid temperatures and

	adjusts line pressure for temperature.
TR Sensor	The TR sensor has a 6-pin electrical connector. The TR sensor is located on the inside of the transmission at the manual control lever. The TR sensor sends a signal to the PCM to start the vehicle in PARK and NEUTRAL. The TR sensor opens/closes a set of 4 switches that are monitored by the PCM to determine the position of the manual control lever.
TSS Sensor	This TSS sensor is a Hall-effect pickup that sends a signal to the PCM that indicates transmission turbine shaft input speed. The TSS information is compared to engine RPM to determine TSS performance. TSS is also compared to OSS to determine shift quality and clutch performance.
OSS Sensor	The OSS sensor is a Hall-effect pickup, located on the transfer shaft drive gear, that sends a signal to the PCM to indicate transmission output speed. The OSS is used for shift scheduling. OSS is also compared to TSS to determine shift quality and clutch performance.

Hydraulic System Diagram





Hydraulic Circuit Identification Chart

Circuit Name	Description
BREVA	BREV5 pressure from the drive enable valve to the clutch A regulator valve.
BREV5	BREV 5F pressure from the clutch A latch valve to the drive enable valve and the No. 2 shuttle ball.
BREV 5F	Regulated line pressure from the CL B circuit directed to the A clutch latch valve by the B clutch latch valve.
BREV5/SS1	BREV5 or SS1 pressure from the No. 2 shuttle ball to the solenoid multiplex valve.
CAPLY	Apply circuit to the torque converter, also the return circuit during TCC release.
CAPLY EX	TCC releases pressure from the bypass clutch control regulator valve to the converter release regulator valve.
CAPLY F	Line pressure from the PUMP circuit directed to the bypass clutch control regulator valve by the main regulator valve.
CL A	Regulated line pressure from the clutch A regulator valve to the clutch A latch valve and the forward (A) clutch to apply the clutch.
CLA FB	Regulated line pressure from the clutch A latch valve that feeds back to the clutch A regulator valve.
CL B	Regulated line pressure from the clutch B regulator valve to the clutch B latch valve and the direct (B) clutch to apply the clutch.
CLB FB	Regulated line pressure from the clutch B latch valve that feeds back to the clutch B regulator valve.

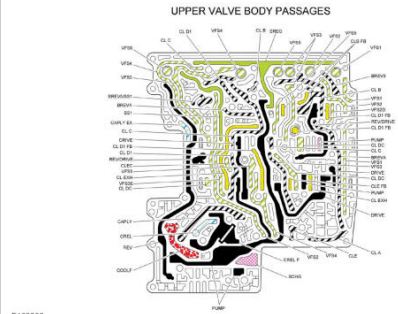
CL C	Regulated line pressure from the clutch C regulator valve to the intermediate (C) clutch to apply the clutch.
CL D1	Regulated line pressure from the clutch D1 regulator valve to the clutch D1 latch valve and the low/reverse (D) clutch to apply the clutch.
CL D1 FB	Regulated line pressure from the clutch D1 latch valve that feeds back to the clutch D1 regulator valve.
CL D2	Regulated line pressure from the clutch D2 regulator valve to the low/reverse (D) clutch to apply the clutch.
CL DC	Regulated solenoid output pressure from SSD directed by the solenoid multiplex valve to the D1 and D2 regulator and latch valves to apply the low/reverse (D) clutch.
CLE	Regulated line pressure from the clutch E regulator valve to the clutch E latch valve and the Overdrive (O/D) (E) clutch to apply the clutch.
CLEC	Regulated solenoid output pressure from the CLEC F circuit directed by the drive enable valve to the clutch E regulator and latch valves to apply the clutch.
CLEC F	Regulated solenoid output pressure from the VFS4 circuit directed to the drive enable valve by the solenoid multiplex valve to move the clutch E regulator and latch valves to apply the O/D (E) clutch.
CLE FB	Regulated line pressure from the clutch E latch valve that feeds back to the clutch E regulator valve.
CL EXH	Line pressure regulated to approximately 21 kPa (3 psi) by the D2 latch valve that supplies exhaust pressure to the A, B, C, D1 and E clutch when the clutches are released.
COOLF	Pressure from the lubrication control valve to the oil cooler or the thermal bypass valve that feeds the lubrication circuit.
CREL	Pressure supplied to the torque converter by the converter release regulator valve to release the TCC.
CREL F	Line pressure from the main regulator valve that supplies the converter release regulator valve and the lubrication control valve.

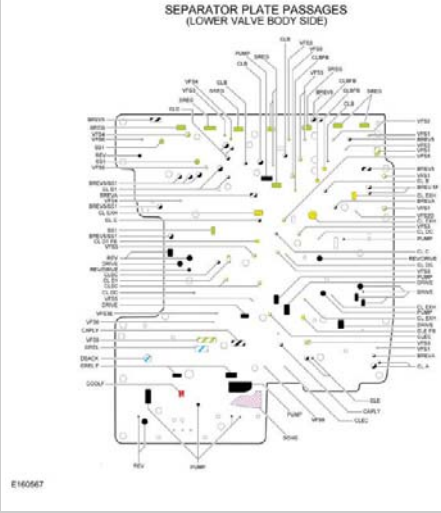
DBACK	CAPLY EX pressure directed to the drain back valve by the converter release regulator valve.
DRIVE	Line pressure directed by the manual valve to the A, C and E clutch regulator valves and the No. 1 shuttle ball.
LUBE	Transmission lubrication circuit supplied by the COOLF circuit after the fluid circulates the transmission fluid cooler or is returned by the cooler bypass valve.
PUMP	Line pressure supplied by the pump to the manual valve, solenoid pressure regulator valve, main regulator valve, clutch D1 regulator valve, clutch D2 regulator valve and clutch D2 latch valve.
REV	Line pressure from the manual valve to the No. 1 shuttle ball and the solenoid multiplex valve.
REV/DRIVE	REV or DRIVE pressure from the No. 1 shuttle ball to the clutch B regulator valve.
SCHG	Line pressure from the main regulator valve to the pump suction port.
SREG	Line pressure from the solenoid regulator valve that supplies pressure to the 7 solenoids, SSA, SSB, SSC, SSD, SSE, TCC solenoid and LPC solenoid.
SS1	Solenoid output pressure from SSE to the drive enable valve and to shuttle ball No. 2 to direct SSD output pressure to clutch E regulator and latch valves to apply the O/D (E) clutch.
VFS1	Solenoid output pressure from SSA to the A clutch regulator and latch valve to apply the forward (A) clutch.
VFS2	Solenoid output pressure from SSB to the B clutch regulator and latch valve to apply the direct (B) clutch and is also routed to the D1 latch valve.
VFS2D	SSB output pressure from the VFS2 circuit directed to the clutch B regulator valve by the D1 latch valve.
VFS3	Solenoid output pressure from SSC to the C clutch regulator valve to apply the intermediate (C) clutch and is also routed to the clutch E latch valve.
VFS3E	SSC output pressure from the VFS3 circuit directed to the clutch C regulator valve by the clutch E latch valve.
VFS4	Solenoid output pressure from SSD to the solenoid multiplex valve to apply either the D or E clutch.

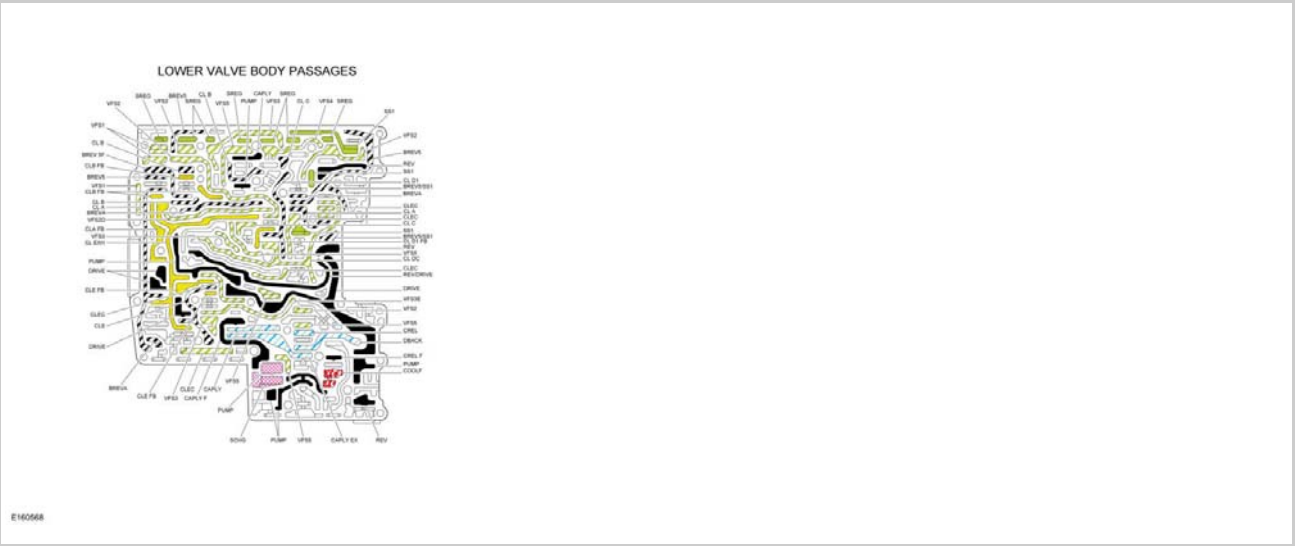
VFS5	Solenoid output pressure from the LPC solenoid to the main regulator valve to control line pressure.
VFS6	Solenoid output pressure from the TCC solenoid to the bypass clutch control regulator valve and the converter release regulator valve to control the TCC.

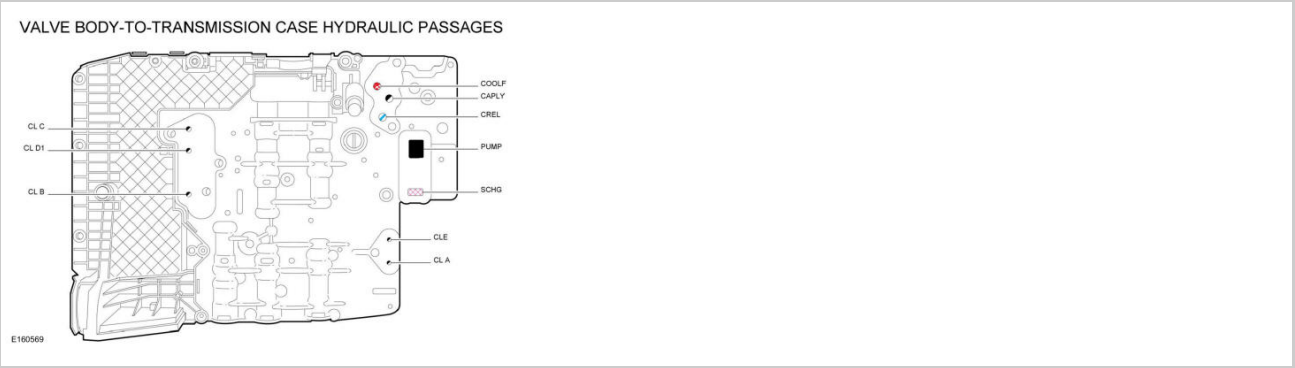
Valve Body Maps for Solenoid and Line Pressure

Solenoid Body Hydraulic Passages







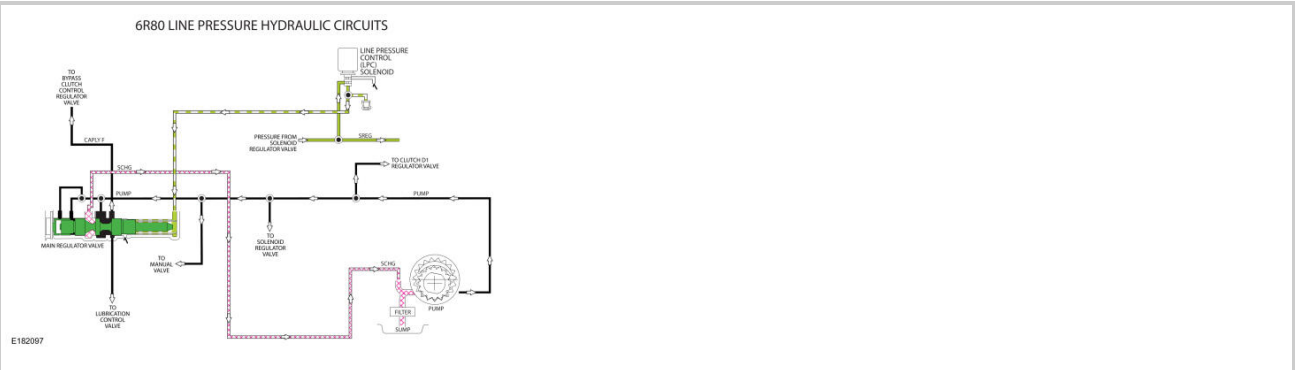


Line Pressure Hydraulic Circuits

The PCM controls line pressure with the LPC solenoid. Varying pressure from the LPC solenoid effects shift feel while allowing sufficient pressure for clutch application.

When the engine is running, the pump supplies pressure to the main regulator valve through the PUMP circuit. The position of the main regulator valve controls line pressure (in the PUMP circuit). Pressure from the LPC solenoid through the VFS5 circuit controls the position of the main regulator valve.

The main regulator valve varies pressure in the SCHG circuit. The higher the pressure in the SCHG circuit, the lower the line pressure (PUMP circuit) is. As SCHG pressure decreases, line pressure (PUMP circuit) increases.



Lubrication Hydraulic Circuits

The main regulator valve supplies pressure to the lubrication control valve through the CREL F circuit.

When the TCC is applied, the lubrication control valve supplies the transmission lubrication through the COOLF circuit to the LUBE circuit.

When the TCC is released, return fluid from the torque converter is supplied to the LUBE circuit through the CAPLY, CAPLY EX and DBACK circuits.

Pressure in the LUBE circuit either circulates through the thermal bypass valve when TFT is below operating temperature or through the transmission fluid cooler when the transmission fluid is at or above operating temperature. Return fluid from the thermal bypass valve or the transmission fluid cooler enters the input shaft through the pump assembly and flows through passages in the input shaft, intermediate shaft and output shaft to provide lubrication for the transmission.



Transmission Electronic Control System

The PCM control the electronic functions of this transmission. A plastic molded leadframe is bolted to the main control assembly. The leadframe contains the TSS, OSS, TFT and TR sensors.

The PCM receives input signals from engine and transmission sensors and uses these inputs to control line pressure, shift time, TCC, and shift solenoids. The PCM also provides power and ground for the reverse lamp relay coil and provides a PARK/NEUTRAL start enable signal.

The following is a list of direct engine and driver inputs to the PCM along with module information from the vehicle CAN:

- Engine speed
- Engine torque
- ECT
- Engine Oil Temperature (EOT)
- TP
- APP
- BPP
- ABS wheel speed
- Traction Control (ATC) status

The PCM also:

- Monitors inputs and outputs for the presence of faults.

- Stores DTCs related to detected faults.
- Provides outputs on the CAN for TR, OSS, TSS, TFT, current gear and A/C inhibit.
- Provides OBD information using the CAN to illuminate the MIL or Transmission Control Indicator Lamp (TCIL).
- Provides diagnostic information to a scan tool through the DLC.

If the PCM detects a system or component fault, it substitutes a default value or signal using Failure Mode and Effect Management strategies.

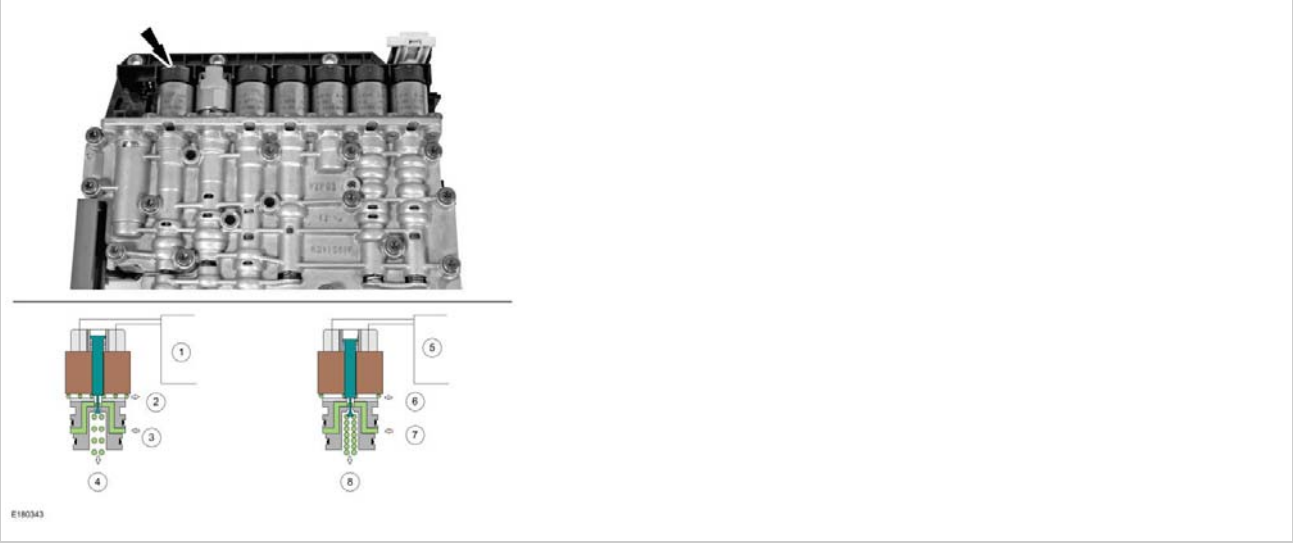
The PCM also uses Failure Mode and Effect Management strategies to compensate for electrical or mechanical shift solenoid and apply component faults that result in alternate shift patterns.

If the transmission loses complete electronic control, it operates in a fail-safe mode with:

- Maximum line pressure in all transmission ranges
- Functional PARK, REVERSE and NEUTRAL positions
- Operation in 3rd or 5th gear (depending on the failure conditions) when the selector lever is in the DRIVE, 3, 2 or 1 position
- TCC is released in all transmission ranges and gears

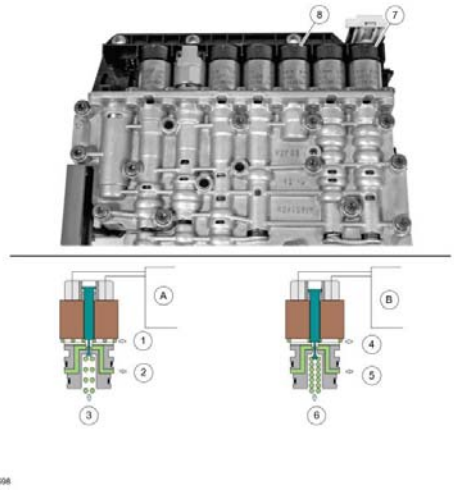
Torque Converter Clutch (TCC) Proportional (VFS)

The TCC solenoid is a VFS that varies hydraulic pressure by actuating a hydraulic valve. The PCM applies variable current to the TCC solenoid which varies pressure in the VFS6 hydraulic circuit to the Converter Release Regulator Valve and the Bypass Clutch Control Regulator Valve. The TCC solenoid uses proportional operation. As the current from the PCM decreases, the pressure from the solenoid decreases. As the current from the PCM increases, the pressure from the solenoid increases. The TCC solenoid is supplied hydraulic pressure from the SREG circuit. With zero current, the TCC solenoid fully closes the hydraulic valve which applies the minimum amount of hydraulic pressure to the Converter Release Regulator Valve and the Bypass Clutch Control Regulator Valve through the VFS6 hydraulic circuit and releases the TCC. With maximum current to the solenoid, the hydraulic valve fully opens the outlet port for maximum pressure to the VFS6 hydraulic circuit to apply the TCC.



Item	Description
1	Low Current
2	Low Exhaust
3	SREG Circuit Fluid (Supply)
4	High Pressure To VFS5 Hydraulic Circuit
5	High Current
6	High Exhaust
7	SREG Circuit Fluid (Supply)
8	Low Pressure To VFS5 Hydraulic Circuit

Shift Solenoid A (SSA), Shift Solenoid B (SSB), Shift Solenoid C (SSC) and Shift Solenoid D (SSD)



Item	Description
A	Low Current
B	High Current
1	High Exhaust
2	SREG Circuit Fluid (Supply)
3	Low Pressure To Clutch Regulator And Latch Valves
4	Low Exhaust
5	SREG Circuit Fluid (Supply)
6	High Pressure To Clutch Regulator And Latch Valves
7	SSA) Variable Force Solenoid (VFS)
8	SSC VFS

SSB and SSD use inverse proportional operation. As the current from the PCM decreases, the pressure from the solenoid increases. As the current from the PCM increases, the pressure from the solenoid decreases. SSB and SSD are supplied hydraulic pressure from the SREG circuit.

With zero current, SSB and SSD fully open the hydraulic valves which applies maximum hydraulic pressure to the regulator and latch valves to apply the clutch that it controls. With maximum current to the solenoids, the hydraulic valve fully closes to apply zero amount of hydraulic pressure to the regulator and latch valves of the clutch that it controls and releases the clutch.

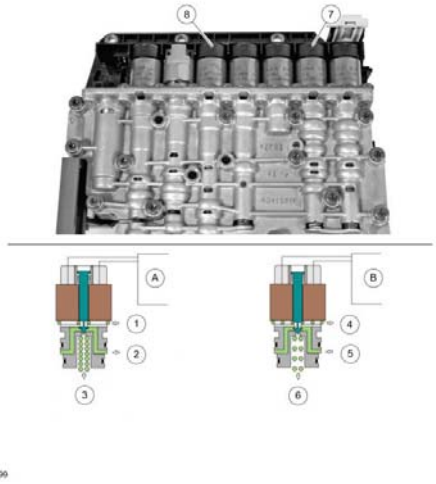
Shift solenoids A through D are VFS that vary hydraulic pressure by actuating a hydraulic valve.

The PCM applies variable current to the shift solenoids which varies pressure in the hydraulic circuit to the regulator and latch valves of the clutch that it controls.

SSA and SSC use proportional operation. As the current from the PCM decreases, the pressure from the solenoid decreases. As the current from the PCM increases, the pressure from the solenoid increases. SSA and SSC are supplied hydraulic pressure from the SREG circuit.

With zero current, SSA and SSC fully close the hydraulic valves which applies zero amount of hydraulic pressure to the regulator and latch valves of the clutch that it controls and releases the clutch. With maximum current to the solenoids, the hydraulic valves fully open for maximum pressure to the regulator and latch valves to apply the clutch.

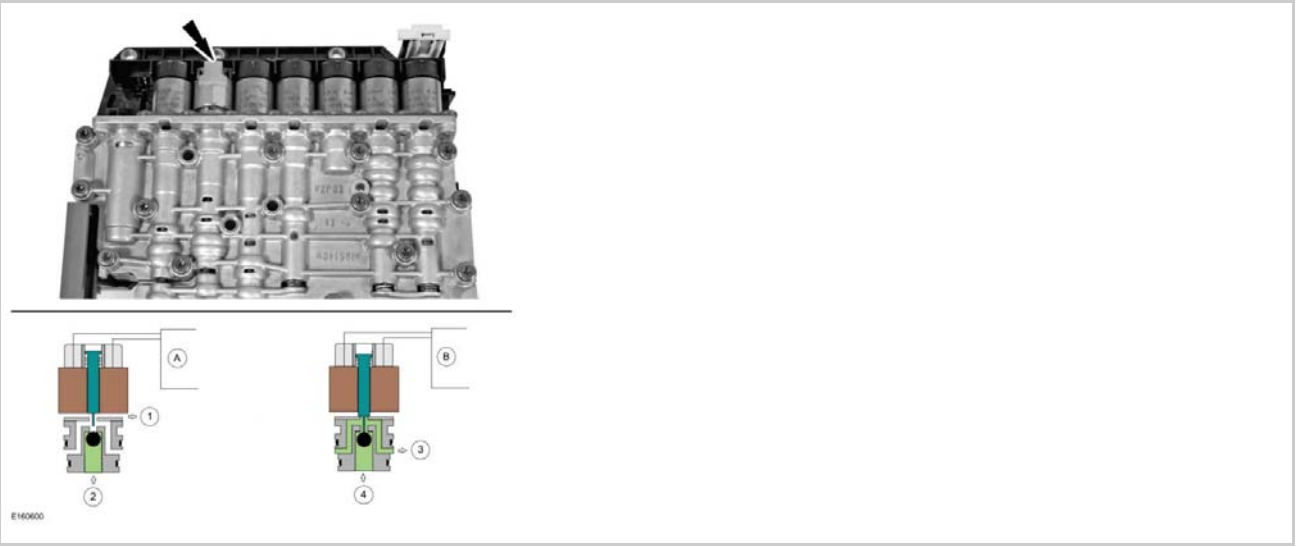
Shift Solenoid B (SSB) and Shift Solenoid D (SSD) Inverse Proportional Variable VFS



Item	Description
A	Low Current
B	High Current
1	Low Exhaust
2	SREG Circuit Fluid (Supply)
3	Low Pressure To Clutch Regulator And Latch Valves
4	High Exhaust
5	SREG Circuit Fluid (Supply)

6	High Pressure To Clutch Regulator And Latch Valves
7	Shift Solenoid B (SSB) Variable Force Solenoid (VFS)
8	SSD VFS

Shift Solenoid E (SSE) ON/OFF Solenoid



Item	Description
A	Off
B	On
1	Exhaust Port Connects To Outlet Port (SS1 Circuit)
2	SREG Circuit Fluid (Supply)
3	Outlet Port (SS1 Circuit)
4	SREG Circuit Fluid (Supply)

Turbine Shaft Speed (TSS) Sensor

The TSS is a Hall-effect type sensor that provides a signal to the PCM that changes in frequency as the rotating speed of the forward (1, 2, 3, 4) clutch cylinder varies.

The PCM compares the TSS sensor signal with the engine speed information to determine the amount of slip occurring in the torque converter.

The PCM also compares the TSS sensor signal with the OSS sensor signal to determine the gear ratio provided by the rear planetary gearset.

The PCM uses the TSS sensor signal as an input for its strategies for shifts and TCC operation. The PCM also uses the TSS sensor signal for transmission fault detection and diagnostics.

Output Shaft Speed (OSS) Sensor

The OSS sensor is a Hall-effect type sensor that provides a signal to the PCM that changes in frequency as the rotating speed of the output shaft ring gear varies.

The PCM also compares the OSS sensor signal with the TSS sensor signal to determine the gear ratio provided by the rear planetary gearset.

The PCM uses the OSS sensor signal as an input for its strategies for shifts and TCC operation. The PCM also uses the OSS sensor signal for transmission fault detection and diagnostics.

Transmission Fluid Temperature (TFT) Sensor

The TFT sensor is a temperature dependent resistor that is in contact with transmission fluid in the transmission sump area.

The PCM monitors the voltage across the TFT sensor, which changes as transmission fluid temperature varies.

The PCM uses the TFT sensor signal as an input for its strategy for shifting and TCC operation. The PCM also uses the TFT sensor signal for transmission fault detection and diagnostics.

Transmission Range (TR) Sensor

The TR sensor has a set of Hall-effect sensors that have a pattern of ON/OFF states which are dependent on the PARK, REVERSE, NEUTRAL, DRIVE, 3,

2 or 1 position of the manual valve.

The TR sensor also provides signals for the starting system and the reverse lights.

The PCM uses the TR sensor signal as an input for its strategy for shifting and TCC operation. The PCM also uses the TR sensor signal for transmission fault detection and diagnostics.

Transmission Operation Overview

Transmission operation is controlled by the PCM.

Torque Converter

This transmission uses a torque converter with the following elements:

- Impeller
- Turbine
- Reactor
- TCC

For diagnostic information, Refer to: Torque Converter Clutch (TCC) .

Planetary Gearsets

Operation of this transmission involves the use of 2 planetary gearsets that have the following components:

- Front (single planetary gearset)
    - One sun gear
    - One planetary carrier with 4 gears

    - One ring gear
- Rear (ravigneaux planetary gearset)
    - Two sun gears of different sizes
    - Three short planetary gear pinions meshing with the sun gears
    - Three long planetary gear pinions meshing with the sun gears
    - One planetary carrier
    - One ring gear

Hydraulic System

The hydraulic operation of this transmission includes the following components:

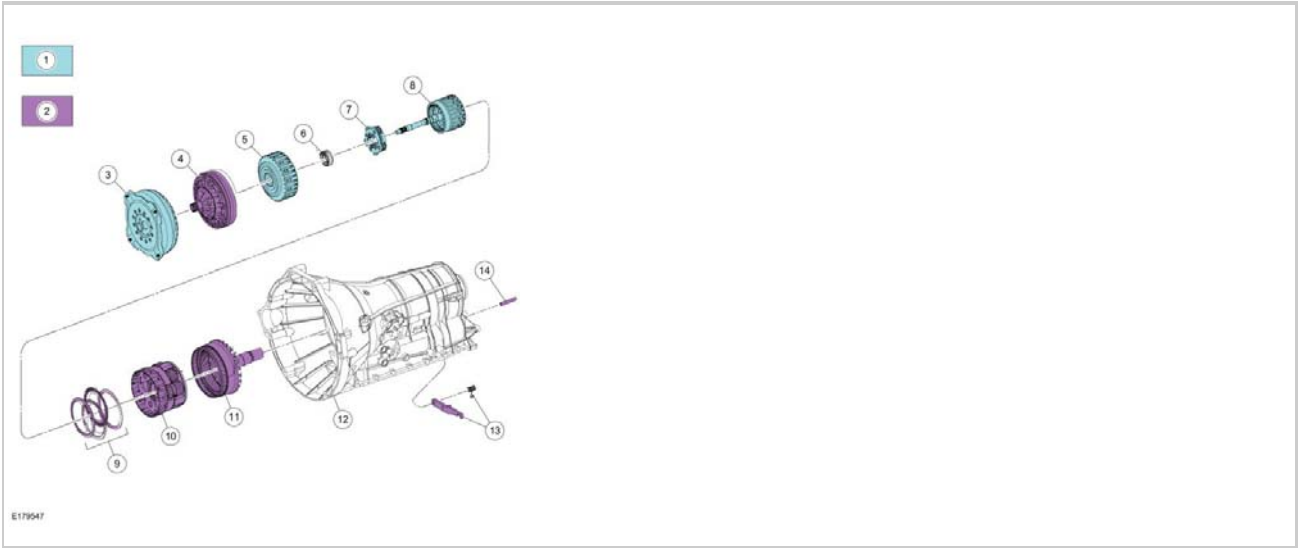
- Main control assembly
- Pump assembly with filter
- Torque converter
- Apply components (clutches)

Transmission Operation Overview

The PCM controls the operation of this transmission with the following solenoids:

- LPC solenoid
- SSA
- SSB
- SSC
- SSD
- SSE
- TCC solenoid

Park Position



Item	Description
1	Driven Components
2	Held Components
3	Torque Converter
4	Pump Assembly
5	Forward Clutch Cylinder and Hub Assembly
6	Front Planetary Sun Gear (No. 1)
7	Front Planetary Carrier Assembly
8	Front Planetary Ring Gear Assembly (input shaft)
9	Low Reverse Clutch (D) Assembly
10	Rear Planetary Carrier
11	Rear Planetary Ring Gear and Output Shaft Assembly
12	Transmission Case
13	Park Pawl and Spring
14	Park Pawl Pin

Mechanical Operation

Apply components:

- Park pawl engaged holding the park gear (output shaft) stationary
- Low/reverse clutch (D) applied

Planetary Gearset Operation

Front planetary gearset driving components:

- Ring gear (input shaft)

Front planetary gearset driven components:

- Planetary carrier

Front planetary gearset held components:

- Sun gear (splined to pump assembly)

Rear planetary gearset driving components:

- None

Rear planetary gearset driven components:

- None

Rear planetary gearset held components:

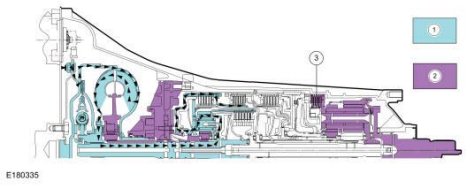
- Planetary carrier
- Ring gear (output shaft)

Park Position Clutch Application Chart

Gear	Forward A (1, 2, 3, 4)	Direct B (3, 5, R)	Intermediate C (2, 6)	Low/Reverse D (1, R)	Overdrive E (4, 5, 6)	Low-OWC
Park	-	-	-	H*	-	-
Planetary Components	Front planetary carrier-to-No. 3 sun gear	Front carrier-to-No. 2 sun gear	No. 2 sun gear	Rear planetary carrier	Input shaft-to-rear planetary carrier	Rear planetary carrier

* H = Hold Clutch

Park Position Power Flow



Item	Description
1	Driven Components
2	Held Components

3	Low Reverse Clutch (D)

Hydraulic Operation

Line pressure hydraulic circuits:

- The position of the main regulator valve controls line pressure. The position of the main regulator valve is dependent on the pressure applied to it by the LPC solenoid through the VFS5 circuit.
- The main regulator valve varies pressure in the PUMP circuit by controlling hydraulic flow from the SCHG circuit into the pump suction circuit.
- Line pressure is supplied to the:
    - manual valve.
    - lubrication control valve.
    - converter release regulator valve.
    - bypass clutch control regulator valve.
    - solenoid pressure regulator valve.
    - D1 latch and regulator valves.

Torque converter circuits:

- When the TCC is released, the converter release regulator valve applies pressure to the torque converter through the CREL circuit to release the TCC.
- CREL pressure exits the torque converter through the CAPLY circuit to the bypass clutch control regulator valve.
- The bypass clutch control regulator valve directs the pressure from the CAPLY circuit back to the converter release regulator valve through the CAPLY EX circuit.
- The converter release regulator valve directs the pressure from the CAPLY EX circuit to the drain back valve through the DBACK circuit.

Cooler and lubrication hydraulic circuits:

- The lubrication control valve directs line pressure to the transmission fluid cooler or the thermal bypass valve through the COOLF circuit.
- When the transmission fluid exits the transmission fluid cooler or thermal bypass valve, it provides lubrication to the transmission through the LUBE circuit.

Solenoid hydraulic circuits:

- The solenoid pressure regulator valve supplies regulated line pressure to the shift, LPC and TCC solenoids through the SREG hydraulic circuit.
- The LPC solenoid applies varying pressure to the main regulator valve through the VFS5 hydraulic circuit. The LPC solenoid regulates line pressure by controlling the position of the main regulator valve.

- SSD supplies pressure to the solenoid multiplex valve through the VFS4 circuit.
- The position of the solenoid multiplex valve allows pressure from the VFS4 circuit to be directed to the D1 and D2 latch and regulator valves through the CL DC circuit to position the valves for low/reverse clutch (D) application.

Clutch hydraulic circuits:

- Line pressure is supplied by the pump to the D1 latch and regulator valves.
- Regulated line pressure from the D1 regulator valve is supplied to the low/reverse clutch (D) to apply the clutch.

Electrical Operation

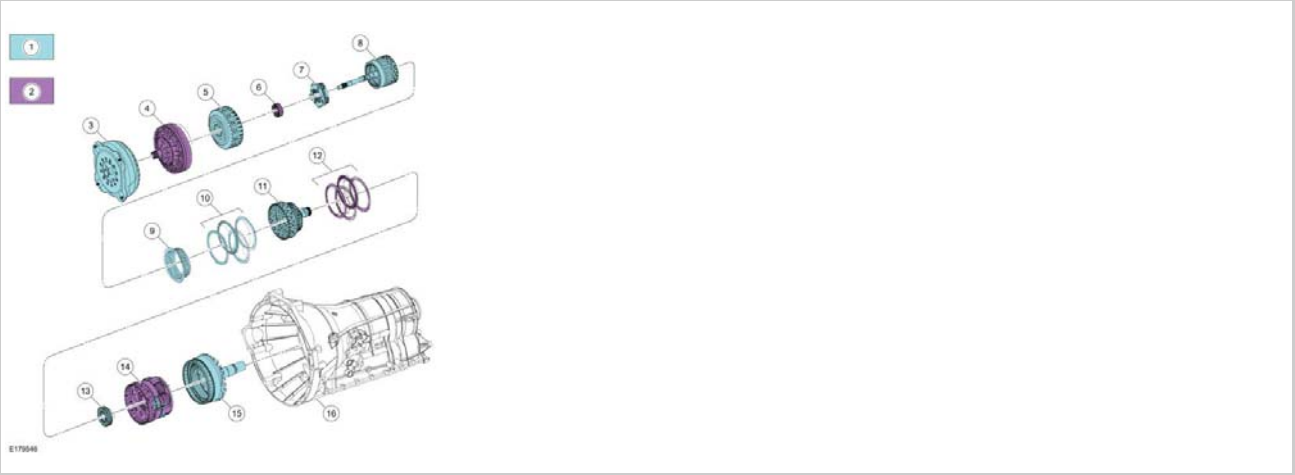
Solenoid operation:

Selector Lever Position	PCM Commanded Gear	SSA NL (1, 2, 3, 4)	SSB NH (3, 5, R)	SSC NL (CB 2, 6)	SSD NH (CB L/R 4, 5, 6)	SSE NC	TCC NL
P	P	Off	On	Off	On	On	Off

CB = Clutch brake, NC = Normally closed, NH = Normally high, NL = Normally low

For solenoid information, Refer to: Main Control Valve Body .

Reverse Position



Item	Description
1	Driven Components
2	Held Components
3	Torque Converter
4	Pump Assembly
5	Forward Clutch Cylinder and Hub Assembly
6	Front Planetary Sun Gear (No. 1)

7	Front Planetary Carrier Assembly
8	Front Planetary Ring Gear Assembly (Input Shaft)
9	Direct Clutch Hub
10	Direct Clutch (B) Assembly
11	Direct Clutch cylinder
12	Low/Reverse Clutch (D) Assembly
13	Front Planetary Sun Gear (No. 2)
14	Rear Planetary Carrier
15	Rear Planetary Ring Gear and Output Shaft Assembly
16	Transmission Case

Mechanical Operation

Apply components:

- Low/reverse clutch (D) applied
- Direct clutch (B) applied

Planetary Gearset Operation

Front planetary gearset driving components

- Ring gear (input shaft)

Front planetary gearset driven components:

- Planetary carrier

Front planetary gearset held components:

- Sun gear (splined to pump assembly)

Rear planetary gearset driven components:

- None

Rear planetary gearset driven components:

- Ring gear (output shaft)

Rear planetary gearset held components:

- Planetary carrier

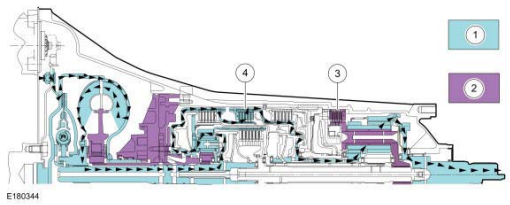
Reverse Position Clutch Application Chart

Gear	Forward A (1, 2, 3, 4)	Direct B (3, 5, R)	Intermediate C (2, 6)	Low/Reverse D (1, R)	Overdrive E (4, 5, 6)	Low-OWC

Reverse	-	D	-	H*	-	-
Planetary Components	Front planetary carrier-to-No. 3 sun gear	Front carrier-to-No. 2 sun gear	No. 2 sun gear	Rear planetary carrier	Input shaft-to-rear planetary carrier	Rear planetary carrier

* H = Hold Clutch

Reverse Position Power Flow



Item	Description
1	Driven Components
2	Held Components
3	Low Reverse Clutch (D)
4	Direct Clutch (B)

Hydraulic Operation

Line pressure hydraulic circuits:

- The position of the main regulator valve controls line pressure. The position of the main regulator valve is dependent on the pressure applied to it by the LPC solenoid through the VFS5 circuit.
- The main regulator valve varies pressure in the PUMP circuit by controlling hydraulic flow from the SCHG circuit into the pump suction circuit.
- Line pressure is supplied to the:
  - manual valve.
  - lubrication control valve.
  - converter release regulator valve.
  - bypass clutch control regulator valve.
  - solenoid pressure regulator valve.
  - D1 latch and regulator valves.
- In reverse, the manual valve directs line pressure to the No. 1 shuttle valve and the solenoid multiplex valve through the REV circuit.

- The No. 1 shuttle ball directs line pressure to the clutch B regulator valve.

Torque converter circuits:

- When the TCC is released, the converter release regulator valve applies pressure to the torque converter through the CREL circuit to release the TCC.
- CREL pressure exits the torque converter through the CAPLY circuit to the bypass clutch control regulator valve.
- The bypass clutch control regulator valve directs the pressure from the CAPLY circuit back to the converter release regulator valve through the CAPLY EX circuit.
- The converter release regulator valve directs the pressure from the CAPLY EX circuit to the drain back valve through the DBACK circuit.

Cooler and lubrication hydraulic circuits:

- The lubrication control valve directs line pressure to the transmission fluid cooler or the thermal bypass valve through the COOLF circuit.
- When the transmission fluid exits the transmission fluid cooler or thermal bypass valve, it provides lubrication to the transmission through the LUBE circuit.

Solenoid hydraulic circuits:

- The solenoid pressure regulator valve supplies regulated line pressure to the shift, LPC and TCC solenoids through the SREG hydraulic circuit.
- The LPC solenoid applies varying pressure to the main regulator valve through the VFS5 hydraulic circuit. The LPC solenoid regulates line pressure by controlling the position of the main regulator valve.
- SSD supplies pressure to the solenoid multiplex valve through the VFS4 circuit.
- SSB supplies pressure to the clutch B regulator and latch valves to position the valves for direct clutch (B) application.

Clutch hydraulic circuits:

- Line pressure is supplied by the pump to the D1 latch and regulator valves.
- Regulated line pressure from the D1 regulator valve is supplied to the low/reverse clutch (D) to apply the clutch.
- Line pressure is supplied by the manual valve to the clutch B latch and regulator valves.
- Regulated line pressure from the clutch B regulator valve is supplied to the direct clutch (B) to apply the clutch.

Reverse Position Solenoid Operation Chart

Solenoid operation:

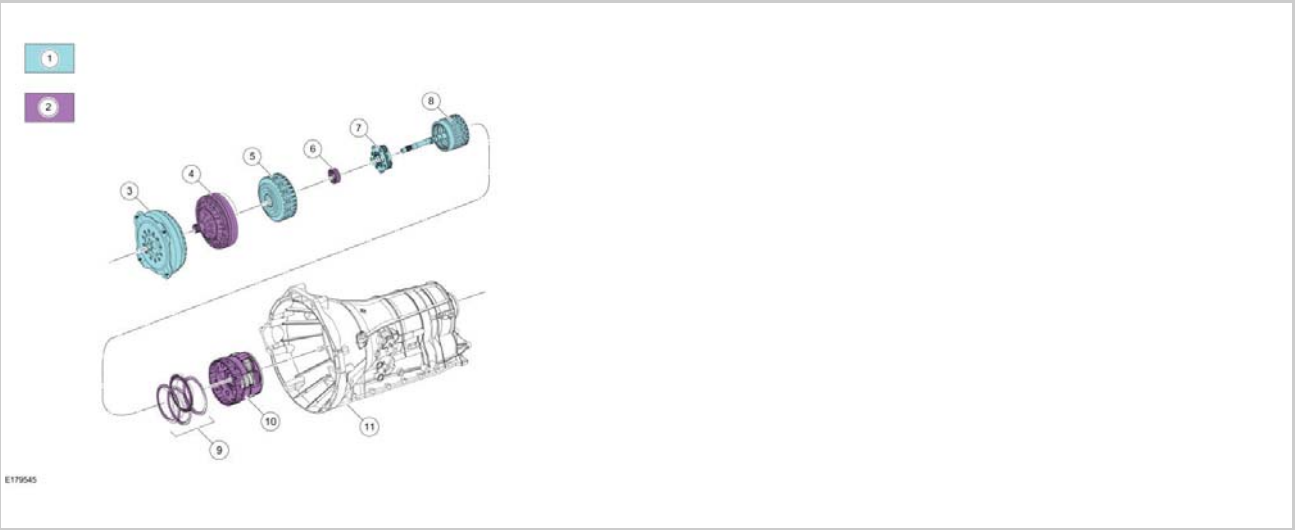
Selector Lever	PCM Commanded	SSA NL (1, 2, 3,	SSB NH (3, 5, R)	SSC NL (CB 2,	SSD NH (CB L/R	SSE NC	TCC NL

Position	Gear	4)		6)	4, 5, 6)		
R	R	Off	Off	Off	Off	On	Off

CB = Clutch brake, NC = Normally closed, NH = Normally high, NL = Normally low

For solenoid information, Refer to: Main Control Valve Body .

Neutral Position



Item	Description
1	Driven Components
2	Held Components
3	Torque Converter
4	Pump Assembly
5	Forward Clutch Cylinder and Hub Assembly
6	Front Planetary Sun Gear (No. 1)
7	Front Planetary Carrier Assembly
8	Front Planetary Ring Gear Assembly (Input Shaft)
9	Low Reverse Clutch (D) Assembly
10	Rear Planetary Carrier
11	Transmission Case

Mechanical Operation

Apply components:

- Low/reverse clutch (D) applied

Planetary Gearset Operation

Front planetary gearset driving components

- Ring gear (input shaft)

Front planetary gearset driven components:

- Planetary carrier

Front planetary gearset held components:

- Sun gear (splined to pump assembly)

Rear planetary gearset driving components:

- None

Rear planetary gearset driven components:

- None

Rear planetary gearset held components:

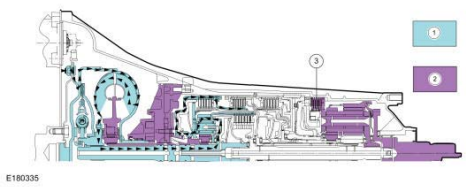
- Planetary carrier

Neutral Position Clutch Application Chart

Gear	Forward A (1, 2, 3, 4)	Direct B (3, 5, R)	Intermediate C (2, 6)	Low/Reverse D (1, R)	Overdrive E (4, 5, 6)	Low-OWC
Reverse	-	-	-	H*	-	-
Planetary Components	Front planetary carrier-to-No. 3 sun gear	Front carrier-to-No. 2 sun gear	No. 2 sun gear	Rear planetary carrier	Input shaft-to-rear planetary carrier	Rear planetary carrier

* H = Hold Clutch

Neutral Position Power Flow



Item	Description
1	Driven Components

2	Held Components
3	Low/Reverse Clutch (D)

Hydraulic Operation

Line pressure hydraulic circuits:

- The position of the main regulator valve controls line pressure. The position of the main regulator valve is dependent on the pressure applied to it by the LPC solenoid through the VFS5 circuit.
- The main regulator valve varies pressure in the PUMP circuit by controlling hydraulic flow from the SCHG circuit into the pump suction circuit.
- Line pressure is supplied to the:
    - manual valve.
    - lubrication control valve.
    - converter release regulator valve.
    - bypass clutch control regulator valve.
    - solenoid pressure regulator valve.
    - D1 latch and regulator valves.
- In reverse, the manual valve directs line pressure to the No. 1 shuttle valve and the solenoid multiplex valve through the REV circuit.
- The No. 1 shuttle ball directs line pressure to the clutch B regulator valve.

Torque converter circuits:

- When the TCC is released, the converter release regulator valve applies pressure to the torque converter through the CREL circuit to release the TCC.
- CREL pressure exits the torque converter through the CAPLY circuit to the bypass clutch control regulator valve.
- The bypass clutch control regulator valve directs the pressure from the CAPLY circuit back to the converter release regulator valve through the CAPLY EX circuit.
- The converter release regulator valve directs the pressure from the CAPLY EX circuit to the drain back valve through the DBACK circuit.

Cooler and lubrication hydraulic circuits:

- The lubrication control valve directs line pressure to the transmission fluid cooler or the thermal bypass valve through the COOLF circuit.
- When the transmission fluid exits the transmission fluid cooler or thermal bypass valve, it provides lubrication to the transmission through the LUBE circuit.

Solenoid hydraulic circuits:

- The solenoid pressure regulator valve supplies regulated line pressure to the shift, LPC and TCC

solenoids through the SREG hydraulic circuit.

- The LPC solenoid applies varying pressure to the main regulator valve through the VFS5 hydraulic circuit. The LPC solenoid regulates line pressure by controlling the position of the main regulator valve.
- SSD supplies pressure to the solenoid multiplex valve through the VFS4 circuit.
- SSB supplies pressure to the clutch B regulator and latch valves to position the valves for direct clutch (B) application.

Clutch hydraulic circuits:

- Line pressure is supplied by the pump to the D1 latch and regulator valves.
- Regulated line pressure from the D1 regulator valve is supplied to the low/reverse clutch (D) to apply the clutch.
- Line pressure is supplied by the manual valve to the clutch B latch and regulator valves.
- Regulated line pressure from the clutch B regulator valve is supplied to the direct clutch (B) to apply the clutch.

Neutral Position Solenoid Operation Chart

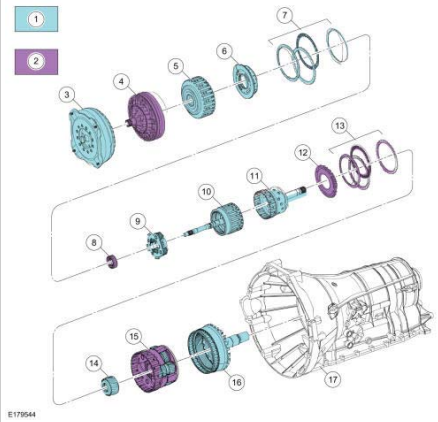
Solenoid operation:

Selector Lever Position	PCM Commanded Gear	SSA NL (1, 2, 3, 4)	SSB NH (3, 5, R)	SSC NL (CB 2, 6)	SSD NH (CB L/R 4, 5, 6)	SSE NC	TCC NL
R	R	Off	Off	Off	Off	On	Off

CB = Clutch brake, NC = Normally closed, NH = Normally high, NL = Normally low

For solenoid information, Refer to: Main Control Valve Body .

1st Gear



Item	Description

1	Driven Components
2	Held Components
3	Torque Converter
4	Pump Assembly
5	Forward Clutch Cylinder and Hub Assembly
6	Forward Clutch Balance Piston Assembly
7	Forward Clutch (A) Assembly
8	Front Planetary Sun Gear (No. 1)
9	Front Planetary Carrier Assembly
10	Front Planetary Ring Gear Assembly (Input Shaft)
11	No. 3 Sun Gear Hub and Shaft Assembly
12	Low One-Way Clutch
13	Low reverse Clutch (D) Assembly
14	Rear Planetary Sun Gear (No. 3)
15	Rear Planetary Carrier
16	Rear Planetary Ring Gear and Output Shaft Assembly
17	Transmission Case

Mechanical Operation

Apply components:

- Low/reverse clutch (D) applied

Planetary Gearset Operation

Front planetary gearset driving components

- Ring gear (input shaft)

Front planetary gearset driven components:

- Planetary carrier

Front planetary gearset held components:

- Sun gear (splined to pump assembly)

Rear planetary gearset driving components:

- None

Rear planetary gearset driven components:

- None

Rear planetary gearset held components:

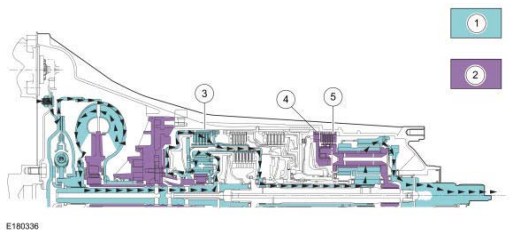
- Planetary carrier

1st Gear Clutch Application Chart

Gear	Forward A (1, 2, 3, 4)	Direct B (3, 5, R)	Intermediate C (2, 6)	Low/Reverse D (1, R)	Overdrive E (4, 5, 6)	Low-OWC
Reverse	-	-	-	*H	-	-
Planetary Components	Front planetary carrier-to-No. 3 sun gear	Front carrier-to-No. 2 sun gear	No. 2 sun gear	Rear planetary carrier	Input shaft-to-rear planetary carrier	Rear planetary carrier

* H = Hold Clutch

1st Gear Power Flow



Item	Description
1	Driven Components
2	Held Components
3	Forward Clutch (A)
4	Low One-Way Clutch
5	Low/Reverse Clutch (D) (Applied Below 5 kph [3 mph] Only)

Hydraulic Operation

Line pressure hydraulic circuits:

- The position of the main regulator valve controls line pressure. The position of the main regulator valve is dependent on the pressure applied to it by the LPC solenoid through the VFS5 circuit.
- The main regulator valve varies pressure in the PUMP circuit by controlling hydraulic flow from the SCHG circuit into the pump suction circuit.
- Line pressure is supplied to the:
    - manual valve.

    - lubrication control valve.
    - converter release regulator valve.
    - bypass clutch control regulator valve.
    - solenoid pressure regulator valve.
    - D1 latch and regulator valves.
- In reverse, the manual valve directs line pressure to the No. 1 shuttle valve and the solenoid multiplex valve through the REV circuit.
- The No. 1 shuttle ball directs line pressure to the clutch B regulator valve.

Torque converter circuits:

- When the TCC is released, the converter release regulator valve applies pressure to the torque converter through the CREL circuit to release the TCC.
- CREL pressure exits the torque converter through the CAPLY circuit to the bypass clutch control regulator valve.
- The bypass clutch control regulator valve directs the pressure from the CAPLY circuit back to the converter release regulator valve through the CAPLY EX circuit.
- The converter release regulator valve directs the pressure from the CAPLY EX circuit to the drain back valve through the DBACK circuit.

Cooler and lubrication hydraulic circuits:

- The lubrication control valve directs line pressure to the transmission fluid cooler or the thermal bypass valve through the COOLF circuit.
- When the transmission fluid exits the transmission fluid cooler or thermal bypass valve, it provides lubrication to the transmission through the LUBE circuit.

Solenoid hydraulic circuits:

- The solenoid pressure regulator valve supplies regulated line pressure to the shift, LPC and TCC solenoids through the SREG hydraulic circuit.
- The LPC solenoid applies varying pressure to the main regulator valve through the VFS5 hydraulic circuit. The LPC solenoid regulates line pressure by controlling the position of the main regulator valve.
- SSD supplies pressure to the solenoid multiplex valve through the VFS4 circuit.
- SSB supplies pressure to the clutch B regulator and latch valves to position the valves for direct clutch (B) application.

Clutch hydraulic circuits:

- Line pressure is supplied by the pump to the D1 latch and regulator valves.
- Regulated line pressure from the D1 regulator valve is supplied to the low/reverse clutch (D) to apply the clutch.

- Line pressure is supplied by the manual valve to the clutch B latch and regulator valves.
- Regulated line pressure from the clutch B regulator valve is supplied to the direct clutch (B) to apply the clutch.

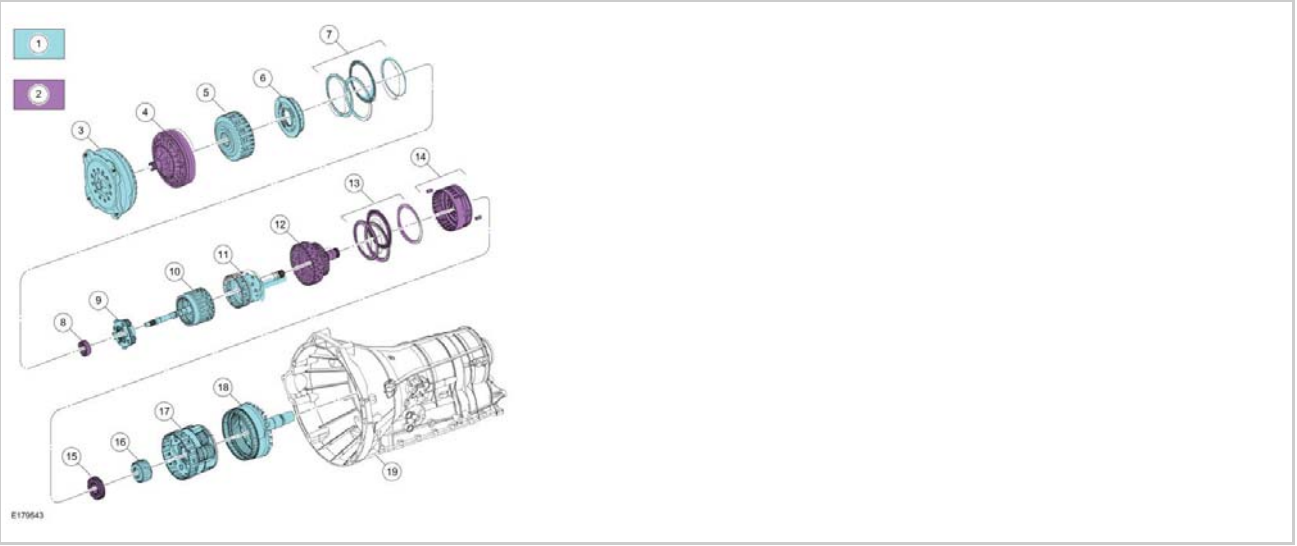
1st Gear Solenoid Operation Chart

Solenoid operation:

Selector Lever Position	PCM Commanded Gear	SSA NL (1, 2, 3, 4)	SSB NH (3, 5, R)	SSC NL (CB 2, 6)	SSD NH (CB L/R 4, 5, 6)	SSE NC	TCC NL
D	1	On	On	Off	Off*	On	Off
1	1	On	On	Off	Off	On	Off

CB = Clutch brake, NC = Normally closed, NH = Normally high, NL = Normally low * Solenoid is ON when vehicle speed is above 4 kph (3mph).

2nd Gear



Item	Description
1	Driven Components
2	Held Components
3	Torque Converter
4	Pump Assembly
5	Forward Clutch Cylinder and Hub Assembly
6	Forward Clutch Balance Piston Assembly
7	Forward Clutch (A) Assembly
8	Front Planetary Sun Gear (No. 1)
9	Front Planetary Carrier Assembly

10	Front Planetary Ring Gear Assembly (Input Shaft)
11	No. 3 Sun Gear Hub and Shaft Assembly
12	Direct Clutch Cylinder
13	Intermediate Clutch (C) Assembly
14	Center Support
15	Rear Planetary Sun Gear (No. 2)
16	Rear Planetary Sun Gear (No. 3)
17	Rear Planetary Carrier
18	Rear Planetary Ring Gear and Output Shaft Assembly
19	Transmission Case

Mechanical Operation

Apply components:

- Forward clutch (A) applied
- Intermediate clutch (C) applied

Planetary Gearset Operation

Front planetary gearset driving components:

- Ring gear (input shaft)

Front planetary gearset driven components:

- Planetary carrier

Front planetary gearset held components:

- Sun gear (splined to pump assembly)

Rear planetary gearset driving components:

- No. 3 sun gear

Rear planetary gearset driven components:

- Planetary carrier
- Ring gear (output shaft)

Rear planetary gearset held components:

- No. 2 sun gear

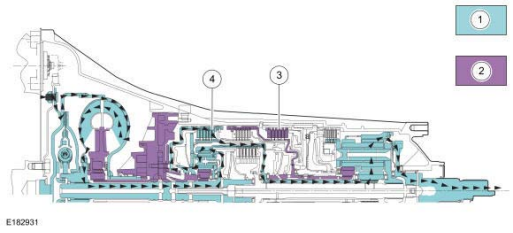
2nd Gear Clutch Application Chart

Gear	Forward	Direct	Intermediate	Low/Reverse	Overdrive	Low-OWC

	A (1, 2, 3, 4)	B (3, 5, R)	C (2, 6)	D (1, R)	E (4, 5, 6)	
2nd Gear D and Manual 2	D	-	H	-	-	O/R
Planetary Components	Front planetary carrier-to-No. 3 sun gear	Front carrier-to-No. 2 sun gear	No. 2 sun gear	Rear planetary carrier	Input shaft-to-rear planetary carrier	Rear planetary carrier

D = Drive Clutch * H = Hold Clutch O/R = Overrunning

2nd Gear Power Flow



Item	Description
1	Driven Components
2	Held Components
3	Intermediate Clutch (C)
4	Forward Clutch (A)

Hydraulic Operation

Line Pressure Hydraulic Circuits:

- The position of the main regulator valve controls line pressure. The position of the main regulator valve is dependent on the pressure applied to it by the LPC solenoid through the VFS5 circuit.
- The main regulator valve varies pressure in the PUMP circuit by controlling hydraulic flow from the SCHG circuit into the pump suction circuit.
- Line pressure is supplied to the:
  - Manual valve.
  - Lubrication control valve.
  - Converter release regulator valve.
  - Bypass clutch control regulator valve.
  - Solenoid pressure regulator valve.

    - D1 latch and regulator valves.
- In drive, the manual valve directs line pressure to the No. 1 shuttle valve and clutch A, C and E regulator valves.
- The No. 1 shuttle ball directs line pressure to the clutch B regulator valve.

Torque converter circuits:

- When the TCC is released, the converter release regulator valve applies pressure to the torque converter through the CREL circuit to release the TCC.
- CREL pressure exits the torque converter through the CAPLY circuit to the bypass clutch control regulator valve.
- The bypass clutch control regulator valve directs the pressure from the CAPLY circuit back to the converter release regulator valve through the CAPLY EX circuit.
- The converter release regulator valve directs the pressure from the CAPLY EX circuit to the drain back valve through the DBACK circuit.

Cooler and lubrication hydraulic circuits:

- The lubrication control valve directs line pressure to the transmission fluid cooler or the thermal bypass valve through the COOLF circuit.
- When the transmission fluid exits the transmission fluid cooler or thermal bypass valve, it provides lubrication to the transmission through the LUBE circuit.

Solenoid hydraulic circuits:

- The solenoid pressure regulator valve supplies regulated line pressure to the shift, LPC and TCC solenoid through the SREG hydraulic circuit.
- The LPC solenoid applies varying pressure to the main regulator valve through the VFS5 hydraulic circuit. The LPC solenoid regulates line pressure by controlling the position of the main regulator valve.
- SSA supplies pressure to the clutch A regulator and latch valves to position the valves for forward clutch (A) application.
- SSC supplies pressure to the clutch C regulator valve to position the valve for intermediate clutch (C) application.

Clutch hydraulic circuits:

- Regulated line pressure from the clutch A regulator valve is supplied to the forward clutch (A) to apply the clutch.
- Regulated line pressure from the clutch C regulator valve is supplied to the intermediate clutch (C) to apply the clutch.

Electrical Operation

2nd Gear Solenoid Operation Chart

Selector Lever Position	PCM Commanded Gear	Shift Solenoid	TCC NL				
SSA NL (1, 2, 3, 4)	SSB NH (3, 5, R)	SSC NL (CB 2, 6)	SSD NH (CB L/R 4, 5, 6)	SSE NC			
D and 2	2	ON	ON	ON	ON	OFF	OFF

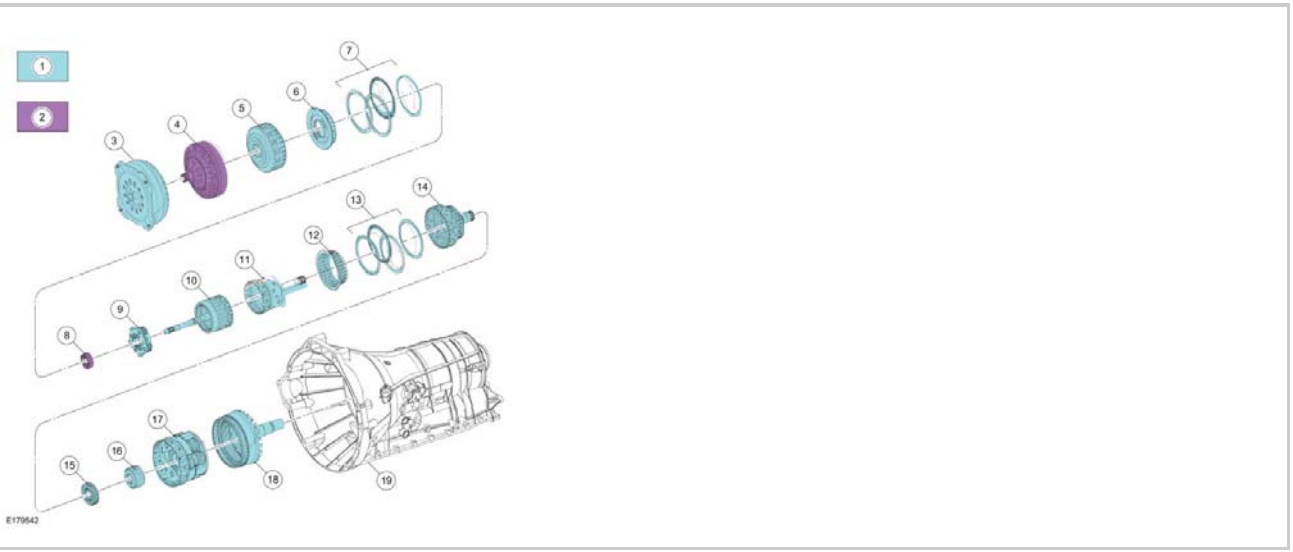
CB = Clutch brake

NC = Normally closed

NH = Normally high

NL = Normally low

3rd Gear



Item	Description
1	Driven Components
2	Held Components
3	Torque Converter
4	Pump Assembly
5	Forward Clutch Cylinder and Hub Assembly
6	Forward Clutch Balance Piston Assembly
7	Forward Clutch (A) Assembly
8	Front Planetary Sun Gear (No. 1)
9	Front Planetary Carrier Assembly
10	Front Planetary Ring Gear Assembly (Input Shaft)

11	No. 3 Sun Gear Hub and Shaft Assembly
12	Direct Clutch Cylinder
13	Direct Clutch (B) Assembly
14	Low One-Way Clutch
15	Rear Planetary Sun Gear (No. 2)
16	Rear Planetary Sun Gear (No. 3)
17	Rear Planetary Carrier
18	Rear Planetary Ring Gear and Output Shaft Assembly
19	Transmission Case

Mechanical Operation

Apply components:

- Forward clutch (A) applied
- Direct clutch (B) applied

Planetary Gearset Operation

Front planetary gearset driving components:

- Ring gear (input shaft)

Front planetary gearset driven components:

- Planetary carrier

Front planetary gearset held components:

- Sun gear (splined to pump assembly)

Rear planetary gearset driving components:

- No. 3 sun gear
- No. 2 sun gear

Rear planetary gearset driven components:

- Planetary carrier
- Ring gear (output shaft)

Rear planetary gearset held components:

- None

3rd Gear Clutch Application Chart

Gear	Forward A	Direct B	Intermediate C	Low/Reverse D	Overdrive E	Low-OWC

	(1, 2, 3, 4)	(3, 5, R)	(2, 6)	(1, R)	(4, 5, 6)	
3rd Gear D and Manual 3	D	D				O/R
Planetary Components	Front planetary carrier-to-No. 3 sun gear	Front carrier-to-No. 2 sun gear	No. 2 sun gear	Rear planetary carrier	Input shaft-to-rear planetary carrier	Rear planetary carrier

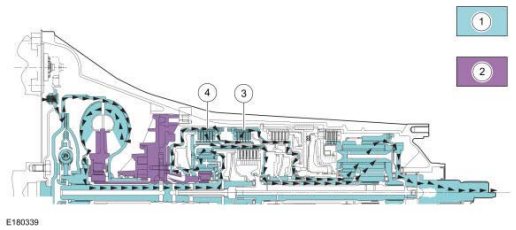
CB = Clutch brake

NC = Normally closed

NH = Normally high

NL = Normally low

3rd Gear Power Flow



Item	Description
1	Driven Components
2	Held Components
3	Direct Clutch (B)
4	Forward Clutch (A)

Hydraulic Operation

Line pressure hydraulic circuits:

- The position of the main regulator valve controls line pressure. The position of the main regulator valve is dependent on the pressure applied to it by the LPC solenoid through the VFS5 circuit.
- The main regulator valve varies pressure in the PUMP circuit by controlling hydraulic flow from the SCHG circuit into the pump suction circuit.
- Line pressure is supplied to the:
  - Manual valve.
  - Lubrication control valve.
  - Converter release regulator valve.

    - Bypass clutch control regulator valve.
    - Solenoid pressure regulator valve.
    - D1 latch and regulator valves.
- In drive, the manual valve directs line pressure to the No. 1 shuttle valve and clutch A, C and E regulator valves.
- The No. 1 shuttle ball directs line pressure to the clutch B regulator valve.

Torque converter circuits:

- When the TCC is released, the converter release regulator valve applies pressure to the torque converter through the CREL circuit to release the TCC.
    - CREL pressure exits the torque converter through the CAPLY circuit to the bypass clutch control regulator valve.
- The bypass clutch control regulator valve directs the pressure from the CAPLY circuit back to the converter release regulator valve through the CAPLY EX circuit.
- The converter release regulator valve directs the pressure from the CAPLY EX circuit to the drain back valve through the DBACK circuit.

Cooler and lubrication hydraulic circuits:

- The lubrication control valve directs line pressure to the transmission fluid cooler or the thermal bypass valve through the COOLF circuit.
- When the transmission fluid exits the transmission fluid cooler or thermal bypass valve, it provides lubrication to the transmission through the LUBE circuit.

Solenoid hydraulic circuits:

- The solenoid pressure regulator valve supplies regulated line pressure to the shift, LPC and TCC solenoids through the SREG hydraulic circuit.
- The LPC solenoid applies varying pressure to the main regulator valve through the VFS5 hydraulic circuit. The LPC solenoid regulates line pressure by controlling the position of the main regulator valve.
- SSA supplies pressure to the clutch A regulator and latch valves to position the valves for forward clutch (A) application.
- SSB supplies pressure to the clutch B regulator valve to position the valve for direct clutch (B) application.

Clutch hydraulic circuits:

- Regulated line pressure from the clutch A regulator valve is supplied to the forward clutch (A) to apply the clutch.
- Regulated line pressure from the clutch B regulator valve is supplied to the direct clutch (B) to apply the clutch.

Electrical Operation

3rd Gear Solenoid Operation Chart

Selector Lever Position	PCM Commanded Gear	Shift Solenoid	TCC NL				
SSA NL (1, 2, 3, 4)	SSB NH (3, 5, R)	SSC NL (CB 2, 6)	SSD NH (CB L/R 4, 5, 6)	SSE NC			
D and 3	3	On	Off	Off	On	Off	Off

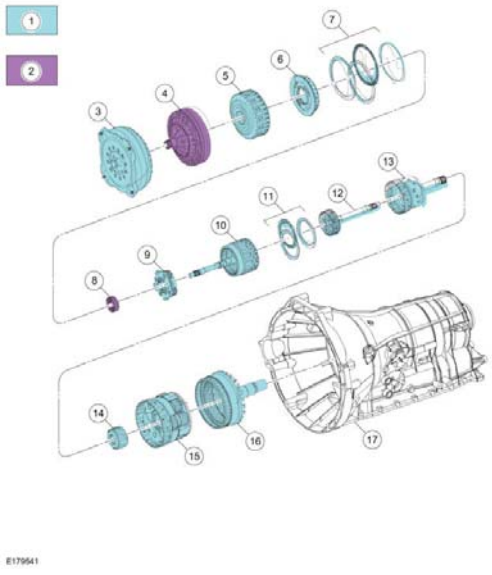
CB = Clutch brake

NC = Normally closed

NH = Normally high

NL = Normally low

4th Gear



Item	Description
1	Driven Components
2	Held Components
3	Torque Converter
4	Pump Assembly
5	Forward Clutch Cylinder and Hub Assembly
6	Forward Clutch Balance Piston

7	Forward Clutch (A) Assembly
8	Front Planetary Sun Gear (No. 1)
9	Front Planetary Carrier Assembly
10	Front Planetary Ring Gear Assembly (Input Shaft)
11	Overdrive Clutch (E) Assembly
12	Overdrive Clutch Shaft
13	No. 3 Sun Gear Hub and Shaft Assembly
14	Rear Planetary Sun Gear (No. 3)
15	Rear Planetary Carrier
16	Rear Planetary Ring Gear and Output Shaft Assembly
17	Transmission Case

Mechanical Operation

Apply components:

- Forward clutch (A) applied
- Overdrive clutch (E) applied

Planetary Gearset Operation

Front planetary gearset driving components:

- Ring gear (input shaft)

Front planetary gearset driven components:

- Planetary carrier

Front planetary gearset held components:

- Sun gear (splined to pump assembly

Rear planetary gearset driving components:

- No. 3 sun gear
- Planetary carrier

Rear planetary gearset driven components:

- Ring gear (output shaft)

Rear planetary gearset held components:

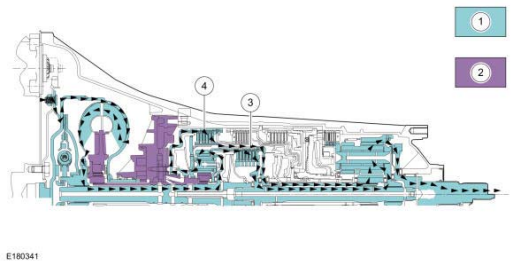
- None

4th Gear Clutch Application Chart

Gear	Forward A (1, 2, 3, 4)	Direct B (3, 5, R)	Intermediate C (2, 6)	Low/Reverse D (1, R)	Overdrive E (4, 5, 6)	Low-OWC
4th Gear D						
Planetary Components	Front planetary carrier-to-No. 3 sun gear	Front carrier-to-No. 2 sun gear	No. 2 sun gear	Rear planetary carrier	Input shaft-to-rear planetary carrier	Rear planetary carrier

- D = Drive Clutch
- O/R = Overrunning

4th Gear Power Flow



Item	Description
1	Driven Components
2	Held Components
3	Overdrive Clutch (E)
4	Forward Clutch (A)

Hydraulic Operation

Line pressure hydraulic circuits:

- The position of the main regulator valve controls line pressure. The position of the main regulator valve is dependent on the pressure applied to it by the LPC solenoid through the VFS5 circuit.
- The main regulator valve varies pressure in the PUMP circuit by controlling hydraulic flow from the SCHG circuit into the pump suction circuit.
- Line pressure is supplied to the:
  - Manual valve.
  - Lubrication control valve
  - Converter release regulator valve.

    - Bypass clutch control regulator valve.
    - Solenoid pressure regulator valve.
    - D1 latch and regulator valves.
- In drive, the manual valve directs line pressure to the No. 1 shuttle valve and clutch A, C and E regulator valves.
- The No. 1 shuttle ball directs line pressure to the clutch B regulator valve.

Torque converter circuits:

- When the TCC is released, the converter release regulator valve applies pressure to the torque converter through the CREL circuit to release the TCC.
- CREL pressure exits the torque converter through the CAPLY circuit to the bypass clutch control regulator valve.
- The bypass clutch control regulator valve directs the pressure from the CAPLY circuit back to the converter release regulator valve through the CAPLY EX circuit.
- The converter release regulator valve directs the pressure from the CAPLY EX circuit to the drain back valve through the DBACK circuit.

Cooler and lubrication hydraulic circuits:

- The lubrication control valve directs line pressure to the transmission fluid cooler or the thermal bypass valve through the COOLF circuit.
- When the transmission fluid exits the transmission fluid cooler or thermal bypass valve, it provides lubrication to the transmission through the LUBE circuit.

Solenoid hydraulic circuits:

- The solenoid pressure regulator valve supplies regulated line pressure to the shift, LPC and TCC solenoid through the SREG hydraulic circuit.
- The LPC applies varying pressure to the main regulator valve through the VFS5 hydraulic circuit. The LPC solenoid regulates line pressure by controlling the position of the main regulator valve.
- SSA supplies pressure to the clutch A regulator and latch valves to position the valves for forward clutch (A) application.
- SSD supplies pressure to the solenoid multiplex valve through the VFS4 circuit.
- SSE supplies pressure to the solenoid multiplex valve and the drive enable valve through the SS1 circuit to move the valves.
- The position of the solenoid multiplex valve and the drive enable valve allows pressure from the VFS4 circuit to be directed to the clutch E latch and regulator valves through the CLEC circuit to position the valves for overdrive clutch (E) application.

Clutch hydraulic circuits:

- Regulated line pressure from the clutch A regulator valve is supplied to the forward clutch (A) to apply the clutch.

- Regulated line pressure from the clutch E regulator valve is supplied to the overdrive clutch (E) to apply the clutch.

Electrical Operation

Solenoid operation:

4th Gear Solenoid Operation Chart

Selector Lever Position	PCM Commanded Gear		TCC NL				
SSA NL (1, 2, 3, 4)	SSB NH (3, 5, R)	SSC NL (CB 2, 6)	SSD NH (CB L/R 4, 5, 6)	SSE NC			
D	4	On	On	Off	Off	Off	On/Off

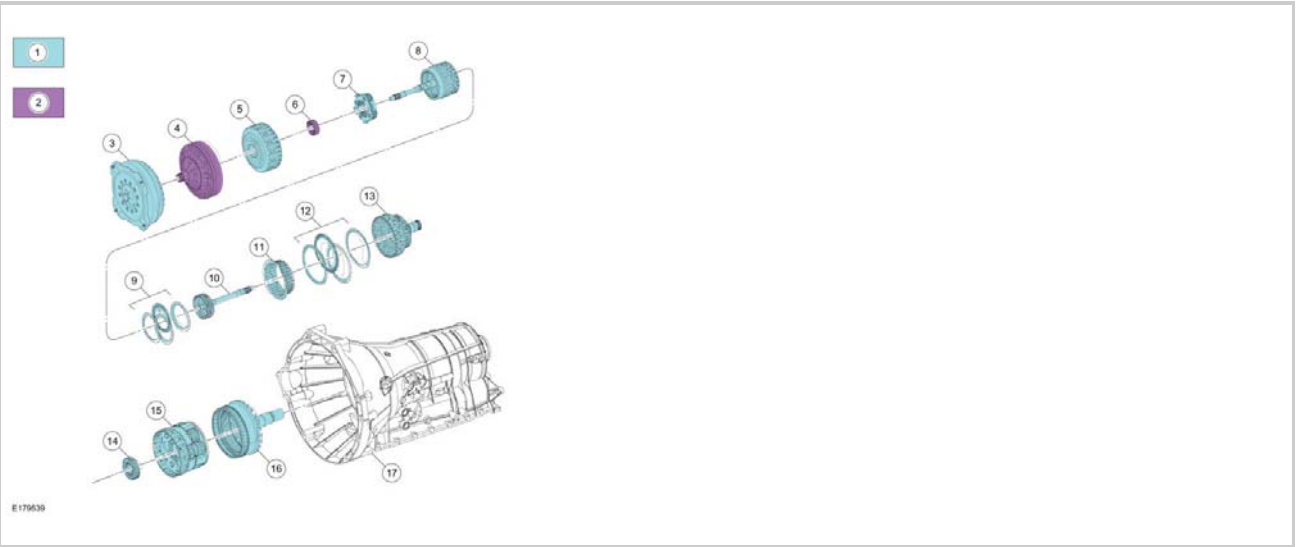
CB = Clutch brake

NC = Normally closed

NH = Normally high

NL = Normally low

5th Gear



Item	Description
1	Driven Components
2	Held Components
3	Torque Converter
4	Pump Assembly
5	Forward Clutch Cylinder and Hub Assembly

6	Front Planetary Sun Gear (No. 1)
7	Front Planetary Carrier Assembly
8	Front Planetary Ring Gear Assembly (Input Shaft)
9	Overdrive Clutch (E) Assembly
10	Overdrive Clutch Shaft
11	Direct Clutch Hub
12	Direct Clutch (B) Assembly
13	Direct Clutch Cylinder
14	Rear Planetary Sun Gear (No. 2)
15	Rear Planetary Carrier
16	Rear Planetary Ring Gear and Output Shaft Assembly
17	Transmission Case

Mechanical Operation

Apply components:

- Overdrive clutch (E) applied
- Direct clutch (B) applied

Planetary Gearset Operation

Front planetary gearset driving components:

- Ring gear (input shaft)

Front planetary gearset driven components:

- Planetary carrier

Front planetary gearset held components:

- Sun gear (splined to pump assembly)

Rear planetary gearset driving components:

- No. 2 sun gear
- Planetary carrier

Rear planetary gearset driven components:

- Ring gear (output shaft)

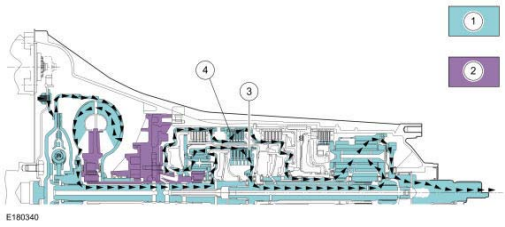
Rear planetary gearset held components:

- None

5th Gear Clutch Application Chart

Gear	Forward A (1, 2, 3, 4)	Direct B (3, 5, R)	Intermediate C (2, 6)	Low/Reverse D (1, R)	Overdrive E (4, 5, 6)	Low-OWC
5th Gear D	-	D	-	-	D	O/R
Planetary Components	Front planetary carrier-to-No. 3 sun gear	Front carrier-to-No. 2 sun gear	No. 2 sun gear	Rear planetary carrier	Input shaft-to-rear planetary carrier	Rear planetary carrier

5th Gear Power Flow



Item	Description
1	Driven Components
2	Held Components
3	Overdrive Clutch (E)
4	Direct Clutch (B)

Hydraulic Operation

Line pressure hydraulic circuits:

The position of the main regulator valve controls line pressure. The position of the main regulator valve is dependent on the pressure applied to it by the LPC solenoid through the VFS5 circuit.

The main regulator valve varies pressure in the PUMP circuit by controlling hydraulic flow from the SCHG circuit into the pump suction circuit.

- Line pressure is supplied to the:
  - Manual valve.
  - Lubrication control valve.
  - Converter release regulator valve.
  - Bypass clutch control regulator valve.
  - Solenoid pressure regulator valve.
  - D1 latch and regulator valves.
- In drive, the manual valve directs line pressure to the No. 1 shuttle valve and clutch A, C and E

regulator valves.

- The No. 1 shuttle ball directs line pressure to the clutch B regulator valve.

Torque converter circuits:

- When the TCC is released, the converter release regulator valve applies pressure to the torque converter through the CREL circuit to release the TCC.
- CREL pressure exits the torque converter through the CAPLY circuit to the bypass clutch control regulator valve.
- The bypass clutch control regulator valve directs the pressure from the CAPLY circuit back to the converter release regulator valve through the CAPLY EX circuit.
- The converter release regulator valve directs the pressure from the CAPLY EX circuit to the drain back valve through the DBACK circuit.

Cooler and lubrication hydraulic circuits:

- The lubrication control valve directs line pressure to the transmission fluid cooler or the thermal bypass valve through the COOLF circuit.
- When the transmission fluid exits the transmission fluid cooler or thermal bypass valve, it provides lubrication to the transmission through the LUBE circuit.

Solenoid hydraulic circuits:

- The solenoid pressure regulator valve supplies regulated line pressure to the shift, LPC and TCC solenoid through the SREG hydraulic circuit.
- The PCA applies varying pressure to the main regulator valve through the VFS5 hydraulic circuit. LPC solenoid regulates line pressure by controlling
- The position of the main regulator valve.
- SSB supplies pressure to the clutch B regulator valve to position the valve for direct clutch (B) application.
- SSD supplies pressure to the solenoid multiplex valve through the VFS4 circuit.
- SSE supplies pressure to the solenoid multiplex valve and the drive enable valve through the SS1 circuit to move the valves.
- The position of the solenoid multiplex valve and the drive enable valve allows pressure from the VFS4 circuit to be directed to the clutch E latch and regulator valves through the CLEC circuit to position the valves for overdrive clutch (E) application.

Clutch hydraulic circuits:

- Regulated line pressure from the clutch B regulator valve is supplied to the direct clutch (B) to apply the clutch.
- Regulated line pressure from the clutch E regulator valve is supplied to the overdrive clutch (E) to apply the clutch.

Electrical Operation

Solenoid operation:

5th Gear Solenoid Operation Chart

Selector Lever Position	PCM Commanded Gear	Shift Solenoid	TCC NL				
SSA NL (1, 2, 3, 4)	SSB NH (3, 5, R)	SSC NL (CB 2, 6)	SSD NH (CB L/R 4, 5, 6)	SSE NC			
D	5	OFF	Off	Off	OFF	Off	ON/Off

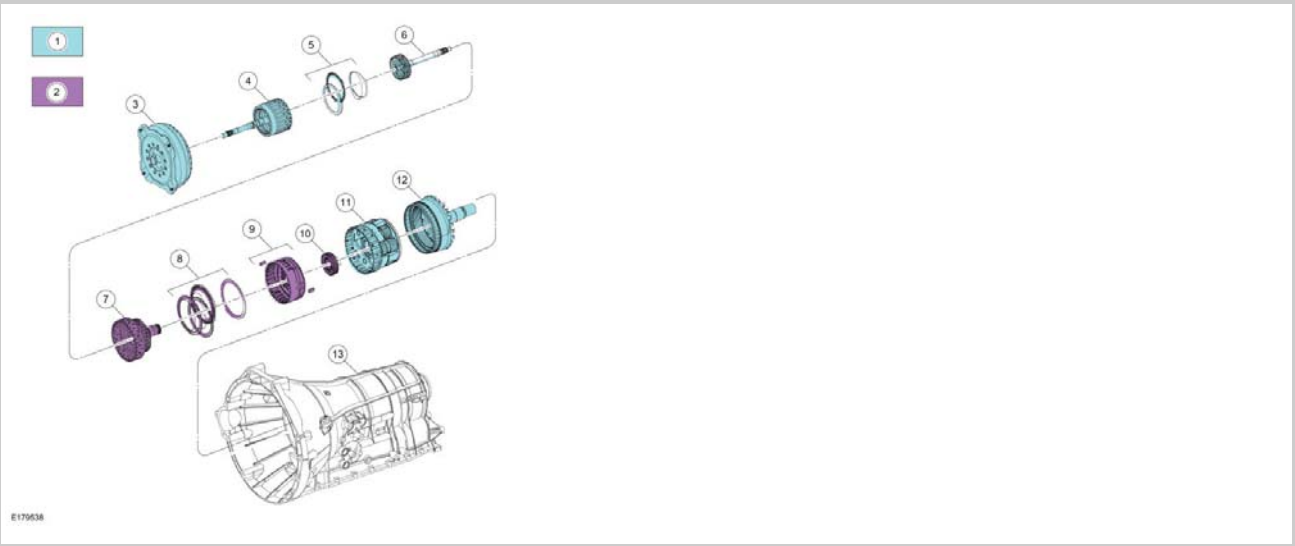
CB = Clutch brake

NC = Normally closed

NH = Normally high

NL = Normally low

6th Gear Torque Converter Clutch (TCC) Applied



Item	Description
1	Driven Components
2	Held Components
3	Torque Converter
4	Front Planetary Ring Gear Assembly (Input Shaft)
5	Overdrive Clutch (E) Assembly
6	Overdrive Clutch Shaft
7	Direct Clutch Cylinder

8	Intermediate Clutch (C) Assembly
9	Center Support
10	Rear Planetary Sun Gear (No. 2)
11	Rear Planetary Carrier
12	Rear Planetary Ring Gear and Output Shaft Assembly
13	Transmission Case

Mechanical Operation

Apply components:

- Overdrive clutch (E) applied
- Intermediate clutch (C) applied

Planetary Gearset Operation

Front planetary gearset driving components:

- Ring gear (input shaft)

Front planetary gearset driven components:

- Planetary carrier (does not contribute to power flow)

Front planetary gearset held components:

- Sun gear (splined to pump assembly)

Rear planetary gearset driving components:

- Planetary carrier

Rear planetary gearset driven components:

- Ring gear (output shaft)

Rear planetary gearset held components:

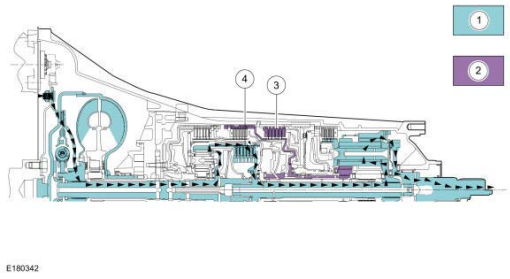
- No. 2 sun gear

6th Gear Torque Converter Clutch (TCC) Applied Clutch Application Chart

Gear	Forward A (1, 2, 3, 4)	Direct B (3, 5, R)	Intermediate C (2, 6)	Low/Reverse D (1, R)	Overdrive E (4, 5, 6)	Low-OWC
6th Gear D			H		D	O/R
Planetary Components	Front planetary carrier-to-No. 3 sun gear	Front carrier-to-No. 2 sun gear	No. 2 sun gear	Rear planetary carrier	Input shaft-to-rear planetary carrier	Rear planetary carrier

- D = Drive Clutch
- H = Hold Clutch
- O/R = Overrunning

6th Gear Power Flow



Item	Description
1	Driven Components
2	Held Components
3	Intermediate Clutch (C)
4	Overdrive Clutch (E)

Hydraulic Operation

Line pressure hydraulic circuits:

- The position of the main regulator valve controls line pressure. The position of the main regulator valve is dependent on the pressure applied to it by the LPC solenoid through the VFS5 circuit.
- The main regulator valve varies pressure in the PUMP circuit by controlling hydraulic flow from the SCHG circuit into the pump suction circuit.
- Line pressure is supplied to the:
  - Manual valve.
  - Lubrication control valve.
  - Converter release regulator valve.
  - Bypass clutch control regulator valve.
  - Solenoid pressure regulator valve.
  - D1 latch and regulator valves.
- In drive, the manual valve directs line pressure to the No. 1 shuttle valve and clutch A, C and E regulator valves
- The No. 1 shuttle ball directs line pressure to the clutch B regulator valve.

Torque converter circuits:

- When the TCC is applied, the bypass clutch control regulator valve applies pressure to the torque converter through the CAPLY circuit to apply the TCC.
- CAPLY pressure exits the torque converter through the CREL circuit to the converter release regulator valve.

Cooler and lubrication hydraulic circuits:

- The lubrication control valve directs line pressure to the transmission fluid cooler or the thermal bypass valve through the COOLF circuit.
- When the transmission fluid exits the transmission fluid cooler or thermal bypass valve, it provides lubrication to the transmission through the LUBE circuit.

Solenoid hydraulic circuits:

- The solenoid pressure regulator valve supplies regulated line pressure to the shift, LPC and TCC solenoids through the SREG hydraulic circuit.
- The LPC solenoid applies varying pressure to the main regulator valve through the VFS5 hydraulic circuit. The LPC solenoid regulates line pressure by controlling the position of the main regulator valve.
- The TCC solenoid supplies pressure to the converter release regulator valve and the bypass clutch control regulator valve to move the position of the valves for TCC application.
- SSC supplies pressure to the clutch C regulator valve to position the valve for intermediate clutch (C) application.
- SSD supplies pressure to the solenoid multiplex valve through the VFS4 circuit.
- SSE supplies pressure to the solenoid multiplex valve and the drive enable valve through the SS1 circuit to move the valves.
- The position of the solenoid multiplex valve and the drive enable valve allows pressure from the VFS4 circuit to be directed to the clutch E latch and regulator valves through the CLEC circuit to position the valves for overdrive clutch (E) application.

Clutch hydraulic circuits:

- Regulated line pressure from the clutch C regulator valve is supplied to the intermediate clutch (C) to apply the clutch.
- Regulated line pressure from the clutch E regulator valve is supplied to the overdrive clutch (E) to apply the clutch.

6th Gear Torque Converter Clutch (TCC) Applied Solenoid Operation Chart

Selector Lever Position	PCM Commanded Gear	Shift Solenoid	TCC NL	
SSA NL (1, 2, 3, 4)	SSB NH (3, 5, R)	SSC NL (CB 2, 6)	SSD NH (CB L/R	SSE NC

			4, 5, 6)				
6	Off	On	On	Off	Off	Off	On/Off

CB = Clutch brake

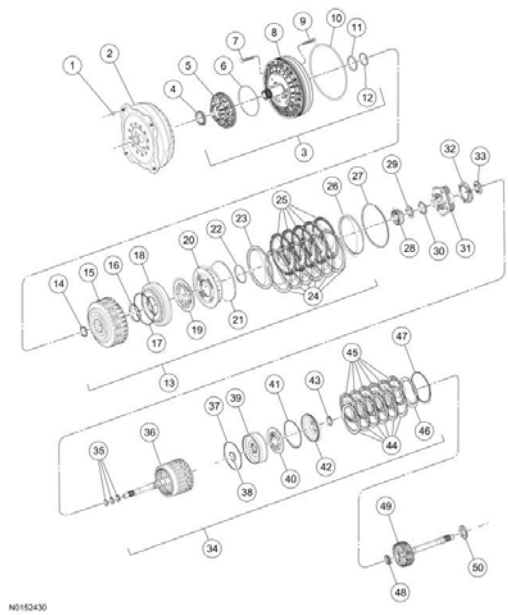
NC = Normally closed

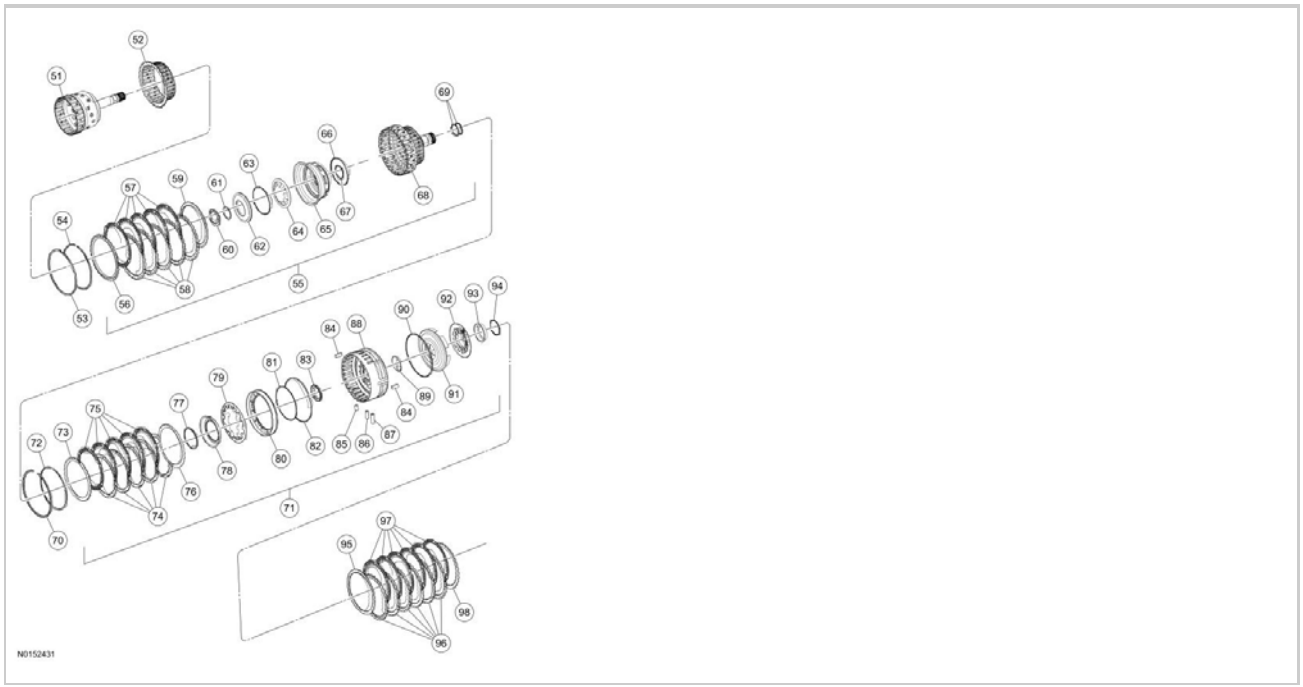
NH = Normally high

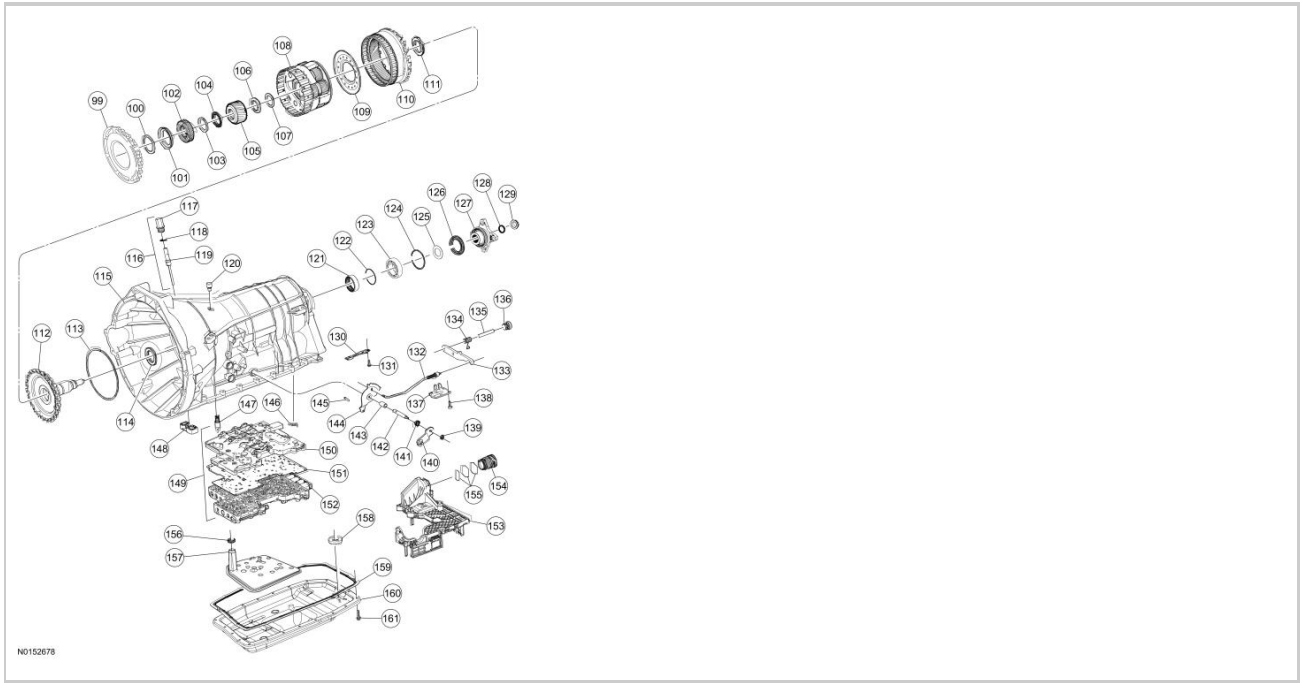
NL = Normally low

DESCRIPTION AND OPERATION > TRANSMISSION DESCRIPTION

Disassembled Views







Item	Part Number	Description
1	N800750-S437	Flexplate-to-torque converter nut (quantity model dependent)
2	7902	Torque converter (model dependent)
3	7A103	Pump assembly
4	7A248	Front pump oil seal
5	-	Pump body (part of 7A103)
6	7A248	Front pump inner oil seal
7	7N134	Front pump-to-case bolt (13 required)

8	7A103	Front pump assembly
9	W707871-S300	Bolt - attaches pump to pump adapter assembly (11 required)
10	7A248	Front pump outer oil seal
11	7D019	Clutch support fluid seal
12	7L323	Front pump support seal
13	-	Forward (A) clutch assembly
14	7D014	Front pump selective washer
15	7A360	Forward (A) clutch cylinder and hub assembly
16	7A548	Forward (A) clutch inner piston seal
17	7A548	Forward (A) clutch outer piston seal
18	7A262	Forward (A) clutch piston
19	7A480	Forward (A) clutch piston retaining spring
20	7H360	Forward (A) clutch balance piston assembly
21	7A548	Forward (A) clutch balance piston outer seal
22	7H365	Forward (A) clutch balance piston snap ring
23	7E085	Forward (A) clutch cushion spring
24	7E314	Forward (A) clutch steel plates (externally splined) (quantity model dependent)
25	7B164	Forward (A) clutch friction plates (internally splined) (quantity model dependent)
26	7B066	Forward (A) clutch pressure plate
27	7D483	Pressure plate retaining snap ring
28	7D063	Front planetary sun gear (No. 1)
29	7H375	Bearing (T1)
30	-	Front planetary carrier assembly snap ring (part of 7A398)
31	7A398	Front planetary carrier assembly
32	7L339	Plate transmission fluid collector
33	7L495	Bearing (T2)
34	-	Overdrive (E) clutch assembly
35	7G091	Turbine shaft seals (3 required)
36	7F207	Input shaft
37	7A548	Overdrive (E) clutch piston outer seal
38	7A548	Overdrive (E) clutch piston inner seal

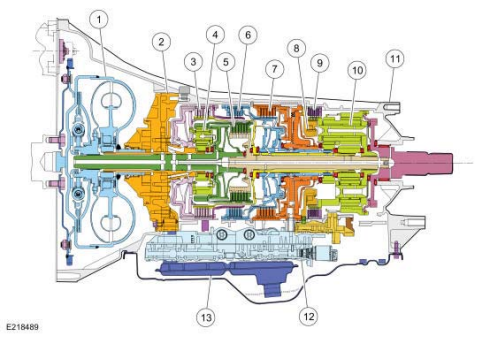
39	7A262	Overdrive (E) clutch piston
40	7B070	Overdrive clutch piston spring
41	7A548	Balance piston outer seal
42	7H360	Overdrive (E) balance piston
43	7C122	Balance piston snap ring
44	7B442	Overdrive (E) clutch steel plates (externally splined)
45	7B164	Overdrive (E) clutch friction plates (internally splined)
46	7B066	Overdrive (E) pressure plate
47	7D483	Overdrive (E) clutch retaining ring
48	7C096	Bearing (T3)
49	7F351	Intermediate (C) clutch shaft
50	7H375	Bearing (T4)
51	7B067	Sun gear hub and shaft assembly
52	7F236	Direct (B) clutch hub
53	7C122	Direct (B) clutch cylinder retaining ring
54	7D483	Direct (B) clutch pressure plate retaining ring
55	-	Direct (B) clutch assembly (clutch B)
56	7B066	Direct (B) clutch pressure plate
57	7B164	Direct (B) clutch friction plates (internally splined) (quantity model dependent)
58	7B442	Direct (B) clutch steel plates (externally splined) (quantity model dependent)
59	7E085	Direct (B) clutch cushion plate
60	7C096	Roller bearing (T5)
61	7A577	Direct (B) clutch piston retaining ring
62	7A262	Direct (B) clutch balance piston
63	7A548	Direct (B) clutch balance seal
64	7B488	Direct (B) clutch piston return spring
65	-	Direct (B) clutch piston
66	7A548	Direct (B) clutch piston outer seal
67	7C099	Direct (B) clutch piston inner seal
68	7F283	Direct (B) clutch cylinder
69	7D020	Shell cylinder seals (2 required)

70	7D483	Center support retaining ring
71	-	Center support assembly
72	7D483	Intermediate (C) clutch pressure plate retaining ring
73	7B066	Intermediate (C) clutch pressure plate
74	7B442	Intermediate (C) clutch steel plates (externally splined) (quantity model dependent)
75	7B164	Intermediate (C) clutch friction plates (internally splined) (quantity model dependent)
76	7E085	Intermediate (C) clutch pressure plate spring
77	7A577	Intermediate (C) clutch retaining ring
78	7B043	Intermediate (C) clutch ring
79	7A480	Intermediate (C) clutch piston spring
80	7E005	Intermediate (C) clutch piston
81	7F225	Intermediate (C) clutch piston inner seal
82	7F224	Intermediate (C) clutch piston outer seal
83	7F373	Bearing (T6)
84	7B220	Center support keys (2 required)
85	7G199	Center support feed tube seal (black)
86	7G087	Center support feed tube seal (green or orange)
87	7G084	Center support feed tube seal (blue)
88	7G033	Center support
89	7D404	Low/reverse clutch piston center seal
90	7D403	Low/reverse clutch piston outer seal
91	7A262	Low/reverse clutch piston
92	7B070	Low/reverse clutch piston return spring
93	7H318	Low/reverse clutch piston retainer
94	7D483	Retainer transmission-snap ring
95	7E085	Clutch disc cushion plate
96	7B442	Low/reverse clutch steel plates (externally splined)
97	7B164	Low/reverse clutch friction plates (internally splined)
98	7B066	Low/reverse clutch pressure plate (select fit)
99	7A089	OWC
100	7F405	Thrust gear shim (select fit)

101	7C041	Thrust bearing (T7)
102	7D063	Sun gear No. 2
103	7D235	Thrust bearing outer race
104	7D234	Roller bearing (T8)
105	7D063	Sun gear No. 3
106	7D234	Roller bearing (T9)
107	-	Roller bearing race (T9)
108	7D006	Rear planetary carrier assembly
109	-	Fluid collar rear planetary plate (part of 7D006)
110	7A153	Output shaft ring gear assembly
111	7G178	Thrust Bearing (T10)
112	7060	Output shaft park gear assembly
113	7N194	Output shaft retaining ring
114	7B368	Bearing (T11)
115	7005	Transmission case assembly (model dependent)
116	7A010	Transmission case fluid fill plug assembly
117	7H398	Transmission case fluid fill plug
118	7A010	Transmission case fluid fill seal
119	7A010	Transmission oil level indicator
120	7034	Transmission case vent assembly (model dependent)
121	7A415	Output shaft bearing assembly
122	7030	Output shaft bearing snap ring
123	7R205	Output shaft ball bearing
124	7030	Output shaft ball bearing snap ring
125	7N135	Slip plane washer
126	7052	Output shaft seal
127	7A021	Output shaft flange (model dependent)
128	7052	Output shaft flange seal
129	7045	Output shaft flange retaining nut
130	7E332	Manual valve detent spring
131	W711235-S300	Manual valve detent spring retaining screw and washer
132	7A232	Park pawl actuator rod
133	7A441	Park pawl

134	7D070	Park pawl return spring
135	7D071	Park pawl shaft
136	7H398	Plug assembly transmission case housing
137	7G101	Park rod actuating plate
138	W711235-S300	Park pawl abutment retaining screw and washer
139	W708455-S441	Manual control lever nut
140	7A256	Manual control lever
141	7B498	Manual control lever shaft seal
142	7C493	Manual control lever shaft
143	7A209	Manual control lever shaft spacer
144	7A115	Manual valve detent lever assembly
145	7G100	Manual valve detent lever retaining pin
146	7F277	OWC bias spring
147	7H322	Thermal bypass valve
148	7B148	Front pump adapter seal
149	7A100	Main control assembly
150	-	Main control valve body assembly (part of 7A100)
151	7Z490	Main control valve body separator plate
152	-	Lower main control valve body (part of 7A100)
153	7G276	Molded leadframe
154	7G276	Bulkhead connector sleeve
155	7A248	Bulkhead connector sleeve seals
156	-	Transmission fluid filter seal (part of 7A098)
157	7A098	Transmission fluid filter
158	-	Transmission fluid pan magnet
159	7A191	Transmission fluid pan gasket
160	7A194	Transmission fluid pan
161	W500214-S437-S437	Transmission fluid pan bolt

Component Location



Item	Description
1	Torque converter
2	Front pump assembly
3	Forward clutch (A)
4	Front planetary gearset
5	Overdrive clutch (E)
6	Direct clutch (B)
7	Intermediate clutch (C)
8	One-Way Clutch (OWC)
9	Low/reverse clutch (D)
10	Rear planetary gearset
11	Transmission case
12	Main control assembly
13	Transmission fluid filter

DIAGNOSIS AND TESTING > DIAGNOSIS BY SYMPTOM > SYMPTOM CHART(S)

Symptom Chart: Automatic Transmission

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

In most circumstances the PCM sets a DTC to help guide with diagnostics. Refer to the DTC Chart before using the Symptom Chart. The Condition column lists the vehicle condition. The Possible Sources column lists a detailed vehicle condition. The Action column lists the action to be performed to determine the cause of the condition. Each action lists the components that can cause the symptom and the individual components in that system. The components are listed in order of disassembly. Use the list of components and the required action to focus on disassembly inspections for the root cause of the concern.

Symptom	Possible Sources	Action

Engagement concerns	No forward	REFER to: Forward Clutch Assembly .
No reverse		REFER to: Direct Clutch Assembly .
Harsh reverse		REFER to: Direct Clutch Assembly .
Harsh forward		REFER to: Forward Clutch Assembly .
Delayed/soft reverse		REFER to: Direct Clutch Assembly .
Delayed soft/forward		CHECK the transmission fluid level. REFER to: Transmission Fluid Level Check . INSPECT the forward clutch assembly for damage. REPAIR as required. REFER to: Forward Clutch Assembly .
No forward and no reverse		CHECK the transmission fluid level. REFER to: Transmission Fluid Level Check . INSPECT the filter and pump assembly. REFER to: Transmission Fluid Pan, Gasket and Filter .
Delayed/soft forward and reverse		Forward clutch damaged or worn. REFER to: Forward Clutch Assembly .
Neutral after launch		REFER to: Low One-Way Clutch Assembly .
Shift concerns	No 1-2 shift/harsh/soft/slipping	REFER to: Intermediate Clutch Assembly . REFER to: Forward Clutch Assembly . REFER to: Low One-Way Clutch Assembly .
No 2-3 shift/harsh/soft/slipping		REFER to: Direct Clutch Assembly . REFER to: Forward Clutch Assembly . REFER to: Intermediate Clutch Assembly .
No 3-4 shift/harsh/soft/slipping		REFER to: Overdrive Clutch Assembly . REFER to: Forward Clutch Assembly .

		REFER to: Direct Clutch Assembly .
No 4-5 shift/harsh/soft/slipping		REFER to: Direct Clutch Assembly . REFER to: Overdrive Clutch Assembly . REFER to: Forward Clutch Assembly .
No 5-6 shift/harsh/soft/slipping		REFER to: Intermediate Clutch Assembly . REFER to: Direct Clutch Assembly .
Only gears 1, 2, 3, 4 available		REFER to: Forward Clutch Assembly .
Only gears 3 and 5 available		REFER to: Direct Clutch Assembly .
Only gears 2 and 6 available		REFER to: Intermediate Clutch Assembly .
Only gears 4, 5, 6 available		REFER to: Overdrive Clutch Assembly .
Only gears 1 and R available		REFER to: Low/Reverse Clutch Assembly . REFER to: Low One-Way Clutch Assembly .
No engine braking in low		REFER to: Low/Reverse Clutch Assembly .
Torque converter operation concerns	No apply	CHECK for DTCs related to torque converter concerns. INSPECT the torque converter hydraulic circuits and regulator valve for damage or wear. REFER to: Main Control Valve Body and REFER to: Torque Converter Clutch (TCC) .
Always applied (engine stalls)		CHECK for DTCs related to torque converter concerns. INSPECT the torque converter hydraulic circuits and regulator valve for damage or wear. REFER to: Main Control Valve Body and REFER to: Torque Converter Clutch (TCC) .
Cycling/shutter/chatter		CHECK for DTCs related to torque converter concerns. CHECK the transmission fluid level. REFER to: Transmission

		Fluid Level Check . INSPECT the torque converter hydraulic circuits and regulator valve for damage or wear. REFER to: Torque Converter Clutch (TCC) .
Other concerns	Selector lever high effort	Selector lever cable routed wrong, binding or damaged. REFER to: External Controls .
External leaks		Damaged or worn seals. REFER to: Leakage Inspection .
Noise		Engine drive accessories, suspension, CV joints, REFER to: Noise, Vibration and Harshness (NVH) .
Vibration		Engine drive accessories, suspension, CV joints, transmission fluid cooler tubes, REFER to: Noise, Vibration and Harshness (NVH) .
No park range		INSPECT the selector lever cable for correct adjustment. REFER to: Selector Lever Cable Adjustment .
INSPECT the manual control lever for damage, wear or correct installation. REFER to: Shift Solenoids (SS) .		
INSPECT the park pawl, park pawl actuator, for damage or wear. REFER to: Shift Solenoids (SS) .		
Overheating		Transmission fluid cooling system damaged. REFER to: Transmission Cooling .

DIAGNOSIS AND TESTING > DIAGNOSTIC STRATEGY > OVERVIEW

The diagnostic process for each transmission concern will vary depending on the symptoms and condition of the vehicle. The diagnostic process below is an efficient method to collect as much data as possible about the concern before performing a repair or removing the transmission from the vehicle for teardown and further inspection. Intermittent concerns and concerns that result in default or fail-safe operations can be difficult to diagnose.

DIAGNOSIS AND TESTING > DIAGNOSTIC STRATEGY > AUTOMATIC TRANSMISSION DIAGNOSIS

Many transmission faults will set one or more DTCs in the PCM/ TCM. In some instances a group of

DTCs may indicate a particular fault. The transmission may only operate in default or failsafe modes while certain DTCs are set.

Begin diagnosis by performing the PCM Quick Test. Refer to ENGINE CONTROLS - INTRODUCTION (EXCEPT DIESEL & HYBRID) . Record all DTCs and related freeze frame data. Clear DTCs after recording the information.

DIAGNOSIS AND TESTING > DIAGNOSTIC STRATEGY > PRELIMINARY INSPECTION

The preliminary inspection will:

1.

* Find obvious causes for a concern.

2.

* Adjust the selector lever linkage.

3.

* Collect a fluid sample.

DIAGNOSIS AND TESTING > DIAGNOSTIC STRATEGY > PID MONITOR/RECORD ON ROAD TEST

Using the DTCs and freeze frame data as a guide, prepare the scan tool to make a recording of the event. Select the transmission PIDs that are related to the concern as well as PIDs for general automatic transmission operation. Since you may only get one or two chances to duplicate the concern, it is better to have more data on the recording. If possible, set datalogger to automatically start recording when a PID reaches a certain value. For example, you might want the recording to start 6 seconds before a fault PID changes from No Fault to Fault.

The PCM/ TCM may set a DTC after the first occurrence of the fault. Some DTCs may require up to 5 consecutive occurrences before setting. Drive the vehicle in a manner similar to the freeze frame data conditions if possible. If no freeze frame data is available, then perform this road test:

- Drive vehicle normally for 1-3 minutes to warm up the fluid.
- From a stop, accelerate the vehicle to 6th gear with the shifts occurring at approximately 2000 RPM. Stay in 6th gear for 30 seconds or until the TCC applies. Repeat this two times.
- From a stop, accelerate the vehicle to 6th gear with the shifts occurring at approximately 3000 RPM. Stay in 6th gear for 30 seconds or until the TCC applies. Repeat this two times.

After the road test, review the recording and recheck for newly set DTCs. Electrical fault DTCs are diagnosed in pinpoint tests. Hydraulic, mechanical, and performance fault DTCs are diagnosed in component tests. REFER to DTC chart for detailed diagnosis.

If no DTCs are set, use the data collected, the clutch application chart, and the solenoid application chart to determine suspect transmission systems for the concern. Use the component test to diagnose

each suspect system.

DIAGNOSIS AND TESTING > DIAGNOSTIC STRATEGY > PINPOINT TESTS

The pinpoint tests are divided by component or system. Each test is a series of circuit checks to verify the integrity of the wiring harness between the PCM/ TCM and the solenoid or sensor.

DIAGNOSIS AND TESTING > DIAGNOSTIC STRATEGY > COMPONENT TESTS

The component tests are divided by system. Each test lists the possible symptoms the system can exhibit. For each symptom is a list of components that could cause the symptom. The components are listed in least intrusive to most intrusive order.

DIAGNOSIS AND TESTING > DIAGNOSTIC STRATEGY > PERFORM REPAIR

There are over 400 individual components in an automatic transmission. All of these parts must be in good working order. Many repairs are fairly straight forward. In these repairs you will:

- Clean and inspect all parts removed
- Attempt to determine root cause of the failure
- Identify and repair/replace any related damaged parts
- Carefully document findings on the repair order

In the case of clutch failure where the transmission fluid is heavily contaminated with friction material, the transmission needs to be overhauled. The repair will require complete disassembly and cleaning of the transmission. All seals and gaskets (except the reusable pan gasket) should be replaced.

DIAGNOSIS AND TESTING > DIAGNOSTIC STRATEGY > COMPLETE REPAIR

After reassembling the transmission, several steps are required to properly restore the vehicle before returning it to the customer.

- Initial transmission fluid fill - this may be completed before the transmission is installed in the vehicle
- Clear adaptive tables - required for overhaul and when the solenoid body has been replaced
- Reset misfire monitor - required whenever the transmission has been removed
- Road Test until the transmission fluid is up to operating temperature, this is required to make sure transmission fluid cooler is full of transmission fluid
- Perform adaptive drive cycle - required if the adaptive tables were cleared
- Set transmission fluid level - transmission fluid is now at the correct temperature and that the

transmission fluid cooler has been purged of air.

- Verify the repair resolved the concern - this is also known as the "post repair road test"

DIAGNOSIS AND TESTING > DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND PINPOINT TESTS - 2.3L ECOBOOST (201KW 273PS) > PRINCIPLES OF OPERATION

Inspection and Verification

1.

Verify the customer concern.

2.

Visually inspect for obvious signs of mechanical or electrical damage.

3.

If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.

4.

If the cause is not visually evident, verify the symptom. REFER to: Diagnosis By Symptom .

When the electrical connector or solenoid body is disconnected, inspect the connector for terminal condition, corrosion and contamination. Also inspect the connector seal for damage. Clean, repair or install new components as required.

Power is routed through the Transmission Solenoid Power Control (TSPC) relay (inside the PCM) to all transmission solenoids. If the power circuit to the transmission solenoids or the TSPC relay fails open, then all solenoids are failed electrically OFF. Check for open, short to ground or the transmission connector disconnected. The TSPC relay disables power to the transmission solenoids when certain transmission DTCs are set.

Shift Solenoid Pre-Diagnosis

Selector Lever Position	PCM Commanded Gear	Shift Solenoid	TCC NL				
SSA NL TCC NL (1, 2, 3, 4)	SSB NH (3, 5, R)	SSC NL (CB 2, 6)	SSD NH (CB L, R/C 4, 5, 6)	SSE NC			
P	P	Off	On	Off	Off	Off	Off
R	R	Off	Off	Off	Off	Off	Off
N	N	Off	On	Off	Offa	Off	Off

D	1	On	On	Off	Offb	Off	Off
2		On	On	On	On	Off	Off
3		On	Off	Off	On	On	On/Off
4		On	On	Off	Off	On	On/Off
5		Off	Off	Off	Off	On	On/Off
6		Off	On	On	Off	On	On/Off
M c	--	--	--	--	--	--	--
2	2	On	On	On	On	Off	Off
1	1	On	On	Off	Off	On	Off

a Solenoid state changes if vehicle is moving forward with the selector lever in the NEUTRAL position. b Solenoid is On when vehicle is above 5 km/h (3 mph). c All gears available upon driver request.

CB = Clutch brake

NC = Normally closed

NH = Normally high

NL = Normally low

DIAGNOSIS AND TESTING > DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND PINPOINT TESTS - 2.3L ECOBOOST (201KW 273PS) > DTC CHART: PCM

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

DTC Chart

DTC	Description	Component	Action
P0657	Actuator Supply Voltage A Circuit Open	Actuator Supply Voltage A Circuit Open	Power is routed through the Transmission Solenoid Power Control (TSPC) relay (inside the PCM) to all solenoids. If the power circuit to the transmission solenoids or the TSPC relay fails open, then all solenoids are failed electrically off. CHECK for open, short to ground or the transmission connector disconnected. The TSPC relay also disables power to the transmission solenoids when certain transmission

			DTCs are set. REPAIR as required. CLEAR the DTC. GO to Pinpoint Test A
P0701	Transmission Control System Range/Performance	Transmission hydraulic and clutch systems (including non-electrical shift solenoid faults, main control valve body and clutch(s)).	Intermittent clutch on fault and may set with DTCs P2700, P2701, P2702, P2703 and/or P2704. CLEAR the DTC. If DTC P0701 returns, REFER to: Diagnosis By Symptom .
P0702	Transmission Control System Electrical	Battery	INSPECT the PCM power and ground circuits for opens or short to ground. INSPECT the PCM connector for damaged or pushed-out terminals, corrosion or loose wires. CLEAR the DTC. RERUN the KOEO and (KOER self-test). If DTC P0702 returns, REFER to: Charging System - 2.3L EcoBoost (201kW/273PS) .
P0705	Transmission Range Sensor "A" Circuit (PRNDL Input)	TR sensor	GO to Pinpoint Test C
P0706	Transmission Range Sensor "A" Circuit Range/Performance	TR sensor	The TR sensor outputs a duty cycle indicating manual lever position. This DTC sets when the duty cycle is greater or less than the expected duty cycle by 50Hz or more. Engine may not crank. CLEAR the DTC. If DTC P0706 returns, GO to Pinpoint Test C
P0707	Transmission Range Sensor "A" Circuit Low	TR sensor	Engine may not crank, CLEAR the DTC. If DTC P0707 returns, GO to Pinpoint Test C
P0708	Transmission Range Sensor "A" Circuit High	TR sensor	Engine may not crank, CLEAR the DTC. If DTC P0708 returns, GO to Pinpoint Test C
P0709	Transmission Range Sensor "A" Circuit Intermittent	TR sensor	The TR sensor outputs a duty cycle indicating manual lever position. This DTC sets when the duty cycle is within range but is in the dead band between the design position, and a in-range but invalid duty

			cycle. GO to Pinpoint Test C
P0710	Transmission Fluid Temperature Sensor "A" Circuit	TFT sensor	CLEAR the DTC. If DTC P0710 returns, GO to Pinpoint Test B
P0711	Transmission Fluid Temperature Sensor "A" Circuit Range/Performance	TFT sensor	CLEAR the DTC. If DTC P0711 returns, GO to Pinpoint Test B
P0712	Transmission Fluid Temperature Sensor "A" Circuit Low	TFT sensor	DTC P0710 may set. CLEAR the DTC. If DTC P0712 returns, GO to Pinpoint Test B
P0713	Transmission Fluid Temperature Sensor "A" Circuit High	TFT sensor	DTC P0710 may set. CLEAR the DTC. If DTC P0713 returns, GO to Pinpoint Test B
P0715	Turbine/Input Shaft Speed Sensor "A" Circuit	TSS sensor	DTC P0717 may set. CLEAR the DTC. If DTC P0715 returns, GO to Pinpoint Test D
P0717	Turbine/Input Shaft Speed Sensor "A" Circuit No Signal	TSS sensor	This DTC sets when DTC P0715 is set. REFER to DTC P0715.
P0718	Turbine/Input Shaft Speed Sensor "A" Circuit Intermittent	TSS sensor	CLEAR the DTC. If DTC P0718 returns, GO to Pinpoint Test D
P0720	Output Shaft Speed Sensor Circuit	OSS sensor	DTC P0722 may set. CLEAR the DTC. If DTC P0720 returns, GO to Pinpoint Test E
P0721	Output Shaft Speed Sensor Circuit Range/Performance	OSS sensor	CLEAR the DTC. If DTC P0721 returns, GO to Pinpoint Test E
P0722	Output Shaft Speed Sensor Circuit No Signal	OSS sensor	This DTC sets when DTC P0720 is set. REFER to DTC P0720.
P0729	Gear 6 Incorrect Ratio	Transmission	CLEAR the DTC. If DTC P0729 returns, REFER to: Diagnosis By Symptom .
P0731	Gear 1 Incorrect Ratio	Transmission	CLEAR the DTC. If DTC P0731 returns, REFER to: Diagnosis By Symptom .
P0732	Gear 2 Incorrect Ratio	Transmission	CLEAR the DTC. If DTC P0732 returns, REFER to: Diagnosis By Symptom .

P0733	Gear 3 Incorrect Ratio	Transmission	CLEAR the DTC. If DTC P0733 returns, REFER to: Diagnosis By Symptom .
P0734	Gear 4 Incorrect Ratio	Transmission	CLEAR the DTC. If DTC P0734 returns, REFER to: Diagnosis By Symptom .
P0735	Gear 5 Incorrect Ratio	Transmission	CLEAR the DTC. If DTC P0735 returns, REFER to: Diagnosis By Symptom .
P0740	Torque Converter Clutch Solenoid Circuit/Open	TCC solenoid	DTC P0743 may set, CLEAR the DTC. If DTC P0740 returns, GO to Pinpoint Test A
P0741	Torque Converter Clutch Solenoid Circuit Performance/Stuck Off	TCC solenoid	DTC P0741 is a non-electrical DTC. CLEAR the DTC. If DTC P0741 returns, REFER to: Diagnosis By Symptom .
P0742	Torque Converter Clutch Solenoid Circuit Stuck On	TCC solenoid	DTC P0743 may set, CLEAR the DTC. If DTC P0742 returns, GO to Pinpoint Test A
P0743	Torque Converter Clutch Solenoid Circuit Electrical	TCC solenoid	DTC P0740, P0742 and/or P0744 may set, CLEAR the DTC. If DTC P0743 returns, GO to Pinpoint Test A
P0744	Torque Converter Clutch Solenoid Circuit Intermittent	TCC solenoid	DTC P0743 may set, CLEAR the DTC. If DTC P0744 returns, GO to Pinpoint Test A
P0748	Pressure Control Solenoid "A" Electrical	LPC	DTC P0960, P0962 and/or P0963 may set, CLEAR the DTC. If DTC P0748 returns, GO to Pinpoint Test A
P0750	Shift Solenoid "A"	SSA	DTC P0751 may set, CLEAR the DTC. If DTC P0750 returns, GO to Pinpoint Test A
P0751	Shift Solenoid "A" Performance/Stuck Off	SSA	DTC P2700 may set, CLEAR the DTC. If DTC P0751 returns, REFER to: Diagnosis By Symptom .
P0752	Shift Solenoid "A" Stuck On	SSA	CLEAR the DTC. If DTC P0752 returns, REFER to: Diagnosis By Symptom .

P0753	Shift Solenoid "A" Electrical	SSA	DTC P0750, P0973 and/or P0974 may set, CLEAR the DTC. If DTC P0753 returns, GO to Pinpoint Test A
P0754	Shift Solenoid "A" Intermittent	SSA	CLEAR the DTC. If DTC P0754 returns, GO to Pinpoint Test A
P0755	Shift Solenoid "B"	SSB	DTC P0756 may set, CLEAR the DTC. If DTC P0755 returns, GO to Pinpoint Test A
P0756	Shift Solenoid "B" Performance/Stuck Off	SSB	DTC P2701 may set, CLEAR the DTC. If DTC P0756 returns, REFER to: Diagnosis By Symptom .
P0757	Shift Solenoid "B" Stuck On	SSB	DTC P2701 may set, CLEAR the DTC. If DTC P0757 returns, REFER to: Diagnosis By Symptom .
P0758	Shift Solenoid "B" Electrical	SSB	DTC P0755, P0976 and/or P0977 may set, CLEAR the DTC. If DTC P0758 returns, GO to Pinpoint Test A
P0759	Shift Solenoid "B" Intermittent	SSB	CLEAR the DTC. If DTC P0759 returns, GO to Pinpoint Test A
P0760	Shift Solenoid "C"	SSC	DTC P0761 may set, CLEAR the DTC. If DTC P0760 returns, GO to Pinpoint Test A
P0761	Shift Solenoid "C" Performance/Stuck Off	SSC	DTC P2702 may set, CLEAR the DTC. If DTC P0761 returns, REFER to: Diagnosis By Symptom .
P0762	Shift Solenoid "C" Stuck On	SSC	DTC P0763 may set, CLEAR the DTC. If DTC P0762 returns, REFER to: Diagnosis By Symptom .
P0763	Shift Solenoid "C" Electrical	SSC	DTC P0760, P0979 and/or P0980 may set, CLEAR the DTC. If DTC P0763 returns, GO to Pinpoint Test A
P0764	Shift Solenoid "C" Intermittent	SSC	CLEAR the DTC. If DTC P0764 returns, GO to Pinpoint Test A

P0765	Shift Solenoid "D"	SSD	DTC P0766 may set, CLEAR the DTC. If DTC P0765 returns, GO to Pinpoint Test A
P0766	Shift Solenoid "D" Performance/Stuck Off	SSD	DTC P2704 may set, CLEAR the DTC. If DTC P0766 returns, REFER to: Diagnosis By Symptom .
P0767	Shift Solenoid "D" Stuck On	SSD	DTC P07A9 and/or P2704 may set, CLEAR the DTC. If DTC P0767 returns, REFER to: Diagnosis By Symptom .
P0768	Shift Solenoid "D" Electrical	SSD	DTC P0765, P0982 and/or P0983 may set, CLEAR the DTC. If DTC P0768 returns, GO to Pinpoint Test A
P0769	Shift Solenoid "D" Intermittent	SSD	CLEAR the DTC. If DTC P0769 returns, GO to Pinpoint Test A
P0770	Shift Solenoid "E"	SSE	DTC P0773 may set, CLEAR the DTC. If DTC P0770 returns, GO to Pinpoint Test A
P0771	Shift Solenoid "E" Performance/Stuck Off	SSE	DTC P0984 may set, CLEAR the DTC. If DTC P0771 returns, REFER to: Diagnosis By Symptom .
P0772	Shift Solenoid "E" Stuck On	SSE	DTC P0984 may set, CLEAR the DTC. If DTC P0772 returns, REFER to: Diagnosis By Symptom .
P0773	Shift Solenoid "E" Electrical	SSE	REFER to DTC P0770.
P0774	Shift Solenoid "E" Intermittent	SSE	CLEAR the DTC. If DTC P0774 returns, GO to Pinpoint Test A
P07A8	Transmission Friction Element "D" Stuck Off	Transmission	CLEAR the DTC. If DTC P07A8 returns, REFER to: Diagnosis By Symptom .
P07A9	Transmission Friction Element "D" Stuck On	Transmission	DTC P0767 may set, CLEAR the DTC. If DTC P07A9 returns, REFER to: Diagnosis By Symptom .
P07AA	Transmission Friction Element "E" Stuck Off	Transmission	CLEAR the DTC. If DTC P07AA returns, REFER to: Diagnosis By Symptom .

P0815	Upshift Switch Circuit	SelectShift™ switch	CLEAR the DTC. If DTC P0815 returns, REFER to: External Controls .
P0816	Downshift Switch Circuit	SelectShift™ switch	CLEAR the DTC. If DTC P0816 returns, REFER to: External Controls .
P0826	Up and Down switch circuit	SelectShift™ switch	REFER to: External Controls .
P0882	PCM Power Input Signal Low	Battery	INSPECT the PCM power and ground circuits for opens or short to ground. INSPECT the PCM connector for damaged or pushed-out terminals, corrosion or loose wires. CLEAR the DTC. If DTC P0882 returns, REFER to: Charging System - 2.3L EcoBoost (201kW/273PS) .
P0883	PCM Power Input Signal High	Battery	CLEAR the DTC. If DTC P0883 returns, REFER to: Charging System - 2.3L EcoBoost (201kW/273PS) .
P0960	Pressure Control Solenoid "A" Control Circuit/Open	LPC	DTC P0748 may set, CLEAR the DTC. If DTC P0960 returns, GO to Pinpoint Test A
P0961	Pressure Control Solenoid "A" Control Circuit Range/Performance	LPC	CLEAR the DTC. If DTC P0961 returns, GO to Pinpoint Test A
P0962	Pressure Control Solenoid "A" Control Circuit Low	LPC	DTC P0748 may set, CLEAR the DTC. If DTC P0962 returns, GO to Pinpoint Test A
P0963	Pressure Control Solenoid "A" Control Circuit High	LPC	DTC P0748 may set, CLEAR the DTC. If DTC P0963 returns, GO to Pinpoint Test A
P0973	Shift Solenoid "A" Control Circuit Low	SSA	DTC P0753 may set, CLEAR the DTC. If DTC P0973 returns, GO to Pinpoint Test A
P0974	Shift Solenoid "A" Control Circuit High	SSA	DTC P0748 may set, CLEAR the DTC. If DTC P0974 returns, GO to Pinpoint Test A

P0976	Shift Solenoid "B" Control Circuit Low	SSB	DTC P0758 may set, CLEAR the DTC. If DTC P0976 returns, GO to Pinpoint Test A
P0977	Shift Solenoid "B" Control Circuit High	SSB	DTC P0758 may set, CLEAR the DTC. If DTC P0977 returns, GO to Pinpoint Test A
P0979	Shift Solenoid "C" Control Circuit Low	SSC	DTC P0763 may set, CLEAR the DTC. If DTC P0979 returns, GO to Pinpoint Test A
P0980	Shift Solenoid "C" Control Circuit High	SSC	DTC P0763 may set, CLEAR the DTC. If DTC P0980 returns, GO to Pinpoint Test A
P0982	Shift Solenoid "D" Control Circuit Low	SSD	DTC P0768 may set, CLEAR the DTC. If DTC P0982 returns, GO to Pinpoint Test A
P0983	Shift Solenoid "D" Control Circuit High	SSD	DTC P0768 may set, CLEAR the DTC. If DTC P0983 returns, GO to Pinpoint Test A
P0984	Shift Solenoid "E" Range/Performance	SSE	DTC P0771 and/or P0772 may set, CLEAR the DTC. If DTC P0984 returns, REFER to: Diagnosis By Symptom .
P1001	The KOER Not Able to Complete, KOER Aborted	PCM	RETRIEVE and RECORD all DTCs. REPAIR any self-test or CMDTCs first. CLEAR the DTC. RERUN the KOER self-test. If the DTC returns, REPROGRAM the PCM to the latest software. RERUN the KOER self-test. If the DTC returns, INSTALL a new PCM, REFER to: Powertrain Control Module (PCM) . After installing the new PCM PROGRAM it with the latest software and PERFORM the Transmission Strategy Download, REFER to: Transmission Strategy Download .

P1397	System Voltage Out Of Self Test Range	PCM	INSPECT the PCM power and ground circuits for opens or short to ground. INSPECT the PCM connector for damaged or pushed-out terminals, corrosion or loose wires. CLEAR the DTC. RUN the KOEO self-test. If DTC P1397 returns, REFER to: Charging System - 2.3L EcoBoost (201kW/273PS) .
P1501	Vehicle Speed Sensor Out Of Self Test Range	PCM	Vehicle speed not at 0.0 mph (km/h) during the KOEO and/or KOER self-test. CLEAR the DTC and RERUN the KOEO and KOER self-test. If DTC P1501 returns, REFER to: Anti-Lock Brake System (ABS) and Stability Control .
P1502	Vehicle Speed Sensor Intermittent	PCM	Vehicle speed not at 0.0 mph (km/h) during the KOEO and/or KOER self-test. CLEAR the DTC and RERUN the KOEO and KOER self-test. If DTC P1501 returns, REFER to: Anti-Lock Brake System (ABS) and Stability Control .
P1635	Tire/Axle Out Of Acceptable Range	PCM	Refer to ENGINE CONTROLS - INTRODUCTION (EXCEPT DIESEL & HYBRID) .
P1636	Inductive Signature Chip Communication Error	PCM	CLEAR the DTC. If DTC P1636 returns, INSTALL a new PCM. REFER to: Powertrain Control Module (PCM) . After installing the new PCM, PROGRAM it with the latest software and PERFORM the Transmission Strategy Download, REFER to: Transmission Strategy Download .
P163E	Transmission Control Module Programming Error	PCM	CLEAR the DTC. REPROGRAM the original PCM with the latest software. If DTC P163E returns, INSTALL a new PCM. REFER to: Powertrain Control Module

			(PCM) . After installing the new PCM, PROGRAM it with the latest software and PERFORM the Transmission Strategy Download, REFER to: Transmission Strategy Download .
P163F	Transmission ID Block Corrupted, Not Programmed	PCM	CLEAR the DTC. REPROGRAM the original PCM with the latest software. If DTC P163F returns, INSTALL a new PCM. REFER to: Powertrain Control Module (PCM) . After installing the new PCM, PROGRAM it with the latest software and PERFORM the Transmission Strategy Download, REFER to: Transmission Strategy Download .
P1700	Drivers Door Status Correlation	Transmission	OPEN then CLOSE the drivers door and cycle the door locks. If the door ajar icon is illuminated on the IPC and the door lock and unlock are not working correctly, REFER to: Locks, Latches and Entry Systems . If the door ajar and locks are working correctly, REFER to: External Controls .
P1702	Transmission Range Sensor Circuit Intermittent	TR sensor	DTC P0706, P0707 and/or P0708 may set, CLEAR the DTC. If DTC P1702 returns, GO to Pinpoint Test C
P1705	Transmission Range Circuit Not Indicating Park/Neutral During Self Test	TR sensor	CLEAR the DTC. RERUN the KOEO and KOER self-test. If DTC P1705 returns, GO to Pinpoint Test C
P1711	Transmission Fluid Temperature Sensor Out Of Self Test Range	TFT sensor	CLEAR the DTC and RERUN the KOEO and KOER self-test.
P1744	Torque Converter Clutch Solenoid Circuit Performance	TCC	DTC P1744 is a non-electrical DTC. CLEAR the DTC. If DTC P1744 returns, REFER to: Diagnosis By Symptom .

P177F	Unable To Fully Engage Neutral	Direct or forward clutch pack	This DTC may set when there is a mechanical/hydraulic concern with the direct or forward clutch pack, possibly deformed clutch plates or a rolled clutch seal allowing the direct clutch or the forward clutch to mechanically or hydraulically apply in neutral. PLACE the transmission in neutral with the engine running to see if there is any creep torque, this fault causes the transmission to partially engage forward gear in neutral. This DTC may set with P0752, P0757, P0762, and/or P0767. CLEAR the DTC. If the DTC returns, check the transmission for internal failure. REFER to: Transmission .
P1780	Transmission Control Switch (O/D Cancel) Circuit Out of Self-Test Range	TCS	CLEAR the DTC. If DTC P1780 returns, REFER to: External Controls .
P1783	Transmission Over Temperature Condition	Transmission	CLEAR the DTC. If DTC P1783 returns, determine if this DTC was set in conjunction with any transmission fluid temperature sensor circuit DTCs and RESOLVE them first, otherwise REFER to: Transmission Cooling .
P1910	Reverse Lamp Control Circuit/Open	Reverse lamps	CLEAR the DTC. TEST system for normal operation. If DTC P1910 returns, REFER to: Reversing Lamps .
P1921	Transmission Range Signal	TR sensor	The engine may not crank. DTC P0706, P0707 and/or P0708 may set. CLEAR the DTC. If DTC P1921 returns, CLEAR the DTC. RERUN the KOEO and KOER self-test. If DTC P1921 returns, GO to Pinpoint Test C
P2700	Transmission Friction Element "A" Apply Time	Transmission	DTC P2700 is a non-electrical DTC. DTC

	Range/Performance		P0751 and/or P0752 may set. CLEAR the DTC. If DTC P2700 returns, REFER to: Diagnosis By Symptom .
P2701	Transmission Friction Element "B" Apply Time Range/Performance	Transmission	DTC P2701 is a non-electrical DTC. DTC P0756 and/or P0757 may set. CLEAR the DTC. If DTC P2701 returns, REFER to: Diagnosis By Symptom .
P2702	Transmission Friction Element "C" Apply Time Range/Performance	Transmission	DTC P2702 is a non-electrical DTC. DTC P0761 and/or P0762 may set. CLEAR the DTC. If DTC P2702 returns, REFER to: Diagnosis By Symptom .
P2703	Transmission Friction Element "D" Apply Time Range/Performance	Transmission	DTC P2703 is a non-electrical DTC. DTC P0766 and/or P0768 may set. CLEAR the DTC. If DTC P2703 returns, REFER to: Diagnosis By Symptom .
P2704	Transmission Friction Element "E" Apply Time Range/Performance	Transmission	DTC P2704 is a non-electrical DTC. DTC P0771 and/or P0772 may set. CLEAR the DTC. If DTC P2704 returns, REFER to: Diagnosis By Symptom .
P2705	Transmission Friction Element "F" Apply Time Range/Performance	Mechanical one-way clutch	DTC P2705 is a non-electrical DTC. CLEAR the DTC. If DTC P2705 returns, REFER to: Diagnosis By Symptom .
P2758	Torque Converter Clutch Pressure Control Solenoid Stuck On	TCC	CLEAR the DTC. If DTC P2758 returns, REFER to: Diagnosis By Symptom .
P2760	Torque Converter Clutch Pressure Control Solenoid Intermittent	TCC	CLEAR the DTC. If DTC P2760 returns, GO to Pinpoint Test A

DIAGNOSIS AND TESTING > DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND PINPOINT TESTS - 2.3L ECOBOOST (201KW 273PS) > PINPOINT TESTS

Power is routed through the transmission solenoid power control relay (inside the PCM) to all transmission solenoids. If the power circuit to the transmission solenoids or the transmission solenoid power control relay fails open, all solenoids are failed electrically off. Check for open, short to ground or

the transmission connector disconnected. The transmission solenoid power control relay disables power to the transmission solenoids when certain transmission DTCs are set.

- Carry out KOEO and KOER procedures.
- Retrieve and record all DTCs.
- Repair all non-transmission DTCs first.
- Repair all transmission DTCs second.
- Clear all CMDTCs and attempt to repeat them.
- Repair all CMDTCs.
- If only pass codes are obtained, REFER to: Diagnosis By Symptom .

DIAGNOSIS AND TESTING > DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND PINPOINT TESTS - 2.3L ECOBOOST (201KW 273PS) > PINPOINT TESTS > PINPOINT TEST A : TRANSMISSION CONTROL SOLENOIDS

Refer to Transmission Controls - 6R80 for schematic and connector information.

Normal Operation

When the electrical connector or solenoid body is disconnected, inspect the connector for terminal condition, corrosion and contamination. Also inspect the connector seal for damage. Clean, repair or install new components as required. Power is routed through the Transmission Solenoid Power Control (TSPC) relay (inside the PCM) to all transmission solenoids. If the power circuit to the transmission solenoids or the TSPC relay fails open, then all solenoids are failed electrically OFF. CHECK for open, short to ground or the transmission connector disconnected. The TSPC relay disables power to the transmission solenoids when certain transmission DTCs are set

DIAGNOSIS AND TESTING > DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND PINPOINT TESTS - 2.3L ECOBOOST (201KW 273PS) > PINPOINT TESTS > PINPOINT TEST A : TRANSMISSION CONTROL SOLENOIDS > PINPOINT TEST A : TRANSMISSION CONTROL SOLENOIDS

NOTE: Without a voltage signal return to the PCM, the Transmission Solenoid Power Control (TSPC) relay is commanded OFF. By using a fused jumper wire between a transmission solenoid control circuit and the signal return circuit, the TSPC relay circuit supplies power to the transmission solenoids when the ignition is cycled from OFF to ON. Do not use a solenoid control circuit that may be at fault.

NOTE: Read and record all DTCs.

A1 CHECK THE SOLENOID POWER CIRCUIT FOR VOLTAGE

Ignition OFF.

Disconnect: Transmission vehicle harness C1575

Inspect the connector for damaged or pushed out terminals, corrosion, loose wires and missing or damaged seals.

Using the chart, connect a fused jumper wire between one of the 7 solenoid control circuit pins on transmission vehicle harness C1575 and C1575-5 .

Ignition ON.

> *NOTE: Do not use a solenoid control circuit that may be at fault. Failure to jump pin 5 to a known good solenoid control circuit can cause incorrect diagnostic results.*

Using the chart, connect a fused jumper wire between one of the 7 solenoid control circuit pins on transmission vehicle harness C1575 and C1575-5

Transmission Vehicle Harness C1575	Solenoid Control Circuit
C1575-9	SSA
C1575-14	SSB
C1575-13	SSC
C1575-10	SSD
C1575-8	SSE
C1575-16	LPC solenoid
C1575-3	TCC solenoid

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1575-7		Ground

Is the voltage greater than 11 volts?

Yes	GO to A4

No	GO to A2

A2 CHECK THE SOLENOID POWER CIRCUIT FOR AN OPEN

Ignition OFF.

Disconnect: C1551E . Inspect the connector for damaged or pushed out terminals, corrosion, loose wires and missing or damaged seals.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1551E-80	Ω	C1575-7

Is the resistance less than 3 ohms?

Yes	GO to A3

No	REPAIR transmission vehicle harness circuit for an open. CLEAR the DTCs. TEST the system for normal operation. If DTC P0657 returns, INSTALL a new PCM. REFER to: Powertrain Control Module (PCM) . PROGRAM the PCM with the latest calibration level. PERFORM the Solenoid Body Strategy Data Download procedure. REFER to: Transmission Strategy Download .

A3 CHECK THE SOLENOID POWER CIRCUIT FOR A SHORT TO GROUND

Positive Lead	Measurement / Action	Negative Lead
C1551E-80	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to A4

No	REPAIR transmission vehicle harness circuit short to ground. CLEAR the DTCs. If DTC P0657 returns, INSTALL a new PCM, REFER to: Powertrain Control Module (PCM) . PROGRAM the PCM with the latest calibration level. PERFORM the Solenoid Body Strategy Data Download procedure. REFER to: Transmission Strategy Download .

A4 CHECK SOLENOID CONTROL CIRCUITS FOR AN OPEN

Ignition OFF.

Disconnect: TCM C1551E

Inspect the connector for damaged or pushed out terminals, corrosion, loose wires and missing or damaged seals.

Measure the resistance of the solenoid control circuits using the following chart.

Positive Lead	Measurement / Action	Negative Lead
C1551E-60	Ω	C1575-9
C1551E-45	Ω	C1575-14

C1551E-75	Ω	C1575-13
C1551E-30	Ω	C1575-10
C1551E-2	Ω	C1575-8
C1551E-59	Ω	C1575-16
C1551E-44	Ω	C1575-3

Is the resistance less than 3 ohms on each circuit?

Yes	GO to A5

No	REPAIR the transmission vehicle harness circuit. CLEAR the DTCs.

A5 CHECK SOLENOID CONTROL CIRCUITS FOR A SHORT TO GROUND

Measure the resistance between the transmission vehicle harness C1575 , harness side and ground using the following chart.

Positive Lead	Measurement / Action	Negative Lead
C1575-7	Ω	Ground
C1575-9	Ω	Ground
C1575-14	Ω	Ground
C1575-13	Ω	Ground
C1575-10	Ω	Ground
C1575-8	Ω	Ground
C1575-16	Ω	Ground
C1575-3	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to A6

No	REPAIR the transmission vehicle harness circuit. CLEAR the DTCs.

A6 CHECK SOLENOID CONTROL CIRCUITS FOR A SHORT TO POWER

Connect: PCM C1551E

Measure for voltage between the transmission vehicle harness C1575 , harness side and ground using the following chart.

Positive Lead	Measurement / Action	Negative Lead
C1575-9		Ground
C1575-14		Ground
C1575-13		Ground
C1575-10		Ground
C1575-8		Ground
C1575-16		Ground
C1575-3		Ground

Is voltage greater than 3 volts on each circuit?

Yes	REPAIR the transmission vehicle harness circuit. CLEAR the DTCs.

No	GO to A7

A7 CHECK COMPONENT RESISTANCE

Measure resistance of the solenoid between the transmission molded leadframe C1551E , component side using the following chart.

Transmission	Solenoid	Transmission	Ohms
C1575-7	SSA	C1575-9	4.8 to 5.6
C1575-7	SSB	C1575-14	4.8 to 5.6
C1575-7	SSC	C1575-13	4.8 to 5.6
C1575-7	SSD	C1575-10	4.8 to 5.6
C1575-7	SSE	C1575-8	17.5 to 18.6
C1575-7	LPC solenoid	C1575-16	4.8 to 5.6
C1575-7	TCC solenoid	C1575-3	4.8 to 5.6

Are the solenoid resistances within specifications?

Yes	Inspect for stuck valves or debris, REFER to: Main Control Valve Body . REFER to: Shift Solenoids (SS) . CLEAR the transmission adaptive tables and perform the adaptive drive cycle. REFER to: Adaptive Learning Drive Cycle .

No	GO to A8

A8 CHECK SOLENOID RESISTANCE

Remove the molded leadframe from the main control. REFER to: Shift Solenoids (SS) . Inspect for metallic contamination and clean the solenoid and molded leadframe terminals.

Measure and record the resistance of the suspected solenoid. REFER to: Shift Solenoids (SS) . Compare the recorded value with the chart below.

Solenoid	Ohms
SSA	4.8 to 5.6
SSB	4.8 to 5.6
SSC	4.8 to 5.6
SSD	4.8 to 5.6
SSE	17.5 to 18.6
LPC solenoid	4.8 to 5.6
TCC solenoid	4.8 to 5.6

Is the solenoid resistance within specification?

Yes	INSTALL a new molded leadframe, REFER to: Shift Solenoids (SS) . CLEAR the DTCs.

No	INSTALL a new solenoid for the solenoid that failed the resistance check. REFER to: Shift Solenoids (SS) . CLEAR the transmission adaptive tables and perform the adaptive drive cycle. REFER to: Adaptive Learning Drive Cycle .

DIAGNOSIS AND TESTING > DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND PINPOINT TESTS - 2.3L ECOBOOST (201KW 273PS) > PINPOINT TESTS > PINPOINT TEST B : TFT (TRANSMISSION FLUID TEMPERATURE) SENSOR

Refer to Transmission Controls - 6R80 for schematic and connector information.

The TFT sensor is a temperature dependent resistor that is in contact with transmission fluid in the transmission sump area. The PCM monitors the voltage across the TFT sensor, which changes as transmission fluid temperature varies. The PCM uses the TFT sensor signal as an input for its strategy for shifting and TCC operation. The PCM also uses the TFT sensor signal for transmission fault detection and diagnostics.

PCM Non-MIL sister code to TFT circuit fault codes P0712 and P0713. This code is used to illuminate the wrench lamp. When the PCM detects a TFT circuit fault that could result in a driveability symptom. The DTC is set to illuminate the wrench lamp. Connectors damaged or pushed-out terminals, corrosion, loose wires and missing or damaged seals TFT sensor Transmission internal wiring harness frame PCM

DIAGNOSIS AND TESTING > DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND PINPOINT TESTS - 2.3L ECOBOOST (201KW 273PS) > PINPOINT TESTS > PINPOINT

TEST B : TFT (TRANSMISSION FLUID TEMPERATURE) SENSOR > PINPOINT TEST B : TFT (TRANSMISSION FLUID TEMPERATURE) SENSOR

B1 CHECK TFT INPUT SIGNAL

Ignition OFF.

Disconnect: Transmission Vehicle Harness C1575

Inspect the connector for damaged or pushed out terminals, corrosion, loose wires and missing or damaged seals.

Connect the diagnostic tool.

Ignition ON.

Enter the following mode on the diagnostic scan tool: TFT PIDs TFT and TFTV.

Does the TFT PID display -40 °C (-40 °F) and the TFTV PID display 4.96 to 5.10 volts? ?

Yes	GO to B2

No	REPAIR the circuit.

B2 CHECK TFT SIGNAL INPUT CIRCUIT FOR VOLTAGE

Measure.

Positive Lead	Measurement / Action	Negative Lead
C1575-6		Ground

Is the voltage between 4.8 and 5.1 volts?

Yes	GO to B3

No	INSPECT and REPAIR the transmission open circuit. If an open circuit is not found, INSTALL a new PCM, REFER to: Powertrain Control Module (PCM) . PROGRAM the PCM with the latest calibration level. PERFORM the Solenoid Body Strategy Data Download procedure. REFER to: Transmission Strategy Download .

B3 CHECK TFT SIGNAL RETURN CIRCUIT

Connect a fused jumper wire between the transmission vehicle harness C1575-5 and C1575-6 , harness side

Positive Lead	Measurement / Action	Negative Lead
C1575-5		C1575-6

Does the TFT PID display 190 °-195 °C (374 °-383 °F) and the TFTV PID display 0 volts?

Yes	GO to B4

No	INSPECT and REPAIR the transmission vehicle harness signal return circuit for an open. If an open circuit is not found, INSTALL a new PCM, REFER to: Powertrain Control Module (PCM) . PROGRAM the PCM with the latest calibration level. PERFORM the Solenoid Body Strategy Data Download procedure. REFER to: Transmission Strategy Download .

B4 CHECK TFT SENSOR RESISTANCE

Remove the transmission molded leadframe. REFER to: Shift Solenoids (SS) . Inspect for metal shavings on the exposed metal contacts or other components and clean the solenoid and transmission internal wiring harness frame terminals.

Measure the resistance between the transmission molded leadframe C1575-5 and C1575-6 , component side using the following chart.

C1575-5	Ω	C1575-6
°C	°F	Resistance
-40 to -20	-40 to -4	967K-284K
-19 to -1	-3 to 31	284K-100K
0-20	32-68	100K-37K
21-40	69-104	37K-16K
41-70	105-158	16K-5K
71-90	159-194	5K-2.7K
91-110	195-230	2.7K-1.5K
111-130	231-266	1.5K-0.8K
131-150	267-302	0.8K-0.54K

Does the temperature to resistance specification match?

Yes	To diagnose an overheating concern REFER to: Diagnosis By Symptom .

No	INSPECT and CLEAN the TFT sensor on the molded leadframe for metallic contamination. INSTALL a new molded leadframe if no debris was found, REFER to: Transmission Strategy Download . CLEAR the DTCs.

DIAGNOSIS AND TESTING > DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND PINPOINT TESTS - 2.3L ECOBOOST (201KW 273PS) > PINPOINT TESTS > PINPOINT

TEST C : TR SENSOR

Refer to Transmission Controls - 6R80 for schematic and connector information.

Normal Operation

The TR sensor has a set of Hall-effect sensors that have a pattern of ON/OFF states which are dependent on the PARK, REVERSE, NEUTRAL, DRIVE, 3, 2 or 1 position of the manual valve. The TR sensor has digital sensor (hall effect) that converts the shifter position into a bit pattern, and a micro controller that converts the 4 bit signal into a 125 Hz pulse width modulated signal. The TR sensor also provides signals for the starting system and the reverse lights. The PCM uses the TR sensor signal as an input for its strategy for shifting and TCC operation. The PCM also uses the TR sensor signal for transmission fault detection and diagnostics. The TR sensor is integral to the leadframe. DTCs P0705, P0706, P0707, P0708, P0709, P1702, P1705 and P1921 cannot be set by an incorrectly adjusted selector lever cable.

DIAGNOSIS AND TESTING > DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND PINPOINT TESTS - 2.3L ECOBOOST (201KW 273PS) > PINPOINT TESTS > PINPOINT TEST C : TR SENSOR > PINPOINT TEST C : TR SENSOR

NOTE: Read and record all DTCs.

C1 VERIFY DTCS

Ignition OFF.

Select PARK.

Connect the diagnostic tool.

Carry out the KOEO then the KOER test.

Are TR sensor DTCs present?

Yes	GO to C2

No	If no DTCs are present, and to diagnose any symptoms that may be present REFER to: Diagnosis By Symptom .

C2 CHECK TR SENSOR ELECTRICAL OPERATION

Ignition ON.

Enter the following diagnostic mode on the scan tool: TR PID: TR_DC and TR_FREQ.

Move the selector lever into each range and stop.

Observe the PIDs: TR_DC and TR_FREQ while wiggling the harness or driving the vehicle.

Compare the PID TR_DC to the selector lever position duty cycle, using the following chart.

Selector Lever Position	Range (% Duty Cycle)
P	8.0 - 25.8
R	30.50 - 39.31
N	40.54 - 52.49
D	54.35 - 71.15

Is the TR_FREQ between 100 to 150 Hz?

Is the TR_DC within range?

Does the TR_DC and TR_FREQ remain steady when the harness is wiggled or the vehicle driven?

Yes	The problem is not in the TR sensor system. REFER to: Diagnosis By Symptom .

No	GO to C3

C3 CHECK TR SENSOR VPWR CIRCUIT FOR POWER

Ignition OFF.

Disconnect: Transmission Vehicle Harness C1575

Inspect the connector for damaged or pushed out terminals, corrosion, loose wires and missing or damaged seals.

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1575-12		Ground

Is the voltage greater than 11 volts?

Yes	INSPECT and REPAIR the transmission vehicle harness circuit for an open. If an open circuit is not found, INSTALL a new PCM, REFER to: Powertrain Control Module (PCM) . PERFORM the Solenoid Body Strategy Data Download procedure. REFER to: Transmission Strategy Download .

No	GO to C4

C4 CHECK TR SENSOR SIGNAL CIRCUIT

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1575-4		Ground

Is the voltage greater than 4.8 volts?

Yes	GO to C5

No	INSPECT and REPAIR the transmission vehicle harness for an open. If an open circuit is not found, INSTALL a new PCM, REFER to: Powertrain Control Module (PCM) . PERFORM the Solenoid Body Strategy Data Download procedure. REFER to: Transmission Strategy Download .

C5 CHECK TR SENSOR GROUND CIRCUIT

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1575-4		C1575-11

Is the voltage greater than 4.8 volts?

Yes	GO to C6

No	INSPECT and REPAIR transmission vehicle harness circuit for an open. If an open circuit is not found, INSTALL a new PCM, REFER to: Powertrain Control Module (PCM) . PERFORM the Solenoid Body Strategy Data Download procedure. REFER to: Transmission Strategy Download .

C6 CHECK TR SENSOR TO MANUAL VALVE

Drain the transmission fluid and remove the transmission fluid pan. REFER to: Transmission Fluid Pan, Gasket and Filter .

Check the connection between the TR sensor and the manual control valve. REFER to: Transmission .

Inspect the molded leadframe for metallic contamination, REFER to: Shift Solenoids (SS) .

Is the TR sensor connected to the manual control valve shaft?

Is the TR sensor connected to the manual control valve shaft?

Yes	INSTALL a new TR sensor. REFER to: Shift Solenoids (SS) .

No	CONNECT the TR sensor to the manual control valve, REFER to: Shift Solenoids (SS) . CLEAN any debris from the molded leadframe. RUN the KOEO self-test. If DTCs return,

	INSTALL a new TR sensor. REFER to: Shift Solenoids (SS) .

DIAGNOSIS AND TESTING > DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND PINPOINT TESTS - 2.3L ECOBOOST (201KW 273PS) > PINPOINT TESTS > PINPOINT TEST D : TSS (TURBINE SHAFT SPEED) SENSOR

Refer to Transmission Controls - 6R80 for schematic and connector information.

Normal Operation

The TSS sensor is a Hall-effect type sensor that provides a signal to the PCM that changes in frequency as the rotating speed of the forward (1, 2, 3, 4) clutch cylinder varies. The PCM compares the TSS sensor signal with the engine speed information to determine the amount of slip occurring in the torque converter. The PCM also compares the TSS sensor signal with the OSS sensor signal to determine the gear ratio provided by the rear planetary gearset. The PCM uses the TSS sensor signal as an input for its strategies for shifts and TCC operation. The PCM also uses the TSS sensor signal for transmission fault detection and diagnostics. REFER to: Transmission Description - System Operation and Component Description .

DIAGNOSIS AND TESTING > DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND PINPOINT TESTS - 2.3L ECOBOOST (201KW 273PS) > PINPOINT TESTS > PINPOINT TEST D : TSS (TURBINE SHAFT SPEED) SENSOR > PINPOINT TEST D : TSS (TURBINE SHAFT SPEED) SENSOR

NOTE: If DTCs P0705, P0706, P0707, P0708, P0709, P1702, P1705 and/or P1921 are set, diagnose those DTCs first.

NOTE: Read and record all DTCs.

D1 DRIVE CYCLE TEST

Connect the diagnostic tool.

Enter the following diagnostic mode: PID TSS_SRC..

Monitor the PID TSS_SRC while road testing the vehicle. Drive the vehicle so the transmission upshifts and downshifts through all the gears.

Does the TSS sensor RPM increase and decrease with engine RPM and vehicle speed?

Yes	REFER to: Road Testing Vehicle .

No	GO to D2

D2 CHECK TSS SENSOR SIGNAL CIRCUIT FOR POWER

Ignition OFF.

Disconnect: Transmission Vehicle Harness C1575

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1575-1		Ground

Is the voltage less than 4.8 volts?

Yes	GO to D3

No	GO to D6

D3 CHECK THE TSS SENSOR SIGNAL CIRCUIT FOR AN OPEN

Ignition OFF.

Disconnect: PCM C1551E

Inspect the connector for damaged or pushed out terminals, corrosion, loose wires and missing or damaged seals.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1575-1	Ω	C1551E-27

Is the resistance less than 3 ohms?

Yes	GO to D4

No	INSPECT and REPAIR transmission vehicle harness TSS sensor signal circuit for an open. If an open circuit is not found, INSTALL a new PCM, REFER to: Powertrain Control Module (PCM) . PERFORM the Solenoid Body Strategy Data Download procedure. REFER to: Transmission Strategy Download .

D4 CHECK THE TSS SENSOR SIGNAL CIRCUIT FOR A SHORT TO GROUND

Measure:

Positive Lead	Measurement / Action	Negative Lead

C1575-1	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to D5

No	INSPECT and REPAIR transmission vehicle harness TSS sensor signal circuit for a short to ground. If a short to ground is not found, INSTALL a new PCM, REFER to: Powertrain Control Module (PCM) . PERFORM the Solenoid Body Strategy Data Download procedure. REFER to: Transmission Strategy Download .

D5 CHECK THE TSS SENSOR SIGNAL CIRCUIT FOR A SHORT TO POWER

Connect: PCM C1551E

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1575-1		Ground

Is voltage greater than 5.1 volts?

Yes	INSPECT and REPAIR transmission vehicle harness TSS sensor signal circuit for a short to power. If a short to power is not found, INSTALL a new PCM, REFER to: Powertrain Control Module (PCM) . PERFORM the Solenoid Body Strategy Data Download procedure. REFER to: Transmission Strategy Download .

No	GO to D6

D6 CHECK THE TSS SENSOR GROUND CIRCUIT

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1575-1		C1575-5

Is voltage less than 4.8 volts?

Yes	REPAIR the transmission vehicle harness signal return circuit for an open. If an open is not found, INSTALL a new PCM, REFER to: Powertrain Control Module (PCM) . PROGRAM the PCM with the latest calibration level. PERFORM the Solenoid Body Strategy Data Download procedure. REFER to: Transmission Strategy Download .

No	INSTALL a new molded leadframe, REFER to: Shift Solenoids (SS) . CLEAR the DTCs.

DIAGNOSIS AND TESTING > DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND PINPOINT TESTS - 2.3L ECOBOOST (201KW 273PS) > PINPOINT TESTS > PINPOINT TEST E : OSS (OUTPUT SHAFT SPEED) SENSOR

Refer to Transmission Controls - 6R80 for schematic and connector information.

Normal Operation

The OSS sensor is a Hall-effect type sensor that provides a signal to the PCM that changes in frequency as the rotating speed of the output shaft ring gear varies. The PCM also compares the OSS sensor signal with the TSS sensor signal to determine the gear ratio provided by the rear planetary gearset. The PCM uses the OSS sensor signal as an input for its strategies for shifts and TCC operation. The PCM also uses the OSS sensor signal for transmission fault detection and diagnostics.

DIAGNOSIS AND TESTING > DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND PINPOINT TESTS - 2.3L ECOBOOST (201KW 273PS) > PINPOINT TESTS > PINPOINT TEST E : OSS (OUTPUT SHAFT SPEED) SENSOR > PINPOINT TEST E : OSS (OUTPUT SHAFT SPEED) SENSOR

NOTE: If DTCs P0705, P0706, P0707, P0708, P0709, P1702, P1705 and/or P1921 are set, diagnose those DTCs first.

NOTE: Read and record all DTCs.

E1 DRIVE CYCLE TEST

Using the diagnostic scan tool, monitor the OSS sensor PID OSS_SRC while road testing the vehicle. Drive the vehicle so the transmission upshifts and downshifts through all the gears.

Does the OSS sensor RPM increase and decrease with engine RPM and vehicle speed?

Yes	REFER to: Road Testing Vehicle .

No	GO to E2

E2 CHECK OSS SENSOR SIGNAL CIRCUIT FOR POWER

Ignition OFF.

Disconnect: PCM C1551E

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1575-15		Ground

Is the voltage less than 4.8 volts?

Yes	GO to E3

No	GO to E6

E3 CHECK THE OSS SENSOR SIGNAL CIRCUIT FOR AN OPEN

Ignition OFF.

Disconnect: PCM C1551E

Inspect the connector for damaged or pushed out terminals, corrosion, loose wires and missing or damaged seals.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1575-15	Ω	C1551E-12

Is the resistance less than 3 ohms?

Yes	GO to E4

No	INSPECT and REPAIR transmission vehicle harness OSS sensor signal circuit for an open. If an open circuit is not found, INSTALL a new PCM, REFER to: Powertrain Control Module (PCM) . PERFORM the Solenoid Body Strategy Data Download procedure. REFER to: Transmission Strategy Download .

E4 CHECK THE OSS SENSOR SIGNAL CIRCUIT FOR A SHORT TO GROUND

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1575-15	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to E5

No	INSPECT and REPAIR transmission vehicle harness OSS sensor signal circuit for a short

	to ground. If a short to ground is not found, INSTALL a new PCM, REFER to: Powertrain Control Module (PCM) . PERFORM the Solenoid Body Strategy Data Download procedure. REFER to: Transmission Strategy Download .

E5 CHECK THE OSS SENSOR SIGNAL CIRCUIT FOR A SHORT TO POWER

Connect: PCM C1551E

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1575-15		Ground

Is voltage greater than 5.1 volts?

Yes	INSPECT and REPAIR transmission vehicle harness OSS sensor signal circuit for a short to power. If a short to power is not found, INSTALL a new PCM, REFER to: Powertrain Control Module (PCM) . PERFORM the Solenoid Body Strategy Data Download procedure. REFER to: Transmission Strategy Download .

No	GO to E6

E6 CHECK THE OSS SENSOR GROUND CIRCUIT

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1575-15		C1575-5

Is voltage less than 4.8 volts?

Yes	REPAIR the transmission vehicle harness signal return circuit for an open. If an open is not found, INSTALL a new PCM, REFER to: Powertrain Control Module (PCM) . PROGRAM the PCM with the latest calibration level. PERFORM the Solenoid Body Strategy Data Download procedure. REFER to: Transmission Strategy Download .

No	INSTALL a new molded leadframe, REFER to: Shift Solenoids (SS) .

DIAGNOSIS AND TESTING > DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND PINPOINT TESTS - 3.7L DURATEC (227KW 301PS) > PRINCIPLES OF OPERATION

Inspection and Verification

1.

Verify the customer concern.

2.

Visually inspect for obvious signs of mechanical or electrical damage.

3.

If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.

4.

If the cause is not visually evident, verify the symptom. REFER to: Diagnosis By Symptom .

When the electrical connector or solenoid body is disconnected, inspect the connector for terminal condition, corrosion and contamination. Also inspect the connector seal for damage. Clean, repair or install new components as required.

Power is routed through the Transmission Solenoid Power Control (TSPC) relay (inside the) to all transmission solenoids. If the power circuit to the transmission solenoids or the TSPC relay fails open, then all solenoids are failed electrically OFF. Check for open, short to ground or the transmission connector disconnected. The TSPC relay disables power to the transmission solenoids when certain transmission DTCs are set.

Shift Solenoid Pre-Diagnosis

Selector Lever Position	PCM Commanded Gear	Shift Solenoid	TCC NL				
SSA NL TCC NL (1, 2, 3, 4)	SSB NH (3, 5, R)	SSC NL (CB 2, 6)	SSD NH (CB L, R/C 4, 5, 6)	SSE NC			
P	P	Off	On	Off	Off	Off	Off
R	R	Off	Off	Off	Off	Off	Off
N	N	Off	On	Off	Offa	Off	Off
D	1	On	On	Off	Offb	Off	Off
2		On	On	On	On	Off	Off
3		On	Off	Off	On	On	On/Off
4		On	On	Off	Off	On	On/Off
5		Off	Off	Off	Off	On	On/Off
6		Off	On	On	Off	On	On/Off
M c	--	--	--	--	--	--	--

2	2	On	On	On	On	Off	Off
1	1	On	On	Off	Off	On	Off

a Solenoid state changes if vehicle is moving forward with the selector lever in the NEUTRAL position. b Solenoid is On when vehicle is above 5 km/h (3 mph). c All gears available upon driver request.

CB = Clutch brake

NC = Normally closed

NH = Normally high

NL = Normally low

DIAGNOSIS AND TESTING > DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND PINPOINT TESTS - 3.7L DURATEC (227KW 301PS) > DTC CHART: PCM

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

DTC Chart

DTC	Description	Component	Action
P0657	Actuator Supply Voltage A Circuit Open	Actuator Supply Voltage A Circuit Open	Power is routed through the Transmission Solenoid Power Control (TSPC) relay (inside the PCM) to all solenoids. If the power circuit to the transmission solenoids or the TSPC relay fails open, then all solenoids are failed electrically off. CHECK for open, short to ground or the transmission connector disconnected. The TSPC relay also disables power to the transmission solenoids when certain transmission DTCs are set. REPAIR as required. CLEAR the DTC. GO to PINPOINT TEST A : TRANSMISSION CONTROL SOLENOIDS .
P0701	Transmission Control System Range/Performance	Transmission hydraulic and clutch systems (including non-electrical shift solenoid faults, main control valve body and clutch(s)).	Intermittent clutch on fault and may set with DTCs P2700, P2701, P2702, P2703 and/or P2704. CLEAR the DTC. If DTC P0701 returns, REFER to: Diagnosis By Symptom .

P0702	Transmission Control System Electrical	Battery	INSPECT the PCM power and ground circuits for opens or short to ground. INSPECT the PCM connector for damaged or pushed-out terminals, corrosion or loose wires. CLEAR the DTC. RERUN the KOEO and (KOER self-test. If DTC P0702 returns, REFER to: Charging System - 3.7L Duratec (227kW/301PS) .
P0705	Transmission Range Sensor "A" Circuit (PRNDL Input)	TR sensor	GO to PINPOINT TEST C : TR SENSOR
P0706	Transmission Range Sensor "A" Circuit Range/Performance	TR sensor	The TR sensor outputs a duty cycle indicating manual lever position. This DTC sets when the duty cycle is greater or less than the expected duty cycle by 50Hz or more. Engine may not crank. CLEAR the DTC. If DTC P0706 returns, GO to PINPOINT TEST C : TR SENSOR
P0707	Transmission Range Sensor "A" Circuit Low	TR sensor	Engine may not crank, CLEAR the DTC. If DTC P0707 returns, GO to PINPOINT TEST C : TR SENSOR
P0708	Transmission Range Sensor "A" Circuit High	TR sensor	Engine may not crank, CLEAR the DTC. If DTC P0708 returns, GO to PINPOINT TEST C : TR SENSOR
P0709	Transmission Range Sensor "A" Circuit Intermittent	TR sensor	The TR sensor outputs a duty cycle indicating manual lever position. This DTC sets when the duty cycle is within range but is in the dead band between the design position, and a in-range but invalid duty cycle. GO to PINPOINT TEST C : TR SENSOR
P0710	Transmission Fluid Temperature Sensor "A" Circuit	TFT sensor	CLEAR the DTC. If DTC P0710 returns, GO to PINPOINT TEST B : TFT (TRANSMISSION FLUID TEMPERATURE) SENSOR

P0711	Transmission Fluid Temperature Sensor "A" Circuit Range/Performance	TFT sensor	CLEAR the DTC. If DTC P0711 returns, GO to PINPOINT TEST B : TFT (TRANSMISSION FLUID TEMPERATURE) SENSOR
P0712	Transmission Fluid Temperature Sensor "A" Circuit Low	TFT sensor	DTC P0710 may set. CLEAR the DTC. If DTC P0712 returns, GO to PINPOINT TEST B : TFT (TRANSMISSION FLUID TEMPERATURE) SENSOR
P0713	Transmission Fluid Temperature Sensor "A" Circuit High	TFT sensor	DTC P0710 may set. CLEAR the DTC. If DTC P0713 returns, GO to PINPOINT TEST B : TFT (TRANSMISSION FLUID TEMPERATURE) SENSOR
P0715	Turbine/Input Shaft Speed Sensor "A" Circuit	TSS sensor	DTC P0717 may set. CLEAR the DTC. If DTC P0715 returns, GO to PINPOINT TEST D : TSS (TURBINE SHAFT SPEED) SENSOR .
P0717	Turbine/Input Shaft Speed Sensor "A" Circuit No Signal	TSS sensor	This DTC sets when DTC P0715 is set. REFER to DTC P0715.
P0718	Turbine/Input Shaft Speed Sensor "A" Circuit Intermittent	TSS sensor	CLEAR the DTC. If DTC P0718 returns, GO to PINPOINT TEST D : TSS (TURBINE SHAFT SPEED) SENSOR
P0720	Output Shaft Speed Sensor Circuit	OSS sensor	DTC P0722 may set. CLEAR the DTC. If DTC P0720 returns, GO to PINPOINT TEST E : OSS (OUTPUT SHAFT SPEED) SENSOR
P0721	Output Shaft Speed Sensor Circuit Range/Performance	OSS sensor	CLEAR the DTC. If DTC P0721 returns, GO to PINPOINT TEST E : OSS (OUTPUT SHAFT SPEED) SENSOR
P0722	Output Shaft Speed Sensor Circuit No Signal	OSS sensor	This DTC sets when DTC P0720 is set. REFER to DTC P0720.
P0729	Gear 6 Incorrect Ratio	Transmission	CLEAR the DTC. If DTC P0729 returns, REFER to: Diagnosis By Symptom .

P0731	Gear 1 Incorrect Ratio	Transmission	CLEAR the DTC. If DTC P0731 returns, REFER to: Diagnosis By Symptom .
P0732	Gear 2 Incorrect Ratio	Transmission	CLEAR the DTC. If DTC P0732 returns, REFER to: Diagnosis By Symptom .
P0733	Gear 3 Incorrect Ratio	Transmission	CLEAR the DTC. If DTC P0733 returns, REFER to: Diagnosis By Symptom .
P0734	Gear 4 Incorrect Ratio	Transmission	CLEAR the DTC. If DTC P0734 returns, REFER to: Diagnosis By Symptom .
P0735	Gear 5 Incorrect Ratio	Transmission	CLEAR the DTC. If DTC P0735 returns, REFER to: Diagnosis By Symptom .
P0740	Torque Converter Clutch Solenoid Circuit/Open	TCC solenoid	DTC P0743 may set, CLEAR the DTC. If DTC P0740 returns, GO to PINPOINT TEST A : TRANSMISSION CONTROL SOLENOIDS
P0741	Torque Converter Clutch Solenoid Circuit Performance/Stuck Off	TCC solenoid	DTC P0741 is a non-electrical DTC. CLEAR the DTC. If DTC P0741 returns, REFER to: Diagnosis By Symptom .
P0742	Torque Converter Clutch Solenoid Circuit Stuck On	TCC solenoid	DTC P0743 may set, CLEAR the DTC. If DTC P0742 returns, GO to PINPOINT TEST A : TRANSMISSION CONTROL SOLENOIDS
P0743	Torque Converter Clutch Solenoid Circuit Electrical	TCC solenoid	DTC P0740, P0742 and/or P0744 may set, CLEAR the DTC. If DTC P0743 returns, GO to PINPOINT TEST A : TRANSMISSION CONTROL SOLENOIDS
P0744	Torque Converter Clutch Solenoid Circuit Intermittent	TCC solenoid	DTC P0743 may set, CLEAR the DTC. If DTC P0744 returns, GO to PINPOINT TEST A : TRANSMISSION CONTROL SOLENOIDS
P0748	Pressure Control Solenoid "A" Electrical	LPC	DTC P0960, P0962 and/or P0963 may set, CLEAR the DTC. If DTC P0748 returns, GO to PINPOINT TEST A : TRANSMISSION CONTROL

			SOLENOIDS
P0750	Shift Solenoid "A"	SSA	DTC P0751 may set, CLEAR the DTC. If DTC P0750 returns, GO to PINPOINT TEST A : TRANSMISSION CONTROL SOLENOIDS
P0751	Shift Solenoid "A" Performance/Stuck Off	SSA	DTC P2700 may set, CLEAR the DTC. If DTC P0751 returns, REFER to: Diagnosis By Symptom .
P0752	Shift Solenoid "A" Stuck On	SSA	CLEAR the DTC. If DTC P0752 returns, REFER to: Diagnosis By Symptom .
P0753	Shift Solenoid "A" Electrical	SSA	DTC P0750, P0973 and/or P0974 may set, CLEAR the DTC. If DTC P0753 returns, GO to PINPOINT TEST A : TRANSMISSION CONTROL SOLENOIDS
P0754	Shift Solenoid "A" Intermittent	SSA	CLEAR the DTC. If DTC P0754 returns, GO to PINPOINT TEST A : TRANSMISSION CONTROL SOLENOIDS
P0755	Shift Solenoid "B"	SSB	DTC P0756 may set, CLEAR the DTC. If DTC P0755 returns, GO to PINPOINT TEST A : TRANSMISSION CONTROL SOLENOIDS
P0756	Shift Solenoid "B" Performance/Stuck Off	SSB	DTC P2701 may set, CLEAR the DTC. If DTC P0756 returns, REFER to: Diagnosis By Symptom .
P0757	Shift Solenoid "B" Stuck On	SSB	DTC P2701 may set, CLEAR the DTC. If DTC P0757 returns, REFER to: Diagnosis By Symptom .
P0758	Shift Solenoid "B" Electrical	SSB	DTC P0755, P0976 and/or P0977 may set, CLEAR the DTC. If DTC P0758 returns, GO to PINPOINT TEST A : TRANSMISSION CONTROL SOLENOIDS
P0759	Shift Solenoid "B" Intermittent	SSB	CLEAR the DTC. If DTC P0759 returns, GO to PINPOINT TEST A :

			TRANSMISSION CONTROL SOLENOIDS
P0760	Shift Solenoid "C"	SSC	DTC P0761 may set, CLEAR the DTC. If DTC P0760 returns, GO to PINPOINT TEST A : TRANSMISSION CONTROL SOLENOIDS
P0761	Shift Solenoid "C" Performance/Stuck Off	SSC	DTC P2702 may set, CLEAR the DTC. If DTC P0761 returns, REFER to: Diagnosis By Symptom .
P0762	Shift Solenoid "C" Stuck On	SSC	DTC P0763 may set, CLEAR the DTC. If DTC P0762 returns, REFER to: Diagnosis By Symptom .
P0763	Shift Solenoid "C" Electrical	SSC	DTC P0760, P0979 and/or P0980 may set, CLEAR the DTC. If DTC P0763 returns, GO to PINPOINT TEST A : TRANSMISSION CONTROL SOLENOIDS
P0764	Shift Solenoid "C" Intermittent	SSC	CLEAR the DTC. If DTC P0764 returns, GO to PINPOINT TEST A : TRANSMISSION CONTROL SOLENOIDS
P0765	Shift Solenoid "D"	SSD	DTC P0766 may set, CLEAR the DTC. If DTC P0765 returns, GO to PINPOINT TEST A : TRANSMISSION CONTROL SOLENOIDS
P0766	Shift Solenoid "D" Performance/Stuck Off	SSD	DTC P2704 may set, CLEAR the DTC. If DTC P0766 returns, REFER to: Diagnosis By Symptom .
P0767	Shift Solenoid "D" Stuck On	SSD	DTC P07A9 and/or P2704 may set, CLEAR the DTC. If DTC P0767 returns, REFER to: Diagnosis By Symptom .
P0768	Shift Solenoid "D" Electrical	SSD	DTC P0765, P0982 and/or P0983 may set, CLEAR the DTC. If DTC P0768 returns, GO to PINPOINT TEST A : TRANSMISSION CONTROL SOLENOIDS

P0769	Shift Solenoid "D" Intermittent	SSD	CLEAR the DTC. If DTC P0769 returns, GO to PINPOINT TEST A : TRANSMISSION CONTROL SOLENOIDS
P0770	Shift Solenoid "E"	SSE	DTC P0773 may set, CLEAR the DTC. If DTC P0770 returns, GO to PINPOINT TEST A : TRANSMISSION CONTROL SOLENOIDS
P0771	Shift Solenoid "E" Performance/Stuck Off	SSE	DTC P0984 may set, CLEAR the DTC. If DTC P0771 returns, REFER to: Diagnosis By Symptom .
P0772	Shift Solenoid "E" Stuck On	SSE	DTC P0984 may set, CLEAR the DTC. If DTC P0772 returns, REFER to: Diagnosis By Symptom .
P0773	Shift Solenoid "E" Electrical	SSE	REFER to DTC P0770.
P0774	Shift Solenoid "E" Intermittent	SSE	CLEAR the DTC. If DTC P0774 returns, GO to PINPOINT TEST A : TRANSMISSION CONTROL SOLENOIDS
P07A8	Transmission Friction Element "D" Stuck Off	Transmission	CLEAR the DTC. If DTC P07A8 returns, REFER to: Diagnosis By Symptom .
P07A9	Transmission Friction Element "D" Stuck On	Transmission	DTC P0767 may set, CLEAR the DTC. If DTC P07A9 returns, REFER to: Diagnosis By Symptom .
P07AA	Transmission Friction Element "E" Stuck Off	Transmission	CLEAR the DTC. If DTC P07AA returns, REFER to: Diagnosis By Symptom .
P0815	Upshift Switch Circuit	SelectShift™ switch	CLEAR the DTC. If DTC P0815 returns, REFER to: External Controls .
P0816	Downshift Switch Circuit	SelectShift™ switch	CLEAR the DTC. If DTC P0816 returns, REFER to: External Controls .
P0826	Up and Down switch circuit	SelectShift™ switch	REFER to: External Controls .
P0882	PCM Power Input Signal Low	Battery	INSPECT the PCM power and ground circuits for opens or short to ground. INSPECT the PCM connector for damaged

			or pushed-out terminals, corrosion or loose wires. CLEAR the DTC. If DTC P0882 returns, REFER to: Charging System - 3.7L Duratec (227kW/301PS) .
P0883	PCM Power Input Signal High	Battery	CLEAR the DTC. If DTC P0883 returns, REFER to: Charging System - 3.7L Duratec (227kW/301PS) .
P0960	Pressure Control Solenoid "A" Control Circuit/Open	LPC	DTC P0748 may set, CLEAR the DTC. If DTC P0960 returns, GO to PINPOINT TEST A : TRANSMISSION CONTROL SOLENOIDS
P0961	Pressure Control Solenoid "A" Control Circuit Range/Performance	LPC	CLEAR the DTC. If DTC P0961 returns, GO to PINPOINT TEST A : TRANSMISSION CONTROL SOLENOIDS
P0962	Pressure Control Solenoid "A" Control Circuit Low	LPC	DTC P0748 may set, CLEAR the DTC. If DTC P0962 returns, GO to PINPOINT TEST A : TRANSMISSION CONTROL SOLENOIDS
P0963	Pressure Control Solenoid "A" Control Circuit High	LPC	DTC P0748 may set, CLEAR the DTC. If DTC P0963 returns, GO to PINPOINT TEST A : TRANSMISSION CONTROL SOLENOIDS
P0973	Shift Solenoid "A" Control Circuit Low	SSA	DTC P0753 may set, CLEAR the DTC. If DTC P0973 returns, GO to PINPOINT TEST A : TRANSMISSION CONTROL SOLENOIDS
P0974	Shift Solenoid "A" Control Circuit High	SSA	DTC P0748 may set, CLEAR the DTC. If DTC P0974 returns, GO to PINPOINT TEST A : TRANSMISSION CONTROL SOLENOIDS
P0976	Shift Solenoid "B" Control Circuit Low	SSB	DTC P0758 may set, CLEAR the DTC. If DTC P0976 returns, GO to PINPOINT TEST A : TRANSMISSION CONTROL SOLENOIDS

P0977	Shift Solenoid "B" Control Circuit High	SSB	DTC P0758 may set, CLEAR the DTC. If DTC P0977 returns, GO to PINPOINT TEST A : TRANSMISSION CONTROL SOLENOIDS
P0979	Shift Solenoid "C" Control Circuit Low	SSC	DTC P0763 may set, CLEAR the DTC. If DTC P0979 returns, GO to PINPOINT TEST A : TRANSMISSION CONTROL SOLENOIDS
P0980	Shift Solenoid "C" Control Circuit High	SSC	DTC P0763 may set, CLEAR the DTC. If DTC P0980 returns, GO to PINPOINT TEST A : TRANSMISSION CONTROL SOLENOIDS
P0982	Shift Solenoid "D" Control Circuit Low	SSD	DTC P0768 may set, CLEAR the DTC. If DTC P0982 returns, GO to PINPOINT TEST A : TRANSMISSION CONTROL SOLENOIDS
P0983	Shift Solenoid "D" Control Circuit High	SSD	DTC P0768 may set, CLEAR the DTC. If DTC P0983 returns, GO to PINPOINT TEST A : TRANSMISSION CONTROL SOLENOIDS
P0984	Shift Solenoid "E" Range/Performance	SSE	DTC P0771 and/or P0772 may set, CLEAR the DTC. If DTC P0984 returns, REFER to: Diagnosis By Symptom .
P1001	The KOER Not Able to Complete, KOER Aborted	PCM	RETRIEVE and RECORD all DTCs. REPAIR any self-test or CMDTCs first. CLEAR the DTC. RERUN the KOER self-test. If the DTC returns, REPROGRAM the PCM to the latest software. RERUN the KOER self-test. If the DTC returns, INSTALL a new PCM REFER to: Powertrain Control Module (PCM) . After installing the new PCM PROGRAM it with the latest software and PERFORM the Transmission Strategy Download, REFER to: Transmission Strategy Download .

P1397	System Voltage Out Of Self Test Range	PCM	INSPECT the PCM power and ground circuits for opens or short to ground. INSPECT the PCM connector for damaged or pushed-out terminals, corrosion or loose wires. CLEAR the DTC. RUN the KOEO self-test. If DTC P1397 returns, REFER to: Charging System - 3.7L Duratec (227kW/301PS) .
P1501	Vehicle Speed Sensor Out Of Self Test Range	PCM	Vehicle speed not at 0.0 mph (km/h) during the KOEO and/or KOER self-test. CLEAR the DTC and RERUN the KOEO and KOER self-test. If DTC P1501 returns, REFER to: Anti-Lock Brake System (ABS) and Stability Control .
P1502	Vehicle Speed Sensor Intermittent	PCM	Vehicle speed not at 0.0 mph (km/h) during the KOEO and/or KOER self-test. CLEAR the DTC and RERUN the KOEO and KOER self-test. If DTC P1501 returns, REFER to: Anti-Lock Brake System (ABS) and Stability Control .
P1635	Tire/Axle Out Of Acceptable Range	PCM	Refer to ENGINE CONTROLS - INTRODUCTION (EXCEPT DIESEL & HYBRID) .
P1636	Inductive Signature Chip Communication Error	PCM	CLEAR the DTC. If DTC P1636 returns, INSTALL a new PCM. REFER to: Powertrain Control Module (PCM) . After installing the new PCM, PROGRAM it with the latest software and PERFORM the Transmission Strategy Download, REFER to: Transmission Strategy Download .
P163E	Transmission Control Module Programming Error	PCM	CLEAR the DTC. REPROGRAM the original PCM with the latest software. If DTC P163E returns, INSTALL a new PCM. REFER to: Powertrain Control Module

			(PCM) . After installing the new PCM, PROGRAM it with the latest software and PERFORM the Transmission Strategy Download, REFER to: Transmission Strategy Download .
P163F	Transmission ID Block Corrupted, Not Programmed	PCM	CLEAR the DTC. REPROGRAM the original PCM with the latest software. If DTC P163F returns, INSTALL a new PCM. REFER to: Powertrain Control Module (PCM) . After installing the new PCM, PROGRAM it with the latest software and PERFORM the Transmission Strategy Download, REFER to: Transmission Strategy Download .
P1700	Transmission Intermittent Failure (failed to neutral)	Transmission	DTC P1700 is a non-electrical DTC. CLEAR the DTC. If the DTC returns, REFER to: Diagnosis By Symptom .
P1702	Transmission Range Sensor Circuit Intermittent	TR sensor	DTC P0706, P0707 and/or P0708 may set, CLEAR the DTC. If DTC P1702 returns, GO to PINPOINT TEST C : TR SENSOR
P1705	Transmission Range Circuit Not Indicating Park/Neutral During Self Test	TR sensor	CLEAR the DTC. RERUN the KOEO and KOER self-test. If DTC P1705 returns, GO to PINPOINT TEST C : TR SENSOR
P1711	Transmission Fluid Temperature Sensor Out Of Self Test Range	TFT sensor	CLEAR the DTC and RERUN the KOEO and KOER self-test.
P1744	Torque Converter Clutch Solenoid Circuit Performance	TCC	DTC P1744 is a non-electrical DTC. CLEAR the DTC. If DTC P1744 returns, REFER to: Diagnosis By Symptom .
P177F	Unable To Fully Engage Neutral	Direct or forward clutch pack	This DTC may set when there is a mechanical/hydraulic concern with the direct or forward clutch pack, possibly deformed clutch plates or a

			rolled clutch seal allowing the direct clutch or the forward clutch to mechanically or hydraulically apply in neutral. PLACE the transmission in neutral with the engine running to see if there is any creep torque, this fault causes the transmission to partially engage forward gear in neutral. This DTC may set with P0752, P0757, P0762, and/or P0767. CLEAR the DTC. If the DTC returns, check the transmission for internal failure. REFER to: Transmission .
P1780	Transmission Control Switch (O/D Cancel) Circuit Out of Self-Test Range	TCS	CLEAR the DTC. If DTC P1780 returns, REFER to: External Controls .
P1783	Transmission Over Temperature Condition	Transmission	CLEAR the DTC. If DTC P1783 returns, determine if this DTC was set in conjunction with any transmission fluid temperature sensor circuit DTCs and RESOLVE them first, otherwise REFER to: Transmission Cooling .
P1910	Reverse Lamp Control Circuit/Open	Reverse lamps	CLEAR the DTC. TEST system for normal operation. If DTC P1910 returns, REFER to: Reversing Lamps .
P1921	Transmission Range Signal	TR sensor	The engine may not crank. DTC P0706, P0707 and/or P0708 may set. CLEAR the DTC. If DTC P1921 returns, CLEAR the DTC. RERUN the KOEO and KOER self-test. If DTC P1921 returns, GO to PINPOINT TEST C : TR SENSOR .
P2700	Transmission Friction Element "A" Apply Time Range/Performance	Transmission	DTC P2700 is a non-electrical DTC. DTC P0751 and/or P0752 may set. CLEAR the DTC. If DTC P2700 returns, REFER to: Diagnosis By Symptom .

P2701	Transmission Friction Element "B" Apply Time Range/Performance	Transmission	DTC P2701 is a non-electrical DTC. DTC P0756 and/or P0757 may set. CLEAR the DTC. If DTC P2701 returns, REFER to: Diagnosis By Symptom .
P2702	Transmission Friction Element "C" Apply Time Range/Performance	Transmission	DTC P2702 is a non-electrical DTC. DTC P0761 and/or P0762 may set. CLEAR the DTC. If DTC P2702 returns, REFER to: Diagnosis By Symptom .
P2703	Transmission Friction Element "D" Apply Time Range/Performance	Transmission	DTC P2703 is a non-electrical DTC. DTC P0766 and/or P0768 may set. CLEAR the DTC. If DTC P2703 returns, REFER to: Diagnosis By Symptom .
P2704	Transmission Friction Element "E" Apply Time Range/Performance	Transmission	DTC P2704 is a non-electrical DTC. DTC P0771 and/or P0772 may set. CLEAR the DTC. If DTC P2704 returns, REFER to: Diagnosis By Symptom .
P2705	Transmission Friction Element "F" Apply Time Range/Performance	Mechanical one-way clutch	DTC P2705 is a non-electrical DTC. CLEAR the DTC. If DTC P2705 returns, REFER to: Diagnosis By Symptom .
P2758	Torque Converter Clutch Pressure Control Solenoid Stuck On	TCC	CLEAR the DTC. If DTC P2758 returns, REFER to: Diagnosis By Symptom .
P2760	Torque Converter Clutch Pressure Control Solenoid Intermittent	TCC	CLEAR the DTC. If DTC P2760 returns, GO to PINPOINT TEST A : TRANSMISSION CONTROL SOLENOIDS .

DIAGNOSIS AND TESTING > DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND PINPOINT TESTS - 3.7L DURATEC (227KW 301PS) > PINPOINT TESTS

Power is routed through the transmission solenoid power control relay (inside the PCM) to all transmission solenoids. If the power circuit to the transmission solenoids or the transmission solenoid power control relay fails open, all solenoids are failed electrically off. Check for open, short to ground or the transmission connector disconnected. The transmission solenoid power control relay disables power to the transmission solenoids when certain transmission DTCs are set.

- Carry out KOEO and KOER procedures.
- Retrieve and record all DTCs.
- Repair all non-transmission DTCs first.
- Repair all transmission DTCs second.
- Clear all CMDTCs and attempt to repeat them.
- Repair all CMDTCs.
- If only pass codes are obtained, REFER to: Diagnosis By Symptom .

DIAGNOSIS AND TESTING > DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND PINPOINT TESTS - 3.7L DURATEC (227KW 301PS) > PINPOINT TESTS > PINPOINT TEST A : TRANSMISSION CONTROL SOLENOIDS

Refer to Transmission Controls - 6R80 for schematic and connector information.

Normal Operation

When the electrical connector or solenoid body is disconnected, inspect the connector for terminal condition, corrosion and contamination. Also inspect the connector seal for damage. Clean, repair or install new components as required. Power is routed through the Transmission Solenoid Power Control (TSPC) relay (inside the PCM) to all transmission solenoids. If the power circuit to the transmission solenoids or the TSPC relay fails open, then all solenoids are failed electrically OFF. CHECK for open, short to ground or the transmission connector disconnected. The TSPC relay disables power to the transmission solenoids when certain transmission DTCs are set

DIAGNOSIS AND TESTING > DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND PINPOINT TESTS - 3.7L DURATEC (227KW 301PS) > PINPOINT TESTS > PINPOINT TEST A : TRANSMISSION CONTROL SOLENOIDS > PINPOINT TEST A : TRANSMISSION CONTROL SOLENOIDS

> *NOTE: The PCM removes power from the Transmission Solenoid Power Control (TSPC) circuit when the key is on and the transmission harness is disconnected. Use the meter's min/max function to record the voltage before the PCM removes power.*

A1 CHECK THE SOLENOID POWER CIRCUIT FOR VOLTAGE

Ignition OFF.

Disconnect: C1575 .

Inspect the connector for damaged or pushed out terminals, corrosion, loose wires and missing or damaged seals.

NOTE: Use a meter with a min/max feature and/or recording capabilities to obtain accurate measurements.

Set the meter to measure DC voltage.

Set the meter range to greater than 15 volts.

Enable the min/max or recording feature.

NOTE: Make sure all test connections are made at the transmission harness connector before the ignition key is turned to the ON position.

Connect the meter leads to C1575-7 and ground.

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1575-7	V	Ground

Is the maximum recorded voltage greater than 11 volts?

Yes	GO to A4

No	GO to A2

A2 CHECK THE SOLENOID POWER CIRCUIT FOR AN OPEN

Ignition OFF.

Disconnect: C1381E Inspect the connector for damaged or pushed out terminals, corrosion, loose wires and missing or damaged seals.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1381E-91	Ω	C1575-7

Is the resistance less than 3 ohms?

Yes	GO to A3

No	REPAIR transmission vehicle harness circuit for an open.

A3 CHECK THE SOLENOID POWER CIRCUIT FOR A SHORT TO GROUND

Positive Lead	Measurement / Action	Negative Lead
C1381E-91	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	INSTALL a new PCM, REFER to: Powertrain Control Module (PCM) . PROGRAM the PCM with the latest calibration level. PERFORM the Solenoid Body Strategy Data Download procedure. REFER to: Transmission Strategy Download .

No	REPAIR transmission vehicle harness circuit short to ground.

A4 CHECK SOLENOID CONTROL CIRCUITS FOR AN OPEN

Ignition OFF.

Disconnect: PCM C1381E

Inspect the connector for damaged or pushed out terminals, corrosion, loose wires and missing or damaged seals.

Measure the resistance of the solenoid control circuits using the following chart:

Positive Lead	Measurement / Action	Negative Lead
C1381E-75	Ω	C1575-9
C1381E-74	Ω	C1575-14
C1381E-73	Ω	C1575-13
C1381E-72	Ω	C1575-10
C1381E-77	Ω	C1575-8
C1381E-15	Ω	C1575-16
C1381E-14	Ω	C1575-3

Is the resistance less than 3 ohms on the suspect circuit?

Yes	GO to A5

No	REPAIR the transmission vehicle harness circuit. CLEAR the DTCs.

A5 CHECK SOLENOID CONTROL CIRCUITS FOR A SHORT TO GROUND

Measure the resistance between the transmission vehicle harness C1575 , harness side and ground using the following chart:

Positive Lead	Measurement / Action	Negative Lead
C1575-7	Ω	Ground
C1575-9	Ω	Ground
C1575-14	Ω	Ground
C1575-13	Ω	Ground
C1575-10	Ω	Ground
C1575-8	Ω	Ground
C1575-16	Ω	Ground
C1575-3	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to A6

No	REPAIR the transmission vehicle harness circuit. CLEAR the DTCs.

A6 CHECK SOLENOID CONTROL CIRCUITS FOR A SHORT TO POWER

Connect: PCM C1381E

Measure the voltage between the transmission vehicle harness C1575 , harness side and ground using the following chart:

Positive Lead	Measurement / Action	Negative Lead
C1575-9	V	Ground
C1575-14	V	Ground
C1575-13	V	Ground
C1575-10	V	Ground
C1575-8	V	Ground
C1575-16	V	Ground
C1575-3	V	Ground

Is the voltage greater than 3 volts on the suspect circuit?

Yes	REPAIR the transmission vehicle harness circuit. CLEAR the DTCs.

No	GO to A7

A7 CHECK FOR FLUID CONTAMINATION

REMOVE the transmission fluid pan. REFER to: Transmission Fluid Pan, Gasket and Filter .

Inspect for fine metallic contamination at the molded leadframe to solenoid connections.

Is visible metallic contamination present?

Yes	REMOVE and discard the foam strip if equipped. REMOVE and CLEAN the molded lead frame and solenoid terminals with clean transmission fluid. REFER to: Shift Solenoids (SS) .GO to A8

No	GO to A8

A8 CHECK MOLDED LEADFRAME RESISTANCE

Measure resistance of the suspect solenoid circuit between the transmission harness connector C1575 (component side), and the transmission molded leadframe using the table below:

Positive Lead	Measurement / Action	Negative Lead
Transmission Harness Component Side (see table below)	Ω	Lead Frame

Transmission	**Solenoid**	**Solenoid Terminal**
C1575-9	SSA	9
C1575-14	SSB	14
C1575-13	SSC	13
C1575-10	SSD	10
C1575-8	SSE	8
C1575-16	LPC solenoid	16
C1575-3	TCC solenoid	3

Is the resistance less than 3 ohms on the suspect circuit?

Yes	GO to A9

No	INSTALL a new molded leadframe. INSTALL new foam strip (Service Part Number FL3Z-14B167-A) between molded leadframe and the solenoids. REFER to: Shift Solenoids (SS) .

A9 CHECK SOLENOID RESISTANCE

Remove the molded leadframe from the main control. REFER to: Shift Solenoids (SS) . Inspect for metallic contamination and clean the solenoid and molded leadframe terminals.

Measure and record the resistance of the suspected solenoid. REFER to: Shift Solenoids (SS) . Compare the recorded value with the chart below:

Solenoid	Ohms
SSA	4.8 to 5.6
SSB	4.8 to 5.6
SSC	4.8 to 5.6
SSD	4.8 to 5.6
SSE	17.5 to 18.6
LPC solenoid	4.8 to 5.6
TCC solenoid	4.8 to 5.6

Is the solenoid resistance within specification?

Yes	The system is operating correctly at this time. INSTALL new foam strip (Service Part Number FL3Z-14B167-A) between molded leadframe and the solenoids. REFER to: Shift Solenoids (SS) .

No	INSTALL a new solenoid for the solenoid that failed the resistance check. INSTALL new foam strip (Service Part Number FL3Z-14B167-A) between molded leadframe and the solenoids. REFER to: Shift Solenoids (SS) .

DIAGNOSIS AND TESTING > DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND PINPOINT TESTS - 3.7L DURATEC (227KW 301PS) > PINPOINT TESTS > PINPOINT TEST B : TFT (TRANSMISSION FLUID TEMPERATURE) SENSOR

Refer to Transmission Controls - 6R80 for schematic and connector information.

Normal Operation

The TFT sensor is a temperature dependent resistor that is in contact with transmission fluid in the transmission sump area. The PCM monitors the voltage across the TFT sensor, which changes as transmission fluid temperature varies. The PCM uses the TFT sensor signal as an input for its strategy for shifting and TCC operation. The PCM also uses the TFT sensor signal for transmission fault detection and diagnostics.

Possible Sources

- Connectors damaged or pushed-out terminals, corrosion, loose wires and missing or damaged seals
- TFT sensor

- Transmission internal wiring harness frame
- PCM

DIAGNOSIS AND TESTING > DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND PINPOINT TESTS - 3.7L DURATEC (227KW 301PS) > PINPOINT TESTS > PINPOINT TEST B : TFT (TRANSMISSION FLUID TEMPERATURE) SENSOR > PINPOINT TEST B : TFT (TRANSMISSION FLUID TEMPERATURE) SENSOR

B1 CHECK TFT INPUT SIGNAL

Ignition OFF.

Disconnect: Transmission Vehicle Harness C1575

Inspect the connector for damaged or pushed out terminals, corrosion, loose wires and missing or damaged seals.

Connect the diagnostic tool.

Ignition ON.

Enter the following mode on the diagnostic scan tool: TFT PIDs TFT and TFTV.

Does the TFT PID display -40 °C (-40 °F) and the TFTV PID display 4.96 to 5.10 volts?

Yes	GO to B2

No	REPAIR the circuit.

B2 CHECK TFT SIGNAL INPUT CIRCUIT FOR VOLTAGE

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1575-6		Ground

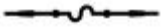
Is the voltage between 4.8 and 5.1 volts?

Yes	GO to B3

No	INSPECT and REPAIR the transmission open circuit. If an open circuit is not found, INSTALL a new PCM, REFER to: Powertrain Control Module (PCM) . PROGRAM the PCM with the latest calibration level. PERFORM the Solenoid Body Strategy Data Download procedure. REFER to: Transmission Strategy Download .

B3 CHECK TFT SIGNAL RETURN CIRCUIT

Connect a fused jumper wire between the transmission vehicle harness C1575-5 and C1575-6 , harness side:

Positive Lead	Measurement / Action	Negative Lead
C1575-5		C1575-6

Does the TFT PID display 190 °-195 °C (374 °-383 °F) and the TFTV PID display 0 volts?

Yes	GO to B4

No	INSPECT and REPAIR the transmission vehicle harness signal return circuit for an open. If an open circuit is not found, INSTALL a new PCM, REFER to: Powertrain Control Module (PCM) . PROGRAM the PCM with the latest calibration level. PERFORM the Solenoid Body Strategy Data Download procedure. REFER to: Transmission Strategy Download .

B4 CHECK TFT SENSOR RESISTANCE

Remove the transmission molded leadframe. REFER to: Shift Solenoids (SS) . Inspect for metal shavings on the exposed metal contacts or other components and clean the solenoid and transmission internal wiring harness frame terminals.

Measure the resistance between the transmission molded leadframe C1575-5 and C1575-6 , component side using the following chart:

C1575-5	Ω	C1575-6
°C	°F	Resistance
-40 to -20	-40 to -4	967K-284K
-19 to -1	-3 to 31	284K-100K
0-20	32-68	100K-37K
21-40	69-104	37K-16K
41-70	105-158	16K-5K
71-90	159-194	5K-2.7K
91-110	195-230	2.7K-1.5K
111-130	231-266	1.5K-0.8K
131-150	267-302	0.8K-0.54K

Does the temperature to resistance specification match?

Yes	To diagnose an overheating concern REFER to: Diagnosis By Symptom .

No	INSPECT and CLEAN the TFT sensor on the molded leadframe for metallic contamination. INSTALL a new molded leadframe if no debris was found, REFER to: Transmission Strategy Download . CLEAR the DTCs.

DIAGNOSIS AND TESTING > DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND PINPOINT TESTS - 3.7L DURATEC (227KW 301PS) > PINPOINT TESTS > PINPOINT TEST C : TR SENSOR

Refer to Transmission Controls - 6R80 for schematic and connector information.

Normal Operation

The TR sensor has a set of Hall-effect sensors that have a pattern of ON/OFF states which are dependent on the PARK, REVERSE, NEUTRAL, DRIVE, 3, 2 or 1 position of the manual valve. The TR sensor has digital sensor (hall effect) that converts the shifter position into a bit pattern, and a micro controller that converts the 4 bit signal into a 125 Hz pulse width modulated signal. The TR sensor also provides signals for the starting system and the reverse lights. The PCM uses the TR sensor signal as an input for its strategy for shifting and TCC operation. The PCM also uses the TR sensor signal for transmission fault detection and diagnostics. The TR sensor is integral to the leadframe. DTCs P0705, P0706, P0707, P0708, P0709, P1702, P1705 and P1921 cannot be set by an incorrectly adjusted selector lever cable.

DIAGNOSIS AND TESTING > DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND PINPOINT TESTS - 3.7L DURATEC (227KW 301PS) > PINPOINT TESTS > PINPOINT TEST C : TR SENSOR > PINPOINT TEST C : TR SENSOR

NOTE: Read and record all DTCs.

C1 VERIFY DTCS

Ignition OFF.

Select PARK.

Connect the diagnostic tool.

Carry out the KOEO then the KOER test.

Are Transmission Range (TR) sensor DTCs present?

Yes	GO to C2

No	If no DTCs are present, and to diagnose any symptoms that may be present REFER to: Diagnosis By Symptom .

C2 CHECK TR SENSOR ELECTRICAL OPERATION

Ignition ON.

Enter the following diagnostic mode on the scan tool: TR PID: TR_DC and TR_FREQ.

Move the selector lever into each range and stop.

Observe the PIDs: TR_DC and TR_FREQ while wiggling the harness or driving the vehicle.

Compare the PID TR_DC to the selector lever position duty cycle, using the following chart.

Selector Lever Position	Range (% Duty Cycle)
P	8.0 - 25.8
R	30.50 - 39.31
N	40.54 - 52.49
D	54.35 - 71.15

Is the TR_FREQ between 100 to 150 Hz?

Is the TR_DC within range?

Does the TR_DC and TR_FREQ remain steady when the harness is wiggled or the vehicle driven?

Yes	The problem is not in the TR sensor system. REFER to: Diagnosis By Symptom .

No	GO to C3

C3 CHECK TR SENSOR VPWR CIRCUIT FOR POWER

Ignition OFF.

Disconnect: Transmission Vehicle Harness C1575

Inspect the connector for damaged or pushed out terminals, corrosion, loose wires and missing or damaged seals.

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1575-12		Ground

Is the voltage greater than 11 volts?

Yes	GO to C4

No	INSPECT and REPAIR the transmission vehicle harness circuit for an open. If an open circuit is not found, INSTALL a new PCM, REFER to: Powertrain Control Module (PCM) . PERFORM the Solenoid Body Strategy Data Download procedure. REFER to: Transmission Strategy Download .

C4 CHECK TR SENSOR SIGNAL CIRCUIT

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1575-4		Ground

Is the voltage greater than 4.8 volts?

Yes	GO to C5

No	INSPECT and REPAIR the transmission vehicle harness for an open. If an open circuit is not found, INSTALL a new PCM, REFER to: Powertrain Control Module (PCM) . PERFORM the Solenoid Body Strategy Data Download procedure. REFER to: Transmission Strategy Download .

C5 CHECK TR SENSOR GROUND CIRCUIT

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1575-4		C1575-11

Is the voltage greater than 4.8 volts?

Yes	GO to C6

No	INSPECT and REPAIR transmission vehicle harness circuit for an open. If an open circuit is not found, INSTALL a new PCM, REFER to: Powertrain Control Module (PCM) . PERFORM the Solenoid Body Strategy Data Download procedure. REFER to: Transmission Strategy Download .

C6 CHECK TR SENSOR TO MANUAL VALVE

Drain the transmission fluid and remove the transmission fluid pan. REFER to: Transmission Fluid Pan, Gasket and Filter .

Check the connection between the TR sensor and the manual control valve. REFER to: Shift Solenoids (SS) .

Inspect the molded leadframe for metallic contamination, REFER to: Shift Solenoids (SS) .

Is the TR sensor connected to the manual control valve shaft?

Is the TR sensor connected to the manual control valve shaft?

Yes	INSTALL a new TR sensor. REFER to: Shift Solenoids (SS) .

No	CONNECT the TR sensor to the manual control valve, REFER to: Shift Solenoids (SS) . CLEAN any debris from the molded leadframe. RUN the KOEO self-test. If DTCs return, INSTALL a new TR sensor.

DIAGNOSIS AND TESTING > DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND PINPOINT TESTS - 3.7L DURATEC (227KW 301PS) > PINPOINT TESTS > PINPOINT TEST D : TSS (TURBINE SHAFT SPEED) SENSOR

Refer to Transmission Controls - 6R80 for schematic and connector information.

Normal Operation

The TSS sensor is a Hall-effect type sensor that provides a signal to the PCM that changes in frequency as the rotating speed of the forward (1, 2, 3, 4) clutch cylinder varies. The PCM compares the TSS sensor signal with the engine speed information to determine the amount of slip occurring in the torque converter. The PCM also compares the TSS sensor signal with the OSS sensor signal to determine the gear ratio provided by the rear planetary gearset. The PCM uses the TSS sensor signal as an input for its strategies for shifts and TCC operation. The PCM also uses the TSS sensor signal for transmission fault detection and diagnostics. REFER to: Transmission Description - System Operation and Component Description .

DIAGNOSIS AND TESTING > DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND PINPOINT TESTS - 3.7L DURATEC (227KW 301PS) > PINPOINT TESTS > PINPOINT TEST D : TSS (TURBINE SHAFT SPEED) SENSOR > PINPOINT TEST D : TSS (TURBINE SHAFT SPEED) SENSOR

NOTE: If DTCs P0705, P0706, P0707, P0708, P0709, P1702, P1705 and/or P1921 are set, diagnose those DTCs first.

NOTE: Read and record all DTCs.

D1 DRIVE CYCLE TEST

Connect the diagnostic tool.

Enter the following diagnostic mode: PID TSS_SRC..

Monitor the PID TSS_SRC while road testing the vehicle. Drive the vehicle so the

transmission upshifts and downshifts through all the gears.

Does the TSS sensor RPM increase and decrease with engine RPM and vehicle speed?

Yes	REFER to: Road Testing Vehicle .

No	GO to D2

D2 CHECK TSS SENSOR SIGNAL CIRCUIT FOR POWER

Ignition OFF.

Disconnect: Transmission Vehicle Harness C1575

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1575-1		Ground

Is the voltage less than 4.8 volts?

Yes	GO to D3

No	GO to D6

D3 CHECK THE TSS SENSOR SIGNAL CIRCUIT FOR AN OPEN

Ignition OFF.

Disconnect: PCM C1381E

Inspect the connector for damaged or pushed out terminals, corrosion, loose wires and missing or damaged seals.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1575-1	Ω	C1381E-25

Is the resistance less than 3 ohms?

Yes	GO to D4

No	INSPECT and REPAIR transmission vehicle harness TSS sensor signal circuit for an open.

D4 CHECK THE TSS SENSOR SIGNAL CIRCUIT FOR A SHORT TO GROUND

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1575-1	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to D5

No	INSPECT and REPAIR transmission vehicle harness TSS sensor signal circuit for a short to ground.

D5 CHECK THE TSS SENSOR SIGNAL CIRCUIT FOR A SHORT TO POWER

Connect: PCM C1381E

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1575-1	V	Ground

Is voltage greater than 5.1 volts?

Yes	INSPECT and REPAIR transmission vehicle harness TSS sensor signal circuit for a short to power.

No	GO to D6

D6 CHECK THE TSS SENSOR GROUND CIRCUIT

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1575-1	V	C1575-5

Is voltage less than 4.8 volts?

Yes	REPAIR the transmission vehicle harness signal return circuit for an open. If an open is not found, INSTALL a new PCM, REFER to: Powertrain Control Module (PCM) . PROGRAM the PCM with the latest calibration level. PERFORM the Solenoid Body Strategy Data Download procedure. REFER to: Transmission Strategy Download .

No	INSTALL a new molded leadframe, REFER to: Shift Solenoids (SS) . CLEAR the DTCs.

DIAGNOSIS AND TESTING > DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND PINPOINT TESTS - 3.7L DURATEC (227KW 301PS) > PINPOINT TESTS > PINPOINT TEST E : OSS (OUTPUT SHAFT SPEED) SENSOR

Refer to Transmission Controls - 6R80 for schematic and connector information.

Normal Operation

The OSS sensor is a Hall-effect type sensor that provides a signal to the PCM that changes in frequency as the rotating speed of the output shaft ring gear varies. The PCM also compares the OSS sensor signal with the TSS sensor signal to determine the gear ratio provided by the rear planetary gearset. The PCM uses the OSS sensor signal as an input for its strategies for shifts and TCC operation. The PCM also uses the OSS sensor signal for transmission fault detection and diagnostics. DTC s are set.

DIAGNOSIS AND TESTING > DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND PINPOINT TESTS - 3.7L DURATEC (227KW 301PS) > PINPOINT TESTS > PINPOINT TEST E : OSS (OUTPUT SHAFT SPEED) SENSOR > PINPOINT TEST E : OSS (OUTPUT SHAFT SPEED) SENSOR

NOTE: If DTCs P0705, P0706, P0707, P0708, P0709, P1702, P1705 and/or P1921 are set, diagnose those DTCs first.

NOTE: Read and record all DTCs.

E1 DRIVE CYCLE TEST

Using the diagnostic scan tool, monitor the OSS sensor PID OSS_SRC while road testing the vehicle. Drive the vehicle so the transmission upshifts and downshifts through all the gears.

Does the OSS sensor RPM increase and decrease with engine RPM and vehicle speed?

Yes	REFER to: Road Testing Vehicle .

No	GO to E2

E2 CHECK OSS SENSOR SIGNAL CIRCUIT FOR POWER

Ignition OFF.

Disconnect: PCM C1575

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1575-15		Ground

Is the voltage less than 4.8 volts?

Yes	GO to E3

No	GO to E6

E3 CHECK THE OSS SENSOR SIGNAL CIRCUIT FOR AN OPEN

Ignition OFF.

Disconnect: PCM C1381E

Inspect the connector for damaged or pushed out terminals, corrosion, loose wires and missing or damaged seals.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1575-15	Ω	C1381E-26

Is the resistance less than 3 ohms?

Yes	GO to E4

No	INSPECT and REPAIR transmission vehicle harness OSS sensor signal circuit for an open. If an open circuit is not found, INSTALL a new PCM, REFER to: Powertrain Control Module (PCM) . PERFORM the Solenoid Body Strategy Data Download procedure. REFER to: Transmission Strategy Download .

E4 CHECK THE OSS SENSOR SIGNAL CIRCUIT FOR A SHORT TO GROUND

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1575-15	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to E5

No	INSPECT and REPAIR transmission vehicle harness OSS sensor signal circuit for a short to ground. If a short to ground is not found, INSTALL a new PCM, REFER to: Powertrain Control Module (PCM) . PERFORM the Solenoid Body Strategy Data Download procedure. REFER to: Transmission Strategy Download .

E5 CHECK THE OSS SENSOR SIGNAL CIRCUIT FOR A SHORT TO POWER

Connect: PCM C1381E

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1575-15		Ground

Is voltage greater than 5.1 volts?

Yes	INSPECT and REPAIR transmission vehicle harness OSS sensor signal circuit for a short to power. If a short to power is not found, INSTALL a new PCM, REFER to: Powertrain Control Module (PCM) . PERFORM the Solenoid Body Strategy Data Download procedure. REFER to: Transmission Strategy Download .

No	GO to E6

E6 CHECK THE OSS SENSOR GROUND CIRCUIT

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1575-15		C1575-5

Is voltage less than 4.8 volts?

Yes	REPAIR the transmission vehicle harness signal return circuit for an open. If an open is not found, INSTALL a new PCM, REFER to: Powertrain Control Module (PCM) . PROGRAM the PCM with the latest calibration level. PERFORM the Solenoid Body Strategy Data Download procedure. REFER to: Transmission Strategy Download .

No	INSTALL a new molded leadframe, REFER to: Shift Solenoids (SS) .

DIAGNOSIS AND TESTING > DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND

PINPOINT TESTS - 5.0L 32V TI-VCT > PRINCIPLES OF OPERATION

Inspection and Verification

1.

Verify the customer concern.

2.

Visually inspect for obvious signs of mechanical or electrical damage.

3.

If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.

4.

If the cause is not visually evident, verify the symptom. REFER to: Diagnosis By Symptom .

When the electrical connector or solenoid body is disconnected, inspect the connector for terminal condition, corrosion and contamination. Also inspect the connector seal for damage. Clean, repair or install new components as required.

Power is routed through the Transmission Solenoid Power Control (TSPC) relay (inside the PCM) to all transmission solenoids. If the power circuit to the transmission solenoids or the TSPC relay fails open, then all solenoids are failed electrically OFF. Check for open, short to ground or the transmission connector disconnected. The TSPC relay disables power to the transmission solenoids when certain transmission DTCs are set.

Shift Solenoid Pre-Diagnosis

Selector Lever Position	PCM Commanded Gear	Shift Solenoid	TCC NL				
SSA NL TCC NL (1, 2, 3, 4)	SSB NH (3, 5, R)	SSC NL (CB 2, 6)	SSD NH (CB L, R/C 4, 5, 6)	SSE NC			
P	P	Off	On	Off	Off	Off	Off
R	R	Off	Off	Off	Off	Off	Off
N	N	Off	On	Off	Offa	Off	Off
D	1	On	On	Off	Offb	Off	Off
2		On	On	On	On	Off	Off
3		On	Off	Off	On	On	On/Off
4		On	On	Off	Off	On	On/Off
5		Off	Off	Off	Off	On	On/Off

6		Off	On	On	Off	On	On/Off
M c	--	--	--	--	--	--	--
2	2	On	On	On	On	Off	Off
1	1	On	On	Off	Off	On	Off

a Solenoid state changes if vehicle is moving forward with the selector lever in the NEUTRAL position. b Solenoid is On when vehicle is above 5 km/h (3 mph). c All gears available upon driver request.

CB = Clutch brake

NC = Normally closed

NH = Normally high

NL = Normally low

DIAGNOSIS AND TESTING > DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND PINPOINT TESTS - 5.0L 32V TI-VCT > DTC CHART: PCM

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

DTC Chart

DTC	Description	Component	Action
P0657	Actuator supply voltage A circuit open	Actuator Supply Voltage A Circuit Open	Power is routed through the Transmission Solenoid Power Control (TSPC) relay (inside the PCM) to all solenoids. If the power circuit to the transmission solenoids or the TSPC relay fails open, then all solenoids are failed electrically off. CHECK for open, short to ground or the transmission connector disconnected. The TSPC relay also disables power to the transmission solenoids when certain transmission DTCs are set. REPAIR as required. CLEAR the DTC. GO to PINPOINT TEST A : TRANSMISSION CONTROL SOLENOIDS
P0701	Transmission Control System Range/Performance	Transmission hydraulic and clutch systems	Intermittent clutch on fault and may set with DTCs P2700,

		(including non-electrical shift solenoid faults, main control valve body and clutch(s)).	P2701, P2702, P2703 and/or P2704. CLEAR the DTC. If DTC P0701 returns, REFER to: Diagnosis By Symptom .
P0702	Transmission Control System Electrical	Battery	INSPECT the PCM power and ground circuits for opens or short to ground. INSPECT the PCM connector for damaged or pushed-out terminals, corrosion or loose wires. CLEAR the DTC. RERUN the KOEO and KOER self-test. If DTC P0702 returns, REFER to: Charging System - 5.0L 32V Ti-VCT .
P0705	Transmission Range Sensor "A" Circuit (PRNDL Input)	TR sensor	GO to PINPOINT TEST C : TR SENSOR
P0706	Transmission Range Sensor "A" Circuit Range/Performance	TR sensor	The TR sensor outputs a duty cycle indicating manual lever position. This DTC sets when the duty cycle is greater or less than the expected duty cycle by 50Hz or more. Engine may not crank. CLEAR the DTC. If DTC P0706 returns, GO to PINPOINT TEST C : TR SENSOR
P0707	Transmission Range Sensor "A" Circuit Low	TR sensor	Engine may not crank, CLEAR the DTC. If DTC P0707 returns, GO to PINPOINT TEST C : TR SENSOR
P0708	Transmission Range Sensor "A" Circuit High	TR sensor	Engine may not crank, CLEAR the DTC. If DTC P0708 returns, GO to PINPOINT TEST C : TR SENSOR
P0709	Transmission Range Sensor "A" Circuit Intermittent	TR sensor	The TR sensor outputs a duty cycle indicating manual lever position. This DTC sets when the duty cycle is within range but is in the dead band between the design position, and an in-range but invalid duty cycle. GO to PINPOINT TEST C : TR SENSOR

P0710	Transmission Fluid Temperature Sensor "A" Circuit	TFT sensor	CLEAR the DTC. If DTC P0710 returns, GO to PINPOINT TEST B : TFT (TRANSMISSION FLUID TEMPERATURE) SENSOR
P0711	Transmission Fluid Temperature Sensor "A" Circuit Range/Performance	TFT sensor	CLEAR the DTC. If DTC P0711 returns, GO to PINPOINT TEST B : TFT (TRANSMISSION FLUID TEMPERATURE) SENSOR
P0712	Transmission Fluid Temperature Sensor "A" Circuit Low	TFT sensor	DTC P0710 may set. CLEAR the DTC. If DTC P0712 returns, GO to PINPOINT TEST B : TFT (TRANSMISSION FLUID TEMPERATURE) SENSOR
P0713	Transmission Fluid Temperature Sensor "A" Circuit High	TFT sensor	DTC P0710 may set. CLEAR the DTC. If DTC P0713 returns, GO to PINPOINT TEST B : TFT (TRANSMISSION FLUID TEMPERATURE) SENSOR
P0715	Turbine/Input Shaft Speed Sensor "A" Circuit	TSS sensor	DTC P0717 may set. CLEAR the DTC. If DTC P0715 returns, GO to PINPOINT TEST D : TSS (TURBINE SHAFT SPEED) SENSOR
P0717	Turbine/Input Shaft Speed Sensor "A" Circuit No Signal	TSS sensor	This DTC sets when DTC P0715 is set. REFER to DTC P0715.
P0718	Turbine/Input Shaft Speed Sensor "A" Circuit Intermittent	TSS sensor	CLEAR the DTC. If DTC P0718 returns, GO to PINPOINT TEST D : TSS (TURBINE SHAFT SPEED) SENSOR
P0720	Output Shaft Speed Sensor Circuit	OSS sensor	DTC P0722 may set. CLEAR the DTC. If DTC P0720 returns, GO to PINPOINT TEST E : OSS (OUTPUT SHAFT SPEED) SENSOR
P0721	Output Shaft Speed Sensor Circuit Range/Performance	OSS sensor	CLEAR the DTC. If DTC P0721 returns, GO to PINPOINT TEST E : OSS (OUTPUT SHAFT SPEED) SENSOR

P0722	Output Shaft Speed Sensor Circuit No Signal	OSS sensor	This DTC sets when DTC P0720 is set. REFER to DTC P0720.
P0729	Gear 6 Incorrect Ratio	Transmission	CLEAR the DTC. If DTC P0729 returns, REFER to: Diagnosis By Symptom .
P0731	Gear 1 Incorrect Ratio	Transmission	CLEAR the DTC. If DTC P0731 returns, REFER to: Diagnosis By Symptom .
P0732	Gear 2 Incorrect Ratio	Transmission	CLEAR the DTC. If DTC P0732 returns, REFER to: Diagnosis By Symptom .
P0733	Gear 3 Incorrect Ratio	Transmission	CLEAR the DTC. If DTC P0733 returns, REFER to: Diagnosis By Symptom .
P0734	Gear 4 Incorrect Ratio	Transmission	CLEAR the DTC. If DTC P0734 returns, REFER to: Diagnosis By Symptom .
P0735	Gear 5 Incorrect Ratio	Transmission	CLEAR the DTC. If DTC P0735 returns, REFER to: Diagnosis By Symptom .
P0740	Torque Converter Clutch Solenoid Circuit/Open	TCC solenoid	DTC P0743 may set, CLEAR the DTC. If DTC P0740 returns, GO to PINPOINT TEST A : TRANSMISSION CONTROL SOLENOIDS
P0741	Torque Converter Clutch Solenoid Circuit Performance/Stuck Off	TCC solenoid	DTC P0741 is a non-electrical DTC. CLEAR the DTC. If DTC P0741 returns, REFER to: Diagnosis By Symptom .
P0742	Torque Converter Clutch Solenoid Circuit Stuck On	TCC solenoid	DTC P0743 may set, CLEAR the DTC. If DTC P0742 returns, GO to PINPOINT TEST A : TRANSMISSION CONTROL SOLENOIDS
P0743	Torque Converter Clutch Solenoid Circuit Electrical	TCC solenoid	DTC P0740, P0742 and/or P0744 may set, CLEAR the DTC. If DTC P0743 returns, GO to PINPOINT TEST A : TRANSMISSION CONTROL SOLENOIDS
P0744	Torque Converter Clutch Solenoid Circuit Intermittent	TCC solenoid	DTC P0743 may set, CLEAR the DTC. If DTC P0744 returns, GO to PINPOINT

			TEST A : TRANSMISSION CONTROL SOLENOIDS
P0748	Pressure Control Solenoid "A" Electrical	LPC	DTC P0960, P0962 and/or P0963 may set, CLEAR the DTC. If DTC P0748 returns, GO to PINPOINT TEST A : TRANSMISSION CONTROL SOLENOIDS
P0750	Shift Solenoid "A"	SSA	DTC P0751 may set, CLEAR the DTC. If DTC P0750 returns, GO to PINPOINT TEST A : TRANSMISSION CONTROL SOLENOIDS
P0751	Shift Solenoid "A" Performance/Stuck Off	SSA	DTC P2700 may set, CLEAR the DTC. If DTC P0751 returns, REFER to: Diagnosis By Symptom .
P0752	Shift Solenoid "A" Stuck On	SSA	CLEAR the DTC. If DTC P0752 returns, REFER to: Diagnosis By Symptom .
P0753	Shift Solenoid "A" Electrical	SSA	DTC P0750, P0973 and/or P0974 may set, CLEAR the DTC. If DTC P0753 returns, GO to PINPOINT TEST A : TRANSMISSION CONTROL SOLENOIDS
P0754	Shift Solenoid "A" Intermittent	SSA	CLEAR the DTC. If DTC P0754 returns, GO to PINPOINT TEST A : TRANSMISSION CONTROL SOLENOIDS
P0755	Shift Solenoid "B"	SSB	DTC P0756 may set, CLEAR the DTC. If DTC P0755 returns, GO to PINPOINT TEST A : TRANSMISSION CONTROL SOLENOIDS
P0756	Shift Solenoid "B" Performance/Stuck Off	SSB	DTC P2701 may set, CLEAR the DTC. If DTC P0756 returns, REFER to: Diagnosis By Symptom .
P0757	Shift Solenoid "B" Stuck On	SSB	DTC P2701 may set, CLEAR the DTC. If DTC P0757 returns, REFER to: Diagnosis By Symptom .
P0758	Shift Solenoid "B" Electrical	SSB	DTC P0755, P0976 and/or P0977 may set, CLEAR the

			DTC. If DTC P0758 returns, GO to PINPOINT TEST A : TRANSMISSION CONTROL SOLENOIDS
P0759	Shift Solenoid "B" Intermittent	SSB	CLEAR the DTC. If DTC P0759 returns, GO to PINPOINT TEST A : TRANSMISSION CONTROL SOLENOIDS
P0760	Shift Solenoid "C"	SSC	DTC P0761 may set, CLEAR the DTC. If DTC P0760 returns, GO to PINPOINT TEST A : TRANSMISSION CONTROL SOLENOIDS
P0761	Shift Solenoid "C" Performance/Stuck Off	SSC	DTC P2702 may set, CLEAR the DTC. If DTC P0761 returns, REFER to: Diagnosis By Symptom .
P0762	Shift Solenoid "C" Stuck On	SSC	DTC P0763 may set, CLEAR the DTC. If DTC P0762 returns, REFER to: Diagnosis By Symptom .
P0763	Shift Solenoid "C" Electrical	SSC	DTC P0760, P0979 and/or P0980 may set, CLEAR the DTC. If DTC P0763 returns, GO to PINPOINT TEST A : TRANSMISSION CONTROL SOLENOIDS
P0764	Shift Solenoid "C" Intermittent	SSC	CLEAR the DTC. If DTC P0764 returns, GO to PINPOINT TEST A : TRANSMISSION CONTROL SOLENOIDS
P0765	Shift Solenoid "D"	SSD	DTC P0766 may set, CLEAR the DTC. If DTC P0765 returns, GO to PINPOINT TEST A : TRANSMISSION CONTROL SOLENOIDS
P0766	Shift Solenoid "D" Performance/Stuck Off	SSD	DTC P2704 may set, CLEAR the DTC. If DTC P0766 returns, REFER to: Diagnosis By Symptom .
P0767	Shift Solenoid "D" Stuck On	SSD	DTC P07A9 and/or P2704 may set, CLEAR the DTC. If DTC P0767 returns, REFER to: Diagnosis By Symptom .

P0768	Shift Solenoid "D" Electrical	SSD	DTC P0765, P0982 and/or P0983 may set, CLEAR the DTC. If DTC P0768 returns, GO to PINPOINT TEST A : TRANSMISSION CONTROL SOLENOIDS
P0769	Shift Solenoid "D" Intermittent	SSD	CLEAR the DTC. If DTC P0769 returns, GO to PINPOINT TEST A : TRANSMISSION CONTROL SOLENOIDS
P0770	Shift Solenoid "E"	SSE	DTC P0773 may set, CLEAR the DTC. If DTC P0770 returns, GO to PINPOINT TEST A : TRANSMISSION CONTROL SOLENOIDS
P0771	Shift Solenoid "E" Performance/Stuck Off	SSE	DTC P0984 may set, CLEAR the DTC. If DTC P0771 returns, REFER to: Diagnosis By Symptom .
P0772	Shift Solenoid "E" Stuck On	SSE	DTC P0984 may set, CLEAR the DTC. If DTC P0772 returns, REFER to: Diagnosis By Symptom .
P0773	Shift Solenoid "E" Electrical	SSE	REFER to DTC P0770.
P0774	Shift Solenoid "E" Intermittent	SSE	CLEAR the DTC. If DTC P0774 returns, GO to PINPOINT TEST A : TRANSMISSION CONTROL SOLENOIDS
P07A8	Transmission Friction Element "D" Stuck Off	Transmission	CLEAR the DTC. If DTC P07A8 returns, REFER to: Diagnosis By Symptom .
P07A9	Transmission Friction Element "D" Stuck On	Transmission	DTC P0767 may set, CLEAR the DTC. If DTC P07A9 returns, REFER to: Diagnosis By Symptom .
P07AA	Transmission Friction Element "E" Stuck Off	Transmission	CLEAR the DTC. If DTC P07AA returns, REFER to: Diagnosis By Symptom .
P0815	Upshift Switch Circuit	SelectShift™ switch	CLEAR the DTC. If DTC P0815 returns, REFER to: External Controls .
P0816	Downshift Switch Circuit	SelectShift™ switch	CLEAR the DTC. If DTC P0816 returns, REFER to:

			External Controls .
P0826	Up and Down switch circuit	SelectShift™ switch	REFER to: External Controls .
P0882	PCM Power Input Signal Low	Battery	INSPECT the PCM power and ground circuits for opens or short to ground. INSPECT the PCM connector for damaged or pushed-out terminals, corrosion or loose wires. CLEAR the DTC. If DTC P0882 returns, REFER to: Charging System - 5.0L 32V Ti-VCT .
P0883	PCM Power Input Signal High	Battery	CLEAR the DTC. If DTC P0883 returns, REFER to: Charging System - 5.0L 32V Ti-VCT .
P0960	Pressure Control Solenoid "A" Control Circuit/Open	LPC	DTC P0748 may set, CLEAR the DTC. If DTC P0960 returns, GO to PINPOINT TEST A : TRANSMISSION CONTROL SOLENOIDS
P0961	Pressure Control Solenoid "A" Control Circuit Range/Performance	LPC	CLEAR the DTC. If DTC P0961 returns, GO to PINPOINT TEST A : TRANSMISSION CONTROL SOLENOIDS
P0962	Pressure Control Solenoid "A" Control Circuit Low	LPC	DTC P0748 may set, CLEAR the DTC. If DTC P0962 returns, GO to PINPOINT TEST A : TRANSMISSION CONTROL SOLENOIDS
P0963	Pressure Control Solenoid "A" Control Circuit High	LPC	DTC P0748 may set, CLEAR the DTC. If DTC P0963 returns, GO to PINPOINT TEST A : TRANSMISSION CONTROL SOLENOIDS
P0973	Shift Solenoid "A" Control Circuit Low	SSA	DTC P0753 may set, CLEAR the DTC. If DTC P0973 returns, GO to PINPOINT TEST A : TRANSMISSION CONTROL SOLENOIDS
P0974	Shift Solenoid "A" Control Circuit High	SSA	DTC P0748 may set, CLEAR the DTC. If DTC P0974 returns, GO to PINPOINT TEST A : TRANSMISSION CONTROL SOLENOIDS

P0976	Shift Solenoid "B" Control Circuit Low	SSB	DTC P0758 may set, CLEAR the DTC. If DTC P0976 returns, GO to PINPOINT TEST A : TRANSMISSION CONTROL SOLENOIDS
P0977	Shift Solenoid "B" Control Circuit High	SSB	DTC P0758 may set, CLEAR the DTC. If DTC P0977 returns, GO to PINPOINT TEST A : TRANSMISSION CONTROL SOLENOIDS
P0979	Shift Solenoid "C" Control Circuit Low	SSC	DTC P0763 may set, CLEAR the DTC. If DTC P0979 returns, GO to PINPOINT TEST A : TRANSMISSION CONTROL SOLENOIDS
P0980	Shift Solenoid "C" Control Circuit High	SSC	DTC P0763 may set, CLEAR the DTC. If DTC P0980 returns, GO to PINPOINT TEST A : TRANSMISSION CONTROL SOLENOIDS
P0982	Shift Solenoid "D" Control Circuit Low	SSD	DTC P0768 may set, CLEAR the DTC. If DTC P0982 returns, GO to PINPOINT TEST A : TRANSMISSION CONTROL SOLENOIDS
P0983	Shift Solenoid "D" Control Circuit High	SSD	DTC P0768 may set, CLEAR the DTC. If DTC P0983 returns, GO to PINPOINT TEST A : TRANSMISSION CONTROL SOLENOIDS
P0984	Shift Solenoid "E" Range/Performance	SSE	DTC P0771 and/or P0772 may set, CLEAR the DTC. If DTC P0984 returns, REFER to: Diagnosis By Symptom .
P1001	The KOER Not Able to Complete, KOER Aborted	PCM	RETRIEVE and RECORD all DTCs. REPAIR any self-test or CMDTCs first. CLEAR the DTC. RERUN the KOER self-test. If the DTC returns, REPROGRAM the PCM to the latest software. RERUN the KOER self-test. If the DTC returns, INSTALL a new PCM REFER to: Powertrain Control Module (PCM) . After installing the new PCM PROGRAM it with the latest software and PERFORM the

			Transmission Strategy Download, REFER to: Transmission Strategy Download .
P1397	System Voltage Out Of Self Test Range	PCM	INSPECT the PCM power and ground circuits for opens or short to ground. INSPECT the PCM connector for damaged or pushed-out terminals, corrosion or loose wires. CLEAR the DTC. RUN the KOEO self-test. If DTC P1397 returns, REFER to: Charging System - 5.0L 32V Ti-VCT .
P1501	Vehicle Speed Sensor Out Of Self Test Range	PCM	Vehicle speed not at 0.0 mph (km/h) during the KOEO and/or KOER self-test. CLEAR the DTC and RERUN the KOEO and KOER self-test. If DTC P1501 returns, REFER to: Anti-Lock Brake System (ABS) and Stability Control .
P1502	Vehicle Speed Sensor Intermittent	PCM	Vehicle speed not at 0.0 mph (km/h) during the KOEO and/or KOER self-test. CLEAR the DTC and RERUN the KOEO and KOER self-test. If DTC P1501 returns, REFER to: Anti-Lock Brake System (ABS) and Stability Control .
P1635	Tire/Axle Out Of Acceptable Range	PCM	Refer to ENGINE CONTROLS - INTRODUCTION (EXCEPT DIESEL & HYBRID) .
P1636	Inductive Signature Chip Communication Error	PCM	CLEAR the DTC. If DTC P1636 returns, INSTALL a new PCM. REFER to: Powertrain Control Module (PCM) . After installing the new PCM, PROGRAM it with the latest software and PERFORM the Transmission Strategy Download, REFER to: Transmission Strategy Download .

P163E	Transmission Control Module Programming Error	PCM	CLEAR the DTC. REPROGRAM the original PCM with the latest software. If DTC P163E returns, INSTALL a new PCM. REFER to: Powertrain Control Module (PCM) . After installing the new PCM, PROGRAM it with the latest software and PERFORM the Transmission Strategy Download, REFER to: Transmission Strategy Download .
P163F	Transmission ID Block Corrupted, Not Programmed	PCM	CLEAR the DTC. REPROGRAM the original PCM with the latest software. If DTC P163F returns, INSTALL a new PCM. REFER to: Powertrain Control Module (PCM) . After installing the new PCM, PROGRAM it with the latest software and PERFORM the Transmission Strategy Download, REFER to: Transmission Strategy Download .
P1700	Drivers Door Status Correlation	Transmission	OPEN then CLOSE the drivers door and cycle the door locks. If the door ajar icon is illuminated on the IPC and the door lock and unlock are not working correctly, REFER to: Locks, Latches and Entry Systems . If the door ajar and locks are working correctly, REFER to: External Controls .
P1702	Transmission Range Sensor Circuit Intermittent	TR sensor	DTC P0706, P0707 and/or P0708 may set, CLEAR the DTC. If DTC P1702 returns, GO to PINPOINT TEST C : TR SENSOR
P1705	Transmission Range Circuit Not Indicating Park/Neutral During Self Test	TR sensor	CLEAR the DTC. RERUN the KOEO and KOER self-test. If DTC P1705 returns, GO to PINPOINT TEST C : TR SENSOR
P1711	Transmission Fluid Temperature Sensor Out Of	TFT sensor	CLEAR the DTC and RERUN the KOEO and KOER

	Self Test Range		self-test.
P1744	Torque Converter Clutch Solenoid Circuit Performance	TCC	DTC P1744 is a non-electrical DTC. CLEAR the DTC. If DTC P1744 returns, REFER to: Diagnosis By Symptom .
P177F	Unable To Fully Engage Neutral	Direct or forward clutch pack	This DTC may set when there is a mechanical/hydraulic concern with the direct or forward clutch pack, possibly deformed clutch plates or a rolled clutch seal allowing the direct clutch or the forward clutch to mechanically or hydraulically apply in neutral. PLACE the transmission in neutral with the engine running to see if there is any creep torque, this fault causes the transmission to partially engage forward gear in neutral. This DTC may set with P0752, P0757, P0762, and/or P0767. CLEAR the DTC. If the DTC returns, check the transmission for internal failure. REFER to: Transmission .
P1780	Transmission Control Switch (O/D Cancel) Circuit Out of Self-Test Range	TCS	CLEAR the DTC. If DTC P1780 returns, REFER to: External Controls .
P1783	Transmission Over Temperature Condition	Transmission	CLEAR the DTC. If DTC P1783 returns, determine if this DTC was set in conjunction with any transmission fluid temperature sensor circuit DTCs and RESOLVE them first, otherwise REFER to: Transmission Cooling .
P1910	Reverse Lamp Control Circuit/Open	Reverse lamps	CLEAR the DTC. TEST system for normal operation. If DTC P1910 returns, REFER to: Reversing Lamps .
P1921	Transmission Range Signal	TR sensor	The engine may not crank. DTC P0706, P0707 and/or P0708 may set. CLEAR the DTC. If DTC P1921 returns,

			CLEAR the DTC. RERUN the KOEO and KOER self-test. If DTC P1921 returns, GO to PINPOINT TEST C : TR SENSOR
P2700	Transmission Friction Element "A" Apply Time Range/Performance	Transmission	DTC P2700 is a non-electrical DTC. DTC P0751 and/or P0752 may set. CLEAR the DTC. If DTC P2700 returns, REFER to: Diagnosis By Symptom .
P2701	Transmission Friction Element "B" Apply Time Range/Performance	Transmission	DTC P2701 is a non-electrical DTC. DTC P0756 and/or P0757 may set. CLEAR the DTC. If DTC P2701 returns, REFER to: Diagnosis By Symptom .
P2702	Transmission Friction Element "C" Apply Time Range/Performance	Transmission	DTC P2702 is a non-electrical DTC. DTC P0761 and/or P0762 may set. CLEAR the DTC. If DTC P2702 returns, REFER to: Diagnosis By Symptom .
P2703	Transmission Friction Element "D" Apply Time Range/Performance	Transmission	DTC P2703 is a non-electrical DTC. DTC P0766 and/or P0768 may set. CLEAR the DTC. If DTC P2703 returns, REFER to: Diagnosis By Symptom .
P2704	Transmission Friction Element "E" Apply Time Range/Performance	Transmission	DTC P2704 is a non-electrical DTC. DTC P0771 and/or P0772 may set. CLEAR the DTC. If DTC P2704 returns, REFER to: Diagnosis By Symptom .
P2705	Transmission Friction Element "F" Apply Time Range/Performance	Transmission	DTC P2705 is a non-electrical DTC. CLEAR the DTC. If DTC P2705 returns, REFER to: Diagnosis By Symptom .
P2758	Torque Converter Clutch Pressure Control Solenoid Stuck On	TCC	CLEAR the DTC. If DTC P2758 returns, REFER to: Diagnosis By Symptom .
P2760	Torque Converter Clutch Pressure Control Solenoid Intermittent	TCC	CLEAR the DTC. If DTC P2760 returns, GO to PINPOINT TEST A : TRANSMISSION CONTROL

			SOLENOIDS .

DIAGNOSIS AND TESTING > DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND PINPOINT TESTS - 5.0L 32V TI-VCT > PINPOINT TESTS

Power is routed through the transmission solenoid power control relay (inside the PCM) to all transmission solenoids. If the power circuit to the transmission solenoids or the transmission solenoid power control relay fails open, all solenoids are failed electrically off. Check for open, short to ground or the transmission connector disconnected. The transmission solenoid power control relay disables power to the transmission solenoids when certain transmission DTCs are set.

- Carry out KOEO and KOER procedures.
- Retrieve and record all DTCs.
- Repair all non-transmission DTCs first.
- Repair all transmission DTCs second.
- Clear all CMDTCs and attempt to repeat them.
- Repair all CMDTCs.
- If only pass codes are obtained, REFER to: Diagnosis By Symptom .

DIAGNOSIS AND TESTING > DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND PINPOINT TESTS - 5.0L 32V TI-VCT > PINPOINT TESTS > PINPOINT TEST A : TRANSMISSION CONTROL SOLENOIDS

Refer to Transmission Controls - 6R80 for schematic and connector information.

Normal Operation

When the electrical connector or solenoid body is disconnected, inspect the connector for terminal condition, corrosion and contamination. Also inspect the connector seal for damage. Clean, repair or install new components as required. Power is routed through the Transmission Solenoid Power Control (TSPC) relay (inside the PCM) to all transmission solenoids. If the power circuit to the transmission solenoids or the TSPC relay fails open, then all solenoids are failed electrically OFF. CHECK for open, short to ground or the transmission connector disconnected. The TSPC relay disables power to the transmission solenoids when certain transmission DTCs are set

DIAGNOSIS AND TESTING > DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND PINPOINT TESTS - 5.0L 32V TI-VCT > PINPOINT TESTS > PINPOINT TEST A : TRANSMISSION CONTROL SOLENOIDS > PINPOINT TEST A : TRANSMISSION CONTROL SOLENOIDS

NOTE: Without a voltage signal return to the PCM, the Transmission Solenoid Power Control (TSPC) relay is commanded OFF. By using a fused jumper wire between a transmission solenoid control circuit and the signal return circuit, the TSPC relay circuit supplies power to the transmission solenoids when the ignition is cycled from OFF to ON. Do not use a solenoid control circuit that may be at fault.

NOTE: Read and record all DTCs.

A1 CHECK THE SOLENOID POWER CIRCUIT FOR VOLTAGE

Ignition OFF.

Disconnect: Transmission vehicle harness C1575

Inspect the connector for damaged or pushed out terminals, corrosion, loose wires and missing or damaged seals.

Using the chart, connect a fused jumper wire between one of the 7 solenoid control circuit pins on transmission vehicle harness C1575 and C1575-5 .

Ignition ON.

NOTE: Do not use a solenoid control circuit that may be at fault. Failure to jump pin 5 to a known good solenoid control circuit can cause incorrect diagnostic results.

Using the chart, connect a fused jumper wire between one of the 7 solenoid control circuit pins on transmission vehicle harness C1575 and C1575-5

Transmission Vehicle Harness C1575	Solenoid Control Circuit
C1575-9	SSA
C1575-14	SSB
C1575-13	SSC
C1575-10	SSD
C1575-8	SSE
C1575-16	LPC solenoid
C1575-3	TCC solenoid

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1575-7		Ground

Is the voltage greater than 11 volts?

Yes	GO to A4

No	GO to A2

A2 CHECK THE SOLENOID POWER CIRCUIT FOR AN OPEN

Ignition OFF.

Disconnect: C175E . Inspect the connector for damaged or pushed out terminals, corrosion, loose wires and missing or damaged seals.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C175E-91	Ω	C1575-7

Is the resistance less than 3 ohms?

Yes	GO to A3

No	REPAIR transmission vehicle harness circuit for an open. CLEAR the DTCs. If DTC P0657 returns, INSTALL a new PCM. REFER to: Powertrain Control Module (PCM) . PROGRAM the PCM with the latest calibration level. PERFORM the Solenoid Body Strategy Data Download procedure. REFER to: Transmission Strategy Download .

A3 CHECK THE SOLENOID POWER CIRCUIT FOR A SHORT TO GROUND

Positive Lead	Measurement / Action	Negative Lead
C175E-91	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to A4

No	REPAIR transmission vehicle harness circuit short to ground. CLEAR the DTCs. If DTC P0657 returns, INSTALL a new PCM, REFER to: Powertrain Control Module (PCM) . PROGRAM the PCM with the latest calibration level. PERFORM the Solenoid Body Strategy Data Download procedure. REFER to: Transmission Strategy Download .

A4 CHECK SOLENOID CONTROL CIRCUITS FOR AN OPEN

Ignition OFF.

Disconnect: TCM C175E

Inspect the connector for damaged or pushed out terminals, corrosion, loose wires and missing or damaged seals.

Measure the resistance of the solenoid control circuits using the following chart.

Positive Lead	Measurement / Action	Negative Lead
C175E-75	Ω	C1575-9
C175E-74	Ω	C1575-14
C175E-73	Ω	C1575-13
C175E-72	Ω	C1575-10
C175E-77	Ω	C1575-8
C175E-15	Ω	C1575-16
C175E-14	Ω	C1575-3

Is the resistance less than 3 ohms on each circuit?

Yes	GO to A5

No	REPAIR the transmission vehicle harness circuit. CLEAR the DTCs.

A5 CHECK SOLENOID CONTROL CIRCUITS FOR A SHORT TO GROUND

Measure the resistance between the transmission vehicle harness C1575 , harness side and ground using the following chart.

Positive Lead	Measurement / Action	Negative Lead
C1575-7	Ω	Ground
C1575-9	Ω	Ground
C1575-14	Ω	Ground
C1575-13	Ω	Ground
C1575-10	Ω	Ground
C1575-8	Ω	Ground
C1575-16	Ω	Ground
C1575-3	Ω	Ground

Are the resistances greater than 10, 000 ohms?

Yes	GO to A6

No	REPAIR the transmission vehicle harness circuit. CLEAR the DTCs.

A6 CHECK SOLENOID CONTROL CIRCUITS FOR A SHORT TO POWER

Connect: PCM C175E

Measure for voltage between the transmission vehicle harness C1575 , harness side and ground using the following chart.

Positive Lead	Measurement / Action	Negative Lead
C1575-9		Ground
C1575-14		Ground
C1575-13		Ground
C1575-10		Ground
C1575-8		Ground
C1575-16		Ground
C1575-3		Ground

Is voltage greater than 3 volts on each circuit?

Yes	REPAIR the transmission vehicle harness circuit. CLEAR the DTCs.

No	GO to A7

A7 CHECK COMPONENT RESISTANCE

Measure resistance of the solenoid between the transmission molded leadframe C175E , component side using the following chart.

Transmission	Solenoid	Transmission	Ohms
C1575-7	SSA	C1575-9	4.8 to 5.6
C1575-7	SSB	C1575-14	4.8 to 5.6
C1575-7	SSC	C1575-13	4.8 to 5.6
C1575-7	SSD	C1575-10	4.8 to 5.6
C1575-7	SSE	C1575-8	17.5 to 18.6
C1575-7	LPC solenoid	C1575-16	4.8 to 5.6
C1575-7	TCC solenoid	C1575-3	4.8 to 5.6

Are the solenoid resistances within specifications?

Yes	Inspect for stuck valves or debris, REFER to: Main Control Valve Body . REFER to: Shift Solenoids (SS) . CLEAR the transmission adaptive tables and perform the adaptive drive cycle. REFER to: Adaptive Learning Drive Cycle .

No	GO to A8

A8 CHECK SOLENOID RESISTANCE

Remove the molded leadframe from the main control. REFER to: Shift Solenoids (SS) . Inspect for metallic contamination and clean the solenoid and molded leadframe terminals.

Measure and record the resistance of the suspected solenoid. REFER to: Shift Solenoids (SS) . Compare the recorded value with the chart below.

Solenoid	Ohms
SSA	4.8 to 5.6
SSB	4.8 to 5.6
SSC	4.8 to 5.6
SSD	4.8 to 5.6
SSE	17.5 to 18.6
LPC solenoid	4.8 to 5.6
TCC solenoid	4.8 to 5.6

Is the solenoid resistance within specification?

Yes	INSTALL a new molded leadframe, REFER to: Shift Solenoids (SS) . CLEAR the DTCs.

No	INSTALL a new suspected solenoid which failed the resistance check. REFER to: Shift Solenoids (SS) . CLEAR the transmission adaptive tables and perform the adaptive drive cycle. REFER to: Adaptive Learning Drive Cycle .

DIAGNOSIS AND TESTING > DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND PINPOINT TESTS - 5.0L 32V TI-VCT > PINPOINT TESTS > PINPOINT TEST B : TFT (TRANSMISSION FLUID TEMPERATURE) SENSOR

Refer to Transmission Controls - 6R80 for schematic and connector information.

Normal Operation

The TFT sensor is a temperature dependent resistor that is in contact with transmission fluid in the transmission sump area. The PCM monitors the voltage across the TFT sensor, which changes as transmission fluid temperature varies. The PCM uses the TFT sensor signal as an input for its strategy for shifting and TCC operation. The PCM also uses the TFT sensor signal for transmission fault

detection and diagnostics.

Possible Sources

- Connectors damaged or pushed-out terminals, corrosion, loose wires and missing or damaged seals
- TFT sensor
- Transmission internal wiring harness frame
- PCM

DIAGNOSIS AND TESTING > DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND PINPOINT TESTS - 5.0L 32V TI-VCT > PINPOINT TESTS > PINPOINT TEST B : TFT (TRANSMISSION FLUID TEMPERATURE) SENSOR > PINPOINT TEST B : TFT (TRANSMISSION FLUID TEMPERATURE) SENSOR

B1 CHECK TFT INPUT SIGNAL

Ignition OFF.

Disconnect: Transmission Vehicle Harness C1575 .

Inspect the connector for damaged or pushed out terminals, corrosion, loose wires and missing or damaged seals.

Connect the diagnostic tool.

Ignition ON.

Enter the following mode on the diagnostic scan tool: TFT PIDs TFT and TFTV.

Does the TFT PID display -40 °C (-40 °F) and the TFTV PID display 4.96 to 5.10 volts? ?

Yes	GO to B2

No	REPAIR the circuit.

B2 CHECK TFT SIGNAL INPUT CIRCUIT FOR VOLTAGE

Measure.

Positive Lead	Measurement / Action	Negative Lead
C1575-6		Ground

Is the voltage between 4.8 and 5.1 volts?

Yes	GO to B3

No	INSPECT and REPAIR the transmission open circuit. If an open circuit is not found, INSTALL a new PCM, REFER to: Powertrain Control Module (PCM) . PROGRAM the PCM with the latest calibration level. PERFORM the Solenoid Body Strategy Data Download procedure. REFER to: Transmission Strategy Download .

B3 CHECK TFT SIGNAL RETURN CIRCUIT

Connect a fused jumper wire between the transmission vehicle harness C1575-5 and C1575-6 , harness side

Positive Lead	Measurement / Action	Negative Lead
C1575-5		C1575-6

Does the TFT PID display 190 °-195 °C (374 °-383 °F) and the TFTV PID display 0 volts?

Yes	GO to B4

No	INSPECT and REPAIR the transmission vehicle harness signal return circuit for an open. If an open circuit is not found, INSTALL a new PCM, REFER to: Powertrain Control Module (PCM) . PROGRAM the PCM with the latest calibration level. PERFORM the Solenoid Body Strategy Data Download procedure. REFER to: Transmission Strategy Download .

B4 CHECK TFT SENSOR RESISTANCE

Remove the transmission molded leadframe. REFER to: Shift Solenoids (SS) . Inspect for metal shavings on the exposed metal contacts or other components and clean the solenoid and transmission internal wiring harness frame terminals.

Measure the resistance between the transmission molded leadframe C1575-5 and C1575-6 , component side using the following chart.

C1575-5	Ω	C1575-6
°C	°F	Resistance
-40 to -20	-40 to -4	967K-284K
-19 to -1	-3 to 31	284K-100K
0-20	32-68	100K-37K
21-40	69-104	37K-16K
41-70	105-158	16K-5K
71-90	159-194	5K-2.7K
91-110	195-230	2.7K-1.5K

111-130	231-266	1.5K-0.8K
131-150	267-302	0.8K-0.54K

Does the temperature to resistance specification match?

Yes	To diagnose an overheating concern REFER to: Diagnosis By Symptom .

No	INSPECT and CLEAN the TFT sensor on the molded leadframe for metallic contamination. INSTALL a new molded leadframe if no debris was found, REFER to: Transmission Strategy Download . CLEAR the DTCs.

DIAGNOSIS AND TESTING > DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND PINPOINT TESTS - 5.0L 32V TI-VCT > PINPOINT TESTS > PINPOINT TEST C : TR SENSOR

Refer to Transmission Controls - 6R80 for schematic and connector information.

Normal Operation

The TR sensor has a set of Hall-effect sensors that have a pattern of ON/OFF states which are dependent on the PARK, REVERSE, NEUTRAL, DRIVE, 3, 2 or 1 position of the manual valve. The TR sensor has digital sensor (hall effect) that converts the shifter position into a bit pattern, and a micro controller that converts the 4 bit signal into a 125 Hz pulse width modulated signal. The TR sensor also provides signals for the starting system and the reverse lights. The PCM uses the TR sensor signal as an input for its strategy for shifting and TCC operation. The PCM also uses the TR sensor signal for transmission fault detection and diagnostics. The TR sensor is integral to the leadframe. DTCs P0705, P0706, P0707, P0708, P0709, P1702, P1705 and P1921 cannot be set by an incorrectly adjusted selector lever cable.

DIAGNOSIS AND TESTING > DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND PINPOINT TESTS - 5.0L 32V TI-VCT > PINPOINT TESTS > PINPOINT TEST C : TR SENSOR > PINPOINT TEST C : TR SENSOR

NOTE: Read and record all DTCs.

C1 VERIFY DTCS

Ignition OFF.

Select PARK.

Connect the diagnostic tool.

Carry out the KOEO then the KOER test. DTCs P0705, P0706, P0707, P0708, P0709, P1702, P1705 and P1921 cannot be set by an incorrectly adjusted selector lever cable.

Are TR sensor DTCs present?

Yes	GO to C2

No	If no DTC s are present, and to diagnose any symptoms that may be present REFER to: Diagnosis By Symptom .

C2 CHECK TR SENSOR ELECTRICAL OPERATION

Ignition ON.

Enter the following diagnostic mode on the scan tool: TR PID: TR_DC and TR_FREQ.

Move the selector lever into each range and stop.

Observe the PIDs: TR_DC and TR_FREQ while wiggling the harness or driving the vehicle.

Compare the PID TR_DC to the selector lever position duty cycle, using the following chart.

Selector Lever Position	Range (% Duty Cycle)
P	8.0 - 25.8
R	30.50 - 39.31
N	40.54 - 52.49
D	54.35 - 71.15

Is the TR_FREQ between 100 to 150 Hz?

Is the TR_DC within range?

Does the TR_DC and TR_FREQ remain steady when the harness is wiggled or the vehicle driven?

Yes	The problem is not in the TR sensor system. REFER to: Diagnosis By Symptom .

No	GO to C3

C3 CHECK TR SENSOR VPWR CIRCUIT FOR POWER

Ignition OFF.

Disconnect: Transmission Vehicle Harness C1575

Inspect the connector for damaged or pushed out terminals, corrosion, loose wires and missing or damaged seals.

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1575-12		Ground

Is the voltage greater than 11 volts?

Yes	GO to C4

No	INSPECT and REPAIR the transmission vehicle harness circuit for an open. If an open circuit is not found, INSTALL a new PCM, REFER to: Powertrain Control Module (PCM) . PERFORM the Solenoid Body Strategy Data Download procedure. REFER to: Transmission Strategy Download .

C4 CHECK TR SENSOR SIGNAL CIRCUIT

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1575-4		Ground

Is the voltage greater than 4.8 volts?

Yes	GO to C5

No	INSPECT and REPAIR the transmission vehicle harness for an open. If an open circuit is not found, INSTALL a new PCM, REFER to: Powertrain Control Module (PCM) . PERFORM the Solenoid Body Strategy Data Download procedure. REFER to: Transmission Strategy Download .

C5 CHECK TR SENSOR GROUND CIRCUIT

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1575-4		C1575-11

Is the voltage greater than 4.8 volts?

Yes	GO to C6

No	INSPECT and REPAIR transmission vehicle harness circuit for an open. If an open circuit is not found, INSTALL a new PCM, REFER to: Powertrain Control Module (PCM) . PERFORM the Solenoid Body Strategy Data Download procedure. REFER to: Transmission Strategy Download .

C6 CHECK TR SENSOR TO MANUAL VALVE

Drain the transmission fluid and remove the transmission fluid pan. REFER to: Transmission Fluid Pan, Gasket and Filter .

Check the connection between the TR sensor and the manual control valve. REFER to: Transmission .

Inspect the molded leadframe for metallic contamination, REFER to: Shift Solenoids (SS) .

Is the TR sensor connected to the manual control valve shaft?

Is the TR sensor connected to the manual control valve shaft?

Yes	INSTALL a new TR sensor. REFER to: Shift Solenoids (SS) .

No	CONNECT the TR sensor to the manual control valve, REFER to: Shift Solenoids (SS) . CLEAN any debris from the molded leadframe. RUN the KOEO self-test. If DTCs return, INSTALL a new TR sensor. REFER to: Shift Solenoids (SS) .

DIAGNOSIS AND TESTING > DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND PINPOINT TESTS - 5.0L 32V TI-VCT > PINPOINT TESTS > PINPOINT TEST D : TSS (TURBINE SHAFT SPEED) SENSOR

Refer to Transmission Controls - 6R80 for schematic and connector information.

Normal Operation

The TSS sensor is a Hall-effect type sensor that provides a signal to the PCM that changes in frequency as the rotating speed of the forward (1, 2, 3, 4) clutch cylinder varies. The PCM compares the TSS sensor signal with the engine speed information to determine the amount of slip occurring in the torque converter. The PCM also compares the TSS sensor signal with the OSS sensor signal to determine the gear ratio provided by the rear planetary gearset. The PCM uses the TSS sensor signal as an input for its strategies for shifts and TCC operation. The PCM also uses the TSS sensor signal for transmission fault detection and diagnostics. REFER to: Transmission Description - System Operation and Component Description .

DIAGNOSIS AND TESTING > DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND PINPOINT TESTS - 5.0L 32V TI-VCT > PINPOINT TESTS > PINPOINT TEST D : TSS (TURBINE SHAFT SPEED) SENSOR > PINPOINT TEST D : TSS (TURBINE SHAFT SPEED) SENSOR

NOTE: If DTCs P0705, P0706, P0707, P0708, P0709, P1702, P1705 and/or P1921 are set, diagnose those DTCs first.

NOTE: Read and record all DTCs.

D1 DRIVE CYCLE TEST

Connect the diagnostic tool.

Enter the following diagnostic mode: PID TSS_SRC..

Monitor the PID TSS_SRC while road testing the vehicle. Drive the vehicle so the transmission upshifts and downshifts through all the gears.

Does the TSS sensor RPM increase and decrease with engine RPM and vehicle speed?

Yes	REFER to: Road Testing Vehicle .

No	GO to D2

D2 CHECK TSS SENSOR SIGNAL CIRCUIT FOR POWER

Ignition OFF.

Disconnect: Transmission Vehicle Harness C1575 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1575-1		Ground

Is the voltage less than 4.8 volts?

Yes	GO to D3

No	GO to D6

D3 CHECK THE TSS SENSOR SIGNAL CIRCUIT FOR AN OPEN

Ignition OFF.

Disconnect: PCM C175E

Inspect the connector for damaged or pushed out terminals, corrosion, loose wires and missing or damaged seals.

Measure:

Positive Lead	Measurement / Action	Negative Lead

C1575-1	Ω	C175E-25

Is the resistance less than 3 ohms?

Yes	GO to D4

No	INSPECT and REPAIR transmission vehicle harness TSS sensor signal circuit for an open. If an open circuit is not found, INSTALL a new PCM, REFER to: Powertrain Control Module (PCM) . PERFORM the Solenoid Body Strategy Data Download procedure. REFER to: Transmission Strategy Download .

D4 CHECK THE TSS SENSOR SIGNAL CIRCUIT FOR A SHORT TO GROUND

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1575-1	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to D5

No	INSPECT and REPAIR transmission vehicle harness TSS sensor signal circuit for a short to ground. If a short to ground is not found, INSTALL a new PCM, REFER to: Powertrain Control Module (PCM) . PERFORM the Solenoid Body Strategy Data Download procedure. REFER to: Transmission Strategy Download .

D5 CHECK THE TSS SENSOR SIGNAL CIRCUIT FOR A SHORT TO POWER

Connect: PCM C175E

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1575-1	V	Ground

Is voltage greater than 5.1 volts?

Yes	INSPECT and REPAIR transmission vehicle harness TSS sensor signal circuit for a short to power. If a short to power is not found, INSTALL a new PCM, REFER to: Powertrain Control Module (PCM) . PERFORM the Solenoid Body Strategy Data Download procedure. REFER to: Transmission Strategy Download .

No	GO to D6

D6 CHECK THE TSS SENSOR GROUND CIRCUIT

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1575-1		C1575-5

Is voltage less than 4.8 volts?

Yes	REPAIR the transmission vehicle harness signal return circuit for an open. If an open is not found, INSTALL a new PCM, REFER to: Powertrain Control Module (PCM) . PROGRAM the PCM with the latest calibration level. PERFORM the Solenoid Body Strategy Data Download procedure. REFER to: Transmission Strategy Download .

No	INSTALL a new molded leadframe, REFER to: Shift Solenoids (SS) . CLEAR the DTCs.

DIAGNOSIS AND TESTING > DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND PINPOINT TESTS - 5.0L 32V TI-VCT > PINPOINT TESTS > PINPOINT TEST E : OSS (OUTPUT SHAFT SPEED) SENSOR

Refer to Transmission Controls - 6R80 for schematic and connector information.

Normal Operation

The OSS sensor is a Hall-effect type sensor that provides a signal to the PCM that changes in frequency as the rotating speed of the output shaft ring gear varies. The PCM also compares the OSS sensor signal with the TSS sensor signal to determine the gear ratio provided by the rear planetary gearset. The PCM uses the OSS sensor signal as an input for its strategies for shifts and TCC operation. The PCM also uses the OSS sensor signal for transmission fault detection and diagnostics. DTC s are set.

DIAGNOSIS AND TESTING > DIAGNOSTIC TROUBLE CODE (DTC) CHARTS AND PINPOINT TESTS - 5.0L 32V TI-VCT > PINPOINT TESTS > PINPOINT TEST E : OSS (OUTPUT SHAFT SPEED) SENSOR > PINPOINT TEST E : OSS (OUTPUT SHAFT SPEED) SENSOR

NOTE: If DTCs P0705, P0706, P0707, P0708, P0709, P1702, P1705 and/or P1921 are set, diagnose those DTCs first.

NOTE: Read and record all DTCs.

E1 DRIVE CYCLE TEST

Using the diagnostic scan tool, monitor the OSS sensor PID OSS_SRC while road testing the vehicle. Drive the vehicle so the transmission upshifts and downshifts through all the gears.

Does the OSS sensor RPM increase and decrease with engine RPM and vehicle speed?

Yes	REFER to: Road Testing Vehicle .

No	GO to E2

E2 CHECK OSS SENSOR SIGNAL CIRCUIT FOR POWER

Ignition OFF.

Disconnect: PCM C1575

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1575-15		Ground

Is the voltage less than 4.8 volts?

Yes	GO to E3

No	GO to E6

E3 CHECK THE OSS SENSOR SIGNAL CIRCUIT FOR AN OPEN

Ignition OFF.

Disconnect: PCM C175E

Inspect the connector for damaged or pushed out terminals, corrosion, loose wires and missing or damaged seals.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1575-15	Ω	C175E-26

Is the resistance less than 3 ohms?

Yes	GO to E4

No	INSPECT and REPAIR transmission vehicle harness OSS sensor signal circuit for an open. If an open circuit is not found, INSTALL a new PCM, REFER to: Powertrain Control Module (PCM) . PERFORM the Solenoid Body Strategy Data Download procedure. REFER to: Transmission Strategy Download .

E4 CHECK THE OSS SENSOR SIGNAL CIRCUIT FOR A SHORT TO GROUND

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1575-15	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to E5

No	INSPECT and REPAIR transmission vehicle harness OSS sensor signal circuit for a short to ground. If a short to ground is not found, INSTALL a new PCM, REFER to: Powertrain Control Module (PCM) . PERFORM the Solenoid Body Strategy Data Download procedure. REFER to: Transmission Strategy Download .

E5 CHECK THE OSS SENSOR SIGNAL CIRCUIT FOR A SHORT TO POWER

Connect: PCM C175E

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1575-15	V	Ground

Is voltage greater than 5.1 volts?

Yes	INSPECT and REPAIR transmission vehicle harness OSS sensor signal circuit for a short to power. If a short to power is not found, INSTALL a new PCM, REFER to: Powertrain Control Module (PCM) . PERFORM the Solenoid Body Strategy Data Download procedure. REFER to: Transmission Strategy Download .

No	GO to E6

E6 CHECK THE OSS SENSOR GROUND CIRCUIT

Measure:

Positive Lead	Measurement / Action	Negative Lead
C1575-15		C1575-5

Is voltage less than 4.8 volts?

Yes	REPAIR the transmission vehicle harness signal return circuit for an open. If an open is not found, INSTALL a new PCM, REFER to: Powertrain Control Module (PCM) . PROGRAM the PCM with the latest calibration level. PERFORM the Solenoid Body Strategy Data Download procedure. REFER to: Transmission Strategy Download .

No	INSTALL a new molded leadframe, REFER to: Shift Solenoids (SS) .

DIAGNOSIS AND TESTING > DIRECT CLUTCH ASSEMBLY

Direct Clutch

For direct (3, 5, R) clutch operation, REFER to: Direct Clutch Assembly .**Direct Clutch**

Condition	Possible Sources	Action
Direct (3, 5, R) clutch does not apply	SSB is mechanically stuck OFF	INSTALL a new solenoid. REFER to: Shift Solenoids (SS) .
	Clutch B regulator valve stuck OFF	DISASSEMBLE, CLEAN and INSPECT the clutch B regulator valve. REFER to: Main Control Valve Body . If bore or valve is damaged, INSTALL a new main control valve body. REFER to: Main Control Valve Body .
-	CLB, DRIVE, REV/DRIVE, VFS2 hydraulic circuits blocked/leaking	DISASSEMBLE, CLEAN and INSPECT the main control valve body. REFER to: Main Control Valve Body . If bore or valve is damaged, INSTALL a new main control valve body. REFER to: Main Control Valve Body .
	Ball valve 1 check ball missing/damaged	REMOVE the main control valve body, and INSPECT the check ball missing/damage. REFER to: Main Control Valve Body .
	Center support, direct clutch drum, direct clutch drum Teflon™ seals, direct clutch friction plates, direct clutch piston seals	INSPECT components wear and damage. CLEAN and/or INSTALL new components as necessary. REFER to: Transmission .

Direct (3, 5, R) clutch always applied	SSB is mechanically stuck ON	INSTALL a new solenoid. REFER to: Shift Solenoids (SS) .
	Clutch B regulator valve stuck ON	DISASSEMBLE, CLEAN and INSPECT the clutch B regulator valve. REFER to:Main Control Valve Body . If bore or valve is damaged, INSTALL a new main control valve body. REFER to: Main Control Valve Body .
	CLB, DRIVE, REV/DRIVE, VFS2 hydraulic circuits blocked/leaking	REMOVE the main control valve body, and INSPECT the check ball missing/damage. missing/damage. REFER to: Main Control Valve Body .
	Center support, direct clutch drum, direct clutch drum Teflon™ seals, direct clutch friction plates, direct clutch piston seals	INSPECT components wear and damage. CLEAN and/or INSTALL new components as necessary. REFER to: Transmission .
Direct (3, 5, R) clutch delayed/soft/slipping apply	Incorrect transmission strategy programmed into PCM.	PERFORM the Transmission Strategy Download, REFER to: Transmission Strategy Download .
	SSB is mechanically sticking	INSTALL a new solenoid. REFER to: Shift Solenoids (SS) .
	Clutch B regulator valve sticking, Clutch B latch valve sticking	DISASSEMBLE, CLEAN and INSPECT the clutch B regulator valve. REFER to: Main Control Valve Body . If bore or valve is damaged, INSTALL a new main control valve body. REFER to: Main Control Valve Body .
	CLB, DRIVE, REV/DRIVE, VFS2 hydraulic circuits blocked/leaking	REMOVE the main control valve body, and separator plate passages for debris/blockage. CLEAN as necessary. missing/damage. REFER to: Main Control Valve Body .
	BV 1 check ball missing/damaged	REMOVE the main control valve body, and INSPECT the check ball missing/damage. missing/damage. REFER to: Main Control Valve Body .
	Center support, direct clutch drum, direct clutch drum Teflon™ seals, direct clutch friction plates, direct clutch piston seals	INSPECT components wear and damage. CLEAN and/or INSTALL new components as necessary. REFER to: Transmission .

Direct (3, 5, R) clutch harsh apply	Incorrect transmission strategy programmed into PCM.	PERFORM the Transmission Strategy Download, REFER to: Transmission Strategy Download .
	SSB is mechanically stuck OFF	INSTALL a new solenoid. REFER to: Shift Solenoids (SS) .
	Clutch B regulator valve sticking, Clutch B latch valve sticking	DISASSEMBLE, CLEAN and INSPECT the clutch B regulator valve. REFER to: Main Control Valve Body . If bore or valve is damaged, INSTALL a new main control valve body. REFER to: Main Control Valve Body .
	CLB, DRIVE, REV/DRIVE, VFS2 hydraulic circuits blocked/leaking	REMOVE the main control valve body, and separator plate passages for debris/blockage. CLEAN as necessary. missing/damage. REFER to: Main Control Valve Body .
	Ball valve 1 check ball missing/damaged	REMOVE the main control valve body, and INSPECT the check ball missing/damage. missing/damage. REFER to: Main Control Valve Body .
	Center support, direct clutch drum, direct clutch drum Teflon™ seals, direct clutch friction plates, direct clutch piston seals	INSPECT components wear and damage. CLEAN and/or INSTALL new components as necessary. REFER to: Transmission .
	Direct (3, 5, R) clutch piston return spring	INSPECT the return spring for proper installation and damage. INSTALL new components as necessary. REFER to: Transmission .

DIAGNOSIS AND TESTING > FORWARD CLUTCH ASSEMBLY > SYMPTOM CHART

Forward Clutch

For forward clutch operation, REFER to: Forward Clutch Assembly .

Condition	Possible Sources	Action
Forward clutch does not apply	SSA is mechanically stuck OFF	INSTALL a new solenoid. REFER to: Shift Solenoids (SS) . PERFORM the Transmission Strategy Download, REFER to: Transmission Strategy Download .

	Clutch B regulator valve stuck OFF	DISASSEMBLE, CLEAN and INSPECT the regulator valve. If bore or valve is damaged, INSTALL a new main control valve body. REFER to: Main Control Valve Body .
	CLA, DRIVE, VFS1 hydraulic circuits blocked/leaking	DISASSEMBLE and INSPECT the main control valve body and separator plate passages for debris/blockage. CLEAN as necessary. REFER to: Main Control Valve Body .
	Input shaft, input shaft Teflon™ seals, forward clutch drum	INSPECT components wear and damage. CLEAN and/or INSTALL new components necessary. REFER to: Transmission .
	Forward clutch friction plates, piston seals	INSPECT components wear and damage. CLEAN and/or INSTALL new components necessary. REFER to: Transmission .
Forward clutch always applied	SSA mechanically stuck ON	INSTALL a new solenoid. PERFORM the Transmission Strategy Download, REFER to: Shift Solenoids (SS) . PERFORM the Transmission Strategy Download, REFER to: Transmission Strategy Download .
	Clutch A regulator valve stuck ON	DISASSEMBLE, CLEAN and INSPECT the regulator valve. If bore or valve is damaged, INSTALL a new main control valve body. REFER to: Main Control Valve Body .
	CLA, DRIVE, VFS3 hydraulic circuits blocked/leaking	DISASSEMBLE and INSPECT the main control valve body and separator plate passages for debris/blockage. CLEAN as necessary.
	Forward clutch friction plates	INSPECT components wear and damage. CLEAN and/or INSTALL new components necessary. REFER to: Transmission .
	Forward clutch piston seals	INSPECT components wear and damage. CLEAN and/or INSTALL new components necessary. REFER to: Transmission .

forward clutch delayed/soft /slipping apply	Incorrect transmission strategy programmed into PCM.	PERFORM the Transmission Strategy Download, REFER to: Transmission Strategy Download .
	SSA mechanically sticking	INSTALL a new solenoid. REFER to: Shift Solenoids (SS) . PERFORM the Transmission Strategy Download, REFER to: Transmission Strategy Download .
	Clutch A regulator or latch valve sticking	DISASSEMBLE, CLEAN and INSPECT the valves. If bore or valve is damaged, INSTALL a new main control valve body. REFER to: Main Control Valve Body .
	CLA, DRIVE, VFS3 hydraulic circuits blocked/leaking	DISASSEMBLE and INSPECT the main control valve body and separator plate passages for debris/blockage. CLEAN as necessary. REFER to: Main Control Valve Body .
	Center support, forward clutch hub/direct clutch drum	DISASSEMBLE and INSPECT the transmission passages for debris/blockage. CLEAN as necessary. REFER to: Transmission .
	Forward clutch friction plates	DISASSEMBLE and INSPECT the transmission passages for debris/blockage. CLEAN as necessary. REFER to: Transmission .
	Forward clutch piston seals	DISASSEMBLE and INSPECT the transmission passages for debris/blockage. CLEAN as necessary. REFER to: Transmission .
forward clutch harsh apply	Incorrect transmission strategy programmed into PCM.	PERFORM the Transmission Strategy Download, REFER to: Transmission Strategy Download .
	SSA mechanically sticking	INSTALL a new solenoid. REFER to: Shift Solenoids (SS) . PERFORM the Transmission Strategy Download, REFER to: Transmission Strategy Download .
	Clutch C regulator valve sticking	DISASSEMBLE, CLEAN and INSPECT the valves. If bore or valve is damaged, INSTALL a new main control valve body. REFER to: Main Control Valve Body .

	CLC, DRIVE, VFS3 hydraulic circuits blocked/leaking	DISASSEMBLE and INSPECT the main control valve body and separator plate passages for debris/blockage. CLEAN as necessary.
	Input shaft, input shaft Teflon™ seals, forward clutch drum	DISASSEMBLE and INSPECT the transmission passages for debris/blockage. CLEAN as necessary. REFER to: Transmission .
-	Forward clutch friction plates or piston seals	DISASSEMBLE and INSPECT the transmission passages for debris/blockage. CLEAN as necessary. REFER to: Transmission .
-	Forward clutch piston return spring	DISASSEMBLE and INSPECT the transmission passages for debris/blockage. CLEAN as necessary. REFER to: Transmission .

DIAGNOSIS AND TESTING > INTERMEDIATE CLUTCH ASSEMBLY

Intermediate Clutch

For intermediate clutch operation, REFER to: Intermediate Clutch Assembly .**Intermediate Clutch**

Condition	Possible Sources	Action
Intermediate clutch does not apply	Main control to case seal blocked, damaged, or missing	INSTALL a new seal. REFER to: Main Control Valve Body .
	SSC is mechanically stuck OFF	INSTALL a new solenoid. REFER to: Shift Solenoids (SS) . PERFORM the Transmission Strategy Download, REFER to: Transmission Strategy Download .
	Clutch C regulator valve stuck OFF	DISASSEMBLE, CLEAN and INSPECT the regulator valve. If bore or valve is damaged, INSTALL a new main control valve body. REFER to: Main Control Valve Body .
	CLC, DRIVE, VFS3 hydraulic circuits blocked/leaking	DISASSEMBLE and INSPECT the main control valve body and separator plate passages for debris/blockage. CLEAN as necessary. REFER to: Main

		Control Valve Body .
	Center support, intermediate clutch hub/direct clutch drum	INSPECT components wear and damage. CLEAN and/or INSTALL new components necessary. REFER to: Transmission .
	Intermediate clutch friction plates	INSPECT components wear and damage. CLEAN and/or INSTALL new components necessary. REFER to: Transmission .
	Intermediate clutch piston seals	INSPECT components wear and damage. CLEAN and/or INSTALL new components necessary. REFER to: Transmission .
Intermediate clutch always applied	Main control to case seal blocked, damaged, or missing	INSTALL a new seal. REFER to: Main Control Valve Body .
	Shift Solenoid C (SSC) mechanically stuck ON	INSTALL a new solenoid. PERFORM the Transmission Strategy Download, REFER to: Shift Solenoids (SS) . PERFORM the Transmission Strategy Download, REFER to: Transmission Strategy Download .
	Clutch C regulator valve stuck ON	DISASSEMBLE, CLEAN and INSPECT the regulator valve. If bore or valve is damaged, INSTALL a new main control valve body. REFER to: Main Control Valve Body .
	CLC, DRIVE, VFS3 hydraulic circuits blocked/leaking	DISASSEMBLE and INSPECT the main control valve body and separator plate passages for debris/blockage. CLEAN as necessary. REFER to: Main Control Valve Body .
	Center support, intermediate clutch hub/direct clutch drum	INSPECT components wear and damage. CLEAN and/or INSTALL new components necessary. REFER to: Transmission .
	Intermediate clutch friction plates	INSPECT components wear and damage. CLEAN and/or INSTALL new components necessary. REFER to: Transmission .
	Intermediate clutch piston seals	INSPECT components wear and damage. CLEAN and/or INSTALL new components necessary. REFER to: Transmission .

Intermediate clutch delayed/soft /slipping apply	Incorrect transmission strategy programmed into PCM.	PERFORM the Transmission Strategy Download, REFER to: Transmission Strategy Download .
	Main control to case seal blocked	INSTALL a new seal. REFER to: Main Control Valve Body .
	SSC mechanically sticking	INSTALL a new solenoid. REFER to: Shift Solenoids (SS) . PERFORM the Transmission Strategy Download, REFER to: Transmission Strategy Download .
	Clutch C regulator valve sticking	DISASSEMBLE, CLEAN and INSPECT the valves. If bore or valve is damaged, INSTALL a new main control valve body. REFER to: Main Control Valve Body .
	CLC, DRIVE, VFS3 hydraulic circuits blocked/leaking	DISASSEMBLE and INSPECT the main control valve body and separator plate passages for debris/blockage. CLEAN as necessary. REFER to: Main Control Valve Body .
	Center support, intermediate clutch hub/direct clutch drum	DISASSEMBLE and INSPECT the transmission passages for debris/blockage. CLEAN as necessary. REFER to: Transmission .
	Intermediate clutch friction plates	DISASSEMBLE and INSPECT the transmission passages for debris/blockage. CLEAN as necessary. REFER to: Transmission .
	Intermediate clutch piston seals	DISASSEMBLE and INSPECT the transmission passages for debris/blockage. CLEAN as necessary. REFER to: Transmission .
Intermediate clutch harsh apply	Incorrect transmission strategy programmed into PCM.	PERFORM the Transmission Strategy Download, REFER to: Transmission Strategy Download .
	Main control to case seal blocked	INSTALL a new seal. REFER to: Main Control Valve Body .
	SSC mechanically sticking	INSTALL a new solenoid. REFER to: Shift Solenoids (SS) . PERFORM the Transmission Strategy Download, REFER to: Transmission Strategy Download .

	Clutch C regulator valve sticking	DISASSEMBLE, CLEAN and INSPECT the valves. If bore or valve is damaged, INSTALL a new main control valve body. REFER to: Main Control Valve Body .
	CLC, DRIVE, VFS3 hydraulic circuits blocked/leaking	DISASSEMBLE and INSPECT the main control valve body and separator plate passages for debris/blockage. CLEAN as necessary. REFER to: Main Control Valve Body .
	Center support, intermediate clutch hub/direct clutch drum	DISASSEMBLE and INSPECT the transmission passages for debris/blockage. CLEAN as necessary. REFER to: Transmission .
-	Intermediate clutch friction plates	DISASSEMBLE and INSPECT the transmission passages for debris/blockage. CLEAN as necessary. REFER to: Transmission .
-	Intermediate clutch piston seals	DISASSEMBLE and INSPECT the transmission passages for debris/blockage. CLEAN as necessary. REFER to: Transmission .

DIAGNOSIS AND TESTING > LEAKAGE INSPECTION

Leak Check Test

1.

With the vehicle in NEUTRAL, position the vehicle on a hoist. REFER to: Jacking and Lifting - Overview .

2.

Inspect the gasket and sealing areas for evidence of leakage.

3.

Trace the transmission fluid leak to the highest point.

4.

Clean area of suspected leak.

5.

Lower vehicle.

6.

Remove the transmission fluid fill plug or fluid level indicator.

7.

Add leak detection dye to the transmission fluid. Use 1 fl. oz. (30 ml) of dye solution for every 4 qt (3.8 L) of transmission fluid.

8.

Road test the vehicle for at least 1 mile with at least 1 application of the TCC.

9.

With the vehicle in NEUTRAL, position the vehicle on a hoist. REFER to: Jacking and Lifting - Overview .

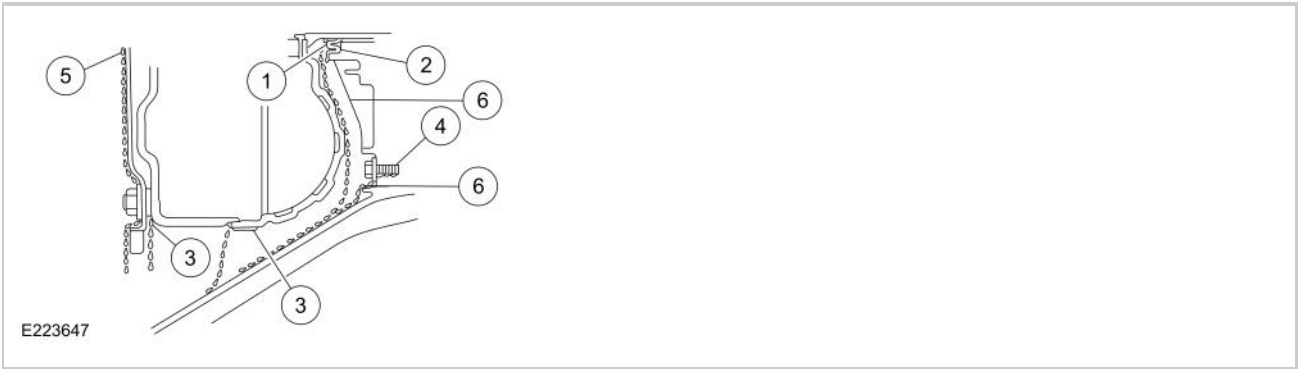
10.

If the source of the leak is obvious, repair as required.

11.

After the repair, clean the affected area.

Leakage From Torque Converter Housing



12.

Leaks from the torque converter housing can originate from several locations. The paths which the transmission fluid takes to reach the bottom of the torque converter housing is shown in the illustration. The following 6 steps correspond with the numbers in the illustration.

1.

Transmission fluid leaking by the converter hub seal lip will tend to move along the drive hub and onto the back of the torque converter. Except in the case of a total seal failure, transmission fluid leakage by the lip of the seal will be deposited on the inside of the torque converter housing only, near the outside diameter of the housing.

2.

Transmission fluid leakage by the outside diameter of the torque converter impeller hub seal and the case will follow the same path that leaks by the inside diameter of the converter hub seal follow.

3.

Transmission fluid leakage from the converter cover weld or the converter-to-flexplate stud weld will appear at outside diameter of torque converter on the back face of the flexplate and in the converter housing only near the flexplate. If a converter-to-flexplate lug, lug weld or converter cover weld leak is suspected, remove the converter and pressure check.

4.

Transmission fluid leakage from the bolts inside the converter housing will flow down the back of the torque converter housing. Leakage may be from loose or missing bolts.

5.

Engine oil leaks from the rear main oil.

6.

Transmission fluid leak from pump to case seal.

13.

Remove the torque converter.

14.

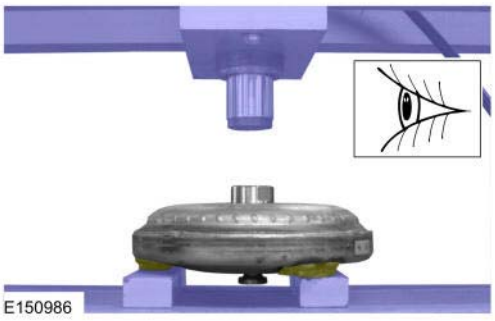
Using a black light, observe the torque converter housing. Inspect for evidence of dye from the pump bolts, pump seal, and torque converter hub seal. Repair as required.

15.

If the source of the leak is not evident, continue with this procedure to leak test the torque converter.

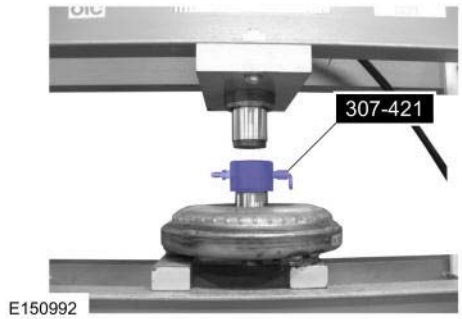
16.

Place the torque converter in an arbor press. Support the torque converter on the mounting pads.



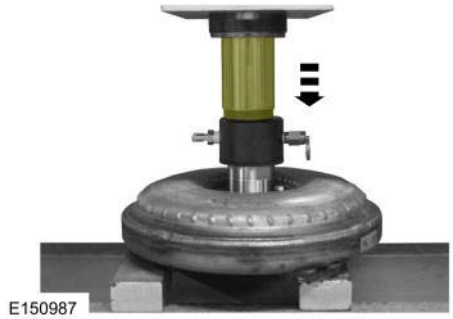
17.

Install the torque converter leak tester (307-421) into the torque converter hub.



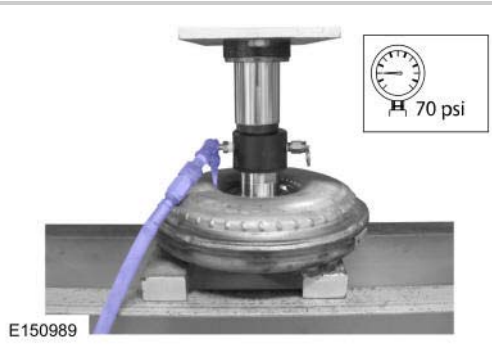
18.

Secure the press. Apply enough force from the press to seal the torque converter leak tester (307-421) into the torque converter hub.



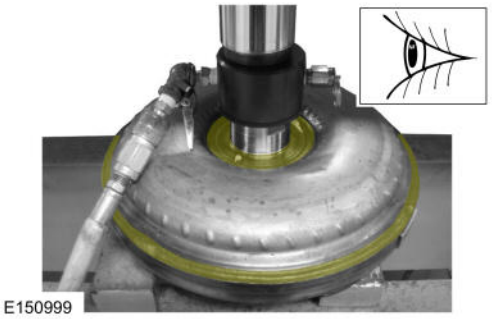
19.

Connect a compressed air supply to the torque converter leak tester (307-421).



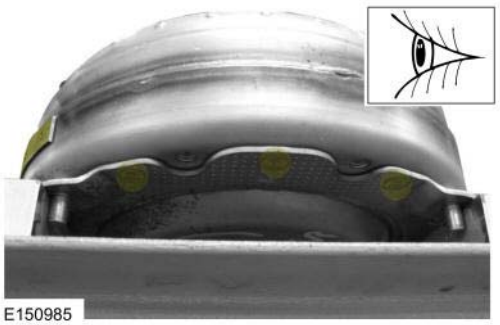
20.

Inspect for leaks at the torque converter hub weld and seams with air pressure applied to the valve. A soap bubble solution can be applied around those areas to aid in the diagnosis. If any leaks are present, install a new torque converter.



21.

Inspect for leaks at the stud or mounting pad and balance weight welds. A soap bubble solution can be applied around those areas to aid in the diagnosis. If any leaks are present, install a new torque converter.



22.

After leaks are repaired, clean the remaining transmission fluid dye from serviced areas.

DIAGNOSIS AND TESTING > LOW REVERSE CLUTCH ASSEMBLY

Low/Reverse Clutch

For low/reverse clutch operation, REFER to: Low/Reverse Clutch Assembly .**Low/Reverse Clutch**

Condition	Possible Sources	Action
Low/Reverse clutch does not apply	SSD solenoid filter blocked to	CLEAN or INSTALL a new solenoid. REFER to: Shift Solenoids (SS) .
	SSD is mechanically stuck OFF	INSTALL a new solenoid. REFER to: Shift Solenoids (SS) . PERFORM the Transmission Strategy Download, REFER to: Transmission Strategy Download .

	Low/Reverse clutch (CBLR/C456) regulator valve stuck OFF	DISASSEMBLE, CLEAN and INSPECT the low/reverse clutch regulator valve. If bore or valve is damaged, INSTALL a new main control. REFER to: Main Control Valve Body .
	SSD SIG, CBLR/C456 SUPPLY, CBLR SUPPLY hydraulic circuits blocked/leaking	DISASSEMBLE and INSPECT the main control valve body and separator plate passages for debris/blockage. CLEAN as necessary. REFER to: Main Control Valve Body .
	REV/SSE SIG to multiplex shift valve shuttle ball missing/damaged	REMOVE the main control valve body and INSPECT the check ball missing/damage. REFER to: Main Control Valve Body .
	Multiplex shift valve stuck in default position	DISASSEMBLE, CLEAN and INSPECT the multiplex shift valve. If bore or valve is damaged, INSTALL a new main control valve body. REFER to: Main Control Valve Body .
	CBLR supply hydraulic circuit blocked or leaking	DISASSEMBLE and INSPECT the transmission cover passages for debris/blockage. CLEAN as necessary. REFER to: Transmission .
	Rear planetary carrier/center ring gear	INSPECT the planetary carrier/center ring gear for wear and damage that would prevent the gear from being held. INSTALL new components necessary. REFER to: Transmission .
	Low/Reverse clutch friction plates	DISASSEMBLE and INSPECT the low/reverse clutch friction and steel plates. INSTALL new components as necessary. REFER to: Transmission .
	Low/Reverse clutch piston seal leakage	INSTALL a new low/reverse clutch piston and seals. REFER to: Transmission .
Low/Reverse clutch always applied	SSD solenoid filter seal damaged	INSTALL a new solenoid. REFER to: Shift Solenoids (SS) .
	SSD mechanically stuck ON	INSTALL a new solenoid. REFER to: Shift Solenoids (SS) . PERFORM the Transmission Strategy Download, REFER to:

		Transmission Strategy Download .
	Low/Reverse clutch (CBLR/C456) regulator valve stuck ON	DISASSEMBLE, CLEAN and INSPECT the low/reverse clutch regulator valve and spring. If bore or valve is damaged, INSTALL a new main control valve body. REFER to: Main Control Valve Body .
	SSD SIG, CBLR/C456 SUPPLY, CBLR SUPPLY hydraulic circuits blocked/leaking	DISASSEMBLE and INSPECT the main control valve body and separator plate passages for leakage. CLEAN as necessary. REFER to: Transmission Description - System Operation and Component Description .
	Low One-Way Clutch (OWC)	INSPECT the Low One-Way Clutch (OWC) for free rotation in over-run direction. INSTALL new components as necessary. REFER to: Transmission .
	Low/Reverse clutch friction plates	DISASSEMBLE and INSPECT the low/reverse clutch friction and steel plates. INSTALL new components as necessary. REFER to: Transmission .
	Low/Reverse clutch piston return spring	INSPECT the return spring for damage. INSTALL new components as necessary. REFER to: Transmission .
Low/Reverse clutch delayed/soft/slipping apply	Incorrect Transmission Strategy programmed into PCM	PERFORM the Transmission Strategy Download, REFER to: Transmission Strategy Download .
	SSD filter seal damaged	INSTALL a new solenoid. REFER to: Shift Solenoids (SS) .
	SSD mechanically sticking	INSTALL a new solenoid. REFER to: Shift Solenoids (SS) .
	Low/Reverse clutch (CBLR/C456) regulator valve sticking	DISASSEMBLE, CLEAN and INSPECT the low/reverse clutch regulator valve. If bore or valve is damaged, INSTALL a new main control valve body. REFER to: Main Control Valve Body .
	Low/Reverse clutch (CBLR/C456) boost valve stuck ON	DISASSEMBLE, CLEAN and INSPECT the low/reverse clutch boost valve. If bore or valve is damaged, INSTALL a new main

		control valve body. REFER to: Main Control Valve Body .
	SSD SIG, CBLR/C456 SUPPLY, CBLR SUPPLY hydraulic circuits blocked/leaking	DISASSEMBLE and INSPECT the main control and separator plate passages for debris/blockage. CLEAN as necessary. REFER to: Main Control Valve Body .
	REV/SSE SIG to multiplex shift valve shuttle ball missing/damaged	REMOVE the main control valve body and INSPECT the check ball missing/damage. REFER to: Main Control Valve Body .
	CBLR supply hydraulic circuit blocked or leaking	DISASSEMBLE and INSPECT the transmission cover passages for debris/blockage. CLEAN as necessary. REFER to: Main Control Valve Body .
	Low/Reverse clutch friction plates	DISASSEMBLE and INSPECT the low/reverse clutch friction and steel plates. INSTALL new components as necessary. REFER to: Transmission .
	Low/Reverse clutch piston seal leakage	INSTALL a new low/reverse clutch piston and seals. REFER to: Transmission .
Low/Reverse clutch harsh apply	Incorrect Transmission Strategy programmed into PCM	PERFORM the Transmission Strategy Download, REFER to: Transmission Strategy Download .
	SSD mechanically sticking	INSTALL a new solenoid. REFER to: Shift Solenoids (SS) . PERFORM the Transmission Strategy Download, REFER to: Transmission Strategy Download .
	Low/Reverse clutch regulator valve sticking	DISASSEMBLE, CLEAN and INSPECT the low/reverse clutch regulator valve and spring. If bore, valve or spring is damaged, INSTALL a new main control valve body. REFER to: Main Control Valve Body .
	Low/Reverse clutch (CBLR/C456) boost valve sticking	DISASSEMBLE, CLEAN and INSPECT the low/reverse clutch boost valve and spring. If bore, valve or spring is damaged, INSTALL a new main control valve body. REFER to: Main Control Valve Body .

	SSD SIG, CBLR/C456 SUPPLY, CBLR SUPPLY hydraulic circuits blocked/leaking	DISASSEMBLE and INSPECT the main control valve body and separator plate passages for debris/blockage. CLEAN as necessary. REFER to: Main Control Valve Body .
	Low/Reverse clutch friction plates	DISASSEMBLE and INSPECT the low/reverse clutch friction and steel plates. INSTALL new components as necessary. REFER to: Transmission .
	Low/Reverse clutch piston return spring	INSPECT the return spring for proper installation and damage. INSTALL new components as necessary. REFER to: Transmission .

DIAGNOSIS AND TESTING > LOW ONE-WAY CLUTCH ASSEMBLY

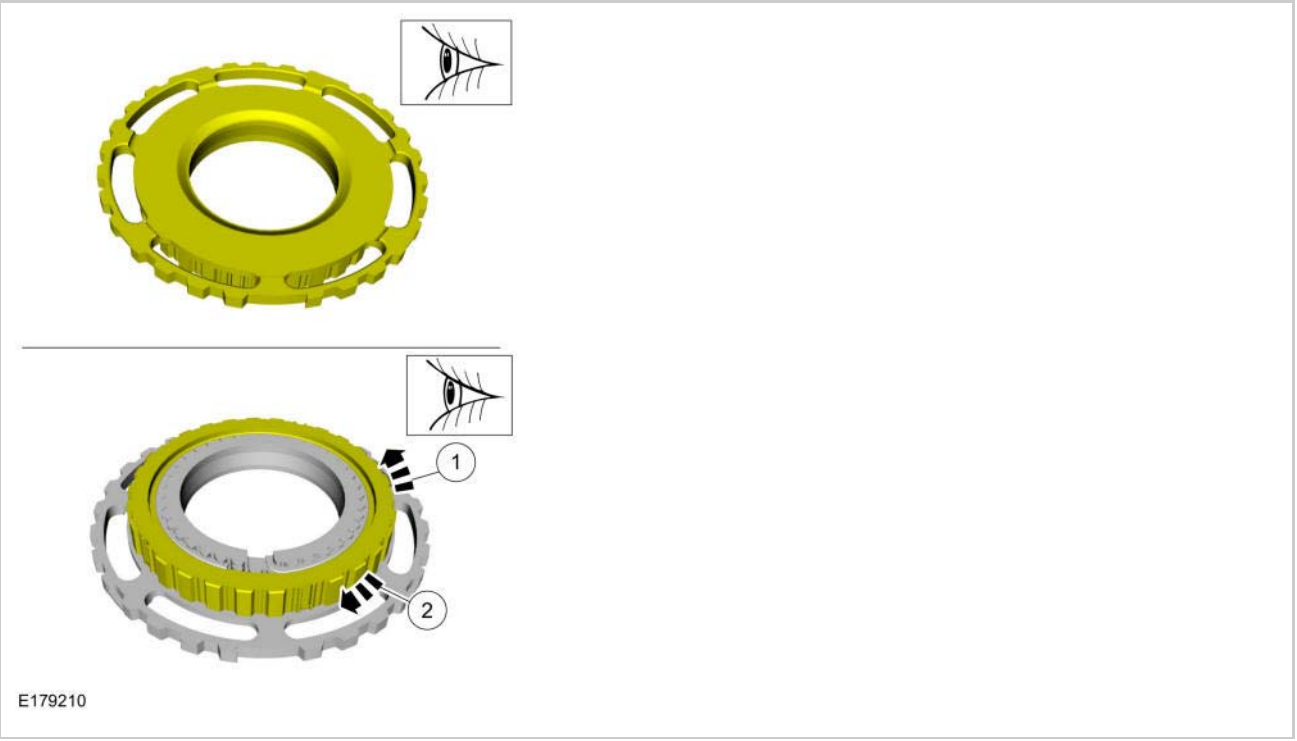
Low One Way Clutch

For low one way clutch operation, REFER to: Low One-Way Clutch Assembly .

NOTE: Do not clean with water or with water-based solvents. Damage to the component may occur.

NOTE: The low one way clutch cannot be disassembled.

Clean and inspect the low one way clutch for cracks and damaged splines. The splined section should rotate in the direction of the number 1 arrow and lock when rotated in the direction of the number 2 arrow. Check for burned or excessively worn surfaces. If any damage is found or the clutch does not rotate or lock, install a new low one-way clutch.



DIAGNOSIS AND TESTING > OVERDRIVE CLUTCH ASSEMBLY

Overdrive Clutch

For overdrive clutch operation, REFER to: Overdrive Clutch Assembly .

Diagnostics in this article assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

Condition	Possible Sources	Action
Overdrive clutch does not apply	SSD is mechanically stuck OFF, SSE is mechanically stuck ON	INSTALL a new solenoid. REFER to: Shift Solenoids (SS) .
	Clutch E regulator valve is stuck OFF	DISASSEMBLE, CLEAN and INSPECT the overdrive clutch regulator valve. If bore or valve is damaged, INSTALL a new main control. REFER to: Main Control Valve Body . REFER to: Symbols Glossary .
	CLE, Drive, VFS4, SS1, CLECF, CLEC hydraulic circuits blocked/leaking	DISASSEMBLE and INSPECT the main control valve body and separator plate passages for debris/blockage. CLEAN as necessary. REFER to: Main Control Valve Body . REFER to: Symbols Glossary .

	Solenoid multiplex or drive enable valves stuck in applied position or springs broken	DISASSEMBLE, CLEAN and INSPECT the multiplex shift valve. If bore or valve is damaged, INSTALL a new main control valve body. REFER to: Main Control Valve Body . REFER to: Symbols Glossary .
	Ball valve 2 missing	INSPECT for presence of Ball valve 2, REFER to: Main Control Valve Body . REFER to: Symbols Glossary .
	Input shaft, input shaft Teflon™ seals, or intermediate shaft, Overdrive clutch piston seal leakage	REFER to: Transmission . REFER to: Symbols Glossary .
	Overdrive clutch friction plates	DISASSEMBLE and INSPECT the overdrive clutch friction and steel plates. INSTALL new components as necessary. REFER to: Overdrive Clutch Assembly .
Overdrive clutch always applied	SSD is mechanically stuck OFF, SSE is mechanically stuck ON	INSTALL a new solenoid. REFER to: Shift Solenoids (SS) .
	Clutch E regulator valve is stuck OFF	DISASSEMBLE, CLEAN and INSPECT the overdrive clutch regulator valve. If bore or valve is damaged, INSTALL a new main control. REFER to: Main Control Valve Body . REFER to: Symbols Glossary .
	CLE, Drive, VFS4, SS1, CLECF, CLEC hydraulic circuits blocked/leaking	DISASSEMBLE and INSPECT the main control valve body and separator plate passages for debris/blockage. CLEAN as necessary. REFER to: Main Control Valve Body . REFER to: Symbols Glossary .
	Solenoid multiplex or drive enable valves stuck in applied position or springs broken	DISASSEMBLE, CLEAN and INSPECT the multiplex shift valve. If bore or valve is damaged, INSTALL a new main control valve body. REFER to: Main Control Valve Body . REFER to: Symbols Glossary .
	Ball valve 2 missing	REFER to: Main Control Valve Body . REFER to: Main Control Valve Body .

-	Input shaft, input shaft Teflon™ seals, or intermediate shaft, Overdrive clutch piston seal leakage	REFER to: Transmission . REFER to: Symbols Glossary .
-	Overdrive clutch friction plates	DISASSEMBLE and INSPECT the overdrive clutch friction and steel plates. INSTALL new components as necessary. REFER to: Transmission . REFER to: Symbols Glossary .
Overdrive clutch delayed/soft /slipping apply	SSD is mechanically stuck OFF, SSE is mechanically stuck ON	INSTALL a new solenoid. REFER to: Shift Solenoids (SS) .
	Clutch E regulator valve is stuck OFF	DISASSEMBLE, CLEAN and INSPECT the overdrive clutch regulator valve. If bore or valve is damaged, INSTALL a new main control. REFER to: Main Control Valve Body . REFER to: Symbols Glossary .
	CLE, Drive, VFS4, SS1, CLECF, CLEC hydraulic circuits blocked/leaking	DISASSEMBLE and INSPECT the main control valve body and separator plate passages for debris/blockage. CLEAN as necessary. REFER to: Main Control Valve Body . REFER to: Symbols Glossary .
	Solenoid multiplex or drive enable valves stuck in applied position or springs broken	DISASSEMBLE, CLEAN and INSPECT the multiplex shift valve. If bore or valve is damaged, INSTALL a new main control valve body. REFER to: Main Control Valve Body . REFER to: Symbols Glossary .
	Ball valve 2 missing	INSPECT for missing ball valve, REFER to: Main Control Valve Body . REFER to: Symbols Glossary .
	Input shaft, input shaft Teflon™ seals, or intermediate shaft, Overdrive clutch piston seal leakage	INSPECT for damaged Teflon™ seal, REFER to: Transmission . REFER to: Symbols Glossary .
	Overdrive clutch friction plates	DISASSEMBLE and INSPECT the overdrive clutch friction and steel plates. INSTALL new components as necessary. REFER to: Transmission . REFER to: Symbols Glossary .

Overdrive clutch harsh apply	SSD is mechanically stuck OFF, SSE is mechanically stuck ON	INSTALL a new solenoid. REFER to: Shift Solenoids (SS) .
	Clutch E regulator valve is stuck OFF	DISASSEMBLE, CLEAN and INSPECT the overdrive clutch regulator valve. If bore or valve is damaged, INSTALL a new main control. REFER to: Main Control Valve Body . REFER to: Symbols Glossary .
	CLE, Drive, VFS4, SS1, CLECF, CLEC hydraulic circuits blocked/leaking	DISASSEMBLE and INSPECT the main control valve body and separator plate passages for debris/blockage. CLEAN as necessary. REFER to: Main Control Valve Body . REFER to: Symbols Glossary .
	Solenoid multiplex or drive enable valves stuck in applied position or springs broken	DISASSEMBLE, CLEAN and INSPECT the multiplex shift valve. If bore or valve is damaged, INSTALL a new main control valve body. REFER to: Main Control Valve Body . REFER to: Symbols Glossary .
	Ball valve 2 missing	INSPECT for missing ball valve, REFER to: Main Control Valve Body . REFER to: Symbols Glossary .
	Input shaft, input shaft Teflon™ seals, or intermediate shaft, Overdrive clutch piston seal leakage	INSPECT for damaged Teflon™ seal, REFER to: Transmission . REFER to: Symbols Glossary .
-	Overdrive clutch friction plates	DISASSEMBLE and INSPECT the overdrive clutch friction and steel plates. INSTALL new components as necessary. REFER to: Transmission . REFER to: Symbols Glossary .

DIAGNOSIS AND TESTING > PARAMETER IDENTIFICATION (PID) CHART

2.3L, 3.7L and 5.0L Diagnostic PID Chart

PID Acronym	PID Name	Description
APP1	APP sensor 1	APP

AST	Time Since Start	Time (in seconds) since the vehicle was started
CLRDIST	Distance since DTC cleared	Distance driven since PCM Diagnostic Trouble Codes (DTCs) were cleared
DTC PCM	Continuous Codes	Number of PCM Diagnostic Trouble Codes (DTCs) present
ECT PCM	ECTPCM	Engine coolant temperature data provided to the PCM
ENGLOAD	Engine Load	Engine load calculated by PCM
GEAR	Gear Commanded by Module	PCM commanded transmission gear
GEAR_OSC	Gear Commanded by Output State Control	Output state control commanded gear
GEAR_RAT	Gear Ratio Commanded	Theoretical transmission gear ratio commanded
HRSH_SHFT	Firm Shift	Output state control commanded firm shift
LINEDSD	Line Pressure Control Desired	Commanded line pressure
LPC	Line Pressure Control	Commanded pressure for the Line Pressure Control (LPC) Variable Force Solenoid (VFS)
LPC_AMP	Line Pressure Control in Amps	Commanded current for the Line Pressure Control (LPC) Variable Force Solenoid (VFS)
LPC_F	Line Pressure Control Status	Fault status for the Line Pressure Control (LPC) Variable Force Solenoid (VFS)
MIL_DIS	The distance travelled since the (MIL) was activated	The distance travelled since the MIL was activated
OSS_F	Output Shaft Speed Reliable	Fault status for the OSS sensor
OSS_SRC	Unfiltered Output Shaft Speed A	Actual speed of the OSS sensor (RPM)
RPM_PCM	Engine Revolutions Per Minute	Engine RPM input to PCM
SHFT_DROP	Shift RPM Drop in Input Shaft Speed Below Expected	Shift RPM drop in input shaft speed below expected
SHFT_FLRE	Shift RPM Rise in Input Shaft Speed Above Expected	Shift RPM rise in input shaft speed above expected
SHFT_ID	Shift Identification of Shift (PID)s Lag, Time, Flare and Drop	Shift identification of shift Parameter Identifications (PIDs) lag, time, flare and drop

SHFT_LAG	Shift Time Elapsed From 10% to 90% of Complete	Actual time during shift between 10% and 90% complete
SHFT_TIME	Shift Time Elapsed From Commanded to 10% Complete	Shift time 0% to 10% complete
SHFT_TYP	Shift Type	Shift Type
SSPCA	Shift Solenoid Pressure Control A	Commanded pressure for the Shift Solenoid Pressure Control A (SSPCA)/CB1234
SSA_AMP	Shift Solenoid Pressure Control A	Commanded current for the Shift Solenoid Pressure Control A (SSPCA)/CB1234
SSPCA_F	(SSPCA) Status	Fault status for the Shift Solenoid Pressure Control A (SSPCA)/CB1234
SSPCB	Shift Solenoid Pressure Control B	Commanded pressure for the Shift Solenoid Pressure Control B (SSPCB)/C35R
SSB_AMP	Shift Solenoid Pressure Control B	Commanded current for the Shift Solenoid Pressure Control B (SSPCB)/C35R
SSPCB_F	(SSPCB) Status	Fault status for the Shift Solenoid Pressure Control B (SSPCB)/C35R
SSPCC	Shift Solenoid Pressure Control C	Commanded pressure for the Shift Solenoid Pressure Control C (SSPCC)/CB26
SSC_AMP	Shift Solenoid Pressure Control C	Commanded current for the Shift Solenoid Pressure Control C (SSPCC)/CB26
SSPCC_F	(SSPCC) Status	Fault status for the Shift Solenoid Pressure Control C (SSPCC)/CB26
SSPCD	Shift Solenoid Pressure Control D	Commanded pressure for the Shift Solenoid Pressure Control D (SSPCD)/CBLR, C456
SSD_AMP	Shift Solenoid Pressure Control D	Commanded current for the Shift Solenoid Pressure Control D (SSPCD)/CBLR, C456
SSPCD_F	(SSPCD) Status	Fault status for the Shift Solenoid Pressure Control D (SSPCD)/CBLR, C456
SSPCE	Shift Solenoid Pressure Control E	Commanded pressure for the Shift Solenoid Pressure Control E (SSPCE)/CBLR, C456

SSE_AMP	Shift Solenoid Pressure Control E	Commanded current for the Shift Solenoid Pressure Control E (SSPCE)/CBLR, C456
SSPCE_F	(SSPCE) Status	Fault status for the Shift Solenoid Pressure Control E (SSPCE)/CBLR, C456
SST_D	SelectShift™ Transmission - Down Switch Input	SelectShift™ transmission-down switch input
SST_U	SelectShift™ Transmission - Up Switch Input	SelectShift™ transmission-up switch input
TCC AMP	Converter Pressure Control	Commanded current for the TCC
TC_SLIPACT	Torque Converter Slip Actual	Actual difference between engine speed and turbine speed, measured in RPM
TC_SLIPDSD	Torque Converter Slip Desired	PCM commanded difference between engine speed and turbine speed, measured in RPM
TCC	Torque Converter Clutch Solenoid	Commanded pressure for the TCC
TCC_F	Torque Converter Clutch Pressure Control Fault	Fault status for the TCC
TCC_OSC	Output State Control of Torque Converter	Output state control commanded pressure to the TCC
TCC_RAT	Torque Slip Ratio	Actual speed ratio of torque converter (1.0 = fully engaged)
TCS_DEPRES	Transmission Control Switch Pressed	TCS status
TCS_STATE	Transmission Control Switch Requested State	TCS status
TFT	Transmission Fluid Temperature	TFT
TFT_F	Transmission Fluid Temperature Status	Fault status for TFT sensor
TFTV	Transmission Fluid Temperature	TFT voltage
TR	Transmission Range	TR
TR_CRANK	Transmission Range Input Allowing Engine Start	TR
TR_F	Transmission Range Status	Fault status for TR sensor
TRAN_RAT	Gear Ratio Measured	Actual transmission gear ratio

TRANS_VOLT_A	Transmission Supply Voltage Control State	Transmission supply voltage
TRO_N_F	Neutral Output Status	Transmission neutral output status
TRO_P_F	Park Output Status	Transmission park output status
TSS_F	Turbine Shaft Speed Reliable	Fault status of the TSS sensor (RPM)
TSS_SRC	Unfiltered Turbine Shaft Speed	Actual speed of the TSS sensor (RPM)
VPWR_PCM	Module supply voltage	PCM supply voltage
VSS	Vehicle Speed	Vehicle Speed

DIAGNOSIS AND TESTING > PRELIMINARY INSPECTION > OVERVIEW

The preliminary inspection is part of Automatic Transmission Diagnosis. The preliminary inspection is used to find obvious causes for transmission concern.

DIAGNOSIS AND TESTING > PRELIMINARY INSPECTION > UNDERHOOD INSPECTION

To correctly diagnose a concern, first understand the customer concern or condition. Customer contact may be required to understand the conditions, including when the concern occurs. For example:

1.

Look for missing or damaged air induction components.

2.

Inspect the wire harness for proper routing, especially near the rear of the cylinder heads. Make sure the harness is not chafed or pinched.

3.

Inspect transmission fluid cooler for proper mounting and check for any missing air deflectors.

DIAGNOSIS AND TESTING > PRELIMINARY INSPECTION > UNDER VEHICLE INSPECTION

1.

Place the selector lever in D.

2.

With the vehicle in NEUTRAL, position it on a hoist. REFER to: Jacking and Lifting - Overview .

3.

Inspect transmission case for evidence of leaks.

4.

Inspect transmission fluid cooler lines for proper routing, pinches, or kinks.

5.

Inspect transmission fluid cooler mounting and check for any missing air deflectors.

6.

Adjust the selector lever cable. REFER to: Selector Lever Cable Adjustment .

DIAGNOSIS AND TESTING > PRELIMINARY INSPECTION > TRANSMISSION FLUID INSPECTION

Transmission fluid condition can provide many clues to the nature of the transmission concern. Proper transmission fluid level can only be determined with the transmission fluid at a specified temperature range. It is not necessary to verify exact transmission fluid level at this time. If the transmission fluid is below operating temperature, it is expected to be low on the transmission fluid level indicator. Transmission fluid temperatures below 30.2 °F (-1 °C) may not show up on a transmission fluid level indicator.

1.

With the vehicle in NEUTRAL, position it on a hoist. REFER to: Jacking and Lifting - Overview . Remove the transmission fluid fill plug and transmission fluid level indicator.

2.

Allow the transmission fluid to drip onto a facial tissue or white sheet of paper.

3.

Examine the stain.

4.

Small black particles are typically burnt friction material.

5.

Small shiny metallic particles indicate excessive hard part wear.

6.

Foamy pink color indicates either water or engine coolant in the transmission.

DIAGNOSIS AND TESTING > PRELIMINARY INSPECTION > WATER IN TRANSMISSION FLUID

To correctly repair an automatic transmission that has had water or coolant introduced into the system, completely disassemble, clean, and replace the following parts:

- All internal and external seals
- All friction material
- Torque converter
- All parts with bonded seals
- All solenoids
- All transmission fluid filters

Prior to installing the transmission, flush and clean the transmission fluid cooler(s) and the transmission fluid cooler tubes and hoses.

DIAGNOSIS AND TESTING > ROAD TESTING VEHICLE > SHIFT POINT ROAD TEST

> *NOTE: Always drive the vehicle in a safe manner according to driving conditions and obey all traffic laws.*

Most performance based automatic transmission DTCs require the fault to be detected multiple times before setting a DTC. In many instances the faults musts be detected consecutively a predetermined number of times (up to five). Performing the shift point road test as detailed below increases the likelihood that a DTC sets if a fault is present in the system.

1. Bring engine and transmission up to normal operating temperature.
2. Operate the vehicle with the selector lever in the D position.
3. Apply minimum throttle and observe speeds when an upshift occurs. Refer to the Shift Speeds chart.
4. With the selector lever in the D position and speed above 80 km/h (50 mph) and less than half throttle, move the selector lever from the D position to manual 2 position and release the accelerator pedal. The transmission should downshift into 2nd gear. With the transmission

remaining in the manual 2 position, move the selector lever into the manual 1 position and release the accelerator pedal. The transmission should downshift into 1st gear at speeds below approximately 45-56 km/h (28-35 mph).

5.

If the transmission fails to upshift/downshift, REFER to: Diagnosis By Symptom .

Shift Speed

Throttle Position	Shift	Km/h	MPH
Light Throttle	1-2	13-21	8-13
Throttle Position (TP) Sensor	2-3	26-34	16-21
Voltage @ 1.25 Volts	3-4	35-43	22-27
4-5		56-64	35-40
5-6		71-79	44-49
Closed Throttle	6-5	56-64	35-40
5-4		40-48	25-30
4-3		13-21	8-13
3-2		3-11	2-7
2-1		2-6	1-4
Wide Open Throttle (WOT)	1-2	45-53	28-33
2-3		87-95	54-59
3-4		140-148	87-92

DIAGNOSIS AND TESTING > SPECIAL TESTING PROCEDURES > FRONT PUMP OUTPUT TEST

The special tests are designed to aid the technician in diagnosing the hydraulic and mechanical portions of the transmission. The front pump output test can also be used to detect a stuck or inoperative main control torque converter regulator valve. The datalogger is used to measure the amount of time it takes the vehicle to reach approximately 5 Km/h (3 MPH) at engine idle speed without pressing the accelerator pedal, verifying transmission pump operation.

1.

Verify transmission fluid temperature is at 77 °C (170 °F) or above.

2.

Park the vehicle for a minimum of 6 hours or overnight on a level spot where it can be driven

forward uninhibited for up to 5 Km/h (3 MPH).

3.

Using a diagnostic scan tool, with Ignition On and Engine Off, select the following PIDs:

VSS Vehicle speed

TRS Transmission Range selector

BOO1 Brake On

APP% Accelerator Pedal Position

Gear_Mode Transmission gear

TFT Transmission Fluid Temperature

TSS_SRC Turbine Speed Sensor

RPM Engine Revolutions

Gear_Rat Transmission Gear ratio

NOTE: Read and review the following steps before performing them as they need to happen consecutively.

4.
Make sure the parking brake is released prior to the next step.

NOTE: Do not apply the accelerator pedal for this test.

5.
Press the record function and perform the following steps.

Press the brake pedal.

Start the engine.

Immediately place the transmission selector lever in the D position.

Immediately release the brake pedal and allow the vehicle to move at idle speed only. Do not accelerate.

6.

After recording for 15 seconds, stop the vehicle.

7.

Using the scroll feature, slide the time bar to the point when the brake was released as indicated by PID BOO1, and note the time at the bottom.

8.

Move the slide until the VSS shows 5 Km/h (3 MPH), or the maximum speed attained.

9.

Did the vehicle reach 5 Km/h (3 MPH) within 5 seconds?

Yes - vehicle is operating normally. This procedure does not apply.

No - replace the transmission pump assembly. REFER to: Transmission .

DIAGNOSIS AND TESTING > SPECIAL TESTING PROCEDURES > FRONT PUMP OUTPUT TEST- TORQUE CONVERTER PRESSURE REGULATOR VALVE

1.

Using a diagnostic scan tool, perform a self-test and check for DTCs.

2.

RECORD the RPM and TSS data while raising the engine RPM.

3.

If the TSS stays at 0 RPM the torque converter is malfunctioning.

4.

INSPECT the main control torque converter regulator valve.

DIAGNOSIS AND TESTING > TORQUE CONVERTER CLUTCH (TCC)

For torque converter operation, REFER to: Torque Converter .

Condition	Possible Sources	Action
TCC does not apply	TCC solenoid mechanically stuck OFF	INSTALL a new TCC solenoid. REFER to: Shift Solenoids (SS) .
	Bypass Clutch Control Regulator Valve stuck OFF	DISASSEMBLE, CLEAN and INSPECT the regulator valve. If bore or valve is damaged, INSTALL a new main control valve body. REFER to: Main Control Valve Body .
	Converter Release Regulator Valve stuck OFF	DISASSEMBLE, CLEAN and INSPECT the regulator valve. If bore or valve is damaged, INSTALL a new main control valve body.

		REFER to: Main Control Valve Body .
	CAPLY, CREL, CAPLY F, VFS6 hydraulic circuit blocked or leaking	DISASSEMBLE, CLEAN and INSPECT the valves. If bore or valve is damaged, INSTALL a new main control. REFER to: Main Control Valve Body .
	TCC friction material worn or damaged	INSTALL a new TCC. REFER to: Transmission - 2.3L EcoBoost (231kW/314PS) . REFER to: Transmission - 3.7L Duratec (227kW/301PS) . REFER to: Transmission - 5.0L 32V Ti-VCT .
TCC always applied/stalls vehicle	TCC solenoid mechanically stuck ON	INSTALL a new TCC solenoid. REFER to: Shift Solenoids (SS) .
	Bypass Clutch Control Regulator Valve stuck ON	DISASSEMBLE, CLEAN and INSPECT the regulator valve. If bore or valve is damaged, INSTALL a new main control valve body. REFER to: Main Control Valve Body .
	Converter Release Regulator Valve stuck OFF	DISASSEMBLE, CLEAN and INSPECT the regulator valve. If bore or valve is damaged, INSTALL a new main control valve body. REFER to: Main Control Valve Body .
	CAPLY, CREL, CAPLY F, VFS6 hydraulic circuit blocked or leaking	DISASSEMBLE, CLEAN and INSPECT the valves. If bore or valve is damaged, INSTALL a new main control. REFER to: Main Control Valve Body .
	TCC friction material worn or damaged	INSTALL a new TCC. REFER to: Transmission - 2.3L EcoBoost (231kW/314PS) . REFER to: Transmission - 3.7L Duratec (227kW/301PS) . REFER to: Transmission - 5.0L 32V Ti-VCT .
TCC cycles, shudders or chatters	Incorrect Transmission Strategy programmed into PCM.	PERFORM the Transmission Strategy Download, REFER to: Transmission Strategy Download .
	TCC solenoid mechanically sticking	INSTALL a new solenoid. REFER to: Shift Solenoids (SS) . PERFORM the Transmission Strategy Download, REFER to: Transmission Strategy Download .

	Bypass Clutch Control Regulator Valve stuck ON	DISASSEMBLE, CLEAN and INSPECT the regulator valve. If bore or valve is damaged, INSTALL a new main control valve body. REFER to: Main Control Valve Body .
	Converter Release Regulator Valve stuck OFF	DISASSEMBLE, CLEAN and INSPECT the regulator valve. If bore or valve is damaged, INSTALL a new main control valve body. REFER to: Main Control Valve Body .
	CAPLY, CREL, CAPLY F, VFS6 hydraulic circuit blocked or leaking	DISASSEMBLE, CLEAN and INSPECT the valves. If bore or valve is damaged, INSTALL a new main control. REFER to: Main Control Valve Body .
	TCC friction material worn or damaged	INSTALL a new TCC. REFER to: Transmission - 2.3L EcoBoost (231kW/314PS) . REFER to: Transmission - 3.7L Duratec (227kW/301PS) . REFER to: Transmission - 5.0L 32V Ti-VCT .

GENERAL PROCEDURES > ADAPTIVE LEARNING DRIVE CYCLE

Configuration

NOTE: Always drive the vehicle in a safe manner according to driving conditions and obey all traffic laws.

NOTE: The Transmission Drive Cycle Test must be followed exactly. Malfunctions must occur 4 times consecutively for shift error DTC to set, and 5 times consecutively for continuous TCC DTC to set.

NOTE: Use the Transmission Drive Cycle Test for checking codes after performing a self-test.

1.

Record then clear the DTCs (Diagnostic Trouble Codes).

2.

Warm the engine to normal operating temperature.

3.

Make sure the transmission fluid level is correct.

4.

With the selector lever in (D), moderately accelerate from stop to 80 km/h (50 mph) allowing the transmission to shift into 6th gear. Keep vehicle speed and throttle steady for a minimum of 15 seconds.

5.

With the transmission in 6th gear and maintaining steady speed and throttle, lightly apply and release the brake to operate stoplamps. Maintain the speed and throttle for a minimum of 5 seconds.

6.

Brake to a stop and remain stopped for a minimum of 20 seconds.

7.

Repeat Steps 4 through 6 five times.

8.

Perform a self-test and record DTCs.

If DTCs are present, repair all non-transmission DTCs first as they can directly affect the transmission operation. Repeat the self-test and road test the vehicle to verify the repair. Clear the DTCs. Perform the drive cycle test and repeat the self-test after completing the repair. Refer to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 2.3L EcoBoost (201kW/273PS) . Refer to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) . Refer to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 5.0L 32V Ti-VCT .

If the tests pass and a concern is still present, refer to Diagnosis By Symptom, OASIS messages and TSB regarding concern. Refer to: Diagnosis By Symptom .

NOTE: The vehicle wiring harness, PCM and non-transmission sensors may affect transmission operations. Repair these concerns first.

9.

Repair all DTCs after the OBD test procedures are completed. Begin with non-transmission related DTCs, then repair any transmission related DTCs. Use the DTC Chart for information on condition and symptoms. The pinpoint tests are used in diagnosing transmission electrical concerns. Make sure the vehicle wiring harness and the PCM are diagnosed as well. The Engine Controls article aids in diagnosing non-transmission electronic components. Refer to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 2.3L EcoBoost (201kW/273PS) . Refer to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) . Refer

to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 5.0L 32V Ti-VCT .

GENERAL PROCEDURES > TRANSMISSION AND TORQUE CONVERTER FLUID DRAIN AND REFILL

Special Tool(s) / General Equipment

Fluid Exchanger

Materials

Name	Specification
Motorcraft ® MERCON ® LV Automatic Transmission Fluid (U.S.) XT-10-QLVC (U.S.)	MERCON ® LVWSS-M2C938-A

Flushing

NOTE: Use transmission fluid specific for this transmission. Do not use any supplemental transmission fluid additives or cleaning agents. The use of these products can cause internal transmission components to fail, which will affect the operation of the transmission.

1.

With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

2.

Connect the Fluid Exchanger to the transmission fluid cooler tube after the transmission fluid cooler on the return tube. This helps remove any foreign material trapped in the transmission fluid coolers. Use the General Equipment: Fluid Exchanger

3.

Perform the transmission fluid exchange using the Fluid Exchanger.

Follow the manufacturer's instructions included with the machine. Use the General Equipment: Fluid Exchanger

Material

: Motorcraft ® MERCON ® LV Automatic Transmission Fluid (U.S.) / XT-10-QLVC (U.S.) (MERCON ® LV) (WSS-M2C938-A)

4.

Once the transmission fluid exchange is completed, disconnect the Fluid Exchanger. Reconnect any disconnected transmission fluid cooler tubes. Use the General Equipment: Fluid Exchanger

5.

Check the transmission fluid level. Refer to: Transmission Fluid Level Check .

GENERAL PROCEDURES > TRANSMISSION FLUID DRAIN AND REFILL

Special Tool(s) / General Equipment

	307-570 Tube, Transmission Fill TKIT-2006U-F/FM TKIT-2006U-FLM/LM TKIT-2006U-ROW1 TKIT-2006U-ROW2
	307-D465 Transporter Fluid Evacuator/Injector
 416-D002	416-D002 Vacuum Pump Kit

Materials

Name	Specification
Motorcraft ® MERCON ® LV Automatic Transmission Fluid (U.S.) XT-10-QLVC (U.S.)	MERCON ® LVWSS-M2C938-A

Draining

NOTE: The transmission fluid pan must be removed to drain the transmission fluid. Follow the steps in the Transmission Fluid Pan, Gasket and Filter procedure to remove and install the transmission fluid pan. It is not necessary to remove the transmission fluid filter to drain the transmission fluid.

1.
Remove the transmission fluid pan to drain the transmission fluid. Refer to: Transmission Fluid Pan, Gasket and Filter .

Filling

NOTE: This procedure contains the air purge steps required to purge air from the transmission fluid cooling system. This procedure is NOT intended for use with the Transmission Fluid Level Check.

NOTE: The vehicle should not be driven if the transmission fluid level is low or internal failure could result.

NOTE: The use of any other transmission fluid than specified can result in the transmission failing to operate in a normal manner or transmission failure.

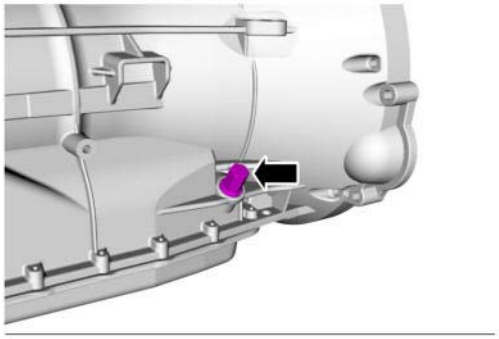
NOTE: Check the transmission fluid level if the transmission starts to slip, shifts slowly or shows signs of transmission fluid leaking.

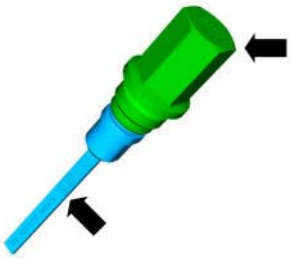
NOTE: Here is an overview of the Transmission Fluid Refill procedure.

- Adding 3.3L (3.5 qt) of transmission fluid is an initial fill enabling the engine to be started.
- Filling the transmission to the transmission fluid level indicator area below the crosshatch mark allows the vehicle to be driven.
- The vehicle should be driven to allow the transmission fluid temperature to reach 96.7 °C - 102 °C (206 °F - 215 °F) in order to purge the air from the transmission fluid cooling system.
- Fill the transmission fluid to the fill range on the transmission fluid level indicator at the normal operating range 96.7 °C - 102 °C (206 °F - 215 °F).

1.

Remove the transmission fluid fill plug and remove the transmission fluid level indicator from the plug.





E181797

NOTE: The transmission will need 11.35L (12 qt) of transmission fluid added to the transmission as an initial fill if the transmission has been overhauled.

NOTE: The transmission will need 3.3L (3.5 qt) of transmission fluid added to the transmission as an initial fill if:

2.

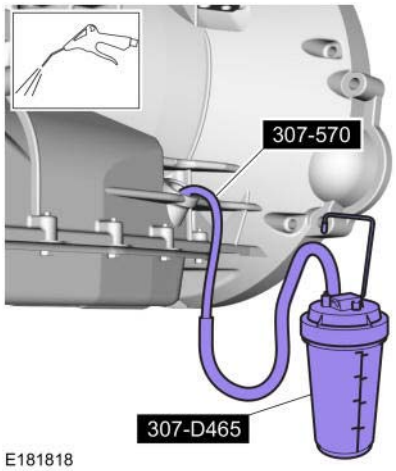
a new main control has been installed.

the transmission fluid pan or transmission fluid filter have been removed.

Using the special tools, add transmission fluid to the transmission through the transmission fluid fill hole. Use Special Service Tool: 307-570 Tube, Transmission Fill., 307-D465 Transporter Fluid Evacuator/Injector.

Material

: Motorcraft ® MERCON ® LV Automatic Transmission Fluid (U.S.) / XT-10-QLVC (U.S.) (MERCON ® LV) (WSS-M2C938-A)



3.

1.

Connect the diagnostic scan tool and monitor the transmission fluid temperature.

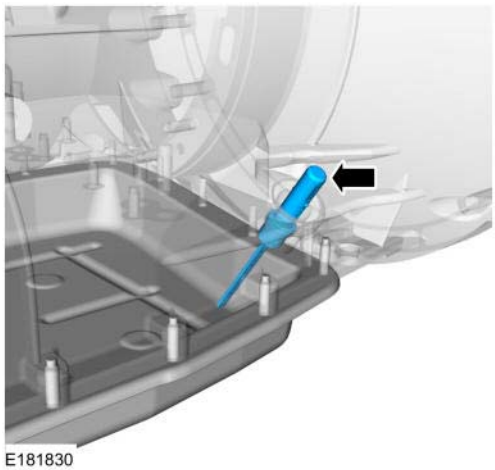
2.

Start the engine.

3.

Place the selector lever in each gear position, holding approximately 5 seconds in each position. Place the selector lever in PARK, with the engine at idle (600-750 RPM).

Check the transmission fluid level using the transmission fluid level indicator.



NOTE: The vehicle is safe to drive with a cold transmission fluid temperature if the transmission fluid level is in the transmission fluid level indicator area below the crosshatch mark as shown. Failure to add transmission fluid to this level can result in damage to the transmission.

4.
Add transmission fluid to the area on the transmission fluid level indicator below the crosshatch mark.



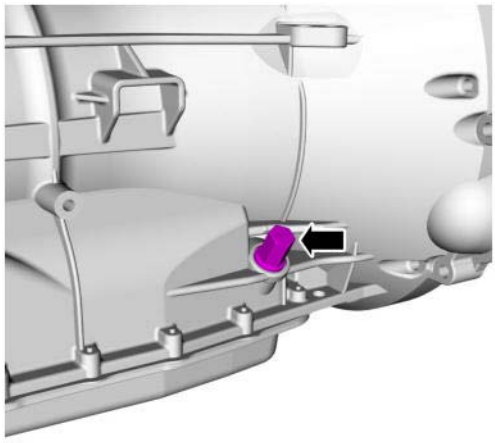
E181869

5.

Install the transmission fluid fill plug.

Torque

: 26 lb.ft (35 Nm)



E181871

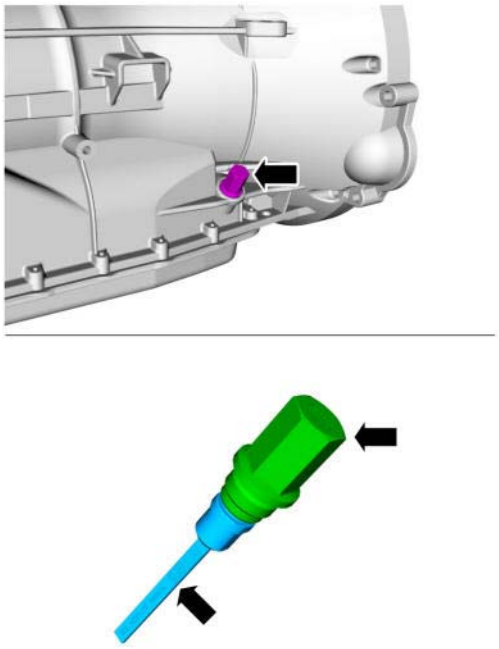
NOTE: Always drive the vehicle in a safe manner according to driving conditions and obey all traffic laws.

6.
Drive the vehicle. While driving the vehicle, use the scan tool to verify the transmission fluid has reached a temperature of 96.7 °C - 102 °C (206 °F - 215 °F). This circulates the transmission fluid through the torque converter and the transmission fluid cooling system, eliminating any trapped air in the transmission fluid cooling system. With the engine idling (600-750 RPM) in PARK, verify the transmission fluid temperature is between 96.7 °C - 102 °C (206 °F - 215 °F) and lift the vehicle on a hoist. Refer to: Jacking and Lifting - Overview .

7.

Remove the transmission fluid fill plug and remove the transmission fluid level indicator from the

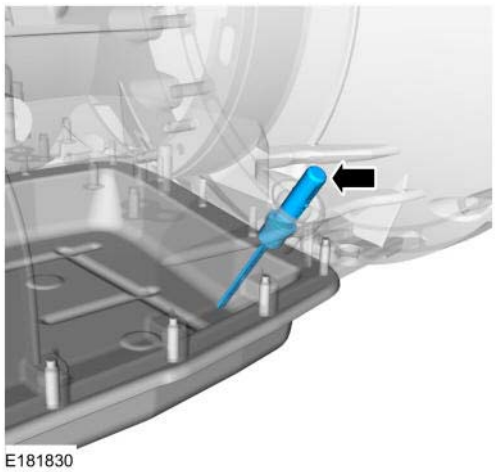
plug.



E181797

8.

Check the transmission fluid level using the transmission fluid level indicator.



E181830

NOTE: The transmission fluid level indicator has 2 areas for the fluid level, a crosshatched (A) area and a dotted (B) area. Use the dotted (B) area when checking the transmission fluid level. The correct transmission fluid level is at the upper level of the dotted (B) area marks on the transmission fluid level indicator.

9.
Using the scan tool verify the transmission fluid temperature is between 96.7 °C - 102 °C (206 °F - 215 °F). The transmission fluid level must be at the upper level of the dotted (B) area.



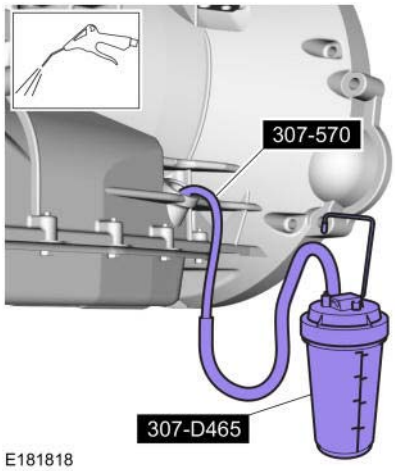
E193861

10.

If the transmission fluid level is low, add transmission fluid using the special tools.Use Special Service Tool: 307-570 Tube, Transmission Fill., 307-D465 Transporter Fluid Evacuator/Injector.

Material

: Motorcraft ® MERCON ® LV Automatic Transmission Fluid (U.S.) / XT-10-QLVC (U.S.) (MERCON ® LV) (WSS-M2C938-A)



E181818

11.

If the transmission fluid is overfilled, remove transmission fluid using the special tools. Use Special Service Tool: 307-570 Tube, Transmission Fill., 307-D465 Transporter Fluid Evacuator/Injector., 416-D002 Vacuum Pump Kit.

Material

: Motorcraft ® MERCON ® LV Automatic Transmission Fluid (U.S.) / XT-10-QLVC (U.S.) (MERCON ® LV) (WSS-M2C938-A)



12.

Install the transmission fluid fill plug.

Torque

: 26 lb.ft (35 Nm)



GENERAL PROCEDURES > TRANSMISSION FLUID LEVEL CHECK

Inspection

NOTE: The vehicle should not be driven if the transmission fluid level is low. Internal failure could result.

NOTE: If the vehicle has been operated for an extended period at high highway speeds, in city traffic, during hot weather or while pulling a trailer, the transmission fluid must cool down to obtain an accurate reading.

NOTE: Do not overfill the transmission. The transmission fluid level must be at the upper level of the dotted (B) area marks on the transmission fluid level indicator.

NOTE: If a new transmission fluid cooler or new fluid cooler tubes have been installed, drive the vehicle to warm the transmission fluid to 96.7 °C-102 °C (206 °F-215 °F) in order to purge the air from the transmission fluid cooling system.

1.

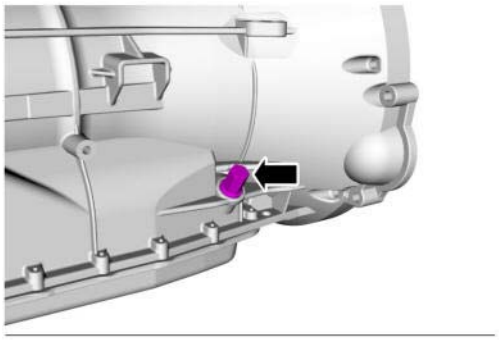
Connect the diagnostic scan tool and position the vehicle on a hoist. Refer to: Jacking and Lifting - Overview .

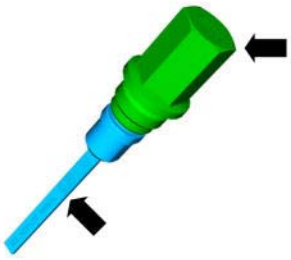
2.

With the engine running, place the transmission selector lever in each gear position, holding approximately 5 seconds in each position. Place the transmission selector lever in PARK.

3.

Remove the transmission fluid fill plug and remove the transmission fluid level indicator from the plug.

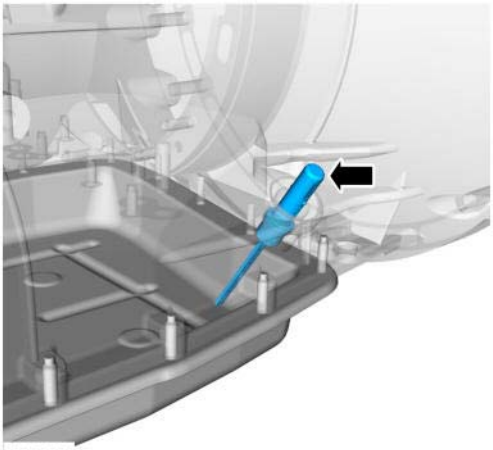




E181797

4.

Check the transmission fluid level using the transmission fluid level indicator.



E181830

NOTE: The transmission fluid level indicator has 2 areas for the fluid level, a crosshatched (A) area and a dotted (B) area. Use the dotted (B) area when checking the transmission fluid level. The correct transmission fluid level is at the upper level of the dotted (B) area marks on the transmission fluid level indicator.

5.
Using the scan tool verify the transmission fluid temperature is between 96.7 °C - 102 °C (206 °F - 215 °F). The transmission fluid level must be at the upper level of the dotted (B) area.



E193861

6.

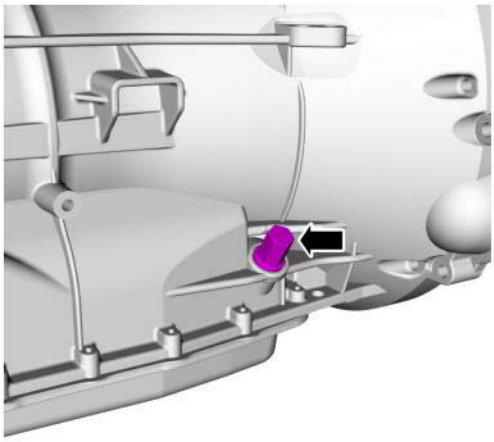
If the transmission fluid is not at the correct level, follow the steps for adding or removing transmission fluid. Refer to: Transmission Fluid Drain and Refill .

7.

Install the transmission fluid fill plug.

Torque

: 26 lb.ft (35 Nm)



E181871

GENERAL PROCEDURES > TRANSMISSION IDENTIFICATION

Check

1.

Using the scan tool, select Powertrain, Transmission and Transmission Characterization / Solenoid IDN from the toolbox icon and follow the instructions displayed on the scan tool. The Transmission Characterization / Solenoid IDN screen displays solenoid body identification information:

Solenoid body identification is a 12-digit number

Solenoid body strategy is a 13-digit number. If the solenoid body strategy field is blank, the module contains a partial transmission solenoid body strategy. This is due to a corrupt or missing file at the time the programmable parameters were completed.

NOTE: The 13-digit solenoid body strategy number consists of only numbers. Letters are not used.

2.
Compare the solenoid body identification and strategy to the solenoid body identification tag located on the left side of the transmission case.

- **Original Solenoid Body Service Tag**

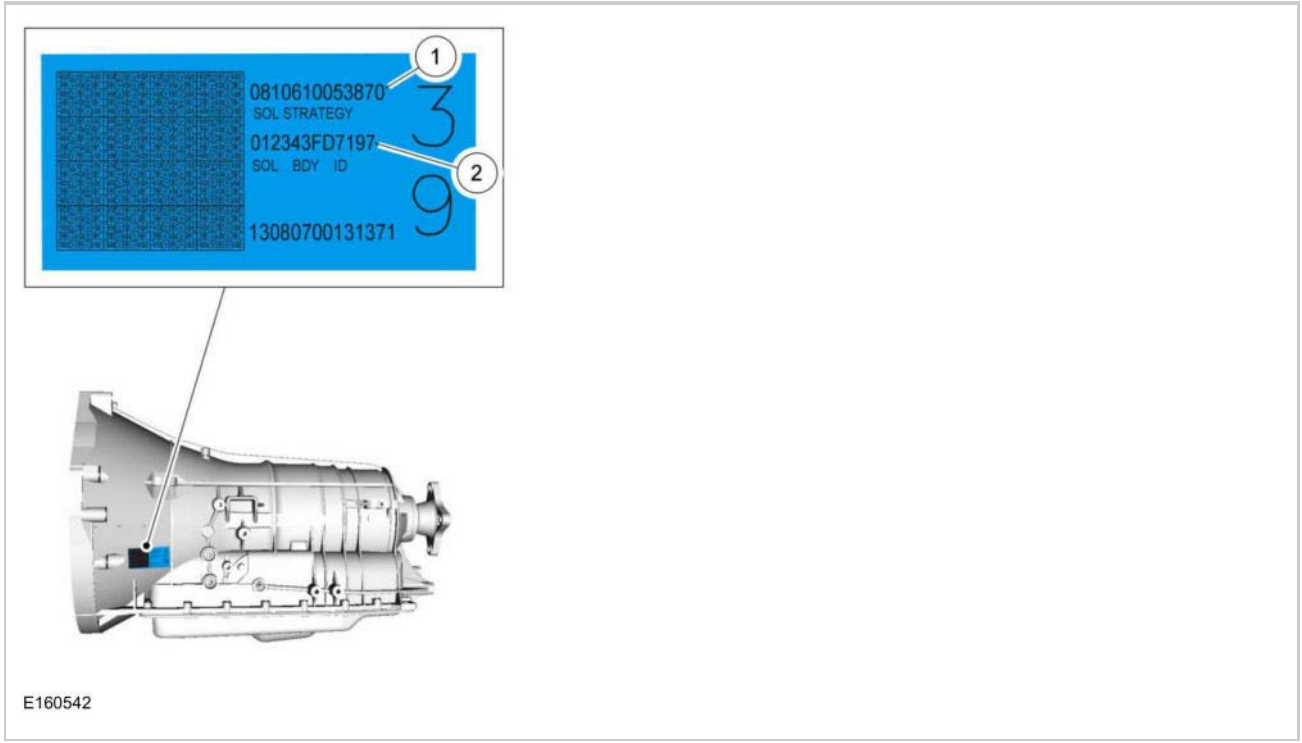
3.

1.

13 - digit solenoid body strategy

2.

12 - digit solenoid body identification



4.

If the solenoid body identification and strategy displayed on the scan tool match the solenoid body identification tag or replacement tag, then the solenoid body identification and strategy are correct for this transmission and a solenoid body strategy data download is not required. If the solenoid body identification tag or replacement tag is missing or damaged so it is not readable or does not match the identification or strategy displayed on the scan tool, remove the transmission fluid pan and filter and locate the 13-digit solenoid body strategy etched on the main control casting. Refer to: Transmission Fluid Pan, Gasket and Filter .

- **Replacement Solenoid Body Service Tag**

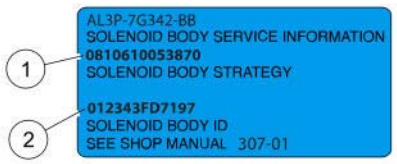
5.

1.

13 - digit solenoid body strategy

2.

12 - digit solenoid body identification



E181713

- **Main Control Solenoid Body Strategy**

> *NOTE: If the new main control was not supplied with a replacement solenoid strategy identification tag, DO NOT INSTALL the main control as all required programming information is missing.*

> *NOTE: The 13-digit solenoid body strategy number displayed on the scan tool must match the solenoid body strategy number etched on the main control. If the numbers do not match, damage to the transmission or driveability concerns can occur.*

6.
Compare the solenoid body strategy identification etched on the main control to the solenoid strategy identification tag on the transmission case. If the solenoid body strategy identification etched on the main control does not match the solenoid strategy identification tag then a solenoid body strategy data download is required. If the solenoid body strategy etched on the main control does match the solenoid strategy identification tag on the transmission case but does not match the solenoid body identification and strategy displayed on the scan tool, then a solenoid body strategy data download is also required.



E184453

GENERAL PROCEDURES > TRANSMISSION STRATEGY DOWNLOAD

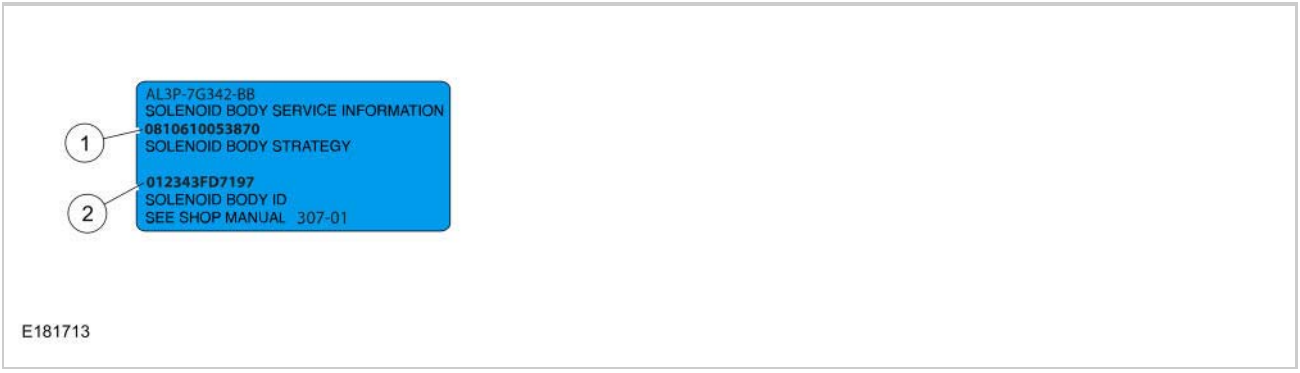
Programming

1.

If a new main control was installed, record the 12-digit solenoid body identification and 13-digit solenoid body strategy from the replacement solenoid body tag provided with the main control service kit. Place the replacement tag over the existing identification tag.

13 - digit solenoid body strategy

12 - digit solenoid body identification



2.

Using the scan tool, select module Programming and Programmable Parameters under the toolbox icon and select transmission. Follow the instructions displayed on the scan tool. There are fields to enter the solenoid body 12-digit identification and 13-digit strategy recorded from the solenoid body.

NOTE: If the solenoid body information is not correct, transmission damage or driveability concerns can occur.

3.
Enter the solenoid body 13-digit strategy. The scan tool verifies the numbers entered are valid and display a message if the information is not valid. The scan tool will check to verify the file is present on the scan tool. If the file is present, the technician may proceed with downloading the file to the module. If the file is not present, the scan tool will need to be connected to the Professional Technician Society (PTS) server to download the file onto the scan tool.

4.

Verify the file is present on the scan tool. If the file is present, go to Step 8. If the file is not present, continue with this procedure.

5.

Connect the scan tool to the Professional Technician Society (PTS) server.

6.

Follow the instructions on the network to download the strategy file to the scan tool.

7.

If the scan tool cannot connect to the Professional Technician Society (PTS) server, download the file from Professional Technician Society (PTS) using the OASIS tab and select the transmission strategy. If the scan tool cannot download a strategy from the web site, a partial strategy will automatically be downloaded.

8.

Reconnect the scan tool to the vehicle.

9.

Follow the instructions displayed on the scan tool.

10.

The scan tool automatically downloads the strategy file or partial strategy file to the module. The scan tool displays a message when it is finished downloading the data that states that the file was downloaded successfully.

NOTE: If a drive cycle is not completed, erratic shifts and driveability concerns may occur.

11.
Road test the vehicle following the Adaptive Learning Drive Cycle. Refer to: Adaptive Learning Drive Cycle .

REMOVAL AND INSTALLATION > TRANSMISSION - 2.3L ECOBOOST (231KW 314PS)

Special Tool(s) / General Equipment

	307-346 (T97T-7902-A) Retainer, Torque Converter TKIT-1997-F/FLM/LT TKIT-1998-LM (NavigatoR)
Magnetic Socket	
Transmission Jack	

Materials

Name	Specification
Motorcraft ® Multi-Purpose Grease Spray XL-5-A	ESB-M1C93-B
Motorcraft ® MERCON ® LV Automatic Transmission Fluid (U.S.) XT-10-QLVC (U.S.)	MERCON ® LVWSS-M2C938-A

REMOVAL AND INSTALLATION > TRANSMISSION - 2.3L ECOBOOST (231KW 314PS) > REMOVAL

1.

With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

2.

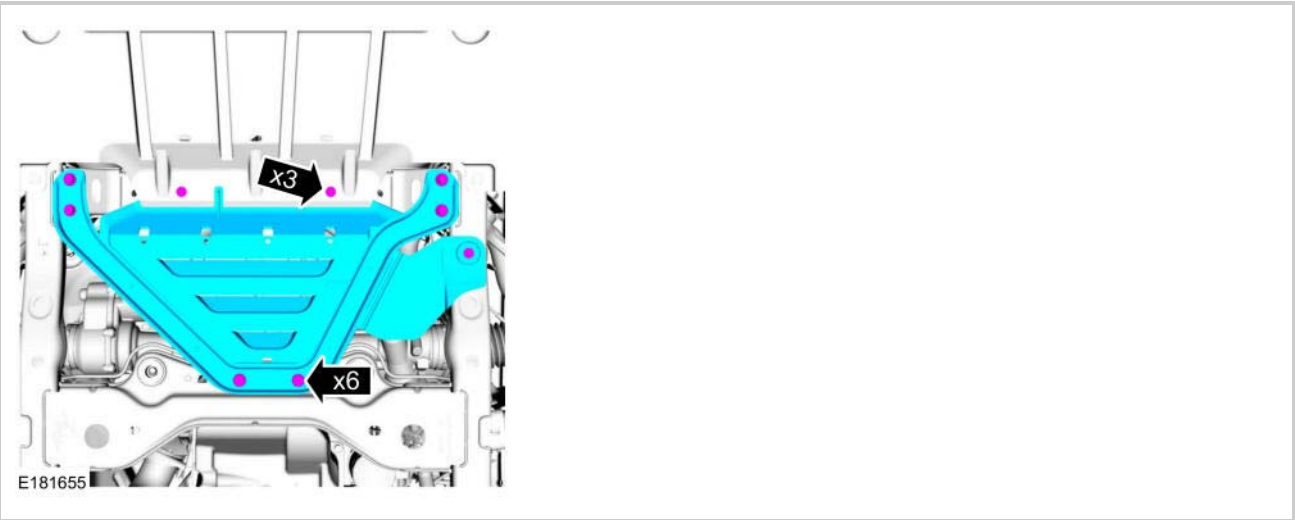
Remove the following items:

Refer to: Starter Motor .

Refer to: Driveshaft .

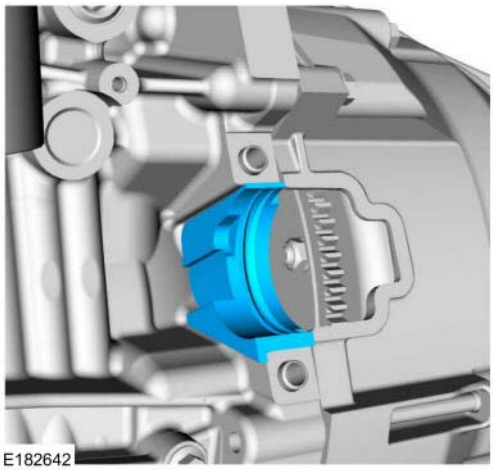
3.

Remove the screws, bolts and the underbody shield.



4.

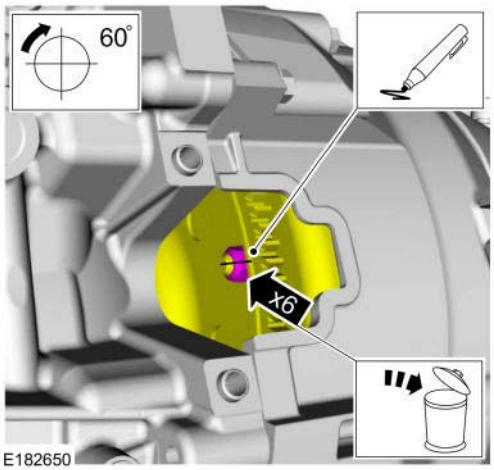
Remove the starter motor insulator.



NOTE: Index mark one stud and the flexplate for assembly reference.

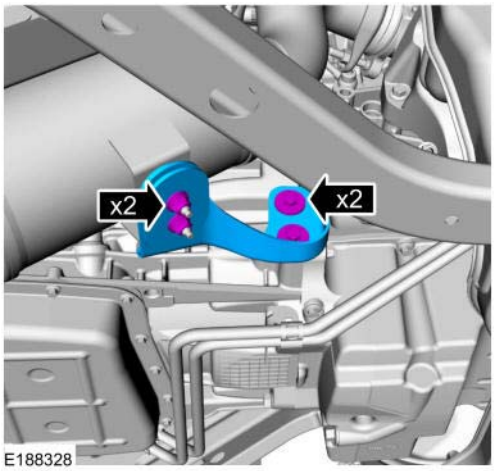
NOTE: Only rotate the crankshaft in a clockwise direction.

5.
Remove and discard the torque converter nuts. Use the General Equipment: Magnetic Socket



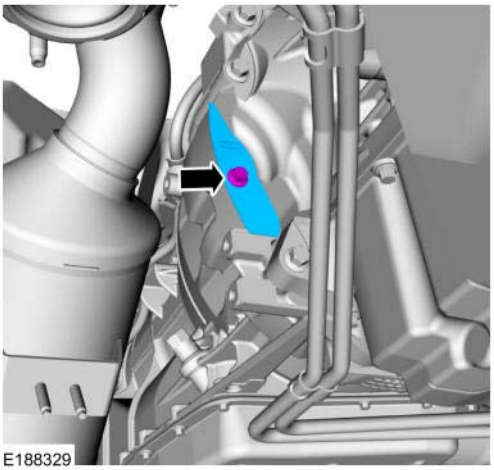
6.

Remove the nuts, bolts and the catalytic converter bracket.



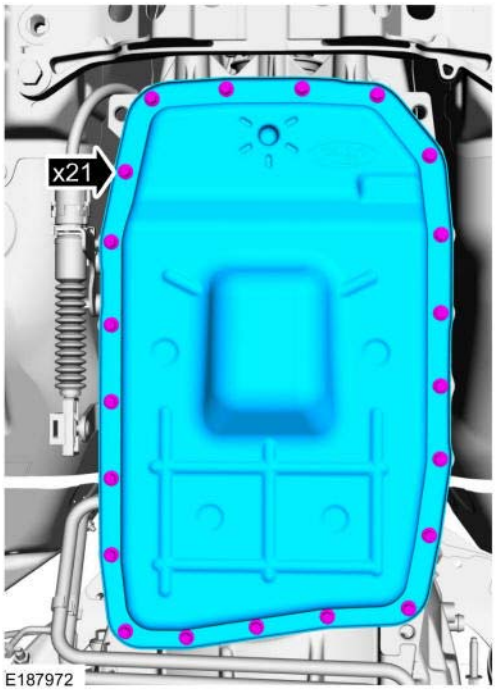
7.

Remove the bolt and the dust shield.



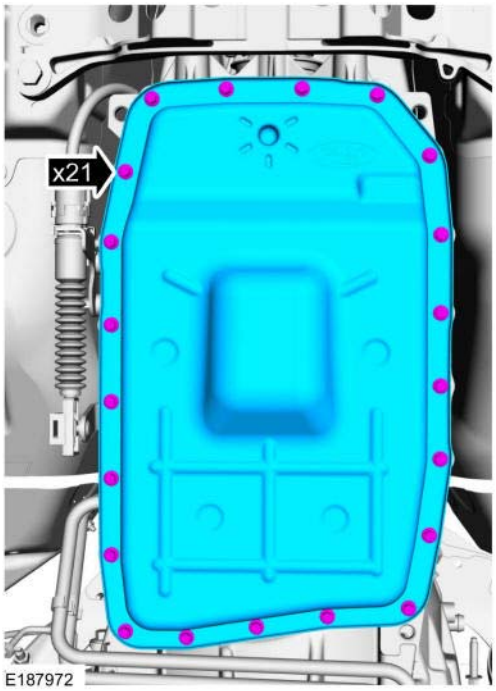
NOTE: If transmission disassembly or installation of a new transmission is necessary, drain the transmission fluid.

8.
Remove the transmission fluid pan bolts and the transmission fluid pan and allow the transmission fluid to drain.



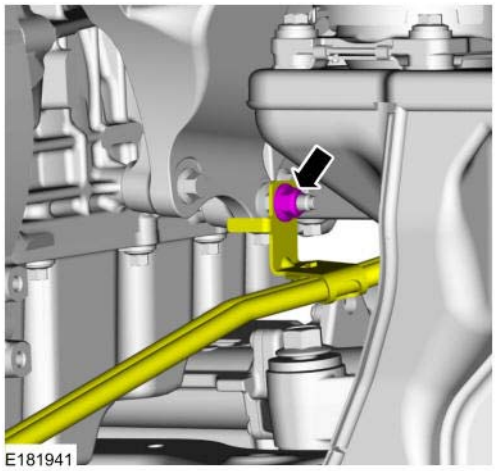
NOTE: It is not necessary to torque transmission fluid pan bolts at this time.

9.
Install the transmission fluid pan and the bolts.



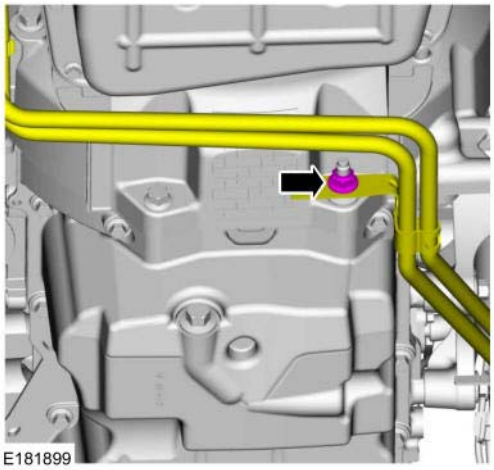
10.

Remove the transmission fluid cooler tube nut from the RH engine mount bracket.



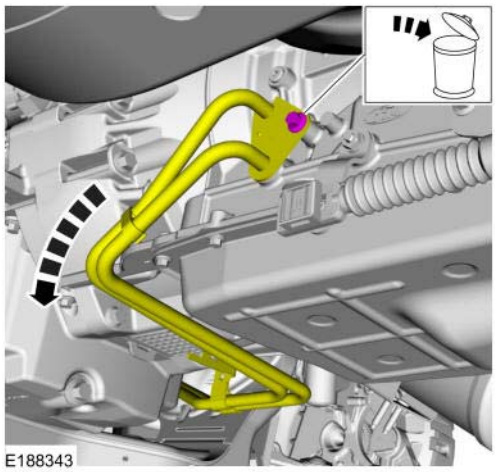
11.

Remove the transmission fluid cooler tube nut.



12.

Remove and discard the bolt and position the transmission fluid cooler tubes aside.



13.

1.

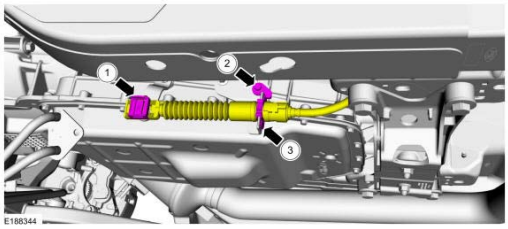
Disconnect the selector lever cable from the selector lever.

2.

Remove the bolt from the bracket.

3.

Disconnect the selector lever cable from the bracket.



NOTE: Make sure the transmission jack contacts the outer ribs of the transmission fluid pan.

NOTE: Secure the transmission to the transmission jack with a safety strap or chain.

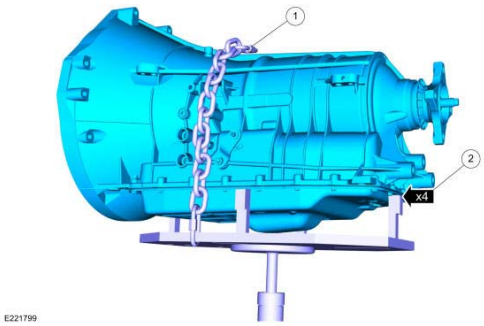
14.
Using a high-lift transmission jack, support the transmission.

1.

Safety chain

2.

Outer ribs of the transmission fluid pan Use the General Equipment: Transmission Jack

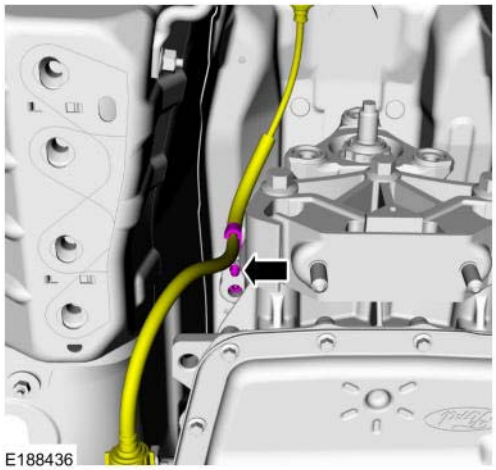


15.

Remove the transmission support crossmember. Refer to: Transmission Support Crossmember .

16.

Disconnect the selector lever cable retainer from the transmission case.



NOTE: Do not pull on the wiring harness to disconnect the electrical connector or damage to the electrical connector will occur.

17.

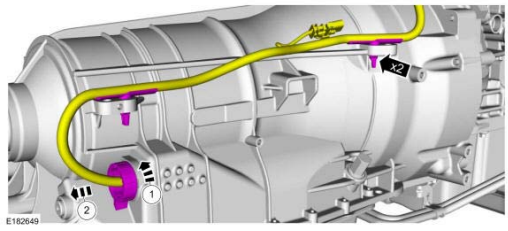
1.

Rotate the transmission electrical connector counterclockwise.

2.

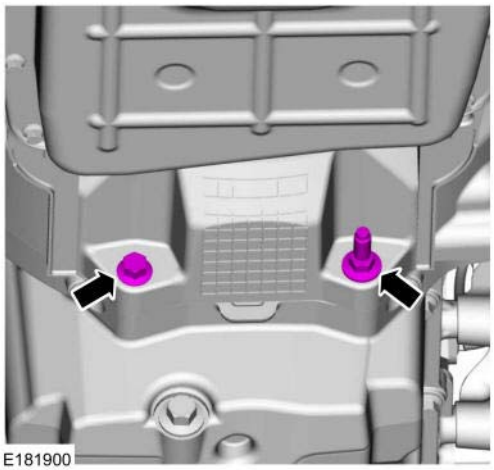
Pull the transmission electrical connector out to disconnect.

Detach the retainers and position the wiring harness aside.



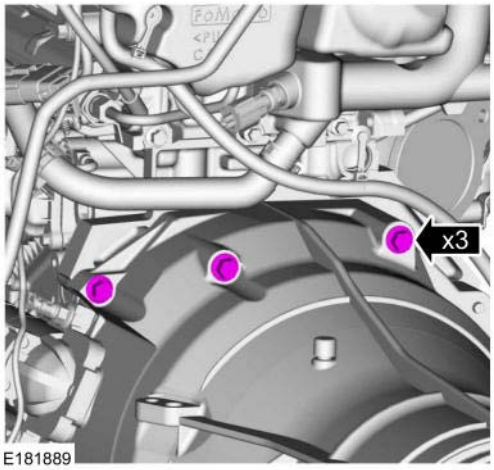
18.

Remove the lower bellhousing bolt and stud bolt.



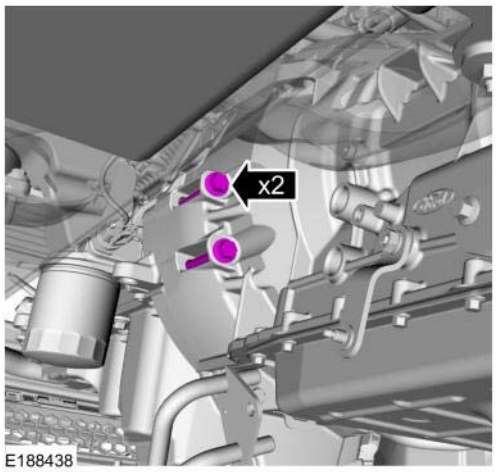
19.

Remove the upper bellhousing bolts.



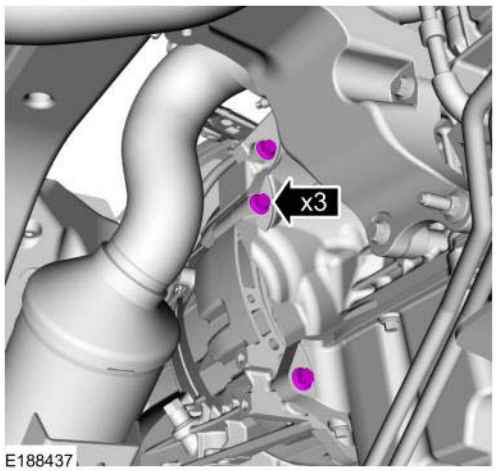
20.

Remove the LH side bellhousing bolts.



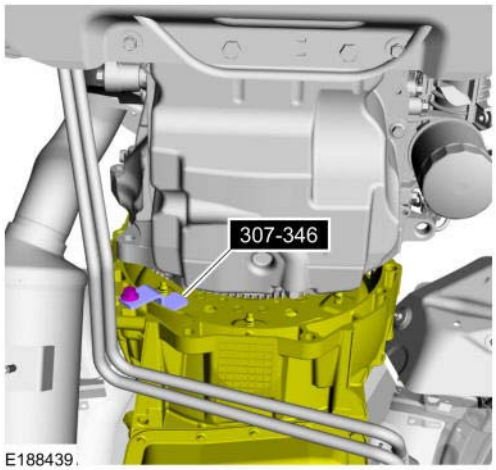
21.

Remove the RH side bellhousing bolts.



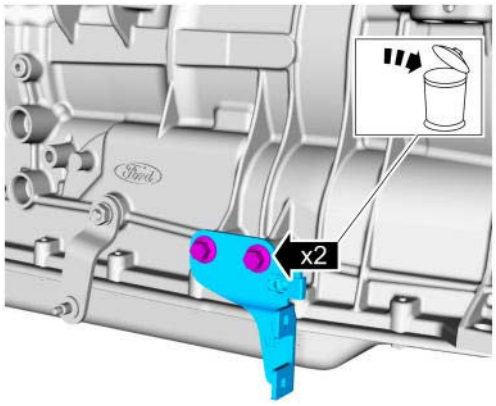
22.

Slide the transmission back enough to install the special tool and remove the transmission from the vehicle. Use Special Service Tool: 307-346 (T97T-7902-A) Retainer, Torque Converter.



23.

If installing a new or re-manufactured transmission, remove and discard the bolts.



E221622

NOTE: Failure to clean the transmission fluid cooler tubes can result in transmission failure.

24.
If the transmission is to be overhauled or if installing a new or re-manufactured transmission, carryout the transmission fluid cooler backflushing and cleaning. Refer to: Transmission Fluid Cooler - Backflushing and Cleaning .

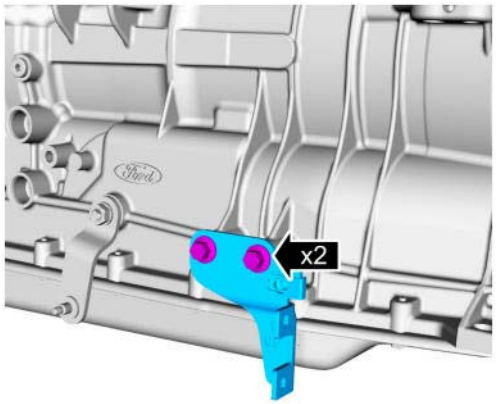
REMOVAL AND INSTALLATION > TRANSMISSION - 2.3L ECOBOOST (231KW 314PS) > INSTALLATION

1.

If removed, install the bracket and the new bolts.

Torque

: 18 lb.ft (25 Nm)



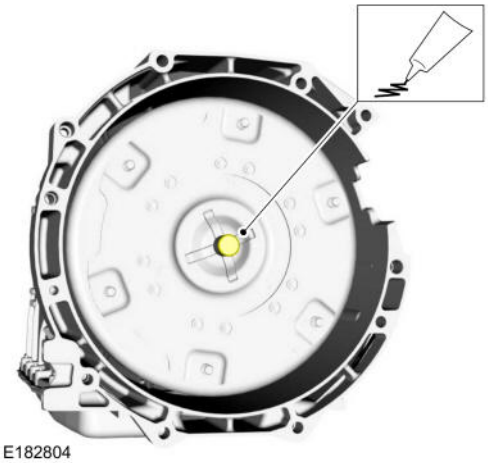
E221623

2.

Lubricate the torque converter pilot hub with multi-purpose grease.

Material

: Motorcraft ® Multi-Purpose Grease Spray / XL-5-A (ESB-M1C93-B)


E182804

3.

Install the special tool. Use Special Service Tool: 307-346 (T97T-7902-A) Retainer, Torque Converter.



E188616

NOTE: If transmission was disassembled, add transmission fluid to the transmission.

NOTE: If transmission is being replaced, remove the transmission fluid fill plug and verify that the transmission is filled with transmission fluid.

4.

1.

Remove the transmission fluid fill plug transmission fluid level indicator assembly.

Torque

: 19 lb.ft (26 Nm)

2.

Verify transmission is filled with transmission fluid.

3.

Slightly tilt the transmission rearward.

4.

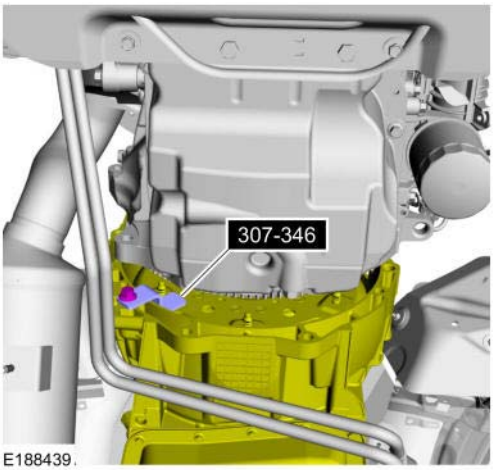
If the transmission was disassembled, add 11.35L (12 qt) of transmission fluid to the transmission through the transmission fluid fill hole.



NOTE: Make sure the transmission jack contacts the outer ribs of the transmission fluid pan.

NOTE: Secure the transmission to the transmission jack with a safety strap.

5.
Using a high-lift transmission jack, position the transmission into the vehicle behind the engine and remove the special tool. Use Special Service Tool: 307-346 (T97T-7902-A)Retainer, Torque Converter. Use the General Equipment: Transmission Jack



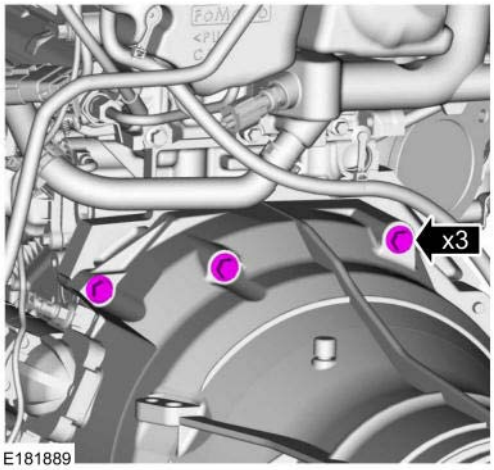
NOTE: With the transmission in a horizontal position, move it toward the engine and position it on the dowel pins.

NOTE: Make sure the torque converter is fully seated in the transmission before aligning the transmission to the engine.

6.
Install the upper bellhousing bolts.

Torque

: 35 lb.ft (48 Nm)

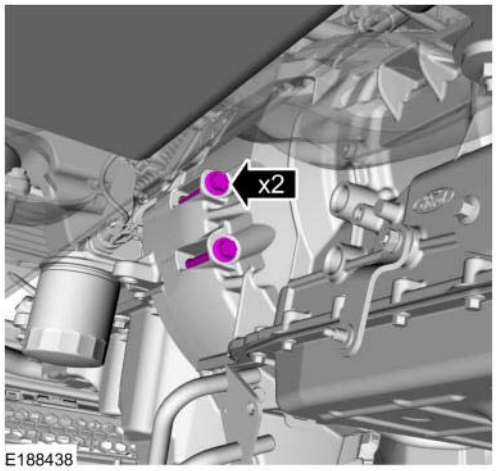


7.

Install the LH side bellhousing bolts.

Torque

: 35 lb.ft (48 Nm)

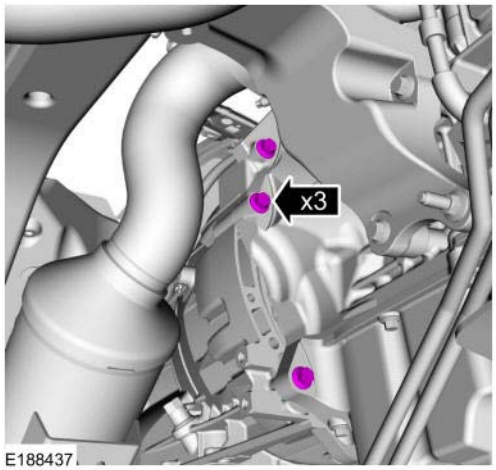


8.

Install the RH side bellhousing bolts.

Torque

: 35 lb.ft (48 Nm)

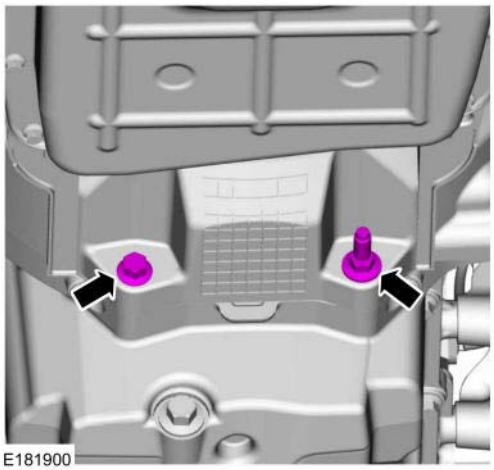


9.

Install the lower bellhousing bolt and stud bolt.

Torque

: 35 lb.ft (48 Nm)

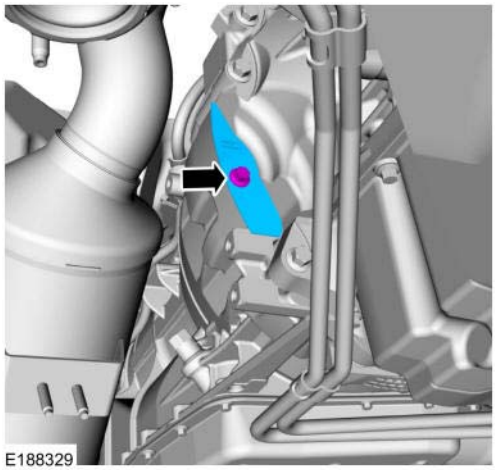


10.

Install the dust shield and the bolt.

Torque

: 18 lb.ft (25 Nm)

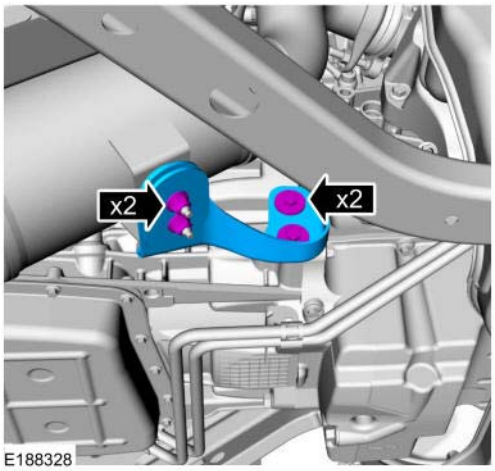


11.

Install the catalytic converter bracket, the nuts and the bolts.

Torque

: 18 lb.ft (25 Nm)

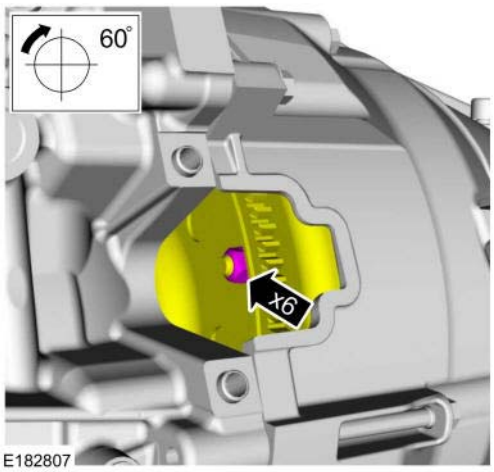


NOTE: Only rotate the crankshaft in a clockwise direction.

12.
Install the new torque converter nuts.

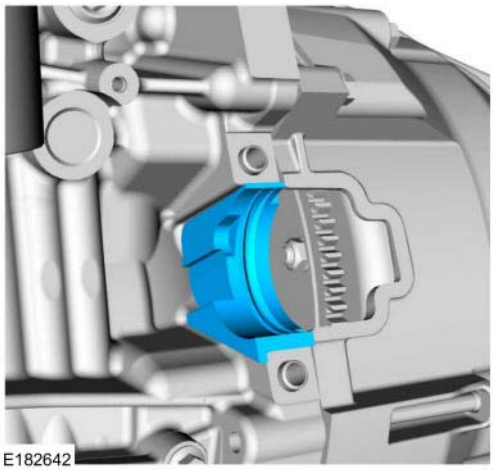
Torque

: 35 lb.ft (48 Nm)



13.

Install the starter motor insulator.



14.

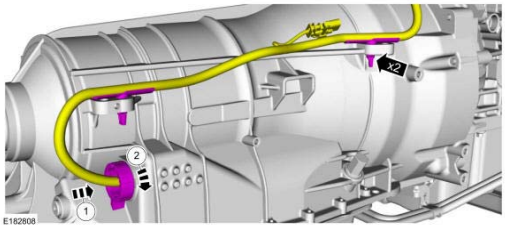
1.

Push the transmission electrical connector in to connect.

2.

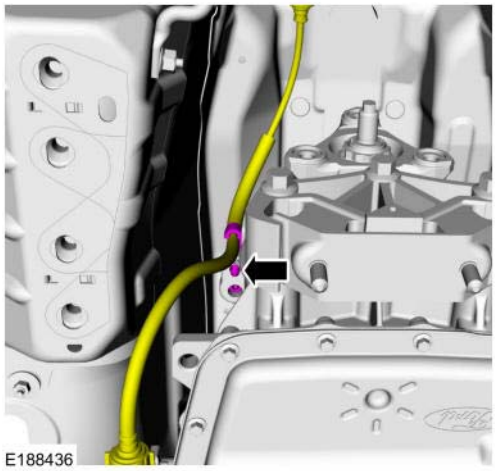
Rotate the transmission electrical connector clockwise.

Attach the wiring harness retainers.



15.

Connect the selector lever cable retainer to the transmission case.



16.

Install the transmission support crossmember. Refer to: Transmission Support Crossmember .

17.

1.

Connect the selector lever cable to the bracket.

2.

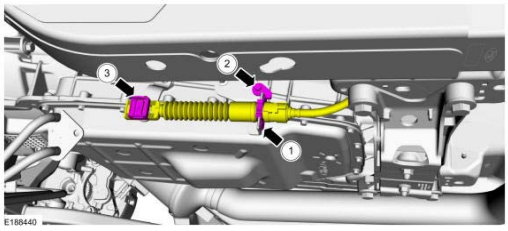
Install the bolt.

Torque

: 62 lb.in (7 Nm)

3.

Connect the selector lever cable to the selector lever.

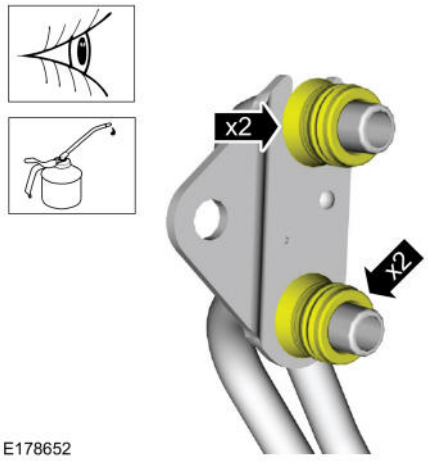


NOTE: Lubricate with clean transmission fluid.

18.
Inspect the transmission fluid cooler tube band seals and backing rings for damage, replace if necessary.

Material

: Motorcraft ® MERCON ® LV Automatic Transmission Fluid (U.S.) / XT-10-QLVC (U.S.) (MERCON ® LV) (WSS-M2C938-A)

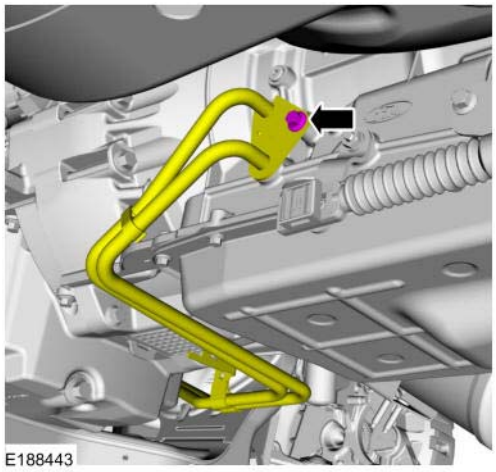


19.

Install the transmission fluid cooler tubes and the new bolt.

Torque

: 18 lb.ft (25 Nm)

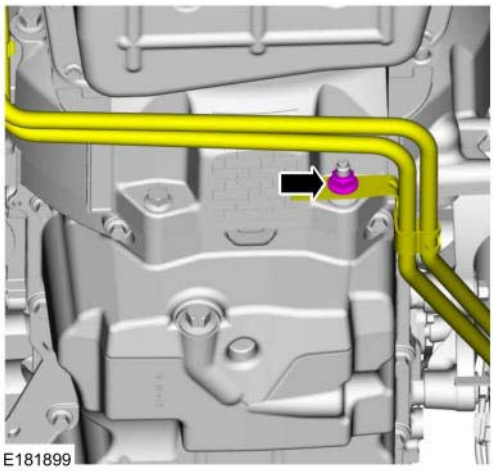


20.

Install the transmission fluid cooler tube bracket nut.

Torque

: 124 lb.in (14 Nm)

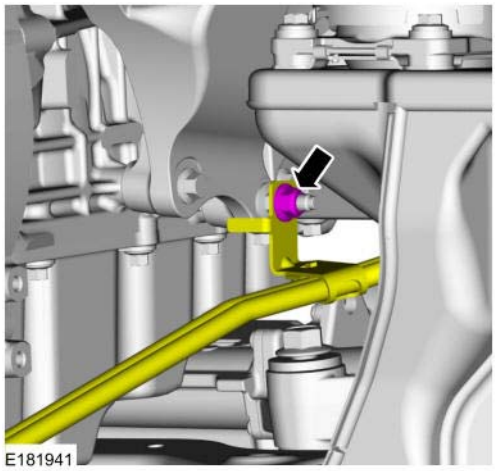


21.

Install the transmission fluid cooler tube nut on the RH engine mount bracket.

Torque

: 35 lb.ft (48 Nm)



22.

1.

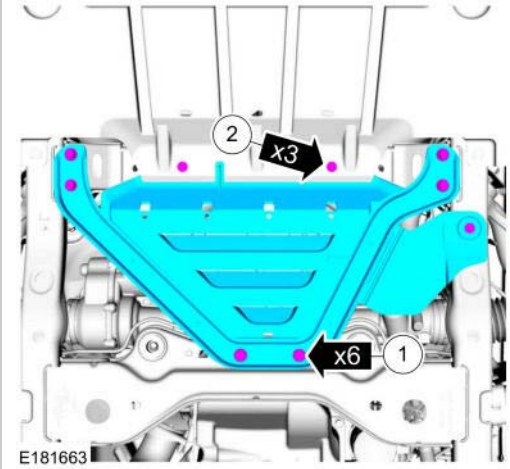
Install the underbody shield and the bolts.

Torque

: 46 lb.ft (63 Nm)

2.

Install the underbody shield screws.



23.

Install the following items:

Refer to: Driveshaft .

Refer to: Starter Motor .

24.

Verify the selector lever cable is correctly adjusted. Refer to: Selector Lever Cable Adjustment .

25.

After completing the repairs, perform the Misfire Monitor Neutral Profile Correction procedure using a diagnostic scan tool.

26.

If a new transmission or a new main control was installed, the solenoid body strategy must be updated. Refer to: Transmission Strategy Download .

27.

If the transmission was overhauled, the adaptive learning drive cycle must be updated. Refer to: Adaptive Learning Drive Cycle .

28.

While driving the vehicle, use the scan tool to verify that the TFT has reached a temperature of 96.7 °C-102 °C (206 °F-215 °F). This will circulate the transmission fluid through the torque converter and the transmission fluid cooling system, eliminating any trapped air in the transmission fluid cooling system.

29.

Check the transmission fluid level. Refer to: Transmission Fluid Level Check .

REMOVAL AND INSTALLATION > TRANSMISSION - 3.7L DURATEC (227KW 301PS)

Special Tool(s) / General Equipment

	307-346 (T97T-7902-A) Retainer, Torque Converter TKIT-1997-F/FLM/LT TKIT-1998-LM (NavigatoR)
Transmission Jack	

Materials

Name	Specification
Motorcraft ® Multi-Purpose Grease Spray XL-5-A	ESB-M1C93-B
Motorcraft ® MERCON ® LV Automatic Transmission Fluid (U.S.) XT-10-QLVC (U.S.)	MERCON ® LVWSS-M2C938-A

REMOVAL AND INSTALLATION > TRANSMISSION - 3.7L DURATEC (227KW 301PS) > REMOVAL

1.

With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

2.

Remove the following items:

Refer to: Starter Motor .

Refer to: Driveshaft .

NOTE: Vehicles are equipped with either an underbody shield or a subframe bracket and underbody shield assembly.

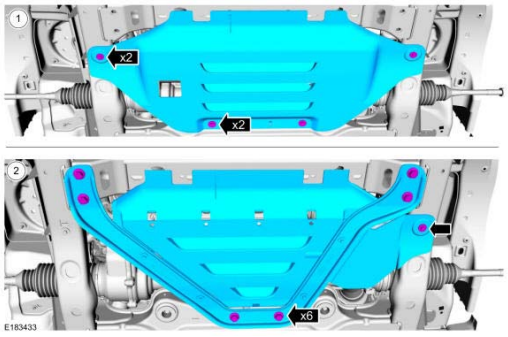
3.

1.

Remove the bolts and the underbody shield.

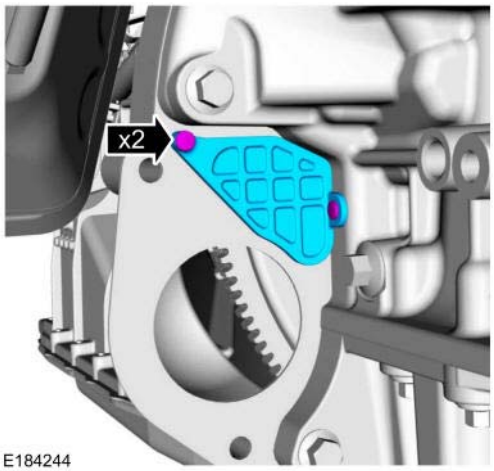
2.

Remove the bolts and the subframe bracket and underbody shield assembly.



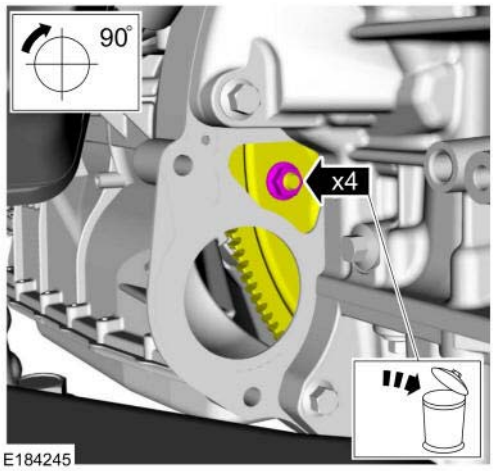
4.

Remove the retainers and the access cover.



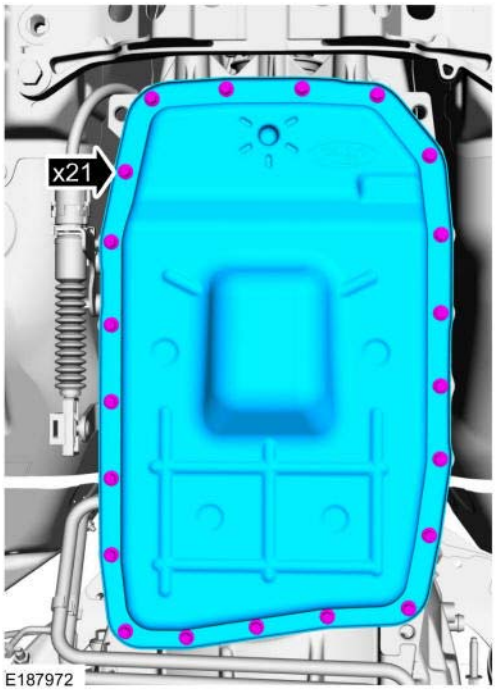
NOTE: Using the crankshaft pulley bolt, turn the engine clockwise.

5.
Remove and discard the torque converter nuts.



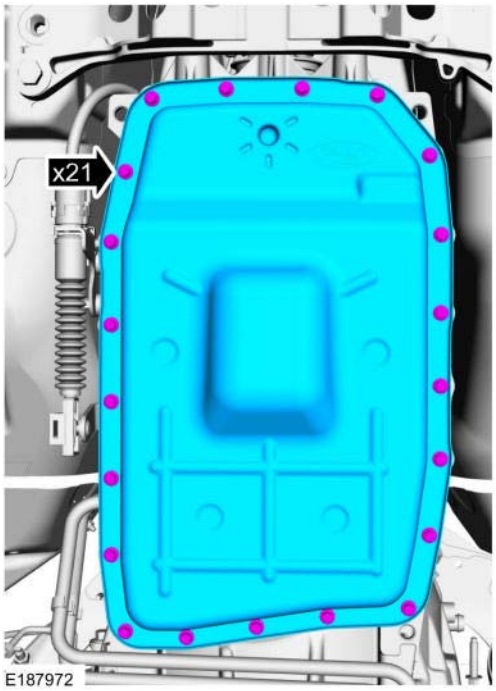
NOTE: If transmission disassembly or installation of a new transmission is necessary, drain the transmission fluid.

6.
Remove the transmission fluid pan bolts and the transmission fluid pan and allow the transmission fluid to drain.



NOTE: It is not necessary to torque transmission fluid pan bolts at this time.

7.
Install the transmission fluid pan and the bolts.

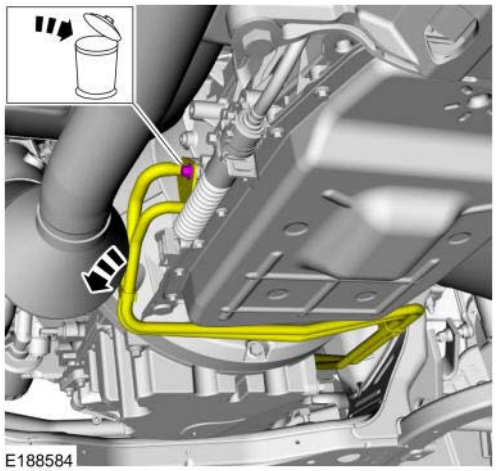


8.

Remove the LH catalyst monitor sensor. Refer to: Catalyst Monitor Sensor .

9.

Remove and discard the bolt and position the transmission fluid cooler tubes aside.



10.

1.

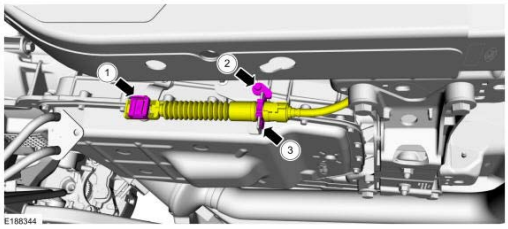
Disconnect the selector lever cable from the selector lever.

2.

Remove the bolt from the bracket.

3.

Disconnect the selector lever cable from the bracket.



NOTE: Make sure the transmission jack contacts the outer ribs of the transmission fluid pan.

NOTE: Secure the transmission to the transmission jack with a safety strap or chain.

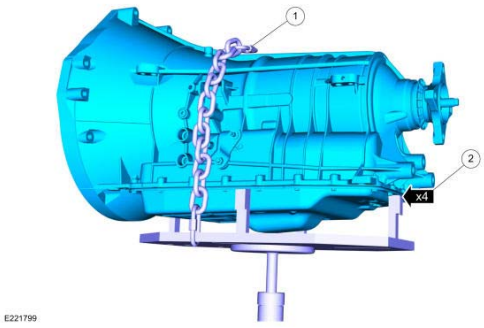
11.
Using a high-lift transmission jack, support the transmission.

1.

Safety chain

2.

Outer ribs of the transmission fluid pan Use the General Equipment: Transmission Jack

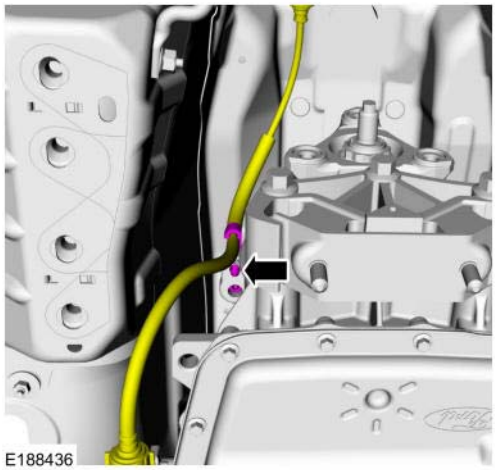


12.

Remove the transmission support crossmember. Refer to: Transmission Support Crossmember .

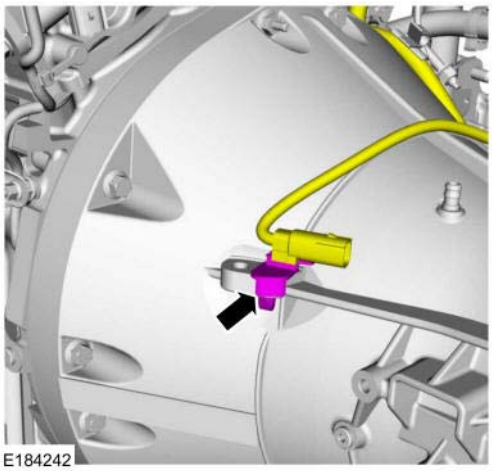
13.

Disconnect the selector lever cable retainer from the transmission case.



14.

Detach the wiring harness retainer from the LH side of the transmission.



NOTE: Do not pull on the wiring harness to disconnect the electrical connector or damage to the electrical connector will occur.

15.

1.

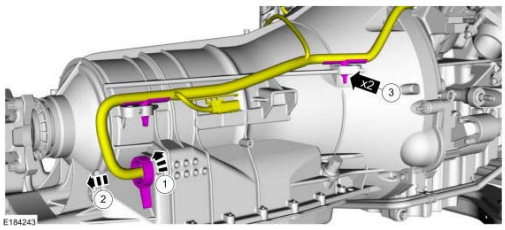
Rotate the transmission electrical connector counterclockwise.

2.

Pull the transmission electrical connector out to disconnect.

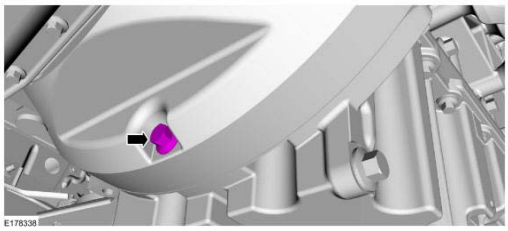
3.

Detach the retainers and position the wiring harness aside.



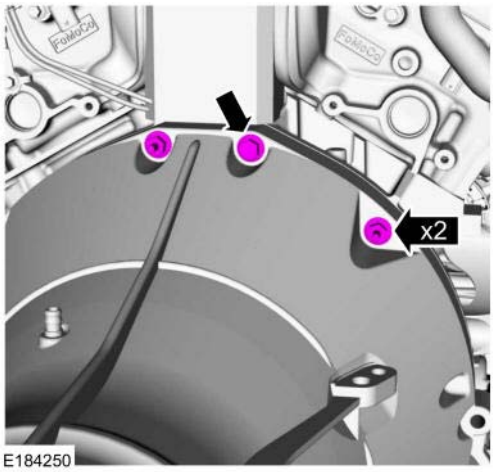
16.

Remove the lower bellhousing bolts.



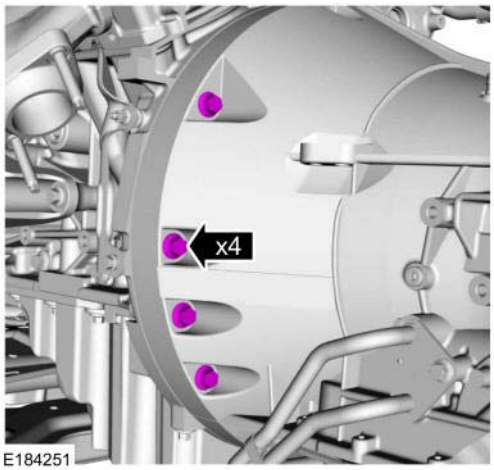
17.

Remove the upper bellhousing bolts.



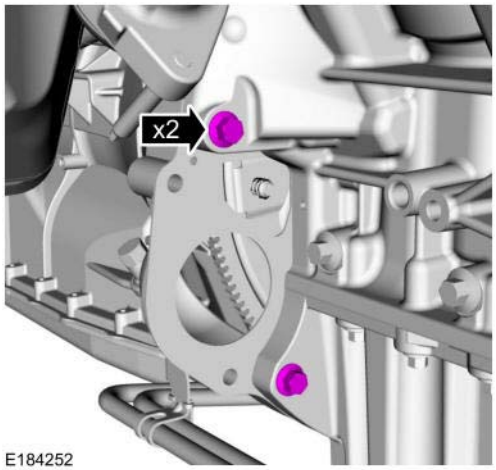
18.

Remove the LH side bellhousing bolts.



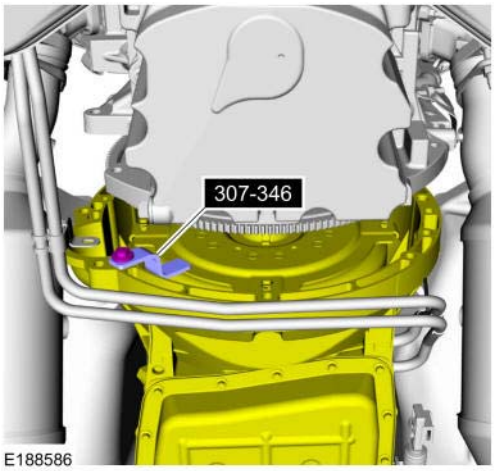
19.

Remove the RH side bellhousing bolts.



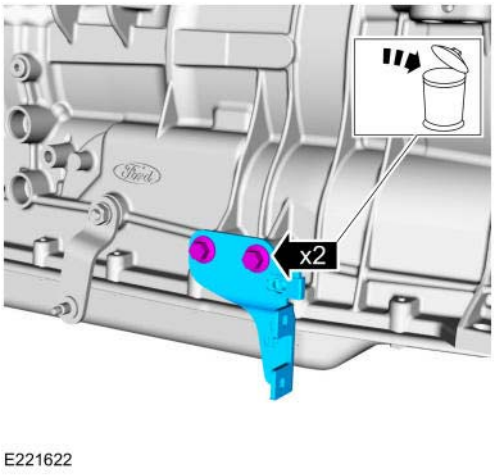
20.

Slide the transmission back enough to install the special tool and remove the transmission from the vehicle. Use Special Service Tool: 307-346 (T97T-7902-A) Retainer, Torque Converter.



21.

If installing a new or re-manufactured transmission, remove and discard the bolts.



NOTE: Failure to clean the transmission fluid cooler tubes can result in transmission failure.

22.
If the transmission is to be overhauled or if installing a new or re-manufactured transmission, carryout the transmission fluid cooler backflushing and cleaning. Refer to: Transmission Fluid Cooler - Backflushing and Cleaning .

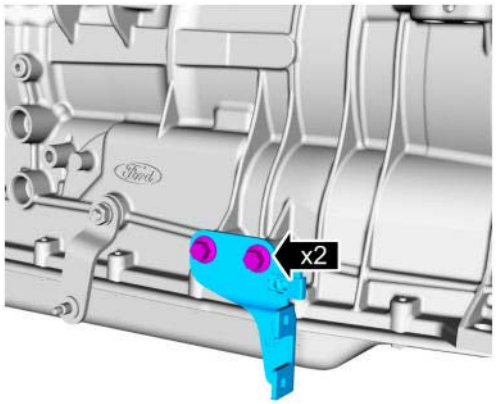
REMOVAL AND INSTALLATION > TRANSMISSION - 3.7L DURATEC (227KW 301PS) > INSTALLATION

1.

If removed, install the bracket and the new bolts.

Torque

: 18 lb.ft (25 Nm)



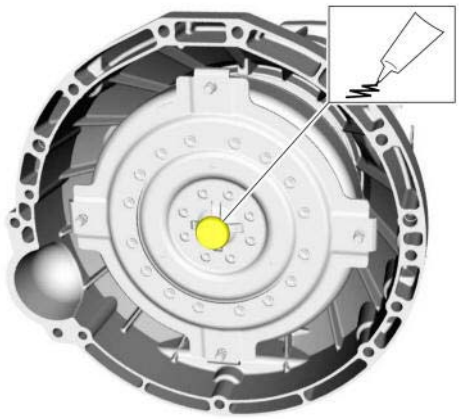
E221623

2.

Lubricate the torque converter pilot hub with multi-purpose grease.

Material

: Motorcraft ® Multi-Purpose Grease Spray / XL-5-A (ESB-M1C93-B)



E178649

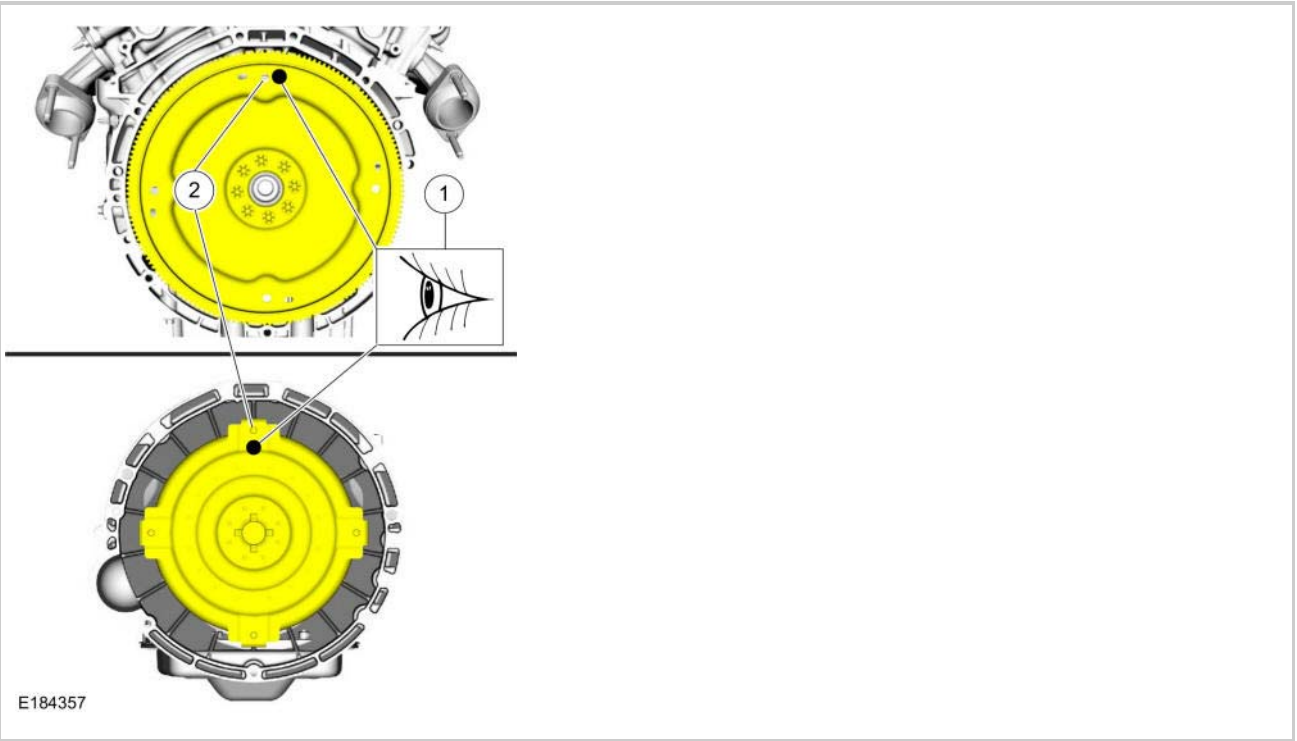
3.

1.

Inspect the torque converter stud and flexplate for paint marks.

2.

Align the torque converter stud and flexplate hole near the paint marks to the 12 o'clock position.



4.

Install the special tool.Use Special Service Tool: 307-346 (T97T-7902-A) Retainer, Torque Converter.



NOTE: If transmission was disassembled, add transmission fluid to the transmission.

NOTE: If transmission is being replaced, remove the transmission fluid fill plug and verify that the transmission is filled with transmission fluid.

5.

1.

Remove the transmission fluid fill plug transmission fluid level indicator assembly.

Torque

: 19 lb.ft (26 Nm)

2.

Verify transmission is filled with transmission fluid.

3.

Slightly tilt the transmission rearward.

4.

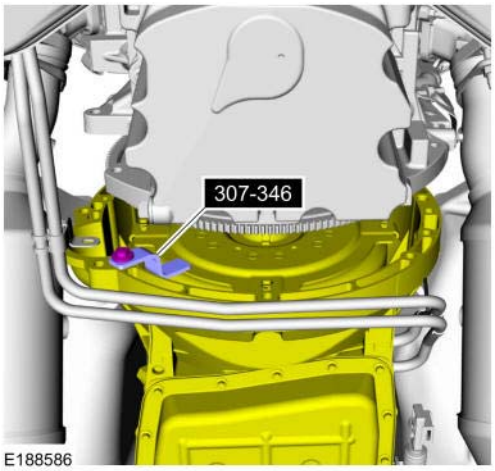
If the transmission was disassembled, add 11.35L (12 qt) of transmission fluid to the transmission through the transmission fluid fill hole.



NOTE: Make sure the transmission jack contacts the outer ribs of the transmission fluid pan.

NOTE: Secure the transmission to the transmission jack with a safety strap.

6.
Using a high-lift transmission jack, position the transmission into the vehicle behind the engine and remove the special tool. Use Special Service Tool: 307-346 (T97T-7902-A) Retainer, Torque Converter. Use the General Equipment: Transmission Jack



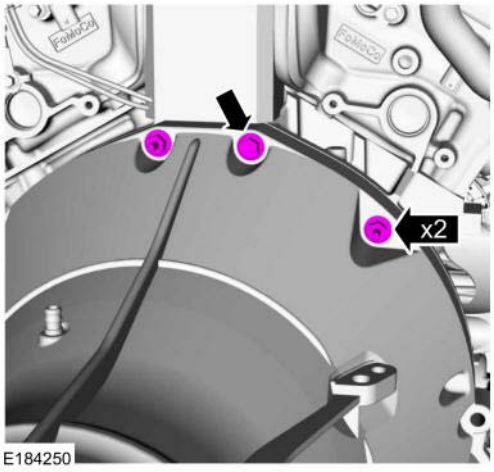
NOTE: With the transmission in a horizontal position, move it toward the engine and position it on the dowel pins.

NOTE: Make sure the torque converter is fully seated in the transmission before aligning the transmission to the engine.

7.
Install the upper bellhousing bolts.

Torque

: 35 lb.ft (48 Nm)

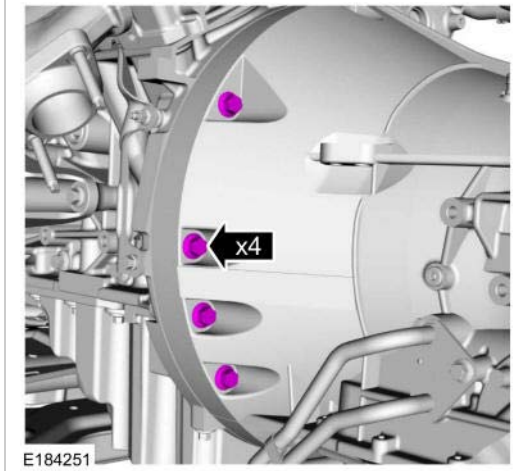


8.

Install the LH side bellhousing bolts.

Torque

: 35 lb.ft (48 Nm)

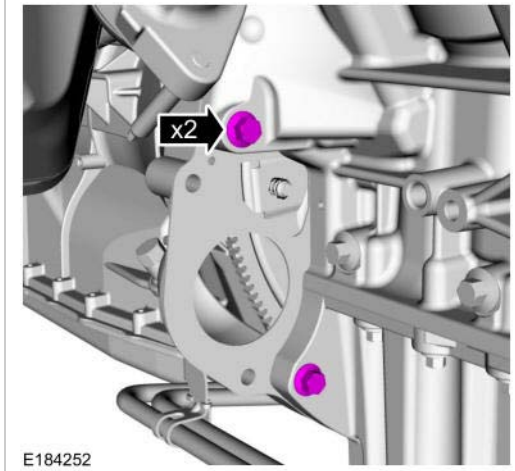


9.

Install the RH side bellhousing bolts.

Torque

: 35 lb.ft (48 Nm)

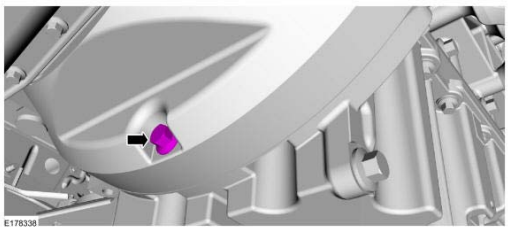


10.

Install the lower bellhousing bolt.

Torque

: 35 lb.ft (48 Nm)

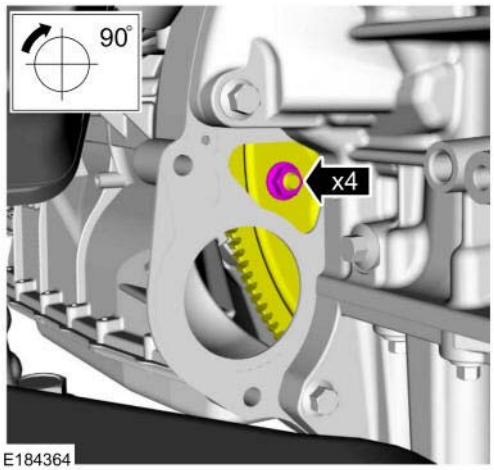


NOTE: Using the crankshaft pulley bolt, turn the engine clockwise.

11.
Install the new torque converter nuts.

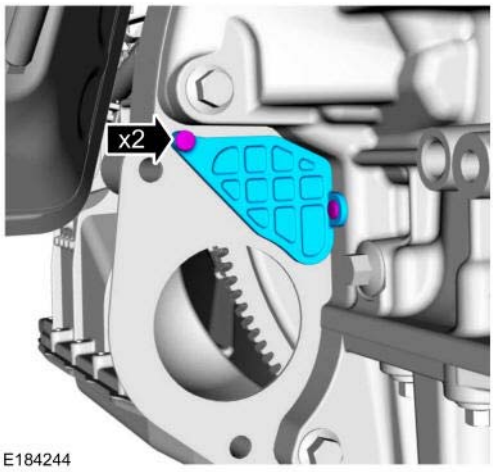
Torque

: 35 lb.ft (48 Nm)



12.

Install the access cover and the retainers.



13.

1.

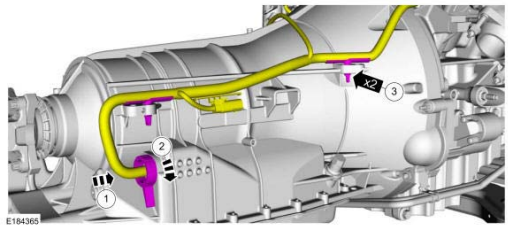
Push the transmission electrical connector in to connect.

2.

Rotate the transmission electrical connector clockwise.

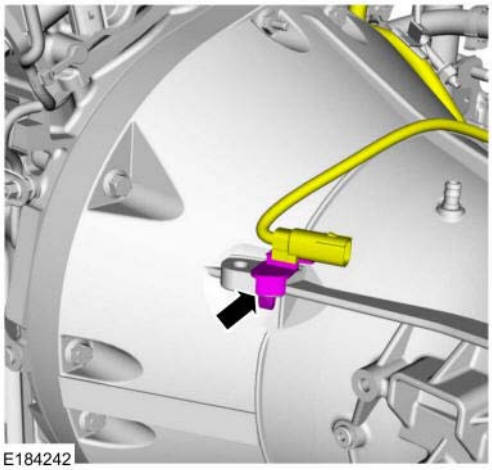
3.

Attach the wiring harness retainers.



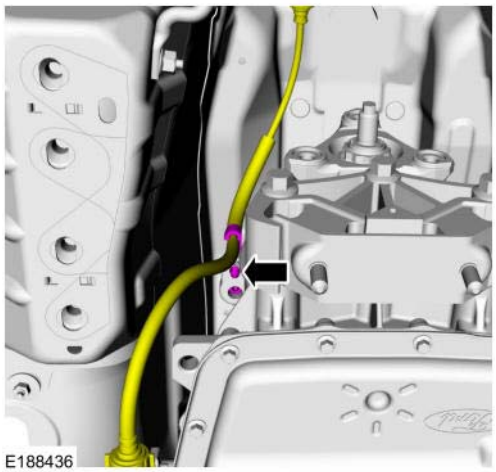
14.

Attach the wiring harness retainer to the LH of the transmission.



15.

Connect the selector lever cable retainer to the transmission case.



16.

Install the transmission support crossmember. Refer to: Transmission Support Crossmember .

17.

1.

Connect the selector lever cable to the bracket.

2.

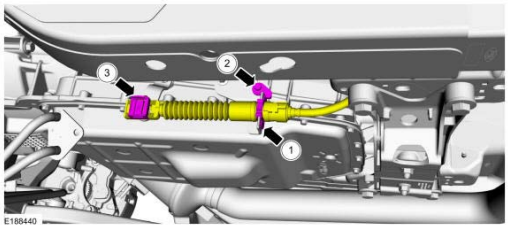
Install the bolt.

Torque

: 62 lb.in (7 Nm)

3.

Connect the selector lever cable to the selector lever.

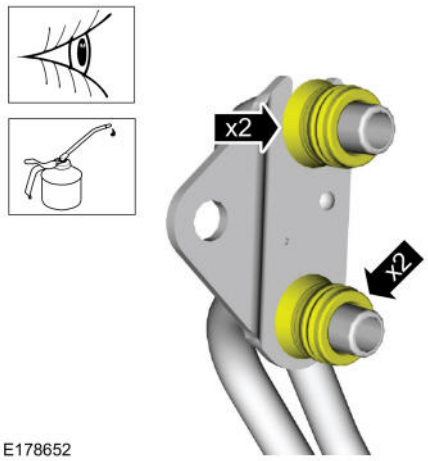


NOTE: Lubricate with clean transmission fluid.

18.
Inspect the transmission fluid cooler tube band seals and backing rings for damage, replace if necessary.

Material

: Motorcraft ® MERCON ® LV Automatic Transmission Fluid (U.S.) / XT-10-QLVC (U.S.) (MERCON ® LV) (WSS-M2C938-A)

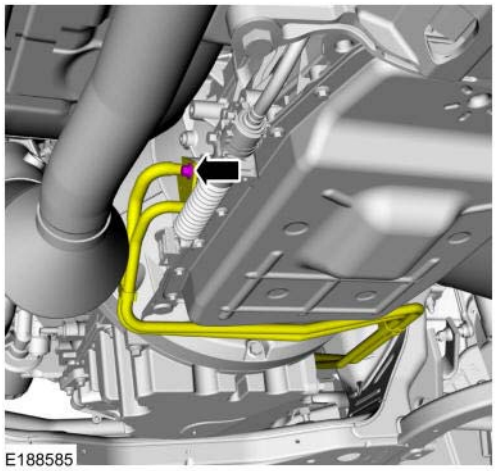


19.

Install the transmission fluid cooler tubes and the new bolt.

Torque

: 18 lb.ft (25 Nm)



20.

Install the LH catalyst monitor sensor. Refer to: Catalyst Monitor Sensor .

21.

NOTE: Vehicles are equipped with either an underbody shield or a subframe bracket and underbody shield assembly.

1.
Install the underbody shield and the bolts.

Torque

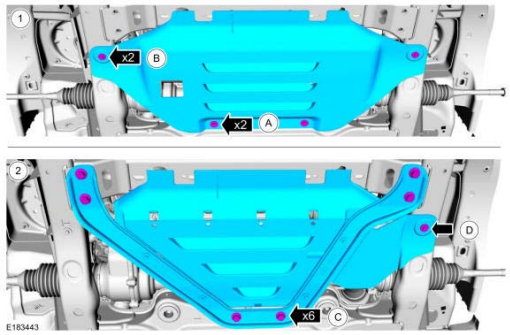
: A: 97 lb.in (11 Nm) B: 18 lb.in (2 Nm)

2.

Install the subframe bracket and underbody shield assembly and the bolts.

Torque

: C: 46 lb.ft (63 Nm) D: 18 lb.in (2 Nm)



22.

Install the following items:

Refer to: Driveshaft .

Refer to: Starter Motor .

23.

Verify the selector lever cable is correctly adjusted. Refer to: Selector Lever Cable Adjustment .

24.

After completing the repairs, perform the Misfire Monitor Neutral Profile Correction procedure using a diagnostic scan tool.

25.

If a new transmission or a new main control was installed, the solenoid body strategy must be updated. Refer to: Transmission Strategy Download .

26.

If the transmission was overhauled, the adaptive learning drive cycle must be updated. Refer to: Adaptive Learning Drive Cycle .

27.

While driving the vehicle, use the scan tool to verify that the TFT has reached a temperature of 96.7 °C-102 °C (206 °F-215 °F). This will circulate the transmission fluid through the torque converter and the transmission fluid cooling system, eliminating any trapped air in the transmission fluid cooling system.

28.

Check the transmission fluid level. Refer to: Transmission Fluid Level Check .

REMOVAL AND INSTALLATION > TRANSMISSION - 5.0L 32V TI-VCT

Special Tool(s) / General Equipment

	307-346 (T97T-7902-A) Retainer, Torque Converter TKIT-1997-F/FLM/LT TKIT-1998-LM (NavigatoR)
Magnetic Socket	
Transmission Jack	

Materials

Name	Specification
Motorcraft ® Multi-Purpose Grease Spray XL-5-A	ESB-M1C93-B
Motorcraft ® MERCON ® LV Automatic Transmission Fluid (U.S.) XT-10-QLVC (U.S.)	MERCON ® LVWSS-M2C938-A

REMOVAL AND INSTALLATION > TRANSMISSION - 5.0L 32V TI-VCT > REMOVAL

1.

With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

2.

Remove the following items:

Refer to: Starter Motor .

Refer to: Driveshaft .

Refer to: Catalytic Converter RH .

3.

Remove the LH HO2S and the LH catalyst monitor sensor. Refer to: Heated Oxygen Sensor (HO2S) . Refer to: Catalyst Monitor Sensor .

NOTE: Vehicles are equipped with either an underbody shield or a subframe bracket and underbody shield assembly.

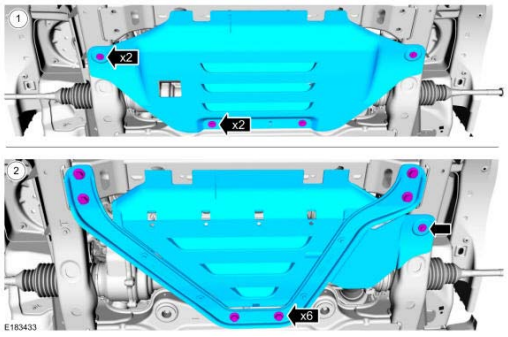
4.

1.

Remove the bolts and the underbody shield.

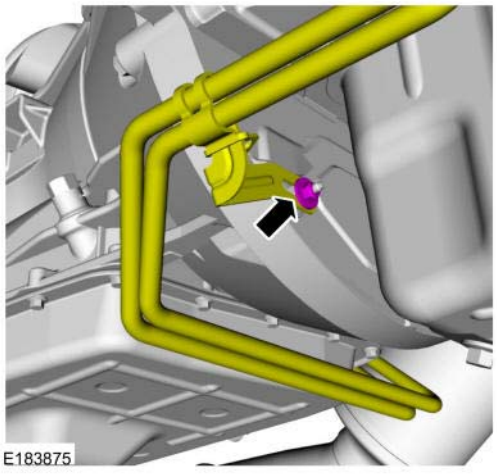
2.

Remove the bolts and the subframe bracket and underbody shield assembly.



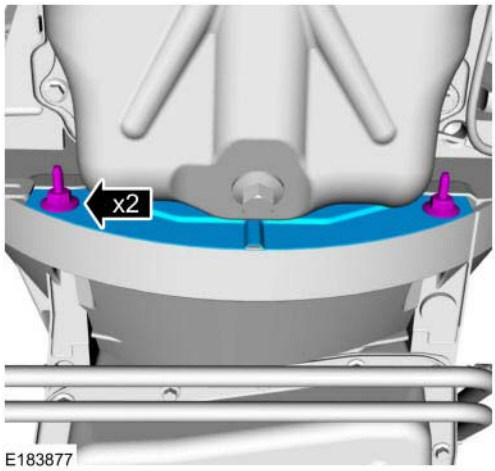
5.

Remove the transmission cooling tube nut and bracket from the flexplate inspection cover stud bolt.



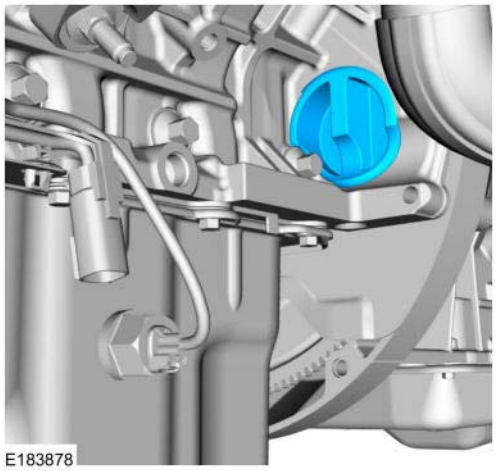
6.

Remove the stud bolts and the flexplate inspection cover.



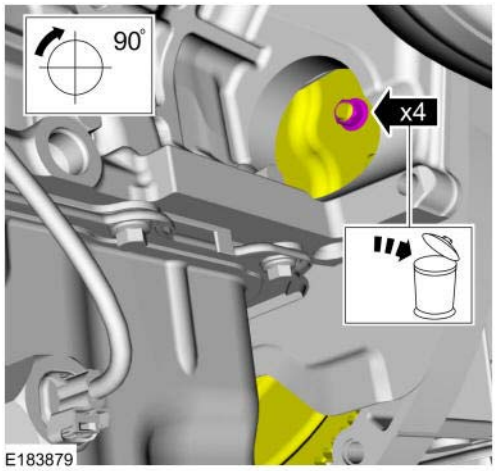
7.

Remove the rubber access plug.



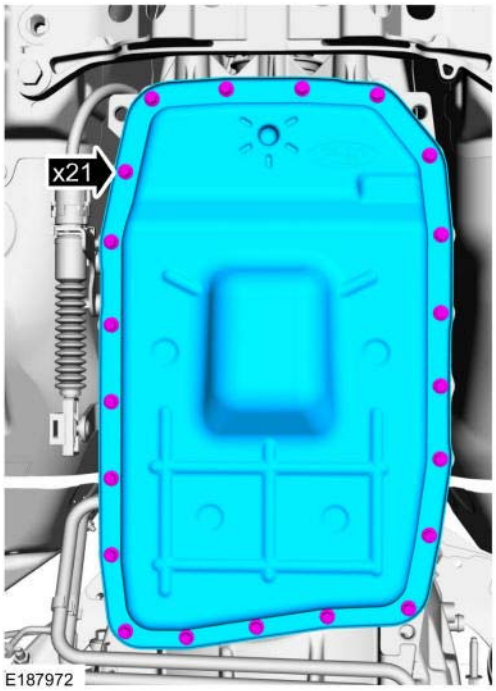
NOTE: Only rotate the crankshaft in a clockwise direction.

8.
Remove and discard the torque converter nuts. Use the General Equipment: Magnetic Socket



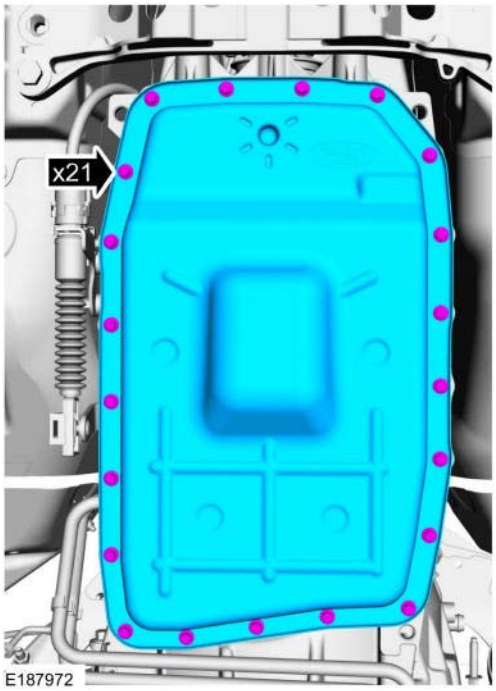
NOTE: If transmission disassembly or installation of a new transmission is necessary, drain the transmission fluid.

9.
Remove the transmission fluid pan bolts and the transmission fluid pan and allow the transmission fluid to drain.



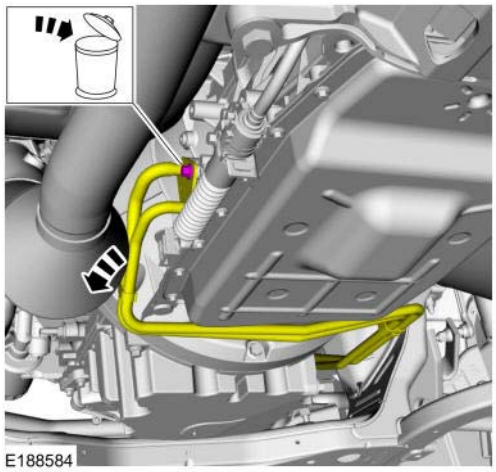
NOTE: It is not necessary to torque transmission fluid pan bolts at this time.

10.
Install the transmission fluid pan and the bolts.



11.

Remove and discard the bolt and position the transmission fluid cooler tubes aside.



12.

1.

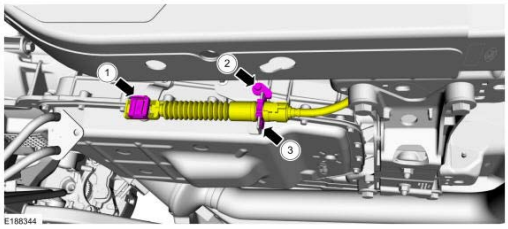
Disconnect the selector lever cable from the selector lever.

2.

Remove the bolt from the bracket.

3.

Disconnect the selector lever cable from the bracket.



NOTE: Make sure the transmission jack contacts the outer ribs of the transmission fluid pan.

NOTE: Secure the transmission to the transmission jack with a safety strap or chain.

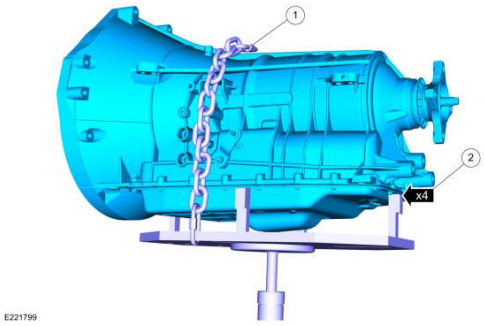
13.
Using a high-lift transmission jack, support the transmission.

1.

Safety chain

2.

Outer ribs of the transmission fluid pan Use the General Equipment: Transmission Jack

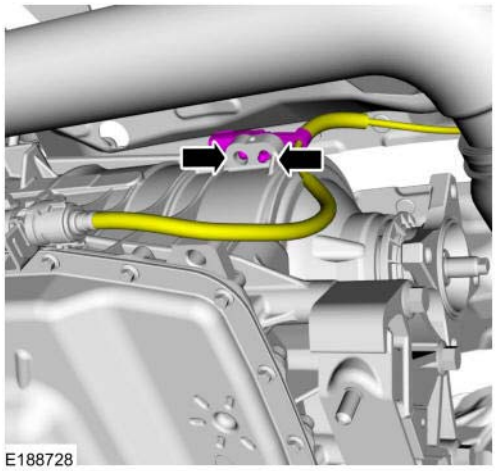


14.

Remove the transmission support crossmember. Refer to: Transmission Support Crossmember .

15.

Disconnect the selector lever cable and wiring harness retainers from the transmission case.



NOTE: Do not pull on the wiring harness to disconnect the electrical connector or damage to the electrical connector will occur.

16.

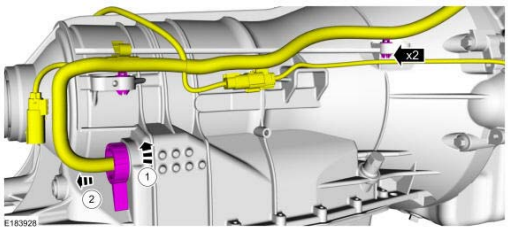
1.

Rotate the transmission electrical connector counterclockwise.

2.

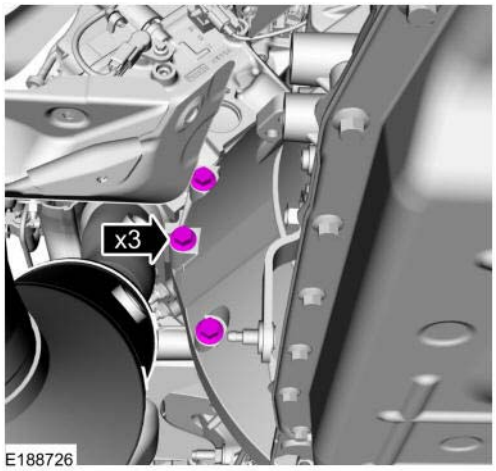
Pull the transmission electrical connector out to disconnect.

Detach the retainers and position the wiring harness aside.



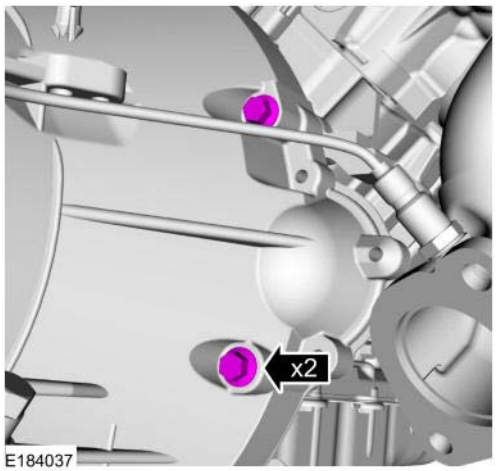
17.

Remove the LH side bellhousing bolts.



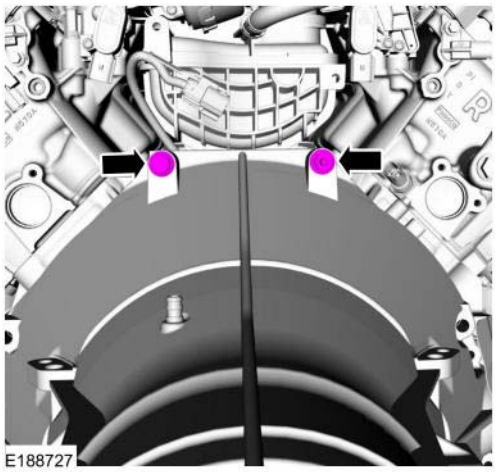
18.

Remove the RH side bellhousing bolts.



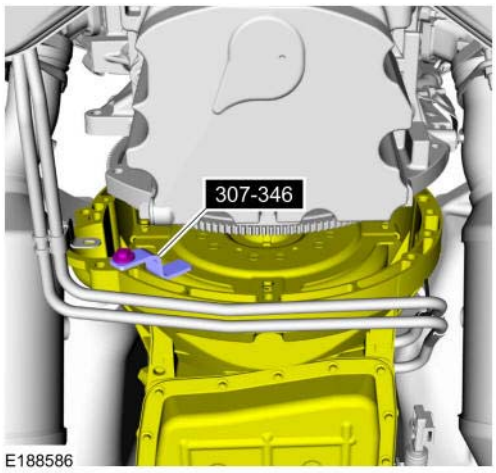
19.

Remove the upper bellhousing bolt and stud bolt.



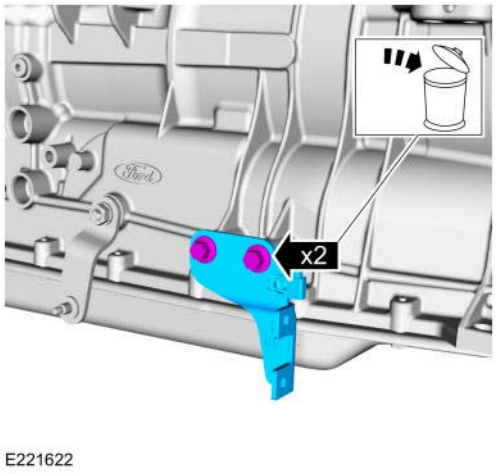
20.

Slide the transmission back enough to install the special tool and remove the transmission from the vehicle. Use Special Service Tool: 307-346 (T97T-7902-A) Retainer, Torque Converter.



21.

If installing a new or re-manufactured transmission, remove and discard the bolts.



NOTE: Failure to clean the transmission fluid cooler tubes can result in transmission failure.

22.
If the transmission is to be overhauled or if installing a new or re-manufactured transmission, carryout the transmission fluid cooler backflushing and cleaning. Refer to: Transmission Fluid Cooler - Backflushing and Cleaning .

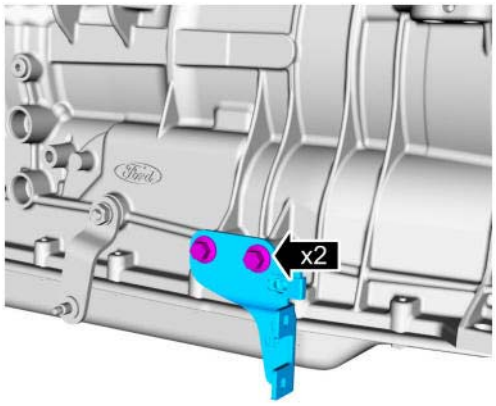
REMOVAL AND INSTALLATION > TRANSMISSION - 5.0L 32V TI-VCT > INSTALLATION

1.

If removed, install the bracket and the new bolts.

Torque

: 18 lb.ft (25 Nm)



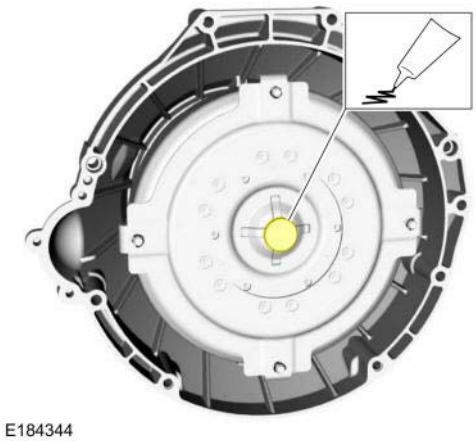
E221623

2.

Lubricate the torque converter pilot hub with multi-purpose grease.

Material

: Motorcraft ® Multi-Purpose Grease Spray / XL-5-A (ESB-M1C93-B)



E184344

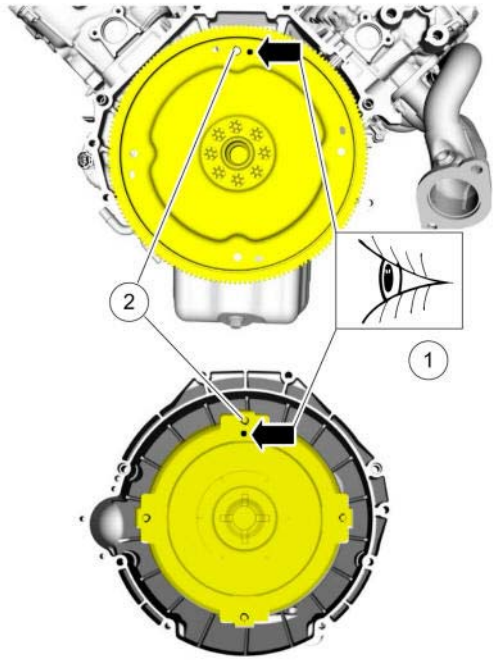
3.

1.

Inspect the torque converter stud and flexplate for paint marks.

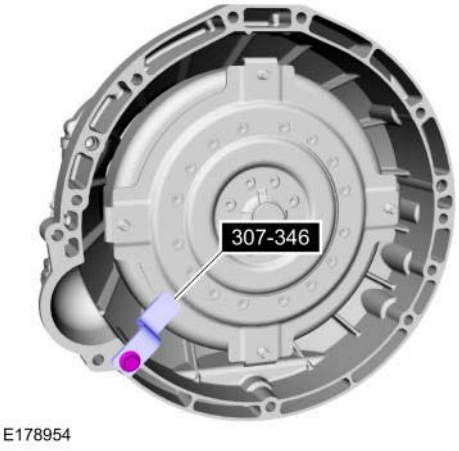
2.

Align the torque converter stud and flexplate hole near the paint marks to the 12 o'clock position.



4.

Install the special tool. Use Special Service Tool: 307-346 (T97T-7902-A) Retainer, Torque Converter.



NOTE: If transmission was disassembled, add transmission fluid to the transmission.

NOTE: If transmission is being replaced, remove the transmission fluid fill plug

and verify that the transmission is filled with transmission fluid.

5.

1.

Remove the transmission fluid fill plug transmission fluid level indicator assembly.

Torque

: 19 lb.ft (26 Nm)

2.

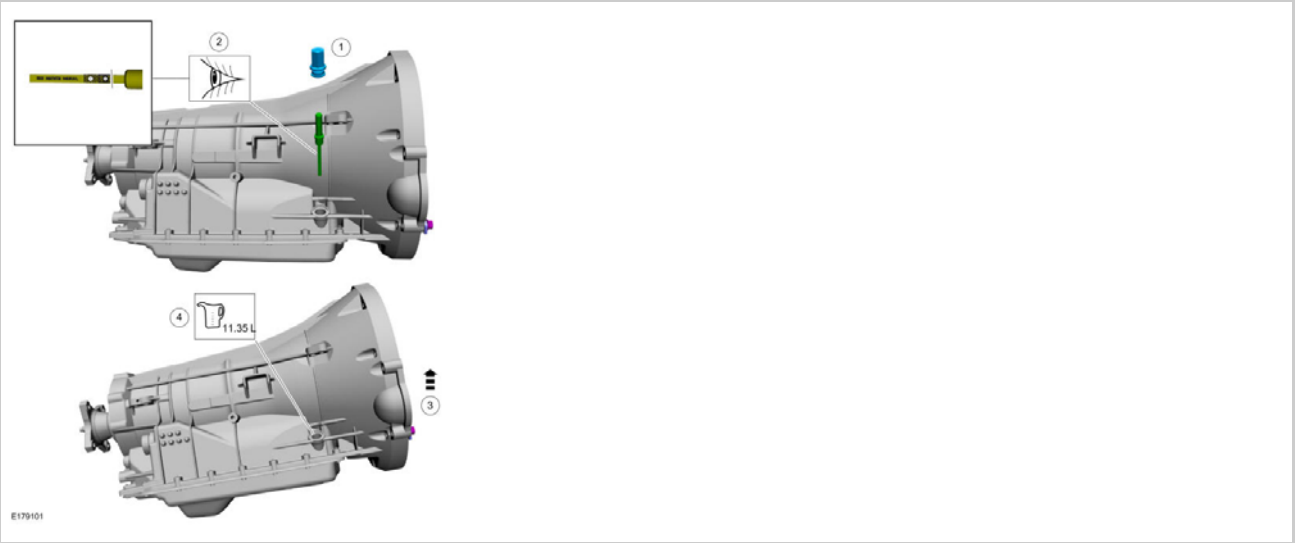
Verify transmission is filled with transmission fluid.

3.

Slightly tilt the transmission rearward.

4.

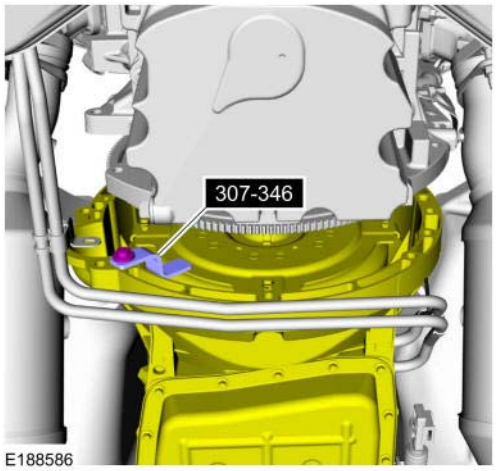
If the transmission was disassembled, add 11.35L (12 qt) of transmission fluid to the transmission through the transmission fluid fill hole.



NOTE: Make sure the transmission jack contacts the outer ribs of the transmission fluid pan.

NOTE: Secure the transmission to the transmission jack with a safety strap.

6.
Using a high-lift transmission jack, position the transmission into the vehicle behind the engine and remove the special tool. Use Special Service Tool: 307-346 (T97T-7902-A) Retainer, Torque Converter. Use the General Equipment: Transmission Jack



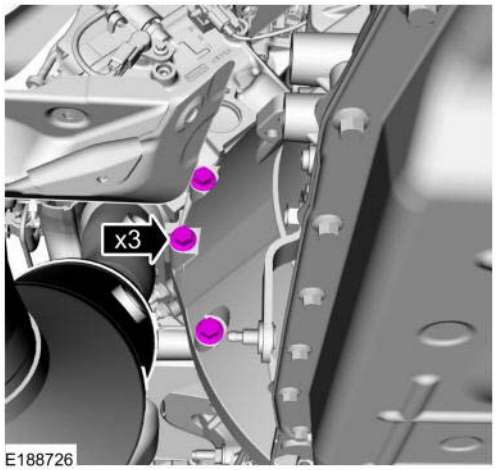
NOTE: With the transmission in a horizontal position, move it toward the engine and position it on the dowel pins.

NOTE: Make sure the torque converter is fully seated in the transmission before aligning the transmission to the engine.

7.
Install the LH side bellhousing bolts.

Torque

: 35 lb.ft (48 Nm)

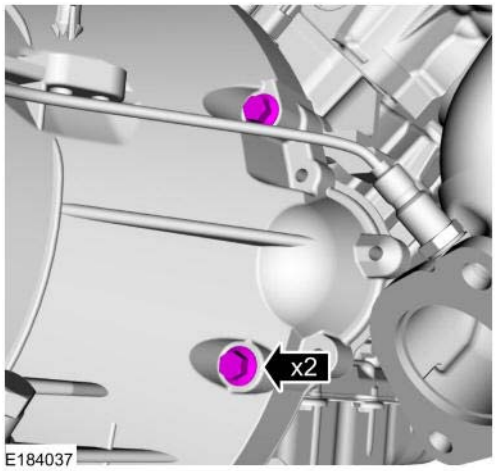


8.

Install the RH side bellhousing bolts.

Torque

: 35 lb.ft (48 Nm)

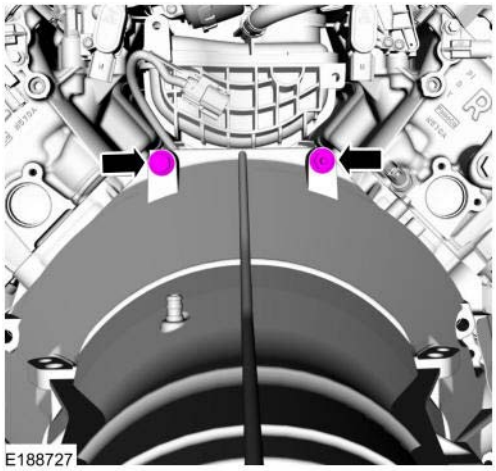


9.

Install the upper bellhousing bolt and stud bolt.

Torque

: 35 lb.ft (48 Nm)

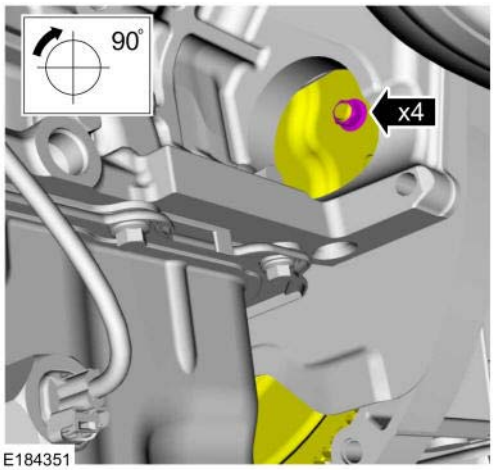


NOTE: Only rotate the crankshaft in a clockwise direction.

10.
Install the new torque converter nuts.

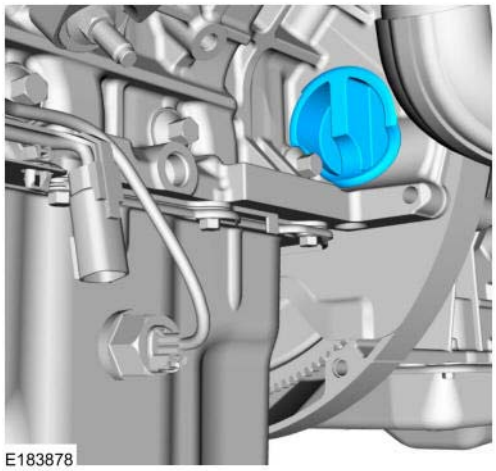
Torque

: 35 lb.ft (48 Nm)



11.

Install the rubber access plug.

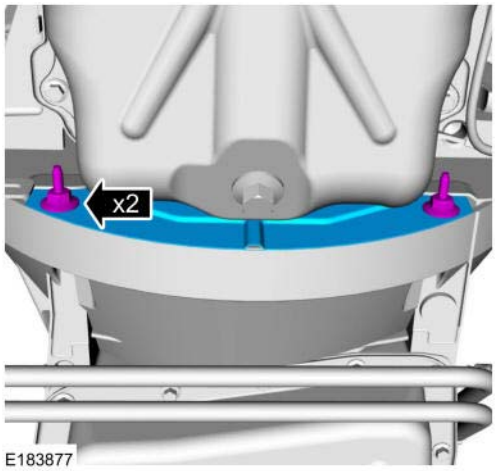


12.

Install the flexplate inspection cover and the stud bolts.

Torque

: 35 lb.ft (48 Nm)



13.

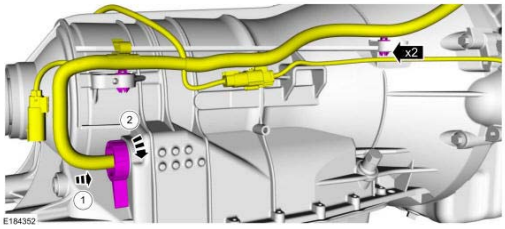
1.

Push the transmission electrical connector in to connect.

2.

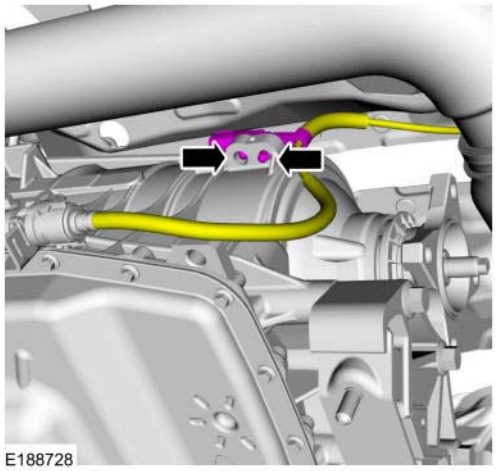
Rotate the transmission electrical connector clockwise.

Attach the wiring harness retainers.



14.

Connect the selector lever cable and wiring harness retainers to the transmission case.



15.

Install the transmission support crossmember. Refer to: Transmission Support Crossmember .

16.

1.

Connect the selector lever cable to the bracket.

2.

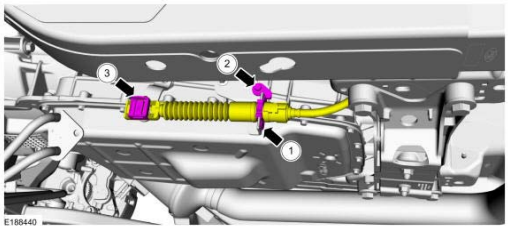
Install the bolt.

Torque

: 62 lb.in (7 Nm)

3.

Connect the selector lever cable to the selector lever.

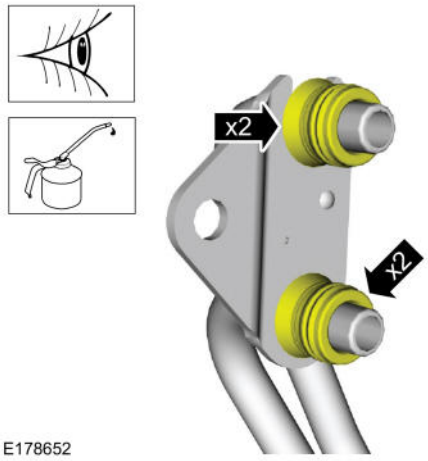


NOTE: Lubricate with clean transmission fluid.

17.
Inspect the transmission fluid cooler tube band seals and backing rings for damage, replace if necessary.

Material

: Motorcraft ® MERCON ® LV Automatic Transmission Fluid (U.S.) / XT-10-QLVC (U.S.) (MERCON ® LV) (WSS-M2C938-A)

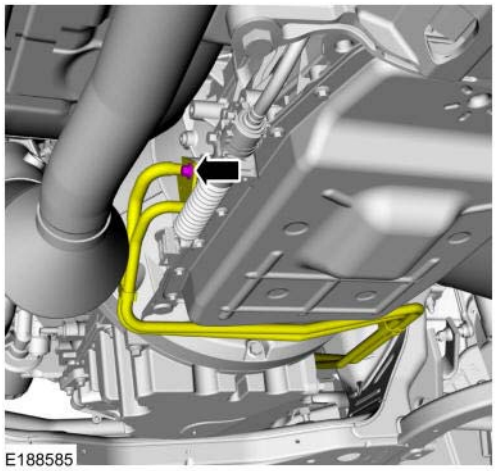


18.

Install the transmission fluid cooler tubes and the new bolt.

Torque

: 18 lb.ft (25 Nm)

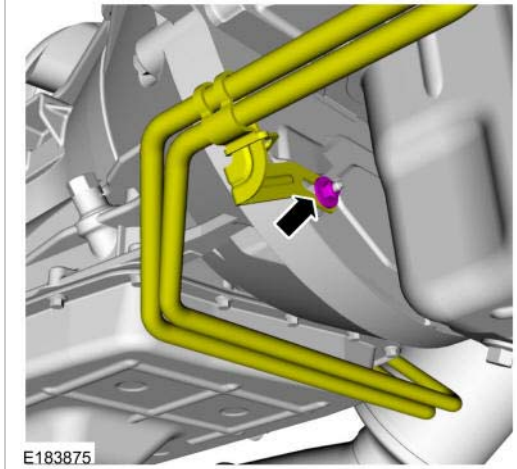


19.

Install the transmission cooling tube bracket and nut.

Torque

: 124 lb.in (14 Nm)



20.

> *NOTE: Vehicles are equipped with either an underbody shield or a subframe bracket and underbody shield assembly.*

1.
Install the underbody shield and the bolts.

Torque

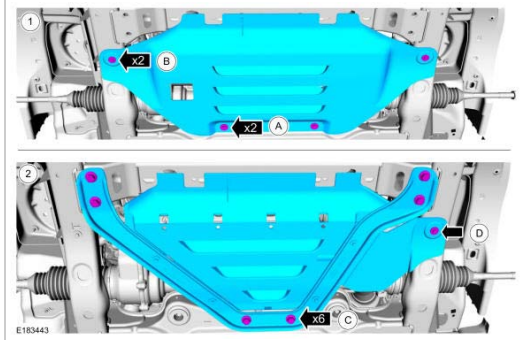
: A: 97 lb.in (11 Nm) B: 18 lb.in (2 Nm)

2.

Install the subframe bracket and underbody shield assembly and the bolts.

Torque

: C: 46 lb.ft (63 Nm) D: 18 lb.in (2 Nm)



21.

Install the LH HO2S and the LH catalyst monitor sensor. Refer to: Heated Oxygen Sensor (HO2S) . Refer to: Catalyst Monitor Sensor .

22.

Install the following items:

Refer to: Catalytic Converter RH .

Refer to: Driveshaft .

Refer to: Starter Motor .

23.

Verify the selector lever cable is correctly adjusted. Refer to: Selector Lever Cable Adjustment .

24.

After completing the repairs, perform the Misfire Monitor Neutral Profile Correction procedure using a diagnostic scan tool.

25.

If a new transmission or a new main control was installed, the solenoid body strategy must be updated. Refer to: Transmission Strategy Download .

26.

If the transmission was overhauled, the adaptive learning drive cycle must be updated. Refer to: Adaptive Learning Drive Cycle .

27.

While driving the vehicle, use the scan tool to verify that the TFT has reached a temperature of 96.7 °C-102 °C (206 °F-215 °F). This will circulate the transmission fluid through the torque converter and the transmission fluid cooling system, eliminating any trapped air in the transmission fluid cooling system.

28.

Check the transmission fluid level. Refer to: Transmission Fluid Level Check .

REMOVAL AND INSTALLATION > TRANSMISSION FLUID PAN, GASKET AND FILTER

Materials

Name	Specification
Motorcraft ® MERCON ® LV Automatic Transmission Fluid (U.S.) XT-10-QLVC (U.S.)	MERCON ® LVWSS-M2C938-A

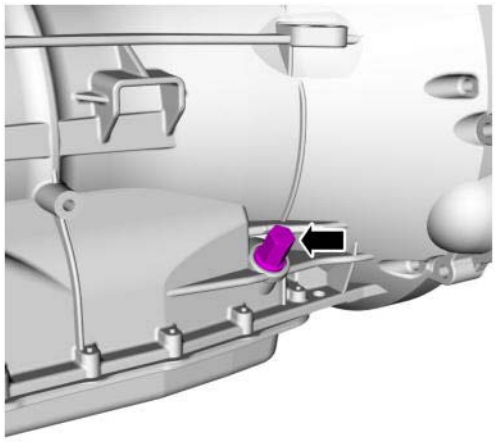
REMOVAL AND INSTALLATION > TRANSMISSION FLUID PAN, GASKET AND FILTER > REMOVAL

1.

With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

2.

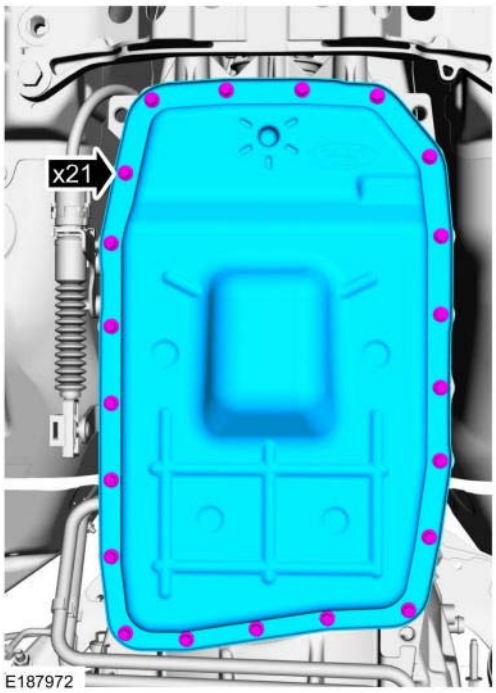
Remove the transmission fluid fill plug transmission fluid level indicator assembly.



E181871

3.

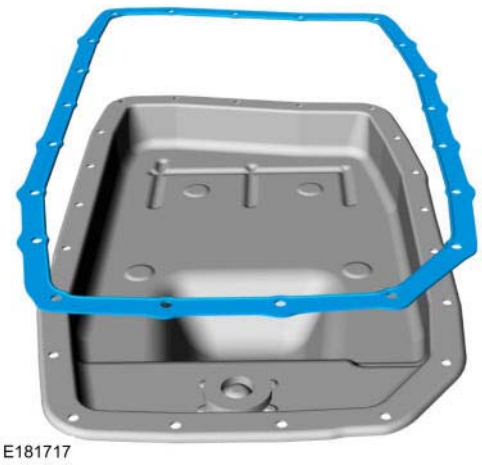
Remove the transmission fluid pan bolts and the transmission fluid pan and allow the transmission fluid to drain.



E187972

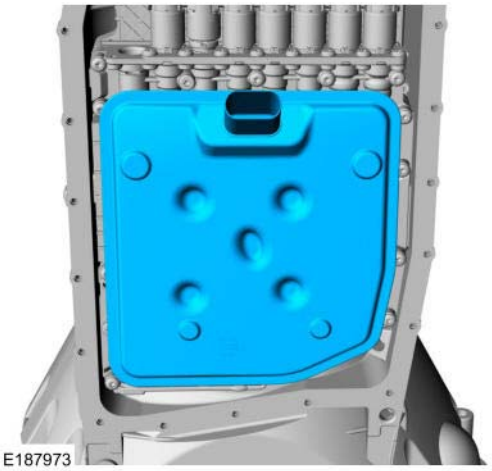
4.

Remove the transmission fluid pan gasket.


E181717

NOTE: The transmission fluid filter may be reused if no excessive contamination is indicated.

5.
Remove the transmission fluid filter.


E187973

6.

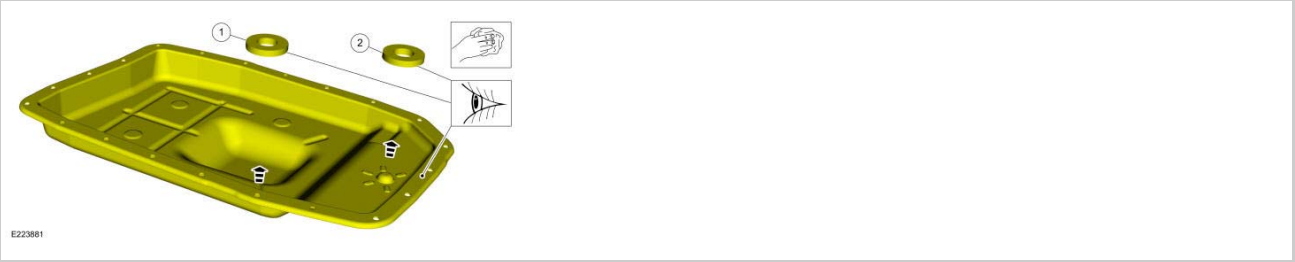
Clean and inspect the transmission fluid pan and magnet(s).

1.

Late build transmissions

2.

All transmissions



REMOVAL AND INSTALLATION > TRANSMISSION FLUID PAN, GASKET AND FILTER > INSTALLATION

1.

Inspect the transmission pump bore for the transmission fluid filter seal. If the seal is in the pump, carefully remove the seal without scratching the transmission pump bore.

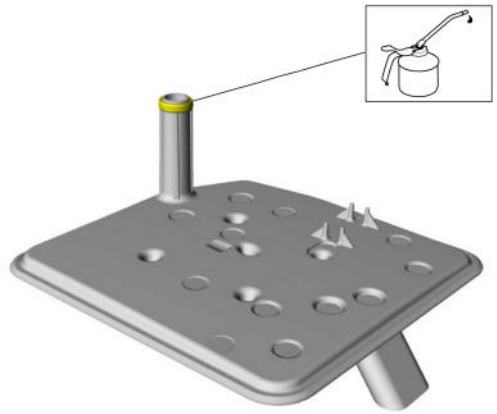


2.

Make sure that the seal is on the transmission fluid filter and lubricate the seal with automatic transmission fluid.

Material

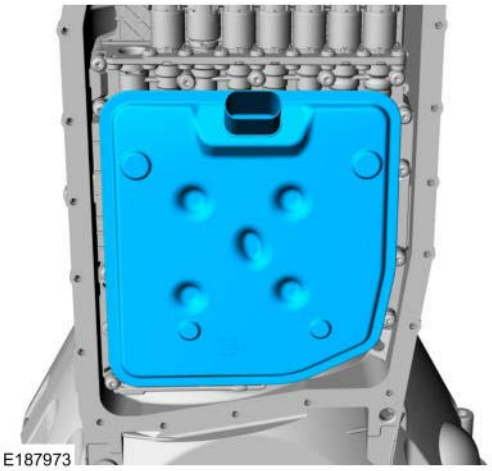
: Motorcraft ® MERCON ® LV Automatic Transmission Fluid (U.S.) / XT-10-QLVC (U.S.) (MERCON ® LV) (WSS-M2C938-A)



E181721

NOTE: The transmission fluid filter may be reused if no excessive contamination is indicated.

3.
If required, install a new transmission fluid filter.



E187973

4.

Position the magnet(s) in the transmission fluid pan.

1.

Late build transmissions

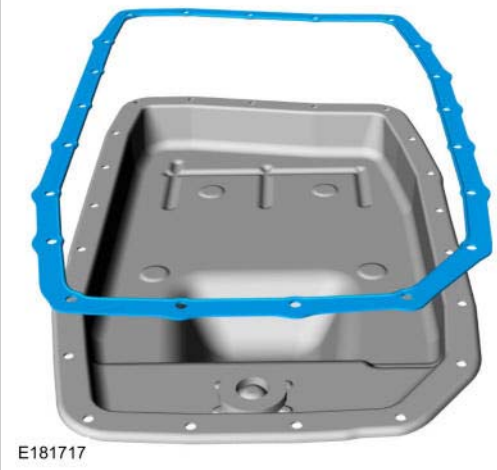
2.

All transmissions



NOTE: The transmission fluid pan gasket can be reused if not damaged.

5.
Install a new transmission fluid pan gasket if required.

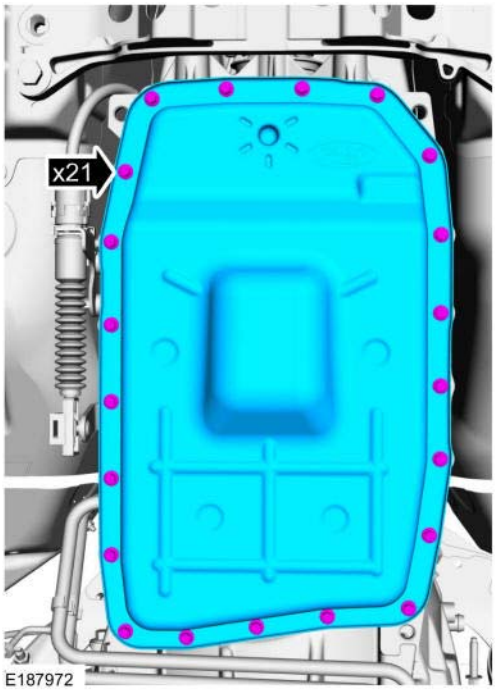


NOTE: Tighten the transmission fluid pan bolts in a crisscross pattern.

6.
Install the transmission fluid pan and tighten the bolts in a crisscross pattern.

Torque

: 80 lb.in (9 Nm)



7.

Fill and check the transmission fluid. Refer to: Transmission Fluid Drain and Refill .

REMOVAL AND INSTALLATION > TRANSMISSION SUPPORT INSULATOR

Special Tool(s) / General Equipment

Vehicle/Axle Stands
Wooden Block

REMOVAL AND INSTALLATION > TRANSMISSION SUPPORT INSULATOR > REMOVAL

1.

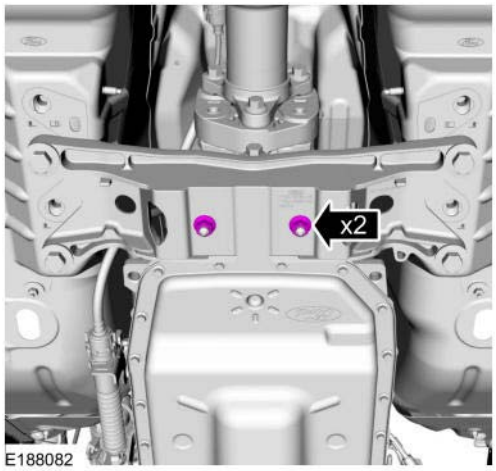
With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

2.

Remove the transmission support insulator nuts.

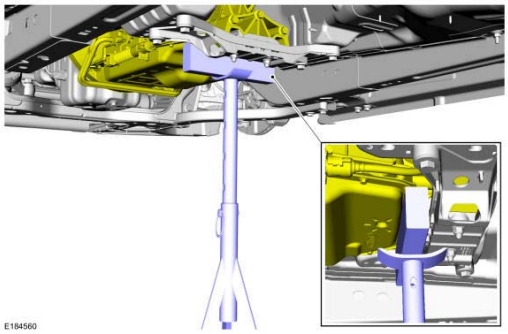
Torque

: 59 lb.ft (80 Nm)



NOTE: Make sure the jackstand and wooden block makes contact on the outer rib of the transmission fluid pan.

3.
Using a jackstand and a wooden block, support the transmission.Use the General Equipment: Vehicle/Axle Stands Use the General Equipment: Wooden Block

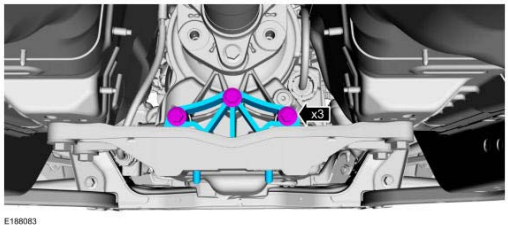


4.

Remove the bolts and the transmission support insulator.

Torque

: 76 lb.ft (103 Nm)



REMOVAL AND INSTALLATION > TRANSMISSION SUPPORT INSULATOR > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > MAIN CONTROL VALVE BODY

Special Tool(s) / General Equipment

 E173280	307-717 Remover, Kostal Sleeve TKIT-2013B-FL TKIT-2013B-ROW

REMOVAL AND INSTALLATION > MAIN CONTROL VALVE BODY > REMOVAL

NOTE: The Solenoid Body Strategy Data Download procedure must be performed if a new main control assembly is installed.

1.

Remove the transmission fluid pan and filter. Refer to: Transmission Fluid Pan, Gasket and Filter .

NOTE: Do not pull on the wiring harness to disconnect the electrical connector or damage to the electrical connector will occur.

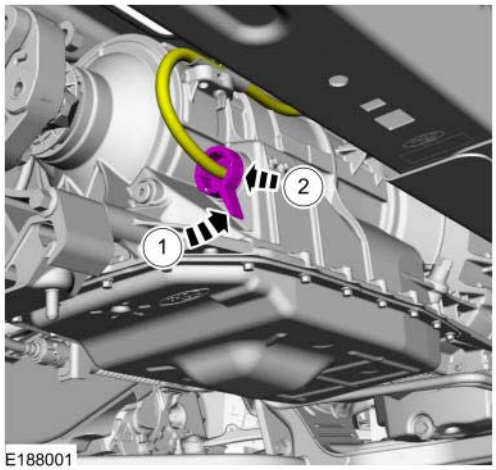
2.

1.

Rotate the transmission electrical connector counterclockwise.

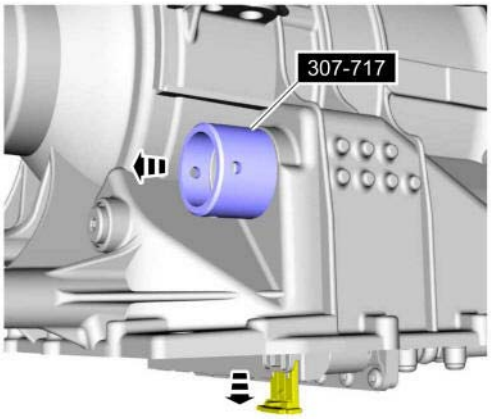
2.

Pull the transmission electrical connector out to disconnect.



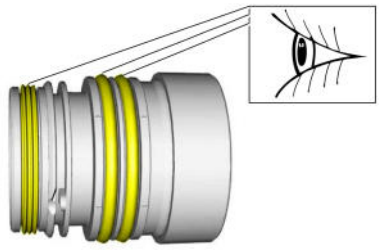
3.

Pull the transmission bulkhead connector sleeve retainer down to release it. Using the special tool, pull the outer shell of the bulkhead connector sleeve out of the transmission. Use Special Service Tool: 307-717 Remover, Kostal Sleeve.



4.

Inspect the bulkhead connector sleeve seals and install new seals if damage is found.



NOTE: During removal of the main control assembly, the thermal bypass valve or

blank plug can fall out of the transmission case. Damage to the valve or plug can occur if the valve or plug falls out.

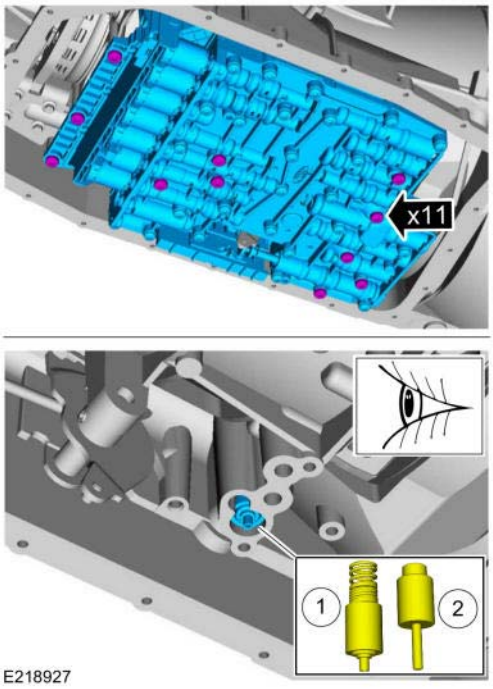
5.
Remove the bolts from the main control assembly and remove the main control assembly and the thermal bypass valve or blank plug. Inspect the thermal bypass valve for damage and discard the valve if damage is found.

NOTE: Vehicles without transmission fluid warmer.

1.
Thermal bypass valve

NOTE: Vehicles equipped with transmission fluid warmer.

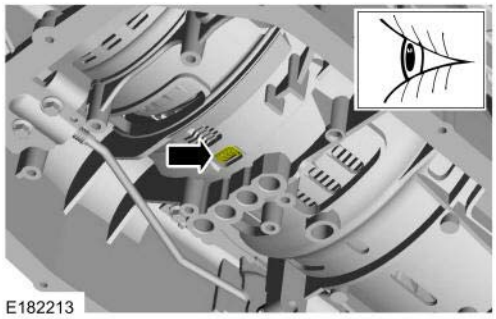
2.
Blank plug



REMOVAL AND INSTALLATION > MAIN CONTROL VALVE BODY > INSTALLATION

1.

Inspect the bias spring to make sure it is positioned correctly in the transmission case.



NOTE: Before installing the main control assembly into the transmission case, verify the presence and orientation of the center support feed tube seals. Also note that one or more of the center support feed tube seals may have remained in the main control assembly during removal and should be installed into the transmission case at this time.

2.

1.

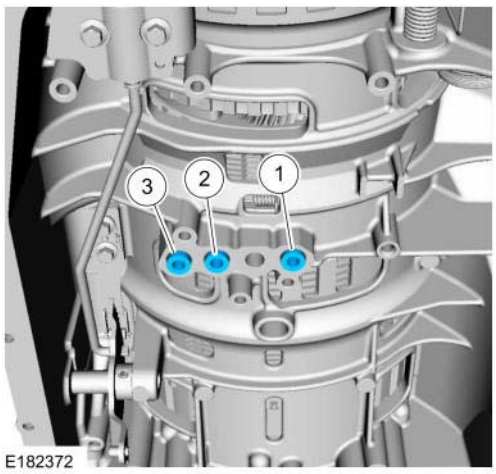
Center support feed tube seal (7G199 Black)

2.

Center support feed tube seal (7G087 Green or Orange)

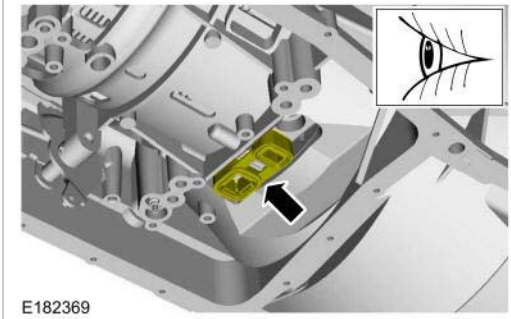
3.

Center support feed tube seal (7G084 Blue)



3.

Verify the rubber adapter is in place.



4.

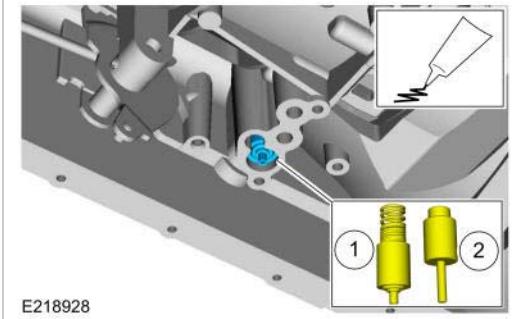
Material: Petroleum JellyCoat the thermal bypass valve or plug with petroleum jelly to hold it in place and install the thermal bypass valve or plug into the transmission case.

NOTE: Vehicles without transmission fluid warmer.

1.
Thermal bypass valve

NOTE: Vehicles equipped with transmission fluid warmer.

2.
Blank plug



NOTE: The main control will not rest flush on the on the transmission case, this is a normal condition with the rubber feed tubes, the bolts will pull the main control assembly to the case.

5.

1.

Align the guide pins on the main control with the alignment holes in the transmission case.

2.

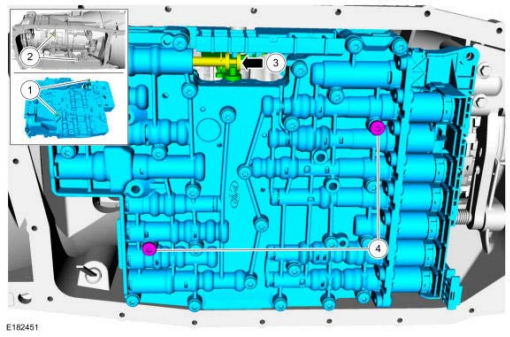
Alignment holes.

3.

Align the manual valve with the manual valve pin.

4.

Loosely install the 2 bolts.



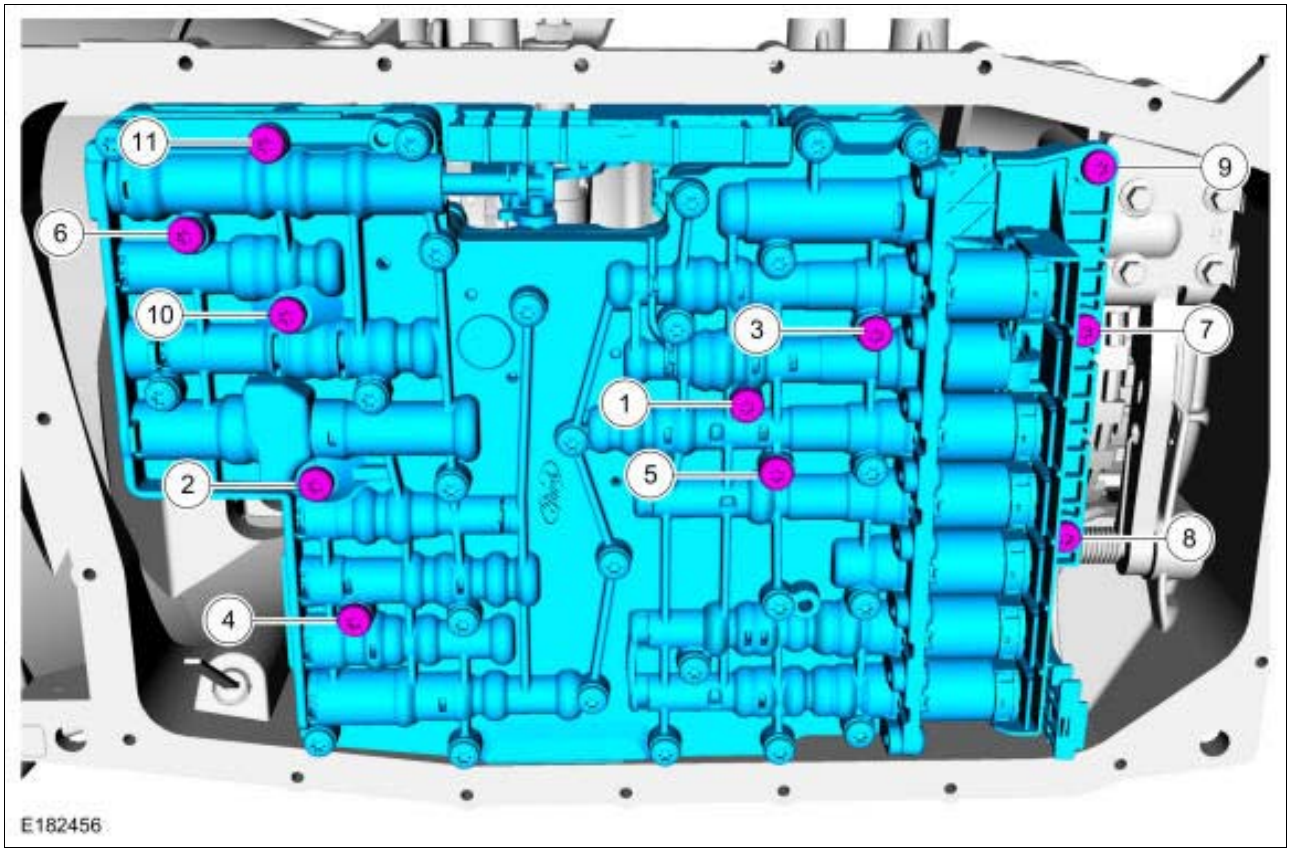
6.

Install the main control valve body bolts and tighten in the sequence shown.

Torque

: 71 lb.in (8 Nm)

Fig 1: Main Control Valve Body Bolts Tightening Sequence



Courtesy of FORD MOTOR CO.

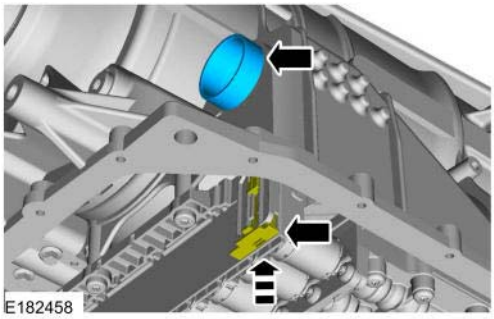
7.

If removed, install the bulkhead connector sleeve seals.



8.

With the release tab down and unlocked, push the outer shell of the bulkhead electrical connector into the transmission. Make sure the bulkhead connector is fully seated into the molded leadframe. Push up on the tab and lock the outer shell of the bulkhead electrical connector in place. Make sure the locking tab is securely locked.



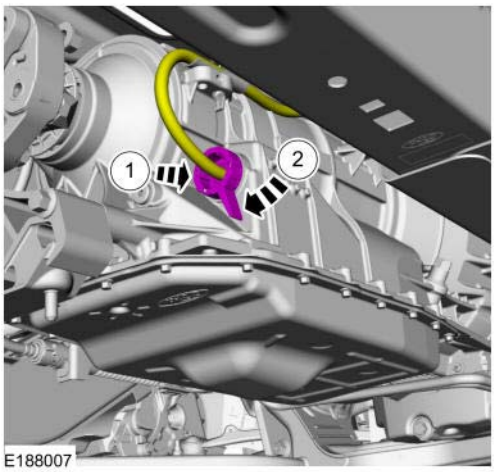
9.

1.

Connect the transmission electrical connector.

2.

Rotate the transmission electrical connector clockwise to lock it.



10.

Install the transmission fluid pan and filter. Refer to: Transmission Fluid Pan, Gasket and Filter .

NOTE: If an individual solenoid was replaced clear the adaptive strategy.

11.
If any of the solenoids were replaced, Perform a Road Test - Adaptive Drive Cycle after the adaptive strategy is cleared. Refer to: Adaptive Learning Drive Cycle .

NOTE: The solenoid body strategy data file and solenoid body identification must be updated anytime a new solenoid body is installed. A new solenoid body service tag must be installed over the current solenoid body service tag on top of the transmission

case.

12.
If a new main control was installed, download a new transmission strategy. Refer to: Transmission Strategy Download .

REMOVAL AND INSTALLATION > OUTPUT SHAFT SEAL

Special Tool(s) / General Equipment

 E216593	205-199 (T83T-3132-A1) Installer, Spindle/Axle Shaft T83-4000-AT KIT-1983-F TKIT-1983-FLM TKIT-1983-FX
 E181073	307-715Installer, Output Seal (4X2) TKIT-2013B-FL TKIT-2013B-ROW
Punch	

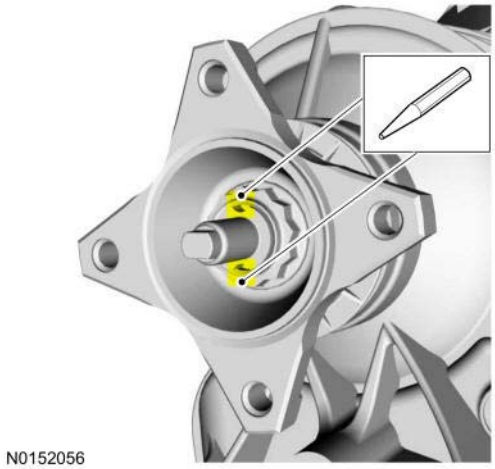
REMOVAL AND INSTALLATION > OUTPUT SHAFT SEAL > REMOVAL

1.

Remove the driveshaft. Refer to: Driveshaft .

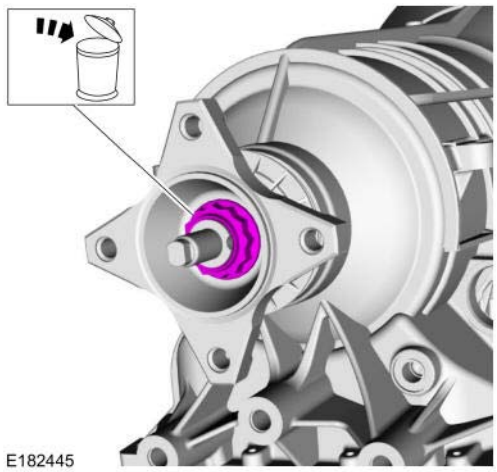
NOTE: The output shaft flange retaining nut has been staked to prevent it from coming loose. Prior to removing the nut, remove the stake to prevent damage to the output shaft.

2.
Remove the stakes from the output shaft flange retaining nut. Use the General Equipment: Punch



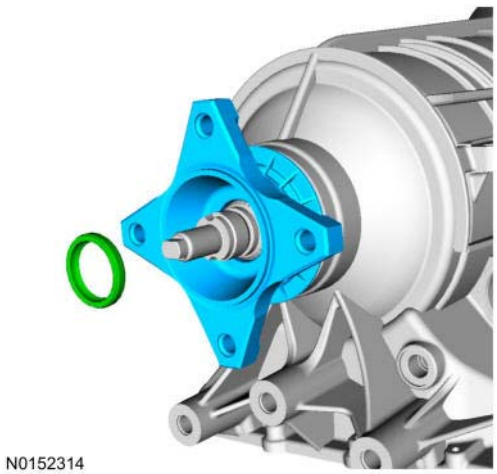
3.

Remove and discard the output shaft flange retaining nut.



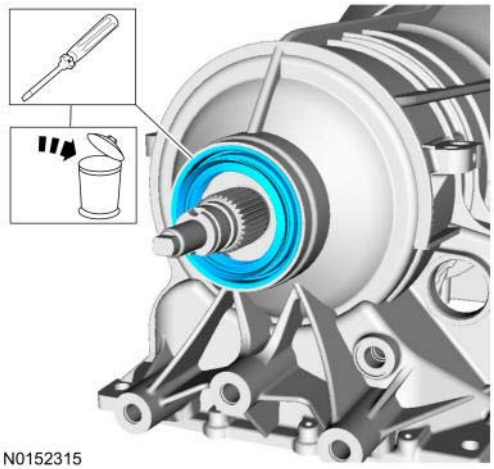
4.

Remove the output shaft flange seal and the output shaft flange.



5.

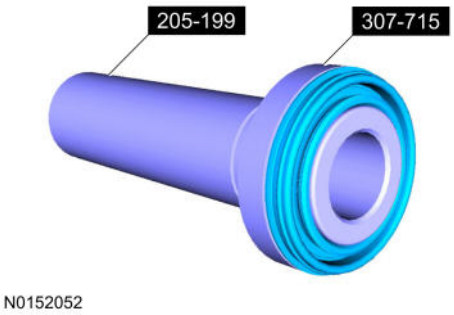
Remove and discard the output shaft seal.



REMOVAL AND INSTALLATION > OUTPUT SHAFT SEAL > INSTALLATION

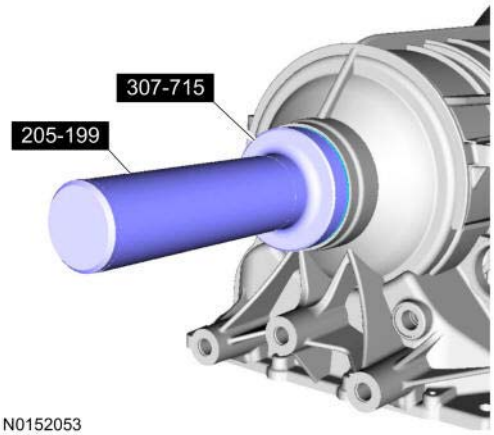
1.

Position a new output shaft seal on the special tool. Use Special Service Tool: 205-199 (T83T-3132-A1)Installer, Spindle/Axle Shaft., 307-715Installer, Output Seal (4X2).



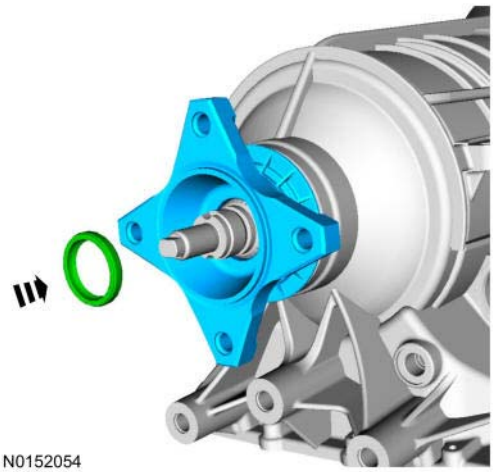
2.

Using the special tool, install the output shaft seal.Use Special Service Tool: 205-199 (T83T-3132-A1) Installer, Spindle/Axle Shaft., 307-715 Installer, Output Seal (4X2).



3.

Install the output shaft flange and the output shaft flange seal.

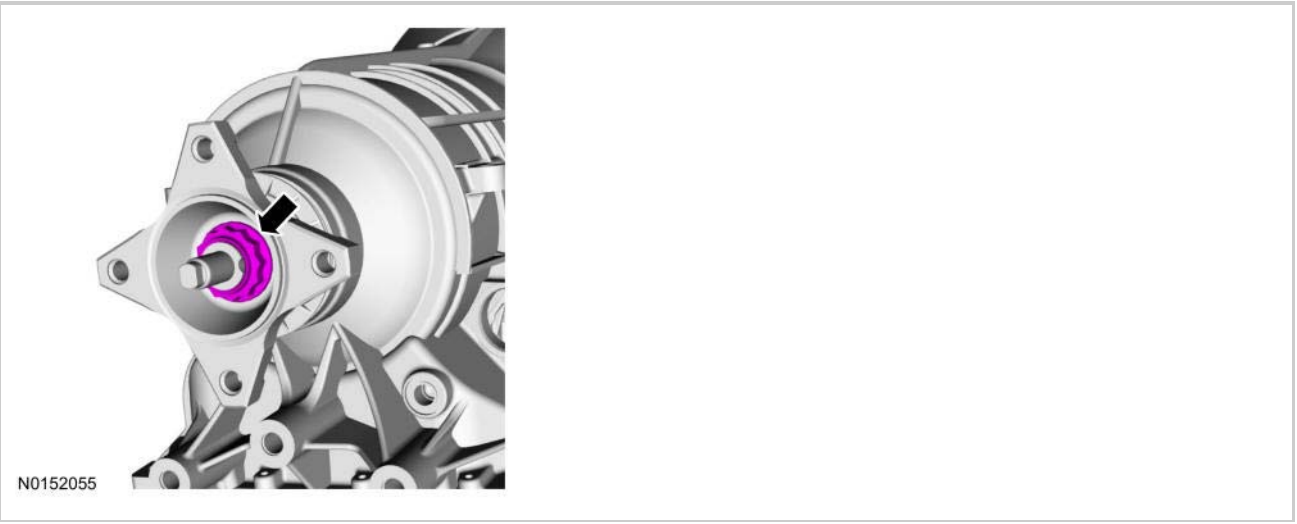


4.

Install the new output shaft flange retaining nut.

Torque

: 59 lb.ft (80 Nm)



5.

After installing the output shaft flange retaining nut, stake the slots to prevent it from coming loose. Use the General Equipment: Punch



6.

Install the driveshaft. Refer to: Driveshaft .

7.

Check the transmission fluid level. Refer to: Transmission Fluid Level Check .

REMOVAL AND INSTALLATION > SELECTOR SHAFT SEAL

Special Tool(s) / General Equipment

 E142021	307-559 Installer, Shifter Fluid Seal TKIT-2005U-FLM TKIT-2005U-LM TKIT-2006U-FLM/LM TKIT-2006UF/FM

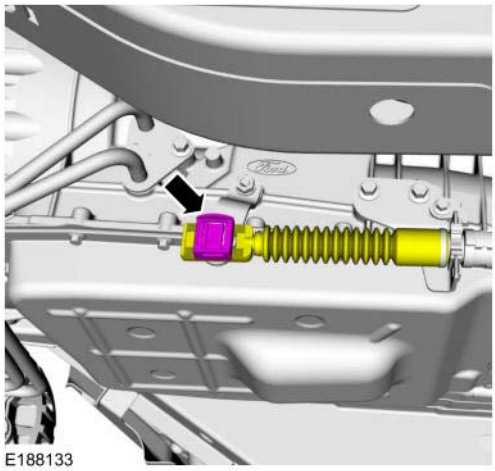
REMOVAL AND INSTALLATION > SELECTOR SHAFT SEAL > REMOVAL

1.

With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

NOTE: To prevent selector lever cable damage, do not apply force to the selector lever cable between the selector lever and the selector lever cable bracket.

2.
Disconnect the transmission selector lever cable end from the selector lever.

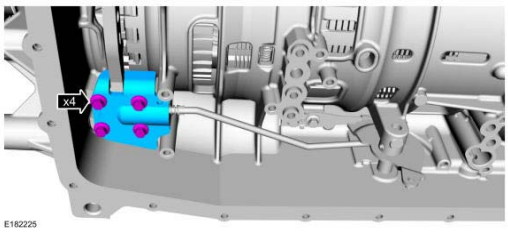

E188133

3.

Remove the main control valve body. Refer to: Main Control Valve Body .

4.

Remove the bolts and the park rod actuating plate.



E182225

5.

1.

Remove and discard the roll pin.

2.

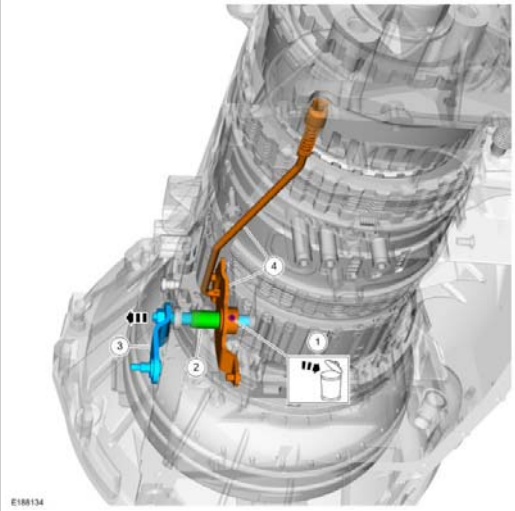
Hold the selector lever spacer to keep it from falling.

3.

Slide the selector lever shaft out of the case.

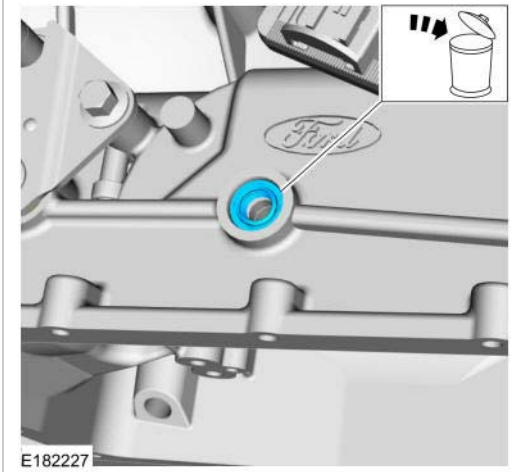
4.

Remove the manual valve detent lever and park pawl actuator rod as an assembly.



6.

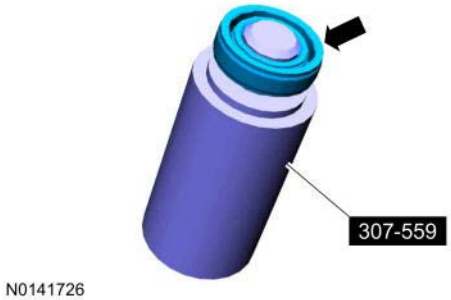
Remove and discard the selector shaft seal.



REMOVAL AND INSTALLATION > SELECTOR SHAFT SEAL > INSTALLATION

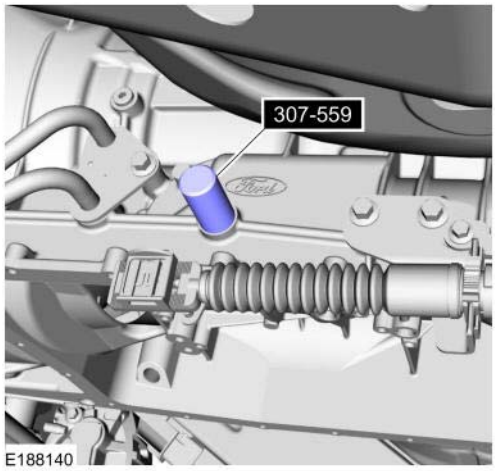
1.

Install a new selector shaft seal on the special tool. Use Special Service Tool: 307-559 Installer, Shifter Fluid Seal.



2.

Using the special tool, install the selector shaft seal. Use Special Service Tool: 307-559 Installer, Shifter Fluid Seal.



3.

NOTE: Push on the park pawl to position the park pawl actuator rod in place.

1.
Install the manual valve detent lever and park pawl actuator rod as an assembly.

2.

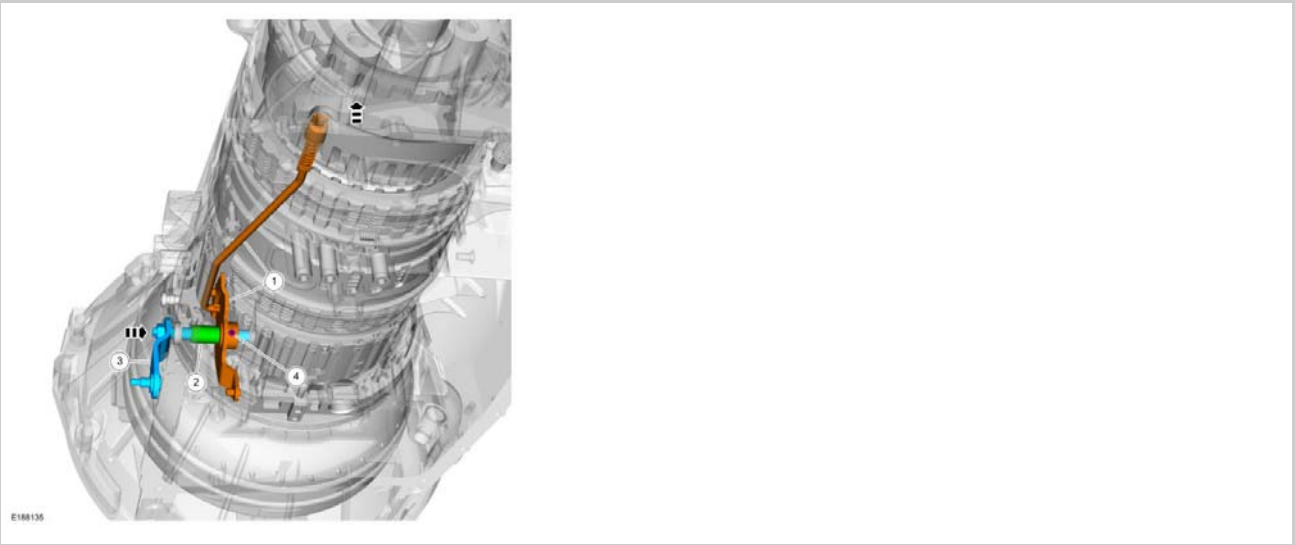
Position the selector lever spacer in place.

3.

Slide the selector lever shaft into the case and line up the roll pin hole.

4.

Install the new roll pin.

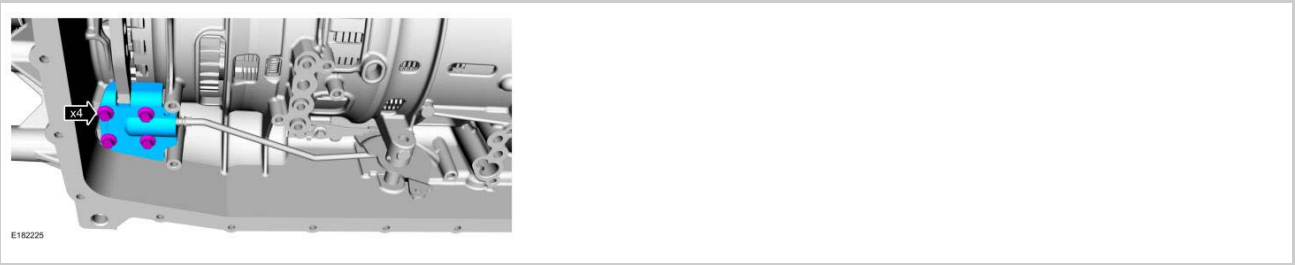


4.

While holding the park rod down, install the park rod actuating plate and bolts.

Torque

: 106 lb.in (12 Nm)

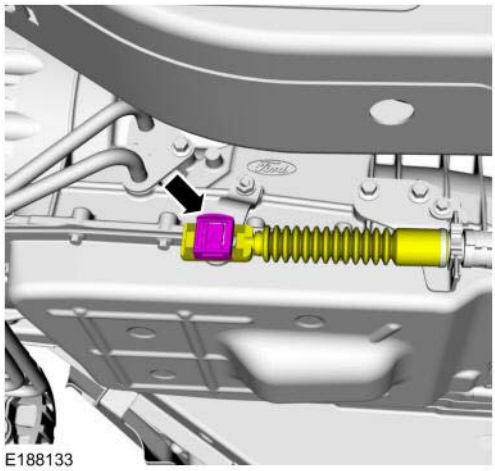


5.

Install the main control valve body. Refer to: Main Control Valve Body .

NOTE: To prevent selector lever cable damage, do not apply force to the selector lever cable between the selector lever and the selector lever cable bracket.

6.
Install the selector lever cable end on the selector lever.



REMOVAL AND INSTALLATION > SHIFT SOLENOIDS (SS)

Materials

Name	Specification
Motorcraft ® MERCON ® LV Automatic Transmission Fluid (U.S.) XT-10-QLVC (U.S.)	MERCON ® LVWSS-M2C938-A

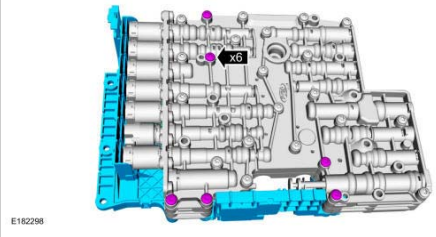
REMOVAL AND INSTALLATION > SHIFT SOLENOIDS (SS) > REMOVAL

1.

Remove the main control valve body. Refer to: Main Control Valve Body .

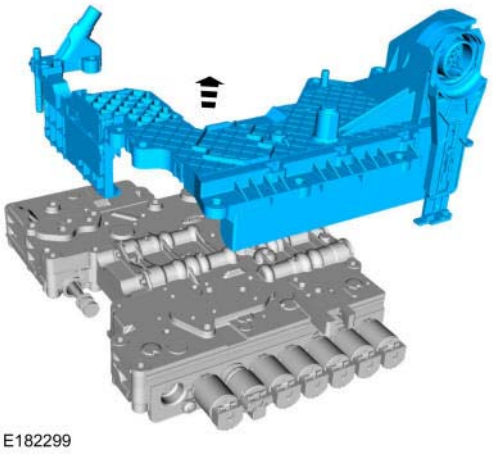
2.

Remove the long bolts from the molded leadframe.



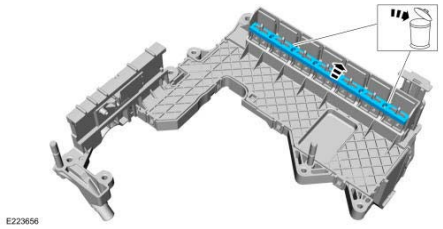
3.

Carefully separate the molded leadframe from the main control valve body assembly.



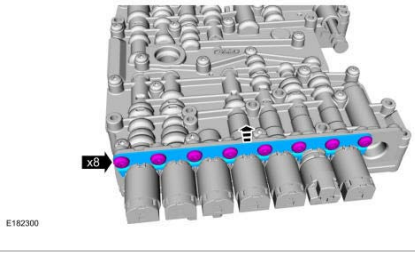
4.

If equipped, remove and discard the foam strip seal.



5.

Remove the solenoid bracket bolts and the solenoid bracket.



NOTE: A Variable Force Solenoid (VFS) is calibrated from the factory and are not all the same. To replace a Variable Force Solenoid (VFS), match the replacement solenoid nozzle color and the band number with the original solenoid or harsh/erratic shifts, harsh/soft engagement or damage to the transmission can occur.

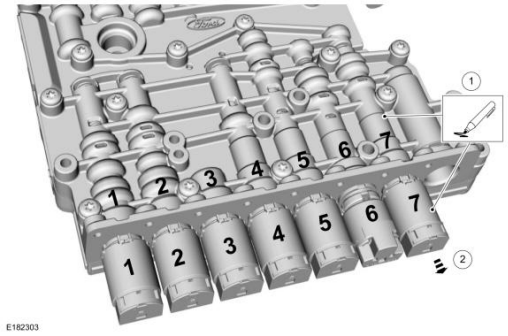
6.

1.

If replacing more then one solenoid, number the solenoids and number the main control valve body solenoid ports to correspond to the solenoid.

2.

Pull the solenoid(s) out of the main control valve body.



REMOVAL AND INSTALLATION > SHIFT SOLENOIDS (SS) > INSTALLATION

NOTE: A Variable Force Solenoid (VFS) is calibrated from the factory and are not all the same. To replace a Variable Force Solenoid (VFS), match the replacement solenoid nozzle color and the band number with the original solenoid or harsh/erratic shifts, harsh/soft engagement or damage to the transmission can occur.

NOTE: Identify what type of solenoid is being replaced. The solenoid can be a normally high Variable Force Solenoid (VFS) with a black nozzle, normally low Variable Force Solenoid (VFS) with a brown nozzle or an ON/OFF solenoid.

1.

1.

7G383, SSA, Forward (1, 2, 3, 4) clutch, normally low solenoid (brown nozzle).

2.

7G383, SSB, Direct (3, 5, R) clutch, normally high solenoid (black nozzle).

3.

7G383, SSC, Intermediate (2, 6) clutch, normally low solenoid (brown nozzle).

4.

7G383, LPC solenoid, normally high solenoid (black nozzle).

5.

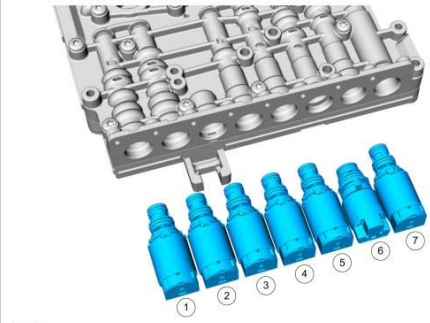
7G383, SSD, low/reverse/overdrive clutch, normally high solenoid (black nozzle).

6.

7G484, SSE, normally off ON/OFF solenoid.

7.

7G383, TCC solenoid, normally low solenoid (brown nozzle).



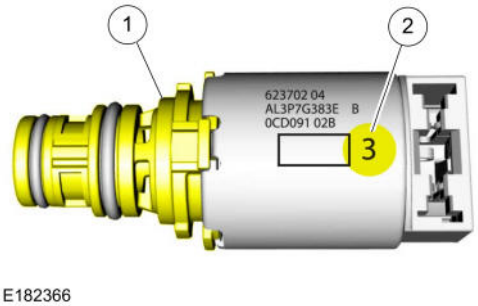
2.

1.

If replacing a Variable Force Solenoid (VFS), record the solenoid nozzle color to get the correct part number for the solenoid.

2.

If replacing a Variable Force Solenoid (VFS), record the band number to get the correct part number for the solenoid.

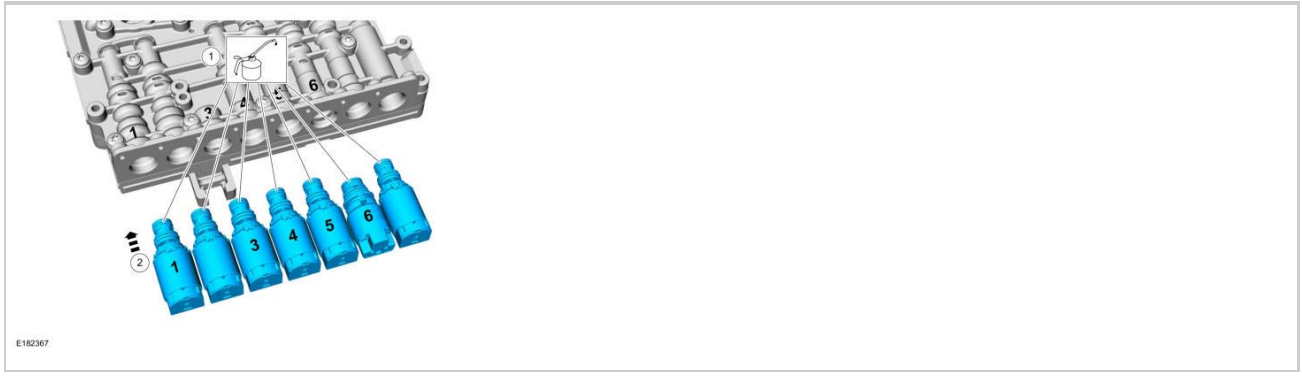


3.

Lubricate the solenoid O-rings and position the solenoid(s) in the main control valve body in the correct port(s) as marked during removal.

Material

: Motorcraft ® MERCON ® LV Automatic Transmission Fluid (U.S.) / XT-10-QLVC (U.S.) (MERCON ® LV) (WSS-M2C938-A)



4.

Position the solenoid bracket in place and install the bolts.

Torque

: 53 lb.in (6 Nm)



NOTE: Some vehicles may not have been built with a foam strip seal. A new foam strip seal should be installed on all molded leadframes.

5.
Install a new foam strip seal on the molded leadframe.



NOTE: The TR sensor pin must be aligned with the manual control valve during installation.

6.
Position the molded leadframe on the main control valve body and align the TR sensor pin with the manual control valve.



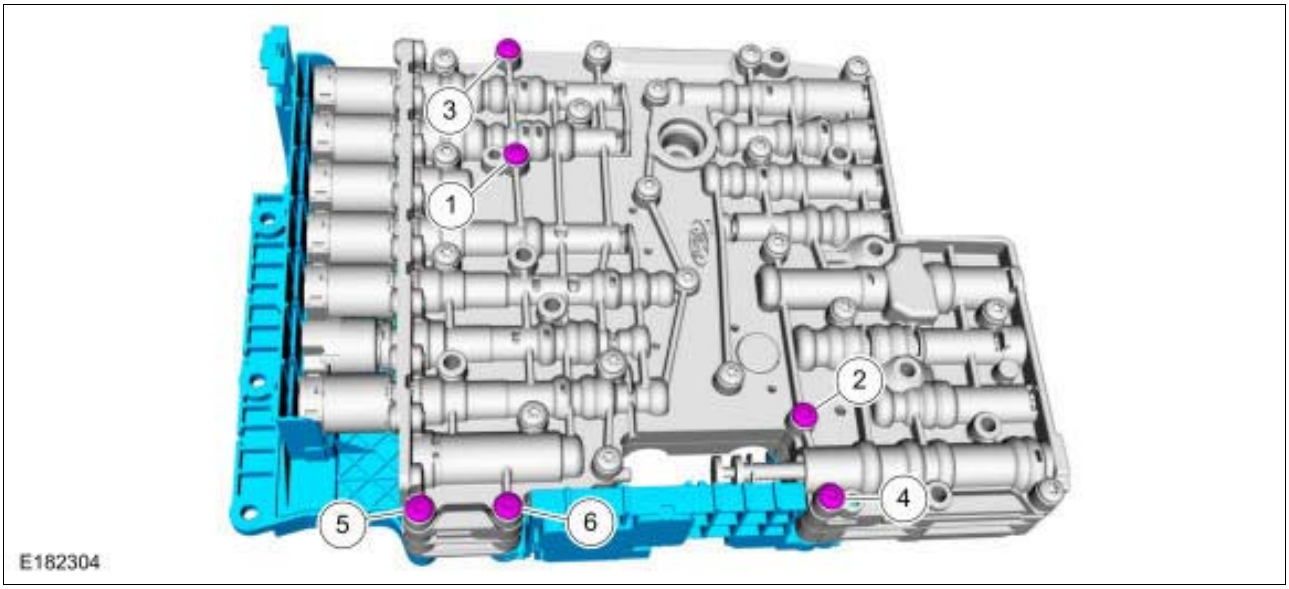
7.

Install the long bolts into the molded leadframe. Tighten the bolts in the sequence shown.

Torque

: 53 lb.in (6 Nm)

Fig 1: Molded Leadframe Bolts Tightening Sequence



Courtesy of FORD MOTOR CO.

8.

Install the main control valve body. Refer to: Main Control Valve Body .

OVERHAUL > MAIN CONTROL VALVE BODY

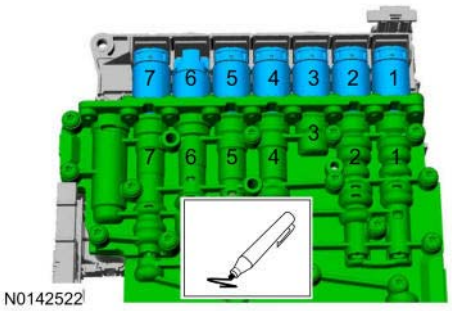
NOTE: Solenoids may visually appear the same but their designs/functions are different. Use care not to assemble the main control assembly incorrectly. Incorrect solenoid installation results in poor transmission shift quality.

NOTE: Note the location of the 8 check balls, 6 solenoid dampers, 2 internal valves and springs and 2 filter screens for reassembly.

1.

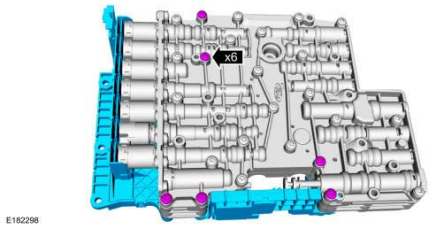
Make an identifying mark on each solenoid and the corresponding bore for correct assembly.

For solenoid and valve identification. Refer to: Main Control Valve Body .



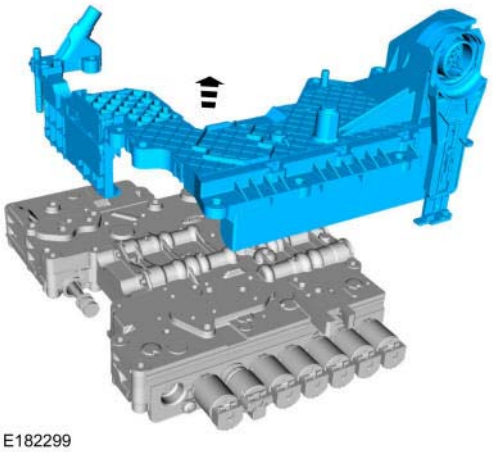
2.

Remove the long bolts from the molded leadframe.



3.

Carefully separate the molded leadframe from the main control valve body assembly.



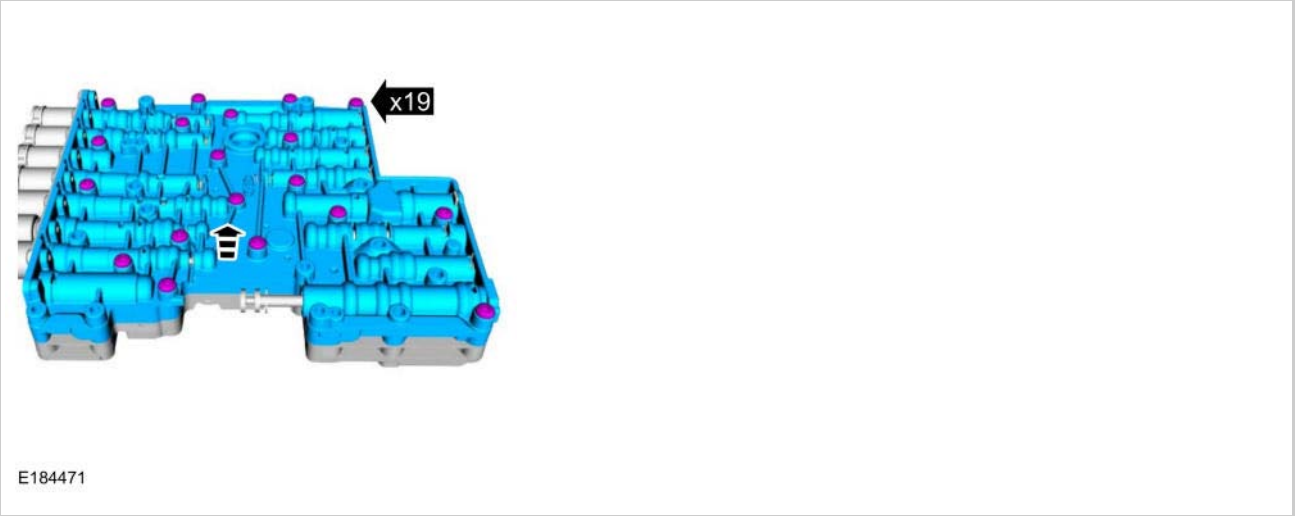
4.

If equipped, remove and discard the foam strip seal.



5.

Remove the short main control bolts from the main control assembly. Separate the lower half of the main control assembly from the upper half of the main control assembly.



6.

Remove and discard the main control valve body separator plate.



7.

Remove the solenoid dampers, check balls, converter drain back valves and filter screens from the main control assembly. Note the location for assembly.

1.

Solenoid dampers

2.

Check balls

3.

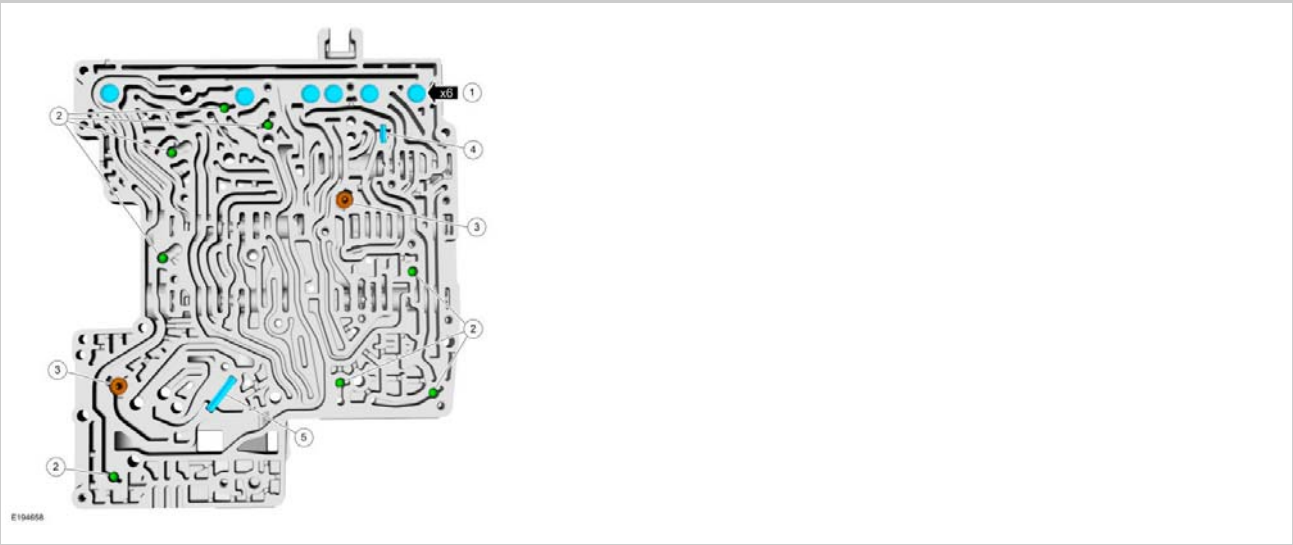
Converter drain back valves and springs

4.

Small filter screen

5.

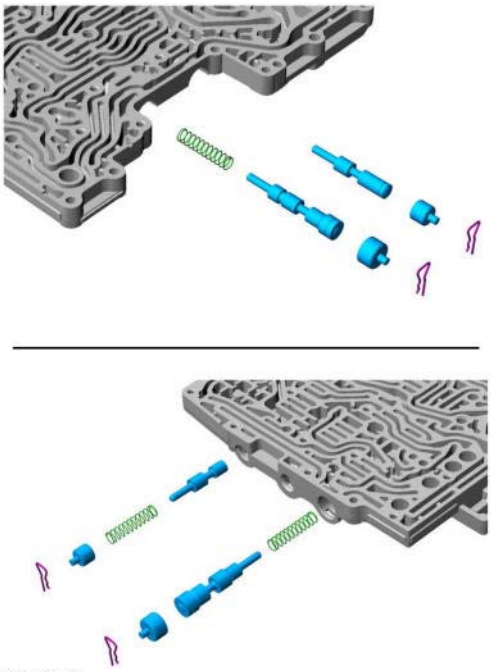
Large filter screen



NOTE: Note the location and order of the clips, caps, valves and valve springs for assembly.

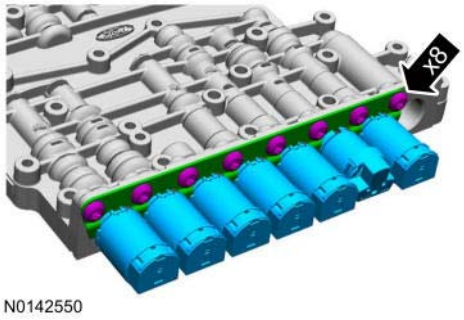
NOTE: Many components and surfaces in the main control valve body are precision machined. Careful handling during disassembly, cleaning, inspection and assembly prevents unnecessary damage to machined surfaces.

8.
Remove the retaining clips, caps, valves and valve springs from each bore of the main control assembly. Clean the main control assembly and install the clips, caps, valves and valve springs in the same order as noted during removal.



9.

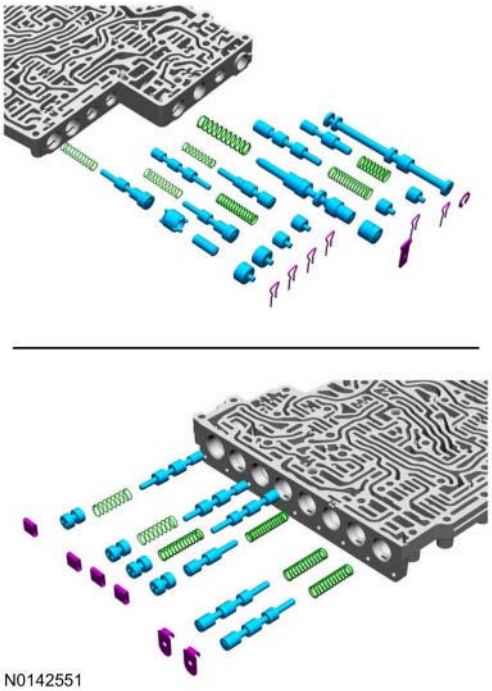
Remove the solenoids.



NOTE: Note the location and order of the clips, caps, valves and valve springs for assembly.

NOTE: Many components and surfaces in the main control valve body are precision machined. Careful handling during disassembly, cleaning, inspection and assembly prevents unnecessary damage to machined surfaces.

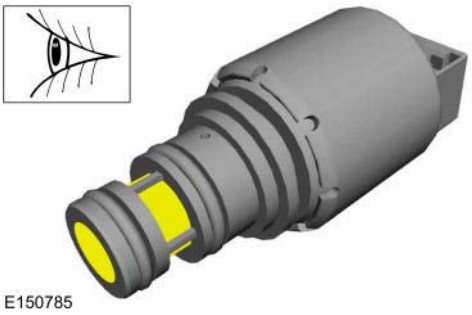
10.
Remove the retaining clips, caps, valves and valve springs from each bore of the main control assembly. Clean the main control assembly and install the clips, caps, valves and valve springs in the same order as noted during removal.



N0142551

11.

Inspect the solenoid screens for debris that may restrict fluid flow.



E150785

12.

If installing new solenoids, note the color of the plastic nozzle and the large O-ring. High pressure solenoids, such as the LPC solenoid, SSB and SSD, have black plastic nozzles and orange O-rings. Low pressure solenoids, such as the TCC solenoid, SSA and SSC, have brown plastic nozzles and green O-rings. The solenoids can only be replaced with the same color solenoid.

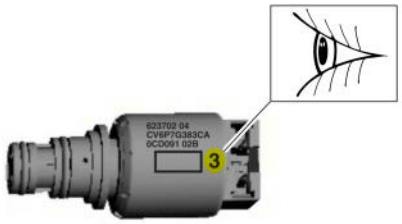


E150962

13.

Determine the part number suffix by checking the solenoid service band number etched on the side of the solenoid. The band number is next to the two-dimensional matrix barcode on the side of the solenoid and will be a 1, 2, 3, 4 or 5. Determine the part number suffix and match the new solenoid base part number and suffix with the old solenoid.

Solenoid Number	Solenoid Part Number Suffix
1	B
2	C
3	D
4	E
5	F



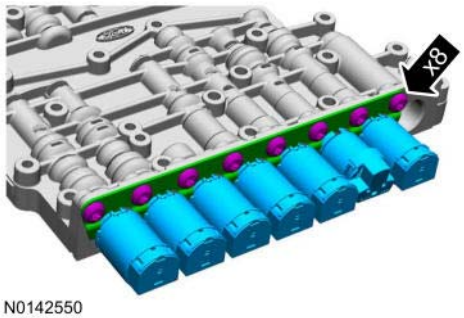
E150961

14.

Install the solenoids into their correct bores as marked during disassembly.

Torque

: 53 lb.in (6 Nm)



N0142550

NOTE: Toward the back of the upper valve body there is a hydraulic passage that is shaped as though it receives a check ball. This passage does not require a check ball. Be sure not to mistake this hydraulic passage for a passage that does require a check ball or damage to the transmission can occur.

15.
Install the solenoid dampers, check balls, converter drain back valves and springs and filter screens in the main control assembly.

1.

Solenoid dampers

2.

Check balls

3.

Converter drain back valves and springs

4.

Small filter screen

5.

Large filter screen

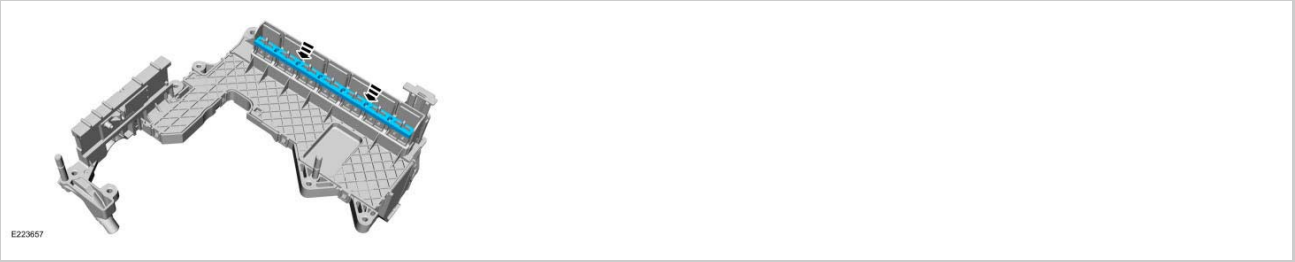
6.

Empty hydraulic passage (no check ball)



NOTE: Some vehicles may not have been built with a foam strip seal. A new foam strip seal should be installed on all molded leadframes.

16.
Install a new foam strip seal on the molded leadframe.



17.

Align the guide pins on the molded leadframe with the holes in the main control upper valve body and install the valve body onto the molded leadframe.

1.

Molded leadframe

2.

Upper main control valve body

3.

Guide pins



NOTE: If the drain back valves are not installed correctly in the separator plate, damage to the transmission can occur.

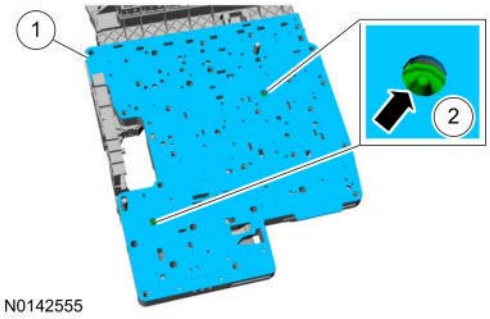
18.
Position the new main control separator plate on the main control upper valve body. Check the 2 drain back valves to be sure they are correctly positioned in the separator plate when the separator plate is pressed flush against the main control upper valve body.

1.

Main control separator plate

2.

Drain back valves



NOTE: If the drain back valves are not installed correctly in the separator plate, damage to the transmission can occur.

19.
Position the main control lower valve body on the 2 molded leadframe alignment studs, align the manual valve with the TR sensor on the molded leadframe and install the main control lower valve body. Install the long molded leadframe-to-valve body bolts hand-tight.

1.

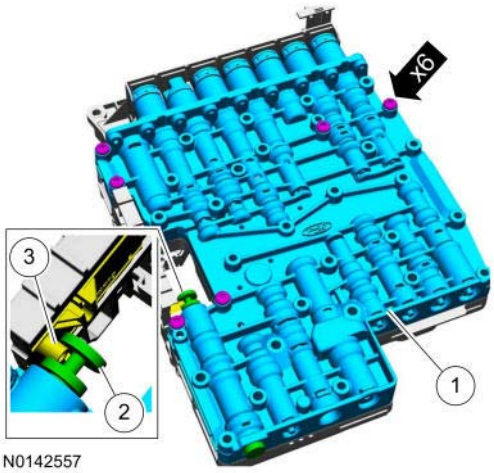
Main control lower valve body

2.

Manual valve

3.

TR sensor



20.

Install the short main control assembly lower-to-upper valve body bolts. Tighten all the bolts in the sequence shown below.

Tighten bolts 1 through 6

Torque

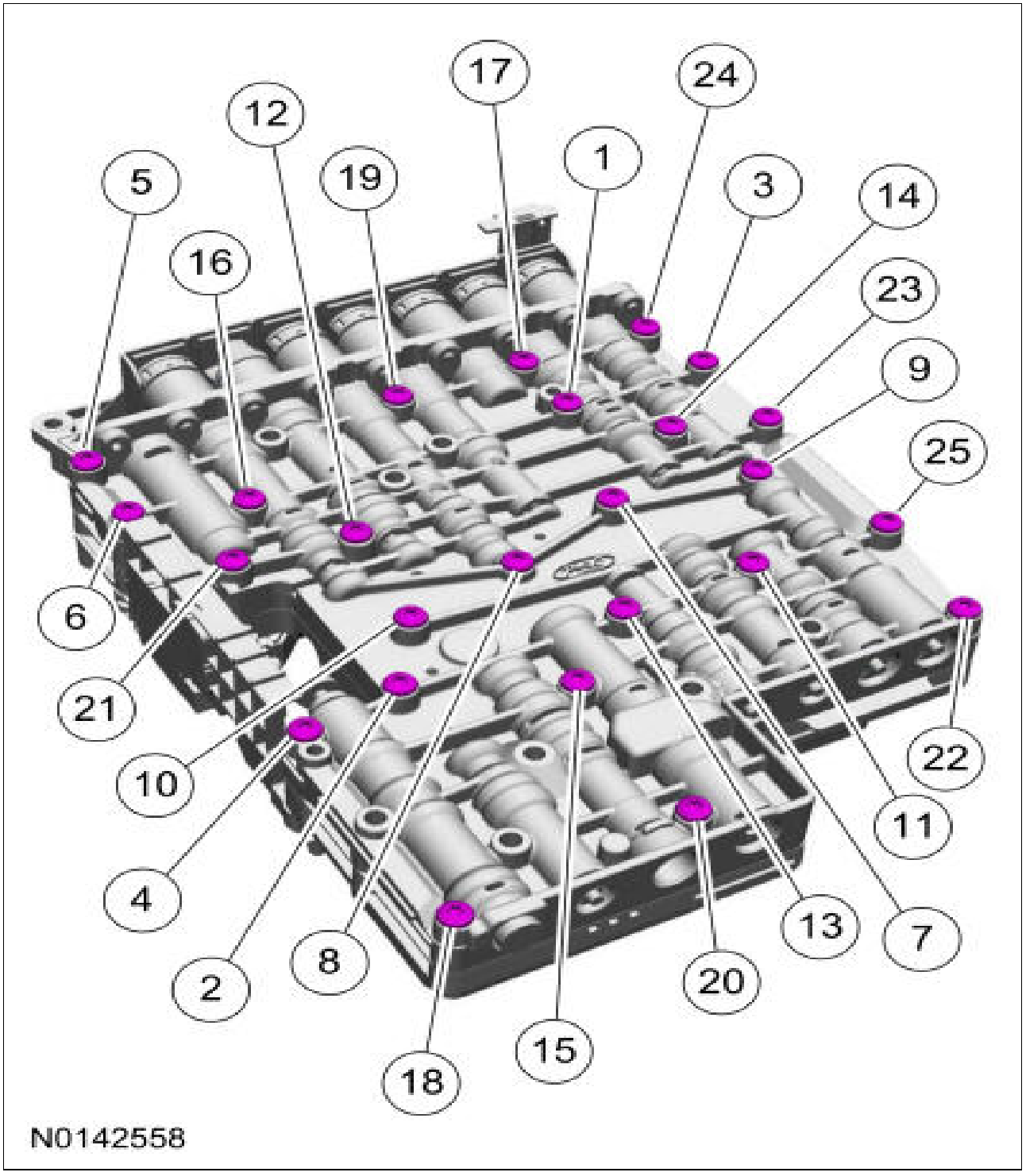
: 53 lb.in (6 Nm)

Tighten bolts 7 through 25

Torque

: 62 lb.in (7 Nm)

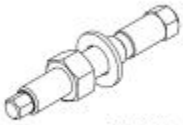
Fig 1: Main Control Assembly Valve Body Bolts Tightening Sequence

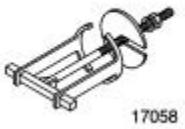
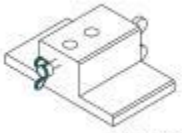


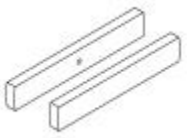
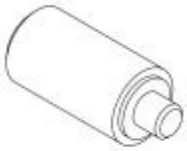
Courtesy of FORD MOTOR CO.

OVERHAUL > TRANSMISSION

Special Tool(s) / General Equipment

 E129694	100-001 (T50T-100-A) Slide Hammer
 E139373	100-002 (TOOL-4201-C) Holding Fixture with Dial Indicator Gauge
 E142000	204-029 Drawbar
 E216593	205-199 (T83T-3132-A1) Installer, Spindle/Axle Shaft T83-4000-A TKIT-1983-F TKIT-1983-FLM TKIT-1983-FX
	205-219 (T85L-1225-AH) Remover, Axle Bearing TKIT-1985-FH-2
 14046	205-256 Installer, Front Wheel Hub Seal T88C-1000-ST TKIT-1988-FESTIVA TKIT-1988-TRACER
 E142003	205-276 Installer, Front Wheel Hub Seal TKIT-1988-FH TKIT-1988-FLMH
 307-003	307-003 (T57L-500-B) Holding Fixture, Transmission

 17058	307-015 Compressor, Clutch Spring
 E142010	307-091 Handle, Torque Converter TKIT-2009TC-F
 17040	307-209 Compressor, Spring Washer TKIT-2-MEX TKIT-2000-F/FM/FLM TKIT-2005U-LM1
 E142013	307-343 Retaining Ring Pliers TKIT-1995-FH/FLMH TKIT-1995-LMH/MH
 E142014	307-525 Compressor, Clutch Spring TKIT-2005D2-F
 E142015	307-534 End Play Gauge, Transmission TKIT-2005D2-F
 E142016	307-552 Compressor, Clutch Spring TKIT-2005U-FLM TKIT-2005U-LM TKIT-2006U-FLM/LM TKIT-2006UF/FM
 E142017	307-553 Remover, Transmission Fluid Pump TKIT-2005U-FLM TKIT-2005U-LM TKIT-2006U-FLM/LM TKIT-2006UF/FM

 E142018	307-554 Gauge, D-Clutch Measurement TKIT-2005U-FLM TKIT-2005U-LM TKIT-2006U-FLM/LM TKIT-2006UF/FM
 E142019	307-555 End Play Gauge, Clutch TKIT-2005U-FLM TKIT-2005U-LM TKIT-2006U-FLM/LM TKIT-2006UF/FM
 E142020	307-556 Installer, Fluid Pump Seal TKIT-2005U-FLM TKIT-2005U-LM TKIT-2006U-FLM/LM TKIT-2006UF/FM
 E142021	307-559 Installer, Shifter Fluid Seal TKIT-2005U-FLM TKIT-2005U-LM TKIT-2006U-FLM/LM TKIT-2006UF/FM
 E142022	307-562 Remover, Needle Bearing TKIT-2005U-FLM TKIT-2005U-LM TKIT-2006U-FLM/LM TKIT-2006UF/FM
 E181071	307-713 Installer, Roller Bearing TKIT-2013B-FL TKIT-2013B-ROW
 E181072	307-714 Installer, Needle Bearing TKIT-2013B-FL TKIT-2013B-ROW

 E181073	307-715 Installer, Output Seal (4X2) TKIT-2013B-FL TKIT-2013B-ROW
 E181074	307-716 Installer, Teflon Seal TKIT-2013B-FL TKIT-2013B-ROW
 E173280	307-717 Remover, Kostal Sleeve TKIT-2013B-FL TKIT-2013B-ROW
 308-375	308-375 Remover, Input Shaft Seal TKIT-1999-F/FLM/LT TKIT-2005U-M
Flat Headed Screw Driver	
Depth Gauge	
Punch	

Materials

Name	Specification
Motorcraft ® 6R ATF Additive Kit XL-16	-
Motorcraft ® MERCON ® LV Automatic Transmission Fluid (U.S.) XT-10-QLVC (U.S.)	MERCON ® LVWSS-M2C938-A

1.

The following components are discarded during disassembly and must be replaced:

Description	Part Number
Gasket and Oil Seal Kit	7153
Transmission fluid filter	7A098
Front pump adapter seal	7F401
Direct clutch feed tube (Black)	7G199

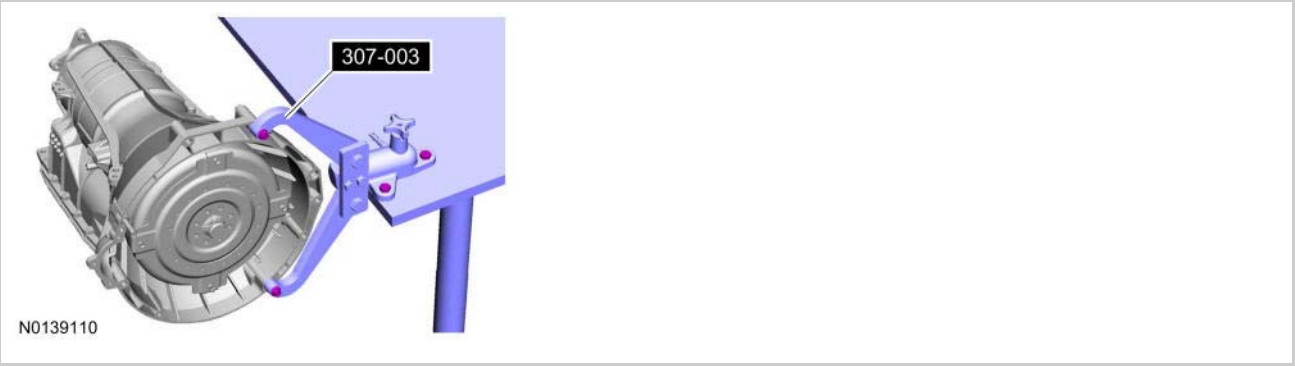
Low/reverse clutch feed tube (Green or Orange)	7G087
Intermediate clutch feed tube (Blue)	7G084
Output shaft retaining nut	7045
TR sensor roll pin	7G100
Park pawl abutment retaining screw and washer	W711235-S300
TR detent spring retaining screw and washer	W711235-S300
Direct clutch hub retaining ring	7D483
Direct clutch hub	7F236
Overdrive clutch balance piston retaining ring	7C122
Intermediate clutch piston retaining ring	7A577
Low/reverse clutch piston return spring retainer	7H318

2.

For information on component views and base part numbers. Refer to: Transmission Description .

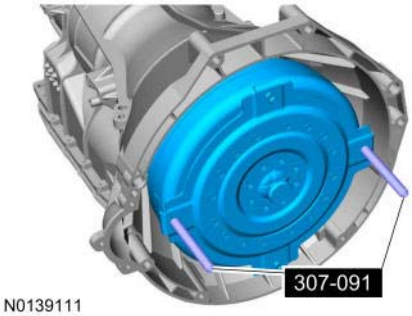
3.

Install the special tool on the torque converter housing and install the transmission on a bench. Use Special Service Tool: 307-003 (T57L-500-B) Holding Fixture, Transmission.



4.

Using the special tool, remove the torque converter.Use Special Service Tool: 307-091 Handle, Torque Converter.



5.

1.

Inspect the sealing surface for a groove worn from the seal. Install a new torque converter if necessary.

2.

A new or remanufactured torque converter must be installed if one or more of the following statements are true:

A torque converter malfunction has been determined based on complete diagnostic procedures.

The torque converter stud or studs, impeller hub or bushing are damaged.

The torque converter exhibits external discoloration (due to overheating).

There is evidence of transmission assembly or fluid contamination due to the following transmission or converter failure modes:

Major metallic failure

Multiple clutch plates or band failures

Sufficient component wear which results in metallic contamination

Water or antifreeze contamination

3.

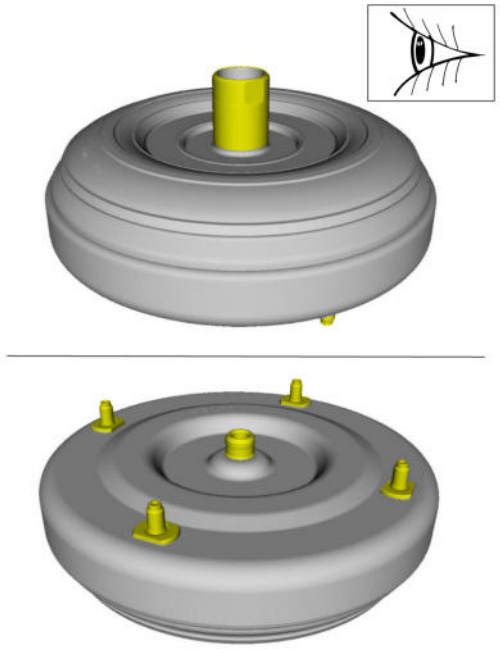
If none of the above conditions are present, continue with the following fluid inspection.

4.

Pour a small amount of transmission fluid from the torque converter onto an absorbent white tissue or through a paper filter.

5.

Examine the fluid for contaminants. The fluid must be free of metallic contaminants.



E150775

NOTE: Do not use water-based cleaners or mineral spirits to clean or flush the torque converter or transmission damage will occur. Use only clean transmission fluid designated for the transmission and torque converter being serviced.

6.

1.

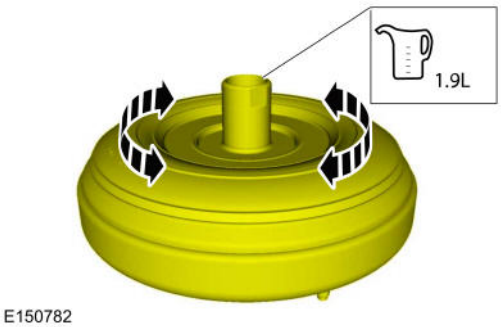
Drain the remaining fluid from the torque converter. Apply the specified amount of fluid.

Material

: Motorcraft ® MERCON ® LV Automatic Transmission Fluid (U.S.) / XT-10-QLVC (U.S.) (MERCON ® LV) (WSS-M2C938-A)

Agitate by hand.

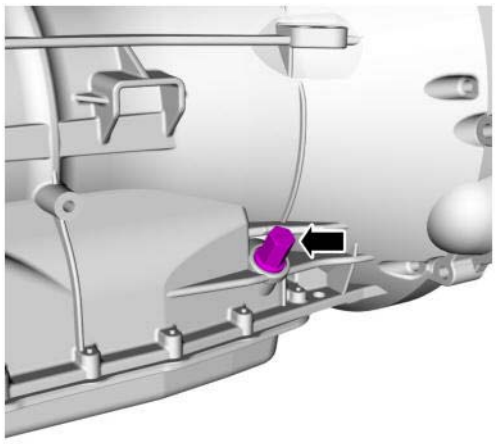
Thoroughly drain the fluid.



E150782

7.

Remove the transmission fluid fill plug.



E181871

8.

Remove the transmission fluid pan bolts and the transmission fluid pan.



E195080

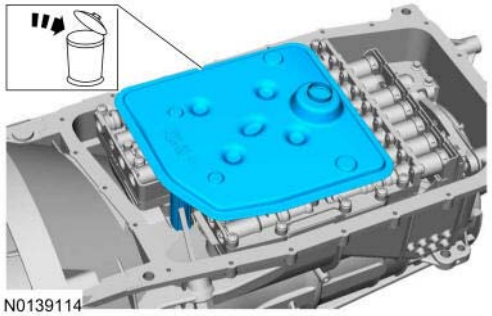
9.

Remove the transmission fluid pan gasket.


N0139113

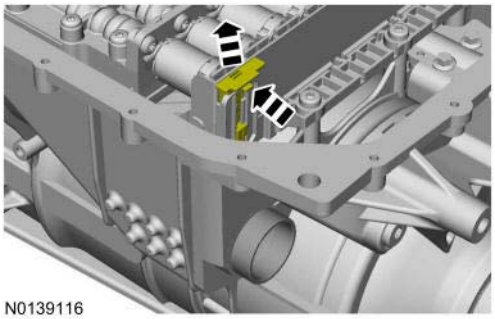
10.

Remove and discard the transmission fluid filter.


N0139114

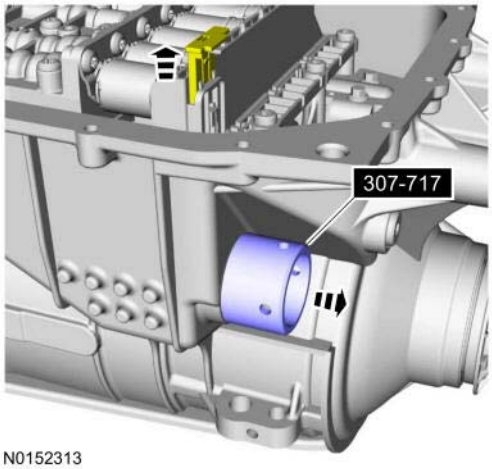
11.

Press the release tab and lift up on the bulkhead electrical connector retainer to release the bulkhead electrical connector shell.


N0139116

12.

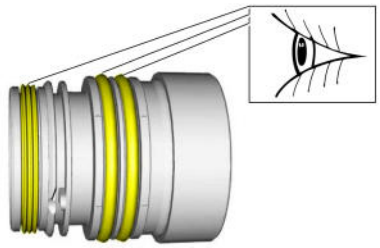
With the transmission bulkhead connector sleeve retainer released, use the special tool to pull the outer shell of the bulkhead connector sleeve out of the transmission. Use Special Service Tool: 307-717 Remover, Kostal Sleeve.



N0152313

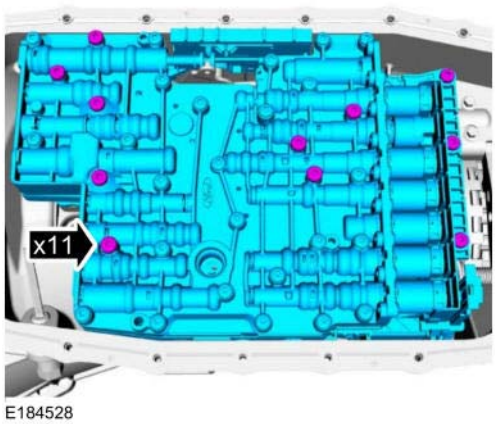
13.

Inspect the bulkhead connector sleeve seals. If necessary, replace the seals.


N0152364

14.

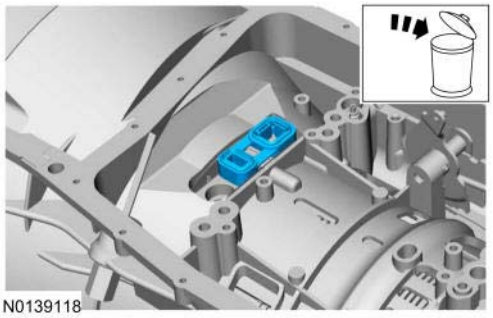
Remove the bolts from the main control assembly and remove the main control assembly.



E184528

15.

Remove and discard the front pump adapter seal.



NOTE: The green (7G087) center support feed tube seal may be replaced with an orange (7G087) center support feed tube seal.

16.

1.

Center support feed tube seal (7G199 Black)

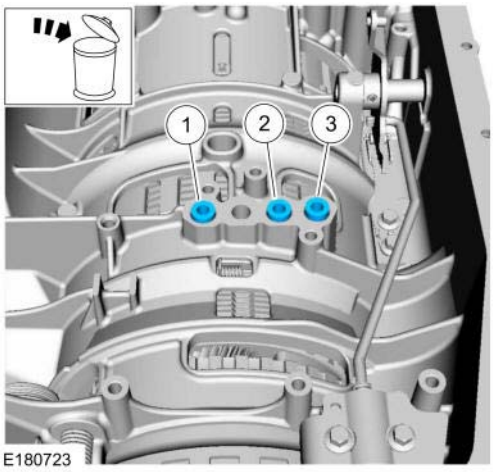
2.

Center support feed tube seal (7G087 Green or Orange)

3.

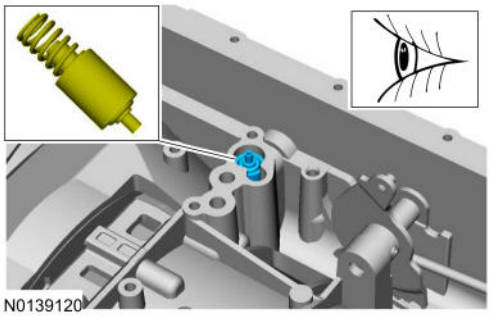
Center support feed tube seal (7G084 Blue)

Remove and discard the feed tubes.



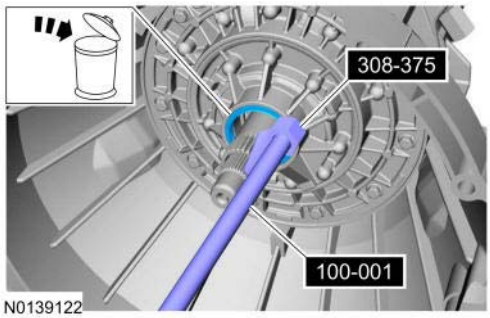
17.

Remove the thermal bypass valve from the case. Inspect the thermal bypass valve for damage and discard the valve if damaged.



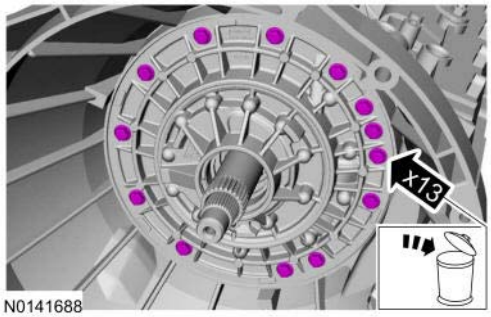
18.

Using the special tools, remove and discard the front pump seal. Use Special Service Tool: 100-001 (T50T-100-A) Slide Hammer., 308-375 Remover, Input Shaft Seal.



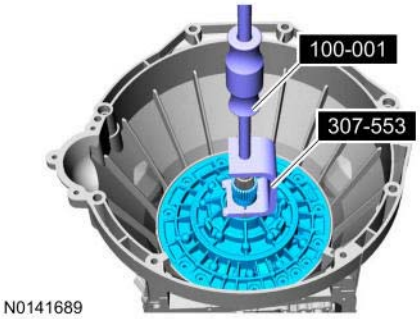
19.

Remove and discard the front pump-to-case bolts and washers.



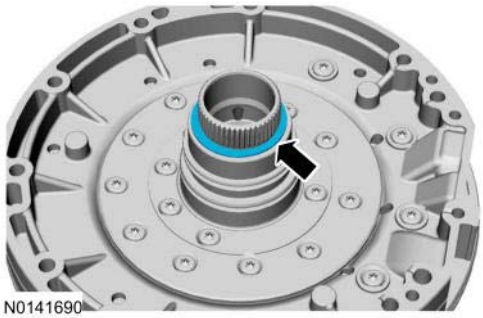
20.

Using the special tools, remove the pump. Use Special Service Tool: 100-001 (T50T-100-A) Slide Hammer., 307-553 Remover, Transmission Fluid Pump.



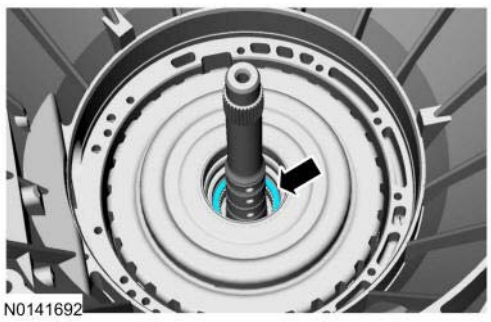
NOTE: The selective shim may come out while removing the front pump.

21.
Inspect the back of the front pump for the selective shim and remove if necessary.



22.

If the selective shim is not on the pump, using a magnet, remove it from the forward (A)/overdrive (E) clutch assembly.



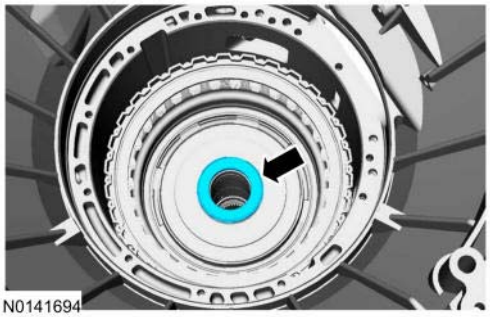
23.

Remove the forward (A)/overdrive (E) clutch assembly.


N0141693

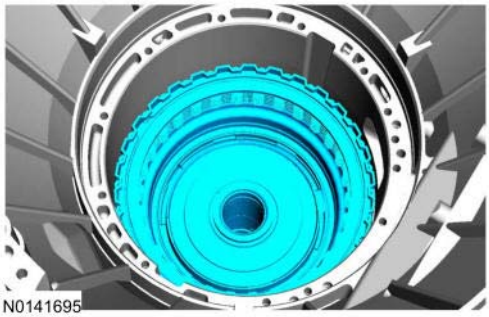
24.

Remove the caged T5 roller bearing from the direct (B) clutch assembly.


N0141694

25.

Remove the direct (B) clutch assembly.


N0141695

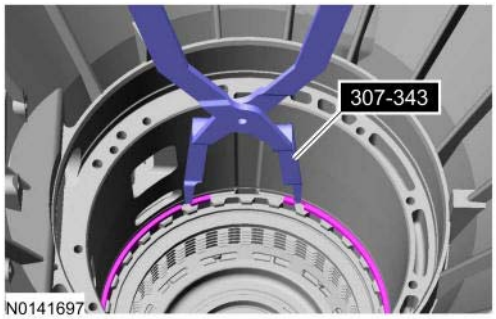
26.

Remove the bias spring.



27.

Using the special tools, remove the center support snap ring.Use Special Service Tool: 307-343 Retaining Ring Pliers.



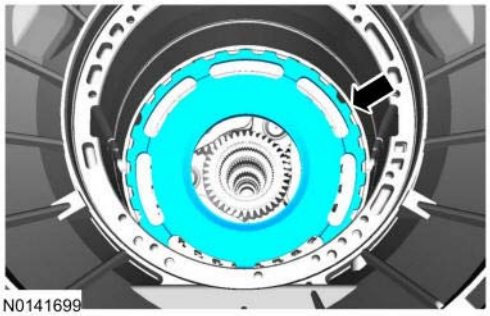
28.

Remove the center support and T6 bearing.



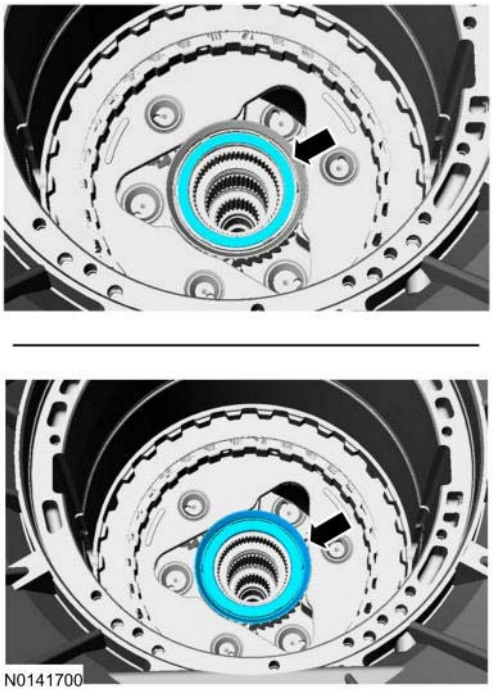
NOTE: When removing the one-way clutch, note the position for assembly.

29.
Remove the one-way clutch.



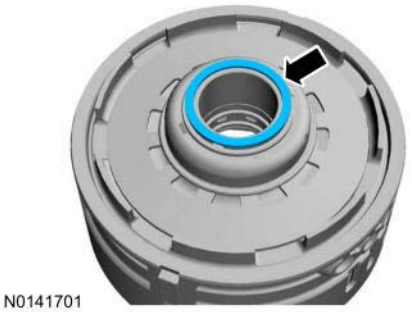
NOTE: The selective shim might stick to the T7 thrust bearing during removal of the center support.

30.
Remove the selective shim and the T7 thrust bearing.



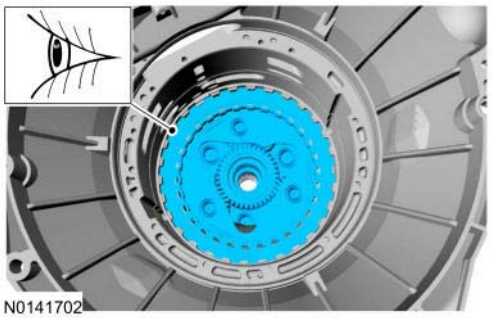
NOTE: The selective shim might stick to the back of the center support assembly during removal.

31.
Remove the selective shim from the center support assembly.


N0141701

NOTE: Some of the clutch plates may stay in the case when removing the planetary carrier and the low/reverse clutch pack. Remove any clutch plates from the transmission that were not removed with the carrier and keep the clutch plates together.

32.
Remove the planetary carrier and the low/reverse clutch pack as an assembly. Inspect the clutch plates for excessive wear or damage. If the clutch plates are excessively worn or damaged replace as necessary. If the clutch plates are not excessively worn or damaged, they can be reused.


N0141702

33.

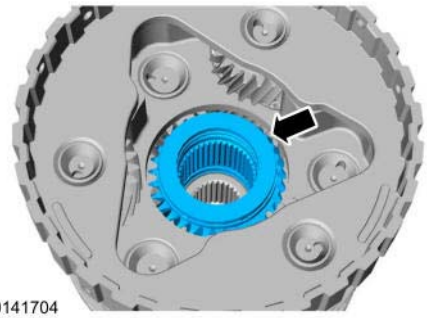
Remove the No. 2 sun gear and race.


N0141703

NOTE: When removing the sun gear, note that the tapered edge is facing up toward the torque converter housing.

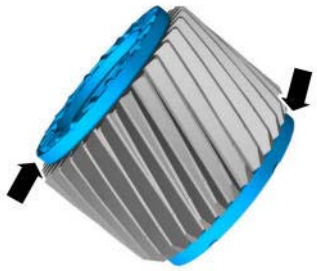
NOTE: Remove the bearings with the sun gear.

34.
Remove the No. 3 sun gear.



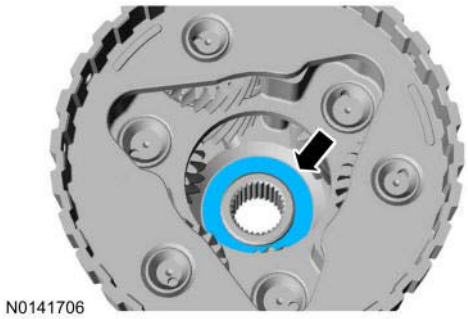
35.

Remove the top T8 and the bottom T9 roller bearings from the sun gear.



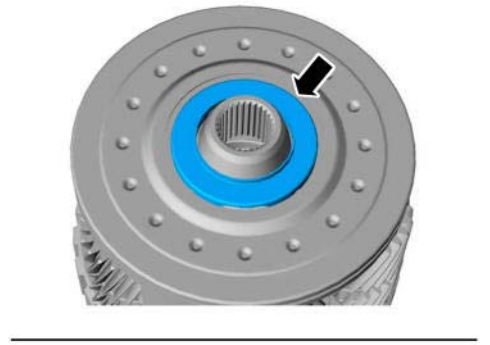
36.

Remove the T9 roller bearing race from the bottom of the carrier.



NOTE: The T10 thrust bearing can stick to the planetary carrier.

37.
Remove the T10 thrust bearing.

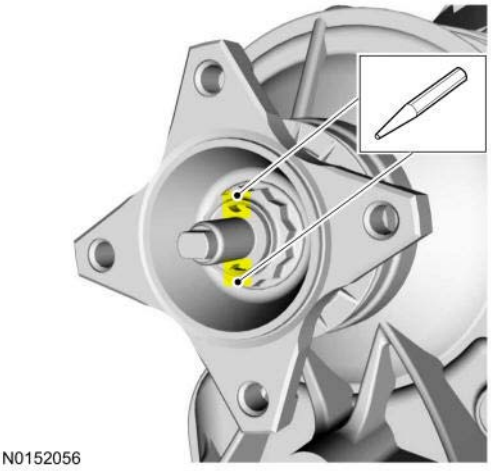




N0141707

NOTE: The output shaft flange retaining nut has been staked to prevent it from coming loose. Prior to removing the nut, remove the stake to prevent damage to the output shaft.

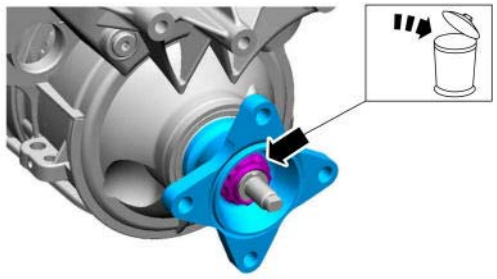
38.
Remove the stakes from the output shaft flange retaining nut. Use the General Equipment: Punch



N0152056

39.

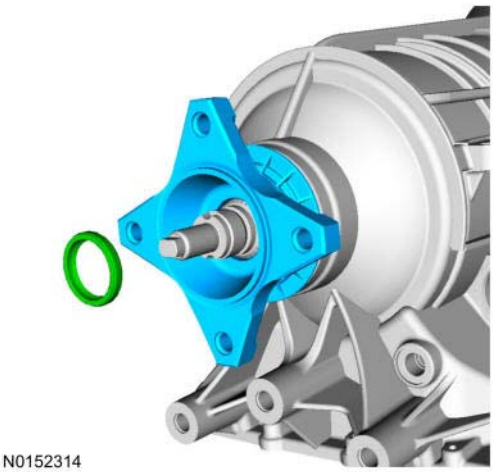
Place the manual control lever in the PARK position and remove and discard the output shaft flange retaining nut.



N0141709

40.

Remove the output shaft flange seal and flange.



N0152314

41.

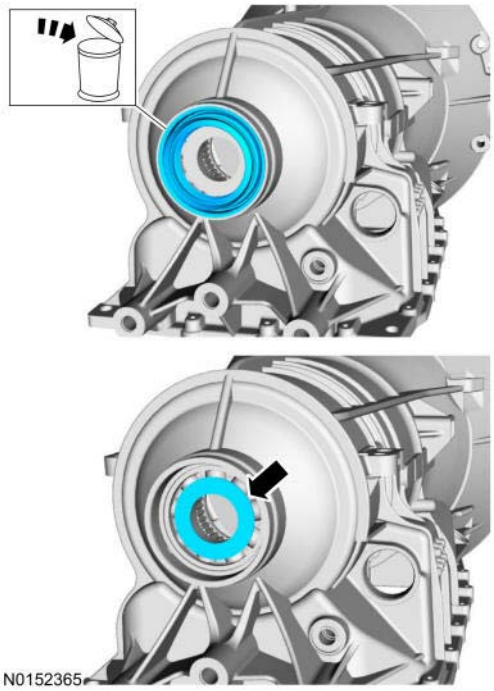
Remove the planetary carrier hub, output shaft assembly and T11 bearing.



N0141710

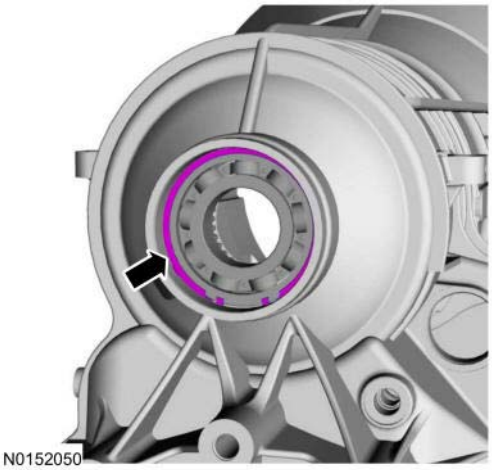
42.

Remove and discard the output shaft seal and remove the slip plane washer.



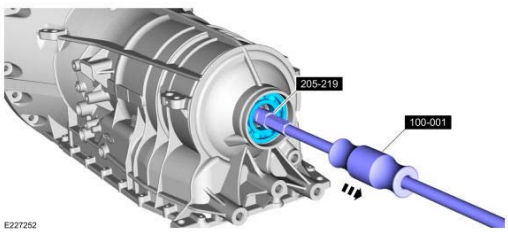
43.

Remove the output shaft ball bearing snap ring.



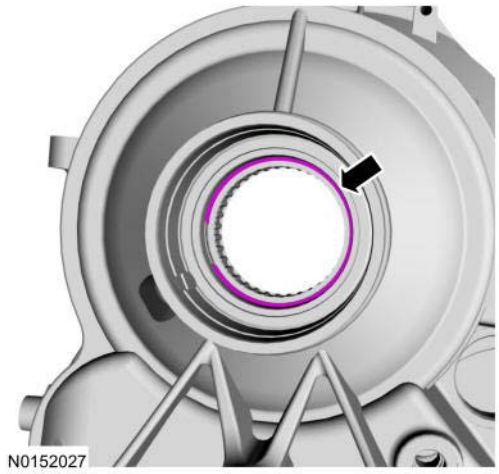
44.

Using the special tools, remove the output shaft ball bearing. Use Special Service Tool: 100-001 (T50T-100-A) Slide Hammer., 205-219 (T85L-1225-AH) Remover, Axle Bearing.



45.

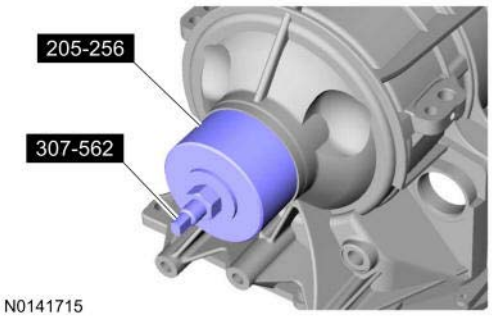
Remove the snap ring.



NOTE: Use care when installing the Needle Bearing Remover. Look inside the transmission case to make sure that the Needle Bearing Remover contacts the bearing only and not the lip of the case, or damage to the case will occur.

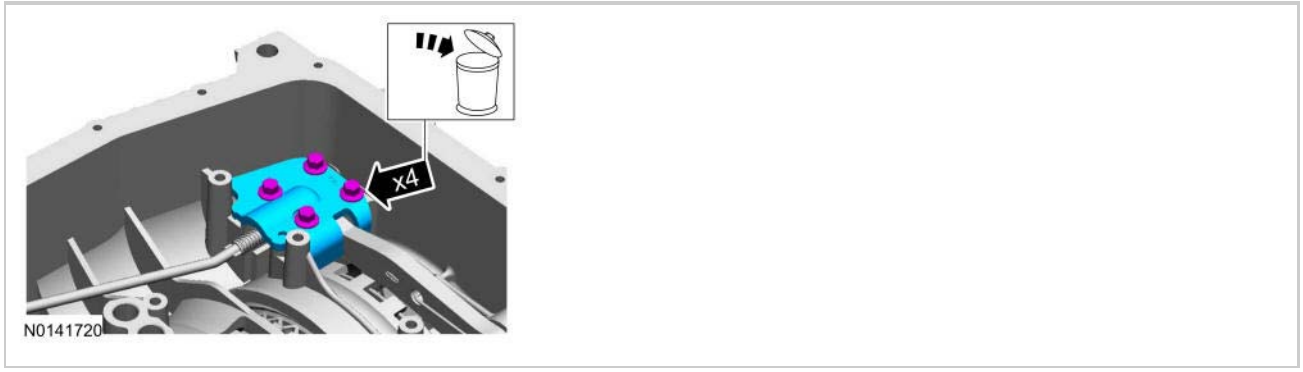
46.
Install the special tools on the bearing and remove the bearing. Use Special Service Tool: 205-256 Installer, Front Wheel Hub Seal., 307-562 Remover, Needle Bearing.





47.

Remove and discard the 4 park rod actuating plate bolts and remove the park rod actuating plate.



48.

1.

Remove and discard the roll pin.

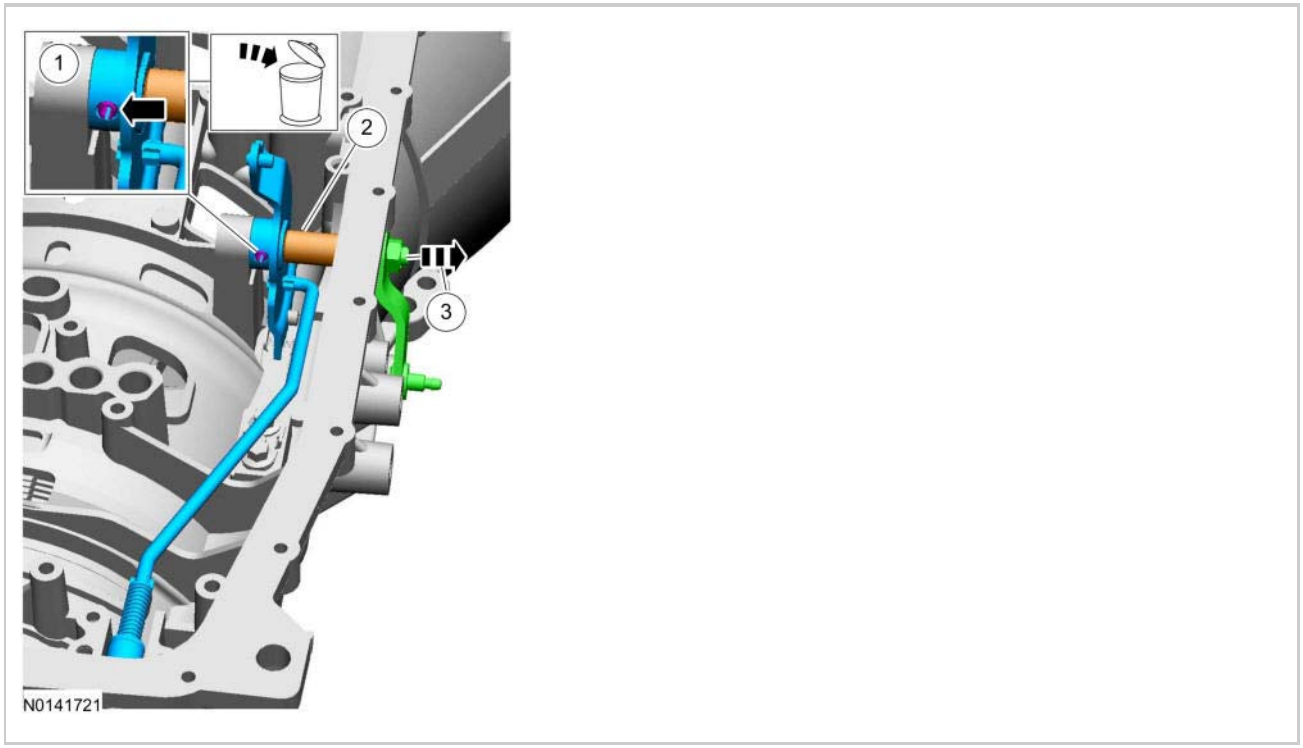
2.

Hold the manual control lever spacer to keep it from falling into the case.

3.

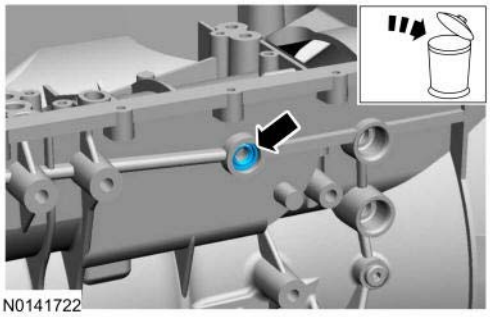
Slide the manual control lever shaft out of the case.

Remove the manual valve detent lever and park pawl actuator rod as an assembly.



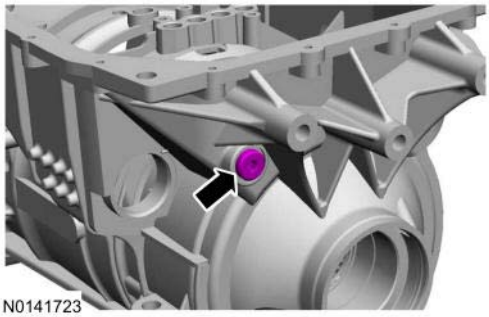
49.

Remove and discard the manual control lever shaft seal.



50.

Remove the bolt from the back of the case to access to the park pawl pin.



51.

1.

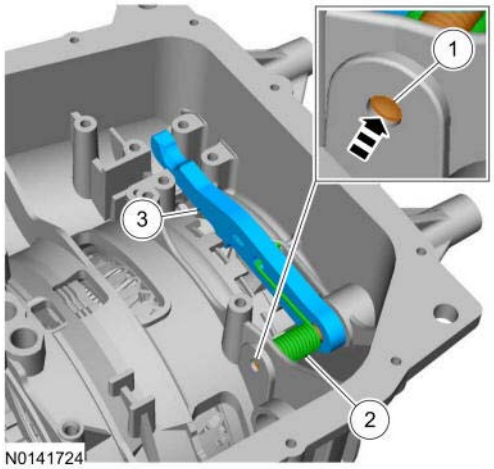
Push the park pawl pin out toward the back side of the case and remove the pin.

2.

Remove the park pawl return spring.

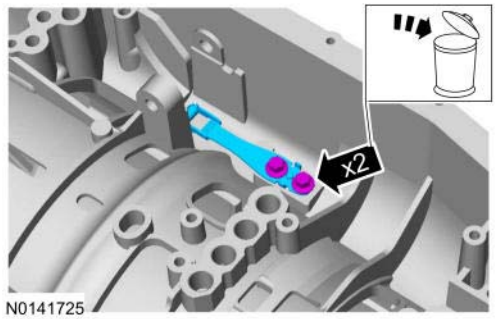
3.

Remove the park pawl.



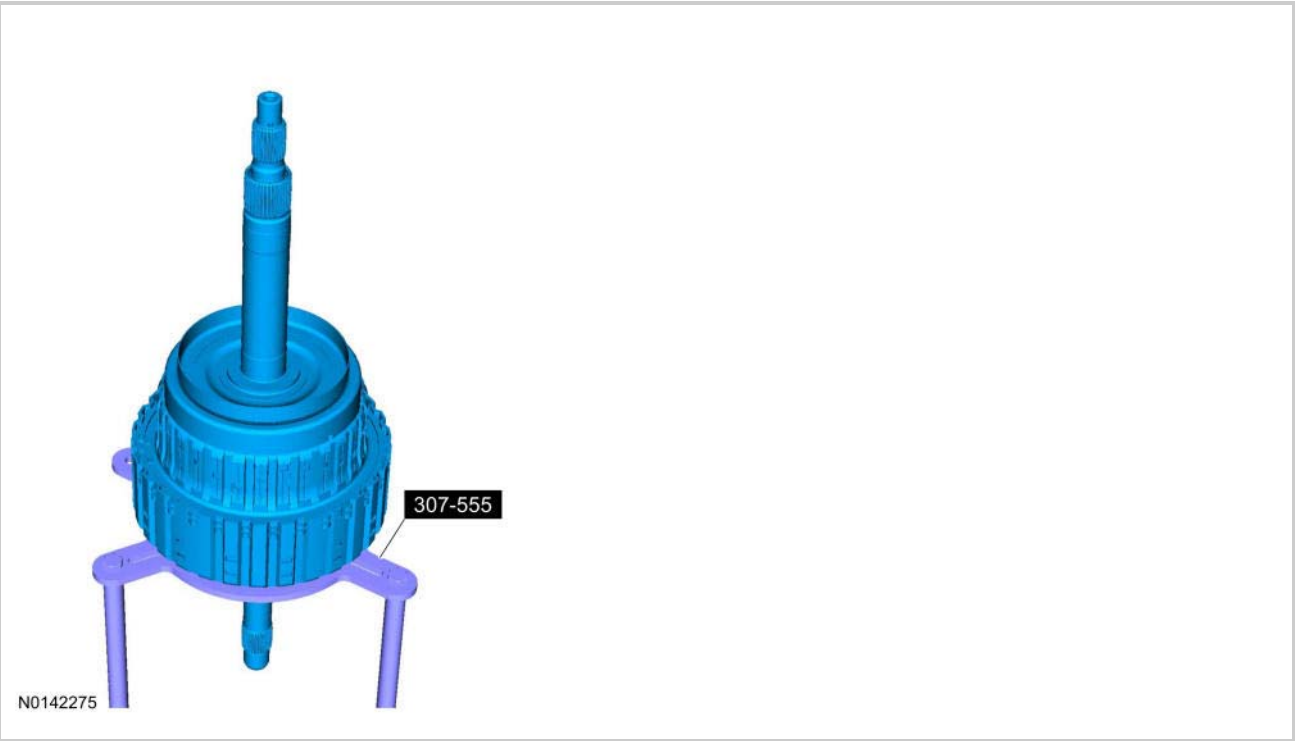
52.

Remove and discard the 2 bolts and remove the park detent spring.



53.

Position the forward/overdrive clutch assembly in the special tool.Use Special Service Tool: 307-555 End Play Gauge, Clutch.



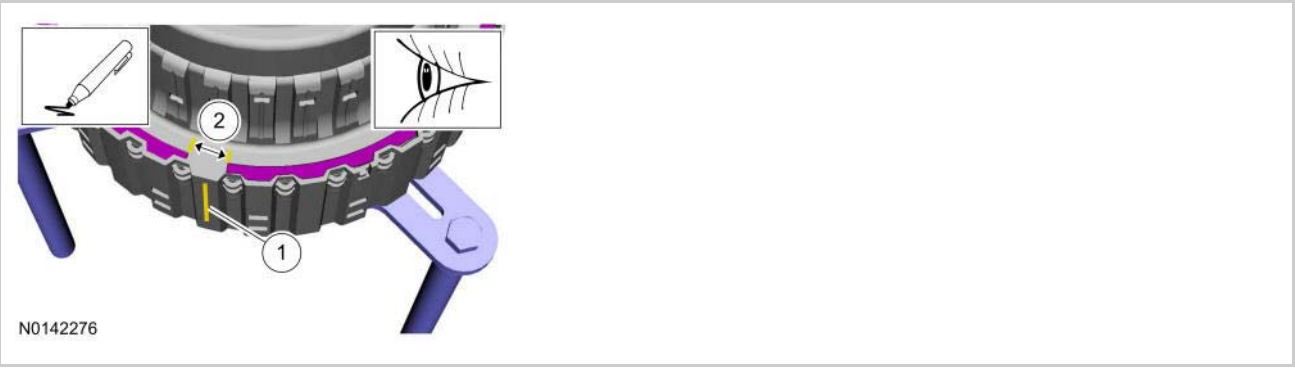
54.

1.

Locate the snap ring gap.

2.

Index-mark the direct clutch outer shell snap ring gap location to the side of the forward clutch hub using a paint marker.



55.

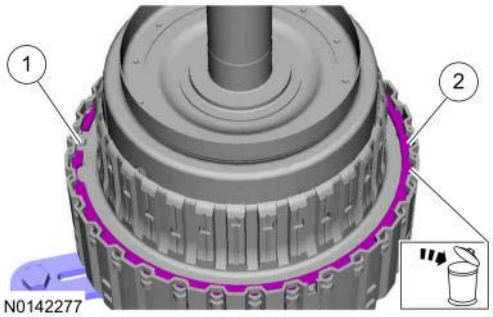
1.

Locate the snap ring gap.

2.

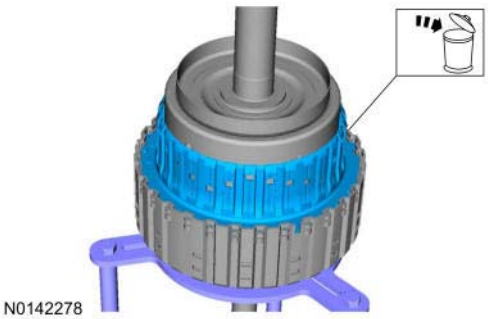
Pry the snap ring out of the groove 180 ° from the snap ring gap and remove and discard

the snap ring.



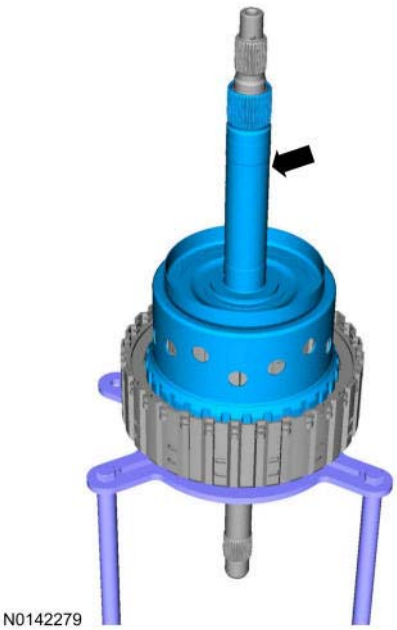
56.

Remove and discard the direct clutch hub.



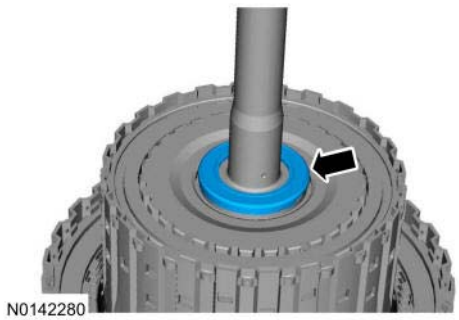
57.

Remove the forward clutch and sun shaft assembly.



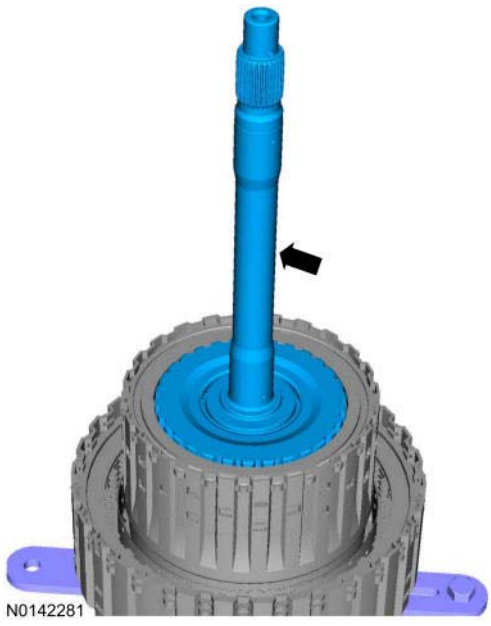
NOTE: The bearing may stick in the forward clutch drum.

58.
Remove the intermediate shaft T4 thrust bearing.



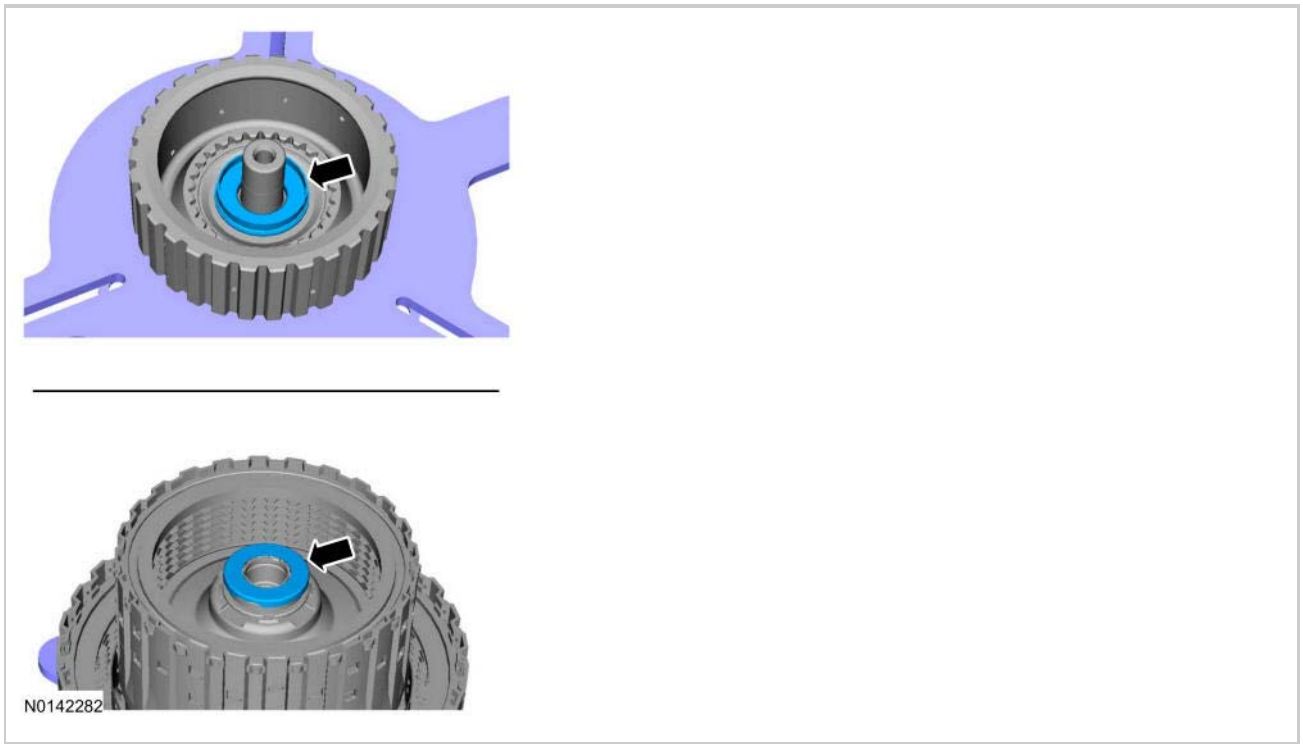
59.

Remove the intermediate shaft assembly.



60.

If the T3 thrust bearing stuck to the intermediate shaft assembly, remove it from the intermediate shaft assembly. If the T3 thrust bearing is on the overdrive clutch, remove it from the overdrive clutch assembly.



61.

Remove the overdrive clutch pack from the forward clutch pack.



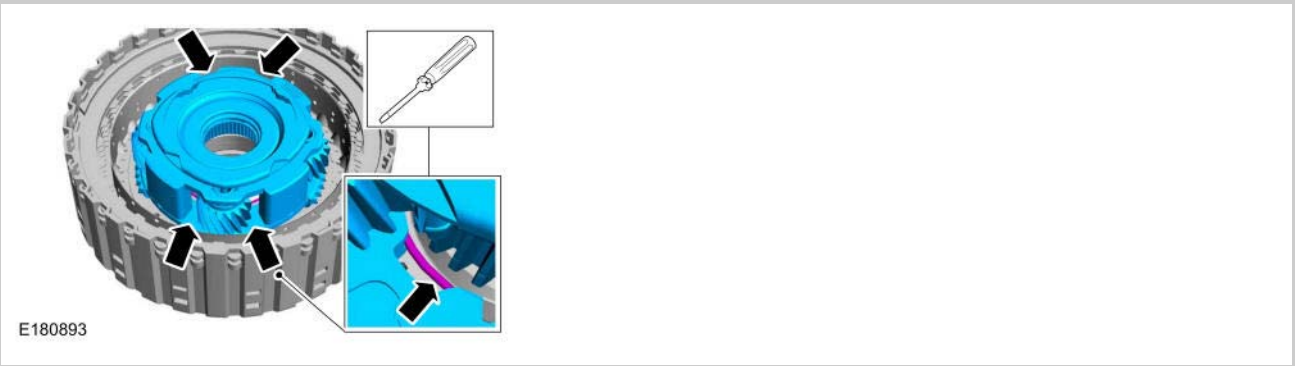
62.

If the T2 thrust bearing is on the forward clutch assembly, remove it from the forward clutch assembly.



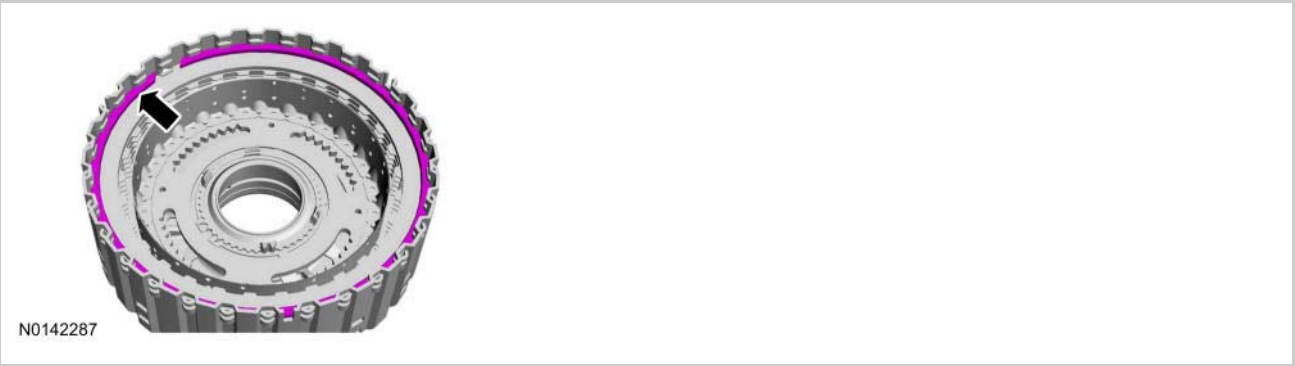
63.

Remove the front planetary carrier and sun gear from the forward clutch assembly. Use a small screwdriver or a pick inserted into the front planetary assembly, push on the retaining ring in 4 places while lifting up on the front planetary assembly.Use the General Equipment: Flat Headed Screw Driver



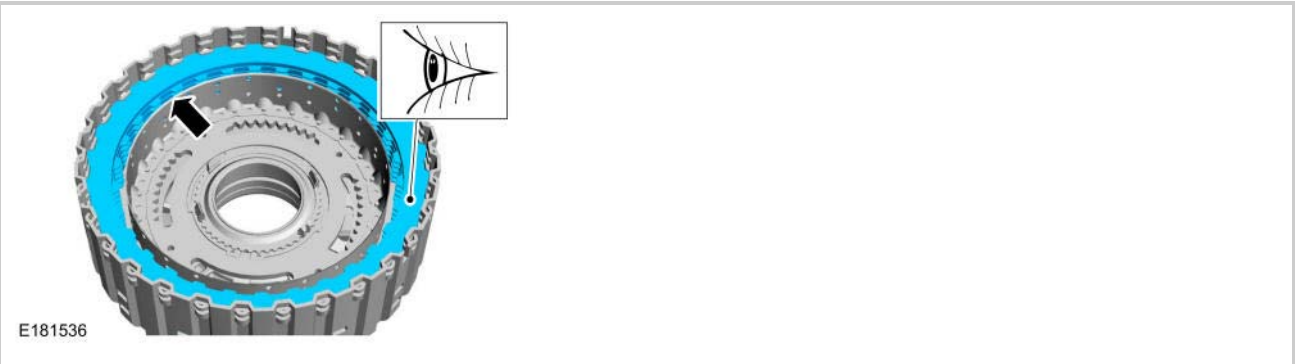
64.

Remove the forward clutch pack snap ring.



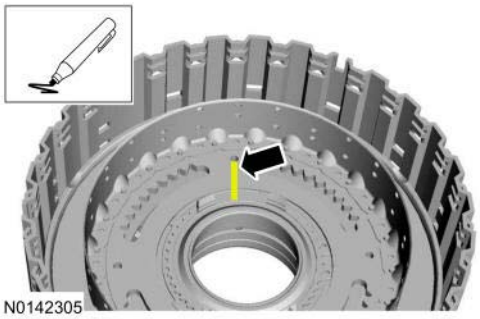
65.

Remove the forward clutch steel and friction plates. Inspect the clutch plates for excessive wear or damage. If the clutch plates are excessively worn or damaged replace as necessary. If the clutch plates are not excessively worn or damaged, they can be reused.



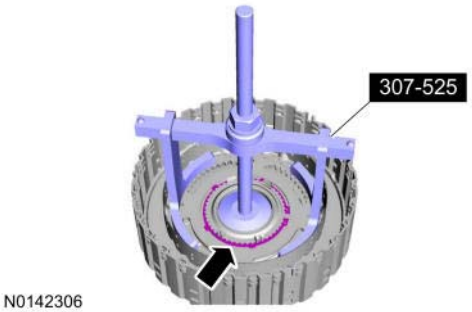
66.

For correct alignment during assembly, make an identifying mark on the balance dam and the center part of the housing.



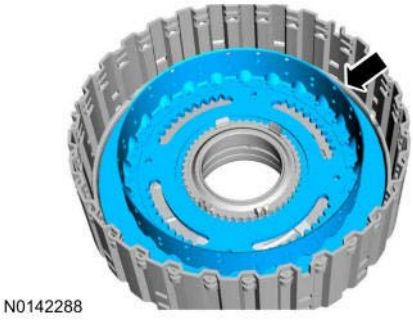
67.

Using the special tool, slightly collapse the balance dam to access to the retaining ring and remove the retaining ring. Use Special Service Tool: 307-525 Compressor, Clutch Spring.



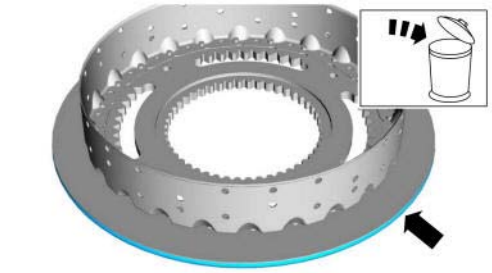
68.

Remove the balance dam.



69.

Remove and discard the O-ring seal from the balance dam.



N0142289

70.

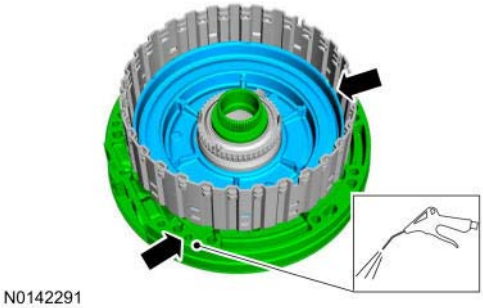
Remove the forward clutch return spring.



N0142290

71.

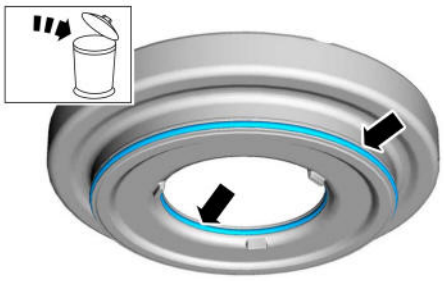
Install the forward clutch on the front pump to remove the forward clutch piston. Apply a small amount of shop air to remove the piston.



N0142291

72.

Remove and discard the inner and outer piston O-ring seals.



N0142292

73.

Remove the sun gear from the planetary carrier.



N0142293

NOTE: The T1 thrust bearing may have stuck to the sun gear when it was removed.

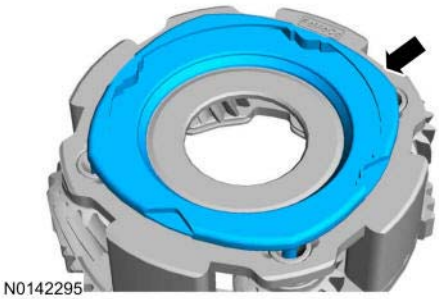
74.
Remove the T1 bearing from the planetary carrier.



N0142294

75.

Remove the transmission fluid collector plate from the front planetary carrier.

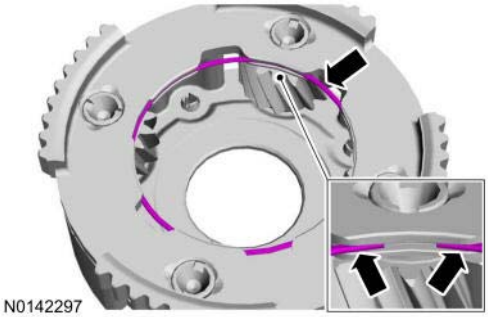


76.

Clean and inspect the components of the forward clutch assembly for damage and install new components as necessary.

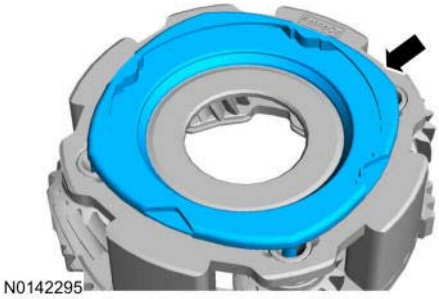
NOTE: If a new planetary assembly is being installed, the new planetary assembly may not come with the snap ring installed.

77.
Install the planetary assembly snap ring, if necessary. Make sure the planetary snap ring is oriented correctly.



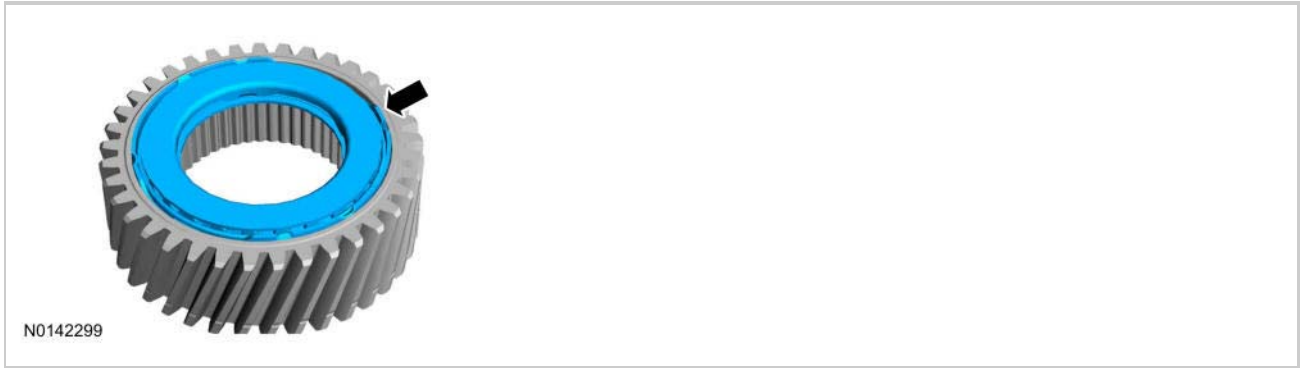
78.

Install the transmission fluid collector plate on the front planetary carrier.



79.

Install the T1 bearing onto the sun gear.



80.

Install the sun gear into the planet assembly with the T1 bearing facing down and the recessed part of the gear up.



81.

Install new O-ring seals onto the forward clutch piston. Lightly coat the O-ring seal with clean transmission fluid.

Material

: Motorcraft ® MERCON ® LV Automatic Transmission Fluid (U.S.) / XT-10-QLVC (U.S.) (MERCON ® LV) (WSS-M2C938-A)



82.

Install the forward clutch piston into the forward clutch drum.



N0142301

83.

Install the forward clutch return spring.



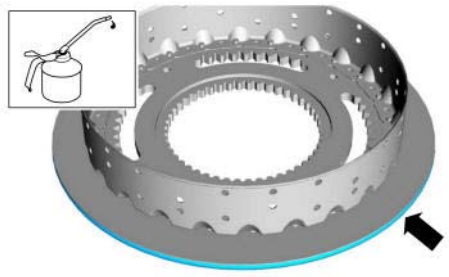
N0142290

84.

Install a new O-ring seal onto the forward clutch balance dam. Lightly coat the O-ring seal with clean transmission fluid.

Material

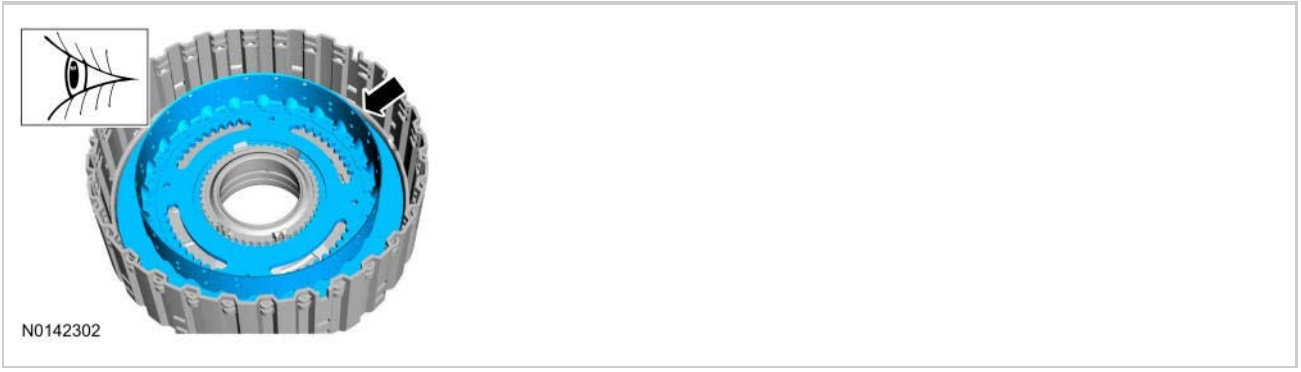
: Motorcraft ® MERCON ® LV Automatic Transmission Fluid (U.S.) / XT-10-QLVC (U.S.) (MERCON ® LV) (WSS-M2C938-A)



N0142307

85.

Align the marks made during disassembly and install the balance dam into the forward clutch drum.



NOTE: Prior to releasing the special tool, make sure that the snap ring is fully seated.

86.
Using the special tool, slightly collapse the balance dam and install the retaining ring. Use Special Service Tool: 307-525 Compressor, Clutch Spring.

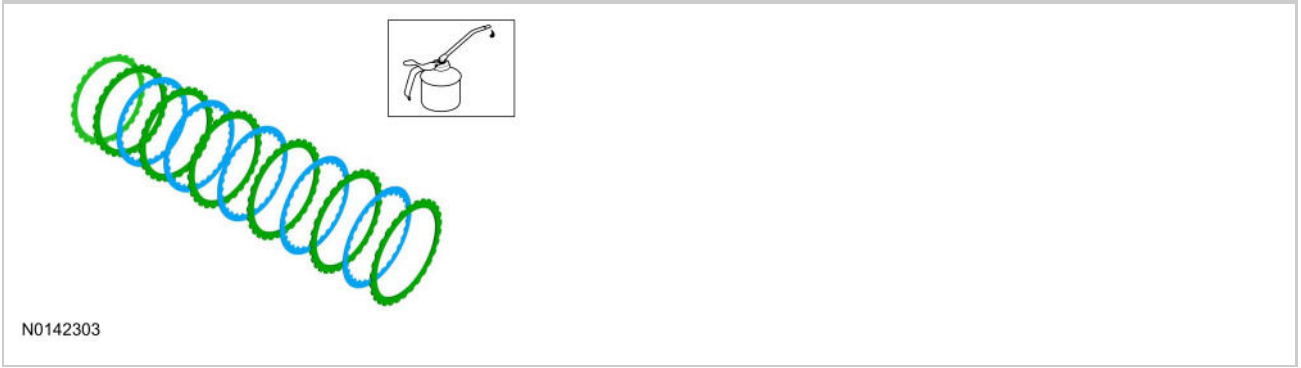


NOTE: Friction and steel plate quantity will vary based on engine displacement.

87.
Soak the forward clutch plates in clean transmission fluid. For friction and steel plate quantity, refer to the Clutch Plate Quantity Chart. Refer to: Specifications .

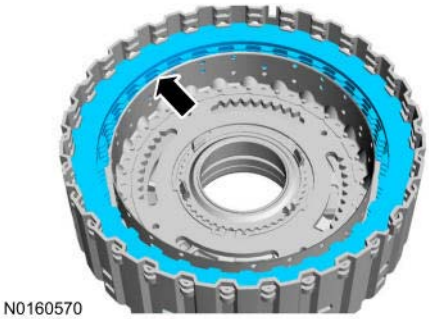
Material

: Motorcraft ® MERCON ® LV Automatic Transmission Fluid (U.S.) / XT-10-QLVC (U.S.) (MERCON ® LV) (WSS-M2C938-A)



88.

Install the forward clutch plates, starting with the wave spring then a steel plate and alternating between friction and steel plates and install the pressure plate.



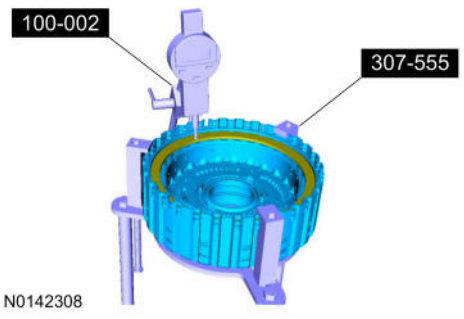
89.

Install the forward clutch plate snap ring.



NOTE: All forward clutch plates, friction and steel are of a wave-type design.

90.
Install the forward clutch assembly on the Clutch End Play Gauge and install the dial indicator gauge. Position the plunger so it fits into the snap ring gap. Use Special Service Tool: 100-002 (TOOL-4201-C) Holding Fixture with Dial Indicator Gauge., 307-555 End Play Gauge, Clutch.



91.

With the dial indicator gauge set at zero, lift up on the steel pressure plate so it is against the

select fit snap ring. Record this reading as reading A. Use Special Service Tool: 100-002 (TOOL-4201-C) Holding Fixture with Dial Indicator Gauge., 307-555 End Play Gauge, Clutch.



92.

Rotate the forward clutch assembly 180 degrees from the opening of the snap ring, take a second reading and record this reading as reading B.

Description	Reading
Reading A	
Reading B	
Average reading A and B for a total end clearance	

NOTE: If the end clearance is not within specification, install a new snap ring until the correct specification is achieved.

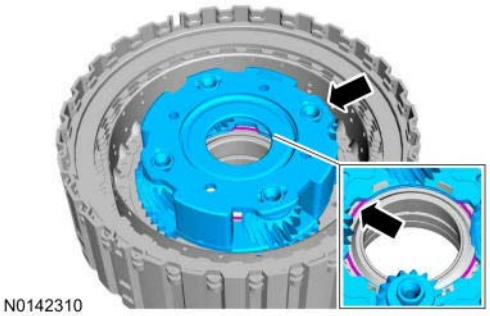
93.

0.71-1.10 mm (0.028-0.043 in)

If the free pack end clearance between the bottom of the snap ring and the top of the pressure plate is high, re-measure using a thicker select fit snap ring. If the free pack end clearance between the bottom of the snap ring and the top of the pressure plate is low, re-measure using a thinner select fit snap ring.

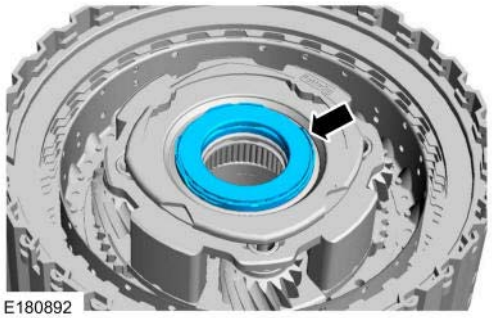
94.

Install the sun gear and planetary gearset into the forward clutch drum. Make sure it snaps and locks in place.



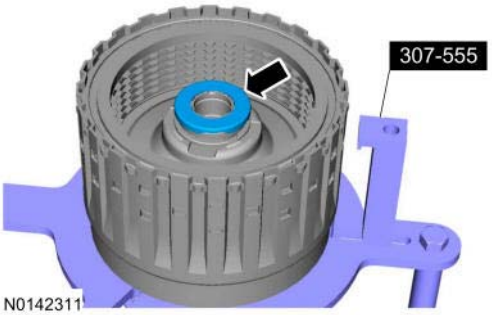
95.

Install the T2 thrust bearing.



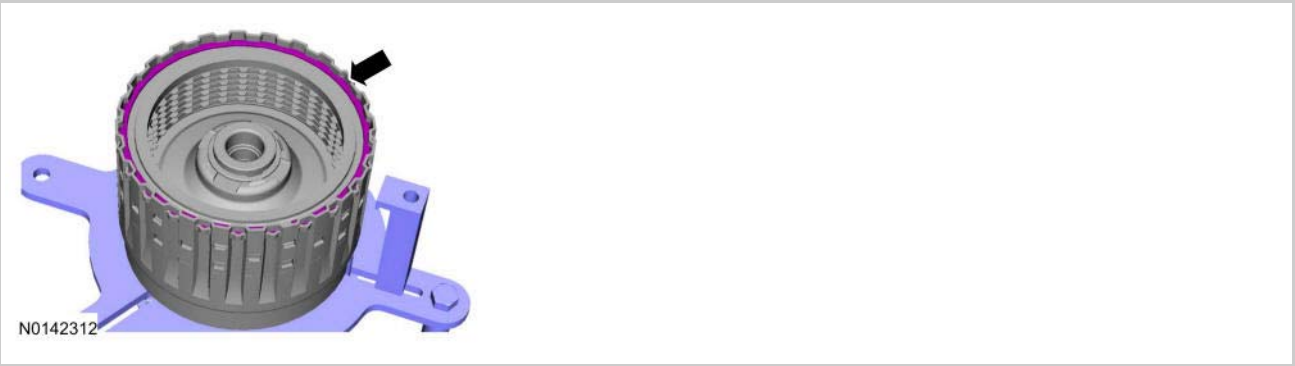
96.

Position the overdrive clutch assembly into the special tool and remove the T3 thrust bearing. Use Special Service Tool: 307-555 End Play Gauge, Clutch.



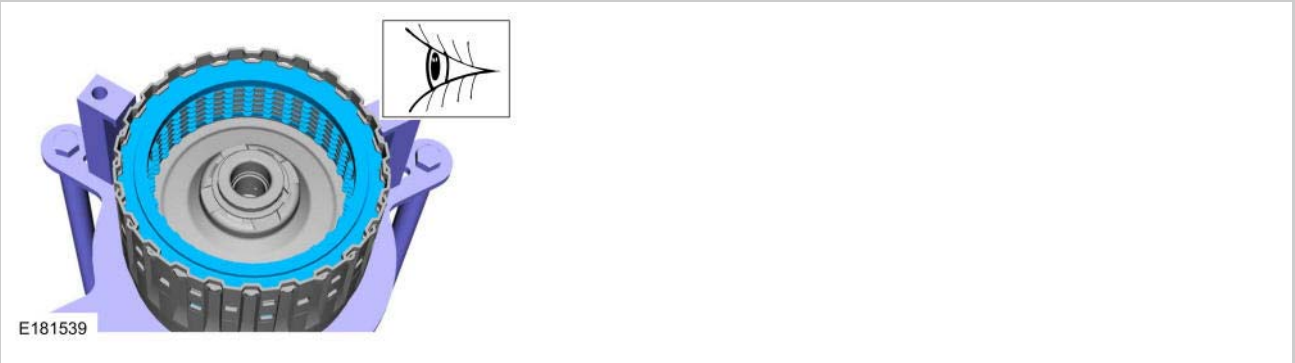
97.

Remove the overdrive clutch pack snap ring.



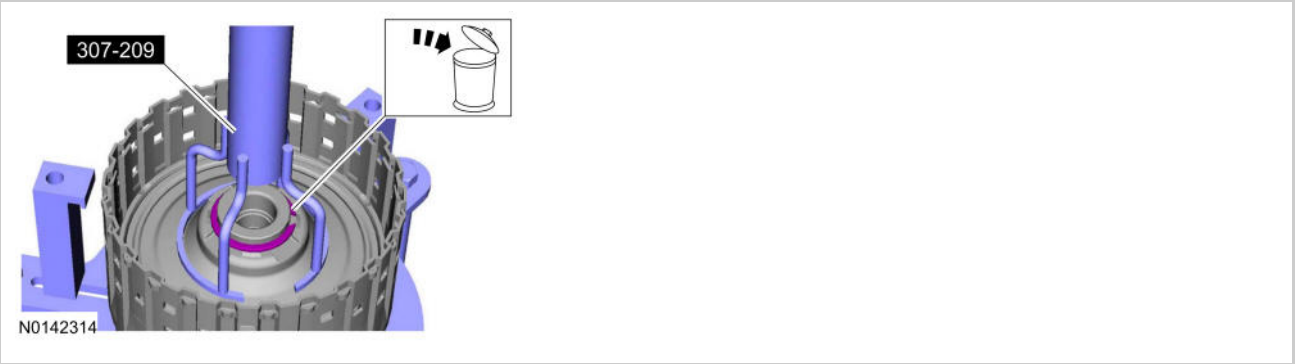
98.

Remove the overdrive clutch pack. Inspect the clutch plates for excessive wear or damage. If the clutch plates are excessively worn or damaged replace as necessary. If the clutch plates are not excessively worn or damaged, they can be reused.



99.

Using the special tool and a press, remove and discard the overdrive clutch balance piston retaining ring. Use Special Service Tool: 307-209 Compressor, Spring Washer.



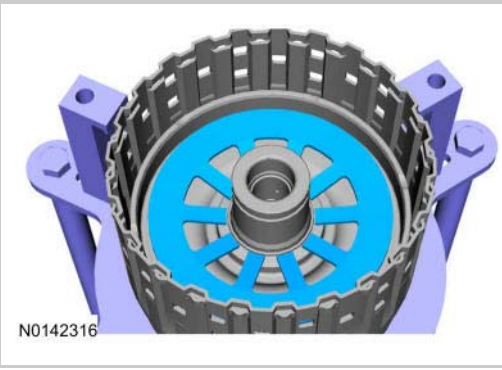
100.

Remove the overdrive clutch balance piston.



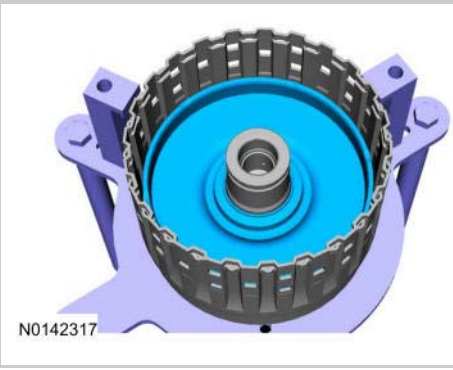
101.

Remove the overdrive clutch return spring.



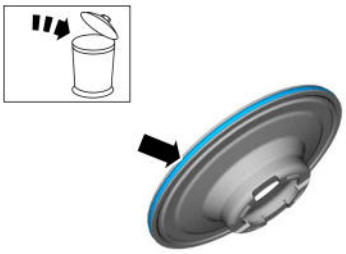
102.

Remove the overdrive clutch apply piston.



103.

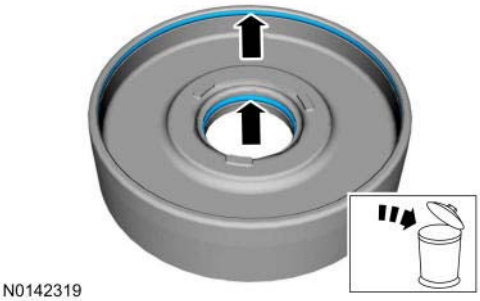
Remove and discard the overdrive clutch balance piston O-ring seal.



N0142318

104.

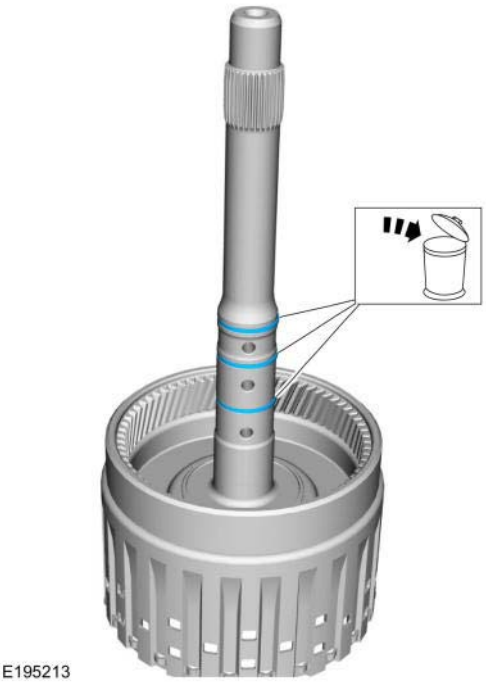
Remove and discard the O-ring seals from the clutch apply piston.



N0142319

105.

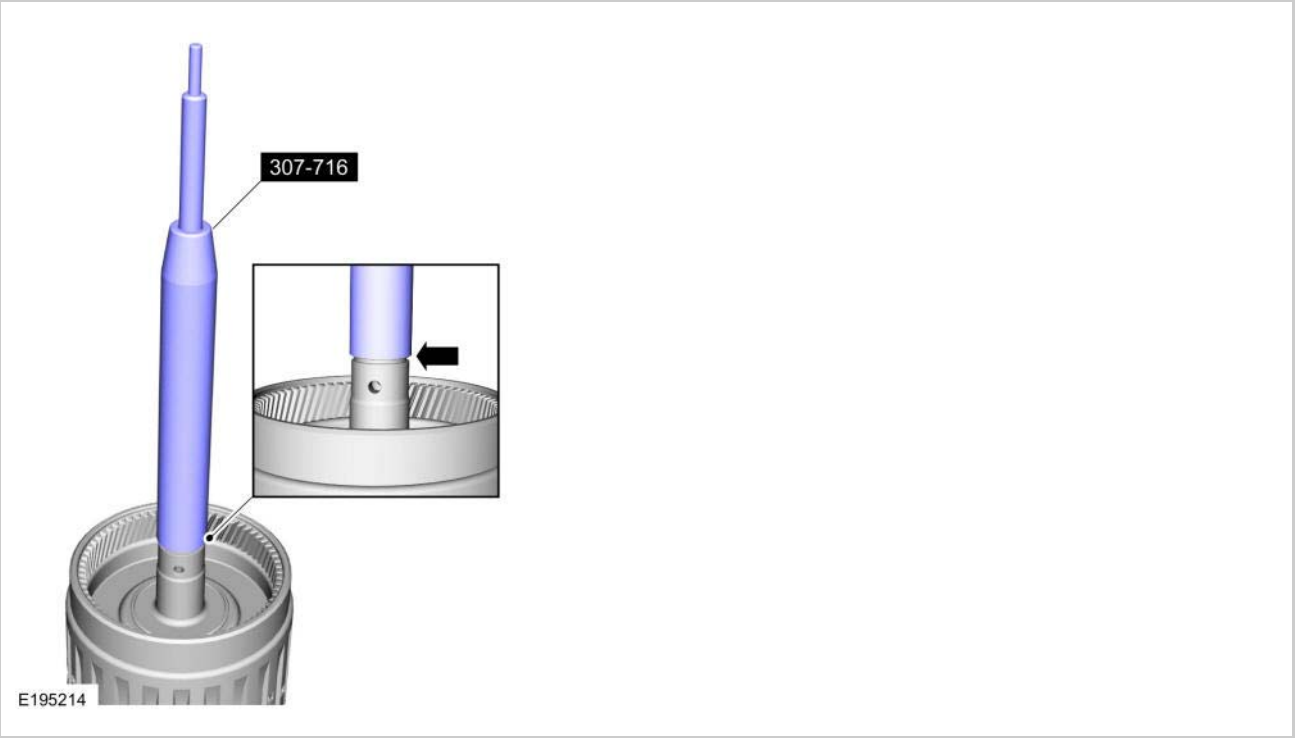
Remove and discard the Teflon ® seals.



E195213

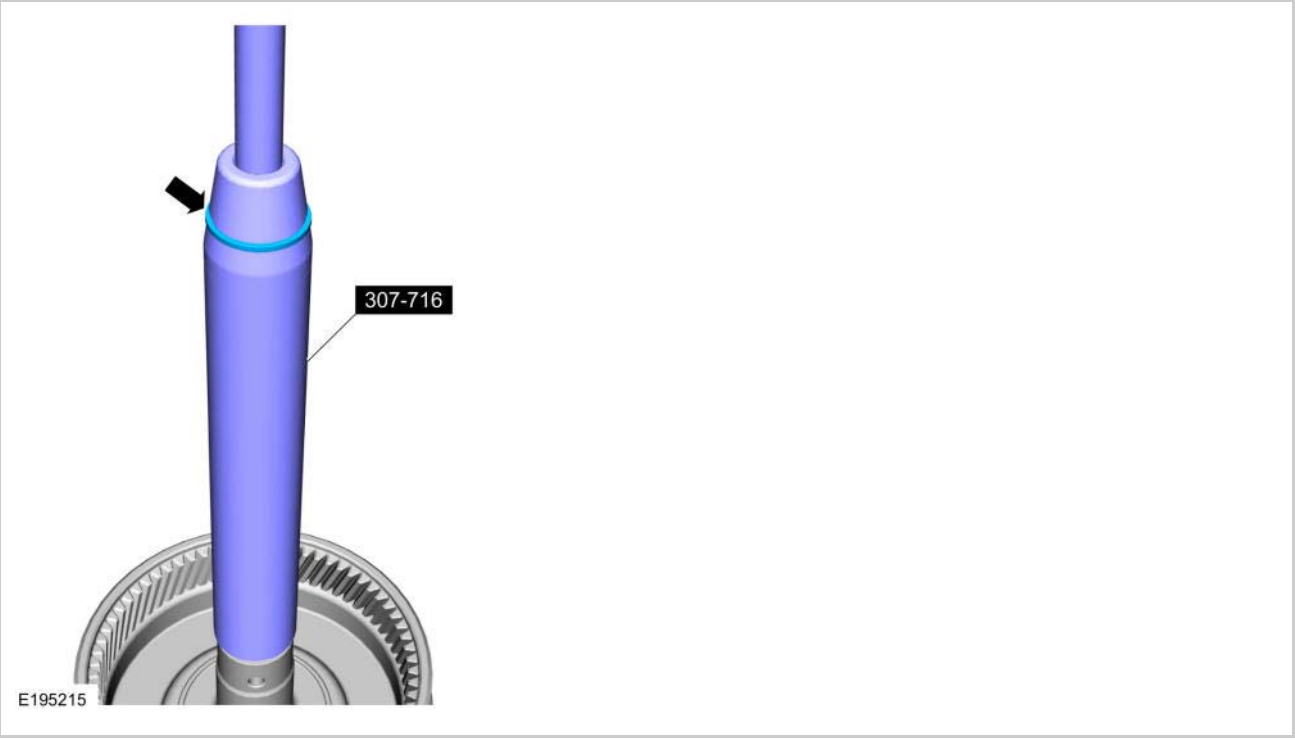
106.

Install the special tool and adjust the special tool to align the bottom edge of the tool with the top edge of the bottom Teflon ® seal groove. Use Special Service Tool: 307-716 Installer, Teflon Seal.



107.

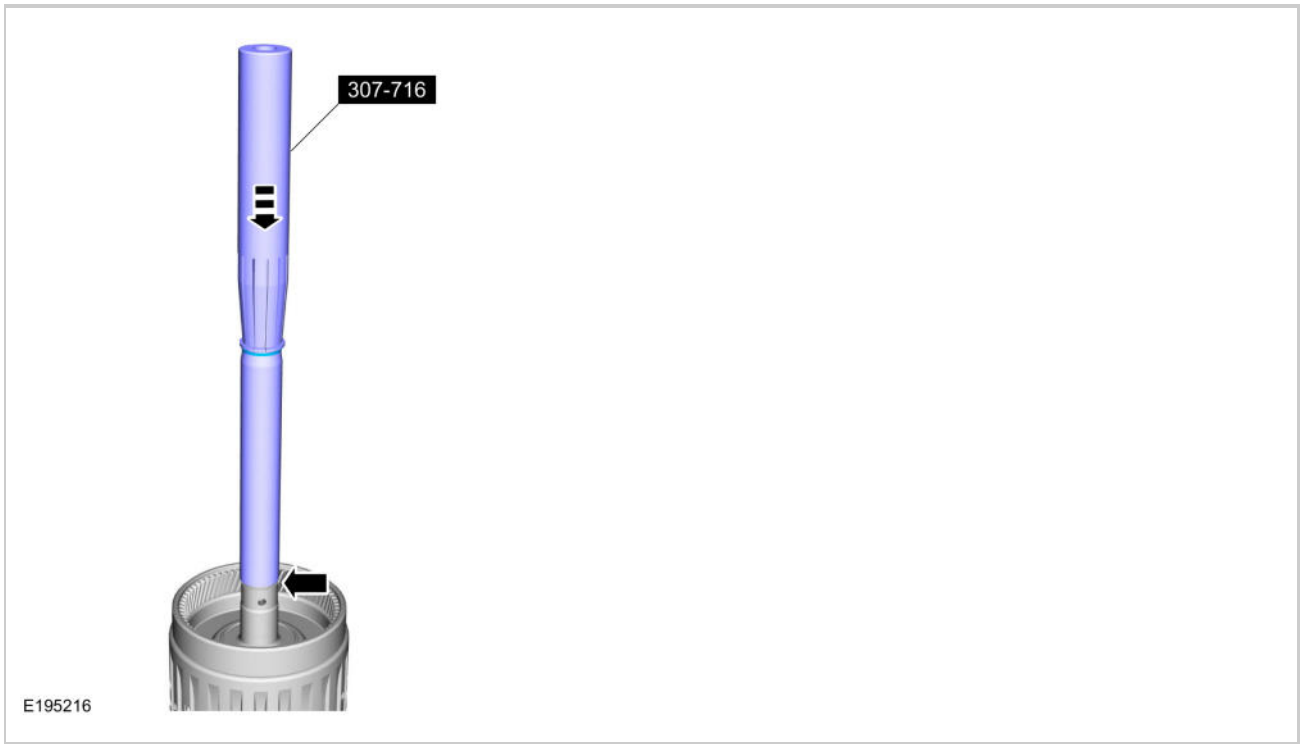
Install a new Teflon ® seal on the special tool.Use Special Service Tool: 307-716 Installer, Teflon Seal.



108.

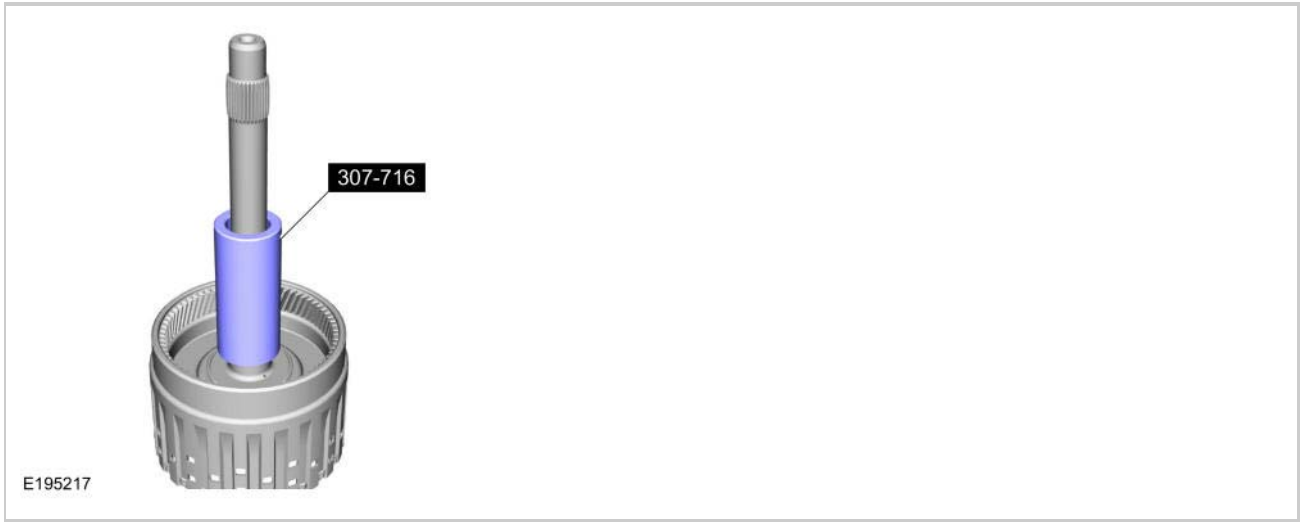
Using the top half of the special tool, slide the Teflon ® seal into the groove. Remove the special

tools and repeat the steps for the other 2 Teflon ® seals. Use Special Service Tool: 307-716 Installer, Teflon Seal.



109.

Install the special tool to size the 3 Teflon ® seals. Use Special Service Tool: 307-716 Installer, Teflon Seal.

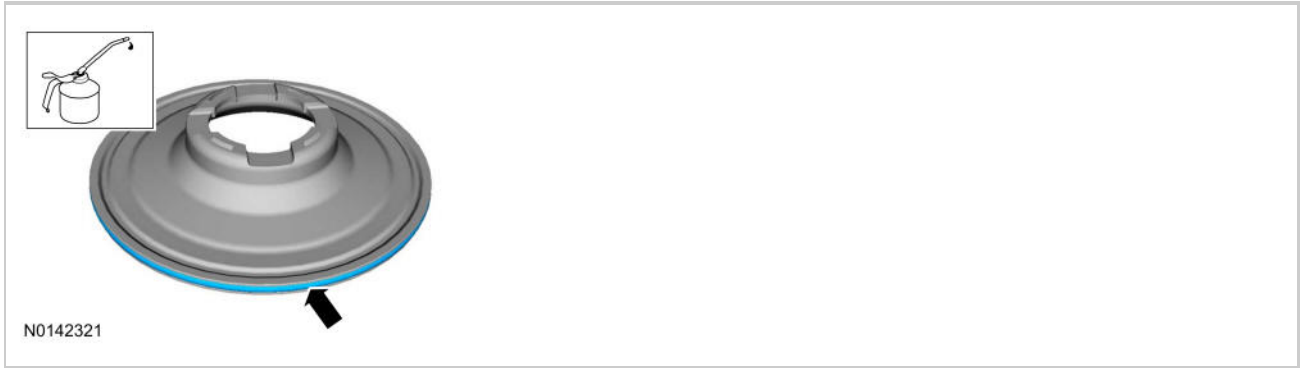


110.

Install a new outer O-ring seal on the overdrive clutch balance piston. Lightly coat the O-ring seal with clean transmission fluid.

Material

: Motorcraft ® MERCON ® LV Automatic Transmission Fluid (U.S.) / XT-10-QLVC (U.S.) (MERCON ® LV) (WSS-M2C938-A)

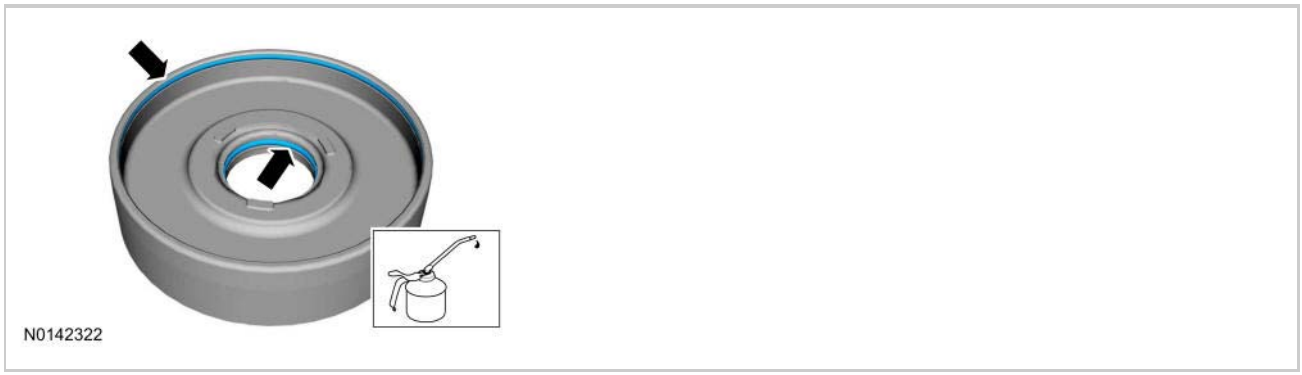


111.

Install a new outer O-ring seal on the overdrive clutch balance piston. Lightly coat the O-ring seals with clean transmission fluid.

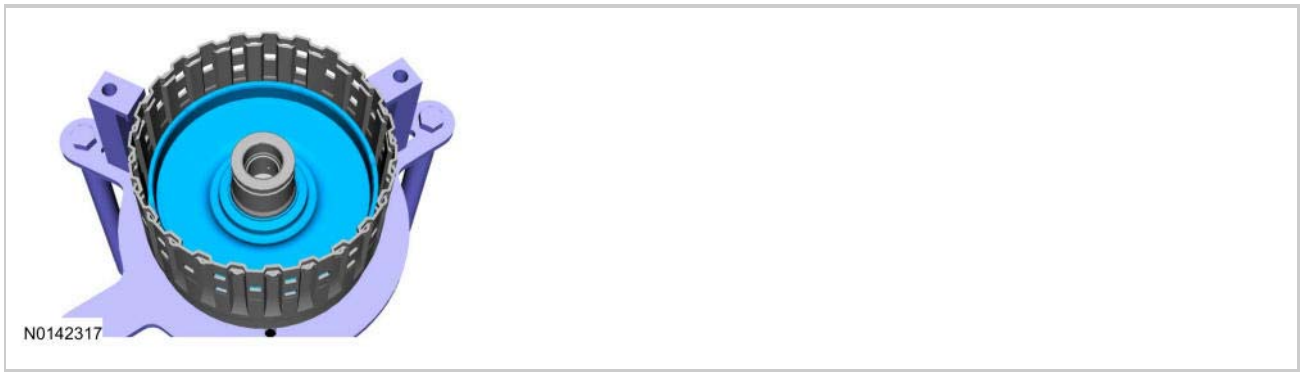
Material

: Motorcraft ® MERCON ® LV Automatic Transmission Fluid (U.S.) / XT-10-QLVC (U.S.) (MERCON ® LV) (WSS-M2C938-A)



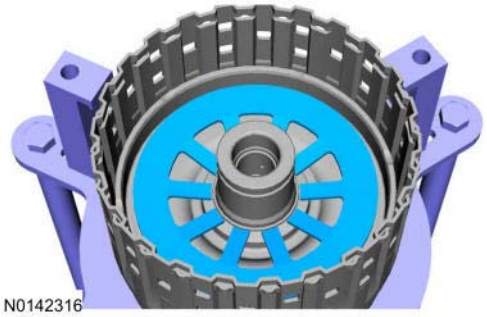
112.

Install the overdrive clutch apply piston into the drum with the O-ring seals and the 3 pads facing down.



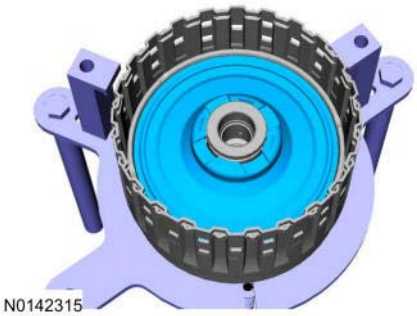
NOTE: The fingers on the return spring are facing down toward the piston.

113.
Install the overdrive clutch return spring.



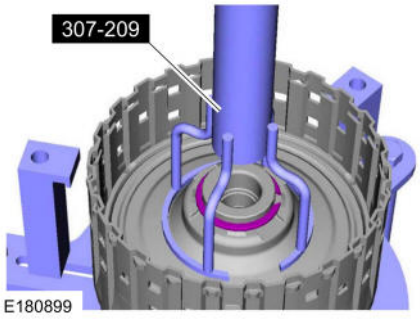
NOTE: The cone shape of the balance piston must face up when installed correctly.

114.
Install the overdrive clutch balance piston.



115.

Using the special tool and a press, install the balance piston retaining ring. Use Special Service Tool: 307-209 Compressor, Spring Washer.

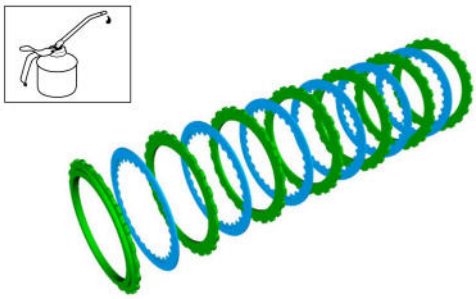


NOTE: Friction and steel plate quantity will vary based on engine displacement.

116.
Soak the overdrive clutch in clean transmission fluid. For friction and steel plate quantity, refer to the Clutch Plate Quantity Chart. Refer to: Specifications .

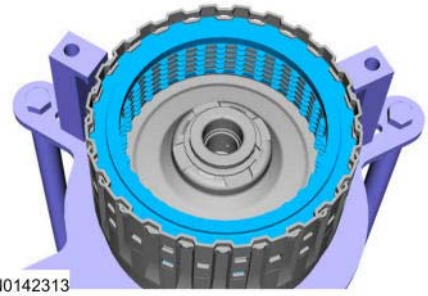
Material

: Motorcraft ® MERCON ® LV Automatic Transmission Fluid (U.S.) / XT-10-QLVC (U.S.) (MERCON ® LV) (WSS-M2C938-A)


N0142323

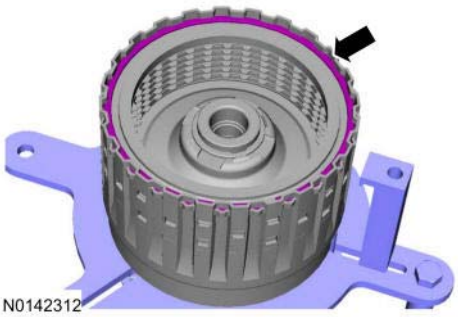
117.

Install the overdrive clutch plates, starting with a steel plate and alternating between friction and steel plates and ending with the pressure plate on the top.


N0142313

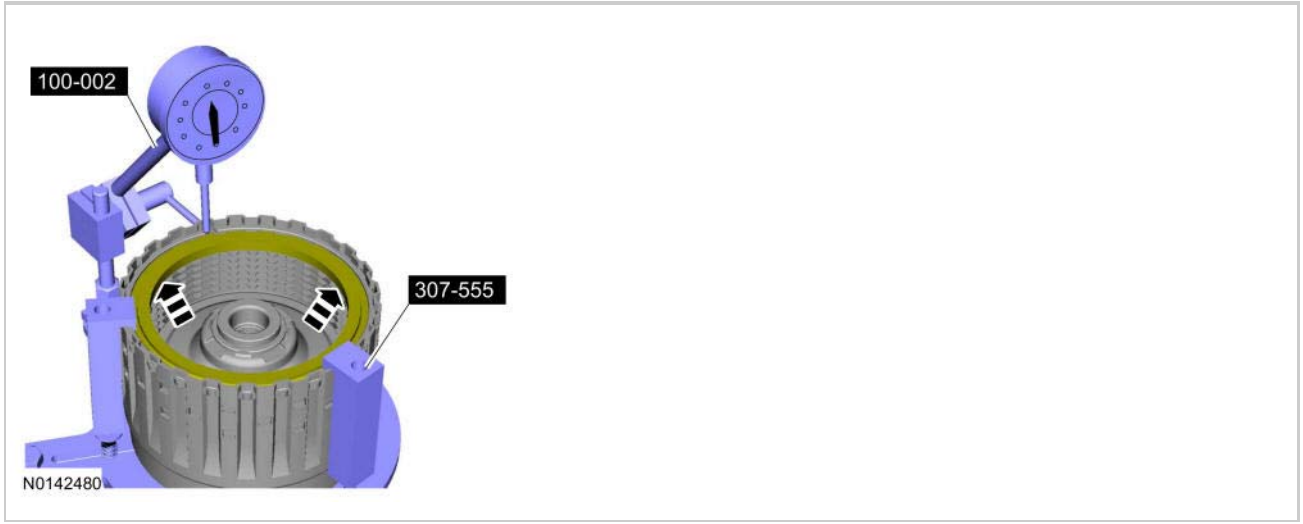
118.

Install the overdrive clutch pack snap ring.


N0142312

119.

Install the overdrive assembly on the Clutch End Play Gauge and install the dial indicator gauge. Position the plunger so it fits into the opening of the snap ring. With the dial indicator set at zero, lift up on the steel pressure plate so it is against the select fit snap ring. Record this reading as reading A. Use Special Service Tool: 100-002 (TOOL-4201-C) Holding Fixture with Dial Indicator Gauge., 307-555 End Play Gauge, Clutch.



120.

Rotate the overdrive clutch assembly 180 degrees from the opening of the snap ring, take a second reading and record this reading as reading B.

Description	Reading
Reading A	
Reading B	
Average reading A and B for a total end clearance	

121.

0.5-0.9 mm (0.019-0.035 in)

If the free pack end clearance between the bottom of the snap ring and the top of the pressure plate is high, re-measure using a thicker select fit snap ring. If the free pack end clearance between the bottom of the snap ring and the top of the pressure plate is low, re-measure using a thinner select fit snap ring.

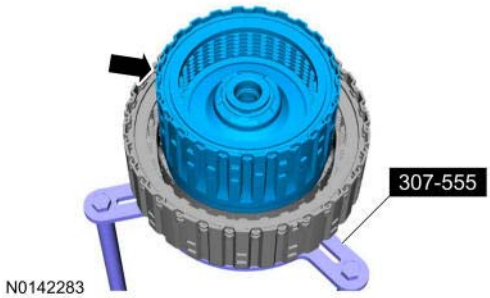
122.

Install the T3 thrust bearing.



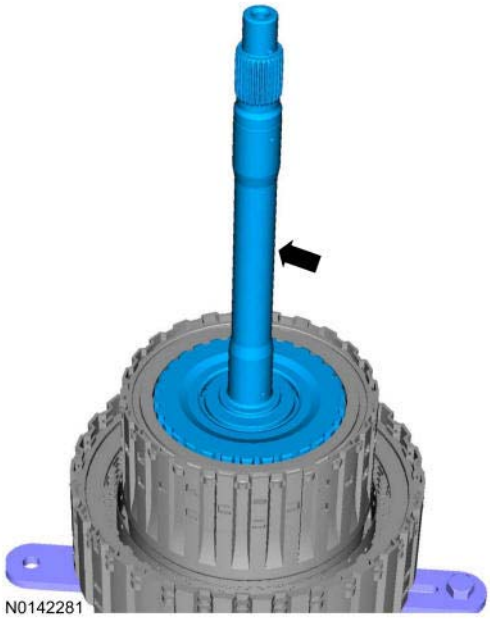
123.

Position the forward clutch assembly in the special tool and install the overdrive clutch pack onto the forward clutch and planetary gear set.Use Special Service Tool: 307-555 End Play Gauge, Clutch.



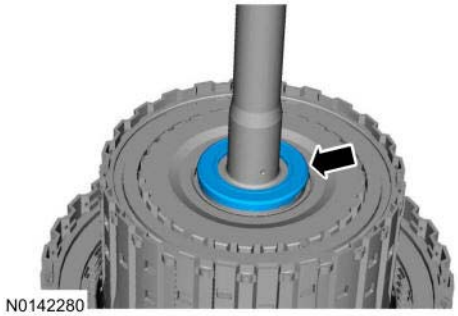
124.

Install the intermediate shaft assembly.



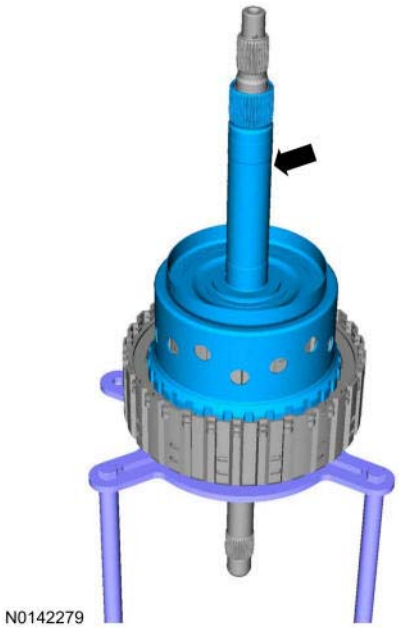
NOTE: Inspect and install new thrust bearings as required.

125.
Install the T4 intermediate shaft bearing.



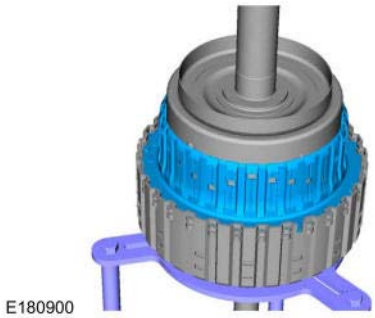
126.

Install the forward clutch hub and sun shaft assembly.



127.

Install a new direct clutch hub.



NOTE: Do not install the snap ring on the forward clutch hub with the snap ring

gap in the same position as the original snap ring or damage to the transmission can occur.

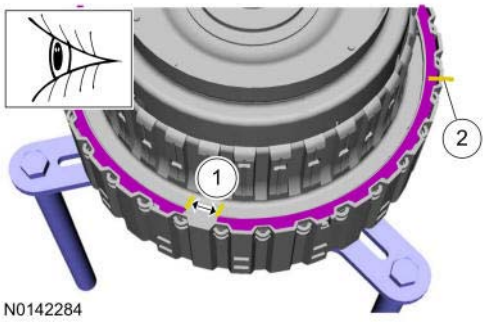
128.

1.

Install the snap ring with the snap ring gap approximately 120 ° away from the mark made on the forward clutch hub during disassembly.

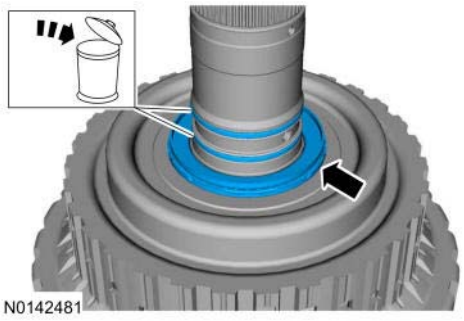
2.

Index mark from original snap ring gap location.



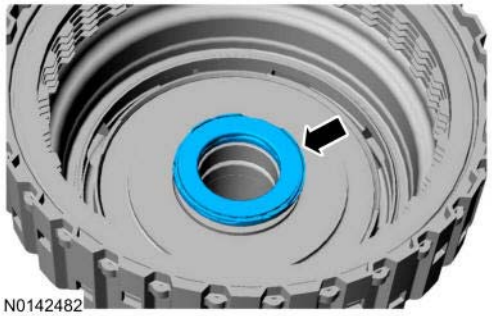
129.

Remove and discard the 2 scarf cut seals and remove the roller bearing.



130.

Remove the T5 thrust bearing.


N0142482

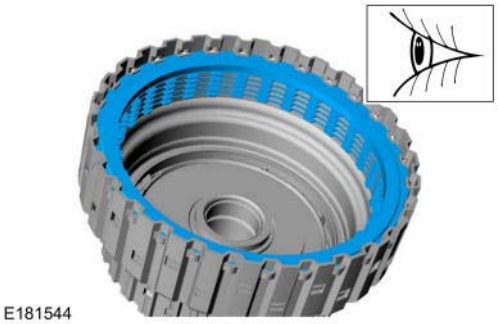
131.

Remove the direct clutch snap ring.


N0142483

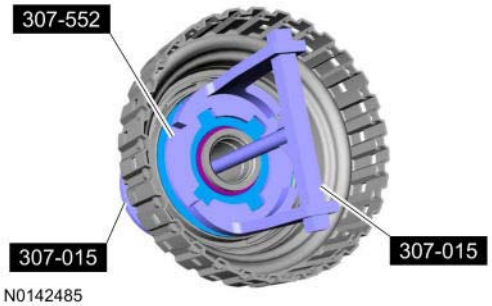
132.

Remove the direct clutch steel and friction plates. Inspect the clutch plates for excessive wear or damage. If the clutch plates are excessively worn or damaged replace as necessary. If the clutch plates are not excessively worn or damaged, they can be reused.


E181544

133.

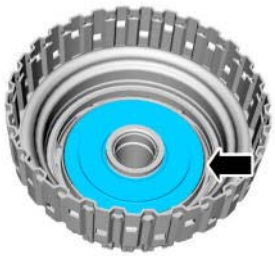
Install the special tools and remove the direct clutch balance piston snap ring. Use Special Service Tool: 307-015 Compressor, Clutch Spring., 307-552 Compressor, Clutch Spring.



N0142485

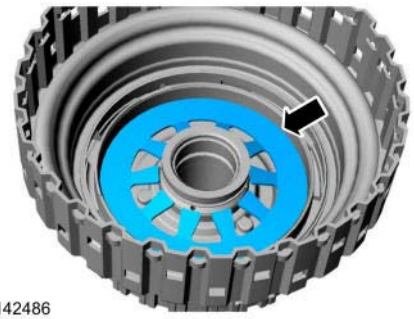
134.

Remove the balance piston.


E180912

135.

Remove the direct clutch return spring.


N0142486

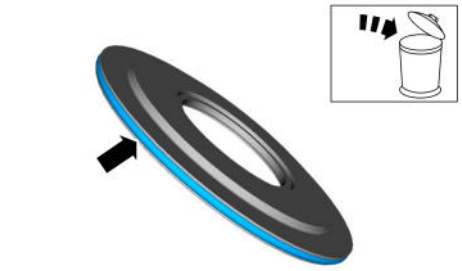
136.

Remove the direct clutch piston.


N0142487

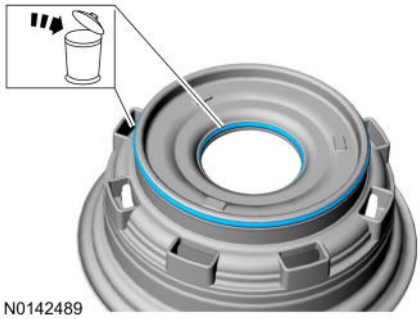
137.

Remove and discard the outer O-ring seal from the balance piston.


N0142488

138.

Remove and discard the O-ring seals from the apply piston.


N0142489

139.

Inspect the components of the direct clutch for damage. If damage is indicated, install new components as necessary.

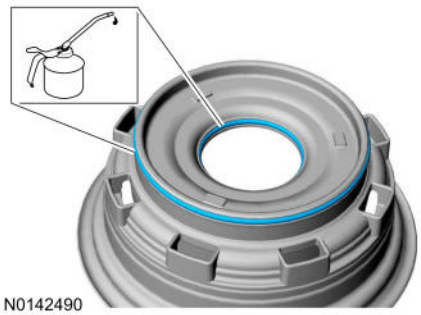
140.

Install new O-ring seals on the apply piston. Lightly coat the O-ring seals with clean transmission fluid.

Material

: Motorcraft ® MERCON ® LV Automatic Transmission Fluid (U.S.) / XT-10-QLVC (U.S.)

(MERCON ® LV) (WSS-M2C938-A)

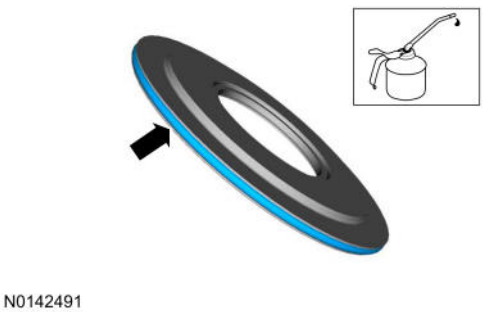


141.

Install a new O-ring seal on the balance piston. Lightly coat the O-ring seal with clean transmission fluid.

Material

: Motorcraft ® MERCON ® LV Automatic Transmission Fluid (U.S.) / XT-10-QLVC (U.S.) (MERCON ® LV) (WSS-M2C938-A)



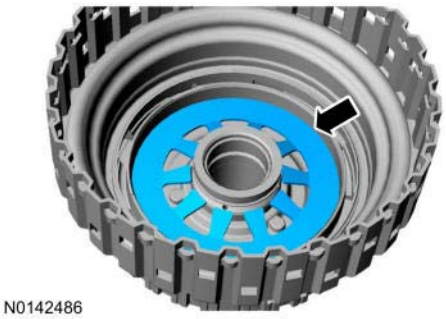
142.

Install the direct clutch piston.



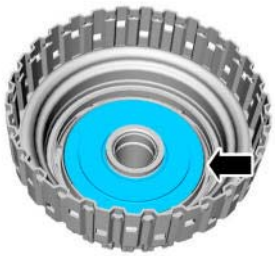
143.

Install the direct clutch return spring.


N0142486

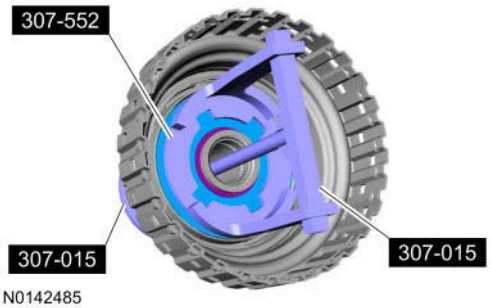
144.

Install the balance piston.


E180912

145.

Install the special tools the direct clutch assembly and install a the balance piston snap ring. Use Special Service Tool: 307-015 Compressor, Clutch Spring., 307-552 Compressor, Clutch Spring.



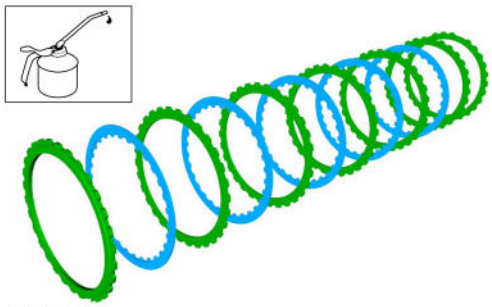
N0142485

NOTE: Friction and steel plate quantity will vary based on engine displacement.

146.
Soak the direct clutch in clean transmission fluid. For friction and steel plate quantity, refer to the Clutch Plate Quantity Chart. Refer to: Specifications .

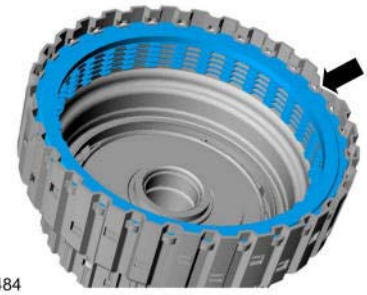
Material

: Motorcraft ® MERCON ® LV Automatic Transmission Fluid (U.S.) / XT-10-QLVC (U.S.) (MERCON ® LV) (WSS-M2C938-A)


N0142492

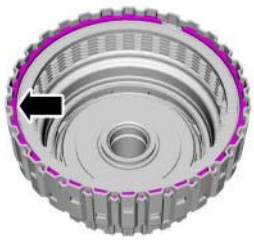
147.

Install the direct clutch plates, starting with the wave spring then a steel plate and alternating between steel and friction plates, and ending with the pressure plate on the top.


N0142484

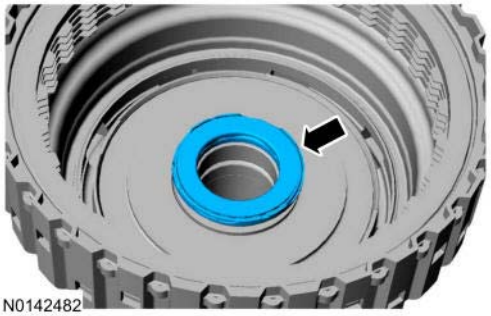
148.

Install the direct clutch snap ring.


N0142483

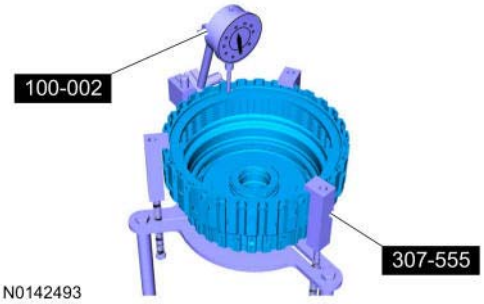
NOTE: Inspect the thrust bearing for damage and install a new thrust bearing if damage is found.

149.
Install the T5 thrust bearing.



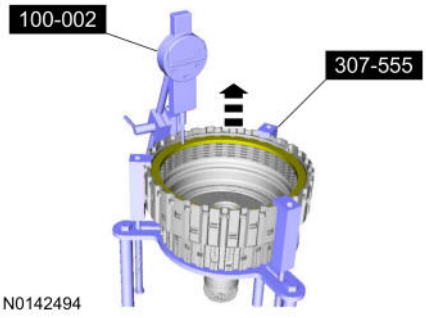
NOTE: All direct clutch plates, friction and steel are of a wave-type design.

150.
Install the direct clutch assembly on the Clutch End Play Gauge and install the dial indicator gauge. Position the plunger so it fits into the opening of the snap ring. Use Special Service Tool: 100-002 (TOOL-4201-C) Holding Fixture with Dial Indicator Gauge., 307-555 End Play Gauge, Clutch.



151.

With the dial indicator set at zero, lift up on the steel pressure plate so it is against the select fit snap ring. Record this reading as reading A.Use Special Service Tool: 100-002 (TOOL-4201-C) Holding Fixture with Dial Indicator Gauge., 307-555 End Play Gauge, Clutch.



152.

Rotate the direct clutch assembly 180 ° from the opening of the snap ring, take a second reading and record this reading as reading B.

Description	Reading
Reading A	
Reading B	
Average reading A and B for a total end clearance	

NOTE: If the final measurement is not within specification, install a new snap ring until the correct specification is achieved.

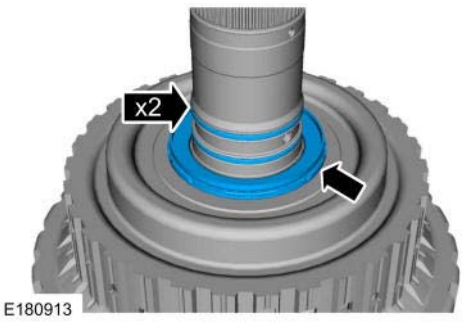
153.

0.5-1.3 mm (0.019-0.051 in)

If the free pack end clearance between the bottom of the snap ring and the top of the pressure plate is high, re-measure using a thicker select fit snap ring. If the free pack end clearance between the bottom of the snap ring and the top of the pressure plate is low, re-measure using a thinner select fit snap ring.

154.

Install 2 new scarf cut seals and the roller bearing.

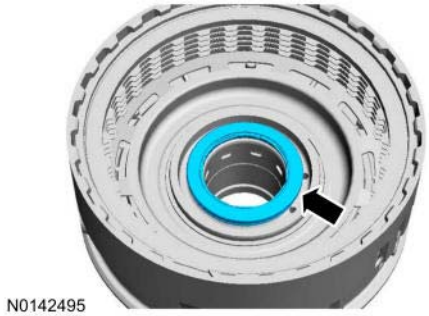


NOTE: The intermediate clutch plate quantity is model dependent on engine size. Failure to install the correct clutch plate quantity will result in transmission failure.

NOTE: The intermediate clutch piston is model dependent on engine size due to the different quantity of intermediate clutch plates. If installing a new intermediate clutch piston, check to make sure the height of the new piston is the same as the original piston. Failure to install the correct piston will result in transmission failure.

155.

Remove the T6 thrust bearing.


N0142495

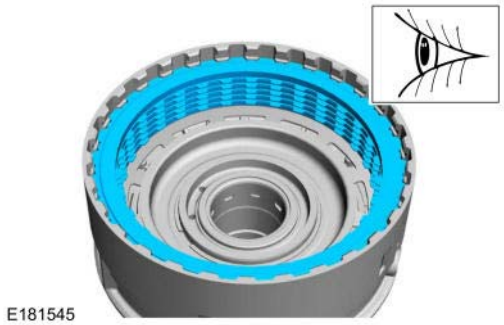
156.

Remove the intermediate clutch plate snap ring.


N0142496

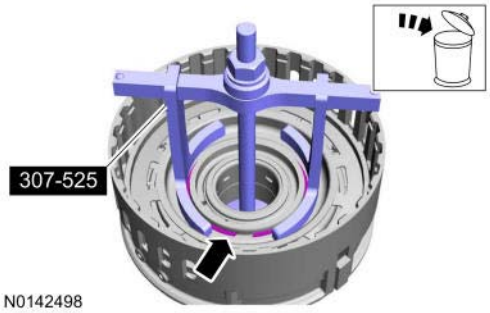
157.

Remove the intermediate clutch plates. Inspect the clutch plates for excessive wear or damage. If the clutch plates are excessively worn or damaged replace as necessary. If the clutch plates are not excessively worn or damaged, they can be reused.


E181545

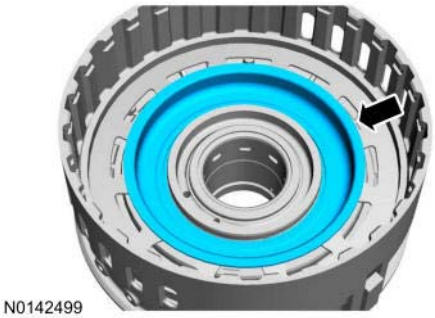
158.

Using the special tool, remove and discard the intermediate clutch return spring retainer. Use Special Service Tool: 307-525 Compressor, Clutch Spring.



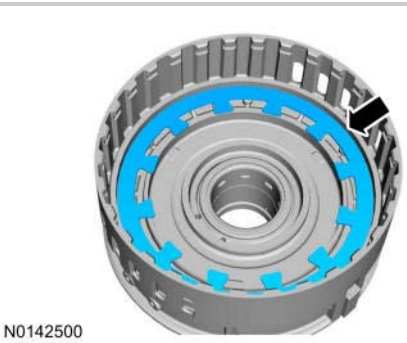
159.

Remove the intermediate clutch return spring top plate.



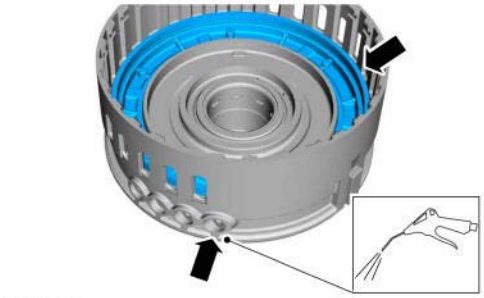
160.

Remove the intermediate clutch return spring.



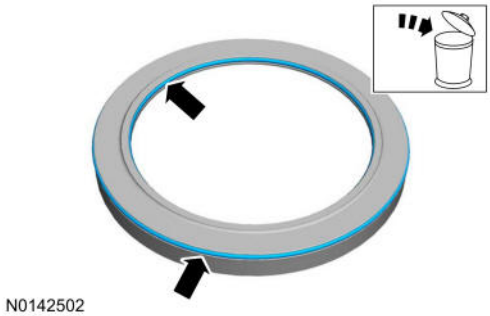
161.

Applying a slight amount of air to the port, remove the intermediate clutch piston.



162.

Remove and discard the inner and outer intermediate clutch piston O-ring seals.

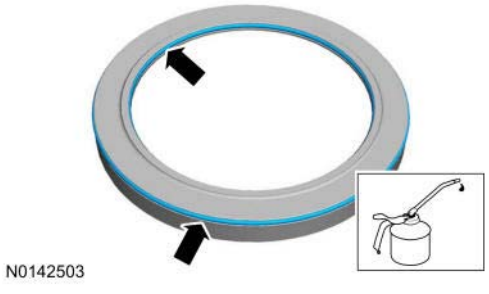


163.

Install the inner and outer intermediate clutch piston O-ring seals.

Material

: Motorcraft ® MERCON ® LV Automatic Transmission Fluid (U.S.) / XT-10-QLVC (U.S.) (MERCON ® LV) (WSS-M2C938-A)



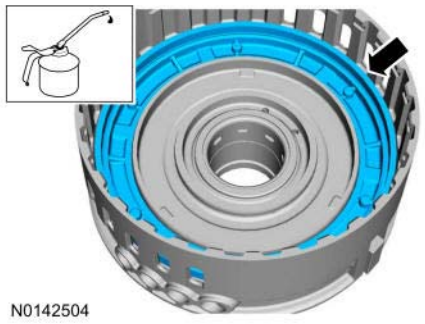
164.

Lightly coat the O-ring seals in clean automatic transmission fluid and install the intermediate clutch piston.

Material

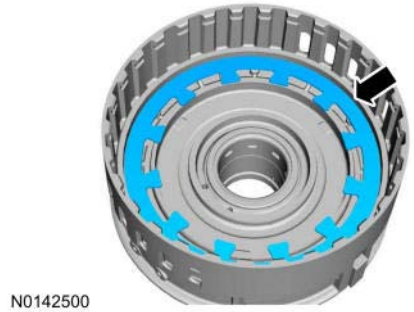
: Motorcraft ® MERCON ® LV Automatic Transmission Fluid (U.S.) / XT-10-QLVC (U.S.)

(MERCON ® LV) (WSS-M2C938-A)



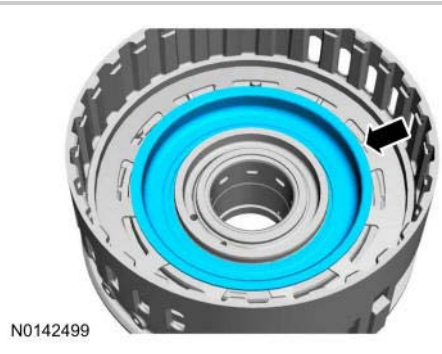
165.

Install the intermediate clutch return spring.



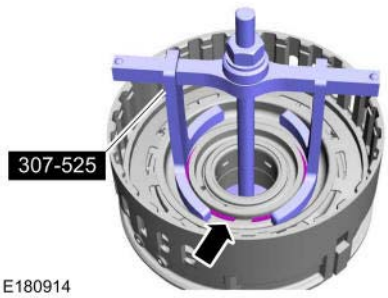
166.

Install the intermediate clutch return spring top plate.



167.

Using the special tool, install a new intermediate clutch return spring retainer. Use Special Service Tool: 307-525 Compressor, Clutch Spring.

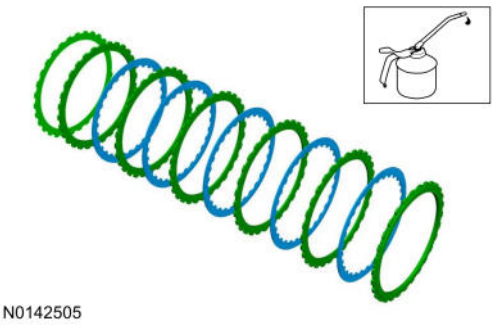


NOTE: Friction and steel plate quantity will vary based on engine displacement.

168.
Soak the intermediate clutch plates in clean automatic transmission fluid. For friction and steel plate quantity, refer to the Clutch Plate Quantity Chart. Refer to: Specifications .

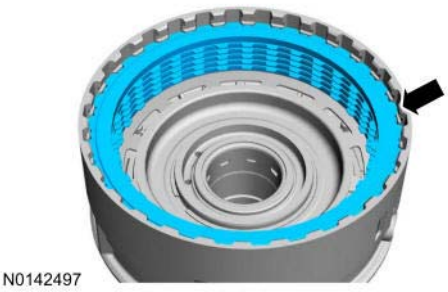
Material

: Motorcraft ® MERCON ® LV Automatic Transmission Fluid (U.S.) / XT-10-QLVC (U.S.) (MERCON ® LV) (WSS-M2C938-A)



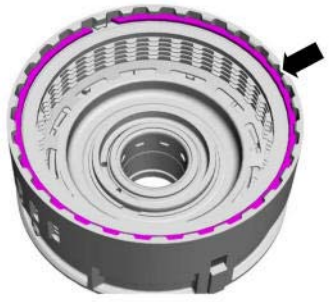
169.

Install the intermediate clutch plates, starting with the wave spring then a steel plate and alternating between friction and steel plates, and ending with the pressure plate.



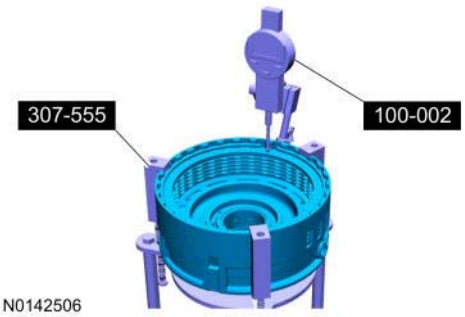
170.

Install the intermediate clutch plate snap ring.



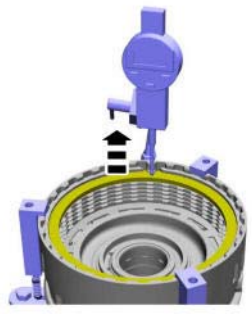
NOTE: All intermediate clutch plates, friction and steel are of a wave-type design.

171.
Install the intermediate clutch assembly on the Clutch End Play Gauge and install the dial indicator gauge. Position the plunger so it fits into the opening of the snap ring.Use Special Service Tool: 100-002 (TOOL-4201-C) Holding Fixture with Dial Indicator Gauge., 307-555 End Play Gauge, Clutch.



172.

With the dial indicator set at zero, lift up on the steel pressure plate so it is against the select fit snap ring. Record this reading as reading A.



173.

Rotate the intermediate clutch assembly 180 ° from the opening of the snap ring, take a second reading and record this reading as reading B.

Description	Reading
Reading A	
Reading B	
Average reading A and B for a total end clearance	

NOTE: If the final measurement is not within specification, install a new snap ring until the correct specification is achieved.

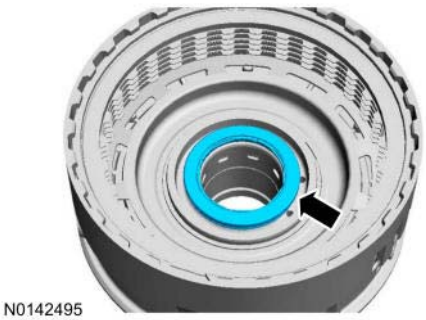
174.

0.7-1.1 mm (0.027-0.043 in)

If the free pack end clearance between the bottom of the snap ring and the top of the pressure plate is high, re-measure using a thicker select fit snap ring. If the free pack end clearance between the bottom of the snap ring and the top of the pressure plate is low, re-measure using a thinner select fit snap ring.

175.

Install the T6 thrust bearing.

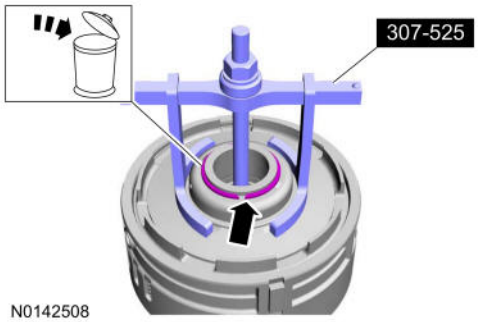

N0142495

NOTE: The low/reverse clutch plate quantity is model dependent on engine size. Failure to install the correct clutch plate quantity will result in transmission failure.

NOTE: The low/reverse clutch plates are installed in the case during the transmission assembly procedure.

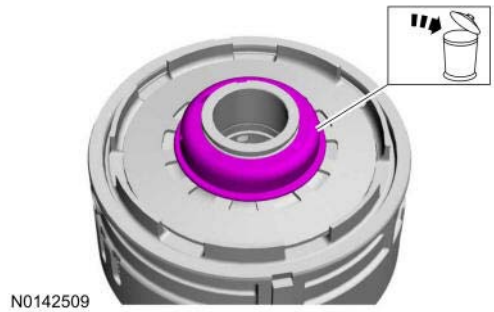
176.

Using the special tool, remove and discard the low/reverse clutch return spring retainer. Use Special Service Tool: 307-525 Compressor, Clutch Spring.



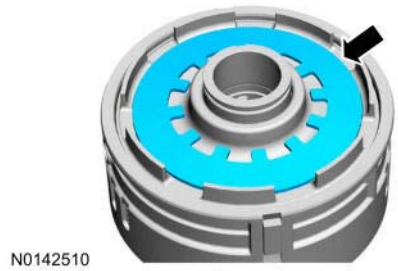
177.

Remove and discard the low/reverse clutch return spring retainer.



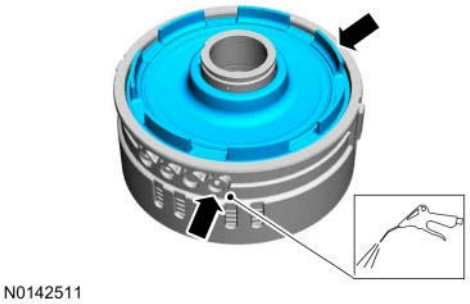
178.

Remove the low/reverse clutch return spring.



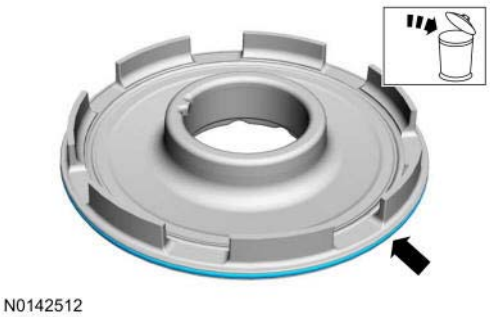
179.

Apply a slight amount of air to the port, remove the low/reverse clutch piston from the low/reverse clutch drum.



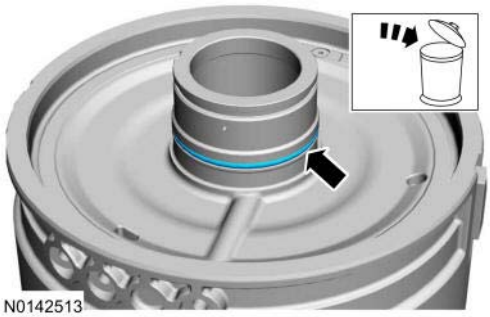
180.

Remove and discard the low/reverse outer piston O-ring seal.



181.

Remove and discard the low/reverse drum O-ring seal.

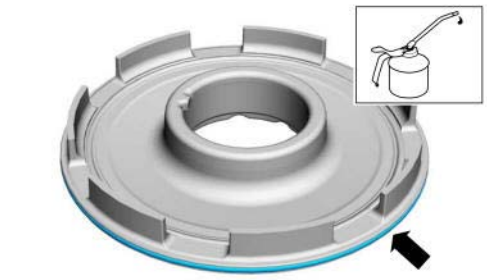


182.

Install new low/reverse outer piston O-ring seal.

Material

: Motorcraft ® MERCON ® LV Automatic Transmission Fluid (U.S.) / XT-10-QLVC (U.S.) (MERCON ® LV) (WSS-M2C938-A)

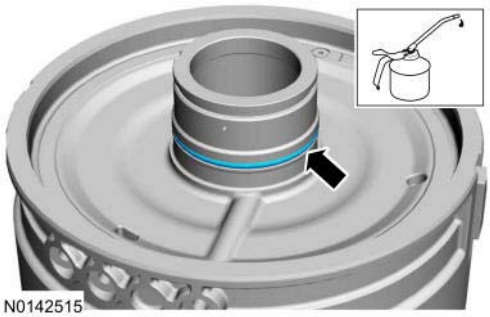

N0142514

183.

Install a new low/reverse drum inner O-ring seal.

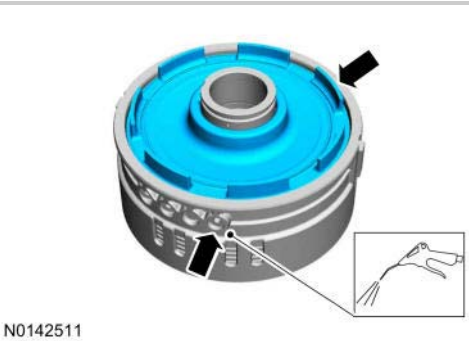
Material

: Motorcraft ® MERCON ® LV Automatic Transmission Fluid (U.S.) / XT-10-QLVC (U.S.) (MERCON ® LV) (WSS-M2C938-A)


N0142515

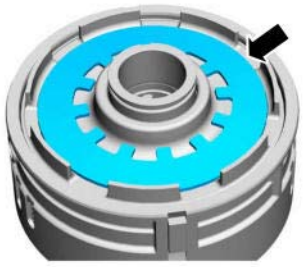
184.

Align the alignment tab on the piston with the groove in the center support and install the low/reverse piston.


N0142511

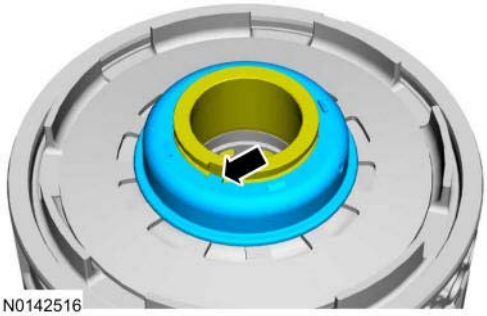
185.

Install the low/reverse clutch return spring.


N0142510

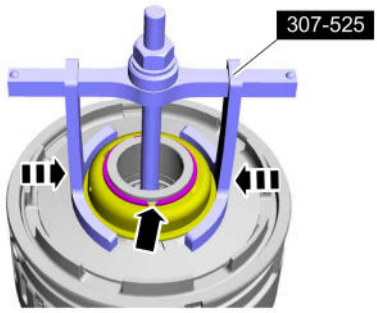
186.

Install a new low/reverse clutch return spring retainer. Align the alignment tab on the retainer with the groove in the center support and install the low/reverse piston return spring retainer.


N0142516

187.

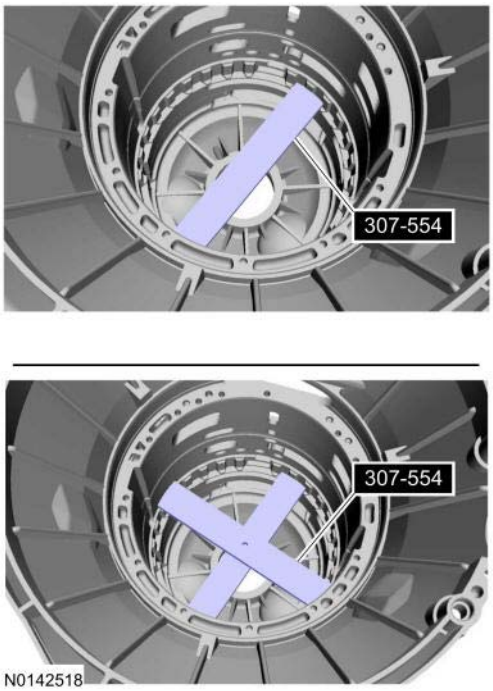
Using the special tool, compress the low/reverse clutch return spring and install the retaining ring.Use Special Service Tool: 307-525 Compressor, Clutch Spring.



N0142517

NOTE: All low/reverse clutch plates, friction and steel are of a wave-type design.

188.
Install the special tool into the case. Use Special Service Tool: 307-554 Gauge, D-Clutch Measurement.

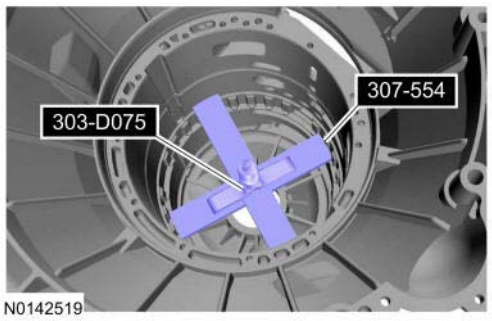


189.

With the special tool positioned in the case, use the depth gauge to measure the case stop depth.

Description	Reading
Measure the distance from the top of the upper gauge bar to the top of the lower gauge bar. Record this reading as the case measurement. Record as reading A.	

Use Special Service Tool: 307-554 Gauge, D-Clutch Measurement. Use the General Equipment: Depth Gauge



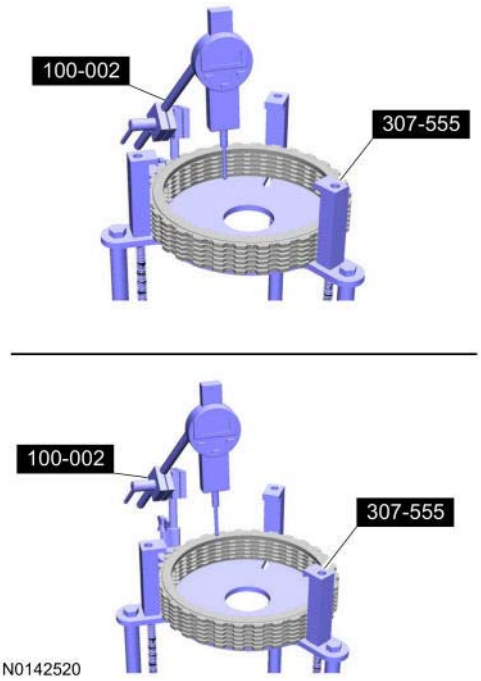
190.

Measure the clutch pack height.

Description	Reading
Place the low/reverse clutch pack on the Clutch	

End Play Gauge with the wave spring down and the pressure plate on top. Place the plunger of the dial indicator on the pressure plate. Slide the clutch to the side so the plunger of the dial indicator is touching the gauge plate of Clutch End Play Gauge. Zero out the dial indicator. Carefully lift the plunger enough to slide the clutch pack under the plunger to take a reading. Record this reading. Rotate the clutch pack 180 degrees and take a second reading. Average the readings. Record this as B.	

Use Special Service Tool: 100-002 (TOOL-4201-C) Holding Fixture with Dial Indicator Gauge., 307-555 End Play Gauge, Clutch.

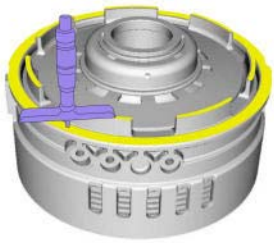


191.

Using a depth gauge, measure the piston to center support shoulder height.

Description	Reading
Measure the piston to center support shoulder height. Record this measurement. Rotate the center support 180 degrees and record this measurement. Average the 2 measurements. Record this as C.	

Use the General Equipment: Depth Gauge



N0142521

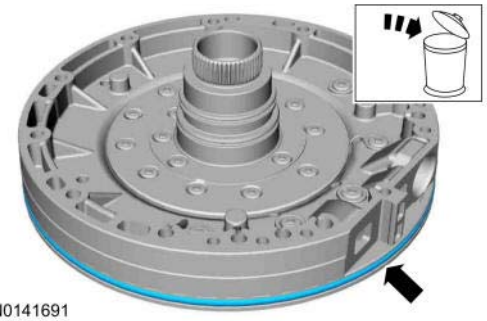
192.

Calculate the end clearance. Compare the end clearance to the specification. If the end clearance is out of specification, select the next thinner or thicker plate as required and repeat the steps to measure the clutch height.

Description	Reading
Subtract B and C from A to determine end clearance	
Total C measurement	
End clearance specification	1.0-1.6 mm (0.039-0.062 in)

193.

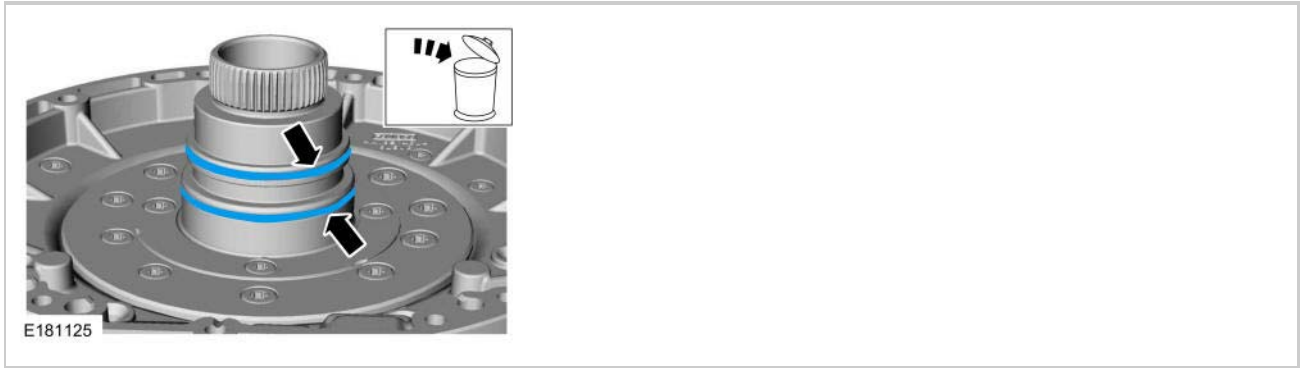
Remove and discard the front pump O-ring seal.



N0141691

194.

Remove and discard the front pump seal rings.



195.

1.

Pump body

2.

Pump plate assembly

3.

Index-mark the pump body to the pump plate assembly.



196.

1.

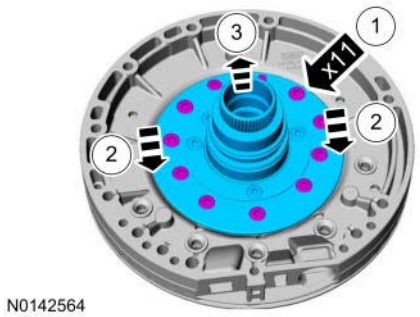
Loosen the pump plate assembly-to-pump body bolts.

2.

Push down on the loose pump plate assembly-to-pump body bolts to remove the pump body from the pump plate assembly.

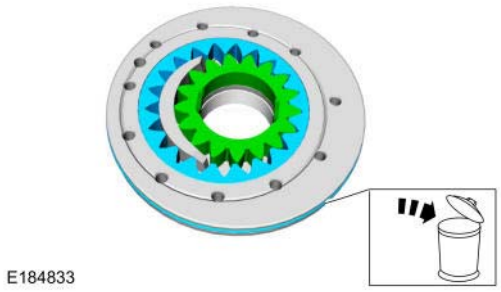
3.

Remove the bolts and the pump body.



197.

Remove and discard the pump body outer seal and remove the fluid pump gears.



NOTE: Clean all pump components in solvent and dry the parts with compressed air. Inspect the pump gears, faces, gear teeth and mating surfaces for damage or scoring. Install a new pump if necessary.

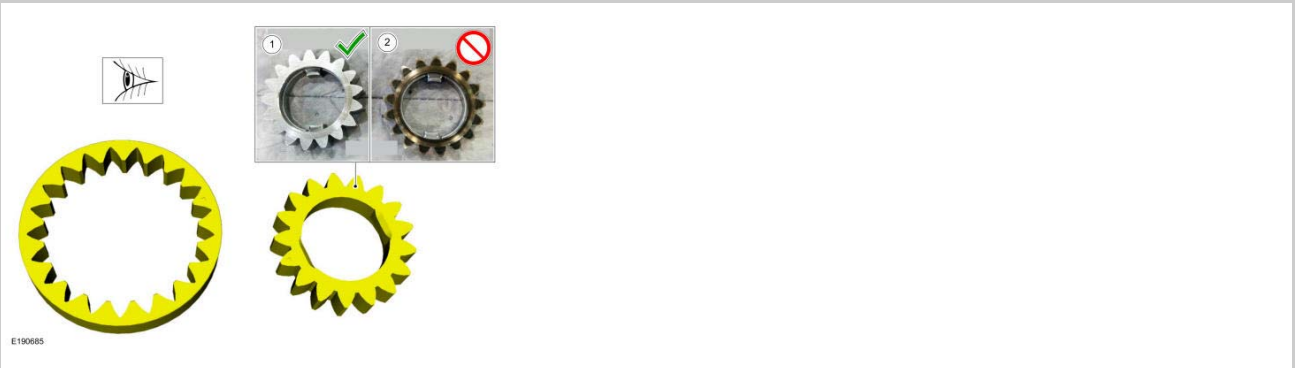
198.

NOTE: Some pump internal wear mark or light scratches is normal.

1.
Acceptable wear.

2.

If the gears are burned, discolored or scored or if the teeth are damaged, install a new pump.



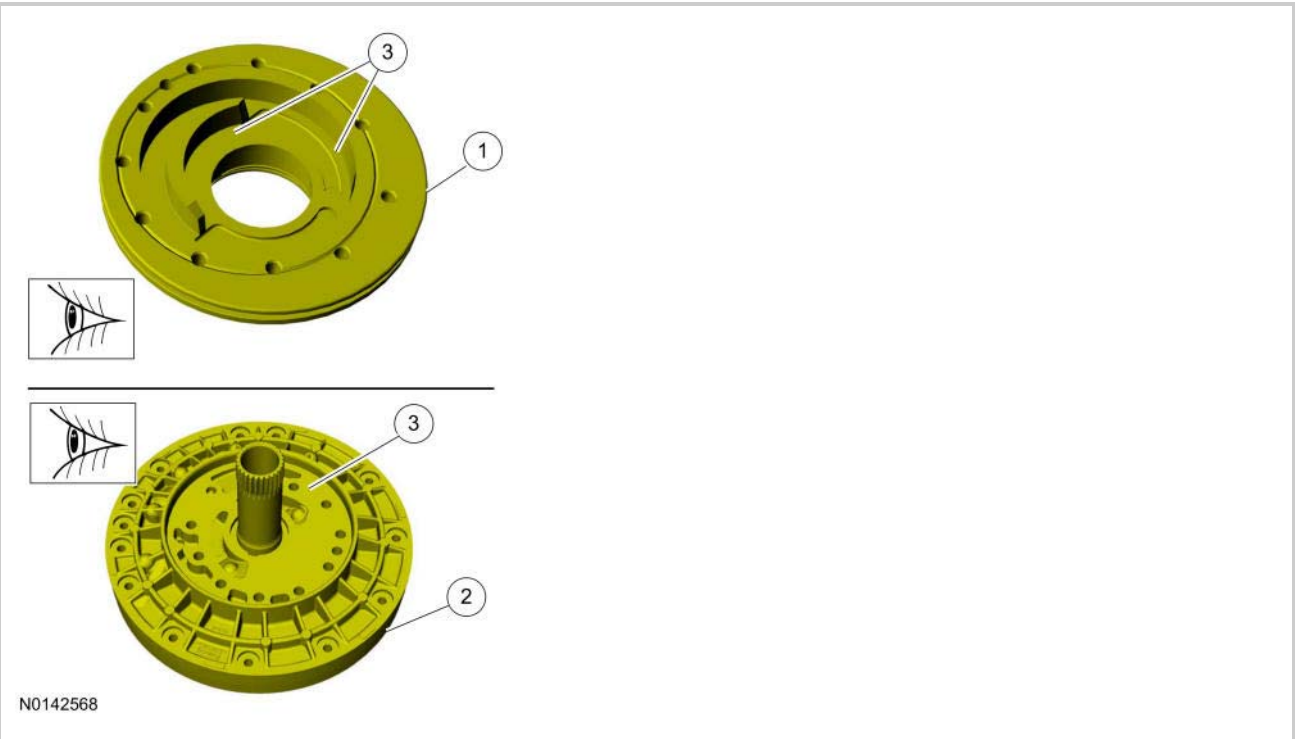
199.

Inspect the pump body for damage or scoring.

Inspect the pump plate assembly for damage or scoring.

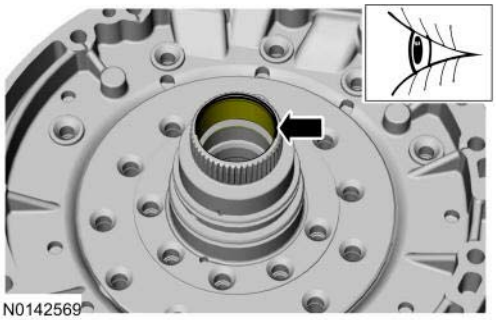
Inspect the pump gear thrust surfaces for damage or scoring.

Install a new pump if necessary.



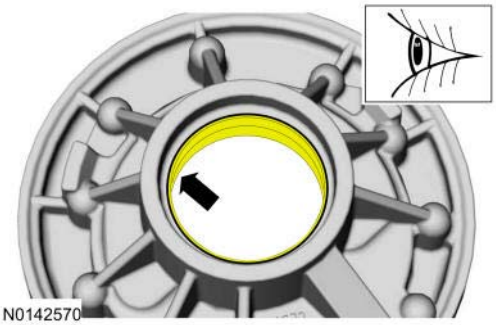
200.

Inspect the input shaft bushing for damage or scoring. If the bushing is damaged, install a new pump.



201.

Inspect the torque converter hub bushing for damage or scoring. If the bushing is damaged, install a new pump.

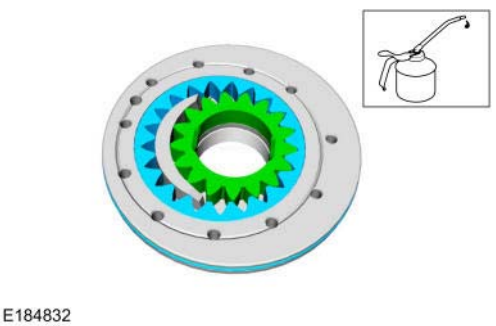


NOTE: Prior to installation, lightly lubricate the pump gears with clean automatic transmission fluid.

202.
Install the pump gears with the dot facing the pump plate assembly and install a new pump body outer seal. Lubricate the pump gears and the seal with clean automatic transmission fluid.

Material

: Motorcraft ® MERCON ® LV Automatic Transmission Fluid (U.S.) / XT-10-QLVC (U.S.) (MERCON ® LV) (WSS-M2C938-A)



203.

1.

Pump body

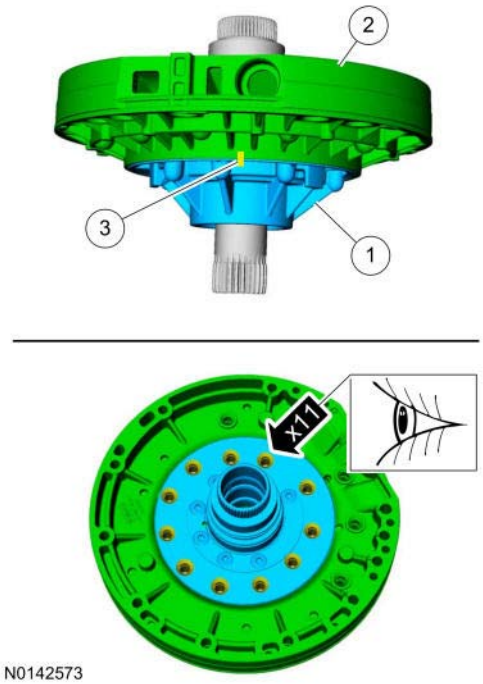
2.

Pump plate assembly

3.

Align the marks made during disassembly to correctly assemble the pump. Press the pump body into the pump plate assembly.

Visually inspect the pump body-to-pump plate assembly bolt holes to be sure that the pump body and pump plate are correctly aligned.

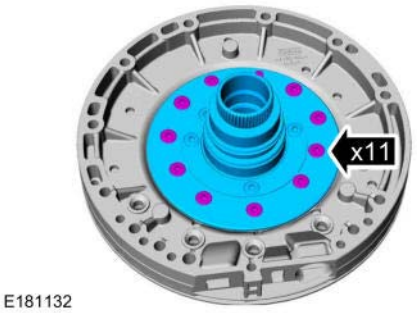


204.

Install the pump plate assembly-to-front pump body bolts.

Torque

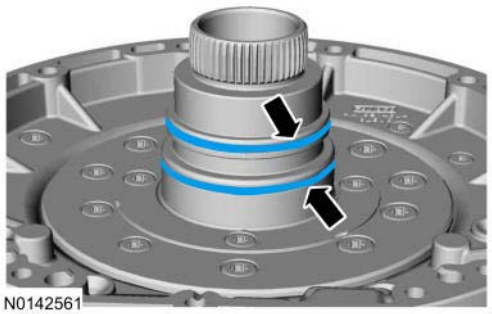
: 133 lb.in (15 Nm)



E181132

NOTE: Make sure that the seal ends of each seal ring are hooked together or fluid leakage can occur.

205.
Install the front pump seal rings onto the stator support. Make sure the seals are fully seated in the stator support seal grooves and the seal ends are oriented 180 degrees apart.

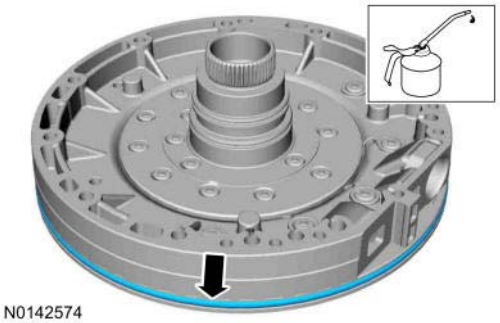

N0142561

206.

Install the pump outer diameter front pump O-ring seal.

Material

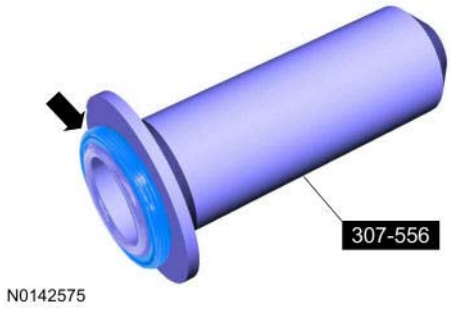
: Motorcraft ® MERCON ® LV Automatic Transmission Fluid (U.S.) / XT-10-QLVC (U.S.) (MERCON ® LV) (WSS-M2C938-A)


N0142574

207.

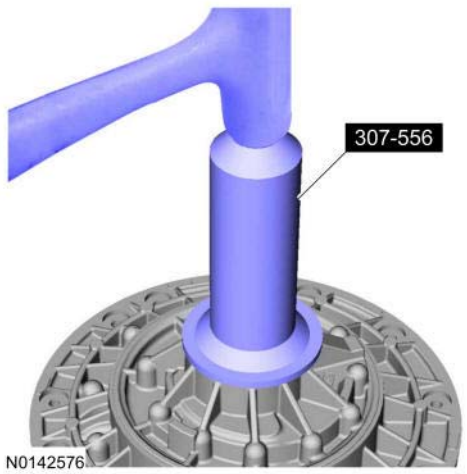
Install a new front pump seal on the special tool.Use Special Service Tool: 307-556 Installer, Fluid

Pump Seal.



208.

Using the special tool, install the front pump seal. Use Special Service Tool: 307-556 Installer, Fluid Pump Seal.

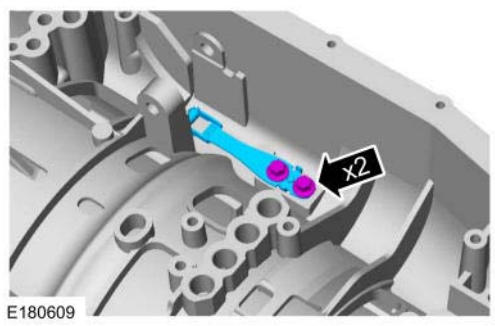


209.

Install the park detent spring and the bolts.

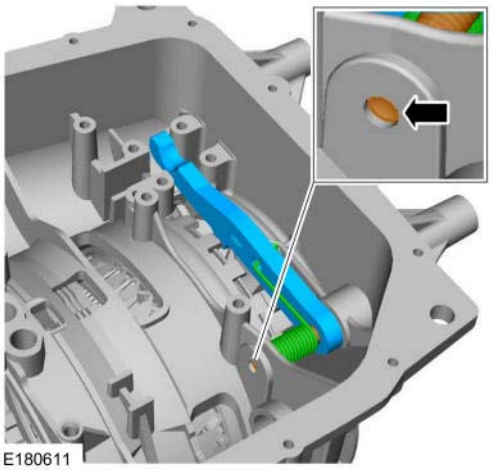
Torque

: 106 lb.in (12 Nm)



210.

Position the park pawl and spring into the case and install the park pawl pin.

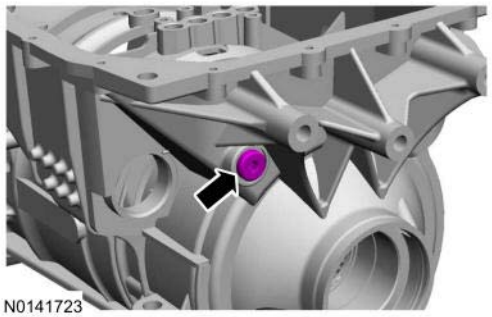


211.

Position the park pawl and spring into the case and install the park pawl pin.

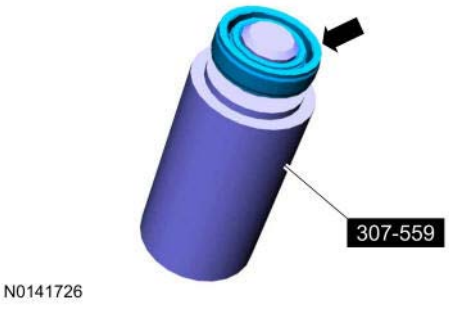
Torque

: 17 lb.ft (23 Nm)



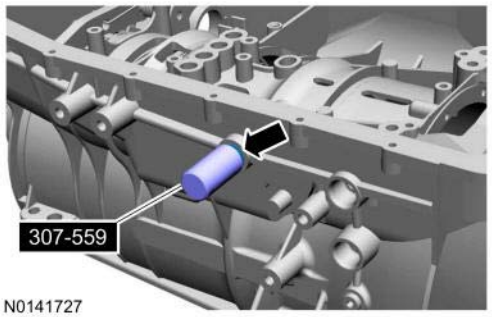
212.

Install a new manual control lever shaft seal on the special tool. Use Special Service Tool: 307-559 Installer, Shifter Fluid Seal.



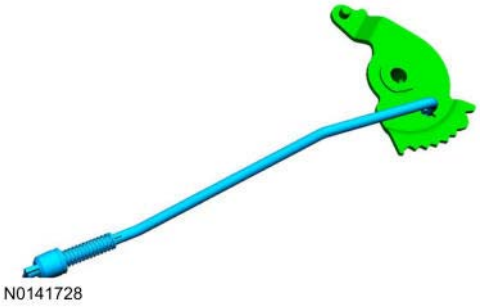
213.

Using the special tool, install the manual control lever shaft seal. Use Special Service Tool: 307-559 Installer, Shifter Fluid Seal.



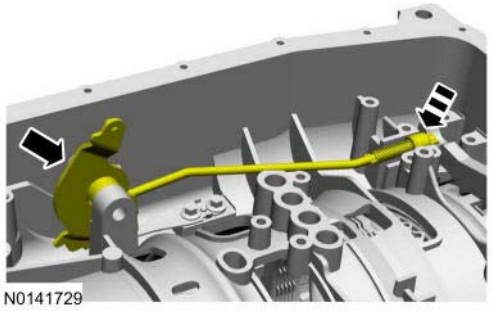
214.

Assemble the manual control lever detent plate assembly and park pawl actuator rod.



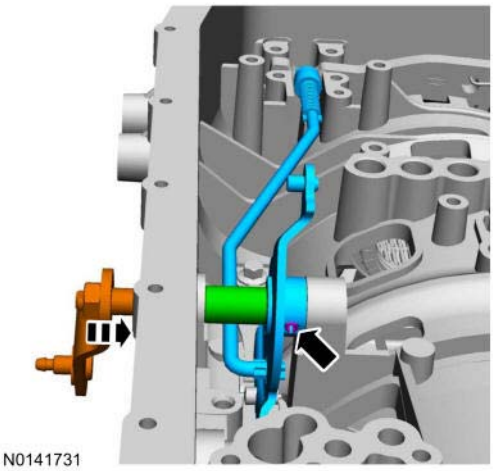
215.

Position the manual valve detent lever and park pawl actuator rod assembly in the transmission case.



216.

Position the manual control lever spacer in place and slide the manual control lever shaft into the case and the manual lever detent plate. Align the roll pin hole in the manual control lever detent plate with the roll pin hole in the manual control lever shaft and install a new roll pin.

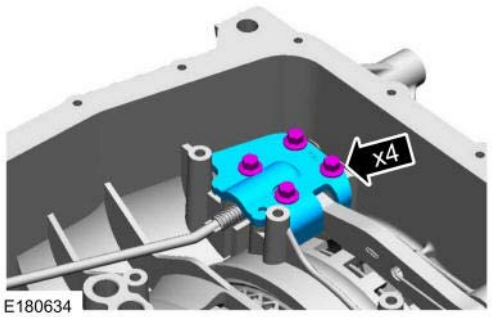


217.

Install the park rod actuating plate and the bolts.

Torque

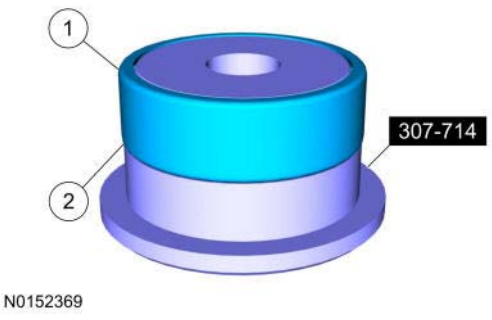
: 106 lb.in (12 Nm)



218.

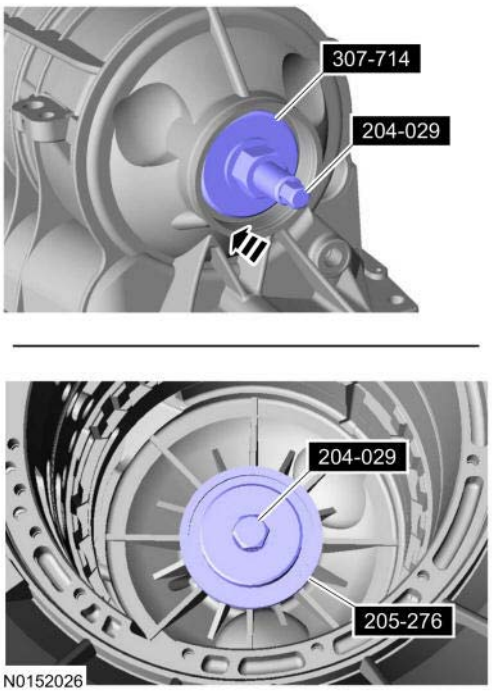
Install the needle bearing on the special tool so that the rounded end faces up.

Flat bearing surface (snap ring side) facing down. Use Special Service Tool: 307-714 Installer, Needle Bearing.



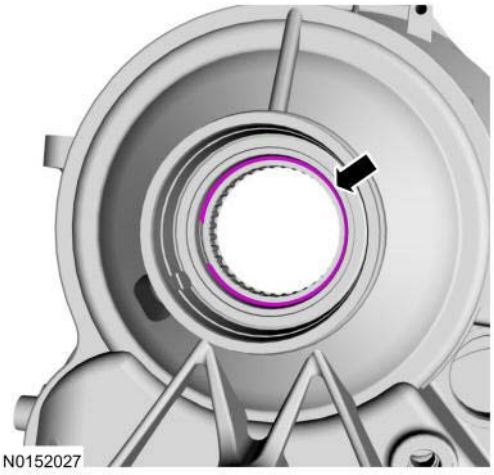
219.

Assemble the special tools and install the bearing in the transmission case.Use Special Service Tool: 204-029 Drawbar., 205-276 Installer, Front Wheel Hub Seal., 307-714 Installer, Needle Bearing.



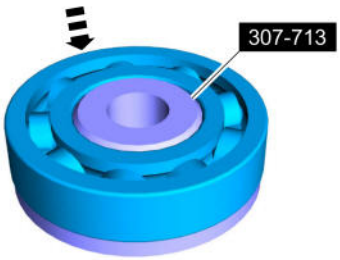
220.

Install the snap ring.



221.

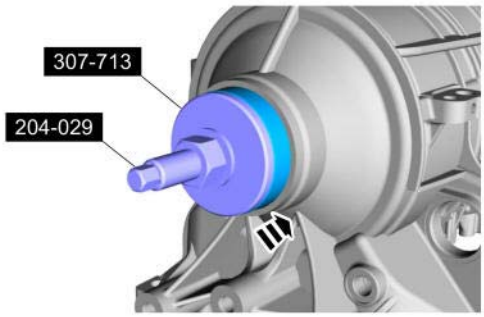
Install the bearing on the special tool.Use Special Service Tool: 307-713 Installer, Roller Bearing.

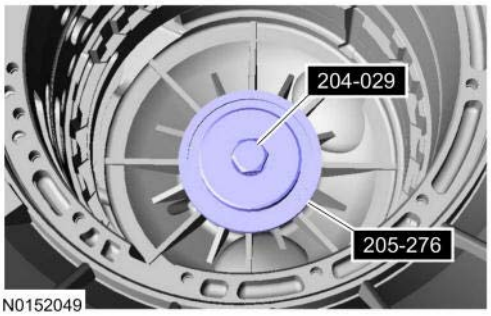


N0152047

222.

Assemble the special tools and install the bearing in the transmission case. Use Special Service Tool: 204-029 Drawbar., 205-276 Installer, Front Wheel Hub Seal., 307-713 Installer, Roller Bearing.

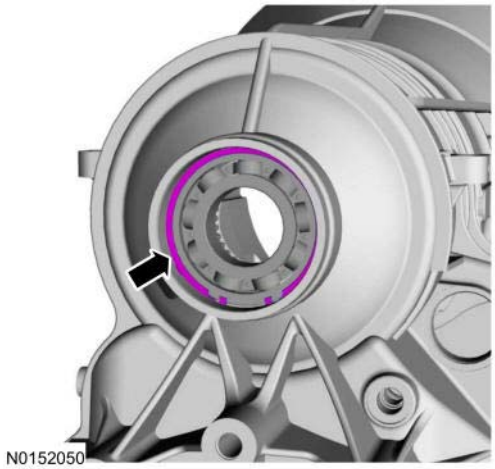




N0152049

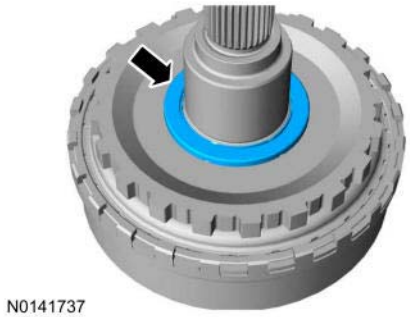
223.

Install the snap ring.



224.

Install the T11 bearing, on the planetary ring gear and output shaft assembly.



225.

Install the rear planetary ring gear and output shaft assembly.



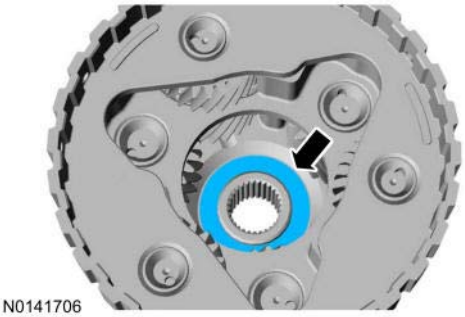
226.

Install the T10 thrust bearing on the output shaft assembly.


N0141738

227.

Install the T9 roller bearing race into the bottom of the carrier.


N0141706

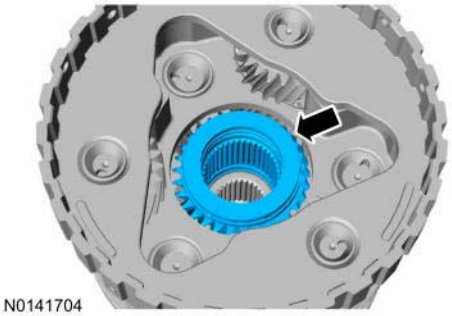
228.

Install the top T8 and the bottom T9 roller bearings onto the sun gear.


N0141705

NOTE: When installing the sun gear, make sure that the TAPERED EDGE is facing UP toward the torque converter housing.

229.
Install the sun gear into the planetary assembly.



NOTE: Be sure the bearing race is installed in the sun gear.

230.

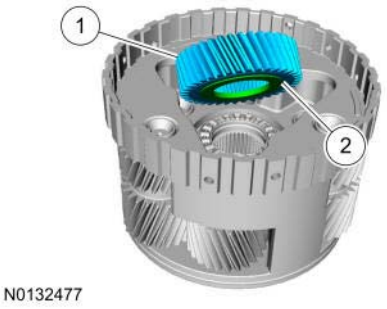
1.

low/reverse sun gear

2.

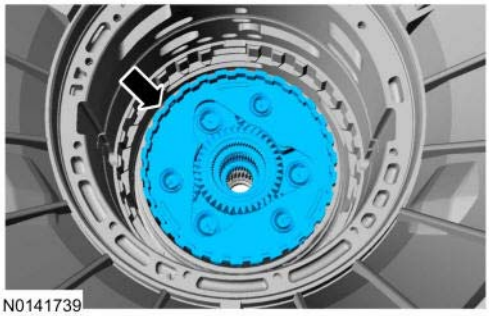
bearing race

Install the low/reverse sun gear and bearing race into the planetary carrier with the race side facing down.



NOTE: Place the manual control lever in PARK when installing the rear planetary gearset to hold the rear ring gear stationary.

231.
Install the planetary carrier.

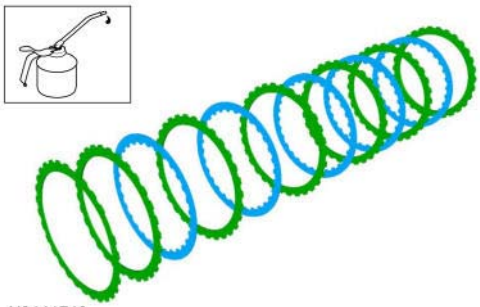

N0141739

NOTE: Friction and steel plate quantity are model dependent and vary based on engine displacement.

232.
Soak the low/reverse clutch plates in clean automatic transmission fluid. For friction and steel plate quantity, refer to the Clutch Plate Quantity Chart. Refer to: Specifications .

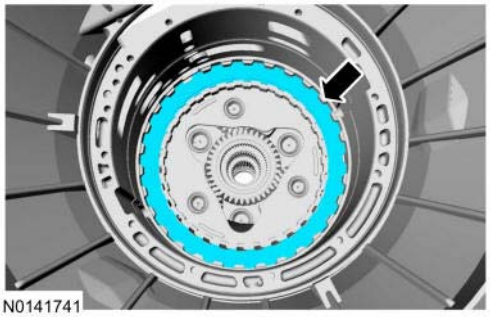
Material

: Motorcraft ® MERCON ® LV Automatic Transmission Fluid (U.S.) / XT-10-QLVC (U.S.) (MERCON ® LV) (WSS-M2C938-A)


N0141740

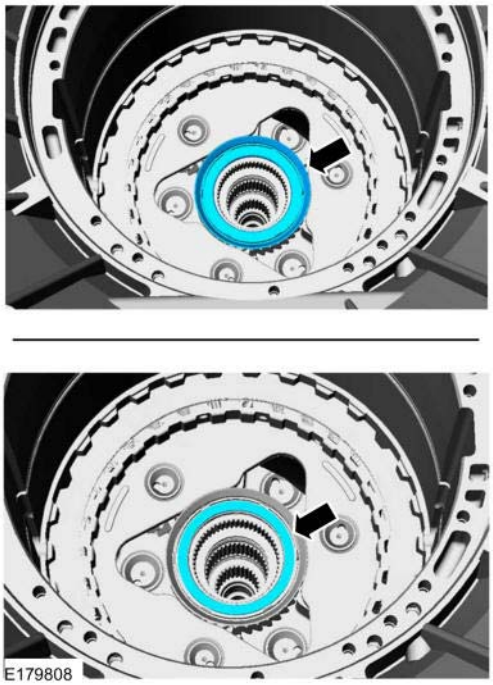
233.

Install the low/reverse clutch plates, starting with the pressure plate and alternating between the friction and steel plates and ending with the wave spring plate on the top.


N0141741

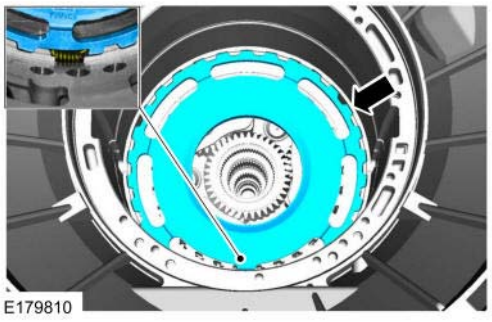
NOTE: Inspect the T7 thrust bearing and selective shim for damage or scoring.

234.
Install the T7 thrust bearing and the selective shim.



NOTE: Align the one-way clutch in the transmission case so the bias spring fits into the transmission case.

235.
Install the one-way clutch clocked so that the bias spring can engage the one-way clutch and the case.



236.

Install the bias spring.



NOTE: Make sure the center support feed holes are lined up with the feed holes in the case.

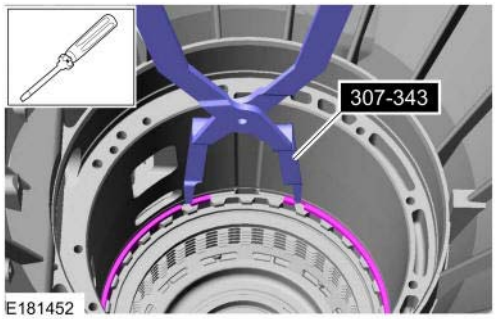
237.
Install the center support into the case.



NOTE: Rotate the case to a horizontal position.

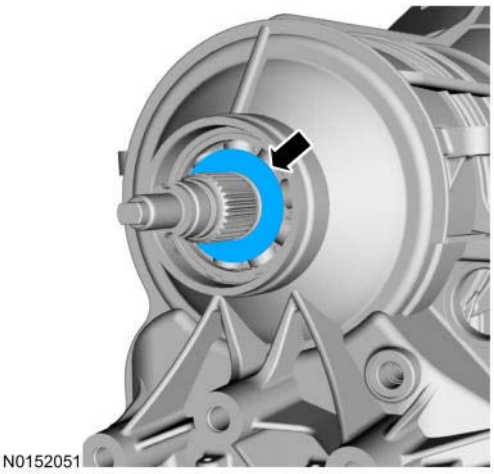
NOTE: Install the snap ring with the beveled surface facing up and the snap ring gap in the 3 o'clock or the 9 o'clock position.

238.
Using the special tool, install the center support snap ring. Using a tool, make sure the snap ring is fully seated. Use Special Service Tool: 307-343 Retaining Ring Pliers.Use the General Equipment: Flat Headed Screw Driver



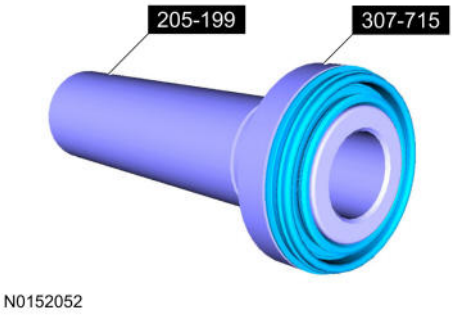
NOTE: Rotate the case to a vertical position.

239.
Install the slip plane washer.



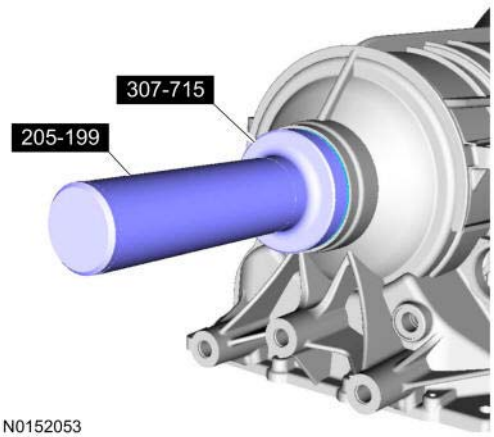
240.

Position a new output shaft seal on the special tool.Use Special Service Tool: 205-199 (T83T-3132-A1) Installer, Spindle/Axle Shaft., 307-715 Installer, Output Seal (4X2).



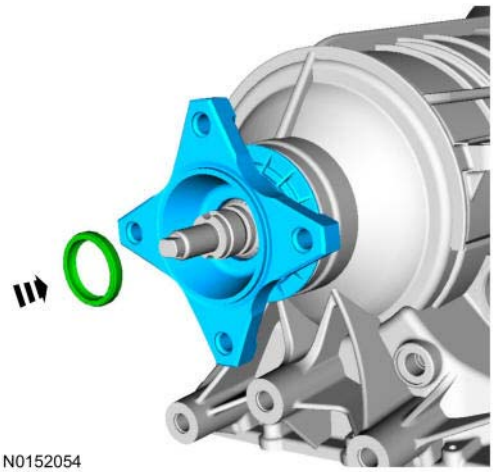
241.

Using the special tools, install the output shaft seal.Use Special Service Tool: 205-199 (T83T-3132-A1) Installer, Spindle/Axle Shaft., 307-715 Installer, Output Seal (4X2).



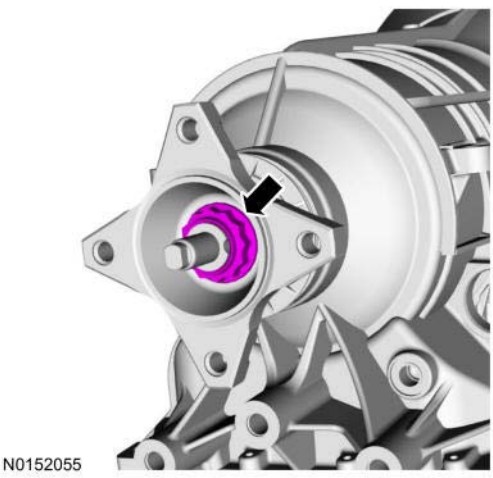
242.

Install the output shaft flange and the output shaft flange seal.



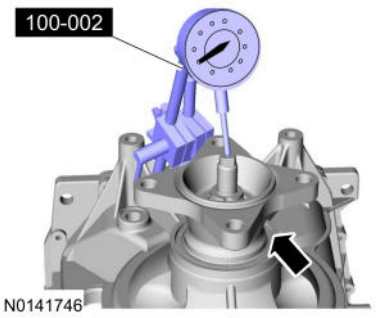
243.

Loosely install a new output shaft flange retaining nut.



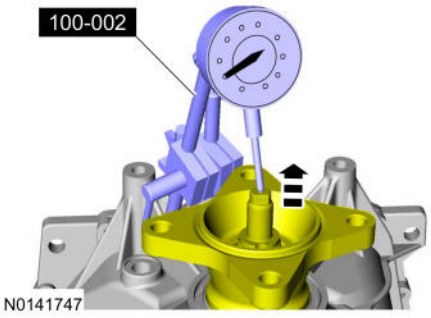
NOTE: Loosely install the flange nut or an inaccurate reading may be recorded.

244.
Install the special tool on the transmission case and position the plunger on the output shaft flange. Use Special Service Tool: 100-002 (TOOL-4201-C) Holding Fixture with Dial Indicator Gauge.



NOTE: Loosely install the flange nut or an inaccurate reading may be recorded.

245.
Lift up on the output shaft flange and record the reading. The reading should be within 0.6-0.9 mm (0.024-0.035 in). If the reading is not within specification, install a different (either thinner or thicker) rear planetary gearset selective shim.Use Special Service Tool: 100-002 (TOOL-4201-C) Holding Fixture with Dial Indicator Gauge.

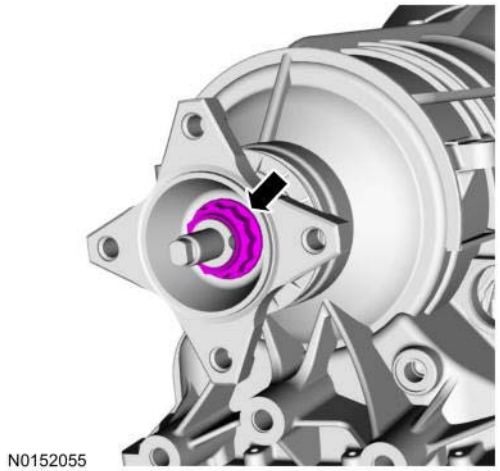


246.

Tighten the output shaft flange nut.

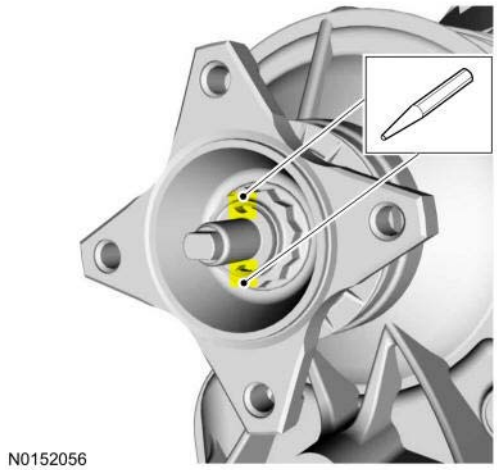
Torque

: 59 lb.ft (80 Nm)



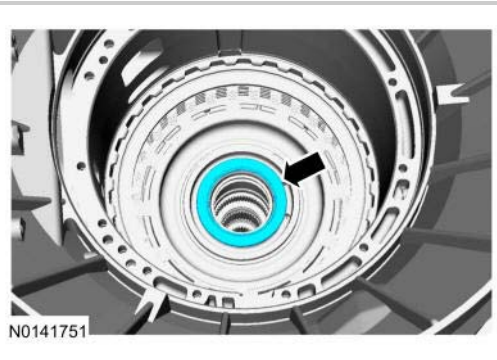
247.

After installing the new output shaft flange retaining nut, stake the slots to prevent it from coming loose.Use the General Equipment: Punch



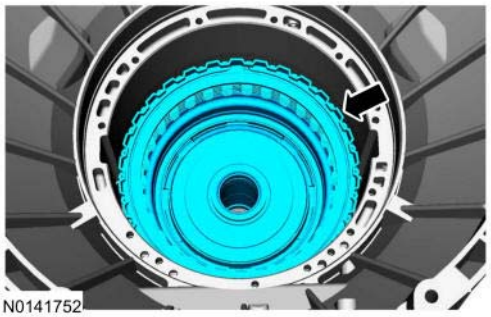
NOTE: Rotate the transmission in the vertical position with the torque converter housing facing up.

248.
Install the T6 bearing.



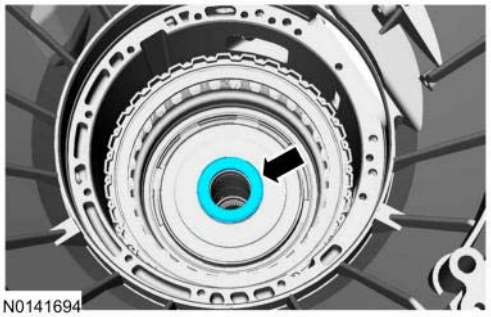
249.

Install the direct clutch assembly.



250.

Install the T5 roller bearing on the direct clutch assembly.



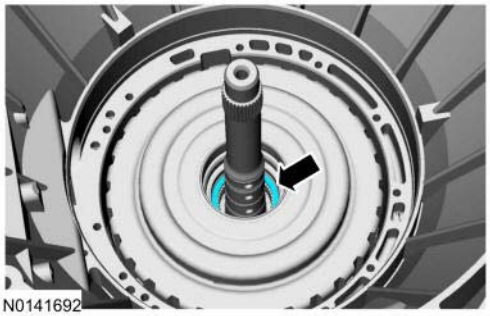
251.

Install the forward/overdrive clutch assembly.



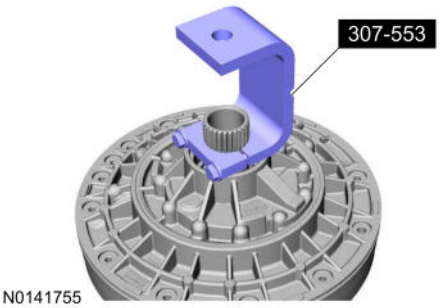
252.

Install the selective shim.



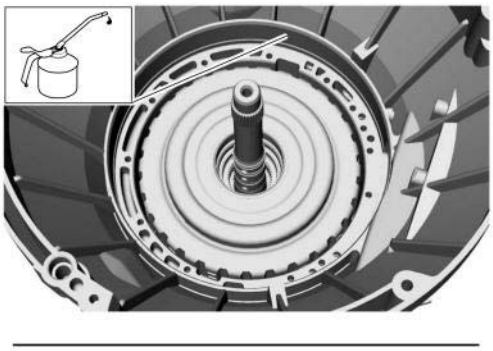
253.

Install the special tool on the front pump.Use Special Service Tool: 307-553 Remover, Transmission Fluid Pump.



254.

Lubricate the transmission case pump bore with petroleum jelly. Using the special tool, position the pump assembly in the case and rotate the pump to insert the pump splines into the front planetary sun gear. Rotate the pump to align the pump-to-case bolts and push the pump into the case. Use Special Service Tool: 307-553 Remover, Transmission Fluid Pump.



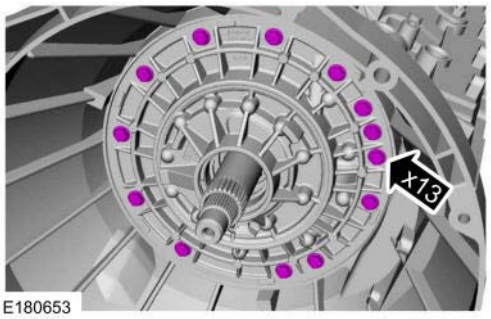


NOTE: Failure to replace the fasteners will result in transmission fluid leakage.

255.
Install new front pump-to-case bolts and washers. Tighten in a crisscross pattern.

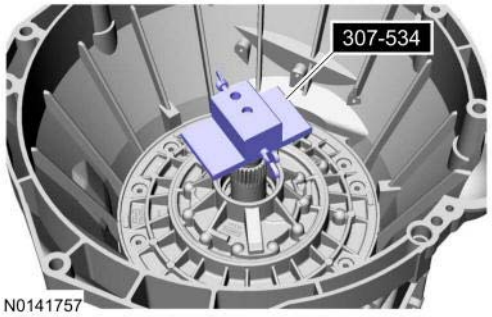
Torque

: 89 lb.in (10 Nm)



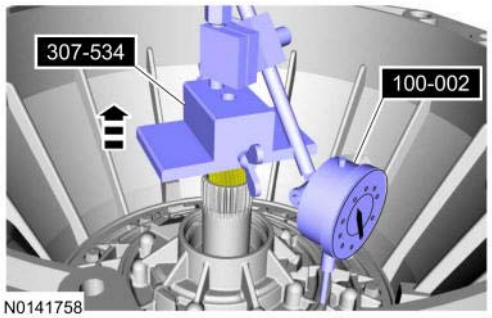
256.

Install the special tool on the input shaft.Use Special Service Tool: 307-534 End Play Gauge, Transmission.



257.

Install the special tools. Push down on the Transmission End Play Gauge and zero the dial indicator. Lift up on the Transmission End Play Gauge and record the measurement on the dial indicator. The specification should be between 0.2-0.4 mm. If the Measurement is not within specification, remove the pump and install a new selective shim. Use Special Service Tool: 100-002 (TOOL-4201-C) Holding Fixture with Dial Indicator Gauge., 307-534 End Play Gauge, Transmission.



NOTE: The green (7G087) center support feed tube seal may be replaced with an orange (7G087) center support feed tube seal.

258.

1.

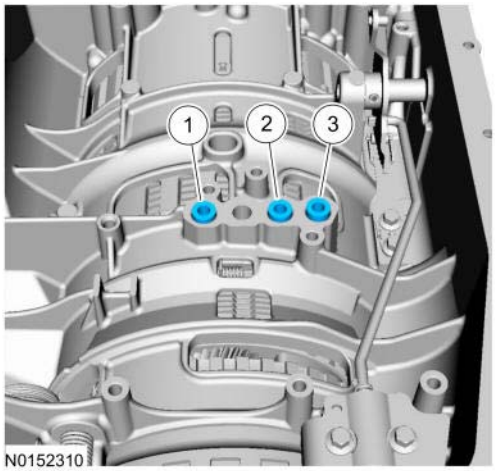
Install a new center support feed tube seal (7G199 Black).

2.

Install a new center support feed tube seal (7G087 Green or Orange).

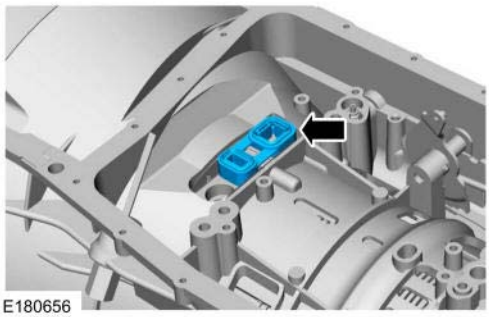
3.

Install a new center support feed tube seal (7G084 Blue).



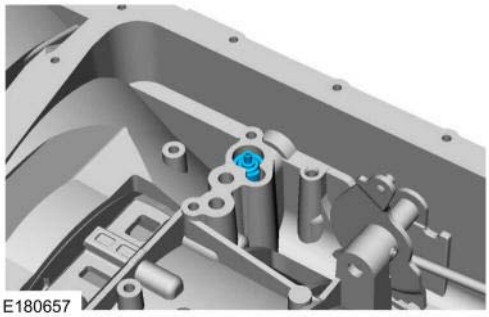
259.

Install a new front pump adapter seal.



260.

Install the thermal bypass valve into the case.



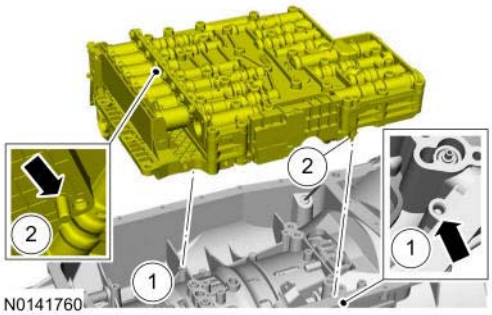
261.

1.

Alignment holes

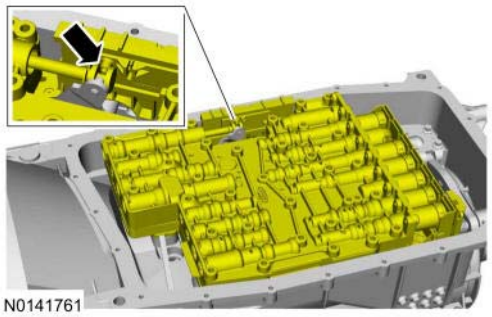
2.

Guide pins



NOTE: The main control assembly will not lay flush on the case, this is a normal condition with the rubber feed tubes, the bolts will pull the main control assembly down.

262.
Slightly lift the main control assembly and align the manual valve in the manual valve linkage and position the main control in place.



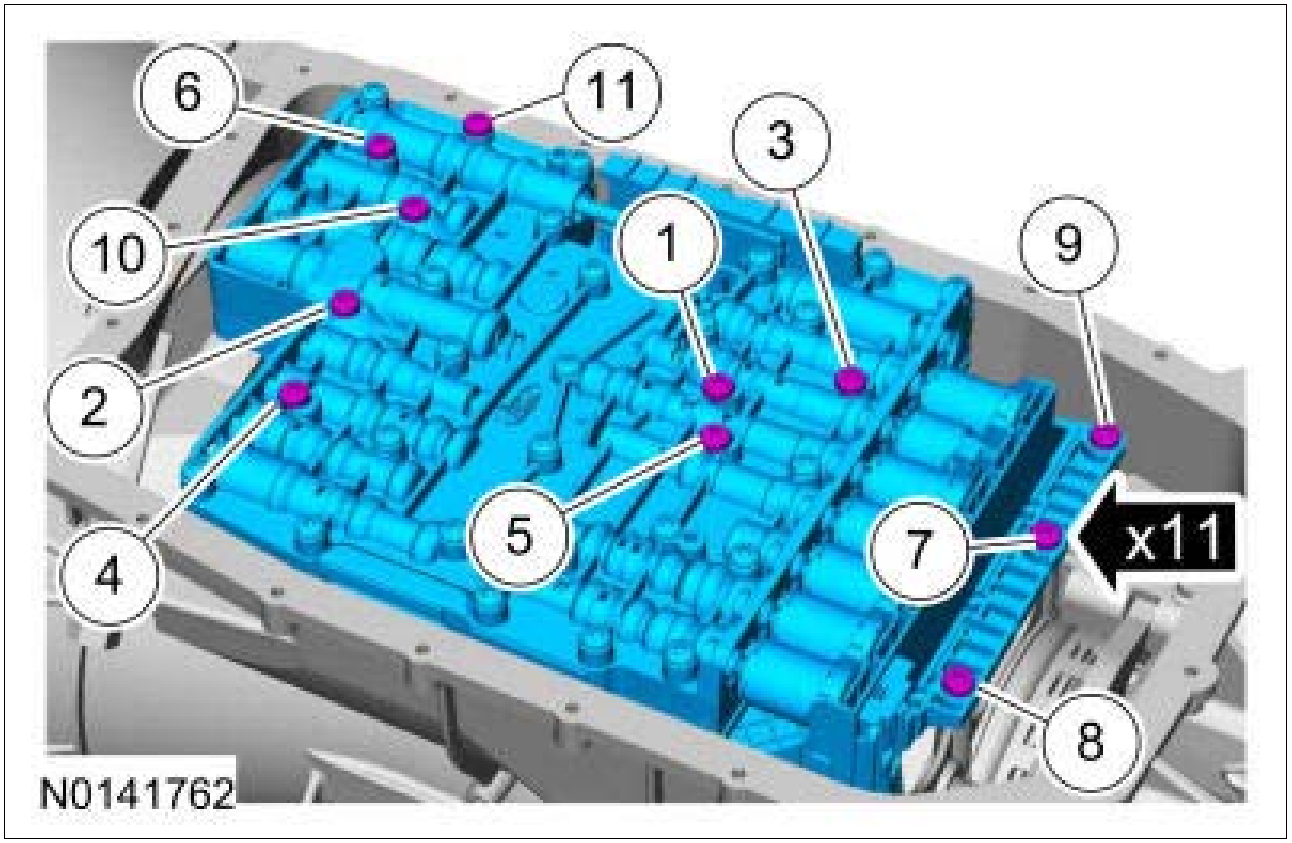
263.

Install the main control assembly bolts and tighten in the sequence shown below.

Torque

: 71 lb.in (8 Nm)

Fig 1: Main Control Assembly Bolts Tightening Sequence



Courtesy of FORD MOTOR CO.

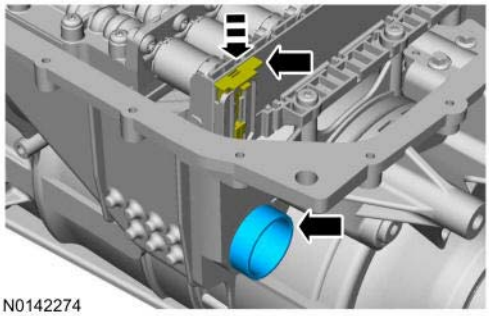
264.

If removed, install the bulkhead connector sleeve seals.



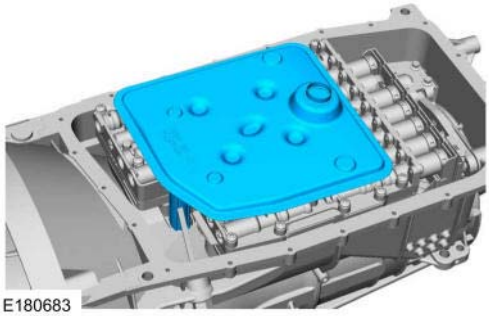
265.

With the release tab up and unlocked, push the outer shell of the bulkhead electrical connector into the transmission. Make sure the bulkhead connector is fully seated into the molded leadframe. Press down on the tab and lock the outer shell of the bulkhead electrical connector in place. Make sure the locking tab is securely locked.


N0142274

266.

Install a new transmission fluid filter.


E180683

NOTE: The fluid pan gasket can be reused if not damaged.

267.
Install the transmission fluid pan gasket.


N0139113

268.

Install the transmission fluid pan and transmission fluid pan bolts. Tighten in a crisscross pattern.

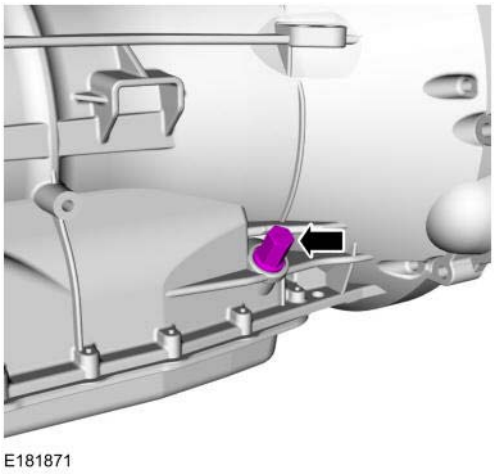
Torque

: 80 lb.in (9 Nm)



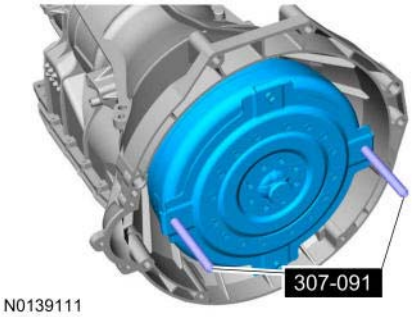
269.

Install the transmission fluid fill plug.



270.

Using the special tool, install the torque converter. Use Special Service Tool: 307-091 Handle, Torque Converter.



NOTE: The 6R ATF Additive Kit XL-16 kit contains two syringes. The syringe with additive "F" is to be used after all of the fluid has been replaced in the transmission or if the overdrive frictions are replaced. The syringe with additive "T" is a tracer that is part of the kit and is not used.

NOTE: Only 9-10 ml of the 6R ATF Additive Kit XL-16 kit should be used after all of the fluid has been replaced in the transmission or if the overdrive frictions are replaced. Too much additive in the fluid can result in converter clutch slip issues.

271.
If the Overdrive clutch FRICTIONS were replaced, add 9-10 ml of Motorcraft ® 6R ATF Additive Kit XL-16 syringe with additive "F" to the transmission.

Material

: Motorcraft ® 6R ATF Additive Kit / XL-16

DISASSEMBLY > TRANSMISSION

1.

To disassemble the transmission, refer to transmission overhaul. Refer to: Transmission .

ASSEMBLY > TRANSMISSION

1.

To assemble the transmission, refer to transmission overhaul. Refer to: Transmission .

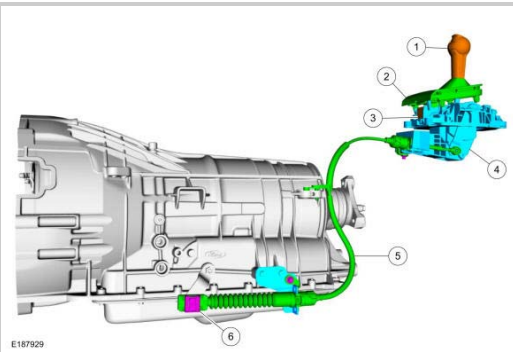
INSTALLATION > TRANSMISSION

1.

To install the transmission assembly. Refer to: Transmission - 2.3L EcoBoost (231kW/314PS) . Refer to: Transmission - 3.7L Duratec (227kW/301PS) . Refer to: Transmission - 5.0L 32V Ti-VCT .

DESCRIPTION AND OPERATION > EXTERNAL CONTROLS - COMPONENT LOCATION

Transmission Selector Lever and Cable



Item	Description
1	Transmission selector lever knob
2	Transmission selector lever bezel
3	Brake shift interlock actuator
4	Transmission selector lever assembly
5	Transmission selector lever cable
6	Transmission selector lever cable adjuster

Transmission Paddle Switches



Item	Description
1	Downshift paddle switch
2	Upshift paddle switch

DESCRIPTION AND OPERATION > EXTERNAL CONTROLS - OVERVIEW > OVERVIEW

The transmission selector lever linkage consists of:

- a selector lever cable that connects the transmission manual control lever to the selector lever assembly.
- a brake shift interlock actuator that is integral to the selector lever assembly.

The selector lever assembly:

- locks the transmission selector lever in the P position when the ignition switch is in the LOCK position.
- requires the transmission selector lever to be in the P position to turn the ignition switch to the LOCK position.

The steering wheel:

- has SelectShift™ paddle switches mounted to it that allow the driver to manually shift the transmission.

DESCRIPTION AND OPERATION > EXTERNAL CONTROLS - SYSTEM OPERATION AND COMPONENT DESCRIPTION

System Operation

The transmission has 5 range positions P, R, N, D and S with SelectShift™ paddle switches mounted on the steering wheel.

DESCRIPTION AND OPERATION > EXTERNAL CONTROLS - SYSTEM OPERATION AND COMPONENT DESCRIPTION > PARK

In the PARK position:

- there is no powerflow through the transmission.
- the parking pawl locks the output shaft
- the engine may be started.
- the ignition key may be removed.

DESCRIPTION AND OPERATION > EXTERNAL CONTROLS - SYSTEM OPERATION AND COMPONENT DESCRIPTION > REVERSE

In the REVERSE position:

- the vehicle may be operated in a rearward direction, at a reduced gear ratio.
- engine braking will occur.

DESCRIPTION AND OPERATION > EXTERNAL CONTROLS - SYSTEM OPERATION AND COMPONENT DESCRIPTION > NEUTRAL

In the NEUTRAL position:

- there is no powerflow through the transmission.
- the output shaft is not held and is free to turn.
- the engine may be started.

DESCRIPTION AND OPERATION > EXTERNAL CONTROLS - SYSTEM OPERATION AND COMPONENT DESCRIPTION > DRIVE

DRIVE is the normal position for most forward driving.

DRIVE provides:

- automatic shifts - 1st through 6th gears.
- maximum fuel economy during normal operation.

DESCRIPTION AND OPERATION > EXTERNAL CONTROLS - SYSTEM OPERATION AND COMPONENT DESCRIPTION > MANUAL S POSITION

In manual S position:

- the transmission provides maximum engine braking.
- gears 1 through 6 are available.
- the driver can manually shift the transmission to gears 1 through 6 using the SelectShift™ paddle switches located on the steering wheel.
- grade assist is activated.
- the transmission will select gears that will provide the engine braking desired, based on the vehicle inputs, which will increase engine rpm during engine braking.

DESCRIPTION AND OPERATION > EXTERNAL CONTROLS - SYSTEM OPERATION AND COMPONENT DESCRIPTION > BRAKE SHIFT INTERLOCK OPERATION

The brake shift interlock actuator inhibits the selector lever movement from the PARK position by mechanically blocking the detent pawl of the selector lever mechanism. When the brake pedal is pressed (BPP switch closed) with the ignition key in the RUN position and the transmission in PARK, the brake shift interlock actuator is energized by the BCM, allowing the selector lever to be moved out of the PARK

position.

The brake shift interlock system consists of:

- a brake shift interlock actuator that is integral to the selector lever assembly.
- an ignition switch.
- a BPP switch.
- a BCM.

DESCRIPTION AND OPERATION > EXTERNAL CONTROLS - SYSTEM OPERATION AND COMPONENT DESCRIPTION > SELECTOR LEVER CABLE

The selector lever cable consists of:

- a cable that connect the transmission manual control lever to the selector lever assembly.
- a cable grommet that is fastened to the floor pan.
- an adjuster locking tab at the transmission manual control lever.

DESCRIPTION AND OPERATION > EXTERNAL CONTROLS - SYSTEM OPERATION AND COMPONENT DESCRIPTION > SELECTOR LEVER

Selector Lever Cable

The selector lever cable consists of:

- a cable that connect the transmission manual control lever to the selector lever assembly.
- a cable grommet that is fastened to the floor pan.
- an adjuster locking tab at the transmission manual control lever.

Selector Lever

The selector lever consists of:

- a selector lever knob.
- a brake shift interlock actuator that is integral to the selector lever assembly.

DIAGNOSIS AND TESTING > EXTERNAL CONTROLS > INSPECTION AND VERIFICATION

1.

Verify the customer concern.

2.

Visually inspect for obvious signs of mechanical or electrical damage.

3.

If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step

4.

If the cause is not visually evident, verify the symptom and refer to the Symptom Chart .

Mechanical	Electrical
Transmission selector lever cable	Brake Shift Interlock Actuator (BSIA)
Manual control lever	Wiring harness
Selector lever	Terminals
Selector lever knob	Connectors
	SelectShift™ paddle switches

DIAGNOSIS AND TESTING > EXTERNAL CONTROLS > DTC CHART - BCM

DTC	Description	Action
B1319:11	Brake Shift Interlock (BSI) Output Circuit Short To Ground	GO to Pinpoint Test A
B1319:15	Brake Shift Interlock (BSI) Output Circuit Short To Battery or Open	GO to Pinpoint Test A

DIAGNOSIS AND TESTING > EXTERNAL CONTROLS > SYMPTOM CHART

Diagnostics in this service information assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

In most circumstances the PCM sets a DTC to help guide diagnostics. Refer to the DTC Chart - BCM before using the Symptom Chart. The Symptom column lists the vehicle condition. The Possible Sources column lists a detailed vehicle condition. The Action column lists the action to be performed to determine the cause of the condition. Each action lists the components that can cause the symptom and the individual components in that system. The components are listed in order of disassembly. Use the list of components and the required action to focus on disassembly inspections for the root cause of the concern.

Symptom	Possible Sources	Action
Brake shift interlock system	Circuitry open, shorted to	GO to Pinpoint Test A

does not release/lock correctly	ground or shorted to power	
Brake Shift Interlock Actuator (BSIA) solenoid		INSTALL a new selector lever assembly. REFER to: Selector Lever Assembly .
Paddle shift does not operate correctly	Wiring, terminals or connectors Selector lever or knob Paddle shift switches Clockspring SCCM PCM	GO to Pinpoint Test B
Selector lever linkage is out of correct gear relationship	Selector lever linkage out of adjustment	REFER to: Selector Lever Cable Adjustment .
Loose selector lever cable bracket		CHECK the selector lever cable bracket. TIGHTEN as necessary.
Loose or out of alignment selector lever bezel		CHECK the selector lever bezel alignment. ALIGN or INSTALL a new selector lever bezel if necessary. REFER to: Selector Lever Assembly .
Selector lever binding	Selector lever bezel damaged	CHECK the selector lever bezel for damage. If necessary, INSTALL a new selector lever bezel. REFER to: Selector Lever Assembly .
Selector lever damaged		CHECK the selector lever for damage. If necessary, INSTALL a new selector lever assembly. REFER to: Selector Lever Assembly .
Selector lever cable damaged		CHECK the selector lever cable for damage. If necessary, INSTALL a new selector lever cable. REFER to: Selector Lever Cable Adjustment).
Internal transmission components damaged		CHECK the manual control lever and internal transmission components for damage. REFER to: Main Control Valve Body .
Brake shift interlock override does not release the selector lever	Brake shift interlock override damaged	INSPECT the selector lever for damage. If necessary, INSTALL a new selector lever. REFER to: Selector Lever Assembly .
Vibration - a high frequency (20-80 Hz) that is felt through the seat or selector lever. Changes with engine speed	Selector lever cable incorrectly routed, grounded out or loose	CHECK the selector lever cable. REFER to: Selector Lever Cable Adjustment .

The ignition key cannot be returned to the OFF position or the ignition key can be turned to the OFF position when the selector lever is not in P	Wiring, terminals or connectors Ignition lock cylinder Key removal inhibit solenoid (part of the ignition switch) Park detect switch (part of the selector lever) Selector lever cable Mechanical damage to the selector lever, selector lever cable or selector lever knob	REFER to: Steering Wheel and Column Electrical Components .
The PRNDL indicator does not illuminate P	Wiring, terminals or connectors PCM concern IPC Park detect switch (part of the selector lever assembly)	REFER to: INSTRUMENTATION, MESSAGE CENTER AND WARNING CHIMES .

DIAGNOSIS AND TESTING > EXTERNAL CONTROLS > PINPOINT TESTS

DTCs B1319:11, B1319:15

Refer to Shift Interlock for schematic and connector information.

Normal Operation and Fault Conditions

The BCM provides power to the Brake Shift Interlock Actuator (BSIA). When the BCM receives a brake pedal applied input, voltage is applied to the brake shift interlock actuator. When the actuator is energized, the plunger is pulled inward allowing the selector lever to move from the park position.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
B1319:11	Brake Shift Interlock Output Circuit Short To Ground	Short to ground in the Brake Shift Interlock Actuator (BSIA) circuitry.
B1319:15	Brake Shift Interlock Output Circuit Short To Battery or Open	Short to power or open in the Brake Shift Interlock Actuator (BSIA) circuitry.

Possible Sources

- Connectors damaged or pushed-out terminals, corrosion, loose wires and missing or damaged seals
- Brake Shift Interlock Actuator (BSIA)
- BCM

DIAGNOSIS AND TESTING > EXTERNAL CONTROLS > PINPOINT TESTS > PINPOINT

TEST A : DTCS B1319:11, B1319:15 > PINPOINT TEST A : DTCS B1319:11, B1319:15

A1 CHECK THE STOPLAMPS

Apply the brake pedal and observe the stoplamps.

Do the stoplamps illuminate?

Yes	GO to A2

No	REFER to: Stoplamps .

A2 CHECK THE BRAKE SHIFT INTERLOCK ACTUATOR POWER CIRCUIT FOR VOLTAGE

Disconnect Floor Shifter C3245 .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3245-4		Ground

Is the voltage greater than 11 volts with the brake pedal applied and 0 volts with the brake pedal not applied?

Yes	GO to A5

No	If the voltage was greater than 11 volts with the brake pedal applied or not applied, GO to A3 Otherwise, GO to A5

A3 CHECK THE BRAKE SHIFT INTERLOCK ACTUATOR POWER CIRCUIT FOR A SHORT TO VOLTAGE

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3245-4		Ground

Is any voltage present?

Yes	REPAIR the circuit.

No	GO to A7

A4 CHECK THE BRAKE SHIFT INTERLOCK ACTUATOR POWER CIRCUIT FOR AN OPEN

Disconnect BCM C2280B .

Inspect for damaged or pushed-out terminals.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3245-4	Ω	C2280B-46

Is the resistance less than 3 ohms?

Yes	GO to A6

No	REPAIR the circuit.

A5 CHECK THE BRAKE SHIFT INTERLOCK ACTUATOR GROUND CIRCUIT FOR AN OPEN

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3245-5	Ω	Ground

Is the resistance less than 3 ohms?

Yes	GO to A6

No	REPAIR the circuit.

A6 CHECK THE BRAKE SHIFT INTERLOCK ACTUATOR POWER CIRCUIT FOR SHORT TO GROUND

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C3245-4		Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to A7

No	REPAIR the circuit.

A7 CHECK FOR CORRECT BCM OPERATION

Ignition OFF.

Disconnect and inspect all BCM connectors.

Check for the following:

corrosion (install new connector or terminals - clean module pins)

damaged or bent pins - install new terminals/pins

pushed-out pins - install new pins as necessary

Connect all BCM connectors. Make sure they seat and latch correctly.

Operate the system and verify the concern is still present.

Is the concern still present?

Yes	

No	The system is operating correctly at this time. The concern may have been caused by a loose or corroded connector.

DIAGNOSIS AND TESTING > EXTERNAL CONTROLS > PINPOINT TESTS > PINPOINT TEST B : PADDLE SHIFT DOES NOT OPERATE CORRECTLY

Paddle Shift Does Not Operate Correctly

Refer to Transmission Controls - 6R80 for schematic and connector information.

Normal Operation and Fault Conditions

Each paddle shift switch is a momentary contact switch integral to the steering wheel. When the selector lever is placed in the sport shift position, the upshift/downshift feature becomes activated and allows the operator to upshift or downshift without removing their hands from the steering wheel.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
P0815	Upshift Switch Circuit	The PCM detects a voltage high signal when an upshift is requested.
P0816	Downshift Switch Circuit	The PCM detects a voltage high signal when a downshift is requested.

P0819	Up and Down Shift Switch to Transmission Range Correlation	The PCM detects a voltage high signal when an upshift or downshift is requested.

Possible Sources

- Circuitry open/shorted
- Clockspring
- Selector lever assembly
- Selector lever knob
- SCCM
- PCM

DIAGNOSIS AND TESTING > EXTERNAL CONTROLS > PINPOINT TESTS > PINPOINT TEST B : PADDLE SHIFT DOES NOT OPERATE CORRECTLY > PINPOINT TEST B : PADDLE SHIFT DOES NOT OPERATE CORRECTLY

B1 MONITOR SHIFT SELECT PIDS

Ignition ON.

Enter the following diagnostic mode: Datalogger.

Monitor the PCM PIDs, SST_D and SST_U while depressing the upshift and downshift switches.

Do both the upshift and downshift PIDs show low when their respective switch is depressed and high when the switch is not depressed?

Yes	The system is operating correctly at this time. The concern may have been caused by a loose connector.

No	If the Upshift switch PID reads high when the switch is pressed, or if the Upshift PID reads low when the switch is not pressed, GO to B2. If the Downshift switch PID reads high when the switch is pressed, or if the Downshift PID reads low when the switch is not pressed, GO to B9. If the PIDs for both switches show no change when both of the switches are pressed, GO to B12

B2 CHECK THE UPSHIFT PADDLE SWITCH

Remove the driver air bag module. REFER to: Driver Airbag .

Disconnect Upshift Paddle Switch Connector C2428 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
Component side resistance pin 1.	Ω	Component side resistance pin 2.

Is the resistance less than 1.5 ohms with upshift switch pressed and greater than 10, 000 ohms when released?

Yes	GO to B3

No	INSTALL a new upshift paddle switch. REFER to: Upshift Paddle Switch .

B3 CHECK THE UPSHIFT SIGNAL CIRCUIT FOR VOLTAGE

Ignition OFF.

Disconnect Right Paddle Shifter, C2428 .

Inspect the connector for damaged or pushed-out terminals.

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2428-4	V	Ground

Is the voltage greater than 11 volts?

Yes	GO to B12

No	GO to B4

B4 CHECK THE UPSHIFT SIGNAL CIRCUIT FOR AN OPEN

Ignition OFF.

Disconnect PCM.

Inspect the connectors for damaged or pushed-out terminals.

For the 2.3L engine, measure:

Positive Lead	Measurement / Action	Negative Lead
C226A-10	Ω	C1551B-89

For the 3.5L engine, measure:

Positive Lead	Measurement / Action	Negative Lead
C226A-10	Ω	C1381B-23

For the 5.0L engine, measure:

Positive Lead	Measurement / Action	Negative Lead
C226A-10	Ω	C175B-23

Is the resistance less than 3 ohms?

Yes	GO to B5

No	REPAIR the circuit.

B5 CHECK THE UPSHIFT SIGNAL CIRCUIT FOR A SHORT TO GROUND

Measure:

Positive Lead	Measurement / Action	Negative Lead
C226A-10	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to B6

No	REPAIR the circuit.

B6 CHECK THE CLOCKSPRING CIRCUIT FOR AN OPEN

Connect PCM.

Disconnect SCCM C226A .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
Component Side C226A-10	Ω	C218B-12

Is the resistance less than 3 ohms?

Yes	INSTALL a new PCM. REFER to: POWERTRAIN CONTROL MODULE (PCM) - 2.3L EcoBoost (231kW/314PS). REFER to: POWERTRAIN CONTROL MODULE (PCM) - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS). PERFORM the Transmission Strategy

	Download procedure. REFER to: Transmission Strategy Download .

No	INSTALL a new clockspring. If concern still exists, INSTALL a new SCCM. REFER to: Steering Column Control Module (SCCM) .

B7 CHECK THE DOWNSHIFT PADDLE SWITCH

Remove the driver air bag module. REFER to: Driver Airbag .

Disconnect Downshift Paddle Switch Connector C2429 .

Measure:

Positive Lead	Measurement / Action	Negative Lead
Component side resistance pin 3	Ω	Component side resistance pin 4

Is the resistance less than 1.5 ohms with upshift switch pressed and greater than 10, 000 ohms when released?

Yes	GO to B9

No	INSTALL a new upshift paddle switch. REFER to: Downshift Paddle Switch .

B8 CHECK THE DOWNSHIFT SIGNAL CIRCUIT FOR VOLTAGE

Ignition OFF.

Disconnect Left Paddle Shifter, C2429 .

Inspect the connector for damaged or pushed-out terminals.

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C2429-4	V	Ground

Is the voltage greater than 11 volts?

Yes	GO to B12

No	GO to B9

B9 CHECK THE DOWNSHIFT SIGNAL CIRCUIT FOR AN OPEN

Ignition OFF.

Disconnect PCM.

Inspect the connector for damaged or pushed-out terminals.

For the 2.3L engine, measure:

Positive Lead	Measurement / Action	Negative Lead
C226A-9	Ω	C1551B-88

For the 3.5L engine, measure:

Positive Lead	Measurement / Action	Negative Lead
C226A-9	Ω	C1381B-24

For the 5.0L engine, measure:

Positive Lead	Measurement / Action	Negative Lead
C226A-9	Ω	C175B-24

Is the resistance less than 3 ohms?

Yes	GO to B10

No	REPAIR the circuit.

B10 CHECK THE DOWNSHIFT SIGNAL CIRCUIT FOR A SHORT TO GROUND

Measure:

Positive Lead	Measurement / Action	Negative Lead
C226A-9	Ω	Ground

Is the resistance greater than 10, 000 ohms?

Yes	GO to B11

No	REPAIR the circuit.

B11 CHECK THE CLOCKSPRING CIRCUIT FOR AN OPEN

Connect PCM.

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
Component Side C226A-9	Ω	C218B-5

Is the resistance less than 3 ohms?

Yes	INSTALL a new PCM. REFER to: POWERTRAIN CONTROL MODULE (PCM) - 2.3L EcoBoost (231kW/314PS). REFER to: POWERTRAIN CONTROL MODULE (PCM) - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS). PERFORM the Transmission Strategy Download procedure. REFER to: Transmission Strategy Download .

No	INSTALL a new clockspring. If concern still exists, INSTALL a new SCCM. REFER to: Steering Column Control Module (SCCM) .

B12 CHECK THE SIGNAL RETURN CIRCUIT FOR A SHORT TO GROUND

Disconnect PCM.

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
C226A-11	Ω	Ground

Is the voltage greater than 10, 000 ohms?

Yes	GO to B13

No	REPAIR the circuit.

B13 CHECK THE SIGNAL RETURN CIRCUIT FOR AN OPEN

Connect PCM.

Ignition ON.

For the 2.3L, measure:

Positive Lead	Measurement / Action	Negative Lead
C226A-11	Ω	C1551B-88

For the 3.5L, measure:

Positive Lead	Measurement / Action	Negative Lead

C226A-11	Ω	C1381B-24

For the 5.0L, measure:

Positive Lead	Measurement / Action	Negative Lead
C226A-11	Ω	C175B-24

Is the resistance less than 3 ohms

Yes	INSTALL a new PCM. REFER to: POWERTRAIN CONTROL MODULE (PCM) - 2.3L EcoBoost (231kW/314PS). REFER to: POWERTRAIN CONTROL MODULE (PCM) - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS). PERFORM the Transmission Strategy Download procedure. REFER to: Transmission Strategy Download .

No	REPAIR the circuit.

B14 CHECK THE CLOCKSPRING CIRCUIT FOR AN OPEN

Connect PCM C175B .

Ignition ON.

Measure:

Positive Lead	Measurement / Action	Negative Lead
Component Side C226A-11	Ω	C218B-13

Is the resistance less than 3 ohms?

Yes	INSTALL a new PCM. REFER to: POWERTRAIN CONTROL MODULE (PCM) - 2.3L EcoBoost (231kW/314PS). REFER to: POWERTRAIN CONTROL MODULE (PCM) - 5.0L 32V Ti-VCT/5.0L Ti-VCT V8 (308kW/418PS). PERFORM the Transmission Strategy Download procedure. REFER to: Transmission Strategy Download .

No	INSTALL a new clockspring. If concern still exists, INSTALL a new SCCM. REFER to: Steering Column Control Module (SCCM) .

GENERAL PROCEDURES > BRAKE SHIFT INTERLOCK ACTUATOR MANUAL OVERRIDE

Activation

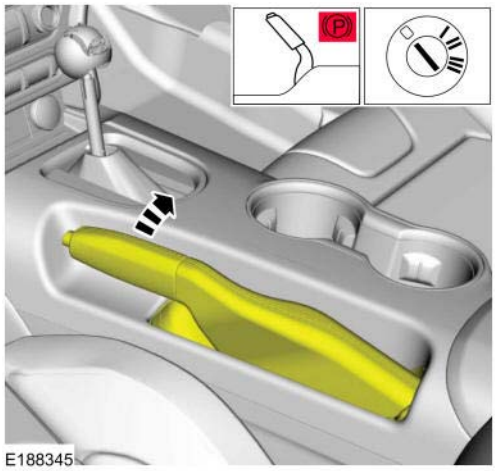
NOTE: If it is necessary to use the brake shift interlock actuator override procedure to move the selector lever out of the PARK position, it is possible that a fuse has blown and the

brake lights are not operational. Before driving the vehicle, verify the brake lights are working.

This vehicle is equipped with a brake shift interlock actuator feature that prevents the selector lever from being moved out of the PARK position when the ignition is in the ON position until the brake pedal is applied. If the selector lever cannot be moved out of the PARK position when the ignition is in the ON position and the brake pedal is applied:

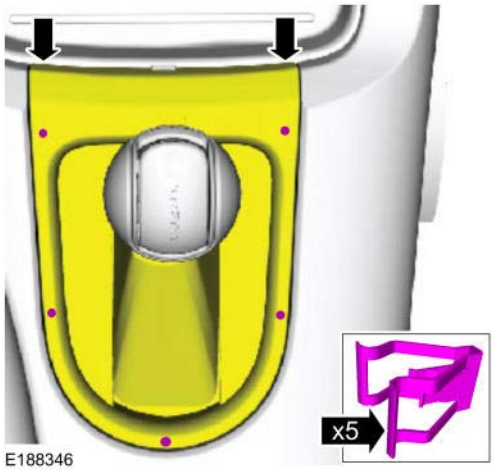
1.

Fully apply the parking brake. Set the ignition switch to the 0 position (ignition off).



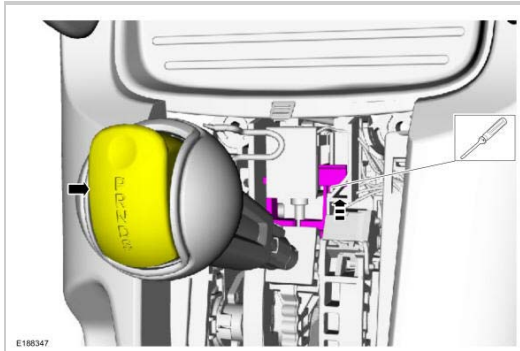
2.

Starting from the front corners, carefully pry up the bezel and position it out of the way.



3.

Using a small screwdriver, push forward on the brake shift interlock actuator on the selector lever assembly, apply the brake pedal, press the button on the selector lever knob and move the selector lever into NEUTRAL.



4.

Start the engine.

5.

Snap the bezel into place.



GENERAL PROCEDURES > SELECTOR LEVER CABLE ADJUSTMENT

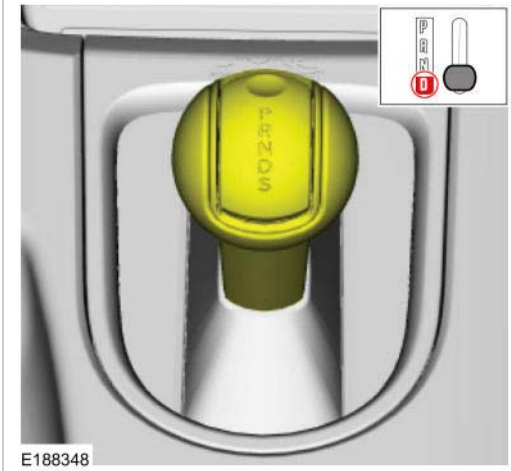
Adjustment

1.

With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

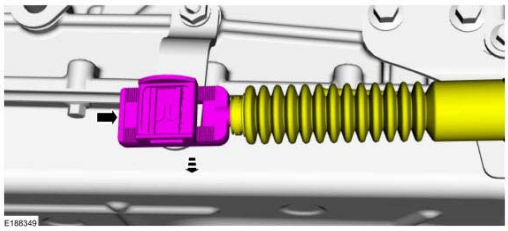
2.

Position the shifter lever in DRIVE.



3.

Disconnect the selector lever cable from the manual lever.

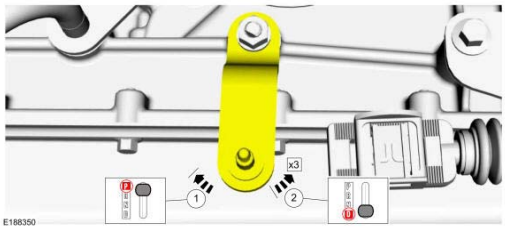


4.

Position the manual lever in DRIVE.

Rotate the manual lever clockwise until it stops.

Rotate the manual lever counterclockwise 3 detents.



5.

Unlock the adjuster.

1.

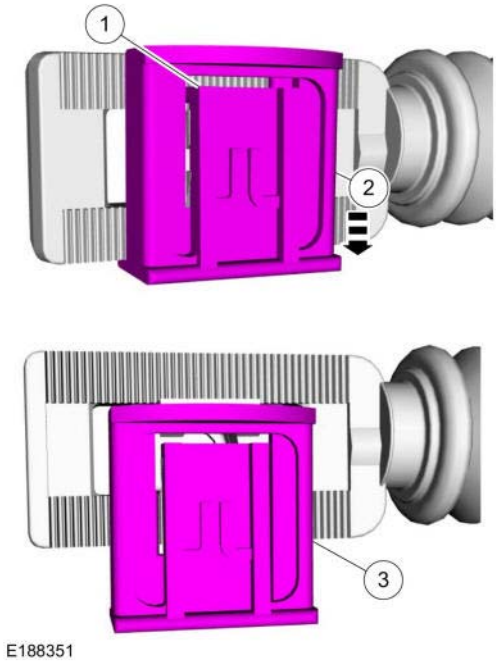
Gently pry the latch up.

2.

Push the lock tab to slide it down.

3.

Lock tab shown open in illustration.



NOTE: After locking the adjuster, pull back on the adjuster to make sure it is securely installed.

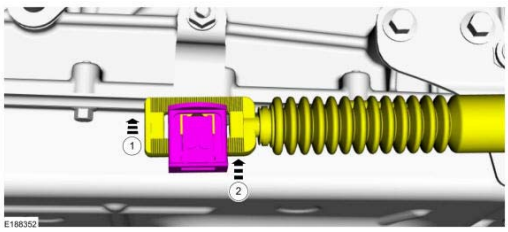
6.
Connect and lock the adjuster.

1.

With the adjuster lock tab released, connect the selector lever cable end to the manual control lever.

2.

Push the lock tab upward to lock the transmission selector lever cable adjustment lock.



7.

Verify the vehicle starts in PARK and NEUTRAL only and that the reverse lamps illuminate in

REVERSE.

REMOVAL AND INSTALLATION > DOWNSHIFT PADDLE SWITCH > REMOVAL

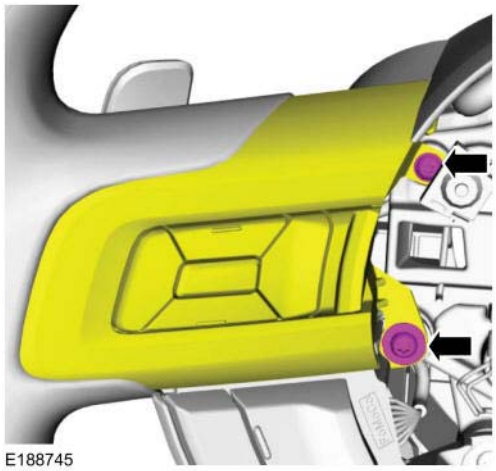
NOTE: Removal steps in this procedure may contain installation details.

1.

Remove the driver air bag. Refer to: Driver Airbag .

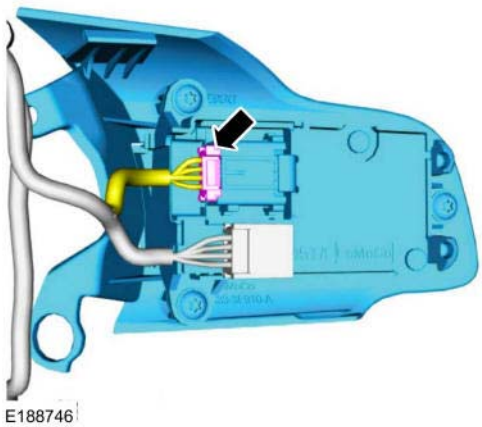
2.

Remove the screws and position the LH speed control switch to access the electrical connector.


E188745

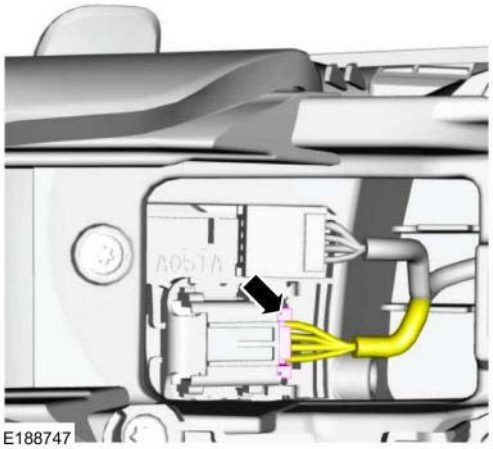
3.

Disconnect the LH speed control switch electrical connector and remove the switch.


E188746

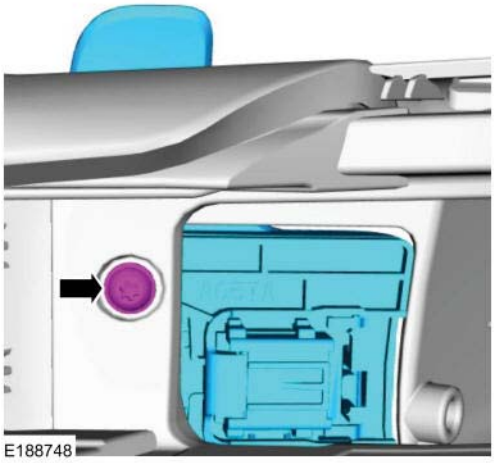
4.

Disconnect the downshift paddle switch electrical connector.



5.

Remove the screw and the downshift paddle switch.



REMOVAL AND INSTALLATION > DOWNSHIFT PADDLE SWITCH > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > SELECTOR LEVER ASSEMBLY

Special Tool(s) / General Equipment

Interior Trim Remover

REMOVAL AND INSTALLATION > SELECTOR LEVER ASSEMBLY > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

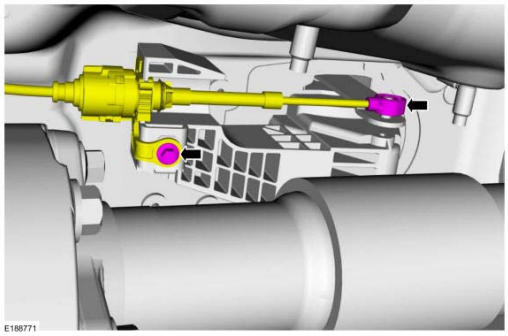
With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

2.

Disconnect the selector lever cable from the selector lever and remove the selector lever cable retainer bolt.

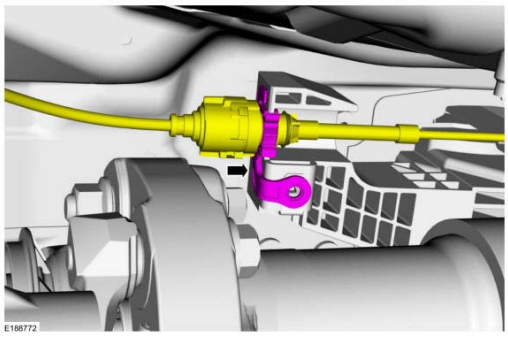
Torque

: 62 lb.in (7 Nm)



3.

Disconnect the selector lever cable from the selector lever assembly.



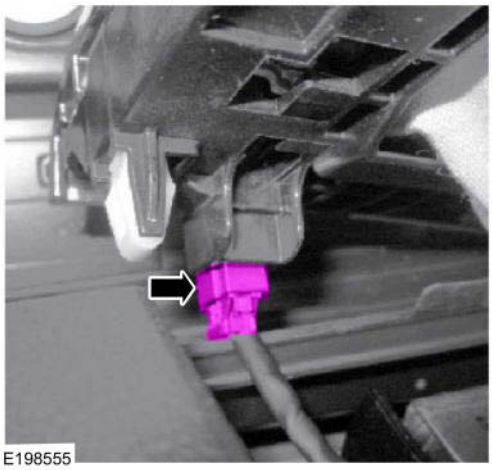
4.

Starting from the front corners, carefully pry up the bezel and position it out of the way.



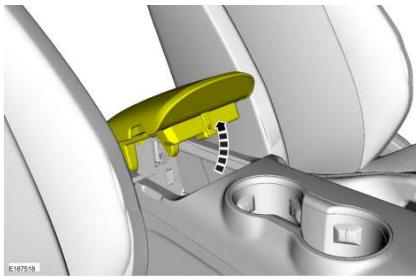
5.

Disconnect the electrical connector.



6.

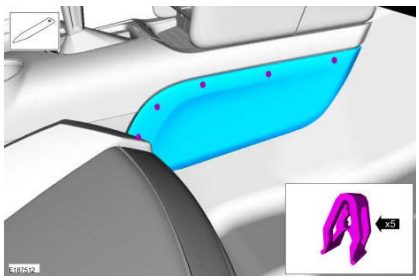
Open the floor console lid.



NOTE: If necessary, position the seat rearward.

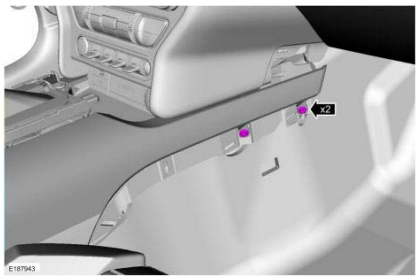
7.
Release the clips and remove the floor console RH side trim panel.

Use the General Equipment: Interior Trim Remover



8.

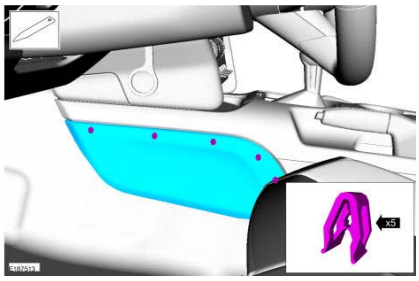
Remove the RH side front screws.



NOTE: If necessary, position the seat rearward.

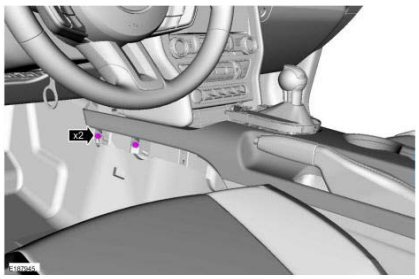
9.
Release the clips and remove the LH side trim panel.

Use the General Equipment: Interior Trim Remover



10.

Remove the LH side front screws.

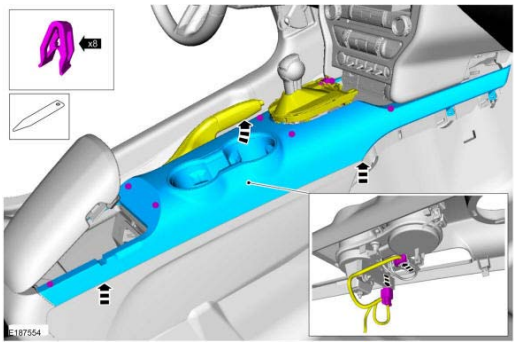


11.

Release the clips, position the selector lever bezel and boot aside and remove the floor console upper trim panel.

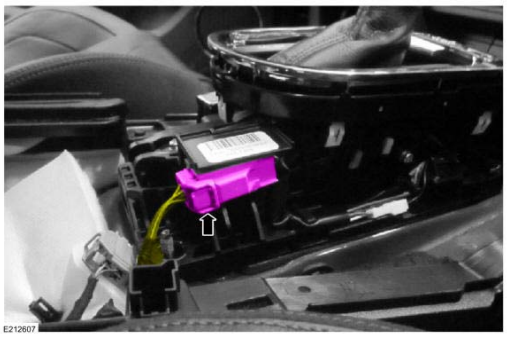
Disconnect the electrical connectors.

Use the General Equipment: Interior Trim Remover



12.

Disconnect the selector lever assembly electrical connector.

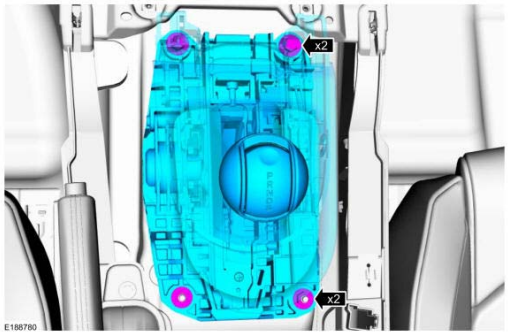


13.

Remove the bolts, the nuts and the selector lever assembly.

Torque

: 80 lb.in (9 Nm)



REMOVAL AND INSTALLATION > SELECTOR LEVER ASSEMBLY > INSTALLATION

1.

To install, reverse the removal procedure.

2.

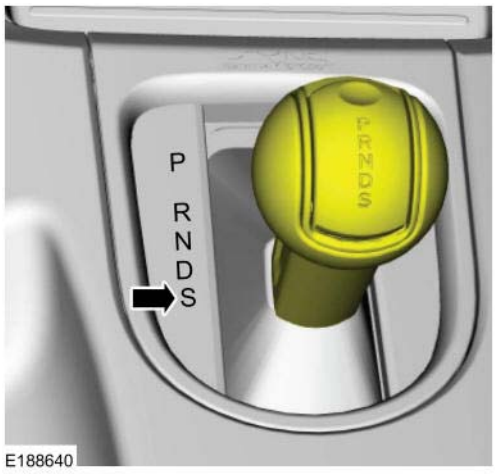
Adjust the selector lever cable. Refer to: Selector Lever Cable Adjustment .

REMOVAL AND INSTALLATION > SELECTOR LEVER BEZEL > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

Position the shifter in the S position.



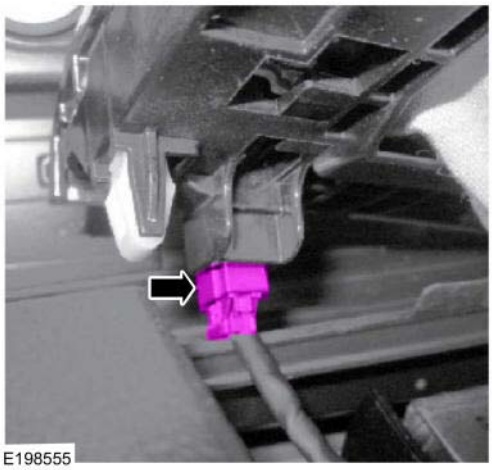
2.

Starting from the front corners, carefully pry up the bezel and position it out of the way.



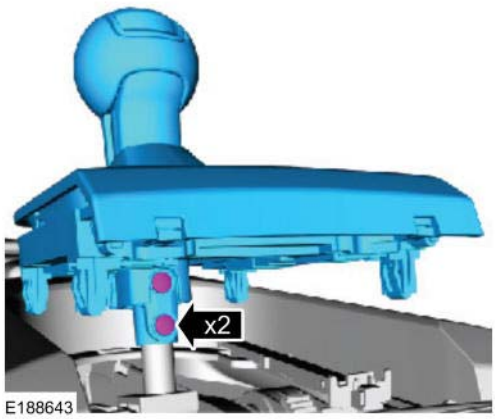
3.

Disconnect the electrical connector.



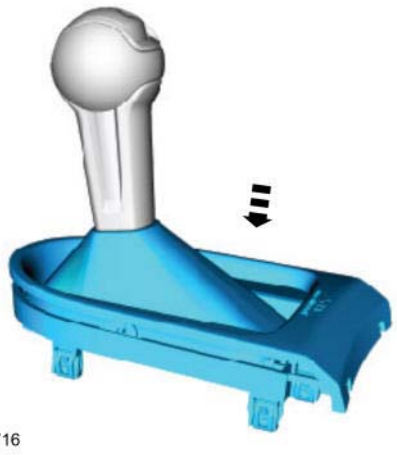
4.

Remove the screws and the shifter knob, boot and bezel as an assembly.



5.

Remove the boot and bezel from the shifter knob.


E188716

REMOVAL AND INSTALLATION > SELECTOR LEVER BEZEL > INSTALLATION

1.

To install, reverse the removal procedure.

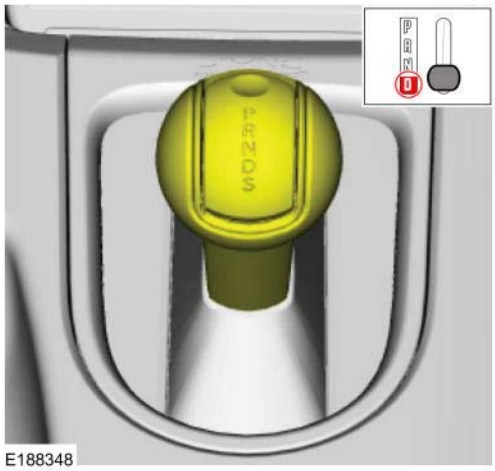
REMOVAL AND INSTALLATION > SELECTOR LEVER CABLE > REMOVAL

1.

With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

2.

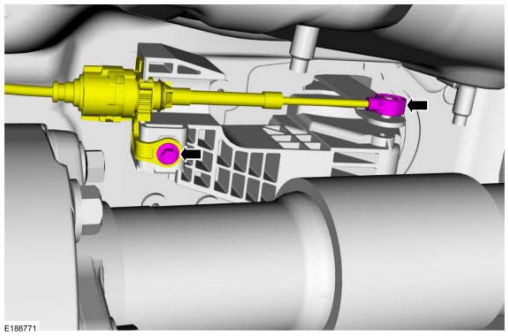
Position the selector lever in DRIVE.



E188348

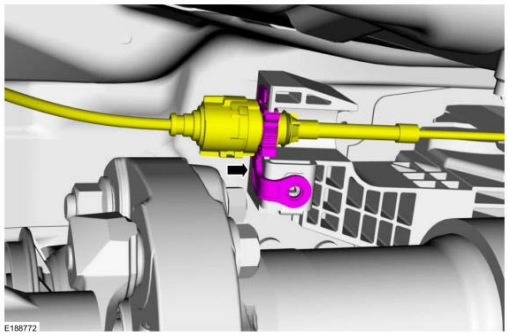
3.

Disconnect the selector lever cable from the selector lever and remove the selector lever cable retainer bolt.



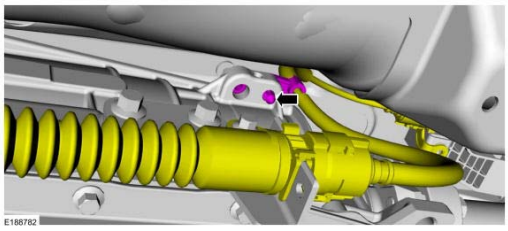
4.

Disconnect the selector lever cable from the selector lever assembly.



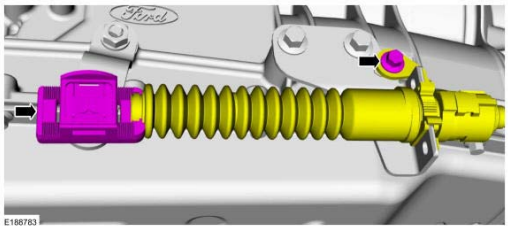
5.

Disconnect the selector lever cable retainer from the transmission.



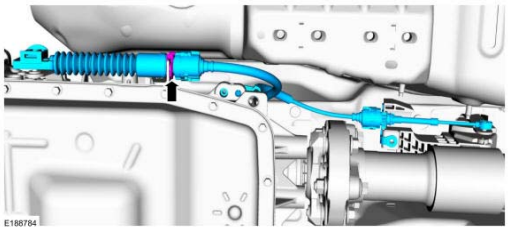
6.

Disconnect the selector lever cable from the manual lever and remove the selector lever cable bolt.



7.

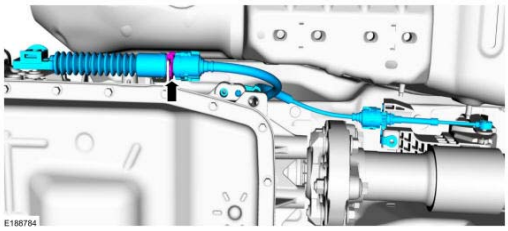
Disconnect the selector cable retainer and remove the selector lever cable.



REMOVAL AND INSTALLATION > SELECTOR LEVER CABLE > INSTALLATION

1.

Position the selector lever cable and connect the selector lever cable retainer.

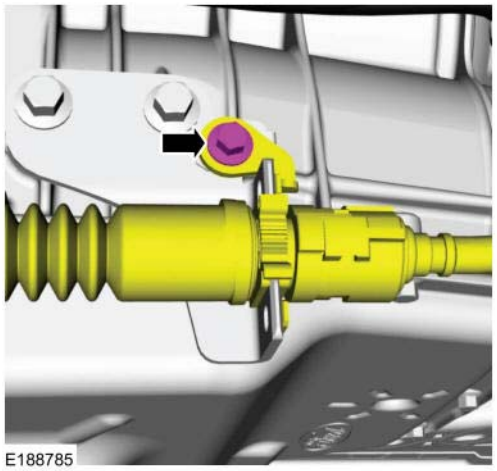


2.

Install the selector lever cable retainer bolt.

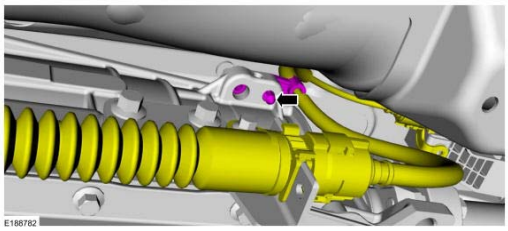
Torque

: 62 lb.in (7 Nm)



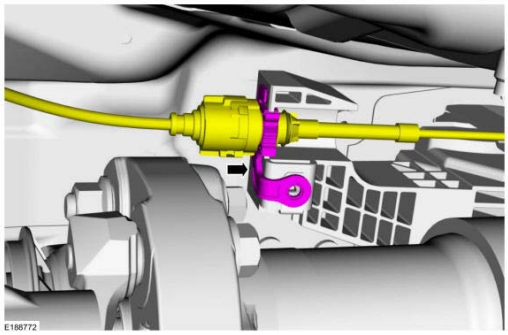
3.

Connect the selector lever cable retainer to the transmission.



4.

Connect the selector lever cable to the selector lever assembly.

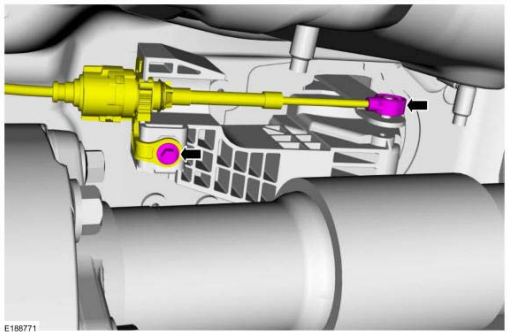


5.

With the selector lever in DRIVE, install the selector lever cable retainer bolt and connect the selector lever cable to the selector lever.

Torque

: 62 lb.in (7 Nm)



6.

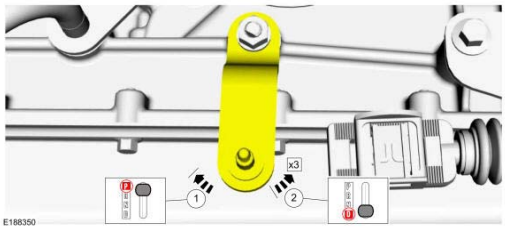
Position the manual lever in DRIVE.

1.

Rotate the manual lever clockwise until it stops.

2.

Rotate the manual lever counterclockwise 3 detents.



7.

Unlock the adjuster.

1.

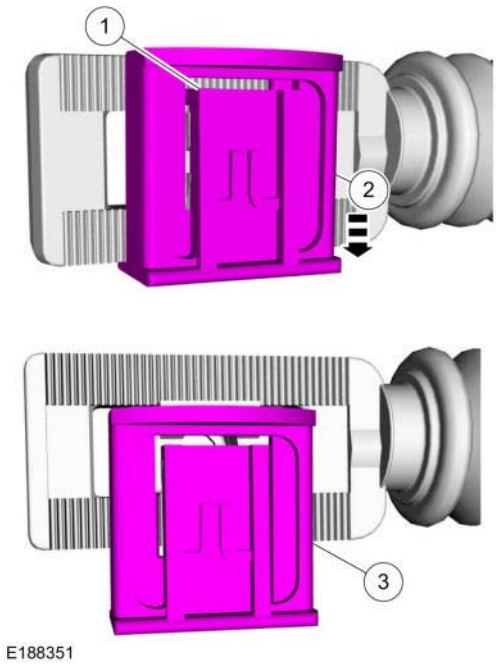
Gently pry the latch up.

2.

Push the lock tab to slide it down.

3.

Lock tab shown open in illustration.



NOTE: After locking the adjuster, pull back on the adjuster to make sure it is securely installed.

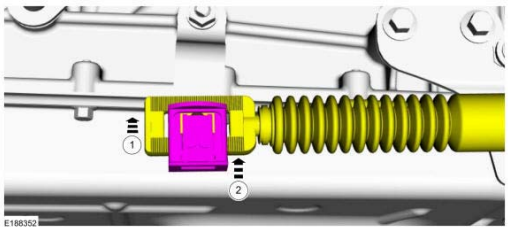
8.
Connect and lock the adjuster.

1.

With the adjuster lock tab released, connect the selector lever cable end to the manual control lever.

2.

Push the lock tab upward to lock the transmission selector lever cable adjustment lock.



9.

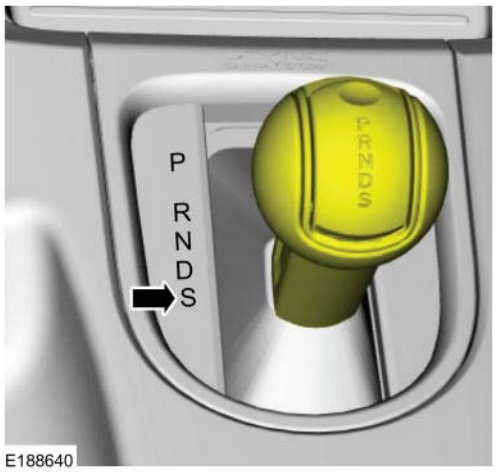
Verify the vehicle starts in PARK and NEUTRAL only and that the reverse lamps illuminate in REVERSE.

REMOVAL AND INSTALLATION > SELECTOR LEVER KNOB > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

Position the shifter in the S position.



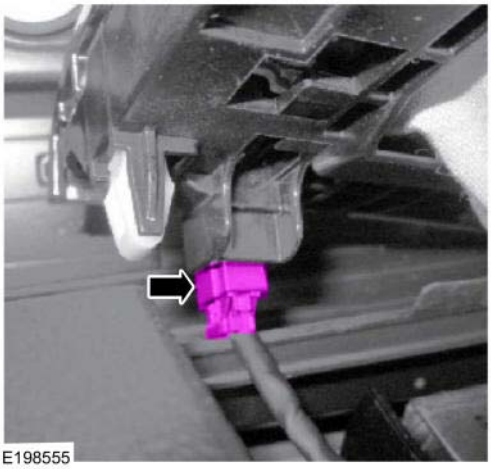
2.

Starting from the front corners, carefully pry up the bezel and position it out of the way.



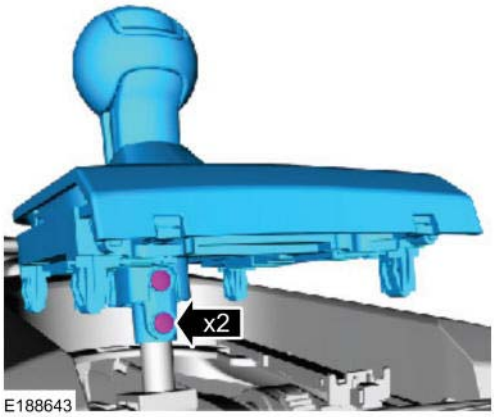
3.

Disconnect the electrical connector.



4.

Remove the screws and the shifter knob, boot and bezel as an assembly.



5.

Remove the shifter knob from the boot and bezel.



REMOVAL AND INSTALLATION > SELECTOR LEVER KNOB > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > UPSHIFT PADDLE SWITCH > REMOVAL

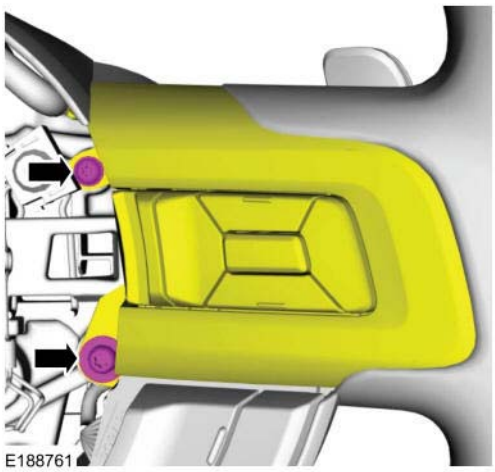
NOTE: Removal steps in this procedure may contain installation details.

1.

Remove the driver air bag. Refer to: Driver Airbag .

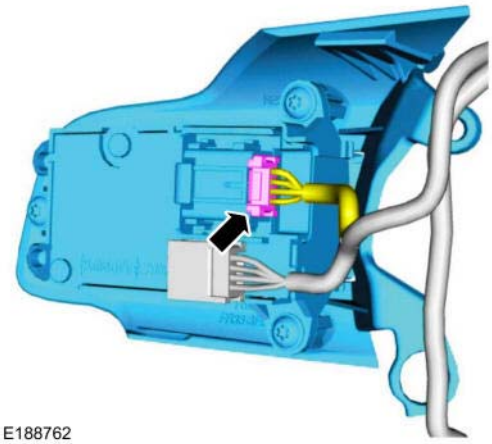
2.

Remove the screws and position the RH speed control switch to access the electrical connector.



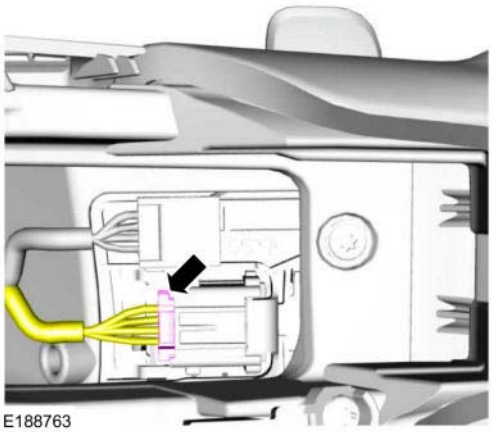
3.

Disconnect the RH speed control switch electrical connector and remove the switch.


E188762

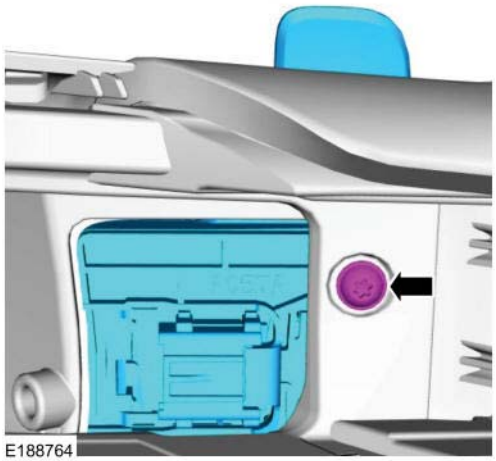
4.

Disconnect the upshift paddle switch electrical connector.


E188763

5.

Remove the screw and the upshift paddle switch.


E188764

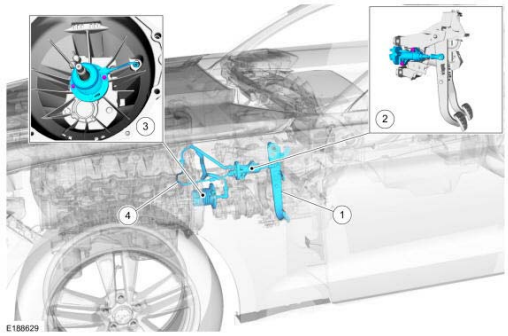
REMOVAL AND INSTALLATION > UPSHIFT PADDLE SWITCH > INSTALLATION

1.

To install, reverse the removal procedure.

Service Manual: CLUTCH CONTROLS

DESCRIPTION AND OPERATION > CLUTCH CONTROLS - COMPONENT LOCATION



Item	Description
1	Clutch pedal
2	Clutch master cylinder
3	Clutch slave cylinder
4	Clutch hydraulic fluid tubes

GENERAL PROCEDURES > CLUTCH SYSTEM BLEEDING

Special Tool(s) / General Equipment

Brake/Clutch System Pressure Bleeder/Filler

Materials

Name	Specification
Motorcraft® DOT 4 LV High Performance Motor Vehicle Brake Fluid PM-20	WSS-M6C65-A2

Bleeding

WARNING: Carefully read cautionary information on product label. For emergency medical information seek medical advice. In the USA or Canada on Ford/Motorcraft products call the Poison Control Center at: 1-800-959-3673. For additional information, consult the product Material Safety Data Sheet (MSDS) if available. Failure to follow these instructions may result in serious personal injury.

NOTE: Do not spill brake fluid on painted or plastic surfaces or damage to the surface

may occur. If brake fluid is spilled onto a painted or plastic surface, immediately wash the surface with water.

1.

Make sure all hydraulic tubes are correctly seated.

2.

Make sure the clutch pedal is in the most upward position.

3.

Check the fluid level of the brake/clutch reservoir. Fill the reservoir with the specified fluid to the MAX mark.

Material

: Motorcraft® DOT 4 LV High Performance Motor Vehicle Brake Fluid / PM-20 (WSS-M6C65-A2)

4.

Using a suitable bleeder kit and a Vacuum Pump Kit, install the rubber stopper in the reservoir opening. Make sure the rubber stopper has a tight fit. Alternate method: use a 50 mm (1.96 in) rubber stopper with an 8 mm (0.31 in) pipe inserted through the rubber stopper. Use the General Equipment: Brake/Clutch System Pressure Bleeder/Filler

5.

Holding the rubber stopper in place, operate the vacuum pump to 15-20 inches of vacuum. Hold the vacuum for one minute, then quickly relieve the vacuum. Remove the special tools.

6.

Check the fluid level of the reservoir. Fill the reservoir with the specified fluid to the MAX mark. Install the reservoir cap.

7.

Press and release the clutch pedal 10 to 12 times or until clutch pedal effort is consistent and positive at top of clutch pedal travel.

8.

Repeat Steps 4 through 7 two additional times or until clutch pedal effort is consistent and positive at top of clutch pedal travel.

9.

Install the reservoir cap.

10.

Check the clutch pedal reserve. Test the clutch system for normal operation.

REMOVAL AND INSTALLATION > CLUTCH MASTER CYLINDER - LHD > REMOVAL

WARNING: Carefully read cautionary information on product label. For emergency medical information seek medical advice. In the USA or Canada on Ford/Motorcraft products call the Poison Control Center at: 1-800-959-3673. For additional information, consult the product Material Safety Data Sheet (MSDS) if available. Failure to follow these instructions may result in serious personal injury.

NOTE: Do not spill brake fluid on painted or plastic surfaces or damage to the surface may occur. If brake fluid is spilled onto a painted or plastic surface, immediately wash the surface with water.

1.

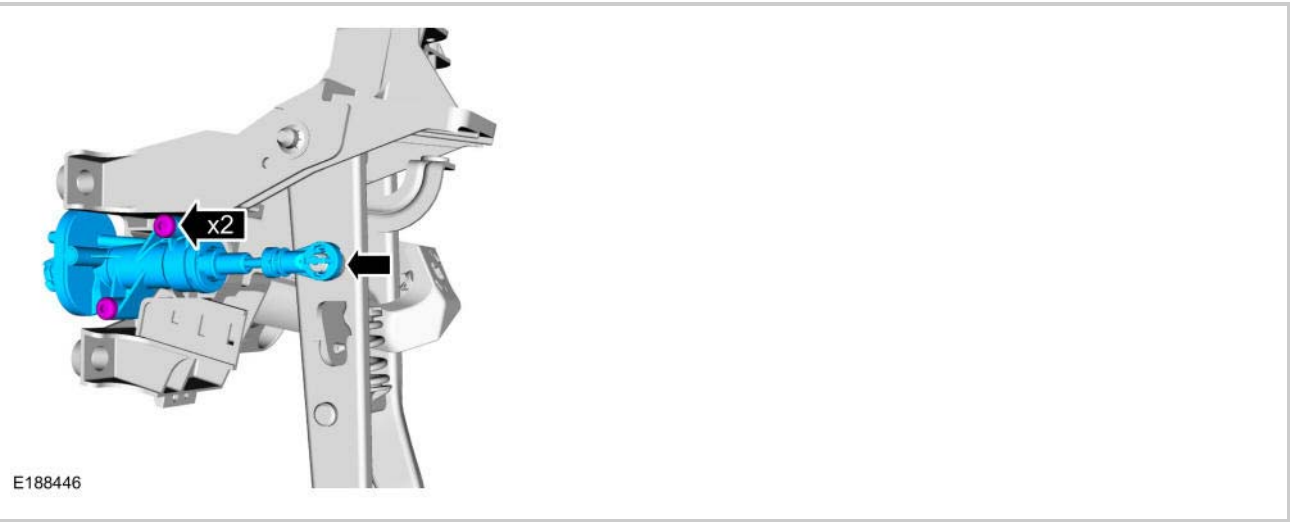
Remove the brake pedal and bracket assembly. Refer to: Brake Pedal and Bracket - 6-Speed Manual Transmission - 3160/6-Speed Manual Transmission - MT82 .

2.

Remove the clutch master cylinder bolts, then disconnect the clutch master cylinder from the clutch pedal and remove the master cylinder.

Torque

: 89 lb.in (10 Nm)



REMOVAL AND INSTALLATION > CLUTCH MASTER CYLINDER - LHD > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Bleed the clutch hydraulic system. Refer to: Clutch System Bleeding .

REMOVAL AND INSTALLATION > CLUTCH PEDAL - LHD > REMOVAL

1.

The clutch pedal is serviced as part of the brake pedal assembly. Remove the brake pedal assembly. Refer to: Brake Pedal and Bracket - 6-Speed Manual Transmission - 3160/6-Speed Manual Transmission - MT82 .

REMOVAL AND INSTALLATION > CLUTCH PEDAL - LHD > INSTALLATION

1.

To install, reverse the removal procedure.

REMOVAL AND INSTALLATION > CLUTCH SLAVE CYLINDER > REMOVAL

WARNING: Do not breathe dust or use compressed air to blow dust from storage containers or friction components. Remove dust using government-approved techniques. Friction component dust may be a cancer and lung disease hazard. Exposure to potentially hazardous components may occur if dusts are created during repair of friction components, such as brake pads and clutch discs. Exposure may also cause irritation to skin, eyes and respiratory tract, and may cause allergic reactions and/or may lead to other chronic health effects. If irritation persists, seek medical attention or advice. Failure to follow these instructions may result in serious personal injury.

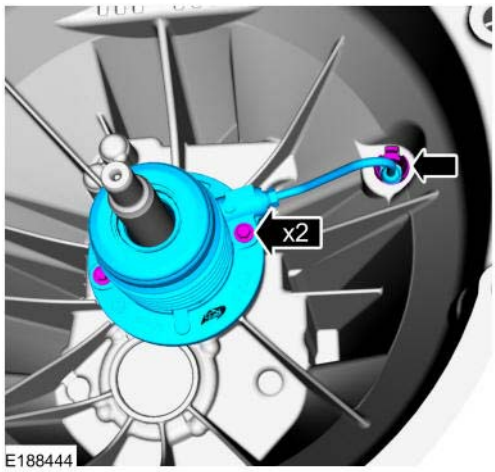
WARNING: Carefully read cautionary information on product label. For emergency medical information seek medical advice. In the USA or Canada on Ford/Motorcraft products call the Poison Control Center at: 1-800-959-3673. For additional information, consult the product Material Safety Data Sheet (MSDS) if available. Failure to follow these instructions may result in serious personal injury.

1.

Remove the transmission. Refer to: Transmission - 2.3L EcoBoost (201kW/273PS) . Refer to: Transmission - 3.7L Duratec (227kW/301PS) . Refer to: Transmission - 5.0L 32V Ti-VCT .

2.

Remove the clutch slave cylinder bolts. Pull the clutch slave cylinder outward and release the tube from the retaining clip.



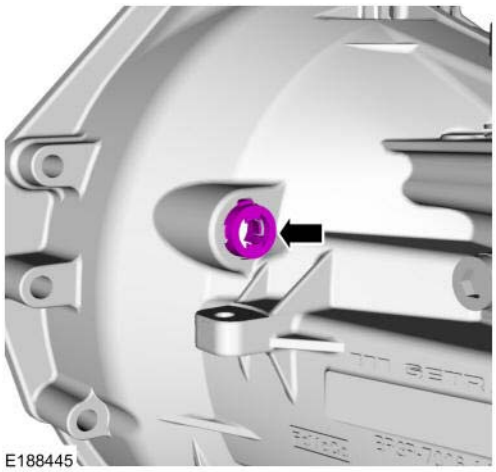
3.

Inspect the clutch slave cylinder for a damaged boot, leaking brake fluid or a worn or damaged release bearing. Rotate the release bearing while applying pressure. If the bearing rotation is rough, install a new clutch slave cylinder.

REMOVAL AND INSTALLATION > CLUTCH SLAVE CYLINDER > INSTALLATION

1.

Install a new retaining clip.

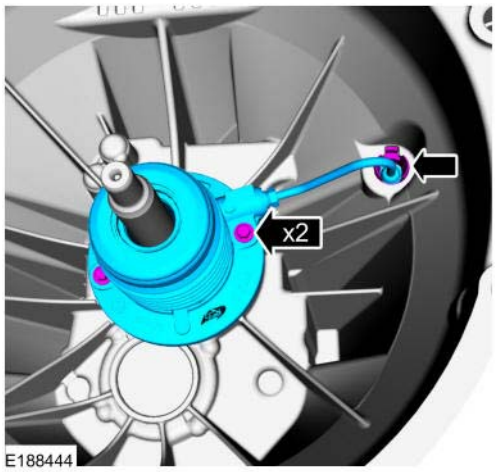


2.

Position the clutch slave cylinder in the transmission, inserting the tube through the retaining clip. Install the clutch slave cylinder bolts.

Torque

: 97 lb.in (11 Nm)



3.

Install the transmission. Refer to: Transmission - 2.3L EcoBoost (201kW/273PS) . Refer to: Transmission - 3.7L Duratec (227kW/301PS) . Refer to: Transmission - 5.0L 32V Ti-VCT .

Service Manual: CLUTCH

REMOVAL AND INSTALLATION > CLUTCH DISC AND PRESSURE PLATE - 2.3L ECOBOOST (201KW 273PS)

Special Tool(s) / General Equipment

Clutch Alignment Tool

REMOVAL AND INSTALLATION > CLUTCH DISC AND PRESSURE PLATE - 2.3L ECOBOOST (201KW 273PS) > REMOVAL

WARNING: Do not breathe dust or use compressed air to blow dust from storage containers or friction components. Remove dust using government-approved techniques. Friction component dust may be a cancer and lung disease hazard. Exposure to potentially hazardous components may occur if dusts are created during repair of friction components, such as brake pads and clutch discs. Exposure may also cause irritation to skin, eyes and respiratory tract, and may cause allergic reactions and/or may lead to other chronic health effects. If irritation persists, seek medical attention or advice. Failure to follow these instructions may result in serious personal injury.

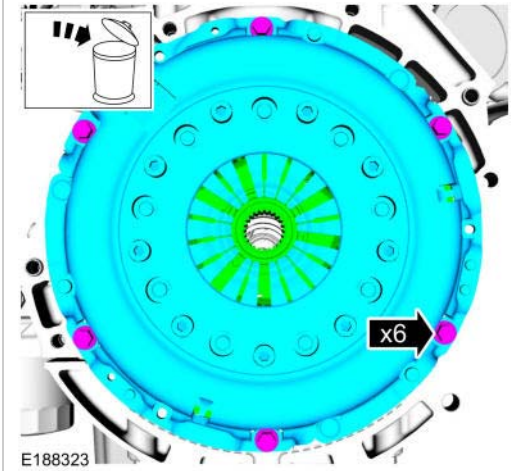
1.

Remove the transmission. Refer to: Transmission - 2.3L EcoBoost (201kW/273PS) .

NOTE: If the parts are to be reused, index-mark the pressure plate to the flywheel. Failure to install the pressure plate to the flywheel in the original position may result in a clutch system vibration.

NOTE: Loosen the bolts evenly to prevent clutch pressure plate damage.

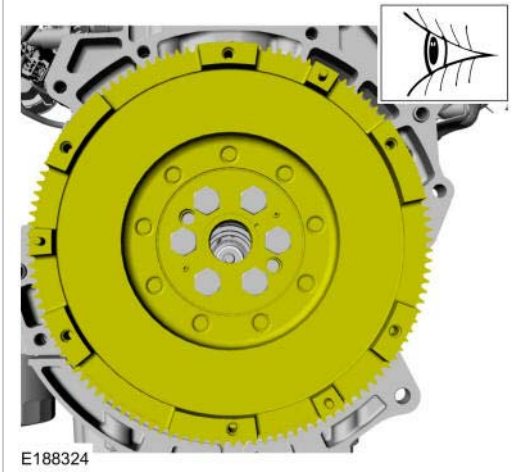
2.
Remove the pressure plate bolts by turning them 1 turn at a time in a star pattern until the clutch is fully released. Remove the pressure plate and the clutch disc. Discard the pressure plate bolts.



REMOVAL AND INSTALLATION > CLUTCH DISC AND PRESSURE PLATE - 2.3L ECOBOOST (201KW 273PS) > INSTALLATION

1.

Inspect the flywheel for damage, burn marks or wear and install a new flywheel if necessary.



NOTE: If installing a new pressure plate and/or flywheel, align the paint dot on the pressure plate as close as possible to the paint dot on the flywheel or a clutch system vibration can occur.

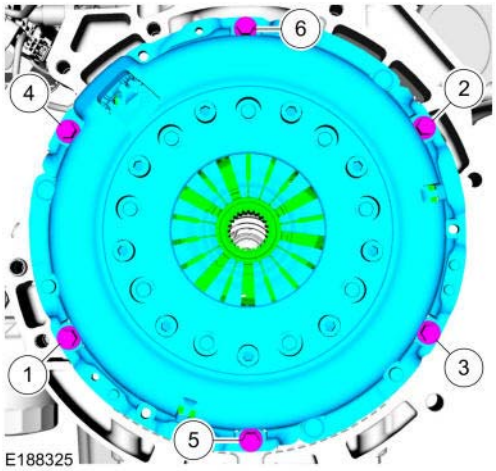
NOTE: If installing the original pressure plate, align it using the index-marks made during removal or a clutch system vibration can occur.

2.
Using a clutch aligner, position the clutch disc on the flywheel. If installing the original pressure plate, align the pressure plate to the flywheel using the index-marks made during removal. If

installing a new pressure plate, align the pressure plate to the flywheel using the paint dots. Install new pressure plate bolts by turning the bolts 1 turn at a time in a star pattern until the clutch is fully secured. Use the General Equipment: Clutch Alignment Tool

Torque

: 26 lb.ft (35 Nm)



3.

Install the transmission. Refer to: Transmission - 2.3L EcoBoost (201kW/273PS) .

4.

After completing the repairs, use the scan tool to perform the Misfire Monitor Neutral Profile Correction procedure, following the on-screen instructions.

REMOVAL AND INSTALLATION > CLUTCH DISC AND PRESSURE PLATE - 3.7L DURATEC (227KW 301PS)

Special Tool(s) / General Equipment

Clutch Alignment Tool

REMOVAL AND INSTALLATION > CLUTCH DISC AND PRESSURE PLATE - 3.7L DURATEC (227KW 301PS) > REMOVAL

WARNING: Do not breathe dust or use compressed air to blow dust from storage containers or friction components. Remove dust using government-approved techniques. Friction component dust may be a cancer and lung disease hazard. Exposure to potentially hazardous components may occur if dusts are created during repair of friction components, such as brake pads and clutch discs. Exposure may also cause irritation to skin, eyes and

respiratory tract, and may cause allergic reactions and/or may lead to other chronic health effects. If irritation persists, seek medical attention or advice. Failure to follow these instructions may result in serious personal injury.

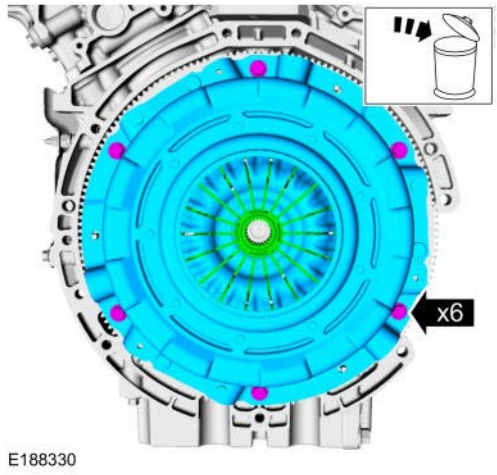
1.

Remove the transmission. Refer to: Transmission - 3.7L Duratec (227kW/301PS) .

NOTE: Loosen the bolts evenly to prevent clutch pressure plate damage.

NOTE: If the parts are to be reused, index-mark the pressure plate to the flywheel. Failure to install the pressure plate to the flywheel in the original position may result in a clutch system vibration.

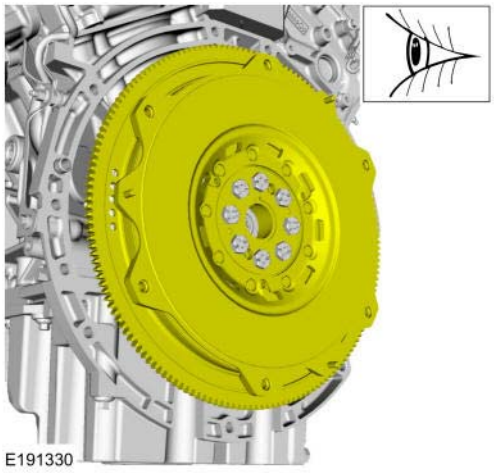
2.
Remove the pressure plate bolts by turning them 1 turn at a time in a star pattern until the clutch is fully released. Remove the pressure plate and the clutch disc. Discard the pressure plate bolts.



REMOVAL AND INSTALLATION > CLUTCH DISC AND PRESSURE PLATE - 3.7L DURATEC (227KW 301PS) > INSTALLATION

1.

Inspect the flywheel for damage. Refer to: Flywheel Inspection - 3.7L Duratec (227kW/301PS) .



NOTE: If installing a new pressure plate and/or flywheel, align the paint dot on the pressure plate as close as possible to the paint dot on the flywheel or a clutch system vibration can occur.

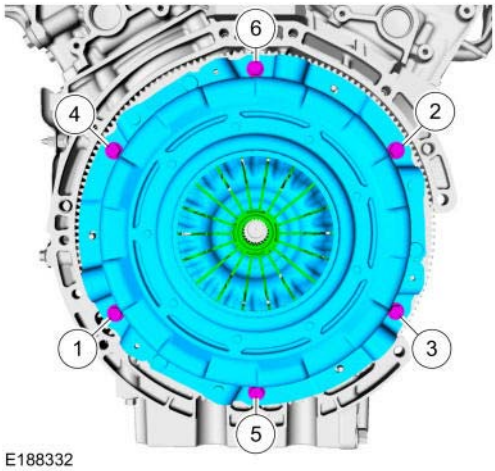
NOTE: If installing the original pressure plate, align it using the index-marks made during removal or a clutch system vibration can occur.

2.
Using a clutch aligner, position the clutch disc on the flywheel. If installing the original pressure plate, align the pressure plate to the flywheel using the index-marks made during removal. If installing a new pressure plate, align the pressure plate to the flywheel using the paint dots. Install new pressure plate bolts by turning the bolts 1 turn at a time in a star pattern until the clutch is fully secured. Use the General Equipment: Clutch Alignment Tool

Torque:

Stage 1: 46 lb.ft (63 Nm)

Stage 2: 60°



3.

Install the transmission. Refer to: Transmission - 3.7L Duratec (227kW/301PS) .

4.

After completing the repairs, use the scan tool to perform the Misfire Monitor Neutral Profile Correction procedure, following the on-screen instructions.

REMOVAL AND INSTALLATION > CLUTCH DISC AND PRESSURE PLATE - 5.0L 32V TI-VCT

Special Tool(s) / General Equipment

Clutch Alignment Tool

REMOVAL AND INSTALLATION > CLUTCH DISC AND PRESSURE PLATE - 5.0L 32V TI-VCT > REMOVAL

WARNING: Do not breathe dust or use compressed air to blow dust from storage containers or friction components. Remove dust using government-approved techniques. Friction component dust may be a cancer and lung disease hazard. Exposure to potentially hazardous components may occur if dusts are created during repair of friction components, such as brake pads and clutch discs. Exposure may also cause irritation to skin, eyes and respiratory tract, and may cause allergic reactions and/or may lead to other chronic health effects. If irritation persists, seek medical attention or advice. Failure to follow these instructions may result in serious personal injury.

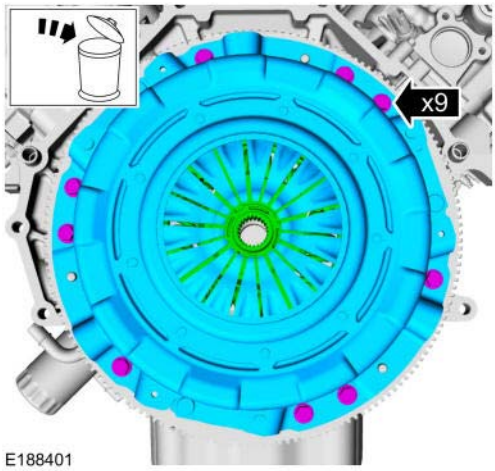
1.

Remove the transmission. Refer to: Transmission - 5.0L 32V Ti-VCT .

NOTE: If the parts are to be reused, index-mark the pressure plate to the flywheel. Failure to install the pressure plate to the flywheel in the original position may result in a clutch system vibration.

NOTE: Loosen the bolts evenly to prevent clutch pressure plate damage.

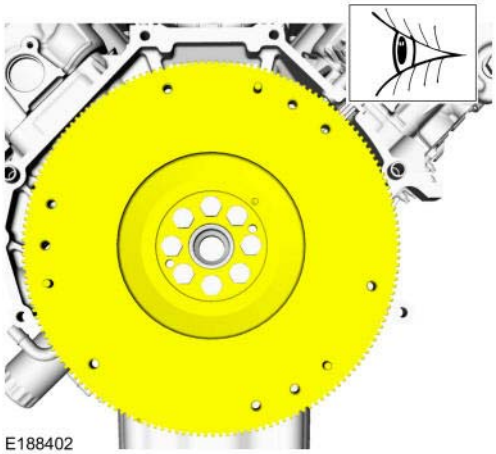
2.
Remove the pressure plate bolts by turning them 1 turn at a time in a star pattern until the clutch is fully released. Remove the pressure plate and the clutch disc. Discard the pressure plate bolts.



REMOVAL AND INSTALLATION > CLUTCH DISC AND PRESSURE PLATE - 5.0L 32V TI-VCT > INSTALLATION

1.

Inspect the flywheel for damage, burn marks or wear and install a new flywheel if necessary.



NOTE: If installing a new pressure plate and/or flywheel, align the paint dot on the pressure plate as close as possible to the paint dot on the flywheel or a clutch system vibration can occur.

NOTE: If installing the original pressure plate, align it using the index-marks made during removal or a clutch system vibration can occur.

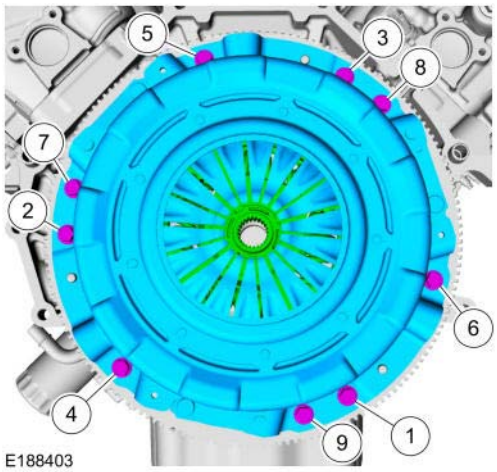
2.
Using a clutch aligner, position the clutch disc on the flywheel. If installing the original pressure plate, align the pressure plate to the flywheel using the index-marks made during removal. If

installing a new pressure plate, align the pressure plate to the flywheel using the paint dots. Install new pressure plate bolts by turning the bolts 1 turn at a time in a star pattern until the clutch is fully secured. Use the General Equipment: Clutch Alignment Tool

Torque:

Stage 1: 46 lb.ft (63 Nm)

Stage 2: 60°



3.

Install the transmission. Refer to: Transmission - 5.0L 32V Ti-VCT .

4.

After completing the repairs, use the scan tool to perform the Misfire Monitor Neutral Profile Correction procedure, following the on-screen instructions.

REMOVAL AND INSTALLATION > PILOT BEARING

Special Tool(s) / General Equipment

 E135106	308-001 (T58L-101-B) Remover, Pilot Bearing

REMOVAL AND INSTALLATION > PILOT BEARING > REMOVAL

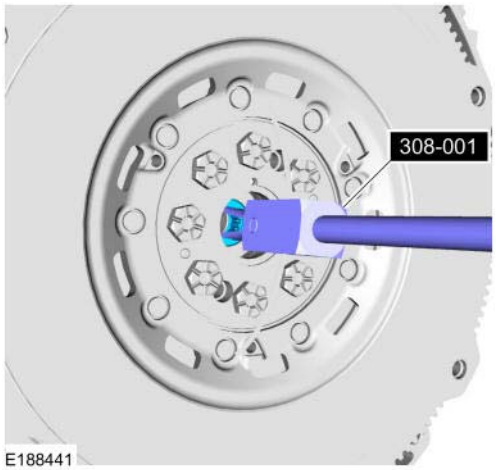
NOTE: The pilot bearing is not serviceable on vehicles equipped with a 5.2L

engine. Install a new flywheel.

1.
Remove the clutch disc and pressure plate. Refer to: Clutch Disc and Pressure Plate - 2.3L EcoBoost (201kW/273PS) . Refer to: Clutch Disc and Pressure Plate - 3.7L Duratec (227kW/301PS) . Refer to: Clutch Disc and Pressure Plate - 5.0L 32V Ti-VCT .

2.

Using the special tool, remove the pilot bearing. Use Special Service Tool: 308-001 (T58L-101-B) Remover, Pilot Bearing.



REMOVAL AND INSTALLATION > PILOT BEARING > INSTALLATION

1.

Position the pilot bearing in the crankshaft. Using a driver, install the pilot bearing.



2.

Install the clutch disc and pressure plate. Refer to: Clutch Disc and Pressure Plate - 2.3L

EcoBoost (201kW/273PS) . Refer to: Clutch Disc and Pressure Plate - 3.7L Duratec (227kW/301PS) . Refer to: Clutch Disc and Pressure Plate - 5.0L 32V Ti-VCT .

SPECIFICATIONS > SPECIFICATIONS

MATERIALS SPECIFICATIONS

Name	Specification
High Temperature 4x4 Front Axle and Wheel Bearing Grease XG-11	WSS-M1C267-A1
Premium Long-Life Grease XG-1-E1	ESA-M1C75-B
Threadlock 262 TA-26	WSK-M2G351-A6
Motorcraft® MT82 Transmission Additive XL-18	-
Gasket Maker TA-16	WSK-M2G348-A5
Motorcraft® DOT 4 LV High Performance Motor Vehicle Brake Fluid PM-20	WSS-M6C65-A2
Motorcraft® Dual Clutch Transmission Fluid XT-11-QDC	WSS-M2C200-D2

LUBRICANTS, FLUIDS, SEALERS AND ADHESIVES SPECIFICATIONS

Description	Specifications
Gasket Maker TA-16	Material : Gasket Maker / TA-16 (WSK-M2G348-A5)
Motorcraft® DOT 4 LV High Performance Motor Vehicle Brake Fluid / PM-20	Material : Motorcraft® DOT 4 LV High Performance Motor Vehicle Brake Fluid / PM-20 (WSS-M6C65-A2)
Motorcraft® Dual Clutch Transmission Fluid / XT-11-QDC	Material : Motorcraft® Dual Clutch Transmission Fluid / XT-11-QDC (WSS-M2C200-D2)
Motorcraft® Premium Long-Life Grease XG-1-E1	Material : Premium Long-Life Grease / XG-1-E1 (ESA-M1C75-B)
High Temperature 4x4 Front Axle and Wheel Bearing Grease / XG-11	Material : High Temperature 4x4 Front Axle and Wheel Bearing Grease / XG-11 (WSS-M1C267-A1)
Motorcraft® Threadlock 262 TA-26	Material : Threadlock 262 / TA-26 (WSK-M2G351-A6)
Motorcraft® MT82 Transmission Additive XL-18 (1)	Material : Motorcraft® MT82 Transmission Additive / XL-18

(1)	XL-18 is only required after synchronizer replacement.

CAPACITIES SPECIFICATIONS

Description	Liters
Transmission Fluid	2.7 qt (2.6L)

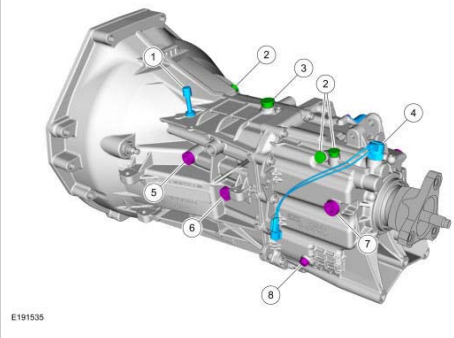
GENERAL SPECIFICATIONS

Item	Specification
Transmission Weight	81.1 lb (36.8 kg)
Input Shaft Rotational Torque maximum	1.2 Nm (10.6 lb-in)

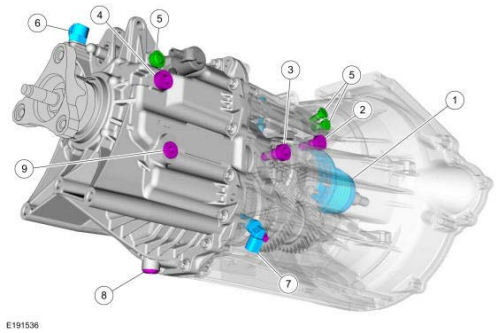
TRANSMISSION GEAR RATIOS SPECIFICATIONS

Gear	2.3L GTDI	3.7L	5.0L
1st	4.24:1	4.24:1	3.66:1
2nd	2.54:1	2.54:1	2.43:1
3rd	1.66:1	1.66:1	1.69:1
4th	1.24:1	1.24:1	1.31:1
5th	1:1	1:1	1:1
6th	0.70:1	0.70:1	0.65:1
Reverse	3.84:1	3.84:1	3.32:1

DESCRIPTION AND OPERATION > MANUAL TRANSMISSION - COMPONENT LOCATION



Item	Description
1	Transmission vent
2	Shift rail detents
3	Shift shaft stop pin
4	Reverse lamp switch
5	5th/6th gear shift fork pivot bolt
6	3rd/4th gear shift fork pivot bolt
7	Reverse shift fork pivot bolt
8	Reverse idler gear bracket bolt



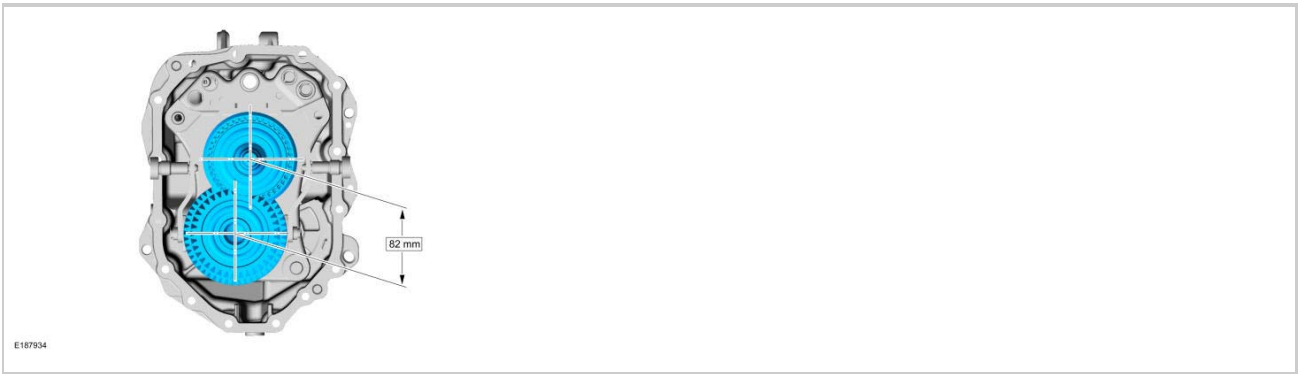
Item	Description
1	Clutch slave cylinder
2	5th/6th gear shift fork pivot bolt
3	3rd/4th gear shift fork pivot bolt
4	Reverse shift fork pivot bolt
5	Shift rail detents
6	Reverse lamp switch
7	OSS sensor
8	Drain plug
9	Fill plug

DESCRIPTION AND OPERATION > MANUAL TRANSMISSION - OVERVIEW > OVERVIEW

The MT82 is a fully synchronized 6-speed manual transmission with reverse gear. The name of the MT82 is derived from the distance between the two shafts in the transmission:

- **M** Manual.

- **T** Transmission.
- **82** The distance between the main shaft and the counter shaft in millimeters.



This transmission is a coaxial transmission with three shafts. The input shaft as well as the output shaft lie on a single axis. All gear wheels have helical teeth and are constantly engaged. The transmission is designed for a maximum torque of 480 Nm. In order to ensure secure mounting of the selector rods, they are passed through a centre bearing mounting plate. The center bearing mounting plate is bolted to the housing. All gear selector forks and shift forks are made of forged steel. The main selector shaft is mounted in the center bearing mounting plate. The bearing of the transmission does not require preloading and therefore does not require shims. In order to compensate for the heat expansion of the shafts, they run in one bearing which can slide in its seat and one bearing which is pressed home in its seat. To improve gearshifting, 1st and 2nd gear have triple synchronizers and 3rd and 4th gear have double synchronizers. Only the 5th and 6th gears and the reverse gear have single synchronizers. The transmission fluid is designed to last the entire service life of the transmission and does not need to be changed during servicing.

DESCRIPTION AND OPERATION > MANUAL TRANSMISSION - OVERVIEW > IDENTIFICATION TAGS

The transmission identification tag is located on the RH side of the transmission, near the driveshaft flange.

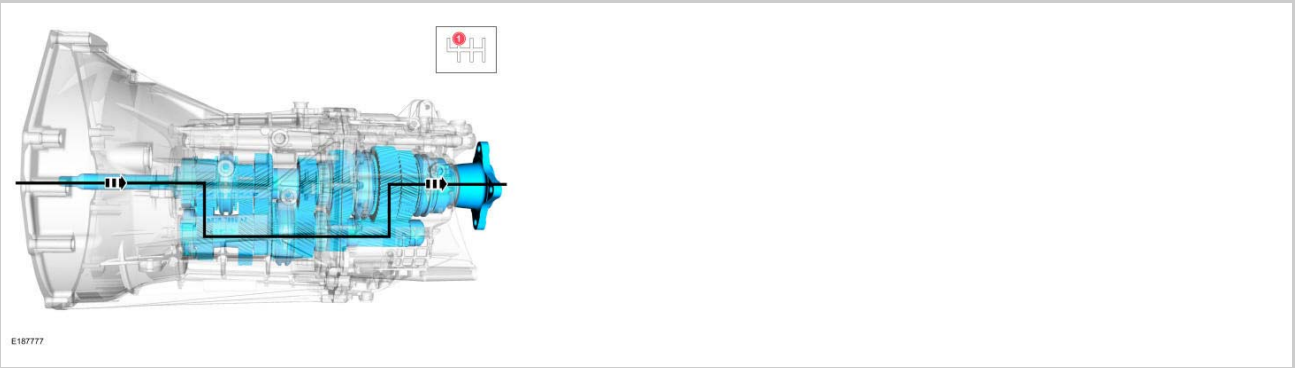


Item	Description
1	Replacement part number
2	Place of manufacture
3	Transmission build date

4	Build time

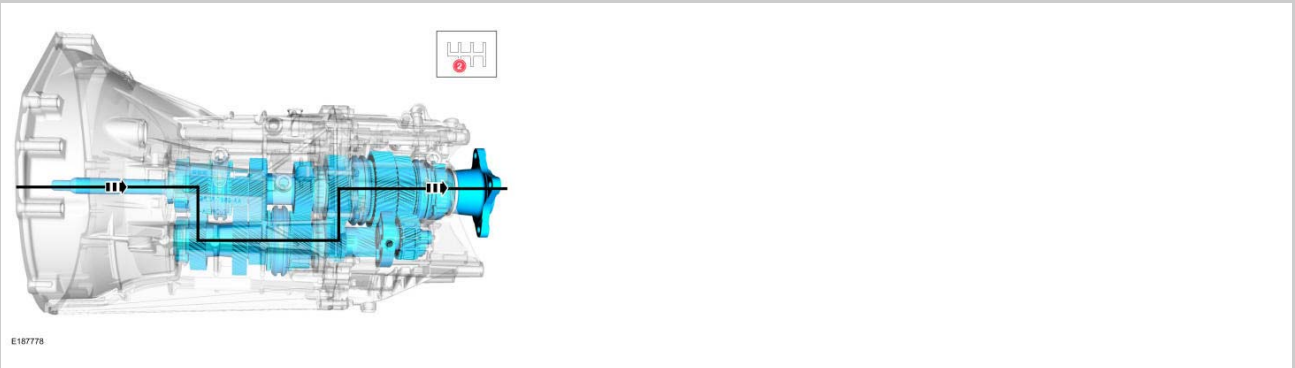
DESCRIPTION AND OPERATION > MANUAL TRANSMISSION - SYSTEM OPERATION AND COMPONENT DESCRIPTION > SYSTEM OPERATION

First Gear Powerflow



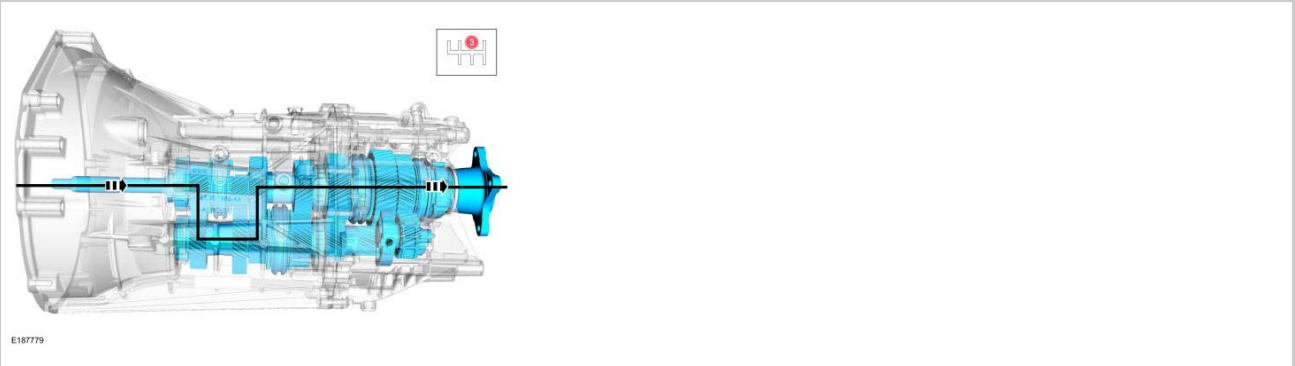
In first gear, the shift shaft assembly pulls the 1st/2nd shift rail and fork back to slide the 1st/2nd synchronizer sleeve onto 1st gear to lock it to the output shaft. Torque is transferred from the input shaft to the counter shaft through 5th gear and from the counter shaft to the output shaft through 1st gear.

Second Gear Powerflow



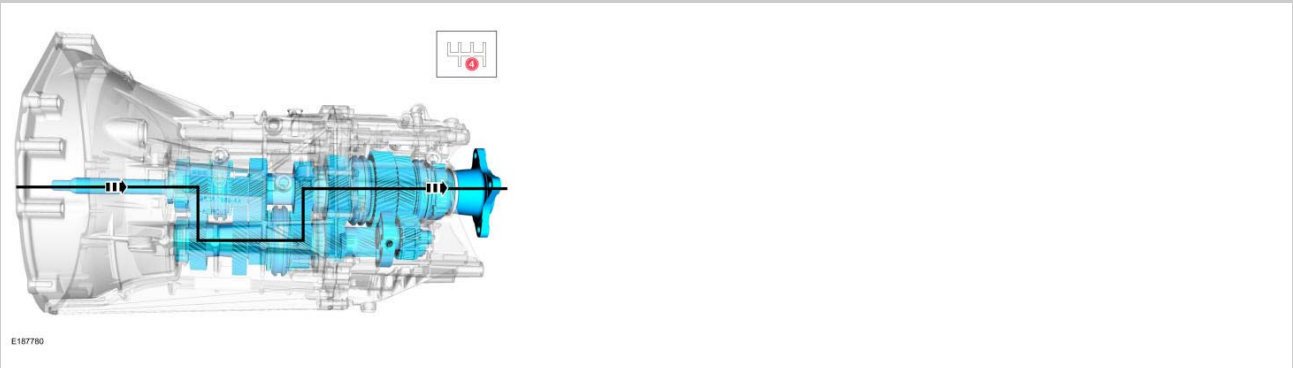
In second gear, the shift shaft assembly pushes the 1st/2nd shift rail and fork forward to slide the 1st/2nd synchronizer sleeve onto 2nd gear to lock it to the output shaft. Torque is transferred from the input shaft to the counter shaft through 5th gear and from the counter shaft to the output shaft through 2nd gear.

Third Gear Powerflow



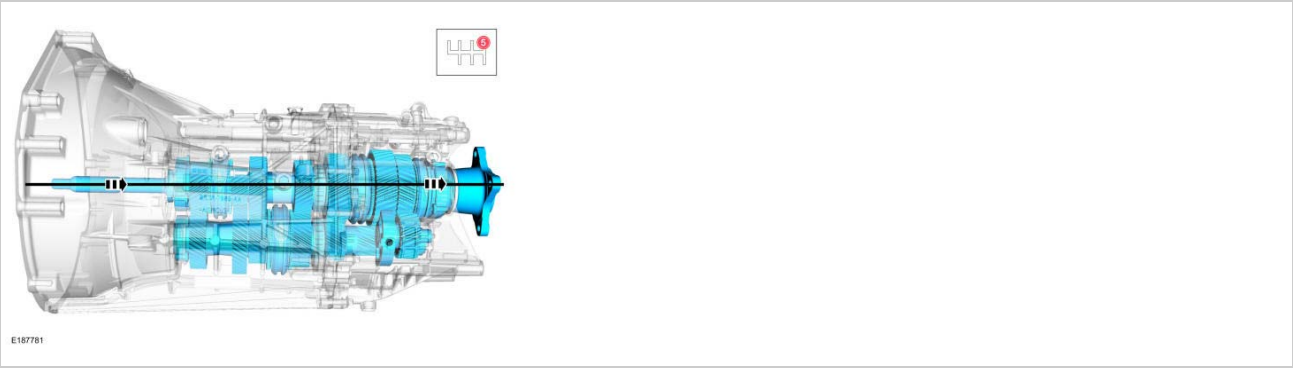
In third gear, the shift shaft assembly pulls the 3rd/4th shift rail back which pivots the 3rd/4th shift fork to slide the 3rd/4th synchronizer sleeve forward onto 3rd gear to lock it to the counter shaft. Torque is transferred from the input shaft to the counter shaft through 5th gear and from the counter shaft to the output shaft through 3rd gear.

Fourth Gear Powerflow



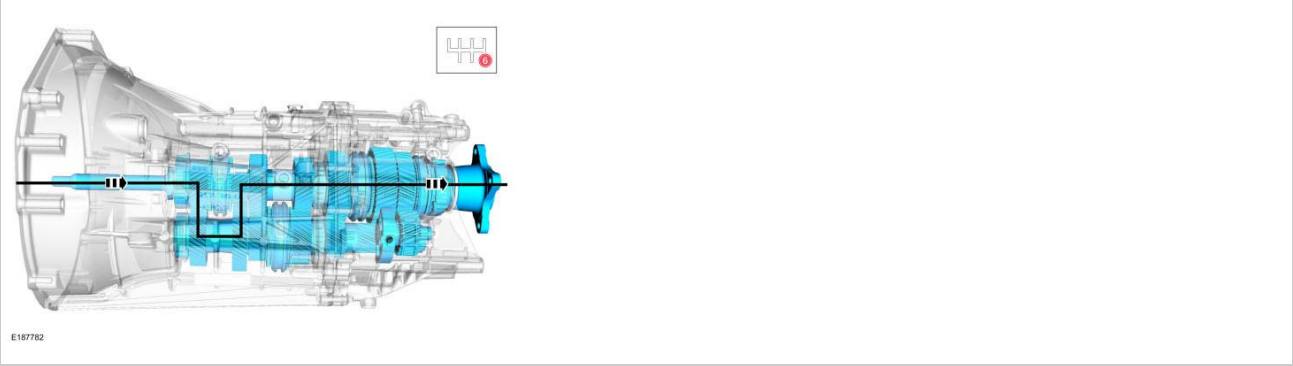
In forth gear, the shift shaft assembly pushes the 3rd/4th shift rail forward which pivots the 3rd/4th shift fork to slide the 3rd/4th synchronizer sleeve back onto 4th gear to lock it to the counter shaft. Torque is transferred from the input shaft to the counter shaft through 5th gear and from the counter shaft to the output shaft through 4th gear.

Fifth Gear Powerflow



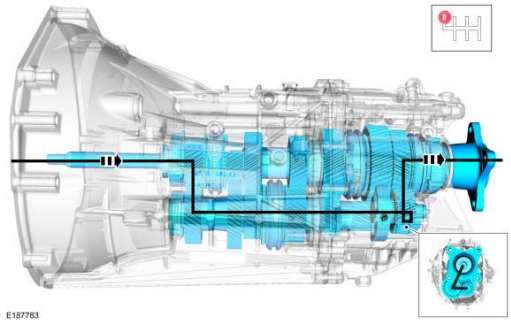
In fifth gear, the shift shaft assembly pulls the 5th/6th shift rail back which pivots the 5th/6th shift fork to slide the 5th/6th synchronizer sleeve forward onto the input shaft to lock it to the output shaft. Torque is transferred from the input shaft to the output shaft through the 5th/6th synchronizer sleeve and provides direct drive through the transmission.

Sixth Gear Powerflow



In sixth gear, the shift shaft assembly pushes the 5th/6th shift rail forward which pivots the 5th/6th shift fork to slide the 5th/6th synchronizer sleeve back onto 6th gear to lock it to the output shaft. Torque is transferred from the input shaft to the counter shaft through 5th gear and from the counter shaft to the output shaft through 6th gear.

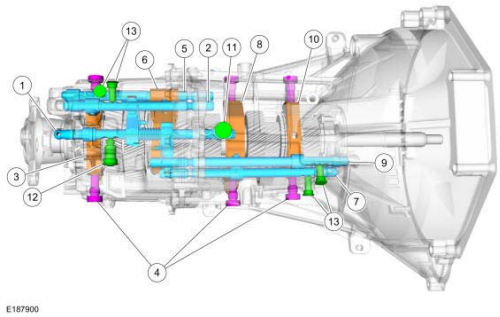
Reverse Powerflow



In reverse, the shift shaft assembly pulls the reverse shift rail back which pivots the reverse shift fork to slide the reverse synchronizer sleeve forward onto reverse gear to lock it to the output shaft. Torque is transferred from the input shaft to the counter shaft through 5th gear and from the counter shaft to the output shaft through the reverse gear and reverse idler gear to rotate the output shaft in the opposite direction.

Component Description

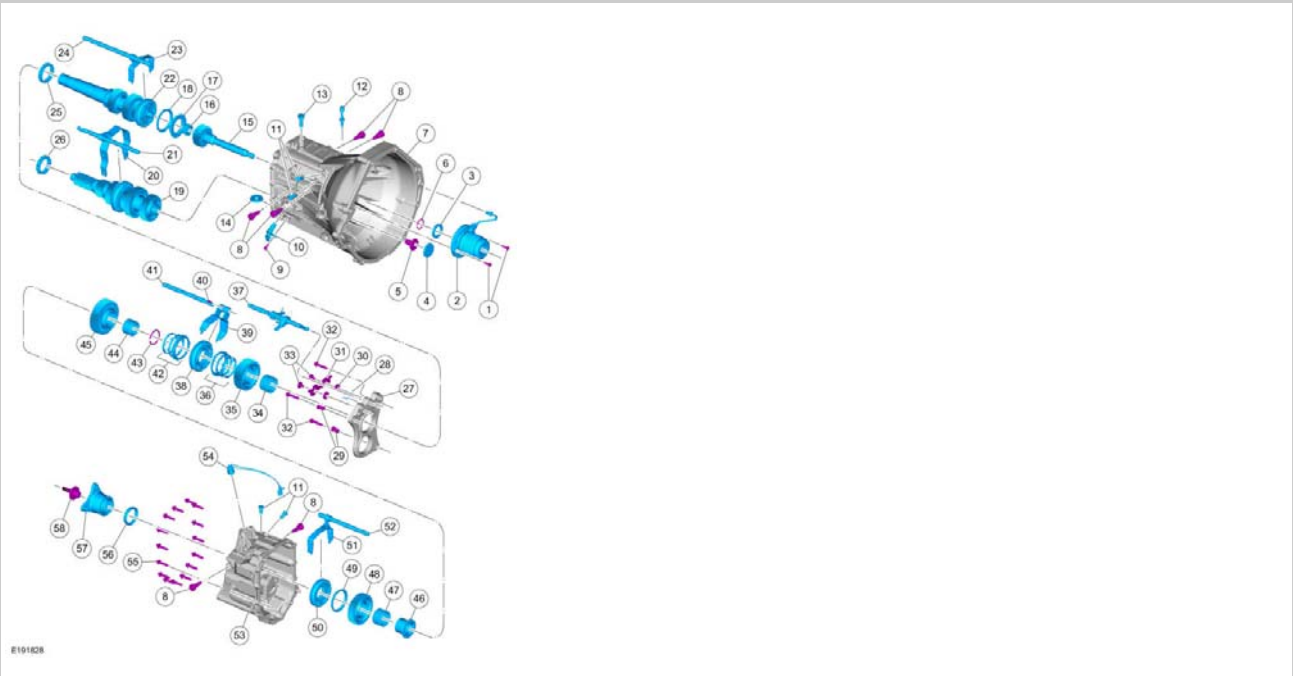
Internal Gearshift Mechanism



Item	Description
1	Shift shaft assembly
2	Reverse shift rail
3	Reverse shift fork
4	Shift fork pivot bolts
5	1st/2nd shift rail
6	1st/2nd shift fork
7	3rd/4th shift rail
8	3rd/4th shift fork

9	5th/6th shift rail
10	5th/6th shift fork
11	Shift shaft stop pin
12	Shift shaft d©tente
13	Shift rail detents

Transmission Exploded View

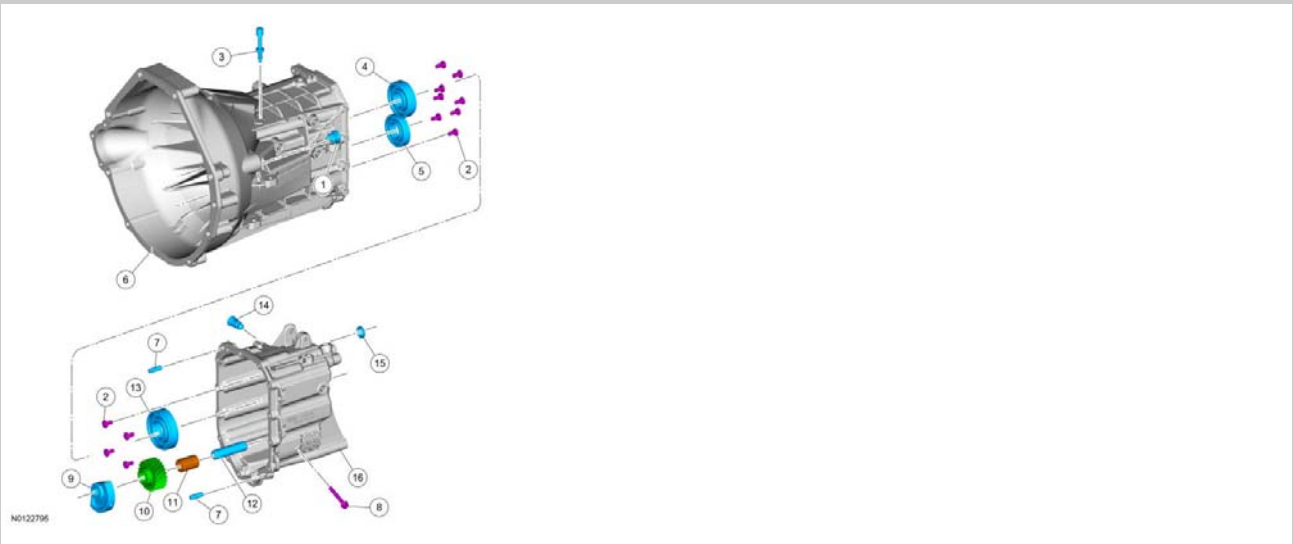


Item	Description
1	Clutch slave cylinder bolt (2 required)
2	Clutch slave cylinder
3	Input shaft seal
4	Countershaft bolt cover
5	Countershaft bolt
6	Input shaft snap ring
7	Front transmission case assembly
8	Shift fork pivot bolts (6 required)
9	OSS sensor bolt
10	OSS sensor
11	Shift rail detents (4 required)
12	Transmission case vent tube
13	Shift shaft stop pin

14	Magnet
15	Input shaft
16	Output shaft roller bearing
17	5th gear synchronizer cone
18	5th gear synchronizer ring
19	Countershaft assembly
20	3rd/4th shift fork
21	3rd/4th shift rail
22	Output shaft assembly
23	5th/6th shift fork
24	5th/6th shift rail
25	Center support bearing (output shaft)
26	Center support bearing (countershaft)
27	Center support
28	Spring
29	Dowels (2 required)
30	Spacers (2 required)
31	Interlock plate
32	Center support bolts (3 required)
33	Interlock plate bolts (2 required)
34	2nd gear needle bearing
35	2nd gear
36	2nd gear synchronizer ring assembly
37	Shift shaft assembly
38	1st/2nd gear synchronizer assembly
39	1st/2nd shift fork
40	Roll pin
41	1st/2nd shift rail
42	1st gear synchronizer ring assembly
43	1st/2nd gear synchronizer assembly snap ring
44	1st gear needle bearing
45	1st gear
46	Reverse gear needle bearing race

47	Reverse gear needle bearing
48	Reverse gear
49	Reverse gear synchronizer ring
50	Reverse gear synchronizer assembly
51	Reverse shift fork
52	Reverse shift rail
53	Rear transmission case assembly
54	Reverse lamp switch
55	Transmission case bolts
56	Output shaft seal
57	Output shaft flange
58	Output shaft flange bolt

Transmission Case



Item	Description
1	Clutch slave cylinder tube retaining clip
2	Bearing retaining bolts
3	Transmission case vent tube
4	Input shaft bearing
5	Countershaft bearing
6	Front transmission case
7	Dowel pin
8	Reverse idler gear bracket bolt

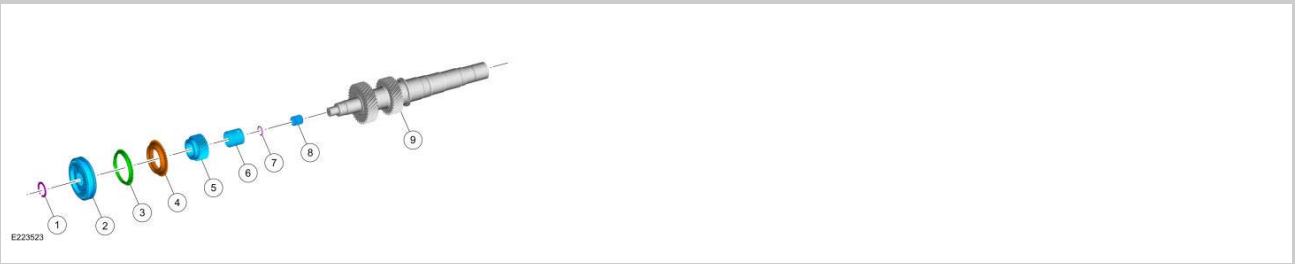
9	Reverse idler gear bracket
10	Reverse idler gear
11	Reverse idler gear needle bearing
12	Reverse idler gear shaft
13	Output shaft bearing
14	Shift shaft detent
15	Shift shaft seal
16	Rear transmission case

Counter Shaft



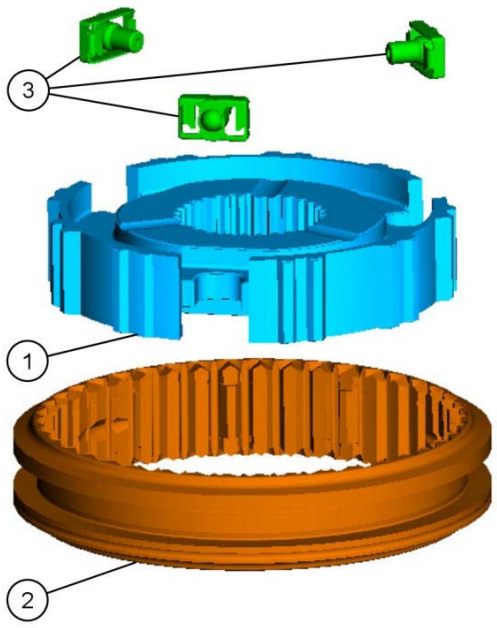
Item	Description
1	5th gear
2	6th gear
3	3rd gear
4	3rd gear needle bearing
5	3rd gear synchronizer ring assembly
6	3rd/4th gear synchronizer assembly snap ring
7	3rd/4th gear synchronizer assembly
8	4th gear synchronizer ring assembly
9	4th gear
10	4th gear needle bearing
11	Countershaft

Output Shaft



Item	Description
1	5th/6th gear synchronizer assembly snap ring
2	5th/6th gear synchronizer assembly
3	6th gear synchronizer ring
4	6th gear synchronizer cone
5	6th gear
6	6th gear needle bearing
7	Pocket bearing inner bearing race retainer
8	Pocket bearing inner bearing race
9	Output shaft

Synchronizer Assembly



E92188

Item	Description
1	Synchronizer hub
2	Synchronizer sleeve
3	Pressure pieces

DIAGNOSIS AND TESTING > MANUAL TRANSMISSION > INSPECTION AND VERIFICATION

NOTE: If transmission noise is reported, first check the transmission fluid level. The vehicle should not be driven if the transmission fluid level is low. A low transmission fluid level will damage the transmission.

NOTE: If an observed or reported concern is found, correct the cause before proceeding.

Gear driven units produce a certain level of noise. Some noise is acceptable and audible at certain speeds or under various driving conditions. Many conditions, such as road and weather can amplify normal vehicle noise.

The following overview is a guide to diagnose a transmission or clutch concern:

- Verify and document the customer concern.
    - During the customer interview, if a leak was noticed or if a leak is the concern, check the transmission fluid level. The vehicle should not be driven if the transmission fluid level is low.
- Check fluid level and condition.
- Evaluate the clutch hydraulic system.
- Evaluate the clutch.
- Inspect gearshift mechanism.
- Evaluate the transmission.

Check Fluid Level and Condition

An incorrect transmission fluid level may affect the transmission operation and can result in transmission damage. REFER to: Transmission Fluid Level Check .

DIAGNOSIS AND TESTING > MANUAL TRANSMISSION > CHECK FLUID LEVEL AND CONDITION

NOTE: Excessive temperatures may break down the transmission lubricant. If there is reason to believe the transmission has been subjected to temperatures exceeding 135°C (275°F) for an extended period (greater than 20 minutes), change the lubricant immediately.

A low transmission fluid level can result in poor transmission shifting, engagement or damage. It also indicates a leak in the transmission seals or gaskets.

1.

Check the transmission fluid condition.

Allow the transmission fluid to drip onto a white cloth and examine the stain. Check the transmission fluid for contamination or metal particles.

DIAGNOSIS AND TESTING > MANUAL TRANSMISSION > EVALUATE CLUTCH HYDRAULIC SYSTEM

1.

Verify the clutch hydraulic fluid reservoir is filled to the correct level.

If the clutch hydraulic fluid level is low, add fluid as necessary. Check the clutch hydraulic system for leaks.

DIAGNOSIS AND TESTING > MANUAL TRANSMISSION > EVALUATE THE CLUTCH

1.

Apply and release the clutch pedal slowly to check pedal binding. Make sure the clutch pedal can be fully applied and is not restricted by the floor mat.

2.

With the engine idling and the park brake applied, move the gearshift lever into 4th gear. Increase engine speed to 2, 000 rpm and slowly release the clutch pedal.

If the engine stalls, the clutch is not slipping.

If the engine does not stall, the clutch is slipping.

DIAGNOSIS AND TESTING > MANUAL TRANSMISSION > INSPECT GEARSHIFT MECHANISM

1.

Inspect the gearshift mechanism for:

signs of damage.

missing or loose fasteners.

binding.

2.

Repair as necessary.

DIAGNOSIS AND TESTING > MANUAL TRANSMISSION > EVALUATE TRANSMISSION

NOTE: The vehicle should not be driven if the transmission fluid level is low or damage may occur.

NOTE: Before attempting to repair any concerns, road test the vehicle to determine which system the concern is in.

1.

Road test the vehicle. Use the following methods to diagnose the concern.

Start the engine.

Evaluate the noise in NEUTRAL while vehicle is parked.

Check whether the noise is present with the clutch fully disengaged (clutch pedal applied). Check to see if the pedal pulsates abnormally (clutch diaphragm finger runout).

Check whether the noise is present with the gearshift in the NEUTRAL position and the clutch fully engaged (clutch pedal released). Apply the park brake and move the gearshift towards the 1st gear position.

With the clutch fully engaged (clutch pedal released) check whether the noise is present as the engine speed is raised. If the noise reduces, note the engine speed at which this occurs.

Listen for any change in noise while applying and releasing the clutch pedal.

Listen for any change in noise while changing the engine rpm.

Drive the vehicle and shift through all the gears including REVERSE. Listen for any changes in noise.

Drive the vehicle in the gear in which the noise is most noticeable. Apply the clutch pedal and leave the gear engaged. Listen for any change in noise.

Drive the vehicle in the gear in which the noise is most noticeable. Apply the clutch pedal and shift the transmission into NEUTRAL. Release the clutch pedal and allow the vehicle to coast.

2.

The following list of conditions are typical clutch concerns.

Clutch slippage

Clutch chatter or shudder

Clutch pedal feels spongy or has excessive travel. Clutch will not disengage

Clutch drag, also hard to shift

Clutch pedal pulsation

Clutch-related vibrations

Excessive noise

3.

The following list of conditions are typical clutch hydraulic system concerns.

Clutch pedal feels spongy or has excessive travel. Clutch will not disengage

Clutch drag, also hard to shift

Clutch pedal pulsation

Clutch system leakage

4.

Compare the road test results with the following symptom charts. The following list of conditions are typical transmission concerns:

DIAGNOSIS AND TESTING > MANUAL TRANSMISSION > SYMPTOM CHART: MANUAL TRANSMISSION

Diagnostics in this service information assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

Symptom	Possible Sources	Action
Transmission difficult to shift when cold	Normal Condition	Excessive force to select gears when the transmission is cold is a normal condition. Test drive the vehicle to see if the condition is still present when it warms up.
Transmission difficult to shift	Lubricant	ADD or DRAIN and FILL with specified lubricant. REFER to: Transmission Draining and Filling .
Internal shift mechanism		CHECK the internal shift mechanism for smooth operation. REPAIR or INSTALL a new mechanism as necessary.
Sliding gears, synchronizers		CHECK for free movement of gears and synchronizers. REPAIR or INSTALL new components as necessary.

Housings, shaft		CHECK for binding condition between the input shaft and the engine crankshaft pilot bearing or bushing. REPAIR or INSTALL new components as necessary. REFER to: Pilot Bearing .
Loose pressure plate to flywheel bolts		CHECK for loose bolts at the pressure plate. INSTALL new components as necessary. REFER to: Clutch Disc and Pressure Plate - 2.3L EcoBoost (201kW/273PS) . REFER to: Clutch Disc and Pressure Plate - 3.7L Duratec (227kW/301PS) . REFER to: Clutch Disc and Pressure Plate - 5.0L 32V Ti-VCT .
Transmission will not shift - gearshift lever moves	Gearshift lever damaged	INSTALL a new gearshift lever. REFER to: Gearshift Lever .
Damaged or worn selector arm. Loose shift rail bushings		CHECK the internal shift components. INSTALL new component as necessary.
Damaged or offset lever plate		CHECK the internal shift components. INSTALL new component as necessary.
NOTE: While verifying the condition, determine whether the noise is gear rollover noise, release bearing rub or some other transmission-related noise. Gear rollover noise, inherent in manual transmissions, is caused by the constant mesh of gears turning at the engine idle speed while the clutch is engaged and the transmission is in NEUTRAL. Release bearing rub is sometimes mistaken for mainshaft bearing noise. Gear rollover noise will disappear when the clutch is disengaged or when the transmission is engaged in gear. Release bearing rub will disappear when the clutch is	Lubricant	ADD or DRAIN and FILL with specified lubricant. REFER to: Transmission Draining and Filling .

engaged. In the event that a bearing is damaged, the noise is more pronounced while engaged in gear under load or coast than in NEUTRAL.		
Noisy in forward gears		
Components grounding out on the transmission		CHECK for screws and bolts of body or other components grounding out. CORRECT as necessary.
Components housing bolts		CHECK the torque on the transmission-to-flywheel housing bolts and the flywheel housing-to-engine block bolts. TIGHTEN the bolts to specification.
Bearings or gears		INSPECT the bearings. INSPECT the gears and gear teeth for wear or damage. INSTALL new components as necessary.
Axle howl or whine		The MT82 transmission may be suspect of a gear whine noise, which seems to be emanating from the rear of the vehicle at or in excess of 80 km/h (50 mph) at full operating temperature. Drive the vehicle at customer complaint speeds in 5th gear (this is the direct gear) to eliminate manual transmission as noise source, reach full operating temperature and confirm if noise is still present. REFER to: Suspension System .
Gears clash when shifting from one forward gear to another	Pilot bearing	CHECK for a binding condition between the input shaft and the engine crankshaft pilot bearing. INSTALL new components as necessary. REFER to: Pilot Bearing .
Gear teeth and/or synchronizer		REPAIR or INSTALL new components as necessary.
Damaged shift forks or worn shift fork inserts		INSPECT for wear or damage. INSTALL new components as

		necessary.
Transmission jumps out of gear	Transmission-to-engine mounting bolts	TIGHTEN the bolts to specification.
Crankshaft pilot bearing		INSTALL a new pilot bearing. REFER to: Pilot Bearing .
Internal Damage		INSPECT the synchronizer sleeves for free movement on their hubs. INSPECT the synchronizer blocking rings for widened index slots, rounded clutch teeth and smooth internal surface. CHECK shift forks for worn or loose mounting on shift rails. INSPECT the synchronizer sliding sleeve and the gear clutch teeth for wear or damage. REPAIR or INSTALL a new component as necessary.
Gear teeth		If worn or damaged, INSTALL new gears.
Transmission will not shift into one gear - all others OK	Manual shift linkage	REPAIR or INSTALL new components as necessary.
Backup switch ball		If REVERSE is the problem, CHECK reverse lamp switch for ball frozen in extended position.
Internal components		INSPECT the shift rail and fork system, synchronizer system and the gear clutch teeth for restricted travel. REPAIR or INSTALL new components as necessary.
Transmission is locked in one gear and cannot be shifted out of that gear	Internal components	INSPECT the problem gears, shift rails, forks and the synchronizer for wear or damage. REPAIR as necessary.
Fork on rail or shift rail		CHECK the shift rail interlock system. REPAIR as necessary.
Transmission leaks	Lubricant	CHECK the level and type.
Other component leaking		IDENTIFY leaking fluid as engine, power steering or transmission fluid. REPAIR as necessary.
False report		REMOVE all traces of lube on the exposed transmission surfaces. CHECK the vent for

		free breathing. OPERATE the transmission and INSPECT for new leakage. REPAIR as necessary.
Internal components		INSPECT for leaks at the input shaft seal. INSPECT the case for sand holes or cracks. REPAIR or INSTALL a new case as necessary.
Fill and drain plugs		CHECK fill and drain plugs and bore threads. REPAIR as necessary. TIGHTEN plugs to specified torque value.
Bearing failure	Other part failure Raceways or rollers Lubricant Towing vehicle further than 80 km (50 mi) with driveshaft installed.	REMOVE, DISASSEMBLE and CLEAN the transmission. Inspect for damaged parts and install new components as necessary. (Note: RESET the bearing preload if any new tapered bearings are installed.)
Vibration break-up of retainer and brinelling of races Bearing(s) Shafts or bore Incorrect preload		DETERMINE the cause of vibration and CORRECT. Otherwise, PROCEED as above.
Input shaft oil dam		INSTALL new components as necessary and VERIFY the oil dam installation is correct. CHECK for correct installation of the snap ring on the mainshaft next to the oil dam.
Oil baffle in the input bearing shim pack		INSTALL a new oil baffle, making sure it is not damaged during assembly.

DIAGNOSIS AND TESTING > MANUAL TRANSMISSION > SYMPTOM CHART: NVH

Diagnostics in this service information assume a certain skill level and knowledge of Ford-specific diagnostic practices. REFER to: Diagnostic Methods .

Symptom	Possible Sources	Action
NOTE: NVH symptoms should be identified using the diagnostic tools that are	Gear engagement	Acceptable operating condition. Caused by the contact pattern of these gears.

available. Since it is possible any one of multiple systems may be the cause of a symptom, it may be necessary to use a process of elimination type of diagnostic approach to pinpoint the responsible system. If this is not the causal system for the symptom, check for the next likely system and continue diagnosis.		
Transmission rattle noise - noise occurs at 1st and 2nd gear on light acceleration.		
Transmission rattling/clattering noise - occurs in NEUTRAL or in gear, at idle	Incorrect fluid level or fluid quality	COMPARE with other like vehicles. CHECK that the transmission is filled to the correct level and with the specified fluid. REFER to: Transmission Fluid Level Check .
Transmission rattling/clattering noise - noise at idle in NEUTRAL	Worn or rough reverse idler gear	CHECK the reverse idler gear. REPAIR as necessary.
Excessive backlash in gears		CHECK the gear backlash. ADJUST as necessary.
Worn countershaft gears		REPAIR as necessary.
Transmission whine - a mild whine at extreme speeds or high rpm	Rotating gears/geartrain	Acceptable noise.
Transmission whine - a high pitched whine, also described as a squeal	Transmission gears are worn (high mileage vehicle)	Result of normal gear wear. REPAIR as necessary.
Mismatched gear sets		INSPECT the gear sets for an uneven wear pattern on the face of the gear teeth. REPAIR as necessary.
Damaged or worn transmission bearing		INSPECT the transmission bearings. INSTALL new bearings as necessary.
Transmission growling/humming - noise occurs in the forward gears. The noise is more prominent when the gear is loaded. The problem gear can be located as the noise occurs in a specific gear position	Gear is cracked, chipped or rough	INSPECT the transmission gears for damage or wear. INSTALL new gears as necessary.

Axle howl or whine		The MT82 transmission may be suspect of a gear whine noise, which seems to be emanating from the rear of the vehicle at or in excess of 80 km/h (50 mph) at full operating temperature. Drive the vehicle at customer complaint speeds in 5th gear (this is the direct gear) to eliminate manual transmission as noise source, reach full operating temperature and confirm if noise is still present. REFER to: Suspension System . If noise is not present, proceed with gear noise analysis.
Transmission hissing - noise in NEUTRAL or in forward gears. As bearings wear or break up, the noise changes to a thumping noise	Damaged or worn bearings	INSPECT the transmission bearings. INSTALL new bearings as necessary.
Transmission knocking/thudding - noise at low speeds in forward gears	Bearings with damaged balls or rollers or with pitted and spalled races	INSPECT the transmission bearings. INSTALL new bearings as necessary.
Transmission growling/humming - noise occurs in the forward gears. The noise is more prominent when the gear is loaded. The problem gear can be located as the noise occurs in a specific gear position *Transmission rumble/growl - noise at higher speeds in forward gears, more pronounced in a coast/deceleration condition	Incorrect driveline angle	CHECK the driveline angle. REPAIR as necessary. REFER to: Driveshaft .
Driveshaft out of balance or damaged		CHECK the driveshaft for damage, missing balance weights or undercoating. REFER to the driveshaft runout and balance test. REFER to: Driveshaft .
Axle howl or whine		The MT82 transmission may be suspect of a gear whine noise, which seems to be emanating from the rear of the vehicle at or in excess of 80 km/h (50 mph) at full operating temperature. Drive the vehicle at customer complaint speeds in 5th gear (this is the direct

		gear) to eliminate manual transmission as noise source, reach full operating temperature and confirm if noise is still present. REFER to: Suspension System . If noise is not present, proceed with gear noise analysis.
Transmission rumble/growl - noise at all speeds in forward gears, more pronounced in a heavy acceleration condition	Damaged or worn transmission bearing or gears (high mileage vehicles)	CHECK transmission fluid for excessive metal particles. REPAIR as necessary.

GENERAL PROCEDURES > TRANSMISSION FLUID LEVEL CHECK

Special Tool(s) / General Equipment

Fluid Suction Gun

Materials

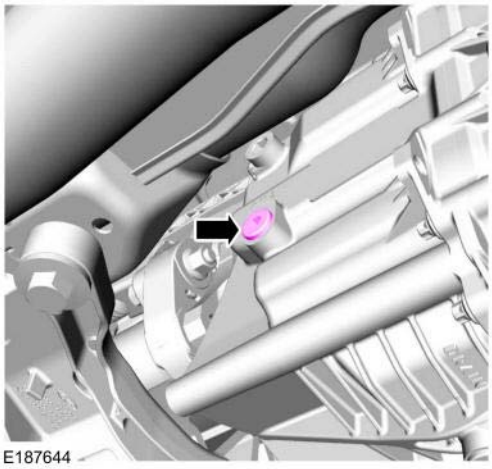
Name	Specification
Motorcraft® Dual Clutch Transmission Fluid XT-11-QDC	WSS-M2C200-D2

NOTE: Make sure that the vehicle is level.

1.
Refer to: Jacking and Lifting - Overview .

2.

Remove the fill plug.



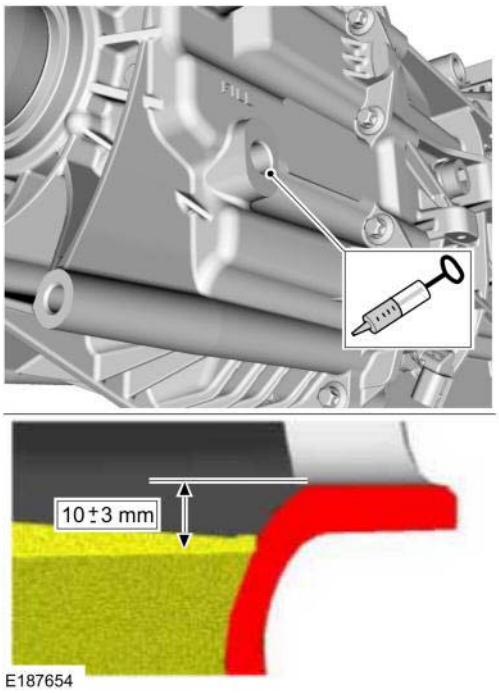
3.

Add or remove transmission fluid as necessary. Refer to: Specifications .

Use the General Equipment: Fluid Suction Gun

Material

: Motorcraft® Dual Clutch Transmission Fluid / XT-11-QDC (WSS-M2C200-D2)

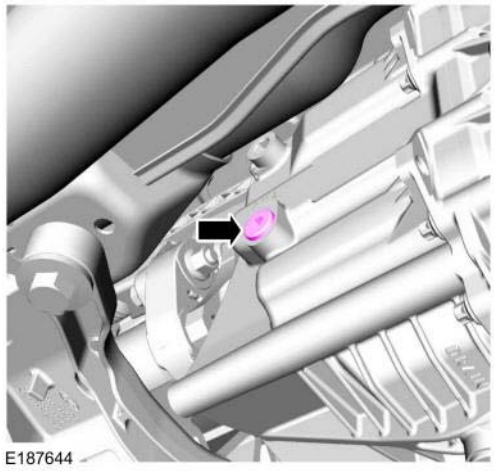


4.

Install the fill plug.

Torque

: 26 lb.ft (35 Nm)



GENERAL PROCEDURES > TRANSMISSION DRAINING AND FILLING

Special Tool(s) / General Equipment

Fluid Suction Gun

Materials

Name	Specification
Motorcraft® Dual Clutch Transmission Fluid XT-11-QDC	WSS-M2C200-D2

NOTE: Make sure that the vehicle is level.

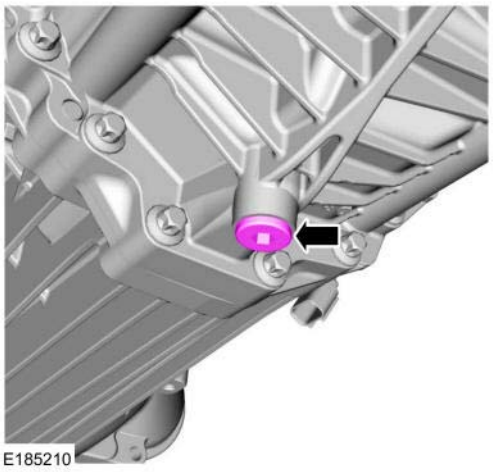
1.
Refer to: Jacking and Lifting - Overview .

2.

Remove the drain plug and drain the transmission fluid.

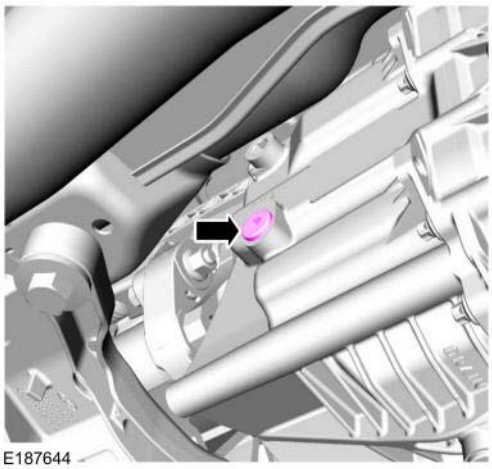
Torque

: 26 lb.ft (35 Nm)



3.

Remove the fill plug.



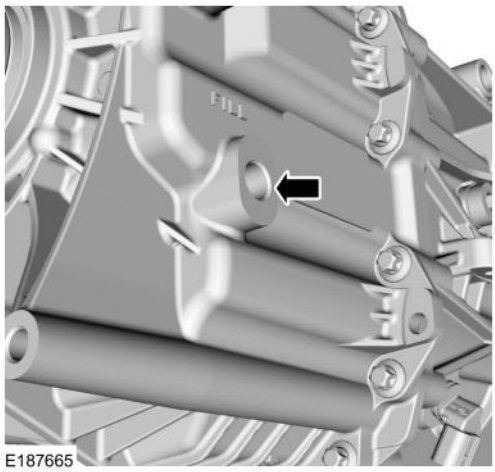
4.

Fill the transmission. Refer to: Specifications).

Use the General Equipment: Fluid Suction Gun

Material

: Motorcraft® Dual Clutch Transmission Fluid / XT-11-QDC (WSS-M2C200-D2)

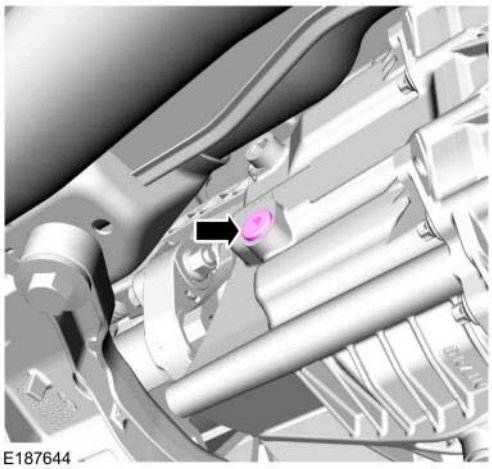


5.

Install the fill plug.

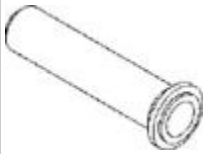
Torque

: 26 lb.ft (35 Nm)



REMOVAL AND INSTALLATION > INPUT SHAFT SEAL - 2.3L ECOBOOST (201KW 273PS)

Special Tool(s) / General Equipment

	308-375 Remover, Input Shaft Seal TKIT-1999-F/FLM/LT TKIT-2005U-M
	308-806 Installer, Front Seal TKIT-2010A-F TKIT-2010A-LM TKIT-2010A-ROW
	308-937 Installer, Input Shaft Seal TKIT-2014D-FL_ROW TKIT-2014D-ROW2
Slide Hammer	

REMOVAL AND INSTALLATION > INPUT SHAFT SEAL - 2.3L ECOBOOST (201KW 273PS) > REMOVAL

1.

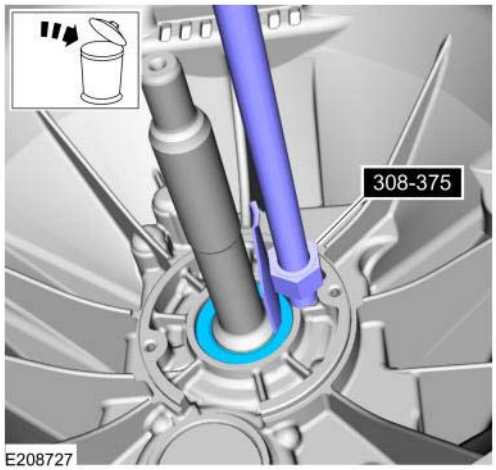
Remove the clutch slave cylinder. Refer to: Clutch Slave Cylinder .

2.

Using the special tools, remove and discard the input shaft seal.

Use Special Service Tool: 308-375 Remover, Input Shaft Seal.

Use the General Equipment: Slide Hammer

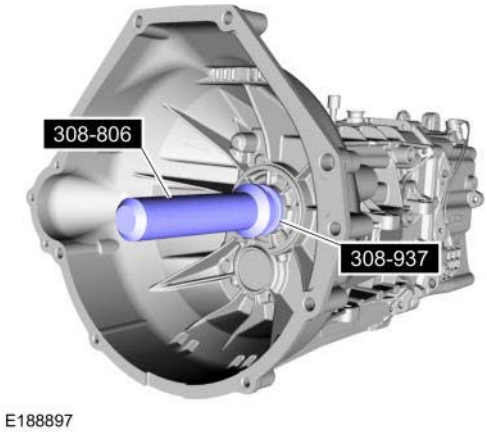


REMOVAL AND INSTALLATION > INPUT SHAFT SEAL - 2.3L ECOBOOST (201KW 273PS) > INSTALLATION

1.

Using the special tools, install the input shaft seal.

Use Special Service Tool: 308-806 Installer, Front Seal, 308-937 Installer, Input Shaft Seal.

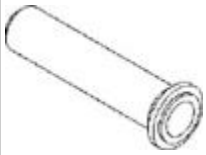


2.

Install the clutch slave cylinder. Refer to: Clutch Slave Cylinder .

REMOVAL AND INSTALLATION > INPUT SHAFT SEAL - 3.7L DURATEC (227KW 301PS)

Special Tool(s) / General Equipment

	308-375 Remover, Input Shaft Seal TKIT-1999-F/FLM/LT TKIT-2005U-M
	308-806 Installer, Front Seal TKIT-2010A-FT KIT-2010A-LM TKIT-2010A-ROW
Slide Hammer	

REMOVAL AND INSTALLATION > INPUT SHAFT SEAL - 3.7L DURATEC (227KW 301PS) > REMOVAL

1.

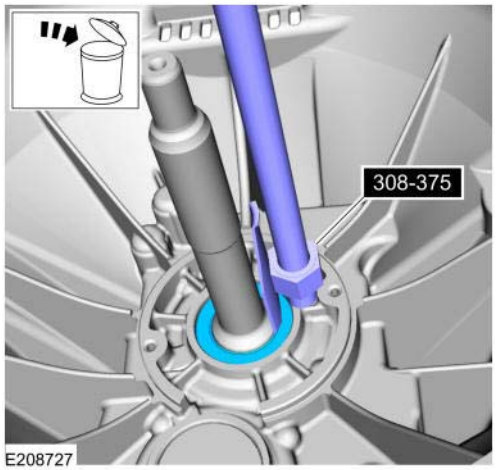
Remove the clutch slave cylinder. Refer to: Clutch Slave Cylinder .

2.

Using the special tools, remove and discard the input shaft seal.

Use Special Service Tool: 308-375 Remover, Input Shaft Seal.

Use the General Equipment: Slide Hammer

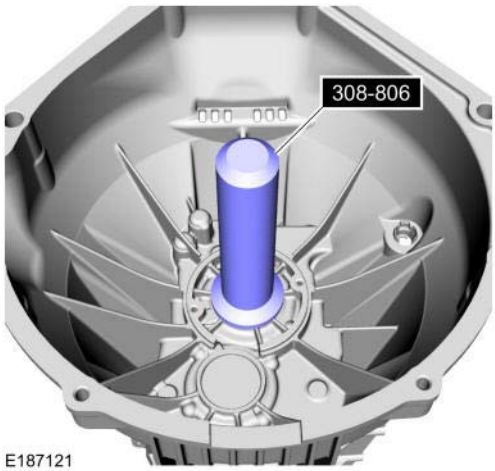


REMOVAL AND INSTALLATION > INPUT SHAFT SEAL - 3.7L DURATEC (227KW 301PS) > INSTALLATION

1.

Using the special tools, install the input shaft seal.

Use Special Service Tool: 308-806 Installer, Front Seal.

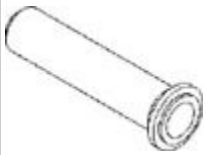


2.

Install the clutch slave cylinder. Refer to: Clutch Slave Cylinder .

REMOVAL AND INSTALLATION > INPUT SHAFT SEAL - 5.0L 32V TI-VCT

Special Tool(s) / General Equipment

 308-375	308-375 Remover, Input Shaft Seal TKIT-1999-F/FLM/LT TKIT-2005U-M
	308-806 Installer, Front Seal TKIT-2010A-F TKIT-2010A-LM TKIT-2010A-ROW
Slide Hammer	

REMOVAL AND INSTALLATION > INPUT SHAFT SEAL - 5.0L 32V TI-VCT > REMOVAL

1.

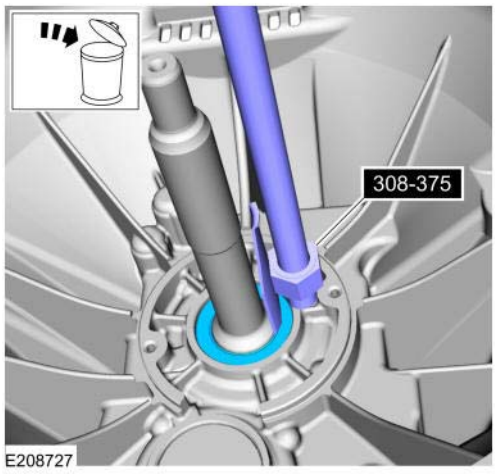
Remove the clutch slave cylinder. Refer to: Clutch Slave Cylinder .

2.

Using the special tools, remove and discard the input shaft seal.

Use Special Service Tool: 308-375 Remover, Input Shaft Seal.

Use the General Equipment: Slide Hammer

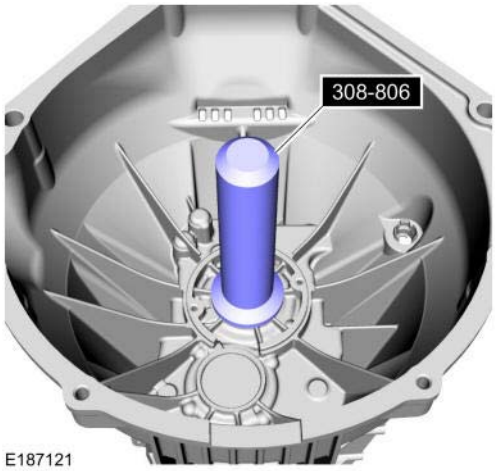


REMOVAL AND INSTALLATION > INPUT SHAFT SEAL - 5.0L 32V TI-VCT > INSTALLATION

1.

Using the special tools, install the input shaft seal.

Use Special Service Tool: 308-806 Installer, Front Seal.



2.

Install the clutch slave cylinder. Refer to: Clutch Slave Cylinder .

REMOVAL AND INSTALLATION > OUTPUT SHAFT SEAL

Special Tool(s) / General Equipment

 E133913	205-153 (T80T-4000-W) Handle
	308-808 Installer, Rear Flange TKIT-2010A-F TKIT-2010A-LM TKIT-2010A-ROW
	308-809 Installer, Syncro Gear Pack TKIT-2010A-ROW
	308-811 Installer, Rear Seal TKIT-2010A-F TKIT-2010A-LM TKIT-2010A-ROW
 E188623	308-938 Remover/Installer, Companion Flange Nut TKIT-2014D-FL_ROW TKIT-2014D-ROW2
Transmission Jack	
Two Leg Puller	

Materials

Name	Specification
Threadlock 262 TA-26	WSK-M2G351-A6

REMOVAL AND INSTALLATION > OUTPUT SHAFT SEAL > REMOVAL

1.

Remove the driveshaft. Refer to: Driveshaft .

2.

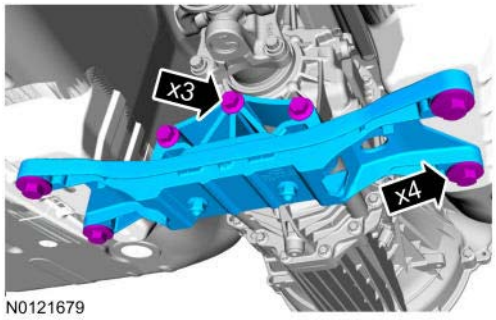
Support the transmission with a transmission jack and secure it with a safety strap.

Use the General Equipment: Transmission Jack

3.

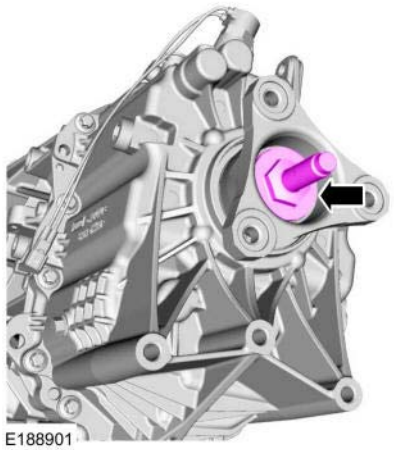
Remove the bolts and remove transmission support insulator and crossmember.

Use the General Equipment: Transmission Jack



4.

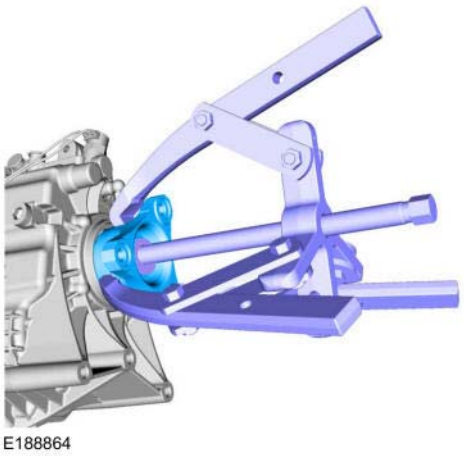
Remove the output shaft flange bolt.



5.

Remove the output shaft flange.

Use the General Equipment: Two Leg Puller


E188864

6.

Remove and discard the output shaft seal.

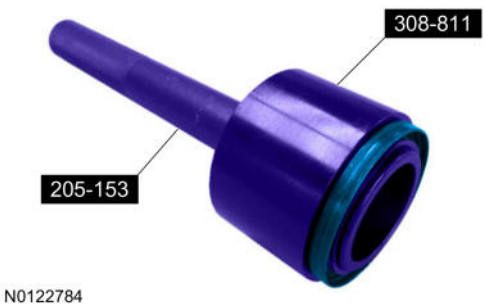

N0122881

REMOVAL AND INSTALLATION > OUTPUT SHAFT SEAL > INSTALLATION

1.

Install a new seal on the special tools.

Use Special Service Tool: 205-153 (T80T-4000-W) Handle, 308-811 Installer, Rear Seal.

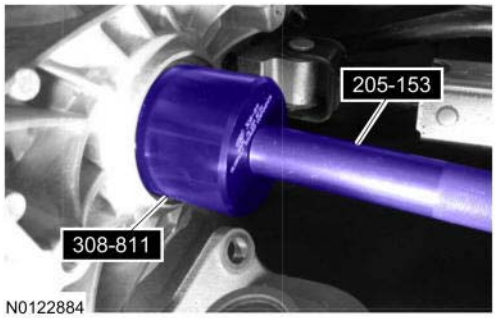


N0122784

2.

Using the special tools, install a new seal.

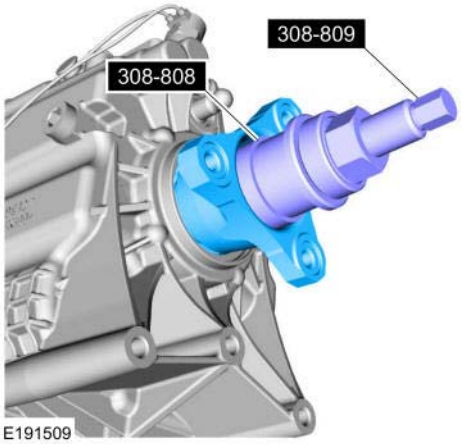
Use Special Service Tool: 205-153 (T80T-4000-W) Handle, 308-811 Installer, Rear Seal.



3.

Using the special tools, install the output shaft flange.

Use Special Service Tool: 308-808 Installer, Rear Flange, 308-809 Installer, Syncro Gear Pack.



4.

Install the special tools. Clean the threads on the output shaft bolt and apply one dot of thread locking adhesive to the lower end of the output shaft bolt threads. Using the special tools, install the output shaft flange bolt.

Use Special Service Tool: 308-938 Remover/Installer, Companion Flange Nut.

Material

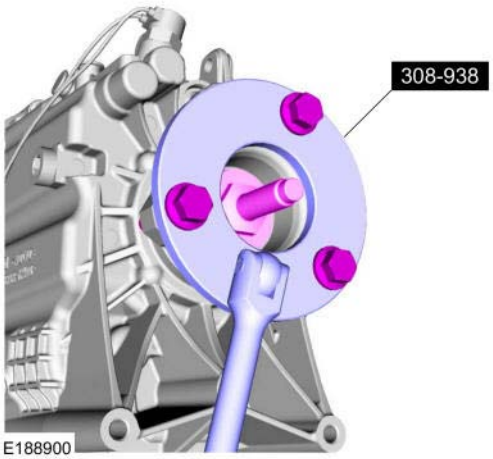
: Threadlock 262 / TA-26 (WSK-M2G351-A6)

Torque:

Stage 1: 148 lb.ft (200 Nm)

Stage 2: Loosen: 5 turn(s)

Stage 3: 133 lb.ft (180 Nm)



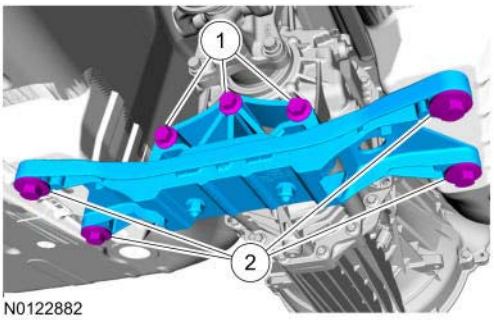
5.

Install the transmission support insulator and crossmember and install the bolts.

Torque:

1: 76 lb.ft (103 Nm)

2: 46 lb.ft (63 Nm)



6.

Install the driveshaft. Refer to: Driveshaft .

REMOVAL AND INSTALLATION > TRANSMISSION SUPPORT INSULATOR

Special Tool(s) / General Equipment

Transmission Jack
Retaining Strap

REMOVAL AND INSTALLATION > TRANSMISSION SUPPORT INSULATOR >

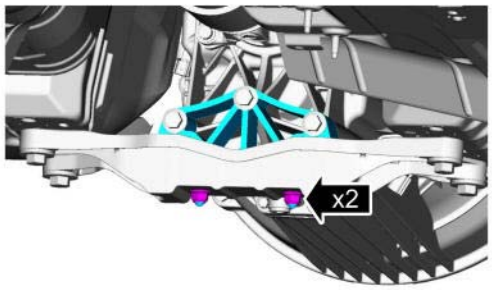
REMOVAL

1.

With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

2.

Remove the transmission support insulator nuts.



E187195

3.

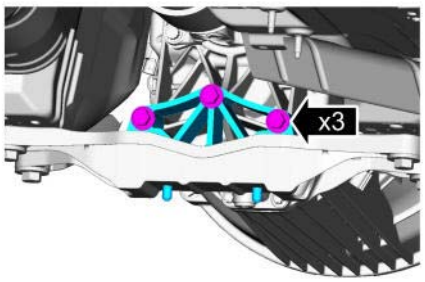
Support the transmission with a transmission jack. Secure the transmission to the transmission jack.

Use the General Equipment: Transmission Jack

Use the General Equipment: Retaining Strap

4.

Remove the transmission support insulator bolts and the transmission support insulator.



E187196

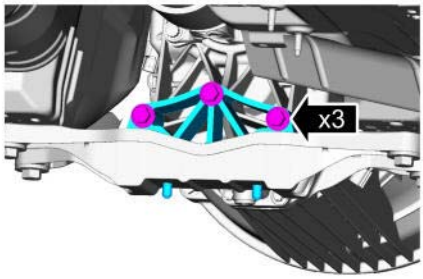
REMOVAL AND INSTALLATION > TRANSMISSION SUPPORT INSULATOR > INSTALLATION

1.

Install the transmission support insulator and the bolts.

Torque

: 76 lb.ft (103 Nm)



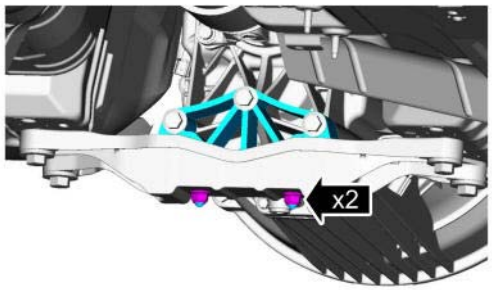
E187196

2.

Install the transmission support insulator nuts.

Torque

: 52 lb.ft (70 Nm)



E187195

REMOVAL AND INSTALLATION > VEHICLE SPEED SENSOR (VSS) > REMOVAL

1.

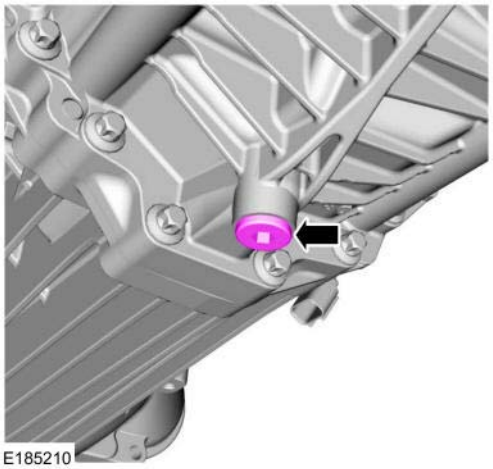
With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

2.

Remove the drain plug and drain the transmission fluid.

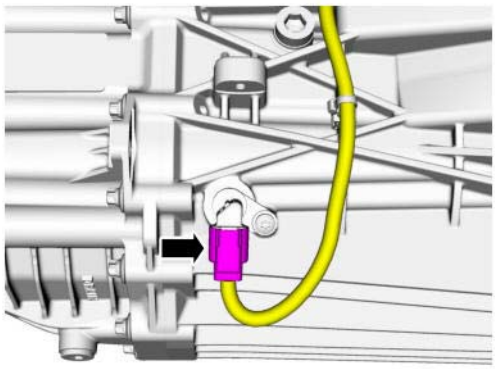
Torque

: 26 lb.ft (35 Nm)


E185210

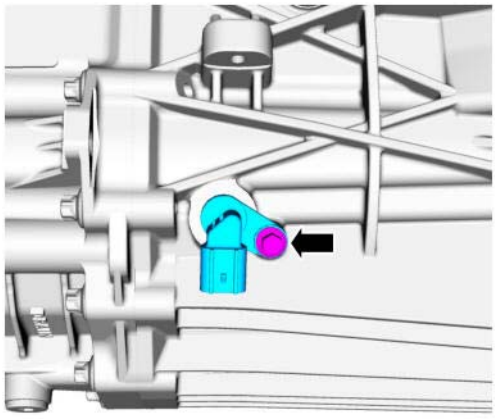
3.

Disconnect the VSS electrical connector.


E187192

4.

Remove the VSS bolt and the VSS.


E187193

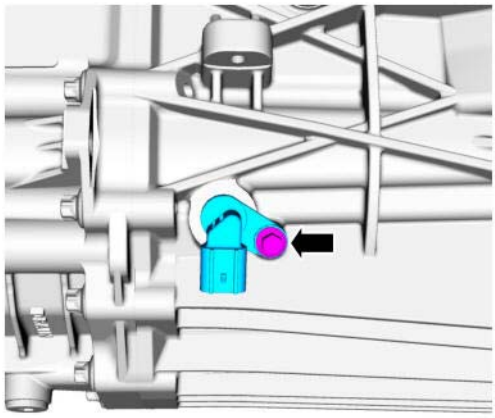
REMOVAL AND INSTALLATION > VEHICLE SPEED SENSOR (VSS) > INSTALLATION

1.

Install the VSS and the VSS bolt.

Torque

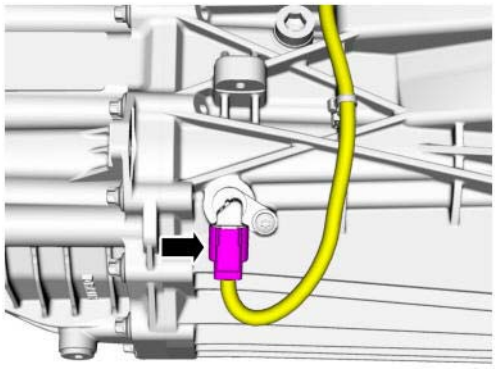
: 89 lb.in (10 Nm)



E187193

2.

Connect the VSS electrical connector.



E187192

3.

Fill the transmission. Refer to: Transmission Fluid Drain and Refill .

REMOVAL > TRANSMISSION - 2.3L ECOBOOST (201KW 273PS)

Special Tool(s) / General Equipment

Transmission Jack

WARNING: Do not breathe dust or use compressed air to blow dust from storage containers or friction components. Remove dust using government-approved techniques. Friction component dust may be a cancer and lung disease hazard. Exposure to potentially hazardous components may occur if dusts are created during repair of friction components, such as brake pads and clutch discs. Exposure may also cause irritation to skin, eyes and respiratory tract, and may cause allergic reactions and/or may lead to other chronic health effects. If irritation persists, seek medical attention or advice. Failure to follow these instructions may result in serious personal injury.

1.

Disconnect the battery. Refer to: Battery Disconnect and Connect .

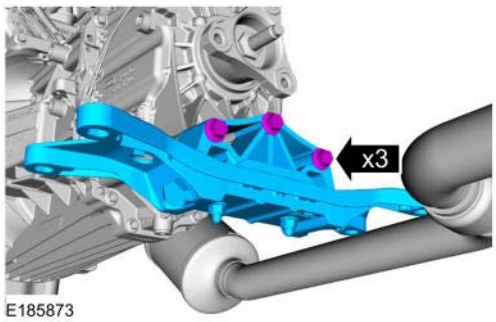
NOTE: Support the transmission with a transmission jack for gearshift lever removal.

2.
Remove the gearshift lever. Refer to: Gearshift Lever .

Use the General Equipment: Transmission Jack

3.

Remove the bolts and remove the transmission support insulator and crossmember from the back of the transmission.

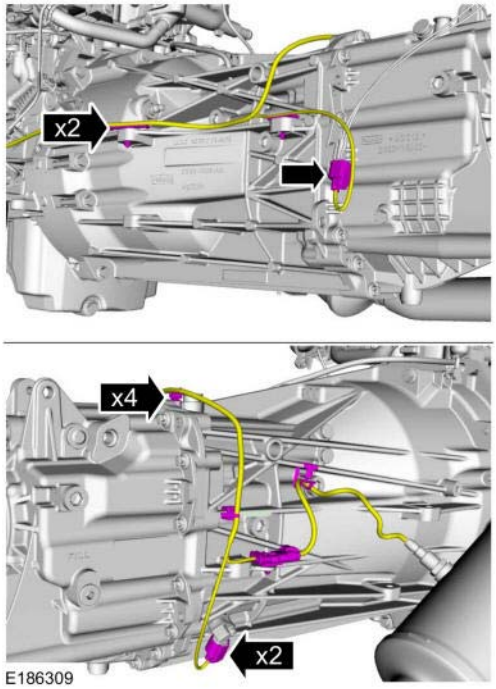


4.

Remove the starter motor. Refer to: STARTER MOTOR .

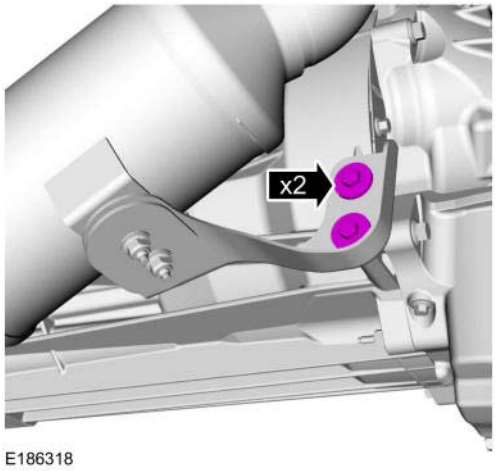
5.

Disconnect the electrical connectors and the wiring retainers and position the vehicle wiring harness aside.



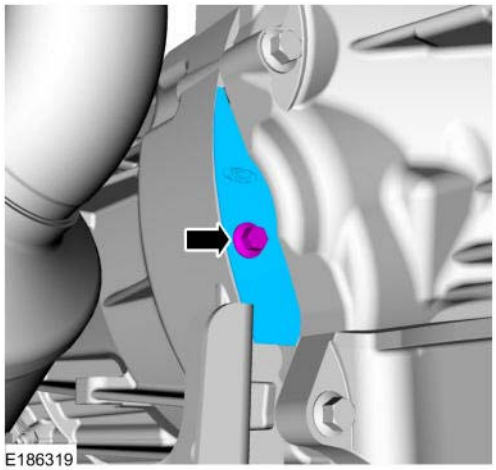
6.

Remove the catalytic converter support bracket bolts.



7.

Remove the bolt and the inspection cover.

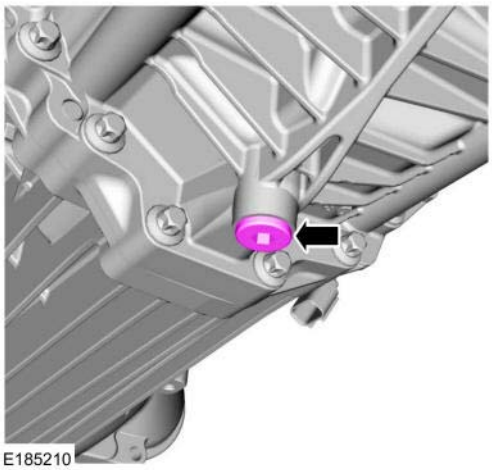


NOTE: If disassembly of the transmission is required, drain the transmission fluid.

8.
Remove the drain plug and drain the transmission fluid.

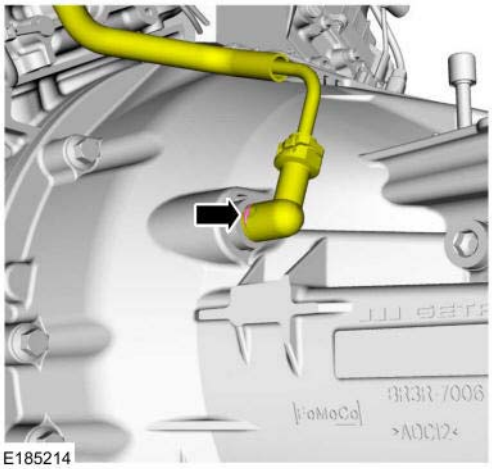
Torque

: 26 lb.ft (35 Nm)



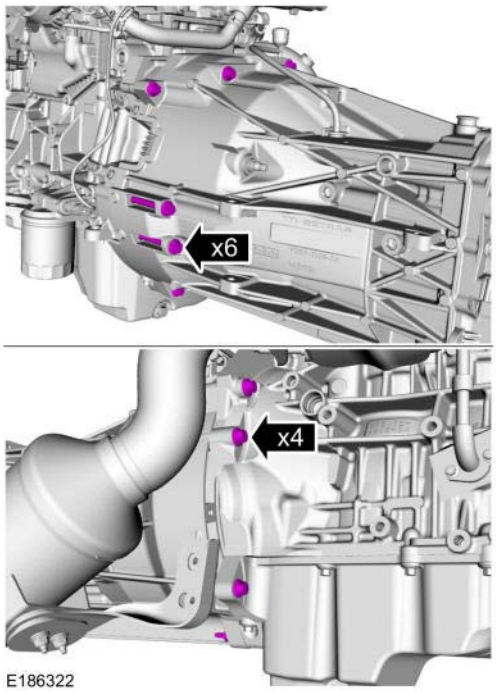
9.

Remove the retainer and disconnect the hydraulic tube from the clutch master cylinder.



NOTE: Secure the transmission with a safety strap to the transmission jack.

10.
Remove the bellhousing bolts, pull the transmission back to remove the input shaft from the clutch, lower the transmission and remove it from the vehicle.



REMOVAL > TRANSMISSION - 3.7L DURATEC (227KW 301PS)

Special Tool(s) / General Equipment

Transmission Jack

WARNING: Do not breathe dust or use compressed air to blow dust from storage containers or friction components. Remove dust using government-approved techniques. Friction component dust may be a cancer and lung disease hazard. Exposure to potentially hazardous components may occur if dusts are created during repair of friction components, such as brake pads and clutch discs. Exposure may also cause irritation to skin, eyes and respiratory tract, and may cause allergic reactions and/or may lead to other chronic health effects. If irritation persists, seek medical attention or advice. Failure to follow these instructions may result in serious personal injury.

1.

Disconnect the battery. Refer to: Battery Disconnect and Connect .

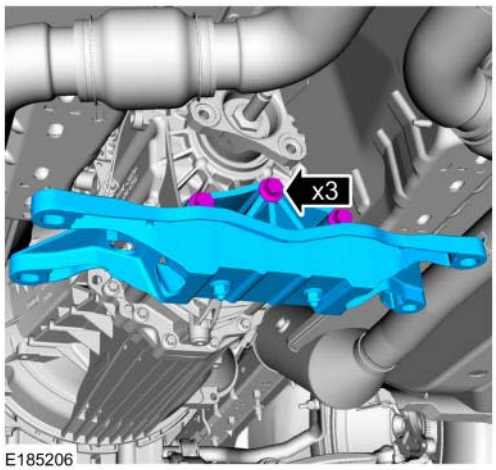
NOTE: Support the transmission with a transmission jack for gearshift lever removal.

2.
Remove the gearshift lever. Refer to: Gearshift Lever .

Use the General Equipment: Transmission Jack

3.

Remove the bolts and remove the transmission support insulator and crossmember from the back of the transmission.

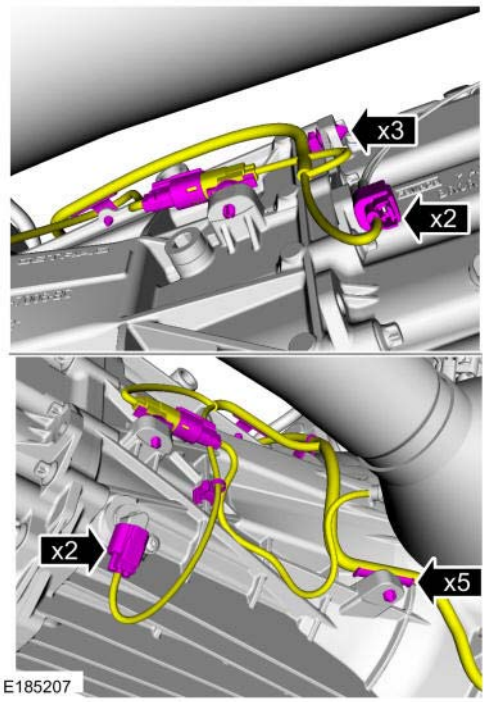


4.

Remove the starter motor. Refer to: STARTER MOTOR .

5.

Disconnect the electrical connectors and the wiring retainers and position the vehicle wiring harness aside.

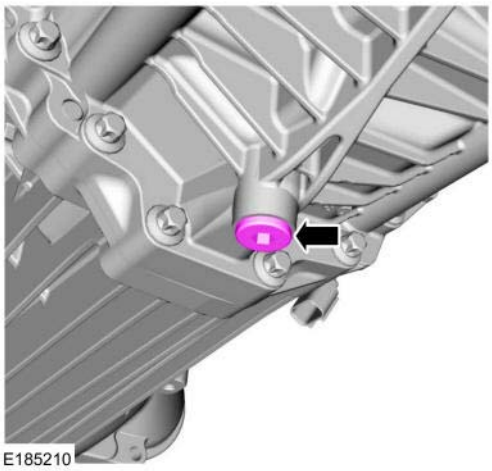


NOTE: If disassembly of the transmission is required, drain the transmission fluid.

6.
Remove the drain plug and drain the transmission fluid.

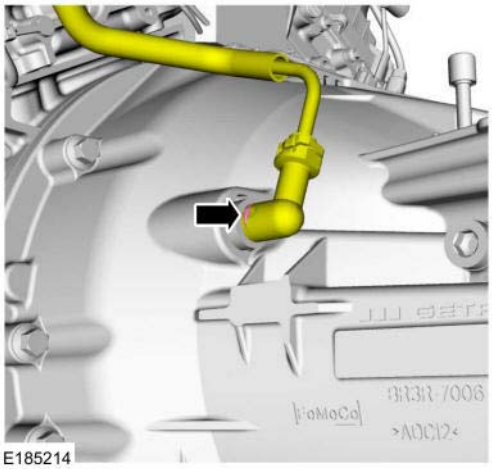
Torque

: 26 lb.ft (35 Nm)



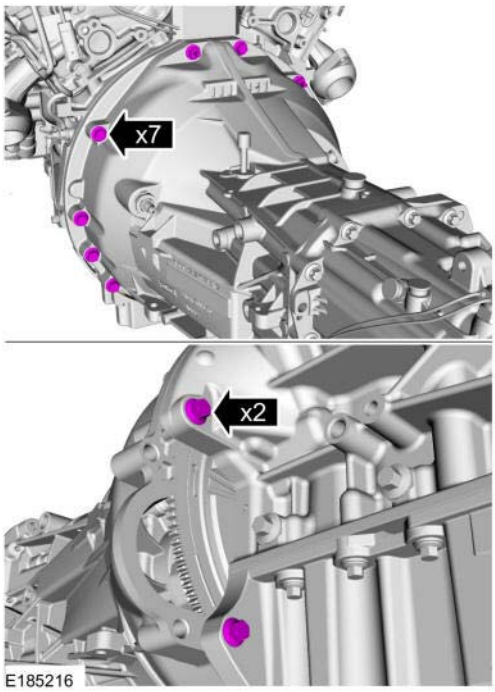
7.

Remove the retainer and disconnect the hydraulic tube from the clutch master cylinder.



NOTE: Secure the transmission with a safety strap to the transmission jack.

8.
Remove the bellhousing bolts, pull the transmission back to remove the input shaft from the clutch, lower the transmission and remove it from the vehicle.



REMOVAL > TRANSMISSION - 5.0L 32V TI-VCT

Special Tool(s) / General Equipment

Transmission Jack

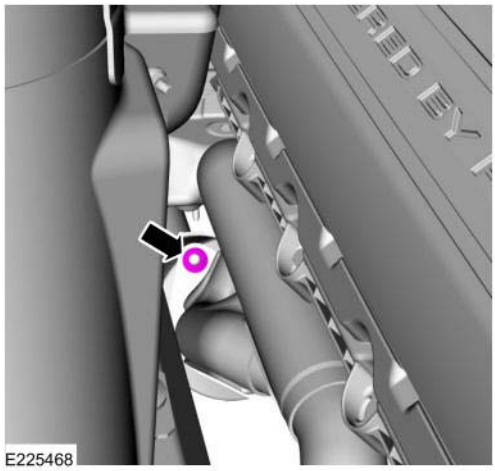
WARNING: Do not breathe dust or use compressed air to blow dust from storage containers or friction components. Remove dust using government-approved techniques. Friction component dust may be a cancer and lung disease hazard. Exposure to potentially hazardous components may occur if dusts are created during repair of friction components, such as brake pads and clutch discs. Exposure may also cause irritation to skin, eyes and respiratory tract, and may cause allergic reactions and/or may lead to other chronic health effects. If irritation persists, seek medical attention or advice. Failure to follow these instructions may result in serious personal injury.

1.

Disconnect the battery. Refer to: Battery Disconnect and Connect .

2.

Remove the upper RH catalytic converter nut.



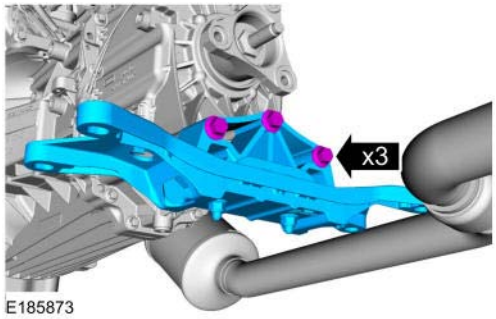
NOTE: Support the transmission with a transmission jack for gearshift lever removal.

3.
Remove the gearshift lever. Refer to: Gearshift Lever .

Use the General Equipment: Transmission Jack

4.

Remove the bolts and remove the transmission support insulator and crossmember from the back of the transmission.



5.

Remove the starter motor. Refer to: STARTER MOTOR .

6.

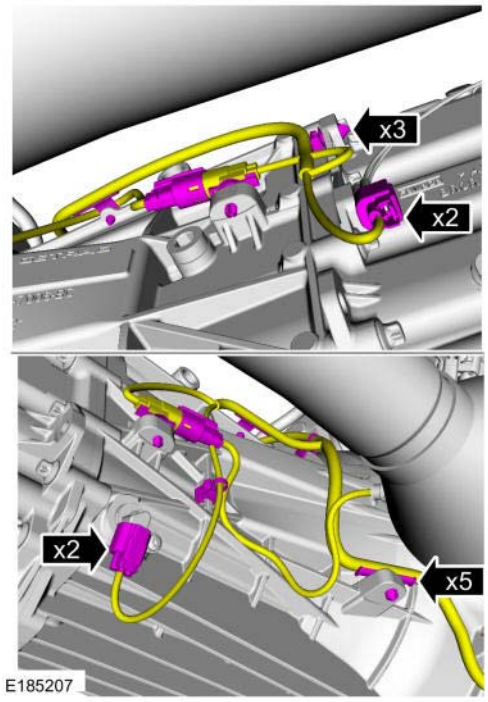
Remove the RH catalytic converter. Refer to: CATALYTIC CONVERTER RH .

7.

Remove the LH HO2S and the catalyst monitor. Refer to: HEATED OXYGEN SENSOR (HO2S) . Refer to: CATALYST MONITOR SENSOR .

8.

Disconnect the electrical connectors and the wiring retainers and position the vehicle wiring harness aside.

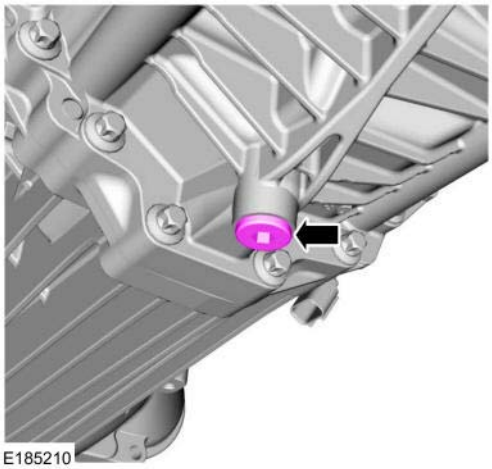


NOTE: If disassembly of the transmission is required, drain the transmission fluid.

9.
Remove the drain plug and drain the transmission fluid.

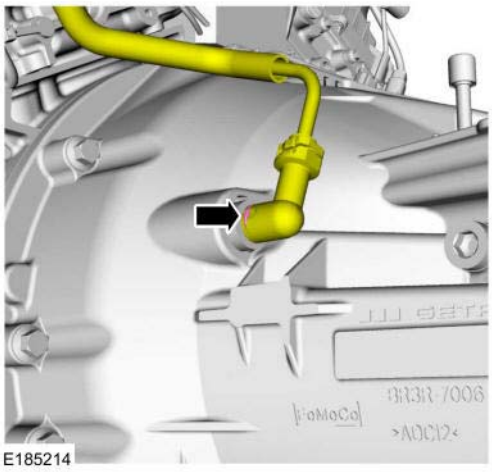
Torque

: 26 lb.ft (35 Nm)



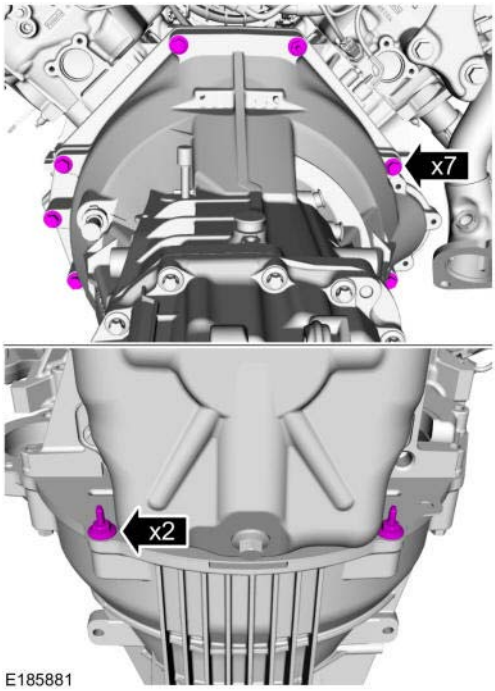
10.

Remove the retainer and disconnect the hydraulic tube from the clutch master cylinder.



NOTE: Secure the transmission with a safety strap to the transmission jack.

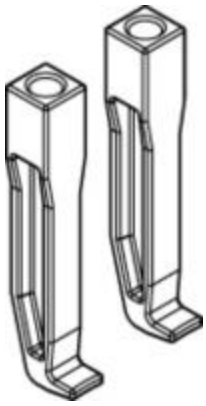
11.
Remove the bellhousing bolts, pull the transmission back to remove the input shaft from the clutch, lower the transmission and remove it from the vehicle.



DISASSEMBLY > TRANSMISSION - 2.3L ECOBOOST (201KW 273PS)

Special Tool(s) / General Equipment

	205-153 (T80T-4000-W) Handle
	307-003 (T57L-500-B) Holding Fixture, Transmission
	308-130 (T87T-7025-DH) Installer, Shift Rail Needle Bearing TKIT-1987-FLMH
	308-375 Remover, Input Shaft Seal TKIT-1999-F/FLM/LT TKIT-2005U-M

	308-810 Remover, Syncro Gear Pack TKIT-2010A-F TKIT-2010A-LM TKIT-2010A-ROW
 E216591	308-812 Remover, Detent TKIT-2010A-F TKIT-2010A-LM TKIT-2010A-ROW
 E188623	308-938 Remover/Installer, Companion Flange Nut TKIT-2014D-FL_ROW TKIT-2014D-ROW2
Slide Hammer Dent Puller	
Slide Hammer	
Three Leg Puller	
Hydraulic Press	
Center Punch	
Two Leg Puller	
Locking Pliers	

WARNING: Do not breathe dust or use compressed air to blow dust from storage containers or friction components. Remove dust using government-approved techniques. Friction component dust may be a cancer and lung disease hazard. Exposure to potentially hazardous components may occur if dusts are created during repair of friction components, such as brake pads and clutch discs. Exposure may also cause irritation to skin, eyes and respiratory tract, and may cause allergic reactions and/or may lead to other chronic health effects. If irritation persists, seek medical attention or advice. Failure to follow these instructions may result in serious personal injury.

1.

YouTube	A multimedia supplement to the instructions contained in this article is available. To view the multimedia example of the condition described go to; **http://www.youtube.com/user/Mitchell1Tips then type, "A00680083" into the "Search Channel" box.**

2.

Clean the transmission exterior with solvent and dry with compressed air. During disassembly, clean all components with solvent and dry with compressed air.

3.

Attach the transmission to the special tool.

Use Special Service Tool: 307-003 (T57L-500-B) Holding Fixture, Transmission.



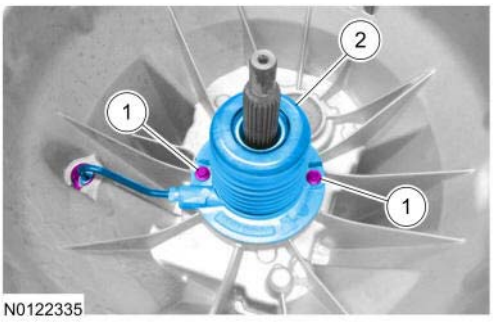
4.

1.

Remove the slave cylinder bolts.

2.

Pull the clutch slave cylinder outward and release the tube from the retaining clip and if equipped, remove the clutch slave cylinder spacer.



5.

Inspect the clutch slave cylinder for the following:

Damaged boot

Leaking brake fluid

Worn or damaged release bearing

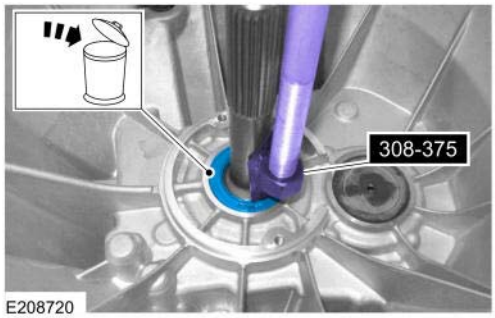
Rotate the release bearing while applying pressure. If the bearing rotation is rough, install a new clutch slave cylinder.

6.

Using the special tools, remove and discard the input shaft seal.

Use Special Service Tool: 308-375 Remover, Input Shaft Seal.

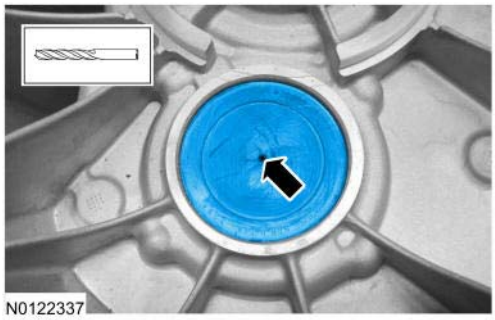
Use the General Equipment: Slide Hammer



7.

Using a center punch, mark a location in the center of the countershaft bolt cover. Using a drill bit of the appropriate size for the dent puller, drill a hole in the center of the countershaft bolt cover. Drill the hole to pierce the countershaft bolt cover approximately 2 mm (0.078 in) in depth.

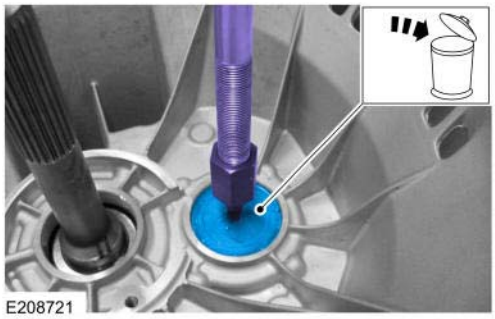
Use the General Equipment: Center Punch



8.

Using the special tool, remove and discard the countershaft bolt cover.

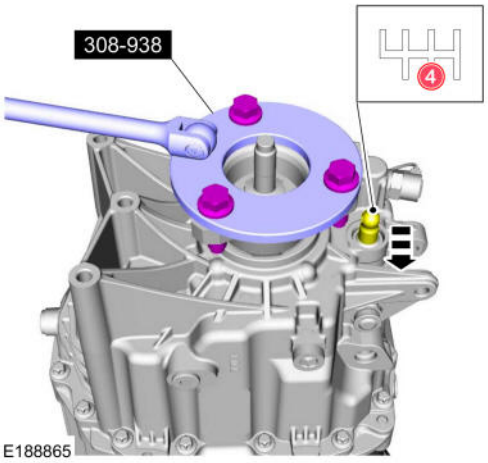
Use the General Equipment: Slide Hammer Dent Puller



9.

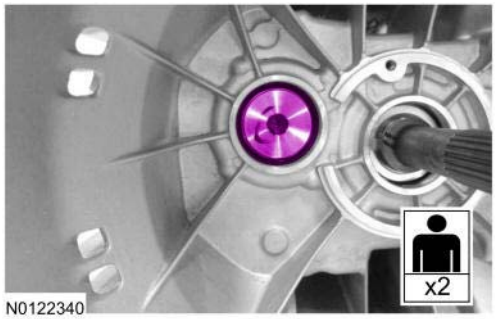
Install the special tools, position the shift shaft into 4th gear.

Use Special Service Tool: 308-938 Remover/Installer, Companion Flange Nut.



10.

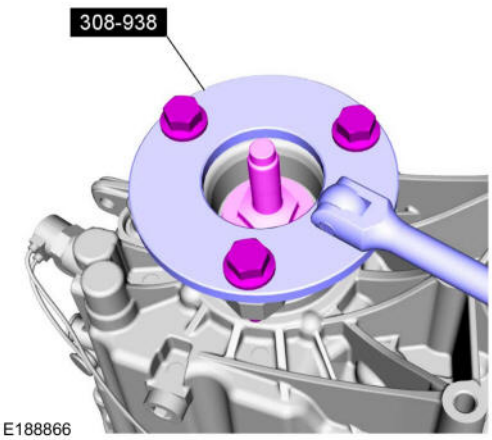
With the help of an assistant, hold the special tools and remove the countershaft bolt.



11.

Using the special tools, hold the output shaft flange and remove the bolt.

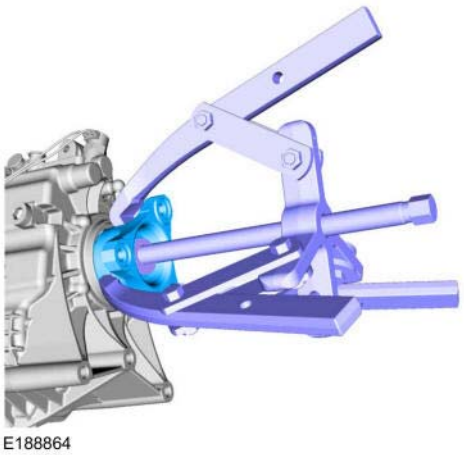
Use Special Service Tool: 308-938 Remover/Installer, Companion Flange Nut.



12.

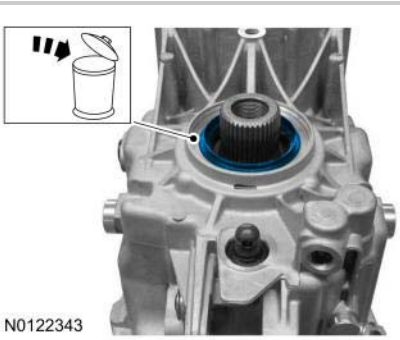
Using the three leg puller and the step plate, remove the output shaft flange.

Use the General Equipment: Three Leg Puller



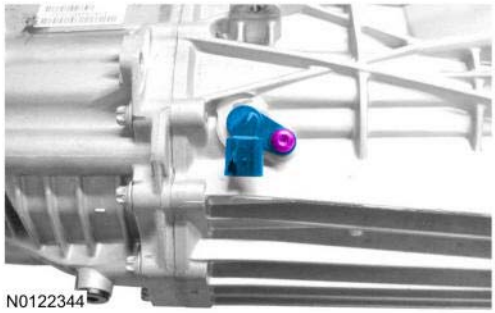
13.

Remove and discard the output shaft seal.



14.

Remove the bolt and the OSS sensor.



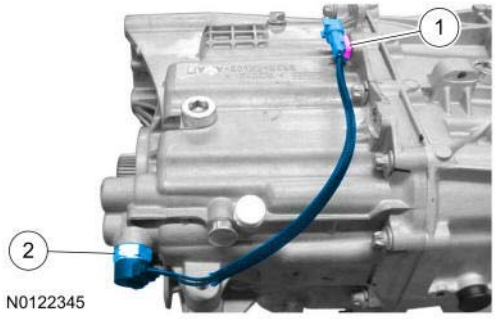
15.

1.

Detach the electrical connector retainer.

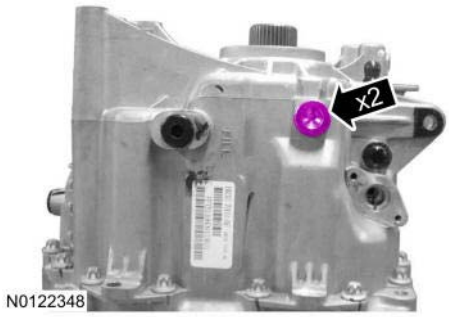
2.

Remove the reverse lamp switch.



16.

Remove the LH and RH reverse gear shift fork pivot bolts.



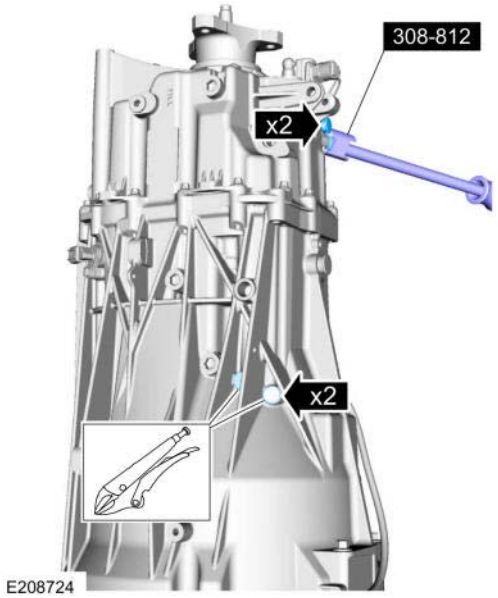
17.

Using the special tools, remove the shift rail detents. Use locking pliers with a slide hammer to access the 2 front shift rail detents.

Use Special Service Tool: 308-812 Remover, Detent.

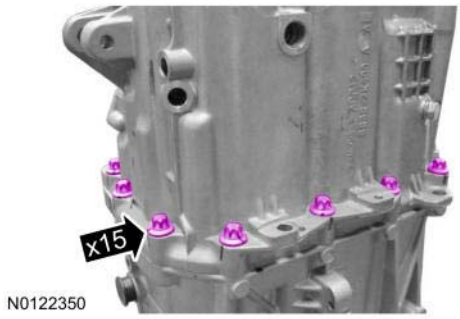
Use the General Equipment: Locking Pliers

Use the General Equipment: Slide Hammer



18.

Remove the transmission case bolts.



19.

Using the two leg puller and the step plate, remove the rear transmission case.

Use the General Equipment: Two Leg Puller


N0122791

NOTE: To remove the reverse shift fork and the reverse shift rail assembly, the transmission must be in neutral and the groves on the shift rail must be aligned with the interlock plate.

20.
Remove the reverse shift fork and the reverse shift rail assembly.

Inspect the reverse shift fork and reverse shift rail assembly for wear or damage. Install new components as necessary.

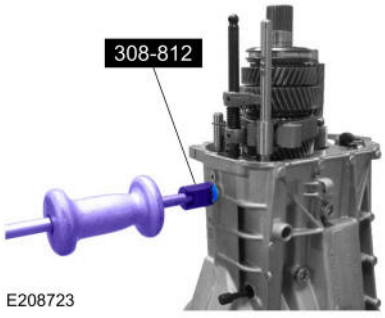

N0122352

21.

Using the special tools, remove the shift shaft stop pin.

Use Special Service Tool: 308-812 Remover, Detent.

Use the General Equipment: Slide Hammer



E208723

22.

Remove the shift shaft.


N0124189

23.

Using the push/puller set, step plate and special tool, remove the 1st gear, the reverse gear and the reverse gear synchronizer assembly.

Inspect the 1st and reverse gears for wear or damage. Install new gears as necessary.

Inspect the reverse gear needle bearing and the reverse gear needle bearing race for wear or damage. Install new components as necessary.

Inspect the reverse gear synchronizer assembly and the reverse gear synchronizer ring for wear or damage. Install new components as necessary.

Use Special Service Tool: 308-810 Remover, Syncro Gear Pack.



N0124190

24.

Remove the 1st gear needle bearing.

Inspect the 1st gear needle bearing for wear or damage. Install a new 1st gear needle bearing as necessary.


N0124191

NOTE: Note the position of each synchronizer ring component before removal.

25.
Remove the 1st gear synchronizer ring assembly.

Inspect all synchronizer ring components for wear or damage. Install new components as necessary.


N0124192

NOTE: Slide the synchronizer sleeve up while removing the pressure pieces.

26.

1.

Remove the 3 pressure pieces.


N0124193

NOTE: Index-mark the synchronizer sleeve to the synchronizer hub before removal.

27.
Remove the 1st/2nd shift fork, the 1st/2nd shift rail and the 1st/2nd synchronizer sleeve.

Inspect the 1st/2nd shift fork and the 1st/2nd shift rail for wear or damage. Install new components as necessary.

Inspect the 1st/2nd synchronizer sleeve for wear or damage. Install a new 1st/2nd synchronizer assembly as necessary.


N0124202

28.

Remove the magnet.


N0122374

29.

Remove the bolts, spacers, spring and the interlock plate.



N0124194

30.

Remove the center support bolts.



31.

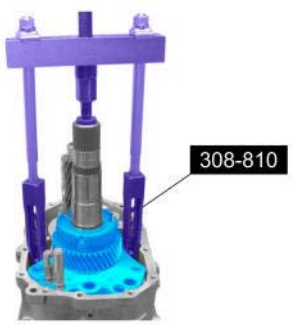
Remove the 1st/2nd synchronizer hub snap ring.



NOTE: The center support must be pulled up evenly or damaged to the center support or transmission case can occur.

32.
Using the push/puller set, step plate and special tool, under the center support pull off the center support, 2nd gear and the 1st/2nd synchronizer hub.

Use Special Service Tool: 308-810 Remover, Syncro Gear Pack.



NOTE: Note the position of each synchronizer ring component before removal.

33.
Remove the 1st/2nd synchronizer hub, the 2nd gear synchronizer ring assembly and the 2nd gear.

Inspect all the components for wear or damage. Install new components as necessary.


N0124198

34.

Remove the 2nd gear needle bearing.

Inspect the 2nd gear needle bearing for wear or damage. Install a new needle bearing as necessary.


N0122365

35.

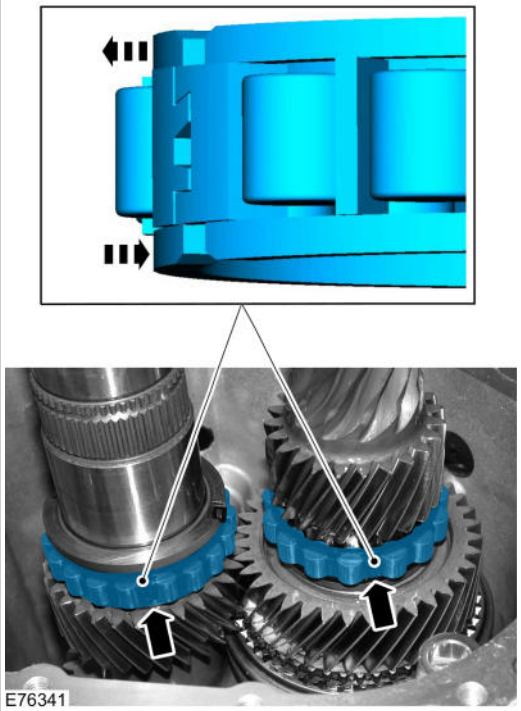
Remove the center support.

Inspect the center support for wear or damage. Install a new center support as necessary.


N0122366

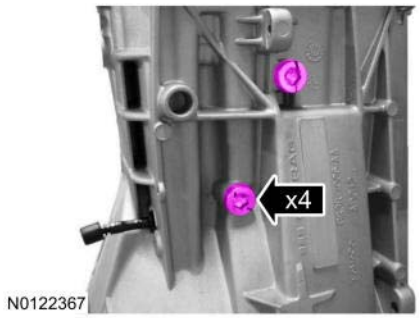
NOTE: When removing the bearings, do not over expand the bearing cages or damage to the bearing cages can occur.

36.
Unlock the bearing cage tabs and slightly expand the bearing cages. Remove the center support bearings by sliding them up the shaft assemblies.



37.

Remove the 2 LH and the 2 RH shift fork pivot bolts.



38.

Remove the 3rd/4th shift rail and the 3rd/4th shift fork.


N0122368

39.

Remove the 5th/6th shift rail and the 5th/6th shift fork.


N0122369

WARNING: Wear protective gloves when handling components or parts that have pointed or sharp edges. Failure to follow this instruction may result in serious personal injury.

NOTE: Use an assistant when pressing out the countershaft and output shaft, do not allow the shafts to bind during removal.

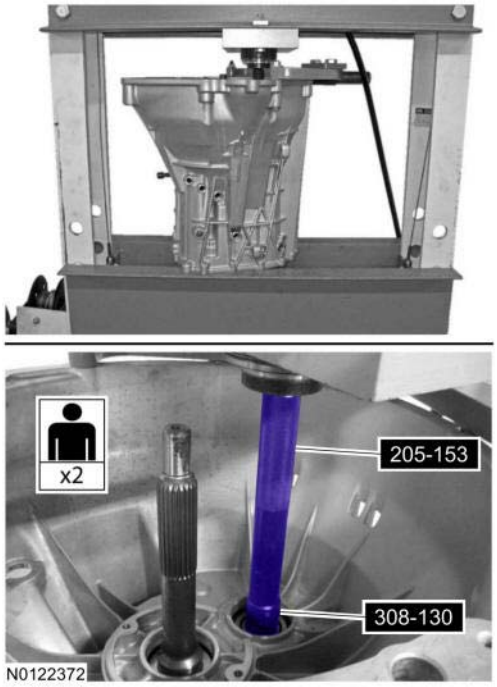
NOTE: The countershaft bolt must be removed prior to pressing out the countershaft or damage to the transmission case will occur.

40.

With an assistant, support the transmission case on flat surface of a hydraulic press. Using the special tools, press the countershaft out of the bearing and remove the countershaft and output shaft.

Use Special Service Tool: 205-153 (T80T-4000-W) Handle, 308-130 (T87T-7025-DH) Installer, Shift Rail Needle Bearing.

Use the General Equipment: Hydraulic Press



NOTE: Removal of the input shaft is only required if damage is found to the input shaft, input shaft seal or input shaft bearing. If damage is not found, no not remove the input shaft.

41.
Remove the input shaft snap ring.



WARNING: Wear protective gloves when handling components or parts that have pointed or sharp edges. Failure to follow this instruction may result in serious personal injury.

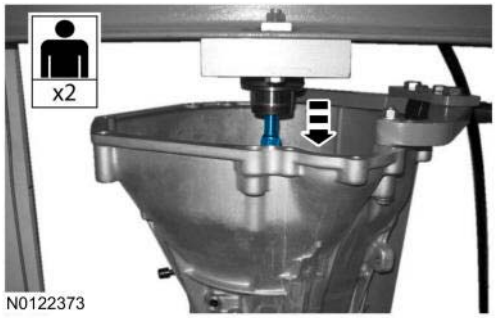
NOTE: Use an assistant when pressing out the input shaft, do not allow the input shaft to drop during removal.

NOTE: Removal of the input shaft is only required if damage is found to the input shaft, input shaft seal or input shaft bearing. If damage is not found, no not remove the input shaft.

42.

With an assistant, support the transmission case on flat surfaces of a hydraulic press. Using the hydraulic press, remove the input shaft.

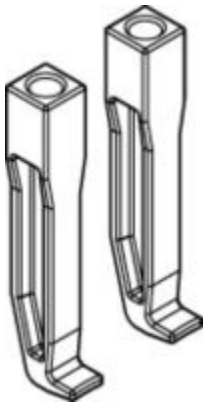
Use the General Equipment: Hydraulic Press



DISASSEMBLY > TRANSMISSION - 3.7L DURATEC (227KW 301PS)

Special Tool(s) / General Equipment

 E133913	205-153 (T80T-4000-W) Handle
 307-003	307-003 (T57L-500-B) Holding Fixture, Transmission
 E182026	308-130 (T87T-7025-DH) Installer, Shift Rail Needle Bearing TKIT-1987-FLMH

	308-375 Remover, Input Shaft Seal TKIT-1999-F/FLM/LT TKIT-2005U-M
	308-810 Remover, Syncro Gear Pack TKIT-2010A-F TKIT-2010A-LM TKIT-2010A-ROW
	308-812 Remover, Detent TKIT-2010A-F TKIT-2010A-LM TKIT-2010A-ROW
	308-938 Remover/Installer, Companion Flange Nut TKIT-2014D-FL_ROW TKIT-2014D-ROW2
Slide Hammer Dent Puller	
Slide Hammer	
Three Leg Puller	
Hydraulic Press	
Center Punch	
Two Leg Puller	

WARNING: Do not breathe dust or use compressed air to blow dust from storage containers or friction components. Remove dust using government-approved techniques. Friction component dust may be a cancer and lung disease hazard. Exposure to potentially hazardous components may occur if dusts are created during repair of friction components, such as brake pads and clutch discs. Exposure may also cause irritation to skin, eyes and respiratory tract, and may cause allergic reactions and/or may lead to other chronic health effects. If irritation persists, seek medical attention or advice. Failure to follow these instructions may result in serious personal injury.

1.

YouTube	A multimedia supplement to the instructions contained in this article is available. To view the multimedia example of the condition described go to; **http://www.youtube.com/user/Mitchell1Tips then type, "A00680083" into the "Search Channel" box.**

2.

Clean the transmission exterior with solvent and dry with compressed air. During disassembly, clean all components with solvent and dry with compressed air.

3.

Attach the transmission to the special tool.

Use Special Service Tool: 307-003 (T57L-500-B)Holding Fixture, Transmission.



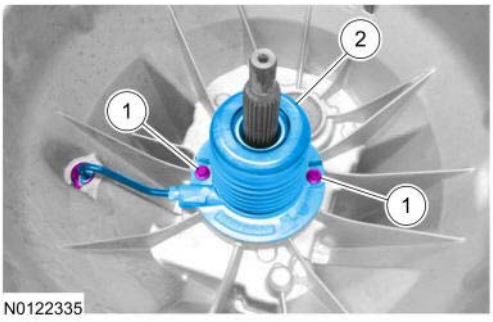
4.

1.

Remove the slave cylinder bolts.

2.

Pull the clutch slave cylinder outward and release the tube from the retaining clip and if equipped, remove the clutch slave cylinder spacer.



5.

Inspect the clutch slave cylinder for the following:

Damaged boot

Leaking brake fluid

Worn or damaged release bearing

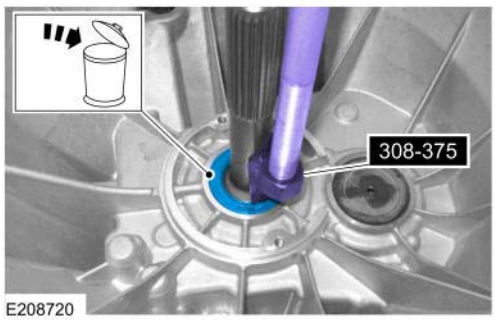
Rotate the release bearing while applying pressure. If the bearing rotation is rough, install a new clutch slave cylinder.

6.

Using the special tools, remove and discard the input shaft seal.

Use Special Service Tool: 308-375 Remover, Input Shaft Seal.

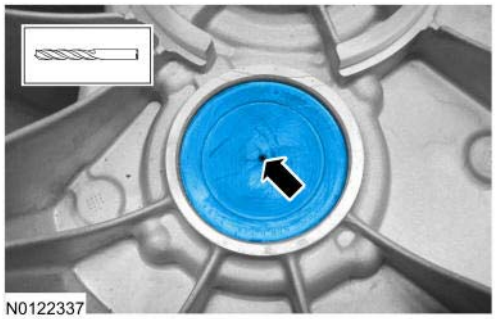
Use the General Equipment: Slide Hammer



7.

Using a center punch, mark a location in the center of the countershaft bolt cover. Using a drill bit of the appropriate size for the dent puller, drill a hole in the center of the countershaft bolt cover. Drill the hole to pierce the countershaft bolt cover approximately 2 mm (0.078 in) in depth.

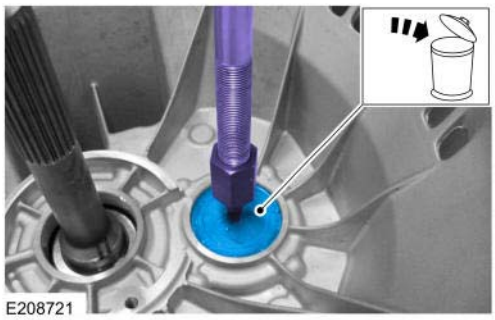
Use the General Equipment: Center Punch



8.

Using the special tool, remove and discard the countershaft bolt cover.

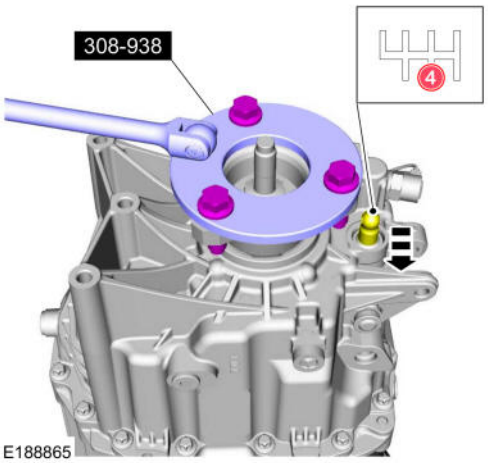
Use the General Equipment: Slide Hammer Dent Puller



9.

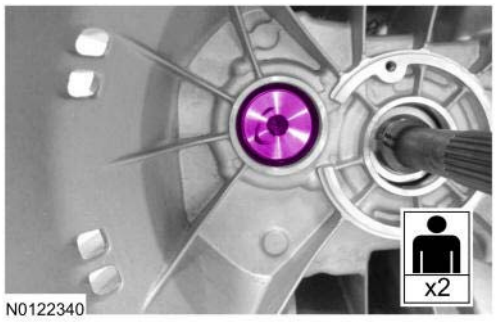
Install the special tools, position the shift shaft into 4th gear.

Use Special Service Tool: 308-938 Remover/Installer, Companion Flange Nut.



10.

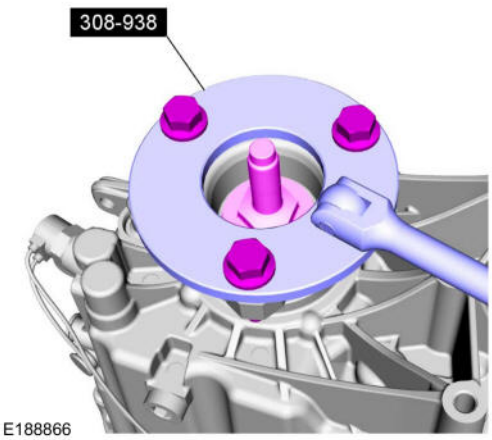
With the help of an assistant, hold the special tools and remove the countershaft bolt.



11.

Using the special tools, hold the output shaft flange and remove the bolt.

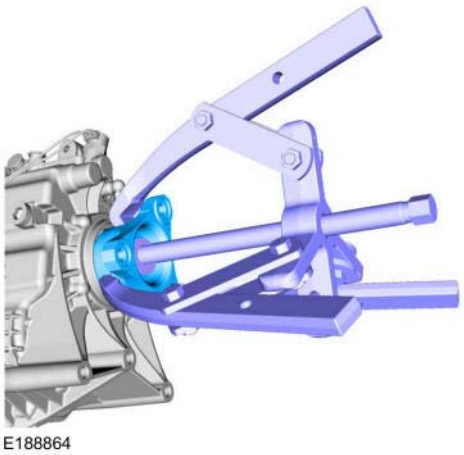
Use Special Service Tool: 308-938 Remover/Installer, Companion Flange Nut.



12.

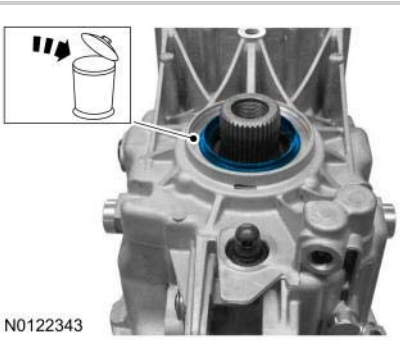
Using the three leg puller and the step plate, remove the output shaft flange.

Use the General Equipment: Three Leg Puller



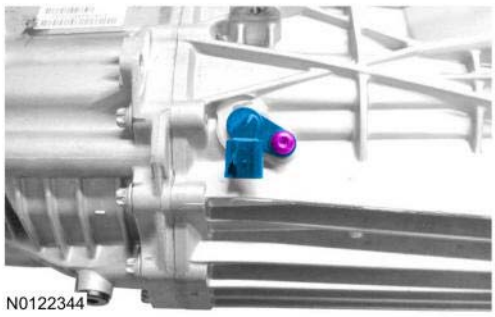
13.

Remove and discard the output shaft seal.



14.

Remove the bolt and the OSS sensor.



15.

1.

Detach the electrical connector retainer.

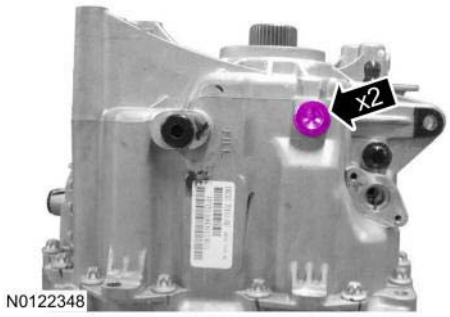
2.

Remove the reverse lamp switch.



16.

Remove the LH and RH reverse gear shift fork pivot bolts.

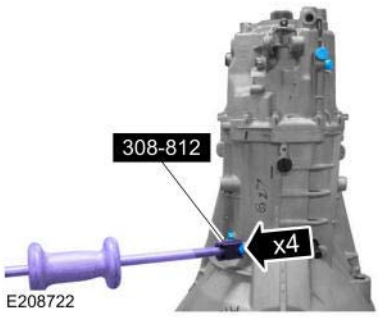


17.

Using the special tools, remove the shift rail detents.

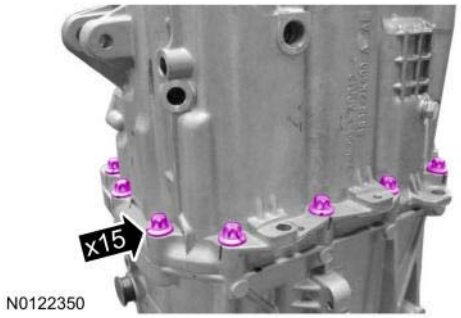
Use Special Service Tool: 308-812 Remover, Detent.

Use the General Equipment: Slide Hammer



18.

Remove the transmission case bolts.



19.

Using the two leg puller and the step plate, remove the rear transmission case.

Use the General Equipment: Two Leg Puller



NOTE: To remove the reverse shift fork and the reverse shift rail assembly, the transmission must be in neutral and the groves on the shift rail must be aligned with the interlock plate.

20.

Remove the reverse shift fork and the reverse shift rail assembly.

Inspect the reverse shift fork and reverse shift rail assembly for wear or damage. Install new components as necessary.

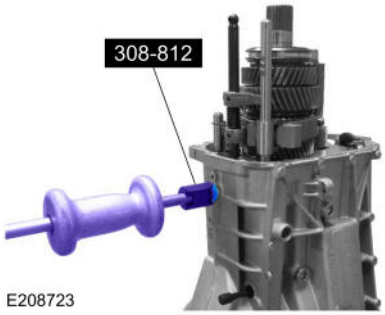

N0122352

21.

Using the special tools, remove the shift shaft stop pin.

Use Special Service Tool: 308-812 Remover, Detent.

Use the General Equipment: Slide Hammer



E208723

22.

Remove the shift shaft.


N0124189

23.

Using the push/puller set, step plate and special tool, remove the 1st gear, the reverse gear and the reverse gear synchronizer assembly.

Inspect the 1st and reverse gears for wear or damage. Install new gears as necessary.

Inspect the reverse gear needle bearing and the reverse gear needle bearing race for wear or damage. Install new components as necessary.

Inspect the reverse gear synchronizer assembly and the reverse gear synchronizer ring for wear or damage. Install new components as necessary.

Use Special Service Tool: 308-810 Remover, Syncro Gear Pack.



24.

Remove the 1st gear needle bearing.

Inspect the 1st gear needle bearing for wear or damage. Install a new 1st gear needle bearing as necessary.



NOTE: Note the position of each synchronizer ring component before removal.

25.
Remove the 1st gear synchronizer ring assembly.

Inspect all synchronizer ring components for wear or damage. Install new components as necessary.


N0124192

NOTE: Slide the synchronizer sleeve up while removing the pressure pieces.

26.

1.

Remove the 3 pressure pieces.


N0124193

NOTE: Index-mark the synchronizer sleeve to the synchronizer hub before removal.

27.
Remove the 1st/2nd shift fork, the 1st/2nd shift rail and the 1st/2nd synchronizer sleeve.

Inspect the 1st/2nd shift fork and the 1st/2nd shift rail for wear or damage. Install new components as necessary.

Inspect the 1st/2nd synchronizer sleeve for wear or damage. Install a new 1st/2nd synchronizer assembly as necessary.


N0124202

28.

Remove the magnet.


N0122374

29.

Remove the bolts, spacers, spring and the interlock plate.



N0124194

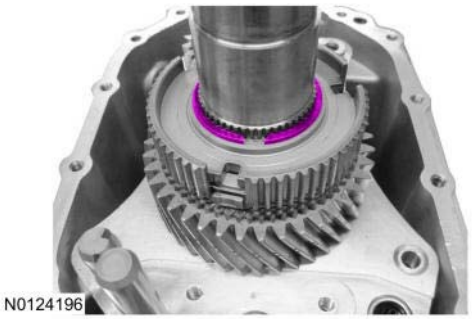
30.

Remove the center support bolts.



31.

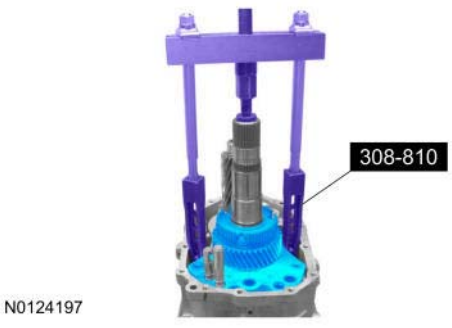
Remove the 1st/2nd synchronizer hub snap ring.



NOTE: The center support must be pulled up evenly or damaged to the center support or transmission case can occur.

32.
Using the push/puller set, step plate and special tool, under the center support pull off the center support, 2nd gear and the 1st/2nd synchronizer hub.

Use Special Service Tool: 308-810 Remover, Syncro Gear Pack.



NOTE: Note the position of each synchronizer ring component before removal.

33.
Remove the 1st/2nd synchronizer hub, the 2nd gear synchronizer ring assembly and the 2nd gear.

Inspect all the components for wear or damage. Install new components as necessary.


N0124198

34.

Remove the 2nd gear needle bearing.

Inspect the 2nd gear needle bearing for wear or damage. Install a new needle bearing as necessary.


N0122365

35.

Remove the center support.

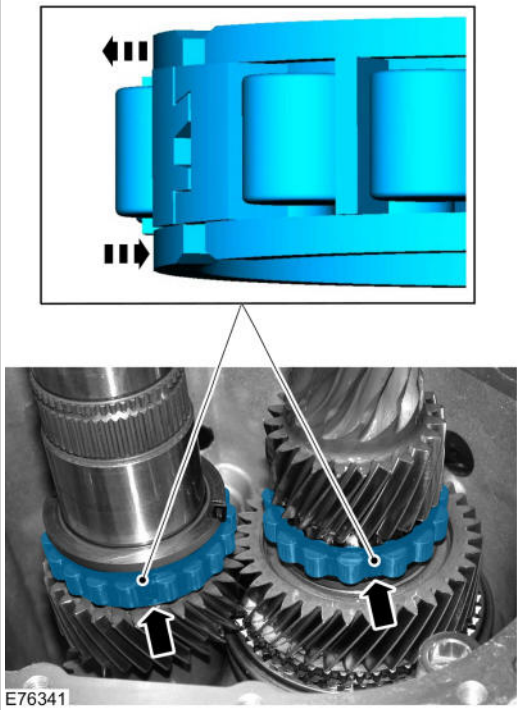
Inspect the center support for wear or damage. Install a new center support as necessary.


N0122366

NOTE: When removing the bearings, do not over expand the bearing cages or damage to the bearing cages can occur.

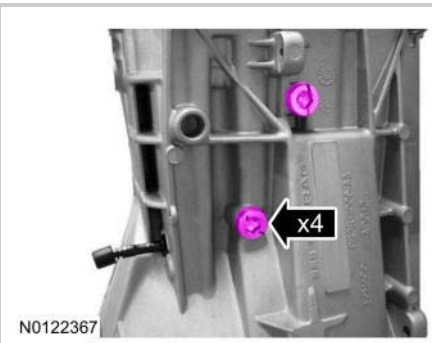
36.

Unlock the bearing cage tabs and slightly expand the bearing cages. Remove the center support bearings by sliding them up the shaft assemblies.



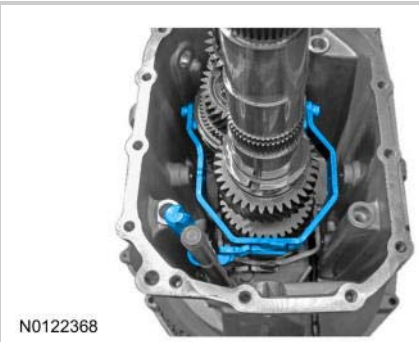
37.

Remove the 2 LH and the 2 RH shift fork pivot bolts.



38.

Remove the 3rd/4th shift rail and the 3rd/4th shift fork.



39.

Remove the 5th/6th shift rail and the 5th/6th shift fork.



WARNING: Wear protective gloves when handling components or parts that have pointed or sharp edges. Failure to follow this instruction may result in serious personal injury.

NOTE: Use an assistant when pressing out the countershaft and output shaft, do not allow the shafts to bind during removal.

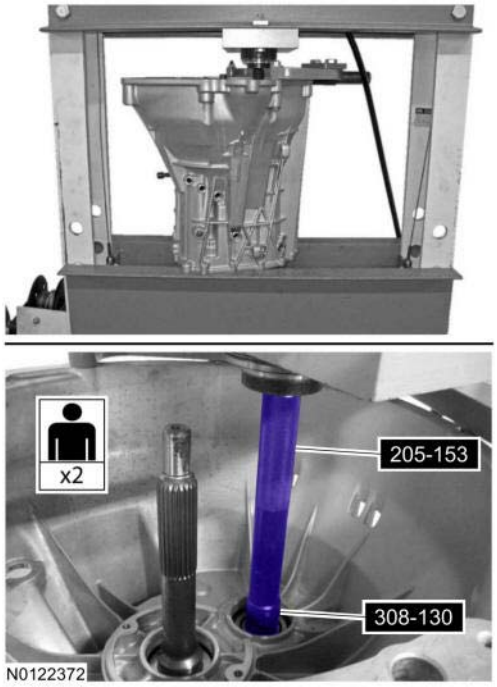
NOTE: The countershaft bolt must be removed prior to pressing out the countershaft or damage to the transmission case will occur.

40.

With an assistant, support the transmission case on flat surface of a hydraulic press. Using the special tools, press the countershaft out of the bearing and remove the countershaft and output shaft.

Use Special Service Tool: 205-153 (T80T-4000-W) Handle, 308-130 (T87T-7025-DH) Installer, Shift Rail Needle Bearing.

Use the General Equipment: Hydraulic Press



NOTE: Removal of the input shaft is only required if damage is found to the input shaft, input shaft seal or input shaft bearing. If damage is not found, no not remove the input shaft.

41.
Remove the input shaft snap ring.



WARNING: Wear protective gloves when handling components or parts that have pointed or sharp edges. Failure to follow this instruction may result in serious personal injury.

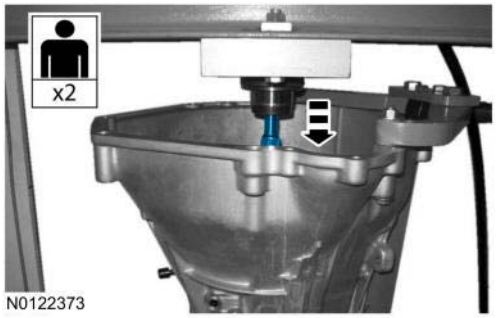
NOTE: Use an assistant when pressing out the input shaft, do not allow the input shaft to drop during removal.

NOTE: Removal of the input shaft is only required if damage is found to the input shaft, input shaft seal or input shaft bearing. If damage is not found, no not remove the input shaft.

42.

With an assistant, support the transmission case on flat surfaces of a hydraulic press. Using the hydraulic press, remove the input shaft.

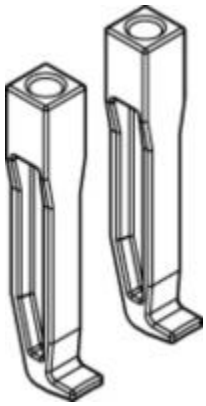
Use the General Equipment: Hydraulic Press



DISASSEMBLY > TRANSMISSION - 5.0L 32V TI-VCT

Special Tool(s) / General Equipment

 E133913	205-153 (T80T-4000-W) Handle
 307-003	307-003 (T57L-500-B) Holding Fixture, Transmission
 E182026	308-130 (T87T-7025-DH) Installer, Shift Rail Needle Bearing TKIT-1987-FLMH

	308-375 Remover, Input Shaft Seal TKIT-1999-F/FLM/LT TKIT-2005U-M
	308-810 Remover, Syncro Gear Pack TKIT-2010A-F TKIT-2010A-LM TKIT-2010A-ROW
	308-812 Remover, Detent TKIT-2010A-F TKIT-2010A-LM TKIT-2010A-ROW
	308-938 Remover/Installer, Companion Flange Nut TKIT-2014D-FL_ROW TKIT-2014D-ROW2
Slide Hammer Dent Puller	
Slide Hammer	
Three Leg Puller	
Hydraulic Press	
Center Punch	
Two Leg Puller	

WARNING: Do not breathe dust or use compressed air to blow dust from storage containers or friction components. Remove dust using government-approved techniques. Friction component dust may be a cancer and lung disease hazard. Exposure to potentially hazardous components may occur if dusts are created during repair of friction components, such as brake pads and clutch discs. Exposure may also cause irritation to skin, eyes and respiratory tract, and may cause allergic reactions and/or may lead to other chronic health effects. If irritation persists, seek medical attention or advice. Failure to follow these instructions may result in serious personal injury.

1.

YouTube	A multimedia supplement to the instructions contained in this article is available. To view the multimedia example of the condition described go to; **http://www.youtube.com/user/Mitchell1Tips then type, "A00680083" into the "Search Channel" box.**

2.

Clean the transmission exterior with solvent and dry with compressed air. During disassembly, clean all components with solvent and dry with compressed air.

3.

Attach the transmission to the special tool.

Use Special Service Tool: 307-003 (T57L-500-B) Holding Fixture, Transmission.



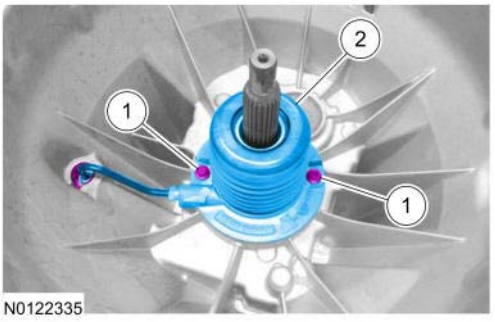
4.

1.

Remove the slave cylinder bolts.

2.

Pull the clutch slave cylinder outward and release the tube from the retaining clip and if equipped, remove the clutch slave cylinder spacer.



5.

Inspect the clutch slave cylinder for the following:

Damaged boot

Leaking brake fluid

Worn or damaged release bearing

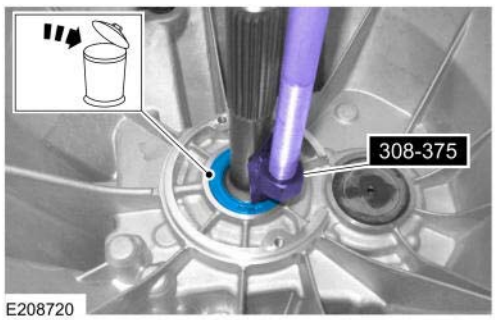
Rotate the release bearing while applying pressure. If the bearing rotation is rough, install a new clutch slave cylinder.

6.

Using the special tools, remove and discard the input shaft seal.

Use Special Service Tool: 308-375 Remover, Input Shaft Seal.

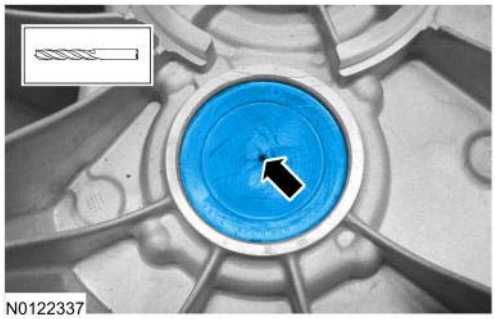
Use the General Equipment: Slide Hammer



7.

Using a center punch, mark a location in the center of the countershaft bolt cover. Using a drill bit of the appropriate size for the dent puller, drill a hole in the center of the countershaft bolt cover. Drill the hole to pierce the countershaft bolt cover approximately 2 mm (0.078 in) in depth.

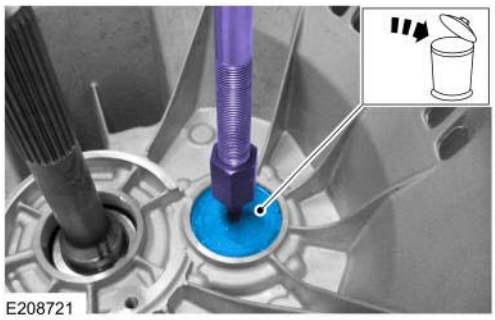
Use the General Equipment: Center Punch



8.

Using the special tool, remove and discard the countershaft bolt cover.

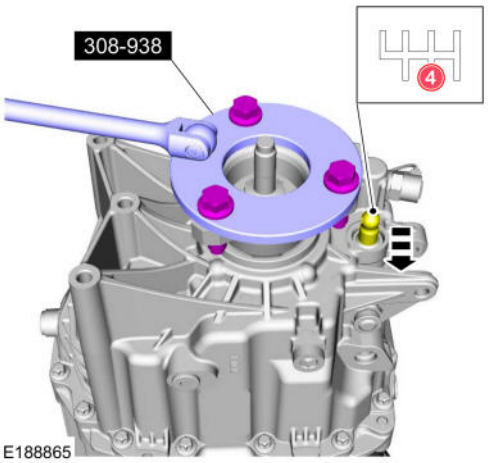
Use the General Equipment: Slide Hammer Dent Puller



9.

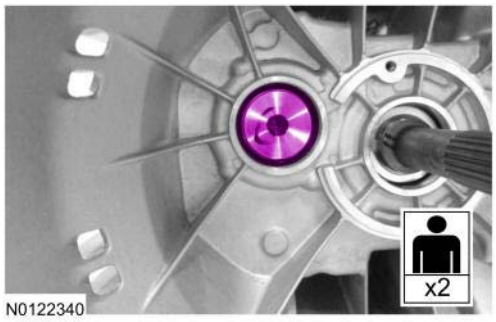
Install the special tools, position the shift shaft into 4th gear.

Use Special Service Tool: 308-938 Remover/Installer, Companion Flange Nut.



10.

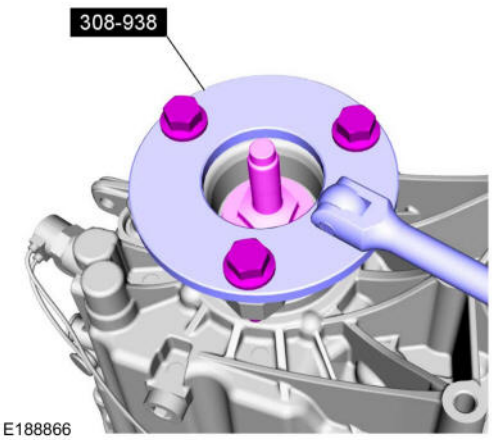
With the help of an assistant, hold the special tools and remove the countershaft bolt.



11.

Using the special tools, hold the output shaft flange and remove the bolt.

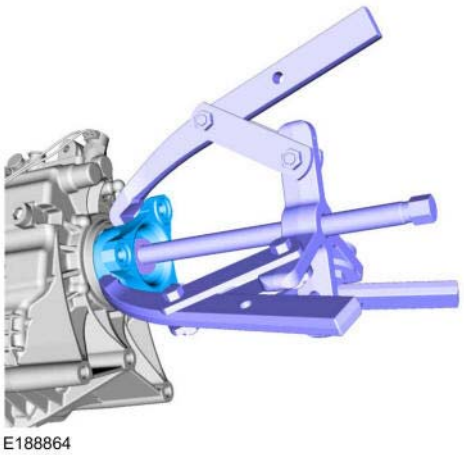
Use Special Service Tool: 308-938 Remover/Installer, Companion Flange Nut.



12.

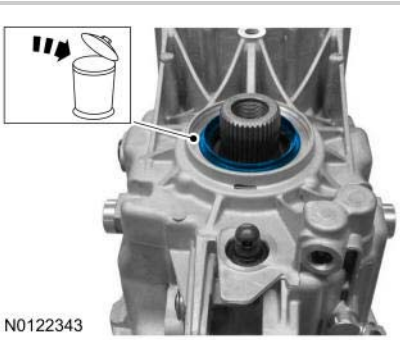
Using the three leg puller and the step plate, remove the output shaft flange.

Use the General Equipment: Three Leg Puller



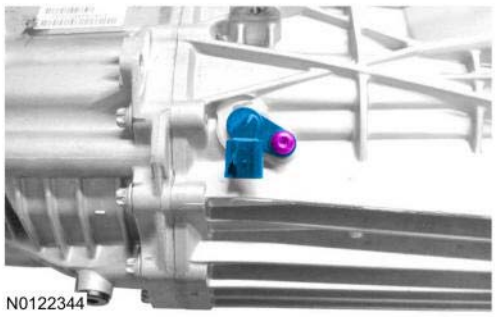
13.

Remove and discard the output shaft seal.



14.

Remove the bolt and the OSS sensor.



15.

1.

Detach the electrical connector retainer.

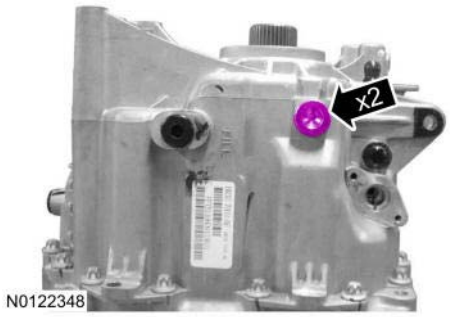
2.

Remove the reverse lamp switch.



16.

Remove the LH and RH reverse gear shift fork pivot bolts.

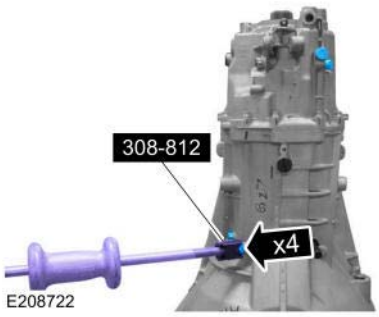


17.

Using the special tools, remove the shift rail detents.

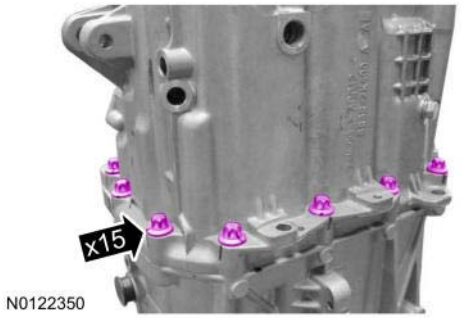
Use Special Service Tool: 308-812 Remover, Detent.

Use the General Equipment: Slide Hammer



18.

Remove the transmission case bolts.



19.

Using the two leg puller and the step plate, remove the rear transmission case.

Use the General Equipment: Two Leg Puller



NOTE: To remove the reverse shift fork and the reverse shift rail assembly, the transmission must be in neutral and the groves on the shift rail must be aligned with the interlock plate.

20.

Remove the reverse shift fork and the reverse shift rail assembly.

Inspect the reverse shift fork and reverse shift rail assembly for wear or damage. Install new components as necessary.

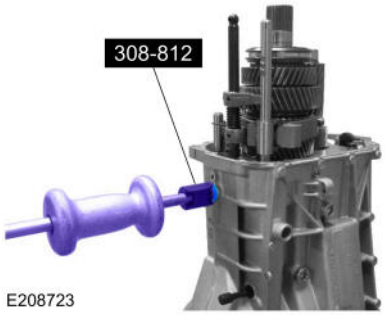

N0122352

21.

Using the special tools, remove the shift shaft stop pin.

Use Special Service Tool: 308-812 Remover, Detent.

Use the General Equipment: Slide Hammer



E208723

22.

Remove the shift shaft.


N0124189

23.

Using the push/puller set, step plate and special tool, remove the 1st gear, the reverse gear and the reverse gear synchronizer assembly.

Inspect the 1st and reverse gears for wear or damage. Install new gears as necessary.

Inspect the reverse gear needle bearing and the reverse gear needle bearing race for wear or damage. Install new components as necessary.

Inspect the reverse gear synchronizer assembly and the reverse gear synchronizer ring for wear or damage. Install new components as necessary.

Use Special Service Tool: 308-810 Remover, Syncro Gear Pack.



24.

Remove the 1st gear needle bearing.

Inspect the 1st gear needle bearing for wear or damage. Install a new 1st gear needle bearing as necessary.



NOTE: Note the position of each synchronizer ring component before removal.

25.
Remove the 1st gear synchronizer ring assembly.

Inspect all synchronizer ring components for wear or damage. Install new components as necessary.


N0124192

NOTE: Slide the synchronizer sleeve up while removing the pressure pieces.

26.

1.

Remove the 3 pressure pieces.


N0124193

NOTE: Index-mark the synchronizer sleeve to the synchronizer hub before removal.

27.
Remove the 1st/2nd shift fork, the 1st/2nd shift rail and the 1st/2nd synchronizer sleeve.

Inspect the 1st/2nd shift fork and the 1st/2nd shift rail for wear or damage. Install new components as necessary.

Inspect the 1st/2nd synchronizer sleeve for wear or damage. Install a new 1st/2nd synchronizer assembly as necessary.


N0124202

28.

Remove the magnet.


N0122374

29.

Remove the bolts, spacers, spring and the interlock plate.



N0124194

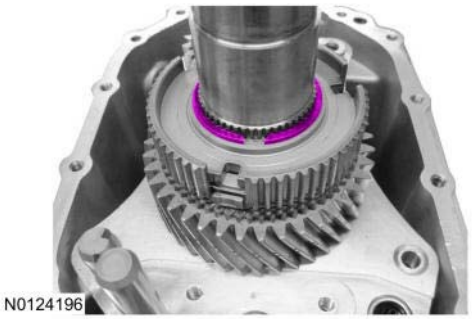
30.

Remove the center support bolts.



31.

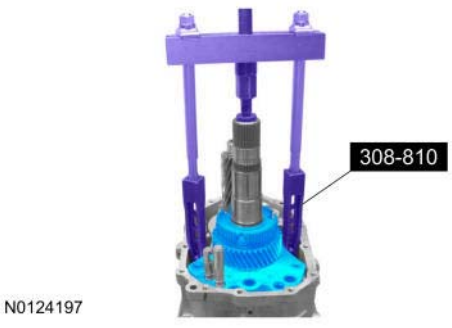
Remove the 1st/2nd synchronizer hub snap ring.



NOTE: The center support must be pulled up evenly or damaged to the center support or transmission case can occur.

32.
Using the push/puller set, step plate and special tool, under the center support pull off the center support, 2nd gear and the 1st/2nd synchronizer hub.

Use Special Service Tool: 308-810 Remover, Syncro Gear Pack.



NOTE: Note the position of each synchronizer ring component before removal.

33.
Remove the 1st/2nd synchronizer hub, the 2nd gear synchronizer ring assembly and the 2nd gear.

Inspect all the components for wear or damage. Install new components as necessary.


N0124198

34.

Remove the 2nd gear needle bearing.

Inspect the 2nd gear needle bearing for wear or damage. Install a new needle bearing as necessary.


N0122365

35.

Remove the center support.

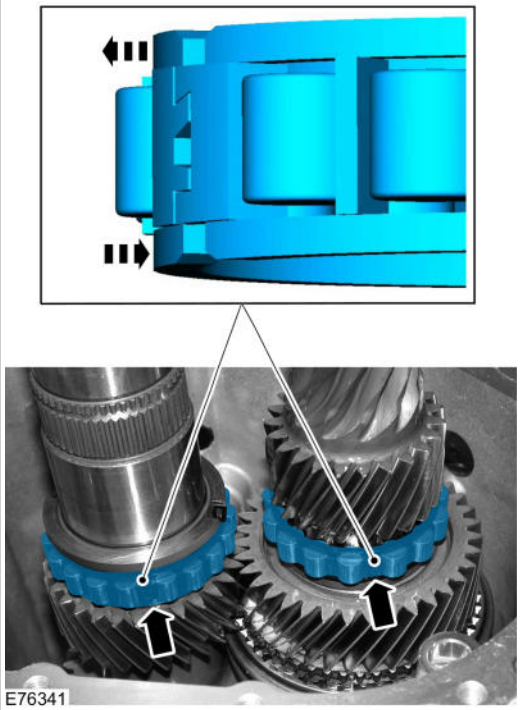
Inspect the center support for wear or damage. Install a new center support as necessary.


N0122366

NOTE: When removing the bearings, do not over expand the bearing cages or damage to the bearing cages can occur.

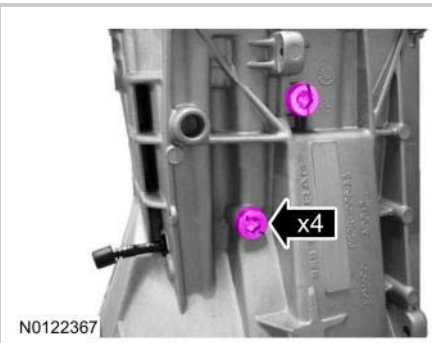
36.

Unlock the bearing cage tabs and slightly expand the bearing cages. Remove the center support bearings by sliding them up the shaft assemblies.



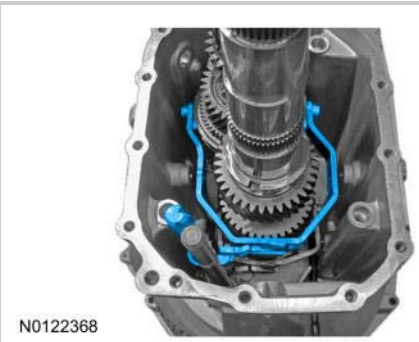
37.

Remove the 2 LH and the 2 RH shift fork pivot bolts.



38.

Remove the 3rd/4th shift rail and the 3rd/4th shift fork.



39.

Remove the 5th/6th shift rail and the 5th/6th shift fork.



WARNING: Wear protective gloves when handling components or parts that have pointed or sharp edges. Failure to follow this instruction may result in serious personal injury.

NOTE: Use an assistant when pressing out the countershaft and output shaft, do not allow the shafts to bind during removal.

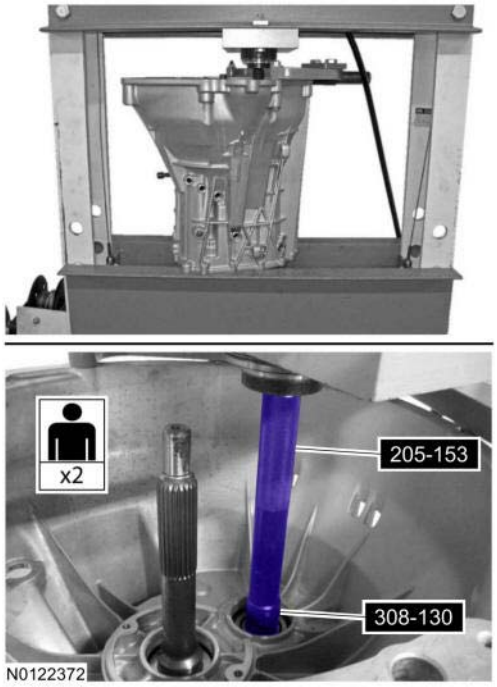
NOTE: The countershaft bolt must be removed prior to pressing out the countershaft or damage to the transmission case will occur.

40.

With an assistant, support the transmission case on flat surface of a hydraulic press. Using the special tools, press the countershaft out of the bearing and remove the countershaft and output shaft.

Use Special Service Tool: 205-153 (T80T-4000-W) Handle, 308-130 (T87T-7025-DH) Installer, Shift Rail Needle Bearing.

Use the General Equipment: Hydraulic Press



NOTE: Removal of the input shaft is only required if damage is found to the input shaft, input shaft seal or input shaft bearing. If damage is not found, no not remove the input shaft.

41.
Remove the input shaft snap ring.



WARNING: Wear protective gloves when handling components or parts that have pointed or sharp edges. Failure to follow this instruction may result in serious personal injury.

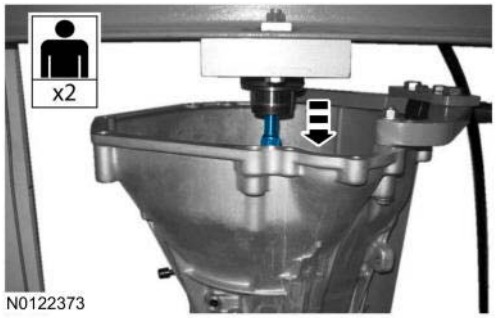
NOTE: Use an assistant when pressing out the input shaft, do not allow the input shaft to drop during removal.

NOTE: Removal of the input shaft is only required if damage is found to the input shaft, input shaft seal or input shaft bearing. If damage is not found, no not remove the input shaft.

42.

With an assistant, support the transmission case on flat surfaces of a hydraulic press. Using the hydraulic press, remove the input shaft.

Use the General Equipment: Hydraulic Press



DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES > COUNTERSHAFT

Special Tool(s) / General Equipment

 E133913	205-153 (T80T-4000-W) Handle
 E182026	308-130 (T87T-7025-DH) Installer, Shift Rail Needle Bearing TKIT-1987-FLMH
Hydraulic Press	
Bearing Separator	

Materials

Name	Specification
Motorcraft® Dual Clutch Transmission Fluid XT-11-QDC	WSS-M2C200-D2

DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES > COUNTERSHAFT > DISASSEMBLY

NOTE: Hand-tighten the Bearing Puller to prevent gear damage.

NOTE: Support the countershaft while using the hydraulic press to prevent damage to the shaft or gears.

NOTE: Removing the Fifth and Sixth gears may take up to 18, 000 pounds of force. Do not heat the gear.

1.

Using the special tools, bearing separator and a hydraulic press, remove the 5th gear.

Inspect the 5th gear for wear or damage. Install a new gear as necessary.

Use Special Service Tool: 308-130 (T87T-7025-DH) Installer, Shift Rail Needle Bearing,205-153 (T80T-4000-W) Handle.

Use the General Equipment: Bearing Separator

Use the General Equipment: Hydraulic Press



2.

Using the special tool, bearing separator and a hydraulic press, remove the 6th gear.

Inspect the 6th gear for wear or damage. Install a new gear as necessary.

Use Special Service Tool: 308-130 (T87T-7025-DH) Installer, Shift Rail Needle Bearing.

Use the General Equipment: Bearing Separator

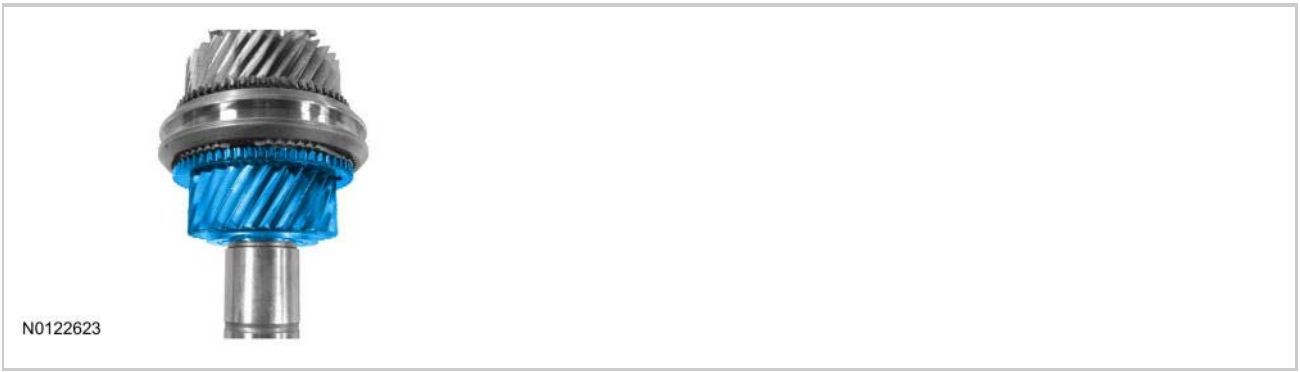
Use the General Equipment: Hydraulic Press



3.

Remove the 3rd gear.

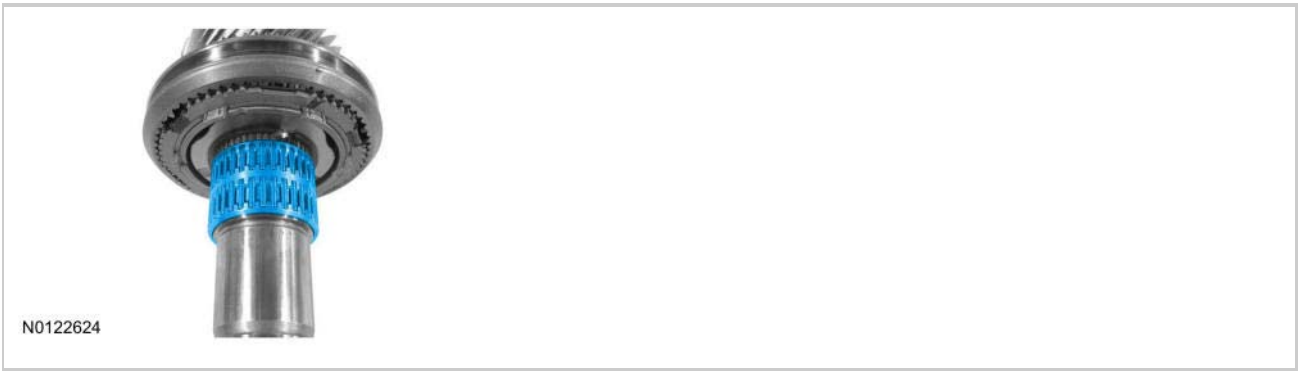
Inspect the 3rd gear for wear or damage. Install a new gear as necessary.



4.

Remove the 3rd gear needle bearing.

Inspect the 3rd gear needle bearing for wear or damage. Install a new needle bearing as necessary.



NOTE: Prior to removing the synchronizer rings, note the position of each synchronizer ring.

5.
Remove the 3rd gear synchronizer ring assembly.

Inspect all synchronizer ring components for wear or damage. Install new components as necessary.


N0122625

6.

Remove the 3rd/4th gear synchronizer assembly snap ring.


E76347

7.

Using the special tool, the bearing separator and a hydraulic press, remove the 4th gear and the 3rd/4th gear synchronizer assembly.

Use Special Service Tool: 308-130 (T87T-7025-DH) Installer, Shift Rail Needle Bearing.

Use the General Equipment: Bearing Separator

Use the General Equipment: Hydraulic Press



N0122626

NOTE: Prior to removing the synchronizer rings, note the position of each

synchronizer ring.

8.
Remove the 4th gear from the 4th gear synchronizer ring assembly. Remove the 4th gear synchronizer ring assembly from the 3rd/4th gear synchronizer assembly.

Inspect the 4th gear for wear or damage. Install a new gear as necessary.

Inspect the 3rd/4th gear synchronizer assembly for wear or damage. Install a new 3rd/4th gear synchronizer assembly as necessary.

Inspect the synchronizer ring components for wear or damage. Install new components as necessary.


E184723

NOTE: When removing the bearing, do not over expand the bearing cage or damage to the bearing cage can occur.

9.
Remove the 4th gear needle bearing.

Inspect the 4th gear needle bearing for wear or damage. Install a new needle bearing as necessary.


N0122628

10.

Inspect the countershaft for scoring or worn or damaged splines. Install a new countershaft as necessary.

DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES > COUNTERSHAFT > ASSEMBLY

NOTE: Lubricate all components with the recommended transmission fluid before assembling.

NOTE: When installing the bearing, do not over expand the bearing cage or damage to the bearing cage can occur.

1.
Install the 4th gear needle bearing.

Material

: Motorcraft® Dual Clutch Transmission Fluid / XT-11-QDC (WSS-M2C200-D2)


N0122628

NOTE: The 4th gear synchronizer ring assembly outer ring has one identification notch.

NOTE: The 6 synchronizer ring tabs must engage into the 6 gear slot and the 3 synchronizer ring tabs must engage into the 3 synchronizer assembly slots or damage to the synchronizer assembly and synchronizer ring assembly can occur.

NOTE: The groove on the 3rd/4th gear synchronizer assembly must be facing away from 4th gear or damage to the synchronizer assembly can occur.

2.
With the groove on the 3rd/4th gear synchronizer assembly sleeve facing away from the 4th gear install the 4th gear synchronizer ring assembly and the 4th gear.

Align the 6 synchronizer ring tabs with the 6 gear slots and the 3 synchronizer ring tabs with the 3 synchronizer assembly slots.



N0124483

3.

Using the bearing separator and a hydraulic press, install the 4th gear and the 3rd/4th gear synchronizer assembly.

Use the General Equipment: Bearing Separator

Use the General Equipment: Hydraulic Press



N0122629

4.

Install the 3rd/4th gear synchronizer assembly snap ring.



E76347

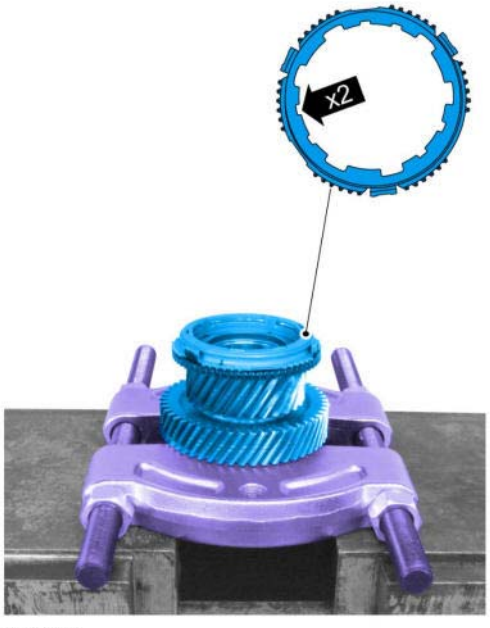
NOTE: The 3rd gear synchronizer ring assembly outer ring has 2 identification notches.

NOTE: The 6 synchronizer ring tabs must engage into the 6 gear slots or damage to the synchronizer assembly and synchronizer ring assembly can occur.

5.
Position the 6th gear and the 3rd gear and the 3rd gear synchronizer ring assembly onto the bearing separator.

Align the 6 synchronizer ring tabs with the 6 gear slots.

Use the General Equipment: Bearing Separator



N0124484

NOTE: Lubricate the needle bearing with petroleum jelly to hold it in place during assembly.

6.
Install the 3rd gear needle bearing.


N0121675

NOTE: Do not allow the 3rd gear needle bearing to slide down the countershaft while pressing the components or damage to the needle bearing can occur.

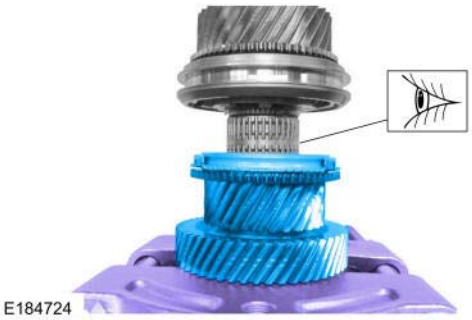
NOTE: The 3 synchronizer ring tabs must engage into the 3 synchronizer assembly slots or damage to the synchronizer assembly and synchronizer ring assembly can occur.

7.
While keeping the 3rd gear needle bearing from sliding down the countershaft, use the bearing separator and a hydraulic press to install the 6th gear the 3rd gear and the 3rd gear synchronizer ring assembly.

Align the 3 synchronizer ring tabs with the 3 synchronizer assembly slots.

Use the General Equipment: Bearing Separator

Use the General Equipment: Hydraulic Press


E184724

8.

Using the bearing separator and a hydraulic press, install the 5th gear.

Use the General Equipment: Bearing Separator

Use the General Equipment: Hydraulic Press



DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES > OUTPUT SHAFT

Special Tool(s) / General Equipment

Hydraulic Press
Bearing Separator

Materials

Name	Specification
Motorcraft® Dual Clutch Transmission Fluid XT-11-QDC	WSS-M2C200-D2

DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES > OUTPUT SHAFT > DISASSEMBLY

NOTE: Hand-tighten the Bearing Separator to prevent gear damage.

NOTE: Support the output shaft while using the press to prevent damage to the shaft or gears.

1.

Remove the 5th/6th gear synchronizer assembly snap ring.


E76500

2.

Using the bearing separator and a hydraulic press, remove the 5th/6th gear synchronizer assembly.

Inspect the 5th/6th gear synchronizer assembly and the 6th gear synchronizer ring and cone for wear or damage. Install new components as necessary.

Use the General Equipment: Bearing Separator

Use the General Equipment: Hydraulic Press


N0122554

3.

Remove the 6th gear.

Inspect the 6th gear for wear or damage. Install a new gear as necessary.


N0122555

4.

Remove the 6th gear needle bearing.

Inspect the 6th gear needle bearing for wear or damage. Install a new needle bearing as necessary.



5.

Inspect the output shaft for scoring or worn or damaged splines. Install a new output shaft as necessary.

DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES > OUTPUT SHAFT > ASSEMBLY

NOTE: Lubricate all components with the recommended transmission fluid before reassembling.

1.

Position the 5th/6th gear synchronizer assembly on the bearing separator and a hydraulic press.

Use the General Equipment: Bearing Separator

Use the General Equipment: Hydraulic Press

Material

: Motorcraft® Dual Clutch Transmission Fluid / XT-11-QDC (WSS-M2C200-D2)



NOTE: The 3 synchronizer ring tabs must engage into 3 synchronizer assembly

slots or damage to the synchronizer assembly and synchronizer ring can occur.

2.
Install the 6th gear synchronizer ring and cone.

Align the 3 synchronizer ring tabs with the 3 synchronizer assembly slots.


N0122557

3.

Install the 6th gear needle bearing.


N0122794

4.

Install the 6th gear.


N0122558

5.

Using the bearing separator and a hydraulic press, install the 5th/6th gear synchronizer assembly and the 6th gear.

Use the General Equipment: Bearing Separator

Use the General Equipment: Hydraulic Press



6.

Install the 5th/6th gear synchronizer assembly snap ring.



DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES > SYNCHRONIZERS

Materials

Name	Specification
High Temperature 4x4 Front Axle and Wheel Bearing Grease XG-11	WSS-M1C267-A1

DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES > SYNCHRONIZERS > DISASSEMBLY

NOTE: Make a note of/mark the installed positions of the components before removal.

1.

1.

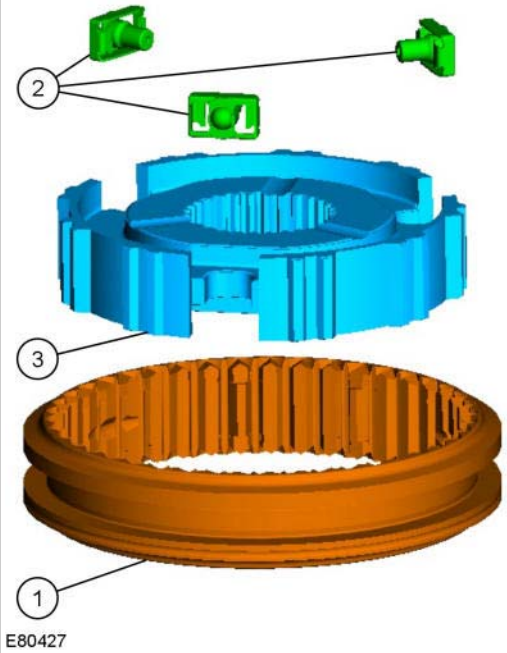
Synchronizer sleeve.

2.

Pressure pieces.

3.

Synchronizer hub.



NOTE: 3rd/4th gear only.

NOTE: Make a note of/mark the installed positions of the components before removal.

NOTE: Make sure that the endstops do not drop off of the synchronizer sleeve during disassembly so that the correct installed position can be noted.

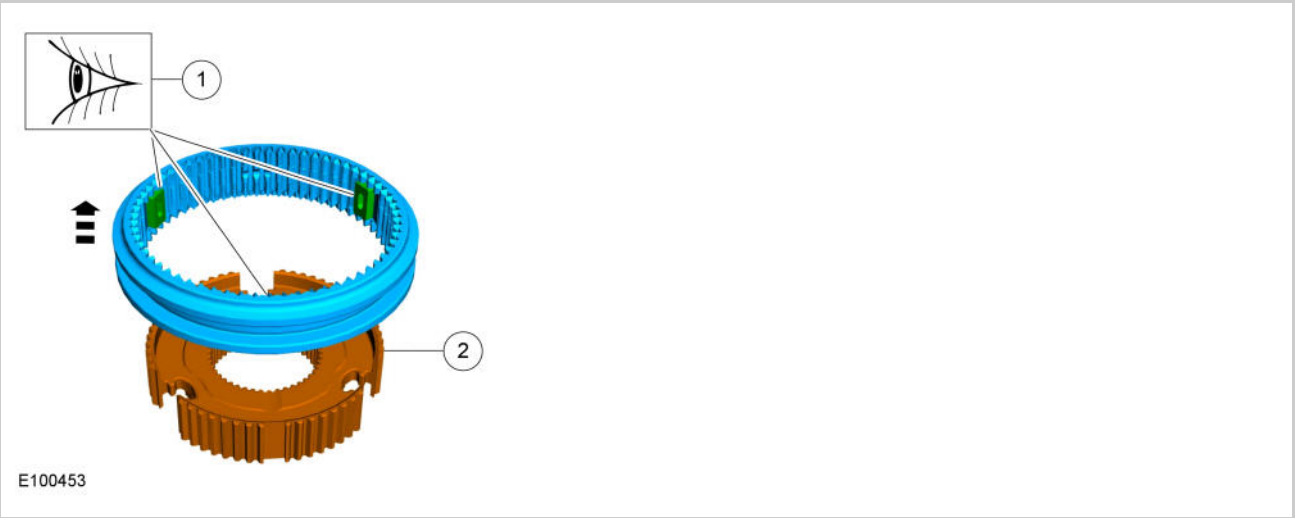
2.

1.

Remove the endstops from the synchronizer sleeve.

2.

Synchronizer hub.



DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES > SYNCHRONIZERS > ASSEMBLY

NOTE: 3rd/4th gear only.

1.

1.

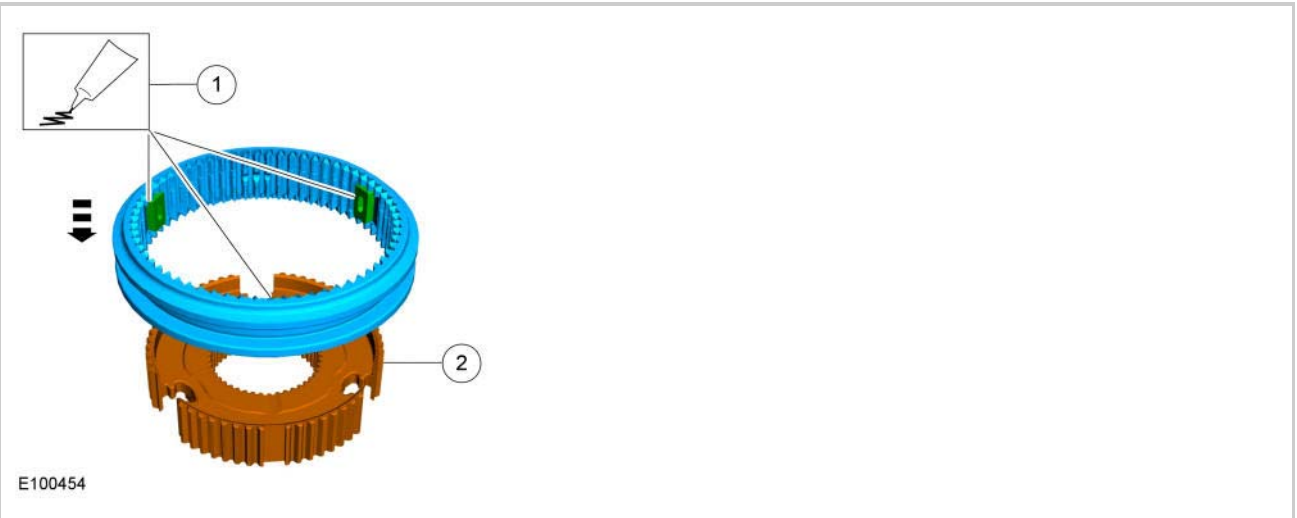
Use grease to hold the endstops to the synchronizer sleeve.

Material

: High Temperature 4x4 Front Axle and Wheel Bearing Grease / XG-11 (WSS-M1C267-A1)

2.

Install the synchronizer sleeve on the synchronizer hub.



NOTE: Make sure that the components are installed in their original positions.

2.

1.

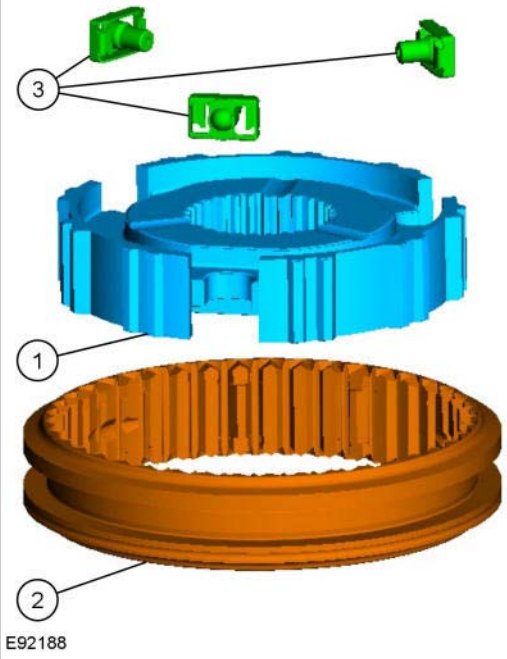
Synchronizer hub.

2.

Synchronizer sleeve.

3.

Pressure pieces.

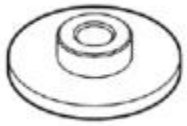


E92188

DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES > TRANSMISSION CASE

Special Tool(s) / General Equipment

 E133913	205-153 (T80T-4000-W) Handle

	307-541 Installer, Transfer Gear Bearing TKIT-2005D1-F
 E170503	307-557 Installer, Ball Bearing TKIT-2005U-FLM TKIT-2005U-LM TKIT-2006U-FLM/LM TKIT-2006UF/FM
 E216426	307-626 Installer, Differential Seal TKIT-2008ET-FLM TKIT-2008ET-ROW
 E170535	307-664 Case Bushing Installer TKIT-2009OP-FLM TKIT-2009OP-ROW
	308-202 (T91T-7127-B) Installer, Input Shaft Bearing TKIT-1991-F/FM TKIT-1991-FLM
 E216591	308-812 Remover, Detent TKIT-2010A-F TKIT-2010A-LM TKIT-2010A-ROW
Slide Hammer	

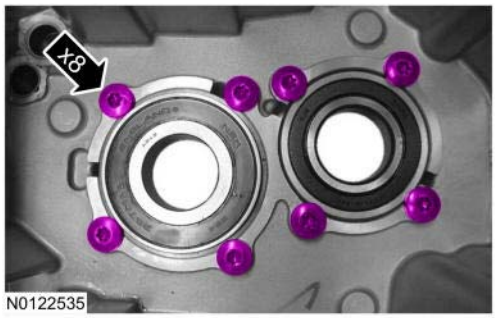
Materials

Name	Specification
Threadlock 262 TA-26	WSK-M2G351-A6
Motorcraft® Dual Clutch Transmission Fluid XT-11-QDC	WSS-M2C200-D2

DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES > TRANSMISSION CASE > DISASSEMBLY

1.

Remove the bolts.

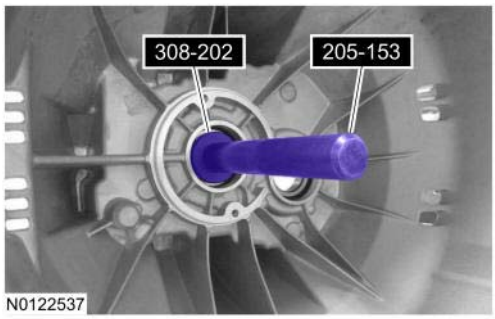


2.

Using the special tools, remove the input shaft bearing.

Inspect the input shaft bearing for wear or damage. Install a new bearing as necessary.

Use Special Service Tool: 308-202 (T91T-7127-B) Installer, Input Shaft Bearing, 205-153 (T80T-4000-W) Handle.

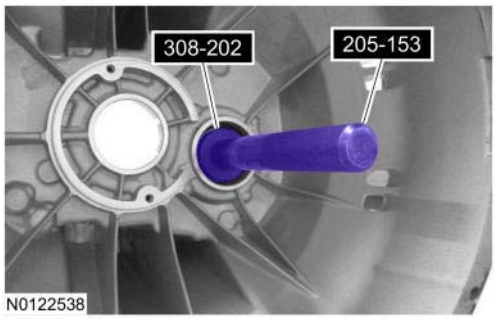


3.

Using the special tools, remove the countershaft bearing.

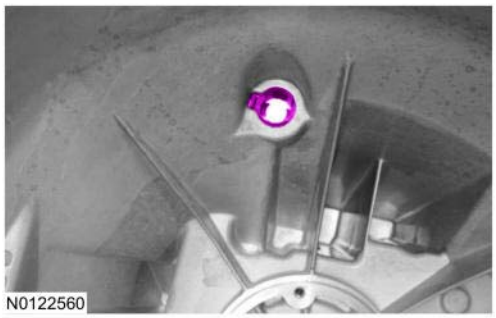
Inspect the countershaft bearing for wear or damage. Install a new bearing as necessary.

Use Special Service Tool: 308-202 (T91T-7127-B) Installer, Input Shaft Bearing, 205-153 (T80T-4000-W) Handle.



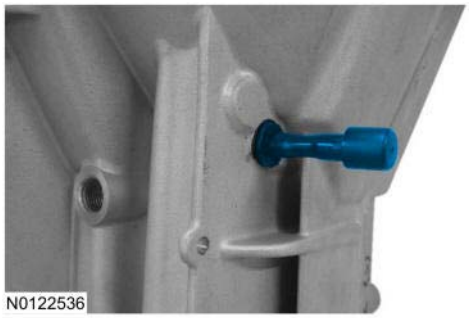
4.

If replacing the transmission case, remove the clutch slave cylinder tube retaining clip.



5.

If replacing the transmission case, remove the transmission case vent tube.



6.

Using a brass drift, tap the dowel pins flush with the transmission case.



7.

Remove the bolt and the reverse idler gear assembly.

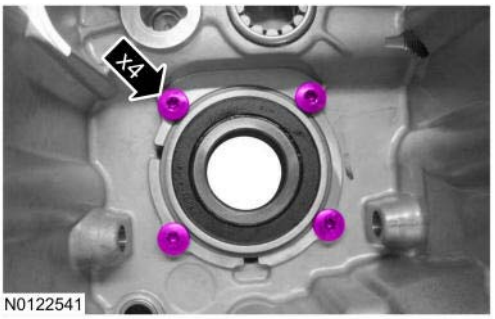
Inspect the reverse idler gear for wear or damage. Install a new gear as necessary.

Inspect the reverse idler gear needle bearing and shaft for wear or damage. Install new components as necessary.


N0122540

8.

Remove the bolts.



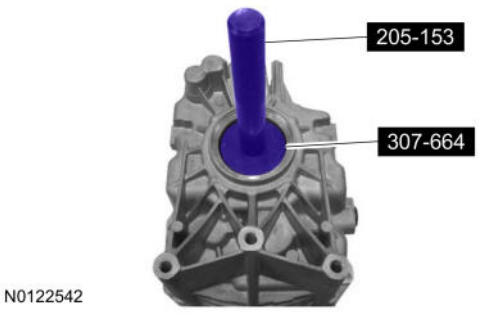
N0122541

9.

Using the special tools, remove the output shaft bearing.

Inspect the output shaft bearing for wear or damage. Install a new bearing as necessary.

Use Special Service Tool: 307-664 Case Bushing Installer, 205-153 (T80T-4000-W) Handle.



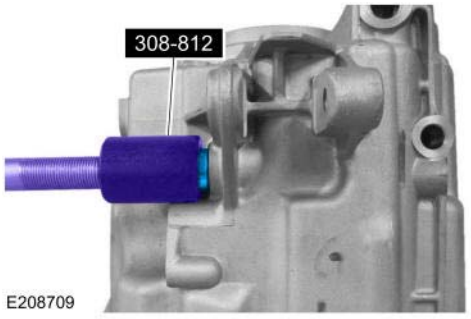
N0122542

10.

If replacing the transmission case, use the special tools to remove the shift shaft detent.

Use Special Service Tool: 308-812 Remover, Detent.

Use the General Equipment: Slide Hammer



11.

If leakage is present, remove the shift shaft seal.



12.

Clean and inspect the front and rear transmission cases.

Inspect the shift shaft and shift rail bearing for wear or damage. Install new components as necessary.

Inspect the rear countershaft for wear or damage. Install a new rear transmission case as necessary.

DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES > TRANSMISSION CASE > ASSEMBLY

NOTE: Lubricate all components with the recommended transmission fluid before reassembling.

1.

If removed, install the shift shaft seal.

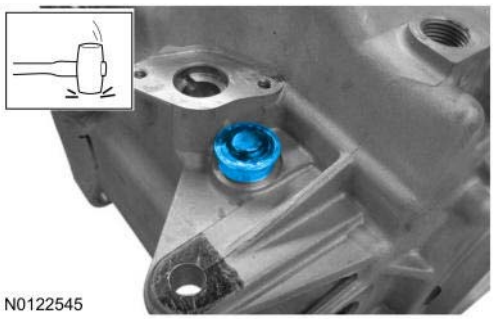
Material

: Motorcraft® Dual Clutch Transmission Fluid / XT-11-QDC (WSS-M2C200-D2)



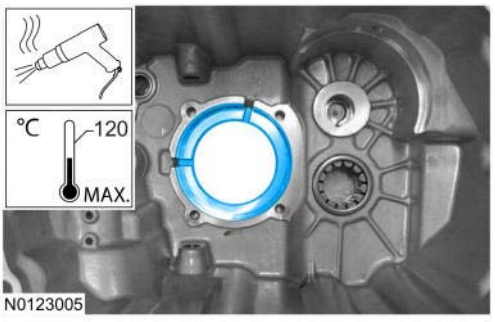
2.

If removed, use a soft-faced hammer to install the shift shaft detent.



NOTE: Do not heat the transmission case higher the 120°C (248°F) maximum or damage to the transmission case can occur.

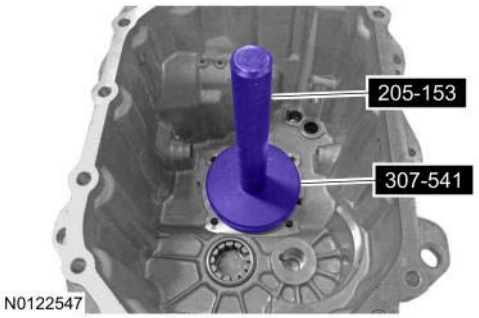
3.
Using a heat gun, heat the transmission case to maximum of 120°C (248°F).



NOTE: Install the output shaft bearing with the grooved side of the outer output shaft bearing race facing the inside of the transmission case or damage to the transmission case can occur.

4.
Using the special tools, install the output shaft bearing.

Use Special Service Tool: 307-541 Installer, Transfer Gear Bearing, 205-153 (T80T-4000-W) Handle.



5.

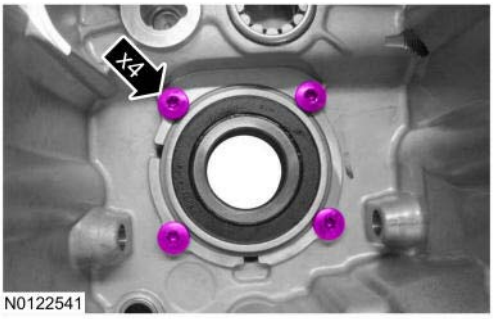
Apply threadlock and install the bearing retaining bolts.

Material

: Threadlock 262 / TA-26 (WSK-M2G351-A6)

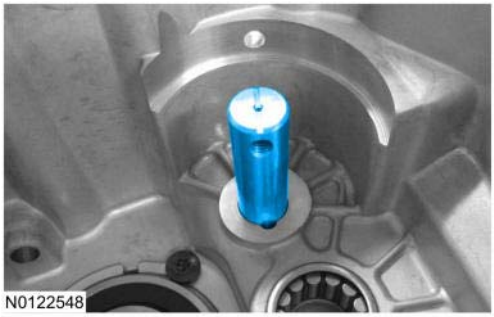
Torque

: 27 lb.ft (36 Nm)



6.

Install the reverse idler gear shaft.



7.

Install the reverse idler gear and the reverse idler gear needle bearing.


N0122549

8.

Install the reverse idler gear bracket.


N0122550

9.

Apply threadlock and install the reverse idler gear bracket bolt.

Material

: Threadlock 262 / TA-26 (WSK-M2G351-A6)

Torque

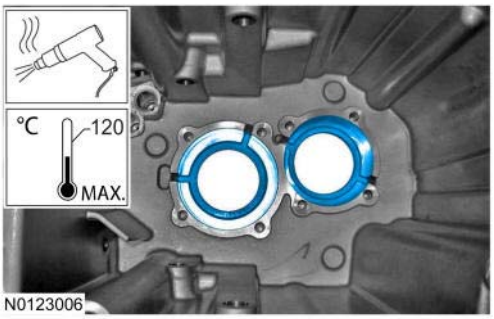
: 20 lb.ft (27 Nm)


N0122540

NOTE: Do not heat the transmission case higher the 120°C (248°F) maximum or

damage to the transmission case can occur.

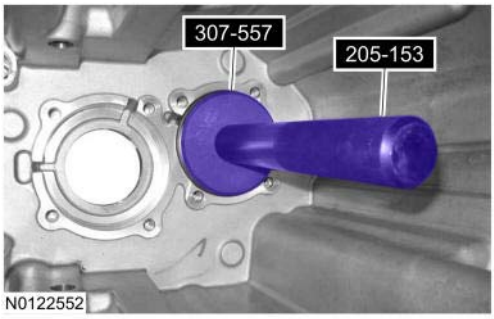
10.
Using a heat gun, heat the transmission case to maximum of 120°C (248°F).



11.

Using the special tools, install the countershaft bearing.

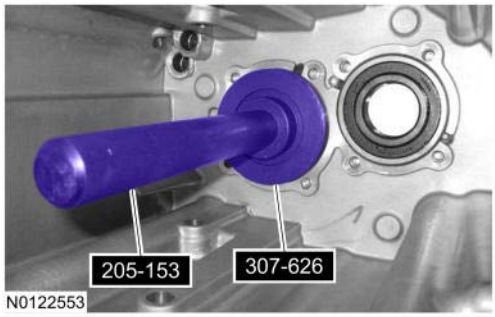
Use Special Service Tool: 307-557 Installer, Ball Bearing, 205-153 (T80T-4000-W) Handle.



NOTE: Install the input shaft bearing with the grooved side of the outer input shaft bearing race facing the inside of the transmission case or damage to the transmission case can occur.

12.
Using the special tools, install the input shaft bearing.

Use Special Service Tool: 307-626 Installer, Differential Seal, 205-153 (T80T-4000-W) Handle.



13.

Apply threadlock and install the bearing retaining bolts.

Material

: Threadlock 262 / TA-26 (WSK-M2G351-A6)

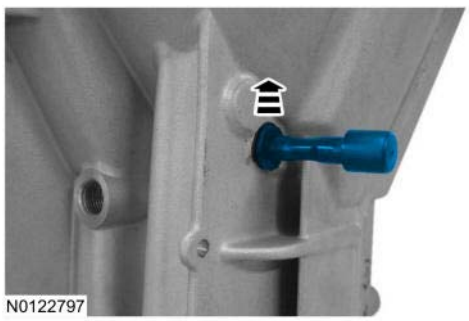
Torque

: 27 lb.ft (36 Nm)



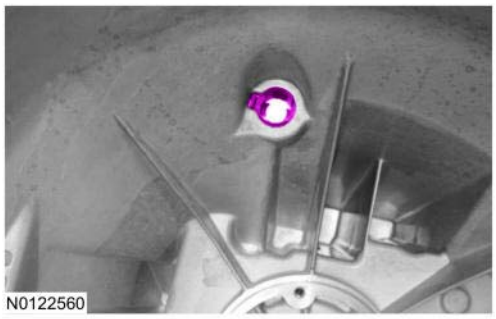
NOTE: Before installing the vent tube, lightly coat the vent tube "O" ring with recommended transmission fluid.

14.
If removed, install the transmission case vent tube with the notch pointing to the front of the transmission case.



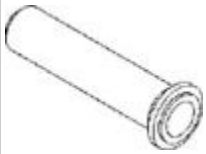
15.

If removed, install the clutch slave cylinder tube retaining clip.



ASSEMBLY > TRANSMISSION - 2.3L ECOBOOST (201KW 273PS)

Special Tool(s) / General Equipment

	205-153 (T80T-4000-W) Handle
	308-806 Installer, Front Seal TKIT-2010A-F TKIT-2010A-LM TKIT-2010A-ROW
	308-808 Installer, Rear Flange TKIT-2010A-F TKIT-2010A-LM TKIT-2010A-ROW
	308-809 Installer, Syncro Gear Pack TKIT-2010A-ROW
	308-811 Installer, Rear Seal TKIT-2010A-F TKIT-2010A-LM

	TKIT-2010A-ROW
 E188622	308-937 Installer, Input Shaft Seal TKIT-2014D-FL_ROW TKIT-2014D-ROW2
 E188623	308-938 Remover/Installer, Companion Flange Nut TKIT-2014D-FL_ROW TKIT-2014D-ROW2

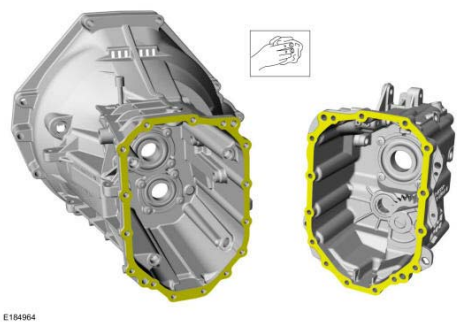
Materials

Name	Specification
Threadlock 262 TA-26	WSK-M2G351-A6
Motorcraft® MT82 Transmission Additive XL-18	-
Gasket Maker TA-16	WSK-M2G348-A5

NOTE: Lubricate all components with the recommended transmission fluid before assembling.

NOTE: Do not use metal scrapers, wire brushes, power abrasive discs, or other abrasive means to clean sealing surfaces. These tools cause scratches and gouges which make leak paths.

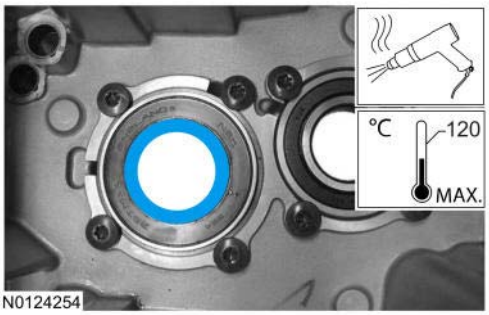
1.
Make sure that the mating faces are clean and free of foreign material. Refer to: RTV Sealing Surface Cleaning and Preparation .


E184964

NOTE: Do not heat the input shaft bearing higher than 120°C (248°F) maximum or

damage to the input shaft bearing can occur.

2.
Using a heat gun, heat the input shaft bearing inner race to a maximum of 120°C (248°F).



3.

Install the input shaft.



4.

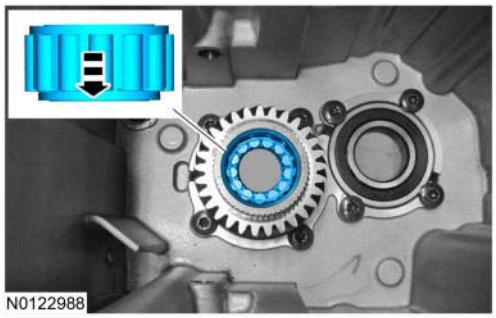
Install the input shaft snap ring.



NOTE: Make sure the small diameter side of the output shaft roller bearing cage is facing the input shaft or damage to the output shaft bearing can occur.

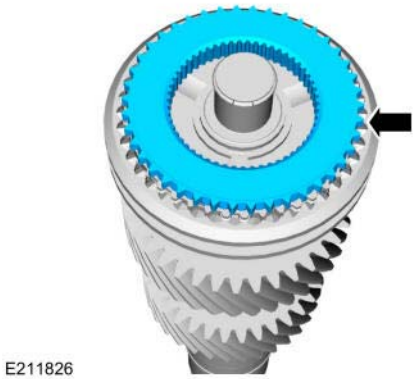
5.
With the small diameter side of the output shaft roller bearing cage facing the input shaft, install

the output shaft roller bearing.



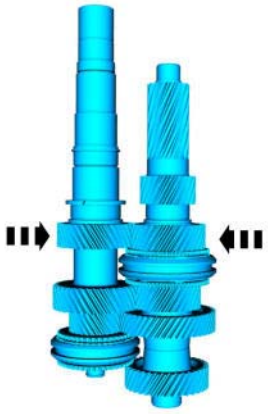
NOTE: Apply petroleum jelly to hold the 5th gear synchronizer ring and the 5th gear synchronizer cone in place during assembly.

6.
Install the 5th gear synchronizer ring and the 5th gear synchronizer cone.



7.

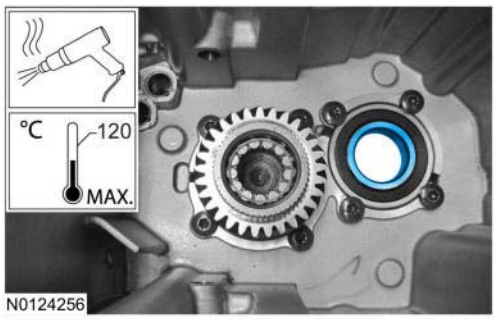
Assemble the output shaft and countershaft assemblies.



E211828

NOTE: Do not heat the countershaft bearing higher than 120°C (248°F) maximum or damage to the countershaft bearing can occur.

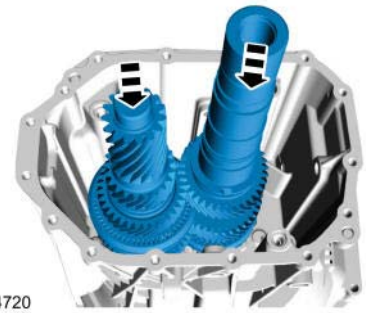
8.
Using a heat gun, heat the countershaft bearing inner race to a maximum of 120°C (248°F).



N0124256

9.

Install the output shaft and countershaft assembly.



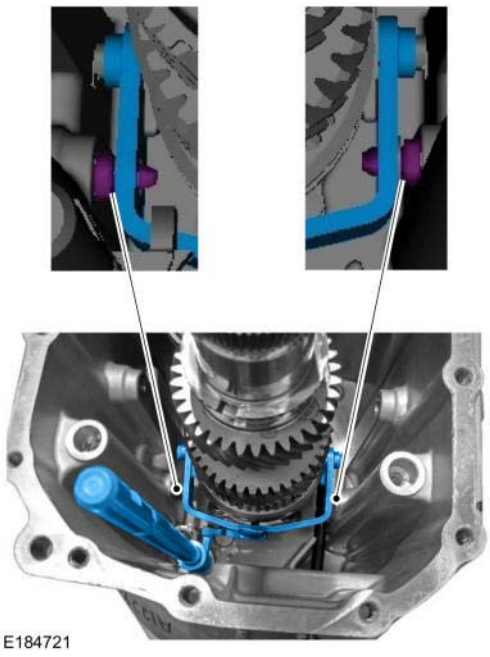
E184720

NOTE: Make sure the shift fork pivot bolts engage into the shift fork or damage to the shift fork can occur.

10.
Install the 5th/6th shift fork, the 5th/6th shift rail. Apply threadlock and sealer and loosely install the shift fork pivot bolts.

Material

: Threadlock 262 / TA-26 (WSK-M2G351-A6)

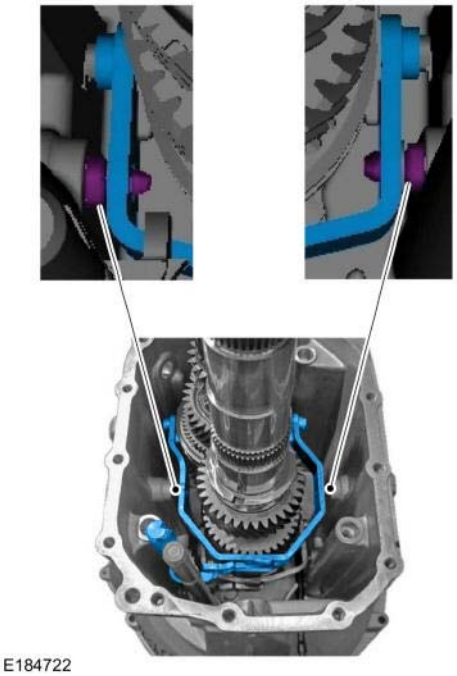


NOTE: Make sure the shift fork pivot bolts engage into the shift fork or damage to the shift fork can occur.

11.
Install the 3rd/4th shift fork, the 3rd/4th shift rail. Apply threadlock and sealer and loosely install the shift fork pivot bolts.

Material

: Threadlock 262 / TA-26 (WSK-M2G351-A6)

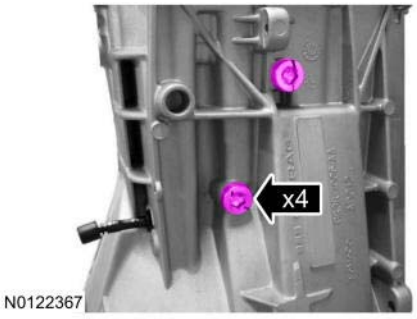


12.

Tighten the 2 LH and the 2 RH shift fork pivot bolts.

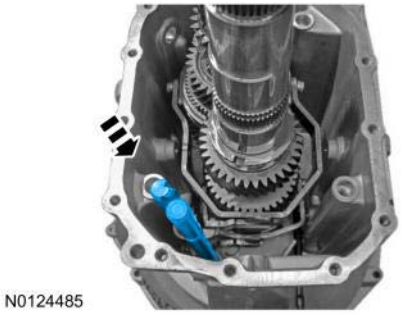
Torque

: 27 lb.ft (37 Nm)



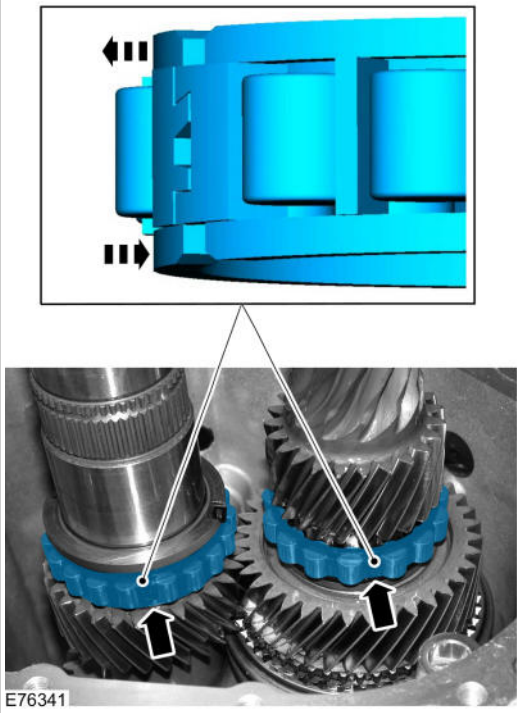
13.

Push down the 3rd/4th shift rail and the 5th/6th shift rail to lock the transmission into 2 gears.



NOTE: When installing the bearings, do not over expand the bearing cages or damage to the bearing cages can occur.

14.
Slightly expand the center support bearing cages and slide the center support bearings down the shaft assemblies. Lock the bearing cage tabs.



15.

Loosely install the center support and finger tighten the bolts.



NOTE: Install the countershaft bolt with the transmission in the vertical position with the input shaft facing down.

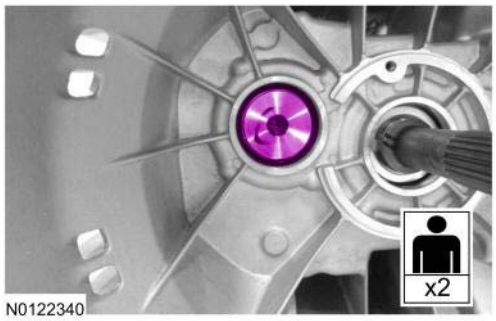
16.
Apply threadlock and install the countershaft bolt.

Material

: Threadlock 262 / TA-26 (WSK-M2G351-A6)

Torque

: 70 lb.ft (95 Nm)



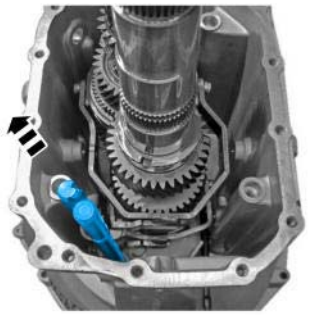
17.

Remove the center support and the bolts.



18.

Pull up on the 3rd/4th shift rail and 5th/6th shift rail to unlock the transmission from 2 gears.


N0124531

NOTE: The center support must be tightened evenly or damage to the center support or transmission case can occur.

19.
Install the center support, apply threadlock and evenly tighten the center support bolts.

Material

: Threadlock 262 / TA-26 (WSK-M2G351-A6)

Torque

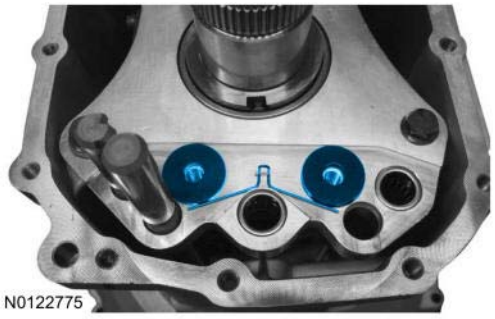
: 18 lb.ft (24 Nm)



N0123038

20.

Install the spring and spacers.



NOTE: Make sure the interlock plate moves freely.

21.
Install the interlock plate, apply threadlock and install the interlock plate bolts.

Material

: Threadlock 262 / TA-26 (WSK-M2G351-A6)

Torque

: 18 lb.ft (24 Nm)



22.

Install the 2nd gear needle bearing.



23.

Install the 2nd gear.


N0123034

NOTE: The 6 synchronizer ring tabs must engage into the 6 gear slots or damage to the synchronizer ring assembly can occur.

NOTE: The 2nd gear synchronizer ring assembly outer ring has 2 identification notches.

24.
Install the 2nd gear synchronizer ring assembly.



N0124481

NOTE: The 3 synchronizer ring tabs must engage into the 3 synchronizer hub slots or damage to the synchronizer hub and the synchronizer ring assembly can occur.

NOTE: The long shoulder of the 1st/2nd synchronizer hub must be facing 2nd gear or damage to the synchronizer hub can occur.

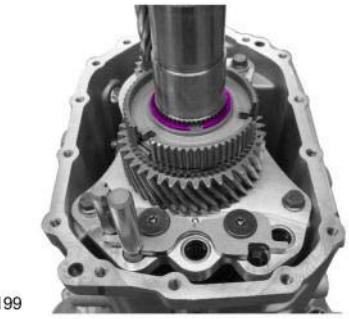
25.
With the long shoulder of the 1st/2nd synchronizer hub must be facing 2nd gear, use the special tool and install the 1st/2nd synchronizer hub.

Use Special Service Tool: 308-809 Installer, Syncro Gear Pack.



26.

Install the 1st/2nd synchronizer hub snap ring.



NOTE: Align the index marks made during removal on the synchronizer sleeve and the synchronizer hub.

27.
With the groove on the 1st/2nd synchronizer sleeve facing 2nd gear, install the 1st/2nd shift fork the 1st/2nd shift rail and the 1st/2nd synchronizer sleeve.


N0124202

NOTE: Slide the synchronizer sleeve up to install the pressure pieces.

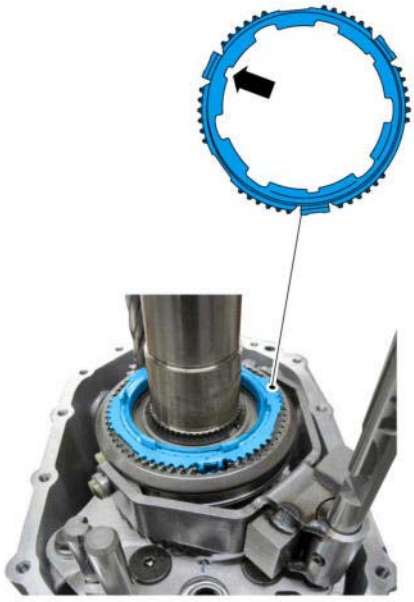
28.
Install the 3 pressure pieces.


N0124193

NOTE: The 3 synchronizer ring tabs must engage into the 3 synchronizer assembly slots or damage to the synchronizer assembly and the synchronizer ring assembly can occur.

NOTE: The 1st gear synchronizer ring assembly outer ring has one identification notch.

29.
Install the 1st gear synchronizer ring assembly.



N0124482

30.

Install the 1st gear needle bearing.



N0123022

NOTE: The 6 synchronizer ring tabs must engage into the 6 gear slots or damage to the synchronizer assembly and synchronizer ring assembly can occur.

31.
Install the 1st gear.


N0123021

32.

Using the special tool, install the reverse gear needle bearing race.

Use Special Service Tool: 308-809 Installer, Syncro Gear Pack.



N0122778

33.

Install the reverse gear needle bearing.


N0123019

34.

Install the reverse gear.


N0123020

NOTE: The shift shaft must be installed in the neutral position prior to installing the shift shaft stop pin or damage to the shift shaft pin can occur.

35.
Install the shift shaft in the neutral position, using a soft-faced hammer install the shift shaft stop pin.


N0123037

36.

Install the reverse gear synchronizer ring.


N0123018

NOTE: The 3 synchronizer ring tabs must engage into the 3 synchronizer assembly slots or damage to the synchronizer assembly and the synchronizer ring can occur.

37.
Using the special tool, install the reverse gear synchronizer assembly.

Use Special Service Tool: 308-809 Installer, Syncro Gear Pack.



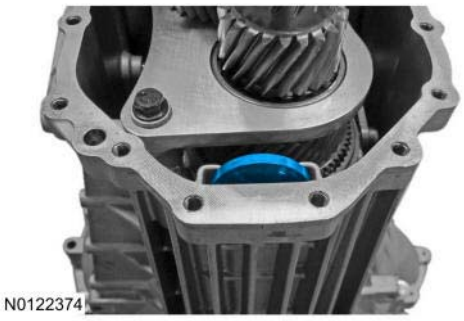
NOTE: To install the reverse shift fork and the reverse shift rail assembly, the transmission must be in neutral and the grooves on the shift rails must be aligned with the interlock plate.

38.
Install the reverse shift fork and the reverse shift rail assembly.



39.

Install the magnet.



40.

Shift the transmission into 4th gear.



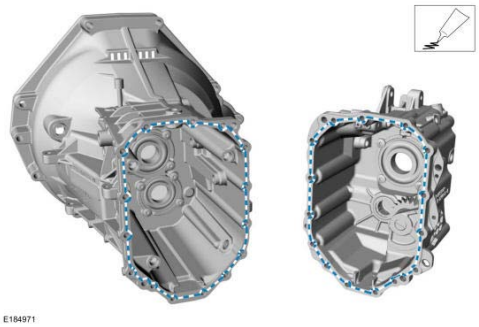
NOTE: Art shown in illustration with internal components removed for clarity.

NOTE: Do not wait longer than 10 minutes to install the rear transmission case assembly due to rapid cure of the sealant.

41.
Clean the sealing surfaces of the front transmission case and the sealing surfaces of the rear transmission case. Thinly coat the sealing surface of the front transmission case assembly and the sealing surface of the rear transmission case assembly with gasket maker.

Material

: Gasket Maker / TA-16 (WSK-M2G348-A5)



NOTE: The rear transmission case assembly must be installed evenly with the transmission shifted into 4th gear, do not allow the shift rails to bind during installation or damage to the transmission case assembly can occur.

42.
Using the special tools, install the rear transmission case assembly.

Use Special Service Tool: 308-809 Installer, Syncro Gear Pack, 308-808 Installer, Rear Flange.



NOTE: Make sure the shift fork pivot bolts engage into the shift fork or damage to the shift fork can occur.

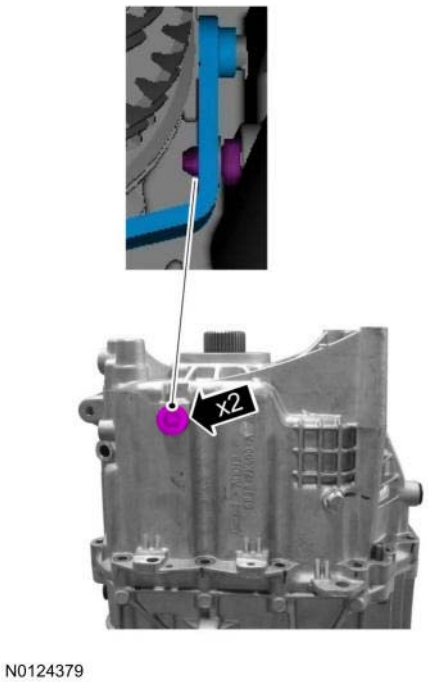
43.
Apply threadlock and sealer and install the shift fork pivot bolts.

Material

: Threadlock 262 / TA-26 (WSK-M2G351-A6)

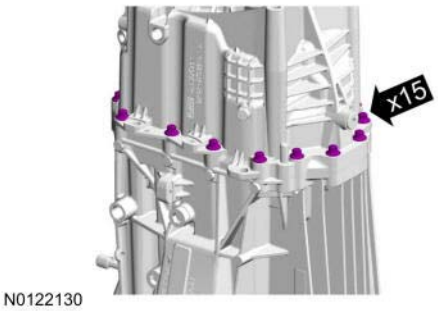
Torque

: 27 lb.ft (37 Nm)



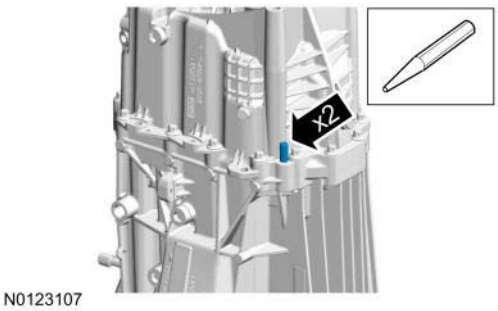
44.

Loosely install the bolts.



45.

Using a brass drift, tap the dowel pins flush with the transmission case.

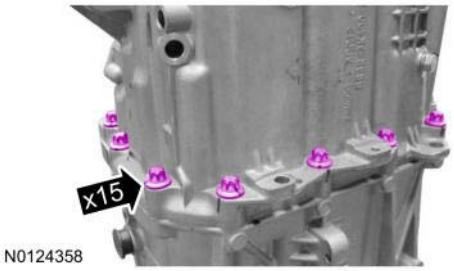


46.

Tighten the bolts.

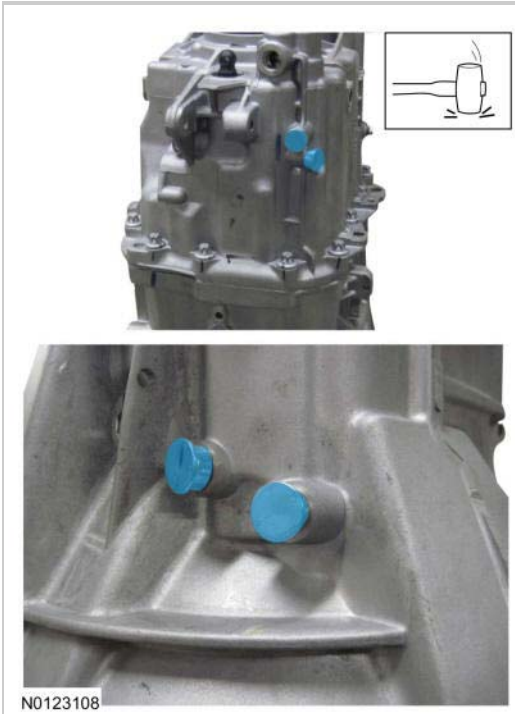
Torque

: 18 lb.ft (24 Nm)



47.

Using a soft-faced hammer install the 4 shift rail detents.



48.

1.

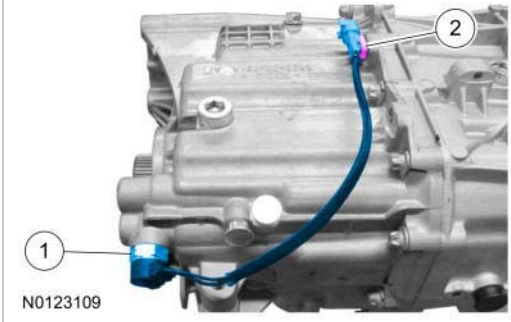
Install the reverse lamp switch.

Torque

: 177 lb.in (20 Nm)

2.

Attach the electrical connector retainer.

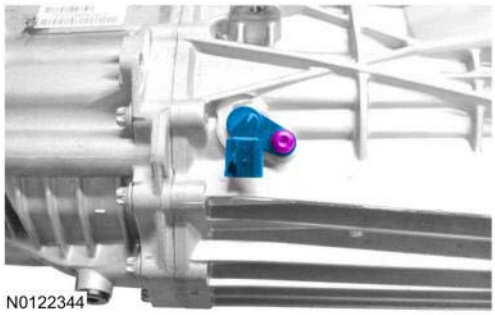


49.

Install the OSS sensor and the bolt.

Torque

: 89 lb.in (10 Nm)



50.

Install a new output shaft seal on the special tools.

Use Special Service Tool: 308-811 Installer, Rear Seal, 205-153 (T80T-4000-W) Handle.



51.

Using the special tools, install the output shaft seal.

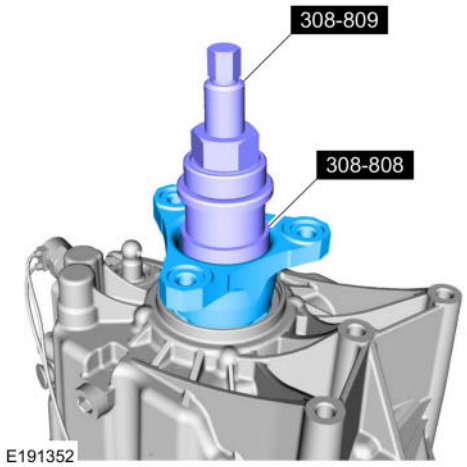
Use Special Service Tool: 308-811 Installer, Rear Seal, 205-153 (T80T-4000-W) Handle.



52.

Using the special tools, install the output shaft flange.

Use Special Service Tool: 308-809 Installer, Syncro Gear Pack, 308-808 Installer, Rear Flange.



53.

Clean the threads on the output shaft bolt and apply one dot of threadlock to the lower end of the output shaft bolt threads. Using the special tools, install the output shaft flange bolt and tighten in 3 stages.

Use Special Service Tool: 308-938 Remover/Installer, Companion Flange Nut.

Material

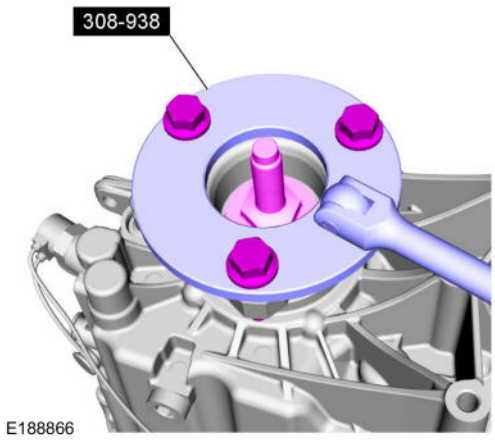
: Threadlock 262 / TA-26 (WSK-M2G351-A6)

Torque:

Stage 1: 148 lb.ft (200 Nm)

Stage 2: Loosen: 5 turn(s)

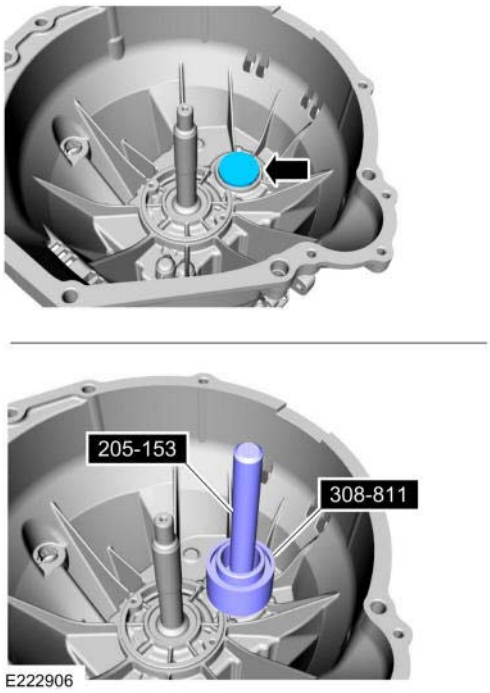
Stage 3: 133 lb.ft (180 Nm)



54.

Install the countershaft bolt cover in the clutch housing. Using the special tools, drive the countershaft bolt cover into the clutch housing.

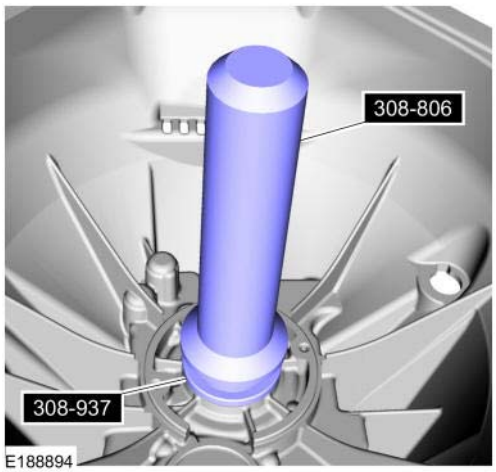
Use Special Service Tool: 308-811 Installer, Rear Seal, 205-153 (T80T-4000-W) Handle.



55.

Using the special tool, install the new input shaft seal.

Use Special Service Tool: 308-806 Installer, Front Seal, 308-937 Installer, Input Shaft Seal.



56.

1.

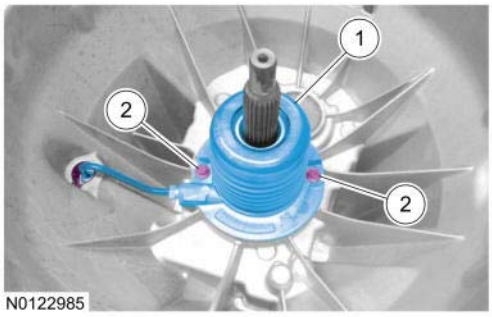
Position the clutch slave cylinder and if equipped, the clutch slave cylinder spacer and connect the tube in the retaining clip.

2.

Install the 2 bolts.

Torque

: 97 lb.in (11 Nm)



57.

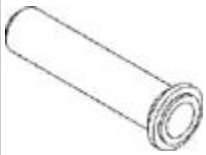
Add 1 bottle (.91 fl oz (27 ml)) of XL-18 to the transmission if a new synchronizer was installed.

Material

: Motorcraft® MT82 Transmission Additive / XL-18

ASSEMBLY > TRANSMISSION - 3.7L DURATEC (227KW 301PS)

Special Tool(s) / General Equipment

	205-153 (T80T-4000-W) Handle
	308-806 Installer, Front Seal TKIT-2010A-F TKIT-2010A-LM TKIT-2010A-ROW
	308-808 Installer, Rear Flange TKIT-2010A-F TKIT-2010A-LM TKIT-2010A-ROW

	308-809 Installer, Syncro Gear Pack TKIT-2010A-ROW
	308-811 Installer, Rear Seal TKIT-2010A-F TKIT-2010A-LM TKIT-2010A-ROW
 E188623	308-938 Remover/Installer, Companion Flange Nut TKIT-2014D-FL_ROW TKIT-2014D-ROW2

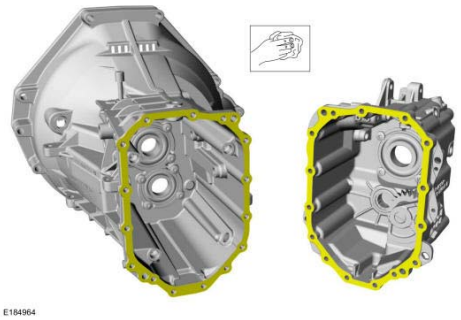
Materials

Name	Specification
Threadlock 262 TA-26	WSK-M2G351-A6
Motorcraft® MT82 Transmission Additive XL-18	-
Gasket Maker TA-16	WSK-M2G348-A5

NOTE: Lubricate all components with the recommended transmission fluid before assembling.

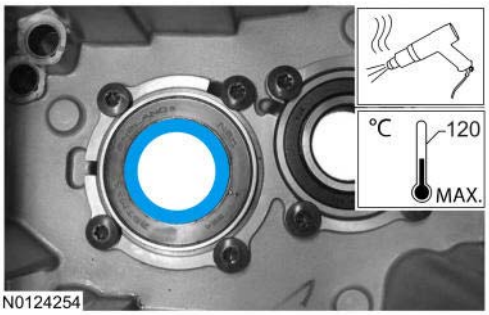
NOTE: Do not use metal scrapers, wire brushes, power abrasive discs, or other abrasive means to clean sealing surfaces. These tools cause scratches and gouges which make leak paths.

1.
Make sure that the mating faces are clean and free of foreign material. Refer to: RTV Sealing Surface Cleaning and Preparation .



NOTE: Do not heat the input shaft bearing higher than 120°C (248°F) maximum or damage to the input shaft bearing can occur.

2.
Using a heat gun, heat the input shaft bearing inner race to a maximum of 120°C (248°F).



3.

Install the input shaft.



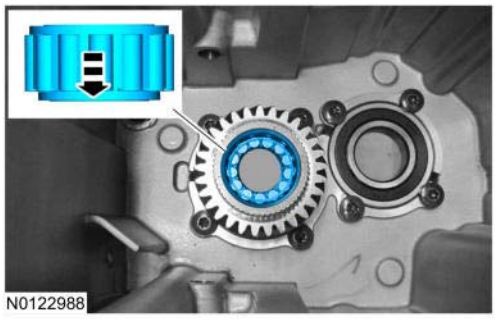
4.

Install the input shaft snap ring.



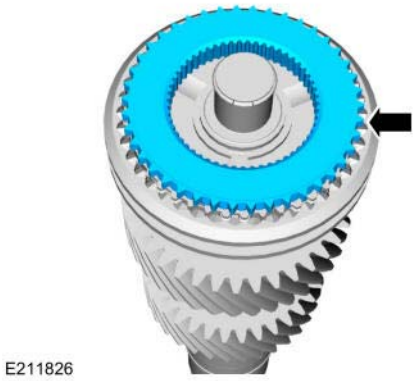
NOTE: Make sure the small diameter side of the output shaft roller bearing cage is facing the input shaft or damage to the output shaft bearing can occur.

5.
With the small diameter side of the output shaft roller bearing cage facing the input shaft, install the output shaft roller bearing.



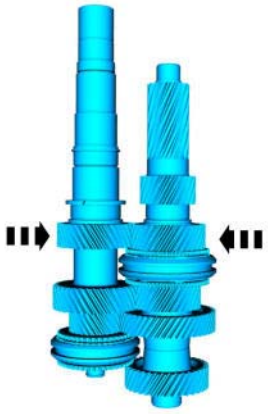
NOTE: Apply petroleum jelly to hold the 5th gear synchronizer ring and the 5th gear synchronizer cone in place during assembly.

6.
Install the 5th gear synchronizer ring and the 5th gear synchronizer cone.



7.

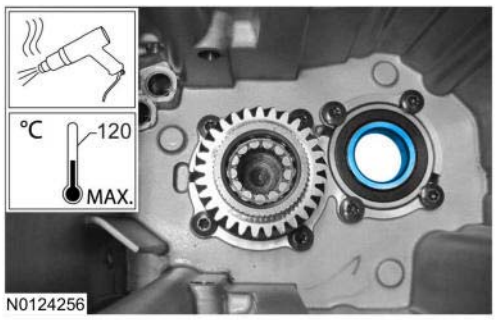
Assemble the output shaft and countershaft assemblies.



E211828

NOTE: Do not heat the countershaft bearing higher than 120°C (248°F) maximum or damage to the countershaft bearing can occur.

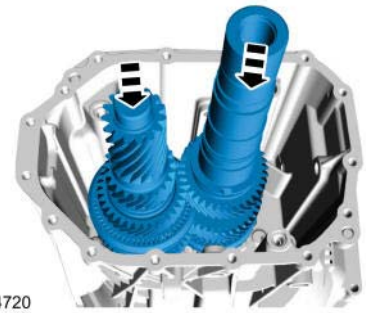
8.
Using a heat gun, heat the countershaft bearing inner race to a maximum of 120°C (248°F).



N0124256

9.

Install the output shaft and countershaft assembly.



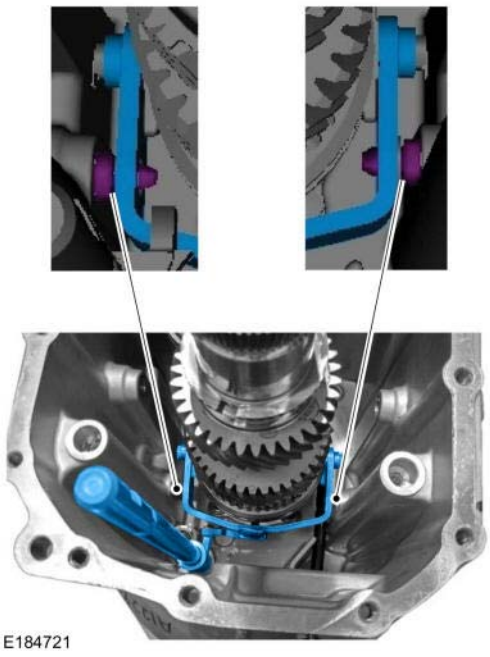
E184720

NOTE: Make sure the shift fork pivot bolts engage into the shift fork or damage to the shift fork can occur.

10.
Install the 5th/6th shift fork, the 5th/6th shift rail. Apply threadlock and sealer and loosely install the shift fork pivot bolts.

Material

: Threadlock 262 / TA-26 (WSK-M2G351-A6)

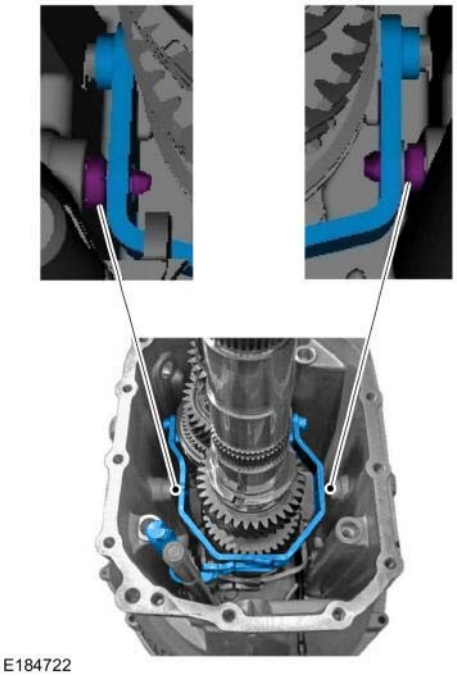


NOTE: Make sure the shift fork pivot bolts engage into the shift fork or damage to the shift fork can occur.

11.
Install the 3rd/4th shift fork, the 3rd/4th shift rail. Apply threadlock and sealer and loosely install the shift fork pivot bolts.

Material

: Threadlock 262 / TA-26 (WSK-M2G351-A6)

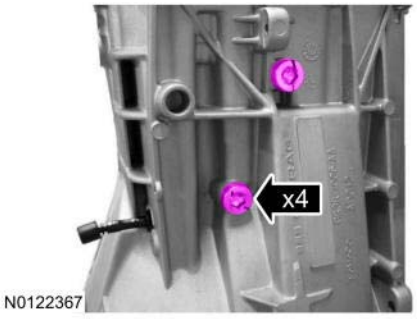


12.

Tighten the 2 LH and the 2 RH shift fork pivot bolts.

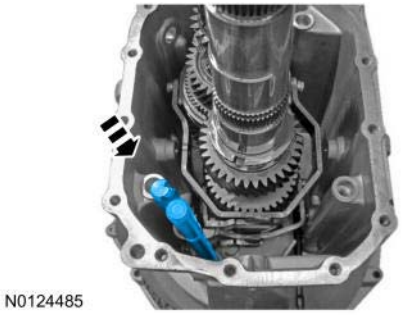
Torque

: 27 lb.ft (37 Nm)



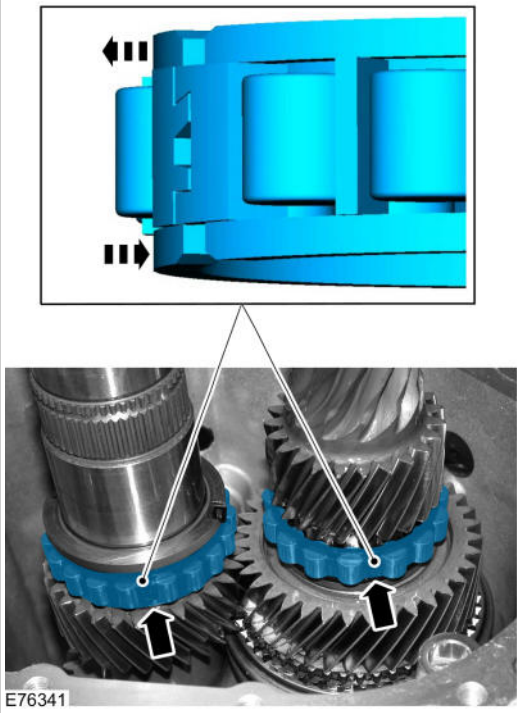
13.

Push down the 3rd/4th shift rail and the 5th/6th shift rail to lock the transmission into 2 gears.



NOTE: When installing the bearings, do not over expand the bearing cages or damage to the bearing cages can occur.

14.
Slightly expand the center support bearing cages and slide the center support bearings down the shaft assemblies. Lock the bearing cage tabs.



15.

Loosely install the center support and finger tighten the bolts.



NOTE: Install the countershaft bolt with the transmission in the vertical position with the input shaft facing down.

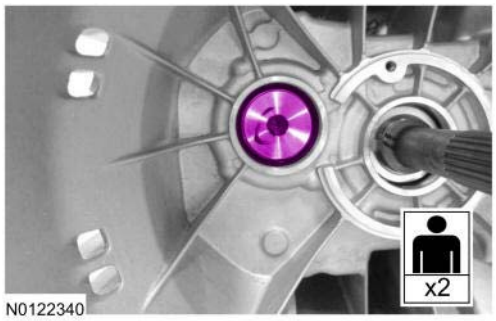
16.
Apply threadlock and install the countershaft bolt.

Material

: Threadlock 262 / TA-26 (WSK-M2G351-A6)

Torque

: 70 lb.ft (95 Nm)



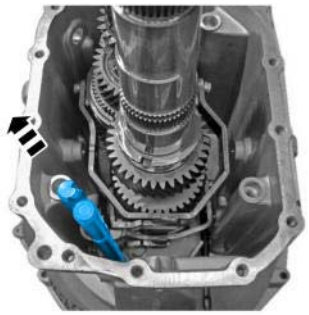
17.

Remove the center support and the bolts.



18.

Pull up on the 3rd/4th shift rail and 5th/6th shift rail to unlock the transmission from 2 gears.


N0124531

NOTE: The center support must be tightened evenly or damage to the center support or transmission case can occur.

19.
Install the center support, apply threadlock and evenly tighten the center support bolts.

Material

: Threadlock 262 / TA-26 (WSK-M2G351-A6)

Torque

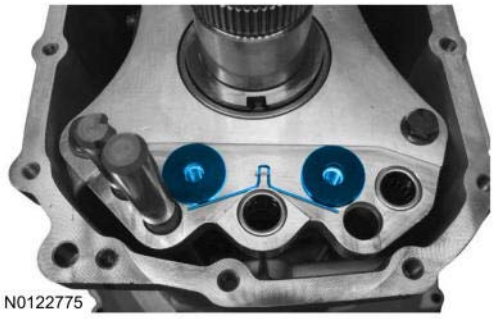
: 18 lb.ft (24 Nm)



N0123038

20.

Install the spring and spacers.



NOTE: Make sure the interlock plate moves freely.

21.
Install the interlock plate, apply threadlock and install the interlock plate bolts.

Material

: Threadlock 262 / TA-26 (WSK-M2G351-A6)

Torque

: 18 lb.ft (24 Nm)



22.

Install the 2nd gear needle bearing.



23.

Install the 2nd gear.


N0123034

NOTE: The 6 synchronizer ring tabs must engage into the 6 gear slots or damage to the synchronizer ring assembly can occur.

NOTE: The 2nd gear synchronizer ring assembly outer ring has 2 identification notches.

24.
Install the 2nd gear synchronizer ring assembly.



N0124481

NOTE: The 3 synchronizer ring tabs must engage into the 3 synchronizer hub slots or damage to the synchronizer hub and the synchronizer ring assembly can occur.

NOTE: The long shoulder of the 1st/2nd synchronizer hub must be facing 2nd gear or damage to the synchronizer hub can occur.

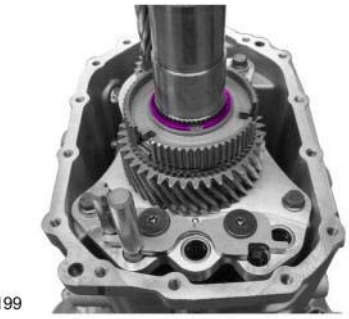
25.
With the long shoulder of the 1st/2nd synchronizer hub must be facing 2nd gear, use the special tool and install the 1st/2nd synchronizer hub.

Use Special Service Tool: 308-809 Installer, Syncro Gear Pack.



26.

Install the 1st/2nd synchronizer hub snap ring.



NOTE: Align the index marks made during removal on the synchronizer sleeve and the synchronizer hub.

27.
With the groove on the 1st/2nd synchronizer sleeve facing 2nd gear, install the 1st/2nd shift fork the 1st/2nd shift rail and the 1st/2nd synchronizer sleeve.


N0124202

NOTE: Slide the synchronizer sleeve up to install the pressure pieces.

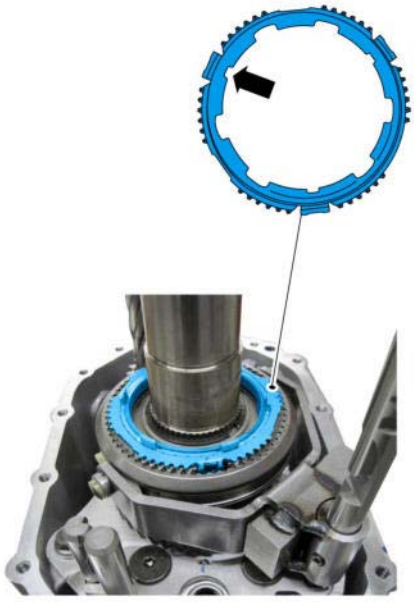
28.
Install the 3 pressure pieces.


N0124193

NOTE: The 3 synchronizer ring tabs must engage into the 3 synchronizer assembly slots or damage to the synchronizer assembly and the synchronizer ring assembly can occur.

NOTE: The 1st gear synchronizer ring assembly outer ring has one identification notch.

29.
Install the 1st gear synchronizer ring assembly.



N0124482

30.

Install the 1st gear needle bearing.



N0123022

NOTE: The 6 synchronizer ring tabs must engage into the 6 gear slots or damage to the synchronizer assembly and synchronizer ring assembly can occur.

31.
Install the 1st gear.


N0123021

32.

Using the special tool, install the reverse gear needle bearing race.

Use Special Service Tool: 308-809 Installer, Syncro Gear Pack.



N0122778

33.

Install the reverse gear needle bearing.


N0123019

34.

Install the reverse gear.


N0123020

NOTE: The shift shaft must be installed in the neutral position prior to installing the shift shaft stop pin or damage to the shift shaft pin can occur.

35.
Install the shift shaft in the neutral position, using a soft-faced hammer install the shift shaft stop pin.


N0123037

36.

Install the reverse gear synchronizer ring.


N0123018

NOTE: The 3 synchronizer ring tabs must engage into the 3 synchronizer assembly slots or damage to the synchronizer assembly and the synchronizer ring can occur.

37.
Using the special tool, install the reverse gear synchronizer assembly.

Use Special Service Tool: 308-809 Installer, Syncro Gear Pack.



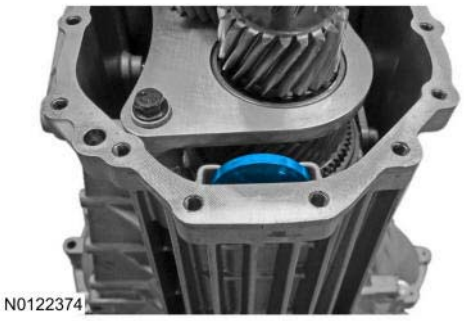
NOTE: To install the reverse shift fork and the reverse shift rail assembly, the transmission must be in neutral and the grooves on the shift rails must be aligned with the interlock plate.

38.
Install the reverse shift fork and the reverse shift rail assembly.



39.

Install the magnet.



40.

Shift the transmission into 4th gear.



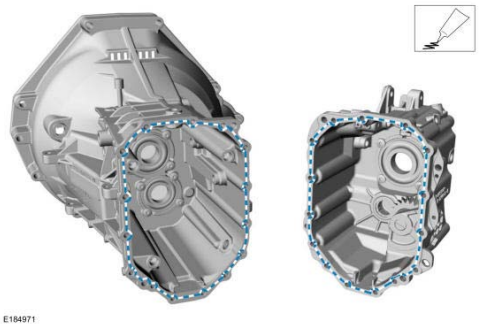
NOTE: Art shown in illustration with internal components removed for clarity.

NOTE: Do not wait longer than 10 minutes to install the rear transmission case assembly due to rapid cure of the sealant.

41.
Clean the sealing surfaces of the front transmission case and the sealing surfaces of the rear transmission case. Thinly coat the sealing surface of the front transmission case assembly and the sealing surface of the rear transmission case assembly with gasket maker.

Material

: Gasket Maker / TA-16 (WSK-M2G348-A5)



NOTE: The rear transmission case assembly must be installed evenly with the transmission shifted into 4th gear, do not allow the shift rails to bind during installation or damage to the transmission case assembly can occur.

42.
Using the special tools, install the rear transmission case assembly.

Use Special Service Tool: 308-809 Installer, Syncro Gear Pack, 308-808 Installer, Rear Flange.



NOTE: Make sure the shift fork pivot bolts engage into the shift fork or damage to the shift fork can occur.

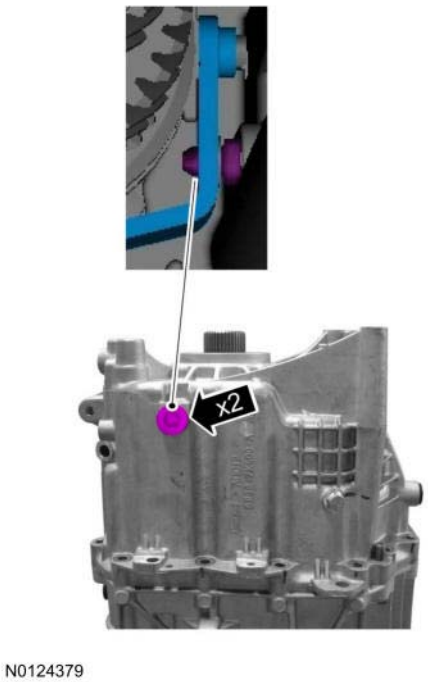
43.
Apply threadlock and sealer and install the shift fork pivot bolts.

Material

: Threadlock 262 / TA-26 (WSK-M2G351-A6)

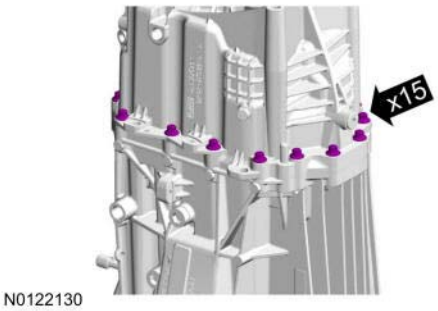
Torque

: 27 lb.ft (37 Nm)



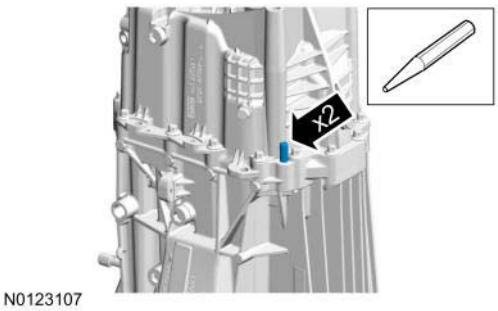
44.

Loosely install the bolts.



45.

Using a brass drift, tap the dowel pins flush with the transmission case.

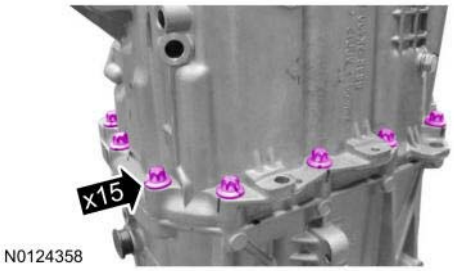


46.

Tighten the bolts.

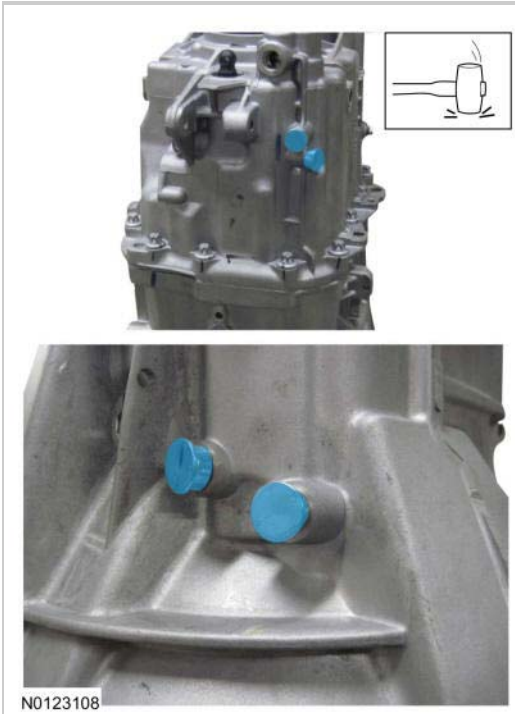
Torque

: 18 lb.ft (24 Nm)



47.

Using a soft-faced hammer install the 4 shift rail detents.



48.

1.

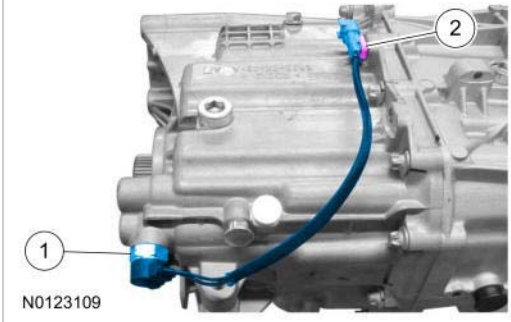
Install the reverse lamp switch.

Torque

: 177 lb.in (20 Nm)

2.

Attach the electrical connector retainer.

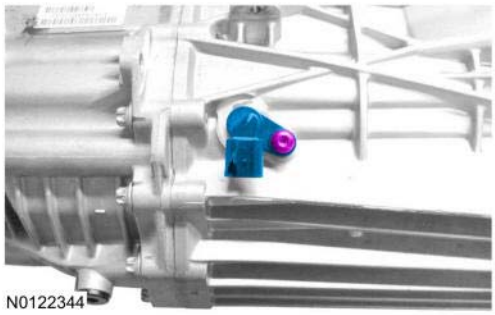


49.

Install the OSS sensor and the bolt.

Torque

: 89 lb.in (10 Nm)



50.

Install a new output shaft seal on the special tools.

Use Special Service Tool: 308-811 Installer, Rear Seal, 205-153 (T80T-4000-W) Handle.



51.

Using the special tools, install the output shaft seal.

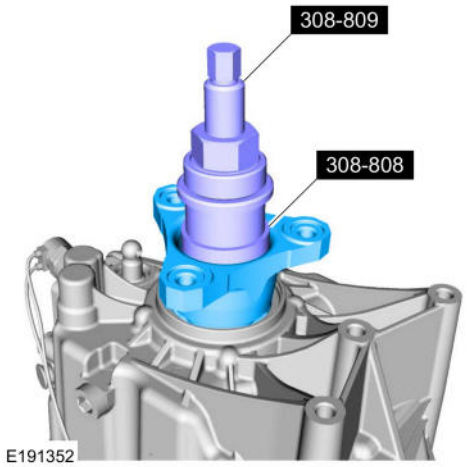
Use Special Service Tool: 308-811 Installer, Rear Seal, 205-153 (T80T-4000-W) Handle.



52.

Using the special tools, install the output shaft flange.

Use Special Service Tool: 308-809 Installer, Syncro Gear Pack, 308-808 Installer, Rear Flange.



53.

Clean the threads on the output shaft bolt and apply one dot of threadlock to the lower end of the output shaft bolt threads. Using the special tools, install the output shaft flange bolt and tighten in 3 stages.

Use Special Service Tool: 308-938 Remover/Installer, Companion Flange Nut.

Material

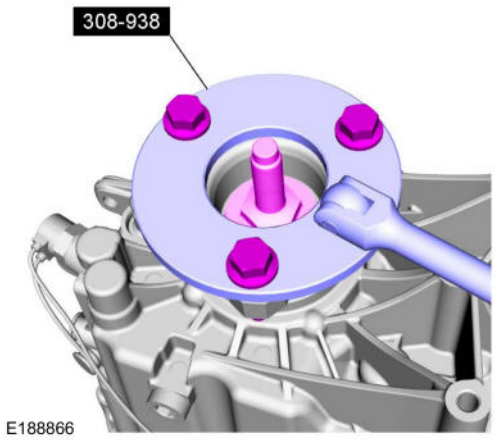
: Threadlock 262 / TA-26 (WSK-M2G351-A6)

Torque:

Stage 1: 148 lb.ft (200 Nm)

Stage 2: Loosen: 5 turn(s)

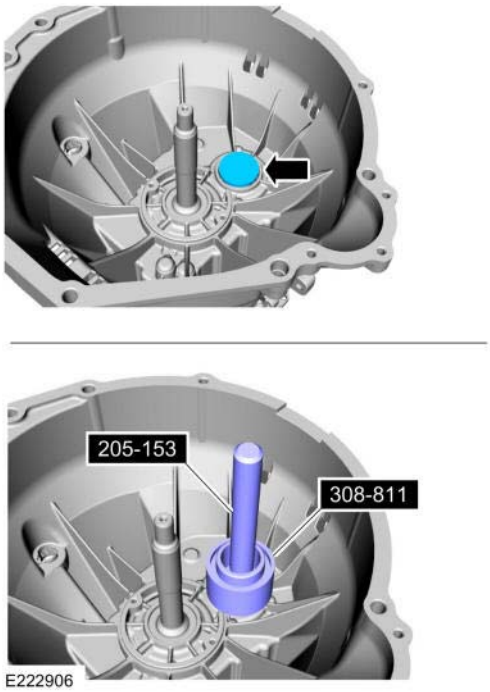
Stage 3: 133 lb.ft (180 Nm)



54.

Install the countershaft bolt cover in the clutch housing. Using the special tools, drive the countershaft bolt cover into the clutch housing.

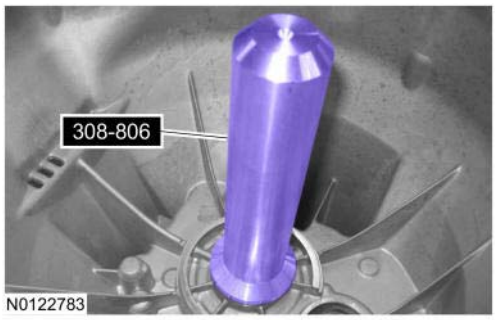
Use Special Service Tool: 308-811 Installer, Rear Seal, 205-153 (T80T-4000-W) Handle.



55.

Using the special tool, install the new input shaft seal.

Use Special Service Tool: 308-806 Installer, Front Seal.



56.

1.

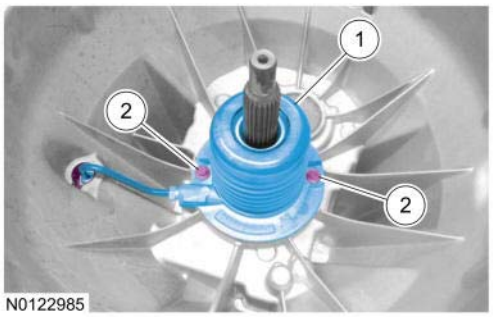
Position the clutch slave cylinder and if equipped, the clutch slave cylinder spacer and connect the tube in the retaining clip.

2.

Install the 2 bolts.

Torque

: 97 lb.in (11 Nm)



57.

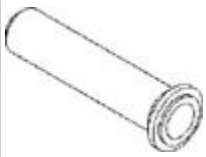
Add 1 bottle (.91 fl oz (27 ml)) of XL-18 to the transmission if a new synchronizer was installed.

Material

: Motorcraft® MT82 Transmission Additive / XL-18

ASSEMBLY > TRANSMISSION - 5.0L 32V TI-VCT

Special Tool(s) / General Equipment

 E133913	205-153 (T80T-4000-W) Handle
	308-806 Installer, Front Seal TKIT-2010A-F TKIT-2010A-LM TKIT-2010A-ROW
	308-808 Installer, Rear Flange TKIT-2010A-F TKIT-2010A-LM TKIT-2010A-ROW
	308-809 Installer, Syncro Gear Pack TKIT-2010A-ROW

	308-811 Installer, Rear Seal TKIT-2010A-F TKIT-2010A-LM TKIT-2010A-ROW
 E188623	308-938 Remover/Installer, Companion Flange Nut TKIT-2014D-FL_ROW TKIT-2014D-ROW2

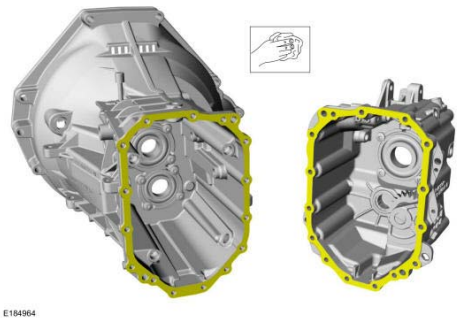
Materials

Name	Specification
Threadlock 262 TA-26	WSK-M2G351-A6
Motorcraft® MT82 Transmission Additive XL-18	-
Gasket Maker TA-16	WSK-M2G348-A5

NOTE: Lubricate all components with the recommended transmission fluid before assembling.

NOTE: Do not use metal scrapers, wire brushes, power abrasive discs, or other abrasive means to clean sealing surfaces. These tools cause scratches and gouges which make leak paths.

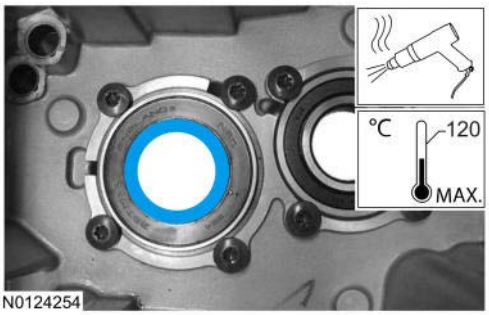
1.
Make sure that the mating faces are clean and free of foreign material. Refer to: RTV Sealing Surface Cleaning and Preparation .



NOTE: Do not heat the input shaft bearing higher than 120°C (248°F) maximum or

damage to the input shaft bearing can occur.

2.
Using a heat gun, heat the input shaft bearing inner race to a maximum of 120°C (248°F).



3.

Install the input shaft.



4.

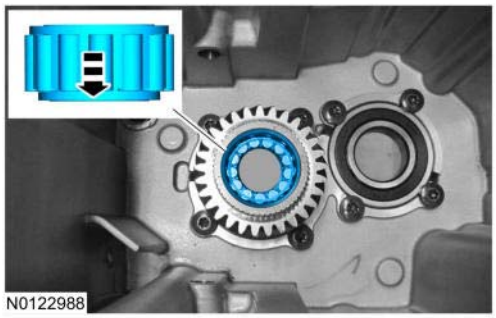
Install the input shaft snap ring.



NOTE: Make sure the small diameter side of the output shaft roller bearing cage is facing the input shaft or damage to the output shaft bearing can occur.

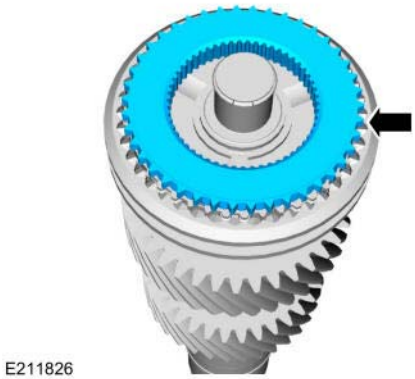
5.
With the small diameter side of the output shaft roller bearing cage facing the input shaft, install

the output shaft roller bearing.



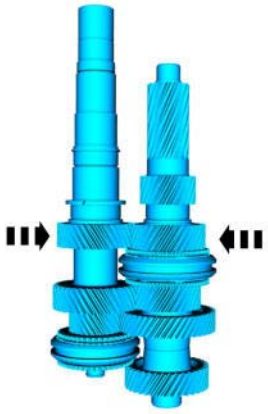
NOTE: Apply petroleum jelly to hold the 5th gear synchronizer ring and the 5th gear synchronizer cone in place during assembly.

6.
Install the 5th gear synchronizer ring and the 5th gear synchronizer cone.



7.

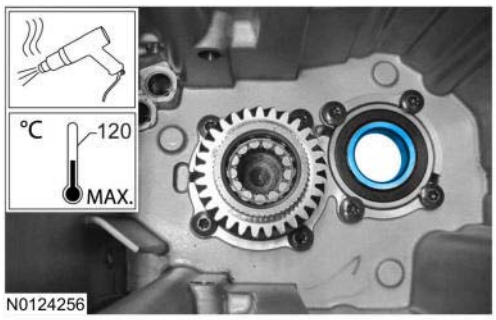
Assemble the output shaft and countershaft assemblies.



E211828

NOTE: Do not heat the countershaft bearing higher than 120°C (248°F) maximum or damage to the countershaft bearing can occur.

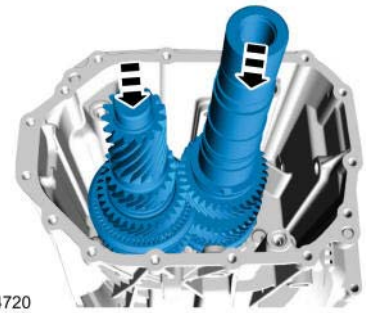
8.
Using a heat gun, heat the countershaft bearing inner race to a maximum of 120°C (248°F).



N0124256

9.

Install the output shaft and countershaft assembly.



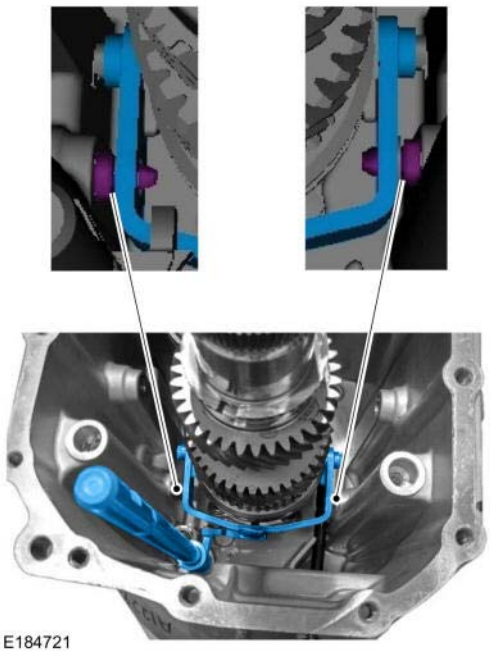
E184720

NOTE: Make sure the shift fork pivot bolts engage into the shift fork or damage to the shift fork can occur.

10.
Install the 5th/6th shift fork, the 5th/6th shift rail. Apply threadlock and sealer and loosely install the shift fork pivot bolts.

Material

: Threadlock 262 / TA-26 (WSK-M2G351-A6)

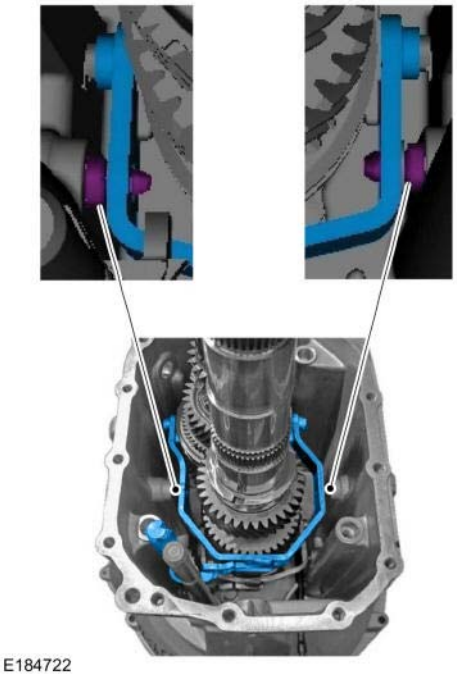


NOTE: Make sure the shift fork pivot bolts engage into the shift fork or damage to the shift fork can occur.

11.
Install the 3rd/4th shift fork, the 3rd/4th shift rail. Apply threadlock and sealer and loosely install the shift fork pivot bolts.

Material

: Threadlock 262 / TA-26 (WSK-M2G351-A6)

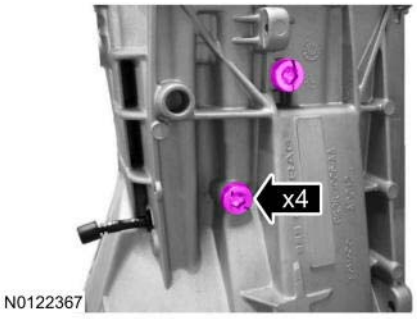


12.

Tighten the 2 LH and the 2 RH shift fork pivot bolts.

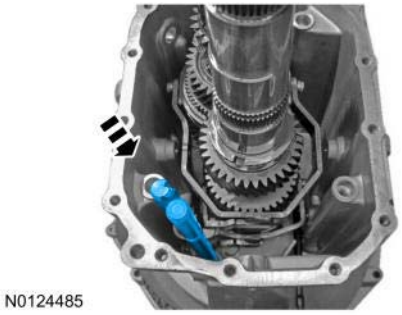
Torque

: 27 lb.ft (37 Nm)



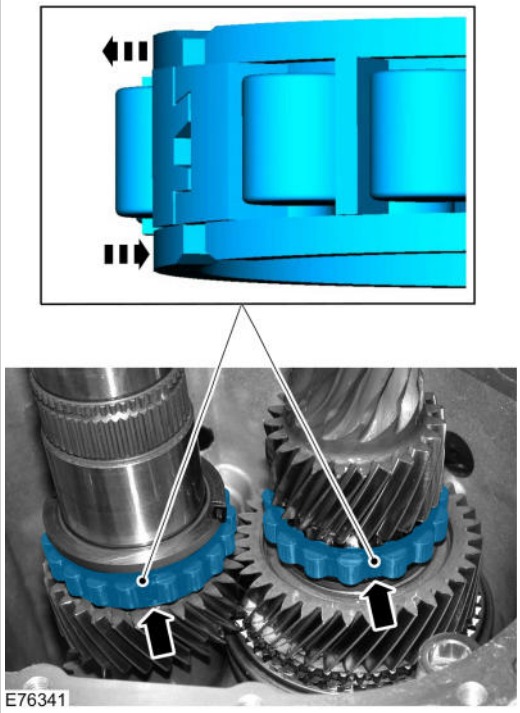
13.

Push down the 3rd/4th shift rail and the 5th/6th shift rail to lock the transmission into 2 gears.



NOTE: When installing the bearings, do not over expand the bearing cages or damage to the bearing cages can occur.

14.
Slightly expand the center support bearing cages and slide the center support bearings down the shaft assemblies. Lock the bearing cage tabs.



15.

Loosely install the center support and finger tighten the bolts.



NOTE: Install the countershaft bolt with the transmission in the vertical position with the input shaft facing down.

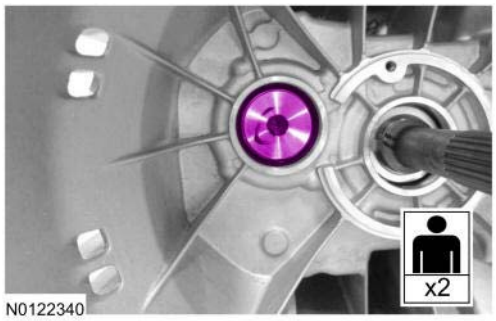
16.
Apply threadlock and install the countershaft bolt.

Material

: Threadlock 262 / TA-26 (WSK-M2G351-A6)

Torque

: 70 lb.ft (95 Nm)



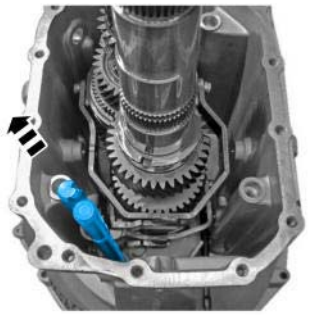
17.

Remove the center support and the bolts.



18.

Pull up on the 3rd/4th shift rail and 5th/6th shift rail to unlock the transmission from 2 gears.


N0124531

NOTE: The center support must be tightened evenly or damage to the center support or transmission case can occur.

19.
Install the center support, apply threadlock and evenly tighten the center support bolts.

Material

: Threadlock 262 / TA-26 (WSK-M2G351-A6)

Torque

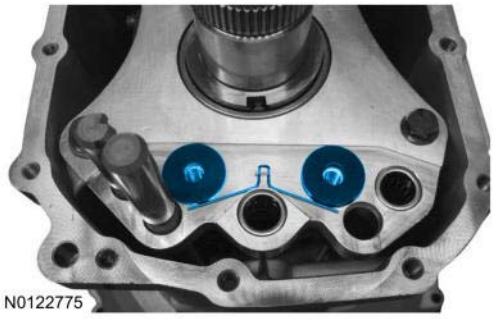
: 18 lb.ft (24 Nm)



N0123038

20.

Install the spring and spacers.



NOTE: Make sure the interlock plate moves freely.

21.
Install the interlock plate, apply threadlock and install the interlock plate bolts.

Material

: Threadlock 262 / TA-26 (WSK-M2G351-A6)

Torque

: 18 lb.ft (24 Nm)



22.

Install the 2nd gear needle bearing.



23.

Install the 2nd gear.


N0123034

NOTE: The 6 synchronizer ring tabs must engage into the 6 gear slots or damage to the synchronizer ring assembly can occur.

NOTE: The 2nd gear synchronizer ring assembly outer ring has 2 identification notches.

24.
Install the 2nd gear synchronizer ring assembly.



N0124481

NOTE: The 3 synchronizer ring tabs must engage into the 3 synchronizer hub slots or damage to the synchronizer hub and the synchronizer ring assembly can occur.

NOTE: The long shoulder of the 1st/2nd synchronizer hub must be facing 2nd gear or damage to the synchronizer hub can occur.

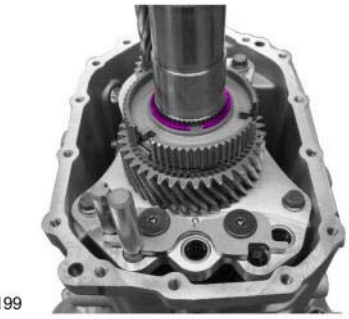
25.
With the long shoulder of the 1st/2nd synchronizer hub must be facing 2nd gear, use the special tool and install the 1st/2nd synchronizer hub.

Use Special Service Tool: 308-809 Installer, Syncro Gear Pack.



26.

Install the 1st/2nd synchronizer hub snap ring.



NOTE: Align the index marks made during removal on the synchronizer sleeve and the synchronizer hub.

27.
With the groove on the 1st/2nd synchronizer sleeve facing 2nd gear, install the 1st/2nd shift fork the 1st/2nd shift rail and the 1st/2nd synchronizer sleeve.


N0124202

NOTE: Slide the synchronizer sleeve up to install the pressure pieces.

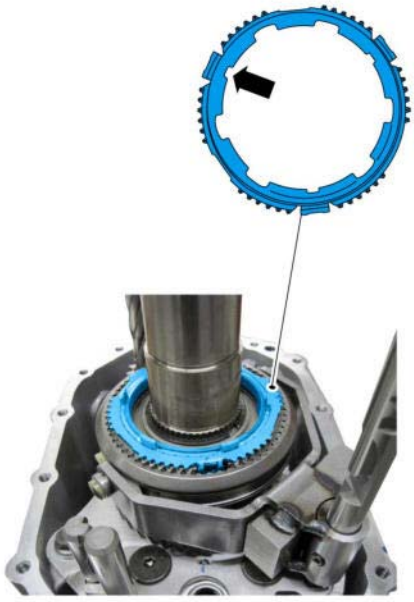
28.
Install the 3 pressure pieces.


N0124193

NOTE: The 3 synchronizer ring tabs must engage into the 3 synchronizer assembly slots or damage to the synchronizer assembly and the synchronizer ring assembly can occur.

NOTE: The 1st gear synchronizer ring assembly outer ring has one identification notch.

29.
Install the 1st gear synchronizer ring assembly.



N0124482

30.

Install the 1st gear needle bearing.



N0123022

NOTE: The 6 synchronizer ring tabs must engage into the 6 gear slots or damage to the synchronizer assembly and synchronizer ring assembly can occur.

31.
Install the 1st gear.


N0123021

32.

Using the special tool, install the reverse gear needle bearing race.

Use Special Service Tool: 308-809 Installer, Syncro Gear Pack.



N0122778

33.

Install the reverse gear needle bearing.


N0123019

34.

Install the reverse gear.


N0123020

NOTE: The shift shaft must be installed in the neutral position prior to installing the shift shaft stop pin or damage to the shift shaft pin can occur.

35.
Install the shift shaft in the neutral position, using a soft-faced hammer install the shift shaft stop pin.


N0123037

36.

Install the reverse gear synchronizer ring.


N0123018

NOTE: The 3 synchronizer ring tabs must engage into the 3 synchronizer assembly slots or damage to the synchronizer assembly and the synchronizer ring can occur.

37.
Using the special tool, install the reverse gear synchronizer assembly.

Use Special Service Tool: 308-809 Installer, Syncro Gear Pack.



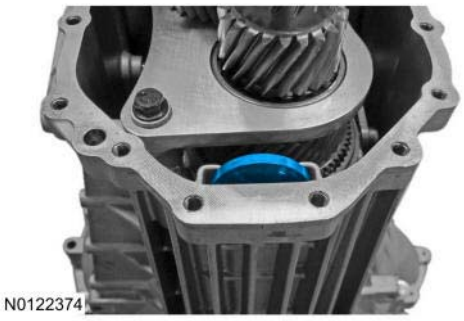
NOTE: To install the reverse shift fork and the reverse shift rail assembly, the transmission must be in neutral and the grooves on the shift rails must be aligned with the interlock plate.

38.
Install the reverse shift fork and the reverse shift rail assembly.



39.

Install the magnet.



40.

Shift the transmission into 4th gear.



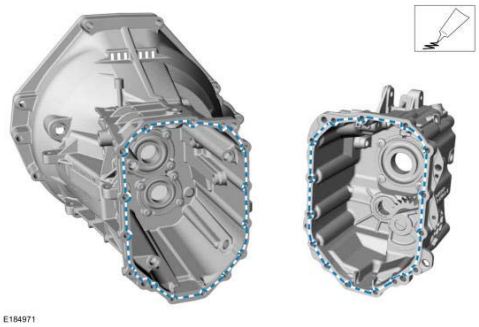
NOTE: Art shown in illustration with internal components removed for clarity.

NOTE: Do not wait longer than 10 minutes to install the rear transmission case assembly due to rapid cure of the sealant.

41.
Clean the sealing surfaces of the front transmission case and the sealing surfaces of the rear transmission case. Thinly coat the sealing surface of the front transmission case assembly and the sealing surface of the rear transmission case assembly with gasket maker.

Material

: Gasket Maker / TA-16 (WSK-M2G348-A5)



NOTE: The rear transmission case assembly must be installed evenly with the transmission shifted into 4th gear, do not allow the shift rails to bind during installation or damage to the transmission case assembly can occur.

42.
Using the special tools, install the rear transmission case assembly.

Use Special Service Tool: 308-809 Installer, Syncro Gear Pack, 308-808 Installer, Rear Flange.



NOTE: Make sure the shift fork pivot bolts engage into the shift fork or damage to the shift fork can occur.

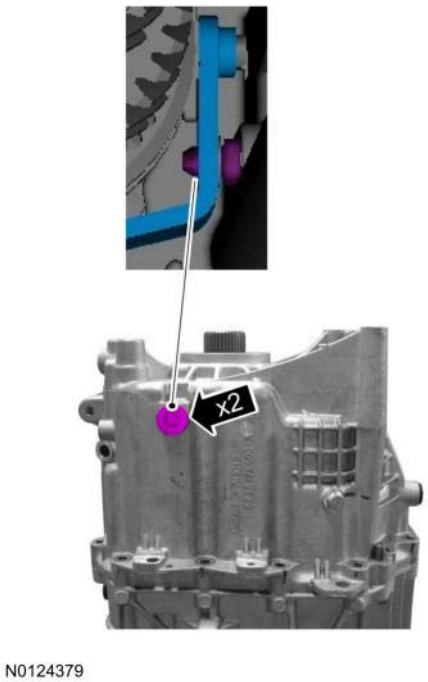
43.
Apply threadlock and sealer and install the shift fork pivot bolts.

Material

: Threadlock 262 / TA-26 (WSK-M2G351-A6)

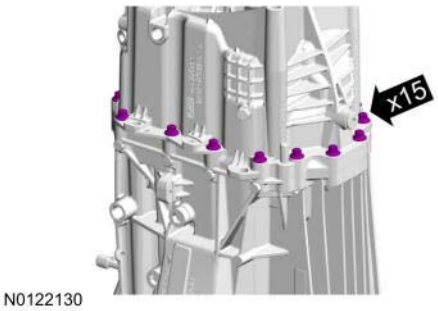
Torque

: 27 lb.ft (37 Nm)



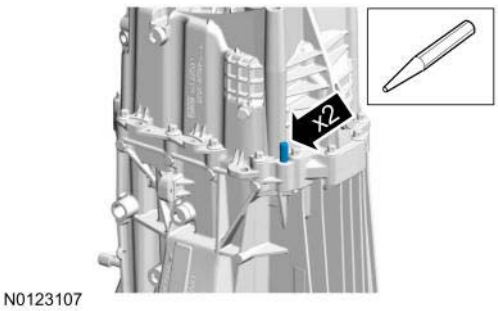
44.

Loosely install the bolts.



45.

Using a brass drift, tap the dowel pins flush with the transmission case.

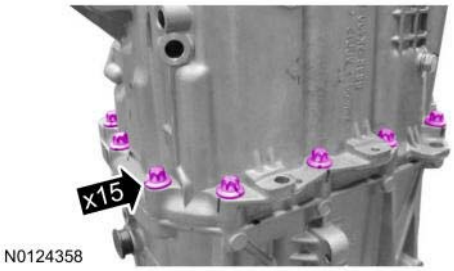


46.

Tighten the bolts.

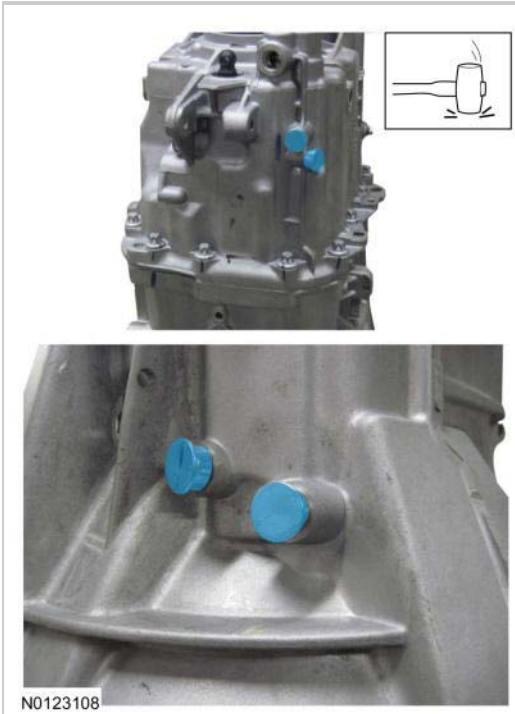
Torque

: 18 lb.ft (24 Nm)



47.

Using a soft-faced hammer install the 4 shift rail detents.



48.

1.

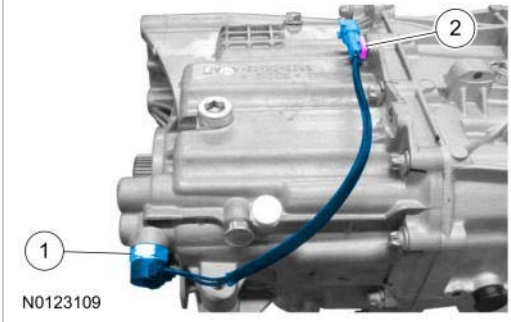
Install the reverse lamp switch.

Torque

: 177 lb.in (20 Nm)

2.

Attach the electrical connector retainer.

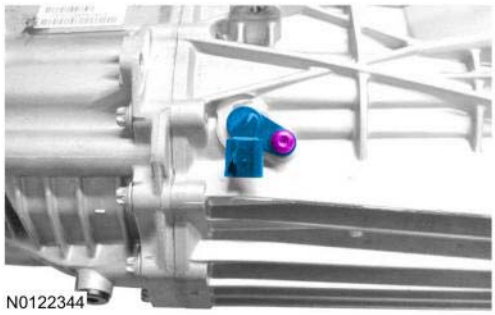


49.

Install the OSS sensor and the bolt.

Torque

: 89 lb.in (10 Nm)



50.

Install a new output shaft seal on the special tools.

Use Special Service Tool: 308-811 Installer, Rear Seal, 205-153 (T80T-4000-W) Handle.



51.

Using the special tools, install the output shaft seal.

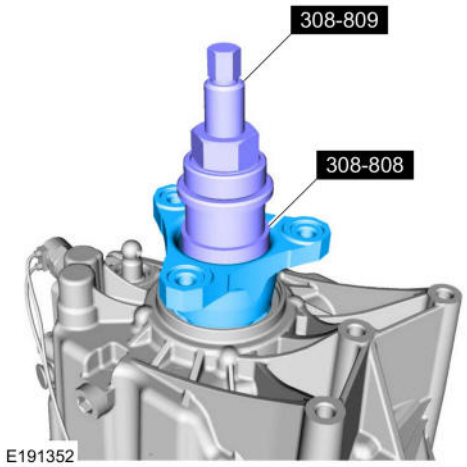
Use Special Service Tool: 308-811 Installer, Rear Seal, 205-153 (T80T-4000-W) Handle.



52.

Using the special tools, install the output shaft flange.

Use Special Service Tool: 308-809 Installer, Syncro Gear Pack, 308-808 Installer, Rear Flange.



53.

Clean the threads on the output shaft bolt and apply one dot of threadlock to the lower end of the output shaft bolt threads. Using the special tools, install the output shaft flange bolt and tighten in 3 stages.

Use Special Service Tool: 308-938 Remover/Installer, Companion Flange Nut.

Material

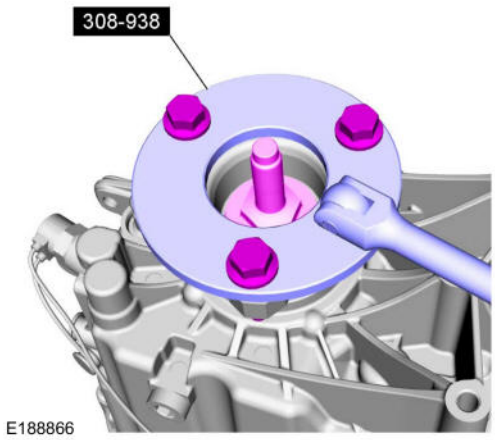
: Threadlock 262 / TA-26 (WSK-M2G351-A6)

Torque:

Stage 1: 148 lb.ft (200 Nm)

Stage 2: Loosen: 5 turn(s)

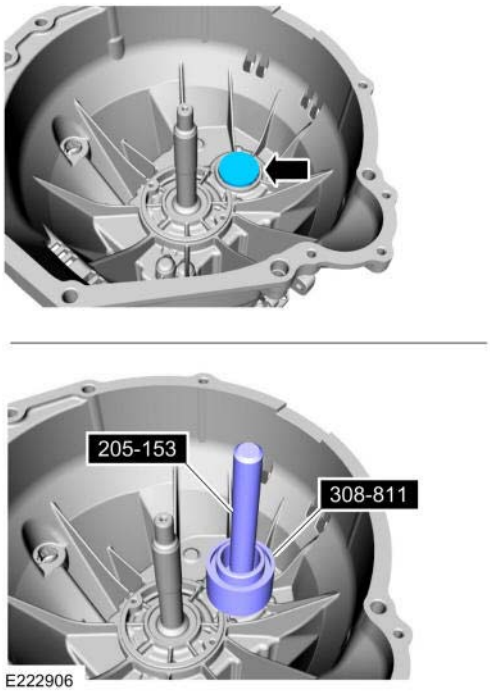
Stage 3: 133 lb.ft (180 Nm)



54.

Install the countershaft bolt cover in the clutch housing. Using the special tools, drive the countershaft bolt cover into the clutch housing.

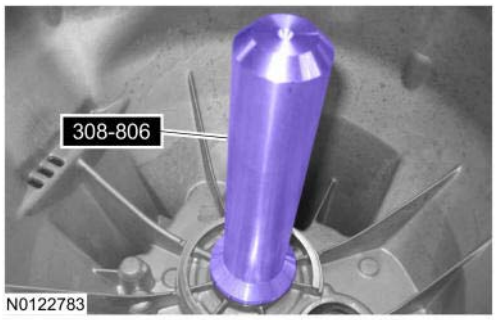
Use Special Service Tool: 308-811 Installer, Rear Seal, 205-153 (T80T-4000-W) Handle.



55.

Using the special tool, install the new input shaft seal.

Use Special Service Tool: 308-806 Installer, Front Seal.



56.

1.

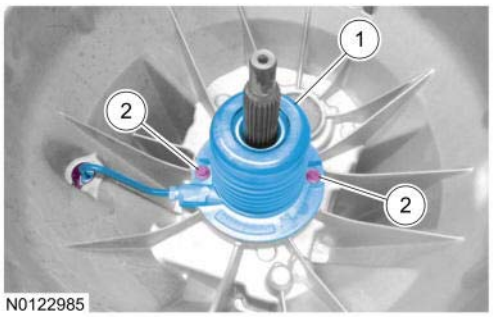
Position the clutch slave cylinder and if equipped, the clutch slave cylinder spacer and connect the tube in the retaining clip.

2.

Install the 2 bolts.

Torque

: 97 lb.in (11 Nm)



57.

Add 1 bottle (.91 fl oz (27 ml)) of XL-18 to the transmission if a new synchronizer was installed.

Material

: Motorcraft® MT82 Transmission Additive / XL-18

INSTALLATION > TRANSMISSION - 2.3L ECOBOOST (201KW 273PS)

Special Tool(s) / General Equipment

Transmission Jack

Materials

Name	Specification
Premium Long-Life Grease XG-1-E1	ESA-M1C75-B

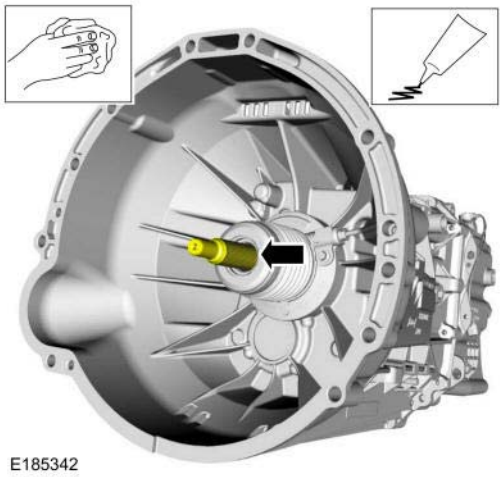
WARNING: Do not breathe dust or use compressed air to blow dust from storage containers or friction components. Remove dust using government-approved techniques. Friction component dust may be a cancer and lung disease hazard. Exposure to potentially hazardous components may occur if dusts are created during repair of friction components, such as brake pads and clutch discs. Exposure may also cause irritation to skin, eyes and respiratory tract, and may cause allergic reactions and/or may lead to other chronic health effects. If irritation persists, seek medical attention or advice. Failure to follow these instructions may result in serious personal injury.

1.

Clean the input shaft and apply a small amount of grease to the splined surface and the pilot bearing surface.

Material

: Premium Long-Life Grease / XG-1-E1 (ESA-M1C75-B)



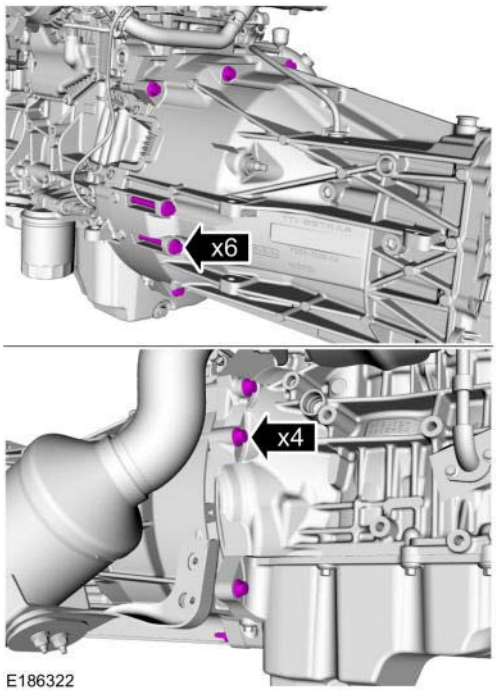
2.

Install the bellhousing bolts.

Use the General Equipment: Transmission Jack

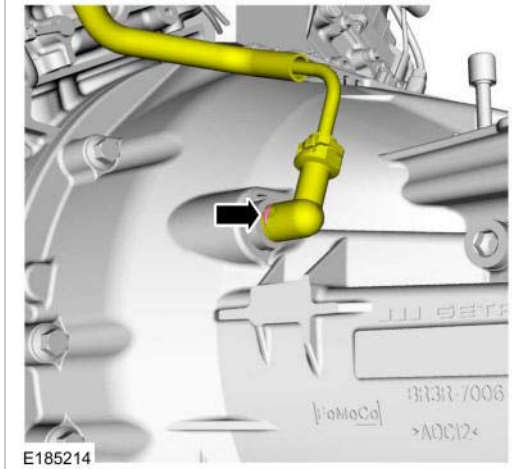
Torque

: 35 lb.ft (48 Nm)



3.

Connect the clutch master cylinder tube and install the retainer.

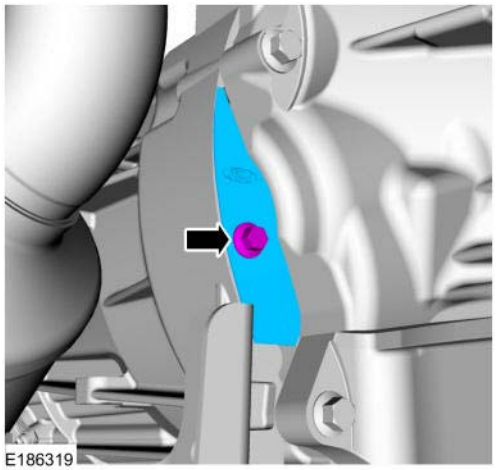


4.

Install the inspection cover and the bolt.

Torque

: 35 lb.ft (48 Nm)

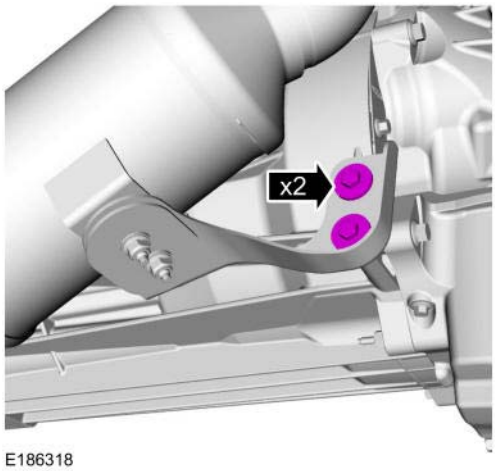


5.

Install the catalytic converter support bracket bolts.

Torque

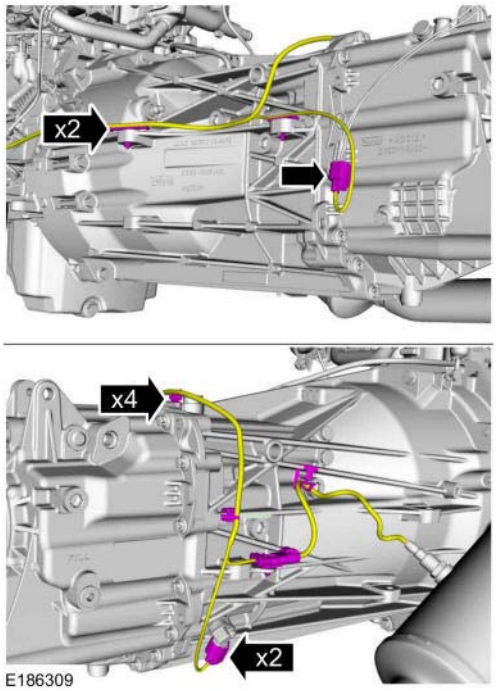
: 18 lb.ft (25 Nm)



E186318

6.

Connect the electrical connectors and the wiring retainers.



E186309

7.

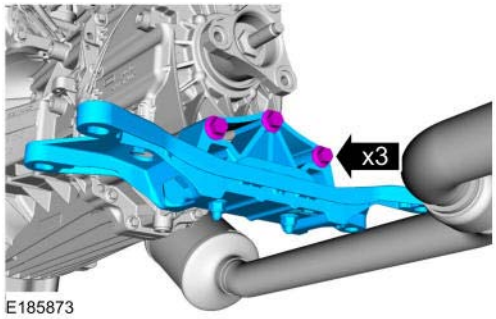
Install the starter motor. Refer to: STARTER MOTOR .

8.

Install the transmission support insulator and crossmember and the bolts.

Torque

: 76 lb.ft (103 Nm)



9.

Install the gearshift lever. Refer to: Gearshift Lever .

10.

Fill the transmission. Refer to: Transmission Draining and Filling .

11.

Connect the battery. Refer to: Battery Disconnect and Connect .

12.

Fill and bleed the clutch hydraulic system. Refer to: Clutch System Bleeding .

INSTALLATION > TRANSMISSION - 3.7L DURATEC (227KW 301PS)

Materials

Name	Specification
Premium Long-Life Grease XG-1-E1	ESA-M1C75-B

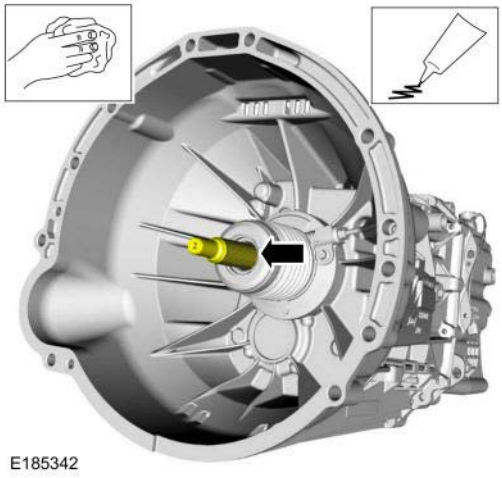
WARNING: Do not breathe dust or use compressed air to blow dust from storage containers or friction components. Remove dust using government-approved techniques. Friction component dust may be a cancer and lung disease hazard. Exposure to potentially hazardous components may occur if dusts are created during repair of friction components, such as brake pads and clutch discs. Exposure may also cause irritation to skin, eyes and respiratory tract, and may cause allergic reactions and/or may lead to other chronic health effects. If irritation persists, seek medical attention or advice. Failure to follow these instructions may result in serious personal injury.

1.

Clean the input shaft and apply a small amount of grease to the splined surface and the pilot bearing surface.

Material

: Premium Long-Life Grease / XG-1-E1 (ESA-M1C75-B)

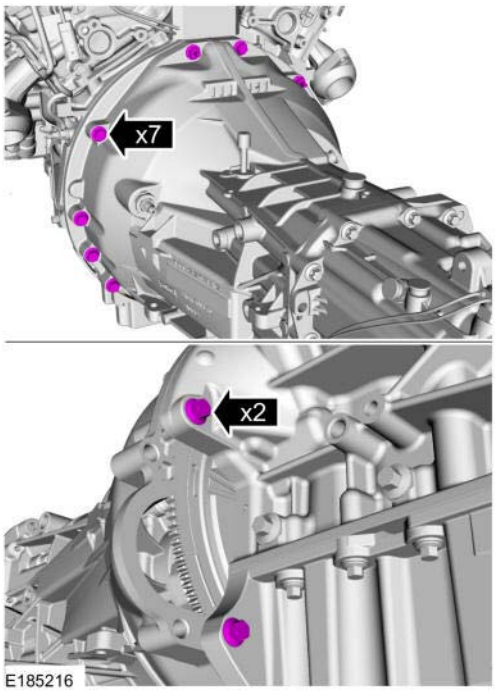


2.

Install the bellhousing bolts.

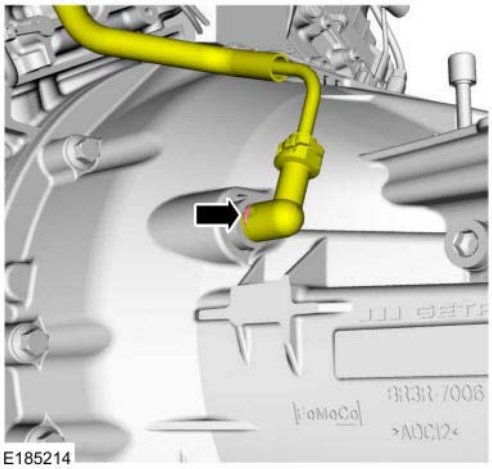
Torque

: 35 lb.ft (48 Nm)



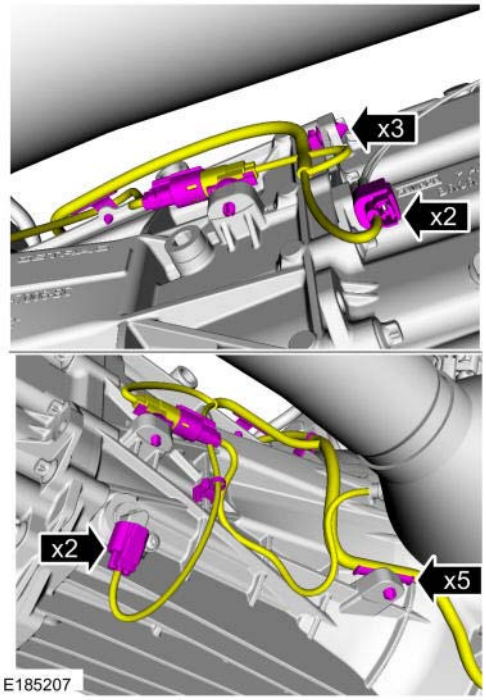
3.

Connect the clutch master cylinder tube and install the retainer.



4.

Connect the electrical connectors and the wiring retainers.



5.

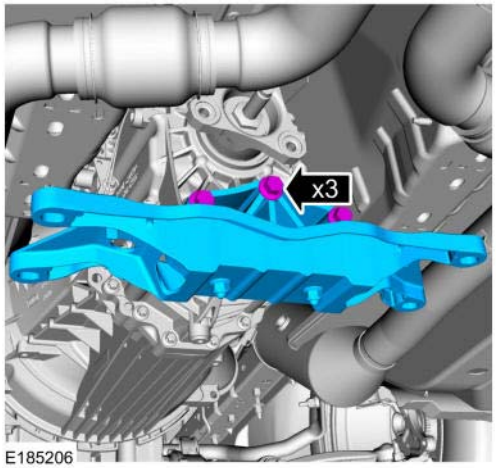
Install the starter motor. Refer to: Starter Motor .

6.

Install the transmission support insulator and crossmember and the bolts.

Torque

: 76 lb.ft (103 Nm)



7.

Install the gearshift lever. Refer to: Gearshift Lever .

8.

Fill the transmission. Refer to: Transmission Draining and Filling .

9.

Connect the battery. Refer to: Battery Disconnect and Connect .

10.

Fill and bleed the clutch hydraulic system. Refer to: Clutch System Bleeding .

INSTALLATION > TRANSMISSION - 5.0L 32V TI-VCT

Materials

Name	Specification
Premium Long-Life Grease XG-1-E1	ESA-M1C75-B

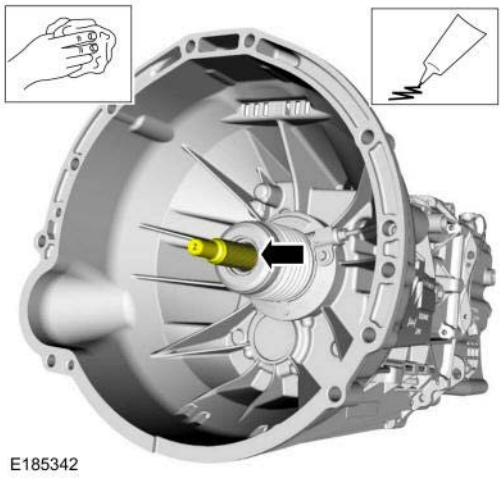
WARNING: Do not breathe dust or use compressed air to blow dust from storage containers or friction components. Remove dust using government-approved techniques. Friction component dust may be a cancer and lung disease hazard. Exposure to potentially hazardous components may occur if dusts are created during repair of friction components, such as brake pads and clutch discs. Exposure may also cause irritation to skin, eyes and respiratory tract, and may cause allergic reactions and/or may lead to other chronic health effects. If irritation persists, seek medical attention or advice. Failure to follow these instructions may result in serious personal injury.

1.

Clean the input shaft and apply a small amount of grease to the splined surface and the pilot bearing surface.

Material

: Premium Long-Life Grease / XG-1-E1 (ESA-M1C75-B)

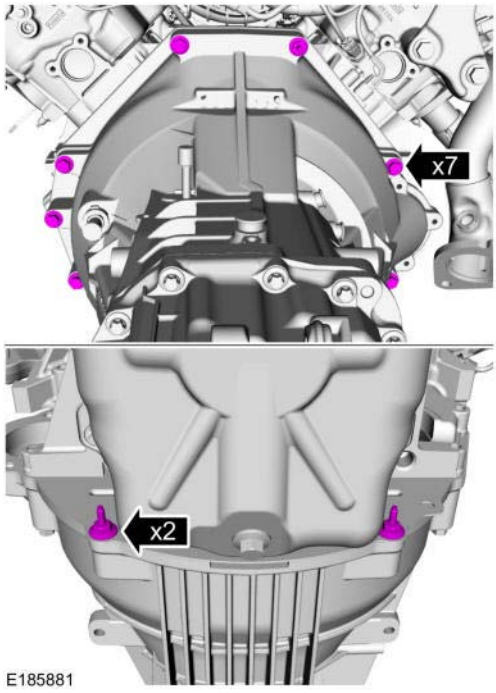


2.

Install the bellhousing bolts.

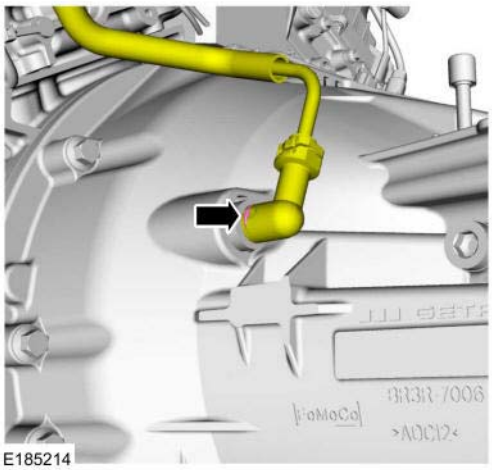
Torque

: 35 lb.ft (48 Nm)



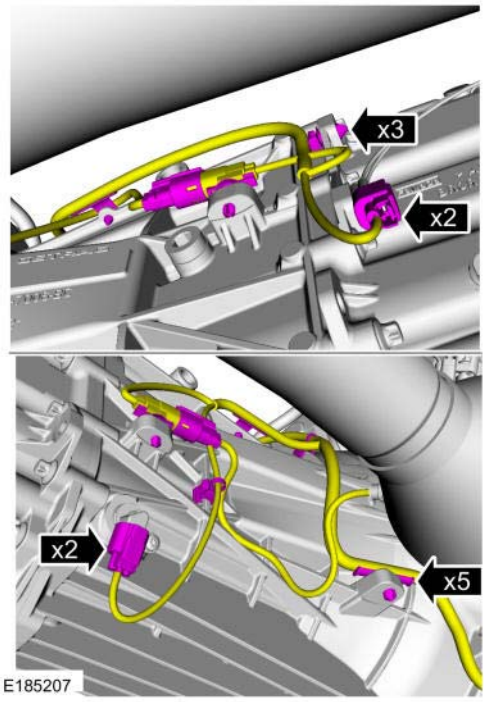
3.

Connect the clutch master cylinder tube and install the retainer.



4.

Connect the electrical connectors and the wiring retainers.



5.

Install the LH HO2S and the catalyst monitor. Refer to: HEATED OXYGEN SENSOR (HO2S) . Refer to: CATALYST MONITOR SENSOR .

6.

Install the RH catalytic converter. Refer to: CATALYTIC CONVERTER RH .

7.

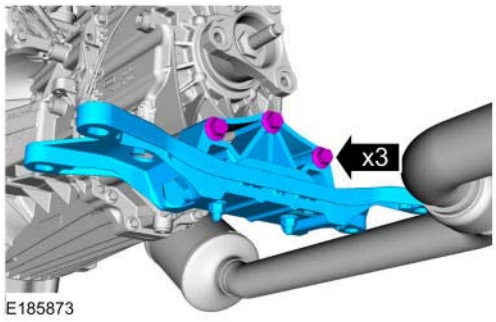
Install the starter motor. Refer to: STARTER MOTOR .

8.

Install the transmission support insulator and crossmember and the bolts.

Torque

: 76 lb.ft (103 Nm)



9.

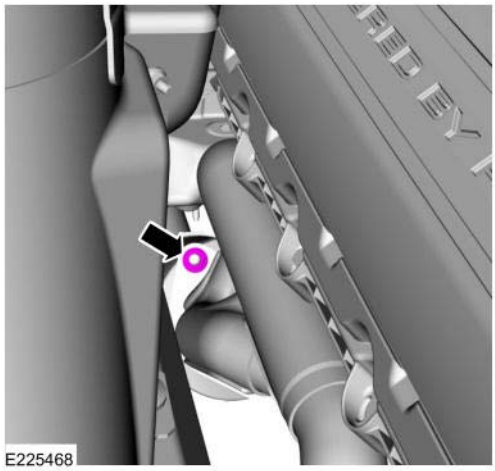
Install the gearshift lever. Refer to: Gearshift Lever .

10.

Install the upper RH catalytic converter nut.

Torque

: 30 lb.ft (40 Nm)



11.

Fill the transmission. Refer to: Transmission Draining and Filling .

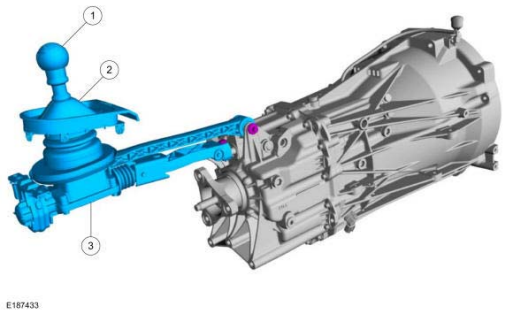
12.

Connect the battery. Refer to: Battery Disconnect and Connect .

13.

Fill and bleed the clutch hydraulic system. Refer to: Clutch System Bleeding .

DESCRIPTION AND OPERATION > EXTERNAL CONTROLS - COMPONENT LOCATION > EXTERNAL CONTROLS



Item	Part Number	Description
1	-	Gearshift lever knob
2	-	Gearshift lever boot
3	-	Gearshift lever

DESCRIPTION AND OPERATION > EXTERNAL CONTROLS - OVERVIEW > OVERVIEW

The manual transmission external controls consists of the following:

- Gearshift lever assembly
    - A service kit which includes (roll pin, spring, plastic blocker, shoulder bolt and anti-rattle washer)
    - A rear isolator
    - A front hub bushing
    - A tunnel seal, foam gasket and boot
- Gearshift lever knob
- Gearshift lever boot

DESCRIPTION AND OPERATION > EXTERNAL CONTROLS - OVERVIEW > SYSTEM OPERATION

The manual transmission is controlled by a floor-mounted gearshift lever located in the floor console. When the operator moves the floor mounted gearshift lever, that movement is transmitted through a lever that is attached to the transmission.

REMOVAL AND INSTALLATION > GEARSHIFT LEVER

Special Tool(s) / General Equipment

Transmission Jack
Interior Trim Remover

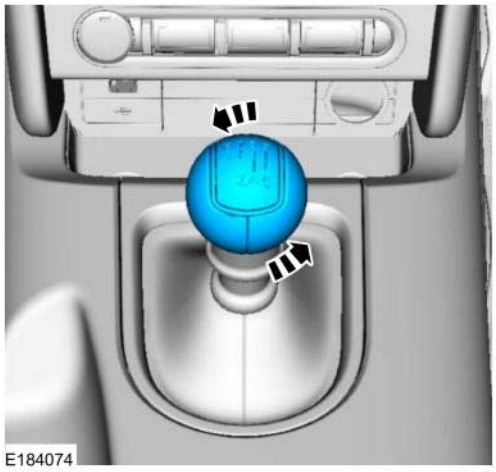
REMOVAL AND INSTALLATION > GEARSHIFT LEVER > REMOVAL

1.

With the vehicle in N, position it on a hoist. Refer to: Jacking and Lifting - Overview .

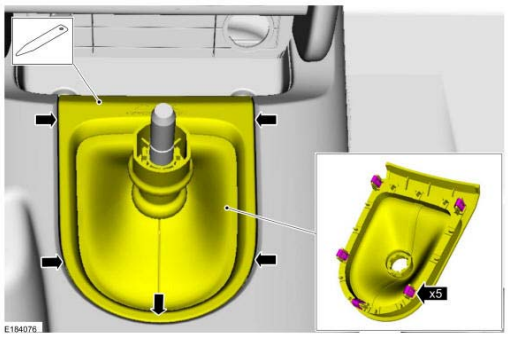
2.

Rotate the gearshift knob counterclockwise and remove the gearshift knob.



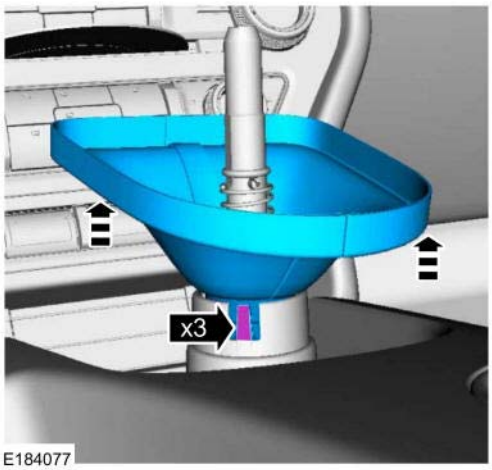
3.

Using an interior trim remover, release the gearshift lever boot from the floor console starting at the front sides and moving rearward. Use the General Equipment: Interior Trim Remover



4.

Release the retainers and remove the gearshift lever boot.

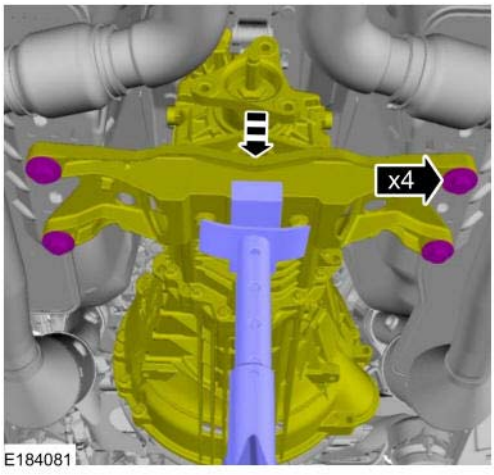


5.

Remove the driveshaft. Refer to: Driveshaft .

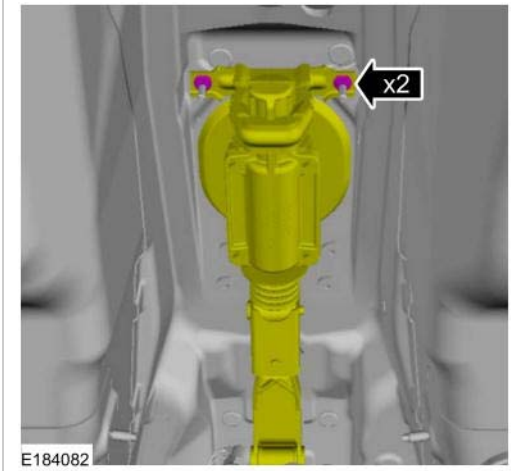
6.

Support the crossmember with a transmission jack, remove the crossmember bolts and lower the transmission. Use the General Equipment: Transmission Jack



7.

Remove the gearshift lever nuts.



8.

Remove the gearshift lever assembly.

1.

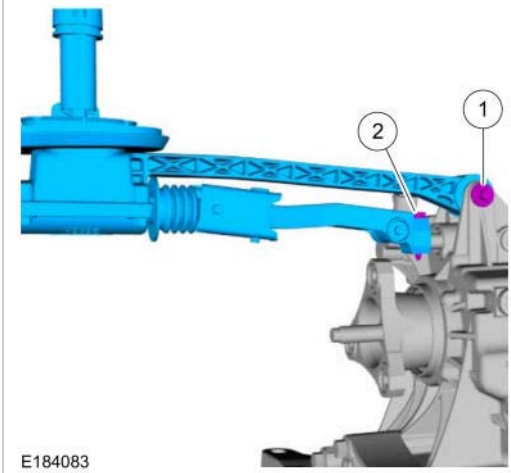
Remove the gearshift lever-to-transmission bolt.

2.

Remove the gearshift lever bolt.

3.

Remove the gearshift lever assembly from the transmission by pulling towards the rear of the vehicle.



9.

Inspect the following components for damage. If damage is found, replace the components as necessary.

1.

Rubber Boot

2.

Service kit (roll pin, spring, plastic blocker, shoulder bolt and anti-rattle washer)

3.

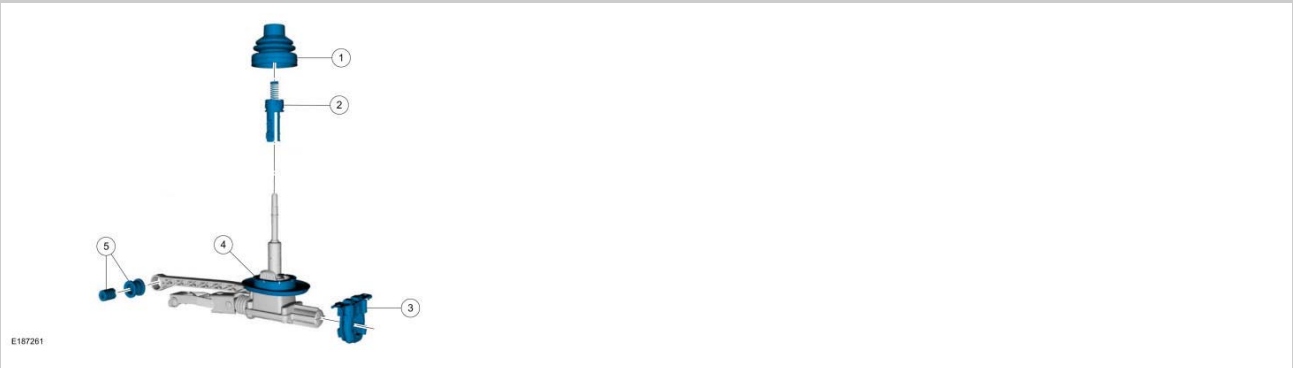
Rear isolator

4.

Tunnel seal and foam gasket

5.

Front hub bushing



REMOVAL AND INSTALLATION > GEARSHIFT LEVER > INSTALLATION

1.

Install the gearshift lever assembly.

1.

Install the gearshift lever bolt.

Torque

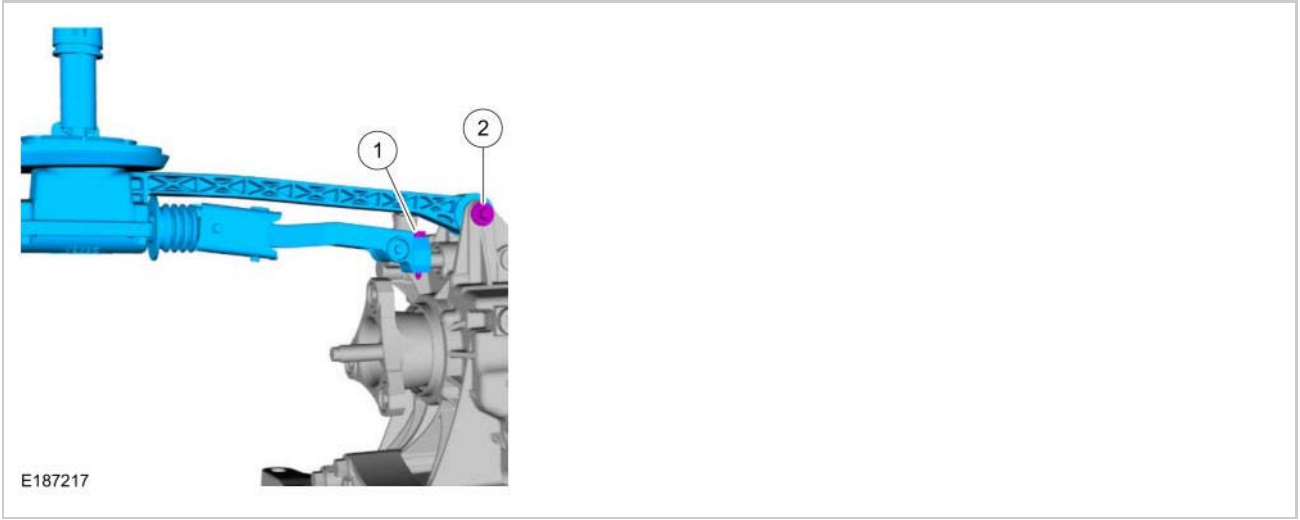
: 133 lb.in (15 Nm)

2.

Install the gearshift lever-to-transmission bolt.

Torque

: 30 lb.ft (40 Nm)

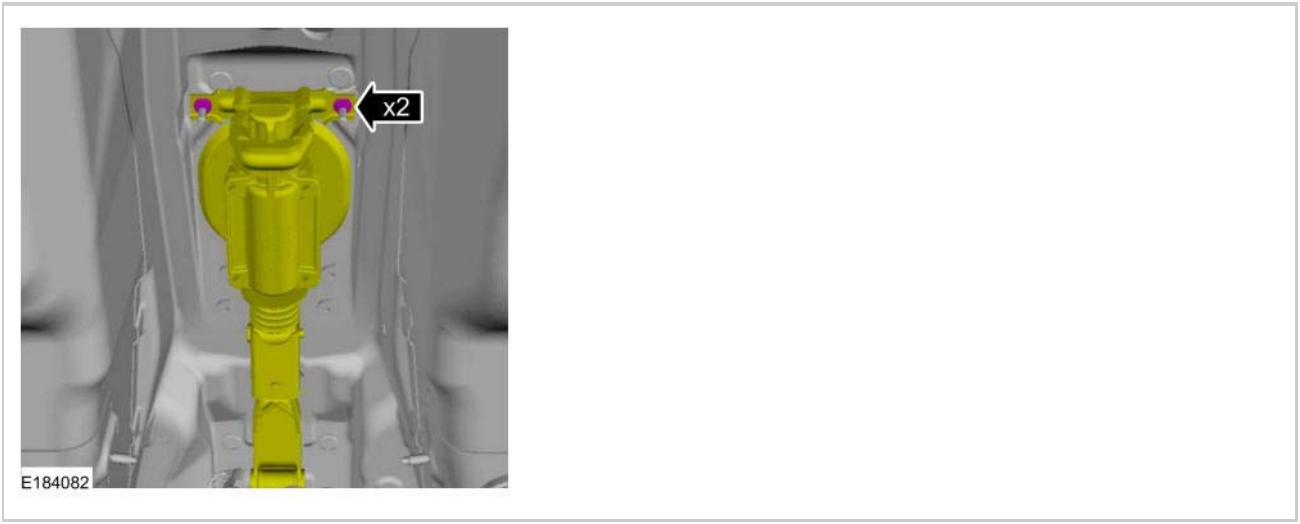


2.

Install the gearshift lever nuts.

Torque

: 97 lb.in (11 Nm)

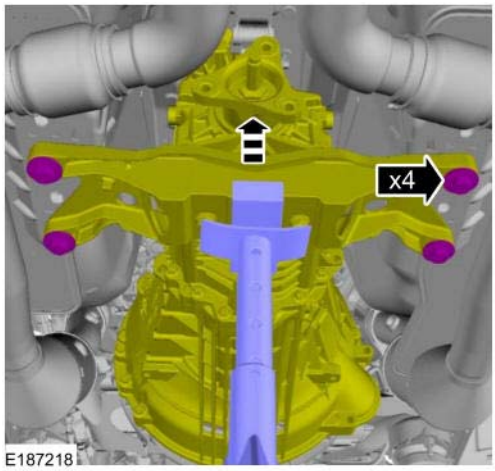


3.

Support the crossmember with a transmission jack, raise the transmission and install the crossmember bolts. Use the General Equipment: Transmission Jack

Torque

: 46 lb.ft (63 Nm)

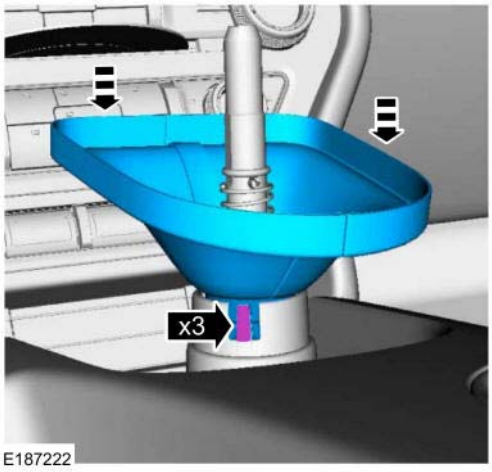


4.

Install the driveshaft. Refer to: Driveshaft .

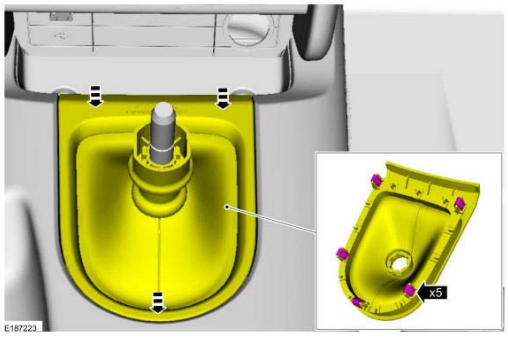
5.

Install the gearshift lever boot and attach the retainers.



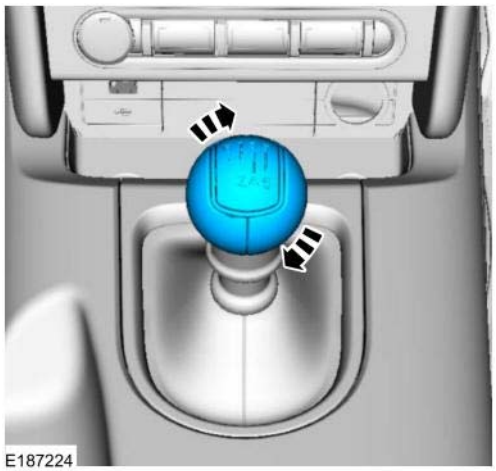
6.

Install the gearshift lever boot to the floor console.



7.

Install the gearshift knob.



REMOVAL AND INSTALLATION > GEARSHIFT LEVER BOOT

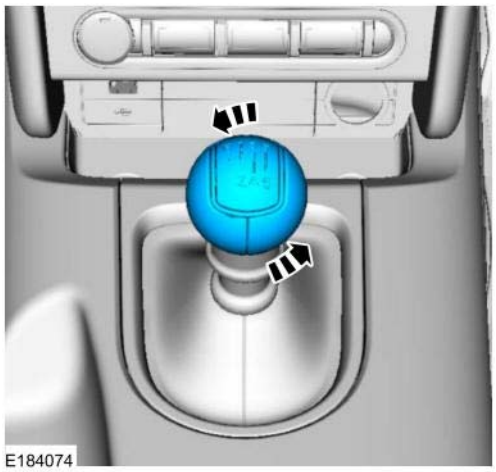
Special Tool(s) / General Equipment

Interior Trim Remover

REMOVAL AND INSTALLATION > GEARSHIFT LEVER BOOT > REMOVAL

1.

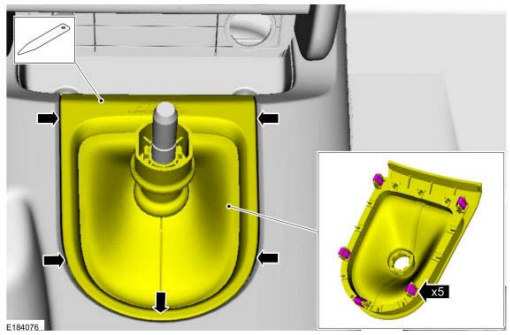
Rotate the gearshift knob counterclockwise and remove the gearshift knob.



2.

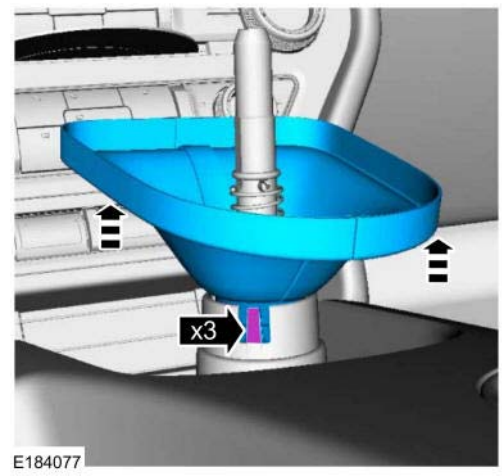
Using an interior trim remover, release the gearshift lever boot from the floor console starting at

the front sides and moving rearward. Use the General Equipment: Interior Trim Remover



3.

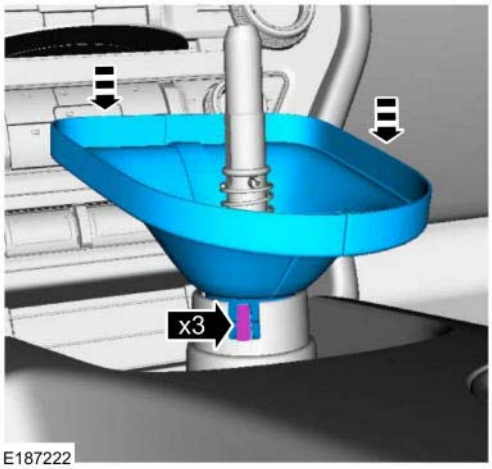
Release the retainers and remove the gearshift lever boot.



REMOVAL AND INSTALLATION > GEARSHIFT LEVER BOOT > INSTALLATION

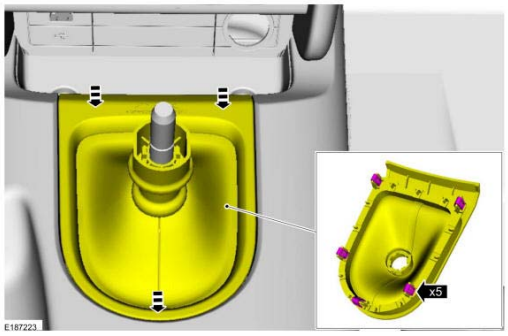
1.

Install the gearshift lever boot and attach the retainers.



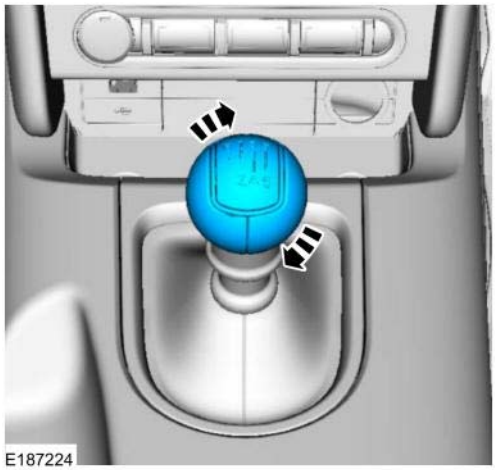
2.

Install the gearshift lever boot to the floor console.



3.

Install the gearshift knob.



DISASSEMBLY AND ASSEMBLY > GEARSHIFT LEVER

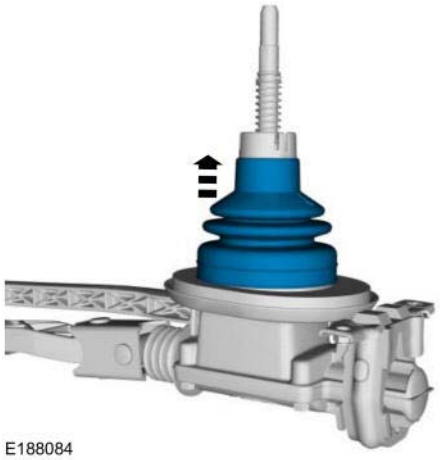
Special Tool(s) / General Equipment

Punch

DISASSEMBLY AND ASSEMBLY > GEARSHIFT LEVER > DISASSEMBLY

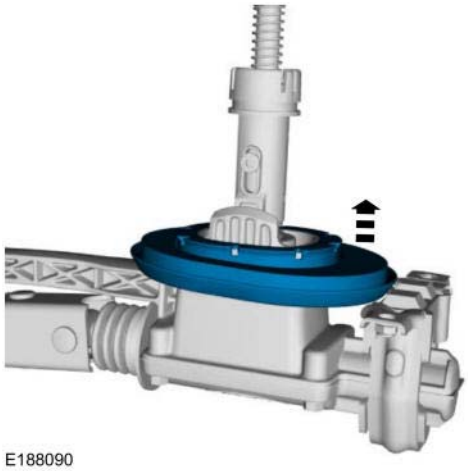
1.

Remove the boot.



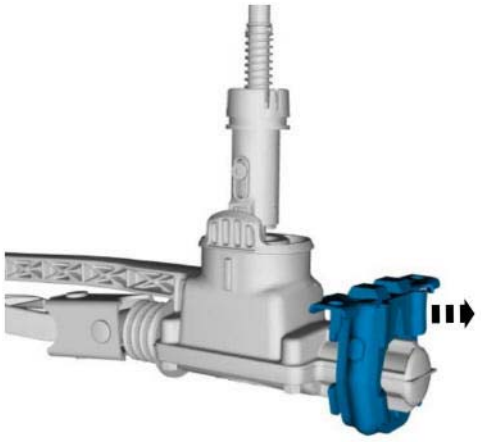
2.

Remove the tunnel seal.



3.

Remove the isolator.



E188086

4.

Remove the steel sleeve.



E188089

5.

Remove the polymer bushing.



E188087

NOTE: The anti-rattle washer is installed above the roll pin.

6.

1.

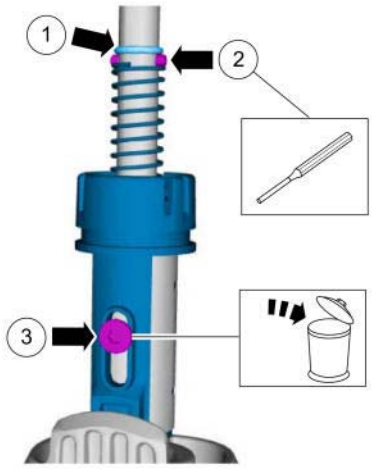
Remove the anti-rattle washer.

2.

Using a punch, remove the roll pin. Use the General Equipment: Punch

3.

Remove and discard the bolt.



DISASSEMBLY AND ASSEMBLY > GEARSHIFT LEVER > ASSEMBLY

1.

1.

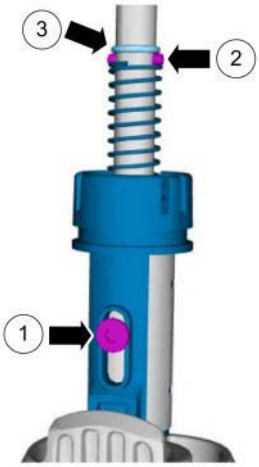
Install a new bolt.

2.

Install the roll pin.

3.

Install the anti-rattle washer.



E188129

2.

Install the polymer bushing.


E188128

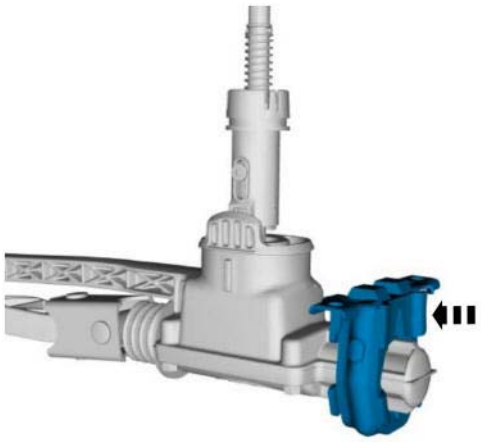
3.

Install the steel sleeve.


E188130

4.

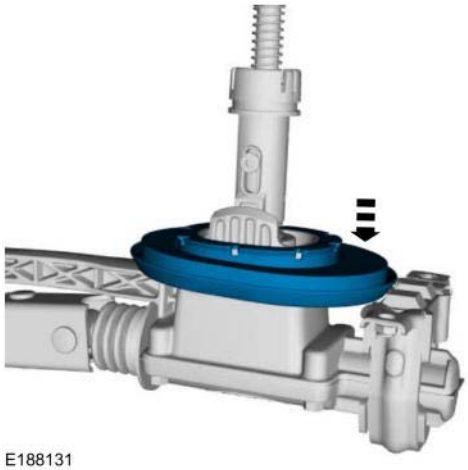
Install the isolator.



E188127

5.

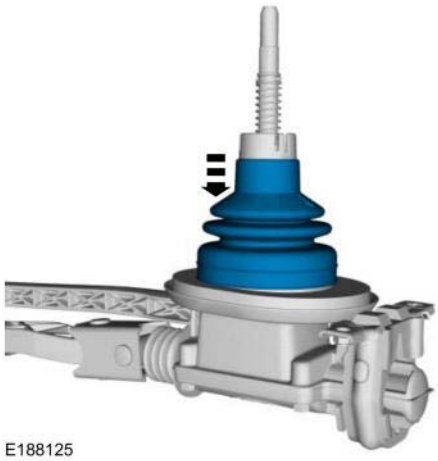
Install the tunnel seal.



E188131

6.

Install the boot.

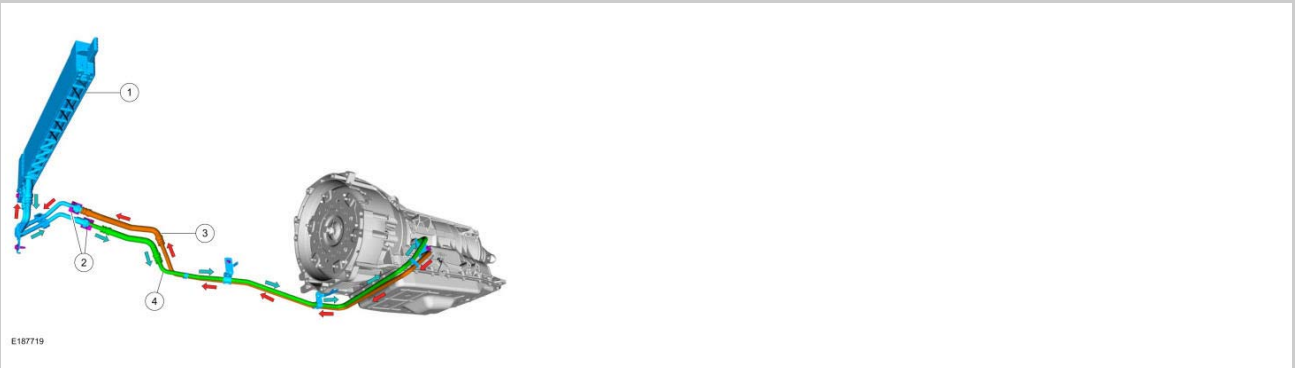


E188125

Service Manual: TRANSMISSION COOLING

DESCRIPTION AND OPERATION > TRANSMISSION COOLING - COMPONENT LOCATION

2.3L Engine



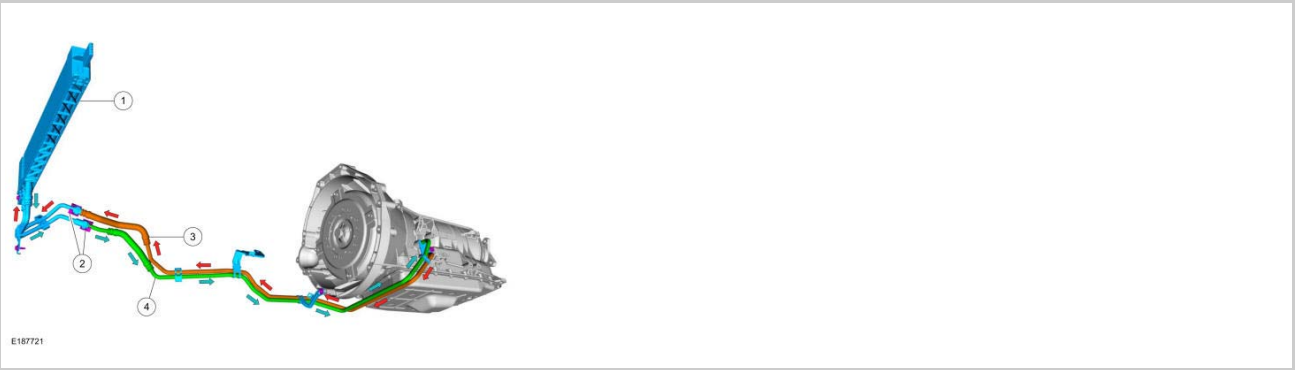
Item	Description
1	Transmission fluid cooler and hose assembly
2	Transmission fluid cooler tube fitting latches
3	Transmission fluid cooler inlet tube
4	Transmission fluid cooler outlet tube

3.7L Engine



Item	Description
1	Transmission fluid cooler and hose assembly
2	Transmission fluid cooler tube fitting latches
3	Transmission fluid cooler inlet tube
4	Transmission fluid cooler outlet tube

5.0L Engine



Item	Description
1	Transmission fluid cooler and hose assembly
2	Transmission fluid cooler tube fitting latches
3	Transmission fluid cooler inlet tube
4	Transmission fluid cooler outlet tube

DESCRIPTION AND OPERATION > TRANSMISSION COOLING - OVERVIEW

Vehicles equipped with an automatic transmission are equipped with an external transmission fluid cooler. The transmission fluid cooler is an oil to air fluid cooler which is mounted in front of the radiator. The transmission fluid travels from the transmission through the cooler and back to the transmission via transmission fluid cooler tubes. The transmission fluid cooler transfers heat from the transmission fluid to the ambient air passing over the cooler.

DIAGNOSIS AND TESTING > TRANSMISSION COOLING > INSPECTION AND VERIFICATION

1.

Verify the customer concern by operating the vehicle to duplicate the condition.

2.

If the inspection reveals obvious concern(s) that can be readily identified, repair as necessary.

3.

Install new components if a transmission fluid leak is found in any of the transmission cooling components.

4.

If the cause is not visually evident, check for DTC. REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 2.3L EcoBoost (201kW/273PS) . REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests - 3.7L Duratec (227kW/301PS) . REFER to: Diagnostic Trouble

Code (DTC) Charts and Pinpoint Tests - 5.0L 32V Ti-VCT .

DIAGNOSIS AND TESTING > TRANSMISSION COOLING > SYMPTOM CHART - TRANSMISSION COOLING

Symptom	Possible Sources	Action
Transmission overheating	Clogged transmission fluid cooler or transmission fluid cooler tubes Bent or crushed transmission fluid cooler tubes	INSPECT the transmission fluid cooler and the transmission fluid cooler tubes for damage or plugging. INSTALL new components as necessary.
System leaks		INSPECT transmission fluid cooler and transmission fluid cooler tubes for leaks. SERVICE as required.
Transmission fluid level is too high		REFER to: Transmission Fluid Level Check .
Vibration - a high frequency (20-80 Hz) that is felt through the seat or gear shifter. Changes with engine speed	Transmission fluid cooler tubes grounded	CHECK the transmission fluid cooler tubes. REPAIR as necessary.

DIAGNOSIS AND TESTING > TRANSMISSION COOLING > CHECK TRANSMISSION FLUID LEVEL AND CONDITION

Transmission Fluid Level Check

To check the transmission fluid level, REFER to: Transmission Fluid Level Check .

High Transmission Fluid Level

A transmission fluid level that is too high may cause the transmission fluid to become aerated due to the churning action of the rotating internal parts. This will cause erratic control pressure, foaming, loss of transmission fluid from the vent tube and possible transmission malfunction and/or damage.

Low Transmission Fluid Level

A low transmission fluid level could result in poor transmission engagement, slipping, malfunction and/or damage. This could also indicate a leak in one of the transmission seals or gaskets.

Transmission Fluid Condition Check

1.

Check the transmission fluid level, REFER to: Transmission Fluid Level Check .

2.

Place a drop of transmission fluid on a facial tissue and examine the stain.

3.

If evidence of solid material is found, the transmission fluid pan should be removed for further inspection.

4.

If transmission fluid contamination or transmission failure is confirmed by the sediment in the bottom of the transmission fluid pan, repair the transmission and clean the transmission fluid cooler tubes and the transmission fluid cooler.

5.

If the transmission is to be overhauled or if installing a new transmission, the transmission fluid cooler must be backflushed. REFER to: Transmission Fluid Cooler - Backflushing and Cleaning .

GENERAL PROCEDURES > TRANSMISSION FLUID COOLER - BACKFLUSHING AND CLEANING

Special Tool(s) / General Equipment

Transmission Cooling System Heated Flusher

Materials

Name	Specification
Motorcraft® MERCON® LV Automatic Transmission Fluid (U.S.) XT-10-QLVC (U.S.)	MERCON® LVWSS-M2C938-A

Flushing

NOTE: Use transmission fluid specified for this transmission. Do not use any supplemental transmission fluid additives or cleaning agents. The use of these products could cause internal transmission components to fail, which will affect the operation of the transmission.

1.
The transmission cooling system (cooler and lines) MUST be flushed every time the transmission is overhauled or replaced in order to minimize the likelihood of repeat repairs. It is mandatory that proper equipment and procedures be followed when flushing coolers/lines. The flushing equipment used MUST:

maintain fluid at 140°F or above

pulsate fluid during cleaning

have a GPM flow meter

have twin magnetic filters

and have air purge capability before and after flushing

2.

If equipment meeting the specifications above is not available, the transmission fluid cooler(s) should be replaced and the lines cleaned by hand.

3.

Check and top off fluid level of the transmission cooling system heated flusher with transmission fluid.

Use the General Equipment: Transmission Cooling System Heated Flusher

Material

: Motorcraft® MERCON® LV Automatic Transmission Fluid (U.S.) / XT-10-QLVC (U.S.) (MERCON® LV) (WSS-M2C938-A)

4.

Turn on the heater and allow the fluid in the cooler line flusher 15-30 minutes to heat up to 60°C (140°F) before using.

5.

Install the line adapters onto the transmission fluid cooler tubes.

6.

Attach the Transmission Cooling System Heated Flusher red line to the transmission fluid cooler inlet tube. Refer to: Transmission Cooling - Component Location .

7.

Attach the Transmission Cooling System Heated Flusher blue line to the transmission fluid cooler outlet tube.

8.

Follow the Transmission Cooling System Heated Flusher manufacturer's instructions to purge the transmission fluid cooler tubes and the transmission fluid cooler prior to starting the flushing procedure.

9.

Allow the Transmission Cooling System Heated Flusher to backflush for 10-15 minutes, then flush the transmission fluid cooler in a normal flow direction for an additional 10-15 minutes.

10.

If the transmission fluid cooling system heated flusher is equipped with an inspection micron filter:

1.

Remove and clean the Oberg 28 micron filter.

2.

Install the filter.

3.

Backflush the system for 5 minutes.

4.

Remove and inspect the filter.

5.

If debris/contamination is present on the filter, repeat step 9.

11.

Follow the equipment instructions to purge the transmission fluid cooler tubes and transmission fluid cooler.

REMOVAL AND INSTALLATION > TRANSMISSION FLUID COOLER - 2.3L ECOBOOST (231KW/314PS)

Special Tool(s) / General Equipment

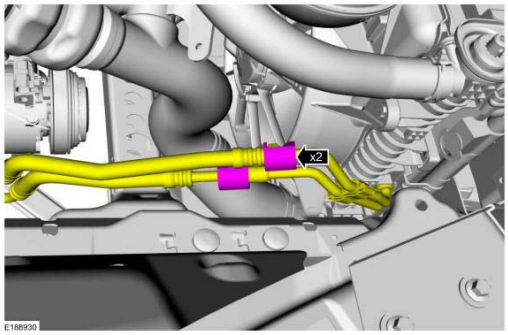
 E152371	307-695 Tool, Quick Disconnect TKIT-2012C-FL TKIT-2012C-ROW TKIT-2012C-ROW2

REMOVAL AND INSTALLATION > TRANSMISSION FLUID COOLER - 2.3L ECOBOOST (231KW/314PS) > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

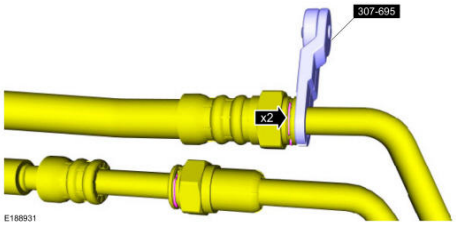
Remove the transmission fluid cooler tube fittings secondary latches.



2.

Using the special tool, disconnect the transmission fluid cooler tube fittings.

Use Special Service Tool: 307-695 Tool, Quick Disconnect.



3.

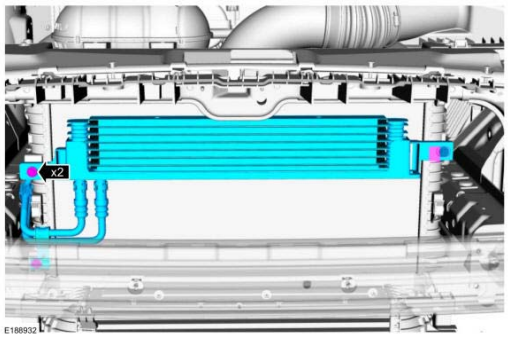
Remove the A/C condenser. Refer to: Condenser - 2.3L EcoBoost (201kW/273PS) .

4.

Remove the bolts and the transmission fluid cooler.

Torque

: 53 lb.in (6 Nm)



REMOVAL AND INSTALLATION > TRANSMISSION FLUID COOLER - 2.3L ECOBOOST (231KW/314PS) > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Check the transmission fluid level and adjust as necessary. Refer to: Transmission Fluid Level Check .

REMOVAL AND INSTALLATION > TRANSMISSION FLUID COOLER - 3.7L DURATEC (227KW 301PS)

Special Tool(s) / General Equipment

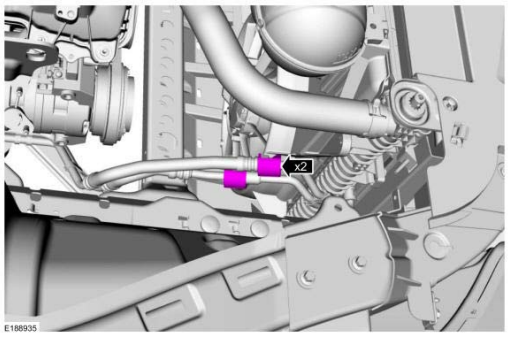
 E152371	307-695 Tool, Quick Disconnect TKIT-2012C-FL TKIT-2012C-ROW TKIT-2012C-ROW2

REMOVAL AND INSTALLATION > TRANSMISSION FLUID COOLER - 3.7L DURATEC (227KW 301PS) > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

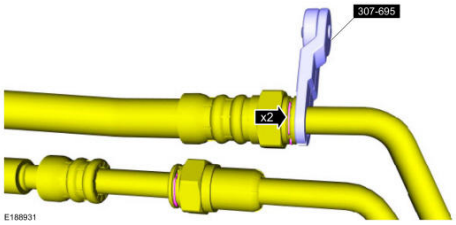
Remove the transmission fluid cooler tube secondary latches.



2.

Using the special tool, disconnect the transmission fluid cooler tube fittings.

Use Special Service Tool: 307-695 Tool, Quick Disconnect.

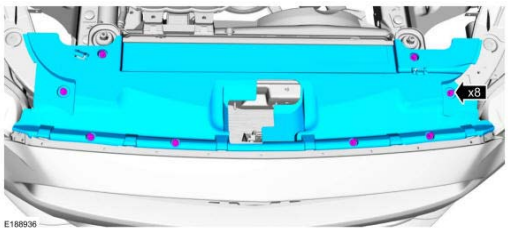


3.

Remove the air cleaner outlet pipe. Refer to: AIR CLEANER OUTLET PIPE - 3.7L Duratec (227kW/301PS).

4.

Remove the pushpins and the radiator sight shield.

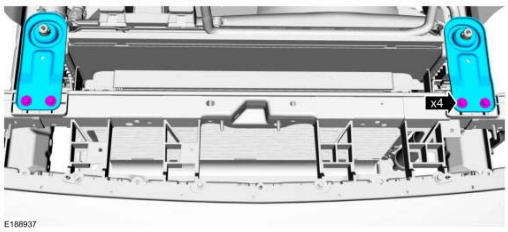


5.

Remove the bolts and the radiator brackets.

Torque

: 97 lb.in (11 Nm)

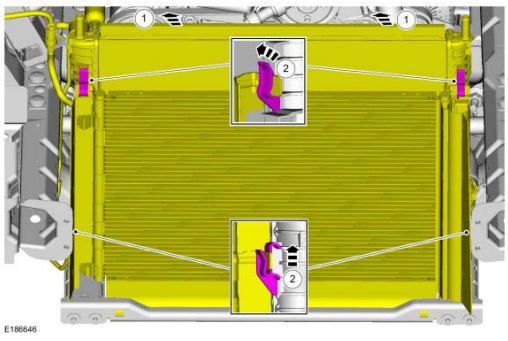


NOTE: Front bumper removed for clarity.

6.
Position the A/C condenser aside.

Position the radiator towards the engine.

Release the upper tabs and position the A/C condenser aside.

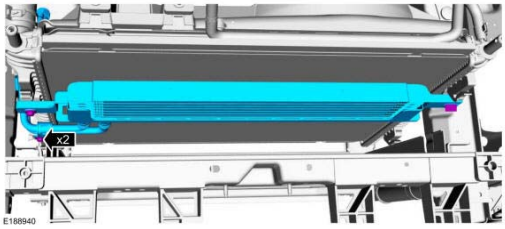


7.

Remove the bolts and the transmission fluid cooler.

Torque

: 53 lb.in (6 Nm)



REMOVAL AND INSTALLATION > TRANSMISSION FLUID COOLER - 3.7L DURATEC (227KW 301PS) > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Check the transmission fluid level and adjust as necessary. Refer to: Transmission Fluid Level Check .

REMOVAL AND INSTALLATION > TRANSMISSION FLUID COOLER - 5.0L 32V TI-VCT

Special Tool(s) / General Equipment

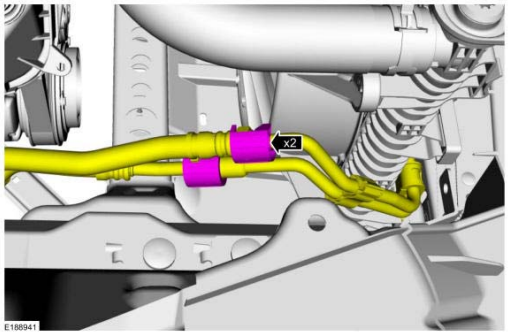
 E152371	307-695 Tool, Quick Disconnect TKIT-2012C-FL TKIT-2012C-ROW TKIT-2012C-ROW2

REMOVAL AND INSTALLATION > TRANSMISSION FLUID COOLER - 5.0L 32V TI-VCT > REMOVAL

NOTE: Removal steps in this procedure may contain installation details.

1.

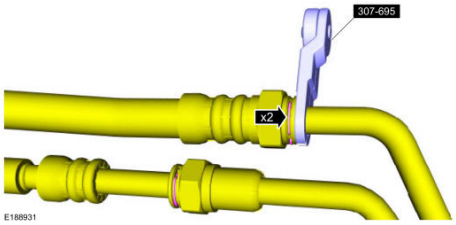
Remove the transmission fluid cooler tube secondary latches.



2.

Using the special tool, disconnect the transmission fluid cooler tube fittings.

Use Special Service Tool: 307-695 Tool, Quick Disconnect.

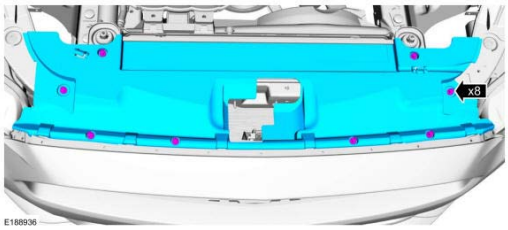


3.

Remove the air cleaner outlet pipe. Refer to: AIR CLEANER OUTLET PIPE - 5.0L 32V Ti-VCT/5.5.0L Ti-VCT V8 (308kW/418PS).

4.

Remove the pushpins and the radiator sight shield.

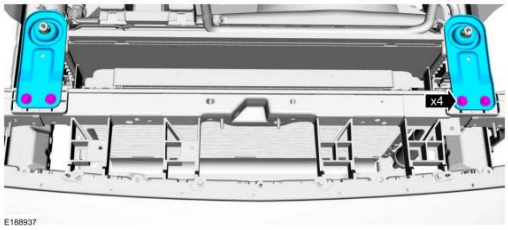


5.

Remove the bolts and the radiator brackets.

Torque

: 97 lb.in (11 Nm)

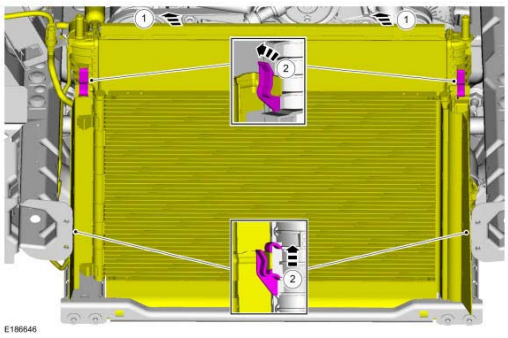


NOTE: Front bumper removed for clarity.

6.
Position the A/C condenser aside.

Position the radiator towards the engine.

Release the upper tabs and position the A/C condenser aside.

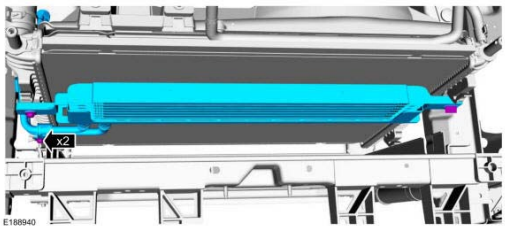


7.

Remove the bolts and the transmission fluid cooler.

Torque

: 53 lb.in (6 Nm)



REMOVAL AND INSTALLATION > TRANSMISSION FLUID COOLER - 5.0L 32V TI-VCT > INSTALLATION

1.

To install, reverse the removal procedure.

2.

Check the transmission fluid level and adjust as necessary. Refer to: Transmission Fluid Level Check .

REMOVAL AND INSTALLATION > TRANSMISSION FLUID COOLER TUBES - 2.3L ECOBOOST (201KW 273PS)

Special Tool(s) / General Equipment

 E152371	307-695 Tool, Quick Disconnect TKIT-2012C-FL TKIT-2012C-ROW TKIT-2012C-ROW2

Materials

Name	Specification
Motorcraft® MERCON® LV Automatic Transmission Fluid (U.S.) XT-10-QLVC (U.S.)	MERCON® LVWSS-M2C938-A

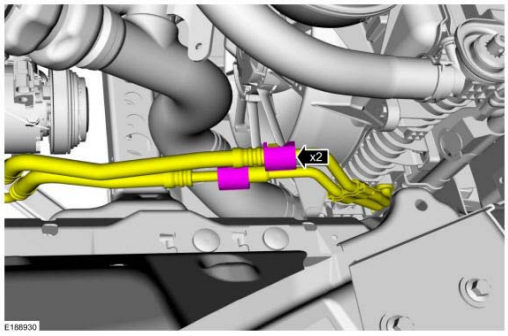
REMOVAL AND INSTALLATION > TRANSMISSION FLUID COOLER TUBES - 2.3L ECOBOOST (201KW 273PS) > REMOVAL

1.

With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

2.

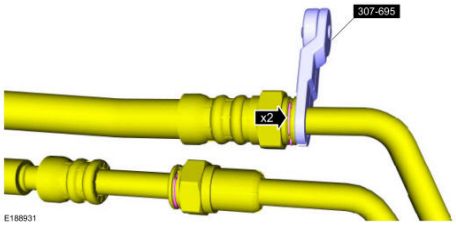
Remove the transmission fluid cooler tube fittings secondary latches.



3.

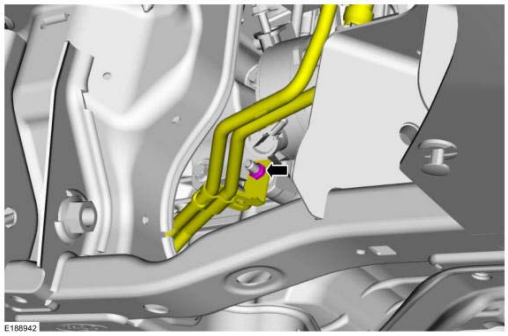
Using the special tool, disconnect the transmission fluid cooler tube fittings.

Use Special Service Tool: 307-695 Tool, Quick Disconnect.



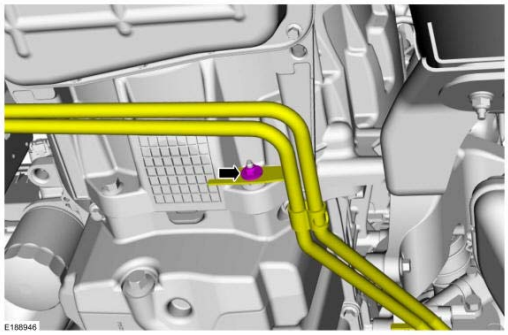
4.

Remove the transmission fluid cooler tubes bracket-to-engine mount nut.



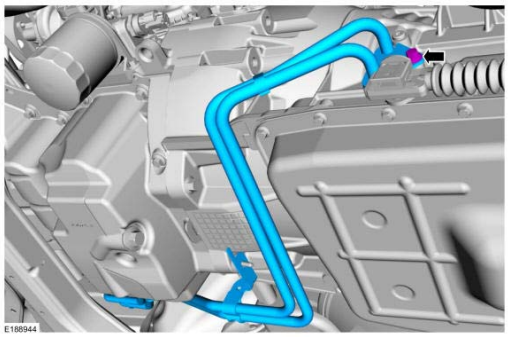
5.

Remove the transmission fluid cooler tubes bracket-to-transmission nut.



6.

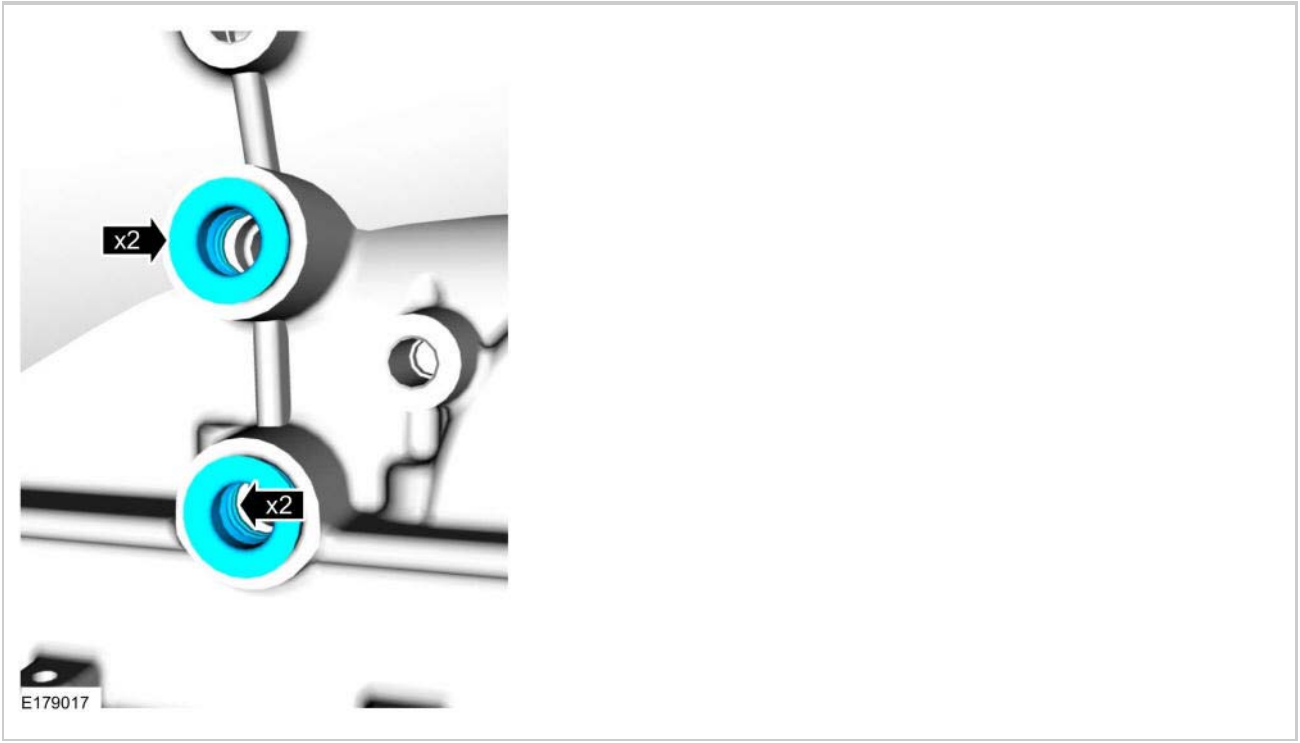
Remove the bolt and the transmission fluid cooler tubes.



REMOVAL AND INSTALLATION > TRANSMISSION FLUID COOLER TUBES - 2.3L ECOBOOST (201KW 273PS) > INSTALLATION

1.

If necessary, remove the transmission fluid cooler tubes backing rings and band seals from the transmission.



2.

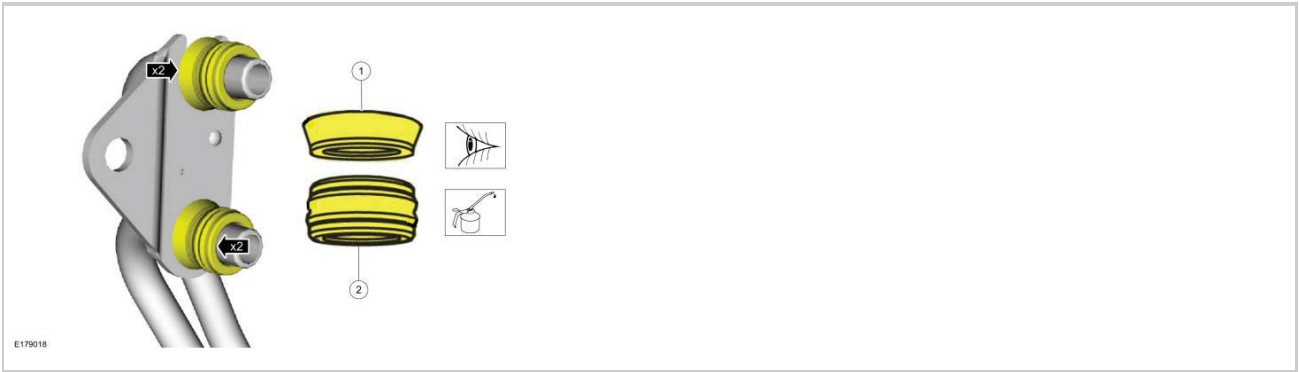
Lubricate the band seals and backing rings.

Backing ring (7J324).

Seal (7D285).

Material

: Motorcraft® MERCON® LV Automatic Transmission Fluid (U.S.) / XT-10-QLVC (U.S.) (MERCON® LV) (WSS-M2C938-A)

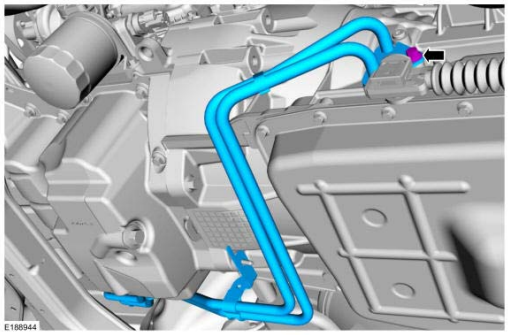


3.

Position the transmission fluid cooler tubes in the vehicle, attach the transmission fluid cooler tubes to the transmission and install the bolt.

Torque

: 18 lb.ft (25 Nm)

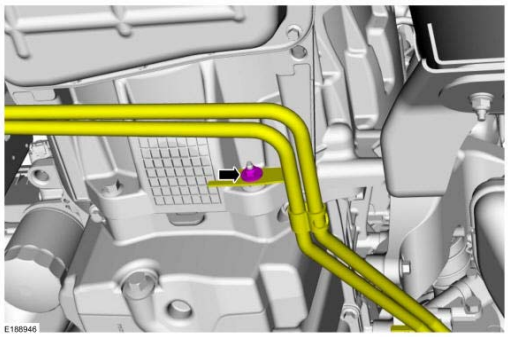


4.

Install the transmission fluid cooler tubes bracket-to-transmission nut.

Torque

: 124 lb.in (14 Nm)

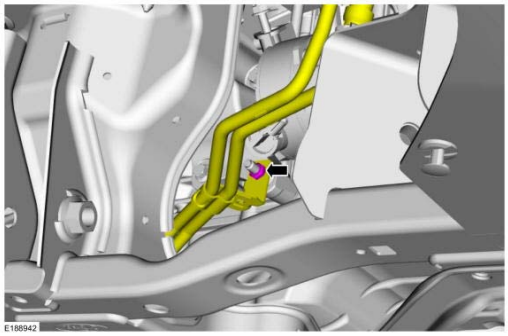


5.

Install the transmission fluid cooler tubes bracket-to-engine mount nut.

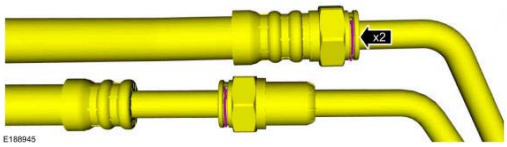
Torque

: 35 lb.ft (48 Nm)



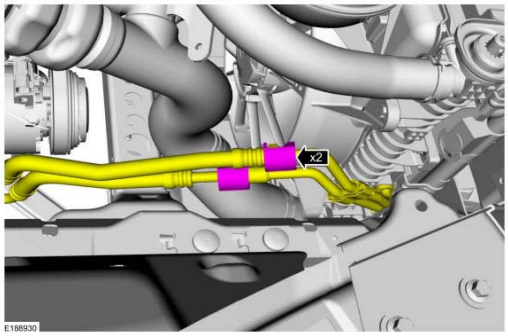
6.

Connect the transmission fluid cooler tube fittings.



7.

Install the transmission fluid cooler tube fittings secondary latches.



8.

Check the transmission fluid level and adjust as necessary. Refer to: Transmission Fluid Level Check .

REMOVAL AND INSTALLATION > TRANSMISSION FLUID COOLER TUBES - 3.7L DURATEC (227KW 301PS)

Special Tool(s) / General Equipment

 E152371	307-695 Tool, Quick Disconnect TKIT-2012C-FL TKIT-2012C-ROW TKIT-2012C-ROW2

Materials

Name	Specification
Motorcraft® MERCON® LV Automatic Transmission Fluid (U.S.) XT-10-QLVC (U.S.)	MERCON® LVWSS-M2C938-A

REMOVAL AND INSTALLATION > TRANSMISSION FLUID COOLER TUBES - 3.7L

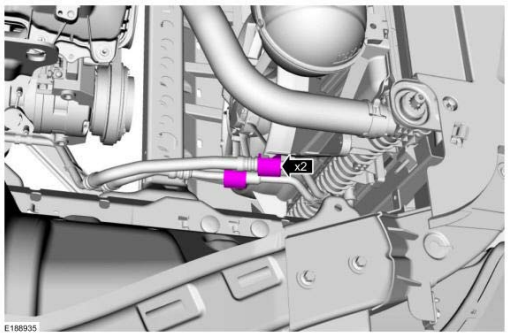
DURATEC (227KW 301PS) > REMOVAL

1.

With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

2.

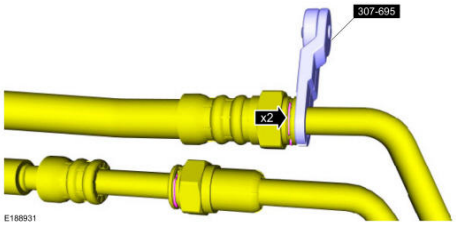
Remove the transmission fluid cooler tube fittings secondary latches.



3.

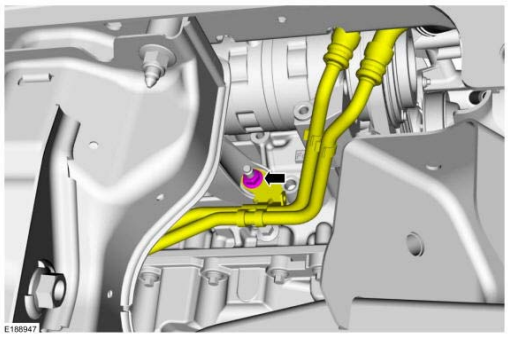
Using the special tool, disconnect the transmission fluid cooler tube fittings.

Use Special Service Tool: 307-695 Tool, Quick Disconnect.



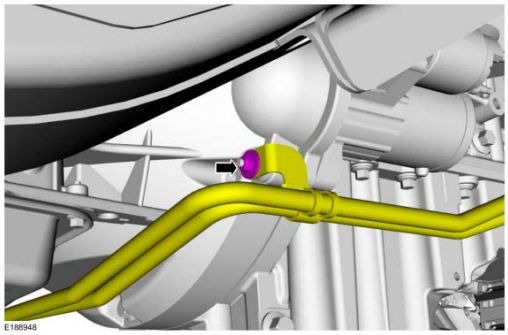
4.

Remove the transmission fluid cooler tubes bracket-to-engine mount nut.



5.

Remove the transmission fluid cooler tubes bracket-to-transmission nut.

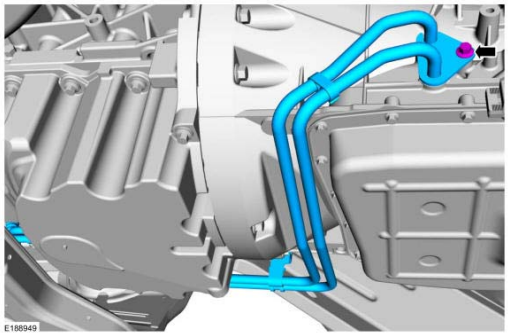


6.

Remove the LH catalyst monitor sensor. Refer to: CATALYST MONITOR SENSOR .

7.

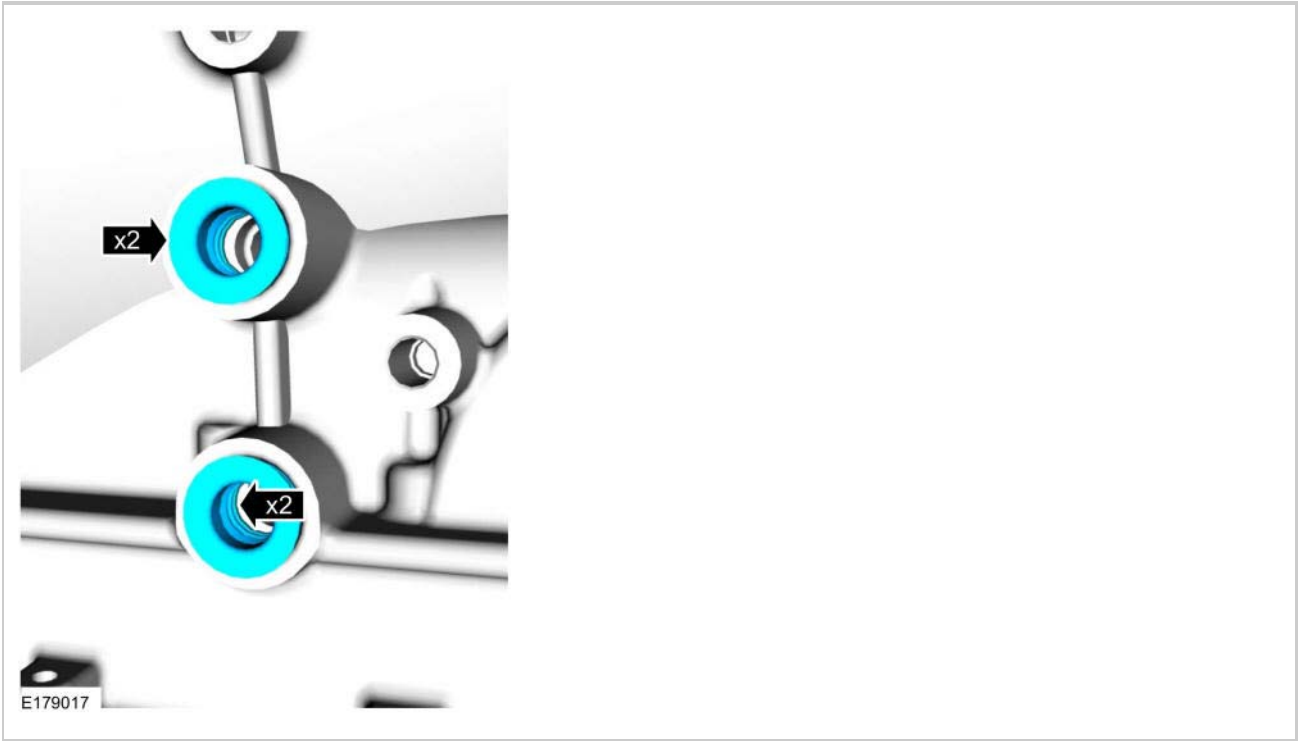
Remove the bolt and the transmission fluid cooler tubes.



REMOVAL AND INSTALLATION > TRANSMISSION FLUID COOLER TUBES - 3.7L DURATEC (227KW 301PS) > INSTALLATION

1.

If necessary, remove the transmission fluid cooler tubes backing rings and band seals from the transmission.



2.

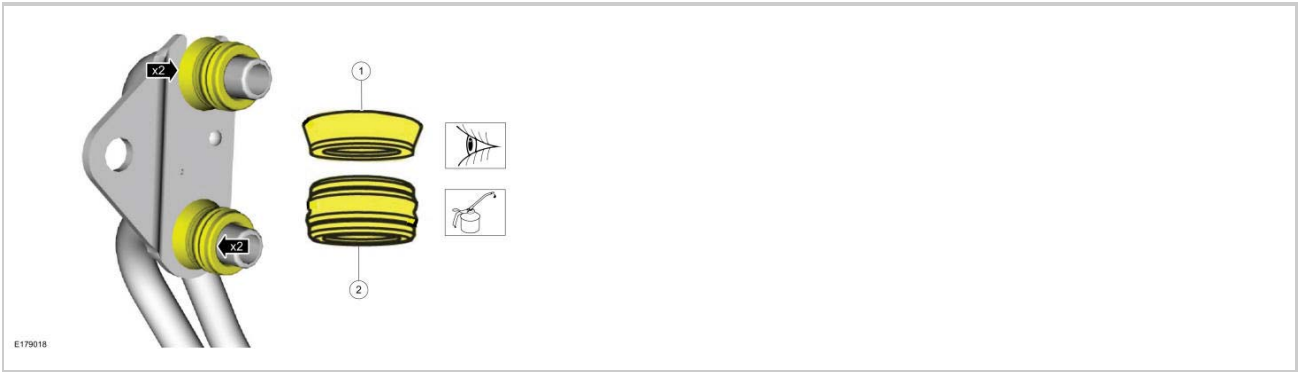
Lubricate the band seals and backing rings.

Backing ring (7J324).

Seal (7D285).

Material

: Motorcraft® MERCON® LV Automatic Transmission Fluid (U.S.) / XT-10-QLVC (U.S.) (MERCON® LV) (WSS-M2C938-A)

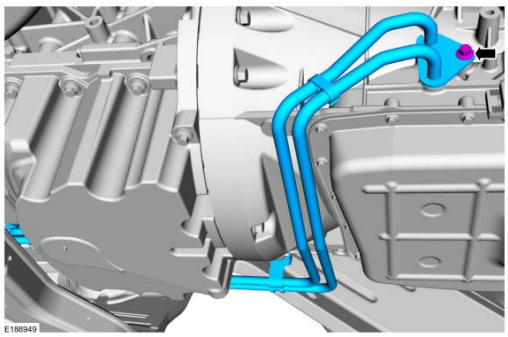


3.

Position the transmission fluid cooler tubes in the vehicle, attach the transmission fluid cooler tubes to the transmission and install the bolt.

Torque

: 18 lb.ft (25 Nm)



4.

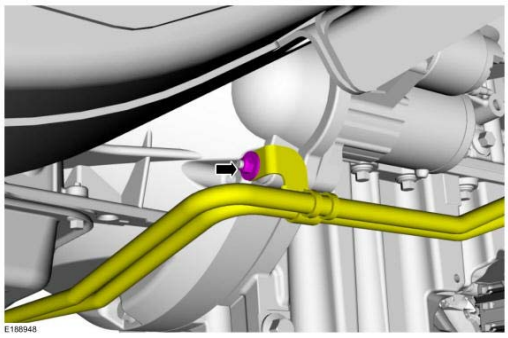
Install the LH catalyst monitor sensor. Refer to: CATALYST MONITOR SENSOR .

5.

Install the transmission fluid cooler tubes bracket-to-transmission nut.

Torque

: 124 lb.in (14 Nm)

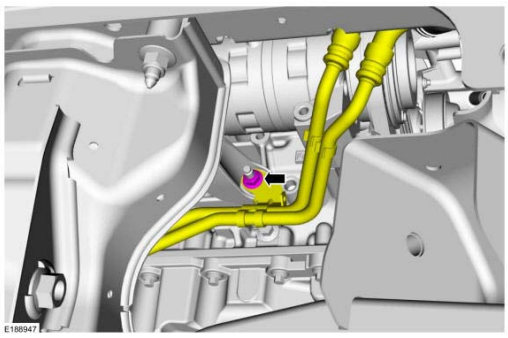


6.

Install the transmission fluid cooler tubes bracket-to-engine mount nut.

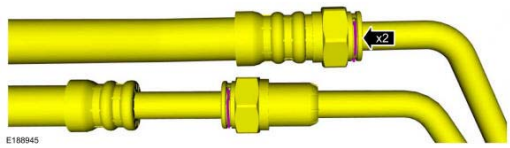
Torque

: 35 lb.ft (48 Nm)



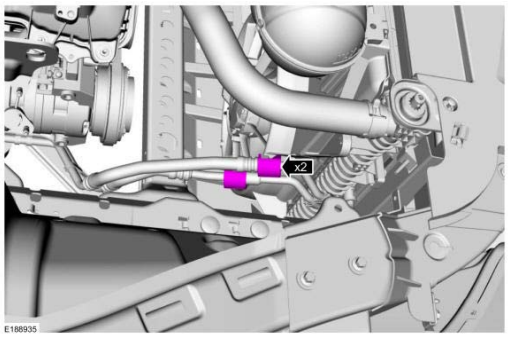
7.

Connect the transmission fluid cooler tube fittings.



8.

Install the transmission fluid cooler tube fittings secondary latches.



REMOVAL AND INSTALLATION > TRANSMISSION FLUID COOLER TUBES - 5.0L 32V TI-VCT

Special Tool(s) / General Equipment

 E152371	307-695 Tool, Quick Disconnect TKIT-2012C-FL TKIT-2012C-ROW TKIT-2012C-ROW2

Materials

Name	Specification
Motorcraft® MERCON® LV Automatic Transmission Fluid (U.S.) XT-10-QLVC (U.S.)	MERCON® LVWSS-M2C938-A

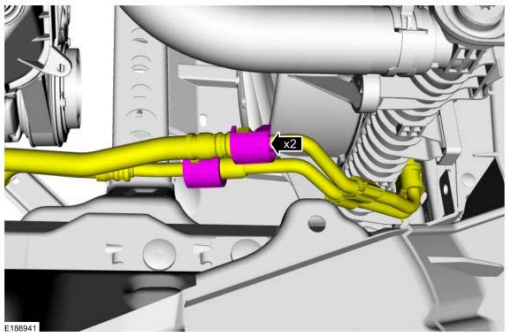
REMOVAL AND INSTALLATION > TRANSMISSION FLUID COOLER TUBES - 5.0L 32V TI-VCT > REMOVAL

1.

With the vehicle in NEUTRAL, position it on a hoist. Refer to: Jacking and Lifting - Overview .

2.

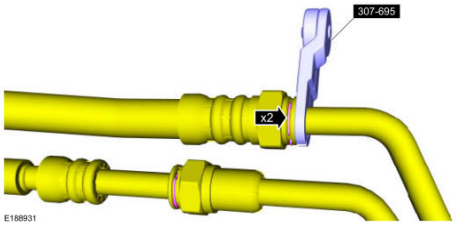
Remove the transmission fluid cooler tube fittings secondary latches.



3.

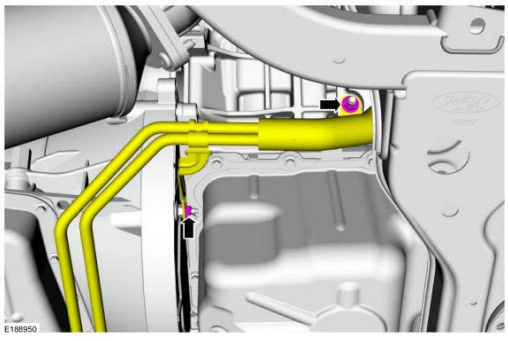
Using the special tool, disconnect the transmission fluid cooler tube fittings.

Use Special Service Tool: 307-695 Tool, Quick Disconnect.



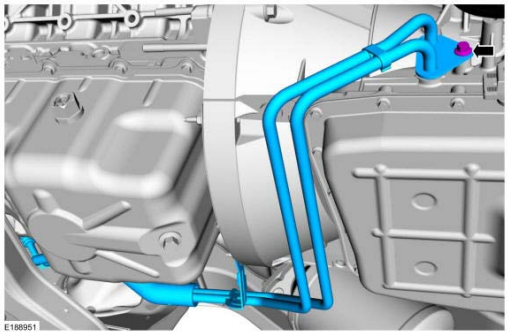
4.

Remove the transmission fluid cooler tubes bracket-to-engine mount nut and the transmission fluid cooler tubes bracket-to-transmission nut.



5.

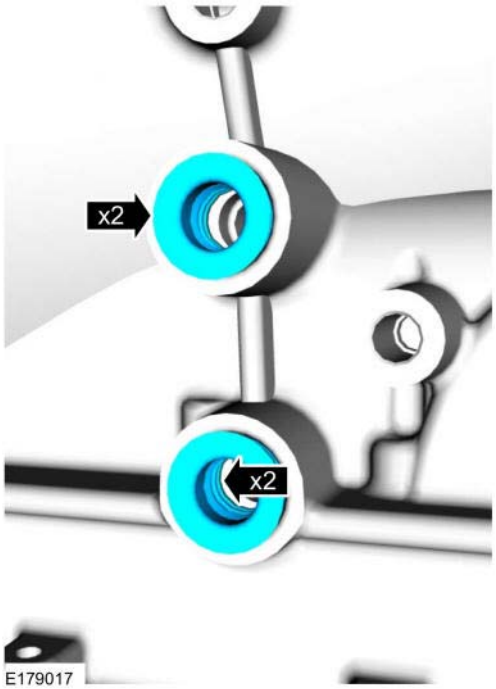
Remove the bolt and the transmission fluid cooler tubes.



REMOVAL AND INSTALLATION > TRANSMISSION FLUID COOLER TUBES - 5.0L 32V TI-VCT > INSTALLATION

1.

If necessary, remove the transmission fluid cooler tubes backing rings and band seals from the transmission.



2.

Lubricate the band seals and backing rings.

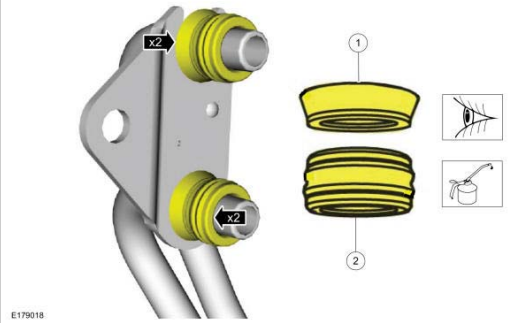
Backing ring (7J324).

Seal (7D285).

Material

: Motorcraft® MERCON® LV Automatic Transmission Fluid (U.S.) / XT-10-QLVC (U.S.)

(MERCON® LV) (WSS-M2C938-A)

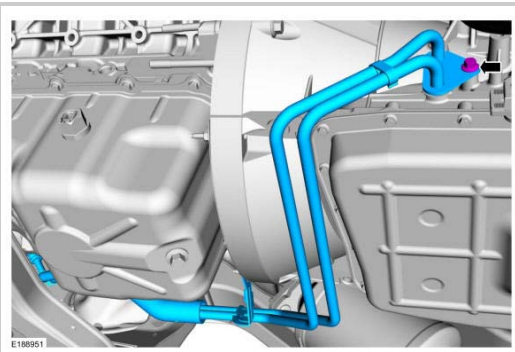


3.

Position the transmission fluid cooler tubes in the vehicle, attach the transmission fluid cooler tubes to the transmission and install the bolt.

Torque

: 18 lb.ft (25 Nm)



4.

Install the nuts.

Install the transmission fluid cooler tubes bracket-to-transmission nut.

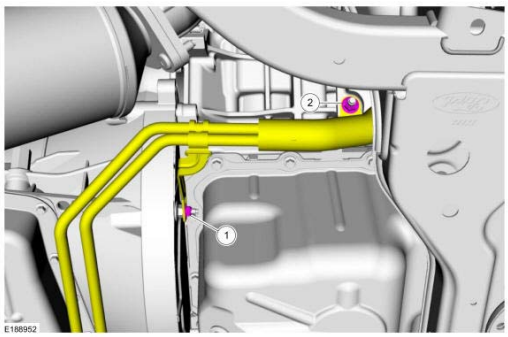
Torque

: 124 lb.in (14 Nm)

Install the transmission fluid cooler tubes bracket-to-engine mount nut.

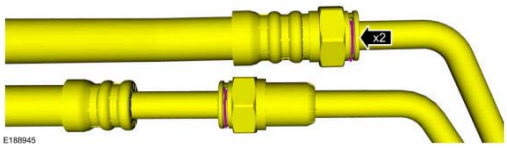
Torque

: 35 lb.ft (48 Nm)



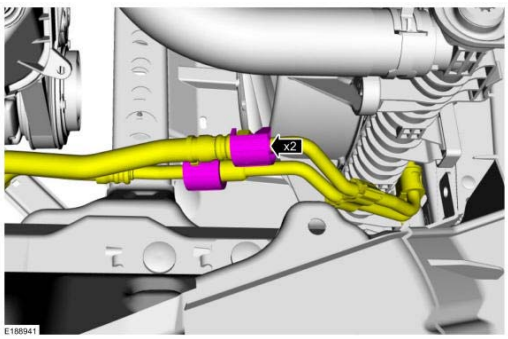
5.

Connect the transmission fluid cooler tube fittings.



6.

Install the transmission fluid cooler tube fittings secondary latches.



Service Manual: SYSTEM WIRING DIAGRAMS

AIR CONDITIONING

Fig 1: Automatic A/C Circuit (1 of 3)

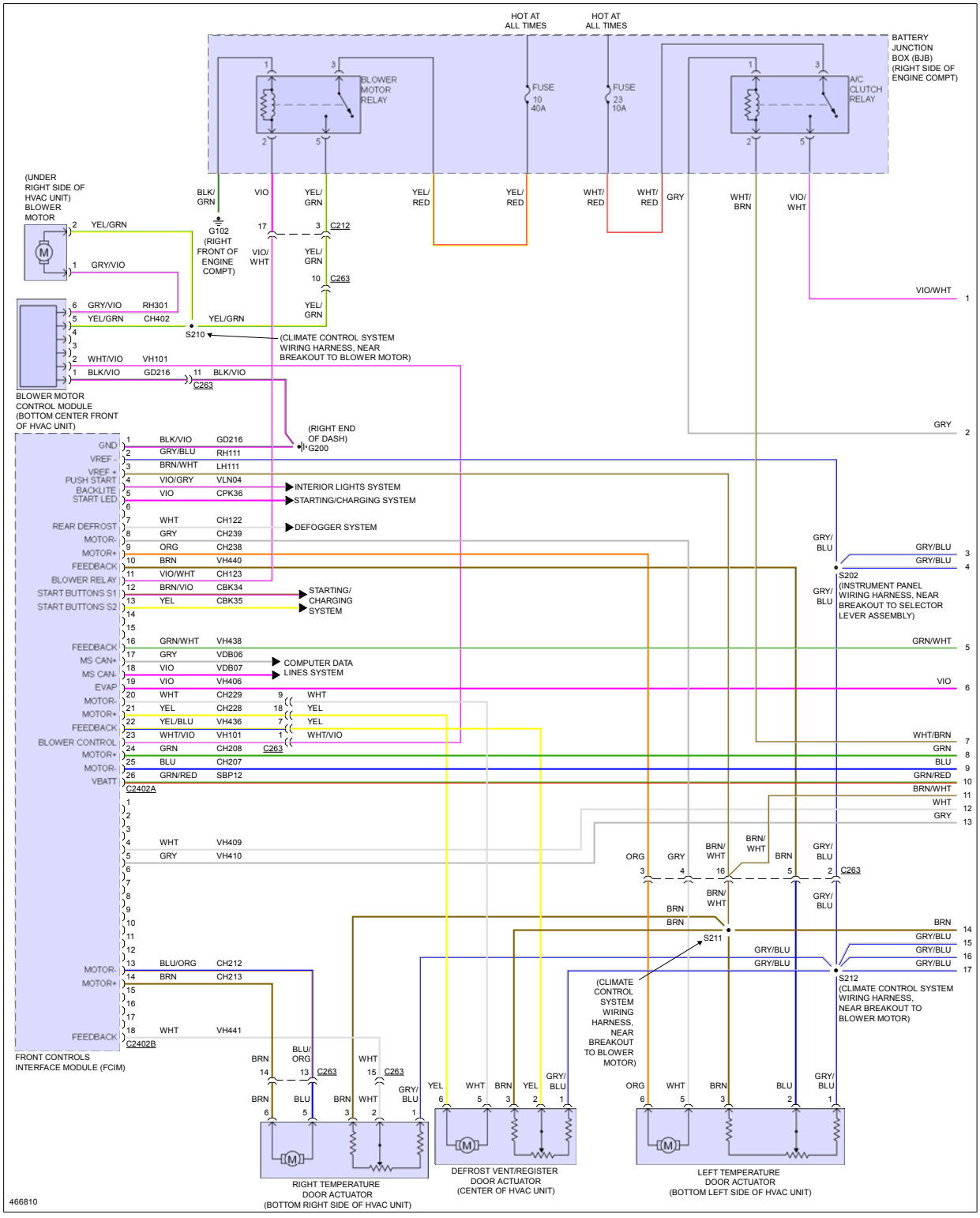


Fig 2: Automatic A/C Circuit (2 of 3)

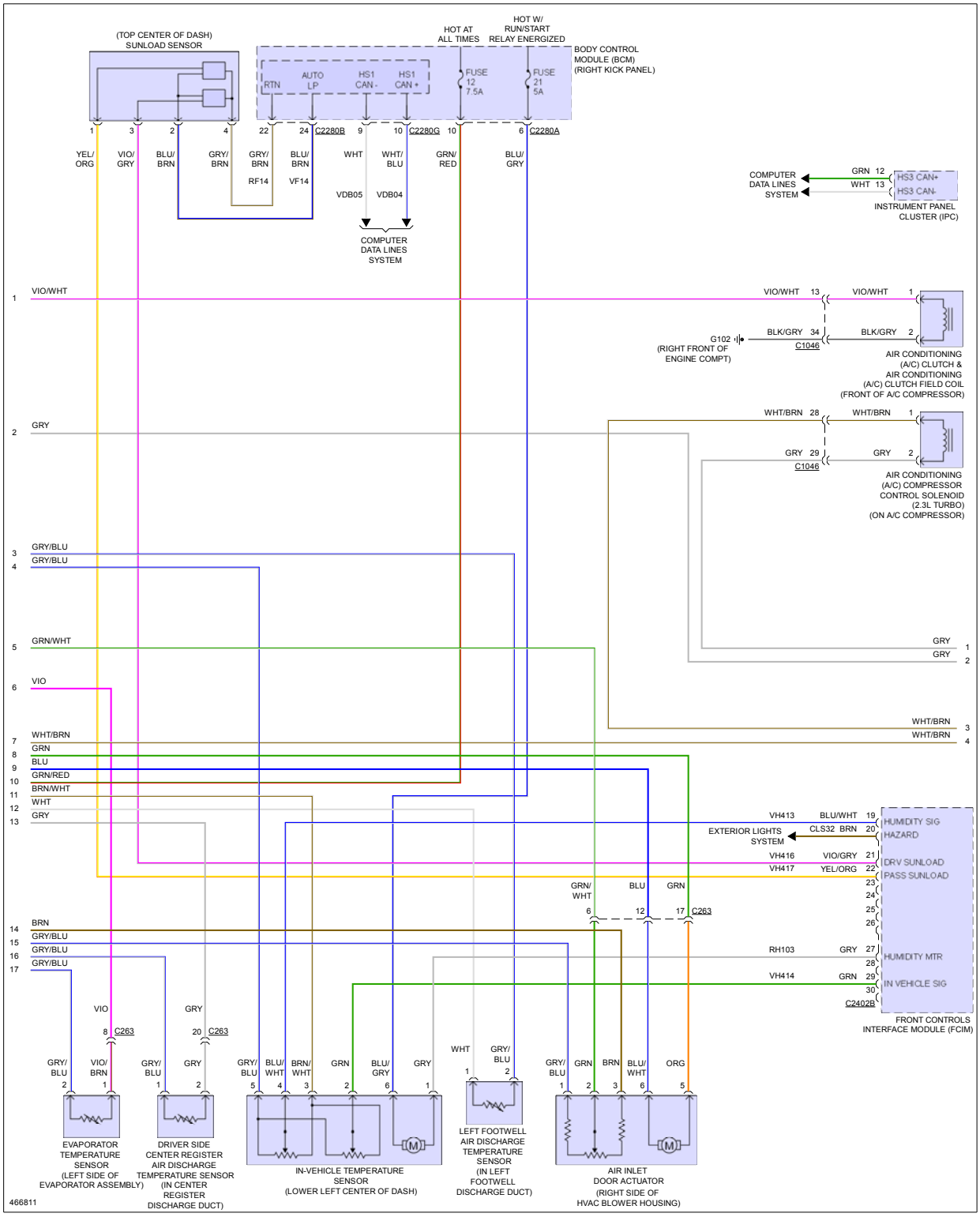


Fig 3: Automatic A/C Circuit (3 of 3)

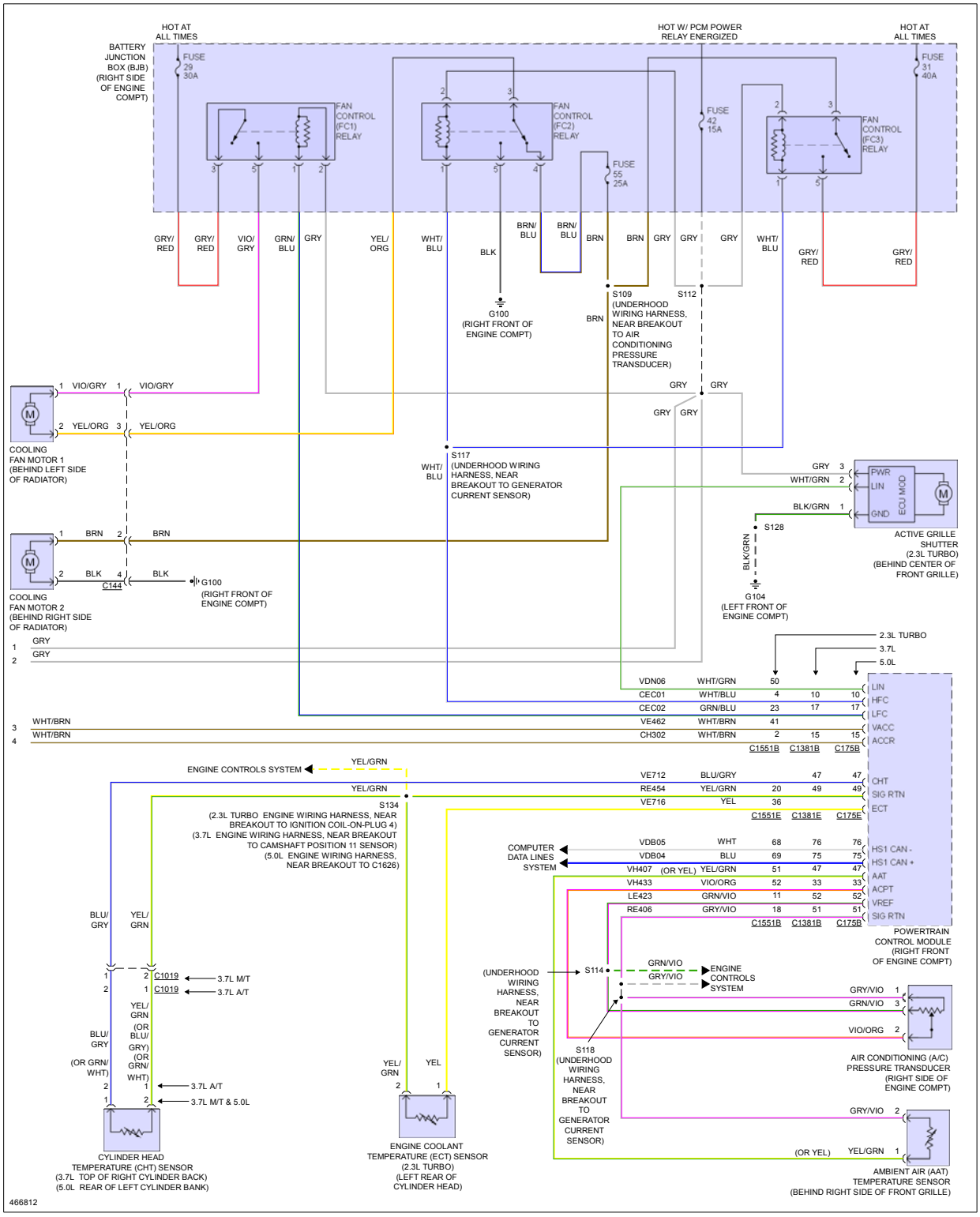


Fig 4: Manual A/C Circuit (1 of 3)

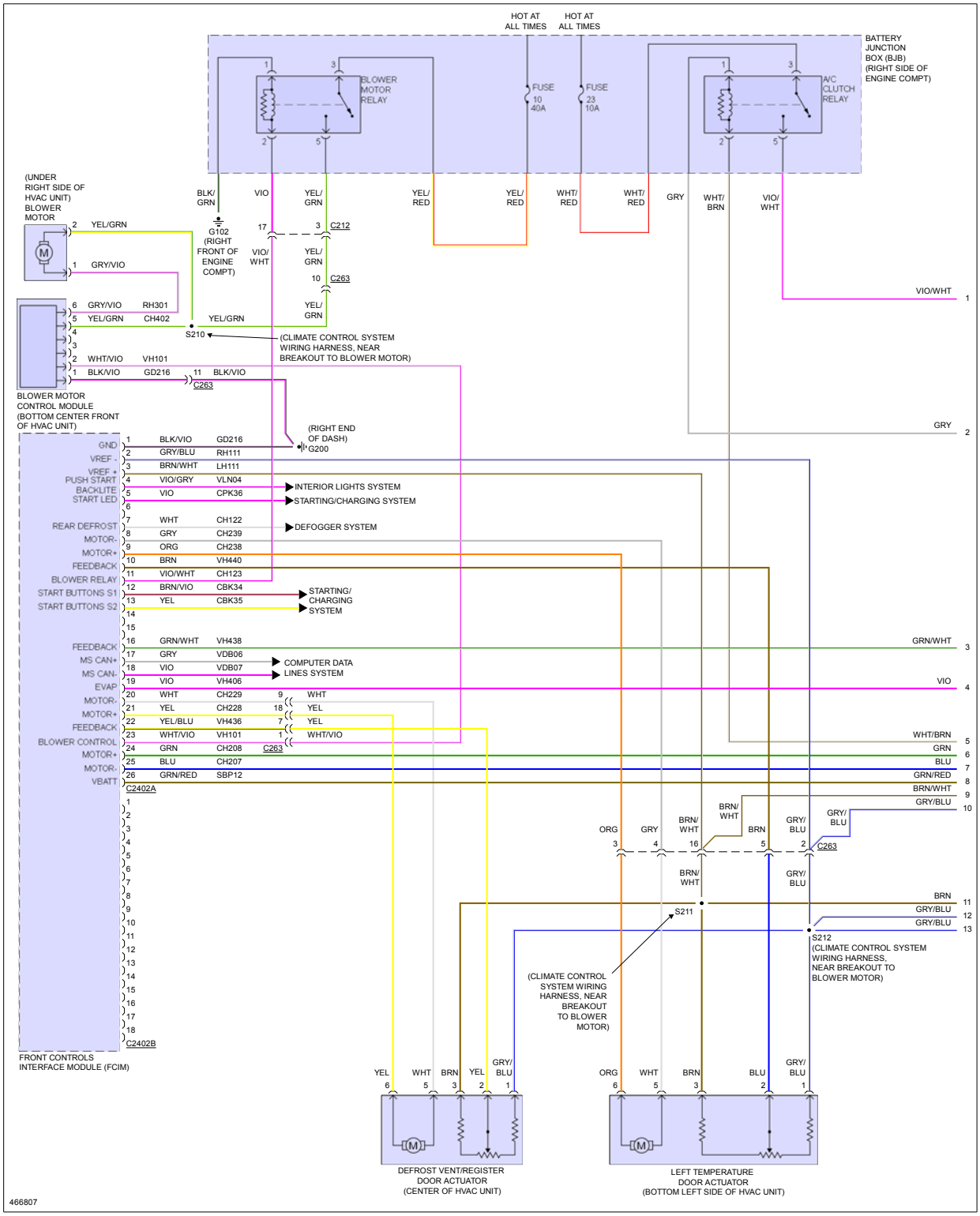


Fig 5: Manual A/C Circuit (2 of 3)

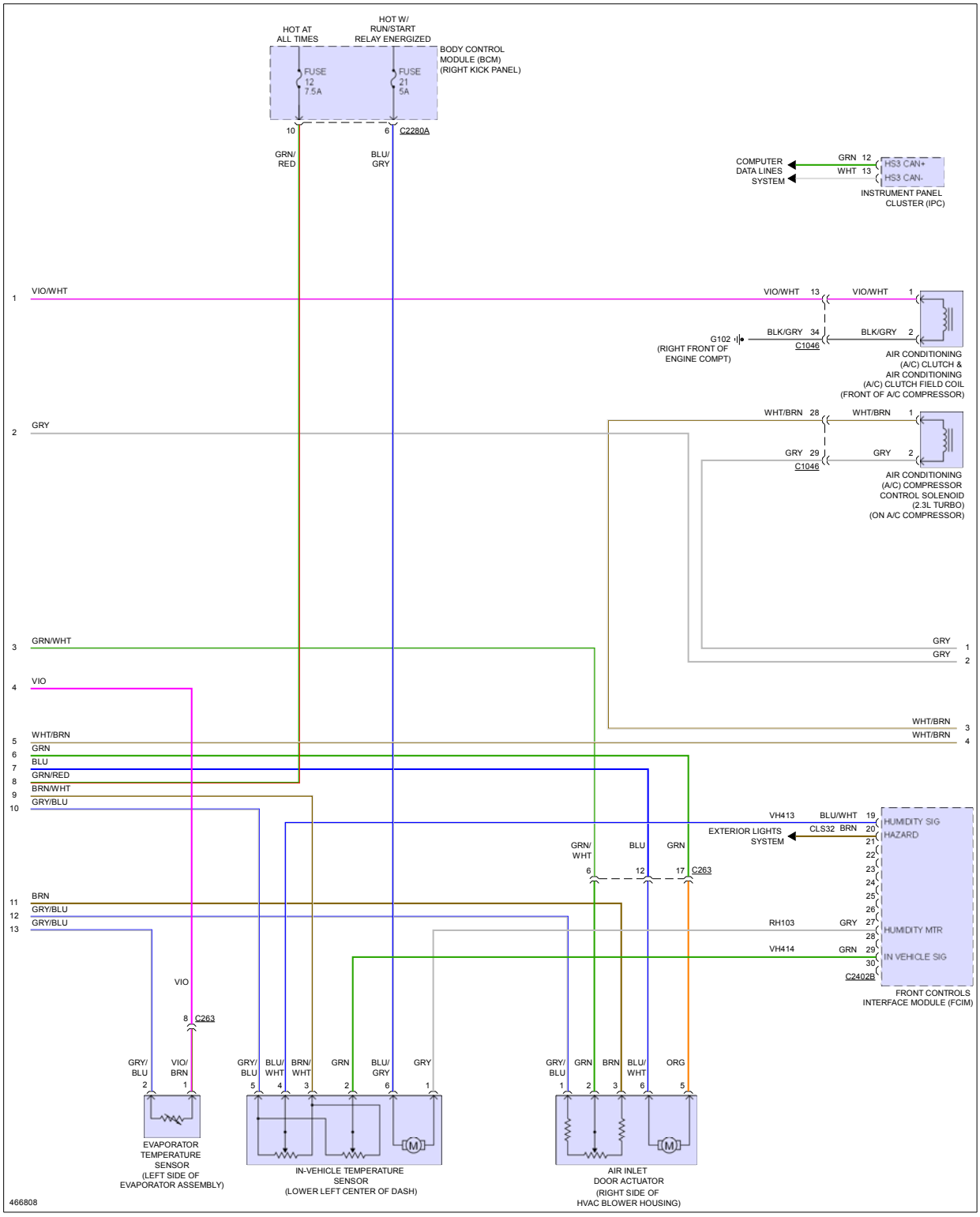
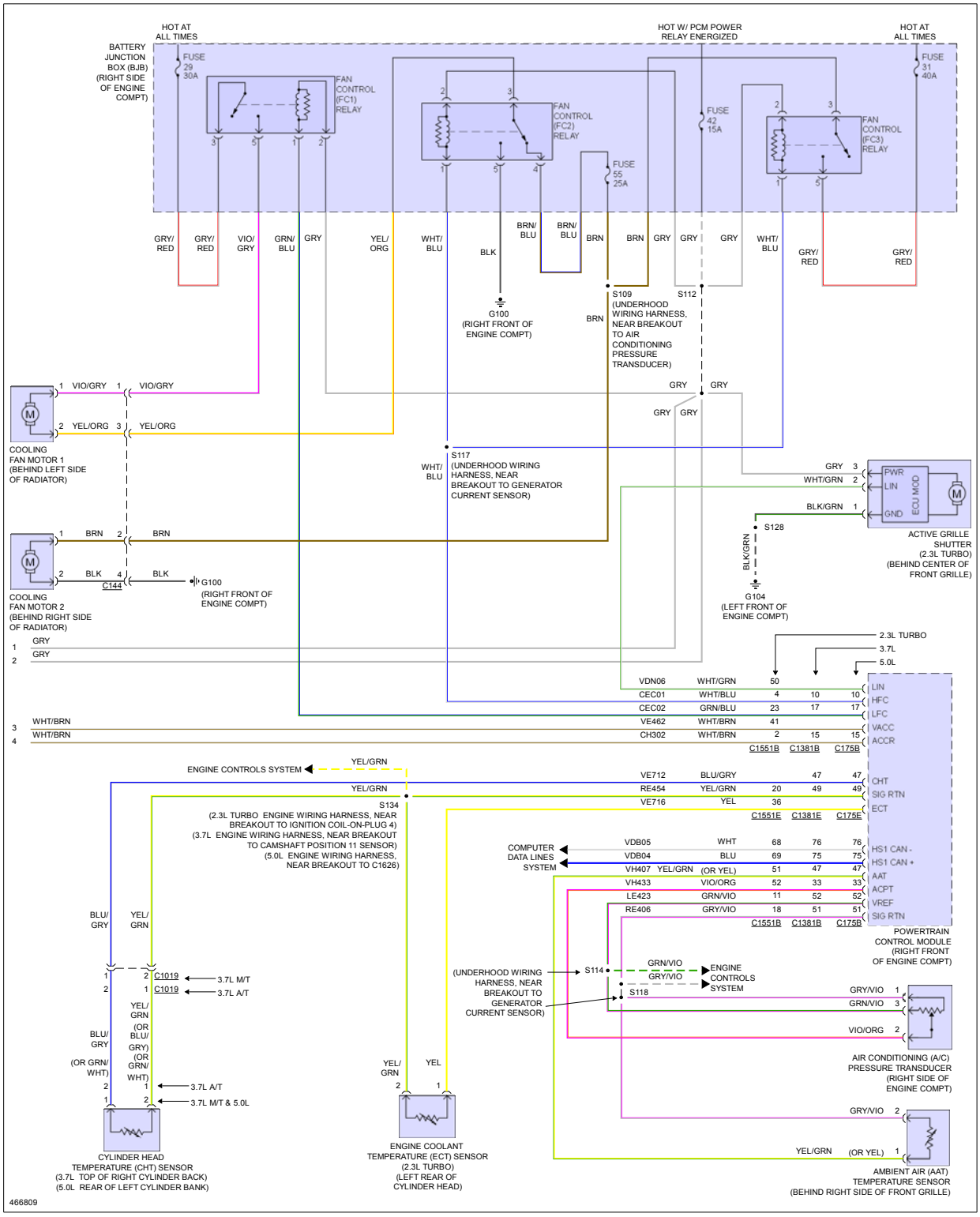
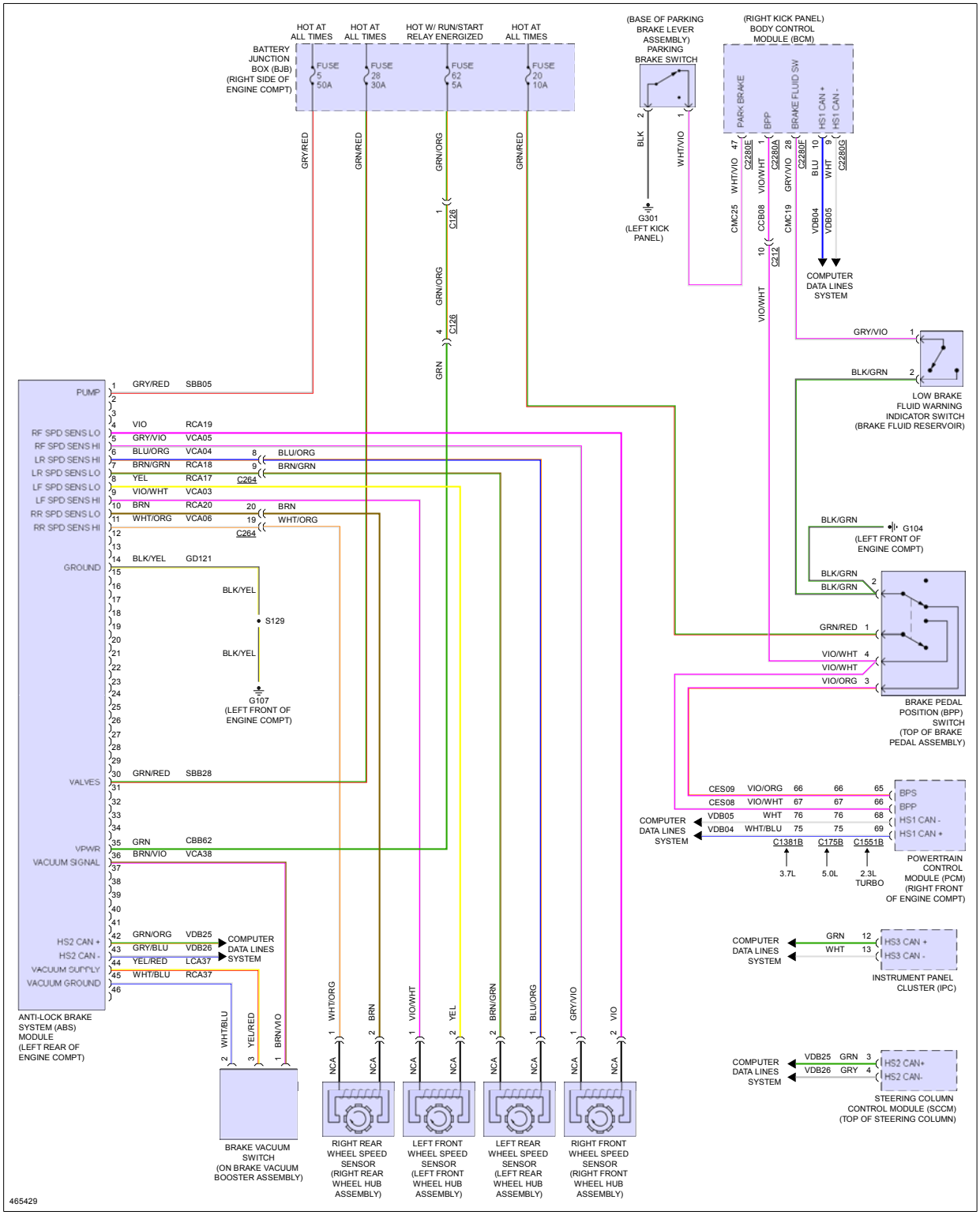


Fig 6: Manual A/C Circuit (3 of 3)



ANTI-LOCK BRAKES

Fig 1: Anti-lock Brakes Circuit



ANTI-THEFT

Fig 1: Anti-theft Circuit, W/ Memory (1 of 4)

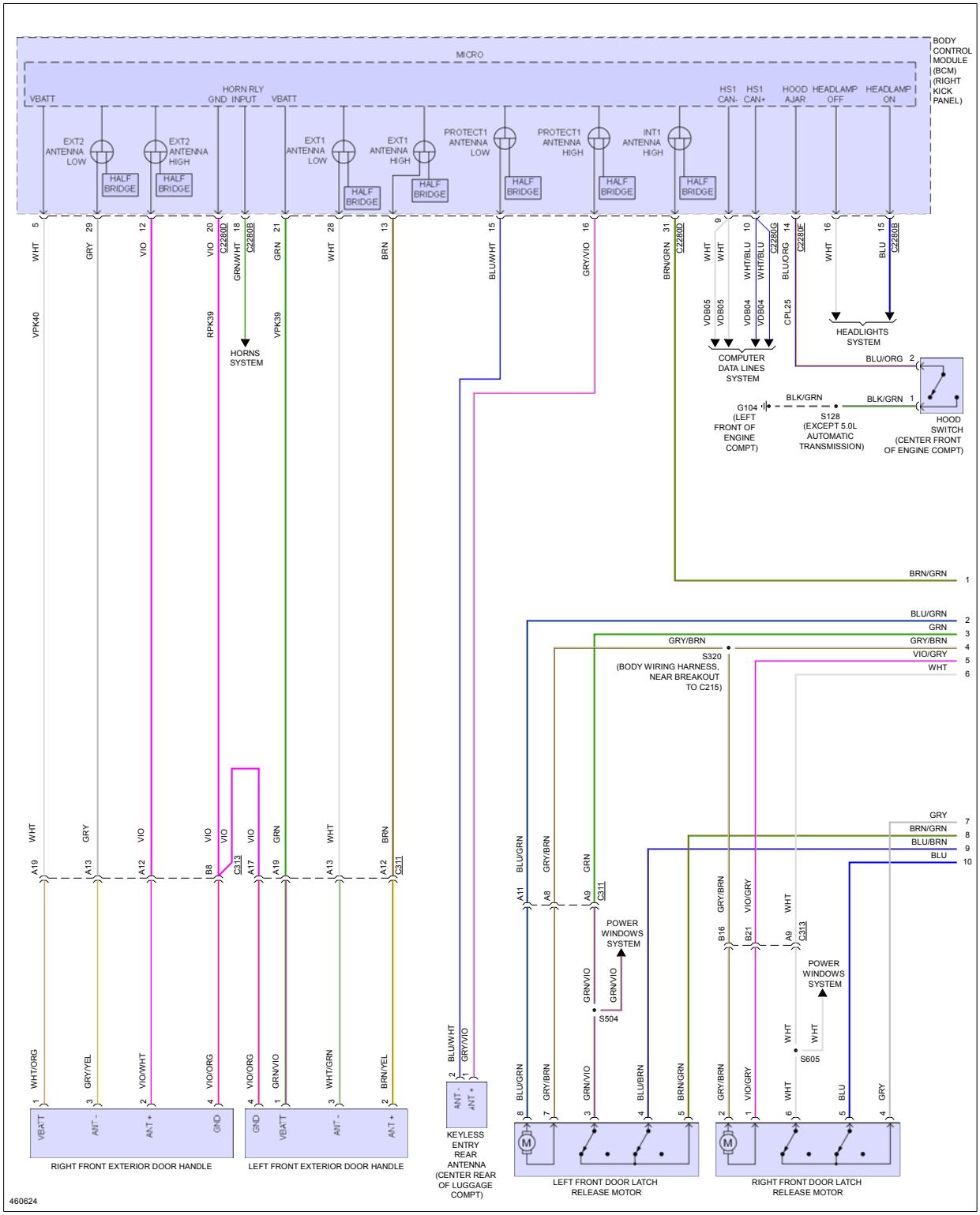


Fig 2: Anti-theft Circuit, W/ Memory (2 of 4)

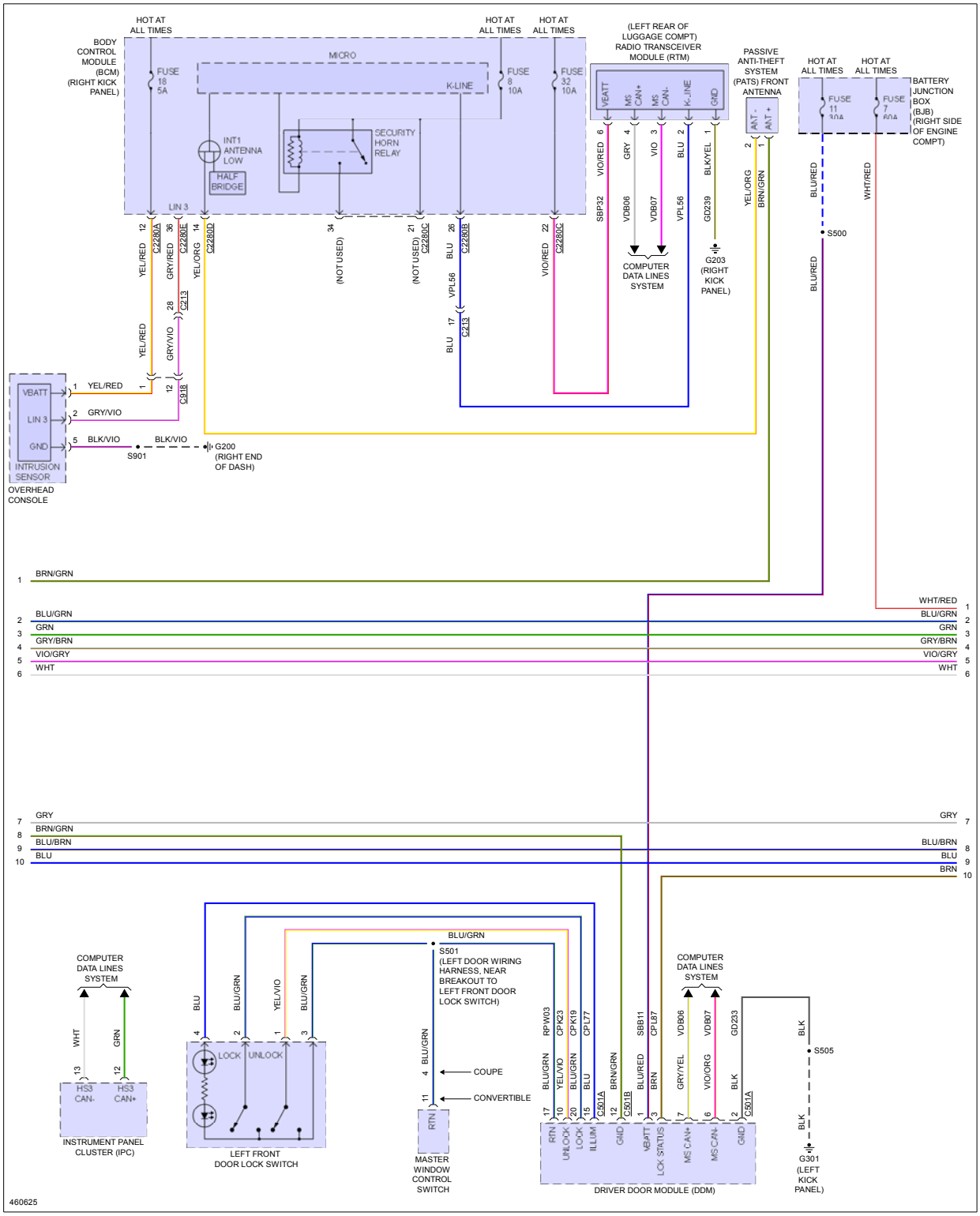


Fig 3: Anti-theft Circuit, W/ Memory (3 of 4)

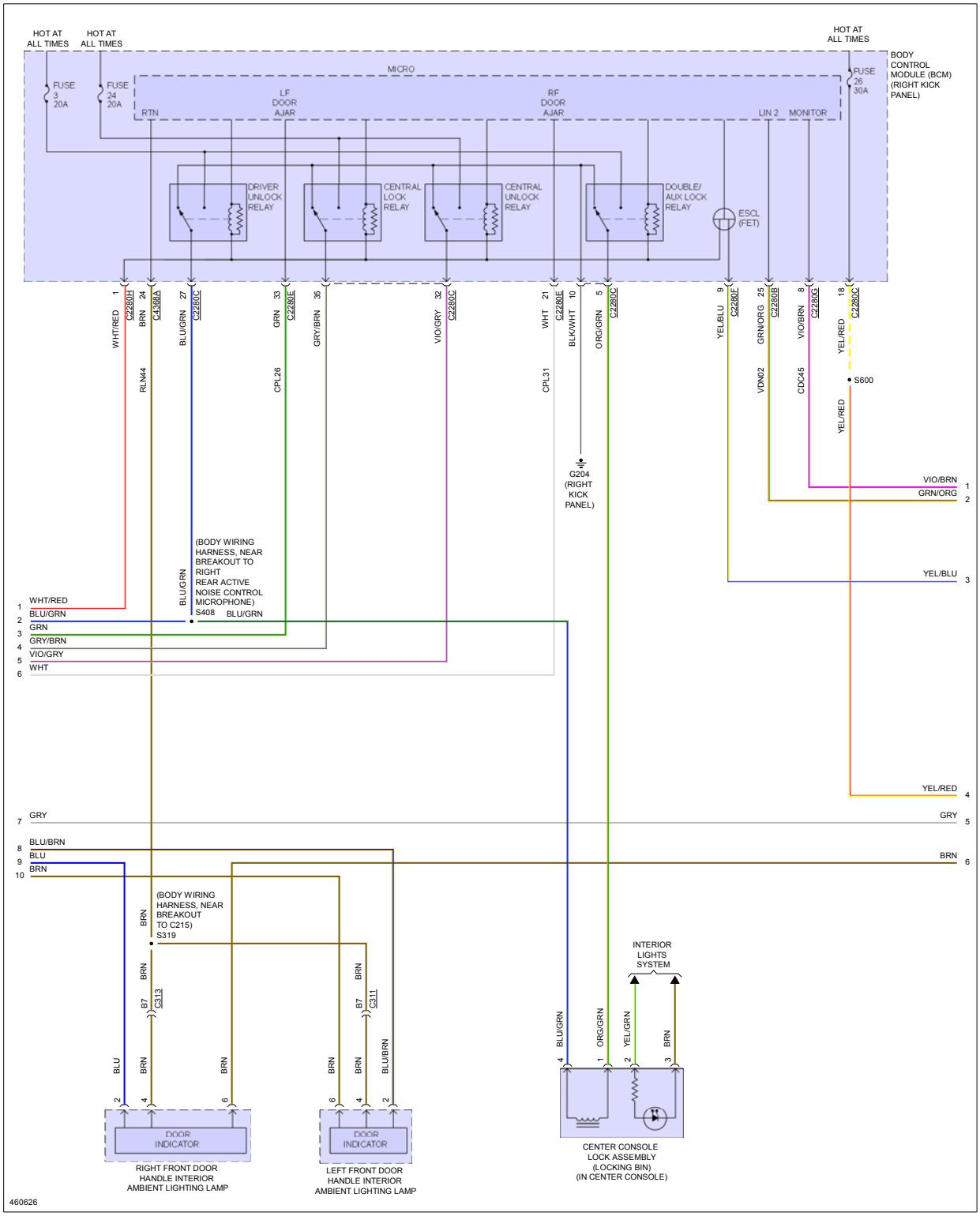


Fig 4: Anti-theft Circuit, W/ Memory (4 of 4)

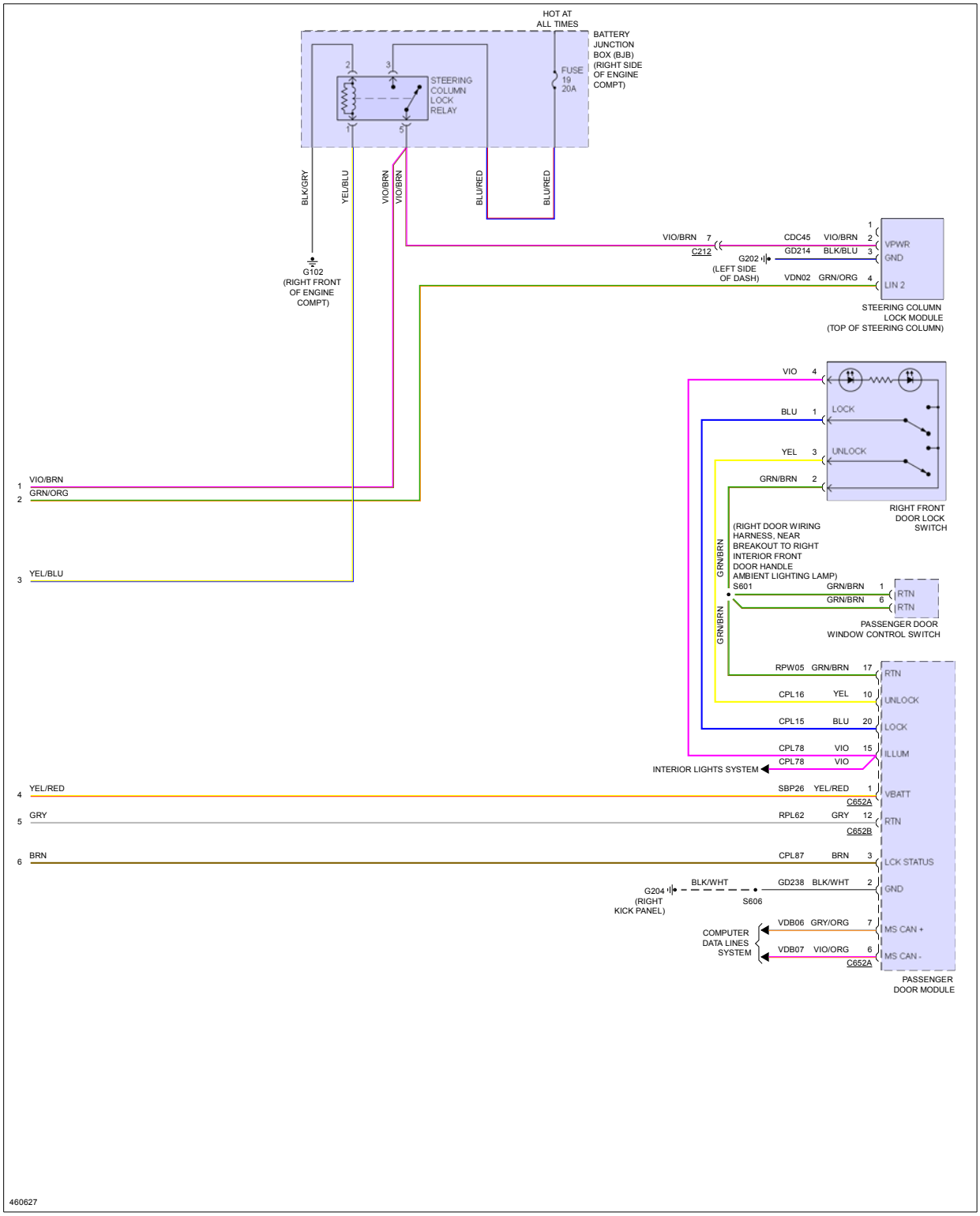


Fig 5: Anti-theft Circuit, W/O Memory (1 of 4)

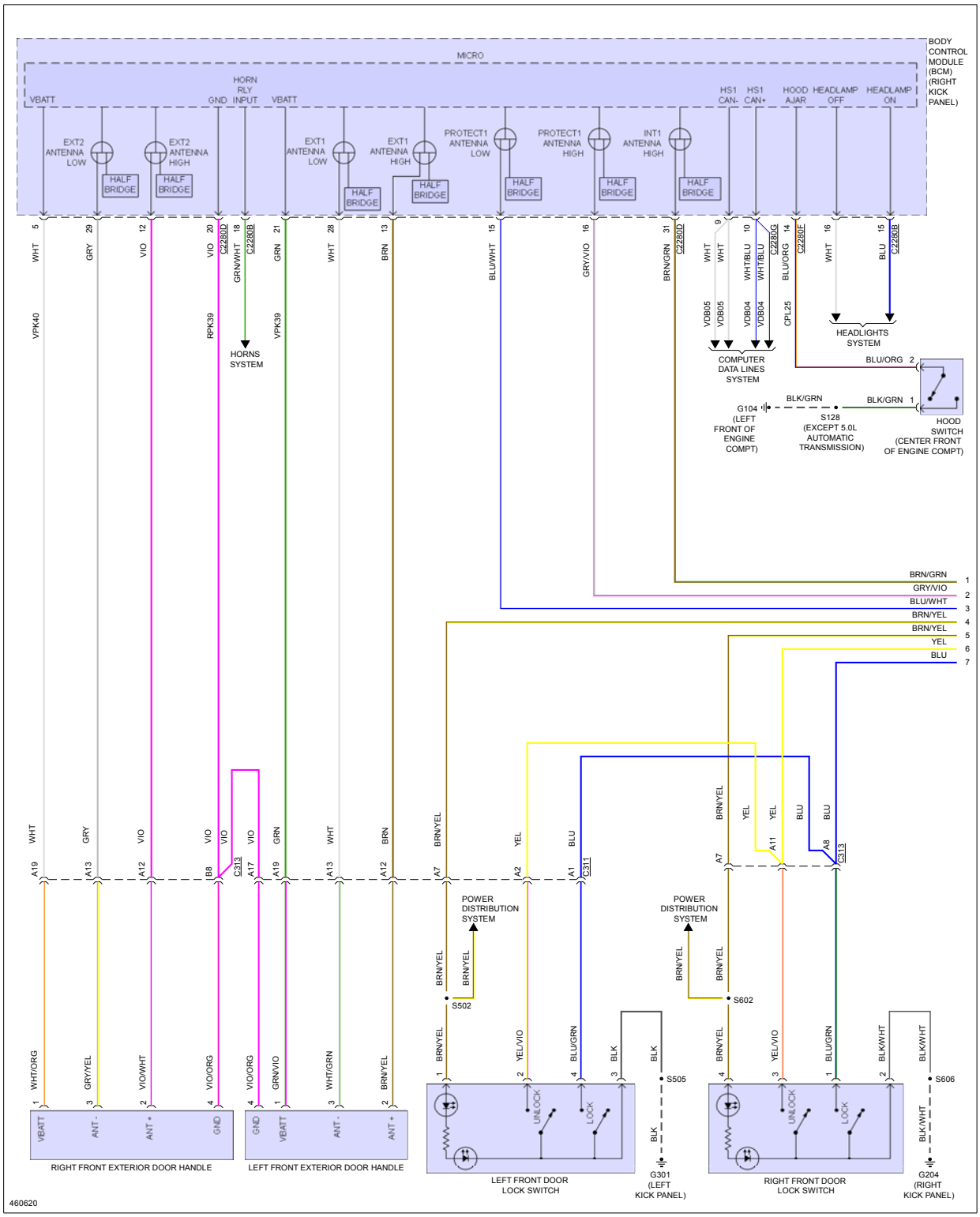


Fig 6: Anti-theft Circuit, W/O Memory (2 of 4)

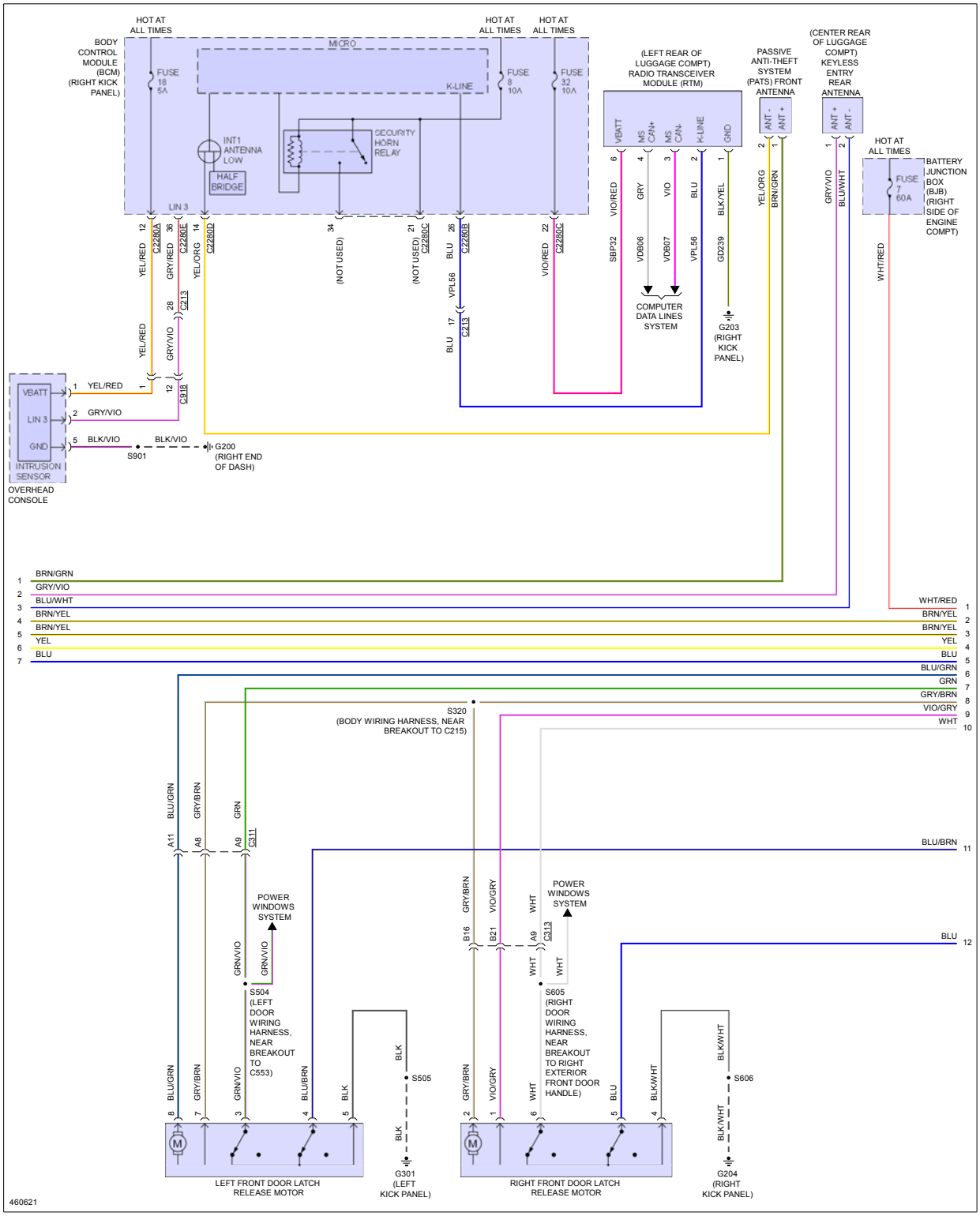


Fig 7: Anti-theft Circuit, W/O Memory (3 of 4)

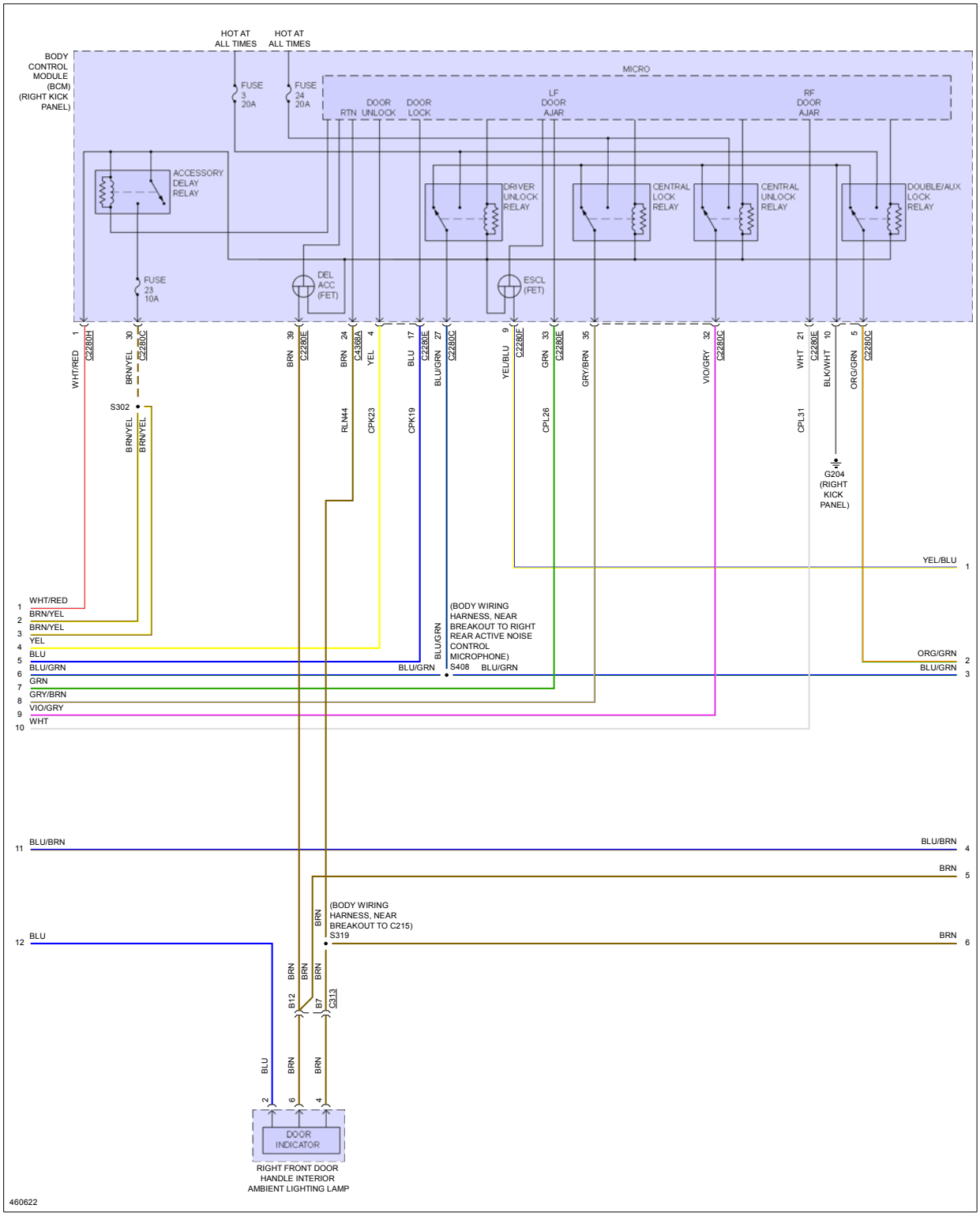
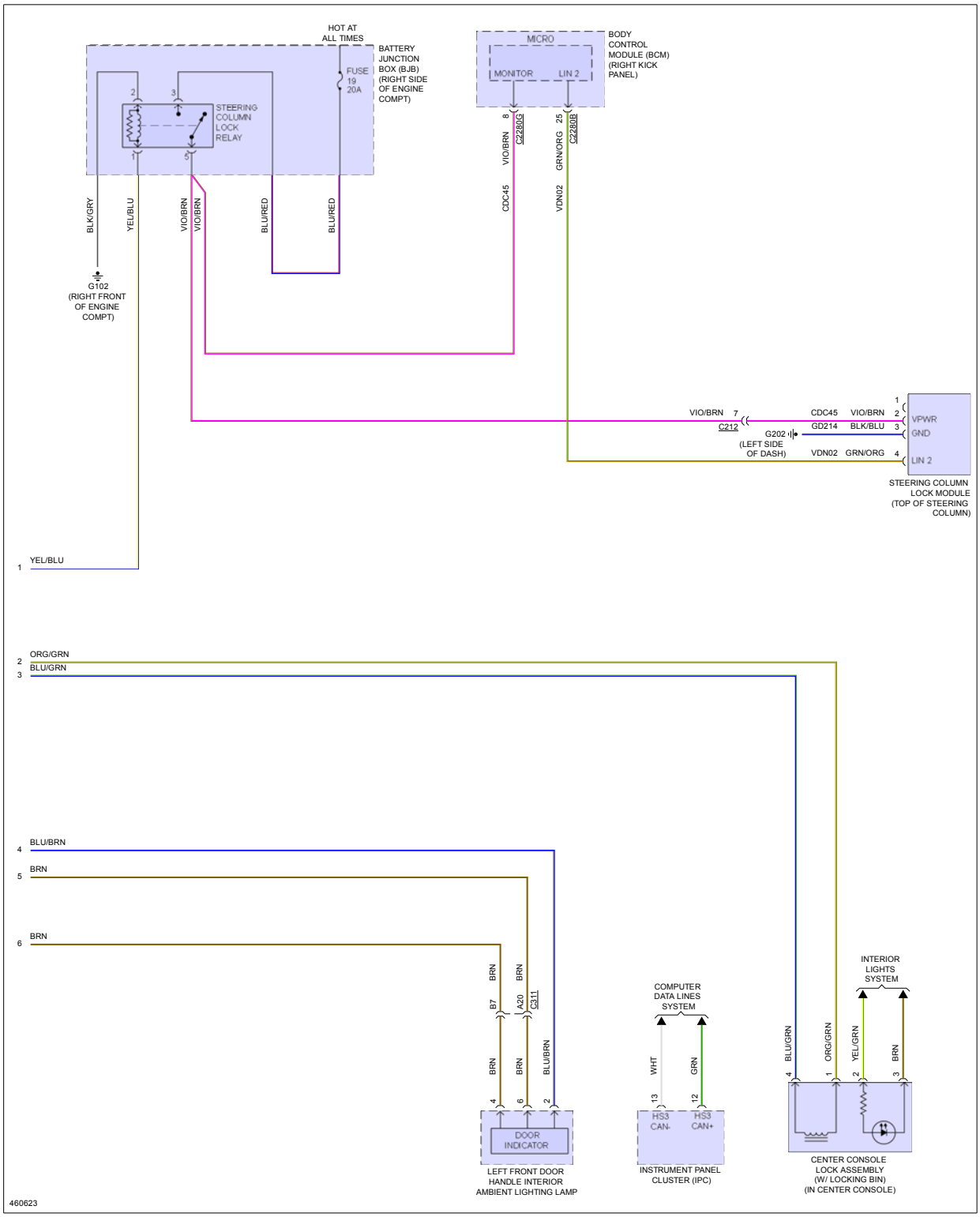


Fig 8: Anti-theft Circuit, W/O Memory (4 of 4)



BODY CONTROL MODULES

Fig 1: Body Control Modules Circuit (1 of 3)

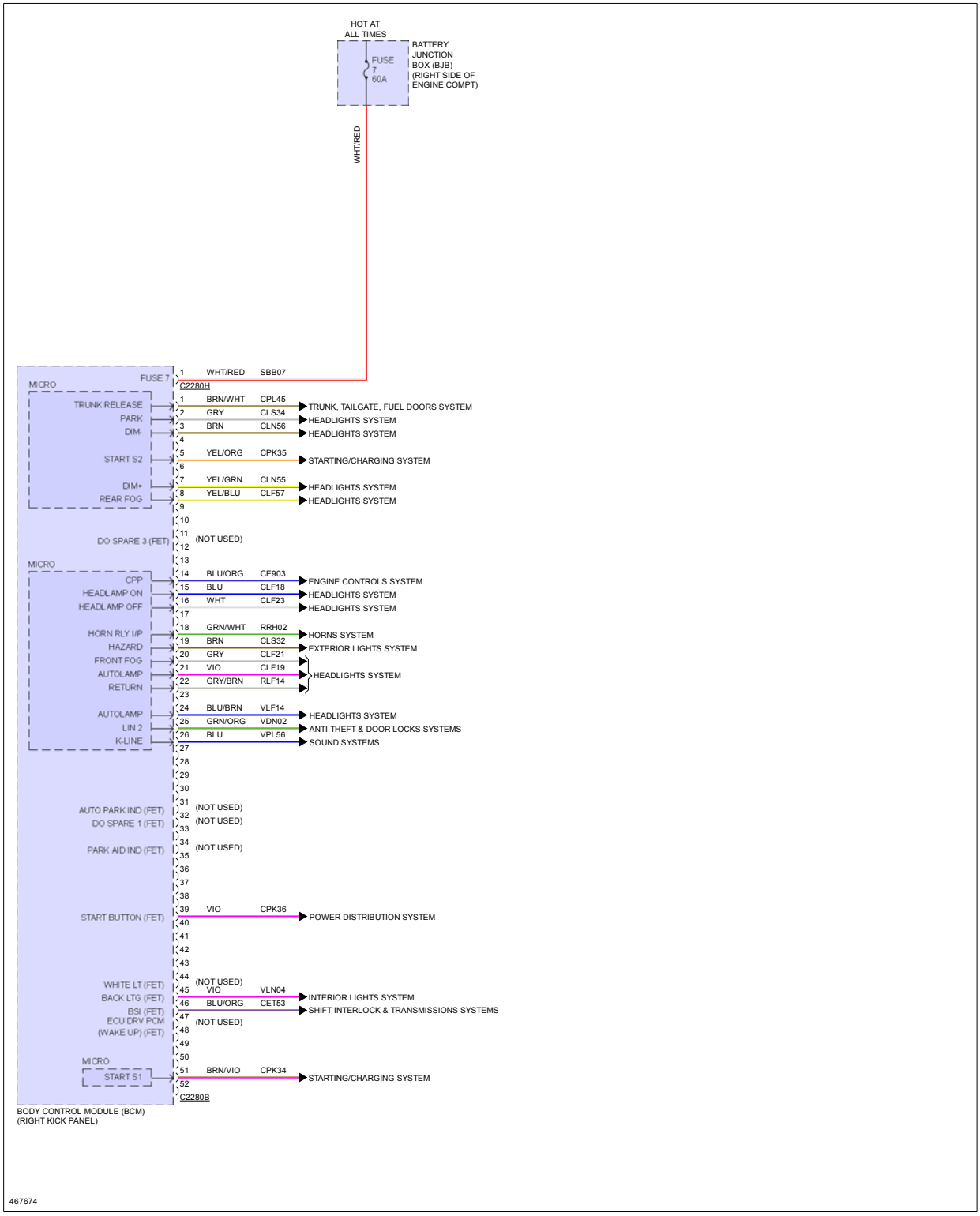


Fig 2: Body Control Modules Circuit (2 of 3)

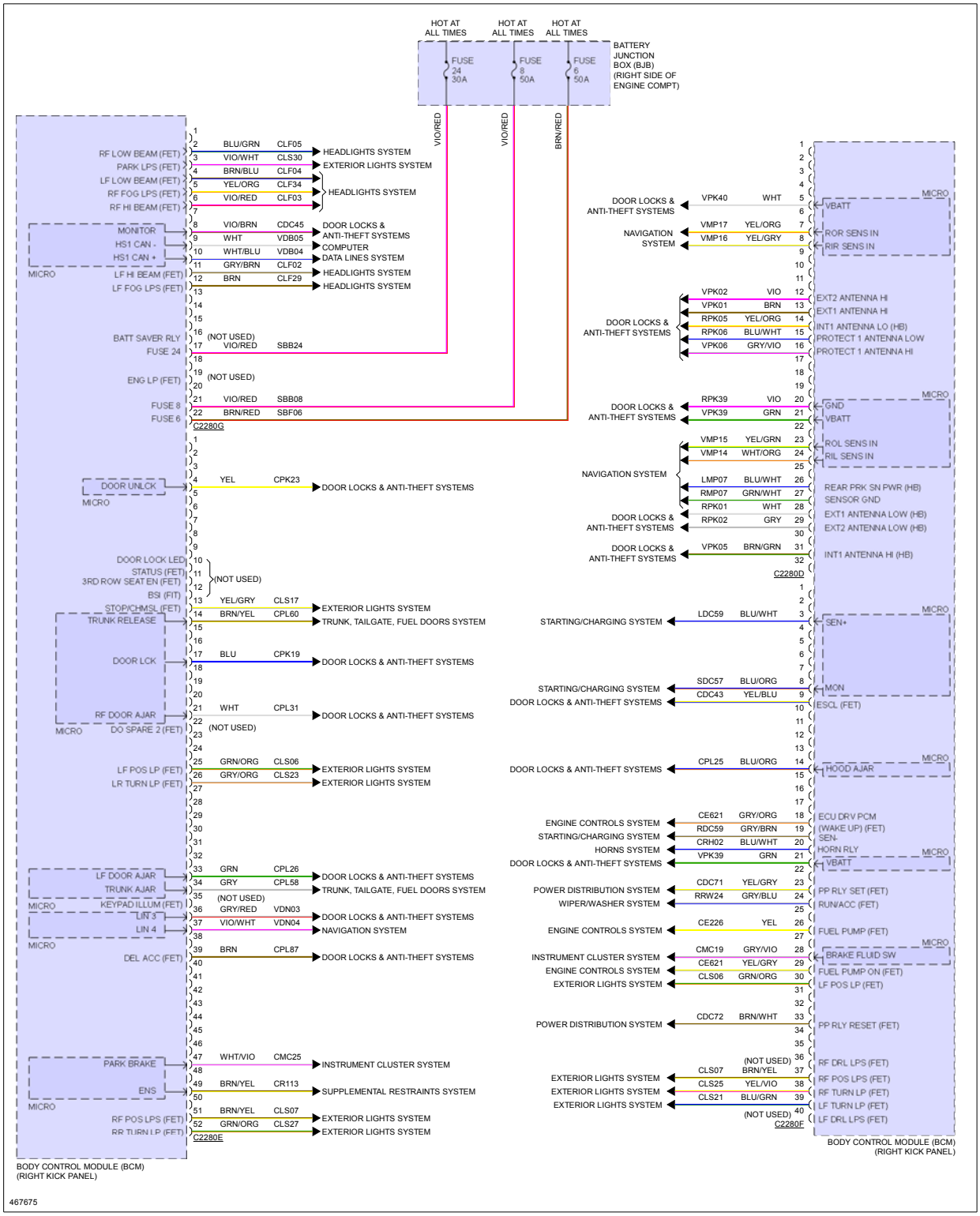
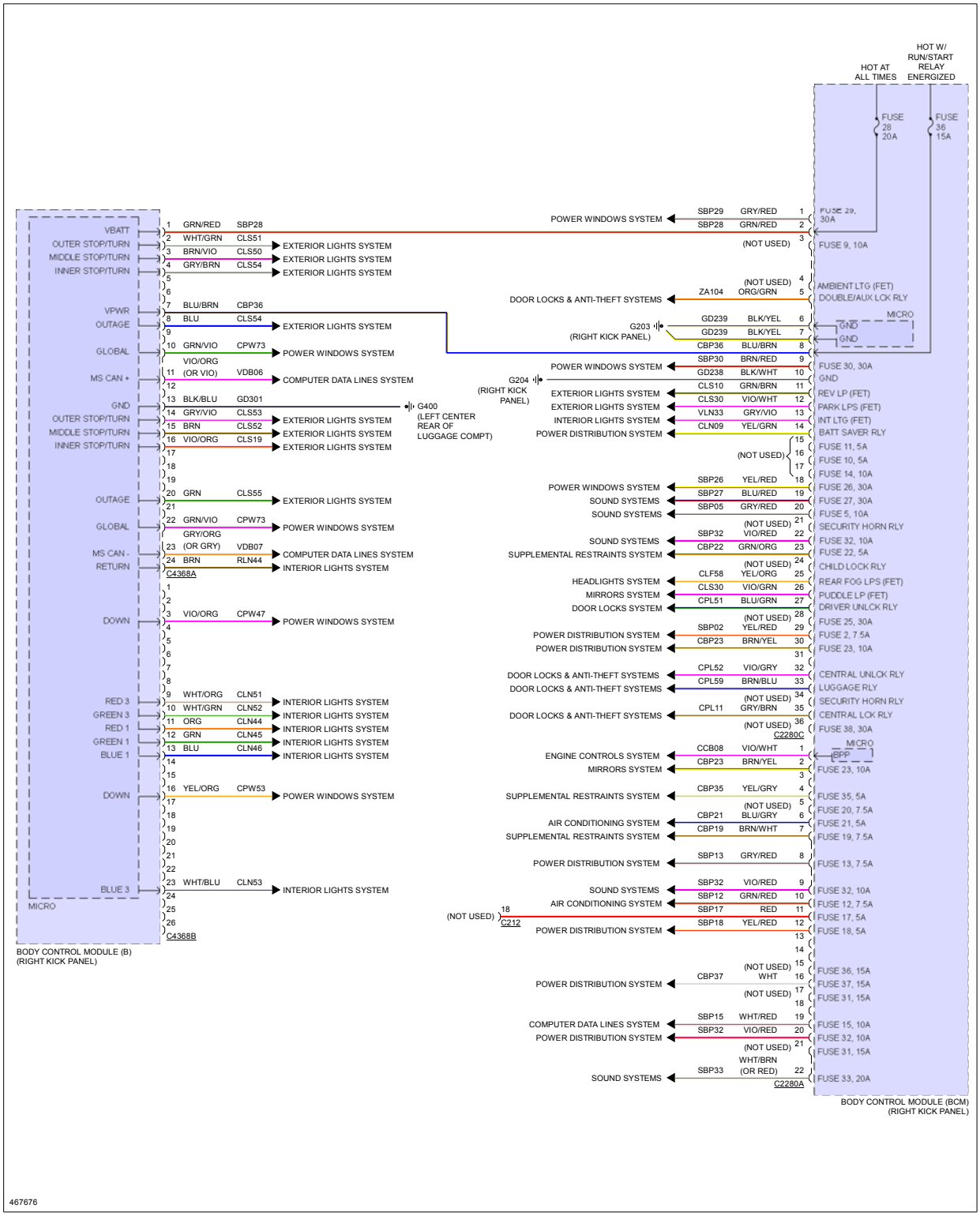


Fig 3: Body Control Modules Circuit (3 of 3)



COMPUTER DATA LINES

Fig 1: Computer Data Lines Circuit, W/ Memory (1 of 2)

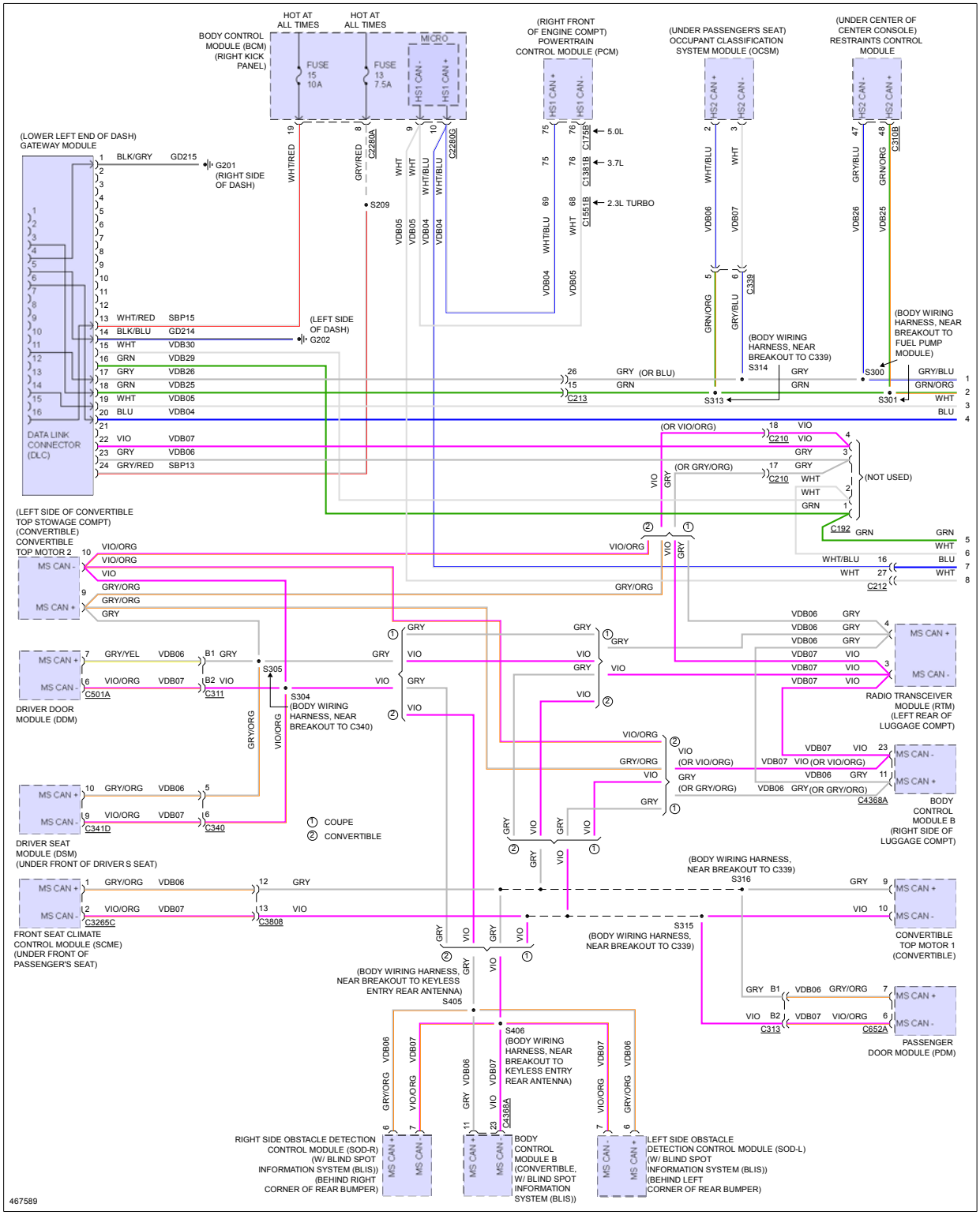


Fig 2: Computer Data Lines Circuit, W/ Memory (2 of 2)

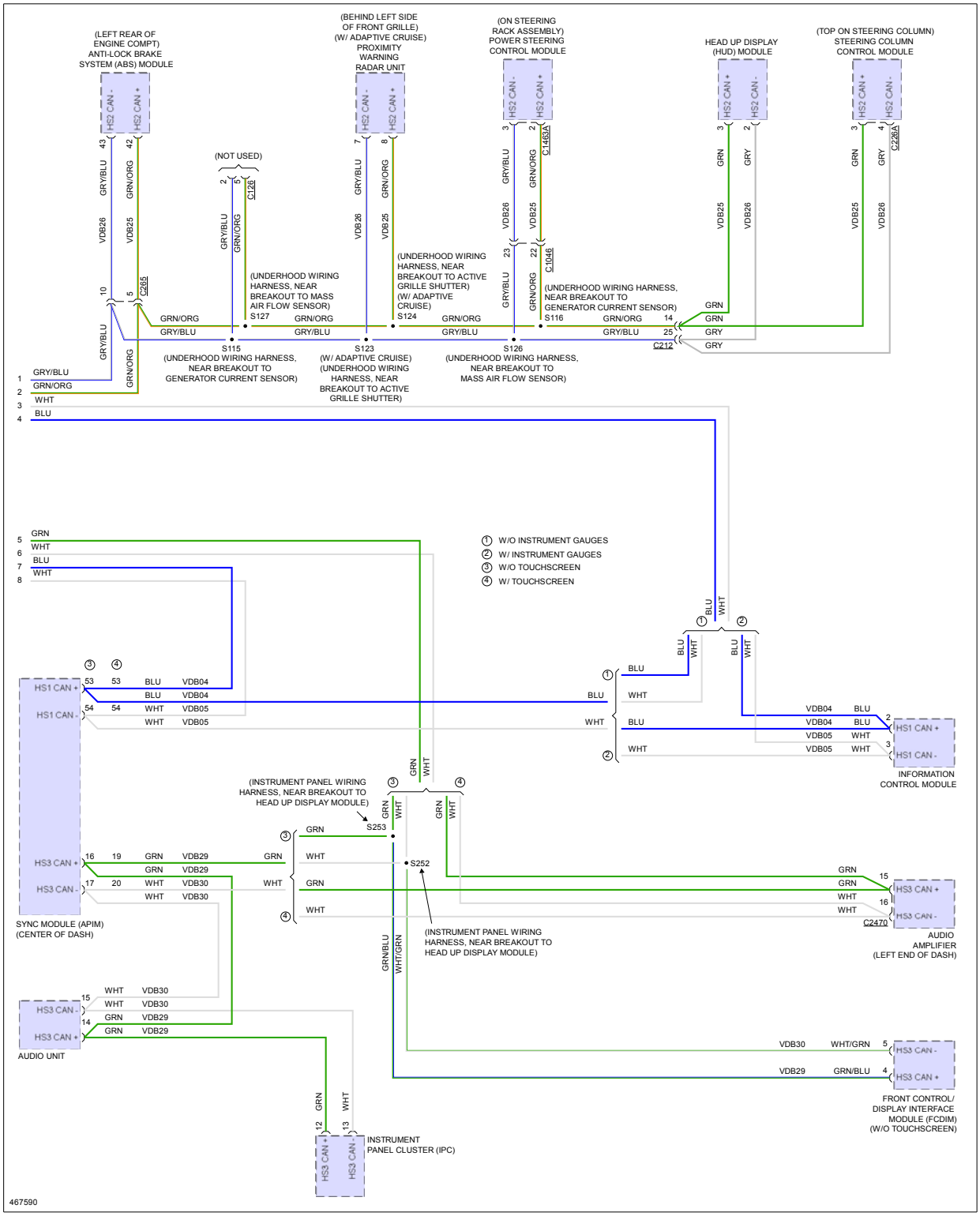


Fig 3: Computer Data Lines Circuit, W/O Memory (1 of 2)

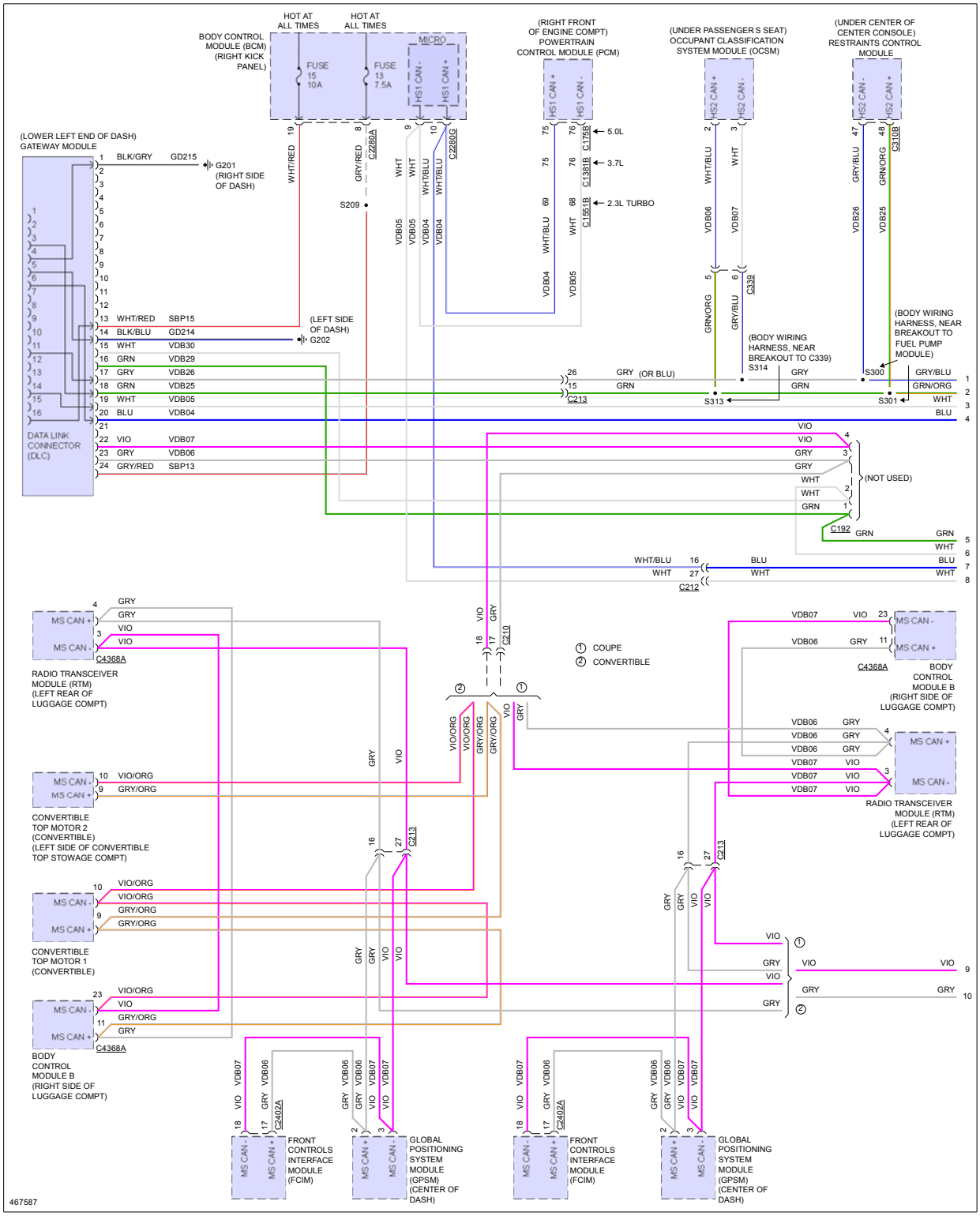
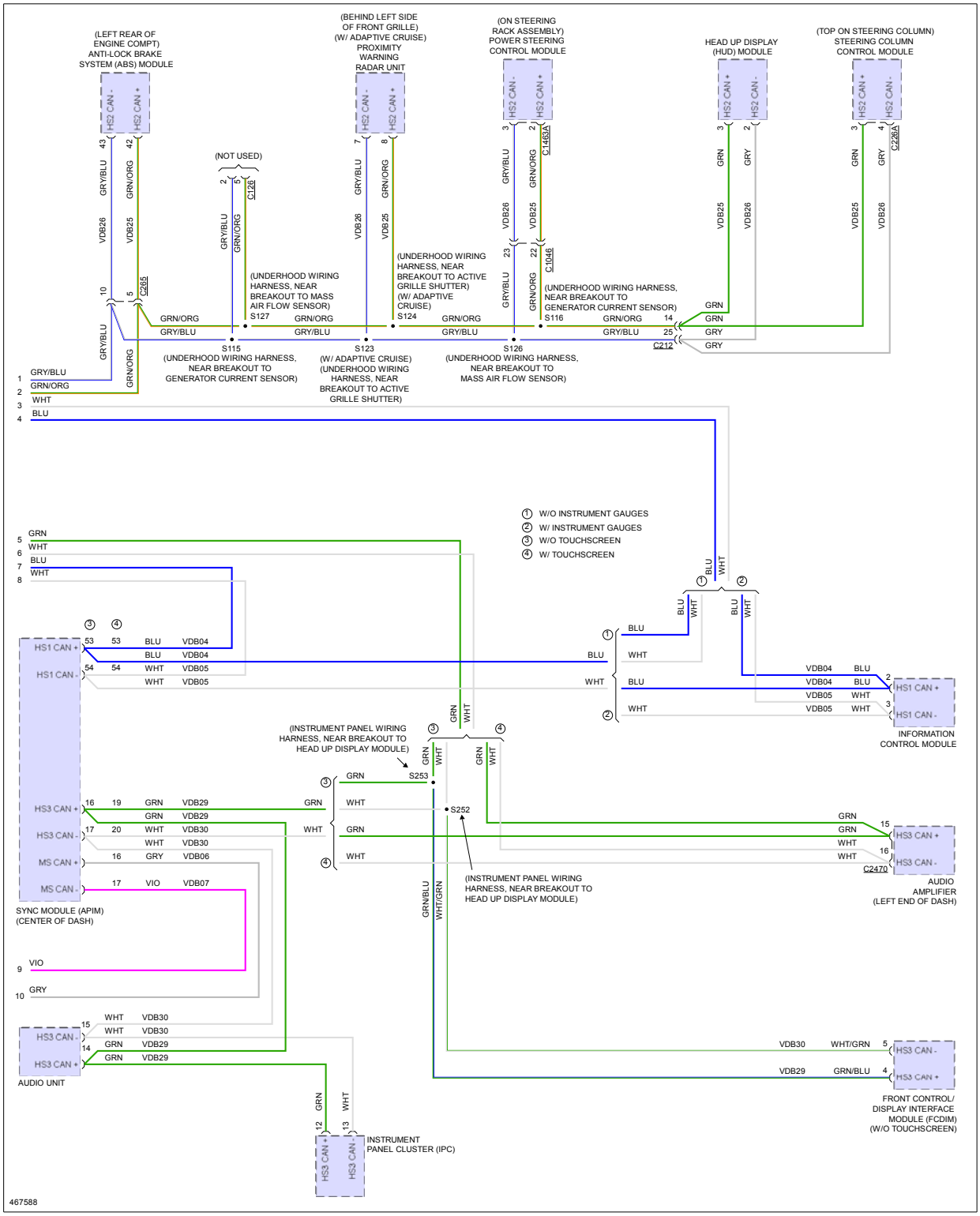
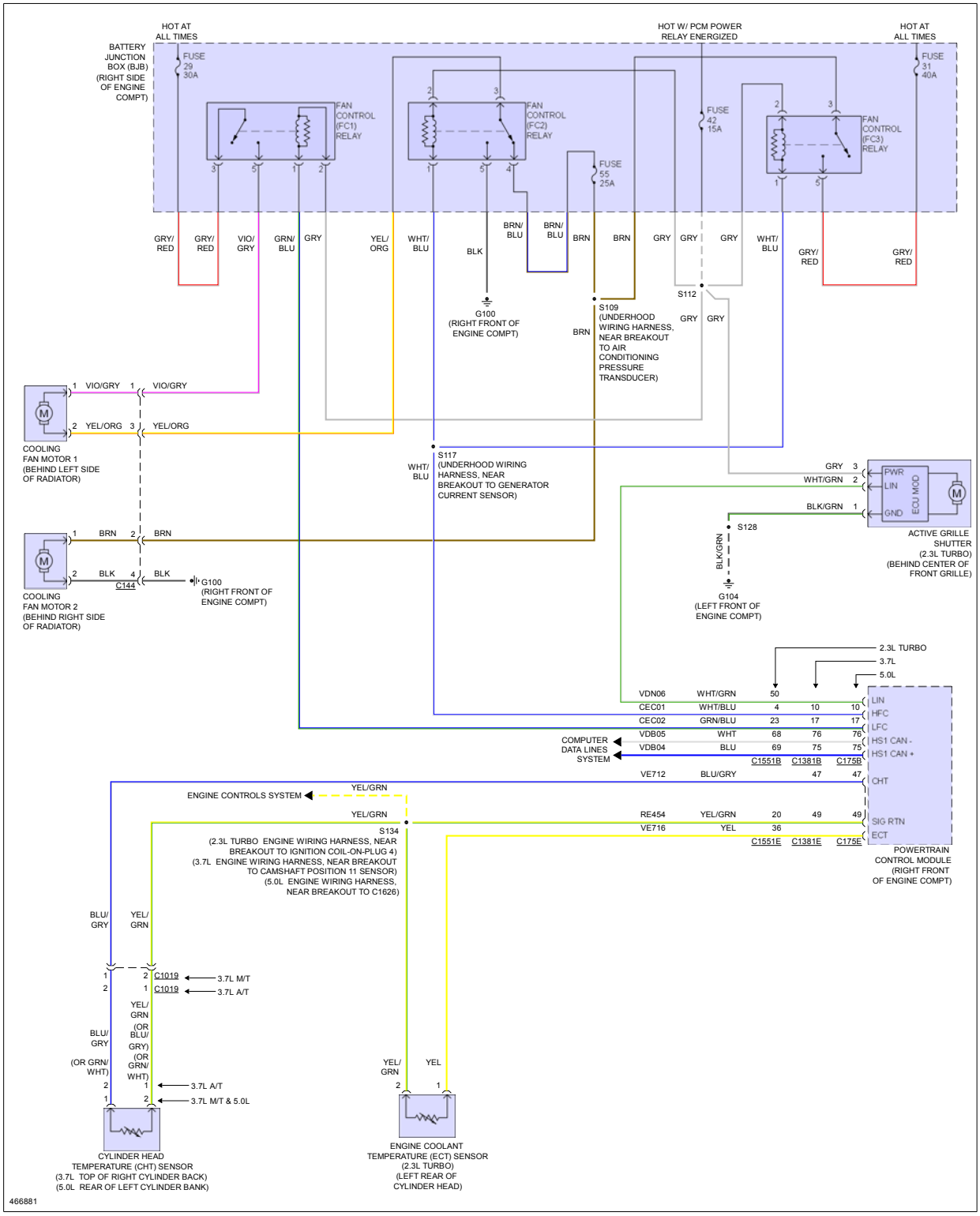


Fig 4: Computer Data Lines Circuit, W/O Memory (2 of 2)



COOLING FAN

Fig 1: Cooling Fan Circuit



CRUISE CONTROL

Fig 1: Cruise Control Circuit (1 of 2)

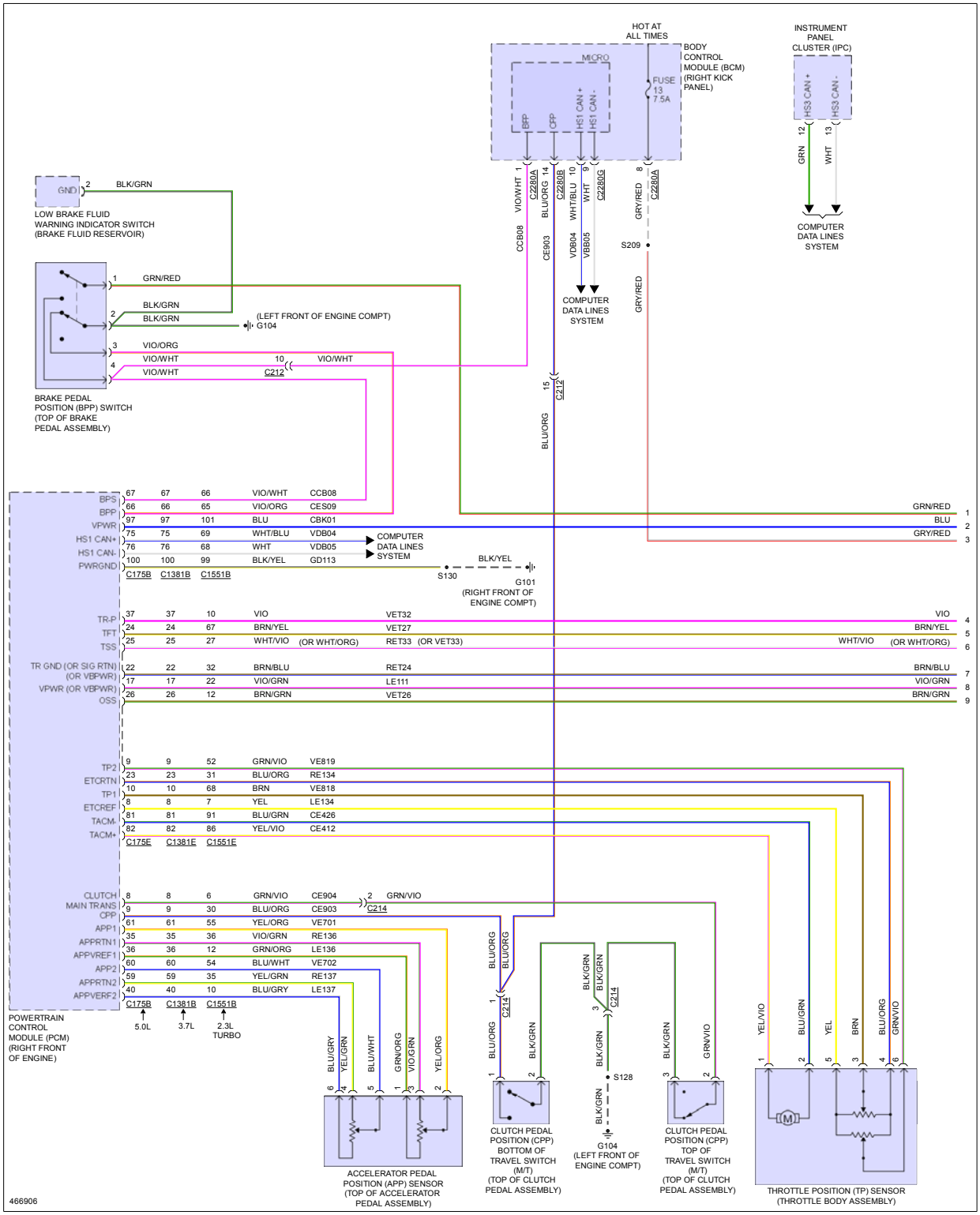
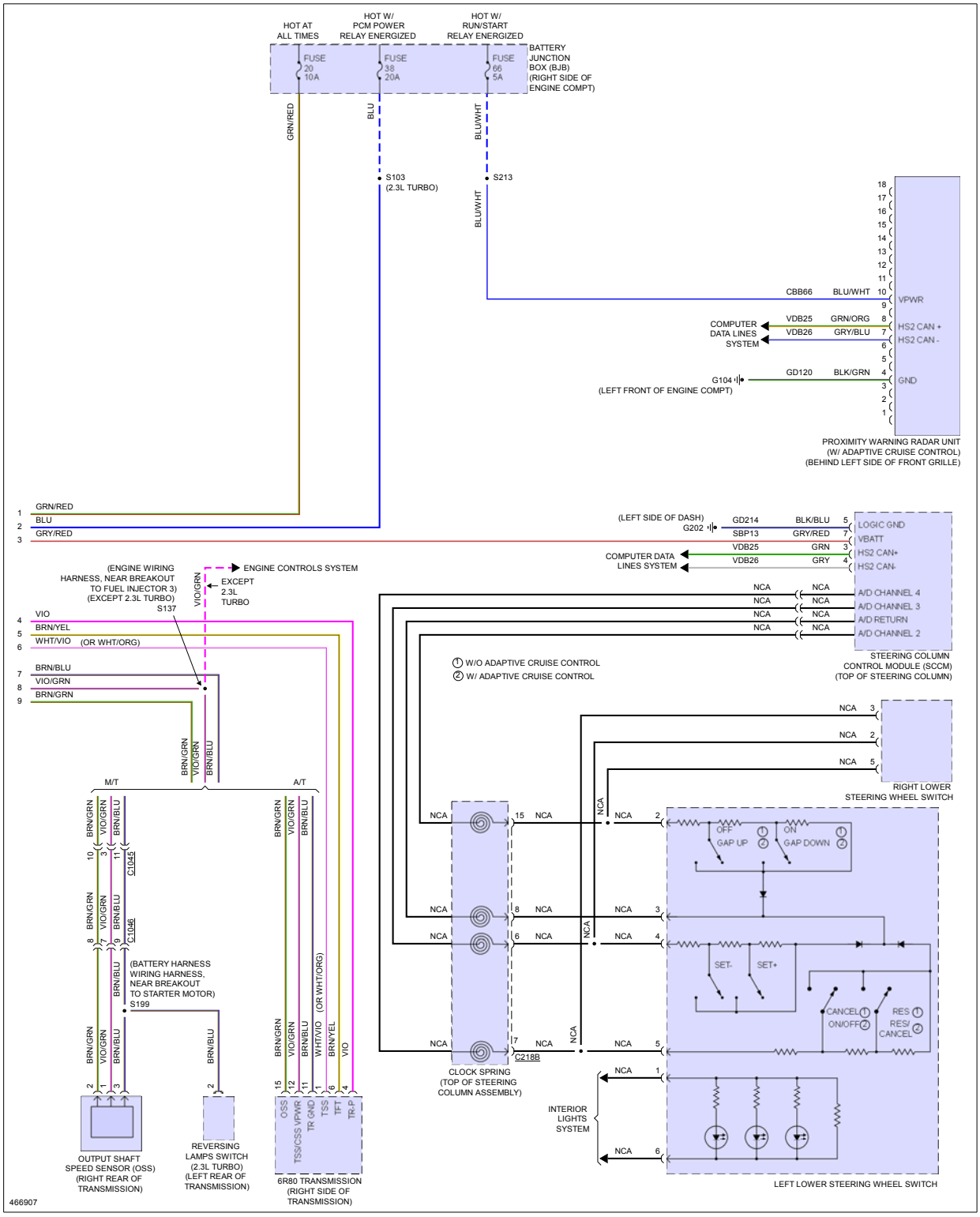
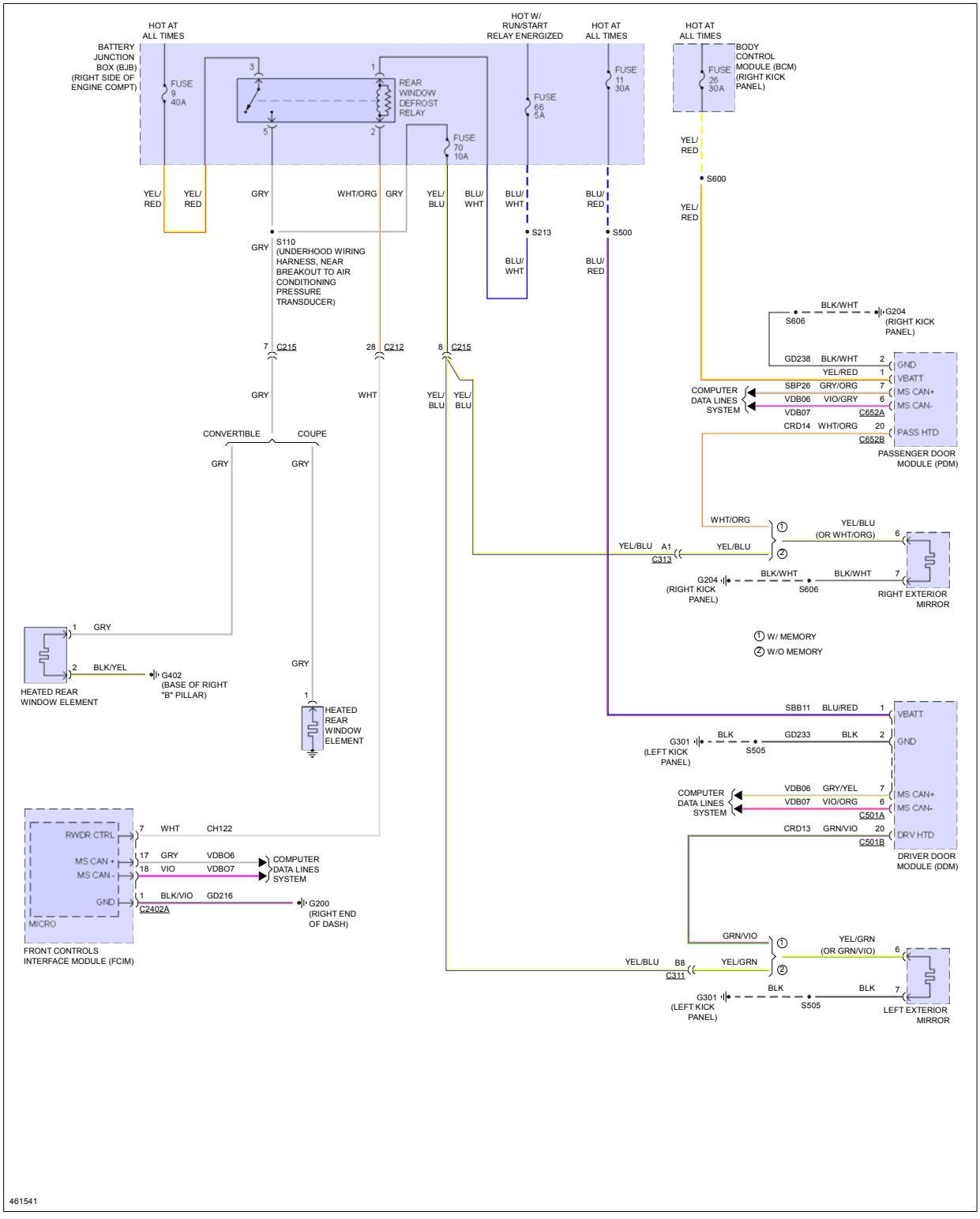


Fig 2: Cruise Control Circuit (2 of 2)



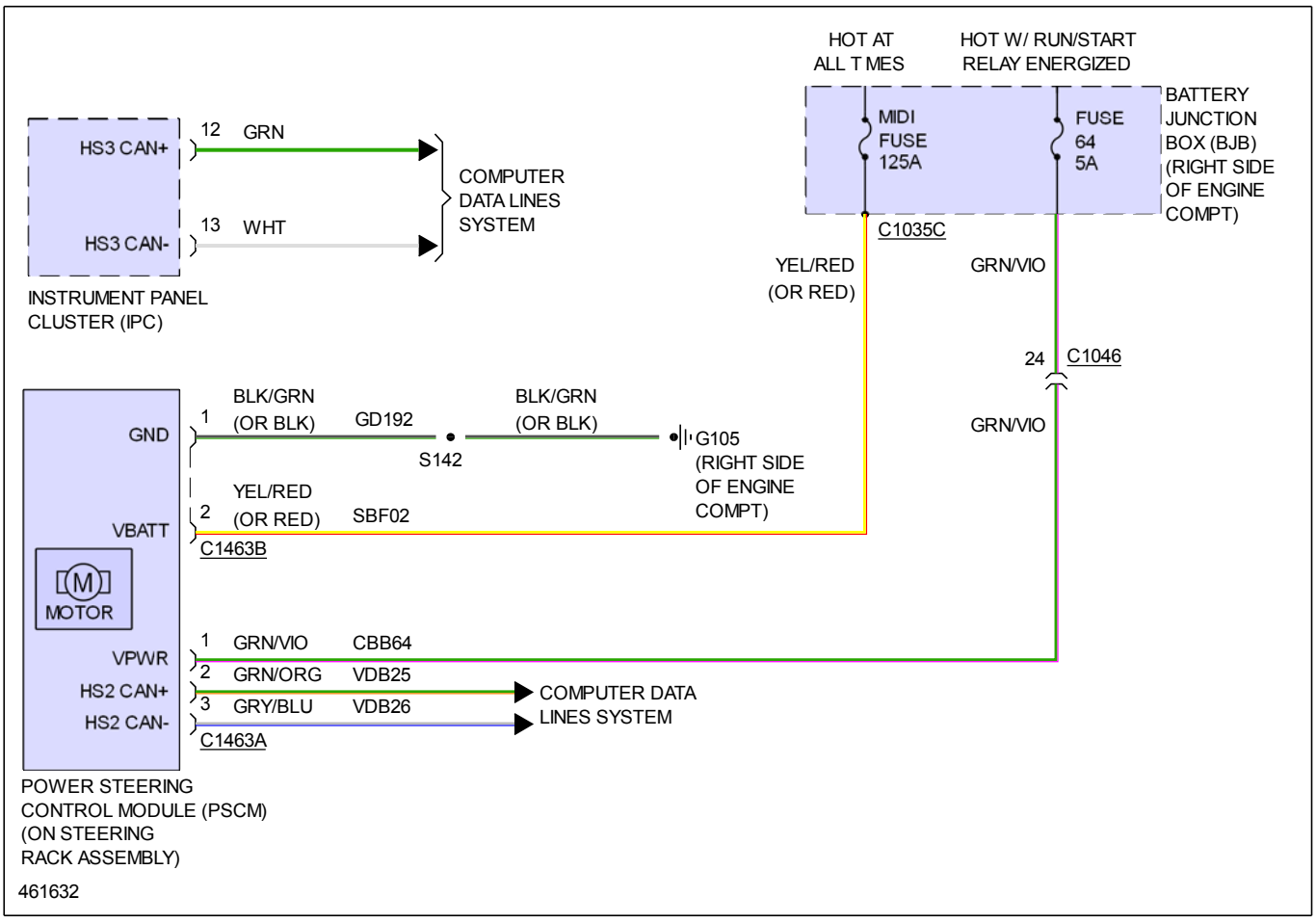
DEFOGGERS

Fig 1: Defoggers Circuit



ELECTRONIC POWER STEERING

Fig 1: Electronic Power Steering Circuit



ENGINE PERFORMANCE > 2.3L TURBO

Fig 1: 2.3L Turbo, Engine Performance Circuit (1 of 6)

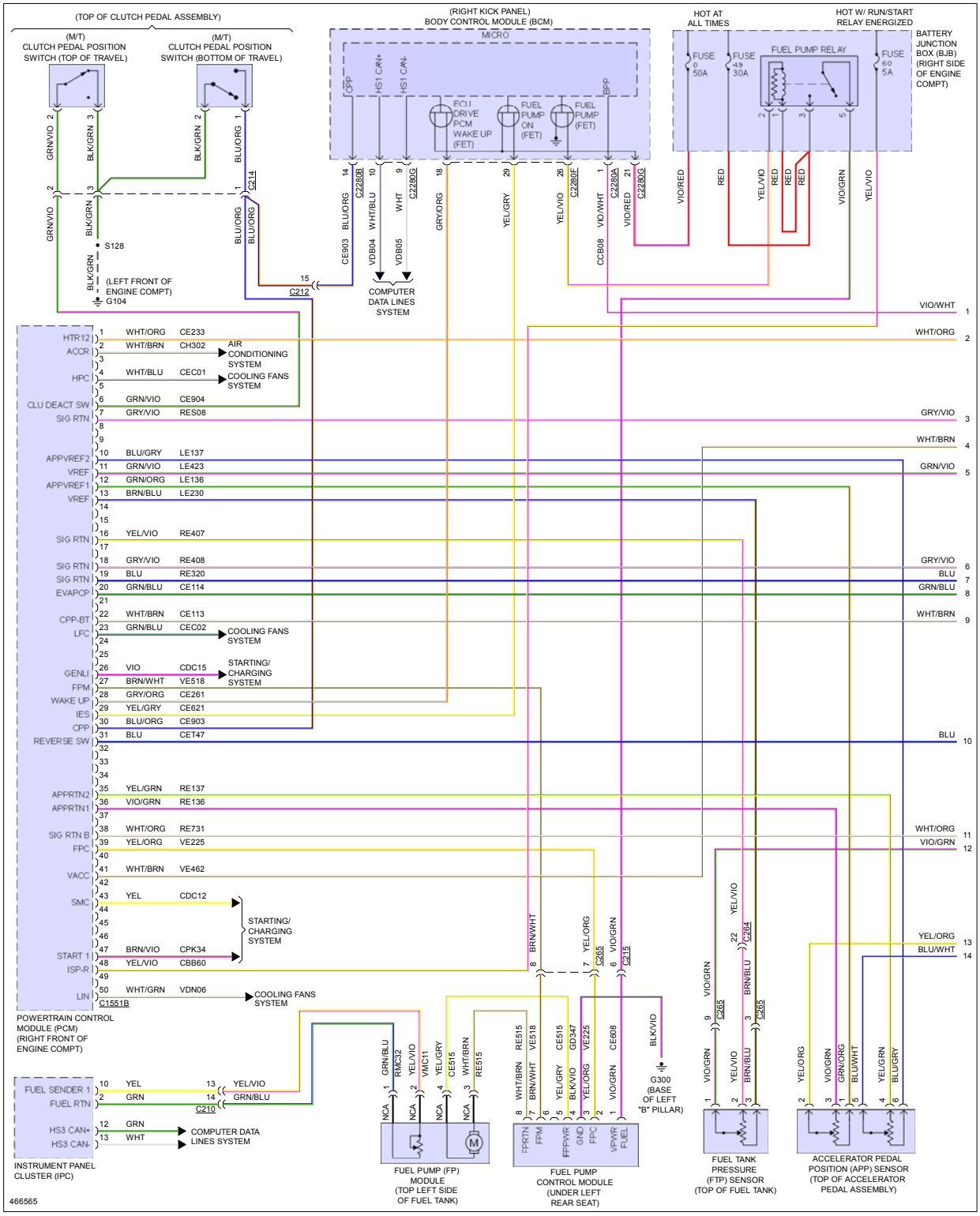


Fig 2: 2.3L Turbo, Engine Performance Circuit (2 of 6)

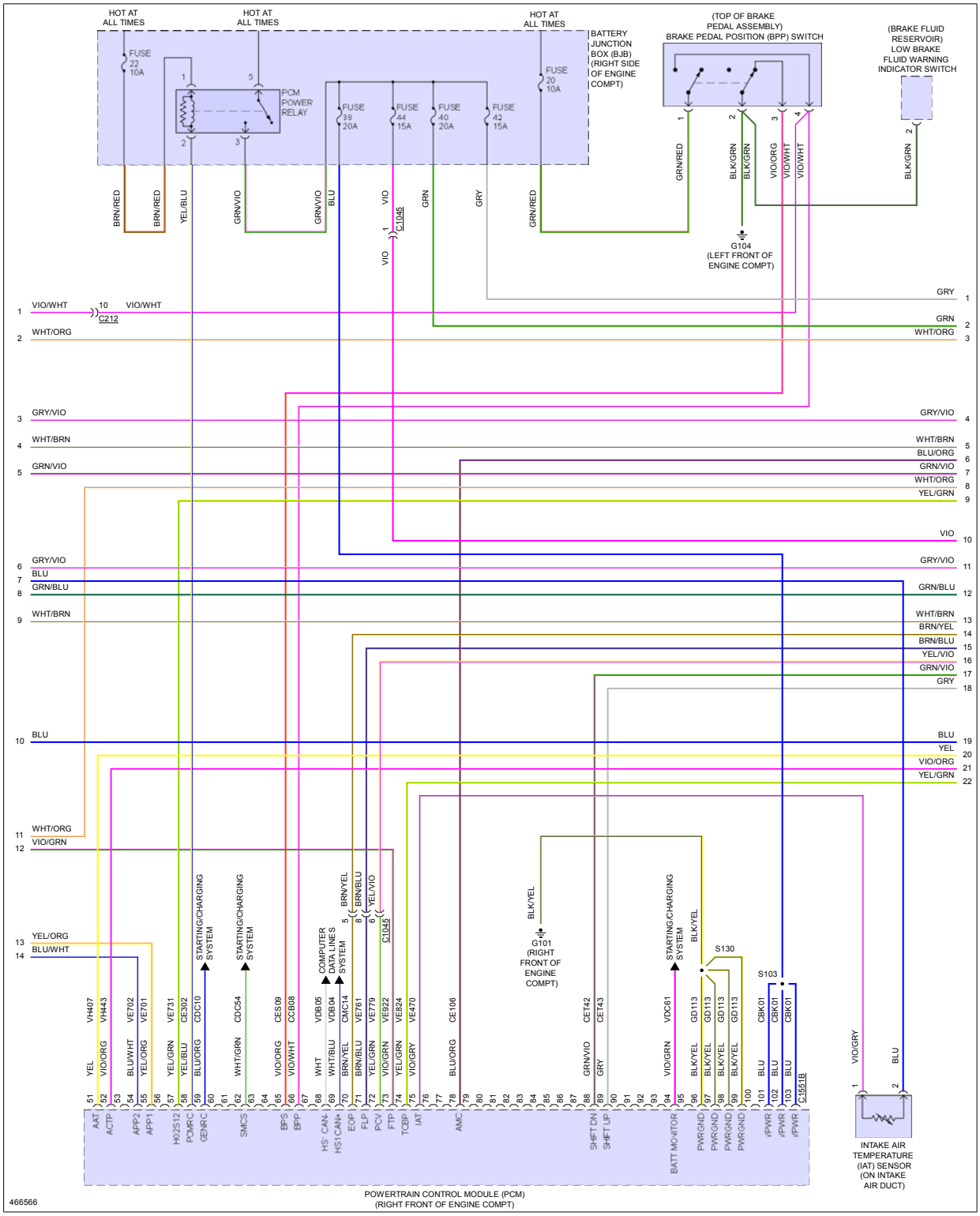


Fig 3: 2.3L Turbo, Engine Performance Circuit (3 of 6)

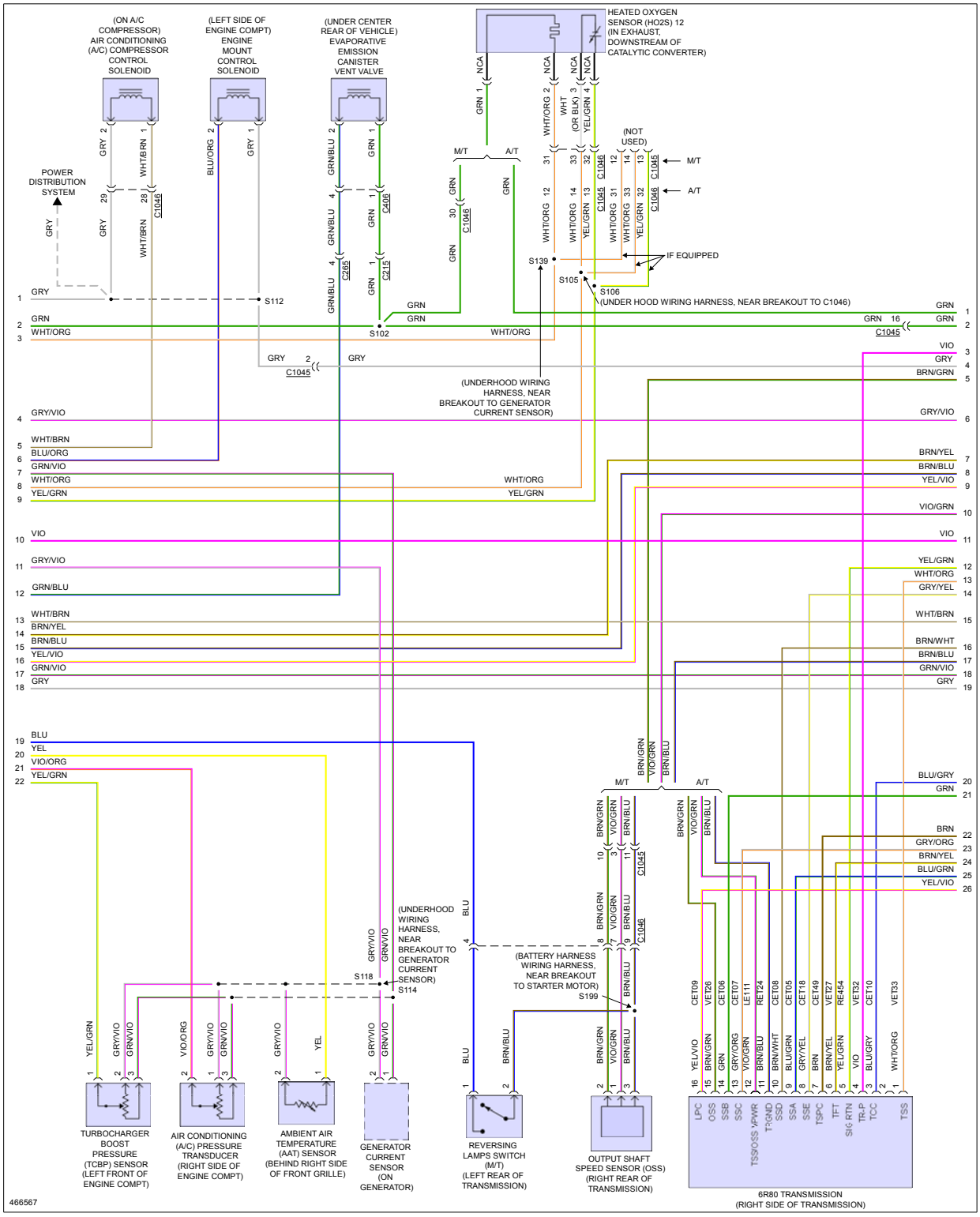


Fig 4: 2.3L Turbo, Engine Performance Circuit (4 of 6)

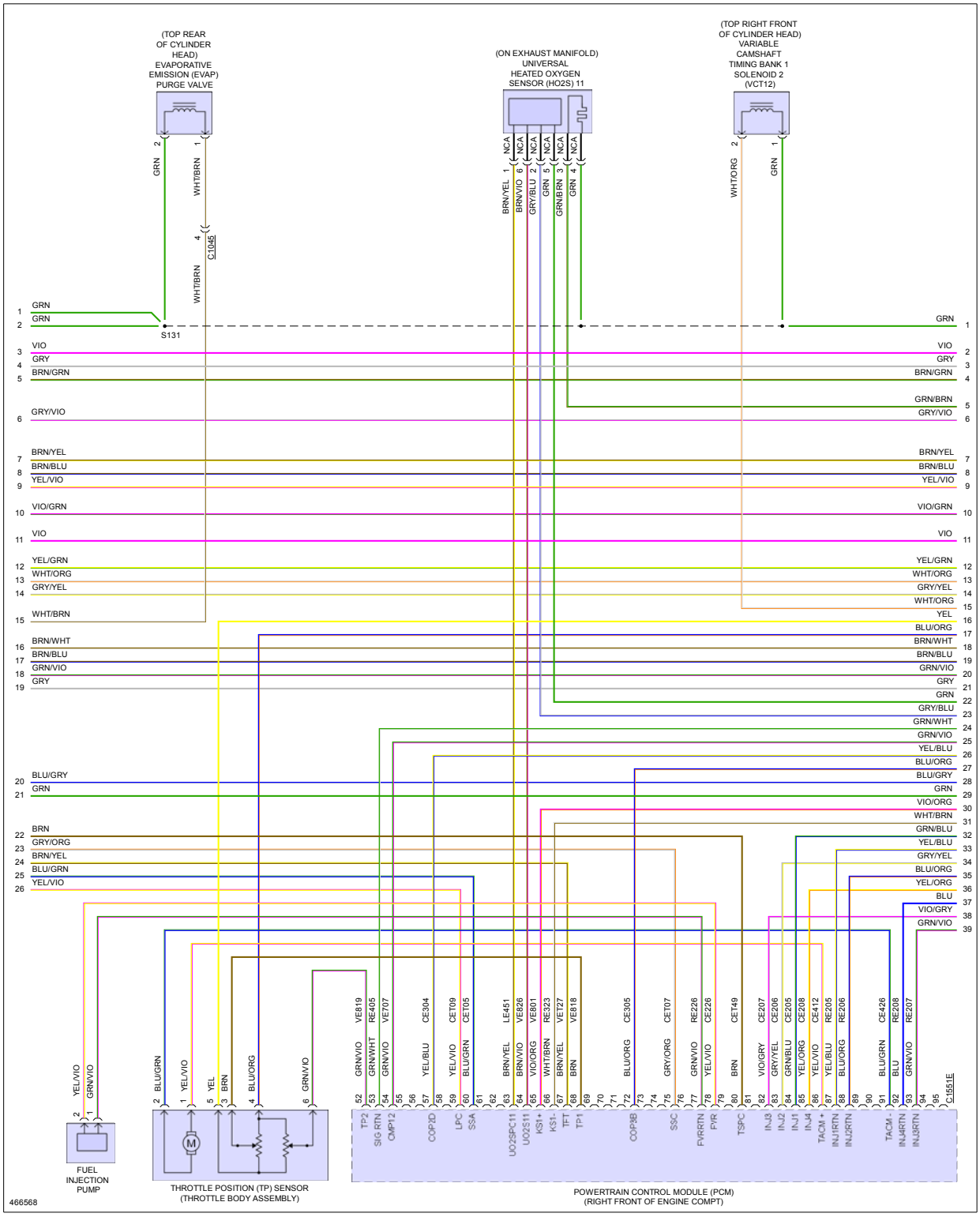


Fig 5: 2.3L Turbo, Engine Performance Circuit (5 of 6)

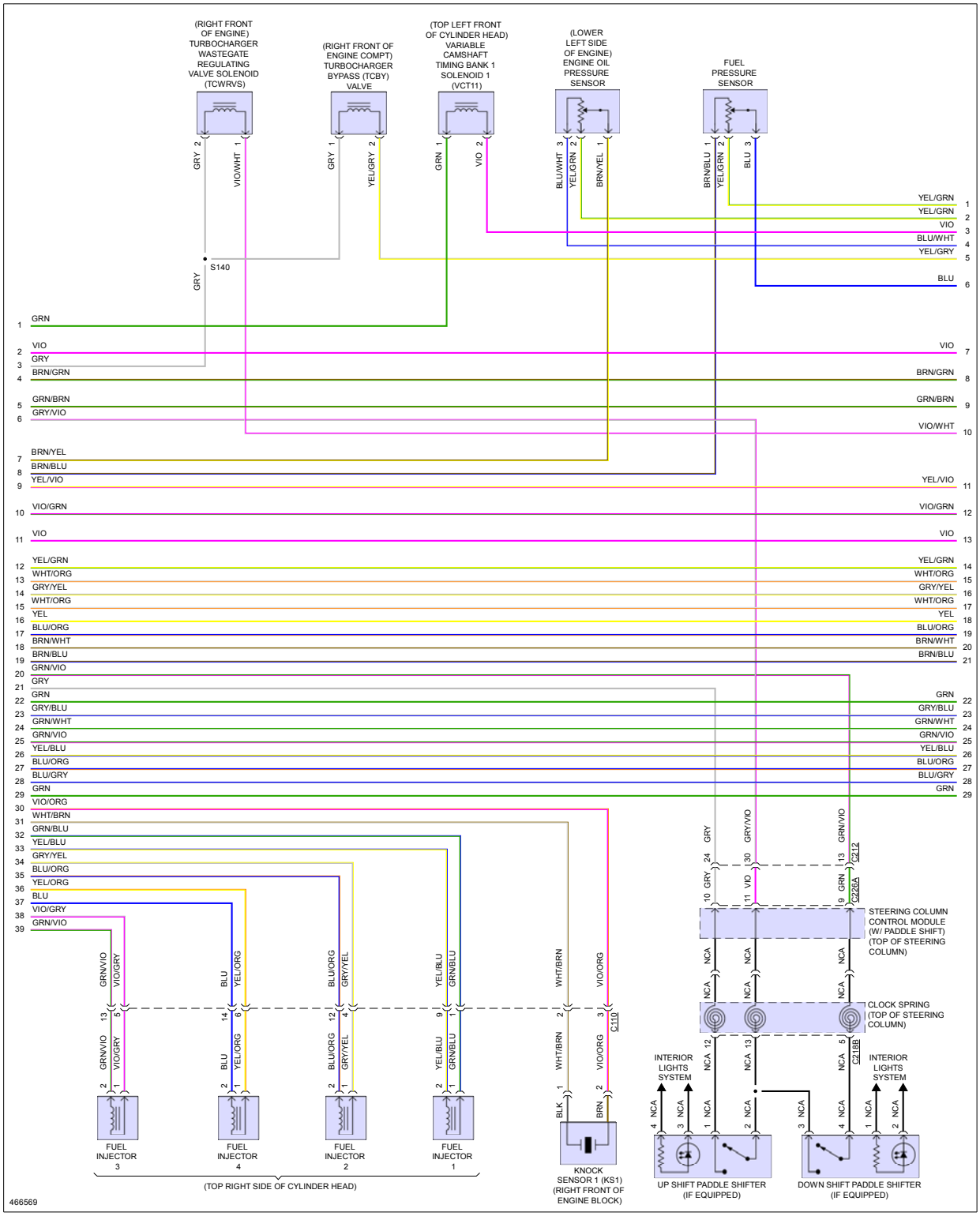
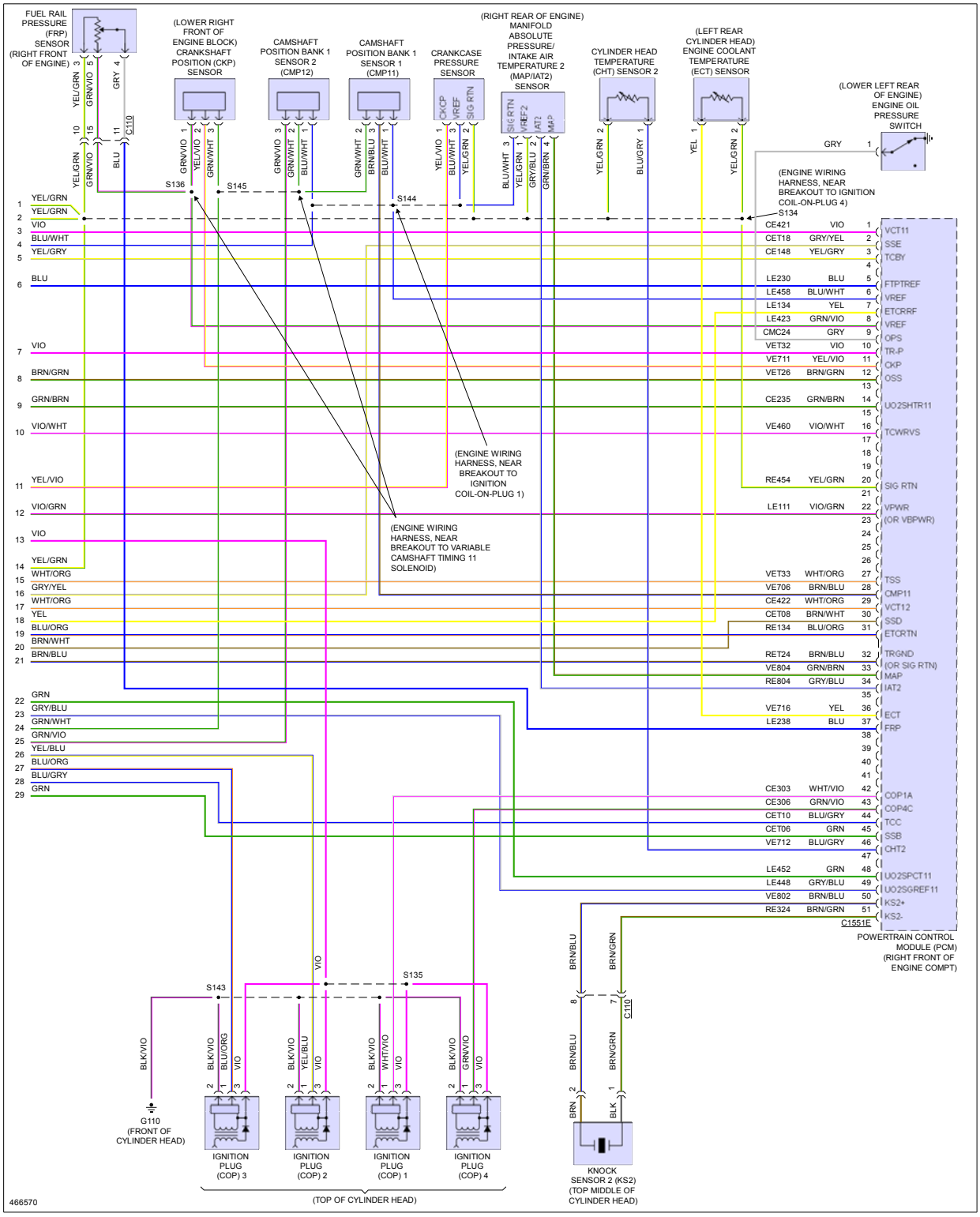


Fig 6: 2.3L Turbo, Engine Performance Circuit (6 of 6)



ENGINE PERFORMANCE > 3.7L

Fig 1: 3.7L, Engine Performance Circuit (1 of 6)

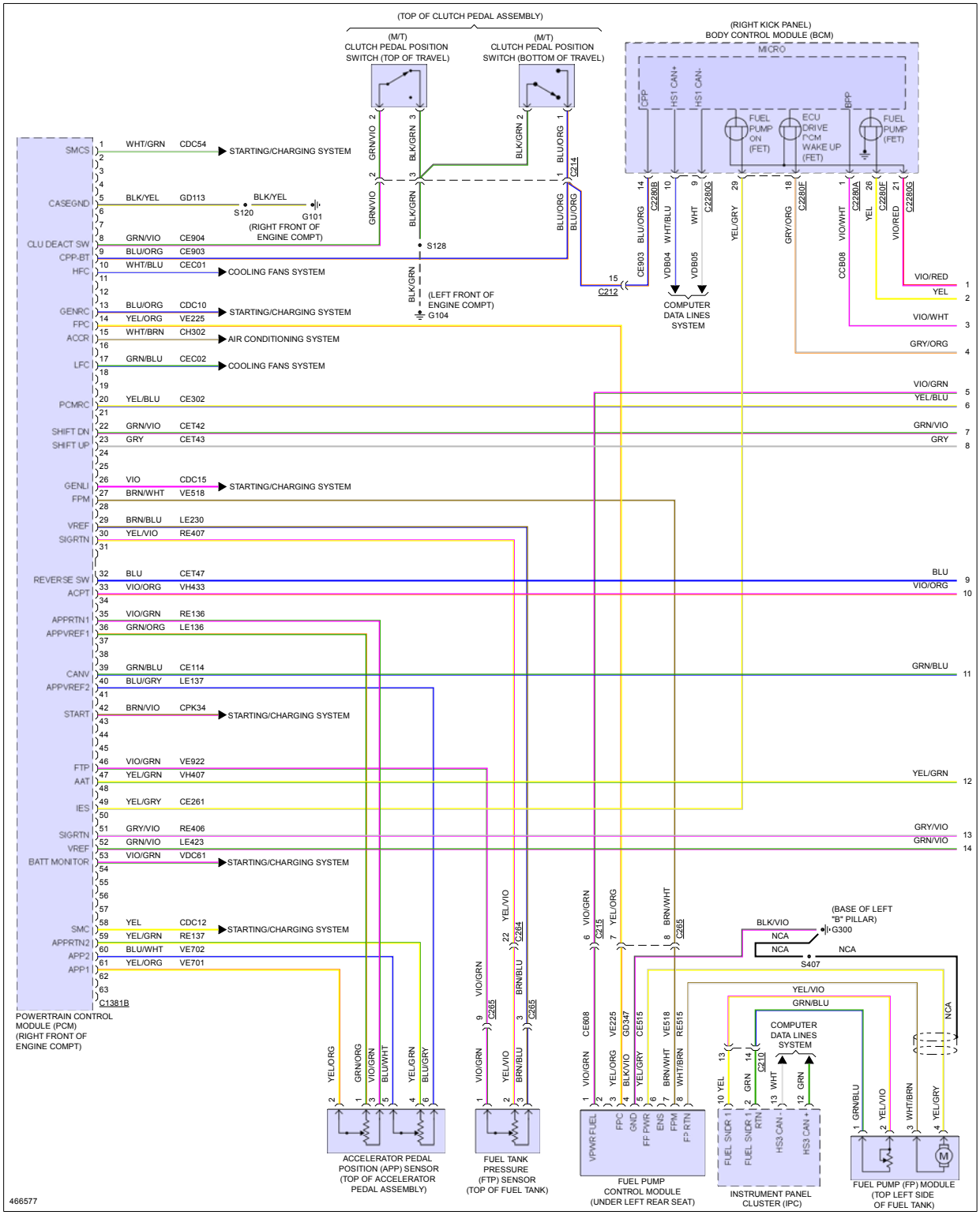


Fig 2: 3.7L, Engine Performance Circuit (2 of 6)

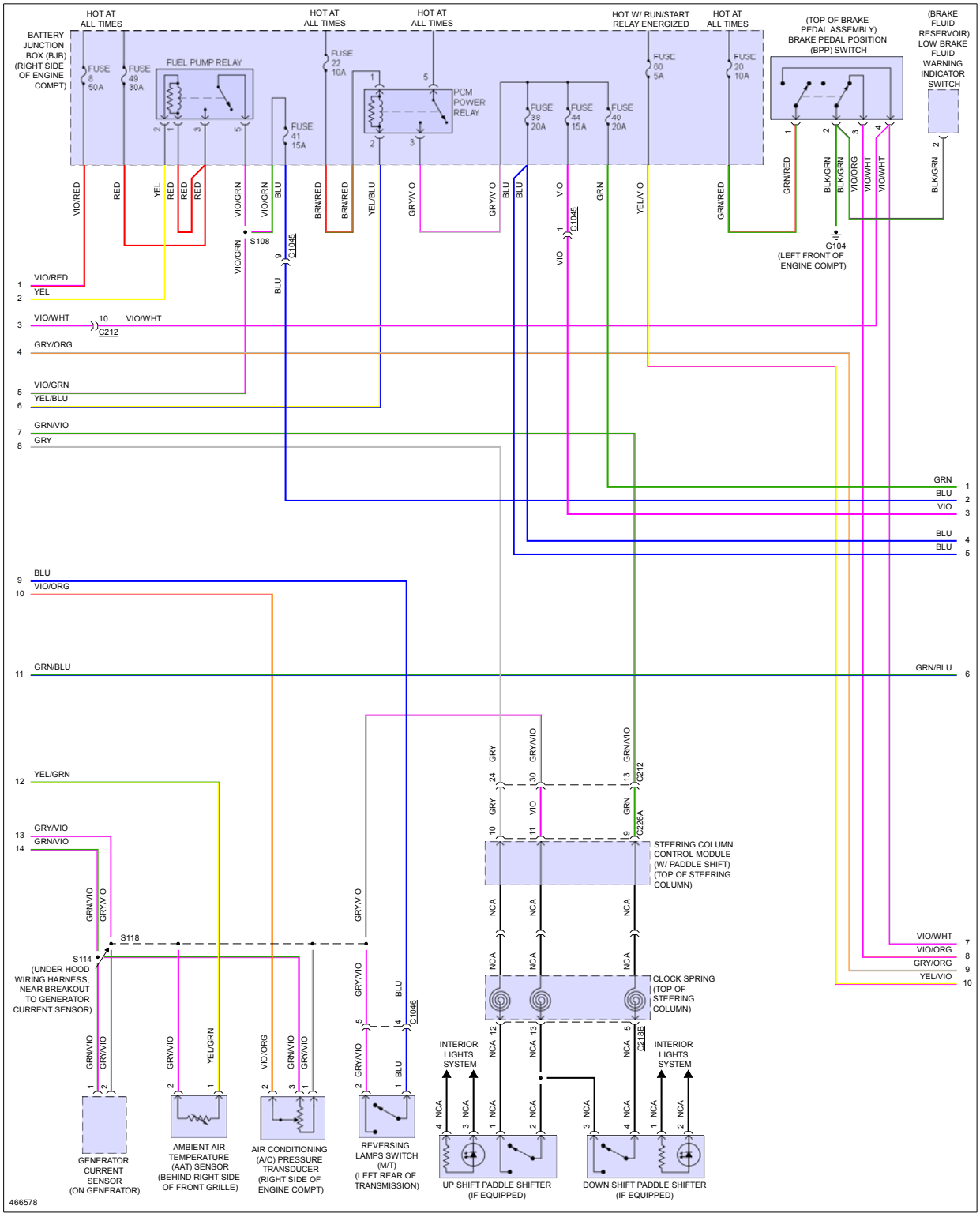


Fig 3: 3.7L, Engine Performance Circuit (3 of 6)

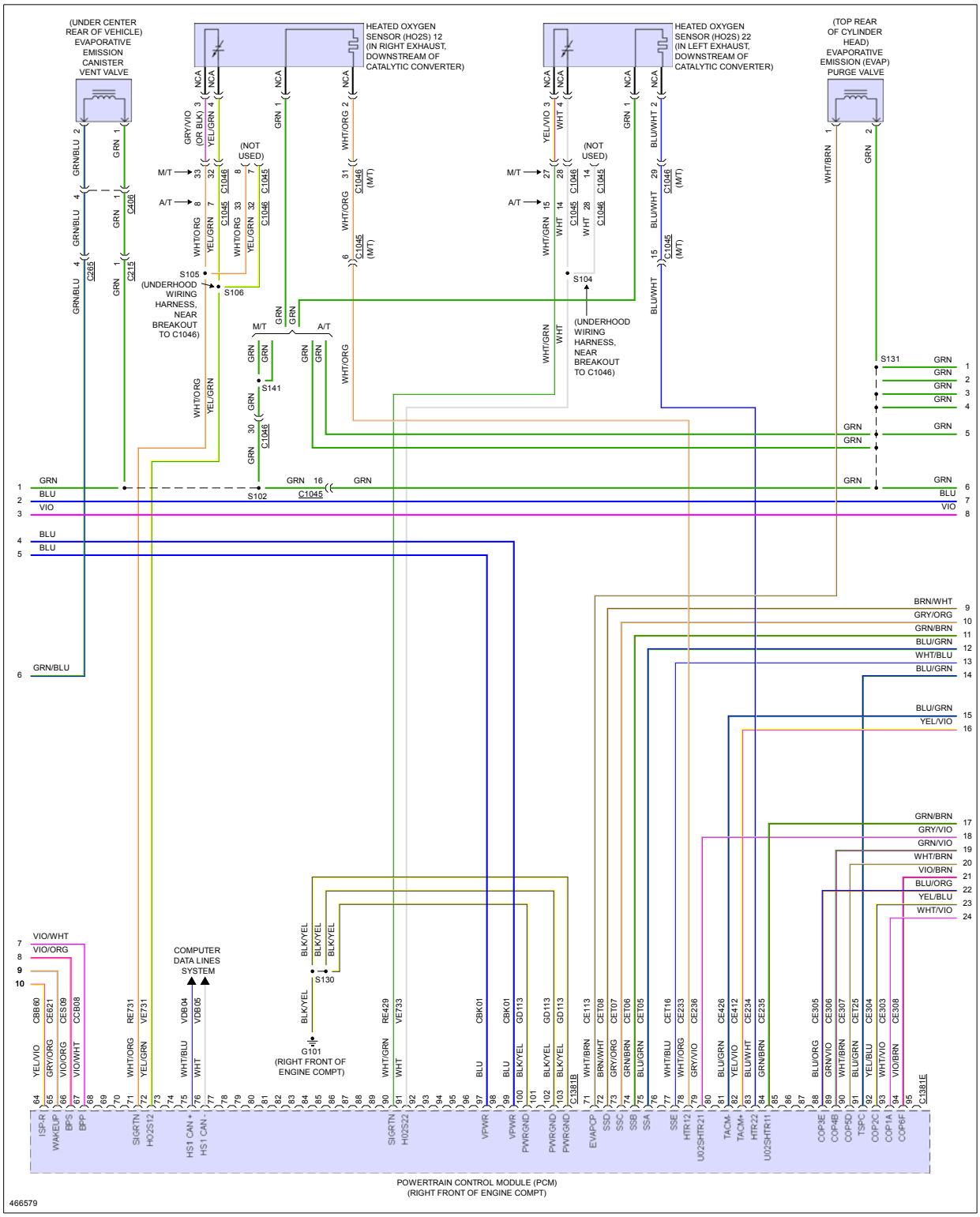


Fig 4: 3.7L, Engine Performance Circuit (4 of 6)

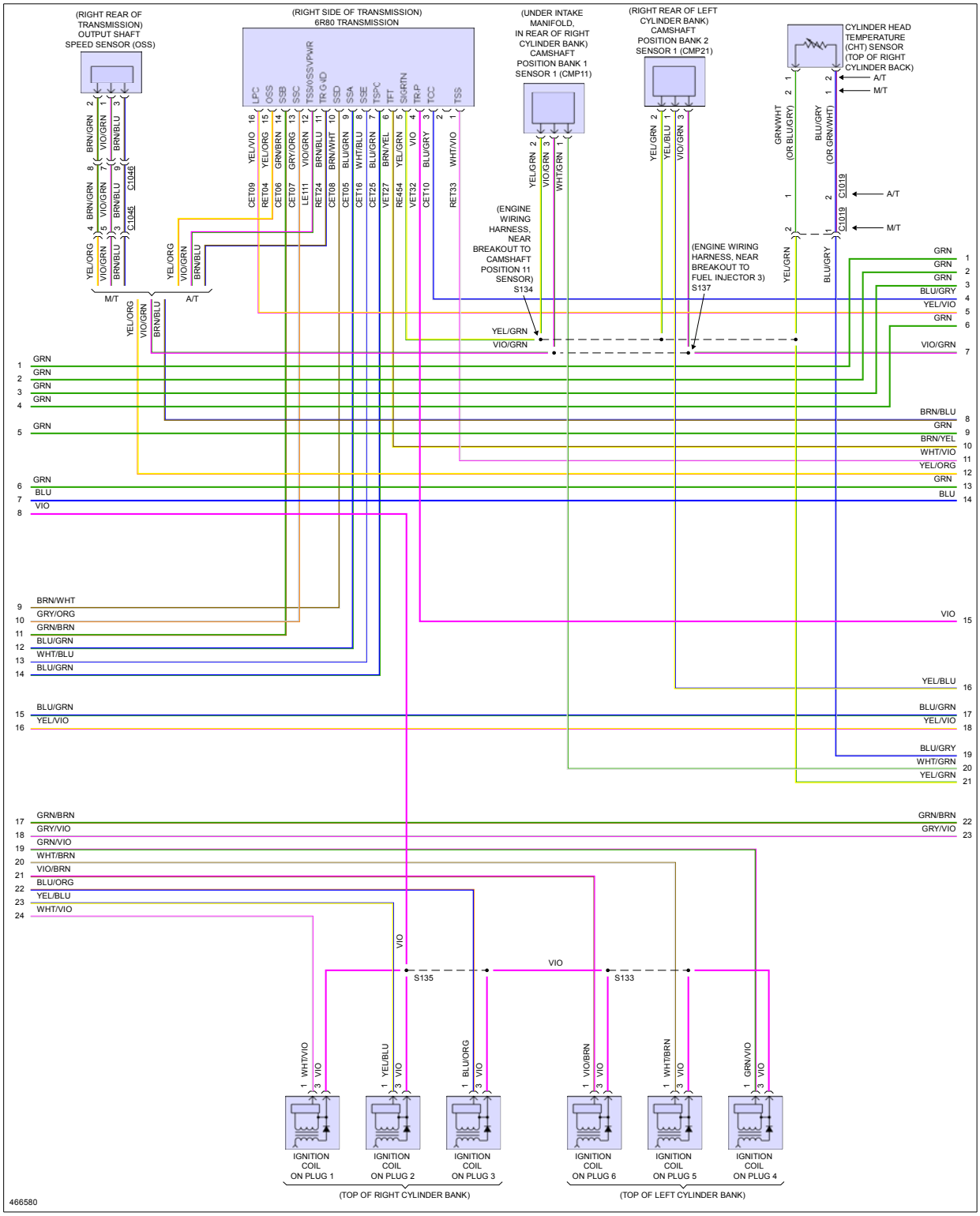


Fig 5: 3.7L, Engine Performance Circuit (5 of 6)

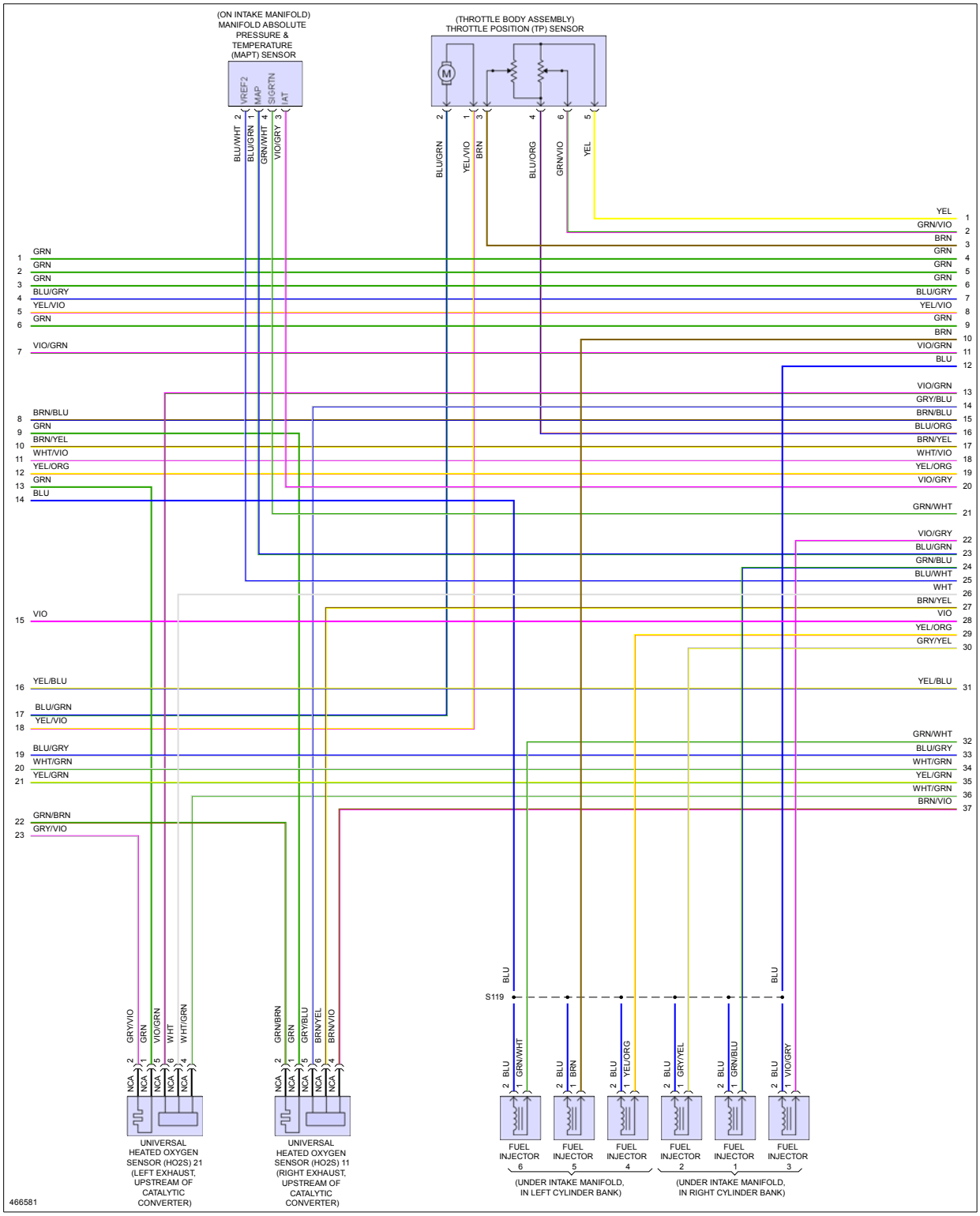
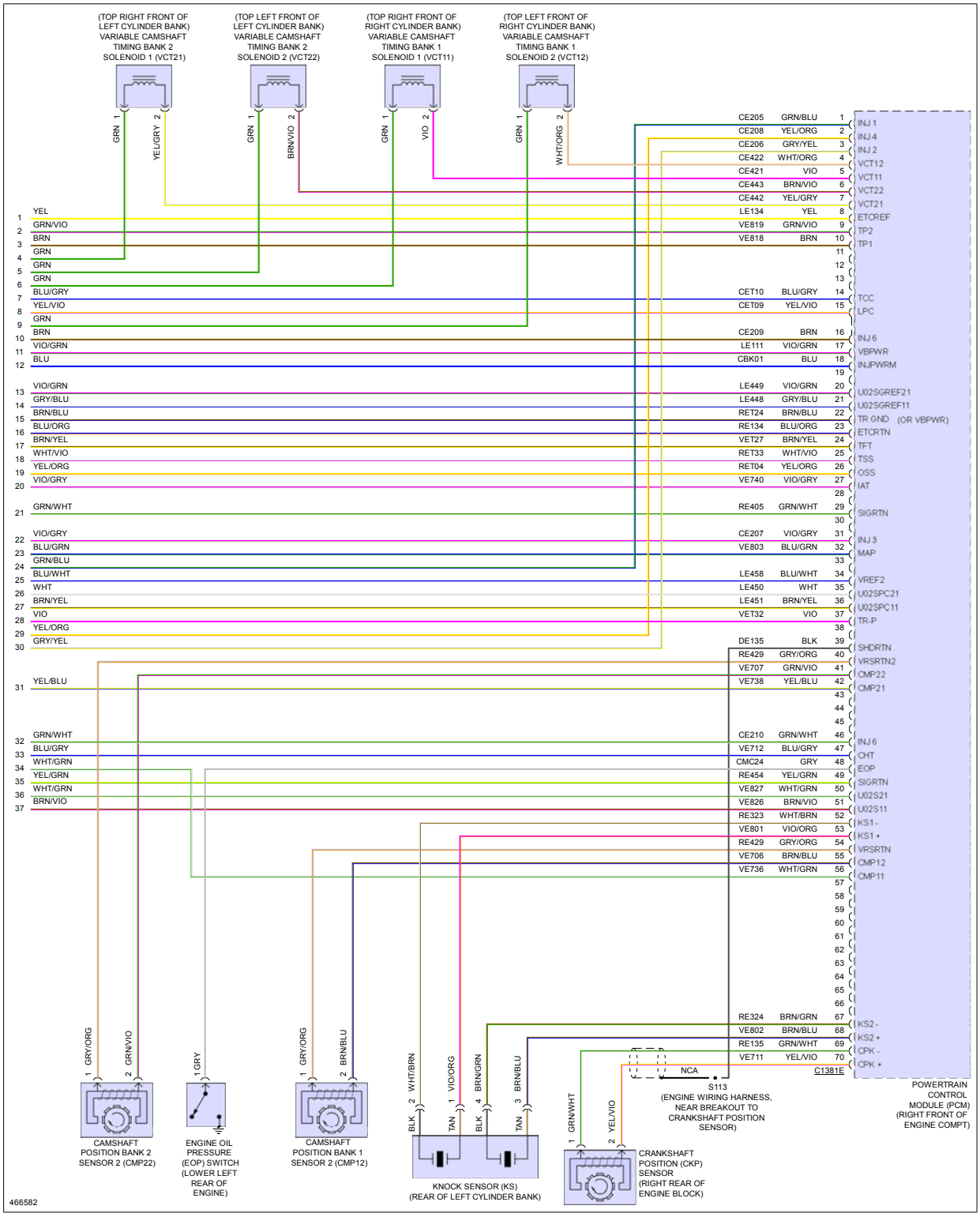


Fig 6: 3.7L, Engine Performance Circuit (6 of 6)



ENGINE PERFORMANCE > 5.0L

Fig 1: 5.0L, Engine Performance Circuit (1 of 6)

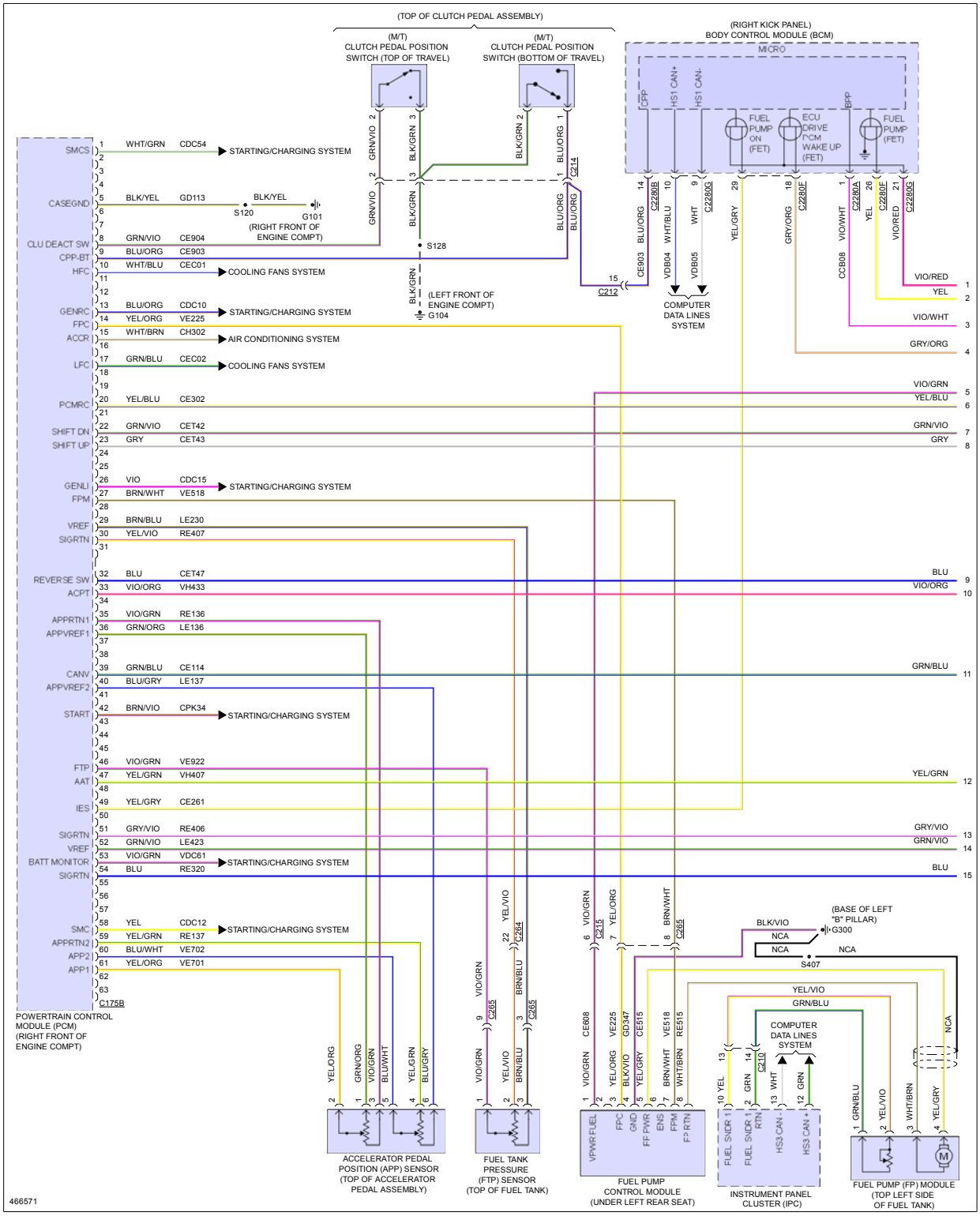


Fig 2: 5.0L, Engine Performance Circuit (2 of 6)

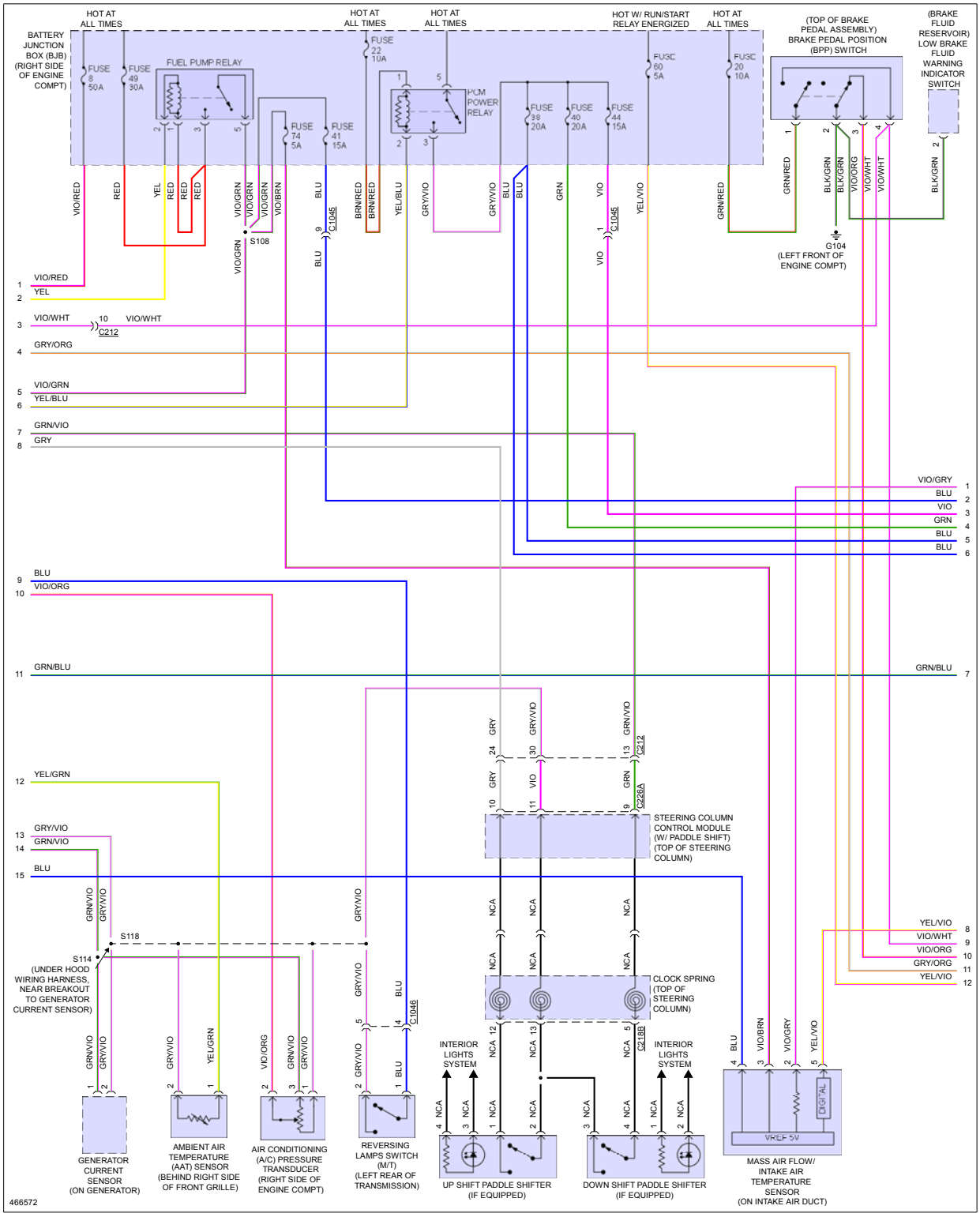


Fig 3: 5.0L, Engine Performance Circuit (3 of 6)

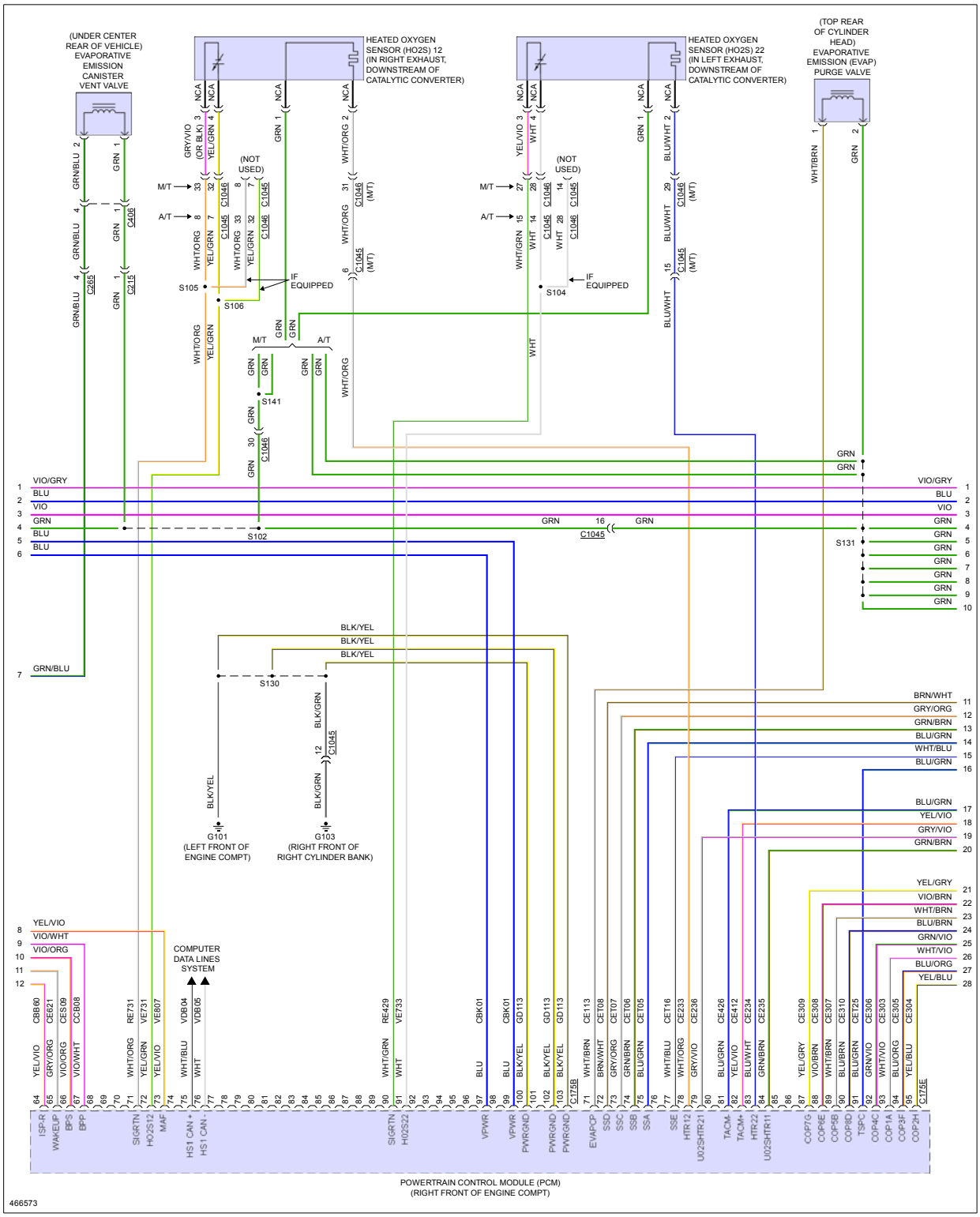


Fig 4: 5.0L, Engine Performance Circuit (4 of 6)

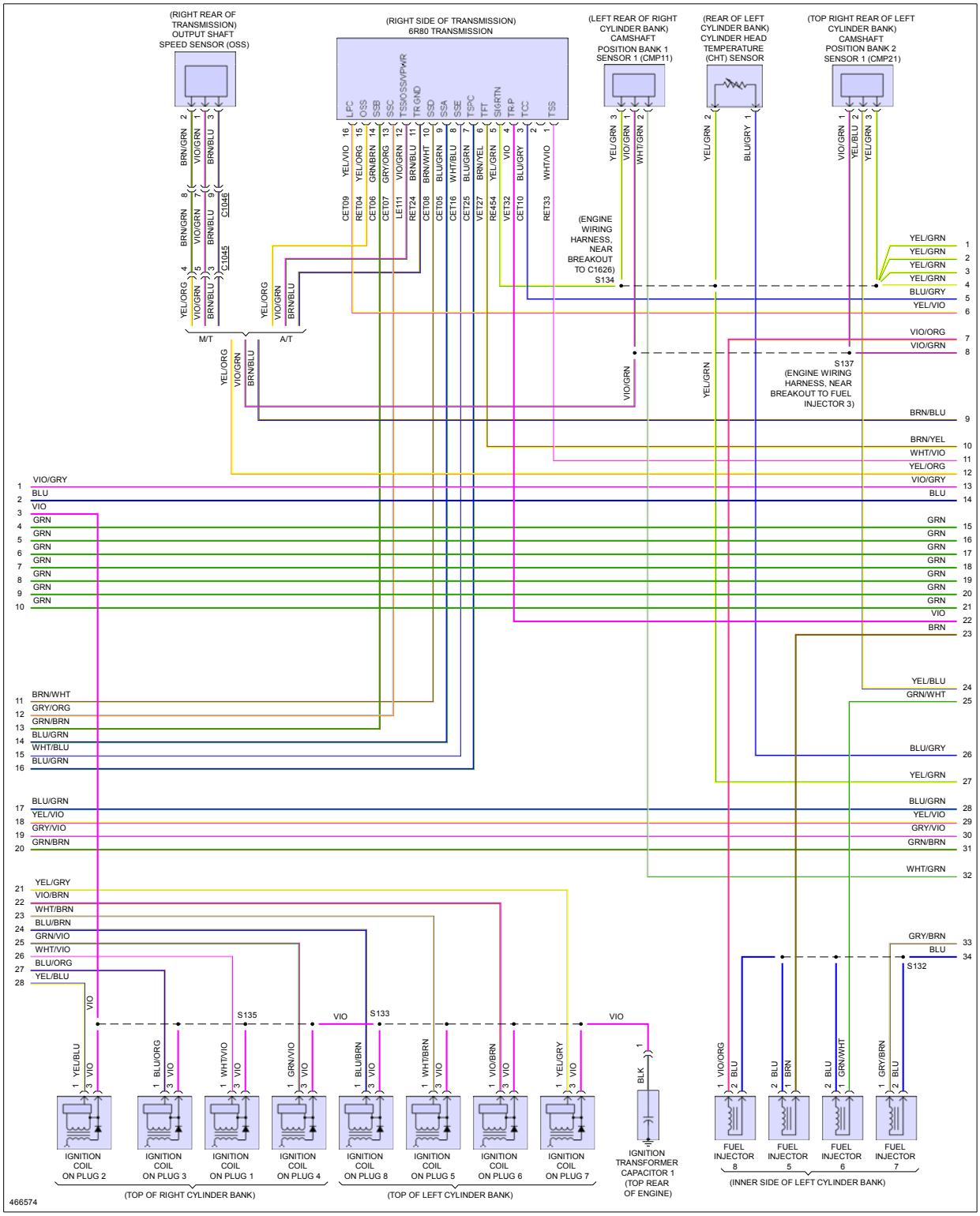


Fig 5: 5.0L, Engine Performance Circuit (5 of 6)

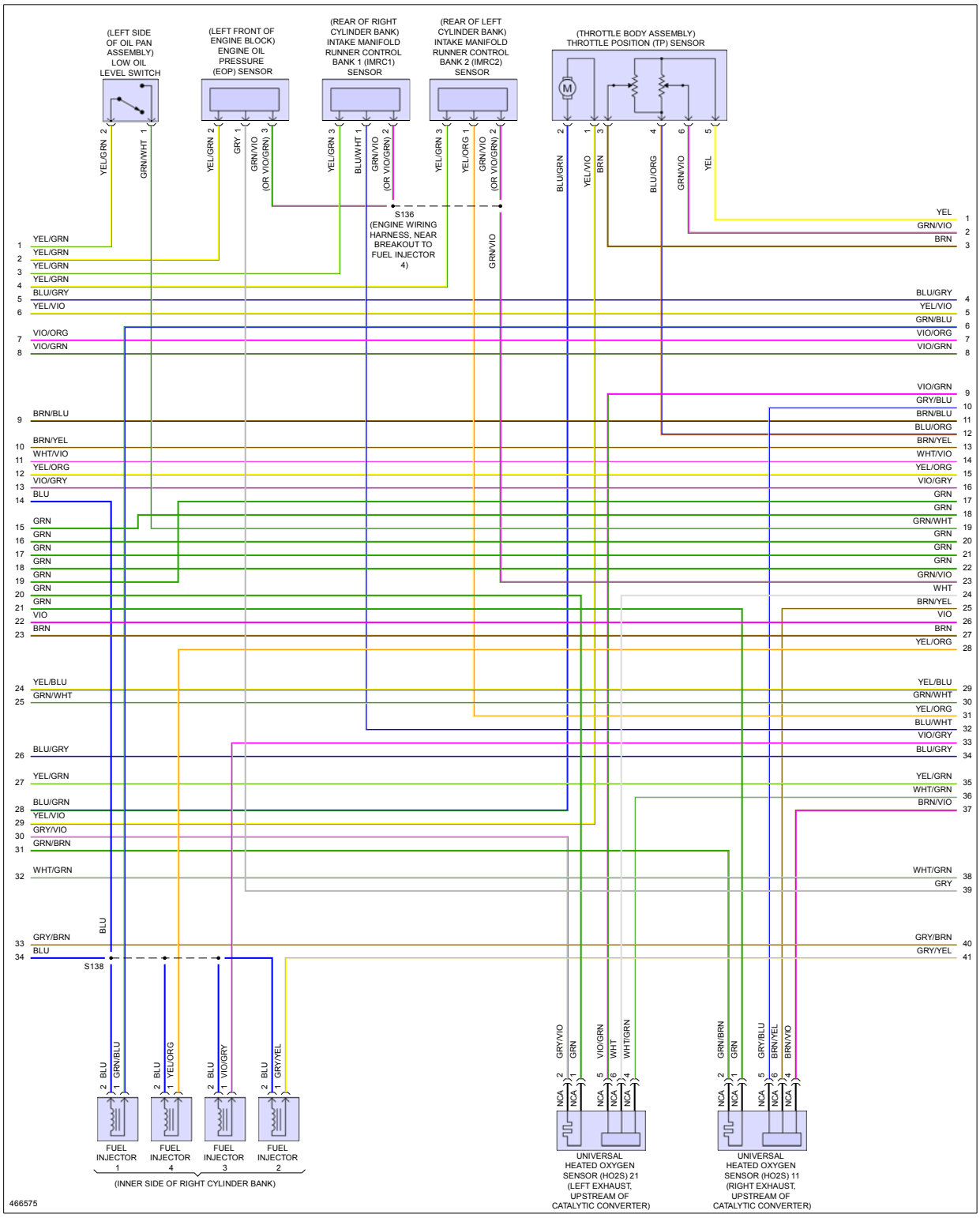
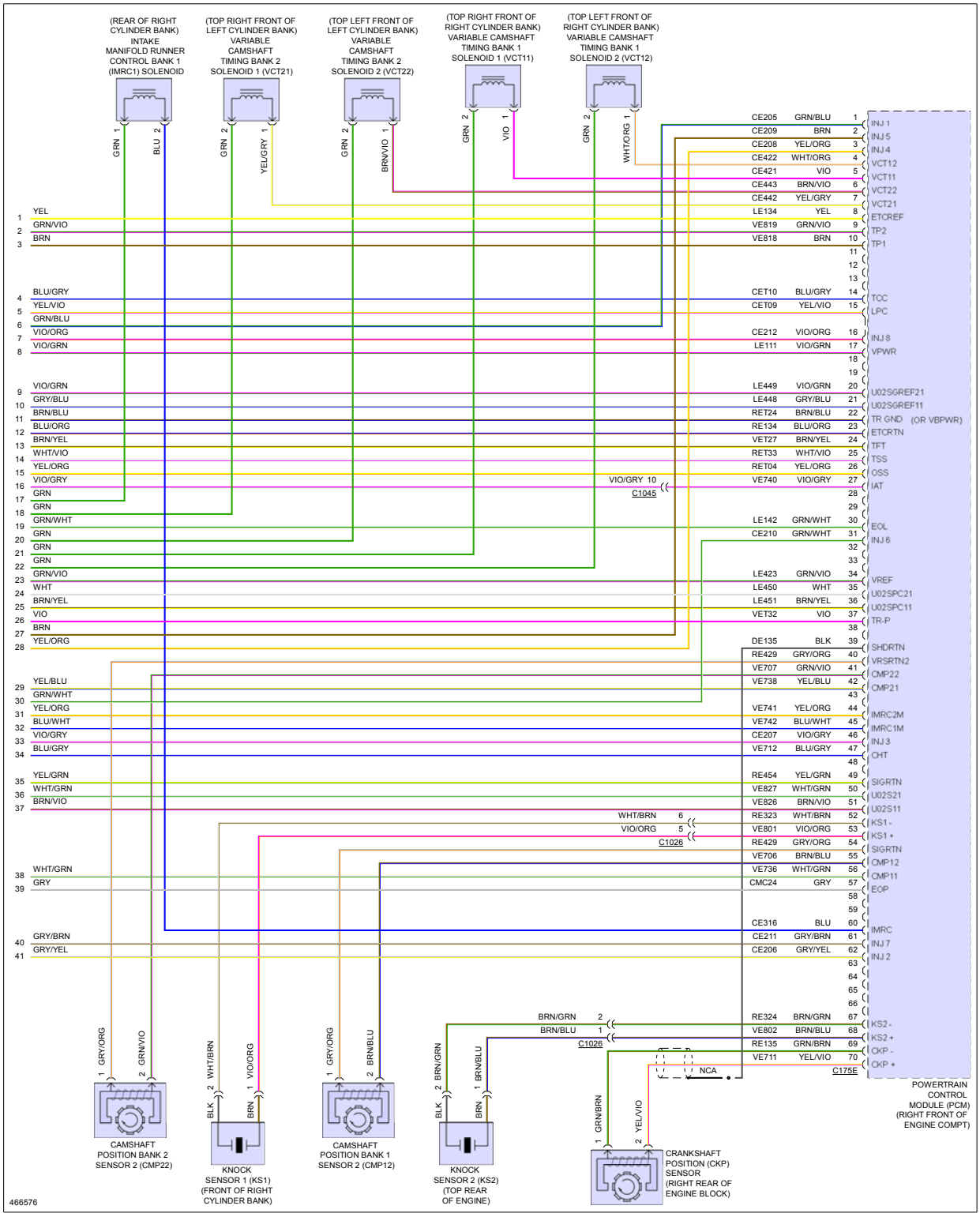


Fig 6: 5.0L, Engine Performance Circuit (6 of 6)



EXTERIOR LIGHTS

Fig 1: Backup Lamps Circuit

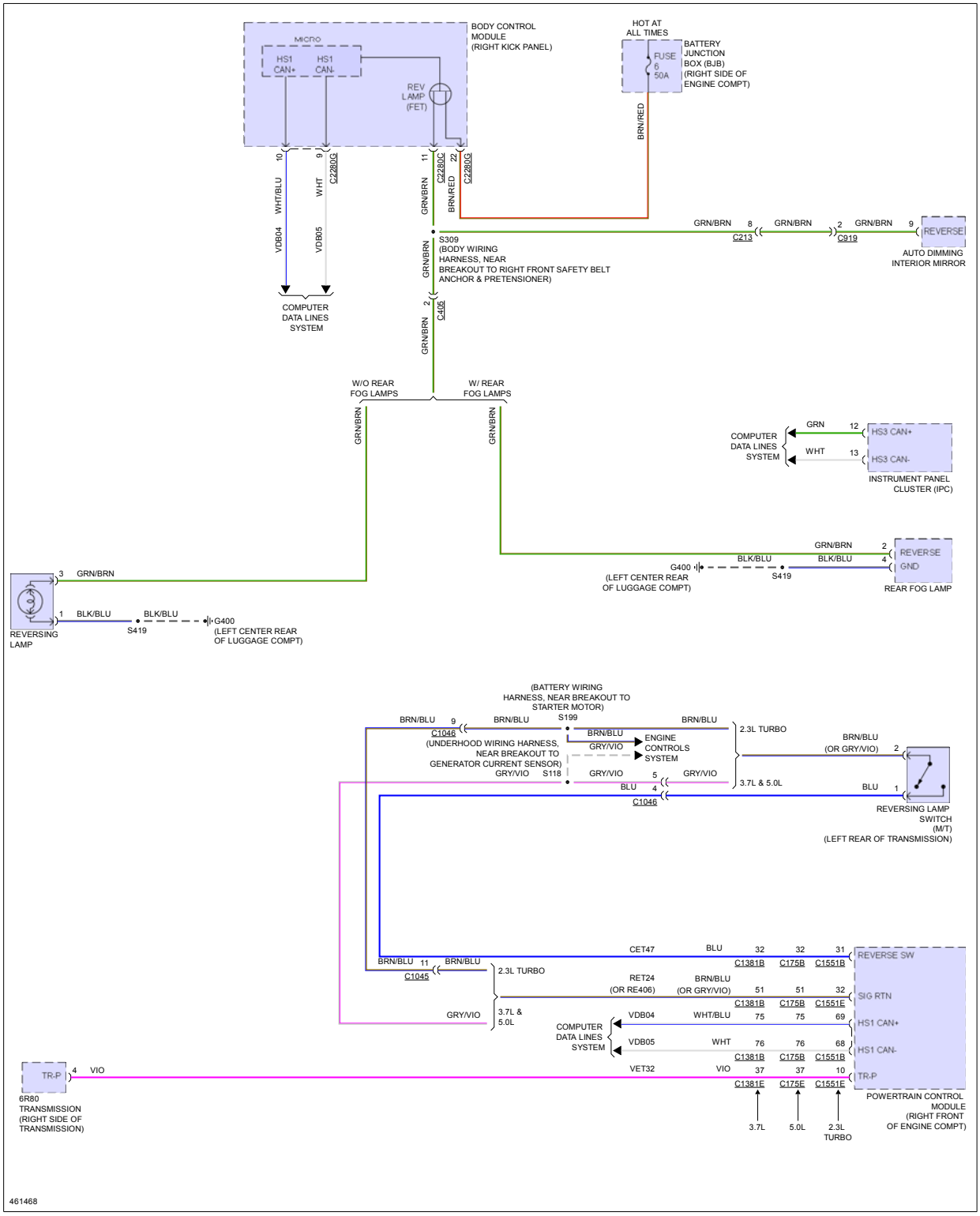


Fig 2: Exterior Lamps Circuit (1 of 3)

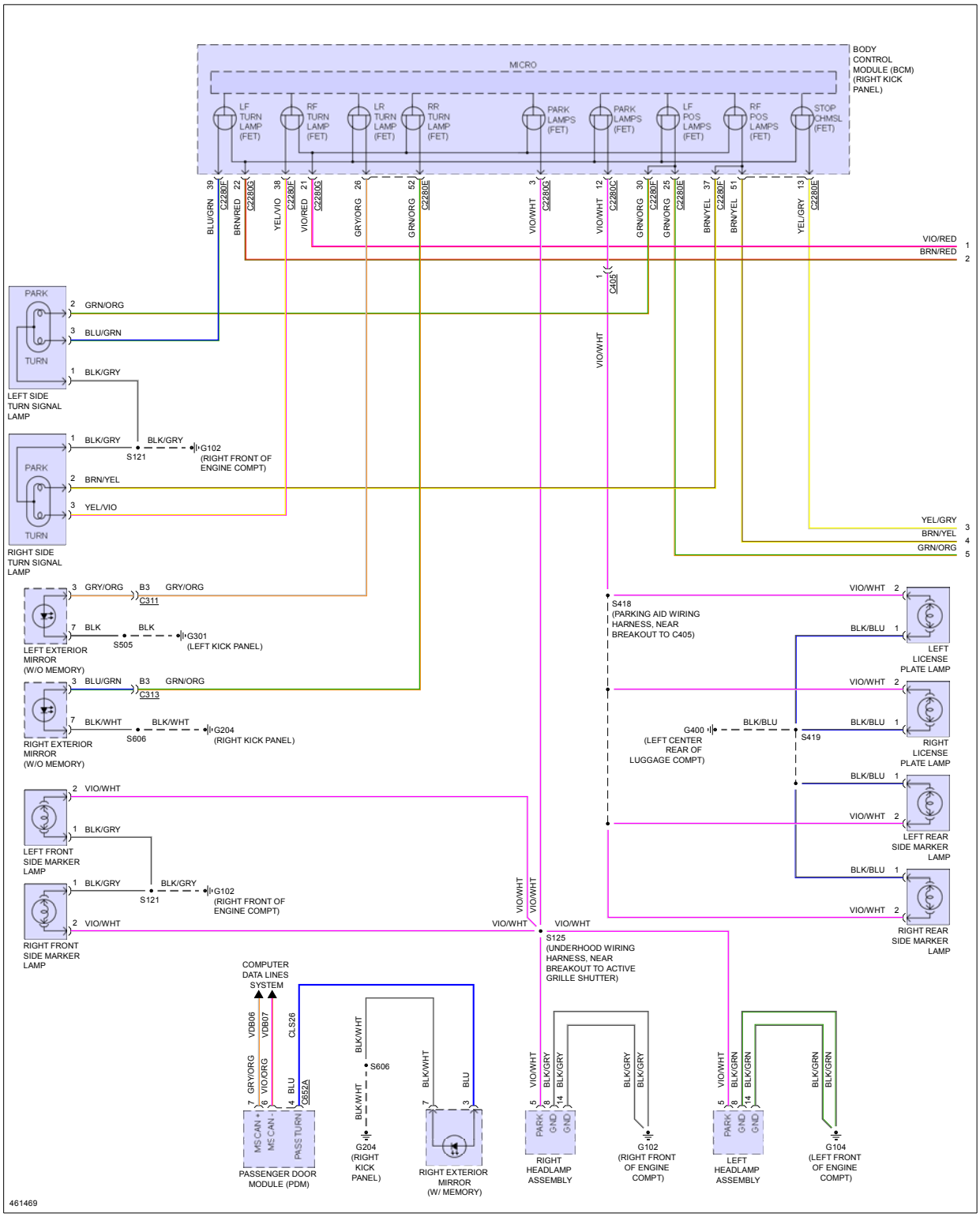


Fig 3: Exterior Lamps Circuit (2 of 3)

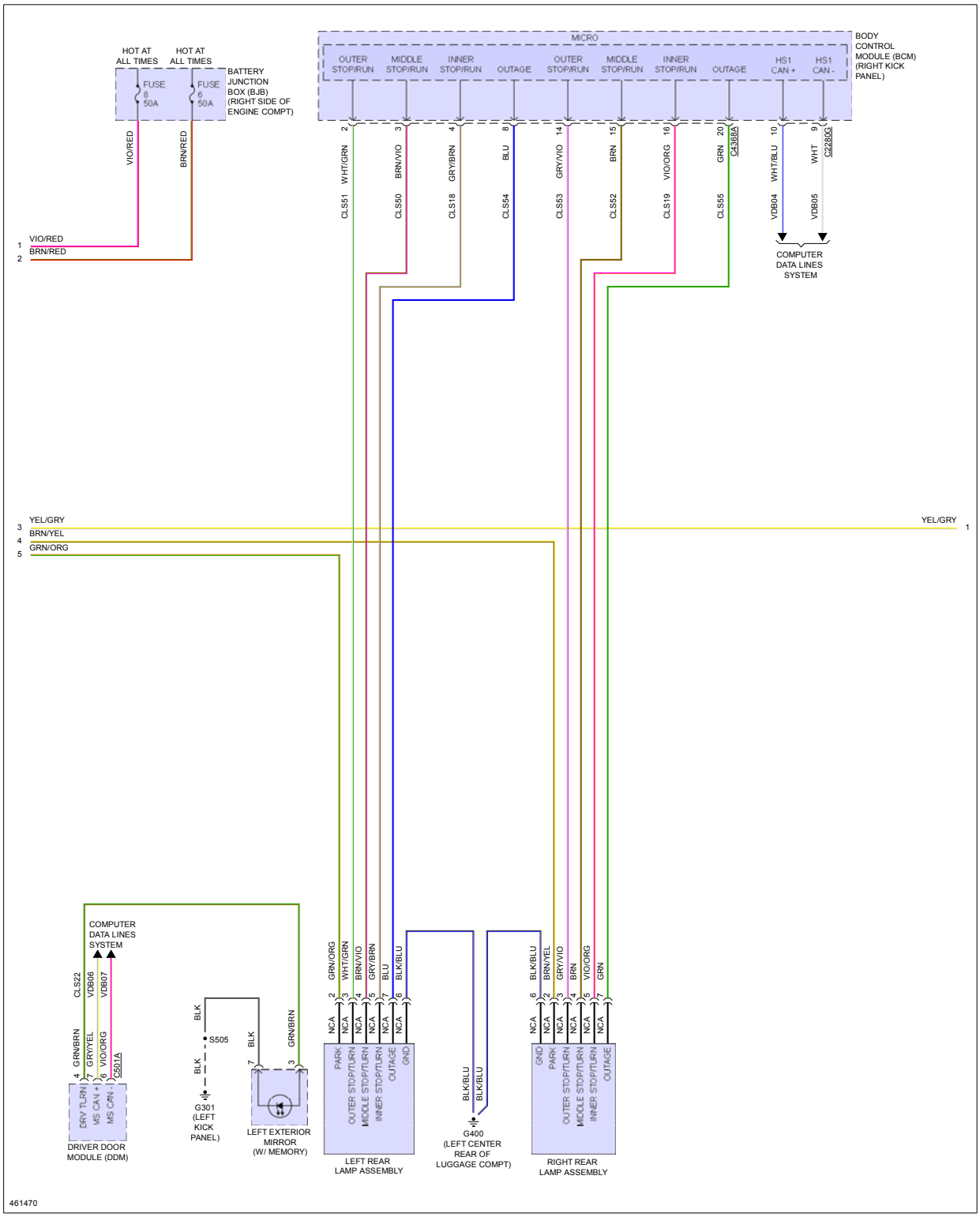
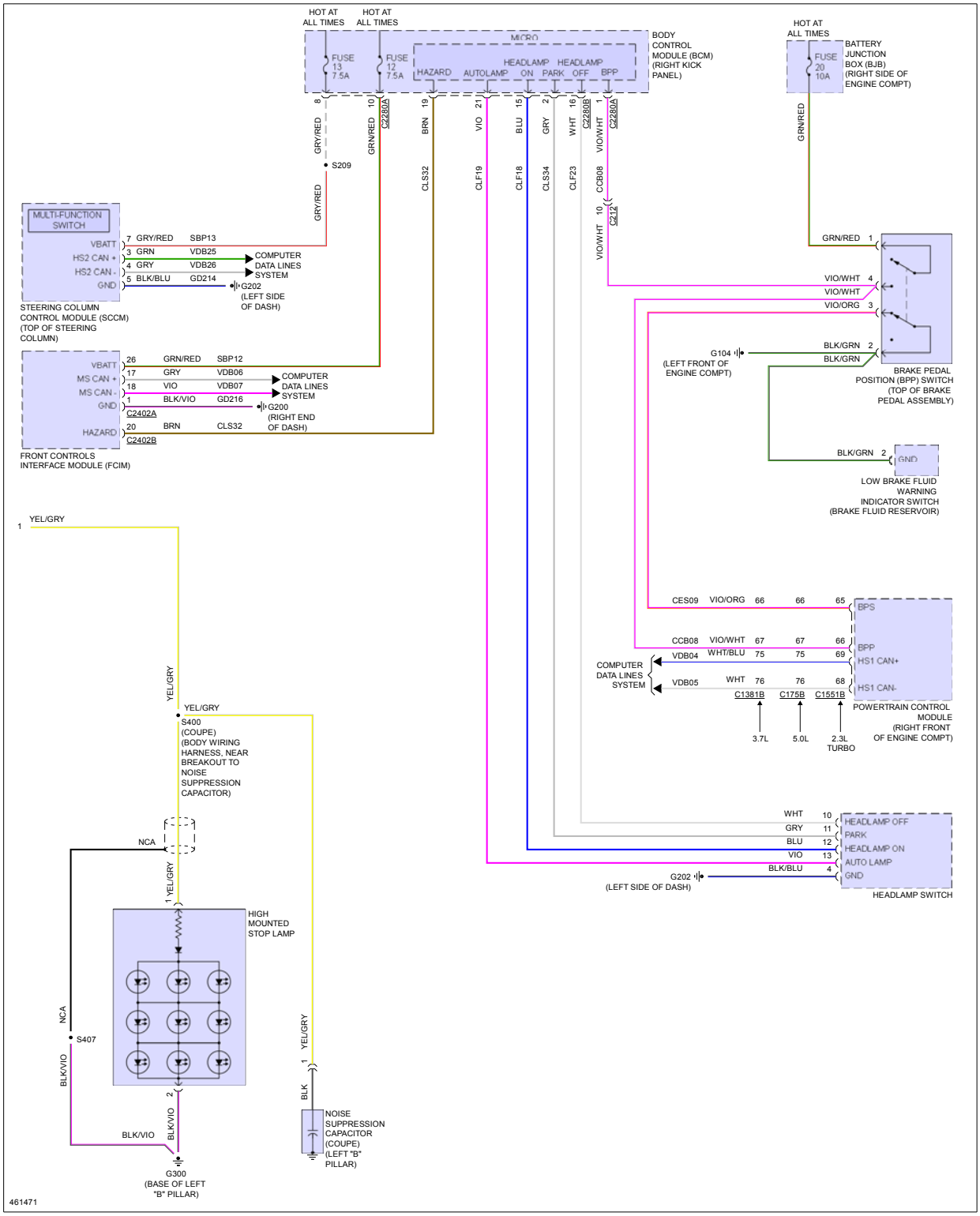


Fig 4: Exterior Lamps Circuit (3 of 3)



GROUND DISTRIBUTION

Fig 1: Ground Distribution Circuit (1 of 4)

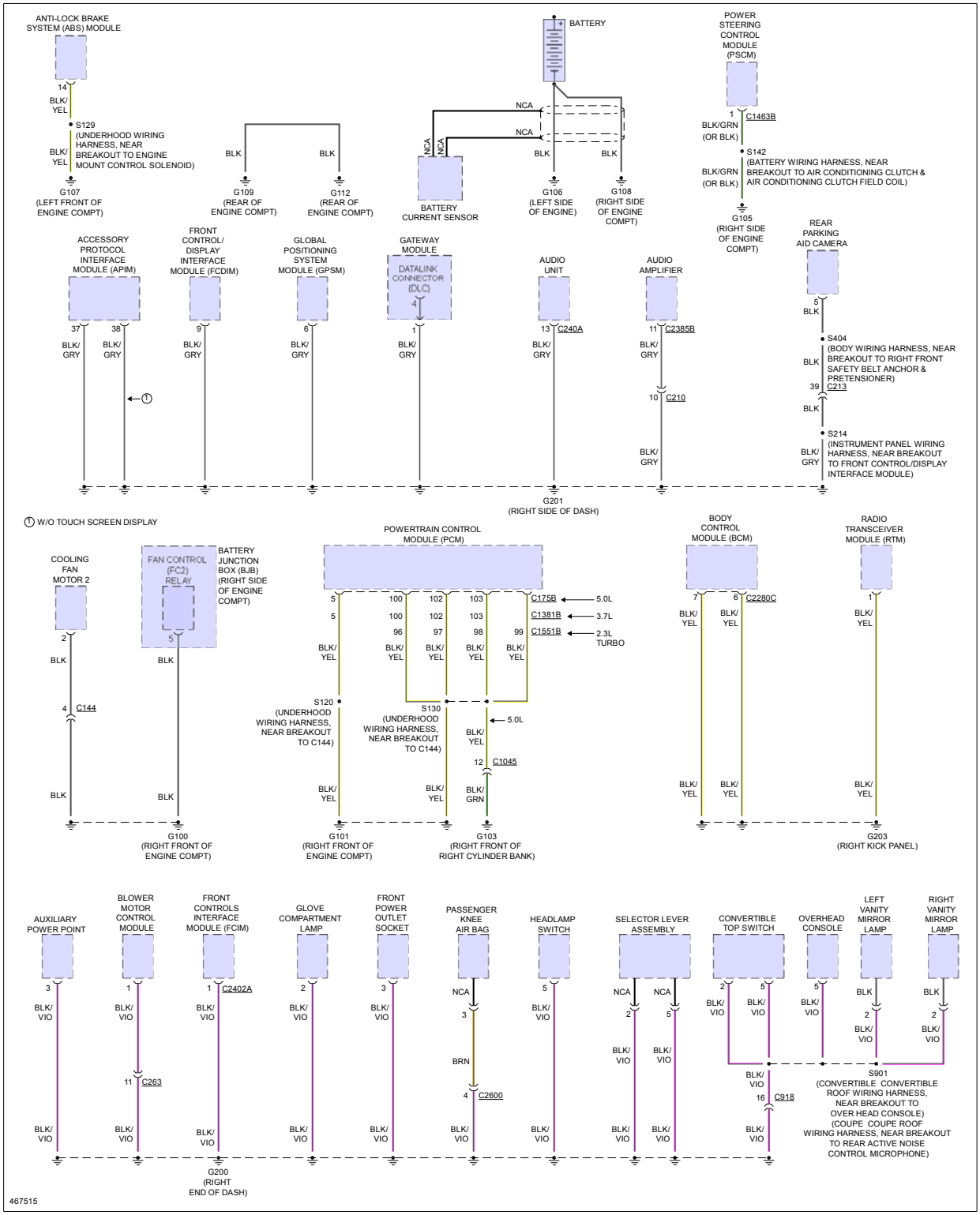


Fig 2: Ground Distribution Circuit (2 of 4)

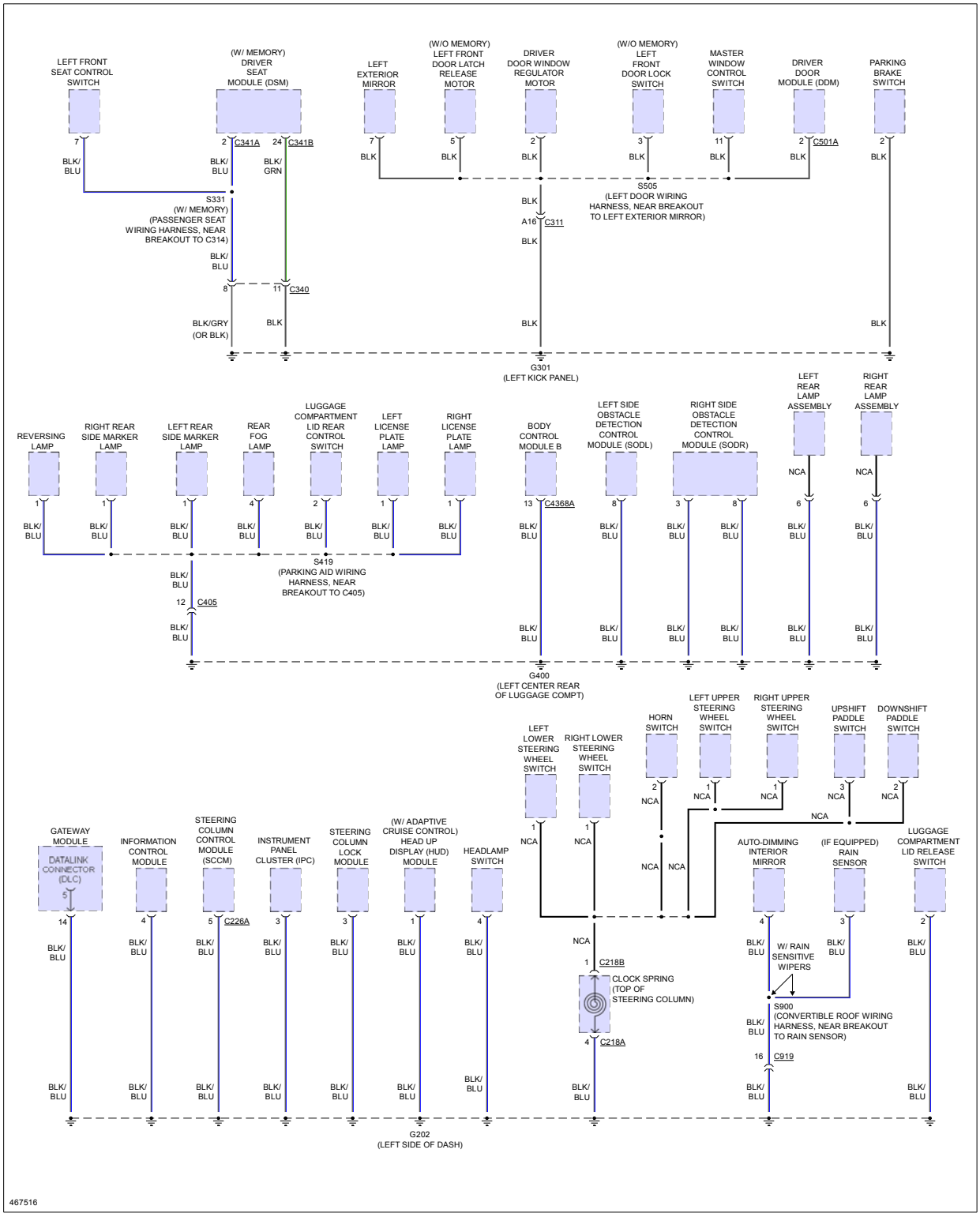


Fig 3: Ground Distribution Circuit (3 of 4)

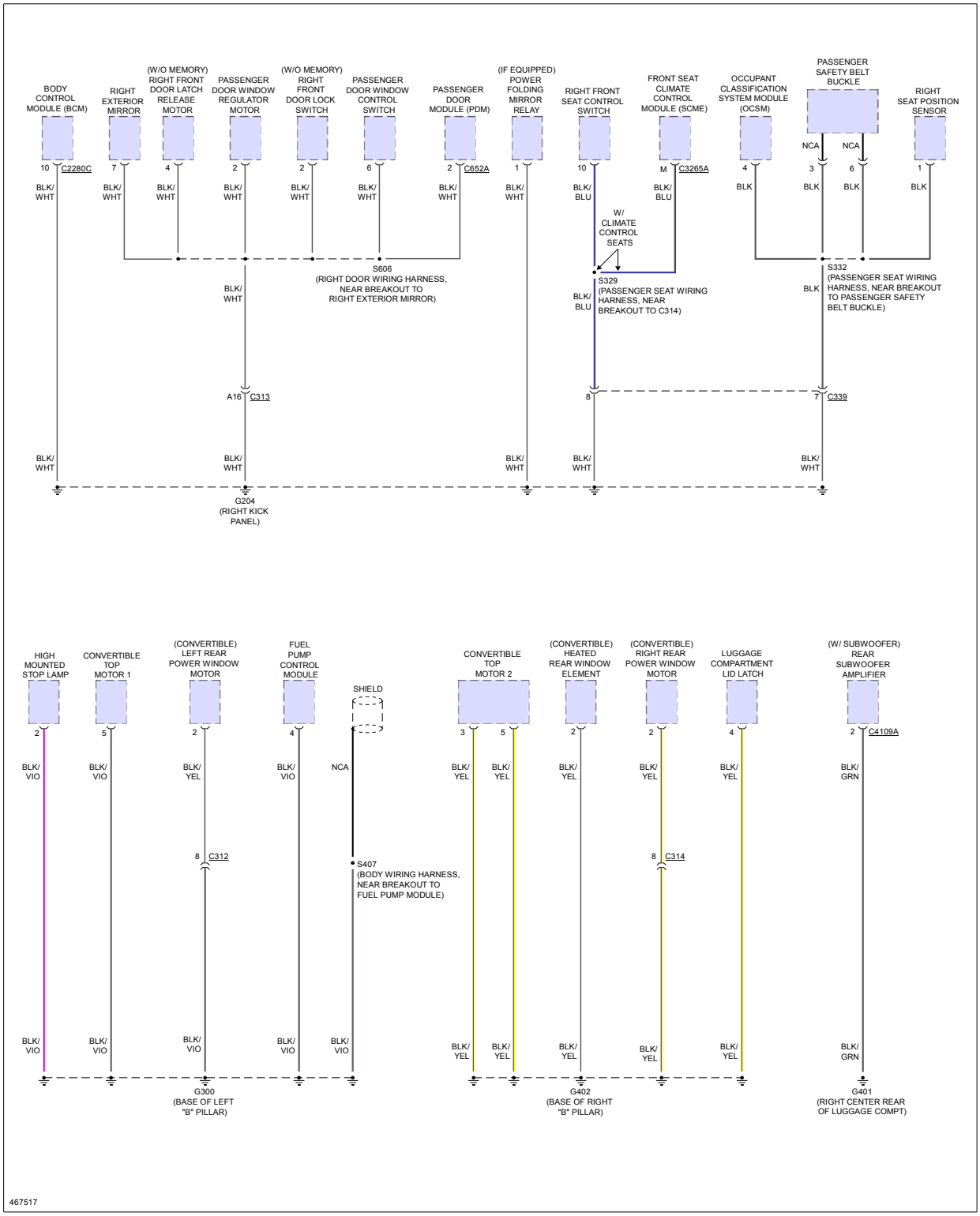
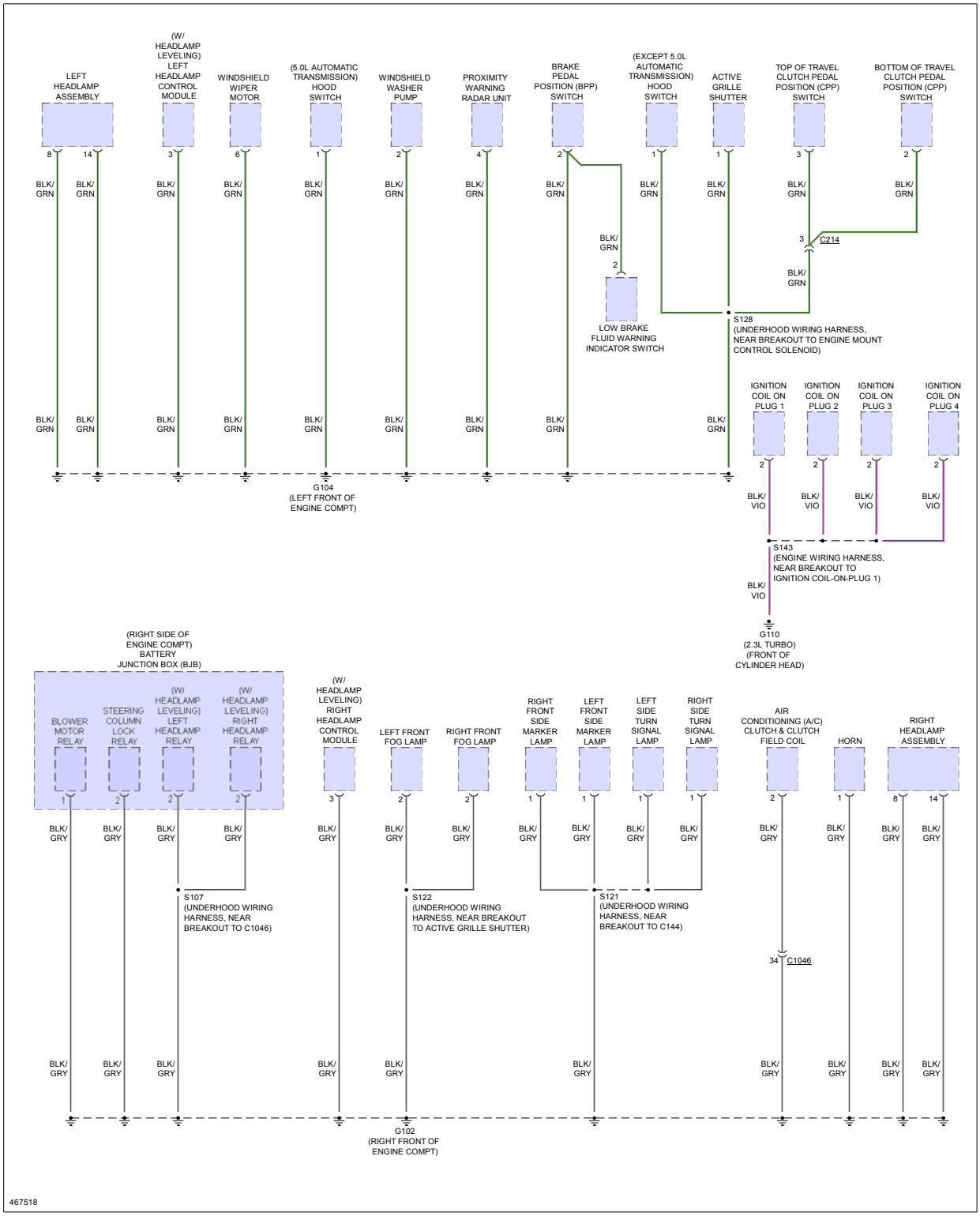


Fig 4: Ground Distribution Circuit (4 of 4)



HEADLIGHTS

Fig 1: Headlights Circuit (1 of 2)

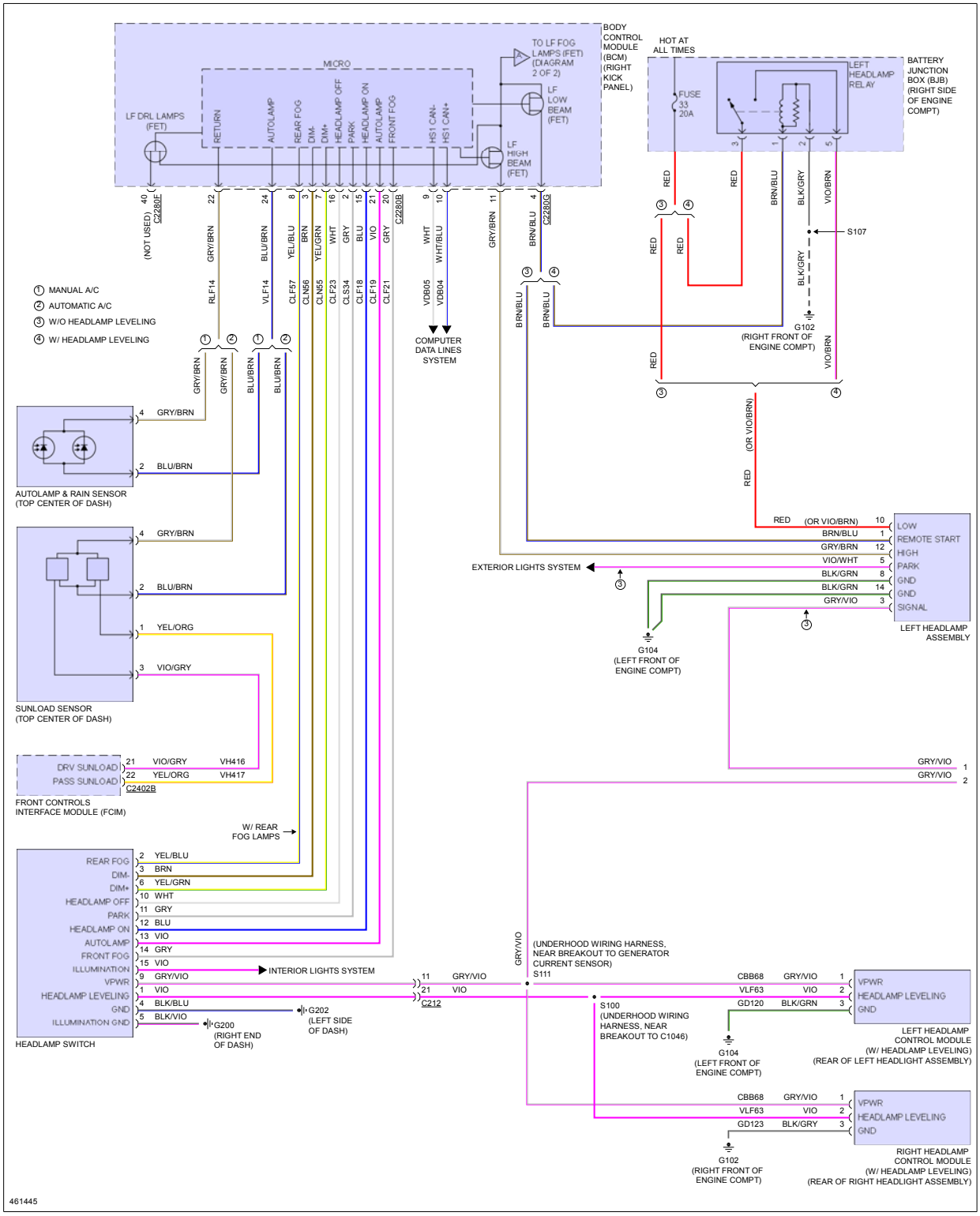
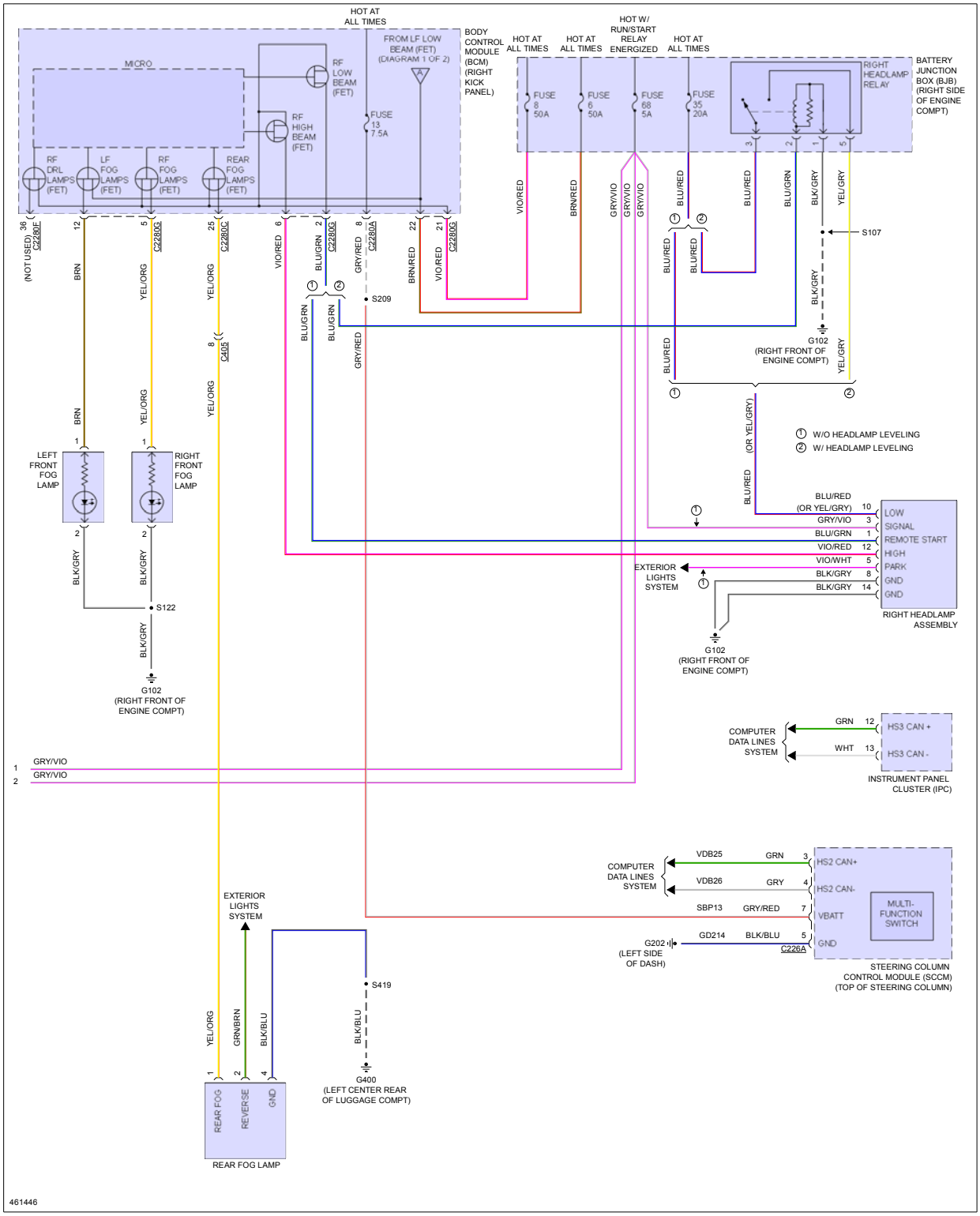
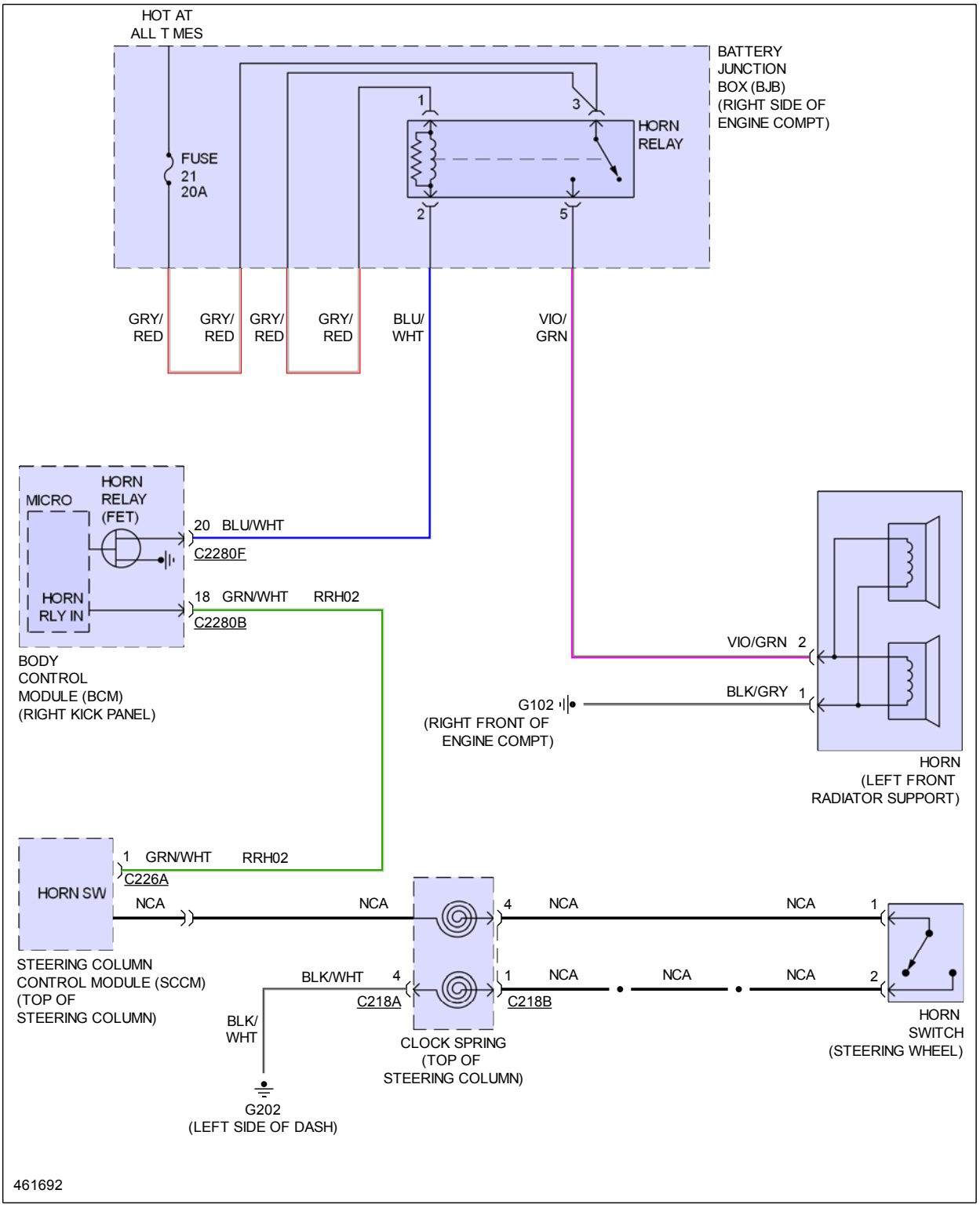


Fig 2: Headlights Circuit (2 of 2)



HORN

Fig 1: Horn Circuit



INSTRUMENT CLUSTER

Fig 1: Instrument Cluster Circuit (1 of 2)

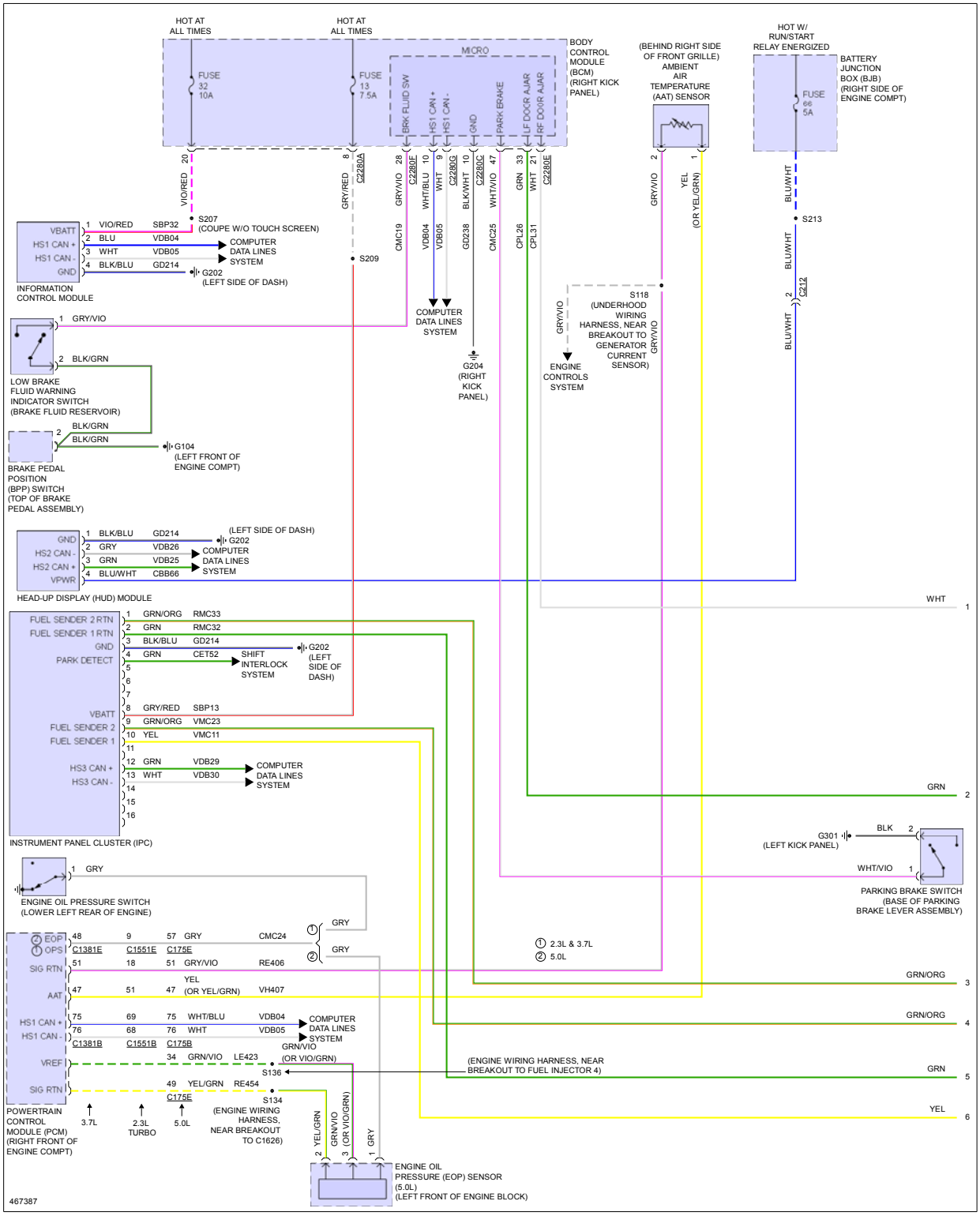


Fig 2: Instrument Cluster Circuit (2 of 2)

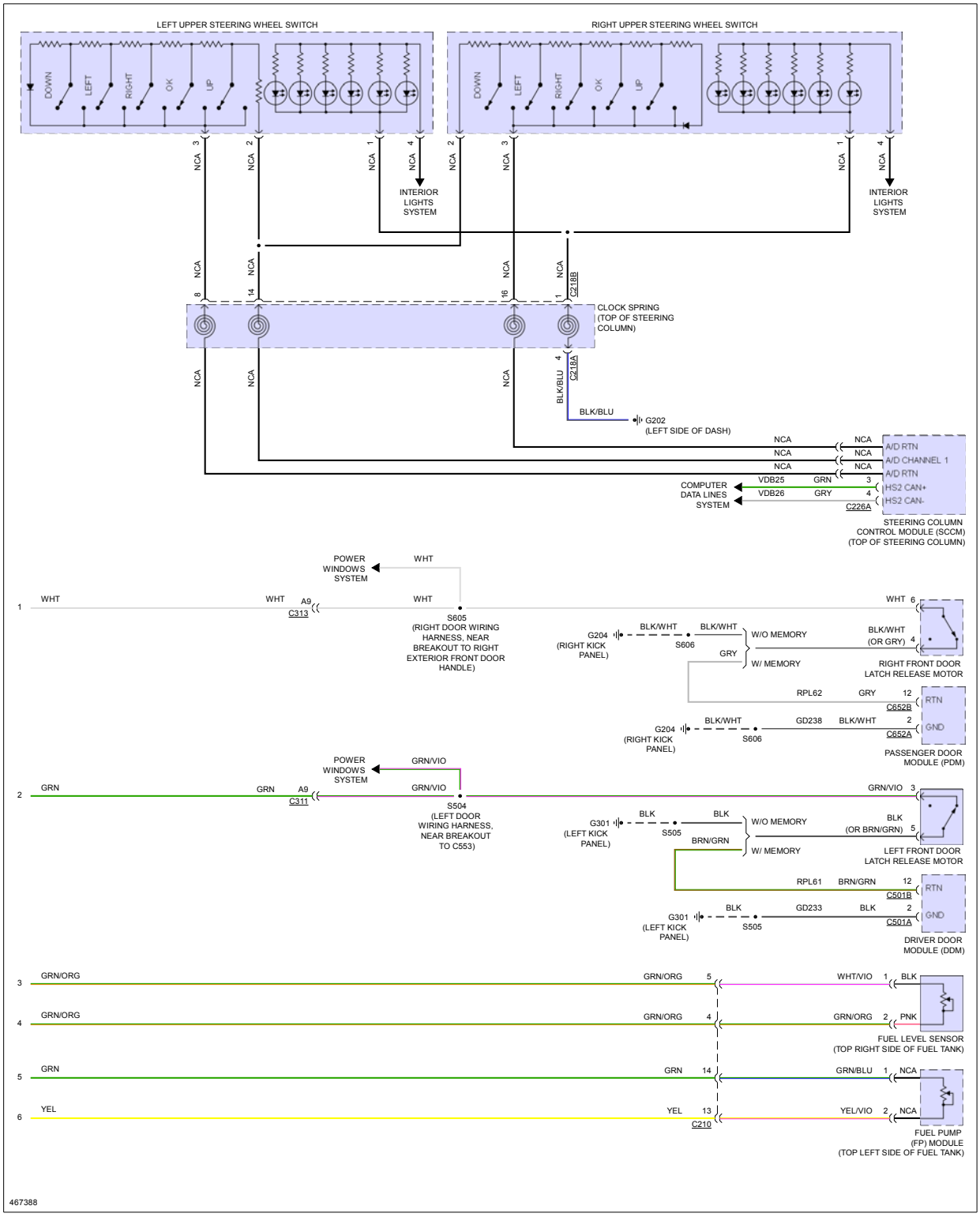
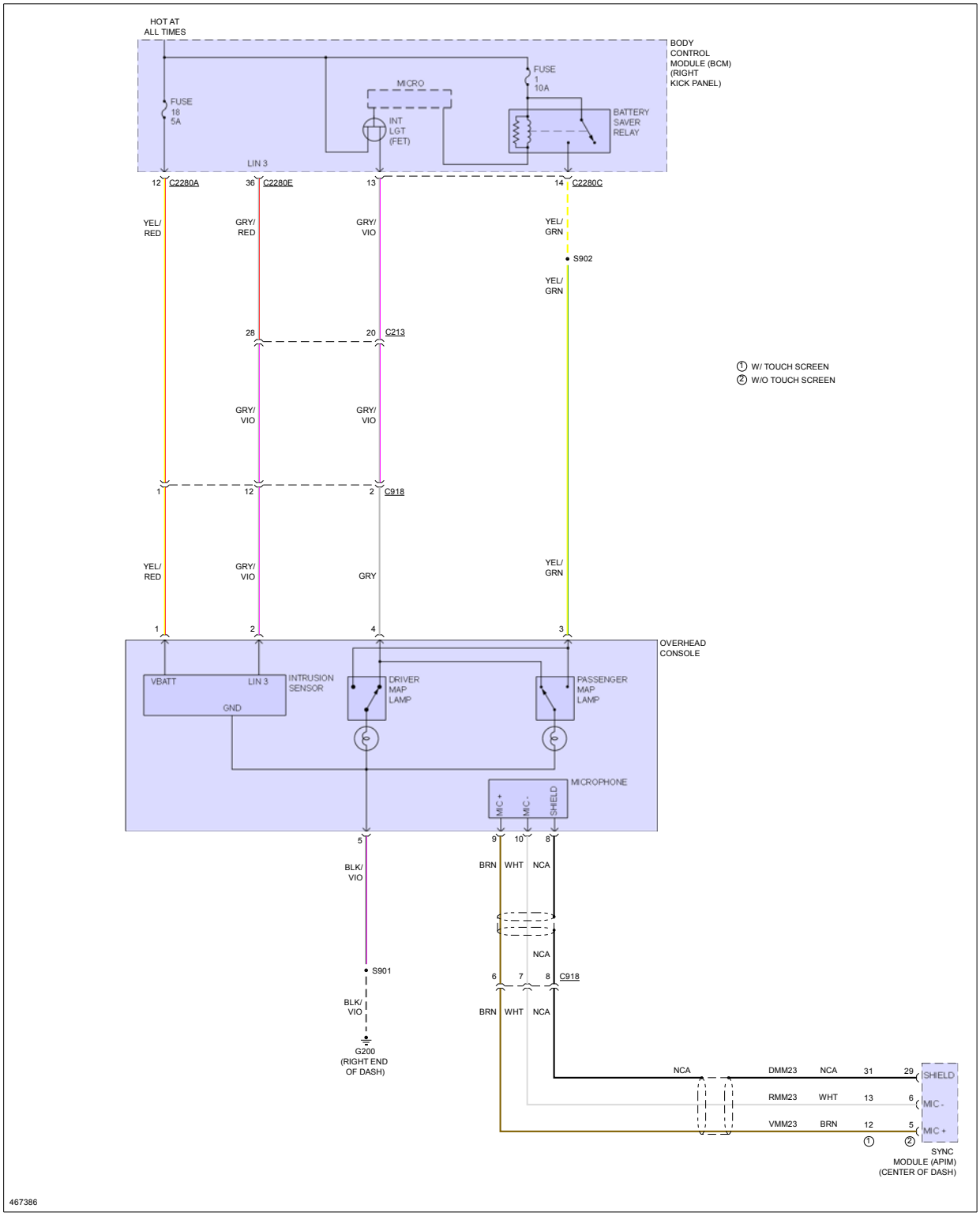


Fig 3: Overhead Console Circuit



INTERIOR LIGHTS

Fig 1: Courtesy Lamps Circuit (1 of 2)

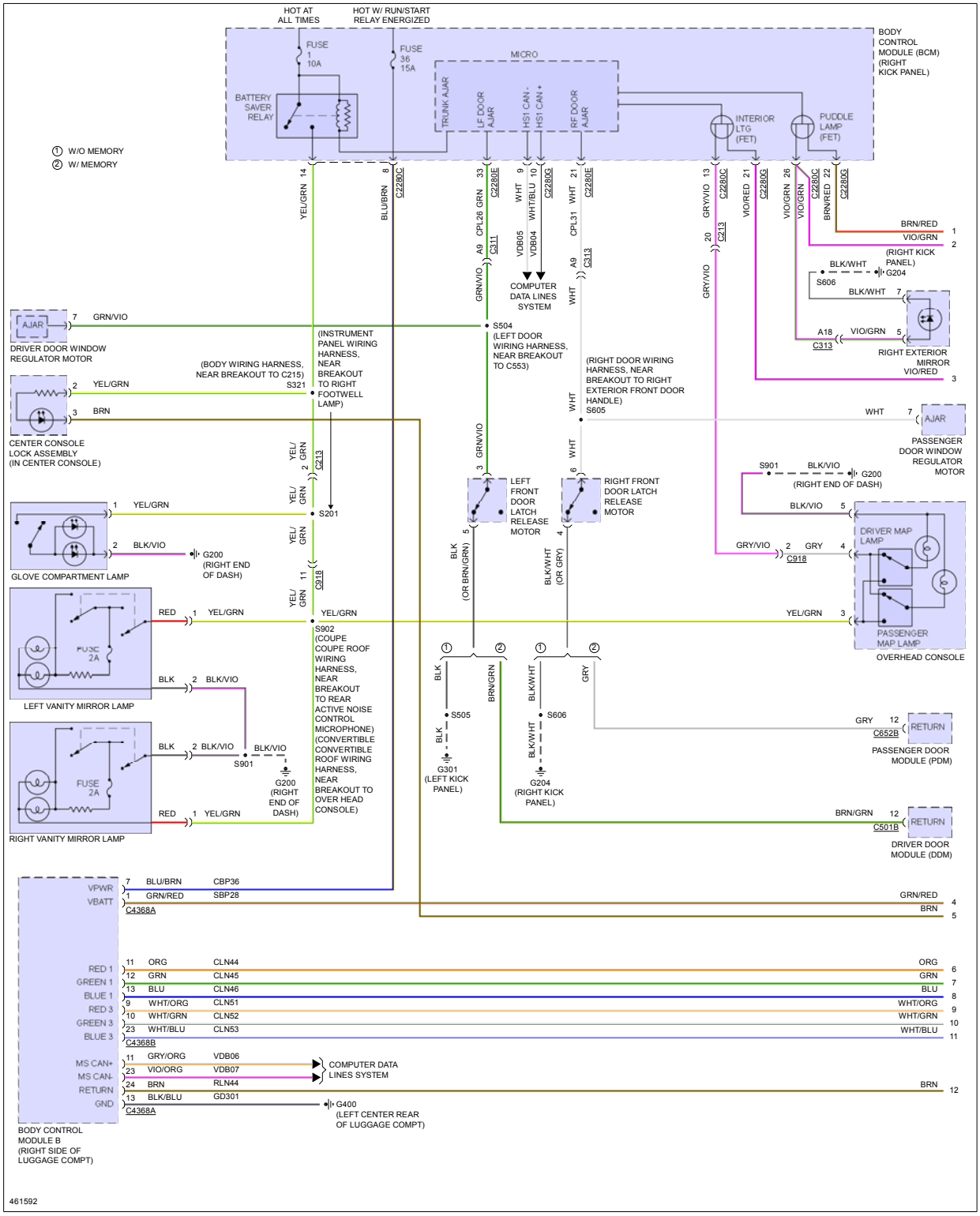


Fig 2: Courtesy Lamps Circuit (2 of 2)

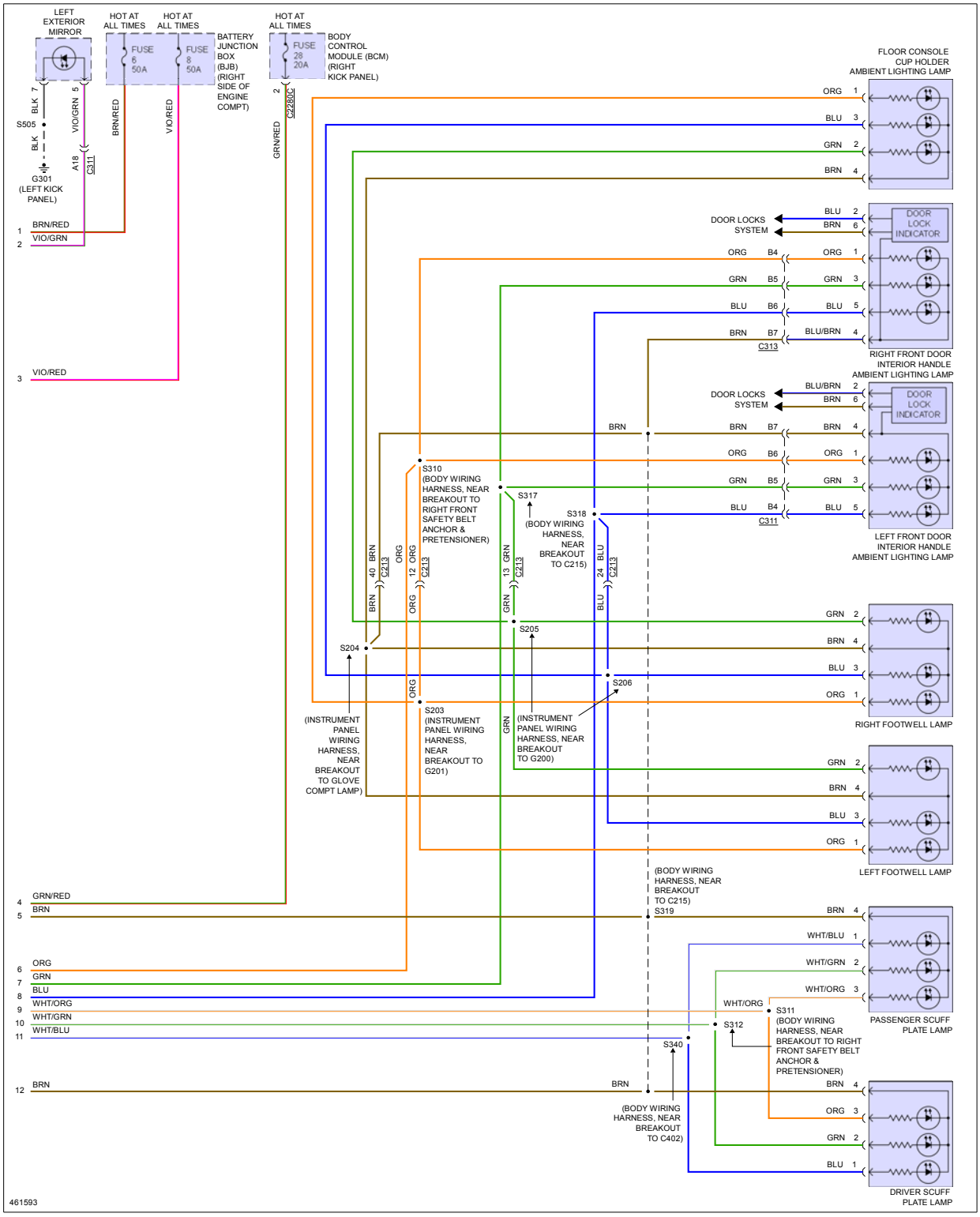
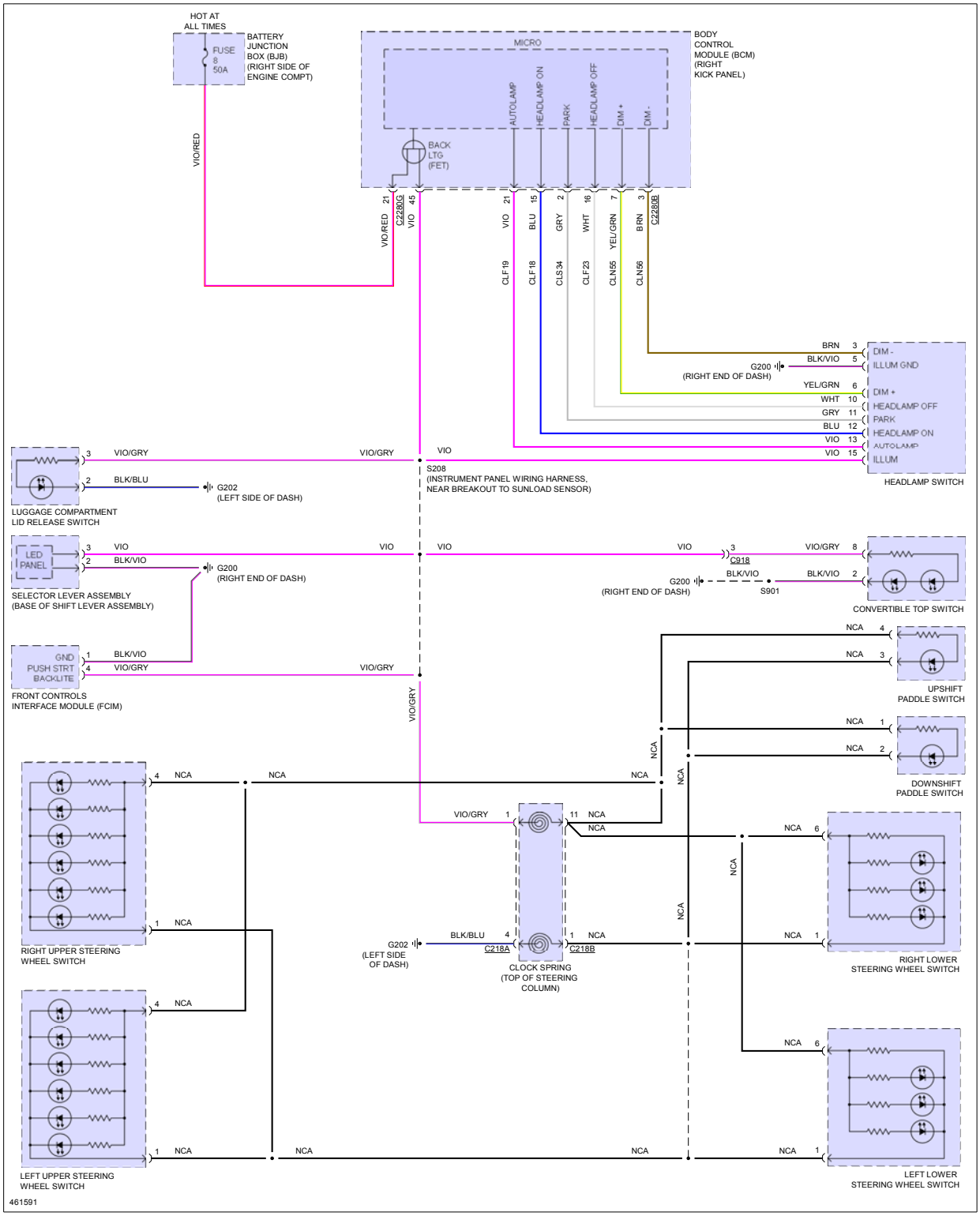


Fig 3: Instrument Illumination Circuit



MEMORY SYSTEMS

Fig 1: Driver"s Memory Seat Circuit (1 of 2)

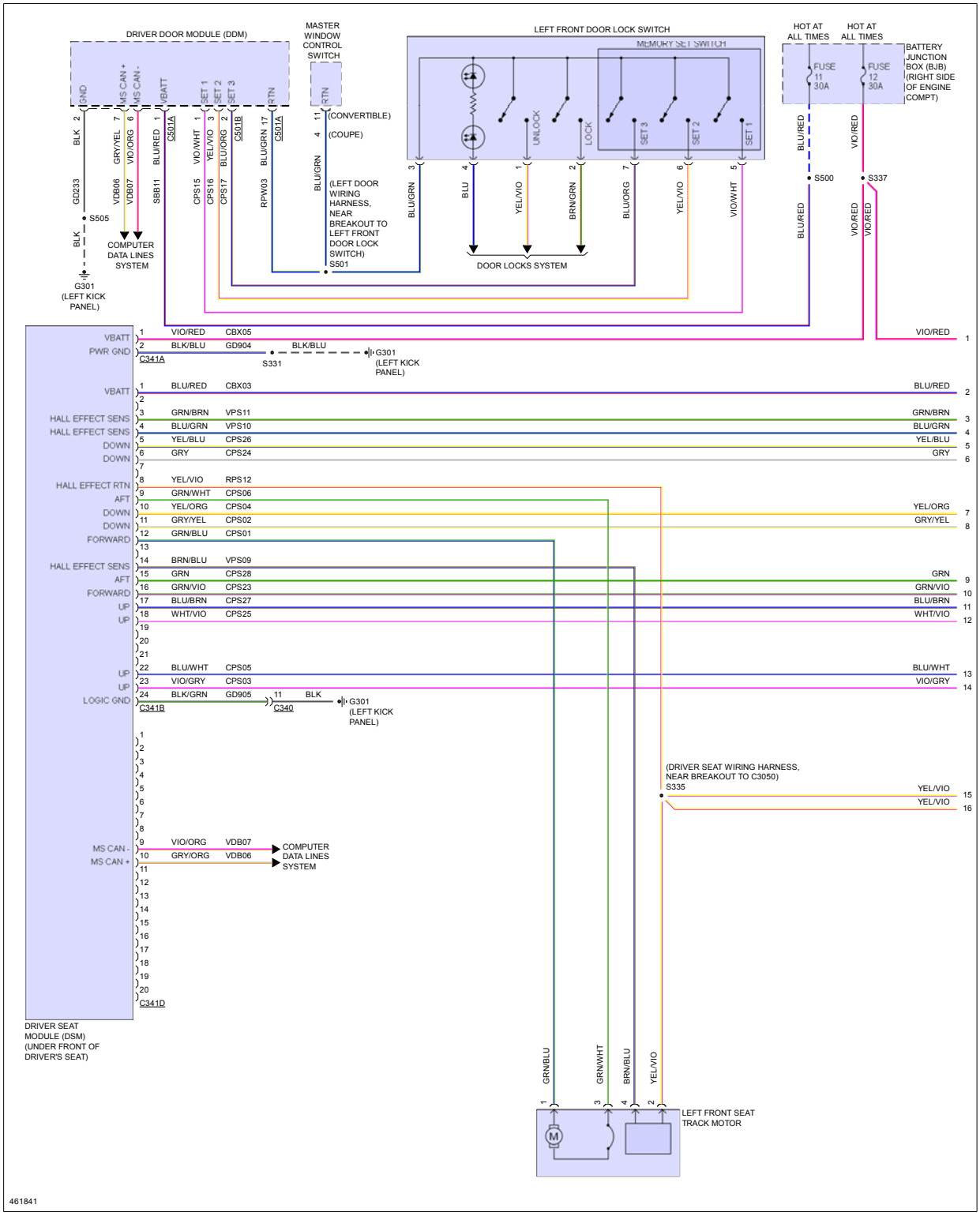


Fig 2: Driver"s Memory Seat Circuit (2 of 2)

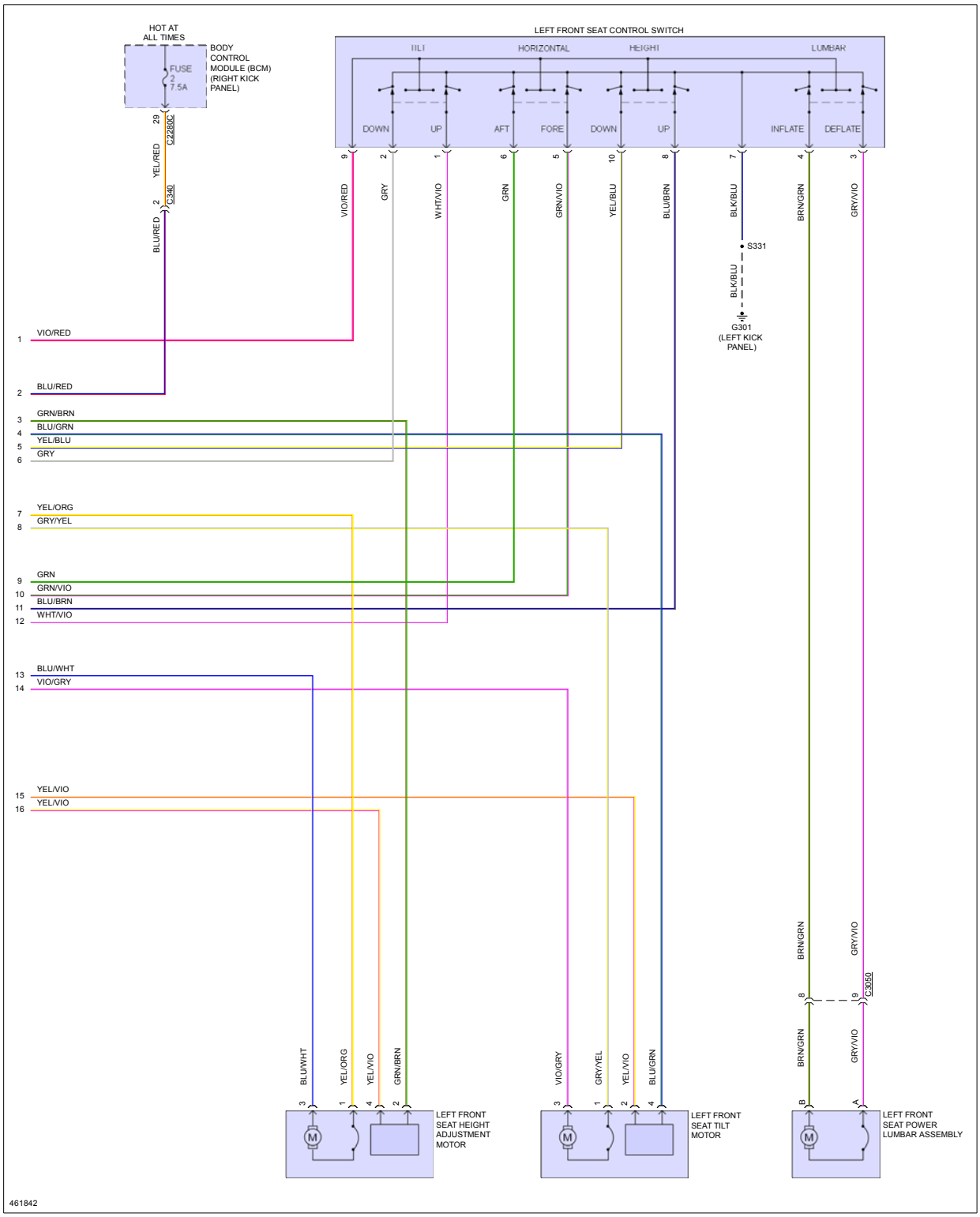


Fig 3: Memory Mirrors Circuit (1 of 2)

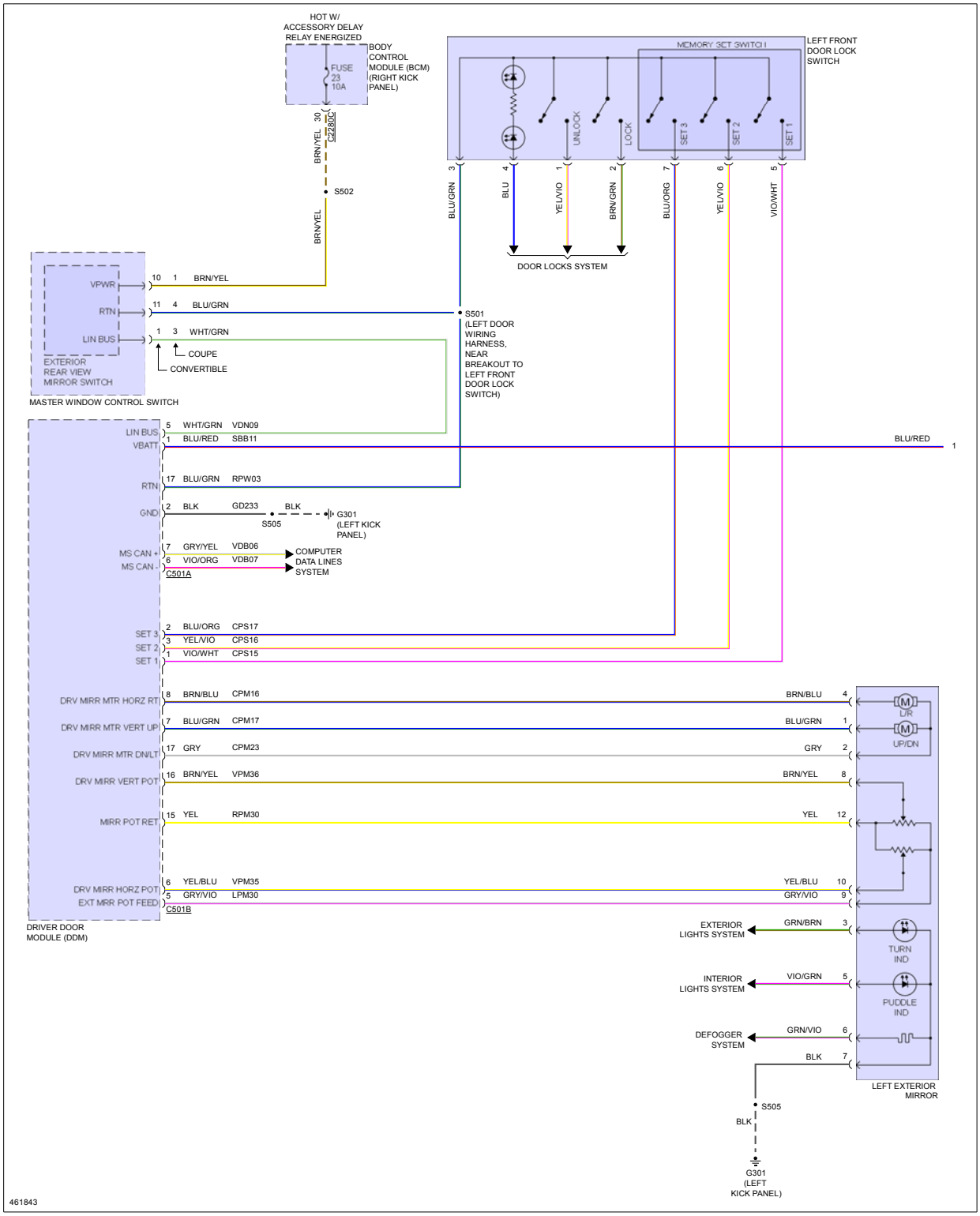
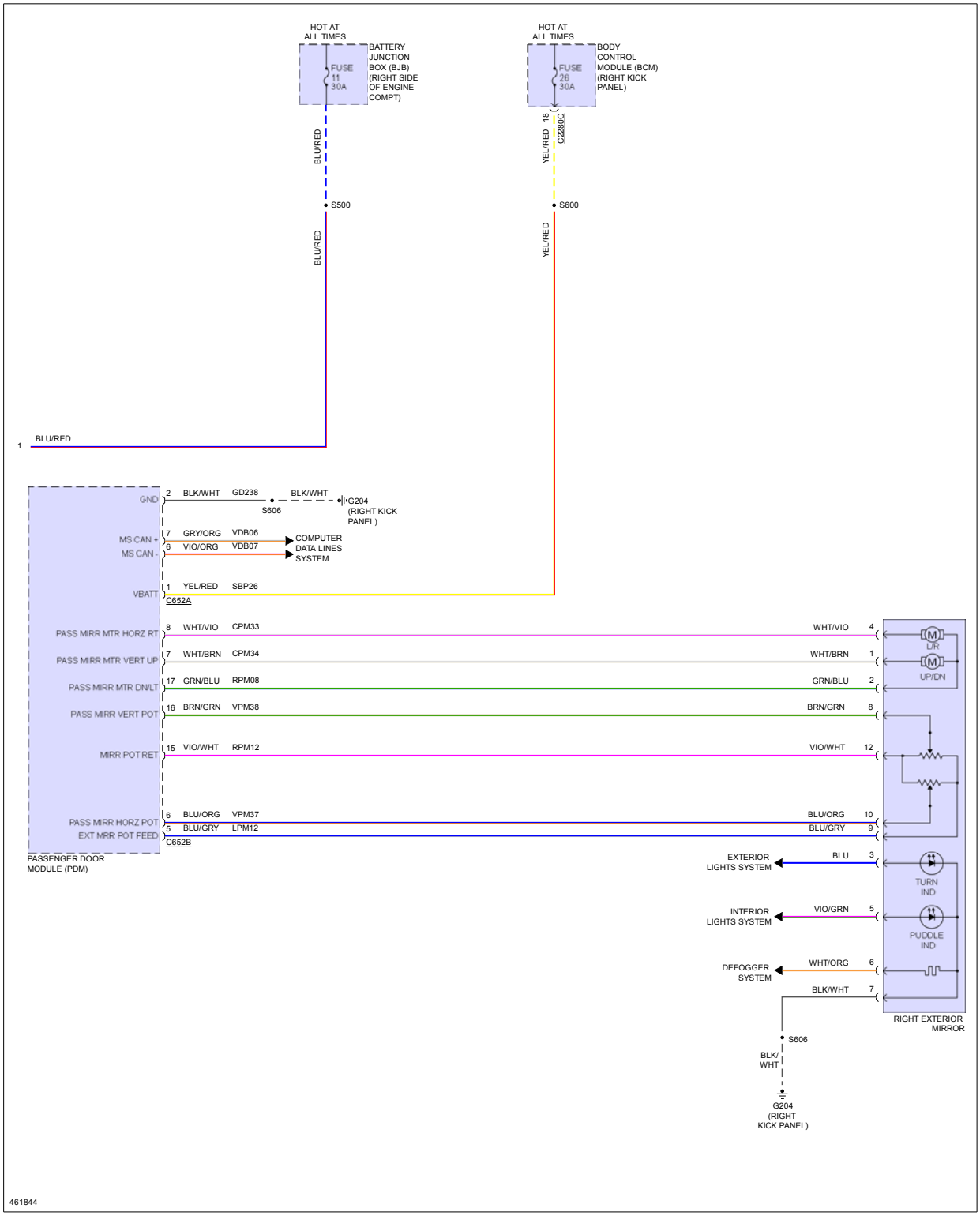


Fig 4: Memory Mirrors Circuit (2 of 2)



NAVIGATION

Fig 1: Blind Spot Information System Circuit

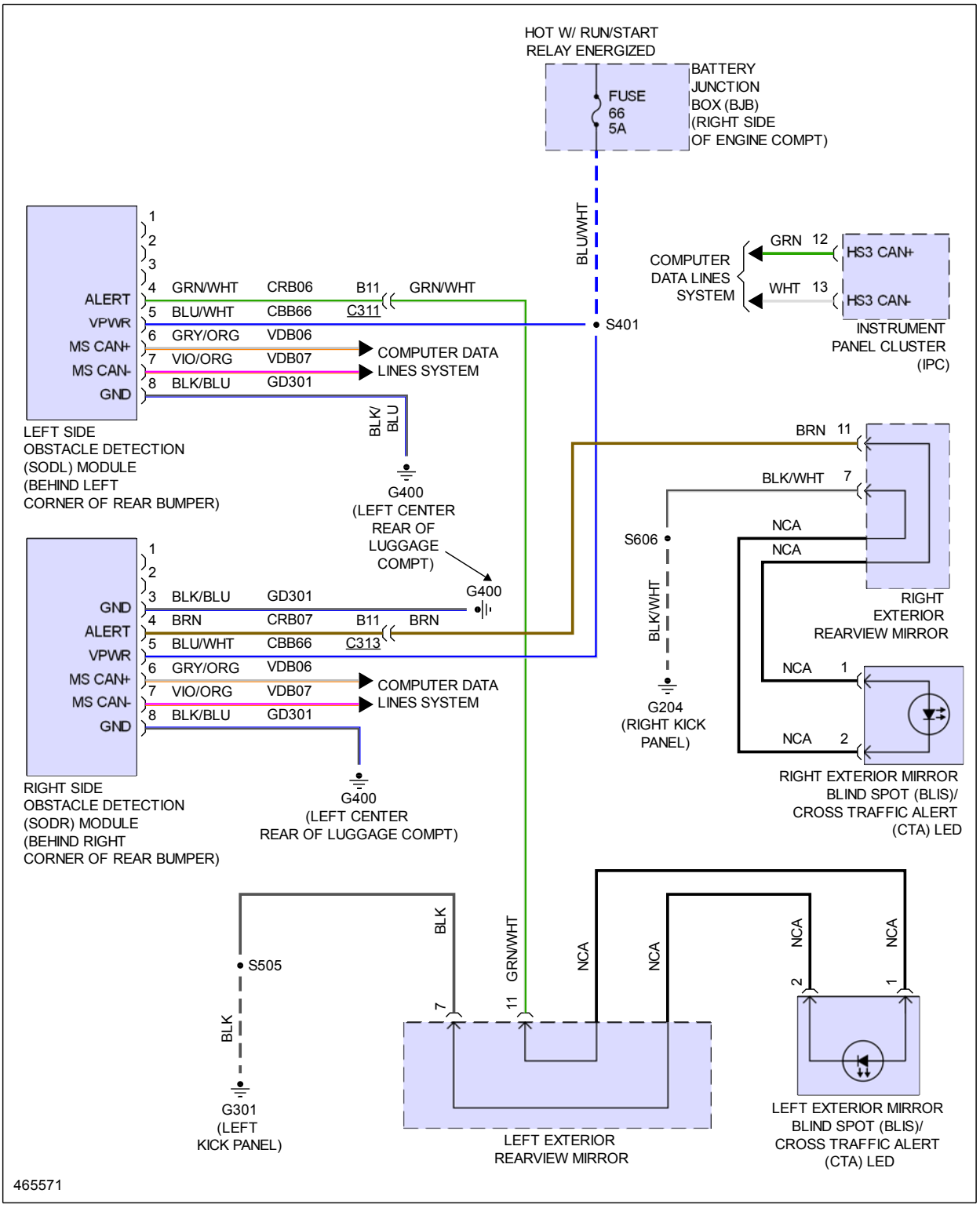


Fig 2: Navigation Circuit, W/ Touch Screen (1 of 4)

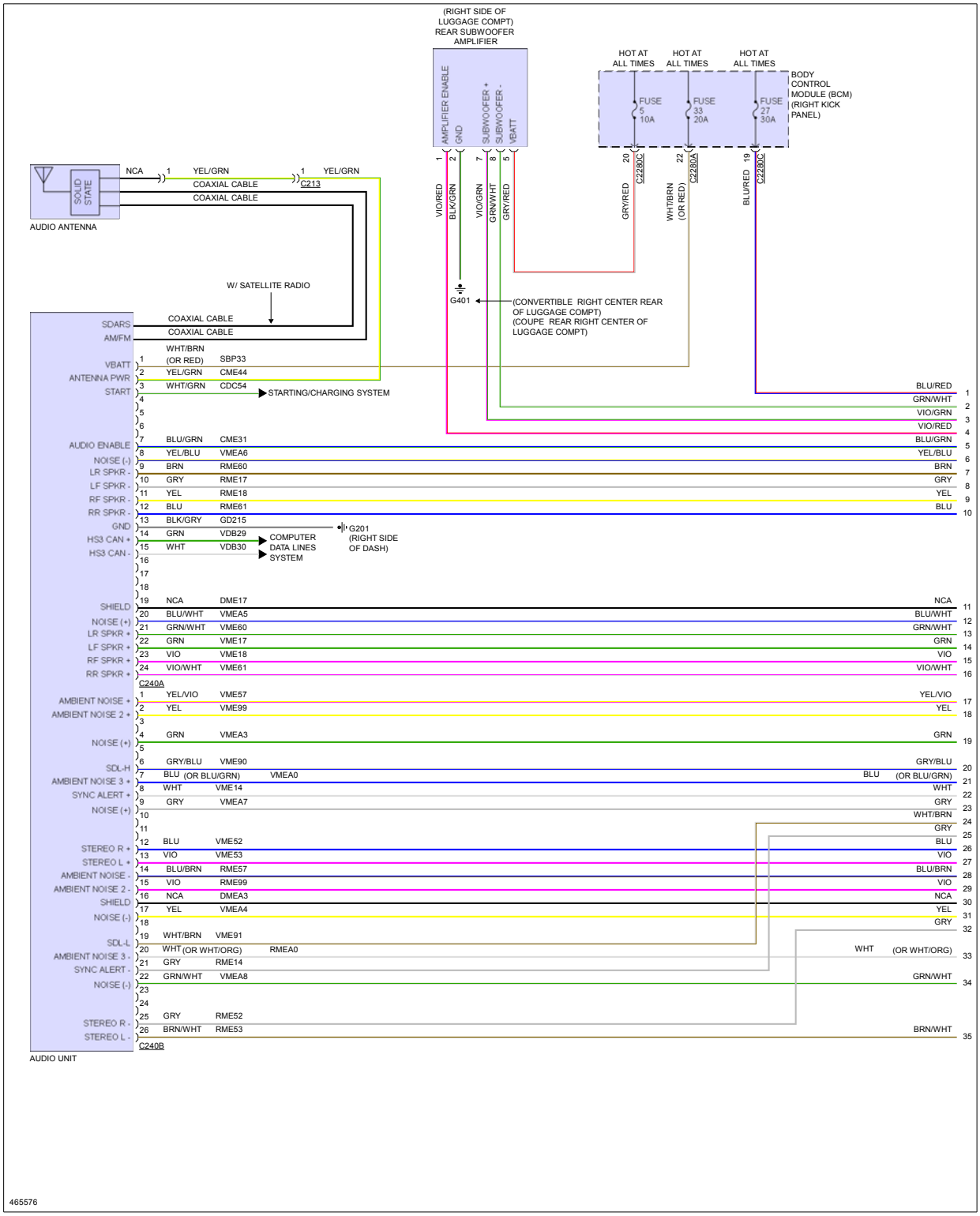


Fig 3: Navigation Circuit, W/ Touch Screen (2 of 4)

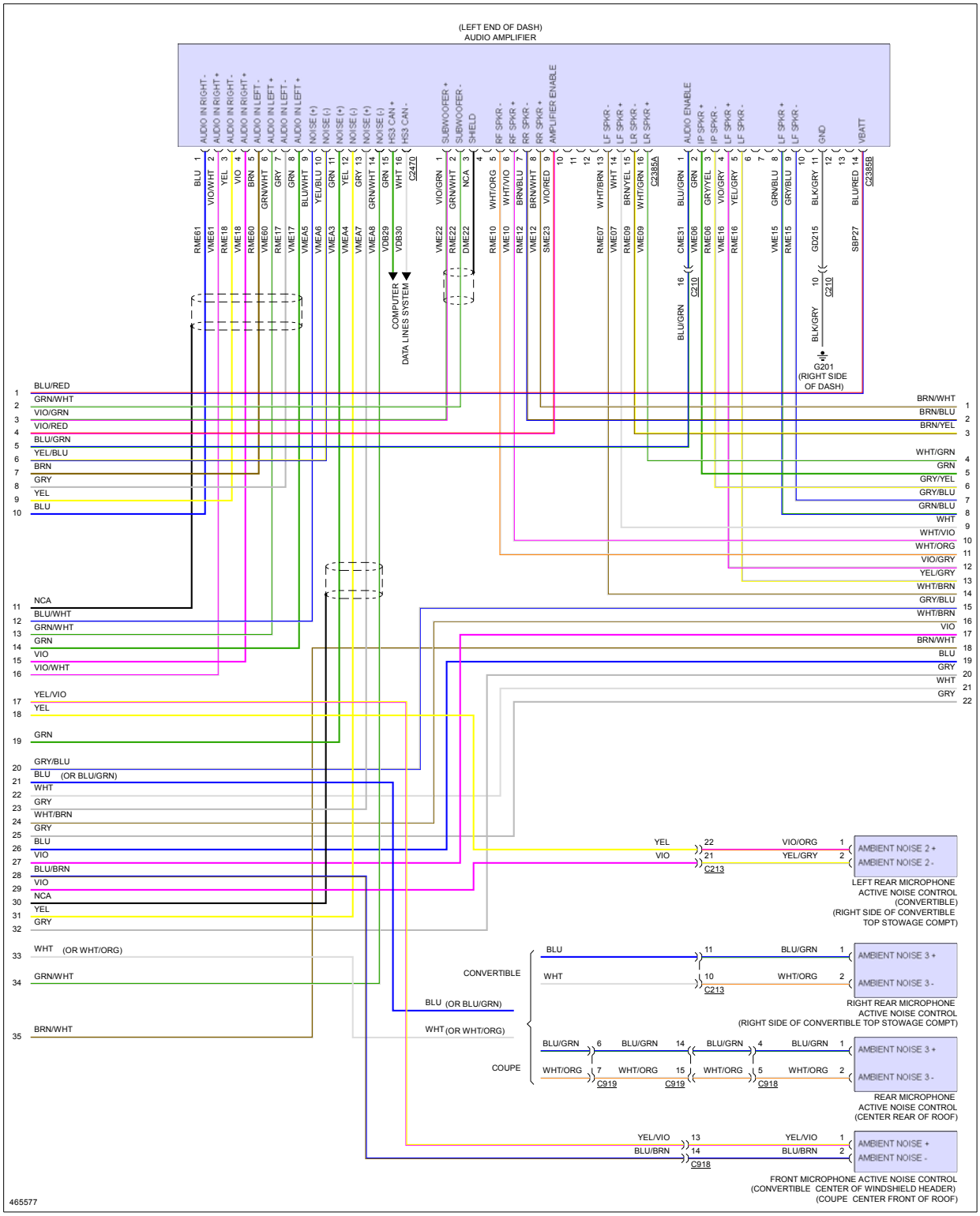


Fig 4: Navigation Circuit, W/ Touch Screen (3 of 4)

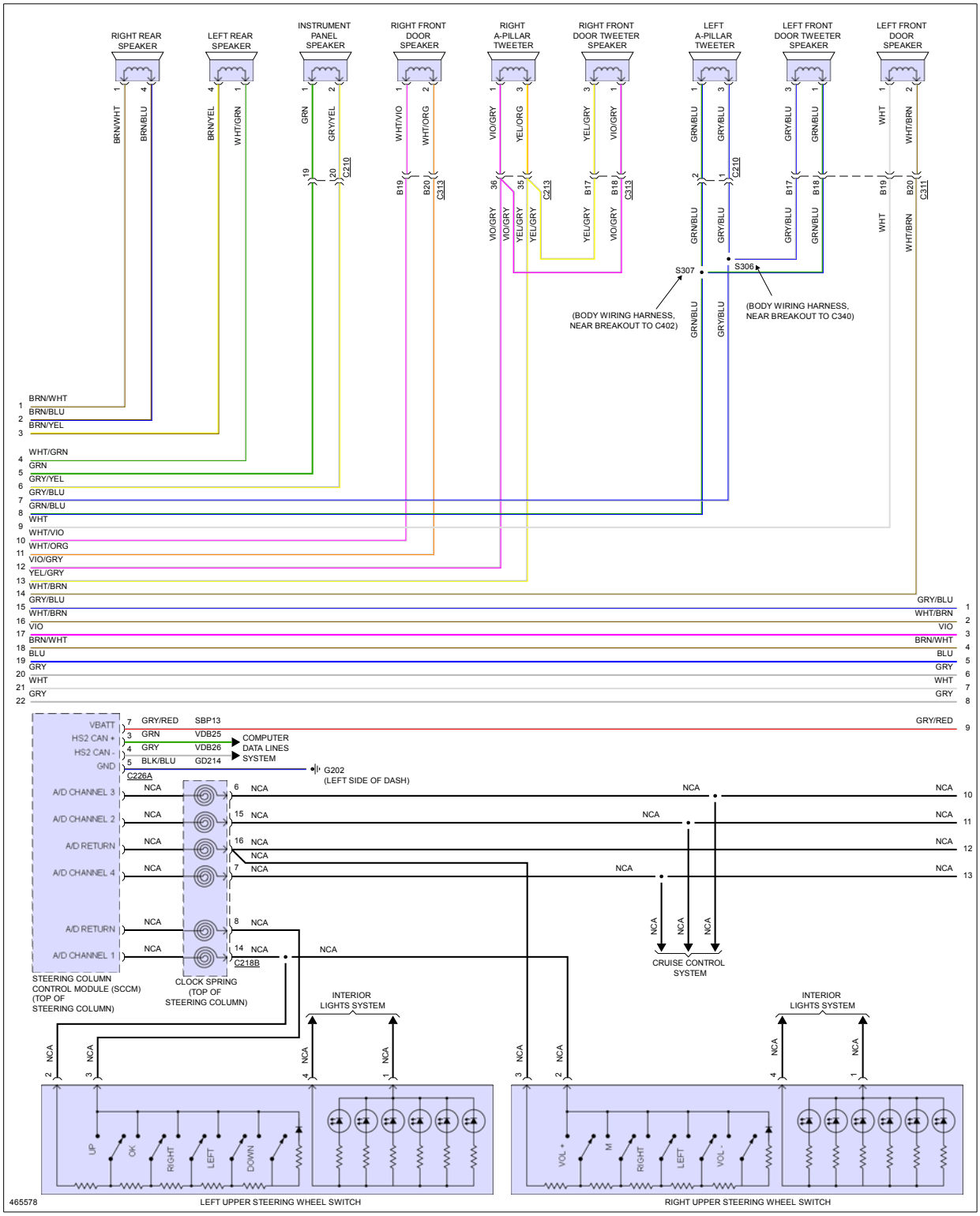


Fig 5: Navigation Circuit, W/ Touch Screen (4 of 4)

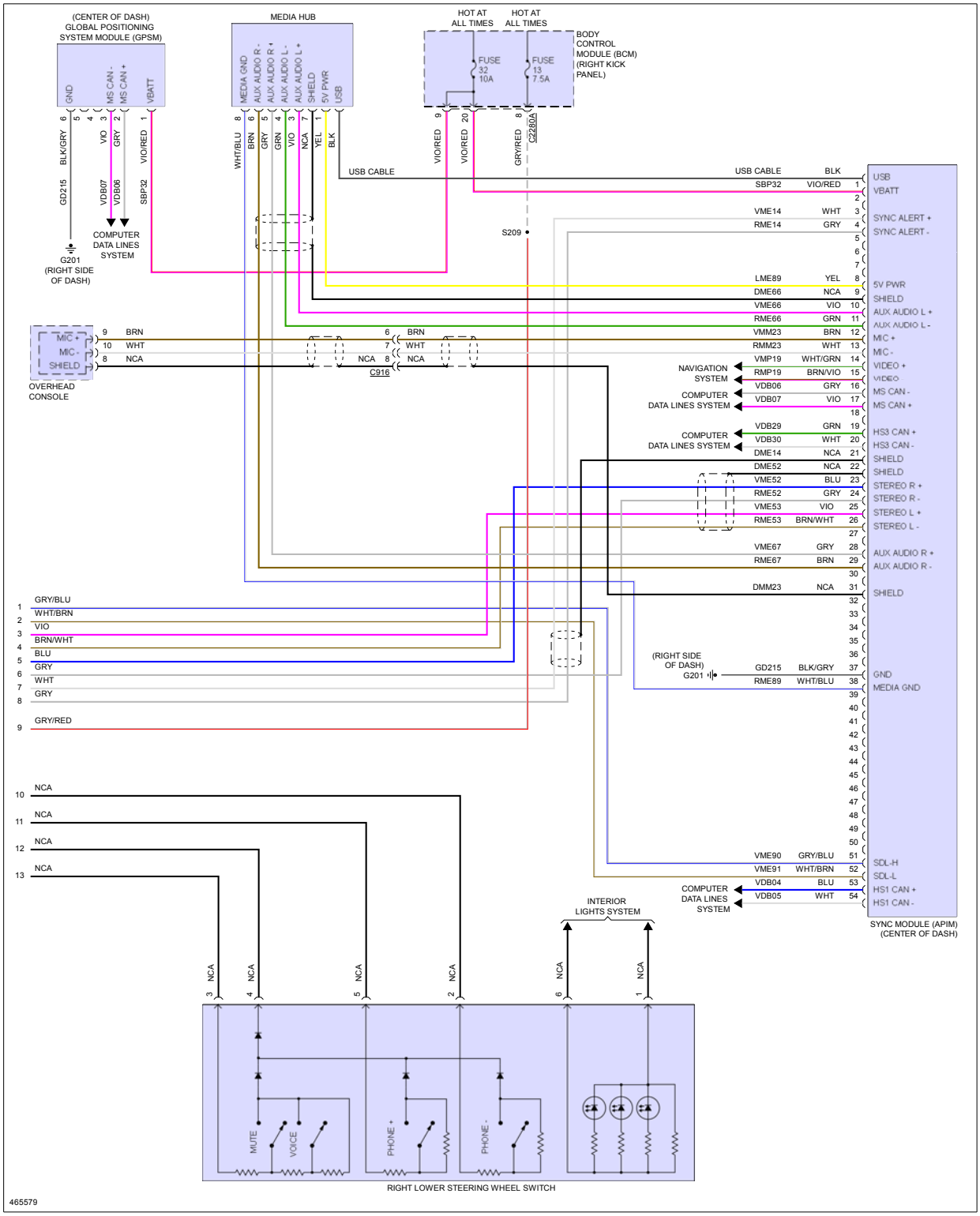


Fig 6: Navigation Circuit, W/O Touch Screen (1 of 4)

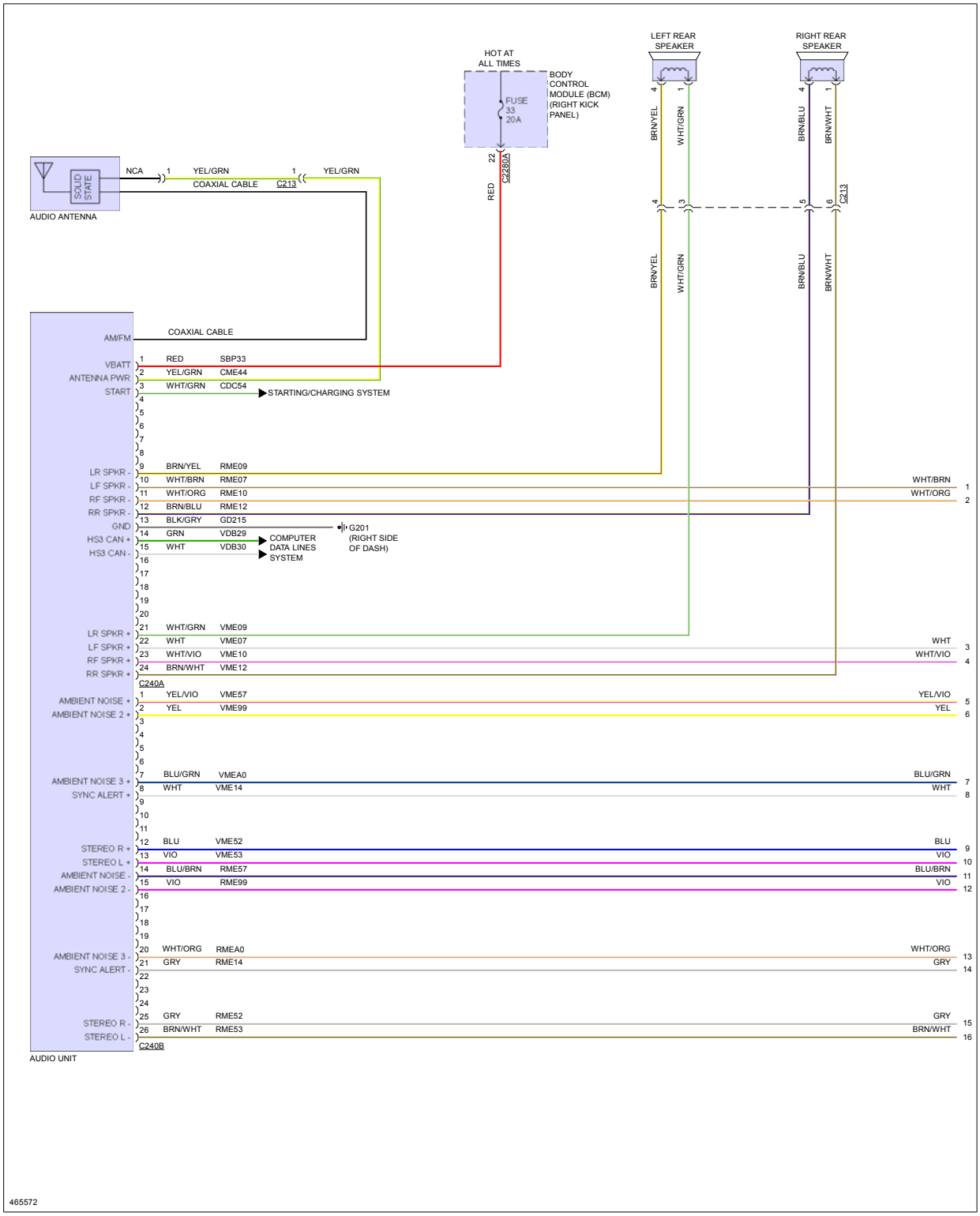


Fig 7: Navigation Circuit, W/O Touch Screen (2 of 4)

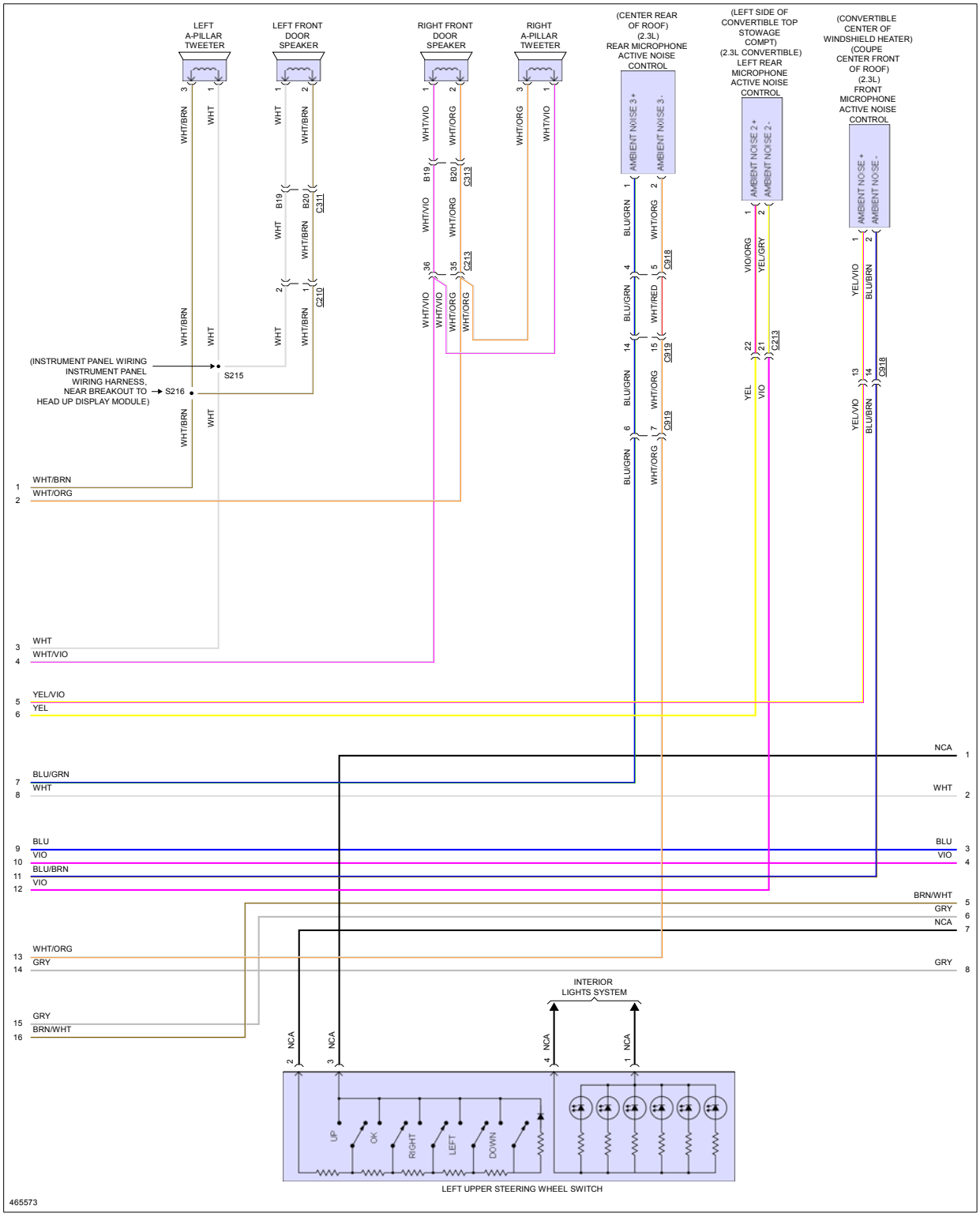


Fig 8: Navigation Circuit, W/O Touch Screen (3 of 4)

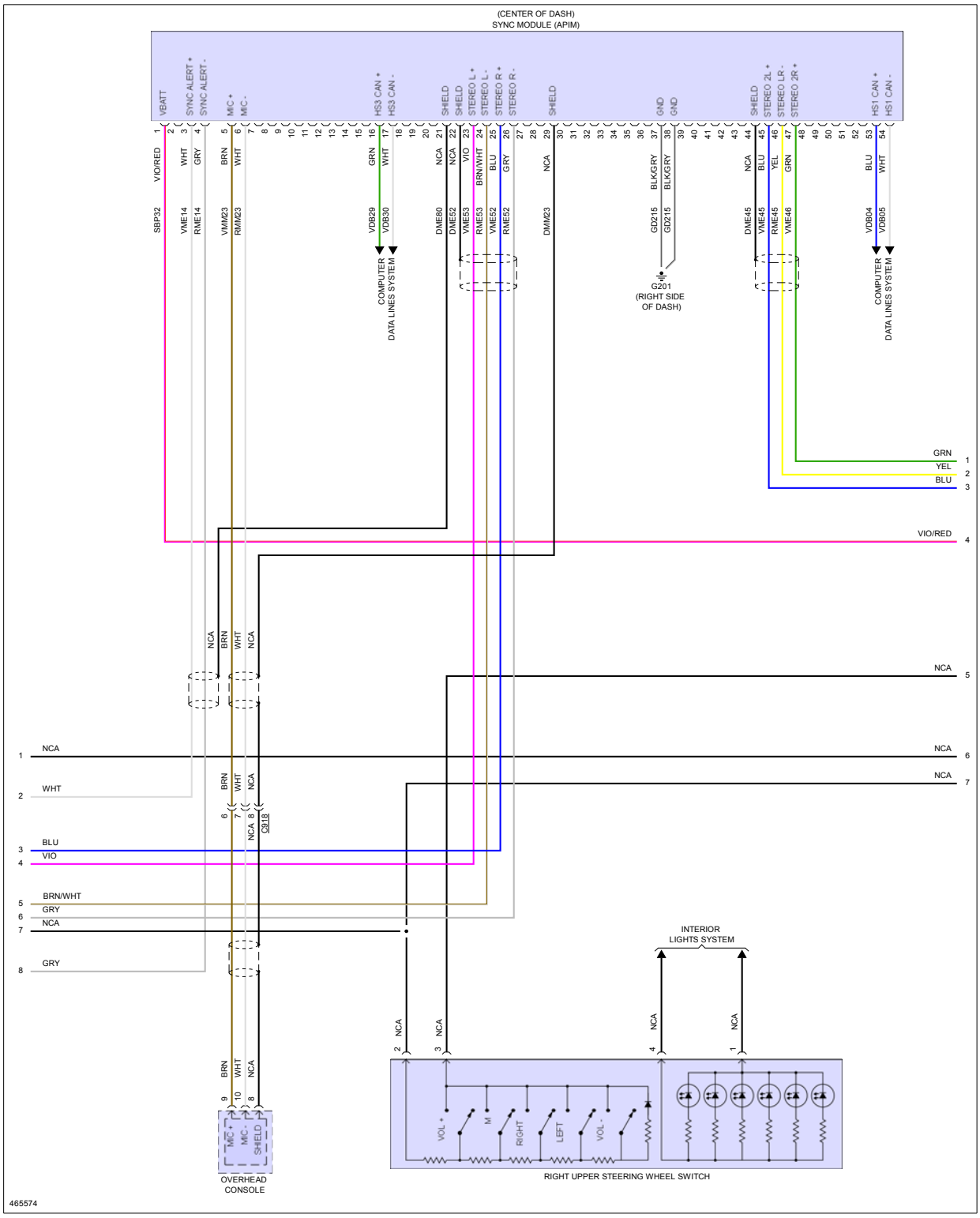


Fig 9: Navigation Circuit, W/O Touch Screen (4 of 4)

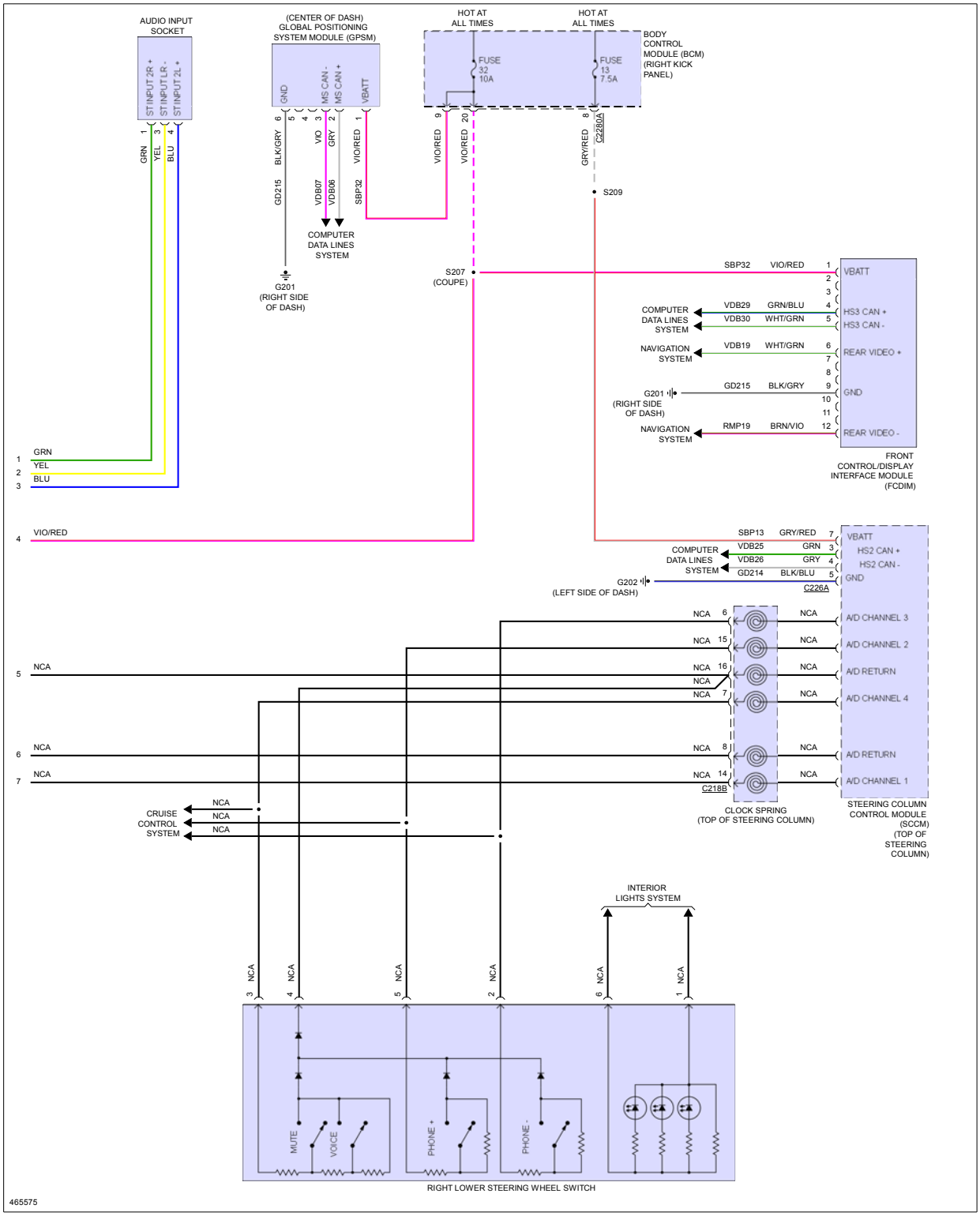


Fig 10: Parking Assistant Circuit

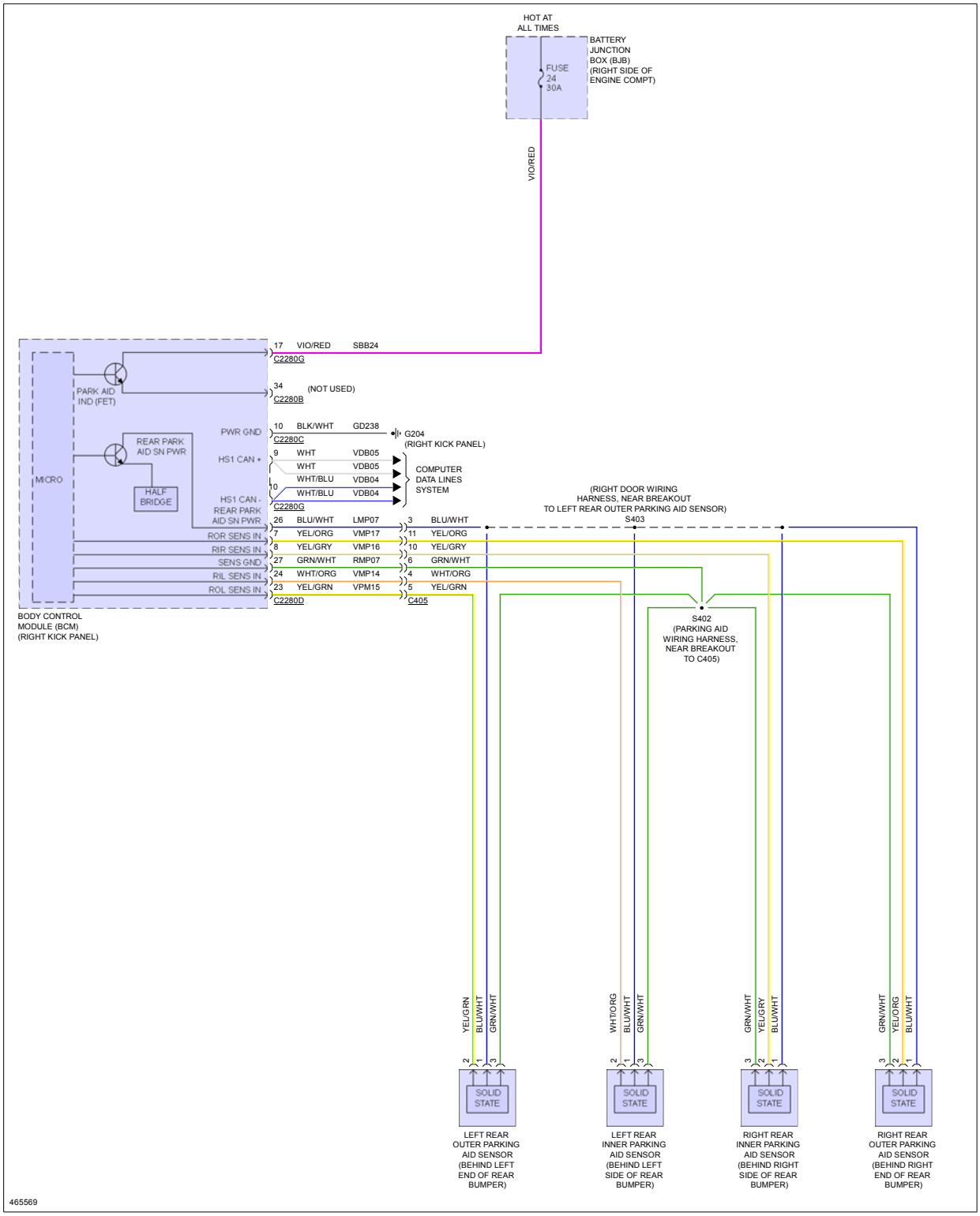
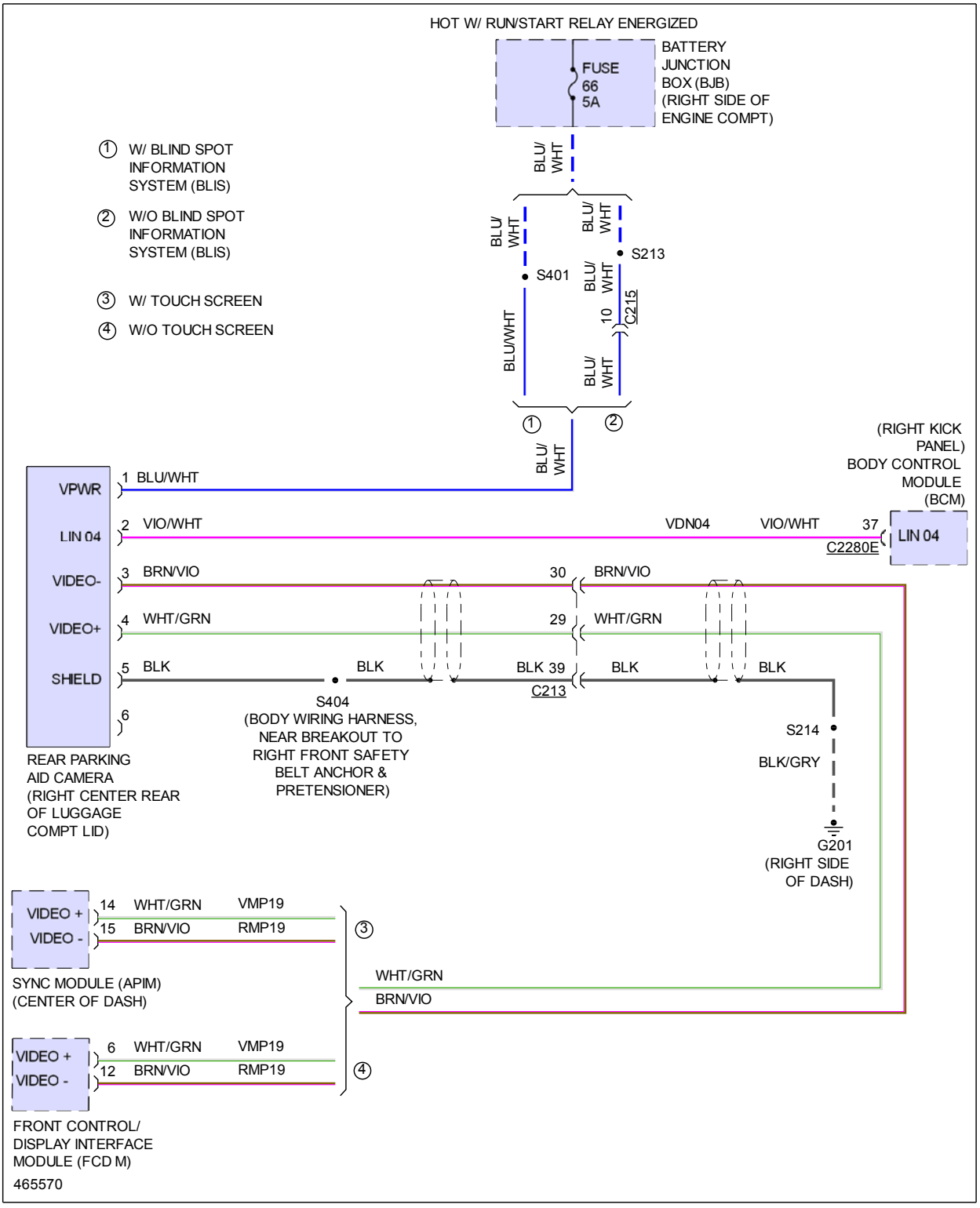


Fig 11: Rear Camera Circuit



POWER DISTRIBUTION

Fig 1: Power Distribution Circuit (1 of 8)

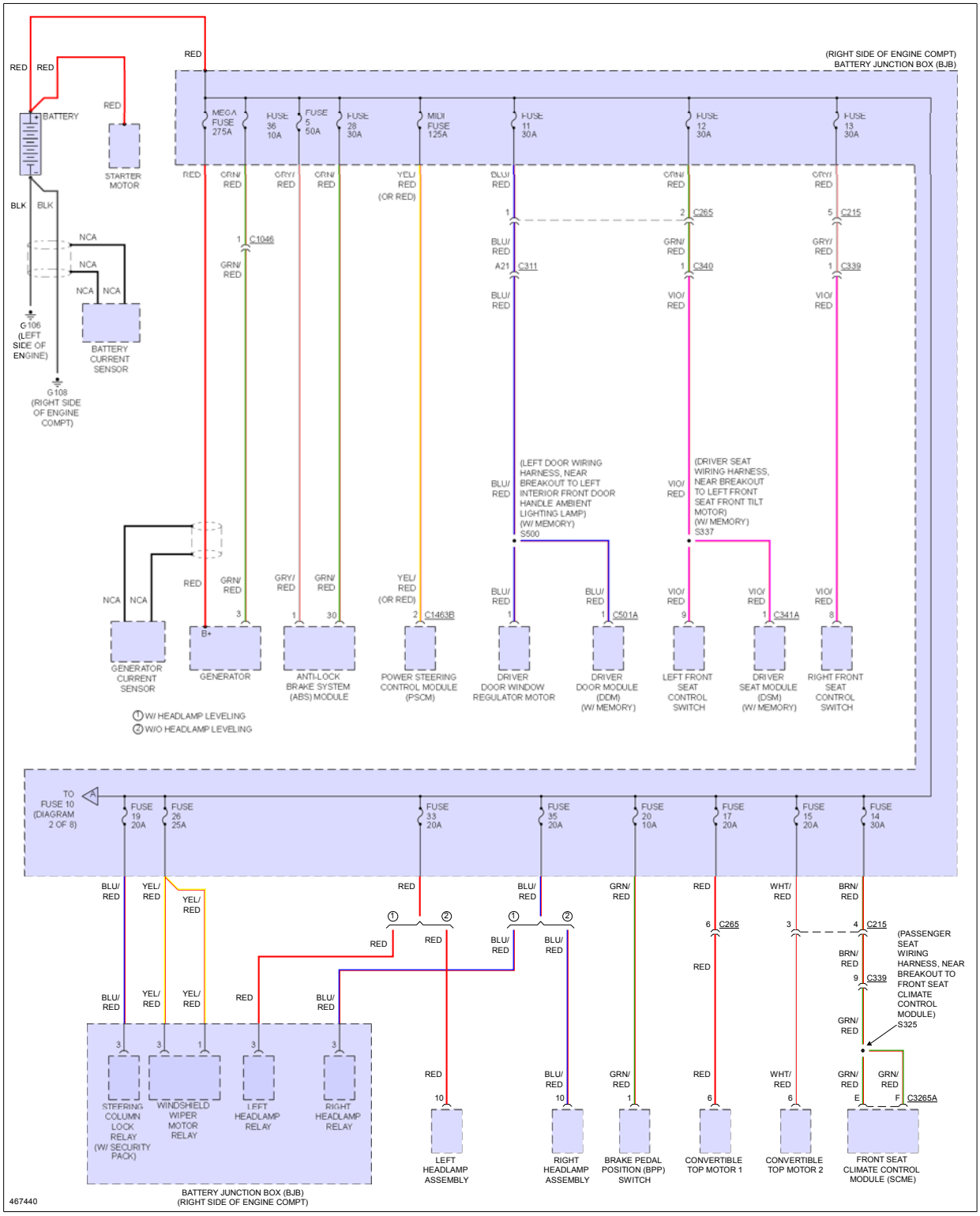


Fig 2: Power Distribution Circuit (2 of 8)

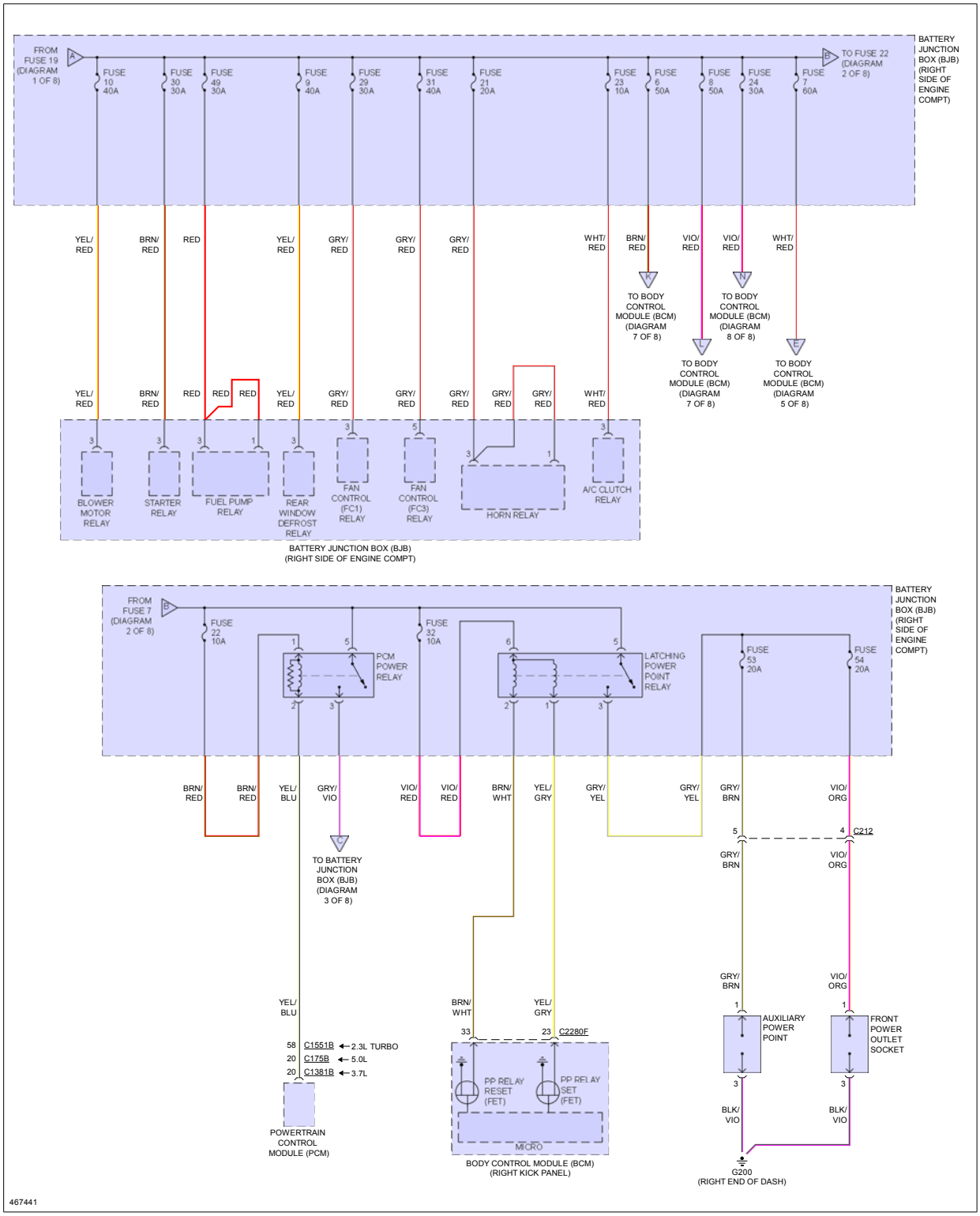


Fig 3: Power Distribution Circuit (3 of 8)

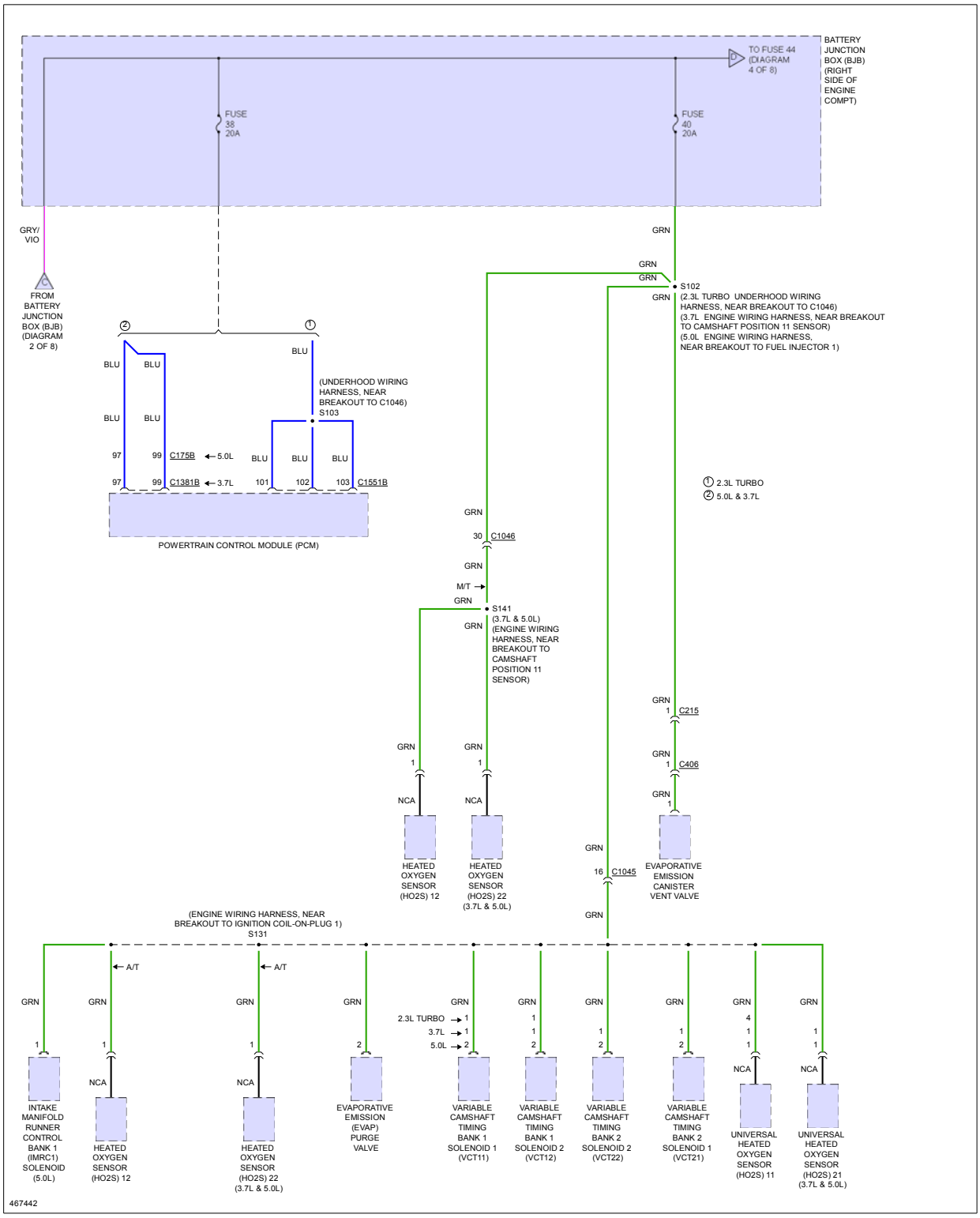


Fig 4: Power Distribution Circuit (4 of 8)

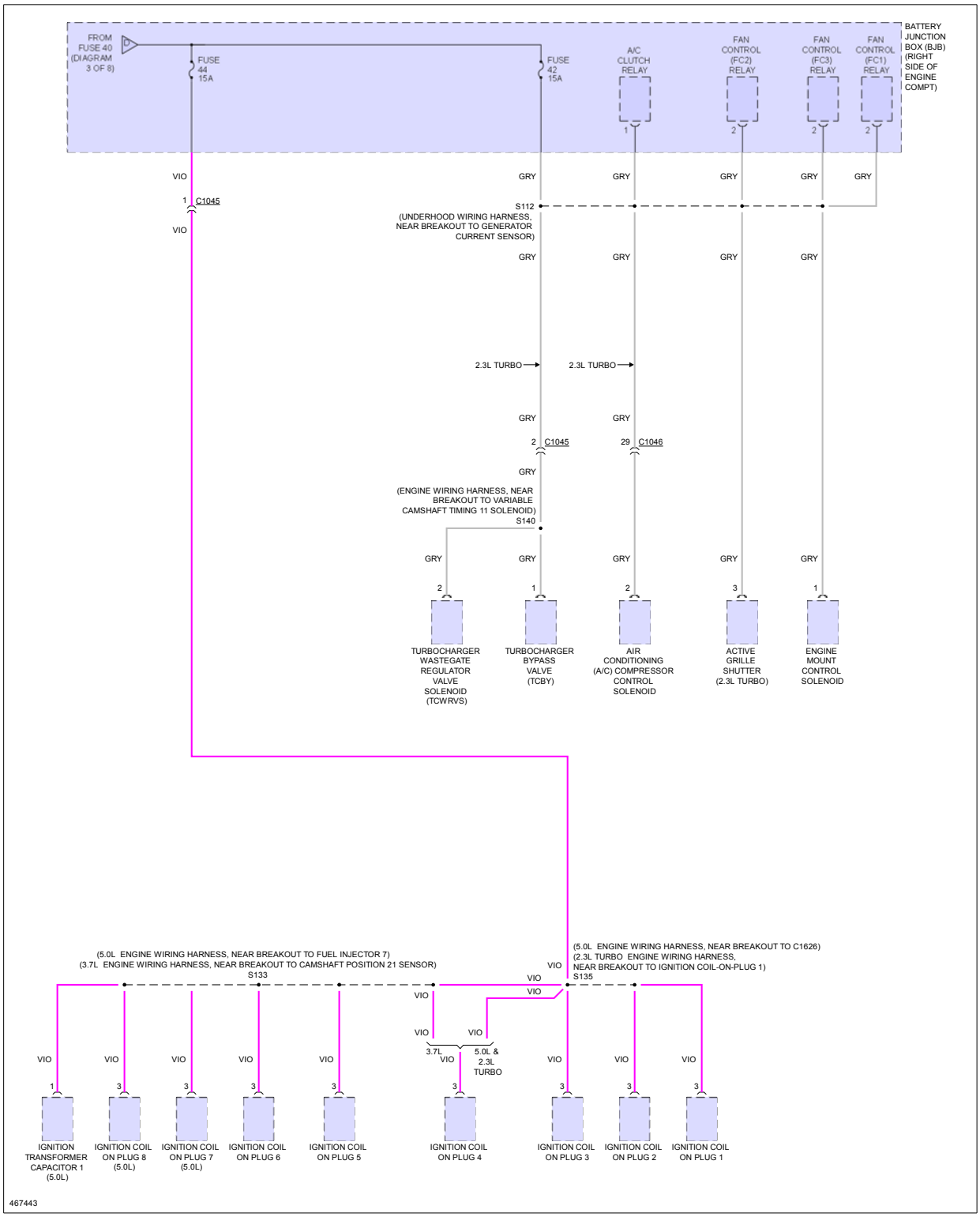


Fig 5: Power Distribution Circuit (5 of 8)

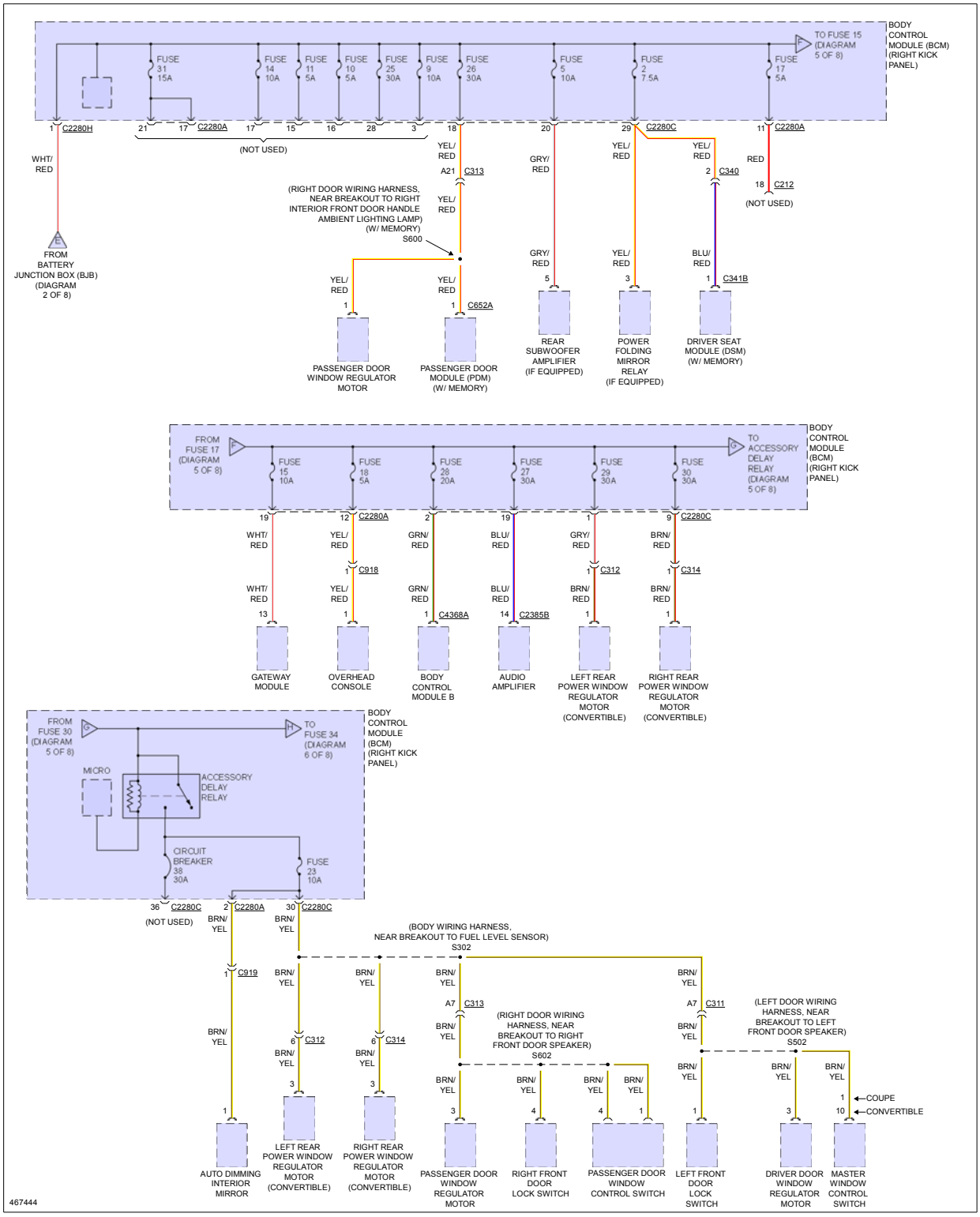


Fig 6: Power Distribution Circuit (6 of 8)

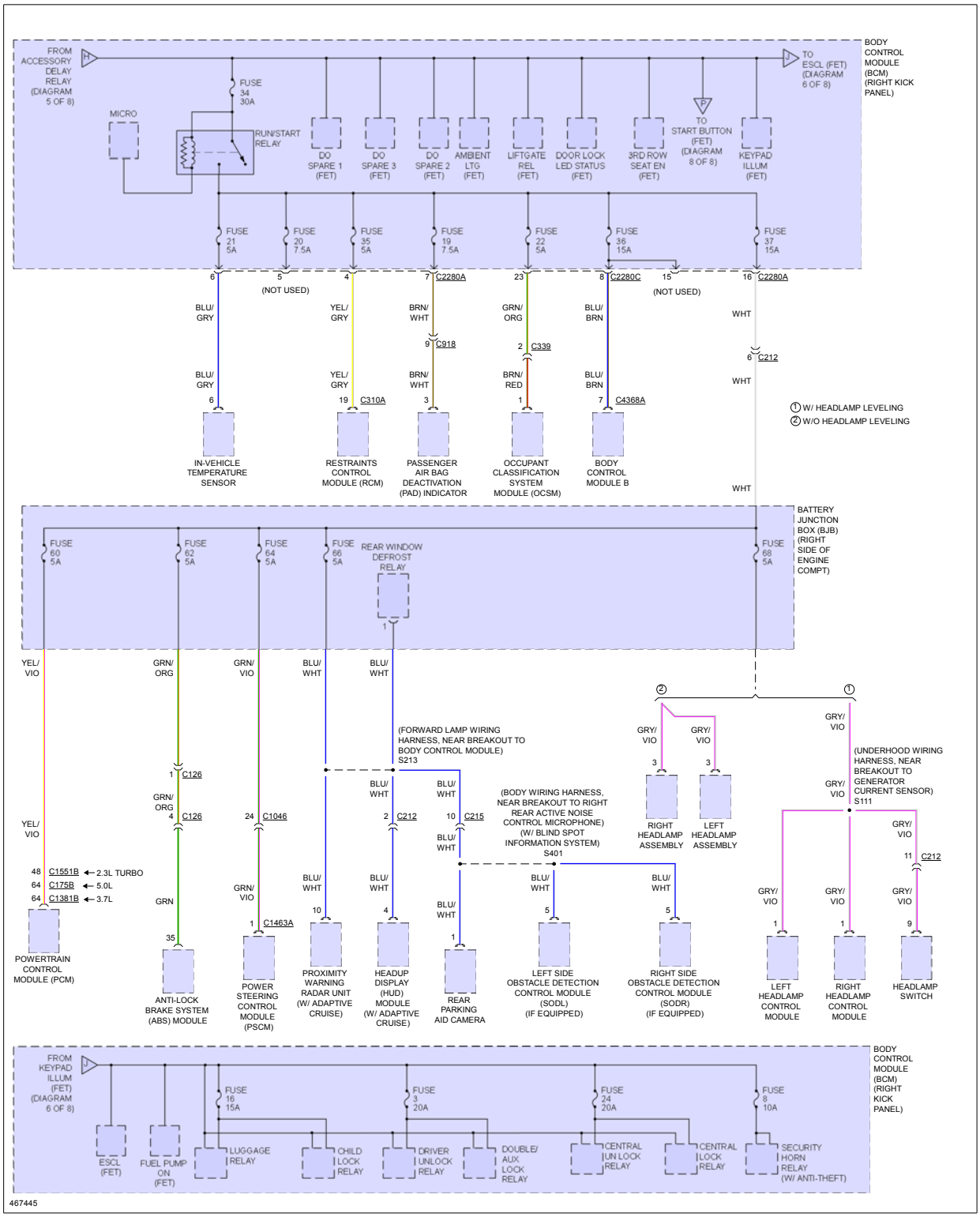


Fig 7: Power Distribution Circuit (7 of 8)

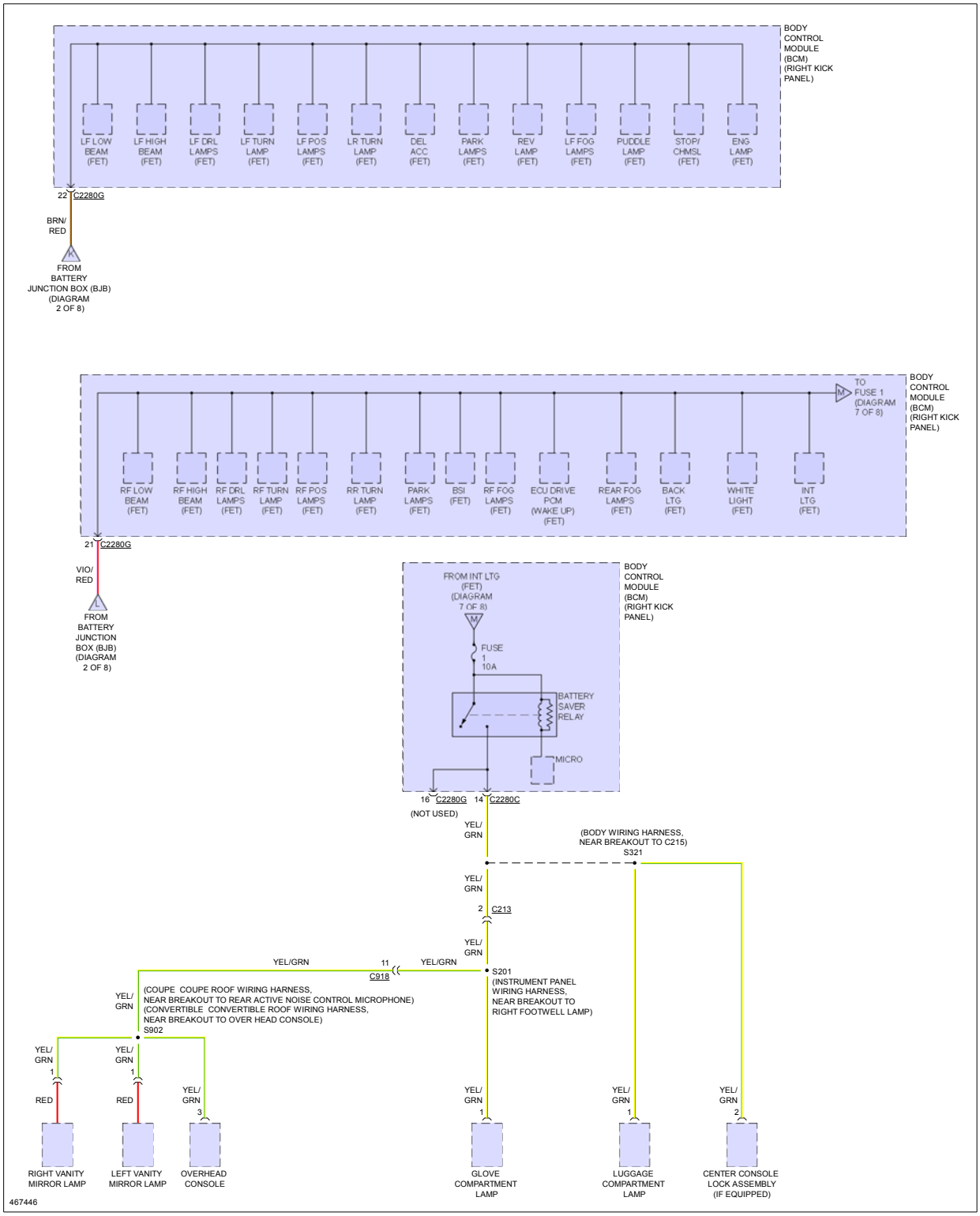
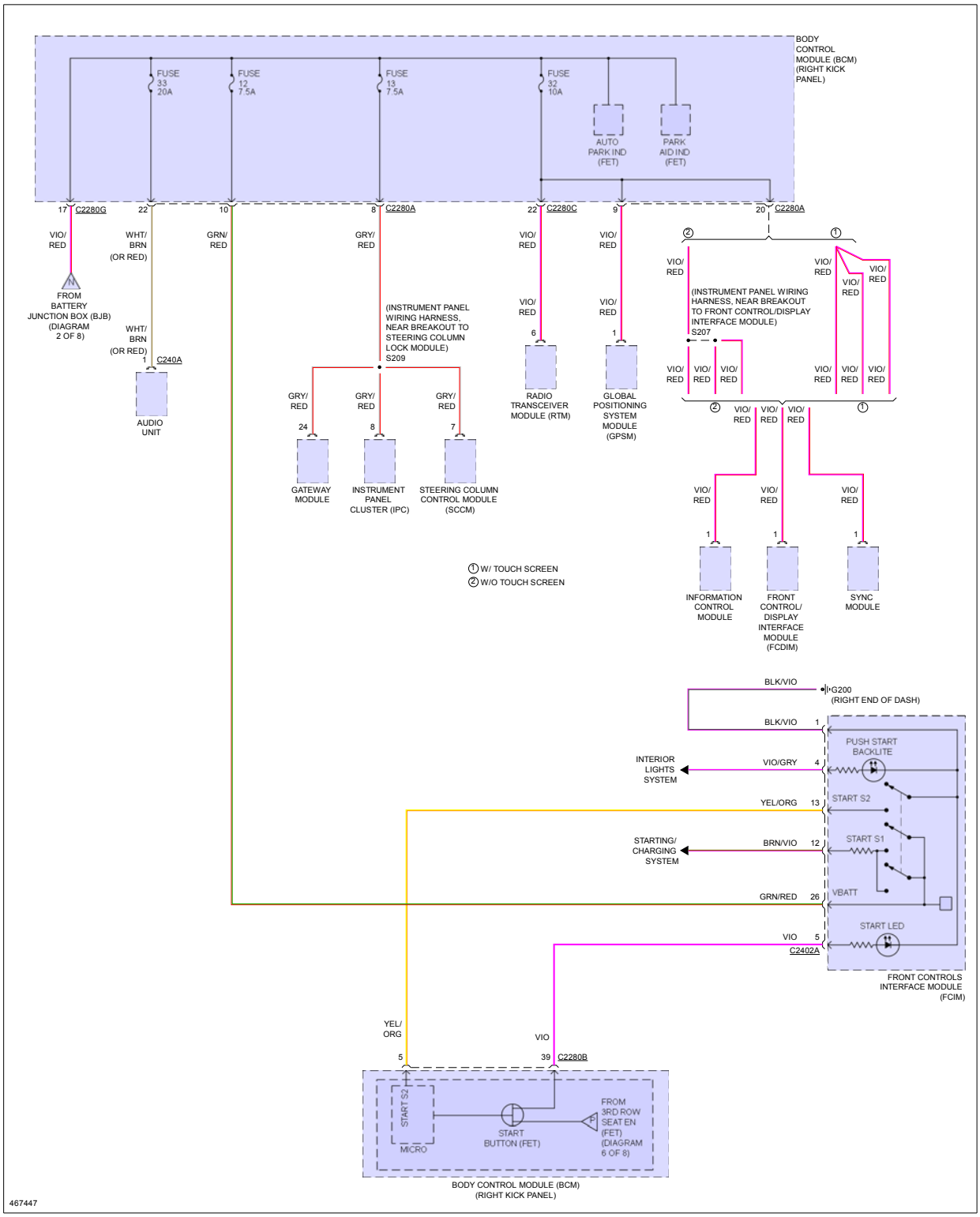


Fig 8: Power Distribution Circuit (8 of 8)



POWER DOOR LOCKS

Fig 1: Power Door Locks Circuit, W/ Memory (1 of 4)

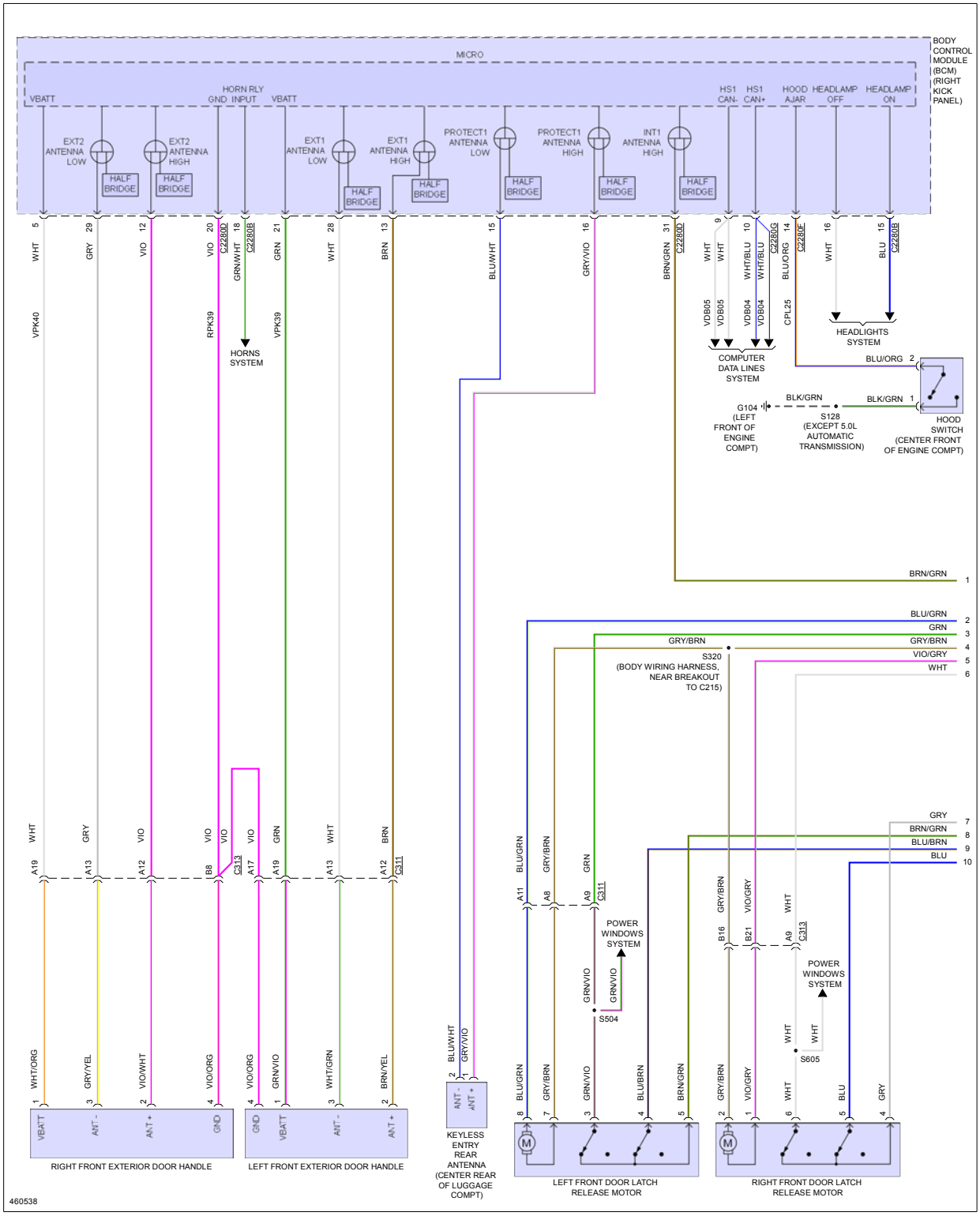


Fig 2: Power Door Locks Circuit, W/ Memory (2 of 4)

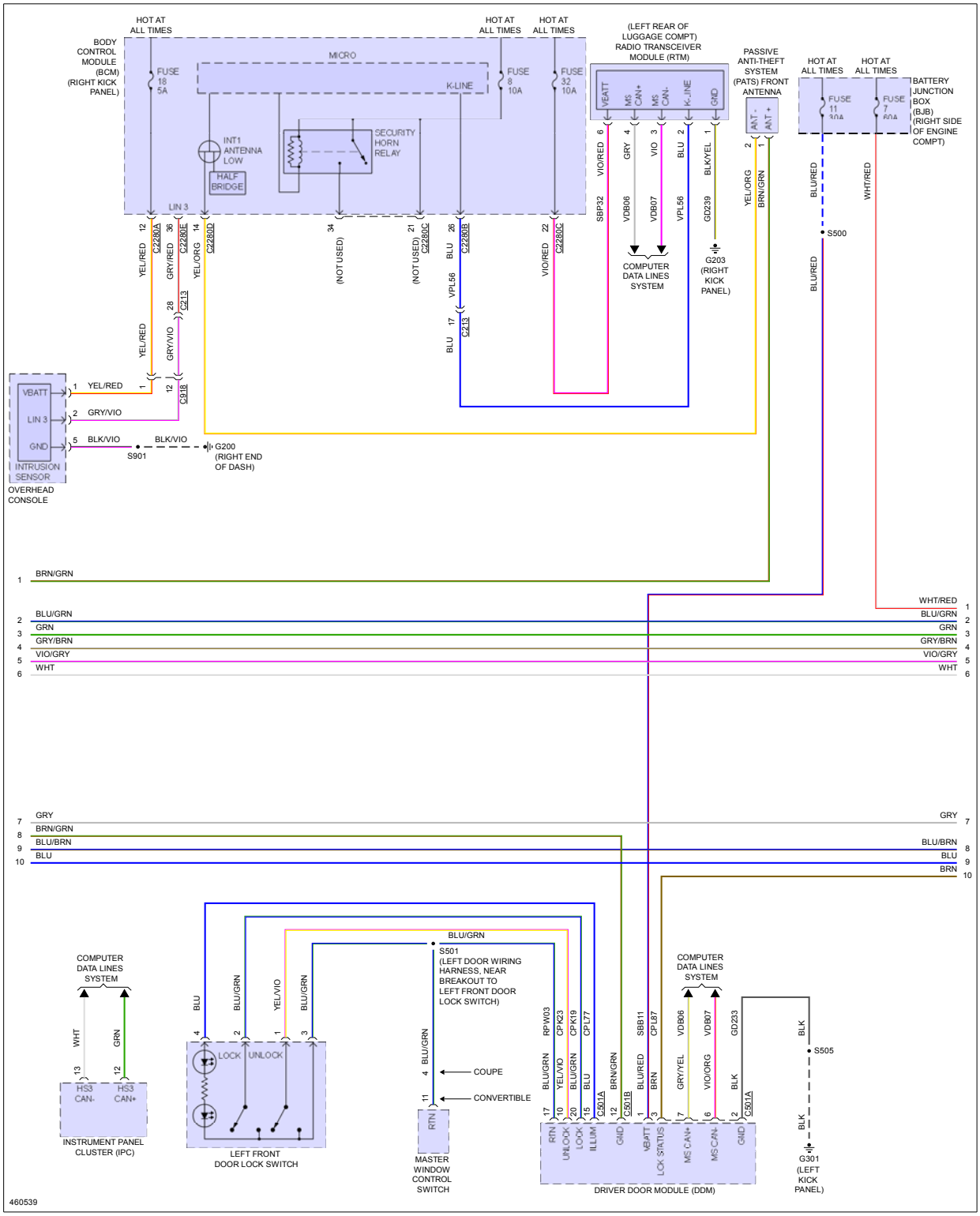


Fig 3: Power Door Locks Circuit, W/ Memory (3 of 4)

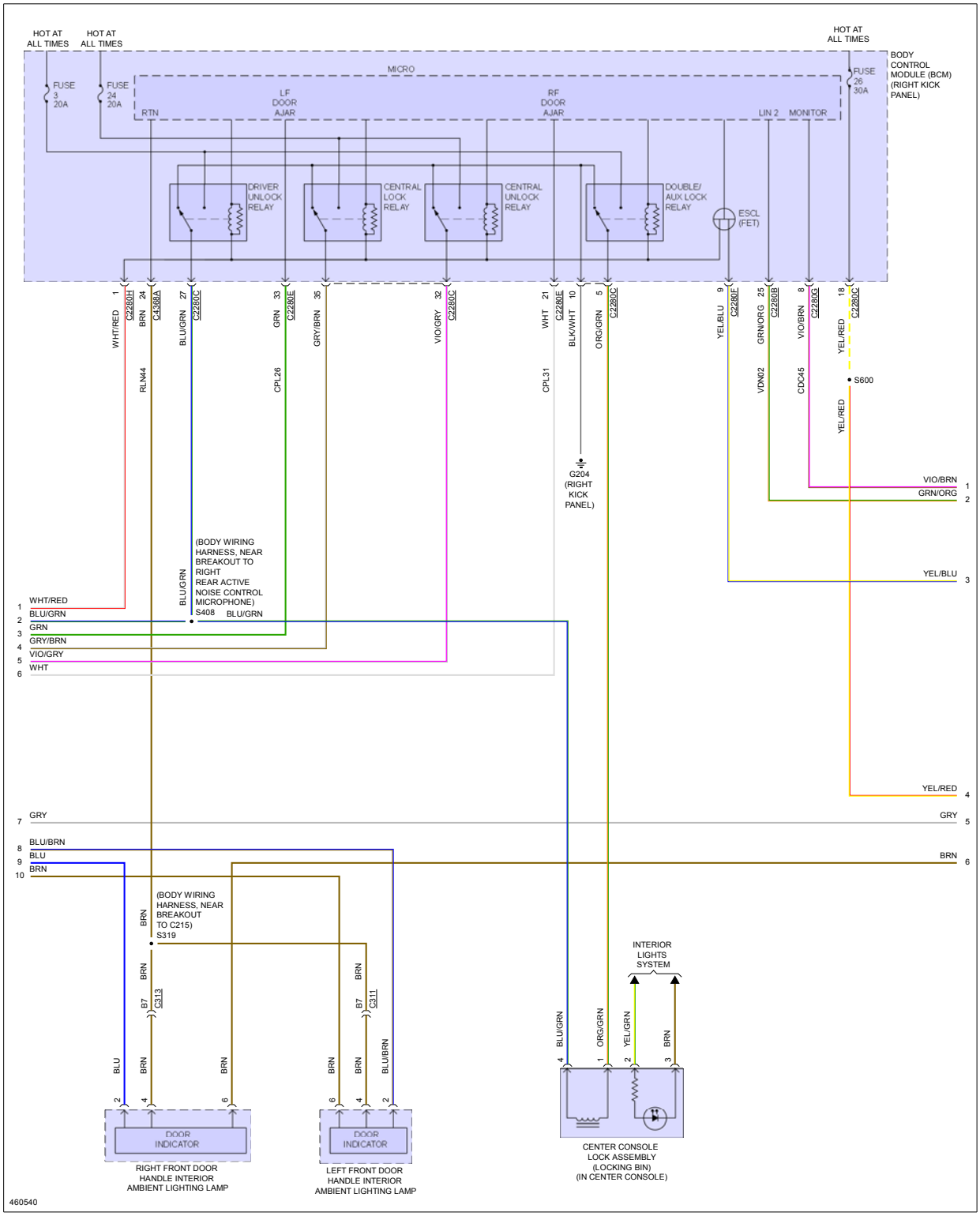


Fig 4: Power Door Locks Circuit, W/ Memory (4 of 4)

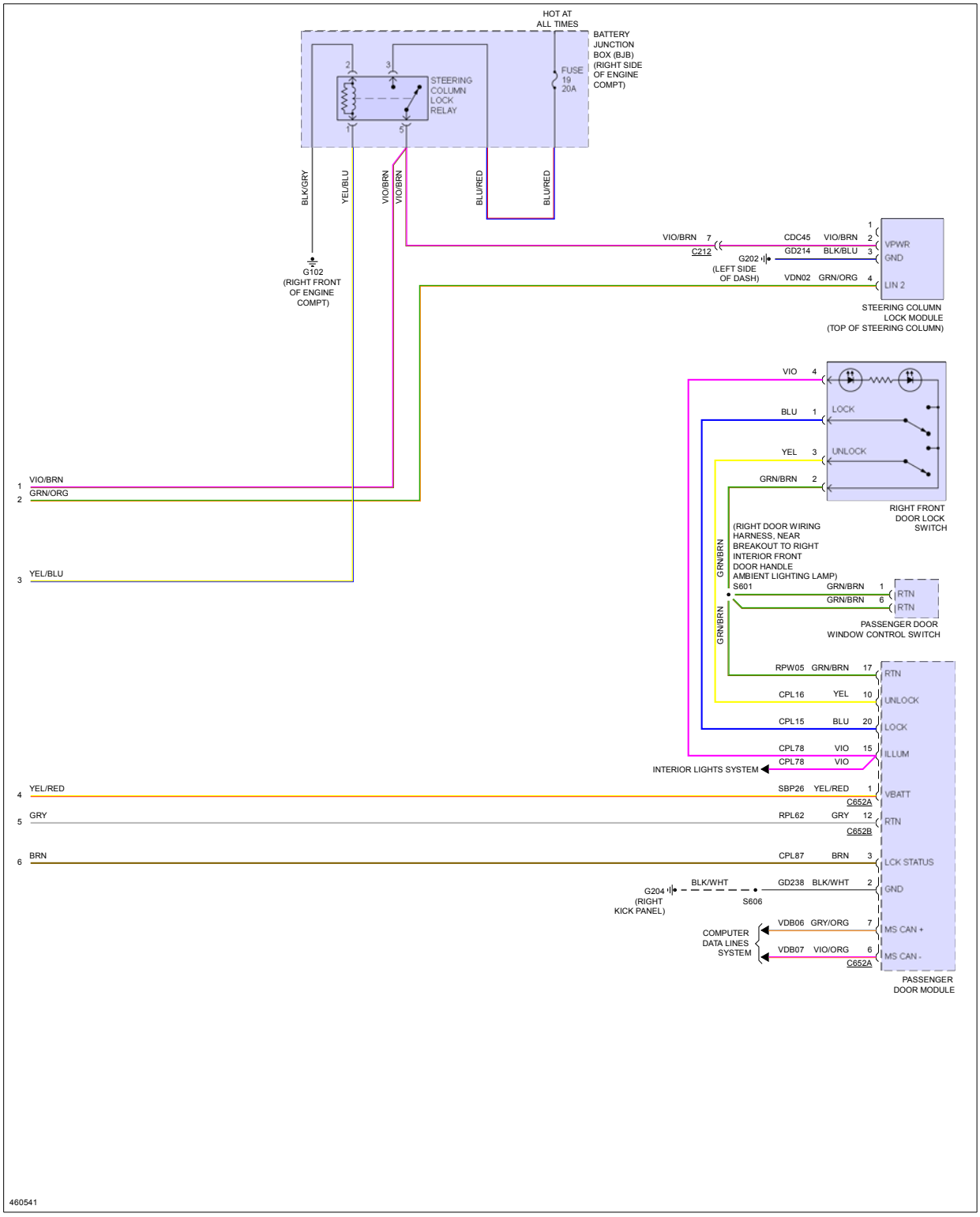


Fig 5: Power Door Locks Circuit, W/O Memory (1 of 4)

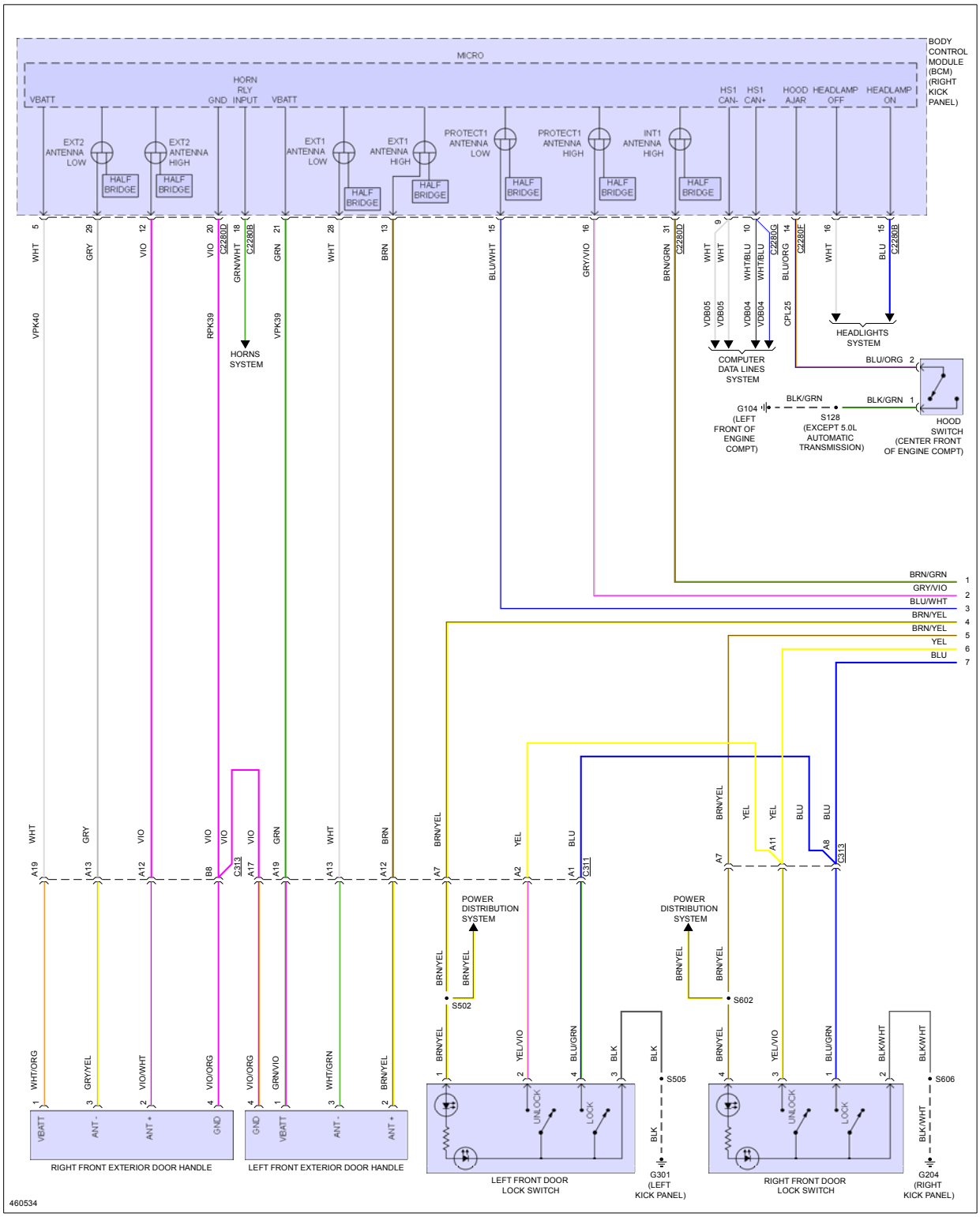


Fig 6: Power Door Locks Circuit, W/O Memory (2 of 4)

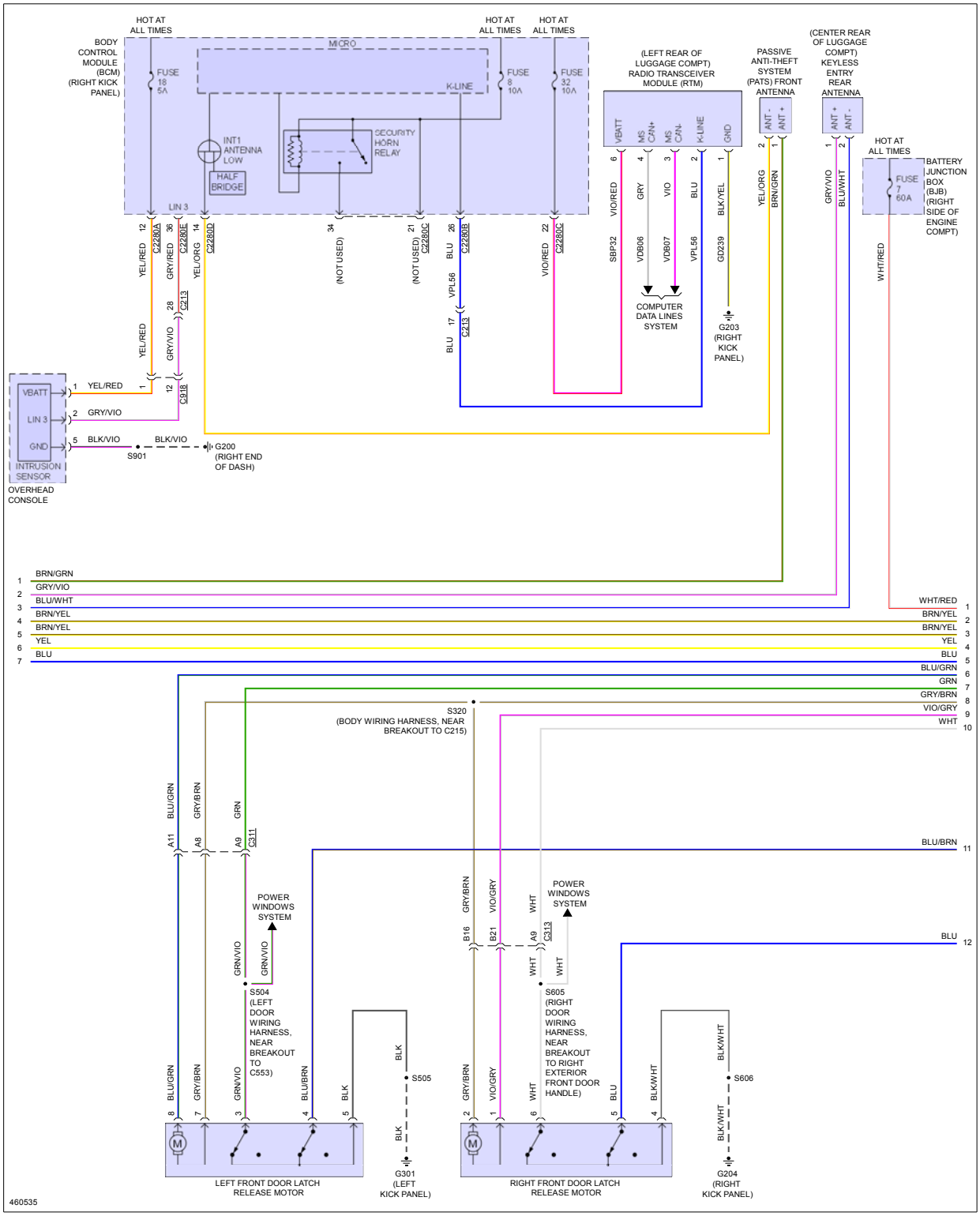


Fig 7: Power Door Locks Circuit, W/O Memory (3 of 4)

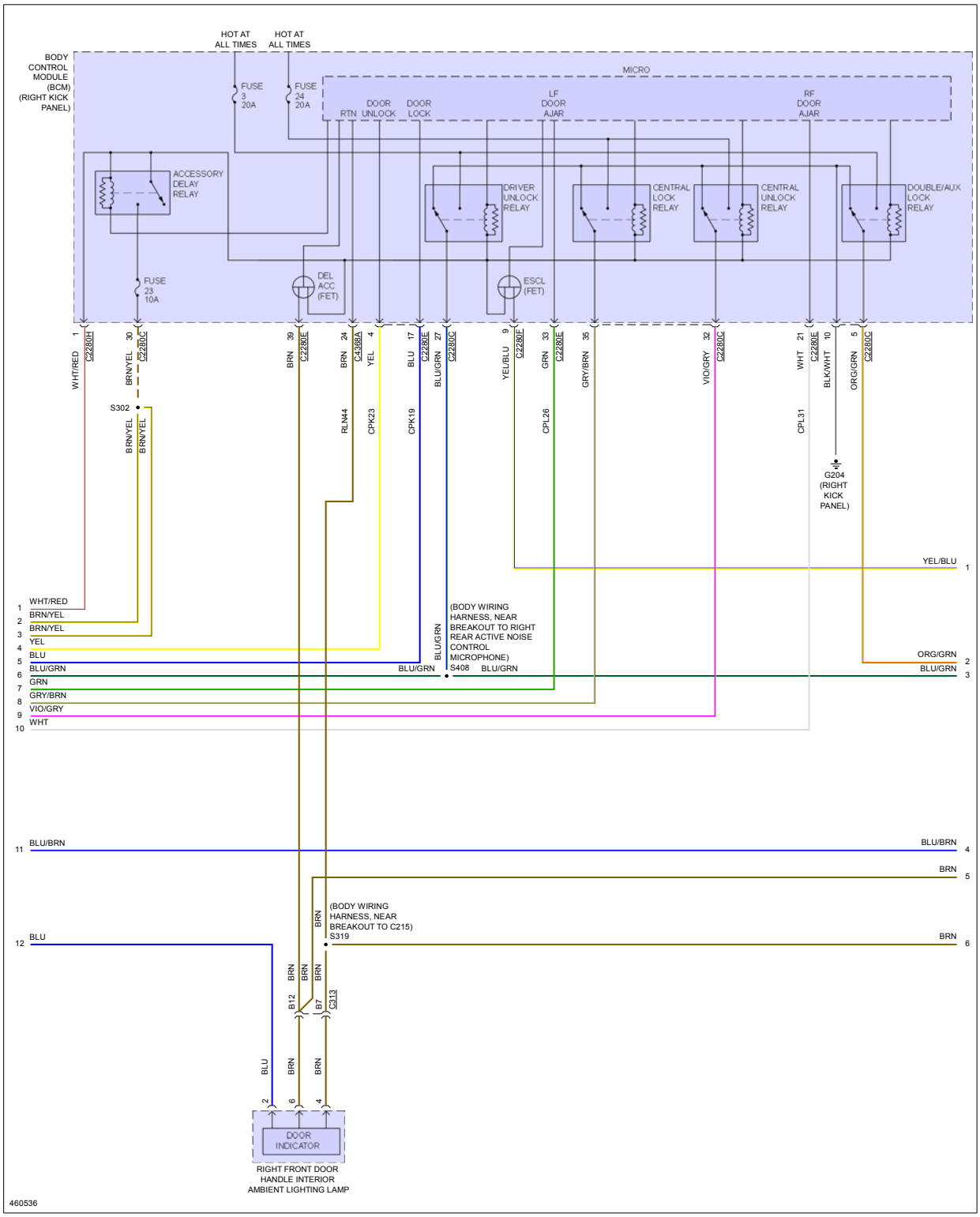
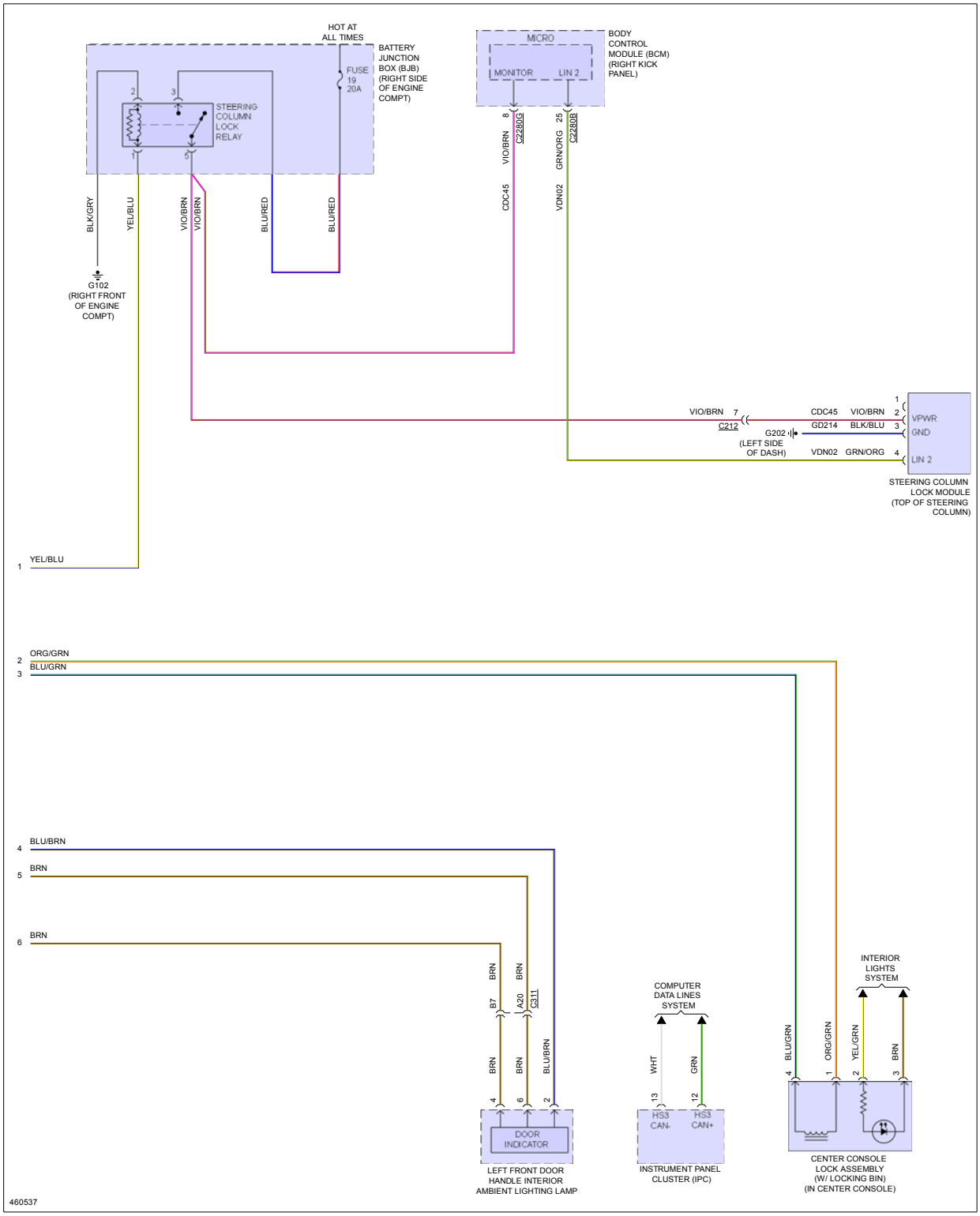


Fig 8: Power Door Locks Circuit, W/O Memory (4 of 4)



POWER MIRRORS

Fig 1: Electrochromic Mirror Circuit

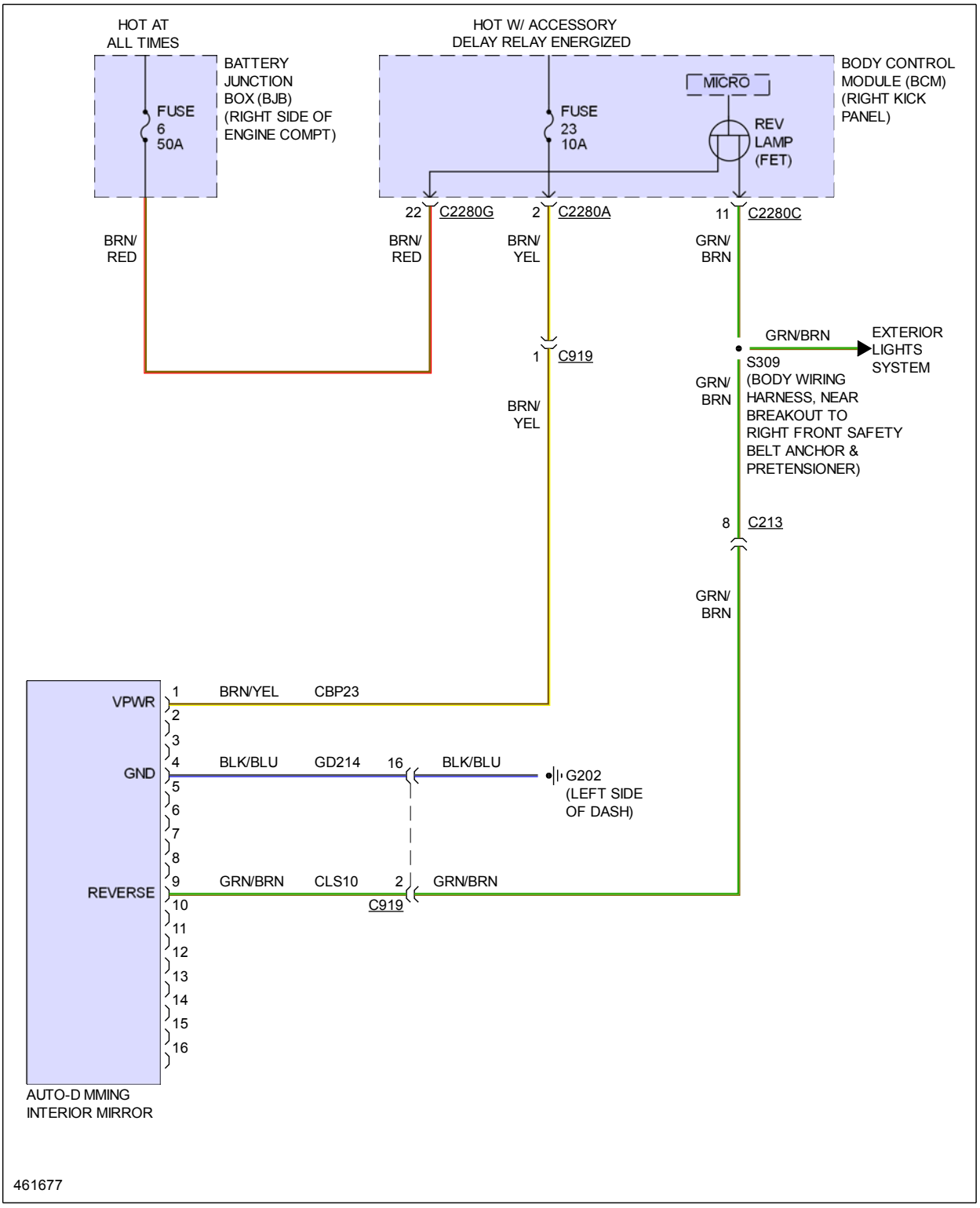
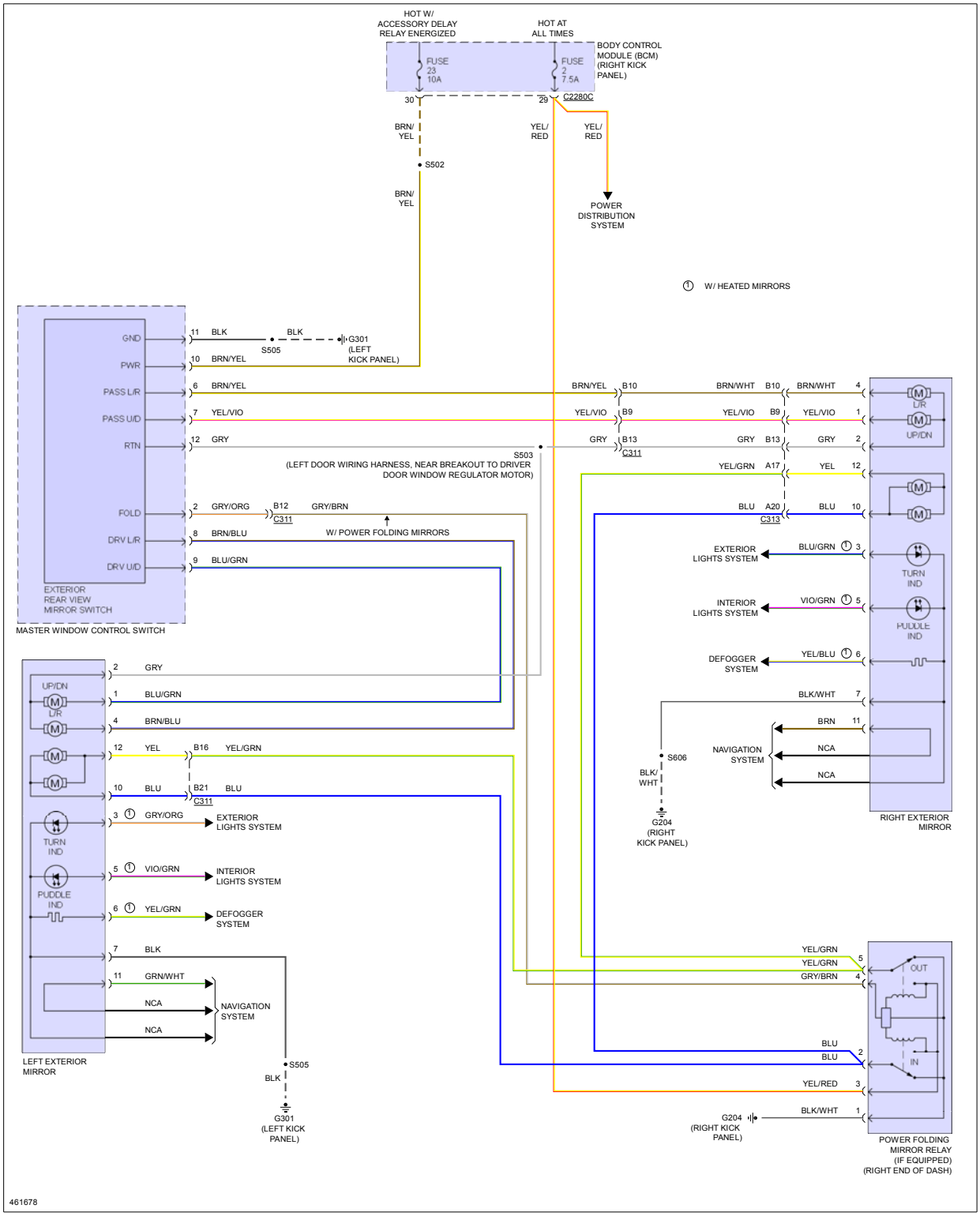


Fig 2: Power Mirrors Circuit



POWER SEATS

Fig 1: Climate Control Seats Circuit

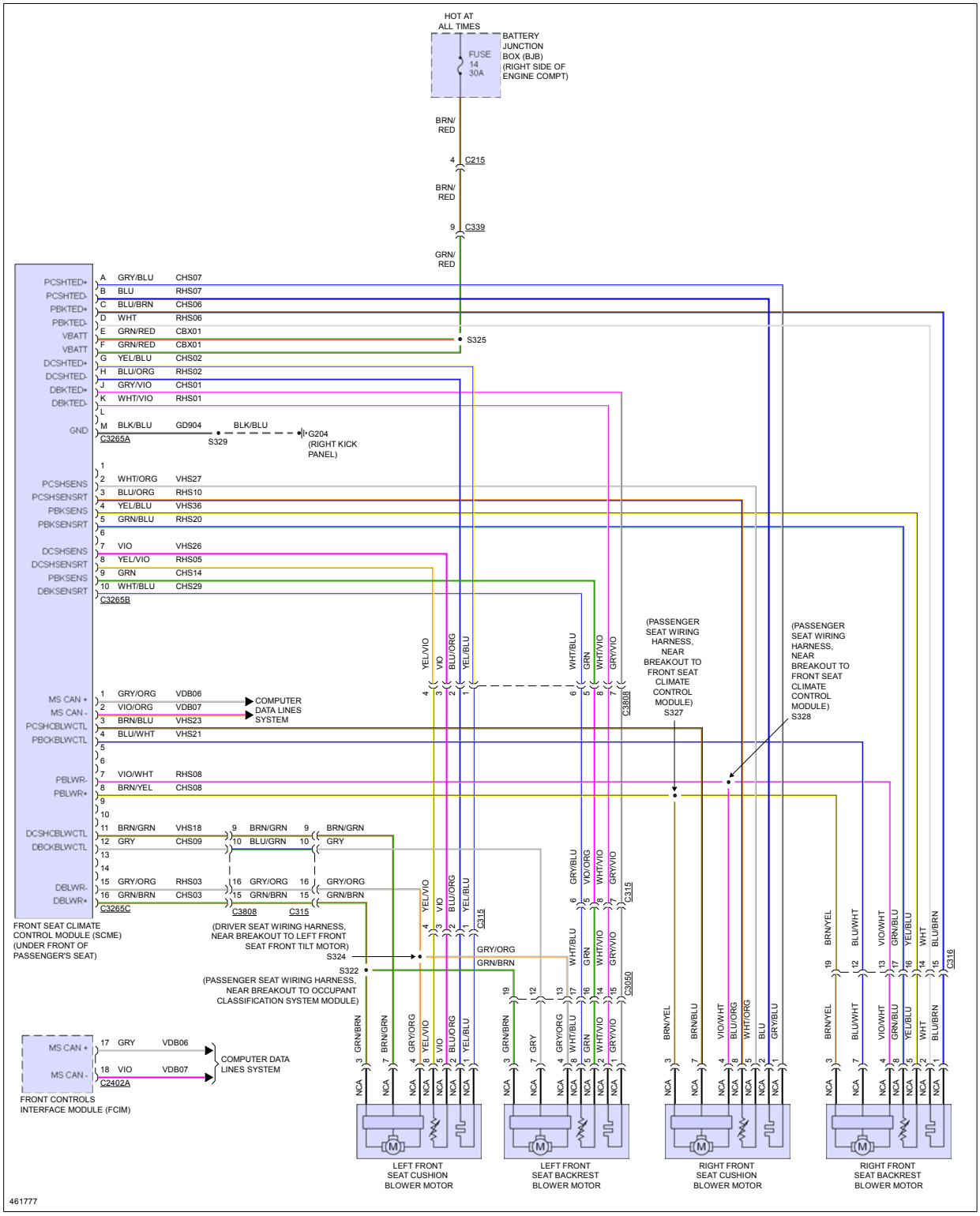


Fig 2: Power Seats Circuit, 6-Way passenger Seat

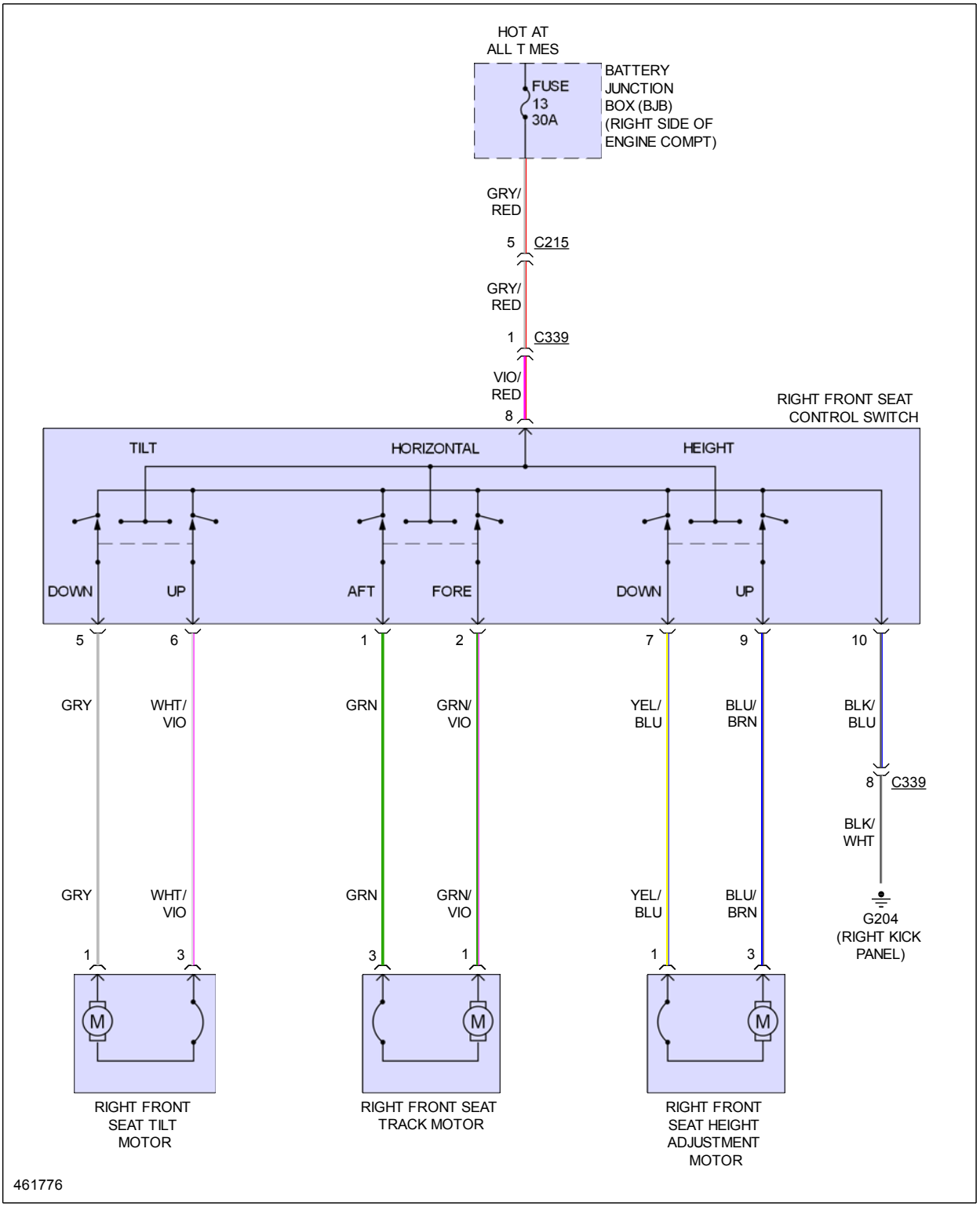
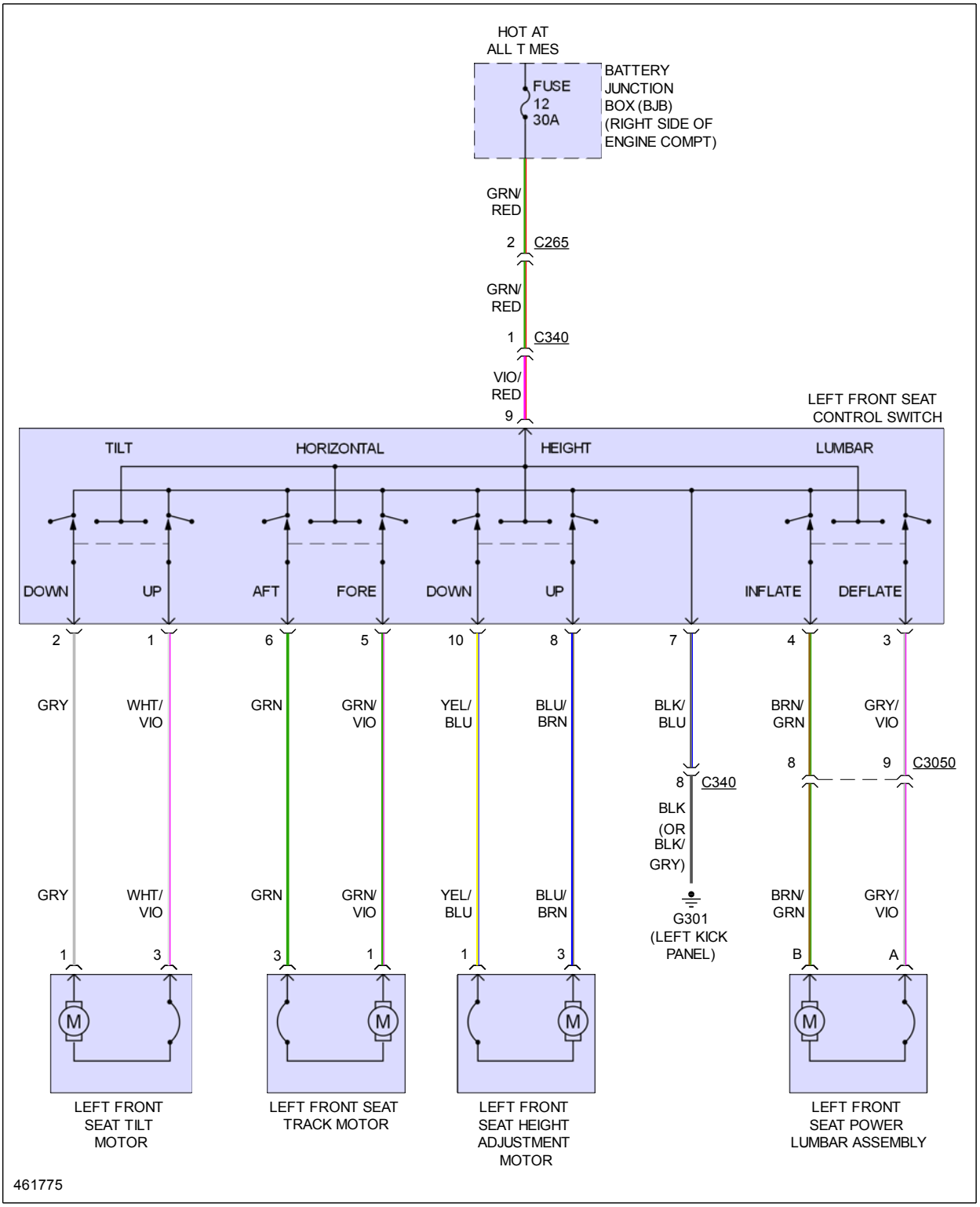
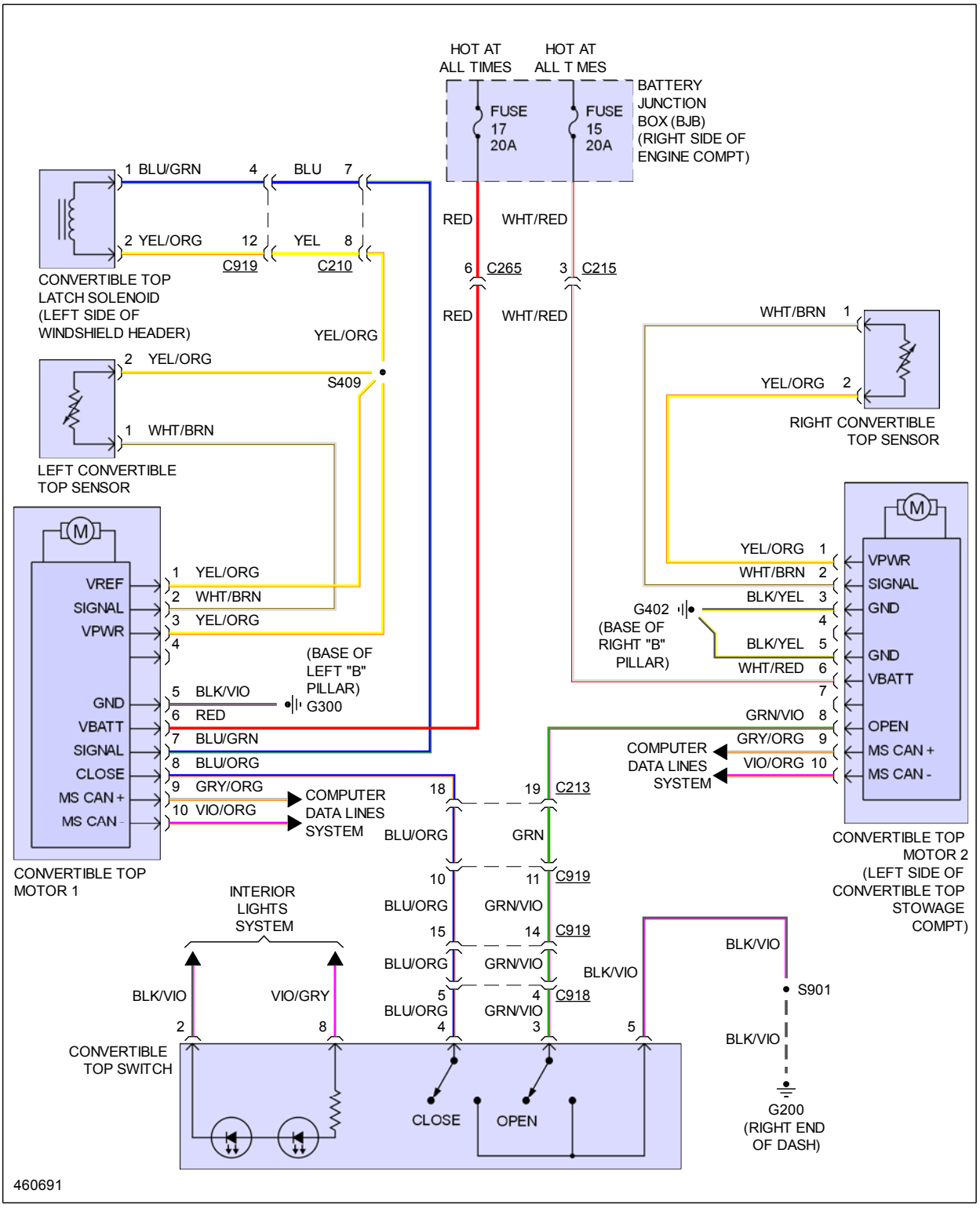


Fig 3: Power Seats Circuit, 8-Way Driver Seat



POWER TOP/SUNROOF

Fig 1: Power Top/Sunroof Circuit



POWER WINDOWS

Fig 1: Power Windows Circuit, W/ Memory (1 of 2)

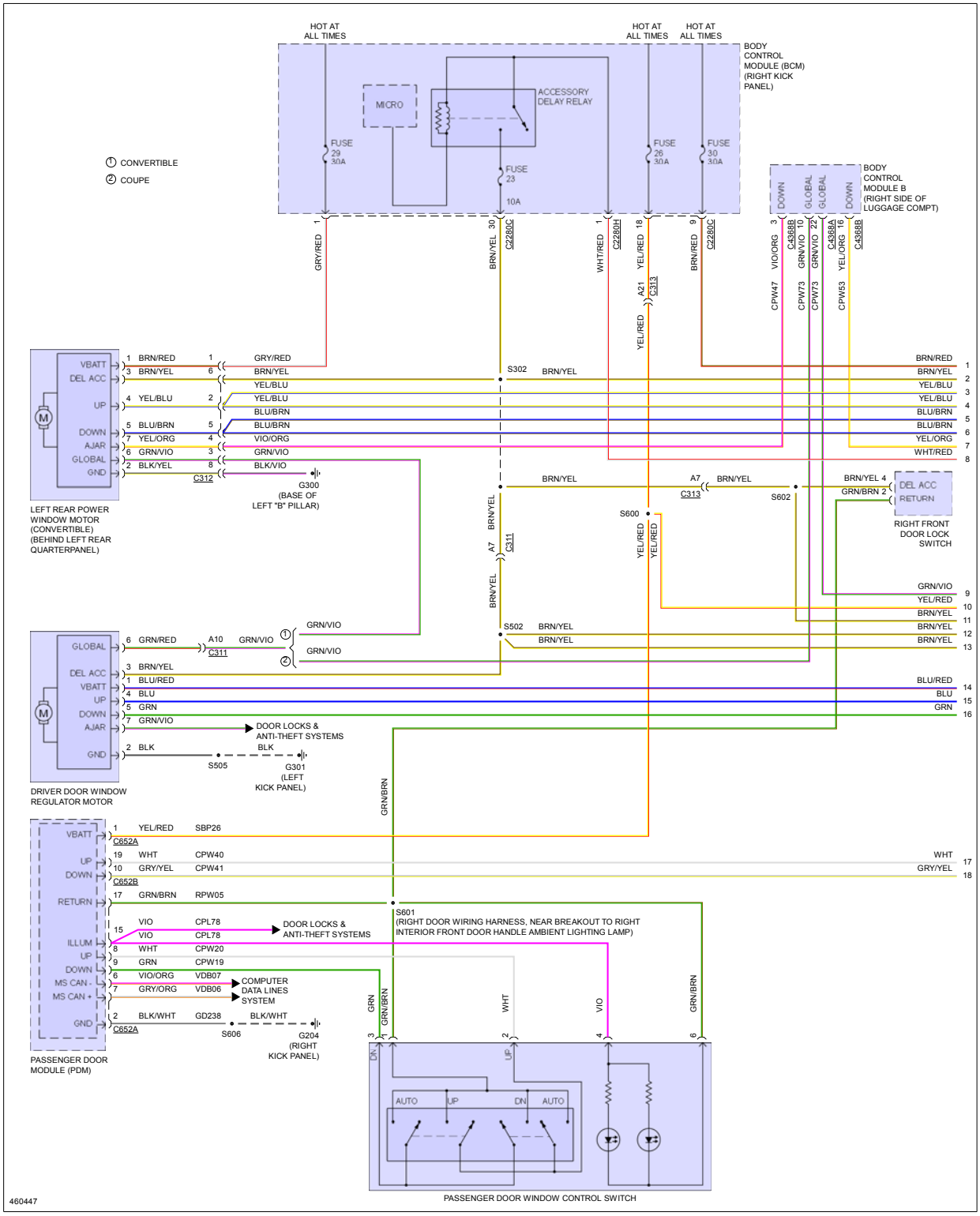


Fig 2: Power Windows Circuit, W/ Memory (2 of 2)

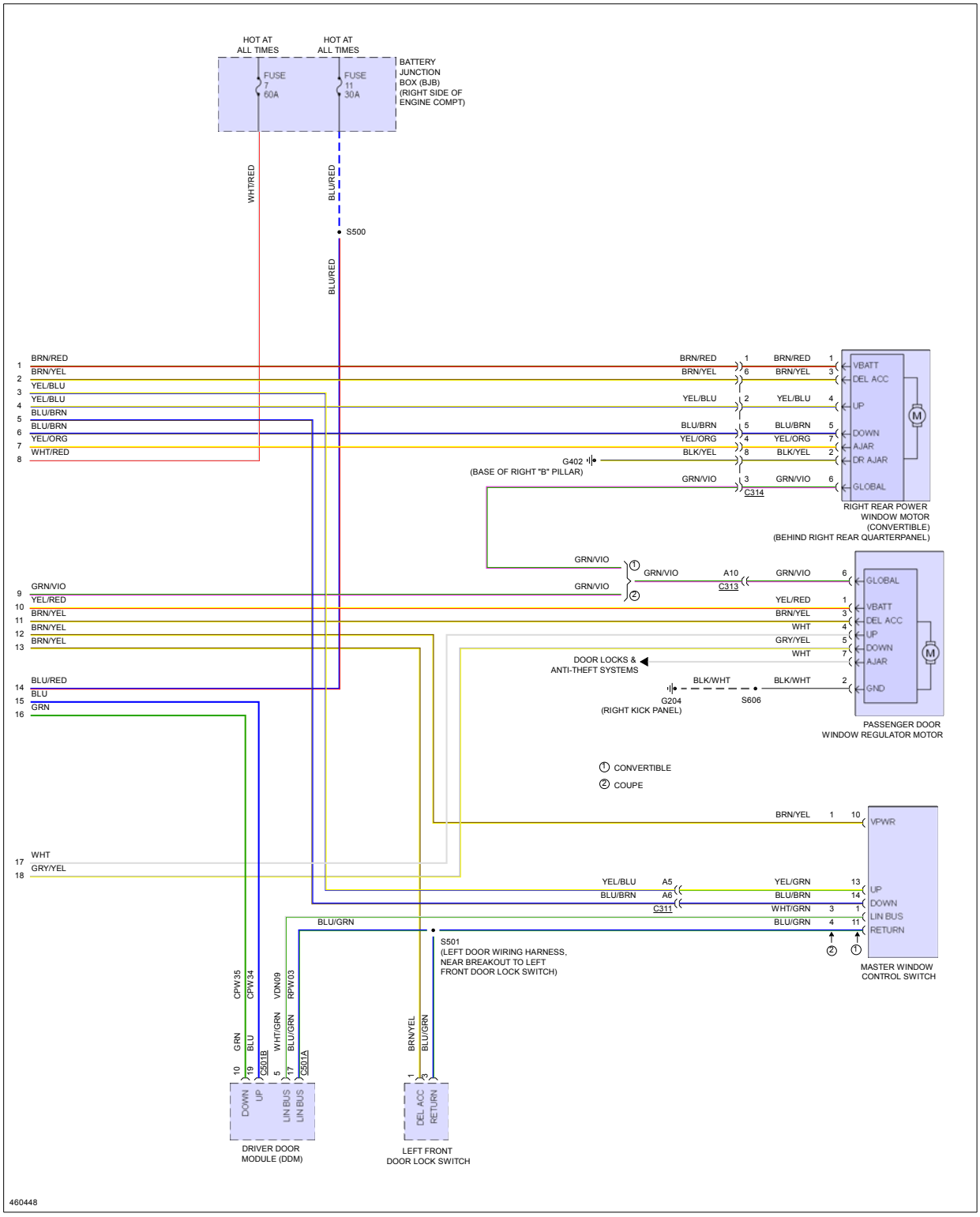


Fig 3: Power Windows Circuit, W/O Memory (1 of 2)

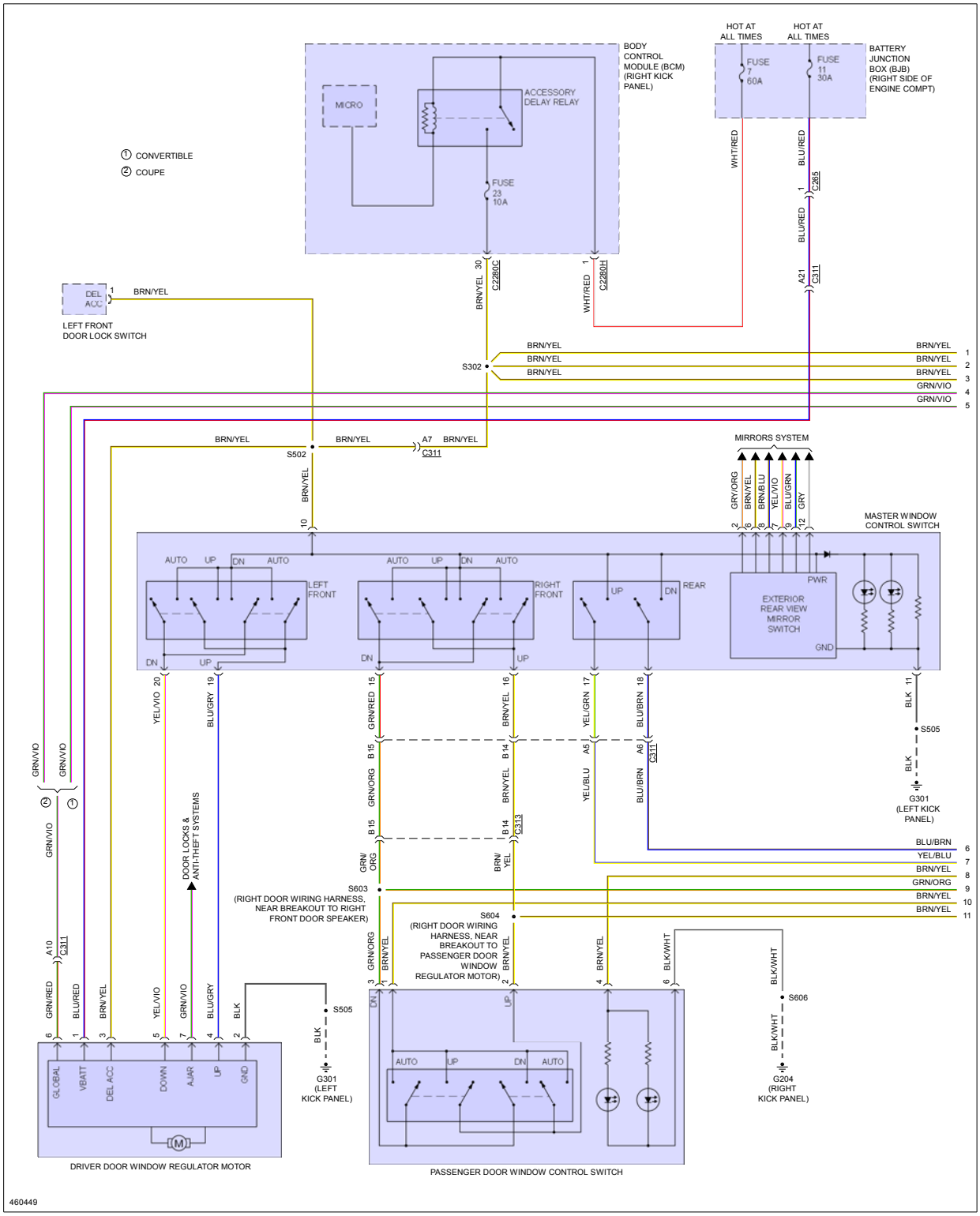
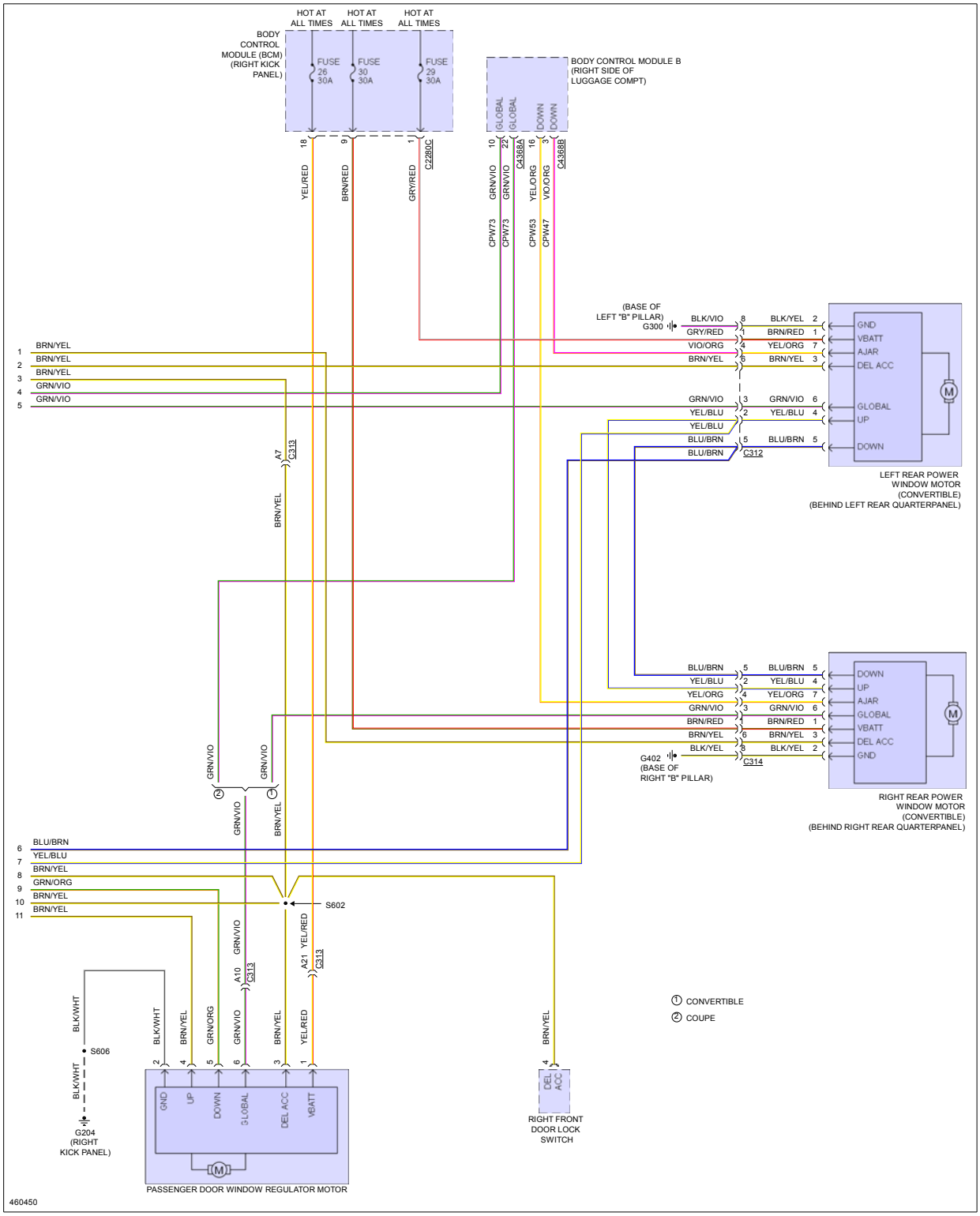


Fig 4: Power Windows Circuit, W/O Memory (2 of 2)



RADIO

Fig 1: Radio Circuit, W/ Touch Screen (1 of 4)

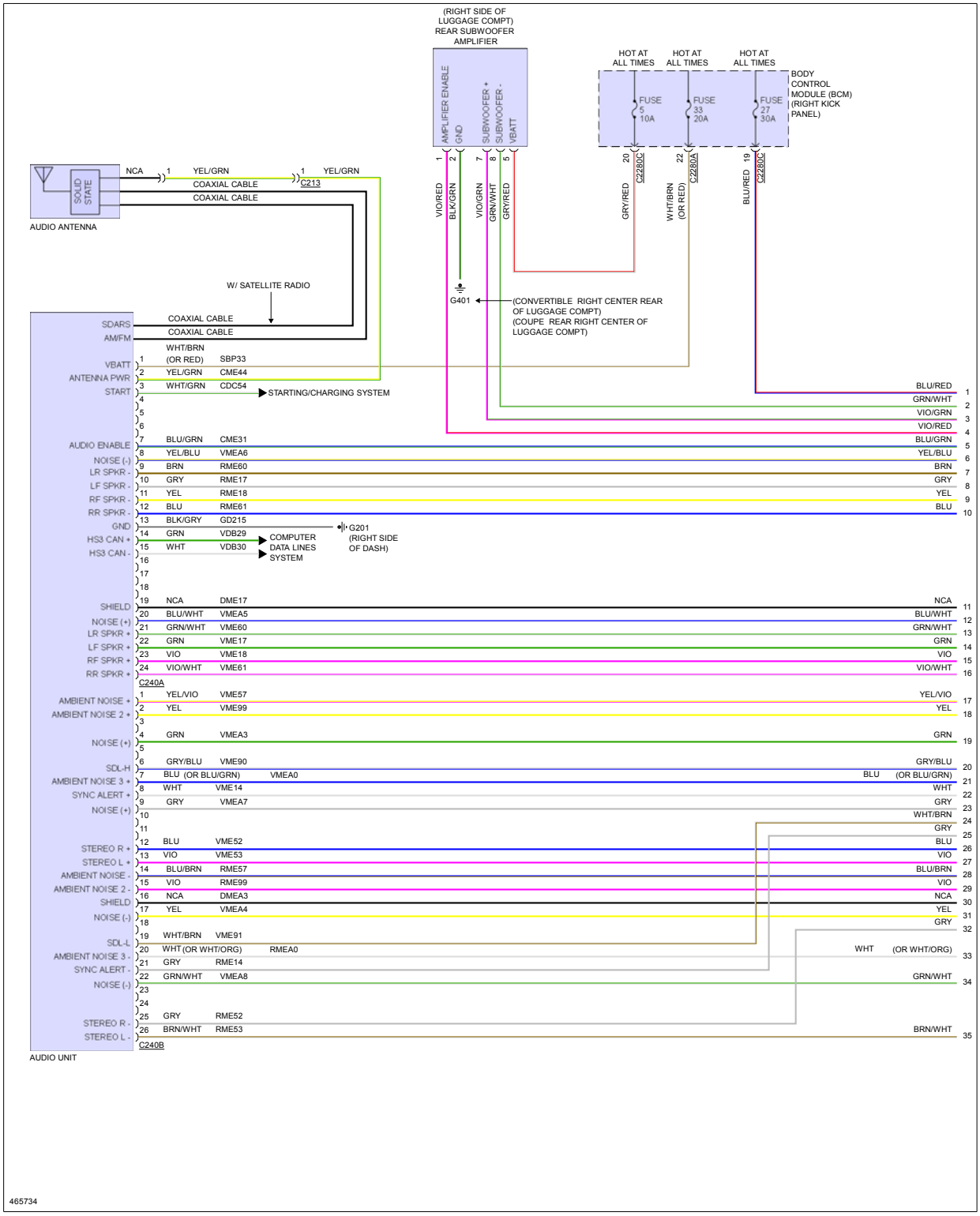


Fig 2: Radio Circuit, W/ Touch Screen (2 of 4)

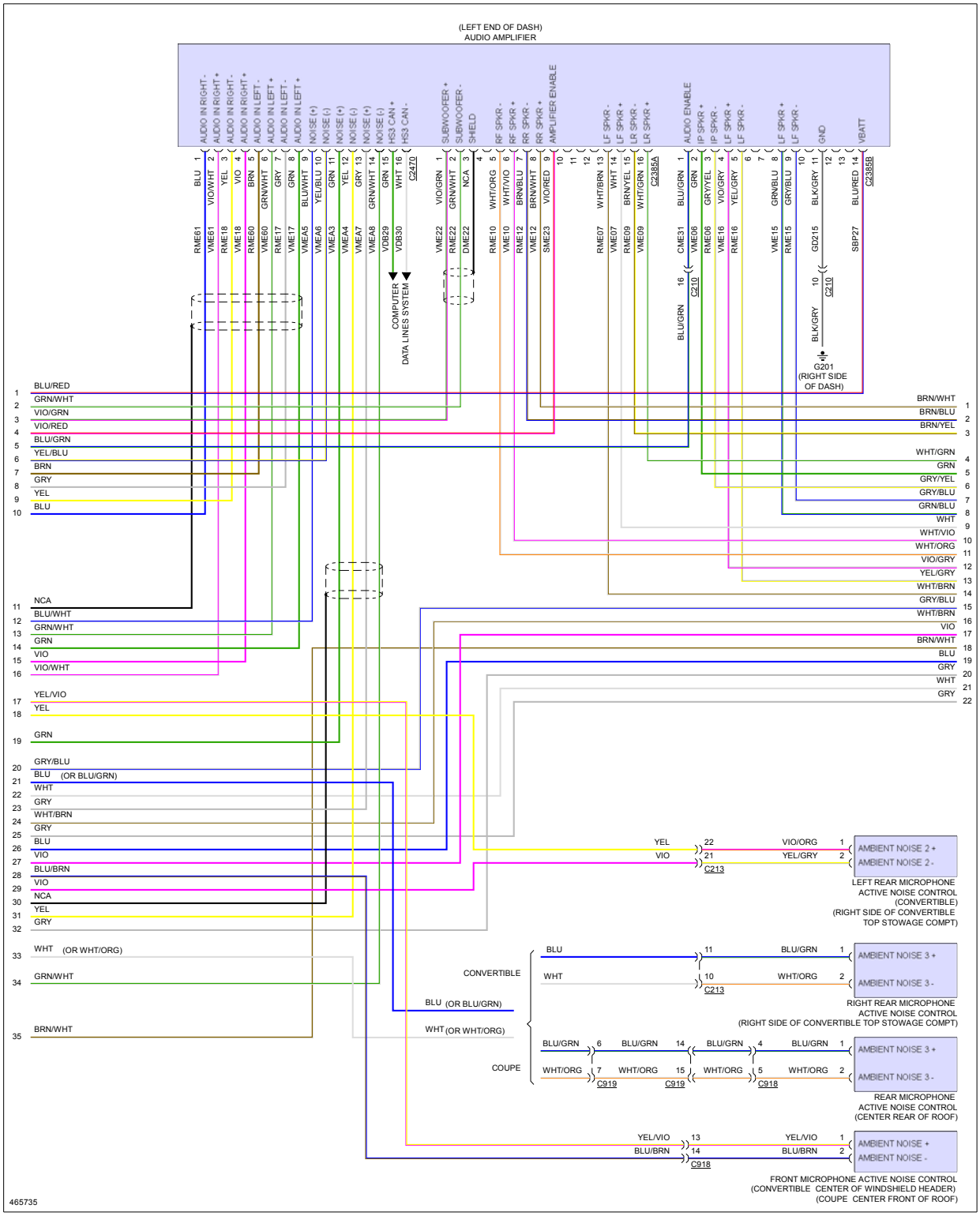


Fig 3: Radio Circuit, W/ Touch Screen (3 of 4)

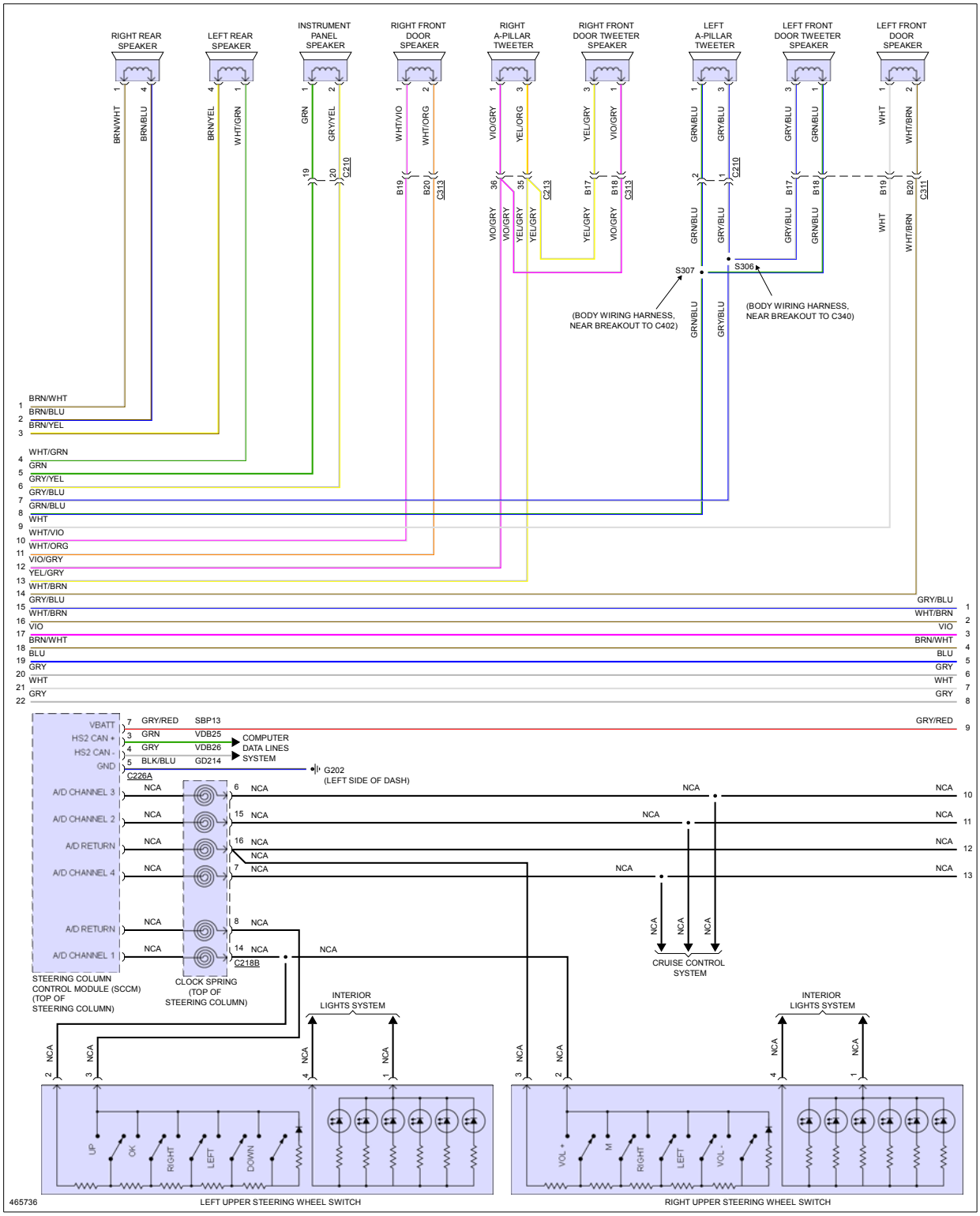


Fig 4: Radio Circuit, W/ Touch Screen (4 of 4)

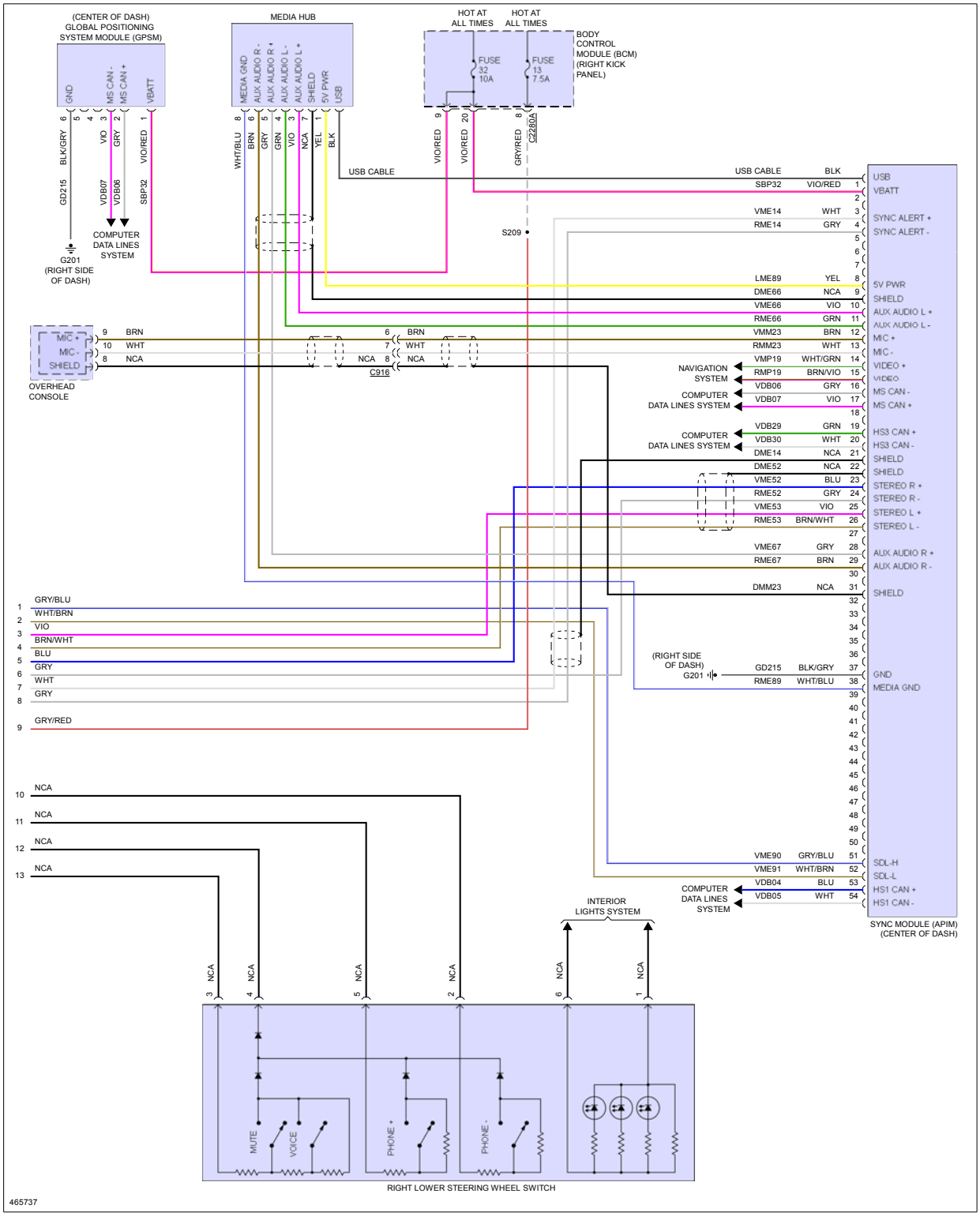


Fig 5: Radio Circuit, W/O Touch Screen (1 of 4)

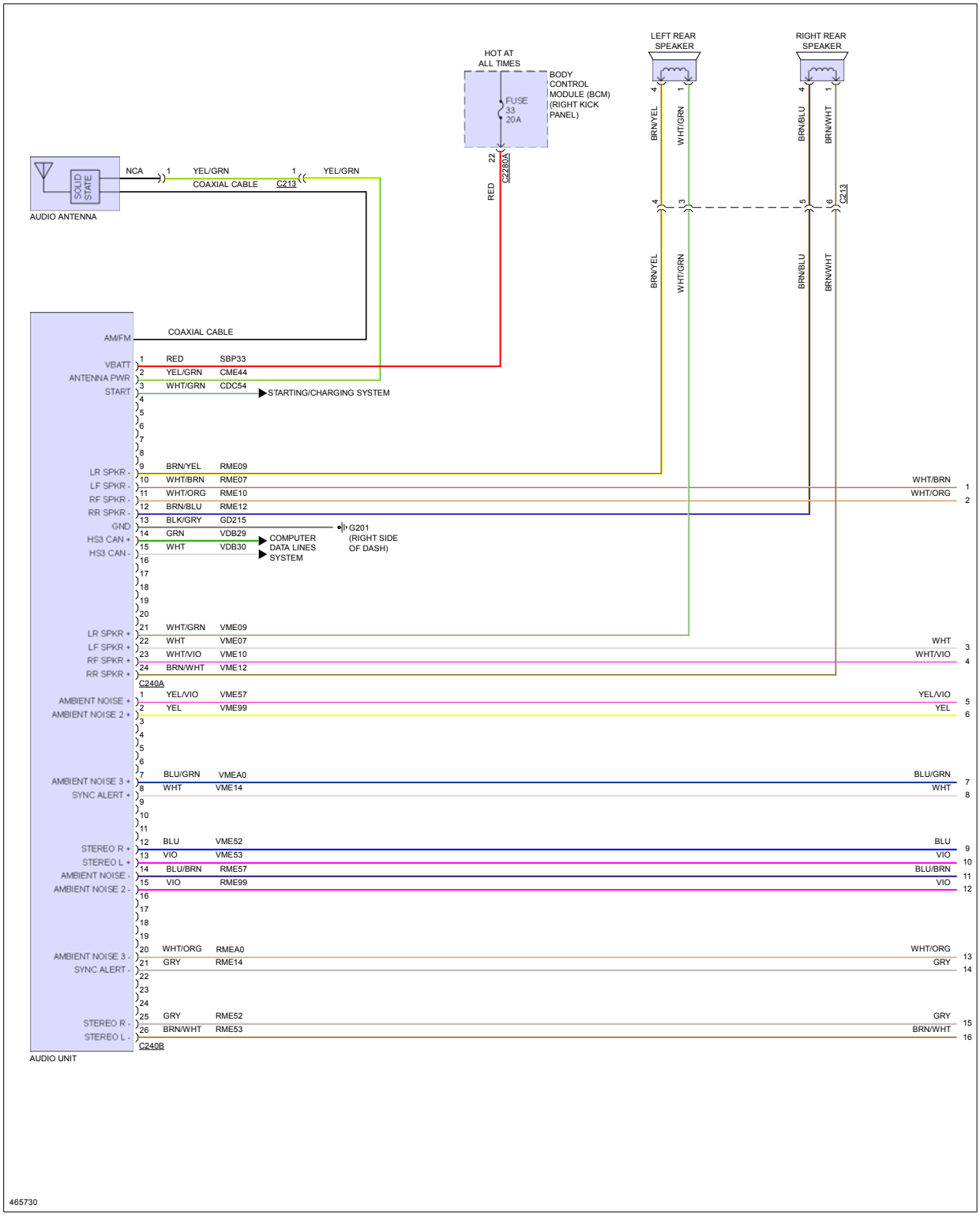


Fig 6: Radio Circuit, W/O Touch Screen (2 of 4)

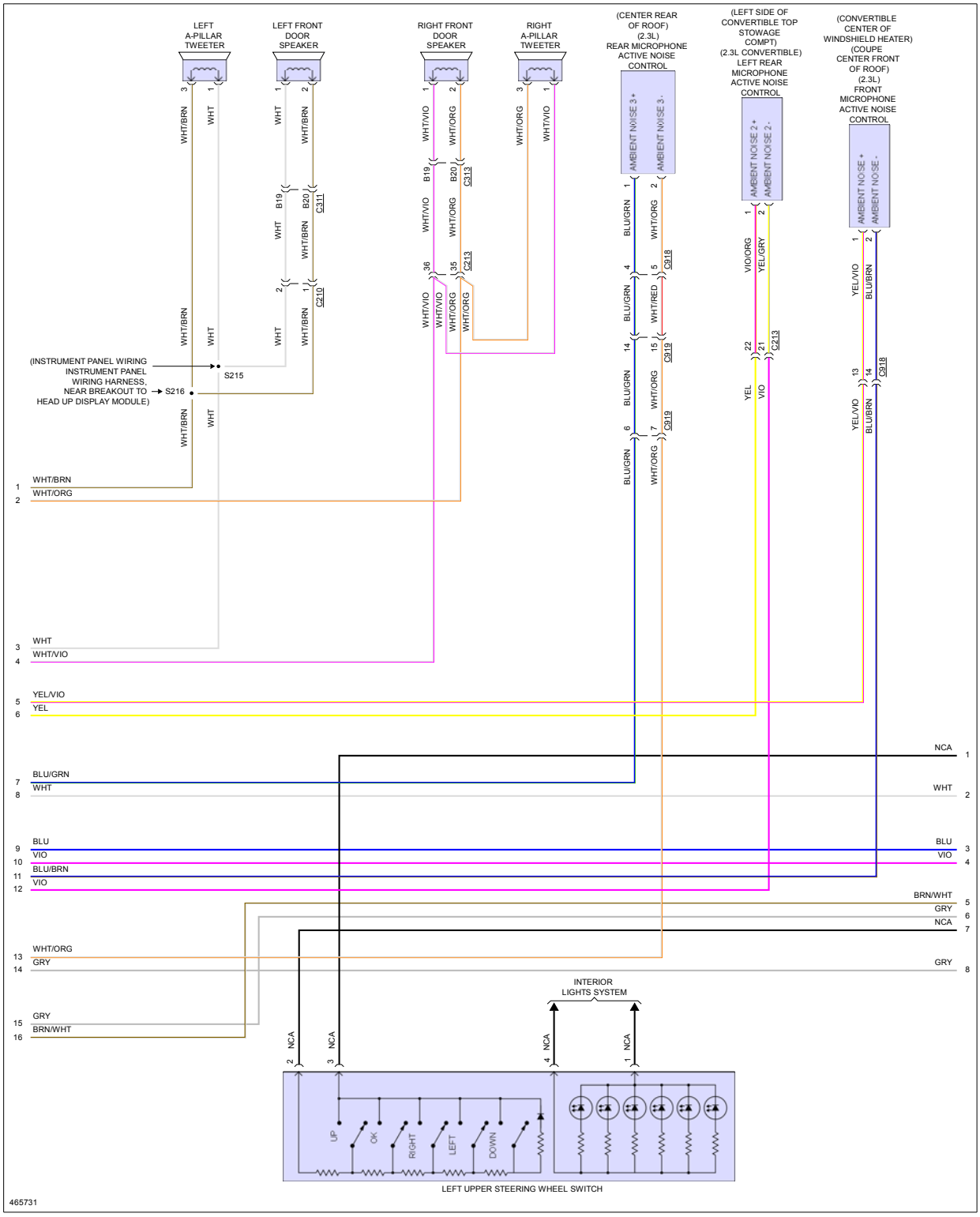


Fig 7: Radio Circuit, W/O Touch Screen (3 of 4)

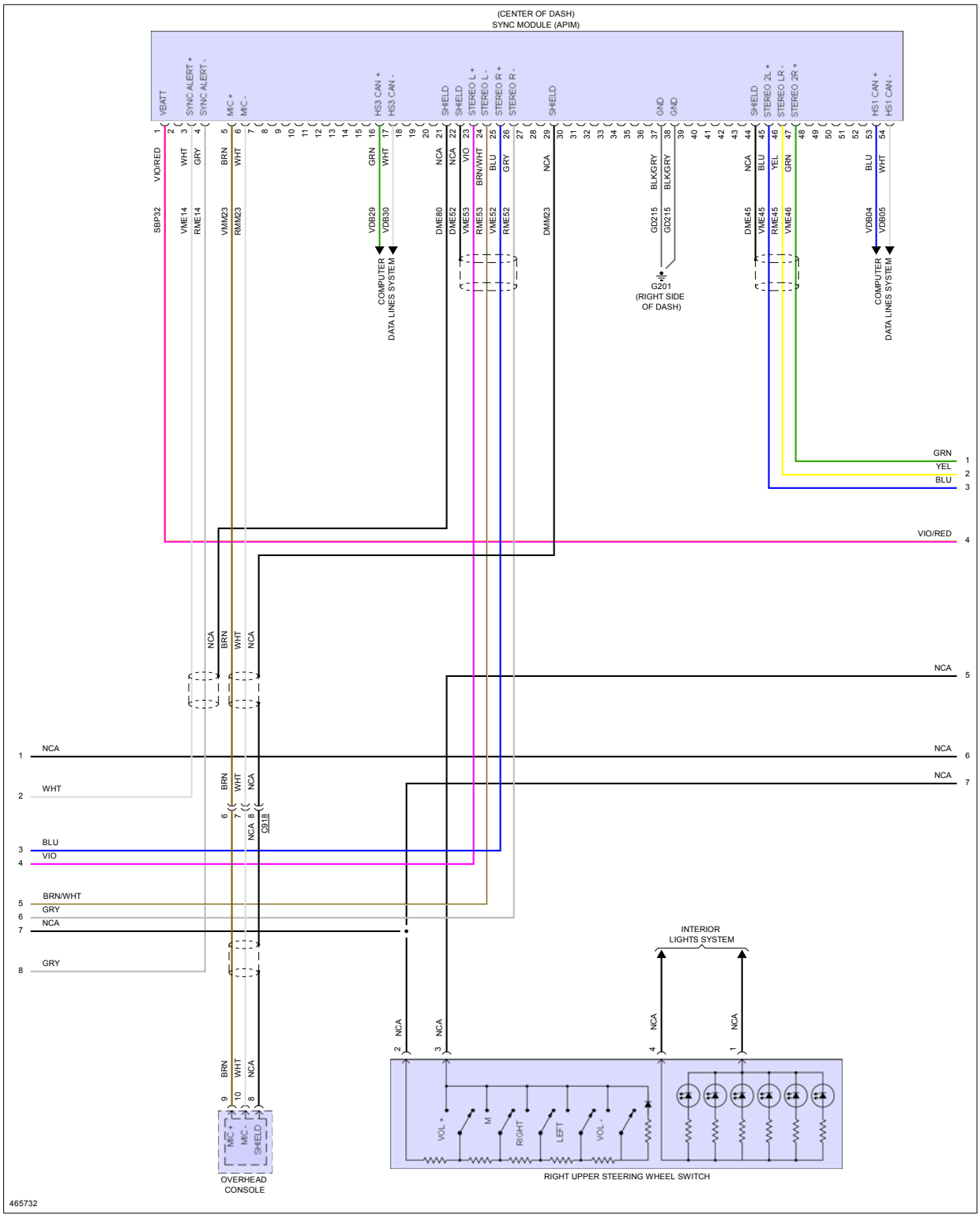
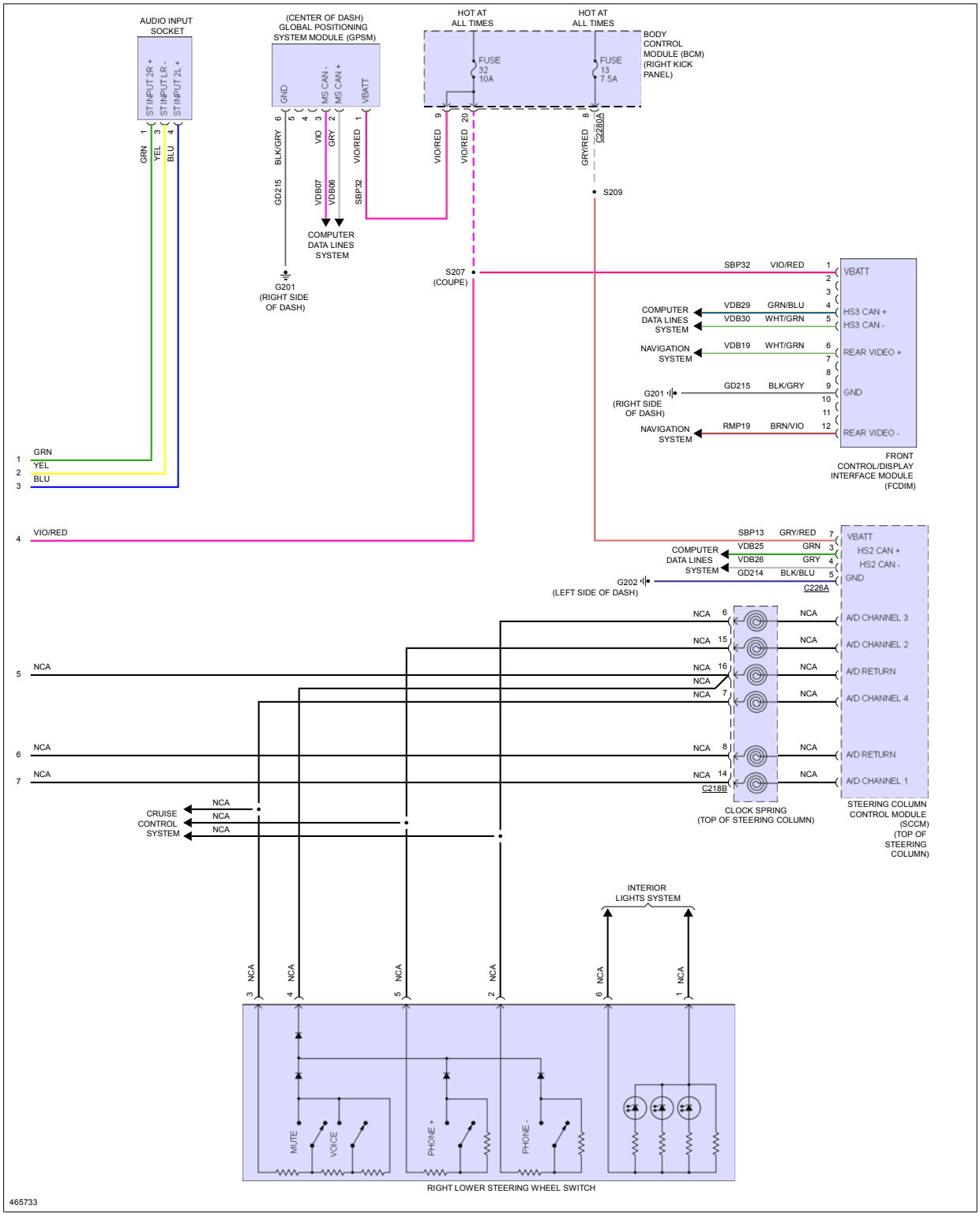
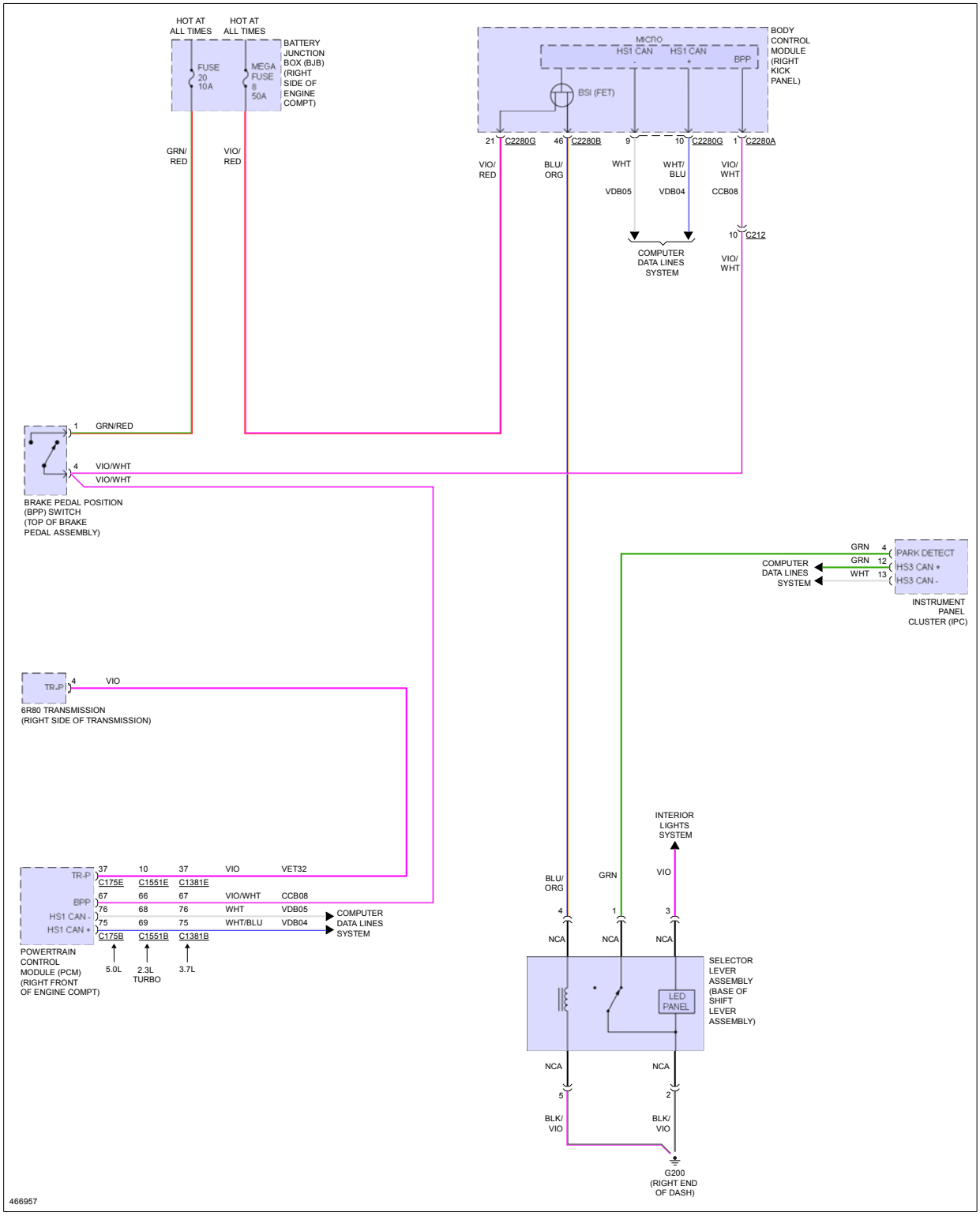


Fig 8: Radio Circuit, W/O Touch Screen (4 of 4)



SHIFT INTERLOCK

Fig 1: Shift Interlock Circuit



STARTING/CHARGING

Fig 1: Charging Circuit

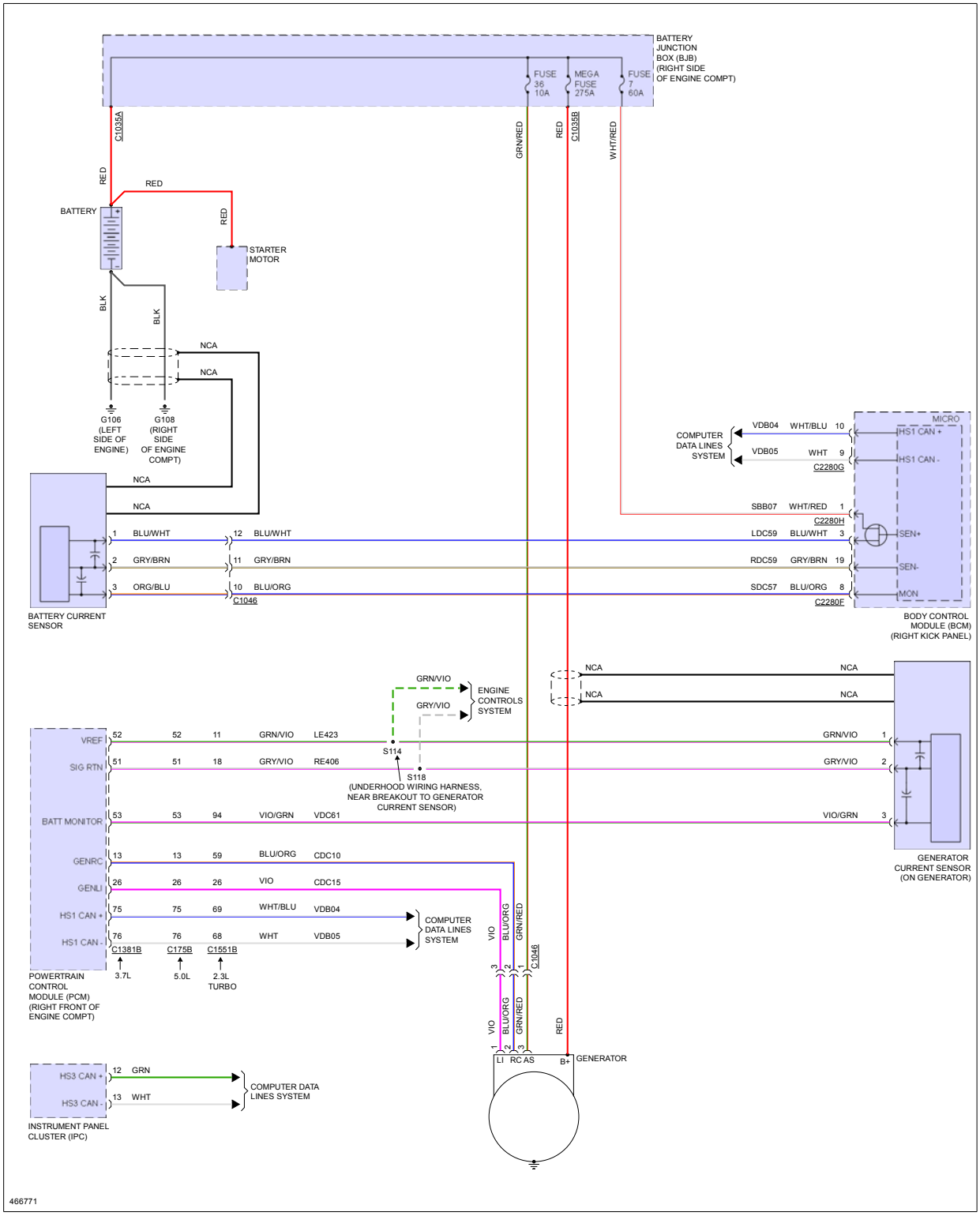
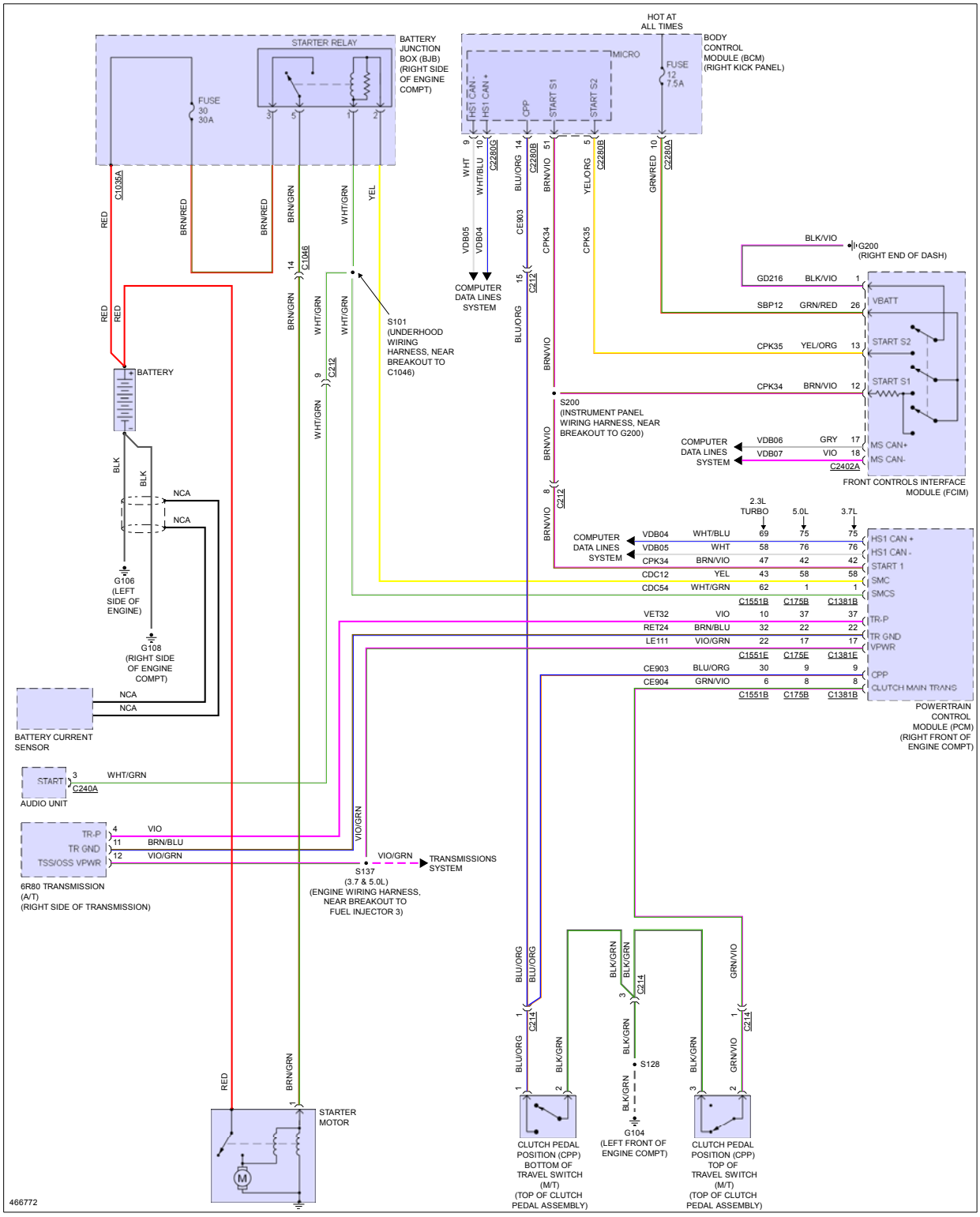


Fig 2: Starting Circuit



SUPPLEMENTAL RESTRAINTS

Fig 1: Supplemental Restraints Circuit (1 of 3)

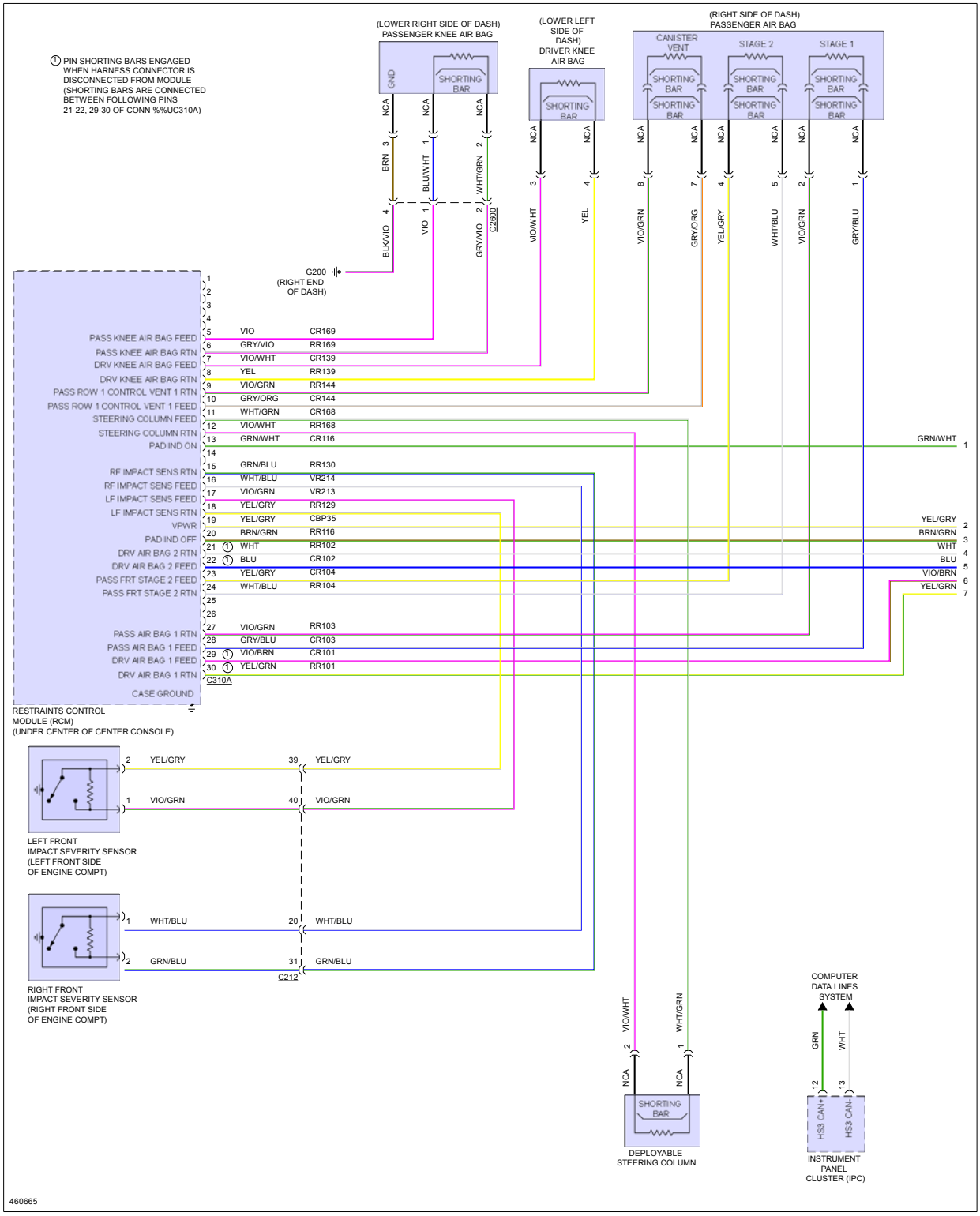


Fig 2: Supplemental Restraints Circuit (2 of 3)

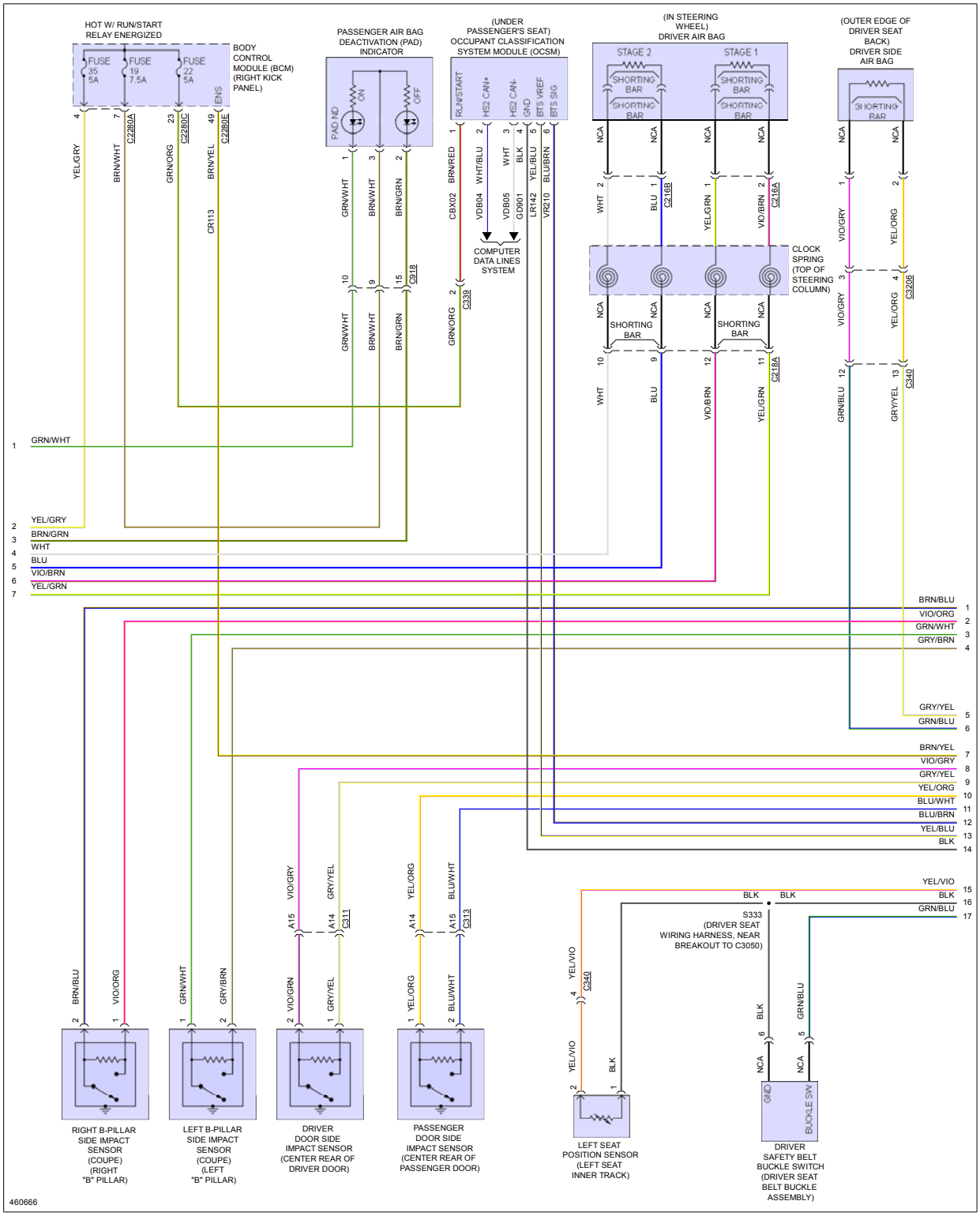
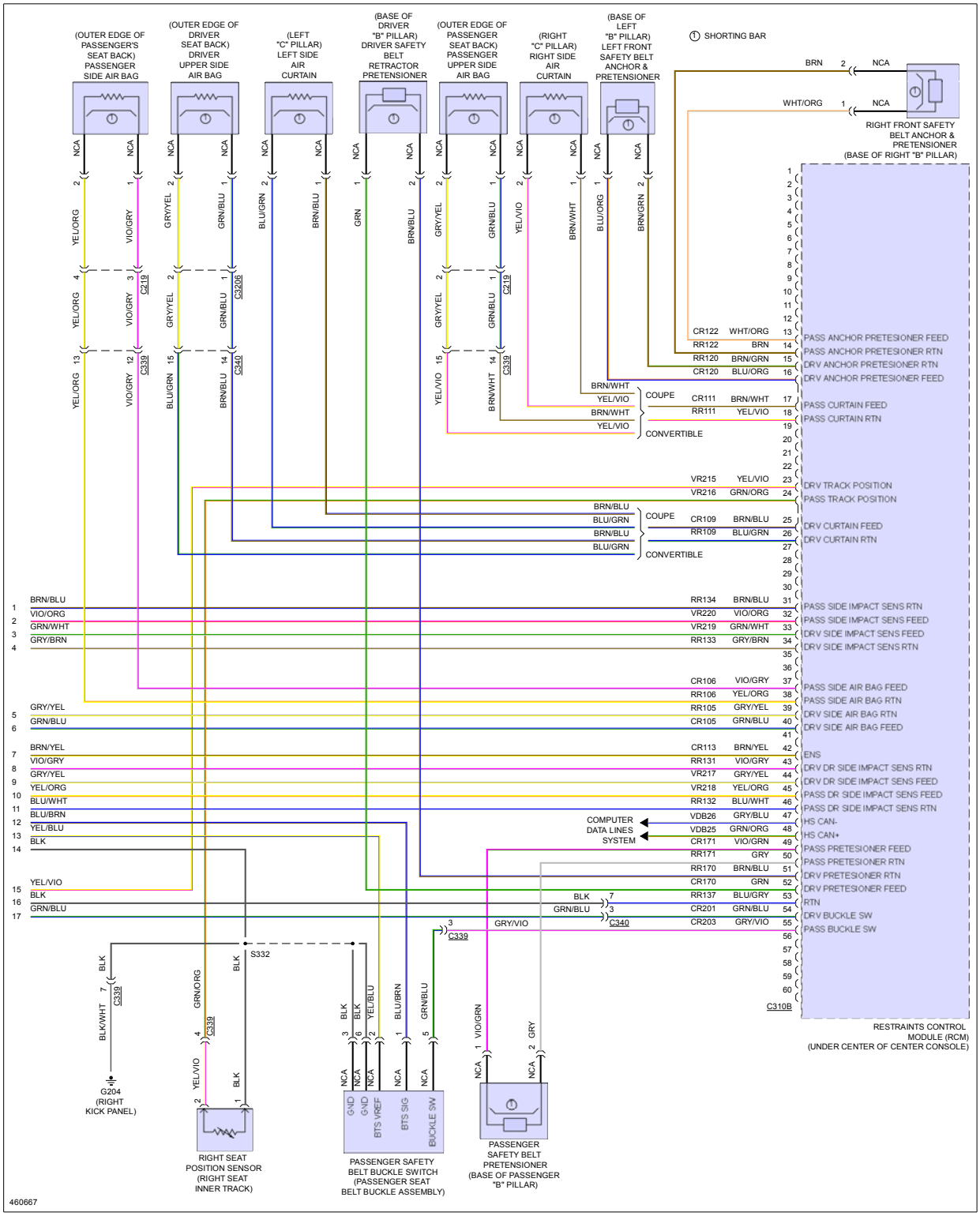


Fig 3: Supplemental Restraints Circuit (3 of 3)



TRANSMISSION

Fig 1: Transmission Circuit (1 of 2)

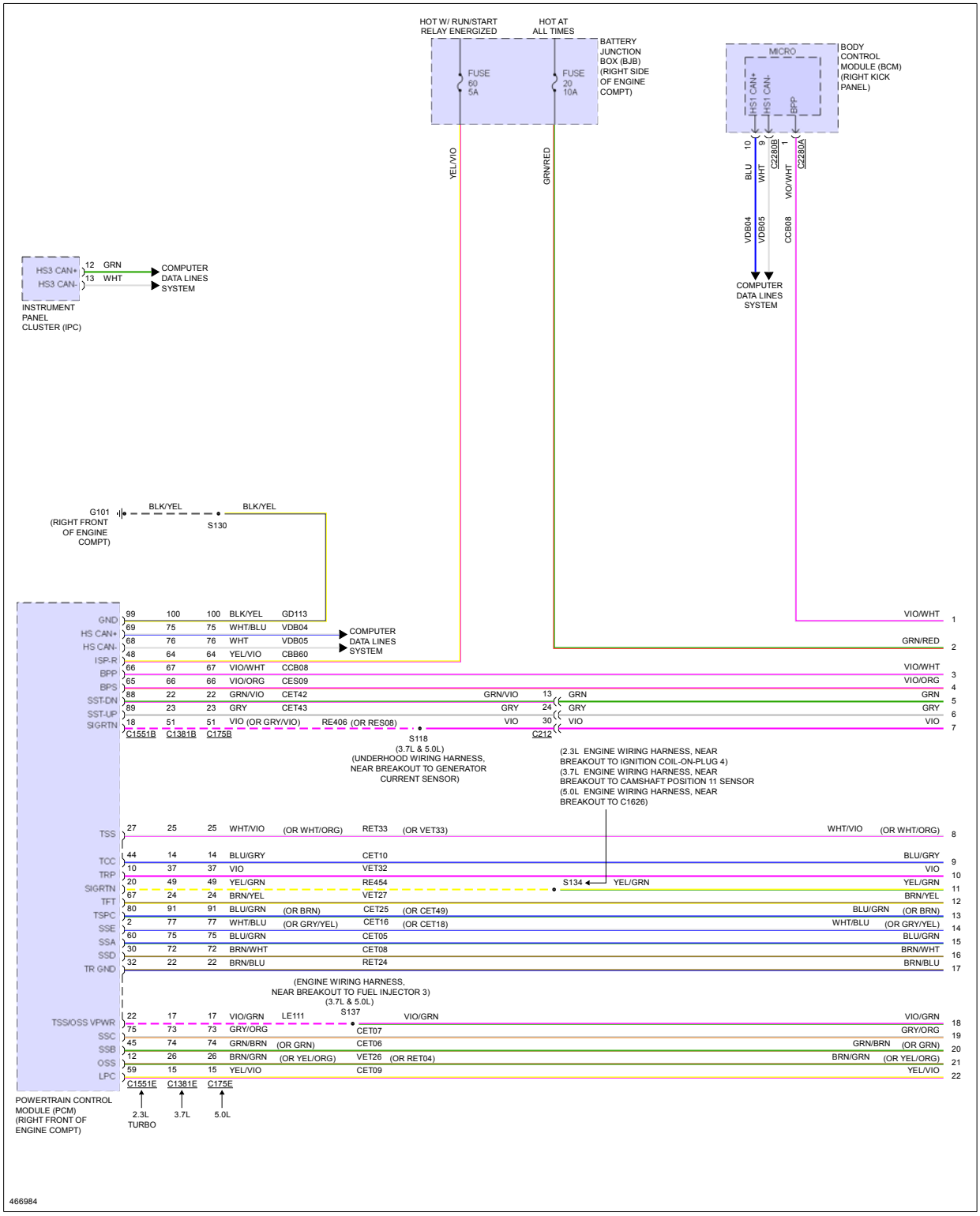
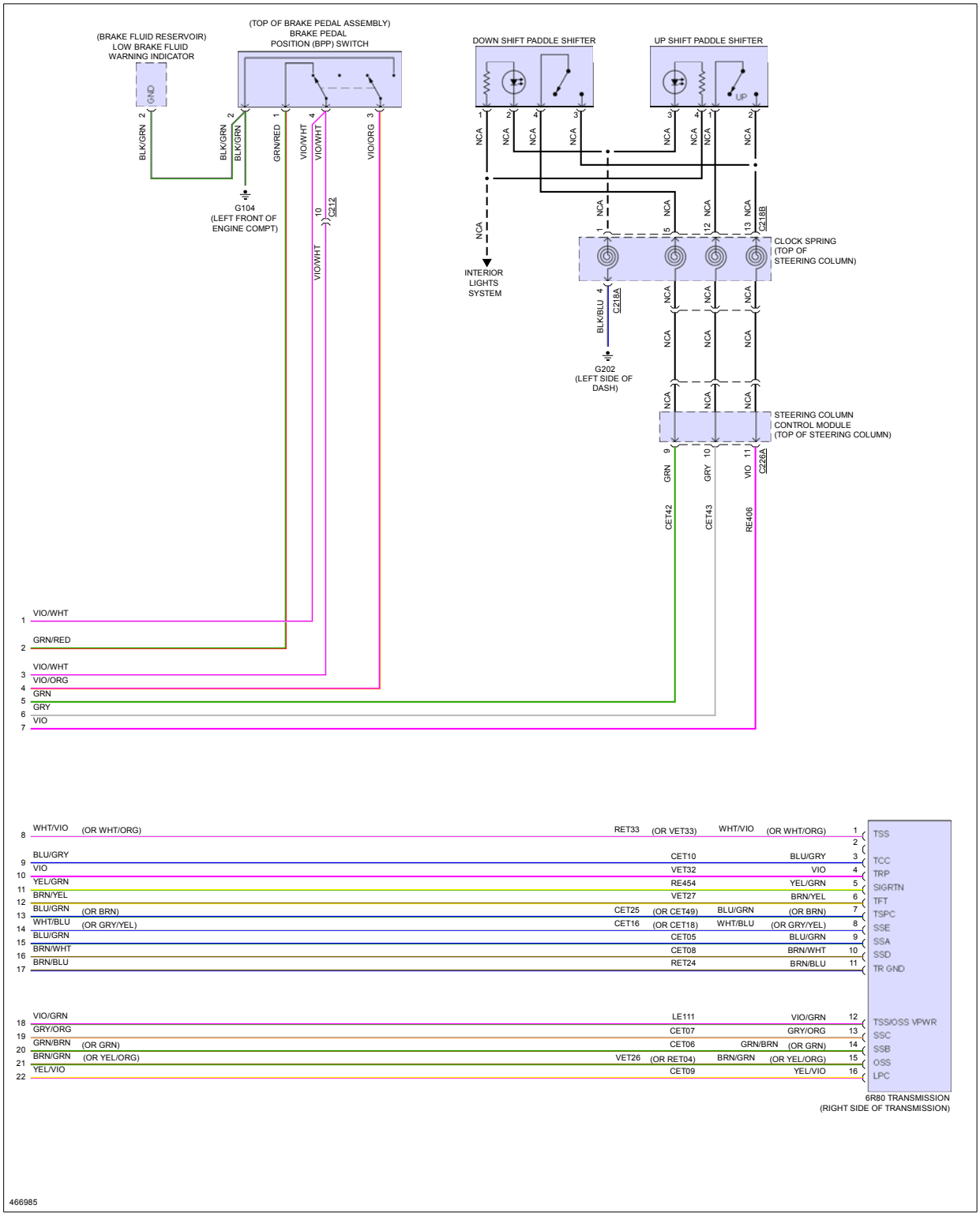
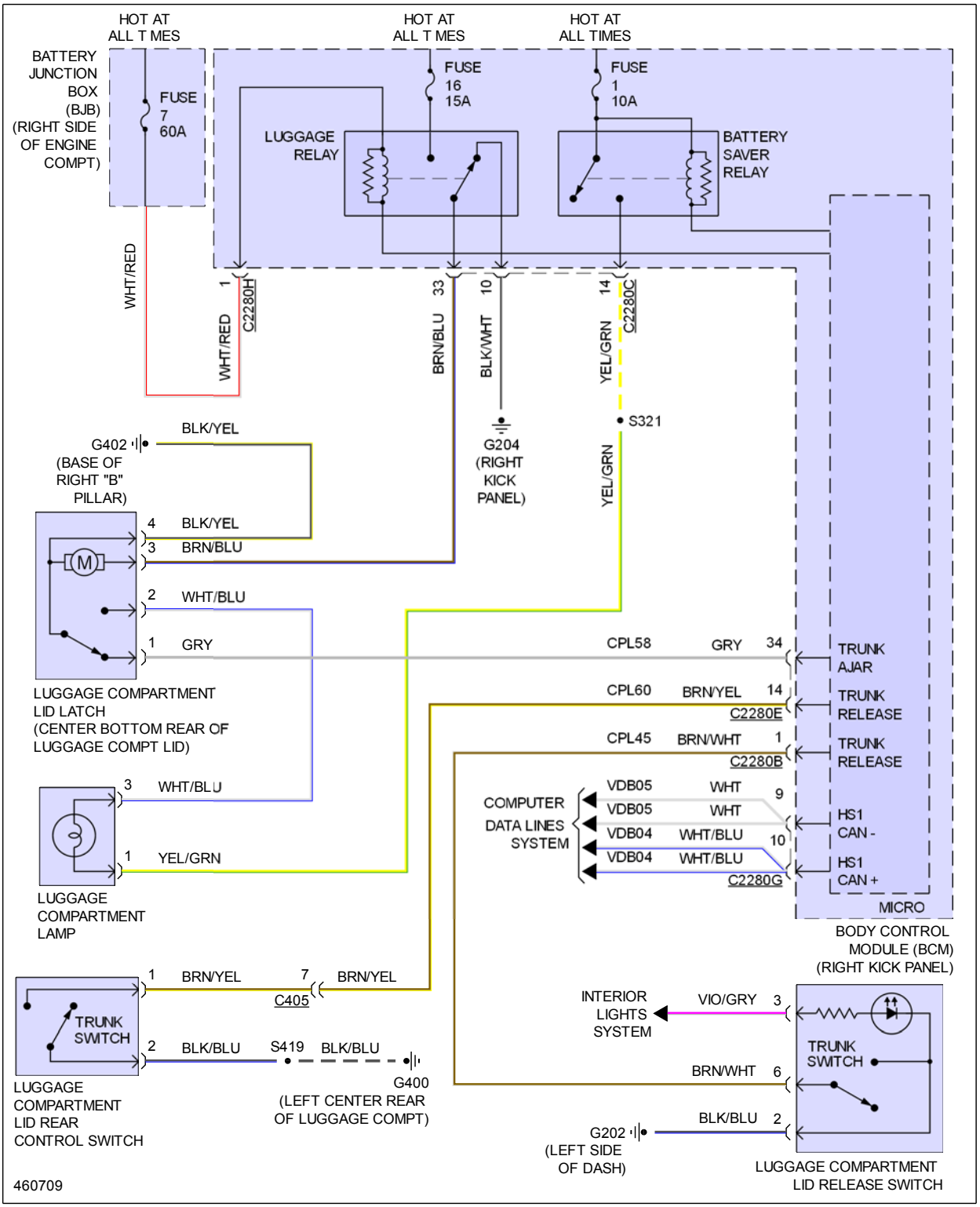


Fig 2: Transmission Circuit (2 of 2)



TRUNK, TAILGATE, FUEL DOOR

Fig 1: Trunk Release Circuit



WARNING SYSTEMS

Fig 1: Chime Circuit

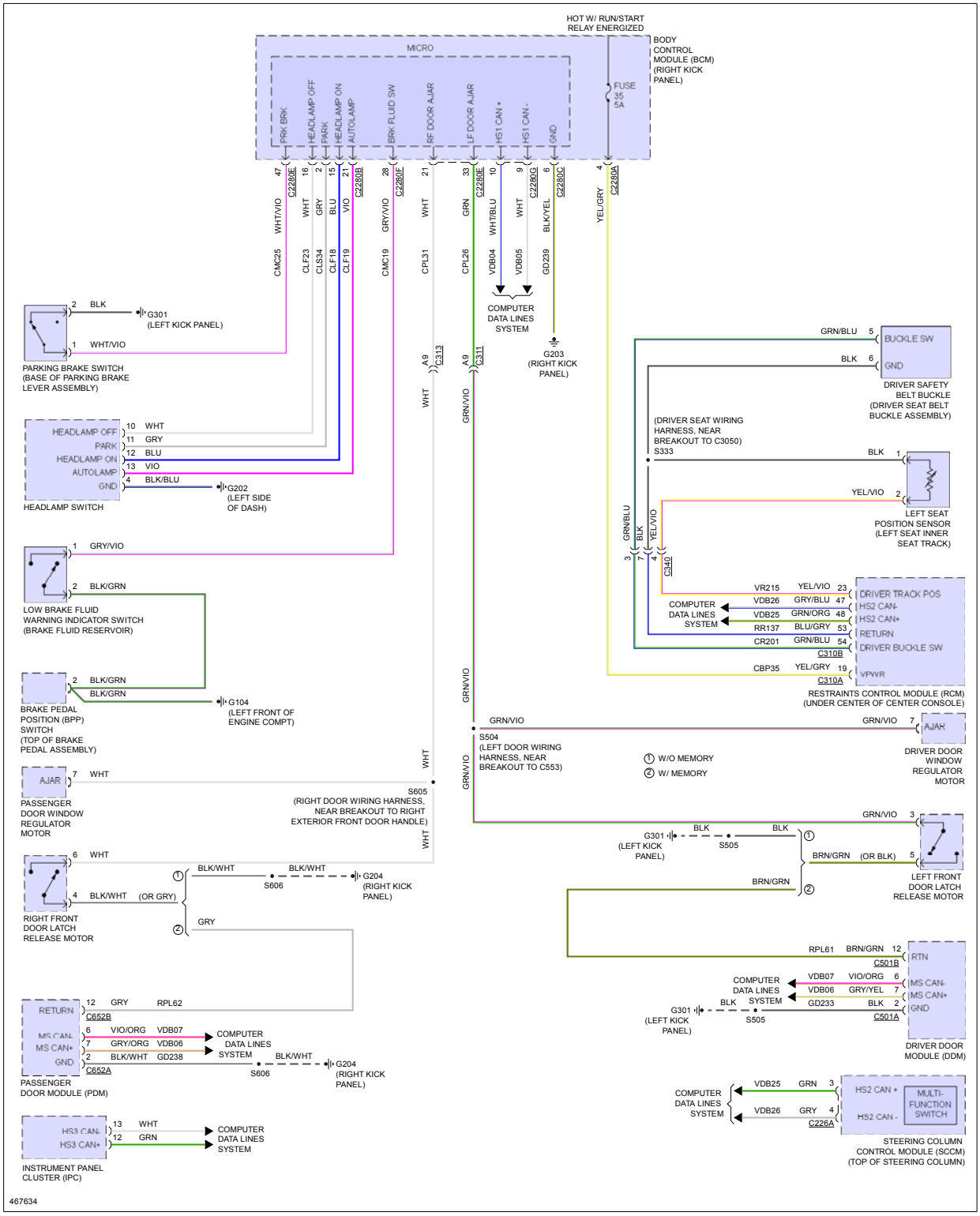


Fig 2: Tire Pressure Monitoring Circuit

